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Industrial Hydraulic Valves

Directional Control, Pressure Control, Sandwich, Subplates & Manifolds, Accessories

Catalog HY14-2500/US

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

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Cat HY14-2500-frtcvr.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Directional Control Valves A

Sandwich Valves B

Subplates and Manifolds C

Pressure Control Valves D

Flow Control and Check Valves E

Wherever in the world machinery is designed, manufactured or used, Parker is there to meet your hydraulic application requirements – with a broad selection of hydraulic components, worldwide availability and technical support, and above all — ***Parker Premier Customer Service***.

Arranged by product group, this catalog contains specifications, technical data, reference materials, dimensions, and ordering information on the complete line.

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D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

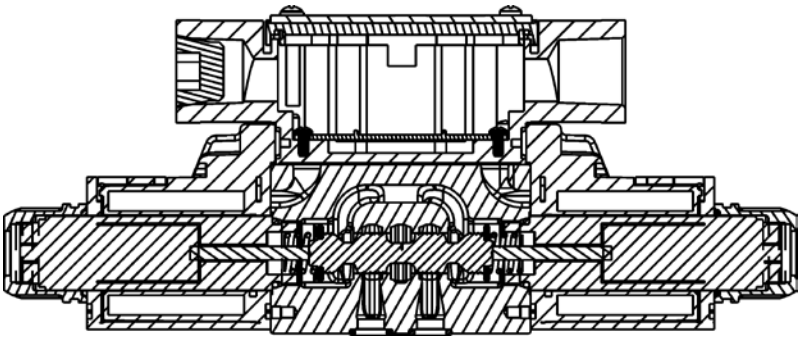
Application

Series D1V hydraulic directional control valves are high performance, direct operated 4-way valves. They are available in 2 or 3-position styles. They are manifold mounted valves, which conform to NFPA's D03, CETOP 3 mounting pattern. These valves were designed for industrial and mobile hydraulic applications which require high cycle rates, long life and high efficiency.

Operation

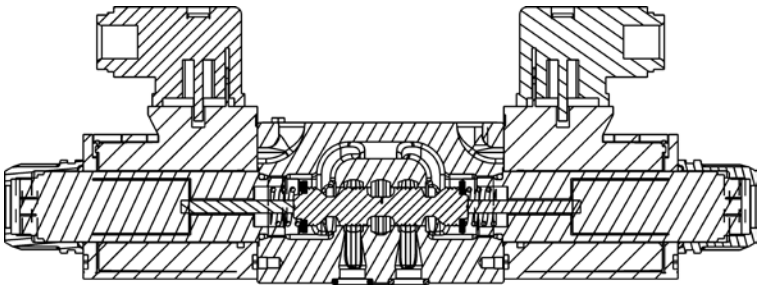
Series D1V directional control valves consist of a 4-chamber style body, and a case hardened sliding spool. The spool is directly shifted by a variety of operators including: solenoid, lever, cam, air or oil pilots.

D1VW Solenoid Operated Plug-In Conduit Box Style



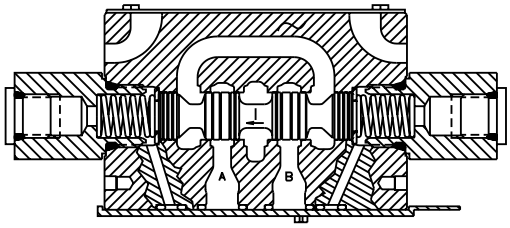
- Easy access mounting bolts.
- Waterproof NEMA 4, IP67.
- No tools required for coil removal.
- 19 standard spool styles available.
- Four electrical connection options.
- Lights included (CSA approval for DC solenoids and lights).
- Easy coil replacement.
- Plug-In design offered with lights & other options.

D1VW Solenoid Operated Hirschmann (DIN) Style



- DIN Style (43650) Hirschmann.
- 19 spool styles available.
- No tools required for coil removal.
- Easy coil replacement.
- AC & DC lights available. (CSA approval for solenoids and lights).

D1VP Oil Pilot Operated



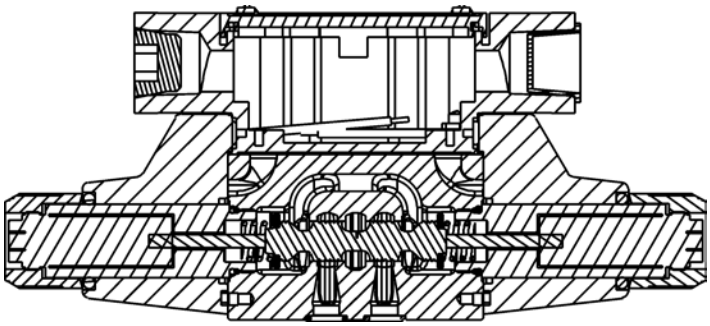
- Subplate pilot or end cap pilot option.
- Pilot pressure: 15.2 Bar (220 PSI) to 207 Bar (3000 PSI).

Electrical Connections

Series D1V valves may be configured in all popular electrical configurations including:

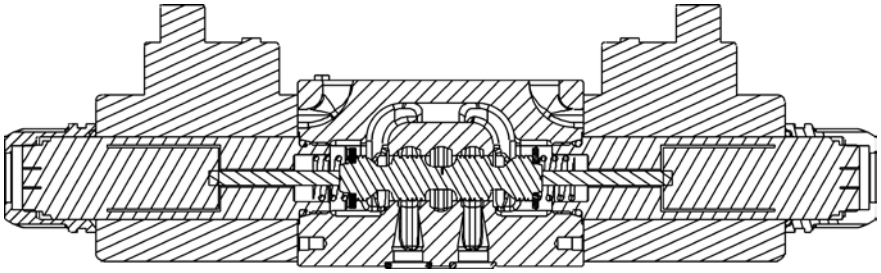
Plug-in Conduit Box	Explosion Proof	Dual Spade (DC only)
DESINA (DC only)	Hirschmann (DIN)	Wire Lead Conduit Box
Deutsch (DC only)	Metri-Pack (DC only)	

D1VW Solenoid Operated Wire Lead Conduit Box Style



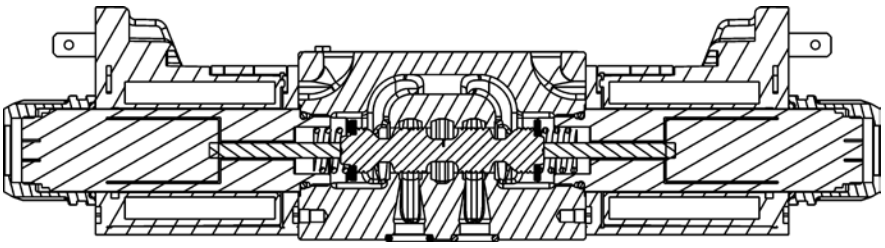
- Easy access mounting bolts.
- Waterproof NEMA 4, IP67.
- No tools required for coil removal.
- 19 spool styles available.
- No lights available

D1VW Solenoid Operated DESINA Style



- Surge suppression standard.
- 19 standard spool available.
- No tools required for spool removal.
- Easy coil replacement.
- Wired to DESINA Spec (VDMA).
- Lights included.

D1VW Solenoid Operated Dual Spade Style



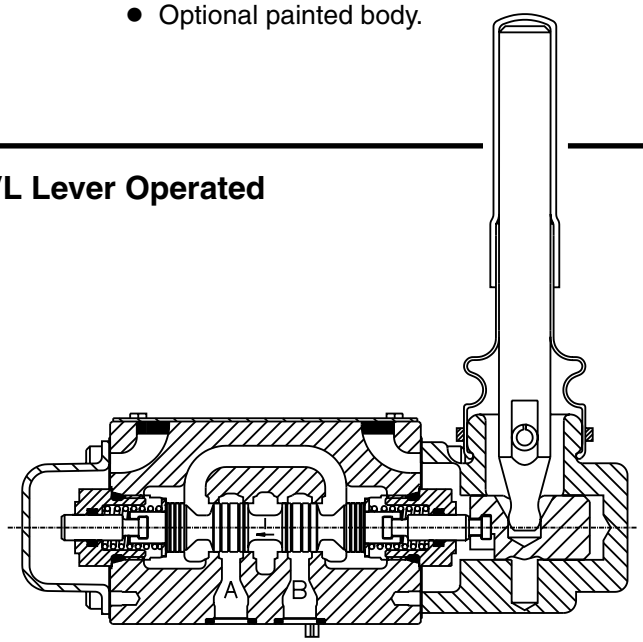
- Dual spade connection (SAE Style 1B).
- Easy coil replacement.
- Surge suppression available.
- 19 standard spool styles available.

Features

- Easy access mounting bolts.
- 345 Bar (5000 PSI) pressure rating.
- Flows to 22 GPM depending on spool.
- Choice of five operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finished body.
- CSA approved and U.L. recognized available.
- Optional proportional spool available.
- Optional painted body.

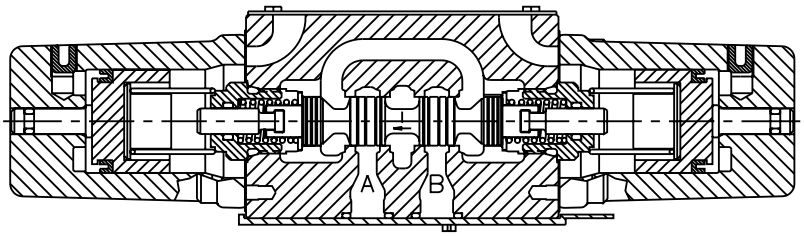
D1VL Lever Operated

- Spring return or detent styles available.
- Heavy duty handle design.



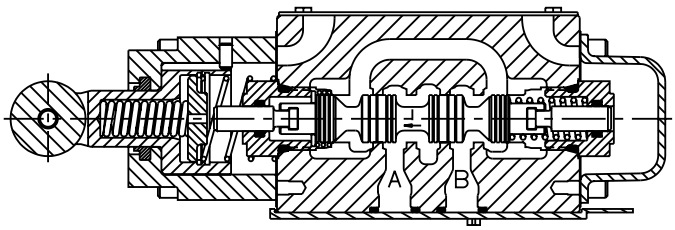
D1VA Air Operated

- Low pilot pressure required – 4.1 Bar (60 PSI) minimum.

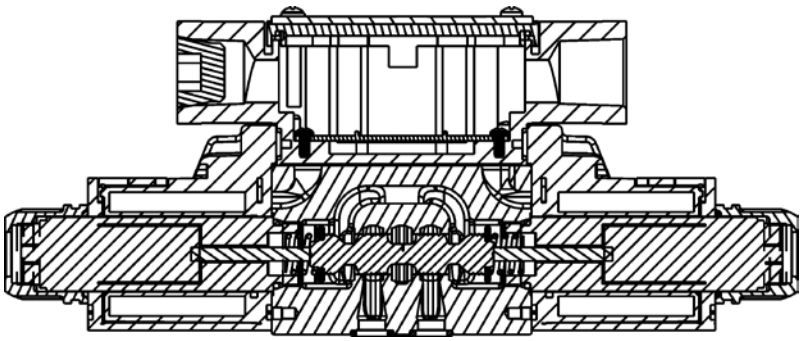


D1VC Cam Operated

- Choice of 2 cam roller positions (D1VC and D1VD).
- Two styles available (D1VC and D1VG).
- Short stroke option.

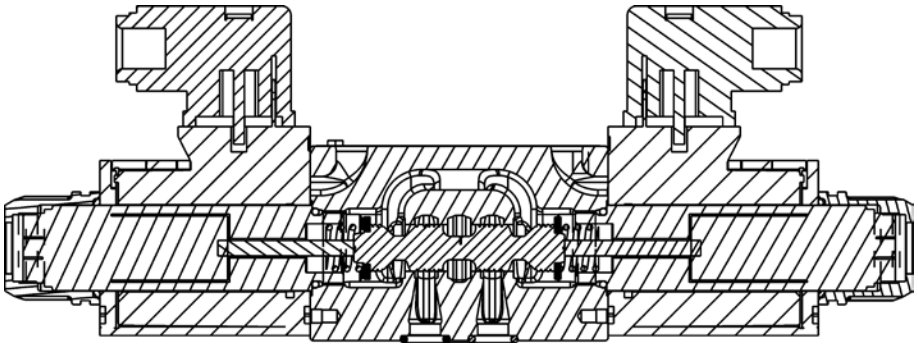


D1VW AC Solenoid Operated Soft Shift

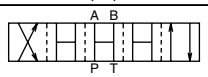
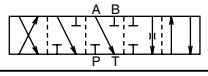
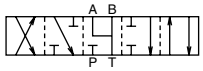
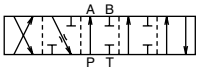
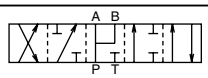
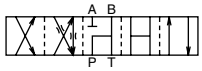
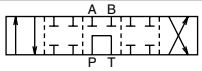
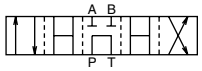
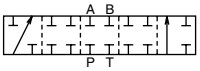
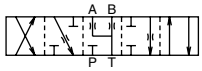
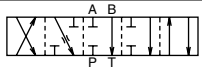
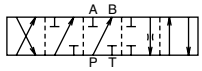
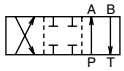
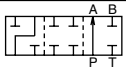
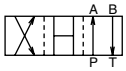
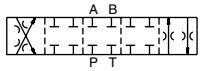
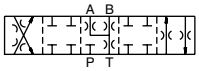


- 4 standard orifice sizes available.
- 19 spool styles available.
- AC Rectified or DC input.

D1VW DC Solenoid Operated Soft Shift

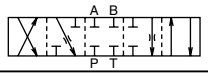
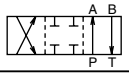
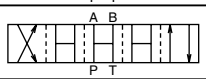
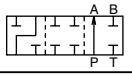
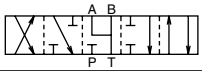
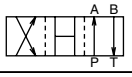
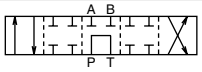
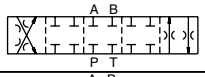
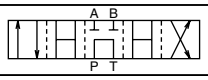
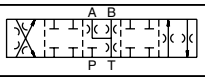


Standard Spool Reference Data

Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction		
		High Watt DC	Low Watt AC	Low Watt DC
D1V*001		78 (20)	49 (13)	37 (10)
D1V*002		78 (20)	45 (12)	68 (18)
D1V*003		70 (18)	30 (8)	34 (9)
D1V*004		37 (10)	30 (8)	68 (18)
D1V*005		60 (16)	45 (12)	45 (12)
D1V*006		79 (21)	49 (13)	52 (14)
D1V*007		45 (12)	18 (5)	18 (5)
D1V*008		49 (13)	45 (12)	37 (10)
D1V*009		58 (15)	45 (12)	45 (12)
D1V*010		13 (4)	11 (3)	15 (4)
D1V*011		58 (16)	30 (8)	37 (10)
D1V*014		45 (12)	18 (5)	18 (5)
D1V*015		79 (21)	30 (8)	34 (9)
D1V*016		60 (16)	45 (12)	52 (14)
D1V*020		78 (20)	45 (12)	75 (20)
D1V*026		37 (10)	11 (3)	7 (2)
D1V*030		70 (18)	18 (5)	75 (20)
D1V*081		32 (9)	26 (7)	30 (8)
D1V*082		32 (9)	26 (7)	34 (9)

Center or De-energized position is indicated by P, A, B & T port notation.

D1VA, D1VP, D1VC, D1VL Reference Data

Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction	Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction
D1V*1		83 (22)	D1V*20 #		53 (14)
D1V*2		83 (22)	D1V*26 #		11 (3)
D1V*4		45 (12)	D1V*30 #		19 (5)
D1V*8		45 (12)	D1V*81		30 (8)
D1V*9		57 (15)	D1V*82		30 (8)

Center or De-energized position is indicated by A, B, P & T port notation.
D1VP only.

Manaplug – Electrical Mini Plug

EP336-30 3 Pin Plug
EP316-30 5 Pin Plug (Double Solenoid)
EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

EP337-30 3 Pin Plug
EP317-30 5 Pin Plug (Double Solenoid)
EP31B-30 5 Pin Plug (Single Solenoid)

Electrical Cords – Mini Plug

EC 3 Conductor, 6 ft.
EC3 3 Conductor, 3 ft.
EC12 3 Conductor, 12 ft.
EC5 5 Conductor, 6 ft.
EC53 5 Conductor, 3 ft.
EC512 5 Conductor, 12 ft.

Desina – 12mm Connector

5004109

Monitor Switch Connector

1301903-N

		Quantity Required		
		A,C,D	B,E,F	H,K,M
Hirschmann – Female Connector				
692915	Gray (Solenoid A)	1	–	1
692914	Black (Solenoid B)	1	1	–
Hirschmann – Female Connector-Rectified (48-240 VAC)				
1301053	Gray (Solenoid A)	1	–	1
1301054	Black (Solenoid B)	1	1	–
Hirschmann – Female Connector-Rectified w/Lights (100-240 VAC)				
1300712		2	1	1
Hirschmann – Female Connector w/Lights (Note Voltages)				
694935	6-48 VAC or VDC	2	1	1
694936	48-120 VDC, 100-240 VAC	2	1	1

Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-15% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact HVD for AC coil applications.

Explosion Proof Solenoid Ratings*

U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
MSHA (EO)	Complies with 30CFR, Part 18
ATEX (ED)	Complies with ATEX requirements for: Exd, Group IIB; EN50014: 1999+ Amds. 1 & 2, EN50018: 2000
ATEX & CSA/US (ET)	Complies with ATEX EN60079-0, EN60079-1 Ex d IIC; CSA/US Ex d IIC, AEx d IIC for Class I, Zone 1, UL1203, UL1604, CSA E61241,1 Class II, Div 1

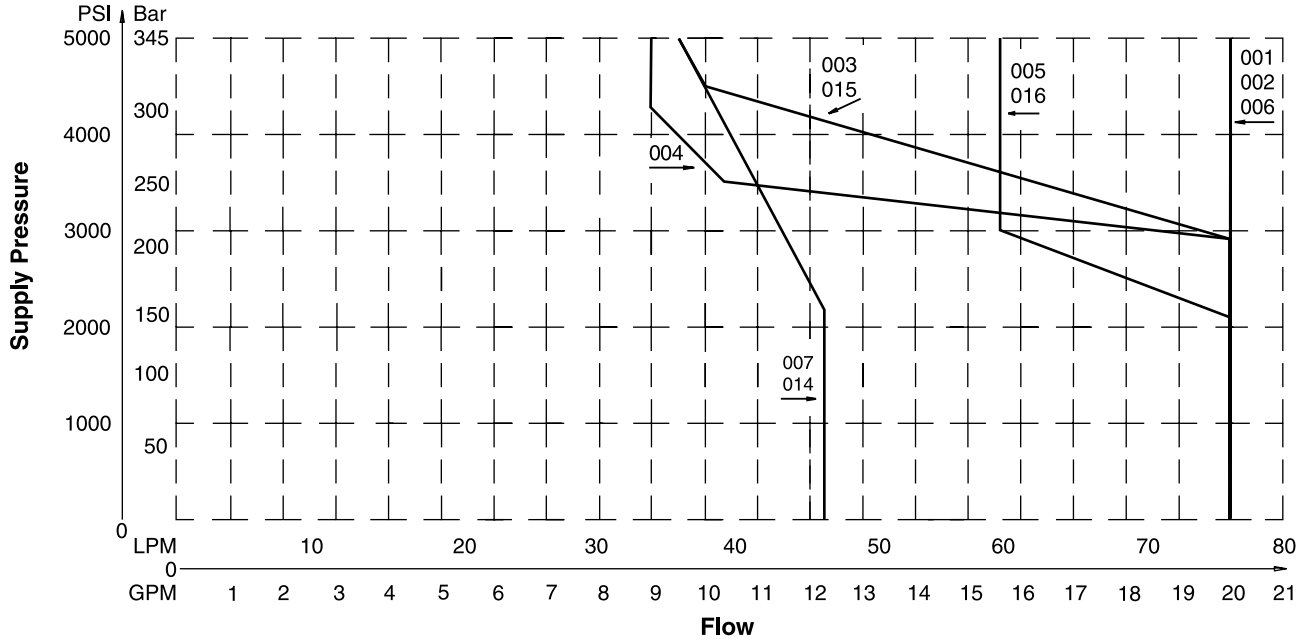
* Allowable Voltage Deviation ±10%.
Note that Explosion Proof AC coils are single frequency only.

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
G	Omit	198 VDC	N/A	N/A	0.15 Amps	30 W	1306.80 ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 ohms
L	L	6 VDC	N/A	N/A	1.67 Amps	10 W	3.59 ohms
L	Omit	6 VDC	N/A	N/A	5.00 Amps	30 W	1.20 ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 ohms
QD	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.20 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.20 ohms
R	F	24/60 VAC, Low Watt	6.67 Amps	160 VA	2.20 Amps	23 W	1.52 ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
Z	Omit	250 VDC	N/A	N/A	0.13 Amps	30 W	1889.64 ohms
Explosion Proof Solenoids							
R		24/60 VAC	7.63 Amps	183 VA	2.85 Amps	27 W	1.99 ohms
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
N		220/50 VAC	0.77 Amps	169 VA	0.31 Amps	27 W	1.38 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
P		110/50 VAC	1.47 Amps	162 VA	0.57 Amps	27 W	34.70 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
"ET" Explosion Proof Solenoids							
K		12 VDC	N/A	N/A	1.00 Amps	12 W	12.00 ohms
J		24 VDC	N/A	N/A	1.00 Amps	13 W	44.30 ohms
Y		120/60-50 VAC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

D1V Shift Limits, DC & AC Rectified 30 Watt



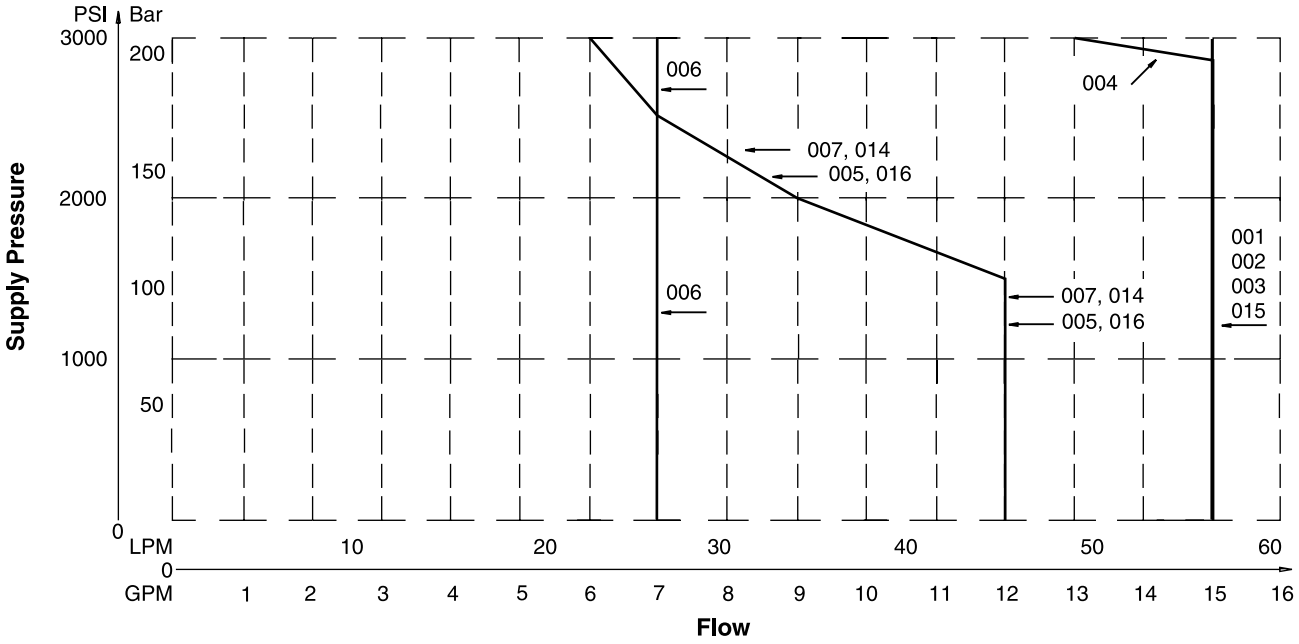
Example:

Determine the maximum allowable flow of a Series D1V valve (#004 spool) at 138 Bar (2000 PSI) supply pressure. Locate the curve marked “004”. At 138 Bar (2000 PSI) supply pressure, the maximum flow is 57 LPM (15 GPM). At 207 Bar (3000 PSI), the flow is 49 LPM (13 GPM).

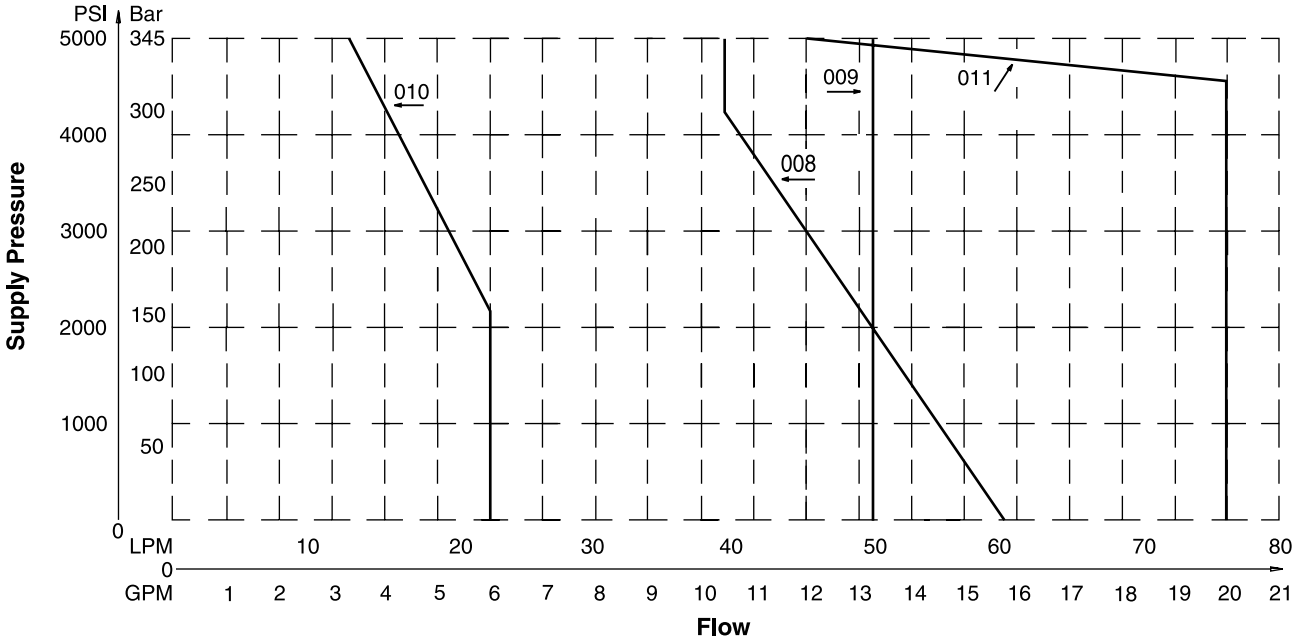
Important Notes for Switching Limit Charts

1. For F & M style valves, reduce flow to 70% of that shown.
2. Shift limits charted for equal flow A and B ports. Unequal A and B port flows may reduce shift limits.
3. These charts do not show explosion proof performance. Consult factory for explosion proof duty.
4. Blocking A or B ports will reduce flow by 70%.

D1VW*****L Shift Limits



D1V Shift Limits, DC & AC Rectified 30 Watt



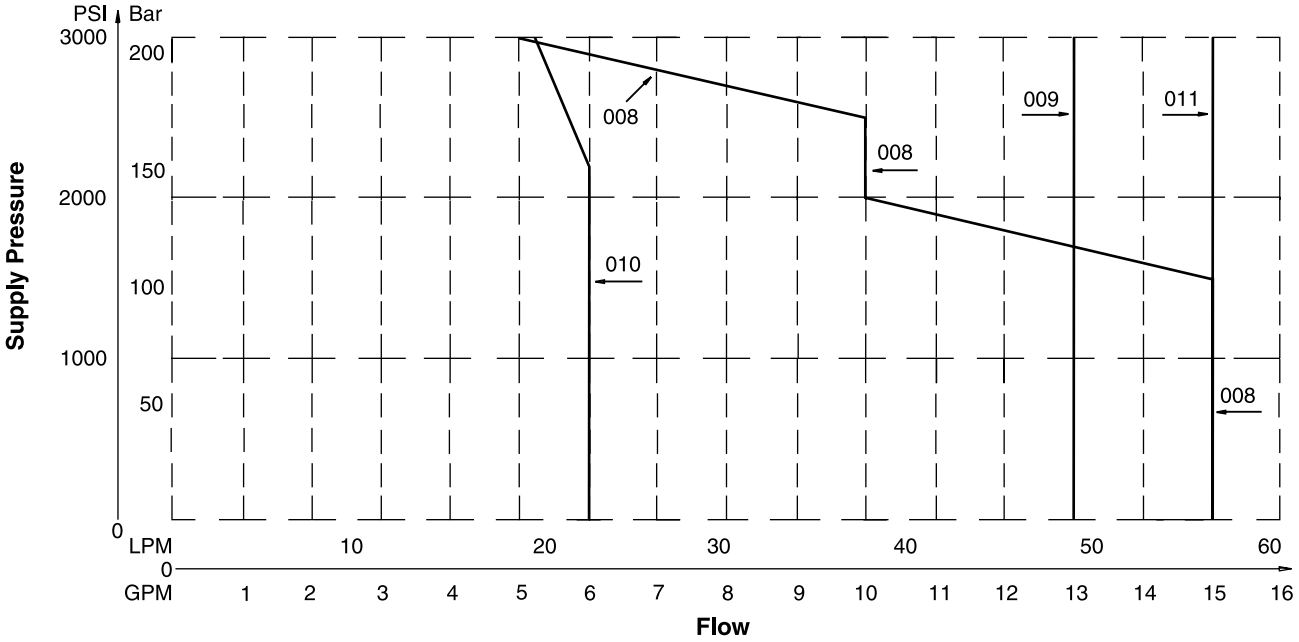
Example:

Determine the maximum allowable flow of a Series D1V valve (#008 spool) at 83 Bar (1200 PSI) supply pressure. Locate the curve marked “008”. At 83 Bar (1200 PSI) supply pressure, the maximum flow is 57 LPM (15 GPM). At 207 Bar (3000 PSI), the flow is 19 LPM (5 GPM).

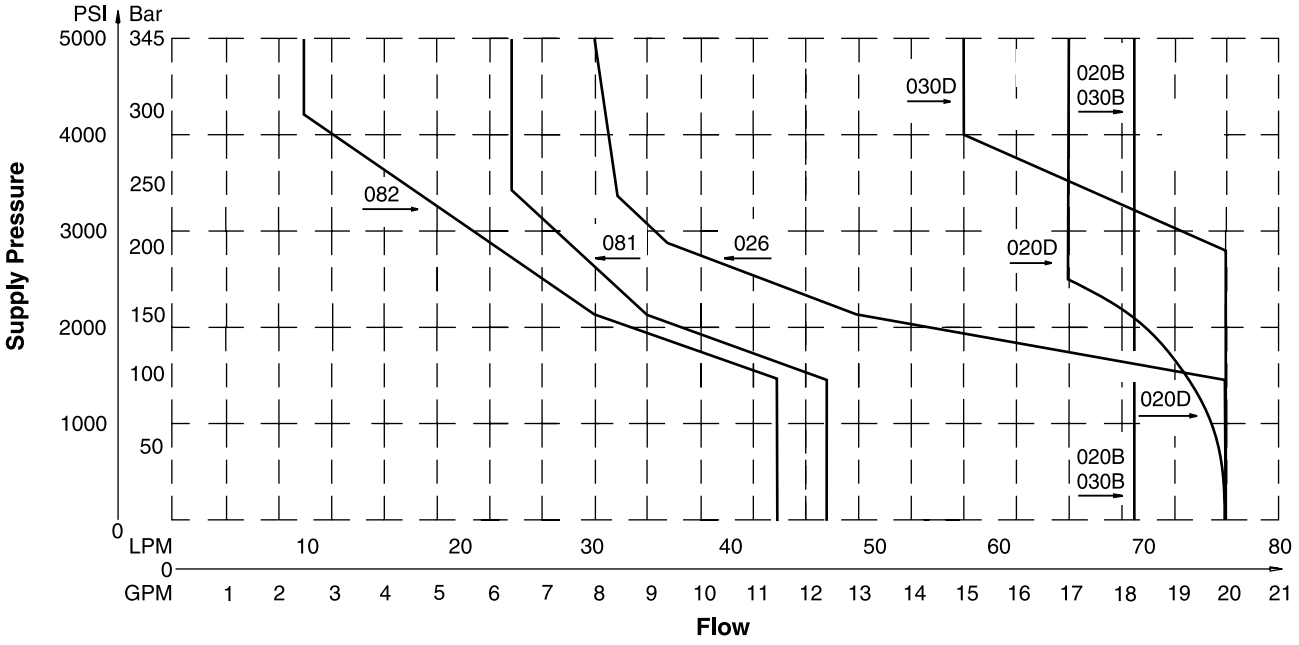
Important Notes for Switching Limit Charts

1. For F & M style valves, reduce flow to 70% of that shown.
2. Shift limits charted for equal flow A and B ports. Unequal A and B port flows may reduce shift limits.
3. These charts do not show explosion proof performance. Consult factory for explosion proof duty.
4. Blocking A or B ports will reduce flow by 70%.

D1VW*****L Shift Limits



D1V Shift Limits, DC & AC Rectified 30 Watt



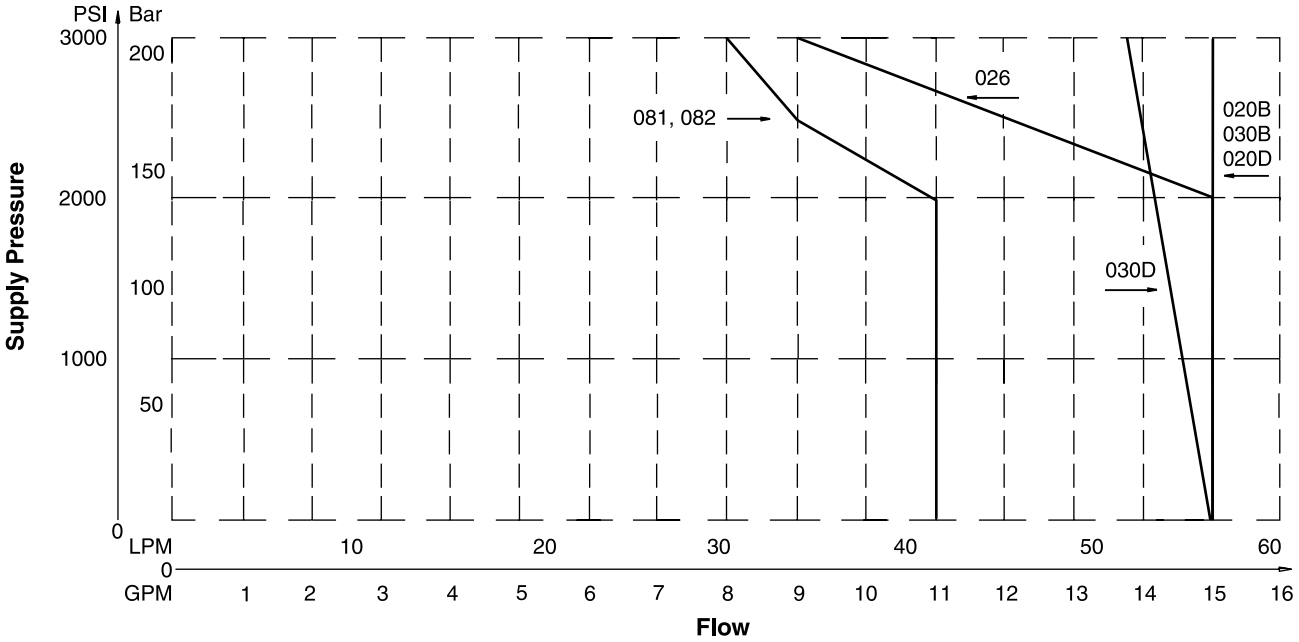
Example:

Determine the maximum allowable flow of a Series D1V valve (#081 spool) at 83 Bar (1200 PSI) supply pressure. Locate the curve marked “081”. At 83 Bar (1200 PSI) supply pressure, the maximum flow is 42 LPM (11 GPM). At 138 Bar (2000 PSI), the flow is 42 LPM (11 GPM).

Important Notes for Switching Limit Charts

1. For F & M style valves, reduce flow to 70% of that shown.
2. Shift limits charted for equal flow A and B ports. Unequal A and B port flows may reduce shift limits.
3. These charts do not show explosion proof performance. Consult factory for explosion proof duty.
4. Blocking A or B ports will reduce flow by 70%.

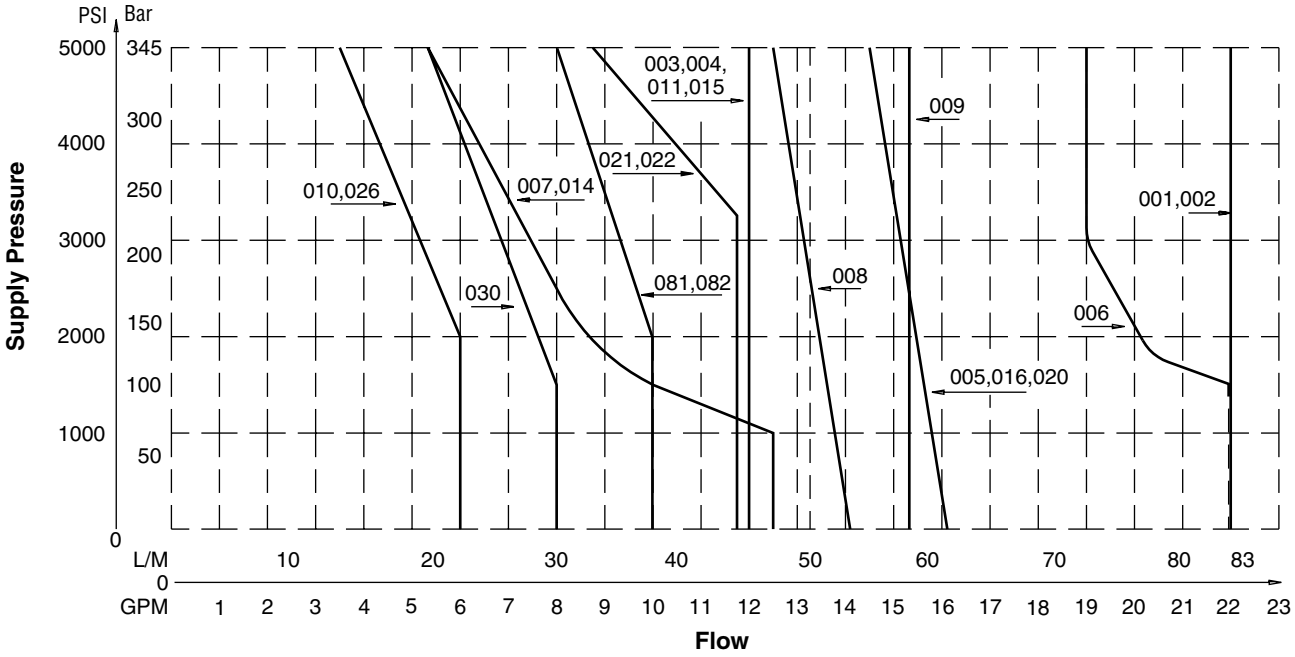
D1VW*****L Shift Limits



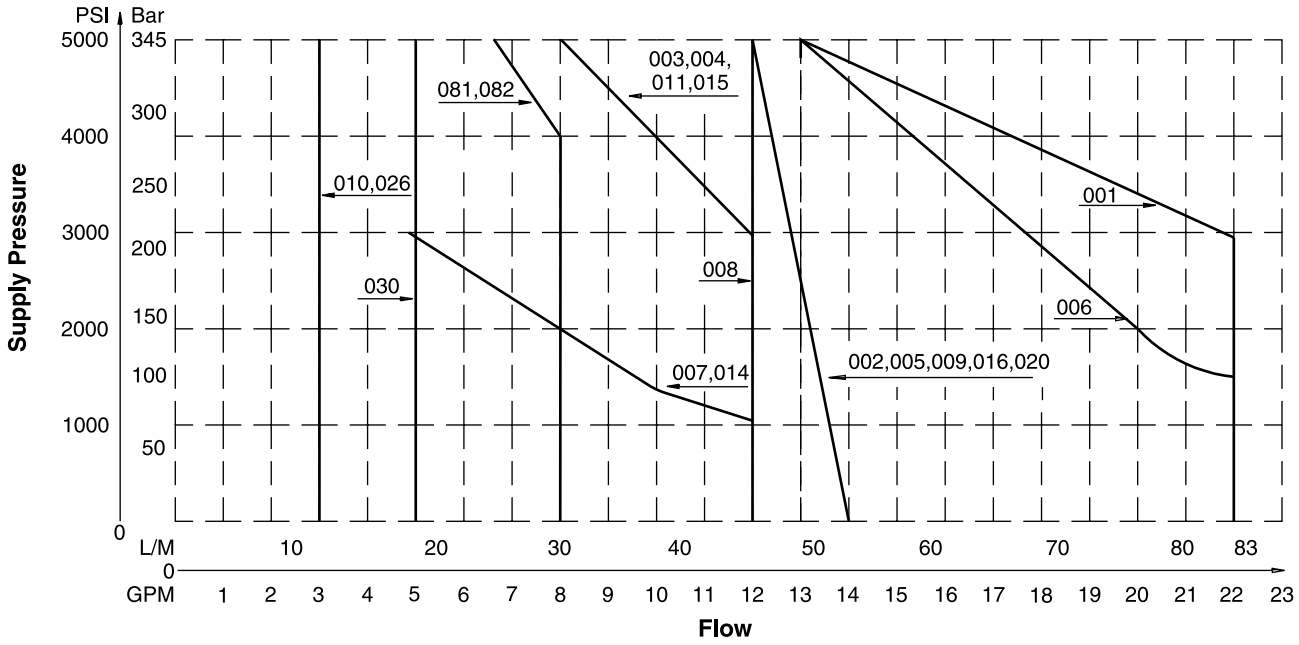
D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

D1V Shift Limits, AC 30 Watt



D1VW*****F Shift Limits, AC



Example:

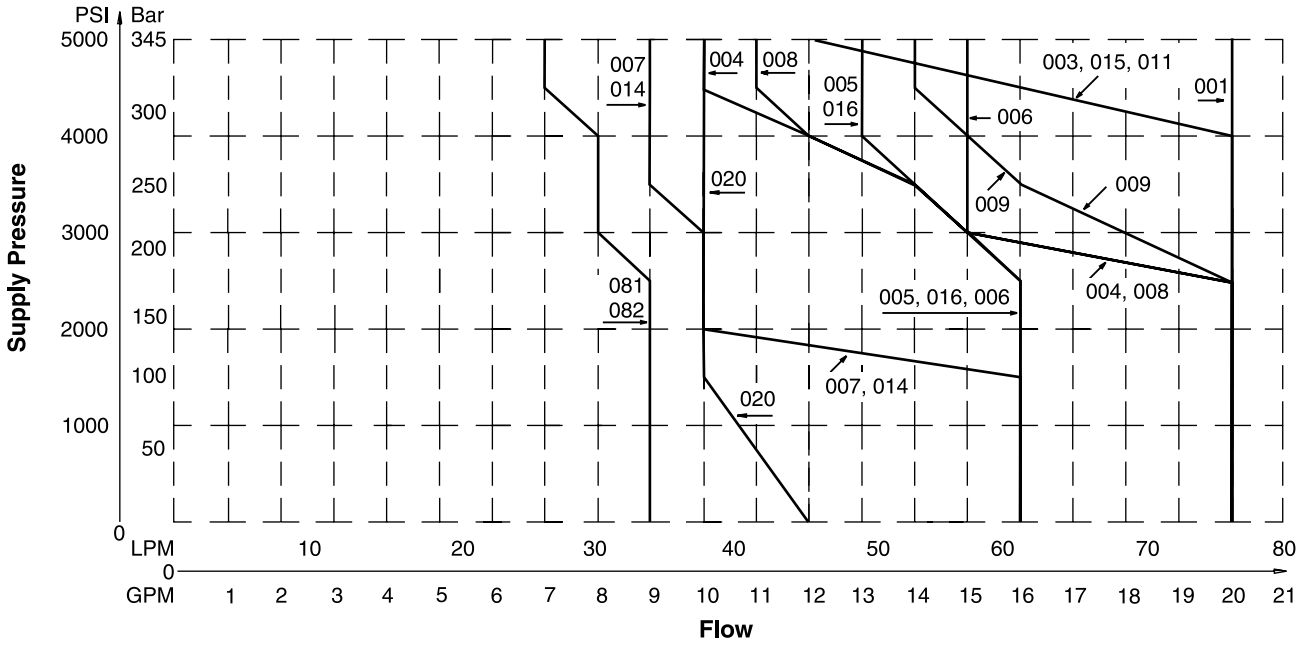
Determine the maximum allowable flow of a Series D1V valve (#009 spool) at 83 Bar (1200 PSI) supply pressure. Locate the curve marked “009”. At 83 Bar (1200 PSI) supply pressure, the maximum flow is 75 LPM (20 GPM). At 207 Bar (3000 PSI), the flow is 68 LPM (18 GPM).

Important Notes for Switching Limit Charts

1. For F & M style valves, reduce flow to 70% of that shown.
2. Shift limits charted for equal flow A and B ports. Unequal A and B port flows may reduce shift limits.
3. These charts do not show explosion proof performance. Consult factory for explosion proof duty.
4. Blocking A or B ports will reduce flow by 70%.

Soft Shift Limit Curves

DC Power Supply



D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Pressure Drop vs. Flow, High Watt

The table to the right provides the flow vs. pressure drop curve reference for standard and high performance D1V Series valves by spool type.

The chart below demonstrates graphically the pressure drop characteristics of the standard D1VW*****F and the high performance D1V. The low watt coil and other design features of the standard D1VW*****F accommodate a maximum flow of 50 LPM (13 GPM) at 345 Bar (5000 PSI).

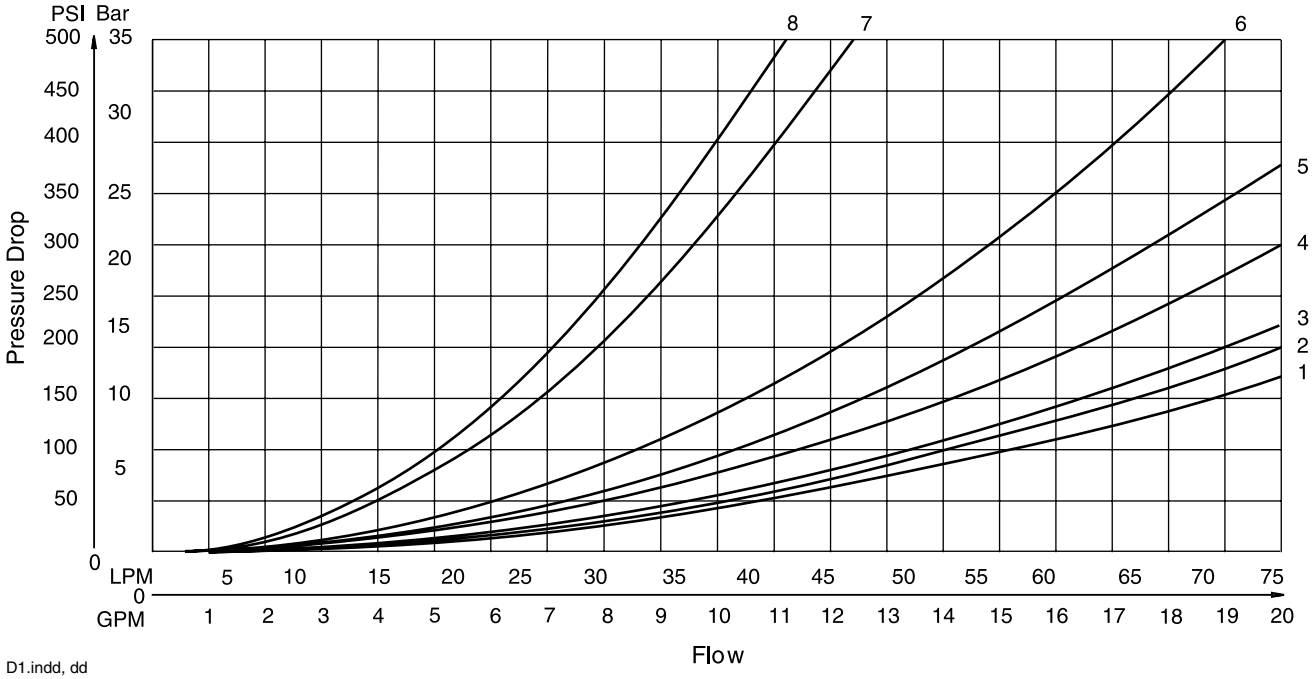
D1VW Pressure Drop Reference Chart – 30 Watt Coil

Spool No.	Curve Number										
	Shifted				Center Condition						
	P–A	P–B	B–T	A–T	(P–T)	(B–A)	(A–B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	2	—	—	—	—	—	—	—
002	2	2	1	1	2	1	1	1	1	1	1
003	2	2	1	1	—	—	—	—	—	1	—
004	2	2	1	1	—	—	—	—	—	2	2
005	2	3	1	1	—	—	—	5	—	—	—
006	2	2	1	1	—	6	6	6	6	—	—
007	2	3	1	1	4	—	1	—	—	—	—
008	5	5	5	5	5	—	—	—	—	—	—
009	4	4	4	4	4	—	—	—	—	—	—
010	3	3	—	—	—	—	—	—	—	—	—
011	3	3	1	1	—	—	—	—	—	8	8
014	3	2	1	1	4	1	—	—	—	—	—
015	2	2	1	1	—	—	—	—	—	—	1
016	3	2	1	1	—	—	—	—	5	—	—
020	4	4	2	2	—	—	—	—	—	—	—
026	4	4	—	—	—	—	—	—	—	—	—
030	2	2	1	1	—	—	—	—	—	—	—
081	7	7	8	8	—	—	—	—	—	—	—
082	7	7	8	8	—	—	—	—	—	—	—

Viscosity Correction Factor

Viscosity (SSU)	75	150	200	250	300	350	400	Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change per chart.
% of ΔP (Approx.)	93	111	119	126	132	137	141	Pressure drops charted for equal flow A and B ports. Unequal A and B port flows may decrease shift limits.

Performance Curves – 30 Watt Coil



D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Pressure Drop vs. Flow, Low Watt

The table to the right provides the flow vs. pressure drop curve reference for 10 watt D1V Series valves by spool type.

The chart below demonstrates graphically the pressure drop characteristics of the standard D1VW*****L and the high performance D1V. The low watt coil and other design features of the standard D1VW*****L accommodate a maximum flow of 50 LPM (13 GPM) at 345 Bar (5000 PSI).

D1VW Pressure Drop Reference Chart – 10 Watt Coil

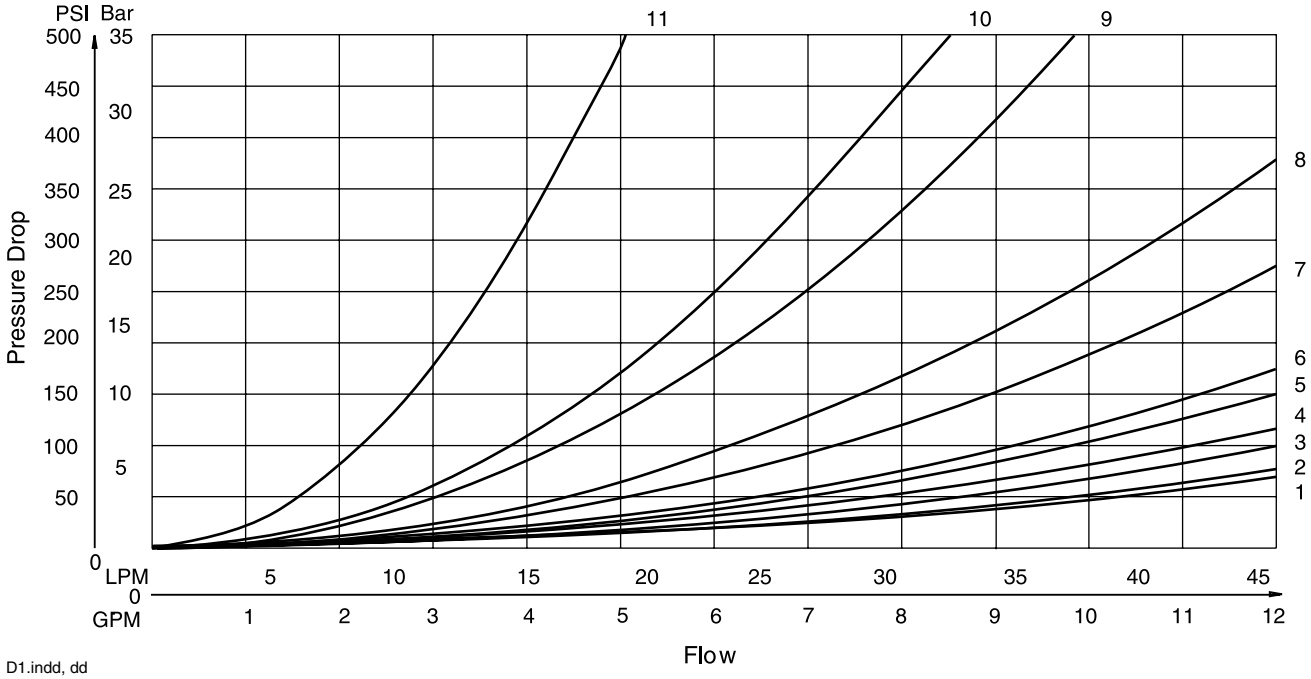
Spool No.	Curve Number										
	Shifted				Center Condition						
	P–A	P–B	B–T	A–T	(P–T)	(B–A)	(A–B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	2	—	—	—	—	—	—	—
002	2	2	1	1	2	2	2	2	2	1	1
003	3	3	2	1	—	—	—	—	—	4	—
004	3	3	1	1	—	—	—	—	—	6	6
005	3	3	1	1	—	—	—	7	—	—	—
006	3	3	1	1	—	8	8	7	7	—	—
007	3	3	1	1	5	—	4	—	—	—	1
008	5	5	6	6	7	—	—	—	—	—	—
009	6	6	6	6	5	—	—	—	—	—	—
010	4	4	—	—	—	—	—	—	—	—	—
011	3	3	1	1	—	—	—	—	—	11	11
014	3	3	1	1	4	—	—	2	—	1	—
015	3	3	1	2	—	—	—	—	—	—	4
016	3	3	1	1	—	—	—	—	7	—	—
020	7	7	4	4	—	—	—	—	—	—	—
026	6	6	—	—	—	—	—	—	—	—	—
030	2	2	1	1	—	—	—	—	—	—	—
081	9	9	10	10	—	—	—	—	—	—	—
082	10	10	10	10	—	—	—	—	—	—	—

Viscosity Correction Factor

Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141

Curves were generated using 100 SSU hydraulic oil.
For any other viscosity, pressure drop will change per chart.

Performance Curves – 10 Watt Coil



D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Notes

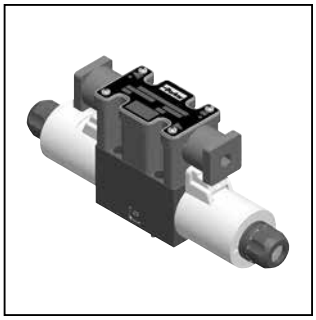
Return to ALPHA TOC
Return to SECTION TOC
A

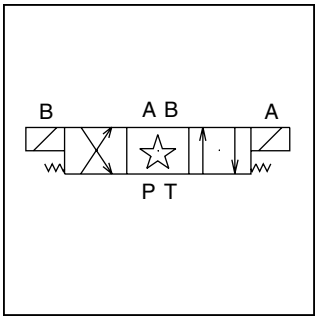
D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

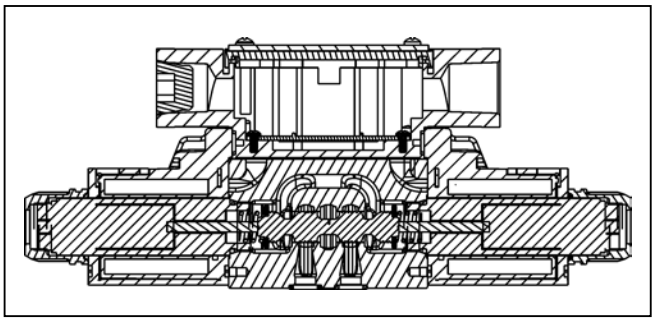
Series D1VW directional control valves are high performance, 4-chamber, direct operated, wet armature solenoid controlled, 3 or 4-way valves. They are available in 2 or 3-position and conform to NFPA's D03, CETOP 3 mounting patterns.





Features

- Soft shift available.
- 19 standard spool styles available (for other spools – Consult Factory).
- Proportional spools.
- DC surge suppression.
- Eight electrical connection options.
- AC & DC lights available (CSA approval for solenoids and lights).
- Internally ground.
- Easy access mounting bolts.
- Waterproof (meets NEMA 4, up to IP67 on some models).
- Explosion proof.
- CSA approvals.



- U.L. recognized available - Contact the division.
- No tools required for coil removal.
- AC rectified coils.

Specifications

Mounting Pattern	NFPA D03, CETOP 3, NG 6
Mounting Interface	DIN 24340-A6 ISO 4401-AB-03-4-A CETOP R35H 4.2-4-03, NFPA D03
Maximum Pressure	P, A, B 345 Bar (5000 PSI) Standard 207 Bar (3000 PSI) 10 Watt CSA 276 Bar (3750 PSI) Tank: 103 Bar (1500 PSI) AC only 207 Bar (3000 PSI) DC/AC Rectified Standard 207 Bar (3000 PSI) AC Optional CSA 103 Bar (1500 PSI)

Leakage Rates* 100 SSU @ 49°C (120°F)	Maximum Allowable: 19.7 cc (1.2 Cu. in.) per Minute/Land @ 69 Bar (1000 PSI)* 73.8 cc (4.5 Cu. in.) per Minute/Land @ 207 Bar (3000 PSI)*
*#008 and #009 Spools may exceed these rates. Consult Factory	Typical: 4.9 cc (0.3 Cu. in.) per Minute/Land @ 69 Bar (1000 PSI)* 26.2 cc (1.6 Cu. in.) per Minute/Land @ 345 Bar (5000 PSI)

Response Time

Response time (milliseconds) at 345 Bar (5000 PSI) is 32 LPM (8.5 GPM).

Solenoid Type	Pull-In	Drop-Out
AC	13	20
DC 10 Watt	61	22
DC 30 Watt	51	21

		Spool Center Condition					
	Orifice	Closed		Open		2-Position	
Soft Shift	Size	Energize	De-Energize	Energize	De-Energize	Energize	De-Energize
S2	0.020	125 ms	920 ms	200 ms	275 ms	51 ms	100 ms
S5	0.050	51 ms	675 ms	50 ms	27 ms	51 ms	21 ms

D — Directional Control Valve

1V — Basic Valve

NFPA D03
CETOP 3
DIN NG6

Actuator

Code	Description
W*	**Solenoid, Wet Pin, Screw-in**
HW*	**Reversed Wiring**

Spool

Style

Seal

Code	Description
N	**Nitrile**
V	**Fluorocarbon**
E*	EPR

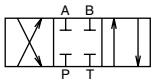
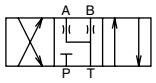
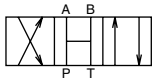
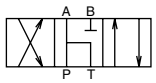
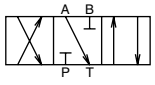
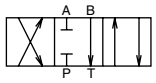
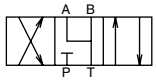
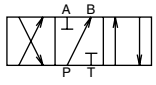
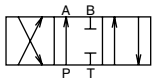
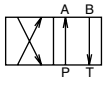
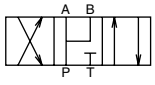
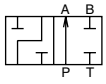
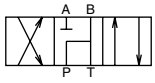
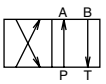
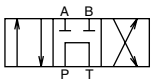
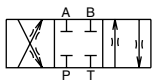
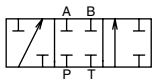
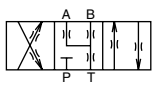
* Contact HVD for availability.

Solenoid Voltage

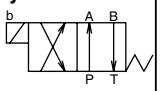
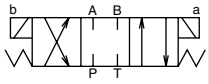
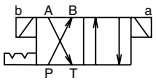
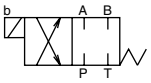
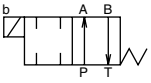
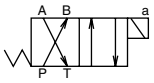
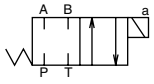
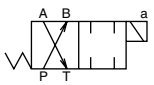
Code	Description	Code	Description
A**	24/50 VAC	Q**	100/60 VAC
D	120 VDC	QD†	100/60 - 100/50 VAC
G	198 VDC	R	24/60 VAC
J	**24 VDC**	**T**	**240/60 - 220/50 VAC**
K	**12 VDC**	U	98 VDC
L	6 VDC	**Y**	**120/60 - 110/50 VAC**
N***	220/50 VAC	Z	250 VDC
P***	110/50 VAC		

** High Watt only
*** Explosion Proof only.
† Available in DIN only.

* Valve schematic symbols are per NFPA/ ANSI standards, providing flow P to A when energizing solenoid A. Note operators reverse sides for #008 and #009 spools. See installation information for details. To configure per DIN standards (A coil over A port, B coil over B port) code valves as D1VHW***.

Code	Symbol	Code	Symbol
001		011	
002		014	
003		015	
004		016	
005		**020***	
006		026*	
007		**030****	
008*, 009**		**081**	
010		**082**	

* 008, 020 & 026 spools have closed crossover.
** 009 & 030 spools have open crossover.

Code	Description	Symbol
B*	**Single solenoid, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Double solenoid, 3 position, spring centered.**	
D†	**Double solenoid, 2 position, detent.**	
E	Single solenoid, 2 position, spring centered. P to B and A to T when energized.	
F‡	Single solenoid, 2 position. Spring offset, energized to center. Position spool spacer on A side. P to A and B to T in spring offset position.	
H*	**Single solenoid, 2 position, spring offset. P to B and A to T in offset position.**	
K	Single solenoid, 2 position, spring centered. P to A and B to T when energized.	
M‡	Single solenoid, 2 position, spring offset, energized to center position. Spool spacer on B side. P to B and A to T in spring offset position.	

* 020, 026 and 030 spools only.
† 020 and 030 spools only.
‡ High Watt only.

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Solenoid Connection | Coil Options | Tube Options | Manual Override Options | Electrical Options | Shift Response and Indication | Approvals | Valve Variations | Design Series

NOTE: Not required when ordering.

Code	Description
C*	**Leadwire Conduit Box**
D**	Metric Plug (M12X1), DESINA
E†	Explosion Proof
G††	**Plug-In Conduit Box**
J#	**Deutsch (DT06-2S)**
M#	Metri-Pack (150)
P	**DIN with Plug**
S#	Dual Spade
W†	**DIN w/o Plug**

* No variations – See Plug-in.
** DC only, lights, diode surge suppressor, not CSA approved.
† Not available with lights.
†† Required for variations on conduit box style. Must have lights.
# DC only, no lights, not CSA approved.

Code	Description
Omit*	**High Watt**
D**	Explosion Proof, EEXD ATEX
E**	Explosion Proof, EEXME ATEX
F†	Low Watt
L††	10 Watt
O**	Explosion Proof, MSHA
T#	Explosion Proof, Ex d IIC ATEX/CSA
U**	Explosion Proof, UL/CSA

* AC ambient temperature must not exceed 60°C (140°F).
** 60 Hz only on AC, no options.
† AC only.
†† DC and AC rectified only.
# J, K and Y voltages only. Dual frequency on AC, no options.

Code	Description
Omit	**Standard Pressure 103.5 Bar (1500 PSI) AC 207 Bar (3000 PSI) DC**
H*	**High Pressure, AC only 207 Bar (3000 PSI)**

* Not available with CSA.

Code	Description
Omit	**Standard**
T*†	No Override
P*	Extended Manual Override w/Boot

* Manual override options not available on explosion proof or soft shift.
† DC/AC rectified only.

Code	Description
Omit	**No Options**
J**	Diode Surge Suppressor
Z†	Rectified Coil

† DC tube standard.
** DC only. DIN coil must have plug with lights.

Code	Description
Omit	**Standard Response**
S2*	Soft Shift, 0.020" Orifice
S3*	Soft Shift, 0.030" Orifice
S4*	Soft Shift, 0.040" Orifice
S5*	Soft Shift, 0.050" Orifice
I7**	Monitor Switch Direct Op. End Stroke
I8**	Monitor Switch Direct Op. Start Stroke

* Not available with 10 watt. AC DIN coil must include plug.
** Single solenoid models only. Not CE or CSA approved.

Code	Description
Omit	**Standard Valve**
3*†	CSA US
4*#	**CSA Canada**

* Not available with AC high pressure tube.
† B, C, H styles only. J, K, Y, U voltages only. C, G, W sol. connections only. Conforms to UL429.
# Valve is derated.

Code	Description
Omit	**No Variations**
5**	**Signal Lights**
56*	**Manaplug (Mini) with Lights**
7B*	Manaplug (Micro) with Lights
1C*	**Manaplug (Mini) Single Sol. 5-pin, with Lights**
1D*	Manplug (Micro) Single Sol. 5-pin, with Lights
1M*	Manaplug Opposite of Normal
4D†	Twist & Lock Override (Old 5426, 33 Ford wiring)
4E†	Push Manual Override (Old x5450)
4F	Heavy Duty Detent
1P	Painted Body
7Y*	4-pin M12x1 Manaplug, special wiring with lights (Old B755)

* Plug-in Conduit Box
** Plug-in, DIN, or DESINA only
† DC/AC Rectified only. Not available with soft shift.

Valve Weight:
Single Solenoid 1.36 kg (3.0 lbs.)
Double Solenoid 1.6 kg (3.5 lbs.)
Standard Bolt Kit: BK209
Metric Bolt Kit: BKM209
Seal Kit:
Nitrile SKD1VWN91
Fluorocarbon SKD1VWV91

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

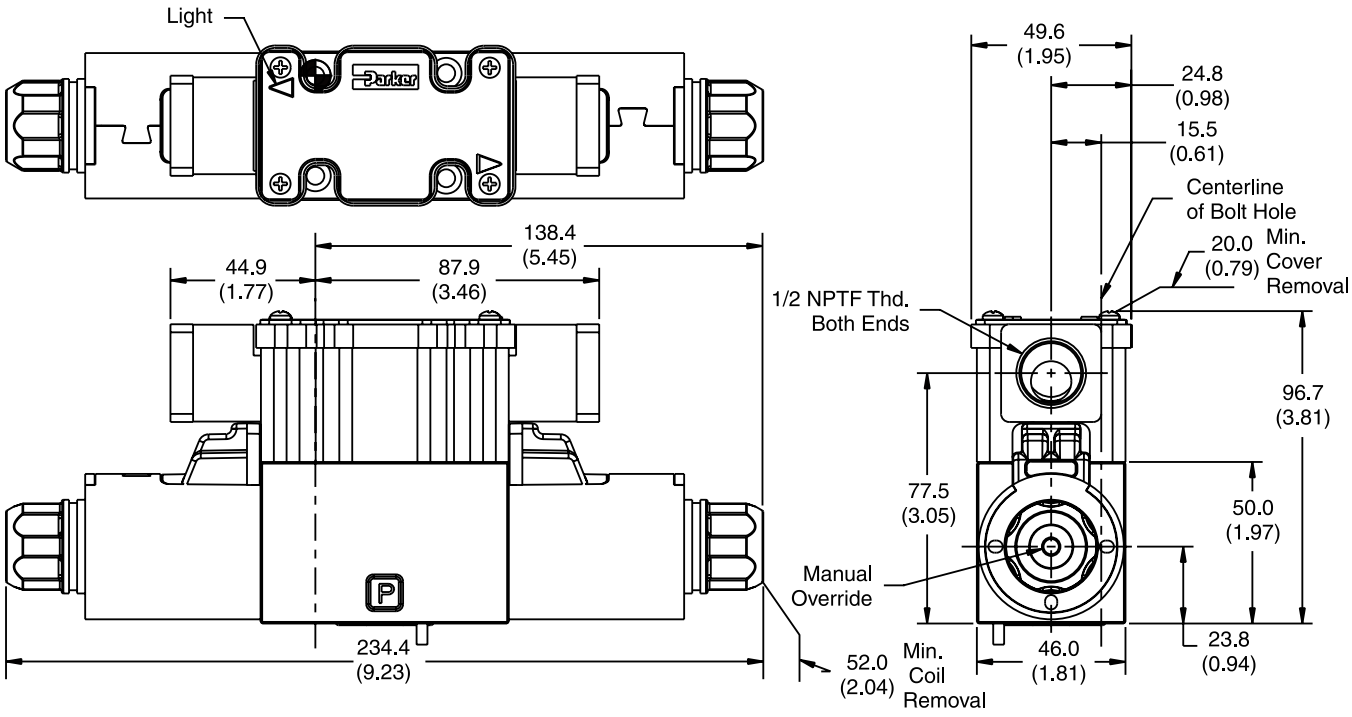
D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

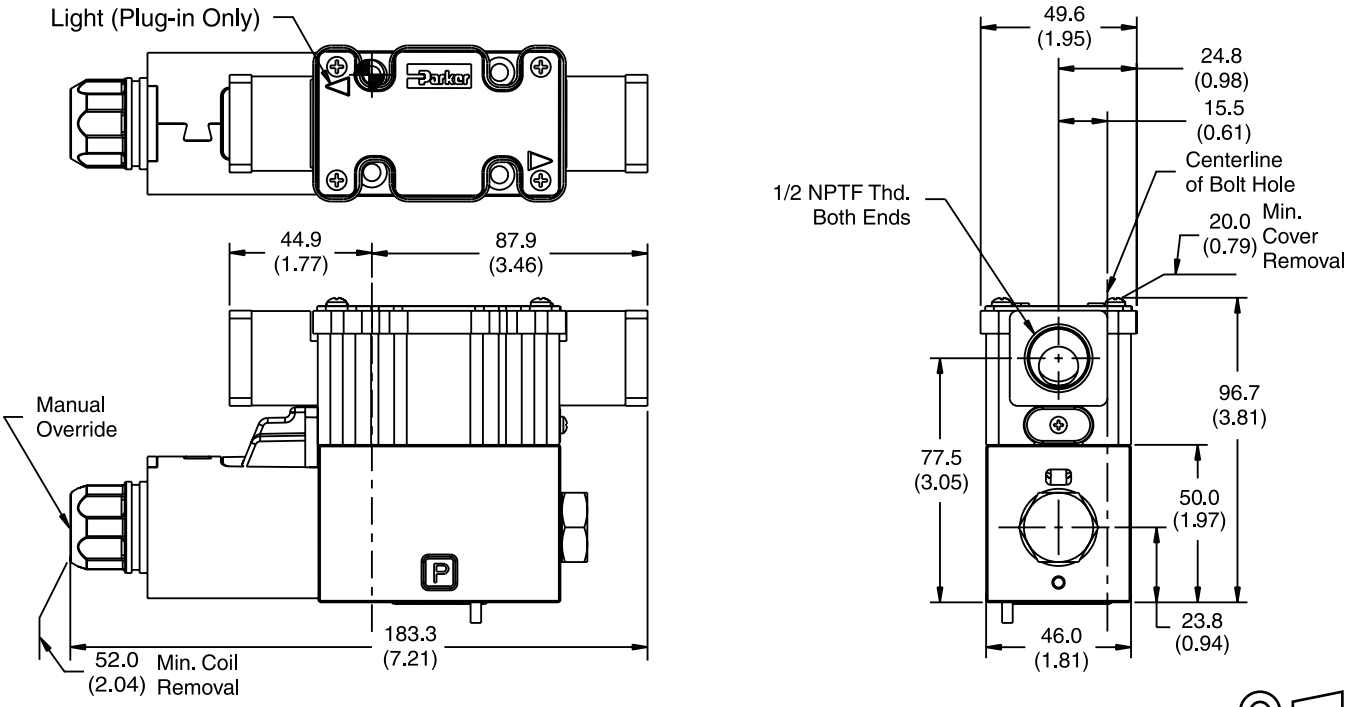
A

DC Plug-In Conduit Box Connector, with Lights, Double Solenoid



Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

DC Plug-In or Leadwire Conduit Box Connector, with or without Lights, Single Solenoid



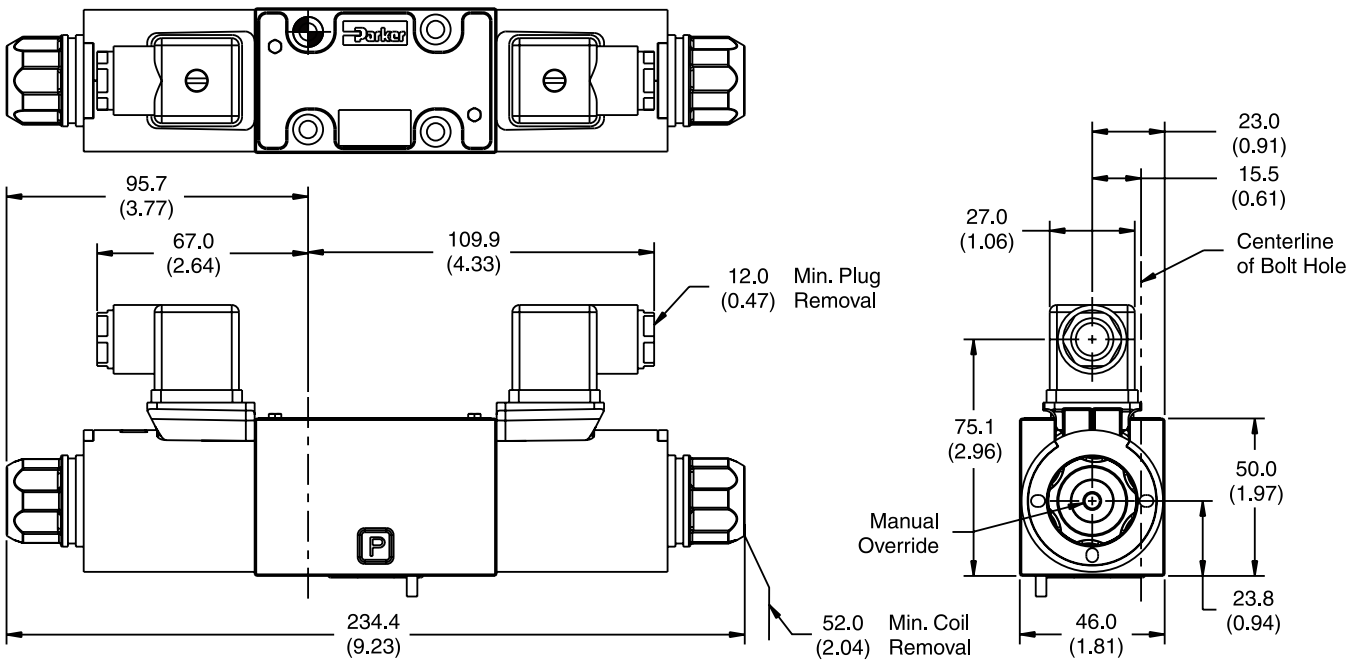
Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

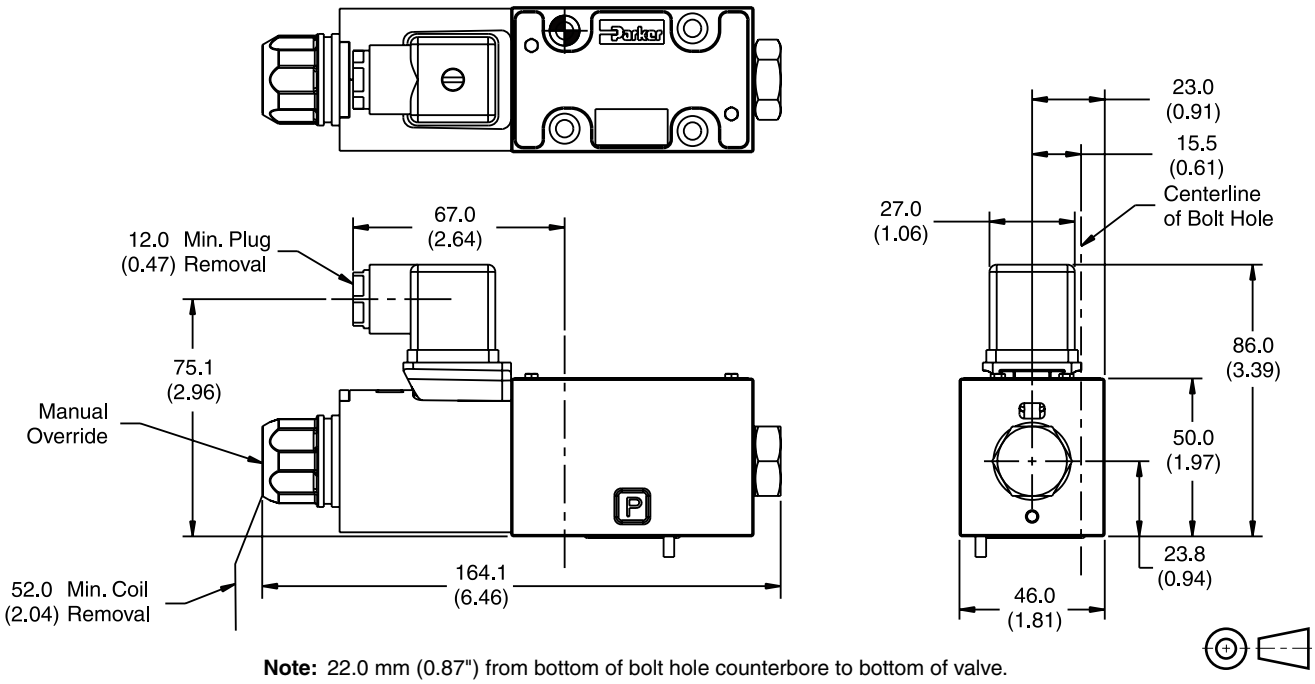
Inch equivalents for millimeter dimensions are shown in (**)

DC DIN with Plug Connector, Double Solenoid
"P" Option Shown



Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

DC DIN Connector, Single Solenoid
"P" Option Shown



Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

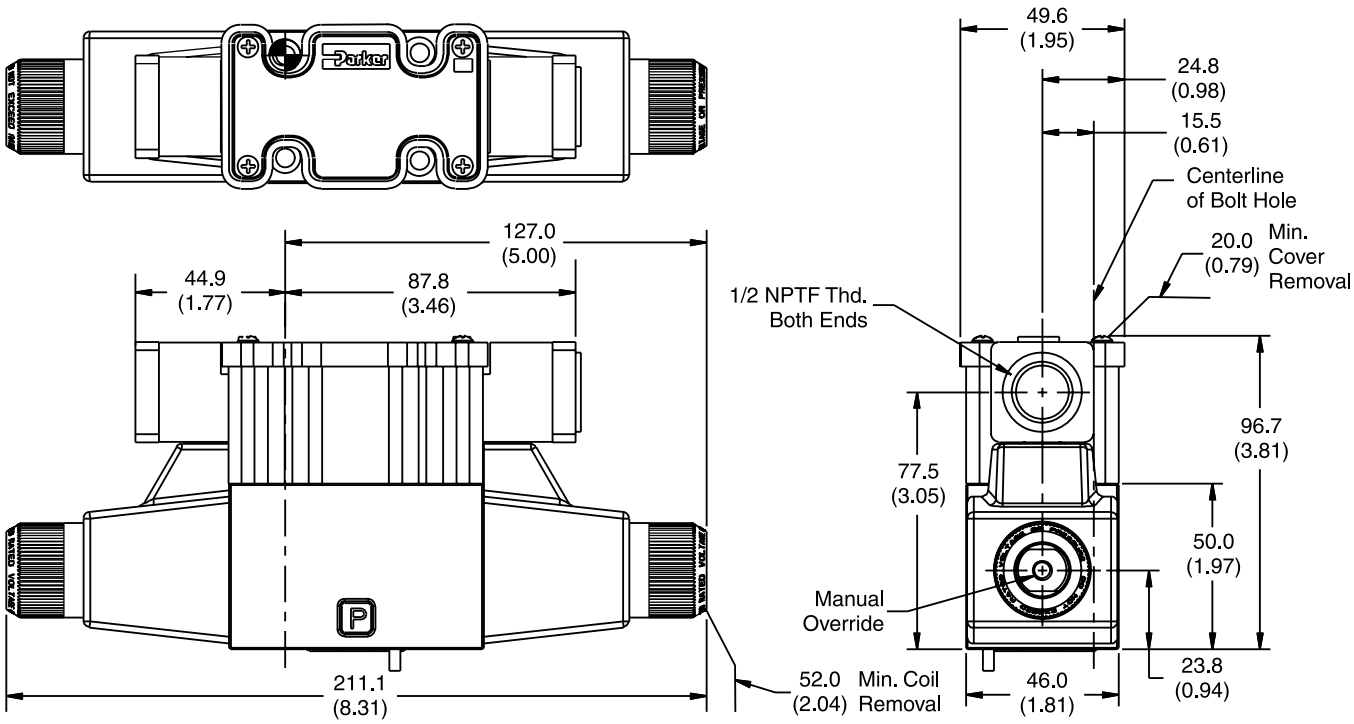
D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

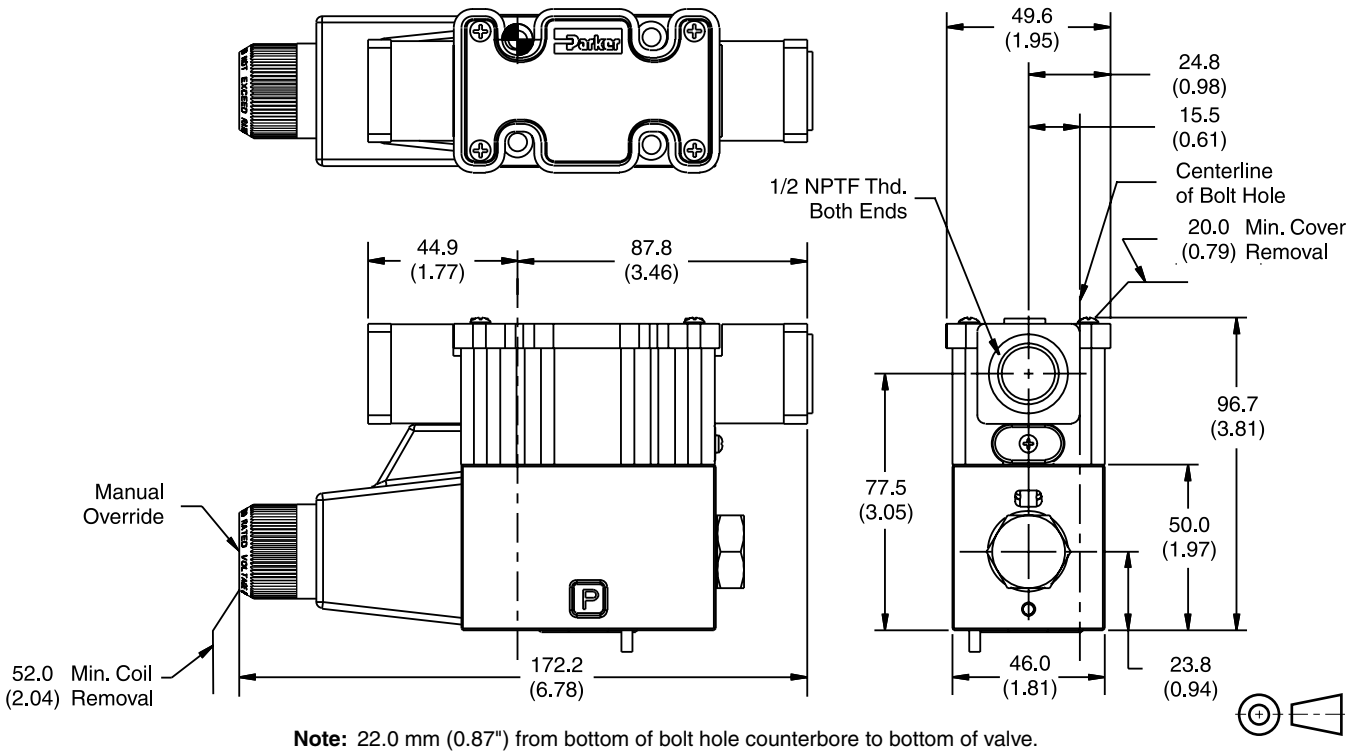
A

AC Leadwire Conduit Box Connector, without Lights, Double Solenoid, "C" Option



Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

AC Leadwire Conduit Box Connector, without Lights, Single Solenoid, "C" Option



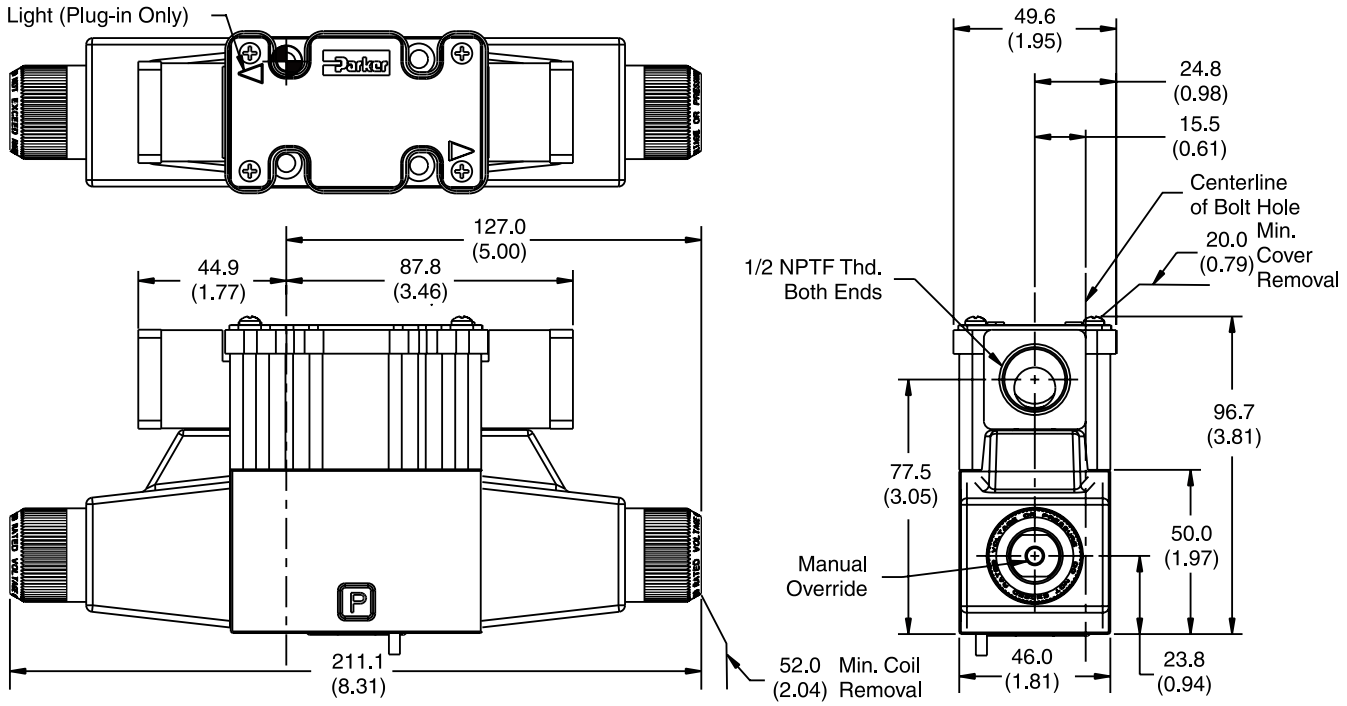
Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

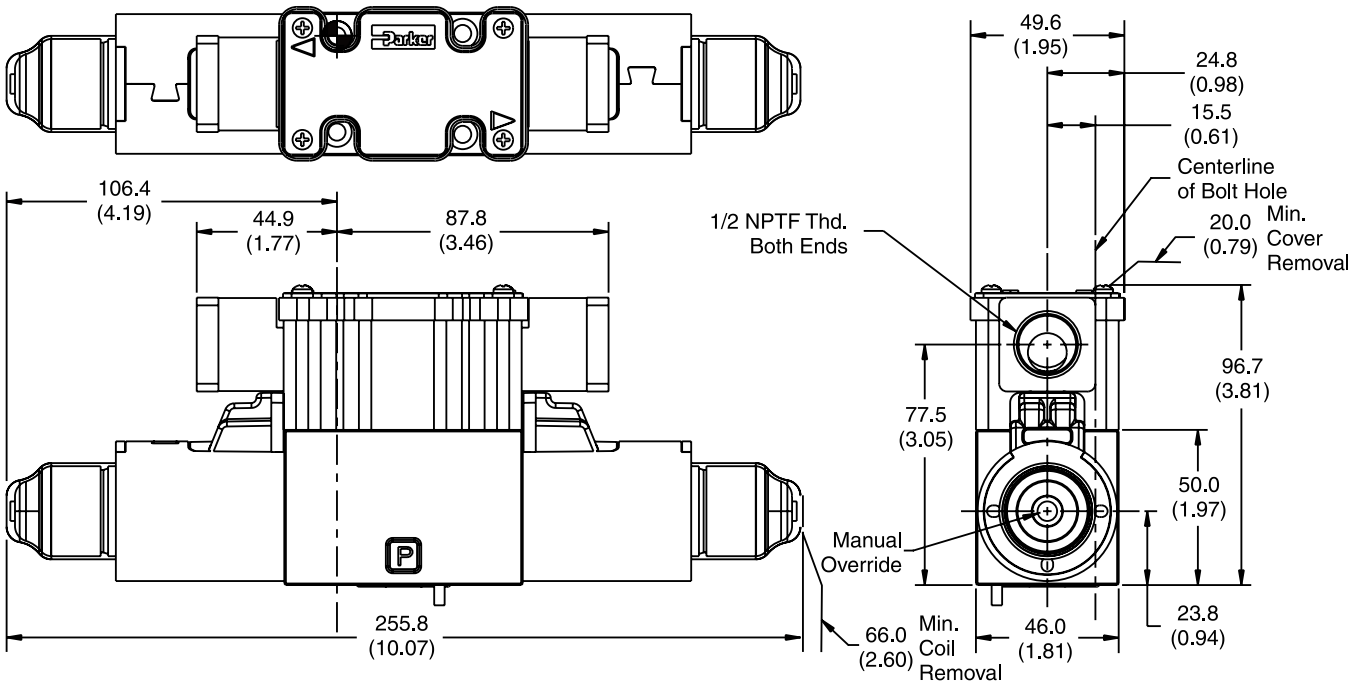
Inch equivalents for millimeter dimensions are shown in (**)

AC Plug-in Conduit Box Connector, with Lights, Double Solenoid, "G" Option



Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

DC Plug-in or Leadwire Conduit Box Connector, with or without Lights and Extended Override Tubes, Double Solenoid



Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

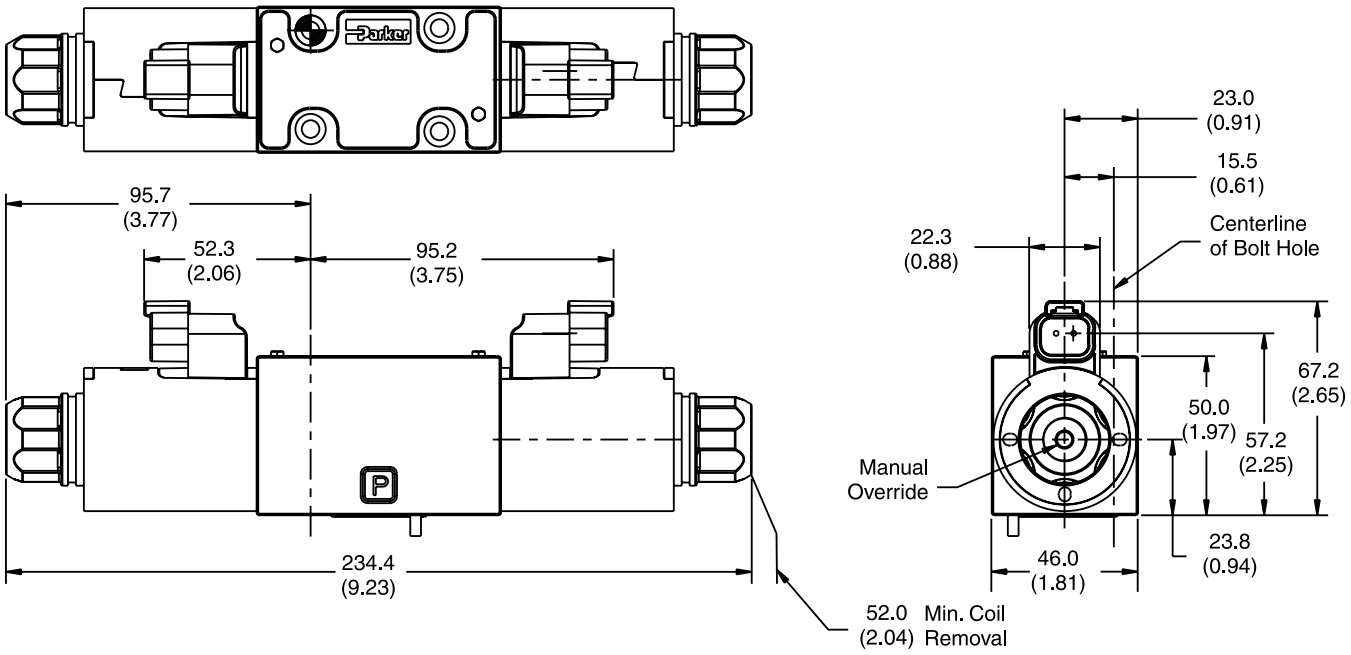
D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

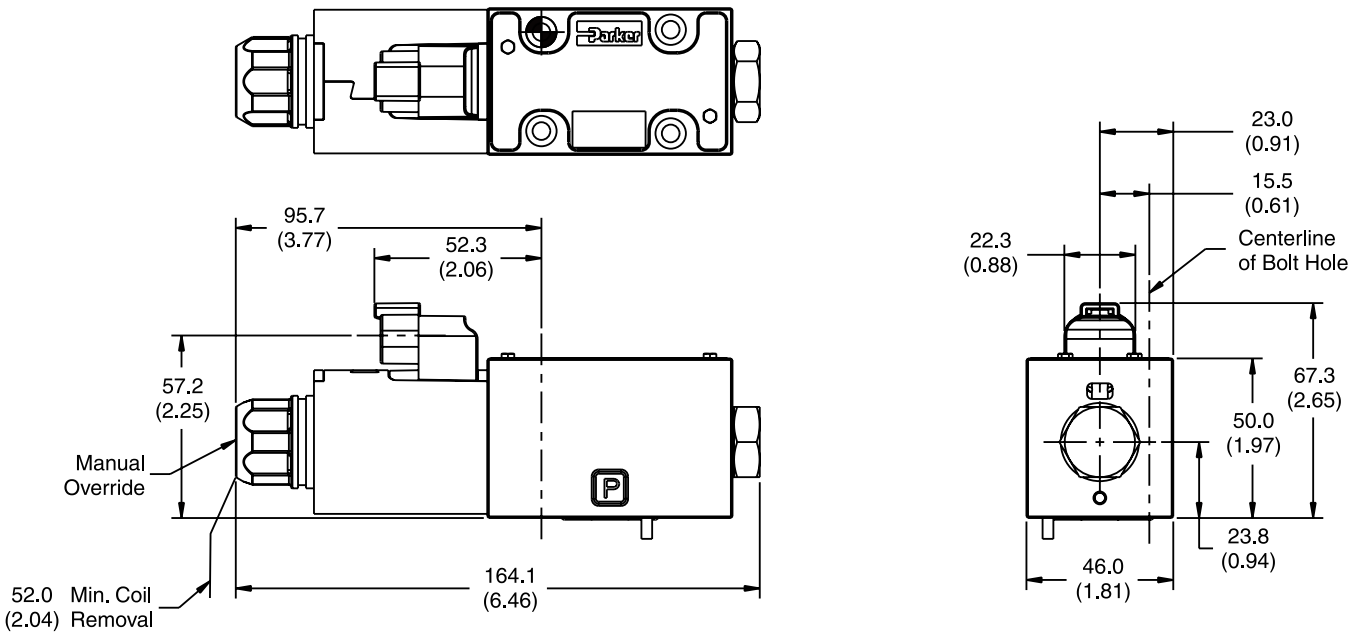
A

DC Deutsch Connector, Double Solenoid



Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

DC Deutsch Connector, Single Solenoid



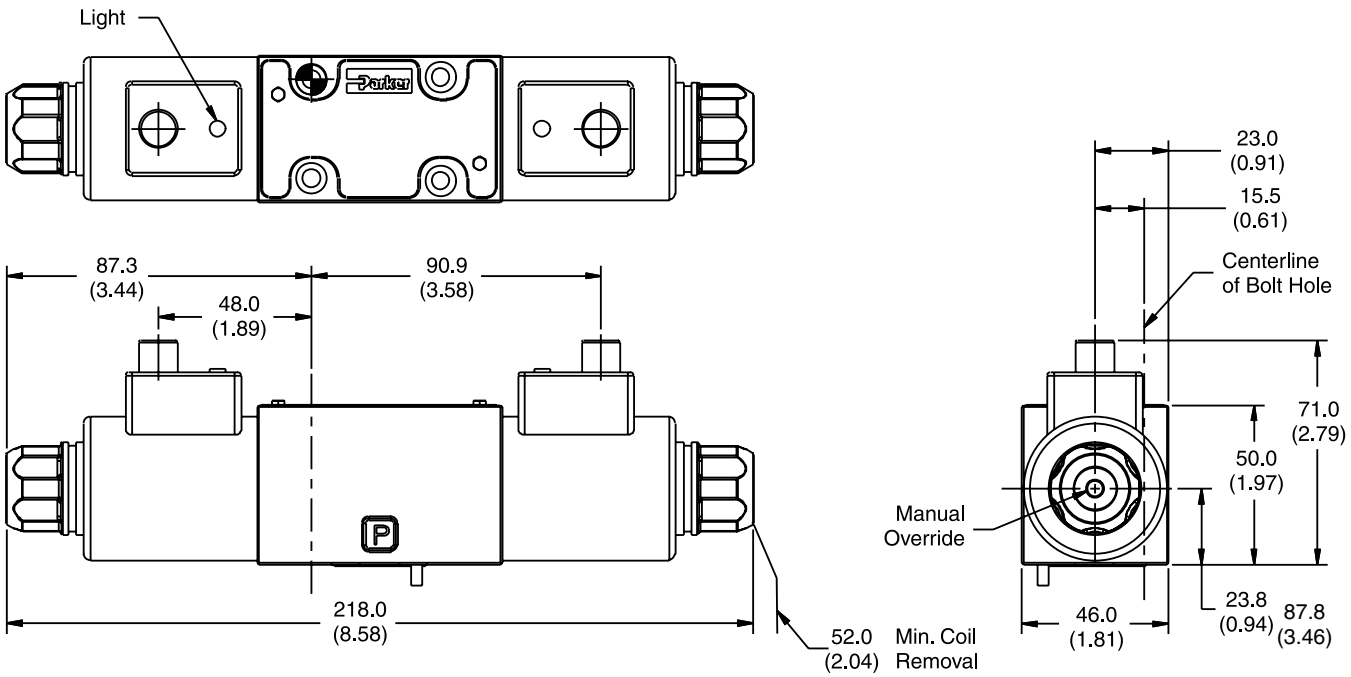
Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

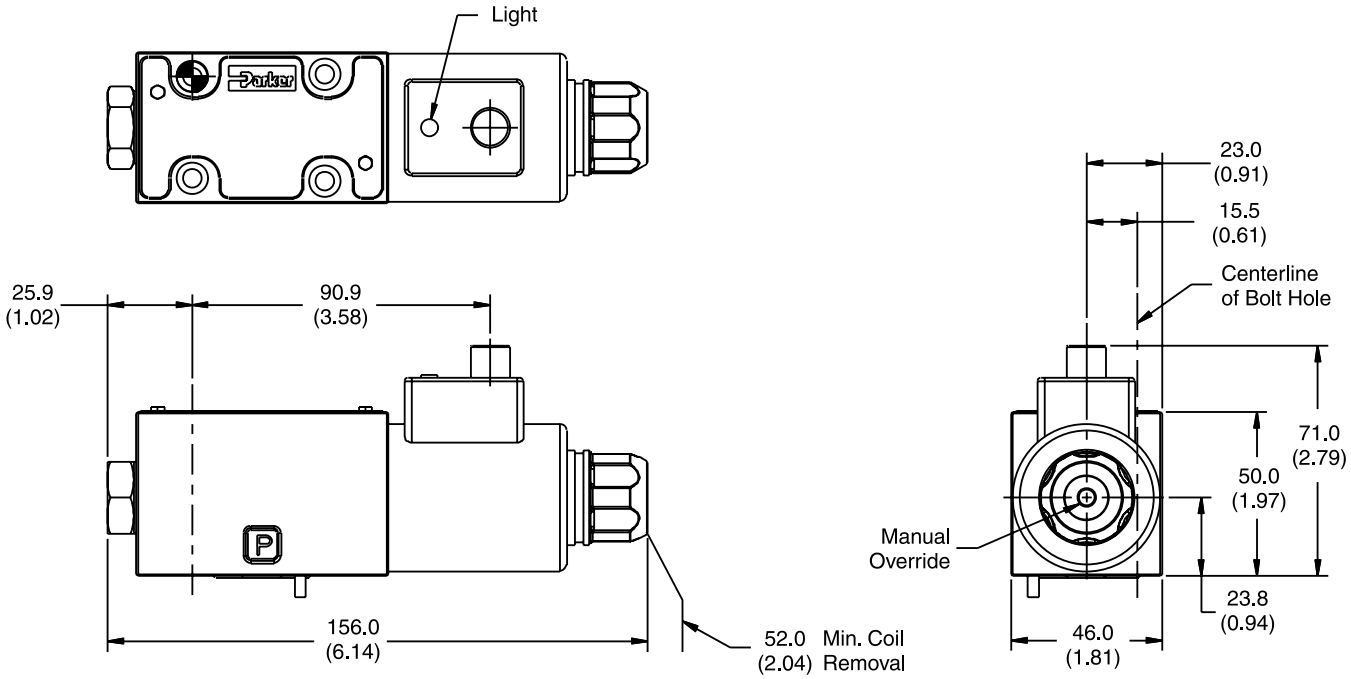
Inch equivalents for millimeter dimensions are shown in (**)

DC Desina Connector, Double Solenoid



Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

DC Desina Connector, Single Solenoid



Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

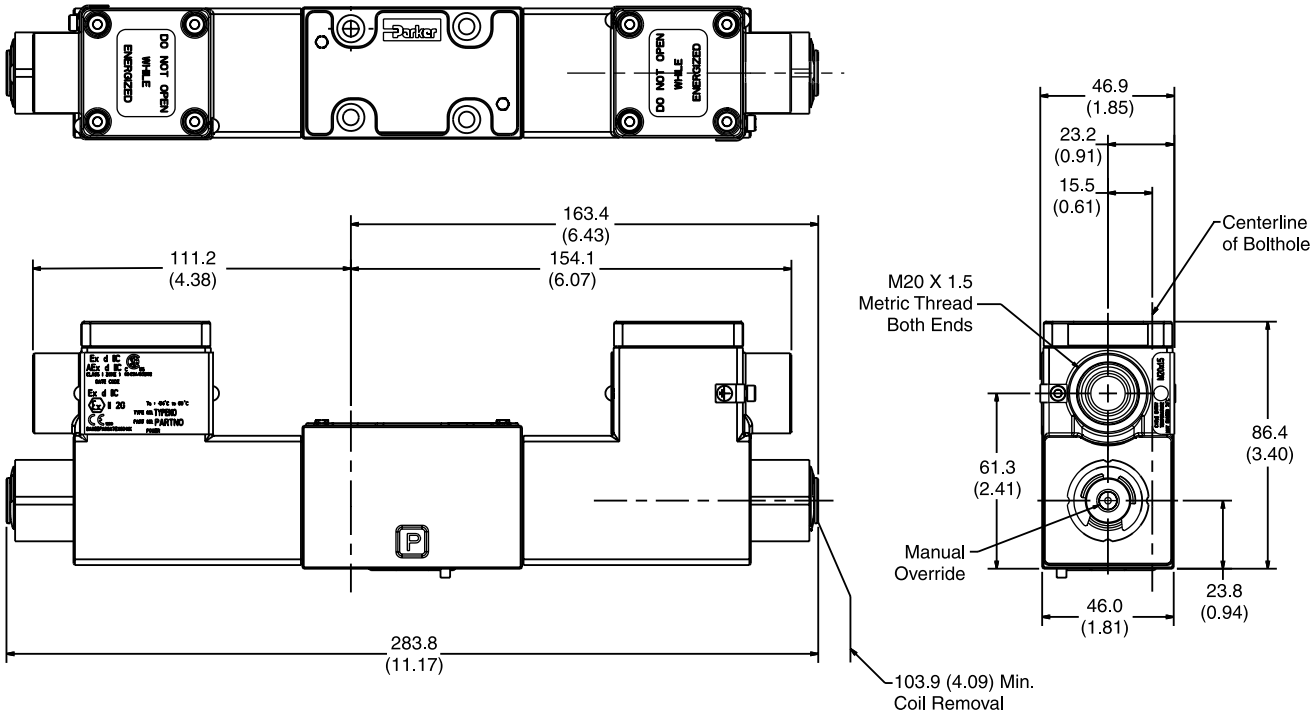
D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

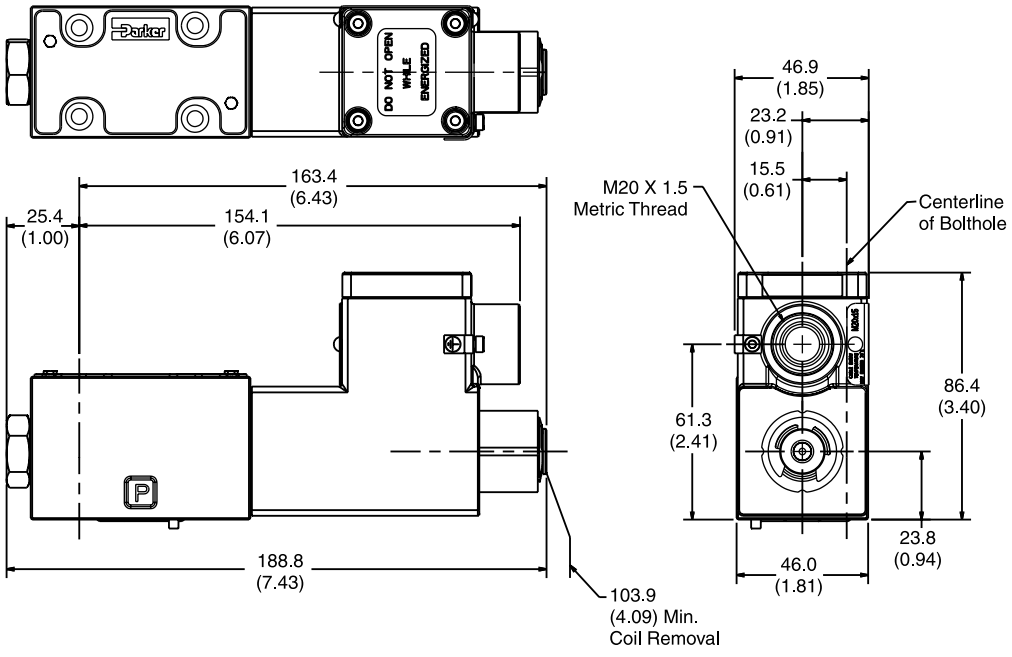
Inch equivalents for millimeter dimensions are shown in (**)

A

Explosion Proof, Ex d IIC ATEX/CSA, Double Solenoid

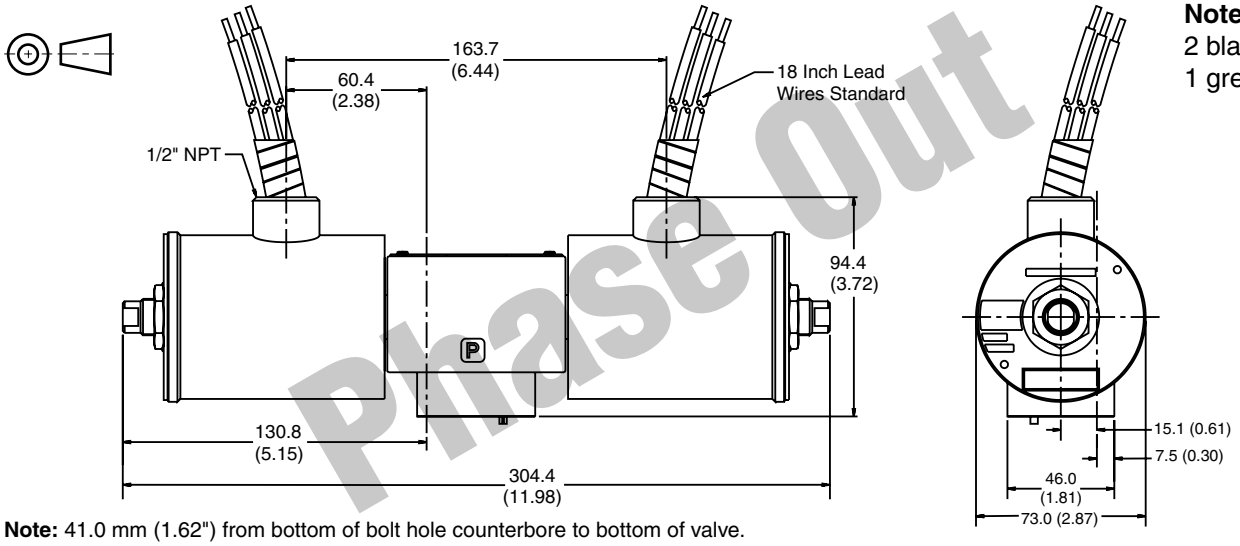


Explosion Proof, Ex d IIC ATEX/CSA, Single Solenoid



Inch equivalents for millimeter dimensions are shown in (**)

Explosion Proof U.L. & C.S.A., Double Solenoid

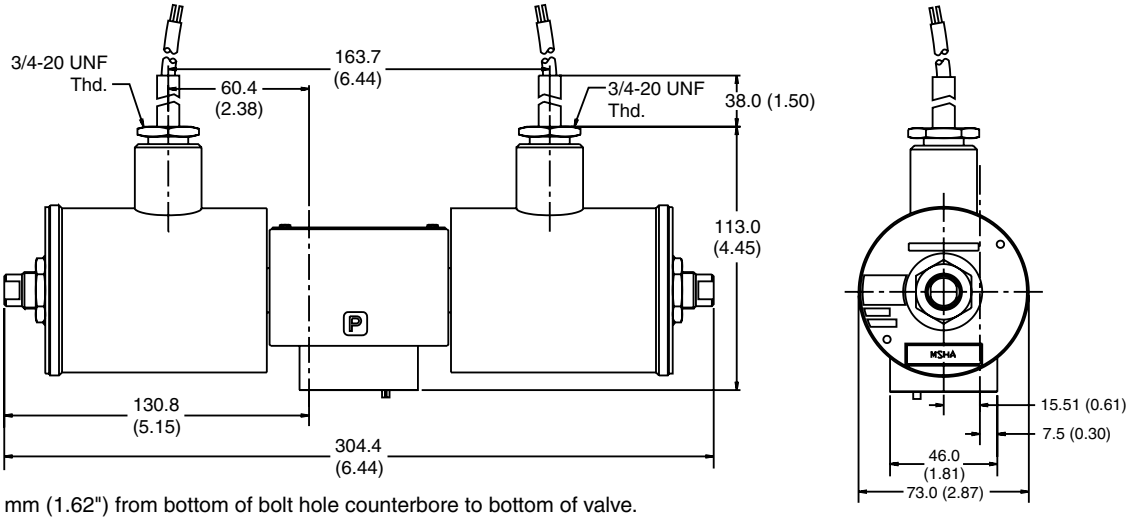


Note:
2 black wires
1 green wire

Phase Out

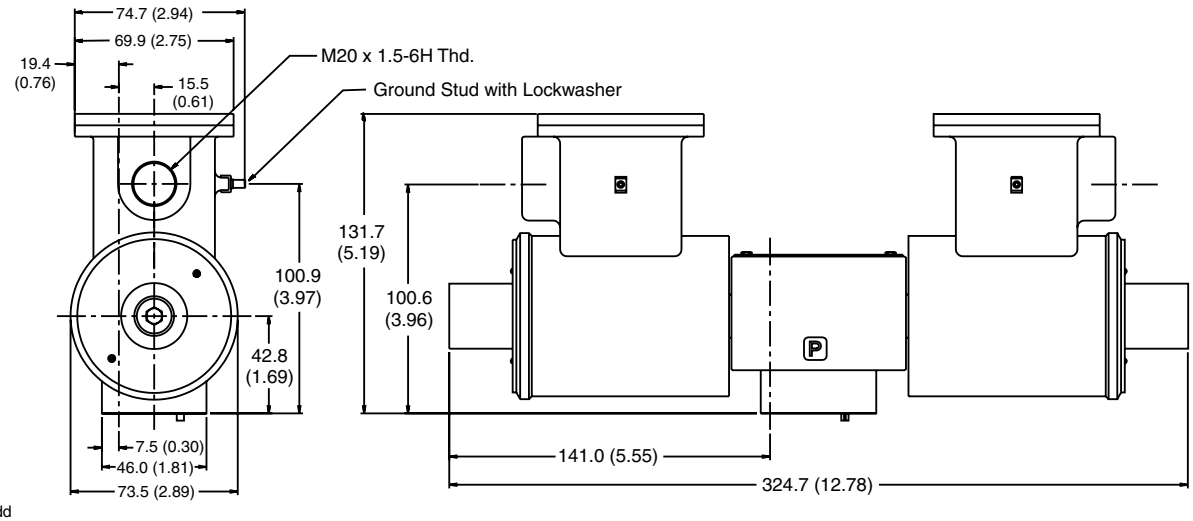
Note: 41.0 mm (1.62") from bottom of bolt hole counterbore to bottom of valve.

Explosion Proof M.S.H.A., Double Solenoid



Note: 41.0 mm (1.62") from bottom of bolt hole counterbore to bottom of valve.

Explosion Proof, EEXD ATEX, Double Solenoid



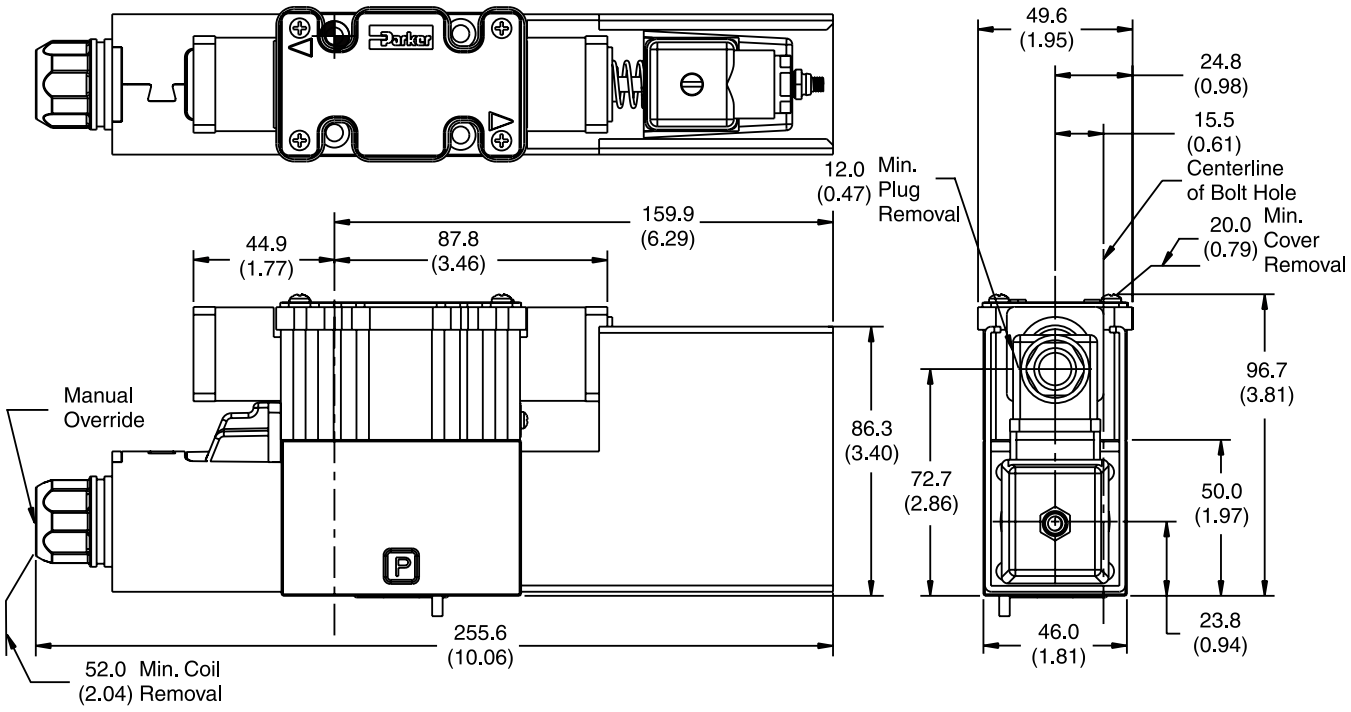
D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

A

DC Plug-in or Leadwire Conduit Box with Monitor Switch, with or without Lights, Single Solenoid



Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

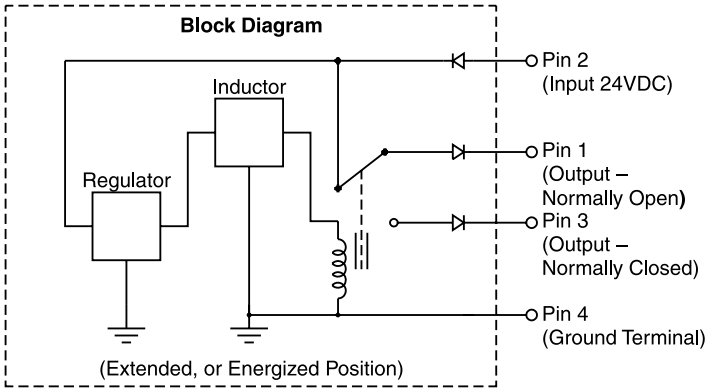
Monitor Switch

(Variation I7 and I8)

This feature provides for electrical confirmation of the spool shift. This can be used in safety circuits, to assure proper sequencing, etc.

Switch Data

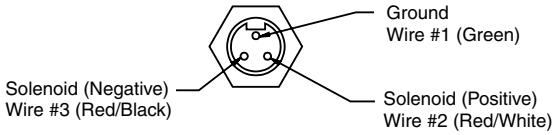
Inductive switch requiring +18-42 volt input. Outputs “A” and “B” are opposite; one at “0” voltage, the other at input voltage. During switching, “A” and “B” outputs reverse. Provides 0.4A switching current.



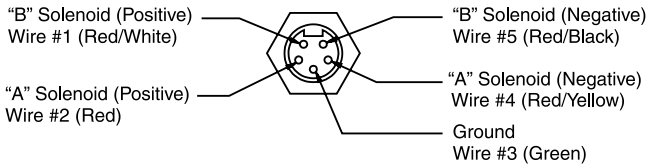
For repetitive switch power-up conditions, please consult factory.

Manaplug (Options 56 & 1C)

Interface
- Brad Harrison Plug
- 3-Pin for Single Solenoid
- 5-Pin for Double Solenoid

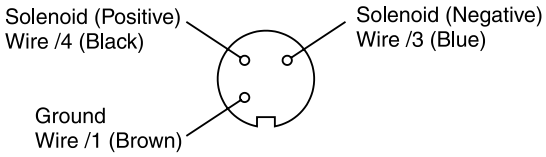


3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

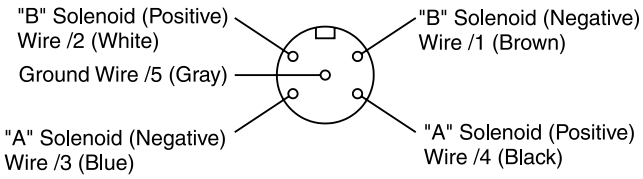


5-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7B & 1D)



3-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

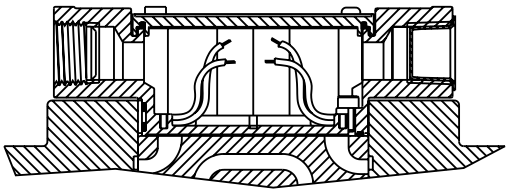


5-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

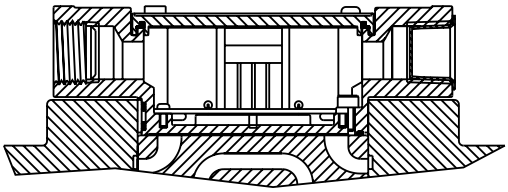
Conduit Box Option C

- No Wiring Options Available



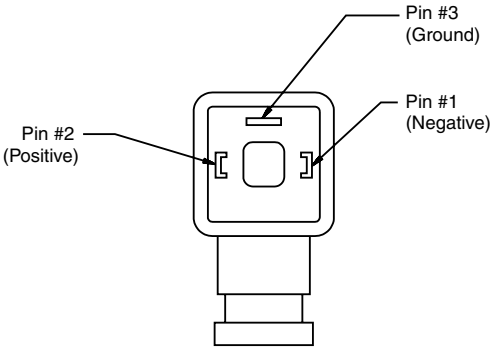
Signal Lights (Option 5) — Plug-in Only

- LED Interface
- Meets Nema 4/IP67



Hirschmann Plug with Lights (Option P5)

ISO 4400/DIN 43650 Form "A"

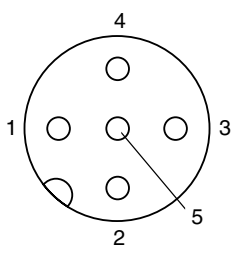


Face View of Plug

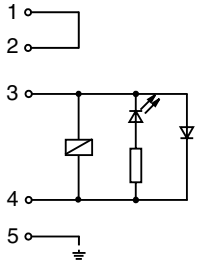
DESINA Connector (Option D)

M12 pin assignment Standard

1 = Not used
2 = Not used
3 = 0V
4 = Signal (24 V)
5 = Earth Ground



DESINA – design
Pin 1 and 2
connected



Pins are as seen on valve (male pin connectors)

D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Mounting Bolt Kits

Bolt Kits for use with D1V Directional Control Valves, "ET" Explosion Proof & Sandwich Valves (D1V*-91, 82 & 70/75 Design, Solenoid Operated & D1V*-72 Design, Non-Solenoid Operated)

Number of Sandwich Valves at 44.5mm (1.75") Thickness	Number of Sandwich Valves @40mm (1.58") thickness									
	0		1		2		3		4	
0	BK209	1.25 in.	BK243	2.88 in.	BK225	4.38 in.	BK244	6.00 in.	BK245	7.50 in.
	BKM209	30 mm	BKM243	70 mm	BKM225	110 mm	BKM244	150 mm	BKM245	190 mm
1	BK246	3.00 in.	BK247	4.62 in.	BK248	6.12 in.	BK249	7.75 in.		
	BKM246	75 mm	BKM247	115 mm	BKM248	155 mm	BKM249	195 mm		
2	BK250	4.75 in.	BK251	6.38 in.	BK252	7.88 in.				
	BKM250	120 mm	BKM251	160 mm	BKM252	200 mm				
3	BK253	6.50 in.	BK254	8.12 in.						
	BKM102	170 mm	BKM254	205 mm						
4	BK103	8.25 in.								
	BKM103	210 mm								

Note: All bolts are SAE Grade 8, 10-24 UNC 2A thread (Metric-M5-0.8)
Torque to 5.6 Nm (50 in-Lb).

Bolt Kits for use with D1V Directional Control Valves with Explosion Proof Coils & Sandwich Valves (D1V*-91, 82 & 70/75 Design) Except "ET" Coil

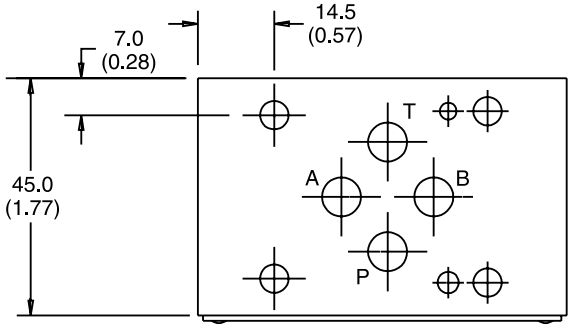
Number of Sandwich Valves at 44.5mm (1.75") Thickness	Number of Sandwich Valves @40mm (1.58") thickness									
	0		1		2		3		4	
0	BK50	2.00 in.	BK211	3.63 in.	BK101	5.12 in.	BK102	6.75 in.	BK103	8.25 in.
	BKM50	50 mm	—		BKM101	130 mm	BKM102	170 mm	BKM103	210 mm
1	BK51	3.75 in.	BK212	5.37 in.	BK105	6.87 in.	BK106	7.75 in.		
	BKM51	95 mm	—		BKM105	180 mm	BKM106	195 mm		
2	BK52	5.50 in.	BK213	7.13 in.	BK108	8.62 in.				
	BKM52	140 mm	—		BKM108	220 mm				
3	BK53	7.25 in.	BK214	8.87 in.						
	BKM53	185 mm	—							
4	BK54	9.00 in.								
	BKM54	230 mm								

Note: All bolts are SAE Grade 8, 10-24 UNC 2A thread (Metric-M5-0.8)
Torque to 5.6 Nm (50 in-Lb).

Sandwich Valve Dimensional Data

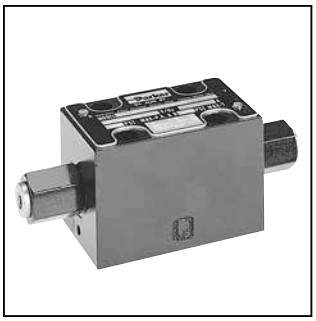
All D03 Sandwich valves (starting with 31 Series) including CM2, CPOM2, FM2, PRDM2 and RM2 measure 40mm (1.58") thickness.

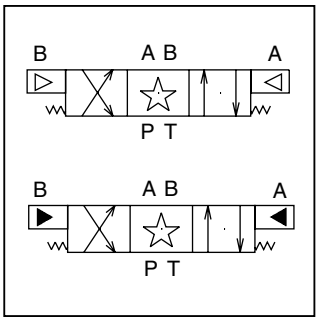
For additional technical information about Sandwich valves, refer to the Sandwich Valve Section of this Catalog.



General Description

Series D1VA and D1VP directional control valves are high performance, 4 and 5-chamber, direct operated, air and oil pilot controlled, 3 or 4-way valves. They are available in 2 or 3-position and conform to NFPA's D03, CETOP 3 mounting patterns.





Features

- Low pilot pressure required.
  D1VA – 4.1 Bar (60 PSI) minimum
  D1VP – 15.2 Bar (220 PSI) minimum

Air Operated

Shift Volume. The air pilot chamber requires a volume of 1.8 cc (.106 in.^{3}) for complete shift from center to end.

Pilot Piston. The pilot piston area is 506 mm^2 (.785 in.^{2}). Pilot piston stroke is 3.4 mm (.135 in.).

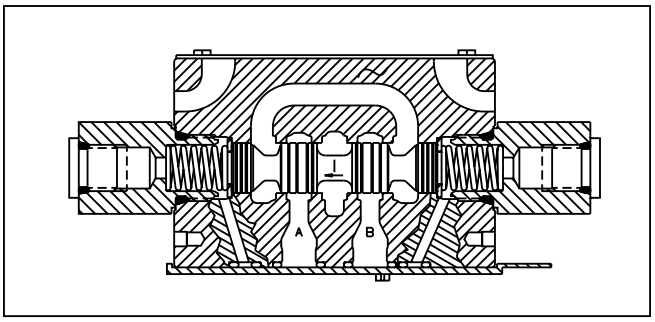
Response Time. Response time will vary with pilot line size, pilot line length, pilot pressure, air control valve shift time and air valve flow capacity (Cv).

Oil Operated

Shift Volume. The hydraulic pilot chamber requires a volume of 0.7 cc (.042 in.^{3}) for complete shift from center to end.

Pilot Piston. The hydraulic piston area is 198 mm^2 (.307 in.^{2}). Pilot piston stroke is 3.4 mm (.135 in.).

Response Time. Response time will vary with pilot line size, pilot line length, pilot pressure, pilot valve shift time and oil valve flow capacity (GPM).

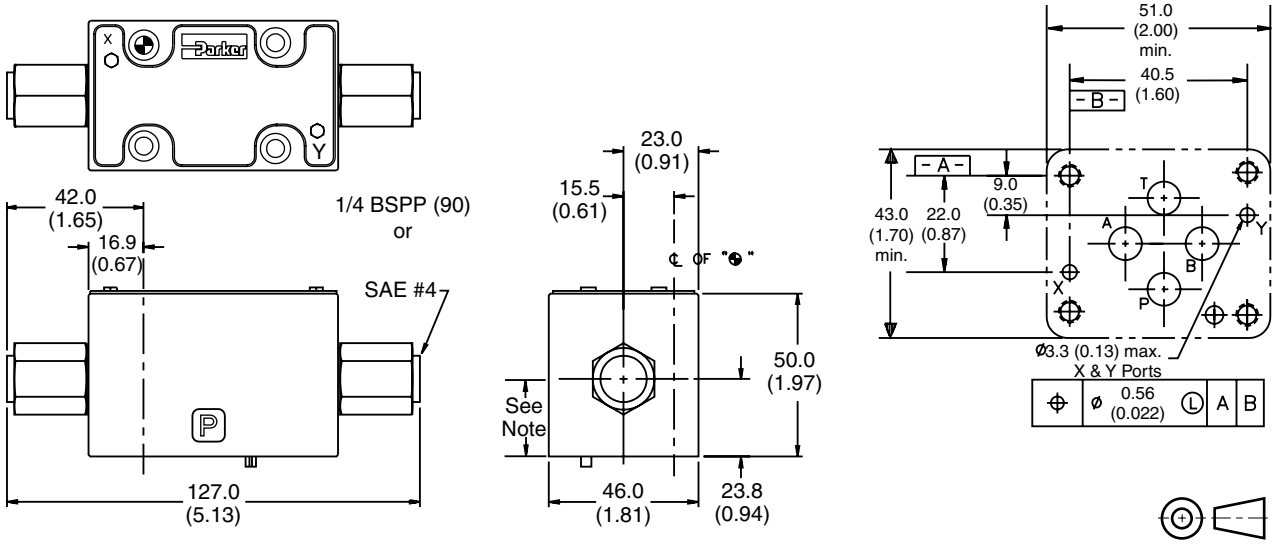


Specifications

Mounting Pattern	NFPA D03, CETOP 3, NG 6
Maximum Pressure	Operating: 345 Bar (5000 PSI) Tank Line: D1VA 34 Bar (500 PSI) D1VP 207 Bar (3000 PSI)
Maximum Flow	See Reference Data
Pilot Pressure	D1VA: Air Minimum 4.1 Bar (60 PSI) Air Maximum 10.2 Bar (150 PSI) D1VP: Oil Minimum 15.2 Bar (220 PSI) Oil Maximum 207 Bar (3000 PSI)

Dimensions – Inch equivalents for millimeter dimensions are shown in (**)

Oil Operated D1VP, Single and Double Pilot



Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

D — Directional Control Valve

1V — Basic Valve
NFPA D03
CETOP 3

P — Actuator
Oil Operator

Spool

Style

Seal

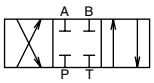
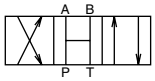
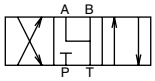
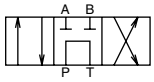
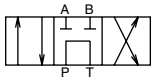
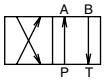
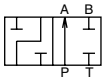
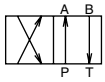
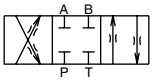
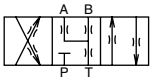
Variations

Design Series
NOTE: Not required when ordering.

Code	Description
Omit	**Standard**
P10*	Monitor Switch
4F	Heavy Duty Detent
90	BSPP Threads

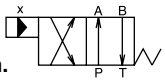
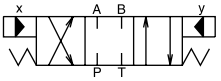
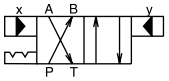
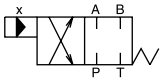
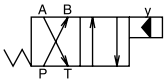
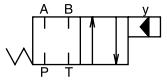
* Not available on C and D styles. Not CE or CSA approved.

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Code	Symbol
001	
002	
004	
008*	
009**	
020*	
026*	
030**	
081	
082	

* 008, 020 and 026 spools have closed crossover.

** 009 and 030 spools have open crossover.

Code	Description	Symbol
B#	**Single operator, two position spring offset. P to A and B to T in offset position.**	
C	**Double operator, three position, spring centered.**	
D	**Double operator, two position, detent.**	
E#	Two position, spring centered. P to B and A to T in shifted position.	
H#	**Single operator, two position, spring offset. P to B and A to T in offset position.**	
K#	Two position, spring centered. P to A and B to T in shifted position.	

\# D available with 020 and 030 spools only.
B & H available with 020, 026 and 030 spools only.
E & K not available with 020, 026 and 030 spools.

This condition varies with spool code.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator X. Note operators reverse sides for #008 and #009 spools. See installation information for details.

Valve Weight:	1.90 kg (4.2 lbs.)
Standard Bolt Kit:	BK209 10–24x1.25
Metric Bolt Kit:	BKM209 M5–0.8x30mm
Seal Kit:	
Nitrile	SKD1VP
Fluorocarbon	SKD1VPV

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

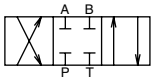
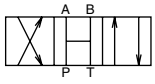
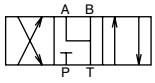
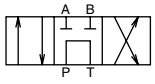
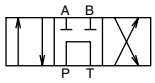
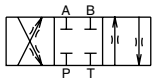
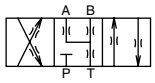
D1.indd, dd

D Directional Control Valve

1V Basic Valve
- NFPA D03 CETOP 3

A Actuator
- Air Operator

Spool

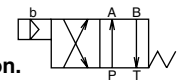
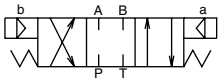
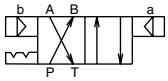
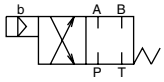
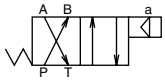
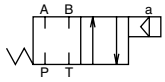
Code	Symbol
001	
002	
004	
008*	
009**	
081	
082	

* 008 spool has closed crossover.

** 009 spool has open crossover.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator A. Note operators reverse sides for #008 and #009 spools. See installation information for details.

Style

Code	Description	Symbol
B	**Single operator, two position spring offset. P to A and B to T in offset position.**	
C	**Double operator, three position, spring centered.**	
D	**Double operator, two position, detent.**	
E	Two position, spring centered. P to B and A to T in shifted position.	
H	**Single operator, two position, spring offset. P to B and A to T in offset position.**	
K	Two position, spring centered. P to A and B to T in shifted position.	

Seal

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Variations

Code	Description
Omit	**Standard**
P10*	Monitor Switch
90	1/4 BSPP Threads

* Not available on C & D styles.
Not CE or CSA approved.

Design Series
NOTE: Not required when ordering.

This condition varies with spool code.

Valve Weight:	1.60 kg (3.5 lbs.)
Standard Bolt Kit:	BK209 10–24x1.25
Metric Bolt Kit:	BKM209 M5–0.8x30mm Grade 8 bolts required
Seal Kit:	
Nitrile	SKD1VA
Fluorocarbon	SKD1VAV

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

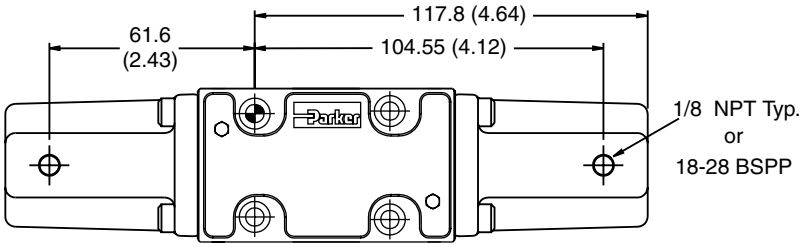
D1.indd, dd

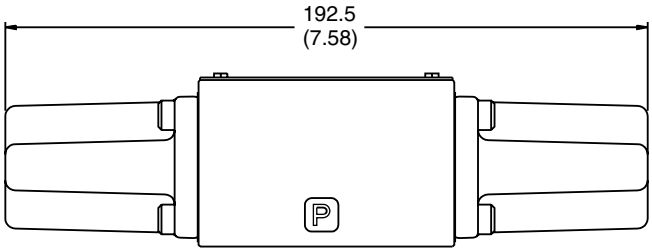
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

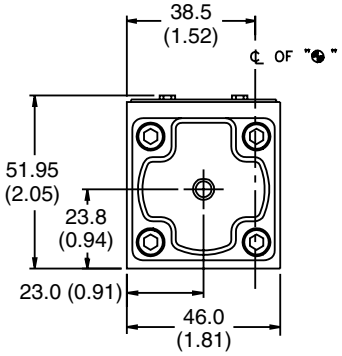
Inch equivalents for millimeter dimensions are shown in (**)

A

Air Operated D1VA, Double Pilot

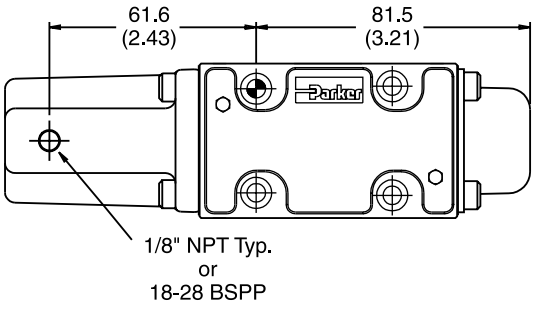


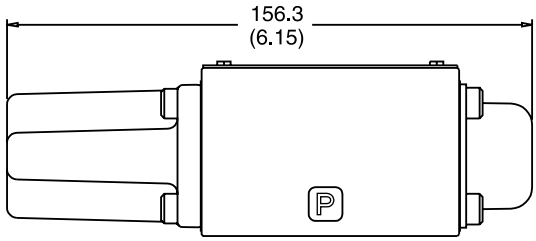


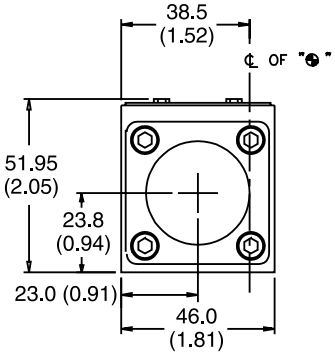


Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

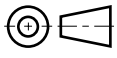
Air Operated D1VA, Single Pilot





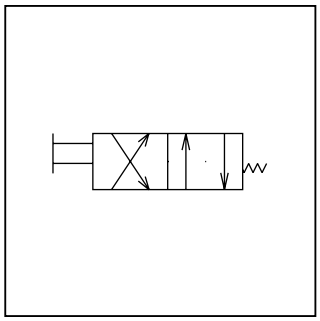


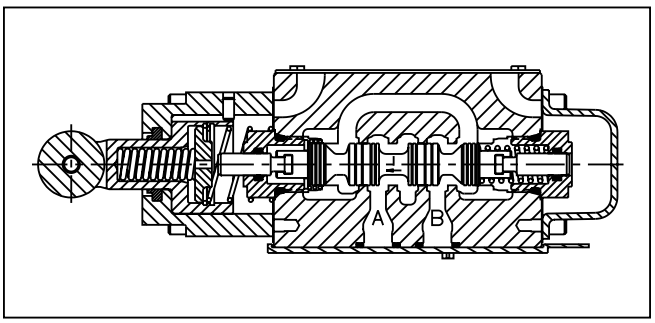
Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.



General Description

Series D1VC, D1VD and D1VG directional control valves are high performance, 4-chamber, direct operated, cam controlled, 4-way valves. They are available in 2-position and conform to NFPA's D03, CETOP 3 mounting patterns.





Features

- Choice of 2 cam roller positions (D1VC and D1VD)
- Two styles available (D1VC and D1VG)
- Short stroke option

Specifications

Mounting Pattern	NFPA D03, CETOP 3, NG 6
Maximum Pressure	Operating: 345 Bar (5000 PSI) Tank Line: 34 Bar (500 PSI)
Nominal Flow	32 LPM (8.5 GPM)
Maximum Flow	See Reference Data
Force Required to Shift	D1VC, D1VD: 107 N (24 lbs.) D1VG: 36 N (8 lbs.)
Maximum Cam Angle	30°

Ordering Information

D — Directional Control Valve

1V — Basic Valve

NFPA D03
CETOP 3

Actuator

Code	Description
C	**Cam (90° to mounting surface)**
D	**Cam parallel to mounting surface**
G	Cam Lever

Spool

Code	Symbol
001	
002	
004	
008*	
009†	
081	
082	

Style

Code	Description	Symbol
B	**Two position, spring offset operator at "A" port end.**	
H	**Two position, spring offset operator at "B" port end.**	

Valve schematic symbols are per NFPA/ ANSI standards, providing flow P to A when energized. Note flow paths reverse sides for #008 and #009 spools.

Seal

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Variations

Code	Description
Omit	**Standard**
P05	Short Stroke
P10*	Monitor Switch

* Not CE or CSA approved.

Design Series

NOTE: Not required when ordering.

Valve Weight: Type C & D 1.44 kg (3.2 lbs.)
Type G 1.6 kg (3.7 lbs.)
Standard Bolt Kit: BK209 1–24x1.25
Metric Bolt Kit: BKM209 M5–0.8x30mm
Seal Kit:
Nitrile SKD1VC
Fluorocarbon SKD1VCV

* 008 spool has closed crossover.
† 009 spool has open crossover.

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

D1.indd, dd

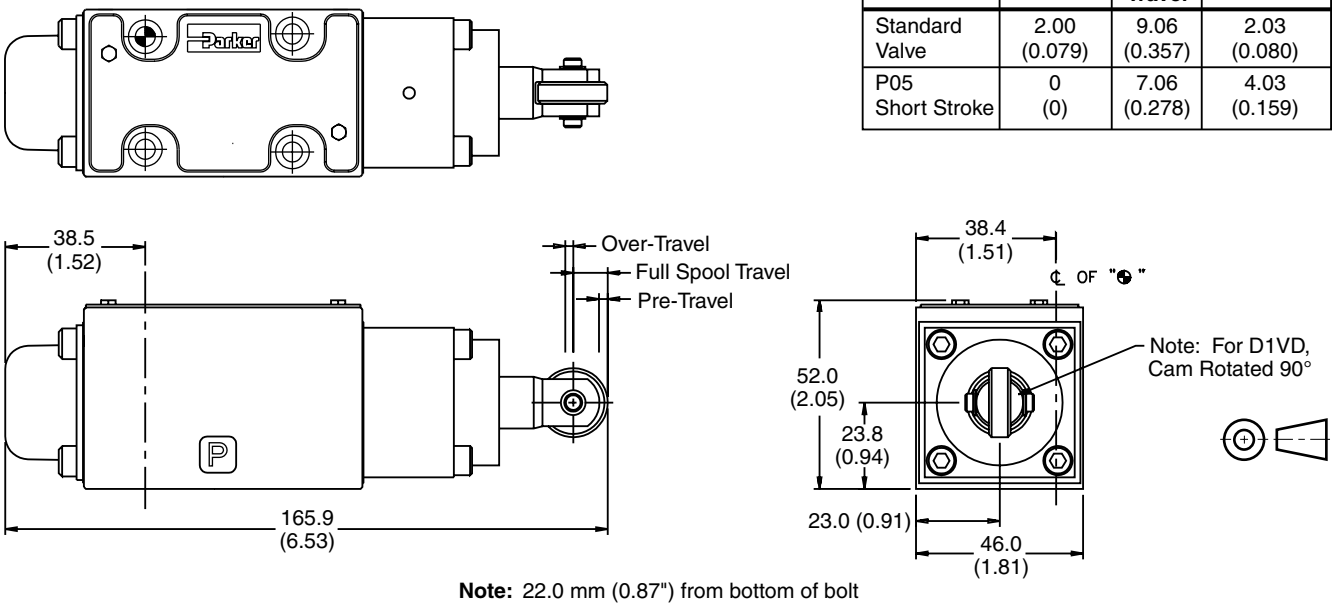
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

A

Cam Operated D1VC and D1VD

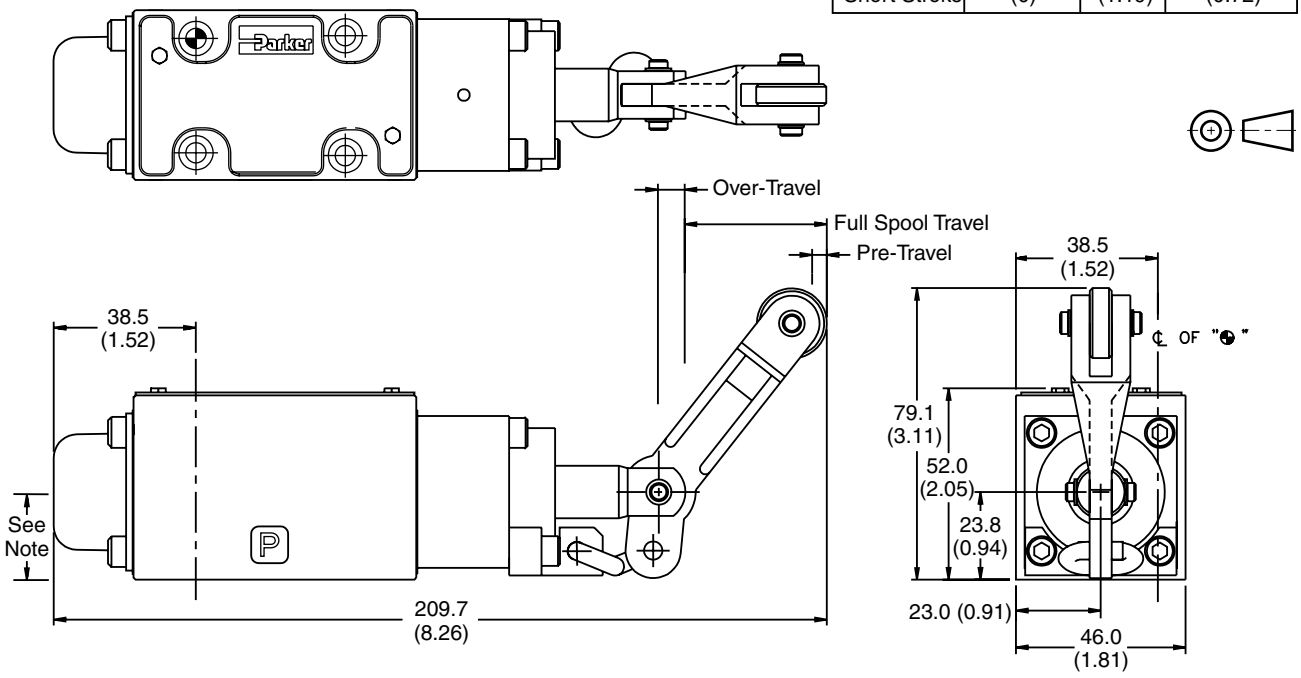
Valve Type	Pre-Travel	Full Spool Travel	Over-Travel
Standard Valve	2.00 (0.079)	9.06 (0.357)	2.03 (0.080)
P05 Short Stroke	0 (0)	7.06 (0.278)	4.03 (0.159)



Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

Cam Lever Operated D1VG

Valve Type	Pre-Travel	Full Spool Travel	Over-Travel
Standard Valve	6.95 (0.27)	39.63 (1.56)	10.00 (0.39)
P05 Short Stroke	0 (0)	30.12 (1.19)	18.40 (0.72)



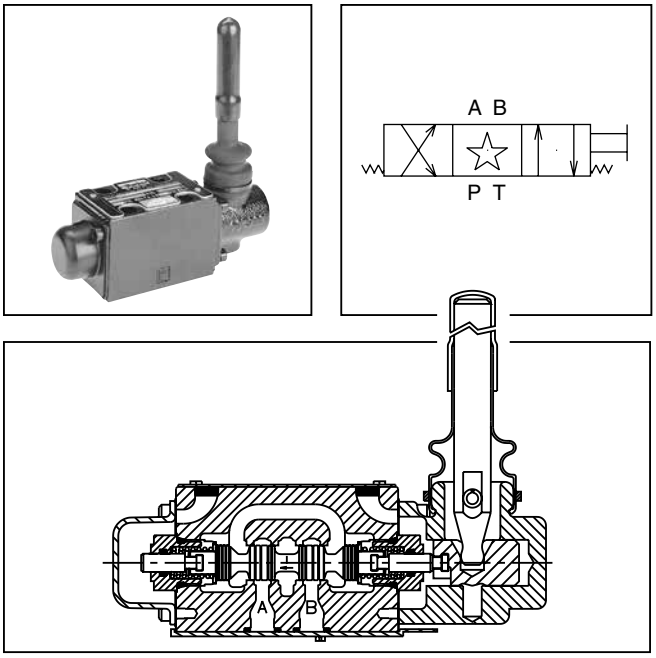
Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series D1VL directional control valves are high-performance, 4-chamber, direct operated, lever controlled, 4-way valves. They are available in 2 or 3-position and conform to NFPA's D03, CETOP 3 mounting patterns.



Features

- Spring return or detent styles available
- Heavy duty handle design

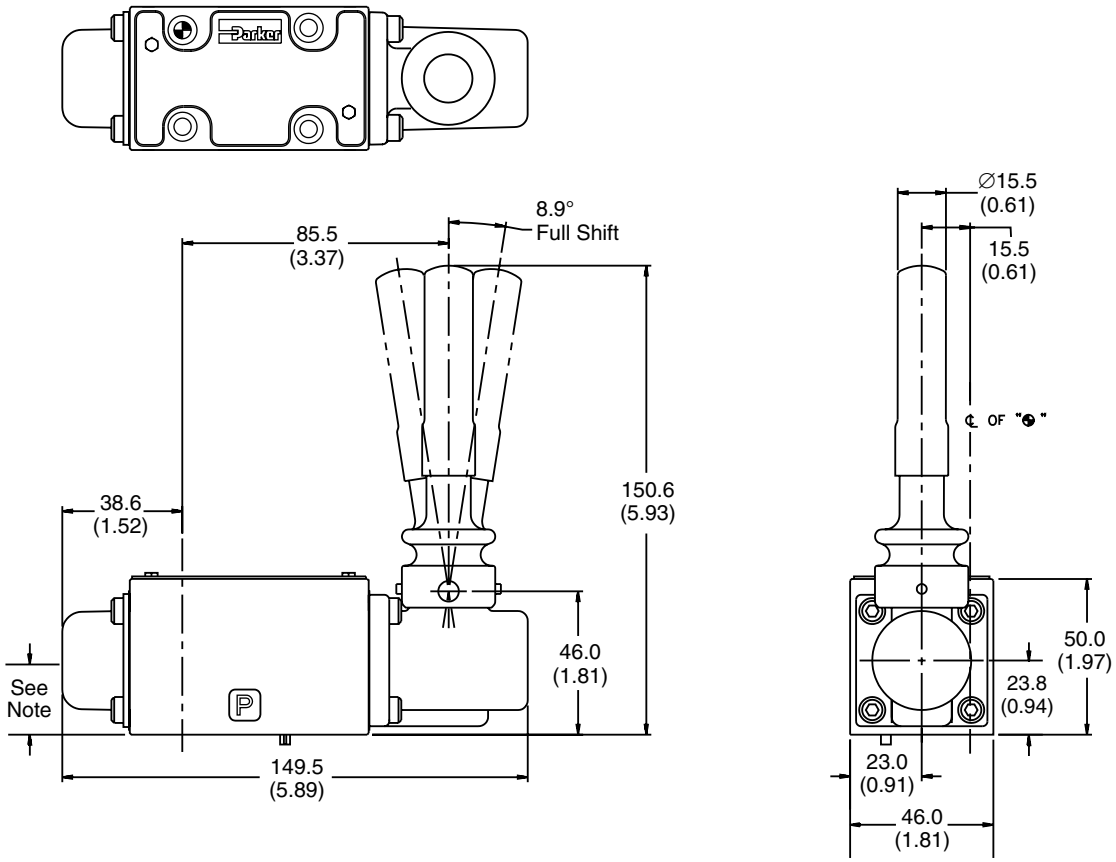
Specifications

Mounting Pattern	NFPA D03, CETOP 3, NG 6
Maximum Pressure	Operating: 345 Bar (5000 PSI) Tank Line: 34 Bar (500 PSI)
Maximum Flow	See Reference Data
Force Required to Shift Lever Operator	25 N (5.6 lbs)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

Lever Operated D1VL



Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

D — Directional Control Valve

1V — Basic Valve

NFPA D03
CETOP 3

Operator Type and Location

Spool

Style

Seal

Variations

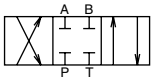
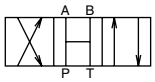
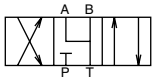
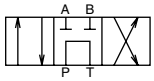
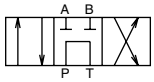
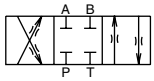
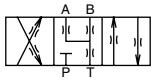
Design Series
NOTE: Not required when ordering.

Code	Description
Omit	**Standard**
P10*	Monitor Switch

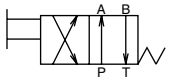
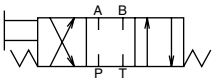
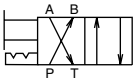
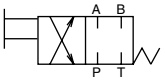
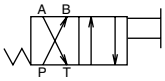
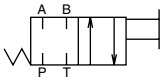
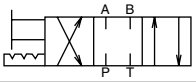
* Not available on C,D or N styles. Not CE or CSA approved.

Code	Operator Type	Operator Location (A or B Port End) For Valve Style						
		B	**C**	**D**	**E**	**H**	**K**	**N**
L	Lever (Standard)	B	B	B	A	B	B	B
LB	Lever (Alternate)	A	A	A	N/A	A	N/A	A

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Code	Symbol
001	
002	
004	
008*	
009†	
081*	
082	

* 008 and 081 spools have closed crossover.
† 009 has open crossover.

Code	Description	Symbol
B	**Two position, spring offset. P to A and B to T in offset position.**	
C	**Three position, spring centered.**	
D	**Two position, detent.**	
E	Two position, spring centered. P to B and A to T in shifted position.	
H	**Two position, spring offset. P to B and A to T in offset position.**	
K	Two position, spring centered. P to A and B to T in shifted position.	
N	Three position, detent.	

This condition varies with spool code.

Valve schematic symbols are per NFPA/ ANSI standards, providing flow P to A when energizing operator A. Note flow paths reverse sides for #008 and #009 spools in three position valves.

Valve Weight:	1.60 kg (3.5 lbs.)
Standard Bolt Kit:	BK209 10–24x1.25
Metric Bolt Kit:	BKM209 M5–0.8x30mm Grade 8 bolts required
Seal Kit:	
Nitrile	SKD1VL
Fluorocarbon	SKD1VLV

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

D1.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Fluid Recommendations

Premium quality hydraulic oil with a viscosity range between 32-54 cst. (150-250 SSU) at 38°C (100°F) is recommended. The absolute operation viscosity range is from 16-220 cst. (80-1000 SSU). Oil should have maximum anti-wear properties and rust and oxidation treatments.

Fluids and Seals

Valves using synthetic, fire-resistant fluids require special seals. When phosphate ester or its blends are used, FLUOROCARBON seals are required. Water-glycol, (95/5) water-in-oil emulsions, and petroleum oil may be used with NITRILE seals.

Temperature Recommendation

Recommended oil temperature:
-29°C to +71°C (-20°F to +160°F)

Ambient temperature:

AC High Watt ambient temperature cannot exceed 60°C (140°F).

DC High Watt, DC Low Watt and AC Low Watt ambient temperature cannot exceed 71°C (160°F).

Filtration

For maximum valve and system component life, the system should be protected at a contamination level not to exceed 125 particles greater than 10 microns per milliliter of fluid. (SAE Class 4 or better, ISO Code 16/13).

Tank Line Surges

If several valves are piped with a common tank line, flow surges in the line may cause unexpected spool shift. Detent style valves are most susceptible to this. Separate tank lines should be used when line surges are expected in an application.

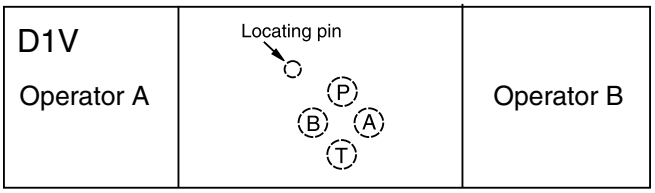
Recommended Mounting Position

Valve Type	Recommended Mounting Position
Detent (Solenoid)	Horizontal
Spring Centered	Unrestricted
Spring Offset	Unrestricted

Silting

Silting can cause any sliding spool valve to stick and not spring return, if held shifted under pressure for long periods of time. The valve should be cycled periodically to prevent sticking.

Flow Path Data



*Note: On valves with 008 or 009 spool, A and/or B operators reverse sides. Flow paths remain the same as viewed from top of valve.

Single Pass Operation

Valve flow ratings are for double pass operation (with equal flow in both paths). When using these components in single pass applications, flow capabilities may be reduced. Consult your local Parker representative for details.

Double Solenoid. With solenoid "A" energized, flow path is P→A and B→T. When solenoid "B" is energized, flow path is P→B and A→T. The center condition on a spring-centered valve exists when both coils are de-energized, or during a complete shift, as the spool passes through center.

Detent and Spring Offset. The center condition exists on detent and spring offset valves only during spool crossover. To shift and hold a detented spool, only a momentary energizing of the solenoid is necessary. The minimum duration of the signal is approximately 0.1 seconds for DC voltages. This position will be held provided the spool center line is in a horizontal plane, and no shock or vibration is present to displace the spool.

Single Solenoid. Spring offset valves can be ordered in styles B, E, F, H, K and M. Flow path data for the various styles are described in the order chart.

Electrical Failure

Should electric power fail, spring offset and spring centered valves will shift to the spring held position. Detented valves will stay in the last position held before power failure. If main flow does not fail or stop simultaneously, machine actuators may continue to function in an undesirable manner or sequence.

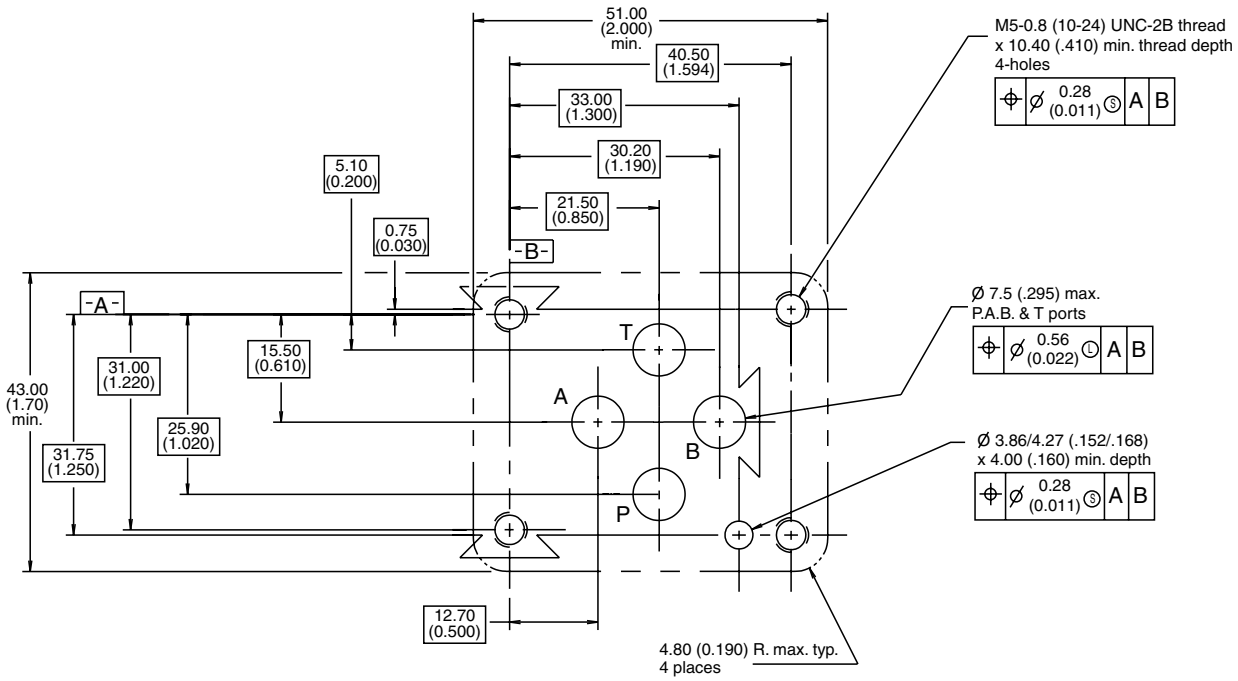
Torque Specifications

Torque values recommended for the bolts which mount the valve to the manifold or subplate are as follows:

#10-24 thread (M5-0.8) torque 5.6 Nm (50 in-lbs).

Mounting Pattern — NFPA D03, CETOP 3, NG 6

Inch equivalents for millimeter dimensions are shown in (**)

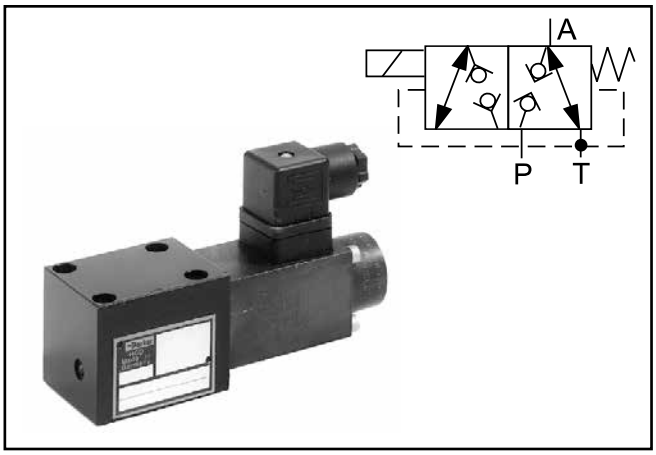


General Description

Series D1SE directional control valves are equipped with a wet pin armature solenoid, drain-free, tapered poppet valve and compatible with the standards DIN NG6, CETOP 3, and NFPA D03. Due to the 3/2 way design, port A is either connected with P or discharged in the tank. The neutral position (solenoid not activated) is taken automatically by a return spring. This position remains until the solenoid is energized.

The valve poppet including activation lever and armature of the solenoid are located in the pressurized oil chamber of connection T. The valve poppet is designed such that there can be no differential area in its axial operational direction (opening, closing). Thus it is statically pressure-balanced so that the valve can be switched in both flow directions even under pressure.

The unit has an all-steel design, the important functional inner parts are hardened, the poppet and seat are ground.



Features

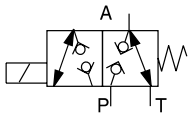
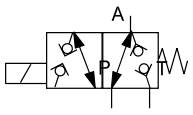
- Low leakage poppet design.
- Fits NFPA D03 mountng.
- Pressure balanced.

Ordering Information

D	1	S	E		B			W	
Directional Control Valve	Basic Valve	Seat Valve	Wet Pin Armature Solenoid, Flanged	Spool	Style	Seal	Solenoid Voltage	Solenoid Connection Without Plug	Design Series

NOTE: Not required when ordering.

DIN NG6
CETOP 3
NPPA D03

Code	Description
30	
83	

Code	Description
K	12V
J	24V
U*	98V
G*	205V

* For alternating current use plug with rectifier.

Code	Description
N	Nitrile
V	Fluorocarbon

Coils for repair

Voltage	Ordering Code
12V	7329700 - 12V
24V	7329700 - 24V
98V	7329700 - 98V
205V	7329700 - 205V

Weight: 0.8 kg (1.76 lbs)

Bold: Designates Tier I products and options.

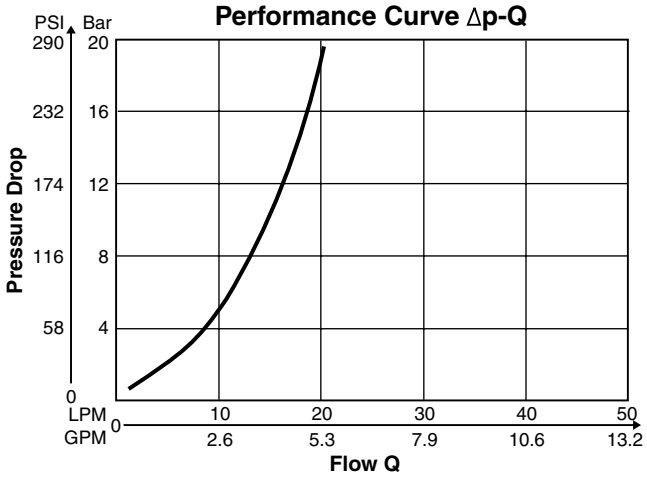
Non-Bold: Designates Tier II products and options.
These products will have longer lead times.

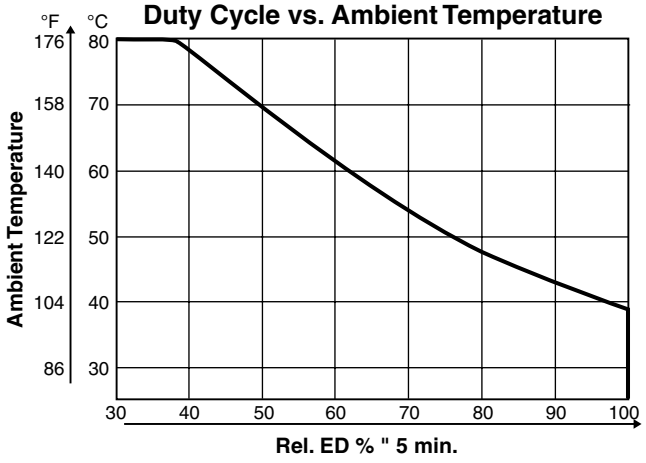
General	
Design	Directional poppet valve
Actuation	Solenoid
Size	DIN NG6 / CETOP 3 / NFPA D03
Mounting Interface	DIN 24340 A6 / ISO 4401 / CETOP RP 121-H / NFPA D03
Mounting Position	Unrestricted
Ambient Temperature	-25°C to +50°C (-13°F to +122°F), observe permissible duty cycle
Hydraulic	
Max. Operating Pressure	350 Bar (5075 PSI) (P, A, and T)
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525
Fluid Temperature	-25°C to +70°C (-13°F to +158°F)
Viscosity Permitted **Recommended**	10...500 cSt / mm²/s (46...2318 SSU) 30...80 cSt / mm²/s (139...371 SSU)
Filtration	ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)
Internal Leakage	3-5 DPM per seat
Maximum Flow	20 LPM (5.28 GPM) (at Δp = 10 bar)

Static / Dynamic				
Step Response	Energized: approx. 50 ms De-energized: approx. 60 ms			
Electrical Characteristics				
Duty Ratio	See Diagram			
Max. Switching Frequency	2000 1/h			
Protection Class	IP 65 in accordance with DIN 40050 (plugged and mounted)			
Code	K	J	U*	G*
Supply Voltage	12 VDC	24 VDC	98 VDC	205 VDC
Tolerance Supply Voltage	±10%	±10%	±10%	±10%
Current Consumption	1.95A	1.1A	0.25A	0.13A
Power Consumption	23.4 W	26.4 W	24.3 W	26.6 W
Solenoid Connection	Connector as per EN 175301-803			
Min. Wiring	3 x 1.5 mm^2 recommended			
Max. Wiring Length	50m (164') recommended			

* For a silicon bridge rectifier, set up apart from unit for connecting to a 50 or 60 Hz power supply, 110 V~(98=) or 230V~ (205V=).
With electrical connections the protective conductor (PE⏚) must be connected according to the relevant regulations.

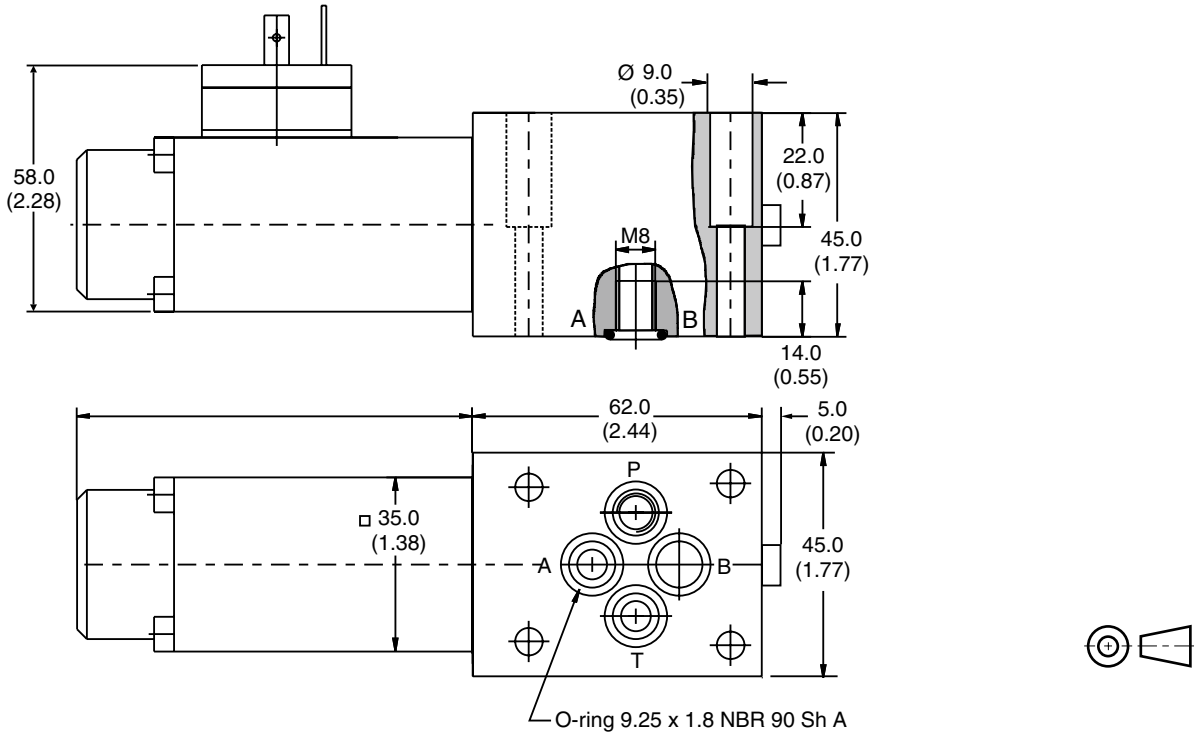
Performance Curves





Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Kit			Seal Kit
R_{max}6.3 ⏥ 0.01/100	BK375	4x M5x30 DIN 912 12.9	6.8 Nm ± 15%	Nitrile: SK-D1SE-70 Fluorocarbon: SK-D1SE-V70

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm.
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

Application

Series D3 hydraulic directional control valves are high performance, direct operated 4-way valves, available in 2 or 3-position. They are manifold mounted which conform to NFPA's D05, CETOP 5, ISO NG10 mounting patterns. These valves were designed for industrial and mobile hydraulic applications which require high cycle rates, long life and high efficiency.

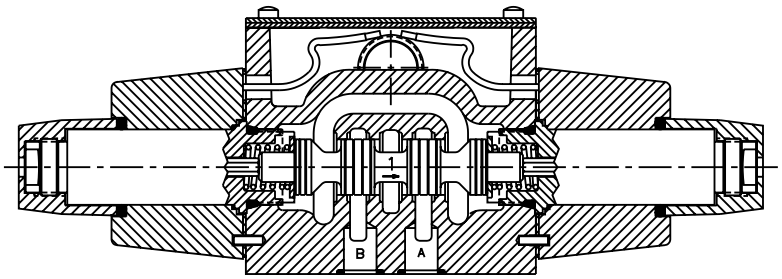
Operation

Series D3 directional control valves consist of a 4-chamber style body, and a case hardened sliding spool. The spool is directly shifted by a variety of operators including: solenoid, lever, cam, or air pilot.

Features

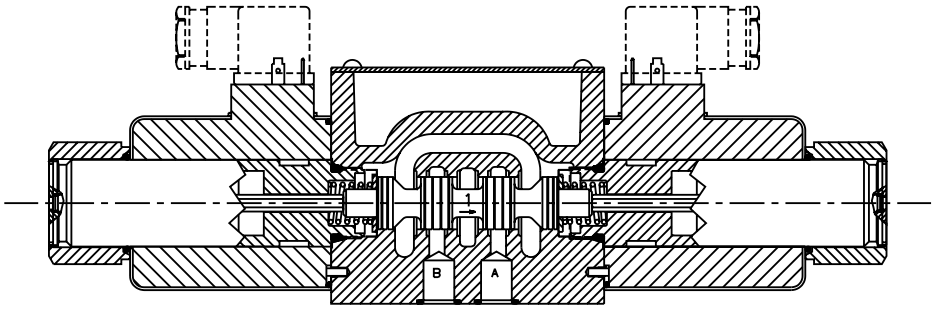
- Easy access mounting bolts.
- 345 Bar (5000 PSI) pressure rating.
- Flows to 40 GPM depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish body.
- CSA approved and UL recognized available.
- Proportional spool available.

D3W Solenoid Operated Conduit Cavity Style



- Wired in cavity.
- Easy access mounting bolts.
- 22 spool styles available.
- Three electrical connection options.
- AC and DC lights available.
- CSA approved.
- Available in low-watt DC version.

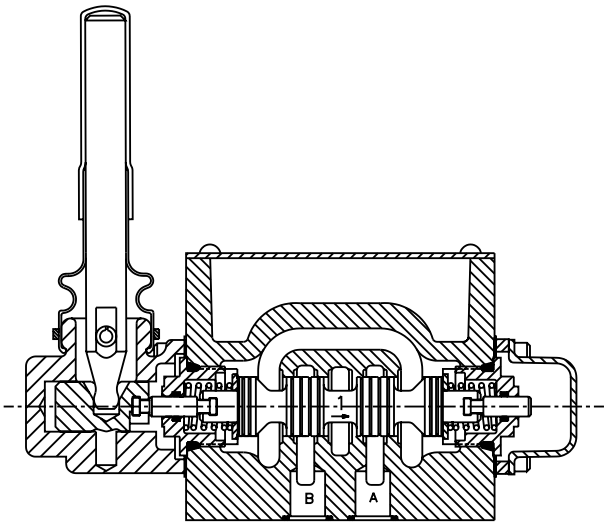
D3W Solenoid Operated Hirschmann (DIN) Style



- DIN Style (43650) Hirschmann.
- 22 spool styles available.
- No tools required for coil removal.
- Easy coil replacement.
- AC and DC lights available.
- CSA approved.
- Available in low-watt DC version.

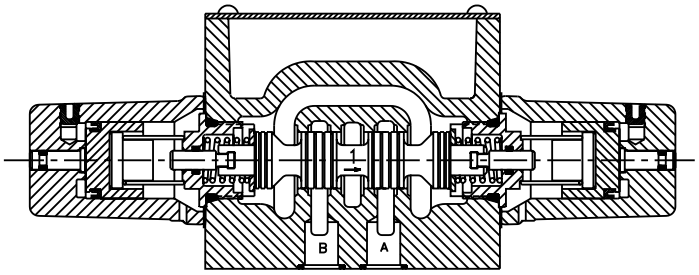
D3L Lever Operated

- Spring return or detent styles available.
- Heavy duty handle design.
- High flow, low pressure drop design.



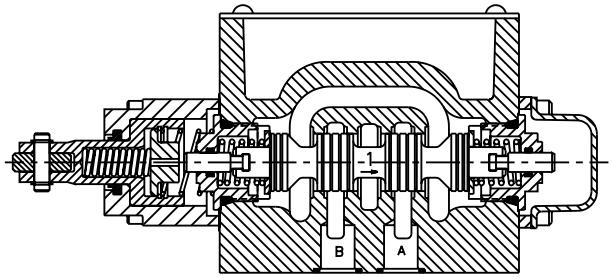
D3A Air Operated

- Low pilot pressure required – 4.1 Bar (60 PSI) minimum.
- High flow, low pressure drop design.



D3C Cam Operated

- Choice of 2 cam roller positions (D3C and D3D).
- Short stroke option.
- High flow, low pressure drop design.



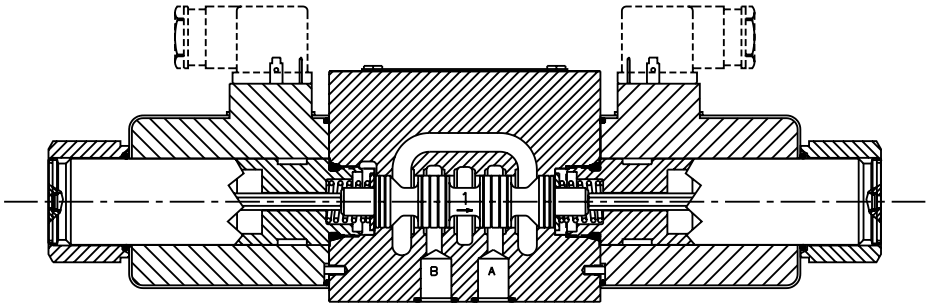
Application

Series D3DW hydraulic directional control valves are high performance, direct operated 4-way valves, available in 2 or 3-position. They are manifold mounted which conform to NFPA's D05, CETOP 5, ISO NG10 mounting pattern. These valves were designed for industrial and mobile hydraulic applications which require high cycle rates, long life and high efficiency.

Operation

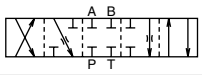
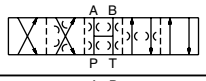
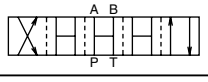
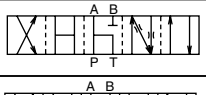
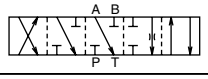
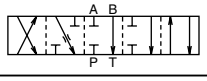
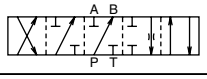
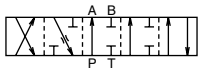
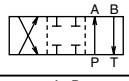
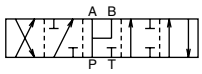
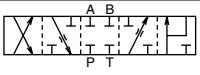
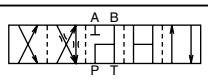
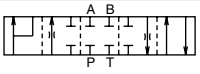
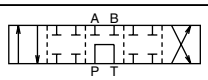
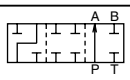
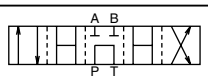
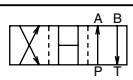
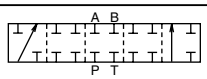
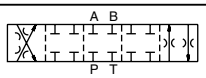
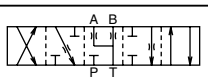
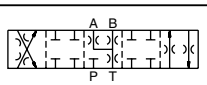
Series D3DW directional control valves consist of a 5-chamber style body, and a case hardened sliding spool.

D3DW Solenoid Operated Hirschmann (DIN) Style



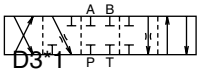
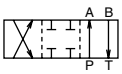
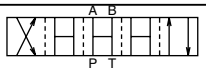
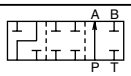
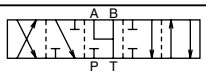
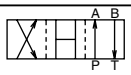
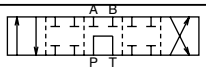
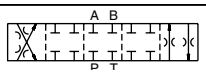
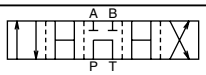
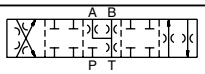
- Easy access mounting bolts.
- No tools required for coil removal.
- 22 spool styles available.
- Signal lights available.
- CSA approved.

D3 Spool Reference Data

Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction			Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction		
		D3W	D3W*F†	D3DW			D3W	D3W*F†	D3DW
D3*1		150 (40)	78 (20)	130 (33)	D3*12		95 (24)	59 (15)	75 (19)
D3*2		150 (40)	78 (20)	115 (30)	D3*14		50† (13)	59# (15)	70† (18)
D3*3		150 (40)	78 (20)	120 (31)	D3*15		150 (40)	78 (20)	120 (31)
D3*4		150 (40)	59 (15)	130 (33)	D3*16		150 (40)	78 (20)	130 (33)
D3*5		150 (40)	78 (20)	130 (33)	D3*20		150 (40)	78 (20)	130 (33)
D3*6		150 (40)	78 (20)	130 (33)	D3*21		115 (30)	N/A	120 (31)
D3*7		50† (13)	59# (15)	70† (18)	D3*22		115 (30)	N/A	120 (31)
D3*8		50‡ (13)	59# (15)	39 (10)	D3*26		115 (30)	N/A	75 (19)
D3*9		39 (10)	59# (15)	75 (19)	D3*30		39 (10)	59# (15)	75 (19)
D3*10		115 (30)	N/A	75 (19)	D3*81		115† (30)	N/A	130 (33)
D3*11		115 (30)	59# (15)	130 (33)	D3*82		115† (30)	N/A	130 (33)

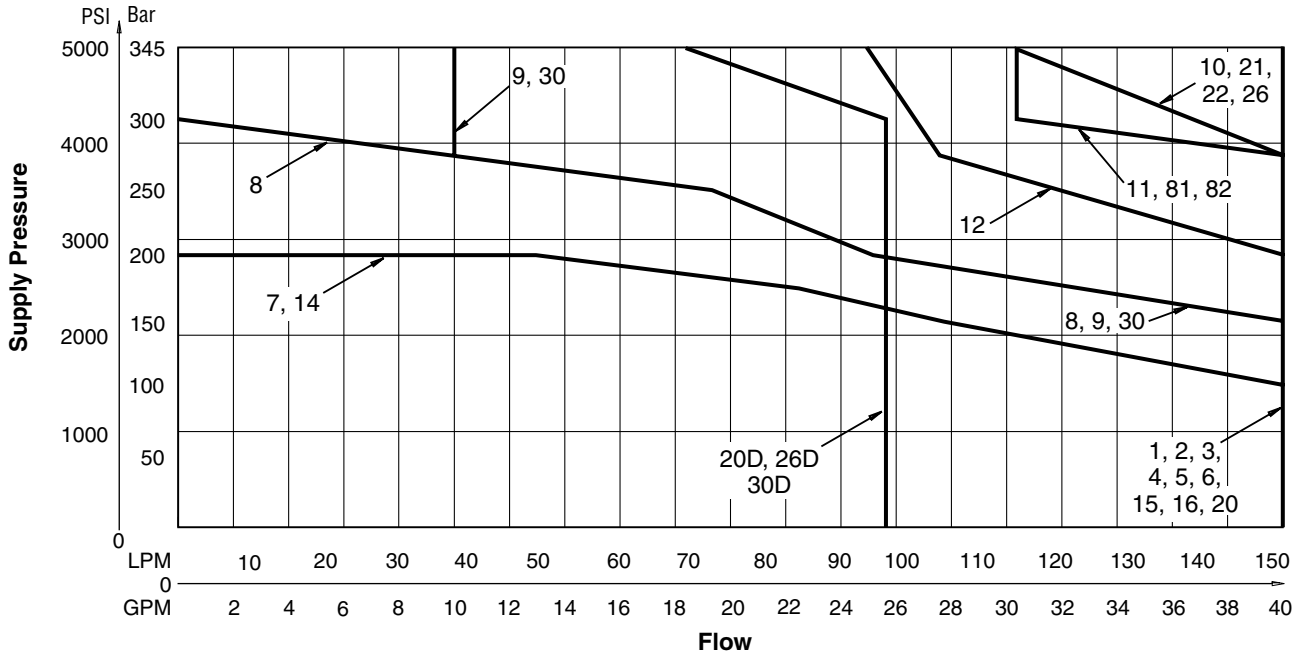
Center or De-energized position is indicated by P, A, B & T port notation.
† 3000 PSI Max. ‡ 2900 PSI Max. # 1500 PSI Max.

D3A, D3C, D3L Spool Reference Data (Four Chamber Body Only)

Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction	Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction
D3*1		150 (40)	D3*20		150 (40)
D3*2		150 (40)	D3*26		115 (30)
D3*4		150 (40)	D3*30		39 (10)
D3*8		50 (13)	D3*81		115 (30)
D3*9		39 (10)	D3*82		115 (30)

Center or De-energized position is indicated by A, B, P & T port notation.

D3W-30/32 DC and AC Rectified Shift Limits



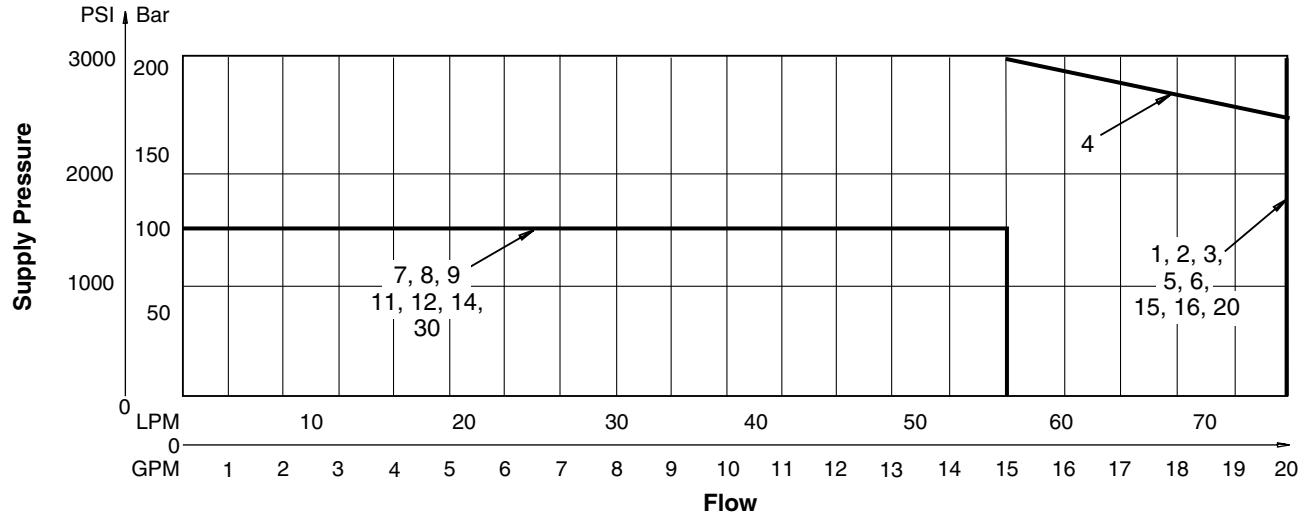
Example:

Determine the maximum allowable flow of a D3W Series valve (20D) at 150 Bar (2175 PSI) supply pressure. Locate the curve marked “20D”. At 150 Bar (2175 PSI) supply pressure, the maximum flow is 98 LPM (25 GPM). At 345 Bar (5000 PSI), the flow is 72 LPM (18.5 GPM).

Important Notes for Switching Limit Charts

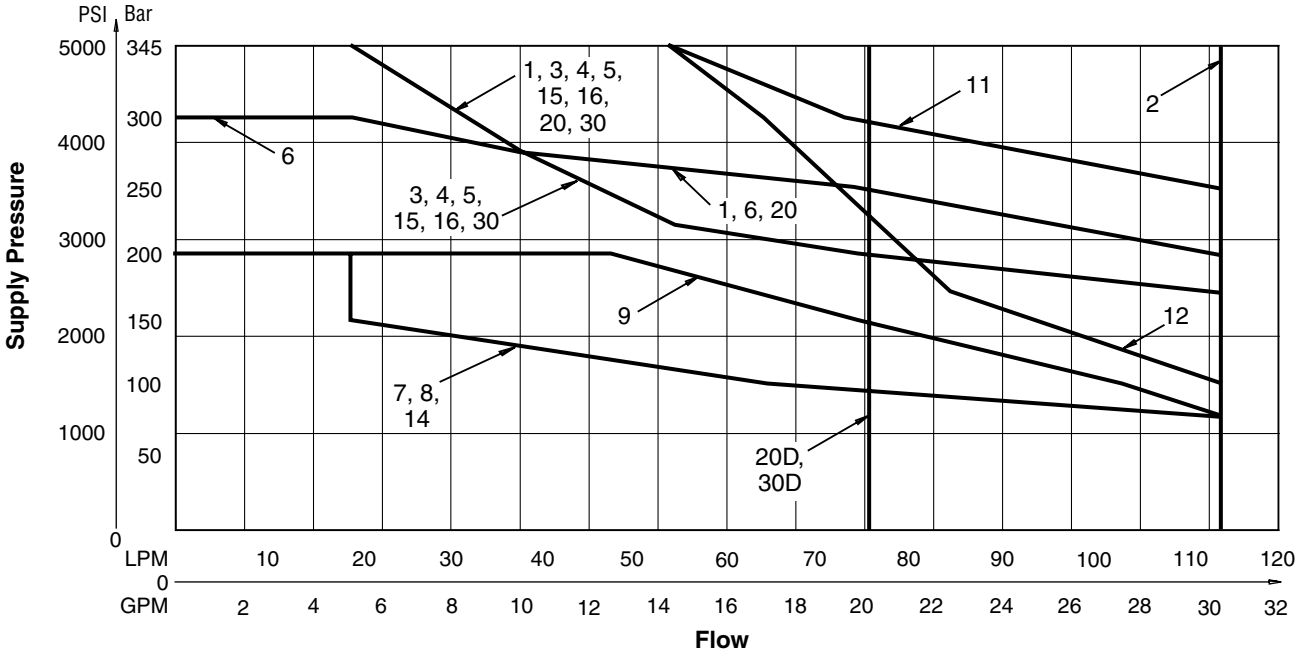
1. For F & M style valves, reduce flow to 70% of that shown.
2. Shift limits charted for equal flow A and B ports. Unequal A and B port flows may reduce shift limits.
3. These charts do not show explosion proof performance. Consult factory for explosion proof duty.
4. Blocking A and B ports will reduce flow to 70% of that shown.

D3W-30/32 Low Watt DC and AC Rectified Shift Limits

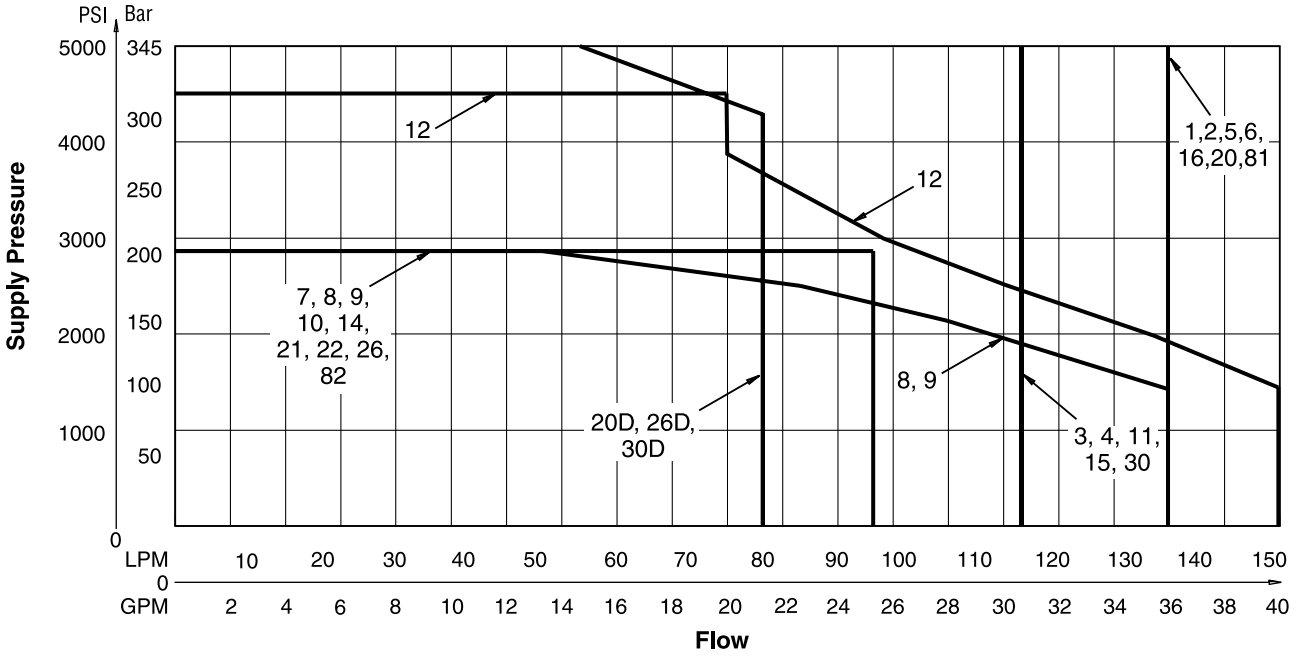


D3.indd, dd

D3W-30/32 AC Shift Limits



D3W-30/32 Soft Shift Limits (High Watt Coil Only)



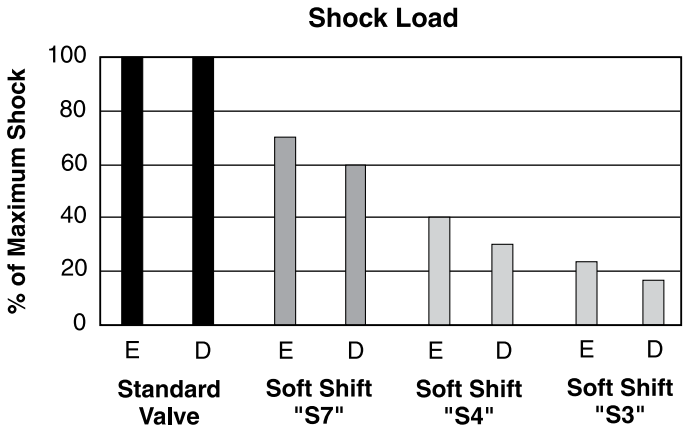
Important Notes for Switching Limit Charts

1. For F & M style valves, reduce flow to 70% of that shown.
2. Shift limits charted for equal flow A and B ports. Unequal A and B port flows may reduce shift limits.
3. These charts do not show explosion proof performance. Consult factory for explosion proof duty.
4. Blocking A and B ports will reduce flow to 70% of that shown.

D3.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

D3W-30/32 Soft Shift Response



E = Energize
D = De-energize

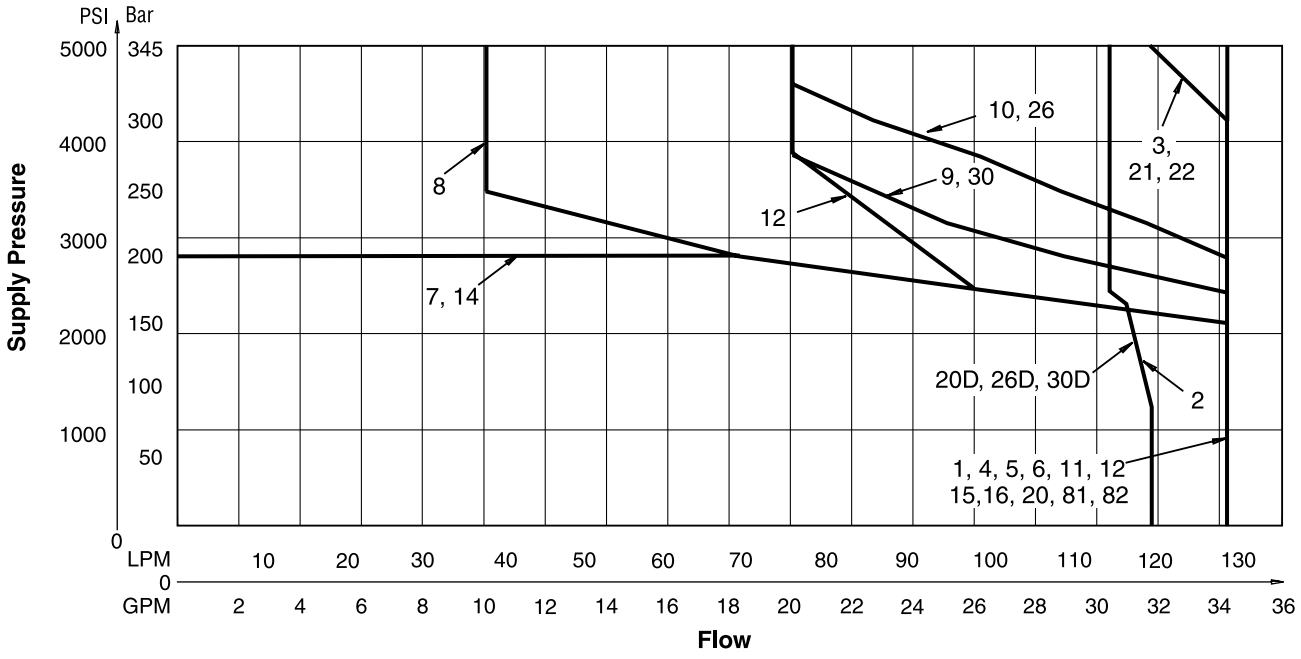
Response Time*

Signal to 95% spool stroke measured at 172 Bar (2500 PSI) and 65 LPM (17 GPM).

Soft Shift Option	Energize	De-energize
S3	400	650
S4	320	550
S7	160	370

* For reference only. Response time varies with flow, pressure and oil viscosity.

D3DW-40/41 Shift Limits



Important Notes for Switching Limit Charts

1. For F & M style valves, reduce flow to 70% of that shown.
2. Shift limits charted for equal flow A and B ports. Unequal A and B port flows may reduce shift limits.
3. These charts do not show explosion proof performance. Consult factory for explosion proof duty.
4. Blocking A and B ports will reduce flow to 70% of that shown.

Pressure Drop vs. Flow

The table shown provides flow vs. pressure drop curve reference for D3 Series valves by spool type.

The chart below demonstrates graphically the performance characteristics of the D3. The low watt coil and other design features of the standard D3W*****F accommodate a maximum flow of 78 LPM (20 GPM) at 207 Bar (3000 PSI).

D3W and D3DW Pressure Drop Reference Chart

Spool No.	Curve Number										
	Shifted				Center Condition						
	P–A	P–B	B–T	A–T	(P–T)	(B–A)	(A–B)	(P-A)	(P-B)	(A-T)	(B-T)
1	5	5	2	2	—	—	—	—	—	—	—
2	4	4	1	1	2	3	3	3	3	1	1
3	5	5	2	3	—	—	—	—	—	1	—
4	4	4	3	3	—	—	—	—	—	1	1
5	6	5	2	2	—	—	—	2	—	—	—
6	6	6	2	2	—	4	4	2	2	—	—
7	5	4	2	1	3	—	—	—	3	—	1
8	8	8	7	7	6	—	—	—	—	—	—
9	5	5	4	4	7	—	—	—	—	—	—
10	5	5	—	—	—	—	—	—	—	—	—
11	5	5	2	2	—	—	—	—	—	10	10
12	5	5	2	2	11	—	—	10	10	10	10
14	4	5	1	2	3	—	—	3	—	1	—
15	5	5	3	2	—	—	—	—	—	—	1
16	5	6	2	2	—	—	—	—	2	—	—
20	5	5	2	2	—	—	—	—	—	—	—
21	5	4	—	1	—	9	—	—	—	—	—
22	4	5	1	—	—	—	9	—	—	—	—
26	5	5	—	—	—	—	—	—	—	—	—
30	5	5	2	2	—	—	—	—	—	—	—

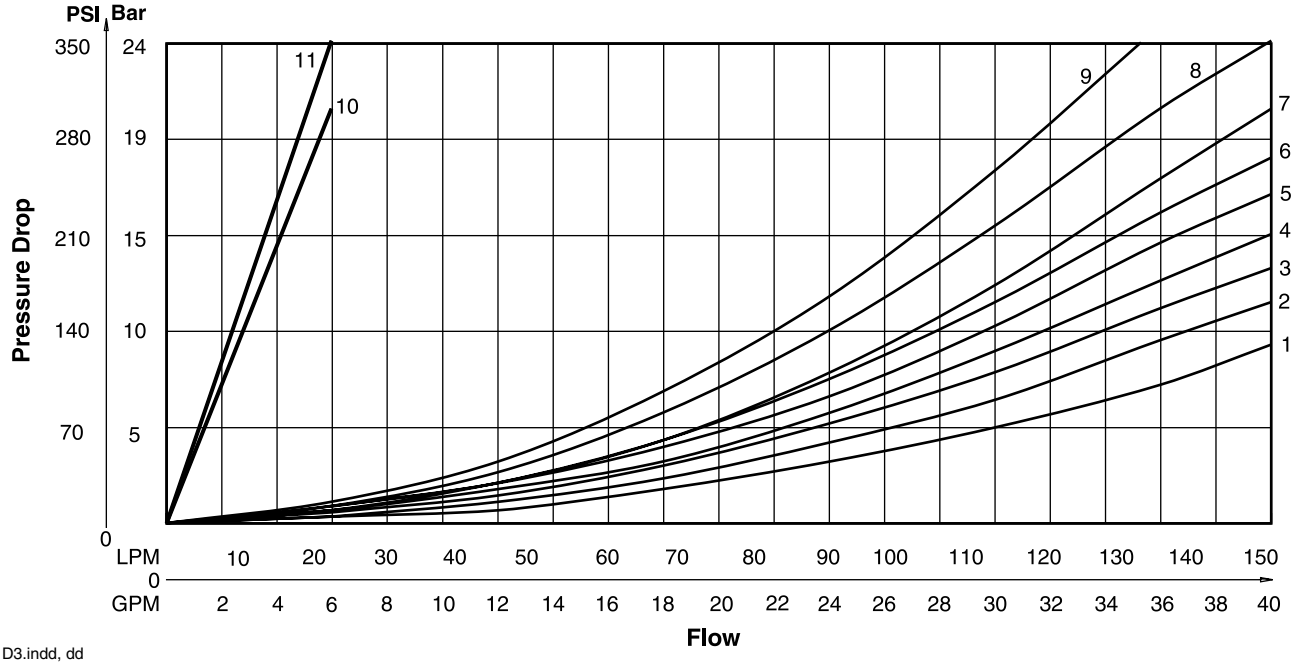
Note:
For 81 and 82 spools, consult factory.

Viscosity Correction Factor

Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141

Curves were generated using 110 SSU hydraulic oil.
For any other viscosity, pressure drop will change per chart.

Performance Curves



D3.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Notes

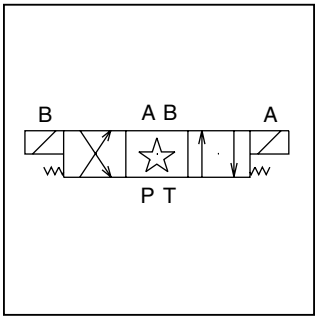
Return to ALPHA TOC
Return to SECTION TOC
A

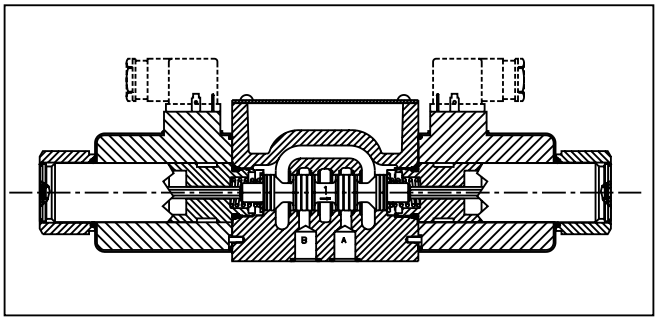
D3.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series D3W directional control valves are high-performance, 4-chamber, direct operated, wet armature, solenoid controlled, 3 or 4-way valves. They are available in 2 or 3-position and conform to NFPA's D05, CETOP 5 mounting patterns.





Features

- Worldwide, high flow, low pressure drop design.
- Soft shift available.
- 22 spools available including proportional.
- DC surge suppression available to protect electrical equipment.
- Three electrical connection options.
- AC & DC lights available.
- Easy access mounting bolts.
- Explosion proof availability.
- CSA approved.
- No tools required for coil removal.
- Rectified coils available for high flow AC applications.

Response Time (ms)

Signal to 95% spool stroke measured at 172 Bar (2500 PSI) and 75 LPM (20 GPM)

Solenoid Type	m sec
AC Energize	21
AC De-energize	35
DC Energize	110
DC De-energize	85

Specifications

Interface	NFPA D05, CETOP 5, NG 10
Max. Operating Pressure	P, A, B: 345 Bar (5000 PSI) Standard CSA 207 Bar (3000 PSI) Tank: 103 Bar (1500 PSI) AC Standard 207 Bar (3000 PSI) AC Optional DC/AC Rectified Standard CSA 103 Bar (1500 PSI)
CSA File Number	LR060407
Leakage Rates 100 SSU @ 49°C (120°F)	Maximum Allowable: 19.6 cc (0.38 Cu. in.) per Minute/ Land @ 69 Bar (1000 PSI)* 35 cc (2.19 Cu. in.) per Minute/ Land @ 207 Bar (3000 PSI)*

* #008 and #009 Spools may exceed these rates, consult factory

D	3	W				
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Seal	Solenoid Voltage

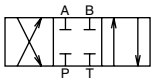
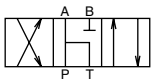
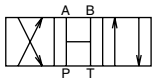
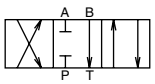
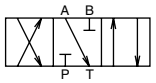
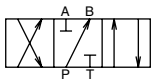
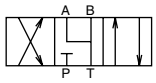
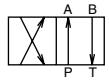
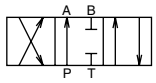
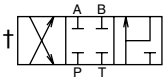
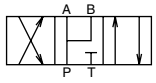
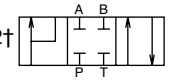
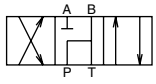
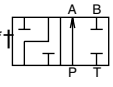
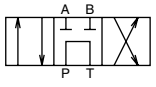
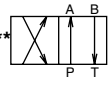
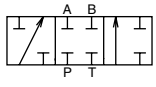
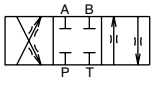
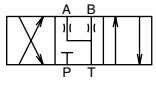
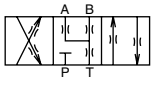
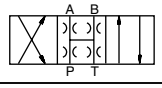
NFPA D05
CETOP 5
NG 10

Wet armature solenoid

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

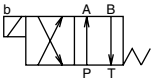
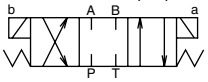
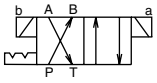
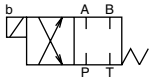
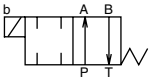
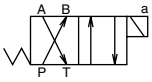
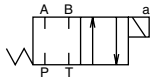
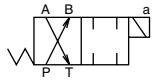
Code	Description
E#	24/60 - 24/50 VAC
Y	**120/60 - 110/50 VAC**
T	**240/60 - 220/50 VAC**
K	**12 VDC**
J	**24 VDC**
D#	120 VDC
U#	98 VDC
Z#	250 VDC

High Watt Coil only.

Code	Symbol	Code	Symbol
1		14	
2		15	
3		16	
4		**20***	
5		21†	
6		22†	
7		26*†	
8* **9****		**30****	
10†		**81† ††**	
11		**82† ††**	
12			

* 8, 20 & 26 spools have closed crossover.
** 9 & 30 spools have open crossover.
† Available only with high-watt rectified AC coils or high-watt DC coils.
†† Spring centered versions C, E, F, K & M only.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing solenoid A. Note operators reverse sides for #8 and #9 spools. See installation information for details.

Code	Description	Symbol
B*	**Single solenoid, 2 position, spring offset. P to A and B to T in offset position**	
C	**Double solenoid, 3 position, spring centered.**	
D†	**Double solenoid, 2 position, detent**	
E	Single solenoid, 2 position, spring centered. P to B and A to T when energized.	
F**	Single solenoid, 2 position. Spring offset, energized to center position. Spool spacer on A side. P to A and B to T in spring offset position.	
H*	**Single solenoid, 2 position, spring offset. P to B and A to T in offset position.**	
K	Single solenoid, 2 position. Spring centered. P to A and B to T when energized.	
M**	Single solenoid, 2 position, spring offset, energized to center position. Spool spacer on B side. P to B and A to T in spring offset position.	

* Only spools 20, 26 & 30.
** High Watt Coil.
† Only spools 20 & 30.

This condition varies with spool code.

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

D3.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Solenoid Connection

Code	Description
C**	**Conduit Cavity**
K	**Conduit Box**
J#*	Deutsch (DT06-2S)
P	**Hirschmann w/Plug**
W*	**Hirschmann w/o Plug**
E*	Explosion Proof

* Lights not available.
** No variations (See "K").
# DC voltage only.

Solenoid/Tube Options

Options	Coil	Tube Rating	
		AC	DC/AC Rectified
Omit	**High Watt**	**103.5 Bar (1500 PSI)**	**207 Bar (3000 PSI)**
F*#	Low Watt	n/a	207 Bar (3000 PSI)
H	**High Watt**	**207 Bar (3000 PSI)**	**n/a**
D†	Explosion Proof, EEXD ATEX		
U†	Explosion Proof, UL/CSA		

* Available only with J, K and Y (Rectified), T (Rectified) voltages.
# Not available with soft shift or with F and M style valves.
† Explosion proof coils are 60 Hz at standard voltage; dual rating not available.

Valve Weight:

Single Solenoid:
AC 4.3 kg (9.5 lbs.)
DC 5.3 kg (11.6 lbs.)

Double Solenoid:
AC 5.0 kg (11.0 lbs.)
DC 7.3 kg (16.0 lbs.)

Seal Kit:

Nitrile SKD3W
Fluorocarbon SKD3WV

Manual Override Options

Code	Description
Omit	**Standard Tube**
P*	Extended Manual Override

* Not available with soft shift or explosion proof.

Electrical Options

Code	Description
Omit	**No Option**
V#	Varistor Surge Suppressor
Z	AC Rectified with MOV Surge Suppressor

DC voltage only.

Shift Response and Indication

Code	Description
Omit	**Standard Valve**
S3**	Soft Shift, 0.030" Orifice
S4**	Soft Shift, 0.040" Orifice
S7**	Soft Shift, 0.070" Orifice
I7*	Monitor Switch Direct Op. End Stroke
I8*	Monitor Switch

* Single solenoid models only. Not CE or CSA approved. Spools 8, 9, 81 & 82 not available.
** High watt coil only.

Approvals

Code	Description
Omit	**Standard Valve**
3*†	CSA US (UL429)
4*	**CSA Canada**

* Not available with AC high pressure tube.
† B, C, H styles only. Y voltage with conduit connection only, must be rectified.

Variations

Code	Description
Omit	**Standard Valve**
5	**Signal Lights**
6	**Manaplug, Brad Harrison Mini**
7	Manaplug, Brad Harrison Micro (M12x1)
56	**Manaplug (Mini) with Lights**
57	Manaplug (Micro) with Lights (M12x1)
1A	**Manaplug (Mini) Single Sol. 5-Pin**
1B	Manaplug (Micro) Single Sol. 5-Pin (M12x1)
1C	**Manaplug (Mini) Single Sol. 5-Pin w/Lights**
1D	Manaplug (Micro) Single Sol. 5-Pin w/Lights (M12x1)
1M	Manaplug Opposite Normal

Design Series
NOTE: Not required when ordering.

Mounting Bolt Kits

UNC Bolt Kits for use with D3W Directional Control Valves & Sandwich Valves		Number of Sandwich Valves @ 2.00" (50mm) thickness			
		0	**1**	**2**	**3**
D3W	Standard:	BK98 1.62"	BK141 3.50"	BK142 5.50"	BK143 7.50"
	Metric:	BKM98 40mm	BKM141 90mm	BKM142 140mm	BKM143 190mm
D3W with explosion proof coils	Standard:	BK144 2.37"	BK61 4.25"	BK62 6.25"	BK63 8.25"
	Metric:	BKM144 60mm	BKM61 110mm	BKM62 160mm	BKM63 210mm

NOTE: All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 Nm (12 ft-lbs)

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Solenoid Ratings**

Insulation	Class H	
Allowable Deviation from rated voltage	DC, AC Rect AC	-10% to +15% -5% to +5%
Armature	Wet pin type	

** DC Solenoids available with optional molded metal oxide varistor (MOV) for surge suppression.
Leadwire length 6" from coil face.

D3W*****F Solenoid Electrical Characteristics‡

Solenoid Code	Nominal Volts/Hz	In Rush Amps	Holding Amps	Watts
KF	12 VDC	—	1.50	18
JF	24 VDC	—	0.75	18

‡ Based on nominal voltage @ 22°C (72°F)

D3W Solenoid Electrical Characteristics†

Solenoid Code	Nominal Volts/Hz	In Rush VA	Holding VA	Nominal Watts (Ref)
Y	120/60 110/50	298 294	95 102	32
T	240/60 220/50	288 288	96 101	32
E	24/60 24/50	290 381	77 110	32
K	12 VDC	—	3.00†	36
J	24 VDC	—	1.50†	36
D	120 VDC	—	0.30†	36
U	98 VDC	—	0.37†	36
Z	250 VDC	—	0.14†	36

† DC holding amps.

D3W Rectified AC Solenoid Electrical Characteristics‡

Solenoid Code	Nominal Volts/Hz	In Rush Amps	Holding Amps	Watts
Y	120/60 110/50	—	.37	36
T	240/60 220/50	—	.18	36
YF	120/60 110/50	—	.18	18
TF	240/60 220/50	—	.09	18

‡ Based on nominal voltage @ 22°C (72°F)

Explosion Proof Solenoids

Explosion Proof Solenoid Ratings

U.L. /CSA (EU)	Class I, Div. 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
ATEX	Complies with ATEX requirements for: Exd, Group IIB; EN50014: 1999+ Amds 1 & 2, EN50018: 200

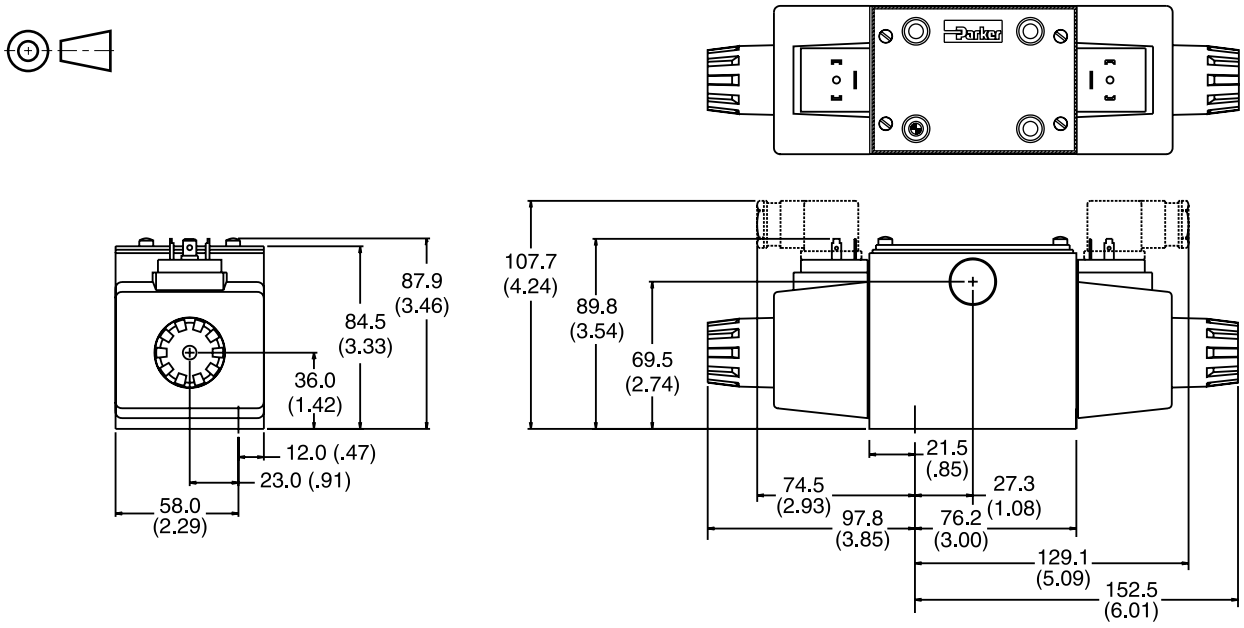
Electrical Characteristics* ED and EU†

Solenoid Code	Nominal Volts/Hz	In Rush VA	Holding VA	Nominal Watts (Ref)
Y	120/60	266	82	36
T	240/60	266	82	36
K	12 VDC	—	3.00†	36
J	24 VDC	—	1.50†	36
D	120 VDC	—	0.30†	36

* Dual frequency not available on explosion proof coils.
† DC holding amps.

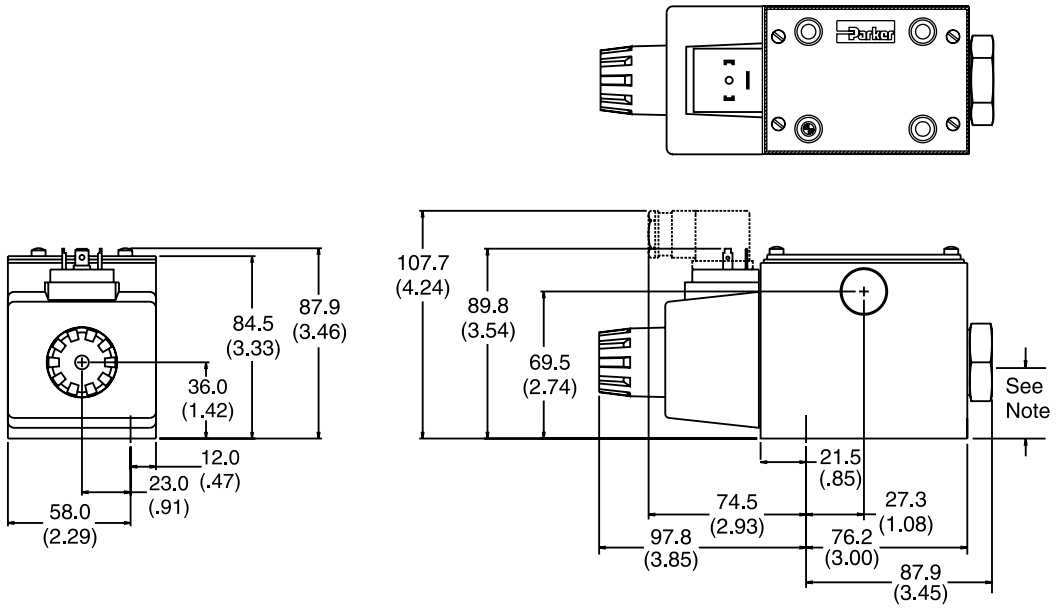
Inch equivalents for millimeter dimensions are shown in (**)

Hirschmann, Double AC Solenoid



Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

Hirschmann, Single AC Solenoid

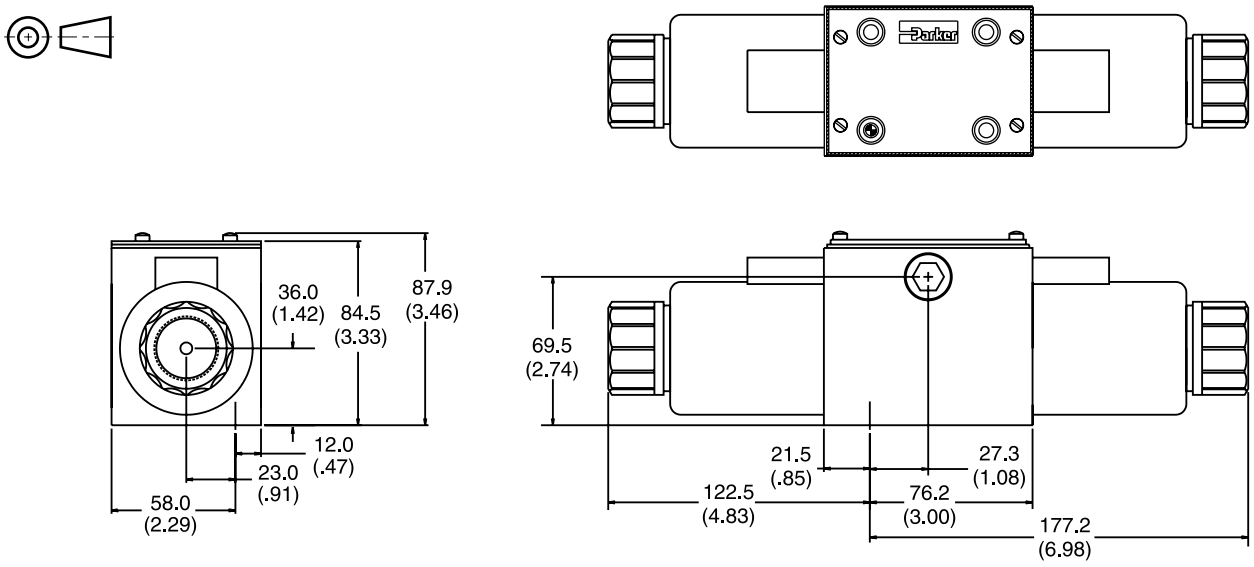


Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

Inch equivalents for millimeter dimensions are shown in (**)

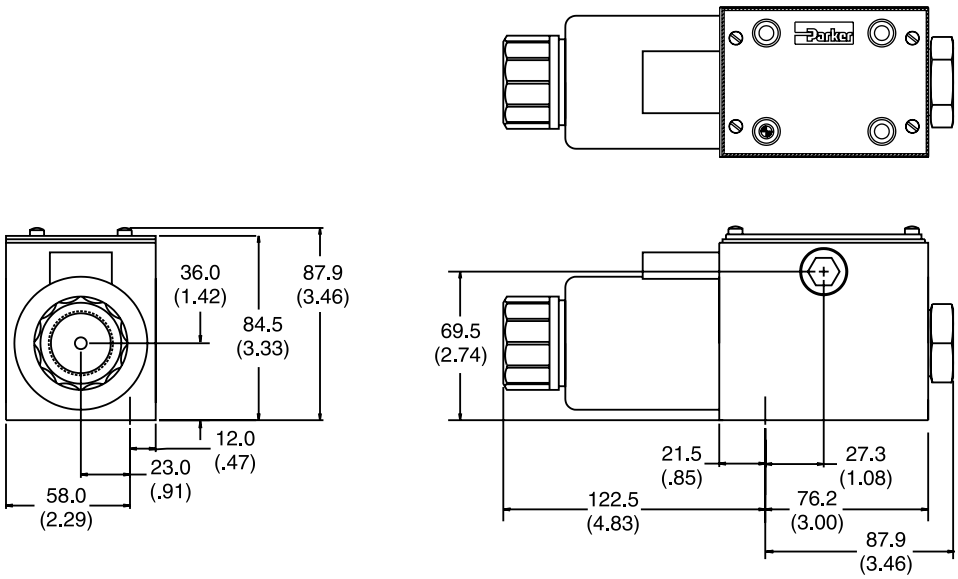
A

Conduit Cavity, Double DC Solenoid



Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

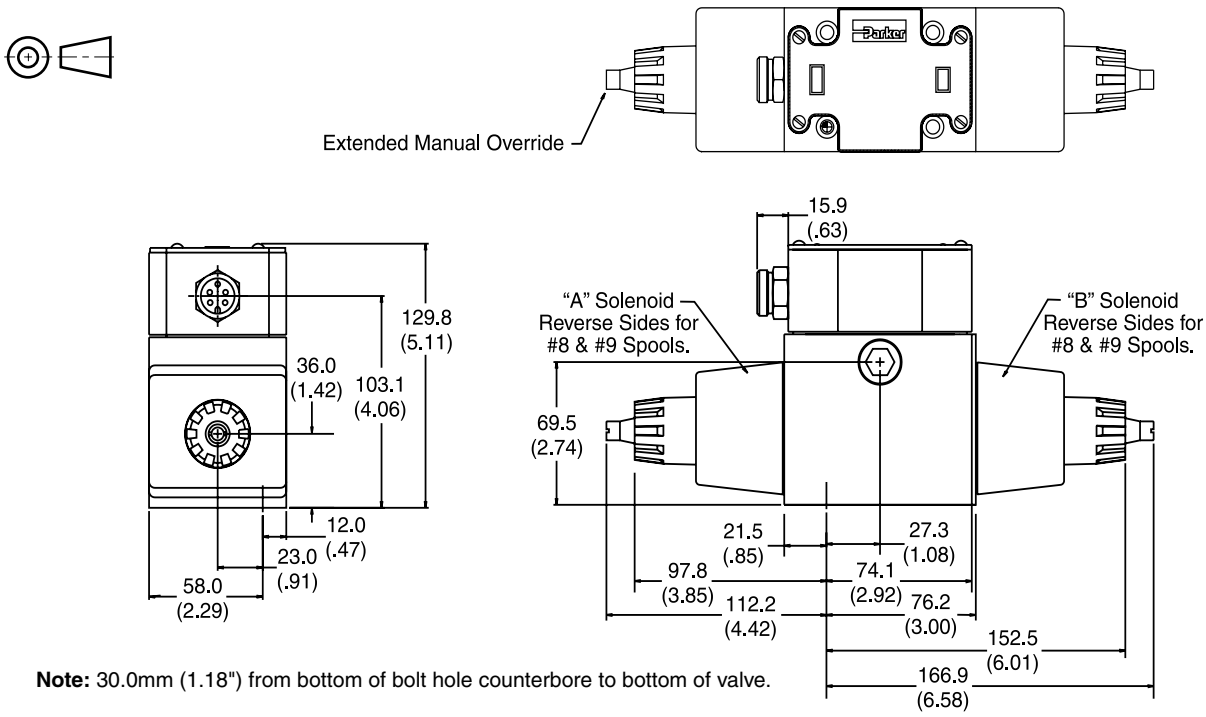
Conduit Cavity, Single DC Solenoid



Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

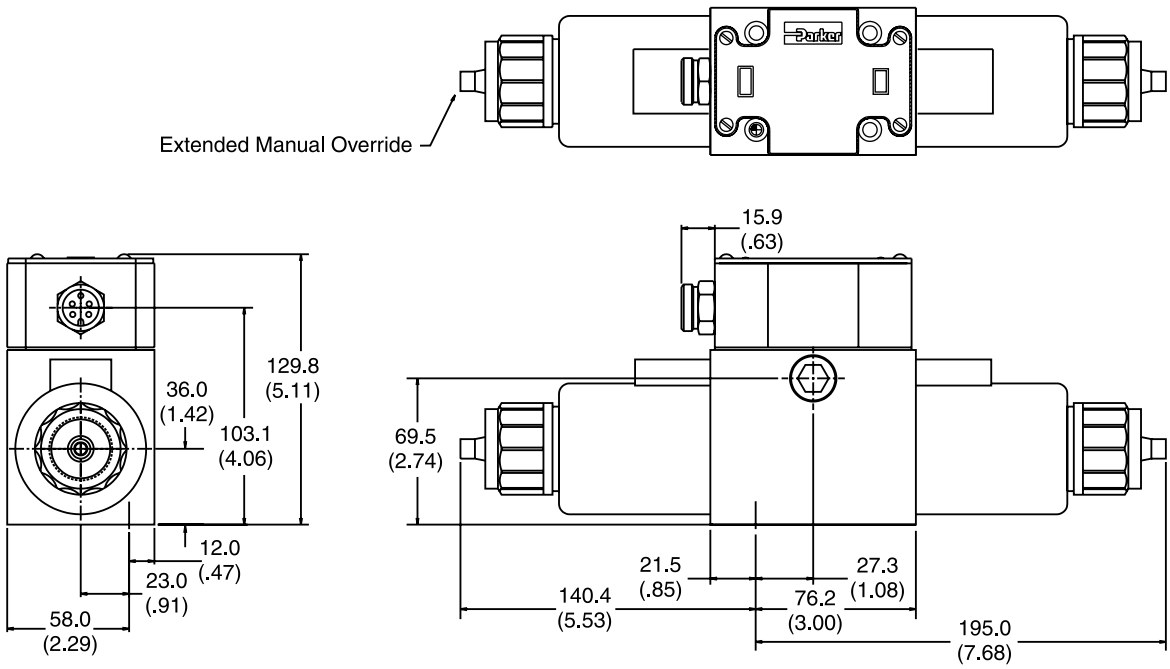
Inch equivalents for millimeter dimensions are shown in (**)

Conduit Box, Single AC Solenoid
with Variation 6 (Manaplug) & Variation P (Extended Manual Override)



Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

Conduit Box, Double DC Solenoid
with Variation 6 (Manaplug) & Variation P (Extended Manual Override)



Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

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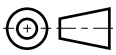
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

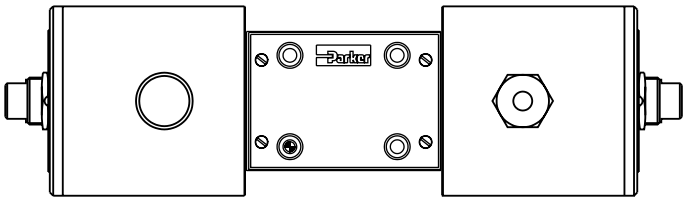
Inch equivalents for millimeter dimensions are shown in (**)

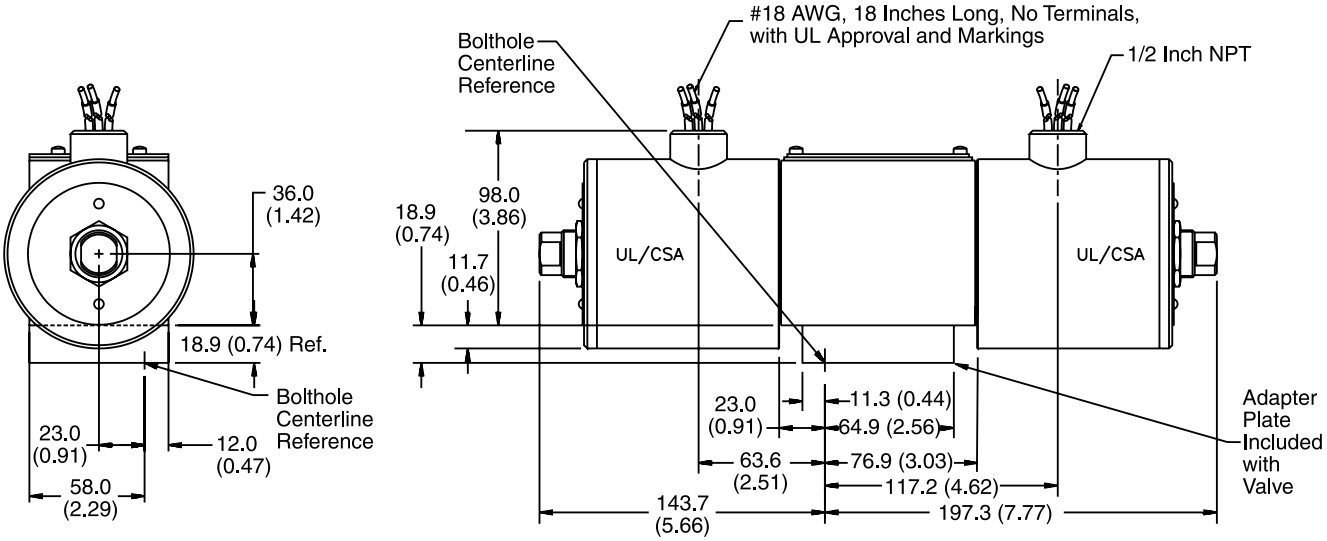
A

Explosion Proof U.L. & CSA, Double Solenoid



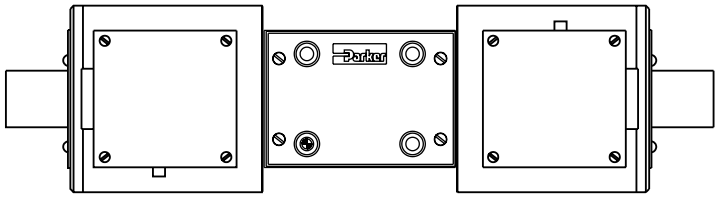
Note:
2 Black Wires
1 Green Wire

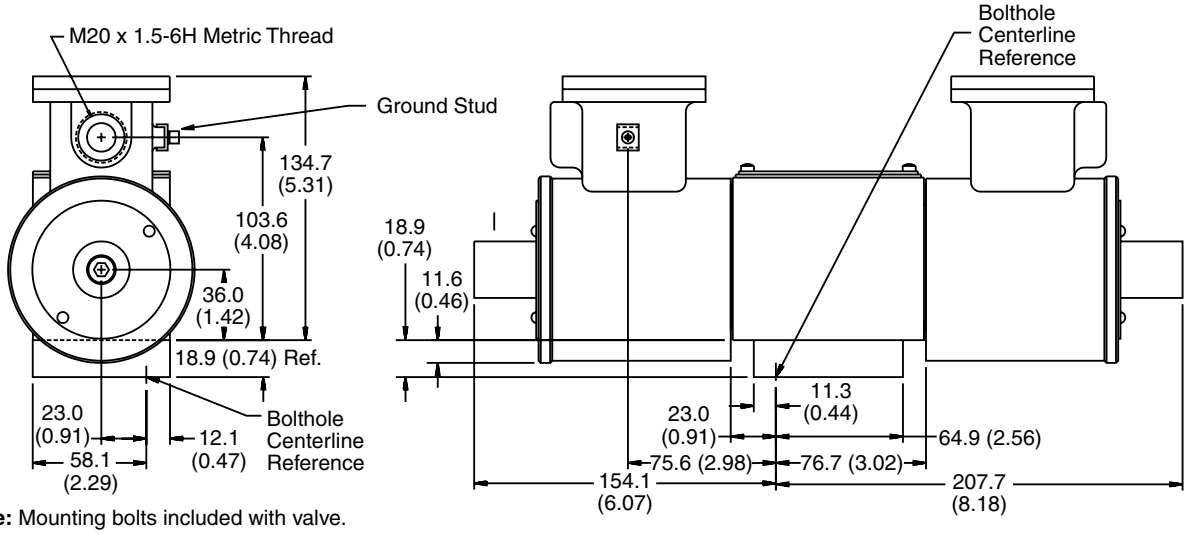




Note: Mounting bolts included with valve.

Explosion Proof ATEX, Double Solenoid





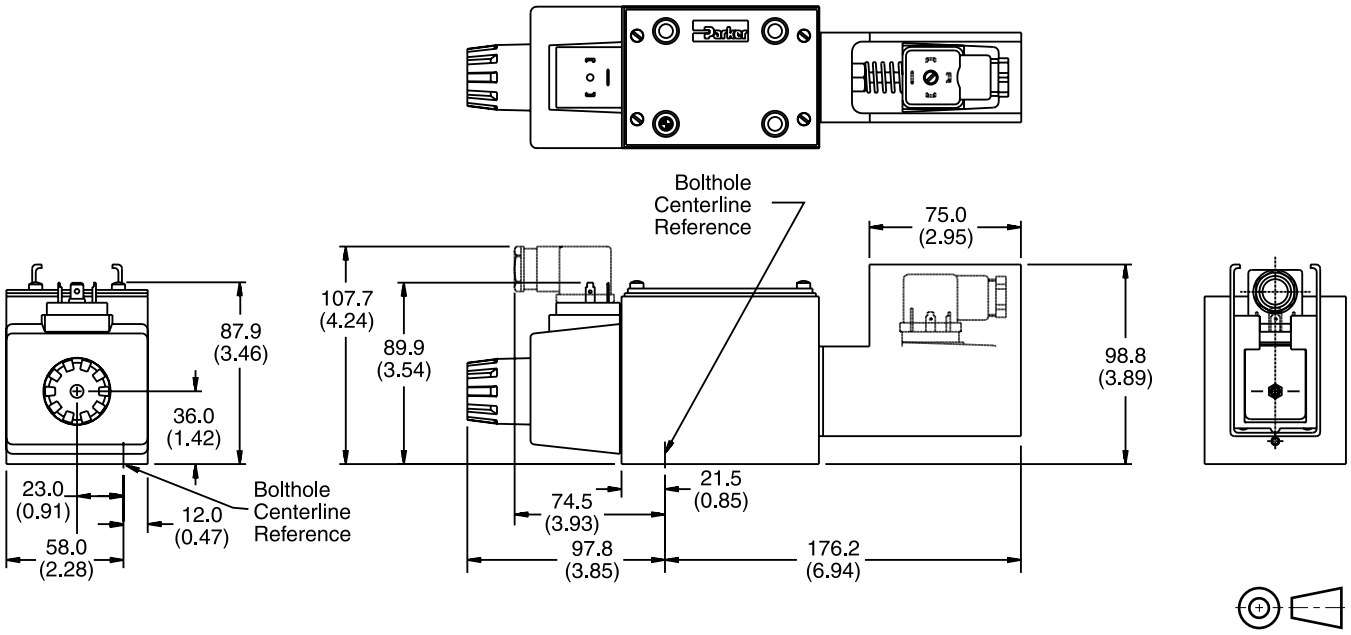
Note: Mounting bolts included with valve.

D3.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

Hirschmann, Single AC Solenoid
with Variation I7 (Monitor Switch)



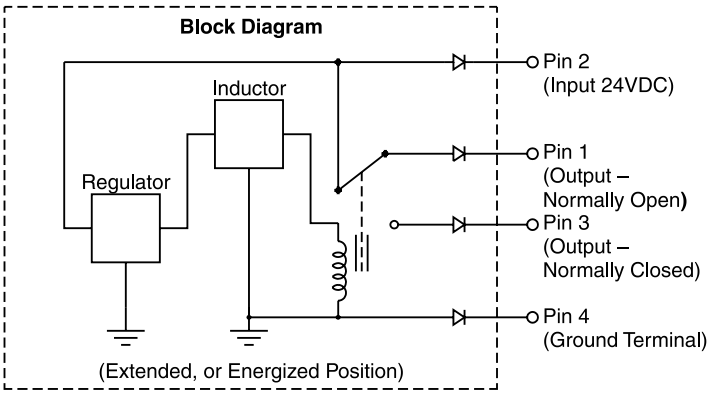
Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

Monitor Switch
(Variation I7) End of Stroke

This feature provides for electrical confirmation of the spool shift. This can be used in safety circuits, to assure proper sequencing, etc.

Switch Data

Inductive switch requiring +18-42 volt input. Outputs “A” and “B” are opposite; one at “0” voltage, the other at input voltage. During switching, “A” and “B” outputs reverse. Provides 0.4A switching current.



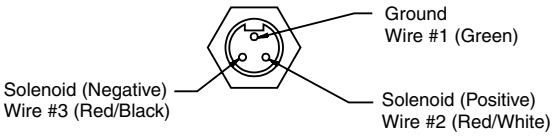
For repetitive switch power-up conditions, please consult factory.

Conduit Box
(connection option K)

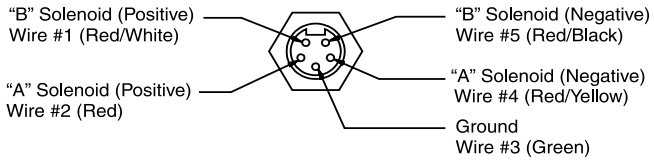
Interface – 152.4 cm (6.0 inch) lead wires, 18 awg.
– Meets NEMA 4 and IP65

Manaplug
(valve variations 6, 56, 1A, 1C)

Interface – Brad Harrison Plug
– 3-Pin for Single Solenoid
– 5-Pin for Double Solenoid



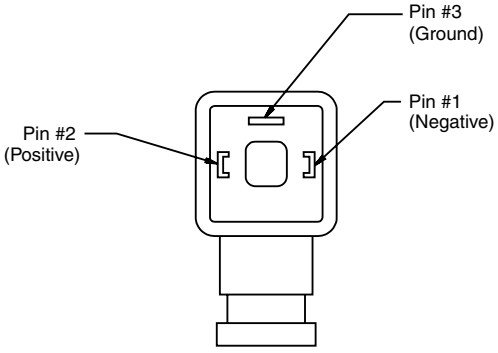
3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid



5-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

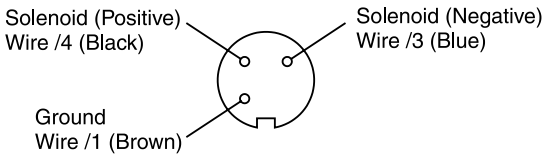
Hirschmann Plug with Lights (P5)



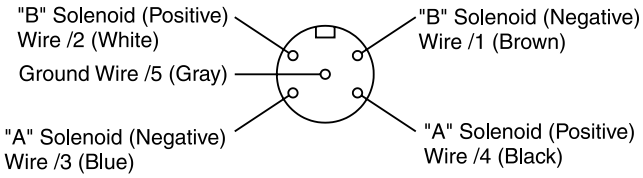
Face View of Plug

Conforms to DIN43650, ISO4400, Form A 3-Pin

Manaplug - Micro Connector
(valve variations 7, 57, 1B, 1D)



3-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

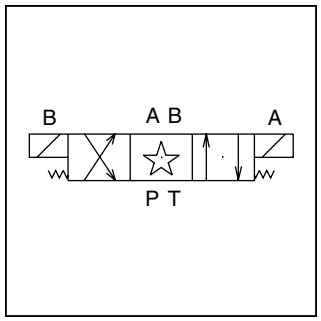


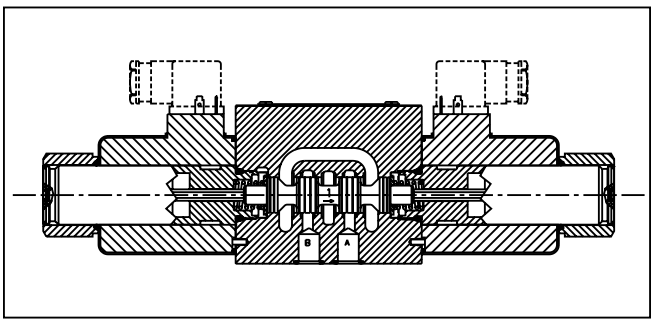
5-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

General Description

Series D3DW directional control valves are high performance, 5-chamber, direct operated, wet armature, solenoid controlled, 3 or 4-way valves. They are available in 2 or 3-position and conform to NFPA's D05, CETOP 5 mounting patterns.





Features

- 22 spools available including proportional.
- DC surge suppression available to protect electrical equipment.
- Easy access mounting bolts.
- CSA approved.
- No tools required for coil removal.
- High pressure tank line capability.
- Monitor switch available.

Response Time (ms)

Signal to 95% spool stroke measured at 175 Bar (2500 PSI) and 75 LPM (20 GPM)

Solenoid Type	Pull-In	Drop-Out
DC	110	85

Solenoid Ratings**

Insulation	Class H
Allowable Deviation from rated voltage	DC only -10% to +15%
Armature	Wet pin type

** DC Solenoids available with optional molded metal oxide varistor (MOV) for surge suppression.

D3DW Solenoid Electrical Characteristics

Solenoid Code	Nominal Volts	In Rush Amps	Holding Amps	Nominal Watts (Ref)
K	12 VDC	—	3.00	36
J	24 VDC	—	1.50	36
D	120 VDC	—	0.30	36
Y*	120/60 110/50	—	0.37	36
T*	240/60 220/50	—	0.18	36

* AC input rectified to DC

Specifications

Interface	NFPA D05, CETOP 5, NG 10
Max. Operating Pressure	P, A, B: 345 Bar (5000 PSI) Standard CSA 207 Bar (3000 PSI) Tank: 207 Bar (3000 PSI) Standard CSA 103 Bar (1500 PSI)
Maximum Flow	See Spool Reference Chart
Leakage Rates 100 SSU @ 49°C (120°F)	Maximum Allowable: 19.7 cc (1.2 Cu. in.) per Minute/ Land @ 69 Bar (1000 PSI)* 73.8 cc (4.5 Cu. in.) per Minute/ Land @ 207 Bar (3000 PSI)* Typical: 4.9 cc (0.3 Cu. in.) per Minute/ Land @ 69 Bar (1000 PSI)* 26.2 cc (1.6 Cu. in.) per Minute/ Land @ 345 Bar (5000 PSI)

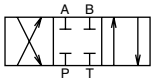
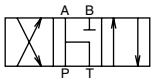
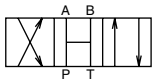
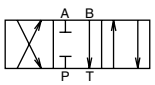
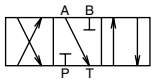
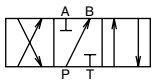
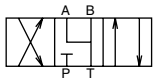
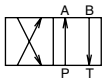
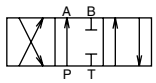
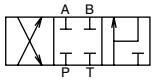
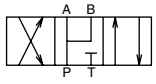
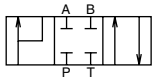
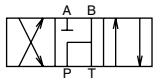
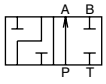
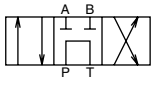
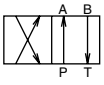
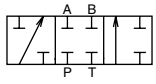
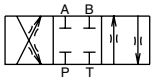
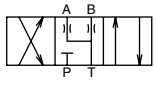
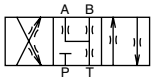
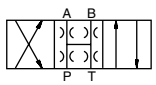
* #008 and #009 Spools may exceed these rates, consult factory.

D	3	D	W				
Directional Control Valve	Basic Valve	Body	Actuator	Spool	Style	Seal	Solenoid Voltage

Basic Valve: NFPA D05 CETOP 5 NG 10

Body: 5-Chamber Body

Actuator: Wet armature solenoid

Code	Symbol	Code	Symbol
1		14	
2		15	
3		16	
4		**20***	
5		21	
6		22	
7		26*	
8* 9**		**30****	
10		**81**	
11		**82**	
12			

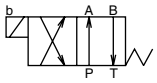
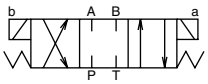
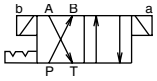
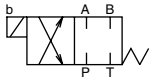
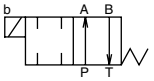
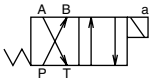
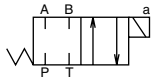
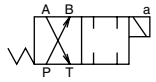
* 8, 20 & 26 spools have closed crossover.
** 9 & 30 spools have open crossover.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing solenoid A. Note operators reverse sides for #8 and #9 spools. See installation information for details.

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Code	Description	Symbol
K	**12 VDC**	
J	**24 VDC**	
D	120 VDC	
Y*	120/60 AC 110/50	
T*	240/60 AC 220/50	

* Must be rectified.

Code	Description	Symbol
B*	**Single solenoid, 2 position, spring offset. P to A and B to T in offset position**	
C	**Double solenoid, 3 position, spring centered.**	
D†	**Double solenoid, 2 position, detent**	
E	Single solenoid, 2 position, spring centered. P to B and A to T when energized.	
F	Single solenoid, 2 position. Spring offset, energized to center. Position spool spacer on A side. P to A and B to T in spring offset position.	
H*	**Single solenoid, 2 position, spring offset. P to B and A to T in offset position.**	
K	Single solenoid, 2 position. Spring centered. P to A and B to T when energized.	
M	Single solenoid, 2 position, spring offset, energized to center position. Spool spacer on B side. P to B and A to T in spring offset position.	

* Only spools 20, 26 & 30.
† Only spools 20 & 30.

This condition varies with spool code.

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Solenoid Connector

Code	Description
P	**Hirschmann w/Plug**
W*	**Hirschmann w/o Plug**

* Not available with signal lights.

Manual Override Options

Code	Description
Omit	**Standard Tube**
P	Extended Manual Override

Electrical Options

Code	Description
Omit	**No Option**
V#	Varistor Surge Suppresor
Z	AC Rectified with MOV

\# DC Voltage only.

Shift Indication

Code	Description
Omit	**Standard Valve**
I7*	Monitor Switch

* Single solenoid models only. Not CE or CSA approved. Not available with spools 8, 9, 81 & 82.

Approvals

Code	Description
Omit	**Standard Valve**
4	**CSA Approval**

Variations

Code	Description
Omit	**Standard Valve**
5	**Signal Lights**

Design Series

NOTE: Not required when ordering.

Mounting Bolt Kits

UNC Bolt Kits for use with D3DW Directional Control Valves & Sandwich Valves					
		Number of Sandwich Valves @ 2.00" (50mm) thickness			
		0	**1**	**2**	**3**
D3DW	Standard:	BK98 1.62"	BK141 3.50"	BK142 5.50"	BK143 7.50"
	Metric:	BKM98 40mm	BKM141 90mm	BKM142 140mm	BKM143 190mm

NOTE: All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 Nm (12 ft-lbs).

Valve Weight:

Single Solenoid	5.3 kg (11.6 lbs.)
Double Solenoid	7.3 kg (16.0 lbs.)

Seal Kit:

Nitrile	SKD3DW
Fluorocarbon	SKD3DWV

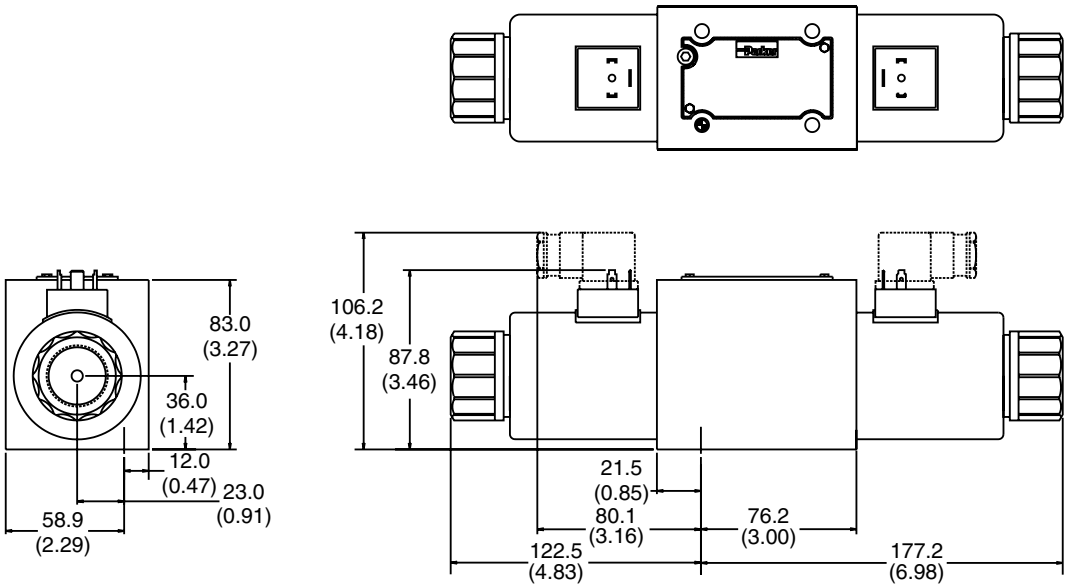
Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Inch equivalents for millimeter dimensions are shown in (**)

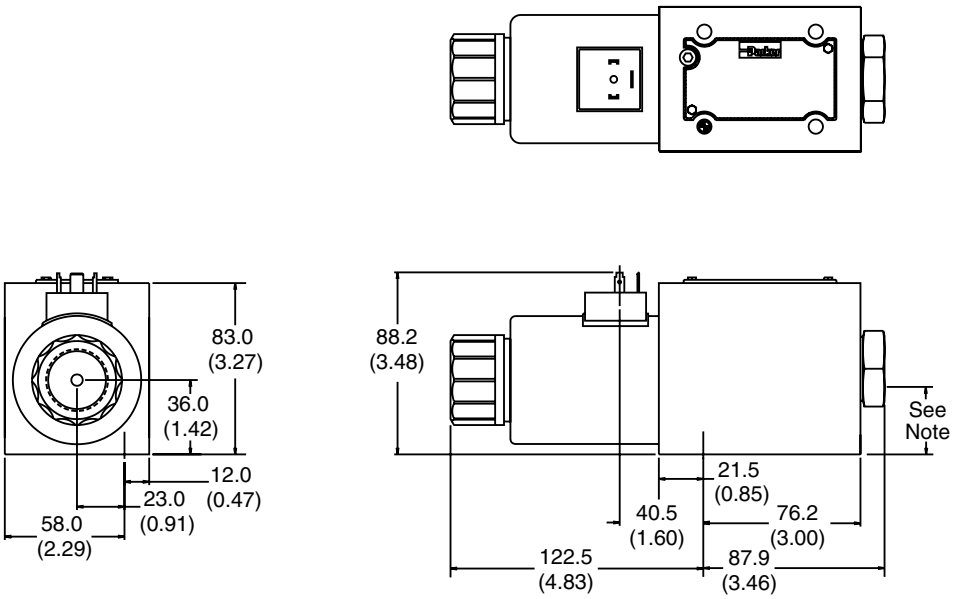
A

Hirschmann, Double DC Solenoid



Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

Hirschmann, Single DC Solenoid



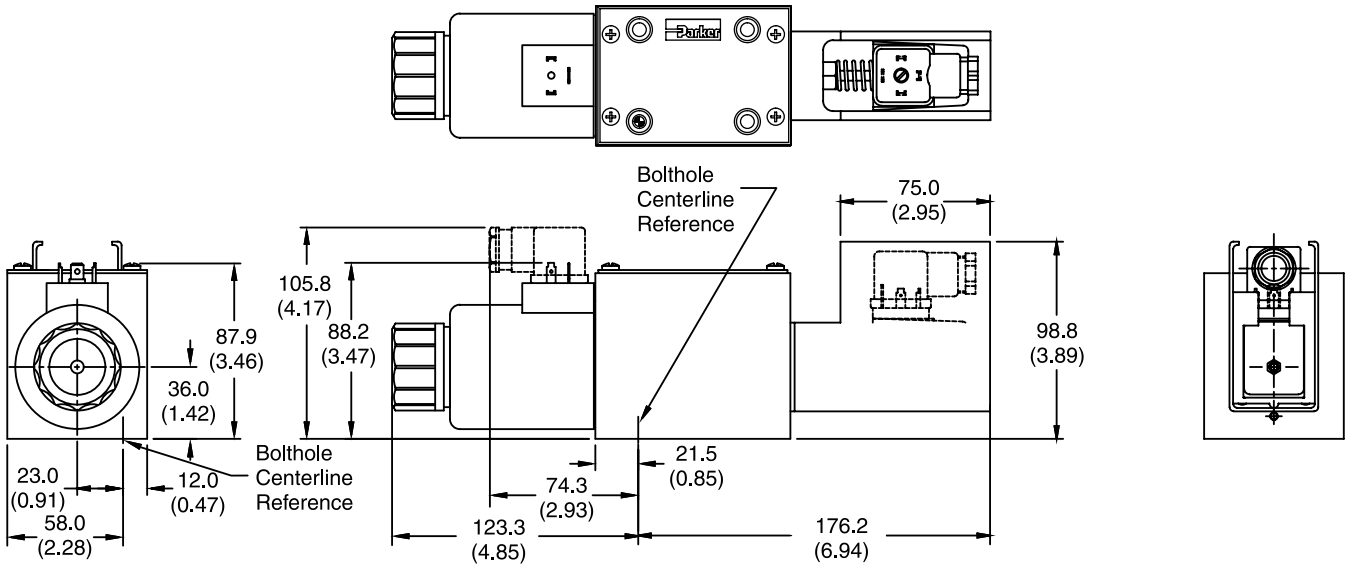
Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

D3.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

Hirschmann, Single DC Solenoid
with Variation I7 (Monitor Switch)



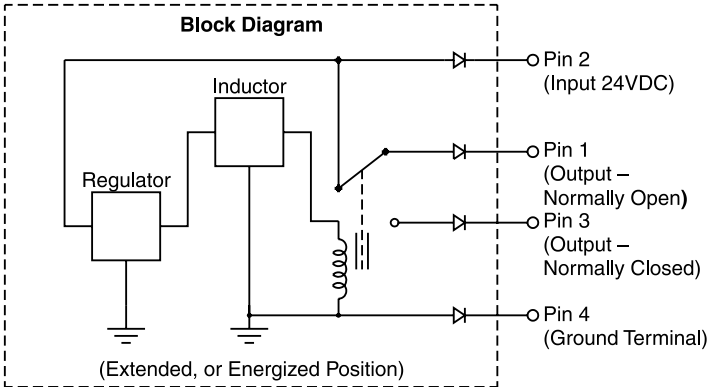
Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

Monitor Switch
(Variation I7) End of Stroke

This feature provides for electrical confirmation of the spool shift. This can be used in safety circuits, to assure proper sequencing, etc.

Switch Data

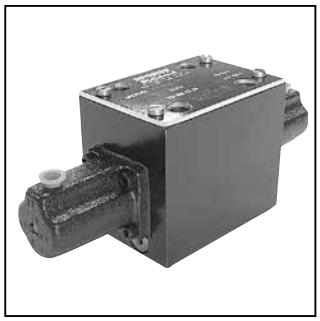
Inductive switch requiring +18-42 volt input. Outputs “A” and “B” are opposite; one at “0” voltage, the other at input voltage. During switching, “A” and “B” outputs reverse. Provides 0.4A switching current.

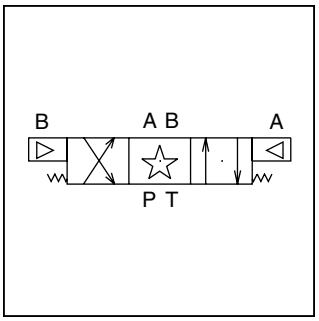


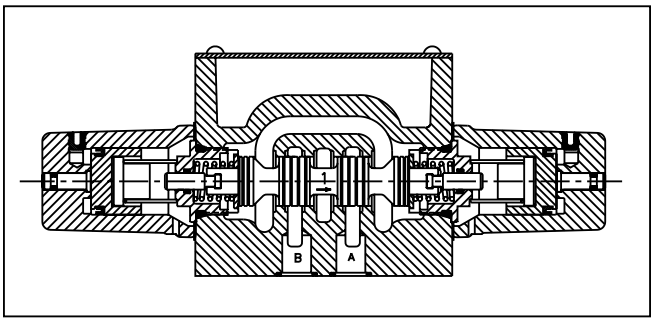
For repetitive switch power-up conditions, please consult factory.

General Description

Series D3A directional control valves are high performance, 4-chamber, direct operated, air pilot controlled, 4-way valves. They are available in 2 or 3-position and conform to NFPA's D05/CETOP 5 mounting patterns.







Features

- Low pilot pressure required – 4.1 Bar (60 PSI) minimum.
- High flow, low pressure drop design.

Specifications

Mounting Pattern	NFPA D05, CETOP 5, NG 10
Maximum Pressure	Operating: 345 Bar (5000 PSI) Tank Line: 34 Bar (500 PSI)
Maximum Flow	See Spool Reference Chart
Pilot Pressure	Air Minimum 4.1 Bar (60 PSI) Air Maximum 6.9 Bar (100 PSI)

Air Operated

Shift Volume. The air pilot chamber requires a volume of 1.8 cc (.106 $in.^3$) for complete shift from center to end.

Pilot Piston. The pilot piston area is 506 mm^2 (.785 $in.^2$). Pilot piston stroke is 3.4 mm (.135 in.).

Response Time* (ms)

Signal to 95% spool stroke measured at 172 Bar (2500 PSI) and 75 LPM (20 GPM)

Pilot Pressure	Pull-In	Drop-Out
60 PSI	23.0 ms	23.0 ms
100 PSI	19.0 ms	38.0 ms

* Chart is for reference only. Response time will vary with pilot line size, length, air pressure and air valve flow capacity (Cv).

D Directional Control Valve

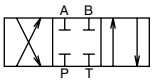
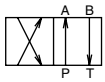
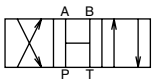
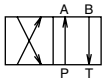
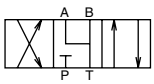
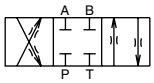
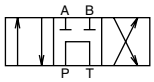
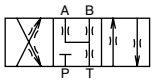
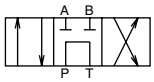
3 Basic Valve

NFPA D05
CETOP 5
NG10

A Actuator

Air Operator

Spool

Code	Symbol	Code	Symbol
1		20*	
2		30†	
4		81	
8*		82	
9†			

* 8 and 20 spools have closed crossover.
† 9 and 30 are open crossover.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator A. Note operators reverse sides for #8 and #9 spools. See installation information for details.

Style

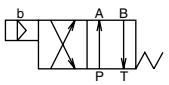
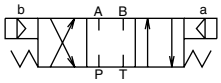
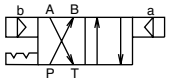
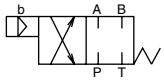
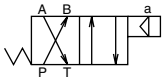
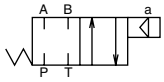
Seal

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Variations

Code	Description
Omit	**Standard**
90	1/4 BSPP Pilot Port

Design Series
NOTE: Not required when ordering.

Code	Description	Symbols
B #	**Single operator, two position spring offset. P to A and B to T in offset position.**	
C	**Double operator, three position, spring centered.**	
D #	**Double operator, two position, detent.**	
E	Two position, spring centered. P to B and A to T in shifted position.	
H #	**Single operator, two position, spring offset. P to B and A to T in offset position.**	
K	Two position, spring centered. P to A and B to T in shifted position.	

\# B, D & H styles available with 20 and 30 spools only.

Indicates air pilot.

This condition varies with spool code.

Mounting Bolt Kits

UNC Bolt Kits for use with D3A Directional Control Valves & Sandwich Valves					
		Number of Sandwich Valves @ 2.00" (50mm) thickness			
		0	**1**	**2**	**3**
D3A	Standard:	BK98 1.62"	BK141 3.50"	BK142 5.50"	BK143 7.50"
	Metric:	BKM98 40mm	BKM141 90mm	BKM142 140mm	BKM143 190mm

NOTE: All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 Nm (12 ft-lbs).

Valve Weight: 4.1 kg (9 lbs.)
Seal Kit:
Nitrile SKD3A
Fluorocarbon SKD3AV

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

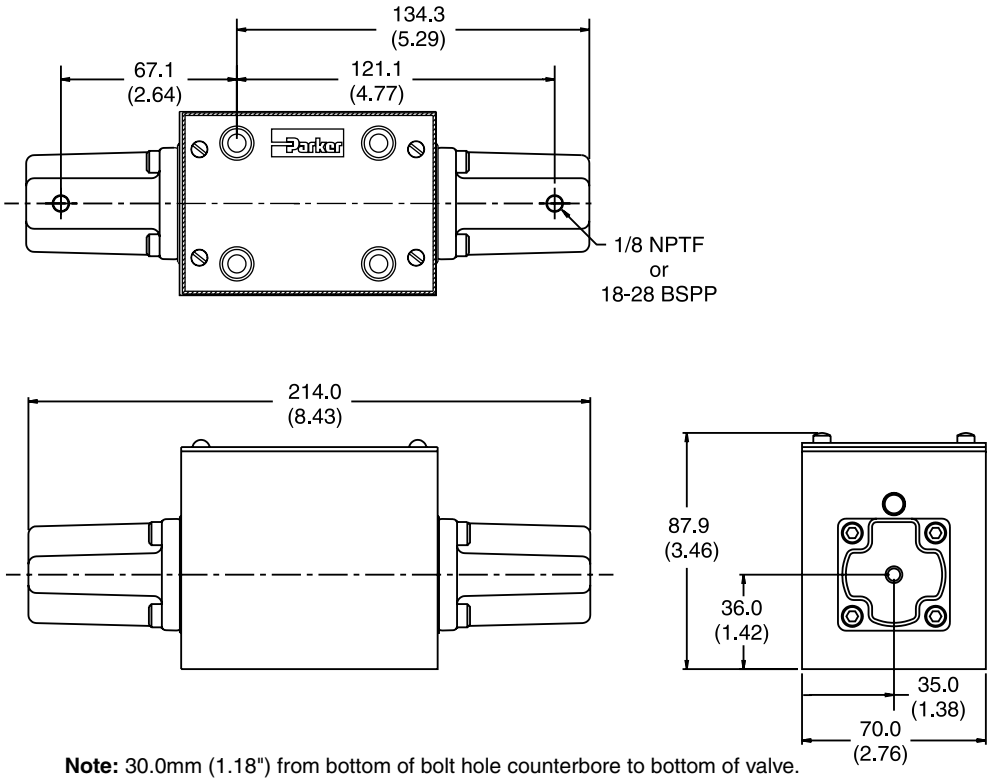
D3.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

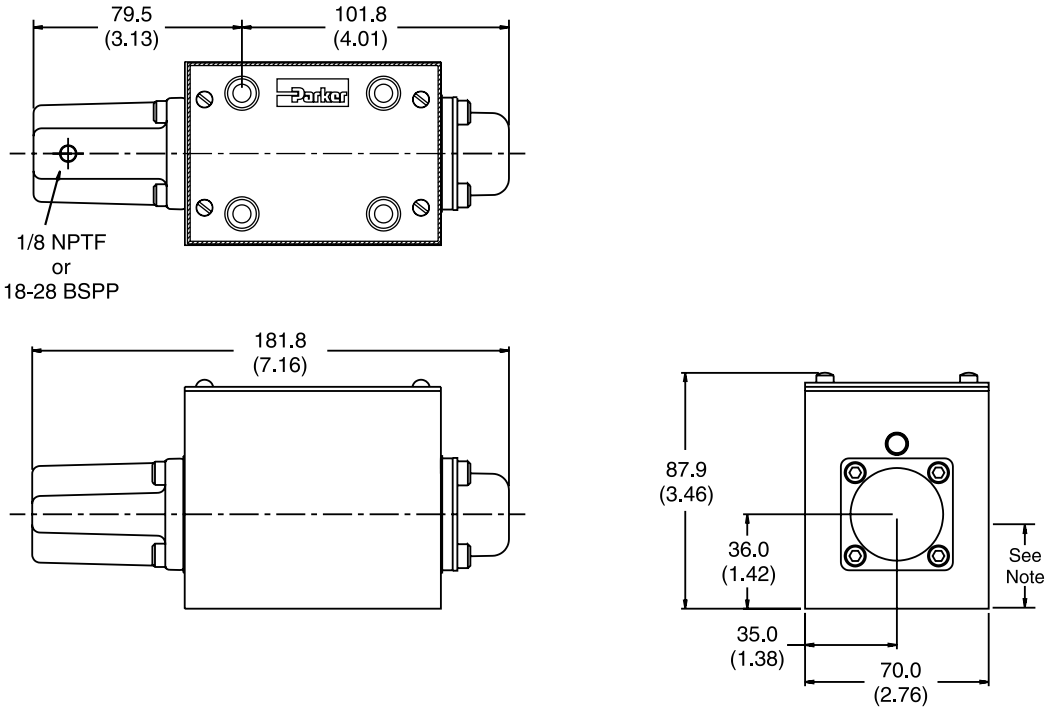
A

Air Operated, Double Pilot



Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

Air Operated, Single Pilot



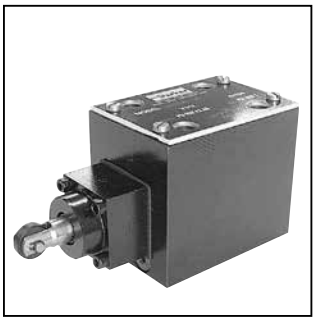
Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

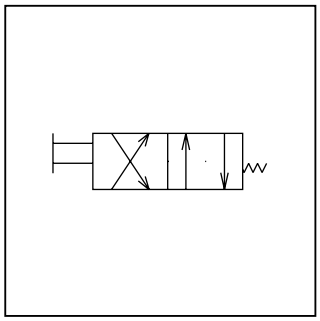
D3.indd, dd

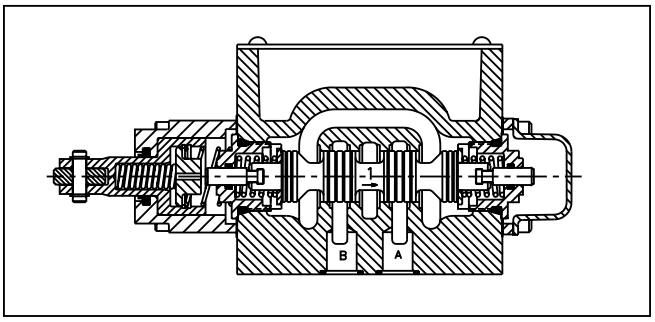
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series D3C and D3D directional control valves are high performance, 4-chamber, direct operated, cam controlled, 3 or 4-way valves. They are available in 2-position and conform to NFPA's D05, CETOP 5 mounting patterns.







Features

- Choice of 2 cam roller positions (D3C and D3D).
- Short stroke option.
- High flow, low pressure drop design.

Specifications

Mounting Pattern	NFPA D05, CETOP 5, NG 10
Maximum Pressure	Operating: 345 Bar (5000 PSI) Tank Line: 34 Bar (500 PSI)
Maximum Flow	See Spool Reference Chart
Force Required to Shift	235 N (53 lbs.)
Maximum Cam Angle	30°

Ordering Information

D	3						
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Seal	Variations	Design Series

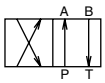
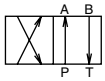
NOTE: Not required when ordering.

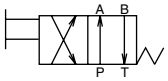
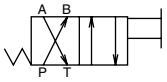
NFPA D05 CETOP 5 NG10

Code	Description
C	**Cam (90° to mounting surface)**
D	**Cam parallel to mounting surface**

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Code	Description
Omit	**Standard**
B5	Short Stroke

Code	Description	Symbol
20*		
30†		

Code	Description	Symbol
B	**Two position, spring offset operator at "A" port end.**	
H	**Two position, spring offset operator at "B" port end.**	

Valve schematic symbols are per NFPA/ANSI standards. See installation information for details.

* 20 spool has closed crossover.

† 30 spool has open crossover.

Valve Weight: 3.6 kg (8 lbs.)

Seal Kit:

Nitrile	SKD3C
Fluorocarbon	SKD3CV

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

D3.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Mounting Bolt Kits

UNC Bolt Kits for use with D3C & D3D Directional Control Valves & Sandwich Valves					
		Number of Sandwich Valves @ 2.00" (50mm) thickness			
		0	1	2	3
D3C, D3D	Standard:	BK98 1.62"	BK141 3.50"	BK142 5.50"	BK143 7.50"
	Metric:	BKM98 40mm	BKM141 90mm	BKM142 140mm	BKM143 190mm

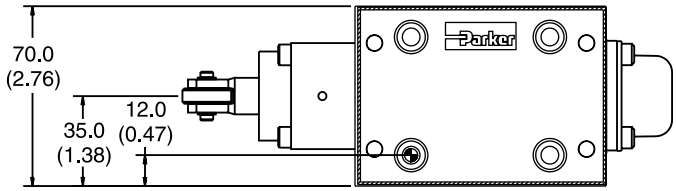
NOTE: All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 Nm (12 ft-lbs)

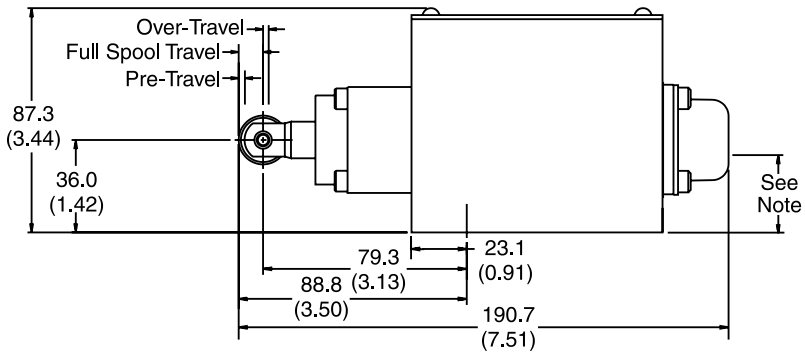
Dimensions

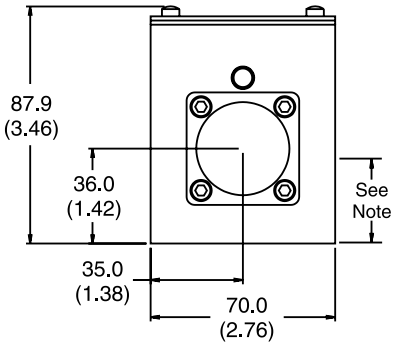
Inch equivalents for millimeter dimensions are shown in (**)

Cam Operated

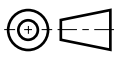
Valve Type	Pre-Travel	Full Spool Travel	Over-Travel
Standard Valve	1.75 (0.07)	5.75 (0.23)	2.03 (0.08)
B5 Short Stroke	0 (0)	4.00 (0.16)	2.03 (0.08)





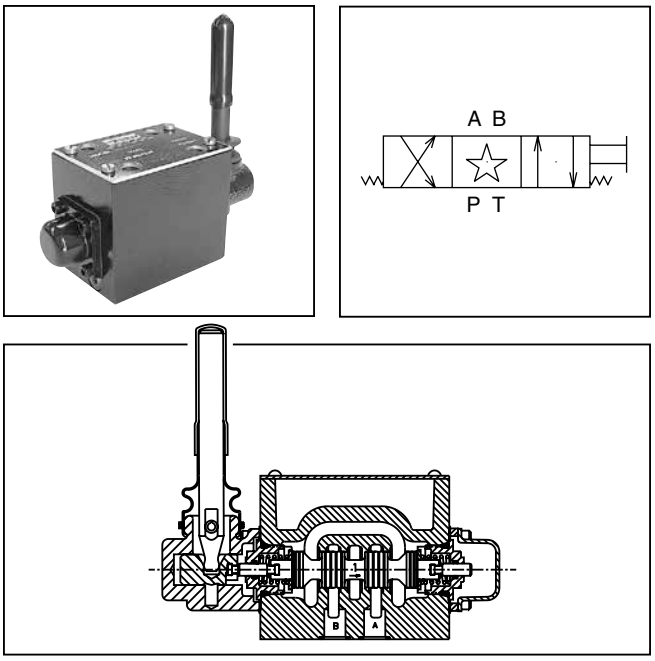


Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.



General Description

Series D3L directional control valves are high performance, 4-chamber, direct operated, lever controlled, 4-way valves. They are available in 2 or 3-position and conform to NFPA's D05, CETOP 5 mounting patterns.



Features

- Spring return or detent styles available.
- High flow, low pressure drop design.
- Heavy duty handle design.

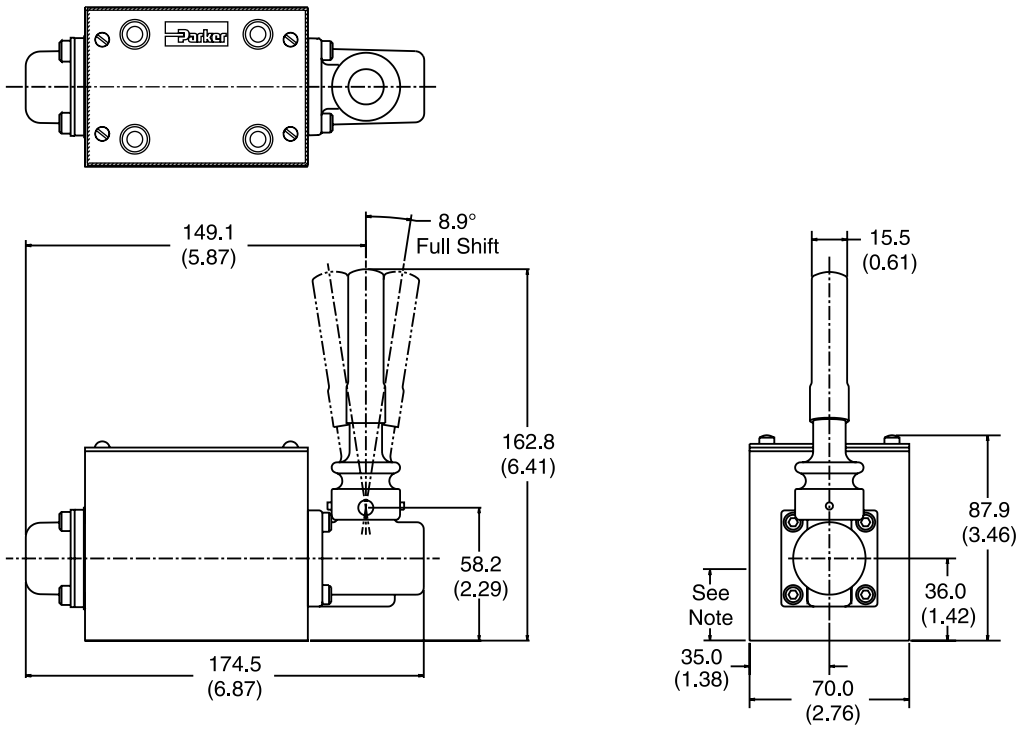
Specifications

Mounting Pattern	NFPA D05, CETOP 5, NG 10
Maximum Pressure	Operating: 345 Bar (5000 PSI) Tank Line: 34 Bar (500 PSI)
Maximum Flow	See Spool Reference Chart
Force Required to Shift Lever Operator	173 N (39 lbs.)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

Lever Operated D3L



Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

D	3	☐	☐	☐	☐	☐	☐
Directional Control Valve	Basic Valve	Operator Type & Location	Spool	Style	Seal	Variations	Design Series

NOTE: Not required when ordering.

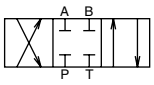
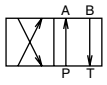
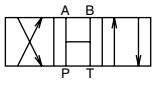
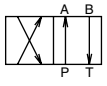
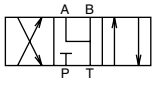
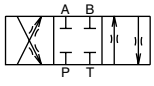
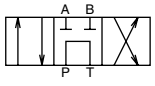
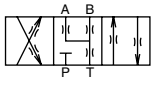
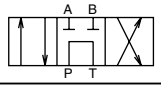
NFPA D05
CETOP 5
NG10

Code	Operator Type	Operator Location (A or B End) For Valve Style						
		B	C	D	E	H	K	N
L	Lever (Standard)	B	B	B	A	B	B	B
LB	Lever (Alternate)	A	A	A	N/A	A	N/A	A

Code	Description
N	Nitrile
V	Fluorocarbon

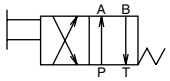
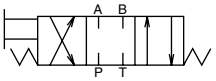
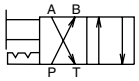
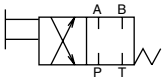
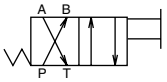
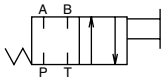
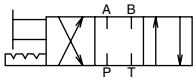
Code	Description
Omit	Standard
I7*	Monitor Switch

* Not available on C, D or N styles. Not CE or CSA approved.

Code	Symbol	Code	Symbol
1		20*	
2		30†	
4		81	
8*		82	
9†			

* 8 and 20 spools have closed crossover.
† 9 and 30 are open crossover.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator A. Note operators reverse sides for #8 and #9 spools. See installation information for details.

Code	Description	Symbol
B*	**Two position, spring offset. P to A and B to T in offset position.**	
C	**Three position, spring centered.**	
D*	**Two position, detent.**	
E	Two position, spring centered. P to B and A to T in shifted position.	
H*	**Two position, spring offset. P to B and A to T in offset position.**	
K	Two position, spring centered. P to A and B to T in shifted position.	
N	Three position, detent.	

* 20 and 30 spools only.

☐ This condition varies with spool code.

Mounting Bolt Kits

UNC Bolt Kits for use with D3L Directional Control Valves & Sandwich Valves					
		Number of Sandwich Valves @ 2.00" (50mm) thickness			
		0	1	2	3
D3L	Standard:	BK98 1.62"	BK141 3.50"	BK142 5.50"	BK143 7.50"
	Metric:	BKM98 40mm	BKM141 90mm	BKM142 140mm	BKM143 190mm

NOTE: All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 Nm (12 ft-lbs).

Valve Weight: 3.6 kg (8 lbs.)
Seal Kit:
Nitrile SKD3L
Fluorocarbon SKD3LV

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

D3.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Fluid Recommendations

Premium quality hydraulic oil with a viscosity range between 32-54 cSt (150-250 SSU) at 38°C (100°F) is recommended. The absolute operation viscosity range is from 16-220 cSt (80-1000 SSU). Oil should have maximum anti-wear properties and rust and oxidation treatments.

Fluids and Seals

Valves using synthetic, fire-resistant fluids require special seals. When phosphate ester or its blends are used, FLUOROCARBON seals are required. Water-glycol, water-in-oil emulsions, and petroleum oil may be used with NITRILE seals.

Temperature Recommendation

Recommended oil temperature:
-29°C to +71°C (-20°F to +160°F)

Filtration

For maximum valve and system component life, the system should be protected at a contamination level not to exceed 125 particles greater than 10 microns per milliliter of fluid. (SAE Class 4 or better, ISO Code 16/13).

Tank Line Surges

If several valves are piped with a common tank line, flow surges in the line may cause unexpected spool shift. Detent style valves are most susceptible to this. Separate tank lines should be used when line surges are expected in an application.

Recommended Mounting Position

Valve Type	Recommended Mounting Position
Detent (Solenoid)	Horizontal
Spring Offset	Unrestricted
Spring Centered	Unrestricted

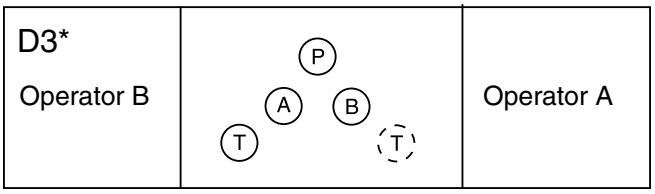
Silting

Silting can cause any sliding spool valve to stick and not spring return, if held shifted under pressure for long periods of time. The valve should be cycled periodically to prevent sticking.

Single Pass Operation

Valve flow ratings are for double pass operation (with equal flow in both paths). When using these components in single pass applications, flow capabilities may be reduced. Consult your local Parker representative for details.

Flow Path Data



*Note: On valves with 008 or 009 spool, A and/or B operators reverse sides. Flow paths remain the same as viewed from top of valve.

Double Solenoid. With solenoid “A” energized, flow path is P→A and B→T. When solenoid “B” is energized, flow path is P→B and A→T. The center condition on a spring-centered valve exists when both coils are de-energized, or during a complete shift, as the spool passes through center.

Detent and Spring Offset. The center condition exists on detent and spring offset valves only during spool crossover. To shift and hold a detented spool, only a momentary energizing of the solenoid is necessary. The minimum duration of the signal is aproximately 0.13 seconds for both AC and DC voltages. This position will be held provided the spool center line is in a horizontal plane, and no shock or vibration is present to displace the spool.

Single Solenoid. Spring offset valves can be ordered in six styles: B, E, F, H, K and M. Flow path data for the various styles are described in the order chart.

Lever Operated (on B end)

Pull lever away from valve	P→A; B→T
Push lever toward valve	P→B; A→T

Note: Reverse with a #8 or #9 spool.

Electrical Failure

Should electric power fail, spring offset and spring centered valves will shift to the spring held position. Detented valves will stay in the last position held before power failure. If main flow does not fail or stop simultaneously, machine actuators may continue to function in an undesirable manner or sequence.

Loss of Pilot Pressure (D3A)

Should a loss of pilot pressure occur, spring offset and spring centered valves will shift to the spring held position. Detented valves will remain in the last position held. If main hydraulic flow does not simultaneously stop, machine actuators may continue to function in an undesirable manner or sequence.

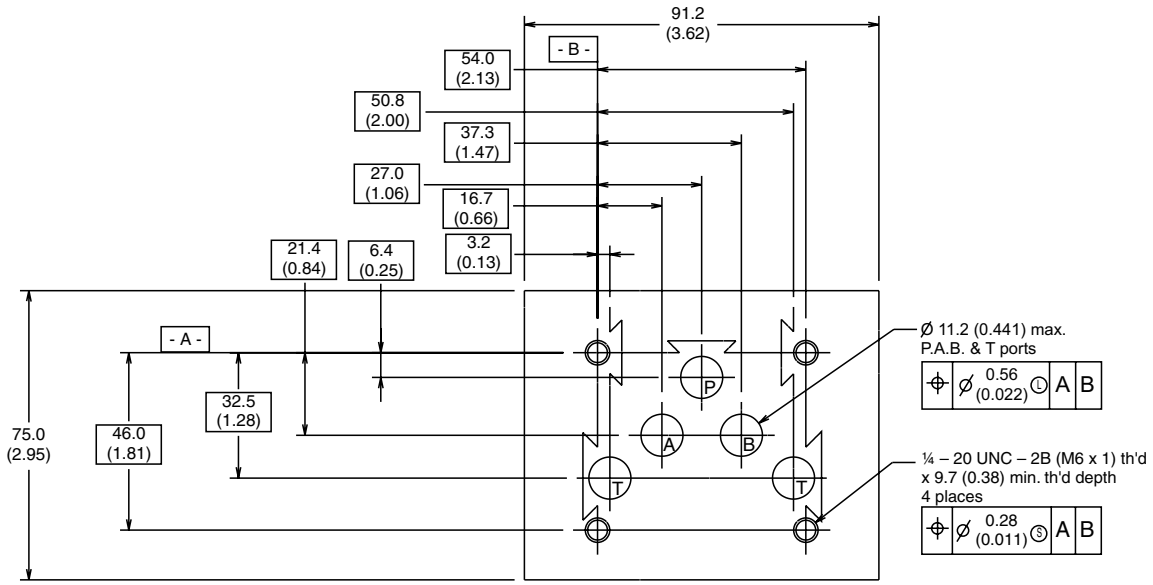
Torque Specifications

Torque values recommended for the bolts which mount the valve to the manifold or subplate are as follows:

1/4-20 thread (M6x1) torque 16.0 Nm (12 ft-lbs).

Mounting Pattern — NFPA, D05, CETOP 5, NG 10

Inch equivalents for millimeter dimensions are shown in (**)



Notes

Return to ALPHA TOC
Return to SECTION TOC
A

D3.indd, dd

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Elyria, Ohio, USA

Application

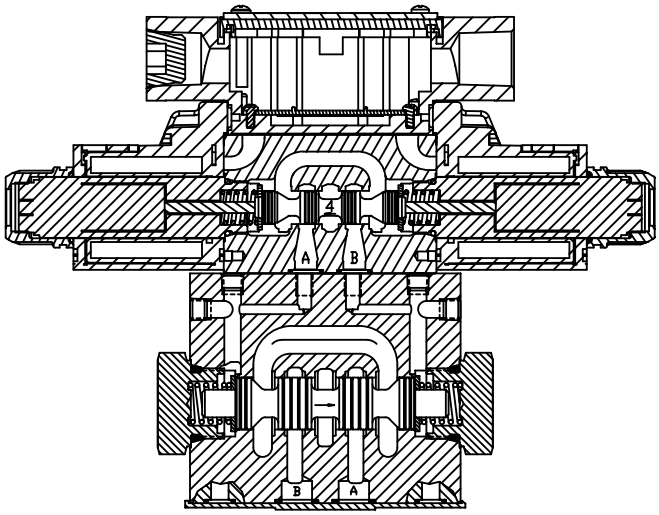
Series D31 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles and are manifold mounted. These valves conform to NFPA's D05H, CETOP 5 and can also be manufactured to an NFPA DO5HE, CETOP 5H configuration.

Operation

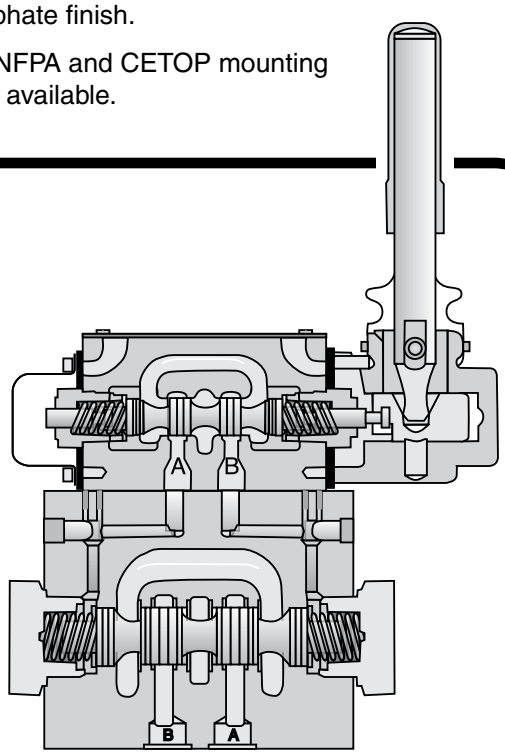
Series D31 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or pilot operators (hydraulic or pneumatic).

Features

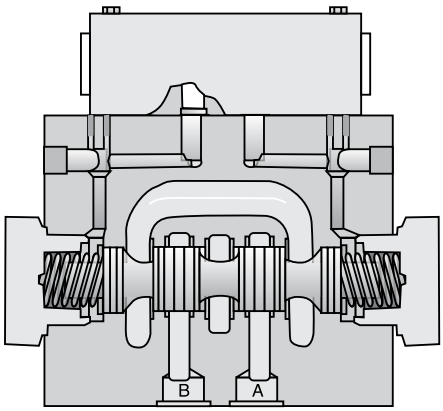
- Easy access mounting bolts.
- 345 Bar (5000 PSI) pressure rating.
- Flows to 175 LPM (45 GPM) depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.
- Both NFPA and CETOP mounting styles available.



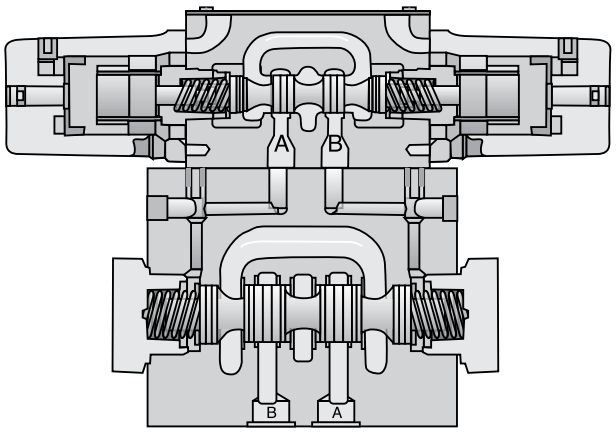
D31*W Solenoid Operated Plug-In Conduit Box



D31*L Lever Operated



D3*P Oil Pilot Operated



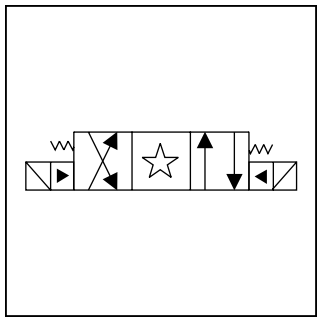
D31*A Air Pilot Operated

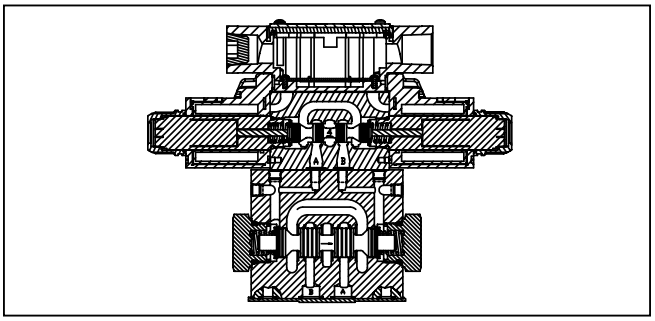
General Description

Series D31 directional control valves are 5-chamber, pilot operated, solenoid controlled valves. The valves are suitable for manifold or subplate mounting.

Features

- **World design –** Available worldwide.
- **Mounting bolts below center line of spool –** Minimizes spool binding.
- **Five chamber style –** Eliminates pressure spikes in tubes, increasing valve life.
- **High pressure and flow ratings –** Increased performance options in a compact valve.





Specifications

Mounting Pattern	NFPA D05H, CETOP 5 NFPA D05HE, CETOP 5H
Max. Operating Pressure	345 Bar (5000 PSI) Standard 207 Bar (3000 PSI) 10 Watt CSA 207 Bar (3000 PSI)
Max. Tank Line Pressure	Internal Drain Model: 103 Bar (1500 PSI) AC Std. 207 Bar (3000 PSI) DC Std./AC Opt. External Drain Model: 207 Bar (3000 PSI) CSA 103 Bar (1500 PSI)
Max. Drain Pressure	103 Bar (1500 PSI) AC only 207 Bar (3000 PSI) DC Std./AC Opt. CSA 103 Bar (1500 PSI)
Min. Pilot Pressure	6.9 Bar (100 PSI)
Max. Pilot Pressure	345 Bar (5000 PSI) Standard CSA 207 Bar (3000 PSI)
Nominal Flow	76 Liters/Min (20 GPM)
Maximum Flow	See Switching Limit Charts

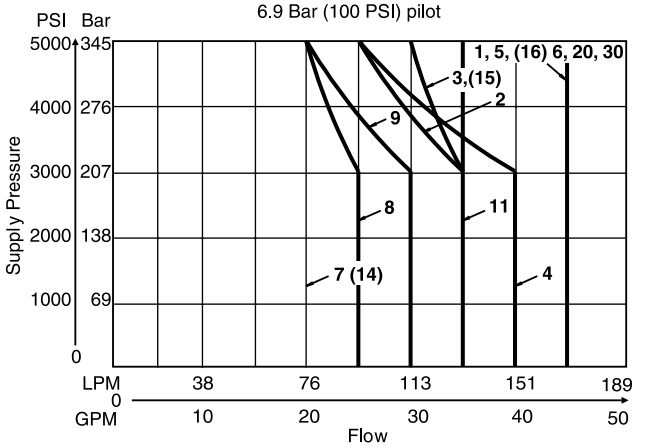
Response Time

Response time (milliseconds)
at 345 Bar (5000 PSI) is 76 LPM (20 GPM)

Solenoid Type	Pilot Pressure	Pull-In	Drop-Out
DC	500	40	50
	1000	36	50
	2000	34	50
AC	500	20	33
	1000	18	33
	2000	13	33

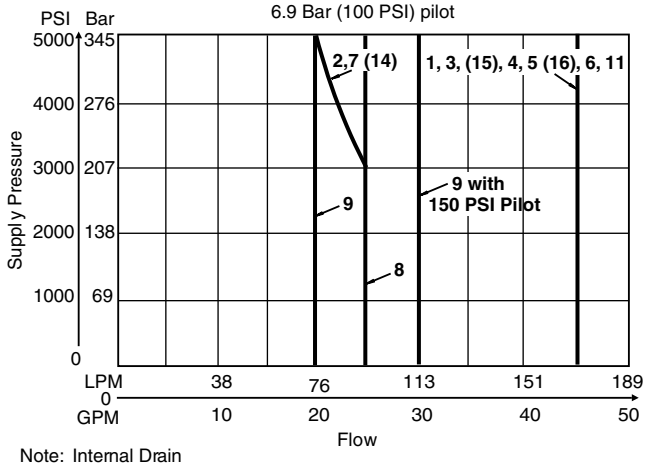
Switching Limit Charts

For Styles B, C, E, H and K
D Style – external drain only (For internal drain see note below)



Note: Internal Drain
1, 4 spools – 113 LPM (30 GPM) max., 7 spool – per curve
All others – 95 LPM (25 GPM) max.

For Styles F and M – external drain only
(For internal drain see note below)



Note: Internal Drain
1, 4 spools – 113 LPM (30 GPM) max., 2, 9 & 14 spools – per curve
All others – 95 LPM (25 GPM) max.

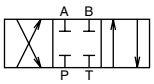
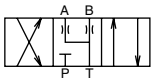
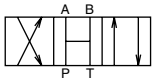
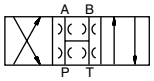
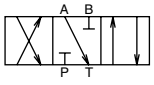
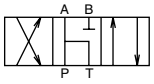
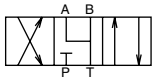
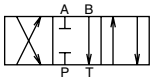
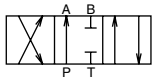
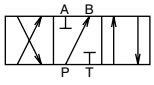
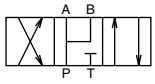
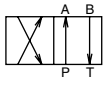
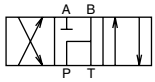
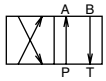
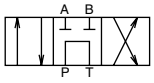
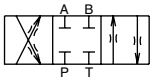
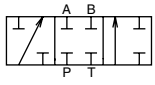
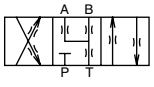
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

D							
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Pilot Supply and Drain	Seal	Solenoid Voltage

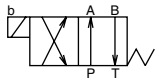
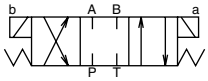
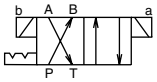
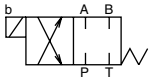
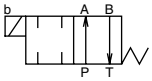
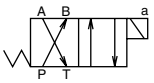
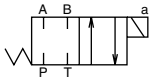
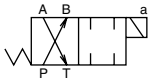
Code	Description
31D	NFPA D05HE, CETOP 5H, DIN NG10, D03 Pilot, ISO Port
31V	**NFPA D05H, CETOP 5, D03 Pilot, NFPA Port**

Code	Description
W#	**Solenoid, Wet Pin, Screw-in**
HW#	**Reversed Wiring**

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing solenoid A. Note operators reverse sides for #008 and #009 spools. See installation information for details. To configure per DIN standards (A coil over A port, B coil over B port) code valves as D31VHW***.

Code	Symbol	Code	Symbol
001		011	
002		012	
003		014	
004		015	
005		016	
006		**020***	
007		**030****	
008* **009****		**081**	
010		**082**	

* 008 & 020 spools have closed crossover.
** 009 & 030 spools have open crossover.

Code	Description	Symbol
B*	**Single solenoid, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Double solenoid, 3 position, spring centered.**	
D*	**Double solenoid, 2 position, detent.**	
E	Single solenoid, 2 position, spring centered. P to B and A to T when energized.	
F†	Single solenoid, 2 position, spring offset, energized to center. Spacer on A side. P to A and B to T in offset position.	
H*	**Single solenoid, 2 position, spring offset. P to B and A to T in offset position.**	
K	Single solenoid, 2 position, spring centered. P to A and B to T when energized.	
M†	Single solenoid, 2 position, spring offset, energized to center. Spacer on B side. P to B and A to T in offset position.	

* 020 and 030 spools only.
† High watt only.

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Code	Description
1*	**Internal Pilot, External Drain**
2*	**External Pilot, External Drain**
4#	**Internal Pilot, Internal Drain**
5	**External Pilot, Internal Drain**

* F and M style available only with external drain.
# Not available with 002, 007, 008, 009 or 014 spools.

Code	Description
A**	24/50 VAC
D	120 VDC
G	198 VDC
J	**24 VDC**
K	**12 VDC**
N***	220/50 VAC
P***	110/50 VAC
Q**	100/60 VAC
QD†	100 VAC/60 Hz 100 VAC/50 Hz
R	24/60 VAC
T	**240/60 - 220/50 VAC**
U	98 VDC
Y	**120/60 - 110/50 VAC**
Z	250 VDC

** High watt only.
*** Explosion proof only.
† Available in DIN only.

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

□ Solenoid Connection | □ Coil Options | □ Tube Options | □ Manual Override Options | □ Electrical Options | □ Shift Response and Indication | □ Approvals | □ Valve Variations | ⌜⌟ Design Series

NOTE: Not required when ordering.

Code	Description
C*	**Leadwire Conduit Box**
D**	Metric Plug (M12X1), DESINA
E†	Explosion Proof
G††	**Plug-In Conduit Box**
J#	**Deutsch (DT06-2S)**
M#	Metri-Pack (150)
P	**DIN with Plug**
S#	Dual Spade
W†	**DIN w/o Plug**

* No variations – See Plug-in.
** DC only, lights, diode surge suppressor, not CSA approved.
† Not available with lights.
†† Required for variations on conduit box style. Must have lights.
# DC only, no lights, not CSA approved.

Code	Description
Omit*	**High Watt**
D**	Explosion Proof, EEXD ATEX
E**	Explosion Proof, EEXME ATEX
F†	Low Watt
L††	10 Watt
O**	Explosion Proof, MSHA
T#	Explosion Proof, Ex d IIC ATEX/CSA
U**	Explosion Proof, UL/CSA

* AC ambient temperature must not exceed 60°C (140°F).
** 60 Hz only on AC, no options.
† AC only.
†† DC and AC rectified only.
# J, K and Y voltages only. Dual frequency on AC, no options.

Code	Description
Omit	**Standard Pressure 103.5 Bar (1500 PSI) AC 207 Bar (3000 PSI) DC**
H*	**High Pressure, AC only 207 Bar (3000 PSI)**

* Not available with CSA.

Code	Description
Omit	**Standard**
P	Extended with Boot
T†	None

† DC or AC rectified only.

Manual Override options not available with Explosion Proof.

Code	Description
Omit	**No Options**
J*	Diode Surge Suppressor
Z†	Rectified Coil

* DC only. DIN coil must include plug with lights.
† DC tube standard.

Code	Description
Omit	**Standard Response, No Switch**
I3	Monitor Switch, 'A' & 'B' Port End
I6	Monitor Switch, 'A' & 'B' Port Start

Note: Not CE or CSA approved. Spools 008, 009, 081 and 082 not available.

Code	Description
Omit	**Standard Valve**
3*†	CSA USA
4*#	**CSA Approved**

* Not available with AC high pressure tube.
# Valve is derated with this option.
† B, C, H styles only. J, K, Y, U voltages only with C, G, W solenoid connections only. Conforms to UL429.

See next page for Valve Variations

Mounting Bolt Kits

UNC Bolt Kits for use with D31*W Directional Control Valves & Sandwich Valves

		Number of Sandwich Valves @ 2.00" (50mm) thickness			
		0	**1**	**2**	**3**
D31*W	Standard:	BK98 1.62"	BK141 3.50"	BK142 5.50"	BK143 7.50"
	Metric:	BKM98 40mm	BKM141 90mm	BKM142 140mm	BKM143 190mm

NOTE: All bolts are SAE grade 8. Standard bolts are 1/4-20 UNCA thread. Metric bolts are M6-1.0 thread. Torque to 16 Nm (12 ft-lbs).

Valve Weight:
Double Solenoid 5.4 kg (12.0 lbs.)

Seal Kit:
Nitrile SKD31VWN91
Fluorocarbon SKD31VWV91

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

D31.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Valve Variations

Code	Description
5*	**Signal Lights – Standard**
	Signal Lights – Hirsch. (DIN with Plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with Lights
56**	**Manaplug (Mini) with Lights**
20	**Fast Response**
1C**	**Manaplug (Mini) Single Sol. 5-pin, with Lights**
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1G**	Manaplug (Mini) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1H**	Manaplug (Micro) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1M**	Manaplug Opposite Normal
1P	Painted Body
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	**Pilot Choke Meter Out**
3B	**Pilot Choke Meter In**
3C	**Pilot Pressure Reducer**
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	**Pilot Choke Meter Out with Lights**
3H*	**Pilot Choke Meter In with Lights**
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights, Mini Manaplug, Pilot Choke Meter Out
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights

* DESINA, plug-in conduit box, and DIN with plug styles only.
** Must have plug-in style conduit box.

D31 Series Pressure Drop vs. Flow

The chart below provides the flow vs. pressure drop curve reference for the D31 Series valves by spool type.

Example:
Find the pressure drop at 76 LPM (20 GPM) for a D31 with a number 1 spool. To the right of spool number 1, locate the number 3 in the P-A column, and 2 in the B-T column.

Using the graph at the bottom, locate curves 2 and 3 and read the pressure drop values. Total pressure drop through the valve is the sum of the two values.

Note: Pressure drops should be checked for all flow paths, especially when using non-symmetrical spools (003, 005, 007, 014, 015 and 016) and unbalanced actuators.

D31 Pressure Drop Reference Chart

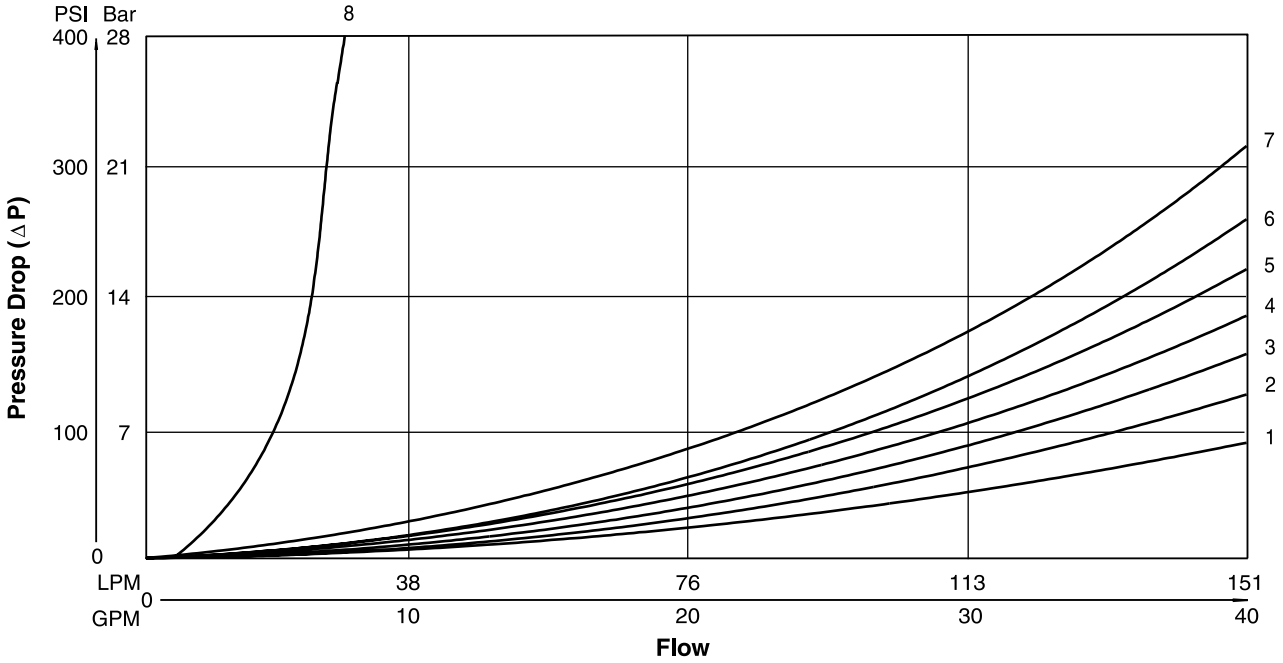
Spool No.	Curve Number										
	Shifted				Center Condition						
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	1	-	-	-	-	-	-	-
002	3	3	1	1	3	3	3	4	4	1	1
003	3	3	1	1	-	-	-	-	-	3	-
004	3	3	1	1	-	-	-	-	-	1	1
005	3	3	1	1	-	-	-	5	-	-	-
006	3	3	1	1	-	5	7	6	5	-	-
007	4	2	1	1	4	-	-	-	3	-	2
009	3	3	1	1	7	-	-	-	-	-	-
010	3	2	-	-	-	-	-	-	-	-	-
011	3	2	1	1	-	-	-	-	-	8	8
014	2	4	1	1	4	-	-	4	-	2	-
015	3	2	4	1	-	-	-	-	-	-	4
016	5	2	1	1	-	-	-	-	5	-	-
020	5	4		2	2	-	-	-	-	-	-
030	4	3		1	1	-	-	-	-	-	-

Viscosity Correction Factor

Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141

Curves were generated using 110 SSU hydraulic oil.
For any other viscosity, pressure drop will change per chart.

Performance Curves



Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-15% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact HVD for AC coil applications.

Explosion Proof Solenoid Ratings*

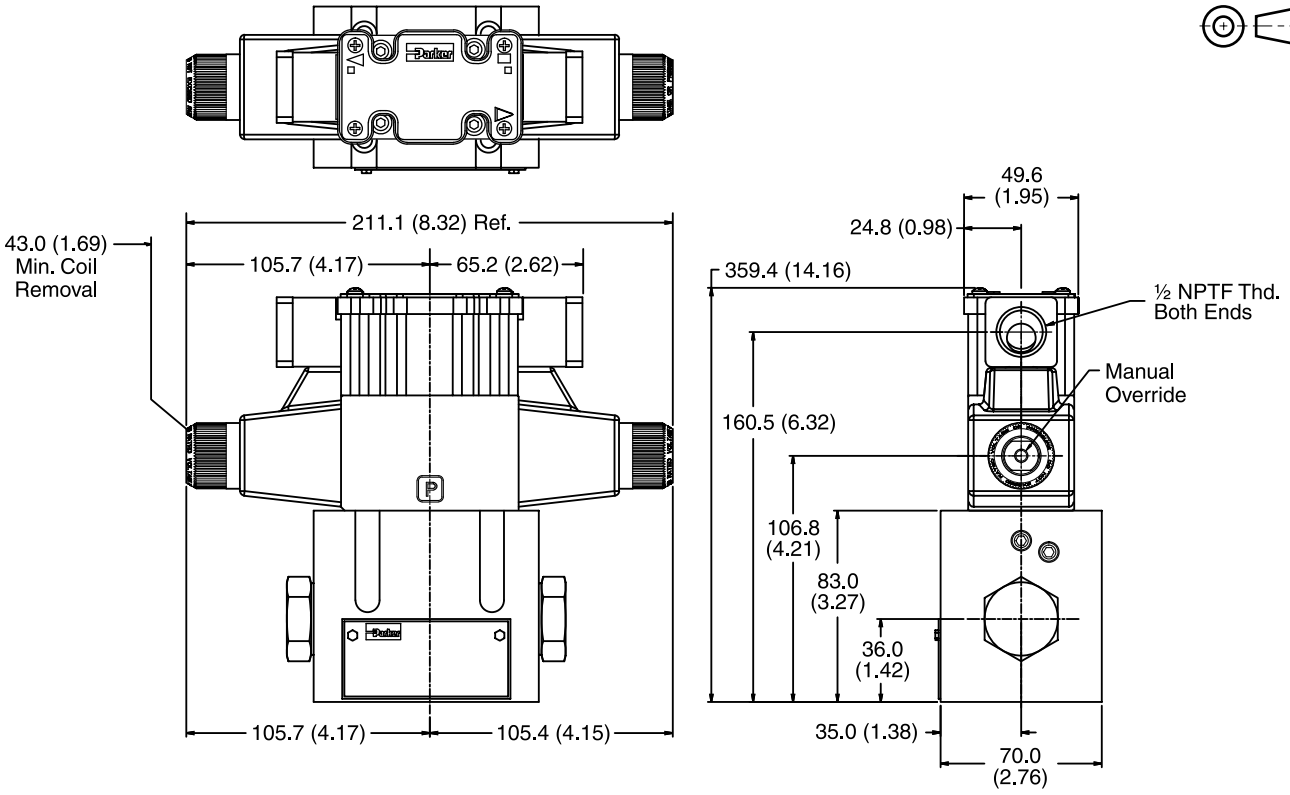
U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
MSHA (EO)	Complies with 30CFR, Part 18
ATEX (ED)	Complies with ATEX requirements for: Exd, Group IIB; EN50014: 1999+ Amds. 1 & 2, EN50018: 2000
ATEX & CSA/US (ET)	Complies with ATEX EN60079-0, EN60079-1 Ex d IIC; CSA/US Ex d IIC, AEx d IIC for Class I, Zone 1, UL1203, UL1604, CSA E61241,1 Class II, Div 1

* Allowable Voltage Deviation ±10%.
Note that Explosion Proof AC coils are single frequency only.

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
G	Omit	198 VDC	N/A	N/A	0.15 Amps	30 W	1306.80 ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 ohms
L	L	6 VDC	N/A	N/A	1.67 Amps	10 W	3.59 ohms
L	Omit	6 VDC	N/A	N/A	5.00 Amps	30 W	1.20 ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 ohms
QD	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.20 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.20 ohms
R	F	24/60 VAC, Low Watt	6.67 Amps	160 VA	2.20 Amps	23 W	1.52 ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
Z	Omit	250 VDC	N/A	N/A	0.13 Amps	30 W	1889.64 ohms
Explosion Proof Solenoids							
R		24/60 VAC	7.63 Amps	183 VA	2.85 Amps	27 W	1.99 ohms
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
N		220/50 VAC	0.77 Amps	169 VA	0.31 Amps	27 W	1.38 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
P		110/50 VAC	1.47 Amps	162 VA	0.57 Amps	27 W	34.70 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
"ET" Explosion Proof Solenoids							
K		12 VDC	N/A	N/A	1.00 Amps	12 W	12.00 ohms
J		24 VDC	N/A	N/A	1.00 Amps	13 W	44.30 ohms
Y		120/60-50 VAC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

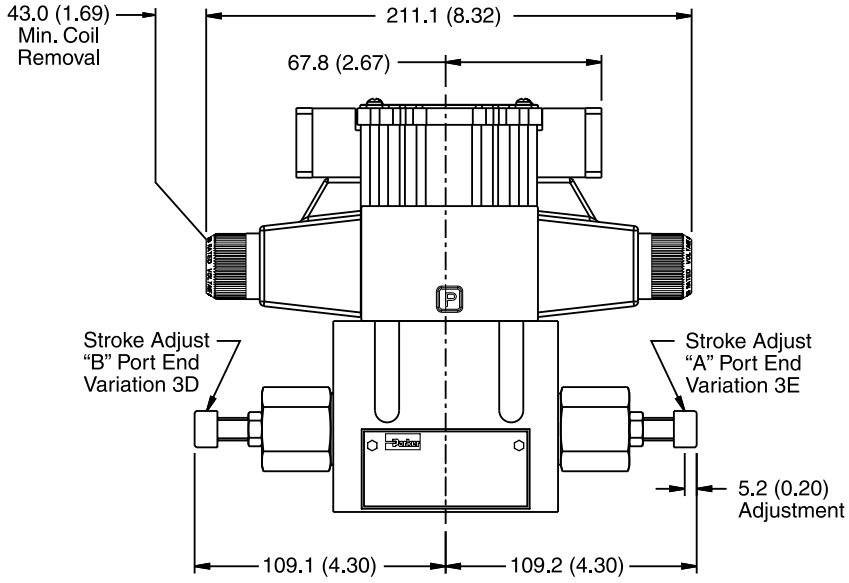
Inch equivalents for millimeter dimensions are shown in (**)

Conduit Box, Double AC Solenoid



Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

Conduit Box and Stroke Adjust, Double AC Solenoid

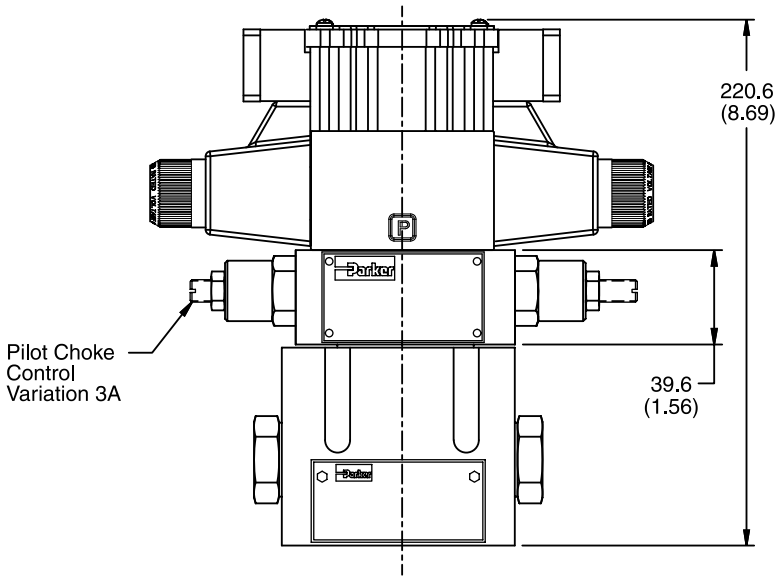


Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

Inch equivalents for millimeter dimensions are shown in (**)

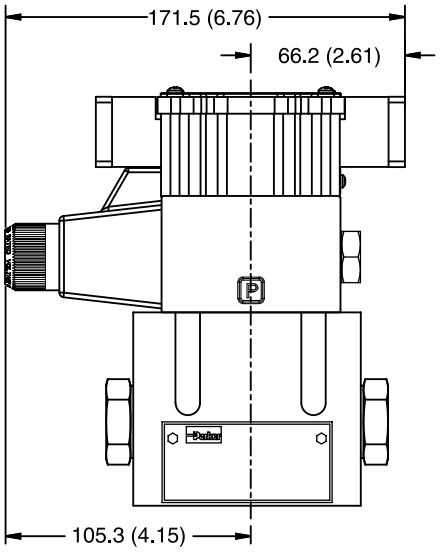
A

Conduit Box and Pilot Choke Control, Double AC Solenoid



Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

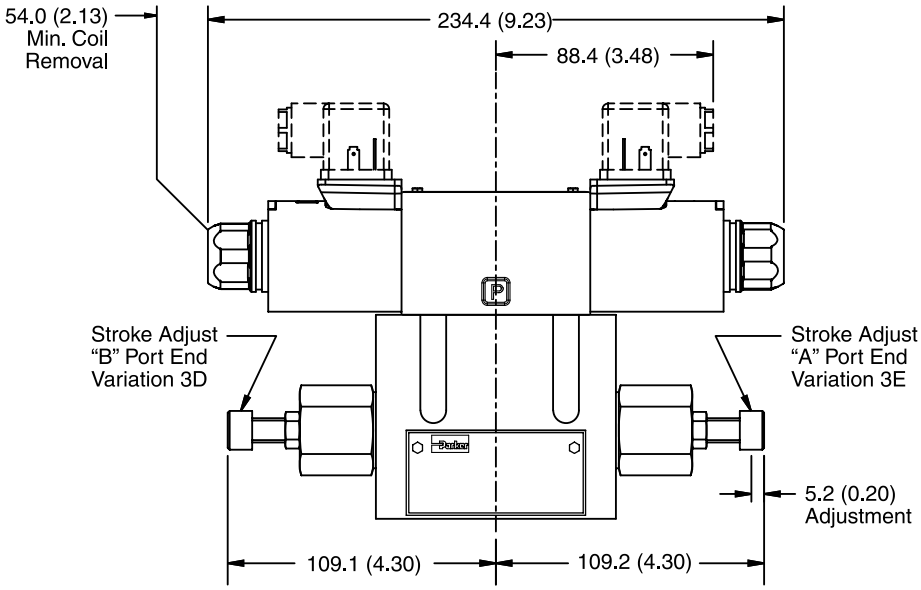
Conduit Box, Single AC Solenoid



Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

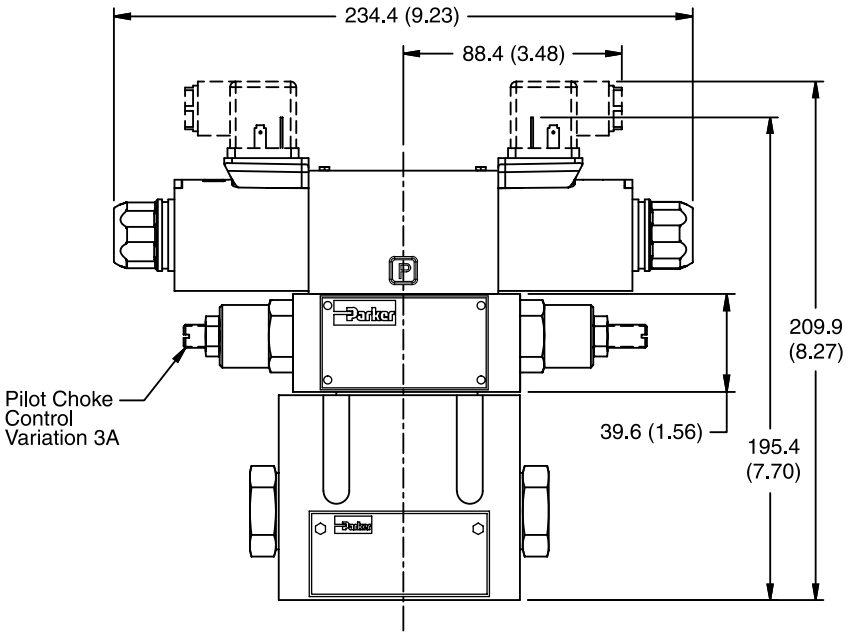
Inch equivalents for millimeter dimensions are shown in (**)

Hirschmann and Stroke Adjust, Double DC Solenoid



Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

Hirschmann and Pilot Choke Control, Double DC Solenoid



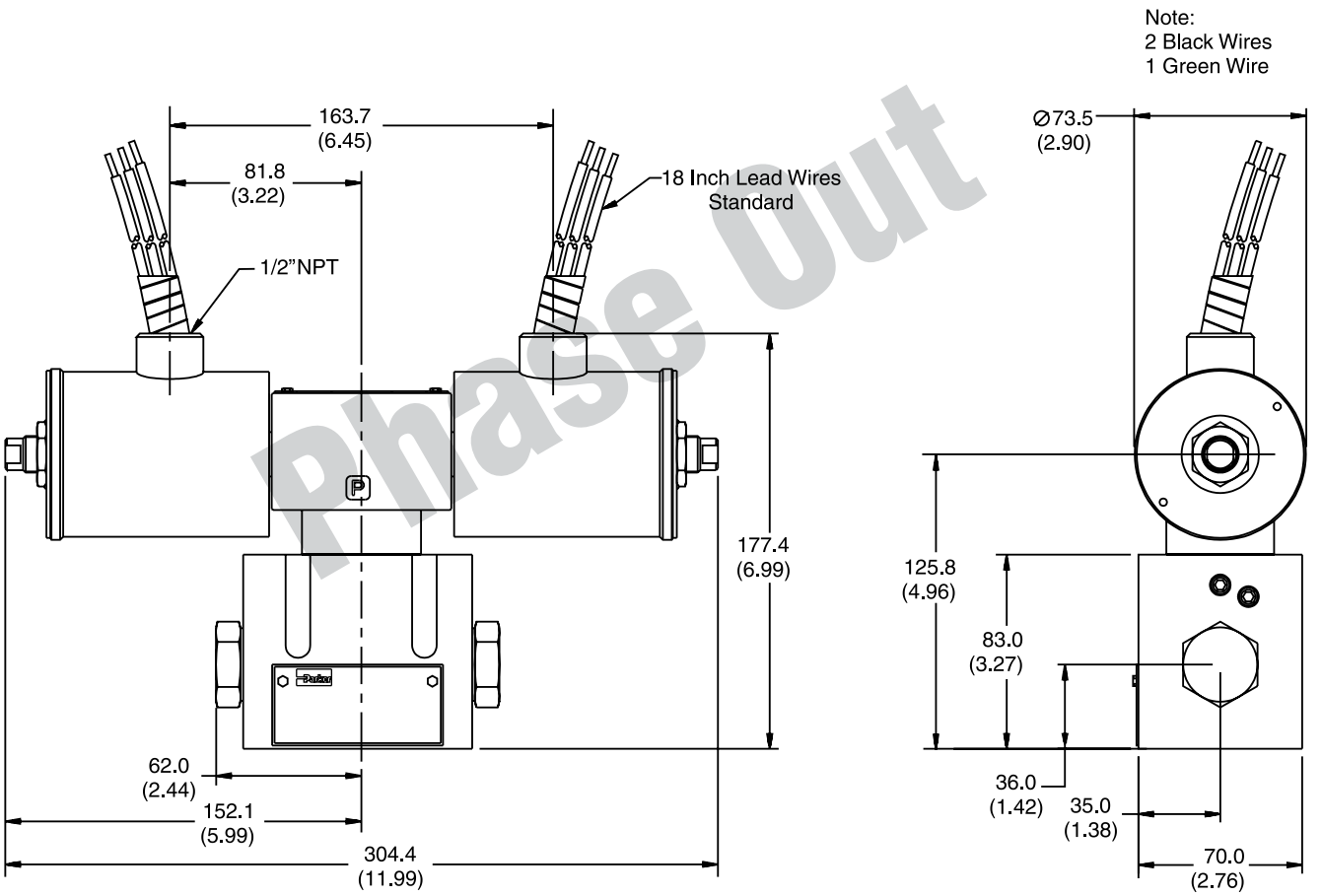
Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

Inch equivalents for millimeter dimensions are shown in (**)

A

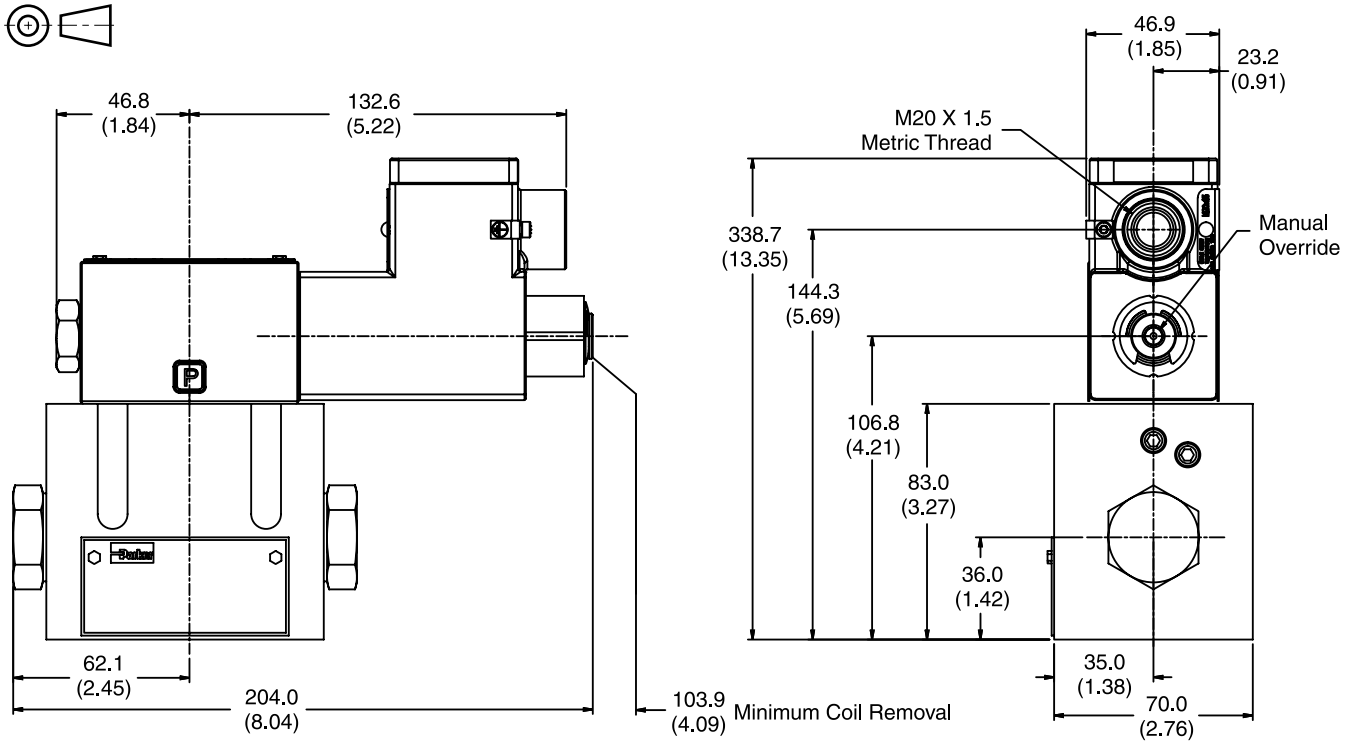
Explosion Proof U.L. and C.S.A. Approved, Double Solenoid

Phase Out

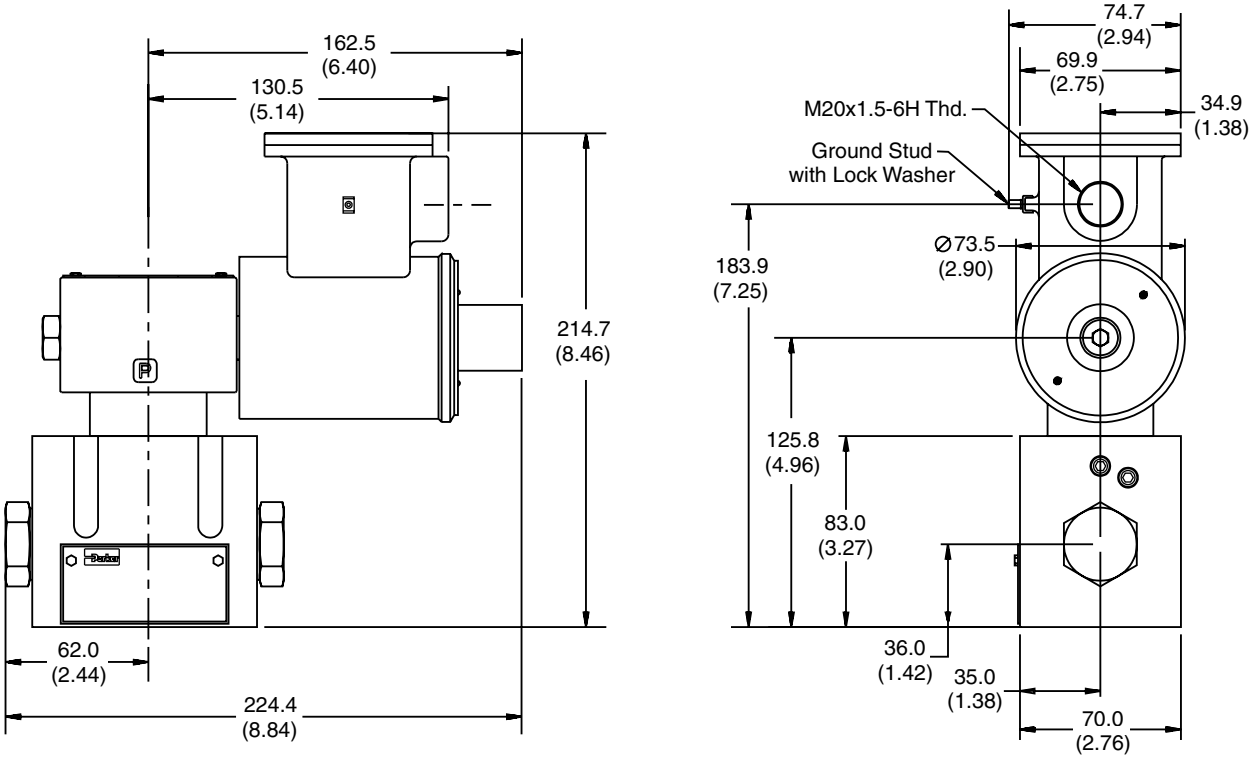


Inch equivalents for millimeter dimensions are shown in (**)

Explosion Proof, EX d IIC ATEX/CSA Single Solenoid



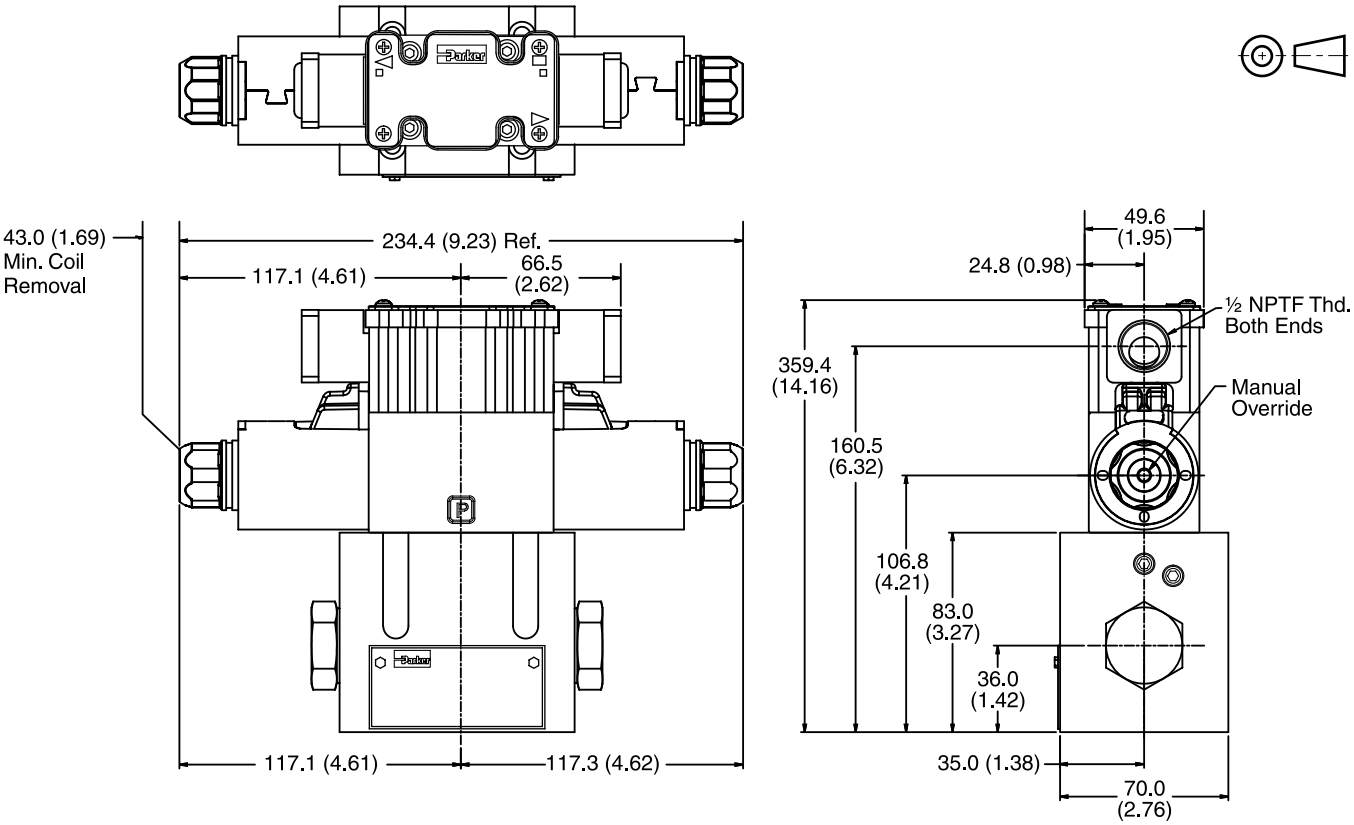
Explosion Proof, EEXD ATEX, Single Solenoid



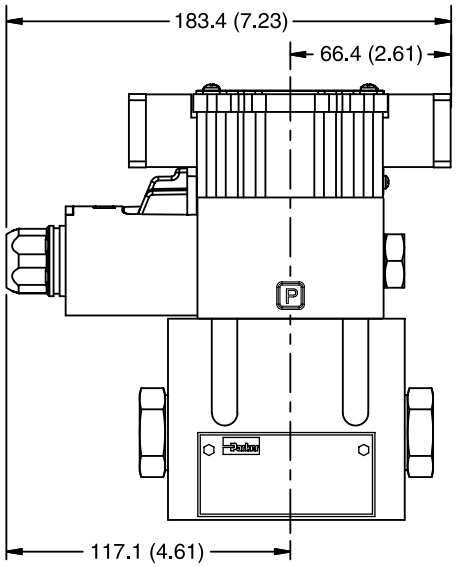
Inch equivalents for millimeter dimensions are shown in (**)

A

Plug-in Conduit Box, Double DC Solenoid



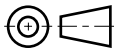
Plug-in Conduit Box, Single DC Solenoid

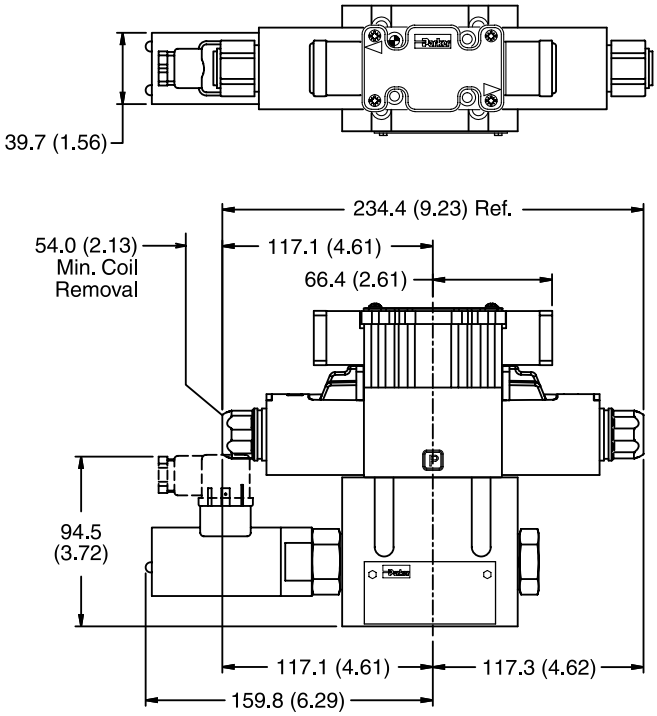


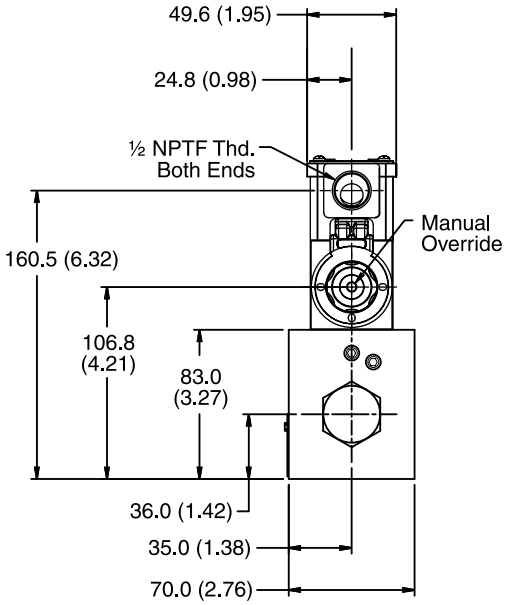
Inch equivalents for millimeter dimensions are shown in (**)

Plug-in Conduit Box, Double DC Solenoid with Variation I3 (Monitor Switch)

Double Solenoid. With solenoid "A" energized, flow path is P→A and B→T. When solenoid "B" is energized, flow path is P→B and A→T. The center condition on a spring-centered valve exists when both coils are de-energized, or during a complete shift, as the spool passes through center.





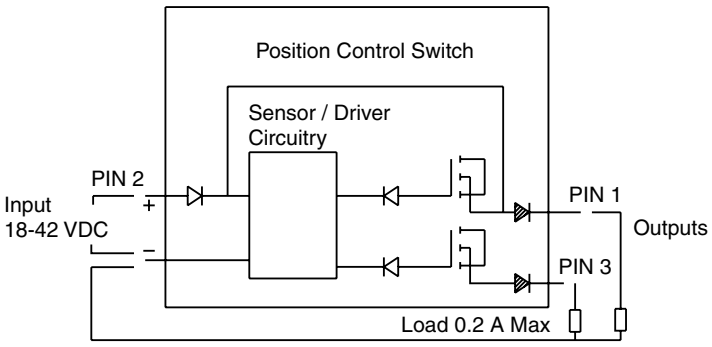


Monitor Switch
(Variation I3 and I6)

This feature provides for electrical confirmation of the spool shift. This can be used in safety circuits, to assure proper sequencing, etc.

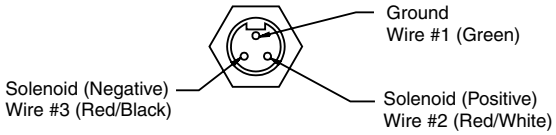
Switch Data

Pin 1 and Pin 3 have outputs equal to the input. When the monitor switch has the output to Pin 1, Pin 3 will have an output of zero, and vice-versa. When the valve is switched, Pin 1 and Pin 3 will switch outputs.

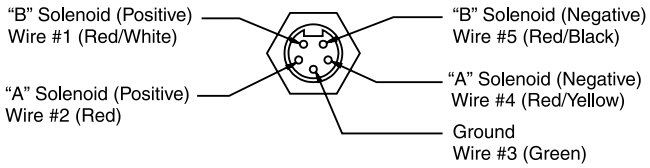


Manaplug (Options 6, 56, 1A & 1C)

Interface – Brad Harrison Plug
– 3-Pin for Single Solenoid
– 5-Pin for Double Solenoid

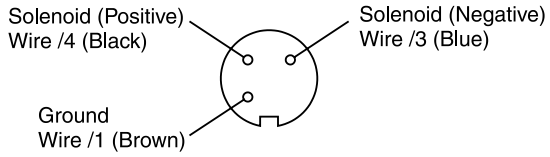


3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

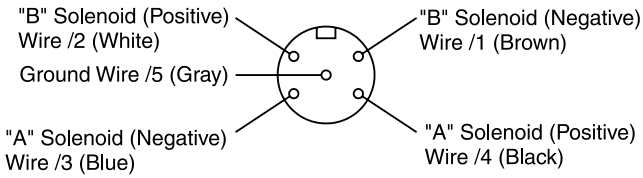


5-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7A, 7B, 1B & 1D)



3-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid



5-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

Manaplug – Electrical Mini Plug

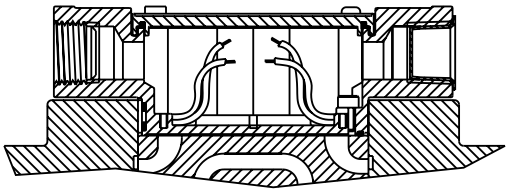
EP336-30	3 Pin Plug
EP316-30	5 Pin Plug (Double Solenoid)
EP31A-30	5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

EP337-30	3 Pin Plug
EP317-30	5 Pin Plug (Double Solenoid)
EP31B-30	5 Pin Plug (Single Solenoid)

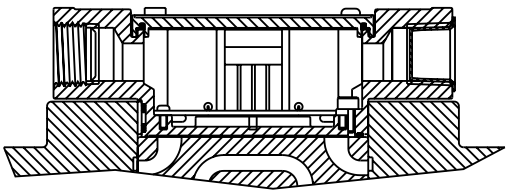
Conduit Box Option C

– No Wiring Options Available

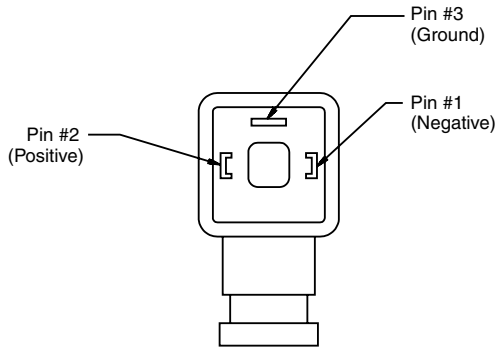


Signal Lights (Option 5) — Plug-in Only

– LED Interface
– Meets Nema 4/IP67



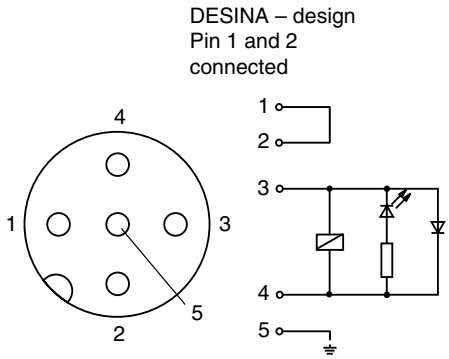
Hirschmann Plug with Lights (Option P5)
ISO 4400/DIN 43650 Form "A"



Face View of Plug

DESINA Connector (Option D)
M12 pin assignment
Standard

1 = Not used
2 = Not used
3 = 0V
4 = Signal (24 V)
5 = Earth Ground



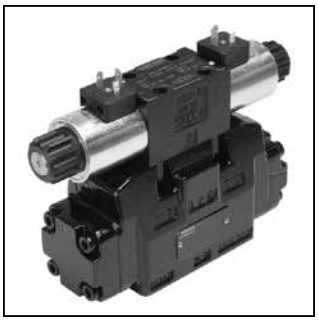
Pins are as seen on valve (male pin connectors)

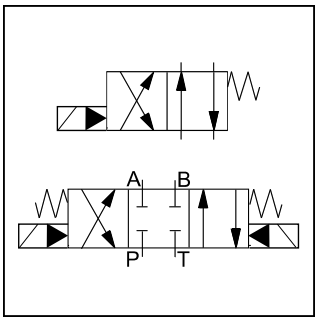
General Description

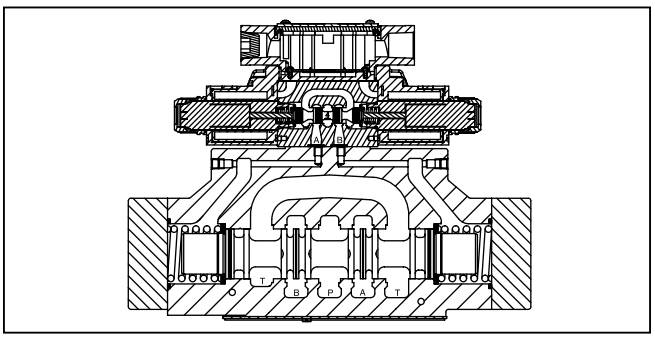
Series D31NW valves are piloted by a D1VW valve. The valves can be ordered with position control.

The minimum pilot pressure must be ensured for all operating conditions of the directional valve.

Additionally spools with a P to T connection in the de-energized position need an external pressure supply (external inlet) or an integral check valve.





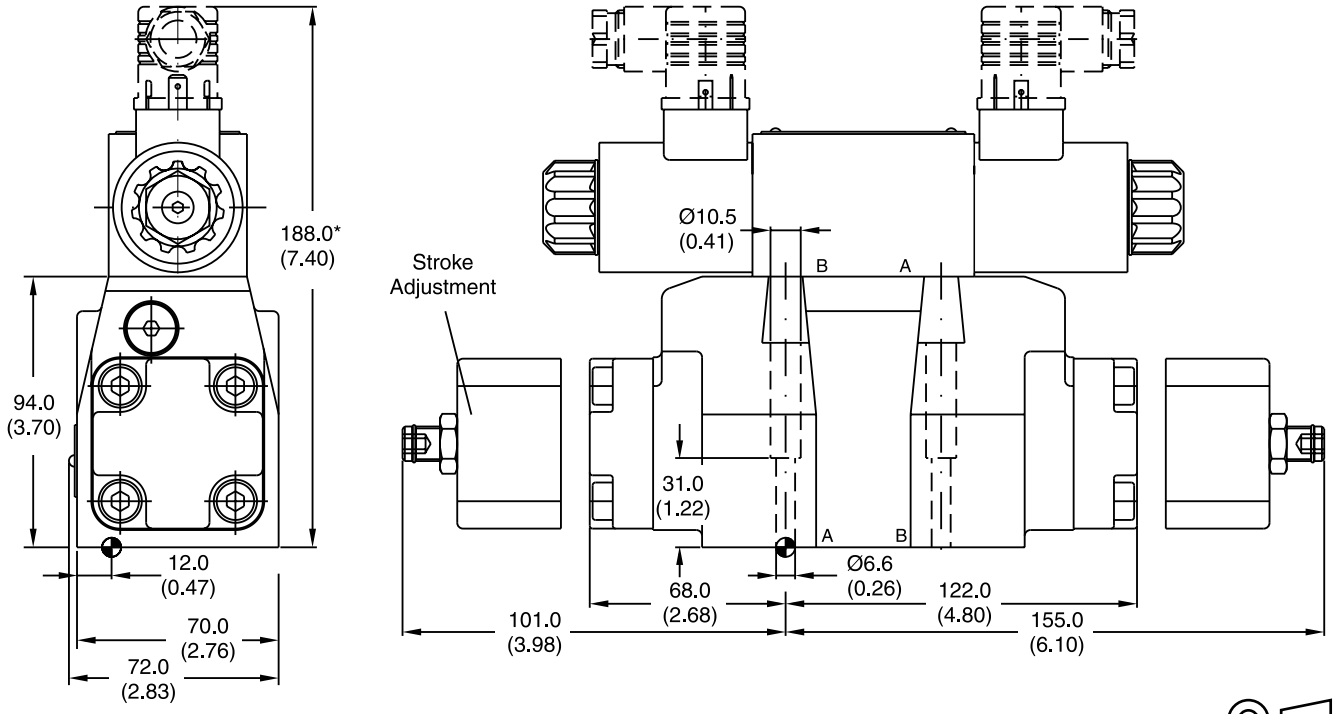


Features

- **World design –** Available worldwide.
- **Mounting bolts below center line of spool –** Minimizes spool binding.
- **Five chamber style –** Eliminates pressure spikes in tubes, increasing valve life.
- **High pressure and flow ratings –** Increased performance options in a compact valve.

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



* Please add for each sandwich plate +40mm (1.58") (pressure reducing valve, pilot choke valve meter-in/-out).

Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK385	4x M6x40 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.)	Nitrile: SK-D31NW-N-91 Fluorocarbon: SK-D31NW-V-91

The space necessary to remove the plug per DIN 43650, design type AF is at least 15 mm.

The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

D31.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

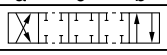
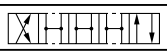
D	31N	W			
Directional Control Valve	Basic Valve	Actuator Solenoid Wet Pin	Spool	Style	Pilot Supply and Drain

NFPA D05HE
CETOP 5H
DIN NG10
D03 Pilot, High flow

Code	Description	
1	**Internal Pilot**	**External Drain**
2	External Pilot	External Drain
4*	**Internal Pilot**	**Internal Drain**
5	External Pilot	Internal Drain

* Not available with 002, 007, 009, 014, 030, 031, 032 spools.

3-Position Spools

Code	Spool Type (a 0 b)
001	
002	
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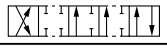
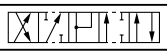
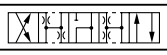
004	
005	
006	
007	
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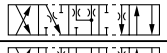
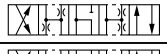
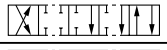
011	
014	
015	
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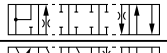
021	
022	
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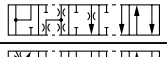
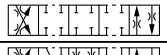
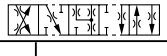
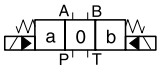
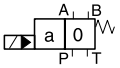
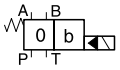
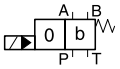
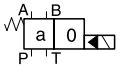
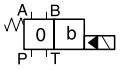
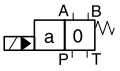
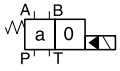
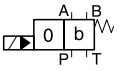
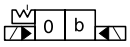
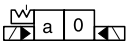
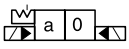
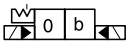
032	
081	
082	

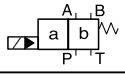
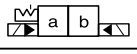
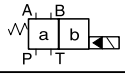
2-Position Spools

Code	Spool Type (a b)
020	
026	
030	

3-Position Spools

Code	All 3-Position Spools		
C			**3 positions.** **Spring offset in position "0".** **Operated in position "a" or "b".**
	Standard	**Spool Type 009**	
E	 Operated in position "a".	 Operated in position "b".	2 positions. Spring offset in position "0".
F	 Spring offset in position "b".	 Spring offset in position "a".	2 positions. Operated in position "0".
K	 Operated in position "b".	 Operated in position "a".	2 positions. Spring offset in position "0".
M	 Spring offset in position "a".	 Spring offset in position "b".	2 positions. Operated in position "0".
R	 No center in offset position.	 No center in offset position.	2 positions, detent. Operated in position "0" or "b".
S	 No center in offset position.	 No center in offset position.	2 positions, detent. Operated in position "0" or "a". No center in offset position.

2-Position Spools

Code	Spool Position	
B		**Spring offset in position "b".** **Operated in position "a".**
D		Detent, operated in position"a" or "b". No center or offset position.
H		Spring offset in position "a". Operated in position "b".

Weight:
Single Solenoid:7.6 kg (16.8 lbs.)
Double Solenoid: 8.1 kg (17.9 lbs.)

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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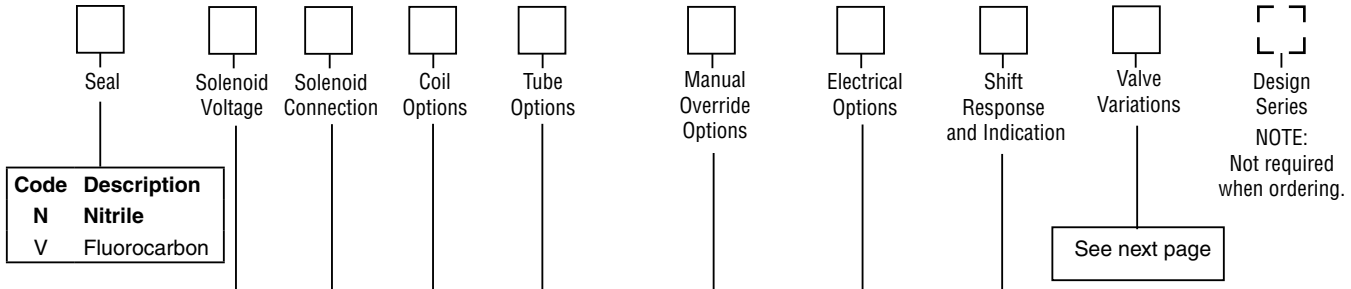

Code	Description
N	**Nitrile**
V	Fluorocarbon

See next page

Code	Description
A*	24/50 VAC
D	120 VDC
G	198 VDC
J	**24 VDC**
K	**12 VDC**
N**	220/50 VAC
Q*	100/60 VAC
QD†	100 VAC/60 HZ 100 VAC/50 HZ
R	24/60 VAC
T	**240/60 - 220/50 VAC**
U	98 VDC
Y	**120/60 - 110/50 VAC**
Z	250 VDC

* High Watt Coil only.
** Explosion Proof only.
† Available in DIN only.

Code	Description
Omit	**Standard**
P	Extended with Boot
T†	None

† DC or AC Rectified only.

Manual Override options not available with Explosion Proof.

Code	Description
Omit	**Standard Response, No Switch**
I3N	Monitor Switch, 'A' & 'B' Port End
I6N	Monitor Switch, 'A' & 'B' Port Start

Note: Not CE or CSA approved. Available in C style with 001, 003, 004 015, 021, and 022 spools only.

Code	Description
Omit	**Standard Pressure 103.5 Bar (1500 PSI) AC 207 Bar (3000 PSI) DC**
H*	**High Pressure, AC only 207 Bar (3000 PSI)**

* Not available with CSA.

Code	Description
Omit	**No Options**
J*	Diode Surge Suppressor
Z†	Rectified Coil

* DC only. DIN coil must include plug with lights.
† DC tube standard.

Code	Description
C*	**Leadwire Conduit Box**
D**	Metric Plug (M12X1), DESINA
E†	Explosion Proof
G††	**Plug-In Conduit Box**
J#	**Deutsch (DT06-2S)**
M#	Metri-Pack (150)
P	**DIN with Plug**
S#	Dual Spade
W†	**DIN w/o Plug**

* No variations – See Plug-in.
** DC only, lights, diode surge suppressor, not CSA approved.
† Not available with lights.
†† Required for variations on conduit box style. Must have lights.
# DC only, no lights, not CSA approved.

Code	Description
Omit*	**High Watt**
D**	Explosion Proof, EEXD ATEX
E**	Explosion Proof, EEXME ATEX
F†	Low Watt
L††	10 Watt
O**	Explosion Proof, MSHA
T#	Explosion Proof, Ex d IIC ATEX/CSA
U**	Explosion Proof, UL/CSA

* AC ambient temperature must not exceed 60°C (140°F).
** 60 Hz only on AC, no options.
† AC only.
†† DC and AC rectified only.
# J, K and Y voltages only. Dual frequency on AC, no options.

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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Hydraulic Valve Division
Elyria, Ohio, USA

Valve Variations

Code	Description
5*	**Signal Lights – Standard**
	Signal Lights – Hirsch. (DIN with Plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with Lights
56**	**Manaplug (Mini) with Lights**
1C**	**Manaplug (Mini) Single Sol. 5-pin, with Lights**
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1G**	Manaplug (Mini) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1H**	Manaplug (Micro) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1M**	Manaplug Opposite Normal
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	**Pilot Choke Meter Out**
3B	**Pilot Choke Meter In**
3C	**Pilot Pressure Reducer**
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	**Pilot Choke Meter Out with Lights**
3H*	**Pilot Choke Meter In with Lights**
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights, Mini Manaplug, Pilot Choke Meter Out
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights

* DESINA, plug-in conduit box, and DIN with plug styles only.
** Must have plug-in style conduit box.

Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-15% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact HVD for AC coil applications.

Explosion Proof Solenoid Ratings*

U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
MSHA (EO)	Complies with 30CFR, Part 18
ATEX (ED)	Complies with ATEX requirements for: Exd, Group IIB; EN50014: 1999+ Amds. 1 & 2, EN50018: 2000
ATEX & CSA/US (ET)	Complies with ATEX EN60079-0, EN60079-1 Ex d IIC; CSA/US Ex d IIC, AEx d IIC for Class I, Zone 1, UL1203, UL1604, CSA E61241,1 Class II, Div 1

* Allowable Voltage Deviation ±10%.
Note that Explosion Proof AC coils are single frequency only.

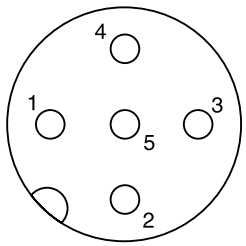
Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
G	Omit	198 VDC	N/A	N/A	0.15 Amps	30 W	1306.80 ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 ohms
L	L	6 VDC	N/A	N/A	1.67 Amps	10 W	3.59 ohms
L	Omit	6 VDC	N/A	N/A	5.00 Amps	30 W	1.20 ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 ohms
QD	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.20 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.20 ohms
R	F	24/60 VAC, Low Watt	6.67 Amps	160 VA	2.20 Amps	23 W	1.52 ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
Z	Omit	250 VDC	N/A	N/A	0.13 Amps	30 W	1889.64 ohms
Explosion Proof Solenoids							
R		24/60 VAC	7.63 Amps	183 VA	2.85 Amps	27 W	1.99 ohms
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
N		220/50 VAC	0.77 Amps	169 VA	0.31 Amps	27 W	1.38 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
P		110/50 VAC	1.47 Amps	162 VA	0.57 Amps	27 W	34.70 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
"ET" Explosion Proof Solenoids							
K		12 VDC	N/A	N/A	1.00 Amps	12 W	12.00 ohms
J		24 VDC	N/A	N/A	1.00 Amps	13 W	44.30 ohms
Y		120/60-50 VAC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

General			
Design		Directional Spool Valve	
Actuation		Solenoid	
Size		NG10	
Mounting Interface		DIN 24340 A10 / ISO 4401 / NFPA D05 / CETOP RP 121-H	
Mounting Position		Unrestricted, preferably horizontal	
Ambient Temperature	**[°C]** **[°C]**	-25...+50; (-13°F...+122°F) (without inductive position control) 0...+50; (+32°F...+122°F) (with inductive position control)	
$MTTF_D$ Value	**[years]**	75	
Hydraulic			
Maximum Operating Pressure		Pilot drain internal: P, A, B, X 315 Bar (4568 PSI); T, Y 140 Bar (2030 PSI) Pilot drain external: P, A, B, T, X 315 Bar (4568 PSI); Y 140 Bar (2030 PSI)	
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature	**[°C]**	-25 ... +70 (-13°F...+158°F)	
Viscosity Permitted	**[cSt]/[mm²/s]**	2.8...400 (13...1854 SSU)	
Recommended	**[cSt]/[mm²/s]**	30...80 (139...371 SSU)	
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)	
Flow Maximum		170 LPM (45 GPM)	
Leakage at 350 Bar (per flow path)	**[ml/min]**	72...422 (0.2...0.11 GPM) (depending on spool)	
Minimum Pilot Supply Pressure		7 Bar (102 PSI)	
Static / Dynamic			
Step Response at 85%		Energized	De-energized
DC Solenoids	**Pilot Pressure**		
	50 Bar & 100 Bar **[ms]**	470	390
	250 Bar & 350 Bar **[ms]**	320	390
AC Solenoids	**Pilot Pressure**		
	50, 100, 250 & 350 Bar **[ms]**	30 / 50	375

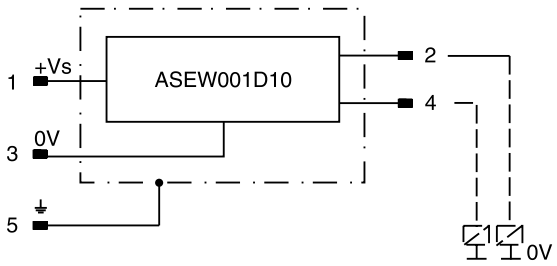
Position Control M12x1

Protection Class		IP 65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature	**[°C]**	0...+50; (+32°F...122°F)
Supply Voltage / Ripple	**[V]**	18...42 ±10%
Current Consumption without Load	**[mA]**	≤ 30
Max. Output Current per Channel, Ohmic	**[mA]**	400
Min. Output Load per Channel, Ohmic	**[kOhm]**	100
Max. Output Drop at 0.2A	**[V]**	≤ 1.1
Max. Output Drop at 0.4A	**[V]**	≤ 1.6
EMC		EN50081-1 / EN50082-2
Max. Tolerance Ambient Field Strength	**[A/m]**	<1200
Min. Distance to Next AC Solenoid	**[m]**	>0.1
Interface		M12x1 per IEC 61076-2-101
Wiring Minimum	**[mm²]**	5 x 0.25 brad shield recommended
Wiring Length Maximum	**[m]**	50 (164 ft.) recommended

M12 Pin Assignment



1 + Supply 18...42V
2 Out B: normally closed
3 0V
4 Out A: normally open
5 Earth ground



Definitions

Start position monitored:

The valve is de-energized. The inductive switch gives a signal at the moment (below 15% spool stroke) when the spool leaves the spring offset position.

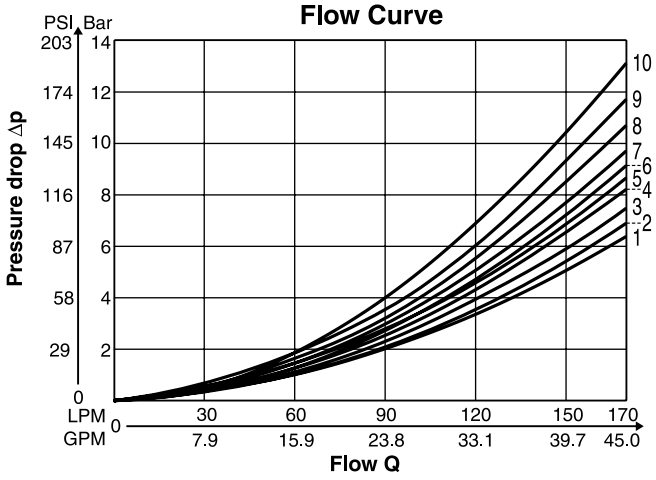
End position monitored:

The inductive switch gives a signal before the end position is reached. (above 85% spool stroke).

Delivery includes plug M12 x 1 (part no.: 5004109).

Performance Curves

The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.

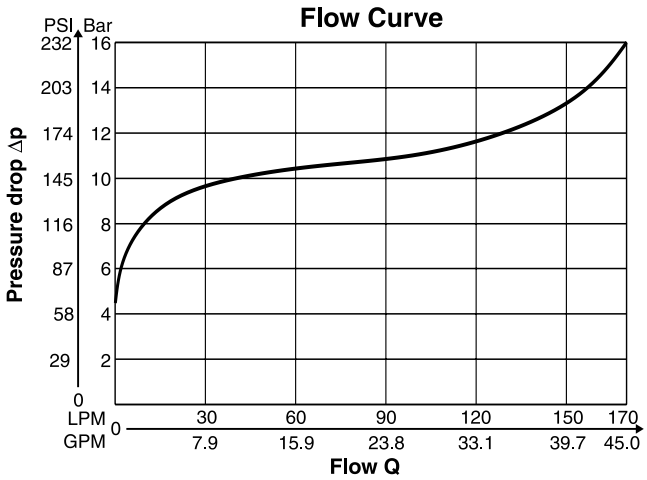


Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
01	3	3	7	4	3
02	3	3	–	2	4
03	3	3	–	2	5
07	4	6	6	4	10
08	2	3	–	4	4
09	2	2	–	1	4
10	2	3	–	4	4
11	5	3	–	2	5
13	2	4	–	1	4
14	4	3	–	2	4

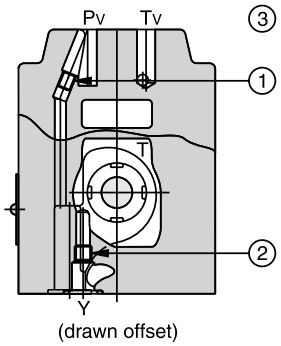
All characteristic curves measured with HLP46 at 50°C (122°F).

Integral Check Valve in the P port

Mounting an integral check valve in the P port is necessary to build up pilot pressure for valves with P to T connection and internal pilot oil supply. The pressure difference at the integral check valve (see performance curves) is to be added to all flow curves of the P-port of the main valve.



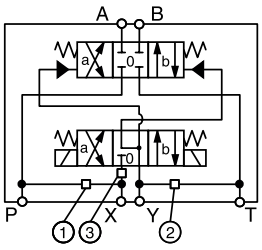
Pilot Oil Inlet (Supply) and Outlet (Drain)



③ Slip-in orifice in pilot p-port
① M6 DIN906
② M6 DIN906

○ open, ● closed

Pilot Oil Inlet	Pilot Oil Outlet	1	2	3
internal	external	○	●	Orifice Ø1.0
external	external	●	●	Orifice Ø1.0
internal	internal	○	○	Orifice Ø1.0
external	internal	●	○	Orifice Ø1.0



All orifice sizes for standard valves

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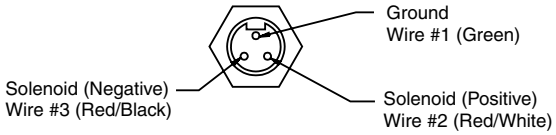
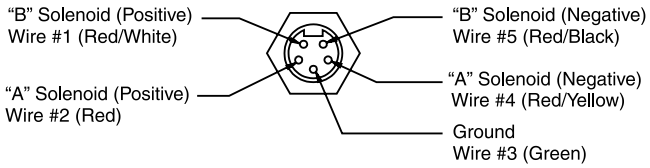
Elyria, Ohio, USA

Manaplug (Options 6, 56, 1A & 1C)

Interface
- 3-Pin for Single Solenoid
- 5-Pin for Double Solenoid

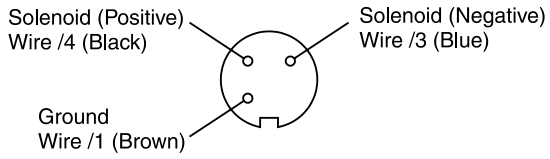


3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

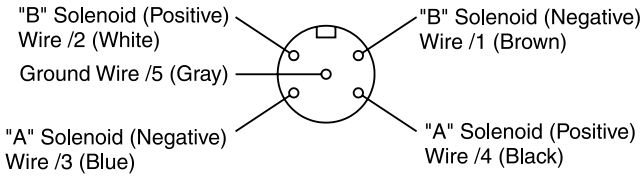


5-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7A, 7B, 1B & 1D)



3-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid



5-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

Manaplug – Electrical Mini Plug

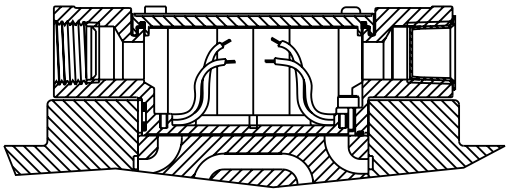
EP336-30	3 Pin Plug
EP316-30	5 Pin Plug (Double Solenoid)
EP31A-30	5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

EP337-30	3 Pin Plug
EP317-30	5 Pin Plug (Double Solenoid)
EP31B-30	5 Pin Plug (Single Solenoid)

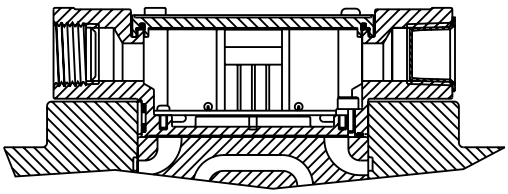
Conduit Box Option C

- No Wiring Options Available

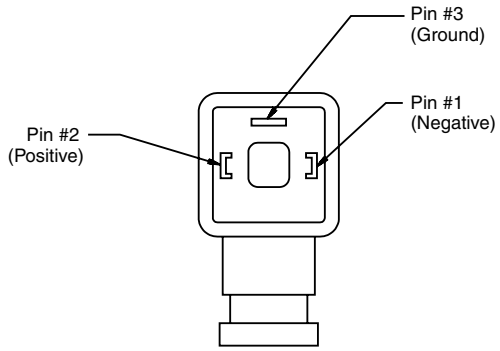


Signal Lights (Option 5) — Plug-in Only

- LED Interface
- Meets Nema 4/IP67



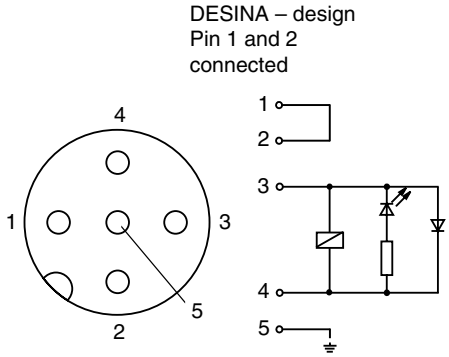
Hirschmann Plug with Lights (Option P5)
ISO 4400/DIN 43650 Form "A"



Face View of Plug

DESINA Connector (Option D)
M12 pin assignment
Standard

1 = Not used
2 = Not used
3 = 0V
4 = Signal (24 V)
5 = Earth Ground



Pins are as seen on valve (male pin connectors)

D31.indd, dd

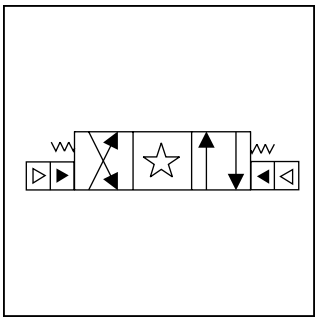
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

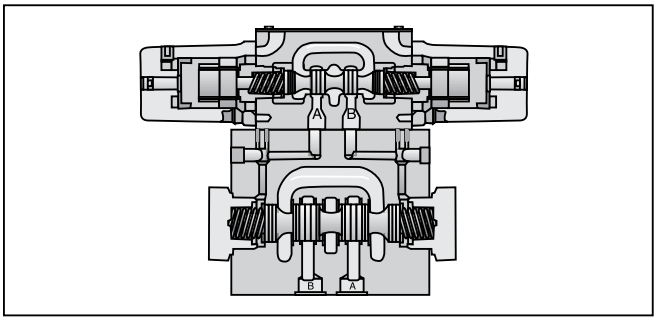
General Description

Series D31*A directional control valves are 5-chamber, air pilot operated valves. The valves are suitable for manifold or subplate mounting.

Features

- **World design –** Available worldwide.
- **Mounting bolts below center line of spool –** Minimizes spool binding.
- **Five chamber style –** Eliminates pressure spikes in tubes, increasing valve life.
- **High pressure and flow ratings –** Increased performance options in a compact valve.

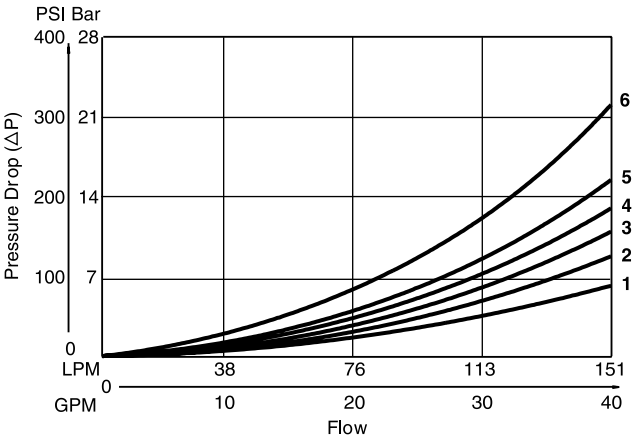




Specifications

Mounting Pattern	NFPA D05H , CETOP 5 NFPA D05HE, CETOP 5H
Max. Operating Pressure	345 Bar (5000 PSI)
Max. Tank Line Pressure	Internal Drain Model: 34 Bar (500 PSI) External Drain Model: 207 Bar (3000 PSI)
Max. Drain Pressure	34 Bar (500 PSI)
Maximum Flow	See Switching Limit Charts
Pilot Pressure	Air Min: 3.4 Bar (50 PSI) Air Max: 10.2 Bar (150 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)

Pressure Drop Chart



VISCOSITY CORRECTION FACTOR							
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141
Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change as per chart.							

D31VA Pressure Drop Reference Chart -- Curve Number											
Spool No.	Shifted				Center Condition						
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	1	-	-	-	-	-	-	-
002	3	3	1	1	3	3	3	4	4	1	1
004	3	3	1	1	-	-	-	-	-	1	1
009	3	3	1	1	6	-	-	-	-	-	-
020	5	4	2	2	-	-	-	-	-	-	-
030	4	3	1	1	-	-	-	-	-	-	-

D31VA Pressure Drop vs. Flow

The chart to the left provides the flow vs. pressure drop curve reference for the D31VA Series valves by spool type.

Example:
Find the pressure drop at 76 LPM (20 GPM) for a D31VA with a number 001 spool. To the right of spool number 001, locate the number 3 in the P-A column, and 2 in the B-T column.

Using the top graph, locate curves 2 and 3 and read the pressure drop values. Total pressure drop through the valve is the sum of the two values.

Ordering Information

D		A							
Directional Control Valve	Basic Valve	Air Operated Pilot	Spool	Style	Pilot Supply and Drain	Seal	Valve Variations	Design Series

NOTE: Not required when ordering.

Code	Description
31D	NFPA D05HE, CETOP 5H (ISO)
31V	**NFPA D05H, CETOP 5**

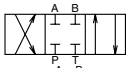
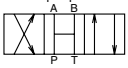
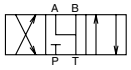
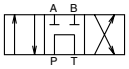
Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Code	Description
1	**Int. pilot/Ext. drain**
2	**Ext. pilot/Ext. drain**
4#	**Int. pilot/Int. drain**
5	**Ext. pilot/Int. drain**

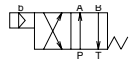
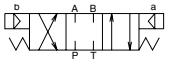
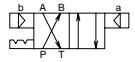
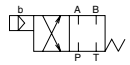
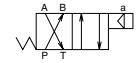
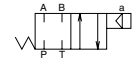
Not available with 002, 008 & 009 spools.

Code	Description
Omit	**Standard**
7	Pilot Choke - Meter Out
8	Stroke Adj. 'B' End
9	Stroke Adj. 'A' End
60	Pilot choke - Meter In
89	Stroke Adj. 'A' & 'B' Ends
90	1/4 BSPP Threads

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator A. Note operators reverse sides for #008 and #009 spools. See installation information for details.

Code	Symbol
001	
002	
004	
008† 009*	
020†	
030*	

† 008 and 020 spools have closed crossover.
* 009 and 030 spools have open crossover.

Code	Description	Symbol
B†	**Single operator, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Double operator, 3 position, spring centered.**	
D†	**Double operator, 2 position, detent.**	
E	Single operator, 2 position, spring centered. P to B and A to T when energized.	
H†	**Single operator, 2 position, spring offset. P to B and A to T in offset position.**	
K	Single operator, 2 position, spring centered. P to A and B to T when energized.	

† Only spools 020 and 030.

This condition varies with spool code.

Valve Weight:
Double Operator
5.7 kg (12.7 lbs.)

Standard Bolt Kit:
BK98

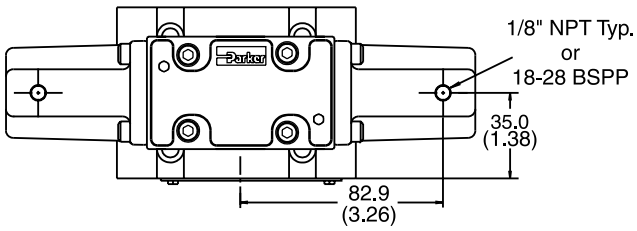
Metric Bolt Kit:
BKM98

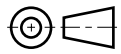
Bold: Designates Tier I products and options.

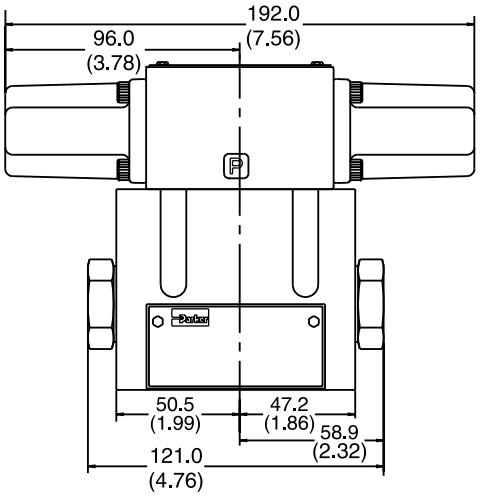
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

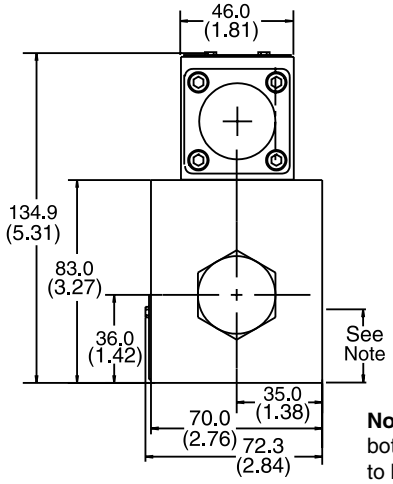
Dimensions – Air Operated

Inch equivalents for millimeter dimensions are shown in (**)









Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

D31.indd, dd

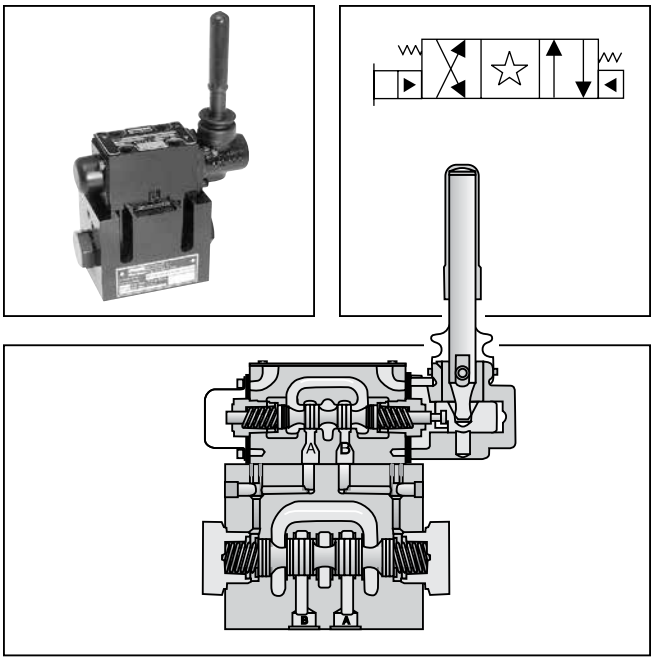
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series D31*L directional control valves are 5-chamber, pilot operated, lever controlled valves. The valves are suitable for manifold or subplate mounting.

Features

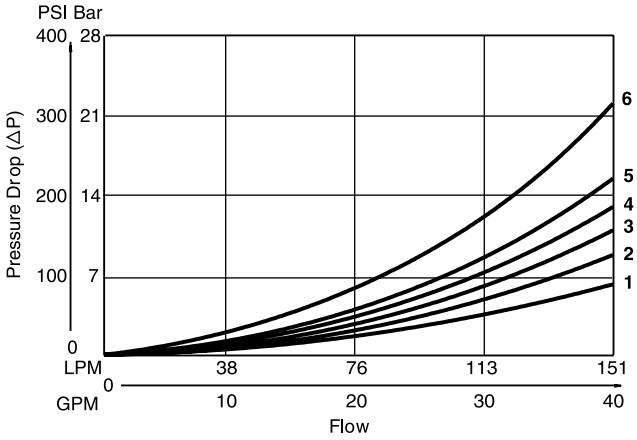
- **World design –** Available worldwide.
- **Mounting bolts below center line of spool –** Minimizes spool binding.
- **Five chamber style –** Eliminates pressure spikes in tubes, increasing valve life.
- **High pressure and flow ratings –** Increased performance options in a compact valve.



Specifications

Mounting Pattern	NFPA D05H , CETOP 5 NFPA D05HE, CETOP 5H
Max. Operating Pressure	345 Bar (5000 PSI)
Max. Tank Line Pressure	Internal Drain Model: 34 Bar (500 PSI) External Drain Model: 207 Bar (3000 PSI)
Maximum Flow	See Switching Limit Charts
Pilot Pressure	Oil Min 6.9 Bar (100 PSI) Oil Max 345 Bar (5000 PSI)
Max. Drain Pressure	34 Bar (500 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)

Pressure Drop Chart



VISCOSITY CORRECTION FACTOR							
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141
Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change as per chart.							

D31VL Pressure Drop Reference Chart -- Curve Number											
Spool No.	Shifted				Center Condition						
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	1	-	-	-	-	-	-	-
002	3	3	1	1	3	3	3	4	4	1	1
004	3	3	1	1	-	-	-	-	-	1	1
009	3	3	1	1	6	-	-	-	-	-	-
020	5	4	2	2	-	-	-	-	-	-	-
030	4	3	1	1	-	-	-	-	-	-	-

D31VL Pressure Drop vs. Flow

The chart to the left provides the flow vs. pressure drop curve reference for the D31VL Series valves by spool type.

Example:
Find the pressure drop at 76 LPM (20 GPM) for a D31VL with a number 001 spool. To the right of spool number 001, locate the number 3 in the P-A column, and 2 in the B-T column.

Using the top graph, locate curves 2 and 3 and read the pressure drop values. Total pressure drop through the valve is the sum of the two values.

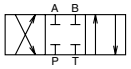
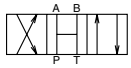
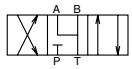
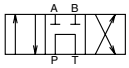
Ordering Information

D		L							
Directional Control Valve	Basic Valve	Lever Operated Pilot	Spool	Style	Pilot Supply and Drain	Seal	Valve Variations	Design Series

NOTE: Not required when ordering.

Code	Description
31D	NFPA D05HE, CETOP 5H (ISO)
31V	**NFPA D05H, CETOP 5**

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator A. Note operators reverse sides for #008 and #009 spools. See installation information for details.

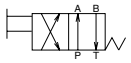
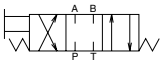
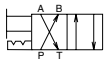
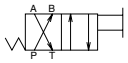
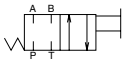
Code	Symbol
001	
002	
004	
008** 009*	
020**	
030*	

* 009 and 030 spools have open crossover.
** 008 and 020 spools have closed crossover.

Code	Description
1	**Int. pilot/Ext. drain**
2	**Ext. pilot/Ext. drain**
4#	**Int. pilot/Int. drain**
5	**Ext. pilot/Int. drain**

\# Not available with 002, 008 & 009 spools.

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Code	Description	Symbol
B†	**Sgl. operator, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Dbl. operator, 3 position, spring centered.**	
D†	**Dbl. operator, 2 position, detent.**	
E	Sgl. operator, 2 position, spring centered. P to B and A to T in shifted position.	
H†	**Sgl. operator, 2 position, spring offset. P to B and A to T in offset position.**	
K	Sgl. operator, 2 position. Spring centered. P to A and B to T in shifted position.	

† Only spools 020 and 030.

This condition varies with spool code.

Code	Description
Omit	Standard
7	Pilot choke – meter out
8	Stroke adj. 'B' End
9	Stroke adj. 'A' End
60	Pilot choke – meter in
89	Stroke adj. 'A' & 'B' Ends

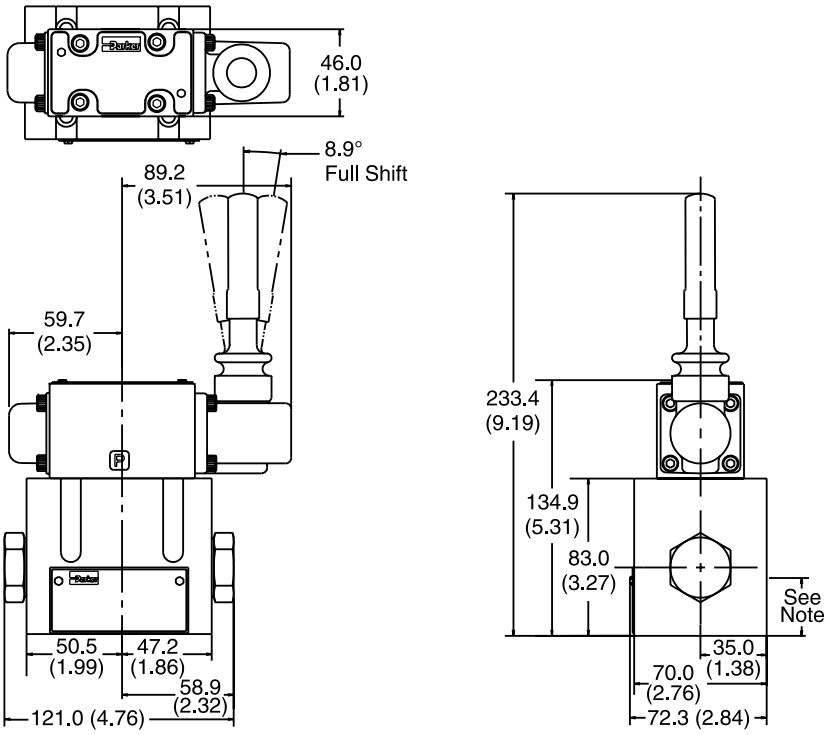
Valve Weight: 5.4 kg (12.0 lbs.)
Standard Bolt Kit: BK98
Metric Bolt Kit: BKM98

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Dimensions – Lever Operated

Inch equivalents for millimeter dimensions are shown in (**)



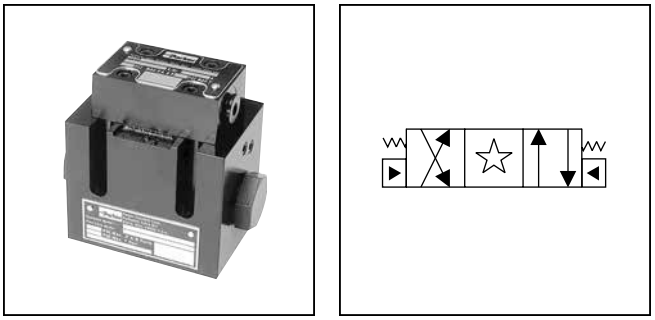
Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

D31.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

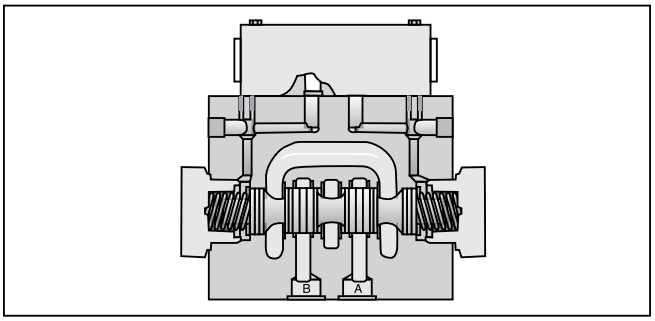
General Description

Series D3*P directional control valves are 5-chamber, oil pilot operated valves. The valves are suitable for manifold or subplate mounting.



Features

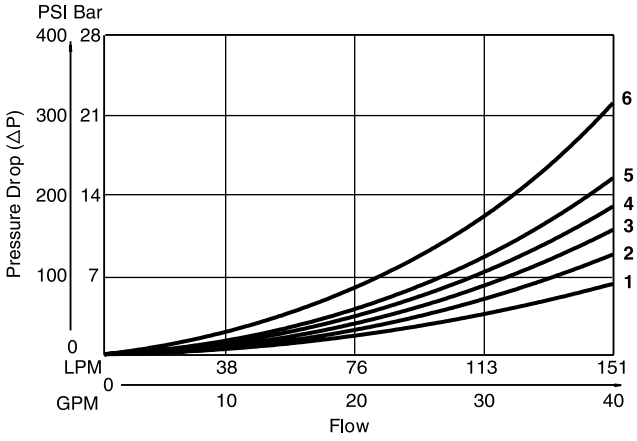
- **World design –** Available worldwide.
- **Mounting bolts below center line of spool –** Minimizes spool binding.
- **High pressure and flow ratings –** Increased performance options in a compact valve.



Specifications

Mounting Pattern	NFPA D05H , CETOP 5 NFPA D05HE, CETOP 5H
Max. Operating Pressure	345 Bar (5000 PSI)
Max. Tank Line Pressure	207 Bar (3000 PSI)
Pilot Pressure	Oil Min: 6.9 Bar (100 PSI) Oil Max: 345 Bar (5000 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)

Pressure Drop Chart



D3P Pressure Drop Reference Chart -- Curve Number											
Spool No.	Shifted				Center Condition						
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)
1	3	3	2	1	-	-	-	-	-	-	-
2	3	3	1	1	3	3	3	4	4	1	1
4	3	3	1	1	-	-	-	-	-	1	1
9	3	3	1	1	6	-	-	-	-	-	-
20	5	4	2	2	-	-	-	-	-	-	-
30	4	3	1	1	-	-	-	-	-	-	-

VISCOSITY CORRECTION FACTOR							
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141
Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change as per chart.							

D3P Pressure Drop vs. Flow

The chart to the left provides the flow vs. pressure drop curve reference for the D3P Series valves by spool type.

Example:
Find the pressure drop at 76 LPM (20 GPM) for a D3P with a number 1 spool. To the right of spool number 1, locate the number 3 in the P-A column, and 2 in the B-T column.

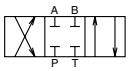
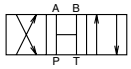
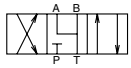
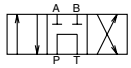
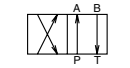
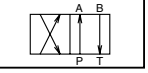
Using the top graph, locate curves 2 and 3 and read the pressure drop values. Total pressure drop through the valve is the sum of the two values.

Ordering Information

D		P							
Directional Control Valve	Basic Valve	Hydraulic Pilot	Spool	Style	Pilot Supply and Drain	Seal	Valve Variations	Design Series

NOTE: Not required when ordering.

Code	Description
3D	NFPA D05HE, CETOP 5H
3	**NFPA D05H, CETOP 5**

Code	Symbol
1	
2	
4	
8** **9***	
20**	
30*	

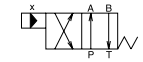
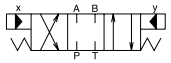
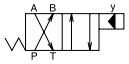
* 9 and 30 spools have open crossover.
** 8 and 20 spools have closed crossover.

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Code	Description
2	**Ext. pilot/Ext. drain**
5#	**Ext. pilot/Int. drain**

Available on "B" and "H" styles only.

Code	Description
Omit	**Standard**
7	Pilot Choke – Meter Out
8	Stroke Adj. 'B' End
9	Stroke Adj. 'A' End
60	Pilot Choke – Meter In
89	Stroke Adj. 'A' & 'B' Ends

Code	Description	Symbol
B†	**Single operator, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Double operator, 3 position, spring centered.**	
H†	**Single operator, 2 position, spring offset. P to B and A to T in offset position.**	

† Only spools 20 and 30.

This condition varies with spool code.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator X. Note operators reverse sides for #8 and #9 spool. See installation information for details.

Valve Weight:
Single Operator 1.4 kg (3.0 lbs.)
Double Operator 1.6 kg (3.5 lbs.)

Standard Bolt Kit: BK98

Metric Bolt Kit: BKM98

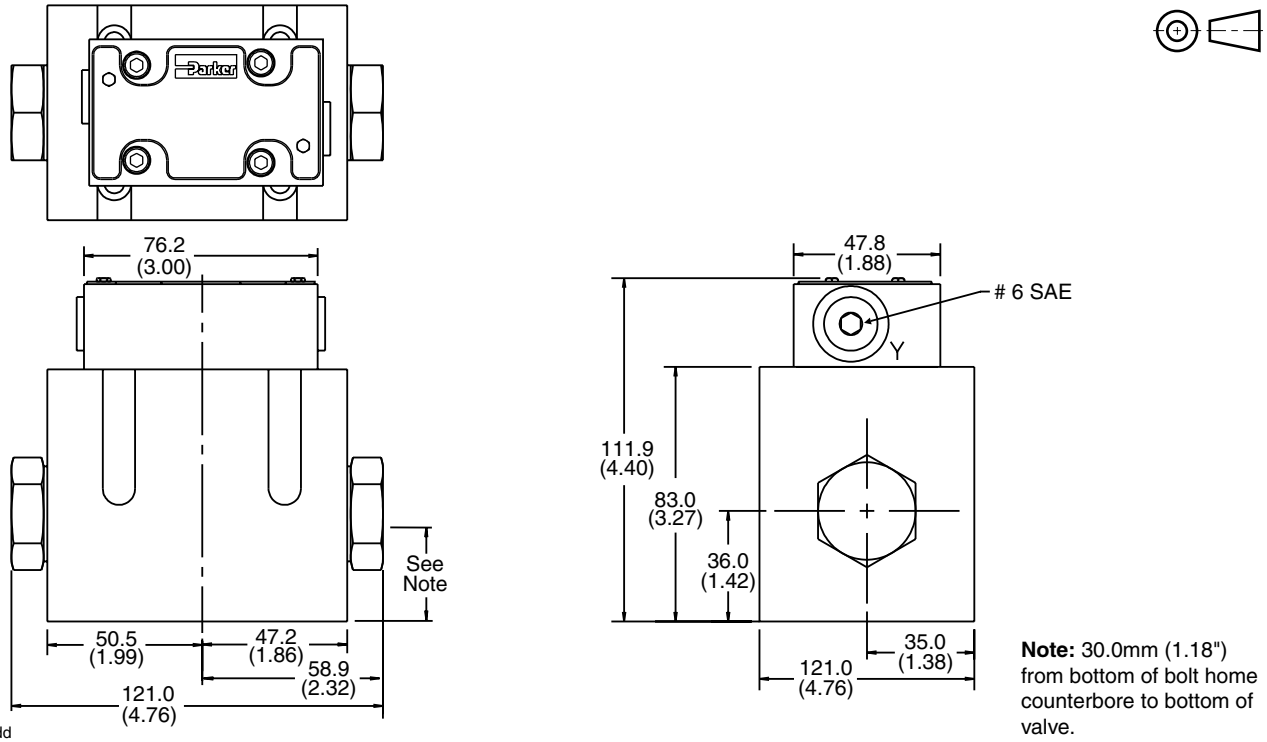
Seal Kit:
Nitrile SKD3P
Fluorocarbon SKD3PV

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Dimensions – Oil Operated

Inch equivalents for millimeter dimensions are shown in (**)



Note: 30.0mm (1.18") from bottom of bolt home counterbore to bottom of valve.

D31.indd, dd

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Hydraulic Valve Division
Elyria, Ohio, USA

FOR MAXIMUM VALVE RELIABILITY, ADHERE TO THE FOLLOWING INSTALLATION INFORMATION.

The following is important installation information which applies to all directional control valves described in this catalog.

Mounting Position

Detent – Horizontal
Spring Offset – Unrestricted
Spring Centered – Unrestricted

Fluid Recommendations

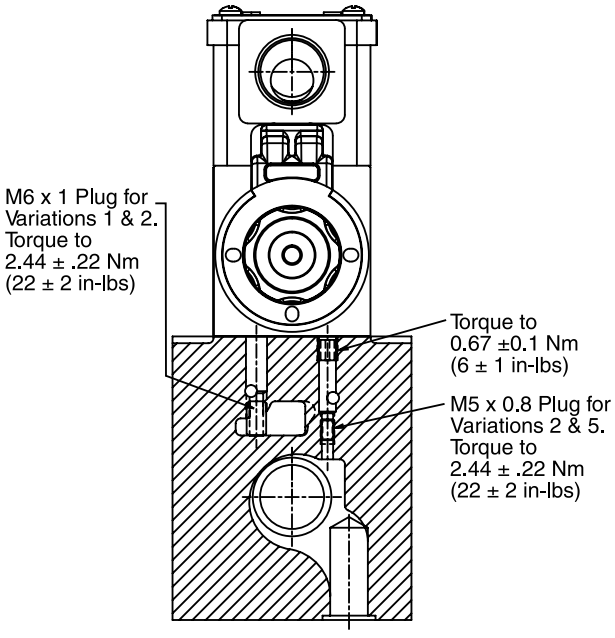
Premium quality hydraulic oil with a viscosity range between 32-54 cst. (150-250 SSU) At 38°C (100°F) is recommended. The absolute operating viscosity range is from 16-220 cst. (80-1000 SSU). Oil should have maximum anti-wear properties and rust and oxidation treatment.

Fluids and Seals

Valves using synthetic, fire-resistant fluids require special seals. When phosphate esters or its blends are used, FLUOROCARBON seals are required. Water-glycol, water-in-oil emulsions and petroleum oil may be used with STANDARD seals.

Filtration

For maximum valve and system component life, the system should be protected from contamination at a level not to exceed 125 particles greater than 10 microns per milliliter of fluid (SAE class 4/ISO 16/13).



Silting

Silting can cause any sliding spool valve to stick and not spring return if held under pressure for long periods of time. The valve should be cycled periodically to prevent sticking.

Special Installations

Consult your Parker representative for any application requiring the following:

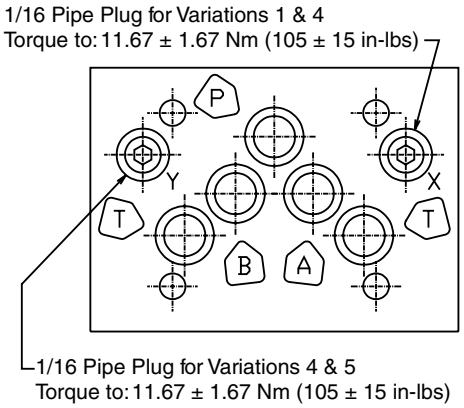
- Pressure above rating.
- Fluid other than those specified.
- Oil temperature above 71.1°C (160°F).
- Flow path other than normal.

Mounting Patterns

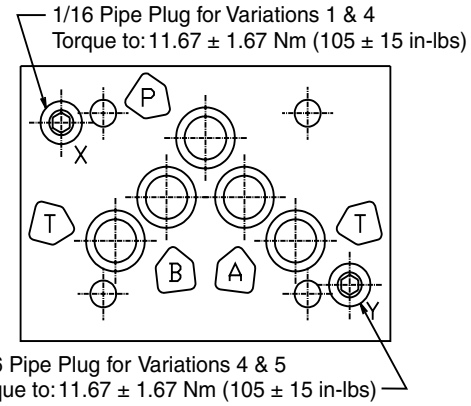
Series	NFPA	Size
D31V*, D3P	D05H, CETOP 5	3/8"
D31D*, D3DP, D31NW	D05HE, CETOP 5H	3/8"

Torque Specifications

The recommended torque values for the bolts which mount the valve to the manifold or subplate are as follows: 16.3 Nm (12 ft-lb).



NFPA D05HE, CETOP 5H Pattern D31DW



NFPA D05H, CETOP 5 Pattern D31VW

SERIES D31*W, D31*A, D31*L PILOT OPERATED, DIRECTIONAL CONTROL VALVES

Tank and Drain Line Surges

If several valves are piped with a common tank or drain line, flow surges in the line may cause an unexpected spool shift. No spring style valves are most susceptible to this. Separate tank and drain lines should be piped in installations where line surges are expected.

Electrical Failure or Loss of Pilot Pressure (D31*A)

Should electric power fail or loss of pilot pressure occur, spring offset and spring centered valves will shift to the spring held position. Detented valves will stay in the last position held before power failure. If main flow does not fail or stop at the same time power fails, machine actuators may continue to function in an undesirable manner or sequence.

Electrical Characteristics (Detented Spool)

Only a momentary energizing of the solenoid is necessary to shift and hold a detented spool. Minimum duration of the signal is 0.1 seconds for DC voltages. For AC voltages the response time is 0.06 seconds. Spool position will be held provided the spool centerline is in a horizontal plane, and no shock or vibration is present to displace the spool.

Pilot/Drain Characteristics

Pilot Pressure: 6.9 to 345 Bar (100 to 5000 PSI)

External: An oil source sufficient to maintain minimum pilot pressure must be connected to the “X” port of the main body. When using the external pilot variation, an M5 x 0.8 x 6mm long set screw must be present in the main body pilot passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with pilot code 2 or 5.

Internal: Flow is internally ported from the pressure port of the main valve body to the “P” port of the pilot valve. The pressure developed at the “P” port of the pilot valve must be 100 PSI (6.9 Bar) minimum at all times.

If the valve center condition allows flow from pressure to tank, 100 PSI (6.9 Bar) back pressure must be developed in the tank line to ensure sufficient pilot force at “P”. The “X” port in subplate must be plugged when using internal pilot variation (1/16 NPT).

Pilot Valve Drain:
Maximum pressure 102 Bar (1500 PSI), 207 Bar (3000 PSI) optional.

External: When using an external drain, an M6 x 1 x 10mm long set screw must be present in the main body drain passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with drain code 1 or 2.

Drain flow from the pilot valve is at the “Y” port of the main body and must be piped directly to tank. Maximum drain line pressure is 102 Bar (1500 PSI), 207 Bar (3000 PSI) optional. Any drain line back pressure is additive to the pilot pressure requirement.

Internal: Drain flow from the pilot valve is internally connected to the main valve tank port. Tank and drain pressure are then identical so tank line pressure should not exceed 102 Bar (1500 PSI), 207 Bar (3000 PSI) optional. Any tank line back pressure is also additive to the pilot pressure requirement. If flow surges (a cause of pressure surges) are anticipated in the tank line, an external drain variation is recommended. The “Y” port in subplate must be plugged when using internal drain variations.

D31*W, D31*A, D31*L Flow Paths

Style Code	Description	No Solenoid/Operator Energized	Solenoid/Operator A Energized	Solenoid/Operator B Energized
B	Spring Offset	P→A and B→T	—	P→B and A→T
C	Spring Centered	Centered	P→A and B→T	P→B and A→T
D	Detented	Last Position Held	P→A and B→T	P→B and A→T
E	Spring Centered	Centered	—	P→B and A→T
F†	Spring Offset, Shift to Center	P→A and B→T	—	Centered
H	Spring Offset	P→B and A→T	P→A and B→T	—
K	Spring Centered	Centered	P→A and B→T	—
M†	Spring Offset, Shift to Center	P→B and A→T	Centered	—

† D31*W only.

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Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

SERIES D3P, D3DP PILOT OPERATED DIRECTIONAL CONTROL VALVES

Tank and Drain Line Surges

If several valves are piped with a common tank or drain line, flow surges in the line may cause an unexpected spool shift. Separate tank and drain lines should be piped in installations where line surges are expected.

Loss of Pilot Pressure

Should oil pilot pressure fail, spring offset and spring centered valves will shift to the spring held position. Detented valves will stay in the last position held before power failure. If main flow does not fail or stop at the same time power fails, machine actuators may continue to function in an undesirable manner or sequence.

Mounting Pattern

D3P valves may be mounted on a standard D05 pattern subplate or manifold only if the “X” and “Y” ports are externally connected to the pilot block on top of the main body. All other mounting styles require a D05H or D05HE pattern which incorporates ports for the “X” and “Y” pilot and drain passages. Location of these ports can be found on the Recommended Mounting Surface pages in this section.

Pilot Drain Characteristics

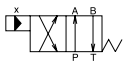
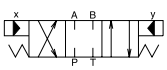
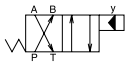
Pilot Pressure: 6.9 to 345 Bar (100 to 5000 PSI)

Direct pilot operated valves use the “X” and “Y” ports to supply pilot oil directly to the ends of the spool, providing spool shifting force. A block mounted on top of the valve body is internally cored to make the necessary connections. Thus when “X” is pressurized, “Y” is used as a drain; and when “Y” is pressurized, “X” becomes the drain.

Any back pressure in these lines when they are being used as a drain is additive to the pilot pressure requirement.

Internal Drain: On spring offset models, only the “X” port is pressurized, as the spring returns the spool to its at rest position. On these models, “Y” may be internally drained through the main tank passage in the valve.

D3P Flow Path/Pilot Pressure

Style Code	Description	“X” & “Y” De-Pressurized	“X” Port Pressurized	“Y” Port Pressurized	Special Notes	Recommended Control Valve For Pilot Oil
B	Two Position Spring Offset	P→A, B→T	P→A, B→T	P→B, A→T	“X” Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position Spring Centered	Center	P→A, B→T	P→B, A→T	Flow paths will be reversed on valves with tandem center (8) spools	
H	Two-Position Spring Offset	P→B, A→T	P→A, B→T	P→B, A→T	“Y” Port may be pressurized to assist spring in returning spool to offset position	

Series D31VW, D31VA, D31VL, D3P Subplate Mounting NFPA D05H, CETOP 5

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 16.3 Nm (12 ft-lbs).

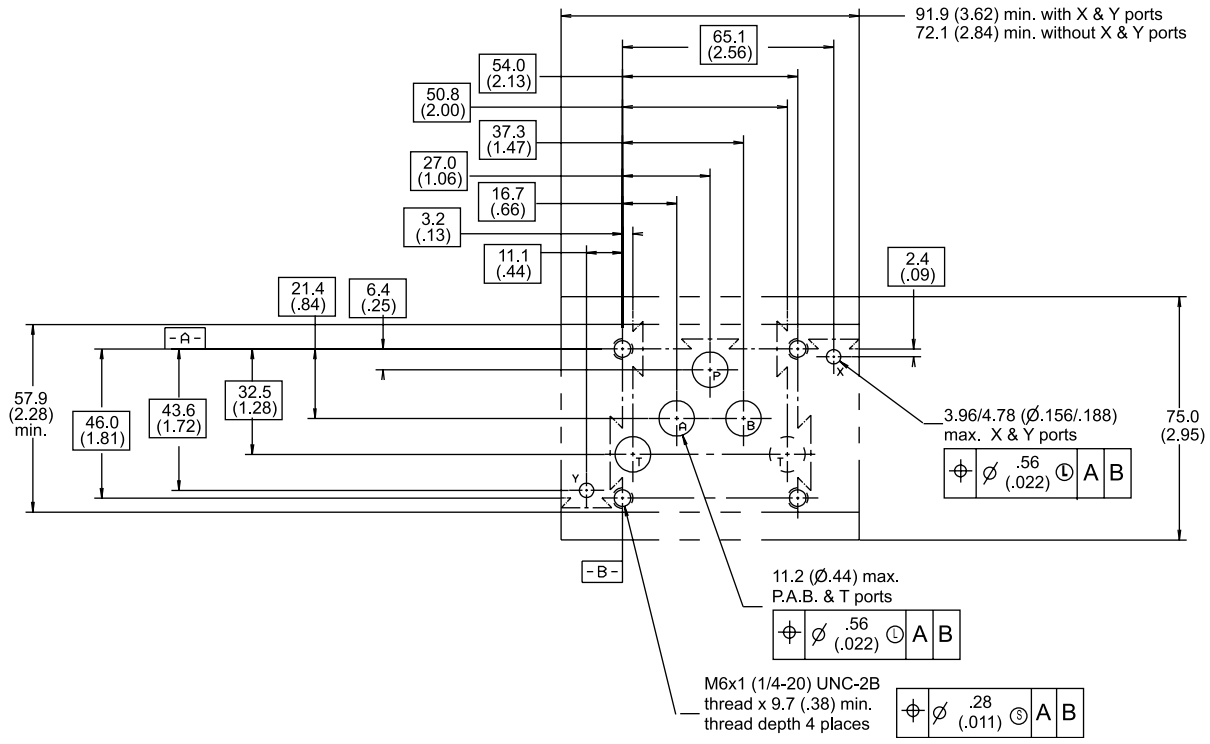
For maximum valve reliability, adhere to the following installation information.

Mounting Position

Valve Type	Mounting Position
Detent (Solenoid)	Horizontal
Spring Offset	Unrestricted
Spring Centered	Unrestricted

Mounting Pattern — NFPA D05H, CETOP 5

Inch equivalents for millimeter dimensions are shown in (**)



Series D31DW, D31DA, D31DL, D3DP, D31NW Subplate Mounting NFPA D05HE, CETOP 5H

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R. and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 16.3 Nm (12 ft-lbs).

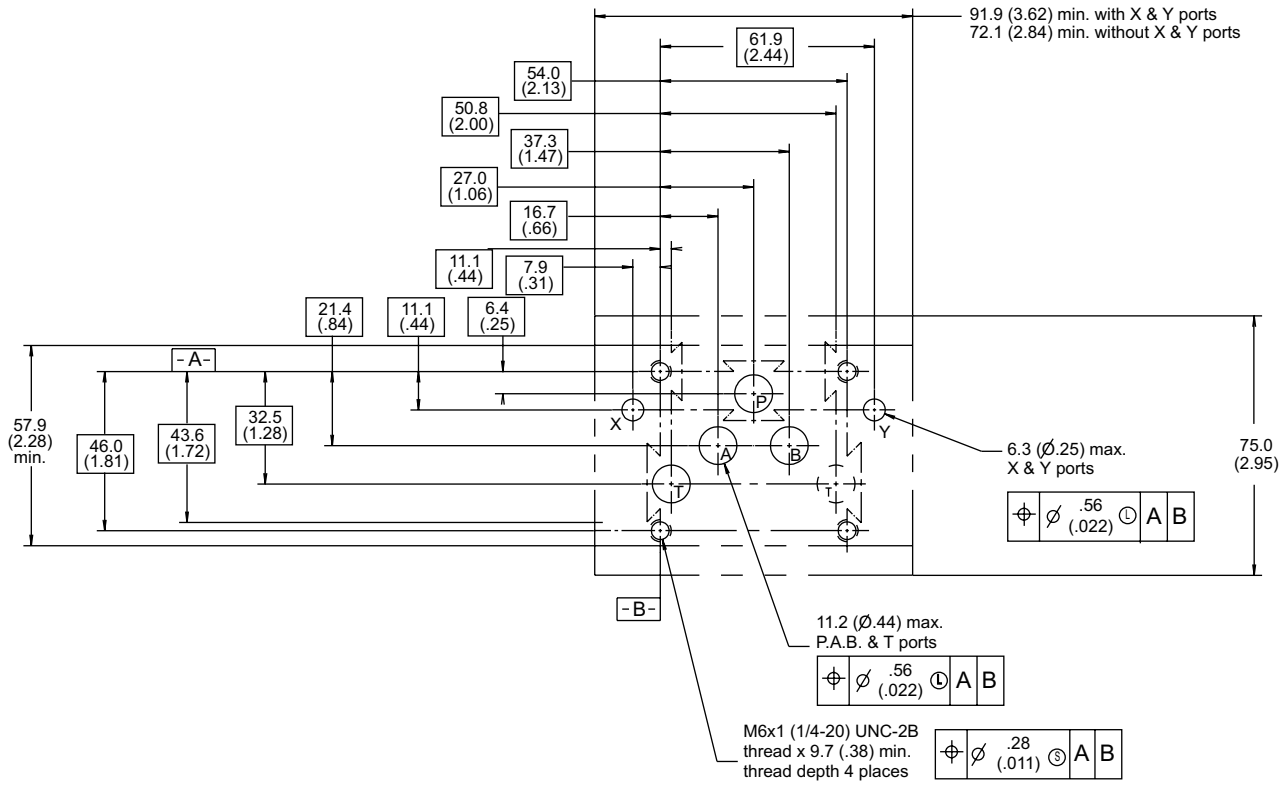
For maximum valve reliability, adhere to the following installation information.

Mounting Position

Valve Type	Mounting Position
Detent (Solenoid)	Horizontal
Spring Offset	Unrestricted
Spring Centered	Unrestricted

Mounting Pattern — NFPA D05HE, CETOP 5H

Inch equivalents for millimeter dimensions are shown in (**)



Notes

Return to ALPHA TOC
Return to SECTION TOC
A

D3.indd, dd

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Elyria, Ohio, USA

Application

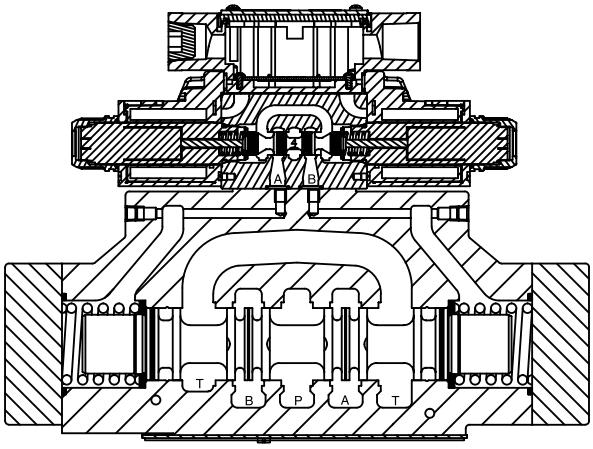
Series D41 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3 position styles and are manifold mounted. These valves conform to NFPA's D07, CETOP 7 mounting patterns.

Operation

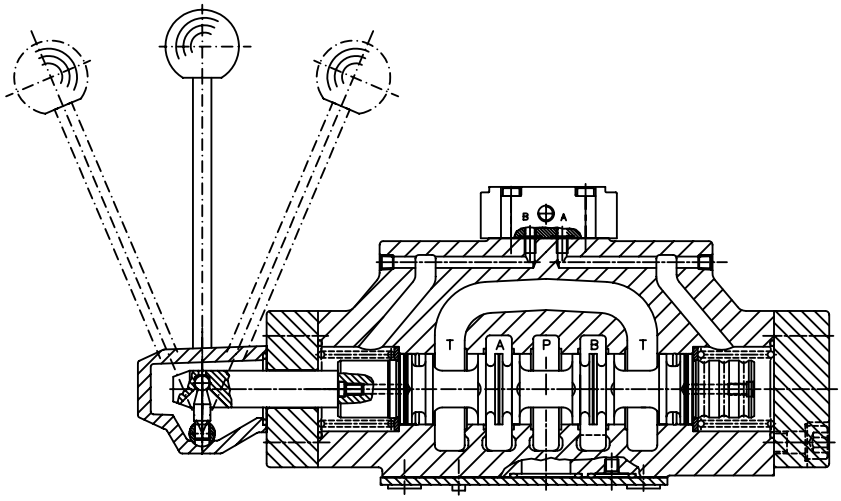
Series D41 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or oil pilot operator.

Features

- Easy access mounting bolts.
- 345 Bar (5000 PSI) pressure rating.
- Flows to 300 LPM (79.4 GPM) depending on spool.
- Choice of three operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.



D41VW Solenoid Operated Plug-In Conduit Box



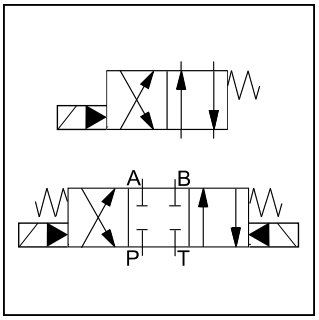
D4L Lever Operated

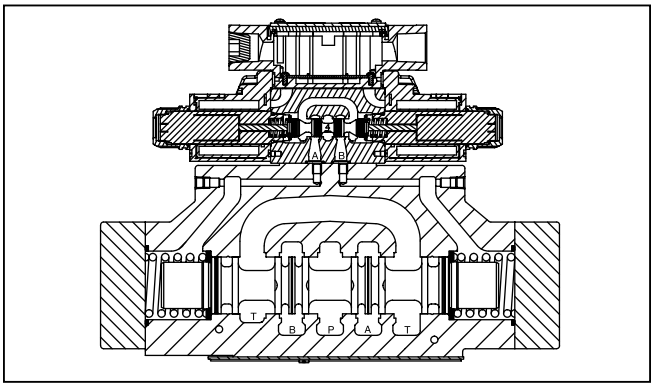
General Description

Series D41VW valves are piloted by a D1VW valve. The valves can be ordered with position control.

The minimum pilot pressure must be ensured for all operating conditions of the directional valve.

Additionally spools with a P to T connection in the de-energized position need an external pressure supply (external inlet) or an integral check valve.



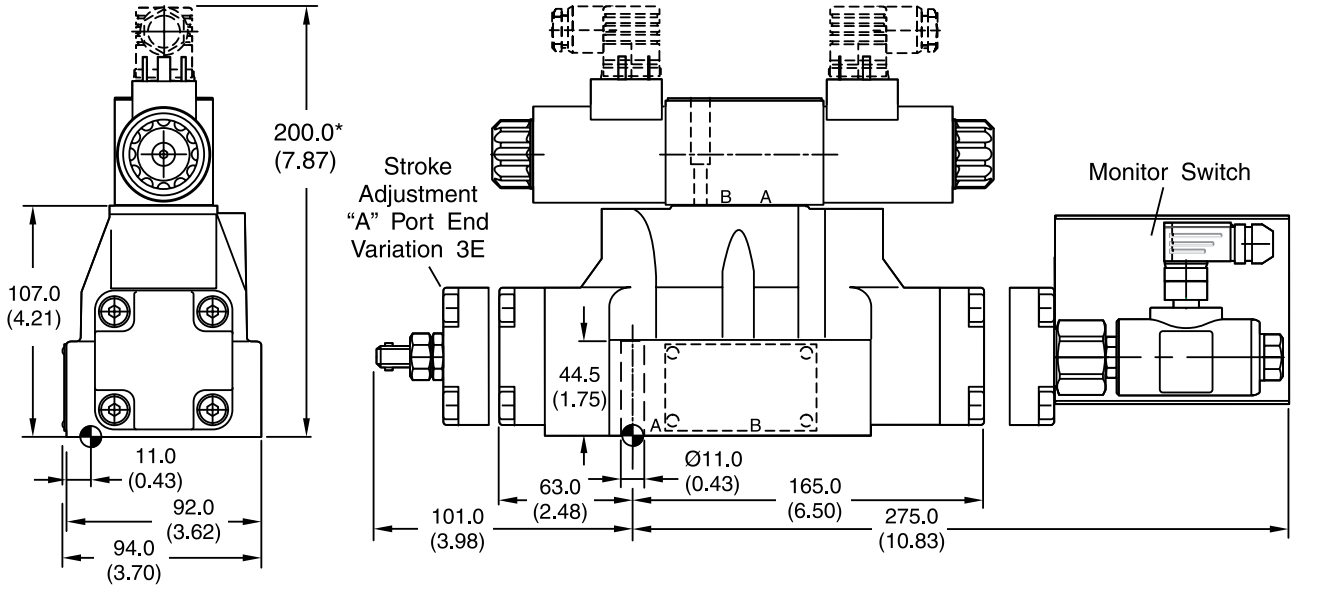


Features

- **World design –** Available worldwide.
- **Mounting bolts below center line of spool –** Minimizes spool binding.
- **Five chamber style –** Eliminates pressure spikes in tubes, increasing valve life.
- **High pressure and flow ratings –** Increased performance options in a compact valve.

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



* Please add for each sandwich plate +40mm (1.58") (pressure reducing valve, pilot choke valve meter-in/-out).

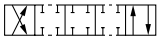
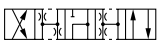
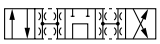
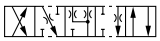
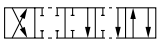
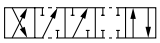
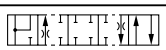
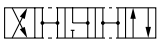
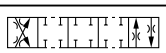
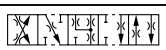
Surface Finish	Kit			Seal Kit
R_{max}6.3 ⏥ 0.01/100	BK320	4x M10x60 2x M6x55 DIN 912 12.9	63 Nm (46.5 lb.-ft.) 13.2 Nm (9.7 lb.-ft.) ±15%	**Nitrile: SK-D41VW-N-91** Fluorocarbon: SK-D41VW-V-91

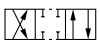
The space necessary to remove the plug per DIN 43650, design type AF is at least 15 mm.

The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm.

D	41V	W				
Directional Control Valve	Basic Valve	Actuator Solenoid Wet Pin	Spool	Style		Pilot Supply and Drain

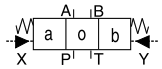
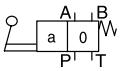
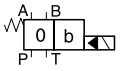
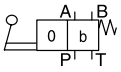
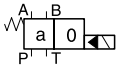
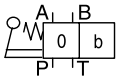
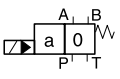
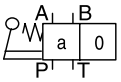
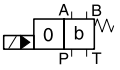
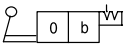
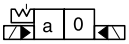
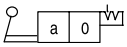
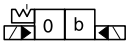
NFPA D07, CETOP 7 DIN NG16

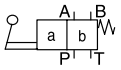
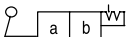
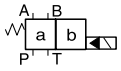
3-Position Spools	
Code	**Spool Type**
	a 0 b
001	
002	
003	
004	
005	
006	
007	
009	
011	
014	
015	
016	
021	
022	
054	
081	
082	

2-Position Spools	
Code	**Spool Type**
	a b
020	
026	
030	

Code	Description	
1	**Internal Pilot**	**External Dain**
2	External Pilot	External Drain
3	Internal Pilot w/ Check	Internal Drain
4	**Internal Pilot**	**Internal Drain**
5	External Pilot	Internal Drain
6	Internal Pilot w/ Check	Internal Drain

* Not available with 002, 007, 009, 054 spools.

3-Position Spools			
Code	**All 3-Position Spools**		
C			**3 positions.** **Spring offset in position "0".** **Operated in position "a" or "b".**
	Standard	**Spool Type 009**	
E	 Operated in position "a".	 Operated in position "b".	2 positions. Spring offset in position "0".
F	 Spring offset in position "b".	 Spring offset in position "a".	2 positions. Operated in position "0".
K	 Operated in position "b".	 Operated in position "a".	2 positions. Spring offset in position "0".
M	 Spring offset in position "a".	 Spring offset in position "b".	2 positions. Operated in position "0".
R	 No center in offset position.	 No center in offset position.	2 positions, detent. Operated in position "0" or "b".
S	 No center in offset position.	 No center in offset position.	2 positions, detent. Operated in position "0" or "a". No center in offset position.

2-Position Spools		
Code	**Spool Position**	
B		**Spring offset in position "b".** **Operated in position "a".**
D		Detent, operated in position"a" or "b". No center or offset position.
H		Spring offset in position "a". Operated in position "b".

Weight:

Single Solenoid: 9.7 kg (21.4 lbs.)

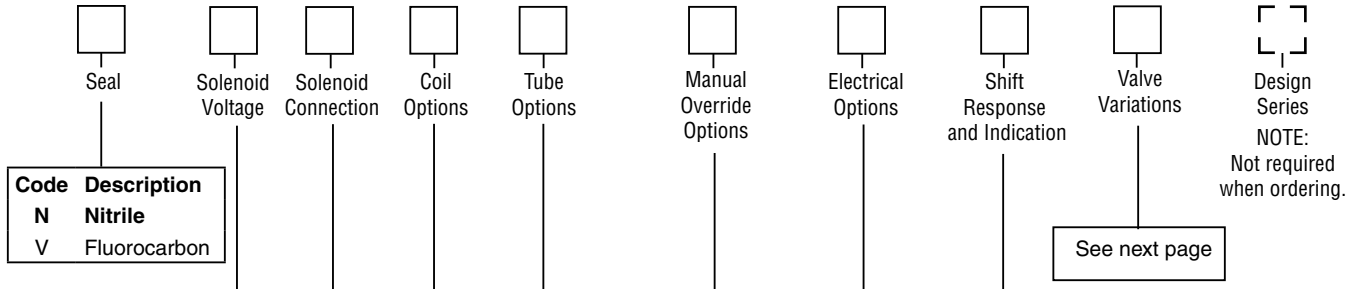
Double Solenoid: 10.3 kg (22.7 lbs.)

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

D41.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA



Code	Description
N	**Nitrile**
V	Fluorocarbon

See next page

Code	Description
A*	24/50 VAC
D	120 VDC
G	198 VDC
J	**24 VDC**
K	**12 VDC**
N**	220/50 VAC
Q*	100/60 VAC
QD†	100 VAC/60 HZ 100 VAC/50 HZ
R	24/60 VAC
T	**240/60 - 220/50 VAC**
U	98 VDC
Y	**120/60 - 110/50 VAC**
Z	250 VDC

* High Watt Coil only.
** Explosion Proof only.
† Available in DIN only.

Code	Description
Omit	**Standard**
P	Extended with Boot
T†	None

† DC or AC Rectified only.

Manual Override options not available with Explosion Proof.

Code	Description
Omit	**Standard Response, No Switch**
I3N	Monitor Switch, 'A' & 'B' Port End
I6N	Monitor Switch, 'A' & 'B' Port Start

Note: Not CE or CSA approved. Spools 005, 006, 008, 016, 054, 081 and 082 not available. C style only.

Code	Description
Omit	**Standard Pressure 103.5 Bar (1500 PSI) AC 207 Bar (3000 PSI) DC**
H*	**High Pressure, AC only 207 Bar (3000 PSI)**

* Not available with CSA.

Code	Description
Omit	**No Options**
J*	Diode Surge Suppressor
Z†	Rectified Coil

* DC or AC Rectified only. DIN coil must include plug with lights.
† DC tube standard.

Code	Description
C*	**Leadwire Conduit Box**
D**	Metric Plug (M12X1), DESINA
E†	Explosion Proof
G††	**Plug-In Conduit Box**
J#	**Deutsch (DT06-2S)**
M#	Metri-Pack (150)
P	**DIN with Plug**
S#	Dual Spade
W†	**DIN w/o Plug**

* No variations – See Plug-in.
** DC only, lights, diode surge suppressor, not CSA approved.
† Not available with lights.
†† Required for variations on conduit box style. Must have lights.
# DC only, no lights, not CSA approved.

Code	Description
Omit*	**High Watt**
D**	Explosion Proof, EEXD ATEX
E**	Explosion Proof, EEXME ATEX
F†	Low Watt
L††	10 Watt
O**	Explosion Proof, MSHA
T#	Explosion Proof, Ex d IIC ATEX/CSA
U**	Explosion Proof, UL/CSA

* AC ambient temperature must not exceed 60°C (140°F).
** 60 Hz only on AC, no options.
† AC only.
†† DC and AC rectified only.
# J, K and Y voltages only. Dual frequency on AC, no options.

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Valve Variations

Code	Description
5*	**Signal Lights – Standard**
	Signal Lights – Hirsch. (DIN with Plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with Lights
56**	**Manaplug (Mini) with Lights**
1C**	**Manaplug (Mini) Single Sol. 5-pin, with Lights**
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1G**	Manaplug (Mini) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1H**	Manaplug (Micro) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1M**	Manaplug Opposite Normal
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	**Pilot Choke Meter Out**
3B	**Pilot Choke Meter In**
3C	**Pilot Pressure Reducer**
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	**Pilot Choke Meter Out with Lights**
3H*	**Pilot Choke Meter In with Lights**
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights and 5-pin Mini Manaplug with Pilot Choke
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights

* DESINA, plug-in conduit box, and DIN with plug styles only.
** Must have plug-in style conduit box.

Bold: Designates Tier I products and options.

Non-bold: Designates Tier II products and options. These products will have longer lead times.

Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-15% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact HVD for AC coil applications.

Explosion Proof Solenoid Ratings*

U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
MSHA (EO)	Complies with 30CFR, Part 18
ATEX (ED)	Complies with ATEX requirements for: Exd, Group IIB; EN50014: 1999+ Amds. 1 & 2, EN50018: 2000
ATEX & CSA/US (ET)	Complies with ATEX EN60079-0, EN60079-1 Ex d IIC; CSA/US Ex d IIC, AEx d IIC for Class I, Zone 1, UL1203, UL1604, CSA E61241,1 Class II, Div 1

* Allowable Voltage Deviation ±10%.
Note that Explosion Proof AC coils are single frequency only.

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
G	Omit	198 VDC	N/A	N/A	0.15 Amps	30 W	1306.80 ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 ohms
L	L	6 VDC	N/A	N/A	1.67 Amps	10 W	3.59 ohms
L	Omit	6 VDC	N/A	N/A	5.00 Amps	30 W	1.20 ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 ohms
QD	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.20 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.20 ohms
R	F	24/60 VAC, Low Watt	6.67 Amps	160 VA	2.20 Amps	23 W	1.52 ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
Z	Omit	250 VDC	N/A	N/A	0.13 Amps	30 W	1889.64 ohms
Explosion Proof Solenoids							
R		24/60 VAC	7.63 Amps	183 VA	2.85 Amps	27 W	1.99 ohms
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
N		220/50 VAC	0.77 Amps	169 VA	0.31 Amps	27 W	1.38 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
P		110/50 VAC	1.47 Amps	162 VA	0.57 Amps	27 W	34.70 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
"ET" Explosion Proof Solenoids							
K		12 VDC	N/A	N/A	1.00 Amps	12 W	12.00 ohms
J		24 VDC	N/A	N/A	1.00 Amps	13 W	44.30 ohms
Y		120/60-50 VAC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

D41.indd, dd

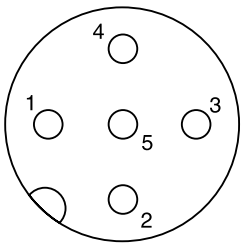
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General			
Design		Directional Spool Valve	
Actuation		Solenoid	
Size		NG16	
Mounting Interface		DIN 24340 A16 / ISO 4401 / NFPA D07 / CETOP RP 121-H	
Mounting Position		Unrestricted, preferably horizontal	
Ambient Temperature	**[°C]** **[°C]**	-25...+50; (-13°F...+122°F) (without inductive position control) 0...+50; (+32°F...+122°F) (with inductive position control)	
$MTTF_D$ Value	**[years]**	75	
Hydraulic			
Maximum Operating Pressure		Pilot drain internal: P, A, B, X 350 Bar (5075 PSI); T, Y 105 Bar (1523 PSI) Pilot drain external: P, A, B, T, X 350 Bar (5075 PSI); Y 105 Bar (1523 PSI) 10 Watt 207 Bar (3000 PSI)	
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature	**[°C]**	-25 ... +70 (-13°F...+158°F)	
Viscosity Permitted	**[cSt]/[mm²/s]**	2.8...400 (13...1854 SSU)	
Recommended	**[cSt]/[mm²/s]**	30...80 (139...371 SSU)	
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)	
Flow Maximum		300 LPM (79.4 GPM)	
Leakage at 350 Bar (per flow path)	**[ml/min]**	up to 200 (0.05 GPM) (depending on spool)	
Operating Pressure Integral Check Valve		See p/Q Diagram	
Minimum Pilot Supply Pressure		5 Bar (73 PSI)	
Static / Dynamic			
Step Response at 85%		Energized	De-energized
DC Solenoids	**Pilot Pressure**		
	50 Bar **[ms]**	95	65
	100 Bar **[ms]**	75	65
	250 Bar & 350 Bar **[ms]**	60	65
AC Solenoids	**Pilot Pressure**		
	50 Bar **[ms]**	75	55
	100 Bar **[ms]**	65	55
	250 Bar & 350 Bar **[ms]**	40	55

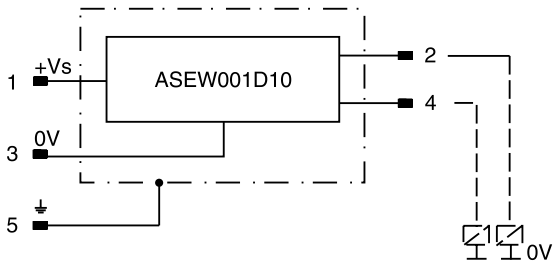
Position Control M12x1

Protection Class		IP 65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature	**[°C]**	0...+50; (+32°F...122°F)
Supply Voltage / Ripple	**[V]**	18...42 ±10%
Current Consumption without Load	**[mA]**	≤ 30
Max. Output Current per Channel, Ohmic	**[mA]**	400
Min. Output Load per Channel, Ohmic	**[kOhm]**	100
Max. Output Drop at 0.2A	**[V]**	≤ 1.1
Max. Output Drop at 0.4A	**[V]**	≤ 1.6
EMC		EN50081-1 / EN50082-2
Max. Tolerance Ambient Field Strength	**[A/m]**	<1200
Min. Distance to Next AC Solenoid	**[m]**	>0.1
Interface		M12x1 per IEC 61076-2-101
Wiring Minimum	**[mm²]**	5 x 0.25 brad shield recommended
Wiring Length Maximum	**[m]**	50 (164 ft.) recommended

M12 Pin Assignment



1 + Supply 18...42V
2 Out B: normally closed
3 0V
4 Out A: normally open
5 Earth ground



Definitions

Start position monitored:

The valve is de-energized. The inductive switch gives a signal at the moment (below 15% spool stroke) when the spool leaves the spring offset position.

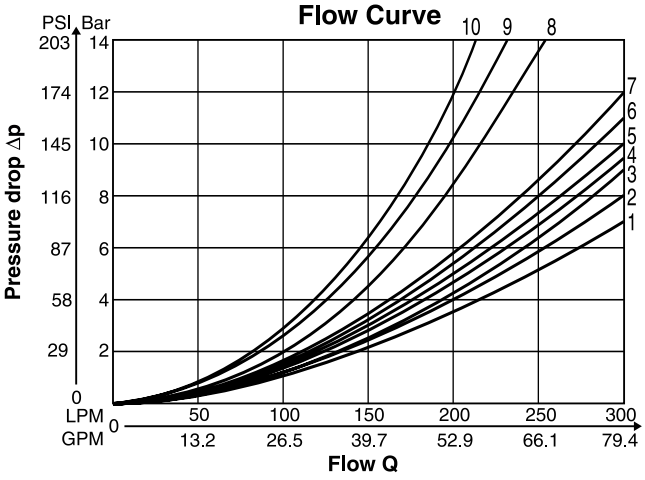
End position monitored:

The inductive switch gives a signal before the end position is reached. (above 85% spool stroke).

Delivery includes plug M12 x 1 (order no.: 5004109).

Performance Curves

The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.

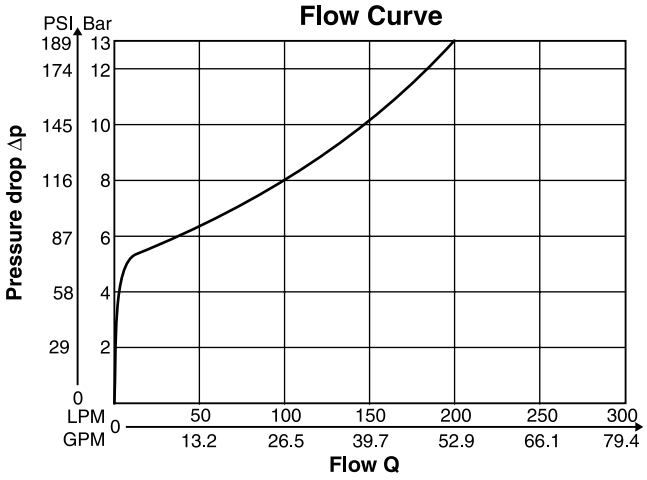


All characteristic curves measured with HLP46 at 50°C.

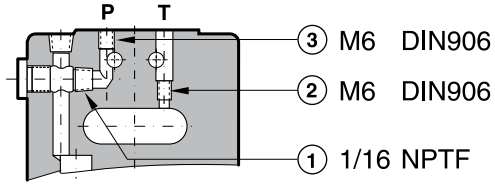
Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
001	1	1	–	4	5
002	1	2	6	4	6
003	1	2	–	5	6
004	1	1	–	5	5
005	2	2	–	3	5
006	1	2	–	3	6
007	1	1	6	4	5
009	2	9	8	7	10
011	1	1	–	4	5
014	1	1	6	4	5
015	1	2	–	4	6
016	2	2	–	3	5
020	3	5	–	3	5
021	2	8	–	2	–
022	8	2	–	–	3
026	3	5	–	–	–
030	2	3	–	6	7
054	2	3	–	6	7

Integral Check Valve in the P port

Mounting an integral check valve in the P port is necessary to build up pilot pressure for valves with P to T connection and internal pilot oil supply. The pressure difference at the integral check valve (see performance curves) is to be added to all flow curves of the P-port of the main valve.

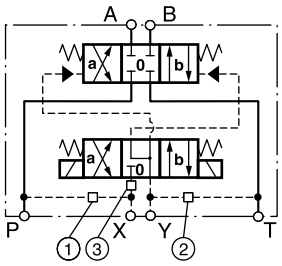


Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

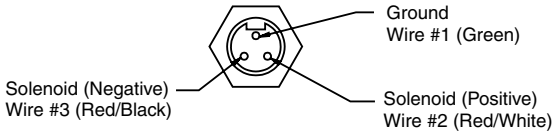
Pilot Oil Inlet	Pilot Oil Outlet	1	2	3
internal	external	○	●	Orifice Ø1.5
external	external	●	●	Orifice Ø1.5
internal	internal	○	○	Orifice Ø1.5
external	internal	●	○	Orifice Ø1.5



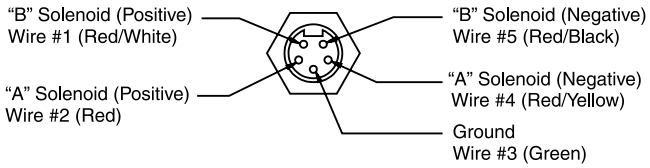
All orifice sizes for standard valves

Manaplug (Options 6, 56, 1A & 1C)

Interface – Brad Harrison Plug
– 3-Pin for Single Solenoid
– 5-Pin for Double Solenoid

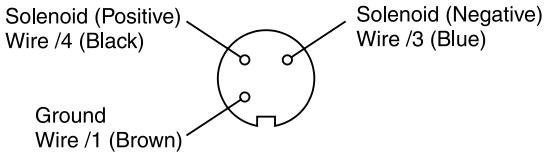


3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

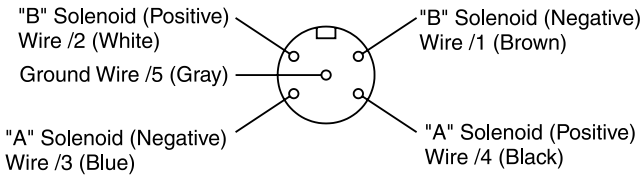


5-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7A, 7B, 1B & 1D)



3-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid



5-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

Manaplug – Electrical Mini Plug

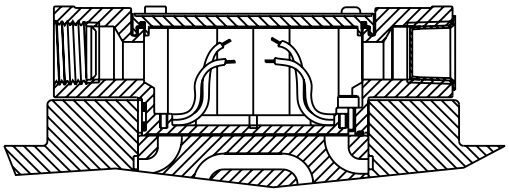
EP336-30	3 Pin Plug
EP316-30	5 Pin Plug (Double Solenoid)
EP31A-30	5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

EP337-30	3 Pin Plug
EP317-30	5 Pin Plug (Double Solenoid)
EP31B-30	5 Pin Plug (Single Solenoid)

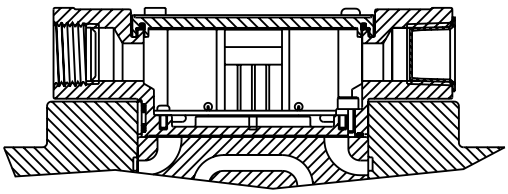
Conduit Box Option C

– No Wiring Options Available

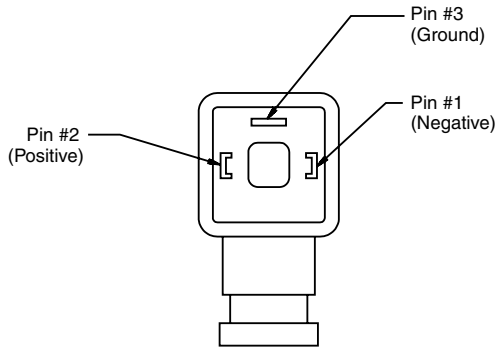


Signal Lights (Option 5) — Plug-in Only

– LED Interface
– Meets Nema 4/IP67



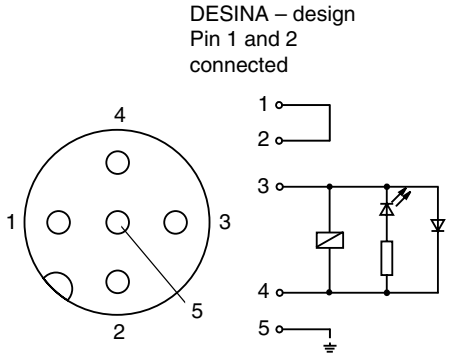
Hirschmann Plug with Lights (Option P5)
ISO 4400/DIN 43650 Form "A"



Face View of Plug

DESINA Connector (Option D)
M12 pin assignment
Standard

1 = Not used
2 = Not used
3 = 0V
4 = Signal (24 V)
5 = Earth Ground



Pins are as seen on valve (male pin connectors)

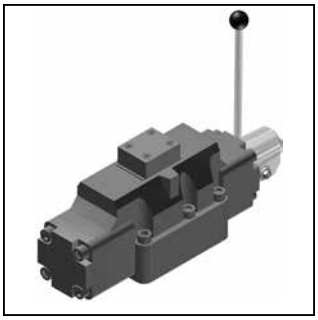
D41.indd, dd

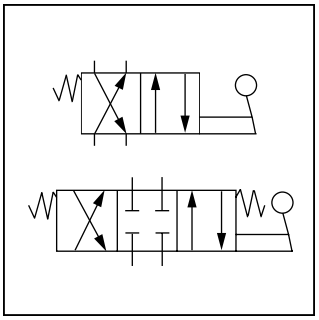
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

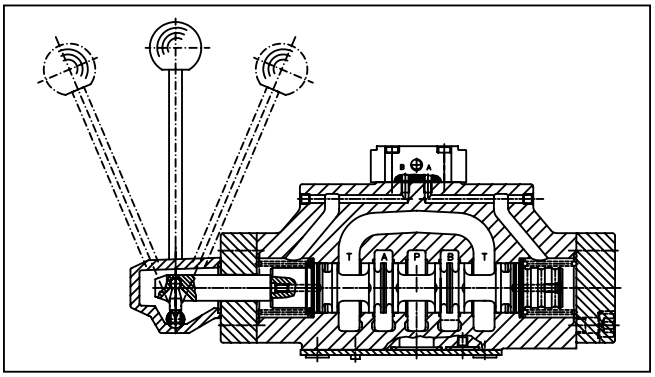
General Description

Series D4L valves are 5 chamber, directional control valves and are available in 2 or 3-position styles. They are operated by a hand lever which is directly connected to the spool.

The hand lever can be located either on the A or B side. Spring offset and detent designs are available.







Features

- Low force required to shift spool.
- Hardened spools provide long life.
- Low pressure drop design.

Specifications

General		
Design		Directional spool valve
Actuation		Lever
Size		NG16
Mounting interface		DIN 24340 A16, ISO 4401, NFPA D07, CETOP RP 121-H
Mounting Position		Unrestricted, preferably horizontal
Ambient Temperature	**[°C]**	-25...+50; (-13°F...+122°F)
Hydraulic		
Maximum Operating Pressure		External Drain: P, A B, T 350 Bar (5075 PSI); X, Y 10 Bar (145 PSI) Internal Drain: P, A B 350 Bar (5075 PSI); T, X, Y 10 Bar (145 PSI)
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525
Fluid Temperature	**[°C]**	-25 ... +70; (-13°F...+158°F)
Viscosity Permitted **Recommended**	**[cSt] /[mm²/s]** **[cSt] /[mm²/s]**	2.8...400 (13...1854 SSU) 30...80 (139...371 SSU)
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)
Maximum Flow		300 LPM (79.4 GPM)
Leakage at 350 Bar (per flow path)	**[ml/min]**	up to 200 (0.05 GPM) (depending on spool)

D — Directional Control Valve

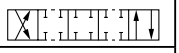
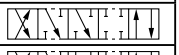
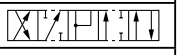
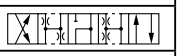
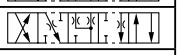
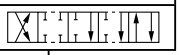
4 — Basic Valve

NFPA D07, CETOP 7 DIN NG16

Actuator

Code	Actuation
L	Lever Side B
LB	Lever Side A

Spool

3 Position Spools	
Code	Spool Type (a 0 b)
1	
2	
3	
4	
6	
7	
9	
11	
14	
15	

2 Position Spools	
Code	Spool Type (a b)
20	
30	

Style

Pilot Supply and Drain

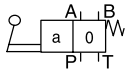
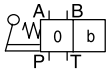
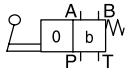
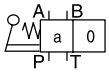
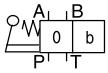
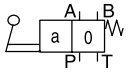
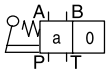
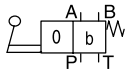
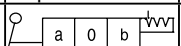
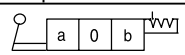
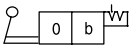
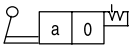
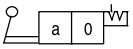
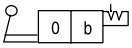
Code	Description	
2*	External Pilot	External Drain
5**	External Pilot	Internal Drain

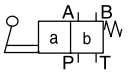
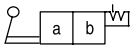
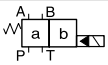
* Pressure T-port > 10 bar
** Pressure T-port < 10 bar

Seal

Code	Description
N	Nitrile
V	Fluorocarbon

Design Series
NOTE: Not required when ordering.

3 Position Spools			
Code	All 3 Position Spools		
C			3 positions. Spring offset in position “0”. Operated in position “a” or “b”.
	Standard	Spool Type 9	
E	 Operated in position “a”.	 Operated in position “b”.	2 positions. Spring offset in position “0”.
F	 Operated in position “0”.	 Operated in position “0”.	2 positions. Spring offset in position “b”.
K	 Operated in position “b”.	 Operated in position “a”.	2 positions. Spring offset in position “0”.
M	 Operated in position “0”.	 Operated in position “0”.	2 positions. Spring offset in position “a”.
N	 No center in offset position.	 No center in offset position.	3 positions, detent. Operated in position “a”, “0” or “b”.
R	 No center in offset position.	 No center in offset position.	2 positions, detent. Operated in position “0” or “b”.
S	 No center in offset position.	 No center in offset position.	2 positions, detent. Operated in position “0” or “a”. No center in offset position.

2 Position Spools		
Code	Spool Position	
B		Spring offset in position “b”. Operated in position “a”.
D		Detent, operated in position “a” or “b”. No center or offset position.
H		Spring offset in position “a”. Operated in position “b”.

Weight: 9.0 kg (19.8 lbs.)

Further spool types on request.

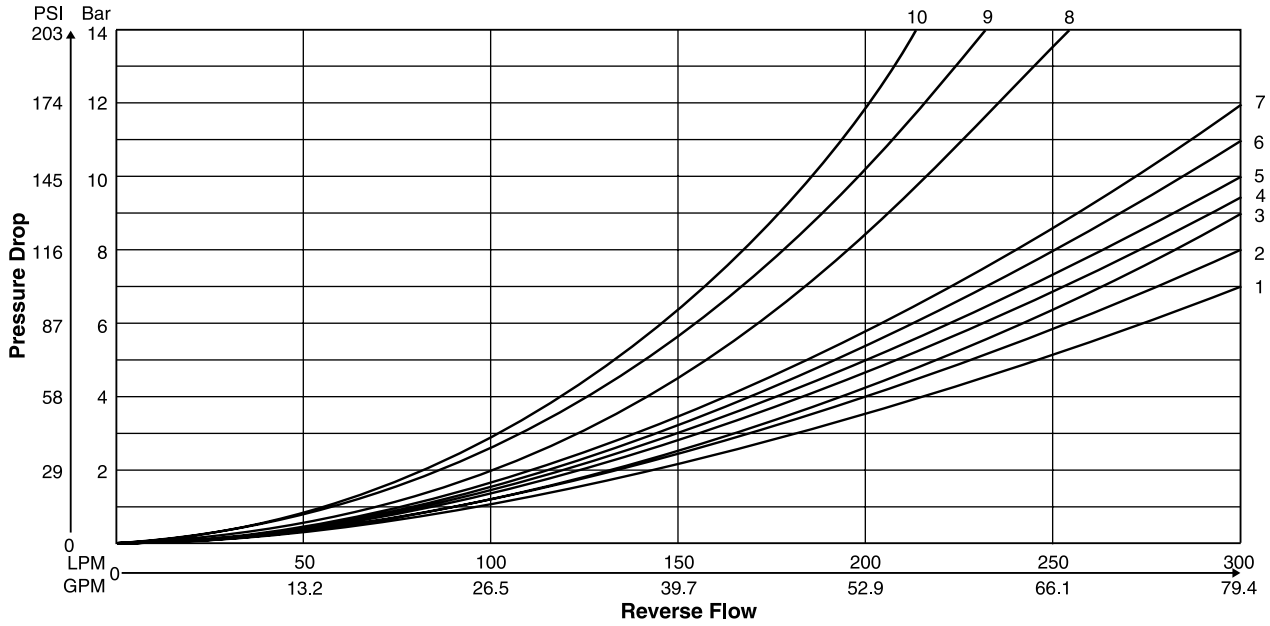
D41.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.

Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
1	1	1	–	4	5
2	1	2	6	4	6
3	1	2	–	5	6
4	1	1	–	5	5
6	1	2	–	3	6
7	1	1	6	4	5
9	2	9	8	7	10
11	1	1	–	4	5
14	1	1	6	5	4
15	2	1	–	6	5
20	3	5	–	3	5
30	2	3	–	6	7

All characteristic curves measured with HLP46 at 50°C.



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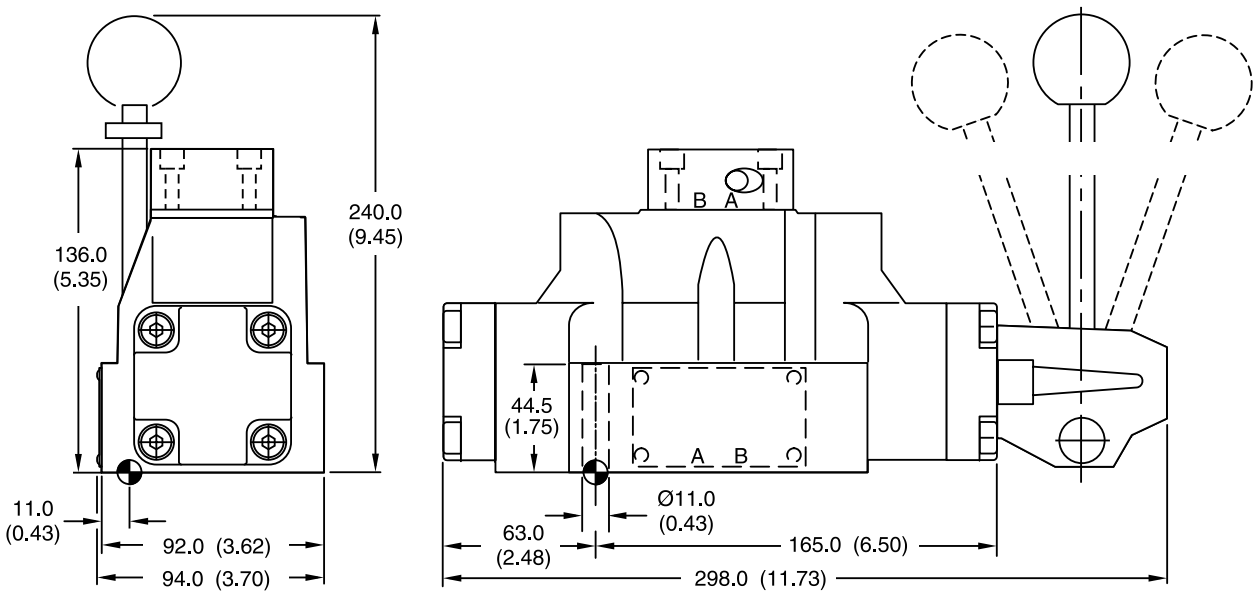
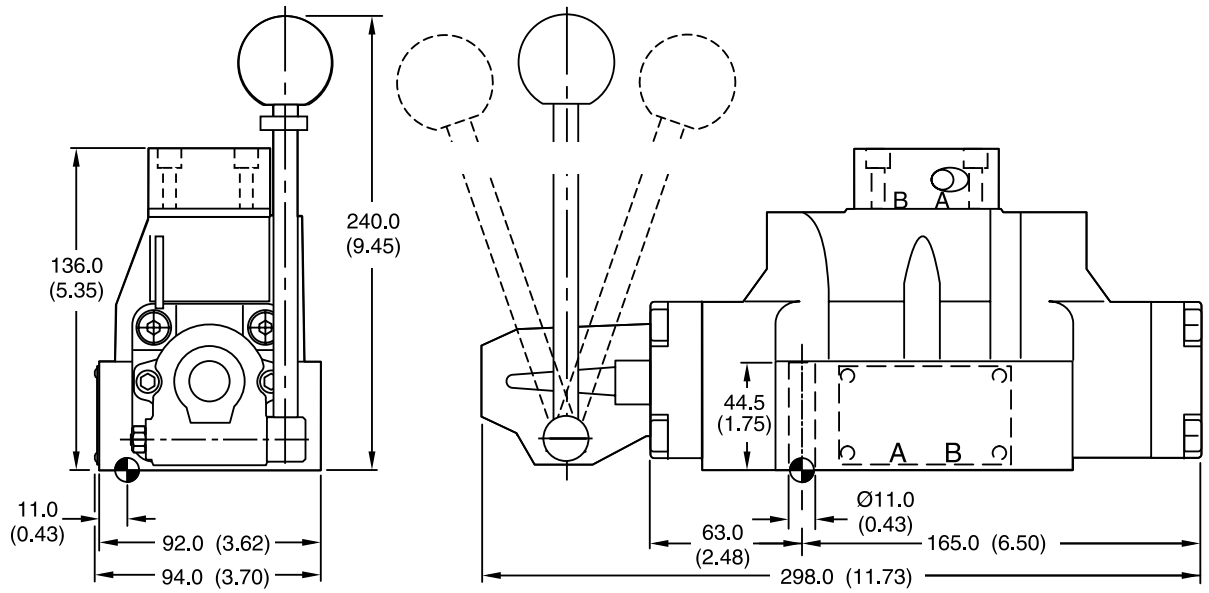
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

D4L



D4LB



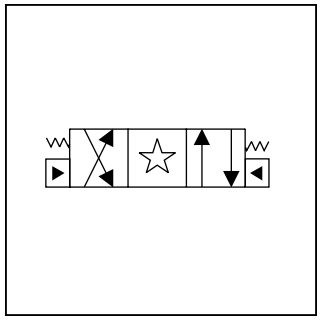
Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK320	4x M10x60 2x M6x55 DIN 912 12.9	63 Nm (46.5 lb.-ft.) 13.2 Nm (9.7 lb.-ft.) ±15%	Nitrile: SK-D4LN60 Fluorocarbon: SK-D4LV60

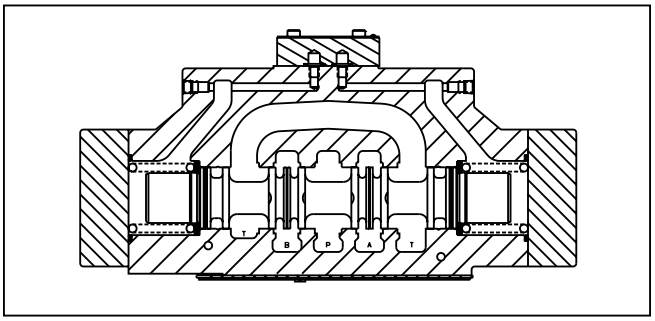
D41.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series D4P directional control valves are 5-chamber pilot operated valves. They are available in 2 or 3-position styles. These manifod mounted valves conform to NFPA's D07, CETOP 7 and NG16.





Features

- Low pressure drop design.
- Hardened spools for long life.

Specifications

General		
Design		Directional spool valve
Actuation		Hydraulic
Size		NG16
Mounting interface		DIN 24340 A16, ISO 4401, NFPA D07, CETOP RP 121-H
Mounting Position		Unrestricted, preferably horizontal
Ambient Temperature	**[°C]**	-25...+50 (-13°F...+122°F)
$MTTF_D$ value		150 years
Hydraulic		
Maximum Operating Pressure		External Drain: P, A B, T 350 Bar (5075 PSI); X, Y 350 Bar (5075 PSI)
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525
Fluid Temperature	**[°C]**	-25 ... +70 (-13°F...+158°F)
Viscosity Permitted **Recommended**	**[cSt] /[mm²/s]** **[cSt] /[mm²/s]**	2.8...400 (13...1850 SSU) 30...80 (139...371 SSU)
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)
Maximum Flow		300 LPM (79.4 GPM)
Leakage at 350 Bar (per flow path)	**[ml/min]**	up to 200 (0.05 GPM) (depending on spool)
Pilot Supply Pressure **Minimum** **Maximum**		5 Bar (73 PSI) 350 Bar (5075 PSI)
Static / Dynamic		
Step Response		The response times depend on the pilot oil pressure and on the speed of the increase/ decrease of the pilot pressure.

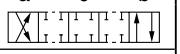
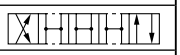
D	4	P	☐	☐	2	☐	☐	⌜⌝
Directional Control Valve	Basic Valve	Hydraulically Operated	Spool	Style	Pilot Supply and Drain External Pilot / External Drain	Seal	Valve Variations	Design Series NOTE: Not required when ordering.

NFPA D07, CETOP 7 DIN NG16

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description	Code	Description
Omit	Standard Valve	9	Stroke Adjust A End
7	Pilot Choke, Meter-Out	60	Pilot Choke, Meter-In
8	Stroke adjust B End	89	Stroke Adjust A and B Ends

3 Position Spools

Code	Spool Type (a 0 b)
1	
2	
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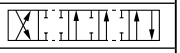
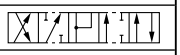
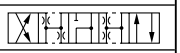
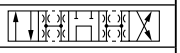
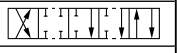
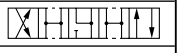
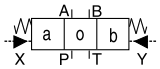
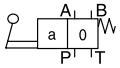
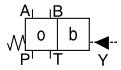
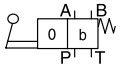
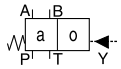
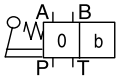
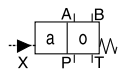
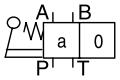
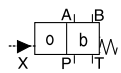
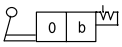
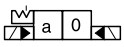
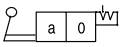
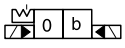
4	
5	
6	
7	
9	
11	
14	
15	
16	
21	
22	
54	
81	
82	

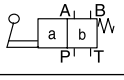
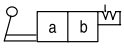
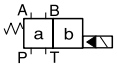
2 Position Spools

Code	Spool Type (a b)
20	
26	
30	

3 Position Spools

Code	All 3 Position Spools		
C			3 positions. Spring offset in position “0”. Operated in position “a” or “b”.
	Standard	Spool Type 9	
E	 Operated in position “a”.	 Operated in position “b”.	2 positions. Spring offset in position “0”.
F	 Spring offset in position “b”.	 Spring offset in position “a”.	2 positions. Operated in position “0”.
K	 Operated in position “b”.	 Operated in position “a”.	2 positions. Spring offset in position “0”.
M	 Spring offset in position “a”.	 Spring offset in position “b”.	2 positions. Operated in position “0”.
R	 No center in offset position.	 No center in offset position.	2 positions, detent. Operated in position “0” or “b”.
S	 No center in offset position.	 No center in offset position.	2 positions, detent. Operated in position “0” or “a”. No center in offset position.

2 Position Spools

Code	Spool Position	
B		Spring offset in position “b”. Operated in position “a”.
D		Detent, operated in position “a” or “b”. No center or offset position.
H		Spring offset in position “a”. Operated in position “b”.

Weight: 9.0 kg (19.8 lbs.)

Further spool types and position control on request.

D41.indd, dd

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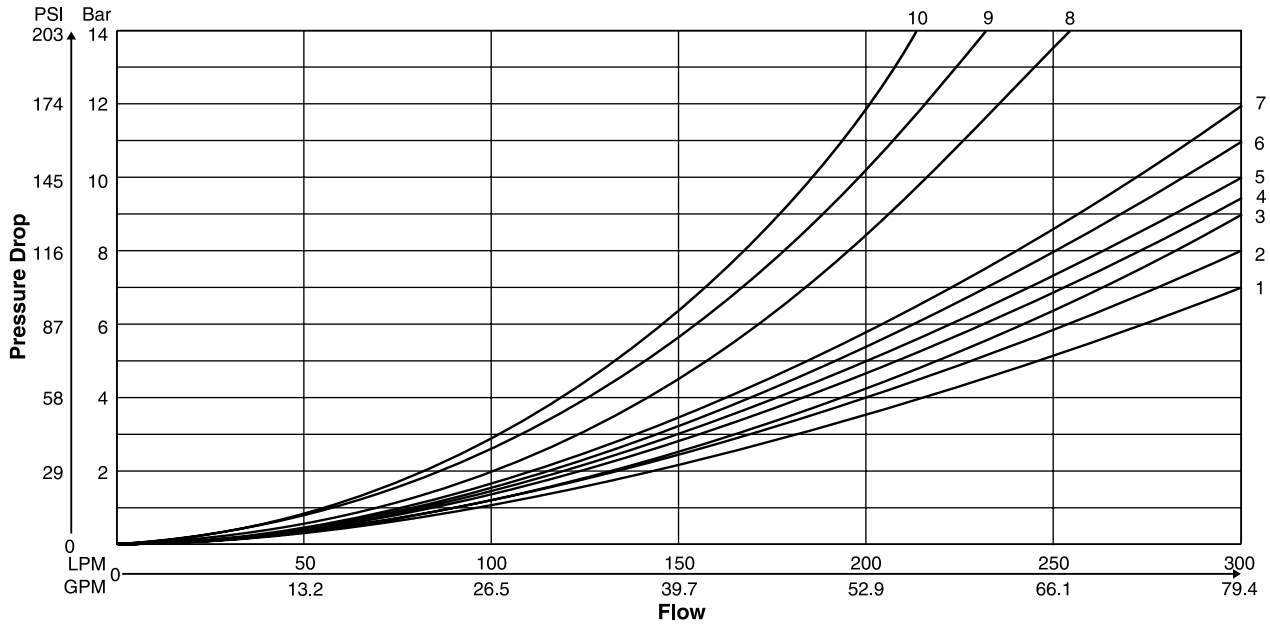
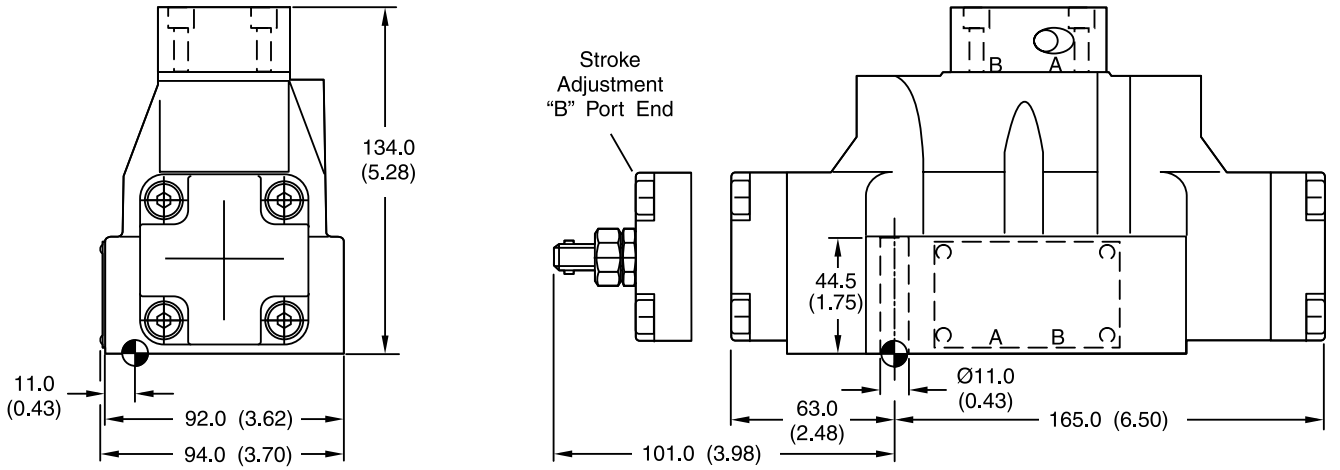
Hydraulic Valve Division
Elyria, Ohio, USA

The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.

Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
1	1	1	–	4	5
2	1	2	6	4	6
3	1	2	–	5	6
4	1	1	–	5	5
5	2	2	–	3	5
6	1	2	–	3	6
7	1	1	6	4	5
9	2	9	8	7	10
11	1	1	–	4	5
14	1	1	6	4	5
15	1	2	–	4	6
16	2	2	–	3	5
20	3	5	–	3	5
21	2	8	–	2	–
22	8	2	–	–	3
26	3	5	–	–	–
30	2	3	–	6	7
54	2	3	–	6	7



Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK320	4x M10x60 2x M6x55 DIN 912 12.9	63 Nm (46.5 lb.-ft.) 13.2 Nm (9.7 lb.-ft.) ±15%	**Nitrile: SK-D41VW-N-91** Fluorocarbon: SK-D41VW-V-91

FOR MAXIMUM VALVE RELIABILITY, ADHERE TO THE FOLLOWING INSTALLATION INFORMATION.

The following is important installation information which applies to all directional control valves described in this catalog.

Mounting Position

Detent – Horizontal
Spring Offset – Unrestricted
Spring Centered – Unrestricted

Fluid Recommendations

Premium quality hydraulic oil with a viscosity range between 32-54 cSt. (150-250 SSU) At 38°C (100°F) is recommended. The absolute operating viscosity range is from 16-220 cSt. (80-1000 SSU). Oil should have maximum anti-wear properties and rust and oxidation treatment.

Fluids and Seals

Valves using synthetic, fire-resistant fluids require special seals. When phosphate esters or its blends are used, FLUOROCARBON seals are required. Water-glycol, water-in-oil emulsions and petroleum oil may be used with STANDARD seals.

Filtration

For maximum valve and system component life, the system should be protected from contamination at a level not to exceed 125 particles greater than 10 microns per milliliter of fluid (SAE class 4/ISO 16/13).

Silting

Silting can cause any sliding spool valve to stick and not spring return if held under pressure for long periods of time. The valve should be cycled periodically to prevent sticking.

Special Installations

Consult your Parker representative for any application requiring the following:

- Pressure above rating.
- Fluid other than those specified.
- Oil temperature above 71.1°C (160°F).
- Flow path other than normal.

Mounting Patterns

Series	NFPA	CETOP
D41V	D07	7

Torque Specifications

The recommended torque values for the bolts which mount the valve to the manifold or subplate are as follows:

63 Nm (46.5 ft-lbs) M10
13.2 Nm (9.7 ft-lbs) M6 1/4-20.

Tank and Drain Line Surges

If several valves are piped with a common tank or drain line, flow surges in the line may cause an unexpected spool shift. Detent style valves are most susceptible to this. Separate tank and drain lines should be piped in installations where line surges are expected.

Electrical Characteristics (Detented Spool)

Only a momentary energizing of the solenoid is necessary to shift and hold a detented spool. Minimum duration of the signal is 0.1 seconds for DC voltages. For AC voltages the response time is 0.06 seconds. Spool position will be held provided the spool centerline is in a horizontal plane, and not shock or vibration is present to displace the spool.

Electrical Failure or Loss of Pilot Pressure

Should electric power fail or loss of pilot pressure occur, spring offset and spring centered valves will shift to the spring held position. Detented valves will stay in the last position held before power failure. If main flow does not fail or stop at the same time power fails, machine actuators may continue to function in an undesirable manner or sequence.

Pilot/Drain Characteristics

Pilot Pressure:
5 to 345 Bar (73 to 5000 PSI)
6.9 Bar (100 PSI) for spools 002, 007, 009 & 014

External: An oil source sufficient to maintain minimum pilot pressure must be connected to the "X" port of the main body. When using the external pilot variation, a 1/16" pipe plug must be present in the main body pilot passage. (For details see Technical pages.) This plug will be furnished in valves ordered with pilot code 2, 3, 5 or 6.

Internal: Flow is internally ported from the pressure port of the main valve body to the "P" port of the pilot valve. The pressure developed at the "P" port of the pilot valve must be 5.0 Bar (73 PSI) minimum at all times or 6.9 Bar (100 PSI) for spools 002, 007, 009 & 014.

Integral Check: Valves using internal pilot and internal drain with an open center spool (spools 2, 7 & 9) can be ordered with an integral check valve in the pressure port of the main valve codes 3 & 6. Pilot oil will be internally ported from the upstream side of this check to the "P" port of the pilot valve, ensuring sufficient pilot pressure. A 1/16" pipe plug will be present in the main body. The "X" port in the subplate must be plugged when using the integral check.

Pilot Valve Drain: Maximum pressure 102 Bar (1500 PSI) AC optional, 207 Bar (3000 PSI) DC standard.

External: When using an external drain, a M6 x 1 x 6mm long set screw must be present in the main body drain passage. (For details see Technical pages.) This plug will be furnished in valves ordered with drain code 1, 2 or 3.

Drain flow from the pilot valve is at the "Y" port of the main body and must be piped directly to tank. Maximum drain line pressure is 102 Bar (1500 PSI), AC optional, 207 Bar (3000 PSI) DC standard. Any drain line back pressure is additive to the pilot pressure requirement.

Internal: Drain flow from the pilot valve is internally connected to the main valve tank port. Tank and drain pressure are then identical so tank line pressure should not exceed 102 Bar (1500 PSI), AC optional, 207 Bar (3000 PSI) DC standard. Any tank line back pressure is also additive to the pilot pressure requirement. If flow surges (a cause of pressure surges) are anticipated in the tank line, an external drain variation is recommended. The "Y" port in the subplate must be plugged when using an internal drain.

D41V* Flow Paths

Style Code	Description	No Solenoid/Operator Energized	Solenoid/Operator A Energized	Solenoid/Operator B Energized
B	Spring Offset	P→A and B→T	—	P→B and A→T
C	Spring Centered	Centered	P→A and B→T	P→B and A→T
D	Detented	Last Position Held	P→A and B→T	P→B and A→T
E	Spring Centered	Centered	—	P→B and A→T
F	Spring Offset, Shift to Center	P→A and B→T	—	Centered
H	Spring Offset	P→B and A→T	P→A and B→T	—
K	Spring Centered	Centered	P→A and B→T	—
M	Spring Offset, Shift to Center	P→B and A→T	Centered	—

Tank and Drain Line Surges

If several valves are piped with a common tank or drain line, flow surges in the line may cause an unexpected spool shift. Detent style valves are most susceptible to this. Separate tank and drain lines should be piped in installations where line surges are expected.

Loss of Pilot Pressure

Should a loss of pilot pressure occur, spring offset and spring centered valves will shift to the spring held position. No spring valves will stay in the last position held. If main hydraulic flow does simultaneously stop, machine actuators may continue to function in an undesirable manner or sequence.

Pilot Drain Characteristics

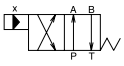
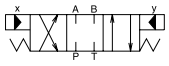
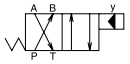
Pilot Pressure:
5 to 350 Bar (73 to 5000 PSI)
6.9 Bar (100 PSI) for spool configurations 2, 7, 9 & 14

Direct pilot operated valves use the “X” and “Y” ports to supply pilot oil directly to the ends of the spool, providing spool shifting force. A block mounted on top of the valve body is internally cored to make the necessary connections. Thus when “X” is pressurized, “Y” is used as a drain; and when “Y” is pressurized, “X” becomes the drain.

Any back pressure in these lines when they are being used as a drain is additive to the pilot pressure requirement.

Internal Drain: On spring offset models, only the “X” port is pressurized, as the spring returns the spool to its at rest position. On these models, “Y” may be internally drained through the main tank passage in the valve.

Flow Path/Pilot Pressure

Style Code	Description	“X” & “Y” De-Pressurized	“X” Port Pressurized	“Y” Port Pressurized	Special Notes	Recommended Control Valve For Pilot Oil
B	Two Position Spring Offset	P→A, B→T	P→A, B→T	P→B, A→T	“X” Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position Spring Centered	Center	P→A, B→T	P→B, A→T	Flow paths will be reversed on valves with tandem center (9) spool	
H	Two-Position Spring Offset	P→B, A→T	P→A, B→T	P→B, A→T	“Y” Port may be pressurized to assist spring in returning spool to offset position	

Subplate Mounting
NFPA D07, CETOP 7 & NG16

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 135.6 Nm (100 ft-lbs).

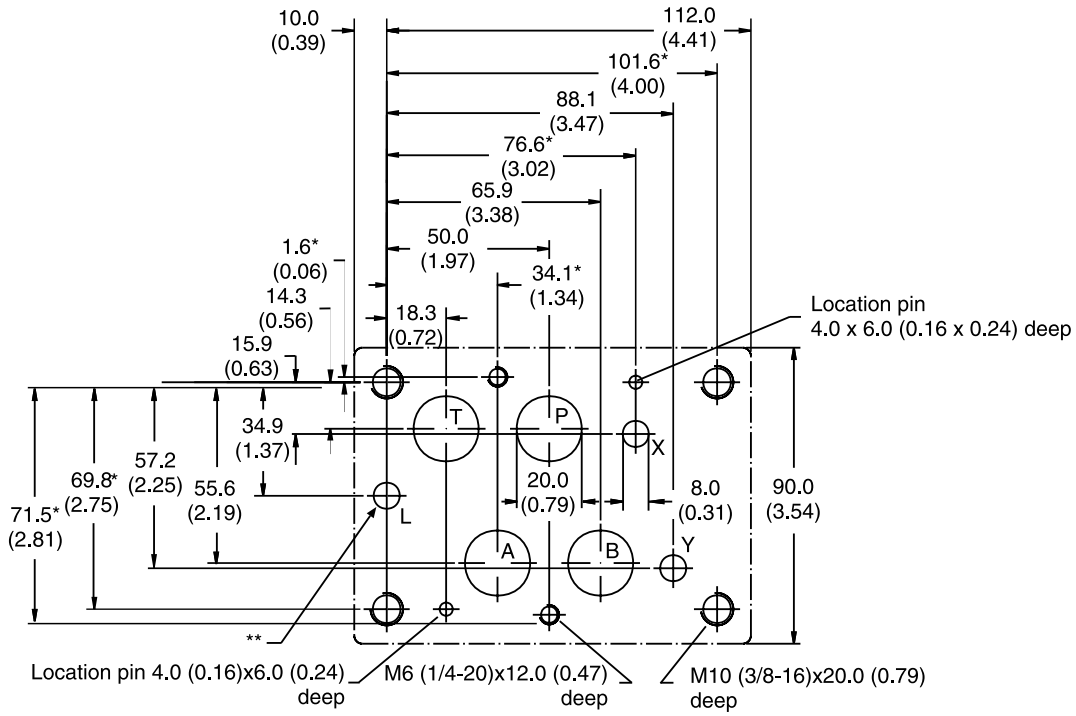
For maximum valve reliability, adhere to the following installation information.

Mounting Position

Valve Type	Mounting Position
Detent (Solenoid)	Horizontal
Spring Offset	Unrestricted
Spring Centered	Unrestricted

Mounting Pattern — NFPA D07, CETOP 7 & NG16

Inch equivalents for millimeter dimensions are shown in (**)



Note: With * marked dimensions ±0.1 mm. All other dimensions ±0.2mm.

Application

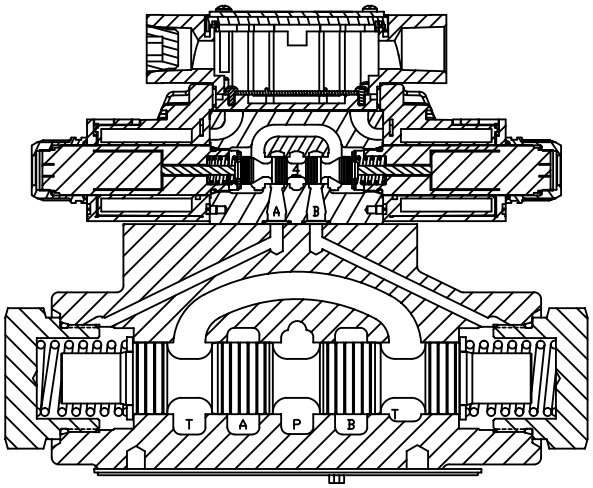
Series D6 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles. These valves are manifold mounted, and conform to NFPA's D08, CETOP 8 mounting patterns.

Operation

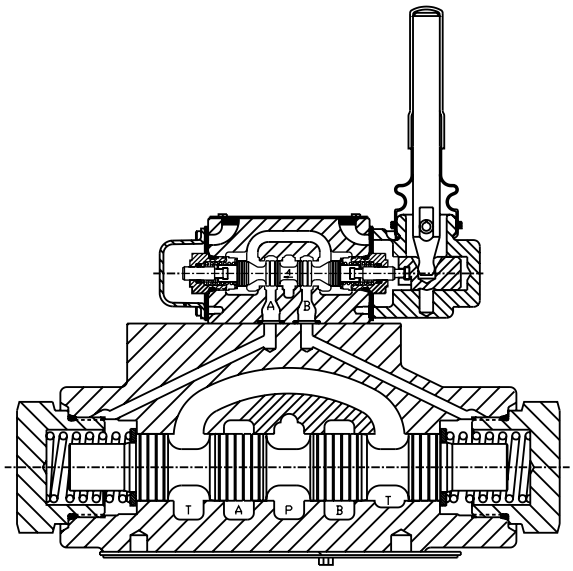
Series D61 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or pilot operators (hydraulic or pneumatic).

Features

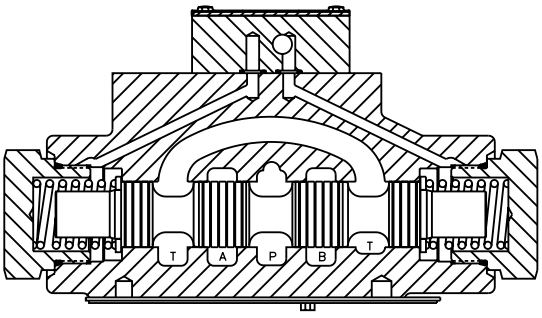
- Easy access mounting bolts.
- 210 Bar (3000 PSI) pressure rating.
- Flows to 380 LPM (100 GPM) depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.



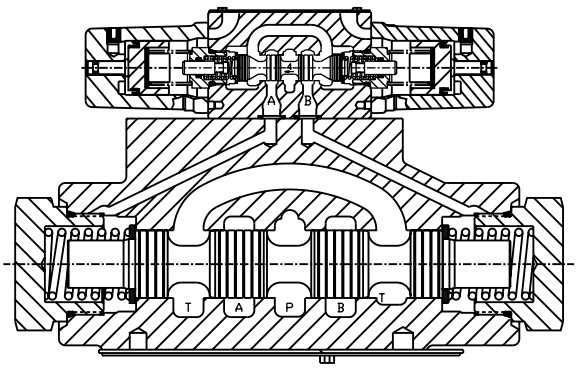
D61*W Solenoid Operated Plug-in Conduit Box



D61*L Lever Operated



D6*P Oil Pilot Operated



D61*A Air Pilot Operated

General Description

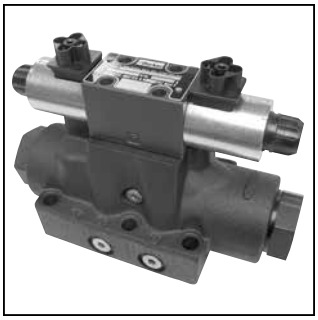
Series D61VW directional control valves are 5-chamber, pilot operated, solenoid controlled valves, They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting patterns.

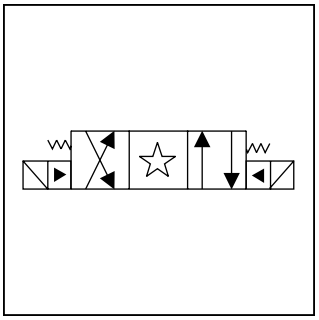
Operation

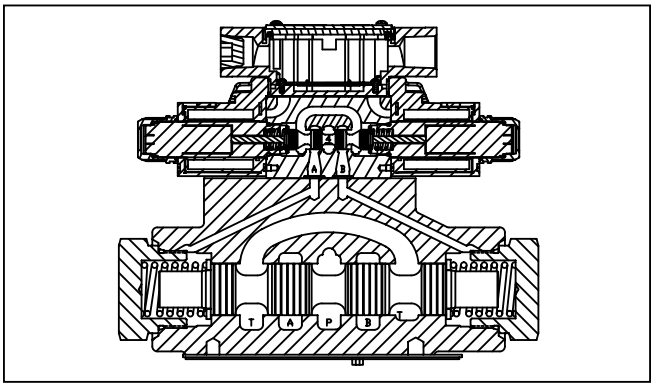
Series D61VW pilot operated valves are standard with low shock spools and pilot orifice. The orifice can be removed if a faster shift is required. It is recommended, however, that all systems operating above 138 Bar (2000 PSI) use the standard valve to avoid severe shock.

Features

- Low pressure drop design.
- Hardened spools provide long life.
- Fast response option available.
- Explosion proof availability.
- Wide variety of voltages and electrical connection options.
- No tools required for coil removal.







Specifications

Mounting Pattern	NFPA D08 CETOP 8, NG25
Maximum Operating Pressure	205 Bar (3000 PSI) Standard CSA 205 Bar (3000 PSI)
Maximum Tank Line Pressure	Internal Drain Model: 102 Bar (1500 PSI) AC Only 205 Bar (3000 PSI) DC Std./ AC Optional External Drain Model: 205 Bar (3000 PSI) CSA 102 Bar (1500 PSI)
Maximum Drain Pressure	102 Bar (1500 PSI) AC Standard 205 Bar (3000 PSI) DC Standard/ AC Optional CSA 102 Bar (1500 PSI)
Minimum Pilot Pressure	5.1 Bar* (75 PSI)
Maximum Pilot Pressure	205 Bar (3000 PSI) Standard CSA 205 Bar (3000 PSI)
Nominal Flow	189 LPM (50 GPM)
Maximum Flow	See Reference Data Chart

* 6.9 Bar (100 PSI) for spool configurations 002, 007, 008, 009 & 014.

Response Time

Response times (milliseconds) are measured at 205 Bar (3000 PSI) and 195 LPM (50 GPM) with various pilot pressures as indicated.

Solenoid Type	Pilot Pressure	Pull-In		Drop-Out	
		Std	Fast	Std	Fast
DC	500	130	100	80	80
	1000	90	90	80	80
	2000	80	80	80	80
AC	500	80	40	72	72
	1000	40	40	72	72
	2000	30	30	72	72

Because of the high drain line pressure transients generated during shifting, use of the fast response option is not recommended for pilot pressures exceeding 138 Bar (2000 PSI).

D	61V							
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Pilot Supply and Drain	Seal		Solenoid Voltage

NFPA D08, CETOP 8, DIN NG25 Low Flow, D03 Pilot

Code	Description
W*	**Solenoid, Wet Pin, Screw-in**
HW*	**Reversed Wiring**

* Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing solenoid A. Note operators reverse sides for #008 and #009 spools. See installation information for details. To configure per DIN standards (A coil over A port, B coil over B port) code valves as D61VHW***.

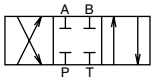
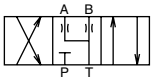
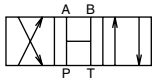
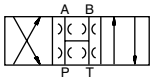
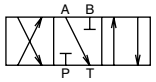
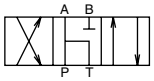
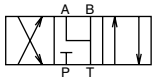
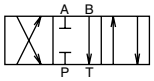
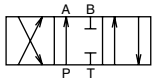
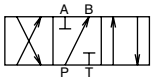
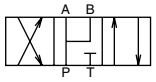
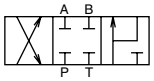
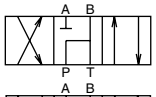
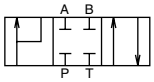
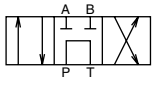
Code	Description
1	**Internal Pilot, External Drain**
2	**External Pilot, External Drain**
3**	Internal Pilot w/Check, External Drain
4*	**Internal Pilot, Internal Drain**
5	**External Pilot, Internal Drain**
6**	Internal Pilot w/Check Internal Drain

* Not availble with 002, 007, 008, 009 & 014 spools.
** #3 and #6 bodies cannot be converted to other styles. Other pilot versions cannot be converted to styles 3 and 6.

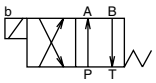
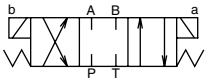
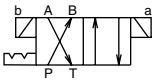
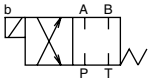
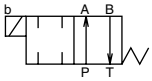
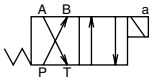
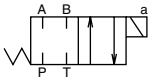
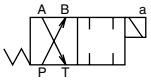
Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Code	Description
A*	24/50 VAC
D	120 VDC
G	198 VDC
J	**24 VDC**
K	**12 VDC**
N**	220/50 VAC
Q*	100/60 VAC
QD†	**100 VAC/60 HZ 100 VAC/50 HZ**
R	24/60 VAC
T	**240/60 - 220/50 VAC**
U	98 VDC
Y	**120/60 - 110/50 VAC**
Z	250 VDC

* High Watt only.
** Explosion Proof only.
† Available in DIN only.

Code	Symbol	Code	Symbol
001		011	
002		012	
003		014	
004		015	
005		016	
006		021	
007		022	
008* **009****			

* 008 spool has closed crossover.
** 009 spool has open crossover.

Code	Description	Symbol
B*	**Single solenoid, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Double solenoid, 3 position, spring centered.**	
D*	**Double solenoid, 2 position, detent.**	
E	Single solenoid, 2 position, spring centered. P to B and A to T when energized.	
F**	Single solenoid, 2 position, spring offset, energized to center. Position spool spacer on A side. P to A and B to T in spring offset position.	
H*	**Single solenoid, 2 position, spring offset. P to B and A to T in offset position.**	
K	Single solenoid, 2 position, spring centered. P to A and B to T when energized.	
M**	Single solenoid, 2 position, spring offset, energized to center position. Spool spacer on B side. P to B and A to T in spring offset position.	

* Available with 001, 002, 004, 011 and 014 spools only.
** High watt coil only.

Bold: Designates Tier I products and options.

Non-bold: Designates Tier II products and options. These products will have longer lead times.

Solenoid Connection

Code	Description
C*	**Leadwire Conduit Box**
D**	Metric Plug (M12X1), DESINA
E†	Explosion Proof
G††	**Plug-In Conduit Box**
J#	**Deutsch (DT06-2S)**
M#	Metri-Pack (150)
P	**DIN with Plug**
S#	Dual Spade
W†	**DIN w/o Plug**

* No variations – See Plug-in.
** DC only, lights, diode surge suppressor, not CSA approved.
† Not available with lights.
†† Required for variations on conduit box style. Must have lights.
# DC only, no lights, not CSA approved.

Coil Options

Code	Description
Omit*	**High Watt**
D**	Explosion Proof, EEXD ATEX
E**	Explosion Proof, EEXME ATEX
F†	Low Watt
L††	10 Watt
O**	Explosion Proof, MSHA
T#	Explosion Proof, Ex d IIC ATEX/CSA
U**	Explosion Proof, UL/CSA

* AC ambient temperature must not exceed 60°C (140°F).
** 60 Hz only on AC, no options.
† AC only.
†† DC and AC rectified only.
# J, K and Y voltages only. Dual frequency on AC, no options.

Tube Options

Code	Description
Omit	**Standard Pressure 103.5 Bar (1500 PSI) AC 207 Bar (3000 PSI) DC**
H*	**High Pressure, AC only 207 Bar (3000 PSI)**

* Not available with CSA.

Manual Override Options

Code	Description
Omit	**Standard**
P	Extended with Boot
T†	None

† DC or AC Rectified only. Manual Override options not available with Explosion Proof.

Electrical Options

Code	Description
Omit	**No Options**
J*	Diode Surge Suppressor
Z †	Rectified Coil

* DC only. DIN coil must include plug with lights.
† DC tube standard.

Shift Response and Indication

Code	Description
Omit	**Standard Response, No Switch**
I3	Monitor Switch, 'A' & 'B' Port End
I6	Monitor Switch, 'A' & 'B' Port Start

Note: Not CE or CSA approved. Not available with "F" or "M" styles.

Approvals

Code	Description
Omit	**Standard Valve**
3*†	CSA US
4*#	**CSA Approved**

* Not available with AC high pressure tube.
# Valve is derated with this option.
† B, C, H styles only. J, K, Y, U voltages only with C, G, W solenoid connections only. Conforms to UL429.

Valve Variations

See next page

Design Series

NOTE: Not required when ordering.

Valve Weight:
Double Solenoid 12.1 kg (26.6 lbs.)

Seal Kit:
Nitrile SKD61VWN91
Fluorocarbon SKD61VWV91

Mounting Bolt Kits

UNC Bolt Kits for use with D6 and D8 Directional Control Valves & Sandwich Valves

	Number of Sandwich Valves @ 2.75" (70mm) thickness			
	0	**1**	**2**	**3**
D6	BK227 2.50"	BK121 5.25"	BK122 8.00"	BK123 10.75"
D6 plus tapping plate	BK161 3.50"	BK170 6.25"	BK171 9.00"	BK172 11.75"
D8	BK228 3.00"	BK131 5.75"	BK132 8.50"	BK133 11.25"
D8 plus tapping plate	BK173 4.00"	BK174 6.75"	BK175 9.50"	BK114 12.125"

Note: All bolts are SAE grade 8, 1/2-13 UNC-3A thread, torque to 133 N.m. (100 ft.-lbs.)

Bold: Designates Tier I products and options.

Non-bold: Designates Tier II products and options. These products will have longer lead times.

D61.indd, dd

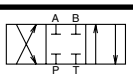
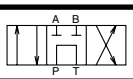
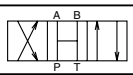
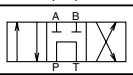
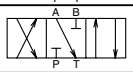
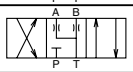
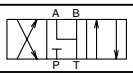
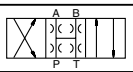
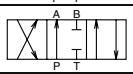
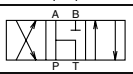
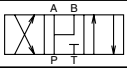
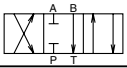
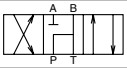
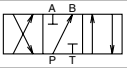
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Valve Variations

Code	Description
5*	**Signal Lights – Standard**
	Signal Lights – Hirsch. (DIN with plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with lights
56**	**Manaplug (Mini) with Lights**
20	**Fast Response**
1C**	**Manaplug (Mini) Single Sol. 5-pin, with Lights**
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1G**	Manaplug (Mini) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1H**	Manaplug (Micro) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1M**	Manaplug Opposite Normal
1P	Painted Body
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	**Pilot Choke Meter Out**
3B	**Pilot Choke Meter In**
3C	**Pilot Pressure Reducer**
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	**Pilot Choke Meter Out with Lights**
3H*	**Pilot Choke Meter In with Lights**
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights, Mini Manaplug, Pilot Choke Meter Out
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights

* DESINA, plug-in conduit box, and DIN with plug styles only.
** Must have plug-in style conduit box.

Reference Data

Model	Spool Symbol	MaximumFlow, LPM (GPM) 207 Bar (3000 PSI) w/o Malfunction	Model	Spool Symbol	Maximum Flow, LPM (GPM) 207 Bar (3000 PSI) w/o Malfunction
D61V*001		390 (100)	D61V*008		312 (80)
D61V*002		312 (80)	D61V*009		312 (80)
D61V*003		390 (100)	D61V*011		390 (100)
D61V*004		390 (100)	D61V*012		137 (35)
D61V*005		390 (100)	D61V*014		195 (50)
D61V*006		390 (100)	D61V*015		390 (100)
D61V*007		195 (50)	D61V*016		390 (100)

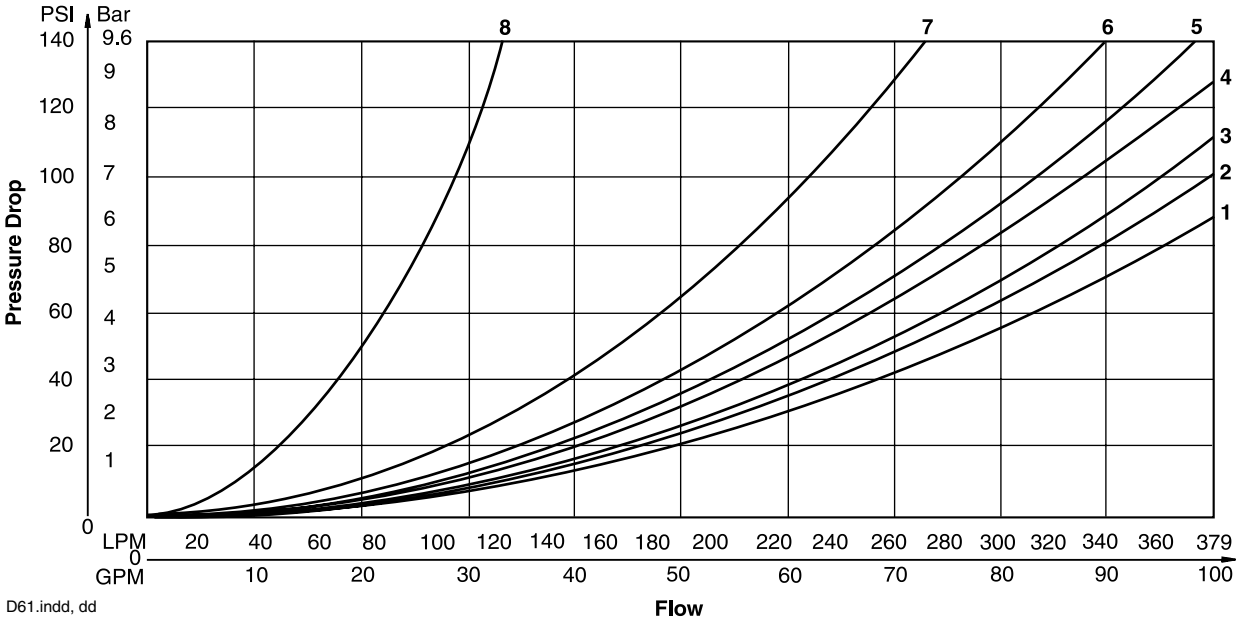
D61V* Series Pressure Drop Chart

The following chart provides the flow vs. pressure drop curve reference for the Series D61V valves by spool type.

VISCOSITY CORRECTION FACTOR							
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141
Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change as per chart.							

D61VW Pressure Drop Reference Chart -- Curve Number					
Spool No.	P–A	P–B	P–T	A–T	B–T
001	3	3	–	1	2
002	4	4	5	4	5
003	3	3	–	4	2
004	3	3	–	4	5
005	3	4	–	1	2
006	4	4	–	1	2
007	4	4	7	1	5
008/009	3	3	7	4	6
011	3	3	–	1	2
012	3	3	8	4	5
014	4	4	–	2	1
015	3	3	–	2	4
016	4	3	–	2	1

Performance Curves



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Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-15% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact HVD for AC coil applications.

Explosion Proof Solenoid Ratings*

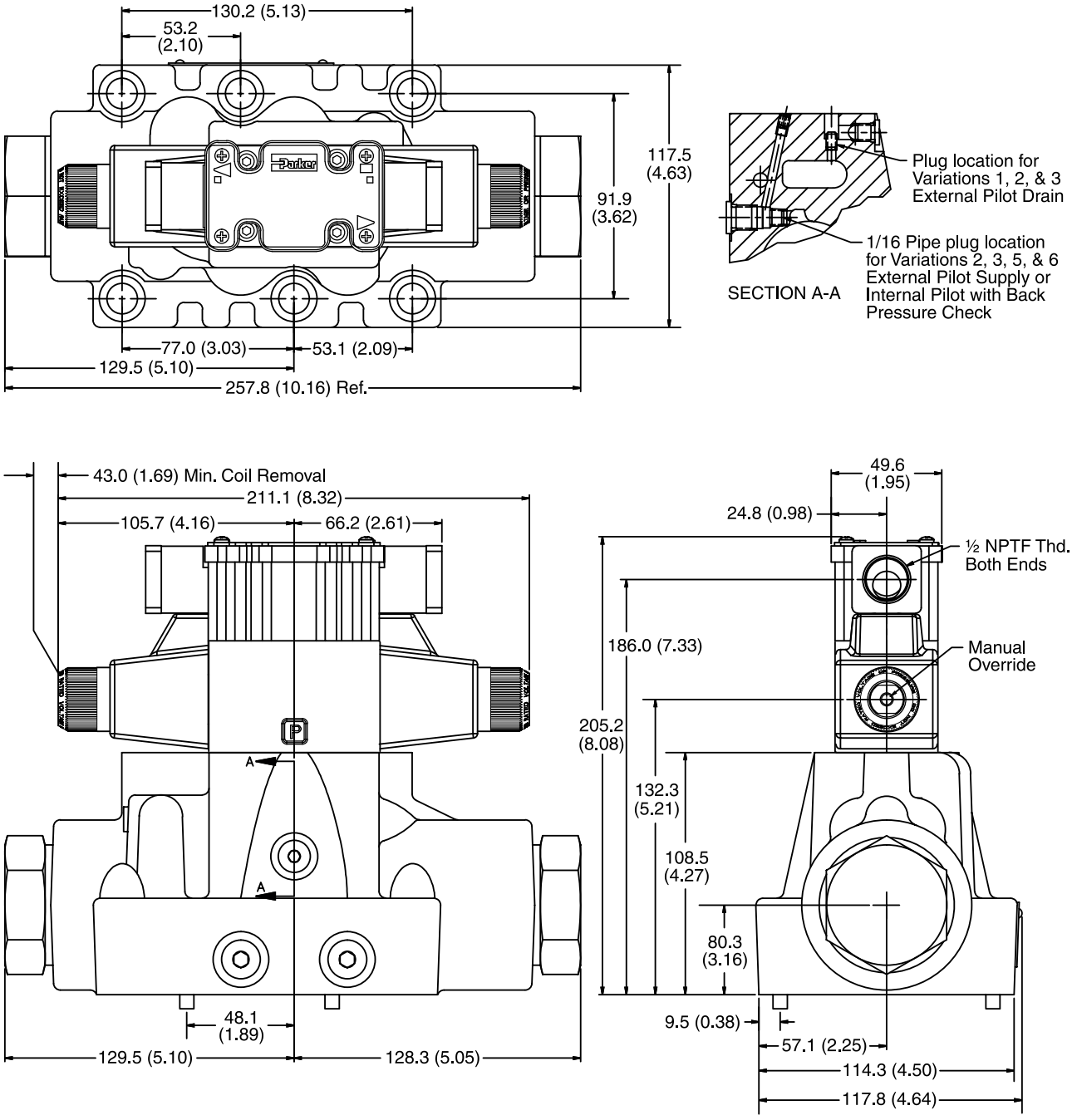
U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
MSHA (EO)	Complies with 30CFR, Part 18
ATEX (ED)	Complies with ATEX requirements for: Exd, Group IIB; EN50014: 1999+ Amds. 1 & 2, EN50018: 2000
ATEX & CSA/US (ET)	Complies with ATEX EN60079-0, EN60079-1 Ex d IIC; CSA/US Ex d IIC, AEx d IIC for Class I, Zone 1, UL1203, UL1604, CSA E61241,1 Class II, Div 1

* Allowable Voltage Deviation ±10%.
Note that Explosion Proof AC coils are single frequency only.

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
G	Omit	198 VDC	N/A	N/A	0.15 Amps	30 W	1306.80 ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 ohms
L	L	6 VDC	N/A	N/A	1.67 Amps	10 W	3.59 ohms
L	Omit	6 VDC	N/A	N/A	5.00 Amps	30 W	1.20 ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 ohms
QD	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.20 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.20 ohms
R	F	24/60 VAC, Low Watt	6.67 Amps	160 VA	2.20 Amps	23 W	1.52 ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
Z	Omit	250 VDC	N/A	N/A	0.13 Amps	30 W	1889.64 ohms
Explosion Proof Solenoids							
R		24/60 VAC	7.63 Amps	183 VA	2.85 Amps	27 W	1.99 ohms
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
N		220/50 VAC	0.77 Amps	169 VA	0.31 Amps	27 W	1.38 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
P		110/50 VAC	1.47 Amps	162 VA	0.57 Amps	27 W	34.70 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
"ET" Explosion Proof Solenoids							
K		12 VDC	N/A	N/A	1.00 Amps	12 W	12.00 ohms
J		24 VDC	N/A	N/A	1.00 Amps	13 W	44.30 ohms
Y		120/60-50 VAC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

Inch equivalents for millimeter dimensions are shown in (**)

Plug-in Conduit Box, Double AC Solenoid

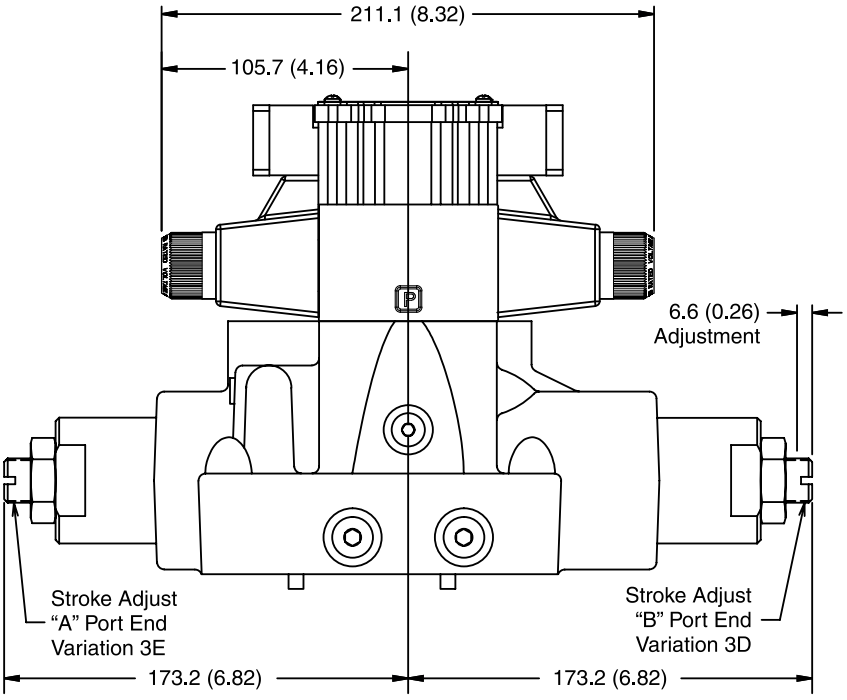


Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

Inch equivalents for millimeter dimensions are shown in (**)

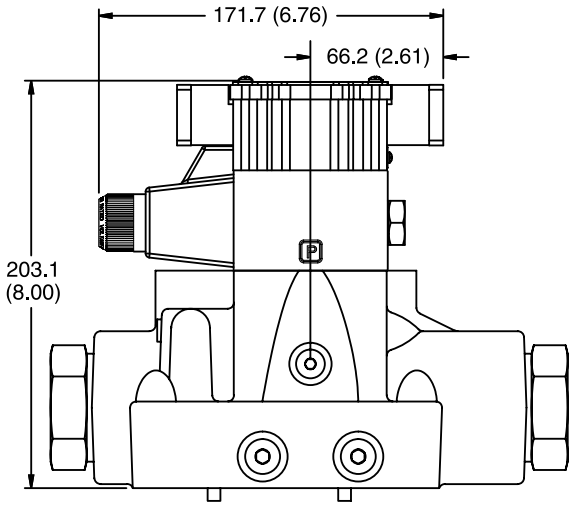
A

Plug-in Conduit Box and Stroke Adjust, Double AC Solenoid



Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

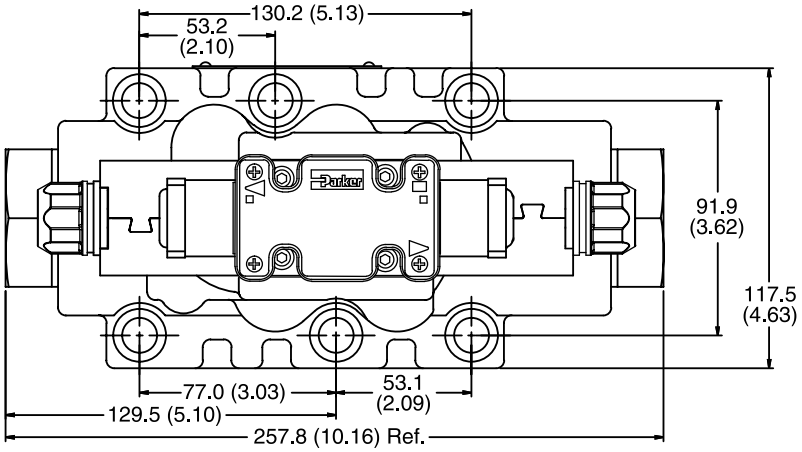
Plug-in Conduit Box, Single AC Solenoid

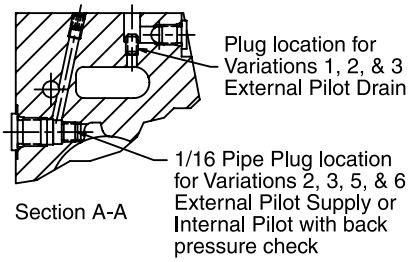


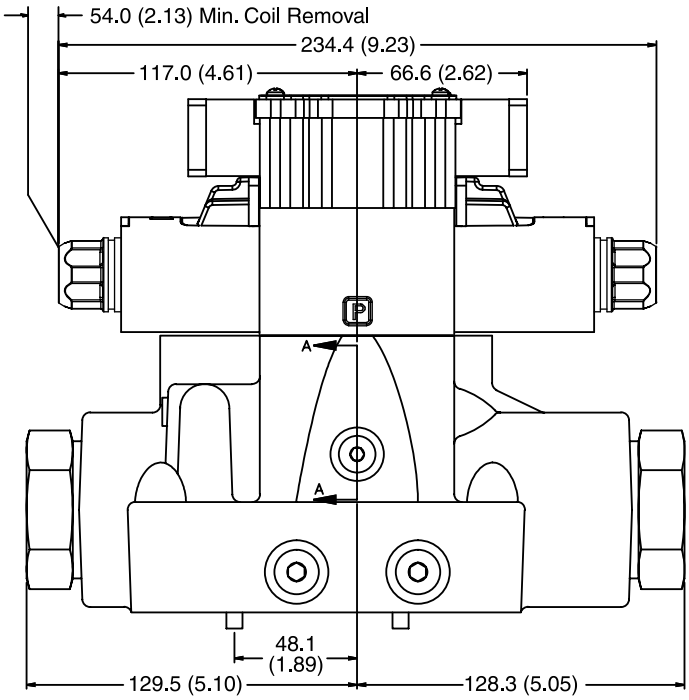
Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

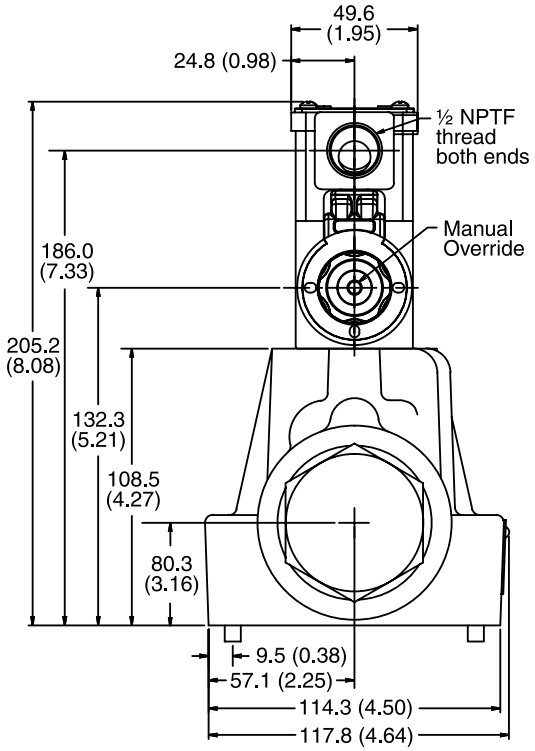
Inch equivalents for millimeter dimensions are shown in (**)

Plug-in Conduit Box, Double DC Solenoid







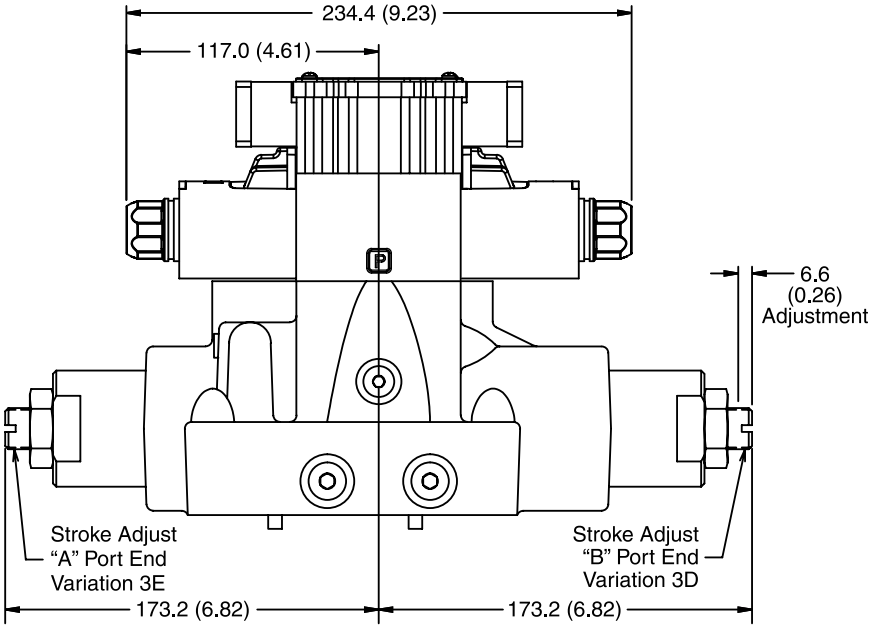


Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

Inch equivalents for millimeter dimensions are shown in (**)

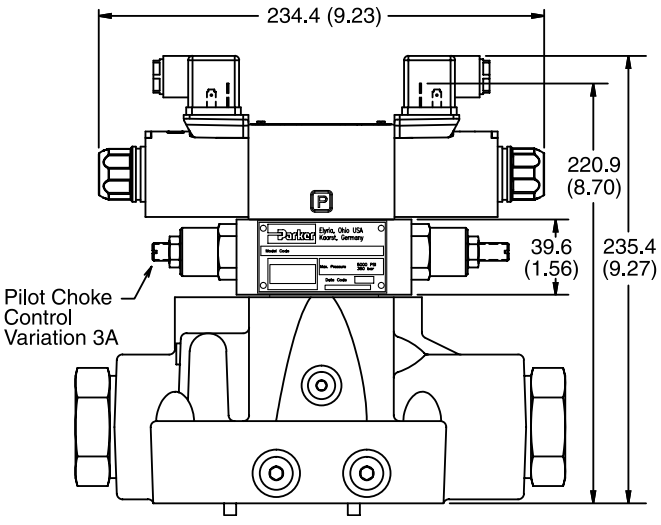
A

Plug-in Conduit Box and Stroke Adjust, Double DC Solenoid

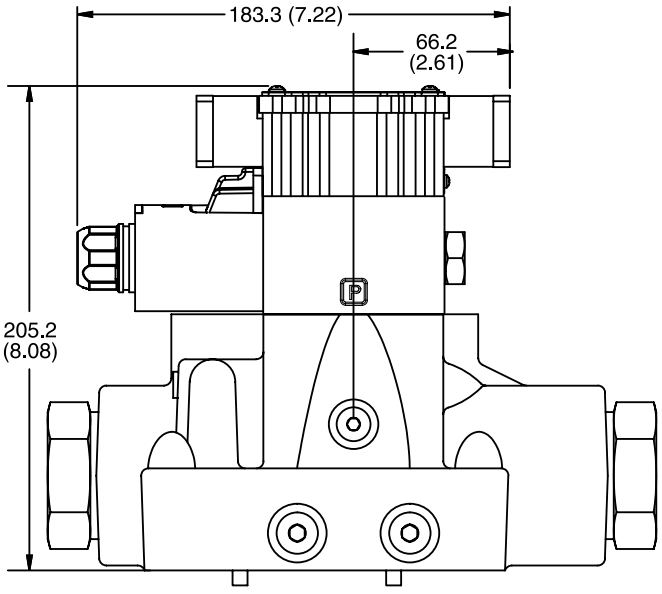


Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

Hirschmann and Pilot Choke Control, Double DC Solenoid



Plug-in Conduit Box, Single DC Solenoid



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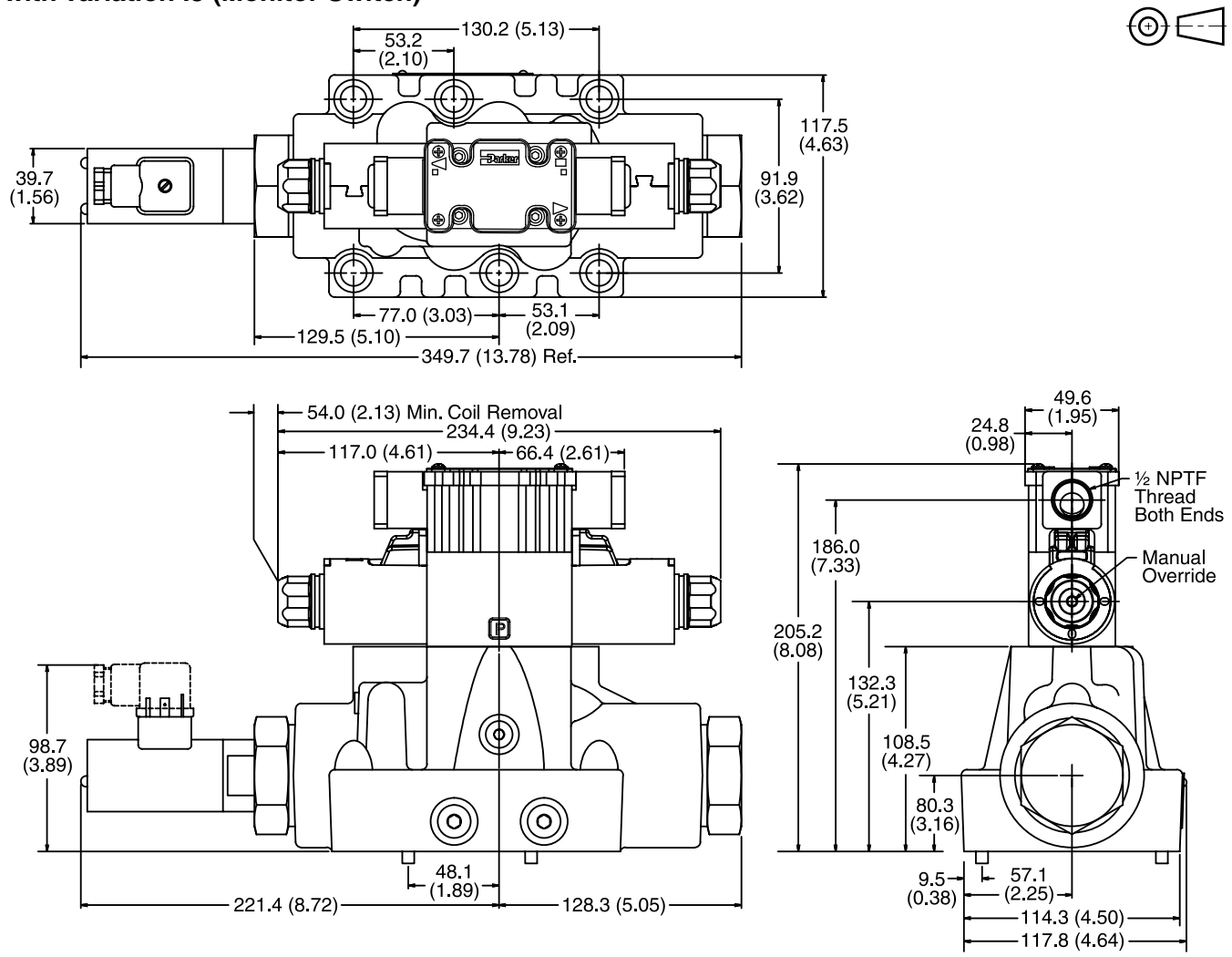
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

Plug-in Conduit Box, Double DC Solenoid
with Variation I3 (Monitor Switch)

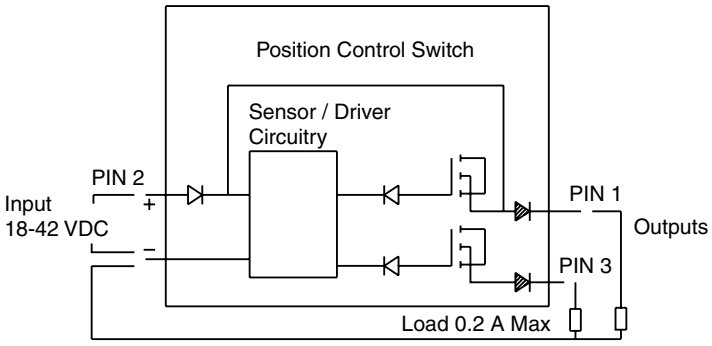


Monitor Switch
(Variation I3 and I6)

This feature provides for electrical confirmation of the spool shift. This can be used in safety circuits, to assure proper sequencing, etc.

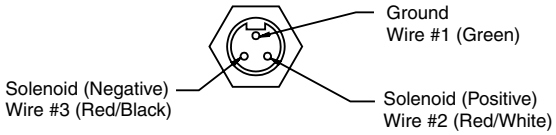
Switch Data

Pin 1 and Pin 3 have outputs equal to the input. When the monitor switch has the output to Pin 1, Pin 3 will have an output of zero, and vice-versa. When the valve is switched, Pin 1 and Pin 3 will switch outputs.

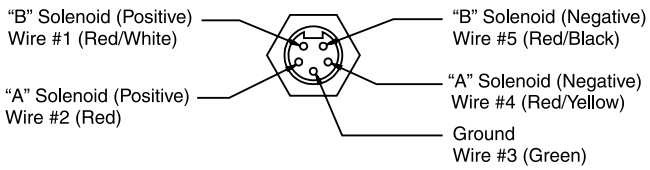


Manaplug (Options 6, 56, 1A & 1C)

Interface – Brad Harrison Plug
– 3-Pin for Single Solenoid
– 5-Pin for Double Solenoid

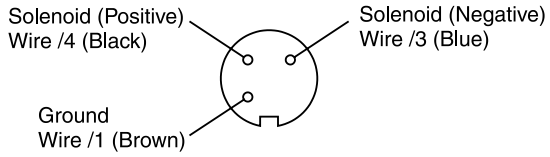


3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

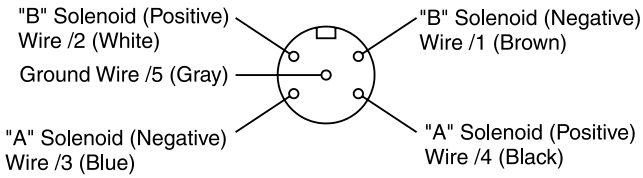


5-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7A, 7B, 1B & 1D)



3-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid



5-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

Manaplug – Electrical Mini Plug

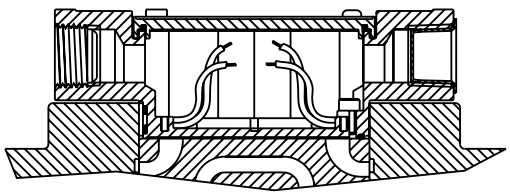
EP336-30	3 Pin Plug
EP316-30	5 Pin Plug (Double Solenoid)
EP31A-30	5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

EP337-30	3 Pin Plug
EP317-30	5 Pin Plug (Double Solenoid)
EP31B-30	5 Pin Plug (Single Solenoid)

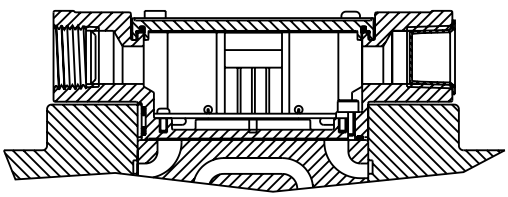
Conduit Box Option C

– No Wiring Options Available

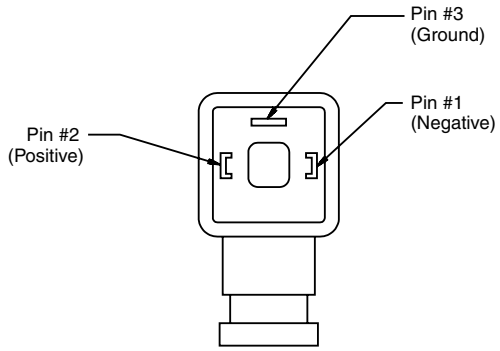


Signal Lights (Option 5) — Plug-in Only

– LED Interface
– Meets Nema 4/IP67



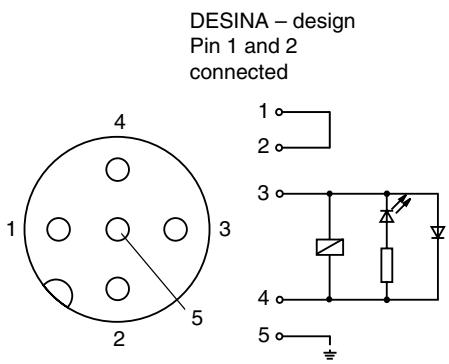
Hirschmann Plug with Lights (Option P5)
ISO 4400/DIN 43650 Form "A"



Face View of Plug

DESINA Connector (Option D)
M12 pin assignment
Standard

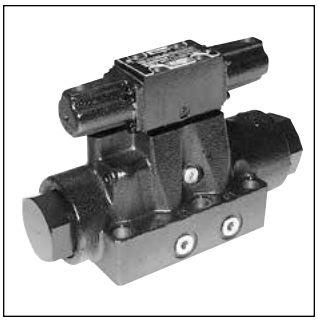
1 = Not used
2 = Not used
3 = 0V
4 = Signal (24 V)
5 = Earth Ground

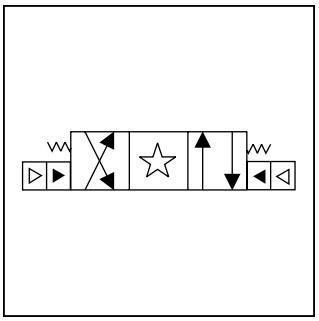


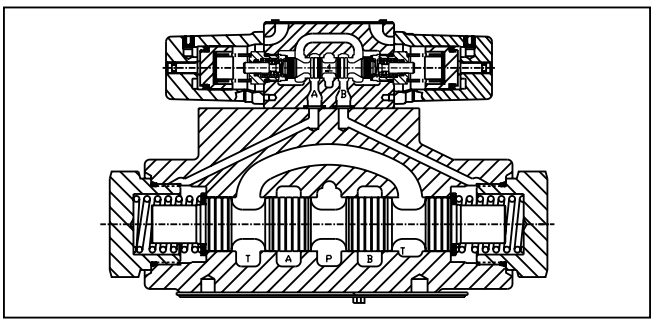
Pins are as seen on valve (male pin connectors)

General Description

Series D61VA directional control valves are 5-chamber, air pilot operated valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting patterns.







Specifications

Mounting Pattern	NFPA D08, CETOP 8, NG25
Max. Operating Pressure	207 Bar (3000 PSI)
Max. Tank Pressure	Internal Drain Model: 34 Bar (500 PSI) External Drain Model: 207 Bar (3000 PSI)
Max. Drain Pressure	34 Bar (500 PSI)
Maximum Flow	See Reference Data
Pilot Pressure	Air Min. 3.4 Bar (50 PSI) Air Max. 10.2 Bar (150 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)

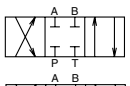
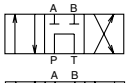
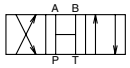
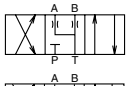
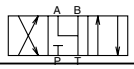
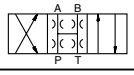
Features

- Low pressure drop.
- Fast response option available.
- Hardened spools provide long life.

Ordering Information

D	61V	A							
Directional Control Valve	Basic Valve	Air Operated Pilot	Spool	Style	Pilot Supply and Drain	Seal		Valve Variations	Design Series

NFPA D08
CETOP 8

Code	Symbol	Code	Symbol
001		008* 009**	
002		011	
004		012	

* 008 spool has closed crossover.
** 009 spool has open crossover.

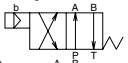
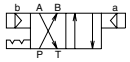
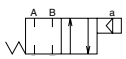
Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
1	Int. pilot/Ext. drain
2	Ext. pilot/Ext. drain
4#	Int. pilot/Int. drain
5	Ext. pilot/Int. drain

\# Not available with 002, 008 & 009 spools.

Code	Description
Omit	Standard
7	Pilot Choke – Meter-out
8	Stroke Adj. 'B' End
9	Stroke Adj. 'A' End
60	Pilot Choke – Meter-in
89	Stroke Adj. 'A' & 'B' Ends
90	1/4 BSPP Threads

NOTE: Not required when ordering.

Code	Description	Symbol
B	**Single operator, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Double operator, 3 position, spring centered.**	
D	**Double operator, 2 position, detent.**	
E	Single operator, 2 position, spring offset to center. P to B and A to T in shifted position.	
H	**Single operator, 2 position, spring offset. P to B and A to T in offset position.**	
K	Single operator, 2 position. Spring offset to center. P to A and B to T in shifted position.	

This condition varies with spool code.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator A. Note operators reverse sides for #8 and #9 spools. See installation information for details.

Valve Weight: 12.4 kg (27.3 lbs.)
Standard Bolt Kit: BK227
Metric Bolt Kit: BKM227
Seal Kit:
Nitrile SKD61VA
Fluorocarbon SKD61VAV

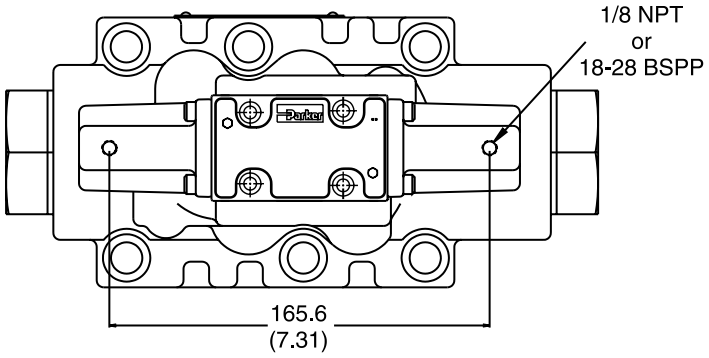
Bold: Designates Tier I products and options.

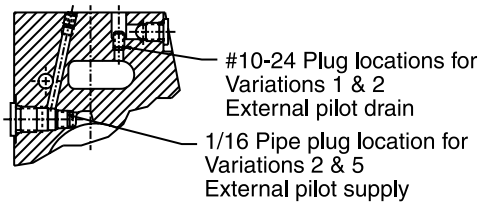
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

D61.indd, dd

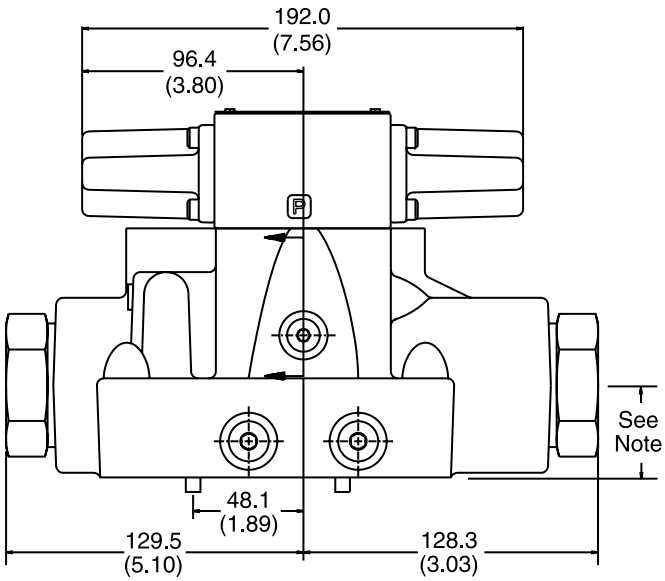
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

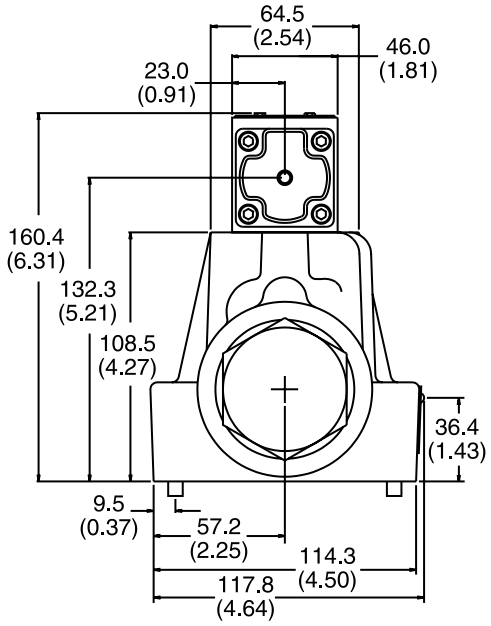
Inch equivalents for millimeter dimensions are shown in (**)





SECTION A-A

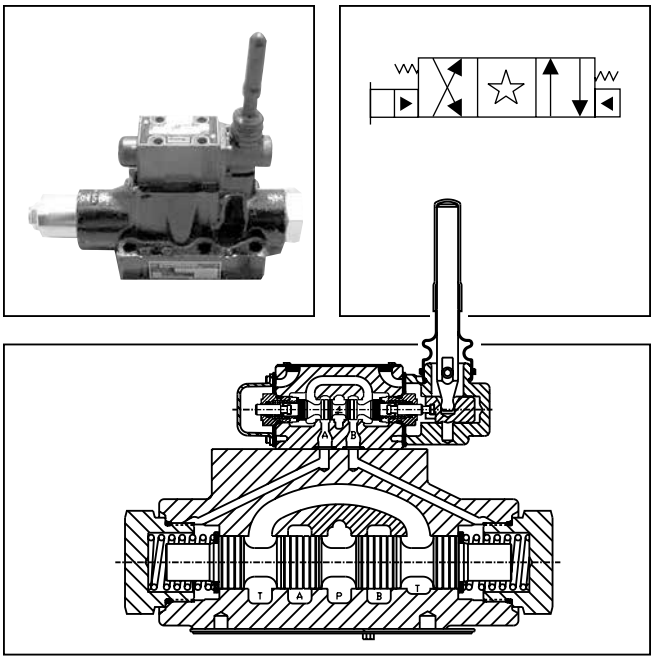




Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

General Description

Series D61VL directional control valves are 5-chamber, lever operated valves. They are available in 2 and 3-position styles. They are manifold or sub-plate mounted valves, which conform to NFPA's D08, CETOP 8 mounting patterns.



Specifications

Mounting Pattern	NFPA D08, CETOP 8, NG25
Max. Operating Pressure	207 Bar (3000 PSI)
Max. Tank Pressure	Internal Drain Model: 34 Bar (500 PSI) External Drain Model: 207 Bar (3000 PSI)
Maximum Drain Pressure	34 Bar (500 PSI)
Maximum Flow	See Reference Data
Pilot Pressure	Oil Min. 6.9 Bar (100 PSI) Oil Max. 207 Bar (3000 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)

Features

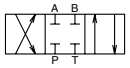
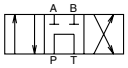
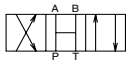
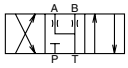
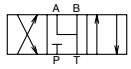
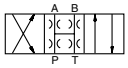
- Low force required to shift spool.
- Hardened spools provide long life.
- Low pressure drop design.

Ordering Information

D	61V	L							
Directional Control Valve	Basic Valve	Lever Operated Pilot	Spool	Style	Pilot Supply and Drain	Seal	Valve Variations	Design Series

NFPA D08 CETOP 8

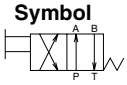
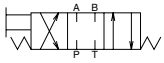
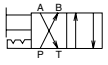
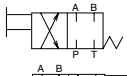
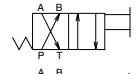
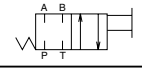
Spool

Code	Symbol	Code	Symbol
001		008* 009**	
002		011	
004		012	

* 008 spool has closed crossover.
** 009 spool has open crossover.

Valve schematic symbols are per NFPA/ ANSI standards, providing flow P to A when energizing operator A. Note operators reverse sides for #8 and #9 spools. See installation information for details.

Style

Code	Description	Symbol
B*	**Single operator, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Double operator, 3 position, spring centered.**	
D*	**Double operator, 2 position, detent.**	
E	Single operator, 2 position, spring centered. P to B and A to T in shifted position.	
H*	**Single operator, 2 position, spring offset. P to B and A to T in offset position.**	
K	Single operator, 2 position. Spring centered. P to A and B to T in shifted position.	

*Available with 001, 002, 004, 011, 012.

Pilot Supply and Drain

Code	Description
1	**Int. pilot/Ext. drain**
2	**Ext. pilot/Ext. drain**
4#	**Int. pilot/Int. drain**
5	**Ext. pilot/Int. drain**

\# Not available with 002, 008 & 009 spools.

Seal

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Valve Variations

Code	Description
Omit	**Standard**
7	Pilot Choke – Meter Out
8	Stroke Adj. 'B' End
9	Stroke Adj. 'A' End
60	Pilot Choke – Meter In
89	Stroke Adj. 'A' & 'B' Ends

Design Series
NOTE: Not required when ordering.

This condition varies with spool code.

Valve Weight:	12.1 kg (26.7 lbs.)
Standard Bolt Kit:	BK227
Metric Bolt Kit:	BKM227
Seal Kit:	
Nitrile	SKD61VL
Fluorocarbon	SKD61VLV

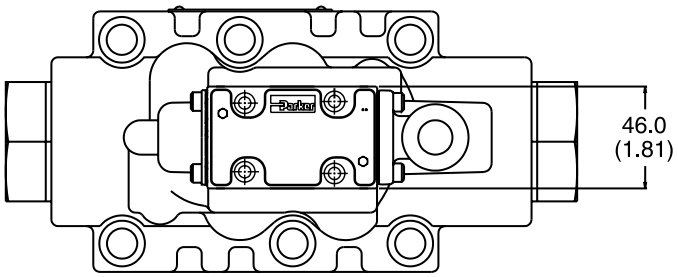
Bold: Designates Tier I products and options.

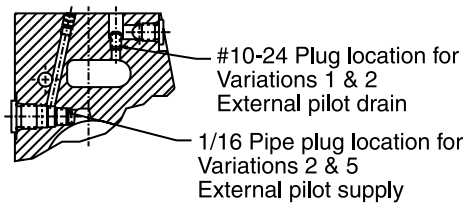
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

D61.indd, dd

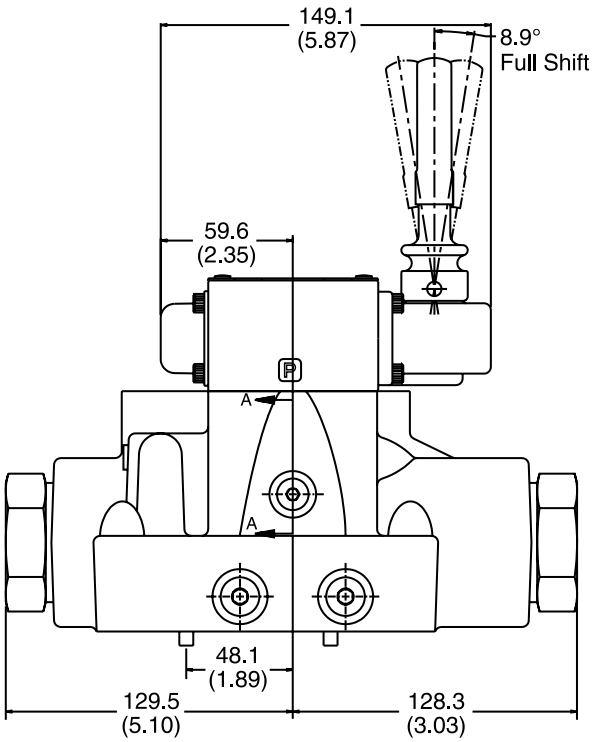
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

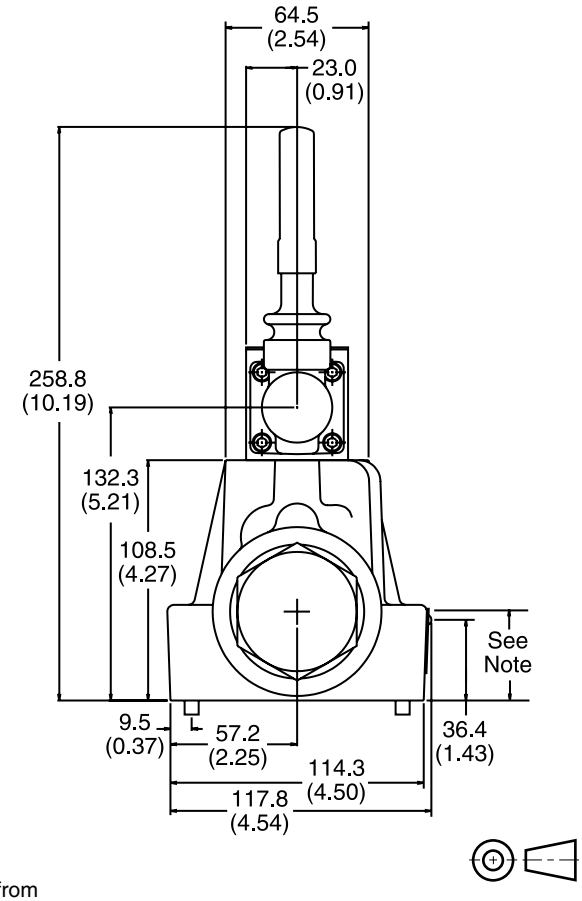
Inch equivalents for millimeter dimensions are shown in (**)





SECTION A-A





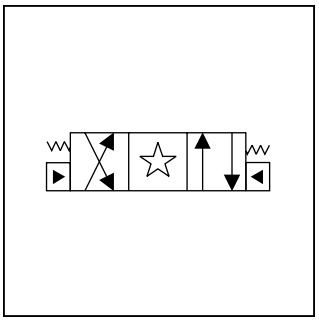
Note: 41.9mm (1.65") from bottom of bolt counterbore.

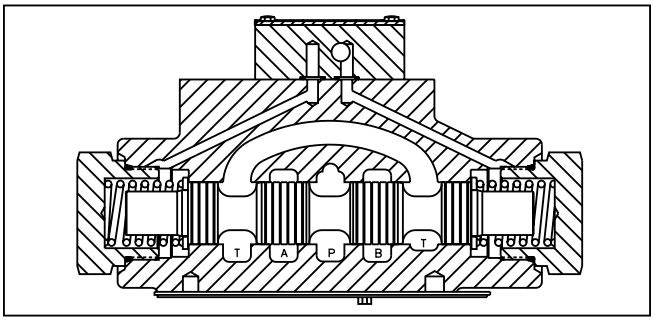
General Description

Series D6P directional control valves are 5-chamber, pilot operated valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting patterns.

Features

- Low pressure drop design.
- Hardened spools provide long life.
- Fast response option available.





Specifications

Mounting Pattern	NFPA D08, CETOP 8, NG25
Max. Operating Press.	207 Bar (3000 PSI)
Max. Tank Line Press.	207 Bar (3000 PSI)
Max. Drain Pressure	207 Bar (3000 PSI)
Min. Pilot Pressure	5.1 Bar* (75 PSI)
Max. Pilot Pressure	207 Bar (3000 PSI)
Nominal Flow	189 Liters/Min (50 GPM)
Maximum Flow	See Reference Chart

* 6.9 Bar (100 PSI) for 2, 8, 9 & 12 spools

For flow path, pilot drain and pilot pressure details, see Installation Information.

Response Time

Response time will vary with pilot line size, pilot line length, pilot pressure shift time and flow capacity of the control valve.

Shift Volume

The pilot chamber requires a volume of 0.54 in^3 for center to end and 1.08 in^3 for end to end.

Ordering Information

D	6	P						
Directional Control Valve	Basic Valve	Hydraulic Pilot	Spool	Style	Pilot Supply and Drain	Seal	Valve Variations	Design Series

NFPA D08
CETOP 8

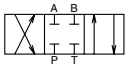
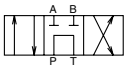
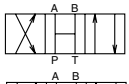
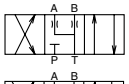
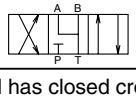
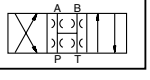
Code	Type
N	Nitrile
V	Fluorocarbon

NOTE: Not required when ordering.

Code	Description
Omit	Standard
7	Pilot Choke – Meter Out
8	Stroke Adj. 'B' End
9	Stroke Adj. 'A' End
20	Fast Response
60	Pilot Choke – Meter In
89	Stroke Adj. 'A' & 'B' Ends

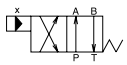
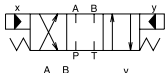
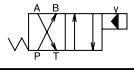
Code	Description
2	Ext. Pilot — Ext. Drain
5#	Ext. Pilot — Int. Drain

Available in "B" & "H" styles only.

Code	Symbol	Code	Symbol
1		8* 9**	
2		11	
4		12	

* 8 spool has closed crossover.
** 9 spool has open crossover.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator X. Note operators reverse sides for #8 and #9 spools. See installation information for details.

Code	Description	Symbol
B	**Single operator, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Double operator, 3 position, spring centered.**	
H	**Single operator, 2 position, spring offset. P to B and A to T in offset position.**	

This condition varies with spool code.

Valve Weight: 11.0 kg (24.2 lbs.)
Standard Bolt Kit: BK227
Metric Bolt Kit: BKM227

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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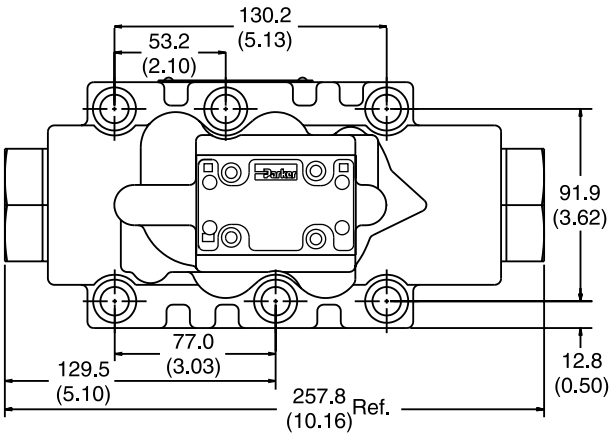
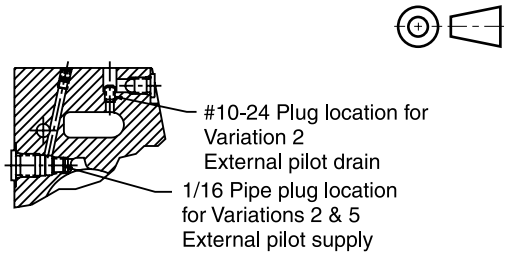
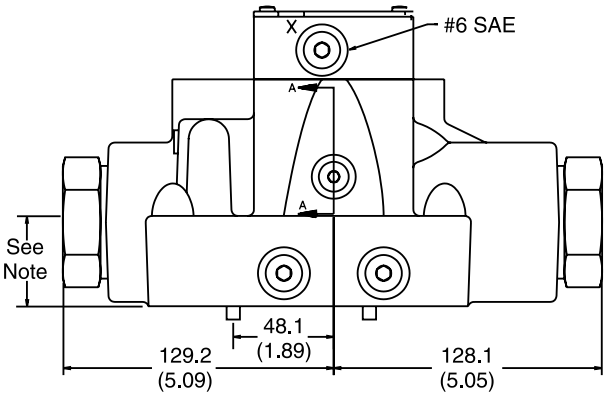
Inch equivalents for millimeter dimensions are shown in (**)

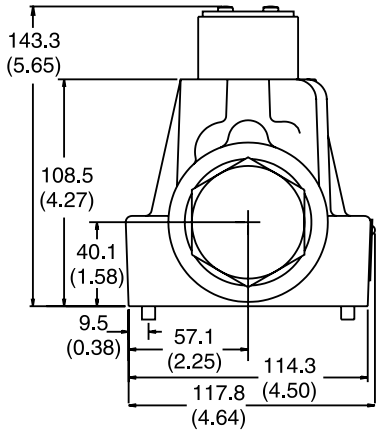
A

Standard Pilot Operated



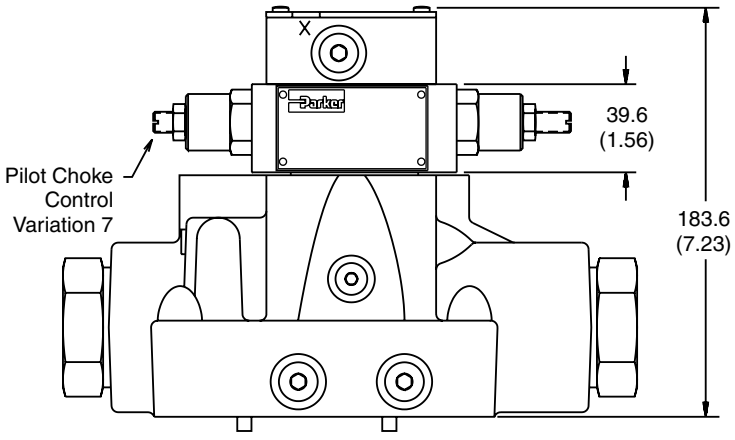






Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

Pilot Operated with Pilot Choke Control



Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

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Elyria, Ohio, USA

FOR MAXIMUM VALVE RELIABILITY, ADHERE TO THE FOLLOWING INSTALLATION INFORMATION.

The following is important installation information which applies to all directional control valves described in this catalog.

Mounting Position
Detent – Horizontal
Spring Offset – Unrestricted
Spring Centered – Unrestricted

Fluid Recommendations
Premium quality hydraulic oil with a viscosity range between 32-54 cSt. (150-250 SSU) At 38°C (100°F) is recommended. The absolute operating viscosity range is from 16-220 cSt. (80-1000 SSU). Oil should have maximum anti-wear properties and rust and oxidation treatment.

Fluids and Seals
Valves using synthetic, fire-resistant fluids require special seals. When phosphate esters or its blends are used, FLUOROCARBON seals are required. Water-glycol, water-in-oil emulsions and petroleum oil may be used with STANDARD seals.

Filtration
For maximum valve and system component life, the system should be protected from contamination at a level not to exceed 125 particles greater than 10 microns per milliliter of fluid (SAE class 4/ISO 16/13).

Silting
Silting can cause any sliding spool valve to stick and not spring return if held under pressure for long periods of time. The valve should be cycled periodically to prevent sticking.

Special Installations
Consult your Parker representative for any application requiring the following:

- Pressure above rating.
- Fluid other than those specified.
- Oil temperature above 71.1°C (160°F).
- Flow path other than normal.

Mounting Patterns

Series	NFPA	Size
D61V*, D6P	D08, CETOP 8	3/4”

Torque Specifications
The recommended torque values for the bolts which mount the valve to the manifold or subplate are as follows: 135.6 Nm (100 ft-lbs).

Series D61VW, D61VA, D61VL

Tank and Drain Line Surges

If several valves are piped with a common tank or drain line, flow surges in the line may cause an unexpected spool shift. Detent style valves are most susceptible to this. Separate tank and drain lines should be piped in installations where line surges are expected.

Electrical Characteristics (Detented Spool)

Only a momentary energizing of the solenoid is necessary to shift and hold a detented spool. Minimum duration of the signal is 0.1 seconds for DC voltages. For AC voltages the response time is 0.06 seconds. Spool position will be held provided the spool centerline is in a horizontal plane, and not shock or vibration is present to displace the spool.

Electrical Failure or Loss of Pilot Pressure (D61VA)

Should electric power fail or loss of pilot pressure occur, spring offset and spring centered valves will shift to the spring held position. Detented valves will stay in the last position held before power failure. If main flow does not fail or stop at the same time power fails, machine actuators may continue to function in an undesirable manner or sequence.

Pilot/Drain Characteristics

Pilot Pressure:
5.1 to 207 Bar (75 to 3000 PSI)
6.9 Bar (100 PSI) for spools 002, 007, 008, 009 & 014

External: An oil source sufficient to maintain minimum pilot pressure must be connected to the “X” port of the main body. When using the external pilot variation, a 1/16" pipe plug must be present in the main body pilot passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with pilot code 2, 3, 5 or 6.

Internal: Flow is internally ported from the pressure port of the main valve body to the “P” port of the pilot valve. The pressure developed at the “P” port of the pilot valve must be 5.1 Bar (75 PSI) minimum at all times or 6.9 Bar (100 PSI) for spools 002, 007, 008, 009 & 014.

Integral Check: Valves using internal pilot and internal drain with an open center spool (spools 002, 008 & 009) can be ordered with an integral check valve in the pressure port of the main valve codes 3 & 6. Pilot oil will be internally ported from the upstream side of this check to the “P” port of the pilot valve, ensuring sufficient pilot pressure. A 1/16” pipe plug will be present in the main body. The “X” port in the subplate must be plugged when using the integral check.

Pilot Valve Drain:
Maximum pressure 102 Bar (1500 PSI), 207 Bar (3000 PSI) optional.

External: When using an external drain, a 10 x 24 x 0.31 long set screw must be present in the main body drain passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with drain code 1, 2 or 3.

Drain flow from the pilot valve is at the “Y” port of the main body and must be piped directly to tank. Maximum drain line pressure is 102 Bar (1500 PSI), 207 Bar (3000 PSI) optional. Any drain line back pressure is additive to the pilot pressure requirement.

Internal: Drain flow from the pilot valve is internally connected to the main valve tank port. Tank and drain pressure are then identical so tank line pressure should not exceed 102 Bar (1500 PSI), 207 Bar (3000 PSI) optional. Any tank line back pressure is also additive to the pilot pressure requirement. If flow surges (a cause of pressure surges) are anticipated in the tank line, an external drain variation is recommended. The “Y” port in the subplate must be plugged when using an internal drain.

D61V* Flow Paths

Style Code	Description	No Solenoid/Operator Energized	Solenoid/Operator A Energized	Solenoid/Operator B Energized
B	Spring Offset	P→A and B→T	—	P→B and A→T
C	Spring Centered	Centered	P→A and B→T	P→B and A→T
D	Detented	Last Position Held	P→A and B→T	P→B and A→T
E	Spring Centered	Centered	—	P→B and A→T
F†	Spring Offset, Shift to Center	P→A and B→T	—	Centered
H	Spring Offset	P→B and A→T	P→A and B→T	—
K	Spring Centered	Centered	P→A and B→T	—
M†	Spring Offset, Shift to Center	P→B and A→T	Centered	—

† D61VW only.

D61.indd, dd

Series D6P

Tank and Drain Line Surges

If several valves are piped with a common tank or drain line, flow surges in the line may cause an unexpected spool shift. Detent style valves are most susceptible to this. Separate tank and drain lines should be piped in installations where line surges are expected.

Loss of Pilot Pressure

Should a loss of pilot pressure occur, spring offset and spring centered valves will shift to the spring held position. No spring valves will stay in the last position held. If main hydraulic flow does simultaneously stop, machine actuators may continue to function in an undesirable manner or sequence.

Pilot Drain Characteristics

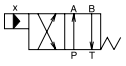
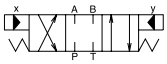
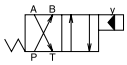
Pilot Pressure:
5.1 to 207 Bar (75 to 3000 PSI)
6.9 Bar (100 PSI) for spools 2, 8, 9 & 12

Direct pilot operated valves use the “X” and “Y” ports to supply pilot oil directly to the ends of the spool, providing spool shifting force. A block mounted on top of the valve body is internally cored to make the necessary connections. Thus when “X” is pressurized, “Y” is used as a drain; and when “Y” is pressurized, “X” becomes the drain.

Any back pressure in these lines when they are being used as a drain is additive to the pilot pressure requirement.

Internal Drain: On spring offset models, only the “X” port is pressurized, as the spring returns the spool to its at rest position. On these models, “Y” may be internally drained through the main tank passage in the valve.

Flow Path/Pilot Pressure

Style Code	Description	“X” & “Y” De-Pressurized	“X” Port Pressurized	“Y” Port Pressurized	Special Notes	Recommended Control Valve For Pilot Oil
B	Two Position Spring Offset	P→A, B→T	P→A, B→T	P→B, A→T	“X” Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position Spring Centered	Center	P→A, B→T	P→B, A→T	Flow paths will be reversed on valves with tandem center (8) spools	
H	Two-Position Spring Offset	P→B, A→T	P→A, B→T	P→B, A→T	“Y” Port may be pressurized to assist spring in returning spool to offset position	

Subplate Mounting
NFPA D08, CETOP 8 & NG 25

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 135.6 Nm (100 ft-lbs).

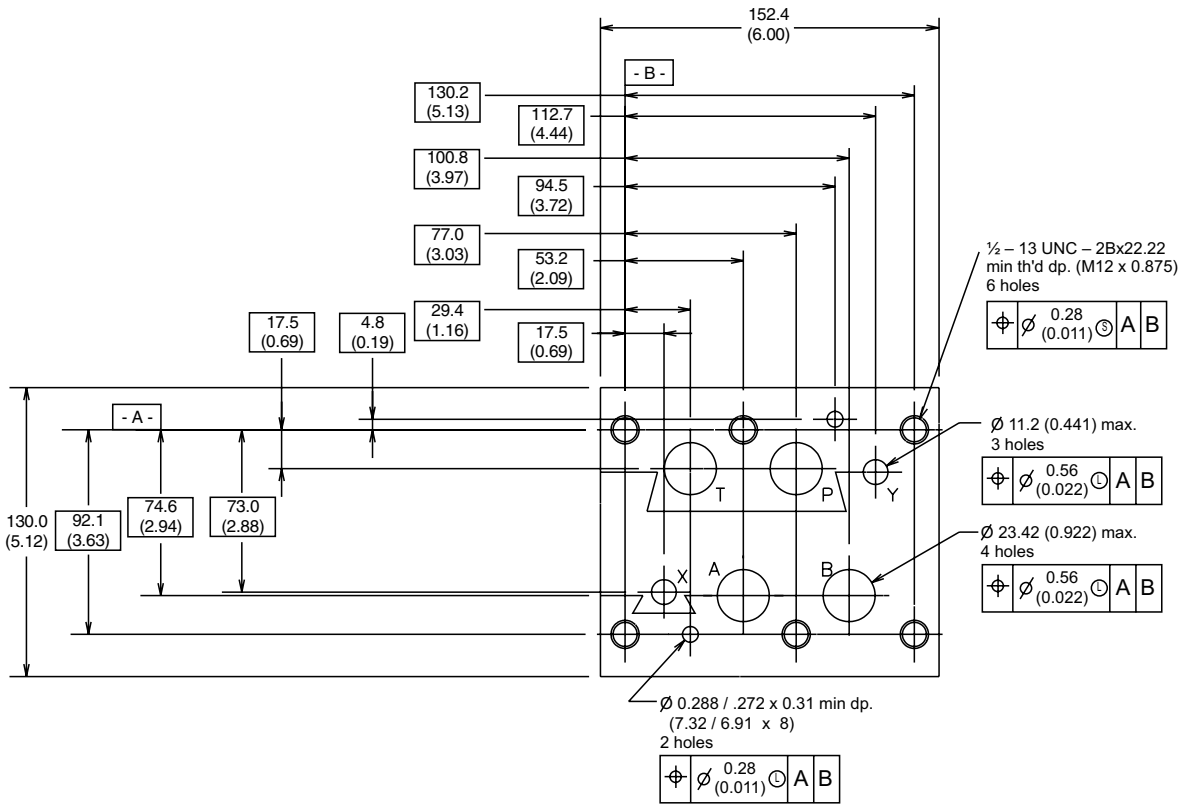
For maximum valve reliability, adhere to the following installation information.

Mounting Position

Valve Type	Mounting Position
Detent (Solenoid)	Horizontal
Spring Offset	Unrestricted
Spring Centered	Unrestricted

Mounting Pattern — NFPA D08, CETOP 8 & NG 25

Inch equivalents for millimeter dimensions are shown in (**)



Notes

Return to ALPHA TOC
Return to SECTION TOC
A

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Application

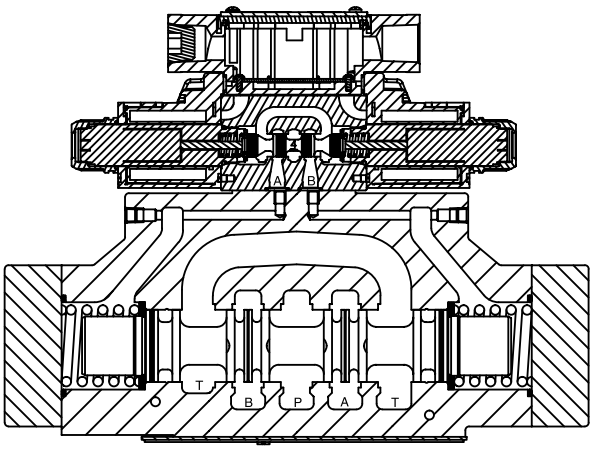
Series D81 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles and are manifold mounted. These valves conform to NFPA's D08, CETOP 8 mounting pattern.

Operation

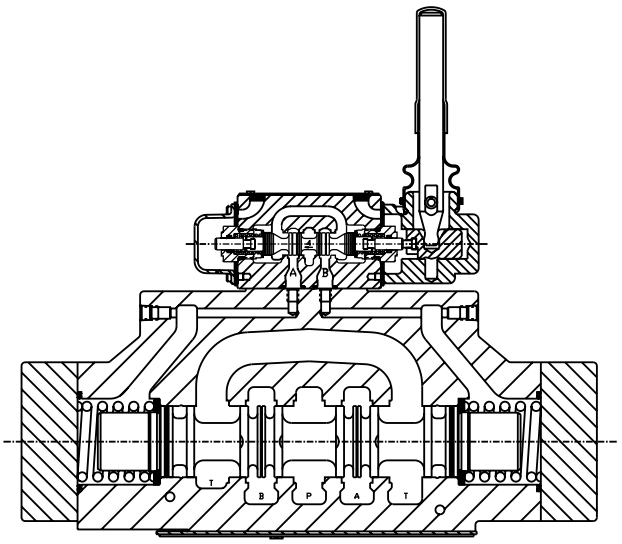
Series D81 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or pilot operators (hydraulic or pneumatic).

Features

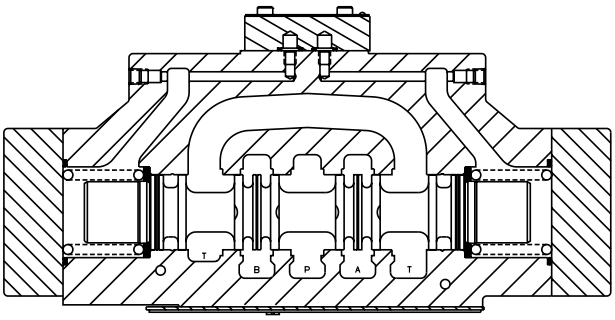
- Easy access mounting bolts.
- 345 Bar (5000 PSI) pressure rating.
- Flows to 622 LPM (160 GPM) depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.



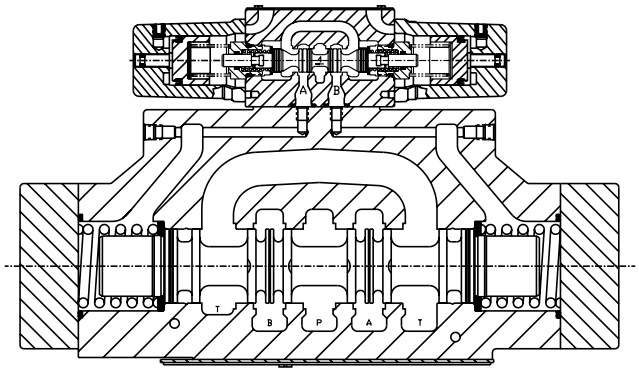
D81VW Solenoid Operated Plug-in Conduit Box



D81VL Lever Operated



D8P Oil Pilot Operated



D81VA Air Pilot Operated

General Description

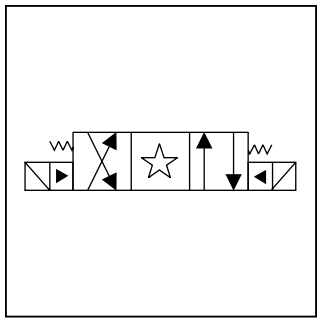
Series D81VW directional control valves are 5-chamber, pilot operated, solenoid controlled valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting pattern.

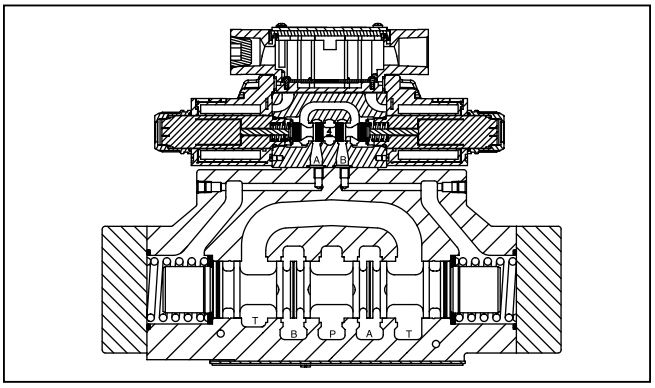
Operation

Series D81VW pilot operated valves are standard with low shock spools and pilot orifice. The orifice can be removed if a faster shift is required. It is recommended, however, that all systems operating above 138 Bar (2000 PSI) use the standard valve to avoid severe shock.

Features

- Low pressure drop design.
- Hardened spools provide long life.
- Fast response option available.
- Wide variety of voltages and electrical connection options.
- Explosion proof availability.
- No tools required for coil removal.





Specifications

Mounting Pattern	NFPA D08, CETOP 8, NG25
Maximum Operating Pressure	345 Bar (5000 PSI) Standard 207 Bar (3000 PSI) 10 Watt CSA 207 Bar (3000 PSI)
Maximum Tank Line Pressure	Internal Drain Model: 103 Bar (1500 PSI) AC Only 207 Bar (3000 PSI) DC Std., AC Optional External Drain Model: 345 Bar (5000 PSI) CSA 103 Bar (1500 PSI)
Maximum Drain Pressure	103 Bar (1500 PSI) AC Only 207 Bar (3000 PSI) DC Std., AC Optional CSA 103 Bar (1500 PSI)
Minimum Pilot Pressure	5.1 Bar* (75 PSI)
Maximum Pilot Pressure	345 Bar (5000 PSI) Standard CSA 207 Bar (3000 PSI)
Nominal Flow	302 LPM (80 GPM)

* 6.9 Bar (100 PSI) for spool configurations 002, 007, 008, 009 & 014.

Response Time

Response times (milliseconds) are measured at 345 Bar (5000 PSI) and 300 LPM (80 GPM) with various pilot pressures as indicated.

Solenoid Type	Pilot Pressure	Pull-In		Drop-Out	
		Std	Fast	Std	Fast
DC	500	140	100	70	70
	1000	125	90	76	76
	2000	100	70	70	70
AC	500	100	60	60	60
	1000	85	50	60	60
	2000	60	30	60	60

Because of the high drain line pressure transients generated during shifting, use of the fast response option is not recommended for pilot pressures exceeding 138 Bar (2000 PSI).

D — Directional Control Valve

81V — Basic Valve

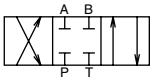
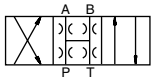
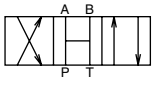
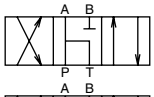
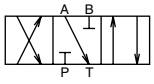
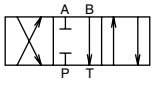
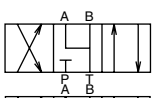
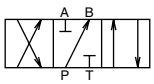
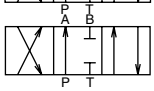
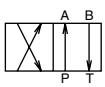
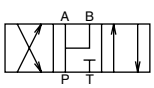
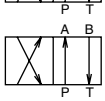
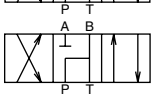
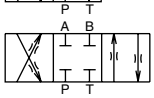
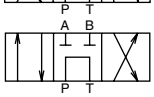
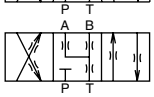
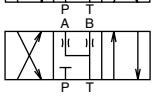
NFPA D08
CETOP 8
DIN NG25
High Flow, D03 Pilot

Actuator

Code	Description
W*	**Solenoid, Wet Pin, Screw-in**
HW*	**Reversed Wiring**

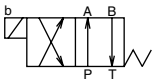
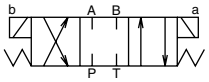
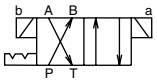
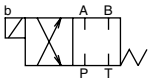
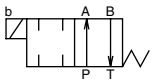
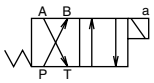
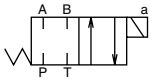
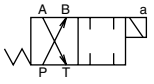
* Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing solenoid A. Note operators reverse sides for #008 and #009 spools. See installation information for details. To configure per DIN standards (A coil over A port, B coil over B port) code valves as D81VHW***.

Spool

Code	Symbol	Code	Symbol
001		012	
002		014	
003		015	
004		016	
005		**020***	
006		**030****	
007		**081**	
008* **009****		**082**	
011			

* 008 & 020 spool have closed crossover.
** 009 & 030 spool have open crossover.

Style

Code	Description	Symbol
B*	**Single solenoid, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Double solenoid, 3 position, spring centered.**	
D*	**Double solenoid, 2 position, detent.**	
E	Single solenoid, 2 position, spring centered. P to B and A to T when energized.	
F**	Single solenoid, 2 position, spring offset, energized to center. Position spool spacer on A side. P to A and B to T in spring offset position.	
H*	**Single solenoid, 2 position, spring offset. P to B and A to T in offset position.**	
K	Single solenoid, 2 position, spring centered. P to A and B to T when energized.	
M**	Single solenoid, 2 position, spring offset, energized to center position. Spool spacer on B side. P to B and A to T in spring offset position.	

* Available with 020 and 030 spools only.
** High watt coil only.

Pilot Supply and Drain

Code	Description
1	**Internal Pilot, External Drain**
2	**External Pilot, External Drain**
3	Internal Pilot w/Check, External Drain
4*	**Internal Pilot, Internal Drain**
5	**External Pilot, Internal Drain**
6	Internal Pilot w/Check, Internal Drain

* Not availble with 002, 007, 008, 009, 014 & 030 spools.

Seal

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Solenoid Voltage

Code	Description
A*	24/50 VAC
D	120 VDC
G	198 VDC
J	**24 VDC**
K	**12 VDC**
N**	220/50 VAC
Q*	100/60 VAC
QD†	**100 VAC/60 Hz 100 VAC/50 Hz**
R	24/60 VAC
T	**240/60 - 220/50 VAC**
U	98 VDC
Y	**120/60 - 110/50 VAC**
Z	250 VDC

* High Watt Coil only.
** Explosion Proof only.
† Available in DIN only.

Bold: Designates Tier I products and options.

Non-bold: Designates Tier II products and options. These products will have longer lead times.

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Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Solenoid Connection

Code	Description
C*	**Leadwire Conduit Box**
D**	Metric Plug (M12X1), DESINA
E†	Explosion Proof
G††	**Plug-In Conduit Box**
J#	**Deutsch (DT06-2S)**
M#	Metri-Pack (150)
P	**DIN with Plug**
S#	Dual Spade
W†	**DIN w/o Plug**

* No variations – See Plug-in.
** DC only, lights, diode surge suppressor, not CSA approved.
† Not available with lights.
†† Required for variations on conduit box style. Must have lights.
# DC only, no lights, not CSA approved.

Coil Options

Code	Description
Omit*	**High Watt**
D**	Explosion Proof, EEXD ATEX
E**	Explosion Proof, EEXME ATEX
F†	Low Watt
L††	10 Watt
O**	Explosion Proof, MSHA
T#	Explosion Proof, Ex d IIC ATEX/CSA
U**	Explosion Proof, UL/CSA

* AC ambient temperature must not exceed 60°C (140°F).
** 60 Hz only on AC, no options.
† AC only.
†† DC and AC rectified only.
# J, K and Y voltages only. Dual frequency on AC, no options.

Tube Options

Code	Description
Omit	**Standard Pressure 103 Bar (1500 PSI) AC 207 Bar (3000 PSI) DC**
H*	**High Pressure, AC only 207 Bar (3000 PSI)**

* Not available with CSA.

Manual Override Options

Code	Description
Omit	**Standard**
P	Extended with Boot
T†	None

† DC or AC Rectified only. Manual Override options not available with Explosion Proof.

Electrical Options

Code	Description
Omit	**No Options**
J*	Diode Surge Suppressor
Z†	Rectified Coil

* DC only. DIN coil must include plug with lights.
† DC tube standard.

Shift Response and Indication

Code	Description
Omit	**Standard Response, No Switch**
I3	Monitor Switch, 'A' & 'B' Port End
I6	Monitor Switch, 'A' & 'B' Port Start

Note: Not CE or CSA approved. Not available with 'F' or 'M' styles.

Approvals

Code	Description
Omit	**Standard Valve**
3*†	CSA US
4*#	**CSA Approved**

* Not available with AC high pressure tube.
# Valve is derated with this option.
† B, C, H styles only. J, K, Y, U voltages only with C, G, W solenoid connections only. Conforms to UL429.

Valve Variations

See next page

Design Series

NOTE: Not required when ordering.

Valve Weight:
Double Solenoid 19.6 kg (43.2 lbs.)

Seal Kit:
Nitrile SKD81VWN91
Fluorocarbon SKD81VWV91

Mounting Bolt Kits

UNC Bolt Kits for use with D6 and D8 Directional Control Valves & Sandwich Valves

	Number of Sandwich Valves @ 2.75" (70mm) thickness			
	0	**1**	**2**	**3**
D6	BK227 2.50"	BK121 5.25"	BK122 8.00"	BK123 10.75"
D6 plus tapping plate	BK161 3.50"	BK170 6.25"	BK171 9.00"	BK172 11.75"
D8	BK228 3.00"	BK131 5.75"	BK132 8.50"	BK133 11.25"
D8 plus tapping plate	BK173 4.00"	BK174 6.75"	BK175 9.50"	BK114 12.125"

Note: All bolts are SAE grade 8, 1/2-13 UNC-3A thread, torque to 133 N.m. (100 ft.-lbs.)

Bold: Designates Tier I products and options.

Non-bold: Designates Tier II products and options. These products will have longer lead times.

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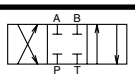
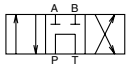
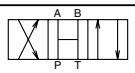
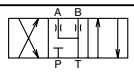
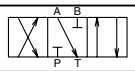
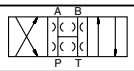
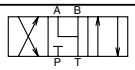
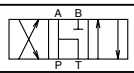
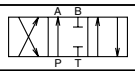
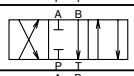
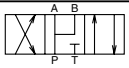
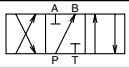
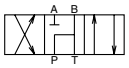
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Valve Variations

Code	Description
5*	**Signal Lights – Standard**
	Signal Lights – Hirsch. (DIN with Plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with Lights
56**	**Manaplug (Mini) with Lights**
20	**Fast Response**
1C**	**Manaplug (Mini) Single Sol. 5-pin, with Lights**
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1G**	Manaplug (Mini) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1H**	Manaplug (Micro) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1M**	Manaplug Opposite Normal
1P	Painted Body
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	**Pilot Choke Meter Out**
3B	**Pilot Choke Meter In**
3C	**Pilot Pressure Reducer**
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	**Pilot Choke Meter Out with Lights**
3H*	**Pilot Choke Meter In with Lights**
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights, Mini Manaplug, Pilot Choke Meter Out
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights

* DESINA, plug-in conduit box, and DIN with plug styles only.
** Must have plug-in style conduit box.

Reference Data

Model	Spool Symbol	MaximumFlow, LPM (GPM) 345 Bar (5000 PSI) w/o Malfunction	Model	Spool Symbol	Maximum Flow, LPM (GPM) 345 Bar (5000 PSI) w/o Malfunction
D81V*001		624 (160)	D81V*008 D81V*009		312 (80)
D81V*002		624 (160)	D81V*011		624 (160)
D81V*003		624 (160)	D81V*012		312 (80)
D81V*004		624 (160)	D81V*014		312 (80)
D81V*005		624 (160)	D81V*015		624 (160)
D81V*006		624 (160)	D81V*016		624 (160)
D81V*007		312 (80)	D81V*020 D81V*030		624 (160)

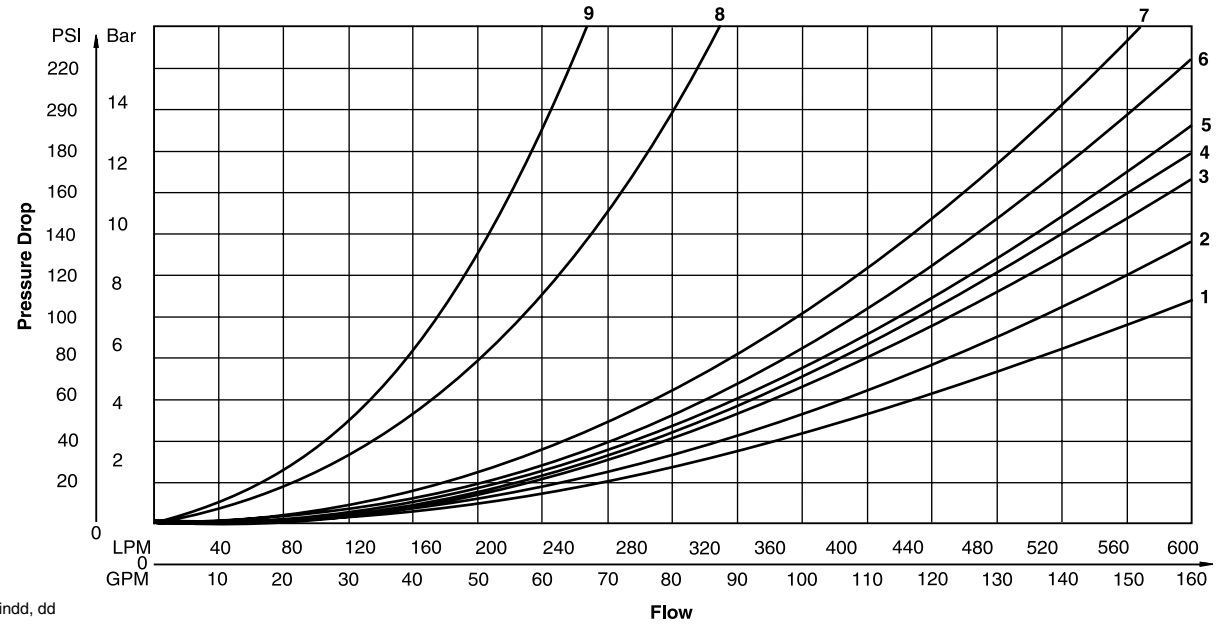
D81V* Series Pressure Drop Chart

The following chart provides the flow vs. pressure drop curve reference for the Series D81V* valve by spool type.

VISCOSITY CORRECTION FACTOR							
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141
Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change as per chart.							

D81VW Pressure Drop Reference Chart – Curve Number					
Spool No.	P–A	P–B	P–T	A–T	B–T
001	1	1	–	3	4
002	2	2	5	4	6
003	1	1	–	4	4
004	1	1	–	4	6
005	2	2	–	3	4
006	2	2	–	3	4
007	1	2	8	3	6
009	2	2	7	3	4
011	1	1	–	3	4
012	1	1	9	3	4
014	2	1	8	6	3
015	2	2	–	5	5
016	2	2	–	4	3
020/030	2	2	–	3	4

Performance Curves



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Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-15% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact HVD for AC coil applications.

Explosion Proof Solenoid Ratings*

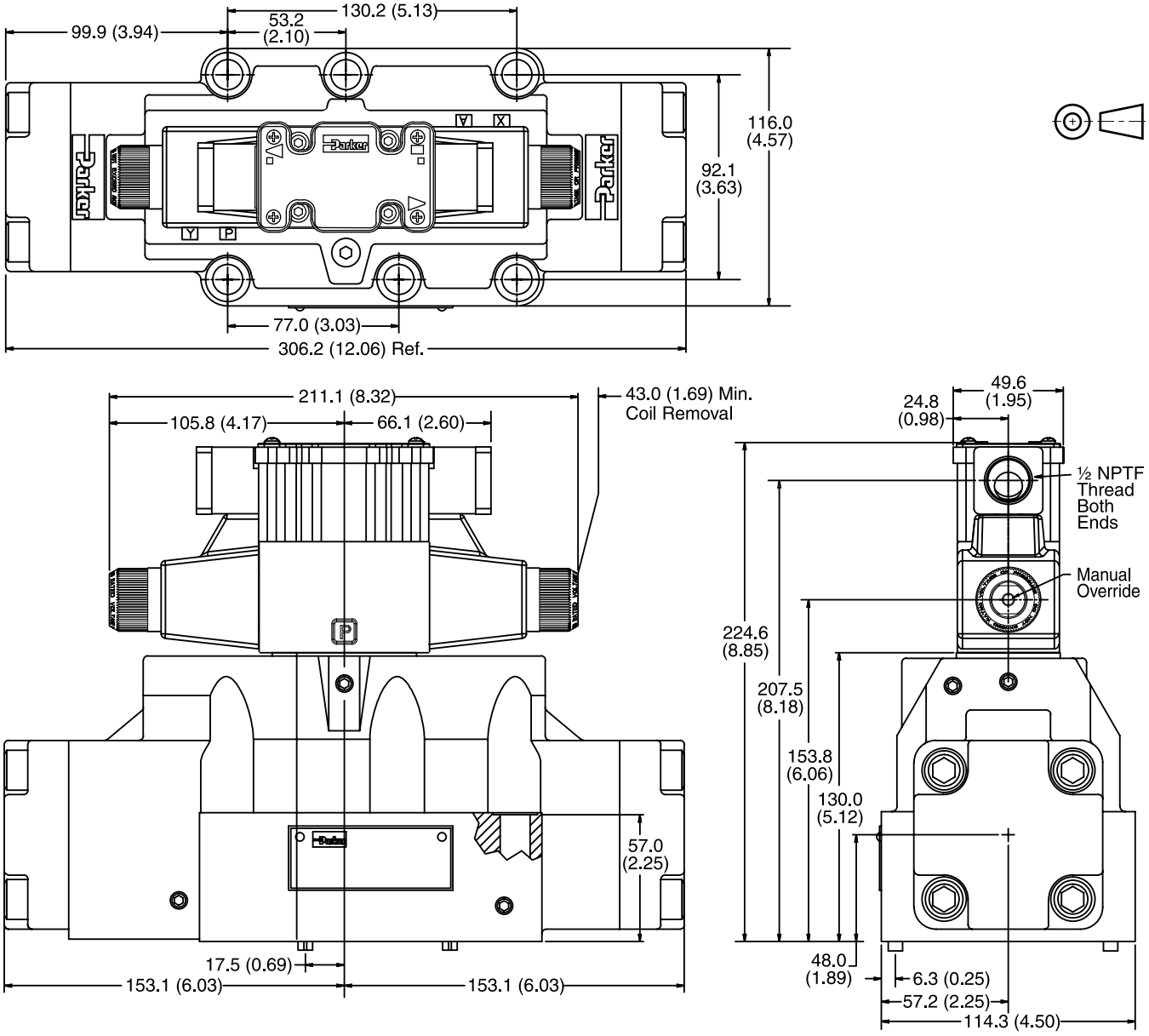
U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
MSHA (EO)	Complies with 30CFR, Part 18
ATEX (ED)	Complies with ATEX requirements for: Exd, Group IIB; EN50014: 1999+ Amds. 1 & 2, EN50018: 2000
ATEX & CSA/US (ET)	Complies with ATEX EN60079-0, EN60079-1 Ex d IIC; CSA/US Ex d IIC, AEx d IIC for Class I, Zone 1, UL1203, UL1604, CSA E61241,1 Class II, Div 1

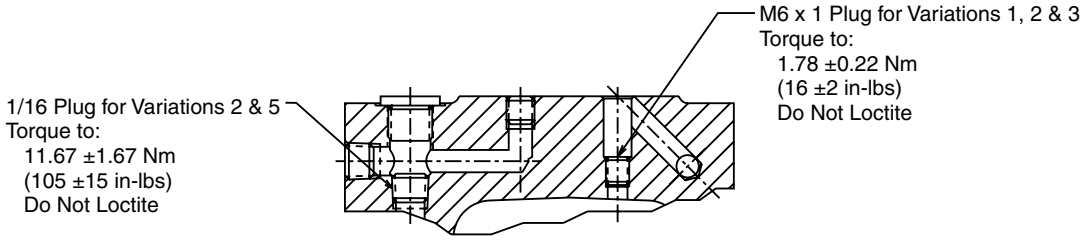
* Allowable Voltage Deviation ±10%.
Note that Explosion Proof AC coils are single frequency only.

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
G	Omit	198 VDC	N/A	N/A	0.15 Amps	30 W	1306.80 ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 ohms
L	L	6 VDC	N/A	N/A	1.67 Amps	10 W	3.59 ohms
L	Omit	6 VDC	N/A	N/A	5.00 Amps	30 W	1.20 ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 ohms
QD	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.20 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.20 ohms
R	F	24/60 VAC, Low Watt	6.67 Amps	160 VA	2.20 Amps	23 W	1.52 ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
Z	Omit	250 VDC	N/A	N/A	0.13 Amps	30 W	1889.64 ohms
Explosion Proof Solenoids							
R		24/60 VAC	7.63 Amps	183 VA	2.85 Amps	27 W	1.99 ohms
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
N		220/50 VAC	0.77 Amps	169 VA	0.31 Amps	27 W	1.38 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
P		110/50 VAC	1.47 Amps	162 VA	0.57 Amps	27 W	34.70 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
"ET" Explosion Proof Solenoids							
K		12 VDC	N/A	N/A	1.00 Amps	12 W	12.00 ohms
J		24 VDC	N/A	N/A	1.00 Amps	13 W	44.30 ohms
Y		120/60-50 VAC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

Inch equivalents for millimeter dimensions are shown in (**)

Plug-in Conduit Box, Double AC Solenoid



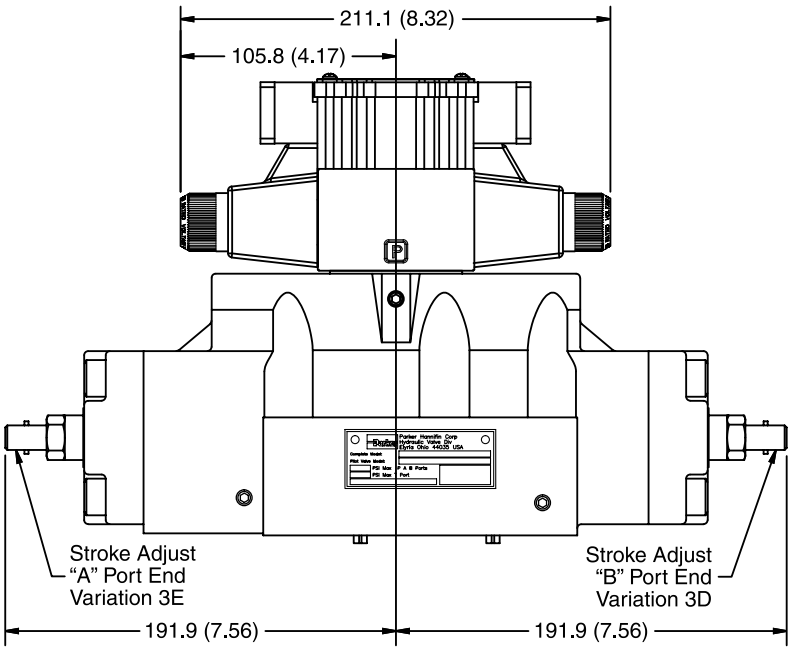


Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

Inch equivalents for millimeter dimensions are shown in (**)

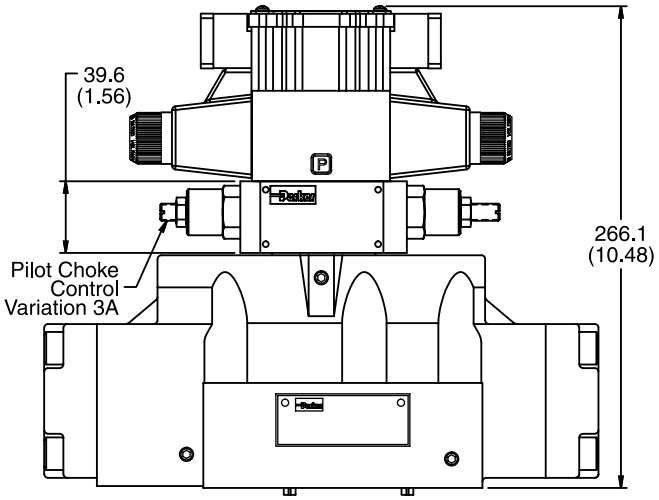
A

Conduit Box and Stroke Adjust, Double AC Solenoid

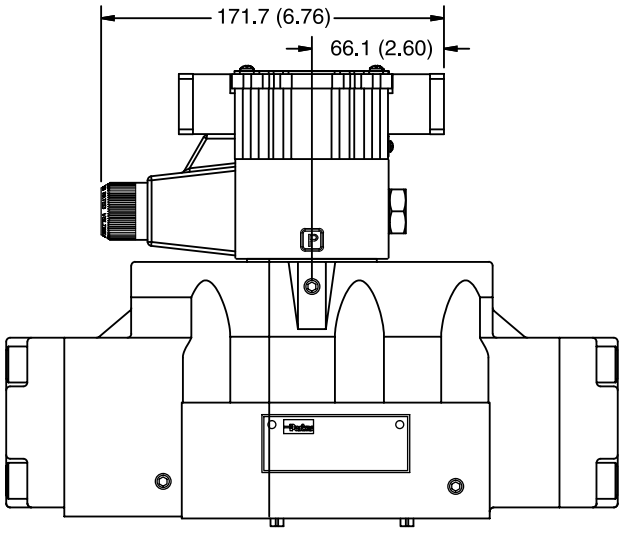


Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

Conduit Box and Pilot Choke Control, Double AC Solenoid



Conduit Box, Single AC Solenoid

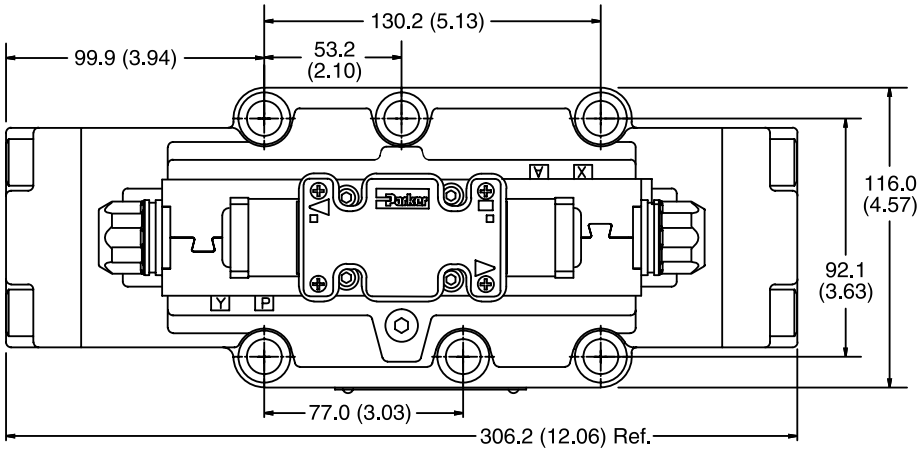


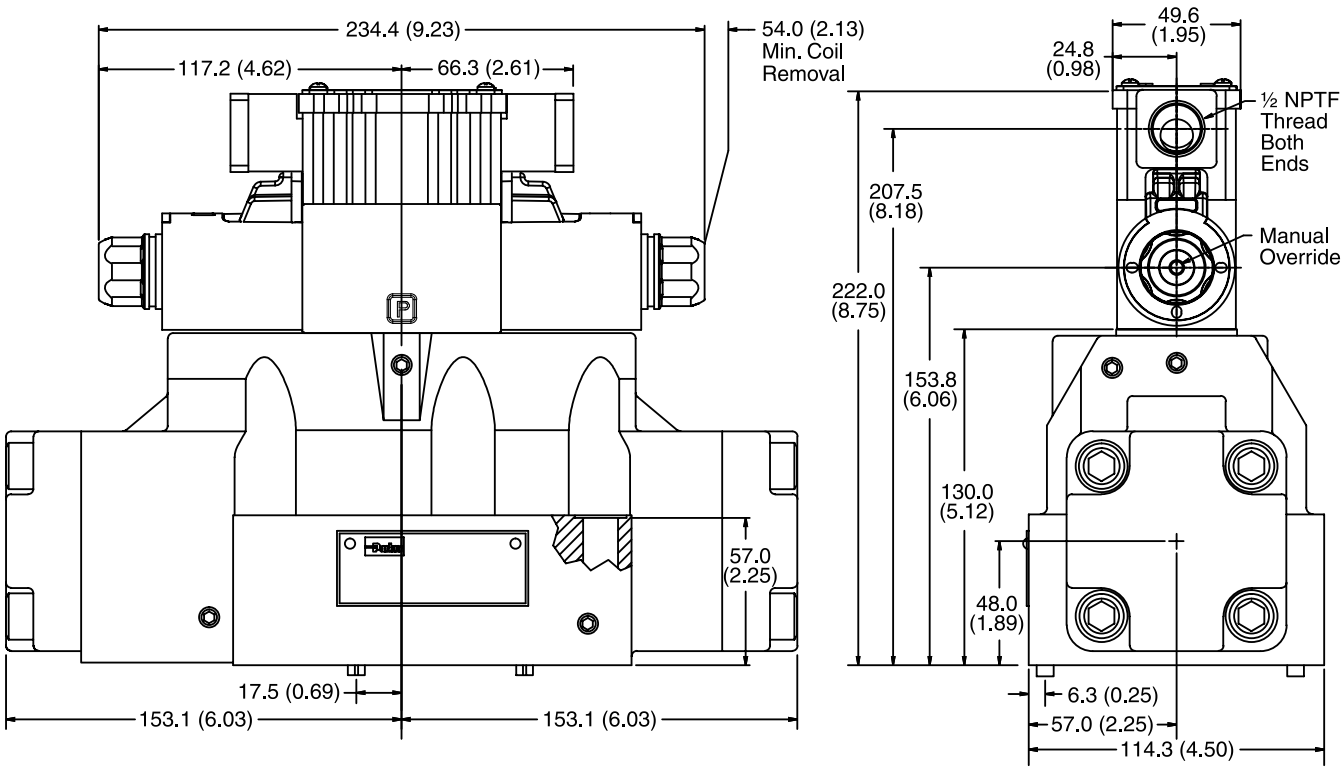
D81.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

Plug-In Conduit Box, Double DC Solenoid



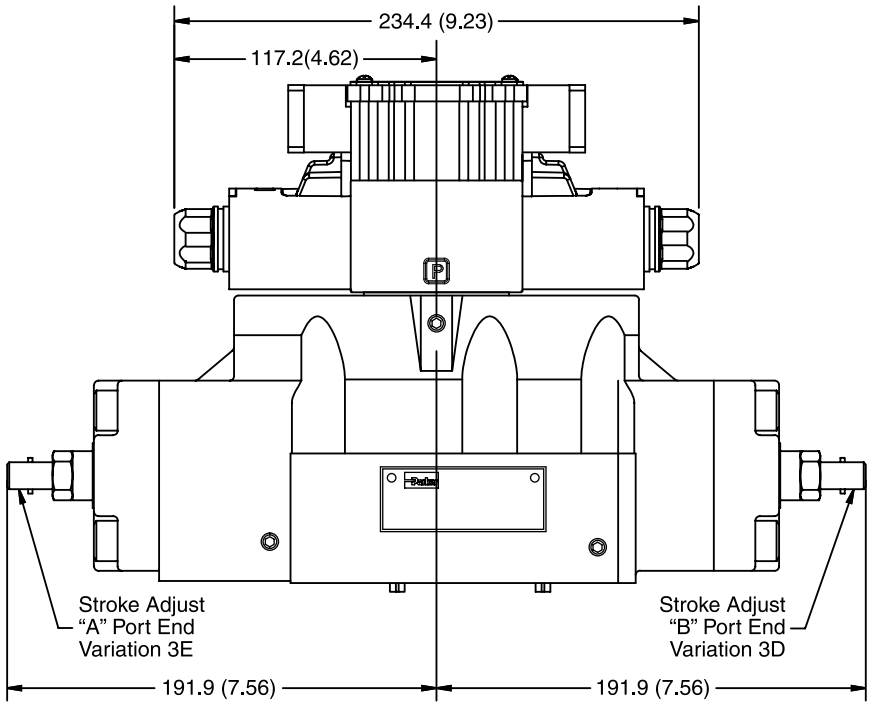


Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

Inch equivalents for millimeter dimensions are shown in (**)

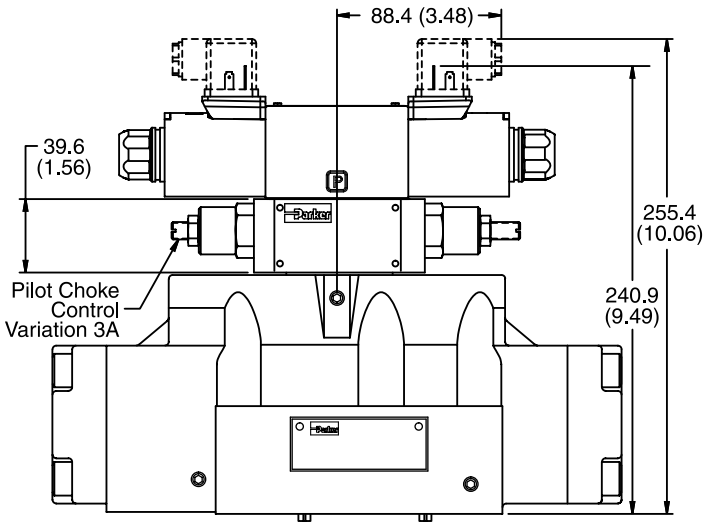
A

Plug-In Conduit Box and Stroke Adjust, Double DC Solenoid

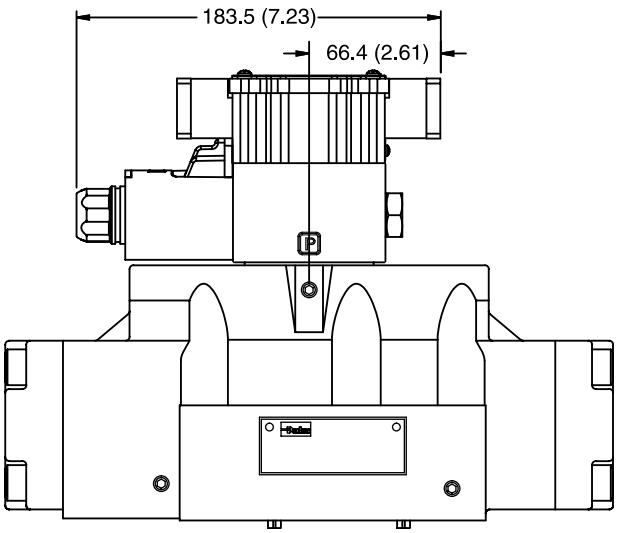


Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

Hirschmann and Pilot Choke Control, Double DC Solenoid



Plug-In Conduit Box, Single DC Solenoid

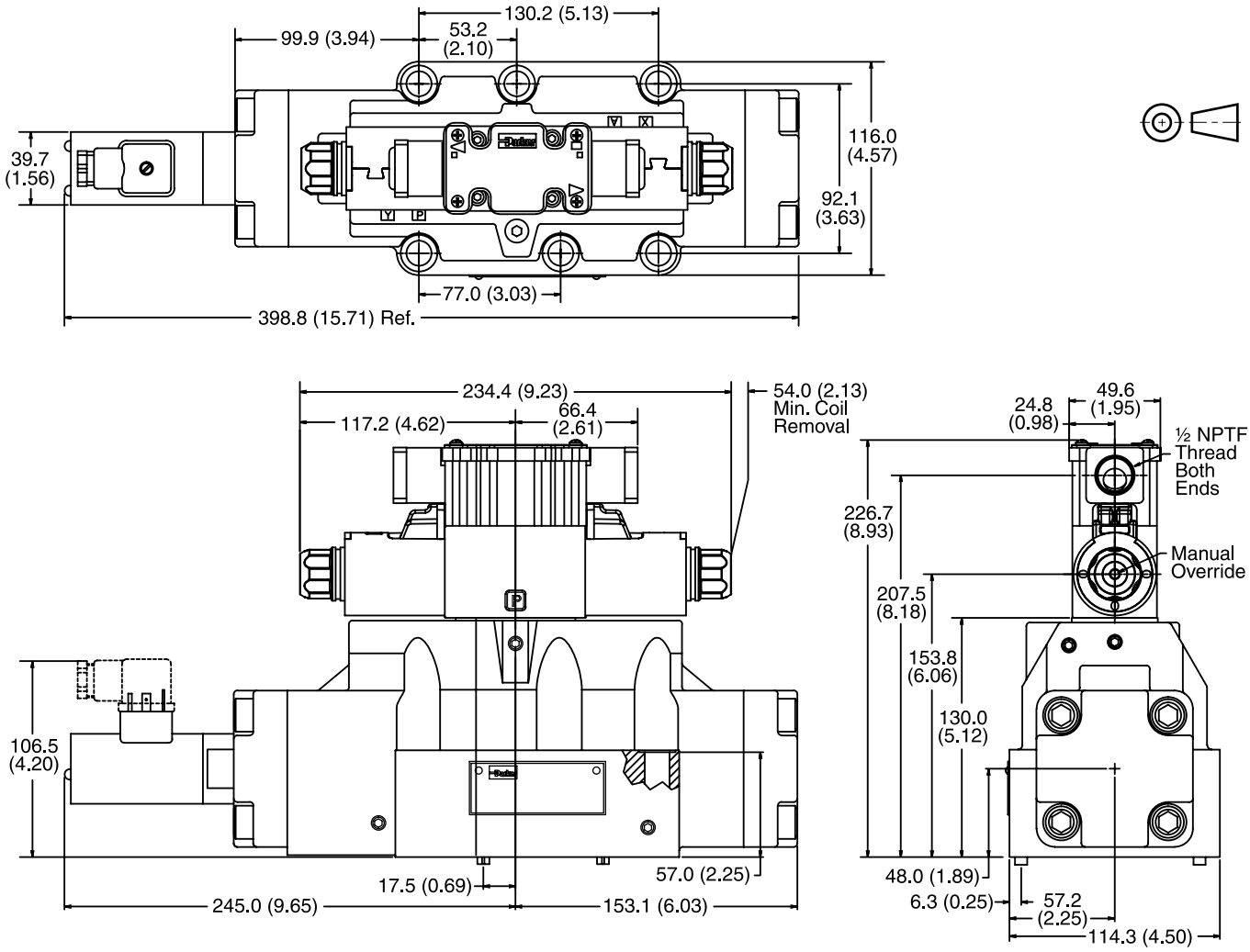


D81.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

Plug-In Conduit Box, Double AC Solenoid
with Variation I3 (Monitor Switch)

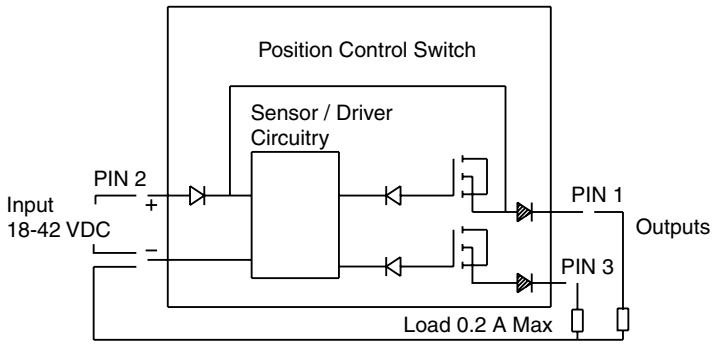


Monitor Switch
(Variation I3 and I6)

This feature provides for electrical confirmation of the spool shift. This can be used in safety circuits, to assure proper sequencing, etc.

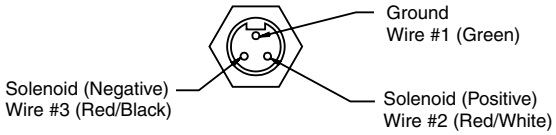
Switch Data

Pin 1 and Pin 3 have outputs equal to the input. When the monitor switch has the output to Pin 1, Pin 3 will have an output of zero, and vice-versa. When the valve is switched, Pin 1 and Pin 3 will switch outputs.

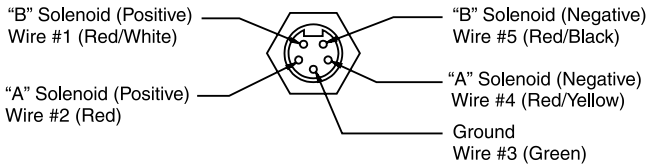


Manaplug (Options 56 & 1C)

Interface – Brad Harrison Plug
– 3-Pin for Single Solenoid
– 5-Pin for Double Solenoid

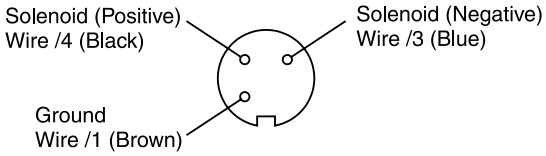


3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

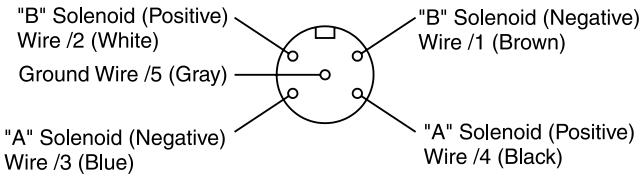


5-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7B & 1D)



3-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

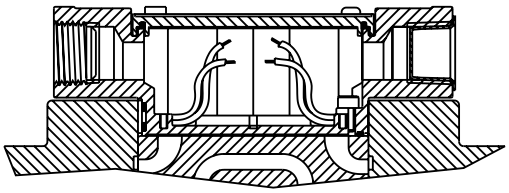


5-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

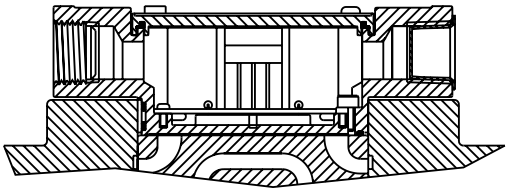
Conduit Box Option C

– No Wiring Options Available



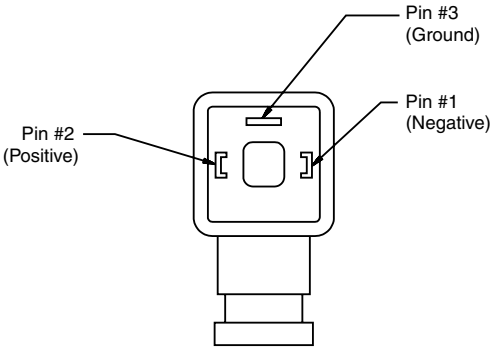
Signal Lights (Option 5) — Plug-in Only

– LED Interface
– Meets Nema 4/IP67



Hirschmann Plug with Lights (Option P5)

ISO 4400/DIN 43650 Form "A"

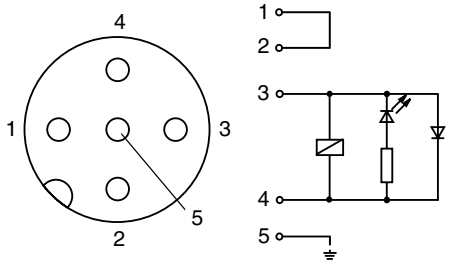


Face View of Plug

DESINA Connector (Option D)

M12 pin assignment
Standard

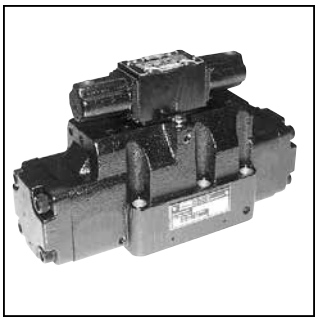
1 = Not used
2 = Not used
3 = 0V
4 = Signal (24 V)
5 = Earth Ground

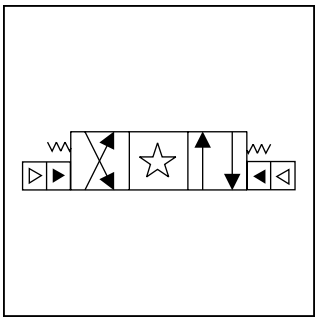


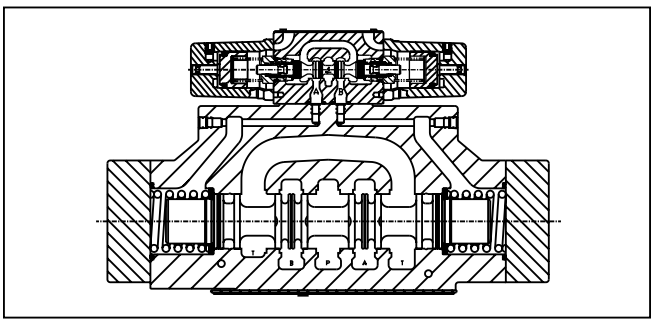
Pins are as seen on valve (male pin connectors)

General Description

Series D81VA directional control valves are 5-chamber, air pilot operated valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting pattern.







Specifications

Mounting Pattern	NFPA D08 , CETOP 8, NG25
Max. Operating Pressure	345 Bar (5000 PSI)
Max. Tank Line Pressure	Internal Drain Model: 34 Bar (500 PSI) External Drain Model: 207 Bar (3000 PSI)
Max. Drain Pressure	34 Bar (500 PSI)
Maximum Flow	See Switching Limit Charts
Pilot Pressure	Air Min 3.4 Bar (50 PSI) Air Max 10.2 Bar (150 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)

Features

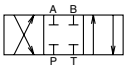
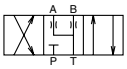
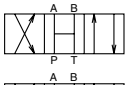
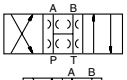
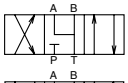
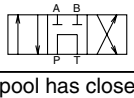
- Low pressure drop design.
- Fast response option available.
- Hardened spools provide long life.

Ordering Information

D	81V	A	☐	☐	☐	☐	☐	⌜⌝
Directional Control Valve	Basic Valve	Air Operated Pilot	Spool	Style	Pilot Supply and Drain	Seal	Valve Variations	Design Series

NFPA D08
CETOP 8
DIN NG25

NOTE: Not required when ordering.

Code	Symbol	Code	Symbol
001		011	
002		012	
004		020*	
009**		030**	

* 020 spool has closed crossover.
** 009 & 030 spools have open crossover.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator A. Note operators reverse sides for #9 spool. See installation information for details.

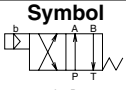
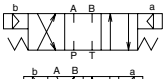
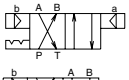
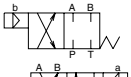
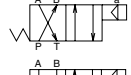
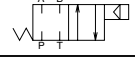
Valve Weight: Single Operated 19.9 kg (43.9 lbs.)
Standard Bolt Kit: BK228
Metric Bolt Kit: BKM228

Code	Description
1	**Int. pilot/Ext. drain**
2	**Ext. pilot/Ext. drain**
4#	**Int. pilot/Int. drain**
5	**Ext. pilot/Int. drain**

\# Not available with 002, 008, 009 & 030 spools.

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Code	Description
Omit	**Standard**
7	Pilot Choke – Meter Out
8	Stroke Adj. 'B' End
9	Stroke Adj. 'A' End
60	Pilot Choke – Meter In
89	Stroke Adj. 'A' & 'B' Ends
90	1/4 BSPP Threads

Code	Description	Symbol
B†	**Sgl. operator, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Dbl. operator, 3 position, spring centered.**	
D†	**Dbl. operator, 2 position, detent.**	
E	Sgl. operator, 2 position, spring centered. P to B and A to T when energized.	
H†	**Sgl. operator, 2 position, spring offset. P to B and A to T in offset position.**	
K	Sgl. operator, 2 position. Spring centered. P to A and B to T when energized.	

This condition varies with spool code.

†Available with 020 & 030 spools only.

Bold: Designates Tier I products and options.

Non-bold: Designates Tier II products and options. These products will have longer lead times.

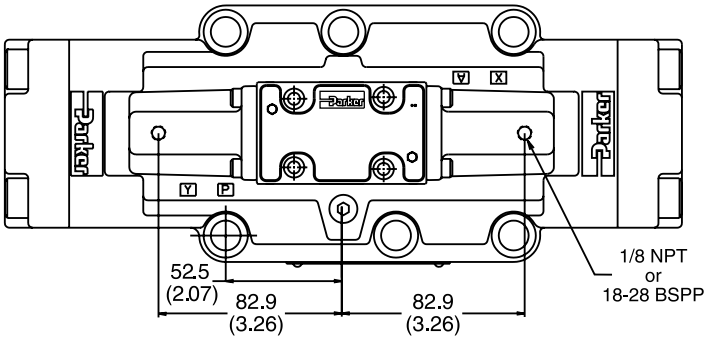
D81.indd, dd

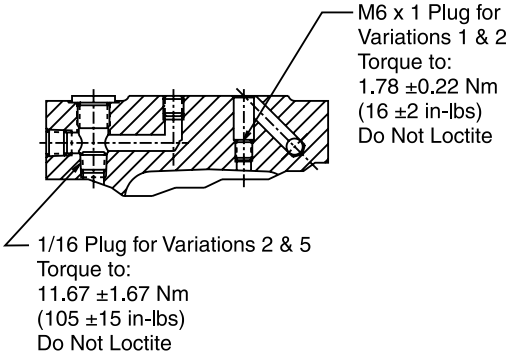
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

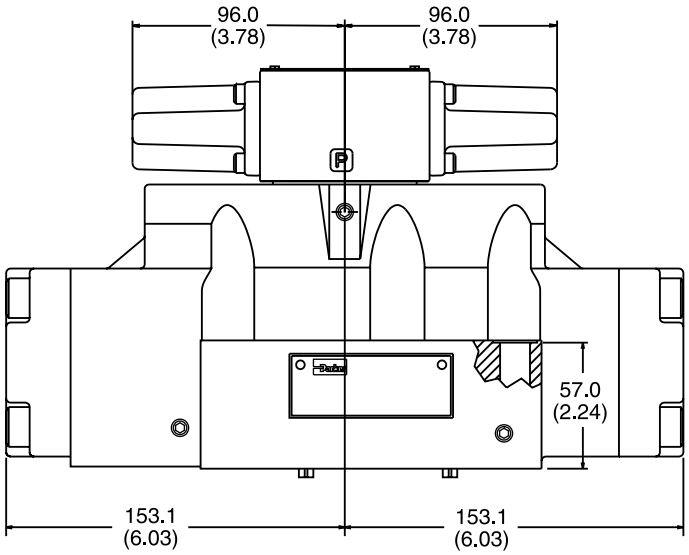
Inch equivalents for millimeter dimensions are shown in (**)

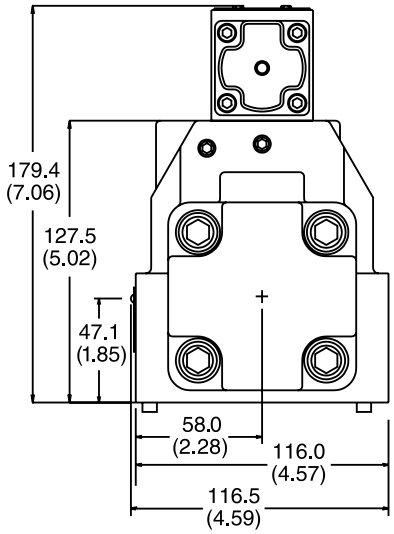
A

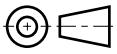
Air Operated







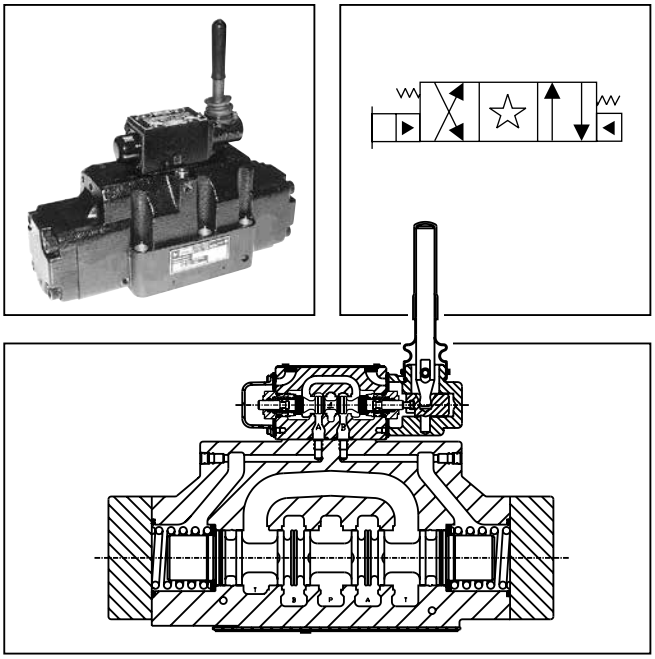




Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

General Description

Series D81VL directional control valves are 5-chamber, lever operated valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting pattern.



Specifications

Mounting Pattern	NFPA D08, CETOP 8, NG25
Max. Operating Pressure	350 Bar (5000 PSI)
Max. Tank Line Pressure	Internal Drain Model 34 Bar (500 PSI) External Drain Model 350 Bar (5000 PSI)
Maximum Drain Pressure	34 Bar (500 PSI)
Maximum Flow	See Reference Data Charts
Pilot Pressure	Oil Min 6.9 Bar (100 PSI) Oil Max 350 Bar (5000 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)

Ordering Information

D Directional Control Valve

81V Basic Valve
NFPA D08
CETOP 8

L Lever Operated Pilot

Spool

Code	Symbol	Code	Symbol
001		011	
002		012	
004		**020***	
008* **009****		**030****	

* 008 & 020 spools have closed crossover.
** 009 & 030 spools have open crossover.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator A. Note operators reverse sides for #9 spool. See installation information for details.

Style

Code	Description	Symbol
B†	**Sgl. operator, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Dbl. operator, 3 position, spring centered.**	
D†	**Dbl. operator, 2 position, detent.**	
E	Sgl. operator, 2 position, spring centered. P to B and A to T in shifted position.	
H†	**Sgl. operator, 2 position, spring offset. P to B and A to T in offset position.**	
K	Sgl. operator, 2 position. Spring centered. P to A and B to T in shifted position.	

† Available with 020 & 030 spools only.

Pilot Supply and Drain

Code	Description
1	**Int. pilot/Ext. drain**
2	**Ext. pilot/Ext. drain**
4#	**Int. pilot/Int. drain**
5	**Ext. pilot/Int. drain**

\# Not available with 002, 008, 009 & 030 spools.

Seal

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Valve Variations

Code	Description
Omit	**Standard**
7	Pilot Choke – Meter Out
8	Stroke Adj. 'B'
9	Stroke Adj. 'A'
60	Pilot Choke – Meter In
89	Stroke Adj. 'A' & 'B'

This condition varies with spool code.

Design Series
NOTE: Not required when ordering.

Valve Weight:	19.6 kg (43.2 lbs.)
Standard Bolt Kit:	BK228
Metric Bolt Kit:	BKM228

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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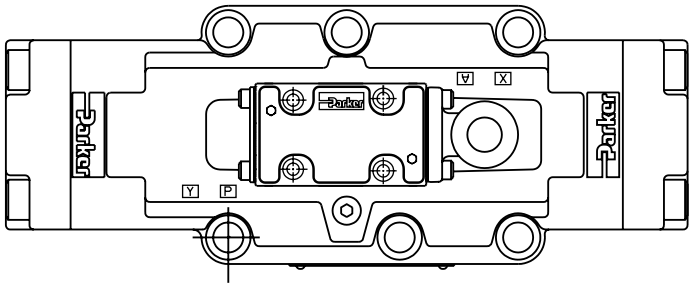
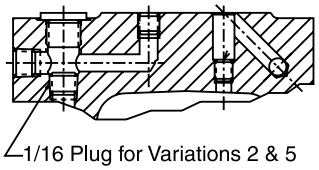
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

A

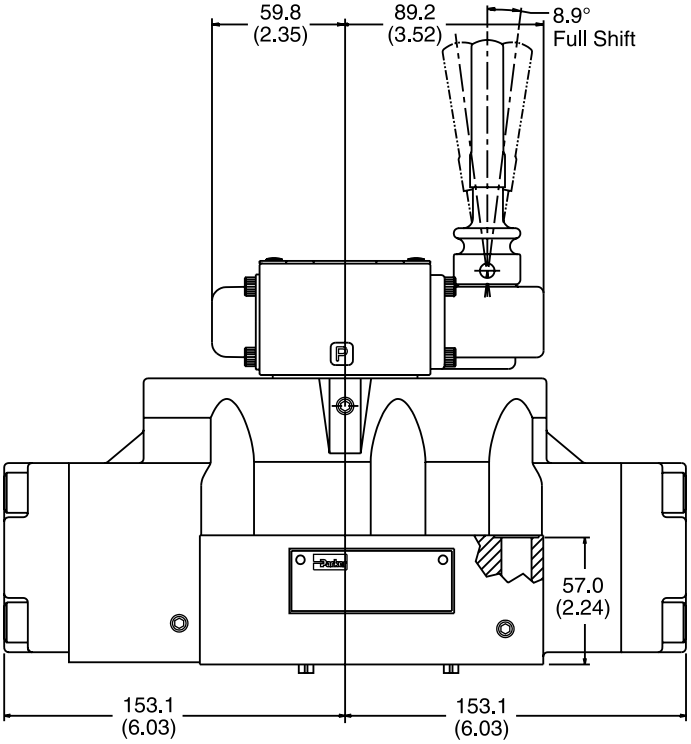
Lever Operated

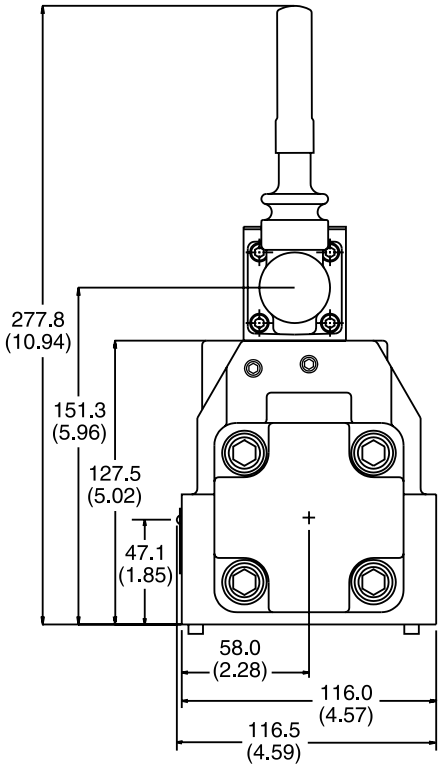


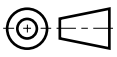


M6 x 1 Plug for
Variations 1 & 2
Torque to:
1.78 ±0.22 Nm
(16 ±2 in-lbs)
Do Not Loctite

1/16 Plug for Variations 2 & 5
Torque to:
11.67 ±1.67 Nm
(105 ±15 in-lbs)
Do Not Loctite



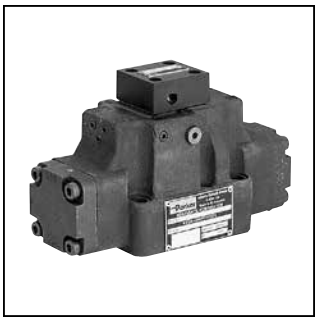


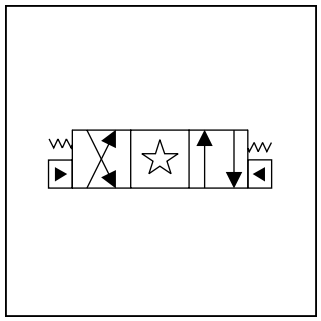


Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

General Description

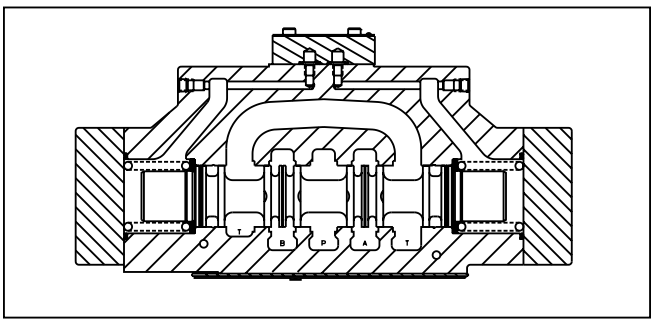
Series D8P directional control valves are 5-chamber, pilot operated valves. They are available in 2 or 3-position styles. These valves are manifold or sub-plate mounted, and conform to NFPA's D08, CETOP 8 mounting pattern.





Features

- Low pressure drop design.
- Hardened spools provide long life.



Specifications

Mounting Pattern	NFPA D08, CETOP 8, NG25
Max. Operating Pressure	345 Bar (5000 PSI)
Max. Tank Line Pressure	345 Bar (5000 PSI)
Max. Drain Pressure	345 Bar (5000 PSI)
Min. Pilot Pressure	5.1 Bar* (75 PSI)
Max. Pilot Pressure	345 Bar (5000 PSI)
Nominal Flow	302 LPM (80 GPM)
Max. Flow	See Reference Data Chart

* 6.9 Bar (100 PSI) for 2, 8, 9 & 12 spools

For flow path, pilot drain and pilot pressure details, see Installation Information.

Response Time

Response time will vary with pilot line size, pilot line length, pilot pressure shift time and flow capacity of the control valve.

Shift Volume

The pilot chamber requires a volume of 1.35 in^3 (22.1 cc) for center to end.

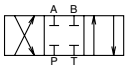
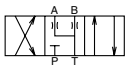
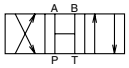
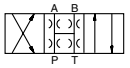
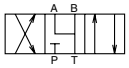
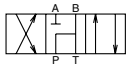
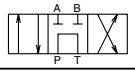
Ordering Information

D	8	P							
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Pilot Supply and Drain	Seal	Valve Variations	Design Series

NFPA D08 CETOP 8 DIN NG25

Oil Operator

NOTE: Not required when ordering.

Code	Symbol	Code	Symbol
1		11	
2		12	
4		20*	
7		30**	
9**			

* 20 spool has closed crossover.
** 9 & 30 spools have open crossover.

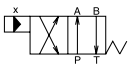
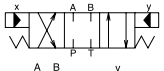
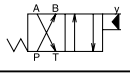
Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator X. Note operators reverse sides for #9 spool. See installation information for details.

Code	Type
N	Nitrile
V	Fluorocarbon

Code	Description
2	Ext. Pilot / Ext. Drain
5#	Ext. Pilot / Int. Drain

\# Available in "B" and "H" style only.

Code	Description
Omit	Standard
7	Pilot Choke – Meter Out
8	Stroke Adj. 'B' End
9	Stroke Adj. 'A' End
60	Pilot Choke – Meter In
89	Stroke Adj. 'A' & 'B' Ends

Code	Description	Symbol
B†	Sgl. operator, 2 position, spring offset. P to A and B to T in offset position.	
C	Dbl. operator, 3 position, spring centered.	
H†	Sgl. operator, 2 position, spring offset. P to B and A to T in offset position.	

This condition varies with spool code.

† Available with 20 & 30 spools only.

Valve Weight: 18.9 kg (41.7 lbs.) **Standard Bolt Kit:** BK228 **Metric Bolt Kit:** BKM228

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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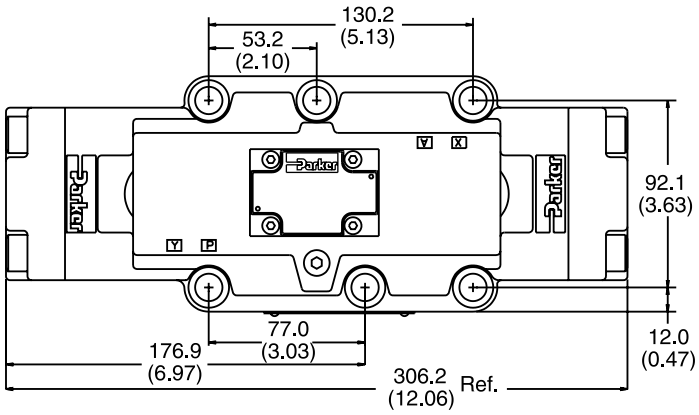
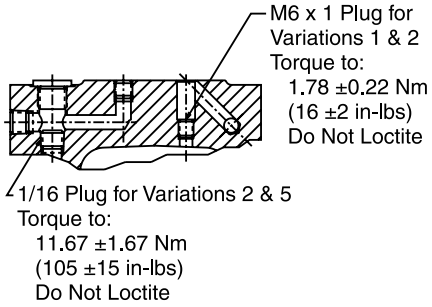
Hydraulic Valve Division
Elyria, Ohio, USA

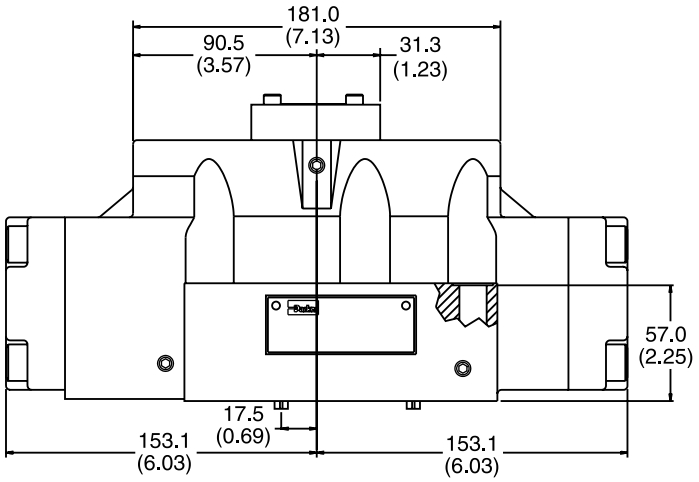
Inch equivalents for millimeter dimensions are shown in (**)

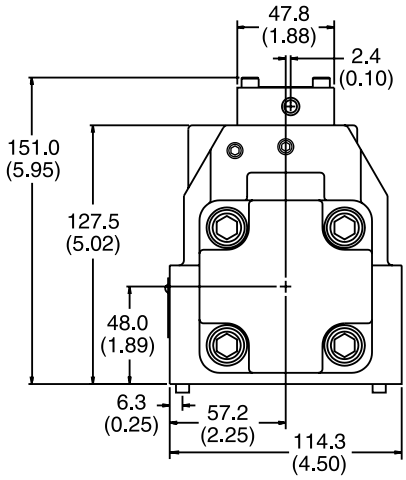
A

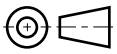
Standard Pilot Operated



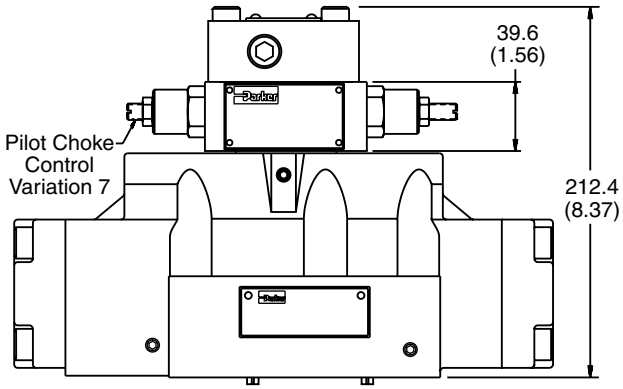








Pilot Operated with Pilot Choke Control



Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

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Elyria, Ohio, USA

Installation Information

FOR MAXIMUM VALVE RELIABILITY, ADHERE TO THE FOLLOWING INSTALLATION INFORMATION.

The following is important installation information which applies to all directional control valves described in this catalog.

Mounting Position
Detent – Horizontal
Spring Offset – Unrestricted
Spring Centered – Unrestricted

Fluid Recommendations
Premium quality hydraulic oil with a viscosity range between 32-54 cSt. (150-250 SSU) At 38°C (100°F) is recommended. The absolute operating viscosity range is from 16-220 cSt. (80-1000 SSU). Oil should have maximum anti-wear properties and rust and oxidation treatment.

Fluids and Seals
Valves using synthetic, fire-resistant fluids require special seals. When phosphate esters or its blends are used, FLUOROCARBON seals are required. Water-glycol, water-in-oil emulsions and petroleum oil may be used with STANDARD seals.

Filtration
For maximum valve and system component life, the system should be protected from contamination at a level not to exceed 125 particles greater than 10 microns per milliliter of fluid (SAE class 4/ISO 16/13).

Silting
Silting can cause any sliding spool valve to stick and not spring return if held under pressure for long periods of time. The valve should be cycled periodically to prevent sticking.

Special Installations
Consult your Parker representative for any application requiring the following:

- Pressure above rating.
- Fluid other than those specified.
- Oil temperature above 71.1°C (160°F).
- Flow path other than normal.

Mounting Patterns

Series	NFPA	CETOP
D81V*, D8P	D08	3/4”

Torque Specifications
The recommended torque values for the bolts which mount the valve to the manifold or subplate are as follows: 135.6 Nm (100 ft-lbs).

Series D81VW, D81VA, D81VL

Tank and Drain Line Surges

If several valves are piped with a common tank or drain line, flow surges in the line may cause an unexpected spool shift. Detent style valves are most susceptible to this. Separate tank and drain lines should be piped in installations where line surges are expected.

Electrical Characteristics (Detented Spool)

Only a momentary energizing of the solenoid is necessary to shift and hold a detented spool. Minimum duration of the signal is 0.1 seconds for DC voltages. For AC voltages the response time is 0.06 seconds. Spool position will be held provided the spool centerline is in a horizontal plane, and not shock or vibration is present to displace the spool.

Electrical Failure or Loss of Pilot Pressure (D81V or D81VA)

Should electric power fail or loss of pilot pressure occur, spring offset and spring centered valves will shift to the spring held position. Detented valves will stay in the last position held before power failure. If main flow does not fail or stop at the same time power fails, machine actuators may continue to function in an undesirable manner or sequence.

Pilot/Drain Characteristics

Pilot Pressure:
5.1 to 345 Bar (75 to 5000 PSI)
6.9 Bar (100 PSI) for spools 002, 007, 008, 009 & 014

External: An oil source sufficient to maintain minimum pilot pressure must be connected to the “X” port of the main body. When using the external pilot variation, a 1/16" pipe plug must be present in the main body pilot passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with pilot code 2, 3, 5 or 6.

Internal: Flow is internally ported from the pressure port of the main valve body to the “P” port of the pilot valve. The pressure developed at the “P” port of the pilot valve must be 5.1 Bar (75 PSI) minimum at all times or 6.9 Bar (100 PSI) for spools 002, 007, 008, 009 & 014.

Integral Check: Valves using internal pilot and internal drain with an open center spool (spools 2, 7, 8 & 9) can be ordered with an integral check valve in the pressure port of the main valve codes 3 & 6. Pilot oil will be internally ported from the upstream side of this check to the “P” port of the pilot valve, ensuring sufficient pilot pressure. A 1/16” pipe plug will be present in the main body. The “X” port in the subplate must be plugged when using the integral check.

Pilot Valve Drain: Maximum pressure 102 Bar (1500 PSI) AC optional, 207 Bar (3000 PSI) DC standard.

External: When using an external drain, a M6 x 1 x 6mm long set screw must be present in the main body drain passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with drain code 1, 2 or 3.

Drain flow from the pilot valve is at the “Y” port of the main body and must be piped directly to tank. Maximum drain line pressure is 102 Bar (1500 PSI), AC optional, 207 Bar (3000 PSI) DC standard. Any drain line back pressure is additive to the pilot pressure requirement.

Internal: Drain flow from the pilot valve is internally connected to the main valve tank port. Tank and drain pressure are then identical so tank line pressure should not exceed 102 Bar (1500 PSI) AC optional, 207 Bar (3000 PSI) DC standard. Any tank line back pressure is also additive to the pilot pressure requirement. If flow surges (a cause of pressure surges) are anticipated in the tank line, an external drain variation is recommended. The “Y” port in the subplate must be plugged when using an internal drain.

D81V* Flow Paths

Style Code	Description	No Solenoid/Operator Energized	Solenoid/Operator A Energized	Solenoid/Operator B Energized
B	Spring Offset	P→A and B→T	—	P→B and A→T
C	Spring Centered	Centered	P→A and B→T	P→B and A→T
D	Detented	Last Position Held	P→A and B→T	P→B and A→T
E	Spring Centered	Centered	—	P→B and A→T
F†	Spring Offset, Shift to Center	P→A and B→T	—	Centered
H	Spring Offset	P→B and A→T	P→A and B→T	—
K	Spring Centered	Centered	P→A and B→T	—
M†	Spring Offset, Shift to Center	P→B and A→T	Centered	—

† D81VW only.

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Hydraulic Valve Division
Elyria, Ohio, USA

Series D8P

Tank and Drain Line Surges

If several valves are piped with a common tank or drain line, flow surges in the line may cause an unexpected spool shift. Detent style valves are most susceptible to this. Separate tank and drain lines should be piped in installations where line surges are expected.

Loss of Pilot Pressure

Should a loss of pilot pressure occur, spring offset and spring centered valves will shift to the spring held position. No spring valves will stay in the last position held. If main hydraulic flow does simultaneously stop, machine actuators may continue to function in an undesirable manner or sequence.

Pilot Drain Characteristics

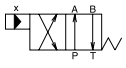
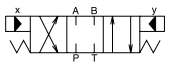
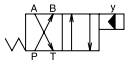
Pilot Pressure:
5.1 to 350 Bar (75 to 5000 PSI)
6.9 Bar (100 PSI) for spools 2, 7, 8, 9 & 14

Direct pilot operated valves use the “X” and “Y” ports to supply pilot oil directly to the ends of the spool, providing spool shifting force. A block mounted on top of the valve body is internally cored to make the necessary connections. Thus when “X” is pressurized, “Y” is used as a drain; and when “Y” is pressurized, “X” becomes the drain.

Any back pressure in these lines when they are being used as a drain is additive to the pilot pressure requirement.

Internal Drain: On spring offset models, only the “X” port is pressurized, as the spring returns the spool to its at rest position. On these models, “Y” may be internally drained through the main tank passage in the valve.

Flow Path/Pilot Pressure

Style Code	Description	“X” & “Y” De-Pressurized	“X” Port Pressurized	“Y” Port Pressurized	Special Notes	Recommended Control Valve For Pilot Oil
B	Two Position Spring Offset	P→A, B→T	P→A, B→T	P→B, A→T	“X” Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position Spring Centered	Center	P→A, B→T	P→B, A→T	Flow paths will be reversed on valves with tandem center (9) spools	
H	Two-Position Spring Offset	P→B, A→T	P→A, B→T	P→B, A→T	“Y” Port may be pressurized to assist spring in returning spool to offset position	

Subplate Mounting
NFPA D08, CETOP 8 & NG25

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 135.6 Nm (100 ft-lbs).

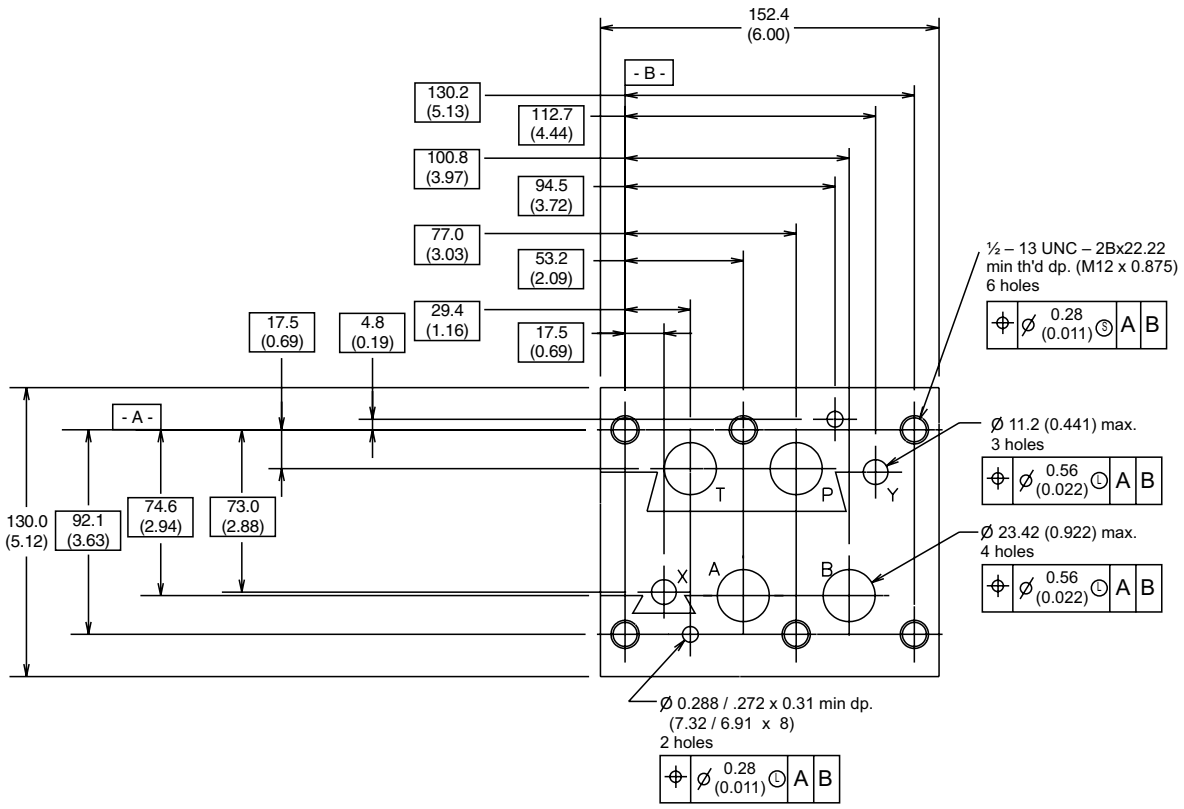
For maximum valve reliability, adhere to the following installation information.

Mounting Position

Valve Type	Mounting Position
Detent (Solenoid)	Horizontal
Spring Offset	Unrestricted
Spring Centered	Unrestricted

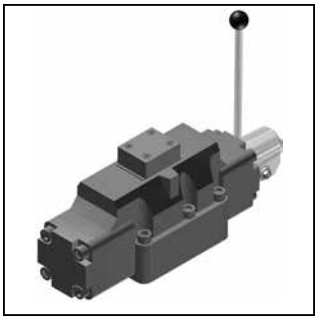
Mounting Pattern — NFPA D08, CETOP 8 & NG25

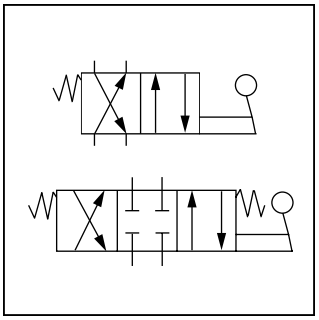
Inch equivalents for millimeter dimensions are shown in (**)

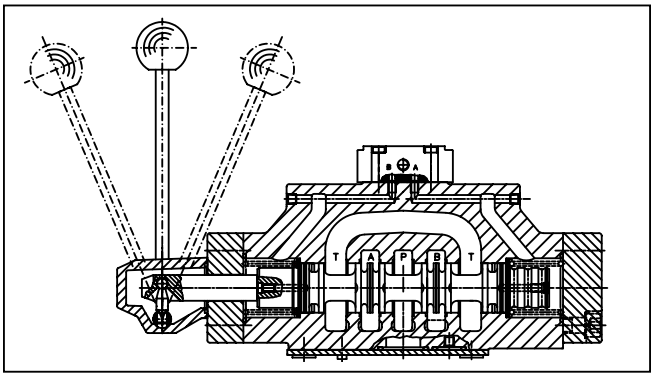


General Description

Series D9L directional control valves are 5-chamber, 4 way, 2 0r 3-position valves. They are operated by a hand lever which is directly connected to the spool. The hand lever can be located either on the A or B side. Spring offset and detent designs are available.







Features

- Streamlined internal channels ensure minimum pressure drop at maximum flow.
- Hardened spools provide long life.

Specifications

General	
Actuation	Lever
Size	NG25
Mounting Interface	DIN 24340 A25 ISO 4401 NFPA D08 CETOP RP 121-H
Mounting Position	Unrestricted, preferably horizontal
Ambient Temperature	-25°C to +50°C (-13°F to +122°F)
Hydraulic	
Maximum Operating Pressure	**External Drain** P, A, B, T 350 Bar (5075 PSI) X, Y 10 Bar (145 PSI) **Internal Drain** P, A, B 350 Bar (5075 PSI) T, X, Y 10 Bar (145 PSI)

Hydraulic (cont.)	
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525
Fluid Temperature	-25°C to +70°C (-13°F to +158°F)
Viscosity Permitted	2.8 to 400 cSt / mm^2/s (13 to 1854 SSU)
Viscosity Recommended	30 to 80 cSt / mm^2/s (139 to 371 SSU)
Filtration	ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)
Maximum Flow	700 LPM (185.2 GPM)
Leakage at 350 Bar (5075 PSI)	up to 800 ml per minute (per flow path) (depending on spool)

D	9						
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Pilot Supply and Drain	Seal	Design Series

NOTE: Not required when ordering.

Basic Valve

NFPA D08
CETOP 8
DIN NG25
32 mm

Seal

Code	Description
N	Nitrile
V	Fluorocarbon

Actuator

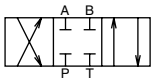
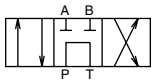
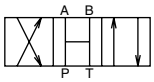
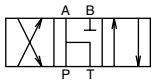
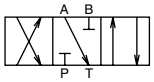
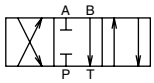
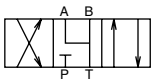
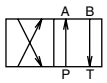
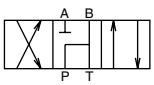
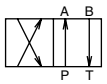
Code	Actuation
L	Lever Side B
LB	Lever Side A

Pilot Supply and Drain

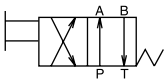
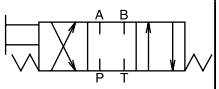
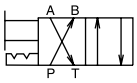
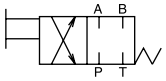
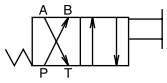
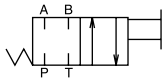
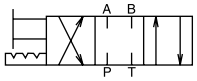
Code	Description	
2*	External Pilot	External Drain
5**	External Pilot	Internal Drain

* Pressure T-port < 10 bar
** Pressure T-port > 10 bar

Spool

Code	Symbol	Code	Symbol
01		09	
02		14	
03		15	
04		20	
07		30	

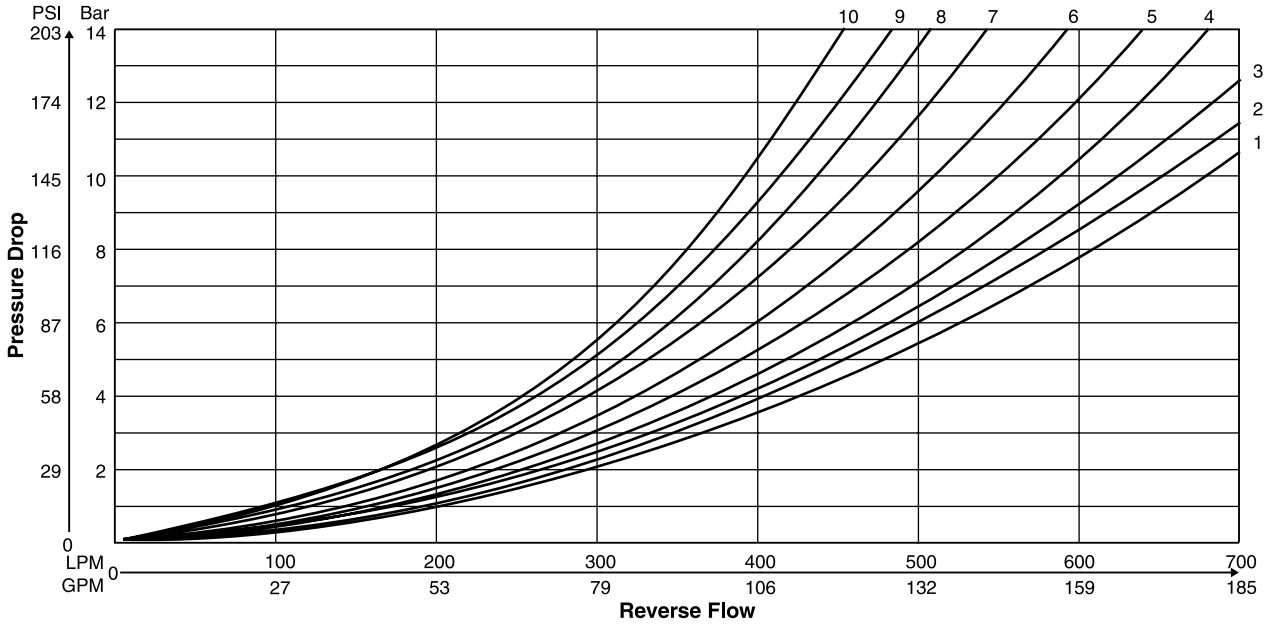
Style

Code	Description	Symbol
B	Single operator, 2 position, spring offset.	
C	Double operator, 3 position, spring centered.	
D	Double operator, 2 position, detent.	
E	Single operator, 2 position, spring centered.	
H	Single operator, 2 position, spring offset.	
K	Single operator, 2 position, spring centered.	
N	Double operator, 3 position, detent.	

Weight: 17.0 kg (37.5 lbs.)

The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.

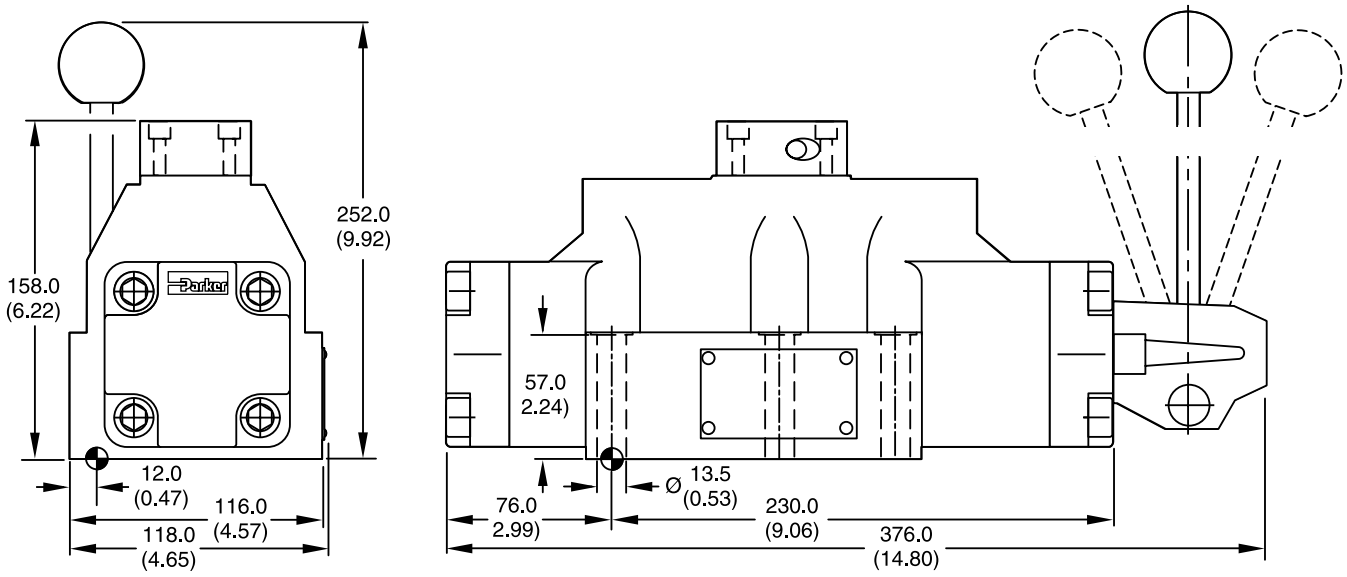
Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
1	3	2	-	3	5
2	2	1	1	3	5
3	4	2	-	3	6
4	4	3	-	3	5
7	3	1	7	3	5
9	4	8	9	4	10
14	1	3	7	5	3
15	2	4	-	5	3
20	6	5	-	6	8
30	3	2	-	3	5



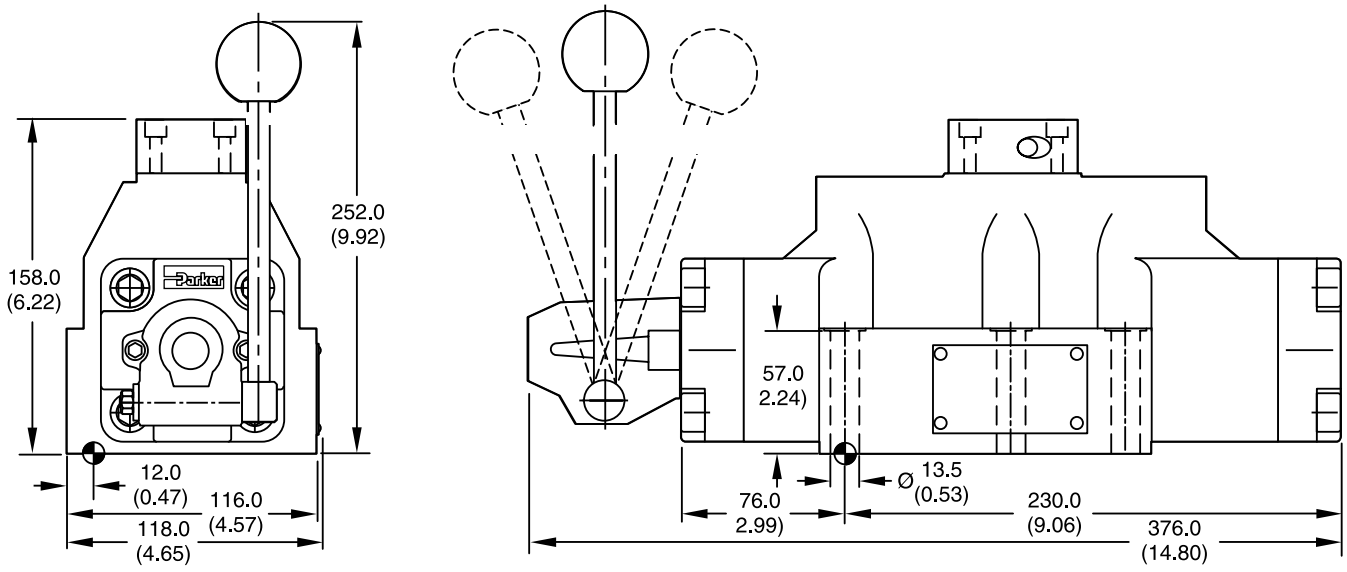
A

Inch equivalents for millimeter dimensions are shown in (**)

D9L



D9LB



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK360	6x M5x75 DIN 912 12.9	108 Nm ±15%	Nitrile: SK-D9LN Fluorocarbon: SK-D9LV

D81.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Notes

Return to ALPHA TOC
Return to SECTION TOC
A

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Application

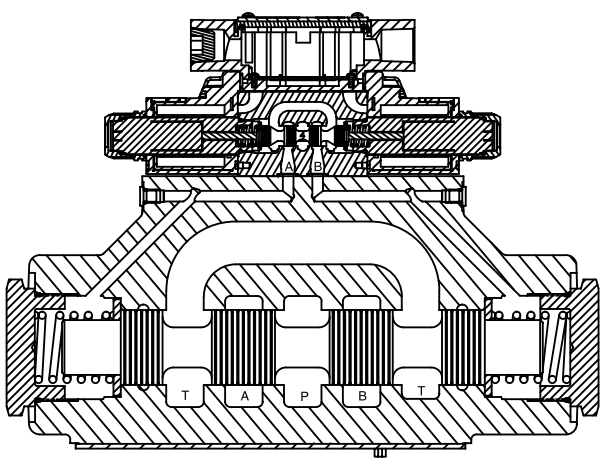
Series D101 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles and are manifold mounted. These valves conform to NFPA's D10, CETOP 10 mounting pattern.

Operation

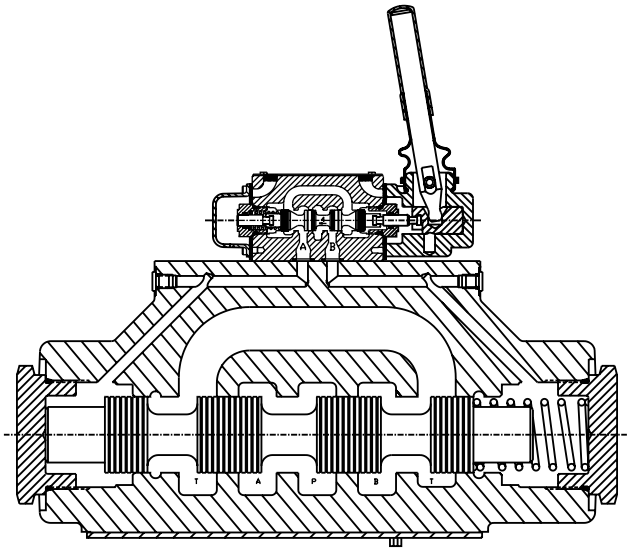
Series D101 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or pilot operators (hydraulic or pneumatic).

Features

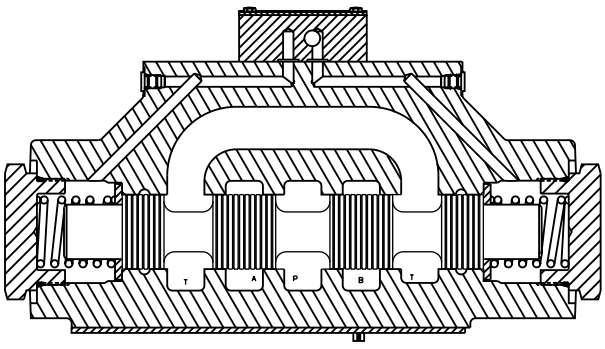
- Easy access mounting bolts.
- 210 Bar (3000 PSI) pressure rating.
- Flows to 950 LPM (250 GPM) depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.



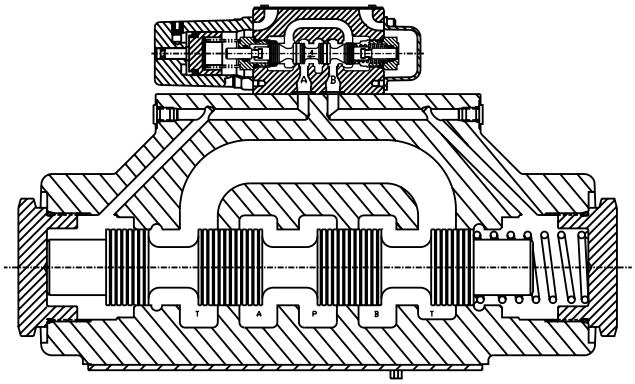
D101VW Solenoid Operated Plug-in Conduit Box



D101VL Lever Operated



D10P Oil Pilot Operated



D101VA Air Pilot Operated

General Description

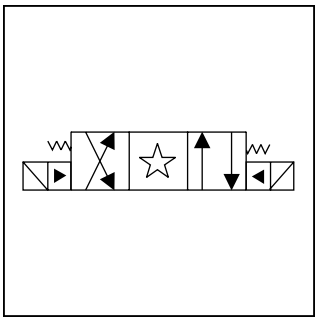
Series D101V directional control valves are 5-chamber, pilot operated, solenoid controlled valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D10, CETOP 10 mounting pattern.

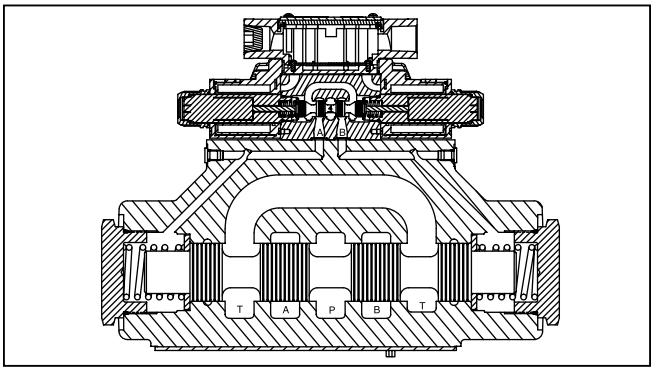
Operation

Series D101V pilot operated valves are standard with low shock spools and pilot orifice. The orifice can be removed if a faster shift is required. However, it is recommended that all systems operating above 138 Bar (2000 PSI) use the standard valve to avoid severe shock.

Features

- Low pressure drop design.
- Hardened spools provide long life.
- Fast response option available.
- Wide variety of voltags and electrical connection options.
- Explosion proof availability.
- No tools required for coil removal.





Specifications

Mounting Pattern	NFPA D10, CETOP 10, NG32
Maximum Operating Pressure	207 Bar (3000 PSI) Standard CSA 207 Bar (3000 PSI)
Maximum Tank Line Pressure	Internal Drain Model: 102 Bar (1500 PSI) AC Only 207 Bar (3000 PSI) DC Standard/AC Optional External Drain Model: 207 Bar (3000 PSI) CSA 102 Bar (1500 PSI)
Maximum Drain Pressure	102 Bar (1500 PSI) AC Only 207 Bar (3000 PSI) DC Standard/AC Optional CSA 102 Bar (1500 PSI)
Minimum Pilot Pressure	4.4 Bar (65 PSI)
Maximum Pilot Pressure	207 Bar (3000 PSI) Standard CSA 207 Bar (3000 PSI)
Nominal Flow	378 LPM (100 GPM)
Maximum Flow	See Reference Chart

Response Time

Response times (milliseconds) are measured at 205 Bar (3000 PSI) and 416 LPM (110 GPM) with various pilot pressures as indicated.

Solenoid Type	Pilot Pressure	Pull-In		Drop-Out	
		Std	Fast	Std	Fast
DC	500	180	170	195	195
	1000	130	125	195	195
	2000	100	95	195	195
AC	500	140	130	185	185
	1000	90	85	185	185
	2000	60	55	185	185

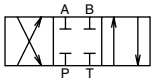
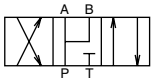
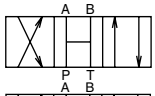
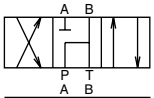
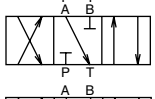
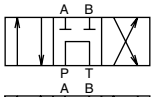
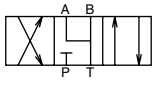
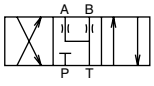
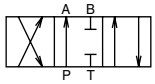
Because of the high drain line pressure transients generated during shifting, use of the fast response option is not recommended for pilot pressures exceeding 205 Bar (2000 PSI).

D	101V							
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Pilot Supply and Drain	Seal	Solenoid Voltage	

NFPA D10
CETOP 10
DIN NG32
D03 Pilot

Code	Description
W*	**Solenoid, Wet Pin, Screw-in**
HW*	**Reversed Wiring**

* Valve schematic symbols are per NFPA/ ANSI standards, providing flow P to A when energizing solenoid A. Note operators reverse sides for #008 and #009 spools. See installation information for details. To configure per DIN standards (A coil over A port, B coil over B port) code valves as D101VHW***.

Code	Symbol	Code	Symbol
001		006	
002		007	
003		**008*** **009****	
004		011	
005			

* 008 spool has closed crossover.
** 009 spool has open crossover.

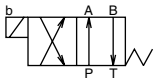
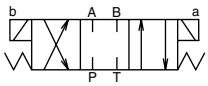
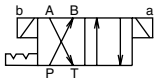
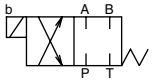
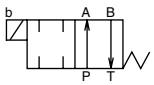
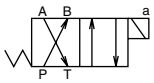
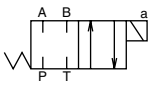
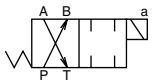
Code	Description
1	**Internal Pilot, External Drain**
2	**External Pilot, External Drain**
3	Internal Pilot w/Check, External Drain
4#	**Internal Pilot, Internal Drain**
5	**External Pilot, Internal Drain**
6	Internal Pilot w/Check, Internal Drain

\# Not available with 002, 007, 008 and 009 spools.

Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Code	Description
A*	24/50 VAC
D	120 VDC
G	198 VDC
J	**24 VDC**
K	**12 VDC**
N**	220/50 VAC
Q*	100/60 VAC
QD†	**100 VAC/50 Hz 100 VAC/60 Hz**
R	24/60 VAC
T	**240/60 - 220/50 VAC**
U	98 VDC
Y	**120/60 - 110/50 VAC**
Z	250 VDC

* High Watt only.
** Explosion Proof only.
† DIN style only.

Code	Description	Symbol
B*	**Single solenoid, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Double solenoid, 3 position, spring centered.**	
D*	**Double solenoid, 2 position, detent.**	
E	Single solenoid, 2 position, spring centered. P to B and A to T when energized.	
F	Single solenoid, 2 position, spring offset, energized to center. Position spool spacer on A side. P to A and B to T in spring offset position.	
H*	**Single solenoid, 2 position, spring offset. P to B and A to T in offset position.**	
K	Single solenoid, 2 position, spring centered. P to A and B to T when energized.	
M	Single solenoid, 2 position, spring offset, energized to center position. Spool spacer on B side. P to B and A to T in spring offset position.	

* Available with 001, 002, 004 and 011 spools only.

Bold: Designates Tier I products and options.

Non-bold: Designates Tier II products and options. These products will have longer lead times.

D101.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Solenoid Connection

Code	Description
C*	**Leadwire Conduit Box**
D**	Metric Plug (M12X1), DESINA
E†	Explosion Proof
G††	**Plug-In Conduit Box**
J#	**Deutsch (DT06-2S)**
M#	Metri-Pack (150)
P	**DIN with Plug**
S#	Dual Spade
W†	**DIN w/o Plug**

* No variations – See Plug-in.
** DC only, lights, diode surge suppressor, not CSA approved.
† Not available with lights.
†† Required for variations on conduit box style. Must have lights.
# DC only, no lights, not CSA approved.

Coil Options

Code	Description
Omit*	**High Watt**
D**	Explosion Proof, EEXD ATEX
E**	Explosion Proof, EEXME ATEX
F†	Low Watt
L††	10 Watt
O**	Explosion Proof, MSHA
T#	Explosion Proof, Ex d IIC ATEX/CSA
U**	Explosion Proof, UL/CSA

* AC ambient temperature must not exceed 60°C (140°F).
** 60 Hz only on AC, no options.
† AC only.
†† DC and AC rectified only.
# J, K and Y voltages only. Dual frequency on AC, no options.

Tube Options

Code	Description
Omit	**Standard Pressure 103.5 Bar (1500 PSI) AC 207 Bar (3000 PSI) DC**
H*	**High Pressure, AC only 207 Bar (3000 PSI)**

* Not available with CSA.

Manual Override Options

Code	Description
Omit	**Standard**
P	Extended with Boot
T*	None

* DC or AC Rectified only. Manual Override options not available with Explosion Proof.

Electrical Options

Code	Description
Omit	**No Options**
J*	Diode Surge Suppressor
Z†	Rectified Coil

* DC only. DIN coil must include plug with lights.
† DC tube standard.

Shift Response and Indication

Code	Description
Omit	**Standard Response, No Switch**
I3	Monitor Switch, 'A' & 'B' Port End
I6	Monitor Switch, 'A' & 'B' Port Start

Note: Not CE or CSA approved. Not available with 'F' or 'M' styles.

Approvals

Code	Description
Omit	**Standard Valve**
3*†	CSA USA (UL 429)
4*#	**CSA Approved**

* Not available with AC high pressure tube.
† B, C, H styles only. J, K, Y, U voltages only with C, G, W solenoid connections only. Conforms to UL429.
# Valve is derated.

Valve Variations

See next page

Design Series

NOTE: Not required when ordering.

Valve Weight:
Double Solenoid 35.0 kg (77.1 lbs.)

Standard Bolt Kit: BK229

Seal Kit:
Nitrile SKD101VWN91
Fluorocarbon SKD101VWV91

Bold: Designates Tier I products and options.

Non-bold: Designates Tier II products and options. These products will have longer lead times.

D101.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Valve Variations

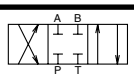
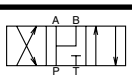
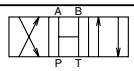
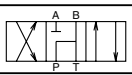
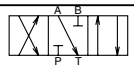
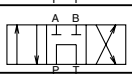
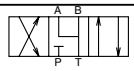
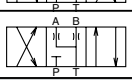
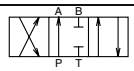
Code	Description
5*	**Signal Lights – Standard**
	Signal Lights – Hirsch. (DIN with Plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with Lights
56**	**Manaplug (Mini) with Lights**
20	**Fast Response**
1C**	**Manaplug (Mini) Single Sol. 5-pin, with Lights**
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1G**	Manaplug (Mini) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1H**	Manaplug (Micro) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1M**	Manaplug Opposite Normal
1P	Painted Body
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	**Pilot Choke Meter Out**
3B	**Pilot Choke Meter In**
3C	**Pilot Pressure Reducer**
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	**Pilot Choke Meter Out with Lights**
3H*	**Pilot Choke Meter In with Lights**
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights, Mini Manaplug, Pilot Choke Meter Out
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights

* DESINA, plug-in conduit box, and DIN with plug styles only.
** Must have plug-in style conduit box.

Bold: Designates Tier I products and options.

Non-bold: Designates Tier II products and options. These products will have longer lead times.

Reference Data

Model	Spool Symbol	MaximumFlow, LPM (GPM) 205 Bar (3000 PSI) w/o Malfunction	Model	Spool Symbol	Maximum Flow, LPM (GPM) 205 Bar (3000 PSI) w/o Malfunction
D101V*001		946 (250)	D101V*006		946 (250)
D101V*002		946 (250)	D101V*007		303 (80)
D101V*003		946 (250)	D101V*008 D101V*009		492 (130)
D101V*004		946 (250)	D101V*011		946 (250)
D101V*005		946 (250)			

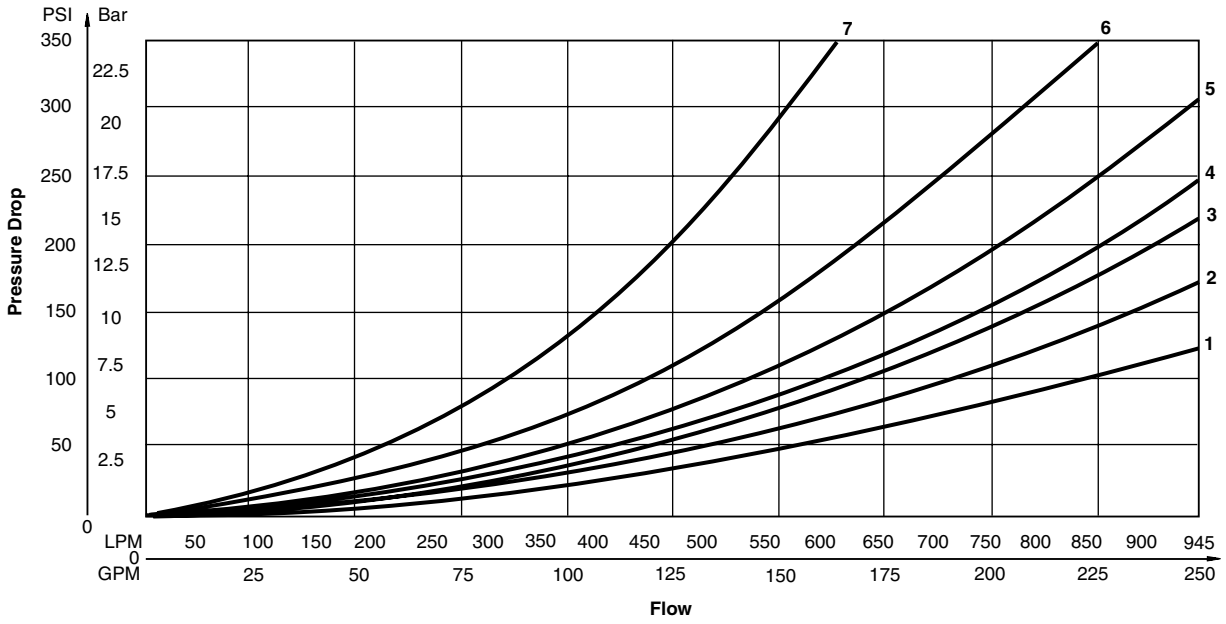
D101VW Series Pressure Drop Chart

The following chart provides the flow vs. pressure drop curve reference for the Series D101VW valve by spool type.

VISCOSITY CORRECTION FACTOR							
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141
Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change as per chart.							

D101VW Pressure Drop Reference Chart -- Curve Number					
Spool No.	P–A	P–B	P–T	A–T	B–T
001	4	4	–	2	3
002	3	3	3	1	2
003	4	4	–	1	3
004	4	4	–	1	2
005	3	4	–	2	3
006	3	3	–	2	3
007	4	3	7	2	2
008/009	5	5	6	2	3
011	4	4	–	2	3

Performance Curves



D101.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-15% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact HVD for AC coil applications.

Explosion Proof Solenoid Ratings*

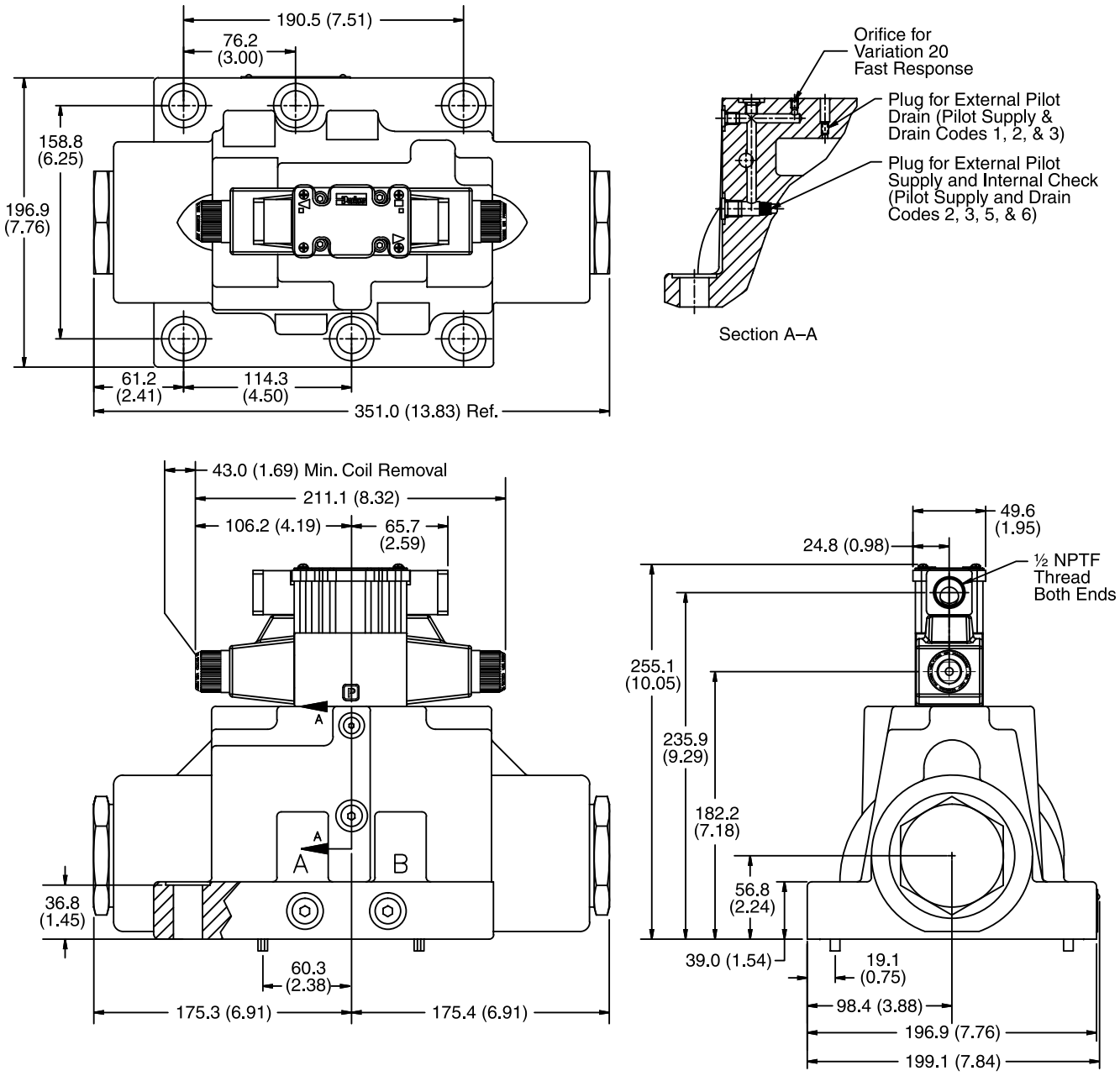
U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
MSHA (EO)	Complies with 30CFR, Part 18
ATEX (ED)	Complies with ATEX requirements for: Exd, Group IIB; EN50014: 1999+ Amds. 1 & 2, EN50018: 2000
ATEX & CSA/US (ET)	Complies with ATEX EN60079-0, EN60079-1 Ex d IIC; CSA/US Ex d IIC, AEx d IIC for Class I, Zone 1, UL1203, UL1604, CSA E61241,1 Class II, Div 1

* Allowable Voltage Deviation ±10%.
Note that Explosion Proof AC coils are single frequency only.

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
G	Omit	198 VDC	N/A	N/A	0.15 Amps	30 W	1306.80 ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 ohms
L	L	6 VDC	N/A	N/A	1.67 Amps	10 W	3.59 ohms
L	Omit	6 VDC	N/A	N/A	5.00 Amps	30 W	1.20 ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 ohms
QD	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.20 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.20 ohms
R	F	24/60 VAC, Low Watt	6.67 Amps	160 VA	2.20 Amps	23 W	1.52 ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
Z	Omit	250 VDC	N/A	N/A	0.13 Amps	30 W	1889.64 ohms
Explosion Proof Solenoids							
R		24/60 VAC	7.63 Amps	183 VA	2.85 Amps	27 W	1.99 ohms
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
N		220/50 VAC	0.77 Amps	169 VA	0.31 Amps	27 W	1.38 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
P		110/50 VAC	1.47 Amps	162 VA	0.57 Amps	27 W	34.70 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
"ET" Explosion Proof Solenoids							
K		12 VDC	N/A	N/A	1.00 Amps	12 W	12.00 ohms
J		24 VDC	N/A	N/A	1.00 Amps	13 W	44.30 ohms
Y		120/60-50 VAC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

Inch equivalents for millimeter dimensions are shown in (**)

Plug-in Conduit Box, Double AC Solenoid

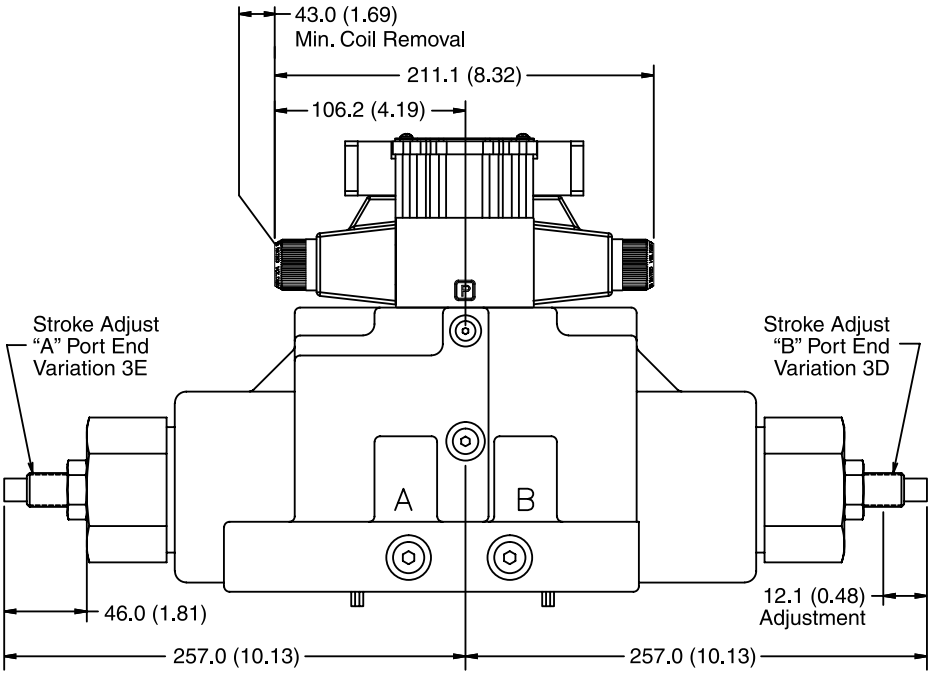


Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

Inch equivalents for millimeter dimensions are shown in (**)

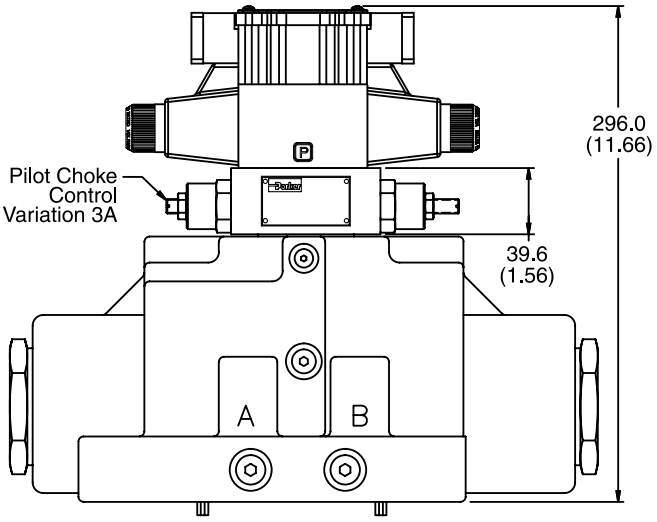
A

Conduit Box and Stroke Adjust, Double AC Solenoid



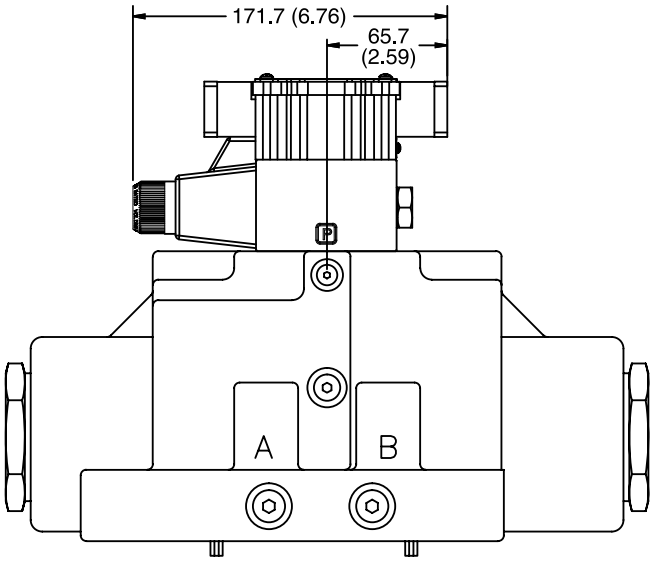
Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

Conduit Box and Pilot Choke Control, Double AC Solenoid



Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

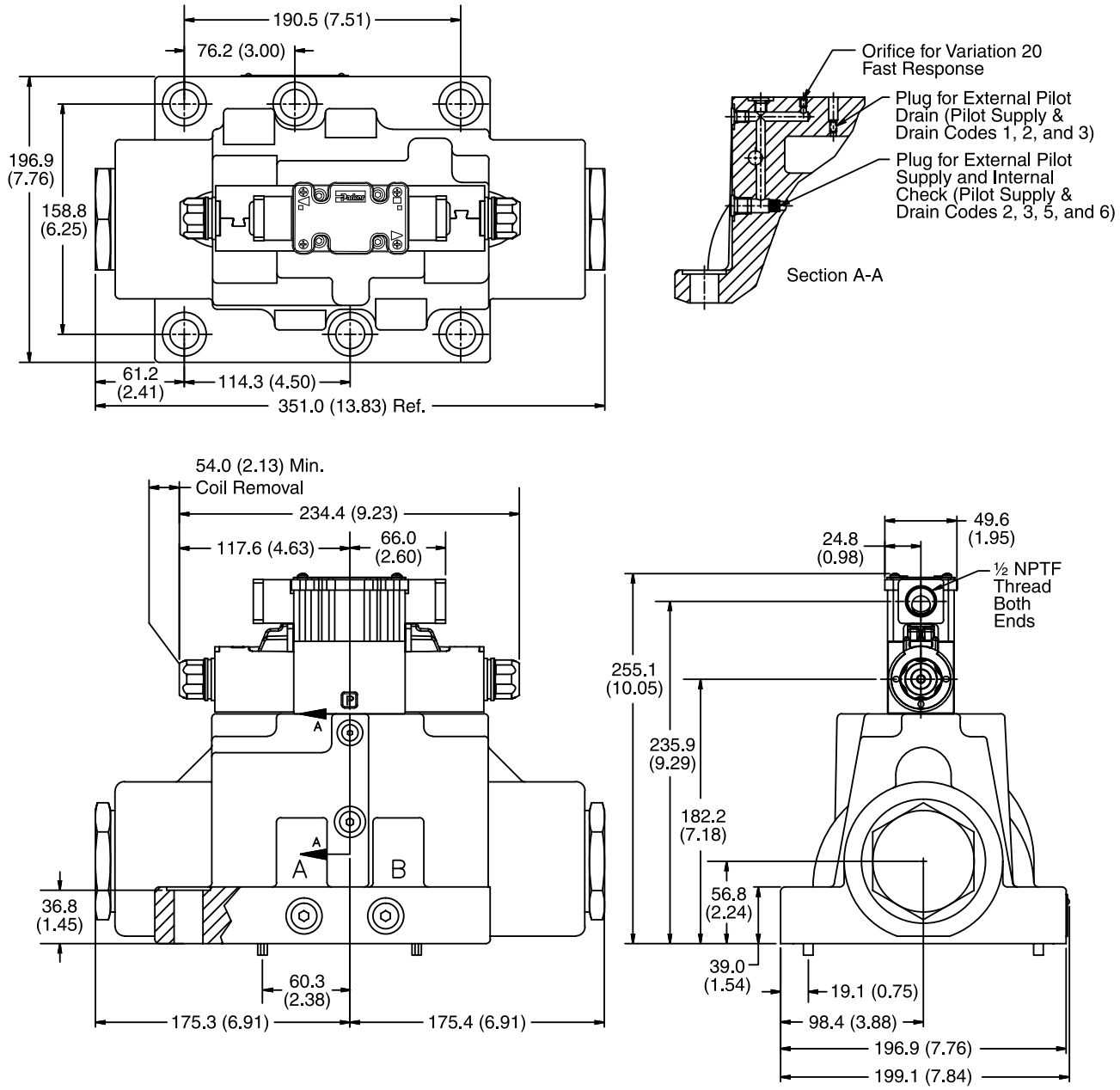
Conduit Box, Single AC Solenoid



D101.indd, dd

Inch equivalents for millimeter dimensions are shown in (**)

Plug-in Conduit Box, Double DC Solenoid



Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

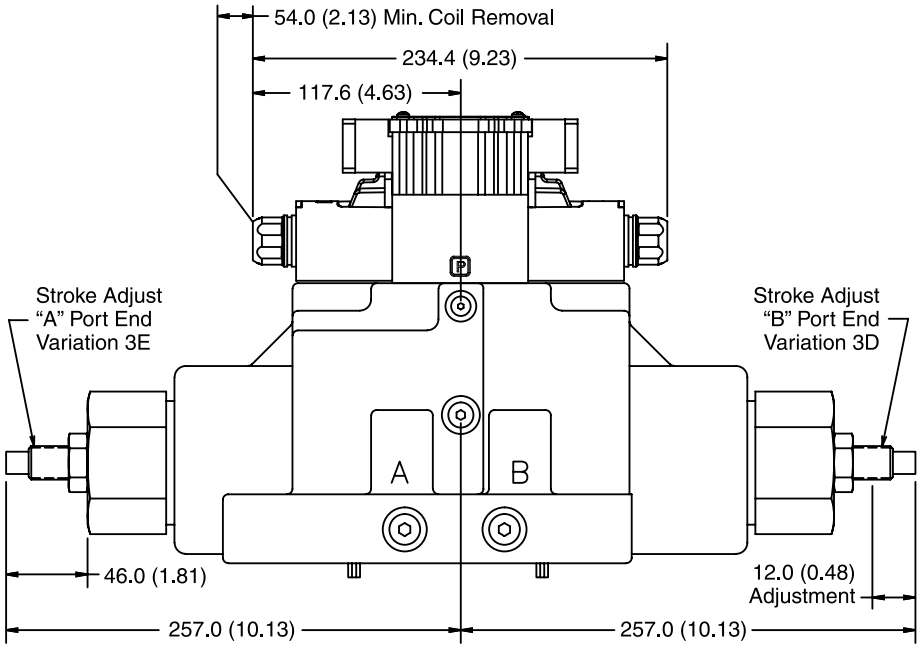
D101.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

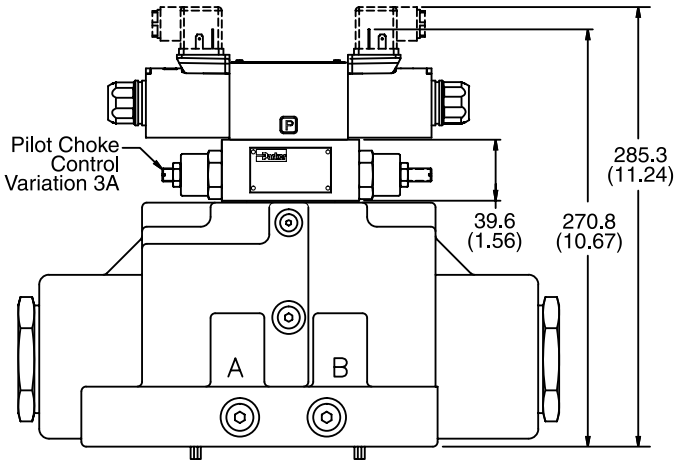
A

Plug-in Conduit Box and Stroke Adjust, Double DC Solenoid



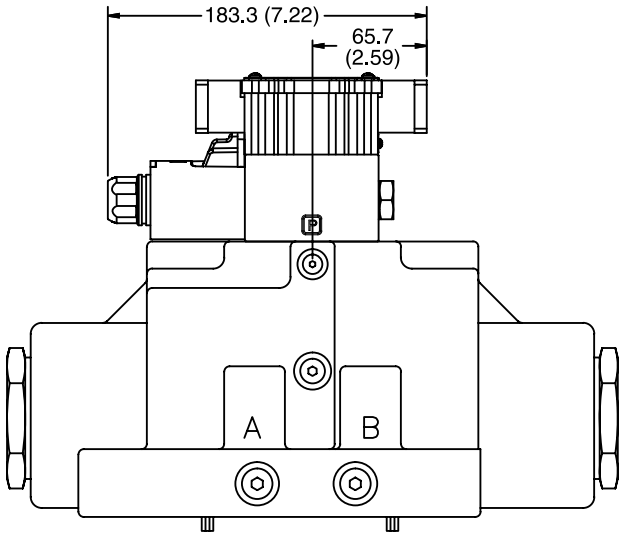
Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

Hirschmann and Pilot Choke Control, Double DC Solenoid



Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

Plug-in Conduit Box, Single DC Solenoid

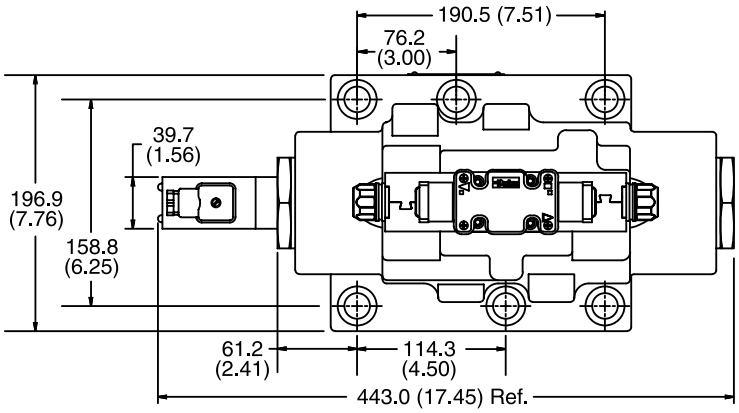


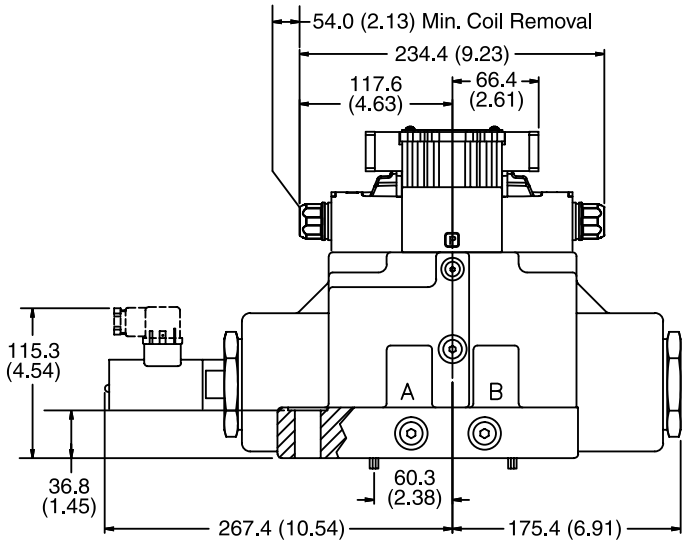
D101.indd, dd

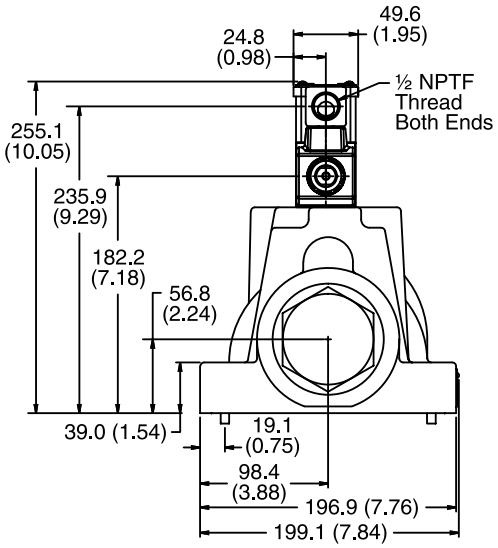
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

Plug-in Conduit Box, Double DC Solenoid
with Variation I3 or I6 (Monitor Switch)





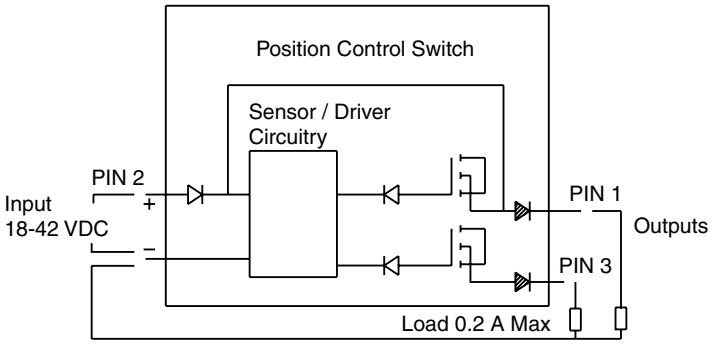


Monitor Switch
(Variation I3 and I6)

This feature provides for electrical confirmation of the spool shift. This can be used in safety circuits, to assure proper sequencing, etc.

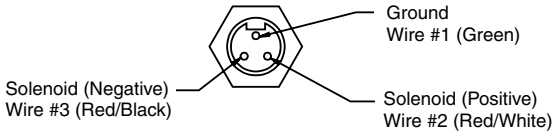
Switch Data

Pin 1 and Pin 3 have outputs equal to the input. When the monitor switch has the output to Pin 1, Pin 3 will have an output of zero, and vice-versa. When the valve is switched, Pin 1 and Pin 3 will switch outputs.

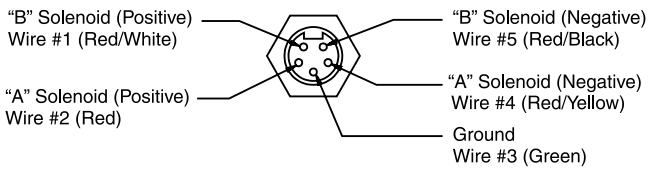


Manaplug (Options 6, 56, 1A & 1C)

Interface – Brad Harrison Plug
– 3-Pin for Single Solenoid
– 5-Pin for Double Solenoid

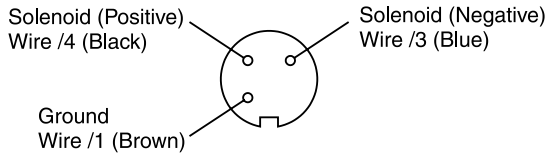


3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

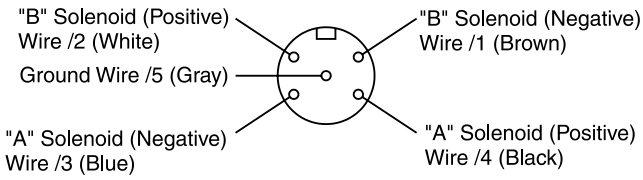


5-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7A, 7B, 1B & 1D)



3-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid



5-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

Manaplug – Electrical Mini Plug

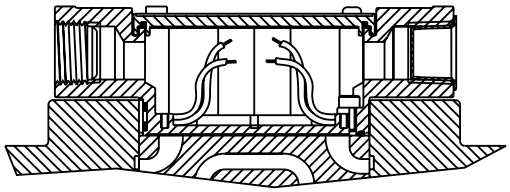
EP336-30	3 Pin Plug
EP316-30	5 Pin Plug (Double Solenoid)
EP31A-30	5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

EP337-30	3 Pin Plug
EP317-30	5 Pin Plug (Double Solenoid)
EP31B-30	5 Pin Plug (Single Solenoid)

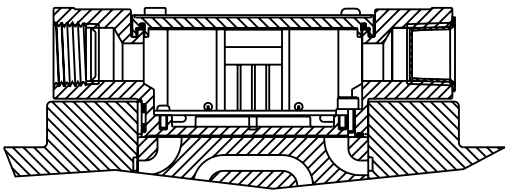
Conduit Box Option C

– No Wiring Options Available

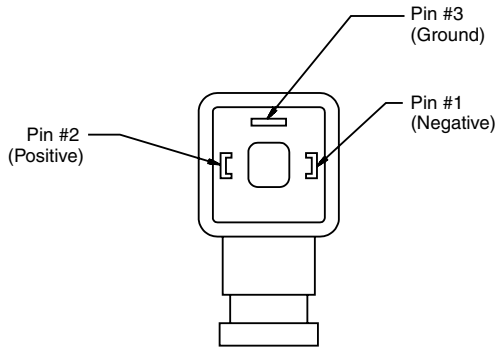


Signal Lights (Option 5) — Plug-in Only

– LED Interface
– Meets Nema 4/IP67



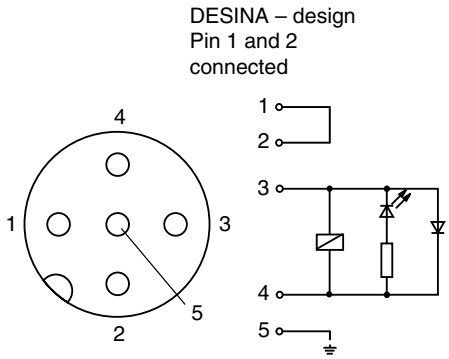
Hirschmann Plug with Lights (Option P5)
ISO 4400/DIN 43650 Form "A"



Face View of Plug

DESINA Connector (Option D)
M12 pin assignment
Standard

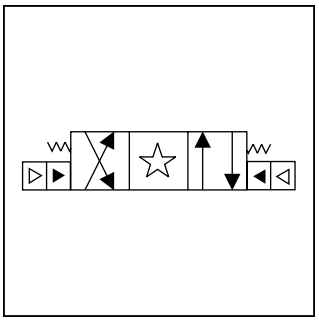
1 = Not used
2 = Not used
3 = 0V
4 = Signal (24 V)
5 = Earth Ground

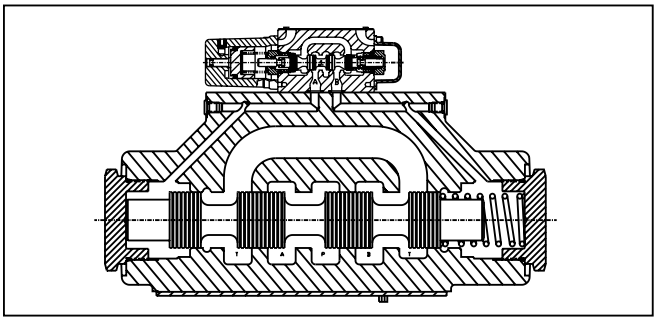


Pins are as seen on valve (male pin connectors)

General Description

Series D101VA directional control valves are 5-chamber, air pilot operated valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D10, CETOP 10 mounting pattern.





Specifications

Mounting Pattern	NFPA D10, CETOP 10, NG32
Max. Operating Pressure	207 Bar (3000 PSI)
Max. Tank Pressure	Internal Drain Model: 34 Bar (500 PSI) External Drain Model: 207 Bar (3000 PSI)
Max. Drain Pressure	34 Bar (500 PSI)
Maximum Flow	See Reference Chart
Pilot Pressure	Air Min 3.4 Bar (50 PSI) Air Max 10.2 Bar (150 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)

Features

- Low pressure drop design.
- Hardened spools provide long life.

Ordering Information

D	101V	A							
Directional Control Valve	Basic Valve	Air Operated Pilot	Spool	Style	Pilot Supply and Drain	Seal	Valve Variations	Design Series

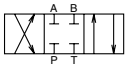
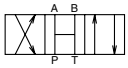
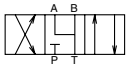
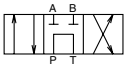
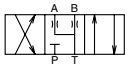
NFPA D10
CETOP 10

NOTE: Not required when ordering.

Code	Type
N	Nitrile
V	Fluorocarbon

Code	Description
Omit	Standard
7	Pilot Choke – Meter Out
8	Stroke Adj. 'B' End
9	Stroke Adj. 'A' End
60	Pilot Choke – Meter In
89	Stroke Adj. 'A' & 'B' Ends
90	1/4 BSPP Threads

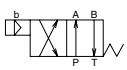
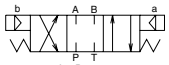
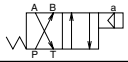
Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator A. Note operators reverse sides on #8 and #9 spools. See installation information for details.

Code	Symbol
1	
2	
4	
8* 9**	
11	

* 8 spool has closed crossover.
** 9 spool has open crossover.

Code	Description
1	Int. pilot/Ext. drain
2	Ext. pilot/Ext. drain
4#	Int. pilot/Int. drain
5	Ext. pilot/Int. drain

Not available with 2, 8 & 9 spools.

Code	Description	Symbol
B†	Sgl. operator, 2 position, spring offset. P to A and B to T in offset position.	
C	Dbl. operator, 3 position, spring centered.	
H†	Sgl. operator, 2 position, spring offset. P to B and A to T in offset position.	

† Available with 1, 2, 4 & 11 spools only.

This condition varies with spool code.

Valve Weight: 35.3 kg (77.8 lbs.)
Standard Bolt Kit: BK229
Metric Bolt Kit: BKM229

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

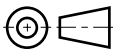
D101.indd, dd

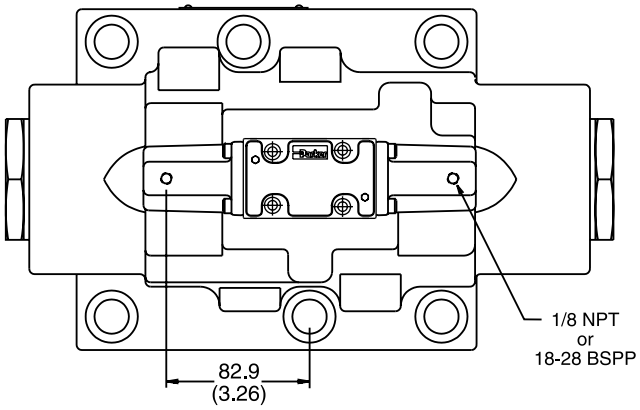
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

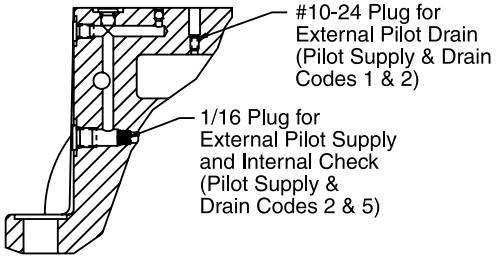
Inch equivalents for millimeter dimensions are shown in (**)

A

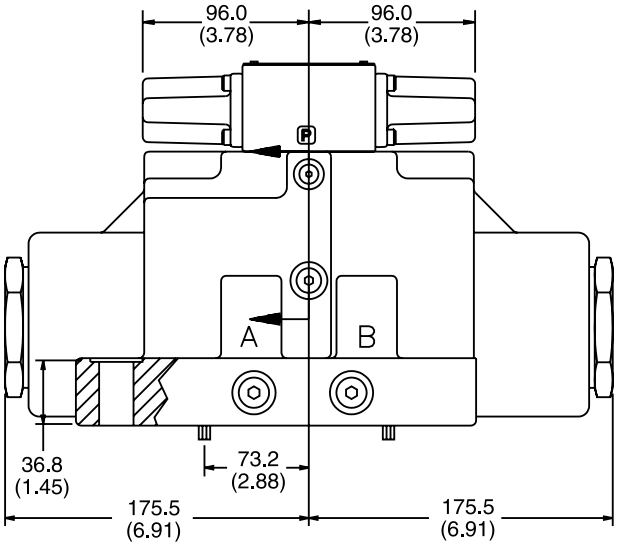
Air Operated

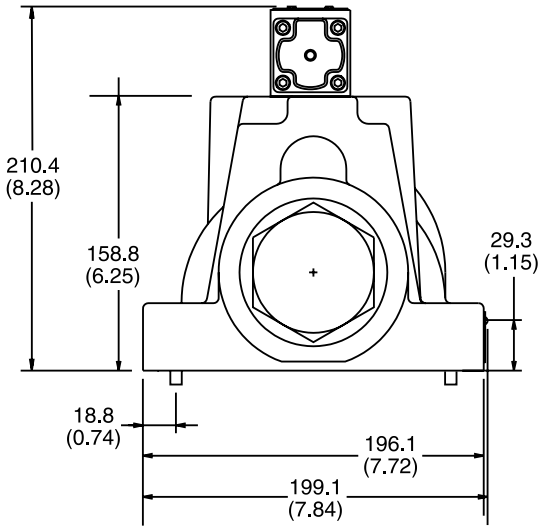






Section A-A





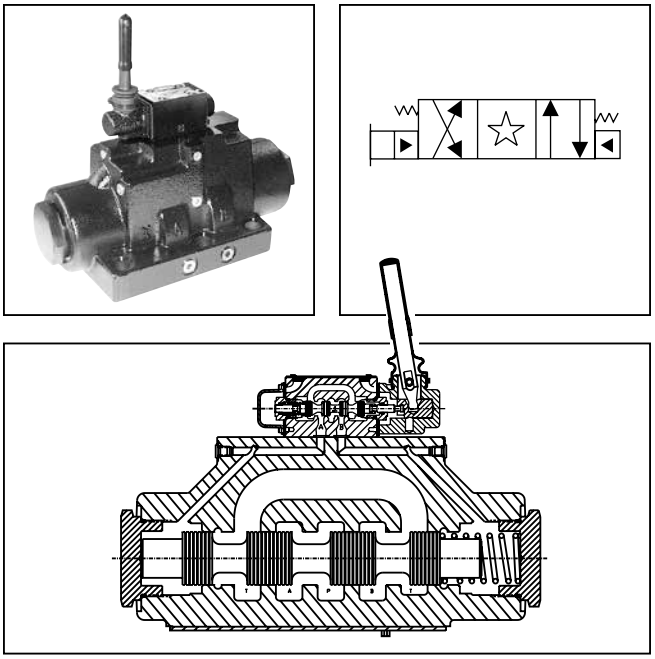
Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

D101.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series D101VL directional control valves are 5-chamber, lever operated valves. They are available is 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D10, CETOP 10 mounting pattern.



Specifications

Mounting Pattern	NFPA D10, CETOP 10, NG32
Max. Operating Pressure	207 Bar (3000 PSI)
Max. Tank Pressure	Internal Drain Model: 34 Bar (500 PSI) External Drain Model: 207 Bar (3000 PSI)
Max. Drain Pressure	34 Bar (500 PSI)
Maximum Flow	See Reference Chart
Pilot Pressure	Oil Min 6.9 Bar (100 PSI) Oil Max 207 Bar (300 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)

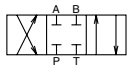
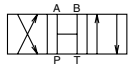
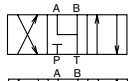
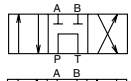
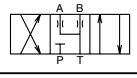
Features

- Low force required to shift spool.
- Hardened spools provide long life.
- Low pressure drop design.

Ordering Information

D — Directional Control Valve
101V — Basic Valve (NFPA D10 CETOP 10)
L — Lever Operated Pilot
Spool
Style
Pilot Supply and Drain
Seal
Valve Variations
Design Series

NOTE: Not required when ordering.

Code	Symbol
1	
2	
4	
8* 9**	
11	

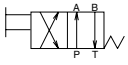
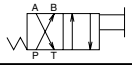
* 8 spool has closed crossover.
** 9 spool has open crossover.

Code	Type
N	Nitrile
V	Fluorocarbon

Code	Supply — Drain
1	Int. pilot/Ext. drain
2	Ext. pilot/Ext. drain
4#	Int. pilot/Int. drain
5	Ext. pilot/Int. drain

\# Not available with 2, 8 & 9 spools.

Code	Description
Omit	Standard
7	Pilot Choke – Meter Out
8	Stroke Adj. 'B' End
9	Stroke Adj. 'A' End
60	Pilot Choke – Meter In
89	Stroke Adj. 'A' & 'B' Ends

Code	Description	Symbol
B†	Sgl. operator, 2 position, spring offset. P to A and B to T in offset position.	
C	Dbl. operator, 3 position, spring centered.	
H†	Sgl. operator, 2 position, spring offset. P to B and A to T in offset position.	

† Available with 1, 2, 4 & 11 spools only.

This condition varies with spool code.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator A. Note operators reverse sides on #8 and #9 spools. See installation information for details.

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Valve Weight: 35.0 kg (77.2 lbs.)
Standard Bolt Kit: BK229
Metric Bolt Kit: BKM229

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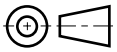
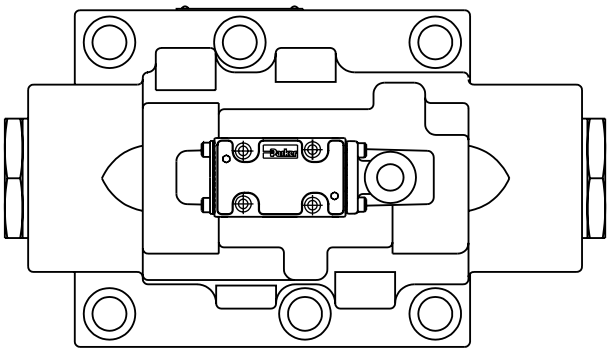
Hydraulic Valve Division
Elyria, Ohio, USA

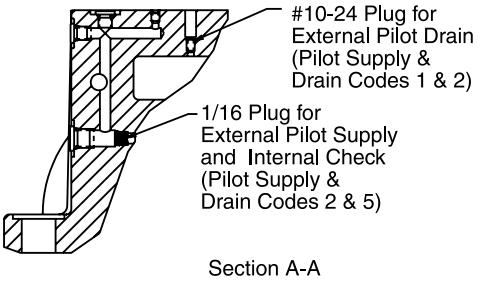
Inch equivalents for millimeter dimensions are shown in (**)

A

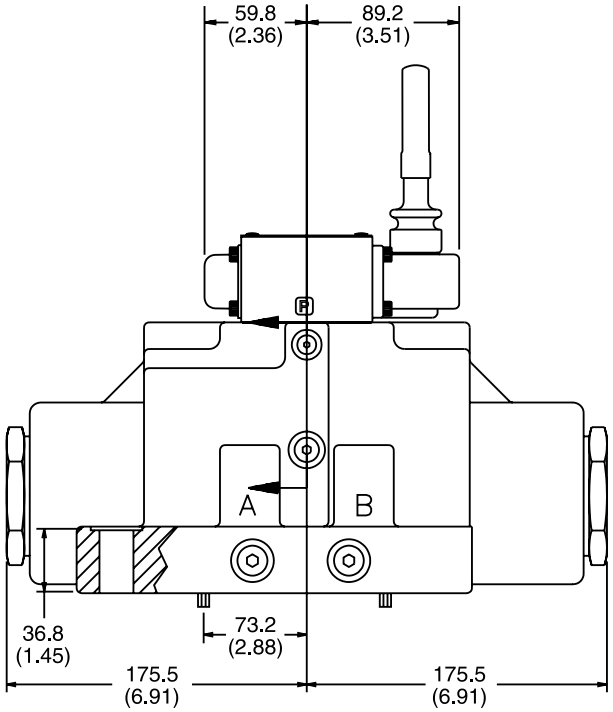
Lever Operated

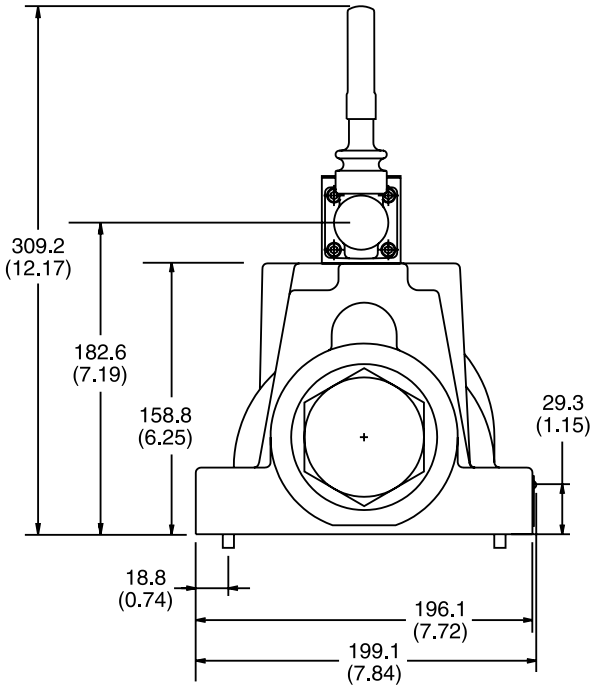






Section A-A





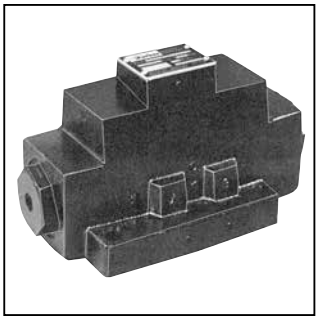
Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

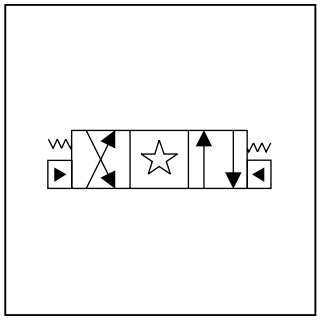
General Description

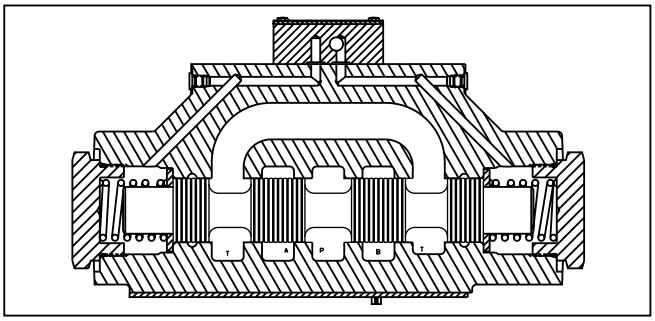
Series D10P directional control valves are 5-chamber, pilot operated valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D10, CETOP 10 mounting pattern.

Features

- Low pressure drop design.
- Hardened spools provide long life.







Specifications

Mounting Pattern	NFPA D10, CETOP 10, NG32
Max. Operating Pressure	207 Bar (3000 PSI)
Max. Tank Line Pressure	207 Bar (3000 PSI)
Max. Drain Pressure	207 Bar (3000 PSI)
Min. Pilot Pressure	4.4 Bar (65 PSI)
Max. Pilot Pressure	207 Bar (3000 PSI)
Nominal Flow	378 LPM (100 GPM)
Maximum Flow	See Reference Chart

For flow path, pilot drain and pilot pressure details, see Installation Information.

Response Time

Response time will vary with pilot line size, pilot line length, pilot pressure shift time and flow capacity of the control valve.

Shift Volume

The pilot chamber requires a volume of 1.51 in^3 (24.75 cc) for center to end.

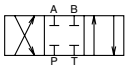
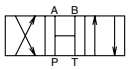
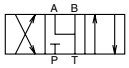
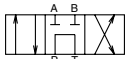
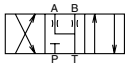
Ordering Information

D Directional Control Valve

10 Basic Valve
NFPA D10 CETOP 10

P Actuator
Oil Operator

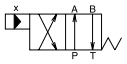
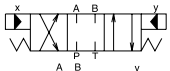
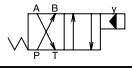
Spool

Code	Symbol
1	
2	
4	
8* 9**	
11	

* 8 spool has closed crossover.
** 9 spool has open crossover.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator X. Note operators reverse sides on #8 and #9 spools. See installation information for details.

Style

Code	Description	Symbol
B†	**Sgl. operator, 2 position, spring offset. P to A and B to T in offset position.**	
C	**Dbl. operator, 3 position, spring centered.**	
H†	**Sgl. operator, 2 position, spring offset. P to B and A to T in offset position.**	

† Available with 1, 2, 4 & 11 spools only.

Pilot Supply and Drain

Code	Description
2	**Ext. Pilot / Ext. Drain**
5#	**Ext. Pilot / Int. Drain**

\# Available in "B" & "H" styles only.

Seal

Code	Type
N	**Nitrile**
V	**Fluorocarbon**

Valve Variations

Code	Description
Omit	**Standard**
7	Pilot Choke – Meter Out
8	Stroke Adj. 'B' End
9	Stroke Adj. 'A' End
60	Pilot Choke – Meter In
89	Stroke Adj. 'A' & 'B' Ends

Design Series
NOTE: Not required when ordering.

Valve Weight: 34.3 kg (75.7 lbs.)
Standard Bolt Kit: BK229
Metric Bolt Kit: BKM229

This condition varies with spool code.

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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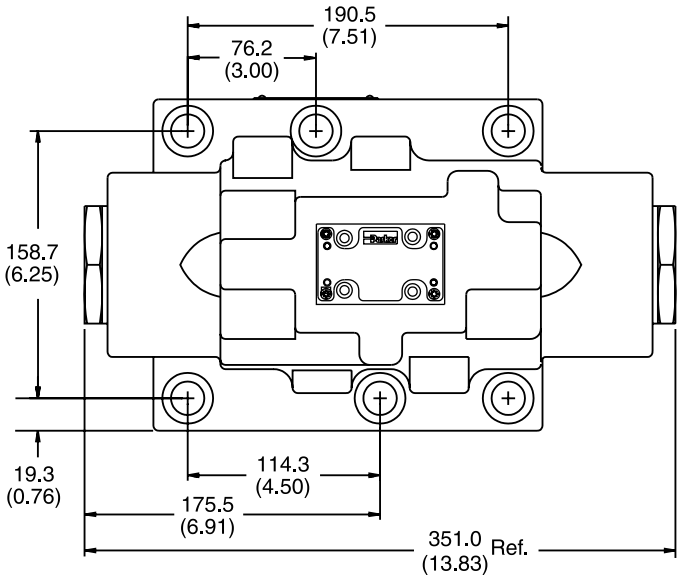
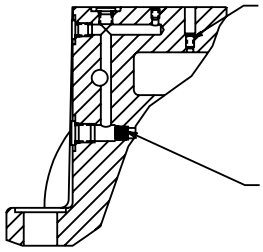
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

A

Standard Pilot Operated

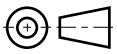




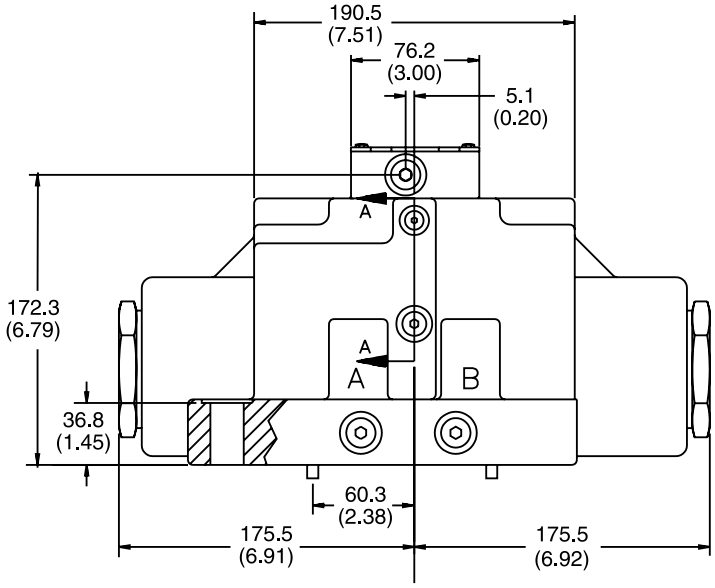
#10-24 Plug for External Pilot Drain
(Pilot supply and drain code 2)

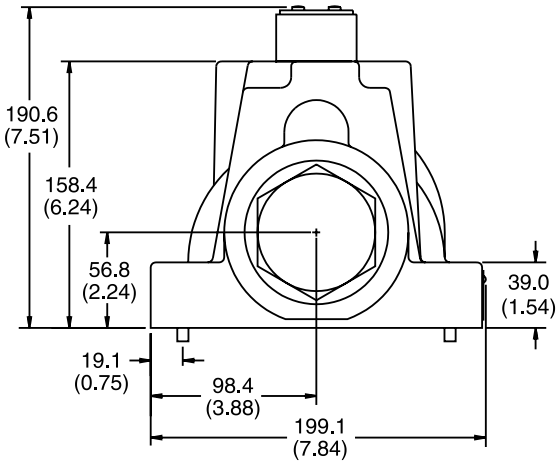
1/16 Plug for External Pilot Supply and Internal Check
(Pilot supply and drain codes 2 & 5)

Section A–A

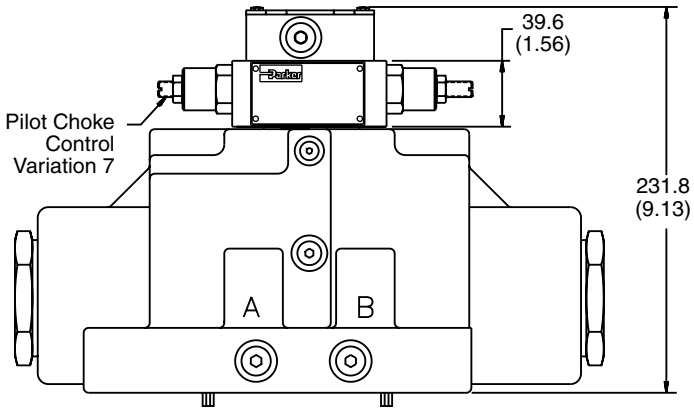


Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.





Pilot Operated with Pilot Choke Control



Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

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Elyria, Ohio, USA

FOR MAXIMUM VALVE RELIABILITY, ADHERE TO THE FOLLOWING INSTALLATION INFORMATION.

The following is important installation information which applies to all directional control valves described in this catalog.

Mounting Position

Detent – Horizontal
Spring Offset – Unrestricted
Spring Centered – Unrestricted

Fluid Recommendations

Premium quality hydraulic oil with a viscosity range between 32-54 cSt (150-250 SSU) At 38°C (100°F) is recommended. The absolute operating viscosity range is from 16-220 cSt (80-1000 SSU). Oil should have maximum anti-wear properties and rust and oxidation treatment.

Fluids and Seals

Valves using synthetic, fire-resistant fluids require special seals. When phosphate esters or its blends are used, FLUOROCARBON seals are required. Water-glycol, water-in-oil emulsions and petroleum oil may be used with STANDARD seals.

Filtration

For maximum valve and system component life, the system should be protected from contamination at a level not to exceed 125 particles greater than 10 microns per milliliter of fluid (SAE class 4/ISO 16/13).

Silting

Silting can cause any sliding spool valve to stick and not spring return if held under pressure for long periods of time. The valve should be cycled periodically to prevent sticking.

Special Installations

Consult your Parker representative for any application requiring the following:

- Pressure above rating.
- Fluid other than those specified.
- Oil temperature above 71.1°C (160°F).
- Flow path other than normal.

Mounting Patterns

Series	NFPA	Size
D101V*, D10P	D10	1-1/4”

Torque Specifications

The recommended torque values for the bolts which mount the valve to the manifold or subplate are as follows: 406.8 Nm (300 ft-lbs).

Series D101VW, D101VA, D101VL

Tank and Drain Line Surges

If several valves are piped with a common tank or drain line, flow surges in the line may cause an unexpected spool shift. Detent style valves are most susceptible to this. Separate tank and drain lines should be piped in installations where line surges are expected.

Electrical Characteristics (Detented Spool)

Only a momentary energizing of the solenoid is necessary to shift and hold a detented spool. Minimum duration of the signal is 0.1 seconds for DC voltages. For AC voltages the response time is 0.06 seconds. Spool position will be held provided the spool centerline is in a horizontal plane, and not shock or vibration is present to displace the spool.

Electrical Failure or Loss of Pilot Pressure (D101VA)

Should electric power fail or loss of pilot pressure occur, spring offset and spring centered valves will shift to the spring held position. Detented valves will stay in the last position held before power failure. If main flow does not fail or stop at the same time power fails, machine actuators may continue to function in an undesirable manner or sequence.

Pilot/Drain Characteristics

Pilot Pressure: 4.4 to 207 Bar (65 to 3000 PSI)

External: An oil source sufficient to maintain minimum pilot pressure must be connected to the “X” port of the main body. When using the external pilot variation, a 1/16" pipe plug must be present in the main body pilot passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with pilot code 2, 3, 5 or 6.

Internal: Flow is internally ported from the pressure port of the main valve body to the “P” port of the pilot valve. The pressure developed at the “P” port of the pilot valve must be 4.4 Bar (65 PSI) minimum at all times.

Integral Check: Valves using internal pilot and internal drain with an open center spool (spools 2, 7, 8 & 9) can be ordered with an integral check valve in the pressure port of the main valve codes 3 & 6. Pilot oil will be internally ported from the upstream side of this check to the “P” port of the pilot valve, ensuring sufficient pilot pressure. A 1/16” pipe plug will be present in the main body. The “X” port in the subplate must be plugged when using the integral check.

Pilot Valve Drain: Maximum pressure 102 Bar (1500 PSI) AC standard, 207 Bar (3000 PSI) AC optional/DC standard.

External: When using an external drain, a 10 x 24 x 0.31 long set screw must be present in the main body drain passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with drain code 1, 2 or 3.

Drain flow from the pilot valve is at the “Y” port of the main body and must be piped directly to tank. Maximum drain line pressure is 102 Bar (1500 PSI) AC standard, 207 Bar (3000 PSI) AC optional/DC standard. Any drain line back pressure is additive to the pilot pressure requirement.

Internal: Drain flow from the pilot valve is internally connected to the main valve tank port. Tank and drain pressure are then identical so tank line pressure should not exceed 102 Bar (1500 PSI) AC standard, 207 Bar (3000 PSI) DC standard/AC optional. Any tank line back pressure is also additive to the pilot pressure requirement. If flow surges (a cause of pressure surges) are anticipated in the tank line, an external drain variation is recommended. The “Y” port in the subplate must be plugged when using an internal drain.

Style Code	Description	No Solenoid/Operator Energized	Solenoid/Operator A Energized	Solenoid/Operator B Energized
B	Spring Offset	P→A and B→T	—	P→B and A→T
C	Spring Centered	Centered	P→A and B→T	P→B and A→T
D	Detented	Last Position Held	P→A and B→T	P→B and A→T
E	Spring Centered	Centered	—	P→B and A→T
F†	Spring Offset, Shift to Center	P→A and B→T	—	Centered
H	Spring Offset	P→B and A→T	P→A and B→T	—
K	Spring Centered	Centered	P→A and B→T	—
M†	Spring Offset, Shift to Center	P→B and A→T	Centered	—

† D101VW only.

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Elyria, Ohio, USA

Tank and Drain Line Surges

If several valves are piped with a common tank or drain line, flow surges in the line may cause an unexpected spool shift. Detent style valves are most susceptible to this. Separate tank and drain lines should be piped in installations where line surges are expected.

Loss of Pilot Pressure

Should a loss of pilot pressure occur, spring offset and spring centered valves will shift to the spring held position. No spring valves will stay in the last position held. If main hydraulic flow does simultaneously stop, machine actuators may continue to function in an undesirable manner or sequence.

Pilot Drain Characteristics

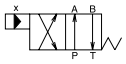
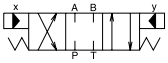
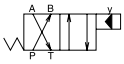
Pilot Pressure:
4.4 to 207 Bar (65 to 3000 PSI)

Direct pilot operated valves use the “X” and “Y” ports to supply pilot oil directly to the ends of the spool, providing spool shifting force. A block mounted on top of the valve body is internally cored to make the necessary connections. Thus when “X” is pressurized, “Y” is used as a drain; and when “Y” is pressurized, “X” becomes the drain.

Any back pressure in these lines when they are being used as a drain is additive to the pilot pressure requirement.

Internal Drain: On spring offset models, only the “X” port is pressurized, as the spring returns the spool to its at rest position. On these models, “Y” may be internally drained through the main tank passage in the valve.

Flow Path/Pilot Pressure

Style Code	Description	“X” & “Y” De-Pressurized	“X” Port Pressurized	“Y” Port Pressurized	Special Notes	Recommended Control Valve For Pilot Oil
B	Two Position Spring Offset	P→A, B→T	P→A, B→T	P→B, A→T	“X” Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position Spring Centered	Center	P→A, B→T	P→B, A→T	Flow paths will be reversed on valves with tandem center (8 & 9) spools	
H	Two-Position Spring Offset	P→B, A→T	P→A, B→T	P→B, A→T	“Y” Port may be pressurized to assist spring in returning spool to offset position	

Subplate Mounting
NFPA D10, CETOP 10 & NG 32

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 406.8 Nm (300 ft-lbs).

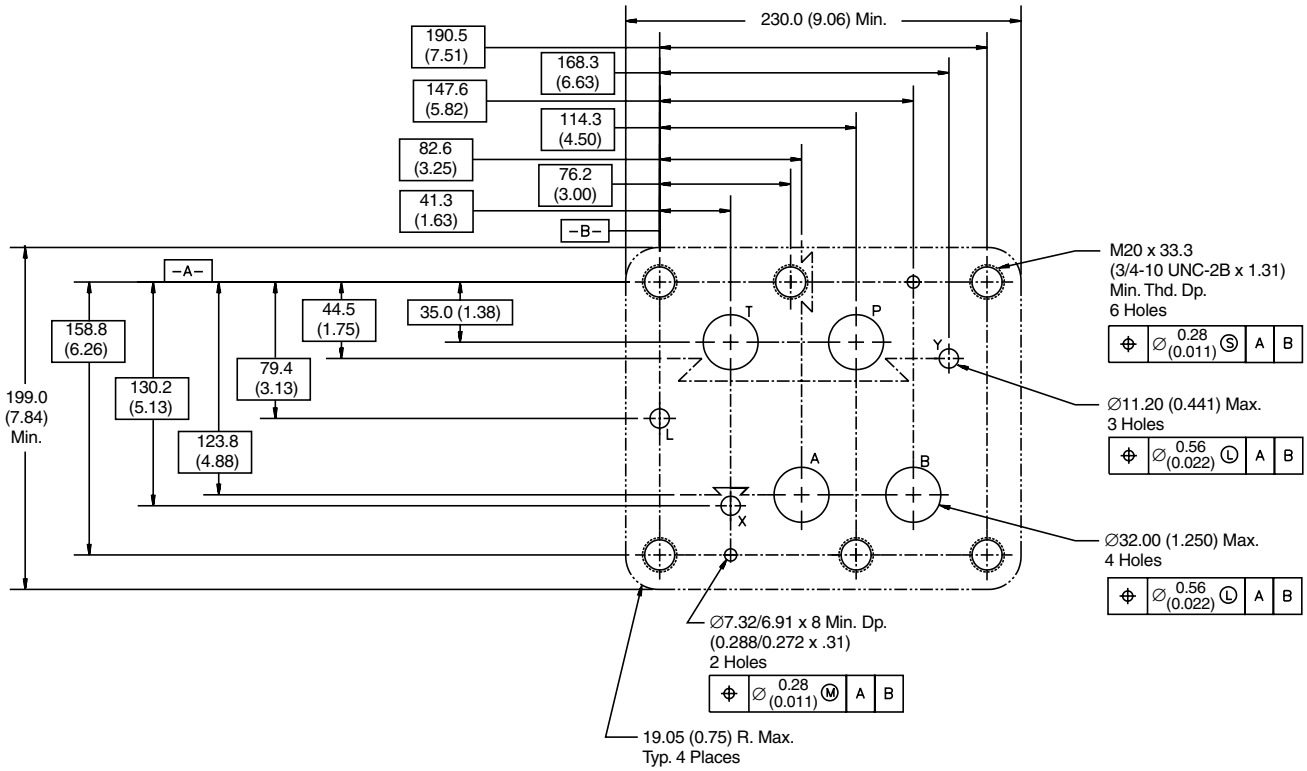
For maximum valve reliability, adhere to the following installation information.

Mounting Position

Valve Type	Mounting Position
Detent (Solenoid)	Horizontal
Spring Offset	Unrestricted
Spring Centered	Unrestricted

Mounting Pattern — NFPA D10, CETOP 10 & NG32

Inch equivalents for millimeter dimensions are shown in (**)

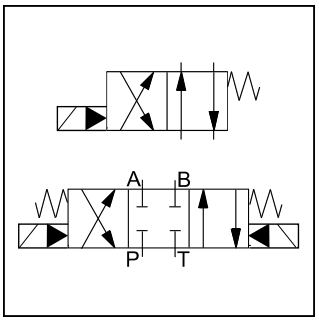


General Description

Series D111VW valves are piloted by a D1VW valve. The valves can be ordered with position control.

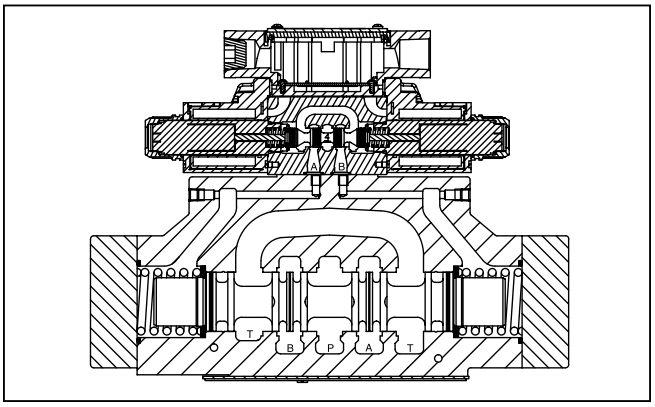
The minimum pilot pressure must be ensured for all operating conditions of the directional valve.

Additionally spools with a P to T connection in the de-energized position need an external pressure supply (external inlet).



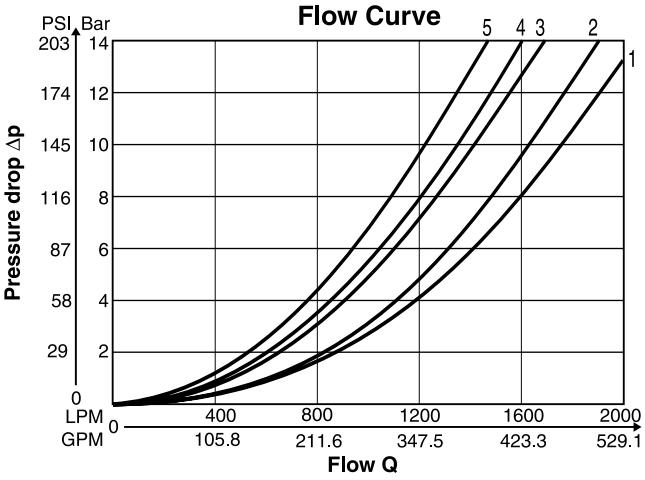
Features

- Low pressure drop design.
- Hardened spools provide long life.
- Wide variety of voltages and electrical connection options.
- Explosion proof availability.
- No tools required for coil removal.



Performance Curves

The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.



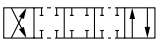
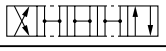
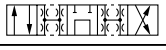
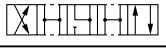
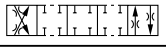
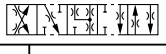
Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
001	5	5	–	4	1
002	5	5	5	4	1
009	3	3	2	3	1
020	5	5	–	3	1
030	5	5	–	4	1
054	5	5	–	4	1

All characteristic curves measured with HLP46 at 50°C.

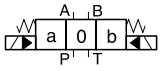
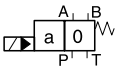
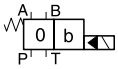
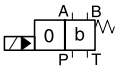
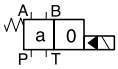
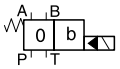
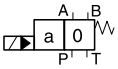
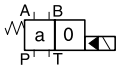
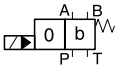
D	111V	W			
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Pilot Supply and Drain
	NFPA 10 CETOP 10 DIN NG32 50 mm	Solenoid Wet Pin			

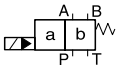
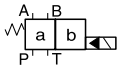
Code	Description	
1	**Internal Pilot**	**External Drain**
2	External Pilot	External Drain
4*	**Internal Pilot**	**Internal Drain**
5	External Pilot	Internal Drain

* Not for spools 002, 009, 030.

3-Position Spools	
Code	**Spool Type**
	a 0 b
001	
002	
009	
054	
081	
082	

2-Position Spools	
Code	**Spool Type**
	a b
020	
030	

3-Position Spools			
Code	**All 3-Position Spools**		
C			**3 positions.** **Spring offset in position "0".** **Operated in position "a" or "b".**
	Standard	Spool Type 009*	
E	 Operated in position "a".	 Operated in position "b".	2 positions. Spring offset in position "0".
F	 Spring offset in position "b".	 Spring offset in position "a".	2 positions. Operated in position "0".
K	 Operated in position "b".	 Operated in position "a".	2 positions. Spring offset in position "0".
M	 Spring offset in position "a".	 Spring offset in position "b".	2 positions. Operated in position "0".

2-Position Spools		
Code	**Spool Position**	
B		**Spring offset in position "b".** **Operated in position "a".**
H		Spring offset in position "a". Operated in position "b".

* Available only with external pilot.

Weight:

Single Solenoid: 67.4 kg (148.6 lbs.)
Double Solenoid: 68.0 kg (149.9 lbs.)

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

D111VW.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Seal

Code	Description
N	**Nitrile**
V	Fluorocarbon

Solenoid Voltage

Code	Description
A*	24/50 VAC
D	120 VDC
G	198 VDC
J	**24 VDC**
K	**12 VDC**
N**	220/50 VAC
Q*	100/60 VAC
QD†	100 VAC/60 HZ 100 VAC/50 HZ
R	24/60 VAC
T	**240/60 - 220/50 VAC**
U	98 VDC
Y	**120/60 - 110/50 VAC**
Z	250 VDC

* High Watt Coil only.
** Explosion Proof only.
† Available in DIN only.

Solenoid Connection

Code	Description
C*	**Leadwire Conduit Box**
D**	Metric Plug (M12X1), DESINA
E†	Explosion Proof
G††	**Plug-In Conduit Box**
J#	**Deutsch (DT06-2S)**
M#	Metri-Pack (150)
P	**DIN with Plug**
S#	Dual Spade
W†	**DIN w/o Plug**

* No variations – See Plug-in.
** DC only, lights, diode surge suppressor, not CSA approved.
† Not available with lights.
†† Required for variations on conduit box style. Must have lights.
# DC only, no lights, not CSA approved.

Coil Options

Code	Description
Omit*	**High Watt**
D**	Explosion Proof, EEXD ATEX
E**	Explosion Proof, EEXME ATEX
F†	Low Watt
L††	10 Watt
O**	Explosion Proof, MSHA
T#	Explosion Proof, Ex d IIC ATEX/CSA
U**	Explosion Proof, UL/CSA

* AC ambient temperature must not exceed 60°C (140°F).
** 60 Hz only on AC, no options.
† AC only.
†† DC and AC rectified only.
# J, K and Y voltages only. Dual frequency on AC, no options.

Tube Options

Code	Description
Omit	**Standard Pressure 103.5 Bar (1500 PSI) AC 207 Bar (3000 PSI) DC**
H*	**High Pressure, AC only 207 Bar (3000 PSI)**

* Not available with CSA.

Manual Override Options

Code	Description
Omit	**Standard**
P	Extended with Boot
T†	None

† DC or AC Rectified only.

Manual Override options not available with Explosion Proof.

Electrical Options

Code	Description
Omit	**No Options**
J*	Diode Surge Suppressor
Z†	Rectified Coil

* DC or AC Rectified only. DIN coil must include plug with lights.
† DC tube standard.

Shift Response and Indication

Code	Description
Omit	**Standard Response, No Switch**
I3N	Monitor Switch, 'A' & 'B' Port End
I6N	Monitor Switch, 'A' & 'B' Port Start

Note: Not CE or CSA approved. C style with 001 and 009 spools only.

Valve Variations

See next page

Design Series

NOTE: Not required when ordering.

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

D111VW.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Valve Variations

Code	Description
5*	**Signal Lights – Standard**
	Signal Lights – Hirsch. (DIN with Plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with Lights
56**	**Manaplug (Mini) with Lights**
1C**	**Manaplug (Mini) Single Sol. 5-pin, with Lights**
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1G**	Manaplug (Mini) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1H**	Manaplug (Micro) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1M**	Manaplug Opposite Normal
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	**Pilot Choke Meter Out**
3B	**Pilot Choke Meter In**
3C	**Pilot Pressure Reducer**
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	**Pilot Choke Meter Out with Lights**
3H*	**Pilot Choke Meter In with Lights**
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights, Mini Manaplug, Pilot Choke Meter Out
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights

* DESINA, plug-in conduit box, and DIN with plug styles only.
** Must have plug-in style conduit box.

Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-15% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact HVD for AC coil applications.

Explosion Proof Solenoid Ratings*

U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
MSHA (EO)	Complies with 30CFR, Part 18
ATEX (ED)	Complies with ATEX requirements for: Exd, Group IIB; EN50014: 1999+ Amds. 1 & 2, EN50018: 2000
ATEX & CSA/US (ET)	Complies with ATEX EN60079-0, EN60079-1 Ex d IIC; CSA/US Ex d IIC, AEx d IIC for Class I, Zone 1, UL1203, UL1604, CSA E61241,1 Class II, Div 1

* Allowable Voltage Deviation ±10%.
Note that Explosion Proof AC coils are single frequency only.

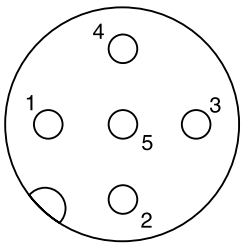
Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
G	Omit	198 VDC	N/A	N/A	0.15 Amps	30 W	1306.80 ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 ohms
L	L	6 VDC	N/A	N/A	1.67 Amps	10 W	3.59 ohms
L	Omit	6 VDC	N/A	N/A	5.00 Amps	30 W	1.20 ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 ohms
QD	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.20 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.20 ohms
R	F	24/60 VAC, Low Watt	6.67 Amps	160 VA	2.20 Amps	23 W	1.52 ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
Z	Omit	250 VDC	N/A	N/A	0.13 Amps	30 W	1889.64 ohms
Explosion Proof Solenoids							
R		24/60 VAC	7.63 Amps	183 VA	2.85 Amps	27 W	1.99 ohms
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
N		220/50 VAC	0.77 Amps	169 VA	0.31 Amps	27 W	1.38 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
P		110/50 VAC	1.47 Amps	162 VA	0.57 Amps	27 W	34.70 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
"ET" Explosion Proof Solenoids							
K		12 VDC	N/A	N/A	1.00 Amps	12 W	12.00 ohms
J		24 VDC	N/A	N/A	1.00 Amps	13 W	44.30 ohms
Y		120/60-50 VAC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

General				
Design			Directional Spool Valve	
Actuation			Solenoid	
Size			NG32	
Mounting Interface			DIN 24340 A32 / ISO 4401 / NFPA D10 / CETOP RP 121-H	
Mounting Position			Unrestricted, preferably horizontal	
Ambient Temperature		**[°C]** **[°C]**	-25...+50; (-13°F...+122°F) (without inductive position control) 0...+50; (+32°F...+122°F) (with inductive position control)	
$MTTF_D$ Value		**[years]**	75	
Hydraulic				
Maximum Operating Pressure			Pilot drain internal: P, A, B, X 350 Bar (5075 PSI) T, Y 102 Bar (1500 PSI) AC only, 207 Bar (3000 PSI) DC/AC optional Pilot drain external: P, A, B, T, X 350 Bar (5075 PSI) Y 102 Bar (1500 PSI) AC only, 207 Bar (3000 PSI) DC/AC optional	
Fluid			Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature		**[°C]**	-25 ... +70; (-13°F...+158°F)	
Viscosity Permitted **Recommended**		**[cSt]/[mm²/s]** **[cSt]/[mm²/s]**	2.8...400 (13...1854 SSU) 30...80 (139...371 SSU)	
Filtration			ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)	
Flow Maximum			2000 LPM (529.1 GPM)	
Leakage at 350 Bar (per flow path)		**[ml/min]**	up to 5000 (1.32 GPM) depending on spool	
Minimum Pilot Supply Pressure			5 Bar (73 PSI)	
Static / Dynamic				
Step Response at 95%			Energized	De-energized
DC Solenoids	**Pilot Pressure**			
	50 Bar	**[ms]**	470	390
	100 Bar	**[ms]**	320	390
	250 Bar	**[ms]**	210	390
	350 Bar	**[ms]**	200	390
AC Solenoids	**Pilot Pressure**	**[ms]**		
	50 Bar	**[ms]**	450	375
	100 Bar	**[ms]**	300	375
	250 Bar	**[ms]**	190	375
	350 Bar	**[ms]**	180	375

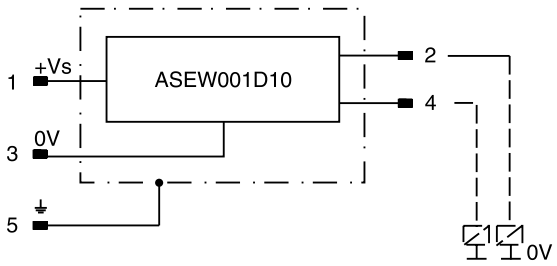
Position Control M12x1

Protection Class		IP 65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature	**[°C]**	0...+50; (+32°F...122°F)
Supply Voltage / Ripple	**[V]**	18...42 ±10%
Current Consumption without Load	**[mA]**	≤ 30
Max. Output Current per Channel, Ohmic	**[mA]**	400
Min. Output Load per Channel, Ohmic	**[kOhm]**	100
Max. Output Drop at 0.2A	**[V]**	≤ 1.1
Max. Output Drop at 0.4A	**[V]**	≤ 1.6
EMC		EN50081-1 / EN50082-2
Max. Tolerance Ambient Field Strength	**[A/m]**	<1200
Min. Distance to Next AC Solenoid	**[m]**	>0.1
Interface		M12x1 per IEC 61076-2-101
Wiring Minimum	**[mm²]**	5 x 0.25 brad shield recommended
Wiring Length Maximum	**[m]**	50 (164 ft.) recommended

M12 Pin Assignment



1 + Supply 18...42V
2 Out B: normally closed
3 0V
4 Out A: normally open
5 Earth ground



Definitions

Start position monitored:

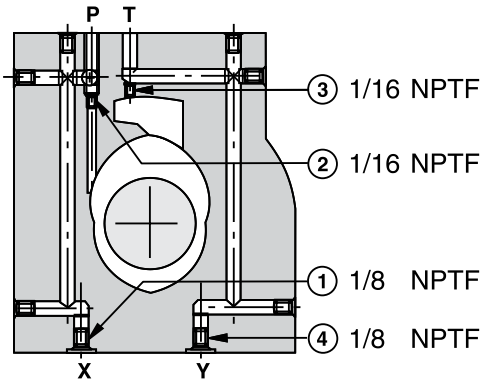
The valve is de-energized. The inductive switch gives a signal at the moment (below 15% spool stroke) when the spool leaves the spring offset position.

End position monitored:

The inductive switch gives a signal before the end position is reached. (above 85% spool stroke).

Delivery includes plug M12 x 1 (part no. 5004109).

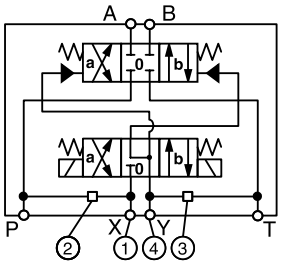
Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

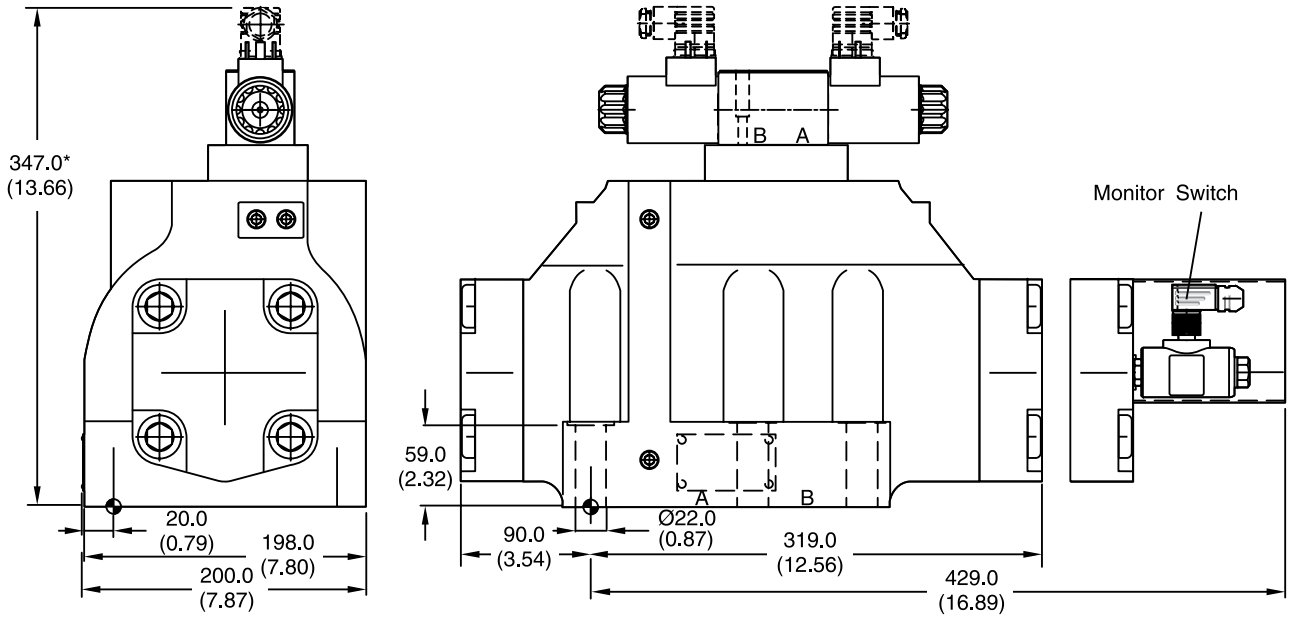
Pilot Oil Inlet	Pilot Oil Outlet	1	2	3	4
internal	external	●	Orifice Ø1.5	●	○
external	external	Orifice Ø1.5	●	●	○
internal	internal	●	Orifice Ø1.5	○	●
external	internal	Orifice Ø1.5	●	○	●

All orifice sizes for standard valves



Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



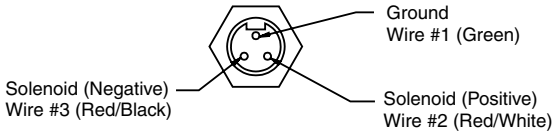
* Please add for each sandwich plate +40mm (1.58") (pressure reducing valve, pilot choke meter-in/-out).

Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK386	6x M20x90 DIN 912 12.9	517 Nm (381.3 lb.-ft.)	**Nitrile: SK-D111VW-N-91** Fluorocarbon: SK-D111VW-V-91

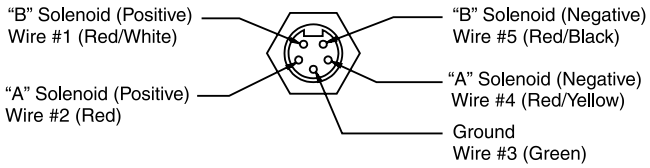
The space necessary to remove the plug per DIN 43650, design type AF is at least 15 mm (0.59 in.).
The torque for the screw M3 of the plug has to be 0.5 Nm (3.7 lb.-ft.) to 0.6 Nm (4.4 lb.-ft).

Manaplug (Options 56 & 1C)

Interface – Brad Harrison Plug
– 3-Pin for Single Solenoid
– 5-Pin for Double Solenoid

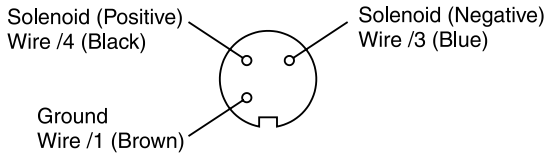


3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

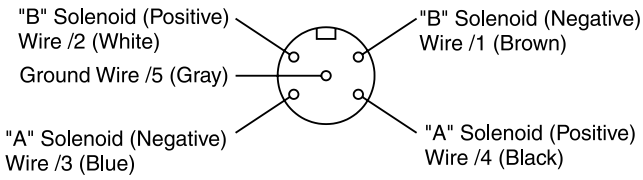


5-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7B & 1D)



3-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

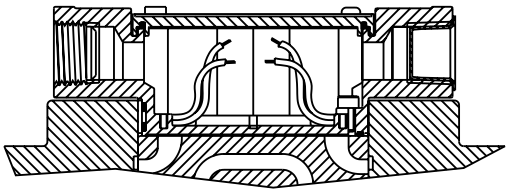


5-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

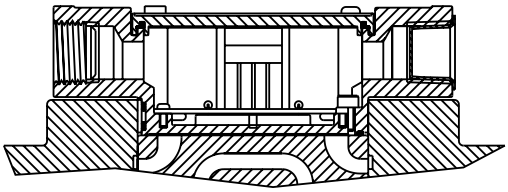
Conduit Box Option C

– No Wiring Options Available



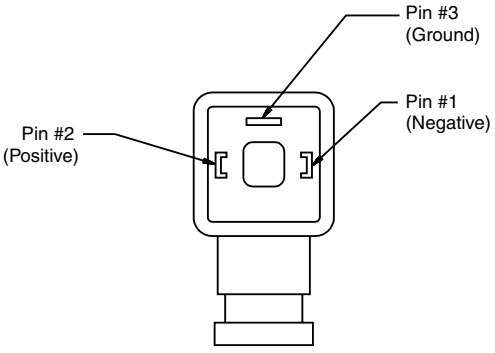
Signal Lights (Option 5) — Plug-in Only

– LED Interface
– Meets Nema 4/IP67



Hirschmann Plug with Lights (Option P5)

ISO 4400/DIN 43650 Form "A"

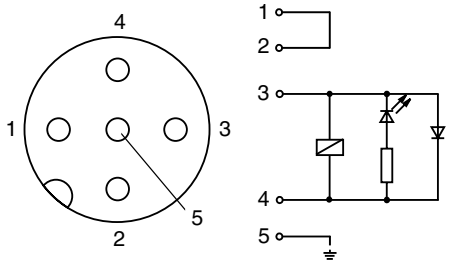


Face View of Plug

DESINA Connector (Option D)

M12 pin assignment
Standard

1 = Not used
2 = Not used
3 = 0V
4 = Signal (24 V)
5 = Earth Ground



Pins are as seen on valve (male pin connectors)

FOR MAXIMUM VALVE RELIABILITY, ADHERE TO THE FOLLOWING INSTALLATION INFORMATION.

The following is important installation information which applies to all directional control valves described in this catalog.

Mounting Position

Detent – Horizontal
Spring Offset – Unrestricted
Spring Centered – Unrestricted

Fluid Recommendations

Premium quality hydraulic oil with a viscosity range between 32-54 cSt (150-250 SSU) At 38°C (100°F) is recommended. The absolute operating viscosity range is from 16-220 cSt (80-1000 SSU). Oil should have maximum anti-wear properties and rust and oxidation treatment.

Fluids and Seals

Valves using synthetic, fire-resistant fluids require special seals. When phosphate esters or its blends are used, FLUOROCARBON seals are required. Water-glycol, water-in-oil emulsions and petroleum oil may be used with STANDARD seals.

Filtration

For maximum valve and system component life, the system should be protected from contamination at a level not to exceed 125 particles greater than 10 microns per milliliter of fluid (SAE class 4/ISO 16/13).

Silting

Silting can cause any sliding spool valve to stick and not spring return if held under pressure for long periods of time. The valve should be cycled periodically to prevent sticking.

Special Installations

Consult your Parker representative for any application requiring the following:

- Pressure above rating.
- Fluid other than those specified.
- Oil temperature above 71.1°C (160°F).
- Flow path other than normal.

Mounting Patterns

Series	NFPA	Size
D111V*, D10P	D10	1-1/4”

Torque Specifications

The recommended torque values for the bolts which mount the valve to the manifold or subplate are as follows: 406.8 Nm (300 ft-lbs).

Tank and Drain Line Surges

If several valves are piped with a common tank or drain line, flow surges in the line may cause an unexpected spool shift. Detent style valves are most susceptible to this. Separate tank and drain lines should be piped in installations where line surges are expected.

Electrical Characteristics (Detented Spool)

Only a momentary energizing of the solenoid is necessary to shift and hold a detented spool. Minimum duration of the signal is 0.1 seconds for DC voltages. For AC voltages the response time is 0.06 seconds. Spool position will be held provided the spool centerline is in a horizontal plane, and not shock or vibration is present to displace the spool.

Electrical Failure or Loss of Pilot Pressure

Should electric power fail or loss of pilot pressure occur, spring offset and spring centered valves will shift to the spring held position. Detented valves will stay in the last position held before power failure. If main flow does not fail or stop at the same time power fails, machine actuators may continue to function in an undesirable manner or sequence.

Pilot/Drain Characteristics

Pilot Pressure: 5 to 345 Bar (73 to 5000 PSI)

External: An oil source sufficient to maintain minimum pilot pressure must be connected to the “X” port of the main body. When using the external pilot variation, a 1/16" pipe plug must be present in the main body pilot passage. (For details see Technical pages.) This plug will be furnished in valves ordered with pilot code 2 or 5.

Internal: Flow is internally ported from the pressure port of the main valve body to the “P” port of the pilot valve. The pressure developed at the “P” port of the pilot valve must be 5 Bar (73 PSI) minimum at all times.

Pilot Valve Drain: Maximum pressure 102 Bar (1500 PSI) AC standard, 207 Bar (3000 PSI) AC optional/DC standard.

External: When using an external drain, a 10 x 24 x 0.31 long set screw must be present in the main body drain passage. (For details see Technical pages.) This plug will be furnished in valves ordered with drain code 1 or 2.

Drain flow from the pilot valve is at the “Y” port of the main body and must be piped directly to tank. Maximum drain line pressure is 102 Bar (1500 PSI) AC standard, 207 Bar (3000 PSI) AC optional/DC standard. Any drain line back pressure is additive to the pilot pressure requirement.

Internal: Drain flow from the pilot valve is internally connected to the main valve tank port. Tank and drain pressure are then identical so tank line pressure should not exceed 102 Bar (1500 PSI) AC standard, 207 Bar (3000 PSI) DC standard/AC optional. Any tank line back pressure is also additive to the pilot pressure requirement. If flow surges (a cause of pressure surges) are anticipated in the tank line, an external drain variation is recommended. The “Y” port in the subplate must be plugged when using an internal drain.

Style Code	Description	No Solenoid/Operator Energized	Solenoid/Operator A Energized	Solenoid/Operator B Energized
B	Spring Offset	P→A and B→T	—	P→B and A→T
C	Spring Centered	Centered	P→A and B→T	P→B and A→T
D	Detented	Last Position Held	P→A and B→T	P→B and A→T
E	Spring Centered	Centered	—	P→B and A→T
F	Spring Offset, Shift to Center	P→A and B→T	—	Centered
H	Spring Offset	P→B and A→T	P→A and B→T	—
K	Spring Centered	Centered	P→A and B→T	—
M	Spring Offset, Shift to Center	P→B and A→T	Centered	—

Subplate Mounting
NFPA D10, CETOP 10 & NG 32

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 406.8 Nm (300 ft-lbs).

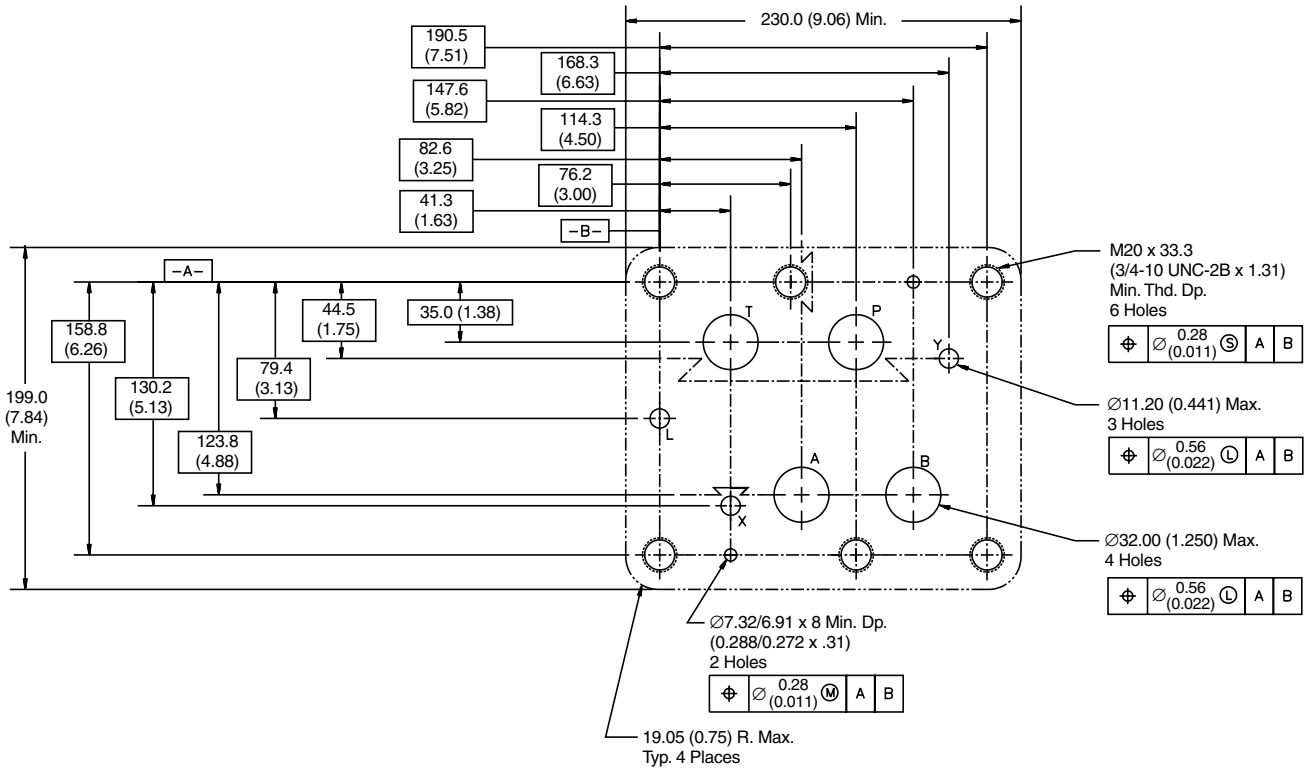
For maximum valve reliability, adhere to the following installation information.

Mounting Position

Valve Type	Mounting Position
Detent (Solenoid)	Horizontal
Spring Offset	Unrestricted
Spring Centered	Unrestricted

Mounting Pattern — NFPA D10, CETOP 10 & NG32

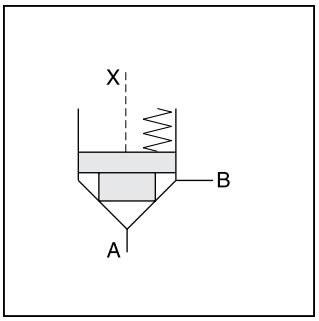
Inch equivalents for millimeter dimensions are shown in (**)

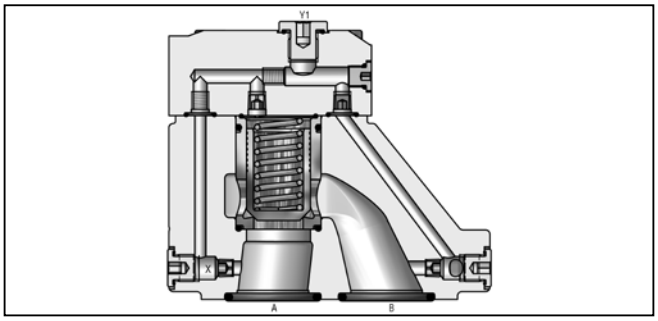


General Description

Series D4S seat valves are designed for directional control functions. A large variety of poppets, springs and covers - including shuttle valves, stroke limiters, solenoid valves (VV01) and position control - allow to design individual hydraulic solutions for nominal flow up to 600 LPM (158.7 GPM).

A complete program is offered under the Parker brand: subplate mounted valves (D4S), SAE flange valves (D5S), pipe mounted valves (D4S), slip-in cartridges (CAR - on request).

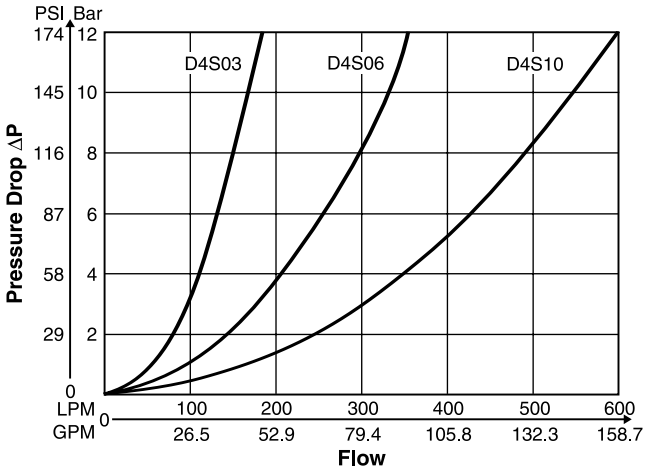


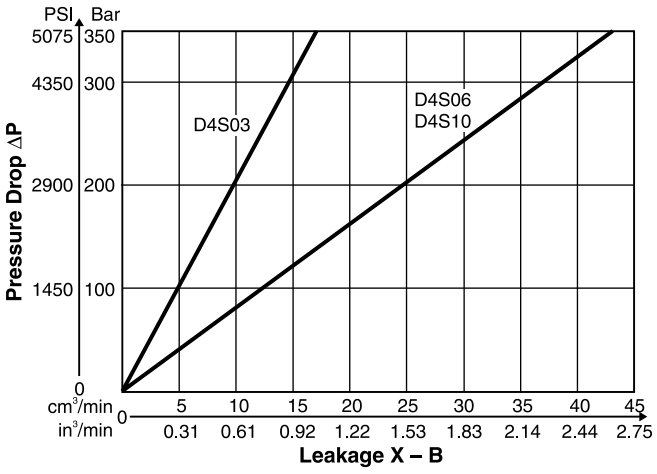


Features

- Subplate mounting acc. to ISO 5781.
- Leak-free seat valve design.
- Numerous pilot options.
- 6 poppet types.
- 3 sizes (NG10, 25, 32).

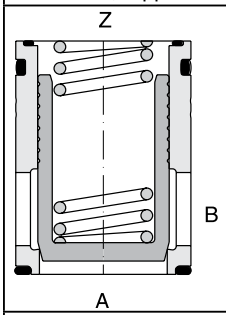
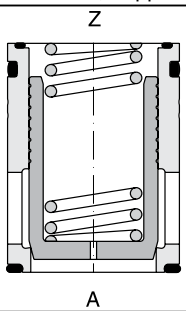
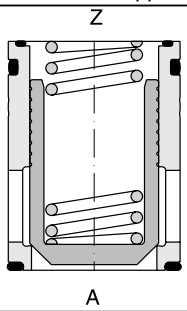
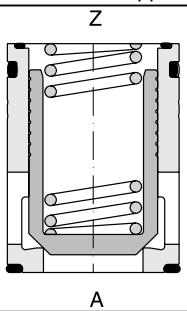
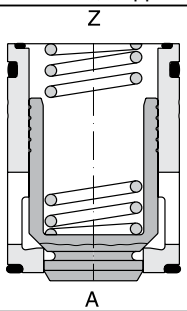
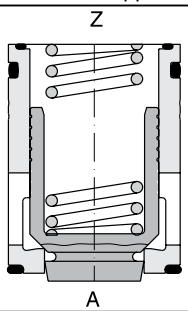
Performance Curves





All characteristic curves measured with HLP46 at 50°C.

Selection of Cartridges

Sleeve 1,Poppet 1	Sleeve 1, Poppet 2	Sleeve 1, Poppet 4	Sleeve 3, Poppet 4	Sleeve 3, Poppet A	Sleeve 3, Poppet B/C
					
1 : 1.05 $A_A = 0.95\ A_C$ $A_B = 0.05\ A_C$ 15° chamfer	1 : 1.05 $A_A = 0.95\ A_C$ $A_B = 0.05\ A_C$ 15° chamfer orifice	1 : 1.05 $A_A = 0.95\ A_C$ $A_B = 0.05\ A_C$ 45° chamfer	1 : 1.67 $A_A = 0.6\ A_C$ $A_B = 0.4\ A_C$ 45° chamfer	1 : 1.67 $A_A = 0.6\ A_C$ $A_B = 0.4\ A_C$ 45° chamfer safety spool	1 : 1.67 $A_A = 0.6\ A_C$ $A_B = 0.4\ A_C$ 45° chamfer throttle spool

D4S — **9**

Seat Valve

Nominal Size

Code	Description
03	NG10
06	NG25
10	NG32

Subplate Mounting ISO 6264, Y1 Port G1/4"

Pilot Connection

Code	Pilot Oil Line in Body	A-X	B-Y
1	Internal from A	⊖	○
2	External from X	●	○
A[1)]	Internal from A	⊖	●
B[1)]	External from X	●	●
C	Internal from A + B	⊖	⊖
D	Internal from B	●	⊖
G	External from Y	●	●

[1)] With VV01 only.

Cap Version

Code	Ports	X	Y	Z	X-Y	Y1	VV01
	Standard						
1	Pilot Oil = Pilot Drain	○	●	⊖	○	●	—
C	Pilot Oil = Pilot Drain	●	○	⊖	○	●	—
	With Solenoid Valve (VV01)						
2	External PD from cap	○	○	⊖	●	○	●
5	External to subplate	○	○	⊖	●	●	○
6	Internal pilot drain	○	○	⊖	●	●	○
	With Stroke Limiter (not for D4S03)						
3	Pilot Oil = Pilot Drain	⊖	●	—	—	—	—
4	Pilot Oil = Pilot Drain	●	⊖	—	—	—	—

Key: ○ Open Bore ● Closed Bore ⊖ Orifice ∅ 1.2
Note: Combination examples provided on pages A227-A229.

Sleeve

Code	Description
1	AA=95%, AB=5%
3	AA=60%, AB=40%

Spool Type

Code	Size	Poppet Type	Sleeve
1	03, 06, 10	With closed bottom and 15° chamfer (pZ max. = pA +20 Bar (290 PSI)	1
2	03	With 0.8 dia. orifice at the bottom and 15° chamfer	1
	06, 10	With 1.2 dia. orifice at the bottom and 15° chamfer	1
4	03, 06, 10	With closed bottom and 45° chamfer	1, 3
A*	06, 10	Safety spool (for end position control only)	3
B*	06, 10	Throttle spool, 10° chamfer	3
C*	06, 10	Throttle spool, 3° chamfer	3

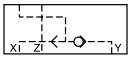
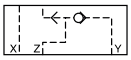
* Springs 2, 3 and 6 only.

Spring | Switching Type | Solenoid Voltage | **B** Design Series | Seal | Options

Code	Description
Omit	Standard w/o vent function
G0R	12V
G0Q	24V
GAR	98V
GAG	205V
W30	110V 50Hz / 120V 60Hz
W31	230V 50Hz / 240V 60Hz

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
Omit	Standard
013	Cover for End Position Control

Code	Description	
Omit	Standard without Vent Function	
09	VV01 with Manual Override	De-energized; power comp. open
10	VV01 without Manual Override	
11	VV01 with Manual Override	De-energized; power comp. closed
12	VV01 without Manual Override	
CA	Shuttle Valve	
DA	Shuttle Valve	
CB	VV01 Code 09 and Shuttle Valve Code CA	
CD	VV01 Code 11 and Shuttle Valve Code CA	
DB	VV01 Code 09 and Shuttle Valve Code DA	
DD	VV01 Code 11 and Shuttle Valve Code DA	
BH	VV01 Code 10 and Shuttle Valve Code CA and Position Control* with Amplifier	
BK	VV01 Code 12 and Shuttle Valve Code CA and Position Control* with Amplifier	
BN	VV01 Code 10 and Shuttle Valve Code DA and Position Control* with Amplifier	
BQ	VV01 Code 12 and Shuttle Valve Code DA and Position Control* with Amplifier	
BC	VV01 Code 10 and Position Control* with Amplifier	
BE	VV01 Code 12 and Position Control* with Amplifier	
BA	Position Control* with Amplifier	
BF	Position Control* with Amplifier and Shuttle Valve Code CA	
BL	Position Control* with Amplifier and Shuttle Valve Code DA	

* Position control for D4S06/10 only.
Spring 2 or 4. Spool A and sleeve 3.
Valve open: Proximity Switch damped.

Weight:

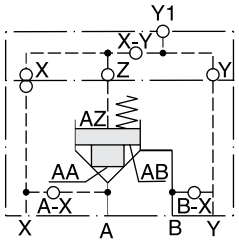
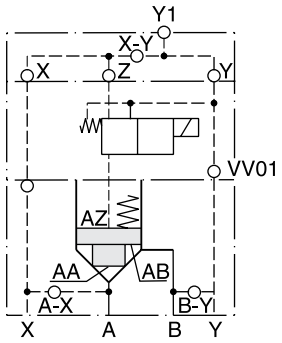
D4S03	2.7 kg (6.0 lbs
D4S06	4.5 kg (9.9 lbs)
D4S10	6.0 kg (13.2 lbs)

Code	Spring — Approx. Cracking Pressure in Bar (PSI)					
	Sleeve Code 1		Sleeve Code 3			
	A -> B		A -> B		B -> A	
	D4S03	D4S06/10	D4S03	D4S06/10	D4S03	D4S06/10
1	2.8 (40.6)	3.5 (50.8)	6.5 (94.3)	6.5 (94.3)	9.5 (137.8)	11.0 (159.5)
2	0.5 (7.3)	0.5 (7.3)	1.0 (14.5)	1.0 (14.5)	1.5 (21.8)	1.7 (24.7)
3	0.3 (4.4)	0.3 (4.4)	0.6 (8.7)	0.6 (8.7)	0.9 (13.1)	1.0 (14.5)
4	2.2 (31.9)	2.2 (31.9)	4.0 (58.0)	3.5 (50.8)	5.5 (79.8)	6.0 (87.0)
5	–	9.0 (130.5)	–	16.0 (232.0)	–	28.0 (406.0)
6	1.2 (17.4)	1.2 (17.4)	2.0 (29.0)	2.2 (31.9)	3.0 (43.5)	3.8 (55.1)
7	3.0 (43.5)	–	8.0 (116.0)	–	12.0 (174.0)	–

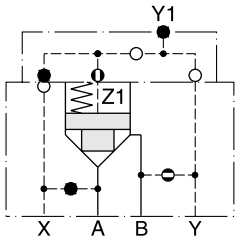
Specifications

General						
Size		**03**	**06**	**10**		
Mounting		Subplate according to ISO 6264				
Mounting Position		Unrestricted				
Ambient Temperature Range		-20°C to +50°C (-4°F to +122°F)				
MTTF$_D$		150 years				
Hydraulic						
Maximum Operating Pressure	**Ports A, B**	up to 350 Bar (5075 PSI)	up to 350 Bar (5075 PSI)	up to 350 Bar (5075 PSI)		
	Port Y with VV01	140 Bar (2030 PSI)	140 Bar (2030 PSI)	140 Bar (2030 PSI)		
Nominal Flow		180 LPM (47.6 GPM)	360 LPM (95.2 GPM)	600 LPM (158.7 GPM)		
Fluid		Hydraulic oil as per DIN 51524 ... 51525				
Fluid Temperature		-20°C to +80°C (-4°F to +176°F)				
Viscosity	**Permitted**	10 to 650 cSt / mm²/s (46 to 3013 SSU)				
	Recommended	30 cSt / mm²/s (139 SSU)				
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)				
Electrical (Solenoid)						
Duty Ratio		100%				
Response Time		Energized / De-energized AC 20/18 ms, DC 46/27 ms				
Protection Class		IP65 in accordance with EN60529 (plugged and mounted)				
	Code	**G0R**	**G0Q**	**GAR**	**GAG**	**W30**	**W31**
Supply Voltage		12V	24V	98V	205V	110V at 50Hz/ 120V at 60 Hz	220V at 50Hz/ 240V at 60Hz
Tolerance Supply Voltage		+5 to -10	+5 to -10	+5 to -10	+5 to -10	+5 to -10	+5 to -10
Power Consumption, Hold	**[W]**	31	31	31	31	78	78
Power Consumption, In Rush	**[W]**	31	31	31	31	264	264
Max. Switching Frequency	**[1/h]**	AC up to 7200; DC up to 16,000 switchings/hour					
Solenoid Connection		Connector as per EN175301-803					
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)					
Coil Insulation Class		H (180°C) (356°F)					

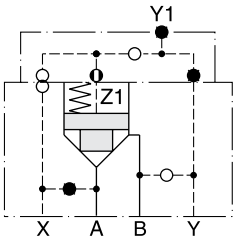
D4S Pilot Configuration

D4S Direct Operated	D4S with VV01
	

D4S Direct Operated Examples

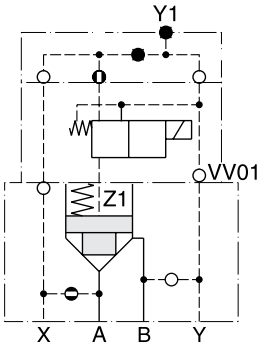


D4S..-.DC
Pilot oil Y = internal from B

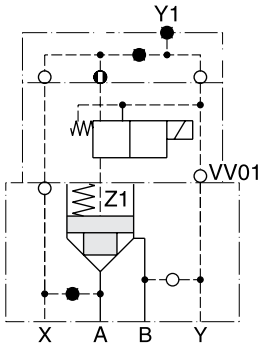


D4S..-.21
Pilot oil X = external

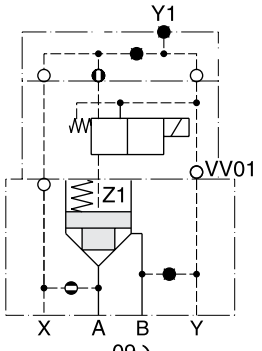
D4S with VV01 Examples



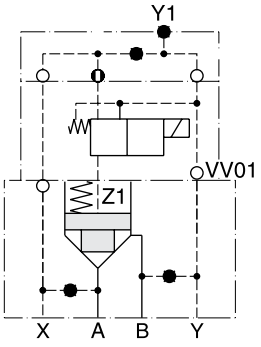
D4S..-.16... 09 10 11 12 } with VV01
Pilot oil X = internal from A
Drain Y = internal to B



D4S..-.26... 09 10 11 12 } with VV01
Pilot oil X = external
Drain Y = internal to B

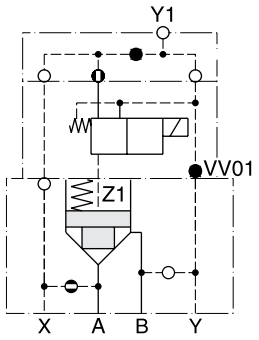


D4S..-.A5... 09 10 11 12 } with VV01
Pilot oil X = internal from A
Drain Y = external to subplate



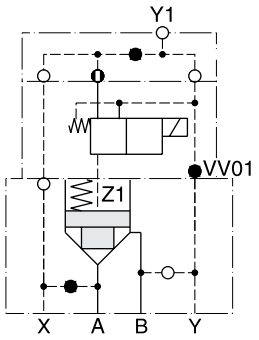
D4S..-.B5... 09 10 11 12 } with VV01
Pilot oil X = external
Drain Y = external to subplate

D4S with VV01 Examples



D4S..-.12... 09, 10, 11, 12 } with VV01

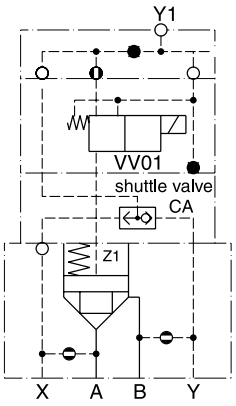
Pilot oil X = internal from A
Drain Y1 = external out of the cap



D4S..-.22... 09, 10, 11, 12 } with VV01

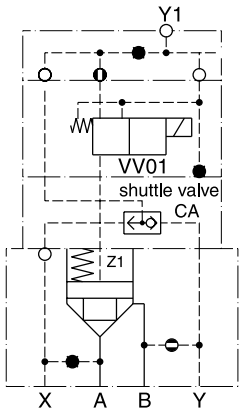
Pilot oil X = external
Drain Y1 = external out of the cap

D4S with Shuttle Valve Examples



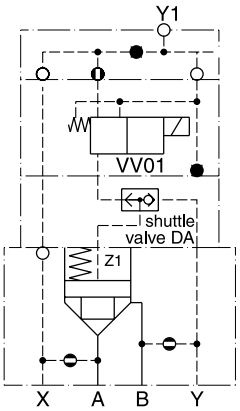
D4S..-.C2... CB, CD } with shuttle valve CA and VV01

Pilot oil = internal from A and B
Drain Y1 = external out of the cap



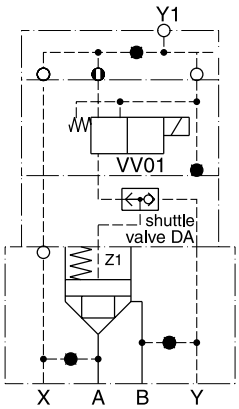
D4S..-.D2... CB, CD } with shuttle valve CA and VV01

Pilot oil = internal from B and external from X
Drain Y1 = external out of the cap



D4S..-.C2... DB, DD } with shuttle valve DA and VV01

Pilot oil = internal from A and B
(B-A = Check valve function)
Drain Y1 = external out of the cap



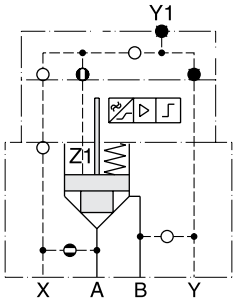
D4S..-.B2... DB, DD } with shuttle valve DA and VV01

Pilot oil = external from X and Y
Drain Y1 = external out of the cap

D4S.indd, dd

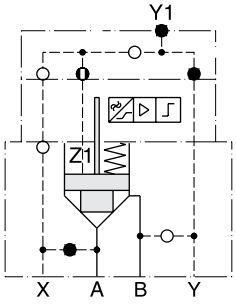
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

D4S with Position Control Examples



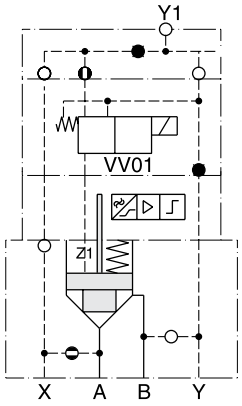
D4S..-.113A.BA
(with position control)

Pilot oil X = internal from A



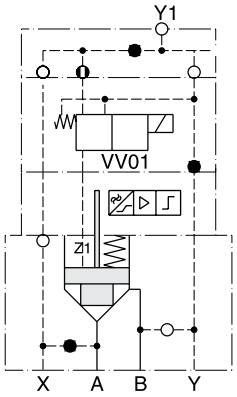
D4S..-.213A.BA
(with position control)

Pilot oil X = external



D4S..-.123A. BC / BE } with position control and VV01

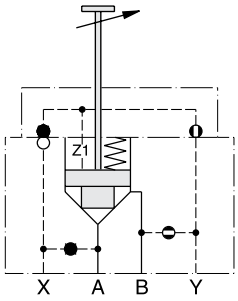
Pilot oil X = internal from A
Drain Y1 = external out of the cap



D4S..-.223A. BC / BE } with position control and VV01

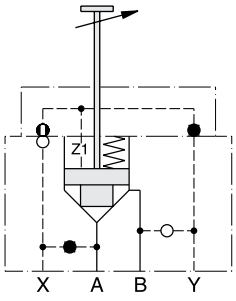
Pilot oil X = external
Drain Y1 = external out of the cap

D4S with Stroke Limiter Examples



D4S..-.D434. with stroke limiter
Pilot oil Y = internal from B

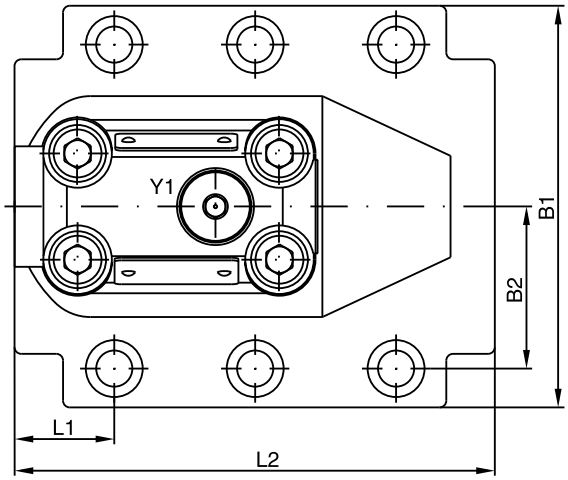
Note: for D4S06 and D4S10 only

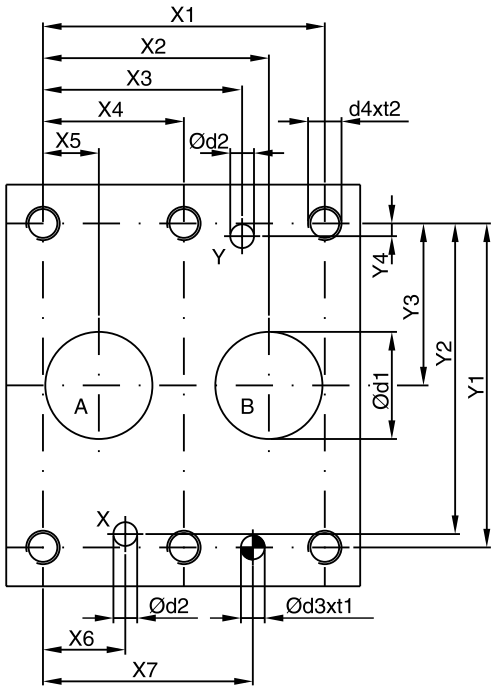


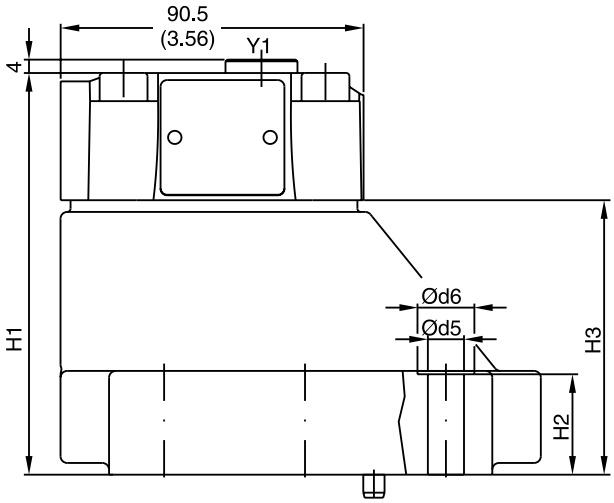
D4S..-.233B. with stroke limiter
Pilot oil X = external

Note: for D4S06 and D4S10 only

Inch equivalents for millimeter dimensions are shown in (**)







NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4
10	6264-06-09-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	-	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)
25	6264-08-13-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	-	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)
32	6264-10-17-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)

NG	ISO-code	B1	B2	H1	H2	H3	L1	L2	D1	D2	D3	t1	D4	t2	D5	D6
10	6264-06-09-*-97	87.3 (3.44)	33.35 (1.31)	83.0 (3.27)	21.0 (0.83)	45.0 (1.77)	29.0 (1.14)	94.8 (3.73)	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	6264-08-13-*-97	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	71.5 (2.81)	34.7 (1.37)	126.8 (4.99)	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	110.8 (0.43)	17.0 (0.67)
32	6264-10-17-*-97	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	82.0 (3.23)	30.6 (1.20)	144.3 (5.68)	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

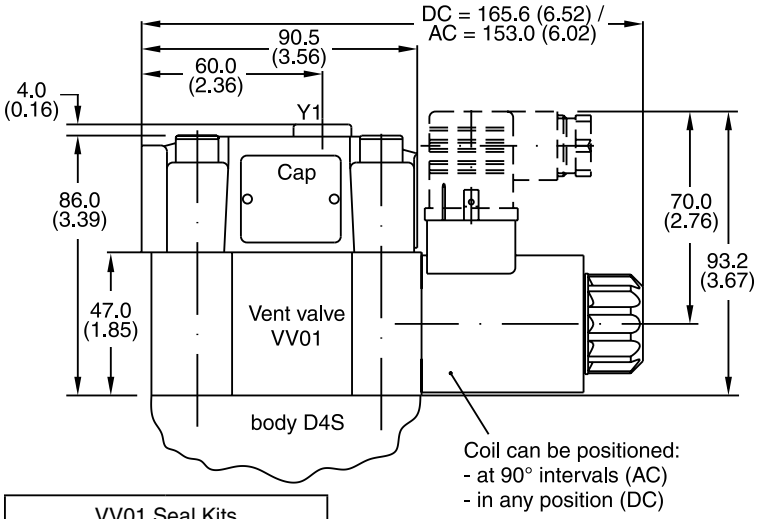
NG	ISO-code	Bolt Kit			Seal Kit		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-07-*-97	BK 505	4x M10 x 35 DIN 912 12.9	63 Nm	S26-58507-0	S26-58507-5	
25	6264-08-11-*-97	BK 485	4x M10 x 45 DIN 912 12.9	(46.5 lb.-ft.)	S26-58475-0	S26-58475-5	
32	6264-10-15-*-97	BK 506	6x M10 x 45 DIN 912 12.9	±15%	S26-58508-0	S26-58508-5	

D4S.indd, dd

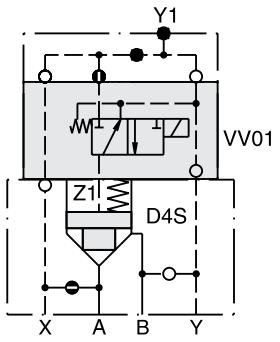
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

D4S with VV01

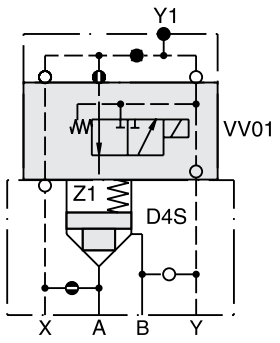


VV01 Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5



with manual override | without manual override

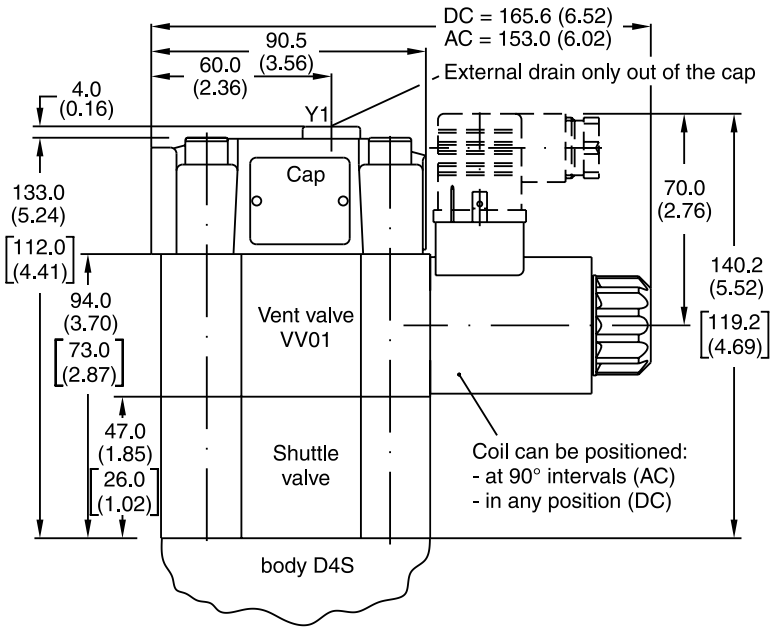
D4S..-..... 09/10
Solenoid energized:
D4S blocked
Solenoid de-energized:
Flow from A-B or B-A



with manual override | without manual override

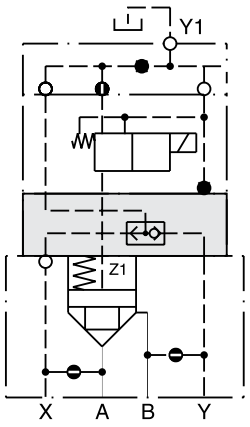
D4S..-..... 11/12
Solenoid energized:
Flow from A-B or B-A
Solenoid de-energized:
D4S Blocked

D4S with Shuttle Valve

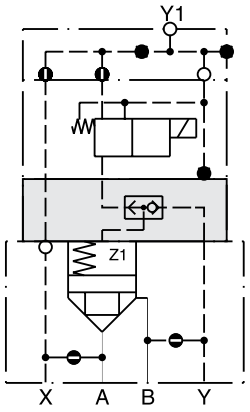


Dimensions in brackets [ ] are for version VV01with shuttle valve code DB or DD.

Note: Shuttle valves only use in connection with vent valve VV01.



cap
vent valve VV01
shuttle valve
(pilot oil from A and B)
body version
series D4S
Code CB
or CD



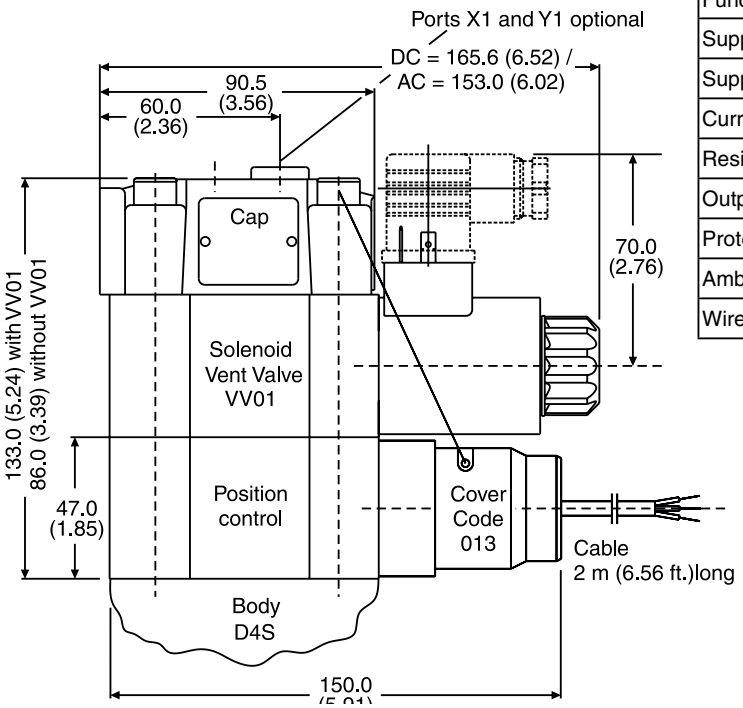
cap
vent valve VV01
shuttle valve 1)
body version
series D4S
Code DB
or DD

1) pilot oil from A and B,
from B to A check valve function

Inch equivalents for millimeter dimensions are shown in (**)

A

Dimensions D4S Position Control



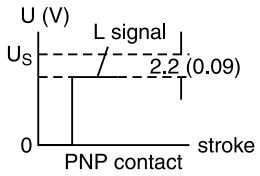
Position Control by Proximity Switch (incl. Amplifier)

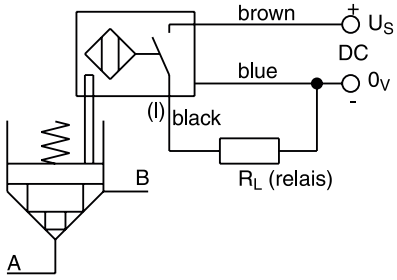
Valve open: proximity switch activated.
This proximity switch is pressure proof and has no wearing parts.

Note: Position control for D4S06 and D4S10 only.

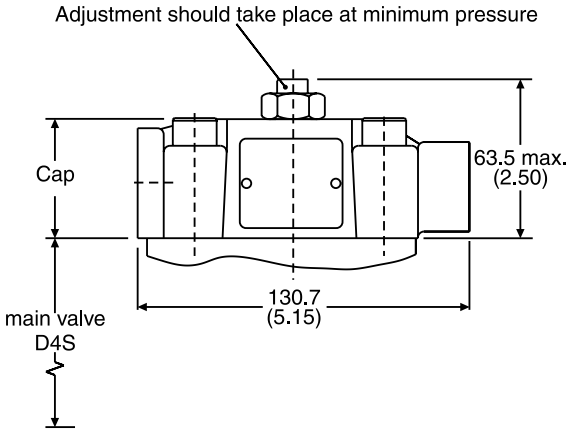
Technical Information (proximity switch)

Function		PNP, contact
Supply voltage (Us)	[VDC]	10...30
Supply voltage ripple	[%]	≤ 10
Current consumption	[mA]	max. 8
Residual voltage L-signal	[V]	Us - 2.2 at I_{max}
Output current (I)	[mA]	≤ 200
Protection class		IP67
Ambient temperature	[C°]	-25...+70; (-13°F...+158° F)
Wire cross section	[mm²]	3 x 0.5

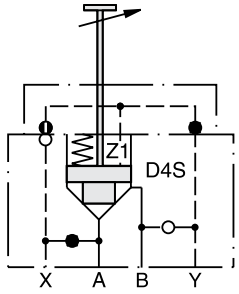




Dimensions D4S Stroke Limiter



Example: D4S$^{06}_{10}$-.23-3B.

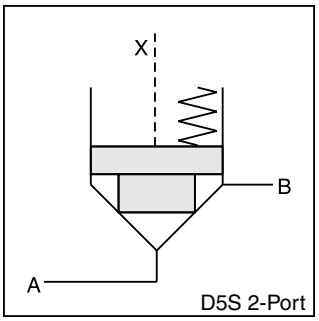


Note: Stroke limiter not for use with D4S03, vent valve VV01, shuttle valve and positon control.

General Description

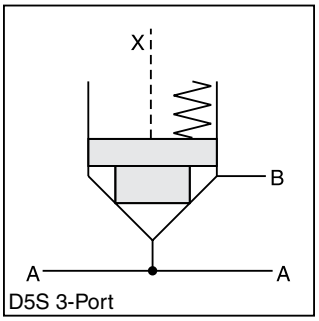
Series D5S seat valves are designed for directional control functions. They enable individual hydraulic solutions for nominal flow up to 800 LPM (211.6 GPM) due to a large variety of poppets, springs and covers, including shuttle valves, stroke limiters, solenoid valves (VV01) and position control.

D5S 2-Port



D5S 2-Port

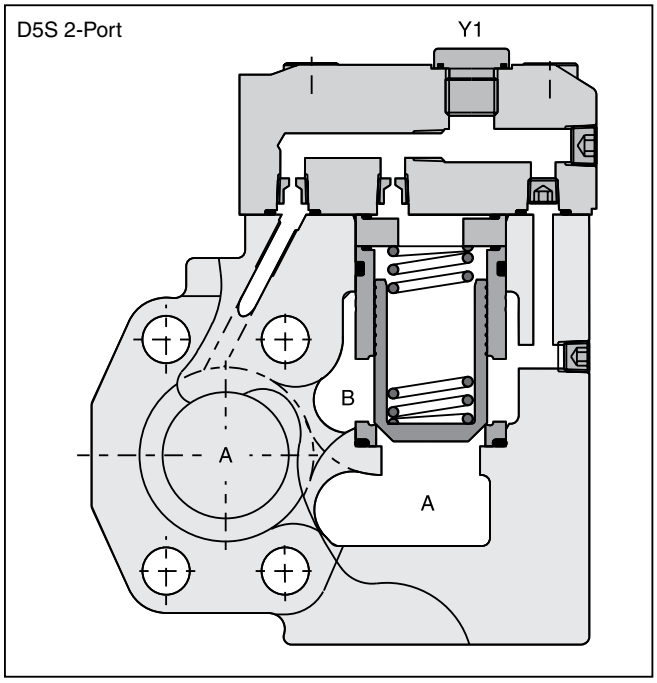
D5S 3-Port

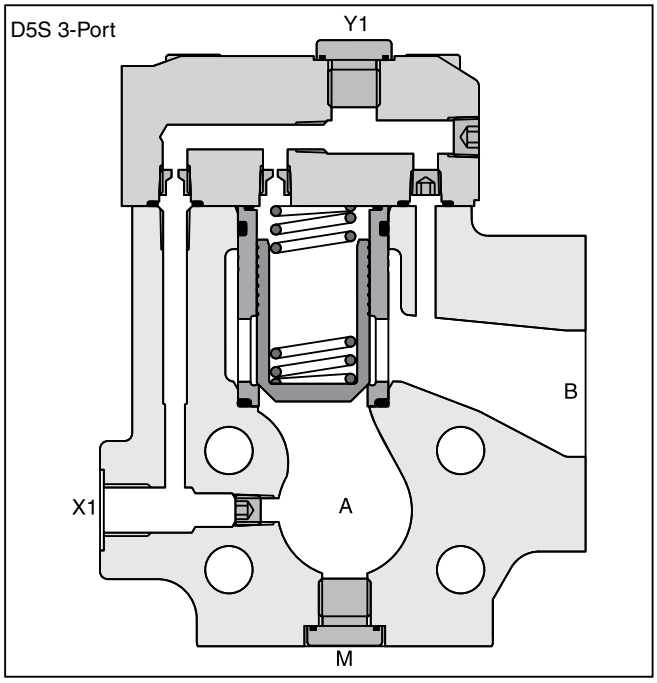


D5S 3-Port

Features

- Leak-free seat valve design.
- 2- and 3-port bodies.
- SAE61 flange.
- Numerous pilot options.
- 6 poppet types.
- 4 sizes (SAE 3/4", 1", 1 1/4", 1 1/2").





D5S — □ □ □ □ □ □

Seat Valve | Size | Body | Pilot Body Configuration | Pilot Cap | Sleeve | Spool Type

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"
12*	SAE 1-1/2"

* D5S 3-Port only

Code	Body	Ports
9	3-Port	Seat entry, A; X1, Y1, M = SAE 4
1	2-Port	Seat entry, A; X1, Y1, M = SAE 4
2	2-Port	Annular entry, B; X1, Y1, M = SAE 4

Code	Pilot Oil Line in Body
1	Internal from A
2	Internal from B
3	Internal from A and B
4	External from X1
5	Internal from B, External from X1

Code	Body	Ports	X	Y	Z	X-Y	X1	Y1	VV01
Standard									
1	2 and 3-Port	Pilot Oil = Pilot Drain	⊖	●	⊖	○	–	●	–
2	2 and 3-Port	Pilot Oil = Pilot Drain	●	⊖	⊖	○	–	●	–
3	2-Port	Pilot Oil = Pilot Drain	●	●	⊖	○	○	●	–
With Solenoid Valve (VV01)									
4	2 and 3-Port	Internal to B	⊖	○	⊖	●	–	●	○
5	2-Port	Internal to B	●	○	⊖	●	○	●	○
6	2 and 3-Port	External Out of Cap	⊖	○	⊖	●	–	○	●
7	2-Port	External Out of Cap	●	○	⊖	●	○	○	●
With Stroke Limiter (not for D5S06)									
A	2 and 3-Port	Pilot Oil = Pilot Drain	⊖	●	⊖	–	●	–	–
B	2 and 3-Port	Pilot Oil = Pilot Drain	●	⊖	–	–	●	–	–
C	2-Port	Pilot Oil = Pilot Drain	●	●	⊖	–	○	–	–

Key: ○ Open Bore ● Closed Bore ⊖ Orifice ∅ 1.2
Note: Combination examples provided on pages A238-A242.

Code	Size	Poppet Type	Sleeve
1	06, 08, 10, 12	With closed bottom and 15° chamfer (pZ max. = pA +20 Bar (290 PSI)	1
2	06	With 0.8 dia. orifice at the bottom and 15° chamfer	1
	08, 10	With 1.2 dia. orifice at the bottom and 15° chamfer	1
4	06, 08, 10, 12	With closed bottom and 45° chamfer	1, 3
A*	08, 10, 12	Safety spool (for end position control only)	3
B*	08, 10, 12	Throttle spool, 10° chamfer	3
C*	08, 10, 12	Throttle spool, 3° chamfer	3

* Springs 2, 3 and 6 only.

D5S.indd, dd

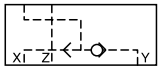
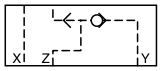
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Spring | Switching Type | Solenoid Voltage | **B** Design Series | Seal | Options

Code	Description
Omit	Standard w/o vent function
G0R	12V
G0Q	24V
GAR	98V
GAG	205V
W30	110V 50Hz / 120V 60Hz
W31	220V 50Hz / 240V 60Hz

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
Omit	Standard
013	Position Control with Protection

Code	Description	
omit	Standard without Vent Function	
09	VV01 with Manual Override	De-energized; power comp. open
10	VV01 without Manual Override	
11	VV01 with Manual Override	De-energized; power comp. closed
12	VV01 without Manual Override	
CA	Shuttle Valve	
DA	Shuttle Valve	
CB	VV01 Code 09 and Shuttle Valve Code CA	
CD	VV01 Code 11 and Shuttle Valve Code CA	
DB	VV01 Code 09 and Shuttle Valve Code DA	
DD	VV01 Code 11 and Shuttle Valve Code DA	
BH	VV01 Code 10 and Shuttle Valve Code CA and Position Control* with Amplifier	
BK	VV01 Code 12 and Shuttle Valve Code CA and Position Control* with Amplifier	
BN	VV01 Code 10 and Shuttle Valve Code DA and Position Control* with Amplifier	
BQ	VV01 Code 12 and Shuttle Valve Code DA and Position Control* with Amplifier	
BC	VV01 Code 10 and Position Control* with Amplifier	
BE	VV01 Code 12 and Position Control* with Amplifier	
BA	Position Control* with Amplifier	
BF	Position Control* with Amplifier and Shuttle Valve Code CA	
BL	Position Control* with Amplifier and Shuttle Valve Code DA	

* Position control for D5S08/10 only.
Spring 2 or 4. Spool A and sleeve 3.

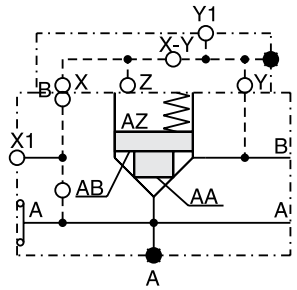
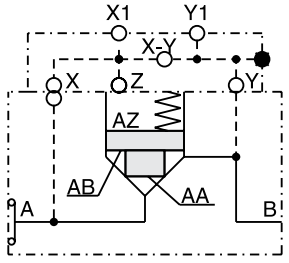
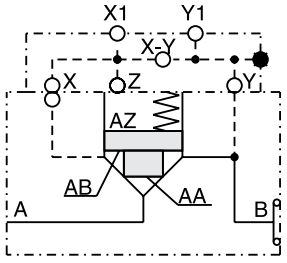
Weight:	**D5S 2-Port**	**D5S 3-Port**
D5S06	3.6 kg (7.9 lbs)	3.4 kg (7.5 lbs)
D5S08	4.1 kg (9.0 lbs)	4.4 kg (9.7 lbs)
D5S10	5.4 kg (11.9 lbs)	5.0 kg (11.0 lbs)
D5S12	—	7.8 kg (17.2 lbs)

Code	Spring — Approx. Cracking Pressure in Bar (PSI)					
	Sleeve Code 1		Sleeve Code 3			
	A -> B		A -> B		B -> A	
	D5S06	D5S08/12	D5S06	D5S08/12	D5S06	D5S08/12
1	2.8 (40.6)	3.5 (50.8)	6.5 (94.3)	6.5 (94.3)	9.5 (137.8)	11.0 (159.5)
2	0.5 (7.3)	0.5 (7.3)	1.0 (14.5)	1.0 (14.5)	1.5 (21.8)	1.7 (24.7)
3	0.3 (4.4)	0.3 (4.4)	0.6 (8.7)	0.6 (8.7)	0.9 (13.1)	1.0 (14.5)
4	2.2 (31.9)	2.2 (31.9)	4.0 (58.0)	3.5 (50.8)	5.5 (79.8)	6.0 (87.0)
5	–	9.0 (130.5)	–	16.0 (232.0)	–	28.0 (406.0)
6	1.2 (17.4)	1.2 (17.4)	2.0 (29.0)	2.2 (31.9)	3.0 (43.5)	3.8 (55.1)
7	3.0 (43.5)	–	8.0 (116.0)	–	12.0 (174.0	–

Specifications

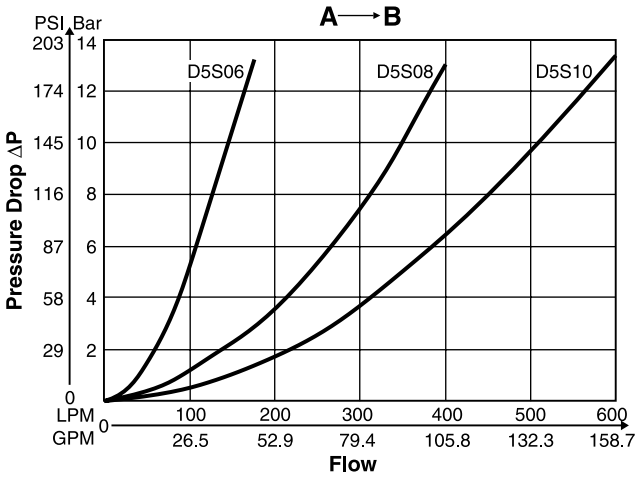
General						
Size		**06**	**08**	**10**	**12**	
Mounting		Flanged according to SAE 61				
Mounting Position		Unrestricted				
Ambient Temperature Range		-20°C to +50°C (-4°F to +122°F)				
Hydraulic						
Maximum Operating Pressure	**SAE 61 Ports A, B**	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)	210 Bar (3045 PSI)	
	Port Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	
Nominal Flow		180 LPM (47.6 GPM)	360 LPM (95.2 GPM)	600 LPM (158.7 GPM)	800 LPM (211.6 GPM)	
Fluid		Hydraulic oil as per DIN 51524 ... 51525				
Fluid Temperature		-20°C to +80°C (-4°F to +176°F)				
Viscosity	**Permitted**	10 to 650 cSt / mm²/s (46 to 3013 SSU)				
	Recommended	30 cSt / mm²/s (139 SSU)				
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)				
Electrical (Solenoid)						
Duty Ratio		100%				
Response Time		Energized / De-energized AC 20/18ms, DC 46/27 ms				
Protection Class		IP65 in accordance with EN60529 (plugged and mounted)				
	Code	**G0R**	**G0Q**	**GAR**	**GAG**	**W30**	**W31**
Supply Voltage		12V	24V	98V	205V	110V at 50Hz 120V at 60 Hz	220V at 50Hz/ 240V at 60Hz
Tolerance Supply Voltage		+5 to -10	+5 to -10	+5 to -10	+5 to -10	±5 to -10	±5 to -10
Power Consumption	**Hold**	31W	31W	31W	31W	78W	78W
	In Rush	31W	31W	31W	31W	264W	264W
Maximum Switching Frequency		AC up to 7200; DC up to 16,000 switchings/hour					
Solenoid Connection		Connector as per EN175301-803					
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)					
Coil Insulation Class		H (180°C) (356°F)					

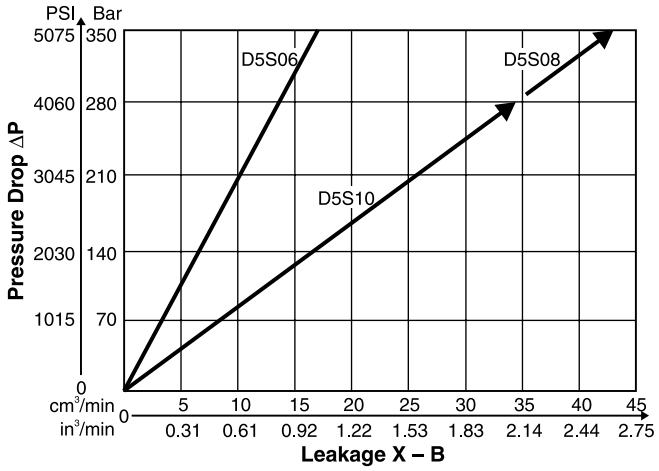
D5S Pilot Configuration

3-Port	2-Port: Seat Entry	2-Port: Annular Entry
		

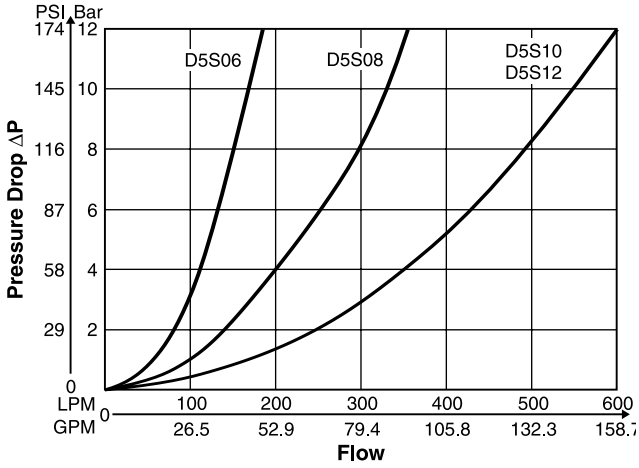
Performance Curves

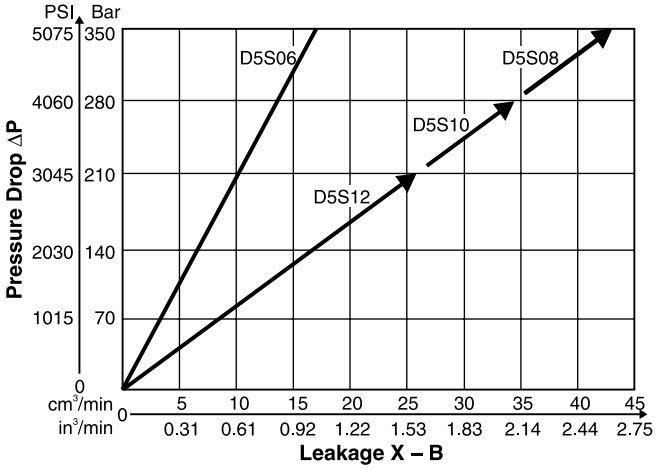
D5S 2-Port*





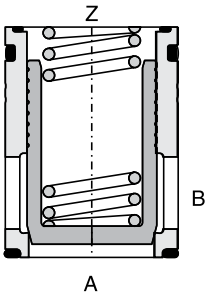
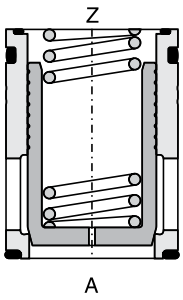
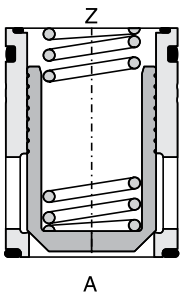
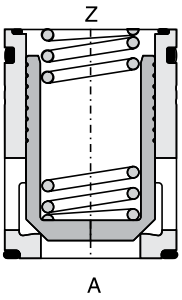
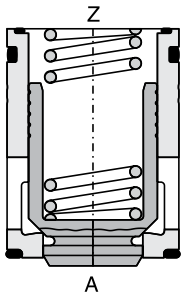
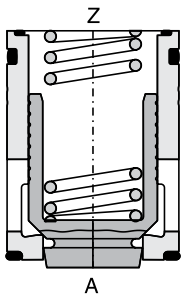
D5S 3-Port*





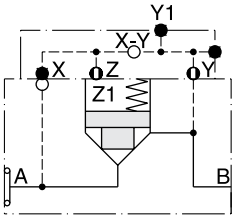
*Fluid viscosity 38cSt at 50°C (122°F)

Selection of Cartridges

Sleeve 1, Poppet 1	Sleeve 1, Poppet 2	Sleeve 1, Poppet 4	Sleeve 3, Poppet 4	Sleeve 3, Poppet A	Sleeve 3, Poppet B/C
					
1 : 1.05 $A_A = 0.95\ A_C$ $A_B = 0.95\ A_C$ 15° chamfer	1 : 1.05 $A_A = 0.95\ A_C$ $A_B = 0.95\ A_C$ 15° chamfer orifice	1 : 1.05 $A_A = 0.95\ A_C$ $A_B = 0.95\ A_C$ 45° chamfer	1 : 1.67 $A_A = 0.6\ A_C$ $A_B = 0.4\ A_C$ 45° chamfer	1 : 1.67 $A_A = 0.6\ A_C$ $A_B = 0.4\ A_C$ 45° chamfer safety spool	1 : 1.67 $A_A = 0.6\ A_C$ $A_B = 0.4\ A_C$ 45° chamfer throttle spool

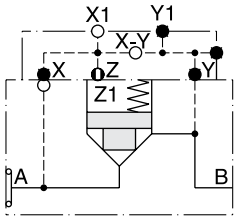
D5S 2-Port Examples

Seat Entry



D5S..-722

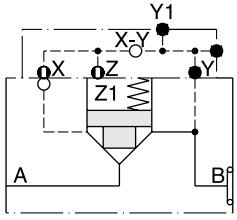
Pilot oil: internal from B



D5S..-743

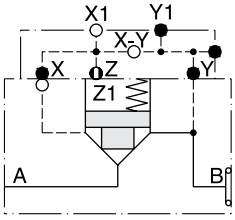
Pilot oil: external from X1

Annular Entry



D5S..-821

Pilot oil: internal from B

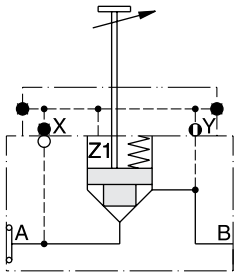


D5S..-843

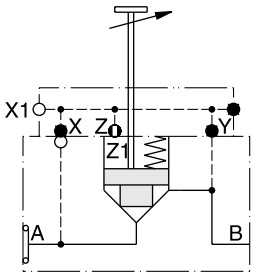
Pilot oil: external from X1

Stroke Limiter D5S 2-Port Examples

Seat Entry

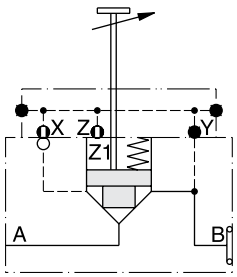


D5S08-72B
10
Pilot oil: internal from B

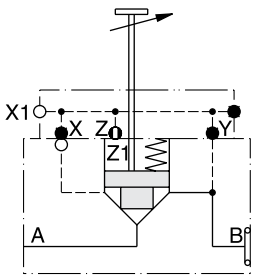


D5S08-74C
10
Pilot oil: external from X1

Annular Entry

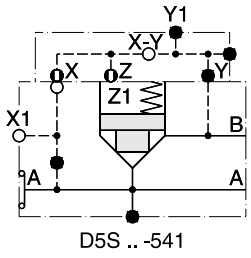


D5S08-82A
10
Pilot oil: internal from B



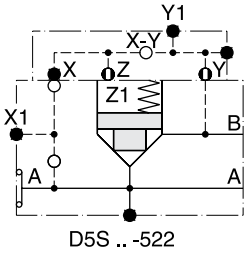
D5S08-84C
10
Pilot oil: external from X1

D5S 3-Port Examples



D5S .. -541

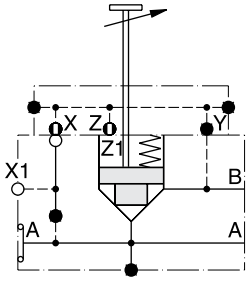
Pilot oil: external from X1



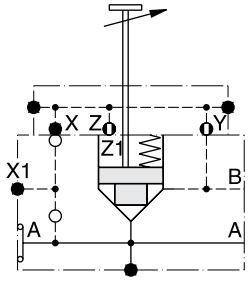
D5S .. -522

Pilot oil: internal from B

Stroke Limiter D5S 3-Port Examples



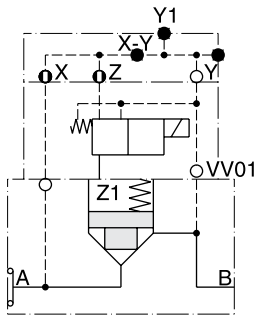
D5S08-54A
10
12
Pilot oil: external from X1



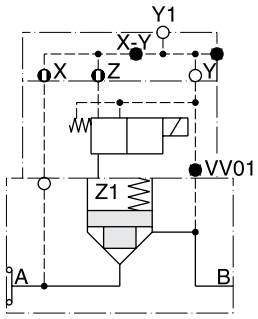
D5S08-52B
10
12
Pilot oil: internal from B

D5S 2-Port with Solenoid Valve VV01 Examples

Seat Entry

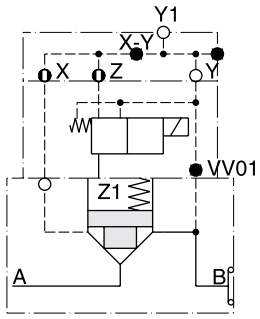


D5S..-714...09
10
11
12
Pilot oil: internal from A
Pilot drain: internal to B

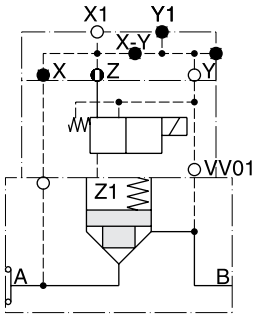


D5S..-716...09
10
11
12
Pilot oil: internal from A
Pilot drain: external out of Y1

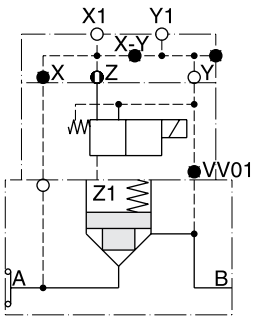
Annular Entry



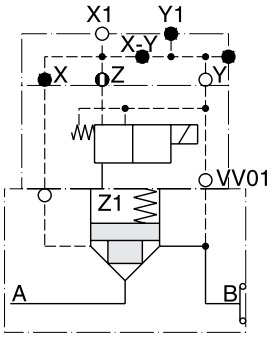
D5S..-826...09
10
11
12
Pilot oil: internal from B
Pilot drain: external out of Y1



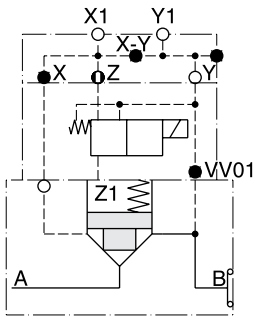
D5S..-745...09
10
11
12
Pilot oil: internal from X1
Pilot drain: internal to B



D5S..-747...09
10
11
12
Pilot oil: internal from X1
Pilot drain: external out of Y1



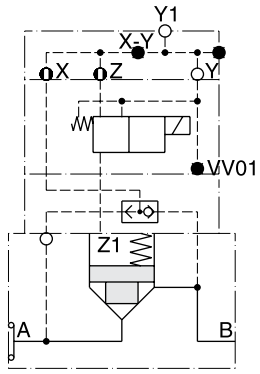
D5S..-845...09
10
11
12
Pilot oil: internal from X1



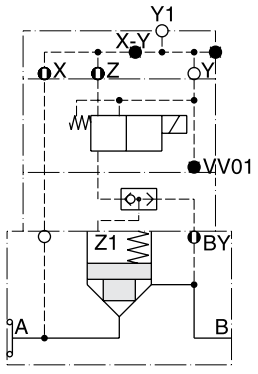
D5S..-847...09
10
11
12
Pilot oil: internal from X1
Pilot drain: external out of Y1

D5S 2-Port with Solenoid Valve VV01 and Shuttle Valve Examples

Seat Entry

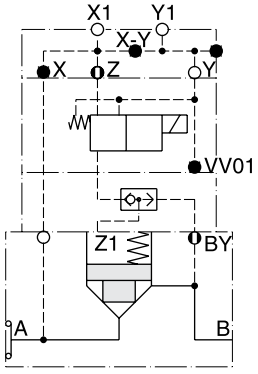


D5S..-736...CB
CD
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1

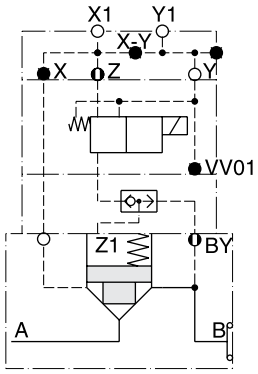


D5S..-736...DB
DD
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1

Annular Entry

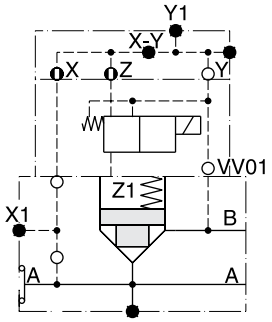


D5S..-757...DB
DD
Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1



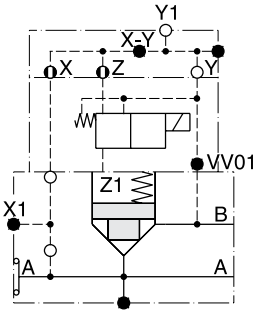
D5S..-857...DB
DD
Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1

D5S 3-Port with Solenoid Valve VV01 Examples



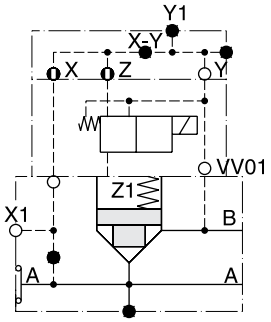
D5S .. -514...09
10
11
12

Pilot oil: internal from A
Pilot drain: internal to B



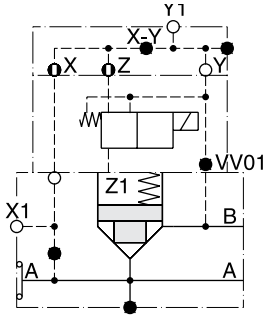
D5S .. -516...09
10
11
12

Pilot oil: internal from A
Pilot drain: external out of Y1



D5S .. -544...09
10
11
12

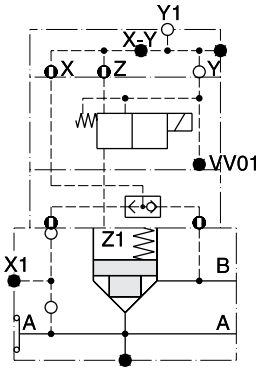
Pilot oil: external from X1
Pilot drain: internal to B



D5S .. -546...09
10
11
12

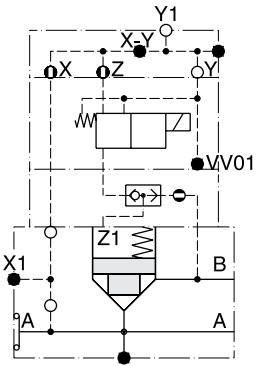
Pilot oil: external from X1
Pilot drain: external out of Y1

D5S 3-Port with Solenoid Valve VV01 and Shuttle Valve Examples



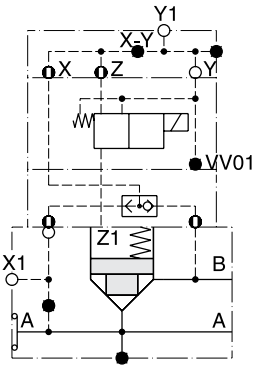
D5S .. -536...CB
CD

Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1



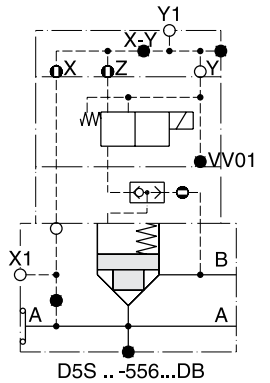
D5S .. -536...DB
DD

Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1



D5S .. -556...CB
CD

Pilot oil: internal from X1 +
internal from B
Pilot drain: external out of Y1

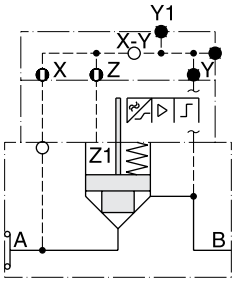


D5S .. -556...DB
DD

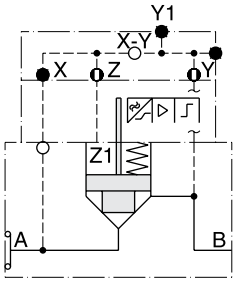
Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1

D5S 2-Port Position Control Examples

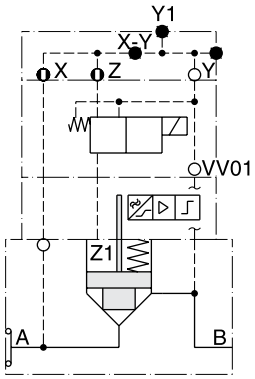
Seat Entry



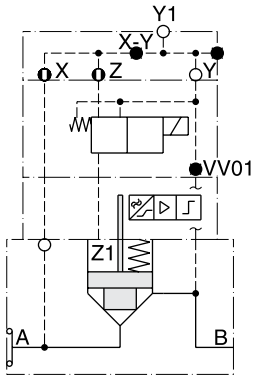
D5S08-7113A.BA
D5S10
Pilot oil: internal from A



D5S08-7223A.BA
D5S10
Pilot oil: internal from B

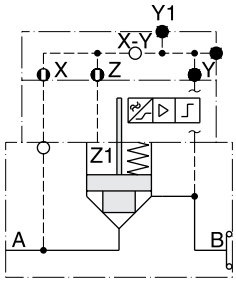


D5S08-7143A.BC
D5S10 BE
Pilot oil: internal from A
Pilot drain: internal to B

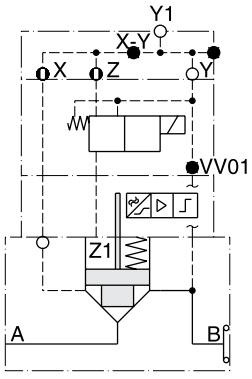


D5S08-7163A.BC
D5S10 BE
Pilot oil: internal from A
Pilot drain: external out of Y1

Annular Entry

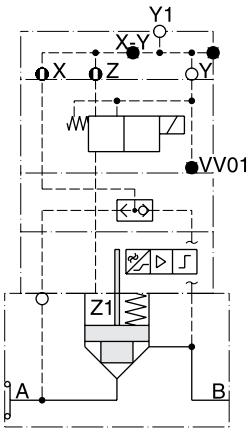


D5S08-8213A.BA
D5S10
Pilot oil: internal from B

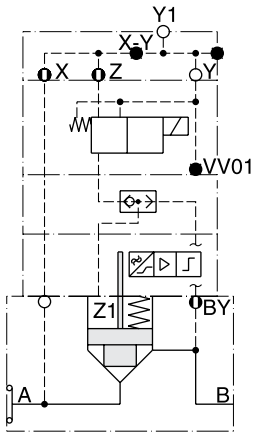


D5S08-8263A.BC
D5S10 BE
Pilot oil: internal from B
Pilot drain: external out of Y1

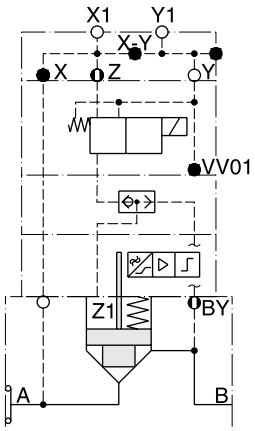
Seat Entry



D5S ..-736...BH
BK
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1

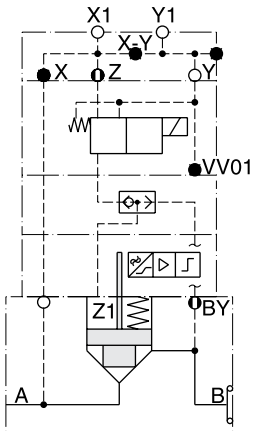


D5S ..-736...BN
BQ
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1



D5S ..-757...BN
BQ
Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1

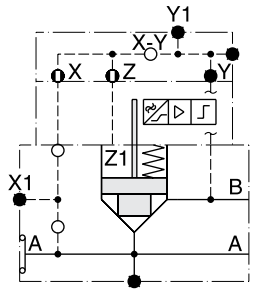
Annular Entry



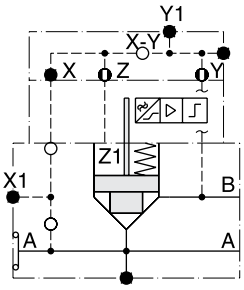
D5S ..-857...BN
BQ
Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1

D5S 3-Port Position Control Examples

Seat Entry

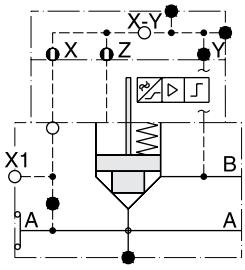


D5S08-5113A.BA
10
12
Pilot oil: internal from A

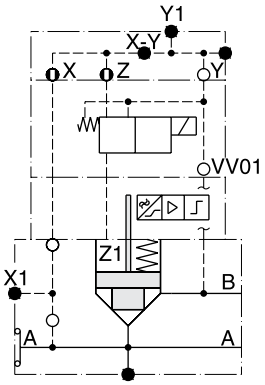


D5S08-5223A.BA
10
12
Pilot oil: internal from B

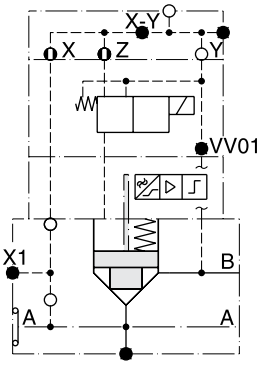
Annular Entry



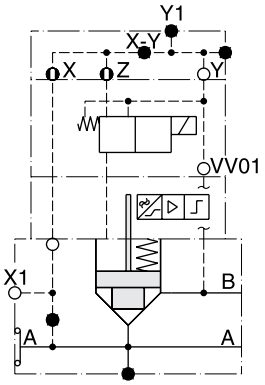
D5S08-5213A.BA
10
12
Pilot oil: external from X1



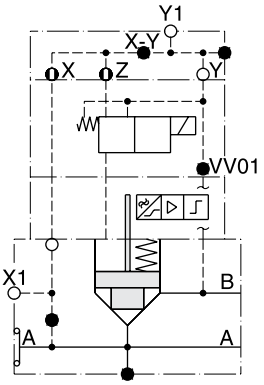
D5S08-5143A.BC
10 BE
12
Pilot oil: internal from A
Pilot drain: internal to B



D5S08-5163A.BC
10 BE
12
Pilot oil: internal from A
Pilot drain: external out of Y1

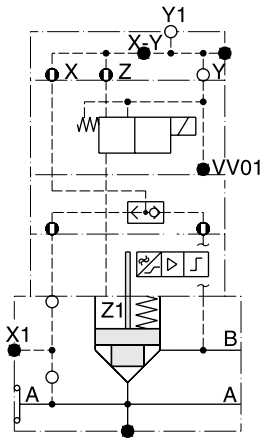


D5S08-5443A.BC
10 BE
12
Pilot oil: external from X1
Pilot drain: internal to B

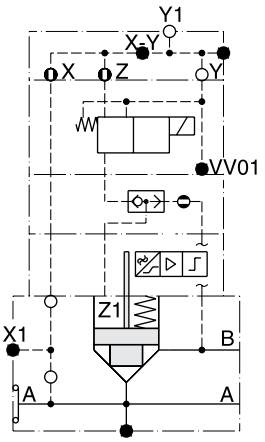


D5S08-5463A.BC
10 BE
12
Pilot oil: external from X1
Pilot drain: external out of Y1

Seat Entry

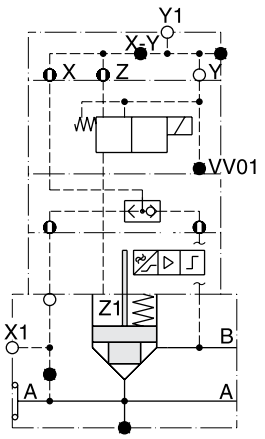


D5S08-5363A.BH
10 BE
12
Pilot oil: internal from A + internal from B
Pilot drain: external out of Y1

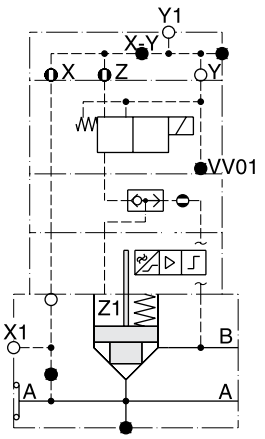


D5S08-5363A.BN
10 BQ
12
Pilot oil: internal from A + internal from B
Pilot drain: external out of Y1

Annular Entry

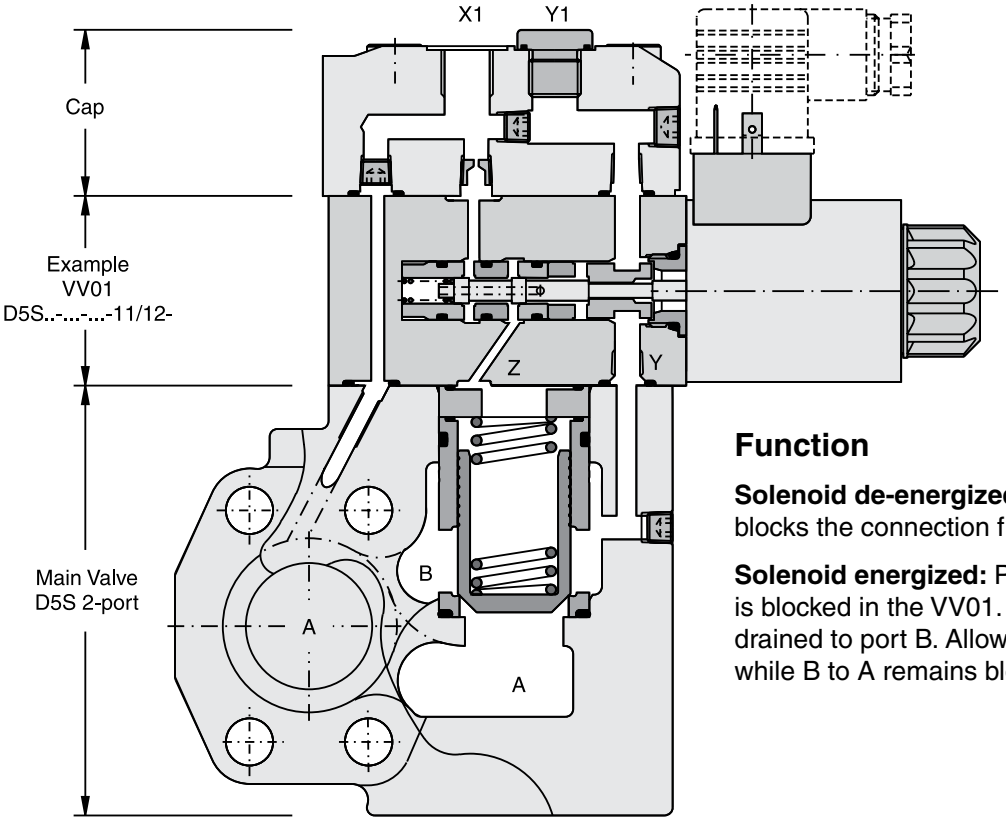


D5S08-5563A.BH
10 BK
12
Pilot oil: external from X1 + internal from B
Pilot drain: external out of Y1



D5S08-5563A.BN
10 BQ
12
Pilot oil: external from X1 + internal from B
Pilot drain: external out of Y1

Example PIlot Oil External from X1, Pilot Drain Internal Out of B with Vent Valve



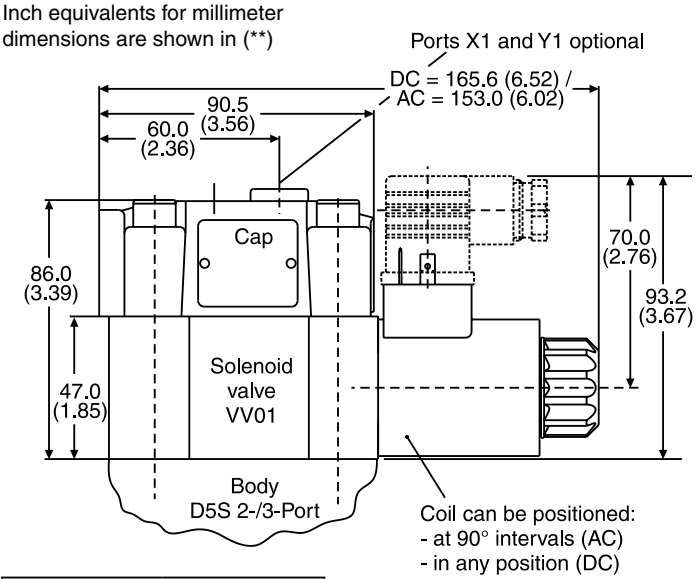
Function

Solenoid de-energized: Pilot oil from X1 to Z blocks the connection from A to B or B to A.

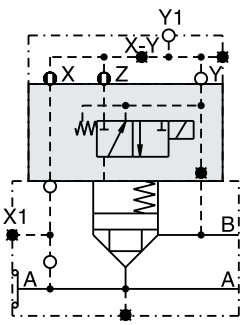
Solenoid energized: Pilot pressure from X1 is blocked in the VV01. The oil in Z is internally drained to port B. Allowing flow from A to B, while B to A remains blocked.

Dimensions — D5S with VV01

Inch equivalents for millimeter dimensions are shown in (**)

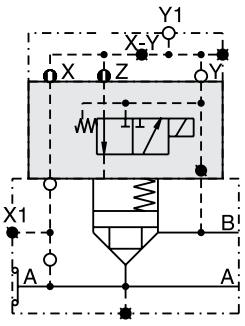


VV01 Seal Kits	
Nitrile	**Fluorocarbon**
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5



with manual override | without manual override

D5S..-.....09/10
Solenoid energized:
Blocked flow from A to B or B to A.
Solenoid de-energized:
Free flow from A to B or B to A.



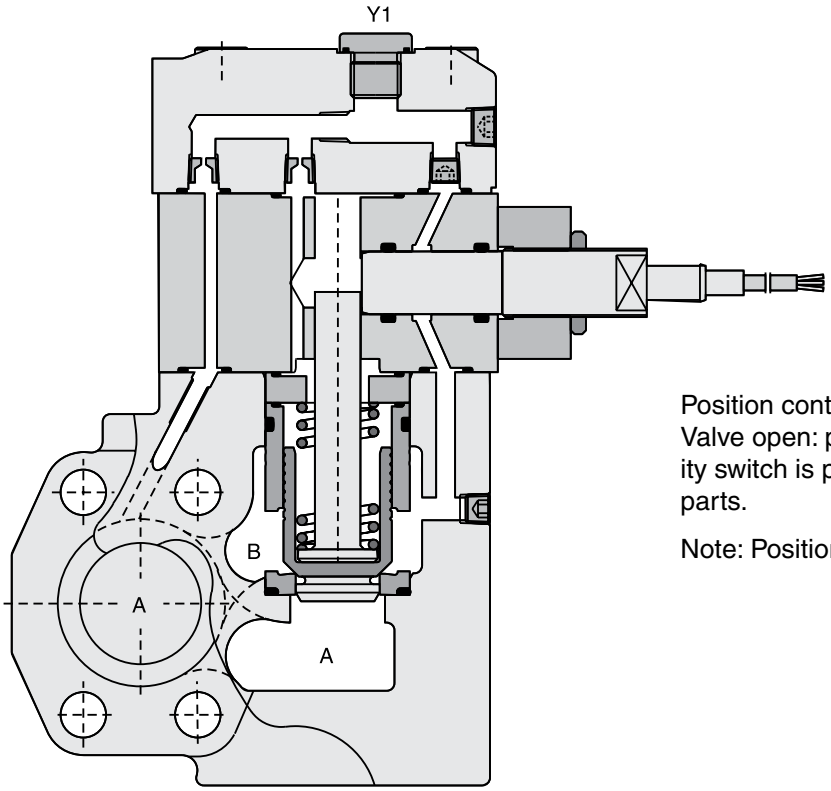
with manual override | without manual override

D5S..-.....11/12
Solenoid energized:
Free flow from A to B or B to A.
Solenoid de-energized:
Blocked flow from A to B or B to A.

D5S.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Example PIlot Oil External from X1, Pilot Drain Internal Out of B with Position Control

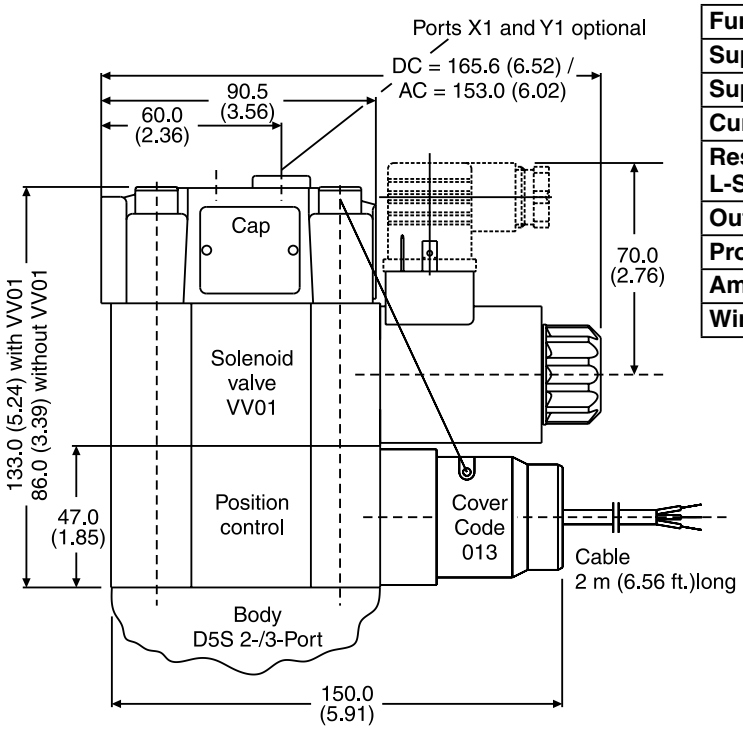


Position control by proximity switch (incl. amplifier). Valve open: proximity switch activited. This proximity switch is pressure proof and has no wearing parts.

Note: Position control for D5S08 and D5S10 only.

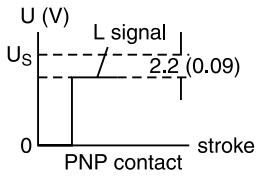
Dimensions — D5S with Position Control

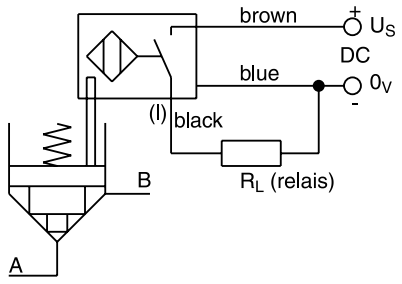
Inch equivalents for millimeter dimensions are shown in (**)



Technical Data (Proximity Switch)

Function	PNP, contact
Supply Voltage	10 - 30VDC
Supply Voltage Ripple	≤10%
Current Consumption	8mA Maximum
Residual Voltage L-Signal	Us – 2.2V at I_{max}
Output Current	≤200 mA
Protection Class	IP67
Ambient Temperature	-25°C to +70°C (-13°F to +158°F)
Wire Cross Section	3 x 0.5 mm²



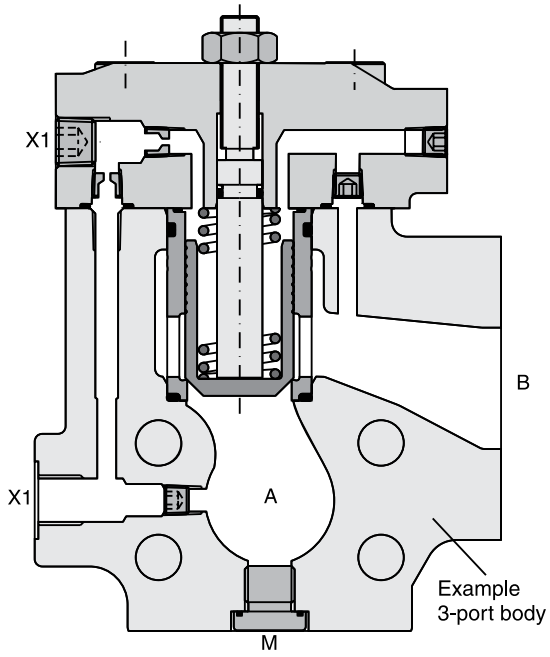


D5S.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

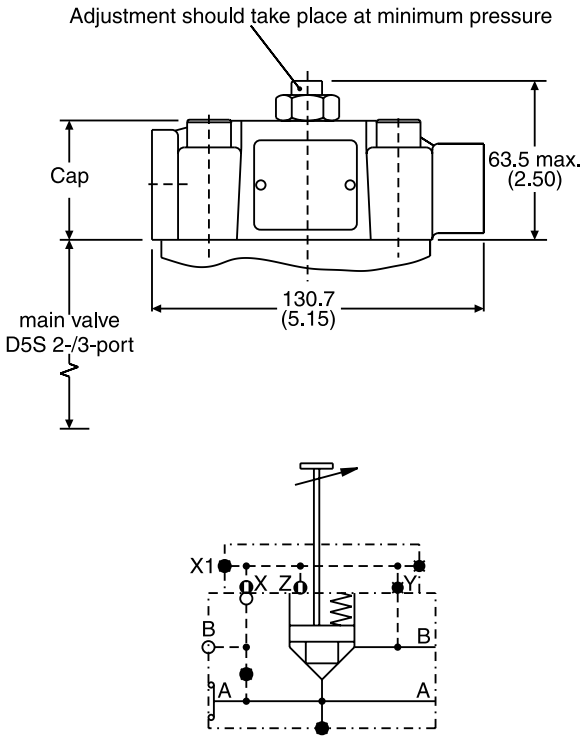
D5S Stroke Limiter



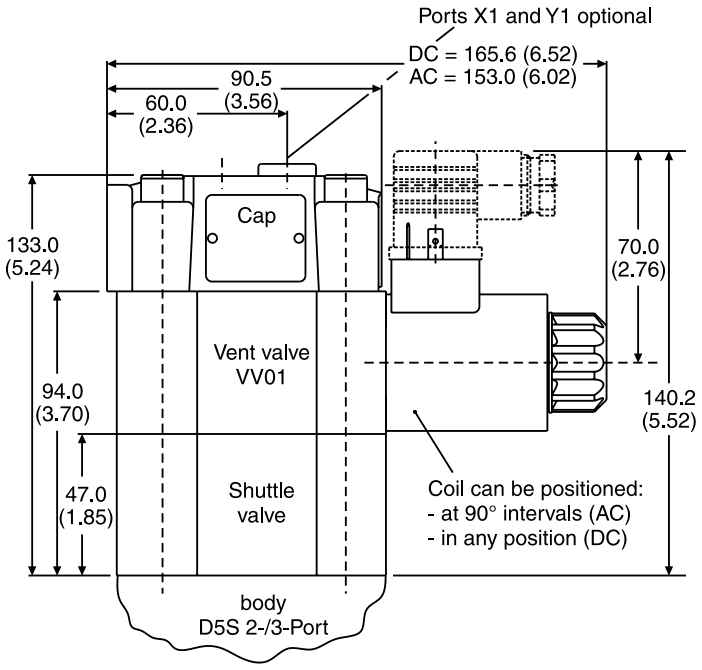
X1 = external pilot-oil (optional)

Note: Stroke limiter not for use with D5S06, solenoid valve VV01, shuttle valve and position control.

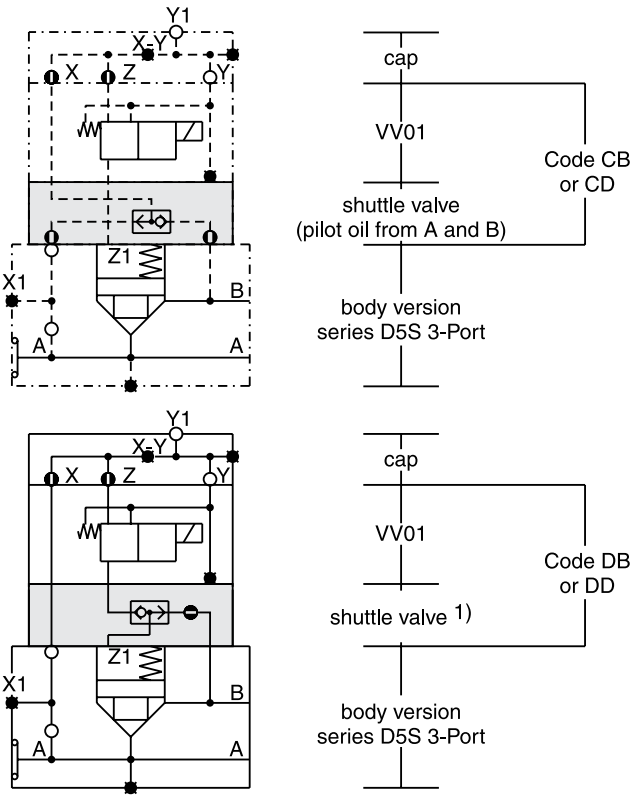
D5S Stroke Limiter Dimensions



D5S with Shuttle Valve Dimensions



Shuttle valve only in connection with vent valve VV01.



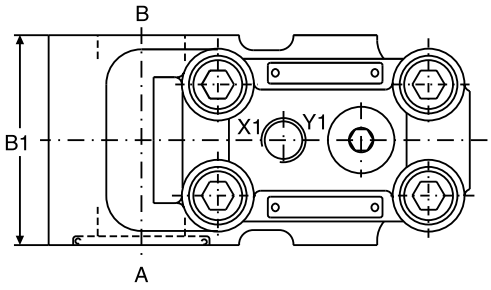
1) pilot oil from A and B, from B to A check valve function

Inch equivalents for millimeter dimensions are shown in (**)

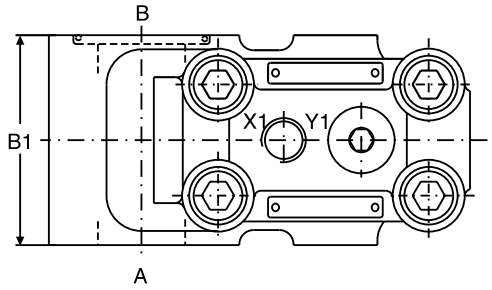
A

2-Port

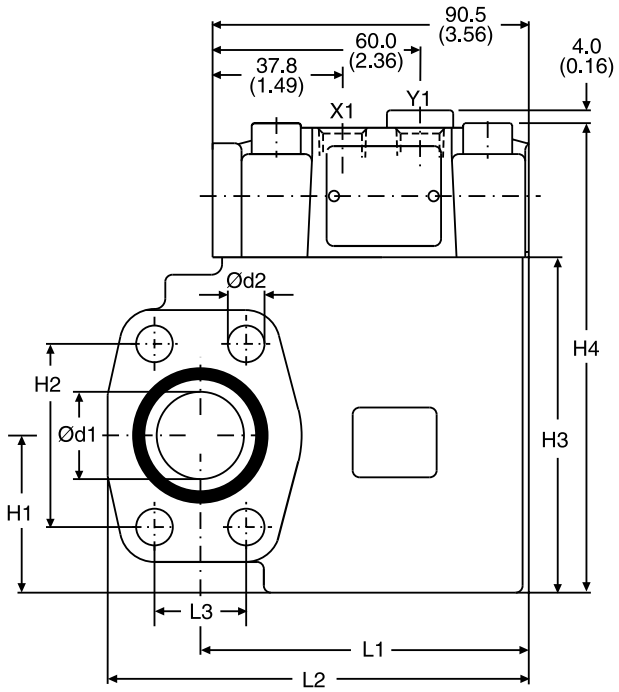
Seat Entry

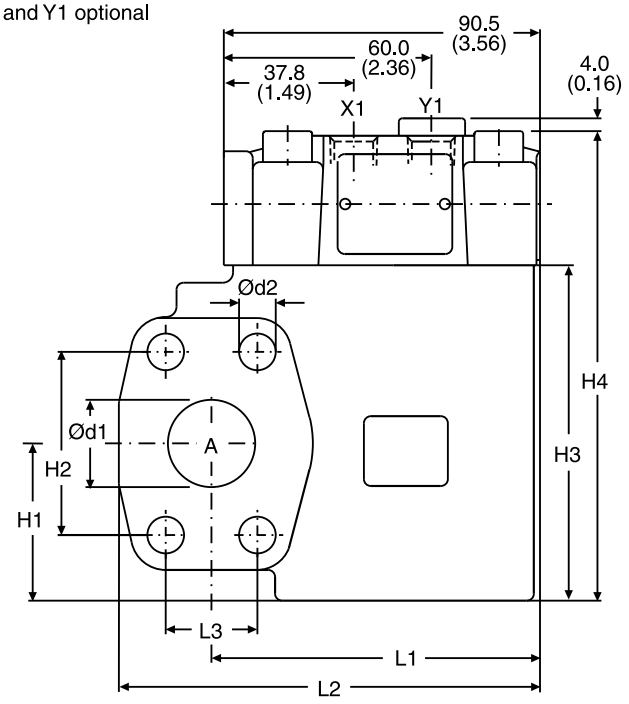


Annular Entry



Ports X1 and Y1 optional





Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5

Size	l1	l2	l3	b1	h1	h2	h3	h4	d1	d2
06	77.0 (3.03)	101.0 (3.98)	22.2 (0.87)	60.0 (2.36)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	127.6 (5.02)	19.0 (0.75)	10.5 (0.41)
08	94.0 (3.70)	120.5 (4.74)	26.2 (1.03)	60.0 (2.36)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	133.6 (5.26)	25.0 (0.98)	10.5 (0.41)
10	94.0 (3.70)	128.0 (5.04)	30.2 (1.19)	75.0 (2.95)	48.0 (1.89)	58.7 (2.31)	109.0 (4.29)	146.6 (5.77)	32.0 (1.26)	12.5 (0.49)

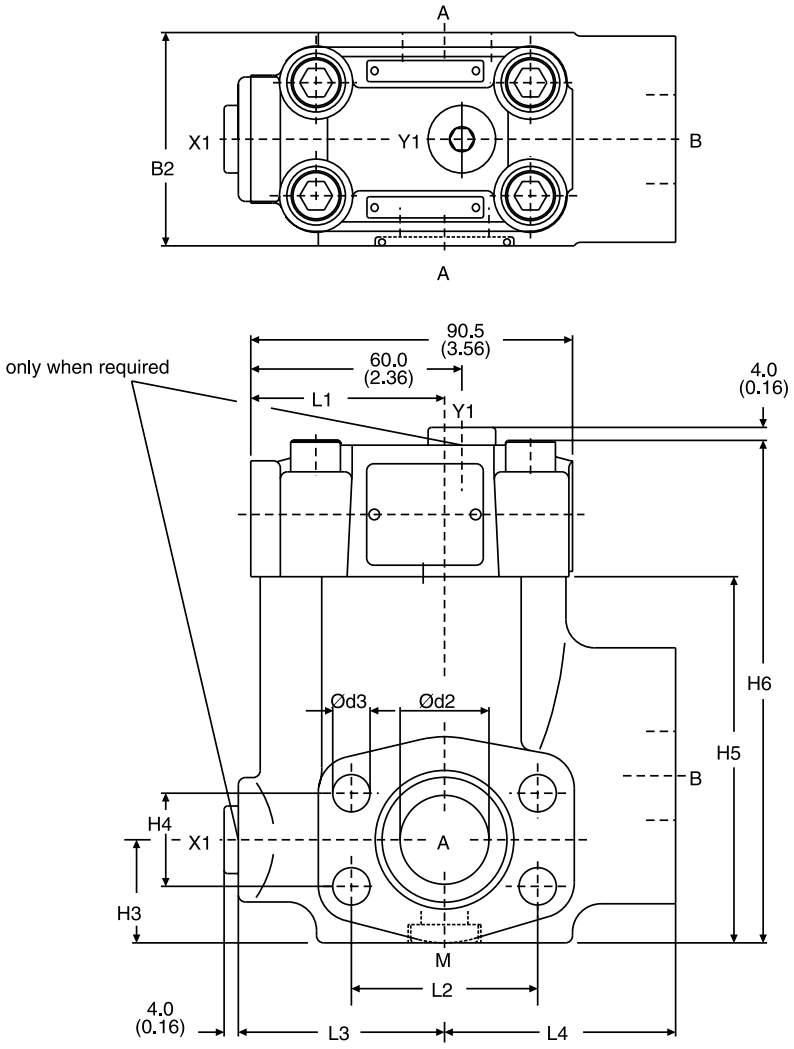
Ports	Function	Port size		
		D5S06	D5S08	D5S10
A	Inlet or outlet	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
B	Outlet or inlet	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
X1	External pilot port	SAE 4		
Y1	External pilot drain			

D5S.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

3-Port



Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
12	S26-27421-0	S26-27421-5

Size	l1	l2	l3	l4	b1	b2	h1	h2	h3	h4	h5	h6	d1	t1	d2	d3
06	49.0 (1.93)	47.6 (1.87)	56.0 (2.20)	63.0 (2.48)	22.2 (0.87)	60.0 (2.36)	41.0 (1.61)	47.6 (1.87)	28.0 (1.10)	22.2 (0.87)	82.0 (3.23)	119.0 (4.69)	3/8" UNC	20.0 (0.79)	19.0 (0.75)	10.5 (0.41)
08	55.0 (2.17)	52.4 (2.06)	58.0 (2.28)	65.0 (2.56)	26.2 (1.03)	60.0 (2.36)	47.0 (1.85)	52.4 (2.06)	29.0 (1.14)	26.2 (1.03)	103.0 (4.06)	141.0 (5.55)	3/8" UNC	23.0 (0.91)	25.0 (0.98)	10.5 (0.41)
10	57.0 (2.24)	58.7 (2.31)	64.0 (2.52)	61.0 (2.40)	30.2 (1.19)	75.0 (2.95)	65.0 (2.56)	58.7 (2.31)	36.0 (1.42)	30.2 (1.19)	113.0 (4.45)	150.0 (5.91)	7/16" UNC	22.0 (0.87)	32.0 (1.26)	12.5 (0.49)
12	37.0 (1.46)	69.8 (2.75)	55.0 (2.17)	93.0 (3.66)	35.7 (1.41)	80.0 (3.15)	73.0 (2.87)	69.8 (2.75)	72.0 (2.83)	35.7 (1.41)	140.0 (5.51)	178.0 (7.01)	1/2" UNC	27.0 (1.06)	38.0 (1.50)	13.5 (0.53)

Ports	Function	Port size			
		D5S06	**D5S08**	**D5S10**	**D5S12**
A (2x)	Inlet or outlet	¾" SAE 61	1" SAE 61	1¼" SAE 61	1½" SAE 61
B	Outlet or inlet	¾" SAE 61	1" SAE 61	1¼" SAE 61	1½" SAE 61
X1*	External pilot port	SAE 4			
Y1	External pilot drain				
M	Pressure gauge				

* closed when supplied.

D5S.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

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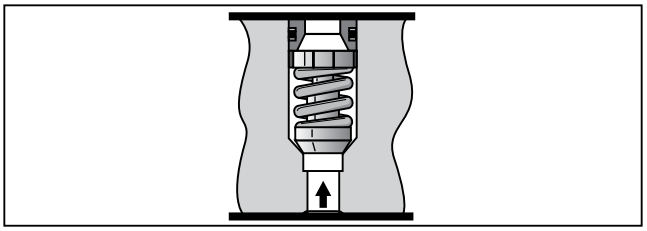
Sandwich valves provide a variety of check, flow control, pressure relief and pressure reducing functions in a compact NFPA D03, D05, D07 and D08 sandwich style valve. The NFPA D03 valve body conforms to the ISO 40 mm (1.57") thickness. These valves are mounted between directional control valves and their mounting surface.

The NFPA D03 Sandwich valves may also be used in conjunction with Parker's Cartpak Series of sandwich valves which offer a wide variety of additional functions including relief, pressure reducing/relieving, load check, back pressure check, needle, flow control, pressure compensated flow control, crossover, relief and directional valves.

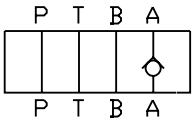
Check Valves

Series CM, ZRV

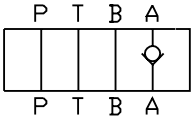
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Positive shut-off is provided by a fully guided poppet and allows full flow in the unchecked position.
- Parker CM, ZRV sandwich style check valves can be used either on the 'P', 'A', 'B', 'T' port or combination.
- Large internal flow paths allow high flow at low pressure drop.



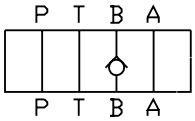
CM*AA



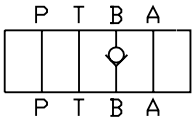
CM*AAF



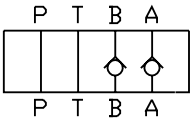
CM*BB



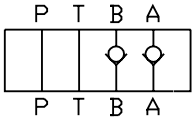
CM*BBF



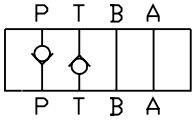
CM*DD



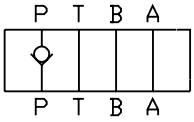
CM*DDF



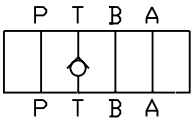
CM*PT



CM*PP, ZRV-P



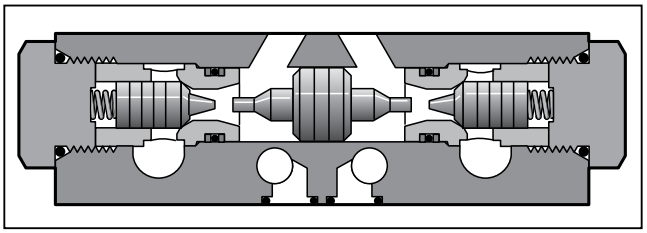
CM*TT, ZRV-T



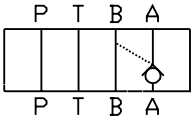
P.O. Check Valves

Series CPOM, ZRE

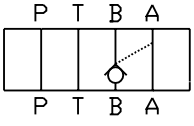
- Parker CPOM, ZRE sandwich style, pilot operated check valves can be provided in either single or double configurations.
- The pilot operated checks may be positioned in 'A' port or 'B' port; or both 'A' and 'B' ports.
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Large internal flow paths allow high flow at low pressure drop.



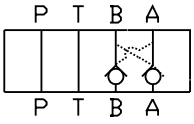
CPOM*AA, ZRE-A



CPOM*BB, ZRE-B



CPOM*DD, ZRE-AB

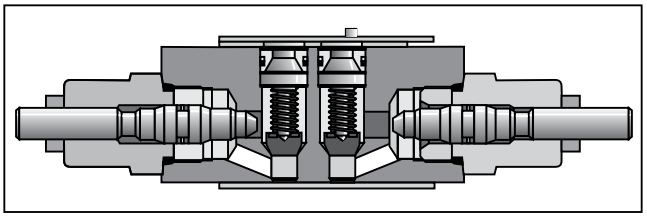


Flow Control Valves

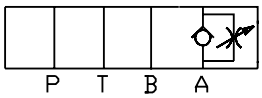
Series FM, ZRD

- Parker FM, ZRD sandwich style flow control valves can be provided in either single or double configurations.

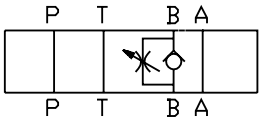
  The flow controls may be positioned in 'P' port, 'A' port, 'B' port, or both 'A' and 'B' ports.
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Two step needles (standard) provide fine adjustment for the first three turns and course adjustment for the last three turns. Fine metering needles are available as an option on D03 and D05 valves.
- Large bypass checks allow high flow at a low pressure drop.
- Reversible (invert 180°) for meter-in or meter-out (D03 & D05 only).



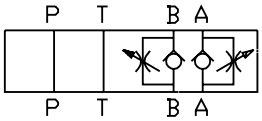
FM*AA, ZRD-AA
(Meter Out)



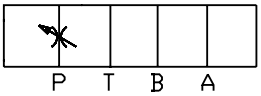
FM*BB, ZRD-BA
(Meter Out)



FM*DD, ZRD-ABA
(Meter Out)



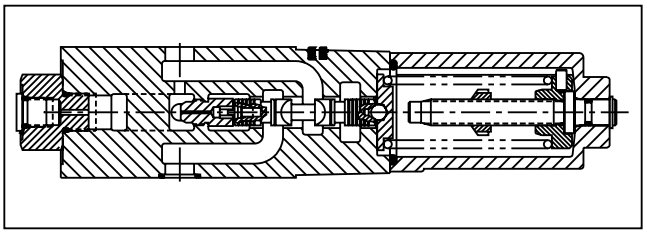
FM*PP
(Meter Out)



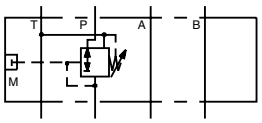
Pressure Reducing Valves

Series PRDM

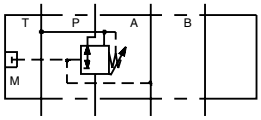
- PRDM sandwich valves may be selected to reduce pressure in the 'P' port, 'A' port or 'B' port.
- The direct operated, cushioned piston design results in fast response, low leakage and minimal hysteresis.
- Up to nine pressure adjustment ranges are available with maximum pressure settings.
- Adjustment options include: internal hex screw, hand knob or internal hex with keylock.
- Fluorocarbon and nitrile seals are available for multi-fluid compatibility.
- Available gage port connections include SAE, NPT, Metric and BSPP.



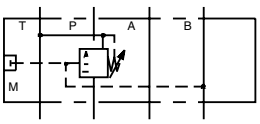
PRDM*PP



PRDM*AA



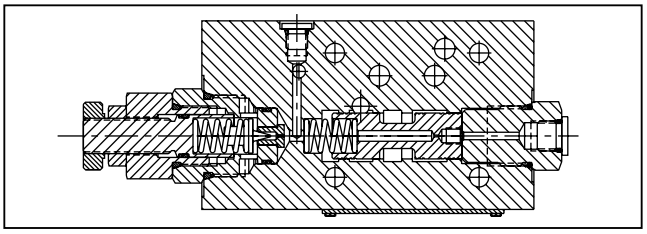
PRDM*BB



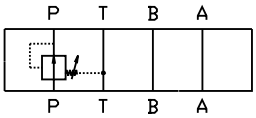
Pressure Reducing Valves

Series PRM, ZDR

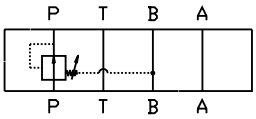
- Parker PRM, ZDR sandwich style pressure reducing valves can be used to reduce pressure on the 'P' port, the 'A' port, or the 'B' port.
- Three pressure adjustment options available: slotted screw, knob and locking knob.
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.



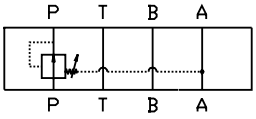
PRM*AA, ZDR-A



PRM*BB, ZDR-B



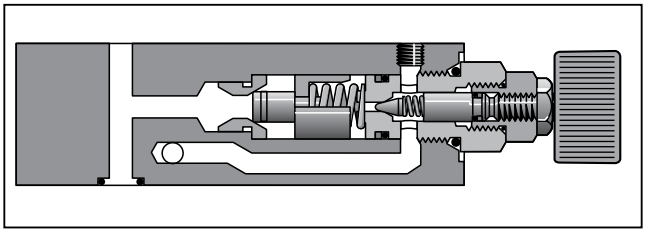
PRM*PP, ZDR-P



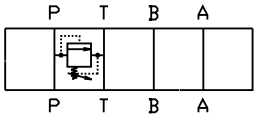
Pressure Relief Valves

Series RM, ZDV

- Parker RM, ZDV sandwich style relief valve is a 'P' port to 'T' port relief.
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Three pressure adjustment options available: slotted screw, knob and locking knob.

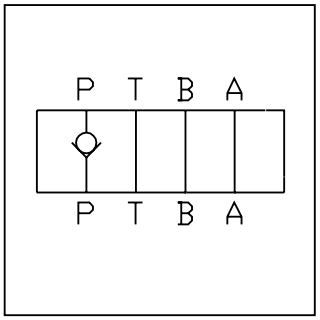


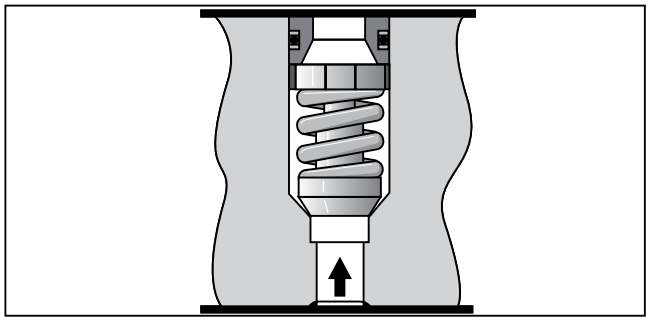
RM*PT, ZDV-P



General Description

Series CM check valves provide an integral, full flow check valve in the pressure 'P' port, 'A' port, 'B' port, or the tank 'T' port of the directional valve. Reverse flow is blocked. The CM2 and CM3 sizes offer a combination P&T check version.





Features

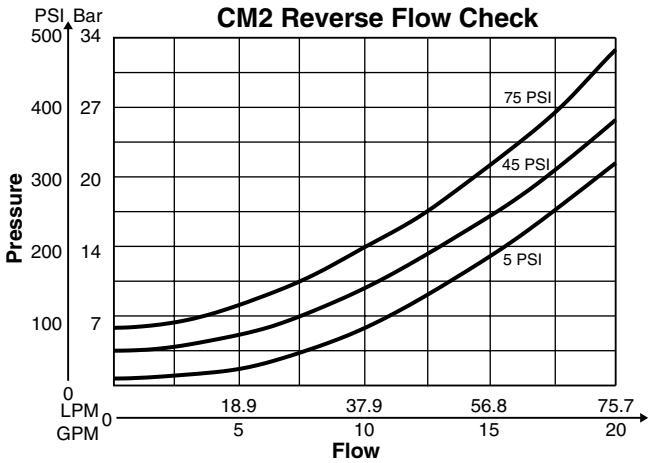
- Valve bodies are manufactured from steel which provides extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Positive shut-off is provided by a fully guided poppet and allows full flow in the unchecked position.
- Parker CM sandwich style check valves can be used either on the 'P', 'A', 'B', 'T' ports, or combinations.
- Large internal flow paths allow high flow at low pressure drop.

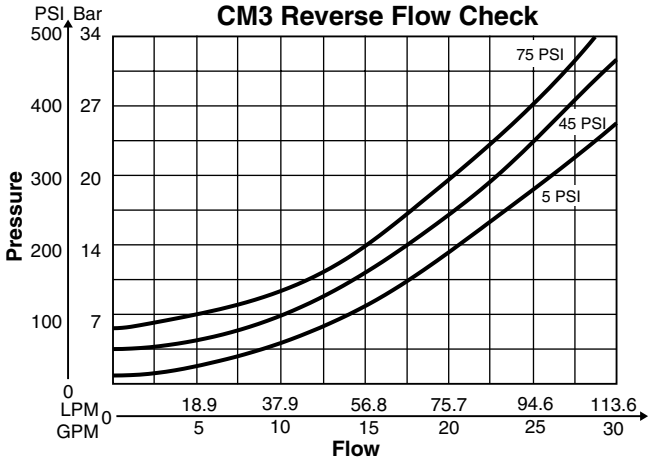
Specifications

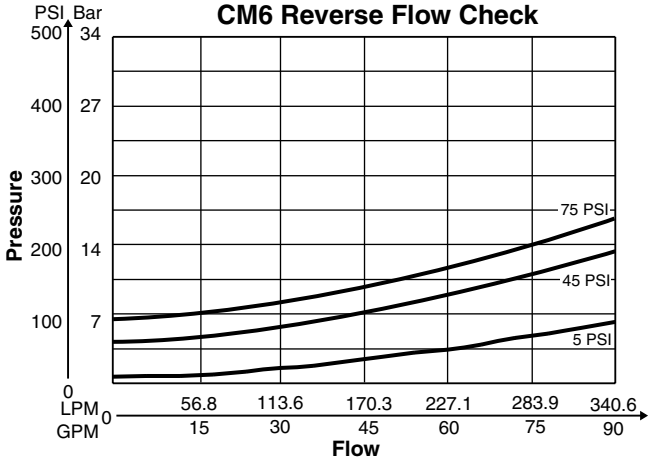
	CM2	CM3	CM6
Mounting Pattern	NFPA D03, CETOP 3, NG6	NFPA D05, CETOP 5, NG10	NFPA D08, CETOP 8, NG25
Maximum Pressure	345 Bar (5000 PSI)	345 Bar (5000 PSI)	345 Bar (5000 PSI)
Maximum Flow	76 LPM (20 GPM)	113 LPM (30 GPM)	340 LPM (90 GPM)
Cracking Pressure	0.3 Bar (5 PSI), 3 Bar* (45 PSI), 5 Bar* (75 PSI)	0.3 Bar (5 PSI), 3 Bar* (45 PSI), 5 Bar* (75 PSI)	0.3 Bar (5 PSI)

* Optional

Performance Curves







VISCOSITY CORRECTION FACTOR							
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141

Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change per chart.

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

CM Check Valve | Size | Port | Cracking Pressure | Seal | * Design Series

NOTE: Not required when ordering.

Code	Description
2	**NFPA D03 Subplate Mounting**
3	**NFPA D05 Subplate Mounting**
6	**NFPA D08 Subplate Mounting**

Code	Description
PP*	P Port Check
PT*	P and T Port Checks
TT*	T Port Check
DD	**A and B Port Checks**
AA	**A Port Check**
BB	**B Port Check**
AAF	A Port Inverted
BBF	B Port Inverted
DDF	A and B Ports Inverted

* Not available on 6 size

Code	Type
Omit	**5 PSI**
Y	45 PSI*
Z	75 PSI*

* Not available on 6 size.

Code	Type
V	**Fluorocarbon**
N	**Nitrile**

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Manapak Bolt Kits

Size "2"				Size "3"			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)	No. of Sandwich	Sandwich & Valve Combination	D3W-30 D3DW & D31*W*	Bolt Length mm (in)
1	Sandwich & D1	BK243	73.2 (2.88)	1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D1	BK225	111.3 (4.38)	2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D1	BK244	152.4 (6.00)	3	Sandwich & D3	BK143	190.5 (7.50)
4	Sandwich & D1	BK245	190.5 (7.50)				

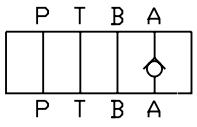
Bolt Kits must be ordered separately. *D31VW with internal pilot and internal drain only.

Size "6"				
Sandwich & Valve Combination	Bolt Kit	Description	Qty/ Kit	Torque IN-LBS
1 Sandwich & D6*VW Valve	BK121	1/2 - 13 x 5.25	6	80
2 Sandwich & D6*VW Valve	BK122	1/2 - 13 x 8.00	6	80
3 Sandwich & D6*VW Valve	BK123	1/2 - 13 x 10.75	6	80
4 Sandwich & D6*VW Valve	BK124	1/2 - 13 x 13.50	6	80

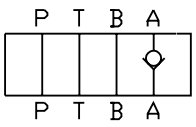
Note: Bolt Kits must be ordered separately.

Unit Weight:
CM2 0.8 kg (1.7 lbs.)
CM3 1.8 kg (3.9 lbs.)
CM6 7.7 kg (17 lbs.)

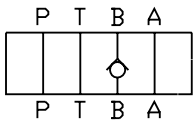
Schematics



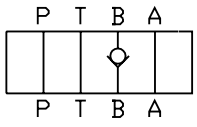
AA Option



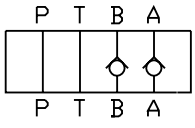
AAF Option



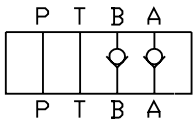
BB Option



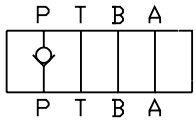
BBF Option



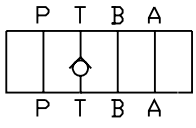
DD Option



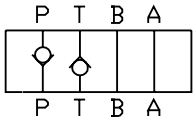
DDF Option



PP Option

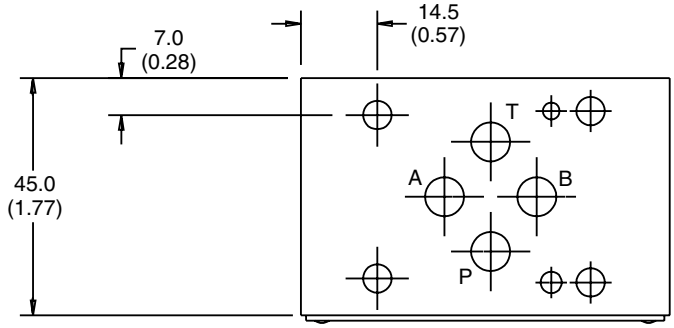


TT Option

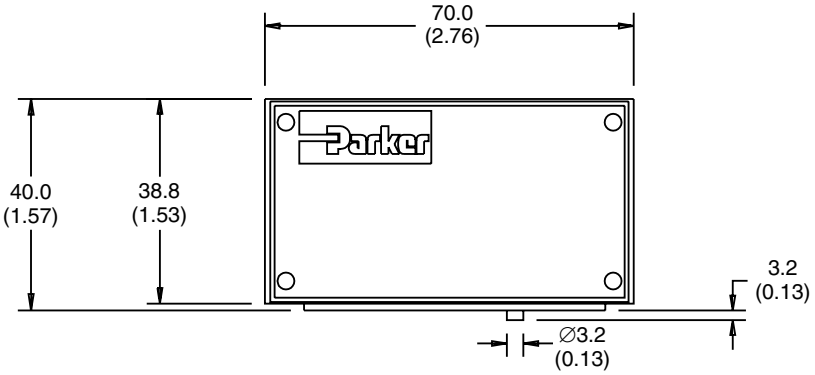


PT Option

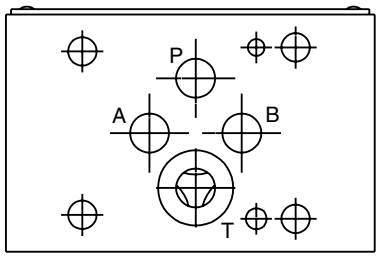
Inch equivalents for millimeter dimensions are shown in (**)



Top View



Face View

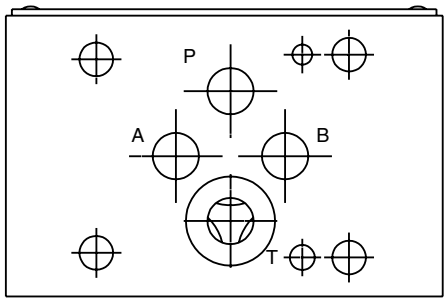


SHOWN WITHOUT O-RING PLATE

Bottom View

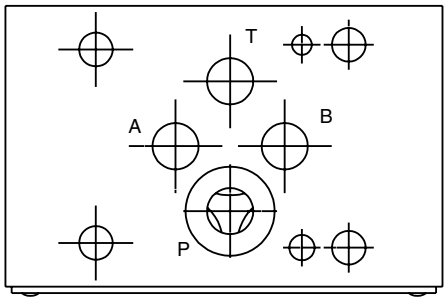
Note: Transfer the locating pin to the hole on the opposite side of the valve body for 'T' port option. (Invert body 180°)

Bottom Views

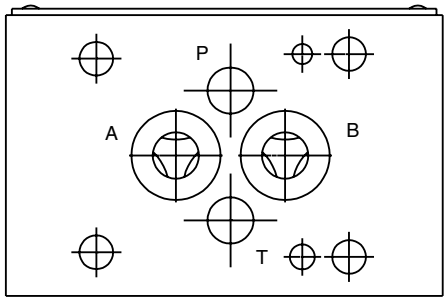


TT

Top Views



PP/PT



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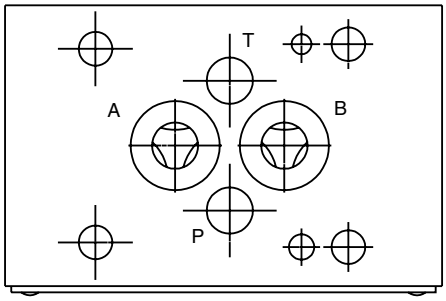
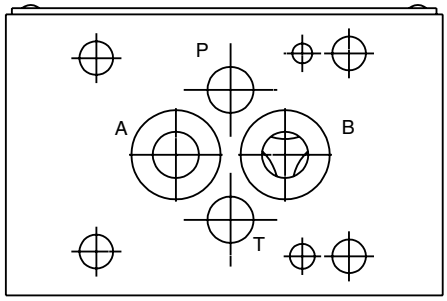
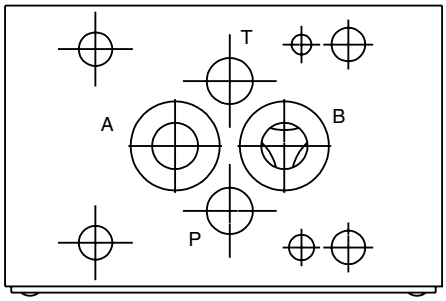


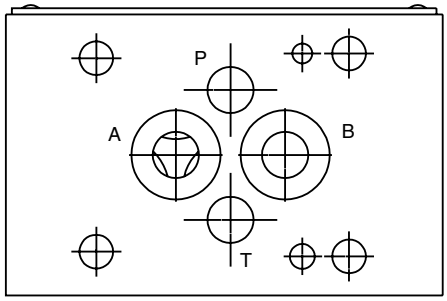
DDF



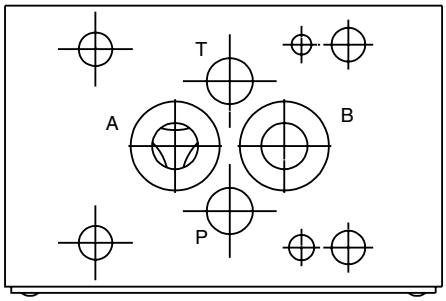
BB



BBF

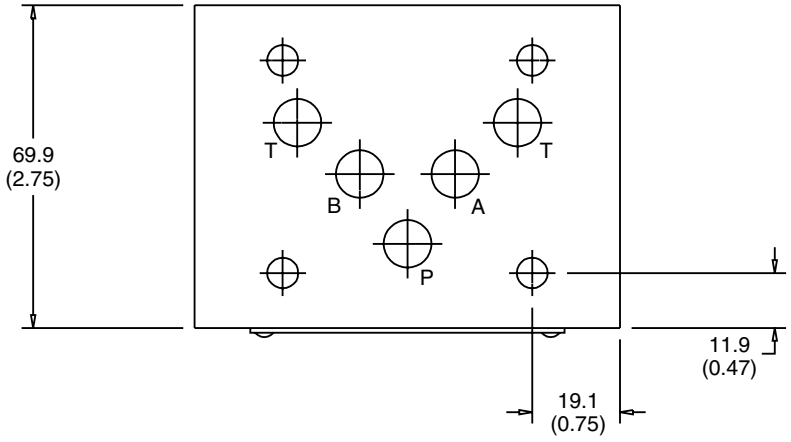


AA

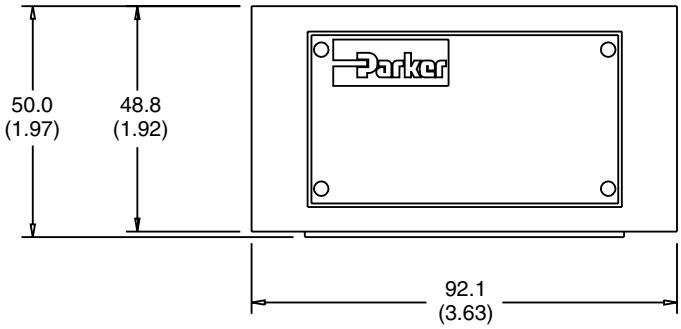


AAF

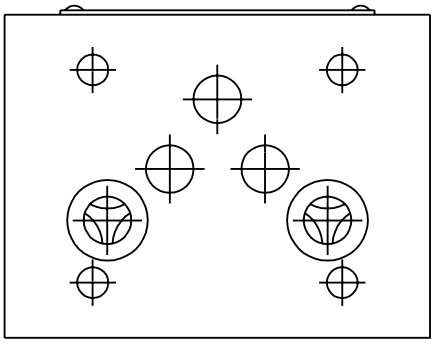
Inch equivalents for millimeter dimensions are shown in (**)



Top View



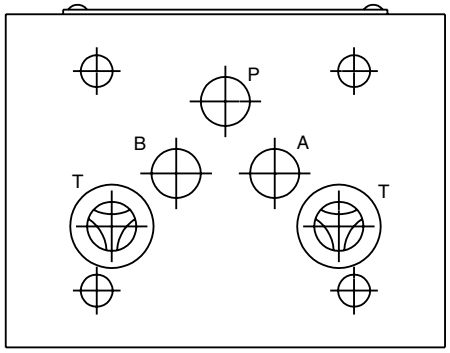
Face View



SHOWN WITHOUT O-RING PLATE

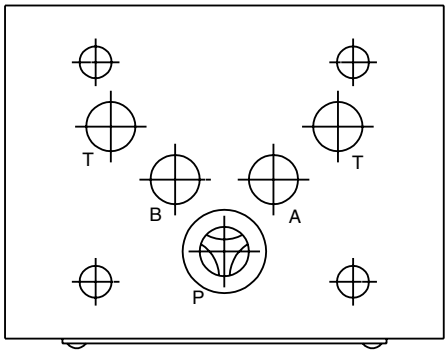
Bottom View

Bottom Views

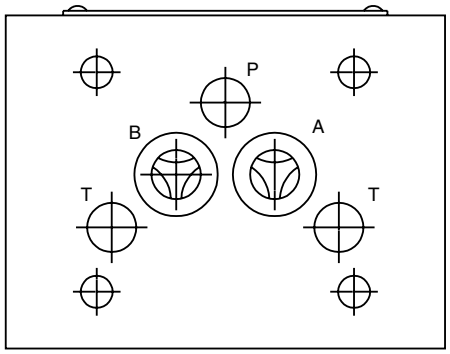


TT

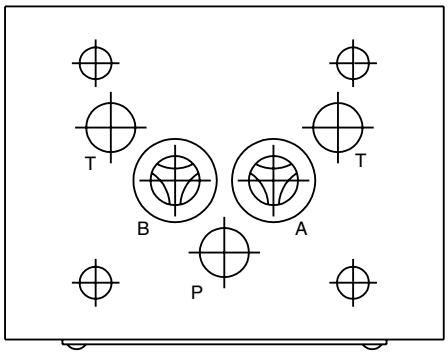
Top Views



PP/PT



DD



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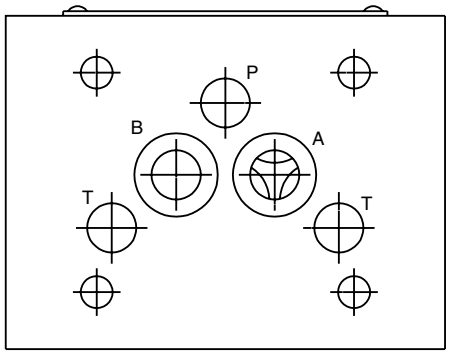

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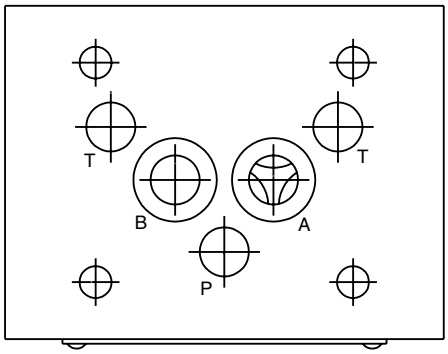
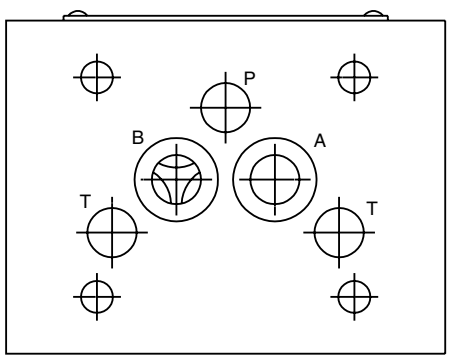
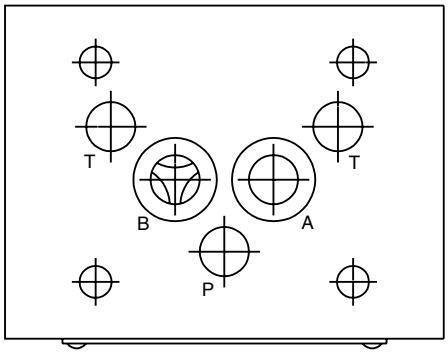


AAF

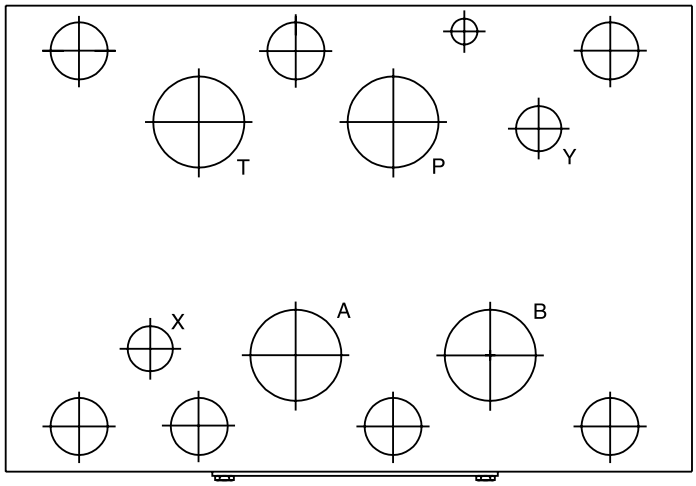


BB

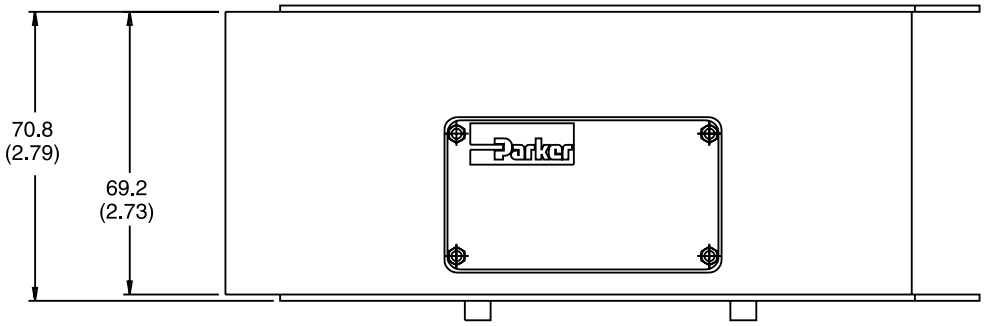


BBF

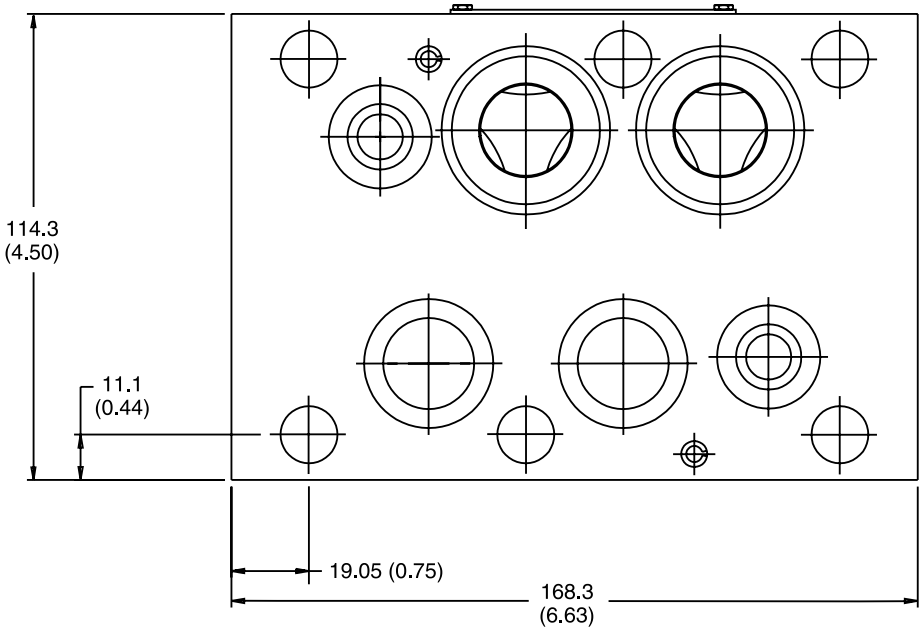
Inch equivalents for millimeter dimensions are shown in (**)



Top View



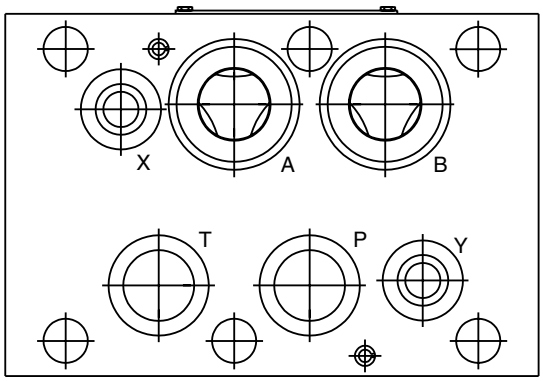
Face View



Bottom View

Bottom Views

Top Views



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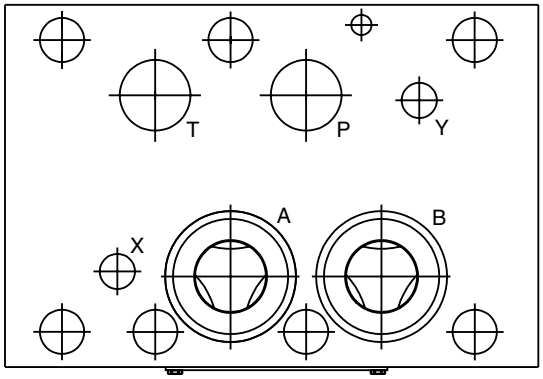

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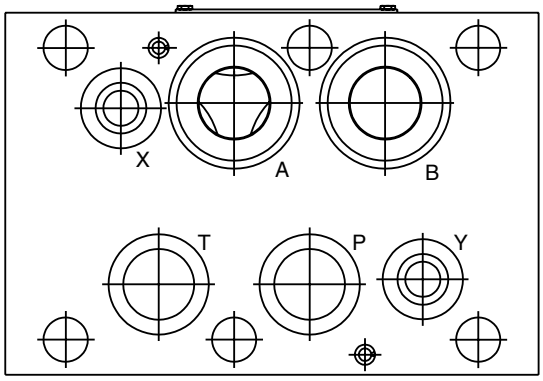

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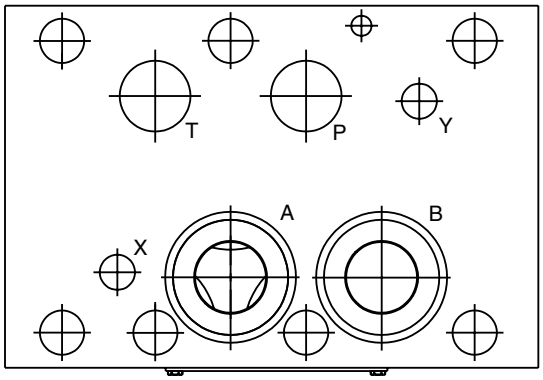

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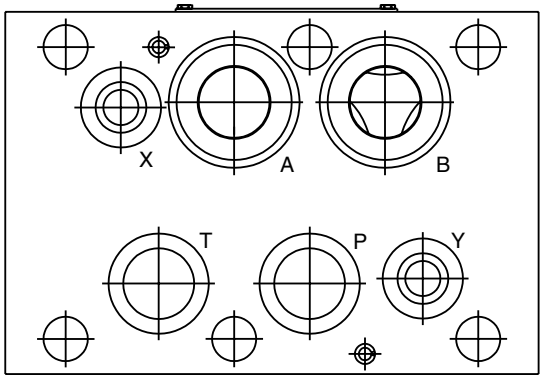
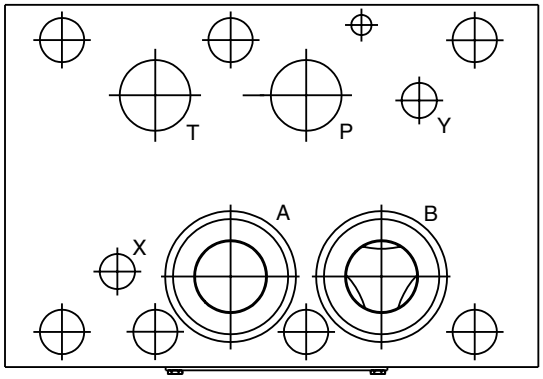


BB

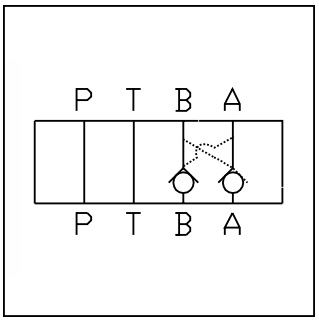


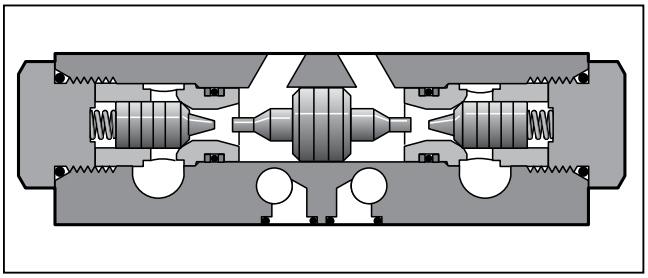
BBF

General Description

Series CPOM double pilot operated check valves block leakage from the actuator ports to tank when the directional valve is in the center position.

NOTE: For max. response and shut off, a directional valve with both cylinder ports drained to tank in the center position is recommended for use with sandwich double pilot operated check valves.

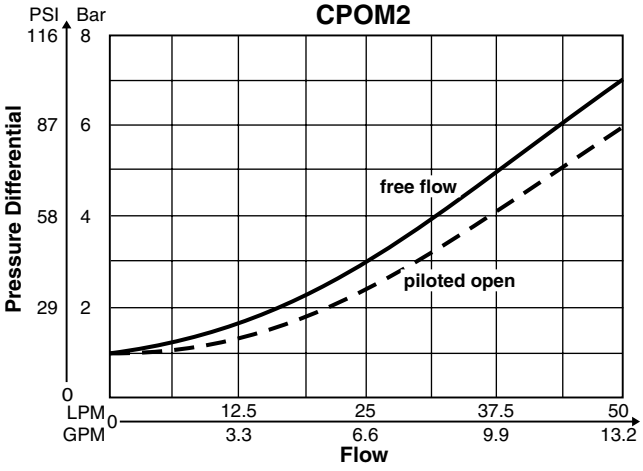


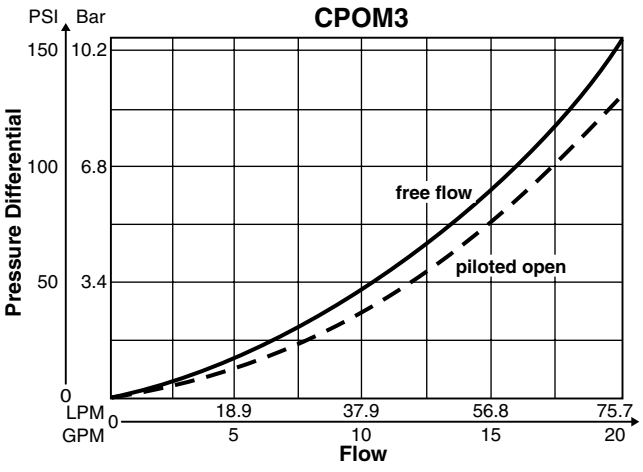


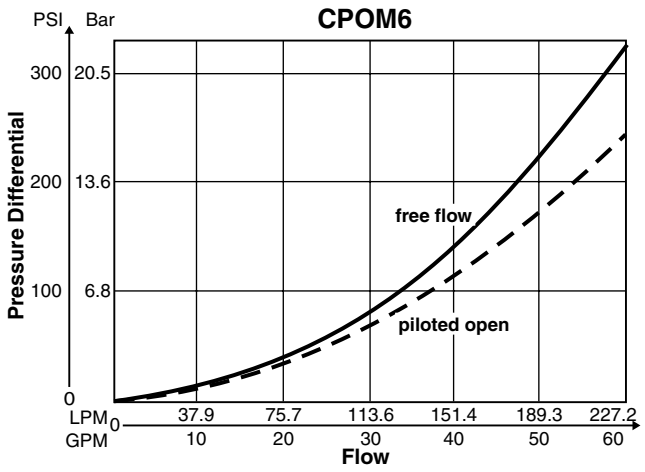
Features

- Parker CPOM sandwich style, p.o. check valves can be provided in either single or double configurations.
- The p.o. checks may be positioned in 'A' port or 'B' port; or both 'A' and 'B' ports.
- Valve bodies are manufactured from steel providing extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Positive shut-off is provided by a hardened poppet and cage assembly.
- Large internal flow paths allow high flow at low pressure drop.

Performance Curves







Specifications

	CPOM2	CPOM3	CPOM6
Mounting Pattern	NFPA D03, CETOP 3, NG 6	NFPA D05, CETOP 5, NG 10	NFPA D08, CETOP 8, NG 25
Maximum Pressure	345 Bar (5000 PSI)	345 Bar (5000 PSI)	205 Bar (3000 PSI)
Maximum Flow	53 LPM (14 GPM) @ 21 Bar (305 PSI) Pressure Drop	76 LPM (20 GPM) @ 11 Bar (155 PSI) Pressure Drop	227 LPM (60 GPM) @ 24 Bar (350 PSI) Pressure Drop
Cracking Pressure	1.0 Bar (15 PSI)	0.3 Bar (5 PSI)	0.4 Bar (6 PSI)
Pilot Ratio	3:1	3:1	3:1
Leakage	5 DPM	5 DPM	5 DPM

Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change as per chart.

Viscosity Correction Factor							
Viscosity (SSU)	75	150	200	250	300	350	400
Percentage of ΔP (Approx.)	93	111	119	126	132	137	141

Parker Sandwich.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

CPOM — Pilot Operated Check Valve

Size

Code	Description
2	NFPA D03 Subplate Mounting
3	NFPA D05 Subplate Mounting
6	NFPA D08 Subplate Mounting

Poppet Style

Code	Description
DD	Double Poppet A and B Ports
AA	A Port Only
BB	B Port Only

Cracking Pressure

Code	Type
Omit**	5 PSI
Y*	45 PSI
Z*	75 PSI

* Available in size 2 only.
** 15 PSI on CPOM2

Seal

Code	Type
N	Nitrile
V	Fluorocarbon

Design Series *

NOTE: Not required when ordering.

Bold: Designates Tier I products and options.
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Bolt Kits

Size "2"

No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D1	BK243	73.2 (2.88)
2	Sandwich & D1	BK225	111.3 (4.38)
3	Sandwich & D1	BK244	152.4 (6.00)
4	Sandwich & D1	BK245	190.5 (7.50)

Size "3"

No. of Sandwich	Sandwich & Valve Combination	D3W-30 D3DW & D31*W*	Bolt Length mm (in)
1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D3	BK143	190.5 (7.50)

* D31VW with internal pilot and internal drain only.

Size "6"

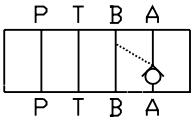
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D6	BK121	133.4 (5.25)
2	Sandwich & D6	BK122	203.2 (8.00)
3	Sandwich & D6	BK123	273.1 10.75)
4	Sandwich & D6	BK124	342.9 (13.5)

Bolt Kits must be ordered separately.

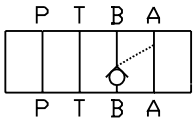
Unit Weight:

CPOM2D	0.8 kg (1.7 lbs.)
CPOM3D	4.4 kg (9.6 lbs.)
CPOM6D	9.5 kg (21.0 lbs.)

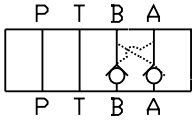
Schematics



AA Option

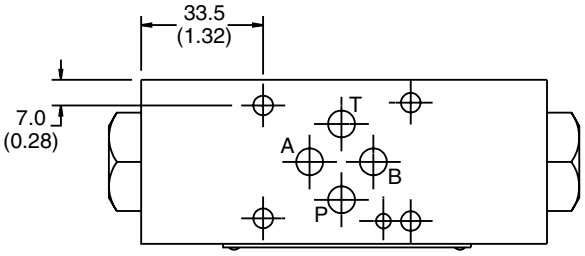


BB Option

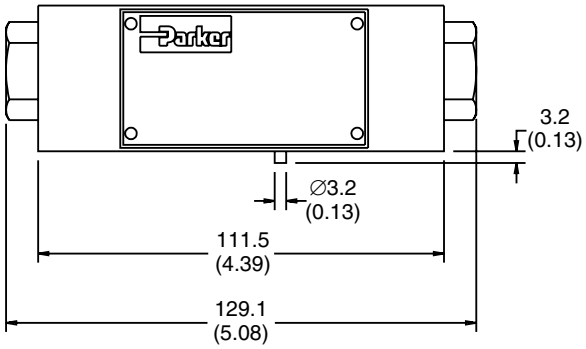


DD Option

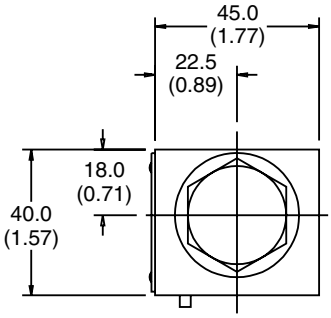
Inch equivalents for millimeter dimensions are shown in (**)



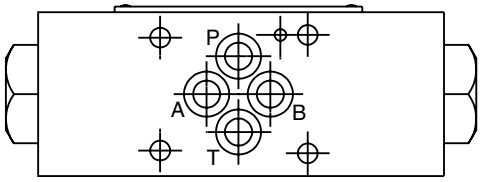
Top View



Face View



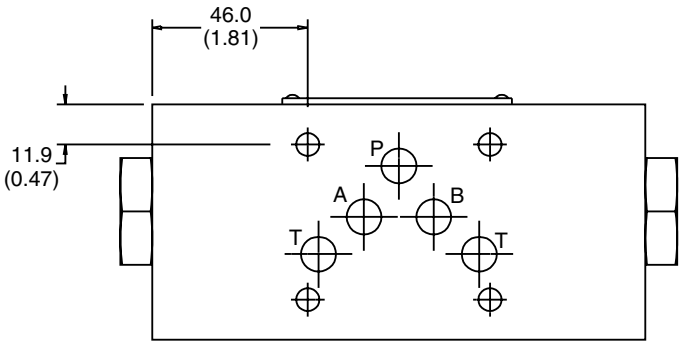
End View



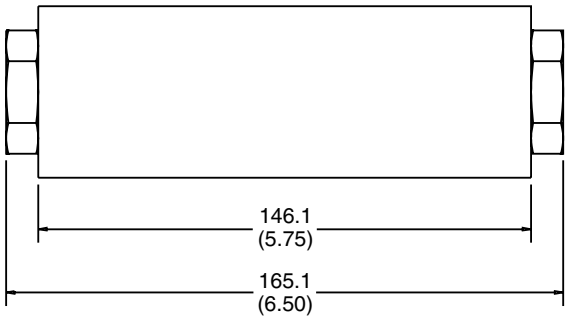
Bottom View

B

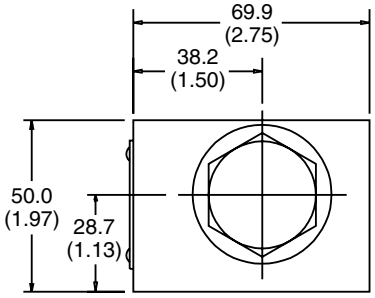
Inch equivalents for millimeter dimensions are shown in (**)



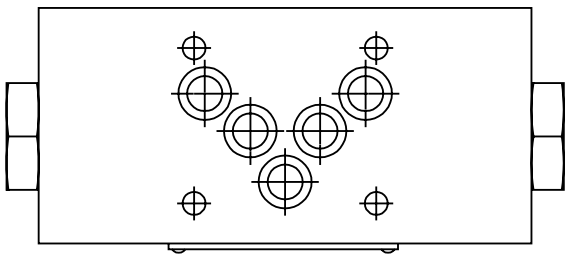
Top View



Face View

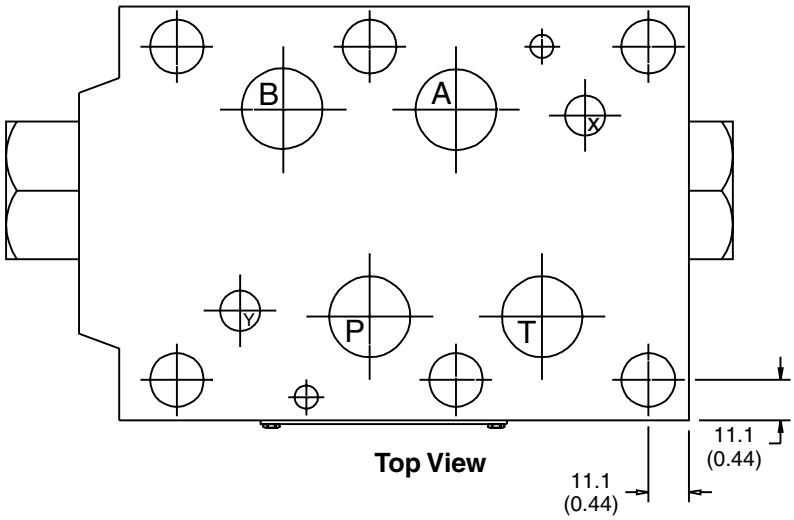


End View

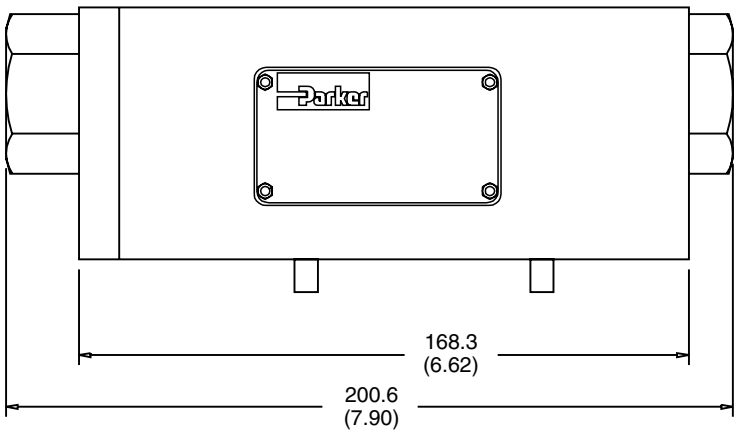


Bottom View

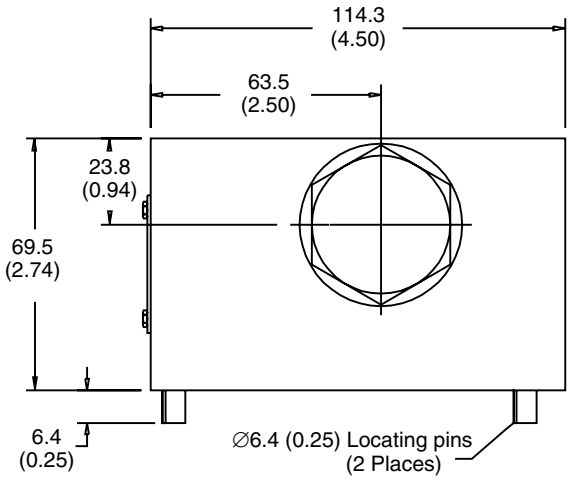
Inch equivalents for millimeter dimensions are shown in (**)



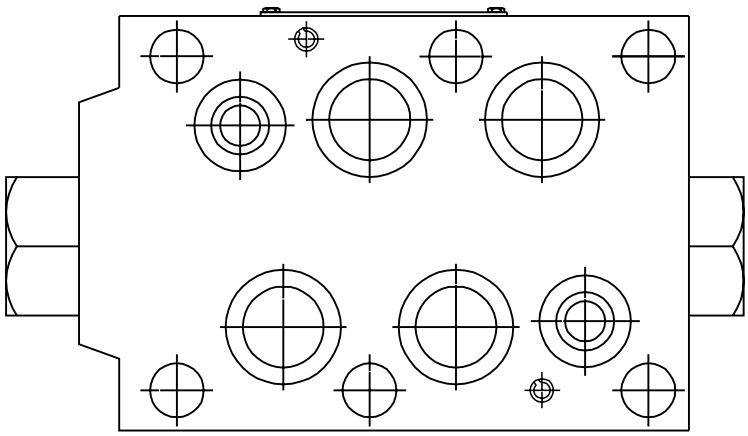
Top View



Face View



End View

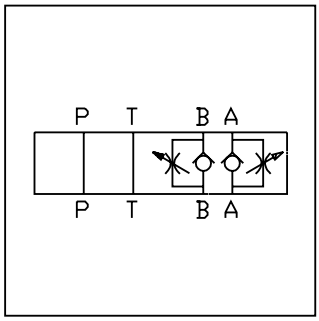


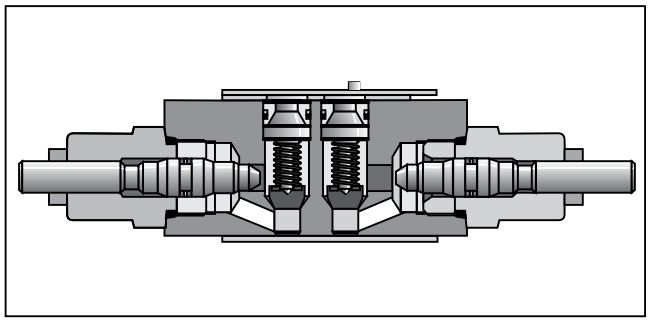
Bottom View

B

General Description

Series FM double flow control valves permit free flow from the directional valve to the actuator and adjustable independent flow regulation in each return line from the actuator (meter-out). The FM2 and FM3 have a seal plate and can be inverted for meter-in applications (see installation drawing for flow direction).

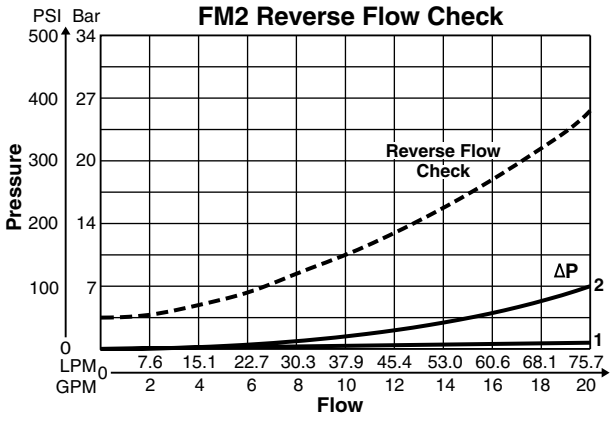


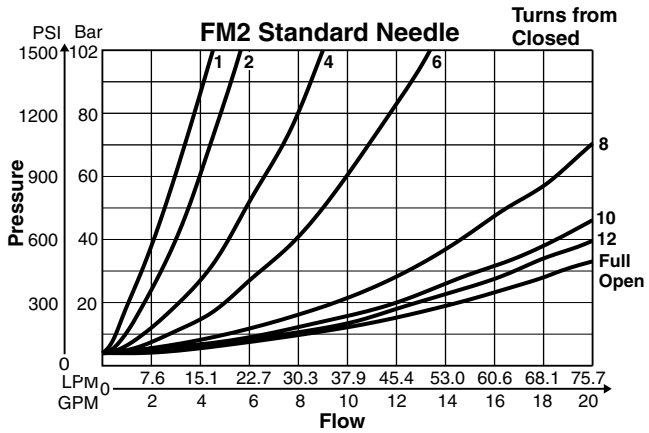


Features

- FM style flow control valves can be provided in either single or double configurations.
- The flow controls may be positioned in 'A' port, 'B' port, both 'A' and 'B' ports or 'P' port.
- Valve bodies are manufactured from steel providing extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Two step needles provide fine adjustment for the first few turns and course adjustment for the last few turns. Standard and fine adjustment needles available.
- Large bypass checks allow high flow at a low pressure drop.
- Valve is reversible (invert 180°) for meter-in or meter-out applications (FM2 and FM3 only).
- Adjustment options include Allen hex or hand knob.

Performance Curves





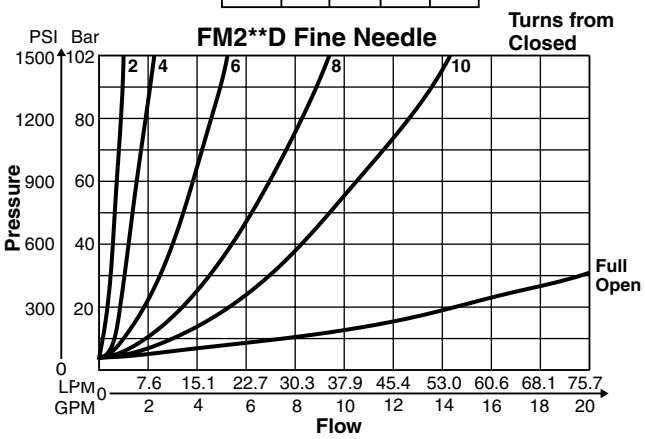
Specifications

	FM2	FM3	FM6
Mounting Pattern	NFPA D03, CETOP 3, NG 6	NFPA D05, CETOP 5, NG 10	NFPA D08, CETOP 8, NG 25
Maximum Pressure	345 Bar (5000 PSI)	345 Bar (5000 PSI)	205 Bar (3000 PSI)
Maximum Flow	76 LPM (20 GPM)	113 LPM (30 GPM)	341 LPM (90 GPM)
Cracking Pressure	0.3 Bar (5 PSI)	0.3 Bar (5 PSI)	0.3 Bar (5 PSI)

Pressure Drop Reference Chart

	P	A	B	T
PP	✻	2	2	1
DD	1	✻	✻	1
AA	1	✻	1	1
BB	1	1	✻	1

✻ See specific flow vs. turns



Curves were generated using 100 SSU hydraulic oil @49°C (120°F). For any other viscosity, pressure drop will change as per chart.

Viscosity Correction Factor							
Viscosity (SSU)	75	150	200	250	300	350	400
Percentage of ΔP (Approx.)	93	111	119	126	132	137	141

Parker Sandwich.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

FM — Flow Valve Control | Size | Meter Option | Needles | Adjustment | Seal | Design Series

NOTE: Not required when ordering.

Code	Description
2	**NFPA D03 Subplate Mounting**
3	**NFPA D05 Subplate Mounting**
***6**	**NFPA D08 Subplate Mounting**

* FM6 - Meter out only

Code	Type
S	**Allen Hex**
K	**Knob**

Code	Type
N	**Nitrile**
V	**Fluorocarbon**

Code	Description
AA	**Single Function A Port Only**
BB	**Single Function B Port Only**
DD	**A and B Ports Dual Function**
PP**	Single Function P Port

** Not availabe on size 6.

Code	Description
Omit	**Standard**
D*	**Fine Meter**

* D needle is the standard needle in valves used as pilot chokes. Not available on size 6.

Bold: Designates Tier I products and options.
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Bolt Kits

Size "2"			
No. of Sandwich	**Sandwich & Valve Combination**	**Bolt Kit**	**Bolt Length mm (in)**
1	Sandwich & D1	BK243	73.2 (2.88)
2	Sandwich & D1	BK225	111.3 (4.38)
3	Sandwich & D1	BK244	152.4 (6.00)
4	Sandwich & D1	BK245	190.5 (7.50)

Size "3"			
No. of Sandwich	**Sandwich & Valve Combination**	**D3W-30 D3DW & D31*W***	**Bolt Length mm (in)**
1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D3	BK143	190.5 (7.50)

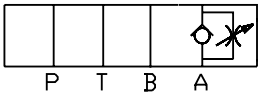
* D31VW with internal pilot and internal drain only.

Size "6"			
No. of Sandwich	**Sadnwich & Valve Combination**	**Bolt Kit**	**Bolt Length mm (in)**
1	Sandwich & D6	BK121	133.4 (5.25)
2	Sandwich & D6	BK122	203.2 (8.00)
3	Sandwich & D6	BK123	273.1 (10.75)
4	Sandwich & D6	BK124	342.9 (13.5)

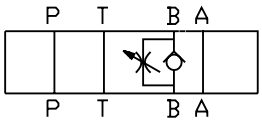
Bolt Kits must be ordered separately.

Unit Weight:
FM2 1.7 kg (3.8 lbs.)
FM3 2.4 kg (5.2 lbs.)
FM6 7.9 kg (17.5 lbs.)

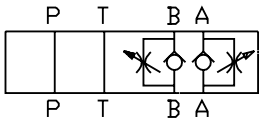
Schematics



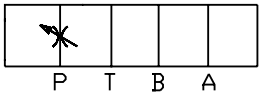
AA Option



BB Option

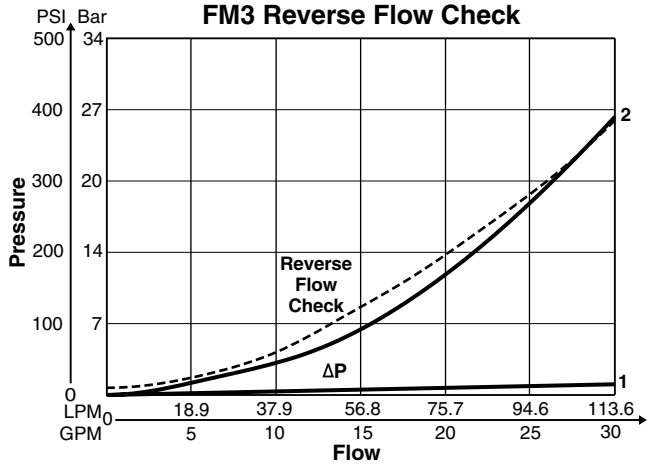


DD Option



PP Option

FM3 Reverse Flow Check

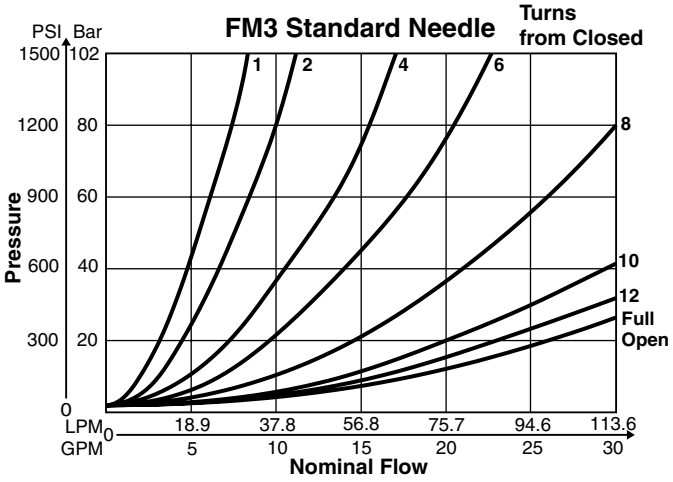


Pressure Drop Reference Chart

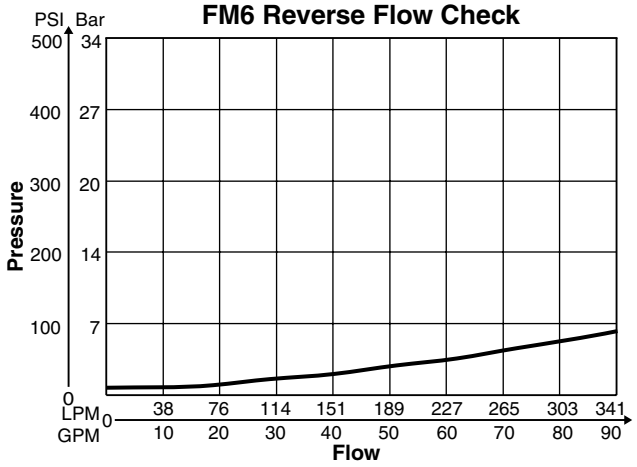
	P	A	B	T
PP	✻	2	2	1
DD	1	✻	✻	1
AA	1	✻	1	1
BB	1	1	✻	1

✻ See specific flow vs. turns chart

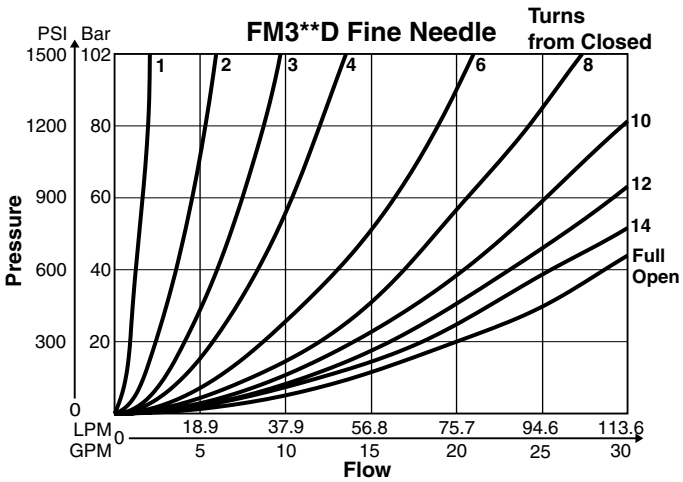
FM3 Standard Needle



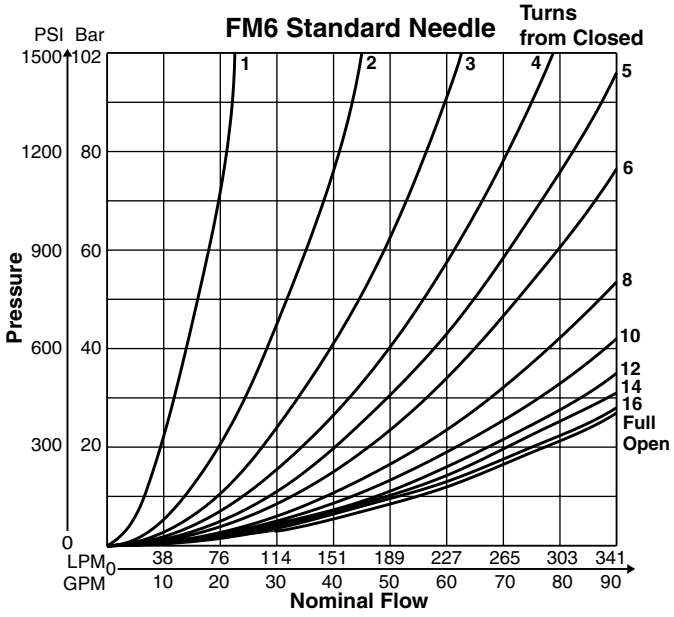
FM6 Reverse Flow Check



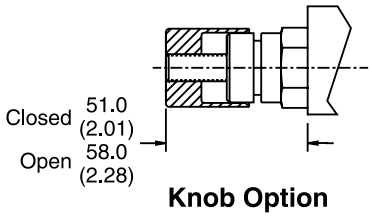
FM3**D Fine Needle



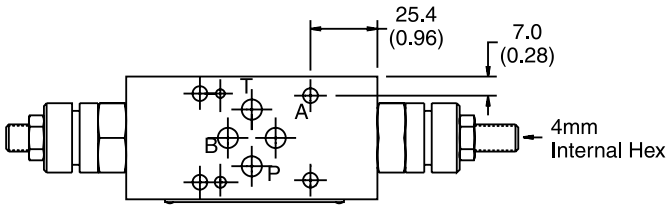
FM6 Standard Needle



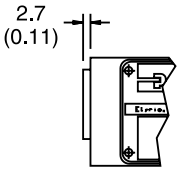
Inch equivalents for millimeter dimensions are shown in (**)



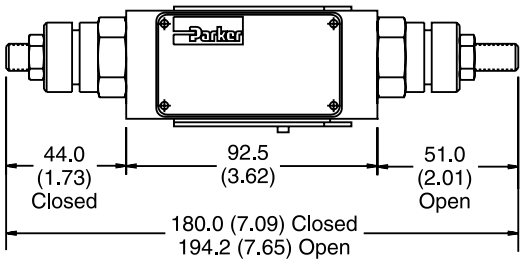
Knob Option



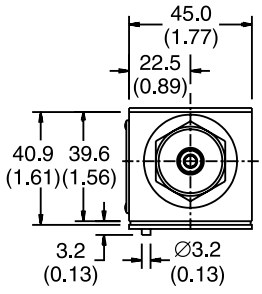
Top View



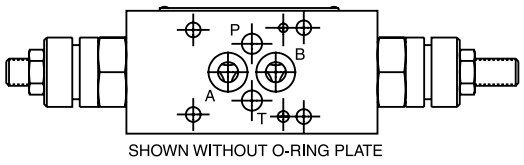
BB Option



Face View



End View



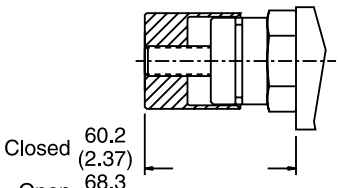
Bottom View

Note: For meter-in option, invert body 180°.

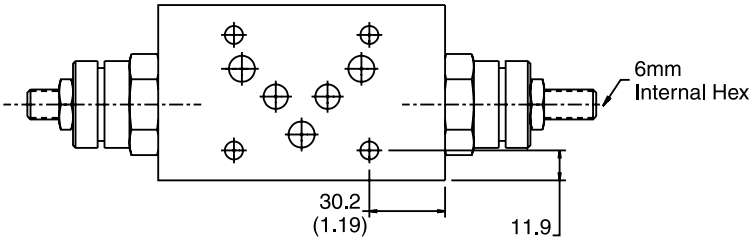
Parker Sandwich.indd, dd

B

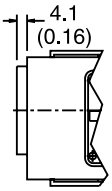
Inch equivalents for millimeter dimensions are shown in (**)



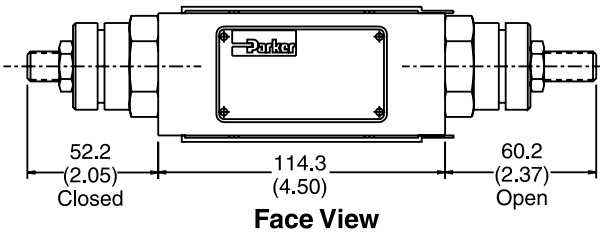
Knob Option



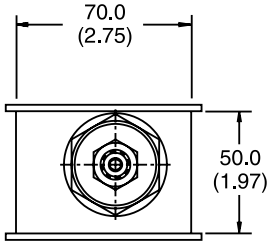
Top View



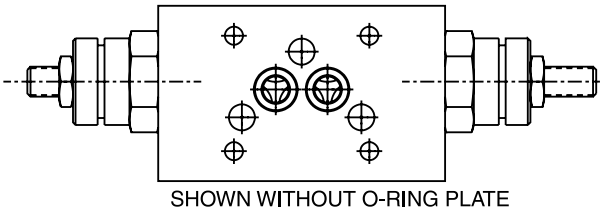
AA Option



Face View



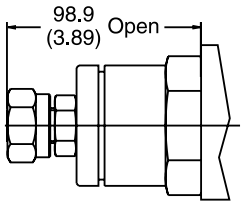
End View



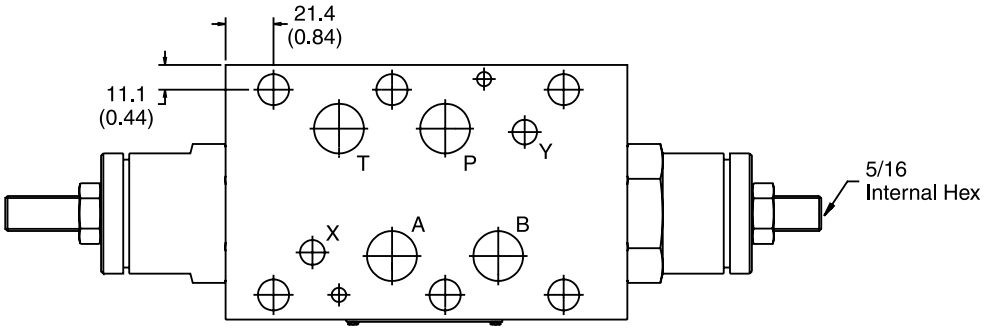
Bottom View

Note: For meter-in option, invert body 180°.

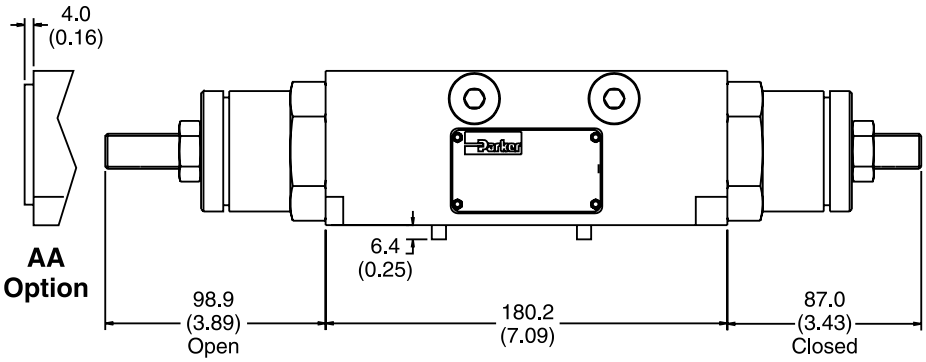
Inch equivalents for millimeter dimensions are shown in (**)



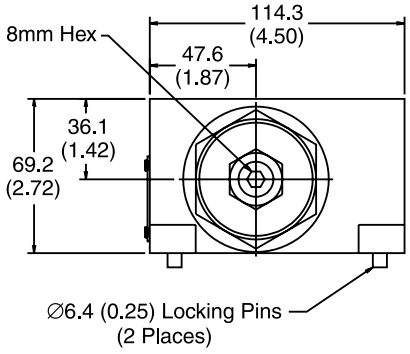
Knob Option



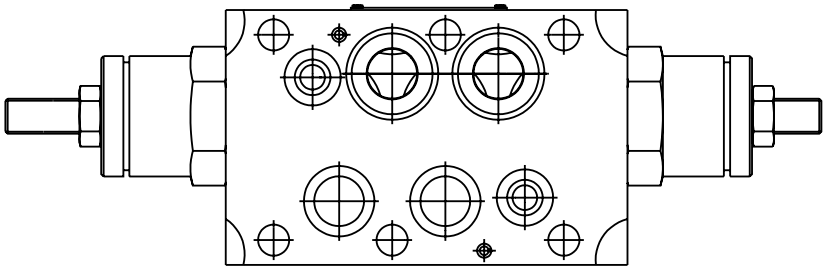
Top View



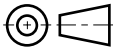
Face View



End View



Bottom View



General Description

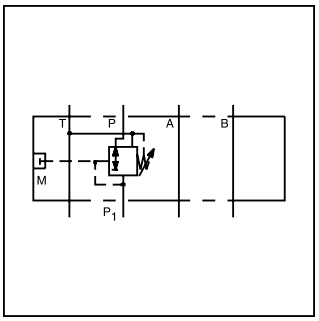
Series PRDM are direct operated pressure reducing valves that are used to regulate pressure in one area of a hydraulic circuit at a predetermined level below normal system pressure. Additionally, an integral pressure relieving function for the secondary reduced pressure circuit is incorporated into the design.

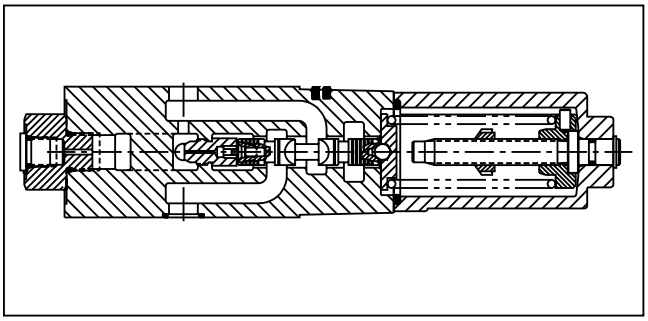
Operation

These valves are “normally open” devices that allow fluid to flow through the controlled port during their non-actuated or “at rest” condition. When downstream pressure exceeds the value set by the spring force, the control piston moves off its seat, closing off the flow path and thus reducing the fluid passing through from the main system. The cushioned piston modulates to maintain the preset pressure in this branch of the hydraulic circuit. If, due to external forces, the pressure continues to rise in this branch circuit, the piston will keep moving against the spring force allowing fluid to be drained to tank, thereby limiting maximum pressure to the valve’s setting.

Features

- PRDM sandwich valves may be selected to reduce pressure in the 'P' port, 'A' port or 'B' port.
- The direct operated, cushioned piston design results in fast response, low leakage and minimal hysteresis.
- Up to nine pressure adjustment ranges are available with maximum pressure settings.
- Adjustment options include: internal hex screw, hand knob or internal hex with keylock.
- Fluorocarbon seals are available.
- Available gage port connections include SAE, NPT, Metric and BSPP.





Specifications

	PRDM2	PRDM3
Mounting Pattern	NFPA D03, CETOP 3, NG6	NFPA D05, CETOP 5, NG10
Maximum Operating Pressure		
P, A, B	350 Bar (5000 PSI)	315 Bar (4560 PSI)
T	10 Bar (145 PSI)	10 Bar (145 PSI)
Max. Flow	40 LPM (10.5 GPM)	80 LPM (21 GPM)
Maximum Leakage P-A	15 ml/min (1.0 cu. in.)	
Pressure Range	**Code** — **Range** 01 — 1.0 to 14 Bar (15 to 200 PSI) 02* — 1.5 to 25 Bar (22 to 363 PSI) 05** — 2 to 50 Bar (29 to 725 PSI) 06* — 1.5 to 64 Bar (22 to 928 PSI) 10** — 4 to 100 Bar (58 to 1450 PSI) 15** — 6 to 150 Bar (87 to 2175 PSI) 16* — 3 to 160 Bar (44 to 2320 PSI) 21 — 8 to 210 Bar (116 to 3045 PSI) 35* — 10 to 315 Bar (147 to 4560 PSI)	
Viscosity Range	12 to 230 cSt / mm²/s (56 to 1066 SSU)	
Filtration	ISO Code 18/16/13 or Better	

* PRDM2 only

** PRDM3 only.

PRDM

Pressure Reducing/ Relieving

Size

Code	Description
2	NFPA D03 Subplate Mounting
3	NFPA D05 Subplate Mounting

Port Reduction

Code	Description
PP	P Port Only
AA	A Port Only
BB	B Port Only

Pressure Range

Code	Description	
01	1 to 14 Bar	(15 to 200 PSI)
02*	1.5 to 25 Bar	(22 to 363 PSI)
05**	2 to 50 Bar	(29 to 725 PSI)
06*	1.5 to 64 Bar	(22 to 928 PSI)
10**	4 to 100 Bar	(58 to 1450 PSI)
15**	6 to 150 Bar	(87 to 2175 PSI)
16*	3 to 160 Bar	(44 to 2320 PSI)
21	8 to 210 Bar	(116 to 3045 PSI)
35*	10 to 315 Bar	(147 to 4560 PSI)

* PRDM2 only.
** PRDM3 only.

Adjustment

Code	Type
L	Hex w/Key Lock
S	Internal Hex Screw Adj.
K	Knob

Seal

Code	Type
N	Nitrile
V	Fluorocarbon

Gage Port

Code	Type
N	1/4" NPT
S	SAE #4 (UNF-2B 7/16-20) Adapter in PRDM3
M	Metric
G	1/4" BSPP

Design Series

NOTE: Not required when ordering.

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Bolt Kits

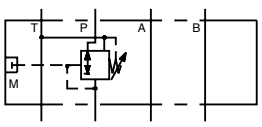
Size "2"				Size "3"			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)	No. of Sandwich	Sandwich & Valve Combination	D3W-30 D3DW & D31*W*	Bolt Length mm (in)
1	Sandwich & D1	BK243	73.2 (2.88)	1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D1	BK225	111.3 (4.38)	2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D1	BK244	152.4 (6.00)	3	Sandwich & D3	BK143	190.5 (7.50)
4	Sandwich & D1	BK245	190.5 (7.50)				

* D31VW with internal pilot and internal drain only.

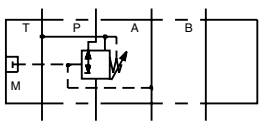
Bolt Kits must be ordered separately.

Weights:
PRDM2 1.3 kg (2.9 lbs.)
PRDM3 2.6 kg (5.8 lbs.)

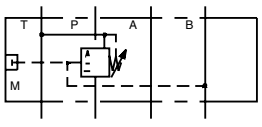
Schematics



PP Option

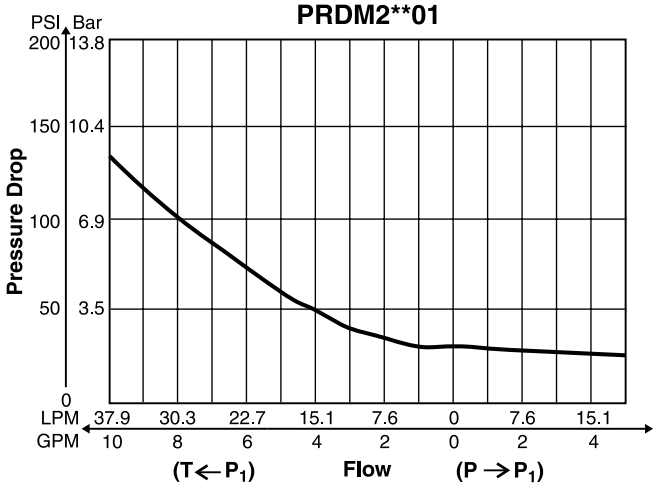


AA Option

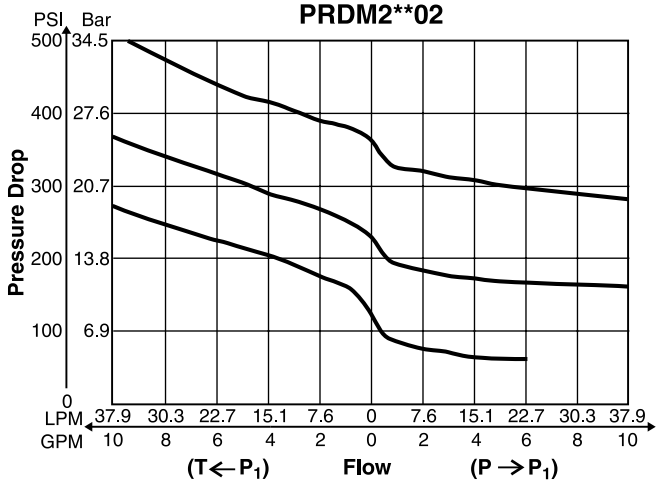


BB Option

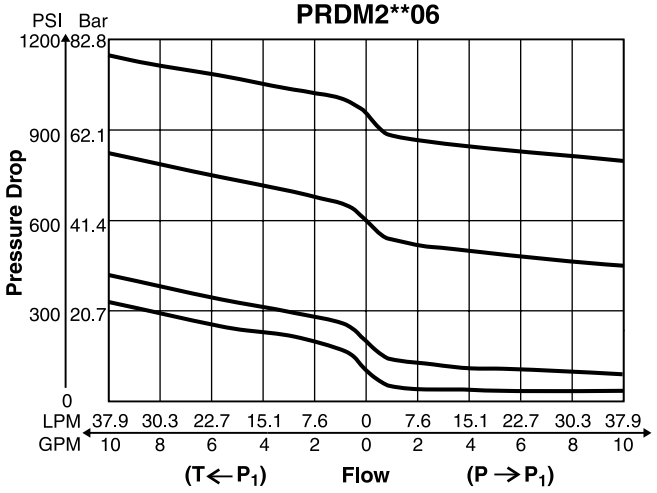
PRDM2**01



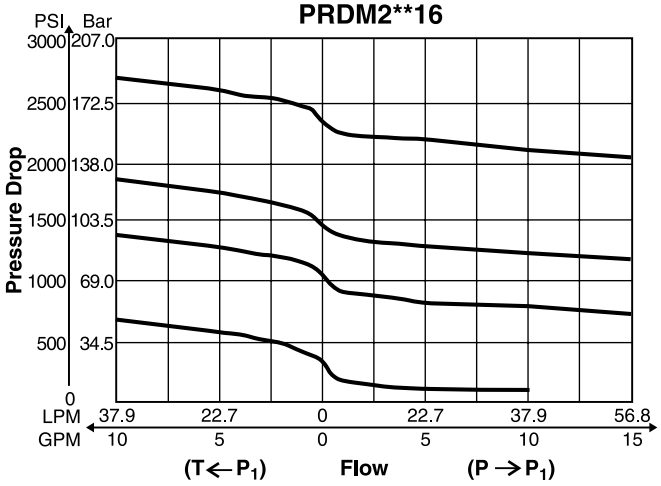
PRDM2**02



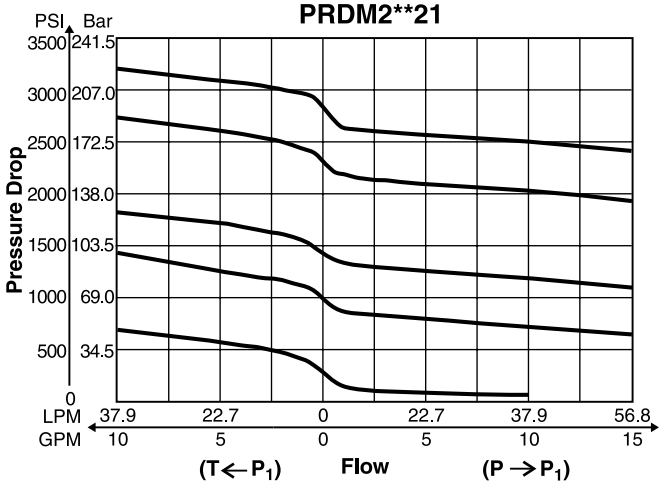
PRDM2**06



PRDM2**16

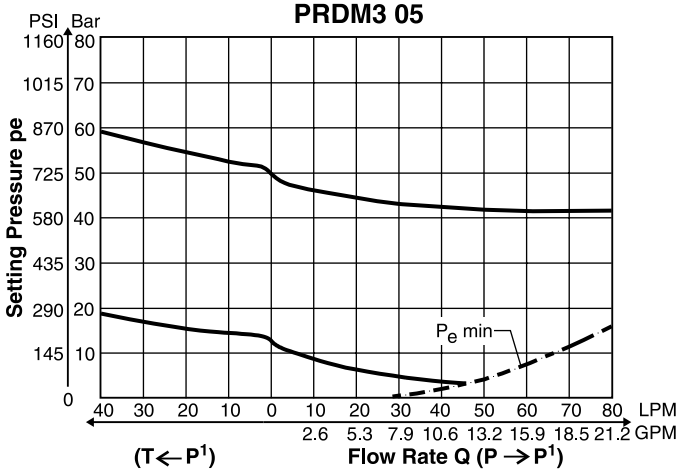


PRDM2**21

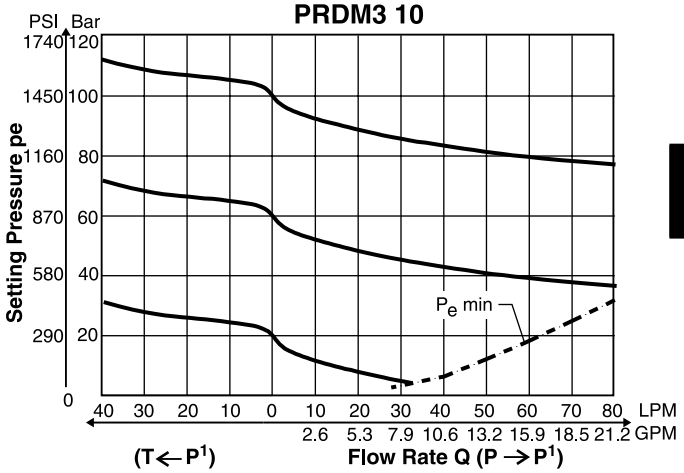


NOTE: Lowest pressure setting dependent upon system resistance.

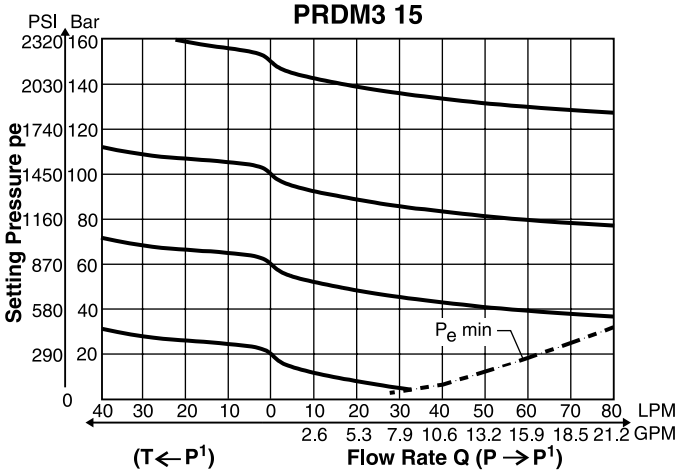
PRDM3 05



PRDM3 10



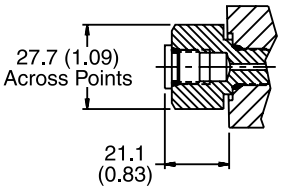
PRDM3 15



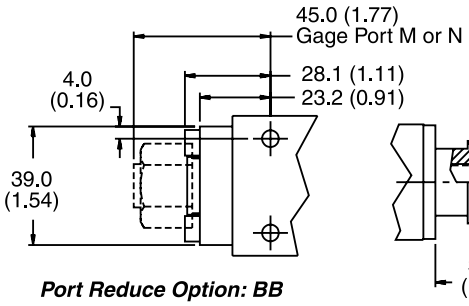
NOTE: Lowest pressure setting dependent upon system resistance.

PRDM2

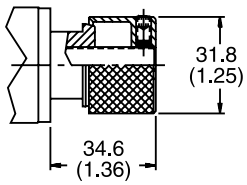
Inch equivalents for millimeter dimensions are shown in (**)



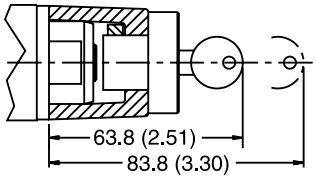
Gauge Port Option: N & S



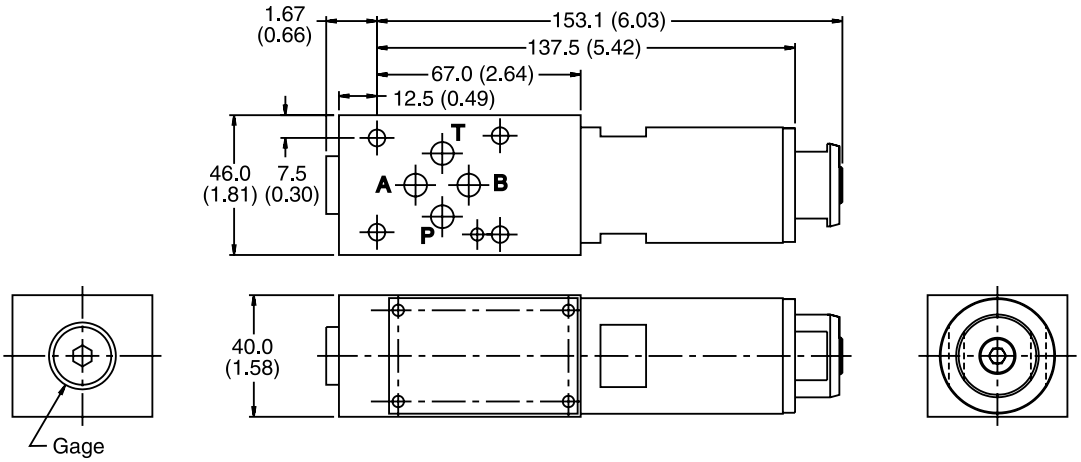
Port Reduce Option: BB



Adjustment Option: K

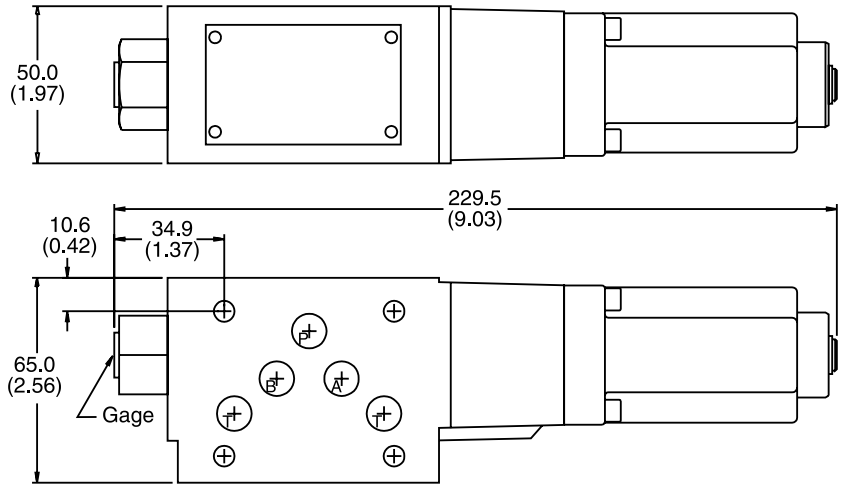


Adjustment Option: L



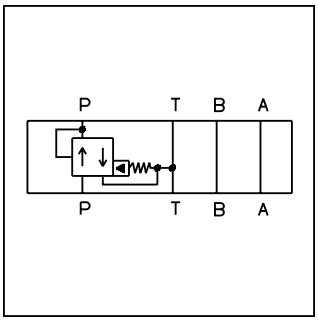
PRDM3

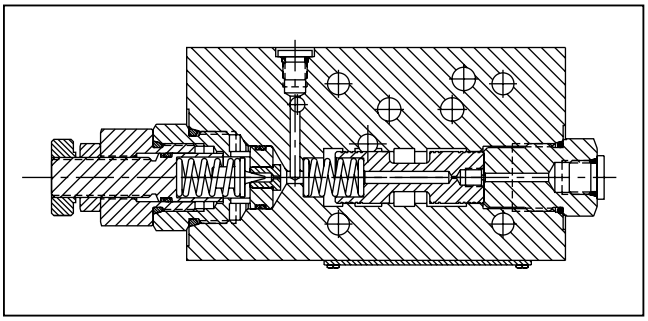
Inch equivalents for millimeter dimensions are shown in (**)



General Description

Series PRM reducing valves are used to regulate pressure, in one area of a circuit, below normal system pressure. This style valve is well suited to perform this function as it mounts directly below the directional control valve.





Operation

These are "normally open" valves that allow fluid to pass through the controlled port during typical operation. When downstream pressure rises above the value set by an adjustable spring force, the control pilot opens and allows the main spool to move from a full open position. The main spool modulates to maintain the desired "reduced pressure" downstream of the valve. The PRM3 also has a relieving mode.

Features

- PRM sandwich style pressure reducing valves can be used to reduce pressure on the 'P' port, the 'A' port, or the 'B' port.
- Three pressure adjustment options are available: slotted screw, knob and locking knob. (PRM6 only)
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.

Specifications

	PRM3	PRM6
Mounting Pattern	NFPA D05, CETOP 5, NG 10	NFPA D08, CETOP 8, NG 25
Minimum Pressure	10 Bar (150 PSI) with rated flow, 150 SSU oil, and fluid temperature of 38°C (100°F).[1]	
Maximum Pressure	345 Bar (5000 PSI)	345 Bar (5000 PSI)
Min. Flow	3.78 LPM (1 GPM)	3.78 LPM (1 GPM)
Maximum Flow	64 LPM (17 GPM)	189 LPM (50 GPM)
Pressure Range	Code / Pressure Range 07 — 10 to 70 Bar (150 - 1000 PSI) 17 — 10 to 175 Bar (150 - 2500 PSI) 25 — 10 to 250 Bar (150 - 3500 PSI) 35 — 10 to 350 Bar (150 - 5000 PSI)	

	PRM3/PRM6
Filtration	ISO 4406 (1999); 18/16/13 (meet NAS 1638:7)
Venting	Connecting the vent port to tank allows the reducing valve to divert flow at minimum pressure.
Remote Control	Remote control valve connected to the vent port can be used to control the pressure.[2]
Drain Line	Drain line from pilot valve is internally connected to the tank port. Tank line pressure is thus added to the valve setting.[3]

[1] Change in flow, temperature or fluid (SSU) rating will affect valve minimum pressure.
[2] Set main valve pressure 10 Bar (150 PSI) higher than remote pilot.
[3] It is important that the drain line connection be taken into consideration when determining the minimum valve setting.

PRM — Pressure Reducing Valve | Size | Port Reduction | Pressure Range | Adjustment | Seal | Gauge Port | Drain | Design Series

NOTE: Not required when ordering.

Code	Description
3	NFPA D05 Subplate Mounting
6	NFPA D08 Subplate Mounting

Code	Description	Available Models PRM3	PRM6
PP	P Port Only	✓	
AA	A Port Only	✓	
BB	B Port Only	✓	✓
PA	P Port Reduced/Convertible to A Port Reduced		✓
AP	A Port Reduced/Convertible to P Port Reduced		✓

Code	Description
07	10 to 70 Bar (150 to 1000 PSI)
17	10 to 175 Bar (150 to 2500 PSI)
25	10 to 250 Bar (150 to 3500 PSI)
35	10 to 345 Bar (150 to 5000 PSI)

Code	Type
K	Knob
L*	Locking Knob
S	Screw Adj.

* PRM6 only.

Code	Type
N	Nitrile
V	Fluorocarbon

Code	Type
Omit*	SAE
S†	SAE
N†	NPT
M†	Metric
G	1/4 BSPP

* PRM6 only.
† PRM3 only.

Code	Type
Omit	Internal
Y	External

Unit Weight:
PRM3 3.0 kg (6.6 lbs.)
PRM6 5.6 kg (12.5 lbs.)

Bold: Designates Tier I products and options.

Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Bolt Kits

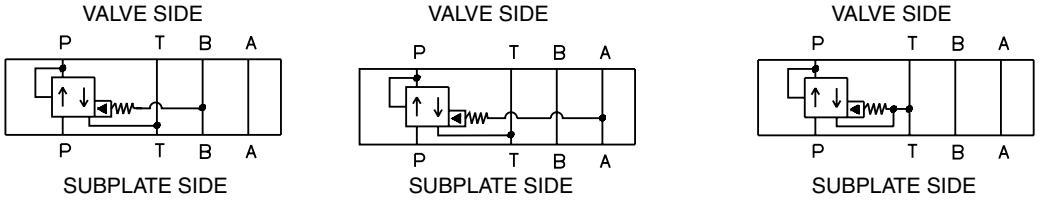
Size "3"				Size "6"			
No. of Sandwich	Sandwich & Valve Combination	D3W-30 D3DW & D31*W*	Bolt Length mm (in)	No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D3	BK141	88.9 (3.50)	1	Sandwich & D6	BK121	133.4 (5.25)
2	Sandwich & D3	BK142	139.7 (5.50)	2	Sandwich & D6	BK122	203.2 (8.00)
3	Sandwich & D3	BK143	190.5 (7.50)	3	Sandwich & D6	BK123	273.1 (10.75)
				4	Sandwich & D6	BK124	342.9 (13.5)

* D31VW with internal pilot and internal drain only.

Bolt Kits must be ordered separately.

Schematics

PRM3



AA Option
'A' Port Reduced

BB Option
'B' Port Reduced

PP Option
'P' Port Reduced

PRM6

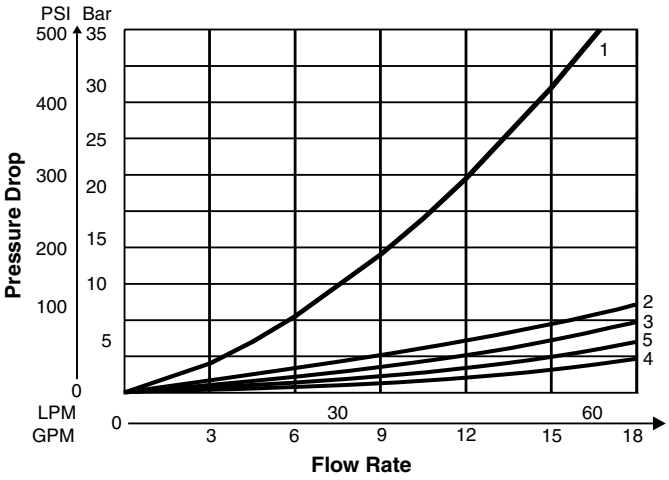
PA Option

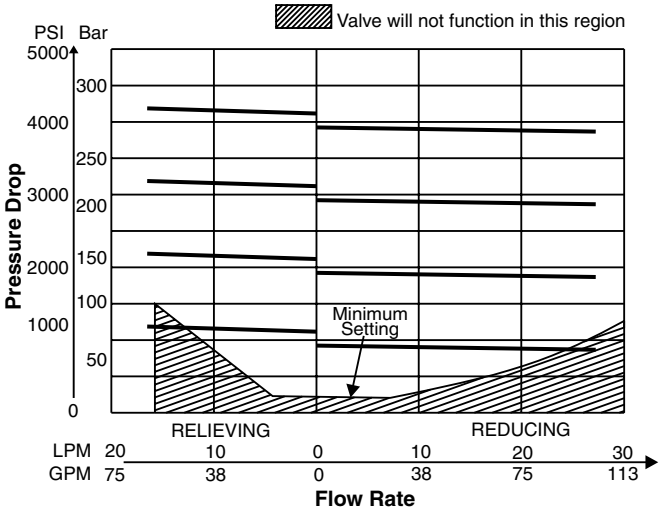
AP Option

Parker Sandwich.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Performance Curves





Mode	Flow Path			
	P → P	A → A	B → B	T → T
PP	1	2	3	4
AA	1	2	3	5
BB	1	2	3	5

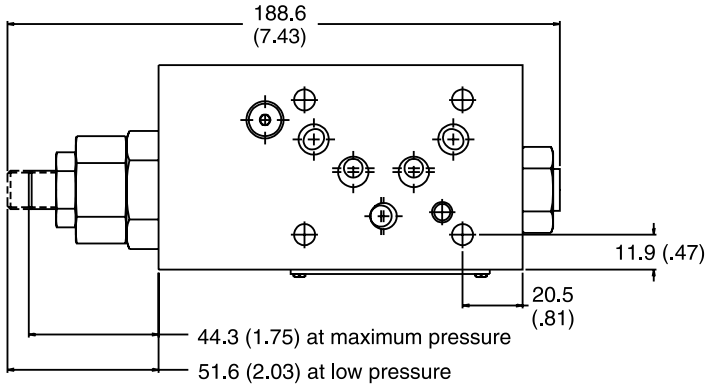
Viscosity Correction Factor							
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (approx.)	93	111	119	126	132	137	141
Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change per chart.							

NOTE: Lowest pressure setting dependent upon system resistance.

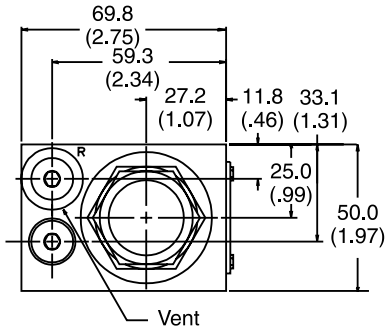
B

PRM3AA

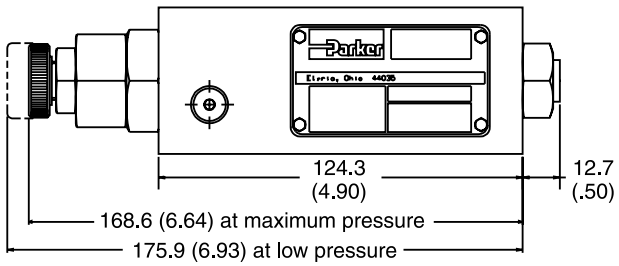
Inch equivalents for millimeter dimensions are shown in (**)



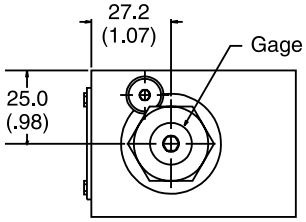
Top View



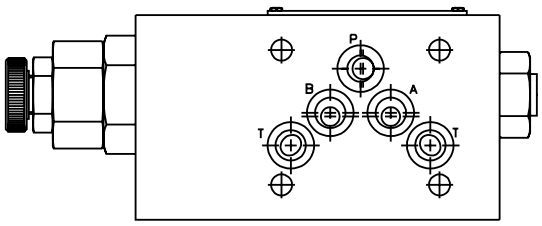
End View



Face View



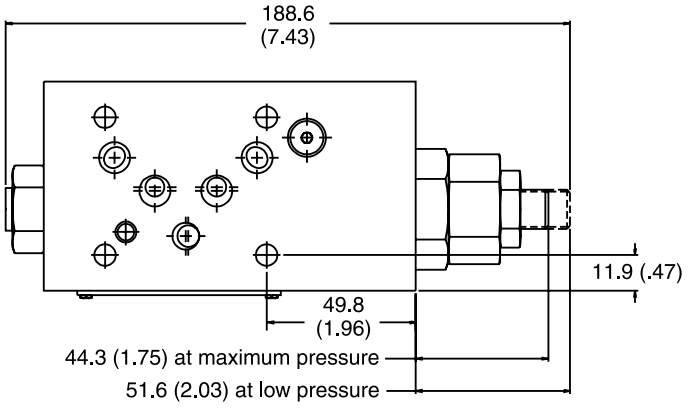
End View



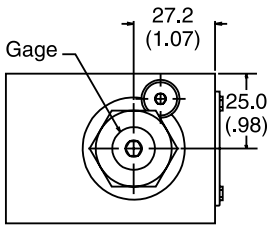
Bottom View

PRM3BB

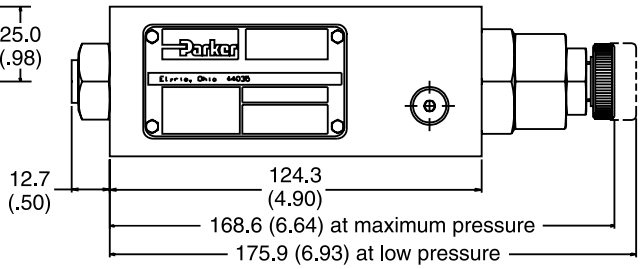
Inch equivalents for millimeter dimensions are shown in (**)



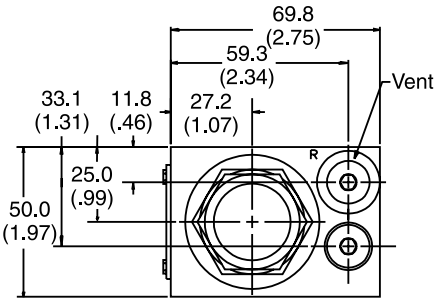
Top View



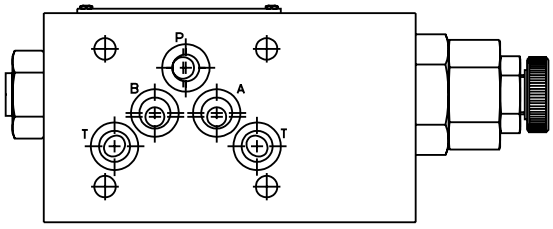
End View



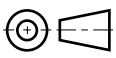
Face View



End View

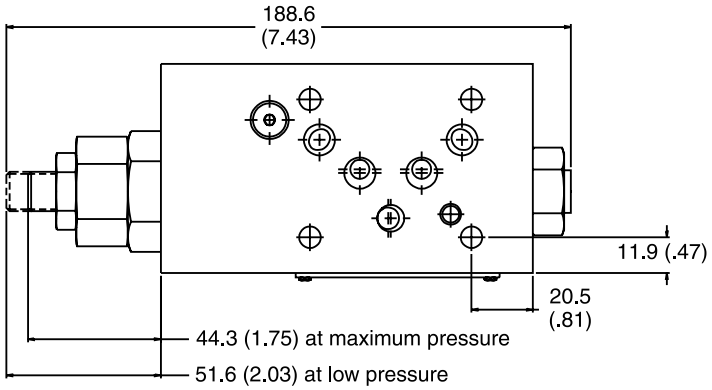


Bottom View

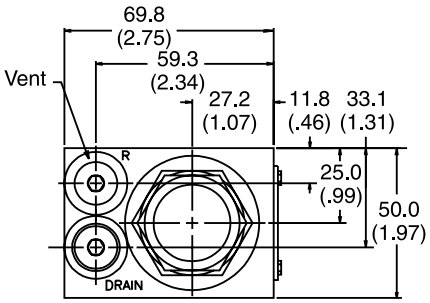


PRM3PP

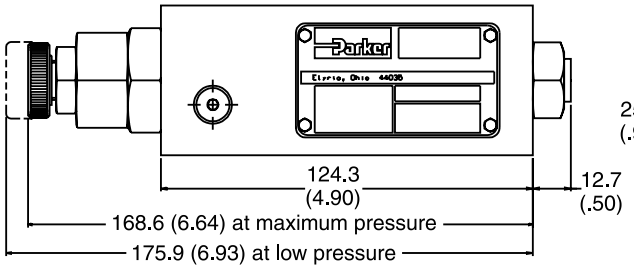
Inch equivalents for millimeter dimensions are shown in (**)



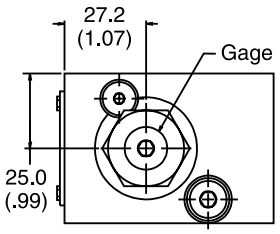
Top View



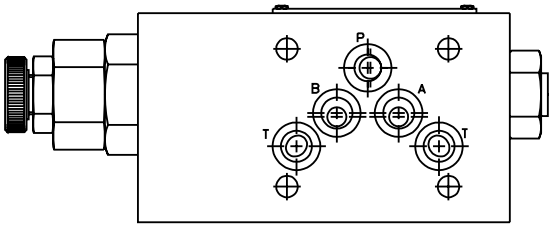
End View



Face View

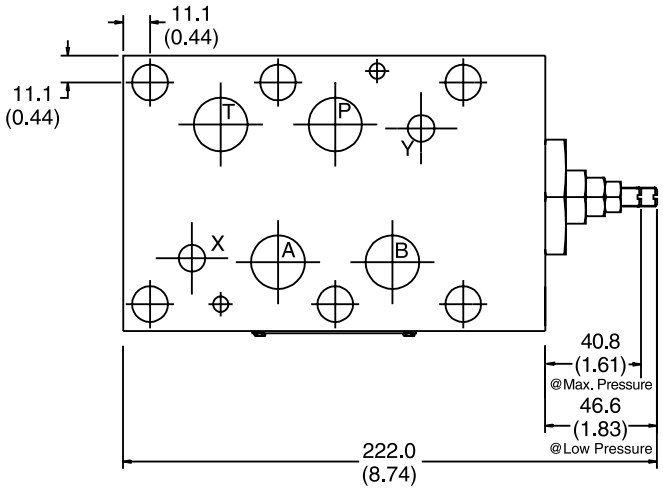


End View

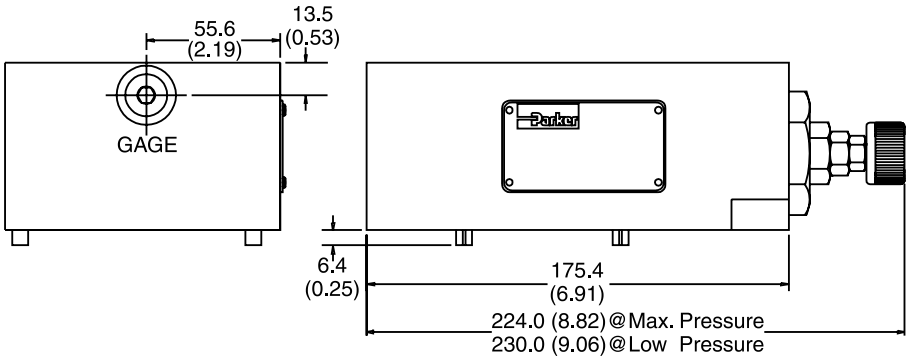


Bottom View

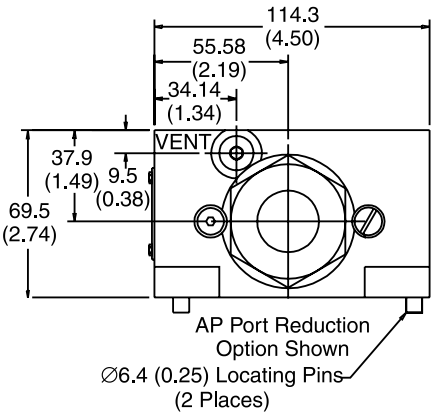
Inch equivalents for millimeter dimensions are shown in (**)



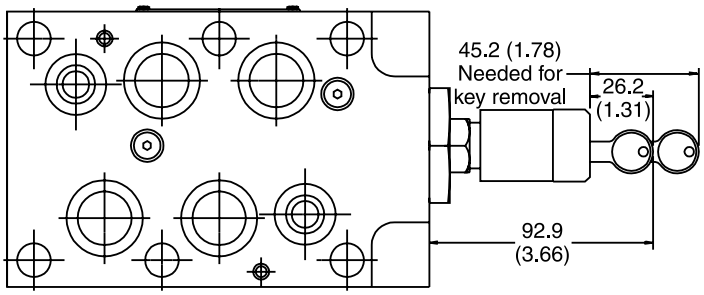
Top View



Face View



End View



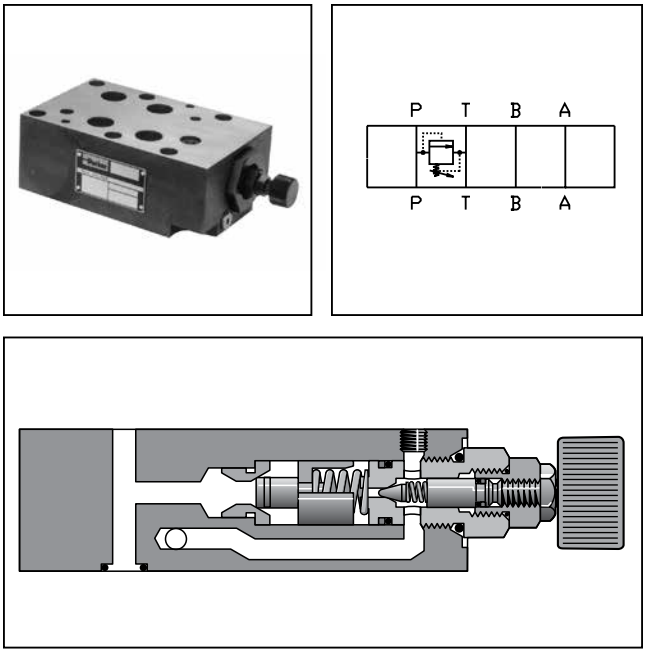
Bottom View

General Description

Series RM relief valves limit system pressure by opening to tank when system pressure reaches the valve setting. With D03 size, they can also be configured to limit the 'A' or 'B' work port pressures independently.

Features

- RM sandwich style relief valves can be used to limit pressure in the 'P' port, 'A' port, or 'B' port.
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Three pressure adjustment options are available: slotted screw, knob and locking knob.
- SAE Gage Port

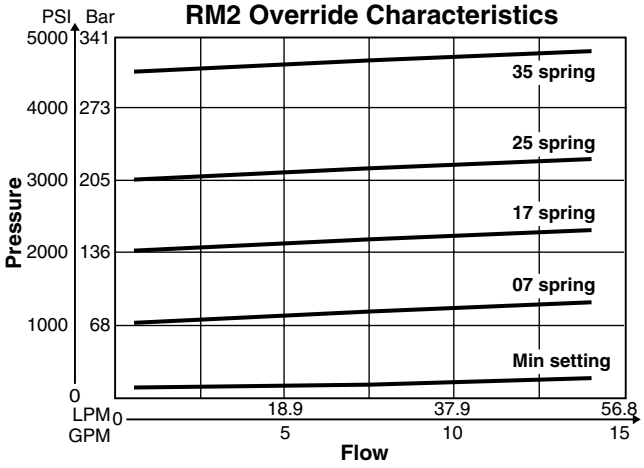


Specifications

	RM2	RM3	RM6
Mounting Pattern	NFPA D03, CETOP 3, NG 6	NFPA D05, CETOP 5, NG 10	NFPA D08, CETOP 8, NG 25
Minimum Pressure	10 Bar (150 PSI) with rated flow, 150 SSU oil, and fluid temperature of 38°C (100°F).[1]		
Maximum Pressure	350 Bar (5000 PSI)	350 Bar (5000 PSI)	350 Bar (5000 PSI)
Minimum Flow	3.78 LPM (1 GPM)	3.78 LPM (1 GPM)	3.78 LPM (1 GPM)
Maximum Flow	53 LPM (14 GPM)	76 LPM (20 GPM)	341 LPM (90 GPM)
Pressure Range	Code — Pressure Range 07 — 10 to 70 Bar (150 - 1000 PSI) 17 — 10 to 175 Bar (150 - 2500 PSI) 25 — 10 to 250 Bar (150 - 3500 PSI) 35 — 10 to 350 Bar (150 - 5000 PSI)		
Filtration	ISO 4406 (1999); 18/16/13 (meet NAS 1638:7)		
Venting	Connecting the vent port to tank allows the relief valve to divert flow at minimum pressure.[2]		
Remote Control	Remote control valve connected to the vent port can be used to control the pressure.[3]		

[1] Change in flow, temperature or fluid (SSU) rating will affect valve minimum pressure.
[2] Not available on Model RM2.
[3] Set main valve pressure 10 Bar (150 PSI) higher than remote pilot.

Performance Curves



VISCOSITY CORRECTION FACTOR							
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141

Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change per chart.

RM — Relief Valve | Size | Port Option | Pressure Range | Adjustment | Seal | Design Series

NOTE: Not required when ordering.

Code	Description
2	**NFPA D03 Subplate Mounting**
3	**NFPA D05 Subplate Mounting**
6	**NFPA D08 Subplate Mounting**

Code	Description
PT	**Relief P to T**
AT*	Relief A to T
BT*	Relief B to T

* RM2 only.

Code	Description
07	**10 to 70 Bar (150 to 1000 PSI)**
17	**10 to 175 Bar (150 to 2500 PSI)**
25	**10 to 250 Bar (150 to 3500 PSI)**
35	**10 to 350 Bar (150 to 5000 PSI)**

Code	Type
K	**Knob**
L	Locking Knob
S	**Slotted Screw with Jam Nut**

Code	Type
N	**Nitrile**
V	**Fluorocarbon**

Unit Weight:
RM2 .95 kg (2.1 lbs.)
RM3 3.0 kg (6.6 lbs.)
RM6 5.9 kg (13.0 lbs.)

Bold: Designates Tier I products and options.
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Bolt Kits

Size "2"			
No. of Sandwich	**Sandwich & Valve Combination**	**Bolt Kit**	**Bolt Length mm (in)**
1	Sandwich & D1	BK243	73.2 (2.88)
2	Sandwich & D1	BK225	111.3 (4.38)
3	Sandwich & D1	BK244	152.4 (6.00)
4	Sandwich & D1	BK245	190.5 (7.50)

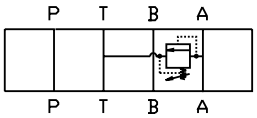
Size "3"			
No. of Sandwich	**Sandwich & Valve Combination**	**D3W-30 D3DW & D31*W***	**Bolt Length mm (in)**
1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D3	BK143	190.5 (7.50)

* D31VW with internal pilot and internal drain only.

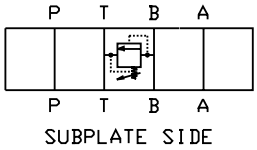
Size "6"			
No. of Sandwich	**Sandwich & Valve Combination**	**Bolt Kit**	**Bolt Length mm (in)**
1	Sandwich & D6	BK121	133.4 (5.25)
2	Sandwich & D6	BK122	203.2 (8.00)
3	Sandwich & D6	BK123	273.1 (10.75)
4	Sandwich & D6	BK124	342.9 (13.5)

Bolt Kits must be ordered separately.

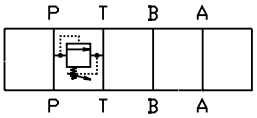
Schematics



AT Option

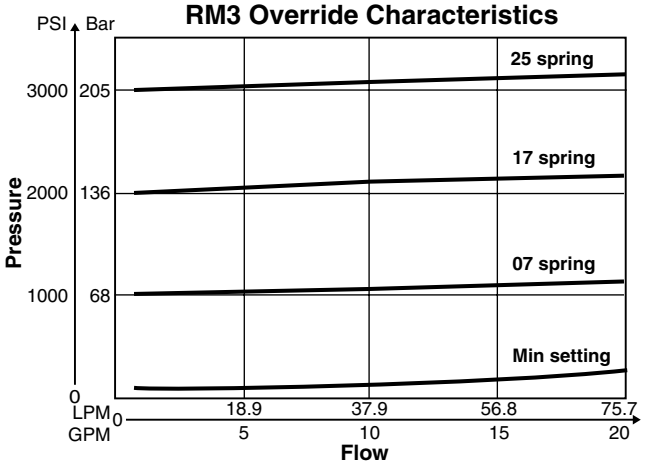


BT Option

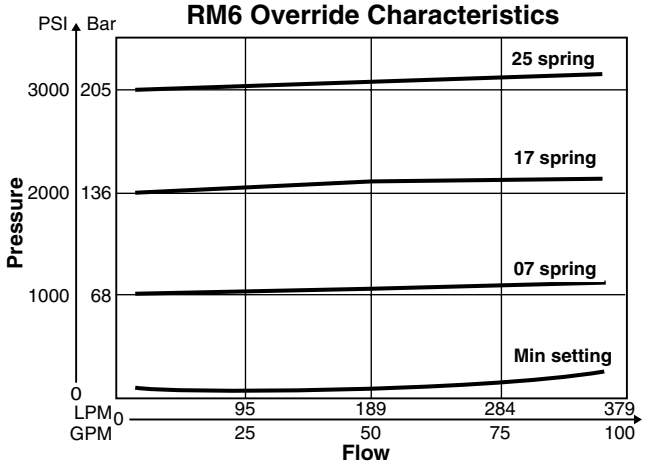


PT Option

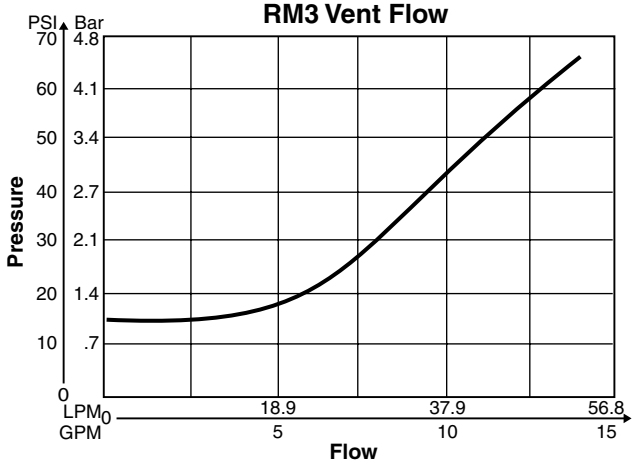
RM3 Override Characteristics



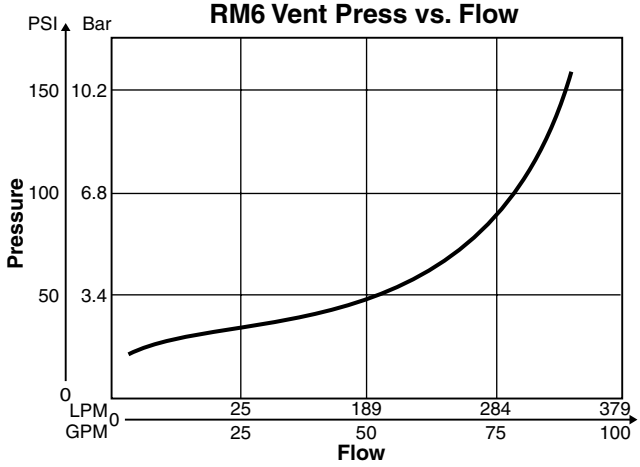
RM6 Override Characteristics



RM3 Vent Flow

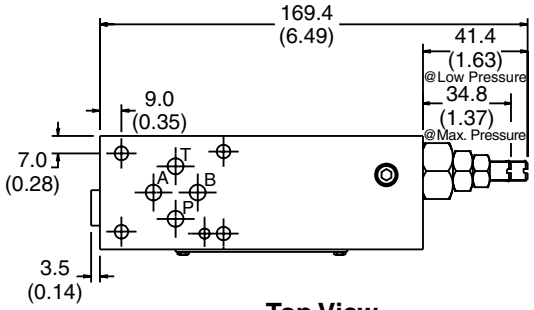


RM6 Vent Press vs. Flow

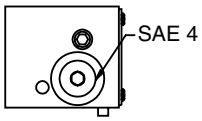


VISCOSITY CORRECTION FACTOR							
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141
Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change per chart.							

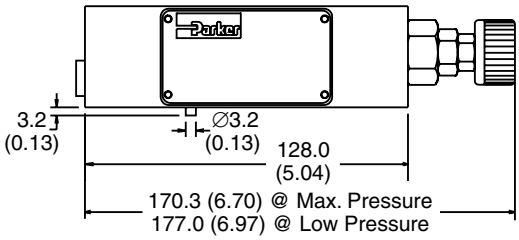
Inch equivalents for millimeter dimensions are shown in (**)



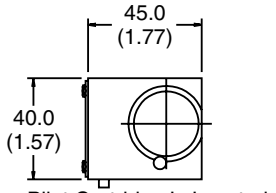
Top View



PT Body Shown
Gage Port Location
Varies from AT Body
and BT Body

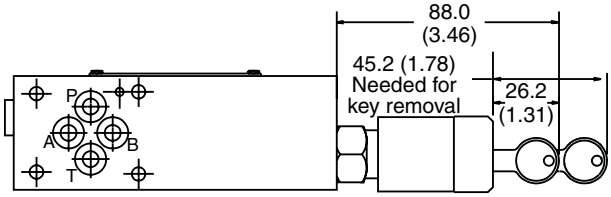


Face View



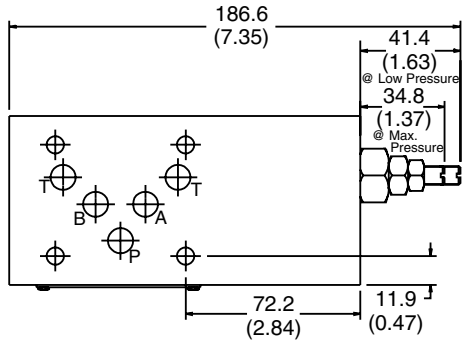
Pilot Cartridge Is Located
On The Right Side
For PT Body And BT Body

End View

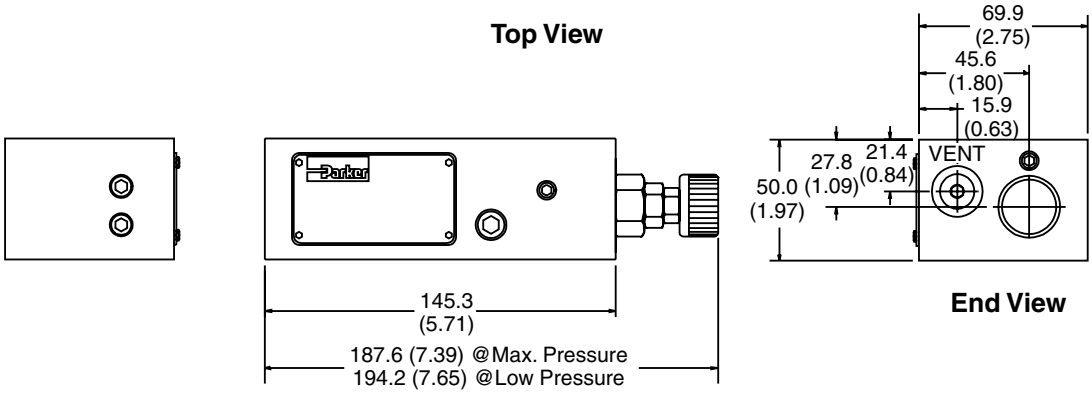


Bottom View

Inch equivalents for millimeter dimensions are shown in (**)

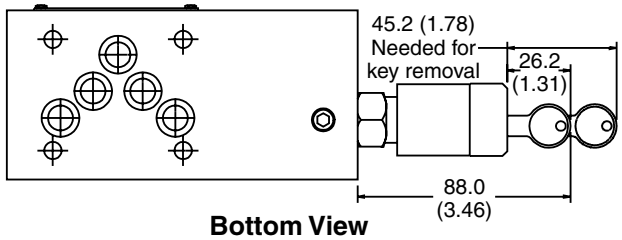


Top View

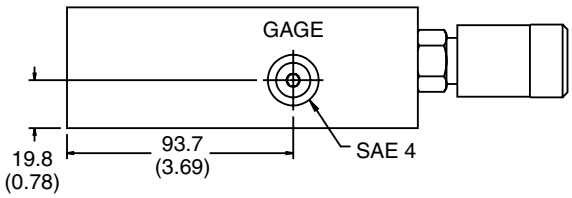


End View

Face View

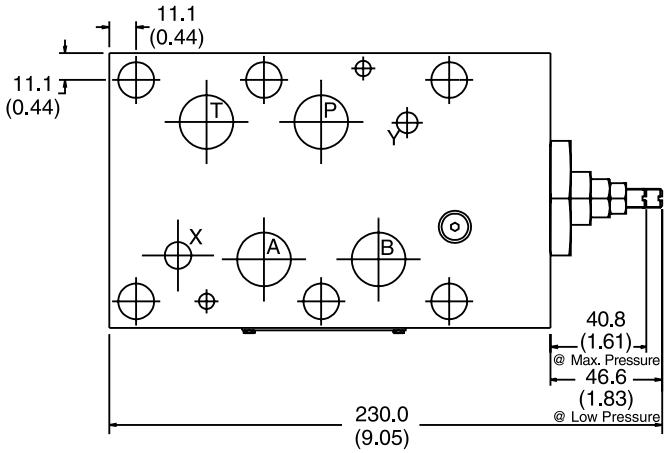


Bottom View

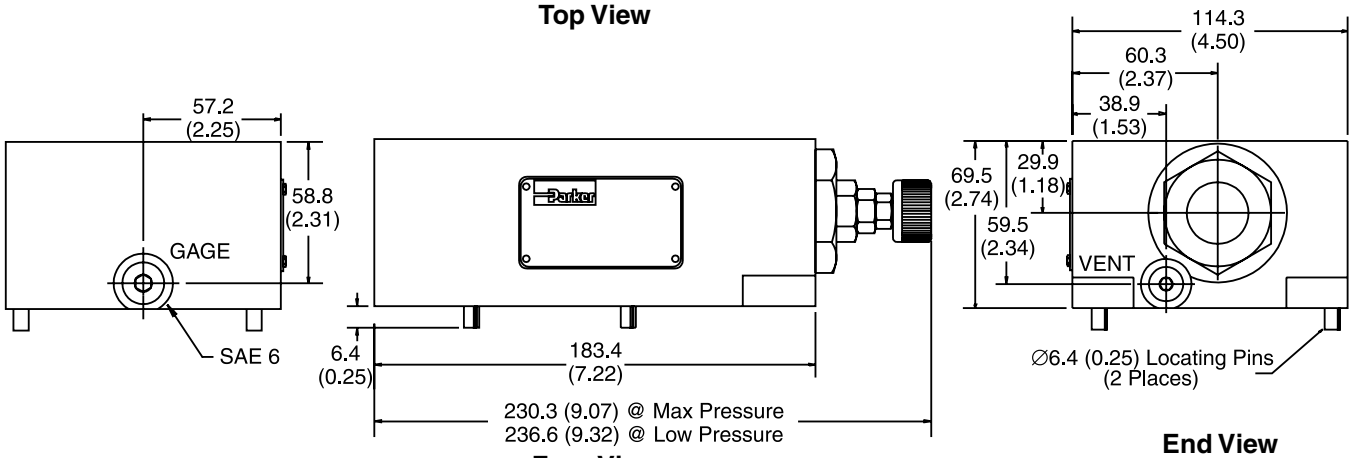


Back View

Inch equivalents for millimeter dimensions are shown in (**)

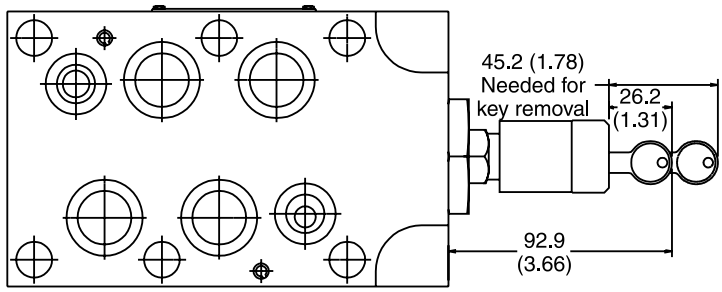


Top View



Face View

End View



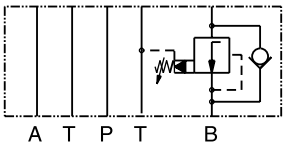
Bottom View

General Description

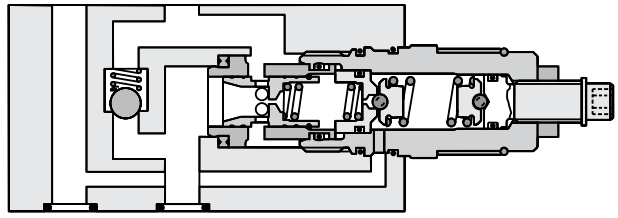
Series ZDR pilot operated pressure reducing valves are designed for maximum flow rates.

The reducing function can be located in the ports P, A or B. The sizes NG06 and NG10 are equipped with an integral return flow check valve (reducing function in A or B).

ZDR-P01



ZDR-B01


ZDR-B02

Features

- High flow capacity.
- Sizes::
  - – ZDR01 – NFPA D03 / NG6 / CETOP 3
  - – ZDR02 – NFPA D05 / NG10 / CETOP 5
- With integral return flow check valve.

Specifications

General		
Size	**NG6**	**NG10**
Mounting Interface	DIN 24340 A6 ISO 4401 NFPA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFPA D05 CETOP RP 121
Mounting Position	Unrestricted	
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)	
Hydraulic		
Maximum Operating Pressure	up to 350 Bar (5075 PSI); ZDR-AR / BR up to 315 Bar (4568 PSI)	
Nominal Flow	80 LPM (21.2 GPM)	120 LPM (31.7 GPM)
Pilot Oil	0.2 LPM (0.1 GPM)	0.3 LPM (0.1 GPM)
Fluid	Hydraulic oil as per DIN 51524 ... 51525	
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)	
Viscosity **Permitted** **Recommended**	10 to 650 cSt / mm^2/s (46 to 3013 SSU) 30 cSt / mm^2/s (139 SSU)	
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	

Ordering Information

ZDR | ☐ | ☐ | ☐ | **S0** | **D** | ☐

Pressure Reducing Valve | Port Option | Size | Pressure Range | Hexagon Screw with Lock Nut | Design Series | Seal

Code	Description
01	NFPA D03 / NG6
02	NFPA D05 / NG10

Code	Description
1	up to 100 Bar (1450 PSI)
5*	up to 350 Bar (5075 PSI)

* AR/BR 325 Bar (4568 PSI)

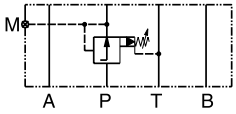
Code	Description
1	Nitrile
5	Fluorocarbon

Code	Size	Description
P	01/02	Pressure reducing in P with pressure gauge port M
AR	01/02	Pressure reducing in A with check valve
BR	01/02	Pressure reducing in B with check valve

Weight:	ZDR-P	ZDR-AR/BR
ZDR*01	1.6 kg (3.5 lbs.)	1.8 kg (4.0 lbs.)
ZDR*02	2.9 kg (6.4 lbs.)	3.0 kg (6.6 lbs.)

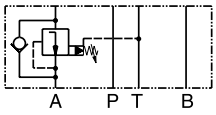
ZDR01

Pressure reducing in P with pressure gauge port M



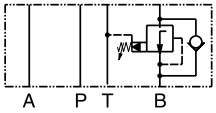
Series
ZDRP011S0D1
ZDRP015S0D1

Pressure reducing in A with check valve



Series
ZDRAR011S0-D1
ZDRAR015S0-D1

Pressure reducing in B with check valve

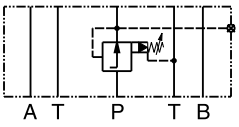


Series
ZDRBR011S0D1
ZDRBR015S0D1

1 = 7 … 140 Bar (102 ... 1450 PSI)
5 = 7 … 315 Bar (102 ... 4568 PSI)

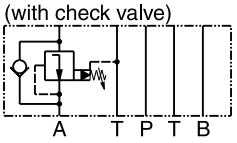
ZDR02

Pressure reducing at P with pressure gauge port M



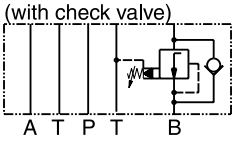
Series
ZDRP021S0D1
ZDRP025S0D1

Pressure reducing at A (with check valve)



Series
ZDRAR021S0D1
ZDRAR025S0D1

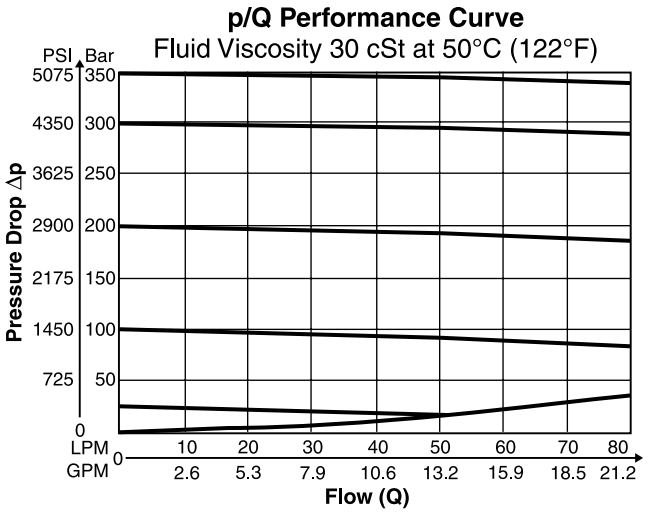
Pressure reducing at B (with check valve)



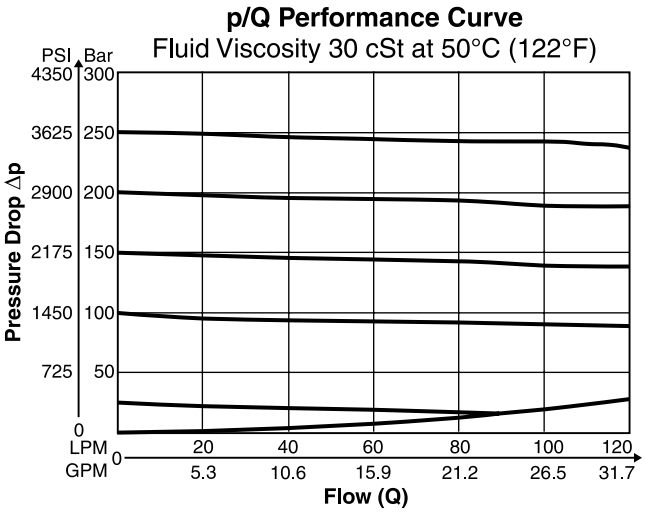
Series
ZDRBR021S0D1
ZDRBR025S0D1

Performance Curves

ZDR-P/AR/BR01



ZDR-P/AR/BR02



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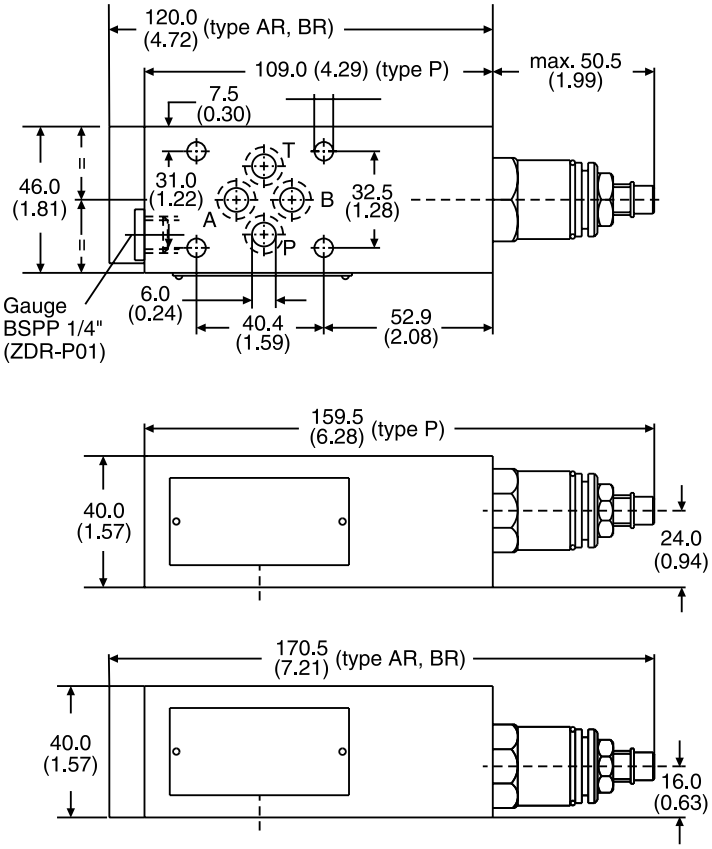
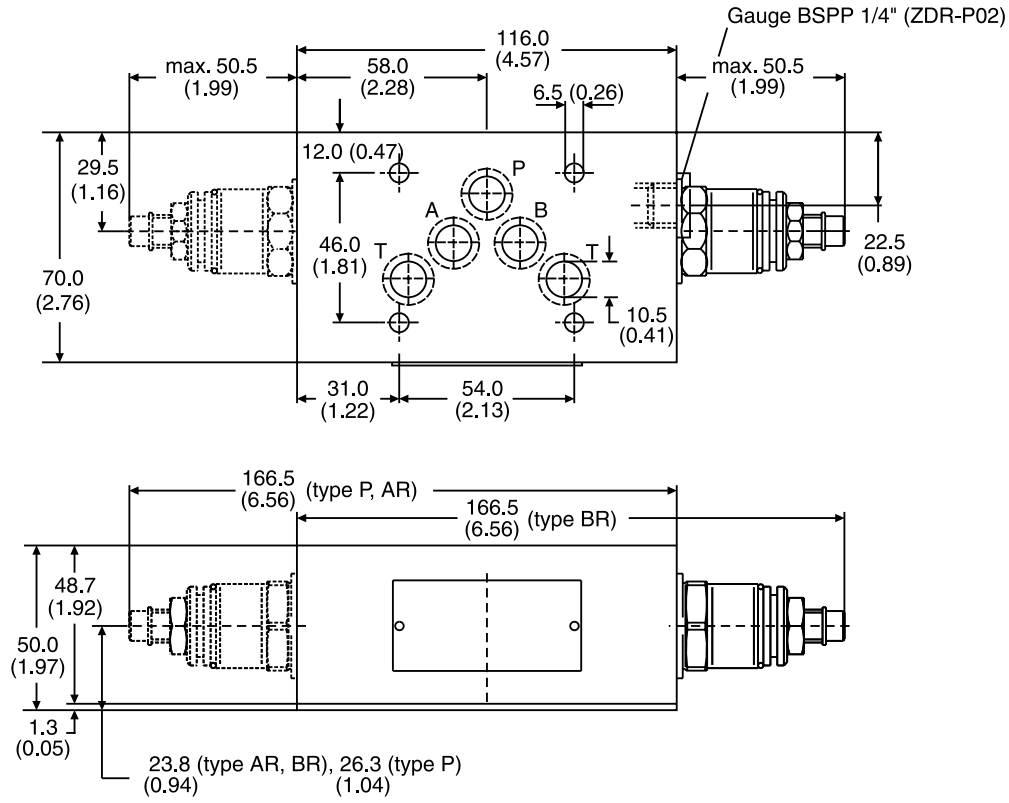
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

ZDR01 – Inch equivalents for millimeter dimensions are shown in (**)



Seal Kit	
Seal	**Order Code**
1	098-91184-0
5	098-91185-0
Complete Cartridge	
Seal	**Order Code**
1	098-91102-0
5	098-91103-0

ZDR02 – Inch equivalents for millimeter dimensions are shown in (**)



Seal Kit	
Seal	**Order Code**
1	098-91182-0
5	098-91183-0
Complete Cartridge	
Seal	**Order Code**
1	098-91102-0
5	098-91103-0

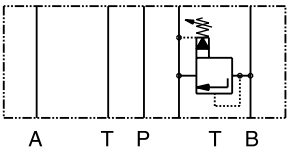
General Description

Series ZDV pilot operated pressure relief valves are designed for maximum flow rates.

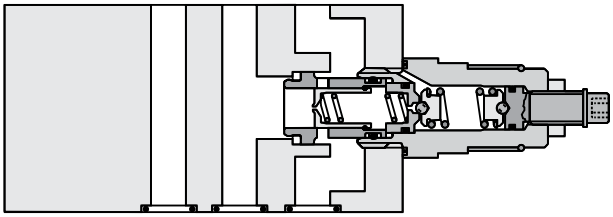
The relief function can be located between P and T, A and T, B and T or A and T + B and T for typical pressure relief functions.

For a pre-charge function the ZDV can be ordered with pressure function between A and B + B and A.

ZDV-P01



ZDV-B01



ZDV-B02

Features

- High flow capacity.
- Pressure function in P, A, B or A + B.
- Sizes:
  - ZDV01 – NFPA D03 / NG6 / CETOP 3
  - ZDV02 – NFPA D05 / NG10 / CETOP 5

Ordering Information

ZDV	[ ]	[ ]	[ ]	S0	D	[ ]
Pressure Relief Valve	Port Option	Size	Pressure Range	Hexagon Screw with Lock Nut	Design Series	Seal

Code	Description
01	NFPA D03 / NG6
02	NFPA D05 / NG10

Code	Description
1	up to 70 Bar (1015 PSI)
5*	up to 350 Bar (5075 PSI)

* ABS 315 Bar (4568 PSI)

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Size	Description
P	01/02	P – T
A	01/02	A – T
B	01/02	B – T
AB	01/02	A – T & B – T
ABS	01/02	A – B & B – A

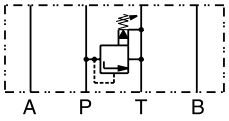
Weight:	One Cartridge	Two Cartridges
ZDV*01	1.6 kg (3.5 lbs.)	2.5 kg (5.5 lbs.)
ZDV*02	3.0 kg (6.6 lbs.)	3.7 kg (8.2 lbs.)

B

Ordering Information

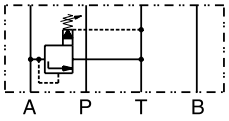
ZDV01

Pressure control P-T



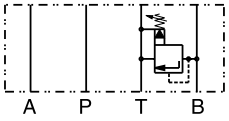
Series
ZDVP011S0D1
ZDVP015S0D1

Pressure control A-T



Series
ZDVA011S0D1
ZDVA015S0D1

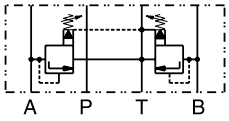
Pressure control B-T



Series
ZDVB011S0D1
ZDVB015S0D1

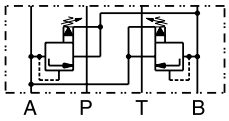
1 = 7 … 70 Bar (102 ...1015 PSI)
5 = 7 … 350 Bar (102 ... 5075 PSI)

Pressure control A-T & B-T



Series
ZDVAB011S0D1
ZDVAB015S0D1

Pressure control A-B & B-A

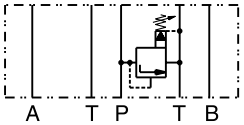


Series
ZDVABS011S0D1
ZDVABS015S0D1

1 = 7 … 70 Bar (102 ...1015 PSI)
5 = 7 … 315 Bar (102 ... 4568 PSI)

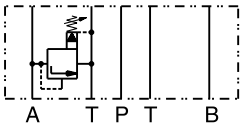
ZDV02

Pressure control P-T



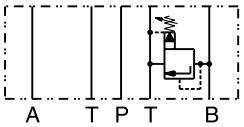
Series
ZDVP021S0D1
ZDVP025S0D1

Pressure control A-T



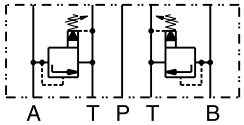
Series
ZDVA021S0D1
ZDVA025S0D1

Pressure control B-T



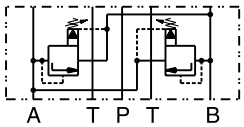
Series
ZDVB021S0D1
ZDVB025S0D1

Pressure control A-T & B-T



Series
ZDVAB021S0D1
ZDVAB025S0D1

Pressure control A-B & B-A



Series
ZDVABS021S0D1
ZDVABS025S0D1

Specifications

General		
Size	**NG6**	**NG10**
Mounting	DIN 24340 A6 ISO 4401 NFPA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFPA D05 CETOP RP 121
Mounting Position	Unrestricted	
Ambient Temperature Range	-20° to +50°C (-4°F to +122°F)	
Hydraulic		
Maximum Operating Pressure	up to 350 Bar (5075 PSI); ZDV*ABS up to 315 Bar (4568 PSI)	
Nominal Flow	80 LPM (21.2 GPM)	140 LPM (37.0 GPM)
Fluid	Hydraulic oil as per DIN 51524 ... 51525	
Fluid Temperature	-20° to +80°C (-4°F to +176°F)	
Viscosity **Permitted** **Recommended**	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)	
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	

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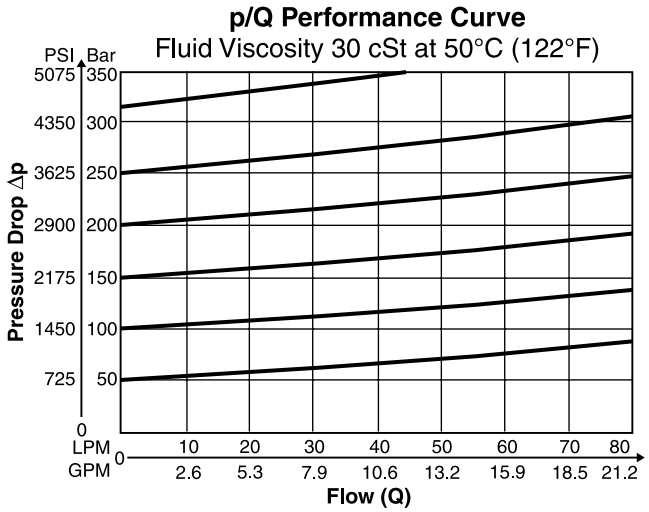
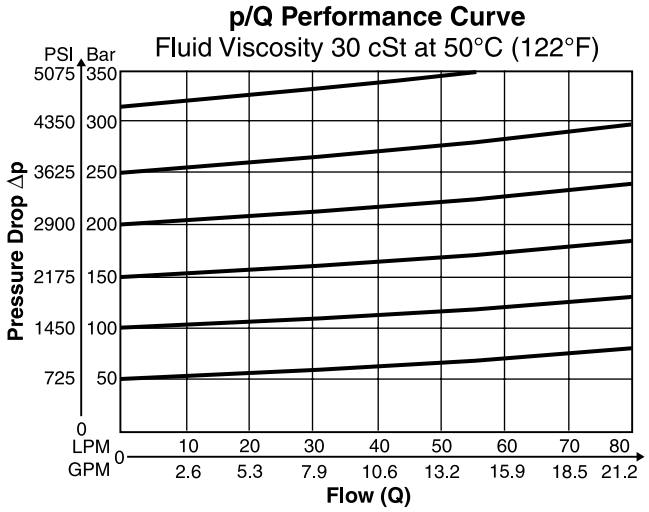
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

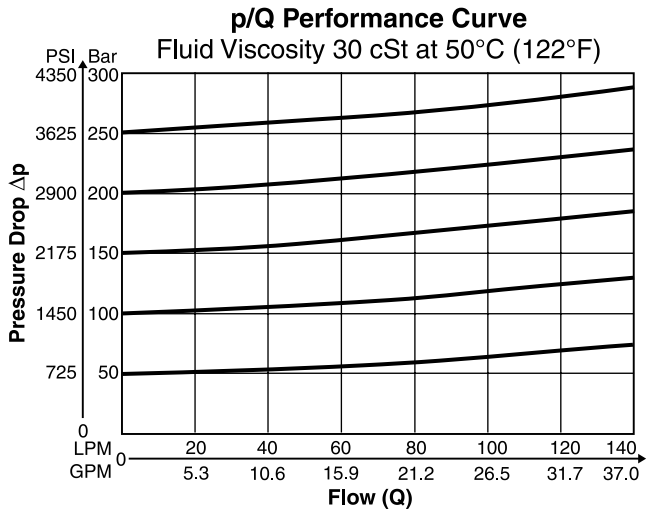
ZDV-P/A/B/ABS01



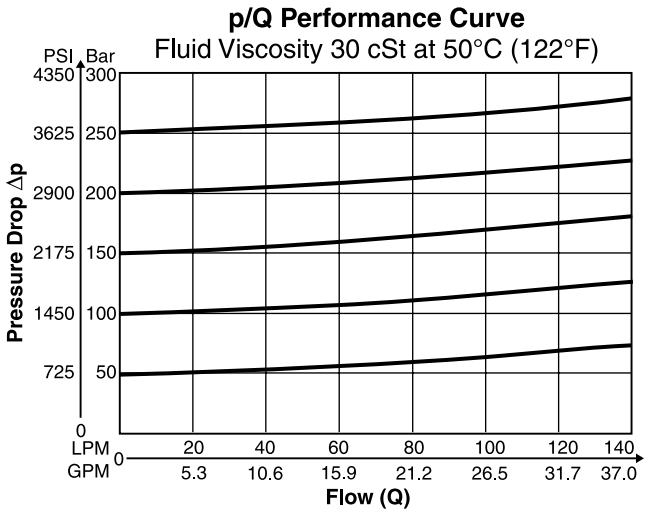
ZDV-AB01



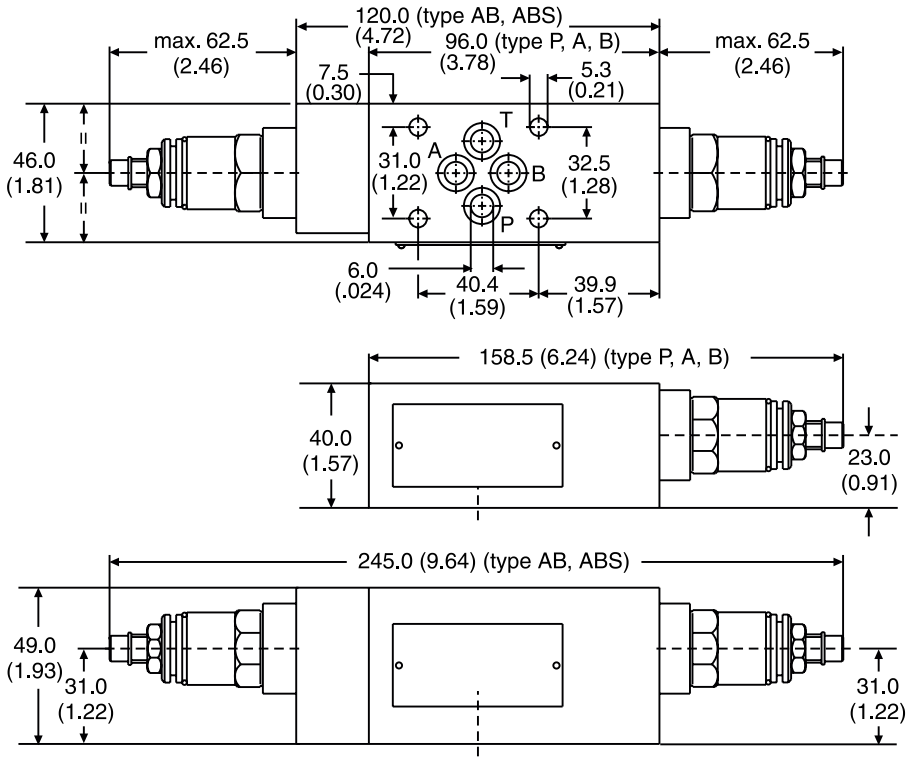
ZDV-P/A/B/AB02



ZDV-ASB02

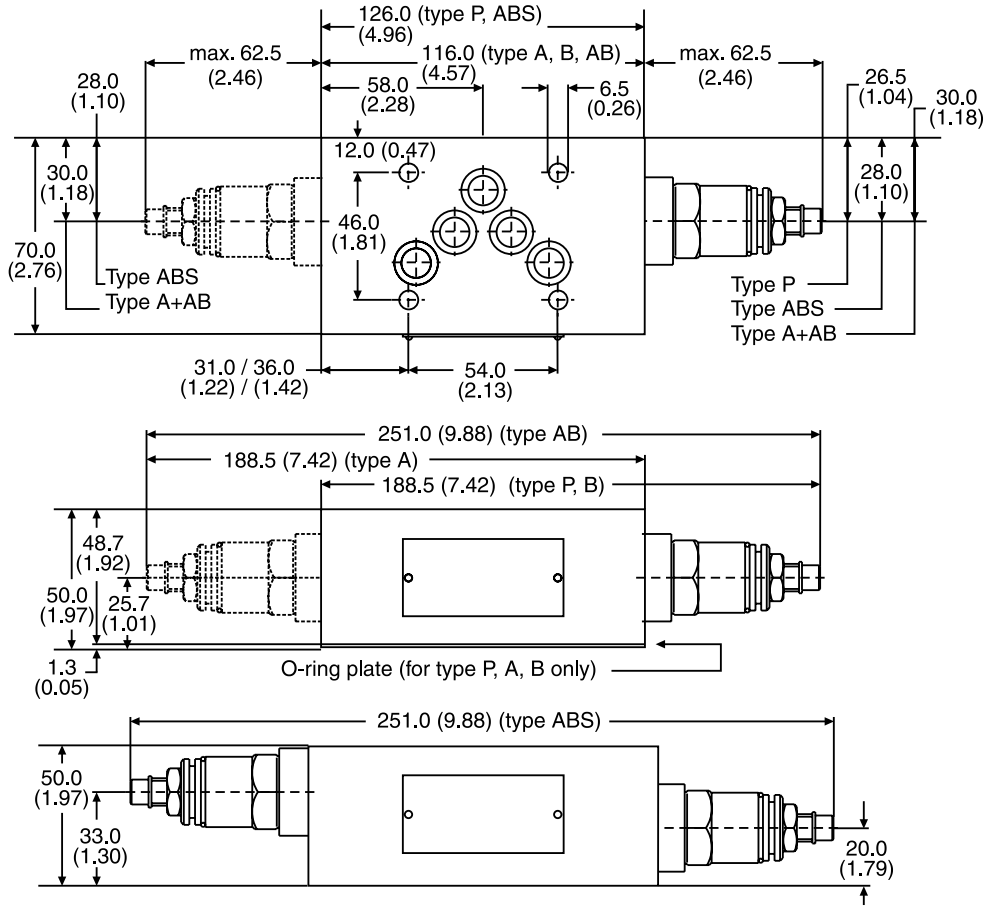


ZDV01 – Inch equivalents for millimeter dimensions are shown in (**)



Seal Kit	
Seal	**Order Code**
1	098-91182-0
5	098-91183-0
Complete Cartridge	
Seal	**Order Code**
1	098-91116-0
5	098-91117-0

ZDV02 – Inch equivalents for millimeter dimensions are shown in (**)



Seal Kit	
Seal	**Order Code**
1	098-91076-0
5	098-91077-0
Complete Cartridge	
Seal	**Order Code**
1	098-91116-0
5	098-91117-0

Denison Sandwich.indd, dd

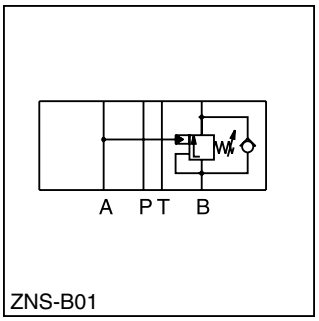
General Description

Series ZNS counterbalance valve controls the actuator movement at overrunning loads.

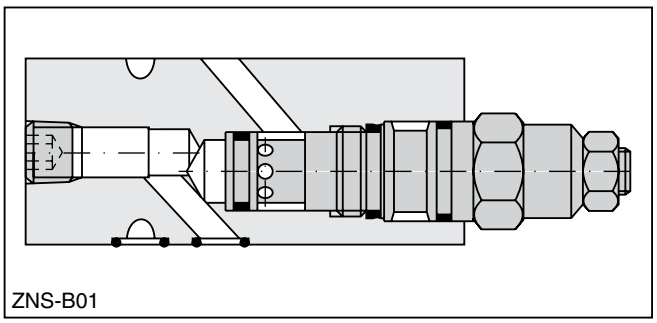
The return flow from the actuator is piloted and controlled by the inlet flow to the actuator, ensuring a cavitation-free lowering of the load.

The counterbalance valve operates as a pressure relief valve. The setting pressure is lowered by the pressure in the inlet line. To ensure safe load holding the setting pressure should be approximately 30% higher than the max. load pressure.

ZNS-AB01



ZNS-B01


ZNS-B01

Features

- Controlled movement loads.
- Load holding via leak-free poppet valve.
- Secondary relief protection for the actuator.
- Sizes:

  ZNS*01 – NFPA D03 / NG6 / CETOP 3

  ZNS*02 – NFPA D05 / NG10 / CETOP 5

Ordering Information

ZNS				S0	D	
Counterbalance Valve	Port Option	Size	Pressure Range	Hexagon Screw with Lock Nut	Design Series	Seal

Code	Description
A	in A
B	in B
AB	in A and B

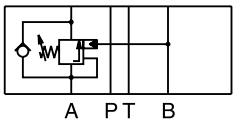
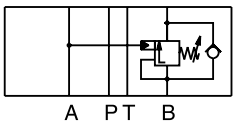
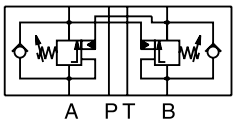
Code	Description
01	NFPA D03 / NG6
02	NFPA D05 / NG10

Code	Description
2	70 to 175 Bar (1015 to 2538 PSI)
5 [1]	140 to 350 Bar (2030 to 5075 PSI)

[1] ZNS02 to 315 Bar (4568 PSI)

Code	Description
1	Nitrile
5	Fluorocarbon

Weight:	1 cartridge	2 cartridges
ZNS*01	1.3 kg (2.9 lbs.)	3.0 kg (6.6 lbs.)
ZNS*02	1.6 kg (3.5 lbs.)	3.9 kg (8.6 lbs.)

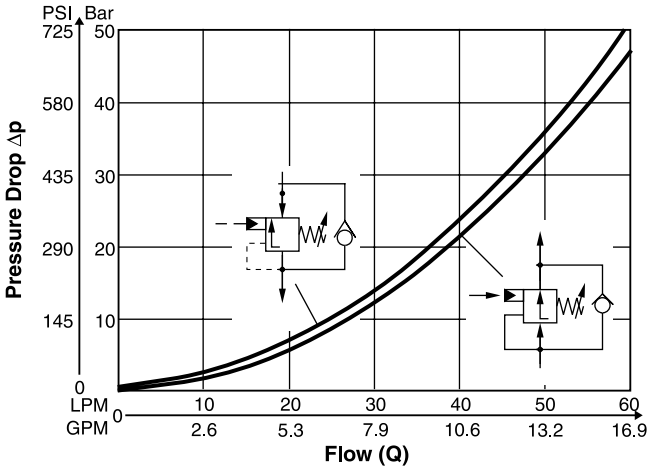
	ZNS01	ZNS02
Counterbalance in A 	Series ZNSA012S0D1 ZNSA015S0D1	Series ZNSA022S0D1 ZNSA025S0D1
Counterbalance in B 	Series ZNSB011S0D1 ZNSB015S0D1	Series ZNSB021S0D1 ZNSB025S0D1
Counterbalance in A and B 	Series ZNSAB011S0D1 ZNSAB015S0D1 2 = 70 ... 175 Bar (1015 ... 2538 PSI) 5 = 140… 350 Bar (2030 ... 5075 PSI)	Series ZNSAB021S0D1 ZNSAB025S0D1 2 = 70 ... 175 Bar (1015 ... 2538 PSI) 5 = 140 …315 Bar (2030 ... 4568 PSI)

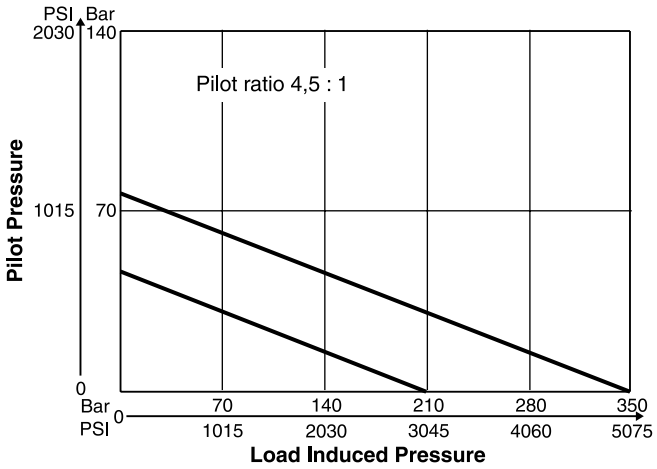
B

Specifications

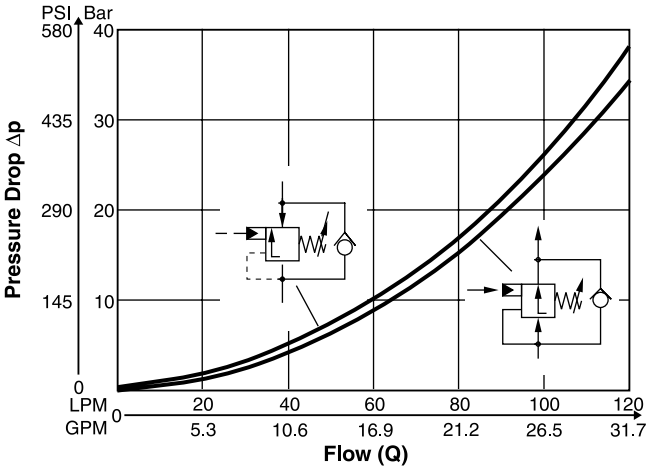
General		
Size	**NG6**	**NG10**
Mounting Interface	DIN 24340 A6 ISO 4401 NFPA D03	DIN 24340 A10 ISO 4401 NFPA D05
Mounting Position	Unrestricted	
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)	
Hydraulic		
Maximum Operating Pressure	350 Bar (5075 PSI)	315 Bar (4568 PSI)
Pressure Range	175 Bar (2538 PSI), 350 Bar (5075 PSI)	
Pilot Ratio	4.5 : 1	
Leakage	On request	
Nominal Flow	60 LPM (15.9 GPM)	120 LPM (31.7 GPM)
Opening Pressure	0.3 LPM (0.1 GPM)	0.3 LPM (0.1 GPM)
Fluid	Hydraulic oil as per DIN 51524 ... 51525	
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)	
Viscosity Permitted **Recommended**	10 to 650 cSt / mm^2/s (46 to 3013 SSU) 30 cSt / mm^2/s (139 SSU)	
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	

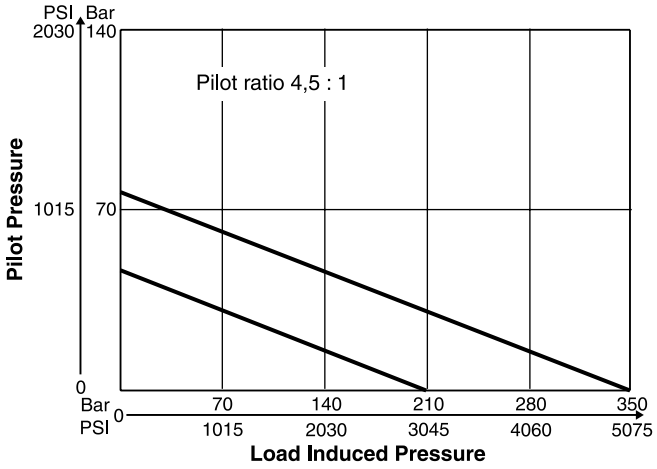
ZNS01





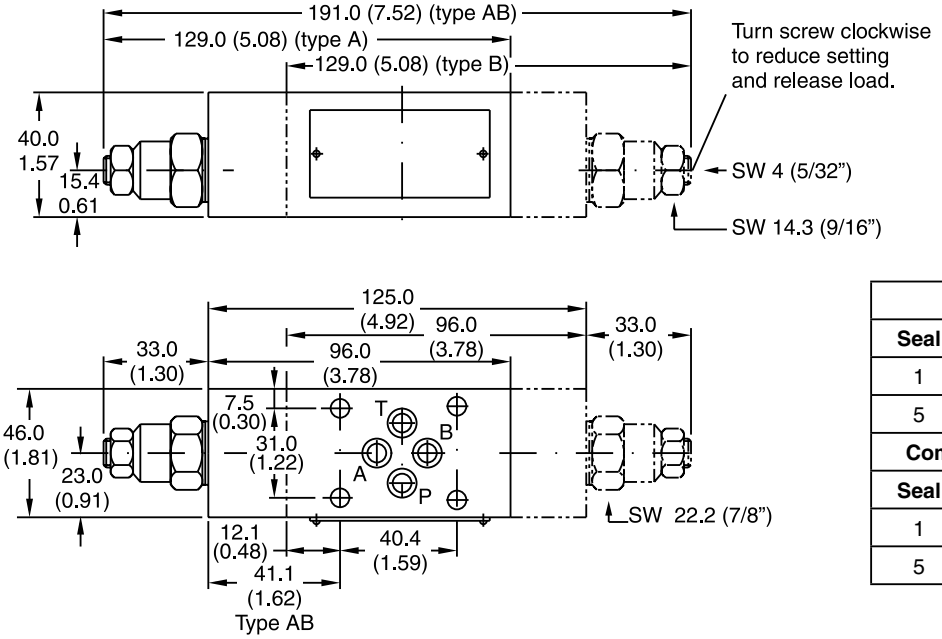
ZNS02





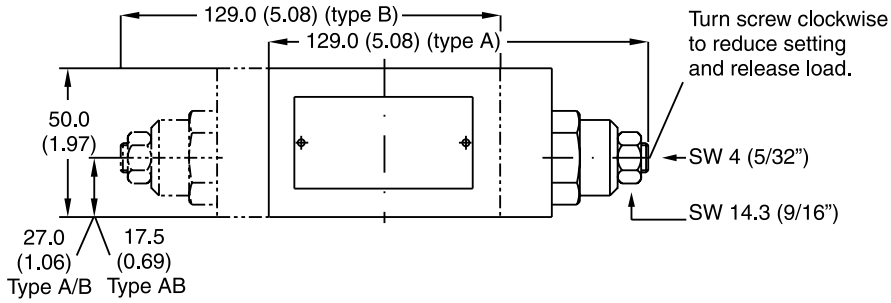
All characteristic curves measured with HLP46 at 50°C (122°F).

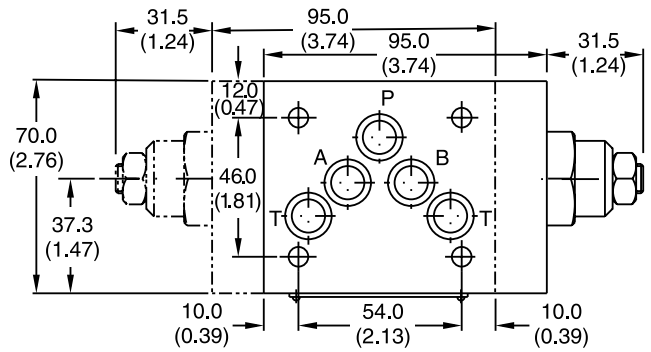
ZNS01 – Inch equivalents for millimeter dimensions are shown in (**)

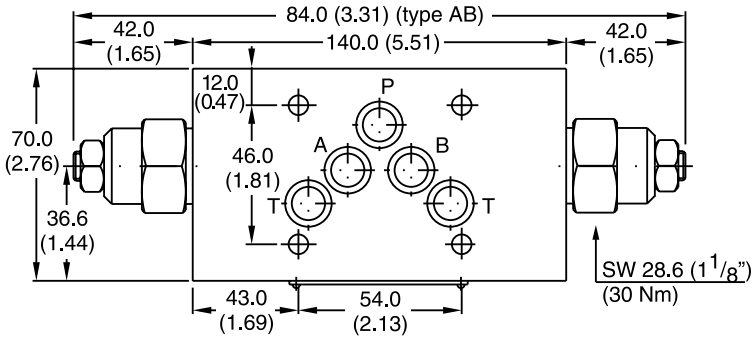


Seal Kit	
Seal	**Order Code**
1	098-91153-0
5	098-91154-0
Complete Cartridge	
Seal	**Order Code**
1	517-01017-2
5	517-00448-8

ZNS02 – Inch equivalents for millimeter dimensions are shown in (**)







Seal Kit	
Seal	**Order Code**
1	098-91155-0
5	098-91183-0
Complete Cartridge	
Seal	**Order Code**
1	517-00449-8
5	517-00450-8

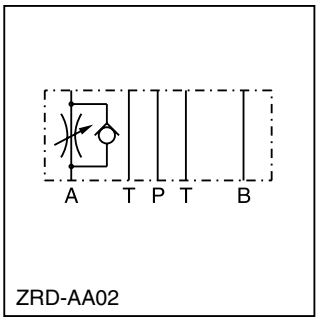
General Description

Series ZRD throttle check valves are designed for maximum flow rates.

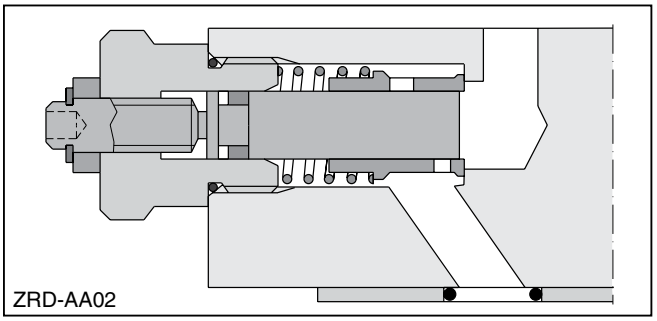
The throttle check function can be located in port A or B as well as in A + B. Meter-in or meter-out functionality can be selected by model code.

A low flow / high resolution version in NFPA 03 / NG6 for sensitive shifting time adjustment of pilot operated directional control valves is available on request.

ZRD-ABZ01



ZRD-AA02


ZRD-AA02

Features

- High flow capacity.
- Various functional arrangements.
- Sizes:
  - – ZRD01 – NFPA D03 / NG6 / CETOP 3
  - – ZRD02 – NFPA D05 / NG10 / CETOP 5

Ordering Information

ZRD	☐	☐	S0	—	D	☐
Throttle Valve with Check	Meter Option	Size	Hexagon Screw with Lock Nut		Design Series	Seal

Code	Description
AA	Meter-out Control in A
AZ	Meter-in Control in A
BA	Meter-out Control in B
BZ	Meter-in Control in B
ABA	Meter-out Control in A and B
ABZ	Meter-in Control in A and B

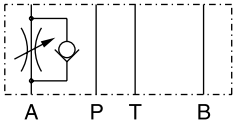
Code	Description
01	NFPA D03 / NG6
02	NFPA D05 / NG10

Code	Description
1	Nitrile
5	Fluorocarbon

Weight:	1 Cartridge	2 Cartridges
ZRD*01	1.2 kg (2.6 lbs)	1.3 kg (2.9 lbs)
ZRD*02	2.8 kg (6.2 lbs.)	2.9 kg (6.4 lbs.)

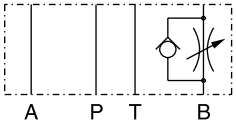
ZRD01

Meter-in control in A



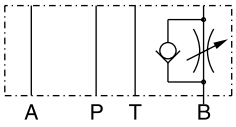
Series ZRDAZ01S0D1

Meter-out control in B



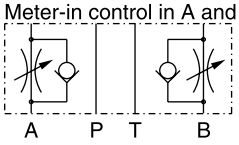
Series ZRDBA01S0D1

Meter-in control in B



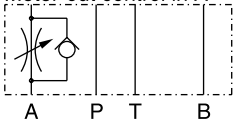
Series ZRDBZ01S0D1

Meter-in control in A and B



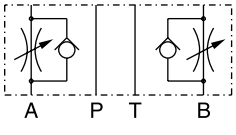
Series ZRDABZ01S0D1

Meter-out control in A



Series ZRDAA01S0D1

Meter-out control in A and B



Series ZRDABA01S0D1

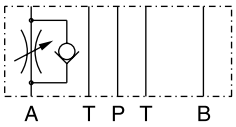
ZRD02 (continued on next page)

B

Ordering Information

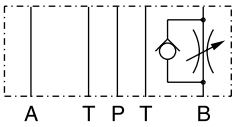
ZRD02

Meter-in control in A



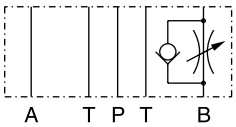
Series ZRDAZ02S0D1

Meter-out control in B



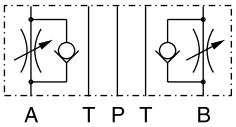
Series ZRDBA02S0D1

Meter-in control in B



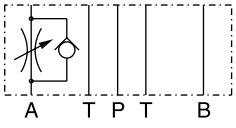
Series ZRDBZ02S0D1

Meter-in control in A and B



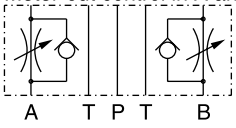
Series ZRDABZ02S0D1

Meter-out control in A



Series ZRDAA02S0D1

Meter-out control in A and B



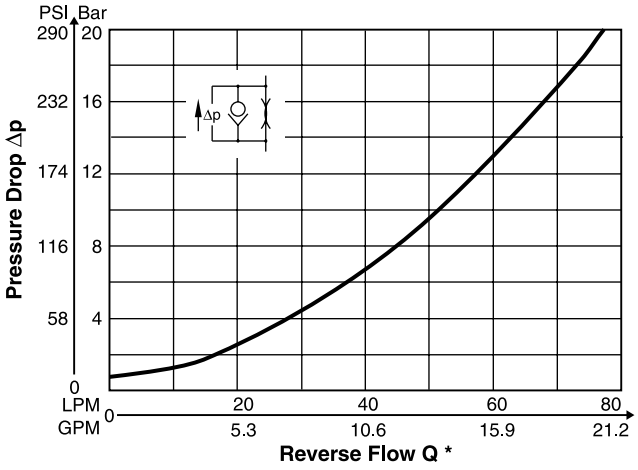
Series ZRDABA02S0D1

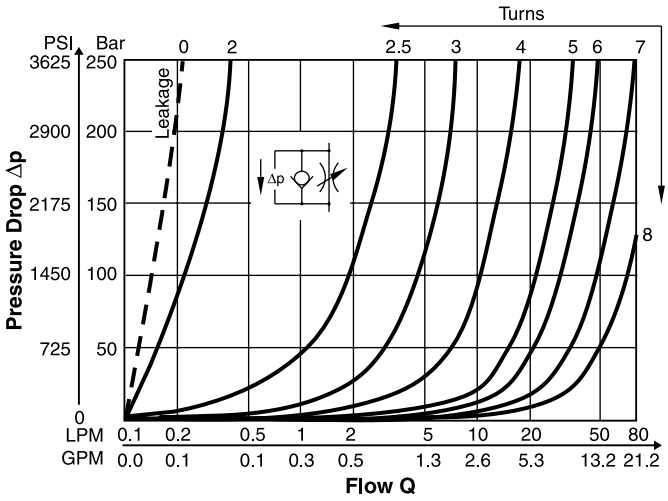
Specifications

General		
Size	**NG6**	**NG10**
Mounting	DIN 24340 A6 ISO 4401 NFPA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFPA D05 CETOP RP 121 5
Mounting Position	Unrestricted	
Ambient Temprature	-20°C to +50°C (-4°F to +122°F)	
Hydraulic		
Max. Operating Pressure	350 Bar (5075 PSI)	
Nominal Flow	80 LPM (21.2 GPM)	160 LPM (42.3 GPM)
Leakage	—	—
Cracking Pressure	—	—
Fluid	Hydraulic oil as per DIN 51524 ... 51525	
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)	
Viscosity **Permitted** **Recommended**	 10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	

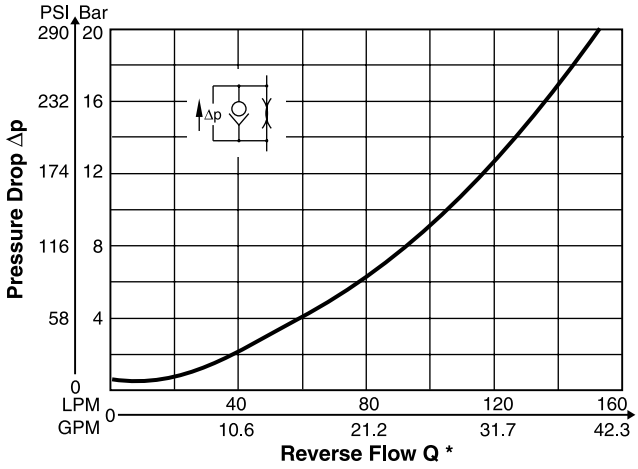
p/Q Performance Curves

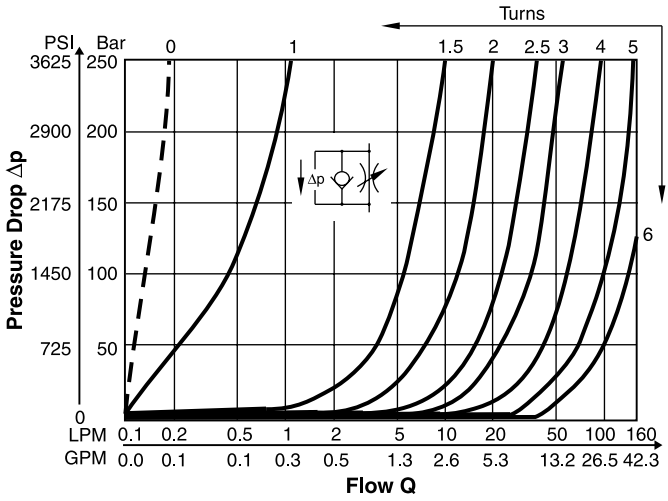
ZRD01





ZRD02



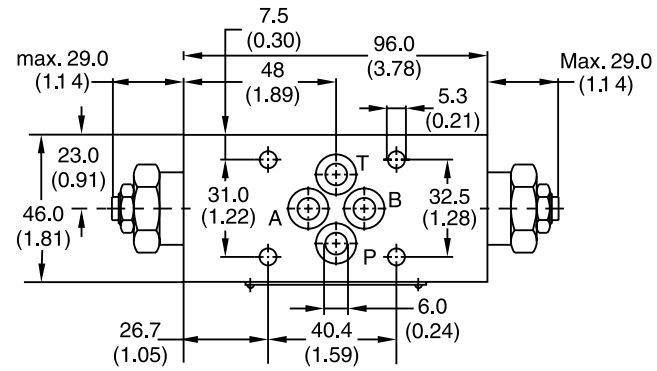


* Throttle closed

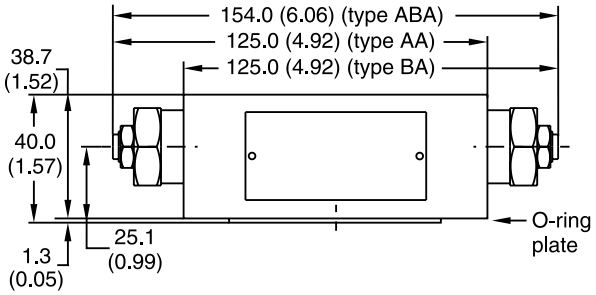
Fluid Viscosity 30 cSt @ 50°C (122°F)

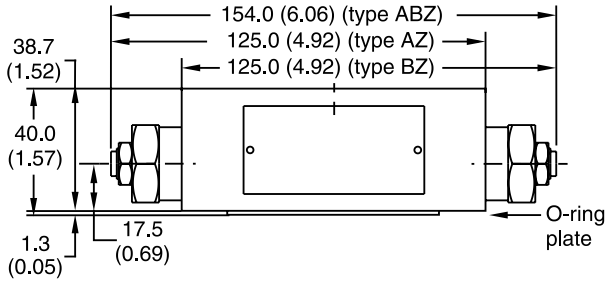
ZRD01

Inch equivalents for millimeter dimensions are shown in (**)



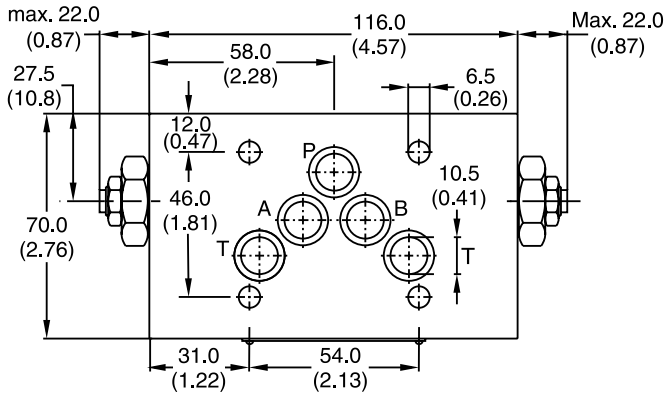
Seal Kit	
Seal	**Order Code**
1	098-91096-0
5	098-91097-0
Complete Cartridge	
Order Code	
098-91119-0	
O-ring Plate	
Order Code	
S26-27553-0	



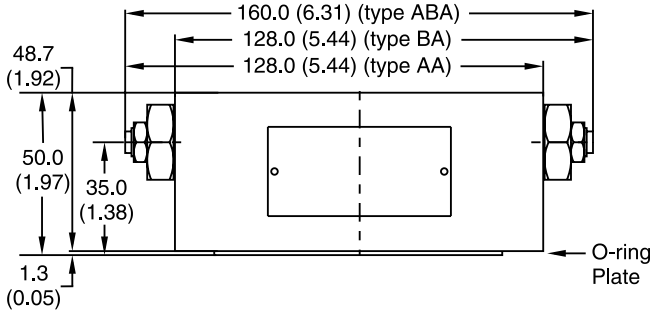


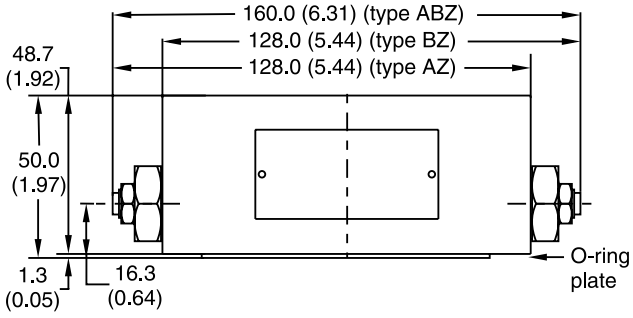
ZRD02

Inch equivalents for millimeter dimensions are shown in (**)



Seal Kit	
Seal	**Order Code**
1	098-91098-0
5	098-91099-0
Complete Cartridge	
Order Code	
098-91120-0	
O-ring Plate	
Order Code	
S16-85742-0	





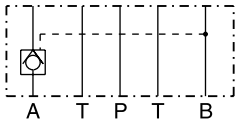
General Description.

Series ZRE pilot operated check valves are designed for maximum flow rates and long life time.

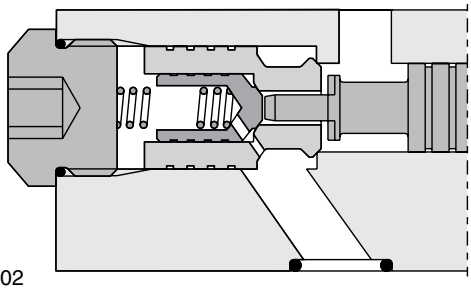
The valves are typically used in combination with spool type directional control valves to ensure leak free positioning of the actuator.

The inlet flow is free while the outlet flow is blocked. Pressure in the inlet line opens the check valve and allows free outlet flow.

ZRE-B01



ZRE-A02


ZRE-A02

Features

- High life time.
- Check function in A, B or A + B.
- Sizes:
  - ZRE01 – NFPA D03 / NG6 / CETOP 3
  - ZRE02 – NFPA D05 / NG10 / CETOP 5

Ordering Information

ZRE — Pilot Operated Check Valve

Port Option	
Code	**Description**
A	Blocked in A
B	Blocked in B
AB	Blocked in A and B

Size	
Code	**Description**
01	NFPA D03 / NG6
02	NFPA D05 / NG10

Design Series	
Code	**Description**
D	Size 01
E	Size 02

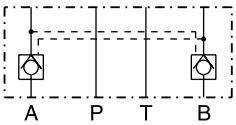
Seal	
Code	**Description**
1	Nitrile
5	Fluorocarbon

Weight:

ZRE*01	1.2 kg (2.6 lbs)
ZRE*02	3.1 kg (6.8 lbs.)

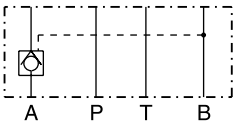
ZRE01

blocked in A and B



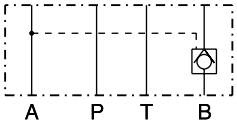
Series ZREAB01D1

blocked in A



Series ZREA01D1

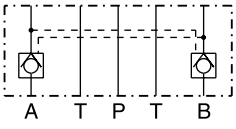
blocked in B



Series ZREB01D1

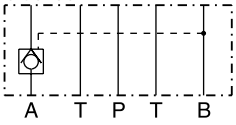
ZRE02

blocked in A and B



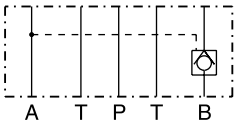
Series ZREAB02E1

blocked in A



Series ZREA02E1

blocked in B



Series ZREB02E1

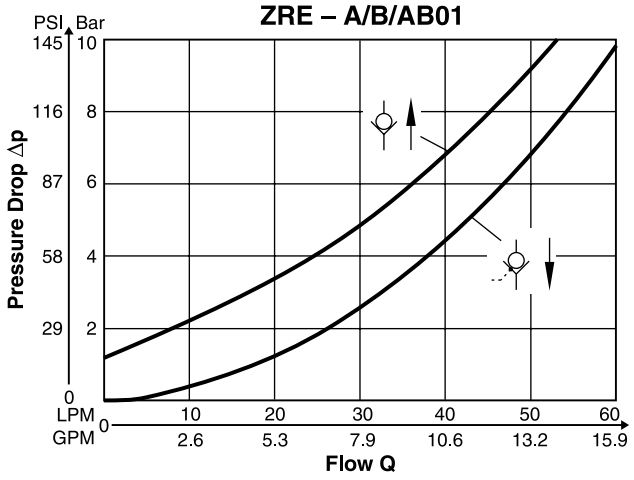
Specifications

General		
Size	**NG6**	**NG10**
Mounting Interface	DIN 24340 A6 ISO 4401 NFPA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFPA D05 CETOP RP 121 5
Mounting Position	Unrestricted	
Ambient Temprature	-20°C to +50°C (-4°F to +122°F)	
Hydraulic		
Max. Operating Pressure	350 Bar (5075 PSI)	
Nominal Flow	60 LPM (15.9 GPM)	120 LPM (31.7 GPM)
Opening Ratio (Pilot Cone/Main Cone)	1:6	1:6
Cracking Pressure	1.2 Bar (17.4 PSI)	2.0 Bar (29.0 PSI)
Fluid	Hydraulic oil in accordance with DIN 51524 ... 51525	
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)	
Viscosity **Permitted** **Recommended**	 10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	

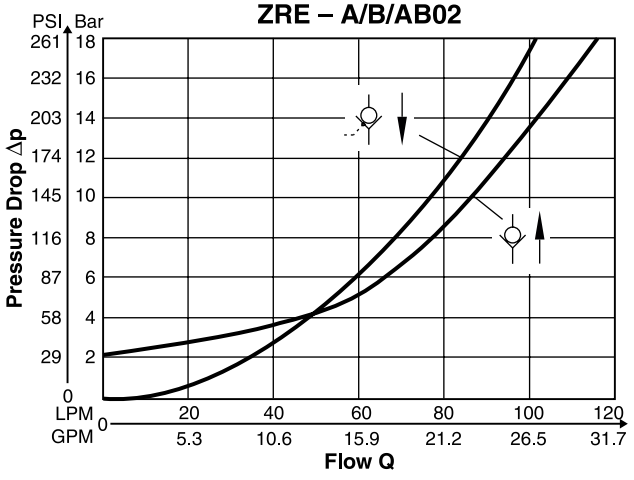
Performance Curves

p/Q

ZRE01



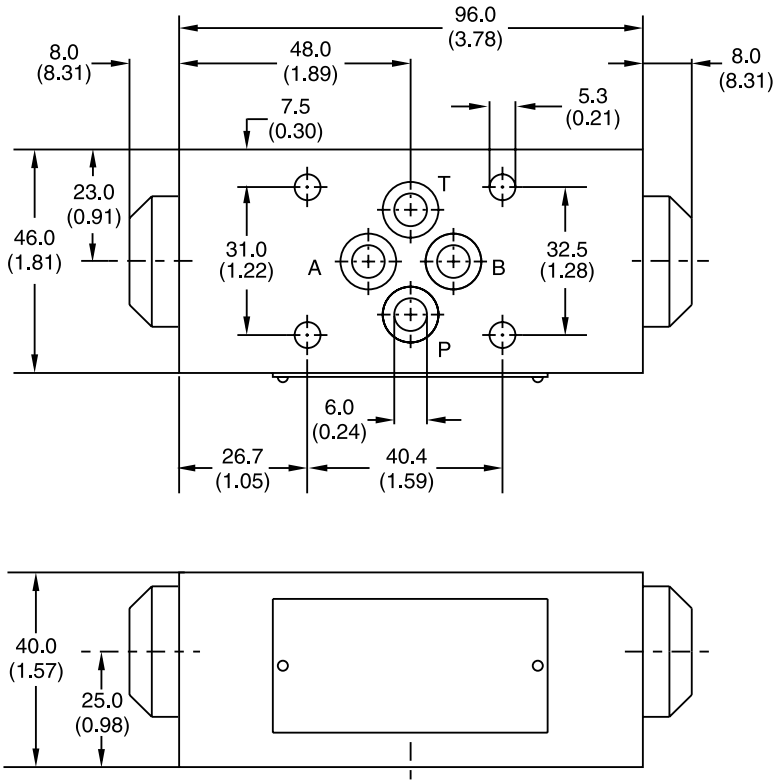
ZRE02



Fluid Viscosity 30 cSt at 50°C (122°F).

ZRE01

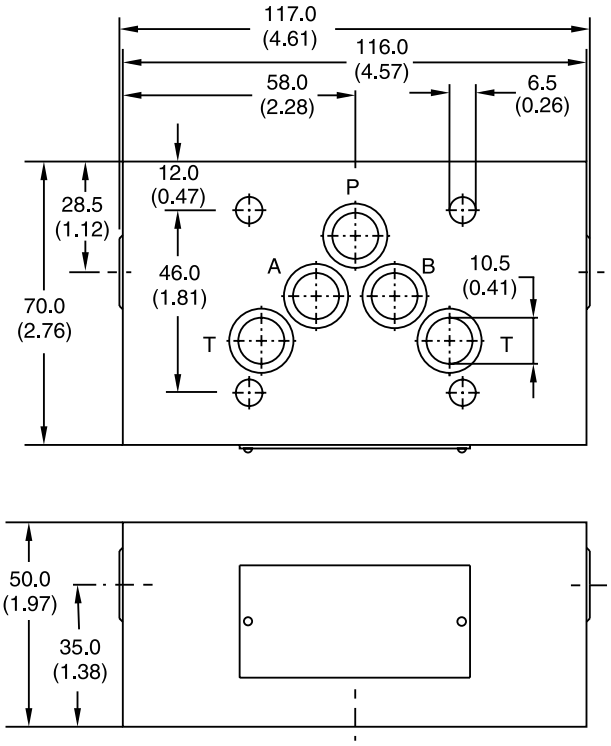
Inch equivalents for millimeter dimensions are shown in (**)



Seal Kit	
Seal	**Order Code**
1	098-91088-0
5	098-91089-0

ZRE02

Inch equivalents for millimeter dimensions are shown in (**)



Seal Kit	
Seal	**Order Code**
1	098-91090-0
5	098-91091-0

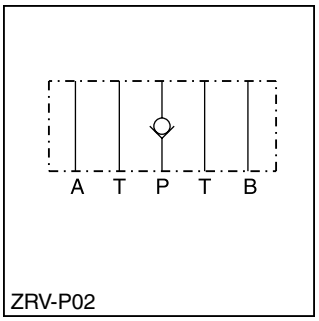
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

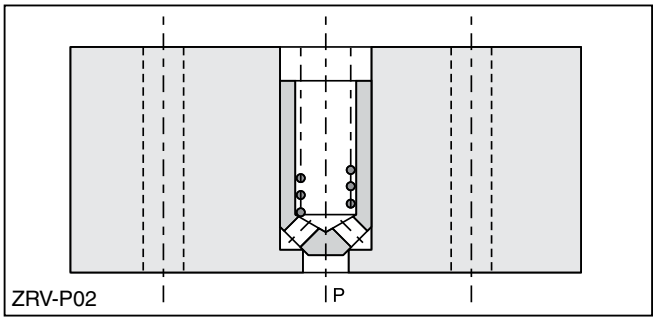
Series ZRV direct operated check valves have a cartridge type insert to provide zero leakage and high life time.

The check function can be located in the P-port or in the T-port.

ZRV-P02



ZRV-P02



ZRV-P02

Features

- Leakage-free seat.
- High life time.
- Cracking pressure 0.5 Bar (7.25 PSI).
- Sizes:
  - ZRV01 – NFPA D03 / NG6 / CETOP 3
  - ZRV02 – NFPA D05 / NG10 / CETOP 5

Ordering Information

ZRV
Direct Operated Check Valve

Port Option

Code	Description
P	Blocked in P
T	Blocked in T

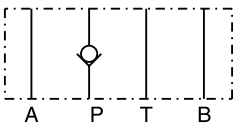
Size

Code	Description
01	NFPA D03 / NG6
02	NFPA D05 / NG10

Weight:
ZRV*01 0.7 kg (1.5 lbs)
ZRV*02 2.0 kg (4.4 lbs.)

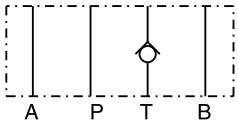
ZRV01

blocked in P



Series ZRVP01

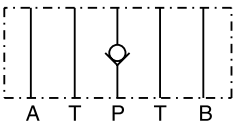
blocked in T



Series ZRVT01

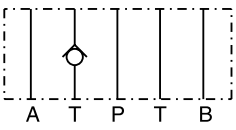
ZRV02

blocked in P



Series ZRVP02

blocked in T



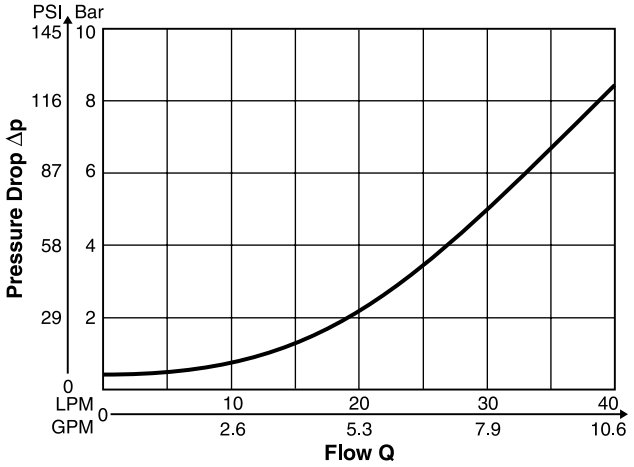
Series ZRVT02

Specifications

General		
Size	**NG6**	**NG10**
Mounting Interface	DIN 24340 A6 ISO 4401 NFPA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFPA D05 CETOP RP 121 5
Mounting Position	Unrestricted	
Ambient Temprature	-20°C to +50°C (-4°F to +122°F)	
Hydraulic		
Max. Operating Pressure	350 Bar (5075 PSI)	
Nominal Flow	40 LPM (10.6 GPM)	100 LPM (26.5 GPM)
Cracking Pressure	0.5 Bar (7.25 PSI)	0.5 Bar (7.25 PSI)
Fluid	Hydraulic oil as per DIN 51524 ... 51525	
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)	
Viscosity **Permitted** **Recommended**	 10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	

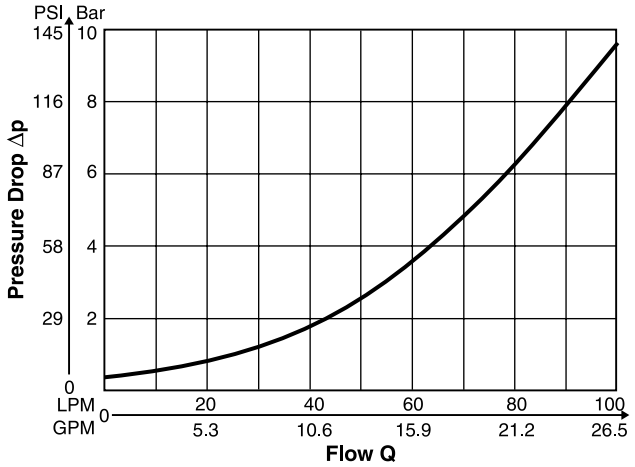
p/Q Performance Curves

ZRV P/T01



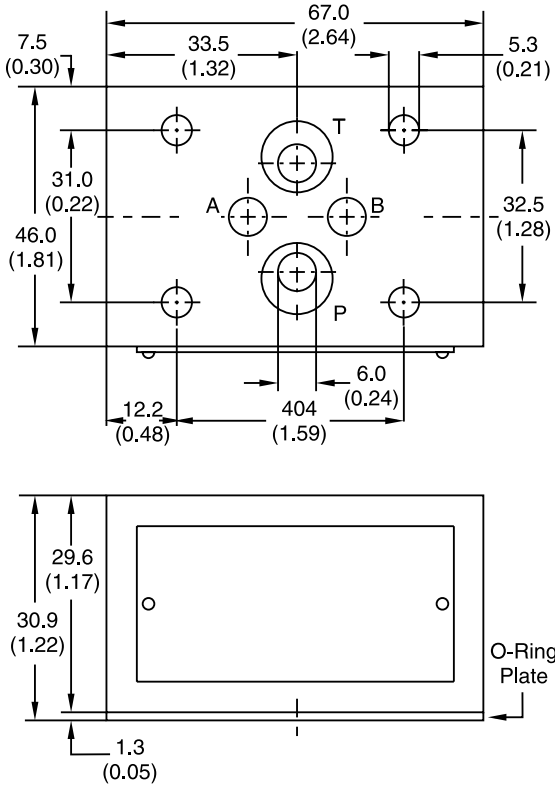
Fluid Viscosity 30 cSt at 50°C (122°F)

ZRV P/T02

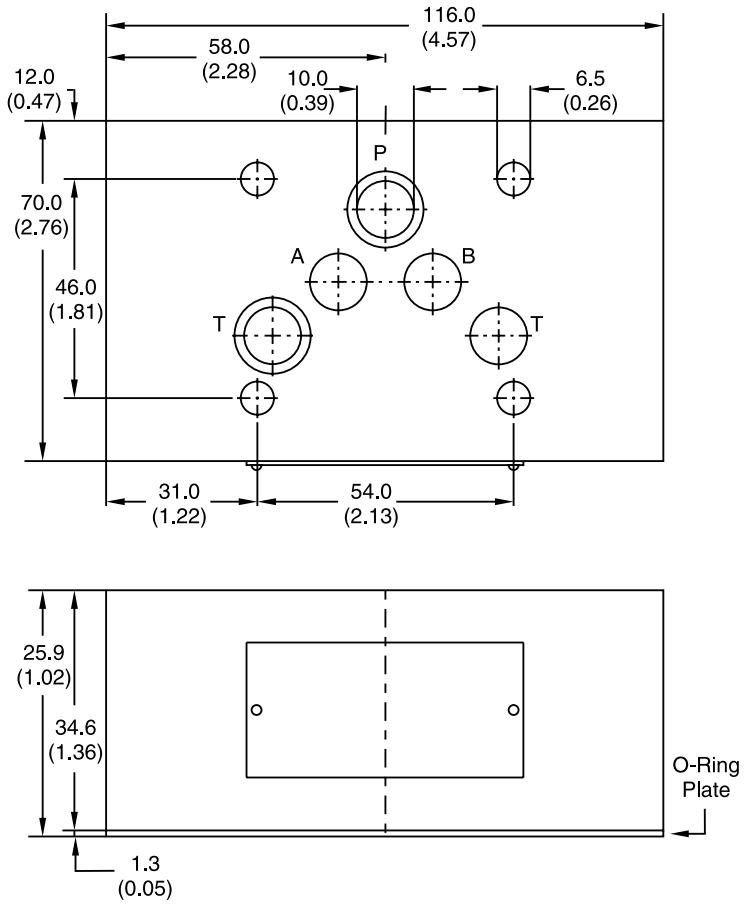


Fluid Viscosity 30 cSt at 50°C (122°F)

ZRV01 – Inch equivalents for millimeter dimensions are shown in (**)

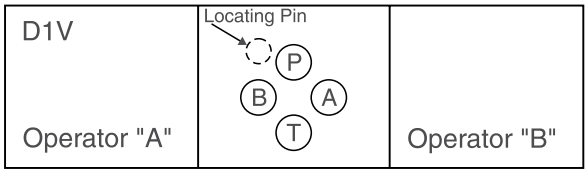


ZRV02 – Inch equivalents for millimeter dimensions are shown in (**)



CAUTION:
Sandwich Installation

Prior to installation of Sandwich valves, please review flow paths. Due to the reversibility of the DO3 size, incorrect installation will alter the hydraulic circuit. Care must be taken during installation to insure that the Sandwich is installed in compliance with the hydraulic schematic. Please consult with your Parker representative with any questions that may arise.



Pressure Ratings

Unless otherwise specified, all Parker Sandwich valves have continuous duty pressure rating as shown in this catalog.

Special Requirements

Consult your Parker representative for factory recommendations on such situations as:

- Installations that will operate at pressures higher than published catalog ratings.
- Use of hydraulic fluids which do not meet our recommended specifications.
- Operations where fluid temperature will exceed 121°C (250°F).

Recommended Mounting Surface

Surface must be flat within .0004 inch T.I.R. and smooth with 32 micro-inch.

System Cleanliness

Any hydraulic system that includes Parker valves should be carefully protected against dirt and fluid contamination. Life of the valves, as well as of all other components, will be greatly lengthened. Operation will be smoother and more precise. Maintenance and repairs will be reduced. Lost production because of low pressure and flow will be minimized. Fluid contamination should be maintained to less than 500 particles larger than 10 micrometers per milliliter of fluid (SAE class 4 or better/ISO Code 16/13).

Hydraulic Fluids

Parker recommends using top-quality hydraulic fluids having a viscosity range of 32 to 54 cSt (150 to 250 SSU) at 38°C (100°F). The absolute viscosity range should be 16 to 220 cSt (80 to 1000 SSU). Fluids should have highest anti-wear characteristics and be treated to avoid rust and oxidation.

Seals

When used with water-glycol, water/oil emulsions, and high-grade petroleum base hydraulic fluids, Parker standard nitrile seals are suitable.

When using phosphate ester fluids or their blends, specify Parker optional seals made of fluorocarbon. Synthetic fire-resistant fluids require special seal materials which your Parker representative can recommend.

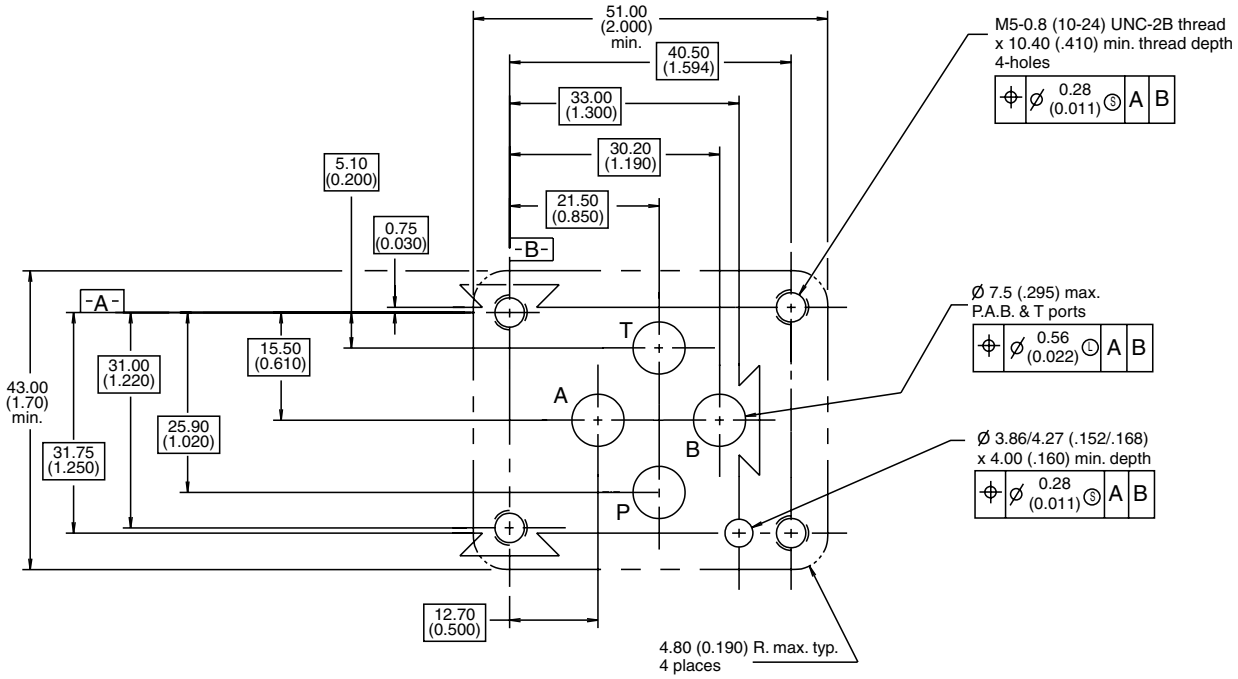
Torque Specifications

The recommended torque valves are for the bolts which mount the valve to the manifold or subplate are as follows:

Size	Torque Valve
D03	5.7 N.m. (50 in.-lbs.)
D05	16.3 N.m. (12 ft.-lbs.)
D07	63.0 N.m. (46.5 ft.-lbs.)
D08	108.5 N.m. (80 ft.-lbs.)

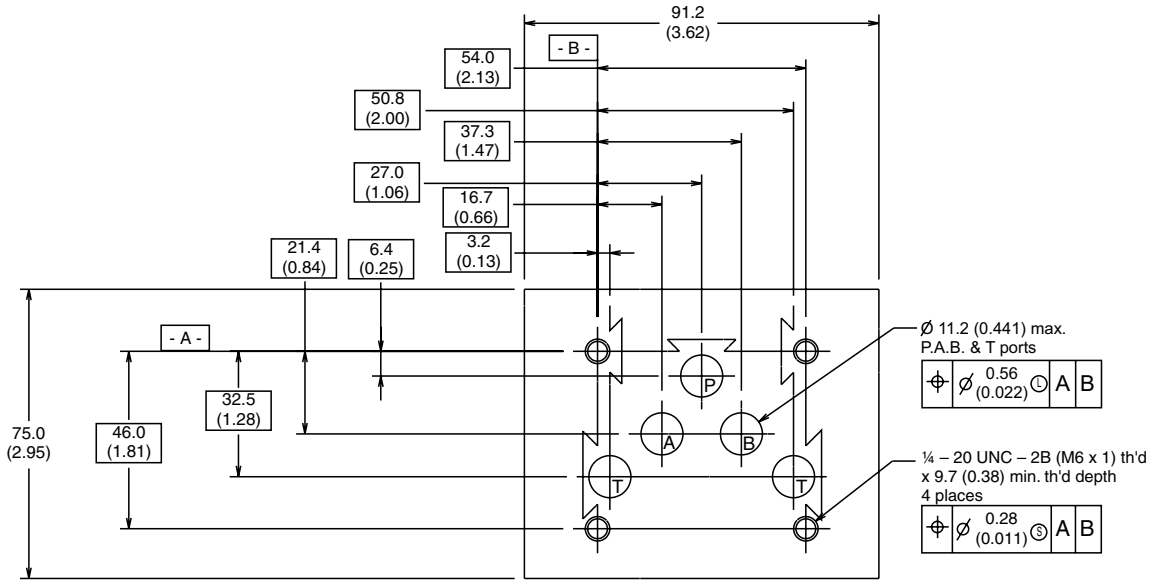
Mounting Pattern – NFPA D03, CETOP 3 & NG6

Inch equivalents for millimeter dimensions are shown in (**)



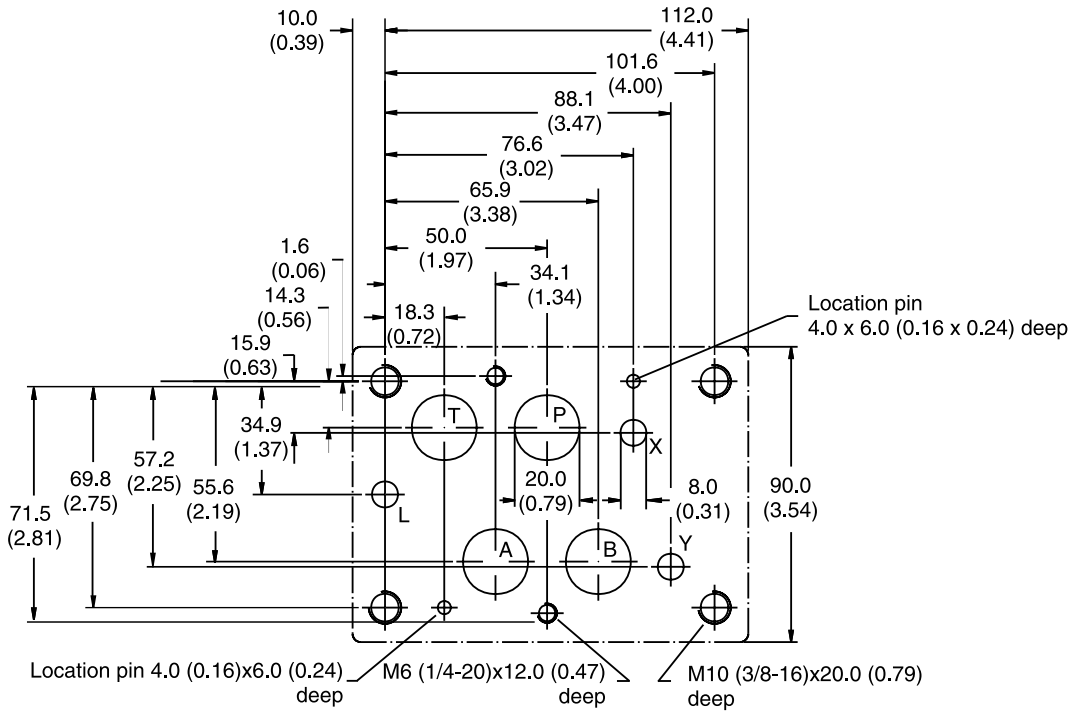
Mounting Pattern – NFPA D05, CETOP 5 & NG10

Inch equivalents for millimeter dimensions are shown in (**)



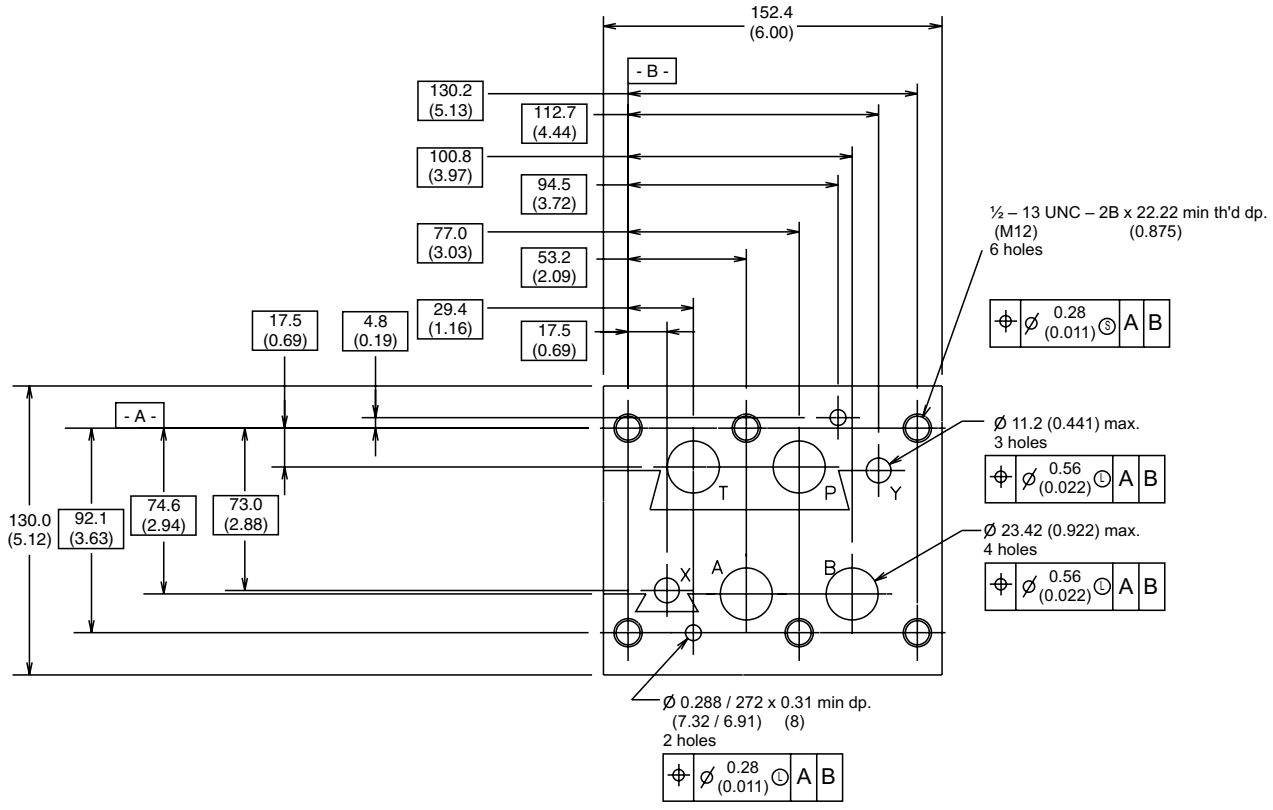
Mounting Pattern – NFPA D07, CETOP 7 & NG16

Inch equivalents for millimeter dimensions are shown in (**)



Mounting Pattern – NFPA D08, CETOP 8 & NG25

Inch equivalents for millimeter dimensions are shown in (**)



Denison Sandwich.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

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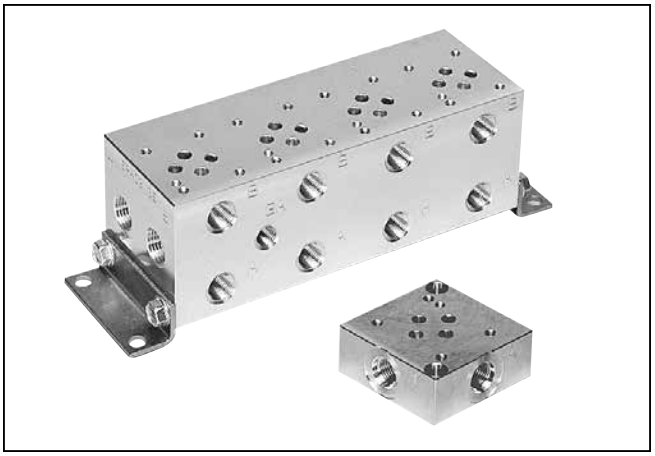
General Description

Series D1V directional control valve subplates provide easy transition from NFPA and CETOP mounting patterns to common plumbing connections. Five different thread types are available for use in any application.
Manifolds provide a single location to mount several valves in a compact and manageable array for operating multiple machines or functions.



C

Features

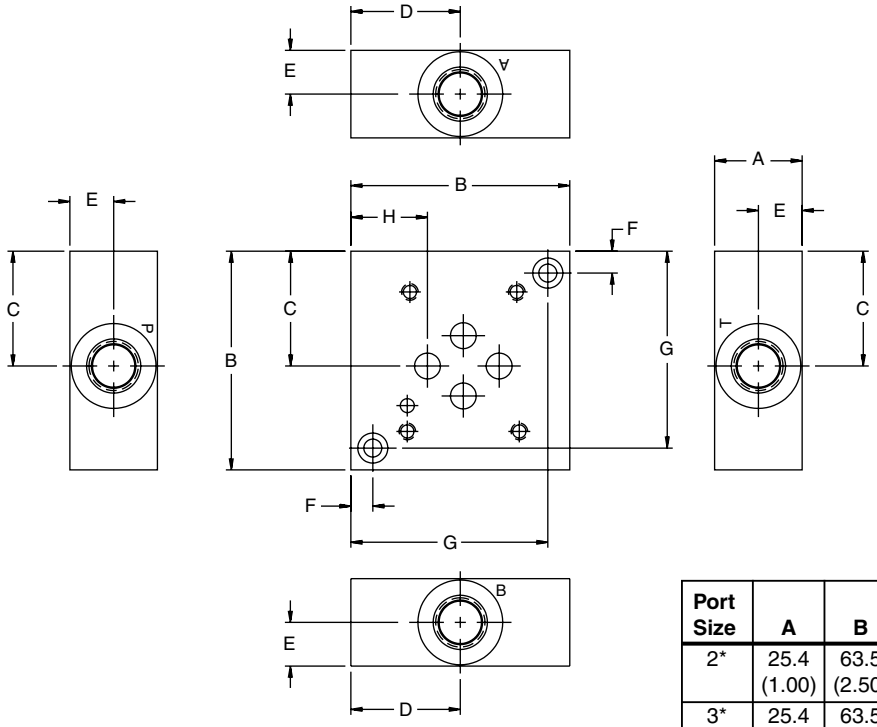
- **Aluminum or steel available** — Flexibility for applying to different system pressures.
- **NPT and SAE thread options available** — Flexibility to plumb into existing systems.
- **Multiple port sizes available** — Eliminates need for reducers and expanders at subplate connection.

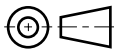
Operation

Series D1V subplates and manifolds consist of an NFPA valve mounting surface and corresponding connections for each valve port. Various port sizes and thread type are available. Cover plates, crossover and tapping plates are also available.

Side Ported Subplate — NFPA D03

Inch equivalents for millimeter dimensions are shown in (**)



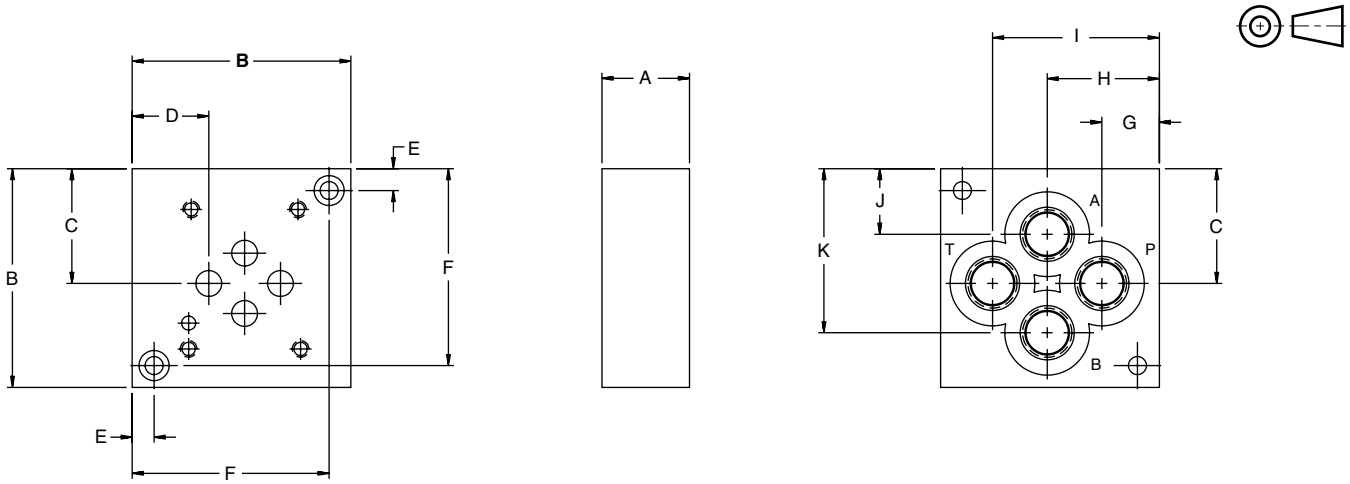


Port Size	A	B	C	D	E	F	G	H
2*	25.4 (1.00)	63.5 (2.50)	33.3 (1.31)	31.8 (1.25)	12.7 (.50)	6.4 (.25)	57.2 (2.25)	22.4 (.88)
3*	25.4 (1.00)	63.5 (2.50)	33.3 (1.31)	31.8 (1.25)	12.7 (.50)	6.4 (.25)	57.2 (2.25)	22.4 (.88)
4*	38 (1.50)	88.9 (3.50)	46.0 (1.81)	45.2 (1.78)	19.1 (.75)	6.4 (.25)	82.5 (3.25)	35.1 (1.38)
6*	44.5 (1.75)	101.6 (4.00)	52.3 (2.06)	51.6 (2.03)	22.4 (.88)	9.7 (.38)	92.2 (3.63)	41.4 (1.63)

See Mounting Bolt Kits for bolt information.

Series D1V
Bottom Ported Subplate — NFPA D03

Inch equivalents for millimeter dimensions are shown in (**)



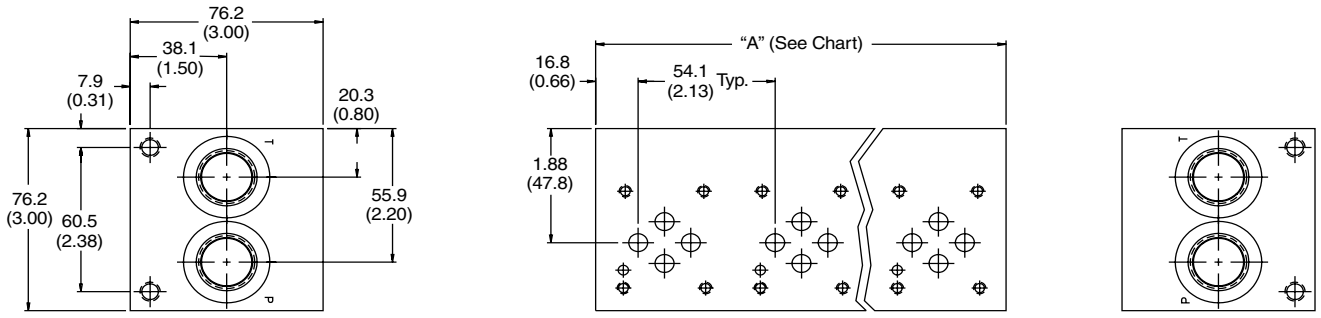
Port Size	A	B	C	D	E	F	G	H	I	J	K
2*	25.4 (1.00)	63.5 (2.50)	33.3 (1.31)	22.4 (.88)	6.4 (.25)	57.2 (2.25)	16.8 (.66)	32.5 (1.28)	48.5 (1.91)	19.1 (.75)	47.8 (1.88)
3*	25.4 (1.00)	63.5 (2.50)	33.3 (1.31)	22.4 (.88)	6.4 (.25)	57.2 (2.25)	15.0 (.59)	32.5 (1.28)	50.0 (1.97)	17.5 (.69)	49.3 (1.94)
4*	38.1 (1.50)	88.9 (3.50)	46.0 (1.81)	35.1 (1.38)	6.4 (.25)	82.6 (3.25)	17.5 (.69)	45.2 (1.78)	71.4 (2.81)	19.1 (.75)	71.4 (2.81)
6*	38.1 (1.50)	114.3 (4.50)	58.7 (2.31)	47.8 (1.88)	9.7 (.38)	104.9 (4.13)	23.9 (.94)	57.9 (2.28)	90.4 (3.56)	23.9 (.94)	90.4 (3.56)

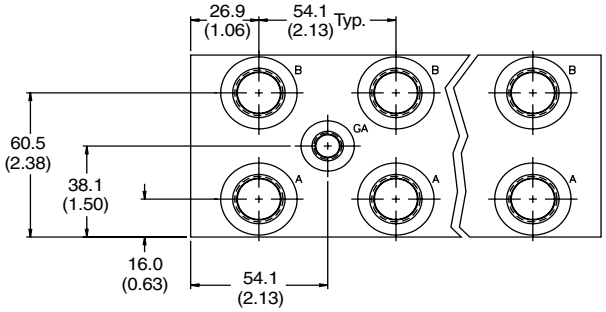
See Mounting Bolt Kits for bolt information.

C

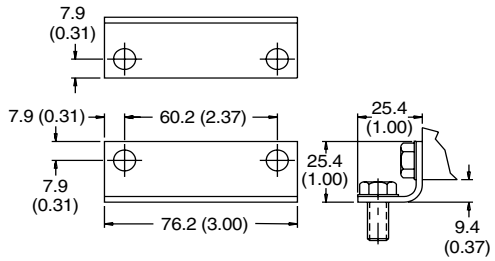
Series D1V
Manifold — NFPA D03

Inch equivalents for millimeter dimensions are shown in (**)





Note: Gage port not available on single station manifold.



Mounting Hardware
(See Ordering Information for Mounting Hardware details)

No. Stations	1	2	3	4	5	6	7	8
"A" Length mm (inch)	54.1 (2.13)	108.0 (4.25)	162.1 (6.38)	215.9 (8.50)	270.0 (10.63)	323.9 (12.75)	378.0 (14.88)	431.8 (17.00)
Wgt., Alum, kg (lbs.)	1.4 (3)	1.8 (4)	2.7 (6)	3.6 (8)	4.1 (9)	5.0 (11)	5.4 (12)	6.4 (14)
Wgt., Iron, kg (lbs.)	2.3 (5)	4.1 (9)	5.9 (13)	7.7 (17)	9.5 (21)	11.8 (26)	13.6 (30)	15.4 (34)

See Mounting Bolt Kits for bolt information.

Series D1V Subplates

SP	D2				35
Subplate	Valve Model	Port Size and Thread Type	Port Location	Material	Design Series
					Required when ordering.

Code	Description
D2*	NFPA D03, NG6, CETOP3

* Consult factory for D03 subplates requiring pilot ports with D1VP.

Code	Description
2N	.25 – 18 NPTF
3N	.38 – 18 NPTF
3S	-6 SAE
4N	.50 – 14 NPTF
4S	-8 SAE
6N	.75 – 14 NPTF
6S	-12 SAE

Code	Description
Omit	Bottom
A	Side

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

Mounting Bolt Kits

UNC Bolt Kits for use with D1V Directional Control Valves & Sandwich Valves (D1V*-91 Design, Solenoid Operated)

	Number of Sandwich Valves @ 1.58" (40mm) thickness				
	0	1	2	3	4
D1V-91	BK209 1.25"	BK243 2.88"	BK225 4.38"	BK244 6.00"	BK245 7.50"
D1V-91 Plus Tapping Plate	BK176 2.25"	BK56 3.81"	BK212 5.38"	BK107 7.00"	BK106 8.50"

Note: All bolts are SAE grade 8, 10-24 UNC-2A thread, torque to 5.6 N.m. (50 in.-lbs.)

Mounting Hardware supplied with subplate includes:

Subplates	Mounting Hardware	Qty.
SPD22N** SPD23N** SPD23S**	.25-20 UNC x .88 LG. SHCS	2
SPD24N** SPD24S**	.25-20 UNC x 1.5 LG. SHCS	2
SPD26N* SPD26S*	.38-16 UNC x 1.50 LG. SHCS	2
SPD26NA* SPD26SA*	.38-16 UNC x 1.75 LG. SHCS	2

Valve mounting threads:
#10-24 UNC x 0.63 DP.
Used for SAE and NPTF ports.
Metric M5-0.8mm ISO 6H x 16 DP.
Used for BSPP, BSPT and ISO ports.

Series D1V Manifolds

SP Manifold

☐ Number of Stations

Code	Description
1	No. of Stations
2	No. of Stations
3	No. of Stations
4	No. of Stations
5	No. of Stations
6	No. of Stations
7	No. of Stations
8	No. of Stations

D2 Valve Model

Code	Description
D2*	NFPA D03, NG6, CETOP3

* Consult factory for D03 manifolds requiring pilot ports with D1VP.

☐ Port Size and Thread Type

Code	Description	Port Size P & T	Port Size A & B	Port Size Gage
N*	NPTF	.50	.38	.25
S**	SAE	-10	-8	-6

* 0.25-18 NPTF gage port plug included.

** -6 SAE gage port plug included.

☐ Material

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

35 Design Series

Required when ordering.

Note: 35 Design Series manifolds conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

Mounting Bolt Kits

UNC Bolt Kits for use with D1V Directional Control Valves & Sandwich (D1V*-91 Design, Solenoid Operated)					
	Number of Sandwich @ 1.58" (40mm) thickness				
	0	1	2	3	4
D1V-91	BK209 1.25"	BK243 2.88"	BK225 4.38"	BK244 6.00"	BK245 7.50"
D1V-91 Plus Tapping Plate	BK176 2.25"	BK56 3.81"	BK212 5.38"	BK107 7.00"	BK106 8.50"

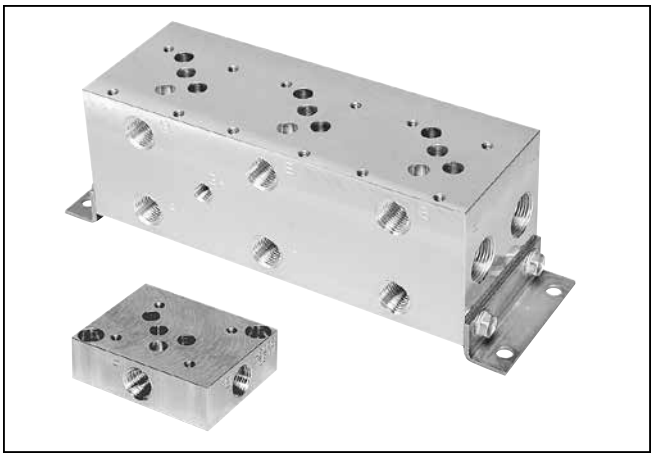
Note: All bolts are SAE grade 8, 10-24 UNC-2A thread, torque to 5.6 N.m. (50 in.-lbs.)

Mounting hardware supplied with manifold includes:
(2) steel brackets
For SAE and NPTF ports: (8) 5/16-18 UNC x .63 hex washer cap screws.
Valve mounting threads:
#10-24 UNC x 0.63 DP. Used for SAE and NPTF ports.

No. Stations	1	2	3	4	5	6	7	8
Wgt., Alum, kg (lbs.)	1.4 (3)	1.8 (4)	2.7 (6)	3.6 (8)	4.1 (9)	5.0 (11)	5.4 (12)	6.4 (14)
Wgt., Iron, kg (lbs.)	2.3 (5)	4.1 (9)	5.9 (13)	7.7 (17)	9.5 (21)	11.8 (26)	13.6 (30)	15.4 (34)

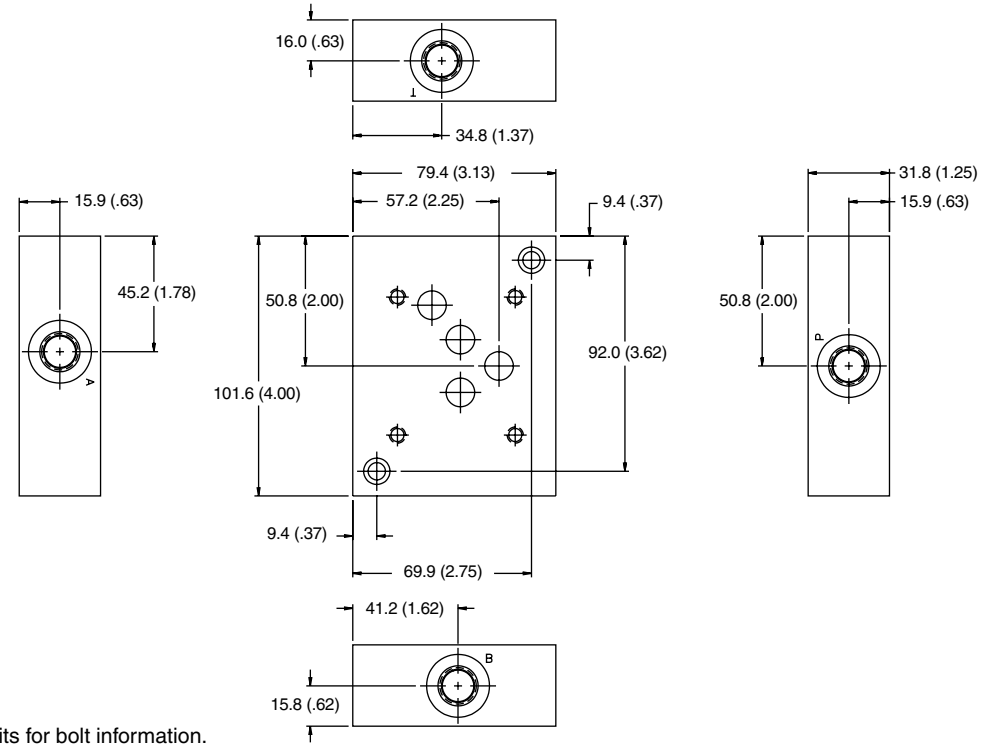
Features

- **Aluminum or steel available** — Flexibility for applying to different system pressures.
- **NPT and SAE thread options available** — Flexibility to plumb into existing systems.
- **Multiple port sizes available** — Eliminates need for reducers and expander at subplate connection.



Side Ported Subplate — NFPA D05

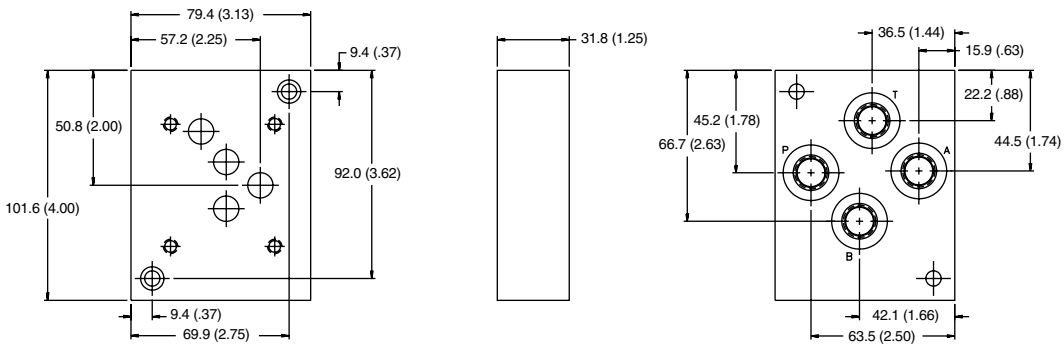
Inch equivalents for millimeter dimensions are shown in (**)



See Mounting Bolt Kits for bolt information.

Bottom Ported Subplate — NFPA D05

Inch equivalents for millimeter dimensions are shown in (**)



See Mounting Bolt Kits for bolt information.

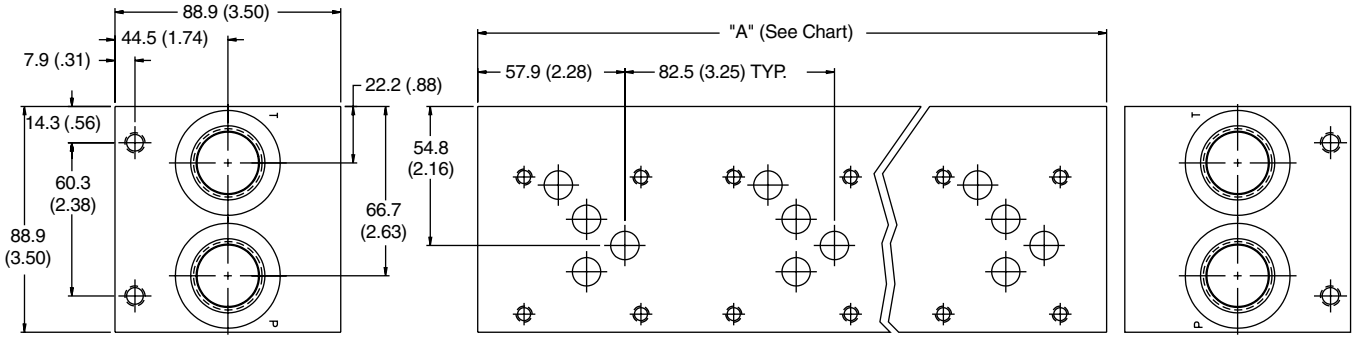
Subplate-Manifold.indd, dd

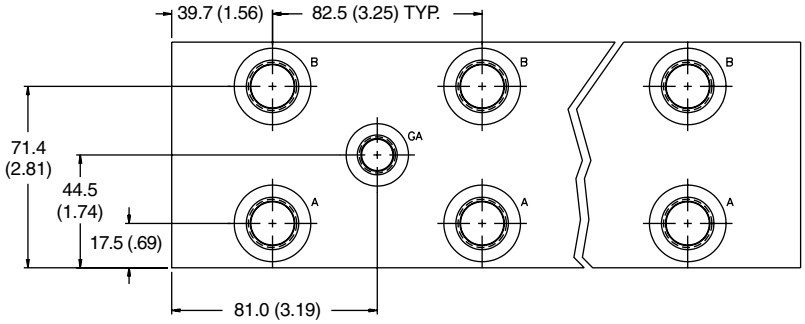
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

C

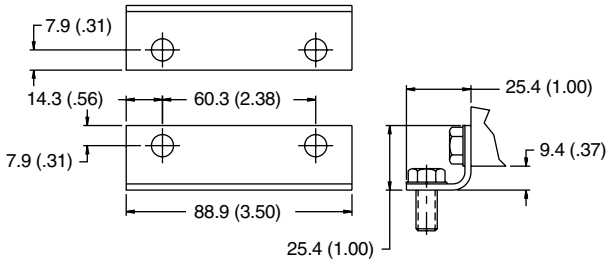
Series D3A, D3DW, D3L and D3W Manifold — NFPA D05

Inch equivalents for millimeter dimensions are shown in (**)





Note: Gage port not available on single station manifold.



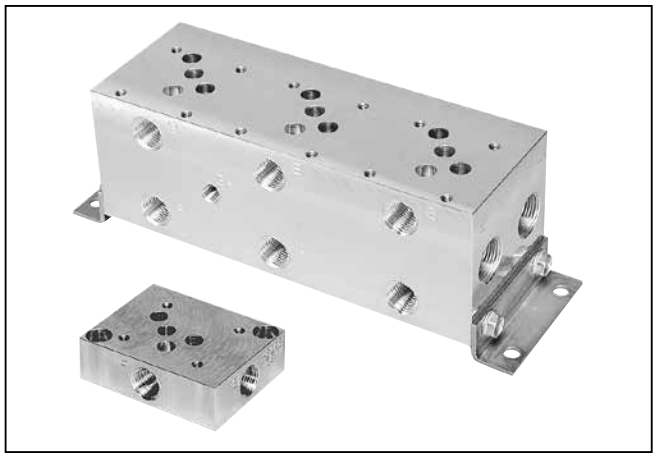
Mounting Hardware
(See Ordering Information for Mounting Hardware details)

No. Stations	1	2	3	4	5	6
"A" Length, mm (in)	82.6 (3.25)	165.1 (6.50)	247.7 (9.75)	330.2 (13.00)	412.8 (16.25)	495.3 (19.50)
Weight, Alum. kg (lbs.)	1.8 (4)	3.6 (8)	5.0 (11)	6.4 (14)	7.9 (17)	9.6 (21)
Weight, Iron kg (lbs.)	4.1 (9)	7.7 (17)	11.8 (26)	15.4 (34)	20.1 (43)	23.3 (51)

See Mounting Bolt Kits for bolt information.

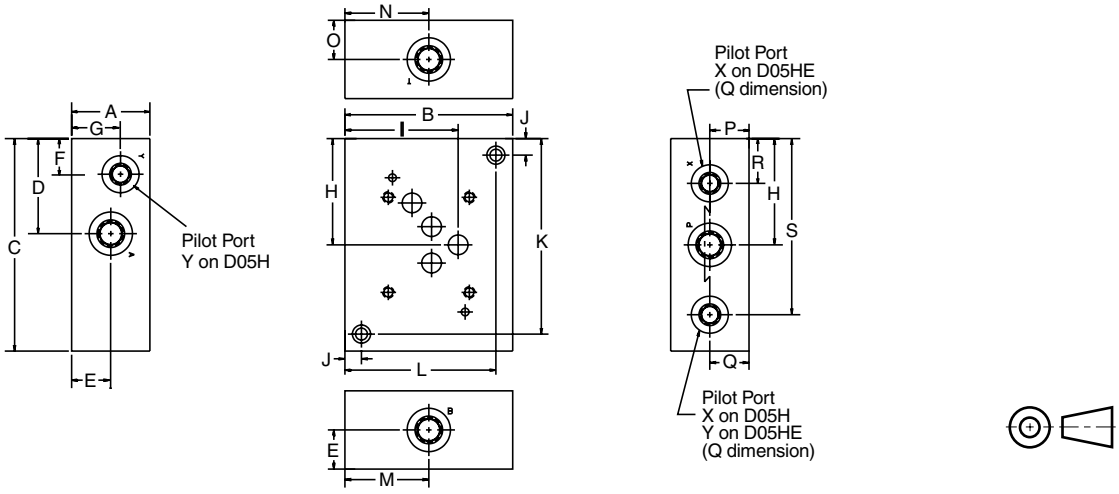
Features

- **Aluminum or steel available** — Flexibility for applying to different system pressures.
- **NPT and SAE thread options available** — Flexibility to plumb into existing systems.
- **Multiple port sizes available** — Eliminates need for reducers and expander at subplate connection.
- **Parallel or series circuit applications** — Flexibility for different circuits.



Side Ported Subplate — NFPA D05, D05H and D05HE

Inch equivalents for millimeter dimensions are shown in (**)



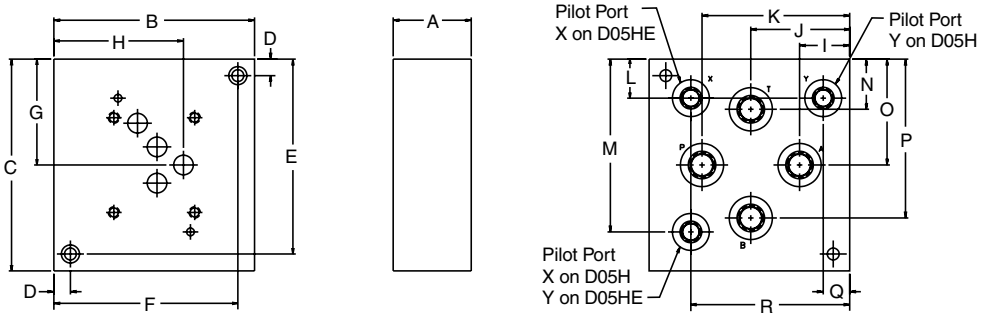
Dimensions	A	B	C	D	E	F *	G*	H	I	J	K	L	M	N	O	P	Q *	R *	S *
SPD31V**A*	44.5 (1.75)	95.3 (3.75)	120.7 (4.75)	54.1 (2.13)	22.4 (0.88)	20.6 (0.81)	22.4 (0.88)	60.2 (2.37)	64.3 (2.53)	9.7 (0.38)	111.0 (4.37)	85.9 (3.38)	47.8 (1.88)	47.8 (1.88)	22.4 (0.88)	22.4 (0.88)	22.4 (0.88)	— —	100.1 (3.94)
SPD31D**A*	44.5 (1.75)	95.3 (3.75)	120.7 (4.75)	54.1 (2.13)	22.4 (0.88)	— —	— —	60.2 (2.37)	64.3 (2.53)	9.7 (0.38)	111.0 (4.37)	85.9 (3.38)	47.8 (1.88)	47.8 (1.88)	22.4 (0.88)	22.4 (0.88)	11.2 (0.44)	25.4 (1.00)	100.1 (3.94)

See Mounting Bolt Kits for bolt information.

* Not available with high flow option.

Bottom Ported Subplate — NFPA D05, D05H and D05HE

Inch equivalents for millimeter dimensions are shown in (**)



Dimension	A	B	C	D	E	F	G	H	I	J	K	L *	M *	N	O	P	Q *	R *
SPD31V***	44.5 (1.75)	114.3 (4.50)	120.7 (4.75)	9.7 (0.38)	111.3 (4.38)	104.9 (4.13)	60.2 (2.37)	73.9 (2.91)	28.4 (1.12)	56.4 (2.22)	84.1 (3.31)	22.4 (0.88)	98.6 (3.88)	28.7 (1.13)	60.5 (2.38)	90.4 (3.56)	15.0 (0.59)	90.4 (3.56)
SPD31D***	44.5 (1.75)	114.3 (4.50)	120.7 (4.75)	9.7 (0.38)	111.3 (4.38)	104.9 (4.13)	60.2 (2.37)	73.9 (2.91)	28.4 (1.12)	56.4 (2.22)	84.1 (3.31)	20.6 (0.81)	100.1 (3.94)	28.7 (1.13)	60.5 (2.38)	90.4 (3.56)	— —	88.9 (3.50)

See Mounting Bolt Kits for bolt information.

* Not available with high flow option.

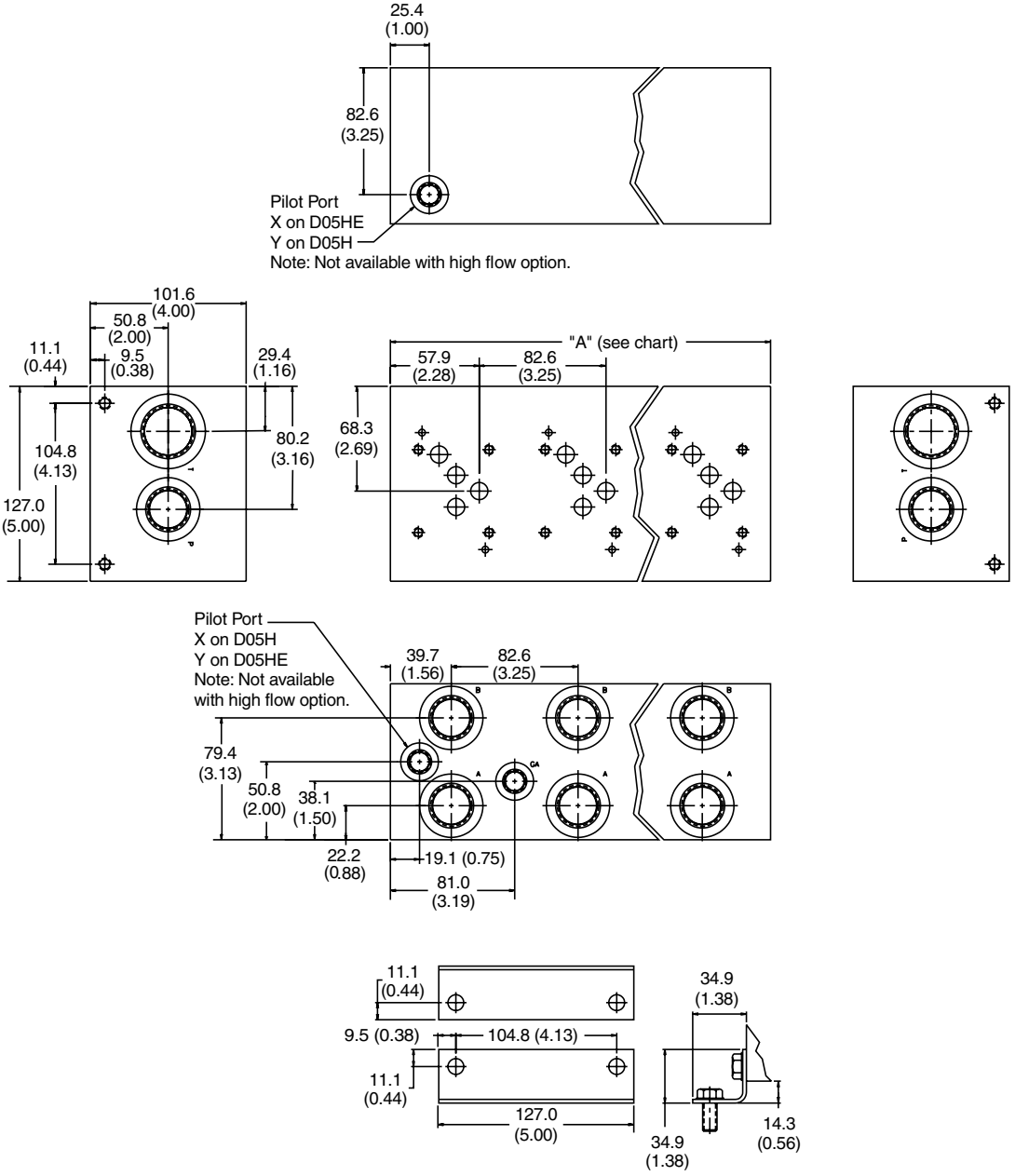
Subplate-Manifold.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

C

Series D3P and High Flow Manifold — NFPA D05, D05H and D05HE

Inch equivalents for millimeter dimensions are shown in (**)



Mounting Hardware
(See Ordering Information for Mounting Hardware details)

No. of Stations	1	2	3	4	5	6
"A" Length mm (inch)	82.6 (3.25)	165.1 (6.50)	247.7 (9.75)	330.2 (13.00)	412.8 (16.25)	495.3 (19.50)
Weight Alum. kg (lbs.)	15.4 (7.00)	26.5 (12.00)	37.5 (17.00)	48.5 (22.00)	59.5 (27.00)	72.8 (33.00)
Weight Iron kg (lbs.)	41.9 (19.00)	83.8 (38.00)	125.7 (57.00)	165.4 (75.00)	187.4 (85.00)	249.2 (113.00)

See Mounting Bolt Kits for bolt information.

Series D3 and D31 Subplates

SP — Subplate

□ — Valve Model

Code	Description
D3	NFPA D05, CETOP5
D31V	NFPA D05H
D31D	NFPA D05HE, NG10, CETPOP5H

D31 manifolds come standard with high flow capability. For flows over 20 GPM use D31V or D31D subplate. It will have X and Y ports.

□ — Port Size and Thread Type

Code	Description
# 3N	.38 – 18 NPTF
# 4N	.50 – 14 NPTF
# 4S	-8 SAE
* 6N	.75 – 14 NPTF
* 6S	-12 SAE

\# Sizes 3* and 4* ports available on SPD3 (NFPA D05) only.

* Size 6* port available on SPD31 (NFPA D05H and D05HE) only.

□ — Port Location

Code	Description
Omit	Bottom
A	Side

□ — Material

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

35 — Design Series

Required when ordering.

Mounting Hardware supplied with subplate includes:

Subplates	Mounting Hardware	Qty.
SPD33N** SPD34N** SPD34S**	.38-16 UNC x 1.25 LG. SHCS	2
SPD31*6N** SPD31*6S** SPD3H6N** SPD3H6S**	.38-16 UNC x 1.75 LG. SHCS	2

Valve mounting threads:
0.25-20 UNC x 0.75 DP.
Used for SAE and NPTF ports.

Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

Mounting Bolt Kits

UNC Bolt Kits for use with D3W, D3, D31VW, D31DW Directional Control Valves & Sandwich Valves				
	Number of Sandwich Valves @2.00" (50mm) thickness			
	0	1	2	3
D3-32, D31VW-91, D31DW-91, D3P	BK98 1.625"	BK141 3.50"	BK142 5.50"	BK143 7.50"
D3-32, D31VW-91, D31DW-91, D3P plus tapping plate	BK166 2.50"	BK167 4.50"	BK168 6.50"	BK169 8.50"

Note: All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 N.m. (12 ft.-lbs.)

Series D3 Manifolds

SP	☐	D3	☐	☐	☐	35
Manifold	Number of Stations	Valve Model	Flow Option	Port Size and Thread Type	Material	Design Series

Required when ordering.

C

Code	Description
1	No. of Stations
2	No. of Stations
3	No. of Stations
4	No. of Stations
5	No. of Stations
6	No. of Stations

Code	Description
D3	NFPA D05, NG10, CETOP5

Code	Description
Omit	Standard Less than 76 LPM (20 GPM)
H*	High Flow Greater than 76 LPM (20 GPM)

*Only available with D3 (D05) model

		Port Size		
Code	Description	P & T	A & B	Gage
N*	NPTF	.75	.50	.25
S**	SAE	-12	-8	-6

* 0.25-18 NPTF gage port plug included.

** -6 SAE gage port plug included.

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

Mounting hardware supplied with manifold includes:
(2) steel brackets
For SAE and NPTF ports:
(8) 5/16-18 UNC x .63 hex washer cap screws

Valve mounting threads:
0.25-20 UNC x 0.75 DP.
Used for SAE and NPTF ports.

Note: 35 Design Series manifolds conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

No. Stations	1	2	3	4	5	6
Wgt., Alum, kg (lbs.)	1.8 (4)	3.7 (8)	5.0 (11)	6.4 (14)	7.8 (17)	9.6 (21)
Wgt., Iron, kg (lbs.)	4.1 (9)	7.8 (17)	11.9 (26)	15.6 (34)	19.7 (43)	23.3 (51)

Mounting Bolt Kits

UNC Bolt Kits for use with D3W and D3 Directional Control Valves & Sandwich Valves				
	Number of Sandwich Valves @2.00" (50mm) thickness			
	0	1	2	3
D3-32	BK98 1.625"	BK141 3.50"	BK142 5.50"	BK143 7.50"
D3-32 plus tapping plate	BK166 2.50"	BK167 4.50"	BK168 6.50"	BK169 8.50"

Note: All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 N.m. (12 ft.-lbs.)

Series D31 and D3P Manifolds

SP					35
Manifold	Number of Stations	Valve Model	Port Size and Thread Type	Material	Design Series
					Required when ordering.

Code	Description
1	No. of Stations
2	No. of Stations
3	No. of Stations
4	No. of Stations
5	No. of Stations
6	No. of Stations

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

Code	Description
D31V	NFPA D05H, D3P
D31D	NFPA D05HE, NG10, CETOP5H

D31 manifolds come standard with high flow capability.

		Port Size			
Code	Description	P , A, B	T	X, Y	Gage
N*	NPTF	.75	1.00	.38	.25
S**	SAE	-12	-16	-6	-6

* 0.25-18 NPTF gage port plug included.

** -6 SAE gage port plug included.

Mounting hardware supplied with manifold includes:
(2) steel brackets
For SAE and NPTF ports:
(8) 3/8-16 UNC x .88 HHCS
and (8) .38 SAE N series washers
Valve mounting threads:
0.25-20 UNC x 0.75 DP.
Used for SAE and NPTF ports.

Note: 35 Design Series manifolds conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

No. Stations	1	2	3	4	5	6
Wgt., Alum, kg (lbs.)	3.2 (7)	5.5 (12)	7.8 (17)	10.1 (22)	12.3 (27)	15.1 (33)
Wgt., Iron, kg (lbs.)	8.7 (19)	17.4 (38)	26.1 (57)	34.3 (75)	38.9 (85)	51.7 (113)

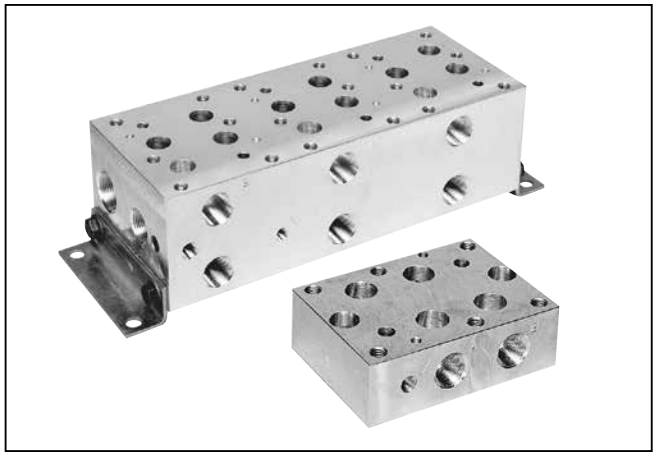
Mounting Bolt Kits

UNC Bolt Kits for use with D3P, D31VW and D31DW Directional Control Valves & Sandwich Valves (D31V*-91 Design, Solenoid Operated)				
	Number of Sandwich Valves @ 2.00" (50mm) thickness			
	0	1	2	3
D31VW-91, D3P D31DW-91	BK98 1.625"	BK141 3.50"	BK142 5.50"	BK143 7.50"
D31VW-91, D3P D31DW-91 plus tapping plate	BK166 2.50"	BK167 4.50"	BK168 6.50"	BK169 8.50"

Note: All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 N.m. (12 ft.-lbs.)

Features

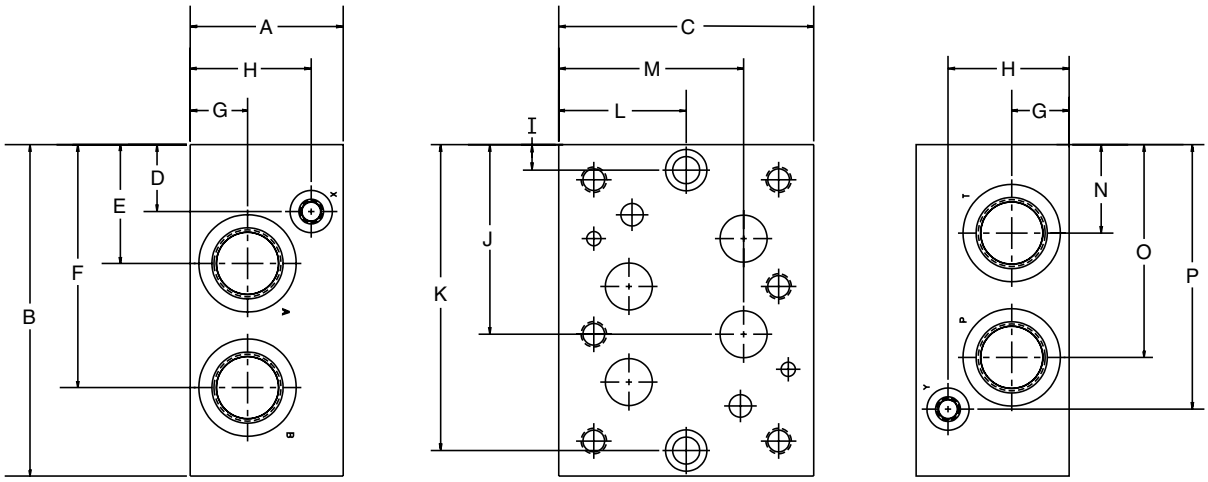
- **Aluminum or steel available** — Flexibility for applying to different system pressures.
- **NPT and SAE thread options available** — Flexibility to plumb into existing systems.
- **Multiple port sizes available** — Eliminates need for reducers and expander at subplate connection.



C

Side Ported Subplate — NFPA D08

Inch equivalents for millimeter dimensions are shown in (**)

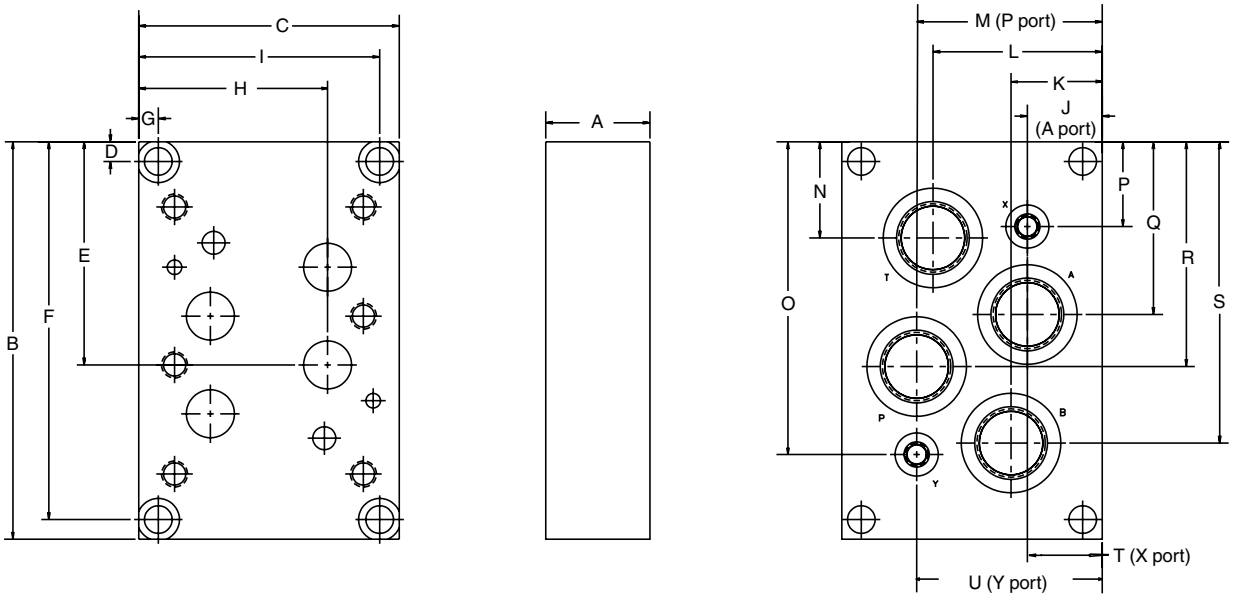


Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
SPD68*A* SPD66NA*	50.8 (2.00)	155.7 (6.13)	114.3 (4.50)	30.2 (1.19)	64.3 (2.53)	115.1 (4.53)	25.4 (1.00)	25.4 (1.00)	12.7 (0.50)	89.7 (3.53)	142.7 (5.62)	57.2 (2.25)	85.9 (3.38)	40.4 (1.59)	91.2 (3.59)	125.5 (4.94)
SPD610*A*	76.2 (3.00)	165.1 (6.50)	127.0 (5.00)	33.3 (1.31)	59.2 (2.33)	121.2 (4.77)	28.7 (1.13)	60.5 (2.38)	12.7 (0.50)	94.5 (3.72)	152.4 (6.00)	63.5 (2.50)	92.2 (3.63)	43.9 (1.73)	105.9 (4.17)	131.8 (5.19)

See Mounting Bolt Kits for bolt information.

Series D6 and D8
Bottom Ported Subplate — NFPA D08

Inch equivalents for millimeter dimensions are shown in (**)

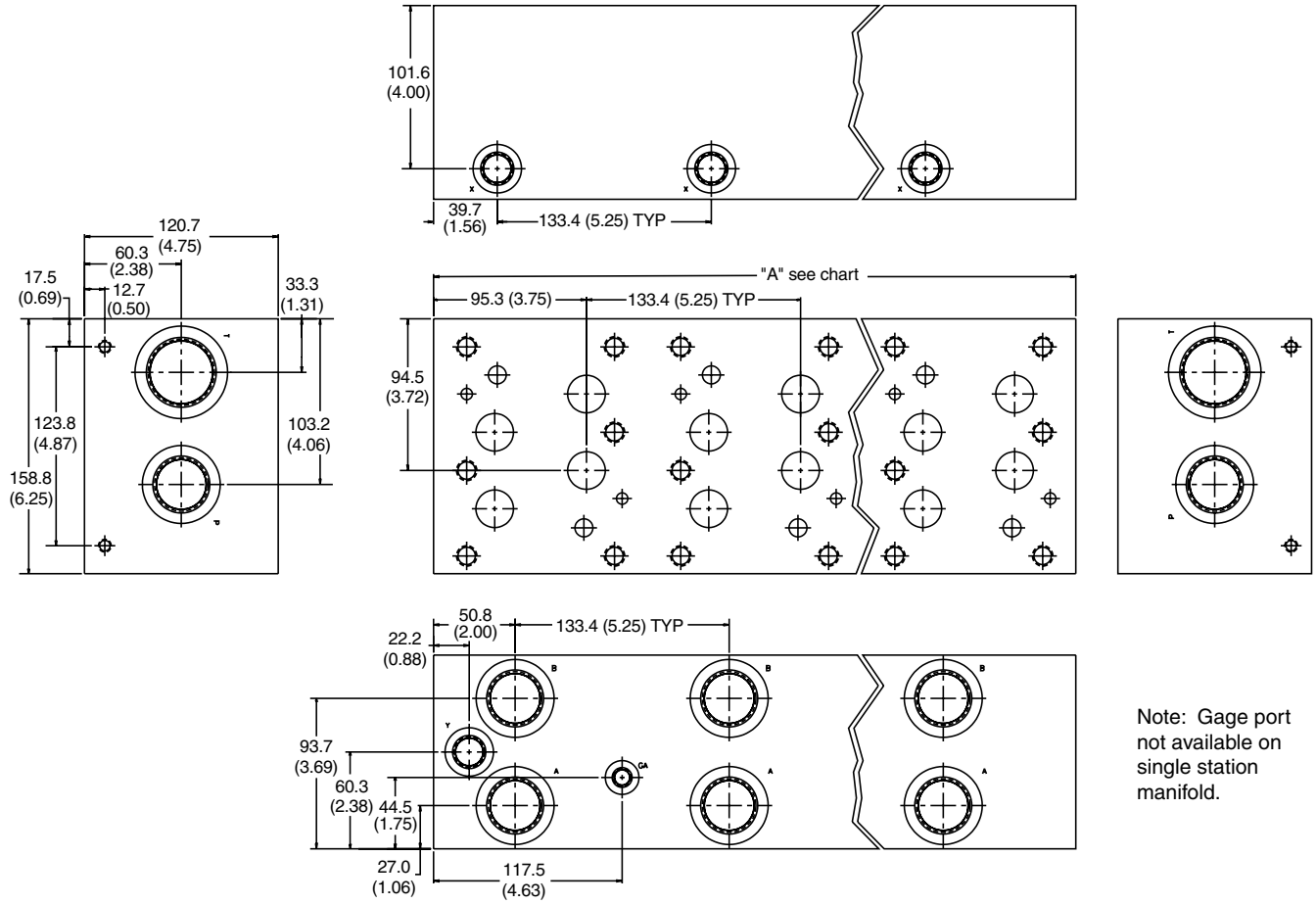


Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SPD68**	38.1	155.7	117.6	12.7	89.7	142.7	58.7	87.4	—	30.2	30.2	87.4	87.4	42.2	125.5	30.2	65.8	89.7	113.5	31.8	85.9
SPD66N*	(1.50)	(6.13)	(4.63)	(0.50)	(3.53)	(5.62)	(2.31)	(3.44)	—	(1.19)	(1.19)	(3.44)	(3.44)	(1.66)	(4.94)	(1.19)	(2.59)	(3.53)	(4.47)	(1.25)	(3.38)
SPD610**	50.8	193.8	127.0	9.7	108.7	184.2	9.7	92.2	117.6	36.6	44.5	82.6	90.4	46.7	152.4	41.4	84.1	109.5	146.8	36.6	90.4
	(2.00)	(7.63)	(5.00)	(0.38)	(4.28)	(7.25)	(0.38)	(3.63)	(4.63)	(1.44)	(1.75)	(3.25)	(3.56)	(1.84)	(6.00)	(1.63)	(3.31)	(4.31)	(5.78)	(1.44)	(3.56)

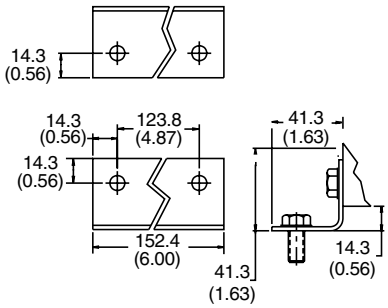
See Mounting Bolt Kits for bolt information.

Series D6 and D8
Manifold — NFPA D08

Inch equivalents for millimeter dimensions are shown in (**)



Note: Gage port not available on single station manifold.



Mounting Hardware
(See Ordering Information for Mounting Hardware details)

No. of Stations	1	2	3	4	5
"A" Length mm (inch)	133.35 (5.25)	266.7 (10.50)	400.05 (15.75)	533.4 (21.00)	666.75 (26.25)
Weight Alum. kg (lbs.)	5 (12)	11 (24)	16 (35)	22 (49)	28 (61)
Weight Iron kg (lbs.)	20 (45)	41 (90)	62 (136)	82 (181)	103 (226)

See Mounting Bolt Kits for bolt information.

Series D6 and D8 Subplates

SP	D6	☐	☐	☐	35
Subplate	Valve Model	Port Size and Thread Type	Port Location	Material	Design Series

Required when ordering.

Code	Description
D6	NFPA D08, NG25, CETOP8

Code	Description
6N	.75 - 14 NPTF
8N	1.00 - 11.5 NPTF
8S	-16 SAE
10N	1.25 - 11.5 NPTF
10S	-20 SAE

Code	Description
Omit	Bottom
A	Side

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

Mounting Hardware supplied with subplate includes:

Subplates	Mounting Hardware	Qty.
SPD66NA* SPD68NA* SPD68SA*	.50-13 UNC x 1.75 LG. SHCS	2
SPD610NA* SPD610SA*	.50-13 UNC x 3.00 LG. SHCS	2
SPD66N* SPD68N* SPD68S*	.50-13 UNC x 1.50 LG. SHCS	2
SPD610N* SPD610S*	.38-16 UNC x 2.00 LG. SHCS	4

Valve mounting threads:
0.50-13 UNC x 1.19 DP.
Used for SAE and NPTF ports.

Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

Mounting Bolt Kits

UNC Bolt Kits for use with D6 and D8 Directional Control Valves & Sandwich Valves				
	Number of Sandwich Valves @ 2.75" (70mm) thickness			
	0	1	2	3
D6	BK227 2.50"	BK121 5.25"	BK122 8.00"	BK123 10.75"
D6 plus tapping plate	BK161 3.50"	BK170 6.25"	BK171 9.00"	BK172 11.75"
D8	BK228 3.00"	BK131 5.75"	BK132 8.50"	BK133 11.25"
D8 plus tapping plate	BK173 4.00"	BK174 6.75"	BK175 9.50"	BK114 12.125"

Note: All bolts are SAE grade 8, 1/2-13 UNC-3A thread, torque to 133 N.m. (100 ft.-lbs.)

Series D6 and D8 Manifolds

SP	☐	D6	☐	☐	35
Manifold	Number of Stations	Valve Model	Port Size and Thread Type	Material	Design Series

Design Series: Required when ordering.

Code	Description
1	No. of Stations
2	No. of Stations
3	No. of Stations
4	No. of Stations
5	No. of Stations

Code	Description
D6	NFPA D08, NG25, CETOP8

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

		Port Size				
Code	Description	P, A, B	T	Y	X (opt.)	Gage
N*	NPTF	1.00	1.25	.38	.25	.25
S**	SAE	-16	-20	-8	-4	-6

* 0.25-18 NPT gage port plug included.
** -6 SAE gage port plug included.

Mounting hardware supplied with manifold includes:
(2) steel brackets
For SAE and NPTF ports:
(8) 1/2-13 UNC x 1.00 HHCS
(8) .50 SAE N Series washers

Valve mounting threads:
0.50-13 UNC x 1.19 DP.
Used for SAE and NPTF ports.

Note: 35 Design Series manifolds conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

No. Stations	1	2	3	4	5
Wgt., Alum, kg (lbs.)	5.5 (12)	11.0 (24)	16.0 (35)	22.4 (49)	27.9 (61)
Wgt., Iron, kg (lbs.)	20.6 (45)	41.1 (90)	62.2 (136)	82.7 (181)	103.3 (226)

Mounting Bolt Kits

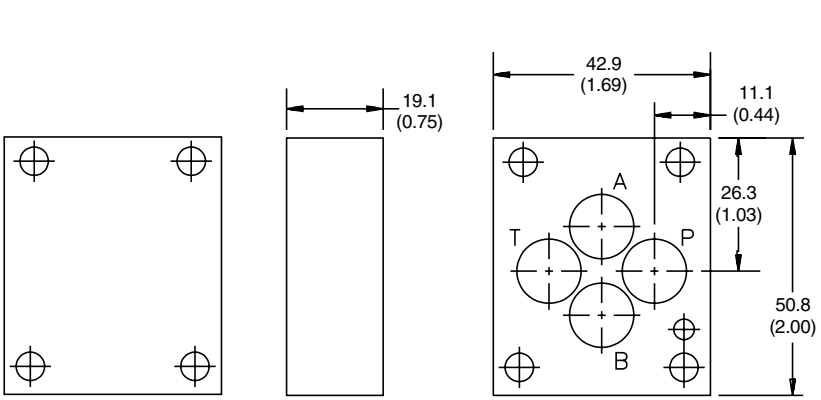
UNC Bolt Kits for use with D6 and D8 Directional Control Valves & Sandwich				
	Number of Sandwich @ 2.75" (70mm) thickness			
	0	1	2	3
D6	BK227 2.50"	BK121 5.25"	BK122 8.00"	BK123 10.75"
D6 plus tapping plate	BK161 3.50"	BK170 6.25"	BK171 9.00"	BK172 11.75"
D8	BK228 3.00"	BK131 5.75"	BK132 8.50"	BK133 11.25"
D8 plus tapping plate	BK173 4.00"	BK174 6.75"	BK175 9.50"	BK114 12.125"

Note: All bolts are SAE grade 8, 1/2-13 UNC-3A thread, torque to 133 N.m. (100 ft.-lbs.)

Dimensions

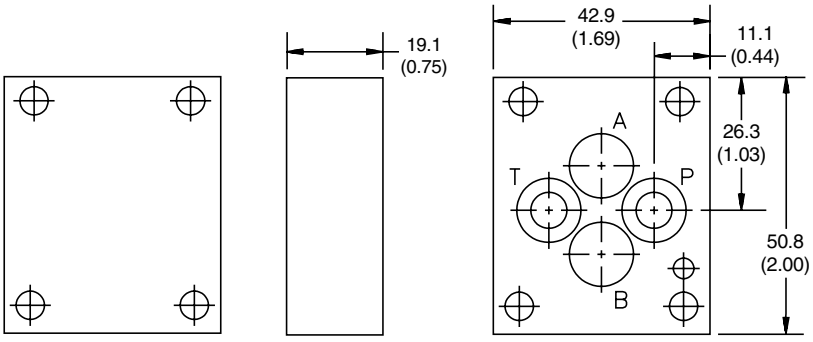
Inch equivalents for millimeter dimensions are shown in (**)

Cover Plate — NFPA D03



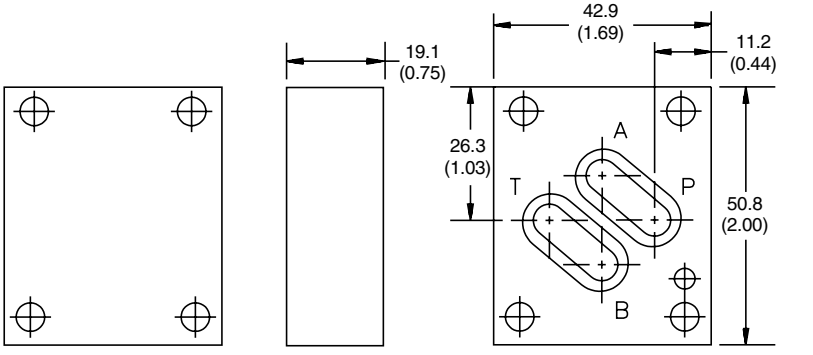
Note:
Mounting hardware supplied with cover plate.
Includes:
2-012V-7 O-ring, Qty. 4
∅0.12 x .25 long locating pin, Qty. 1
10-24 UNC x 1.00 long SHCS, Qty. 4 (SPD2C1EN) or
M5-0.8 x 25 mm long SHCS, Qty. 4 (SPD2C1MN)

Crossover Plate, P→T ports — NFPA D03



Note:
Mounting hardware supplied with crossover plate.
Includes:
2-012V-7 O-ring, Qty. 4
∅0.12 x .25 long locating pin, Qty. 1
10-24 UNC x 1.00 long SHCS, Qty. 4 (SPD2D1EN) or
M5-0.8 x 25 mm long SHCS, Qty. 4 (SPD2D1MN)

Crossover Plate, P→A and B→T ports — NFPA D03



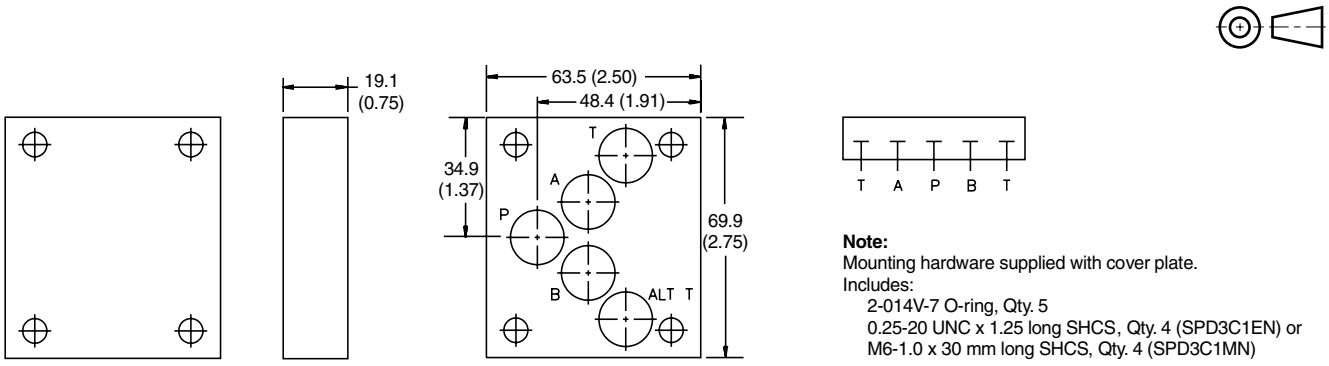
Note:
Mounting hardware supplied with cover plate.
Includes:
2-016V-7 O-ring, Qty. 2
∅0.12 x .25 long locating pin, Qty. 1
10-24 UNC x 1.00 long SHCS, Qty. 4 (SPD2A1EN) or
M5-0.8 x 25 mm long SHCS, Qty. 4 (SPD2A1MN)

C

Dimensions

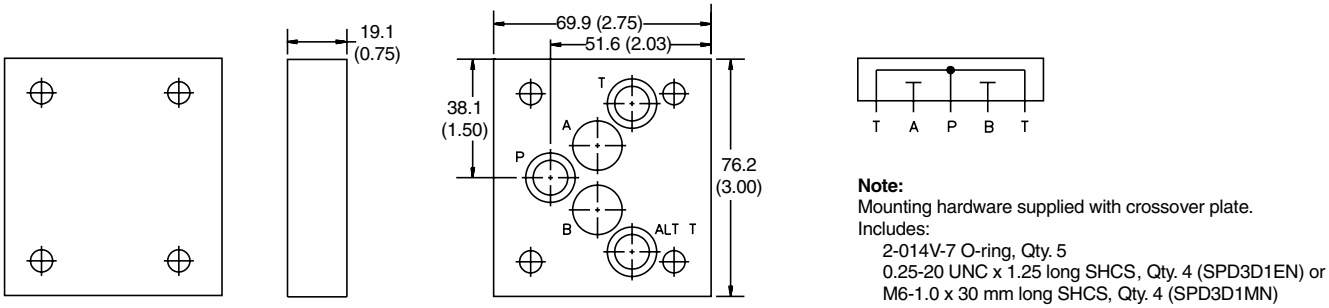
Inch equivalents for millimeter dimensions are shown in (**)

Cover Plate — NFPA D05



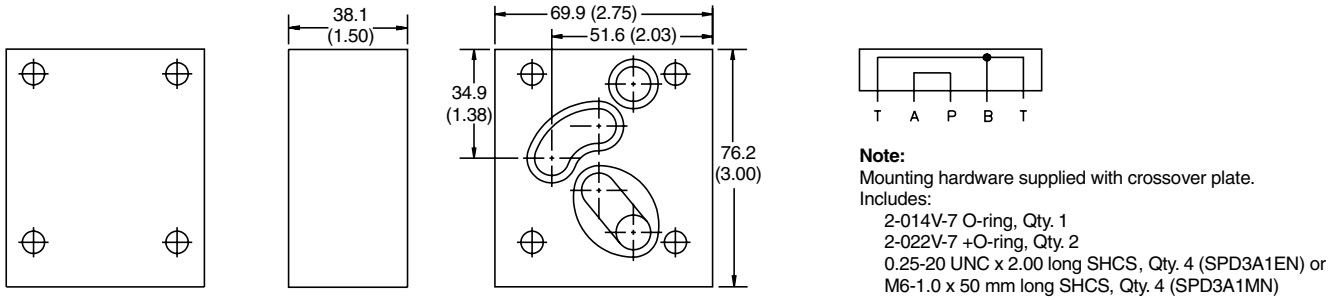
Note:
Mounting hardware supplied with cover plate.
Includes:
2-014V-7 O-ring, Qty. 5
0.25-20 UNC x 1.25 long SHCS, Qty. 4 (SPD3C1EN) or
M6-1.0 x 30 mm long SHCS, Qty. 4 (SPD3C1MN)

Crossover Plate, P→T ports — NFPA D05



Note:
Mounting hardware supplied with crossover plate.
Includes:
2-014V-7 O-ring, Qty. 5
0.25-20 UNC x 1.25 long SHCS, Qty. 4 (SPD3D1EN) or
M6-1.0 x 30 mm long SHCS, Qty. 4 (SPD3D1MN)

Crossover Plate, P→A and B→T ports — NFPA D05

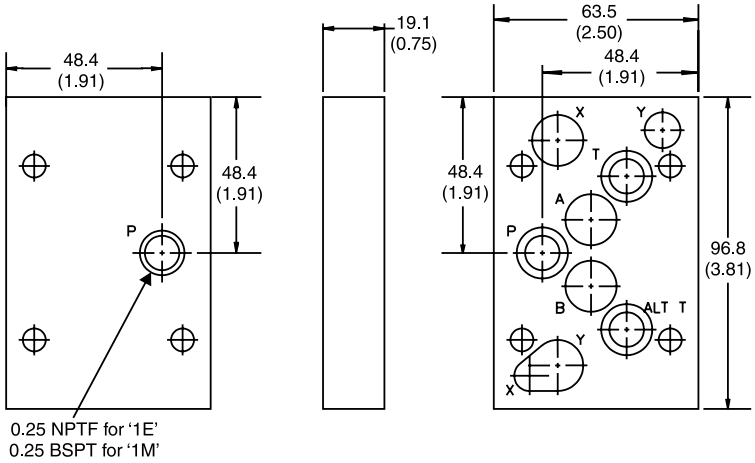


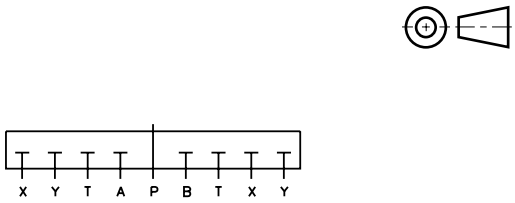
Note:
Mounting hardware supplied with crossover plate.
Includes:
2-014V-7 O-ring, Qty. 1
2-022V-7 +O-ring, Qty. 2
0.25-20 UNC x 2.00 long SHCS, Qty. 4 (SPD3A1EN) or
M6-1.0 x 50 mm long SHCS, Qty. 4 (SPD3A1MN)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

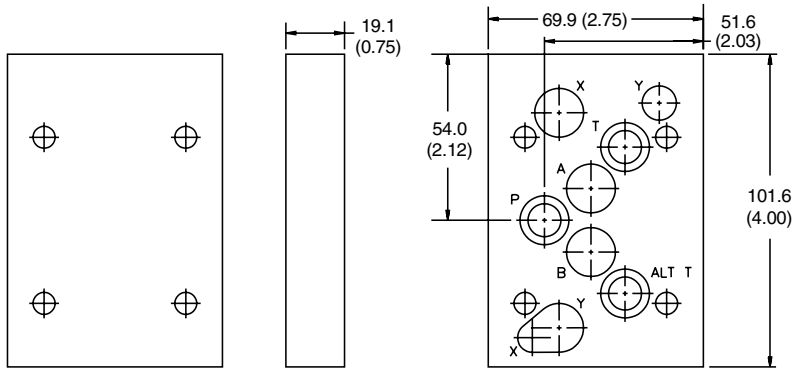
Cover Plate — NFPA D05H

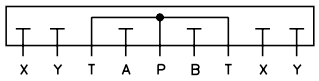




Note:
Mounting hardware supplied with cover plate.
Includes:
- 2-011V-7 O-ring, Qty. 1
- 2-014V-7 O-ring, Qty. 6
- 2-016V-7 O-ring, Qty. 1
- 0.25-18 NPTF plug, Qty. 1 (SPD31VC1EN only)
- 0.25-20 UNC x 1.25 long SHCS, Qty. 4 (SPD31VC1EN) or M6-1.0 x 30 mm long SHCS, Qty. 4 (SPD31VC1MN)

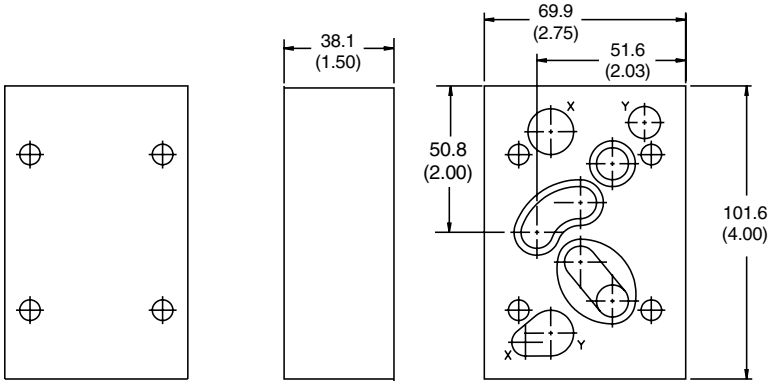
Crossover Plate, P→T ports — NFPA D05H

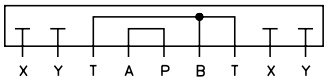




Note:
Mounting hardware supplied with crossover plate.
Includes:
- 2-011V-7 O-ring, Qty. 1
- 2-014V-7 O-ring, Qty. 6
- 2-016V-7 O-ring, Qty. 1
- 0.25-20 UNC x 1.25 long SHCS, Qty. 4 (SPD31VD1EN) or M6-1.0 x 30 mm long SHCS, Qty. 4 (SPD31VD1MN)

Crossover Plate, P→A and B→T ports — NFPA D05H



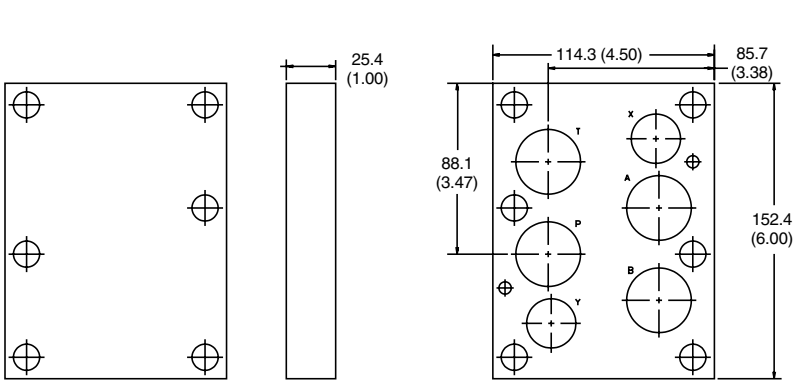


Note:
Mounting hardware supplied with crossover plate.
Includes:
- 2-011V-7 O-ring, Qty. 1
- 2-014V-7 O-ring, Qty. 2
- 2-016V-7 O-ring, Qty. 1
- 2-022V-7 O-ring, Qty. 2
- 0.25-20 UNC x 2.00 long SHCS, Qty. 4 (SPD31VA1EN) or M6-1.0 x 50 mm long SHCS, Qty. 4 (SPD31VA1MN)

C

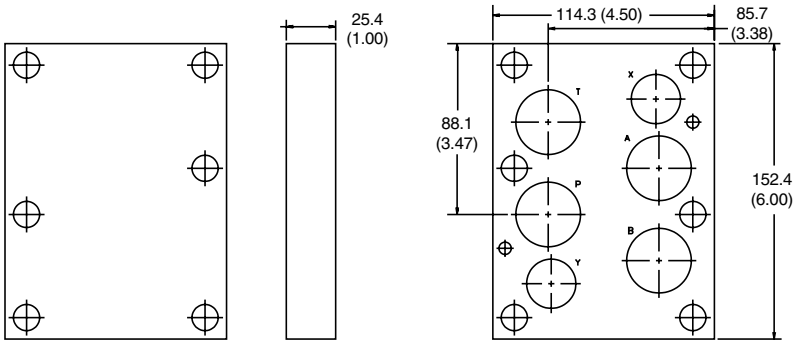
Dimensions
Inch equivalents for millimeter dimensions are shown in (**)

Cover Plate — NFPA D08



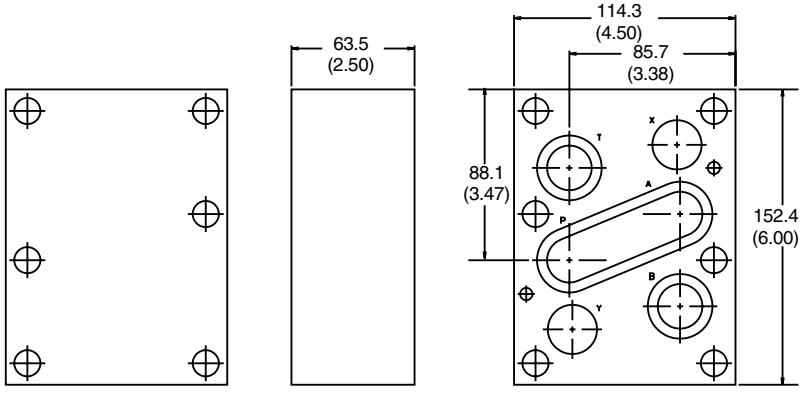
Note:
Mounting hardware supplied with cover plate.
Includes:
2-210V-7 O-ring, Qty. 2
2-215V-7 O-ring, Qty. 4
0.50-13 UNC x 1.75 long SHCS, Qty. 6 (SPD6C1EN) or
M12-1.75 x 45 mm long SHCS, Qty. 6 (SPD6C1MN)
0.25 x 0.50 long locating pins, Qty. 2

Crossover Plate, P→T ports — NFPA D08



Note:
Mounting hardware supplied with cover plate.
Includes:
2-210V-7 O-ring, Qty. 2
2-215V-7 O-ring, Qty. 4
0.50-13 UNC x 1.75 long SHCS, Qty. 6 (SPD6C1EN) or
M12-1.75 x 45 mm long SHCS, Qty. 6 (SPD6C1MN)
0.25 x 0.50 long locating pins, Qty. 2

Crossover Plate, P→A and B→T ports — NFPA D08

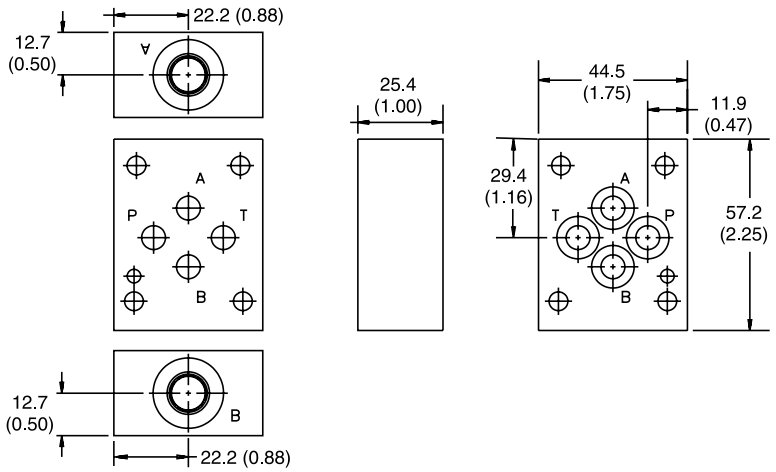


Note:
Mounting hardware supplied with crossover plate.
Includes:
2-210V-7 O-ring, Qty. 2
2-215V-7 O-ring, Qty. 2
2-231V-7 O-ring, Qty. 1
0.50-13 UNC x 3.50 long SHCS, Qty. 6 (SPD6A1EN) or
M12-1.75 x 90 mm long SHCS, Qty. 6 (SPD6A1MN)
0.25 x 0.50 long locating pins, Qty. 2

Dimensions

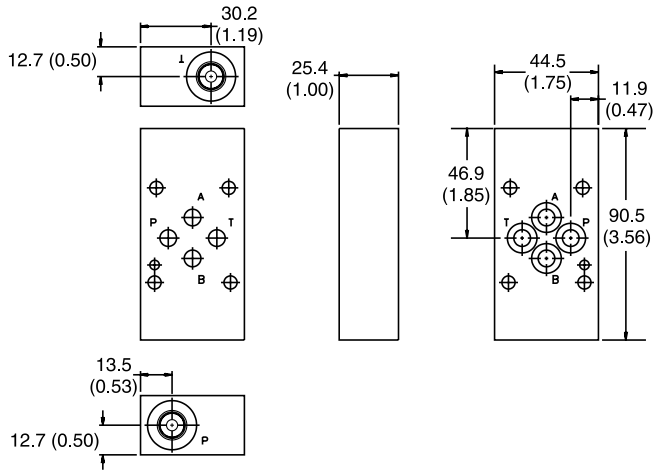
Inch equivalents for millimeter dimensions are shown in (**)

Tapping Plate, A and B ports — NFPA D03



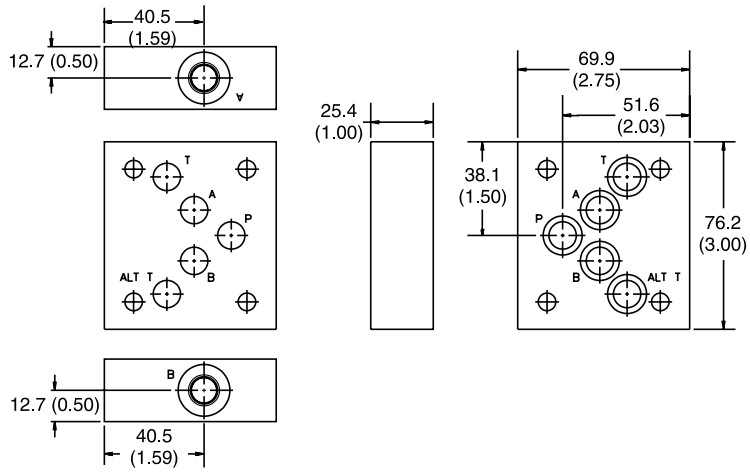
Note:
Interface seal kit provided with tapping plate.
Includes:
2-012V-7 O-ring, Qty. 4
∅0.12 x .25 long locating pin, Qty. 1
0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
-4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

Tapping Plate, P and T ports — NFPA D03



Note:
Interface seal kit provided with tapping plate.
Includes:
2-012V-7 O-ring, Qty. 4
∅0.12 x .25 long locating pin, Qty. 1
0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
-4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

Tapping Plate, A and B ports — NFPA D05



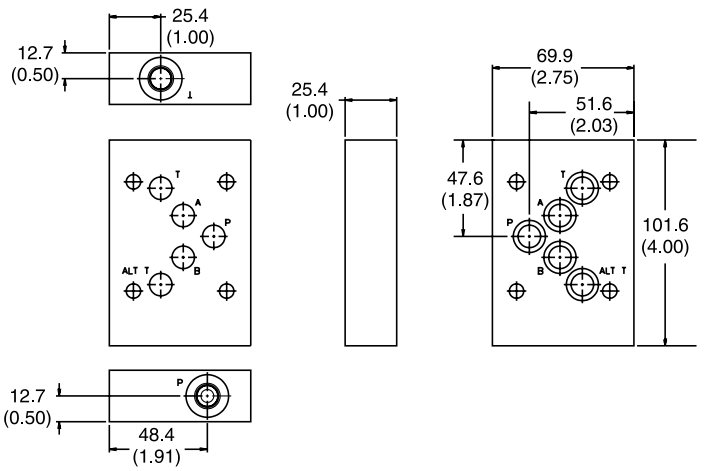
Note:
Interface seal kit provided with tapping plate.
Includes:
2-014V-7 O-ring, Qty. 5
0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
-4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

C

Dimensions

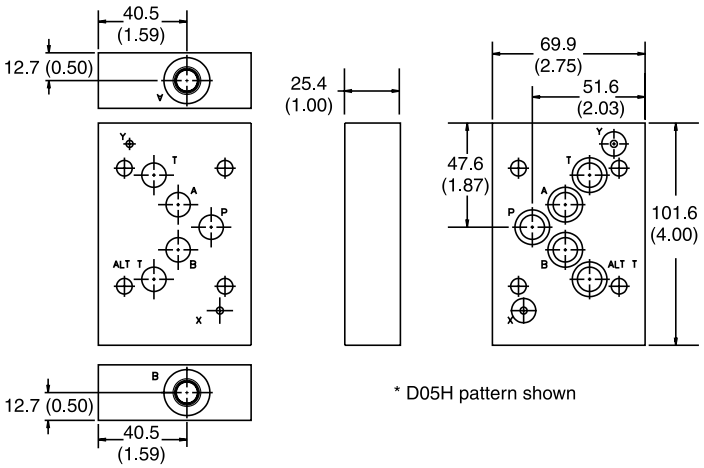
Inch equivalents for millimeter dimensions are shown in (**)

Tapping Plate, P and T ports — NFPA D05



Note:
Interface seal kit provided with tapping plate.
Includes:
2-014V-7 O-ring, Qty. 5
0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
-4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

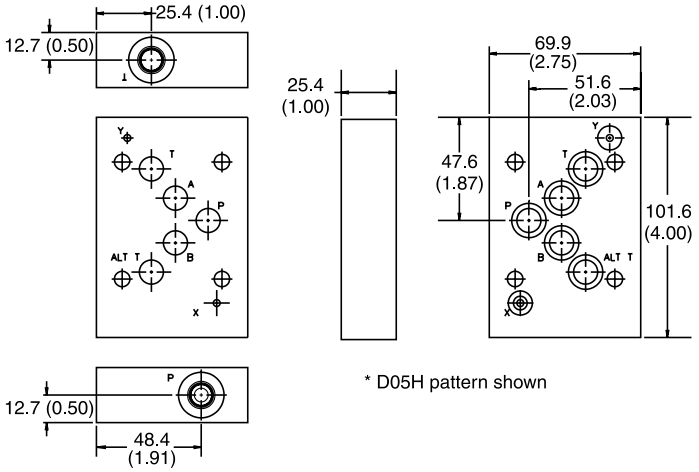
Tapping Plate, A and B ports — NFPA D05H and D05HE (E)



* D05H pattern shown

Note:
Interface seal kit provided with tapping plate.
Includes:
SPD31VT2*W* :
2-011V-7 O-ring, Qty. 2
2-014V-7 O-ring, Qty. 5
SPD31DT2*W*:
2-014V-7 O-ring, Qty. 7
0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
-4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

Tapping Plate, P and T ports — NFPA D05H and D05HE



* D05H pattern shown

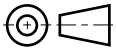
Note:
Interface seal kit provided with tapping plate.
Includes:
SPD31VT2*P*:
2-011V-7 O-ring, Qty. 2
2-014V-7 O-ring, Qty. 5
SPD31DT2*P*:
2-014V-7 O-ring, Qty. 7
0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
-4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

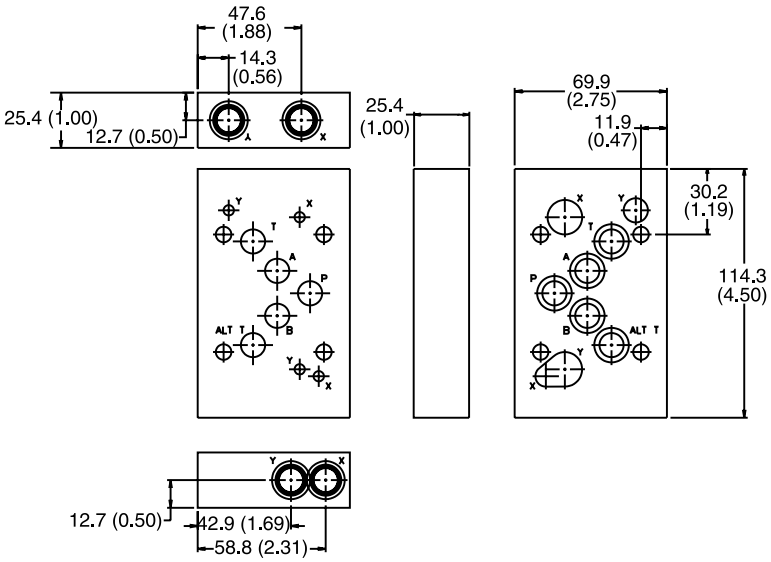
Subplate-Manifold.indd, dd

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

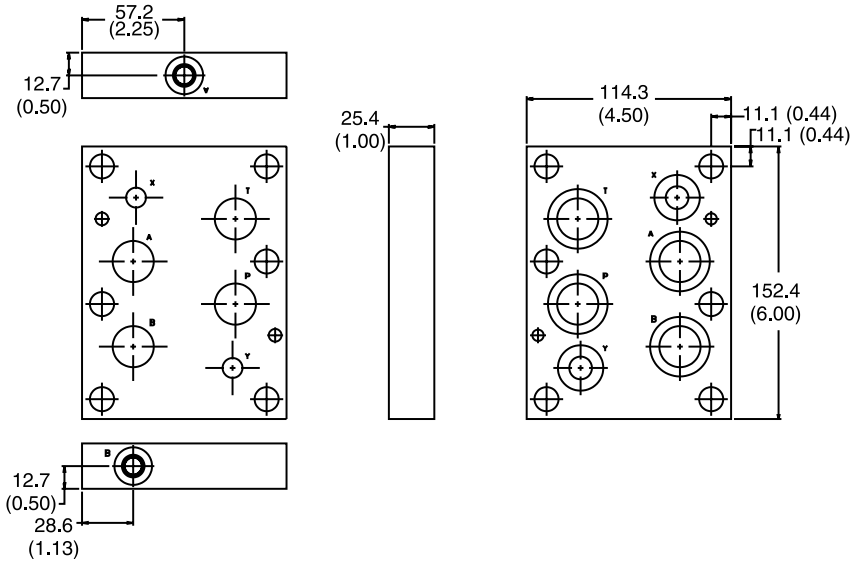
Tapping Plate, X and Y ports — NFPA D05H and D05HE





Note:
Interface seal kit provided with tapping plate.
Includes:
2-011V-7 O-ring, Qty. 1
2-014V-7 O-ring, Qty. 6
2-016V-7 O-ring, Qty. 1
0.25-18 NPTF Plug, Qty. 3 (NPTF port only)
-4 SAE Hex Socket Plug, Qty. 3 (SAE port only)

Tapping Plate, A and B ports — NFPA D08



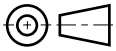
Note:
Interface seal kit provided with tapping plate.
Includes:
2-210V-7 O-ring, Qty. 2
2-215V-7 O-ring, Qty. 4
∅.25 x .50 long locating pin, Qty. 2
0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
-4 SAE Hex Socket Plug, Qty. 1 (SAE port only)

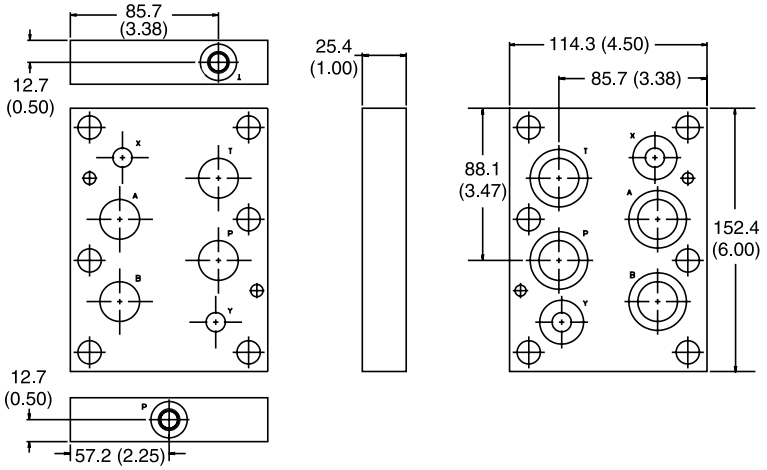
C

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

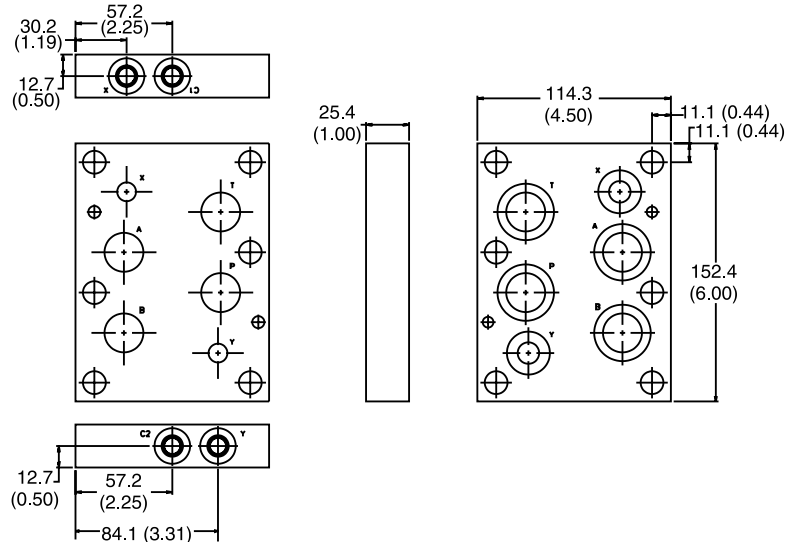
Tapping Plate, P and T ports — NFPA D08





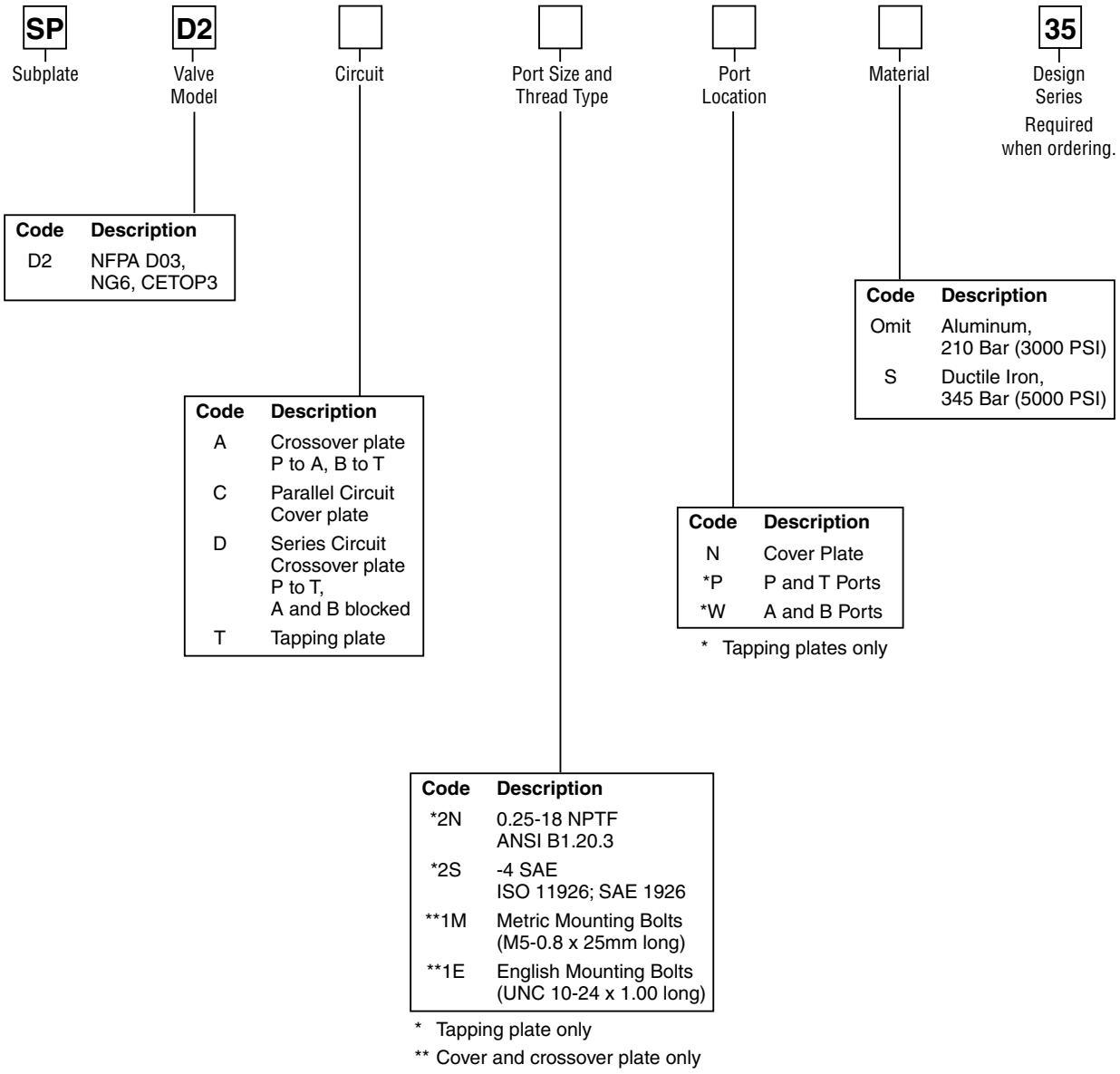
Note:
Interface seal kit provided with tapping plate.
Includes:
- 2-210V-7 O-ring, Qty. 2
- 2-215V-7 O-ring, Qty. 4
- ∅.25 x .50 long locating pin, Qty. 2
- 0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
- -4 SAE Hex Socket Plug, Qty. 1 (SAE port only)

Tapping Plate, X and Y ports — NFPA D08



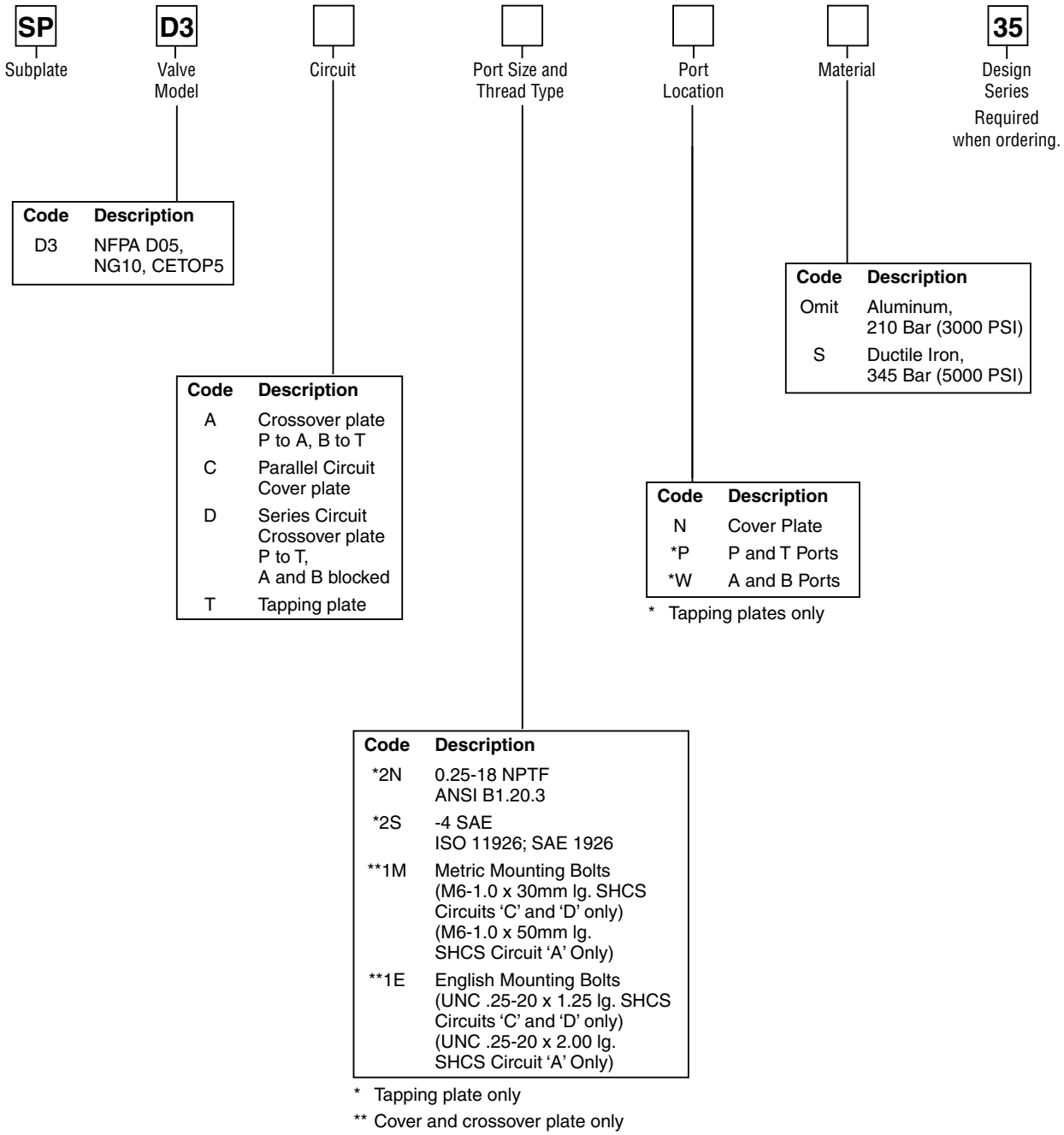
Note:
Interface seal kit provided with tapping plate.
Includes:
- 2-210V-7 O-ring, Qty. 2
- 2-215V-7 O-ring, Qty. 4
- ∅.25 x .50 long locating pin, Qty. 2
- 0.25-18 NPTF Plug, Qty. 3 (NPTF port only)
- -4 SAE Hex Socket Plug, Qty. 3 (SAE port only)

Ordering Information
Series D1V Tapping and Cover Plates



C

Ordering Information
Series D3 Tapping and Cover Plates



Code	Description
D3	NFPA D05, NG10, CETOP5

Code	Description
A	Crossover plate P to A, B to T
C	Parallel Circuit Cover plate
D	Series Circuit Crossover plate P to T, A and B blocked
T	Tapping plate

Code	Description
N	Cover Plate
*P	P and T Ports
*W	A and B Ports

* Tapping plates only

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

Code	Description
*2N	0.25-18 NPTF ANSI B1.20.3
*2S	-4 SAE ISO 11926; SAE 1926
**1M	Metric Mounting Bolts (M6-1.0 x 30mm lg. SHCS Circuits 'C' and 'D' only) (M6-1.0 x 50mm lg. SHCS Circuit 'A' Only)
**1E	English Mounting Bolts (UNC .25-20 x 1.25 lg. SHCS Circuits 'C' and 'D' only) (UNC .25-20 x 2.00 lg. SHCS Circuit 'A' Only)

* Tapping plate only

** Cover and crossover plate only

Ordering Information
Series D31 Tapping and Cover Plates

SP Subplate

☐ Valve Model

Code	Description
D31V	NFPA D05H, D3P
D31D*	NFPA D05HE, NG10, CETOP5H

* Only available with tapping plates. Model D31V cover and crossover plates can be used for D05H and D05HE mounting patterns interchangeably.

☐ Circuit

Code	Description
A	Crossover plate P to A, B to T
C	Parallel Circuit Cover plate
D	Series Circuit Crossover plate P to T, A and B blocked
T	Tapping plate

☐ Port Size and Thread Type

Code	Description
*2N	0.25-18 NPTF ANSI B1.20.3
*2S	-4 SAE ISO 11926; SAE 1926
**1M	Metric Mounting Bolts (M6-1.0 x 30mm lg. SHCS Circuits 'C' and 'D' only) (M6-1.0 x 50mm lg. SHCS Circuit 'A' Only)
**1E	English Mounting Bolts (UNC .25-20 x 1.25 lg. SHCS Circuits 'C' and 'D' only) (UNC .25-20 x 2.00 lg. SHCS Circuit 'A' Only)

* Tapping plate only
** Cover and crossover plate only

☐ Port Location

Code	Description
N	Cover Plate
*P	P and T Ports
*W	A and B Ports
*X	X and Y Ports

* Tapping plates only

☐ Material

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

35 Design Series
Required when ordering.

C

Ordering Information
Series D6 and D8 Tapping and Cover Plates

C

SP	D6	☐	☐	☐	☐	35
Subplate	Valve Model	Circuit	Port Size and Thread Type	Port Location	Material	Design Series

Required when ordering.

Code	Description
D6	NFPA D08, NG25, CETOP8

Code	Description
A	Crossover plate P to A, B to T
C	Parallel circuit Cover plate
D	Series circuit Crossover plate P to T, A and B blocked
T	Tapping plate

Code	Description
N	Cover Plate
*P	P and T Ports
*W	A and B Ports
*X	X and Y Ports

* Tapping plates only

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

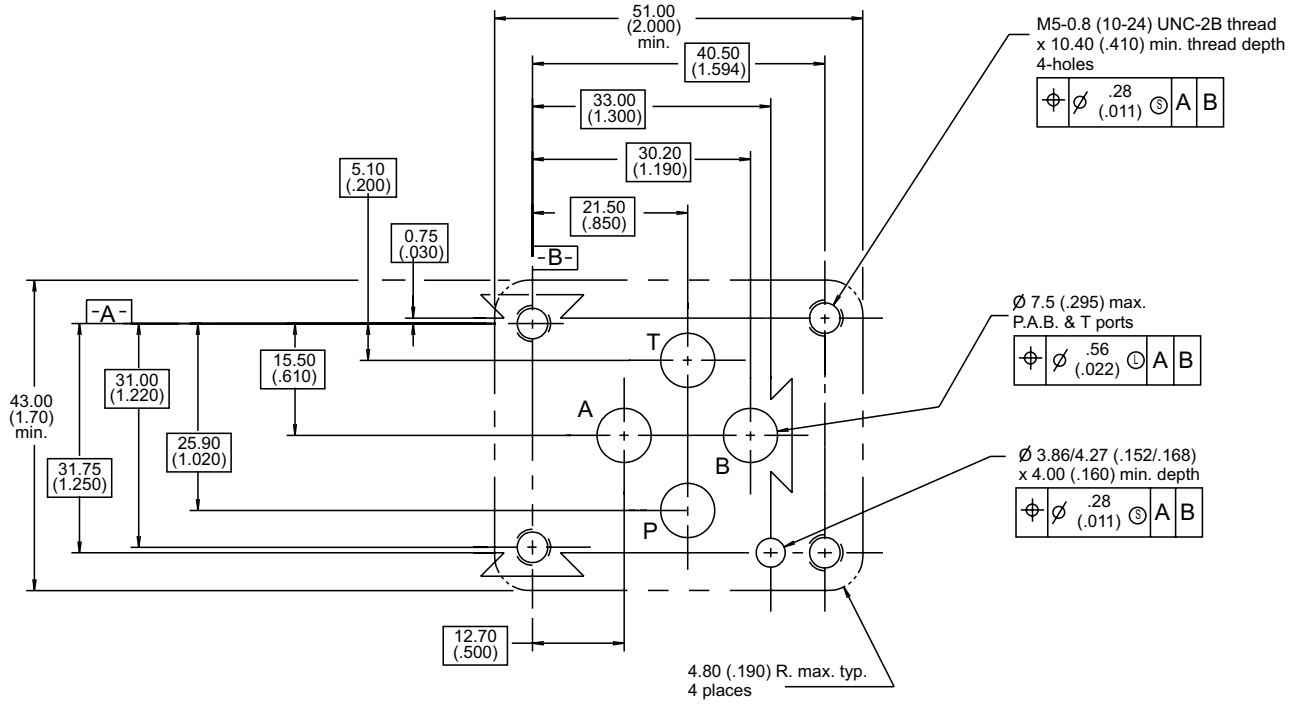
Code	Description
*2N	0.25-18 NPTF ANSI B1.20.3
*2S	-4 SAE ISO 11926; SAE 1926
**1M	Metric Mounting Bolts (M12-1.75 x 45mm lg. SHCS Circuit 'C' only) (M12-1.75 x 60mm lg. SHCS Circuit 'D' only) (M12-1.75 x 90mm lg. SHCS Circuit 'A' only)
**1E	English Mounting Bolts (UNC .50-13 x 1.75 lg. SHCS Circuit 'C' only) (UNC .50-13 x 2.25 lg. SHCS Circuit 'D' only) (UNC .50-13 x 3.50 lg. SHCS Circuit 'A' only)

* Tapping plate only

** Cover and crossover plate only

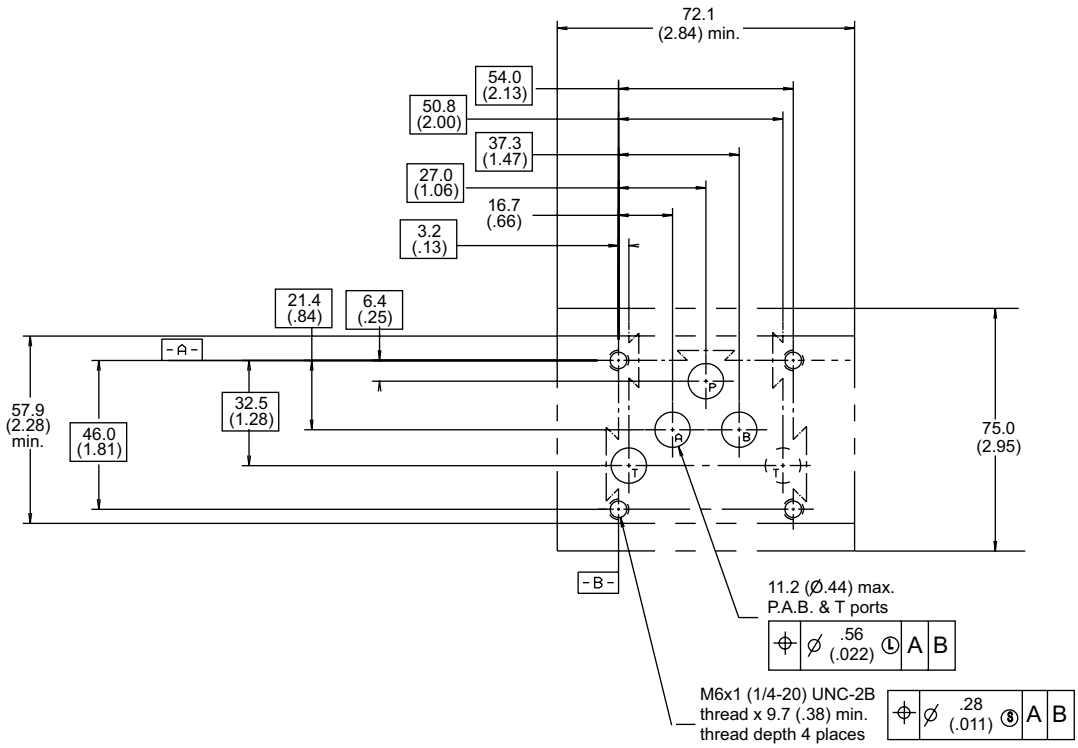
Mounting Pattern — NFPA D03, NG6, CETOP 3

Inch equivalents for millimeter dimensions are shown in (**)



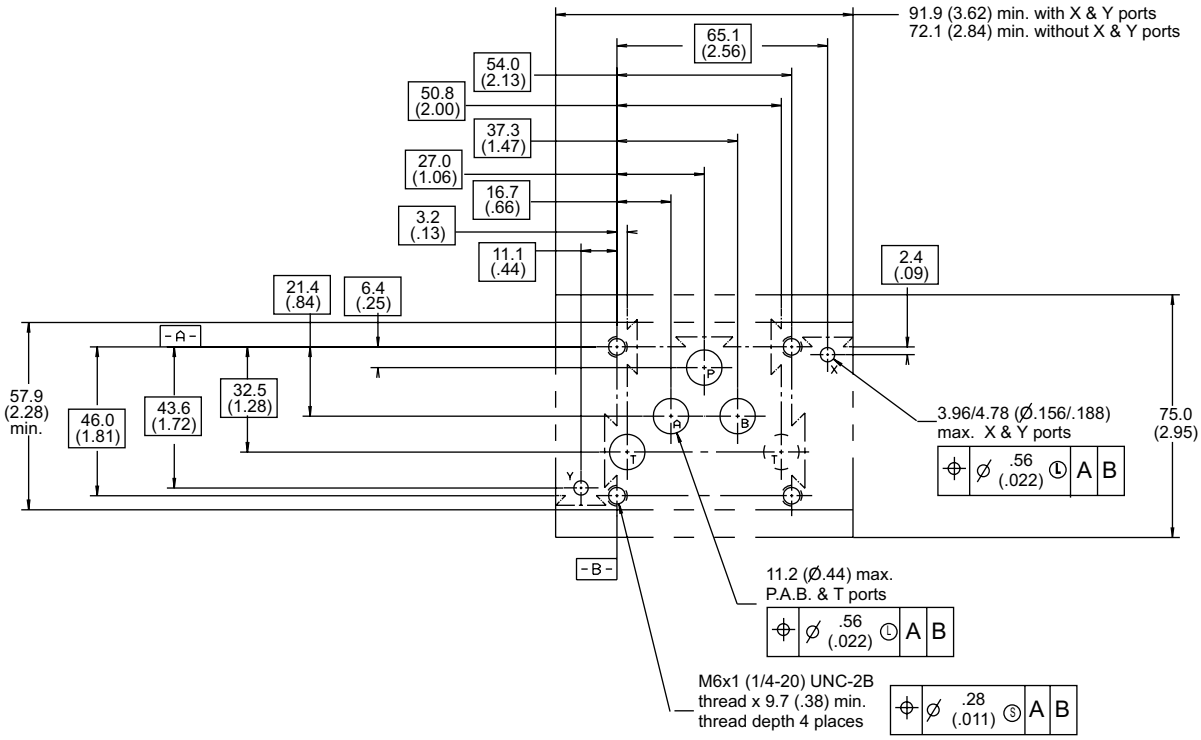
Mounting Pattern — NFPA D05, NG5, CETOP 5

Inch equivalents for millimeter dimensions are shown in (**)



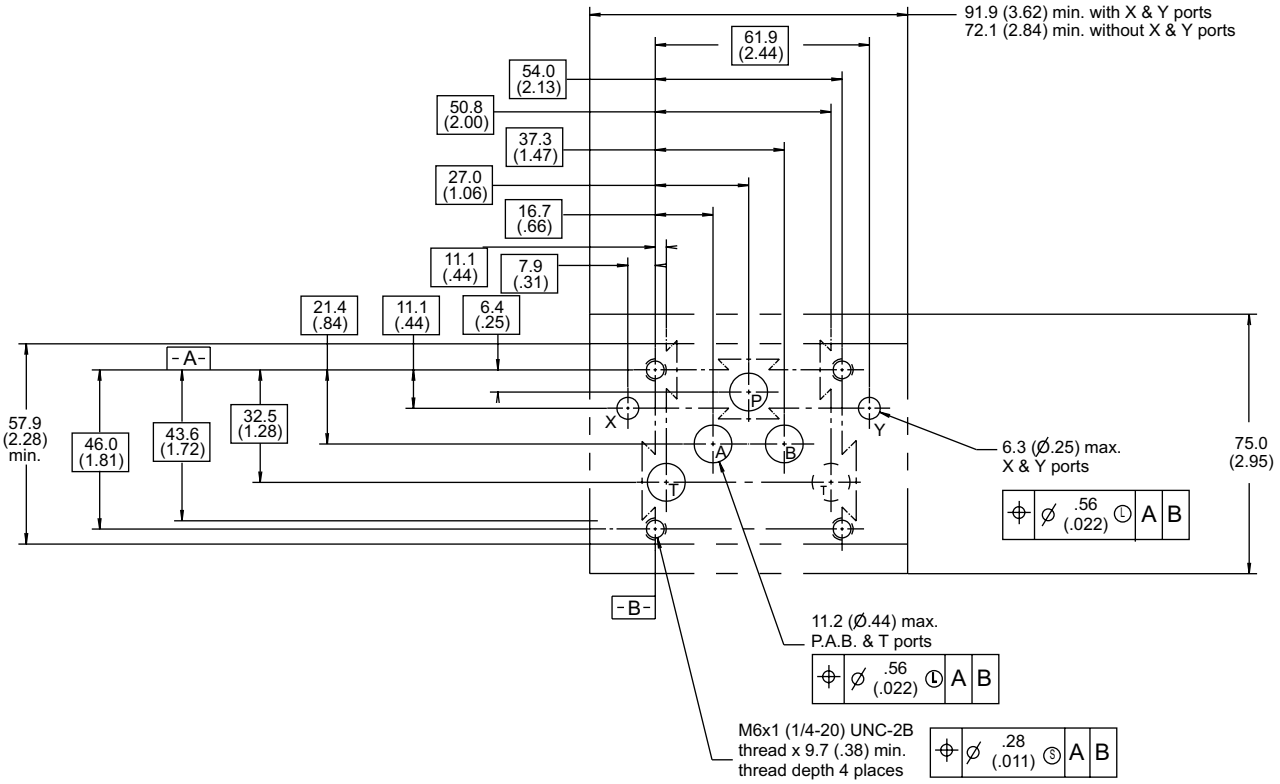
Mounting Pattern — NFPA D05H, NG10, CETOP 5H

Inch equivalents for millimeter dimensions are shown in (**)



Mounting Pattern — NFPA D05HE, NG10, CETOP 5H

Inch equivalents for millimeter dimensions are shown in (**)



Subplate-Manifold.indd, dd

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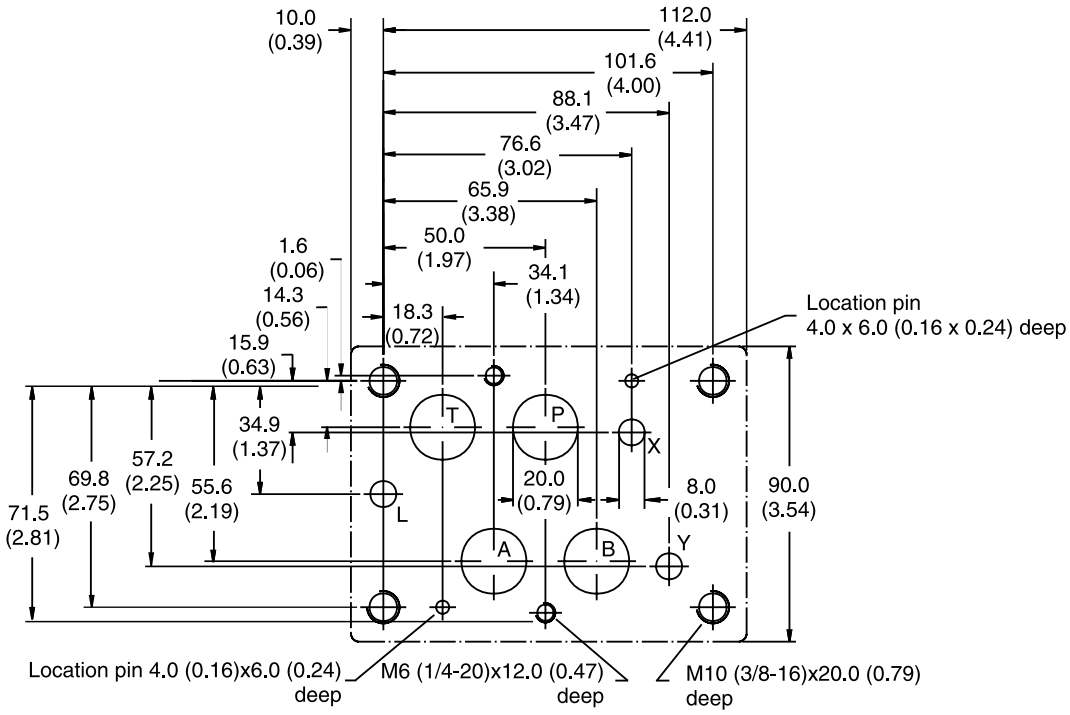
Elyria, Ohio, USA

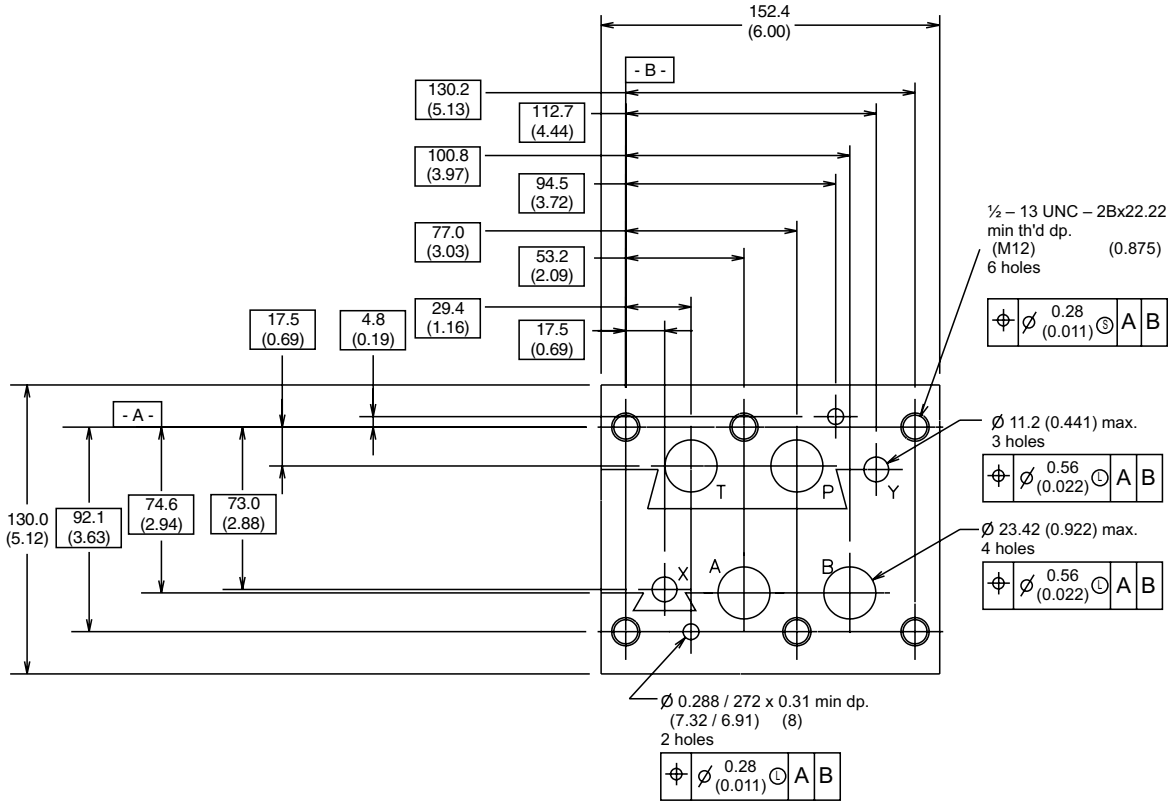
Mounting Pattern — NFPA D07, NG16, CETOP 7

Inch equivalents for millimeter dimensions are shown in (**)



Mounting Pattern — NFPA D08, NG25, CETOP 8

Inch equivalents for millimeter dimensions are shown in (**)



General Description

Series PSB electrohydraulic pressure switches are high performance devices that provide an electrical signal when sensed pressure rises above or falls below the selected setting. Maximum operating pressure is 315 Bar (4560 PSI) for all models.

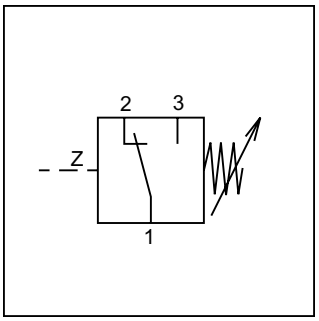
Operation

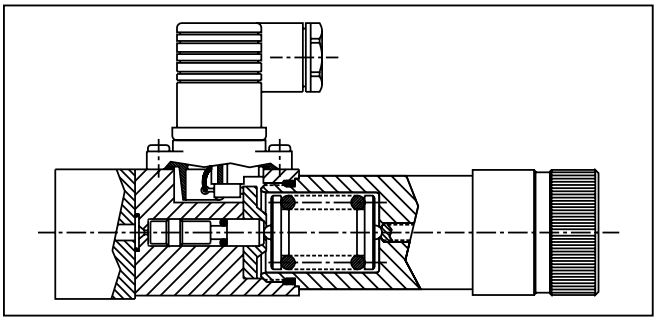
Sensed pressure acts against a piston and spring plate assembly that is opposed by an adjustable spring force. When the pressure against the piston exceeds that of the adjustable spring, the plate moves and actuates a microswitch. The desired operating pressure is adjusted via a setscrew or hand knob. A tamper resistant keylock option is also available with the setscrew type adjuster. The electric element is a high quality micro switch with snap-action contact. Three terminals permit application as "on", "off" or "changeover" switch. The electric connection is made with a 3-pole plug-in connector to DIN 43650 with ground. The plug-in connector is also available with an indicator light.

C

Features

- **Four Separate Adjustable Pressure Range Options —** Enables operator to precisely select the desired pressure setting.
- **Hydraulically Dampened Piston —** Provides accurate response and extended service life.
- **Flange Type Mounting Style —** Provides great flexibility for mounting with manifolds, sandwich plates or direct line connections.
- **Optional Keylock Adjustment —** Prevents tampering or unauthorized adjustments in critical applications.
- **Robust Cast Iron Construction —** A rugged, yet compact, product designed to provide long service life in demanding applications.
- **IP 65 (Nema 4) Class Electrical Protection —** Maintains integrity against moisture in spray or splashdown situations.





Specifications

Type	Plunger type switch
Mounting	Flange mounting or fitted to a level face
Mounting Position	No restrictions
Operating Pressure	Maximum 315 Bar (4560 PSI)
Actuating Pressure Differential	See performance curves
Duty Cycle	Maximum 1/s
Operating Temp. Range (Ambient)	0 to 80° C (32 to 176° F)
Viscosity Range	12 to 400 cSt / mm^2/s (56 to 1854 SSU)
Filtration	Recommend ISO 4406 Code, 18/16/13 or better
Electrical Connection	Plug-in connector to DIN 43650
Insulation	IP 65 (Nema 4)
Contact Load Carrying Capacity	5 A at 250 VAC; 1 A at 50 VDC; .02 A at 250 VDC

Note: For inductive DC loads a diode should be used to increase service life.

PSB — Electrohydraulic Pressure Switch

Operating Pressure Range	Adjustment	Connections	Seal	Locking Option	Electrical Connections	Voltage *
☐	☐	☐	**A**	☐	☐	☐
			Nitrile			

Code — Operating Pressure Range

Code	Operating Pressure Range
040	3 to 40 Bar (45 to 580 PSI)
100	10 to 100 Bar (145 to 1450 PSI)
160	10 to 160 Bar (145 to 2320 PSI)
250	20 to 250 Bar (290 to 3625 PSI)

Code — Adjustment

Code	Adjustment
A	Hexagonal socket
S	Knob with scale

Code — Connections

Code	Connections
F1	Flange (front face)
U1	Flange (right angle)
U2	7/16-20 UNF-2B (front face)

Code — Locking Option

Code	Locking Option
Omit	Without lock
Z*	With lock

* Not available with "S" type knob

Code — Electrical Connections

Code	Electrical Connections
Omit	Without plug-in connector
N	With plug-in connector DIN 43650
L	With plug-in connector DIN 43650 and indicator light

Code — Voltage

Code	Voltage
G024	Plug-in connector w/light, 24VDC
W115	Plug-in connector w/light, 115VAC
W230	Plug-in connector w/light, 230VAC

* Only for the Code "L" Models.

Weight: 1.0 kg (2.2 lbs.)

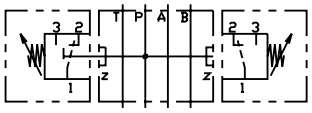
Mounting Bolts

(2 each required)

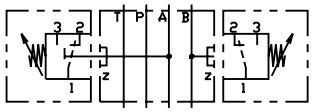
	F1	U1/U2
Inch	10 x 353	10 x 218
	(10-24 x 2.50)	(10-24 x 2.00)
Metric	M5 x 60	M5 x 50

Sandwich Plate to NG6, NFPA D03 Pattern

Allows PSB switches to be used in stacking assemblies with Sandwich style valves.

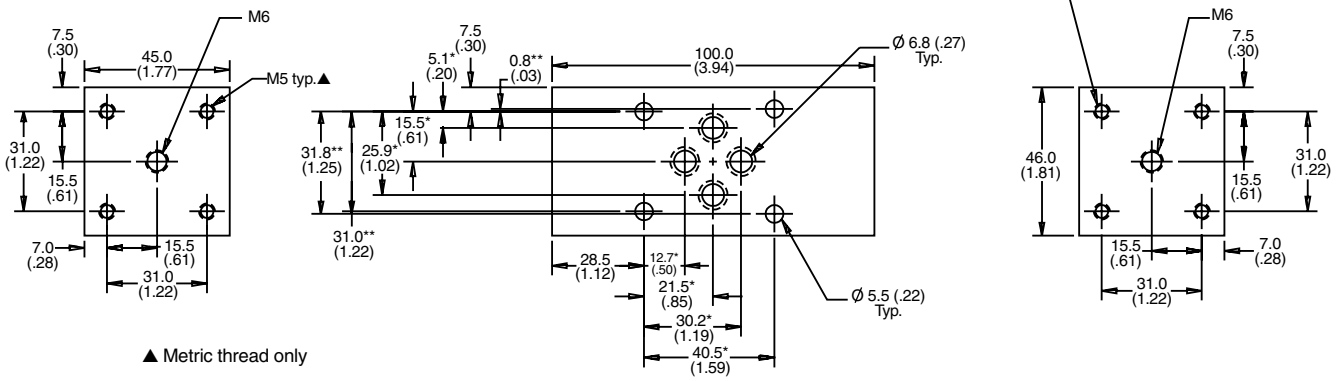


H06PSB-993 -- Pressure switch to P connection



H06PSB-994 -- Pressure switch to A or B or A and B connection

Inch equivalents for millimeter dimensions are shown in (**)



Note:
* Tolerance on these dimensions +/- 0.2
** Tolerance on these dimensions +/- 0.1

Subplate-Manifold.indd, dd

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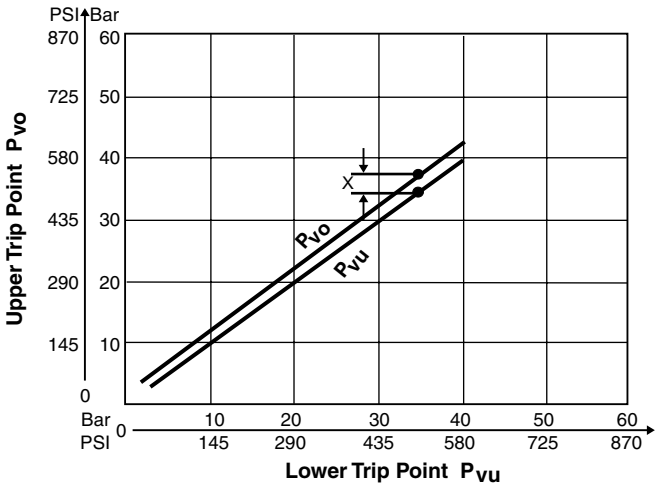
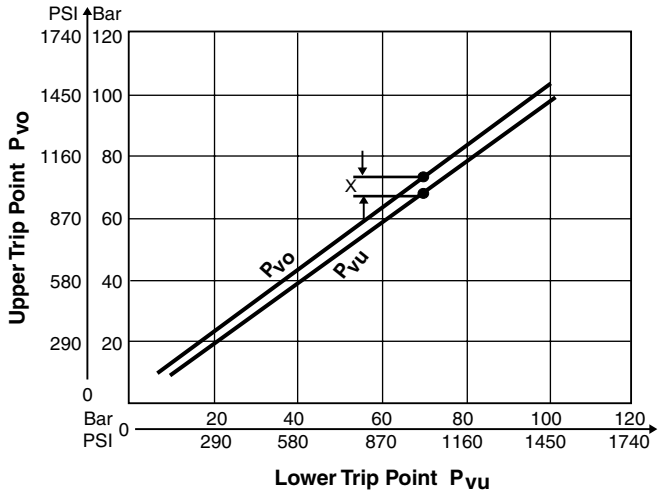
Elyria, Ohio, USA

Performance Curves

PSB 040

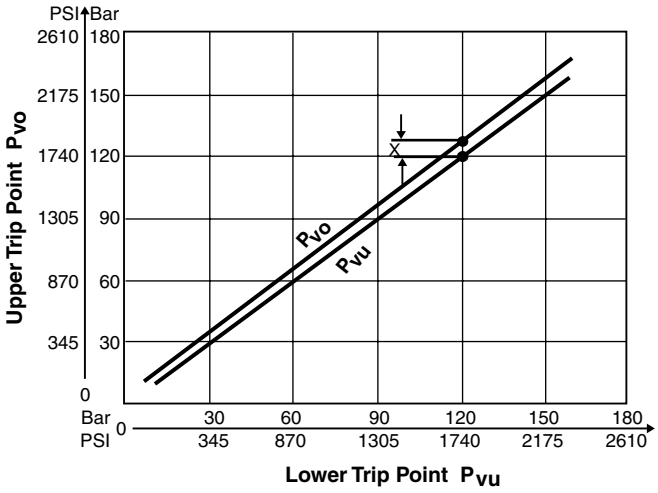


PSB 100

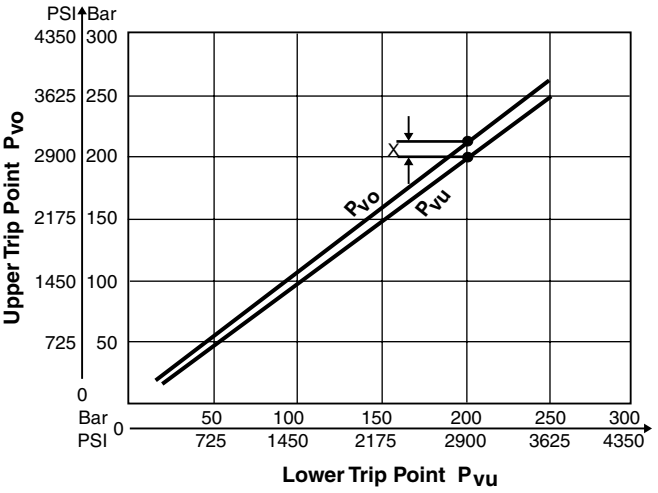


X = Switching Pressure Difference

PSB 160

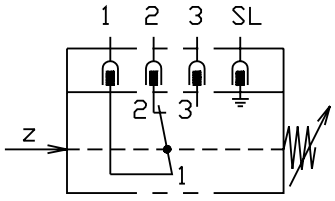


PSB 250

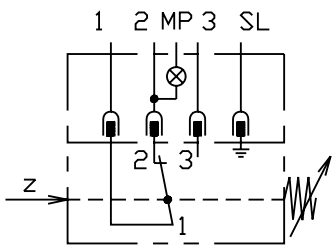


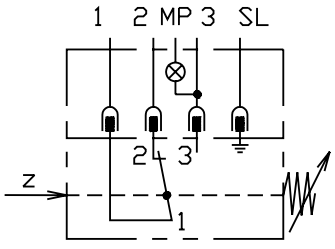
X = Switching Pressure Difference

Electrical Connections



Connection 'N'

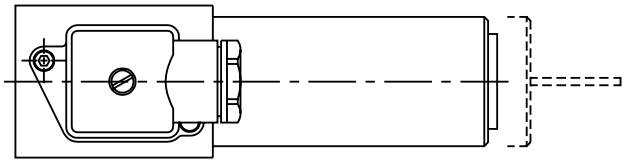




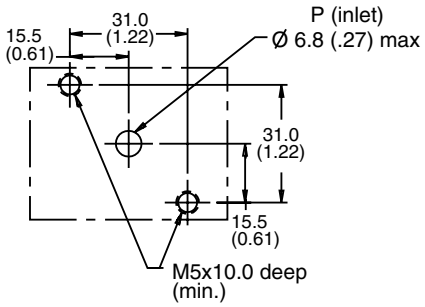
Connection 'L'

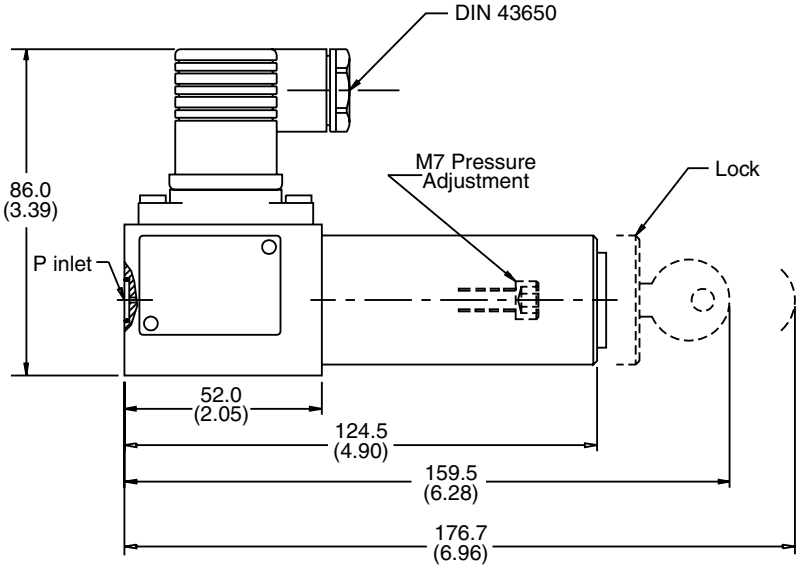
Inch equivalents for millimeter dimensions are shown in (**)

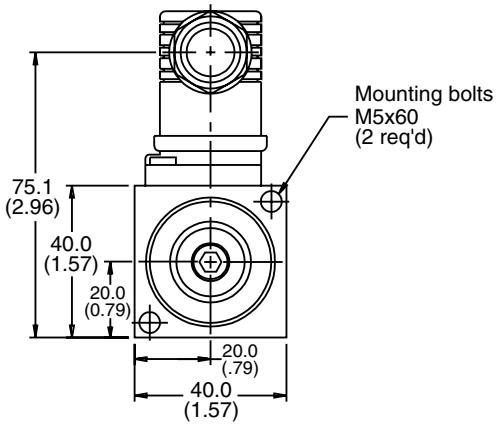
F1

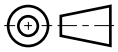


Mounting Pattern



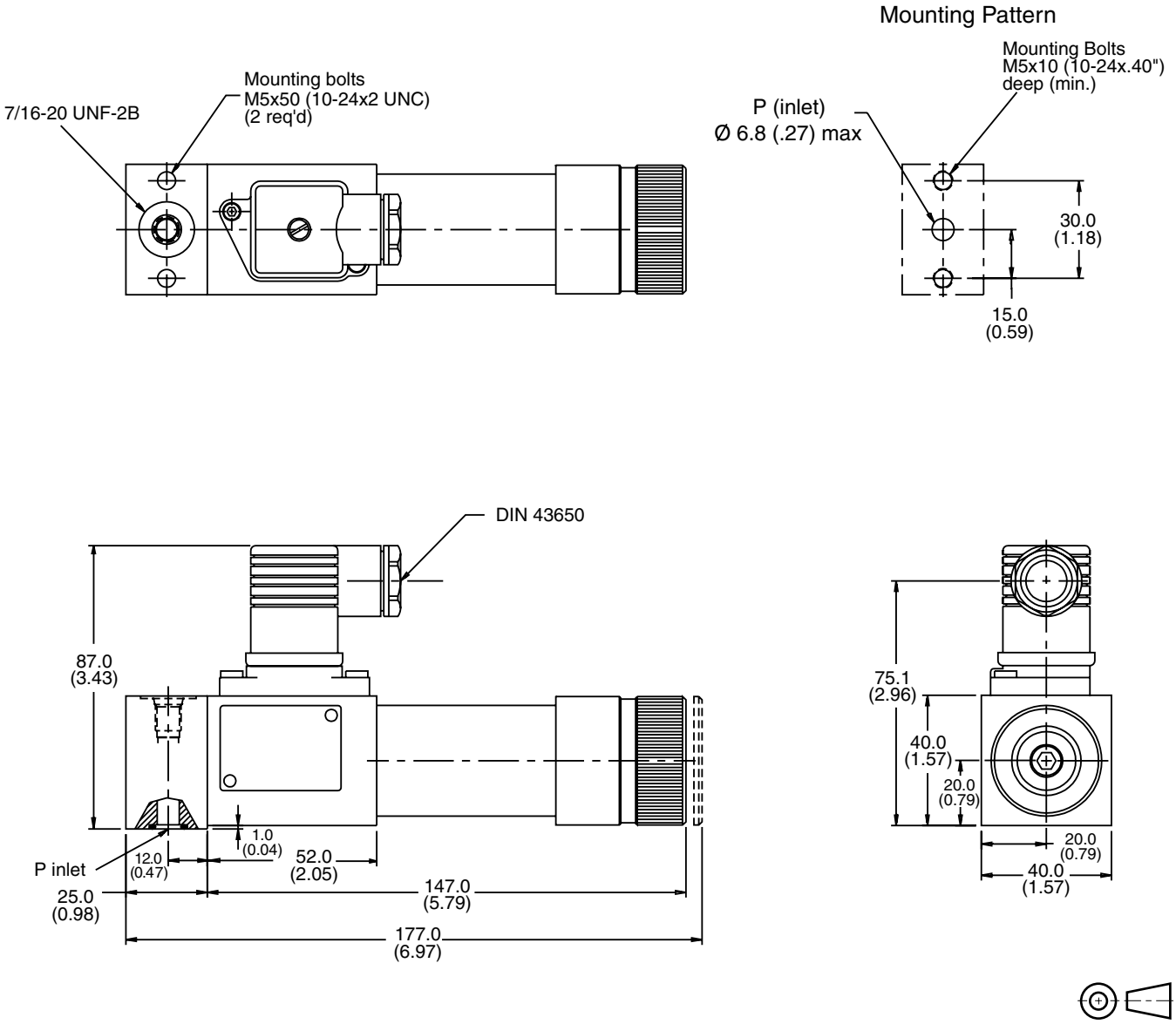






Inch equivalents for millimeter dimensions are shown in (**)

U1



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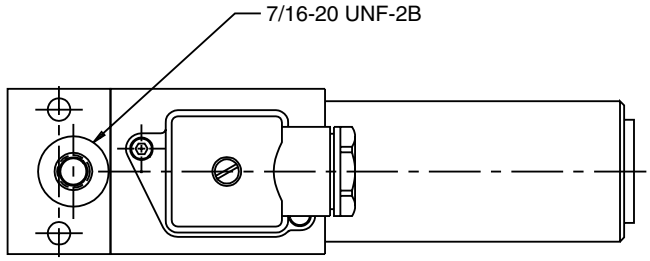
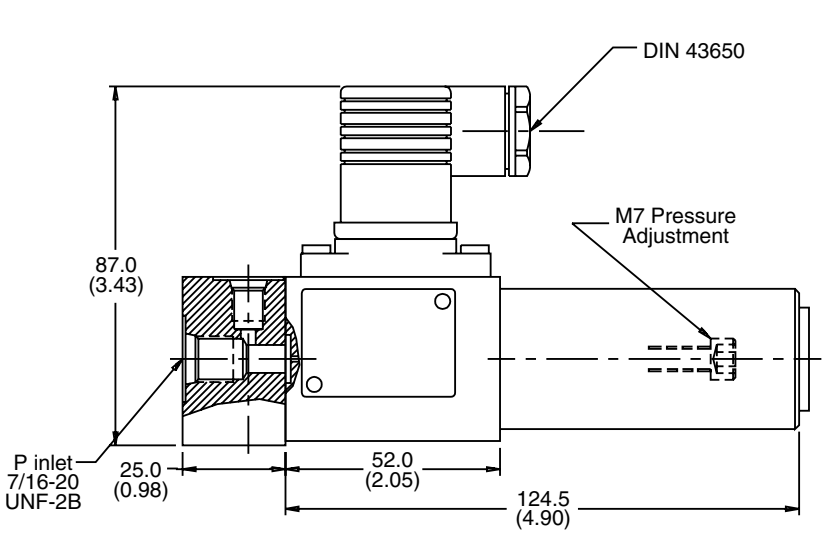
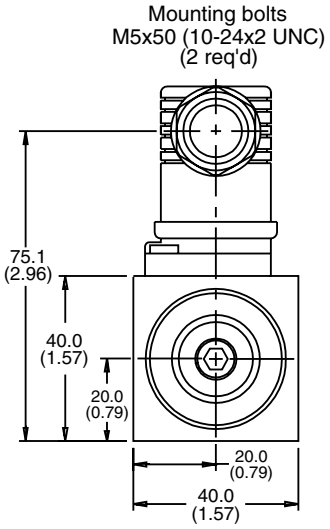
Elyria, Ohio, USA

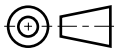
Inch equivalents for millimeter dimensions are shown in (**)

U2









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Replaces Series RS*R, RS*M PHASE OUT
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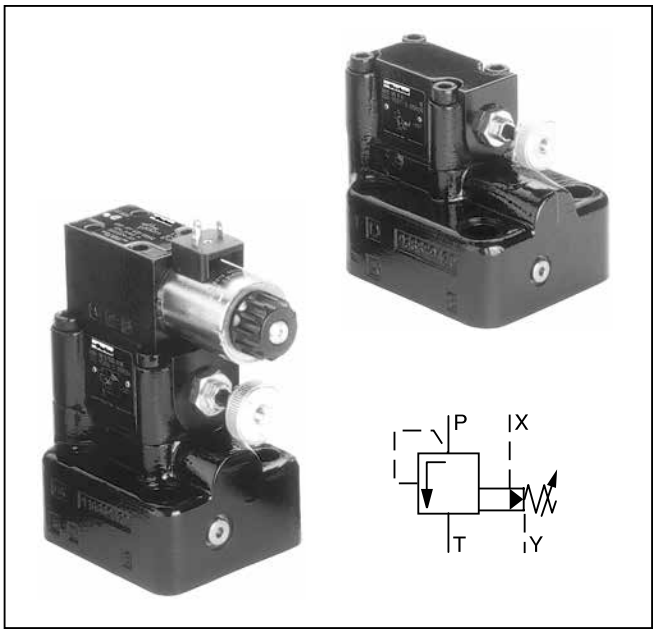
D

General Description

Series R4V and R6V pressure relief valves feature a manual adjustment pilot stage which controls a seated type main stage.

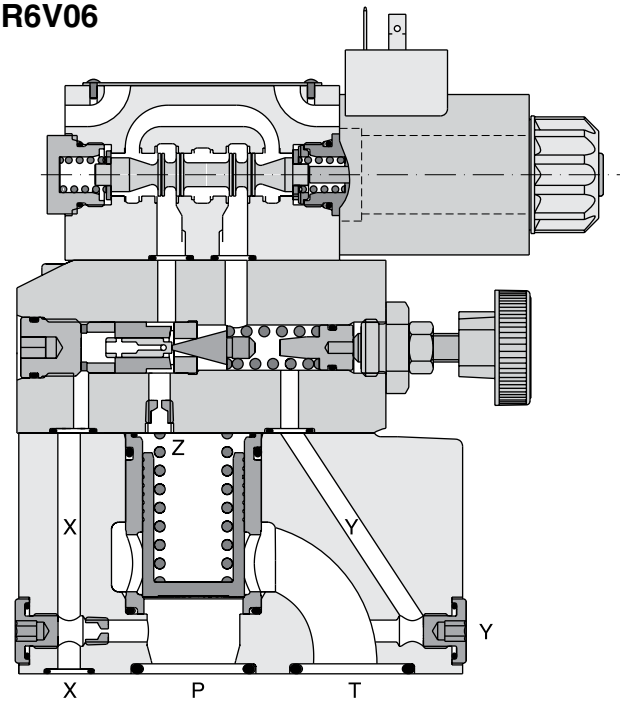
A vent function with a solenoid operated directional valve is available for circulation at minimum pressure.



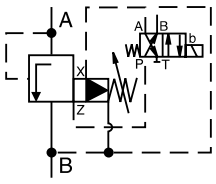
Features

- Pilot operated with manual adjustment.
- 2 interfaces:
  - Subplate, ISO 6264 (DIN 24340 Form D) with VV01 vent valve (R4V)
  - Subplate, ISO 6264 (DIN 24340 Form E) with CETOP 03 vent valve (R6V)
- 3 pressure ranges.
- 3 adjustment modes:
  - Hand knob
  - Acorn nut with lead seal
  - Key lock
- Remote control via port X.

R6V06



Code 1



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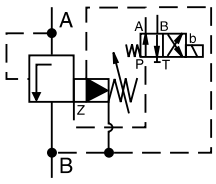


Function

System pressure in port P is applied via the X gallery to the spring loaded cone in the pilot head. The pilot head controls the pressure in the Z area on top of the main cartridge which is additionally kept close by the main spring.

If the pilot pressure exceeds the setting pressure the pilot cone opens and thus limits the pilot pressure.

When the system pressure exceeds the pilot pressure plus the spring force, the main cartridge opens to port T and limits the pressure in port P to the adjusted level.

Additionally to the relief function, a solenoid operated vent valve connects the Z area to tank. This allows oil circulation from P to T at minimum pressure drop. The vent valve can either be a standard CETOP 03 valves (mounting form E) or a sandwich unit (mounting form D). For both types the vent position can be either at the energized or de-energized solenoid.

R | ☐ | V | ☐ | — | 5 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐

R	☐	V	☐	—	5	☐	☐	☐	☐	☐	☐	☐
Pressure Relief Valve	Interface	Relief Function	Size		Maximum Pressure 350 Bar (5075 PSI)	Drain Port	Pressure Range	Adjustment	Pilot Oil Drain Line	Design Series	Seal	Options Check with Factory

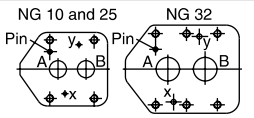
Code	Description
03	NG10
06	NG25
10	NG32

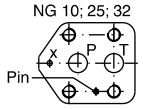
Code	Interface	Drain	Aux Port
3	R4V	Y-port	NPT
7	R4V	Y-port	SAE
9	R4V	Y-port	BSP
9	R6V	Y-port	BSP

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
1	Hand Knob 32mm dia. (Standard)
3	Acorn Nut with Lead Seal
4	Key Lock

Code	Description
4	Subplate Mounting ISO 6264 — NG 10 and 25 / NG 32
6	Subplate Mounting ISO 6264 — NG 10; 25; 32





Code	Description
0 [1]	Internal
1 [2]	External from Subplate
2 [3]	External from Valve Body (Y-port)

1) Only with drain port 3
2) R4V only
3) R6V only

Code	Description
A	R4V
B	R6V

Code	Description
1	Nitrile
5	Fluorocarbon

Weight:

R4V03	2.7 kg (6.0 lbs.)
R4V06	4.5 kg (9.9 (lbs.)
R4V10	6.0 kg (13.2 lbs.)
R6V03	4.5 kg (9.9 lbs.)
R6V06	5.8 kg (12.8 lbs.)
R6V10	7.8 kg (17.2 lbs.)

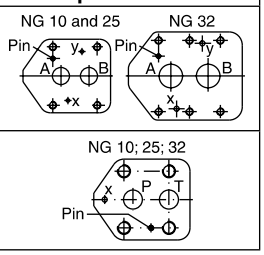
D

R		V		–	5											
Pressure Relief Valve	Interface	Relief Function	Size		Maximum Pressure 350 Bar (5075 PSI)	Drain Port	Pressure Range	Adjustment	Pilot Oil Drain Line	Vent Valve Function	Solenoid Voltage	Design Series	Seal		Modifications

Code	Description
03	NG10
06	NG25
10	NG32

Code	Interface	Drain	Aux Port
3	R4V	Y-port	NPT
7	R4V	Y-port	SAE
9	R4V	Y-port	BSP
9	R6V	Y-port	BSP

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
4	Subplate Mounting ISO 6264 
6	

Code	Description
1	Hand Knob (Standard)
3	Acorn Nut with Lead Seal
4	Key Lock

Code	Description
0 [1]	Internal
1 [2]	External from Subplate
2 [3]	External from Valve Body (Y-port)

1) Only with drain port 3
2) R4V only
3) R6V only

Code	Description
09	Solenoid not activated unpress. circulation
11	Solenoid activated unpress. circulation

Code	Description
G0R	12V
G0Q	24V
GAR	98V
GAG	205V
W30	110V / 50 Hz 120V / 60 Hz
W31	230V / 50 Hz 240V / 60 Hz

Code	Description
A	R4V
B	R6V

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
031 [2]	Vent Function w/ Slow Unloading
VFM [3]	Vent Function w/ Slow Unloading

2) R4V only
3) R6V only

Weight:

R4V03	4.4 kg (9.7 lbs.)
R4V06	6.2 kg 13.7 (lbs.)
R4V10	7.7 kg (17.0 lbs.)
R6V03	5.9 kg (13.0 lbs.)
R6V06	7.2 kg (15.9 lbs.)
R6V10	9.2 kg (20.3 lbs.)

R4V and R6V

General				
Size	**NG10**	**NG25**	**NG32**	
Interface	Subplate mounting acc. ISO 6264 (DIN 24340)			
Mounting Position	As desired, horizontal mounting preferred			
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)			
Hydraulic				
Operating Pressure	Ports P or A and X up to 350 Bar (5075 PSI), Port T or B and Y depressurized			
Pressure Range	105, 210, 350 Bar (1523, 3045, 5075 PSI)			
Nominal Flow Series R4V	150 LPM (39.7 GPM)	350 LPM (92.6 GPM)	650 LPM (172.0 GPM)	
Series R6V	250 LPM (66.1 GPM)	500 LPM (132.3 GPM)	650 LPM (172.0 GPM)	
Fluid	Hydraulic oil according to DIN 51524 ... 51525			
Viscosity Recommended **Permitted**	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)			
Fluid Temperature **Recommended** **Maximum**	 +30°C to +50°C (+86°F to +122°F) -20°C to +70° (-4°F to +158°F)			
Filtration	ISO 4406 (1999), 18/16/13			

R4V and R6V with Vent Function

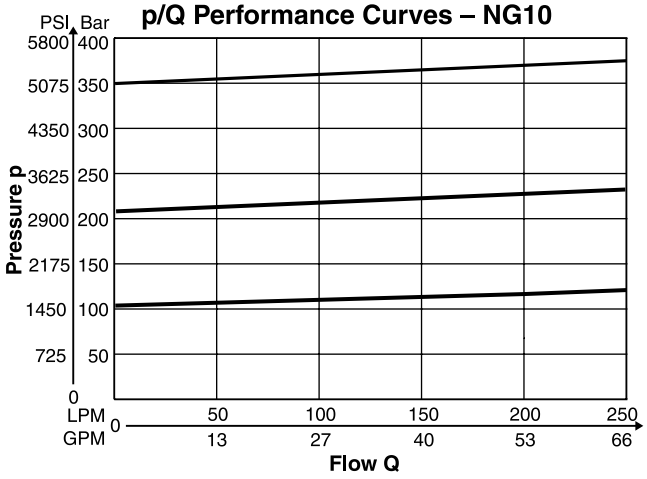
General						
Size	**NG10**	**NG25**	**NG32**			
Interface	Subplate mounting acc. ISO 6264 (DIN 24340)					
Mounting Position	As desired, horizontal mounting preferred					
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)					
Hydraulic						
Operating Pressure	Ports P or A and X up to 350 Bar (5075 PSI), Port T or B and Y depressurized					
Pressure Range	105, 210, 350 Bar (1523, 3045, 5075 PSI)					
Nominal Flow Series R4V	150 LPM (39.7 GPM)	350 LPM (92.6 GPM)	650 LPM (172.0 GPM)			
Series R6V	250 LPM (66.1 GPM)	500 LPM (132.3 GPM)	650 LPM (172.0 GPM)			
Fluid	Hydraulic oil according to DIN 51524 ... 51525					
Viscosity Recommended **Permitted**	30 to 50 cSt /mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)					
Fluid Temperature	-20°C to +70° (-4°F to +158°F)					
Filtration	ISO 4406 (1999), 18/16/13					
Electrical (solenoid)						
Duty Cycle	100% ED CAUTION: Coil temperature up to 180°C (356°F)					
Solenoid Connector	Connector acc. to EN 175301-803					
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)					
Code	**G0R**	**G0Q**	**GAR**	**GAG**	**W30**	**W31**
Supply Voltage	12V	24V	98V	205V	110 at 50Hz 120 at 60Hz	230 at 50Hz 240 at 60Hz
Supply Tolerance	+5...-10	+5...-10	+5...-10	+5...-10	+5...-10	+5...-10
Power Consumption Hold	31W	31W	31W	31W	78W	78W
In Rush	31W	31W	31W	31W	264W	264W
Switching Frequency	16,000 (DC), 7200 (AC) switchings/hour maximum					
Wiring Minimum	3 x 1.5 mm² Recommended					
Wiring Length Maximum	50 m (164 ft.) Recommended					

D

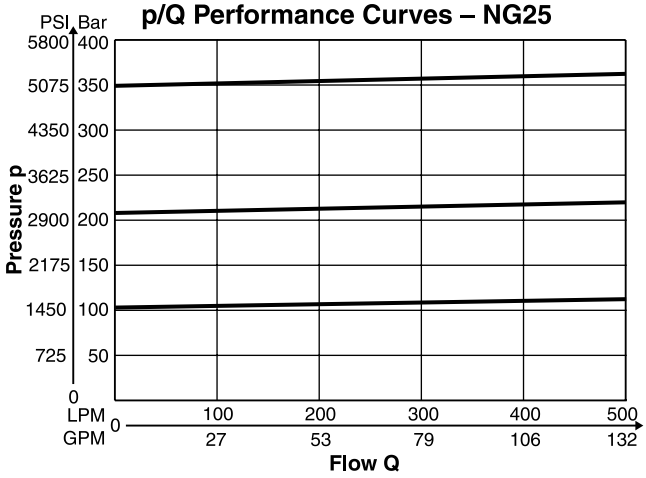
R4V-R6V RS_R RS_M.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

p/Q Performance Curves – NG10

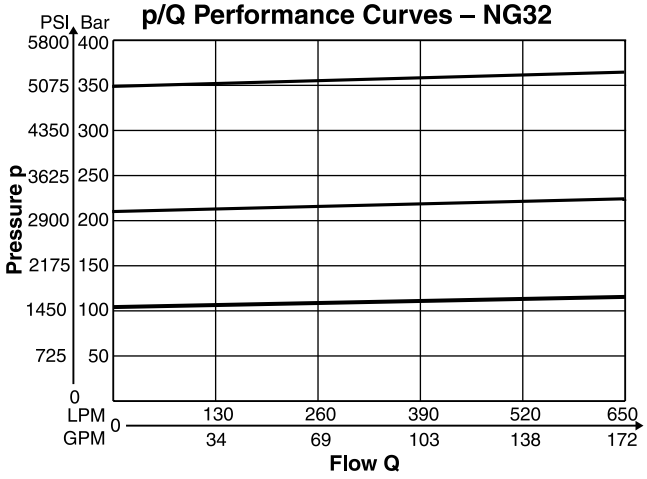


p/Q Performance Curves – NG25



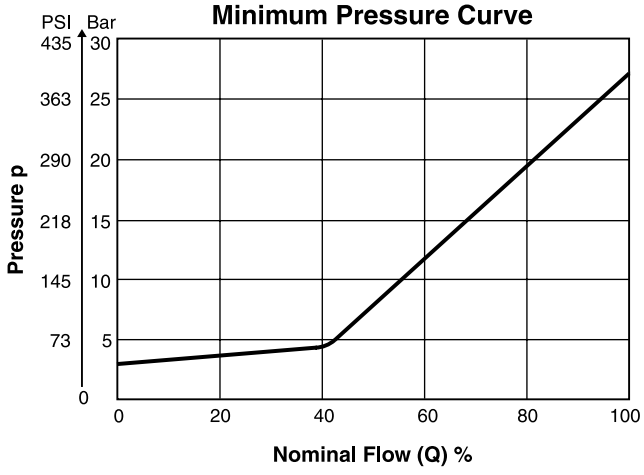
D

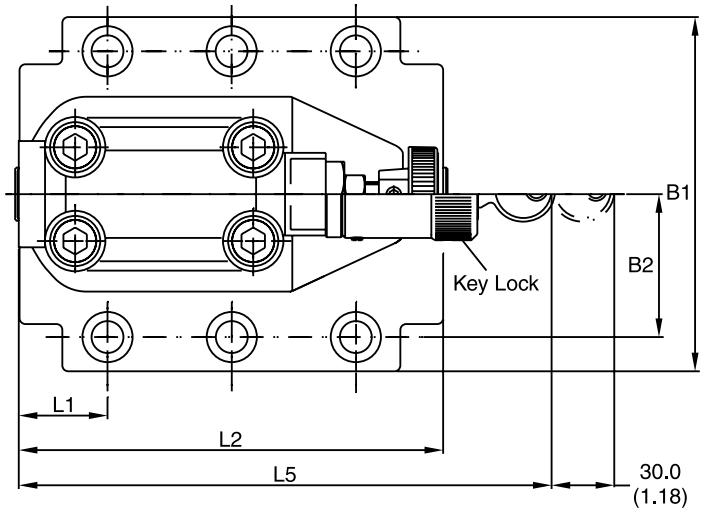
p/Q Performance Curves – NG32

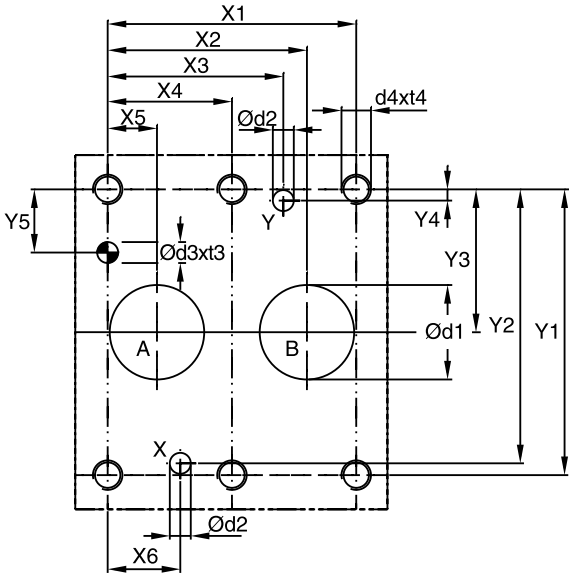


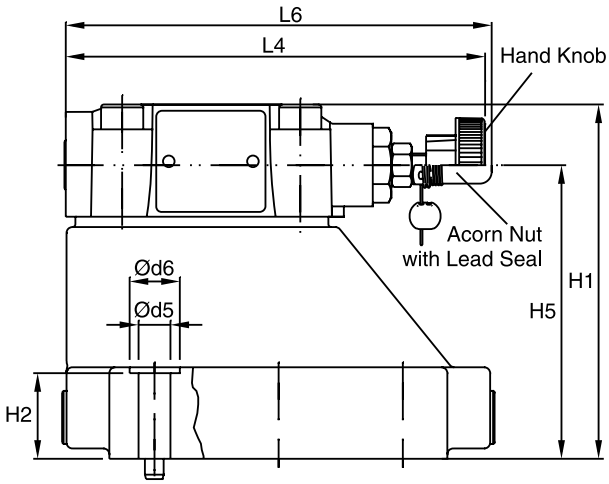
The performance curves are measured with external drain.
For internal drain the tank pressure has to be added to curve.

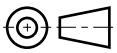
Minimum Pressure Curve




B1
B2
Key Lock
L1
L2
L5
30.0
(1.18)


X1
X2
X3
X4
X5
Ød2
d4xt4
Y5
Ød3xt3
Y
Y4
Y3
Y2
Y1
Ød1
A
B
X
Ød2
X6


L6
L4
Hand Knob
Acorn Nut
with Lead Seal
Ød6
Ød5
H1
H5
H2



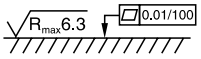
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-07-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	– –	7.2 (0.28)	21.5 (0.85)	0.0 (0.00)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	14.3 (0.56)	– –
25	6264-08-11-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	– –	11.1 (0.44)	20.6 (0.81)	0.0 (0.00)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	15.9 (0.63)	– –
32	6264-10-15-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	0.0 (0.00)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	21.4 (0.84)	– –

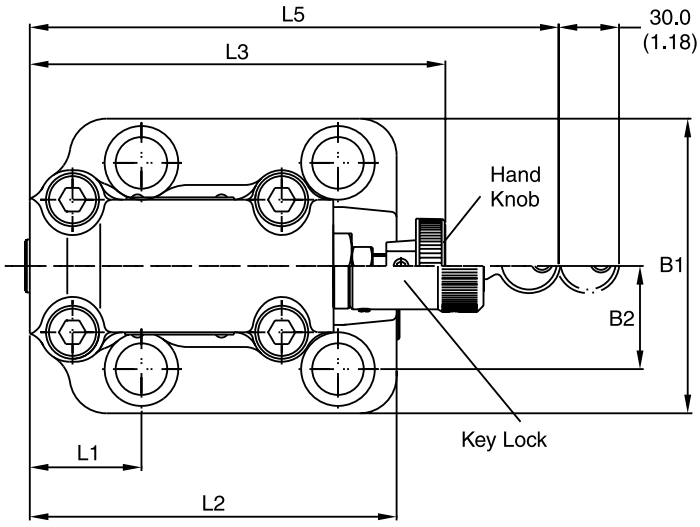
Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

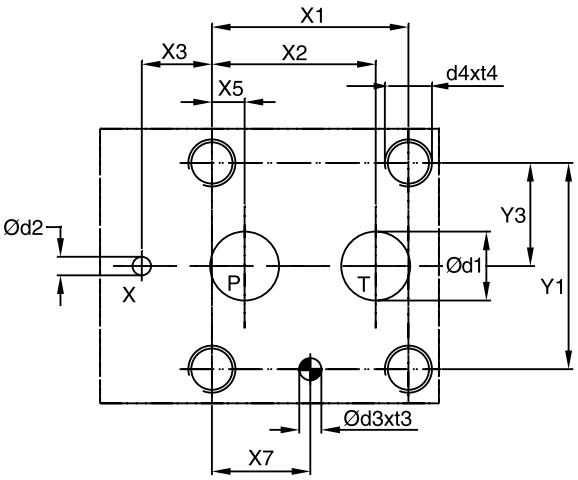
NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-07-*-97	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	– –	– –	62.5 (2.46)	– –	29.0 (1.14)	94.8 (3.73)	– –	143.0 (5.63)	181.0 (7.13)	144.8 (5.76)
25	6264-08-11-*-97	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	– –	– –	89.0 (3.50)	– –	34.7 (1.37)	126.8 (4.99)	– –	143.0 (5.63)	181.0 (7.13)	144.8 (5.76)
32	6264-10-15-*-97	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	– –	– –	99.5 (3.92)	– –	30.6 (1.20)	144.3 (5.68)	– –	143.0 (5.63)	181.0 (7.13)	144.8 (5.76)

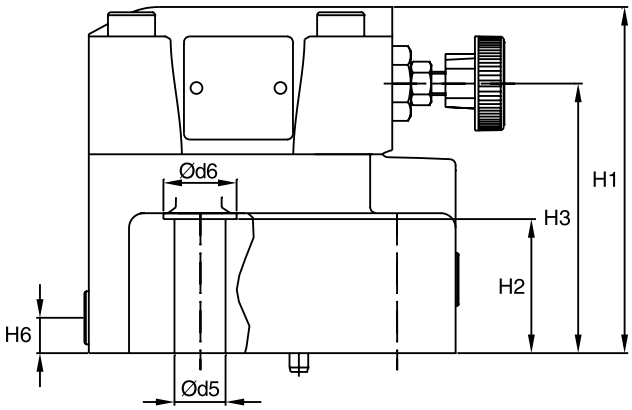
NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	6264-06-07-*-97	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	6264-08-11-*-97	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	6264-10-15-*-97	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

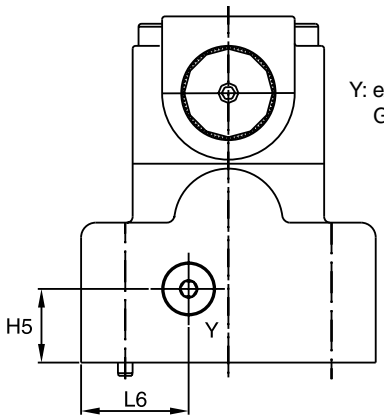
NG	ISO-code	Bolt Kit			Seal Kit Nitrile	Fuorocarbon	Surface Finish
10	6264-06-07-*-97	BK505	4xM10 x 35-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58507-0	S26-58507-5	
25	6264-08-11-*-97	BK485	4xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58475-0	S26-58475-5	
32	6264-10-15-*-97	BK506	6xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58508-0	S26-58508-5	

NG	ISO-code	Subplate	Size
10	6264-06-07-*-97	SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP
25	6264-08-11-*-97	SPP6M8B910	A, B = 1" BSPP x, y = 1/4" BSPP
32	6264-10-15-*-97	SPP10M12B910	A, B = 1 1/2" BSPP x, y = 1/4" BSPP

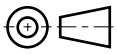








Y: external drain port
G 1/8"



D

Inch equivalents for millimeter dimensions are shown in (**)

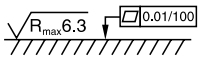
NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.00)	– –	22.1 (0.87)	– –	22.1 (0.87)	53.8 (2.12)	– –	26.9 (1.06)	– –	– –	– –
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.94)	– –	11.1 (0.44)	– –	33.4 (1.31)	70.0 (2.76)	– –	35.0 (1.38)	– –	– –	– –
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	– –	12.7 (0.50)	– –	44.5 (1.75)	82.6 (3.25)	– –	41.3 (1.63)	– –	– –	– –

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

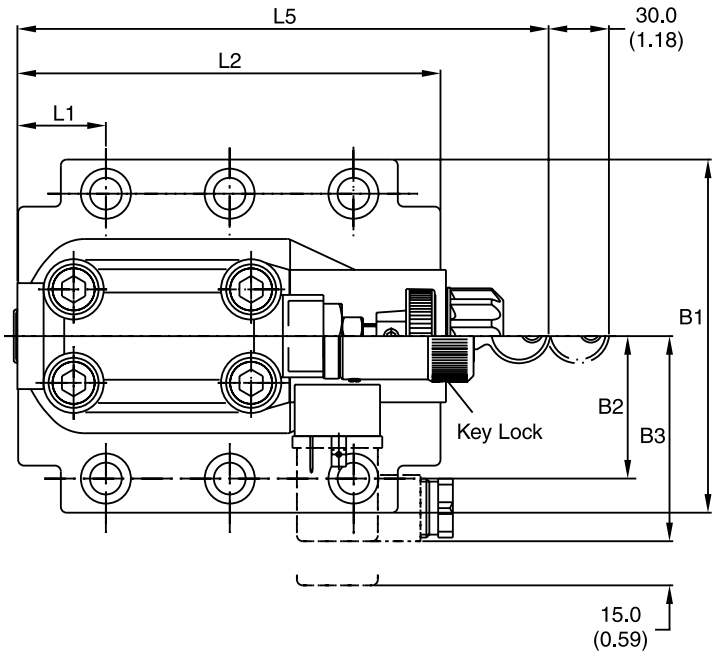
NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-09-*-97	80.0 (3.15)	26.9 (1.06)	114.0 (4.49)	27.0 (1.06)	88.0 (3.46)	– –	25.0 (0.98)	25.0 (0.98)	52.5 (2.07)	118.5 (4.67)	141.0 (5.55)	– –	180.0 (7.09)	29.5 (1.16)
25	6264-08-13-*-97	100.0 (3.94)	35.0 (1.38)	117.5 (4.63)	45.5 (1.79)	91.5 (3.60)	– –	25.0 (0.98)	12.0 (0.47)	37.9 (1.49)	124.5 (4.90)	141.0 (5.55)	– –	180.0 (7.09)	36.5 (1.44)
32	6264-10-17-*-97	120.0 (4.72)	41.3 (1.63)	123.0 (4.83)	52.0 (2.05)	97.0 (3.82)	– –	25.0 (0.98)	13.5 (0.53)	45.0 (1.77)	153.0 (6.02)	141.0 (5.55)	– –	180.0 (7.09)	36.5 (1.83)

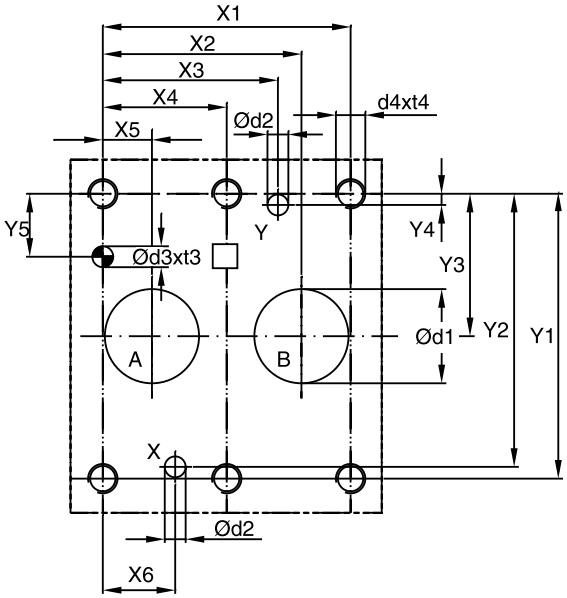
D

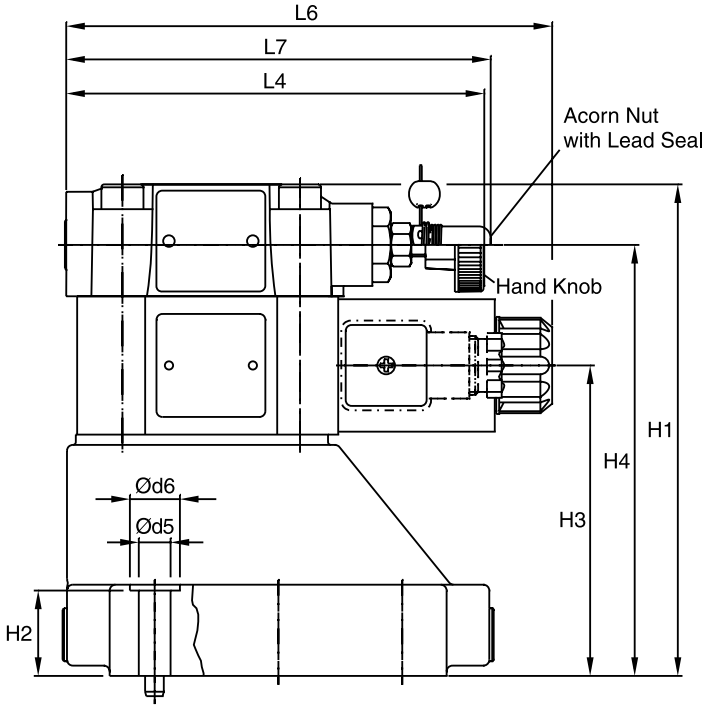
NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	6264-06-09-*-97	14.7 (0.58)	4.8 (0.19)	7.5 (0.30)	10.0 (0.39)	M12	20.0 (0.79)	13.5 (0.53)	20.0 (0.79)
25	6264-08-13-*-97	23.4 (0.92)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M16	27.0 (1.06)	17.5 (0.69)	25.0 (0.98)
32	6264-10-17-*-97	32.0 (1.26)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M18	28.0 (1.10)	20.0 (0.79)	30.0 (1.18)

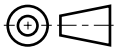
NG	ISO-code	Bolt Kit			Seal Kit Nitrile	Seal Kit Fluorocarbon	Surface Finish
10	6264-06-09-*-97	BK494	4xM12 x 45-DIN 912 12.9	108 Nm (79.6 lb.-ft.) ±15%	S26-96396-0	S26-96396-5	
25	6264-08-13-*-97	BK366	4xM16 x 70-DIN 912 12.9	264 Nm (194.7 lb.-ft.) ±15%	S26-96589-0	S26-96589-5	
32	6264-10-17-*-97	BK507	4xM18 x 75-DIN 912 12.9	398 Nm (293.5 lb.-ft.) ±15%	S26-96392-0	S26-96392-5	

NG	ISO-code	Subplate	Size
10	6264-06-09-*-97	SPP3R6B910	P, T = 3/4" BSPP x = 1/4" BSPP
25	6264-08-13-*-97	SPP6R8B910	P, T = 1 1/4" BSPP x = 1/4" BSPP
32	6264-10-17-*-97	SPP10R12B910	P, T = 1 1/2" BSPP x, y = 1/4" BSPP


L5
30.0
(1.18)
L2
L1
B1
B2
B3
Key Lock
15.0
(0.59)


X1
X2
X3
X4
X5
Ød2
d4xt4
Y5
Y
Y4
Y3
Ød3xt3
Ød1
Y2
Y1
A
B
X
Ød2
X6


L6
L7
L4
Acorn Nut
with Lead Seal
Hand Knob
H1
H4
H3
Ød6
Ød5
H2



D

Inch equivalents for millimeter dimensions are shown in (**)

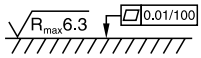
NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-07-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	– –	7.2 (0.28)	21.5 (0.85)	0.0 (0.00)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	14.3 (0.56)	– –
25	6264-08-11-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	– –	11.1 (0.44)	20.6 (0.81)	0.0 (0.00)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	15.9 (0.63)	– –
32	6264-10-15-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	0.0 (0.00)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	21.4 (0.84)	– –

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

NG	ISO-code	B1	B2	B3	H1	H2	H3	H4	L1	L2	L3	L4	L5	L6	L7
10	6264-06-07-*-97	87.3 (3.44)	33.4 (1.31)	70.0 (2.76)	130.0 (5.12)	21.0 (0.83)	68.5 (2.70)	109.5 (4.31)	29.0 (1.14)	94.8 (3.73)	– –	143.0 (5.63)	181.0 (7.13)	165.6 (6.52)	144.8 (5.70)
25	6264-08-11-*-97	105.0 (4.13)	39.7 (1.59)	70.0 (2.76)	156.5 (6.16)	29.0 (1.14)	95.0 (3.74)	136.0 (5.35)	34.7 (1.37)	126.8 (4.99)	– –	143.0 (5.63)	181.0 (7.13)	165.6 (6.52)	144.8 (5.70)
32	6264-10-15-*-97	120.0 (4.72)	48.4 (1.91)	70.0 (2.76)	167.0 (6.57)	29.0 (1.14)	105.5 (4.15)	146.5 (5.77)	30.6 (1.20)	144.3 (5.68)	– –	143.0 (5.63)	181.0 (7.13)	165.6 (6.52)	144.8 (5.70)

D

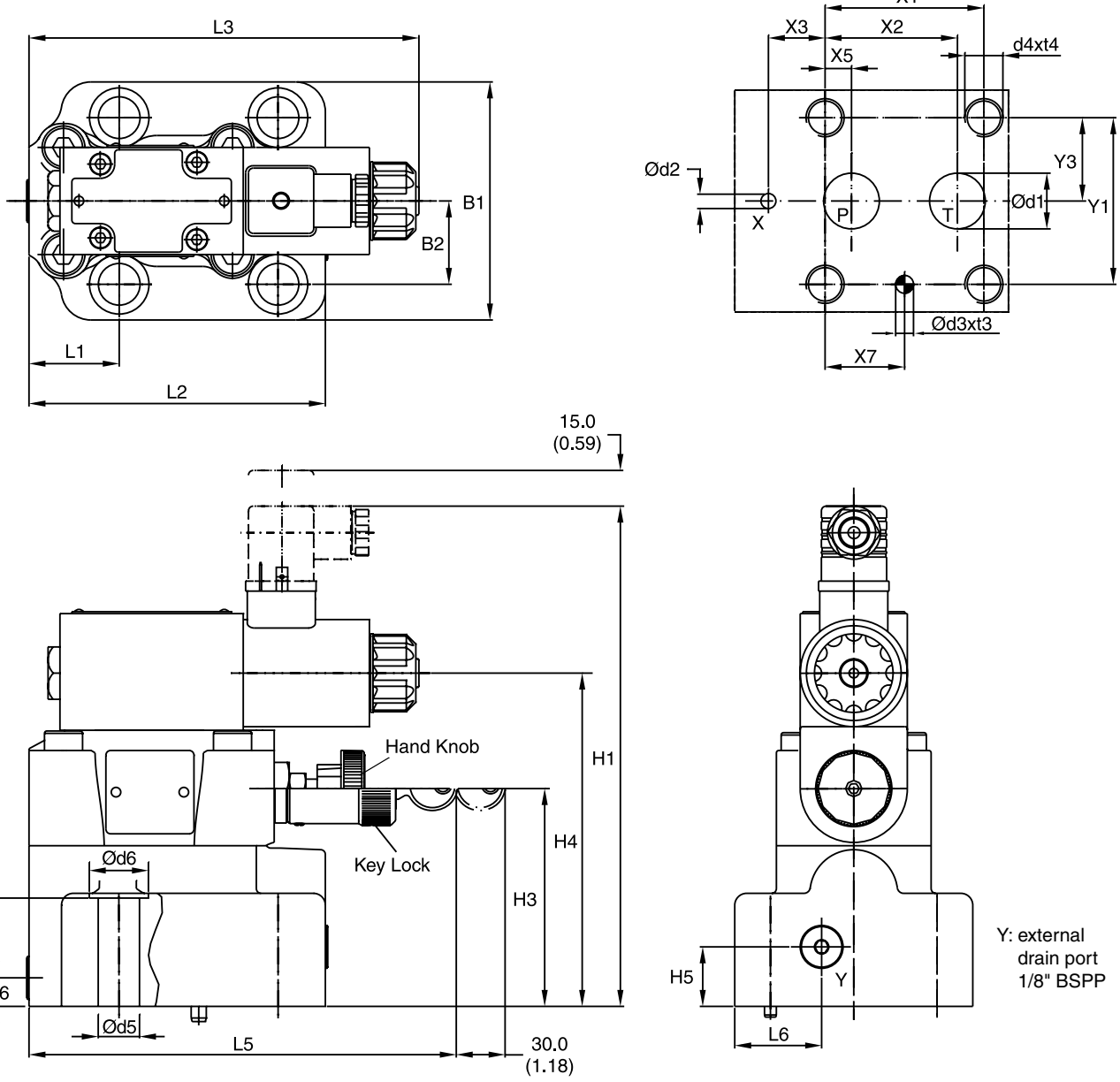
NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	6264-06-07-*-97	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	6264-08-11-*-97	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	6264-10-15-*-97	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal Kit Nitrile	Fluorocarbon	Surface Finish
10	6264-06-07-*-97	BK505	4xM10 x 35-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58507-0	S26-58507-5	
25	6264-08-11-*-97	BK485	4xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58475-0	S26-58475-5	
32	6264-10-15-*-97	BK506	6xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58508-0	S26-58508-5	
VV01*					S56-40609-0	S56-40609-5	

*Please combine seal kit of one size with seal kit of VV01 solenoid for complete seal kit.

NG	ISO-code	Subplate	Size
10	6264-06-07-*-97	SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP
25	6264-08-11-*-97	SPP6M8B910	A, B = 1" BSPP x, y = 1/4" BSPP
32	6264-10-15-*-97	SPP10M12B910	A, B = 1 1/2" BSPP x, y = 1/4" BSPP

D


L3
B1
B2
L1
L2
X1
X3
X2
X5
d4xt4
Ød2
X
P
T
Y3
Ød1
Y1
Ød3xt3
X7
15.0
(0.59)
Hand Knob
Key Lock
H1
H4
H3
Ød6
H2
H6
Ød5
L5
30.0
(1.18)
H5
Y
L6
Y: external
drain port
1/8" BSPP

Inch equivalents for millimeter dimensions are shown in (**)

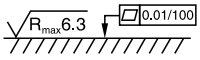
NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.00)	– –	22.1 (0.87)	– –	22.1 (0.87)	53.8 (2.12)	– –	26.9 (1.06)	– –	– –	– –
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.91)	– –	11.1 (0.44)	– –	33.4 (1.31)	70.0 (2.76)	– –	35.0 (1.38)	– –	– –	– –
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	– –	12.7 (0.50)	– –	44.5 (1.75)	82.6 (3.25)	– –	41.3 (1.63)	– –	– –	– –

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-09-*-97	80.0 (3.15)	26.9 (1.06)	206.0 (8.11)	27.0 (1.06)	88.0 (3.46)	136.5 (5.37)	25.0 (0.98)	12.0 (0.47)	52.5 (2.07)	118.5 (4.67)	163.8 (6.45)	– –	180.0 (7.09)	36.5 (1.44)
25	6264-08-13-*-97	100.0 (3.94)	35.0 (1.38)	210.0 (8.27)	45.5 (1.79)	91.5 (3.60)	140.0 (5.51)	25.0 (0.98)	12.0 (0.47)	37.9 (1.49)	124.5 (4.90)	163.8 (6.45)	– –	180.0 (7.09)	36.5 (1.44)
32	6264-10-17-*-97	120.0 (4.72)	41.3 (1.63)	215.5 (8.48)	52.0 (2.05)	97.0 (3.82)	145.5 (5.73)	25.0 (0.98)	12.0 (0.47)	45.0 (1.77)	153 (6.02)	163.8 (6.45)	– –	180.0 (7.09)	36.5 (1.44)

D

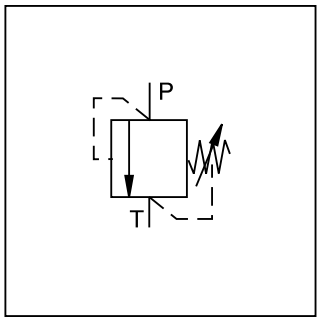
NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	6264-06-09-*-97	14.7 (0.58)	4.8 (0.19)	7.5 (0.30)	10.0 (0.39)	M12	20.0 (0.79)	13.5 (0.53)	20.0 (0.79)
25	6264-08-13-*-97	23.4 (0.92)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M16	27.0 (1.06)	17.5 (0.69)	25.0 (0.98)
32	6264-10-17-*-97	32.0 (1.26)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M18	28.0 (1.10)	20.0 (0.79)	30.0 (1.18)

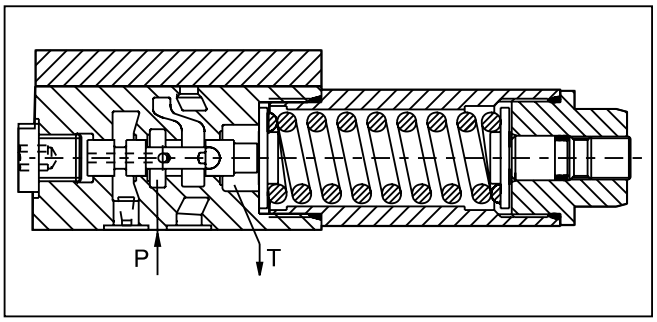
NG	ISO-code	Bolt Kit			Seal Kit Nitrile	Seal Kit Fluorocarbon	Surface Finish
10	6264-06-09-*-97	BK494	4xM12 x 45-DIN 912 12.9	108 Nm (79.6 lb.-ft.) ±15%	S26-96395-0	S26-96395-5	
25	6264-08-13-*-97	BK366	4xM16 x 70-DIN 912 12.9	264 Nm (194.7 lb.-ft.) ±15%	S26-96589-0	S26-96589-5	
32	6264-10-17-*-97	BK507	4xM18 x 75-DIN 912 12.9	398 Nm (293.5 lb.-ft.) ±15%	S26-96392-0	S26-96392-5	

NG	ISO-code	Subplate	Size
10	6264-06-09-*-97	SPP3R6B910	P, T = 3/4" BSPP x = 1/4" BSPP
25	6264-08-13-*-97	SPP6R8B910	P, T = 1 1/4" BSPP x = 1/4" BSPP
32	6264-10-17-*-97	SPP10R12B910	P, T = 1 1/2" BSPP x, y = 1/4" BSPP

General Description

Series VS pressure relief valve is a direct operated spool valve for subplate mounting with internal drain to port T. The connection and function is according to ISO 6264.





Specifiactions

Size	NFPA D03 / NG6
Mounting Interface	ISO 6264
Mounting Position	Unrestricted
Ambient Temperature Range	-20°C to +70°C (-4°F to +158°F)
Working Pressure	Port P: 350 Bar (5075 PSI) Port T: depressurized
Pressure Range	25 Bar (363 PSI) 64 Bar (928 PSI) 160 Bar (2320 PSI) 210 Bar (3045 PSI) 350 Bar (5075 PSI)
Nominal Flow	25 LPM (6.6 GPM)
Pressure Fluid	Hydraulic oil as per DIN 51524 ... 525
Fluid Temperature **Recommended** **Permitted**	 +30°C to +50°C (+86°F to +122°F) -20°C to +70°C (-4°F to +158°F)
Viscosity **Recommended** **Permitted**	 30 to 50 cSt/mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)
Filtration	ISO 4406 (1999), 18/16/13

Features

- Spool type valve.
- Manifold mounting.
- 5 pressure ranges.
- 2 adjustment modes.

Ordering Information

VS — Pressure Relief Valve

□ — Pressure Range

Code	Description
025	25 Bar (363 PSI)
064	64 Bar (928 PSI)
160	160 Bar (2320 PSI)
210	210 Bar (3045 PSI)
350	350 Bar (5075 PSI)

A — Adjustment Screw with Hexagon Socket

06 — Size

Code	Description
06	NFPA D03 / NG6

V — Seal Fluorcarbon

□ — Gage Port

Code	Description
G	BSPP 1/4"
M	M 12x1.5

□ — Lock

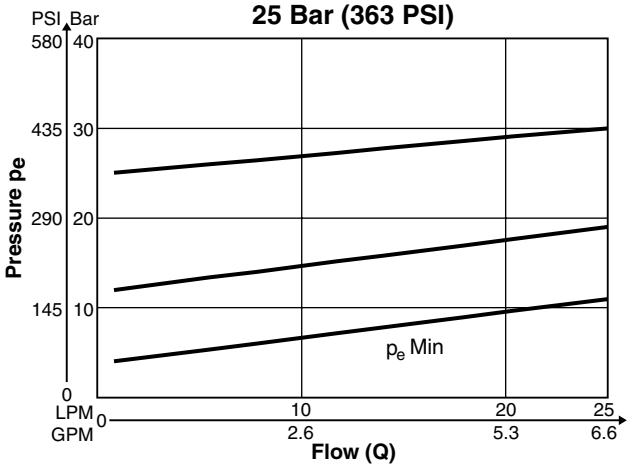
Code	Description
Omit	Normal
Z	Cylinder Lock

⌐ ⌐ — Design Series

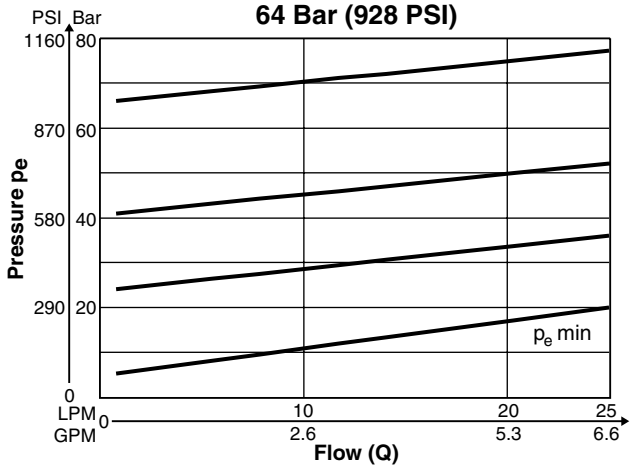
NOTE: Not required when ordering.

Weight: 1.3 kg (2.9 lbs.)

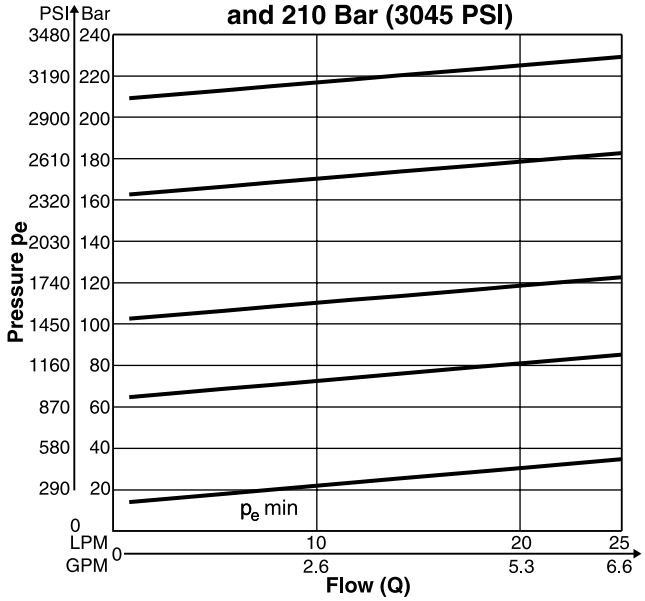
Maximum Setting Pressure 25 Bar (363 PSI)



Maximum Setting Pressure 64 Bar (928 PSI)

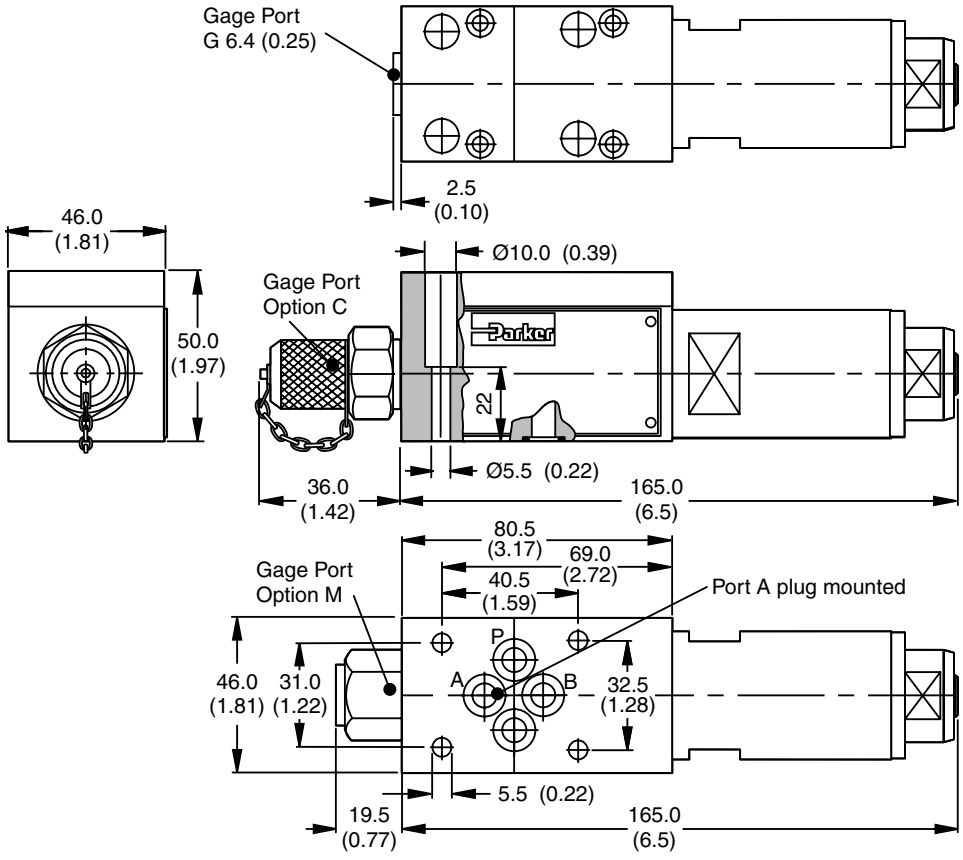


Maximum Setting Pressures 160 Bar (2320 PSI) and 210 Bar (3045 PSI)



D

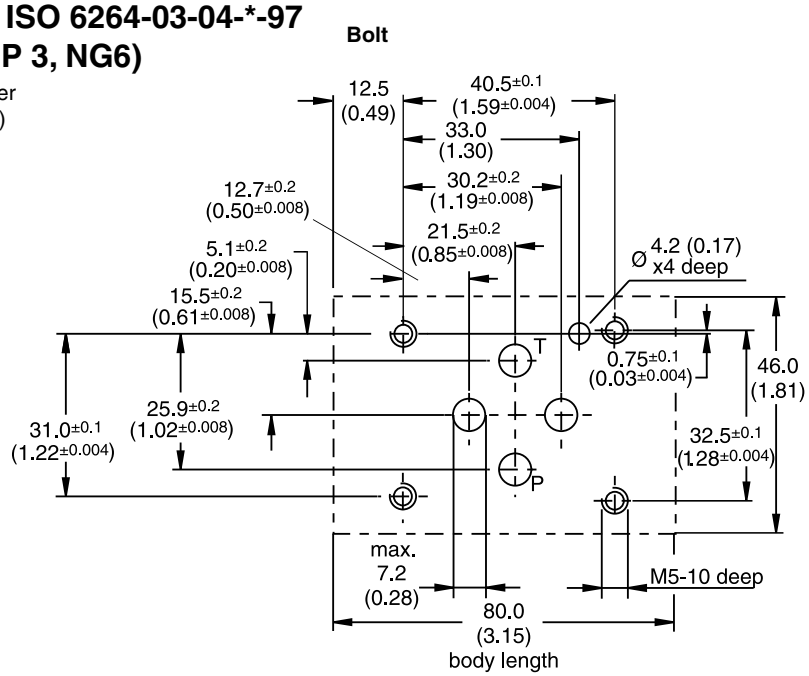
Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Bolt kit DIN912 12.9		Seal Kit Fluorocarbon
R_{max}6.3 0.01/100	M5x30-4pcs	8.1Nm (6.0 lb.-ft.)	SK-VB/VM/VS V

Mounting Pattern ISO 6264-03-04-*-97 (NFPA D03, CETOP 3, NG6)

Inch equivalents for millimeter dimensions are shown in (**)



VS.indd, dd

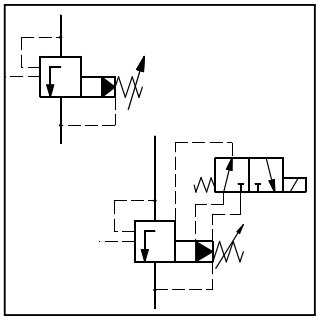
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

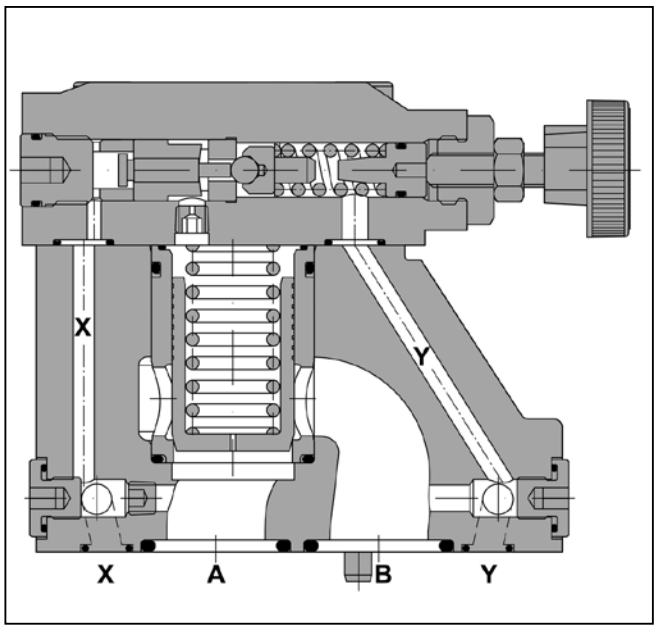
General Description

Series R4U subplate mounted unloading valves are used to unload a circuit at low pressure. The mechanically adjustable pressure signal to unload the main stage has to be applied to port X. The pressure differential between opening and closing is nominal 15% or 28% of the setting pressure:
15% for pressure ranges 350 Bar (5075 PSI) and 28% for 105 Bar (1523 PSI) and 210 Bar (3045 PSI).

Typical applications are to unload the pumps in an accumulator circuit and to unload the low pressure stage of a double pump.

In addition, Series R4U with vent function is vented by electrical operation.

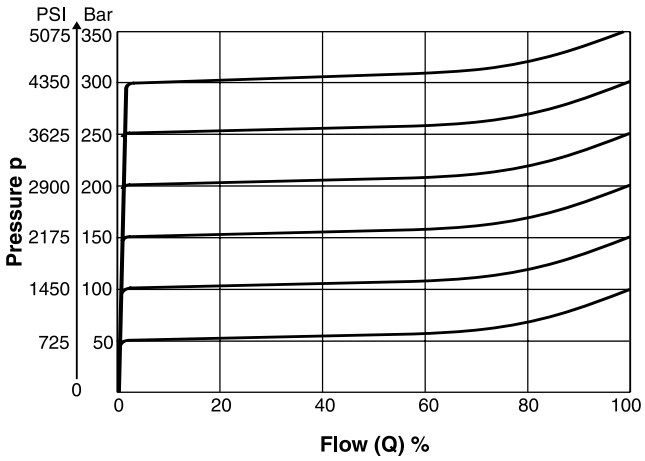


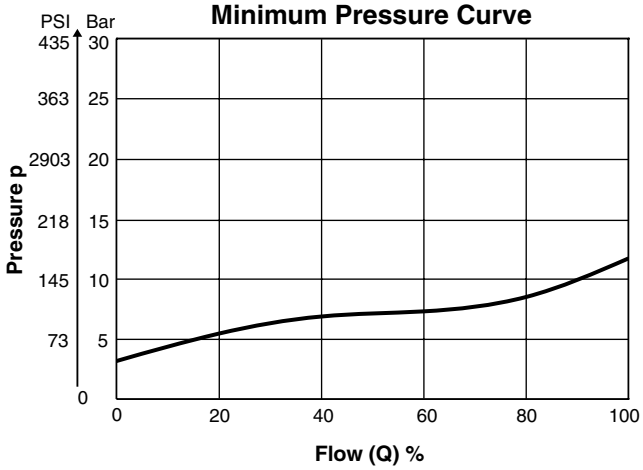


Features

- Pilot operated unloading valve.
- 3 pressure ranges.
- 2 switching types (series R4U with vent function).
- 3 adjustment modes:
  - Hand knob
  - Screw with locknut
  - Key lock

Performance Curves





The performance curves are measured with external drain.
For internal drain the tank pressure has to be added to curve.

R | 4 | U | ☐ | — | 5 | 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | A | ☐ | ☐

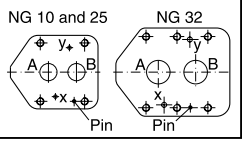
Pressure Valve | Interface | Unloading Function | Valve Size | Maximum Pressure 350 Bar (5075 PSI) | Body Mounting | Pressure Range | Adjustment | Pilot Oil Drain Line | Vent Valve Function | Solenoid Voltage | Design Series | Seal | Options Check with Factory

Code	Description
03	NG10
06	NG25
10	NG32

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Interface
4	Subplate Mounting ISO 5781



Code	Description
1	Hand Knob 32mm dia. Std.
3	Acorn Nut with Lead Seal
4	Key Lock

Code	Description
1	Internal
2	External from Subplate

Code	Description
Omit	Standard without Vent Option
G0R	12 VDC
G0Q	24 VDC
GAR	98 VDC
GAG	205 VDC
W30	110V 50Hz/ 120V 60Hz
W31	230V 50Hz/ 240V 60Hz

Code	Description
Omit	Standard without Vent Option
09	Solenoid not active unpress. circulation
11	Solenoid activivated unpress. circulation

Weight:

R4U03:	2.7 kg	(6.0 lbs.)
R4U06:	4.5 kg	(9.9 lbs.)
R4U10:	6.0 kg	(13.2 lbs.)

Weight: with Vent

R4U03:	4.4 kg	(9.7 lbs.)
R4U06:	6.2 kg	(13.7 lbs.)
R4U10:	7.7 kg	(17.0 lbs.)

D

General			
Size	**NG10**	**NG25**	**NG32**
Interface	Subplate mounting acc. ISO 5781		
Mounting Position	As desired, horizontal mounting preferred		
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)		
Hydraulic			
Operating Pressure	Ports A and X up to 350 Bar (5075 PSI), Ports B and Y depressurized		
Pressure Range	105, 210, 350 Bar (1523, 3045, 5075 PSI)		
Pressure Differential	15% for pressure range 350 Bar (2538 PSI) 28% for pressure ranges 105 Bar (1523 PSI) and 250 Bar (3625 PSI)		
Nominal Flow	150 LPM (39.7 GPM)	350 LPM (92.6 GPM)	650 LPM (172.0 GPM)
Pressure Fluid	Hydraulic oil according to DIN 51524 ... 525		
Viscosity Recommended **Maximum**	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)		
Pressure Fluid Temperature **Recommended** **Maximum**	 +30°C to +50°C (+86°F to +122°F) -20°C to +70°C (-4°F to +158°F)		
Filtration	ISO 4406 (1999), 18/16/13		

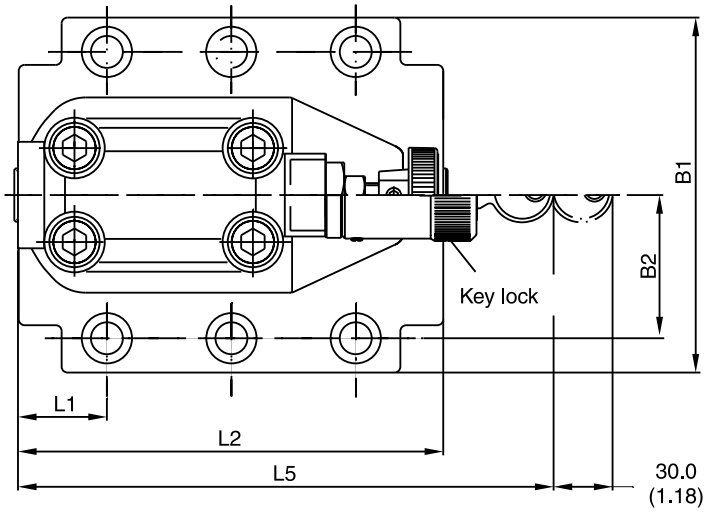
With Vent Function

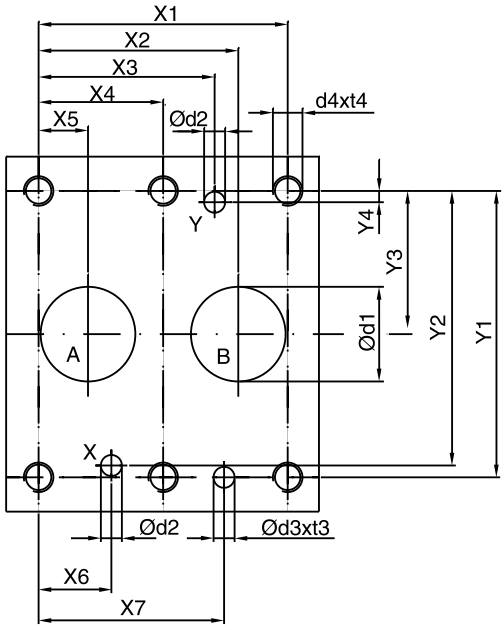
General			
Size	**NG10**	**NG25**	**NG32**
Interface	Subplate mounting acc. ISO 5781		
Mounting Position	As desired, horizontal mounting preferred		
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)		
Hydraulic			
Operating Pressure	Ports A and X up to 350 Bar (5075 PSI), Ports B and Y depressurized		
Pressure Range	105, 210, 350 Bar (1523, 3045, 5075 PSI)		
Pressure Differential	15% for pressure range 350 Bar (5075 PSI) 28% for pressure ranges 105 Bar (1523 PSI) and 250 Bar (3625 PSI)		
Nominal Flow	150 LPM (39.7 GPM)	350 LPM (92.6 GPM)	650 LPM (172.0 GPM)
Pressure Fluid	Hydraulic oil according to DIN 51524 ... 525		
Viscosity Recommended **Maximum**	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)		
Pressure Fluid Temperature **Recommended** **Maximum**	 +30°C to +50°C (+86°F to +122°F) -20°C to +70°C (-4°F to +158°F)		
Filtration	ISO 4406 (1999), 18/16/13		
Electrical (solenoid)			
Duty Cycle	100% ED CAUTION: Coil temperature up to 180°C (356°F) possible		
Max. Switching Frequency	16,000 (DC), 7200 (AC)		
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)		

Code	**G0R**	**G0Q**	**GAR**	**GAG**	**W30**	**W31**
Supply Voltage	12V	24V	98V	205V	110 at 50Hz 120 at 60Hz	230 at 50Hz 240 at 60Hz
Supply Tolerance	+5...-10	+5...-10	+5...-10	+5...-10	+5...-10	+5...-10
Power Consumption Hold	31W	31W	31W	31W	78W	78W
In Rush	31W	31W	31W	31W	264W	264W

Solenoid Connection	Connector as per EN 175301-803
Wiring Minimum	3 x 1.5 mm² recommended
Wiring Length Maximum	50 m (164 ft.) recommended

D


B1
B2
Key lock
L1
L2
L5
30.0
(1.18)


X1
X2
X3
X4
X5
Ød2
d4xt4
Y
Y4
Y3
Y2
Y1
A
B
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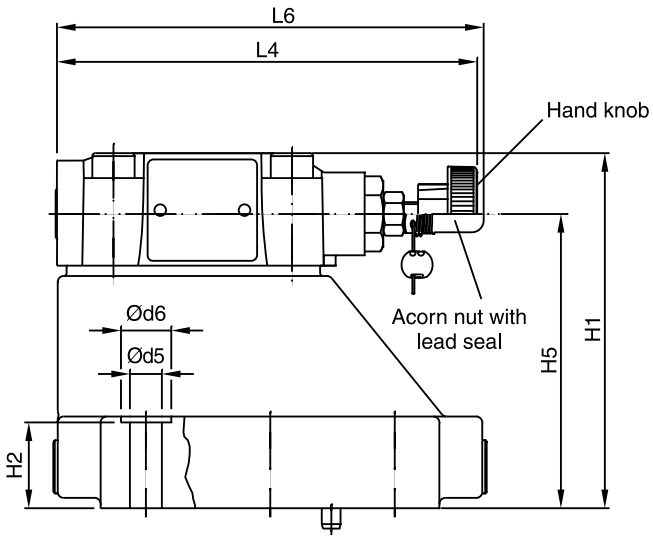
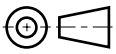
X
Ød2
Ød3xt3
X6
X7


L6
L4
Hand knob
Acorn nut with
lead seal
Ød6
Ød5
H5
H1
H2



Inch equivalents for millimeter dimensions are shown in (**)

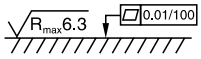
NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 0.85)	–	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	–	–
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	–	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	–	–
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	–	–

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

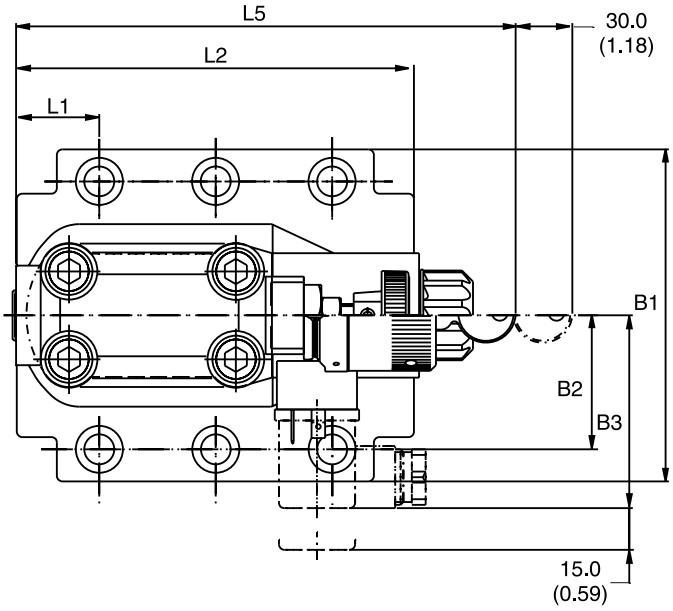
NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	62.5 (2.46)	–	–	–	29.0 (1.14)	94.8 (3.73)	–	141.0 (5.55)	181.0 (7.13)	–
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	89.0 (3.50)	–	–	–	34.7 (1.37)	126.8 (4.99)	–	141.0 (5.55)	181.0 (7.13)	–
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	99.5 (3.92)	–	–	–	30.6 (1.20)	144.3 (5.68)	–	141.0 (5.55)	181.0 (7.13)	–

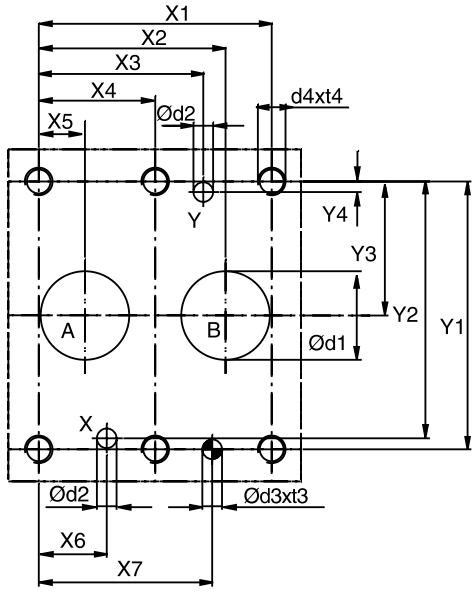
D

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	5781-06-07-0-00	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal Kit Nitrile	Fluorocarbon	Surface Finish
10	5781-06-07-0-00	BK505	4xM10 x 35-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58507-0	S26-58507-5	
25	5781-08-10-0-00	BK485	4xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58475-0	S26-58475-5	
32	5781-10-13-0-00	BK506	6xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58508-0	S26-58508-5	

NG	ISO-code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP x, y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1 1/2" BSPP x, y = 1/4" BSPP


L5
30.0
(1.18)
L2
L1
B1
B2
B3
15.0
(0.59)


X1
X2
X3
X4
X5
Ød2
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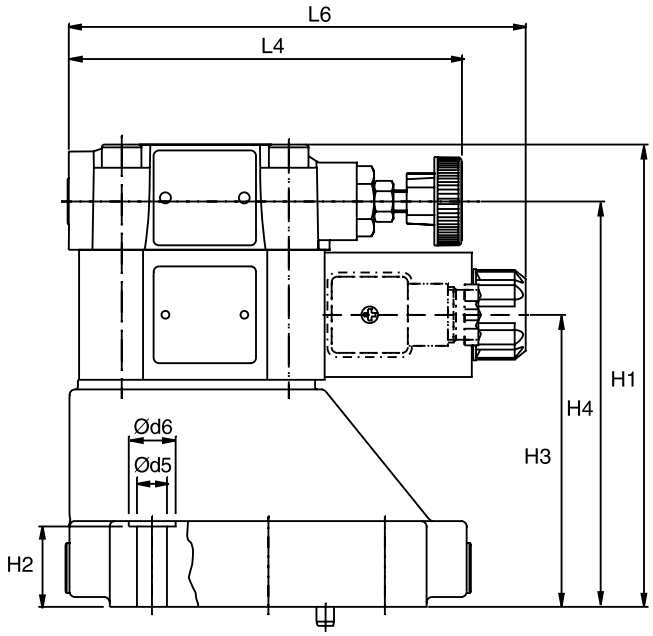
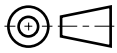
Y
Y4
Y3
Y2
Y1
A
B
Ød1
X
Ød2
Ød3xt3
X6
X7


L6
L4
H1
H4
H3
Ød6
Ød5
H2



D

Inch equivalents for millimeter dimensions are shown in (**)

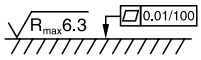
NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	–	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	–	–
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	–	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	–	–
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	–	–

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

NG	ISO-code	B1	B2	B3	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	70.0 (2.76)	130.0 (5.12)	21.0 (0.83)	68.5 (2.70)	109.5 (4.13)	–	–	29.0 (1.14)	94.8 (3.73)	–	141.0 (5.55)	181.0 (7.13)	165.6 (6.52)
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	70.0 (2.76)	156.5 (6.16)	29.0 (1.14)	95.0 (3.74)	136.0 (5.35)	–	–	34.7 (1.37)	126.8 (4.99)	–	141.0 (5.55)	181.0 (7.13)	165.6 (6.52)
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	70.0 (2.76)	167.0 (6.57)	29.0 (1.14)	105.5 (4.15)	146.5 (5.77)	–	–	30.6 (1.20)	144.3 (5.68)	–	141.0 (5.55)	181.0 (7.13)	165.6 (6.52)

D

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	5781-06-07-0-00	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

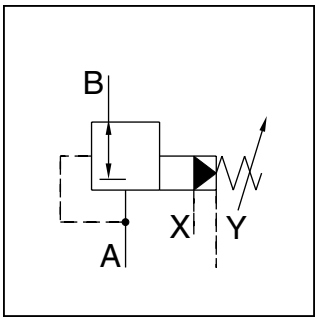
NG	ISO-code	Bolt Kit			Seal Kit Nitrile	Fluorocarbon	Surface Finish
10	5781-06-07-0-00	BK505	4xM10 x 35-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58507-0*	S26-58507-5*	
25	5781-08-10-0-00	BK485	4xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58475-0*	S26-58475-5*	
32	5781-10-13-0-00	BK506	6xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58508-0*	S26-58508-5*	
VV01					S56-40609-0	S56-40609-5	

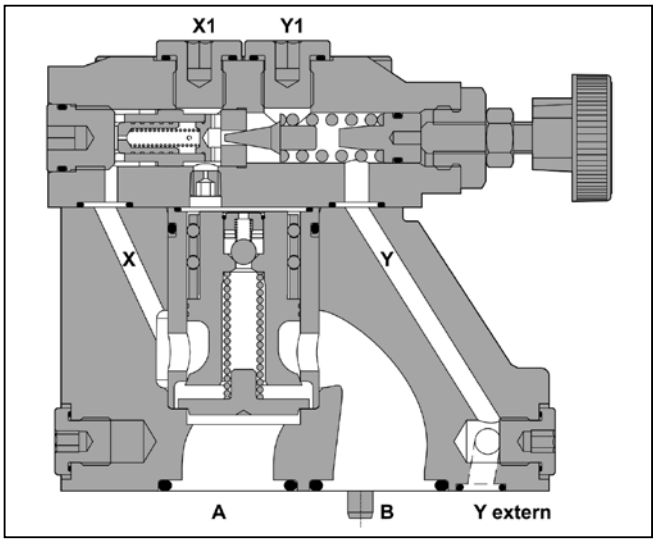
*Please combine seal kit of one size with seal kit of VV01 DC / AC solenoid for complete seal kit.

NG	ISO-code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP x, y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1 1/2" BSPP x, y = 1/4" BSPP

General Description

Series R4R pressure reducing valves are used to control the pressure in the secondary part of the hydraulic system. Independent of the primary pressure the secondary pressure is reduced to the pressure setting. In order to avoid undesired motion the valves are normally closed.





Specifications

Size	NG10, NG25, NG32
Interface	Subplate mounting acc. ISO 5781
Mounting Pos.	As desired, horizontal mounting preferred
Ambient Temp.	-20°C to +80°C (-4°F to +176°F)
Max. Oper. Pressure	Ports A, B and X: 350 Bar (5075 PSI), Port Y: depressurized
Pressure Range	up to 105, 210, 350 Bar (1523, 3045, 5075 PSI)
Nominal Flow	Size NG10: 150 LPM (39.7 GPM) Size NG25: 350 LPM (92.6 GPM) Size NG32: 500 LPM (132.3 GPM)
Pressure Fluid	Hydraulic oil according to DIN 51524... 51525
Pressure Fluid Temperature	Recommended: +30C to +50°C (86°F to +122°F) Maximum: -20°C to +70°C (-4°F to +158°F)
Viscosity	Recommended: 30 to 50 cSt (mm^2/s) Maximum: 20 to 380 cSt (mm^2/s)
Filtration	ISO 4406 (1999), 18/16/13

Features

- Subplate mounting acc. to ISO 5781.
- Normally closed to avoid unintended motion.
- 3 pressure ranges.
- Three adjustment modes:
  – Hand knob
  – Acorn nut with lead seal
  – Key lock

Ordering Information

R	4	R	☐	—	5	7	☐	☐	☐	B	☐	☐
Pressure Reducing Valve	Interface	Reducing Function	Size		Maximum Pressure 350 Bar (5075 PSI)	Body Mounting	Pressure Range	Adjustment	Pilot Oil	Design Series	Seal	Options Check with Factory

Size

Code	Description
03	NG10
06	NG25
10	NG32

Mounting: Subplate mounting

Pressure Range

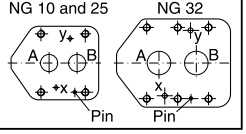
Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Seal

Code	Description
1	Nitrile
5	Fluorocarbon

Interface

Code	Interface
4	Subplate Mounting ISO 5781



Adjustment

Code	Description
1	Hand Knob 32mm dia. Std.
3	Acorn Nut with Lead Seal
4	Key Lock

Pilot Oil

Code	Description	
	Pilot	Drain
1	Internal	External from Y
2	Internal	External from Y1

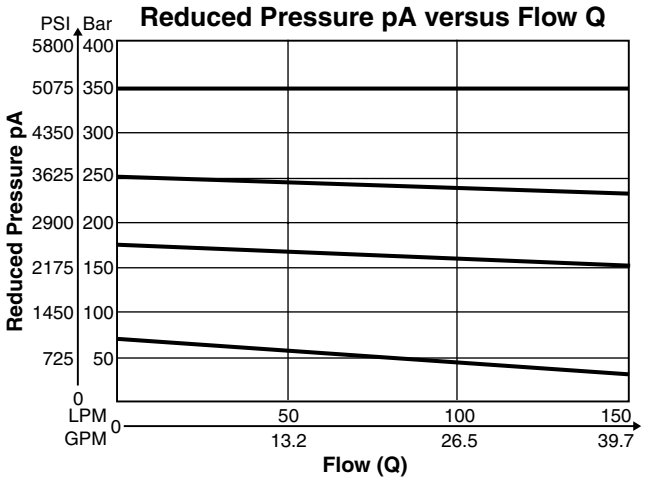
Weight:

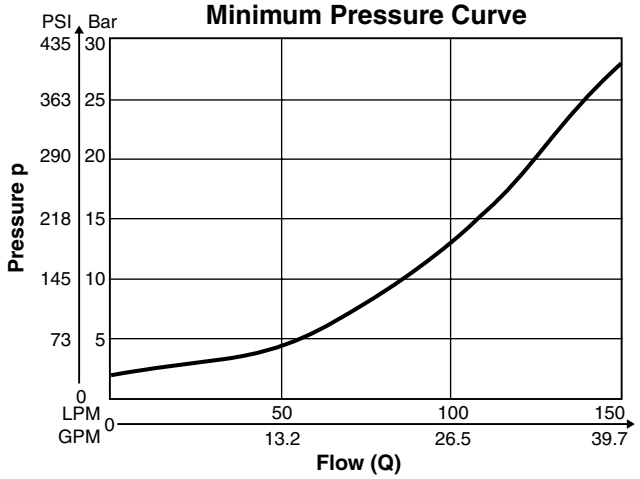
R4R03:	4.8 kg	(10.6 lbs.)
R4R06:	7.2 kg	(15.9 lbs.)
R4R10:	13.5 kg	(29.8 lbs.)

R4R.indd, dd

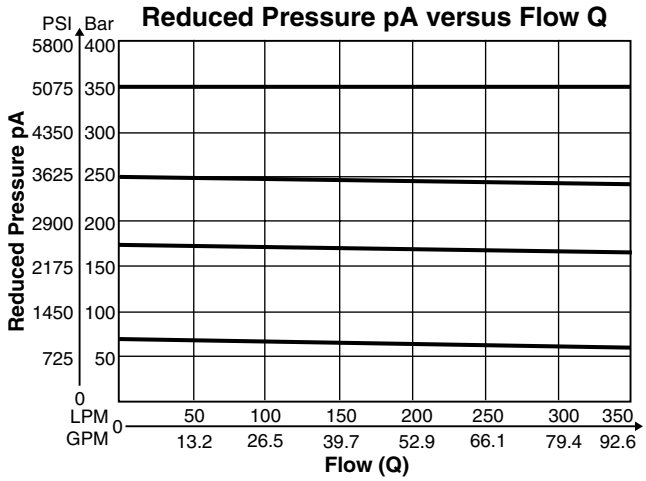
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

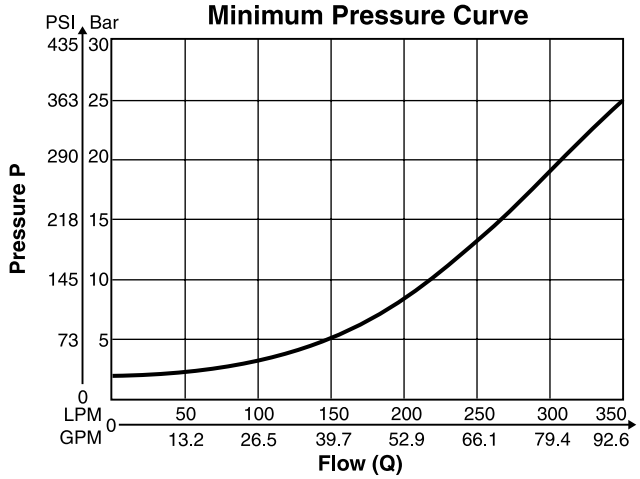
R4R03 [1)]



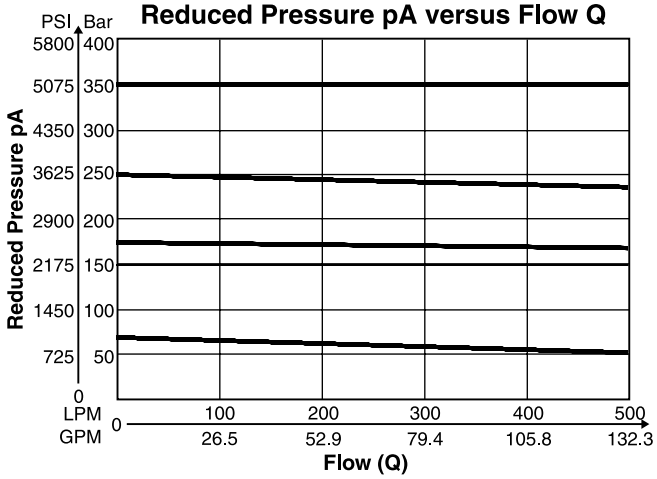


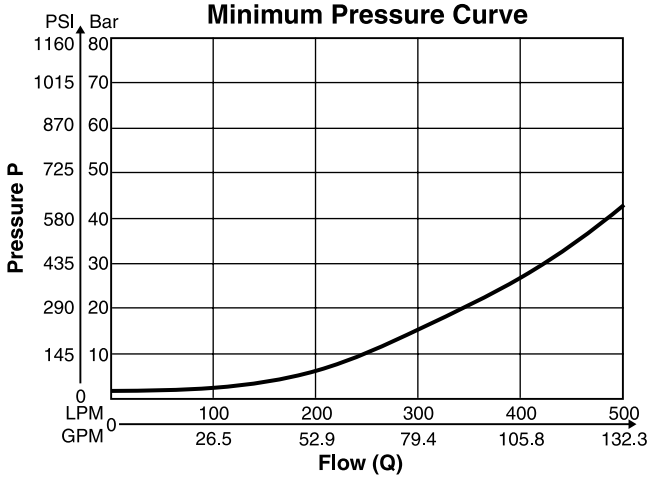
R4R06 [1)]





R4R10 [1)]

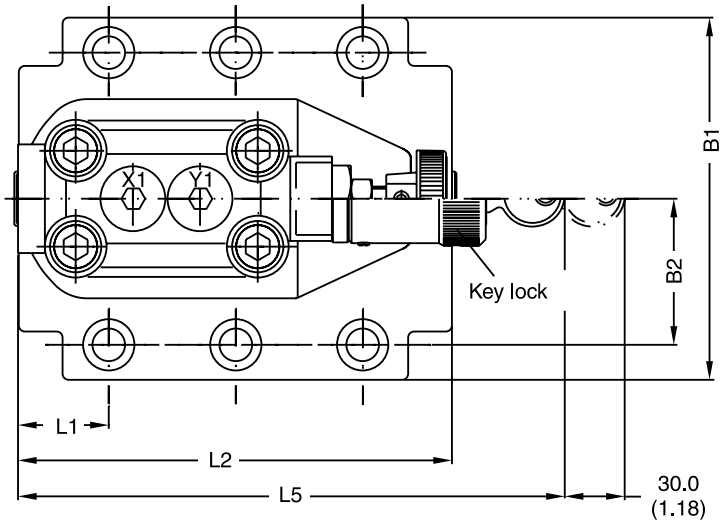


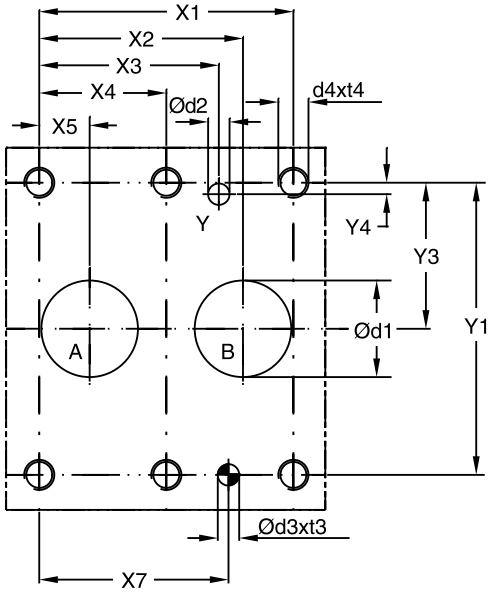


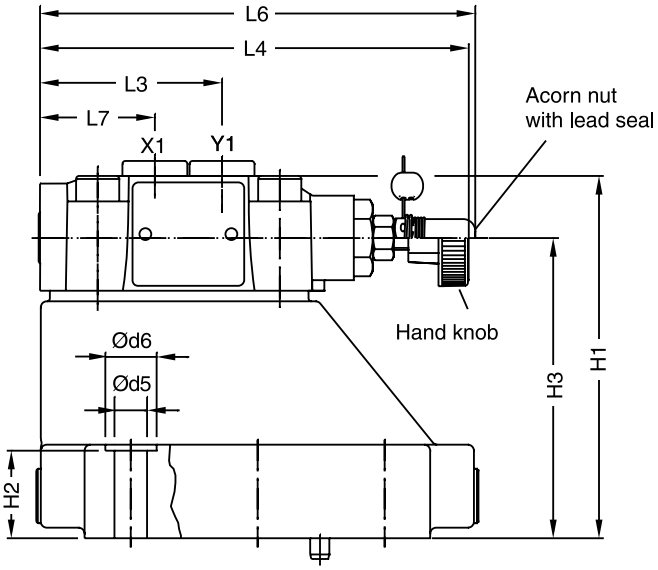
[1)] Measured at 350 Bar (5075 PSI) primary pressure pB.

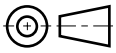
R4R.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA


X1
Y1
B1
B2
Key lock
L1
L2
L5
30.0
(1.18)


X1
X2
X3
X4
X5
Ød2
d4xt4
Y
Y4
Y3
Y1
A
B
Ød1
Ød3xt3
X7


L6
L4
L3
L7
X1
Y1
Acorn nut
with lead seal
Hand knob
Ød6
Ød5
H2
H3
H1



Inch equivalents for millimeter dimensions are shown in (**)

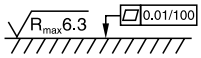
NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	– –	7.2 (0.28)	– –	31.8 (1.25)	66.7 (2.63)	– –	33.4 (1.31)	7.9 (0.31)	– –	– –
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	– –	11.1 (0.44)	– –	44.5 (1.75)	79.4 (3.13)	– –	39.7 (1.56)	6.4 (0.25)	– –	– –
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	– –	62.7 (2.47)	96.8 (3.81)	– –	48.4 (1.92)	3.8 (0.15)	– –	– –

Tolerance for all dimensions ±0.2

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L7
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	62.5 (2.46)	– –	– –	– –	29.0 (1.14)	94.8 (3.73)	60.8 (2.39)	141.0 (5.55)	181.0 (7.13)	38.6 (1.52)
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	89.0 (3.50)	– –	– –	– –	34.7 (1.37)	126.8 (4.99)	60.8 (2.39)	141.0 (5.55)	181.0 (7.13)	38.6 (1.52)
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	99.5 (3.92)	– –	– –	– –	30.6 (1.20)	144.3 (5.68)	60.8 (2.39)	141.0 (5.55)	181.0 (7.13)	38.6 (1.52)

D

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	5781-06-07-0-00	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

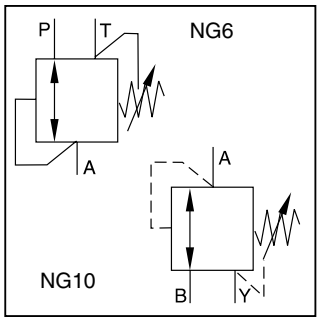
NG	ISO-code	Bolt Kit			Seal Kit Nitrile	Fluorocarbon	Surface Finish
10	5781-06-07-0-00	BK505	4xM10 x 35-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58507-0	S26-58507-5	
25	5781-08-10-0-00	BK485	4xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58475-0	S26-58475-5	
32	5781-10-13-0-00	BK506	6xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58508-0	S26-58508-5	

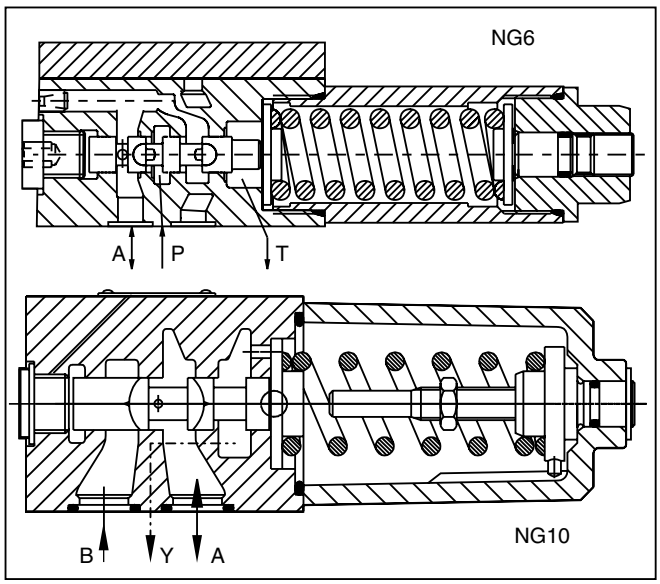
NG	ISO-code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP x, y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1 1/2" BSPP x, y = 1/4" BSPP

General Description

Series VM direct operated, pressure reducing valve with manual adjustment. Series VM is a direct-controlled, spring loaded 3-way pressure reducing valve, that is open in neutral position. The valve closes the connection from P to A (NG6) or B to A (NG10) when the pre-set pressure is exceeded.

If the pressure increases due to an external influence in connection A, the spool moves and opens the connection from A to T (NG6) or A to Y (NG10) until the pre-set pressure is reached.





D

Features

- Spool type valve.
- Manifold mounting acc. to ISO 5871.
- 5 pressure ranges at NG6.
- 3 pressure ranges at NG10.
- 2 adjustment modes.

Ordering Information

V	M	☐	A	☐	V	☐	☐	⌐ ¬
	Pressure Reducing Valve	Maximum Pressure Setting	Adjustment Screw with Hexagon Socket	Size	Seal Fluorocarbon	Gage Port	Lock	Design Series NOTE: Not required when ordering.

Code	Description	
025[1]	25 Bar	(363 PSI)
064	64 Bar	(928 PSI)
125[2]	125 Bar	(1813 PSI)
160[1]	160 Bar	(2320 PSI)
210	210 Bar	(3045 PSI)
350[1]	350 Bar	(5075 PSI)

[1] NG6 only
[2] NG10 only

Code	Description
06	NG6
10	NG10

Code	Description
G[1]	1/4" BSPP
M	M18x1.5 [2] M12x1.5 [1]

[1] NG6 only
[2] NG10 only

Code	Description
Omit	No Lock
Z	Cylinder Lock

Weight:

VM*A06	1.3 kg (2.9 lbs.)
VM*A10	3.7 kg (8.2 lbs.)

General		
Size	**NG6**	**NG10**
Interface	Subplate mounting acc. ISO 5781	
Mounting Position	Unrestricted	
Ambient Temperature	-20°C to +70° (-4°F to +158°F)	
Hydraulic		
Working Pressure	Ports P and A 350 Bar (5075 PSI) Port T depressurized	Ports A and B 210 Bar (3045 PSI) Port Y depressurized
Pressure Range	25, 64, 160, 210, 350 Bar (363, 928, 2320, 3045, 5075 PSI)	64, 125, 210 Bar (928, 1813, 3045 PSI)
Nominal Flow	25 LPM (6.6 GPM)	60 LPM (15.9 GPM)
Pressure Fluid	Hydraulic oil according to DIN 51524 ... 525	
Viscosity Recommended **Maximum**	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)	
Pressure Fluid Temperature **Recommended** **Permitted**	 +30°C to +50°C (+86°F to +122°F) -20°C to +70° (-4°F to +158°F)	
Filtration	ISO 4406 (1999), 18/16/13	

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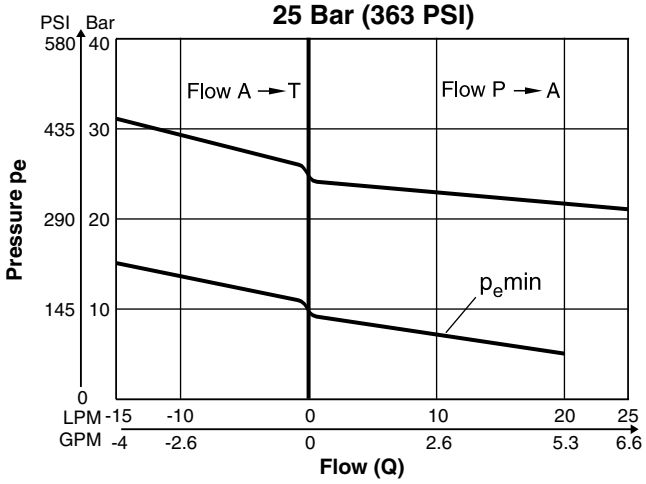
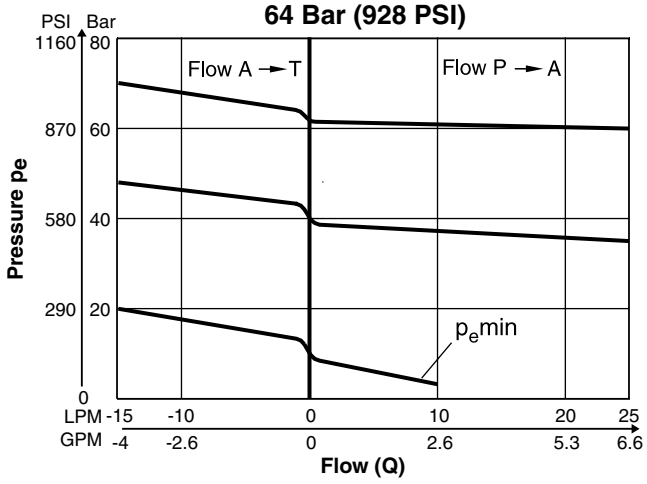
VM*06

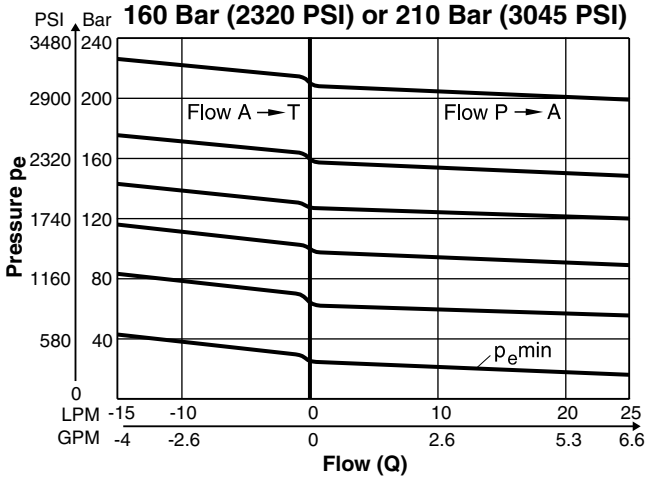
Maximum Pressure Setting
25 Bar (363 PSI)



Maximum Pressure Setting
64 Bar (928 PSI)

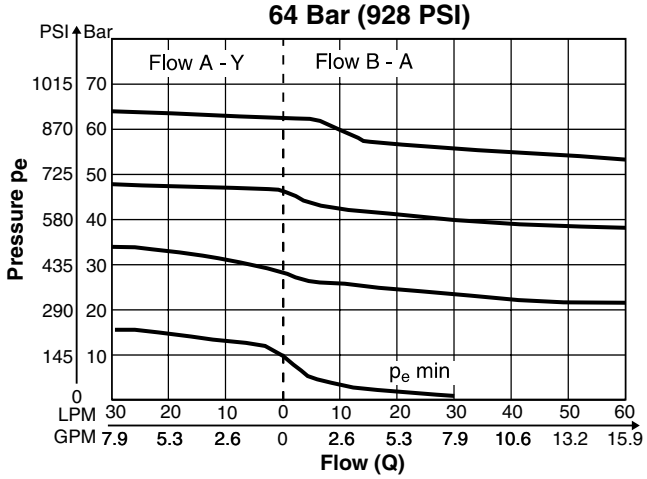


Maximum Pressure Setting
160 Bar (2320 PSI) or 210 Bar (3045 PSI)

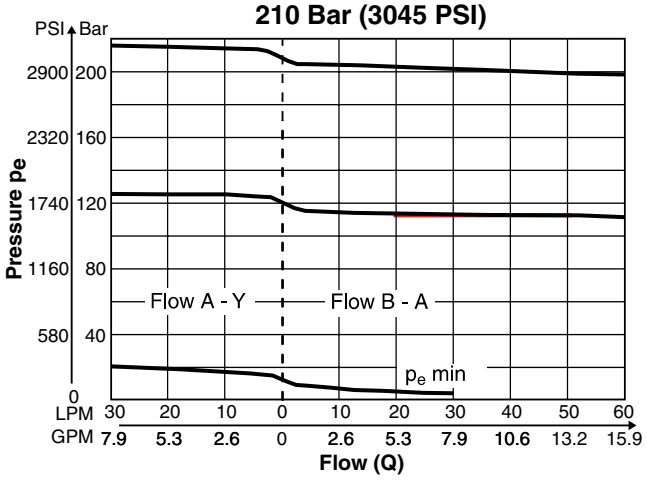


VM*10

Maximum Pressure Setting
64 Bar (928 PSI)



Maximum Pressure Setting
210 Bar (3045 PSI)

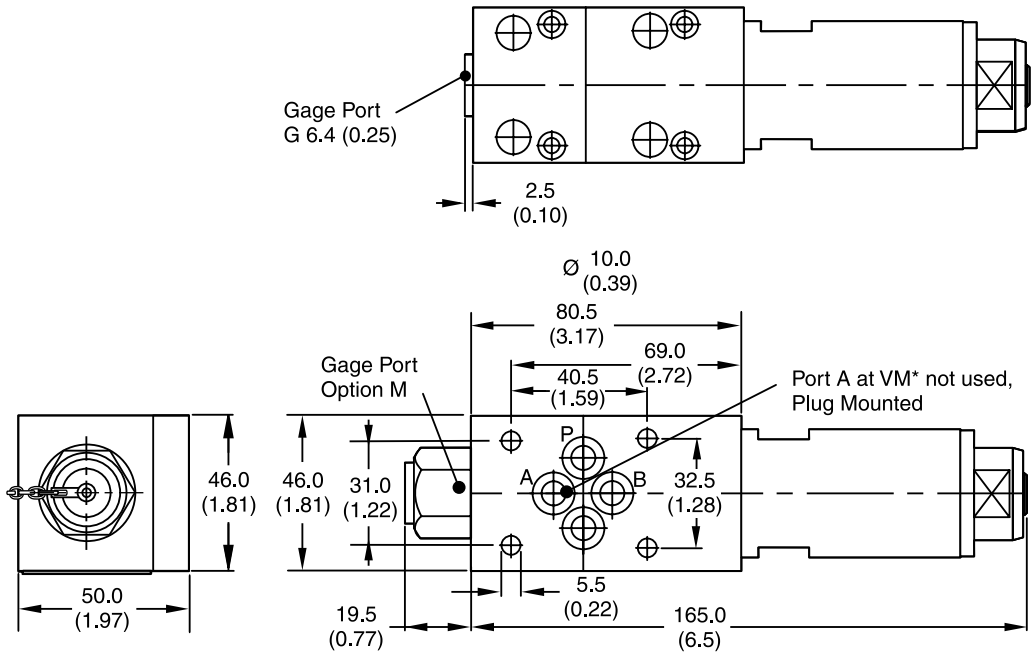


VM.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

VM*06

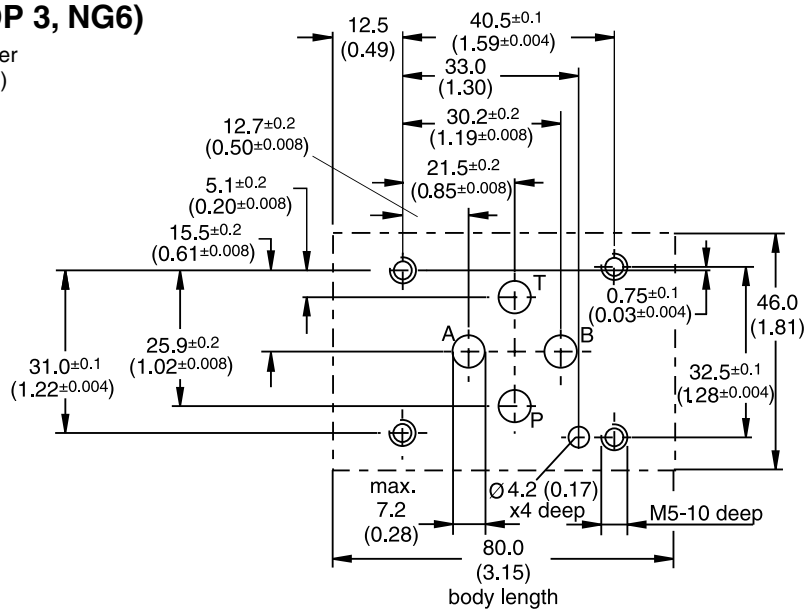
Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Bolt Kit DIN912 12.9		Seal Kit Fluorocarbon
R_{max}6.3 ⏥ 0.01/100	BK375 4x M5x30	8.1 Nm (6.0 lb.-ft.)	SK-VB/VM/VS-V

Mounting Pattern ISO 5871-03-04-0-00 (NFPA D03, CETOP 3, NG6)

Inch equivalents for millimeter dimensions are shown in (**)

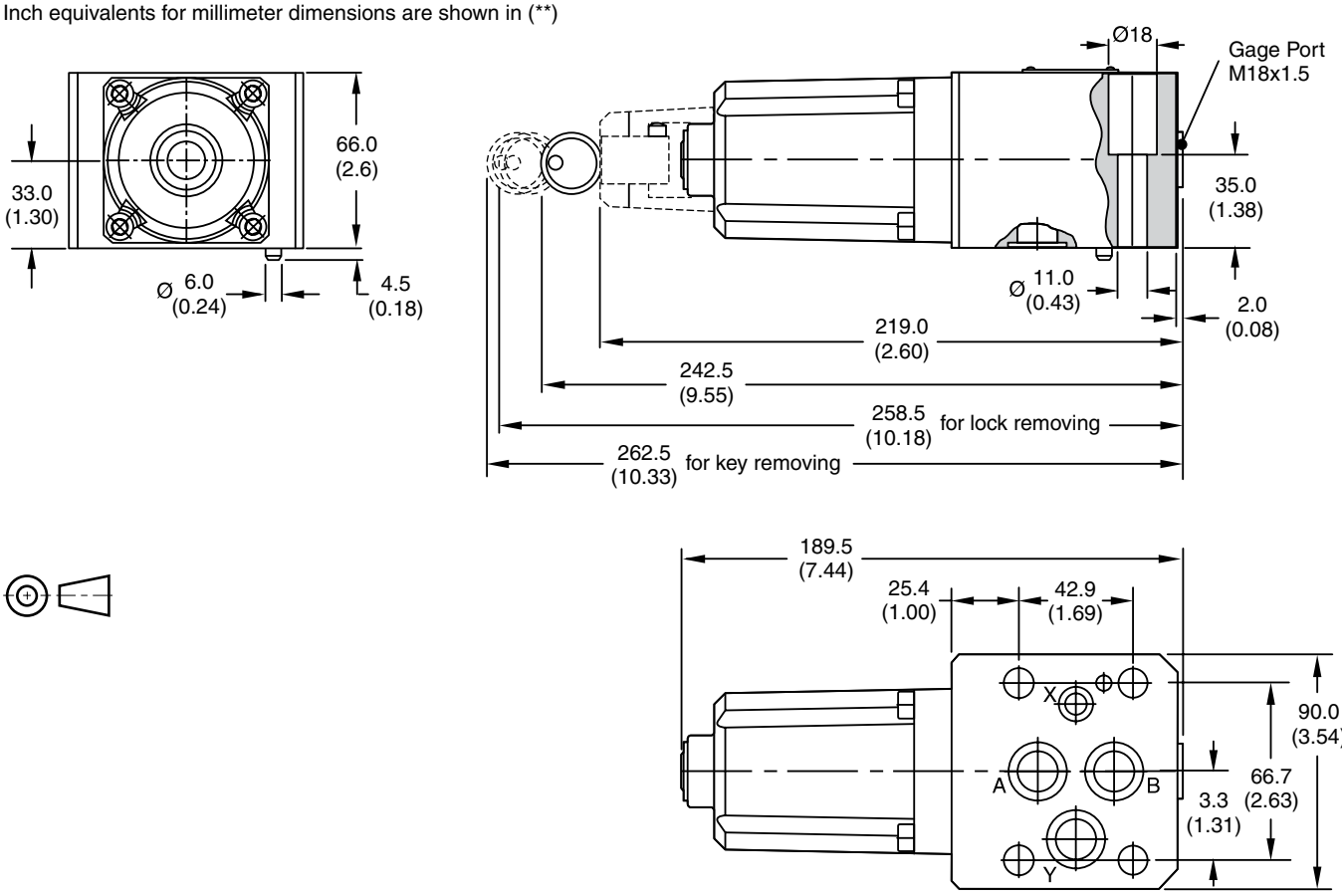


VM.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

VM*10

Inch equivalents for millimeter dimensions are shown in (**)

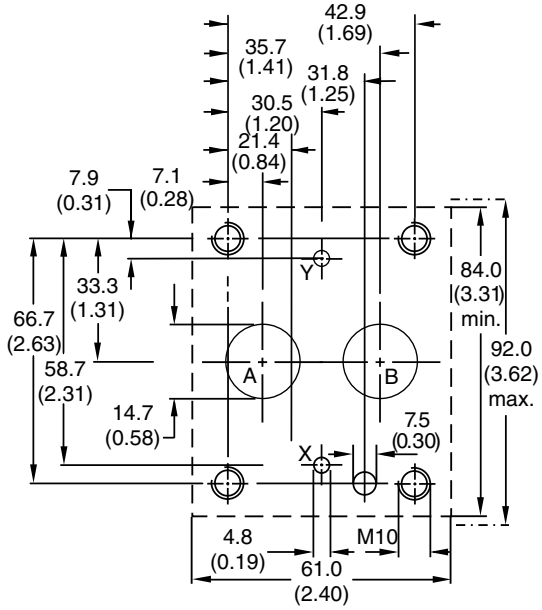


Surface Finish	Bolt Kit DIN912 12.9		Seal Kit Fluorocarbon
R_{max}6.3 0.01/100	BK389 4x M10x50	65 Nm (47.9 lb.-ft.)	SK-VB/VM-A10V

Mounting Pattern ISO 5871-06-07-0-00

Inch equivalents for millimeter dimensions are shown in (**)

Subplate	Size
SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP



VM.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Notes

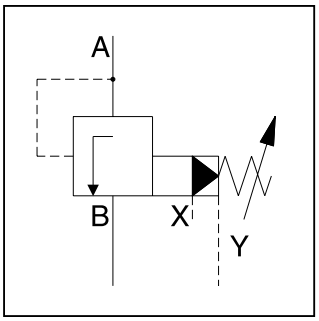
Return to ALPHA TOC
Return to SECTION TOC
D

VM.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

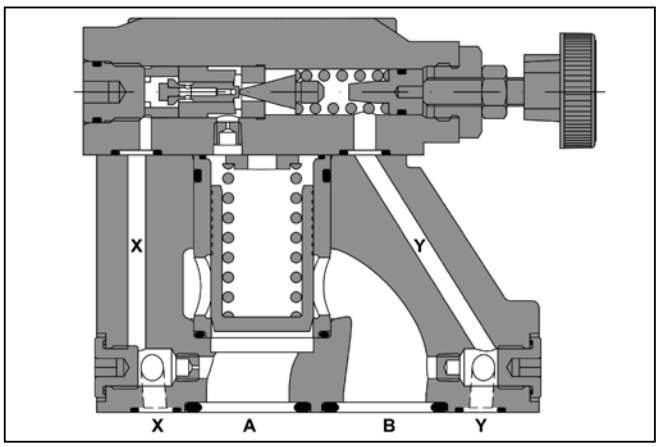
General Description

Series R4S pilot operated sequence valves enable a hydraulic system to operate in a pressure sequence. When the system pressure reaches the setting pressure the valve opens and permits flow to the secondary sub-system.



Features

- Pilot-operated sequence valve.
- 3 pressure ranges.
- 3 adjustment modes:
  - – Hand knob
  - – Acorn nut with lead seal
  - – Key lock



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Ordering Information

R	4	S	☐	—	5	7	☐	☐	1	A	☐
Pressure Valve	Interface	Relief Function	Size		Maximum Pressure 350 Bar (5075 PSI)	Body Mounting	Pressure Range	Adjustment	External Drain from Subplate	Design Series	Seal

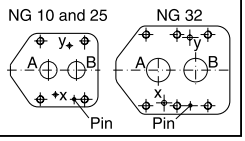
Code	Description
03	NG10
06	NG25
10	NG32

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
1	Hand Knob 32mm dia. Std.
3	Acorn Nut with Lead Seal
4	Key Lock

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Interface
4	Subplate Mounting ISO 5781



Weight:

R4S03:	2.7 kg	(6.0 lbs.)
R4S06:	4.5 kg	(9.0 lbs.)
R4S10:	6.0 kg	(13.2 lbs.)

Specifications

General			
Size	**NG10**	**NG25**	**NG32**
Interface	Subplate mounting acc. ISO 5781		
Mounting Position	As desired, horizontal mounting preferred		
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)		
Hydraulic			
Operating Pressure	Ports A, B and X up to 350 Bar (5075 PSI), Port Y: depressurized		
Pressure Range	up to 105, 210, 350 Bar (1523, 3045, 5075 PSI)		
Nominal Flow	150 LPM (39.7 GPM)	350 LPM (92.6 GPM)	650 LPM (172.0 GPM)
Pressure Fluid	Hydraulic oil according to DIN 51524 ... 51525		
Viscosity **Recommended** **Maximum**	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)		
Pressure Fluid Temperature **Recommended** **Maximum**	 +30°C to +50°C (+86°F to +122°F) -20°C to +70° (-4°F to +158°F)		
Filtration	ISO 4406 (1999), 18/16/13		

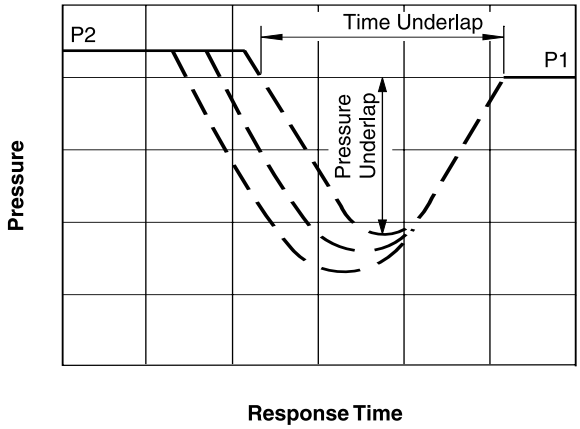
D

Performance Curves

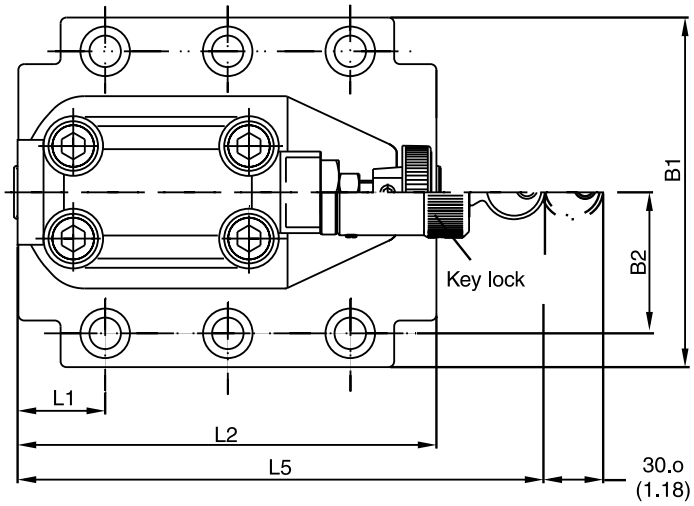
Typical pressure curves at closing point

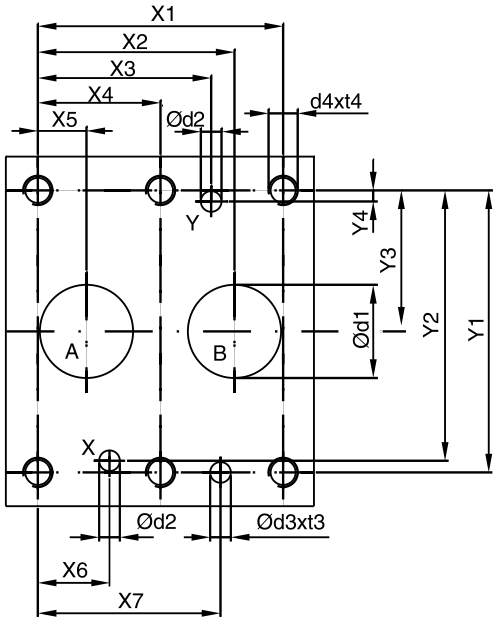
P1 = setting pressure

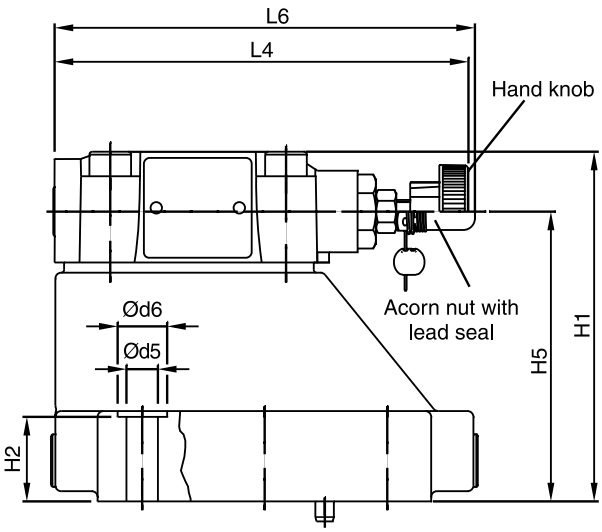
P2 = operating pressure

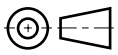


Note:
Time and pressure underlap depend on the characteristics of a specific system.


B1
B2
Key lock
L1
L2
L5
30.o
(1.18)


X1
X2
X3
X4
X5
Ød2
d4xt4
Y
Y4
Y3
Y2
Y1
Ød1
A
B
X
Ød2
Ød3xt3
X6
X7


L6
L4
Hand knob
Acorn nut with
lead seal
Ød6
Ød5
H2
H5
H1



Inch equivalents for millimeter dimensions are shown in (**)

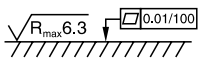
NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	–	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	–	–
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	–	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	–	–
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	–	–

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	62.5 (2.46)	–	–	–	29.0 (1.14)	94.8 (3.73)	–	141.0 (5.55)	181.0 (7.13)	–
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	89.0 (3.50)	–	–	–	34.7 (1.37)	126.8 (4.99)	–	141.0 (5.55)	181.0 (7.13)	–
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	99.5 (3.92)	–	–	–	30.6 (1.20)	144.3 (5.68)	–	141.0 (5.55)	181.0 (7.13)	–

D

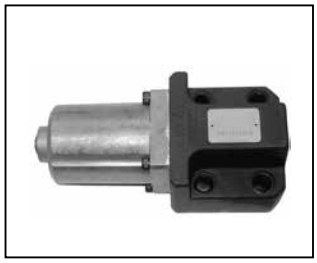
NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	5781-06-07-0-00	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

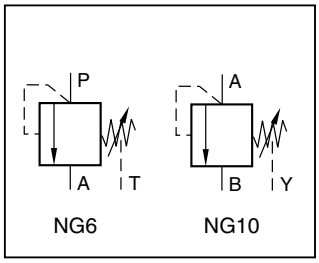
NG	ISO-code	Bolt Kit			Seal Kit Nitrile	Fluorocarbon	Surface Finish
10	5781-06-07-0-00	BK505	4xM10 x 35-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58507-0	S26-58507-5	
25	5781-08-10-0-00	BK485	4xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58475-0	S26-58475-5	
32	5781-10-13-0-00	BK506	6xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58508-0	S26-58508-5	

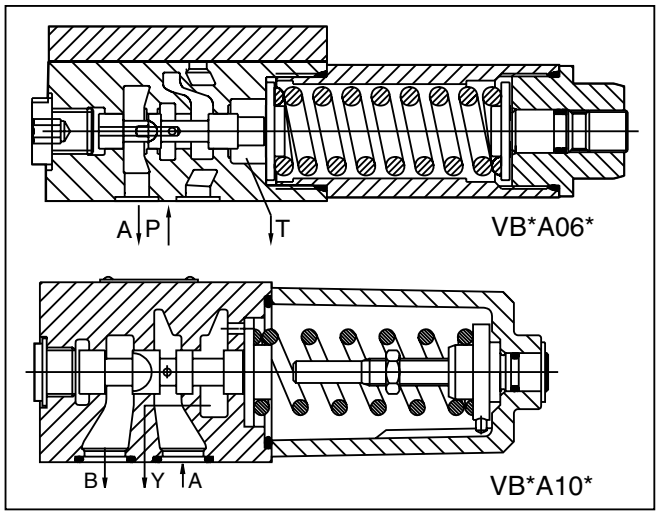
NG	ISO-code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP x, y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1 1/2" BSPP x, y = 1/4" BSPP

General Description

Series VB are direct operated pressure relief valves with manual adjustment. Series VB valves can also be used as pressure sequence valves because of the high pressure capability in the outlet port and the external drain port.







Specifications

Size	NG6, NG10
Interface	ISO 5791
Mounting Pos.	Unrestricted
Ambient Temp.	-20°C to +80°C (-4°F to +176°F)
Max. Operating Pressure	Size 6: Ports P and A 350 Bar (5075 PSI), Port T depressurized Size 10: Ports A and B 315 Bar (4568 PSI), Port Y depressurized
Pressure Range	Size 6: 25, 64, 160, 210, 350 Bar (363, 928, 2320, 3045, 5075 PSI) Size 10: 64, 125, 210 Bar (928, 1813, 3045 PSI)
Nominal Flow	Size 6: 25 LPM (6.6 GPM) Size 10: 60 LPM (15.9 GPM)
Pressure Fluid	Hydraulic oil according to DIN 51524 ... 525
Pressure Fluid Temperature	Recommended: +30C to +50°C (+86°F to +122°F) Permitted: -20°C to +70°C (-4°F to +158°F)
Viscosity	Recommended: 30 to 50 cSt (mm²/s) Permitted: 20 to 380 cSt (mm²/s)
Filtration	ISO 4406 (1999), 18/16/13

Features

- Spool valve.
- Manifold mounting.
- Five pressure ranges at NG6.
- Three pressure ranges at NG10.
- Two adjustment modes.

Ordering Information

VB	□	A	□	V	□	□	Design Series
Sequence Valve	Maximum Pressure Setting	Adjustment Screw with Hexagon Socket	Size	Seal Fluorocarbon	Gauge Port	Lock	NOTE: Not required when ordering.

Code	Description	
025[1]	25 Bar	(363 PSI)
064	64 Bar	(938 PSI)
125[2]	125 Bar	(1813 PSI)
160[1]	160 Bar	(2320 PSI)
210	210 Bar	(3045 PSI)
350[1]	350 Bar	(5075 PSI)

Code	Description
06	NG6
10	NG10

Code	Description
G[1]	G 1/4"
M	M12x1.5

Code	Description
Omit	No Lock
Z	Cylinder Lock

[1] only NG6
[2] only NG10

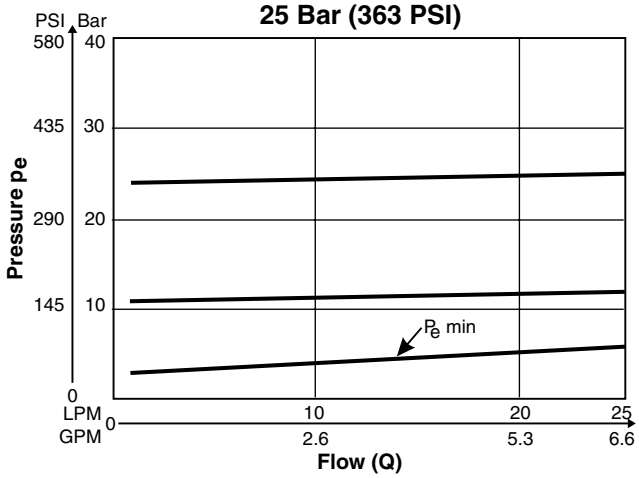
Weight:
VB*A06 1.3 kg (2.9 lbs.)
VB*A10 3.7 kg (8.2 lbs.)

VB.indd, dd

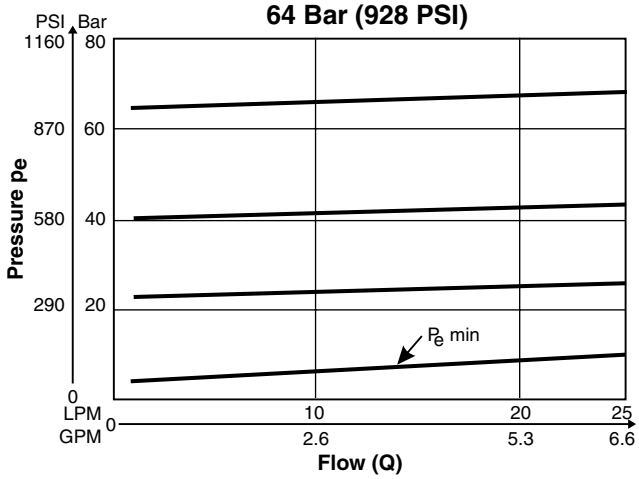
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

VB*06

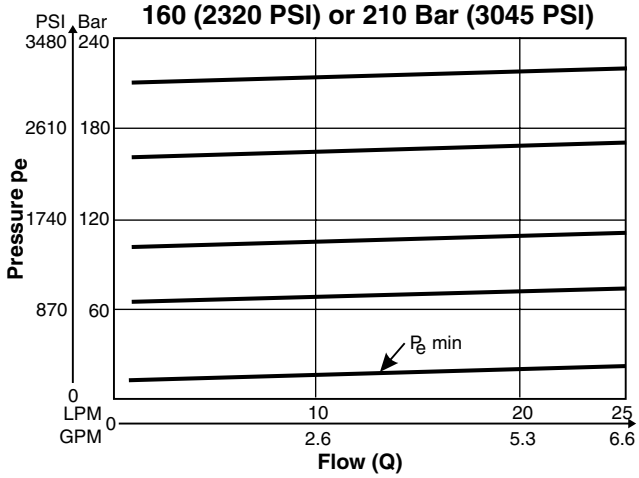
Maximum Setting Pressure
25 Bar (363 PSI)



Maximum. Setting Pressure
64 Bar (928 PSI)

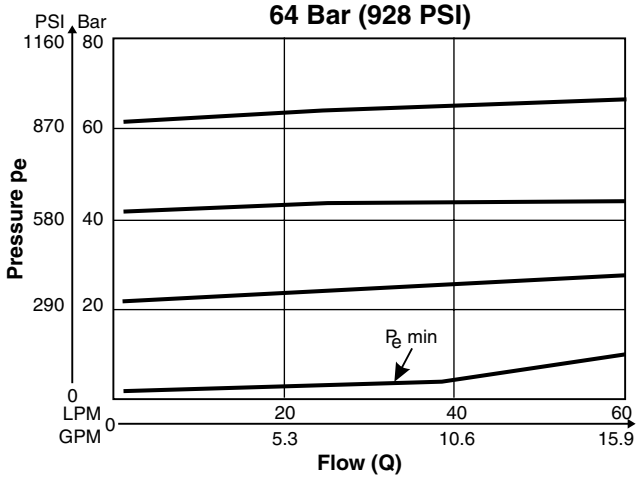


Maximum Setting Pressure
160 (2320 PSI) or 210 Bar (3045 PSI)

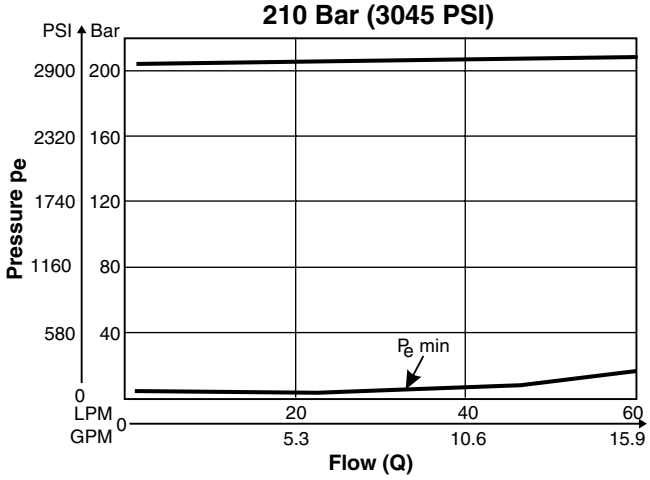


VB*10

Maximum Setting Pressure
64 Bar (928 PSI)



Maximum Setting Pressure
210 Bar (3045 PSI)

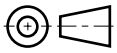


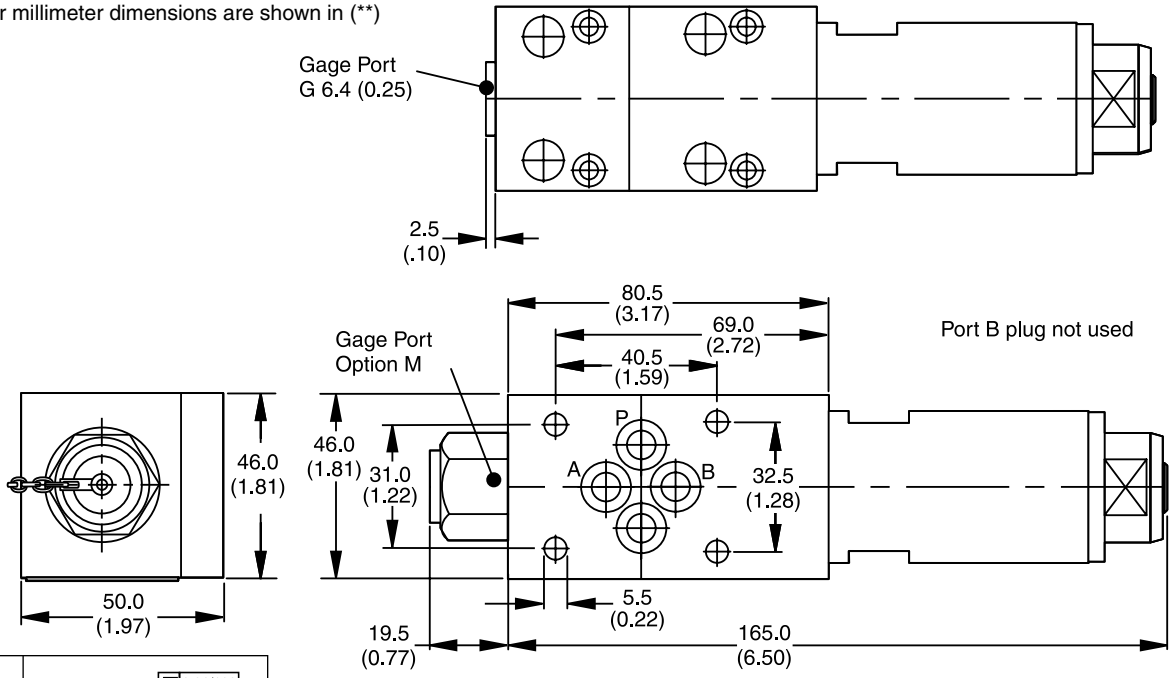
VB.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

VB*06

Inch equivalents for millimeter dimensions are shown in (**)

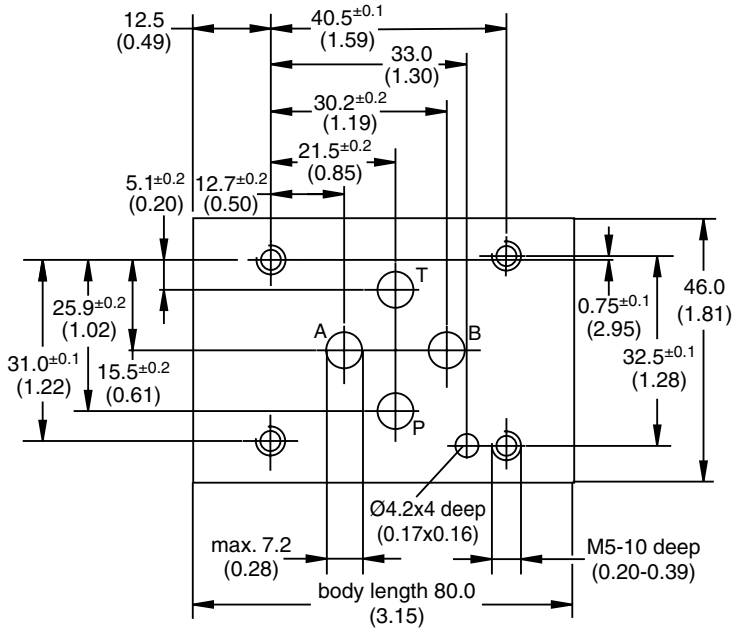




Surface Finish	R_{max}6.3 0.01/100
Bolt Kit **DIN912 12.9**	BK375 4x M5x30
	7.6 Nm (5.6 lb.-ft.) ±15%
Seal Kit **Fluorocarbon**	SK-VB/VM/VS V

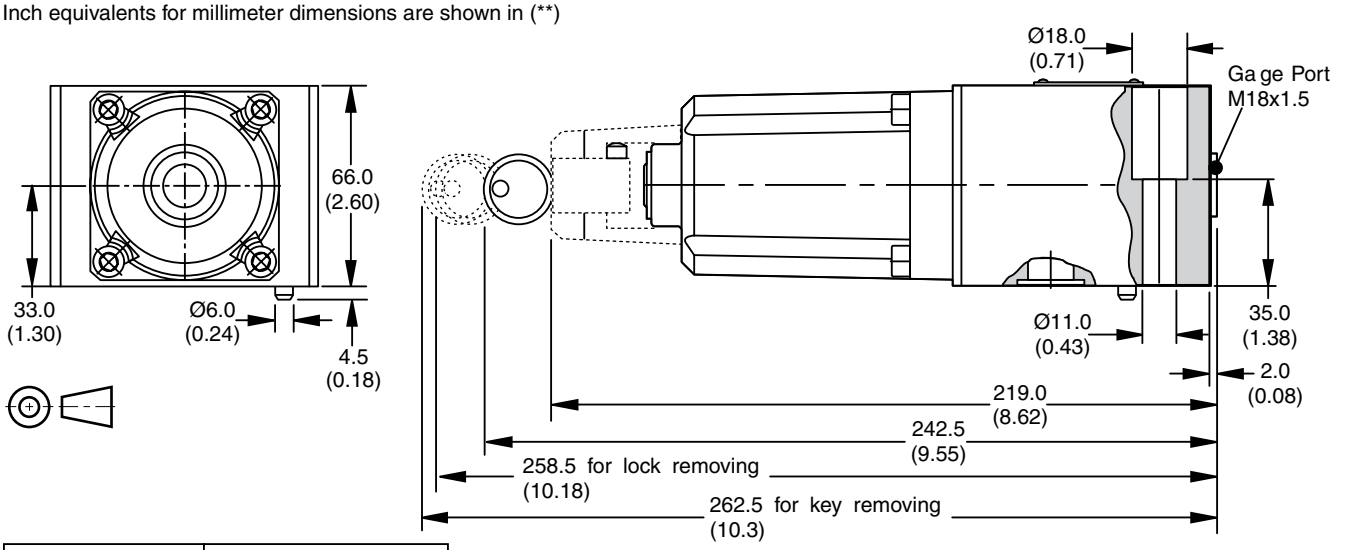
Mounting Pattern ISO 5781-03-04-0-00 (NFPA D03, CETOP 3, NG6)

Inch equivalents for millimeter dimensions are shown in (**)

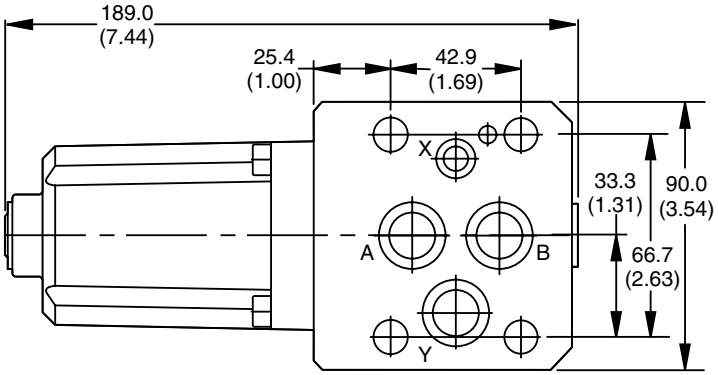


VB*10

Inch equivalents for millimeter dimensions are shown in (**)



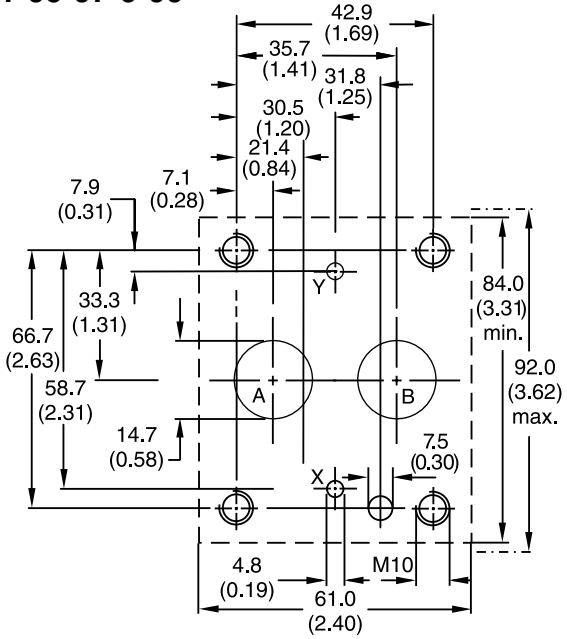
Surface Finish	R_{max}6.3 ⏥ 0.01/100
Bolt Kit **DIN912 12.9**	BK389 4x M10x50
	65 Nm (48 lb.-ft.) ±15%
Seal Kit **Fluorocarbon**	SK-VB/VM-A10V



Subplate	Size
SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP

Mounting Pattern ISO 5781-06-07-0-00

Inch equivalents for millimeter dimensions are shown in (**)



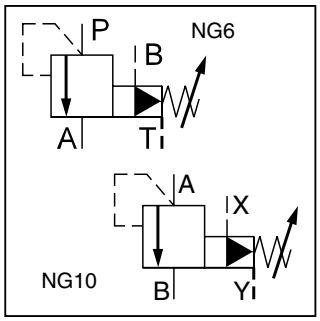
VB.indd, dd

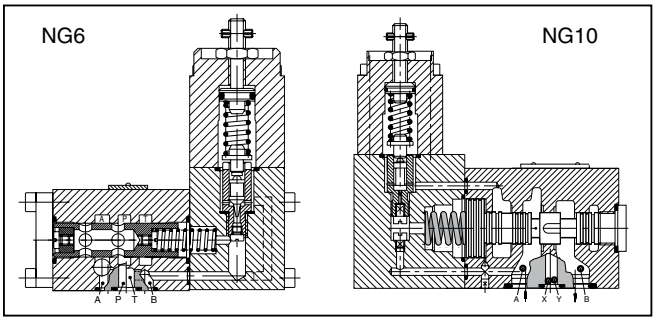
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series VBY pilot operated sequence valves consist of a pilot with manual adjustment and a main part with spool execution. The valve has an external drain.

This valve can also be used as a pressure relief valve. Please observe hydraulic connection.





Features

- Manifold mounting acc. to ISO 5781.
- Type VBY with external drain.
- Main stage spool type valve.
- Pilot stage seated type valve.
- 4 pressure ranges.
- 2 adjustment modes
  - – Screw with hexagon socket
  - – DIN knob

D

Specifications

Size	NG6	NG10
Mounting Pattern	ISO 5781	
Mounting Position	As desired	
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)	
Operating Pressure, Ports **External Drain Port Pressure**	P, A, B up to 315 Bar (4568 PSI) T up to 100 Bar (1450 PSI)	A, B, X up to 315 Bar (4568 PSI) Y up to 100 Bar (1450 PSI)
Pressure Range	64, 160, 210, 315 Bar (928, 2320, 3045, 4568 PSI)	
Pressure Fluid Temperature	-20°C to +70°C (-4°F to +158°F)	
Viscosity Range **Recommended** **Permitted**	 30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)	
Filtration	ISO 4406 (1999), 18/16/13	
Pilot Oil Flow	approx. 500 cm³/min	approx. 1000 cm³/min

Ordering Information

VBY — Pressure Relief Valve

☐ Pressure Range

Code	Description
064	64 Bar (928 PSI)
160	160 Bar (2320 PSI)
210	210 Bar (3045 PSI)
315	315 Bar (4568 PSI)

☐ Adjustment

Code	Description
A	Adjustment Screw with Hexagon Socket
H	Turning Knob with Cylinder Lock

☐ Size

Code	Description
06	NG6
10	NG10

☐ Seal

Code	Description
N	Nitrile
V	Fluorocarbon

☐ Design Series

NOTE: Not required when ordering.

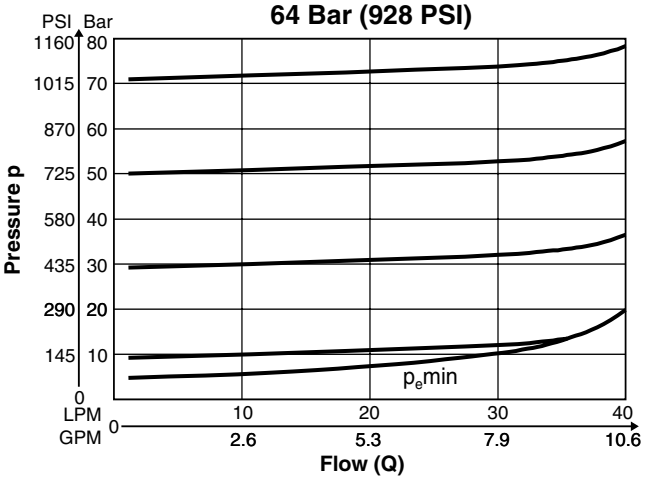
Weight:

VBY*06 2.4 kg (5.29 lbs.)
VBY*10 4.5 kg (9.92 lbs.)

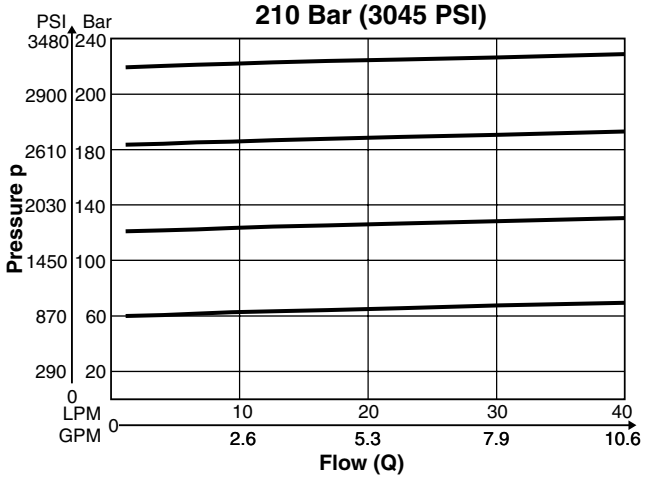
VBY*06

p/Q measured at t = 50°C (122°F) and v = 36mm²/s

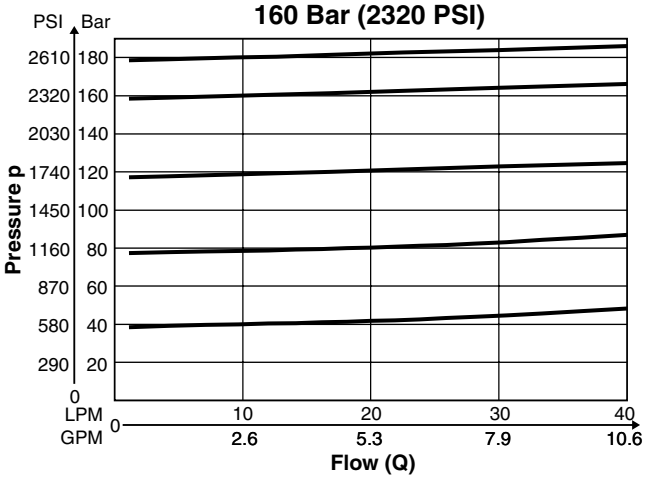
Maximum Setting Range
64 Bar (928 PSI)



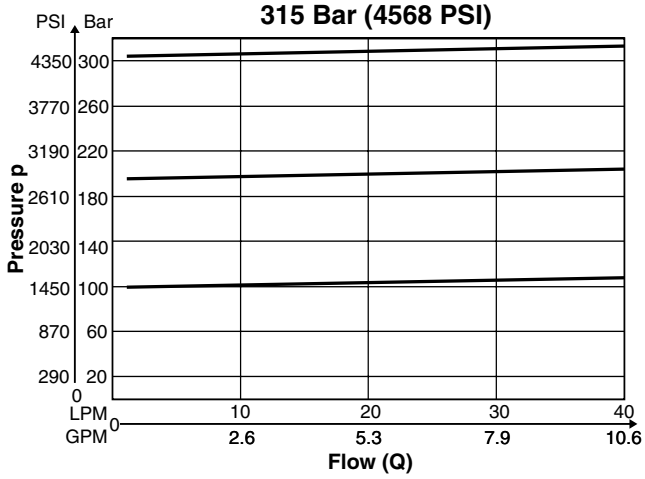
Maximum Setting Range
210 Bar (3045 PSI)



Maximum Setting Range
160 Bar (2320 PSI)



Maximum Setting Range
315 Bar (4568 PSI)

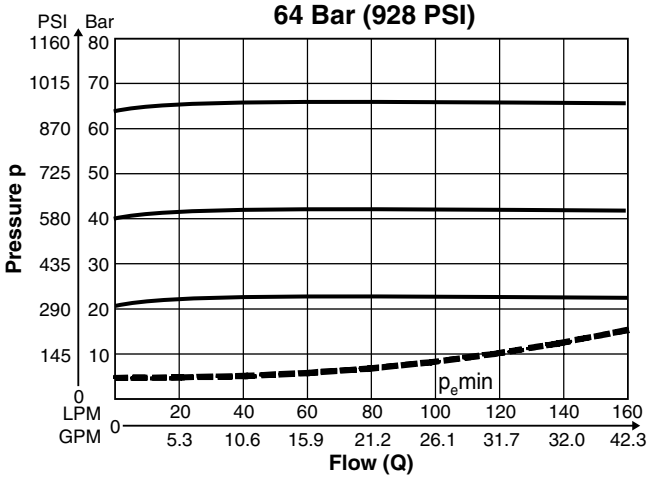


D

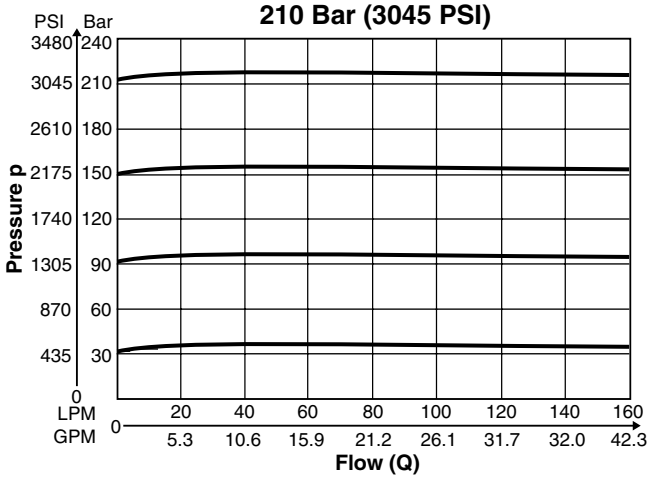
VBY*10

p/Q measured at t = 50°C (122°F) and v = 36mm²/s

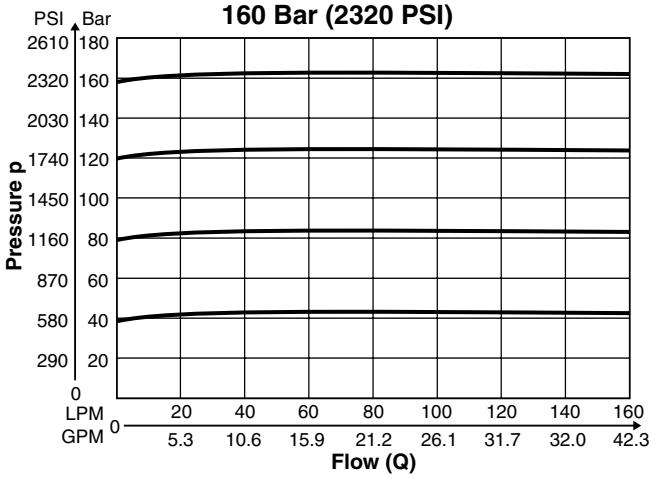
Maximum Setting Range
64 Bar (928 PSI)



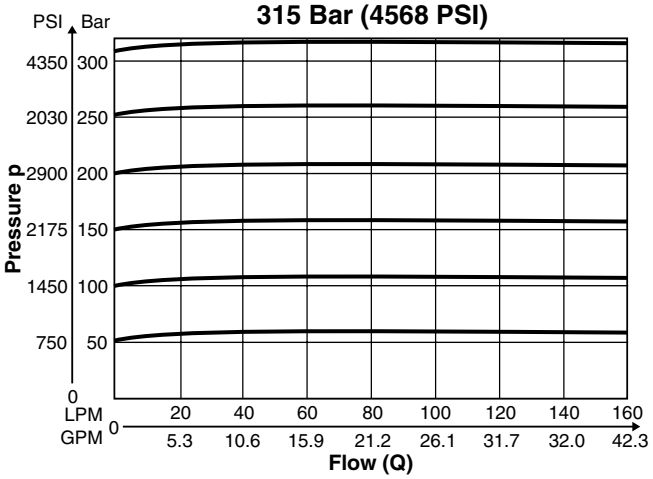
Maximum Setting Range
210 Bar (3045 PSI)



Maximum Setting Range
160 Bar (2320 PSI)

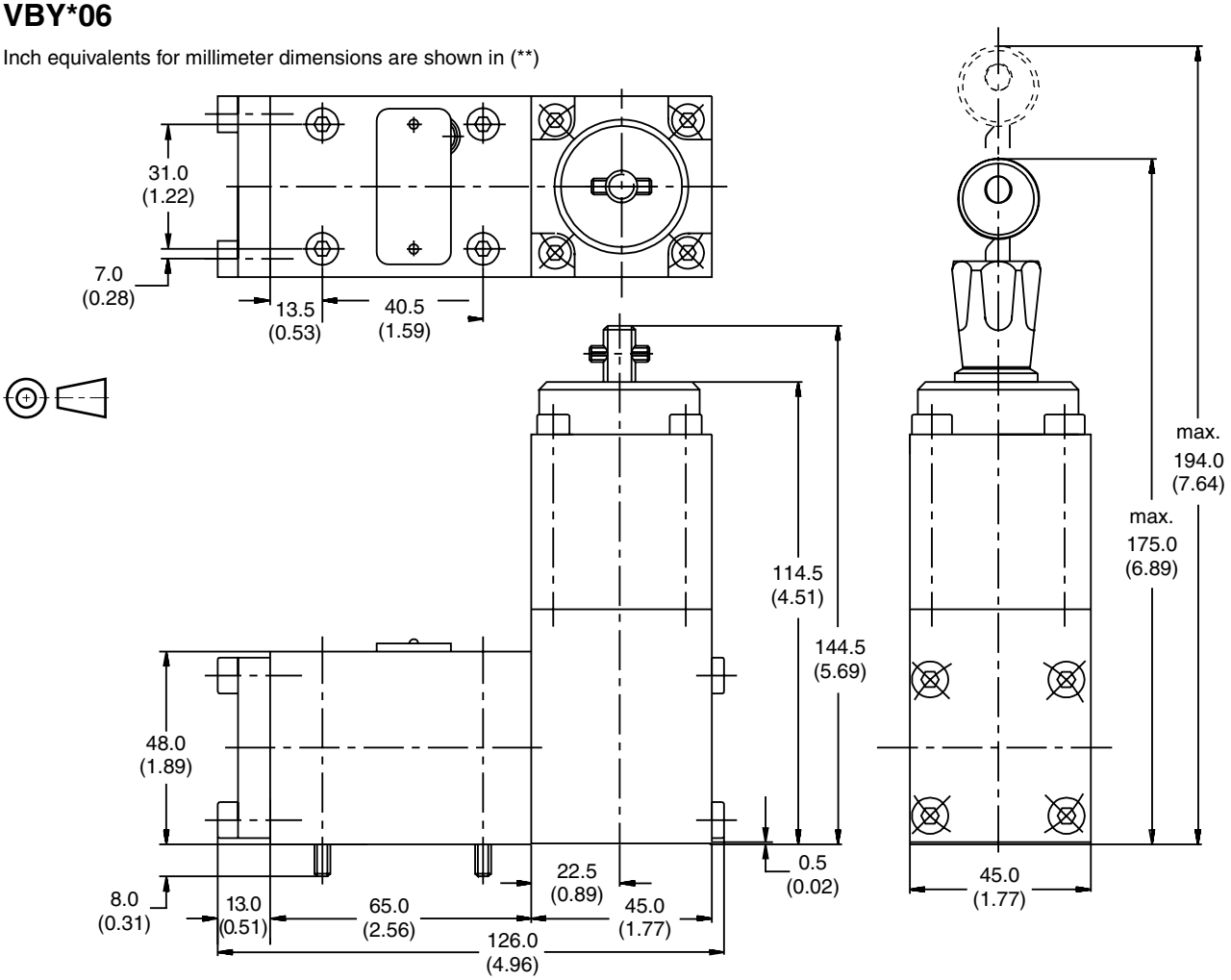


Maximum Setting Range
315 Bar (4568 PSI)



VBY*06

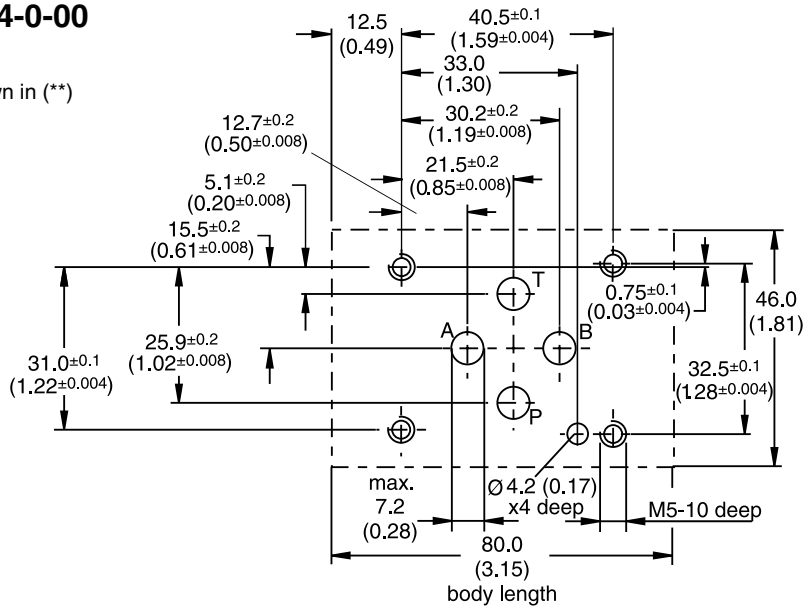
Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Bolt Kit DIN912 12.9		Seal Kit
$\sqrt{R_{max}6.3}$ 0.01/100	BK375 4x M5x30	7.5 Nm (5.5 lb.-ft.)	Nitrile: SK-VB/VM/VS Fluorocarbon: SK-VB/VM/VS V

Mounting Pattern ISO 5781-03-04-0-00 (NFPA D03, CETOP 3, NG6)

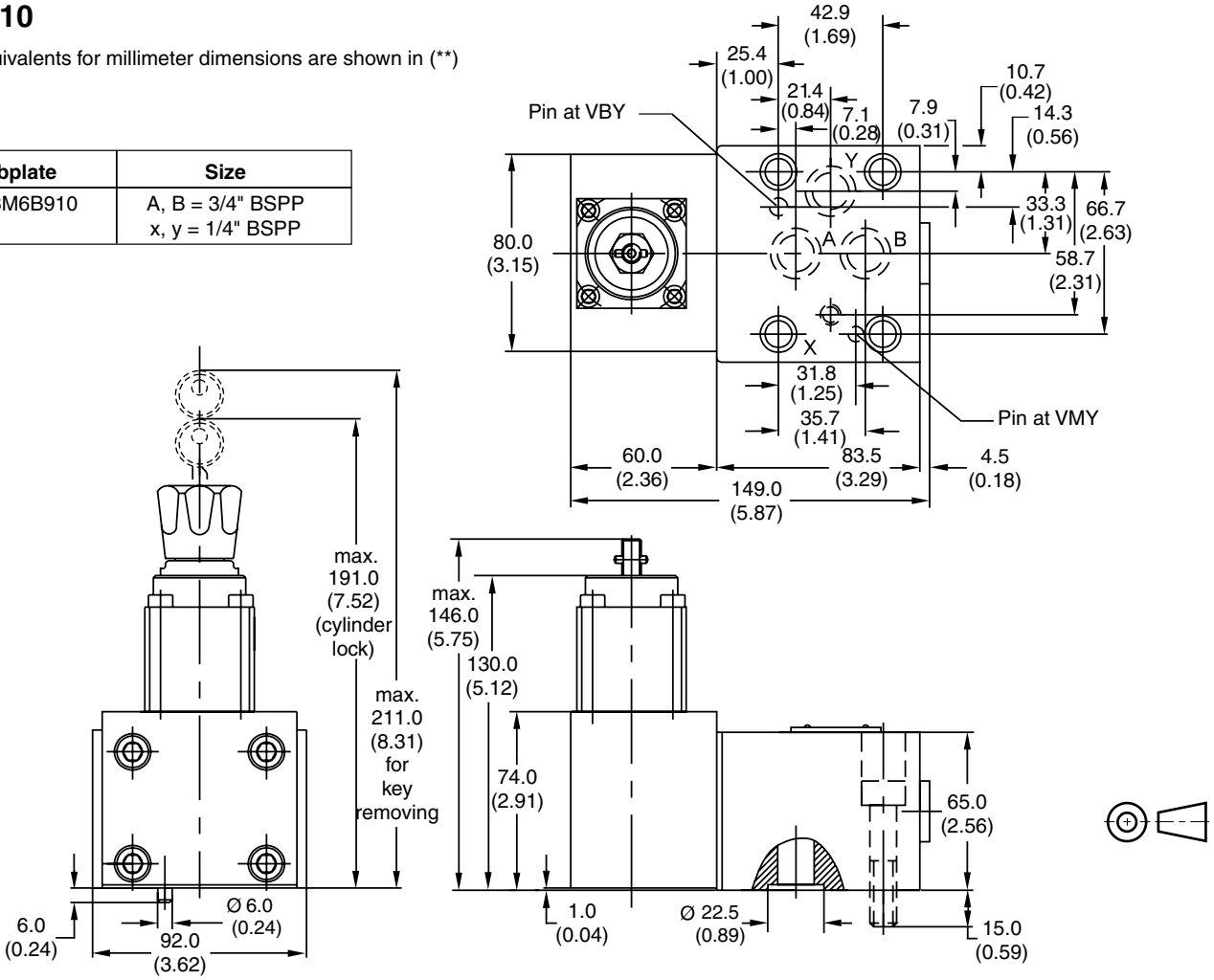
Inch equivalents for millimeter dimensions are shown in (**)



VBY*10

Inch equivalents for millimeter dimensions are shown in (**)

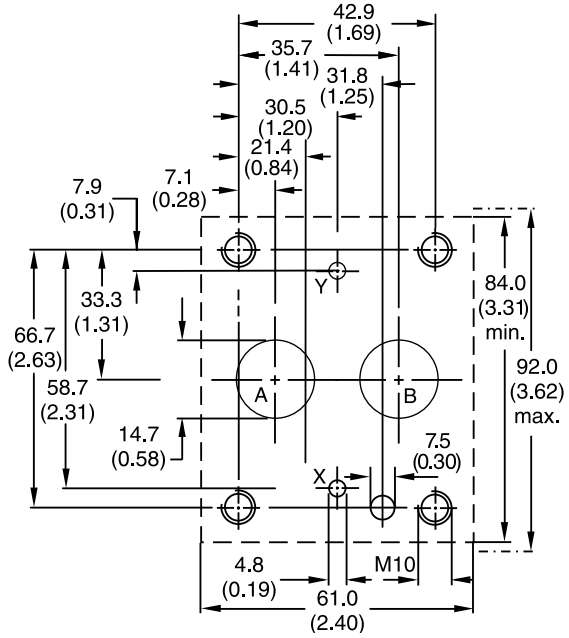
Subplate	Size
SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP



Surface Finish	Bolt Kit DIN912 12.9		Seal Kit
$\sqrt{R_{max}6.3}$ 0.01/100	BK389 4x M10x50	65 Nm (47.9 lb.-ft.)	Nitrile: SK-VB/VM-A10 Fluorocarbon: SK-VB/VM-A10V

Mounting Pattern ISO 5781-06-07-0-00

Inch equivalents for millimeter dimensions are shown in (**)

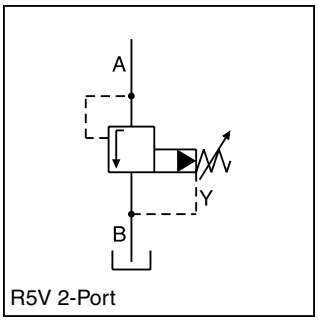


General Description

Series R5V pilot operated pressure relief valves have a similar design to the subplate mounted R4V series. The SAE flanges allow to mount the valves directly on the outlet flanges of pumps or inlet flanges of actuators to achieve a very compact design.

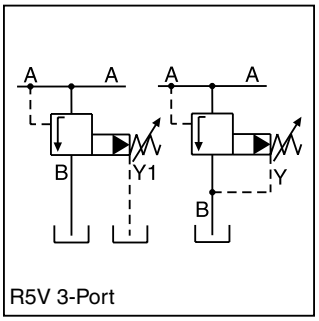
Valves with SAE flanges can also be bolted together to combine functions without the need of a manifold block.

R5V 2-Port



R5V 2-Port

R5V 3-Port



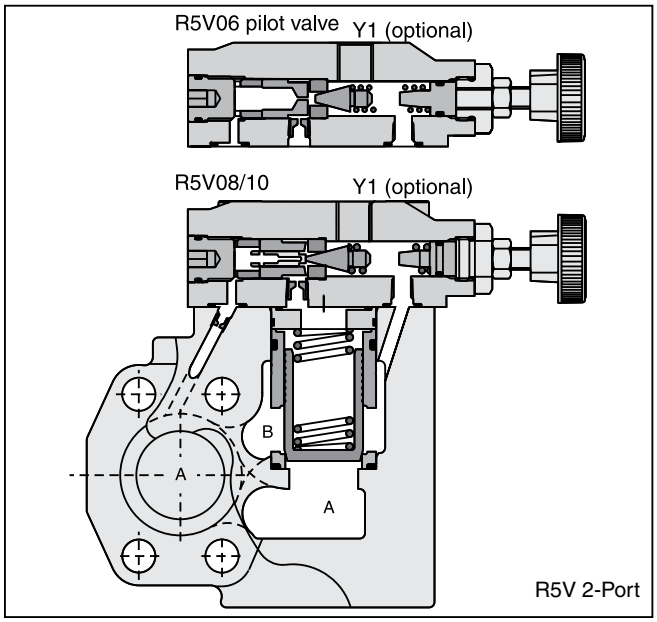
R5V 3-Port

Operation

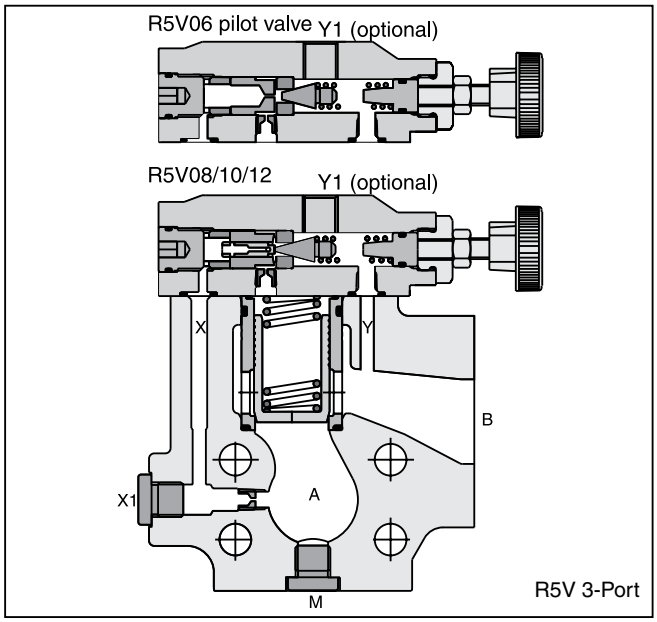
The system pressure in Port A is applied to the pilot valve and to the top surface of the main poppet via an orifice in X. The hydraulically balanced main poppet is held against the seat by the main spring. In this state there is no flow through the valve. The adjusted spring force acting on the pilot cone determines the relief pressure. If the pressure in Port A exceeds the set point, the pilot cone is lifted from its seat, releasing a small pilot flow to tank. The flow through the control orifice in X creates a pressure drop which limits the pressure at the top of the main poppet to the set point. The higher system pressure in Port A now lifts the main poppet off its seat and allows flow to Port B. In the resulting float position only enough flow is passed from Port A to Port B to maintain the inlet pressure in Port A at the set point. When the pressure in Port A falls below the set point, the hydraulic balance on the main poppet is restored. The main spring then forces the main poppet to close.

Features

- Pilot operated with manual adjustment.
- R5V with 2-port body:
  - 3 sizes (SAE 3/4", 1", 1-1/4")
  - SAE 61 flange
- R5V with 3-port body:
  - 4 sizes (SAE 3/4", 1", 1-1/4", 1-1/2")
  - SAE 61 and SAE 62 flange
- 3 pressure stages.
- 3 adjustment modes:
  - Hand knob
  - Acorn nut with lead seal
  - Key lock
- With optional vent function.



R5V 2-Port



R5V 3-Port

R5V □ — □ □ □ □ □ □ □ □ **A** □ □

Pressure Relief Valve | Size | SAE Interface | Pilot Ports | Pressure Range | Adjustment | Pilot Oil | Switching Type | Solenoid Voltage | Design Series | Seal | Options

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"
12*	SAE 1-1/2"

* R5V 3-Port only

Code	Description
Omit	Standard w/o vent function
G0R	12V
G0Q	24V
GAR	98V
GAG	205V
W30	110V 50Hz/ 120V 60Hz
W31	220V 50Hz/ 240V 60Hz

Code	Description
1	Nitrile
5	Fluorocarbon

SAE 61

Code	Size	Maximum Pressure
3	12	210 Bar (3045 PSI)
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

SAE 62

Code	Size	Maximum Pressure
6*	06/08/ 10/12	350 Bar (5075 PSI)

* R5V 3-Port only.

Code	Description
Omit	Standard w/o vent function
09*	Solenoid not activ. unpress. circulation
11**	Solenoid activated unpress. circulation

* Sol. de-energized: open to tank
Sol. energized: vent line blocked.

** Sol. de-energized: vent line blocked
Sol energized: open to tank.

2-Port Body

Code	Description
4	No Ports* X1 = 1/4" NPT
5	Y1 = SAE 4*

3-Port Body

Code	Description
1	No Ports X1 = 1/4" NPT
3	Y1**, X1, M = SAE 4

* 2-port for internal drain (pilot oil code 2).

** 3-Port: Y1 only available at external drain (pilot oil code 6).

Code	Drain Line
2	Internal
6	External from Y1-Port

Code	Description
Omit	Standard
008	Vent function with slow unloading

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 Bar)

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal
4	Key Lock

Weight:	2-Port	3-Port
R5V06	4.0 kg (8.8 lbs.)	3.6 kg (7.9 lbs.)
R5V08	4.6 kg (10.1 lbs.)	4.6 kg (10.1 lbs.)
R4V10	5.9 kg (13.0 lbs.)	5.2 kg (11.5 lbs.)
R5V12	–	8.0 kg (17.6 lbs.)

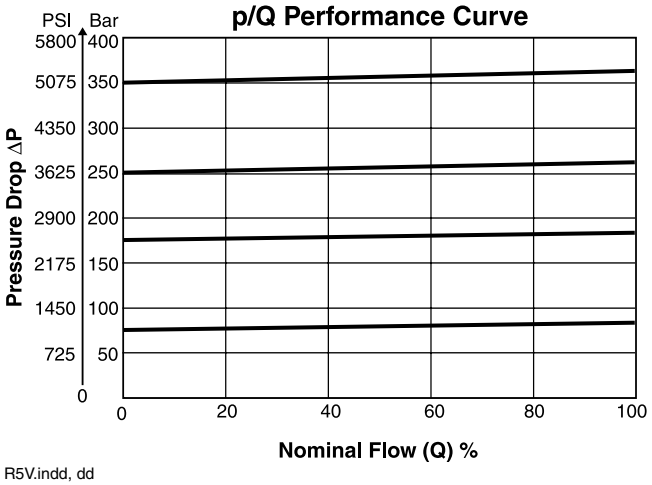
R5V.indd, dd

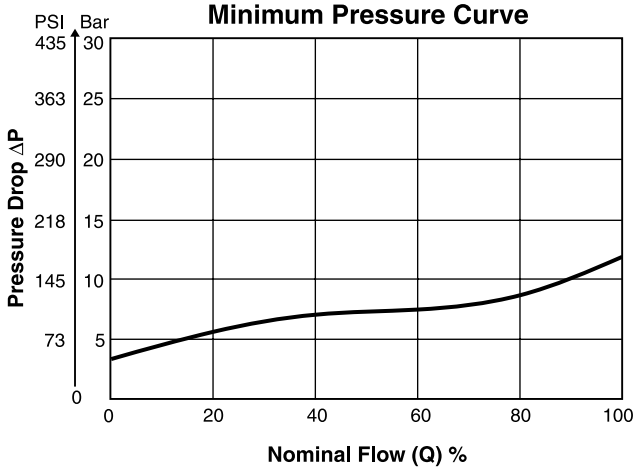
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Specifications

General						
Size		**06**	**08**	**10**	**12**	
Mounting		Flanged according to SAE 61 / SAE 62				
Mounting Position		Unrestricted				
Ambient Temperature Range		-20°C to +50°C (-4°F to +122°F)				
Hydraulic						
Maximum Operating Pressure	**SAE 61 Ports A, B**	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)	210 Bar (3045 PSI)	
	SAE 61 Port Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	
	SAE 62 Ports A, B	350 Bar (5075 PSI)	350 Bar (5075 PSI)	350 Bar (5075 PSI)	350 Bar (5075 PSI)	
	SAE 62 Port Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	
Pressure Ranges		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)				
Nominal Flow		90 LPM (23.8 GPM)	300 LPM (79.4 GPM)	600 LPM (158.7 GPM)	600 LPM (158.7 GPM)	
Fluid		Hydraulic oil as per DIN 51524 to 51525				
Fluid Temperature		-20°C to +80°C (-4°F to +176°F)				
Viscosity	**Permitted**	10 to 650 cSt / mm^2/s (46 to 3013 SSU)				
	Recommended	30 cSt / mm^2/s (139 SSU)				
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)				
Electrical (Solenoid)						
Duty Ratio		100%				
Solenoid Connection		Connector as per EN175301-803				
Protection Class		IP65 in accordance with EN60529 (plugged and mounted)				
	Code	**G0R**	**G0Q**	**GAR**	**GAG**	**W30**	**W31**
Supply Voltage		12V	24V	98V	205V	110V at 50Hz/ 120V at 60Hz	220V at 50Hz/ 240V at 60Hz
Tolerance Supply Voltage		+5 to -10	+5 to -10	+5 to -10	+5 to -10	±5	±5
Power Consumption	**Hold**	31W	31W	31W	31W	78W	78W
	In Rush	31W	31W	31W	31W	264W	264W
Response Time		Energized / De-energized AC 20/18ms, DC 46/27 ms					
Maximum Switching Frequency		AC up to 7200 switchings/hour; DC up to 16,000 switchings/hour					
Coil Insulation Class		H (180°C) (356°F)					

Performance Curves



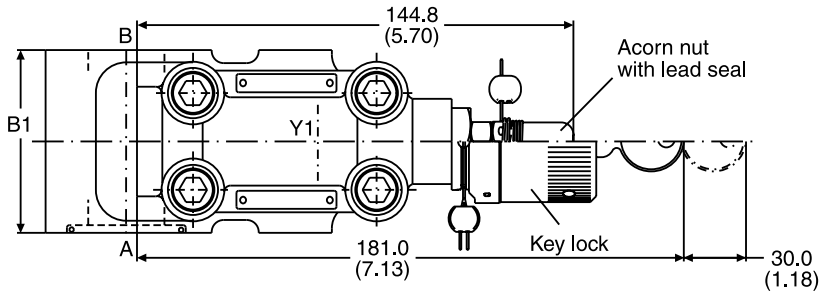


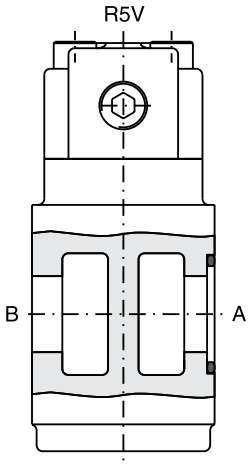
R5V.indd, dd

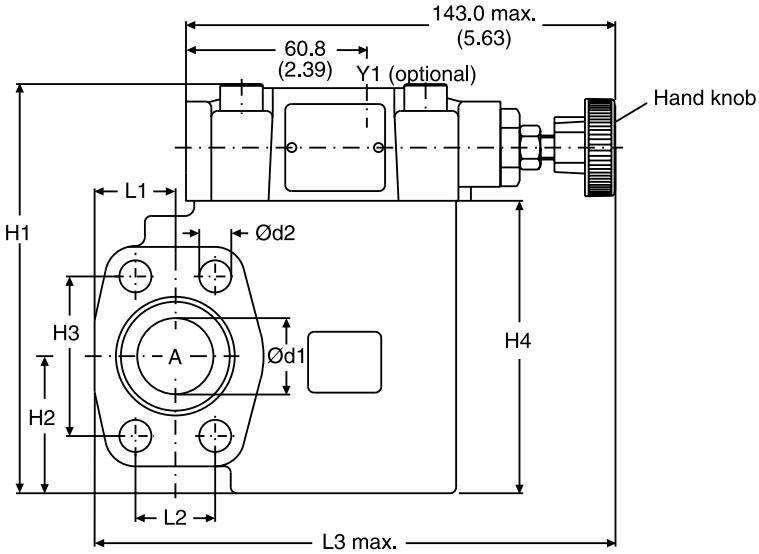
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

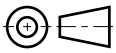
Inch equivalents for millimeter dimensions are shown in (**)

2-Port









Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5

SAE 61

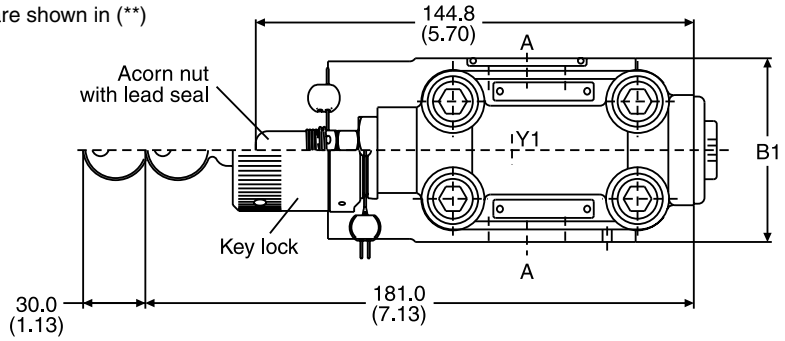
Size	B1	H1	H2	H3	H4	L1	L2	L3	d1	d2
06	60.0 (2.36)	131.6 (5.18)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	24.6 (0.97)	22.2 (0.89)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)
08	60.0 (2.36)	137.6 (5.42)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	26.5 (1.04)	26.2 (1.03)	171.0 (6.73)	25.0 (0.98)	10.5 (0.41)
10	75.0 (2.95)	150.6 (5.93)	48.0 (1.89)	58.7 (2.31)	109.0 (4.29)	34.0 (1.34)	30.2 (1.19)	179.0 (7.05)	32.0 (1.26)	12.5 (0.49)

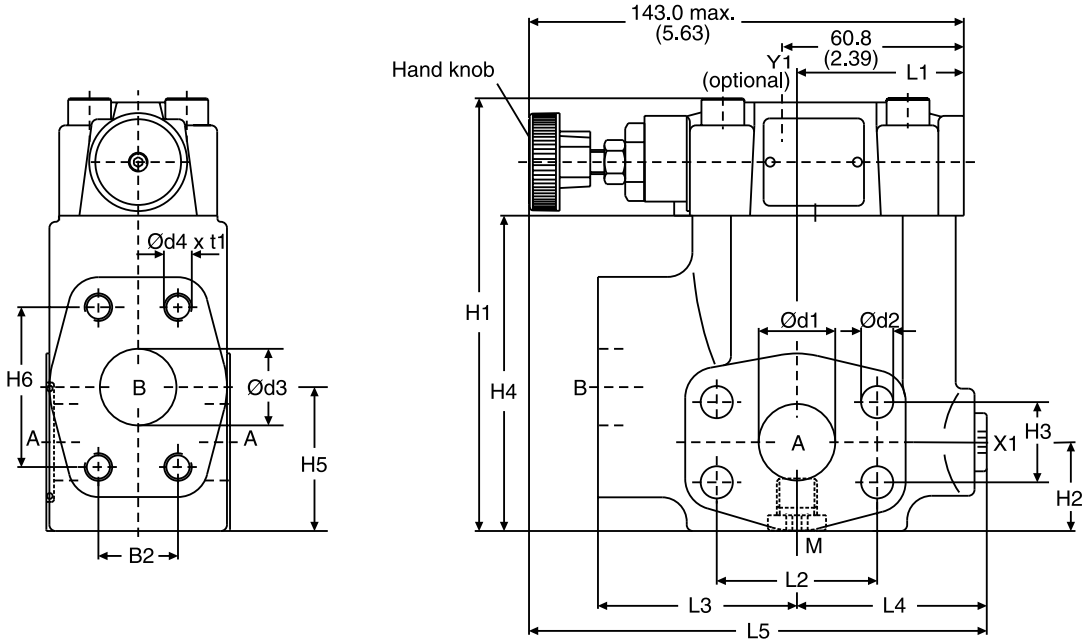
Port	Function	Port Size		
		R5V06	**R5V08**	**R5V10**
A	Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
B	Tank	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
Y1	External Drain	SAE 4		

Inch equivalents for millimeter dimensions are shown in (**)

3-Port

Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
12	S26-27421-0	S26-27421-5





SAE 61

Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	t1
06	60.0 (2.36)	22.2 (0.87)	119.0 (4.69)	28.0 (1.10)	22.2 (0.87)	81.0 (3.19)	41.6 (1.64)	47.6 (1.87)	50.3 (1.98)	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	20.0 (0.79)
08	60.0 (2.36)	26.2 (1.03)	141.0 (5.55)	29.0 (1.14)	26.2 (1.03)	103.0 (4.06)	47.0 (1.85)	52.4 (2.06)	55.8 (2.20)	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.98)	10.5 (0.41)	25.0 (0.98)	23.0 (0.91)
10	75.0 (2.95)	30.2 (1.19)	151.0 (5.94)	34.5 (1.36)	30.2 (1.19)	113.0 (4.45)	64.0 (2.52)	58.7 (2.31)	57.8 (2.28)	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	12.5 (0.49)	32.0 (1.26)	22.0 (0.87)
12	80.0 (3.15)	35.7 (1.41)	178.0 (7.01)	34.0 (1.34)	35.7 (1.41)	140.0 (5.51)	73.0 (2.87)	69.8 (2.75)	37.3 (1.47)	69.8 (2.75)	92.5 (3.64)	55.2 (2.17)	171.2 (6.74)	38.0 (1.50)	13.5 (0.53)	38.0 (1.50)	27.0 (1.06)

SAE 62

Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	t1
06	60.0 (2.36)	23.8 (0.94)	119.0 (4.69)	28.0 (1.10)	23.8 (0.94)	81.0 (3.19)	41.6 (1.64)	50.8 (2.00)	50.3 (1.98)	50.8 (2.00)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	20.0 (0.79)
08	60.0 (2.36)	27.8 (1.09)	141.0 (5.55)	29.0 (1.14)	27.8 (1.09)	103.0 (4.06)	47.0 (1.85)	57.2 (2.25)	55.8 (2.20)	57.2 (2.25)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.98)	12.5 (0.49)	25.0 (0.98)	22.0 (0.87)
10	75.0 (2.95)	31.8 (1.25)	151.0 (5.94)	34.5 (1.36)	31.8 (1.25)	113.0 (4.45)	64.0 (2.52)	66.7 (2.63)	57.8 (2.28)	66.7 (2.63)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	13.5 (0.53)	32.0 (1.26)	24.0 (0.94)
12	80.0 (3.15)	36.5 (1.44)	178.0 (7.01)	34.0 (1.34)	36.5 (1.44)	140.0 (5.51)	73.0 (2.87)	79.4 (3.13)	37.3 (1.47)	79.4 (3.13)	92.5 (3.64)	55.2 (2.17)	171.2 (6.74)	38.0 (1.50)	17.0 (0.67)	38.0 (1.50)	33.0 (1.30)

Port	Function	Port size			
		R5V06	R5V08	R5V10	R5V12
A (2)	Pressure	3/4" SAE 61/62	1" SAE 61/62	1-1/4" SAE 61/62	1-1/2" SAE 61/62
B	Tank	3/4" SAE 61/62	1" SAE 61/62	1-1/4" SAE 61/62	1-1/2" SAE 61/62
X1	External pilot port *	SAE 4			
Y1	External drain	SAE 4			
M	Pressure gauge	SAE 4			

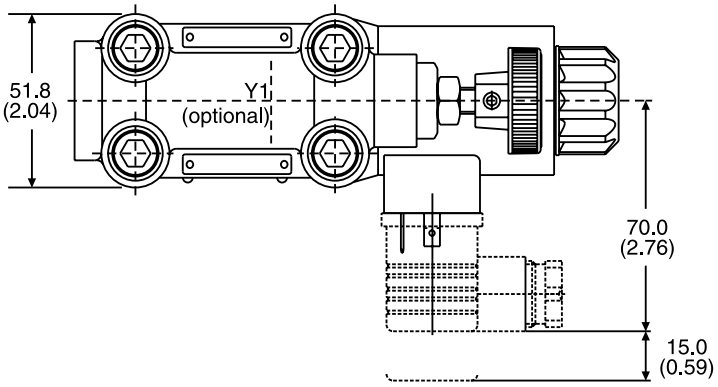
* closed when supplied.

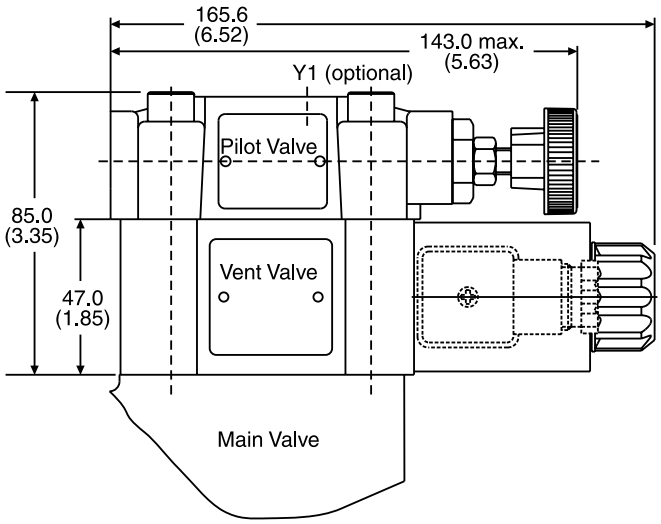
R5V.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

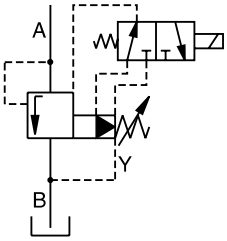
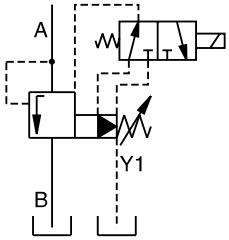
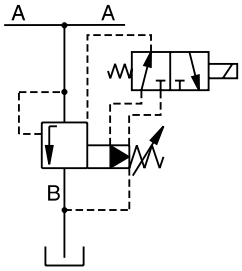
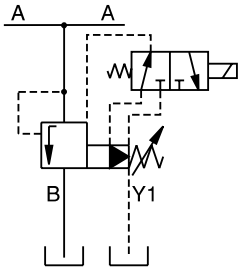
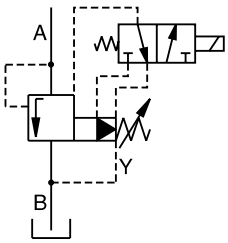
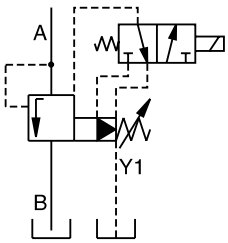
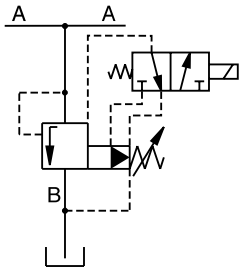
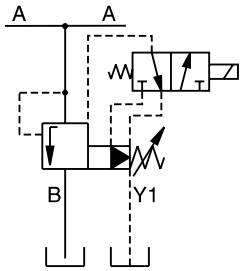
Inch equivalents for millimeter dimensions are shown in (**)

with Vent Function





Vent Valve Seal Kits	
Nitrile	**Fluorocarbon**
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5

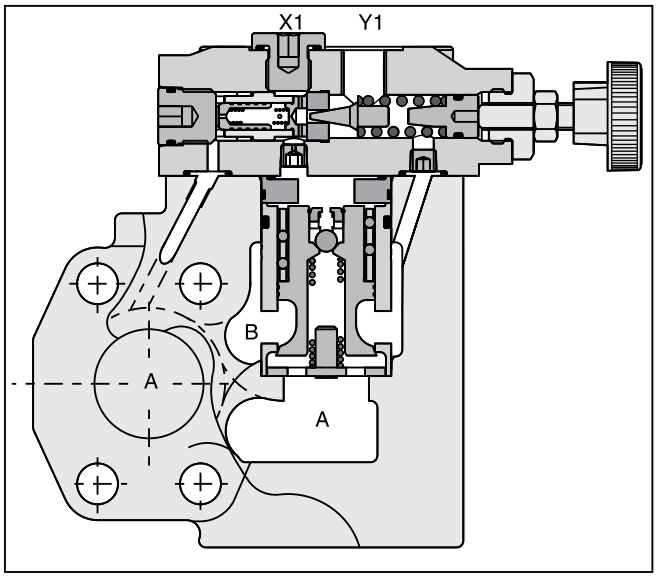
Code	R5V 2-Port		R5V 3-Port	
	Internal Drain	External Drain	Internal Drain	External Drain
11				
09				

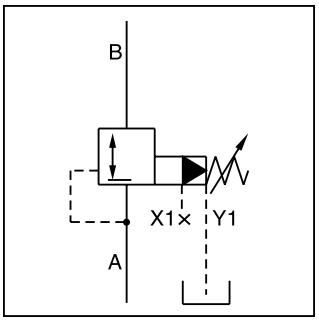
R5V.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series R5R pilot operated pressure reducing valves have a similar design as the subplate mounted R4R series. The SAE flanges allow to mount the valves directly on the inlet flanges of actuators to achieve a very compact design.





Features

- Pilot operated with manual adjustment.
- Normally closed to avoid unintended motion.
- 2-port body with SAE61 flange.
- 3 sizes (SAE 3/4", 1", 1-1/4").
- 3 pressure stages.
- 3 adjustment modes:
  – Hand knob
  – Acorn nut with lead seal
  – Key lock
- With optional vent function.
- Flow direction B → A.

D

Ordering Informaton

R5R	☐	—	☐	2	☐	☐	6	☐	☐	A	☐	☐
Pressure Reducing Valve	Size		SAE 61 Interface	2-Port Body X1, Y1 = SAE 4	Pressure Range	Adjustment	External Drain from Y1 Port	Switching Type	Solenoid Voltage	Design Series	Seal	Options Check with Factory

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"

Code	Size	Max. Pressure
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal
4	Key Lock

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 Bar)

Code	Description
Omit	Standard w/o vent function
G0R	12V
G0Q	24V
GAR	98V
GAG	205V
W30	110V 50Hz/ 120V 60Hz
W31	220V 50Hz/ 240V 60Hz

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
Omit	Standard w/o vent function
09*	Solenoid not activ. unpress. circulation
11**	Solenoid activated unpress. circulation

* Sol. de-energized: open to tank
Sol. energized: vent line blocked

** Sol. de-energized: vent line blocked
Sol energized: open to tank

Further options on request.

Weight:

R5R06 4.0 kg (8.8 lbs.)
R5R08 4.6 kg (10.1 lbs.)
R5R10 5.9 kg (13.0 lbs.)

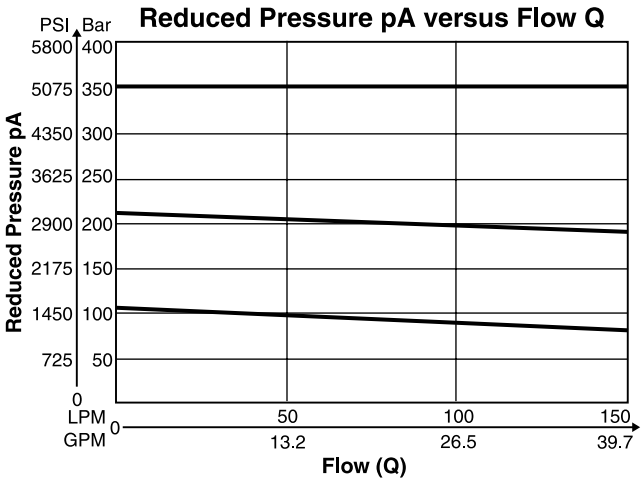
R5R.indd, dd

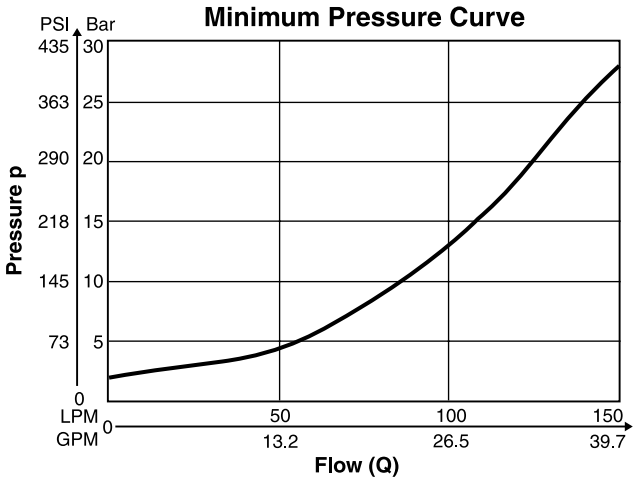
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General						
Size	**06**		**08**		**10**	
Mounting	Flanged according to SAE 61					
Mounting Position	Unrestricted					
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)					
Hydraulic						
Max. Operating Pressure **Ports A,B, X1**	350 Bar (5075 PSI)		350 Bar (5075 PSI)		280 Bar (4060 PSI)	
Port Y1	30 Bar (435 PSI)		30 Bar (435 PSI)		30 Bar (435 PSI)	
Pressure Ranges	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)					
Nominal Flow	90 LPM (23.8 GPM)		300 LPM (79.4 GPM)		500 LPM (132.3 GPM)	
Fluid	Hydraulic oil as per DIN 51524 ... 51525					
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)					
Viscosity **Permitted** **Recommended**	10 to 650 cSt / mm^2/s (46 to 3013 SSU) 30 cSt / mm^2/s (139 SSU)					
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)					
Electrical (Solenoid)						
Duty Ratio	100%					
Solenoid Connection	Connector as per EN175301-803					
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)					
Code	**G0R**	**G0Q**	**GAR**	**GAG**	**W30**	**W31**
Supply Voltage	12V	24V	98V	205V	110V at 50Hz 120V at 60Hz	2200V at 50Hz 240V at 60Hz
Tolerance Supply Voltage	+5 to -10	+5 to -10	+5 to -10	+5 to -10	±5	±5
Power Consumption **Hold**	31W	31W	31W	31W	78W	78W
In Rush	31W	31W	31W	31W	264W	264W
Response Time	Energized / De-energized AC 20/18ms, DC 46/27 ms					
Max. Switching Frequency	AC up to 7200, DC 70 to 16,000 switchings/hour					
Coil Insulation Class	H (180°C) (356°F)					

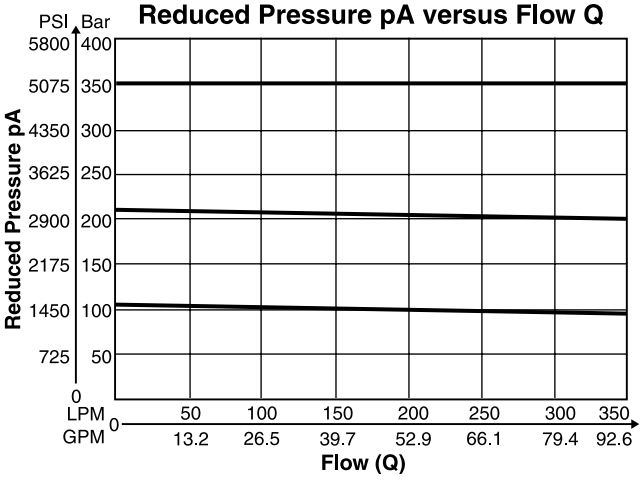
D

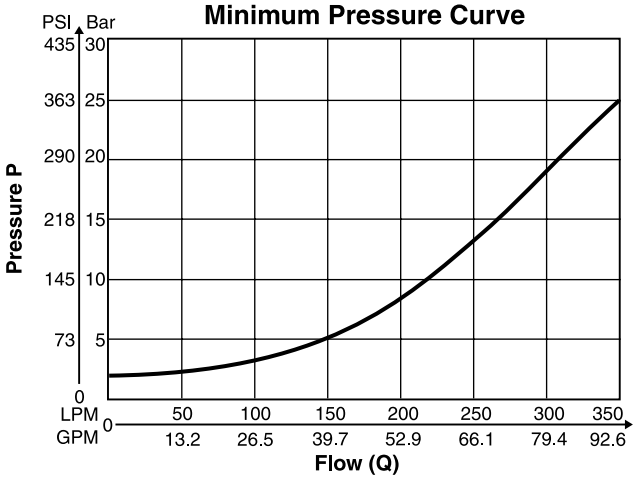
R5R06*



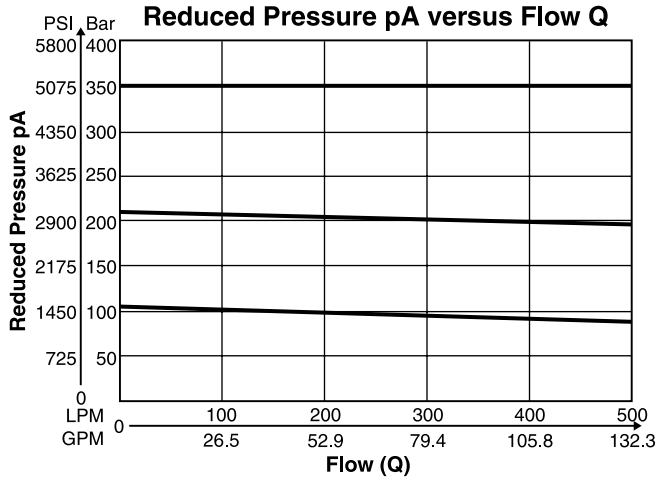


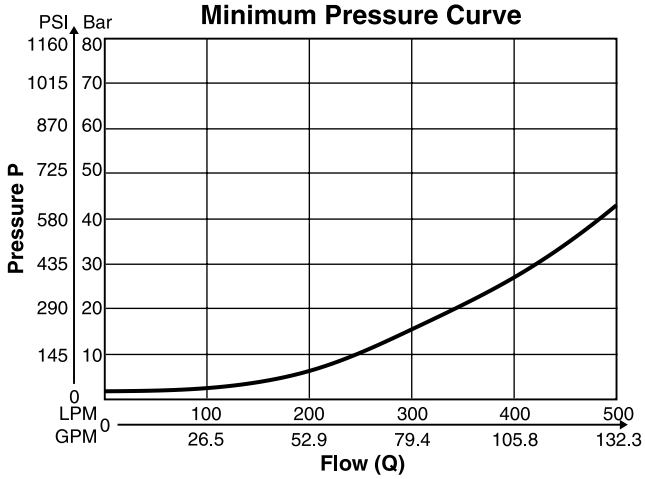
R5R08*





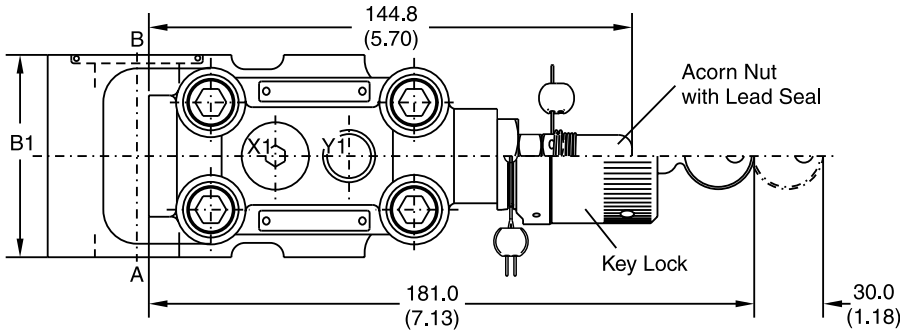
R5R10*

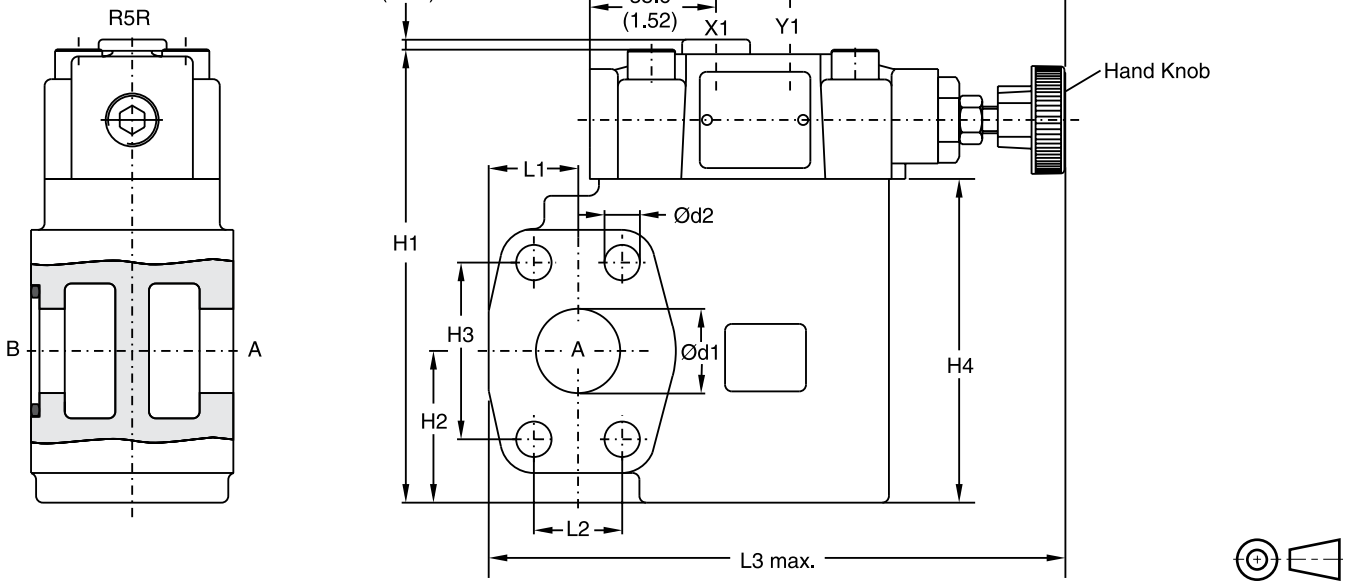




*Measured at 350 Bar (5075 PSI) primary pressure pB.

Inch equivalents for millimeter dimensions are shown in (**)





Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5

Size	B1	H1	H2	H3	H4	L1	L2	L3	d1	d2
06	60.0 (2.36)	131.6 (5.18)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	24.6 (0.97)	22.2 (0.87)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)
08	60.0 (2.36)	137.6 (5.42)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	26.5 (1.04)	26.2 (1.03)	171.0 (6.73)	25.0 (0.98)	10.5 (0.41)
10	75.0 (2.95)	150.6 (5.93)	48.0 (1.89)	58.7 (2.31)	109.0 (4.29)	34.0 (1.34)	30.2 (1.19)	179.0 (7.05)	32.0 (1.26)	12.5 (0.49)

Port	Function	Port Size		
		R5R06	**R5R08**	**R5R10**
B	Inlet Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
A	Reduced Outlet Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
Y1	External Drain	SAE 4		
X1	Pressure Gauge	SAE 4		

R5R.indd, dd

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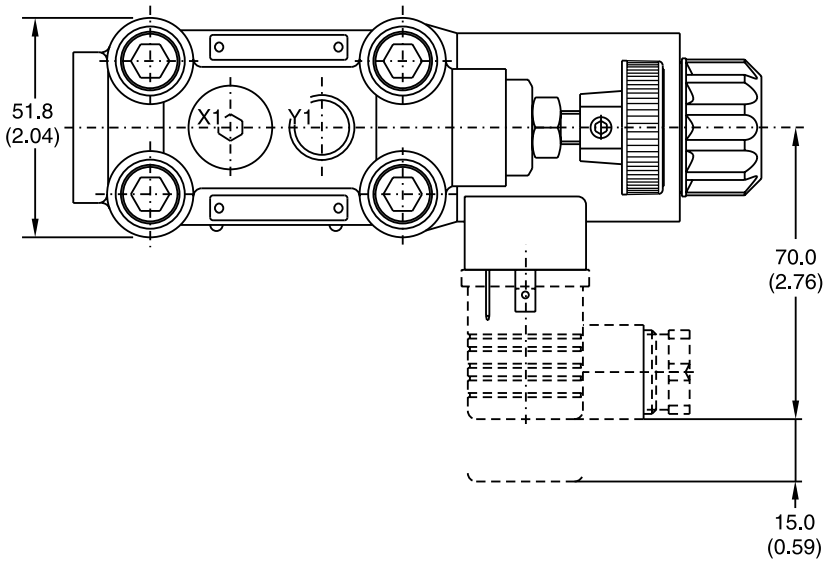
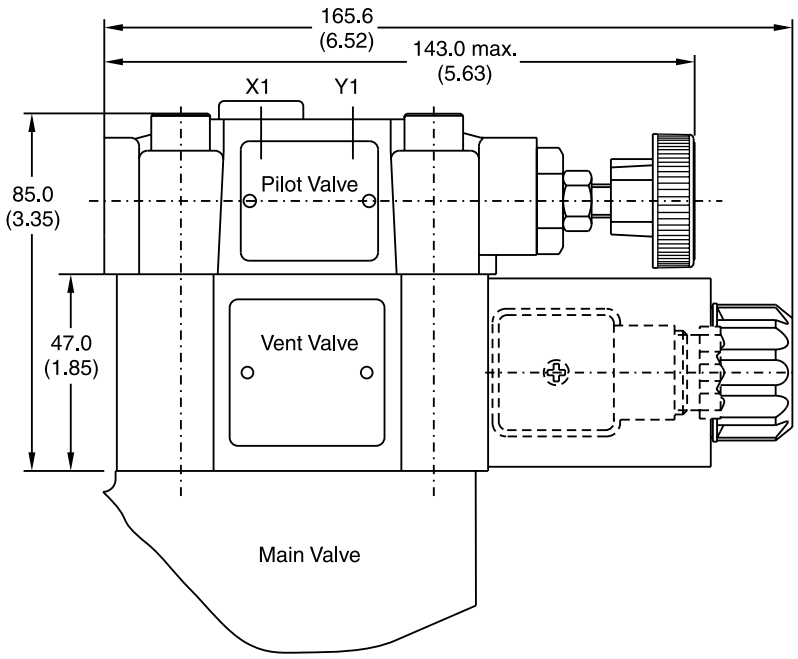
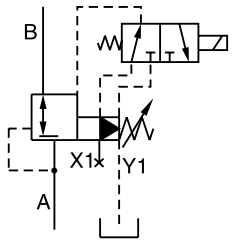
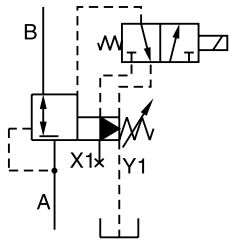
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)





External Drain

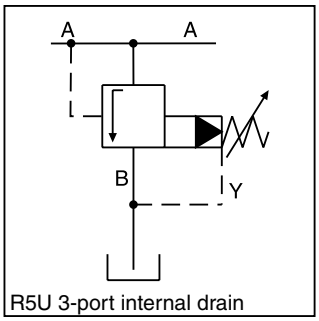
Code 11	Code 09
	

Vent Valve Seal Kits	
Nitrile	**Fluorocarbon**
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5

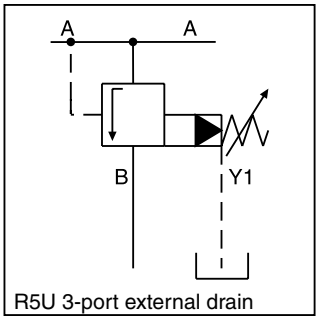
General Description

Series R5U pilot operated, pressure unloading valves have a similar design to the subplate mounted R4U series. The SAE flanges allow to mount the valve directly on the outlet flanges of pumps.

A typical application is the unloading of a pump in an accumulator circuit. The combination of an R5U, C5V and R5V on a double pump generates a high pressure / low pressure pump system without the need of a manifold block or piping between the valves.



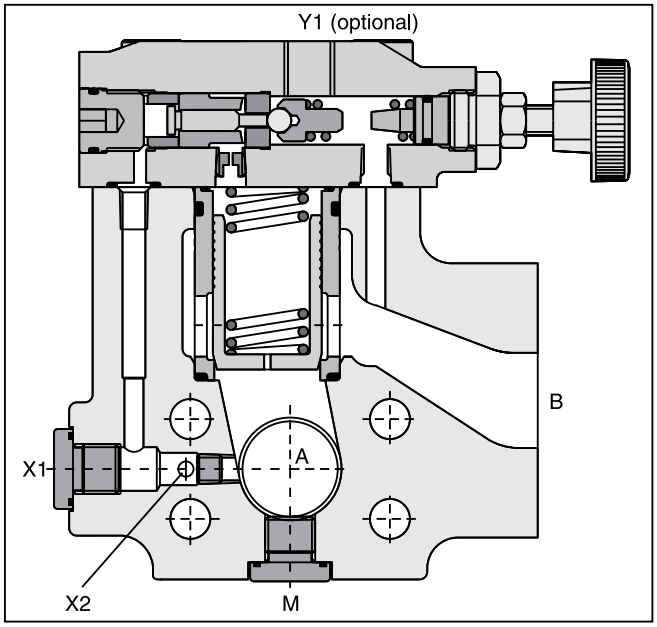
R5U 3-port internal drain



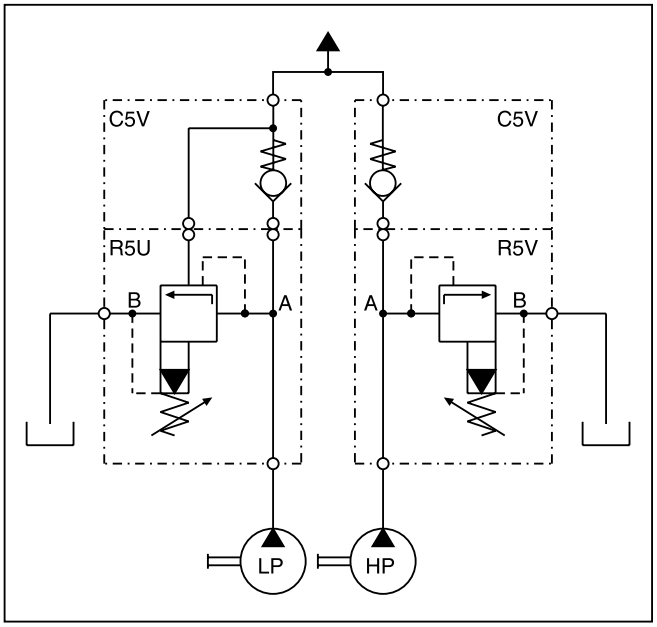
R5U 3-port external drain

Features

- Pilot operated unloading valve.
- 3-port body with SAE 61 flange.
- 4 sizes (SAE 3/4", 1", 1 1/4", 1 1/2").
- 3 pressure stages.
- 3 adjustment modes:
  – Hand knob
  – Acorn nut with lead seal
  – Key lock
- With optional vent function.



High Pressure / Low Pressure System



Ordering Information

R5U [ ] — [ ] **3** [ ] [ ] [ ] [ ] **A** [ ] [ ]

Pressure Unloading Valve | Size | SAE61 Interface | 3-Port Body | Pressure Range | Adjustment | Pilot Oil | Switching Type | Solenoid Voltage | Design Series | Seal | Options Check with Factory

M, Y1, X = SAE 4

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"
12	SAE 1-1/2"

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal
4	Key Lock

Code	Description
Omit	Standard w/o vent function
G0R	12V
G0Q	24V
GAR	98V
GAG	205V
W30	110V 50Hz/ 120V 60Hz
W31	220V 50Hz/ 240V 60Hz

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Size	Max. Pressure
3	12	210 Bar (3045 PSI)
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

Code	Pilot	Drain
4	External via port X1 or X2	External
5	External via port X1 or X2	Internal

Code	Pressure Stage	Pressure Differential
1	up to 105 Bar (1523 PSI)	28%
3	up to 210 Bar (3045 PSI)	28%
5	up to 350 Bar (5075 Bar)	15%

Code	Description
Omit	Standard w/o vent function
09*	Solenoid not activ. unpress. circulation
11**	Solenoid activated unpress. circulation

* Sol. de-energized: open to tank
Sol. energized: vent line blocked

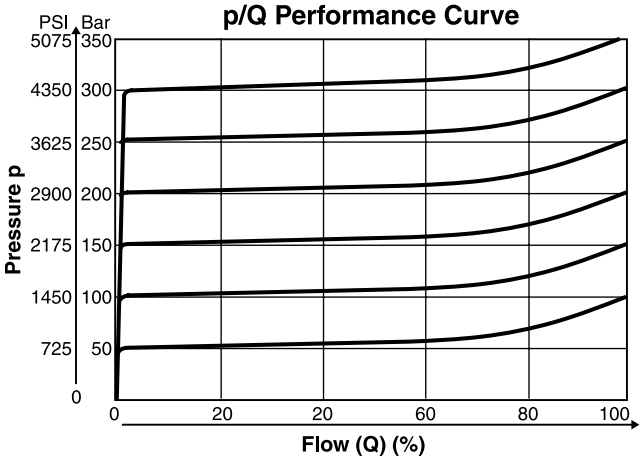
** Sol. de-energized: vent line blocked
Sol energized: open to tank

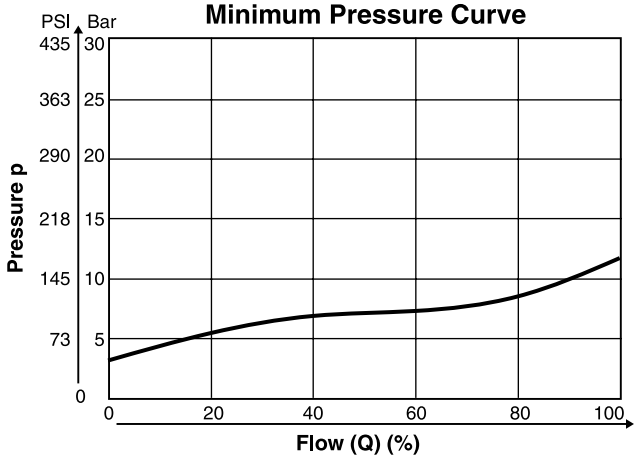
Weight:

R5U06	3.6 kg (7.9 lbs)
R5U08	4.6 kg (10.1 lbs.)
R5U10	5.2 kg (11.5 lbs.)
R5U12	8.0 kg (17.6 lbs.)

Further options on request.

Performance Curves





The performance curves are measured with external drain.
For internal drain the tank pressure has to be added to curve.

R5U.indd, dd

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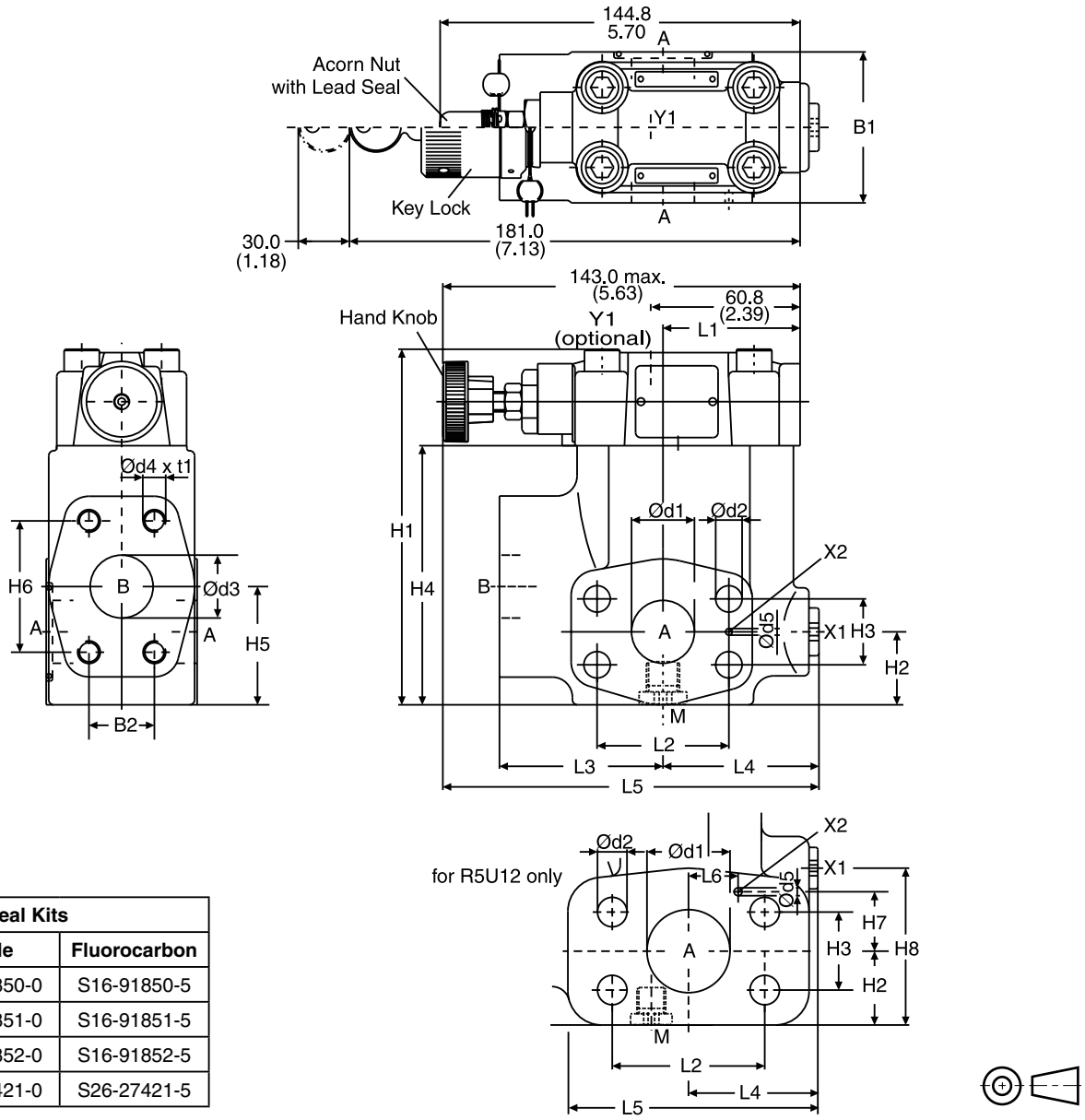
Hydraulic Valve Division
Elyria, Ohio, USA

General						
Size		**06**	**08**	**10**	**12**	
Mounting		Flanged according to SAE 61				
Mounting Position		Unrestricted				
Ambient Temperature		-20°C to +50°C (-4°F to +122°F)				
Hydraulic						
Maximum Operating Pressure	**Ports A,B, X**	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)	210 Bar (3045 PSI)	
	Ports Y, Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	
Pressure Ranges		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)				
Nominal Flow		90 LPM (23.8 GPM)	300 LPM (79.4 GPM)	600 LPM (158.7 GPM)	600 LPM (158.7 GPM)	
Fluid		Hydraulic oil as per DIN 51524 ... 51525				
Fluid Temperature		-20°C to +80°C (-4°F to +176°F)				
Viscosity Permitted Recommended		10 to 650 cSt / mm^2/s (46 to 3013 SSU) 30 cSt / mm^2/s (139 SSU)				
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)				
Electrical						
Duty Ratio		100%				
Solenoid Connection		Connector as per EN175301-803				
Protection Class		IP65 in accordance with EN60529 (plugged and mounted)				
	Code	**G0R**	**G0Q**	**GAR**	**GAG**	**W30**	**W31**
Supply Voltage		12V	24V	98V	205V	110V at 50Hz 120V at 60Hz	220V at 50Hz 240V at 60Hz
Tolerance Supply Voltage		+5 to -10	+5 to -10	+5 to -10	+5 to -10	±5	±5
Power Consumption	**Hold**	31W	31W	31W	31W	78W	78W
	In Rush	31W	31W	31W	31W	264W	264W
Response Time		Energized / De-energized AC 20/18ms, DC 46/27 ms				
Maximum Switching Frequency		AC up to 7200 switchings/hour DC up to 16,000 switchings/hour				
Coil Insulation Class		H (180°C) (356°F)				

D

Inch equivalents for millimeter dimensions are shown in (**)



Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
12	S26-27421-0	S26-27421-5

Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	d4	t1	d5	L6	H7	H8
06	60.0 (2.36)	22.2 (0.87)	119.0 (4.69)	28.0 (1.10)	22.2 (0.87)	81.0 (3.19)	41.6 (1.64)	47.6 (1.87)	50.0 (1.98)	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	3/8"-16 UNC	20.0 (0.79)	3.0 (0.12)	–	–	–
08	60.0 (2.36)	26.2 (1.03)	141.0 (5.55)	29.0 (1.14)	26.2 (1.03)	103.0 (4.06)	47.0 (1.85)	52.4 (2.06)	55.8 (2.20)	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.98)	10.5 (0.41)	25.0 (0.98)	3/8"-16 UNC	23.0 (0.91)	3.0 (0.12)	–	–	–
10	75.0 (2.95)	30.2 (1.19)	151.0 (5.94)	34.5 (1.36)	30.2 (1.19)	113.0 (4.45)	64.0 (2.52)	58.7 (2.31)	57.8 (2.28)	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	12.5 (0.49)	32.0 (1.26)	7/16"-14 UNC	22.0 (0.87)	3.0 (0.12)	–	–	–
12	80.0 (3.15)	35.7 (1.41)	178.0 (7.01)	34.0 (1.34)	35.7 (1.41)	140.0 (5.51)	73.0 (2.87)	69.8 (2.75)	37.3 (1.47)	69.8 (2.75)	92.5 (3.64)	55.2 (2.17)	171.2 (6.74)	38.0 (1.50)	13.5 (0.53)	38.0 (1.50)	1/2"-13 UNC	27.0 (1.06)	3.0 (0.12)	22.4 (0.88)	27.2 (1.07)	73.0 (2.87)

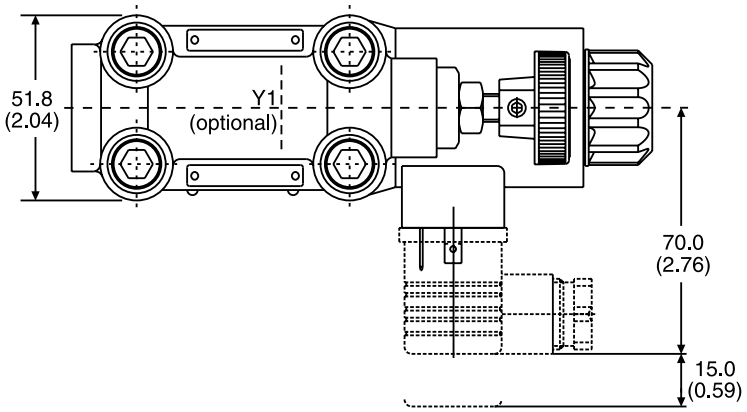
Port	Function	Port Size			
		R5U06	**R5U08**	**R5U10**	**R5U12**
A (2)	Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61	1-1/2" SAE 61
B	Tank	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61	1-1/2" SAE 61
X1	External Pilot Port*	SAE 4			
Y1	External Drain	SAE 4			
M	Pressure Gauge	SAE 4			

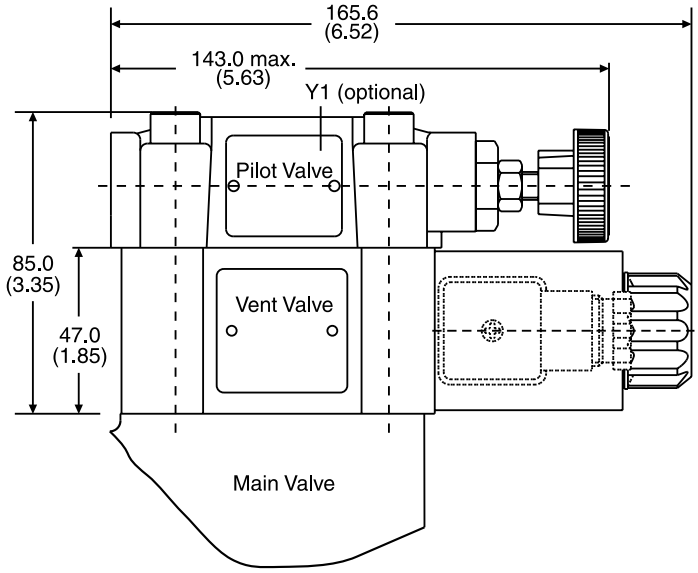
* closed when supplied.

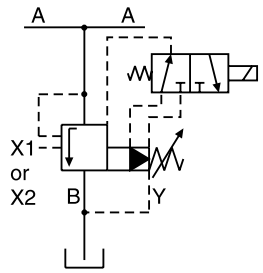
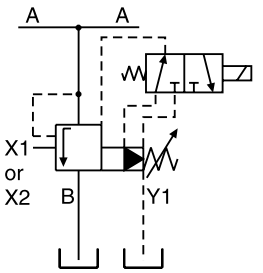
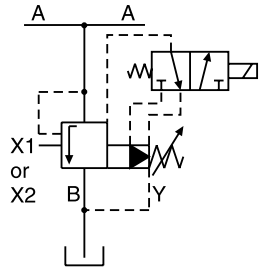
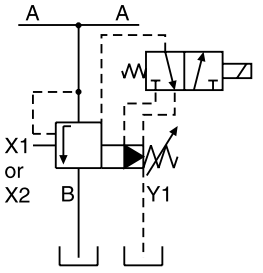
R5U.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)



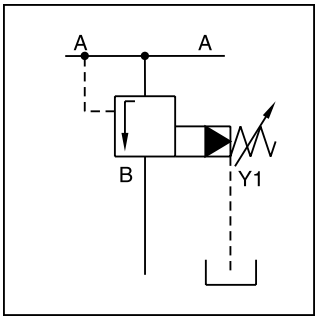


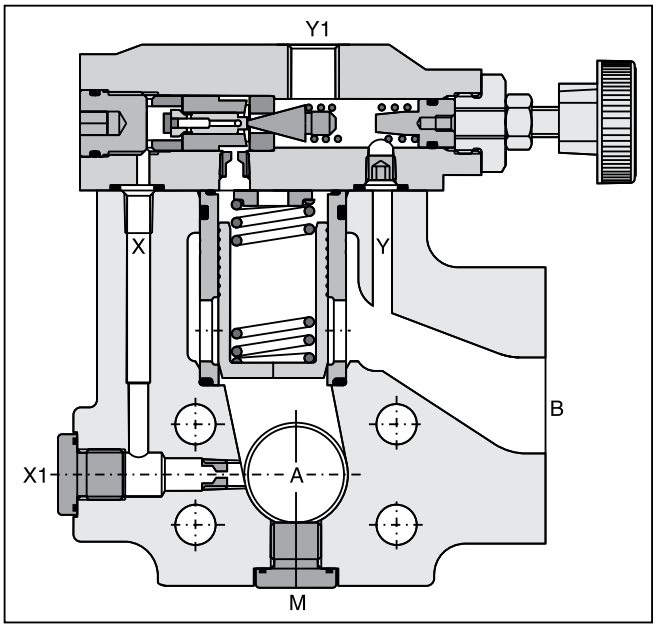
Code	Internal Drain	External Drain
11		
09		

Vent Valve Seal Kits	
Nitrile	**Fluorocarbon**
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5

General Description

Series R5S pilot operated sequence valves have a similar design to the subplate mounted R4S series. The SAE flanges allow to mount the valve directly on the inlet flanges of actuators or outlet flanges of pumps to achieve a very compact design.





Features

- Pilot operated with manual adjustment.
- 3-port body with SAE61 flange.
- 3 sizes (SAE 3/4", 1", 1-1/4").
- 3 pressure stages:
- 2 adjustment modes:
  – Hand knob
  – Acorn nut with lead seal

Ordering Information

R5S	☐	—	☐	3	☐	☐	6	A	☐	☐
Pressure Sequence Valve	Size		SAE 61 Interface	3-Port Body Y1, M = SAE 4	Pressure Range	Adjustment	External Drain from Y1 Port	Design Series	Seal	Options Check with Factory

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 Bar)

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Size	Max. Pressure
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal
4	Key Lock

Weight:

R5S06	3.6 kg (7.9 lbs.)
R5S08	4.6 kg (10.1 lbs.)
R5S10	5.2 kg (11.5 lbs.)

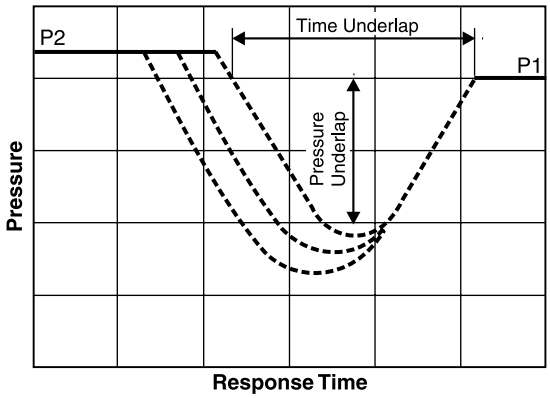
Specifications

General				
Size		**06**	**08**	**10**
Mounting		Flanged according to SAE 61		
Mounting Position		Unrestricted		
Ambient Temperature Range		-20°C to +50°C (-4°F to +122°F)		
Hydraulic				
Max. Operating Pressure	**Ports A,B**	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)
	Ports Y, Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)
Pressure Ranges		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)		
Nominal Flow		90 LPM (23.3 GPM)	300 LPM (79.4 GPM)	600 LPM (158.7 GPM)
Fluid		Hydraulic oil as per DIN 51524 ... 51525		
Fluid Temperature		-20°C to 80°C (-4°F to 176°F)		
Viscosity	**Permitted** **Recommended**	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)		
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		

D

Performance Curve

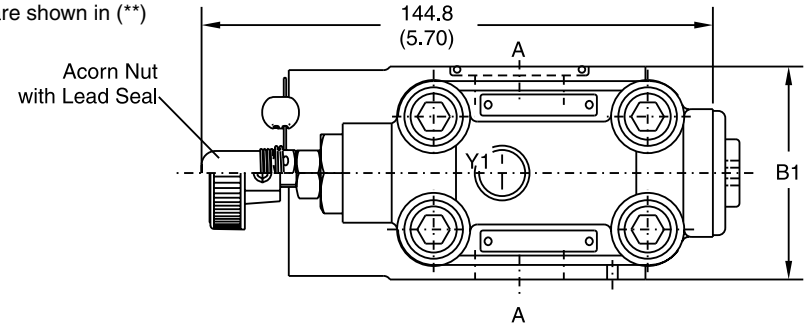
Typical Pressure Characteristics at Closing Point

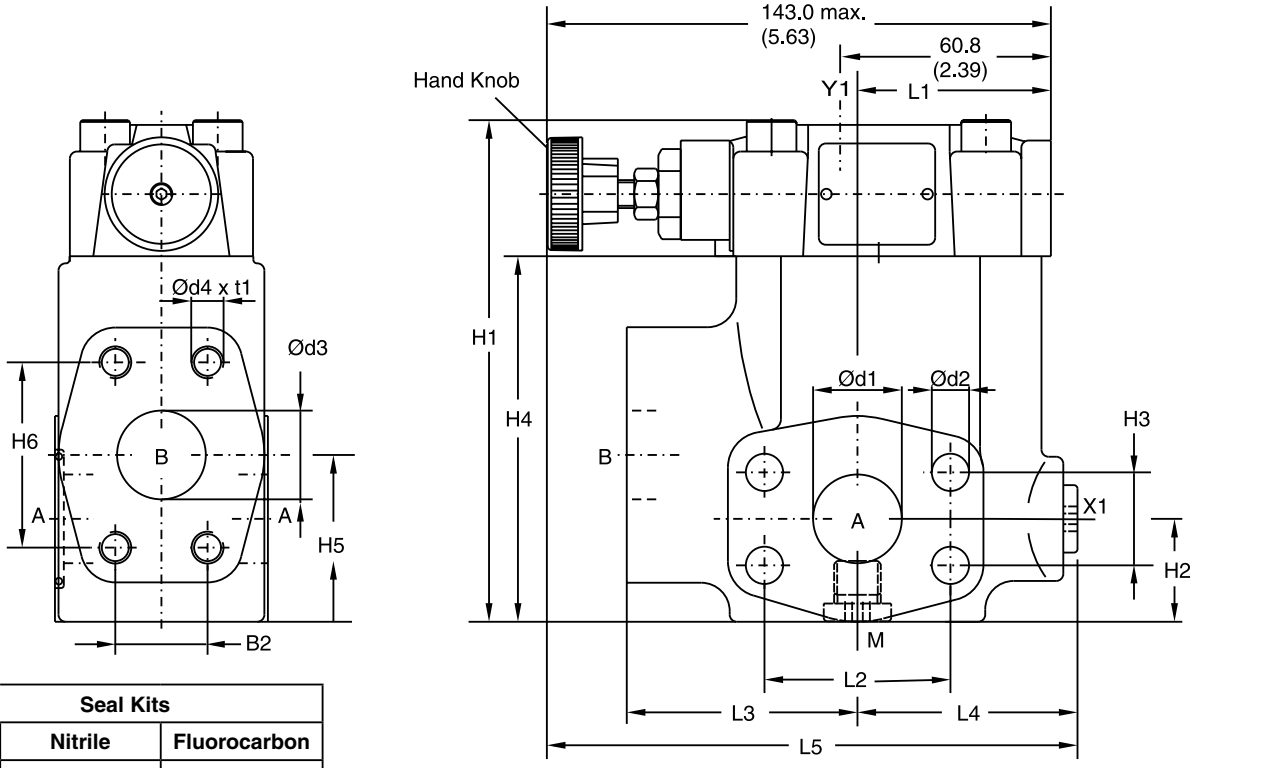


P1 = Setting Pressure
P2 = Operating Pressure

Time and pressure underlap depend on the characteristics of the specific system.

Inch equivalents for millimeter dimensions are shown in (**)





Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5

SAE 61

Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	d4 (option 152)	t1
06	60.0 (2.36)	22.2 (0.87)	119.0 (4.69)	28.0 (1.10)	22.2 (0.87)	81.0 (3.19)	41.6 (1.64)	47.6 (1.87)	50.3 (1.98)	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	3/8"-16 UNC (M10)	20.0 (0.79)
08	60.0 (2.36)	26.2 (1.03)	141.0 (5.55)	29.0 (1.14)	26.2 (1.03)	103.0 (4.06)	47.0 (1.85)	52.4 (2.06)	55.8 (2.20)	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.93)	10.5 (0.41)	25.0 (0.98)	3/8"-16 UNC (M10)	23.0 (0.91)
10	75.0 (2.95)	30.2 (1.19)	151.0 (5.94)	34.5 (1.36)	30.2 (1.19)	113.0 (4.45)	64.0 (1.52)	58.7 (2.31)	57.8 (2.28)	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	12.5 (0.49)	32.0 (1.26)	7/16"-14 UNC (M12)	22.0 (0.87)

Port	Function	Port Size		
		R5S06	**R5S08**	**R5S10**
A (2)	Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
B	Secondary Port	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
X1	External Pilot Port*	SAE 4		
Y1	External Drain	SAE 4		
M	Pressure Gauge	SAE 4		

* closed when supplied.

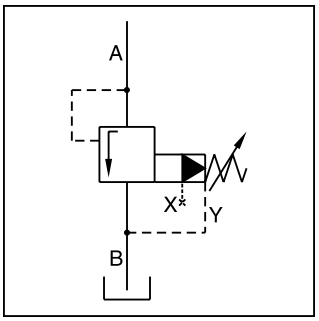
R5S.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series R4V pilot operated, pressure relief valves for in-line mounting have a similar design to the subplate mounted R4V series. For single functions where no manifold blocks are used, the valves can be directly placed in the pipework.

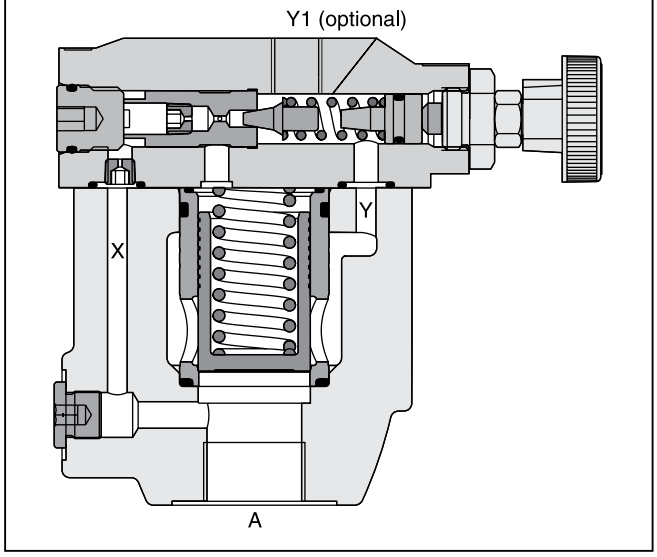
The R4V valves are available with 2 ports (L-body) for in-line relief function or with 3 ports (T-body) for relief functions in the bypass.



Operation

The system pressure in Port A is applied to the pilot valve and to the top surface of the main poppet via an orifice in X. The hydraulically balanced main poppet is held against the seat by the main spring. In this state there is no flow through the valve. The adjusted spring force acting on the pilot cone determines the relief pressure. If the pressure in Port A exceeds the set point, the pilot cone is lifted from its seat, releasing a small pilot flow to tank. The flow through the control orifice in X creates a pressure drop which limits the pressure at the top of the main poppet to the set point. The higher system pressure in Port A now lifts the main poppet off its seat and allows flow to Port B. In the resulting float position only enough flow is passed from Port A to Port B to maintain the inlet pressure in Port A at the set point. When the pressure in Port A falls below the set point, the hydraulic balance on the main poppet is restored. The main spring then forces the main poppet to close.

R4V06 L-Body



Features

- Pilot operated with manual adjustment.
- 2 interfaces:
  - L-body (R4V06-SAE 12, R4V10-SAE 20)
  - T-body (R4V03-SAE 8, R4V06-SAE 16)
- 3 pressure stages.
- 3 adjustment modes:
  - Hand knob
  - Acorn nut with lead seal
  - Key lock
- With optional vent function.

Ordering Information

R4V [ ] — **5** [ ] [ ] [ ] [ ] [ ] [ ] **A** [ ] [ ]

R4V	Size	—	5	Body	Pressure Range	Adjustment	Drain Line	Switching Type	Solenoid Voltage (Optional)	A	Seal	Options
Pressure Relief Valve			Max Pressure 350 Bar (5075 PSI)							Design Series		Check with Factory

Size

Code	Description
03	NG10 (SAE 8)
06	NG25 (SAE 16 – T-Body) (SAE 12 – L-Body)
10	NG32 (SAE 20)

Body

Code	Description
4	R4V03 T-Body R4V06 T-Body
B	R4V06 L-Body R4V10 L-Body

Pressure Range

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 Bar)

Adjustment

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal
4	Key Lock

Drain Line

Code	Description
0	Internal
2	External from Pilot Head (Y1)

Switching Type

Code	Description
Omit	Standard w/o vent function
09*	Solenoid not activ. unpress. circulation
11**	Solenoid activated unpress. circulation

* Sol. de-energized: open to tank
Sol. energized: vent line blocked

** Sol. de-energized: vent line blocked
Sol energized: open to tank

Solenoid Voltage (Optional)

Code	Description
Omit	Standard w/o vent function
G0R	12V
G0Q	24V
GAR	98V
GAG	205V
W30	110V 50Hz/ 120V 60Hz
W31	220V 50Hz/ 240V 60Hz

Design Series

A

Seal

Code	Description
1	Nitrile
5	Fluorocarbon

Options

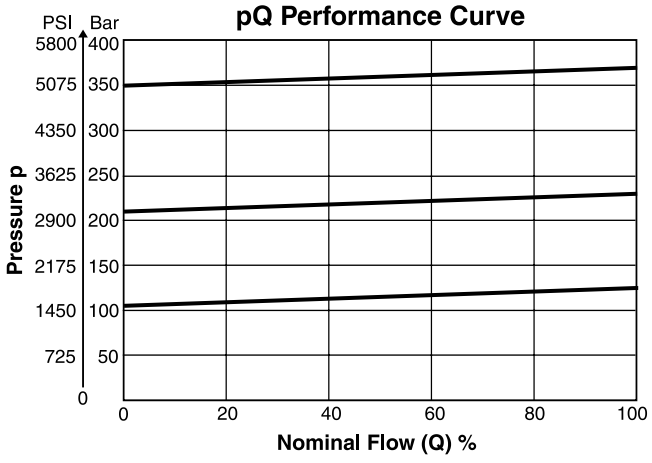
Check with Factory

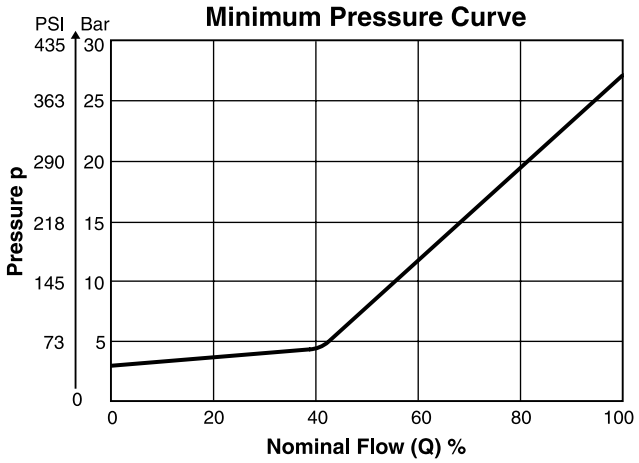
Weight:

R4V03	3.2 kg (7.1 lbs.)
R4V06*4	6.6 kg (14.6 lbs.)
R4V06*B	3.3 kg (8.2 lbs.)
R4V10	5.6 kg (12.3 lbs.)

D

Performance Curves*





* The performance curves are measured with external drain. For internal drain, the tank pressure has to be added to the curve.

R4V.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

R4V

General				
	T-Body		L-Body	
Size	**03 (SAE 8)**	**06 (SAE 16)**	**06 (SAE 12)**	**10 (SAE 20)**
Mounting	Threaded Body			
Mounting Position	Unrestricted			
Ambient Temp. Range	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Max. Operating Pressure	Ports A and X up to 350 Bar (5075 PSI); Ports B and Y 30 Bar (435 PSI)			
Pressure Ranges	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)			
Nominal Flow	60 LPM (15.9 GPM)	200 LPM (52.9 GPM)	200 LPM (52.9 GPM)	450 LPM (119.0 GPM)
Fluid	Hydraulic oil as per DIN 51524 ... 51525			
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity **Permitted** **Recommended**	 10 to 650 cSt / mm^2/s (46 to 3013 SSU 30 cSt / mm^2/s (139 SSU)			
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			

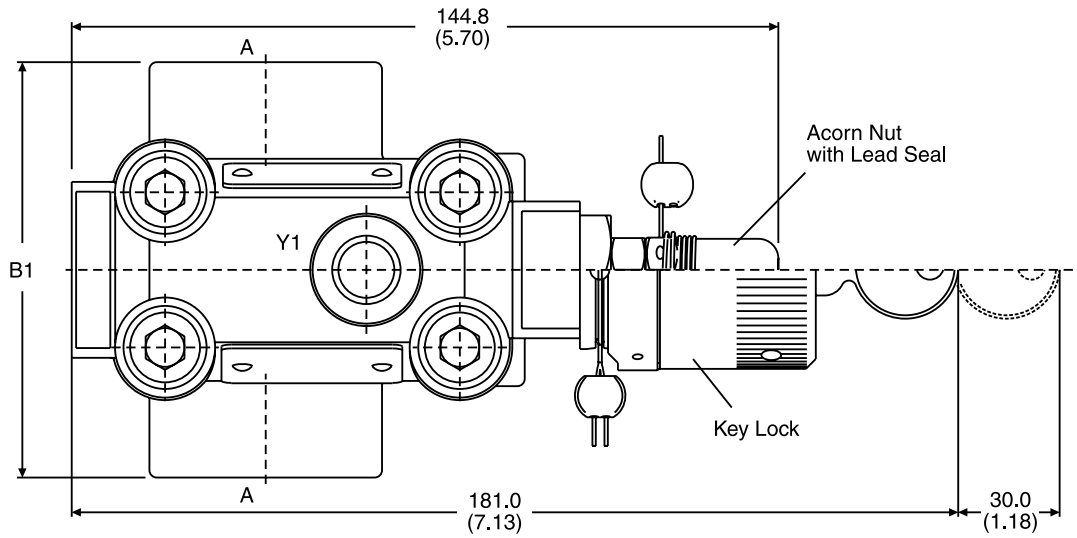
D

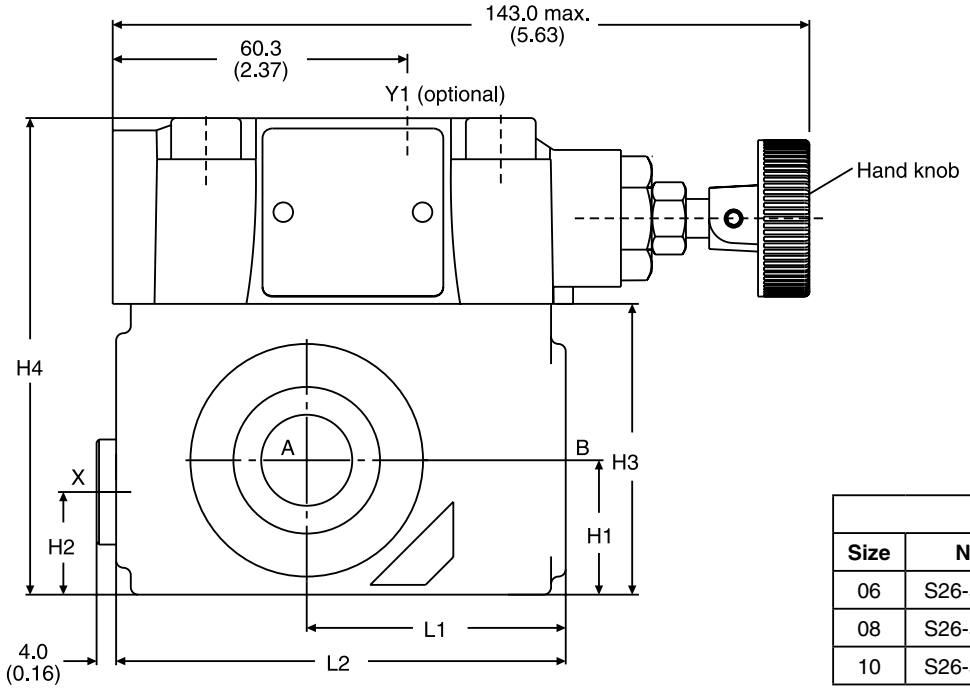
R4V with Vent Function

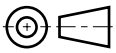
General						
	T-Body		L-Body			
Size	**03 (SAE 8)**	**06 (SAE 16)**	**06 (SAE 12)**	**10 (SAE 20)**		
Mounting	Threaded Body					
Mounting Position	Unrestricted					
Ambient Temp. Range	-20°C to +50°C (-4°F to +122°F)					
Weight	3.2 kg (7.0 lbs)	6.6 kg (14.5 lbs)	3.3 kg (7.3 lbs)	5.6 kg (12.3 lbs)		
Electrical (Solenoid)						
Duty Ratio	100%					
Response Time	Energized / De-energized AC: 20/18ms, DC: 46/27 ms					
Code	**G0R**	**G0Q**	**GAR**	**GAG**	**W30**	**W31**
Supply Voltage	12V	24V	98V	205V	110V at 50Hz 120V at 60Hz	220V at 50Hz 240V at 60Hz
Tolerance Supply Voltage	+5 to -10	+5 to -10	+5 to -10	+5 to -10	±5	±5
Power Consumption Hold	31W	31W	31W	31W	78W	78W
In Rush	31W	31W	31W	31W	264W	264W
Maximum Switching Frequency	AC up to 7,200 switchings per hour DC up to 16,000 switchings per hour					
Solenoid Connection	Connector as per EN175301-803					
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)					
Coil Insulation Class	H (180°C) (356°F)					

T-Body

Inch equivalents for millimeter dimensions are shown in (**)







Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S26-58507-0	S26-58507-5
08	S26-58475-0	S26-58475-5
10	S26-58508-0	S26-58508-5

Size	Body	B1	B2	B3	B4	H1	H2	H3	H4	H5	H6	H7	H8	L1	L2	L3
03	T-body	85.0 (3.35)	–	–	–	27.5 (1.08)	21.0 (0.83)	59.5 (2.34)	97.5 (3.84)	–	–	–	–	53.0 (2.09)	92.0 (3.62)	–
06	T-body	136.0 (5.35)	–	–	–	38.0 (1.50)	28.0 (1.10)	93.0 (3.66)	131.0 (5.16)	–	–	–	–	66.5 (2.62)	117.5 (4.63)	–

Ports	Function	Port size	
		R4V03 T-body	R4V06 T-body
A	Pressure (inlet)	SAE 8	SAE 16
B	Tank (outlet)	SAE 8	SAE 16
X[1]	Ext. Remote Control or Vent Connection	SAE 4	
Y1[2]	External Drain		

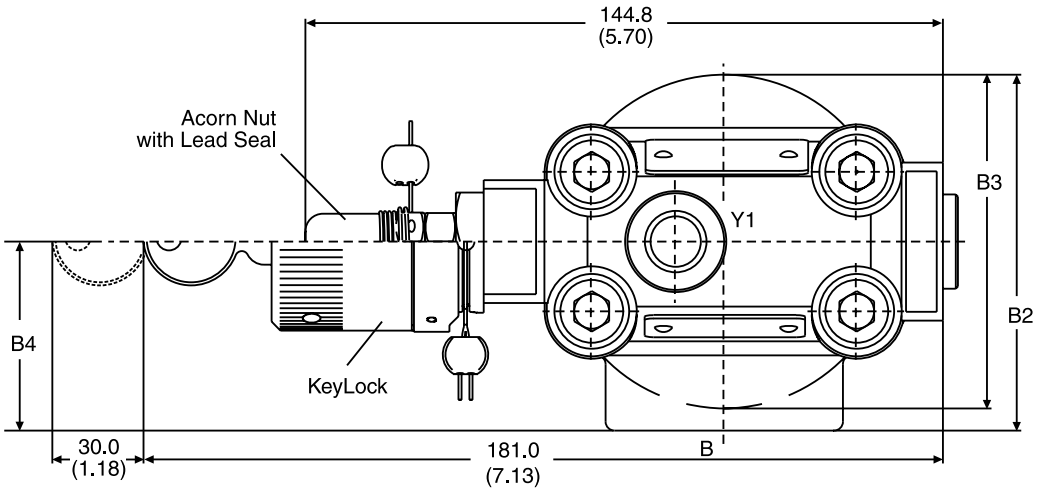
[1] closed when supplied
[2] port Y1 is only available at drain line (code 2) external from the pilot head

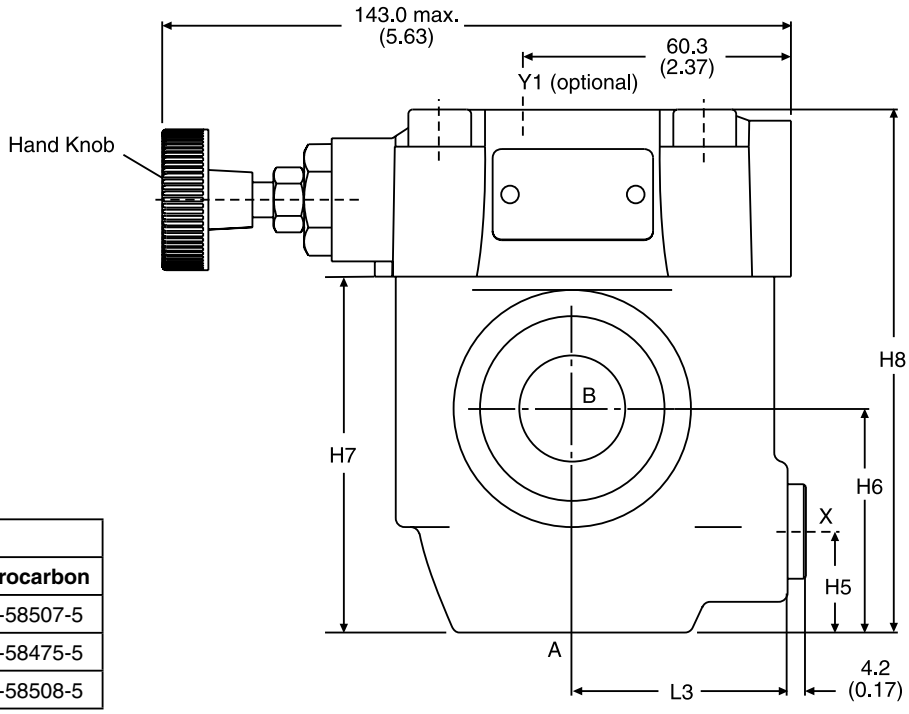
R4V.indd, dd

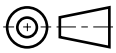
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

L-Body

Inch equivalents for millimeter dimensions are shown in (**)







Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S26-58507-0	S26-58507-5
08	S26-58475-0	S26-58475-5
10	S26-58508-0	S26-58508-5

Size	Body	B1	B2	B3	B4	H1	H2	H3	H4	H5	H6	H7	H8	L1	L2	L3
06	L-body	–	81.0 (3.19)	76.0 (2.99)	43.0 (1.69)	–	–	–	–	23.0 (0.91)	51.0 (2.01)	81.0 (3.19)	119.0 (4.69)	–	–	49.0 (1.93)
10	L-body	–	120.7 (4.75)	85.8 (3.38)	77.8 (3.06)	–	–	–	–	31.8 (1.25)	50.8 (2.00)	96.0 (3.78)	134.0 (5.78)	–	–	49.8 (1.96)

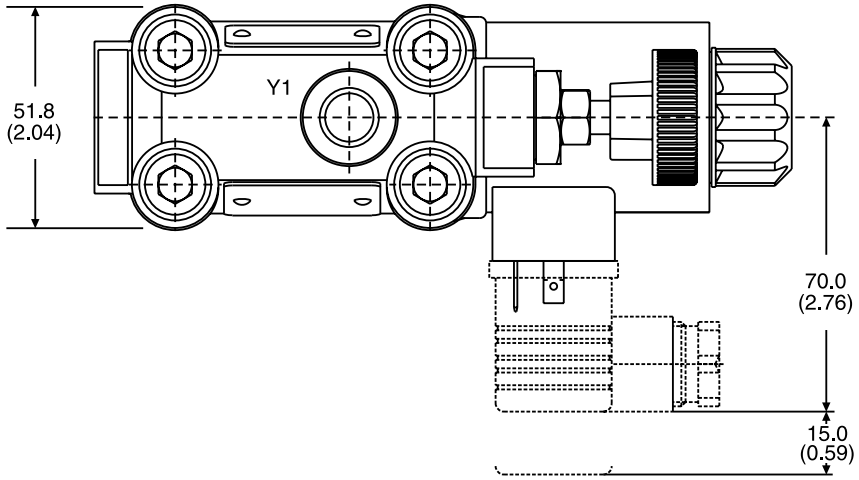
Ports	Function	Port size	
		R4V06 L-body	R4V10 L-body
A	Pressure (inlet)	SAE 12	SAE 20
B	Tank (outlet)	SAE 12	SAE 20
X[1)]	Ext. Remote Control or Vent Connection	SAE 4	
Y1[2)]	External Drain		

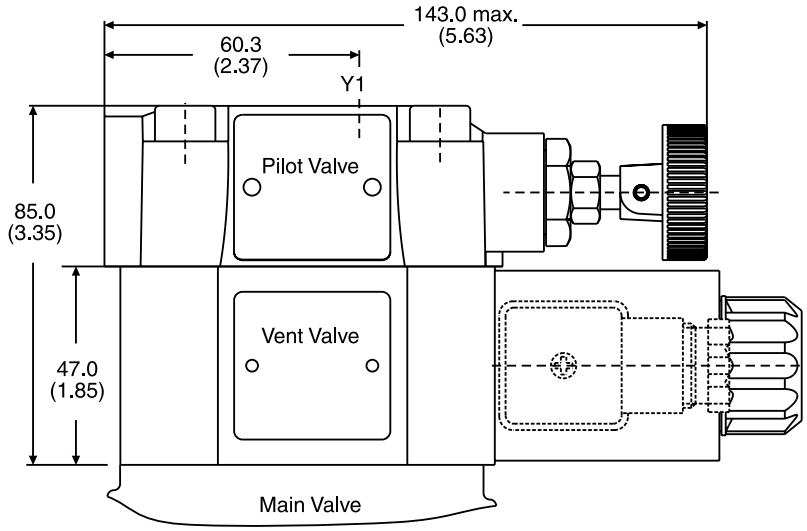
[1)] closed when supplied
[2)] port Y1 is only available at drain line (code 2) external from the pilot head

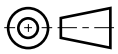
R4V.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

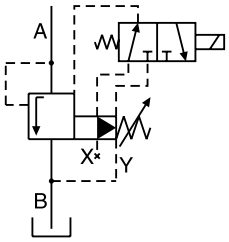
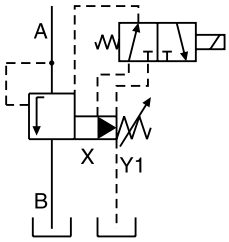
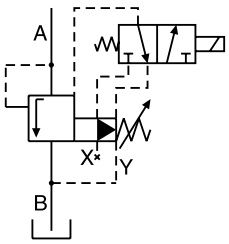
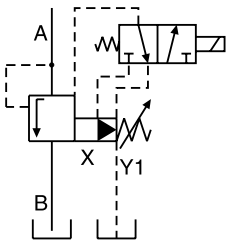
Inch equivalents for millimeter dimensions are shown in (**)







Vent Valve Seal Kits	
Nitrile	**Fluorocarbon**
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5

Code	Internal Drain	External Drain
11		
09		

General Description

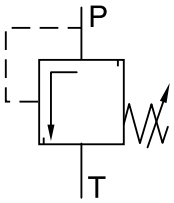
Series R1E02 direct operated, pressure relief valves are seated type valves typically used for remote pressure controls. In applications where the reliabilitiy and simplicity of a hydraulic remote control are preferred to an electrohydraulic system, Series R1E02 is an ideal solution.

Typically pilot operated pressure valves or compensators of variable pumps are controlled.

Foot Mounting

Front Panel Mounting

Subplate Mounting

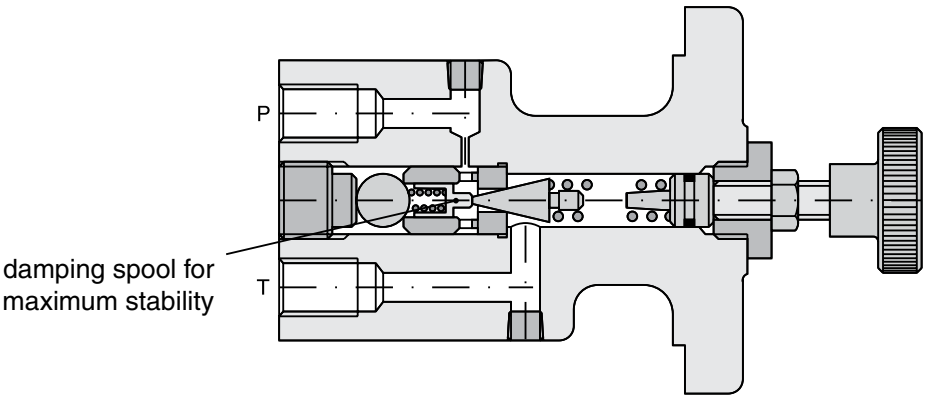


Features

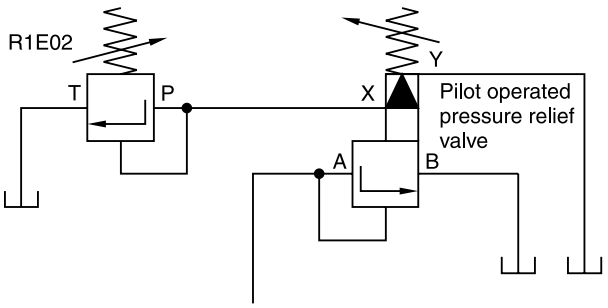
- Seated type valve.
- 3 body variants:
  - foot mounting
  - front panel mounting
  - subplate mounting
- 3 pressure ranges.
- 3 adjustment modes:
  - hand knobs
  - acorn nut with lead seal
  - adjusting with lock

D

Front Panel Mounting



Typical Configuration as Remote Pilot Valve



Ordering Information

R1E02	☐	☐	2	☐	A	1	☐
Pressure Relief Valve	Interface	Pressure Range	Connections G1/4"	Adjustment	Design Series	Seal Nitrile	Options Check with Factory

Code	Description
1	Foot Mounting
2	Front Panel Mounting
3	Subplate Mounting

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
1	Hand Knob Ø32mm
3	Acorn Nut with Lead Seal
4 *	Adjusting Device with Lock (Key Order No. 700-70619)

* on bodies for subplate mounting use plate S16-64188.

Weight:

R1E021	2.1 kg (4.6 lbs.)
R1E022	2.1 kg (4.6 lbs.)
R1E023	1.0 kg (2.2 lbs.)

Seal Kit:

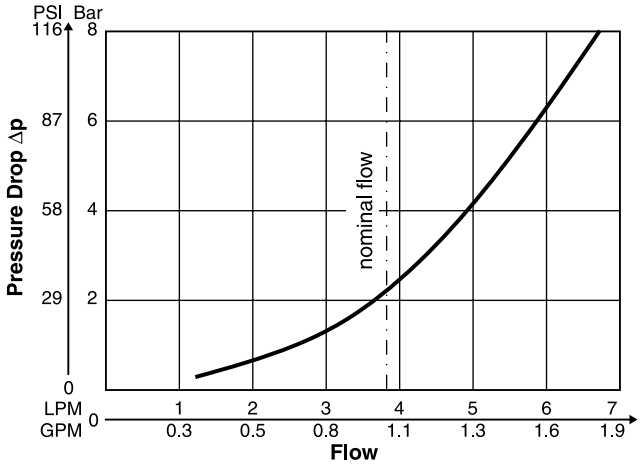
R1E021	S26-58466-0
R1E022	S26-58466-0
R1E023	S16-91963-0

D

Specifications

General	
Size	1/4"
Interface	Foot mounting, Front panel mounting, Subplate mounting
Mounting Position	Unrestricted
Ambient Temperature Range	-20°C to +70°C (-4°F to +158°F)
Hydraulic	
Maximum Operating Pressure	Port P 350 Bar (5075 PSI); Port T depressurized
Pressure Range	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)
Fluid	Hydraulic oil as per DIN 51524 ... 51525
Fluid Temperature	-20°C to +70°C (-4°F to +158°F)
Nominal Flow	3.8 LPM (1.0 GPM)
Minimum Pressure Setting	7 Bar (102 PSI)
Viscosity **Permitted** **Recommended**	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)
Filtration	ISO Class 4406 (1999) 18/16/13

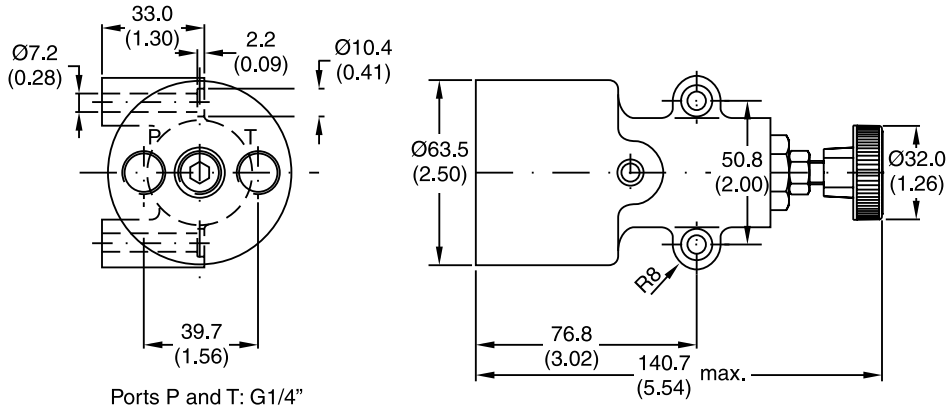
Performance Curve



Fluid viscosity 35 cSt at 50°C (122°F) ± 5°C (41°F)

Inch equivalents for millimeter dimensions are shown in (**)

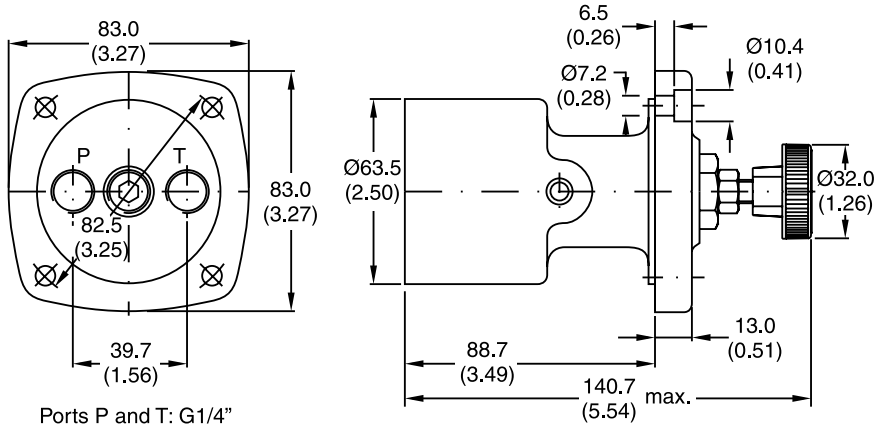
Foot Mounting



Ports P and T: G1/4”

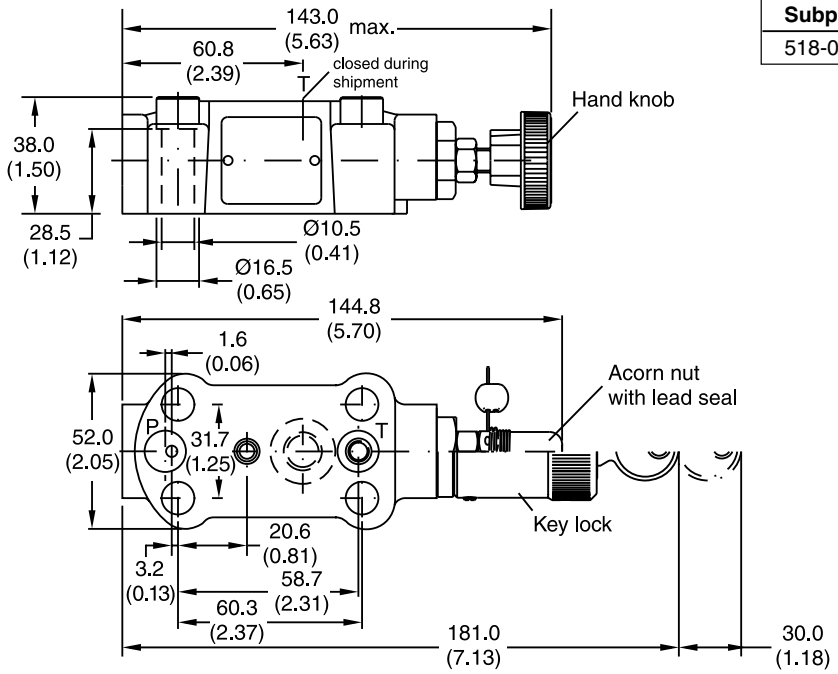
D

Front Panel Mounting



Ports P and T: G1/4”

Subplate Mounting



Subplate	Size
518-00139-0	3/8" NPT

R1E02.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Notes

Return to ALPHA TOC
Return to SECTION TOC
D

R1E02.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Return to ALPHA TOC
Return to SECTION TOC

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Series C4V
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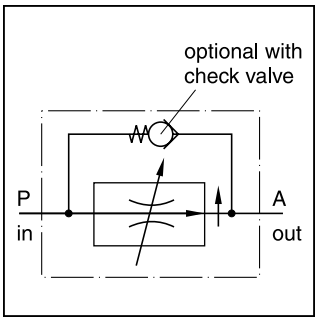
General Description

Series 2F1C 2-way flow control valves provide pressure and viscosity compensated flow from port A to port B. The counter direction is blocked (standard) or can be open via an integral reverse flow check valve (optional).



Operation

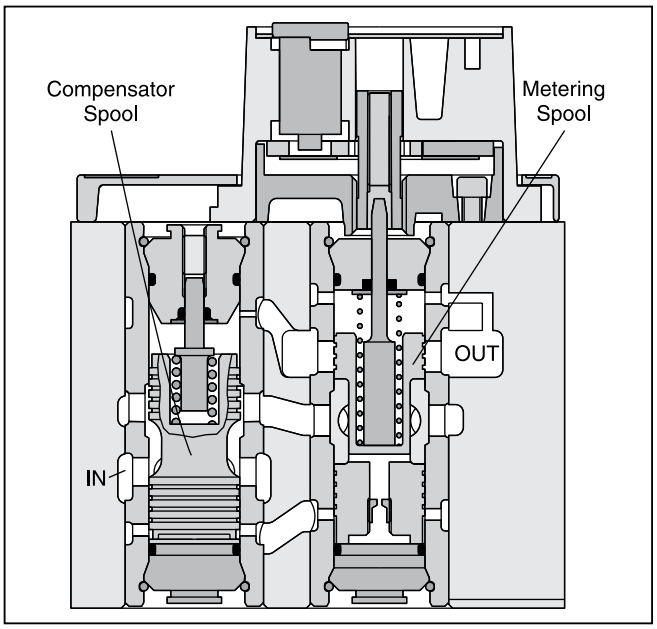
The compensator spool is located in front of the metering spool. The metering spool is closed in the neutral position to avoid undesired initial actuator motion. The oil flow to open the metering spool has to pass a needle valve (not shown in the sectional drawing). The needle valve can be adjusted from the front panel to set the response time of the 2F1C.

The metering spool is adjusted by the main control knob. The key lock has three positions:

Lock: Adjustment is locked.

Adjust: Full adjustment is permitted.

Trim: Fine adjustment of ±5% is possible.



Features

- 2 way flow control valve.
- Subplate mounting according to ISO 6263.
- Excellent fine adjustment.
- Adjustable response time.
- Closed in neutral position.
- Optional reverse flow check valve.
- 2 sizes: NG10 (3/8"), NG16 (3/4").

Ordering Information

2F1C	☐	01	B	5	☐	☐
2-Way Flow Control Valve	Size	Adjustment Knob with Lock	Design Series	Seal	Reverse Flow Check	Options Check with Factory

Code	Description
02	NG10 (3/8")
03	NG16 (3/4")

Fluorocarbon

Code	Description
0	Without Check
C	With Check

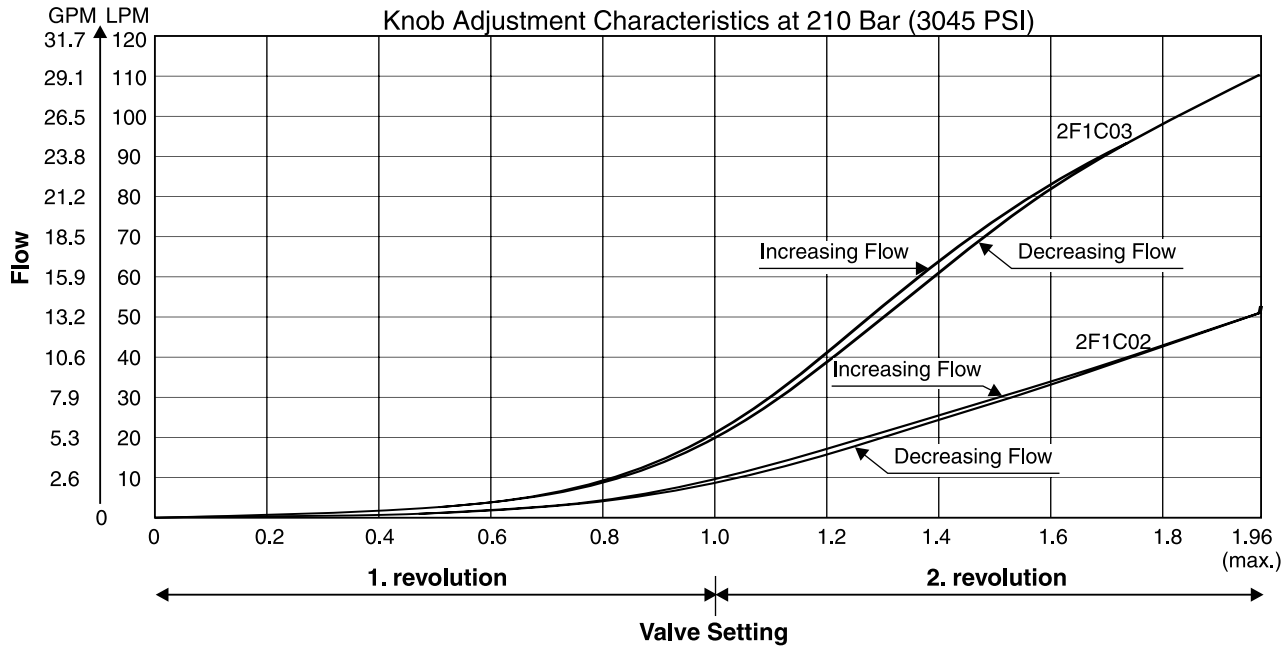
Weight:

2F1C02 6.0 kg (13.2 lbs.)
2F1C03 9.0 kg (19.8 lbs.)

Size		NG10	NG16
Actuator		Manual flow rate adjustment	
Mounting Type		ISO 6263	
Mounting Position		Unrestricted	
Fluid Temperature		+70°C (+158°F) Maximum	
Ambient Temprature		-25°C to +50°C (-13°F to +122°F)	
Viscosity Range		2.8 to 400 cSt / mm^2/s (13 to 1854 SSU)	
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638:7	
Maximum Pressure Difference		See Diagram	
Maximum Operating Pressure	**Port A**	**2F1C02** 14 - 280 Bar (203 - 4060 PSI)	**2F1C03** 14 - 350 Bar (203 - 5075 PSI)
	Port B	0 - 270 Bar (0 - 3915 PSI)	0 - 340 Bar (0 - 4930 PSI)
Flow Direction	**A–B**	Flow control function	
	B–A	Blocked or free flow through check valve	

E

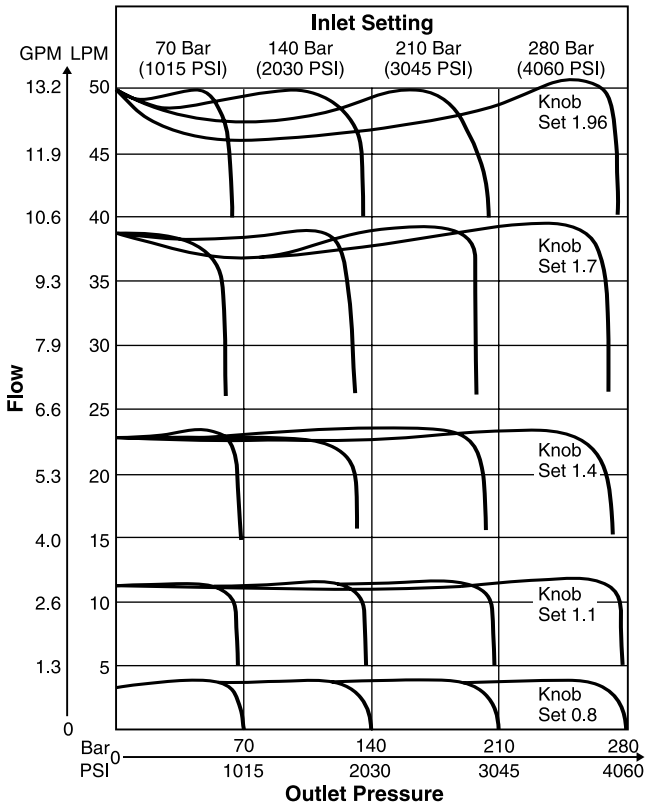
Flow
Knob Adjustment Characteristics at 210 Bar (3045 PSI)



E

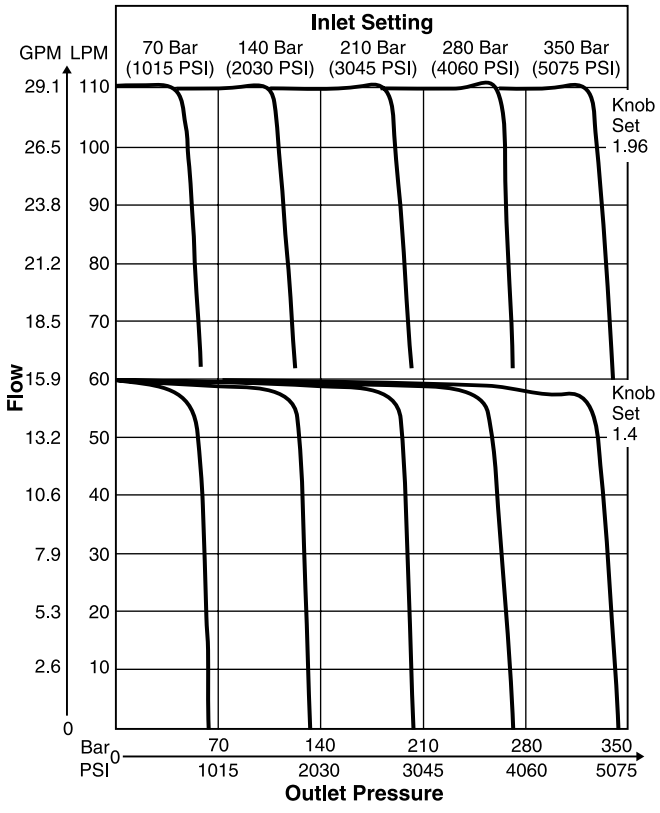
2F1C02

Flow / Pressure Drop
Constant Inlet Pressure – Variable Outlet Pressure



2F1C03

Flow / Pressure Drop
Constant Inlet Pressure – Variable Outlet Pressure



Fluid viscosity 40 cSt at 50°C (122°F)

2F1C.indd, dd

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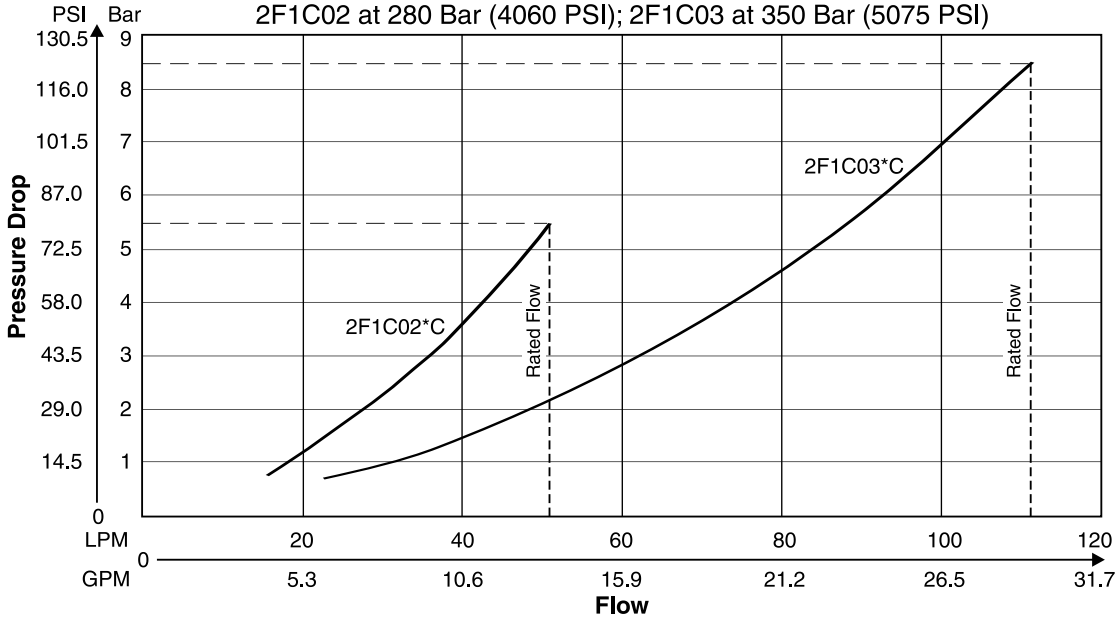
Elyria, Ohio, USA

Pressure Δp/Q
For Reverse Flow Direction
2F1C02 at 280 Bar (4060 PSI); 2F1C03 at 350 Bar (5075 PSI)



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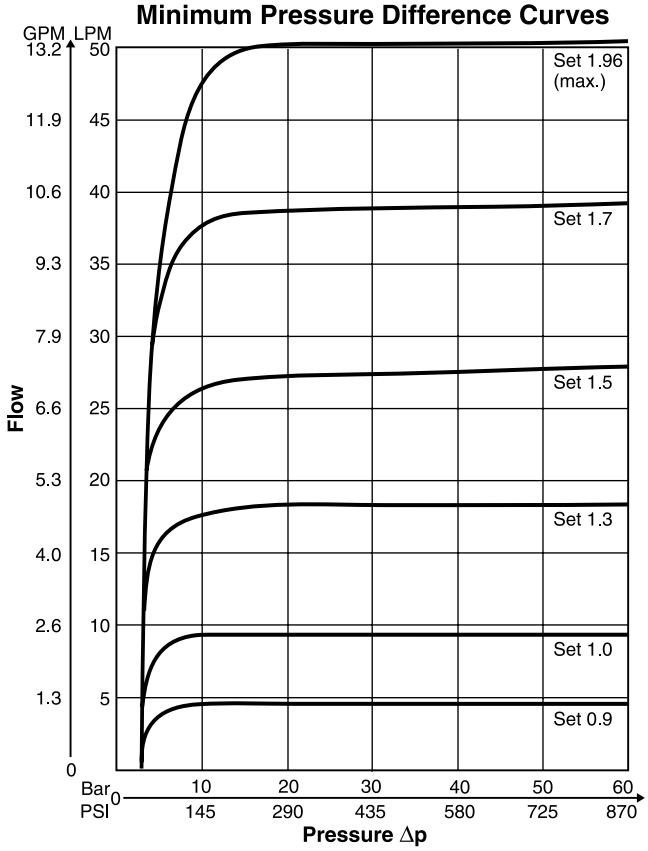
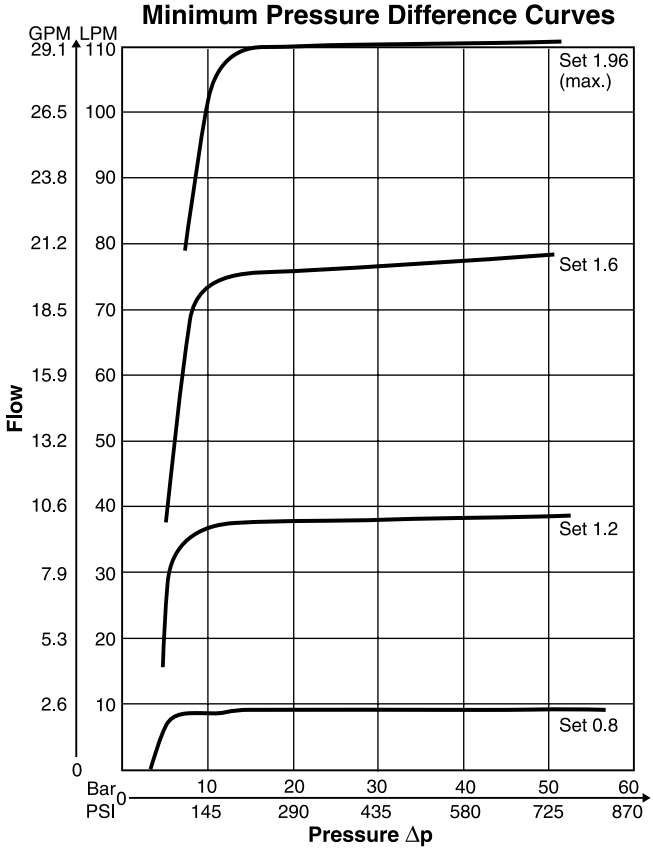
2F1C02

Minimum Pressure Difference Curves



2F1C03

Minimum Pressure Difference Curves



Fluid viscosity 40 cSt at 50°C (122°F)

2F1C.indd, dd

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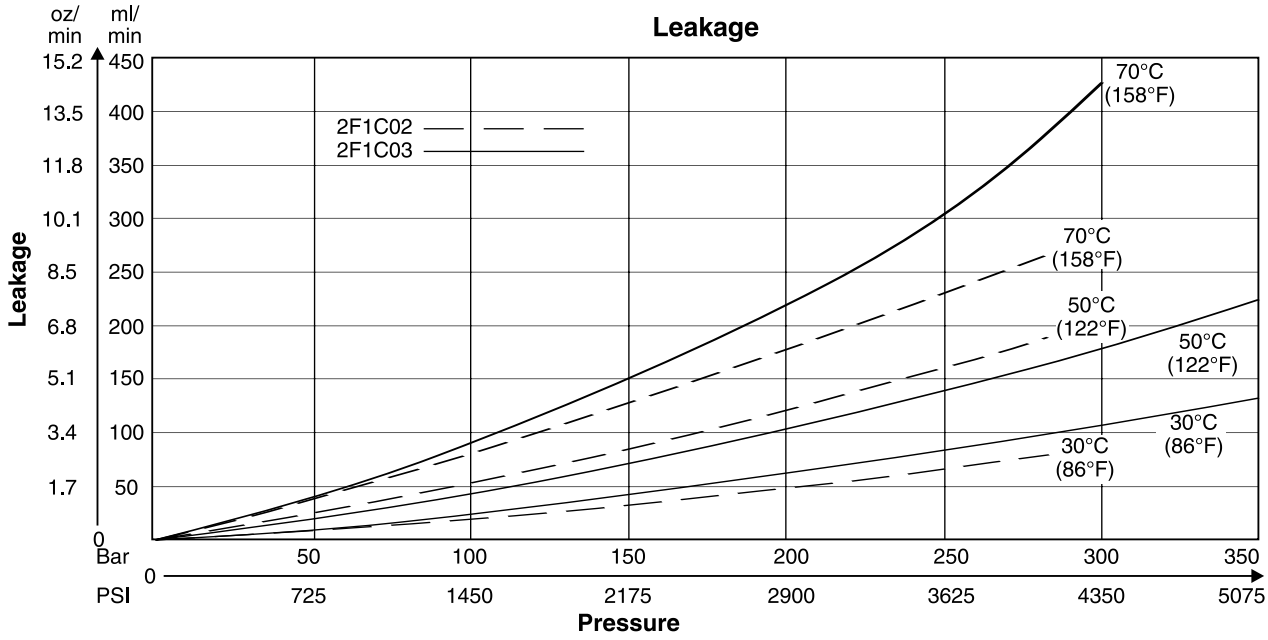
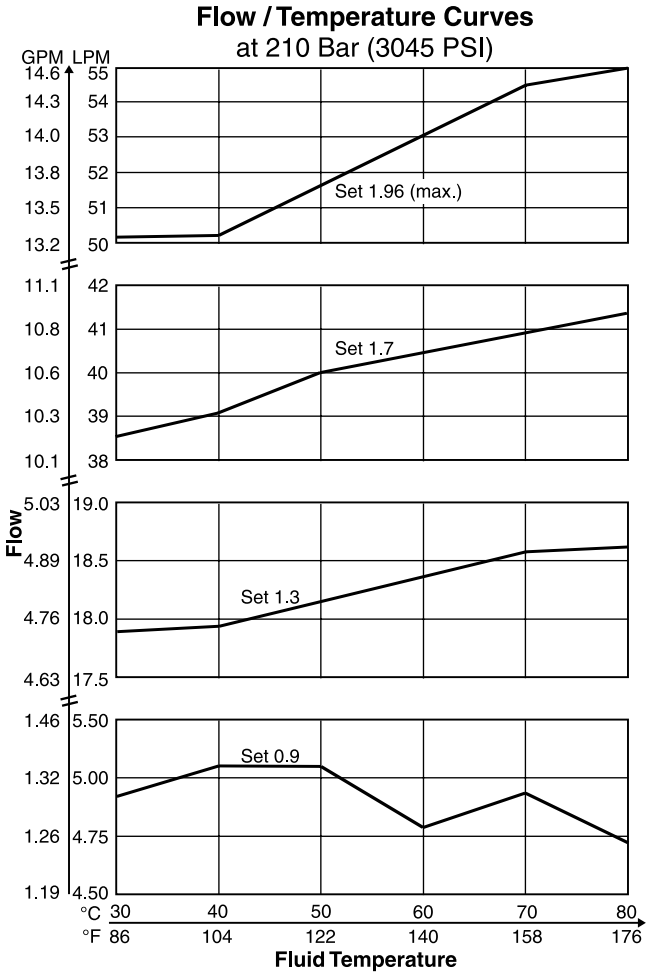
Hydraulic Valve Division
Elyria, Ohio, USA

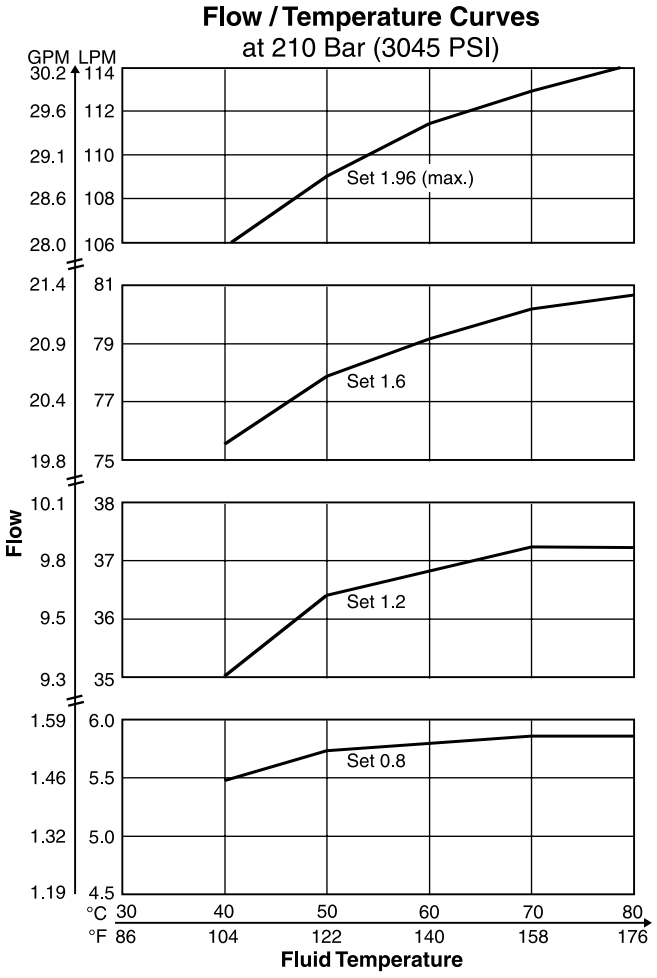


E

2F1C02



2F1C03

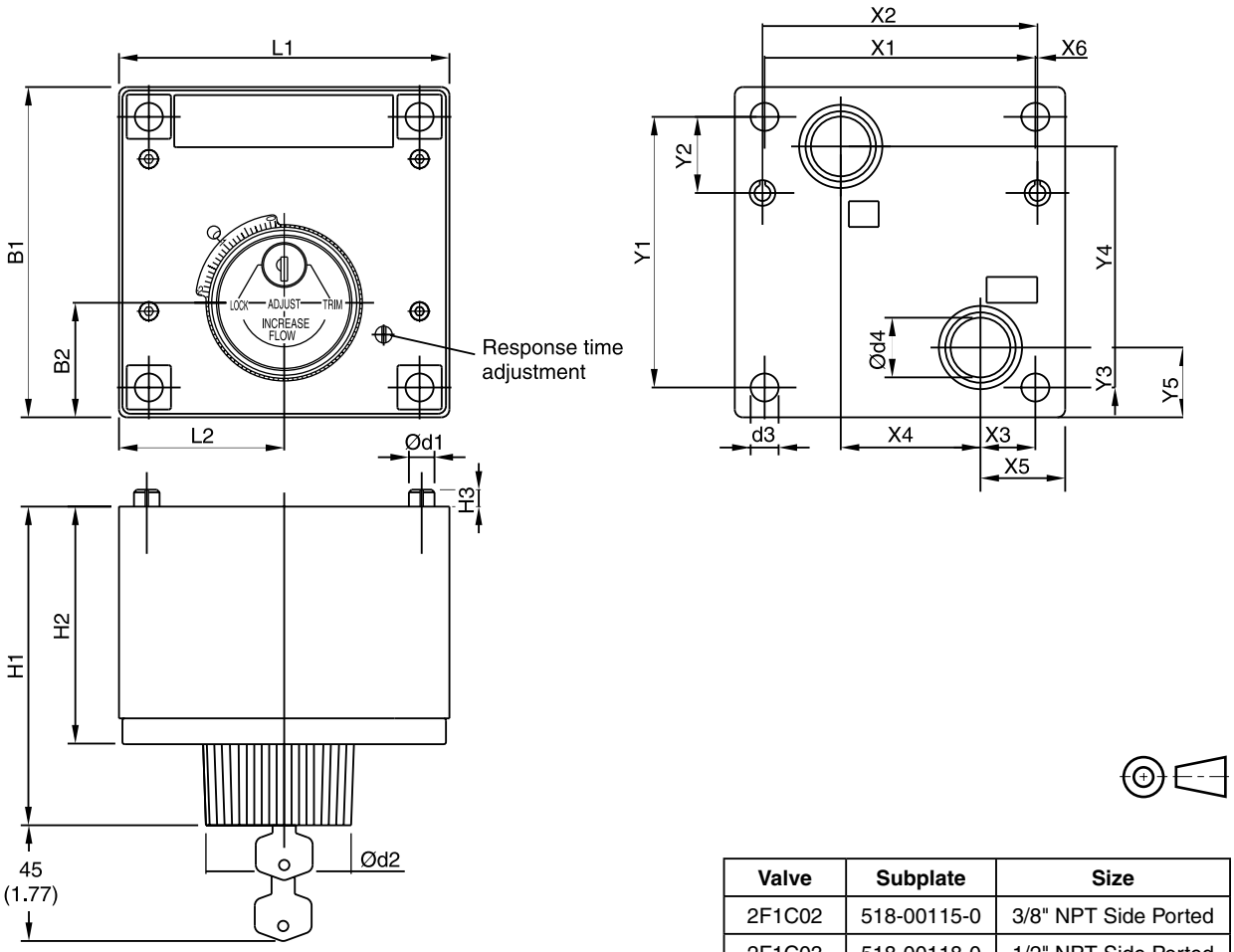


Fluid viscosity 40 cSt at 50°C (122°F)

2F1C.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)



Valve	Subplate	Size
2F1C02	518-00115-0	3/8" NPT Side Ported
2F1C03	518-00118-0	1/2" NPT Side Ported

Size	ISO-code	x1	x2	x3	x4	x5	x6	y1	y2	y3	y4	y5
02	6263-AM-07-2-A	76.2 (3.00)	79.4 (3.13)	9.5 (0.37)	44.5 (1.75)	19.0 (0.75)	–	82.5 (3.25)	23.8 (0.94)	30.2 (1.19)	41.3 (1.63)	39.7 (1.56)
03	6263-AK-06-2-A	101.6 (4.00)	103.2 (4.06)	20.6 (0.81)	52.4 (2.06)	31.8 (1.25)	0.8 (0.03)	101.6 (4.00)	28.6 (1.13)	15.1 (0.59)	75.4 (2.97)	26.2 (1.03)

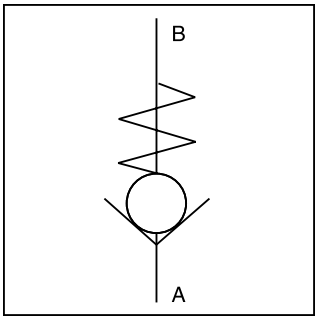
Size	ISO-code	B1	B2	H1	H2	H3	L1	L2	d1	d2	d3	d4
02	6263-AM-07-2-A	101.6 (4.00)	38.1 (1.50)	119.6 (4.71)	87.4 (3.44)	6.4 (0.25)	95.2 (3.75)	47.6 (1.87)	6.4 (0.25)	57.2 (2.25)	8.7 (0.34)	14.2 (0.56)
03	6263-AK-06-2-A	123.8 (4.87)	42.9 (1.69)	121.4 (4.78)	89.2 (3.51)	6.4 (0.25)	123.8 (4.87)	61.9 (2.44)	9.5 (0.37)	57.2 (2.25)	10.5 (0.41)	22.4 (0.88)

Size	ISO-Code	Bolt Kit DIN912 12.9		Seal Kit Fluorocarbon	Surface Finish
02	6263-AM-07-2-A	BK-700-70842-8 4xM8x100	31.8 Nm (23.5 lb.-ft.) ±15%	S26-98617-5	R_{max}6.3 0.01/100
03	6263-AK-06-2-A	BK395 4xM10x100	63 Nm (46.5 lb.-ft.) ±15%		

General Description

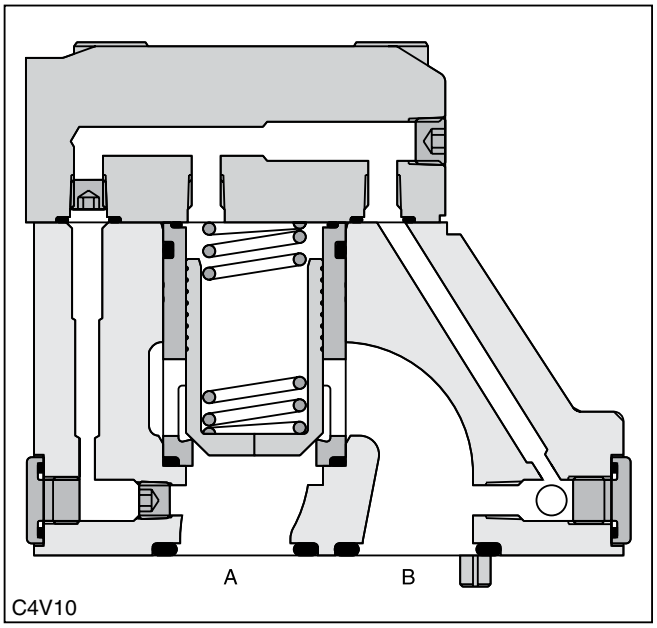
Series C4V direct operated check valves valves allow free flow from A to B. The counter direction is blocked. Series C4V valves are equipped with a leak-free seat type cartridge.

C4V06



Operation

The pressure arising in port A lifts the poppet from the valve seat and releases the flow to B. In the counter direction, the spring and the pressure on top of the cartridge hold the poppet onto the seat and block the flow.



C4V10

E

Features

- High flow, low pressure drop design.
- Minimal internal leakage.
- Six crack pressure options.

Ordering Information

C4V — [ ] **5** **3** **0** [ ] **B** [ ] [ ]

- **C4V** — Direct Operated Check Valve
- [ ] — Size

Code	Description
03	NG10
06	NG25
10	NG32

- **5** — Maximum Pressure 350 Bar (5075 PSI)
- **3** — Subplate Mounting
- **0**
- [ ] — Approximate Cracking Pressure

Code	Description C4V03	C4V06 / C4V10
1	2.8 Bar (40.6 PSI)	3.5 Bar (50.8 PSI)
2	0.5 Bar (7.3 PSI)	0.5 Bar (7.3 PSI)
3	0.3 Bar (4.4 PSI)	0.3 Bar (4.4 PSI)
4	2.2 Bar (31.9 PSI)	2.2 Bar (31.9 PSI)
5	—	9.0 Bar (130.5 PSI)
6	1.2 Bar (17.4 PSI)	1.2 Bar (17.4 PSI)
7	3.0 Bar (43.5 PSI)	—

- **B** — Design Series
- [ ] — Seal

Code	Description
1	Nitrile
5	Fluorocarbon

- [ ] — Options Check with Factory

Weight:

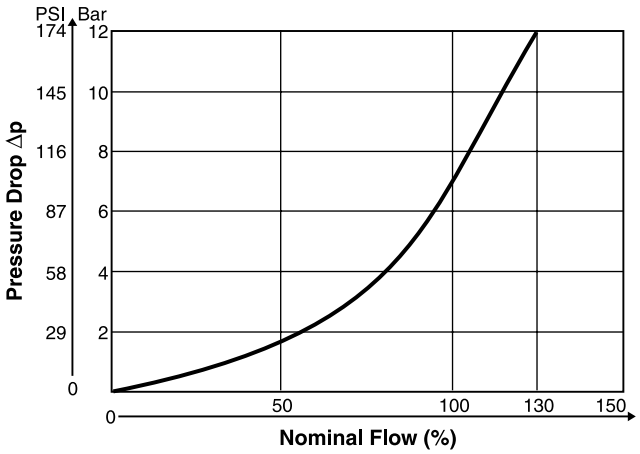
C4V03	2.8 kg (6.2 lbs)
C4V06	4.6 kg (10.1 lbs.)
C4V10	6.1 kg (13.5 lbs.)

Specifications

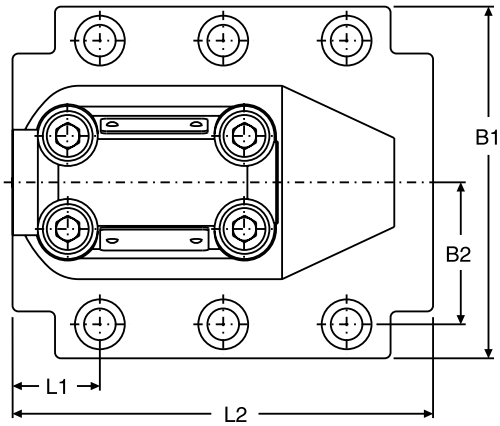
General				
Size		**NG10**	**NG25**	**NG32**
Subplate Mounting		ISO 5781		
Mounting Position		Unrestricted		
Ambient Temperature Range		-20°C to +80°C (-4°F to +176°F)		
Hydraulic				
Maximum Operating Pressure		350 Bar (5075 PSI)		
Pressure Range		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)		
Nominal Flow		150 LPM (39.7 GPM)	270 LPM (71.4 GPM)	450 LPM (119.0 GPM)
Fluid		Hydraulic oil to DIN 51524		
Viscosity	**Recommended**	30 to 50 cSt / mm^2/s (139 to 232 SSU)		
	Permitted	20 to 380 cSt / mm^2/s (93 to 1761 SSU)		
Fluid Temperature	**Recommended**	+30°C to +50°C (86°F to +122°F)		
	Permitted	-20°C to +70°C (-4°F to +158°F)		
Filtration		ISO Class 4406 (1999) 18/16/13 (meet NAS 1638:7)		

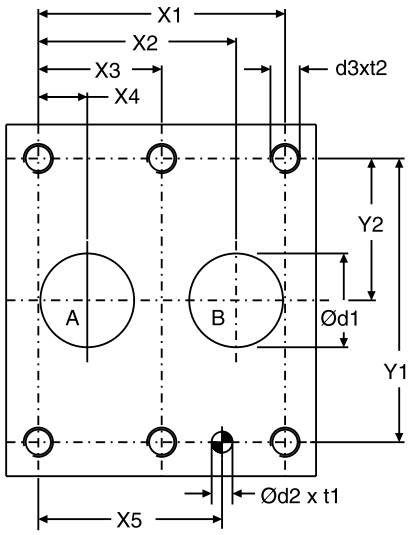
E

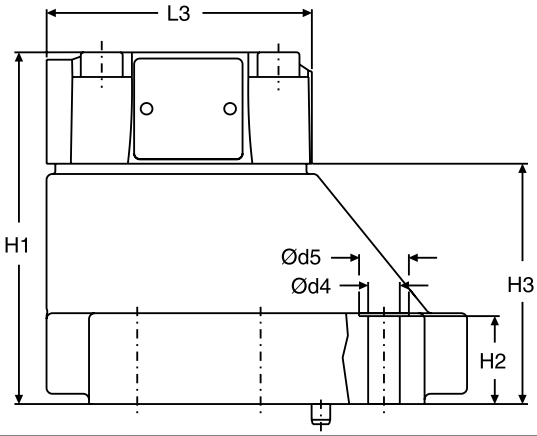
Performance Curve

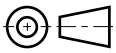


Inch equivalents for millimeter dimensions are shown in (**)





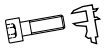
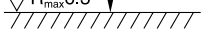




NG	ISO-code	x1	x2	x3	x4	x5	y1	y2	B1	B2	H1	H2	H3	L1	L2
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	–	7.2 (0.28)	31.8 (1.25)	66.7 (2.63)	33.4 (1.31)	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	45.0 (1.77)	29.0 1.14)	94.8 (3.73)
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	–	11.1 (0.44)	44.5 (1.75)	79.4 (3.13)	39.7 (1.56)	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	71.5 (2.81)	34.7 (1.37)	126.8 (4.99)
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	42.1 (1.66)	16.7 (0.66)	62.7 (2.47)	96.8 (3.81)	48.4 (1.91)	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	82.0 (3.23)	30.6 (1.20)	144.3 (5.68)

Tolerance for all dimensions ±0.2 mm (0.01 inches)

NG	ISO-code	d1max	d2	t1	d3	t2	d4	d5
10	5781-06-07-0-00	15.0 (0.59)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal Kit		Surface finish
					Nitrile	Fluorocarbon	
10	5781-06-07-0-00	BK505	4xM10 x 35 DIN 912 12.9	68 Nm (50.2 lb-ft) ±15%	S16-39362-0	S16-39362-5	
25	5781-08-10-0-00	BK485	4xM10 x 45 DIN 912 12.9	68 Nm (50.2 lb-ft) ±15%	S16-39364-0	S16-39364-5	
32	5781-10-13-0-00	BK506	6xM10 x 45 DIN 912 12.9	68 Nm (50.2 lb-ft) ±15%	S16-39366-0	S16-39366-5	

C4V-DO.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Notes

Return to ALPHA TOC
Return to SECTION TOC
E

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

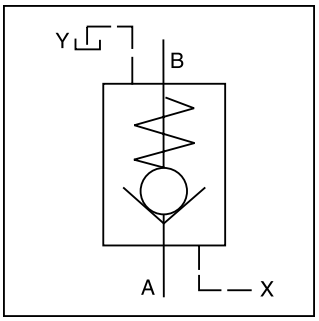
General Description

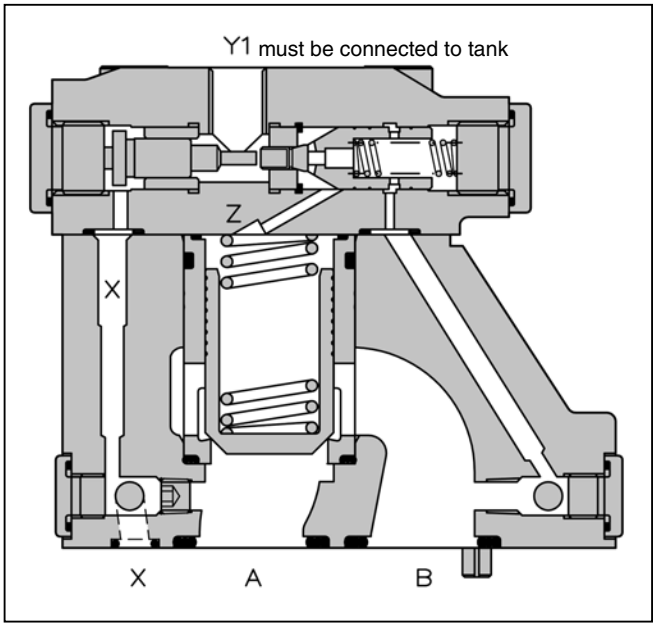
Series C4V hydraulically pilot operated check valves allow free flow from A to B. The counter-flow direction is blocked.

When pressure is applied to control port X, the ring chamber flow from B to A is released.

Up to four different pilot control ratios are available (see Ordering Information).

Check valves allow free flow from A to B. The counter direction is blocked. The C4V series are equipped with a leak-free seat type cartridge.





Operation

When no pressure is applied to the X-port, the flow from B to A is blocked, because the pressure in B is also in effect on top of the poppet.

Pressurizing the X port relieves the area on top of the poppet to the drain port and allows flow from B to A.

The seat design of the C4V valve series provides leak-free separation of port A and B in the closed position.

Features

- High flow, low pressure drop design.
- Minimal internal leakage.

Ordering Information

C4V	☐	—	5	9	☐	☐	B	☐	☐
Pilot Operated Check Valve	Size		Maximum Pressure 350 Bar (5075 PSI)	Y1 Port G1/4"	Opening Ratio	Approximate Cracking Pressure	Design Series	Seal	Options Check with Factory

Code	Description
03	NG10
06	NG25
10	NG32

Code	Description
1	1:1
3	3:1
8	8:1
9	10:1

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description	
	Flow A to B	**Flow A to B**
	C4V03	**C4V06 / C4V10**
2	1.0 Bar (14.5 PSI)	1.0 Bar (14.5 PSI)
4	4.0 Bar (58.0 PSI)	3.5 Bar (50.8 PSI)
6	2.0 Bar (29.0 PSI)	2.2 Bar (31.9 PSI)
	Flow B to A	**Flow B to A**
	C4V03	**C4V06 / C4V10**
2	1.5 Bar (21.8 PSI)	1.7 Bar (24.7 PSI)
4	5.5 Bar (79.8 PSI)	6.0 Bar (87.0 PSI)
6	3.0 Bar (43.5 PSI)	3.8 Bar (55.1 PSI)

Weight:

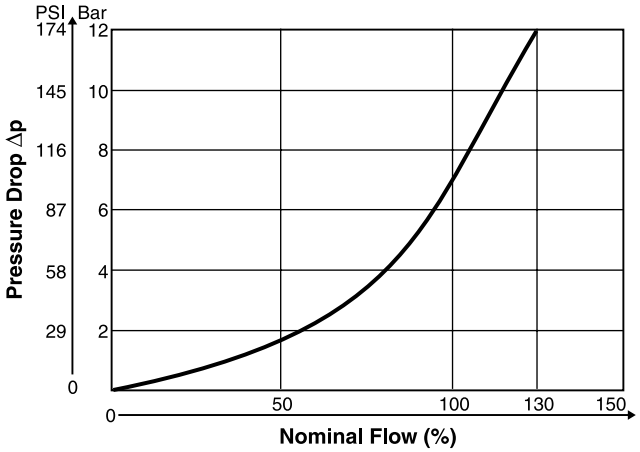
C4V03	2.8 kg (6.2 lbs)
C4V06	4.6 kg (10.1 lbs.)
C4V10	6.1 kg (13.5 lbs.)

Specifications

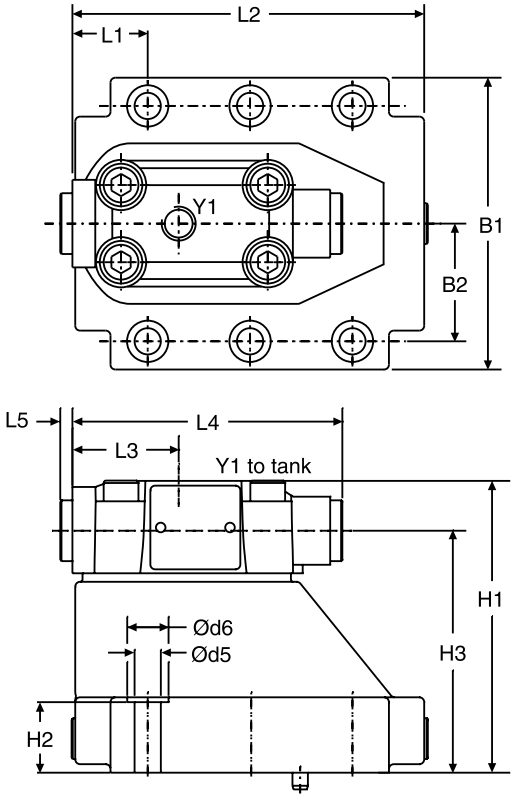
General			
Size	**NG10**	**NG25**	**NG32**
Subplate Mounting	ISO 5781		
Mounting Position	Unrestricted		
Ambient Temperature Range	-20°C to +80°C (-4°F to +176°F)		
Hydraulic			
Maximum Operating Pressure	350 Bar (5075 PSI)		
Nominal Flow	150 LPM (39.7 GPM)	270 LPM (71.4 GPM)	450 LPM (119.0 GPM)
Fluid	Hydraulic oil to DIN 51524		
Viscosity **Recommended** / **Permitted**	30 to 50 cSt / mm^2/s (139 to 232 SSU) 20 to 380 cSt / mm^2/s (93 to 1761 SSU)		
Fluid Temperature **Recommended** / **Permitted**	+30C° to +50°C (86°F to +122°F) -20°C to +70°C (-4°F to +158°F)		
Filtration	ISO Class 4406 (1999) 18/16/13 (meet NAS 1638:7)		

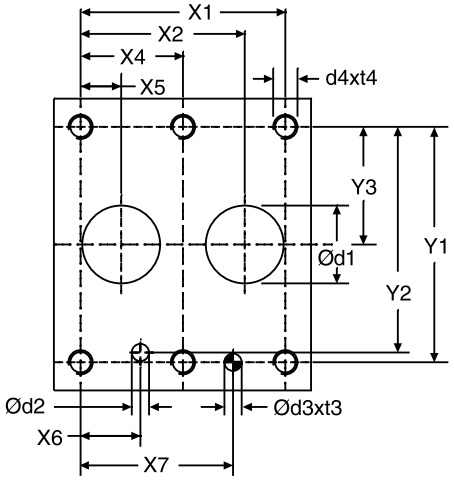
E

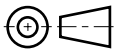
Performance Curve



Inch equivalents for millimeter dimensions are shown in (**)







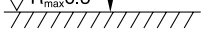
NG	ISO-code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP x, y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1 1/2" BSPP x, y = 1/4" BSPP

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	–	–	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	–	–	–
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	–	–	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	–	–	–
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	–	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	–	–	–

Tolerance for all dimensions ±0.2 mm (0.01 inches)

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	62.5 (2.46)	–	–	–	29.4 (1.16)	95.2 (3.75)	43.7 (1.72)	111.0 (4.37)	5.0 (0.20)	–
25	5781-08-10-0-00	105 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	89.0 (3.50)	–	–	–	35.1 (1.38)	127.2 (5.01)	43.7 (1.72)	111.0 (4.37)	5.0 (0.20)	–
32	5781-10-13-0-00	120 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	99.5 (3.92)	–	–	–	31.0 (1.22)	144.7 (5.70)	43.7 (1.72)	111.0 (4.37)	5.0 (0.20)	–

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	5781-06-07-0-00	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

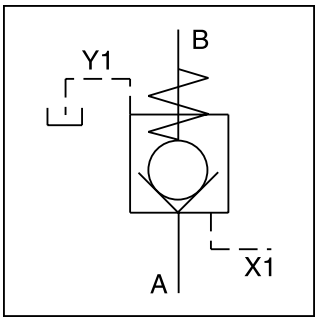
NG	ISO-code	Bolt Kit			Seal Kit		Surface finish
					Nitrile	Fluorocarbon	
10	5781-06-07-0-00	BK505	4xM10 x 35 DIN 912 12.9	68 Nm (50.2 lb-ft) ±15%	S16-39362-0	S16-39362-5	
25	5781-08-10-0-00	BK485	4xM10 x 45 DIN 912 12.9	68 Nm (50.2 lb-ft) ±15%	S16-39364-0	S16-39364-5	
32	5781-10-13-0-00	BK506	6xM10 x 45 DIN 912 12.9	68 Nm (50.2 lb-ft) ±15%	S16-39366-0	SS16-39366-5	

C4V-PO.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series C5P pilot operated check valves have a similar design to the subplate mounted C5V series. The SAE flanges allow to mount directly on the flanges of actuators to achieve a very compact design.

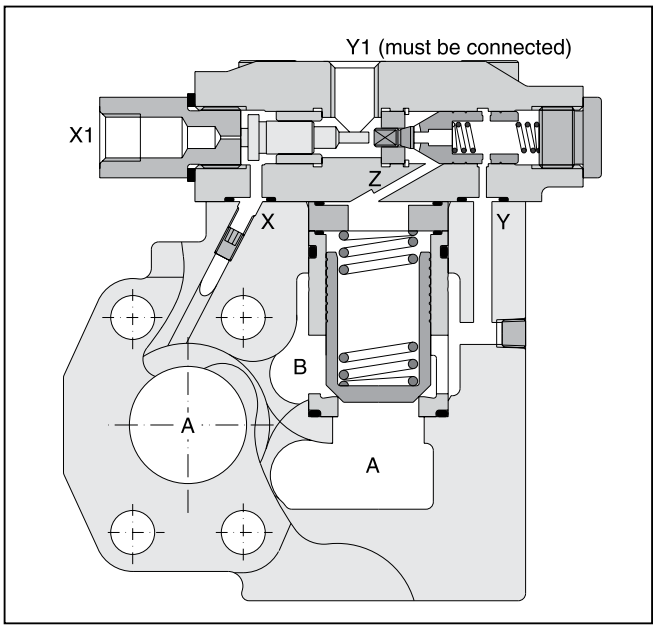


Operation

When no pressure is applied to the X-port, the flow from B to A is blocked, because the pressure in B is also in effect on top of the poppet.

Pressurizing the X port relieves the area on top of the poppet to the drain port and allows flow from B to A.

The seat design of the C5P valve series provides leak-free separation of port A and B in the closed position.



Features

- Pilot operated check valve.
- 2-port body with SAE 61 flange.
- 3 sizes (SAE 3/4", 1", 1 1/4").
- 4 opening ratios.
- Valves with position control are available on request.

Ordering Information

C5P [ ] — [ ] [2] [ ] [ ] [A] [ ] [ ]

Pilot Operated Check Valve | Size | SAE 61 Interface | Pilot Ports | Opening Ratio | Cracking Pressure | Design Series | Seal | Options Check with Factory

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1 1/4"

X1 and Y1 = SAE 4

Code	Description
4	280 Bar (4060 PSI) Size 10 (SAE 61)
5	350 Bar (5075 PSI) Sizes 06/08 (SAE 61)

Code	Description
1	Pilot Operated 1:1 Ratio
3	Pilot Operated 3:1 Ratio
8	Pilot Operated 8:1 Ratio
9	Pilot Operated 10:1 Ratio

Code	Size	Flow A–B	Flow B–A
2	06	1.0 Bar (14.5 PSI)	1.5 Bar (21.8 PSI)
	08/10	1.0 Bar (14.5 PSI)	1.7 Bar (24.7 PSI)
4	06	4.0 Bar (58.0 PSI)	5.5 Bar (79.8 PSI)
	08/10	3.5 Bar (50.8 PSI)	6.0 Bar (87.0 PSI)
6	06	2.0 Bar (29.0 PSI)	3.0 Bar (43.5 PSI)
	08/10	2.2 Bar (31.9 PSI)	3.8 Bar (55. 1 PSI)

Code	Description
1	Nitrile
5	Fluorocarbon

Weight:

C5P06 3.9 kg (8.6 lbs.)
C5P08 4.4 kg (9.7 lbs.)
C5P10 5.7 kg (12.6 lbs.)

C5P.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

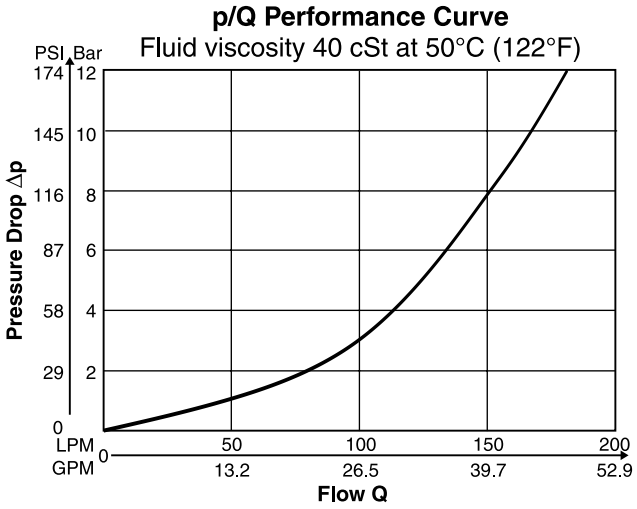
Specifications

General			
Size	**06 (3/4")**	**08 (1")**	**10 (1 1/4")**
Mounting	2-port in-line flange SAE 61		
Mounting Position	Unrestricted		
Ambient Temprature	-20°C to +50°C (-4°F to +122°F)		
Hydraulic			
Maximum Operating Pressure **Ports A, B** **Port Y1**	350 Bar (5075 PSI) 30 Bar (435 PSI)	350 Bar (5075 PSI) 30 Bar (435 PSI)	280 Bar (4060 PSI) 30 Bar (435 PSI)
Nominal Flow	180 LPM (47.6 GPM)	360 LPM (95.2 GPM)	600 LPM (158.7 GPM)
Fluid	Hydraulic oil in accordance with DIN 51524...51525		
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)		
Viscosity **Permitted** **Recommended**	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)		
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638:7)		

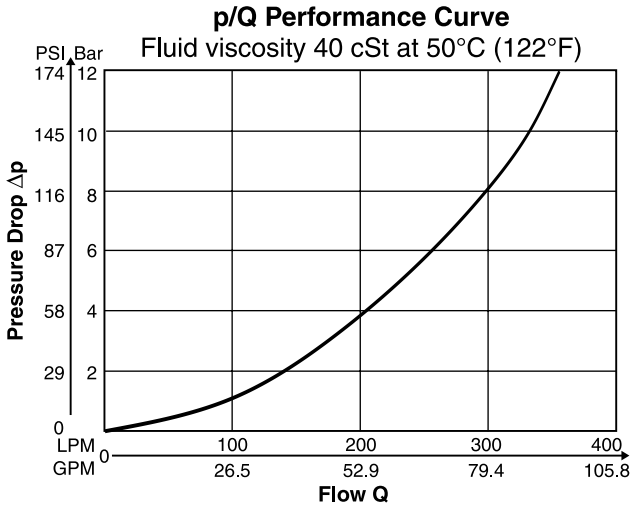
E

Performance Curves

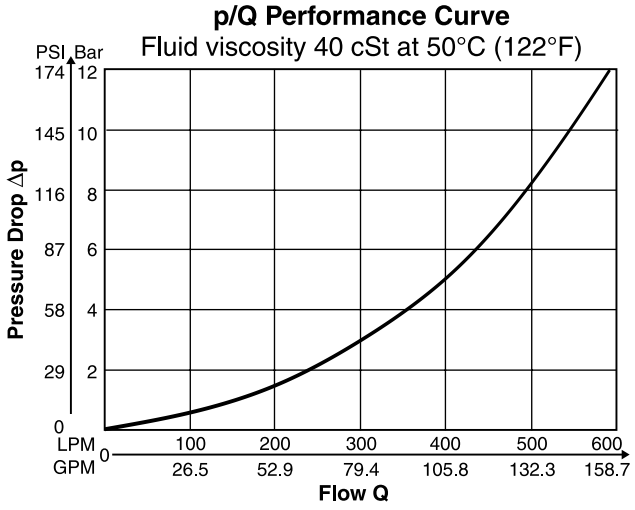
C5P06



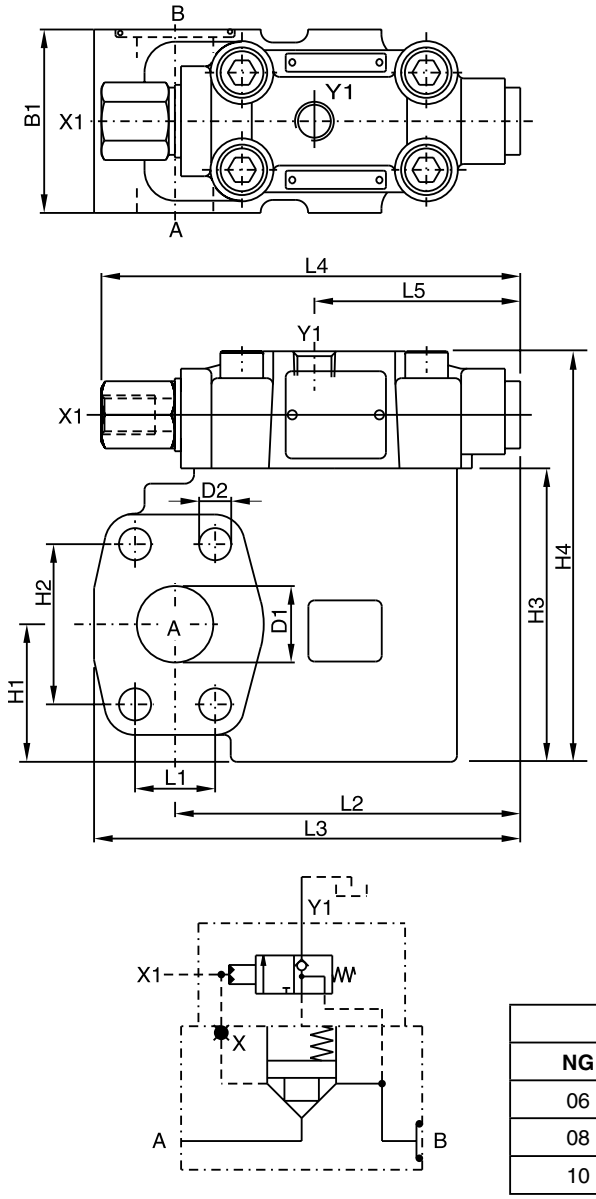
C5P08

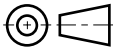


C5P10



Inch equivalents for millimeter dimensions are shown in (**)





Seal Kits		
NG	**Nitrile**	**Fluorocarbon**
06	S26-59404-0	S26-59404-5
08	S26-59405-0	S26-59405-5
10	S26-59406-0	S26-59406-5

Dimensions

Series	L1	L2	L3	L4	L5	B1	H1	H2	H3	H4	D1	D2
C5P06	22.2 (0.87)	95.8 (3.77)	119.8 4.72)	137.0 (5.39)	67.3 (2.65)	60.0 (2.36)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	128.0 (5.04)	19.0 (0.75)	10.5 (0.41)
C5P08	26.2 (1.03)	112.9 (4.44)	139.4 (5.49)	137.0 (5.39)	67.3 (2.65)	60.0 (2.36)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	134.0 (5.28)	25.0 (0.93)	10.5 (0.41)
C5P10	30.2 (1.19)	112.9 (4.44)	146.9 (5.78)	137.0 (5.39)	67.3 (2.65)	75.0 (2.95)	48.0 (1.39)	58.7 (2.31)	109.0 (4.29)	147.0 (5.79)	32.0 (1.26)	12.5 (0.49)

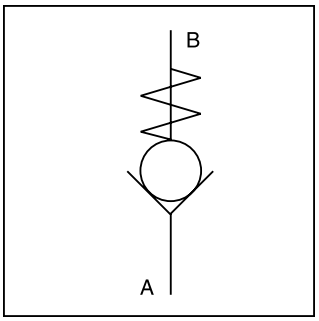
Ports

Port	Function	Port Size		
		C5P06	**C5P08**	**C5P10**
A	Inlet or Outlet	3/4" SAE 61	1" SAE 61	1 1/4" SAE 61
B	Outlet or Inlet	3/4" SAE 61	1" SAE 61	1 1/4" SAE 61
X1	External Pilot Port	SAE 4		
Y1	External Pilot Drain	SAE 4		

General Description

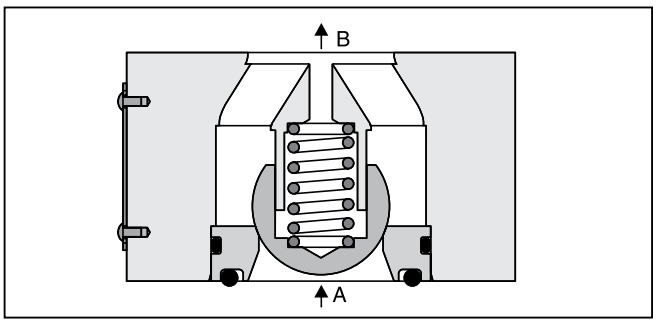
Series C5V direct operated check valves provide free flow in one direction and block the flow in the counter direction.

The SAE flanges allow to mount the C5V directly on the pressure port of pumps for protection against pressure shocks from the system.



Operation

The ball is held on its seat by a spring under zero pressure condition. When flow is increased to the cracking pressure, free flow is allowed from port A to port B. Blocked flow is created when operating pressure and spring on Port B exceed pressure on port A.



Features

- Direct operated check valve.
- SAE 61 and SAE 62 flanges.
- 4 sizes (SAE 3/4", 1", 1 1/4", 1 1/2").
- 3 springs.
- 2 different seal configurations.

E

Ordering Information

C5V — Direct Operated Check Valve

Size

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1 1/4"
12	SAE 1 1/2"

Flange

Code	Description
3	SAE 61
6	SAE 62

Body Sealing

Code	Description
1	Sealing for Port A
2*	Sealing for Ports A and X
3	Without Sealing

* For combination with R5U Unloading Valve (SAE 61 only).

Cracking Pressure

Code	Description
0	0.5 Bar (7 PSI)
1	1.0 Bar (15 PSI)
2	2.0 Bar (29 PSI)

B — Design Series

Seal

Code	Description
1	Nitrile
5	Fluorocarbon

Options

Code	Description
Omit	Standard
019*	C5V10 for M14 Mounting Screws

* For SAE 62 only.

Weight:

C5V06	0.6 kg (1.3 lbs.)
C5V08	0.9 kg (2.0 lbs.)
C5V10	1.3 kg (2.9 lbs.)
C5V12	1.8 kg (4.0 lbs.)

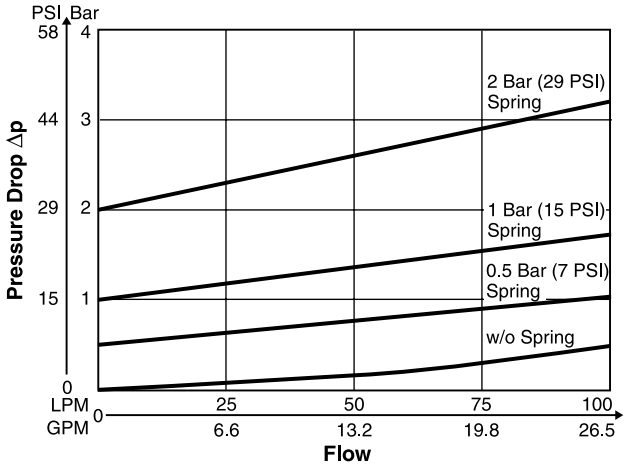
Specifications

General				
Size	**06 (3/4")**	**08 (1")**	**10 (1 1/4")**	**12 (1 1/2")**
Mounting	2-port in-line flange SAE 61 and SAE 62			
Mounting Position	Unrestricted			
Ambient Temprature	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure				
SAE 61	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)	210 Bar (3045 PSI)
SAE 62	420 Bar (6090 PSI)	420 Bar (6090 PSI)	420 Bar (6090 PSI)	420 Bar (6090 PSI)
Nominal Flow	100 LPM (26.5 GPM)	200 LPM (52.9 GPM)	400 LPM (105.8 GPM)	750 LPM (198.4 GPM)
Fluid	Hydraulic oil in accordance with DIN 51524...51525			
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity Permitted	10 to 650 cSt / mm²/s (46 to 3013 SSU)			
Recommended	30 cSt / mm²/s (139 SSU)			
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638:7)			

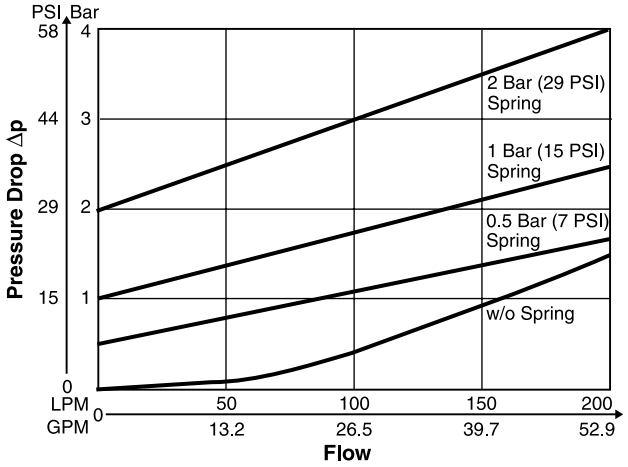
E

Performance Curves

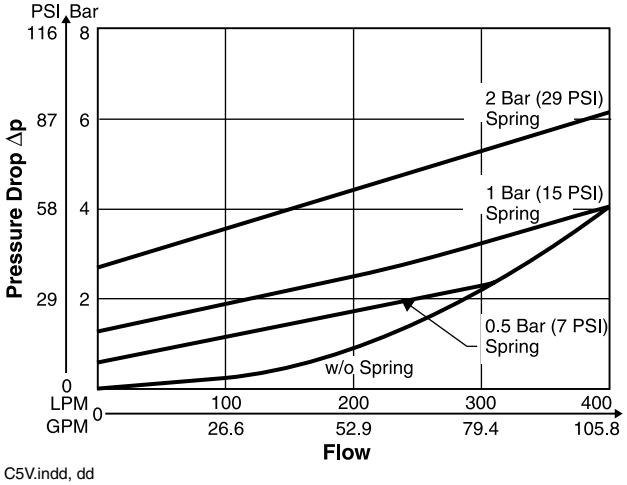
C5V06



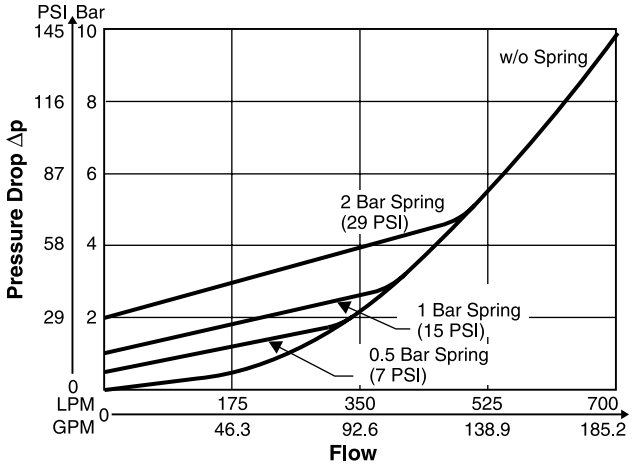
C5V08



C5V10



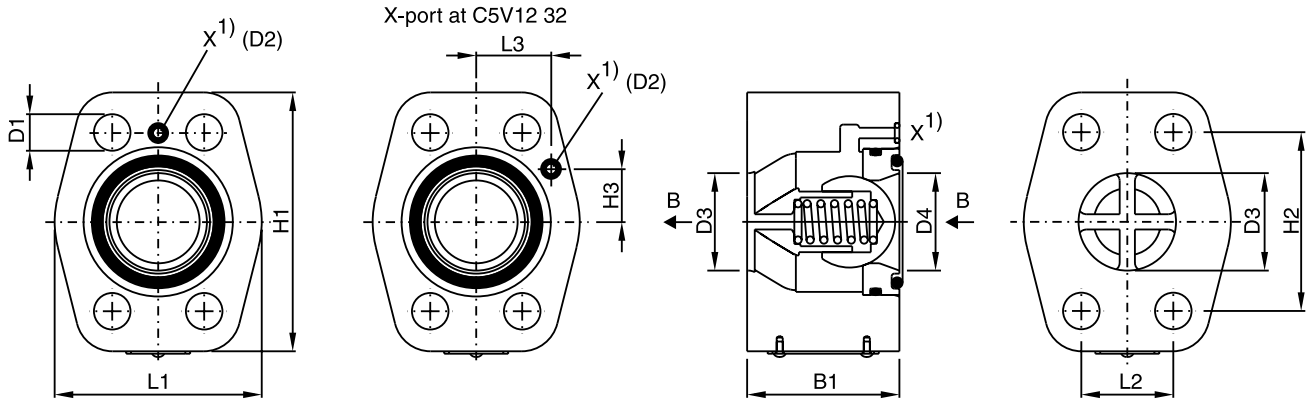
C5V12



C5V.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)



Position of O-ring seal according to ordering information

1) X1 port for C5V*32* (for use with Unloading Valve R5U)

E

Series	Nominal Size		L1	L2	L3	H1	H2	H3	B1	D1	D2	D3 + 0.8	D4
C5V06	3/4"	SAE 61	48.0 (1.89)	22.2 (0.87)	27.2 (1.07)	64.0 (2.52)	47.6 (1.87)	22.4 (0.88)	45.0 (1.77)	10.5 (0.41)	Ø3.0 (0.12)	19.0 (0.75)	19.0 (0.75)
		SAE 62	48.0 (1.89)	23.8 (0.94)	27.2 (1.07)	64.0 (2.52)	50.8 (2.00)	22.4 (0.88)	45.0 (1.77)	10.5 (0.41)	–	19.0 (0.75)	19.0 (0.75)
C5V08	1"	SAE 61	60.0 (2.36)	26.2 (1.03)	27.2 (1.07)	74.0 (2.91)	52.4 (2.06)	22.4 (0.88)	45.0 (1.77)	10.5 (0.41)	Ø3.0 (0.12)	25.0 (0.98)	25.0 (0.98)
		SAE 62	60.0 (2.36)	27.8 (1.09)	27.2 (1.07)	74.0 (2.91)	57.2 (2.25)	22.4 (0.88)	45.0 (1.77)	12.5 (0.49)	–	25.0 (0.98)	25.0 (0.98)
C5V10	1 1/4"	SAE 61	68.0 (2.68)	30.2 (1.19)	27.2 (1.07)	85.0 (3.35)	58.7 (2.31)	22.4 (0.88)	50.0 (1.97)	12.5 (0.49)	Ø3.0 (0.12)	32.0 (1.26)	32.0 (1.26)
		SAE 62	68.0 (2.68)	31.8 (1.25)	27.2 (1.07)	85.0 (3.35)	66.7 (2.63)	22.4 (0.88)	50.0 (1.97)	13.5* (0.53)	–	32.0 (1.26)	32.0 (1.26)
C5V12	1 1/2"	SAE 61	80.0 (3.15)	35.7 (1.41)	27.2 (1.07)	104.0 (4.09)	69.8 (2.75)	22.4 (0.88)	50.0 (1.97)	13.5 (0.53)	Ø3.0 (0.12)	42.0 (1.65)	38.0 (1.50)
		SAE 62	80.0 (3.15)	36.5 (1.44)	27.2 (1.07)	104.0 (4.09)	79.4 (3.13)	22.4 (0.88)	50.0 (1.97)	17.0 (0.67)	–	42.0 (1.65)	38.0 (1.50)

* D1 = 15 (0.59) at option code 019 for M14 mounting screws.

Seal Kits		
NG	**Nitrile**	**Fluorocarbon**
3	S26-75409-0	S26-75409-5
6	S26-75410-0	S26-75410-5
10	S26-75411-0	S26-75411-5
12	S26-75412-0	S26-75412-5

Return to ALPHA TOC
Return to SECTION TOC

Offer of Sale

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7. Contingencies. Seller shall not be liable for any default or delay in performance if caused by circumstances beyond the reasonable control of Seller.

8. User Responsibility. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

9. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

10. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

11. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest. Seller shall have a security interest in, and lien upon, any property of Buyer in Seller's possession as security for the payment of any amounts owed to Seller by Buyer.

12. Improper Use and Indemnity. Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

13. Cancellations and Changes. Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

14. Limitation on Assignment. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

15. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of the agreement. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

16. Waiver and Severability. Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

17. Termination. This agreement may be terminated by Seller for any reason and at any time by giving Buyer thirty (30) days written notice of termination. In addition, Seller may by written notice immediately terminate this agreement for the following: (a) Buyer commits a breach of any provision of this agreement (b) the appointment of a trustee, receiver or custodian for all or any part of Buyer's property (c) the filing of a petition for relief in bankruptcy of the other Party on its own behalf, or by a third party (d) an assignment for the benefit of creditors, or (e) the dissolution or liquidation of the Buyer.

18. Governing Law. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement. Disputes between the parties shall not be settled by arbitration unless, after a dispute has arisen, both parties expressly agree in writing to arbitrate the dispute.

19. Indemnity for Infringement of Intellectual Property Rights. Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

20. Taxes. Unless otherwise indicated, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of Products.

21. Equal Opportunity Clause. For the performance of government contracts and where dollar value of the Products exceed $10,000, the equal employment opportunity clauses in Executive Order 11246, VEVRAA, and 41 C.F.R. §§ 60-1.4(a), 60-741.5(a), and 60-250.4, are hereby incorporated. 6/09

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Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Parker Safety Guide for Selecting and Using Hydraulic Valves and Related Accessories

WARNING: Failure or improper selection or improper use of Parker Hydraulic Valve Division (HVD) Valves or related accessories ("Products") can cause death, personal injury and property damage. Possible consequences of failure or improper use of these Products include but are not limited to:

- Valves or parts thereof thrown off at high speed
- High velocity fluid discharge
- Explosion or burning of the conveyed fluid
- Contact with suddenly moving or falling objects controlled by the Valve
- Injections by high-pressure fluid discharge
- Contact with fluid that may be hot, cold, toxic or otherwise injurious
- Injuries resulting from injection, inhalation or exposure to fluids
- Injury from handling a heavy item (dropped, awkward lift)
- Electric shock from improper handling of solenoid connections
- Injury from slip or fall on spilled or leaked fluid

Before selecting or using any of these Products, it is important that you read and follow the instructions below. In general, the Products are not approved for in-flight aerospace applications. Consult the factory for the few that are FAA approved.

1.0 GENERAL INSTRUCTIONS

1.1 **Scope**: This safety guide provides instructions for selecting and using (including assembling, installing and maintaining) these Products. For convenience all items in this guide are called "Valves". This safety guide is a supplement to and is to be used in conjunction with the specific Parker catalogs for the specific Valves and/or accessories being considered for use. See item 1.6 below for obtaining those catalogs.

1.2 **Fail-Safe:** Valves can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of the Valve or Valve Assembly will not endanger persons or property.

1.3 **Safety Devices:** Never disconnect, override, circumvent or otherwise disable any safety lockout on any system whether powered by HVD Valves or any motion control system of any manufacturer. (e.g. Automatic shut-off on a riding lawn mower should the operator get out of the seat).

1.4 **Distribution:** Provide a copy of this safety guide to each person that is responsible for selecting or using HVD Valve Products. Do not select HVD Valves without thoroughly reading and understanding this safety guide as well as the specific Parker catalogs for the Products considered or selected.

1.5 **User Responsibility:** Due the wide variety of operating conditions and applications for Valves, HVD and its distributors do not represent or warrant that any particular Valve is suitable for any specific system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing is solely responsible for:

- Making the final selection of the Valve
- Assuring that the user's requirements are met and that the application presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the Valves are used.
- Assuring compliance with all applicable government and industry standards.

1.6 **Additional Questions:** Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com , for the telephone numbers of the appropriate technical service department. For additional copies of this or any other Parker Safety Guide go to www.parker.com and click on the safety button on the opening page. Catalogs and/or catalog numbers for the various HVD Valve Products can be obtained by calling HVD at 440-366-5100. Phone numbers and catalog information is also available on the Parker website, www.parker.com .

2.0 VALVE SELECTION INSTRUCTIONS

2.1 **Pressure:** Valve selection must be made so that the maximum working pressure of the Valve is equal to or greater than the maximum system pressure. Surge, impulse or peak transient pressures in the system must be below the maximum working pressure of the Valve. Surge, impulse and peak pressures can usually be determined by sensitive electrical instrumentation that measures and indicates pressures at millisecond intervals. Mechanical pressure gauges indicate only average pressure and cannot be used to determine surge, impulse or peak transient pressures. Burst pressure ratings if given or known are for manufacturing purposes only and are not an indication that the Product can be used in applications at the burst pressure or otherwise above the maximum working pressure.

2.2 **Temperature:** The fluid temperature must be regulated or controlled so that the operating viscosity of the fluid is maintained at a level specified for the particular Valve product. Such ranges are given in the product catalogs or can be obtained from the appropriate customer service department for the particular Valve product.

2.3 **Fluid Compatibility:** The fluid conveyed in Valves has direct implications on the Valve selection. The fluid must be chemically compatible with the Valve component materials. Elastomer seals, brass, cast iron, aluminum for example all are potentially affected by certain fluids. Additionally, fluid selection affects the performance of various Valves. Considerations relative to fluid selection are outlined in the specific HVD Valve product catalog. Of particular importance is that the fluid be for hydraulic use, contain the proper additives and wear inhibitors. See 1.6 "Additional Questions" above for information to obtain such HVD catalogs.

2.4 **Changing Fluids:** If a system requires a different fluid, it should be done with the guidance in number 2.3 above. Additionally, it may be necessary to flush the system (including the Valves) to remove any of the previous fluid. Consult the Parker Valve Division for guidance.

2.5 **Size:** Transmission of power by means of pressurized fluid varies with pressure and rate of flow. The size of the components must be adequate to keep pressure losses to a minimum and avoid damage due to heat generation or excessive fluid velocity.

2.6 **Placement:** Installation of Valves must take into account the orientation of the Valve and the proximity of the Valve to other parts of the system. This includes but is not limited to closeness to hot and cold areas, access for servicing and operation as well as orientation for proper connectors.

2.7 **Ports:** Connection of Valves in systems can be by threaded ports, sub-base surfaces, flanges and manifolds. In all cases, the proper fitting, surface or mounting hardware must be selected to properly seal and contain the system fluid so as to avoid the adverse conditions listed in the initial warning box above. Specifically, if using threaded ports, the designer must make sure that the mating fitting is of the compatible thread. Also, the instructions provided by the connector hardware supplier must be read and understood so as to properly assemble the connector. The Parker Safety Guide for using Hose, Tubing and Fittings and Related Accessories is but one reference to this end.

2.8 **Environment:** Care must be taken to insure that the Valve and Valve Assemblies are either compatible with or protected from the environment (that is, surrounding conditions) to which they are exposed. Environmental conditions including but not limited to ultraviolet radiation, sunlight, heat, ozone, moisture, water, salt water, chemicals and air pollutants can cause degradation and premature failure.

2.9 **Electric Power:** For Valves requiring electric power for control, it is imperative that the electricity be delivered at the proper voltage, current and wattage requirements. To obtain the proper control requirements please refer to the respective Parker product catalog for the specific Valve that is intended for use. If further guidance is required, call the appropriate technical service department identified in the respective Parker product catalog.

2.10 **Specifications and Standards:** When selecting Valves, government, industry and Parker specifications and recommendations must be reviewed and followed as applicable.

2.11 **Accessories:** All accessories used in conjunction with any Parker Valve product must be rated to the same requirements of the Valve including but not limited to pressure, flow, material compatibility, power requirements. All of these items must be examined as stated in the "VALVE INSTALLATION INSTRUCTIONS" paragraph 3.0.

(continued on next page)

3.0 VALVE INSTALLATION INSTRUCTIONS

3.1 **Component Inspection:** Prior to use, a careful examination of the Valve(s) must be performed. The Valve intended for use must be checked for correct style, size, catalog number and external condition. The Valve must be examined for cleanliness, absence of external defects or gouges, cracked or otherwise deformed parts or missing items. The mounting surface or port connections must be protected and free of burrs, scratches, corrosion or other imperfections. Do NOT use any item that displays any signs of nonconformance. In addition, any accessory including but not limited to fittings, bolt kits, hoses, sub bases, manifolds, and electrical connectors must be subjected to the same examination.

3.2 **Handling Valves:** Many Valves whether HVD Valves or of another manufacturer can be large, bulky or otherwise difficult to handle. Care must be taken to use proper lifting techniques, tools, braces, lifting belts or other aids so as not to cause injury to the user, any other person or to property.

3.3 **Filtration:** Fluid cleanliness is a necessity in any hydraulic system. Fluid filters must be installed and maintained in the system to provide the required level of fluid cleanliness. Filters can be placed in the inlets, pressure lines and return lines. The level of cleanliness required is specified in the HVD product catalog for the specific Valve(s) selected or intended for use. For additional information on Filter selection contact Parker Filter Division at 800-253-1258 or 419-644-4311.

3.4 **Servo Valves:** Application of Servo Valves in general requires knowledge and awareness of "closed loop control theory" and the use of electronic controls for successful and safe operation. Individuals who do not have such experience or knowledge must gain training before use of such Products. Parker offers both classroom training as well as manuals to assist in gaining this knowledge. These aids can be obtained by contacting Hydraulic Valve Division at 440-366-5100, calling the general Parker help line 800-CPARKER or going to the Parker web site at www.parker.com.

3.5 **Accessory Ratings:** All accessories used in combination with the selected or intended Valve product must be rated and compatible with the selected Valve. Specifically, the items must be of equal or greater rating including but not limited to pressure, flow, power, size, port style, thread connectors and material.

3.6 **Connection Styles:** It is the responsibility of the user of the Parker product to properly select connectors and accessories that match the connections on the sub plate, Valve, flange or threaded connection or manifold. It is also the responsibility of the installer to possess adequate skill and knowledge including but not limited to thread preparation, torque technique, hose assembly and inspection, tube preparation and assembly, and fitting installation. Parker Tube Fitting Division (www.parker.com/tfd) catalog 4300 and Parker Hose Products (www.parkerhose.com) catalog 4400 describe some basic technical information relative to proper fitting assembly.

3.7 **Electrical Connections:** All electrical connections must be made to the applicable codes and local safety requirements.

3.8 **Gauges and Sensors:** The user must install sufficient gauges and sensors in the system so as to be able to determine the condition of the system. This includes but is not limited to pressure gauges, flow meters, temperature sensors and site gauges. These are of utmost importance should removal or disassembly of a Valve, portion of a Valve or portion of the system become necessary. Refer to "VALVE MAINTENANCE AND REPLACEMENT INSTRUCTIONS" for details and especially item 4.8.

3.9 **System Checkout:** Once installed, the Valve installation must be tested to insure proper operation and that no external leakage exists. All safety equipment must be in place including but not limited to safety glasses, helmets, ear protection, splash guards, gloves, coveralls and any shields on the equipment. All air entrapment must be eliminated and the system pressurized to the maximum system pressure (at or below the Valve maximum working pressure) and checked for proper function and freedom from leaks. Personnel must stay out of potentially hazardous areas while testing and using.

4.0 VALVE MAINTENANCE AND REPLACEMENT INSTRUCTIONS

4.1 **Maintenance Program:** Even with proper installation, Valves and Valve System life may be significantly reduced without a continuing maintenance program. The severity of the application and risk potential must determine the frequency of the inspection and the replacement of the Products so that Products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at a minimum, must include instructions 4.2 through 4.10. An FMEA (Failure Mode and Effects Analysis) is recommended in determining maintenance requirements.

4.2 **Visual Inspection-Valves:** Any of the following conditions require immediate shut down and replacement of the Valve.

- Evidence that the Valve is in partial dis-assembly.
- Visible crack or suspicion of a crack in the Valve housing or bent, cracked or otherwise damaged solenoid.
- Missing or partially extending drive pin on a flow control knob.
- Missing, loose components, obstructions or other condition impeding the motion or function of the manual knob, lever, foot pedal or other mechanical operator of a hydraulic Valve.
- Any evidence of burning or heat induced discoloration.
- Blistered, soft, degraded or loose cover of any kind.
- Loose wire or electrical connector.

4.3 **Visual Inspection-Other:** The following conditions must be tightened, repaired, corrected or replaced as required.

1. Fluid on the ground must be cleaned immediately. Also, the source of the fluid must be determined prior to running the equipment again.
2. Leaking port or excessive external dirt build-up.
3. System fluid level is too low or air is entrapped or visible in the reservoir.
4. Equipment controlled by the Valve or Valve assembly has been losing power, speed, efficiency

4.4 **Filter Maintenance:** System filters must be maintained and kept in proper working order. The main service requirement is periodic replacement of the filter element or screen. Contact Parker Filter Division at 800-253-1258 or 419-644-4311 for further filter maintenance details.

4.5 **Functional Test:** See "System Checkout" number 3.9 above in "VALVE INSTALLATION INSTRUCTIONS".

4.6 **Replacement Intervals:** Valves and Valve Systems will eventually age and require replacement. Seals especially should be inspected and replaced at specific replacement intervals based on previous experience, government or industry recommendations, or when failures could result in unacceptable downtime, damage or injury risk. At a minimum seals must be replaced whenever service is rendered to a Valve product.

4.7 **Adjustments, Control Knobs, and Other Manual Controls:** System Pressure and Flow are typically adjusted by knobs and/or handles. A set-screw or lock-nut secures the adjustment device so as to maintain the desired setting. This set-screw or lock-nut must first be loosened prior to making any adjustments and re-tightened after adjustment on the HVD Valve. All adjustments must be made in conjunction with pressure gauges and/or flow meters (or by watching the speed of the actuator in the case of setting flow only). See paragraph "Gauges and Sensors" above in the section "VALVE INSTALLATION INSTRUCTIONS'. Under no circumstances should any control knob, adjustment stem, handle, foot pedal or other actuating device be forced beyond the mechanical stop(s) on the Valve. For example, the Parker Safety Notice Bulletin **HY14-3310-B1/US** for HVD Colorflow Valves specifically restricts the adjustment torque to "hand adjust" or "less than 10 ft/lbs" if it cannot be adjusted by hand. Failure to adhere to this may force the knob beyond the stop point allowing it to be ejected at high speed resulting in death, personal injury and property damage. For complete safety instructions on HVD Colorflow Valves, copies of Safety Notice **Bulletin HY14-3310-B1/US** can be obtained directly from the Hydraulic Valve Division at 440-366-5100 or from the Parker web site at www.parker.com by selecting the "Safety" button. Parker help line 800-CPARKER is on call 24/7 as well should there be any question about the use of a HVD Valve. Additionally, when making adjustments, always adjust the Valve with all parts of your body to the side of the Valve (that is, the knob is not pointing toward you or anyone else).

4.8 **High pressure Warning:** Hydraulic power is transmitted by high-pressure fluids through hoses, fittings and valves, pumps and actuators. This condition can be dangerous and potentially lethal and, therefore, extreme caution must be exercised when working with fluids under pressure. From time to time, hoses, Valves, tubes or fittings fail if they are not replaced at proper time intervals. Typically these failures are the result of some form of misapplication, abuse, wear, or failure to perform proper maintenance. When such failure occurs, generally the high pressure fluid inside escapes in a stream which may or may not be visible to the user. Under no circumstances should the user attempt to locate the leak by "feeling" with their hands or any other part of their body. High-pressure fluids can and will penetrate the skin and cause severe tissue damage and possible loss of limb or life. Even seemingly minor hydraulic fluid injection injuries must be treated immediately by a physician with knowledge of the tissue damaging properties of hydraulic fluid.

If a hose, tube, fitting or Valve failure occurs, immediately shut down the equipment and leave the area until pressure has been completely released from the system. Simply shutting down the pump may or may not eliminate the pressure in the system. It may take several minutes or even hours for the pressure to be relieved so that the leak area can be examined safely. Once the pressure has been reduced to zero, the suspected leaking item can be taken off the equipment and examined. It must always be replaced if a failure has occurred. Never attempt to patch or repair a connector (especially a hose) or Valve that has failed. Consult the nearest Parker distributor or the appropriate Parker division for component replacement information. Never touch or examine a failed hydraulic component unless it is obvious that the item no longer contains fluid under pressure.

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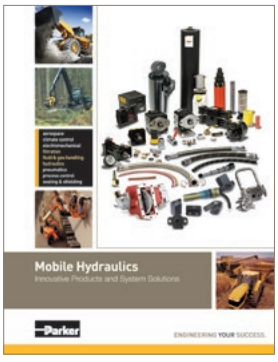

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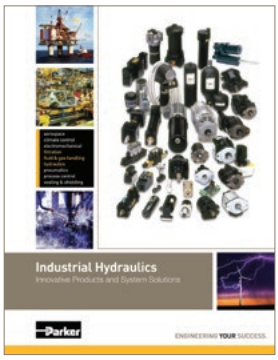

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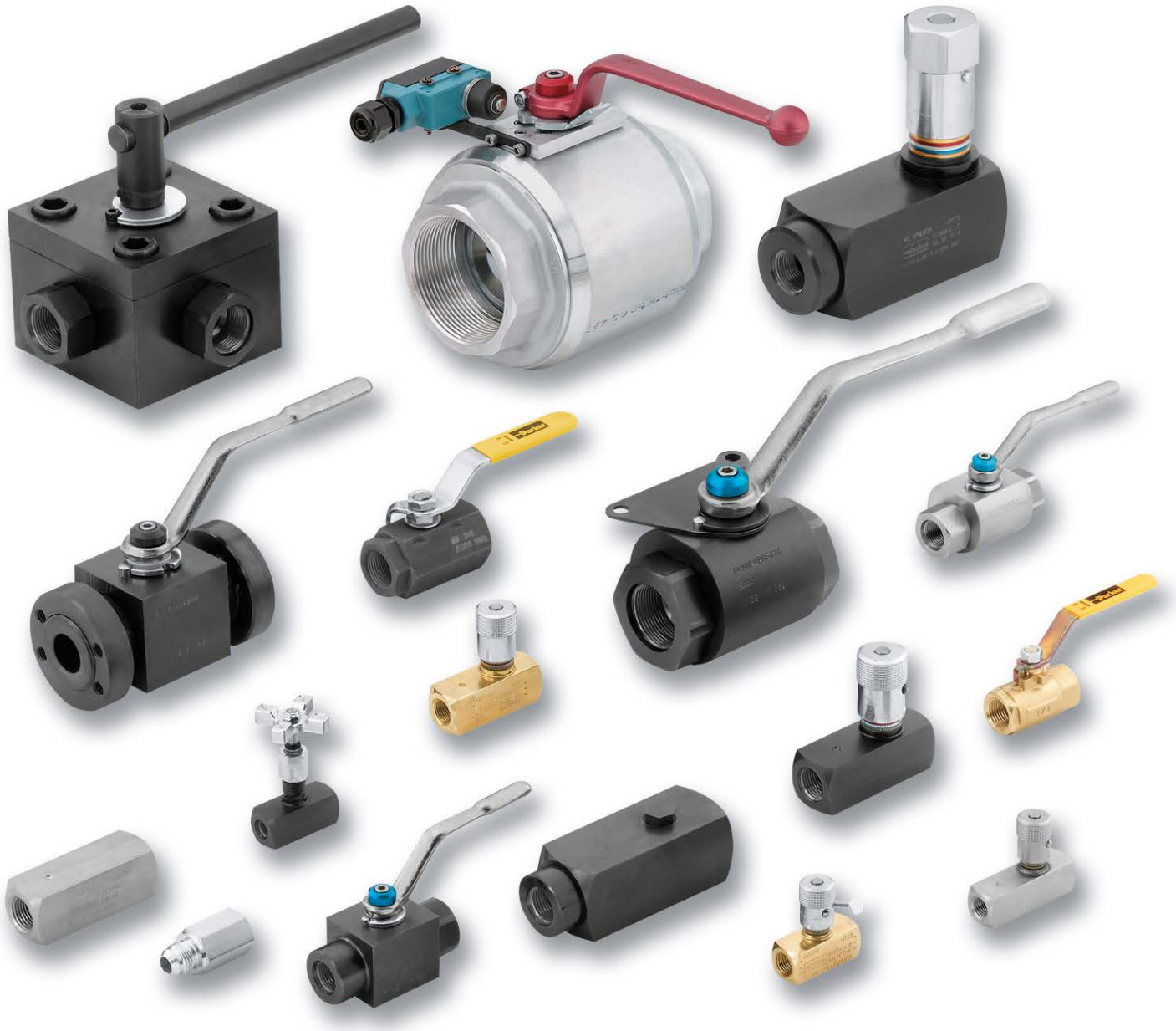

Colorflow® and Ball Valves

Industrial Flow Control, Check, Gauge Control

Catalog HY14-3300/US

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

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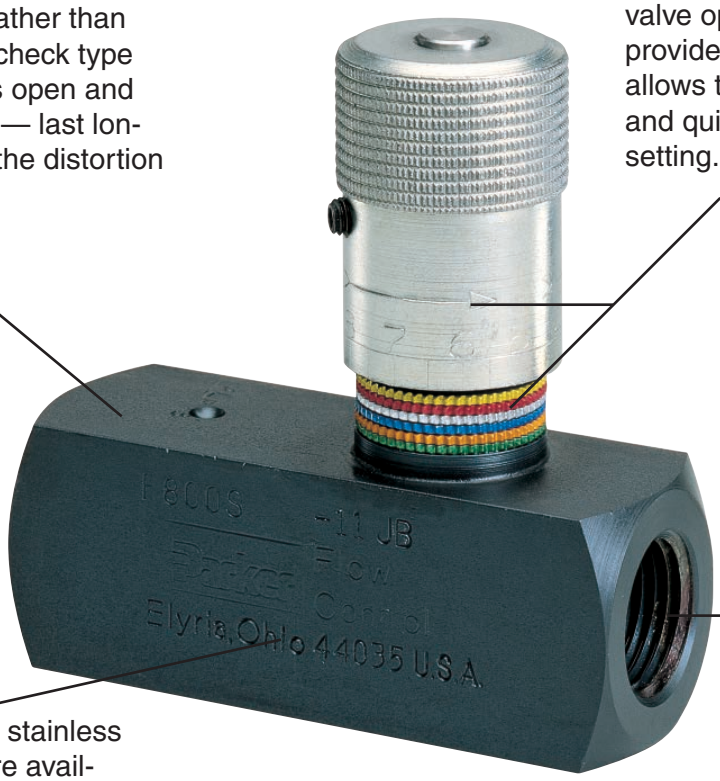
Fully guided poppets are used on Colorflow valves rather than the less durable ball-check type construction. Poppets open and close more smoothly — last longer — and eliminate the distortion of seats and springs.

The exclusive “Colorflow” feature on metering, flow control, and needle valves gives highly visible check-points for setting valve openings. This feature also provides a reference point that allows the valve to be accurately and quickly reset to a previous setting.



Colorflow valves are available with a variety of porting options.

Steel, brass or stainless steel bodies are available, all of which include stainless steel needles as standard.

WARNING: Colorflow valves are not repairable

⚠ WARNING – USER RESPONSIBILITY

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Cat HY14-3300-frtcvr.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Colorflow® Valves

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Flow Control Valves
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Colorflow® Valves

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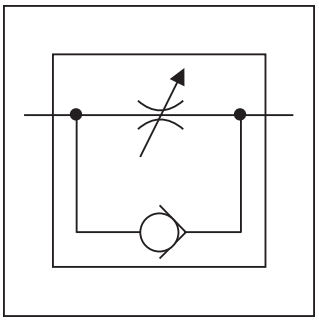
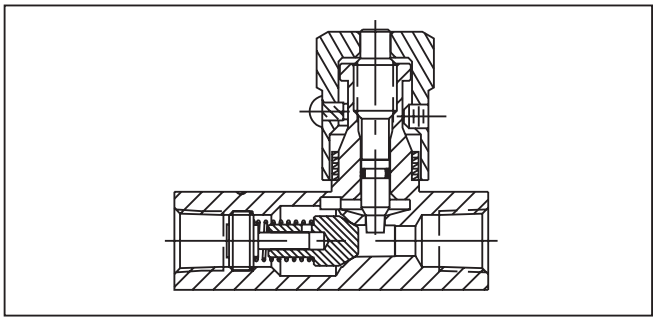
General Description

Series F flow control valves provide precise control of flow and shut-off in one direction, and automatically permit full flow in the opposite direction.





Operation

A two-step needle allows fine adjustment at low flow by using the first three turns of the adjusting knob. The next three turns open the valve to full flow, and also provide standard throttling adjustments.

Features

- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- A simple set screw locks the valve on any desired setting.
- A tamperproof option (T) feature is also available to prevent accidental or intentional adjustment of flow setting.

Specifications

Maximum Operating Pressure	Brass:	140 Bar (2000 PSI); except for F1600 brass which is 35 Bar (500 PSI)
	Steel & Stainless Steel:	345 Bar (5000 PSI) for 200 thru 1020; 207 Bar (3000 PSI) for all other sizes
Material	Body	See ordering code
	Knob	Steel - Zinc plated
	Spring	316 Stainless Steel
	Needle	416 Stainless Steel
	Poppet	416 Stainless Steel
	Retainer	416 Stainless Steel
	Stainless Steel Bodies	303 Stainless Steel

Poppets	Soft seal poppet in brass 200 - 820 sizes Solid metal 416 stainless steel poppet on all other sizes and styles
Nominal Cracking Pressure	0.4 Bar (5 PSI) standard
Temperature Range of Seal Compound	-40°C to +121°C (-40°F to +250°F) Nitrile (standard) -26°C to +205°C (-15°F to +400°F) Fluorocarbon

□ Options — F Series — □ Size — □ Material — □ Needle Options — □ Other Options — □ Seal Compound — ⌐ ⌐ ⌙ Design Series

NOTE: Not required when ordering.

Code	Description
Omit	NPTF/SAE
★8	BSPT
★★9	BSPP

★ Code 8 can be used with sizes 200, 400, 600, 800, 1200 Steel only

★★ Code 9 can be used with sizes 200, 400, 600, 800, 1200, 1600, 2000, 2400.

Code	Size	Code	Size	Code	Size
200 *	1/8"	820 *†	#8 SAE	2000	1 1/4"
400 *†	1/4"	1020	#10 SAE	2020	#20 SAE
420 *	#4 SAE	1200 *	3/4"	2400	1 1/2"
600 *†	3/8"	1220	#12 SAE	2420	#24 SAE
620	#6 SAE	1600 *	1"	3200	2"
800 *†	1/2"	1620	#16 SAE	3220	#32 SAE

* Sizes available in Brass.

† Sizes available in Stainless Steel.

Code	Description
B	Brass
S	Steel
SS*	Stainless Steel

Series F Brass and Stainless Steel Valves can be used for both air and oil service.

* Available in 400, 600 800, and 820 sizes only.

Code	Description
Omit	Standard
4	Fine Metering (200, 400, 420, 600, 620, 820 sizes)

Code	Description
Omit	Standard Knob
T *	Tamperproof
F	Finger Screw

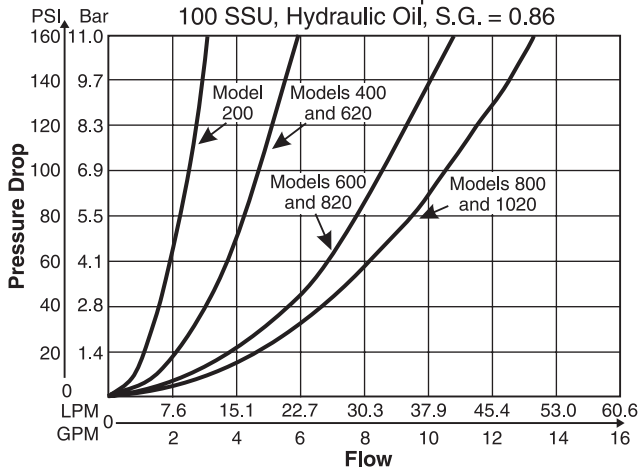
* Not available above 1200 size.

Code	Description
Omit	Nitrile (Standard)
V	Fluorocarbon (Standard on Stainless Steel)

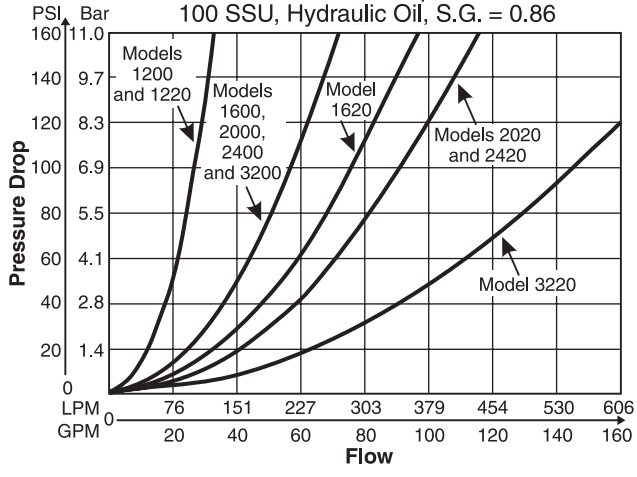
Model Number	Free Flow Rate, Max. LPM (GPM)	Free Flow Orifice Area in.²	Free Flow C_v	Effective Orifice Area, Control Flow in.²	Effective Control Flow C_v
F200	11 (3)	0.023	0.53	0.0102	0.230
F420	11 (3)	0.023	0.53	0.0102	0.230
F400	19 (5)	0.068	1.56	0.0194	0.433
F620	19 (5)	0.068	1.56	0.0194	0.433
F600	30 (8)	0.099	2.27	0.0344	0.787
F820	30 (8)	0.099	2.27	0.0344	0.787
F800	57 (15)	0.224	5.11	0.0427	0.976
F1020	57 (15)	0.224	5.11	0.0427	0.976
F1200	95 (25)	0.348	7.95	0.1080	2.470
F1220	95 (25)	0.348	7.95	0.1080	2.470
F1600	151 (40)	0.453	10.35	0.2300	5.250
F1620	151 (40)	0.453	10.35	0.3070	7.000
F2000	265 (70)	0.855	19.52	0.2300	5.250
F2020	265 (70)	0.855	19.52	0.3710	8.470
F2400	379 (100)	0.955	21.82	0.2300	5.250
F2420	379 (100)	0.955	21.82	0.3710	8.470
F3200	568 (150)	1.046	23.90	0.2300	5.250
F3220	568 (150)	1.046	23.90	0.6010	13.410

Model Number	Effective Orifice Area Control Flow in.²	Effective Control Flow C_v
F400-4	0.0044	0.0758
F600-4	0.0097	0.153
F620-4	0.0044	0.0758
F820-4	0.0097	0.153

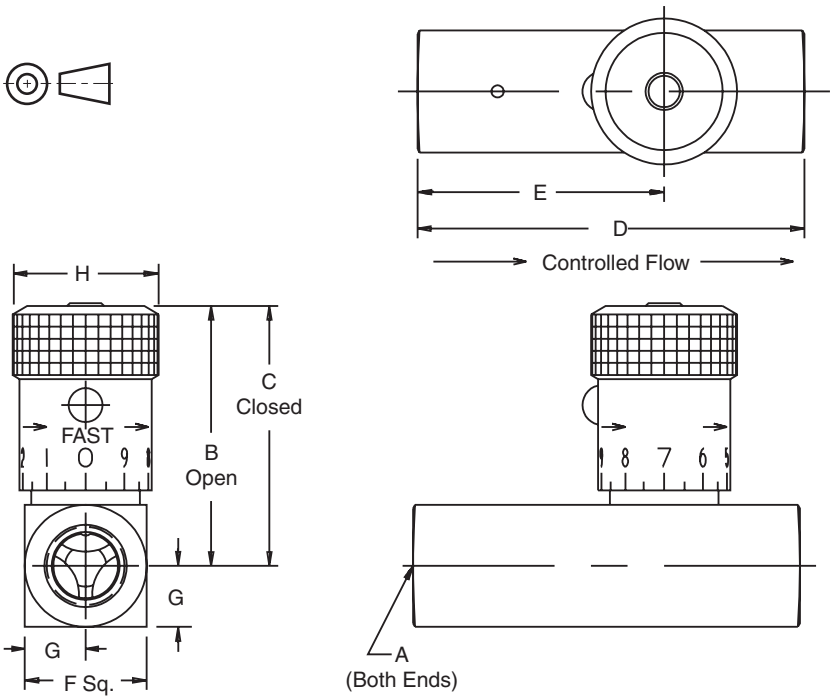
Controlled Flow vs. Pressure Drop
Needle Full Open
100 SSU, Hydraulic Oil, S.G. = 0.86



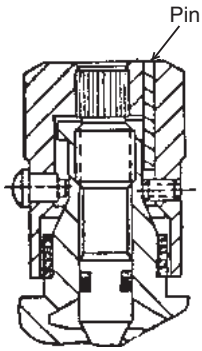
Controlled Flow vs. Pressure Drop
Needle Full Open
100 SSU, Hydraulic Oil, S.G. = 0.86



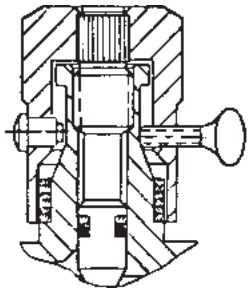
Inch equivalents for millimeter dimensions are shown in (**)



Knob Options



Tamperproof Option (Code "T") permanently locks knob at desired flow setting by installing a pin in predrilled hole.



Finger screw Option (Code "F") provides this thumb-screw in place of set screw.

Model Number	Weight kg (lbs)	A	B	C	D	E	F	G	H
F200	0.1 (0.3)	1/8–27 NPTF	39.1 (1.54)	35.3 (1.39)	50.8 (2.00)	32.5 (1.28)	16.0 (0.63)	7.9 (0.31)	19.1 (0.75)
F400	0.2 (0.5)	1/4–18 NPTF	45.5 (1.79)	40.4 (1.59)	66.8 (2.63)	42.2 (1.66)	20.6 (0.81)	10.4 (0.41)	20.6 (0.81)
F420	0.2 (0.5)	7/16–20 UNF #4 SAE	41.4 (1.63)	37.6 (1.48)	68.3 (2.69)	42.9 (1.69)	20.6 (0.81)	10.4 (0.41)	19.1 (0.75)
F600	0.3 (0.7)	3/8–18 NPTF	55.4 (2.18)	49.5 (1.95)	69.9 (2.75)	44.5 (1.75)	25.4 (1.00)	12.7 (0.50)	25.4 (1.00)
F620	0.3 (0.7)	9/16–18 UNF #6 SAE	47.7 (1.88)	42.7 (1.68)	79.2 (3.12)	48.8 (1.92)	25.4 (1.00)	12.7 (0.50)	20.6 (0.81)
F800	0.7 (1.5)	1/2–14 NPTF	68.6 (2.70)	61.5 (2.42)	87.4 (3.44)	56.6 (2.23)	31.8 (1.25)	16.0 (0.63)	30.2 (1.19)
F820	0.5 (1.1)	3/4–16 UNF #8 SAE	56.9 (2.24)	51.1 (2.01)	88.9 (3.50)	53.8 (2.12)	28.4 (1.12)	14.2 (0.56)	25.4 (1.00)
F1020	0.8 (1.8)	7/8–14 UNF #10 SAE	68.6 (2.70)	61.5 (2.42)	101.6 (4.00)	65.0 (2.56)	31.8 (1.25)	15.7 (0.62)	30.2 (1.19)
F1200	1.2 (2.6)	3/4–14 NPTF	85.9 (3.38)	71.4 (2.81)	98.6 (3.88)	65.5 (2.58)	38.1 (1.50)	19.1 (0.75)	35.1 (1.38)
F1220	1.2 (2.6)	1 1/6–12 UN #12 SAE	85.9 (3.38)	71.4 (2.81)	117.3 (4.62)	76.5 (3.01)	38.1 (1.50)	19.1 (0.75)	35.1 (1.38)
F1600	2.3 (5.1)	1–11 1/2 NPTF	123.7 (4.87)	106.9 (4.21)	127.0 (5.00)	81.8 (3.22)	44.5 (1.75)	22.4 (0.88)	47.8 (1.88) *
F1620	2.3 (5.1)	1 5/16–12 UN #16 SAE	130.8 (5.15)	114.0 (4.49)	142.7 (5.62)	88.9 (3.50)	57.2 (2.25)	28.4 (1.12)	47.8 (1.88) *
F2000	3.7 (8.2)	1 1/4–11 1/2 NPTF	130.0 (5.12)	113.3 (4.46)	143.0 (5.63)	98.6 (3.88)	57.2 (2.25)	28.7 (1.13)	47.8 (1.88) *
F2020	3.7 (8.2)	1 5/8–12 UN #20 SAE	140.2 (5.52)	123.4 (4.86)	165.1 (6.50)	108.0 (4.25)	69.9 (2.75)	35.1 (1.38)	47.8 (1.88) *
F2400	4.6 (10.2)	1 1/2–11 1/2 NPTF	136.4 (5.37)	119.6 (4.71)	143.0 (5.63)	113.5 (4.47)	69.9 (2.75)	35.1 (1.38)	47.8 (1.88) *
F2420	4.6 (10.2)	1 7/8–12 UN-2B #24 SAE	143.5 (5.65)	126.7 (4.99)	184.2 (7.25)	127.0 (5.00)	76.2 (3.00)	38.1 (1.50)	47.8 (1.88) *
F3200	7.9 (17.4)	2–11 1/2 NPTF	146.1 (5.75)	129.3 (5.09)	165.1 (6.50)	134.9 (5.31)	88.9 (3.50)	44.5 (1.75)	47.8 (1.88) *
F3220	7.9 (17.4)	2 1/2–12 UN #32 SAE	163.6 (6.44)	139.4 (5.49)	228.6 (9.00)	155.7 (6.13)	101.6 (4.00)	50.8 (2.00)	47.8 (1.88) *

* = Hex

General Description

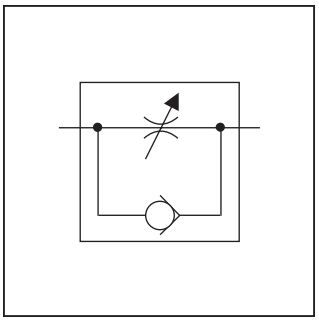
Series 6F flow control valves provide precise control of flow and shut-off in one direction, and automatically permit full flow in the opposite direction.

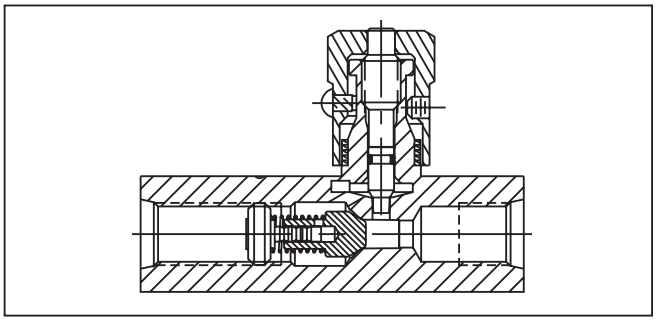
Operation

A two-step needle allows fine adjustment at low flow by using the first three turns of the adjusting knob. The next three turns open the valve to full flow, and also provide standard throttling adjustments.

Features

- Meets ISO 6149 standards.
- Hard metric dimensions.
- Reliable leak-free performance — straight thread port with o-ring sealing.
- Global interchangeablility.

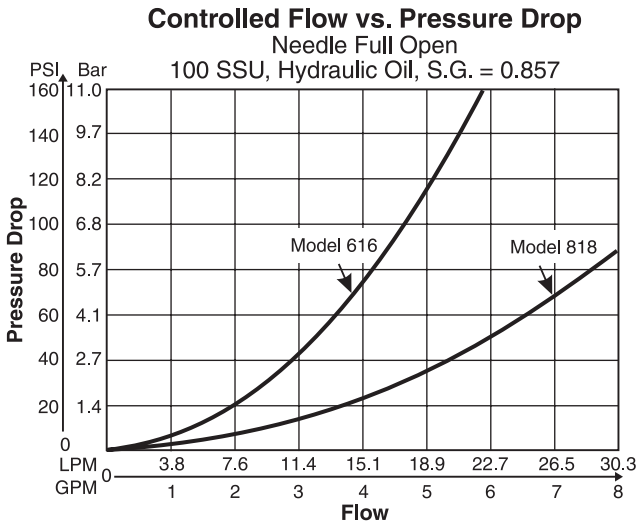


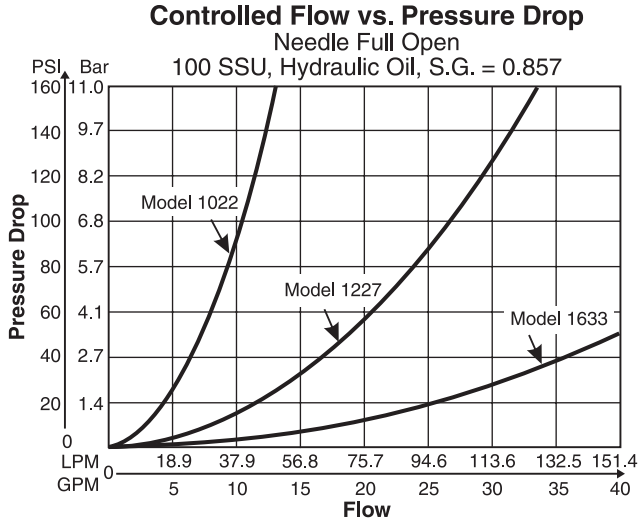


Specifications

Maximum Operating Pressure	M16 x 1.5	345 Bar	(5000 PSI)
	M18 x 1.5	345 Bar	(5000 PSI)
	M22 x 1.5	345 Bar	(5000 PSI)
	M27 x 2.0	207 Bar	(3000 PSI)
	M33 x 2.0	207 Bar	(3000 PSI)
Maximum Flow	M16 x 1.5	19 LPM	(5 GPM)
	M18 x 1.5	30 LPM	(8 GPM)
	M22 x 1.5	57 LPM	(15 GPM)
	M27 x 2.0	95 LPM	(25 GPM)
	M33 x 2.0	151 LPM	(40 GPM)
Material	Body	ASTM 12L14	Carbon Steel
	Knob	ASTM 12L14	Carbon Steel
	Needle	ASTM 416	Stainless Steel
	Poppet	ASTM 416	Stainless Steel
	Retainer	ASTM 416	Stainless Steel
	Spring	ASTM 316	Stainless Steel
Temperature Range of Seal Compound	-40°C to +121°C (-40°F to +250°F) Nitrile (Standard)		
	-26°C to +205°C (-15°F to +400°F) Fluorocarbon		

Performance Curves





Ordering Information

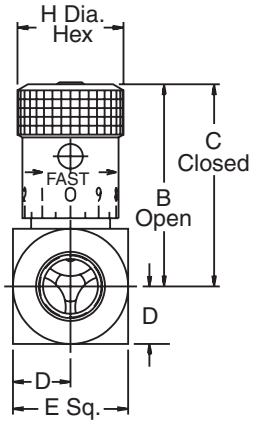
6	F		S	
Ports	Style	Size	Material	Design Series
ISO 6149 ports	Flow Control Valve		Steel	

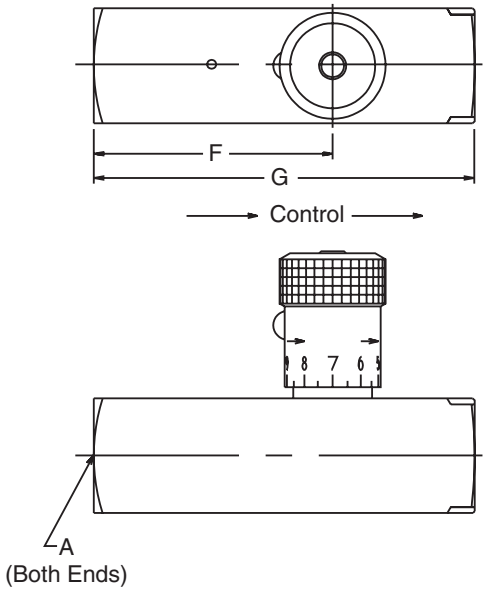
NOTE: Not required when ordering.

Code	Description
616	M16 x 1.5
818	M18 x 1.5
1022	M22 x 1.5
1227	M27 x 2.0
1633	M33 x 2.0

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



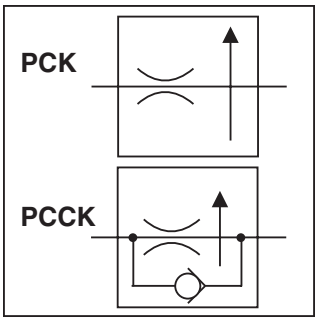


Model Number	Weight kg (lbs.)	A	B	C	D	E	F	G	H
6F616	0.3 (0.7)	M16 x 1.5	47.8 (1.88)	42.7 (1.68)	12.7 (0.50)	25.4 (1.00)	48.7 (1.92)	79.2 (3.12)	20.6 (∅ 0.81)
6F818	0.5 (1.1)	M18 x 1.5	56.9 (2.24)	51.1 (2.01)	14.2 (0.56)	28.4 (1.12)	53.8 (2.12)	88.9 (3.50)	25.4 (∅1.00)
6F1022	0.8 (1.8)	M22 x 1.5	68.6 (2.70)	61.5 (2.42)	15.7 (0.62)	31.8 (1.25)	65.0 (2.56)	101.6 (4.00)	30.2 (∅ 1.19)
6F1227	1.2 (2.6)	M27 x 2.0	85.9 (3.38)	71.4 (2.81)	19.1 (0.75)	38.1 (1.50)	76.5 (3.01)	117.3 (4.62)	35.1 (∅1.38)
6F1633	2.3 (5.1)	M33 x 2.0	124.7 (4.91)	108.0 (4.25)	22.4 (0.88)	44.5 (1.75)	81.8 (3.22)	127.0 (5.00)	47.8 (*1.88)

* = Hex

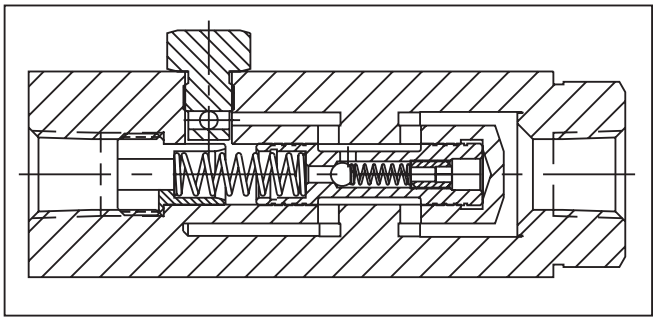
General Description

Series PCK pressure compensated flow control valves are designed to regulate flow at a selected rate, within 5%, regardless of fluctuations in inlet and outlet pressure.



Operation

Series PCK valves are factory-set for a specified flow. The flow can be changed with a different “PCK” Orifice Plug Kit (sold separately).



Features

- Available with reverse flow check.
- Flow precision within ±5% of full flow.

Specifications

	PC*K400S PC*K620S	PC*K600S PC*K820S	PC*K800S PC*K1020S	PC*K1200S PC*K1220S
Maximum Operating Pressure	207 Bar (3000 PSI)			
Minimum Pressure to Compensate	6.9 Bar (100 PSI)	6.9 Bar (100 PSI)	6.9 Bar (100 PSI)	10.4 Bar (150 PSI)
Temperature Range of Seal Compound	-40°C to +121°C (-40°F to +250°F) Nitrile (standard) -26°C to +205°C (-15°F to +400°F) Fluorocarbon			
Mounting	In-line			
Maximum Flow	11 LPM (3 GPM)	23 LPM (6 GPM)	57 LPM (15 GPM)	95 LPM (25 GPM)
Minimum Flow	1 LPM (0.3 GPM)	2 LPM (0.6 GPM)	6 LPM (1.5 GPM)	10 LPM (2.5 GPM)
Reverse Flow, Maximum thru Check	19 LPM (5 GPM)	30 LPM (8 GPM)	76 LPM (20 GPM)	132 LPM (35 GPM)
Pressure Drop, ΔP at Maximum Reverse Flow Flow thru Check	3 Bar (40 PSI)	3 Bar (40 PSI)	PC*K800S: 8 Bar (116 PSI) PC*K1020S: 3 Bar (40 PSI)	PC*K1200S: 8 Bar (116 PSI) PC*K1220S: 3 Bar (40 PSI)
Port Size (in.)	PC*K400S: 1/4 NPTF PC*K620S: 9/16-18 UNF (SAE 6)	PC*K600S: 3/8 NPTF PC*K820S: 3/4-16 UNF (SAE 8)	PC*K800S: 1/2 NPTF PC*K1020S: 7/8-14 UNF (SAE 10)	PC*K1200S: 3/4 NPTF PC*K1220S: 1-1/16-12 UN (SAE 12)

* For optional reverse-flow check, insert “C” in model number at asterisk (*).

□ Options — PC Pressure Compensated Flow Control — □ Reverse Check — K Fixed Flow — □ Port Size — S Material — □ Flow * — □ Seal Compound — ⌜⌟ Design Series

Code	Description
Omit	NPTF/SAE
★ 9	BSPP

★ Code 9 can be used with sizes 400, 600, 800 and 1200

Code	Description
Omit	Without
C	Check

Code	Description
S	Steel

Code	Description
Omit	Nitrile (Standard)
V	Fluorocarbon

NOTE: Not required when ordering.

Code	Size
400	1/4"
600	3/8"
620	#6 SAE
800	1/2"
820	#8 SAE
1020	#10 SAE
1200	3/4"
1220	#12 SAE

Available Flow Settings GPM (LPM)

PCK 400/620 GPM	(LPM)	PCK 600/820 GPM	(LPM)	PCK 800/1020 GPM	(LPM)	PCK 1200/1220 GPM	(LPM)
0.25	(0.9)	0.50	(1.9)	2.00	(7.57)	4.00	(15.14)
0.50	(1.9)	1.00	(3.8)	3.00	(11.36)	6.00	(22.71)
0.75	(2.8)	1.50	(5.7)	4.00	(15.14)	8.00	(30.28)
1.00	(3.8)	2.00	(7.6)	5.00	(18.93)	10.00	(37.85)
1.25	(4.7)	2.50	(9.5)	6.00	(22.71)	12.00	(45.42)
1.50	(5.7)	3.00	(11.4)	7.00	(26.50)	14.00	(52.99)
1.75	(6.6)	3.50	(13.2)	8.00	(30.28)	16.00	(60.56)
2.00	(7.6)	4.00	(15.1)	9.00	(34.07)	18.00	(68.13)
2.25	(8.5)	4.50	(17.0)	10.00	(37.85)	20.00	(75.70)
2.50	(9.5)	5.00	(18.9)	11.00	(41.64)	22.00	(83.27)
2.75	(10.4)	5.50	(20.8)	12.00	(45.42)	24.00	(90.84)
3.00	(11.4)	6.00	(22.7)	13.00	(49.21)		
				14.00	(52.99)		
				15.00	(56.78)		

Note: Settings are based on using 100 SSU at +49°C (+120°F).

* **To order this valve you must indicate appropriate GPM value from table. Example: 9PCCK600S-3.50-V**

"PK" Orifice Plug Kits

PK Plug Kit — □ Valve Size — □ Flow* — □ Seals — ⌜⌟ Design Series

Code	NPTF	SAE
4	400	620
6	600	820
8	800	1020
12	1200	1220

Code	Description
N	Nitrile (Standard)
V	Fluorocarbon

NOTE: Not required when ordering.

Model Number	Weight kg	(lbs.)
PK4-*N	0.5	(0.1)
PK6-*N	0.5	(0.1)
PK8-*N	0.5	(0.1)
PK12-*N	0.5	(0.1)

Available Flow Settings GPM (LPM)

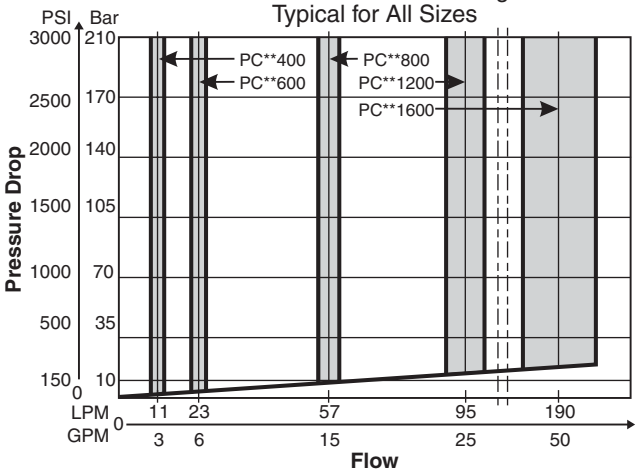
PCK 400/620 GPM	(LPM)	PCK 600/820 GPM	(LPM)	PCK 800/1020 GPM	(LPM)	PCK 1200/1220 GPM	(LPM)
0.25	(0.9)	0.50	(1.9)	2.00	(7.57)	4.00	(15.14)
0.50	(1.9)	1.00	(3.8)	3.00	(11.36)	6.00	(22.71)
0.75	(2.8)	1.50	(5.7)	4.00	(15.14)	8.00	(30.28)
1.00	(3.8)	2.00	(7.6)	5.00	(18.93)	10.00	(37.85)
1.25	(4.7)	2.50	(9.5)	6.00	(22.71)	12.00	(45.42)
1.50	(5.7)	3.00	(11.4)	7.00	(26.50)	14.00	(52.99)
1.75	(6.6)	3.50	(13.2)	8.00	(30.28)	16.00	(60.56)
2.00	(7.6)	4.00	(15.1)	9.00	(34.07)	18.00	(68.13)
2.25	(8.5)	4.50	(17.0)	10.00	(37.85)	20.00	(75.70)
2.50	(9.5)	5.00	(18.9)	11.00	(41.64)	22.00	(83.27)
2.75	(10.4)	5.50	(20.8)	12.00	(45.42)	24.00	(90.84)
3.00	(11.4)	6.00	(22.7)	13.00	(49.21)		
				14.00	(52.99)		
				15.00	(56.78)		

Note: Settings are based on using 100 SSU at +120°F (+49°C).

* **To order this plug kit you must indicate appropriate GPM value from table. Example: PK6-3.50-N**

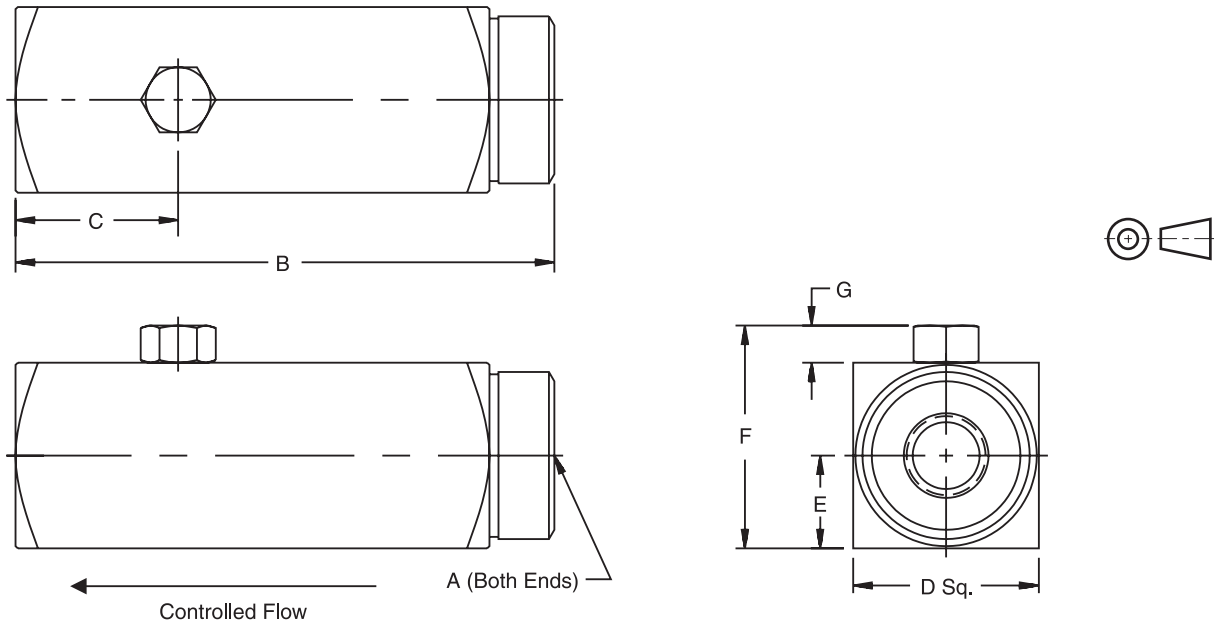
Performance Curves

PC*K Series
Controlled Flow vs. Pressure Drop
at Maximum Flow Setting
Typical for All Sizes



Dimensions

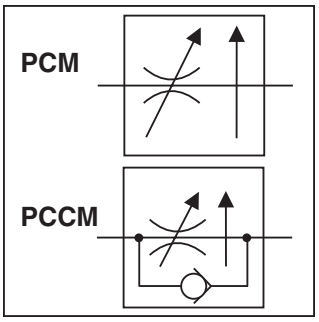
Inch equivalents for millimeter dimensions are shown in (**)



Model Number	Weight kg (lbs.)	A	B	C	D	E	F	G
PC*K400/620	0.03 (0.7)	1/4–18 NPTF/9/16–18 UNF	92.2 (3.63)	27.7 (1.09)	31.8 (1.25)	17.5 (0.69)	38.1 (1.50)	6.4 (0.25)
PC*K600	1.00 (2.1)	3/8–18 NPTF	105.7 (4.16)	30.2 (1.19)	38.1 (1.50)	19.1 (0.75)	44.5 (1.75)	6.4 (0.25)
PC*K 820	1.00 (2.1)	3/4–16 UNF	112.5 (4.43)	37.3 (1.47)	38.1 (1.50)	19.1 (0.75)	44.5 (1.75)	6.4 (0.25
PC*K800/1020	1.50 (3.3)	1/2–14 NPTF/7/8–14 UNF	125.5 (4.94)	36.6 (1.44)	44.5 (1.75)	22.4 (0.88)	50.8 (2.00)	6.4 (0.25)
PC*K1200/1220	1.50 (3.3)	3/4–14 NPTF/1 1/16–12 UNF	149.4 (5.88)	27.7 (1.09)	57.2 (2.25)	28.7 (1.13)	63.5 (2.50)	6.4 (0.25)

General Description

Series PCM pressure compensated flow control valves are designed to regulate flow at a selected rate, within 5%, regardless of fluctuations in inlet and outlet pressure.

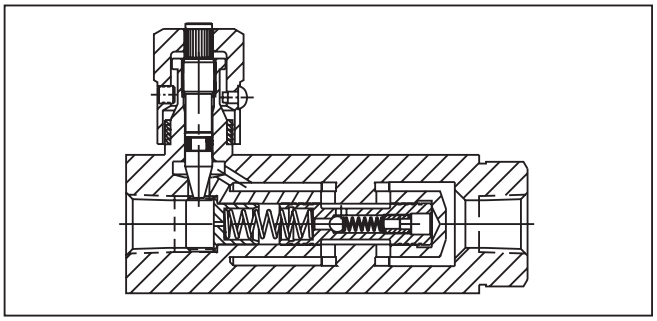


Operation

Series PCM valves can be adjusted for required flows after being installed.

Features

- Available with reverse flow check.
- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- A simple set screw locks the valve on any desired setting.
- A tamperproof option (T) feature is also available to prevent accidental or intentional adjustment of flow setting.



Specifications

	PC*M400S PC*M620S	PC*M600S PC*M820S	PC*M800S PC*M1020S	PC*M1200S PC*M1220S	PC*M1600S PC*M1620S	PC*M2000S
Maximum Operating Pressure	207 Bar (3000 PSI)					
Minimum Pressure to Compensate	6.9 Bar (100 PSI)	6.9 Bar (100 PSI)	6.9 Bar (100 PSI)	10.4 Bar (150 PSI)	10.4 Bar (150 PSI)	10.4 Bar (150 PSI)
Temperature Range of Seal Compound	-40°C to +121°C (-40°F to +250°F) Nitrile (standard) -26°C to +205°C (-15°F to +400°F) Fluorocarbon					
Mounting	Inline					
Maximum Flow	11 LPM (3 GPM)	23 LPM (6 GPM)	57 LPM (15 GPM)	95 LPM (25 GPM)	189 LPM (50 GPM)	303 LPM (80 GPM)
Minimum Flow	1 LPM (0.3 GPM)	2 LPM (0.6 GPM)	6 LPM (1.5 GPM)	10 LPM (2.5 GPM)	19 LPM (5.0 GPM)	30 LPM (8 GPM)
Reverse Flow, Maximum thru Check	19 LPM (5 GPM)	30 LPM (8 GPM)	76 LPM (20 GPM)	132 LPM (35 GPM)	227 LPM (60 GPM)	378 LPM (100 GPM)
Pressure Drop, ΔP at Maximum Reverse Flow thru Check	3 Bar (40 PSI)	3 Bar (40 PSI)	PC*M800S: 8 Bar (116 PSI) PC*M1020S: 3 Bar (40 PSI)	PC*M1200S: 8 Bar (116 PSI) PC*M1220S: 3 Bar (40 PSI)	10 Bar (140 PSI)	11 Bar (155 PSI)
Port Size (in.)	PC*M400S: 1/4 NPTF PC*M620S: 9/16-18 UNF (SAE 6)	PC*M600S: 3/8 NPTF PC*M820S: 3/4-16 UNF (SAE 8)	PC*M800S: 1/2 NPTF PC*M1020S: 7/8-14 UNF (SAE 10)	PC*M1200S: 3/4 NPTF PC*M1220S: 1-1/16-12 UNF (SAE 12)	PC*M1600S: 1 NPTF PC*M1620: 1-5/16-12 UNF (SAE 16)	PC*M2000S: 1 1/4" NPTF

*For optional reverse-flow check, insert “C” in model number at asterisk (*).

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Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Ordering Information

Options		Pressure Compensated Flow Control	Reverse Check	Adjustable Flow	Size	Material	Adjustable Knob Options		Seals	Design Series
☐		PC	☐	M	☐	☐	☐	—	☐	⌜ ⌝

NOTE: Not required when ordering.

Code	Description
Omit	NPTF/SAE
★ 9	BSPP

★ Code 9 can be used with sizes 400, 600, 800, 1200, 1600

Code	Description
Omit	Without
C	Check

Code	Size
400	1/4"
600 *	3/8"
620	#6 SAE
800 *	1/2"
820	#8 SAE
1020	#10 SAE
1200	3/4"
1220	#12 SAE
1600	1"
1620	#16 SAE
2000	1 1/4"

* Available in Stainless Steel

Code	Description
S	Steel
SS	Stainless Steel

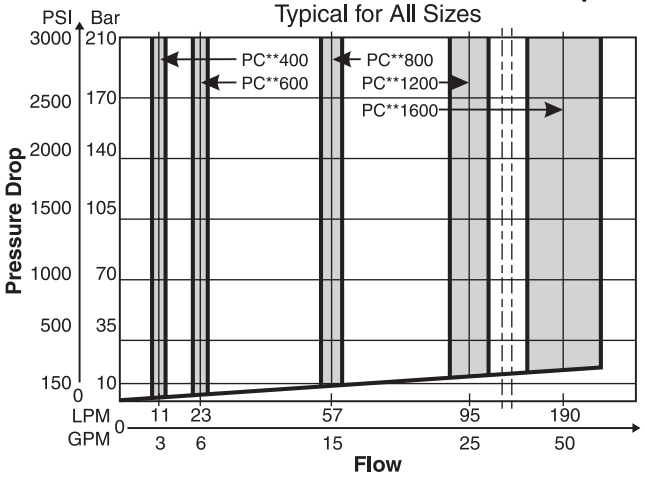
Code	Description
Omit	Standard Knob
T *	Tamperproof
F	Finger Screw

* Not available above 1200 size.

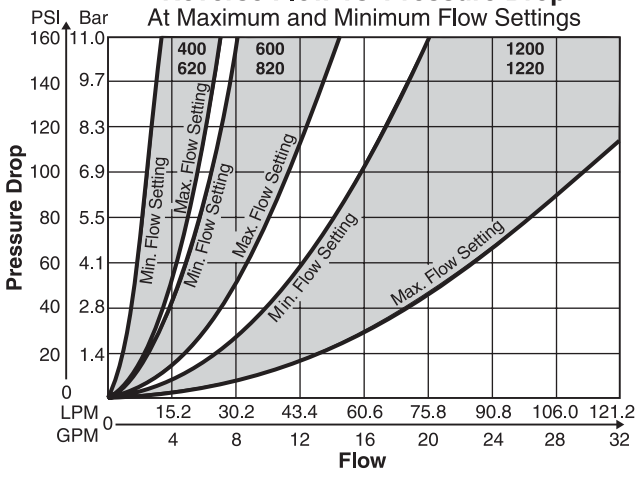
Code	Description
Omit	Nitrile (Standard)
V	Fluorocarbon (Standard on Stainless Steel)

Performance Curves

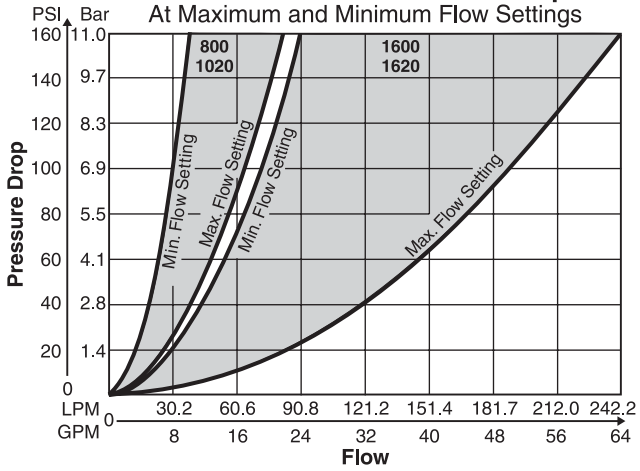
PC*M Series
Controlled Flow vs. Pressure Drop
Typical for All Sizes



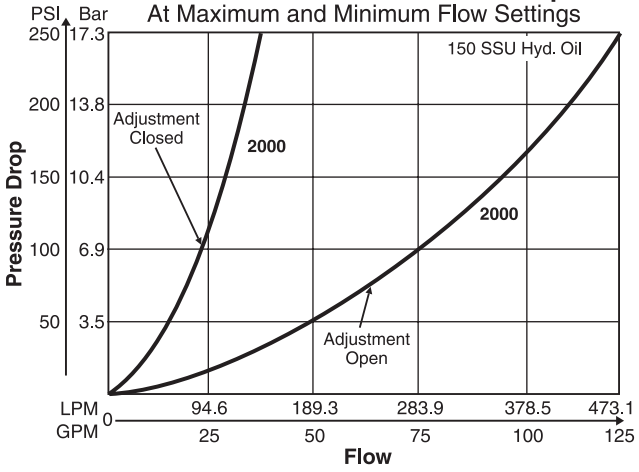
PCCM 400, 600 and 1200 Series
Reverse Flow vs. Pressure Drop
At Maximum and Minimum Flow Settings



PCCM 800 and 1600 Series
Reverse Flow vs. Pressure Drop
At Maximum and Minimum Flow Settings



PCCM 2000S Series
Reverse Flow vs. Pressure Drop
At Maximum and Minimum Flow Settings



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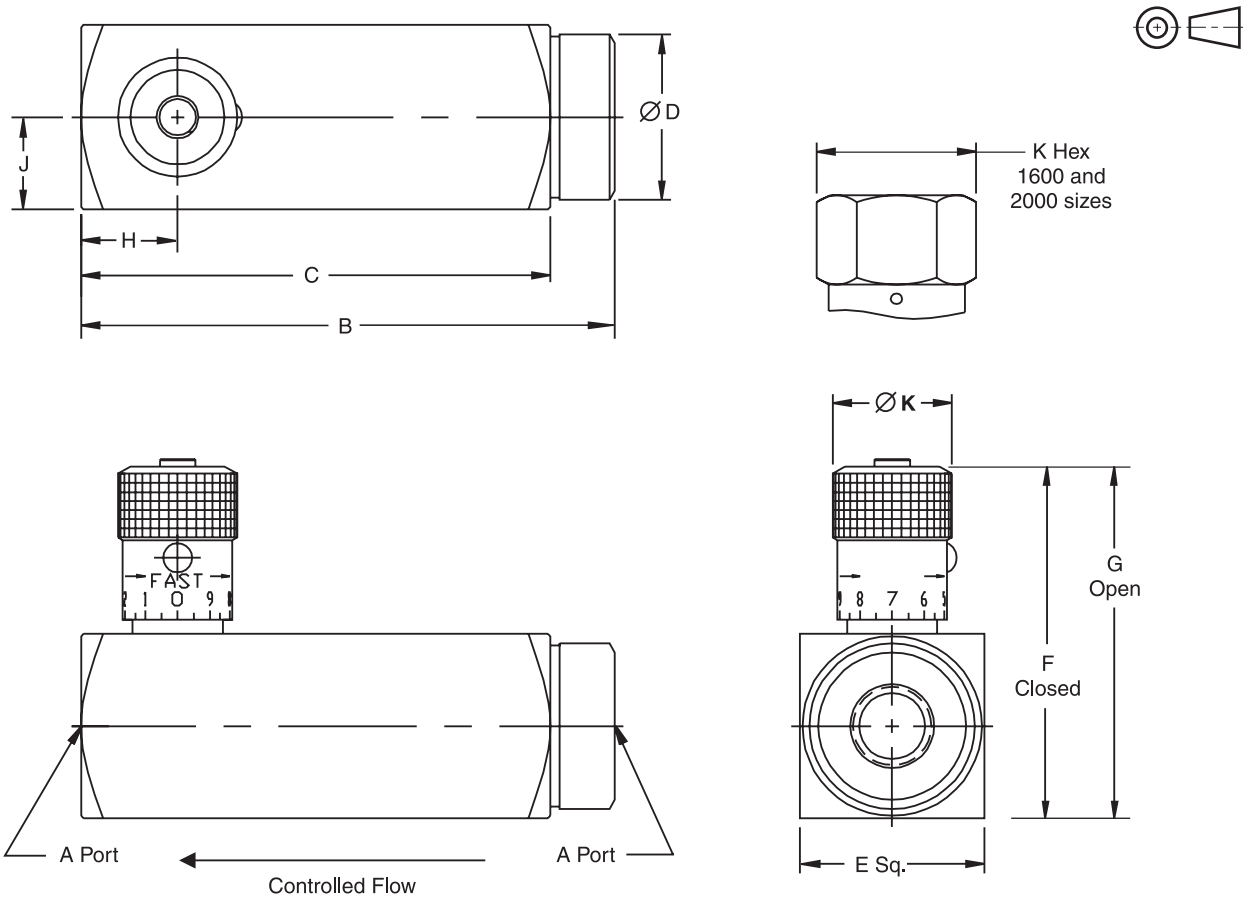
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)



Model Number	Weights kg (lbs.)	A	B	C	D	E	F	G	H	J	K
PC*M400/620	0.8 (1.8)	1/4–18 NPTF 9/16–18 UNF	92.2 (3.63)	81.0 (3.19)	28.7 (1.13)	35.1 (1.38)	64.0 (2.52)	69.3 (2.73)	16.8 (0.66)	17.5 (0.69)	20.6 (0.81)
PC*M600/820	1.0* (2.2)*	3/8–18 NPTF 3/4–16 UNF	105.7 (4.16)	93.0 (3.66)	31.8 (1.25)	38.1 (1.50)	73.7 (2.90)	80.0 (3.15)	17.5 (0.69)	19.1 (0.75)	25.4 (1.00)
PC*M800/1020	1.7 (3.7)	1/2–14 NPTF 7/8–14 UNF	125.5 (4.94)	109.5 (4.31)	38.1 (1.50)	44.5 (1.75)	95.0 (3.74)	102.6 (4.04)	22.4 (0.88)	22.4 (0.88)	30.2 (1.19)
PC*M1200/1220	3.6 (8.0)	3/4–14 NPTF 1 1/16–12 UNF	149.4 (5.88)	130.3 (5.13)	50.8 (2.00)	57.2 (2.25)	115.8 (4.56)	128.5 (5.06)	27.7 (1.09)	28.7 (1.13)	35.1 (1.38)
PC*M1600/1620	6.6 (14.6)	1–11 1/2 NPTF 1 5/16–12 UNF	176.3 (6.94)	155.7 (6.13)	63.5 (2.50)	69.9 (2.75)	158.2 (6.23)	175.3 (6.90)	33.3 (1.31)	35.1 (1.38)	47.8 (1.88)
PC*M2000	11.8 (26.0)	1 1/4–11 1/2 NPTF	212.9 (8.38)	190.5 (7.50)	76.2 (3.00)	88.9 (3.50)	182.1 (7.17)	201.2 (7.92)	41.4 (1.63)	44.5 (1.75)	47.8 (1.88)

* Weights are for PC*M600; weights for PC*M820 are 1.4 kg (3.1lbs.)

General Description

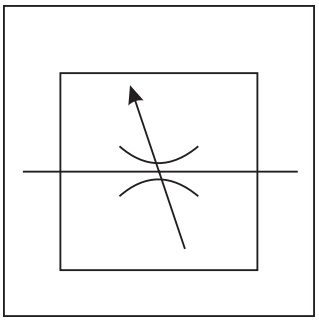
Series N needle valves are ideal as speed controls on hydraulic and pneumatic systems where a reverse flow check is not needed. They provide excellent control and a reliable shut-off in a very small envelope.

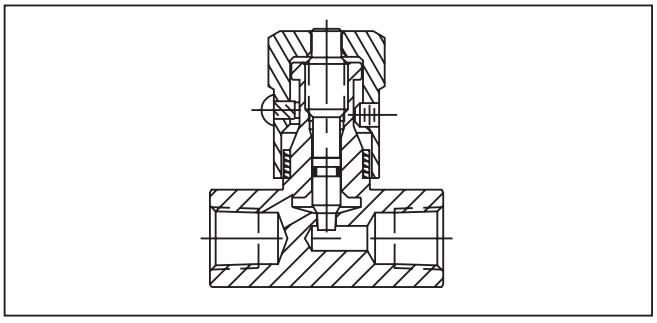
Operation

A two-step needle allows fine adjustment at low flow by using the first three turns of the adjusting knob. The next three turns open the valve to full flow, and also provide standard throttling adjustments.

Features

- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- A simple set screw locks the valve on any desired setting.
- A tamperproof option (T) feature is also available to prevent accidental or intentional adjustment of flow setting.

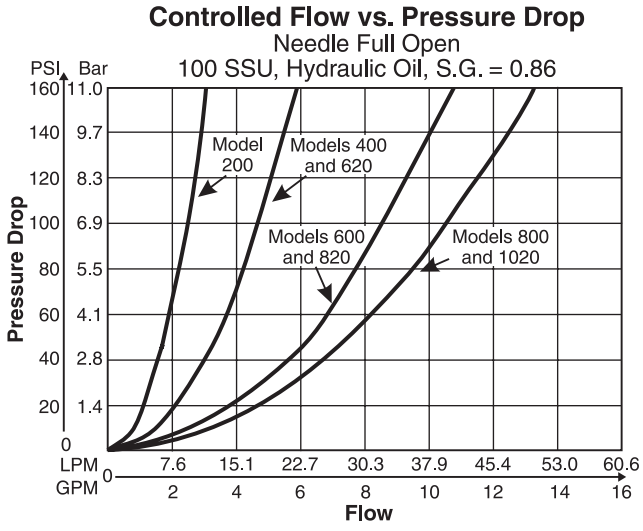


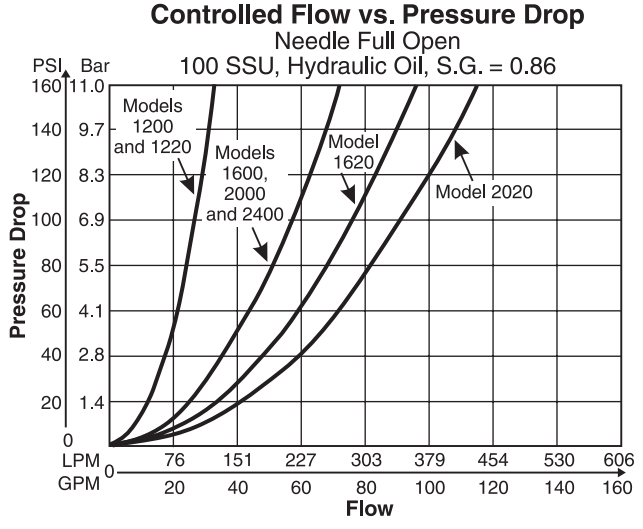


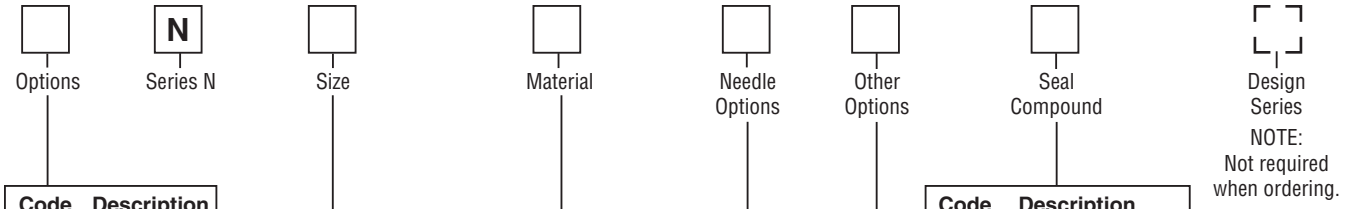
Specifications

Maximum Operating Pressure	Brass:	140 Bar (2000 PSI); except for N1600 brass which is 35 Bar (500 PSI)
	Steel & Stainless Steel:	345 Bar (5000 PSI) for 200 thru 1220; 207 Bar (3000 PSI) for all other sizes
Material	Body	See ordering code
	Knob	Steel - Zinc plated
	Needle	416 Stainless Steel
	Stainless Steel Bodies	303 Stainless Steel
Temperature Range of Seal Compound	-40°C to +121°C (-40°F to +250°F) Nitrile (standard)	
	-26°C to +205°C (-15°F to +400°F) Fluorocarbon	

Performance Curves







NOTE: Not required when ordering.

Code	Description
Omit	NPTF/SAE
★ 8	BSPT
★★ 9	BSPP

★ Code 8 can be used with sizes 400, 600, 800 Steel only

★★ Code 9 can be used with sizes 200, 400, 600, 800, 1200, 1600, 2000

Code	Size	Code	Size
200 *	1/8"	1020	#10 SAE
400 *†	1/4"	1200 *	3/4"
420	#4 SAE	1220	#12 SAE
600 *†	3/8"	1600 *	1"
620	#6 SAE	1620	#16 SAE
800 *†	1/2"	2000	1 1/4"
820 *	#8 SAE	2020	#20 SAE

* Sizes available in Brass.

† Sizes available in Stainless Steel.

Code	Description
B	Brass
S	Steel
SS *	Stainless Steel

Series N Brass Valves can be used for both air and oil service.

* Available in 400, 600 and 800 sizes, NPT only.

Code	Description
Omit	Standard
4	Fine Metering (200, 400, 420, 600, 620, 820 sizes)

Code	Description
Omit	Standard Knob
T *	Tamperproof
F	Finger Screw

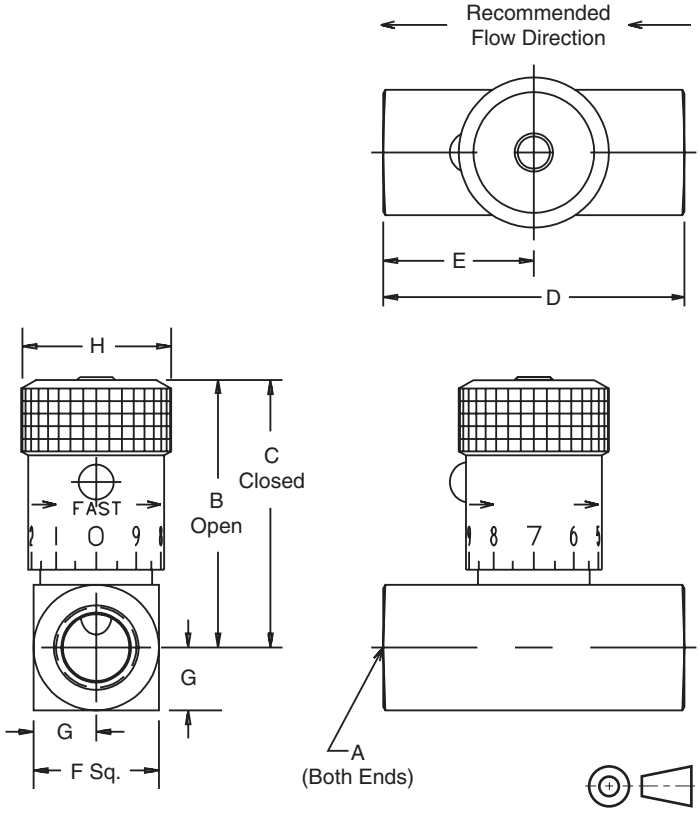
* Not available above 1200 size.

Code	Description
Omit	Nitrile (Standard)
V	Fluorocarbon (Standard on Stainless Steel)
E	EPR (Steel only)

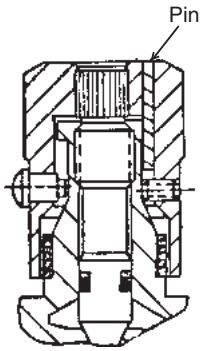
Model Number	Max Flow LPM (GPM)	Effective Orifice Area Control Flow in.²	Effective Control Flow C_v
N200	11 (3)	0.0102	0.230
N420	11 (3)	0.0102	0.230
N400	19 (5)	0.0194	0.443
N620	19 (5)	0.0194	0.443
N600	30 (8)	0.0344	0.787
N820	30 (8)	0.0344	0.787
N800	57 (15)	0.0427	0.976
N1020	57 (15)	0.0427	0.976
N1200	95 (25)	0.1080	2.470
N1220	95 (25)	0.1080	2.470
N1600	151 (40)	0.2300	5.250
N1620	151 (40)	0.3070	7.000
N2000	264 (70)	0.2300	5.250
N2020	264 (70)	0.3710	8.470

Model Number	Effective Orifice Area Control Flow in.²	Effective Control Flow C_v
N400-4	0.0044	0.0758
N600-4	0.0097	0.153
N620-4	0.0044	0.0758
N820-4	0.0097	0.153

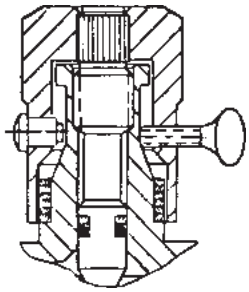
Inch equivalents for millimeter dimensions are shown in (**)



Knob Options



Tamperproof Option (Code "T") permanently locks knob at desired flow setting by installing a pin in predrilled hole.



Finger screw Option (Code "F") provides this thumb-screw in place of set screw.

Model Number	Weight kg (lbs.)	A	B	C	D	E	F	G	H
N200	0.1 (0.3)	1/8–27 NPTF	39.1 (1.54)	35.3 (1.39)	38.1 (1.50)	19.1 (0.75)	15.7 (0.62)	7.9 (0.31)	19.1 (0.75)
N400	0.2 (0.5)	1/4–18 NPTF	45.5 (1.79)	40.4 (1.59)	50.8 (2.00)	25.4 (1.00)	20.6 (0.81)	10.4 (0.41)	20.6 (0.81)
N420	0.1 (0.3)	7/16–20 UNF #4 SAE	41.4 (1.63)	37.6 (1.48)	50.8 (2.00)	25.4 (1.00)	20.6 (0.81)	10.4 (0.41)	19.1 (0.75)
N600	0.4 (0.9)	3/8–18 NPTF	55.4 (2.18)	49.5 (1.95)	63.5 (2.50)	31.8 (1.25)	25.4 (1.00)	12.7 (0.50)	25.4 (1.00)
N620	0.2 (0.5)	9/16–18 UNF #6 SAE	47.8 (1.88)	42.7 (1.68)	60.5 (2.38)	30.2 (1.19)	25.4 (1.00)	12.7 (0.50)	20.6 (0.81)
N800	0.6 (1.3)	1/2–14 NPTF	68.6 (2.70)	61.5 (2.42)	66.5 (2.62)	33.3 (1.31)	31.8 (1.25)	15.7 (0.62)	30.2 (1.19)
N820	0.4 (0.9)	3/4–16 UNF #8 SAE	56.9 (2.24)	51.1 (2.01)	76.2 (3.00)	38.1 (1.50)	28.4 (1.12)	14.2 (0.56)	25.4 (1.00)
N1020	0.6 (1.3)	7/8–14 UNF #10 SAE	68.6 (2.70)	61.5 (2.42)	88.9 (3.50)	44.5 (1.75)	31.8 (1.25)	15.7 (0.62)	30.2 (1.19)
N1200	1.0 (2.2)	3/4–14 NPTF	85.9 (3.38)	71.4 (2.81)	82.6 (3.25)	41.1 (1.62)	38.1 (1.50)	19.1 (0.75)	35.1 (1.38)
N1220	1.0 (2.2)	1 1/6–12 UN #12 SAE	85.9 (3.38)	71.4 (2.81)	101.6 (4.00)	50.8 (2.00)	38.1 (1.50)	19.1 (0.75)	35.1 (1.38)
N1600	2.1 (4.6)	1–11 1/2 NPTF	123.7 (4.87)	106.9 (4.21)	108.0 (4.25)	53.8 (2.12)	44.5 (1.75)	22.4 (0.88)	47.8 * (1.88)
N1620	2.1 (4.6)	1 5/16–12 UN #16 SAE	130.8 (5.15)	114.0 (4.49)	108.0 (4.25)	53.8 (2.12)	57.2 (2.25)	28.4 (1.12)	47.8 * (1.88)
N2000	2.9 (6.4)	1 1/4–11 1/2 NPTF	130.0 (5.12)	113.3 (4.46)	108.0 (4.25)	53.8 (2.12)	57.2 (2.25)	28.4 (1.12)	47.8 * (1.88)
N2020	2.9 (6.4)	1 5/8–12 UN #20 SAE	140.2 (5.52)	123.4 (4.86)	114.3 (4.50)	57.2 (2.25)	69.9 (2.75)	60.5 (2.38)	47.8 * (1.88)

* = Hex

General Description

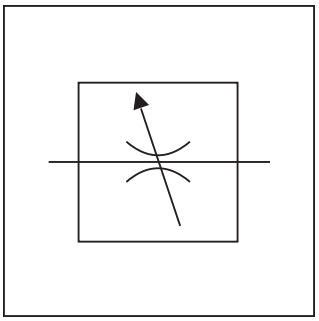
Series 6N needle valves are ideal as speed controls on hydraulic and pneumatic systems where a reverse flow check is not needed. They provide excellent control and a reliable shut-off in a very small envelope.

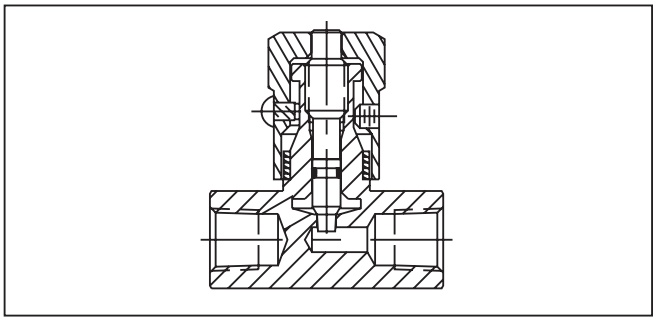
Operation

A two-step needle allows fine adjustment at low flow by using the first three turns of the adjusting knob. The next three turns open the valve to full flow, and also provide standard throttling adjustments.

Features

- Meets ISO 6149 standards.
- Hard metric dimensions.
- Reliable leak-free performance — straight thread port with o-ring sealing.
- Global interchangeablility.

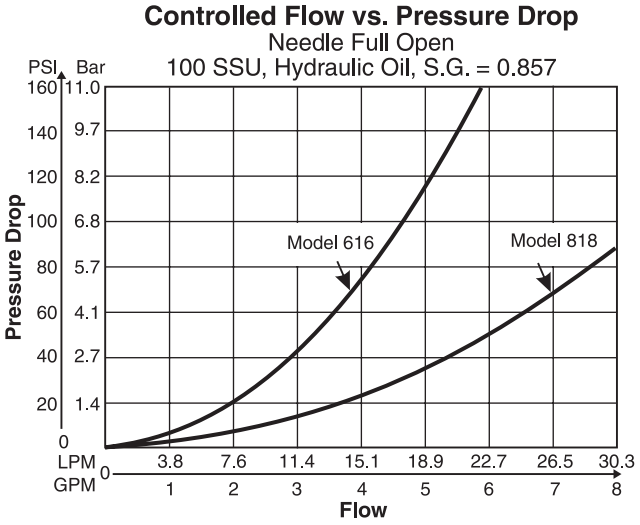


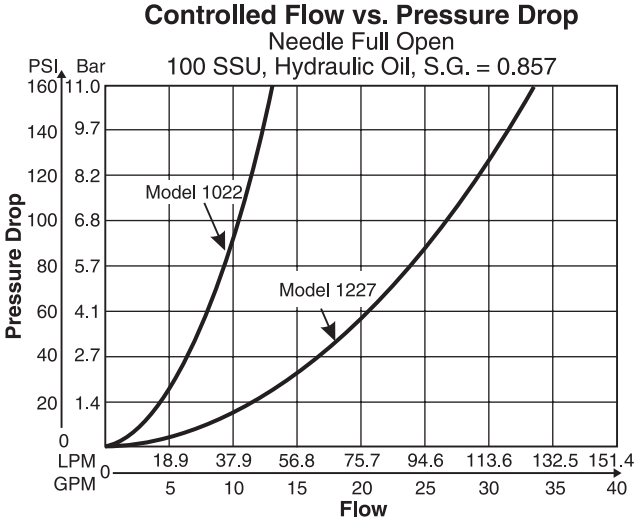


Specifications

Maximum Operating Pressure	345 Bar (5000 PSI)
Maximum Flow	M16 x 1.5 19 LPM (5 GPM) M18 x 1.5 30 LPM (8 GPM) M22 x 1.5 57 LPM (15 GPM) M27 x 2.0 95 LPM (25 GPM)
Material	Body ASTM 12L14 Carbon Steel Knob ASTM 12L14 Carbon Steel Needle ASTM 416 Stainless Steel
Temperature Range of Seal Compound	-40°C to +121°C (-40°F to +250°F) Nitrile (Standard)

Performance Curves





Ordering Information

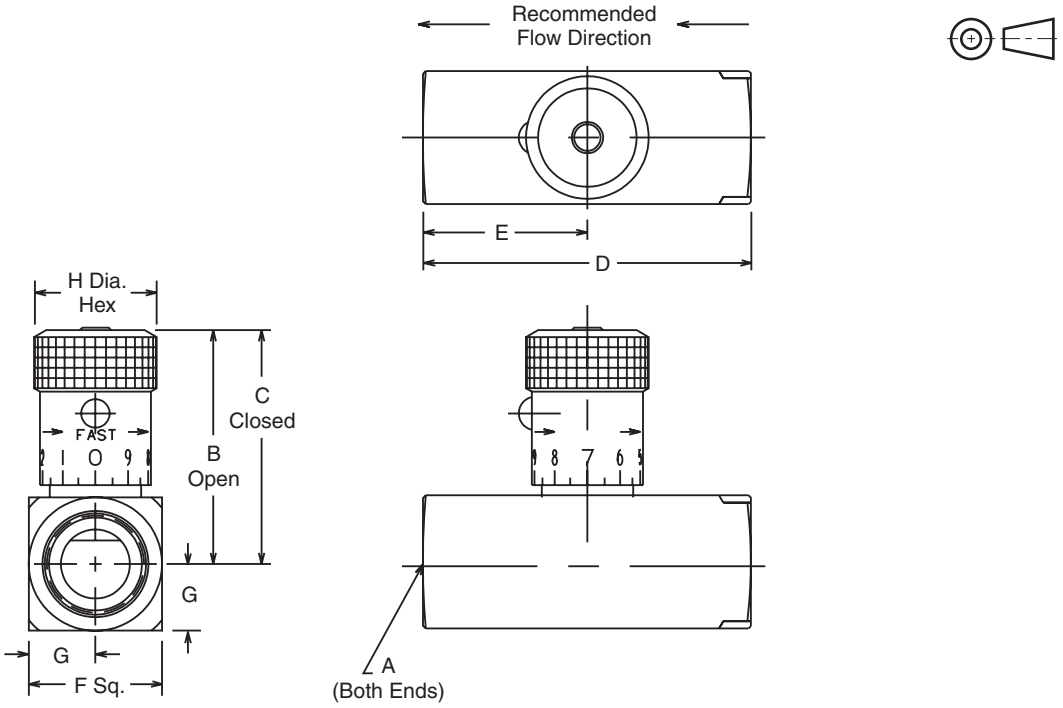
6	N		S	
Ports	Style	Size	Material	Design Series
ISO 6149 ports	Needle Valve	See table below	Steel	

Code	Ratio
616	M16 x 1.5
818	M18 x 1.5
1022	M22 x 1.5
1227	M27 x 2.0

NOTE: Not required when ordering.

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



Model Number	Weight kg (lbs.)	A	B	C	D	E	F	G	H
6N616	0.2 (0.5)	M16 x 1.5	47.8 (1.88)	42.7 (1.68)	60.5 (2.38)	30.2 (1.19)	25.4 (1.00)	12.7 (0.50)	20.6 ∅(0.81)
6N818	0.4 (0.9)	M18 x 1.5	56.9 (2.24)	51.1 (2.01)	76.2 (3.00)	38.1 (1.50)	28.4 (1.12)	14.2 (0.56)	25.4 ∅(1.00)
6N1022	0.6 (1.3)	M22 x 1.5	68.6 (2.70)	61.5 (2.42)	88.9 (3.50)	44.5 (1.75)	31.8 (1.25)	15.7 (0.62)	30.2 ∅(1.19)
6N1227	1.0 (2.2)	M27 x 2.0	85.9 (3.38)	71.4 (2.81)	101.6 (4.00)	50.8 (2.00)	38.1 (1.50)	19.1 (0.75)	35.1 ∅(1.38)

General Description

Series MV high-precision metering and shut-off valves allow extremely close control of fluids used in actuating and governing equipment.

Operation

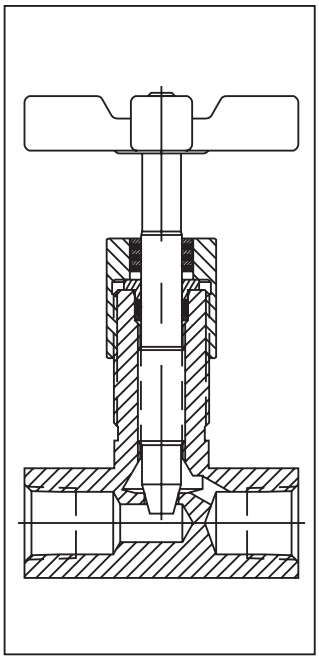
The standard needle allows fine adjustment at low flow by using the first three turns of the adjusting knob. The next three turns open the valve to full flow, and also provide standard throttling adjustments.

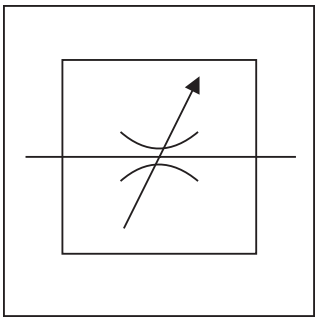
Features

- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- Fine and Micro-fine needles available for extremely fine control.
- MVK mounting kit makes panel mounting simple.
- High efficiency o-ring stem seal that eliminates packing.

Specifications

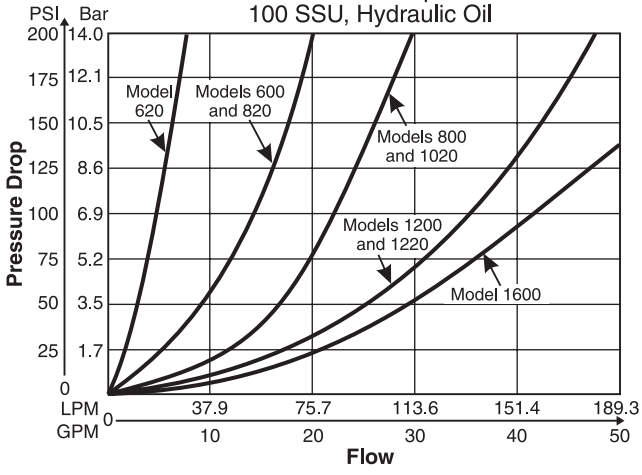
Maximum Operating Pressure	Brass: 140 Bar (2000 PSI) Steel: 413 Bar (6000 PSI) for MV261, 461, 661, 861. 345 Bar (5000 PSI) for MV200, 400, 401, 420, 600, 601,620, 800, 820, 1020, 1200, 1220. 207 Bar (3000 PSI) for all other sizes and styles.
Material	Body: See ordering code Handle: Zinc alloy - Zinc chromate Needle: 416 Stainless Steel
Temperature Range of Seal Compound	-40°C to +121°C (-40°F to +250°F) Nitrile (standard) -26°C to +205°C (-15°F to +400°F) Fluorocarbon



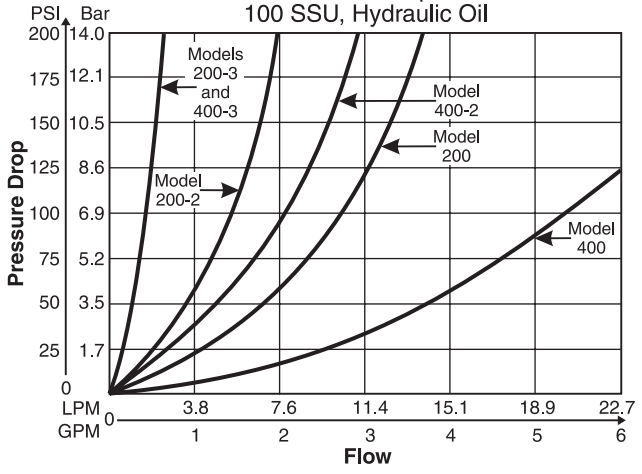


Performance Curves

Controlled Flow vs. Pressure Drop
Needle Full Open
100 SSU, Hydraulic Oil



Controlled Flow vs. Pressure Drop
Needle Full Open
100 SSU, Hydraulic Oil



Ordering Information

Options | Series MV | Size | Material | Needle Options | Seal Compound | Design Series

NOTE: Not required when ordering.

Code	Description
Omit	NPTF/SAE
★ 9	BSPP

★ Code 9 can be used with sizes 200, 261, 400, 461, 600, 661, 800, 861, 1200, 1261, and 1600.

Code	Size	Code	Size
200 *	1/8"	661	3/8"
260	1/8"	681	#6 SAE
261	1/8"	800 *	1/2"
400 *	1/4"	820	#8 SAE
401	1/4"	860	1/2"
420	#4 SAE	861	1/2"
460	1/4"	1020	#10 SAE
461	1/4"	1200	3/4"
600 *	3/8"	1220	#12 SAE
601	3/8"	1261	3/4"
620	#6 SAE	-1600	1"
660	3/8"	-1620	#16 SAE

* Sizes available in Brass
00 is Female to Female
01 is Female to Male
6* is Right Angle
60 is Male to Female
61 is Female to Female

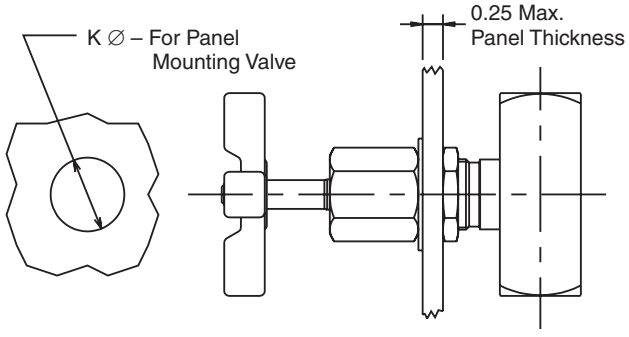
Code	Description
B	Brass
S	Steel

Code	Description
Omit	Standard 30° Taper
2	Fine
3	Micro-fine

2 and 3 not available in sizes 660 and above.

Code	Description
Omit	Nitrile (Standard)
V	Fluorocarbon

Mounting Kit

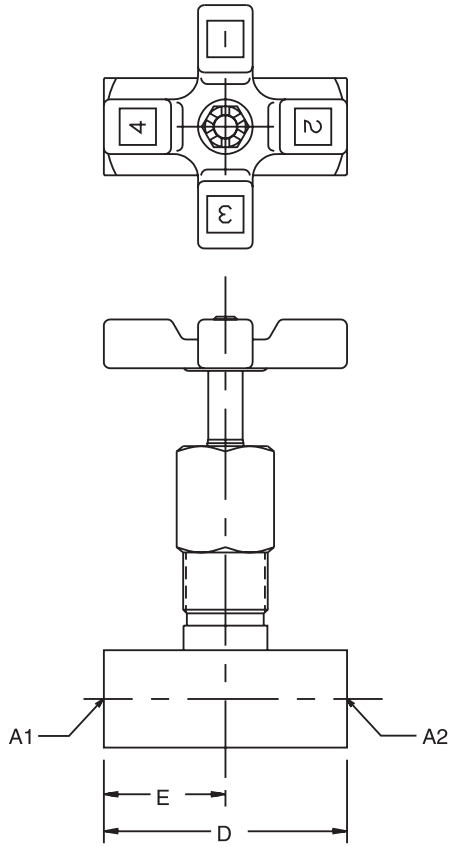


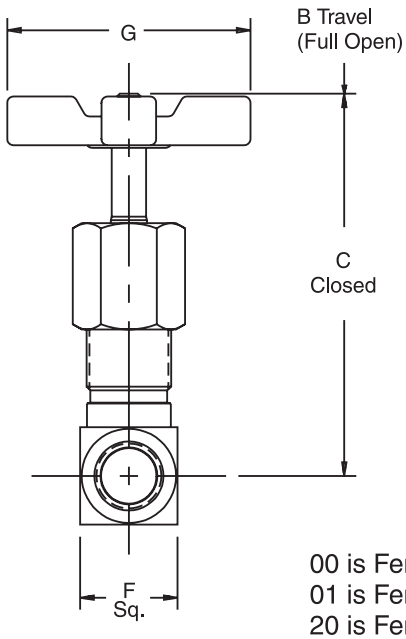
Panel Mounting Kits

Kit Number	K	Valve Model	Kit Number	K	Valve Model
MVK2	15.0 (0.59)	MV200 MV260 MV261S MV420	**MVK8**	29.5 (1.16)	MV800 MV860 MV861S MV1020
MVK4	19.8 (0.78)	MV400 MV401 MV460S MV461S MV620	**MVK12**	35.8 (1.41)	MV1200 MV1220 MV1261
			MVK16	35.8 (1.41)	MV-1600 MV-1620
MVK6	23.1 (0.91)	MV600 MV601 MV660 MV661S MV681 MV820			

Model Number	Effective Orifice Area Max Flow LPM (GPM)	Control Flow in.²	Effective Control Flow C_v
MV200	11 (3)	0.0107	0.244
MV260	11 (3)	0.0107	0.244
MV261	11 (3)	0.0107	0.244
MV420	11 (3)	0.0107	0.244
MV200-2	7 (1.8)	0.0053	0.121
MV260-2	7 (1.8)	0.0053	0.121
MV261-2	7 (1.8)	0.0053	0.121
MV420-2	7 (1.8)	0.0053	0.121
MV200-3	2 (0.5)	0.0014	0.032
MV260-3	2 (0.5)	0.0014	0.032
MV261-3	2 (0.5)	0.0014	0.032
MV420-3	2 (0.5)	0.0014	0.032
MV400	19 (5)	0.0216	0.493
MV460	19 (5)	0.0216	0.493
MV461	19 (5)	0.0216	0.493
MV620	19 (5)	0.0216	0.493
MV400-2	11 (2.8)	0.0081	0.186
MV460-2	11 (2.8)	0.0081	0.186
MV461-2	11 (2.8)	0.0081	0.186
MV620-2	11 (2.8)	0.0081	0.186
MV400-3	2 (0.5)	0.0017	0.039
MV460-3	2 (0.5)	0.0017	0.039
MV461-3	2 (0.5)	0.0017	0.039
MV620-3	2 (0.5)	0.0017	0.039
MV600	30 (8)	0.0567	1.294
MV660	30 (8)	0.0567	1.294
MV661	30 (8)	0.0567	1.294
MV681	30 (8)	0.0567	1.294
MV820	30 (8)	0.0567	1.294
MV600-2	1.8 (0.5)	0.018	0.466
MV600-3	0.28 (0.1)	0.0027	0.0326
MV800	57 (15)	0.0845	1.930
MV860	57 (15)	0.0845	1.930
MV861	57 (15)	0.0845	1.930
MV1020	57 (15)	0.0845	1.930
MV1200	95 (25)	0.1400	3.205
MV1220	95 (25)	0.1400	3.205
MV1261	95 (25)	0.1400	3.205
MV-1600	151 (40)	0.1675	3.829
MV-1620	151 (40)	0.1675	3.829

Inch equivalents for millimeter dimensions are shown in (**)



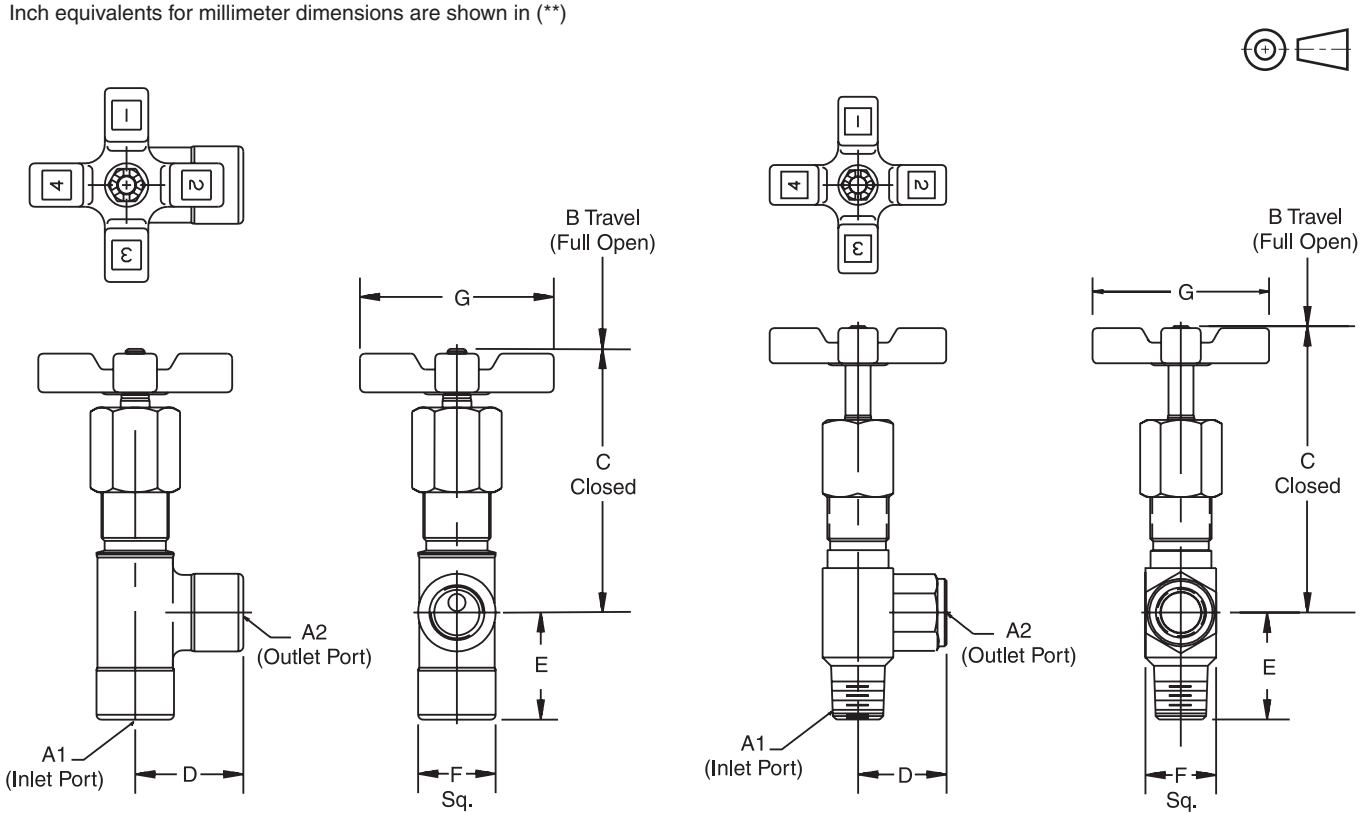


00 is Female to Female
01 is Female to Male
20 is Female to Female

Model Number	Weight kg (lbs.)	A1	A2	B	C	D	E	F	G
MV200	0.1 (0.3)	1/8–27 NPTF Female	1/8–27 NPTF Female	69.1 (2.72)	63.8 (2.51)	38.1 (1.50)	19.1 (0.75)	15.7 (0.62)	44.5 (1.75)
MV420	0.1 (0.3)	7/16-20 UNF #4 SAE	7/16-20 UNF #4 SAE	71.6 (2.82)	66.3 (2.61)	50.8 (2.00)	25.4 (1.00)	20.6 (0.81)	44.5 (1.75)
MV400	0.3 (0.7)	1/4–18 NPTF Female	1/4–18 NPTF Female	86.9 (3.42)	81.5 (3.21)	50.8 (2.00)	25.4 (1.00)	20.6 (0.81)	50.8 (2.00)
MV401	0.3 (0.7)	1/4–18 NPTF Male	1/4–18 NPTF Female	86.9 (3.42)	81.5 (3.21)	55.4 (2.18)	30.0 (1.18)	20.6 (0.81)	50.8 (2.00)
MV620	0.5 (1.1)	9/16–18 UNF #6 SAE	9/16–18 UNF #6 SAE	89.2 (3.51)	83.8 (3.30)	60.5 (2.38)	30.2 (1.19)	25.4 (1.00)	50.8 (2.00)
MV600	0.5 (1.1)	3/8–18 NPTF Female	3/8–18 NPTF Female	99.6 (3.92)	91.9 (3.62)	63.5 (2.50)	31.8 (1.25)	25.4 (1.00)	63.5 (2.50)
MV601	0.5 (1.1)	3/8–18 NPTF Male	3/8–18 NPTF Female	99.6 (3.92)	91.9 (3.62)	68.1 (2.68)	36.3 (1.43)	25.4 (1.00)	63.5 (2.50)
MV820	0.5 (1.1)	3/4–16 UNF #8 SAE	3/4–16 UNF #8 SAE	108.7 (4.28)	101.1 (3.98)	76.2 (3.00)	38.1 (1.50)	28.4 (1.12)	63.5 (2.50)
MV800	1.0 (2.2)	1/2–14 NPTF Female	1/2–14 NPTF Female	129.3 (5.09)	116.6 (4.59)	66.5 (2.62)	33.3 (1.31)	31.8 (1.25)	82.6 (3.25)
MV1020	1.0 (2.2)	7/8–14 UNF #10 SAE	7/8–14 UNF #10 SAE	129.5 (5.10)	116.6 (4.59)	88.9 (3.50)	44.5 (1.75)	31.8 (1.25)	82.6 (3.25)
MV1200	1.6 (3.5)	3/4–14 NPTF Female	3/4–14 NPTF Female	141.8 (5.58)	127.8 (5.03)	82.6 (3.25)	41.1 (1.62)	38.1 (1.50)	98.6 (3.88)
MV1220	1.6 (3.5)	1 1/16–12 UN #12 SAE	1 1/16–12 UN #12 SAE	141.8 (5.58)	127.8 (5.03)	101.6 (4.00)	50.8 (2.00)	38.1 (1.50)	98.6 (3.88)
MV-1600	1.9 (4.2)	1–11 1/2 NPTF Female	1–11 1/2 NPTF Female	146.8 (5.78)	132.8 (5.23)	108.0 (4.25)	53.8 (2.12)	44.5 (1.75)	98.6 (3.88)
MV-1620	1.9 (4.2)	1 5/16–12 UN #16 SAE	1 5/16–12 UN #16 SAE	152.9 (6.02)	138.9 (5.47)	108.0 (4.25)	53.8 (2.12)	57.2 (2.25)	98.6 (3.88)

An optional MVK mounting kit makes panel mounting quite simple.

Inch equivalents for millimeter dimensions are shown in (**)



61 is Female to Female

60 is Male to Female

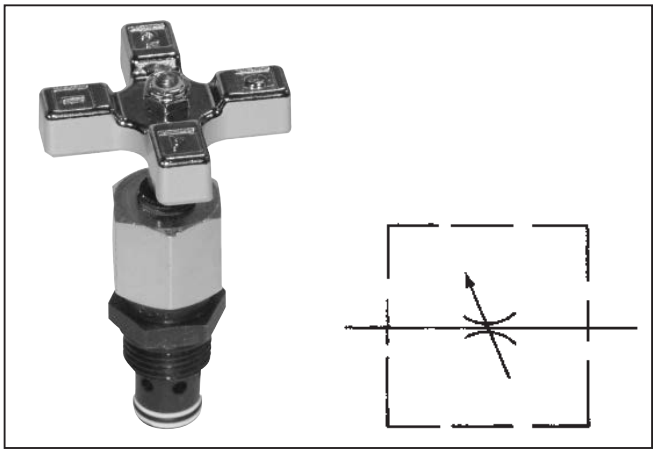
Model Number	Weight kg (lbs.)	A1	A2	B	C	D	E	F	G
MV260	0.1 (0.3)	1/8–27 NPTF Male	1/8–27 NPTF Female	72.4 (2.85)	67.1 (2.64)	19.1 (0.75)	22.1 (0.87)	15.7 (0.62)	44.5 (1.75)
MV460	0.3 (0.7)	1/4–18 NPTF Male	1/4–18 NPTF Female	90.2 (3.55)	84.8 (3.34)	27.2 (1.07)	30.7 (1.21)	20.6 (0.81)	50.8 (2.00)
MV660	0.5 (1.1)	3/8–18 NPTF Male	3/8–18 NPTF Female	110.7 (4.36)	103.1 (4.06)	31.8 (1.25)	34.8 (1.37)	25.4 (1.00)	63.5 (2.50)
MV860	0.9 (2.0)	1/2–14 NPTF Male	1/2–14 NPTF Female	133.4 (5.25)	120.7 (4.75)	36.8 (1.45)	42.7 (1.68)	31.8 (1.25)	82.6 (3.25)
MV261	0.1 (0.3)	1/8–27 NPTF Female	1/8–27 NPTF Female	93.98 (3.70)	60.7 (2.39)	26.9 (1.06)	26.9 (1.06)	17.5 (0.69)	44.5 (1.75)
MV461	0.3 (0.7)	1/4–18 NPTF Female	1/4–18 NPTF Female	86.1 (3.39)	76.4 (3.01)	33.5 (1.32)	31.2 (1.23)	22.3 (0.88)	50.8 (2.00)
MV661	0.5 (1.1)	3/8–18 NPTF Female	3/8–18 NPTF Female	98.04 (3.86)	86.4 (3.40)	38.3 (1.51)	35.0 (1.38)	25.4 (1.00)	63.5 (2.50)
MV861	1.0 (2.2)	1/2–14 NPTF Female	1/2–14 NPTF Female	118.3 (4.66)	106.9 (4.21)	43.43 (1.71)	40.3 (1.59)	29.4 (1.16)	82.6 (3.25)
MV1261	1.6 (3.5)	3/4–14 NPTF Female	3/4–14 NPTF Female	146.8 (5.78)	132.8 (5.23)	44.5 (1.75)	41.1 (1.62)	38.1 (1.50)	98.6 (3.88)

An optional MVK mounting kit makes panel mounting quite simple.

General Description

Series MVI cartridge-type needle valves are designed for installation in a precision-machined cavity made in the manifold of the machine. Detailed instructions for machining the required cavity for the valve are given on page 27.

Properly installed in precision-machined cavities, these needle valves provide precise metering control and full shutoff of flow. An o-ring and backup ring installed on the cartridge fully isolate the inlet and outlet ports of the machined cavity from each other.



Features

- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- Fine and Micro-fine needles available for extremely fine control.
- High efficiency o-ring stem seal that eliminates packing.

Specifications

Maximum Operating Pressure	340 Bar (5000 PSI)
Flow	See table
Material	Steel, compatible in steel or aluminum manifold block cavities
Temperature Range of Seal Compound	-40°C to +121°C (-40°F to +250°F) Nitrile (standard) -26°C to +205°C (-15°F to +400°F) Fluorocarbon

Ordering Information

MVI — Cartridge Needle Valve

□ — Size

Code	Size
400	1/4"
600	3/8"
800	1/2"
1200	3/4"

S — Material

Code	Description
S	Steel

□ — Optional Needle

Code	Description
Omit	Standard
2 *	Fine
3 *	Micro-fine

* Available on MVI400 only.

□ — Seals

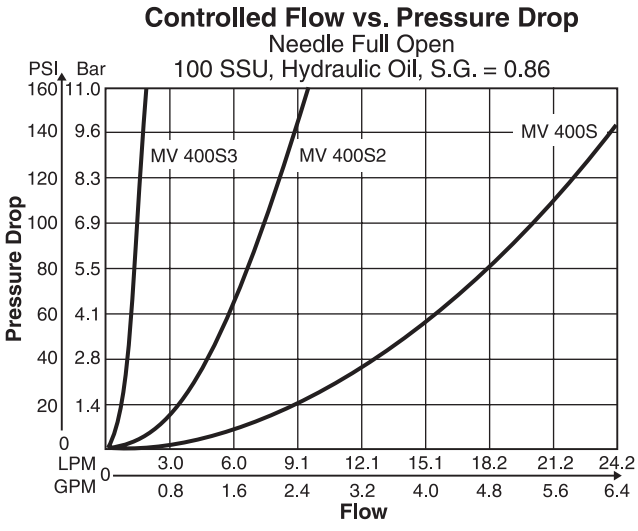
Code	Description
Omit	Nitrile
V	Fluorocarbon

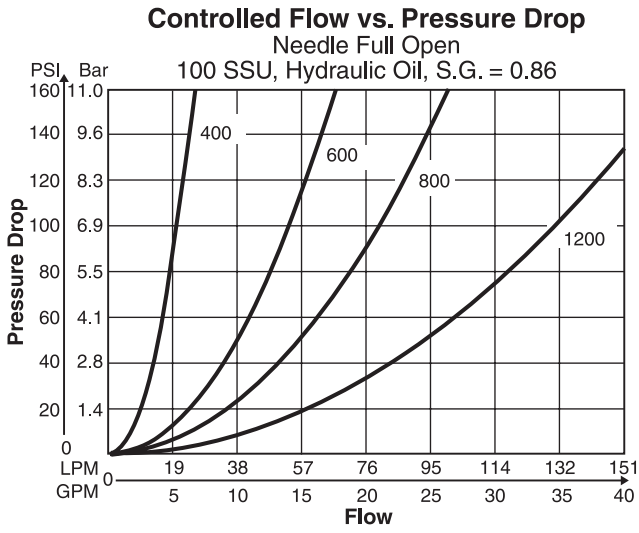
Flow Data

Valve Model	Maximum Flow	ΔP @ Maximum Flow	Orifice Area in² Full Open	C_v * Factor	Valve Size
MVI400	19 LPM (5 GPM)	7 Bar (100 PSI)	0.0216	0.493	1/4"
MVI400-2	11 LPM (2.8 GPM)	14 Bar (200 PSI)	0.0081	0.186	1/4"
MVI400-3	2 LPM (0.5 GPM)	14 Bar (200 PSI)	0.0014	0.032	1/4"
MVI600	30 LPM (8 GPM)	2 Bar (35 PSI)	0.0567	1.294	3/8"
MVI800	57 LPM (15 GPM)	3 Bar (45 PSI)	0.0845	1.930	1/2"
MVI1200	95 LPM (25 GPM)	4 Bar (51 PSI)	0.1400	3.205	3/4"

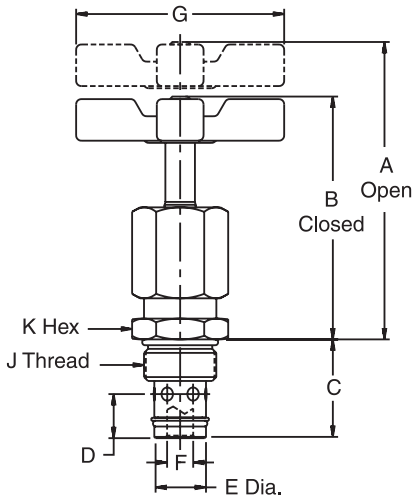
* C_v factor – Flow of water in GPM that valve will pass @ ΔP of 0.1 Bar (1 PSI).

Performance Curves



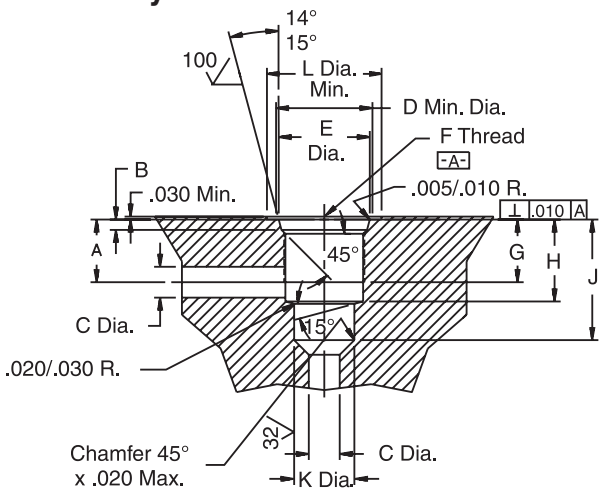


Inch equivalents for millimeter dimensions are shown in (**)



Model Number	A	B	C	D	E	F	G	J	K	Weight
MVI400S *	64.5 (2.54)	59.4 (2.34)	25.4 (1.00)	10.9 (0.43)	14.2 (0.56)	4.6 (0.18)	50.8 (2.00)	3/4-16UNF-2A	22.1 (0.87)	0.2 kg (0.4 lb.)
MVI600S	80.3 (3.16)	72.6 (2.86)	30.0 (1.18)	13.5 (0.53)	15.7 (0.62)	7.9 (0.31)	63.5 (2.50)	7/8-14UNF-2A	25.4 (1.00)	0.3 kg (0.6 lb.)
MVI800S	91.2 (3.59)	78.5 (3.09)	39.6 (1.56)	15.2 (0.60)	20.3 (0.80)	9.4 (0.37)	82.6 (3.25)	1 1/16-12UN-2A	31.8 (1.25)	0.5 kg (1.2 lb.)
MVI1200S	101.6 (4.00)	87.6 (3.45)	43.4 (1.71)	19.1 (0.75)	26.9 (1.06)	11.7 (0.46)	98.3 (3.87)	1 5/16-12UN-2A	38.1 (1.50)	0.9 kg (2.0 lb.)

Machining Detail Installation Cavity



Model Number	A	B	C	D	E	F	G	H	J	K	L
MVI400S *	14.2 (0.56)	2.5/2.9 (0.100/0.115)	5.3 (0.21)	22.1 (0.87)	20.6/20.7 (0.811/0.816)	3/4-16 UNF-2B	14.2 (0.56)	17.8 (0.70)	26.9 (1.06)	14.3/14.3 (0.562/0.564)	30.2 (1.19)
MVI600S	16.5 (0.65)	2.5/2.9 (0.100/0.115)	8.1 (0.32)	25.4 (1.00)	23.9/24.1 (0.942/0.947)	7/8-14 UNF-2B	16.5 (0.65)	21.6 (0.85)	31.8 (1.25)	15.8/15.9 (0.624/0.626)	34.1 (1.34)
MVI800S	24.1 (0.95)	3.3/3.7 (0.130/0.145)	10.2 (0.40)	31.8 (1.25)	29.2/29.3 (1.148/1.153)	1 1/16-12 UN-2B	19.1 (0.75)	30.0 (1.18)	41.1 (1.62)	20.6/20.7 (0.811/0.813)	41.4 (1.63)
MVI1200S	24.6 (0.97)	3.3/3.7 (0.130/0.145)	12.7 (0.50)	38.1 (1.50)	35.5/35.6 1.398/1.403)	1 5/16-12 UN-2B	19.1 (0.75)	31.8 (1.25)	45.2 (1.78)	26.9/27.0 (1.062/1.064)	48.5 (1.91)

General Description

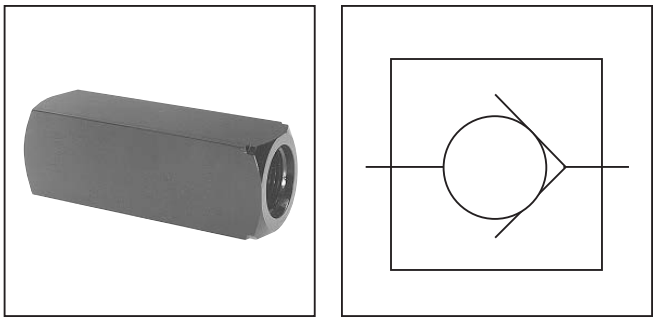
Series C check valves permit free flow in one direction, and dependable shut-off in the reverse direction.

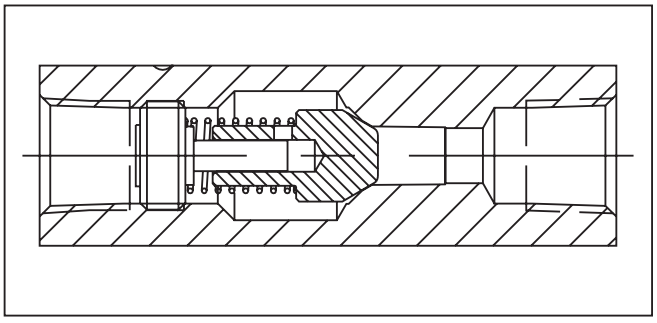
Operation

When pressure going through the valve is increased to the cracking level, the valve opens. When the pressure is reduced to below the cracking level, the valve closes.

Features

- Stainless steel poppets standard.
- Soft seal poppets are standard in some variations.
- Triangular retainers guide the poppets, and hold the spring firmly in place even under high velocity and shock.



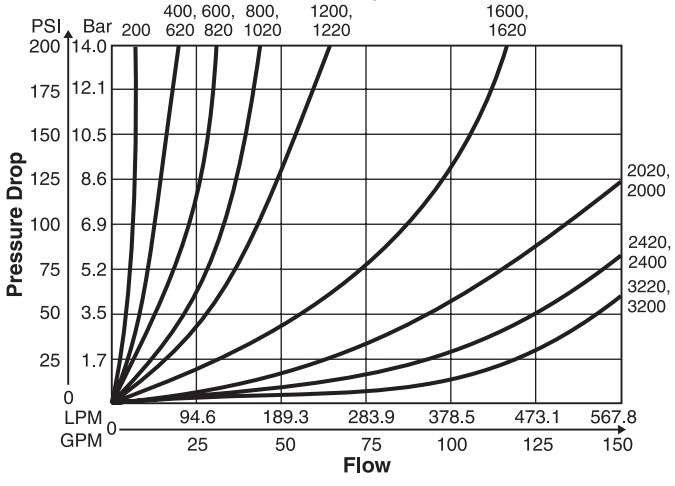


Specifications

Maximum Operating Pressure	Brass:	140 Bar (2000 PSI); except for C1600 brass which is 35 Bar (500 PSI)
	Steel & Stainless Steel:	345 Bar (5000 PSI) for 200 thru 1220; 207 Bar (3000 PSI) for all other sizes and styles
Material	Body	See ordering code
	Spring	316 Stainless Steel
	Poppet	416 Stainless Steel
	Retainer	416 Stainless Steel
	Stainless Steel Bodies	303 Stainless Steel
Poppets	Soft seal poppet is standard for 200 through 800/1020 size. For cracking pressures > 15 PSI, solid metal poppets are standard	
Nominal Cracking Pressure	Standard:	0.4 Bar (5 PSI)
	Optional:	1.38 Bar (20 PSI), 4.48 Bar (65 PSI)
Temperature Range of Seal Compound	-40°C to +121°C (-40°F to +250°F) Nitrile (standard) -26°C to +205°C (-15°F to +400°F) Fluorocarbon	

Performance Curves

Controlled Flow vs. Pressure Drop
Free Flow 0.3 Bar (5 PSI) Cracking
100 SSU, Hydraulic Oil



□ Options — C Series C — □ Size — □ Material — □ Cracking Pressure (nominal) — — □ Seal Compound — Design Series

NOTE: Not required when ordering.

Code	Description
Omit	NPTF/SAE
★ 8	BSPT
★★ 9	BSPP

★ Code 8 can be used with sizes 200, 400, 600, 800, 1200 Steel only

★★ Code 9 can be used with sizes 200, 400, 600, 800, 1200, 1600, 2000, 2400, 3200

Code	Size	Code	Size
200 *	1/8"	1600 *	1"
400 *†	1/4"	1620	#16 SAE
600 *†	3/8"	2000	1 1/4"
620	#6 SAE	2020	#20 SAE
800 *†	1/2"	2400	1 1/2"
820 †	#8 SAE	2420	#24 SAE
1020	#10 SAE	3200	2"
1200 *	3/4"	3220	#32 SAE
1220 *	#12 SAE		

* Sizes available in Brass

† Sizes available in Stainless Steel

Code	Description
B	Brass
S	Steel
SS *	Stainless Steel

Series C Brass Valves can be used for both air and oil service.

* Available in 400, 600, 800 and 820 sizes.

Code	Description
Omit	Standard 0.4 Bar (5 PSI)
20 †	1.38 Bar (20 PSI)
65 †	4.5 Bar (65 PSI)

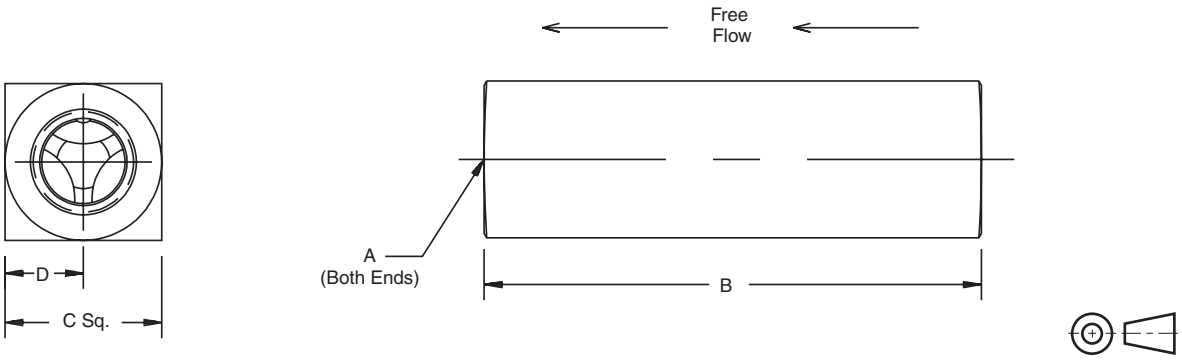
Other cracking pressures available.

† Metal poppet (no seal) on crack pressure >1 Bar (15 PSI).

Code	Description
Omit	Nitrile (Standard)
V	Fluorocarbon (standard on stainless steel)

Model Number	Max Flow LPM (GPM)	Effective Orifice Area Control Flow in.²	Effective Control Flow C_v
C200	11 (3)	0.023	0.53
C400	19 (5)	0.068	1.56
C620	19 (5)	0.068	1.56
C600	30 (8)	0.099	2.27
C820	30 (8)	0.099	2.27
C800	57 (15)	0.224	5.11
C1020	57 (15)	0.224	5.11
C1200	95 (25)	0.348	7.95
C1220	95 (25)	0.348	7.95
C1600	151 (40)	0.453	10.35
C1620	151 (40)	0.453	10.35
C2000	265 (70)	0.855	19.52
C2020	265 (70)	0.855	19.52
C2400	379 (100)	0.955	21.82
C2420	379 (100)	0.955	21.82
C3200	568 (150)	1.046	23.90
C3220	568 (150)	1.046	23.90

Inch equivalents for millimeter dimensions are shown in (**)



Model Number	Weight kg (lbs.)	A	B	C	D
C200	0.05 (0.1)	1/8–27 NPTF	50.8 (2.00)	16.0 (0.63)	7.9. (0.31)
C400	0.2 (0.4)	1/4–18 NPTF	66.8 (2.63)	20.6 (0.81)	10.4 (0.41)
C600	0.2 (0.5)	3/8–18 NPTF	69.9 (2.75)	25.4 (1.00)	12.7 (0.50)
C620	0.2 (0.5)	9/16–18 UNF #6 SAE	79.2 (3.12)	25.4 (1.00)	12.7 (0.50)
C800	0.6 (1.3)	1/2–14 NPTF	87.4 (3.44)	31.8 (1.25)	16.0 (0.63)
C820	0.3 (0.7)	3/4–16 UNF #8 SAE	88.9 (3.50)	28.4 (1.12)	14.2 (0.56)
C1020	0.6 (1.3)	7/8–14 UNF #10 SAE	101.6 (4.00)	31.8 (1.25)	15.7 (0.62)
C1200	0.9 (2.0)	3/4–14 NPTF	98.6 (3.88)	38.1 (1.50)	19.1 (0.75)
C1220	0.9 (2.0)	1 1/6–12 UN #12 SAE	117.3 (4.62)	38.1 (1.50)	19.1 (0.75)
C1600	1.5 (3.3)	1–11 1/2 NPTF	127.0 (5.00)	44.5 (1.75)	22.4 (0.88)
C1620	1.5 (3.3)	1 5/16–12 UN #16 SAE	142.7 (5.62)	57.2 (2.25)	28.4 (1.12)
C2000	2.8 (6.2)	1 1/4–11 1/2 NPTF	143.0 (5.63)	57.2 (2.25)	28.7 (1.13)
C2020	2.8 (6.2)	1 5/8–12 UN #20 SAE	165.1 (6.50)	69.9 (2.75)	35.1 (1.38)
C2400	3.8 (8.4)	1 1/2–11 1/2 NPTF	143.0 (5.63)	69.9 (2.75)	35.1 (1.38)
C2420	3.8 (8.4)	1 7/8–12 UN #24 SAE	184.2 (7.25)	76.2 (3.00)	38.1 (1.50)
C3200	7.0 (15.4)	2–11 1/2 NPTF	165.1 (6.50)	88.9 (3.50)	44.5 (1.75)
C3220	7.0 (15.4)	2 1/2–12 UN #32 SAE	228.6 (9.00)	101.6 (4.00)	50.8 (2.00)

General Description

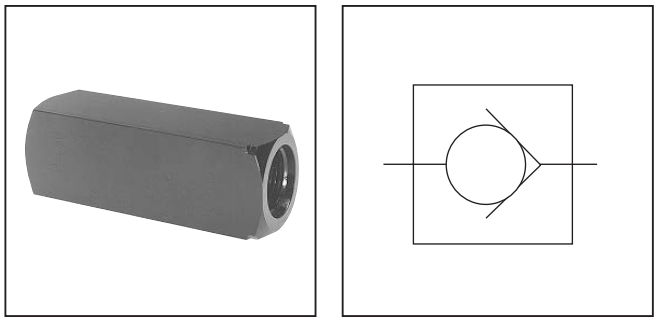
Series 6C check valves provide free flow in one direction and dependable shut-off in the reverse direction.

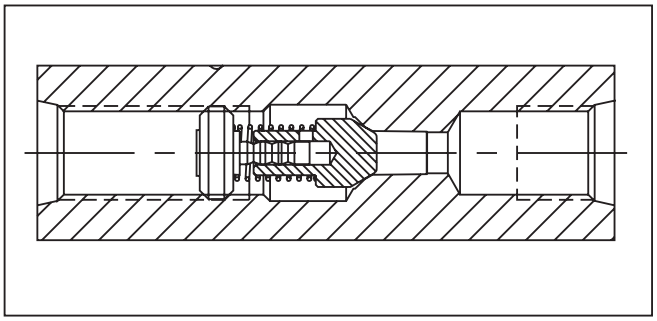
Operation

When pressure going through the valve is increased to the cracking level, the valve opens. When the pressure is reduced to below the cracking level, the valve closes.

Features

- Meets ISO 6149 standards
- Hard metric dimensions.
- Reliable leak-free performance — straight thread port with o-ring sealing.
- Global interchangeablility.



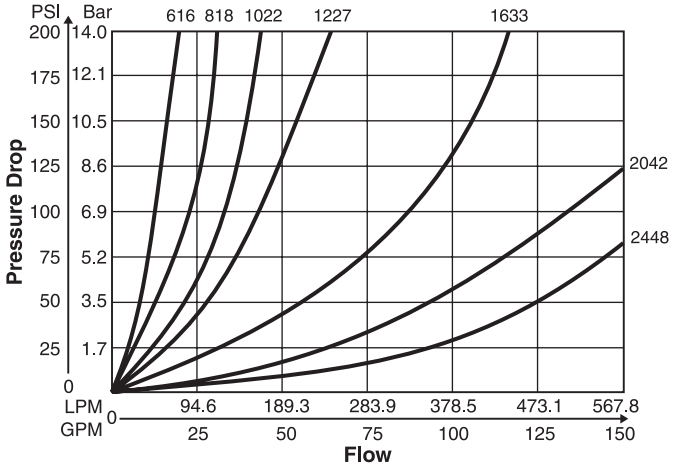


Specifications

Maximum Operating Pressure	345 Bar (5000 PSI)
Maximum Flow	M16 x 1.5 19 LPM (5 GPM) M18 x 1.5 30 LPM (8 GPM) M22 x 1.5 57 LPM (15 GPM) M27 x 2.0 95 LPM (25 GPM) M33 x 2.0 151 LPM (40 GPM) M42 x 2.0 265 LPM (70 GPM) M48 x 2.0 379 LPM (100 GPM)
Cracking Pressure	Standard: 0.3 Bar (5 PSI) Optional: 4.5 Bar (65 PSI)
Material	Body ASTM 12L14 Carbon Steel Poppet ASTM 416 Stainless Steel Retainer ASTM 416 Stainless Steel Spring ASTM 316 Stainless Steel
Temperature Range of Seal Compound	-40°C to +121°C (-40°F to +250°F) Nitrile (Standard) -26°C to +205°C (-15°F to +400°F)Fluorocarbon

Performance Curves

Controlled Flow vs. Pressure Drop
Free Flow 0.3 Bar (5 PSI) Cracking
100 SSU, Hydraulic Oil



Ordering Information

6	C		S	
Ports	Style	Size	Material	Design Series

NOTE: Not required when ordering.

Code	Description
6	ISO 6149 ports

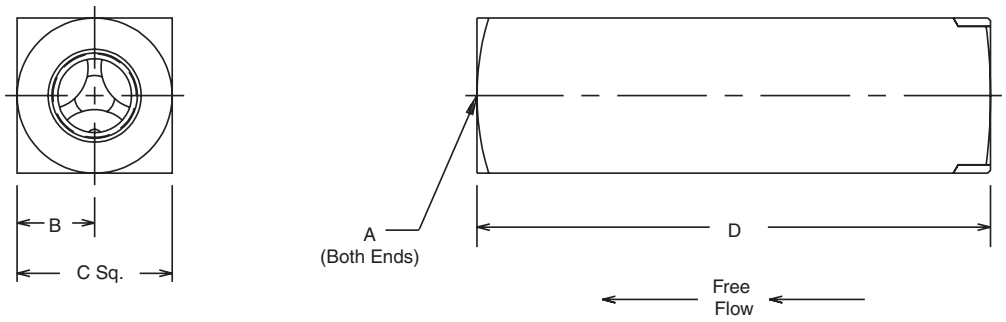
Code	Description
C	Check Valve

Code	Ratio
616	M16 x 1.5
818	M18 x 1.5
1022	M22 x 1.5
1227	M27 x 2.0
1633	M33 x 2.0
2042	M42 x 2.0
2448	M48 x 2.0

Code	Description
S	Steel

Dimensions

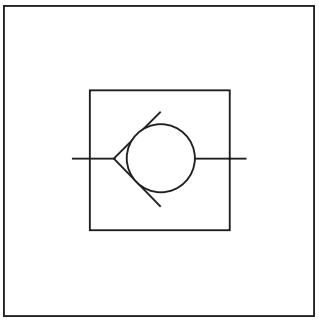
Inch equivalents for millimeter dimensions are shown in (**)



Model Number	Weight kg (lbs.)	A	B	C	D
6C616	0.2 (0.5)	M16 x 1.5	12.7 (0.50)	25.4 (1.00)	79.2 (3.12)
6C818	0.3 (0.7)	M18 x 1.5	14.2 (0.56)	28.4 (1.12)	88.9 (3.50)
6C1022	0.6 (1.3)	M22 x 1.5	15.7 (0.62)	31.8 (1.25)	101.6 (4.00)
6C1227	0.9 (2.0)	M27 x 2.0	19.1 (0.75)	38.1 (1.50)	117.3 (4.62)
6C1633	1.5 (3.3)	M33 x 2.0	22.4 (0.88)	44.5 (1.75)	127.0 (5.00)
6C2042	2.8 (6.2)	M42 x 2.0	28.7 (1.13)	57.2 (2.25)	132.8 (5.23)
6C2448	3.8 (8.4)	M48 x 2.0	35.1 (1.38)	69.9 (2.75)	143.0 (5.63)

General Description

Series VCL check valves operate at free flow in one direction. Reverse flow is blocked.

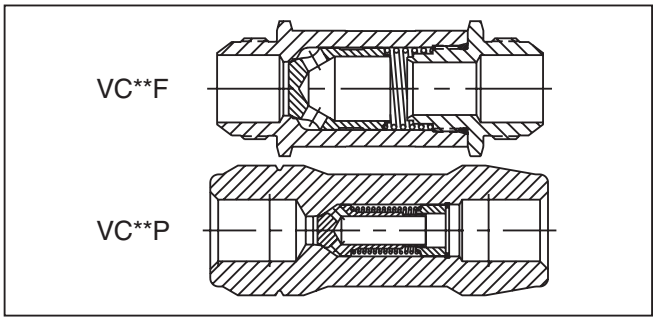


Operation

The spring keeps the poppet closed until the valve reaches the preset pressure. The valve stays open until the pressure goes below the spring setting.

Features

- Poppet spring is isolated from liquid flow stream minimizing turbulence.
- Close tolerance fit between poppet and poppet retainer creates a cushion that protects valve from surge shock damage.



Specifications

Models VCL*P (female pipe to female pipe)

Valve Model	Max. Oper. Press. Bar (PSI)	Material	Rated Flow LPM (GPM)	Cracking Press. ΔP Bar (PSI)	Total ΔP Bar (PSI)	Port Size
VCL4P05	207 (3000)	Steel†	23 (5)	0.3 (5)	0.6 (8.3)	1/4 NPSF
VCL4P65	207 (3000)	Steel†	23 (5)	4.5 (65)	5.0 (72.5)	1/4 NPSF
VCL6P05	207 (3000)	Steel†	30 (8)	0.3 (5)	0.4 (6.0)	3/8 NPSF
VCL6P65	207 (3000)	Steel†	30 (8)	4.5 (65)	4.6 (66.0)	3/8 NPSF
VCL8P05	207 (3000)	Steel†	45 (15)	0.3 (5)	0.5 (7.2)	1/2 NPSF
VCL8P65	207 (3000)	Steel†	45 (15)	4.5 (65)	4.6 (66.0)	1/2 NPSF
VCL12P05	207 (3000)	Steel†	100 (25)	0.3 (5)	0.8 (11.0)	3/4 NPSF
VCL12P65	207 (3000)	Steel†	100 (25)	4.5 (65)	4.6 (67.0)	3/4 NPSF
VCL16P05	207 (3000)	Steel†	133 (35)	0.3 (5)	0.4 (5.3)	1 NPSF
VCL16P65	207 (3000)	Steel†	133 (35)	4.5 (65)	4.6 (66.0)	1 NPSF
VCL20P05	207 (3000)	Steel†	189 (50)	0.3 (5)	1.1 (15.9)	1-1/4 NPSF
VCL20P65	207 (3000)	Steel†	189 (50)	4.5 (65)	5.4 (78.0)	1-1/4 NPSF

† All steel construction with zinc chromate plating.

Models VCL*F (male 37° flare to male 37°)

Valve Model	Max. Oper. Press. Bar (PSI)	Material	Standard Seals	Rated Flow LPM (GPM)	Cracking Press. ΔP Bar (PSI)	Total ΔP Bar (PSI)	Port Size
VCL6F05	207 (3000)	Steel†	Nitrile O-Rings	23 (5)	0.3 (5)	0.6 (8.3)	9/16-18 UNF
VCL6F65	207 (3000)	Steel†	Nitrile O-Rings	23 (5)	4.5 (65)	5.0 (72.5)	(SAE 6)
VCL8F05	207 (3000)	Steel†	Nitrile O-Rings	30 (8)	0.3 (5)	0.4 (6.0)	3/4-16 UNF
VCL8F65	207 (3000)	Steel†	Nitrile O-Rings	30 (8)	4.5 (65)	4.6 (66.0)	(SAE 8)
VCL10F05	207 (3000)	Steel†	Nitrile O-Rings	45 (15)	0.3 (5)	0.5 (7.2)	7/8-14 UNF
VCL10F65	207 (3000)	Steel†	Nitrile O-Rings	45 (15)	4.5 (65)	4.6 (66.0)	(SAE 10)
VCL12F05	207 (3000)	Steel†	Nitrile O-Rings	100 (25)	0.3 (5)	0.8 (11.0)	1 1/16-12 UN
VCL12F65	207 (3000)	Steel†	Nitrile O-Rings	100 (25)	4.5 (65)	4.6 (67.0)	(SAE 12)
VCL16F05	207 (3000)	Steel†	Nitrile O-Rings	133 (35)	0.3 (5)	0.4 (5.3)	1 5/16-12 UN
VCL16F65	207 (3000)	Steel†	Nitrile O-Rings	133 (35)	4.5 (65)	4.6 (66.0)	(SAE 16)
VCL20F05	207 (3000)	Steel†	Nitrile O-Rings	189 (50)	0.3 (5)	1.1 (15.9)	1 5/8-12 UN
VCL20F65	207 (3000)	Steel†	Nitrile O-Rings	189 (50)	4.5 (65)	5.4 (78.0)	(SAE 20)

† All steel construction with zinc chromate plating.

VCL — Series VCL

☐ — Size

Code	Description
4*	1/4"
6	3/8"
8	1/2"
10†	5/8"
12	3/4"
16	1"
20	1 1/4"

* 37° flare (F) not available in size 4.

† NPSF (P) not available in size 10.

☐ — Port Style

Code	Description
F	37° Flare Tube Both Ends
P	NPSF Female Both Ends

☐ — Cracking Pressure

Code	Description
05	0.3 Bar (5 PSI)
65	4.5 Bar (65 PSI)

A

☐ — Seal Compound

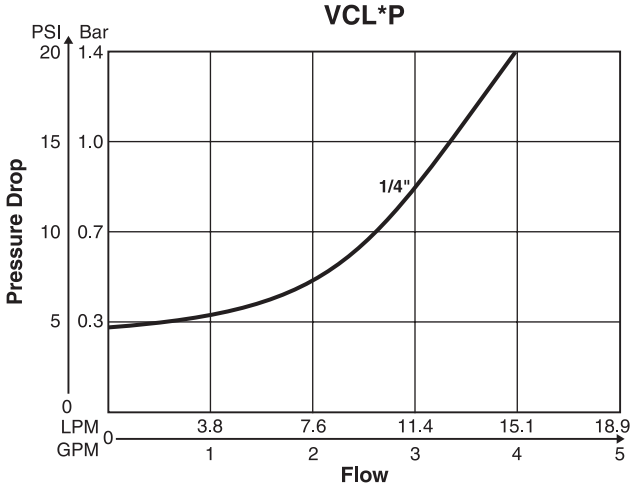
Code	Description
Omit	Nitrile (Standard)
V *	Fluorocarbon

* Only available with "F" port style.

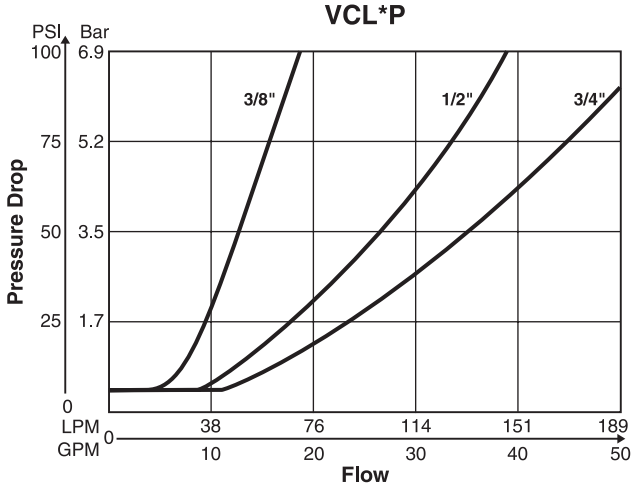
Design Series

NOTE: Not required when ordering.

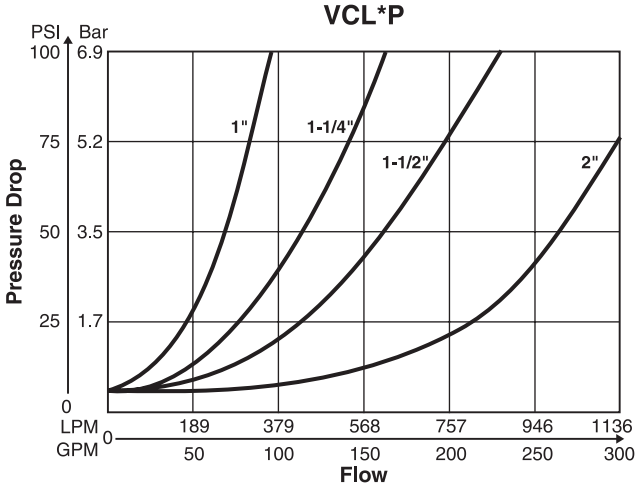
VCL*P



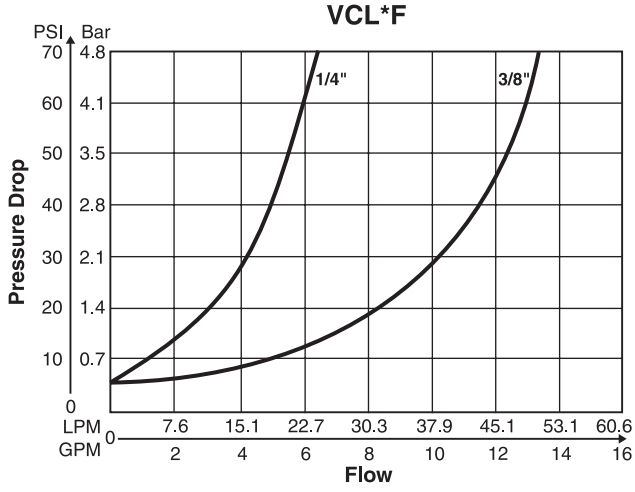
VCL*P



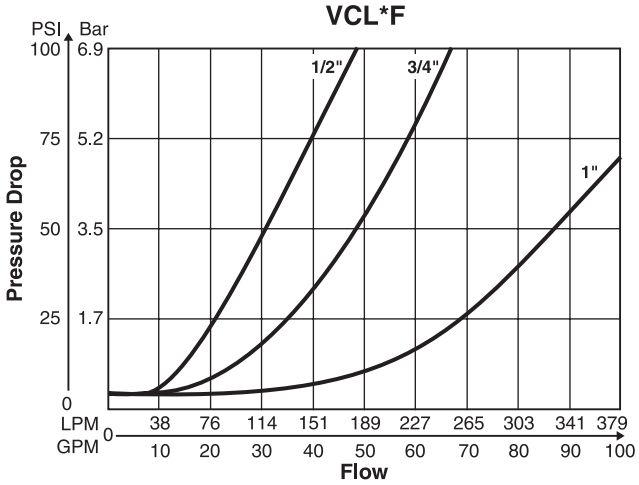
VCL*P



VCL*F



VCL*F



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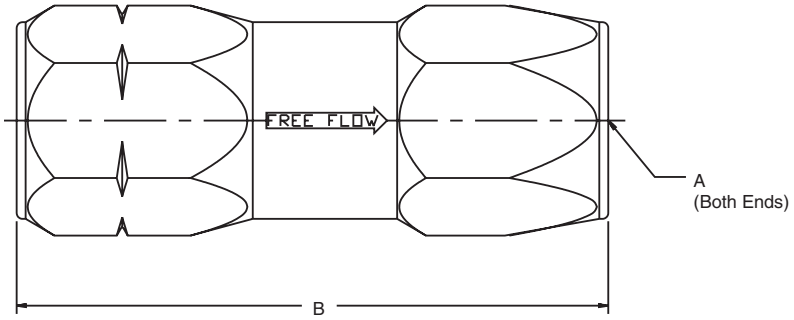
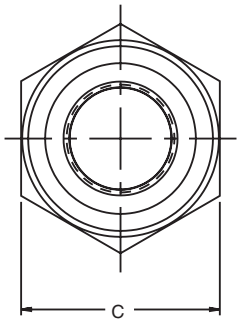
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

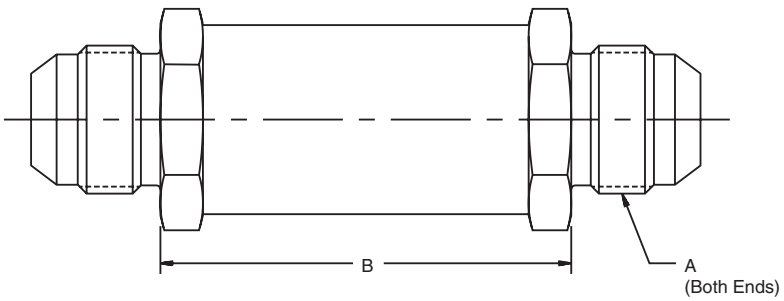
Models VCL*P

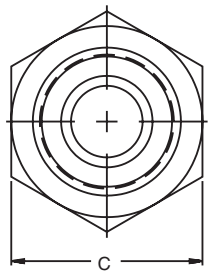




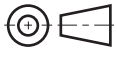
Model Code	Weight kg (lbs.)	A	B	C
VCL4PA**	0.2 (0.4)	1/4-1/8 NPSF	62.0 (2.44)	20.6 (0.81)
VCL6PA**	0.3 (0.7)	3/8-18 NPSF	69.9 (2.75)	22.4 (0.88)
VCL8PA**	0.4 (0.9)	1/2-14 NPSF	88.9 (3.50)	26.9 (1.06)
VCL12PA**	0.5 (1.2)	3/4-14 NPSF	98.6 (3.88)	34.8 (1.37)
VCL16PA**	0.8 (1.8)	1-11 1/2 NPSF	124.0 (4.88)	40.6 (1.60)
VCL20PA**	2.0 (4.3)	1 1/4-11 1/2 NPSF	125.0 (4.94)	50.8 (2.00)

Models VCL*F





Model Code	Weight kg (lbs.)	A	B	C
VCL6FA**	0.2 (0.4)	9/16-18 UNF (SAE 6)	44.5 (1.75)	20.6 (0.81)
VCL8FA**	0.3 (0.7)	3/4-16 UNF (SAE 8)	56.4 (2.22)	25.4 (1.00)
VCL10FA**	0.4 (0.9)	7/8-14 UNF (SAE 10)	61.2 (2.41)	28.4 (1.12)
VCL12FA**	0.5 (1.2)	1 1/16-12 UN (SAE 12)	69.9 (2.75)	35.1 (1.38)
VCL16FA**	0.8 (1.8)	1 15/16-12 UN (SAE 16)	84.1 (3.31)	44.1 (1.62)
VCL20FA**	2.0 (4.3)	1 5/8-12 UN (SAE 20)	84.1 (3.31)	47.8 (1.88)

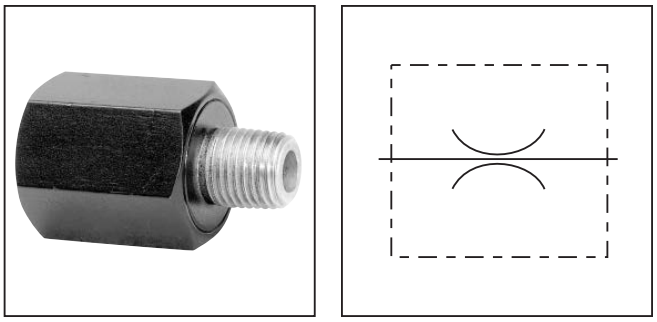


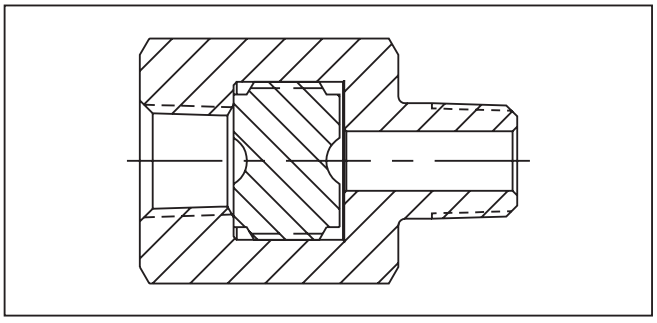
General Description

Series GF valves isolate gages from damage and inaccurate readings caused by line pressure surges and hydraulic hammer.

Operation

The GF uses a capillary orifice to smooth out line pulsations and surges without the use of any moving parts.





Features

- One piece construction.
- The GF requires no adjustment or maintenance.

Specifications

Maximum Operating Pressure	207 Bar (3000 PSI)

Ordering Information

Options	Series	Size	Material	Design Series
☐	GF	☐	S	⌐ ¬ ⌐ ¬

Options

Code	Description
Omit	NPTF/SAE
★9	BSPP

★ Code 9 can be used with size 400

Size

Code	Description
400	1/4"
420	7/16 - 20 UNF (SAE 4)

Material

Code	Description
S	Steel

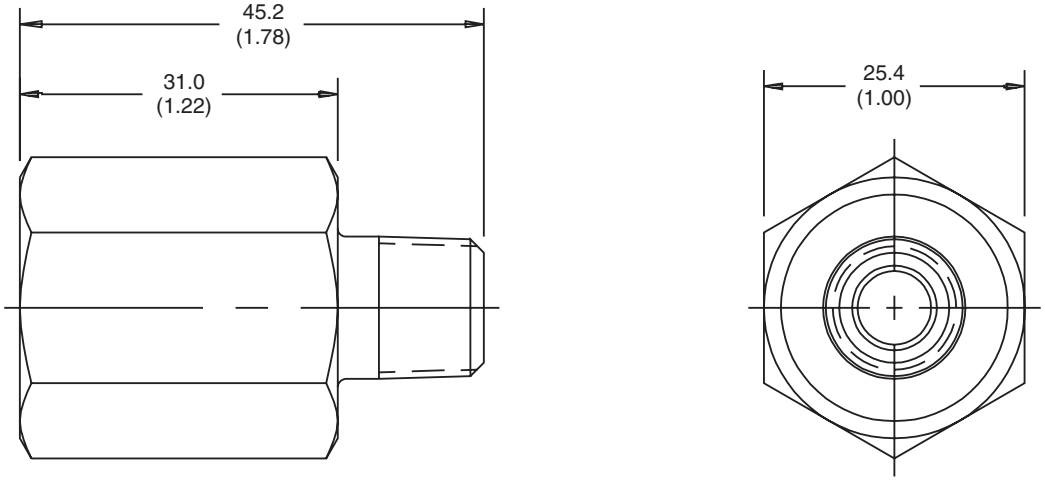
Design Series

NOTE: Not required when ordering.

Weight: 0.6 kg (1.3 lbs.)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

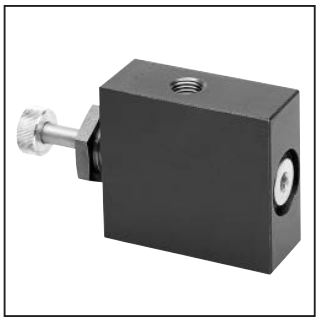


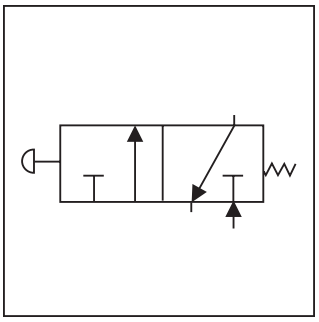
General Description

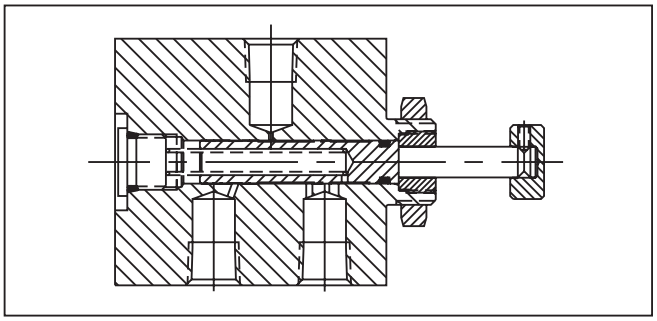
Series GT valves isolate gauges from damage and inaccurate readings caused by line pressure surges and hydraulic hammer.

Operation

The GT has a push-to-read knob that delivers instant pressure to the gauge, yet isolates the gauge from the fluid line until the knob is pressed. When the knob is released, a spring-loaded spool closes instantly and drains all fluid from the gauge back into the reservoir.







Features

- Has a hardened steel spool.
- Partial snubbing action protects the gauge from surge damage.
- Optional panel mount.

Specifications

Maximum Operating Pressure	207 Bar (3000 PSI)
Mounting	In-line

Ordering Information

Options	Series GT	Size	Material	Seal Compound	Design Series
☐	GT	☐	S	☐	⌐ ¬

Code	Description
Omit	NPTF/SAE
★9	BSPP

Code	Description
400	1/4"
420	7/16-20 UNF (SAE 4)

Code	Description
S	Steel

Code	Description
Omit	Nitrile (Std.)
V	Fluorocarbon

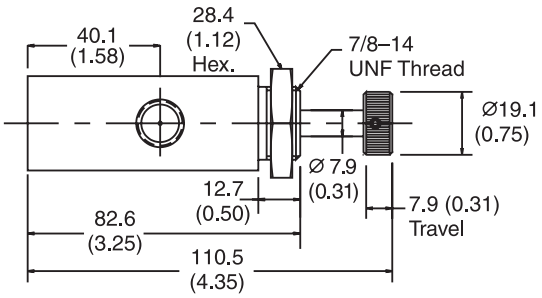
NOTE: Not required when ordering.

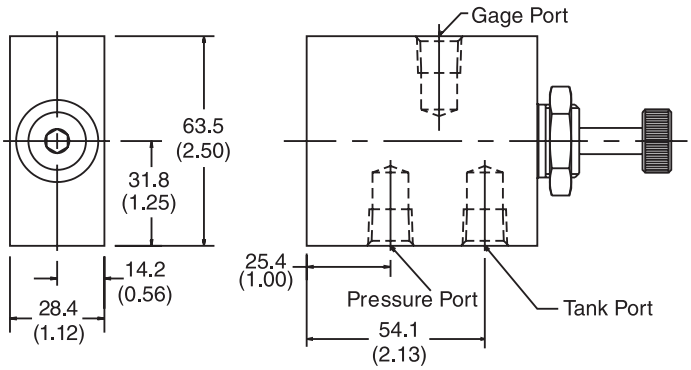
★ Code 9 can be used with size 400

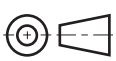
Weight: 1.0 kg (2.2 lbs.)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)







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High Pressure Valves
Low Pressure Valves

Ball Valves

Parker

ENGINEERING YOUR SUCCESS.

General Description

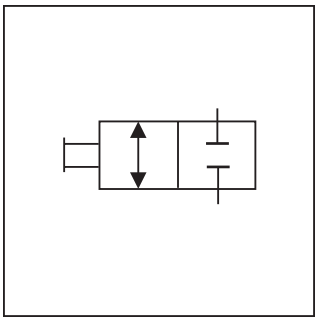
Series BVHP, BVAH, BVHS are 2-way shut-off valves rated at 207 Bar (3000 PSI) and 414 Bar (6000 PSI). A variety of porting options from 1/4" to 2" are available including threaded, SAE 4-bolt flange and split flange.

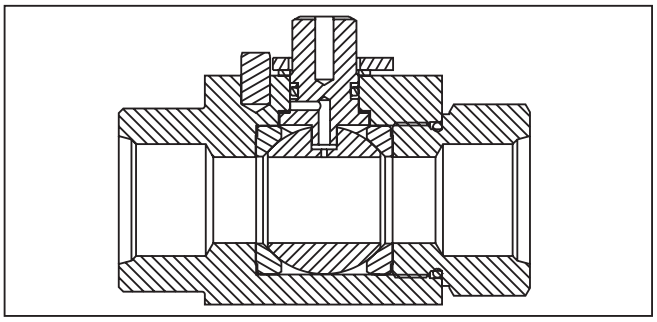
Operation

Parker's 2-way ball valves operate to either off or full flow by rotating the handle 90°. Ball valves are not designed to be a metering or flow control device.

Specifications

Maximum Pressure	BVHP, BVAH steel: 414 Bar (6000 PSI) BVHP16, BVAH stainless steel: 207 Bar (3000 PSI) BVHP04-12, BVHS stainless steel: 414 Bar (6000 PSI)
Body Material	Carbon Steel, Black Oxide Stainless Steel
Ball Material	Steel, Chrome Plated Stainless Steel
Stem Material	Steel, Zinc Plated Stainless Steel
Standard Handle	Steel Offset, Nickel Plated
Standard Ball Seals	Delrin + MoS_2
Standard Shaft Seals	O-Ring & Backup, Nitrile
Temperature Range with Standard Seals	-30°C to +100°C (-22°F to +212°F)

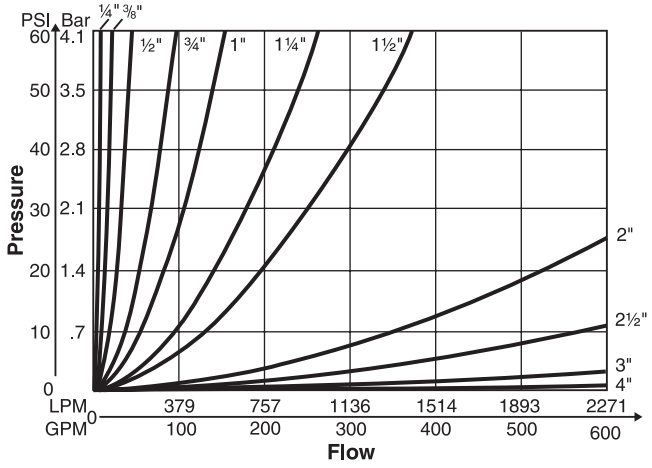




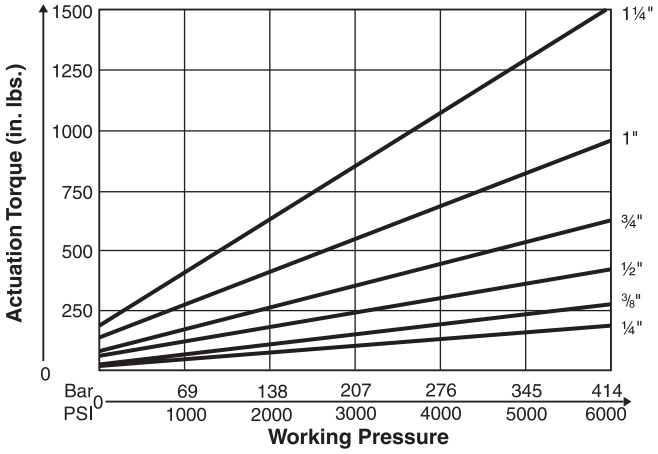
Features

- Thrust bearings and synthetic lubrication in the spindle results in one of the lowest torque requirements in the industry.
- A wide variety of porting options and mounting options make the BVHP, BVAH, BVHS suitable for all mounting applications.
- Delrin seals with molybdenum disulphide (MoS_2) results in lower actuation torque and will increase high duty life cycle expectancy.
- The variety of spindle and ball sealing options makes the BVHP, BVAH, BVHS suitable for most media applications.
- Limit switch (LSB) is NEMA 4 with CSA/UL approval.

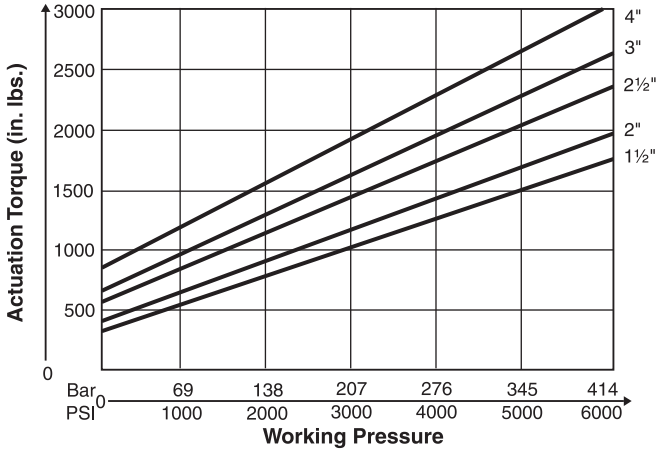
Pressure Drop



Actuation Torque



Actuation Torque



Series*

BVHP
BVAH
BVHS

* See chart below

Size

Code	Size
04	1/4"
06	3/8"
08	1/2"
12	3/4"
16	1"
20	1 1/4"
24	1 1/2"
32	2"

Port

Code	Description
N	NPT Thread
S	SAE Thread
B	BSPP Thread
U	ISO 6149 Thread
*†C	C.61 4-Bolt Flange
*D	C.62 4-Bolt Flange
*†E	C.61 Split Flange
*F	C.62 Split Flange
*†G	C.61 Combo 4B + Split
*H	C.62 Combo 4B + Split

† C.61 Flanges rated to 207 Bar (3000 PSI) with Delrin or Peek seals

* Not available in sizes 1/4" or 3/8"

Body Material

Code	Description
S*	Steel
K*	Stainless Steel

* See chart below

Ball & Stem Material

Code	Description
S	Steel
K	Stainless Steel

Ball Seals

Code	Description
1	Delrin
2 *	PTFE
4 †	Peek

* Valve pressure rating reduced. Consult factory.

† Typically not available with Nitrile. Consult factory.

Shaft Seals

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

Options

Code	Description
Omit	No Options
A	Locking Handle
B	Security Locking Handle
★C	1-Way Limit Switch
★D	2-Way Limit Switch
*E	Panel Mount
G	Flat Non-offset Handle
★**K	1-Way Limit Switch w/Lock
★L	2-Way Limit Switch w/Lock

* Cannot be combined with other options

** Switch is set to indicate valve open condition

★ When selecting this option, your ball valve will come with the limit switch bracket, but does not include the switch. The switch is sold separately (Part #LSB).

Design Series

NOTE: Not required when ordering.

ISO 6149-1 Port Dimensions (inches)

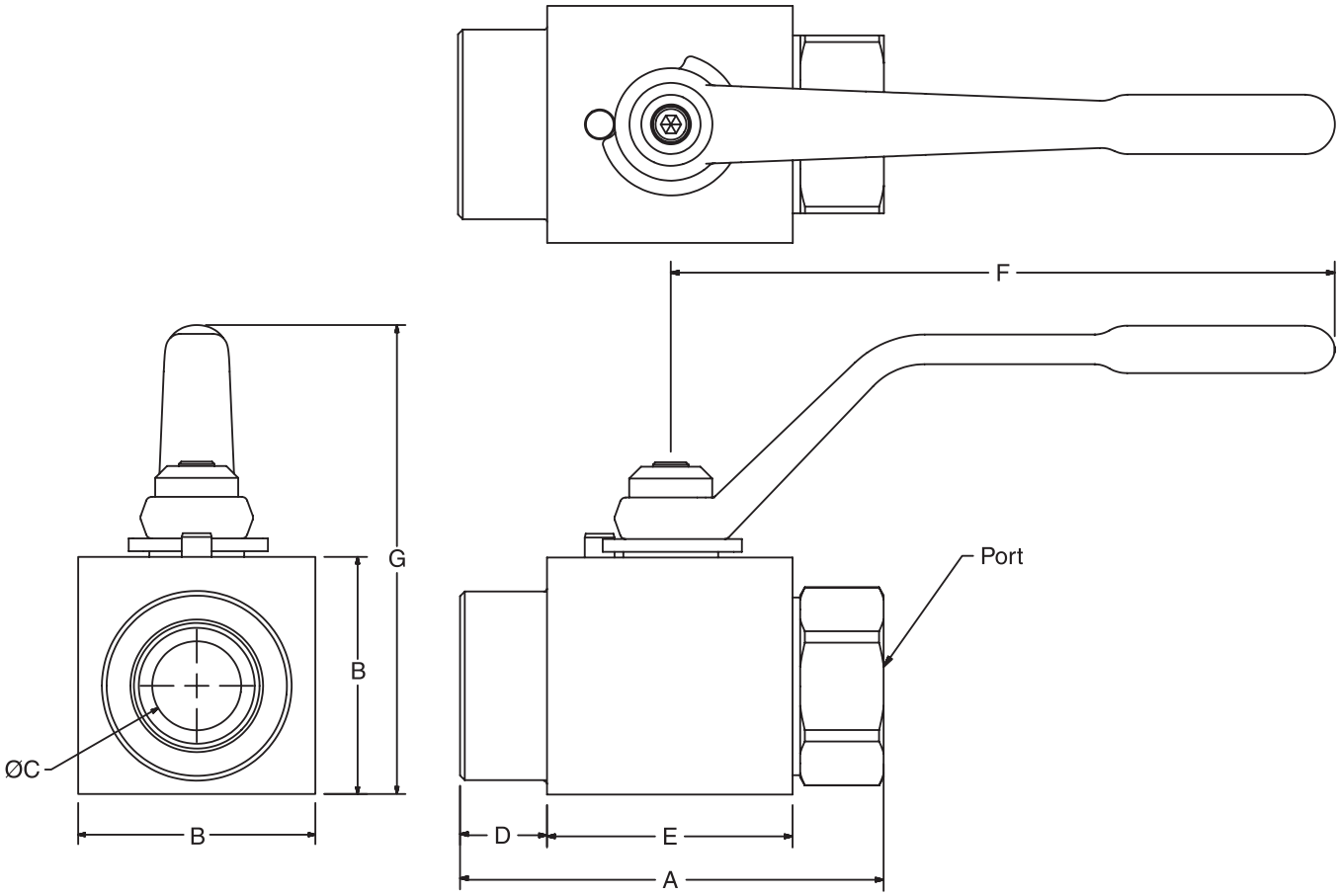
Size	Thread
04	M12 x 1.5
06	M16 x 1.5
08	M18 x 1.5
12	M27 x 2
16	M33 x 2
20	M42 x 2
24	M48 x 2
32	M60 x 2

Weights

Code	Threaded kg (lbs.)	C. 61, 3000 PSI kg (lbs.)	C. 62, 6000 PSI kg (lbs.)
04	0.6 (1.25)	—	—
06	0.7 (1.5)	—	—
08	0.8 (1.75)	0.9 (2.0)	1.3 (2.75)
12	1.9 (4.25)	2.2 (4.75)	2.5 (5.5)
16	2.5 (5.5)	3.2 (7.0)	3.9 (8.5)
20	4.2 (9.25)	5.9 (13.0)	6.8 (15.0)
24	5.2 (11.5)	7.1 (15.7)	8.6 (19.0)
32	8.4 (18.5)	11.8 (24.25)	13.6 (30.0)

	4	6	8	12	16	20	24	32
Steel - 414 Bar (6000 PSI)	BVHP	BVHP	BVHP	BVHP	BVHP	BVAH	BVAH	BVAH
Stainless Steel - 207 Bar (3000 PSI)	X	X	X	X	BVHP	BVAH	BVAH	BVAH
Stainless Steel - 414 Bar (6000 PSI)	BVHP	BVHP	BVHP	BVHP	BVHS	BVHS	BVHS	BVHS

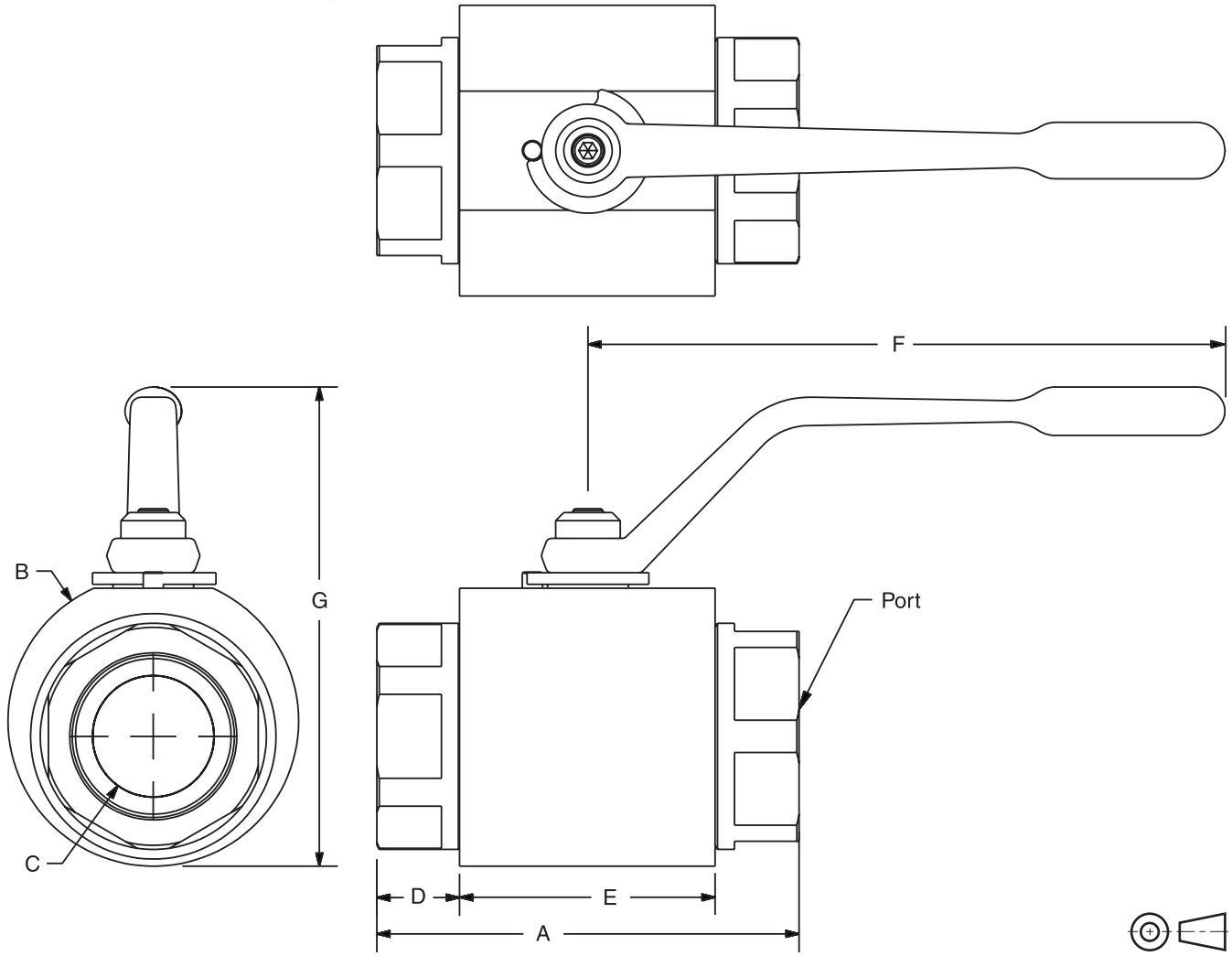
Threaded Ports – BVHP



Code	Port Thread Size	Working Pressure*	Dimensions mm (in)						
			A	B	C	D	E	F	G
BVHP – NPT, SAE, and BSPP									
04	1/4"	414 Bar (6000 PSI)	69.6 (2.74)	35.1 (1.38)	7.9 (0.31)	16.7 (0.66)	35.7 (1.40)	114.3 (4.50)	75.9 (2.99)
06	3/8"	414 Bar (6000 PSI)	72.9 (2.87)	38.1 (1.50)	9.7 (0.38)	14.9 (0.59)	42.4 (1.67)	114.3 (4.50)	79.2 (3.12)
08	1/2"	414 Bar (6000 PSI)	85.3 (3.36)	41.4 (1.63)	12.7 (0.50)	18.5 (0.73)	47.5 (1.87)	114.3 (4.50)	82.6 (3.25)
12	3/4"	414 Bar (6000 PSI)	96.8 (3.81)	57.2 (2.25)	19.1 (0.75)	17.2 (0.68)	61.5 (2.42)	177.8 (7.00)	120.1 (4.73)
16	1"	414 Bar (6000 PSI)	114.6 (4.51)	63.5 (2.50)	23.9 (0.94)	23.9 (0.94)	65.8 (2.59)	177.8 (7.00)	126.5 (4.98)

* BVHP16 in stainless steel is rated to 207 Bar (3000 PSI).

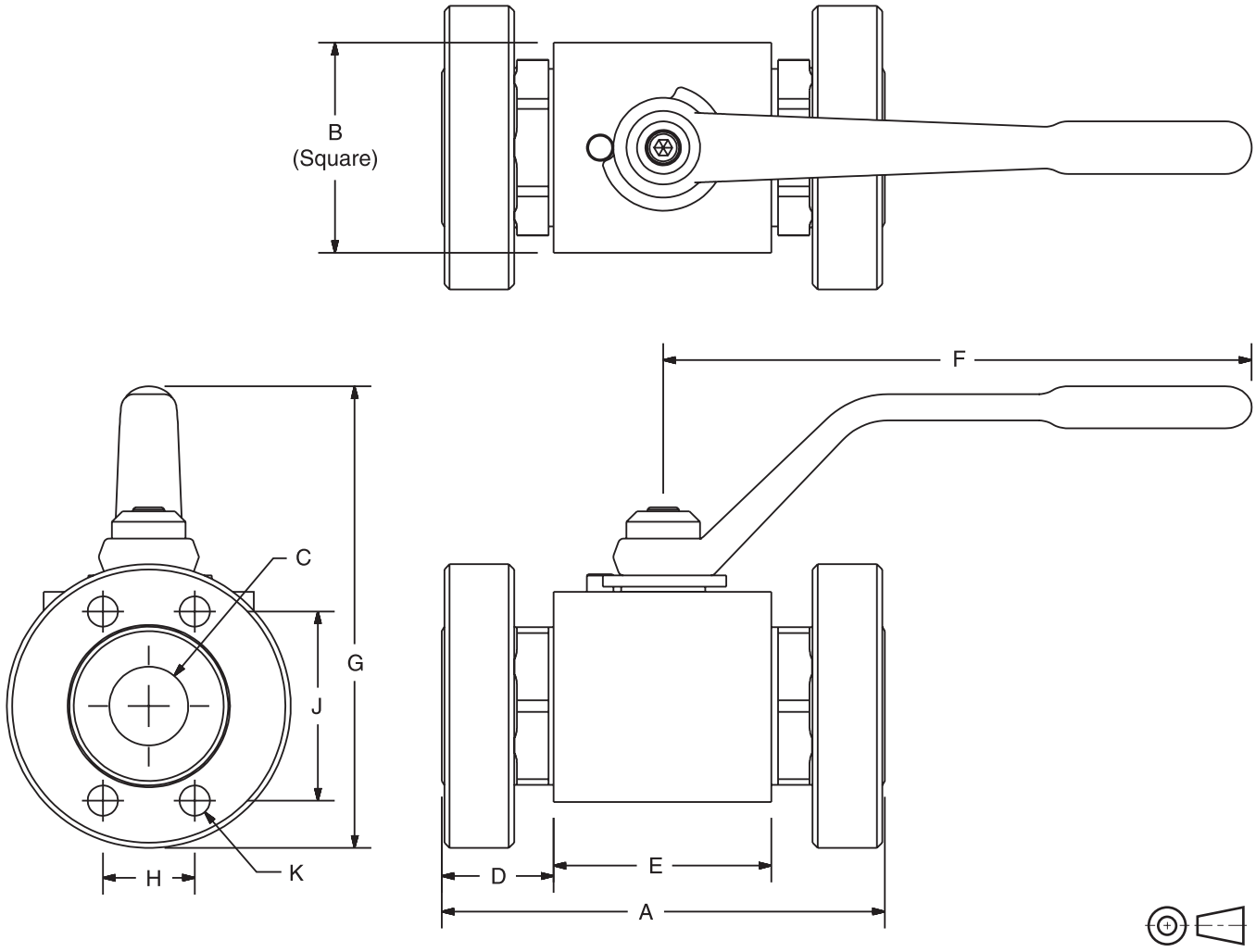
Threaded Ports – BVAH, BVHS



Code	Port Thread Size	Working Pressure*	Dimensions mm (in)						
			A	B	C	D	E	F	G
BVAH – NPT, SAE, and BSPP									
20	1 1/4"	414 Bar (6000 PSI)	122.9 (4.84)	85.9 (3.38)	31.8 (1.25)	21.0 (0.83)	80.5 (3.17)	250.2 (9.85)	163.8 (6.45)
24	1 1/2"	414 Bar (6000 PSI)	135.4 (5.33)	95.3 (3.75)	38.1 (1.50)	24.7 (0.97)	85.5 (3.37)	250.2 (9.85)	173.2 (6.82)
32	2"	414 Bar (6000 PSI)	166.1 (6.54)	114.3 (4.50)	47.8 (1.88)	32.5 (1.28)	100.5 (3.96)	250.2 (9.85)	190.2 (7.49)
BVHS – NPT, SAE, and BSPP									
16	1"	414 Bar (6000 PSI)	123.2 (4.85)	79.5 (3.13)	22.4 (0.88)	12.7 (0.50)	97.3 (3.83)	177.8 (7.00)	132.2 (5.40)
20	1 1/4"	414 Bar (6000 PSI)	123.2 (4.85)	101.6 (4.00)	28.7 (1.13)	12.7 (0.50)	97.3 (3.83)	250.2 (9.85)	177.8 (7.00)
24	1 1/2"	414 Bar (6000 PSI)	138.7 (5.46)	108.0 (4.25)	33.3 (1.31)	16.8 (0.66)	104.5 (4.12)	250.2 (9.85)	186.4 (7.34)
32	2"	414 Bar (6000 PSI)	166.1 (6.54)	127.0 (5.00)	44.5 (1.75)	19.6 (0.77)	126.4 (4.98)	250.2 (9.85)	202.9 (7.99)

* BVAH in stainless steel is rated to 207 Bar (3000 PSI).

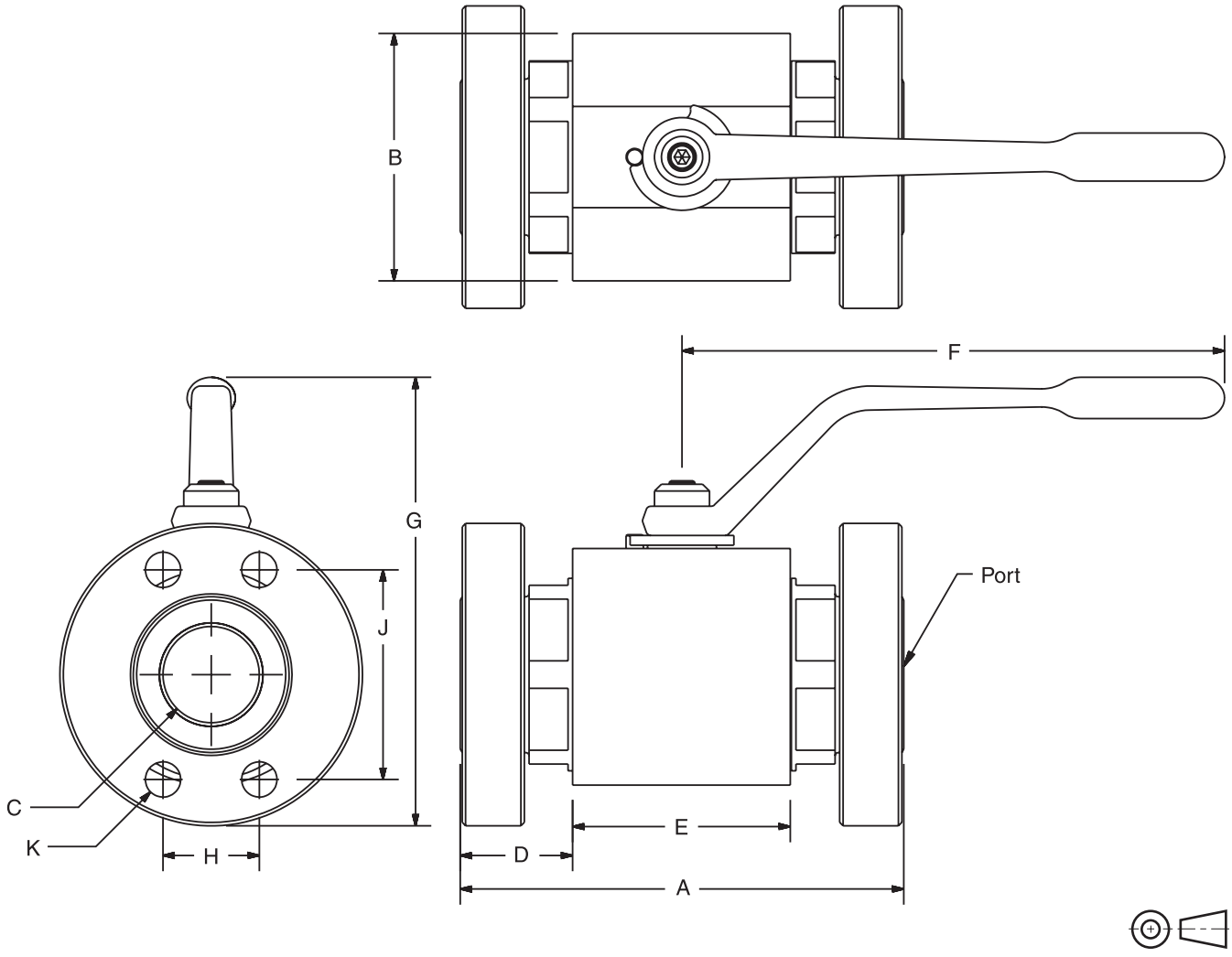
SAE 4-Bolt Flange – BVHP



Code	SAE 4-B Flange Size	Working Pressure*	Dimensions mm (in)									
			A	B	C	D	E	F	G	H	J	K
BVHP – C.61 – SAE 4-Bolt Flange												
08	1/2"	207 Bar (3000 PSI)	108.2 (4.26)	41.4 (1.63)	12.7 (0.50)	30.4 (1.20)	47.5 (1.87)	114.3 (4.50)	91.0 (3.58)	17.5 (0.69)	38.1 (1.50)	5/16"-18
12	3/4"	207 Bar (3000 PSI)	121.2 (4.77)	57.2 (2.25)	19.1 (0.75)	29.8 (1.18)	61.5 (2.42)	177.8 (7.00)	128.9 (5.08)	22.4 (0.88)	47.8 (1.88)	3/8"-16
16	1"	207 Bar (3000 PSI)	133.9 (5.27)	63.5 (2.50)	23.9 (0.94)	34.0 (1.34)	65.8 (2.59)	177.8 (7.00)	135.4 (5.33)	26.2 (1.03)	52.3 (2.06)	3/8"-16
BVHP – C.62 – SAE 4-Bolt Flange												
08	1/2"	414 Bar (6000 PSI)	108.2 (4.26)	41.4 (1.63)	12.7 (0.50)	30.4 (1.20)	47.5 (1.87)	114.3 (4.50)	92.6 (3.65)	18.3 (0.72)	40.4 (1.59)	5/16"-18
12	3/4"	414 Bar (6000 PSI)	121.2 (4.77)	57.2 (2.25)	19.1 (0.75)	29.8 (1.18)	61.5 (2.42)	177.8 (7.00)	129.8 (5.11)	23.9 (0.94)	50.8 (2.00)	3/8"-16
16	1"	414 Bar (6000 PSI)	133.9 (5.27)	63.5 (2.50)	23.9 (0.94)	34.0 (1.34)	65.8 (2.59)	177.8 (7.00)	140.3 (5.52)	27.7 (1.09)	57.2 (2.25)	7/16"-14

* BVHP16 in stainless steel is rated to 207 Bar (3000 PSI).

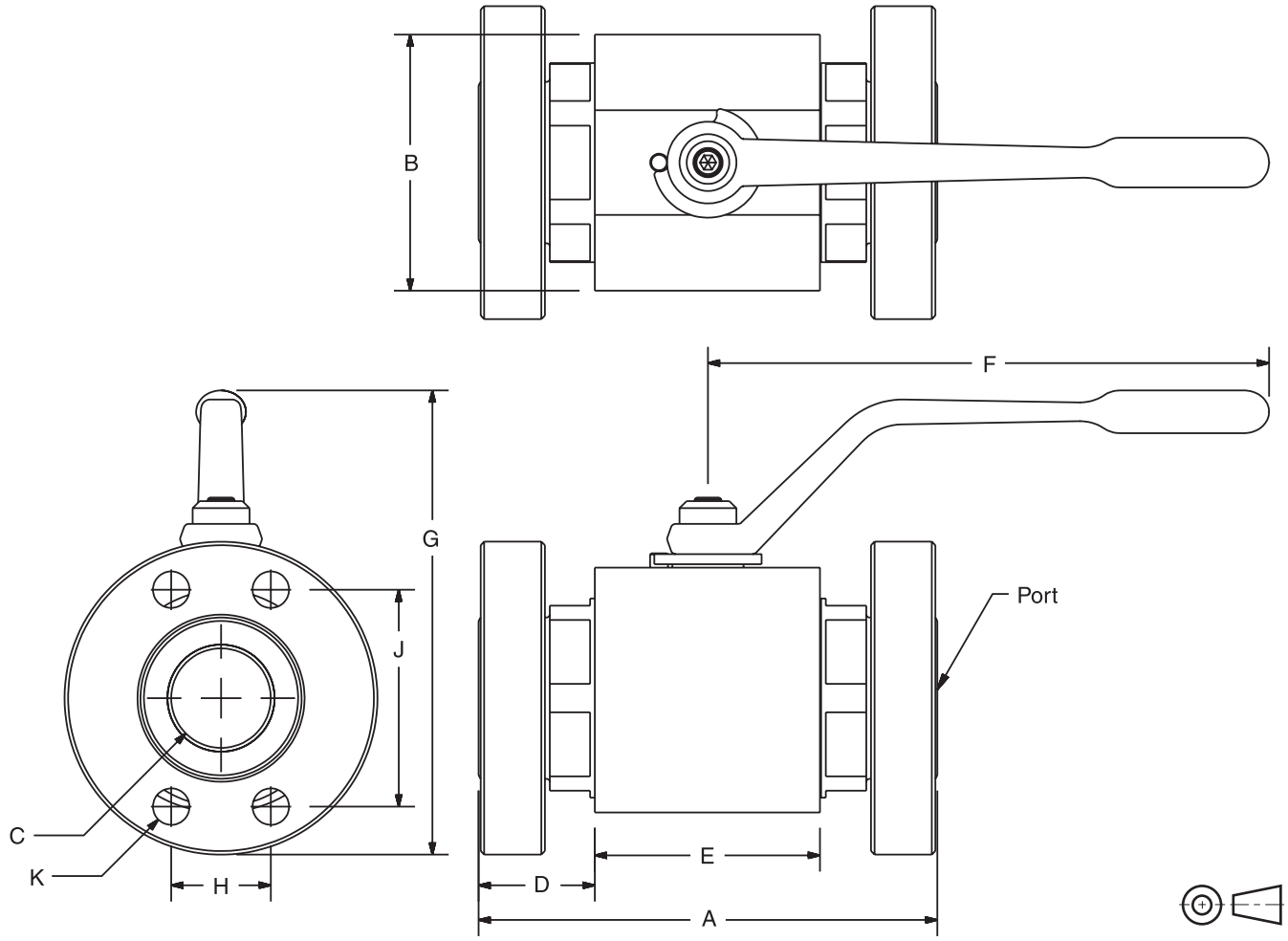
SAE 4-Bolt Flange – BVAH



Code	SAE 4-B Flange Size	Working Pressure*	Dimensions mm (in)									
			A	B	C	D	E	F	G	H	J	K
BVAH – C.61 – SAE 4-Bolt Flange												
20	1 1/4"	207 Bar (3000 PSI)	175.3 (6.90)	85.9 (3.38)	31.8 (1.25)	47.1 (1.86)	80.5 (3.17)	250.2 (9.85)	170.0 (6.69)	30.2 (1.19)	58.7 (2.31)	7/16"-14
24	1 1/2"	207 Bar (3000 PSI)	180.1 (7.09)	95.3 (3.75)	38.1 (1.50)	47.0 (1.85)	85.5 (3.37)	250.2 (9.85)	179.7 (7.07)	35.8 (1.41)	69.9 (2.75)	1/2"-13
32	2"	207 Bar (3000 PSI)	204.7 (8.06)	114.3 (4.50)	47.8 (1.88)	51.8 (2.04)	100.5 (3.96)	250.2 (9.85)	196.6 (7.74)	42.9 (1.69)	77.7 (3.06)	1/2"-13
BVAH – C.62 – SAE 4-Bolt Flange												
20	1 1/4"	414 Bar (6000 PSI)	175.3 (6.90)	85.9 (3.38)	31.8 (1.25)	47.1 (1.86)	80.5 (3.17)	250.2 (9.85)	174.8 (6.88)	31.8 (1.25)	66.8 (2.63)	1/2"-13
24	1 1/2"	414 Bar (6000 PSI)	180.1 (7.09)	95.3 (3.75)	38.1 (1.50)	47.0 (1.85)	85.5 (3.37)	250.2 (9.85)	189.2 (7.45)	36.6 (1.44)	79.2 (3.12)	5/8"-11
32	2"	414 Bar (6000 PSI)	204.7 (8.06)	114.3 (4.50)	47.8 (1.88)	51.8 (2.04)	100.5 (3.96)	250.2 (9.85)	209.3 (8.24)	44.5 (1.75)	96.8 (3.81)	3/4"-10

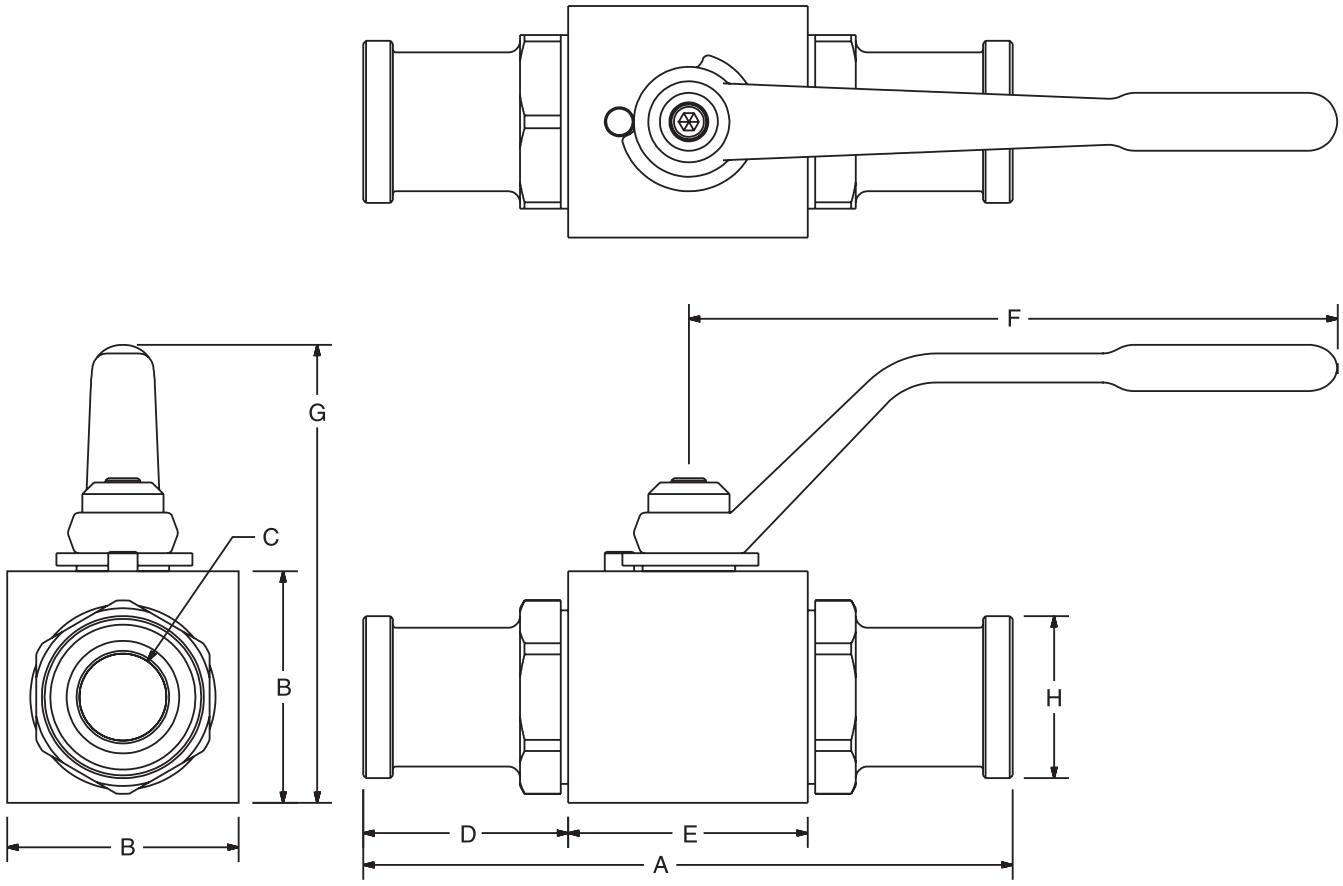
* BVAH in stainless steel is rated to 207 Bar (3000 PSI).

SAE 4-Bolt Flange – BVHS



Code	SAE 4-B Flange Size	Working Pressure	Dimensions mm (in)									
			A	B	C	D	E	F	G	H	J	K
BVHS – C.61 – SAE 4-Bolt Flange												
16	1"	207 Bar (3000 PSI)	134.1 (5.28)	79.5 (3.13)	22.4 (0.88)	18.2 (0.72)	97.3 (3.83)	177.8 (7.00)	137.2 (5.40)	26.2 (1.03)	52.3 (2.06)	3/8"-16
20	1 1/4"	207 Bar (3000 PSI)	175.3 (6.90)	101.6 (4.00)	28.7 (1.13)	38.7 (1.53)	97.3 (3.83)	250.2 (9.85)	177.8 (7.00)	30.1 (1.19)	58.7 (2.31)	7/16"-14
24	1 1/2"	207 Bar (3000 PSI)	180.1 (7.09)	108.0 (4.25)	33.3 (1.31)	37.5 (1.48)	104.5 (4.12)	250.2 (9.85)	186.4 (7.34)	35.7 (1.41)	69.9 (2.75)	1/2"-13
32	2"	207 Bar (3000 PSI)	204.7 (8.06)	127.0 5.00)	44.5 (1.75)	38.9 (1.53)	126.4 (4.98)	250.2 (9.85)	202.9 (7.99)	42.8 (1.69)	77.7 (3.06)	1/2"-13
BVHS – C.62 – SAE 4-Bolt Flange												
16	1"	414 Bar (6000 PSI)	134.1 (5.28)	79.5 (3.13)	22.4 (0.88)	18.2 (0.72)	97.3 (3.83)	177.8 (7.00)	137.2 (5.40)	65.0 (2.56)	57.2 (2.25)	7/16"-14
20	1 1/4"	414 Bar (6000 PSI)	175.3 (6.90)	101.6 (4.00)	28.7 (1.13)	38.7 (1.53)	97.3 (3.83)	250.2 (9.85)	177.8 (7.00)	78.0 (3.07)	66.8 (2.63)	1/2"-13
24	1 1/2"	414 Bar (6000 PSI)	180.1 (7.09)	108.0 (4.25)	33.3 (1.31)	37.5 (1.48)	104.5 (4.12)	250.2 (9.85)	190.5 (7.50)	94.0 (3.70)	79.5 (3.13)	5/8"-11
32	2"	414 Bar (6000 PSI)	204.7 (8.06)	127.0 (5.00)	44.5 (1.75)	38.9 (1.53)	126.4 (4.98)	250.2 (9.85)	209.3 (8.24)	114.0 (4.49)	96.8 (3.81)	3/4"-10

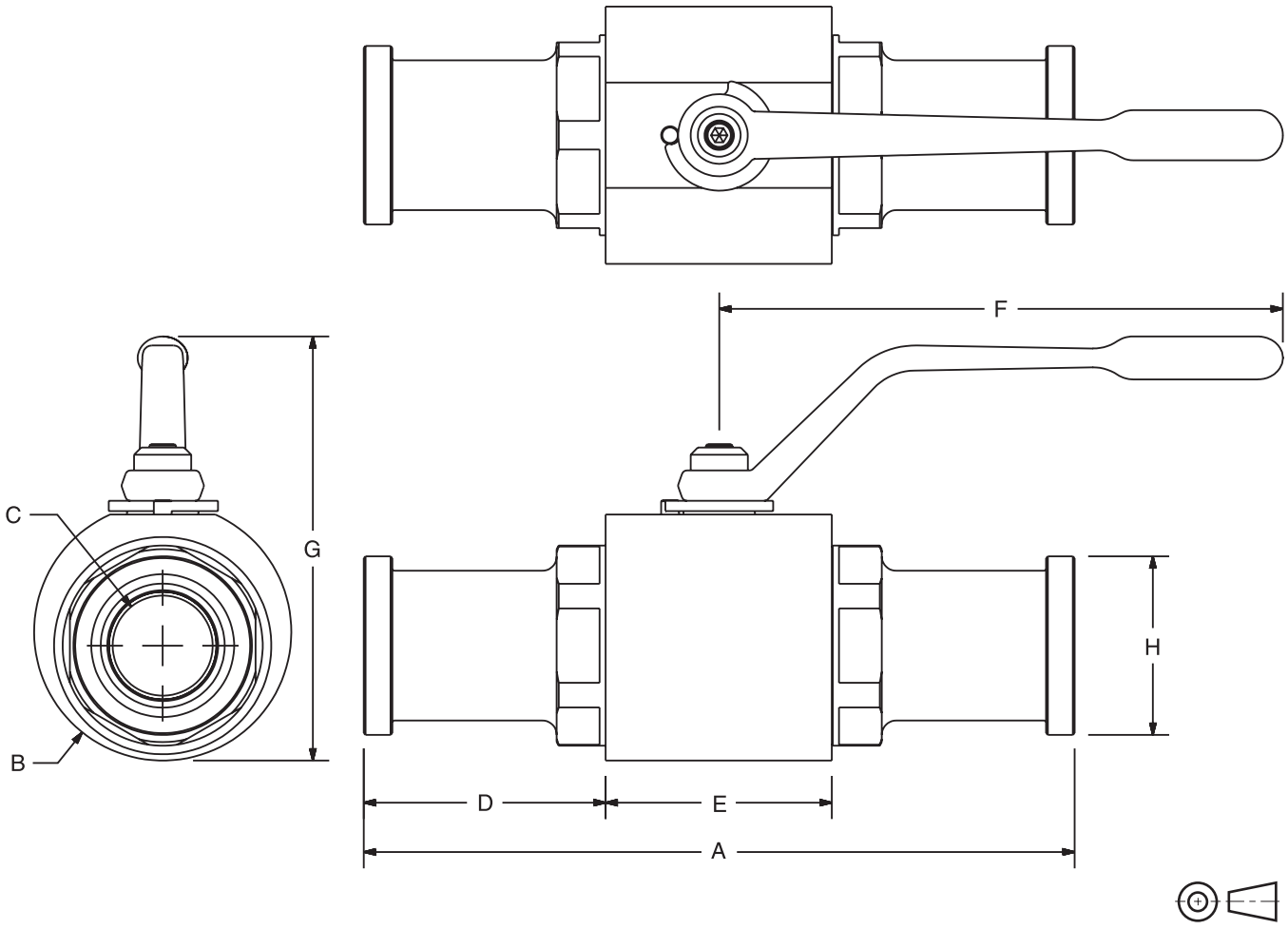
SAE Split Flange – BVHP



Code	Split Flange Size	Working Pressure*	Dimensions mm (in)							
			A	B	C	D	E	F	G	H
BVHP – C.61 – SAE Split Flange										
08	1/2"	207 Bar (3000 PSI)	151.4 (5.96)	41.4 (1.63)	12.7 (0.50)	51.9 (2.05)	47.5 (1.87)	114.3 (4.50)	82.6 (3.25)	30.2 (1.19)
12	3/4"	207 Bar (3000 PSI)	162.1 (6.38)	57.2 (2.25)	19.1 (0.75)	50.3 (1.98)	61.5 (2.42)	177.8 (7.00)	120.1 (4.73)	38.1 (1.50)
16	1"	207 Bar (3000 PSI)	177.5 (6.99)	63.5 (2.50)	23.9 (0.94)	55.9 (2.20)	65.8 (2.59)	177.8 (7.00)	126.5 (4.98)	44.5 (1.75)
BVHP – C.62 – SAE Split Flange										
08	1/2"	414 Bar (6000 PSI)	151.1 (5.95)	41.4 (1.63)	12.7 (0.50)	51.8 (2.04)	47.5 (1.87)	114.3 (4.50)	82.6 (3.25)	31.8 (1.25)
12	3/4"	414 Bar (6000 PSI)	174.2 (6.86)	57.2 (2.25)	19.1 (0.75)	56.4 (2.22)	61.5 (2.42)	177.8 (7.00)	120.1 (4.73)	41.3 (1.63)
16	1"	414 Bar (6000 PSI)	197.9 (7.79)	63.5 (2.50)	23.9 (0.94)	66.0 (2.60)	65.8 (2.59)	177.8 (7.00)	126.5 (4.98)	47.8 (1.88)

* BVHP16 in stainless steel is rated to 207 Bar (3000 PSI).

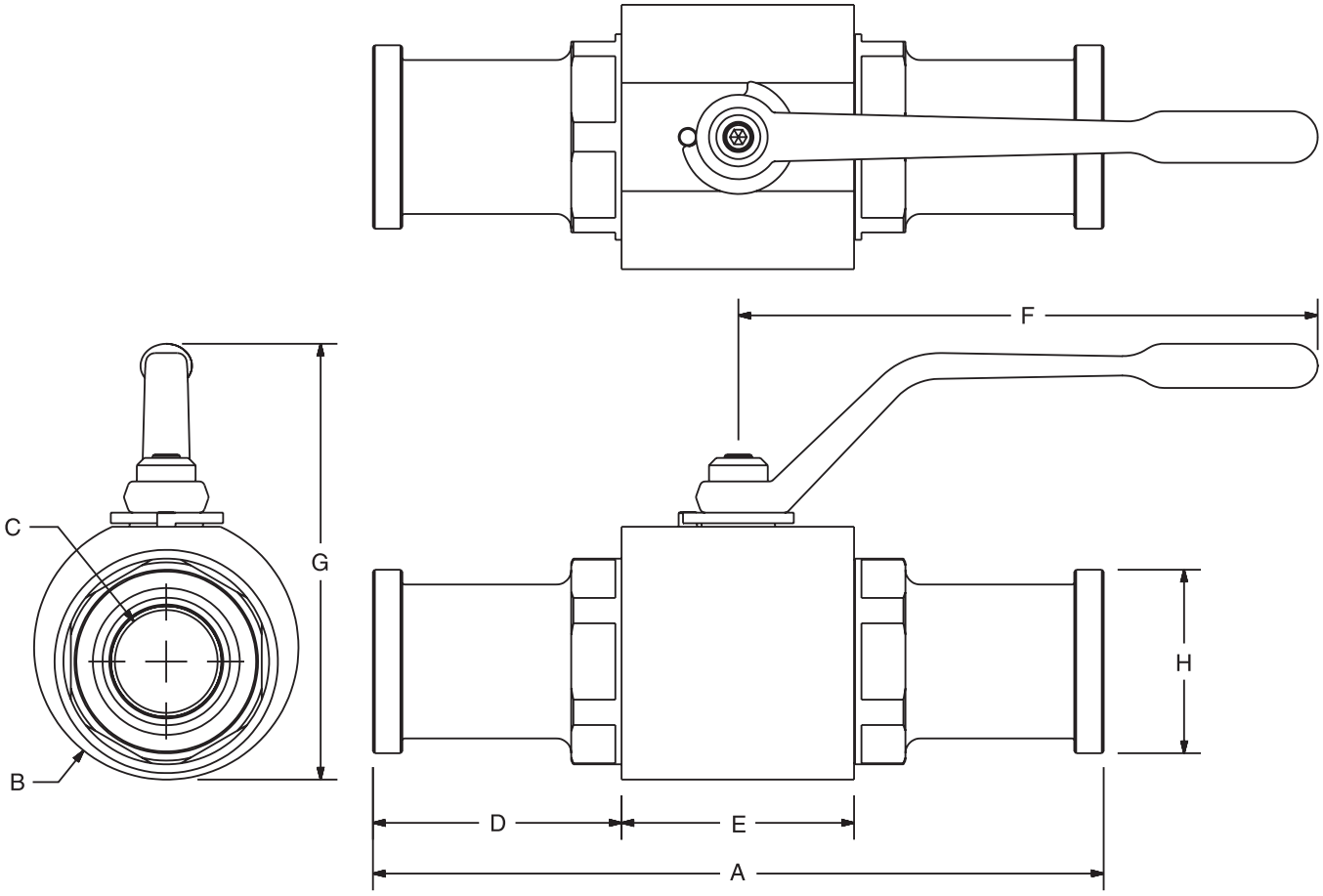
SAE Split Flange – BVAH



Code	Split Flange Size	Working Pressure*	Dimensions mm (in)							
			A	B	C	D	E	F	G	H
BVAH – C.61 – SAE Split Flange										
20	1 1/4"	207 Bar (3000 PSI)	190.5 (7.50)	85.9 (3.38)	31.8 (1.25)	54.8 (2.16)	80.5 (3.17)	250.2 (9.85)	163.8 (6.45)	50.8 (2.00)
24	1 1/2"	207 Bar (3000 PSI)	230.9 (9.09)	95.3 (3.75)	38.1 (1.50)	72.4 (2.85)	85.5 (3.37)	250.2 (9.85)	173.2 (6.82)	60.3 (2.38)
32	2"	207 Bar (3000 PSI)	231.1 (9.10)	114.3 (4.50)	47.8 (1.88)	65.0 (2.56)	100.5 (3.96)	250.2 (9.85)	190.2 (7.49)	71.4 (2.81)
BVAH – C.62 – SAE Split Flange										
20	1 1/4"	414 Bar (6000 PSI)	222.8 (8.77)	85.9 (3.38)	31.8 (1.25)	70.9 (2.79)	80.5 (3.17)	250.2 (9.85)	166.8 (6.45)	54.0 (2.13)
24	1 1/2"	414 Bar (6000 PSI)	280.9 (11.06)	95.3 (3.75)	38.1 (1.50)	97.5 (3.84)	85.5 (3.37)	250.2 (9.85)	173.2 (6.82)	63.5 (2.50)
32	2"	414 Bar (6000 PSI)	316.0 (12.44)	114.3 (4.50)	47.8 (1.88)	107.5 (4.23)	100.5 (3.96)	250.2 (9.85)	190.2 (7.49)	79.4 (3.13)

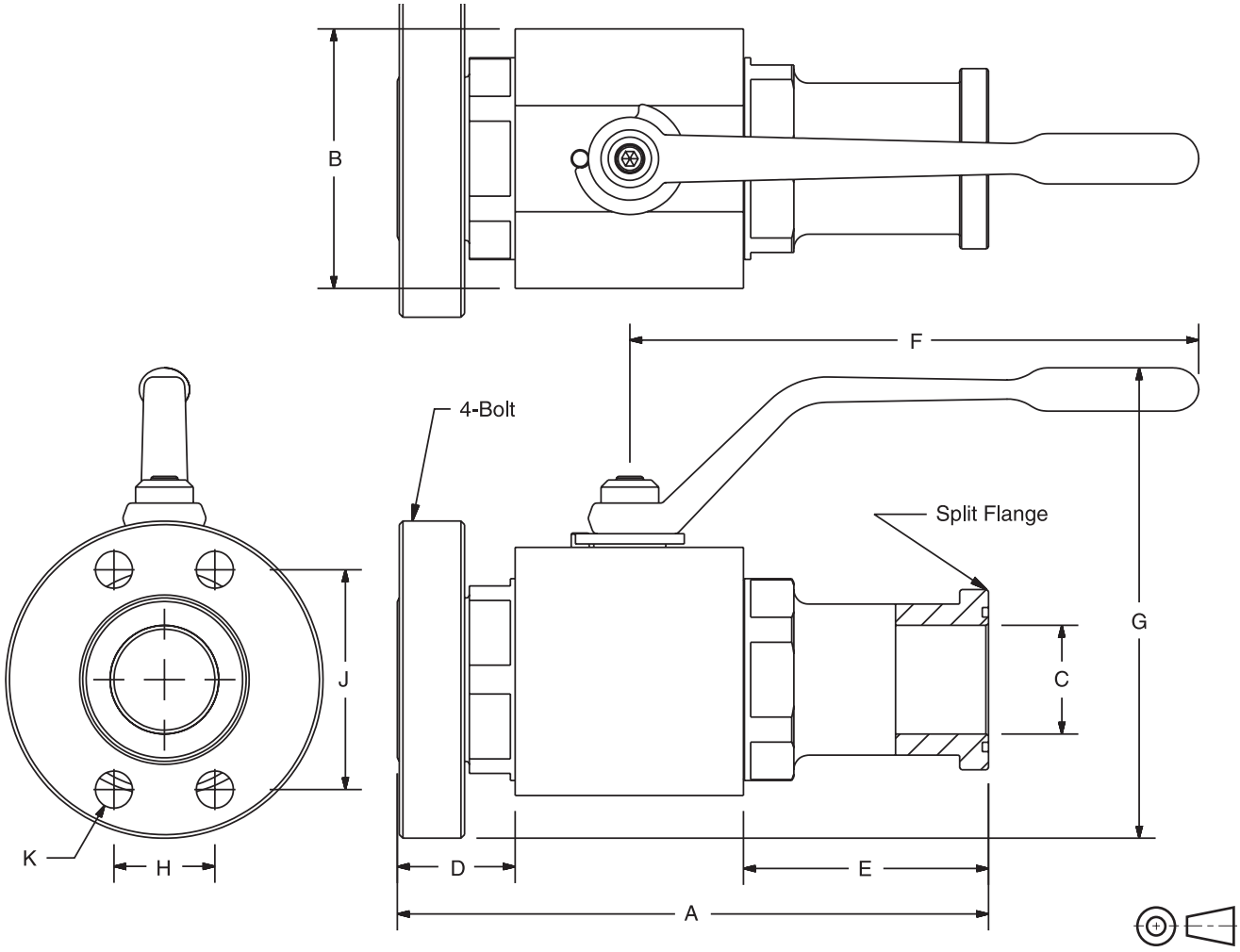
* BVAH in stainless steel is rated to 207 Bar (3000 PSI).

SAE Split Flange – BVHS



Code	Split Flange Size	Working Pressure	Dimensions mm (in)							
			A	B	C	D	E	F	G	H
BVHS – C.61 – SAE Split Flange										
16	1"	207 Bar (3000 PSI)	177.5 (6.99)	79.5 (3.13)	22.4 (0.88)	39.9 (1.57)	97.3 (3.83)	177.8 (7.00)	137.2 (5.40)	44.5 (1.75)
20	1 1/4"	207 Bar (3000 PSI)	190.8 (7.51)	101.6 (4.00)	28.7 (1.13)	46.5 (1.83)	97.3 (3.83)	250.2 (9.85)	177.8 (7.00)	50.8 (2.00)
24	1 1/2"	207 Bar (3000 PSI)	249.9 (9.84)	108.0 (4.25)	33.3 (1.31)	72.4 (2.85)	104.5 (4.12)	250.2 (9.85)	186.4 (7.34)	60.3 (2.38)
32	2"	207 Bar (3000 PSI)	257.0 (10.12)	127.0 (5.00)	44.5 (1.75)	65.0 (2.56)	126.4 (4.98)	250.2 (9.85)	202.9 (7.99)	71.4 (2.81)
BVHS – C.62 – SAE Split Flange										
16	1"	414 Bar (6000 PSI)	197.9 (7.79)	79.5 (3.13)	22.4 (0.88)	50.0 (1.97)	97.3 (3.83)	177.8 (7.00)	137.2 (5.40)	47.8 (1.88)
20	1 1/4"	414 Bar (6000 PSI)	222.8 (8.77)	101.6 (4.00)	28.7 (1.13)	62.5 (2.46)	97.3 (3.83)	250.2 (9.85)	177.8 (7.00)	54.0 (2.13)
24	1 1/2"	414 Bar (6000 PSI)	280.9 (11.06)	108.0 (4.25)	33.3 (1.31)	87.9 (3.46)	104.5 (4.12)	250.2 (9.85)	186.4 (7.34)	63.5 (2.50)
32	2"	414 Bar (6000 PSI)	316.0 (12.44)	127.0 (5.00)	44.5 (1.75)	94.5 (3.72)	126.4 (4.98)	250.2 (9.85)	202.9 (7.99)	79.4 (3.13)

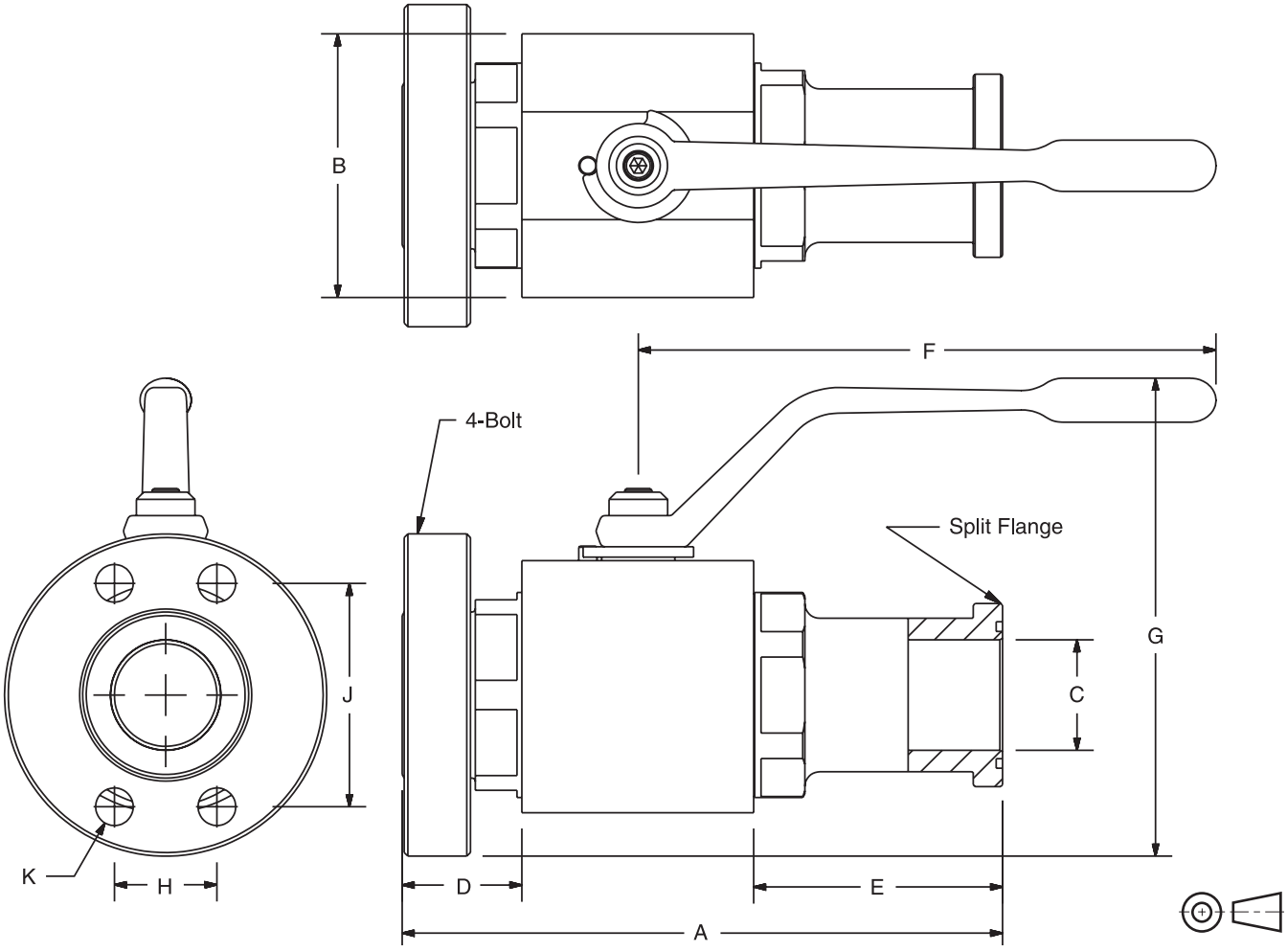
Combination SAE 4-Bolt and SAE Split Flange – BVAH



Code	SAE Flange Size	Working Pressure*	Dimensions mm (in)									
			A	B	C	D	E	F	G	H	J	K
BVAH – C.61 – SAE 4-Bolt and SAE Split Flange Combination												
20	1 1/4"	207 Bar (3000 PSI)	182.9 (7.20)	85.9 (3.38)	31.8 (1.25)	47.6 (1.88)	54.8 (2.16)	250.2 (9.85)	170.0 (6.69)	30.2 (1.19)	58.7 (2.31)	7/16"-14
24	1 1/2"	207 Bar (3000 PSI)	205.5 (8.09)	95.3 (3.75)	38.1 (1.50)	47.5 (1.87)	72.4 (2.85)	250.2 (9.85)	179.7 (7.07)	35.8 (1.41)	69.9 (2.75)	1/2"-13
32	2"	207 Bar (3000 PSI)	217.9 (8.58)	114.3 (4.50)	47.8 (1.88)	52.4 (2.06)	65.0 (2.56)	250.2 (9.85)	196.6 (7.74)	42.9 (1.69)	77.7 (3.06)	1/2"-13
BVAH – C.62 – SAE 4-Bolt and SAE Split Flange Combination												
20	1 1/4"	414 Bar (6000 PSI)	198.9 (7.83)	85.9 (3.38)	31.8 (1.25)	47.6 (1.88)	70.9 (2.79)	250.2 (9.85)	174.8 (6.88)	31.8 (1.25)	66.8 (2.63)	1/2"-13
24	1 1/2"	414 Bar (6000 PSI)	230.6 (9.08)	95.3 (3.75)	38.1 (1.50)	47.5 (1.87)	97.5 (3.84)	250.2 (9.85)	189.2 (7.45)	36.6 (1.44)	79.2 (3.12)	5/8"-11
32	2"	414 Bar (6000 PSI)	260.4 (10.25)	114.3 (4.50)	47.8 (1.88)	52.4 (2.06)	107.4 (4.23)	250.2 (9.85)	209.3 (8.24)	44.5 (1.75)	96.8 (3.81)	3/4"-10

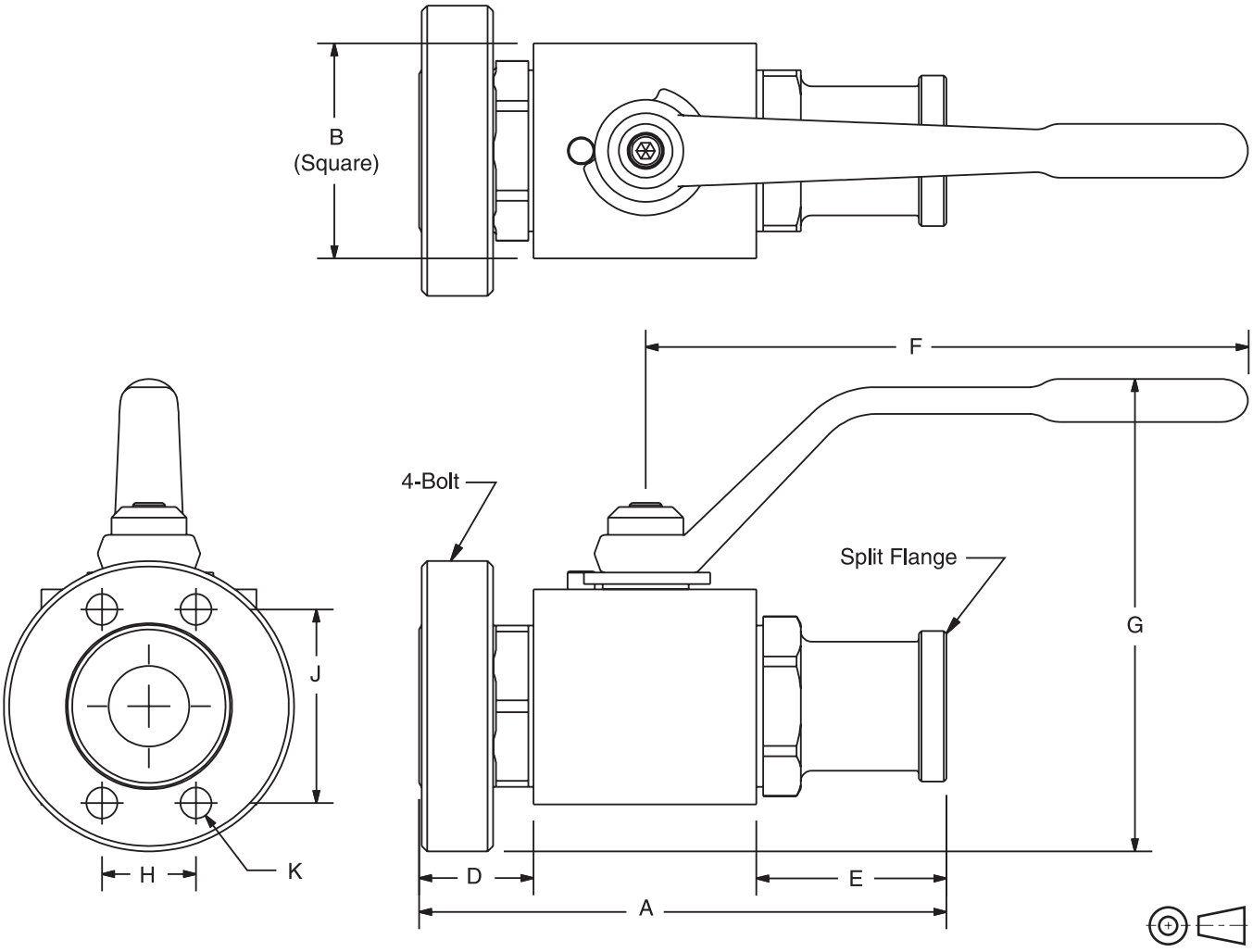
* BVAH in stainless steel is rated to 207 Bar (3000 PSI).

Combination SAE 4-Bolt and SAE Split Flange – BVHS



Code	SAE Flange Size	Working Pressure	Dimensions mm (in)									
			A	B	C	D	E	F	G	H	J	K
BVHS – C.61 – SAE 4-Bolt and SAE Split Flange Combination												
16	1"	207 Bar (3000 PSI)	159.0 (6.26)	79.5 (3.13)	22.4 (0.88)	34.3 (1.35)	52.5 (2.07)	177.8 (7.00)	137.2 (5.40)	26.2 (1.03)	52.3 (2.06)	3/8"-16
20	1 1/4"	207 Bar (3000 PSI)	191.3 (7.53)	101.6 (4.00)	28.7 (1.13)	47.6 (1.88)	46.5 (1.83)	250.2 (9.85)	177.8 (7.00)	30.1 (1.19)	58.7 (2.31)	7/16"-14
24	1 1/2"	207 Bar (3000 PSI)	224.5 (8.84)	108.0 (4.25)	33.3 (1.31)	47.5 (1.87)	72.4 (2.85)	250.2 (9.85)	186.4 (7.34)	35.7 (1.41)	69.9 (2.75)	1/2"-13
32	2"	207 Bar (3000 PSI)	243.8 (9.60)	127.0 (5.00)	44.5 (1.75)	52.4 (2.06)	65.0 (2.56)	250.2 (9.85)	202.9 (7.99)	42.8 (1.69)	77.7 (3.06)	1/2"-13
BVHS – C.62 – SAE 4-Bolt and SAE Split Flange Combination												
16	1"	414 Bar (6000 PSI)	169.2 (6.66)	79.5 (3.13)	22.4 (0.88)	34.3 (1.35)	62.6 (2.47)	177.8 (7.00)	137.2 (5.40)	65.0 (2.56)	57.2 (2.25)	7/16"-14
20	1 1/4"	414 Bar (6000 PSI)	207.3 (8.16)	101.6 (4.00)	28.7 (1.13)	47.6 (1.88)	62.5 (2.46)	250.2 (9.85)	177.8 (7.00)	78.0 (3.07)	66.8 (2.63)	1/2"-13
24	1 1/2"	414 Bar (6000 PSI)	240.0 (9.45)	108.0 (4.25)	33.3 (1.31)	47.5 (1.87)	88.0 (3.47)	250.2 (9.85)	190.5 (7.50)	94.0 (3.70)	79.5 (3.13)	5/8"-13
32	2"	414 Bar (6000 PSI)	273.3 (10.76)	127.0 (5.00)	44.5 (1.75)	52.4 (2.06)	94.5 (3.72)	250.2 (9.85)	209.3 (8.24)	114.0 (4.49)	96.8 (3.81)	3/4"-10

Combination SAE 4-Bolt and SAE Split Flange – BVHP

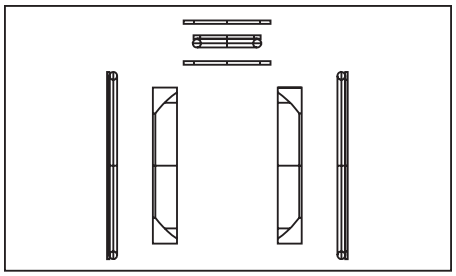


Code	SAE Flange Size	Working Pressure*	Dimensions mm (in)									
			A	B	C	D	E	F	G	H	J	K
BVHP – C.61 – SAE 4-Bolt and SAE Split Flange Combination												
08	1/2"	207 Bar (3000 PSI)	129.8 (5.11)	41.4 (1.63)	12.7 (0.50)	30.1 (1.19)	52.2 (2.06)	114.3 (4.50)	91.0 (3.58)	17.5 (0.69)	38.1 (1.50)	5/16"-18
12	3/4"	207 Bar (3000 PSI)	141.7 (5.58)	57.2 (2.25)	19.1 (0.75)	29.6 (1.17)	50.5 (1.99)	177.8 (7.00)	128.9 (5.08)	22.4 (0.88)	47.6 (1.88)	3/8"-16
16	1"	207 Bar (3000 PSI)	152.4 (6.00)	63.5 (2.50)	23.9 (0.94)	33.8 (1.33)	56.0 (2.21)	177.8 (7.00)	135.4 (5.33)	26.2 (1.03)	52.3 (2.06)	3/8"-16
BVHP – C.62 – SAE 4-Bolt and SAE Split Flange Combination												
08	1/2"	414 Bar (6000 PSI)	129.8 (5.11)	41.4 (1.63)	12.7 (0.50)	30.1 (1.19)	52.1 (2.05)	114.3 (4.50)	92.6 (3.65)	18.3 (0.72)	40.4 (1.59)	5/16"-18
12	3/4"	414 Bar (6000 PSI)	147.8 (5.82)	57.2 (2.25)	19.1 (0.75)	29.6 (1.17)	56.6 (2.23)	177.8 (7.00)	129.8 (5.11)	23.9 (0.94)	50.8 (2.00)	3/8"-16
16	1"	414 Bar (6000 PSI)	165.9 (6.53)	63.5 (2.50)	23.9 (0.94)	33.8 (1.33)	66.3 (2.61)	177.8 (7.00)	140.3 (5.52)	27.7 (1.09)	57.2 (2.25)	7/16"-14

* BVHP16 in stainless steel is rated to 207 Bar (3000 PSI).

Ball Valve Seal Kits restore a ball valve to factory specifications, providing no erosion or metal-to-metal wear has taken place.

The Seal Kit includes all the o-rings, ball seals and thrust bearings that were originally installed at the factory.



Ordering Information

SK — Accessory

Code	Description
SK	Seal Kit

Series

Code	Description
BVHP16, BVAH	Stainless Steel - 3000 PSI
BVHP, BVAH	Steel - 6000 PSI
BVHP04-12, BVHS	Stainless Steel - 6000 PSI

Size

Code	Size
04	1/4"
06	3/8"
08	1/2"
12	3/4"
16	1"
20	1 1/4"
24	1 1/2"
32	2"

Ball Seals

Code	Description
1	Delrin
2 *	PTFE
4 †	Peek

* Valve pressure rating reduced. Consult factory.

† Typically not available with Nitrile. Consult factory.

Shaft Seals

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

Design Series

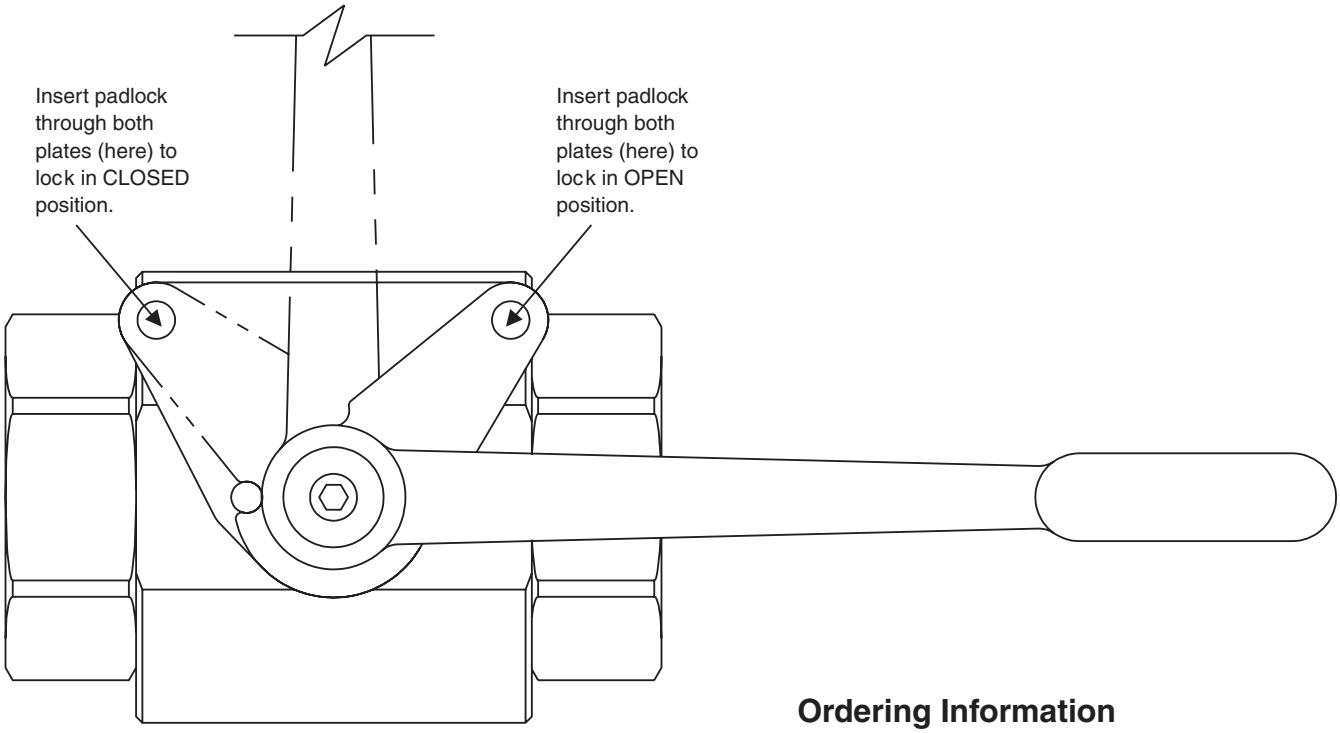
NOTE: Not required when ordering.

Replacement Handles Standard Steel Offset

Series	Part Number
BVHP04	BVH-HS1
BVHP06	BVH-HS1
BVHP08	BVH-HS1
BVHP12	BVH-HS2
BVHP16	BVH-HS2
BVHS16	BVH-HS2
BVAH20	BVH-HS3
BVHS20	BVH-HS3
BVAH24	BVH-HS3
BVHS24	BVH-HS3
BVAH32	BVH-HS3
BVHS32	BVH-HS3

	4	6	8	12	16	20	24	32
Steel - 414 Bar (6000 PSI)	BVHP	BVHP	BVHP	BVHP	BVHP	BVAH	BVAH	BVAH
Stainless Steel - 207 Bar (3000 PSI)	X	X	X	X	BVHP	BVAH	BVAH	BVAH
Stainless Steel - 414 Bar (6000 PSI)	BVHP	BVHP	BVHP	BVHP	BVHS	BVHS	BVHS	BVHS

BVHPLK: Standard Series 'BVHPLK-*' kit replaces the stopwasher with a stationary and moving plate, as illustrated below. As the handle is actuated, the moving plate aligns with one of the two locking positions in the stationary plate, enabling the valve to be locked in either **fully closed** or **fully open** position.



Ordering Information

BVHP, BVAH, BVHS Code	Size	Standard Locking (Part Number)
04	1/4"	BVHPLK-1
06	3/8"	BVHPLK-1
08	1/2"	BVHPLK-1
12	3/4"	BVHPLK-2
16	1"	BVHPLK-2
20	1 1/4"	BVHPLK-3
24	1 1/2"	BVHPLK-3
32	2"	BVHPLK-3

General Description

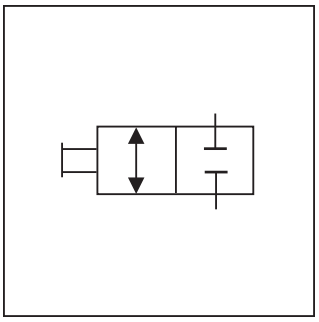
Series BVHH valves are used for shut-off applications and are rated at 690 Bar (10,000 PSI). These valves represent the strongest ball valve in the industry. Series BVHH valves come in ports 1/2" to 2" and SAE, NPT and BSPP ports.

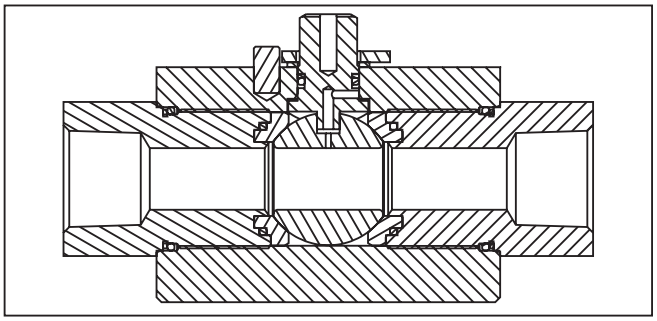
Operation

Parker's 2-way ball valves operate to either off or full flow by rotating the handle 90°. Ball valves are not designed to be a metering or flow control device.

Specifications

Maximum Pressure	690 Bar (10,000 PSI)
Body Material	Carbon Steel, Black Oxide
Ball Material	Steel, Chrome Plated Stainless Steel
Stem Material	Steel, Zinc Plated Stainless Steel
Standard Handle	Steel Offset, Nickel Plated
Standard Ball Seals	Delrin + MoS_2
Standard Shaft Seals	O-Ring & Backup, Nitrile
Temperature Range with Standard Seals	-30°C to +100°C (-22°F to +212°F)



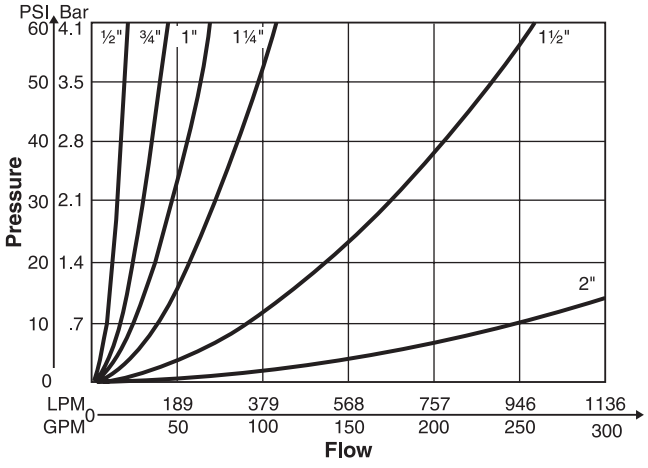


Features

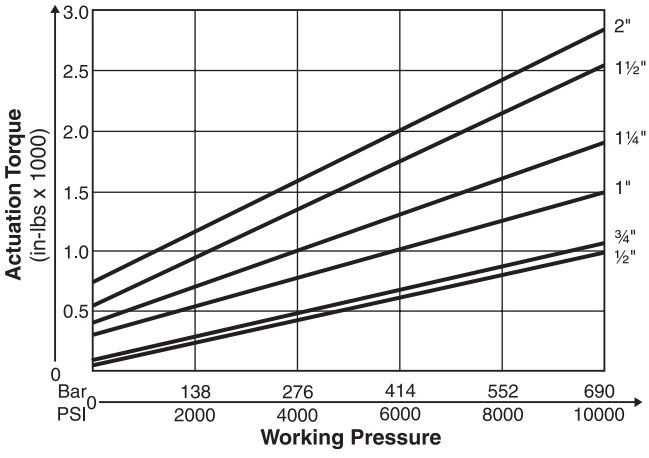
- Encased Delrin moly ball seals increase the reliability compared to ring reinforcement designs.
- The BVHH is fully ported resulting in very low pressure drop.
- Nitrile seals are standard with fluorocarbon and EPR as options.
- The BVHH is available with options found in the 404 Bar (6000 PSI) models.

Performance Curves

Pressure Drop



Actuation Torque



BVHH Series | Size | Port | **S** Body Material | Ball & Stem Material | Ball Seals | Shaft Seals | Options | Design Series

NOTE: Not required when ordering.

Code	Size
08	1/2"
12	3/4"
16	1"
20	1 1/4"
24	1 1/2"
32	2"

Code	Description
N	NPT Thread
S	SAE Thread
B	BSPP Thread

Code	Description
S	Steel

Code	Description
S	Steel
K	Stainless Steel

Code	Description
1	Delrin
4 †	Peek

† Typically not available with Nitrile. Consult factory.

Code	Desciption
N	Nitrile
V	Fluorocarbon
E	EPR

Code	Description
Omit	No Options
A	Locking Handle
B	Security Locking Handle
★C	1-Way Limit Switch
★D	2-Way Limit Switch
*E	Panel Mount
G	Flat Non-offset Handle
★**K	1-Way Limit Switch w/Lock
★L	2-Way Limit Switch w/Lock

* Cannot be combined with other options

** Switch is set to indicate valve open condition

★ When selecting this option, your ball valve will come with the limit switch bracket, but does not include the switch. The switch is sold separately (Part #LSB)

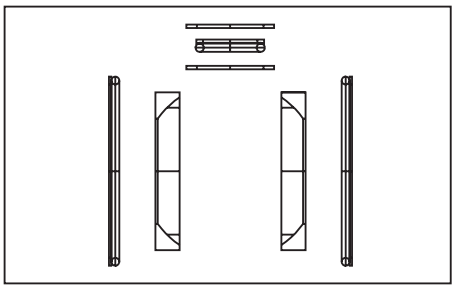
Weights

Code	kg (lbs.)
08	1.6 (3.5)
12	2.0 (4.5)
16	3.2 (7.0)
20	7.9 (17.5)
24	8.7 (19.25)
32	9.8 (21.5)

Seal Kit Accessories

Ball Valve Seal Kits restore a ball valve to factory specifications, providing no erosion or metal-to-metal wear has taken place.

The Seal Kit includes all the o-rings, ball seals and thrust bearings that were originally installed at the factory. A sketch of these parts is provided at the right.



Ordering Information

SK Accessory | **BVHH** Series | Size | Ball Seals | Shaft Seals | Design Series

NOTE: Not required when ordering.

Code	Description
SK	Seal Kit

Code	Size
08	1/2"
12	3/4"
16	1"
20	1 1/4"
24	1 1/2"
32	2"

Code	Description
1	Delrin
4 †	Peek

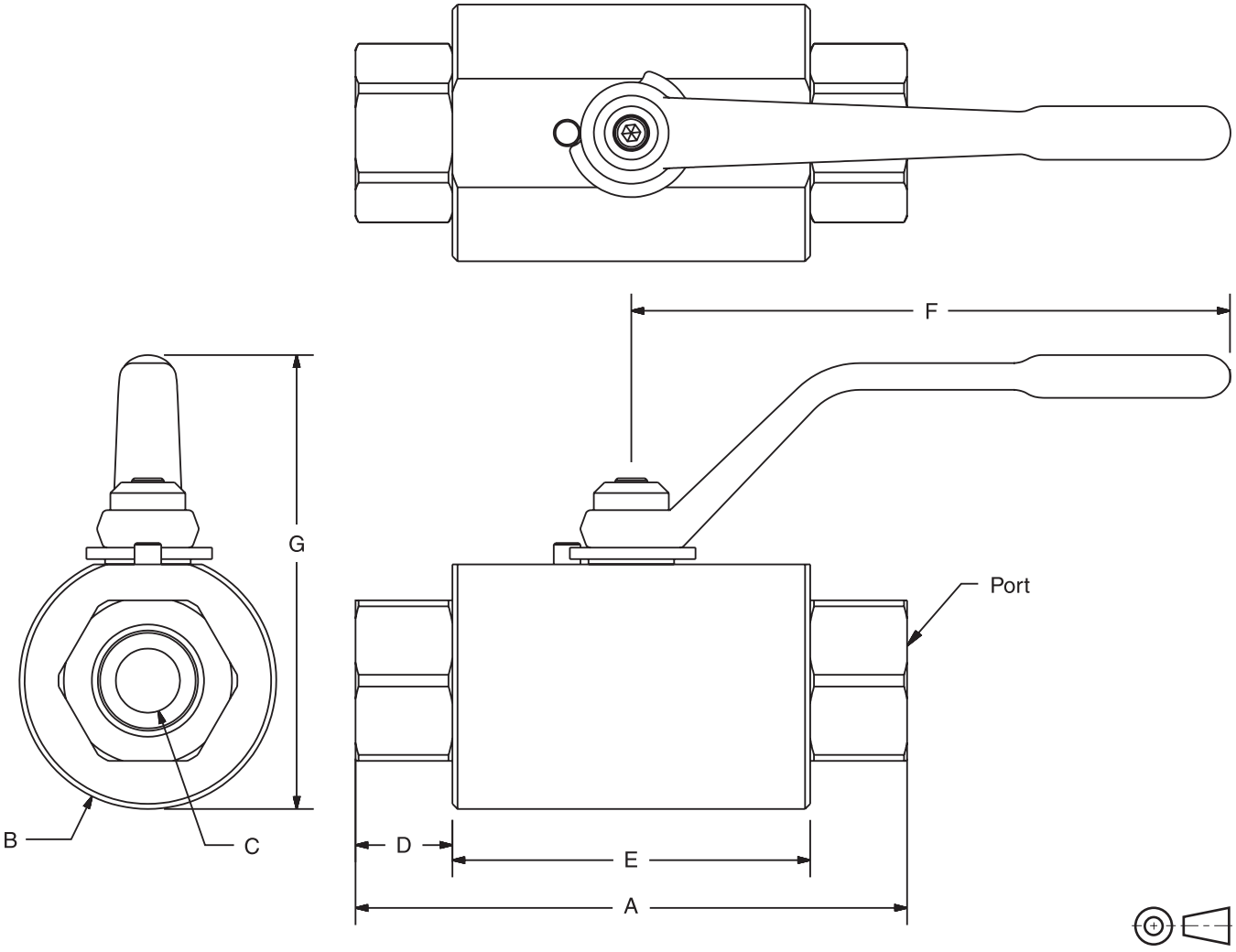
† Typically not available with Nitrile. Consult factory.

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

Replacement Handles Standard Steel Offset

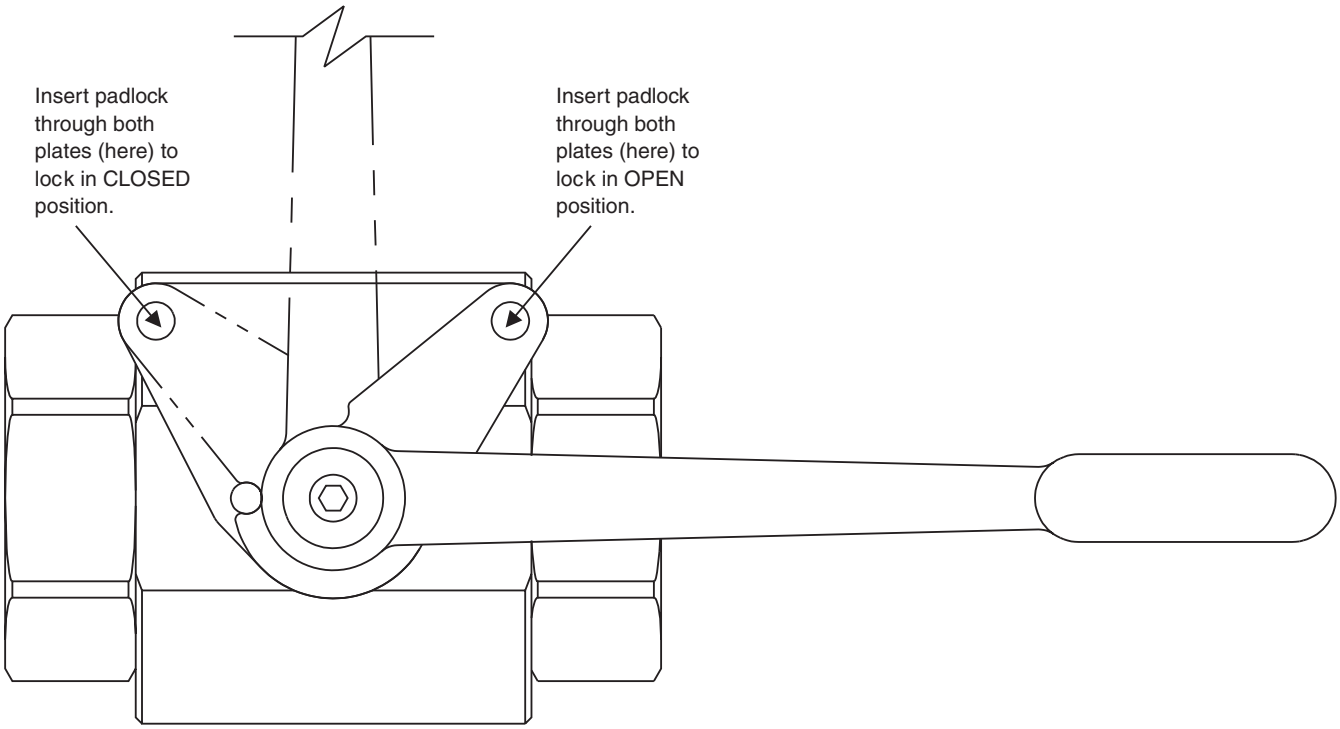
Series	Part Number
BVHH04	BVH-HS1
BVHH06	BVH-HS1
BVHH08	BVH-HS1
BVHH12	BVH-HS2
BVHH16	BVH-HS2
BVHH20	BVH-HS3
BVHH24	BVH-HS3
BVHH32	BVH-HS3

Threaded Ports



Code	Port Thread Size	Working Pressure	Dimensions mm (in)						
			A	B	C	D	E	F	G
BVHH – NPT, SAE, and BSPP									
08	1/2"	690 Bar (10,000 PSI)	107.2 (4.22)	44.5 (1.75)	9.7 (0.38)	22.1 (0.87)	62.5 (2.46)	114.3 (4.50)	83.1 (3.27)
12	3/4"	690 Bar (10,000 PSI)	119.9 (4.72)	63.5 (2.50)	14.2 (0.56)	19.1 (0.75)	82.3 (3.24)	177.8 (7.00)	122.9 (4.84)
16	1"	690 Bar (10,000 PSI)	135.1 (5.32)	69.9 (2.75)	19.1 (0.75)	25.7 (1.01)	83.8 (3.30)	177.8 (7.00)	129.3 (5.09)
20	1 1/4"	690 Bar (10,000 PSI)	157.5 (6.20)	88.9 (3.50)	22.9 (0.90)	28.1 (1.11)	100.9 (3.97)	250.4 (9.86)	165.1 (6.50)
24	1 1/2"	690 Bar (10,000 PSI)	157.7 (6.21)	101.6 (4.00)	28.7 (1.13)	27.2 (1.07)	102.9 (4.05)	250.4 (9.83)	175.5 (6.91)
32	2"	690 Bar (10,000 PSI)	186.7 (7.35)	114.3 (4.50)	38.1 (1.50)	26.2 (1.03)	133.9 (5.27)	250.4 (9.86)	192.8 (7.59)

BVHPLK: Standard Series 'BVHPLK-*' kit replaces the stopwasher with a stationary and moving plate, as illustrated below. As the handle is actuated, the moving plate aligns with one of the two locking positions in the stationary plate, enabling the valve to be locked in either **fully closed** or **fully open** position.



Ordering Information

BVHH Code	Size	Standard Locking (Part Number)
08	1/2"	BVHPLK-1
12	3/4"	BVHPLK-2
16	1"	BVHPLK-2
20	1 1/4"	BVHPLK-3
24	1 1/2"	BVHPLK-3
32	2"	BVHPLK-3

General Description

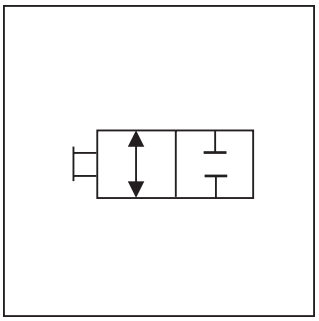
Series BVAM are 2-way ball valves rated at 138 Bar (2000 PSI). This product provides a cost effective solution where 414 Bar (6000 PSI) is not required. Many features found on the 414 Bar (6000 PSI) unit are incorporated in this cost effective product.

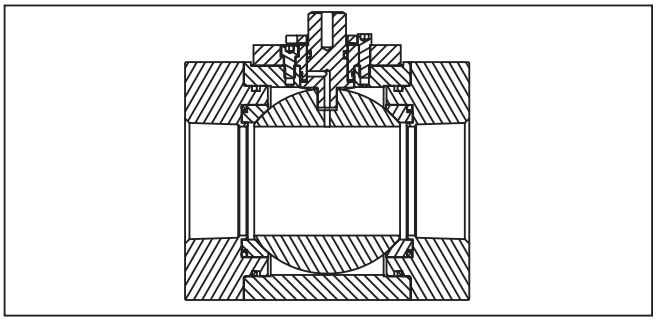
Operation

Parker's 2-way ball valves operate to either off or full flow by rotating the handle 90°. Ball valves are not designed to be a metering or flow control device.

Specifications

Maximum Pressure	138 Bar (2000 PSI)
Body Material	Carbon Steel, Black Oxide
Ball Material	Steel, Chrome Plated
Stem Material	Steel, Zinc Plated
Standard Handle	Steel Offset, Nickel Plated
Standard Ball Seals	Delrin + MoS_2
Standard Shaft Seals	O-Ring & Backup, Nitrile
Temperature Range with Standard Seals	-30°C to +100°C (-22°F to +212°F)



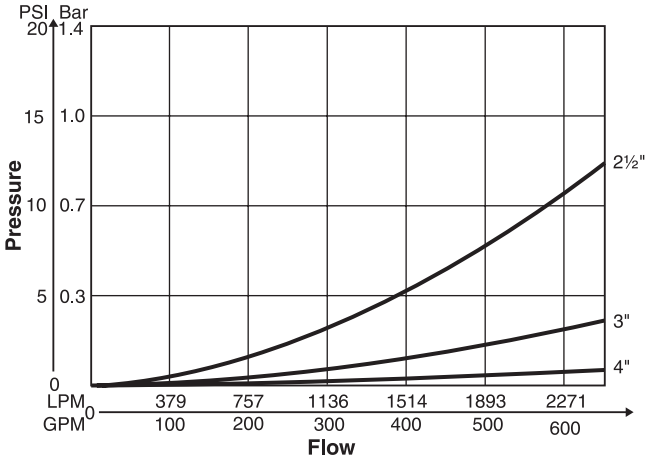


Features

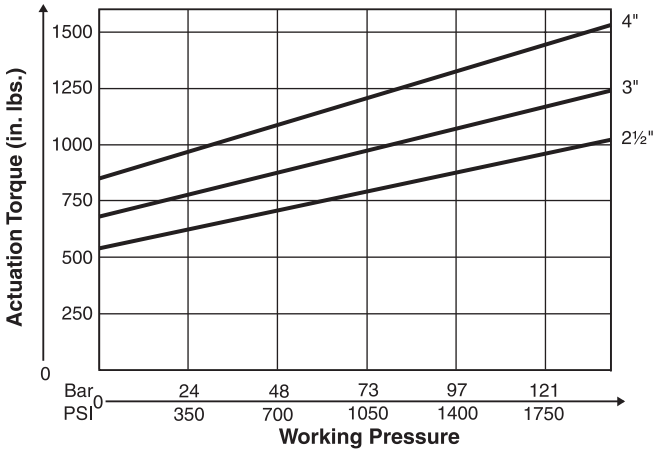
- A full range of threaded porting options allows mounting in most applications.
- The use of MoS_2 mounted ball seals and synthetic lubricant creates a low actuation torque and ensures long life.
- The wide range of spindle and ball sealing materials allows use in most known fluid applications.

Performance Curves

Pressure Drop



Actuation Torque



BVAM — Series

□ — Size

Code	Size
40	2 1/2"
48	3"
64	4"

□ — Port

Code	Description
N	NPT Thread
S	SAE Thread
B	BSPP Thread

S — Body Material

Code	Description
S	Steel

S — Ball & Stem Material

Code	Description
S	Steel

1 — Ball Seals

Code	Description
1	Delrin

□ — Shaft Seals

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

□ — Options

Code	Description
Omit	No Options
A	Locking Handle
B	Security Locking Handle
★C	1 Way Limit Switch
★D	2 Way Limit Switch
*E	Panel Mount
G	Flat Non-offset Handle
★**K	1 Way Limit Switch w/Lock
★L	2 Way Limit Switch w/Lock

* Cannot be combined with other options

** Switch is set to indicate valve open condition

★ When selecting this option, your ball valve will come with the limit switch bracket, but does not include the limit switch. The switch is sold separately (Part #LSB)

[ ] — Design Series

NOTE: Not required when ordering.

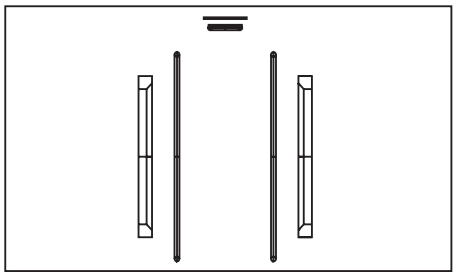
Weights

Code	kg (lbs.)
40	12.5 (27.5)
48	16.9 (37.2)
64	24.8 (54.5)

Seal Kit Accessories

Ball Valve Seal Kits restore a ball valve to factory specifications, providing no erosion or metal-to-metal wear has taken place.

The Seal Kit includes all the o-rings, ball seals and thrust bearings that were originally installed at the factory.



Ordering Information

SK — Accessory

Code	Description
SK	Seal Kit

BVAM — Series

□ — Size

Code	Size
40	2 1/2"
48	3"
64	4"

1 — Ball Seals

Code	Description
1	Delrin

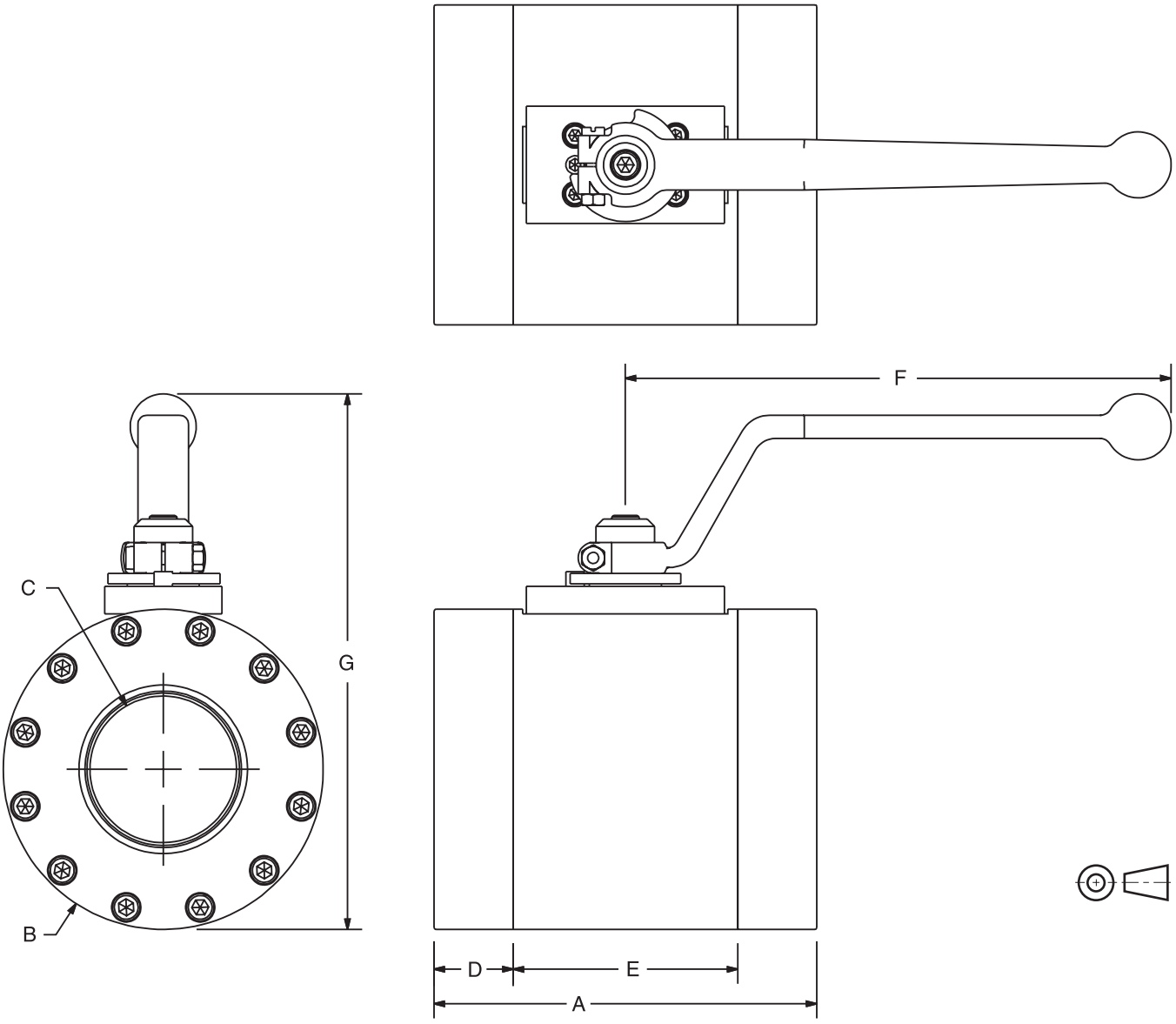
□ — Shaft Seals

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

[ ] — Design Series

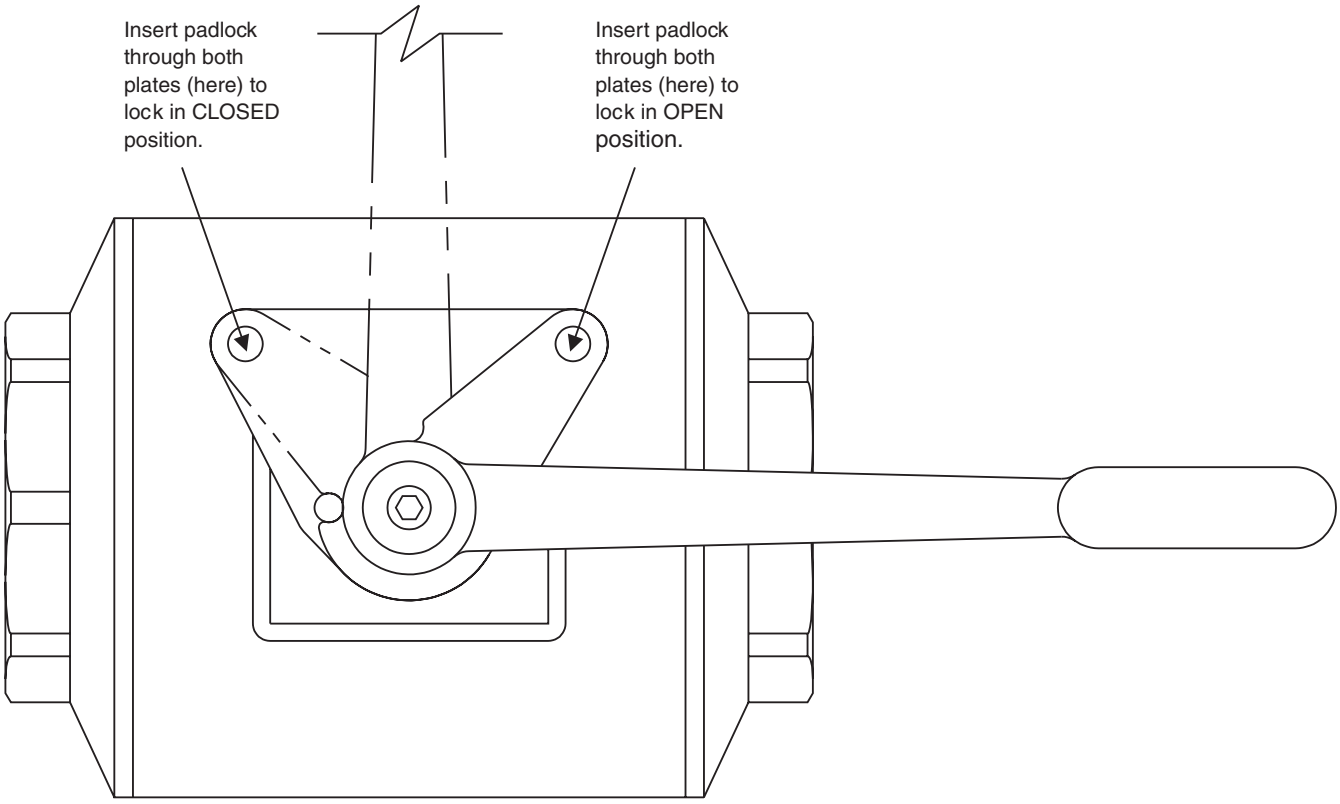
NOTE: Not required when ordering.

Threaded Ports



Code	Port Thread Size	Working Pressure	Dimensions mm (in) A	B	C	D	E	F	G
BVAM – NPT, SAE and BSPP									
40	2 1/2"	138 Bar (2000 PSI)	165.9 (6.53)	138.7 (5.46)	63.5 (2.50)	34.2 (1.35)	97.3 (3.83)	250.4 (9.86)	227.8 (8.97)
48	3"	138 Bar (2000 PSI)	182.6 (7.19)	158.8 (6.25)	76.2 (3.00)	39.7 (1.56)	103.2 (4.06)	250.4 (9.86)	248.7 (9.79)
64	4"	138 Bar (2000 PSI)	216.4 (8.52)	190.5 (7.50)	95.3 (3.75)	38.9 (1.53)	138.4 (5.45)	368.3 (14.50)	292.9 (11.53)

BVHPLK: Standard Series 'BVHPLK-*' kit replaces the stopwasher with a stationary and moving plate, as illustrated below. As the handle is actuated, the moving plate aligns with one of the two locking positions in the stationary plate, enabling the valve to be locked in either **fully closed** or **fully open** position.



Ordering Information

BVAM Code	Size	Standard Locking (Part Number)
40	2 1/2"	BVHPLK-4
48	3"	BVHPLK-4
64	4"	BVHPLK-4

General Description

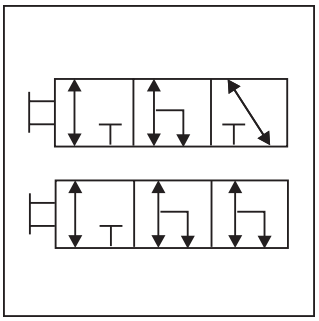
Series BV3D is a 3-way diverter. The product is rated at 207 Bar (3000 PSI) and designed to economically satisfy many 3-way applications.

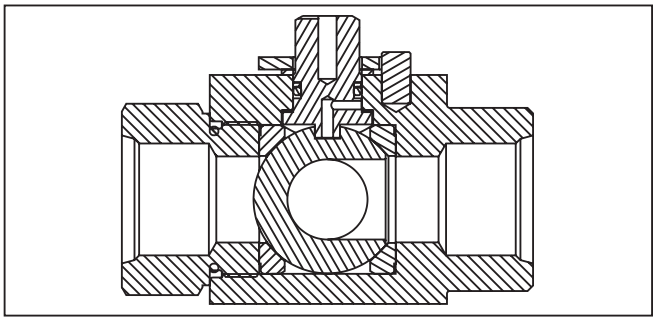
Operation

Series BV3D operates by rotating the handle 90° or 180° depending on the chosen ball pattern. There is a slight port to port overlap. Pressure is applied to Port 1.

Specifications

Maximum Pressure	207 Bar (3000 PSI)
Body Material	Carbon Steel, Black Oxide Stainless Steel
Ball Material	Steel, Chrome Plated
Stem Material	Steel, Zinc Plated Stainless Steel
Standard Handle	Steel Offset, Nickel Plated
Standard Ball Seals	Delrin + MoS_2
Standard Shaft Seals	O-Ring & Backup, Nitrile
Temperature Range with Standard Seals	-30°C to +100°C (-22°F to +212°F)



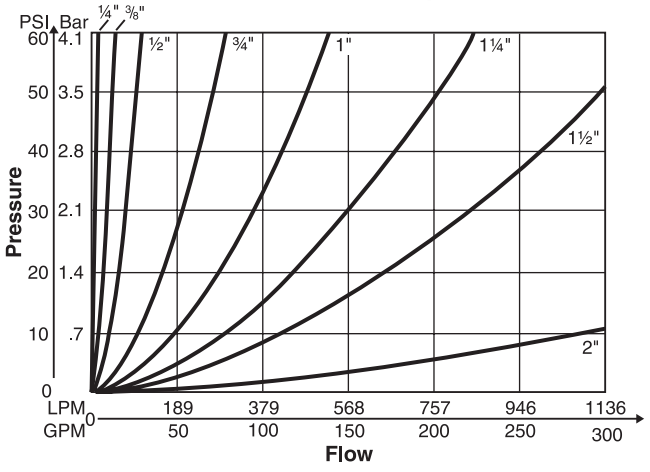


Features

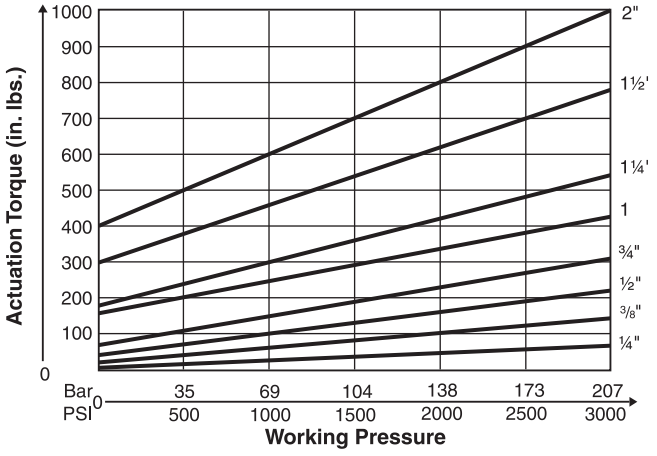
- The standard L-bore ball and T-bore option allows the valve to be utilized in a variety of applications.
- Slight port overlap reduces upstream shock during shifting.
- Utilizing the unique spindle thrust bearing design reduces actuation torque.
- The BV3D can be panel mounted which allows a variety of installation options.
- Delrin seals with molybdenum disulphide (MoS_2) results in lower actuation torque and will increase high duty life cycle expectancy.

Performance Curves

Pressure Drop



Actuation Torque



BV3D — Series | Size | Port | Ball Pattern | Body Material | Ball & Stem Material | Ball Seals | Shaft Seals | Options | Design Series

NOTE: Not required when ordering.

Code	Size
04	1/4"
06	3/8"
08	1/2"
12	3/4"
16	1"
20	1 1/4"
24	1 1/2"
32	2"

Code	Description
N	NPT Thread
S	SAE Thread
B	BSPP Thread
U	ISO 6149 Thread

Code	Description
S	Steel
K	Stainless Steel

Code	Description
S	Steel
K	Stainless Steel

Code	Description
1	Delrin
2 *	PTFE
4 †	Peek

* Valve pressure rating reduced. Consult factory.

† Typically not available with Nitrile. Consult factory.

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

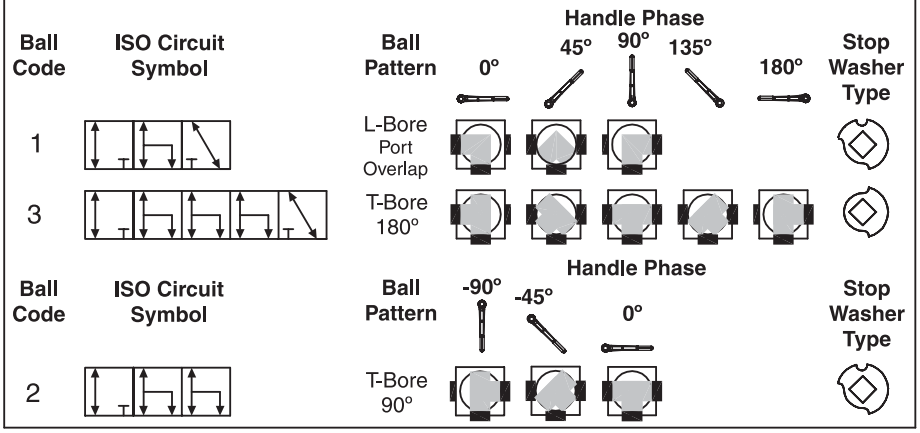
Code	Description
Omit	No Options
A	Locking Handle
★C	1-Way Limit Switch
*E	Panel Mount
G	Flat Non-offset Handle
★**K	1-Way Limit Switch w/Lock

* Cannot be combined with other options

** Switch is set to indicate valve open condition

★ When selecting this option, your ball valve will come with limit switch bracket, but does not include the switch. The switch is sold separately (Part #LSB)

Diverter Valve Ball Porting Options



Pressure is applied to Port 1.

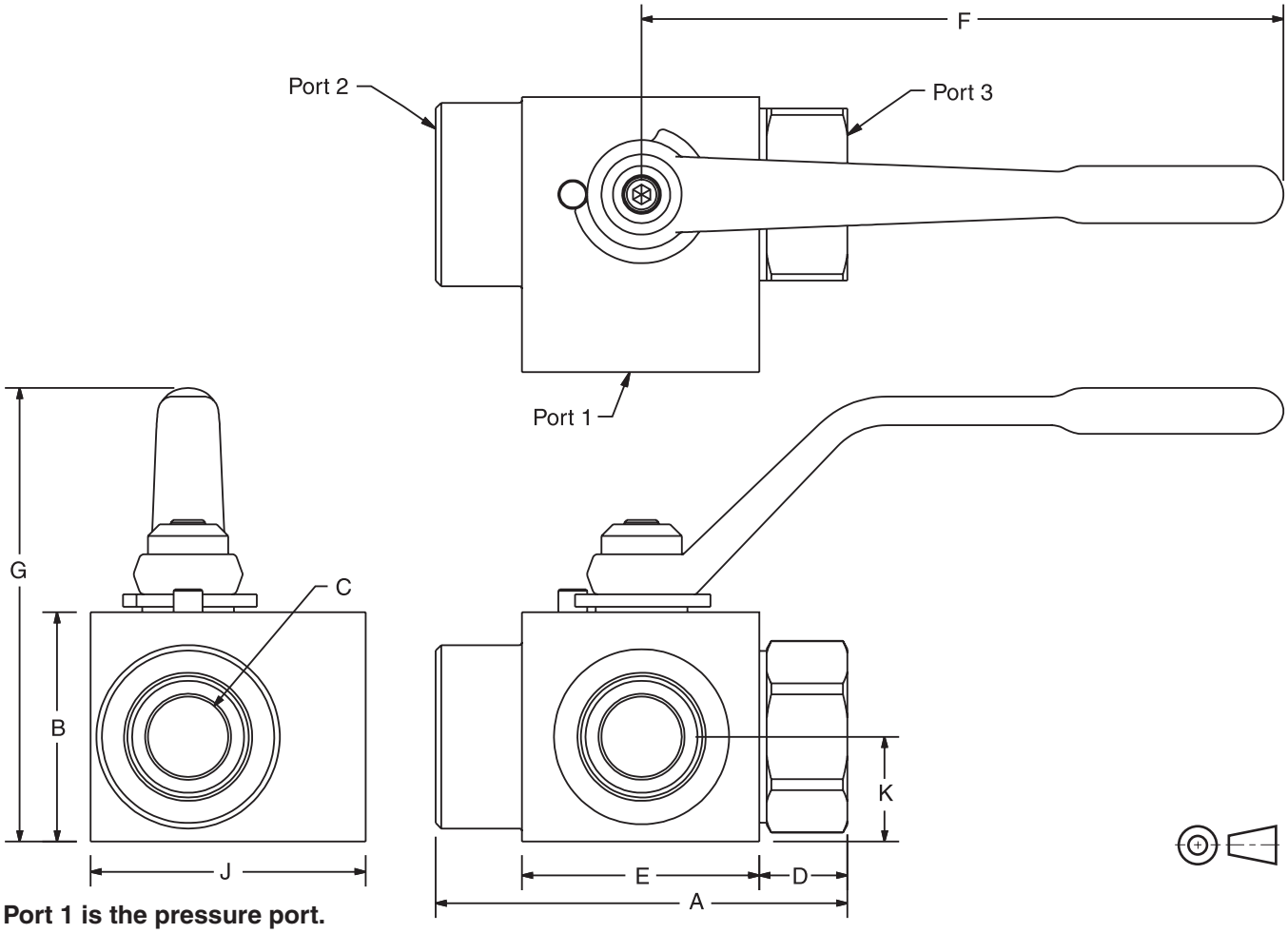
ISO 6149-1 Port Dimensions (inches)

Size	Thread
04	M12 x 1.5
06	M16 x 1.5
08	M18 x 1.5
12	M27 x 2
16	M33 x 2
20	M42 x 2
24	M48 x 2
32	M60 x 2

Weights

Code	kg (lbs.)	Code	kg (lbs.)
04	0.6 (1.25)	16	2.7 (6.0)
06	0.7 (1.5)	20	6.2 (13.75)
08	0.9 (2.0)	24	6.8 (15.0)
12	1.9 (4.25)	32	11.1 (24.5)

Threaded Ports

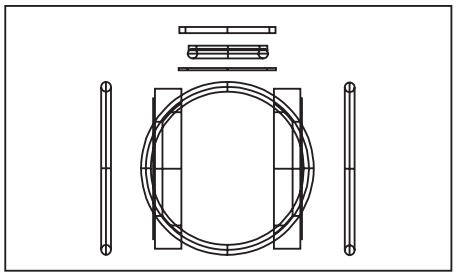


Port 1 is the pressure port.

Code	Port Thread Size	Working Pressure	Dimensions mm (in)								
			A	B	C	D	E	F	G	J	K
BV3D – NPT, SAE, and BSPP											
04	1/4"	207 Bar (3000 PSI)	69.6 (2.74)	35.1 (1.38)	6.4 (0.25)	17.3 (0.68)	35.7 (1.40)	114.3 (4.50)	75.7 (2.98)	52.1 (2.05)	15.5 (0.61)
06	3/8"	207 Bar (3000 PSI)	72.9 (2.87)	38.1 (1.50)	7.9 (0.31)	15.5 (0.61)	42.4 (1.67)	114.3 (4.50)	78.7 (3.10)	53.1 (2.09)	16.3 (0.64)
08	1/2"	207 Bar (3000 PSI)	85.3 (3.36)	41.4 (1.63)	11.2 (0.44)	19.3 (0.76)	47.5 (1.87)	114.3 (4.50)	82.6 (3.25)	59.9 (2.36)	18.5 (0.73)
12	3/4"	207 Bar (3000 PSI)	97.0 (3.82)	57.2 (2.25)	17.5 (0.69)	17.5 (0.69)	61.5 (2.42)	177.8 (7.00)	120.1 (4.73)	74.2 (2.92)	25.4 (1.00)
16	1"	207 Bar (3000 PSI)	114.0 (4.49)	63.5 (2.50)	22.4 (0.88)	24.4 (0.96)	65.8 (2.59)	177.8 (7.00)	125.7 (4.95)	87.4 (3.44)	29.0 (1.14)
20	1 1/4"	207 Bar (3000 PSI)	123.2 (4.85)	88.9 (3.50)	28.7 (1.13)	21.6 (0.85)	80.5 (3.17)	250.4 (9.86)	167.9 (6.61)	120.4 (4.74)	42.9 (1.69)
24	1 1/2"	207 Bar (3000 PSI)	136.4 (5.37)	88.9 (3.50)	35.1 (1.38)	25.1 (0.99)	85.6 (3.37)	250.4 (9.86)	169.9 (6.69)	105.9 (4.17)	38.1 (1.50)
32	2"	207 Bar (3000 PSI)	166.1 (6.54)	114.3 (4.50)	44.5 (1.75)	33.0 (1.30)	100.1 (3.94)	250.4 (9.86)	193.3 (7.61)	159.5 (6.28)	56.1 (2.21)

Ball Valve Seal Kits restore a ball valve to factory specifications, providing no erosion or metal-to-metal wear has taken place.

The Seal Kit includes all the o-rings, ball seals and thrust bearings that were originally installed at the factory. A sketch of these parts is provided at the right.



Ordering Information

SK — Accessory

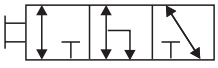
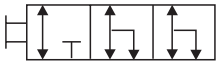
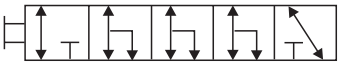
Code	Description
SK	Seal Kit

BV3D — Series

□ — Size

Code	Size
04	1/4"
06	3/8
08	1/2"
12	3/4"
16	1"
20	1 1/4"
24	1 1/2"
32	2"

□ — Ball Pattern

Ball Code	ISO Circuit Symbol	Ball Pattern
1		L-Bore Port Overlap
2		T-Bore 90°
3		T-Bore 180°

□ — Ball Seals

Code	Description
1	Delrin
2 *	PTFE
4 †	Peek

* Valve pressure rating reduced. Consult factory.

† Typically not available with Nitrile. Consult factory.

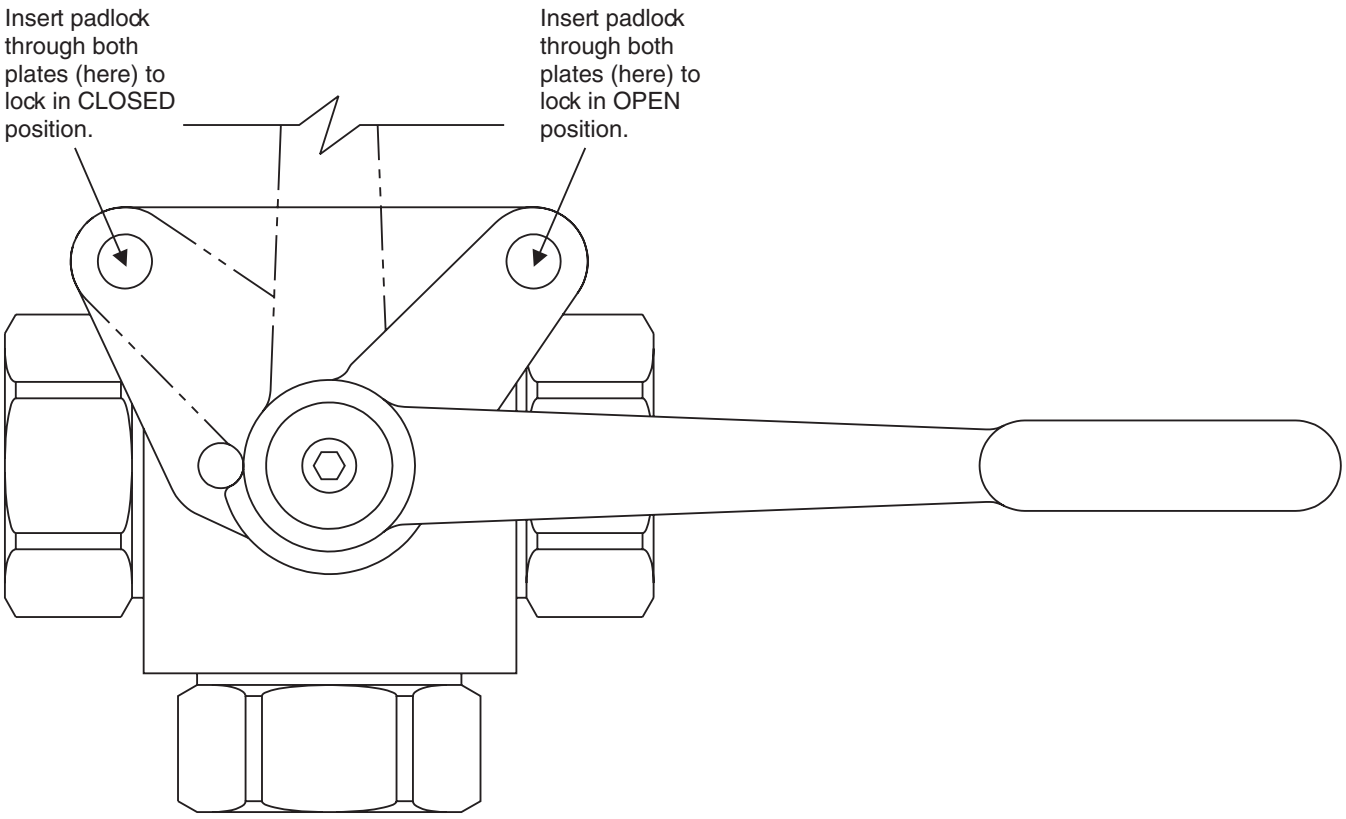
□ — Shaft Seals

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

[ ] — Design Series

NOTE: Not required when ordering.

BVHPLK: Standard Series 'BVHPLK-*' kit replaces the stopwasher with a stationary and moving plate, as illustrated below. As the handle is actuated, the moving plate aligns with one of the two locking positions in the stationary plate, enabling the valve to be locked in either **fully closed** or **fully open** position.



Ordering Information

BV3D Code	Size	Standard Locking (Part Number)
04	1/4"	BVHPLK-1
06	3/8"	BVHPLK-1
08	1/2"	BVHPLK-1
12	3/4"	BVHPLK-2
16	1"	BVHPLK-2
20	1 1/4"	BVHPLK-3
24	1 1/2"	BVHPLK-3
32	2"	BVHPLK-3

General Description

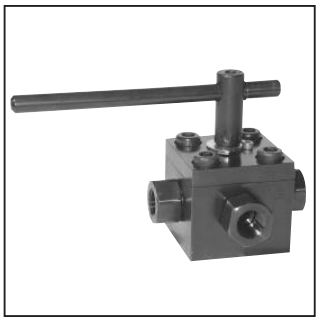
Series BV3H and BV4H are true 3-way and 4-way high pressure valves, incorporating many of the advanced features of the 2-way product. These products come in steel and are rated at 414 Bar (6000 PSI). Ports range from 1/4" to 2" with a variety of porting options.

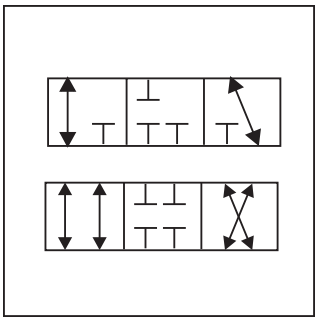
Operation

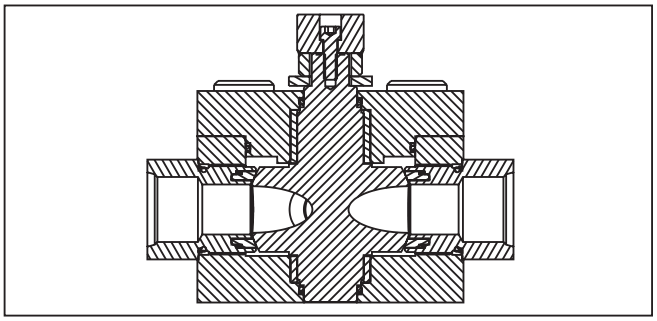
Series BV3H operates by rotating the handle 90° and BV4H operates through 180° rotation of the handle, depending on the flow path. A BV4H with ball #4 is 90° operation.

Specifications

Maximum Pressure	414 Bar (6000 PSI)
Body Material	Carbon Steel, Black Oxide Stainless Steel
Ball Material	Steel, Chrome Plated, Trunnion mount
Standard Pattern	"L" Bore (3W), "T" Bore (4W)
Spindle Material	Steel, Zinc Plated
Standard Handle	T-Type Handle
Standard Ball Seals	Delrin + MoS_2
Standard Shaft Seals	O-Ring & Bearing Stacks
Temperature Range with Standard Seals	-30°C to +100°C (-22°F to +212°F)





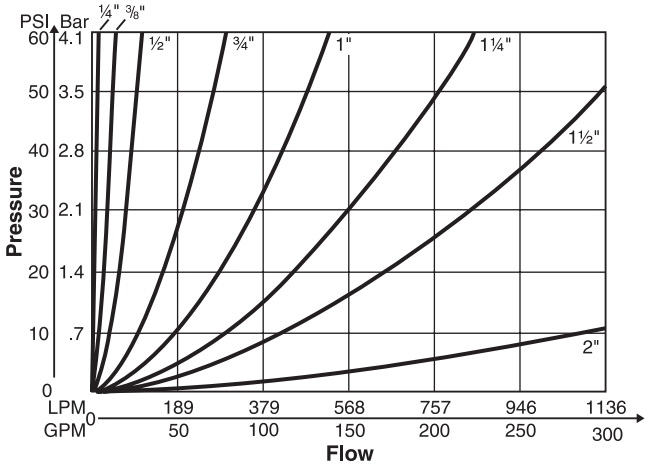


Features

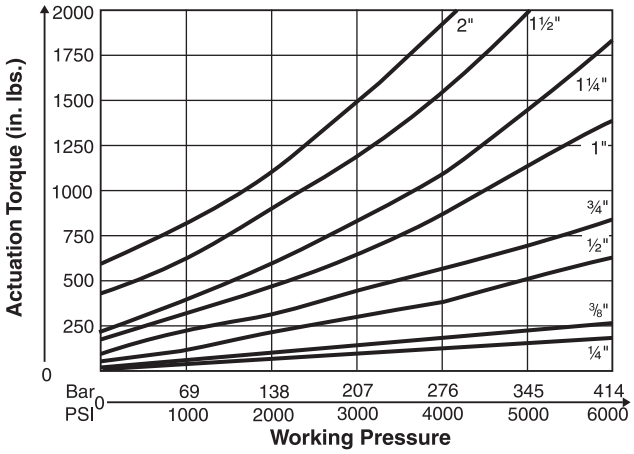
- Three dimensional balanced sealing for near zero leakage in any circuit.
- The unique thrust bearing spindle design reduces actuation torque and reduces the chance of the valve seizing when inactive for periods of time.
- Special seal design enables high port to port ΔP application suitability.
- A variety of ball patterns allows flexibility in many applications.

Performance Curves

Pressure Drop



Actuation Torque



Series

Code	Description
BV3H	3-Way
BV4H	4-Way

Size

Code	Size
04	1/4"
06	3/8
08	1/2"
12	3/4"
16	1"
20	1 1/4"
24	1 1/2"
32	2"

Port

Code	Description
N	NPT Thread
S	SAE Thread
B	BSPP Thread

Ball Pattern

Body Material

Code	Description
S	Steel
K	Stainless Steel

Ball & Stem Material

Code	Description
S	Steel
K	Stainless Steel

Ball Seals

Code	Description
1	Delrin
2 *	PTFE
4 †	Peek

* Valve pressure rating reduced. Consult factory.

† Typically not available with Nitrile. Consult factory.

Shaft Seals

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

Options

Code	Description
Omit	No Options
A	Locking Handle
★C	1-Way Limit Switch
★K	1-Way Limit Switch w/Lock

★ When selecting this option, your ball valve will come with limit switch bracket, but does not include the switch. The switch is sold separately (Part #LSB)

Design Series

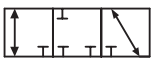
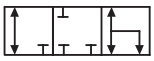
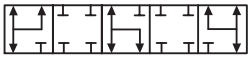
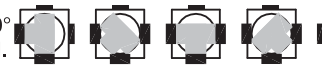
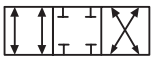
NOTE: Not required when ordering.

Weights

	BV3H		BV4H	
Code	kg	(lbs.)	kg	(lbs)
04	2.0	(4.5)	2.2	(4.75)
06	2.4	(5.25)	2.7	(6.0)
08	3.4	(7.5)	3.6	(8.0)
12	6.8	(15.0)	7.3	(16.0)
16	12.2	(27.0)	12.6	(27.75)
20	22.2	(49.0)	25.4	(56.0)
24	32.7	(72.0)	33.3	(73.5)
32	42.9	(94.5)	47.6	(105.0)

Multiway Manifold Mount Valve Porting Options

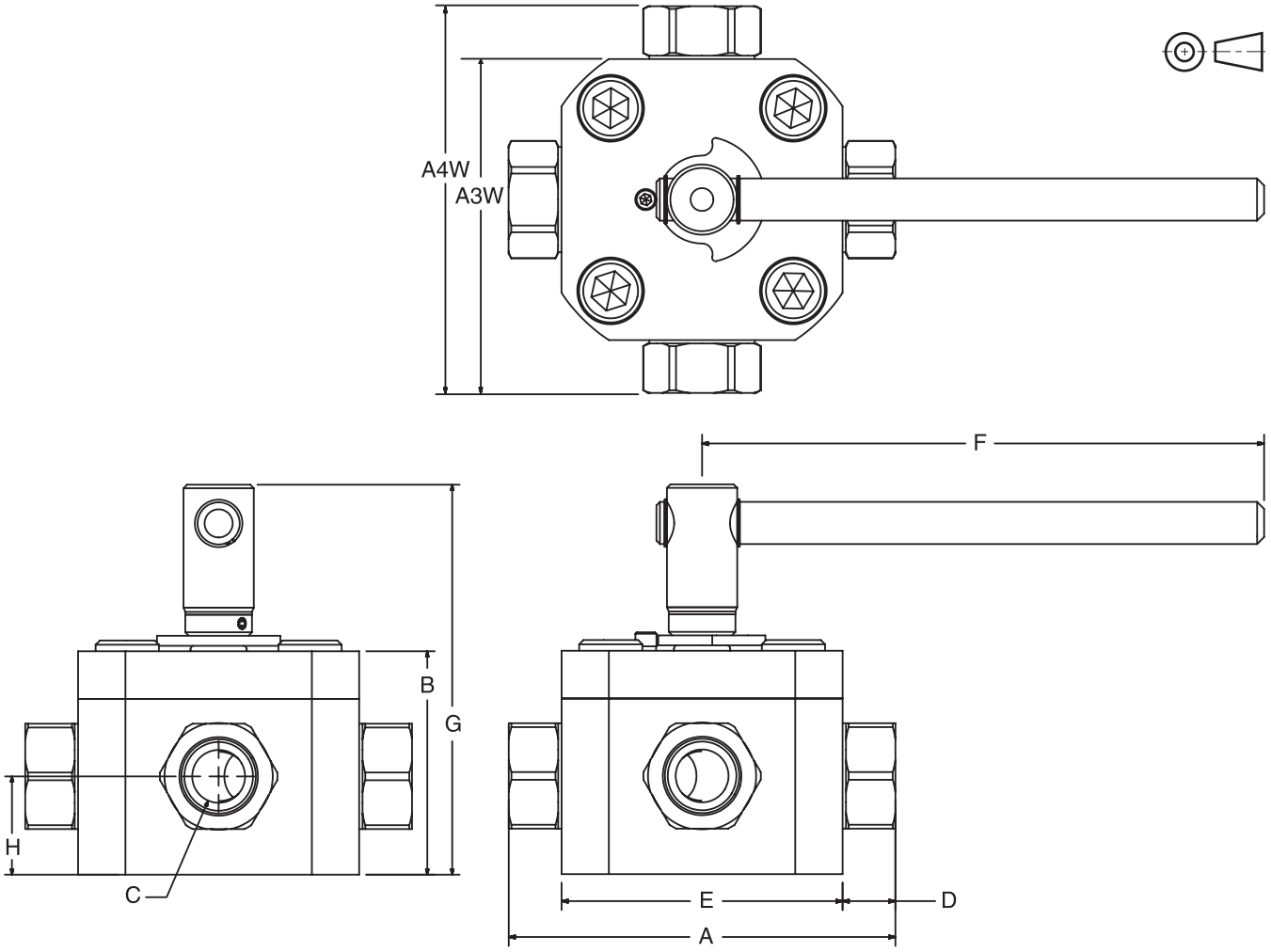
BV3H and BV4H valves are designed with no port-to-port overlap (see ISO symbols) during transition. See the table below to select the ball pattern ordering code.

Ball Code	ISO Circuit Symbol	Ball Pattern	Handle Phase 0°	45°	90°	135°	180°	Stop Washer Type
1		L-Bore 90° 3-Way Std.						
2		T-Bore 90° 3-Way Opt.						
3		T-Bore 180° 4-Way Std.						
4		X-Bore 90° 4-Way Opt.						

Replacement Handles
Standard Steel Offset

Series	Part Number
BV*H04	BVH-HT1
BV*H06	BVH-HT1
BV*H08	BVH-HT1
BV*H12	BVH-HT2
BV*H16	BVH-HT2
BV*H20	BVH-HT3
BV*H24	BVH-HT3
BV*H32	BVH-HT3

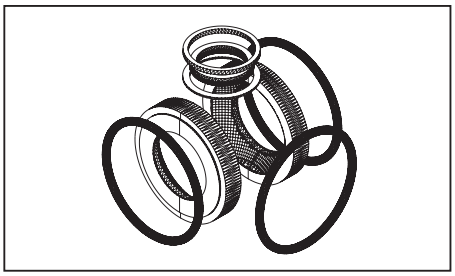
Threaded Ports



Code	Port Thread Size	Working Pressure	Dimensions mm (in)								
			A3W	A4W	B	C	D	E	F	G	H
BV3H/BV4H – NPT, SAE, and BSPP											
04	1/4"	414 Bar (6000 PSI)	78.2 (3.08)	90.4 (3.56)	64.3 (2.53)	7.9 (0.31)	12.2 (0.48)	63.5 (2.50)	177.8 (7.00)	122.2 (4.81)	31.0 (1.22)
06	3/8"	414 Bar (6000 PSI)	78.2 (3.08)	93.0 (3.66)	64.3 (2.53)	7.9 (0.31)	14.7 (0.58)	63.5 (2.50)	177.8 (7.00)	122.2 (4.81)	31.0 (1.22)
08	1/2"	414 Bar (6000 PSI)	95.5 (3.76)	115.1 (4.53)	69.9 (2.75)	11.2 (0.44)	19.9 (0.79)	76.2 (3.00)	177.8 (7.00)	129.0 (5.08)	33.8 (1.33)
12	3/4"	414 Bar (6000 PSI)	118.9 (4.68)	135.9 (5.35)	82.0 (3.23)	16.0 (0.63)	17.1 (0.68)	101.6 (4.00)	254.0 (10.00)	157.2 (6.19)	38.1 (1.50)
16	1"	414 Bar (6000 PSI)	150.9 (5.94)	174.8 (6.88)	101.1 (3.98)	22.4 (0.88)	23.9 (0.94)	127.0 (5.00)	254.0 (10.00)	176.3 (6.94)	50.8 (2.00)
20	1 1/4"	414 Bar (6000 PSI)	167.6 (6.60)	188.7 (7.43)	116.3 (4.58)	28.7 (1.13)	21.1 (0.83)	146.6 (5.77)	368.3 (14.50)	206.8 (8.14)	57.4 (2.26)
24	1 1/2"	414 Bar (6000 PSI)	209.3 (8.24)	234.2 (9.22)	129.0 (5.08)	33.3 (1.31)	25.0 (0.99)	184.2 (7.25)	368.3 (14.50)	219.5 (8.64)	58.9 (2.32)
32	2"	414 Bar (6000 PSI)	267.5 (10.53)	300.0 (11.81)	160.8 (6.33)	44.5 (1.75)	32.5 (1.28)	235.0 (9.25)	368.3 (14.50)	259.1 (10.20)	68.8 (2.71)

Ball Valve Seal Kits restore a ball valve to factory specifications, providing no erosion or metal-to-metal wear has taken place.

The Seal Kit includes all the o-rings, ball seals and thrust bearings that were originally installed at the factory. A sketch of these parts is provided at the right.



Ordering Information

SK — Accessory

Code	Description
SK	Seal Kit

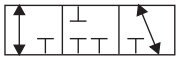
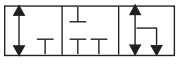
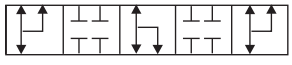
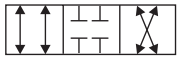
Series

Code	Description
BV3H	3-Way
BV4H	4-Way

Size

Code	Size
04	1/4"
06	3/8
08	1/2"
12	3/4"
16	1"
20	1 1/4"
24	1 1/2"
32	2"

Ball Pattern

Ball Code	ISO Circuit Symbol	Ball Pattern
1		L-Bore 3-Way Std
2		T-Bore 90° 3-Way Opt
3		T-Bore 180° 4-Way S30
4		X-Bore 90° 4-Way Opt

Ball Seals

Code	Description
1	Delrin
2 *	PTFE
4 †	Peek

* Valve pressure rating reduced. Consult factory.

† Typically not available with Nitrile. Consult factory.

Shaft Seals

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

Design Series

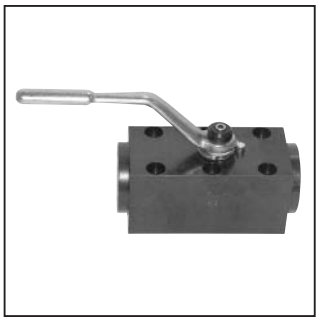
NOTE: Not required when ordering.

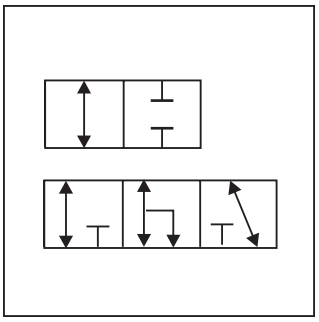
General Description

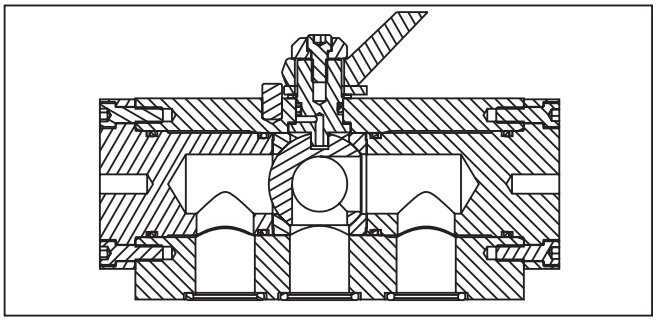
Series BVMM is a manifold mounted high pressure 414 Bar (6000 PSI) 2 or 3-way ball valve. Manifold mounting eliminates an external fluid connection.

Operation

Series BVMM valves operate through either 90° or 180° depending on the ball pattern chosen. For 3-way valves, pressure is applied to Port 1.







Specifications

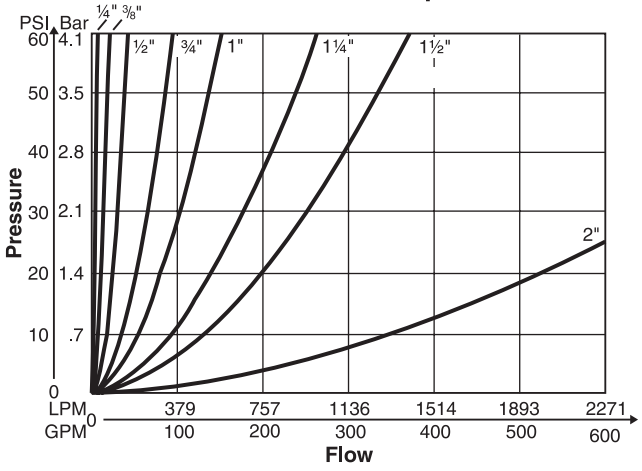
Maximum Pressure	414 Bar (6000 PSI)
Body Material	Carbon Steel, Black Oxide
Ball Material	Steel, Chrome Plated
Spindle Material	Steel, Nickel Plated
Standard Handle	Steel Offset, Nickel Plated
Standard Ball Seals	Delrin + MoS_2
Standard Shaft Seals	O-Ring & Backup, Nitrile
Temperature Range with Standatd Seals	-30°C to +100°C (-22°F to +212°F)

Features

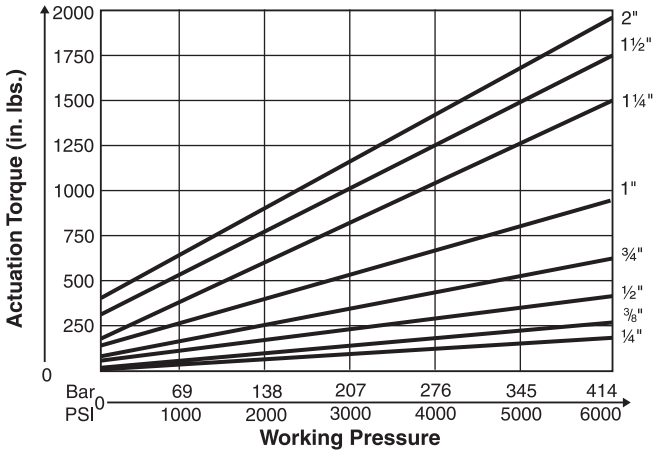
- Variety of ball patterns allow for different flow paths and flexibility for many applications.
- Thrust bearings in the spindle and delrin moly ball seals result in low actuation torque as well as extended service life.

Performance Curves

Pressure Drop



Actuation Torque



BVMM — Series

□ — Size

Code	Size
04	1/4"
06	3/8
08	1/2"
12	3/4"
16	1"
20	1 1/4"
24	1 1/2"
32	2"

□ — Ball Pattern

S — Body Material

Code	Description
S	Steel

S — Ball & Stem Material

Code	Description
S	Steel

□ — Ball Seals

Code	Description
1	Delrin
2 *	PTFE
4 †	Peek

* Valve pressure rating reduced. Consult factory.

† Typically not available with Nitrile. Consult factory.

□ — Shaft Seals

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

□ — Options

Code	Description
Omit	No Options
A	Locking Handle
★C	1-Way Limit Switch
G **	Flat Non-offset Handle
★*K	1-Way Limit Switch w/Lock

* Switch is set to indicate valve open condition

★ When selecting this option, your ball valve will come with limit switch bracket, but does not include the switch. The switch is sold separately (Part #LSB)

** Cannot be combined with other options.

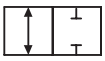
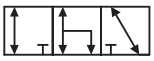
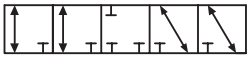
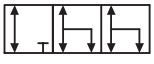
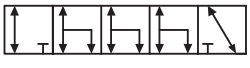
[ ] — Design Series

NOTE: Not required when ordering.

Weights

Code	kg	(lbs.)
04	1.1	(2.5)
06	1.9	(4.25)
08	2.3	(5.0)
12	5.2	(11.5)
16	7.9	(16.5)
20	15.0	(33.0)
24	25.4	(56.0)
32	33.3	(73.5)

Multiway Manifold Mount Valve Porting Options

Ball Code	ISO Circuit Symbol	Ball Pattern	Handle Phase 0°	45°	90°	135°	180°	Stop Washer Type
1		2-Way						
2		L-Bore Port Overlap						
3		L-Bore 180°						
4		T-Bore 90°						
5		T-Bore 180°						

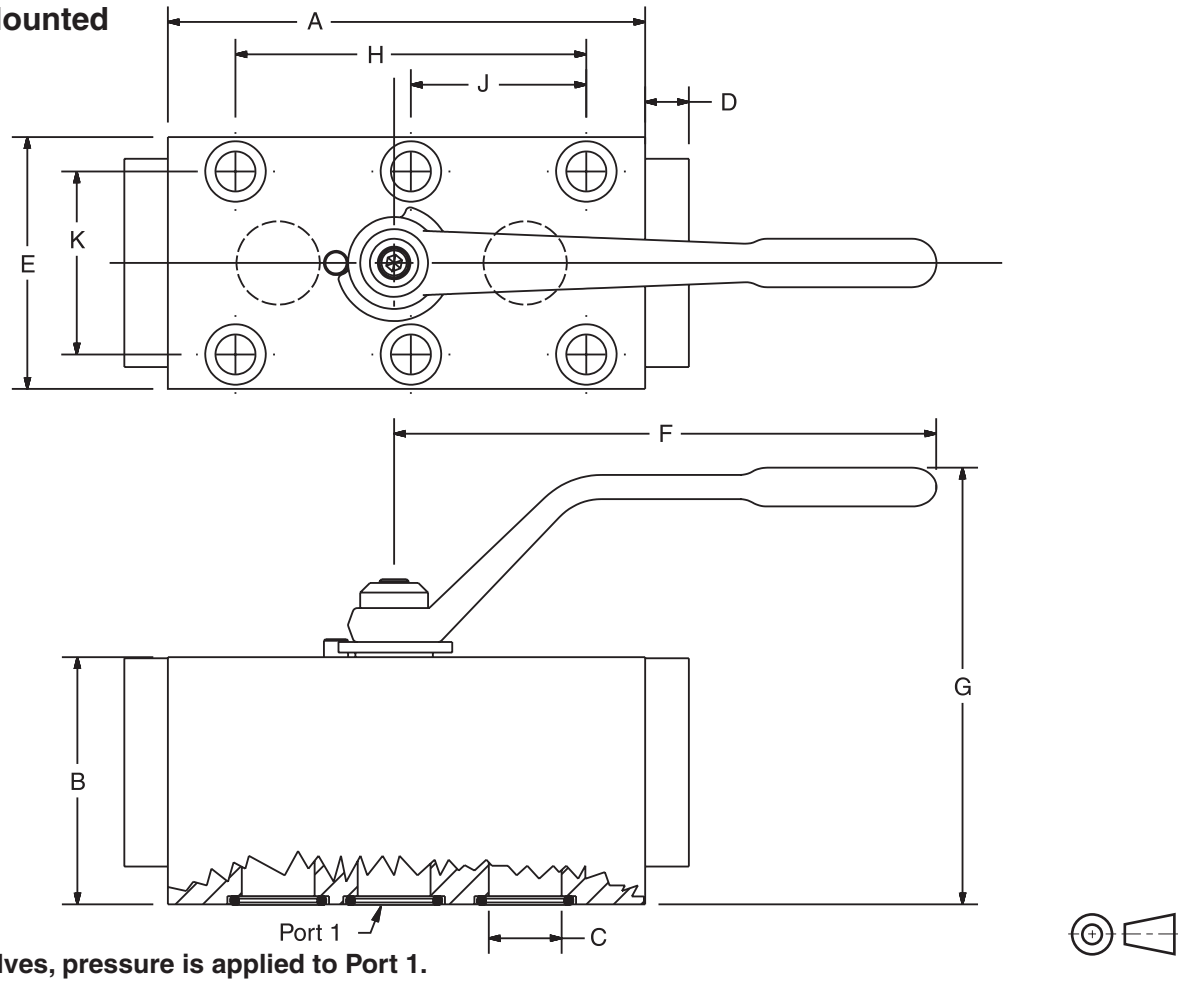
Replacement Handles Standard Steel Offset

Series	Part Number
BVMM04	BVH-HS1
BVMM06	BVH-HS1
BVMM08	BVH-HS1
BVMM12	BVH-HS2
BVMM16	BVH-HS2
BVMM20	BVH-HS3
BVMM24	BVH-HS3
BVMM32	BVH-HS3

Please request a certified print before building a manifold.

For 3-way valves, pressure is applied to Port 1.

Manifold Mounted



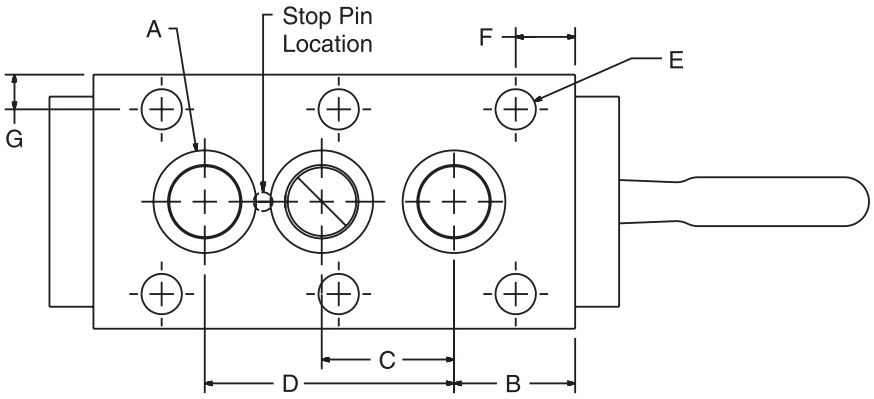
For 3-way valves, pressure is applied to Port 1.
Please request a certified print before building a manifold.

Code	Port Thread Size	Working Pressure	Dimensions mm (in)									
			A	B	C	D	E	F	G	H	J	K
BVMM – 2-Way and 3-Way Manifold Mounted												
04	1/4"	414 Bar (6000 PSI)	63.5 (2.50)	38.1 (1.50)	6.1 (0.24)	11.2 (0.44)	50.8 (2.00)	114.3 (4.50)	79.2 (3.12)	41.99 (1.653)	N/A	35.0 (1.377)
06	3/8"	414 Bar (6000 PSI)	81.8 (3.22)	43.7 (1.72)	9.7 (0.38)	11.2 (0.44)	57.2 (2.25)	114.3 (4.50)	85.1 (3.35)	54.99 (2.165)	N/A	40.0 (1.574)
08	1/2"	414 Bar (6000 PSI)	100.3 (3.95)	50.8 (2.00)	13.0 (0.51)	10.9 (0.43)	57.2 (2.25)	114.3 (4.50)	91.9 (3.62)	82.99 (3.267)	41.5 (1.633)	45.0 (1.770)
12	3/4"	414 Bar (6000 PSI)	132.3 (5.21)	69.9 (2.75)	20.1 (0.79)	10.9 (0.43)	69.9 (2.75)	177.8 (7.00)	132.8 (5.23)	96.98 (3.818)	48.5 (1.909)	51.0 (2.008)
16	1"	414 Bar (6000 PSI)	148.6 (5.85)	82.6 (3.25)	23.9 (0.94)	14.2 (0.56)	82.6 (3.25)	177.8 (7.00)	145.5 (5.73)	115.01 (4.528)	57.5 (2.264)	60.0 (2.362)
20	1 1/4"	414 Bar (6000 PSI)	177.8 (7.00)	95.3 (3.75)	31.8 (1.25)	16.0 (0.63)	101.6 (4.00)	250.4 (9.86)	176.3 (6.94)	135.99 (5.354)	68.0 (2.677)	78.0 (3.070)
24	1 1/2"	414 Bar (6000 PSI)	189.2 (7.45)	100.1 (3.94)	38.1 (1.50)	19.1 (0.75)	127.0 (5.00)	250.4 (9.86)	181.6 (7.15)	111.99 (4.409)	55.9 (2.199)	95.0 (3.740)
32	2"	414 Bar (6000 PSI)	231.1 (9.10)	120.7 (4.75)	47.8 (1.88)	22.1 (0.87)	152.4 (6.00)	250.4 (9.86)	200.9 (7.91)	135.99 (5.354)	68.2 (2.684)	112.0 (4.410)

NOTES: (1) These sizes use only the four outside mounting holes. Dimension J is not applicable.
(2) Ball portings for multiway valves are smaller than their 2-way counterparts in some sizes. Please refer to dimension C to confirm suitability.

3300-ballvalves.indd, ddp

Manifold Porting Specifications



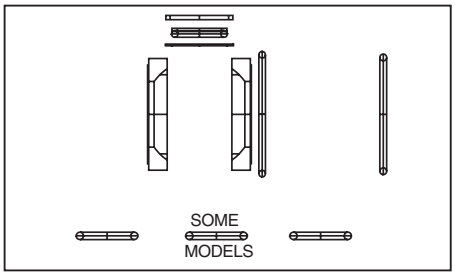
For 3-way valves, pressure is applied to Port 1.

Please request a certified print before building a manifold.

Code	Port Thread Size	Dimensions mm (in)						
		A	B	C	D	E	F	G
BVMM – Mounting Pad Specifications								
04	1/4"	12.70 (0.500)	16.31 (0.642)	21.97 (0.865)	38.99 (1.535)	8.89 (0.350)	15.54 (0.612)	7.92 (0.312)
06	3/8"	15.88 (0.625)	21.84 (0.860)	24.94 (0.982)	43.99 (1.732)	8.89 (0.350)	19.56 (0.770)	8.59 (0.338)
08	1/2"	19.05 (0.750)	24.05 (0.947)	26.42 (1.040)	57.99 (2.283)	8.89 (0.350)	7.44 (0.293)	6.10 (0.240)
12	3/4"	27.00 (1.063)	40.49 (1.594)	30.73 (1.210)	68.99 (2.716)	10.41 (0.410)	22.66 (0.892)	9.42 (0.371)
16	1"	33.35 (1.313)	39.34 (1.549)	38.00 (1.496)	80.98 (3.188)	12.95 (0.510)	19.30 (0.760)	11.28 (0.444)
20	1 1/4"	39.70 (1.563)	40.13 (1.580)	45.97 (1.810)	96.01 (3.780)	13.11 (0.516)	17.17 (0.676)	11.81 (0.465)
24	1 1/2"	47.63 (1.875)	42.19 (1.661)	56.13 (2.210)	111.99 (4.409)	16.66 (0.656)	42.19 (1.661)	16.00 (0.630)
32	2"	57.15 (2.250)	55.30 (2.177)	67.82 (2.670)	135.99 (5.354)	21.08 (0.830)	112.01 (4.410)	20.19 (0.795)

Ball Valve Seal Kits restore a ball valve to factory specifications, providing no erosion or metal-to-metal wear has taken place.

The Seal Kit includes all the o-rings, ball seals and thrust bearings that were originally installed at the factory. A sketch of these parts is provided at the right.



Ordering Information

SK — Accessory

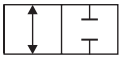
Code	Description
SK	Seal Kit

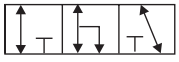
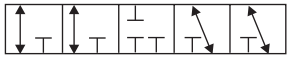
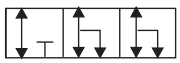
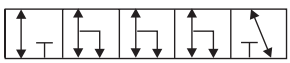
BVMM — Series

Size

Code	Size
04	1/4"
06	3/8
08	1/2"
12	3/4"
16	1"
20	1 1/4"
24	1 1/2"
32	2"

Ball Pattern

Ball Code	ISO Circuit Symbol	Ball Pattern
1		2-Way

Ball Code	ISO Circuit Symbol	Ball Pattern
2		L-Bore Port Overlap
3		L-Bore 180°
4		T-Bore 90°
5		T-Bore 180°

Ball Seals

Code	Description
1	Delrin
2 *	PTFE
4 †	Peek

* Valve pressure rating reduced. Consult factory.

† Typically not available with Nitrile. Consult factory.

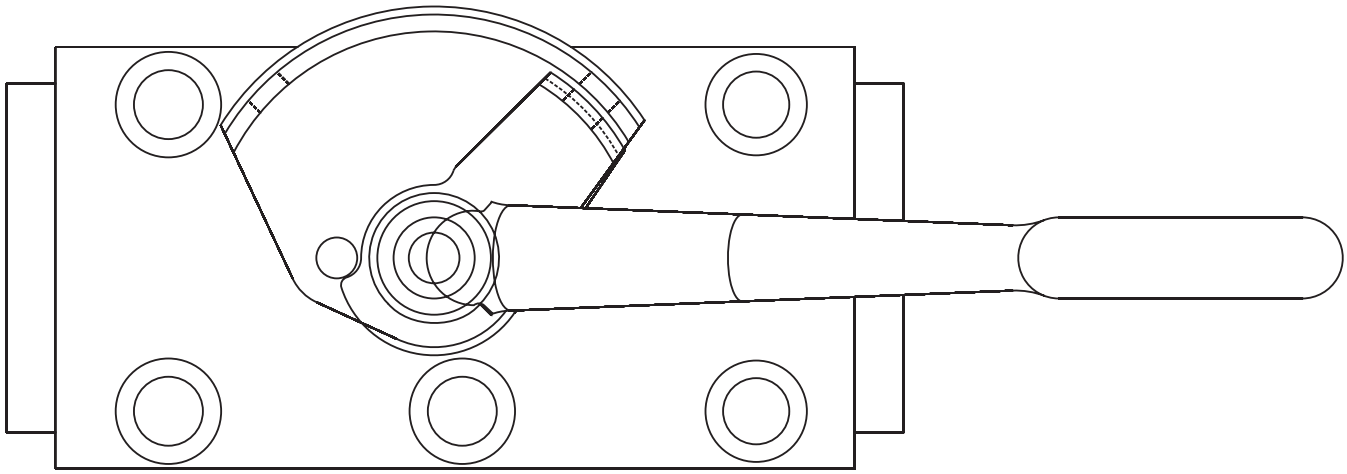
Shaft Seals

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

Design Series

NOTE: Not required when ordering.

BVMM2LK: Standard Series 'BVMM2LK-*' kit replaces the stopwasher with a stationary and moving plate, as illustrated below. As the handle is actuated, the moving plate aligns with one of the two locking positions in the stationary plate, enabling the valve to be locked in either **fully closed** or **fully open** position.



Ordering Information

BVMM		Standard Locking
Code	**Size**	**(Part Number)**
04	1/4"	BVDMLH-1
06	3/8"	BVDMLH-1
08	1/2"	BVDMLH-1
12	3/4"	BVDMLH-2
16	1"	BVDMLH-2
20	1 1/4"	BVDMLH-3
24	1 1/2"	BVDMLH-3
32	2"	BVDMLH-3

General Description

Series BVAL ball valves are designed to meet the needs of suction line and low pressure applications. This series is available from 1/4" to 4" ports NPT, SAE and BSPP, and is designed to assure leak free hydraulic suction and return line durability.

Operation

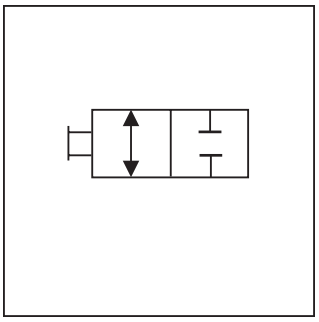
Parker's 2-way ball valves operate to either off or full flow by rotating the handle 90°. Ball valves are not designed to be a metering or flow control device.

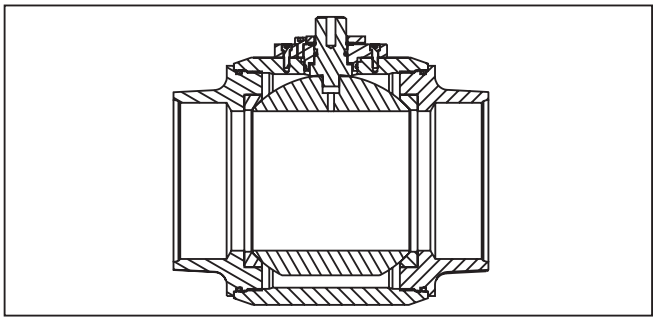
Specifications

Maximum Pressure	28 Bar (400 PSI)
Body Material	Aluminum
Ball Material	Brass, Chrome Plated
Stem Material	Brass, Oversize Bearing Area
Standard Handle	Aluminum Offset
Standard Ball Seals	PTFE standard
Standard Shaft Seals	O-Ring & Backup, Nitrile
Temperature Range with Standatd Seals	-30°C to +100°C (-22°F to +212°F)

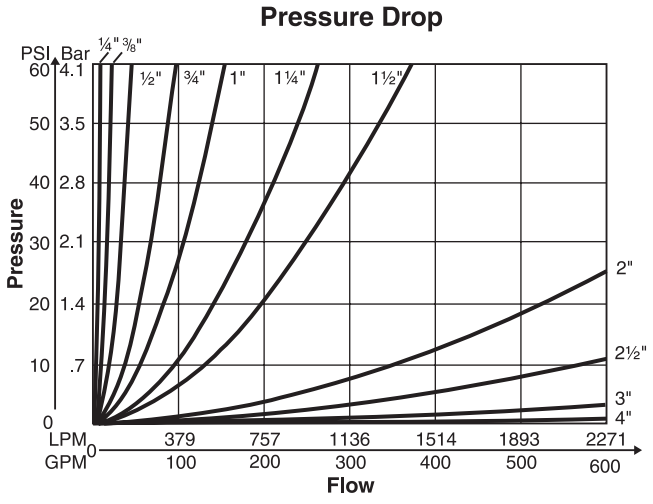
Features

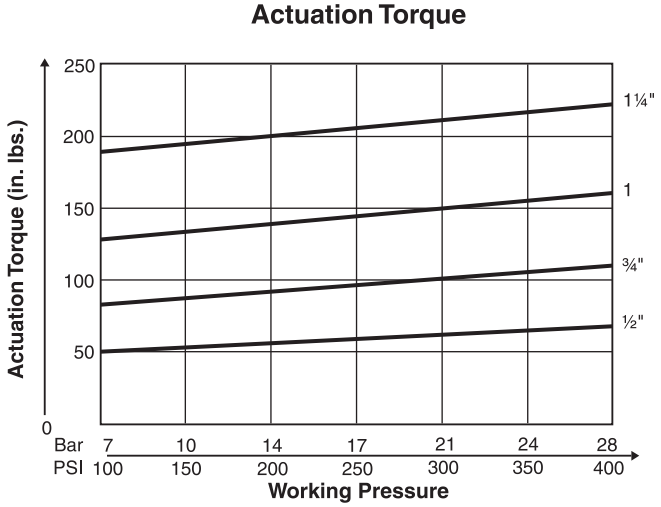
- Unrestricted bore from 1/4" to 4".
- Unrestricted flow and cavitation eliminated.
- Availability of NPT, BSPP and SAE O-ring sealed ports assure leak-free service.
- Choice of optional seal materials allows use with phosphate esters, water glycols and other media.
- Utilizes top grade PTFE ball seats with O-ring seals throughout to assure smooth and leak-free operation.

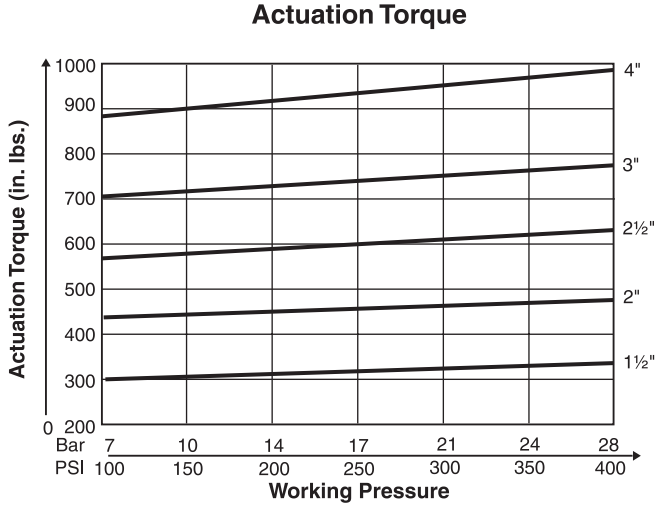




Performance Curves







BVAL — Series

Size

Code	Size
04	1/4"
06	3/8"
08	1/2"
12	3/4"
16	1'
20	1 1/4"
24	1 1/2"
32	2"
40	2 1/2"
48	3"
64	4"

Port

Code	Description
N	NPT Thread
S	SAE Thread
B	BSPP Thread
U	ISO 6149 Thread

S — Body Material

Code	Description
S	Aluminum

S — Ball & Stem Material

Code	Description
S	Brass

2 — Ball Seals

Code	Description
2	PTFE

Shaft Seals

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

Options

Code	Description
Omit	No Options
A	Locking Handle
B	Security Locking Handle
★C	1-Way Limit Switch
D	2-Way Limit Switch
*E	Panel Mount
G	Flat Non-offset Handle
★**K	1-Way Limit Switch w/Lock
★L	2-Way Limit Switch w/Lock

* Cannot be combined with other options

** Switch is set to indicate valve open condition

★ When selecting this option, your ball valve will come with limit switch bracket, but does not include the switch. The switch is sold separately (Part #LSB)

Design Series

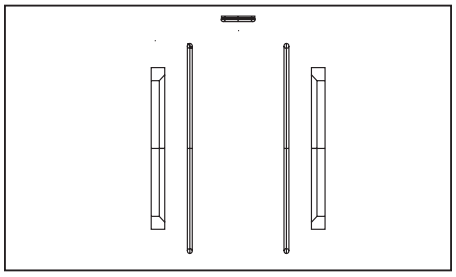
NOTE: Not required when ordering.

Code	Weight kg (lbs.)	Code	Weight kg (lbs.)	Code	Weight kg (lbs.)
4	0.2 (0.5)	16	0.5 (1.0)	40	3.5 (7.75)
6	0.2 (0.5)	20	0.8 (1.75)	48	4.8 (10.5)
8	0.2 (0.5)	24	1.1 (2.5)	64	7.4 (16.25)
12	0.3 (0.75)	32	1.8 (4.0)		

Seal Kit Accessories

Ball Valve Seal Kits restore a ball valve to factory specifications, providing no erosion or metal-to-metal wear has taken place.

The Seal Kit includes all the o-rings, ball seals and thrust bearings that were originally installed at the factory. A sketch of these parts for most 2-way valves is provided at the right.



Ordering Information

SK — Accessory

Code	Description
SK	Seal Kit

BVAL — Series

Size

Code	Size
04	1/4"
06	3/8
08	1/2"
12	3/4"
16	1"
20	1 1/4"
24	1 1/2"
32	2"
40	2 1/2"
48	3"
64	4"

2 — Ball Seals

Code	Description
2	PTFE

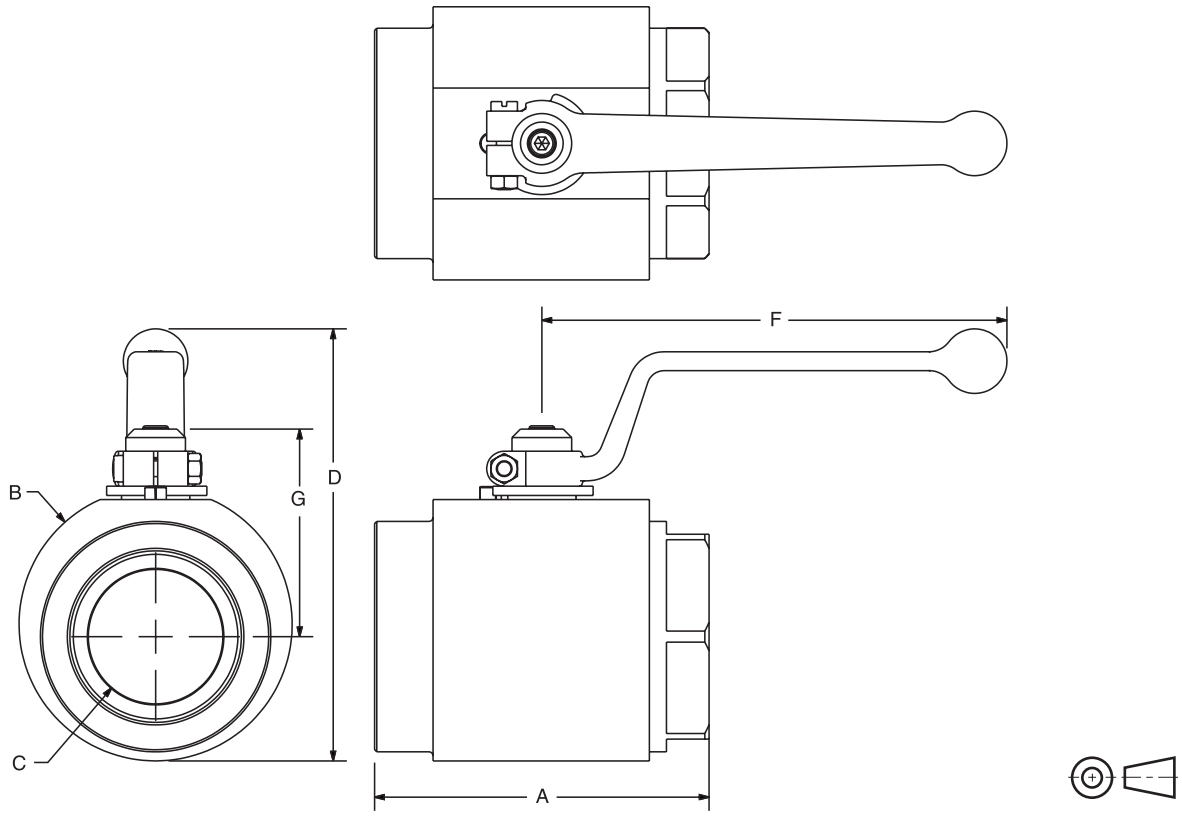
Shaft Seals

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

Design Series

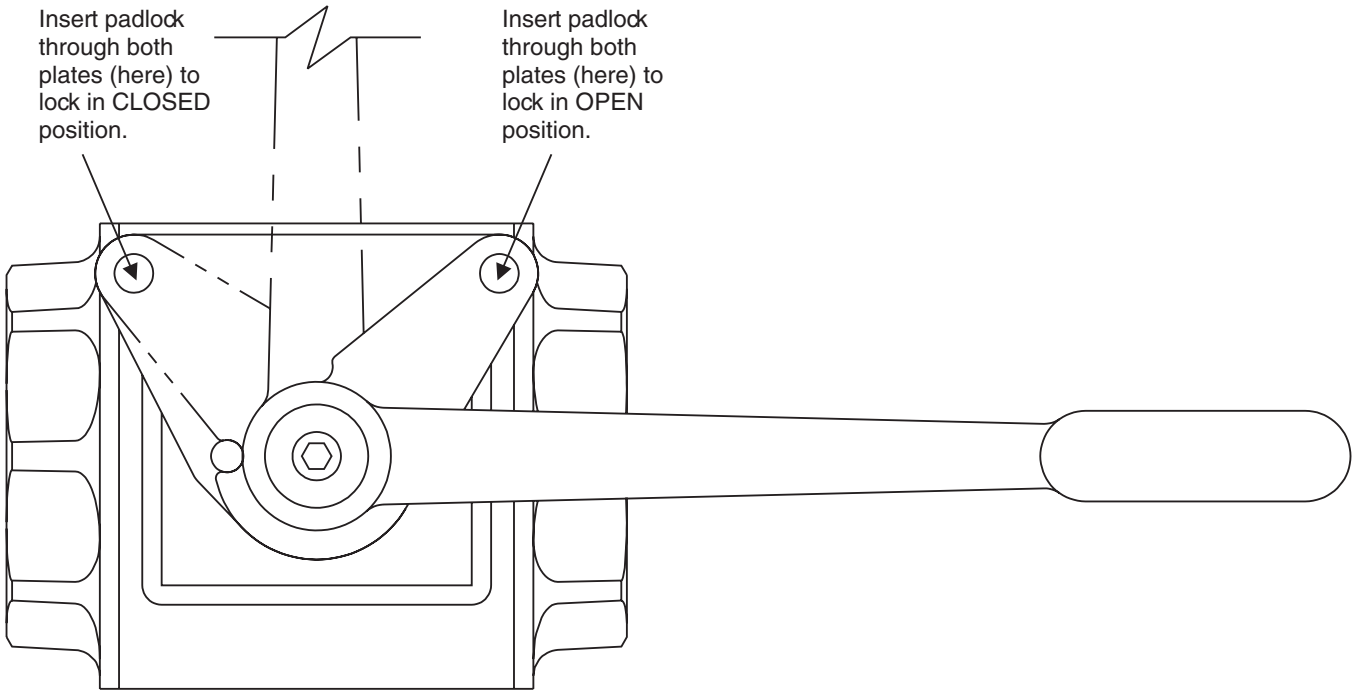
NOTE: Not required when ordering.

Threaded Ports



Code	Port Thread Size	Working Pressure	Dimensions mm (in)					
			A	B	C	D	F	G
BVAL – NPT, SAE, and BSPP								
04	1/4"	28 Bar (400 PSI)	66.8 (2.63)	38.1 (1.50)	6.4 (0.25)	68.6 (2.70)	85.1 (3.35)	41.4 (1.63)
06	3/8"	28 Bar (400 PSI)	66.8 (2.63)	38.1 (1.50)	9.7 (0.38)	68.6 (2.70)	85.1 (3.35)	41.4 (1.63)
08	1/2"	28 Bar (400 PSI)	66.8 (2.63)	38.1 (1.50)	12.7 (0.50)	68.6 (2.70)	85.1 (3.35)	41.4 (1.63)
12	3/4"	28 Bar (400 PSI)	83.3 (3.28)	44.5 (1.75)	19.1 (0.75)	95.8 (3.77)	129.3 (5.09)	47.2 (1.86)
16	1"	28 Bar (400 PSI)	88.4 (3.48)	50.8 (2.00)	25.4 (1.00)	101.9 (4.01)	129.3 (5.09)	50.3 (1.98)
20	1 1/4"	28 Bar (400 PSI)	99.1 (3.90)	69.9 (2.75)	31.8 (1.25)	131.8 (5.19)	173.0 (6.81)	64.3 (2.53)
24	1 1/2"	28 Bar (400 PSI)	109.7 (4.32)	82.6 (3.25)	38.1 (1.50)	143.5 (5.65)	173.0 (6.81)	69.6 (2.74)
32	2"	28 Bar (400 PSI)	124.5 (4.90)	101.6 (4.00)	50.8 (2.00)	162.8 (6.41)	173.0 (6.81)	78.0 (3.07)
40	2 1/2"	28 Bar (400 PSI)	152.4 (6.00)	127.0 (5.00)	63.5 (2.50)	203.2 (8.00)	218.7 (8.61)	104.4 (4.11)
48	3"	28 Bar (400 PSI)	185.7 (7.31)	152.4 (6.00)	76.2 (3.00)	228.3 (8.99)	218.7 (8.61)	116.3 (4.58)
64	4"	28 Bar (400 PSI)	225.8 (8.89)	177.8 (7.00)	101.6 (4.00)	254.3 (10.01)	218.7 (8.61)	129.8 (5.11)

BVHPLK: Standard Series 'BVHPLK-*' kit replaces the stopwasher with a stationary and moving plate, as illustrated below. As the handle is actuated, the moving plate aligns with one of the two locking positions in the stationary plate, enabling the valve to be locked in either **fully closed** or **fully open** position.



Ordering Information

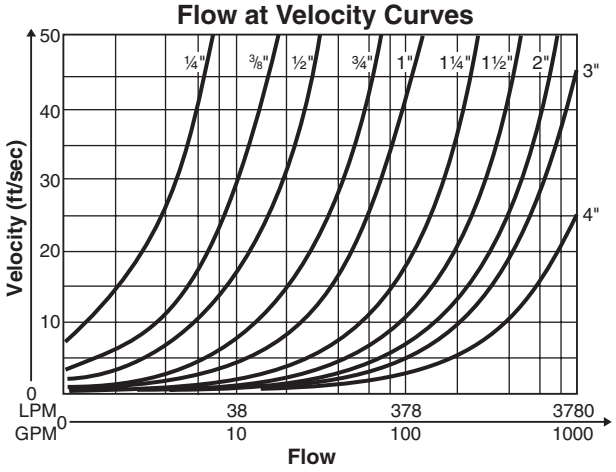
BVAL		Standard Locking
Code	Size	(Part Number)
04	1/4"	BVHPLK-1
06	3/8"	BVHPLK-1
08	1/2"	BVHPLK-1
12	3/4"	BVHPLK-1
16	1"	BVHPLK-1
20	1 1/4"	BVHPLK-2
24	1 1/2"	BVHPLK-2
32	2"	BVHPLK-2
40	2 1/2"	BVHPLK-3
48	3"	BVHPLK-3
64	4"	BVHPLK-3

Ball Valve Sizing Chart (2-Way)

Parker's unrestricted bore ball valves provide a fluid path which, in most cases, imposes no discernable pressure drop in standard hydraulic circuits. As a result, you can treat our valves as just like a length of fluid line, unless you are working with closed loop or other circuits where a tiny pressure drop carries a price tag in heat generation, etc.

The selection chart at the right may be used as a guide for confirming your choice of ball valve fluid line size relative to the expected flow in LPM (GPM) at a given velocity.

Flow at Velocity Curves



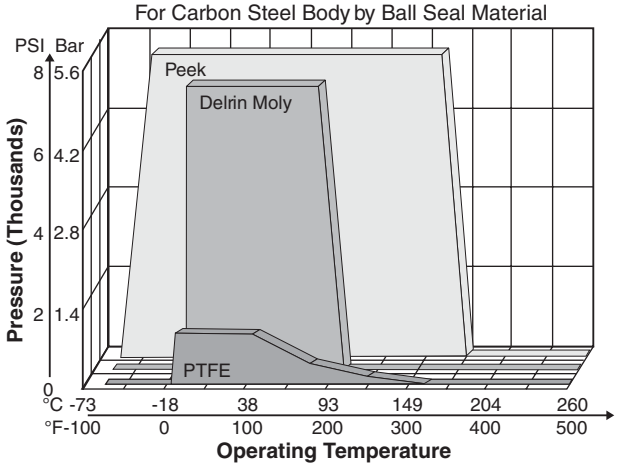
Ball Seals and Internal O-Rings

Standard Ball Seal Materials: Most application needs can be met by specifying one of the following ball seal materials:

- **Delrin™ Moly:** Standard with most ball valves. High pressure, moderate temperature range.
- **PTFE:** Excellent for suction and low pressure use. Inert to most substances and safe for food/water use.
- **Peek Hi-Temp:** Cost effective, provides additional temperature range up to 176.7°C (350°F). Best results with fluorocarbon sealing.

Ball Seal Temperature Ranges

For Carbon Steel Body by Ball Seal Material

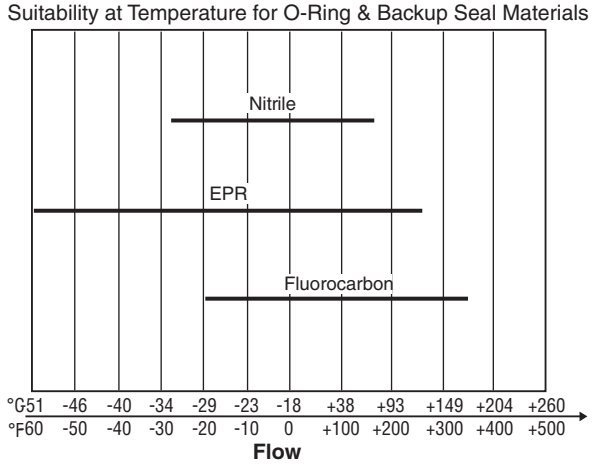


O-Ring and Backup Ring Material

- **Nitrile:** The industry standard for hydraulics using petroleum based fluids. Not suitable above 100°C (212°F).
- **EPR:** For use with Phosphate Esters (“Skydrol”), strong acids and bases, and other hostile media. Not compatible with petroleum based fluids. Good temperature range.
- **Fluorocarbon:** Extends temperature range to 350°F (176.7°C) with most Nitrile compatible media. Somewhat resistant to hostile media.

Elastomer Temperature Ranges

Suitability at Temperature for O-Ring & Backup Seal Materials



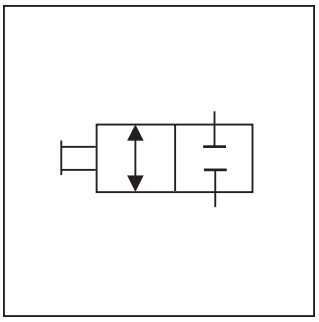
Sealing Materials Technical Data

Never operate Parker Ball Valves outside the temperature range published below for your selected thermoplastic and elastomer materials, even if the combination is approved in the Media Acceptability Table. You may experience valve leakage or failure.

	Ball Seal Materials			O-Ring & Backup Seal Materials		
Order Code	**1**	**2**	**4**	**N**	**E**	**V**
Description	**Delrin™ Moly**	**PTFE**	**PEEK Hi-Temp**	**Nitrile**	**EPR**	**Fluorocarbon**
Temperature Range	-30°C to +100°C (-22°F to +212°F)	-60°C to +180°C (-76°F to +356°F)	-40°C to +250°C (-40°F to +482°F)	-30°C to +100°C (-22°F to +212°F)	-50°C to +150°C (-58°F to +302°F)	-25°C to +250°C (-13°F to +482°F)
Seal Compound Identification	Delrin+MoS_2 Polyoxymethylene impregnated with Molybdenum Disulphide	Polytetra-fluoroethylene	Polyether-ether-ketone	Nitrile Butadiene rubber	Ethylene-polypropylene-diene rubber	Fluoropropylene methylene
Acronym	DM	PTFE	PEEK	NBR	EPR EPDM	FPM
Classification Synthesis	**Thermoplast** Saturated heteropolymer of heterogeneous polymer chains compounded with sulphide of molyb-denum metal for lubrication	**Thermoplast** Homogeneous, pure polymer chains, contain-ing fluorine	**Thermoplast** Aromatic linear polymer	**Elastomer** Unsaturated heteropolymer compounded from acrylonitrate and butadiene	**Elastomer** Saturated heteropolymer utilizing double valence bands outside the primary chain	**Elastomer** Multiple monomers & fluorine com-pounded into saturated hetero-polymer
Commercial Trade Names	Made to Parker's specifications	PTFE Hostaflon Fluon	Victrex	Nitrile Perbunan Chemigum Elaprim Krynac	Buna AP Dutral Epcar Keltran Nordel	Viton Fluorel Technoflon
Chemical Resistance Examples						
Suitable	Hydraulic fluids Water Inert Gases Air Alcohols Glycols Petroleum based fluids	Foodstuffs Acids & Alkalis Organic & inorganic solvents	Most fluids acceptable with Delrin Moly	Hydraulic fluids (except Skydrol) Water Air Petroleum based fluids	Phosphate esters Brake fluid Acids & Alkalis	NBR compatible fluids Acids & Alkalis
Not suitable	High molar acids & alkalis Fluorines Liquids for human consumption	Fluorines Liquid alkali metals	High molar acids & alkalis	Phosphate esters	Petroleum based oil & grease Chlorinated hydrocarbons	Phosphate esters

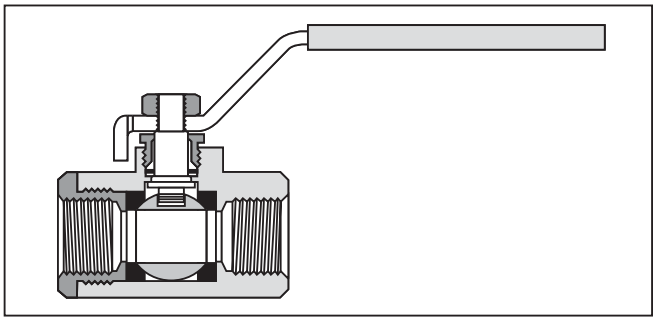
General Description

Series 500 low pressure ball valves provide total shut-off capability for services up to 41 Bar (600 PSI). Series 500 consists of NPT female/female ports, Series 510 and 501 are male/female in SAE and NPT respectively, and Series 506 are female/female in SAE. Series 502 features panel mounting capability.



Operation

A quarter turn of the handle is on or off. Ball valves are not intended for use as a throttling valve. Attempting to use it in these applications may result in premature seal failure and/or inability to turn the valve handle.



Features

- Ball valve bodies are machined from high quality CA377 forgings which provide extended service life and resist failure caused by severe temperature conditions.
- Highly inert PTFE seats and seals provide resistance to chemical corrosion.
- Blowout proof stem design, chrome plated brass ball and a special design handle enable increased turn and leverage for ease of opening and closing.
- Padlocking handle option provides lock-out capability where required.
- Venting option relieves downstream pressure in pneumatic applications.

Specifications

Maximum Working Pressure	41 Bar (600 PSI) Vented up to 17 Bar (250 PSI) Saturated Steam up to 10 Bar (150 PSI) Vacuum service to 29 in. Hg

Ordering Information

Style | Ports | Material (P) | Size | Options | Design Series

NOTE: Not required when ordering.

Style

Code	Description
V	Valve
VP *	Valve, Padlocking Handle
VV **	Valve, Vented
VVP **	Valve Vented, Padlocking Handle

* Only available up to #16 SAE in Series 506.

** Not available in Series 506 and only available up to size 16 in other series.

Material

Code	Description
P	Brass

Ports

Code	Description
500	Female/Female NPT Ports
501	Male/Female NPT Ports
502	Female/Female NPT Ports Panel Mount
506	Female/Female Straight Thread O-ring Ports
510	Male/Female Straight Thread O-ring Ports

Size

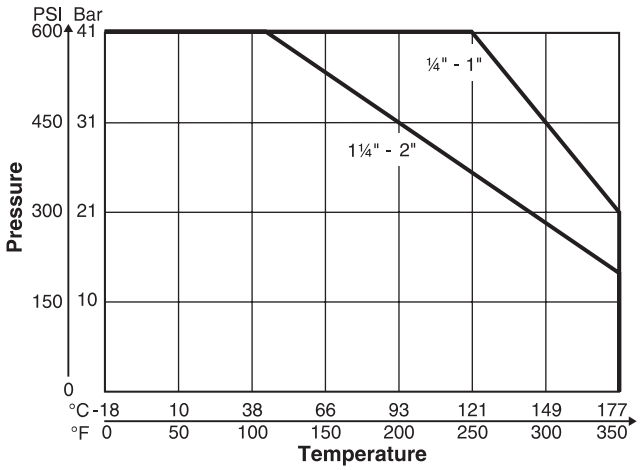
Code	Size
4	1/4" NPT
6	3/8" NPT
8	1/2" NPT
12	3/4" NPT
16	1" NPT
20*	1 1/4" NPT
24*	1 1/2" NPT
32*	2" NPT

* Available only in 500 Type

Options

Code	Description
Omit	No option
01	Stainless Steel Ball & Stem (Size 4 to 16 only)
02	Stainless Steel Handle & Nut
03	Stainless Steel Ball, Stem, Handle & Nut (Size 4 to 16 only)
04	T Handle

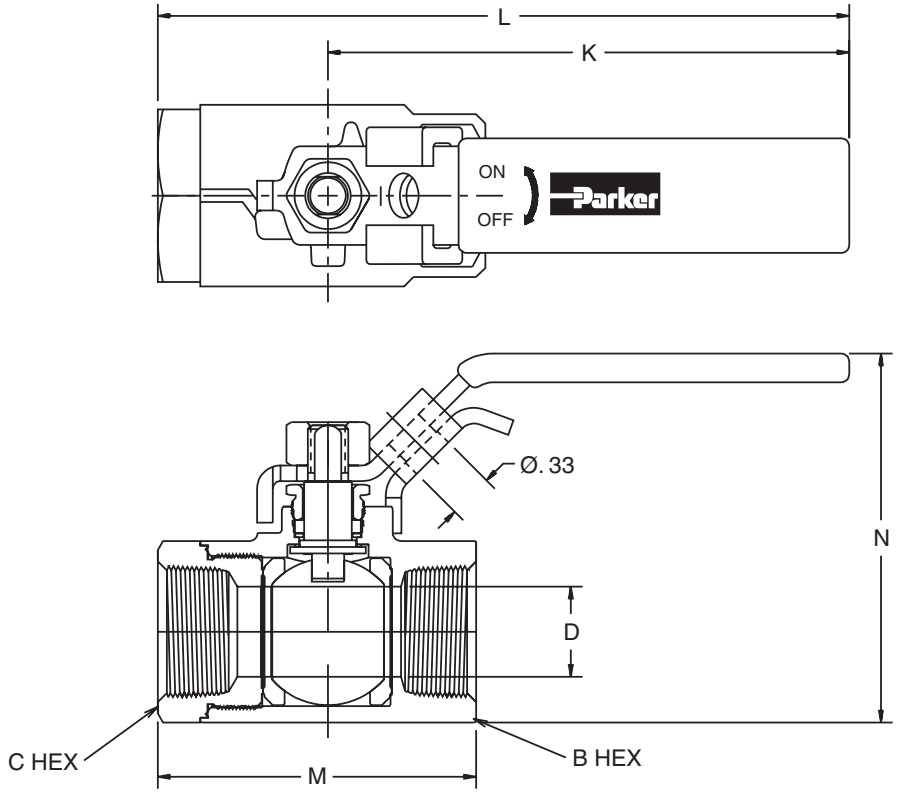
Performance Curves



Flow Data

Type 500, 502		Type 510		Type 501		Type 506	
Valve Size	**C_v**	**Valve Size**	**C_v**	**Valve Size**	**C_v**	**Valve Size**	**C_v**
1/4"	4.0	#4	0.8	1/4"	6.3	#4	4.0
3/8"	5.8	#6	2.1	3/8"	5.7	#6	5.8
1/2"	12.0	#8	5.3	1/2"	10.0	#8	12.0
3/4"	25.0	#12	13.0	3/4"	25.0	#12	25.0
1"	35.0	#16	33.0	1"	35.0	#16	35.0
1-1/4"	57.0	–	–	–	–	#20	57.0
1-1/2"	92.0	–	–	–	–	#24	92.0
2"	224.0	–	–	–	–	#32	224.0

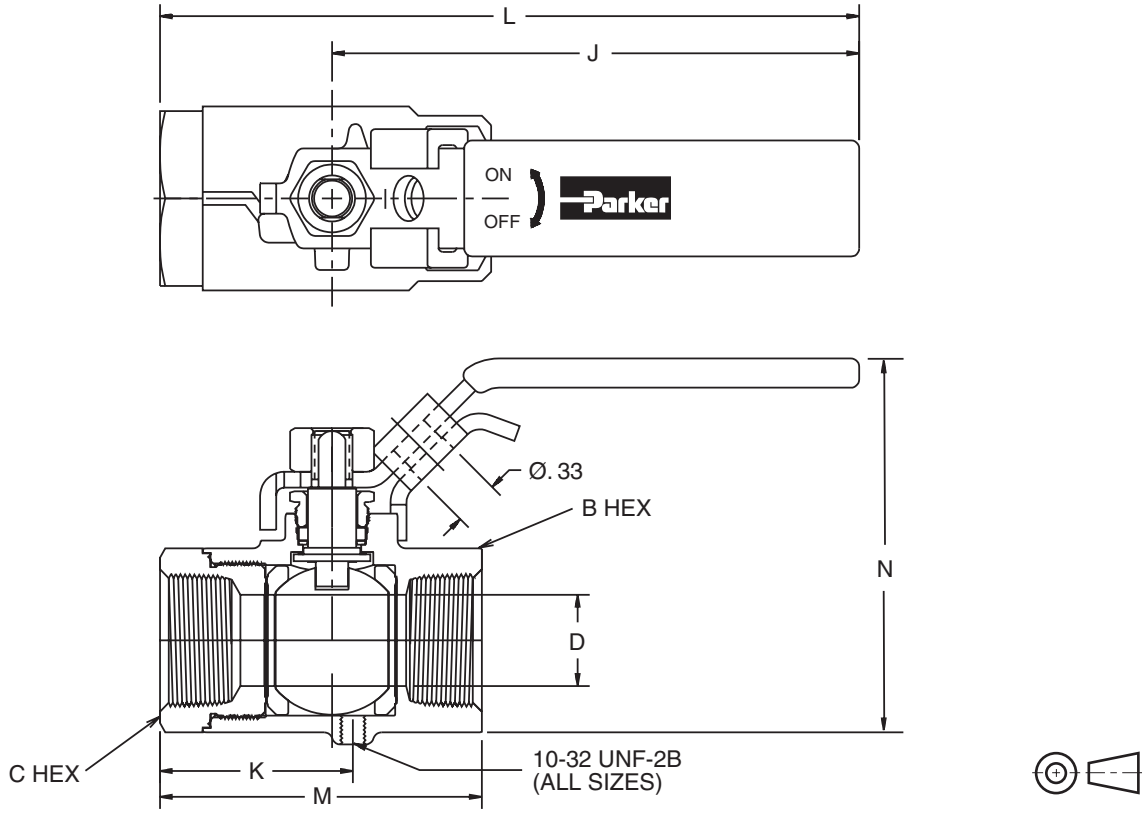
Model V500P and VP500P



Part Number	Pipe Thread (PTF)	B Hex	C Hex	Dimensions mm (in) K	L	M	N	D Flow Ø
Female-Female Pipe Ends V500P								
V500P4	1/4"	15/16"	15/16"	100.6 (3.96)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
V500P6	3/8"	15/16"	15/16"	100.6 (3.96)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
V500P8	1/2"	1-1/16"	1-1/16"	100.6 (3.96)	127.0 (5.00)	55.9 (2.20)	65.5 (2.58)	12.7 (0.500)
V500P12	3/4"	1-1/4"	1-5/16"	100.6 (3.96)	133.4 (5.25)	61.5 (2.42)	71.4 (2.81)	17.4 (0.685)
V500P16	1"	1-1/2"	1-9/16"	100.6 (3.96)	135.6 (5.34)	69.9 (2.75)	78.2 (3.08)	22.2 (0.875)
Locking Handle, Female Pipe Ends VP500P (Shown above)								
VP500P4	1/4"	15/16"	15/16"	100.6 (3.96)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
VP500P6	3/8"	15/16"	15/16"	100.6 (3.96)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
VP500P8	1/2"	1-1/16"	1-1/16"	100.6 (3.96)	127.0 (5.00)	55.9 (2.20)	65.5 (2.58)	12.7 (0.500)
VP500P12	3/4"	1-1/4"	1-5/16"	100.6 (3.96)	133.4 (5.25)	61.5 (2.42)	71.4 (2.81)	17.4 (0.685)
VP500P16	1"	1-1/2"	1-9/16"	100.6 (3.96)	135.6 (5.34)	69.9 (2.75)	78.2 (3.08)	22.2 (0.875)

Locking handle parts: For use with 5/16" Ø shank lock; 33Ø

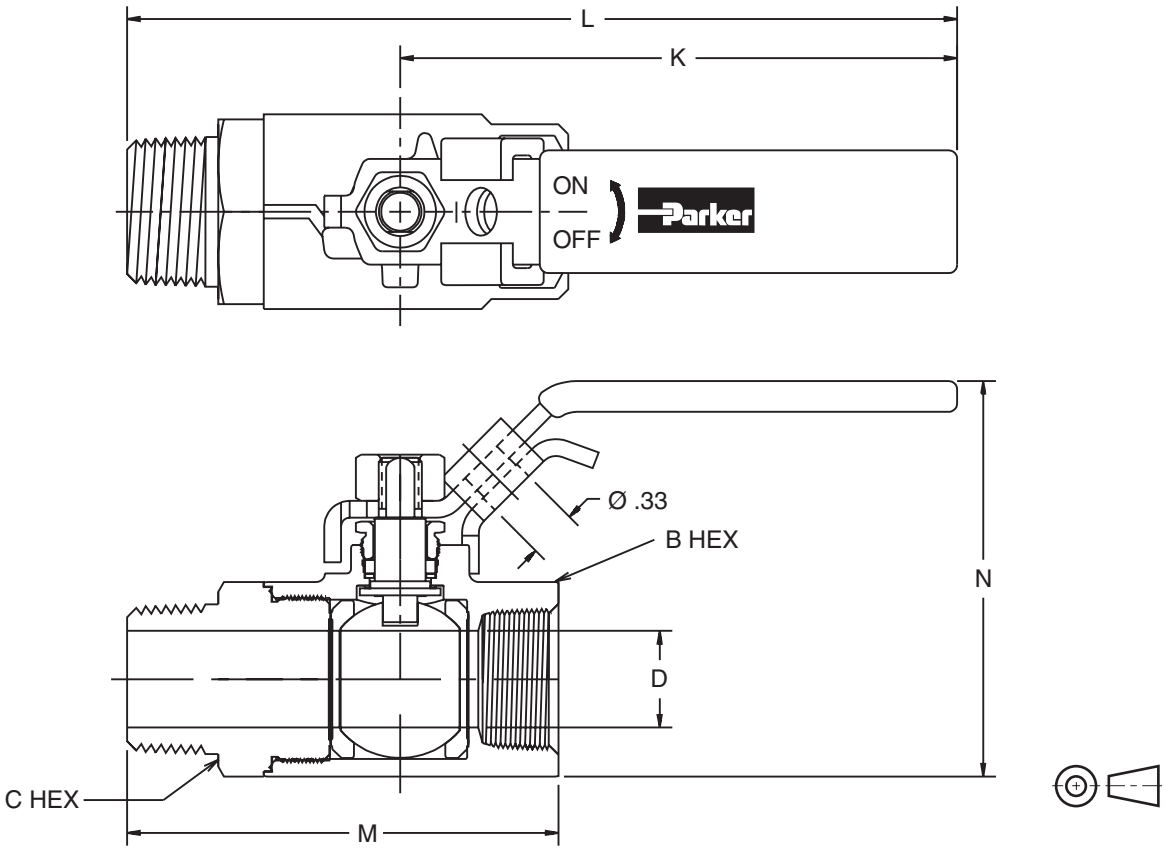
Model VV500P and VVP500P



Part Number	Pipe Thread	B Hex	C Hex	Dimensions mm (in) J	K	L	M	N	D Flow Ø
Vented, Female Pipe Ends VV500P									
VV500P4	1/4"	15/16"	15/16"	100.6 (3.96)	28.2 (1.11)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
VV500P6	3/8"	15/16"	15/16"	100.6 (3.96)	28.2 (1.11)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
VV500P8	1/2"	1-1/16"	1-1/16"	100.6 (3.96)	31.2 (1.23)	127.0 (5.00)	55.9 (2.20)	65.5 (2.58)	12.7 (0.500)
VV500P12	3/4"	1-1/4"	1-5/16"	100.6 (3.96)	36.8 (1.45)	133.4 (5.25)	61.5 (2.42)	71.4 (2.81)	17.4 (0.685)
VV500P16	1"	1-1/2"	1-9/16"	100.6 (3.96)	40.1 (1.58)	135.6 (5.34)	69.9 (2.75)	78.2 (3.08)	22.2 (0.875)
OSHA 29 CFR Part 1910 Vented, Locking Handle, Female Pipe Ends VVP500P (Shown above)									
VVP500P4	1/4"	15/16"	15/16"	100.6 (3.96)	28.2 (1.11)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
VVP500P6	3/8"	15/16"	15/16"	100.6 (3.96)	28.2 (1.11)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
VVP500P8	1/2"	1-1/16"	1-1/16"	100.6 (3.96)	31.2 (1.23)	127.0 (5.00)	55.9 (2.20)	65.5 (2.58)	12.7 (0.500)
VVP500P12	3/4"	1-1/4"	1-5/16"	100.6 (3.96)	36.8 (1.45)	133.4 (5.25)	61.5 (2.42)	71.4 (2.81)	17.4 (0.685)
VVP500P16	1"	1-1/2"	1-9/16"	100.6 (3.96)	40.1 (1.58)	135.6 (5.34)	69.9 (2.75)	78.2 (3.08)	22.2 (0.875)

Locking handle parts: For use with 5/16" Ø shank lock

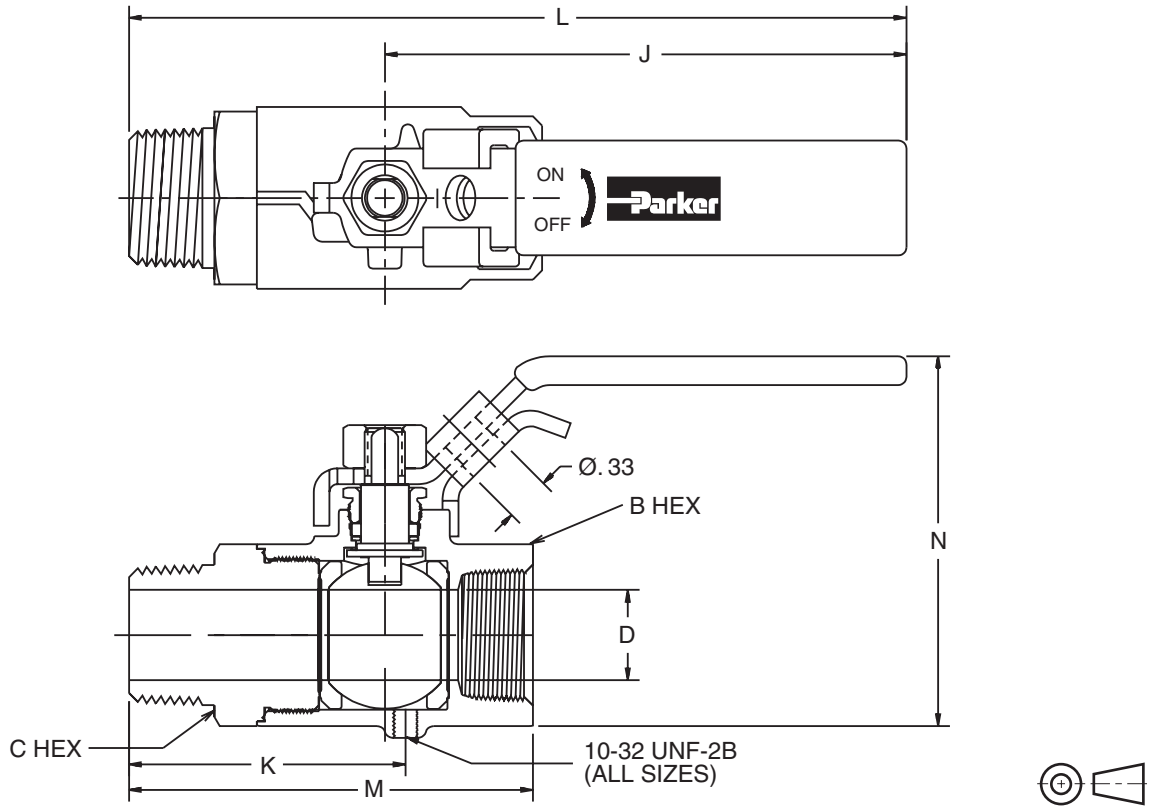
Model V501P and VP501P



Part Number	Pipe Thread	B Hex	C Hex	Dimensions mm (in) K	L	M	N	D Flow Ø
Male-Female Pipe Ends V501P								
V501P4	1/4"	15/16"	15/16"	100.6 (3.96)	138.7 (5.46)	65.8 (2.59)	62.7 (2.47)	8.7 (0.344)
V501P6	3/8"	15/16"	15/16"	100.6 (3.96)	138.7 (5.46)	65.8 (2.59)	62.7 (2.47)	9.5 (0.375)
V501P8	1/2"	1-1/16"	1-1/16"	100.6 (3.96)	146.1 (5.75)	74.9 (2.95)	65.5 (2.58)	12.7 (0.500)
V501P12	3/4"	1-1/4"	1-5/16"	100.6 (3.96)	148.1 (5.83)	76.2 (3.00)	71.4 (2.81)	17.4 (0.685)
V501P16	1"	1-1/2"	1-9/16"	100.6 (3.96)	157.2 (6.19)	91.4 (3.60)	78.2 (3.08)	22.2 (0.875)
Locking Handle, Male-Female Pipe Ends VP501P (Shown above)								
VP501P4	1/4"	15/16"	15/16"	100.6 (3.96)	138.7 (5.46)	65.8 (2.59)	62.7 (2.47)	8.7 (0.344)
VP501P6	3/8"	15/16"	15/16"	100.6 (3.96)	138.7 (5.46)	65.8 (2.59)	62.7 (2.47)	9.5 (0.375)
VP501P8	1/2"	1-1/16"	1-1/16"	100.6 (3.96)	146.1 (5.75)	74.9 (2.95)	65.5 (2.58)	12.7 (0.500)
VP501P12	3/4"	1-1/4"	1-5/16"	100.6 (3.96)	148.1 (5.83)	76.2 (3.00)	71.4 (2.81)	17.4 (0.685)
VP501P16	1"	1-1/2"	1-9/16"	100.6 (3.96)	157.2 (6.19)	91.4 (3.60)	78.2 (3.08)	22.2 (0.875)

Locking handle parts: For use with 5/16" Ø shank lock

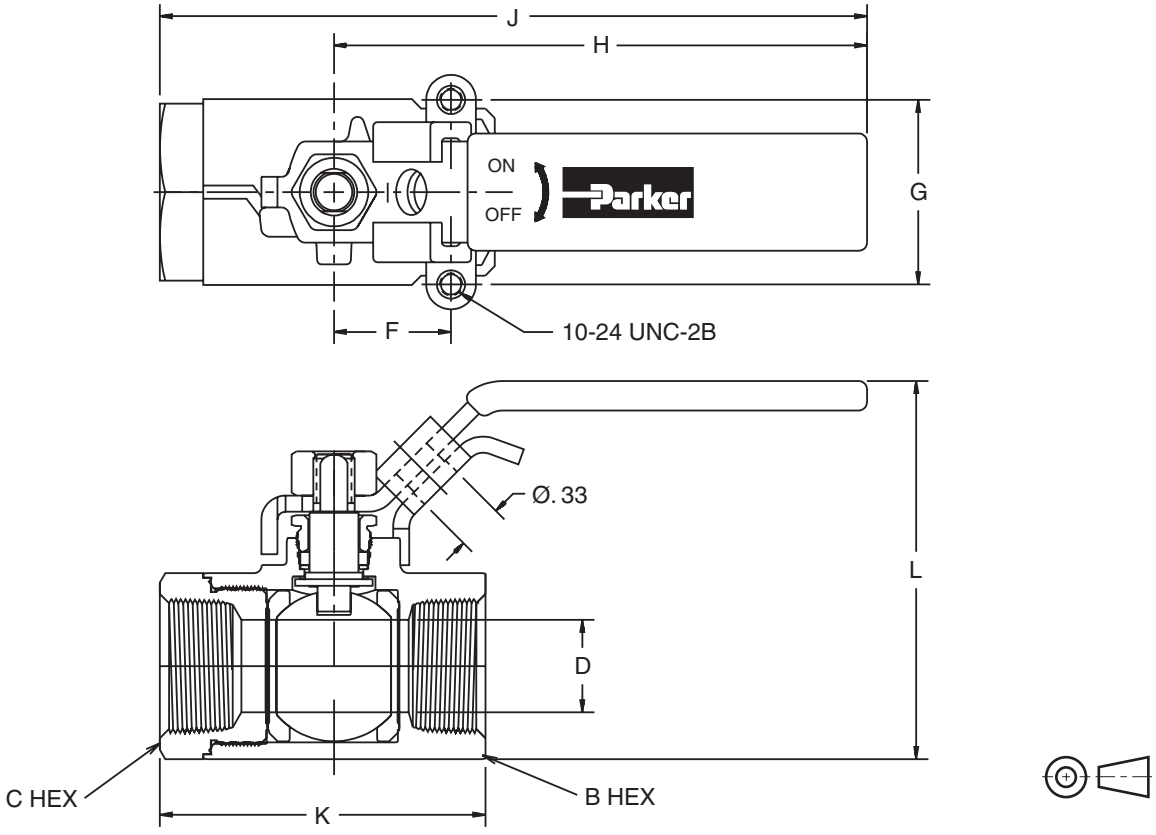
Model VV501P and VVP501P



Part Number	Pipe Thread (PTF)	B Hex	C Hex	Dimensions mm (in) J	K	L	M	N	D Flow Ø
Vented, Male-Female Pipe Ends VV501P									
VV501P4	1/4"	15/16"	15/16"	100.6 (3.96)	42.4 (1.67)	138.7 (5.46)	65.8 (2.59)	62.7 (2.47)	8.7 (0.344)
VV501P6	3/8"	15/16"	15/16"	100.6 (3.96)	42.4 (1.67)	138.7 (5.46)	65.8 (2.59)	62.7 (2.47)	9.5 (0.375)
VV501P8	1/2"	1-1/16"	1-1/16"	100.6 (3.96)	50.3 (1.98)	146.1 (5.75)	74.9 (2.95)	65.5 (2.58)	12.7 (0.500)
VV501P12	3/4"	1-1/4"	1-5/16"	100.6 (3.96)	51.6 (2.03)	148.1 (5.83)	76.2 (3.00)	71.4 (2.81)	17.4 (0.685)
VV501P16	1"	1-1/2"	1-9/16"	100.6 (3.96)	61.7 (2.43)	157.2 (6.19)	91.4 (3.60)	78.2 (3.08)	22.2 (0.875)
OSHA 29 CFR Part 1910 Vented, Locking Handle, Male-Female Pipe Ends VVP501P (Shown above)									
VVP501P4	1/4"	15/16"	15/16"	100.6 (3.96)	42.4 (1.67)	138.7 (5.46)	65.8 (2.59)	62.7 (2.47)	8.7 (0.344)
VVP501P6	3/8"	15/16"	15/16"	100.6 (3.96)	42.4 (1.67)	138.7 (5.46)	65.8 (2.59)	62.7 (2.47)	9.5 (0.375)
VVP501P8	1/2"	1-1/16"	1-1/16"	100.6 (3.96)	50.3 (1.98)	146.1 (5.75)	74.9 (2.95)	65.5 (2.58)	12.7 (0.500)
VVP501P12	3/4"	1-1/4"	1-5/16"	100.6 (3.96)	51.6 (2.03)	148.1 (5.83)	76.2 (3.00)	71.4 (2.81)	17.4 (0.685)
VVP501P16	1"	1-1/2"	1-9/16"	100.6 (3.96)	61.7 (2.43)	157.2 (6.19)	91.4 (3.60)	78.2 (3.08)	22.2 (0.875)

Locking handle parts: For use with 5/16" Ø shank lock

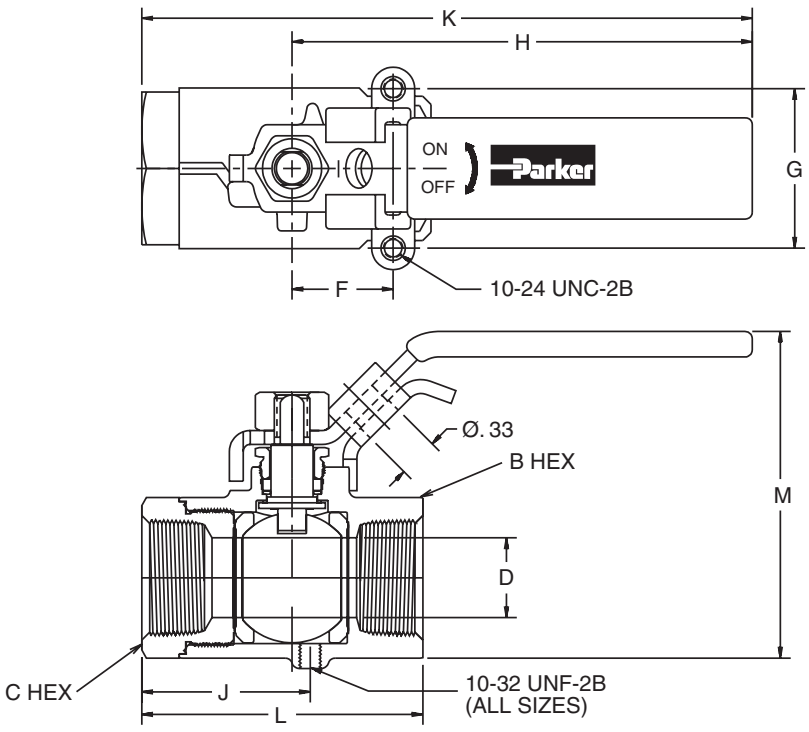
Model V502P and VP502P



Part Number	Pipe Thread	B Hex	C Hex	Dimensions mm (in) F	G	H	J	K	L	D Flow Ø
Female-Female Pipe Ends, Panel Mount V502P										
V502P4	1/4"	15/16"	15/16"	12.7 (0.50)	28.4 (1.12)	100.6 (3.96)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
V502P6	3/8"	15/16"	15/16"	12.7 (0.50)	28.4 (1.12)	100.6 (3.96)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
V502P8	1/2"	1-1/16"	1-1/16"	12.7 (0.50)	28.4 (1.12)	100.6 (3.96)	127.0 (5.00)	55.9 (2.20)	65.5 (2.58)	12.7 (0.500)
V502P12	3/4"	1-1/4"	1-5/16"	22.1 (0.87)	34.8 (1.37)	100.6 (3.96)	133.4 (5.25)	61.5 (2.42)	71.4 (2.81)	17.4 (0.685)
V502P16	1"	1-1/2"	1-9/16"	22.1 (0.87)	34.8 (1.37)	100.6 (3.96)	135.6 (5.34)	69.9 (2.75)	78.2 (3.08)	22.2 (0.875)
Locking Handle, Female Pipe Ends, Panel Mount VP502P (Shown above)										
VP502P4	1/4"	15/16"	15/16"	12.7 (0.50)	28.4 (1.12)	100.6 (3.96)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
VP502P6	3/8"	15/16"	15/16"	12.7 (0.50)	28.4 (1.12)	100.6 (3.96)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
VP502P8	1/2"	1-1/16"	1-1/16"	12.7 (0.50)	28.4 (1.12)	100.6 (3.96)	127.0 (5.00)	55.9 (2.20)	65.5 (2.58)	12.7 (0.500)
VP502P12	3/4"	1-1/4"	1-5/16"	22.1 (0.87)	34.8 (1.37)	100.6 (3.96)	133.4 (5.25)	61.5 (2.42)	71.4 (2.81)	17.4 (0.685)
VP502P16	1"	1-1/2"	1-9/16"	22.1 (0.87)	34.8 (1.37)	100.6 (3.96)	135.6 (5.34)	69.9 (2.75)	78.2 (3.08)	22.2 (0.875)

Locking handle parts: For use with 5/16" ∅ shank lock

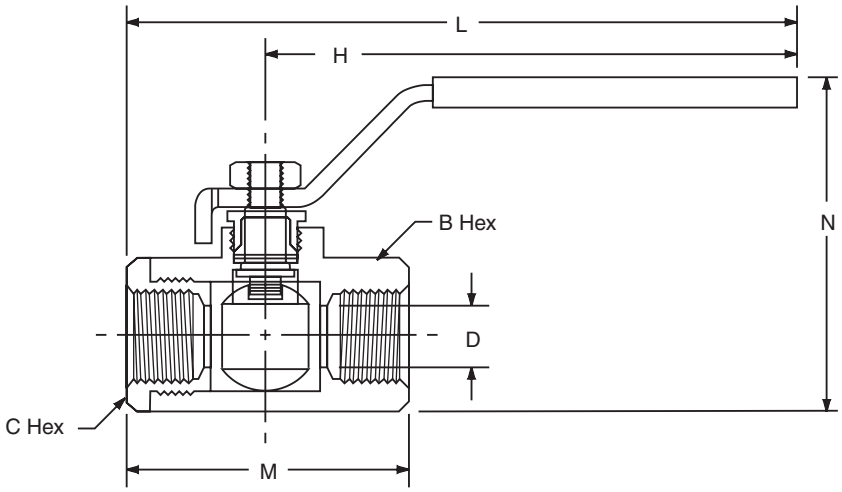
Model VV502P and VVP502P



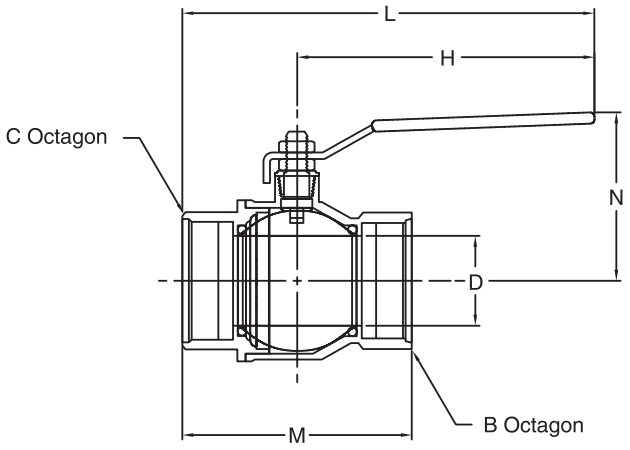
Part Number	Pipe Thread	B Hex	C Hex	Dimensions mm (in) F	G	H	J	K	L	M	D Flow Ø
Vented, Female-Female Pipe Ends, Panel Mount VV502P											
VV502P4	1/4"	15/16"	15/16"	12.7 (0.50)	28.4 (1.12)	100.6 (3.96)	28.2 (1.11)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
VV502P6	3/8"	15/16"	15/16"	12.7 (0.50)	28.4 (1.12)	100.6 (3.96)	28.2 (1.11)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
VV502P8	1/2"	1-1/16"	1-1/16"	12.7 (0.50)	28.4 (1.12)	100.6 (3.96)	31.2 (1.23)	127.0 (5.00)	55.9 (2.20)	65.5 (2.58)	12.7 (0.500)
VV502P12	3/4"	1-1/4"	1-5/16"	22.1 (0.87)	34.8 (1.37)	100.6 (3.96)	36.8 (1.45)	133.4 (5.25)	61.5 (2.42)	71.4 (2.81)	17.4 (0.685)
VV502P16	1"	1-1/2"	1-9/16"	22.1 (0.87)	34.8 (1.37)	100.6 (3.96)	40.1 (1.58)	135.6 (5.34)	69.9 (2.75)	78.2 (3.08)	22.2 (0.875)
OSHA 29 CFR Part 1910 Vented, Locking Handle, Female Pipe Ends, Panel Mount VVP502P (Shown above)											
VVP502P4	1/4"	15/16"	15/16"	12.7 (0.50)	28.4 (1.12)	100.6 (3.96)	28.2 (1.11)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
VVP502P6	3/8"	15/16"	15/16"	12.7 (0.50)	28.4 (1.12)	100.6 (3.96)	28.2 (1.11)	124.5 (4.90)	51.6 (2.03)	62.7 (2.47)	9.5 (0.375)
VVP502P8	1/2"	1-1/16"	1-1/16"	12.7 (0.50)	28.4 (1.12)	100.6 (3.96)	31.2 (1.23)	127.0 (5.00)	55.9 (2.20)	65.5 (2.58)	12.7 (0.500)
VVP502P12	3/4"	1-1/4"	1-5/16"	22.1 (0.87)	34.8 (1.37)	100.6 (3.96)	36.8 (1.45)	133.4 (5.25)	61.5 (2.42)	71.4 (2.81)	17.4 (0.685)
VVP502P16	1"	1-1/2"	1-9/16"	22.1 (0.87)	34.8 (1.37)	100.6 (3.96)	40.1 (1.58)	135.6 (5.34)	69.9 (2.75)	78.2 (3.08)	22.2 (0.875)

Locking handle parts: For use with 5/16" ∅ shank lock

Model V506P

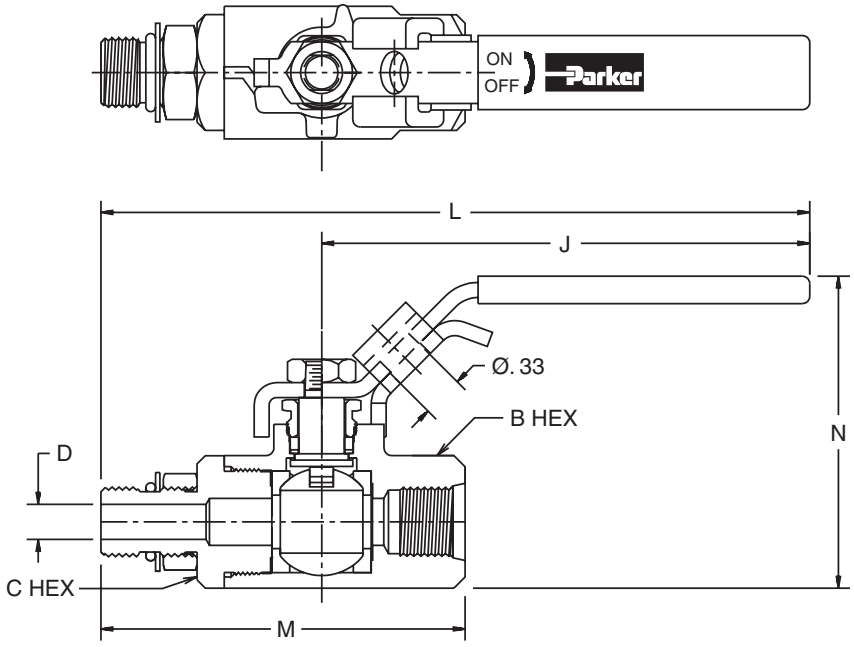


Part Number	Straight Thread	B Hex	C Hex	Dimensions mm (in) H	L	M	N	D Flow Ø
Female/Female, Straight Thread O-Ring Port V506P								
V506P4	7/16-20	15/16"	15/16"	100.6 (3.96)	127.3 (5.01)	55.9 (2.20)	62.7 (2.47)	9.5 (0.375)
V506P6	9/16-18	15/16"	15/16"	100.6 (3.96)	128.8 (5.07)	57.4 (2.26)	62.7 (2.47)	9.5 (0.375)
V506P8	3/4-16	1-1/16"	1-1/16"	100.6 (3.96)	131.6 (5.18)	61.5 (2.42)	66.0 (2.60)	12.7 (0.500)
V506P12	1 1/16-12	1-1/4"	1-5/16"	100.6 (3.96)	149.1 (5.87)	87.9 (3.46)	71.4 (2.81)	17.4 (0.685)
V506P16	1 5/16-12	1-1/2"	1-9/16"	100.6 (3.96)	151.4 (5.96)	93.5 (3.68)	78.2 (3.08)	22.2 (0.875)



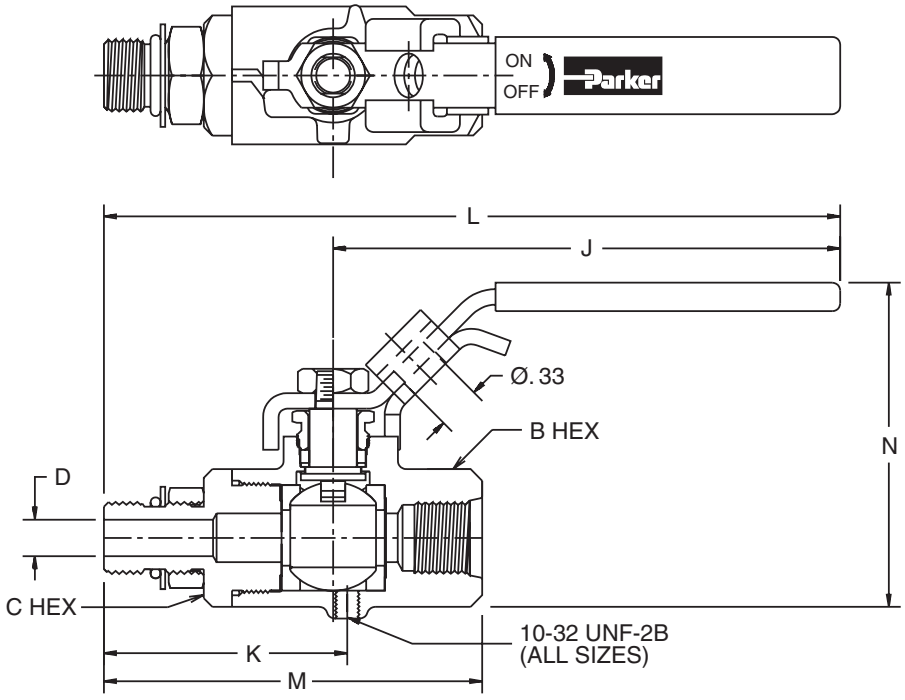
Part Number	Straight Thread	B Octagon	C Octagon	Dimensions mm (in) H	L	M	N	D Flow Ø
Female/Female, Straight Thread O-Ring Port V506P								
V506P20	1 5/8-12	49.0 (1.93)	49.0 (1.93)	158.0 (6.22)	204.5 (8.05)	93.0 (3.66)	76.5 (3.01)	30.0 (1.18)
V506P24	1 7/8-12	54.1 (2.13)	54.1 (2.13)	158.0 (6.22)	209.0 (8.23)	102.1 (4.02)	82.6 (3.25)	38.1 (1.50)
V506P32	2 1/2-12	72.4 (2.85)	72.4 (2.85)	158.0 (6.22)	218.4 (8.60)	120.9 (4.76)	89.4 (3.52)	48.0 (1.89)

Model V510P and VP510P



Part Number	Straight Thread	B Hex	C Hex	Dimensions mm (in) K	L	M	N	D Flow Ø
Male-Female, Straight Thread O-Ring Port V510P								
V510P4	7/16-20	15/16"	15/16"	100.6 (3.96)	142.5 (5.61)	72.4 (2.85)	62.7 (2.47)	4.8 (0.188)
V510P6	9/16-18	15/16"	15/16"	100.6 (3.96)	144.3 (5.68)	74.2 (2.92)	62.7 (2.47)	7.1 (0.281)
V510P8	3/4-16	1-1/16"	1-1/16"	100.6 (3.96)	149.4 (5.88)	80.5 (3.17)	65.5 (2.58)	10.7 (0.422)
V510P12	1-1/16-12	1-1/4"	1-5/16"	100.6 (3.96)	163.6 (6.44)	102.4 (4.03)	71.4 (2.81)	16.7 (0.656)
V510P16	1-5/16-12	1-1/2"	1-9/16"	100.6 (3.96)	166.6 (6.56)	108.7 (4.28)	78.2 (3.08)	22.2 (0.875)
Locking Handle, Straight Thread O-Ring Port VP510P (Shown above)								
VP510P4	7/16-20	15/16"	15/16"	100.6 (3.96)	142.5 (5.61)	72.4 (2.85)	62.7 (2.47)	4.8 (0.188)
VP510P6	9/16-18	15/16"	15/16"	100.6 (3.96)	144.3 (5.68)	74.2 (2.92)	62.7 (2.47)	7.1 (0.281)
VP510P8	3/4-16	1-1/16"	1-1/16"	100.6 (3.96)	149.4 (5.88)	80.5 (3.17)	65.5 (2.58)	10.7 (0.422)

Model VV510P and VVP510P



Part Number	Straight Thread	B Hex	C Hex	Dimensions mm (in) J	K	L	M	N	D Flow Ø
Vented, Straight Thread O-Ring Port VV510P									
VV510P4	7/16-20	15/16"	15/16"	100.6 (3.96)	46.2 (1.82)	142.5 (5.61)	72.4 (2.85)	62.7 (2.47)	4.8 (0.188)
VV510P6	9/16-18	15/16"	15/16"	100.6 (3.96)	48.0 (1.89)	144.3 (5.68)	74.2 (2.92)	62.7 (2.47)	7.1 (0.281)
VV510P8	3/4-16	1-1/16"	1-1/16"	100.6 (3.96)	53.8 (2.12)	149.4 (5.88)	80.5 (3.17)	65.5 (2.58)	10.7 (0.422)
VV510P12	1-1/16-12	1-1/4"	1-5/16"	100.6 (3.96)	67.1 (2.64)	163.6 (6.44)	102.4 (4.03)	71.4 (2.81)	16.7 (0.656)
OSHA 29 CFR Part 1910 Vented, Locking Handle, Male-Female, Straight Thread O-Ring Port VV510P (Shown above)									
VVP510P4	7/16-20	15/16"	15/16"	100.6 (3.96)	46.2 (1.82)	142.5 (5.61)	72.4 (2.85)	62.7 (2.47)	4.8 (0.188)
VVP510P6	9/16-18	15/16"	15/16"	100.6 (3.96)	48.0 (1.89)	144.3 (5.68)	74.2 (2.92)	62.7 (2.47)	7.1 (0.281)
VVP510P8	3/4-16	1-1/16"	1-1/16"	100.6 (3.96)	53.8 (2.12)	149.4 (5.88)	80.5 (3.17)	65.5 (2.58)	10.7 (0.422)

General Description

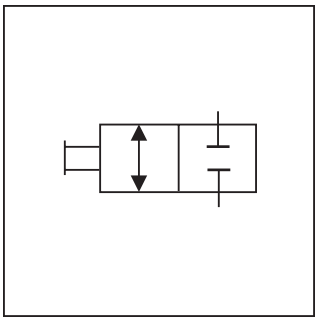
Series 520 low pressure ball valves provide total shut-off capability for services up to 41 Bar (600 PSI). This economical ball valve is available in female pipe sizes.

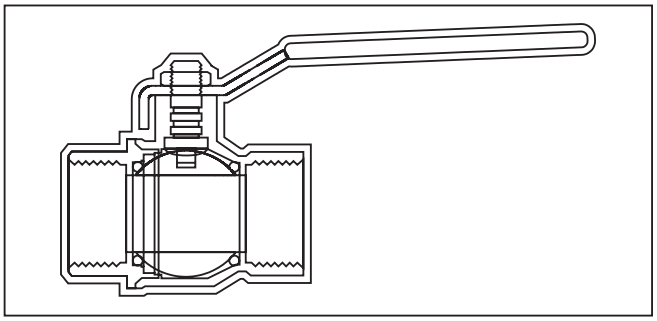
Operation

A quarter turn of the handle is on or off. Ball valves are not intended for use as a throttling valve. Attempting to use it in these applications may result in premature seal failure and/or inability to turn the valve handle.

Features

- Ball valve bodies are machined forgings which provide extended service life and resist failure caused by severe temperature conditions.
- Full flow design assures maximum system efficiency.
- Highly inert PTFE seats provide resistance to chemical corrosion.
- Two fluorocarbon o-rings at the stem provide maximum safety with no maintenance.
- Blowout proof stem design, chrome plated brass ball and a special design handle enable increased turn and leverage for ease of opening and closing.





Specifications

Maximum Working Pressure	Sizes 1/4" - 2" 41 Bar (600 PSI) Sizes 2 1/2" - 3" 31 Bar (450 PSI) Saturated Steam up to 10 Bar (150 PSI) and 177°C (350°F) Vacuum service to 29 in. Hg

Ordering Information

V — Style

Code	Description
V	Valve

520 — Type

Code	Description
520	Female/Female NPT Ports

P — Material

Code	Description
P	Brass

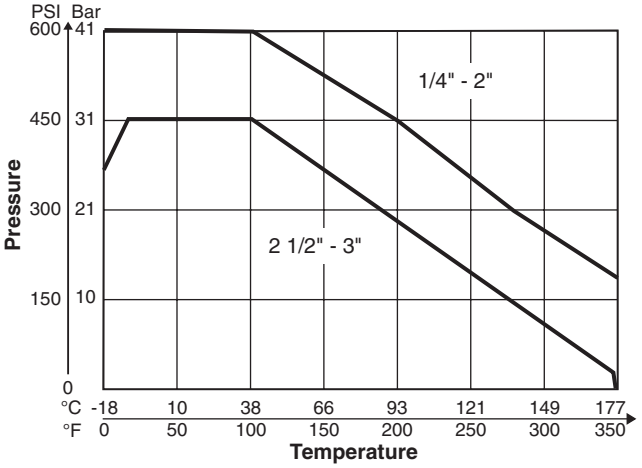
[ ] — Size

Code	Size
4	1/4" NPT
6	3/8" NPT
8	1/2" NPT
12	3/4" NPT
16	1" NPT
20	1 1/4" NPT
24	1 1/2" NPT
32	2" NPT
40	2 1/2" NPT
48	3" NPT

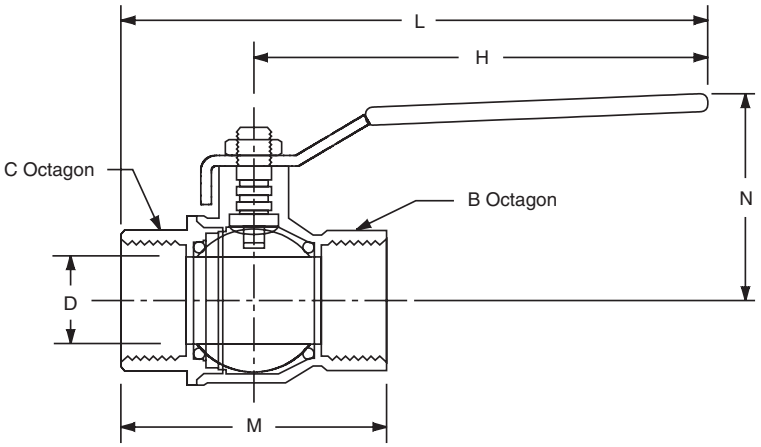
[ ] — Design Series

NOTE: Not required when ordering.

Performance Curves



Dimensions



Part Number	Pipe Thread	B Octagon	C Octagon	Dimensions mm (in)				D Flow Ø
				H	L	M	N	
Brass Ball Valve V520P								
V520P4	1/4-18	20.1 (0.79)	20.1 (0.79)	100.1 (3.94)	122.7 (4.83)	45.0 (1.77)	38.1 (1.50)	7.9 (0.310)
V520P6	3/8-18	20.1 (0.79)	20.1 (0.79)	100.1 (3.94)	122.7 (4.83)	45.0 (1.77)	38.1 (1.50)	10.2 (0.400)
V520P8	1/2-14	24.9 (0.98)	24.9 (0.98)	100.1 (3.94)	129.5 (5.10)	58.9 (2.32)	42.9 (1.69)	15.2 (0.600)
V520P12	3/4-14	31.0 (1.22)	31.0 (1.22)	119.9 (4.72)	151.9 (5.98)	64.0 (2.52)	50.0 (1.97)	20.1 (0.790)
V520P16	1 -11.5	39.9 (1.57)	39.9 (1.57)	119.9 (4.72)	160.5 (6.32)	81.0 (3.19)	54.1 (2.13)	25.4 (1.000)
V520P20	1 1/4	49.0 (1.93)	49.0 (1.93)	158.0 (6.22)	204.5 (8.05)	93.0 (3.66)	71.6 (2.82)	31.8 (1.250)
V520P24	1 1/2	54.1 (2.13)	54.1 (2.13)	158.0 (6.22)	209.0 (8.23)	102.1 (4.02)	77.7 (3.06)	39.9 (1.570)
V520P32	2	68.3 (2.69)	68.3 (2.69)	158.0 (6.22)	217.9 (8.58)	120.9 (4.76)	84.6 (3.33)	50.8 (2.000)
V520P40	2 1/2	85.1 (3.35)	85.1 (3.35)	255.0 (10.04)	333.0 (13.11)	156.0 (6.14)	132.1 (5.20)	64.0 (2.520)
V520P48	3	98.8 (3.89)	98.8 (3.89)	255.0 (10.04)	343.4 (13.52)	177.0 (6.97)	140.0 (5.51)	76.2 (3.000)

General Description

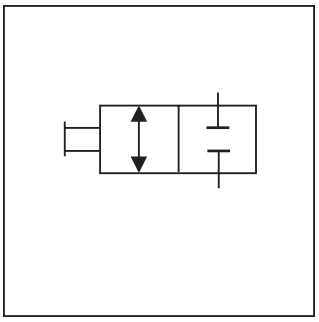
Series 500CS low pressure carbon steel ball valves provide total shut-off capability for services up to 138 Bar (2000 PSI).

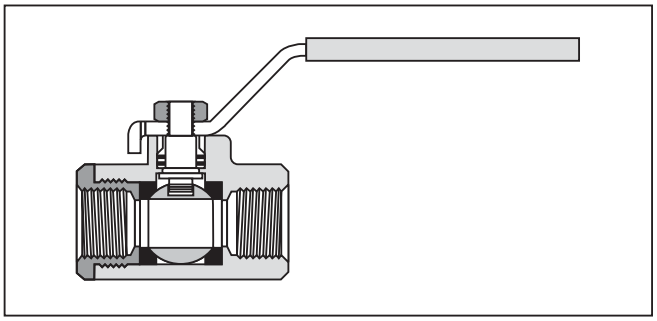
Operation

A quarter turn of the handle is on or off. Ball valves are not intended for use as a throttling valve. Attempting to use it in these applications may result in premature seal failure and/or inability to turn the valve handle.

Features

- Ball valve bodies are machined from high quality carbon steel and phosphate coated forgings providing superior corrosion resistance.
- Highly inert PTFE seats and seals provide resistance to chemical corrosion.
- Blowout proof stem design, chrome plated brass ball and a special design handle enable increased turn and leverage for ease of opening and closing.
- Padlocking handle options provides lock-out capability where required.
- In-line or panel mount options provide installation flexibility.

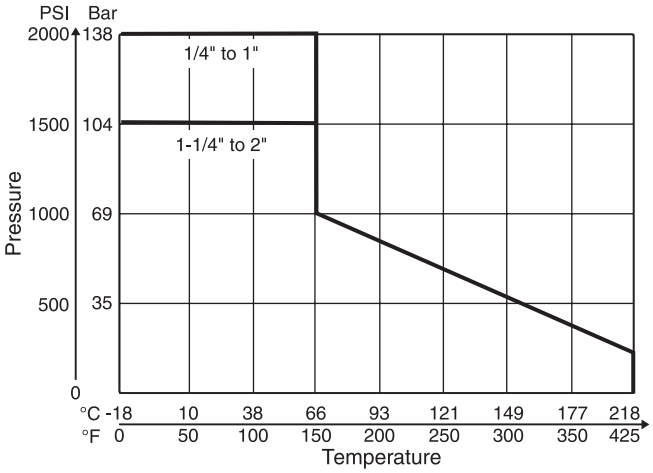




Specifications

Maximum Working Pressure	Sizes 1/4" - 1" 138 Bar (2000 PSI) Sizes 1 1/4" - 2" 103 Bar (1500 PSI) Saturated Steam up to 10 Bar (150 PSI) and 177C (350°F)
Body Material	Carbon Steel, Phosphate Coated

Performance Curves



Flow Data

Type 500CS, 502CS	
Valve Size	**C_v**
1/4"	6.0
3/8"	12.0
1/2"	15.0
3/4"	23.0
1"	36.0
1-1/4"	44.0
1-1/2"	64.0
2"	114.0

Style

Code	Description
V	Valve
VP	Valve, Padlocking Handle

Tube Variations

Code	Description
500	Female/Female NPT Ports
502*	Female/Female Panel Mount

* 502 Panel mount is only available in sizes 20 – 32.

Material

CS

Code	Description
CS	Carbon Steel

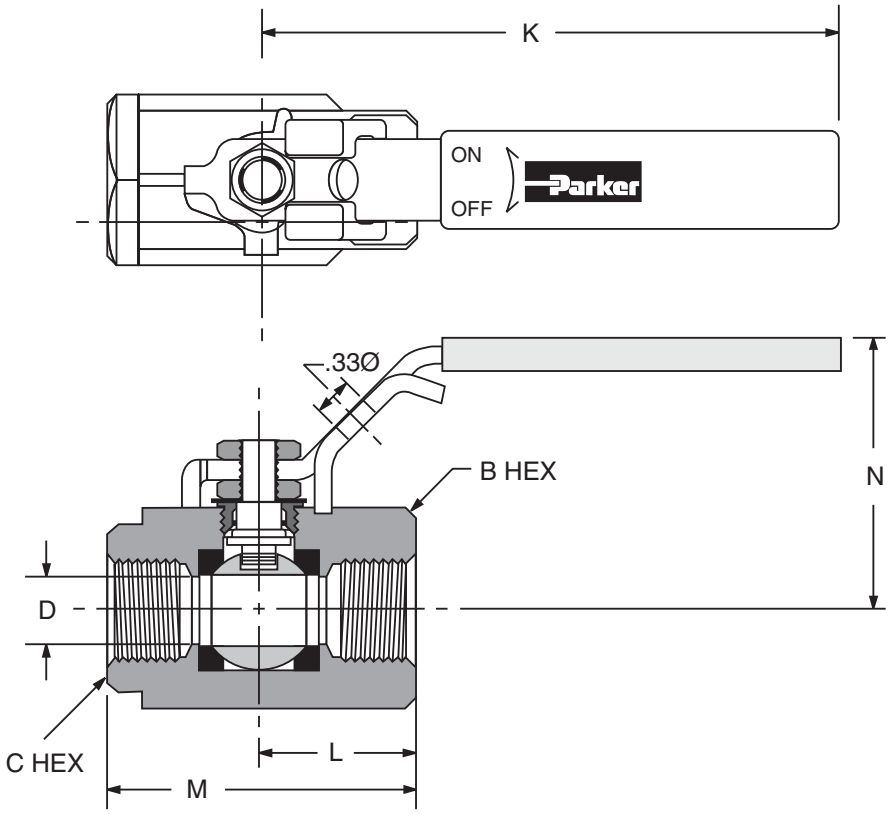
Size

Code	Size
4	1/4" NPT
6	3/8" NPT
8	1/2" NPT
12	3/4" NPT
16	1" NPT
20	1 1/4" NPT
24	1 1/2" NPT
32	2" NPT

Design Series

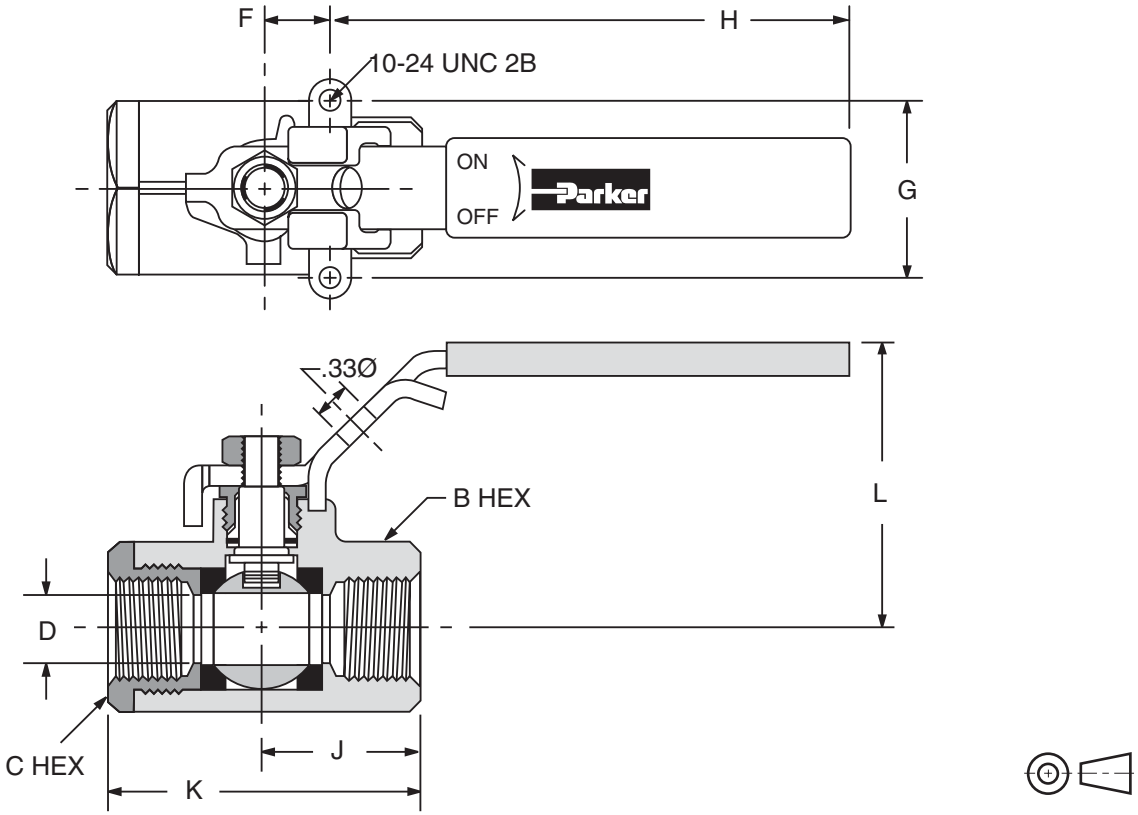
NOTE: Not required when ordering.

Model V500CS and VP500CS



Part Number	Pipe Thread	B Hex	C Hex	Dimensions mm (in) K	L	M	N	D Flow Ø
Female-Female Pipe Ends V500CS								
V500CS4	1/4"	1-1/16"	15/16"	96.0 (3.78)	25.4 (1.00)	50.8 (2.00)	41.4 (1.63)	10.2 (0.400)
V500CS6	3/8"	1-1/16"	15/16"	96.0 (3.78)	25.4 (1.00)	50.8 (2.00)	41.4 (1.63)	10.2 (0.400)
V500CS8	1/2"	1-1/4"	1-1/16"	96.0 (3.78)	31.8 (1.25)	60.2 (2.37)	43.9 (1.73)	13.7 (0.540)
V500CS12	3/4"	1-5/8"	1-3/8"	129.5 (5.10)	38.1 (1.50)	73.7 (2.90)	52.8 (2.08)	17.3 (0.680)
V500CS16	1"	2"	1-5/8"	129.5 (5.10)	44.7 (1.76)	86.6 (3.41)	58.4 (2.30)	22.4 (0.880)
Locking Handle, Female Pipe Ends VP500CS (Shown above)								
VP500CS4	1/4"	1-1/16"	15/16"	104.9 (4.13)	25.4 (1.00)	50.8 (2.00)	56.6 (2.23)	10.2 (0.400)
VP500CS6	3/8"	1-1/16"	15/16"	104.9 (4.13)	25.4 (1.00)	50.8 (2.00)	56.6 (2.23)	10.2 (0.400)
VP500CS8	1/2"	1-1/4"	1-1/16"	104.9 (4.13)	31.8 (1.25)	60.2 (2.37)	56.6 (2.23)	13.7 (0.540)
VP500CS12	3/4"	1-5/8"	1-3/8"	127.0 (5.00)	38.1 (1.50)	73.7 (2.90)	71.1 (2.80)	17.3 (0.680)
VP500CS16	1"	2"	1-5/8"	127.0 (5.00)	44.7 (1.76)	86.6 (3.41)	75.4 (2.97)	22.4 (0.880)

Model V502CS and VP502CS



Part Number	Pipe Thread	B Hex	C Hex	Dimensions mm (in) F	G	H	J	K	L	D Flow Ø
Female-Female Pipe Ends, Panel Mount V502CS										
V502CS20	1-1/4"	2"	2-1/4"	23.9 (0.94)	38.1 (1.50)	154.9 (6.10)	47.5 (1.87)	96.5 (3.80)	70.1 (2.76)	25.4 (1.000)
V502CS24	1-1/2"	2-5/16"	2-1/2"	23.9 (0.94)	38.1 (1.50)	154.9 (6.10)	57.7 (2.27)	115.6 (4.55)	75.7 (2.98)	31.8 (1.250)
V502CS32	2"	2-3/4"	3"	26.2 (1.03)	50.8 (2.00)	218.4 (8.60)	61.5 (2.42)	122.7 (4.83)	89.9 (3.54)	38.1 (1.500)
Locking Handle, Female Pipe Ends, Panel Mount VP502CS (Shown above)										
VP502CS20	1-1/4"	2"	2-1/4"	23.9 (0.94)	38.1 (1.50)	190.5 (7.50)	47.5 (1.87)	96.5 (3.80)	80.0 (3.15)	25.4 (1.000)
VP502CS24	1-1/2"	2-5/16"	2-1/2"	23.9 (0.94)	38.1 (1.50)	190.5 (7.50)	57.7 (2.27)	115.6 (4.55)	85.6 (3.37)	31.8 (1.250)
VP502CS32	2"	2-3/4"	3"	26.2 (1.03)	50.8 (2.00)	222.3 (8.75)	61.5 (2.42)	122.7 (4.83)	87.9 (3.46)	38.1 (1.500)

General Description

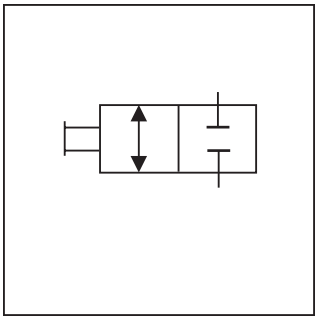
Series 50*SS low pressure, stainless steel ball valves provide total shut-off capability for services up to 138 Bar (2000 PSI).

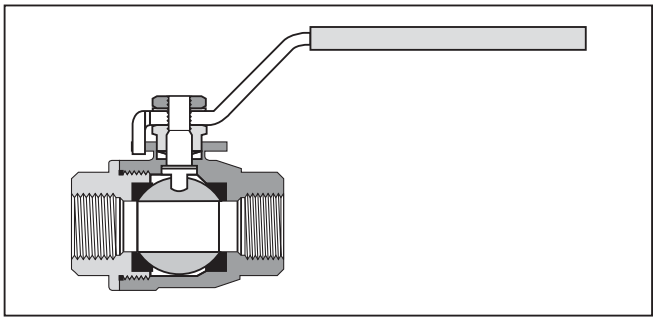
Operation

A quarter turn of the handle is on or off. Ball Valves are not intended for use as a throttling valve. Attempting to use it in these applications may result in premature seal failure and/or inability to turn the valve handle.

Features

- Ball valve bodies are machined from CF-8M stainless steel castings, equivalent of 316 stainless steel which is suited for corrosive environments.
- Highly inert PTFE seats and seals provide resistance to chemical corrosion.
- Blowout proof stem design, 316 stainless ball and a special design handle enable increased turn and leverage for ease of opening and closing.
- Padlocking handle option provides lock-out capability where required.
- Style 502 allows panel mounting for installation flexibility.

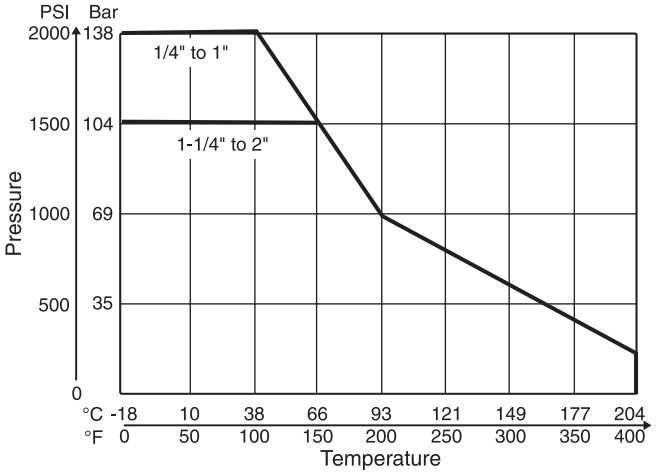




Specifications

Maximum Working Pressure	Sizes 1/4" - 1" 138 Bar (2000 PSI) Sizes 1 1/4" - 2" 103 Bar (1500 PSI) Saturated Steam up to 10 Bar (150 PSI) and 177°C (350°F) Vacuum service to 29 in. Hg
Body Material	CF-8M Stainless Steel 316 SS Cast Equivalent
Ball Material	Stainless Steel

Performance Curves



Flow Data

Type 501SS		Type 502SS	
Valve Size	**C_v**	**Valve Size**	**C_v**
1/4"	4.0	1/4"	4.0
3/8"	6.0	3/8"	6.0
1/2"	14.0	1/2"	14.0
3/4"	35.0	3/4"	35.0
1"	54.0	1"	54.0
		1-1/4"	74.0
		1-1/2"	120.0
		2"	226.0

Style

Code	Description
V	Valve
VP*	Valve, Locking Handle

* Locking handle style is only available in 502 series.

Type

Code	Description
501	Male/Female NPT Ports
502	Female/Female NPT Ports Panel Mount

Material

Code	Description
SS	Stainless Steel

Size *

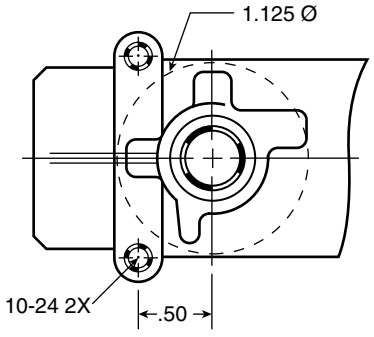
Description 501	502	Code	Size
Y	Y	4	1/4" NPT
Y	Y	6	3/8" NPT
Y	Y	8	1/2" NPT
Y	Y	12	3/4" NPT
Y	Y	16	1" NPT
N	Y	20	1 1/4" NPT
N	Y	24	1 1/2" NPT
N	Y	32	2" NPT

*Note: Y = Yes, it is available in this type
N = Not available in this type

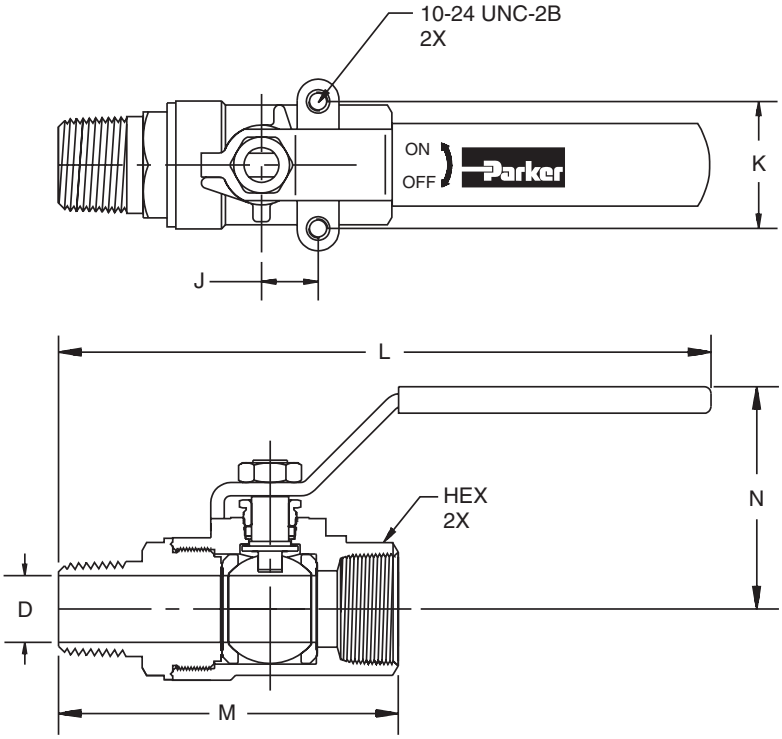
Design Series

NOTE: Not required when ordering.

Mounting Detail

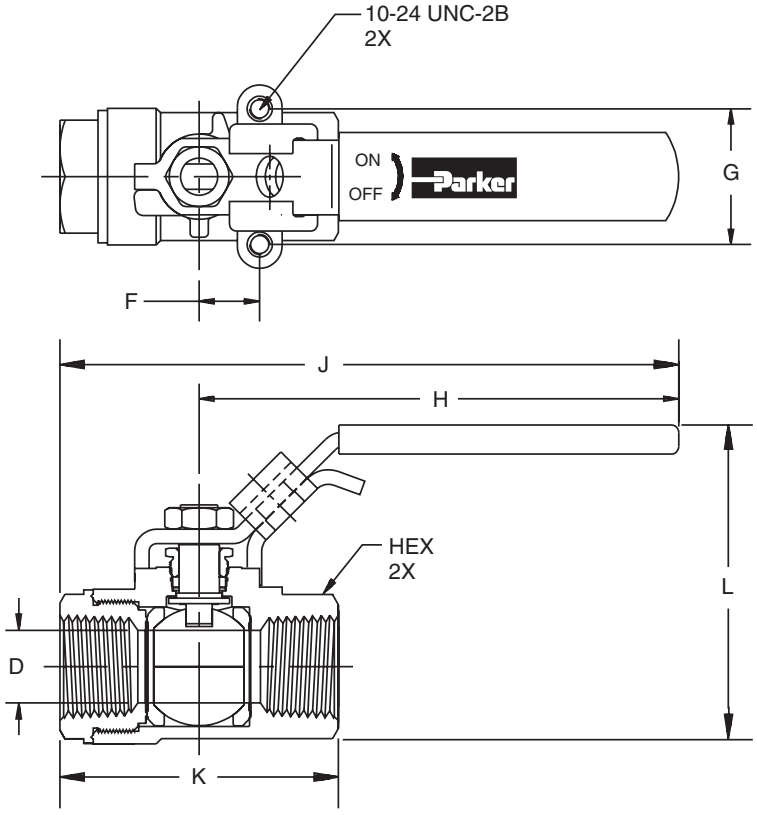


Model V501SS



Part Number	Pipe Thread	Hex	Dimensions mm (in) J	K	L	M	N	D Flow Ø
Male-Female Pipe Ends V501SS								
V501SS4	1/4"	15/16"	12.7 (0.50)	28.4 (1.12)	142.2 (5.60)	67.3 (2.65)	50.0 (1.97)	7.1 (0.280)
V501SS6	3/8"	15/16"	12.7 (0.50)	28.4 (1.12)	142.2 (5.60)	67.3 (2.65)	50.0 (1.97)	9.5 (0.375)
V501SS8	1/2"	1-1/16"	12.7 (0.50)	28.4 (1.12)	148.6 (5.85)	77.5 (3.05)	50.8 (2.00)	12.7 (0.500)
V501SS12	3/4"	1-3/8"	22.4 (0.88)	34.8 (1.37)	184.7 (7.27)	97.8 (3.85)	64.8 (2.55)	18.3 (0.720)
V501SS16	1"	1-5/8"	22.4 (0.88)	34.8 (1.37)	190.0 (7.48)	108.0 (4.25)	68.1 (2.68)	23.9 (0.940)

Model V502SS and VP502SS



Part Number	Pipe Thread	Hex	Dimensions mm (in)						D Flow Ø	Panel Mount Thread
			F	G	H	J	K	L		
Female to Female Panel Mount										
V*502SS4	1/4"	15/16"	12.7 (0.50)	28.6 (1.13)	101.6 (4.00)	127.8 (5.03)	52.6 (2.07)	64.0 (2.52)	9.5 (0.38)	10-24 UNC
V*502SS6	3/8"	15/16"	12.7 (0.50)	28.6 (1.13)	101.6 (4.00)	127.8 (5.03)	52.6 (2.07)	64.0 (2.52)	9.5 (0.38)	10-24 UNC
V*502SS8	1/2"	1-1/16"	12.7 (0.50)	28.6 (1.13)	101.6 (4.00)	130.3 (5.13)	57.7 (2.27)	67.3 (2.65)	12.7 (0.50)	10-24 UNC
V*502SS12	3/4"	1-3/8"	22.2 (0.88)	34.9 (1.38)	127.0 (5.00)	169.4 (6.67)	85.1 (3.35)	87.9 (3.46)	20.1 (0.79)	10-24 UNC
V*502SS16	1"	1-5/8"	22.2 (0.88)	34.9 (1.38)	127.0 (5.00)	172.0 (6.77)	89.9 (3.54)	95.0 (3.74)	25.4 (1.00)	10-24 UNC
V*502SS20	1-1/4"	2"	25.4 (1.00)	38.1 (1.50)	177.8 (7.00)	228.6 (9.00)	101.6 (4.00)	115.6 (4.55)	31.8 (1.25)	1/4-20 UNC
V*502SS24	1-1/2"	2-3/8"	25.4 (1.00)	38.1 (1.50)	177.8 (7.00)	182.6 (7.19)	111.3 (4.38)	137.7 (5.42)	38.1 (1.50)	1/4-20 UNC
V*502SS32	2"	3"	25.4 (1.00)	38.1 (1.50)	177.8 (7.00)	247.7 (9.75)	139.7 (5.50)	144.3 (5.68)	50.8 (2.00)	1/4-20 UNC

Locking handle parts: For use with 5/16" diameter shank lock

General Description

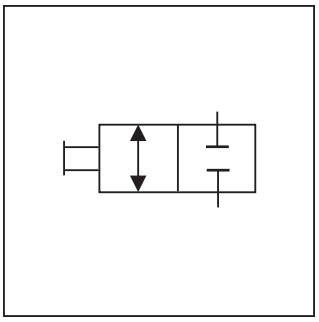
Series 590 low pressure 90° ball valves provide total shut-off capability for services up to 17 Bar (250 PSI).

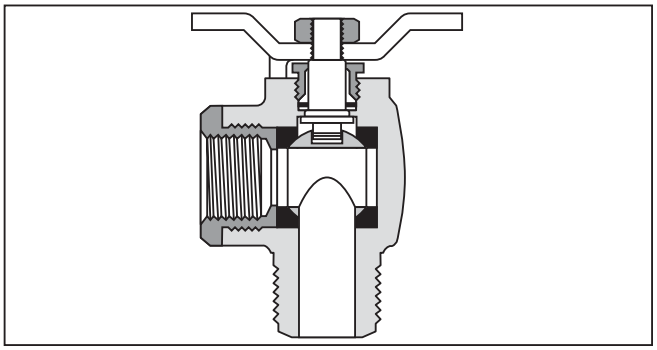
Operation

A quarter turn of the handle is on or off. Ball valves are not intended for use as a throttling valve. Attempting to use it in these applications may result in premature seal failure and/or inability to turn the valve handle.

Features

- Ball Valve bodies are machined from high quality CA377 forgings which provide extended service life and resist failure caused by severe temperature conditions.
- Highly inert PTFE seats and seals provide resistance to chemical corrosion.
- Blowout proof stem design, chrome plated brass ball and a special design handle enable increased turn and leverage for ease of opening and closing.





Specifications

Working Pressure	17 Bar (250 PSI)

Ordering Information

V		P			
Style	Type	Material	Size		Design Series

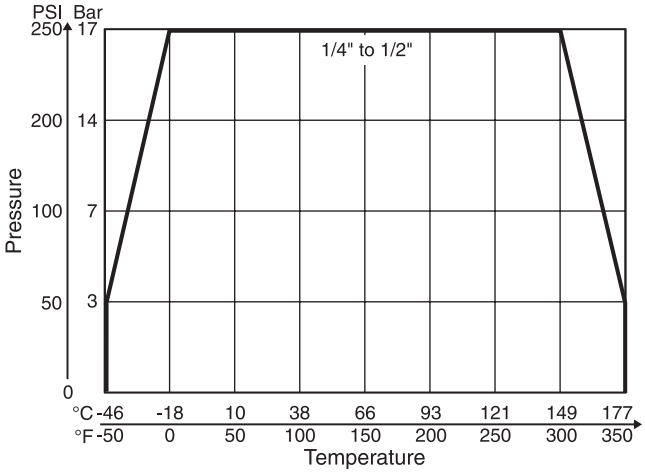
NOTE: Not required when ordering.

Code	Description
590	90° Male/Female NPT Ports
591	90° Male/Male NPT Ports

Code	Description
P	Brass

Code	Size
4	1/4" NPT
6	3/8" NPT
8	1/2" NPT

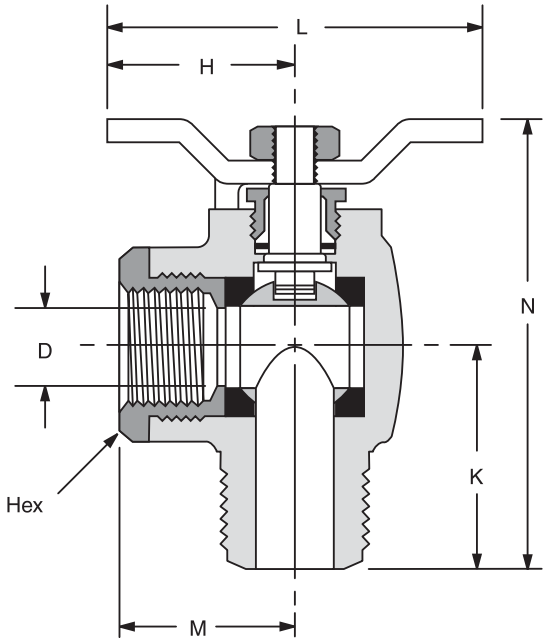
Performance Curve



3300-ballvalves.indd, ddp

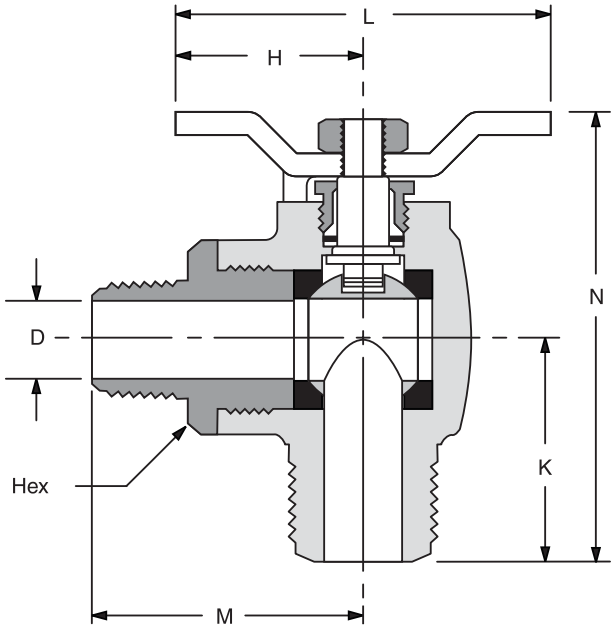
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Model V590P



Part Number	Pipe Thread	Hex	Dimensions mm (in) H	K	L	M	N	D Flow Ø
90° Flow, Male-Female Pipe Ends V590P								
V590P-4	1/4"	15/16"	31.8 (1.25)	27.4 (1.08)	63.5 (2.50)	25.4 (1.00)	61.5 (2.42)	9.5 (0.375)
V590P-6	3/8"	15/16"	31.8 (1.25)	27.7 (1.09)	63.5 (2.50)	25.4 (1.00)	61.7 (2.43)	9.5 (0.375)
V590P-8	1/2"	1-1/16"	31.8 (1.25)	33.0 (1.30)	63.5 (2.50)	27.4 (1.08)	67.8 (2.67)	12.7 (0.500)

Model V591P



Part Number	Pipe Thread (PTF)	Hex	Dimensions mm (in)					D Flow Ø
			H	K	L	M	N	
90° Flow, Male-Female Pipe Ends V591P								
V591P-4	1/4"	15/16"	31.8 (1.25)	27.4 (1.08)	63.5 (2.50)	39.6 (1.56)	61.5 (2.42)	9.5 (0.375)
V591P-6	3/8"	15/16"	31.8 (1.25)	27.7 (1.09)	63.5 (2.50)	39.6 (1.56)	61.7 (2.43)	9.5 (0.375)
V591P-8	1/2"	1-1/16"	31.8 (1.25)	33.0 (1.30)	63.5 (2.50)	46.7 (1.84)	67.8 (2.67)	12.7 (0.500)

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1. **Terms and Conditions**. Seller's willingness to offer Products, or accept an order for Products, to or from Buyer is subject to these Terms and Conditions or any newer version of the terms and conditions found on-line at www.parker.com/saleterms/. Seller objects to any contrary or additional terms or conditions of Buyer's order or any other document issued by Buyer.

2. **Price Adjustments; Payments**. Prices stated on Seller's quote or other documentation offered by Seller are valid for 30 days, and do not include any sales, use, or other taxes unless specifically stated. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). Payment is subject to credit approval and is due 30 days from the date of invoice or such other term as required by Seller's Credit Department, after which Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. **Delivery Dates; Title and Risk; Shipment**. All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the manner of shipment, title to any products and risk of loss or damage shall pass to Buyer upon placement of the products with the shipment carrier at Seller's facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.

4. **Warranty**. Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of eighteen months from the date of delivery to Buyer. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

5. **Claims; Commencement of Actions**. Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 30 days after delivery. Buyer shall notify Seller of any alleged breach of warranty within 30 days after the date the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for an amount due on any invoice) must be commenced within 12 months from the date of the breach without regard to the date breach is discovered.

6. **LIMITATION OF LIABILITY.** UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. **IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.**

7. **User Responsibility**. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

8. **Loss to Buyer's Property**. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, will be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. **Special Tooling**. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

10. **Buyer's Obligation; Rights of Seller**. To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.

11. **Improper Use and Indemnity**. Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

12. **Cancellations and Changes**. Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

13. **Limitation on Assignment**. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

14. **Force Majeure**. Seller does not assume the risk and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

15. **Waiver and Severability**. Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

16. **Termination**. Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days written notice of termination. Seller may immediately terminate this agreement, in writing, if Buyer: (a) commits a breach of any provision of this agreement (b) appointments a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or by a third party (d) makes an assignment for the benefit of creditors, or (e) dissolves or liquidates all or a majority of its assets.

17. **Governing Law**. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.

18. **Indemnity for Infringement of Intellectual Property Rights**. Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

19. **Entire Agreement**. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

20. **Compliance with Law, U. K. Bribery Act and U.S. Foreign Corrupt Practices Act**. Buyer agrees to comply with all applicable laws and regulations, including both those of the United Kingdom and the United States of America, and of the country or countries of the Territory in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA") and the U.S. Anti-Kickback Act (the "Anti-Kickback Act"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that they are familiar with the provisions of the U. K. Bribery Act, the FCPA and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer shall not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase products or otherwise benefit the business of Seller.

02/12

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Parker Safety Guide for Selecting and Using Hydraulic Valves and Related Accessories

WARNING: Failure or improper selection or improper use of Parker Hydraulic Valve Division (HVD) Valves or related accessories ("Products") can cause death, personal injury and property damage. Possible consequences of failure or improper use of these Products include but are not limited to:

- Valves or parts thereof thrown off at high speed
- High velocity fluid discharge
- Explosion or burning of the conveyed fluid
- Contact with suddenly moving or falling objects controlled by the Valve
- Injections by high-pressure fluid discharge
- Contact with fluid that may be hot, cold, toxic or otherwise injurious
- Injuries resulting from injection, inhalation or exposure to fluids
- Injury from handling a heavy item (dropped, awkward lift)
- Electric shock from improper handling of solenoid connections
- Injury from slip or fall on spilled or leaked fluid

Before selecting or using any of these Products, it is important that you read and follow the instructions below. In general, the Products are not approved for in-flight aerospace applications. Consult the factory for the few that are FAA approved.

1.0 GENERAL INSTRUCTIONS

1.1 **Scope**: This safety guide provides instructions for selecting and using (including assembling, installing and maintaining) these Products. For convenience all items in this guide are called "Valves". This safety guide is a supplement to and is to be used in conjunction with the specific Parker catalogs for the specific Valves and/or accessories being considered for use. See item 1.6 below for obtaining those catalogs.

1.2 **Fail-Safe:** Valves can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of the Valve or Valve Assembly will not endanger persons or property.

1.3 **Safety Devices:** Never disconnect, override, circumvent or otherwise disable any safety lockout on any system whether powered by HVD Valves or any motion control system of any manufacturer. (e.g. Automatic shut-off on a riding lawn mower should the operator get out of the seat).

1.4 **Distribution:** Provide a copy of this safety guide to each person that is responsible for selecting or using HVD Valve Products. Do not select HVD Valves without thoroughly reading and understanding this safety guide as well as the specific Parker catalogs for the Products considered or selected.

1.5 **User Responsibility:** Due the wide variety of operating conditions and applications for Valves, HVD and its distributors do not represent or warrant that any particular Valve is suitable for any specific system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing is solely responsible for:

- Making the final selection of the Valve
- Assuring that the user's requirements are met and that the application presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the Valves are used.
- Assuring compliance with all applicable government and industry standards.

1.6 **Additional Questions:** Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com , for the telephone numbers of the appropriate technical service department. For additional copies of this or any other Parker Safety Guide go to www.parker.com and click on the safety button on the opening page. Catalogs and/or catalog numbers for the various HVD Valve Products can be obtained by calling HVD at 440-366-5100. Phone numbers and catalog information is also available on the Parker website, www.parker.com .

2.0 VALVE SELECTION INSTRUCTIONS

2.1 **Pressure:** Valve selection must be made so that the maximum working pressure of the Valve is equal to or greater than the maximum system pressure. Surge, impulse or peak transient pressures in the system must be below the maximum working pressure of the Valve. Surge, impulse and peak pressures can usually be determined by sensitive electrical instrumentation that measures and indicates pressures at millisecond intervals. Mechanical pressure gauges indicate only average pressure and cannot be used to determine surge, impulse or peak transient pressures. Burst pressure ratings if given or known are for manufacturing purposes only and are not an indication that the Product can be used in applications at the burst pressure or otherwise above the maximum working pressure.

2.2 **Temperature:** The fluid temperature must be regulated or controlled so that the operating viscosity of the fluid is maintained at a level specified for the particular Valve product. Such ranges are given in the product catalogs or can be obtained from the appropriate customer service department for the particular Valve product.

2.3 **Fluid Compatibility:** The fluid conveyed in Valves has direct implications on the Valve selection. The fluid must be chemically compatible with the Valve component materials. Elastomer seals, brass, cast iron, aluminum for example all are potentially affected by certain fluids. Additionally, fluid selection affects the performance of various Valves. Considerations relative to fluid selection are outlined in the specific HVD Valve product catalog. Of particular importance is that the fluid be for hydraulic use, contain the proper additives and wear inhibitors. See 1.6 "Additional Questions" above for information to obtain such HVD catalogs.

2.4 **Changing Fluids:** If a system requires a different fluid, it should be done with the guidance in number 2.3 above. Additionally, it may be necessary to flush the system (including the Valves) to remove any of the previous fluid. Consult the Parker Valve Division for guidance.

2.5 **Size:** Transmission of power by means of pressurized fluid varies with pressure and rate of flow. The size of the components must be adequate to keep pressure losses to a minimum and avoid damage due to heat generation or excessive fluid velocity.

2.6 **Placement:** Installation of Valves must take into account the orientation of the Valve and the proximity of the Valve to other parts of the system. This includes but is not limited to closeness to hot and cold areas, access for servicing and operation as well as orientation for proper connectors.

2.7 **Ports:** Connection of Valves in systems can be by threaded ports, sub-base surfaces, flanges and manifolds. In all cases, the proper fitting, surface or mounting hardware must be selected to properly seal and contain the system fluid so as to avoid the adverse conditions listed in the initial warning box above. Specifically, if using threaded ports, the designer must make sure that the mating fitting is of the compatible thread. Also, the instructions provided by the connector hardware supplier must be read and understood so as to properly assemble the connector. The Parker Safety Guide for using Hose, Tubing and Fittings and Related Accessories is but one reference to this end.

2.8 **Environment:** Care must be taken to insure that the Valve and Valve Assemblies are either compatible with or protected from the environment (that is, surrounding conditions) to which they are exposed. Environmental conditions including but not limited to ultraviolet radiation, sunlight, heat, ozone, moisture, water, salt water, chemicals and air pollutants can cause degradation and premature failure.

2.9 **Electric Power:** For Valves requiring electric power for control, it is imperative that the electricity be delivered at the proper voltage, current and wattage requirements. To obtain the proper control requirements please refer to the respective Parker product catalog for the specific Valve that is intended for use. If further guidance is required, call the appropriate technical service department identified in the respective Parker product catalog.

2.10 **Specifications and Standards:** When selecting Valves, government, industry and Parker specifications and recommendations must be reviewed and followed as applicable.

2.11 **Accessories:** All accessories used in conjunction with any Parker Valve product must be rated to the same requirements of the Valve including but not limited to pressure, flow, material compatibility, power requirements. All of these items must be examined as stated in the "VALVE INSTALLATION INSTRUCTIONS" paragraph 3.0.

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3.0 VALVE INSTALLATION INSTRUCTIONS

3.1 **Component Inspection:** Prior to use, a careful examination of the Valve(s) must be performed. The Valve intended for use must be checked for correct style, size, catalog number and external condition. The Valve must be examined for cleanliness, absence of external defects or gouges, cracked or otherwise deformed parts or missing items. The mounting surface or port connections must be protected and free of burrs, scratches, corrosion or other imperfections. Do NOT use any item that displays any signs of nonconformance. In addition, any accessory including but not limited to fittings, bolt kits, hoses, sub bases, manifolds, and electrical connectors must be subjected to the same examination.

3.2 **Handling Valves:** Many Valves whether HVD Valves or of another manufacturer can be large, bulky or otherwise difficult to handle. Care must be taken to use proper lifting techniques, tools, braces, lifting belts or other aids so as not to cause injury to the user, any other person or to property.

3.3 **Filtration:** Fluid cleanliness is a necessity in any hydraulic system. Fluid filters must be installed and maintained in the system to provide the required level of fluid cleanliness. Filters can be placed in the inlets, pressure lines and return lines. The level of cleanliness required is specified in the HVD product catalog for the specific Valve(s) selected or intended for use. For additional information on Filter selection contact Parker Filter Division at 800-253-1258 or 419-644-4311.

3.4 **Servo Valves:** Application of Servo Valves in general requires knowledge and awareness of "closed loop control theory" and the use of electronic controls for successful and safe operation. Individuals who do not have such experience or knowledge must gain training before use of such Products. Parker offers both classroom training as well as manuals to assist in gaining this knowledge. These aids can be obtained by contacting Hydraulic Valve Division at 440-366-5100, calling the general Parker help line 800-CPARKER or going to the Parker web site at www.parker.com.

3.5 **Accessory Ratings:** All accessories used in combination with the selected or intended Valve product must be rated and compatible with the selected Valve. Specifically, the items must be of equal or greater rating including but not limited to pressure, flow, power, size, port style, thread connectors and material.

3.6 **Connection Styles:** It is the responsibility of the user of the Parker product to properly select connectors and accessories that match the connections on the sub plate, Valve, flange or threaded connection or manifold. It is also the responsibility of the installer to possess adequate skill and knowledge including but not limited to thread preparation, torque technique, hose assembly and inspection, tube preparation and assembly, and fitting installation. Parker Tube Fitting Division (www.parker.com/tfd) catalog 4300 and Parker Hose Products (www.parkerhose.com) catalog 4400 describe some basic technical information relative to proper fitting assembly.

3.7 **Electrical Connections:** All electrical connections must be made to the applicable codes and local safety requirements.

3.8 **Gauges and Sensors:** The user must install sufficient gauges and sensors in the system so as to be able to determine the condition of the system. This includes but is not limited to pressure gauges, flow meters, temperature sensors and site gauges. These are of utmost importance should removal or disassembly of a Valve, portion of a Valve or portion of the system become necessary. Refer to "VALVE MAINTENANCE AND REPLACEMENT INSTRUCTIONS" for details and especially item 4.8.

3.9 **System Checkout:** Once installed, the Valve installation must be tested to insure proper operation and that no external leakage exists. All safety equipment must be in place including but not limited to safety glasses, helmets, ear protection, splash guards, gloves, coveralls and any shields on the equipment. All air entrapment must be eliminated and the system pressurized to the maximum system pressure (at or below the Valve maximum working pressure) and checked for proper function and freedom from leaks. Personnel must stay out of potentially hazardous areas while testing and using.

4.0 VALVE MAINTENANCE AND REPLACEMENT INSTRUCTIONS

4.1 **Maintenance Program:** Even with proper installation, Valves and Valve System life may be significantly reduced without a continuing maintenance program. The severity of the application and risk potential must determine the frequency of the inspection and the replacement of the Products so that Products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at a minimum, must include instructions 4.2 through 4.10. An FMEA (Failure Mode and Effects Analysis) is recommended in determining maintenance requirements.

4.2 **Visual Inspection-Valves:** Any of the following conditions require immediate shut down and replacement of the Valve.

- Evidence that the Valve is in partial dis-assembly.
- Visible crack or suspicion of a crack in the Valve housing or bent, cracked or otherwise damaged solenoid.
- Missing or partially extending drive pin on a flow control knob.
- Missing, loose components, obstructions or other condition impeding the motion or function of the manual knob, lever, foot pedal or other mechanical operator of a hydraulic Valve.
- Any evidence of burning or heat induced discoloration.
- Blistered, soft, degraded or loose cover of any kind.
- Loose wire or electrical connector.

4.3 **Visual Inspection-Other:** The following conditions must be tightened, repaired, corrected or replaced as required.

1. Fluid on the ground must be cleaned immediately. Also, the source of the fluid must be determined prior to running the equipment again.
2. Leaking port or excessive external dirt build-up.
3. System fluid level is too low or air is entrapped or visible in the reservoir.
4. Equipment controlled by the Valve or Valve assembly has been losing power, speed, efficiency

4.4 **Filter Maintenance:** System filters must be maintained and kept in proper working order. The main service requirement is periodic replacement of the filter element or screen. Contact Parker Filter Division at 800-253-1258 or 419-644-4311 for further filter maintenance details.

4.5 **Functional Test:** See "System Checkout" number 3.9 above in "VALVE INSTALLATION INSTRUCTIONS".

4.6 **Replacement Intervals:** Valves and Valve Systems will eventually age and require replacement. Seals especially should be inspected and replaced at specific replacement intervals based on previous experience, government or industry recommendations, or when failures could result in unacceptable downtime, damage or injury risk. At a minimum seals must be replaced whenever service is rendered to a Valve product.

4.7 **Adjustments, Control Knobs, and Other Manual Controls:** System Pressure and Flow are typically adjusted by knobs and/or handles. A set-screw or lock-nut secures the adjustment device so as to maintain the desired setting. This set-screw or lock-nut must first be loosened prior to making any adjustments and re-tightened after adjustment on the HVD Valve. All adjustments must be made in conjunction with pressure gauges and/or flow meters (or by watching the speed of the actuator in the case of setting flow only). See paragraph "Gauges and Sensors" above in the section "VALVE INSTALLATION INSTRUCTIONS'. Under no circumstances should any control knob, adjustment stem, handle, foot pedal or other actuating device be forced beyond the mechanical stop(s) on the Valve. For example, the Parker Safety Notice Bulletin **HY14-3310-B1/US** for HVD Colorflow Valves specifically restricts the adjustment torque to "hand adjust" or "less than 10 ft/lbs" if it cannot be adjusted by hand. Failure to adhere to this may force the knob beyond the stop point allowing it to be ejected at high speed resulting in death, personal injury and property damage. For complete safety instructions on HVD Colorflow Valves, copies of Safety Notice **Bulletin HY14-3310-B1/US** can be obtained directly from the Hydraulic Valve Division at 440-366-5100 or from the Parker web site at www.parker.com by selecting the "Safety" button. Parker help line 800-CPARKER is on call 24/7 as well should there be any question about the use of a HVD Valve. Additionally, when making adjustments, always adjust the Valve with all parts of your body to the side of the Valve (that is, the knob is not pointing toward you or anyone else).

4.8 **High pressure Warning:** Hydraulic power is transmitted by high-pressure fluids through hoses, fittings and valves, pumps and actuators. This condition can be dangerous and potentially lethal and, therefore, extreme caution must be exercised when working with fluids under pressure. From time to time, hoses, Valves, tubes or fittings fail if they are not replaced at proper time intervals. Typically these failures are the result of some form of misapplication, abuse, wear, or failure to perform proper maintenance. When such failure occurs, generally the high pressure fluid inside escapes in a stream which may or may not be visible to the user. Under no circumstances should the user attempt to locate the leak by "feeling" with their hands or any other part of their body. High-pressure fluids can and will penetrate the skin and cause severe tissue damage and possible loss of limb or life. Even seemingly minor hydraulic fluid injection injuries must be treated immediately by a physician with knowledge of the tissue damaging properties of hydraulic fluid.

If a hose, tube, fitting or Valve failure occurs, immediately shut down the equipment and leave the area until pressure has been completely released from the system. Simply shutting down the pump may or may not eliminate the pressure in the system. It may take several minutes or even hours for the pressure to be relieved so that the leak area can be examined safely. Once the pressure has been reduced to zero, the suspected leaking item can be taken off the equipment and examined. It must always be replaced if a failure has occurred. Never attempt to patch or repair a connector (especially a hose) or Valve that has failed. Consult the nearest Parker distributor or the appropriate Parker division for component replacement information. Never touch or examine a failed hydraulic component unless it is obvious that the item no longer contains fluid under pressure.

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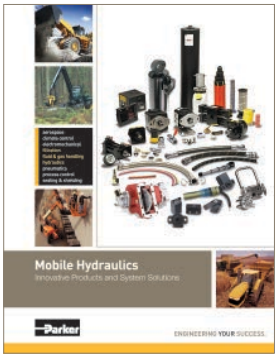

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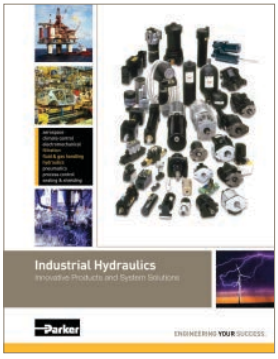

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- This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.
- The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.
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SAFETY GUIDE

For safety information, see Safety Guide SG HY14-1000 at www.parker.com/safety or call 1-800-CParker.

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Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

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Proportional Directional Control Valves A

Proportional Pressure Control Valves B

Servovalves C

Electronics D

Accessories E

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When you are ready to order, call your local Parker Hydraulic distributor for fast delivery and service. Consult your Parker Hydraulic Sales Office for the location of the distributor serving your area (see listing at the back of this catalog).

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Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

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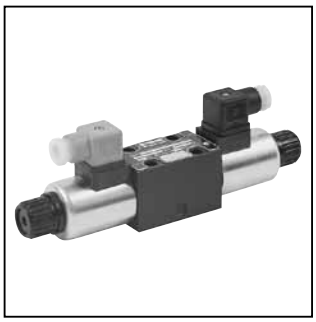
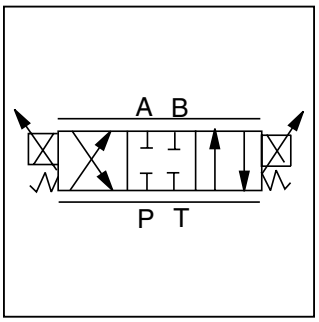
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

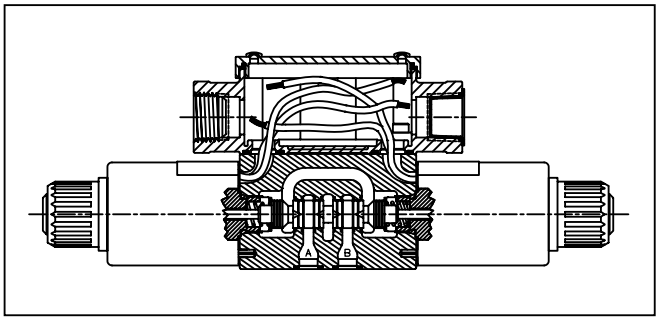
General Description

Series D*FW direct operated proportional directional control solenoid valves are available in sizes NG6 (CETOP 3) and NG10 (CETOP 5).

Typical applications include reproducible control of actuator speed in rapid/slow speed profiling, and smooth acceleration and deceleration performance.





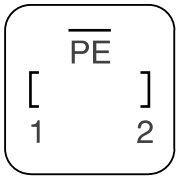


Features

- Standard DIN/ISO/CETOP/NFPA interfaces.
- Progressive flow characteristics for improved low flow resolution.
- Spring centered spool.
- Wide selection of spool options and flow capacity.

Wiring D*FW — Solenoid Coil

(without integrated electronics)



1 = coil connection
2 = coil connection
PE = ground potential

Specifications

Interface DIN	NG6 (CETOP 3)	NG10 (CETOP 5)
Flow Rating @10 Bar (150 PSI) Δp (P→A, B→T) (spool options up to) LPM (GPM)	20 (5.3)	60 (15.9)
Maximum Flow (refer to operating limit curves) LPM (GPM)	48 (12.5)	170 (45)
Step Response (time to reach 90% of a 100% step command) ms	100	165

Hysteresis	%	<8	**Fluid Viscosity, Recommended**	80 – 1000 SSU
Repeatability	%	<2	**Fluid Temperature, Recommended**	0°C to +60°C (+32°F to +140°F)
Max. Operating Pressure			**Environmental Protection Class**	NEMA 1 (IP54)
Port P, A, B	Bar (PSI)	315 (4500)	**Ambient Operating Temperature**	-20°C to +60°C (-4°F to +140°F)
Port T		35 (500)		
Fluid Cleanliness Level		ISO Class 16/13		

D		F	W								0	
Directional Control Valve	Size	Flow Control	Open Loop	Spool Type	Flow	Style	Seal	Solenoid Voltage	Solenoid Accessories	Valve Accessories	Design Series

NOTE: Not required when ordering.

Code	Description
1	NG6/CETOP 3
3	NG10/CETOP 5

Code	Description
J[2]	24 VDC
K	12 VDC
M[2]	9 VDC

(2) Not for D3FW

Code	Description
0	Standard[1]

(1) Metal can coils

Code	Description
F[3]	Free Coil Lead Wires
W[5]	Socket Connector DIN 43650 without Plug

(3) D1FW, 9V overmolded coil only.
(4) Contact factory for custom lead wire and connector options in OEM quantities.
(5) Not available 9V coil.

Code	Description
N	Nitrile
V	Fluorocarbon

Code

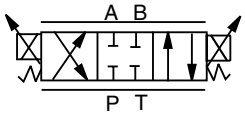
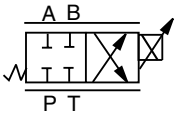
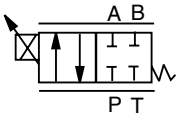
Spool Overlap

$Q_A > Q_B$ [1]		$Q_A = Q_B$		
10%	Spool Type	10%	20%	Spool Type
B31		E01	E81*	
B32		E02	E82*	
		E09	–	

1) Reduced Flow Rate on Port B, Nominal Flow Rate on Port A
Code A* for spool $Q_B > Q_A$ optional
Refer to factory for ratio spool options.
* Use E01 or E02 for new applications.

Code	Flow at Δp 5 Bar (72.5 PSI) per metering edge D1FW LPM (GPM)	D3FW LPM (GPM)
C	7.5 (2.0)*†	–
F	15 (4.0)	–
H	20 (5.3)†#	20 (5.3)*†
K**	–	30 (7.8)
M	–	40 (10.6)
S	–	60 (15.9)†#

Refer to factory for ratio spool options.
* E09 spools only available where indicated.
** E01 spool only.
† Type E spool only.
# Not available with E81, E82.

Code	Style
C	
E	
K	

Bolt Kits:

D1FW	BK209	(4) 10-24x1.25 SHCS
D3FW	BK98	(4) 1/4-20x1.62 SHCS

Weight:

D1FW	2.5 kg (5.5 lbs.)
D3FW	6.8 kg (15.0 lbs.)

Driver Cards

Refer to the Electronics section for driver cards and support electronics.

Mounting Interface

Refer to Mounting Interface Dimensions in the Proportional Directional Valve section of this catalog.

Accessories

Refer to the Accessories section for bolt kits, subplates and connectors.

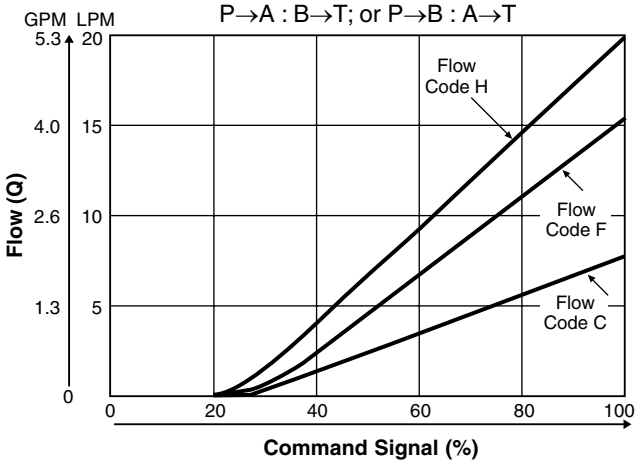
Electrical Specifications

Series D*FW
without integrated electronics

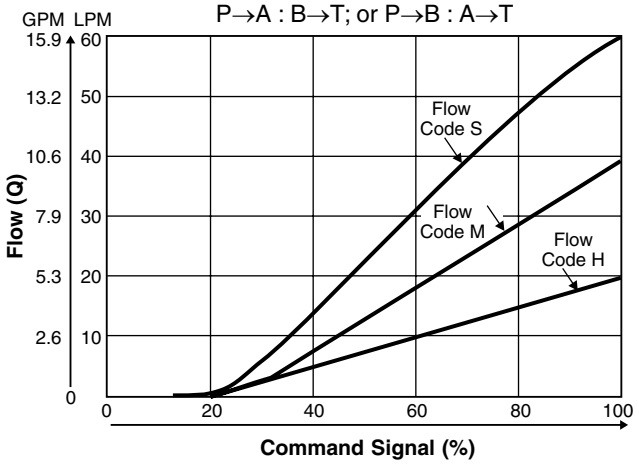
Interface DIN		NG6 (CETOP 3)			NG10 (CETOP 5)	
Solenoid Order Code		**J**	**K**	**M**	**K**	**J**
Nominal Resistance	**ohms**	24	6	3.3	4	16
Nominal Current	**amps**	0.9	1.8	2.5	2.5	1.25
Nominal Voltage	**voltage**	**24**	**12**	**9**	**12**	**24**
Environmental Protection Class		NEMA 1 (IP54)				
Mating Connectors — Solenoid (DIN 43650)		Part #692914 (Black) Part #692915 (Gray)				

Performance Curves

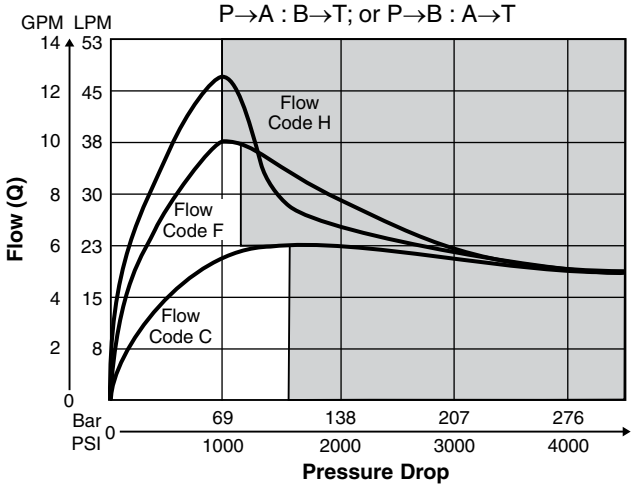
D1FW Flow Characteristics
at Δp = 5 Bar (72.5 PSI) per metering edge
P→A : B→T; or P→B : A→T



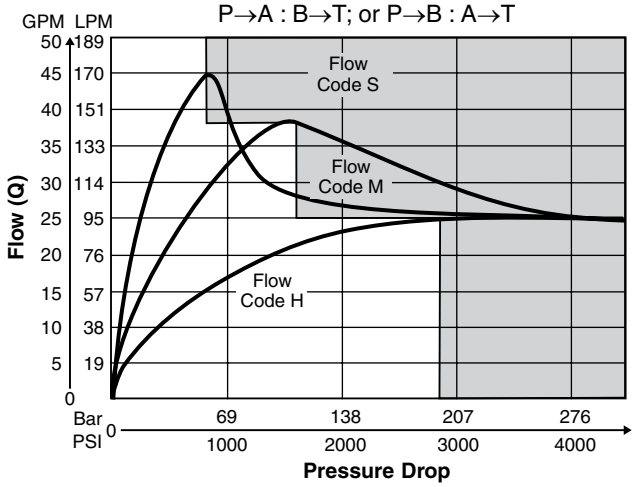
D3FW Flow Characteristics
at Δp = 5 Bar (72.5 PSI) per metering edge
P→A : B→T; or P→B : A→T



D1F* Operating Limits [1)]
at 100% Command
P→A : B→T; or P→B : A→T



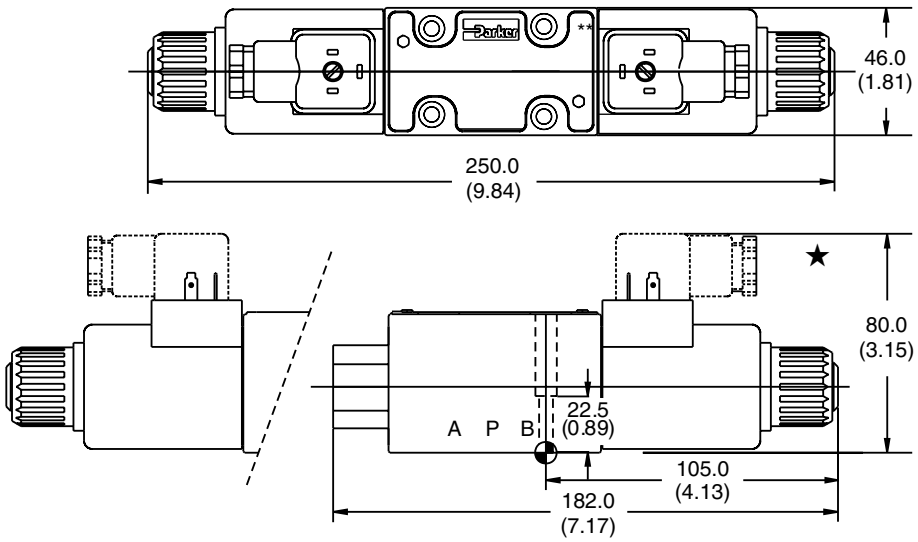
D3F* Operating Limits [1)]
at 100% Command
P→A : B→T; or P→B : A→T



1) Shaded area: Actual flow subject to the system load dynamics
Note: 81 and 82 spools - decrease limits by 15%

D1FW with Hirschmann Connectors

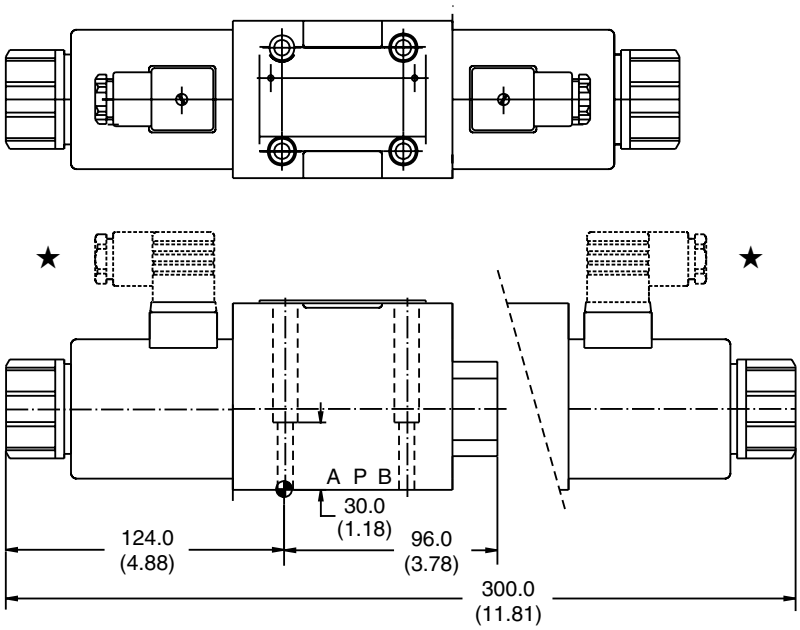
Inch equivalents for millimeter dimensions are shown in (**)



D3FW with Hirschmann Connectors

★ Order plugs separately.

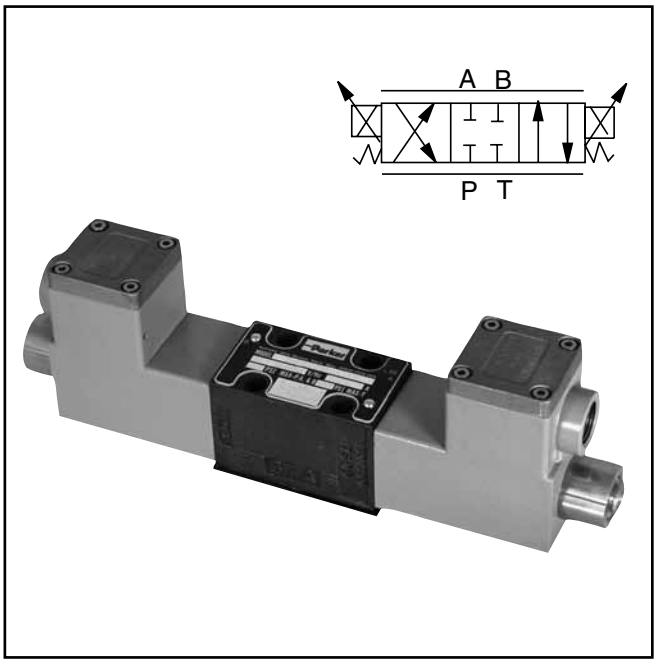
Inch equivalents for millimeter dimensions are shown in (**)



General Description

Series D1FW direct operated proportional directional control solenoid valves are available with explosion proof solenoids for hazardous conditions. Valves are available in sizes NG6 (CETOP 3).

Typical applicatons include reproducible control of acutator speed in rapid/slow speed profiling, and smooth acceleration and deceleration performance.



Features

- Standard DIN/ISO/CETOP/NFPA interfaces.
- Progressive flow characteristics for improved low flow resolution.
- Spring centered spool.
- Wide selection of spool options and flow capacity.
- Single piece rugged solenoid assembly.

Specifications

Interface DIN	**NG6 (CETOP 3)**
Flow Rating @10 Bar (150 PSI) Δp (P→A, B→T) (spool options up to) LPM (GPM)	20 (5.3)
Maximum Flow (refer to operating limit curves) LPM (GPM)	48 (12.5)
Step Response (time to reach 90% of a 100% step command) ms	100

Hysteresis	%	<8	**Fluid Viscosity, Recommended**	80 – 1000 SSU
Repeatability	%	<2	**Fluid Temperature, Recommended**	0°C to +60°C (+32°F to +140°F)
Max. Operating Pressure Port P, A, B Bar (PSI)		315 (4500)	**Environmental Protection Class**	NEMA 4 (IP65)
Port T		35 (500)	**Ambient Operating Temperature**	-20°C to +60°C (-4°F to +140°F)
Fluid Cleanliness Level		ISO Class 16/13		

Complies with:

Ex d IIC

AEx d IIC for Class I Zone 1

UL1203, UL1604, CSA E61241-1-1
Class II Div 1

C US

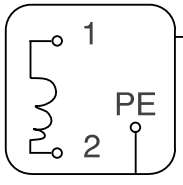
Ex d IIC Ex tD A21 CE 1180 Ex II 2GD

EN60079-0, EN60079-1
EN61241-0, EN61241-1

Wiring D1FW — Solenoid Coil

(without integrated electronics)

CE



1 = coil connection
2 = coil connection
PE = ground potential

Ex

C US

D	1	F	W								
Directional Control Valve	Size	Flow Control	Open Loop	Spool Type	Flow	Style	Seal	Solenoid Voltage	Solenoid Accessories	Valve Accessories	Design Series

NOTE: Not required when ordering.

Code	Description
1	DIN NG6 CETOP 3 NFPA D03

Code	Description
L	6 VDC

Code	Description
T	Exd IIc ATEX / CSA

Code		
Spool Overlap		
10%	20%	Spool Type
E01	E81*	
E02	E82*	
E09	–	

Refer to factory for ratio spool options.

* Use E01 or E02 for new applications.

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
E	Explosion Proof

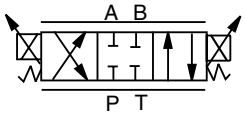
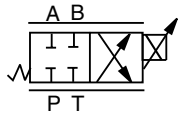
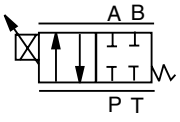
Code	Flow at Δp 5 Bar (72.5 PSI) per metering edge LPM (GPM)
C	7.5 (2.0)*
F	15 (4.0)
H	20 (5.3)†#

Refer to factory for ratio spool options.

* E09 spools only available where indicated.

† Type E spool only.

Not available with E81, E82.

Code	Style
C	
E	
K	

Bolt Kit:

BK209	(4) 10-24x1.25 SHCS
BK375	(4) M5 x 30mm SHCS

Weight:

NG6	4.1 kg (9.1 lbs.)

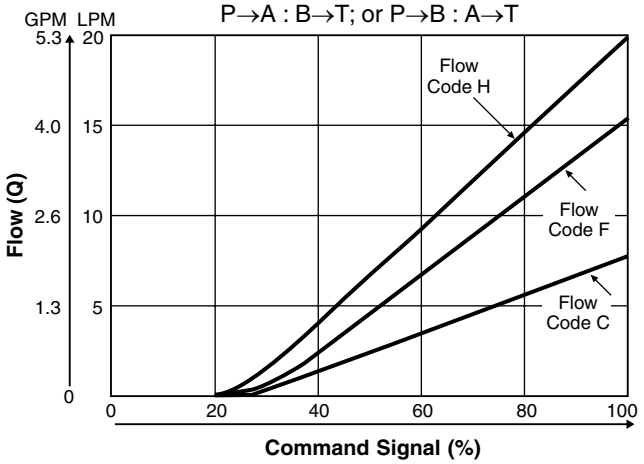
Electrical Specifications
Explosion Proof

Interface DIN		NG6 (CETOP 3)
Solenoid Order Code		**L**
Nominal Resistance	ohms	2.0
Nominal Current	amps	2.4
Nominal Voltage	voltage	5
Nominal Wattage	watts	11.5
Environmental Protection Class		IP66

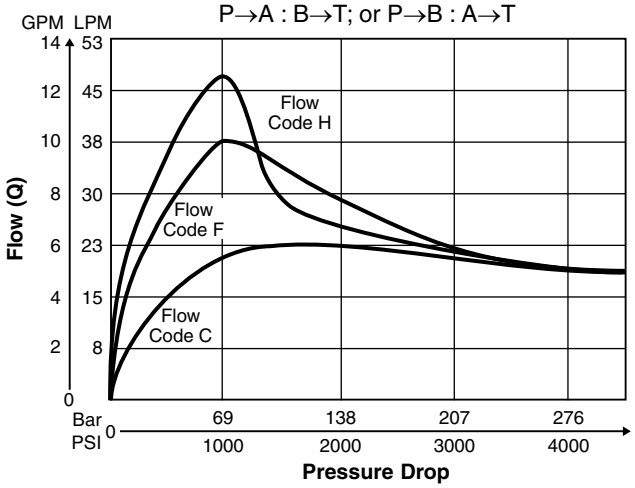
Explosion Proof Ratings	
CSA	Exd IIc, AExd Class I Zone I
ATEX	EEx d IIc G T4 -54°C to 90°C

Performance Curves

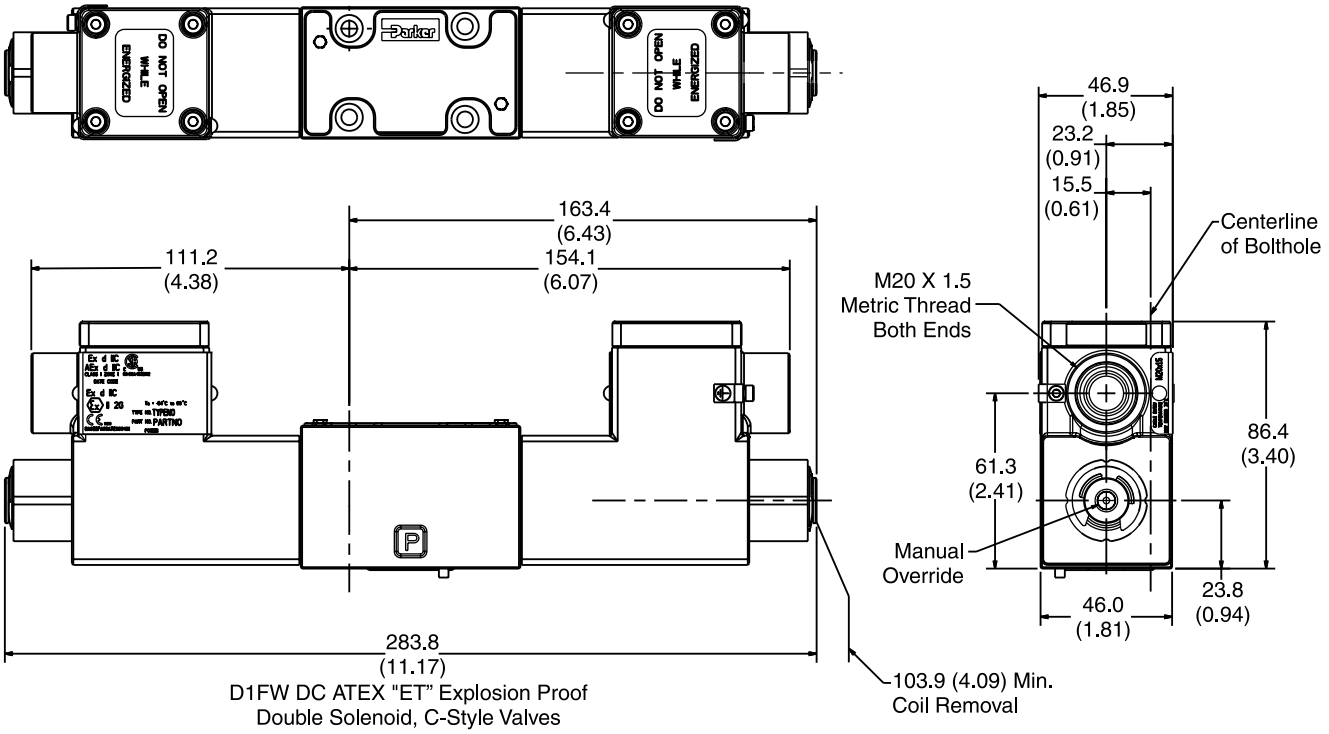
D1FW Flow Characteristics
at Δp = 5 Bar (72.5 PSI) per metering edge
P→A : B→T; or P→B : A→T



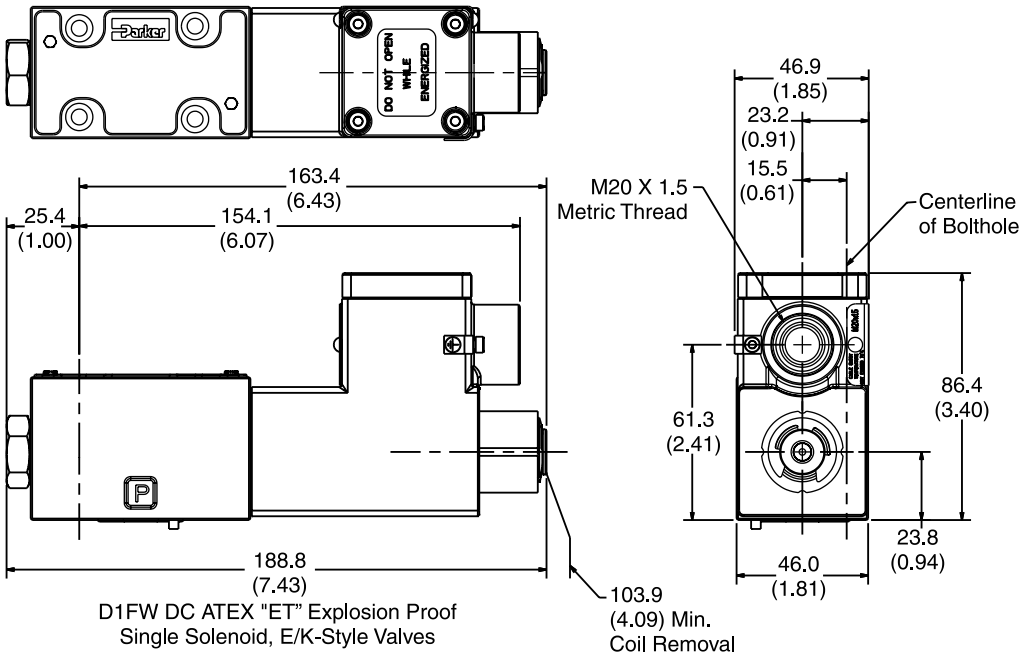
D1FW Operating Limits
at 100% Command
P→A : B→T; or P→B : A→T



Inch equivalents for millimeter dimensions are shown in (**)



D1FW DC ATEX "ET" Explosion Proof
Double Solenoid, C-Style Valves



D1FW DC ATEX "ET" Explosion Proof
Single Solenoid, E/K-Style Valves

Notes

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General Description

Series D1FB (NG6) proportional directional valves are available with and without onboard electronics (OBE).

D1FB OBE:

The digital onboard electronics is situated in a robust metal housing, which allows the usage under rough environmental conditions.

The nominal values are factory set. The cable connection to a serial RS-232 interface is available as an accessory.

D1FB for external electronics:

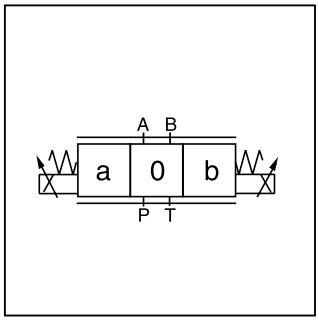
The parameters can be saved, changed and duplicated in combination with the digital power amplifier PWD00A-400.

The valve parameters can be edited with the common ProPxD software for both versions.

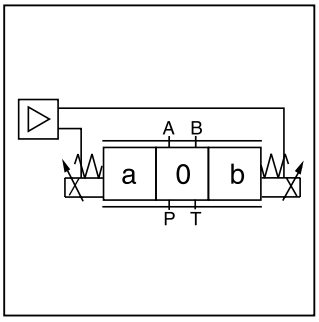
Series D1FB valves can be ordered with spool/sleeve design (D1FB*0) for maximum precision, as well as spool/body design (D1FB*3) for high nominal flow – see functional limit curves for maximum flow capability.

D1FB

D1FB OBE



D1FB

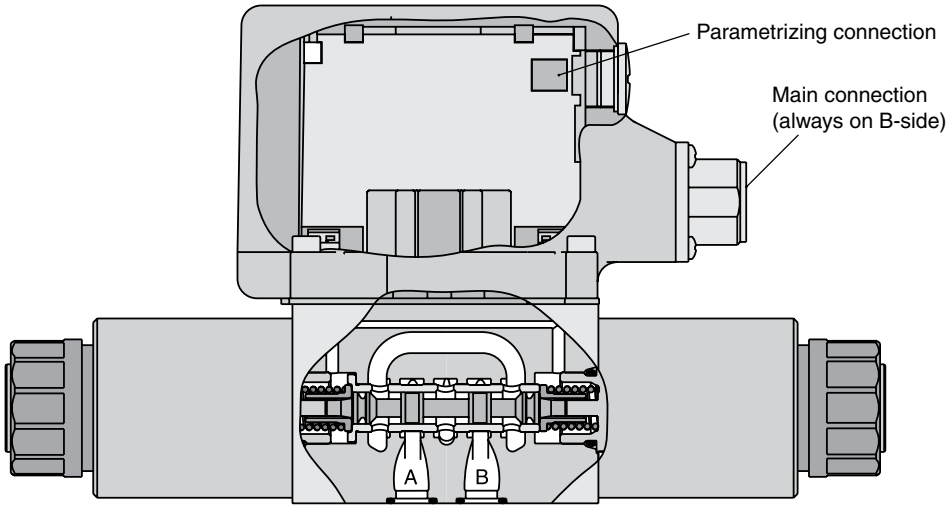


D1FB OBE

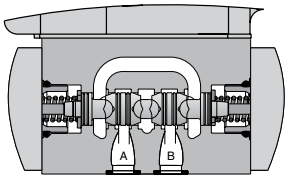
Features

- Spool/sleeve and spool/body.
- 3 command options for D1FB OBE: +/- 10V, 4…20mA, +/- 20mA
- High repeatability from valve to valve.
- Low hysteresis.
- Manual override.
- Digital onboard electronics.

D1FB*0 OBE
Spool/Sleeve Design



D1FB*3 OBE
Spool/Body Design



D	1	F	B	☐	☐	0	☐	☐	☐	☐	[ ]
Directional Control Valves	Size	Flow Control	Standard Dynamics Standard Repeatability	Spool	Style		Seal	Solenoid Voltage	Solenoid Accessories	Design	Design Series

NOTE: Not required when ordering.

Code	Description
1	DIN NG6 CETOP 3 NFPA D03

D1FB*0: Spool/Sleeve Design

Code	Solenoid
M	9V/2.7A
J	24V/0.8A

D1FB*3: Spool/Body Design

Code	Solenoid
K	12V / 2.2A
J	24V / 1.1A

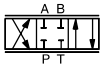
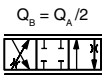
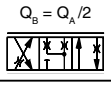
Code	Description
0	Spool/sleeve design
3	Spool/body design

Code	Description
N	Nitrile
V	Fluorocarbon

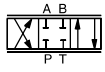
Code	Description
W*	Connector as per DIN 43650 without plug
J	Connector DT04-2P "Deutsch"

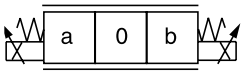
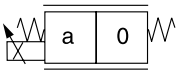
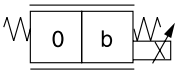
* Please order plugs separately.

D1FB*0: Spool/Sleeve Design
Overlap

Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01H E01F E01C		20 (5.3) 12 (3.2) 6 (1.6)
E02H E02F E02C		20 (5.3) 12 (3.2) 6 (1.6)
E03H E03F E03C		20 (5.3) 12 (3.2) 6 (1.6)
B31H B31F		20/10 (5.3/2.6) 12/6 (3.2/1.6)
B32H B32F		20/10 (5.3/2.6) 12/6 (3.2/1.6)

D1FB*3: Spool/Body Design
Overlap

Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01K E01H E01F		30 (7.9) 20 (5.3) 10 (2.6)
E02K E02H E02F		30 (7.9) 20 (5.3) 10 (2.6)

Code	Style
C	
E	
K	

Bolt Kit:

BK209	(4) 10-24x1.25 SHCS
BK375	(4) M5x30

Weight:

D1FB	2.2 kg (4.9 lbs.)

D	1	F	B	☐	☐	0	☐	☐	☐	☐	☐
Directional Control Valves	Size	Flow Control	Standard Dynamics Standard Repeatability	Spool	Style		Seal	Input Signal	Options	Design	Design Series

NOTE: Not required when ordering.

Code	Description
1	DIN NG6 CETOP 3 NFPA D03

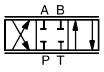
Code	Description
0	Spool/sleeve design
3	Spool/body design

Code	Input signal [1]	Function	Port	Options
F0	0...+/-10V	0...+10V > P-A	6 + PE	Potentiometer supply
G0	0...+/-20mA	0...+20mA > P-A	6 + PE	—
S0	4...20mA	12...20mA > P-A	6 + PE	—
W5 [2]	0...+/-10V 4...20mA	0...+10V > P-A 12...20mA > P-A	11 + PE	Potentiometer supply & command preset channel

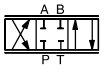
[1] Single solenoid always 0...+10V respectively 4...20 mA
[2] Factory set ± 10V on delivery

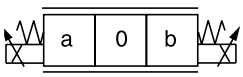
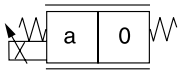
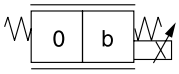
Code	Description
N	Nitrile
V	Fluorocarbon

D1FB*0: Spool/Sleeve Design

Overlap		
Code	**Spool**	**Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge**
E01H E01F E01C		20 (5.3) 12 (3.2) 6 (1.6)
E02H E02F E02C		20 (5.3) 12 (3.2) 6 (1.6)
E03H E03F E03C		20 (5.3) 12 (3.2) 6 (1.6)
B31H B31F	$Q_B = Q_A/2$	20/10 (5.3/2.6) 12/6 (3.2/1.6)
B32H B32F	$Q_B = Q_A/2$	20/10 (5.3/2.6) 12/6 (3.2/1.6)

D1FB*3: Spool/Body Design

Overlap		
Code	**Spool**	**Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge**
E01K E01H E01F		30 (7.9) 20 (5.3) 10 (2.6)
E02K E02H E02F		30 (7.9) 20 (5.3) 10 (2.6)

Code	Style
C	
E	
K	

Bolt Kit:

BK209	(4) 10-24x1.25 SHCS
BK375	(4) M5x30

Weight:

D1FB	2.5 kg (5.5 lbs.)

Please order plugs separately. See Accessories.

Parametrizing cable OBE => RS-232
Item no. 40982923

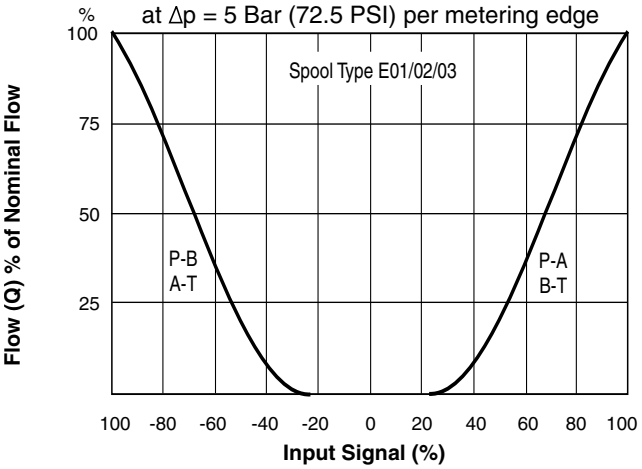
General			
Design		Direct operated proportional DC valve	
Actuation		Proportional solenoid	
Size		NG6 / CETOP 3 / NFPA D03	
Mounting Interface		DIN 24340 / ISO 4401 / CETOP RP121 / NFPA	
Mounting Position		Unrestricted	
Ambient Temperature	**[°C]**	-20...+60; (-4°F...+140°F)	
$MTTF_D$ Value (OBE)	**[years]**	150 (75)	
Vibration Resistance	**[g]**	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27	
Hydraulic			
Maximum Operating Pressure		Ports P, A, B 350 Bar (5075 PSI); Port T 210 Bar (3045 PSI)	
Maximum Pressure Drop PABT / PBAT		350 Bar (5075 PSI)	
Fluid		Hydraulic oil as per DIN 51524...51535, other on request	
Fluid Temperature	**[°C]**	-20...+60; (-4°F...+140°F)	
Viscosity **Permitted** **Recommended**	 **[cSt] / [mm²/s]** **[cSt] / [mm²/s]**	 20...380 (93...1761 SSU) 30...80 (139...371 SSU)	
Filtration		ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	
Nominal Flow at Δp= 5 Bar (72.5 PSI) per Control Edge *		**D1FB*0 (Spool/sleeve)** 6 LPM (1.6 GPM) / 12 LPM (3.2 GPM) / 20 LPM (5.3 GPM)	**D1FB*3 (Spool/body)** 10 LPM (2.6 GPM) / 20 LPM (5.3 GPM) / 30 LPM (7.9 GPM)
Leakage at 100 Bar (1450 PSI) Per Land	**[ml/min]**	<50 (overlap spool)	<60
Overlap	**[%]**	25, electrically normalized at 10 (see flow characteristics for OBE valves)	
Static / Dynamic			
Step Response at 100% Step	**[ms]**	30	30
Hysteresis	**[%]**	<4	<6
Temperature Drift Solenoid Current	**[%/K]**	<0.02	
Electrical			
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible	
Protection Class		Standard (as per EN175301-803) IP65 in accordance with EN60529 (plugged and mounted) DT04-2P "Deutsch" IP69K (plugged and mounted)	
Solenoid		**Code "M"**	**Code "K"**	**Code "J" (Spool/sleeve)**
Supply Voltage	**[V]**	9	12	24
Current Consumption	**[A]**	2.7	2.2	0.8 (1.1)
Resistance	**[Ohm]**	2.7	4.4	18.6
Coil Insulation Class		F (155 °C); (331°F)		
Solenoid Connection		Connector as per EN 175301-803 (code W), DT04-2P "Deutsch" connector (code J). Solenoid identification as per ISO 9461.		
Wiring Minimum	**[mm²]**	3x1.5 (AWG 16) overall braid shield (Code W), "Deutsch" connector DP4 2-Pin (Code J)		
Wiring Length Maximum	**[m]**	50 (164 ft.)		

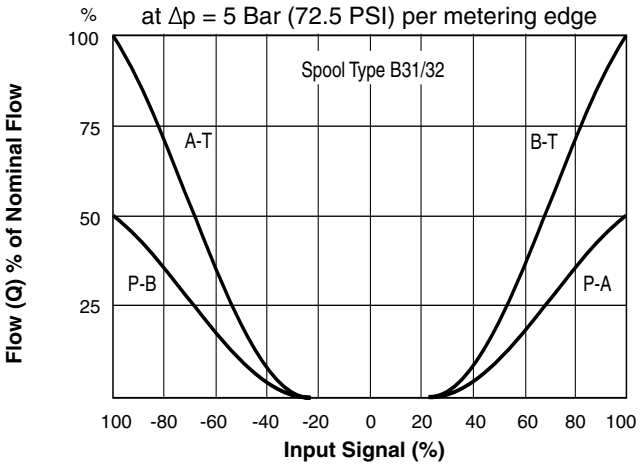
* Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

Continued on the next page

Electrical		
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/ripple DC	**[V]**	18...30, ripple < 5% eff., surge free
Current Consumption Maximum	**[A]**	2.0
Pre-fusing Medium Lag	**[A]**	2.5
Input Signal		
Codes F0 & W5 Voltage	**[V]**	+10...0...-10, ripple < 0.01 % eff., surge free, Ri = 100kOhm, 0...+10V => P -> A
Codes S0 & W5 Current	**[mA]**	4...12...20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 12...20mA => P -> A < 3.6 mA = enable off, > 3.8 mA = enable on (acc. to NAMUR NE43)
Code G0	**[mA]**	+20...0...-20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 0...+20mA => P -> A
Differential Input Maximum		
Codes F0, G0 & S0	**[V]**	30 for terminal D and E against PE (terminal G) 11 for terminal D and E against 0V (terminal B)
Code W5	**[V]**	30 for terminal 4 and 5 against PE (terminal PE) 11 for terminal 4 and 5 against 0V (terminal 2)
Voltage References:		**Not a powered output, +10 VDC at Pin C, -10 VDC at Pin F** **Only for 10K Ohm pots**
Channel Recall Signal	**[V]**	0...2.5: off / 5...30: on / Ri = 100 kOhm
Adjustment Ranges:		
Min	**[%]**	0...50
Max	**[%]**	50...100
Ramp	**[s]**	0...32.5
Interface		RS-232, parametrizing connection 5 pole
EMC		EN 61000-6-2, EN 61000-6-4
Central Connection		
Codes F0, G0 & S0		6 + PE acc. to EN 175201-804
Code W5		11 + PE acc. to EN 175201-804
Wiring Minimum		
Codes F0, G0 & S0	**[mm²]**	7 x 1.0 (AWG16) overall braid shield
Code W5	**[mm²]**	11 x 1.0 (AWG20) overall braid shield
Wiring Length Maximum	**[m]**	50 (164 ft.)

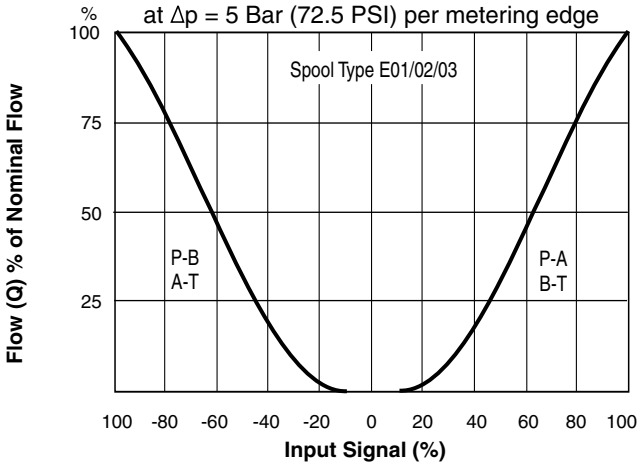
D1FB Flow

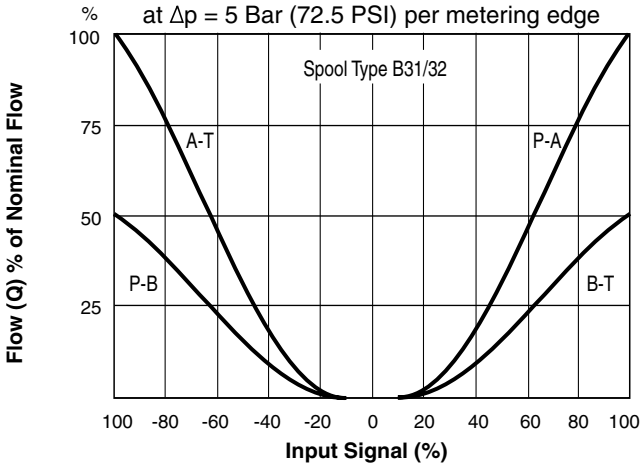




D1FB OBE Flow

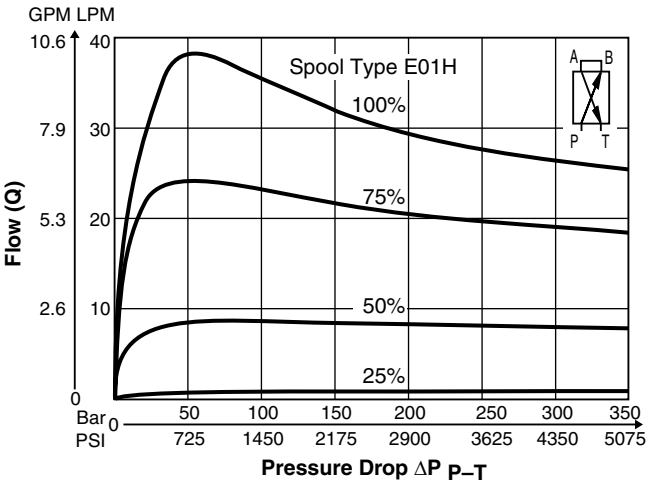
(Electrically set to opening point 10%)

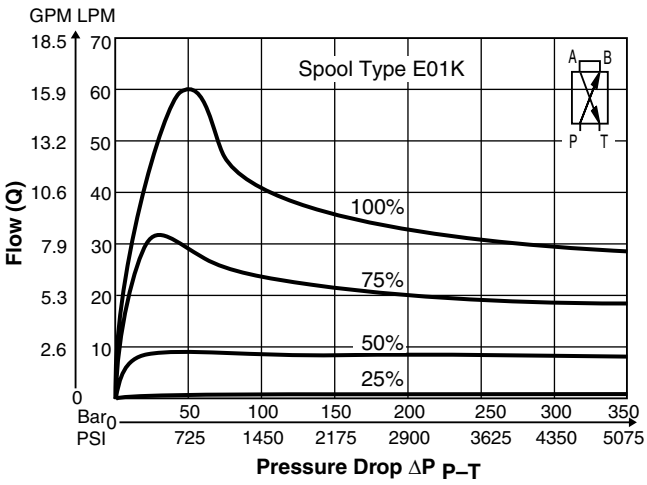




Functional Limits

At 25%, 50%, 75% and 100% command signal (symmetric flow). At asymmetric flow a reduced flow limit has to be considered – typically approx. 10% lower.



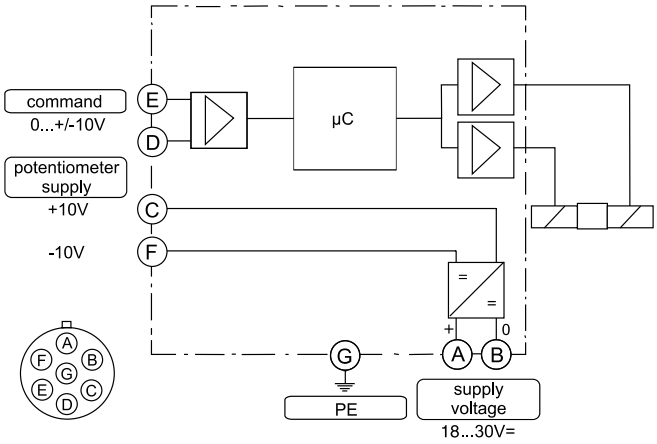


All performance curves measured with HLP46 at 50°C (122°F).

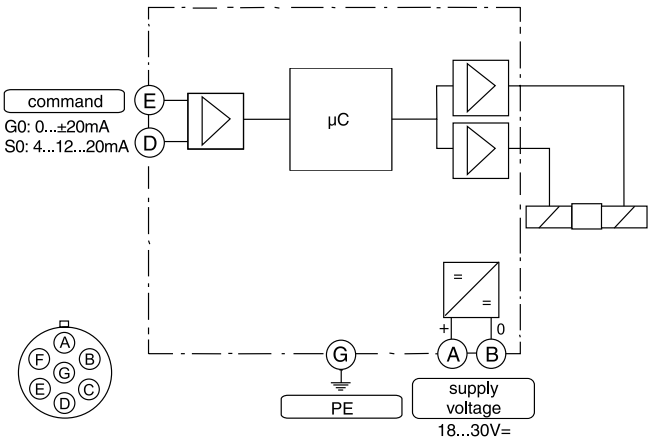
D1FB.indd, ddp

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

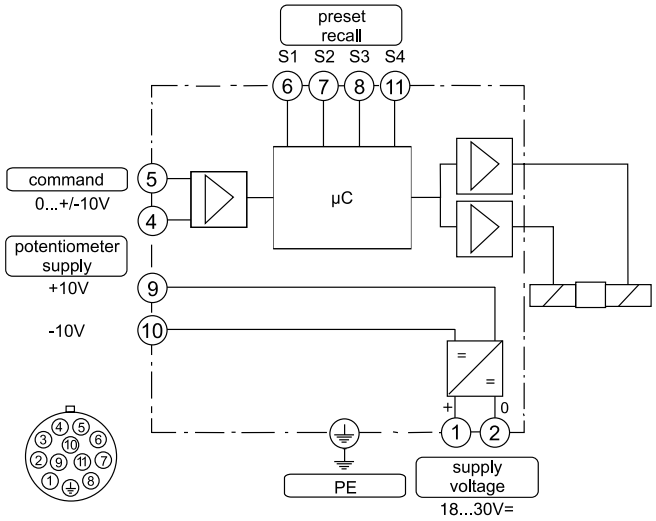
Code F0
6 + PE acc. to EN 175201-804



Code G0, S0
6 + PE acc. to EN 175201-804



Code W5
11 + PE acc. to EN 175201-804



Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

ProPxD Interface Program

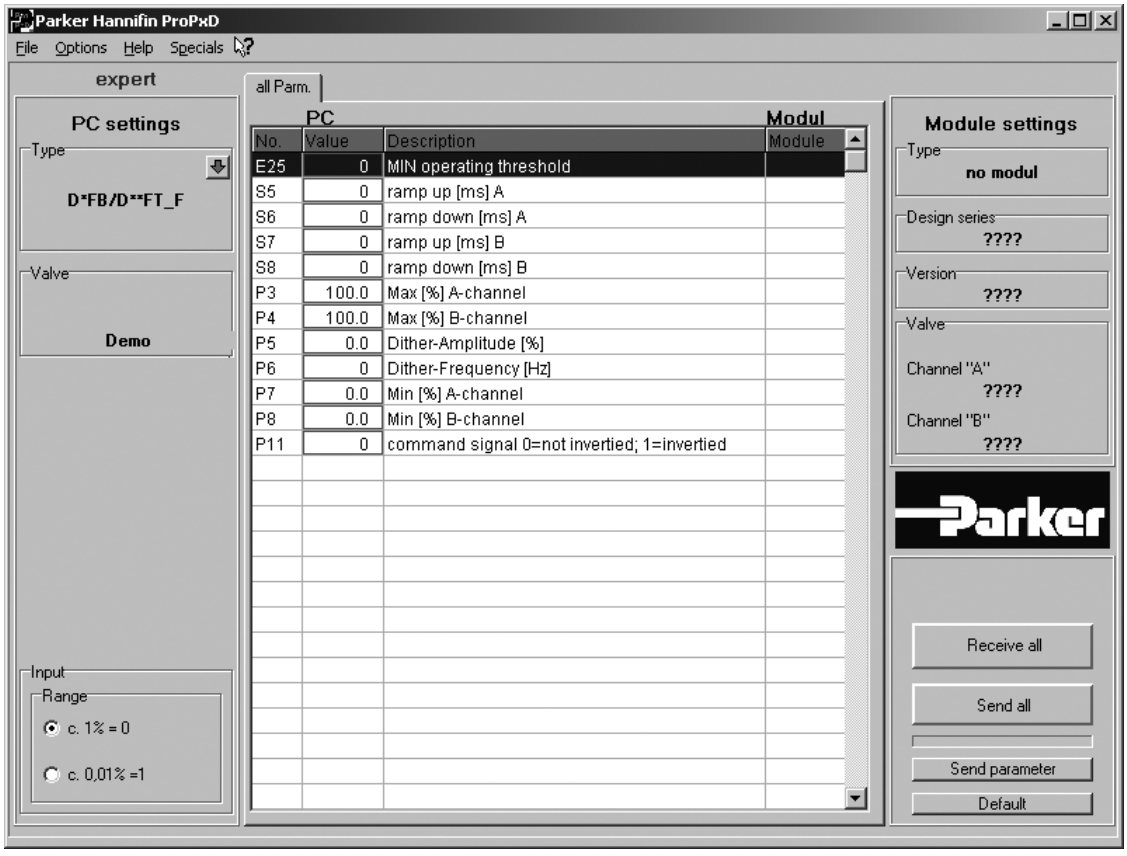
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

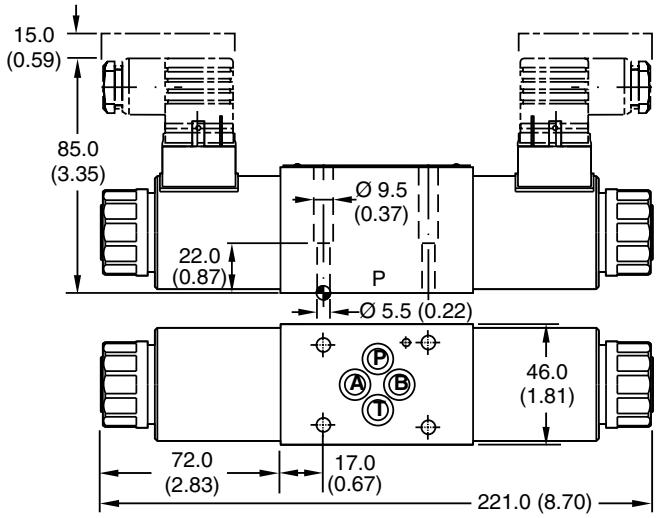
Simple to use interface program. Download free of charge **www.parker.com/euro_hcd → Services → downloads**



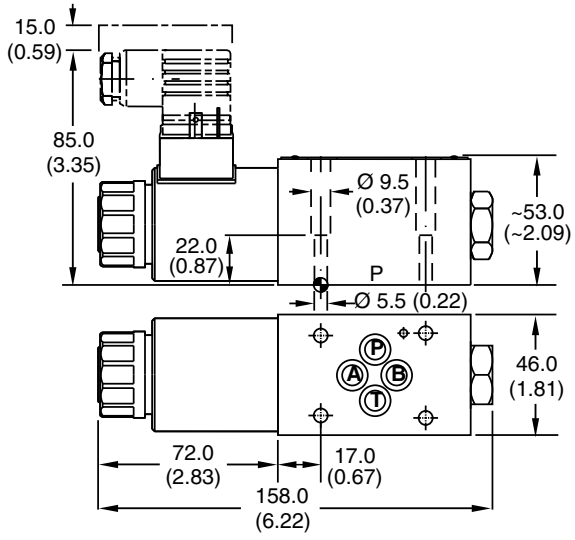
The parametrizing cable may be ordered under item no. 40982923.

Inch equivalents for millimeter dimensions are shown in (**)

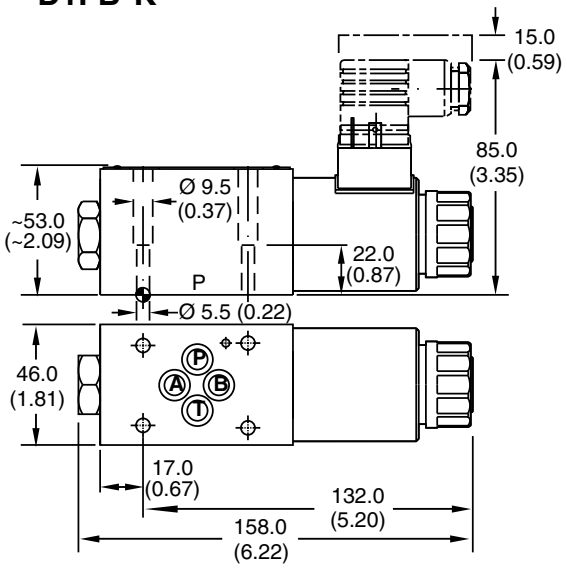
D1FB*C



D1FB*E

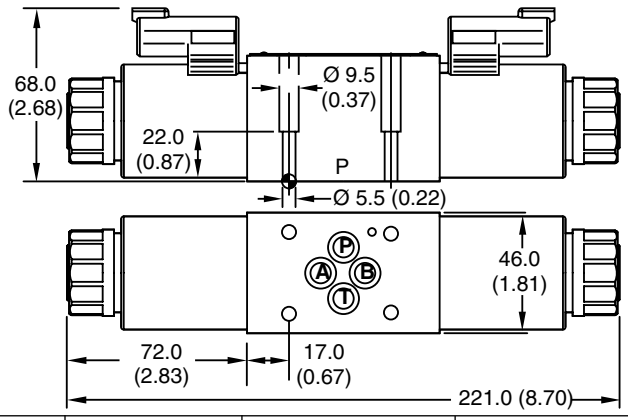


D1FB*K

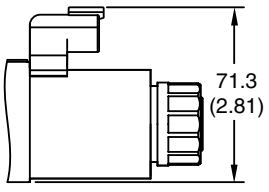


D1FB*C*0 with DT04-2P "Deutsch" Connector

(Only C style shown)



D1FB*C*3

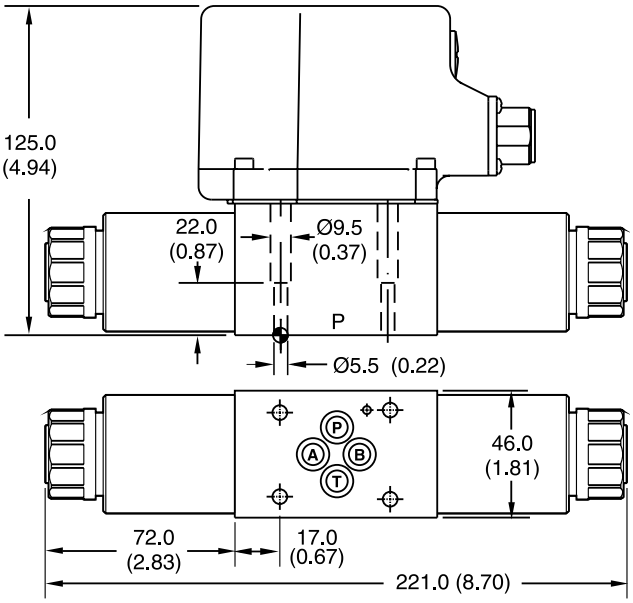


Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK375 BK209	4x M5x30 DIN 912 12.9 4x 10-24x1.25	7.6 Nm (5.6 lb.-ft.) ±15 %	Nitrile: SK-D1FB Fluorocarbon: SK-D1FBV

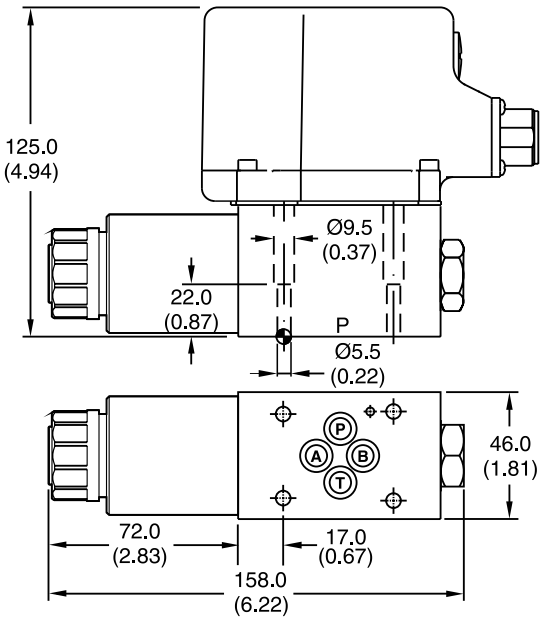
Inch equivalents for millimeter dimensions are shown in (**)

A

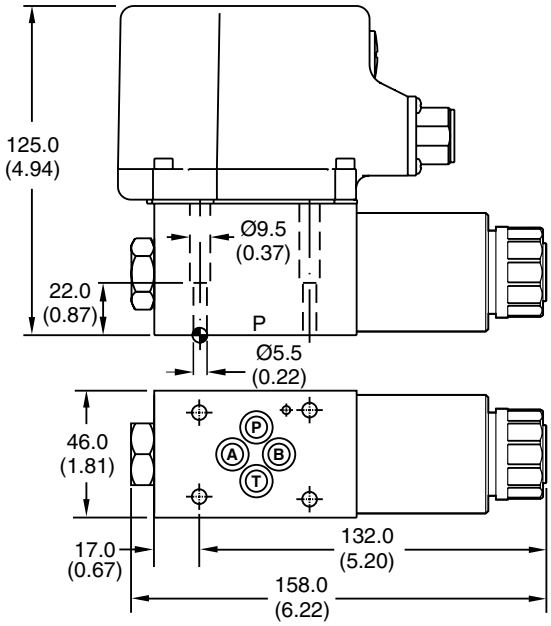
D1FB*C OBE



D1FB*E OBE



D1FB*K OBE



Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}}6.3$ 0.01/100	BK375 BK209	4x M5x30 DIN 912 12.9 4x 10-24x1.25	7.6 Nm (5.6 lb.-ft.) ±15 %	Nitrile: SK-D1FB Fluorocarbon: SK-D1FBV

D1FB.indd, ddp

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series D3FB (NG10) proportional directional valves are available with and without onboard electronics (OBE).

D3FB OBE:

The digital onboard electronics is situated in a robust metal housing, which allows the usage under rough environmental conditions.

The nominal values are factory set. The cable connection to a serial RS-232 interface is available as accessory.

D3FB for external electronics:

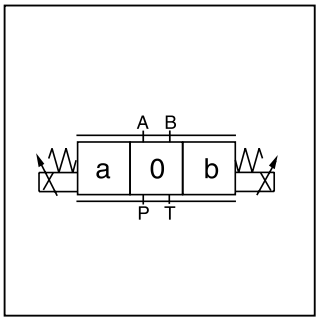
The parameters can be saved, changed and duplicated in combination with the digital power amplifier PWD00A-400.

The valve parameters can be edited with the common ProPxD software for both versions.

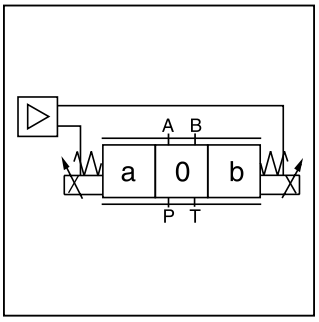
Series D3FB valves can be ordered with spool/sleeve design (D3FB*0) for maximum precision, as well as spool/body design (D3FB*3) for high nominal flow – see functional limit curves for maximum flow capability.

D3FB

D3FB OBE



D3FB



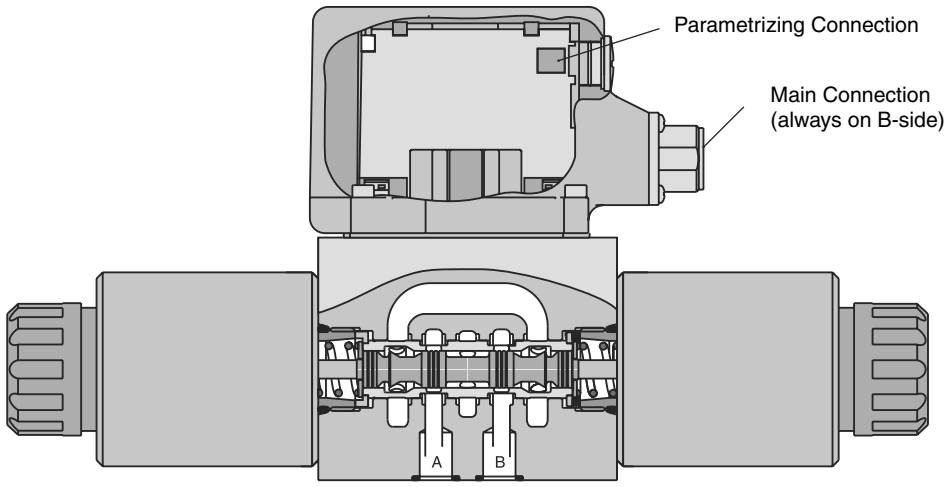
D3FB OBE

CE

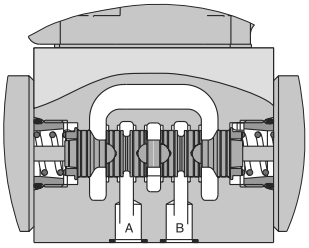
Features

- Spool/sleeve and spool/body.
- 3 command options for D3FB OBE: +/- 10V, 4…20mA, +/- 20mA
- High repeatability from valve to valve.
- Low hysteresis.
- Manual override.
- Digital onboard electronics.

D3FB*0 OBE
Spool/Sleeve Design



D3FB*3 OBE
Spool/Body Design



D	3	F	B			0			W		
Directional Control Valves	Size	Flow Control	Standard Dynamics Standard Repeatability	Spool	Style		Seal	Solenoid Voltage	Solenoid Accessories	Design	Design Series

NOTE: Not required when ordering.

Code	Description
3	DIN NG10 CETOP 5 NFPA D05

D3FB*0: Spool/Sleeve Design	
Code	**Solenoid**
K	12V / 2.95A

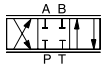
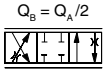
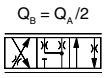
D3FB*3: Spool/Body Design	
Code	**Solenoid**
K	12V / 2.95A
J	24V / 1.5A

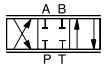
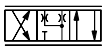
Code	Description
0	Spool/sleeve design
3	Spool/body design

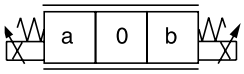
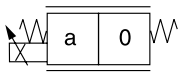
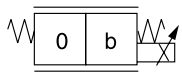
Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
W*	Connector as per DIN 43650 without plug

* Please order plugs separately. See Accessories.

D3FB*0: Spool/Sleeve Design		
Code	**Spool**	**Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge**
E01M E01S		40 (10.6) 60 (15.9)
E02M E02S		40 (10.6) 60 (15.9)
B31M B31S		40 / 20 (10.6 / 5.3) 60 / 30 (15.9 / 7.9)
B32M B32S		40 / 20 (10.6 / 5.3) 60 / 30 (15.9 / 7.9)

D3FB*3: Spool/Body Design		
Code	**Spool**	**Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge**
E01M E01S E01U		40 (10.6) 60 (15.9) 80 (21.2)
E02M E02S E02U		40 (10.6) 60 (15.9) 80 (21.2)

Code	Style
C	
E	
K	

Bolt Kit:

BK98	(4) 1/4-24x1.625 SHCS
BK385	(4) M6x40

Weight:

D3FB	6.5 kg (14.3 lbs.)

D	3	F	B			0					
Directional Control Valves	Size	Flow Control	Standard Dynamics Standard Repeatability	Spool	Style		Seal	Input Signal	Options	Design	Design Series

NOTE: Not required when ordering.

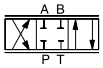
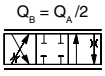
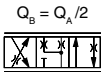
Code	Description
3	DIN NG10 CETOP 5 NFPA D05

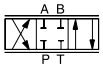
Code	Description
0	Spool/sleeve design
3	Spool/body design

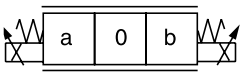
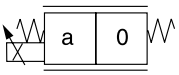
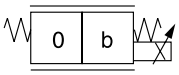
Code	Input signal [1]	Function	Port	Options
F0	0...+/-10V	0...+10V > P-A	6 + PE	Potentiometer supply
G0	0...+/-20mA	0...+20mA > P-A	6 + PE	—
S0	4...20mA	12...20mA > P-A	6 + PE	—
W5 [2]	0...+/-10V 4...20mA	0...+10V > P-A 12...20mA > P-A	11 + PE	Potentiometer supply & command preset channel

[1] Single solenoid always 0...+10V respectively 4...20 mA
[2] Factory set ± 10V on delivery

Code	Description
N	Nitrile
V	Fluorocarbon

D3FB*0: Spool/Sleeve Design		
Code	**Spool**	**Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge**
E01M E01S		40 (10.6) 60 (15.9)
E02M E02S		40 (10.6) 60 (15.9)
B31M B31S		40 / 20 (10.6 / 5.3) 60 / 30 (15.9 / 7.9)
B32M B32S		40 / 20 (10.6 / 5.3) 60 / 30 (15.9 / 7.9)

D3FB*3: Spool/Body Design		
Code	**Spool**	**Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge**
E01M E01S E01U		40 (10.6) 60 (15.9) 80 (21.2)
E02M E02S E02U		40 (10.6) 60 (15.9) 80 (21.2)

Code	Style
C	
E	
K	

Bolt Kit:

BK98	(4) 1/4-20x1.625 SHCS
BK385	(4) M6x40

Weight:

D3FB	7.2 kg (15.9 lbs.)

Please order plugs separately. See Accessories.

Parametrizing cable OBE => RS-232
Item no. 40982923

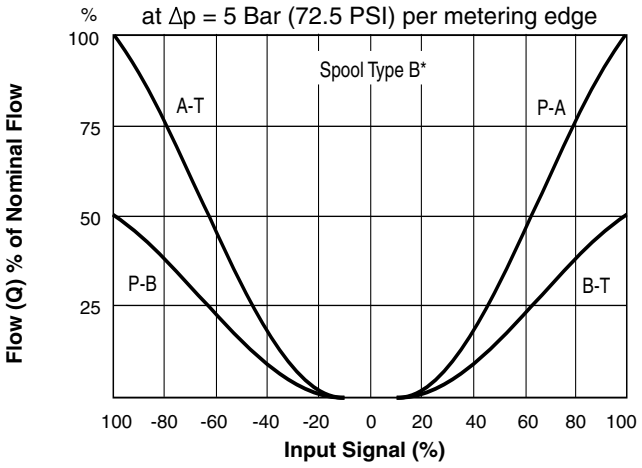
General			
Design		Direct operated proportional DC valve	
Actuation		Proportional solenoid	
Size		NG10 / CETOP 5 / NFPA D05	
Mounting Interface		DIN 24340 / ISO 4401 / CETOP RP121 / NFPA	
Mounting Position		Unrestricted	
Ambient Temperature	**[°C]**	-20...+60; (-4°F...+140°F)	
$MTTF_D$ Value (OBE)	**[years]**	150 (75)	
Vibration Resistance	**[g]**	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27	
Hydraulic			
Maximum Operating Pressure		Ports P, A, B 350 Bar (5075 PSI); Port T 210 Bar (3045 PSI)	
Maximum Pressure Drop PABT / PBAT		350 Bar (5075 PSI)	
Fluid		Hydraulic oil as per DIN 51524...51535, other on request	
Fluid Temperature	**[°C]**	-20...+60; (-4°F...+140°F)	
Viscosity **Permitted** **Recommended**	 **[cSt] / [mm²/s]** **[cSt] / [mm²/s]**	 20...380 (93...1761 SSU) 30...80 (139...371 SSU)	
Filtration		ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	
Nominal Flow at Δp=5 Bar (72.5 PSI) per Control Edge *		**D3FB*0 (Spool/sleeve)**	**D3FB*3 (Spool/body)**
		40 LPM (10.6 GPM) / 60 LPM (15.9 GPM)	40 LPM (10.6 GPM) 60 LPM (15.9 GPM) / 80 LPM (21.2 GPM)
Leakage at 100 Bar (1450 PSI)	**[ml/min]**	<100	<100
Overlap	**[%]**	25, electrically normalized at 10 (see flow characteristics)	
Static / Dynamic			
Step Response at 100% Step	**[ms]**	40	
Hysteresis	**[%]**	<4	<5
Temperature Drift Solenoid Current	**[%/K]**	<0.02	
Electrical			
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible	
Protection Class		IP65 in accordance with EN60529 (plugged and mounted)	
Solenoid		**Code "K"**	**Code "J"**
Supply Voltage	**[V]**	12	24
Current Consumption	**[A]**	2.95	1.5
Resistance	**[Ohm]**	3.84	16.5
Solenoid Connection		Connector as per EN 175301-803	
Wiring Minimum	**[mm²]**	3x1.5 recommended	
Wiring Length Maximum	**[m]**	50 (164 ft.)	

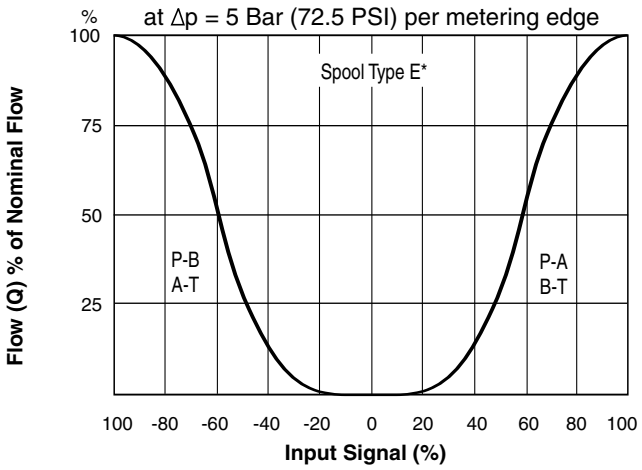
* Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

Continued on the next page

Electrical		
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/Ripple DC	**[V]**	18...30, ripple < 5% eff., surge free
Current Consumption Maximum	**[A]**	3.5
Pre-fusing Medium Lag	**[A]**	4.0
Input Signal		
Codes F0 & W5 Voltage	**[V]**	+10...0...-10, ripple < 0.01 % eff., surge free, Ri = 100kOhm, 0...+10V => P -> A
Codes S0 & W5 Current	**[mA]**	4...12...20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 12...20mA => P -> A < 3.6 mA = enable off, > 3.8 mA = enable on (acc. to NAMUR NE43)
Code G0	**[mA]**	+20...0...-20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 0...+20mA => P -> A
Differential Input Maximum		
Codes F0, G0 & S0	**[V]**	30 for terminal D and E against PE (terminal G) 11 for terminal D and E against 0V (terminal B)
Code W5	**[V]**	30 for terminal 4 and 5 against PE (terminal PE) 11 for terminal 4 and 5 against 0V (terminal 2)
Voltage References:		**Not a powered output** **Only for 10K Ohm pots**
Channel Recall Signal	**[V]**	0...2.5: off / 5...30: on / Ri = 100 kOhm
Adjustment Ranges:		
Minimum	**[%]**	0...50
Maximum	**[%]**	50...100
Ramp	**[s]**	0...32.5
Interface		RS-232, parametrizing connection 5 pole
EMC		EN 61000-6-2, EN 61000-6-4
Central Connection		
Codes F0, G0 & S0		6 + PE acc. to EN 175201-804
Code W5		11 + PE acc. to EN 175201-804
Wiring Minimum		
Codes F0, G0 & S0	**[mm²]**	7 x 1.0 (AWG16) overall braid shield
Code W5	**[mm²]**	11 x 1.0 (AWG20) overall braid shield
Wiring Length Maximum	**[m]**	50 (164 ft.)

(Electrically set to opening point 10%)



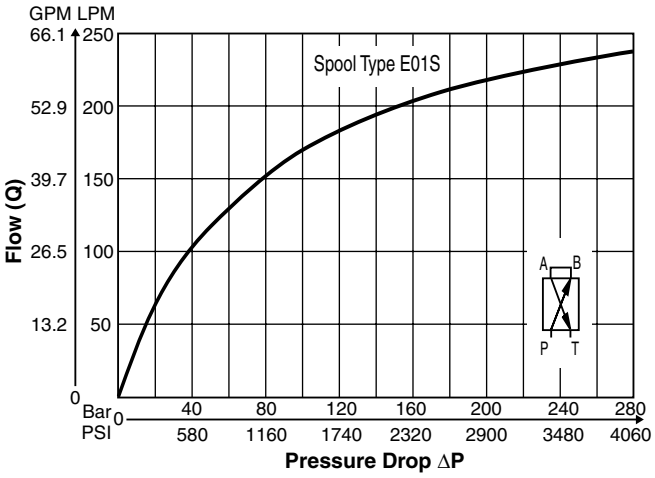


All performance curves measured with HLP46 at 50°C (122°F).

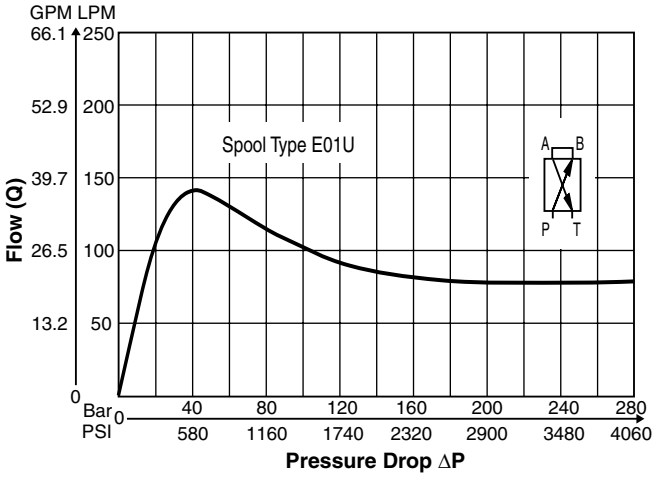
Functional Limits

100% command signal (symmetric flow). At asymmetric flow a reduced flow limit has to be considered – typically approx. 10% lower.

D3FB*0

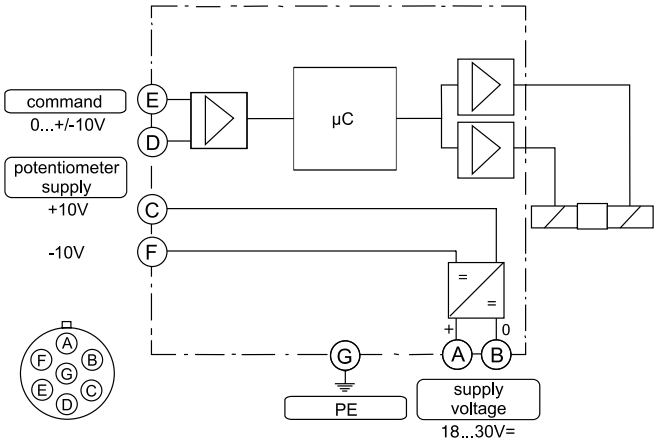


D3FB*3

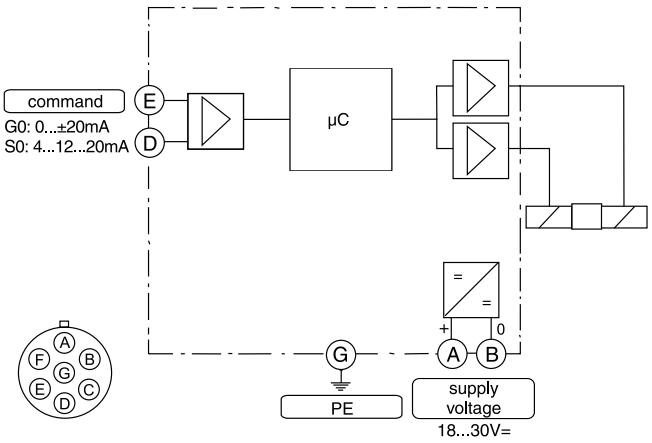


All performance curves measured with HLP46 at 50°C (122°F).

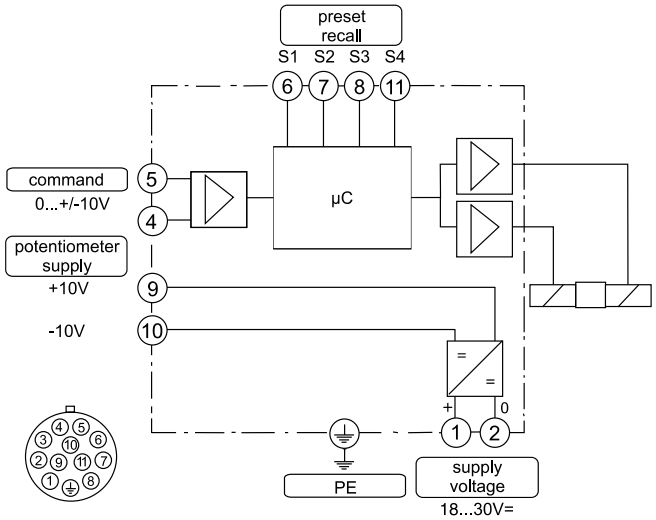
Code F0
6 + PE acc. to EN 175201-804



Code G0, S0
6 + PE acc. to EN 175201-804



Code W5
11 + PE acc. to EN 175201-804



ProPxD Interface Program

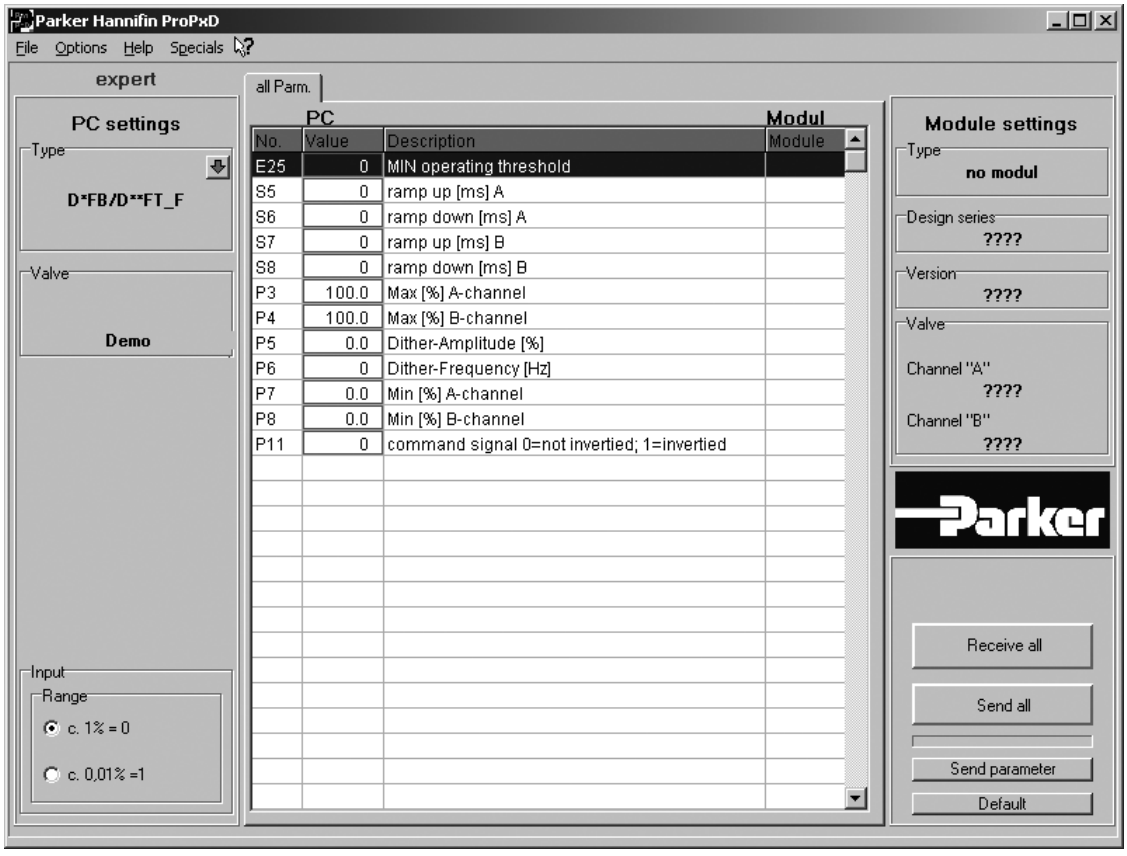
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

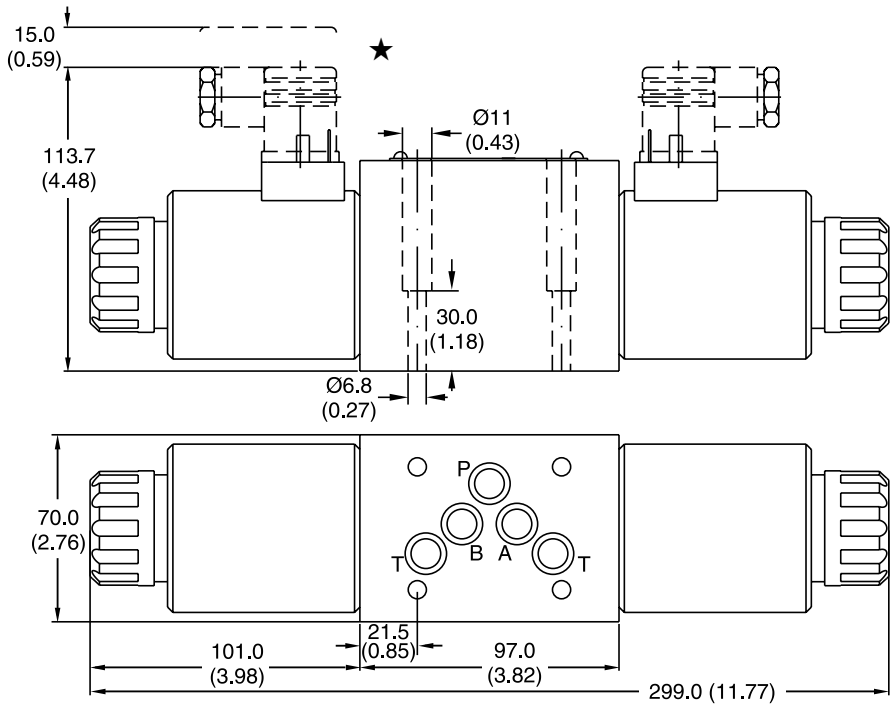
Simple to use interface program. Download free of charge **www.parker.com/euro_hcd → Services → downloads**



The parametrizing cable may be ordered under item no. 40982923.

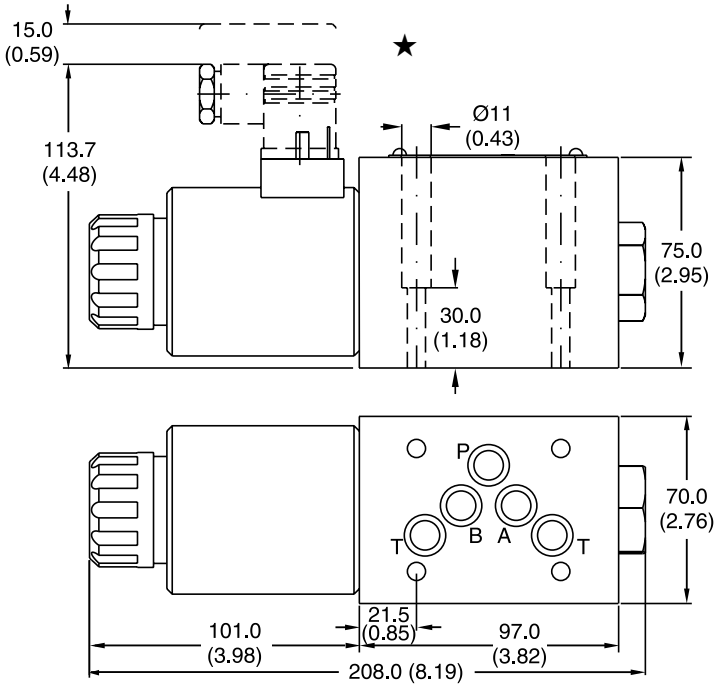
Inch equivalents for millimeter dimensions are shown in (**)

D3FB*C



D3FB*K

★ Order plugs separately.

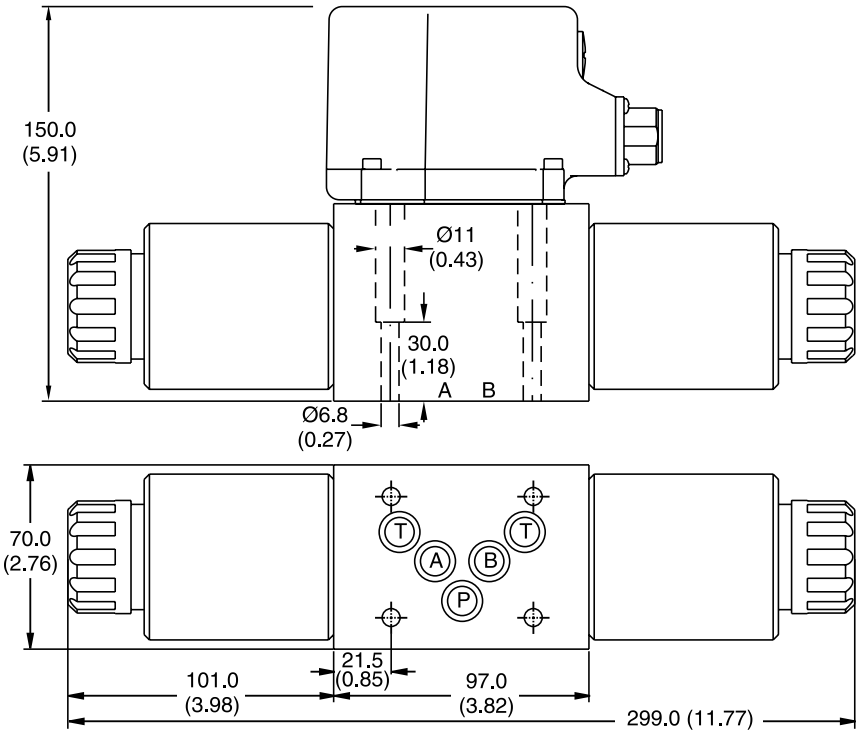


Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D3FB Fluorocarbon: SK-D3FBV

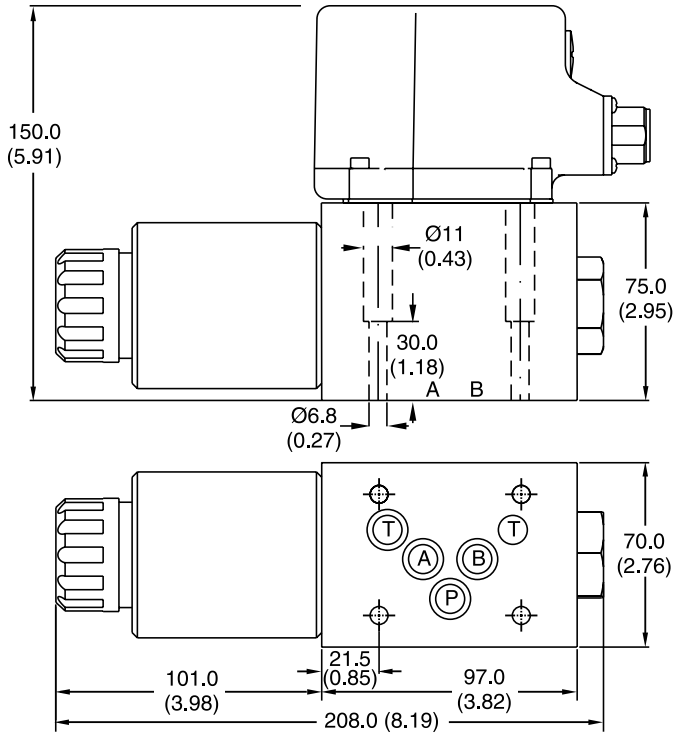
Inch equivalents for millimeter dimensions are shown in (**)

A

D3FB*C OBE



D3FB*E OBE



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D3FB Fluorocarbon: SK-D3FBV

Notes

Return to ALPHA TOC
Return to SECTION TOC
A

General Description

Series D*1FB pilot operated proportional directional valves come in 4 sizes:

D31FB NG10 (CETOP 5)
D41FB NG16 (CETOP 7)
D91FB NG25 (CETOP 8)
D111FB NG32 (CETOP 10)

The valves are available with and without onboard electronics (OBE).

D*1FB OBE:

The digital onboard electronics is situated in a robust metal housing, which allows usage under rough environmental conditions.

The nominal values are factory set. The cable connection to a serial RS-232 interface is available as an accessory.

D*1FB for external electronics:

The parameters can be saved, changed and duplicated in combination with the digital power amplifier PWD00A-400.

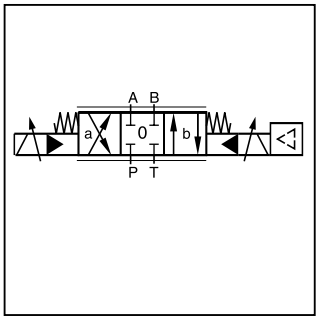
Series D*1FB valve parameters can be edited with the common ProPxD software for both versions.

The D*1FB valves work with barometric feedback of the main stage to the pressure reducing pilot valve. The pilot control pressure of 25 Bar (363 PSI) allows high flow rates of maximum of stability.

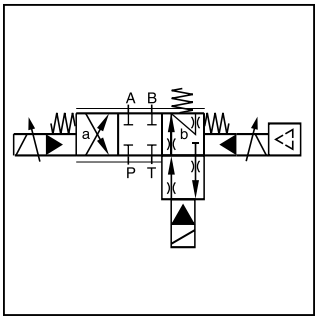
The innovative integrated regenerative function into the A-line (optional) allows new energy saving circuits for differential cylinders. The hybrid version can be switched between regenerative mode and standard mode at any time.

D91FB

D91FB OBE



D*1FB

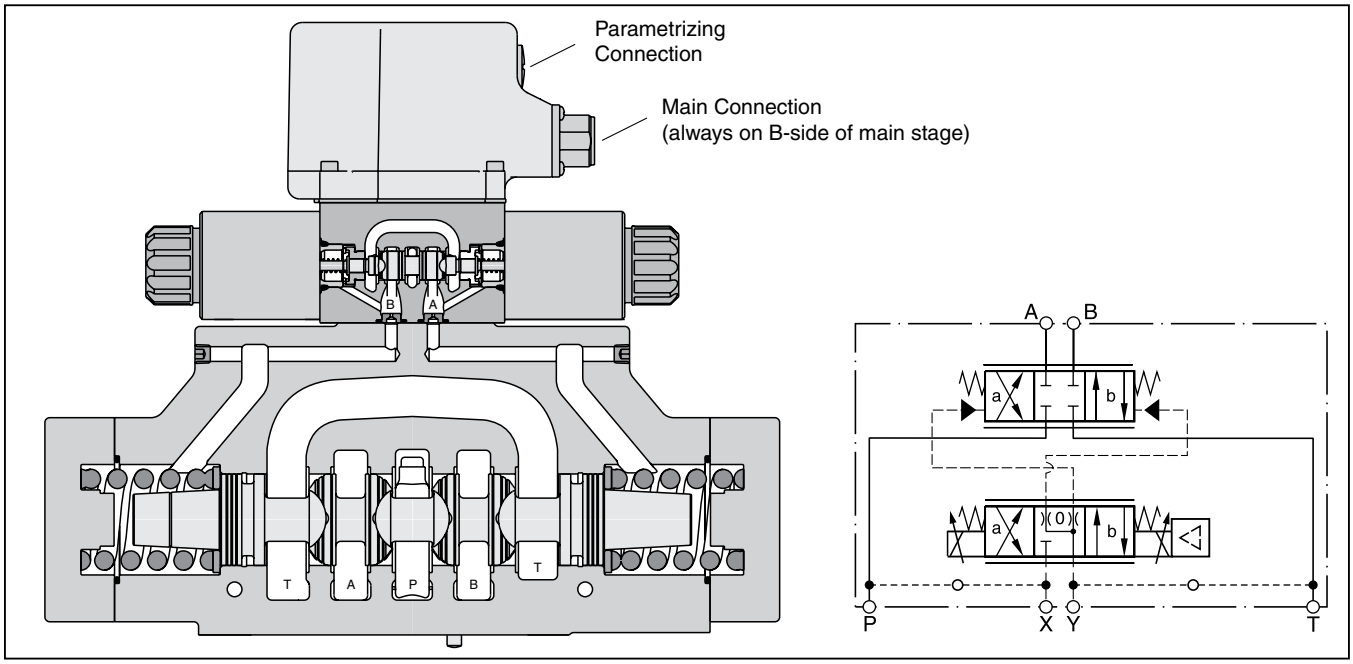


D*1FBZ

Features

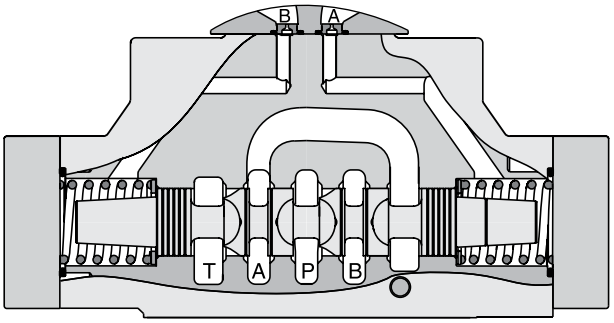
- Progressive flow characteristics for precise adjustment of flow rate.
- High flow capacity.
- Digital onboard electronics.
- Center position monitoring optional.
- New: Switchable regenerative hybrid version.

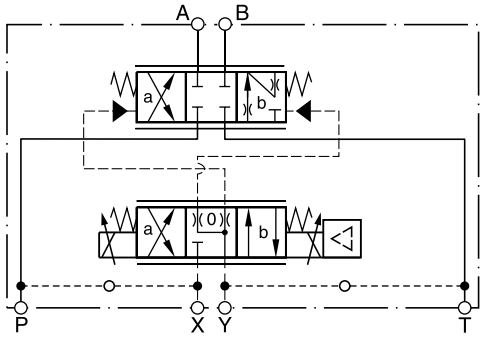
D91FB OBE



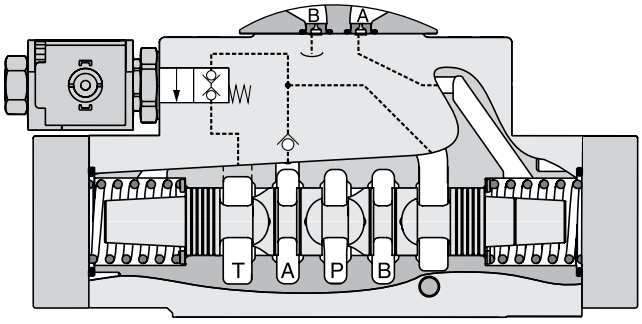
D*1FBR and D*1FBZ

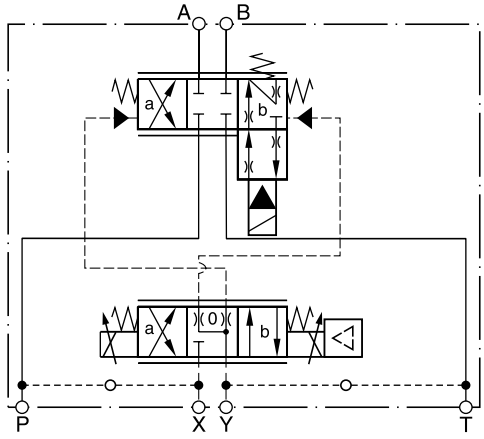
Regenerative Valve D*1FBR





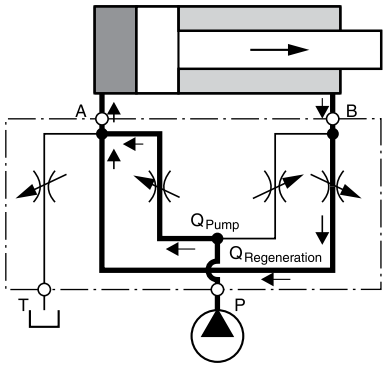
Hybrid Valve D*1FBZ





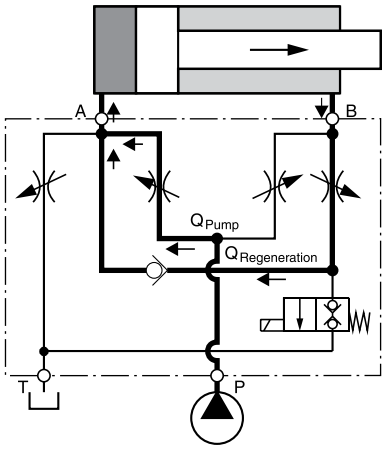
D*1FBR (Regenerative Valve)

Cylinder extending

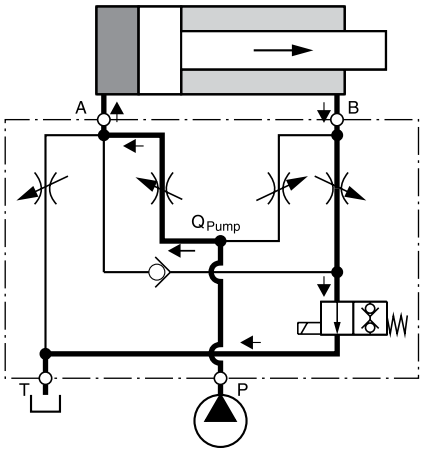


D*1FBZ (Hybrid Valve)

Cylinder extending
regenerative mode
(high speed)



Cylinder extending
standard mode
(high force)



Flow Rate in % of Nominal Flow

Size	Spool	Port					
		A-T	P-A	P-B	B-A (R-Valve)	B-A (Hybrid)	B-T (Hybrid)
D41FBR/Z	31/32	100%	50%	100%	50%	45%	20%
D91FBR/Z	31/32	100%	50%	100%	50%	50%	25%
D111FBR/Z	31/32	100%	50%	100%	50%	50%	20%

D		1	F	B			C						
Directional Control Valves	Size	NG6 Pilot	Flow Control	Dynamics Standard	Spool	Flow	Spool Position	Pilot Connection	Seal	Solenoid Voltage	Solenoid Connector	Valve Accessories	Design Series

NOTE: Not required when ordering.

Code	Description
3	NG10 / CETOP 5
4	NG16 / CETOP 7
9 [1]	NG25 / CETOP 8
11	NG32 / CETOP 10

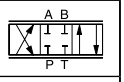
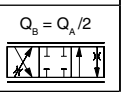
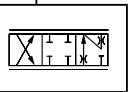
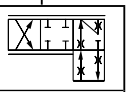
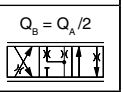
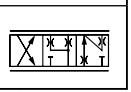
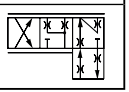
[1] For enlarged connections Ø 32 mm

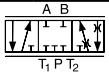
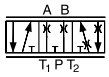
Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
0	Standard
8 [7]	Monitor Switch
L [8]	Hybrid valve 24V normally closed for spool type Z

[7] Not available for D111FBZ

[8] See page A33 for regenerative and hybrid spool information. (not available in D31FB)

Standard		NEW: Regenerative Function		NEW: Hybrid Function [2]	
Code	Spool Type	Code	Spool Type	Code	Spool Type
E01					
E02					
B31		R31		Z31	
B32		R32		Z32	

D31FB spool type: R31  R32 

[2] not available in D31FB.

Code	Inlet	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

Code	Description
W [5]	Connector as per DIN 43650 without plug
J [5] [6]	Connector DT04-2P "Deutsch"

[5] Please order plugs separately. See Accessories.

[6] Not available with hybrid function.

Code	Solenoid
K	12V / 2.5A
J	24V / 1.1A

Code	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge			
	D31	D41	D91	D111
B	—	100 [3] [4] (26.4)	—	—
C	75 [4] (19.8)	130 [3] [4] (34.3)	—	—
D	90 [4] (23.8)	—	—	—
E	120 (31.7)	—	250 [3] [4] (66.0)	—
F	—	200 (52.8)	—	—
H	—	—	400 (105.7)	—
L	—	—	—	1000 (264.2)

[3] Not available with spool type B31 und B32.

[4] Not available with regenerative or hybrid function.

Bolt Kits:

D31FB	BK98	(4) 1/4-20x1.625 SHCS
D41FB	BK160	(4) 3/8-16x2.5 SHCS (2) 1/4-20x2.5 SHCS
D91FB	BK228	(6) 1/2-13x3 SHCS
D111FB	BK150	(6) 3/4-10x3.5 SHCS

Weight:

D31FB	8.1 kg (17.9 lbs.)
D41FB	10.8 kg (23.8 lbs.)
D91FB	19.0 kg (41.9 lbs.)
D111FB	68.0 kg (149.9 lbs.)

D		1	F	B			C					
Directional Control Valves	Size	NG6 Pilot	Flow Control	Onboard Electronics	Spool	Flow	Spool Position	Pilot Connection	Seal	Input Signal / Options	Valve Accessories	Design Series

NOTE: Not required when ordering.

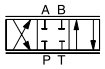
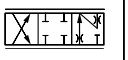
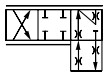
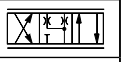
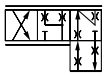
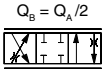
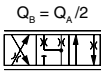
Code	Description
3	NG10 / CETOP 5
4	NG16 / CETOP 7
9 [1]	NG25 / CETOP 8
11	NG32 / CETOP 10

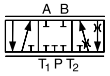
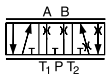
[1] With enlarged connections Ø 32 mm

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
0	Standard
8 [5]	Monitor Switch
L [6]	Hybrid valve 24V normally closed for spool type Z

[5] Not available for D111FBZ.
[6] See page A33 for regenerative and hybrid spool information. (not available in D31FB)

Standard		NEW: Regenerative Function		NEW: Hybrid Function [2]	
Code	Spool Type	Code	Spool Type	Code	Spool Type
E01		R31		Z31	
E02		R32		Z32	
B31	$Q_B = Q_A/2$ 				
B32	$Q_B = Q_A/2$ 				

D31FB spool type: R31  R32 

[2] not available in D31FB.

Code	Inlet	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

Code	Input Signal	Function	Connection	Option
F0	0...±10V	0...+10V P->B	6 + PE	Pot.-supply
G0	0...±20mA	0...+20mA P->B	6 + PE	—
M0	0...±10V	0...+10V P->A	6 + PE	Pot.-supply
S0	4...20mA	12...20mA P->A	6 + PE	—
W5	0...±10V 4...20mA	0...+10V P->A 12...20mA P->A	11 + PE	Pot.-supply + Preset Commands

Code	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge			
	D31	D41	D91	D111
B	—	100 [3] [4] (26.4)	—	—
C	75 [4] (19.8)	130 [3] [4] (34.3)	—	—
D	90 [4] (23.8)	—	—	—
E	120 (31.7)	—	250 [3] [4] (66.0)	—
F	—	200 (52.8)	—	—
H	—	—	400 (105.7)	—
L	—	—	—	1000 (264.2)

[3] Not available with spool type B31 und B32.
[4] Not available with regenerative or hybrid function.

Bolt Kits:

D31FB	BK98	(4) 1/4-20x1.625 SHCS
D41FB	BK160	(4) 3/8-16x2.5 SHCS (2) 1/4-20x2.5 SHCS
D91FB	BK228	(6) 1/2-13x3 SHCS
D111FB	BK150	(6) 3/4-10x3.5 SHCS

Weight:

D31FB	8.4 kg (18.5 lbs.)
D41FB	11.1 kg (24.5 lbs.)
D91FB	19.3 kg (42.6 lbs.)
D111FB	68.3 kg (150.6 lbs.)

Please order plugs separately. See Accessories.

Parametrizing cable OBE => RS-232
Item no. 40982923

General					
Design		Pilot operated DC valve			
Actuation		Proportional solenoid			
Size		**NG10 (CETOP 5)**	**NG16 (CETOP 7)**	**NG25 (CETOP 8)**	**NG32 (CETOP 10)**
Mounting Interface		DIN 24340 / ISO 4401 / CETOP RP121 / NFPA			
Mounting Position		Unrestricted			
Ambient Temperature	**[°C]**	-20...+60; (-4°F...+140°F)			
$MTTF_D$ Value (OBE)	**[years]**	75 (50)			
Vibration Resistance	**[g]**	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27			
Hydraulic					
Maximum Operating Pressure		Pilot Drain Internal: Ports P, A, B, X 350 Bar (5075 PSI); Port T, Y 185 Bar (2683 PSI) NG10: Port T, Y 15 Bar (218 PSI) Pilot Drain External: Ports P, A, B, T, X 350 Bar (5075 PSI); Port Y 185 Bar (2683 PSI) NG10: Port Y 15 Bar (218 PSI)			
Fluid		Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature	**[°C]**	-20...+60; (-4°F...+140°F)			
Viscosity **Permitted** **Recommended**	 **[cSt] / [mm²/s]** **[cSt] / [mm²/s]**	 20...380 (93...1761 SSU) 30...80 (139...371 SSU)			
Filtration		ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Nominal Flow at Δp=Bar (72.5 PSI) per Control Edge *		**D31FB**	**D41FB**	**D91FB**	**D111FB**
		75 LPM (19.8 GPM) 90 LPM (23.8 GPM) 120 LPM (31.7 GPM)	100 LPM (26.4 GPM) 130 LPM (34.4 GPM) 200 LPM (52.9 GPM)	250 LPM (66.1 GPM) 400 LPM (105.8 GPM)	1000 LPM (264.2 GPM)
Leakage at 100 Bar (1450 PSI)	**[ml/min]**	100	200	600	1000
Pilot Supply Pressure		Minimum 30 Bar (435 PSI) [+T/Y pressure]; Maximum 350 Bar (5075 PSI) Optimal Dynamics at 50 Bar (725 PSI)			
Pilot Flow at 100 Bar (1450 PSI)		<0.5 LPM (0.13 GPM)	<1.2 LPM (0.3 GPM)	<1.2 LPM (0.3 GPM)	<1.2 LPM (0.3 GPM)
Pilot Flow, Step Response		2 LPM (0.5 GPM)	1.9 LPM (0.5 GPM)	4.5 LPM (1.2 GPM)	18 LPM (4.8 GPM)
Static / Dynamic					
Step Response at 100% Step	**[ms]**	50	75	100	180
Hysteresis	**[%]**	<5			
Electrical					
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible			
Protection Class		Standard (as per EN175301-803) IP65 in accordance with EN60529 (plugged and mounted) DT04-2P "Deutsch" IP69K (plugged and mounted)			
Solenoid		**Code "K"**		**Code "J"**	
Supply Voltage	**[V]**	12		24	
Current Consumption	**[A]**	2.5		1.1	
Resistance	**[Ohm]**	4.4		18.6	
Coil Insulation Class		F (155 °C); (331°F)			
Solenoid Connection		Connector as per EN 175301-803 (code W), DT04-2P "Deutsch" connector (code J). Solenoid identification as per ISO 9461.			
Wiring Minimum	**[mm²]**	3x1.5 (AWG 16) overall braid shield			
Wiring Length Maximum	**[m]**	50 (164 ft.)			

* Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

Continued on next page

Electrical Monitor Switch (Offboard Electronics)		
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature	**[°C]**	0...70; (32°F...158°F)
Supply Voltage/Ripple	**[V]**	18...42, ripple <10% eff.
Current Consumption without Load	**[mA]**	<30
Maximum Output Current per Channel, Ohmic	**[mA]**	400
Minimum Output Load per Channel, Ohmic	**[kOhm]**	100
Max. output drop at 0.2A **Max. output drop at 0.4A**	**[V]** **[V]**	<1.1 <1.6
EMV		EN 50081-1 / EN50082-2
Maximum tol. Ambient Field Strength	**[A/m]**	1200
Minimum Distance to next AC Solenoid	**[m]**	0.1 (0.2 ft.)
Interface		4+PE acc. IEC 61076-2-101 (M12)
Wiring Minimum	**[mm²]**	5x0.5 (AWG 20) overall braid shield
Wiring Length Maximum	**[m]**	50 (164 ft.)

Electrical (Onboard Electronics)		
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/ripple DC	**[V]**	18...30, ripple < 5% eff., surge free
Current Consumption Maximum	**[A]**	2.0
Pre-fusing Medium Lag	**[A]**	2.5
Input Signal		
Codes F0, M0 & W5 Voltage	**[V]**	+10...0...-10, ripple < 0.01 % eff., surge free, Ri = 100kOhm, 0...+10V
Codes S0 & W5 Current	**[mA]**	4...12...20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 12...20mA < 3.6 mA = enable off, > 3.8 mA = enable on (acc. to NAMUR NE43)
Code G0	**[mA]**	+20...0...-20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 0...+20mA
Differential Input Maximum		
Codes F0, G0, M0 & S0	**[V]**	30 for terminal D and E against PE (terminal G) 11 for terminal D and E against 0V (terminal B)
Code W5	**[V]**	30 for terminal 4 and 5 against PE (terminal PE) 11 for terminal 4 and 5 against 0V (terminal 2)
Voltage References:		Not a powered output Only for 10K Ohm pots
Channel Recall Signal	**[V]**	0...2.5: off / 5...30: on / Ri = 100 kOhm
Adjustment Ranges:		
Minimum	**[%]**	0...50
Maximum	**[%]**	50...100
Ramp	**[s]**	0...32.5
Interface		RS-232, parametrizing connection 5 pole
EMC		EN 61000-6-2, EN 61000-6-4
Central Connection		
Codes F0, G0 & S0		6 + PE acc. to EN 175201-804
Code W5		11 + PE acc. to EN 175201-804
Wiring Minimum		
Codes F0, G0 & S0	**[mm²]**	7 x 1.0 (AWG16) overall braid shield
Code W5	**[mm²]**	11 x 1.0 (AWG20) overall braid shield
Wiring Length Maximum	**[m]**	50 (164 ft.)

Continued on next page

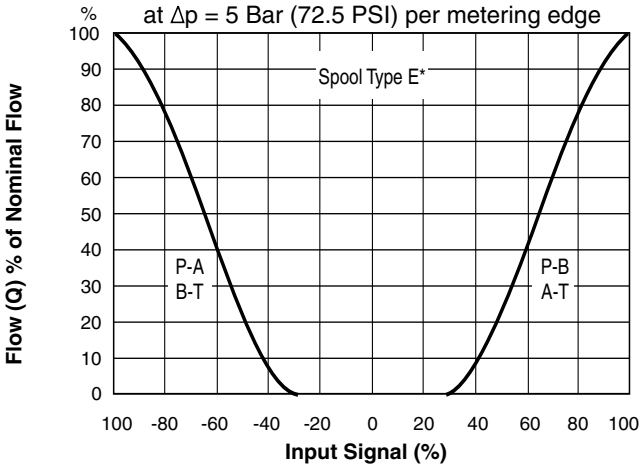
Specifications (cont.)

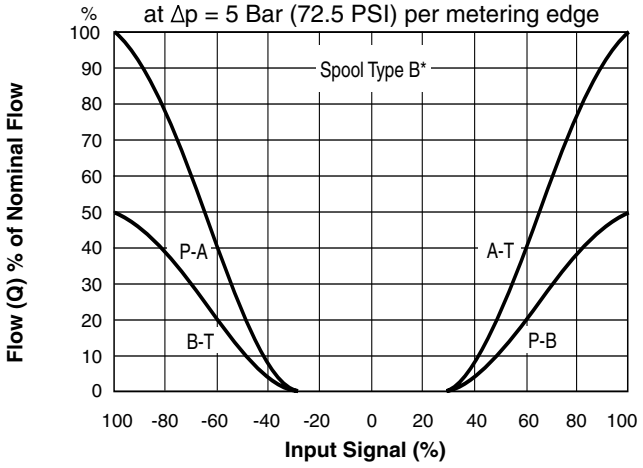
Electrical (Hybrid Option)				
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible		
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)		
		D41	**D91**	**D111**
Supply Voltage	**[V]**	24	24	24
Tolerance Supply Voltage	**[%]**	±10	±10	±10
Current Consumption	**[A]**	1.21	0.96	1.29
Power Consumption	**[W]**	29	23	31
Solenoid Connection		Connector as per EN 175301-803		
Wiring Minimum	**[mm²]**	3 x 1.5 recommended		
Wiring Length Maximum	**[m]**	50 (164 ft.) recommended		

With electrical connections the protective conductor (PE ⏚) must be connected according to the relevant regulations.

Performance Curves

D*1FB Flow

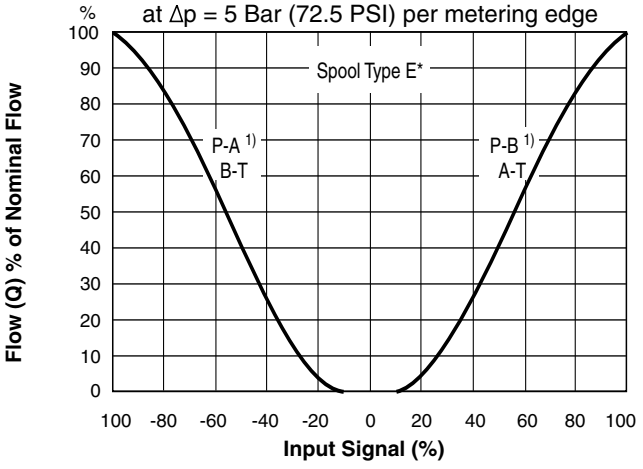


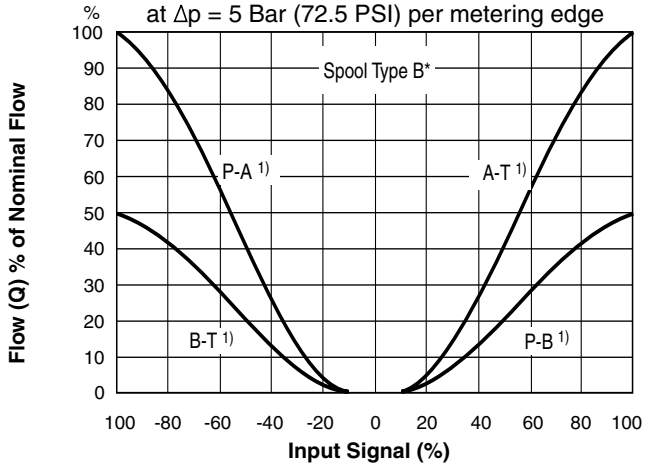


All performance curves measured with HLP46 at 50°C (122°F).

D*1FB OBE Flow

(Electrically set to opening point 10%)





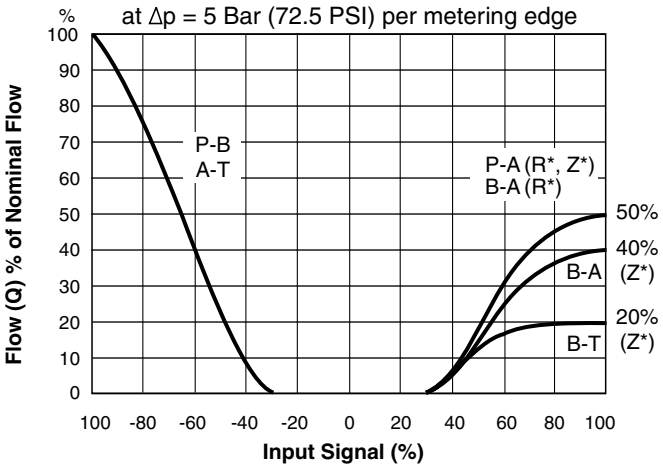
All performance curves measured with HLP46 at 50°C (122°F).

1) Flow direction depending on ordering code.

D*1FB R/Z (Regenerative and Hybrid)

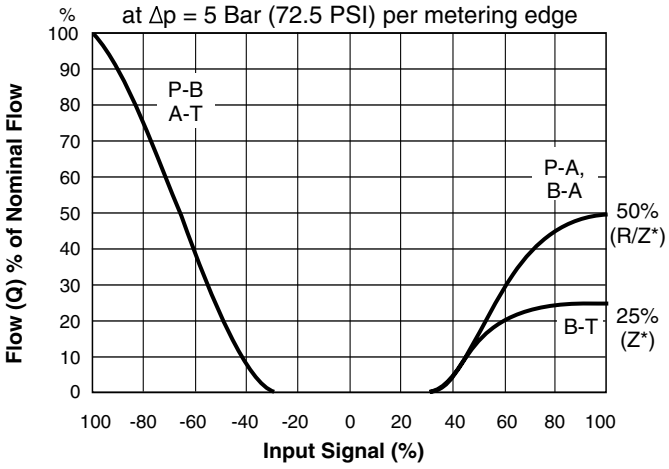
D41FB R/Z

Spool Code **R/Z31/32**



D91FB R/Z

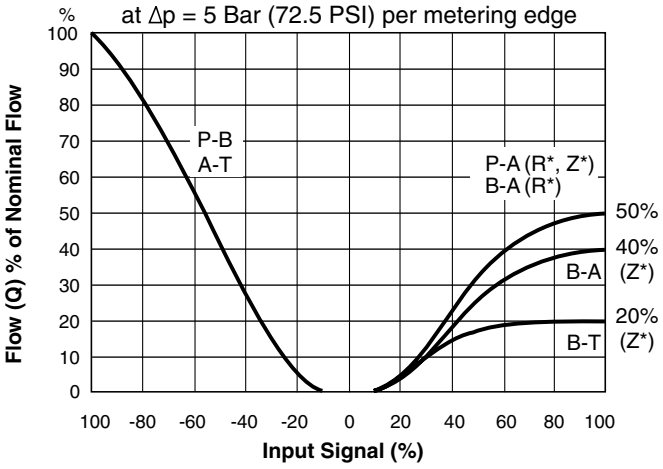
Spool Code **R/Z31/32**



All performance curves measured with HLP46 at 50°C (122°F).

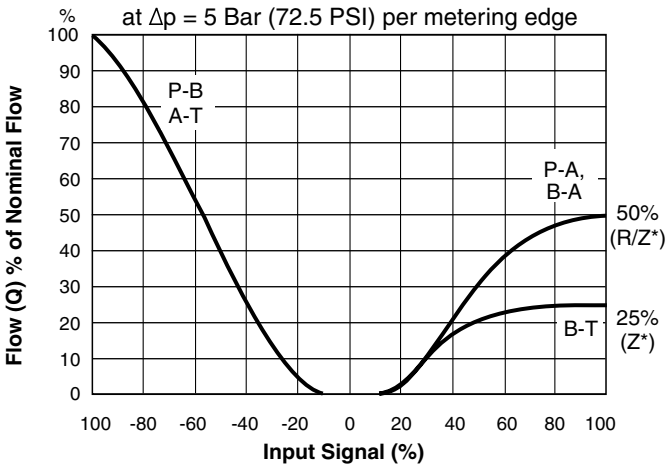
D41FB R/Z OBE

Spool Code **R/Z31/32**



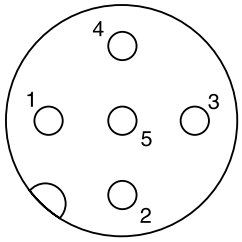
D91FB R/Z OBE

Spool Code **R/Z31/32**

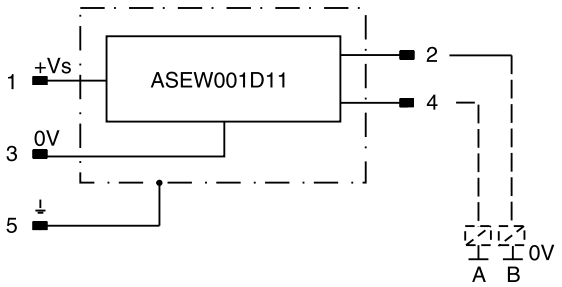


All performance curves measured with HLP46 at 50°C (122°F).

Monitor Switch M12x1 Pin Assignment



1 + Supply 18...42V
2 Output B (normally closed)
3 0V
4 Output A (normally closed)
5 Earth ground



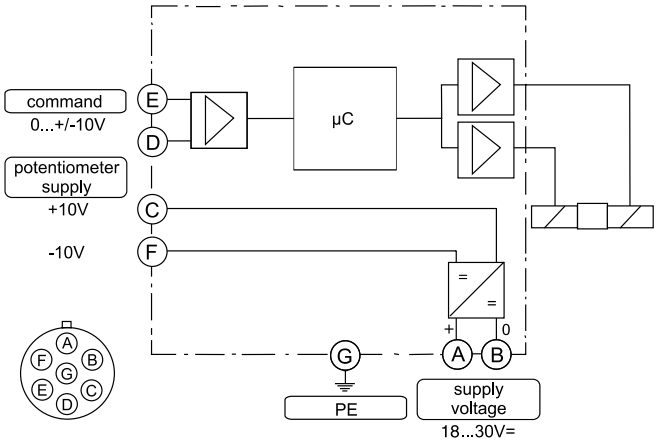
Signal	Output A (pin 4)	Output B (pin 2)
neutral	closed	closed
	open	closed
	closed	open

The neutral position is monitored. The signal changes after less than 10% of the spool stroke.

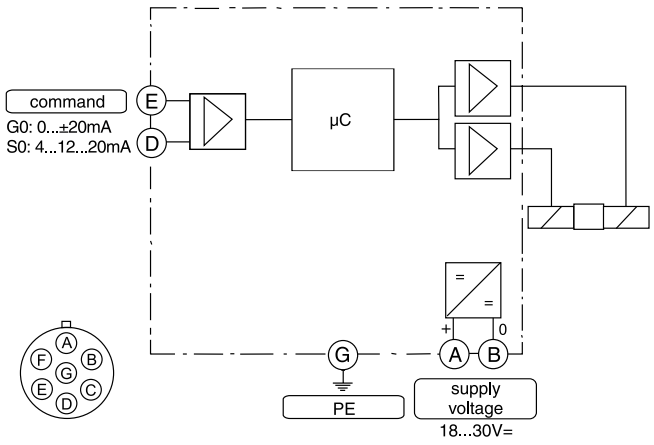
Electrical Monitor Switch

Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature	**[°C]**	0...70; (32°F...158°F)
Supply Voltage/Ripple	**[V]**	18...42, ripple < 10% eff.
Current Consumption without Load	**[mA]**	< 30
Maximum Output Current per Channel, Ohmic	**[mA]**	400
Minimum Output Load per Channel, Ohmic	**[kOhm]**	100
Maximum Output Drop at 0.2A	**[V]**	< 1.1
Maximum Output Drop at 0.4A	**[V]**	< 1.6
EMC		EN 50081-1, EN50082-2
Maximum tol. Ambient Field Strength	**[A/m]**	1200
Minimum Distance to Next AC solenoid	**[m]**	0.1
Interface		4+PE acc. IEC 61076-2-101 (M12)
Wiring Minimum	**[mm²]**	5 x 0.5 (AWG 20) overall braid shield
Wiring Length Maximum	**[m]**	50 (164 ft.)

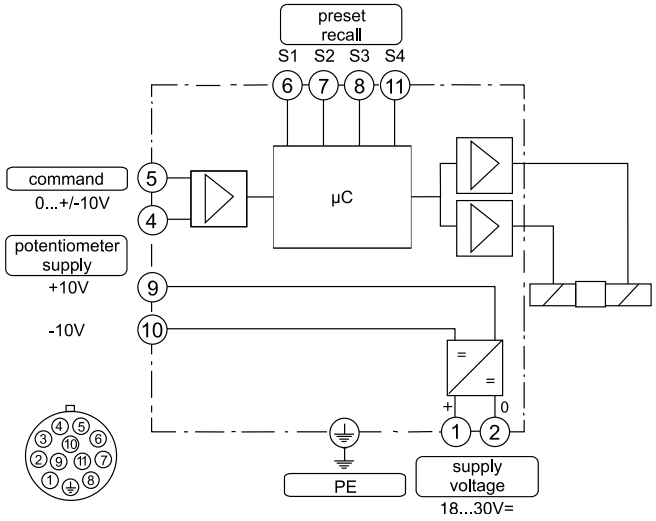
Code F0, M0
6 + PE acc. to EN 175201-804



Code G0, S0
6 + PE acc. to EN 175201-804



Code W5
11 + PE acc. to EN 175201-804



ProPxD Interface Program

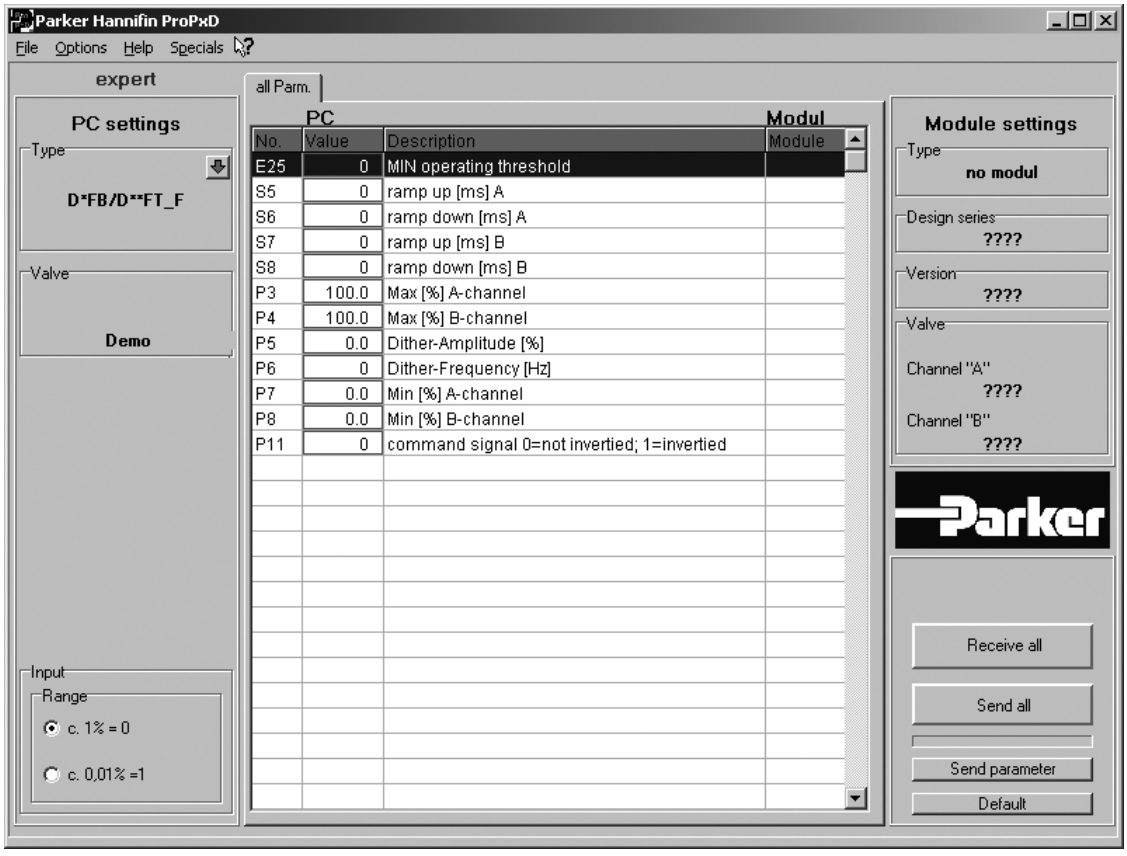
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

Simple to use interface program. Download free of charge **www.parker.com/euro_hcd → Services → downloads**

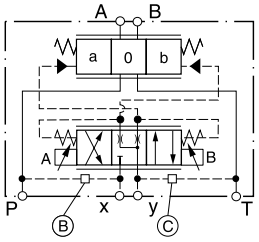


The parametrizing cable may be ordered under item no. 40982923.

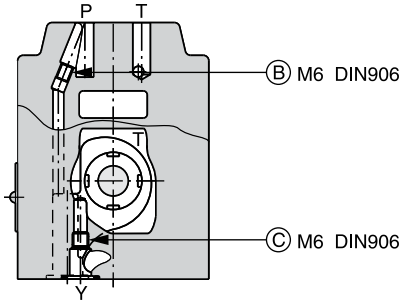
Pilot Flow — Pilot Oil Inlet (Supply) and Outlet (Drain)

○ open, ● closed

Pilot oil Inlet	Drain	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



D31FBB/E



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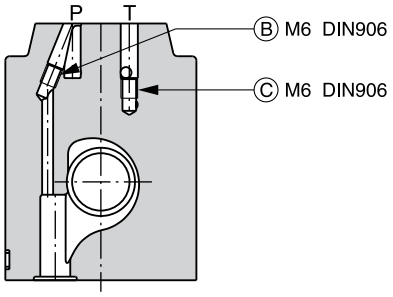
D31FBR



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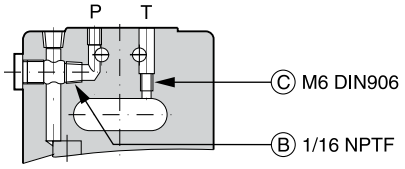

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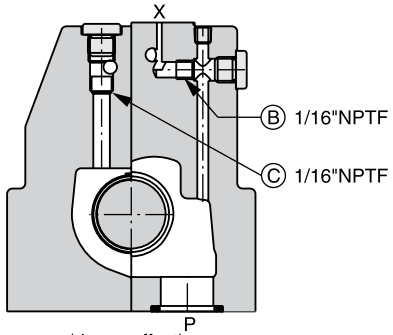

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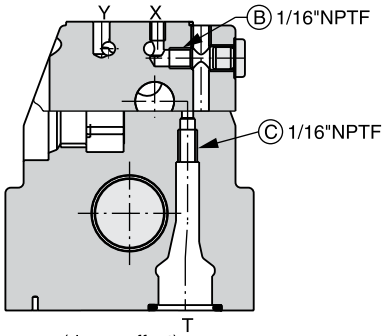

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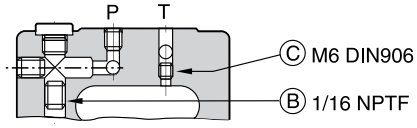
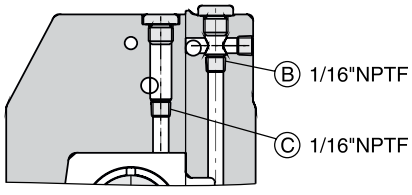
D91FBB/E



D91FBR



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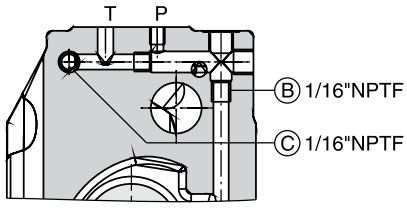
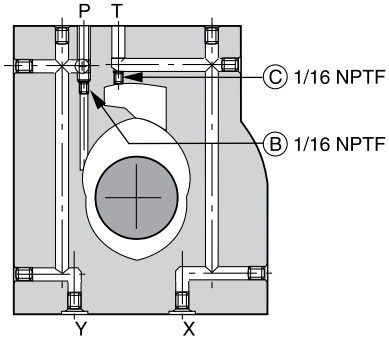


D111FBB/E



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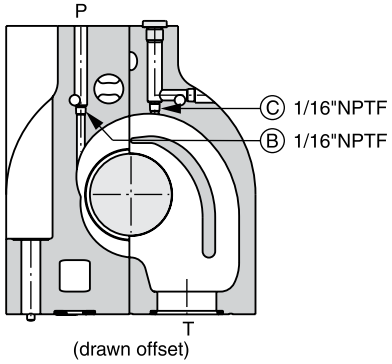

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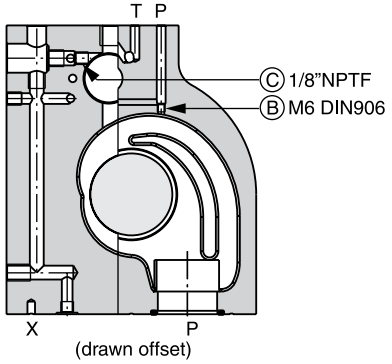
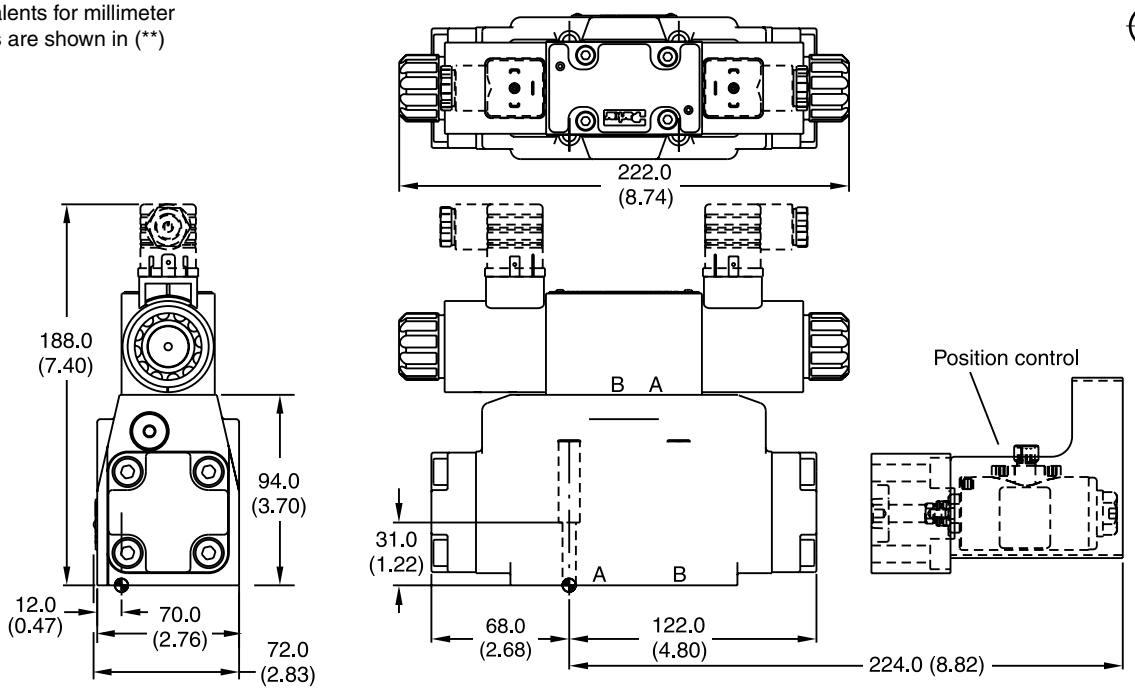


(drawn offset)

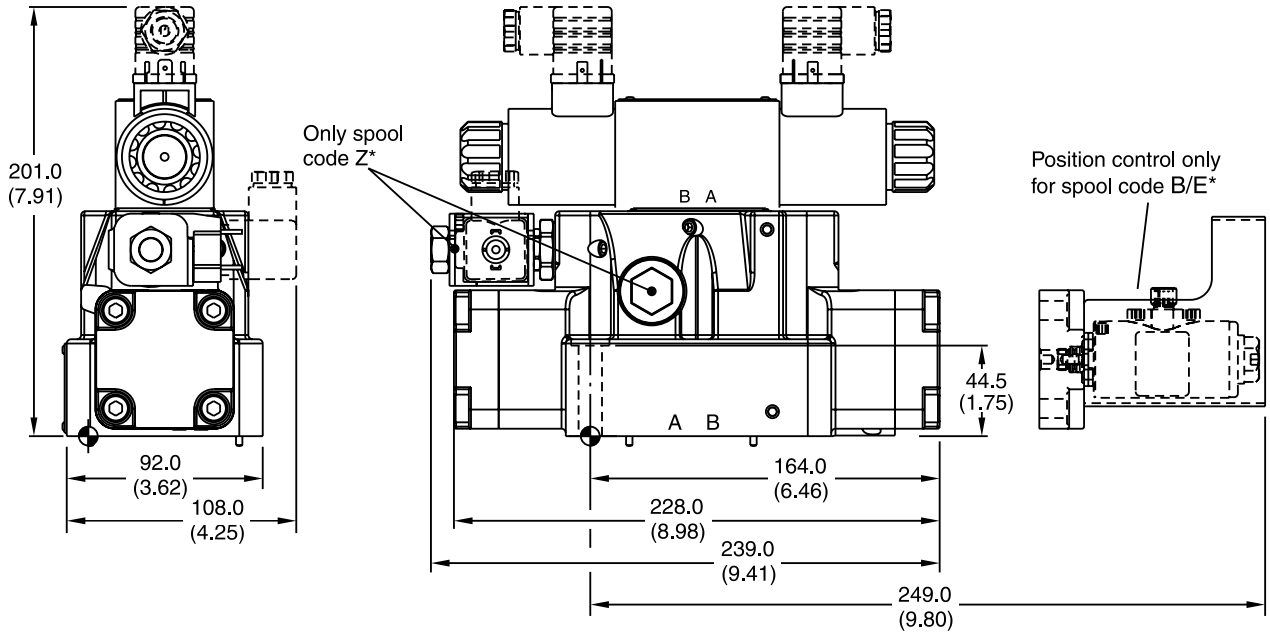
Inch equivalents for millimeter dimensions are shown in (**)

D31FB



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D31FB Fluorocarbon: SK-D31FBV

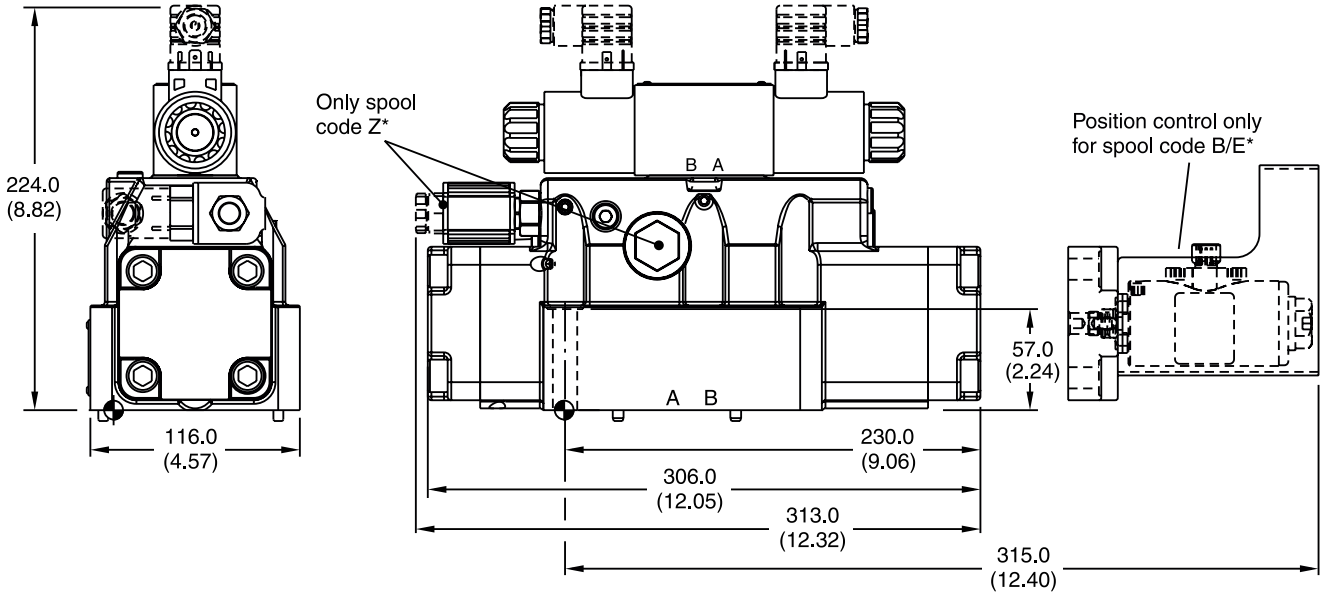
D41FB



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK320 BK160	2x M6x55 4x M10x60 DIN 912 12.9 4x 3/8-16x2.5 2x 1/4-20x2.5	13.2 Nm (9.7 lb.-ft.) 63 Nm (46.5 lb.-ft.) ±15 %	Nitrile: SK-D41FB Fluorocarbon: SK-D41FBV

Inch equivalents for millimeter dimensions are shown in (**)

D91FB

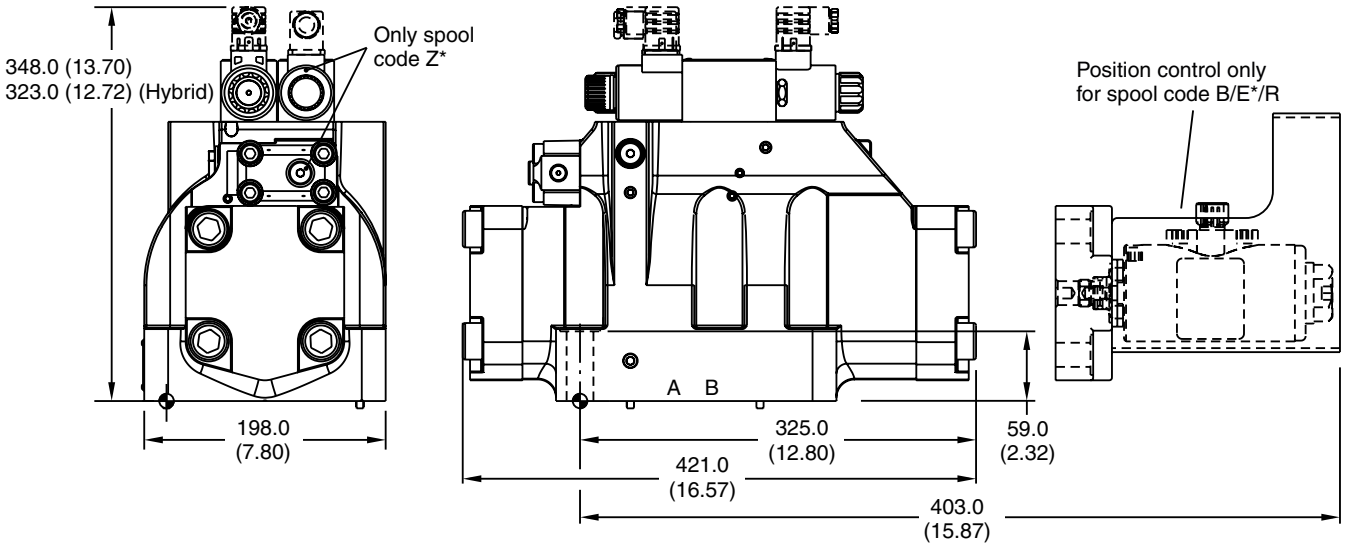


Surface Finish	Kit			Seal Kit
$R_{max}6.3$ 0.01/100	BK360 BK228	6x M12x75 DIN 912 12.9 6x 1/2-13x3.0	108 Nm (79.7 lb.-ft.) ±15 %	Nitrile: SK-D91FB Fluorocarbon: SK-D91FBV

A

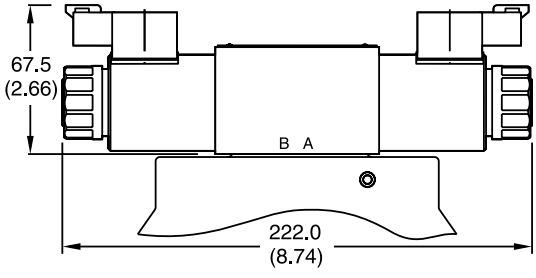
Inch equivalents for millimeter dimensions are shown in (**)

D111FB



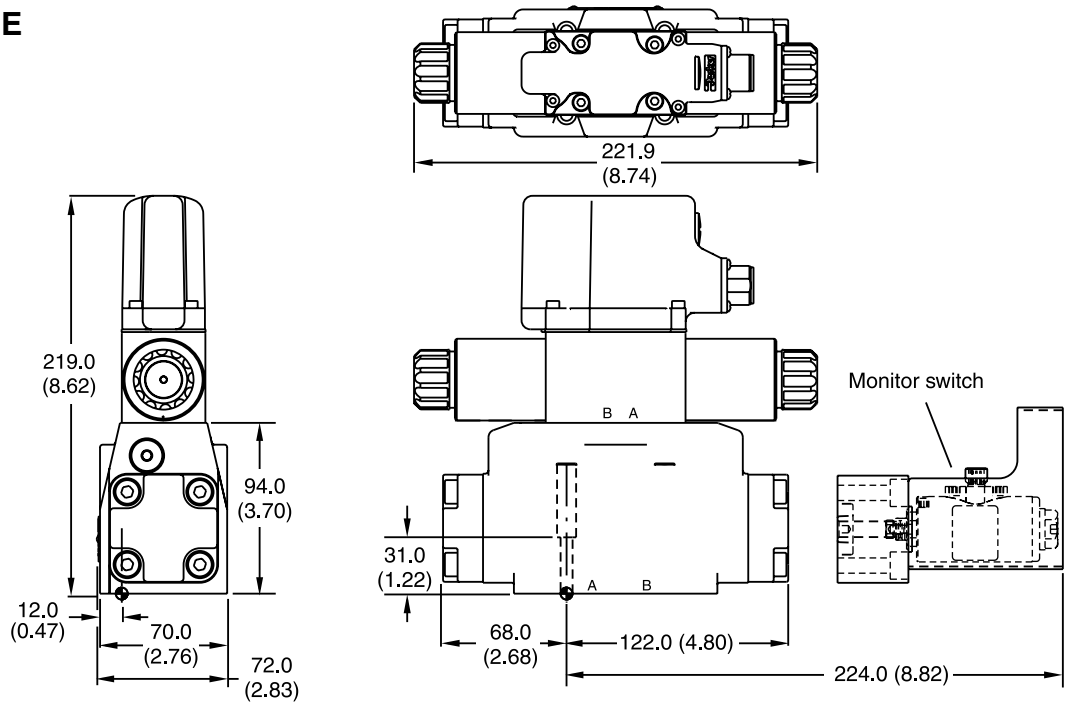
Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}6.3}$ 0.01/100	BK386 BK150	6x M20x90 DIN 912 12.9 6x 3/4-10x3.5	517 Nm (373.9 lb.-ft.) ±15 %	Nitrile: SK-D111FB Fluorocarbon: SK-D111FBV

Dimension with DT04-2P "Deutsch" Connector



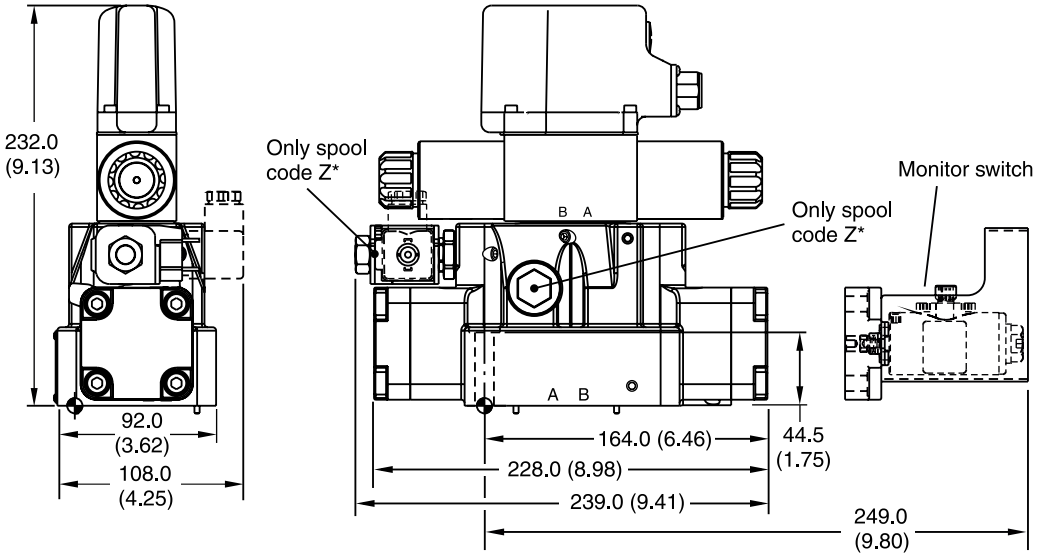
Inch equivalents for millimeter dimensions are shown in (**)

D31FB OBE



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D31FB Fluorocarbon: SK-D311FBV

D41FB OBE

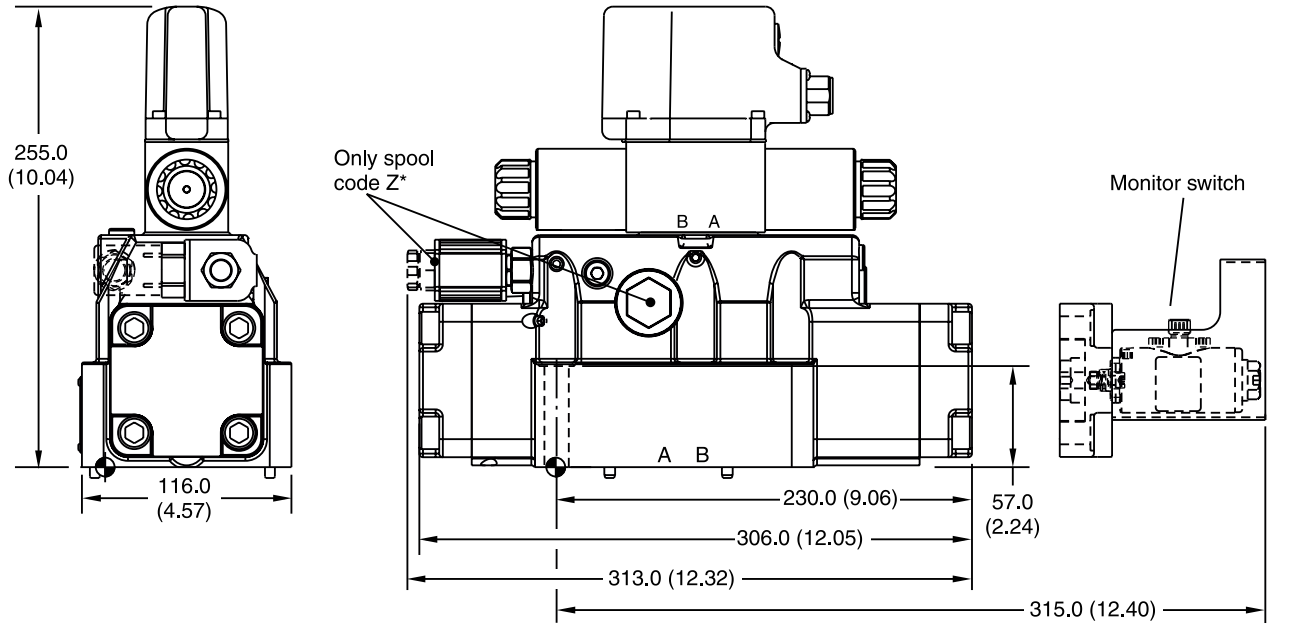


Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK320 BK160	2x M6x55 4x M10x60 DIN 912 12.9 4x 3/8-16x2.5 2x 1/4-20x2.5	13.2 Nm (9.7 lb.-ft.) 63 Nm (46.5 lb.-ft.) ±15 %	Nitrile: SK-D41FB Fluorocarbon: SK-D41FBV

Inch equivalents for millimeter dimensions are shown in (**)

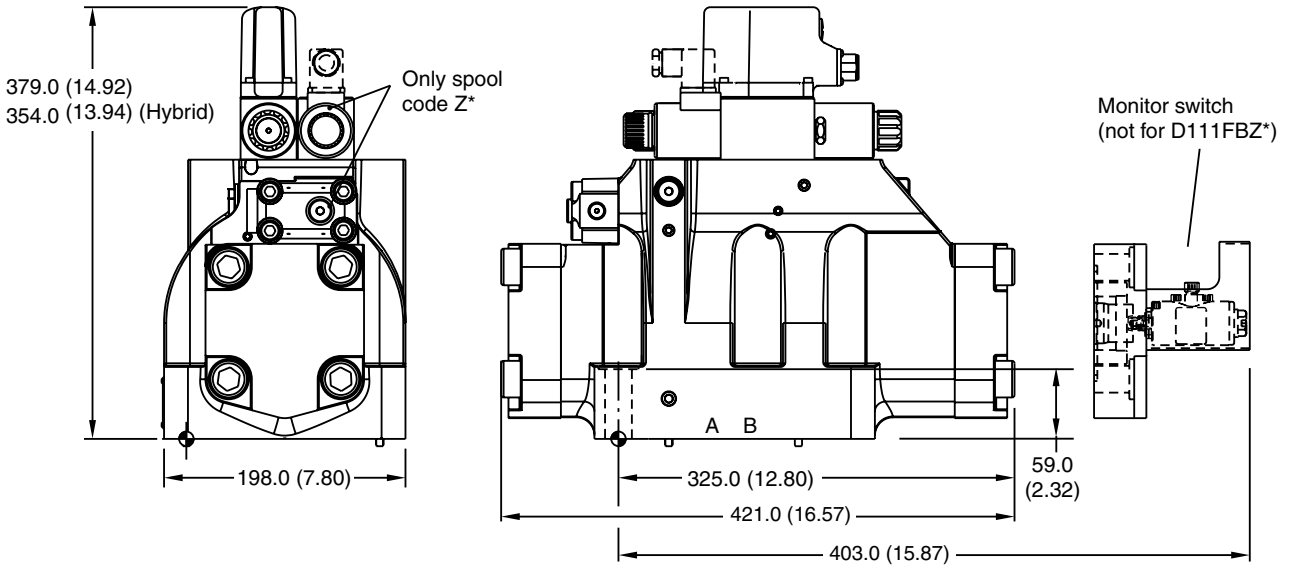
A

D91FB OBE



Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}6.3}$ 0.01/100	BK360 BK228	6x M12x75 DIN 912 12.9 6x 1/2-13x3.0	108 Nm (79.7 lb.-ft.) ±15 %	Nitrile: SK-D91FB Fluorocarbon: SK-D91FBV

D111FB OBE



Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}6.3}$ 0.01/100	BK386 BK150	6x M20x90 DIN 912 12.9 6x 3/4-10x3.5	517 Nm (373.9 lb.-ft.) ±15 %	Nitrile: SK-D111FB Fluorocarbon: SK-D111FBV

General Description

Series D1FB (NG6) and D3FB (NG10) proportional directional valves with CANopen interface are based on the series for standard digital electronics of the same name.

CANopen-Profile

CANopen Application Layer and Communication Layer
CiA DS - 301 Version 4.01

CANopen Layer Setting Services (LSS) and Protocols
CiA DS – 305 Version 2.0

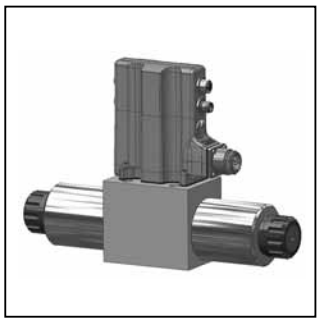
Device Profile in accordance with
CiA DSP – 408 Version 1.5.2

The baud rate and node ID can be set by dip switches or Layer Setting Service (LSS).

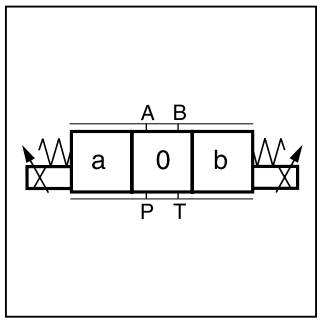
The valve parameters are factory set. Additionally the ProPxD software permits the editing of all parameters via the separate communication port. The software is also used for the valves with digital onboard electronics and the electronics modules. The cable for connection to a serial RS-232 interface is available as accessory.

The digital onboard electronics is situated in a robust metal housing and can be used in rough environments.

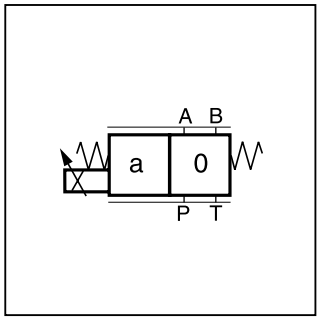
The series D1FB and D3FB are available with spool/sleeve design as well as with spool/body design.



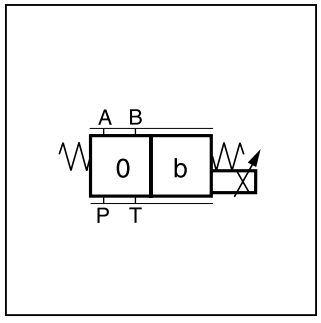
D3FB*C



D*FB*C



D*FB*E



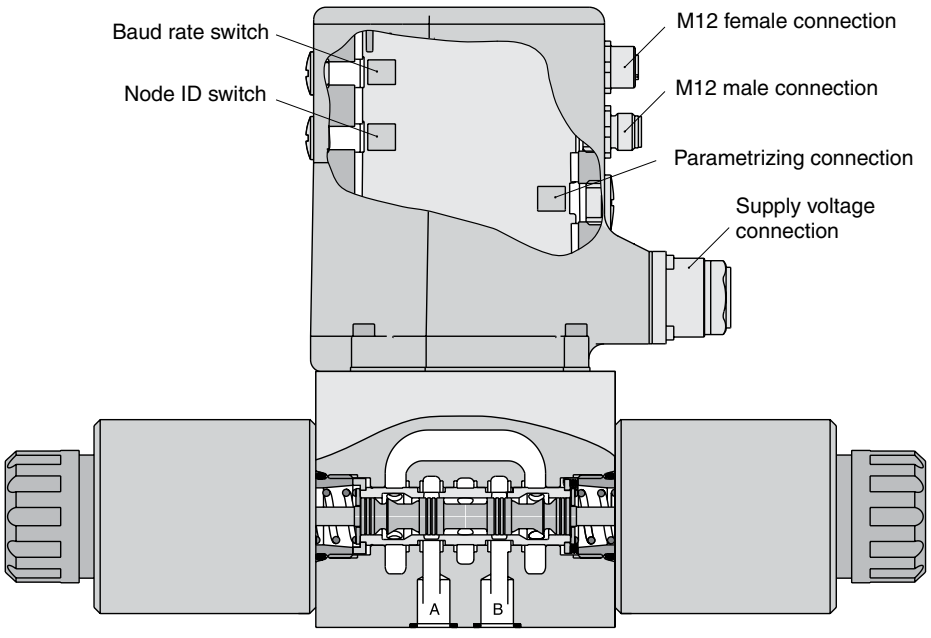
D*FB*K

Features

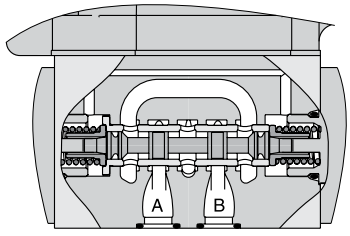
- CANopen interface.
- Spool/sleeve design and spool/body design.
- High repeatability from valve to valve.
- Low hysteresis.
- Manual override.
- Failsafe center position.

D3FB*C*0

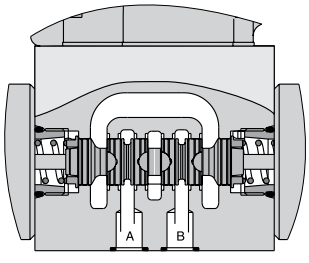
Spool/Sleeve Design



D1FB*C*0
Spool/Sleeve Design



D3FB*C*3
Spool/Body Design



D	1	F	B			0		U	0		
Directional Control Valves	Size	Flow Control	Standard Dynamics Standard Repeatability	Spool	Style		Seal	Communication Interface CANopen DSP 408, 6 + PE, 1xM12 Male 1xM12 Female	Options	Design	Design Series

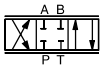
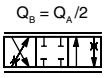
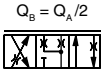
NOTE: Not required when ordering.

Code	Description
1	DIN NG6 CETOP 3 NFPA D03

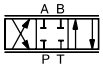
Code	Description
0	Spool/sleeve design
3	Spool/body design

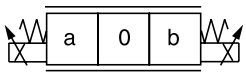
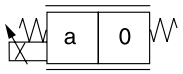
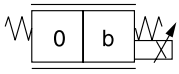
Code	Description
N	Nitrile
V	Fluorocarbon

D1FB*0: Spool/Sleeve Design

Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01H E01F E01C		20 (5.3) 12 (3.2) 6 (1.6)
E02H E02F E02C		20 (5.3) 12 (3.2) 6 (1.6)
E03H E03F E03C		20 (5.3) 12 (3.2) 6 (1.6)
B31H B31F		20/10 (5.3/2.6) 12/6 (3.2/1.6)
B32H B32F		20/10 (5.3/2.6) 12/6 (3.2/1.6)

D1FB*3: Spool/Body Design

Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01K E01H E01F		30 (7.9) 20 (5.3) 10 (2.6)
E02K E02H E02F		30 (7.9) 20 (5.3) 10 (2.6)

Code	Style
C	
E	
K	

Bolt Kit:

BK209	(4) 10-24x1.25 SHCS
BK375	4x M5x30

Weight:

D1FB	2.5 kg (5.5 lbs.)

Parametrizing cable OBE => RS-232
Item no. 40982923

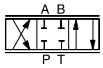
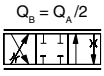
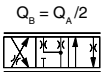
D	3	F	B			0		U	0		
Directional Control Valves	Size	Flow Control	Standard Dynamics Standard Repeatability	Spool	Style		Seal	Communication Interface CANopen DSP 408, 6 + PE, 1xM12 Male 1xM12 Female	Options	Design	Design Series NOTE: Not required when ordering.

Code	Description
3	DIN NG10 CETOP 5 NFPA D05

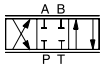
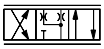
Code	Description
N	Nitrile
V	Fluorocarbon

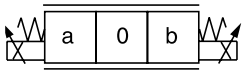
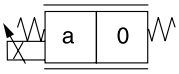
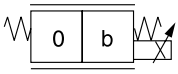
Code	Description
0	Spool/sleeve design
3	Spool/body design

D3FB*0: Spool/Sleeve Design

Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01M E01S		40 (10.6) 60 (15.9)
E02M E02S		40 (10.6) 60 (15.9)
B31M B31S		40 / 20 (10.6 / 5.3) 60 / 30 (15.9 / 7.9)
B32M B32S		40 / 20 (10.6 / 5.3) 60 / 30 (15.9 / 7.9)

D3FB*3: Spool/Body Design

Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01M E01S E01U		40 (10.6) 60 (15.9) 80 (21.2)
E02M E02S E02U		40 (10.6) 60 (15.9) 80 (21.2)

Code	Style
C	
E	
K	

Bolt Kit:

BK98	(4) 1/4-20x1.625 SHCS
BK385	4x M6x40

Weight:

D3FB	7.0 kg (15.4 lbs.)

Parametrizing cable OBE => RS-232
Item no. 40982923

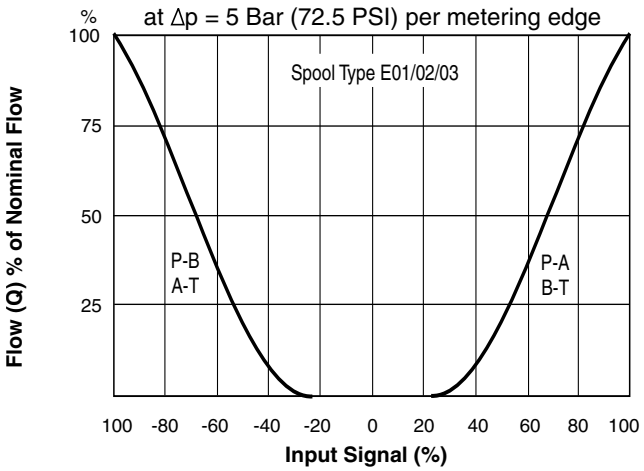
General			
Design	Direct operated proportional DC valve		
Actuation	Proportional solenoid		
Size	**NG6 / CETOP 3 / NFPA D03**		**NG10 / CETOP 5 / NFPA D05**
Mounting Interface	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA		
Mounting Position	Unrestricted		
Ambient Temperature [°C]	-20...+60 (-4°F...+140°F)		
$MTTF_D$ Value (OBE) [years]	75		
Vibration Resistance [g]	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27		
Hydraulic			
Maximum Operating Pressure	Ports P, A, B 350 Bar (5075 PSI); Port T 210 Bar (3045 PSI)		
Maximum Pressure Drop PABT / PBAT	350 Bar (5075 PSI)		
Fluid	Hydraulic oil as per DIN 51524...51535, other on request		
Fluid Temperature [°C]	-20...+60 (-4°F...+140°F)		
Viscosity **Permitted [cSt] / [mm²/s]** **Recommended [cSt] / [mm²/s]**	 20...380 (93...1761 SSU) 30...80 (139...371 SSU)		
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		
Nominal Flow at Δp=5 Bar (72.5 PSI) per Control Edge *	**D1FB*0**	**D1FB*3**	**D3FB*0/3**
	6 LPM (1.6 GPM) / 12 LPM (3.2 GPM) / 20 LPM (5.3 GPM)	10 LPM (2.6 GPM) / 20 LPM (5.3 GPM) / 30 LPM (7.9 GPM)	40 LPM (10.6 GPM) / 60 LPM (15.9 GPM) / 80 LPM (21.2 GPM)
Leakage at 100 Bar (1450 PSI) [ml/min]	<50 (3.0 cu. in.)	<60 (3.7 cu. in.)	<100 (6.1 cu. in.)
Overlap [%]	25, electrically normalized at 10 (see flow characteristics)		
Static / Dynamic			
Step Response at 100% Step [ms]	30	30	40
Hysteresis [%]	<4	<6	<5
Temperature Drift Solenoid Current [%/K]	<0.02		
Electrical			
Duty Ratio [%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible		
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)		
Supply Voltage/Ripple DC [V]	18...30, ripple < 5% eff., surge free		
Current Consumption Maximum [A]	2.0		3.0
Pre-fusing Medium Lag [A]	2.5		4.0
EMC	EN 61000-6-2, EN 61000-6-4		
Connection Supply Voltage	6 + PE acc. to EN 175201-804		
Connection CANopen	1 x Male M12x1: 5p 1 x Female M12x1: 5p acc. to IEC61076-2-101		
Wiring Supply Voltage Minimum [mm²]	3 x 1.0 (AWG16) overall braid shield		
Wiring Length Maximum [m]	50 (164 ft.)		
Wiring CANopen	acc. to CiA DS-301 Version 4 / Twisted pair cable acc. to ISO11898		

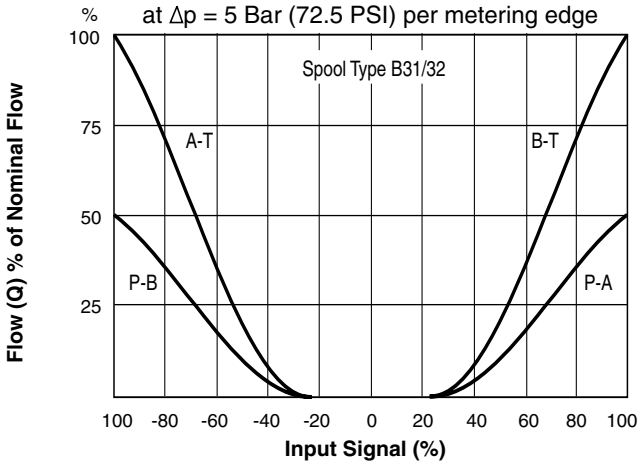
* Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

Continued on the next page

CANopen		
Profiles		Communication Layer CIA DS - 301 Version 4 Device Profile in accordance with CIA DS - 408 Version 1.5.2 Layer Setting Service CIA DS - 305 Version 2
Functionality		CANopen slave One PDO (Receive) One PDO (Transmit) One SDO (not useable for valve parameterizing) Emergency object Sync object Node guarding Life guarding Heartbeat time (producer/consumer) Minimum boot - up Node - ID - adjustment by DIP switch and LSS Baud Rate - adjustment by DIP switch and LSS
Parameterization		
Interface		RS-232, parametrizing cable order code 40982923
Interface Program		ProPxD (see www.parker.com/euro_hcd)
Adjustment Ranges		
	Minimum **[%]**	0...50
	Maximum **[%]**	50...100
	Ramp **[s]**	0...32.5

D1FB*0 Flow

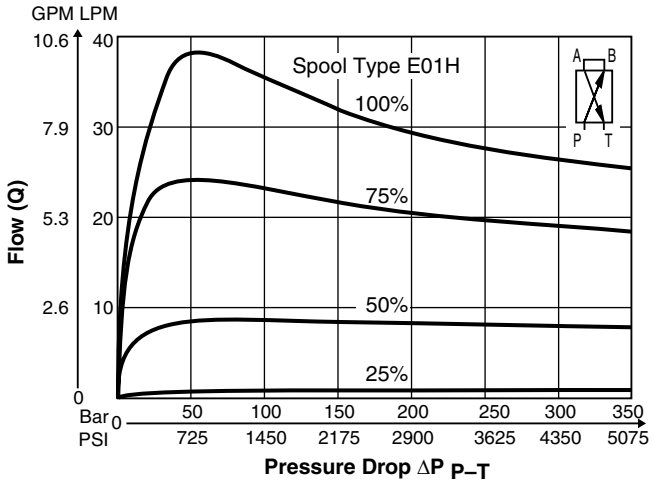




All performance curves measured with HLP46 at 50°C (122°F).

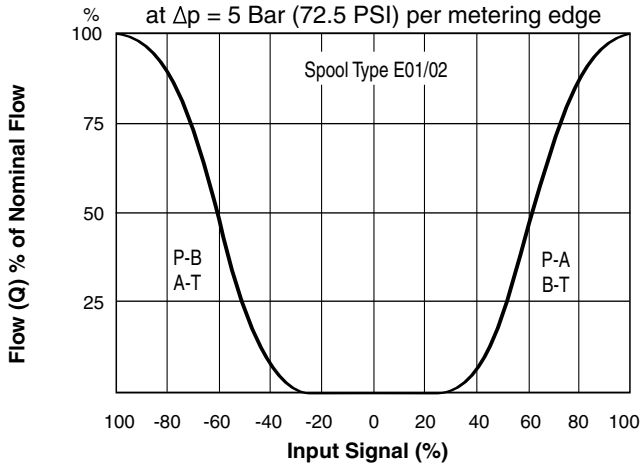
Flow Limit

At 25%, 50%, 75% and 100% command signal (symmetric flow). At asymmetric flow a reduced flow limit has to be considered – typically approx. 10% lower.



All performance curves measured with HLP46 at 50°C (122°F).

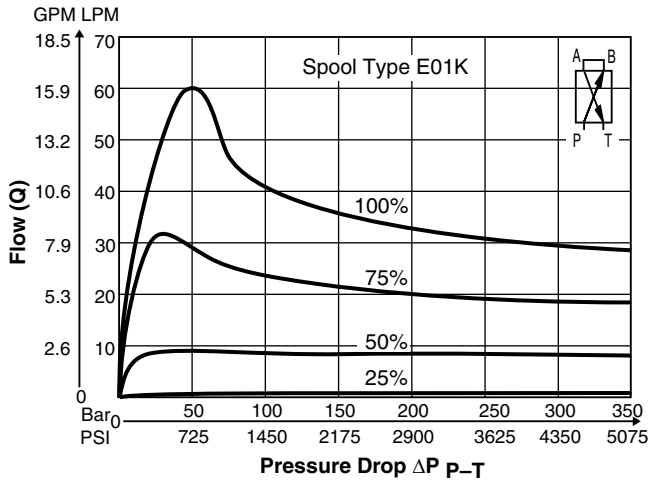
D1FB*3 Flow



All performance curves measured with HLP46 at 50°C (122°F).

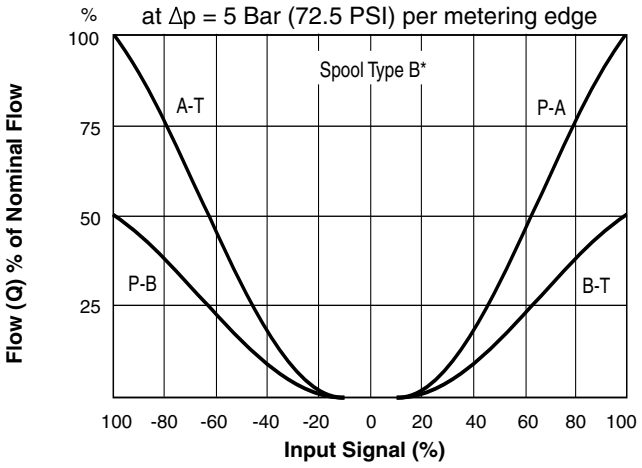
Flow Limit

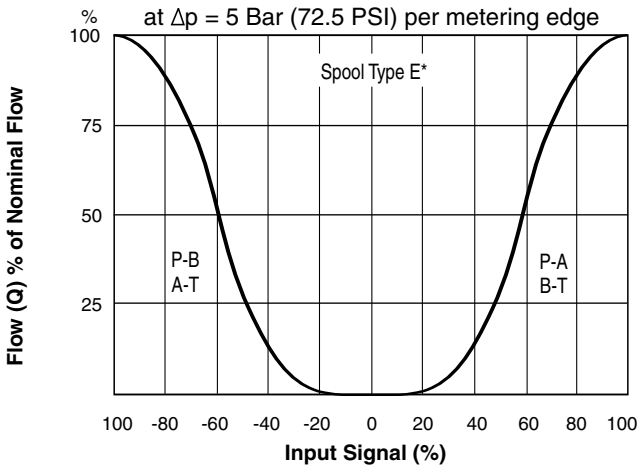
At 25%, 50%, 75% and 100% command signal (symmetric flow). At asymmetric flow a reduced flow limit has to be considered – typically approx. 10% lower.



All performance curves measured with HLP46 at 50°C (122°F).

D3FB Flow



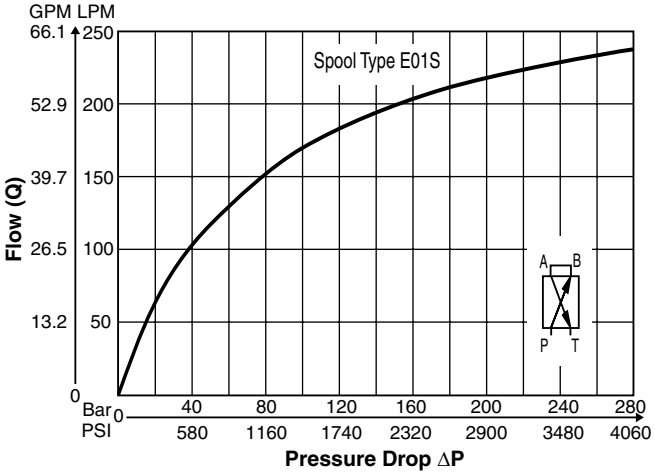


All performance curves measured with HLP46 at 50°C (122°F).

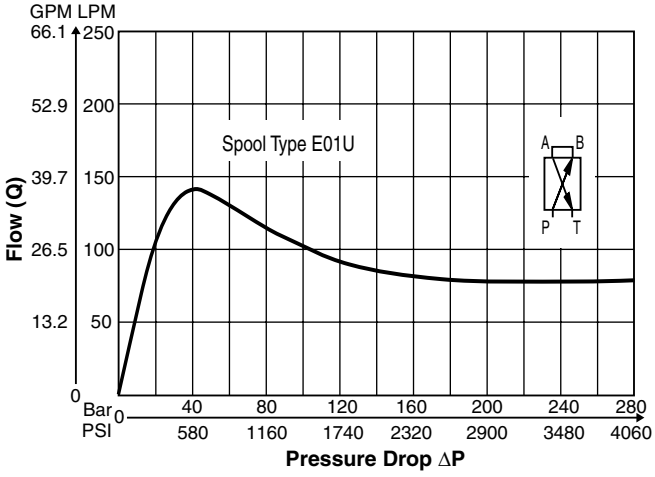
Flow Limit

100% command signal (symmetric flow). At asymmetric flow a reduced flow limit has to be considered – typically approx. 10% lower.

D3FB*0

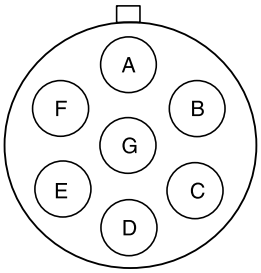


D3FB*3



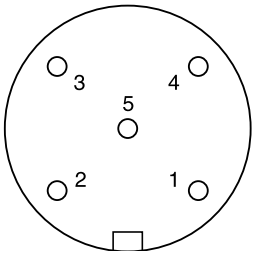
All performance curves measured with HLP46 at 50°C (122°F).

Supply Voltage Connection
6 + PE



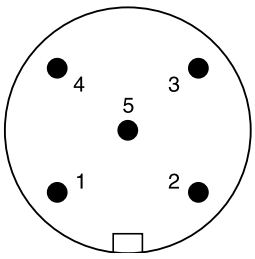
A Supply voltage 18...30V
B Supply voltage 0V
C hC
D hC
E hC
F hC
G PE

CANopen Connection



CAN in: M12, 5 pole male terminals.
Pin 1: CAN_SHLD
Pin 2: nc
Pin 3: CAN_GND
Pin 4: CAN_H
Pin 5: CAN_L

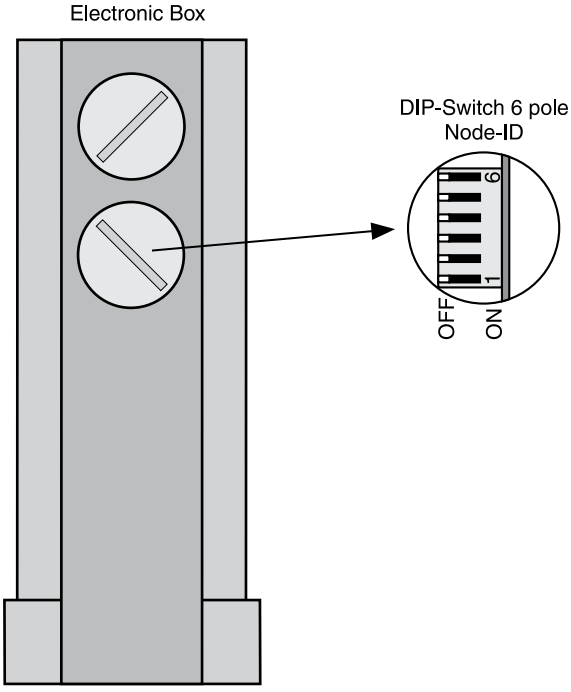
Shield is CAN_GND.



CAN out: M12, 5 pole female terminals.
Pin 1: CAN_SHLD
Pin 2: nc
Pin 3: CAN_GND
Pin 4: CAN_H
Pin 5: CAN_L

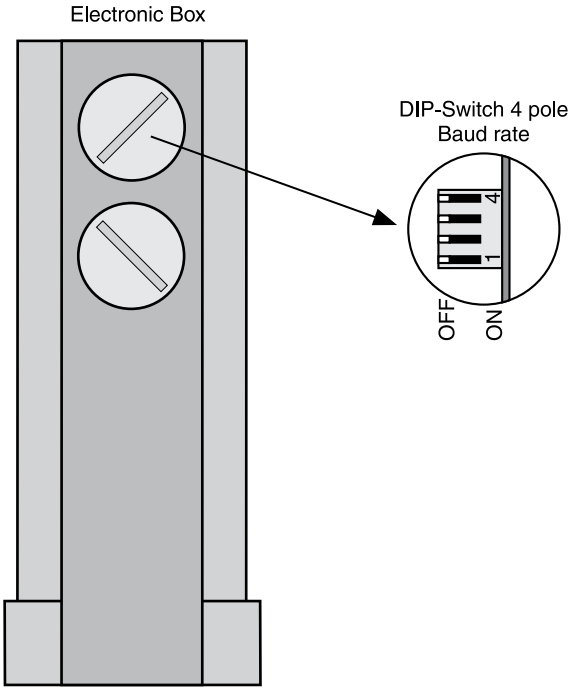
Shield is CAN_GND.

Node–ID Adjustment with DIP Switches



Node-ID	DIP Switch Setting					
	1	2	3	4	5	6
0 LSS -Priority	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**
1	**ON**	OFF	OFF	OFF	OFF	OFF
2	OFF	**ON**	OFF	OFF	OFF	OFF
3	**ON**	**ON**	OFF	OFF	OFF	OFF
…						
61	**ON**	OFF	**ON**	**ON**	**ON**	**ON**
62	OFF	**ON**	**ON**	**ON**	**ON**	**ON**
63	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**
	1	2	3	4	5	6
	Value					

Baud Rate Adjustment with DIP Switches



Baud Rate	DIP Switch Setting			
	1	2	3	4
0 LSS -Priority	**OFF**	**OFF**	**OFF**	Valve Parameterization and Diagnostics ON/OFF
10 kBit/s	**ON**	OFF	OFF	
20 kBit/s	OFF	**ON**	OFF	
50 kBit/s	**ON**	**ON**	OFF	
125 kBit/s	OFF	OFF	**ON**	
250 kBit/s	**ON**	OFF	**ON**	
500 kBit/s	OFF	**ON**	**ON**	
1 MBit/s	**ON**	**ON**	**ON**	

ProPxD Interface Program

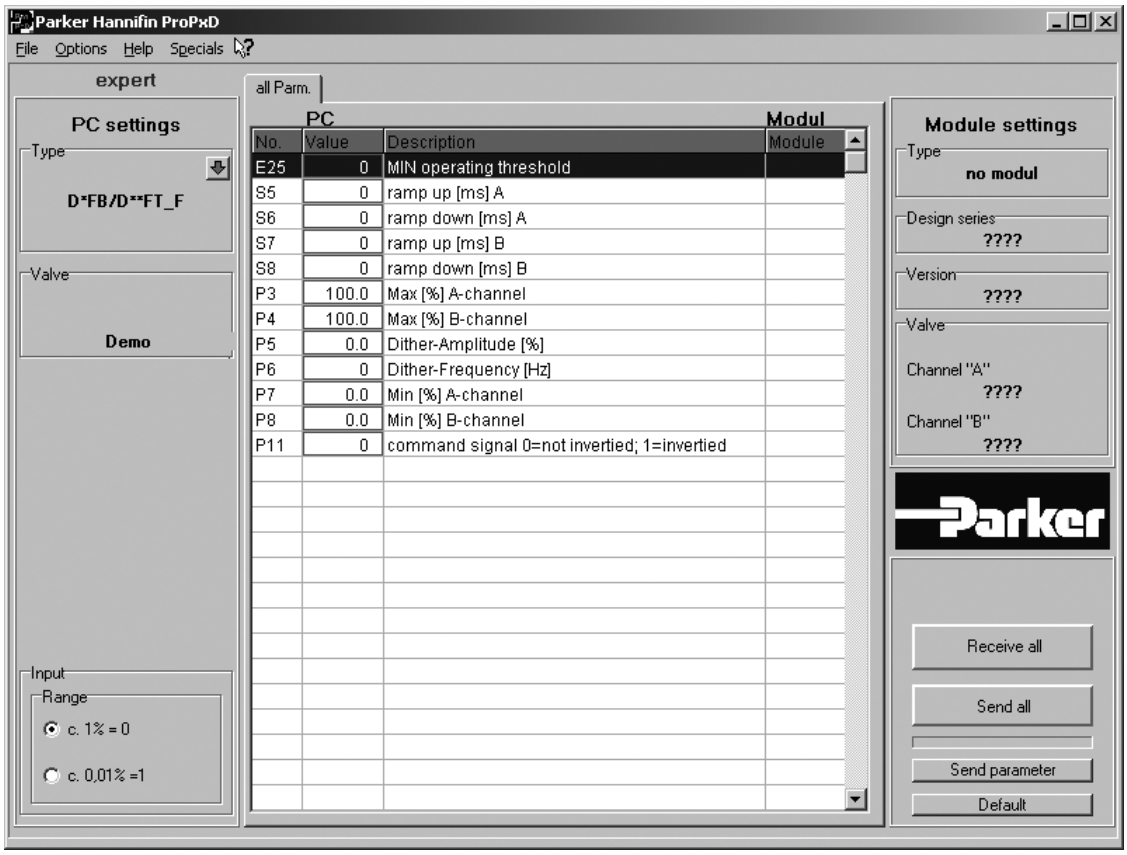
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

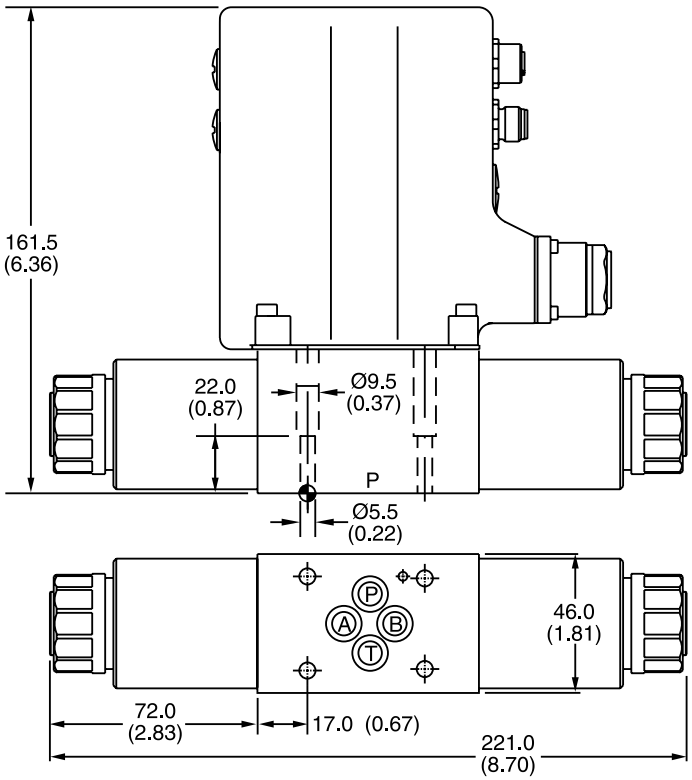
Simple to use interface program. Download free of charge **www.parker.com/euro_hcd → Services → downloads**



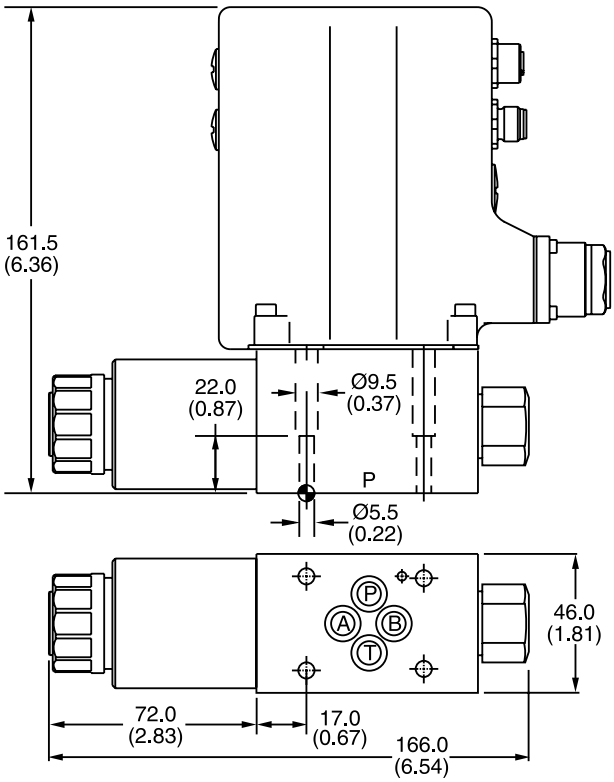
The parametrizing cable may be ordered under item no. 40982923.

Inch equivalents for millimeter dimensions are shown in (**)

D1FB*C



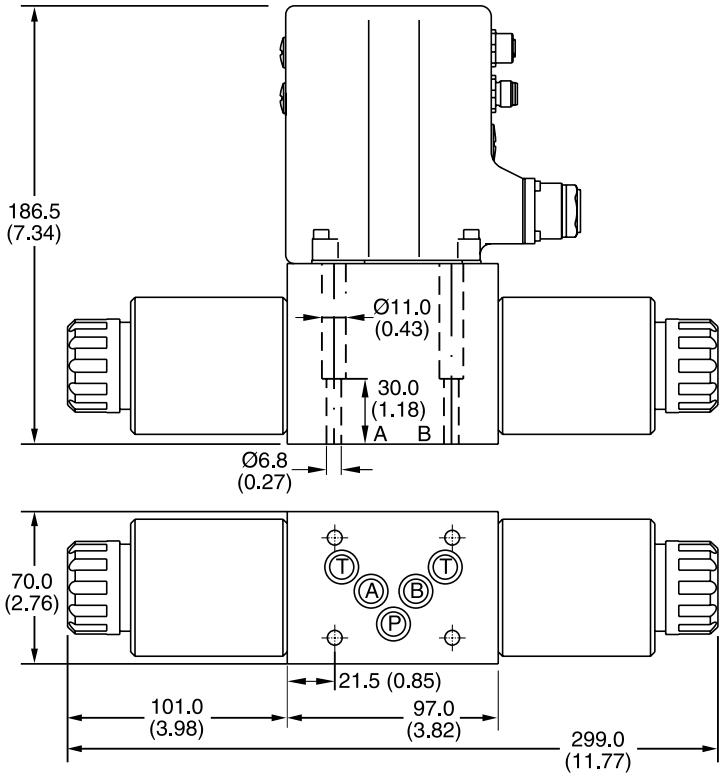
D1FB*E



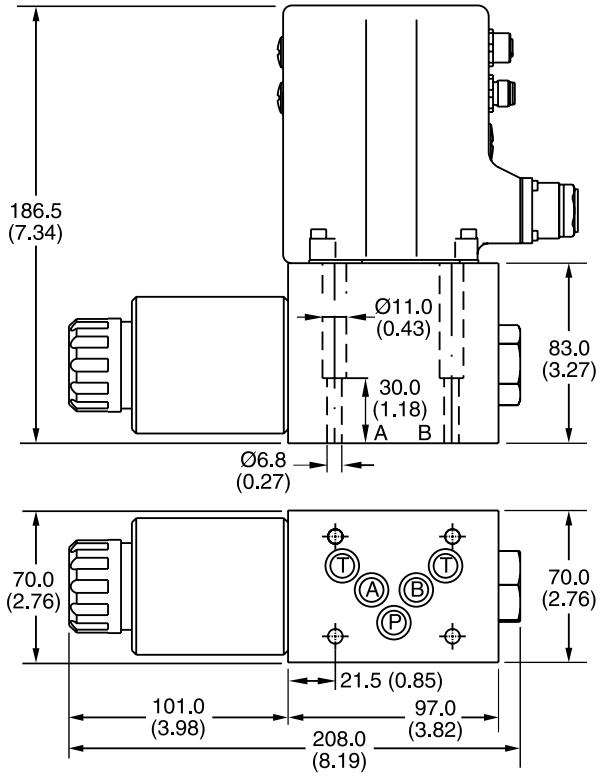
Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK375 BK209	4x M5x30 DIN 912 12.9 4x 10-24x1.25	7.6 Nm (5.6 lb.-ft.) ±15 %	Nitrile: SK-D1FB Fluorocarbon: SK-D1FBV

Inch equivalents for millimeter dimensions are shown in (**)

D3FB*C



D3FB*E



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D3FB Fluorocarbon: SK-D3FBV

General Description

Series D*1FB*EE pilot operated proportional directional valves come in 4 sizes:

D31FB*EE NG10 (CETOP 5)

D41FB*EE NG16 (CETOP 7)

D91FB*EE NG25 (CETOP 8)

D111FB*EE NG32 (CETOP 10)

The D*1FB*EE series with explosion proof solenoids is based on the standard D*1FB series. The specific solenoid design allows the usage in hazardous environments. The explosion proof class is

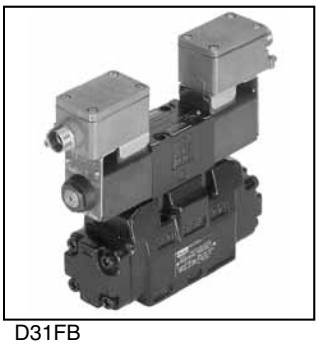
CE Ex II 2 G

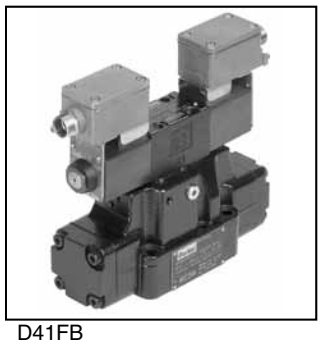
Ex mbe II T4

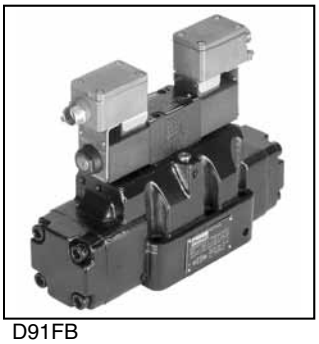
for use in zone 1 (conform to ATEX).

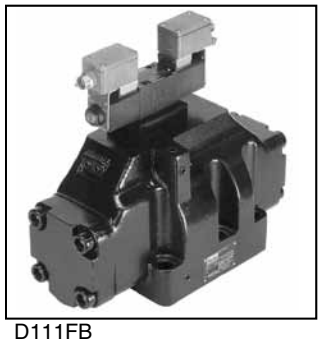
The parameters can be saved, changed and duplicated in combination with the digital power amplifier PWD00A-400 (to be used in an explosion proof cabinet or outside of the hazardous area).

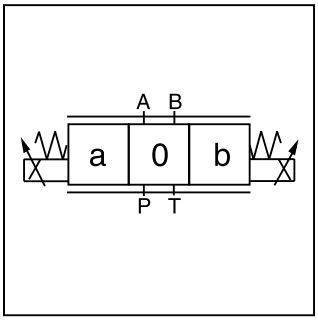
The valve parameters can be edited with the common ProPxD software.


D31FB


D41FB


D91FB

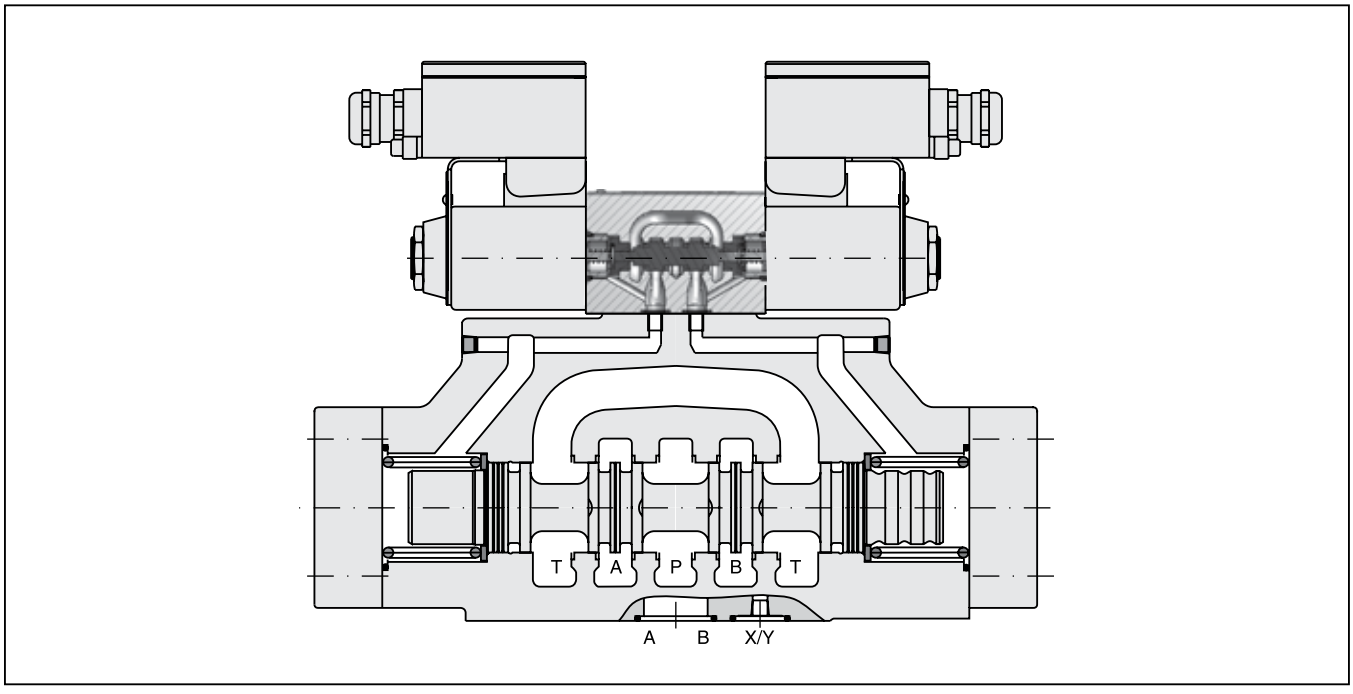

D111FB



Features

- Progressive flow characteristics for precise adjustment of flow rate
- High flow capacity

D91FB*EE

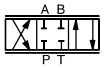
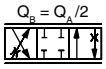
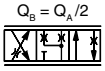


Ordering Information

D		1	F	B						E	0		EE
Directional Control Valves	Size	NG6 Pilot	Flow Control	Dynamics Standard	Spool	Flow	Spool Position	Pilot Connection	Seal	Solenoid Voltage	Explosion Proof	Valve Accessories	Design Series NOTE: Not required when ordering	Connection: Explosion Proof with Cable Glands Ex me II T4

Code	Description
3	NG10 / CETOP 5
4	NG16 / CETOP 7
9 [1]	NG25 / CETOP 8
11	NG32 / CETOP10

[1] With enlarged connections Ø 32 mm

Code	Spool Type
E01	
E02	
B31	
B32	

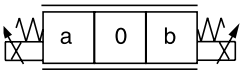
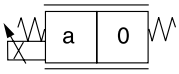
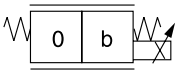
Code	Description
J	24V / 1.5A
K	24V / 2.3A

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Inlet	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

Code	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge			
	D31	D41	D91	D111
B	-	100 [2] (26.4)	-	-
C	75 [2] (19.8)	130 [2] (34.3)	-	-
D	90 (23.8)	-	-	-
E	120 (31.7)	-	250 [2] (66.1)	-
F	-	200 (52.8)	-	-
H	-	-	400 (105.8)	-
L	-	-	-	1000 (264.2)

[2] Not for spool type B31 and B32

Code	Style
C	
E	
K	

Mounting Bolt Kits:

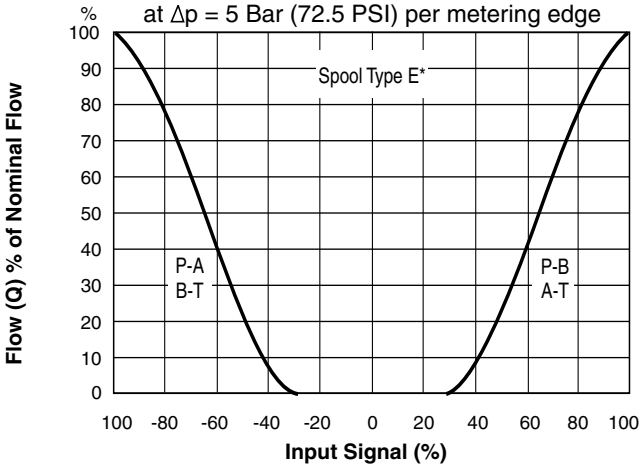
D31FB*EE	BK98
D41FB*EE	BK160
D91FB*EE	BK228
D111FB*EE	BK150

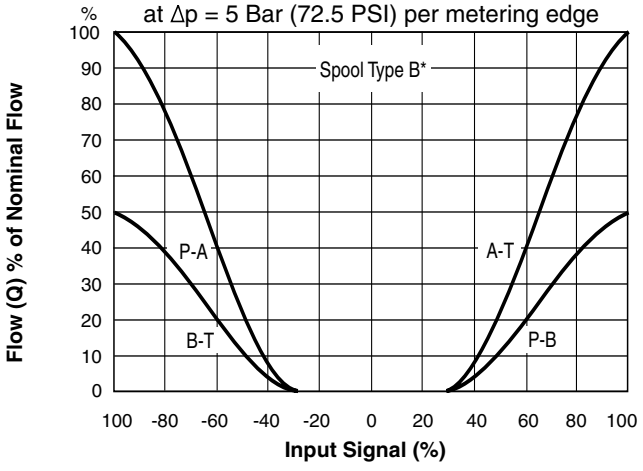
Weight:

D31FB*EE	9.4 kg (20.7 lbs.)
D41FB*EE	12.8 kg (28.2 lbs.)
D91FB*EE	20.3 kg (44.8 lbs.)
D111FB*EE	69.3 kg (152.8 lbs.)

Performance Curves

D*1FB Flow





All characteristic curves measured with HLP46 at 50°C (122°F).

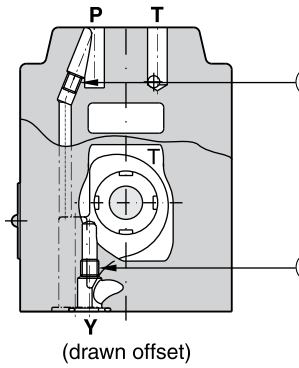
General					
Design		Pilot operated DC valve			
Actuation		Proportional solenoid			
Size		**NG10 (CETOP 5)**	**NG16 (CETOP 7)**	**NG25 (CETOP 8)**	**NG32 (CETOP 10)**
Mounting Interface		DIN 24340 / ISO 4401 / CETOP RP121 / NFPA			
Mounting Position		unrestriced			
Ambient Temperature	**[°C]**	-20...+40; (-4°F...+104°F)			
MTTF$_D$ Value	**[years]**	75			
Vibration Resistance	**[g]**	10 Sinus 5...200Hz acc. IEC 68-2-6 30 Random noise 20...20Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27			
Hydraulic					
Maximum Operating Pressure		Pilot Drain Internal: Ports P, A, B, X 350 Bar (5075 PSI); Port T, Y 185 Bar (2683 PSI) NG10: Port T, Y 15 Bar (218 PSI) Pilot Drain External: Ports P, A, B, T, X 350 Bar (5075 PSI); Port Y 185 Bar (2683 PSI) NG10: Port Y 15 Bar (218 PSI)			
Fluid		Hydraulic oil as per DIN 51524...51535, other on request			
Fluid temperature	**[°C]**	-20...+40; (-4°F...+104°F)			
Viscosity **Permitted** **Recommended**	 **[cSt] / [mm²/s]** **[cSt] / [mm²/s]**	 20...380 (93...1761 SSU) 30...80 (139...371 SSU)			
Filtration		ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Nominal Flow at Δp=Bar (72.5 PSI) per Control Edge *		75 LPM (19.8 GPM) 90 LPM (23.8 GPM) 120 LPM (31.7 GPM)	100 LPM (26.4 GPM) 130 LPM (34.4 GPM) 200 LPM (52.9 GPM)	250 LPM (66.1 GPM) 400 LPM (105.8 GPM)	1000 LPM (264.2 GPM)
Leakage at 100 Bar	**[ml/min]**	100	200	600	1000
Pilot Supply Pressure		Minimum 30 Bar (435 PSI) [+T/Y presure]; Maximum 350 Bar (5075 PSI)) Optimal Dynamics at 50 Bar (725 PSI)			
Pilot flow at 100 Bar		<0.5 LPM (0.13 GPM)	<1.2	<1.2	<1.2
Pilot Flow, Step Response		2 LPM (0.5 GPM)	1.9 LPM (0.5 GPM)	4.5 LPM (1.2 GPM)	18 LPM (4.8 GPM)
Static / Dynamic					
Step Response at 100% Step	**[ms]**	50	75	100	180
Hysteresis	**[%]**	<5			
Electrical					
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible			
Protection Class		CE Ex II 2 G , Ex mbe II T4, IP66 (plugged and mounted)			
Solenoid	**Code**	**K**		**J**	
Supply Voltage	**[V]**	12		24	
Current Consumption	**[A]**	2.3		1.15	
Resistance	**[Ohm]**	3.7		14.8	
Solenoid Connection		Box with M20x1.5 entry for cableglands. Solenoid identificationas per ISO 9461.			
Wiring Minimum	**[mm²]**	3 x 1.5 recommended			
Wiring Length Maximum	**[m]**	50 (164 ft.) recommended			

With electrical connections the protective conductor (PE ⏚) must be connected according to the relevant regulations.

* Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

Pilot Flow
Pilot Oil Inlet (supply) and Outlet (drain)

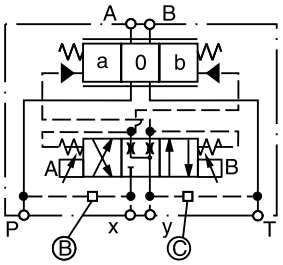
D31FB



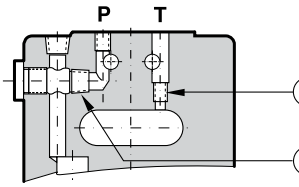
(drawn offset)

○ open, ● closed

Pilot oil Inlet	Pilot oil Drain	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○

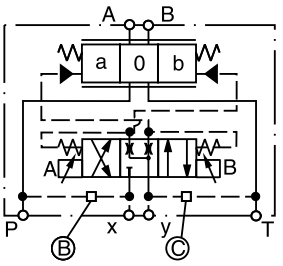


D41FB

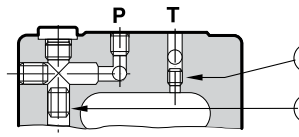


○ open, ● closed

Pilot oil Inlet	Pilot oil Drain	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○

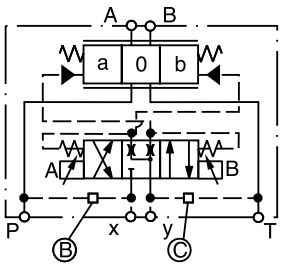


D91FB

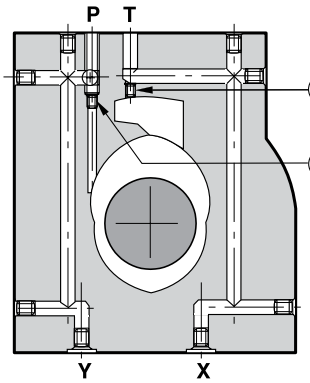


○ open, ● closed

Pilot oil Inlet	Pilot oil Drain	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○

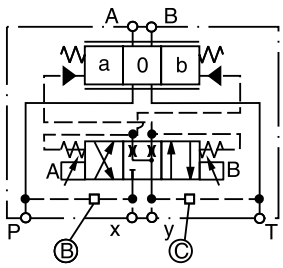


D111FB



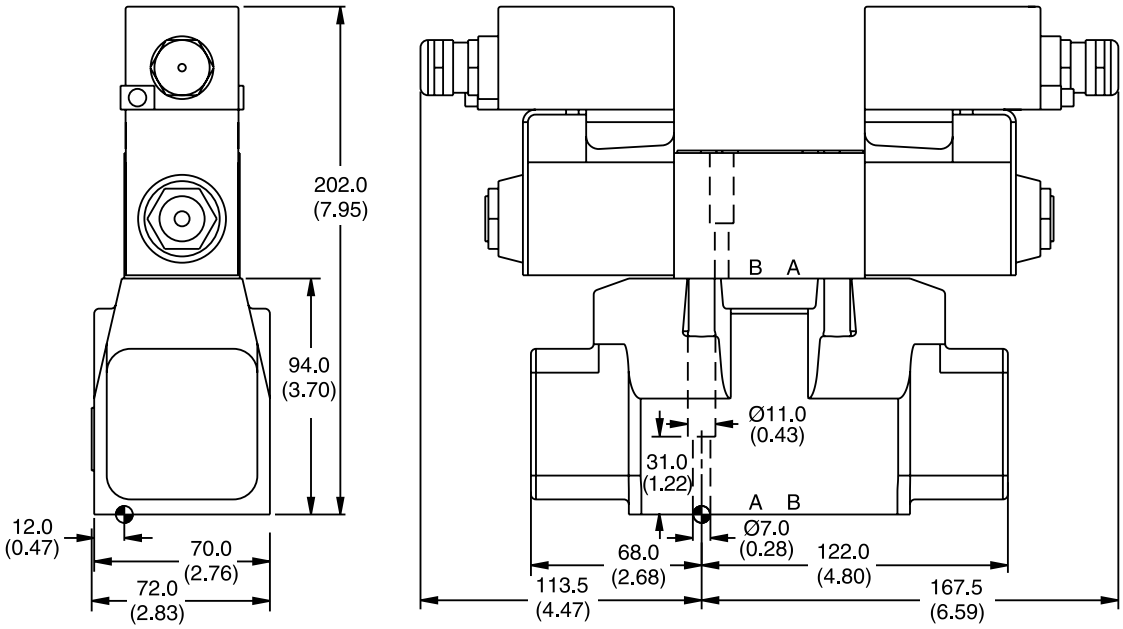
○ open, ● closed

Pilot oil Inlet	Pilot oil Drain	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



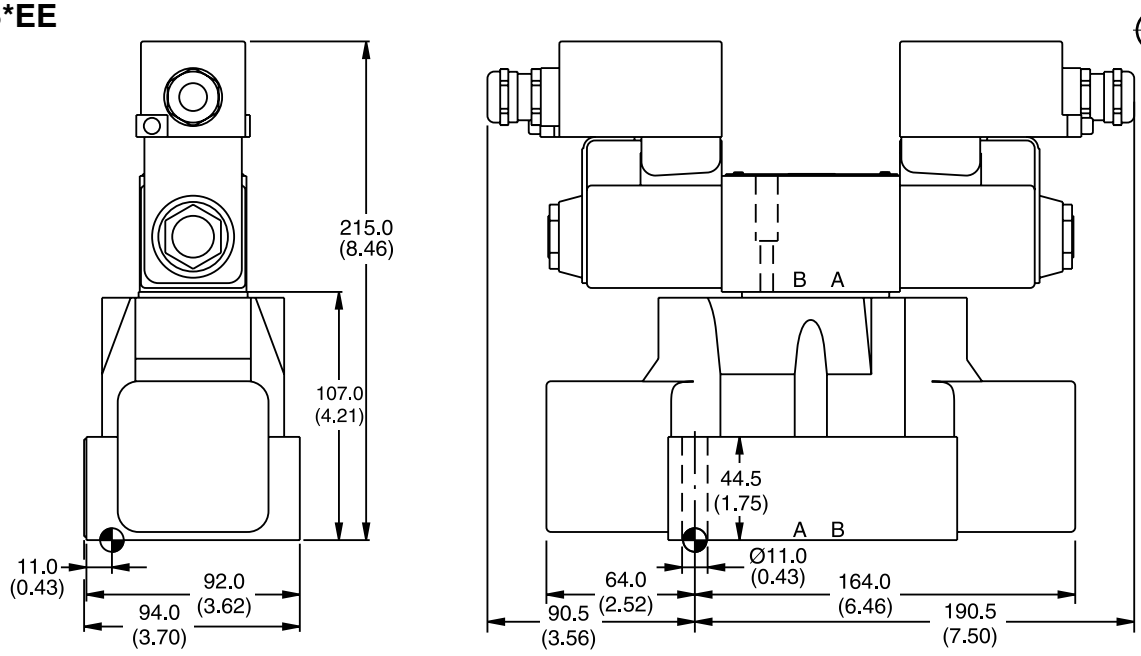
Inch equivalents for millimeter dimensions are shown in (**)

D31FB*EE



Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}6.3}$ 0.01/100	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D31FB Fluorocarbon: SK-D31FBV

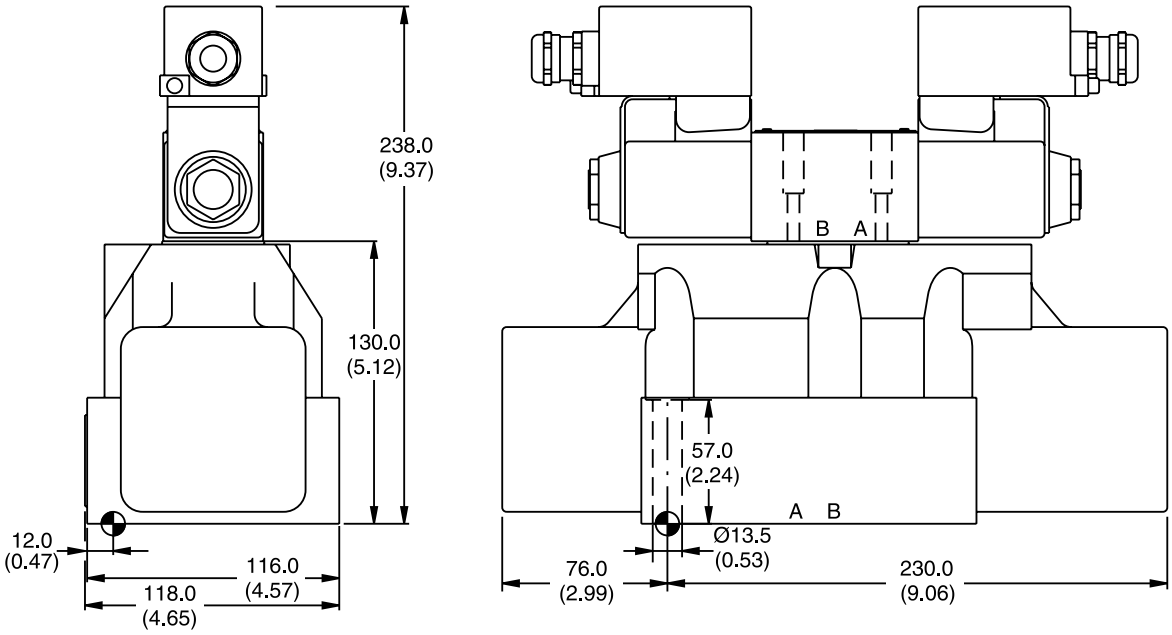
D41FB*EE



Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}6.3}$ 0.01/100	BK320 BK160	2x M6x55 4x M10x60 DIN 912 12.9 4x 3/8-16x2.5 4X 3/8-16X2.5	13.2 Nm (9.7 lb.-ft.) 63 Nm (46.5 lb.-ft.) ±15 %	Nitrile: SK-D41FB Fluorocarbon: SK-D41FBV

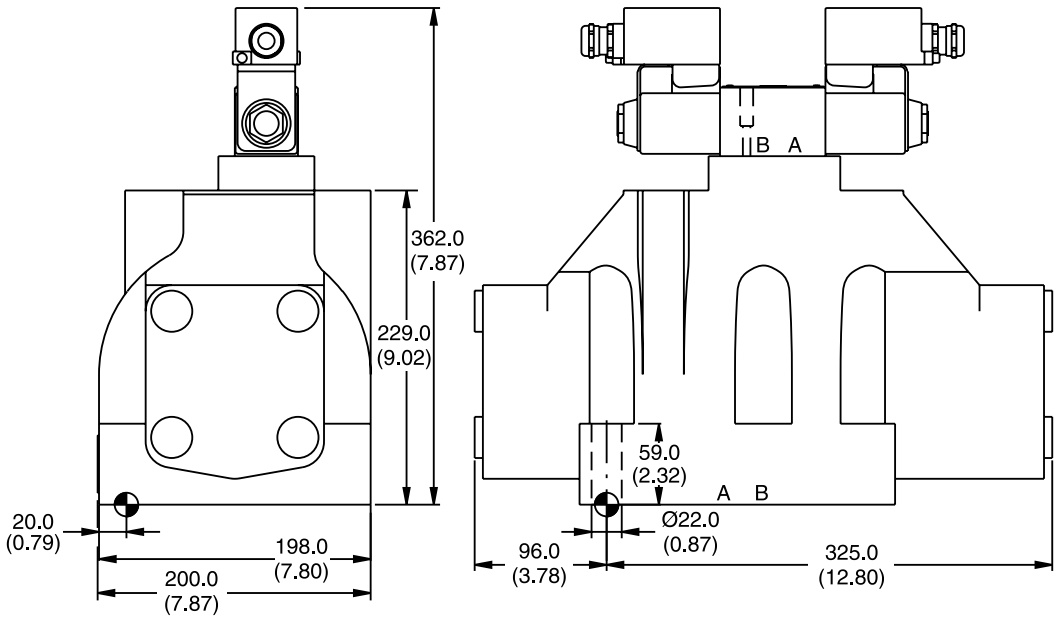
Inch equivalents for millimeter dimensions are shown in (**)

D91FB*EE



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK360 BK228	6x M12x75 DIN 912 12.9 6x 1/2-13x3.0	108 Nm (79.7 lb.-ft.) ±15 %	Nitrile: SK-D91FB Fluorocarbon: SK-D91FBV

D111FB*EE



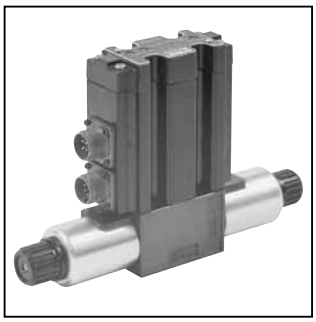
Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK386 BK150	6x M20x90 DIN 912 12.9 6x 3/4-10x3.5	517 Nm (373.9 lb.-ft.) ±15 %	Nitrile: SK-D111FB Fluorocarbon: SK-D111FBV

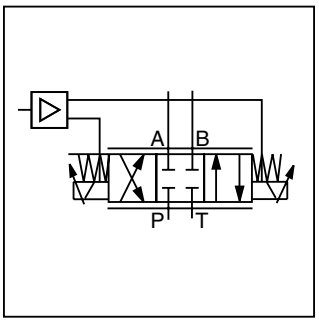
General Description

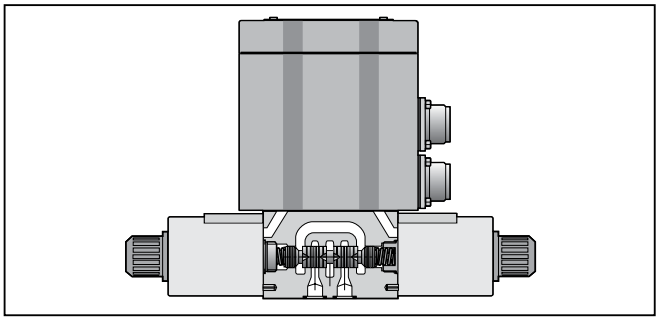
Series D**FL proportional directional control valves are packaged with an integrated microprocessor based open-loop motion profiler. The valve directly accepts electrical on/off logic signals which trigger simple motion profiles controlling actuator speed, acceleration, and deceleration.

D**FL valves are user configurable to operate in one of two control modes: 'Slow Shift' or 'Motion Profiler'. Refer to application guidelines for details. Both DC and AC voltage logic interfaces are available providing a direct interface to PLC's, for a simple field upgrade from AC operated directional valves.

Valves are available in sizes NG6 (CETOP 3), NG10 (CETOP 5), NG16 (CETOP 7) and NG25 (CETOP 8).







Features

- Integrated microprocessor based valve electronics.
- On-board, open-loop motion control profiler.
- Optically isolated 'on-off' inputs trigger motion profiles.
- User selectable operation modes: Slow Shift or Profiler.
- Test points indicating speed and ramp settings.
- On-board microprocessor self diagnostics on start-up.
- LED functional diagnostic indicators.
- Spring centered spool.
- Manual overrides.

CE

Specifications

Interface DIN		**NG6 (CETOP 3)**	**NG10 (CETOP 5)**	**NG16 (CETOP 7)**	**NG25 (CETOP 8)**
Flow Rating @10 Bar (150 PSI) Δp (P→A, B→T) (spool options up to)[1]	LPM (GPM)	20 (5.3)	60 (15.9)	100 (26)	200 (53)
Maximum Flow	LPM (GPM)	27 (7.3) / 34.1 (9) / 30 (8)	62.1 (18) / 83.3 (22) / 118 (31)	144 (38)	372 (98)
Pilot Flow					
Continuous	LPM (GPM)	N/A	N/A	<1.2 (0.3)	<1.2 (0.3)
Step Input	LPM (GPM)	N/A	N/A	2.2 (0.6)	4.5 (1.2)
Operating Pressure					
Port P, A, B	Bar (PSI)	315 (4500)		345 (5000) max.	
Port P, internal pilot		N/A		20 (290) min.	
Port T, internal drain		35 (500)		10 (150) max.	
Port T, external drain		N/A		345 (5000) max.	
Port Y, pilot drain		N/A		10 (150) max.	
Port X, external pilot		N/A		20-345 (290-5000)	
Fluid Cleanliness Level		ISO Class 16/13			
Fluid Viscosity, Recommended		80 – 1000 SSU			
Fluid Temperature, Recommended		0°C to +60°C (+32°F to +140°F)			
Environmental Protection Class		NEMA 4 (IP65)			
Ambient Operating Temperature		-20°C to +60°C (-4°F to +140°F)			

1) Actual pressure drop required for each metering land, up to the specified maximum flow rate is:

$$\Delta P_{actual} = (5)\left(\frac{Q_{actual}}{Q_{rated}}\right)^2 \text{ Bar; (Q in LPM)} \quad \text{[or]} \quad = (75)\left(\frac{Q_{actual}}{Q_{rated}}\right)^2 \text{ PSI; (Q in GPM)}$$

Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

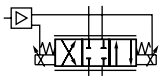
D*FL | ☐ | ☐ | **C** | ☐ | ☐ | **J** | **0** | ☐ | ☐

Proportional Directional Control Valves with Intergrated Motion Control Electronics — Spool Type — Flow — Style — Seal — Electronic Variation — Supply Voltage — Electronic Accessories — Valve Accessories — Design Series

NOTE: Not required when ordering.

Code	Description
D1FL	NG6/CETOP 3
D3FL	NG10/CETOP 5

See Note 1.

Code	Style
C	

Code	Seal
N	Nitrile
V	Fluorocarbon

Code	Description
T	AC Voltage Logic Interface
W	DC Voltage Logic Interface

Code	Supply Voltage
J	24 VDC

Code	Electronic Accessories
0	Standard

Code	Valve Accessories
0	Standard
4	CSA Approved

Code		Spool Type
$Q_A=Q_B$	$Q_A>Q_B$ [1)]	
E01	B31	
E02	B32	

1) Reduced flow rate on Port B, nominal flow on Port A.

Code	Flow at Δp 5 Bar (72.5 PSI) per metering edge D1FL LPM (GPM)	D3FL LPM (GPM)
C	7.5 (2.0)*	–
F	15 (4.0)	–
H	20 (5.3)*	20 (5.3)*
M	–	40 (10.6)
S	–	60 (15.9)*

* Only with spool type E*

Note 1: NG10 (CETOP5) valves are supplied with bolt kit BK98 (1/4-20 x 1.625). For metric bolt kit BK385 (M6 x 40 mm), add "-X6181" to ordering code.

Weight:

D1FL	3.2 kg (7.0 lbs.)
D3FL	7.9 kg (17.5 lbs.)

DFL** | ☐ | ☐ | **C** | ☐ | ☐ | ☐ | **0** | ☐ | ☐

Pilot Operated Proportional Directional Control Valves with Intergrated Motion Control Electronics — Spool Type — Flow — Style — Pilot Connection — Seal — Electronic Variation — Electronic Accessories — Valve Accessories — Design Series

NOTE: Not required when ordering.

Code	Description
D41FL	NG16/CETOP 7
D91FL	NG25/CETOP 8

Code	Pilot	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

Code	Seal
N	Nitrile
V	Fluorocarbon

Code	Description
T	AC Voltage Logic Interface
W	DC Voltage Logic Interface

Code	Valve Accessories
0	Standard
2	Pilot Pressure Reducer[3]
4	CSA Approved

(3) Recommended for pilot pressure applications >205 Bar (3000 PSI)

V-Notch Spools			
Code			Spool Type
$Q_A=Q_B$	$Q_A>Q_B$	$Q_B>Q_A$	
E21	B41	A41	
E22	B42	A42	

Code	Flow at Δp 5 Bar (72.5 PSI) per metering edge D41FL LPM (GPM)	D91FL LPM (GPM)
D	100 (26.5)	–
F	–	200 (53)

Weight:

D41FL	10.9 kg (24.0 lbs.)
D91FL	19.1 kg (42.0 lbs.)

Mounting Interface

Refer to Mounting Interface Dimensions in the Proportional Directional Valve section of this catalog.

Accessories

Refer to the Accessories section for bolt kits, subplates, connectors and pre-assembled cable assemblies.

Supply Voltage	V	12 to 28	
Maximum Current	A	3.5	
Motion Profile Adjustment Speed Ramps (minimum limited by actual valve step response)		User set; potentiometers inside electronics enclosure. 0 to 100% valve opening; two speeds forward, two speeds retract. 0.025 to 15 seconds; one acceleration, two deceleration adjustments. Shared both forward/retract.	
Test Points V1, V2, V3, V4 R1, R2, R3		Inside electronics enclosure. 0 to 5 volts, corresponding to 0 to 100% valve opening, or speed. 0 to 5 volts, corresponding to 0.025 to 15 seconds ramp time.	
Logic Interface Ordering code field: Electrical variation (options available all valve sizes)		**W**	**T**
Electrical Isolation		DC Optical-Coupled	AC Optical-Coupled
Polarity		Signal pins A, C & E; referenced to 0V pins B, D & F respectively.	Signal pins A, C & E; referenced to AC neutral pins B, D & F respectively.
Input Impedance	ohms	>2000	>2000
Input Voltage, Absolute Max.	V	28 VDC	130 VAC
Logic "on" (1), Min. Voltage	V	>9.6 VDC	>96 VAC
Logic "on" (1), Current	mA	3.2 mA	3.2 mA
Logic "off" (0), Min. Voltage	V	<6.0 VDC	<51 VAC
Logic "off" (0), Current	mA	3.2 mA	3.2 mA
Mating Connectors (order separately) **Power Supply Connector** **Logic Input Connector**		Part # 1210292 (4-pin MS) Part # MS3106E-14S-6S (6-pin MS)	

Application Guidelines

The D**FL series proportional valves accept discrete on/off logic signals which trigger simple motion profiles controlling actuator speed, acceleration, and deceleration. All motion control potentiometer adjustments and jumper headers are located inside the electronics enclosure. Two modes of operation are user selectable by a jumper setting (JP1): 'Motion Profiler' or 'Slow Shift'. The 'Motion Profiling' mode provides two-speed velocity control typically used in rapid traverse and feed circuits. The 'Slow Shift' provides single velocity control. Both modes allow individual speed adjustment for actuator extend and retract. Ramp adjustments for extend and retract profiles are shared.
Refer to **Interface and Motion Profile** diagrams on the following pages.

Both DC and AC voltage logic interfaces are available. Refer to ordering code field 'Electronic Variation' and the technical data sheet for more information. Note that the interface connections are polarity sensitive. Refer to the block diagram and technical specifications.

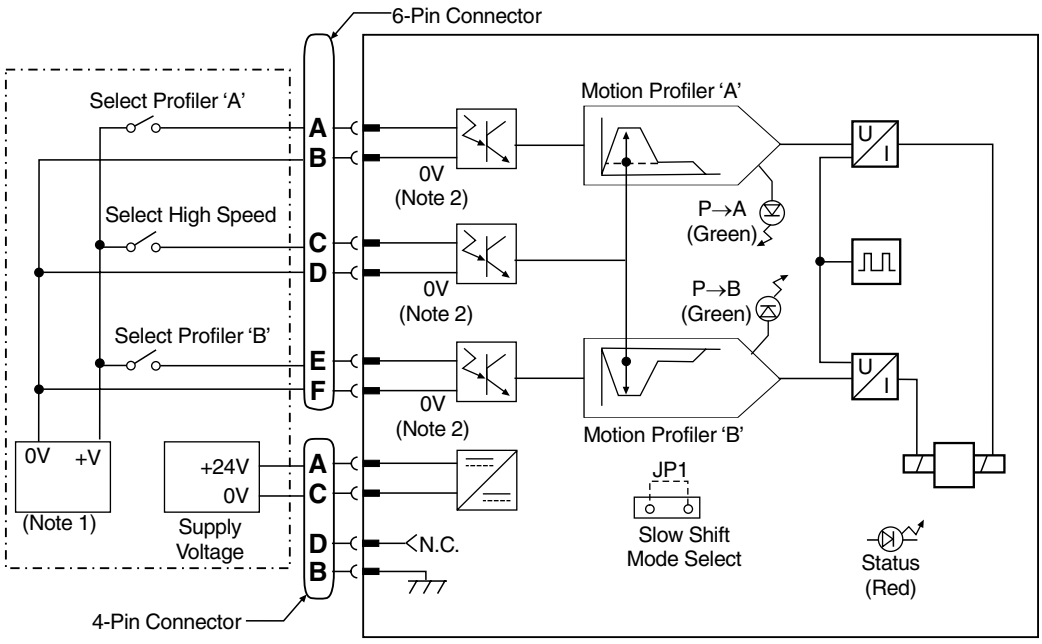
Refer to the Installation Guide for set-up, configuration, and application guidelines (packaged with each valve):

D1FL: Installation Guide Bulletin 2589-M2/USA

D3FL: Installation Guide Bulletin 2589-M3/USA

D41FL,
D91FL: Installation Guide Bulletin 2589-M1/USA

Block Diagram — Wiring

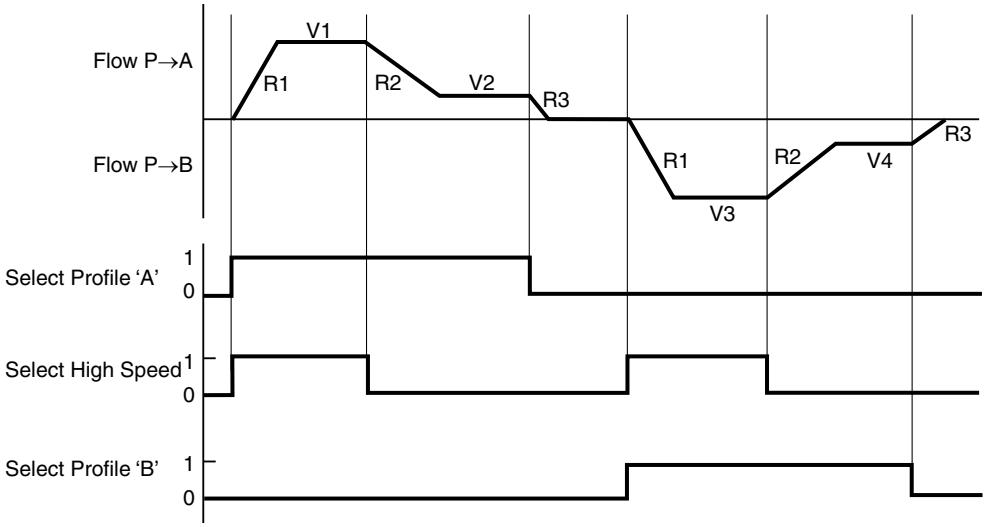


Notes:

1) DC logic source shown, refer to technical data for A.C.
2) 0V reference for DC interface, neutral for AC version.

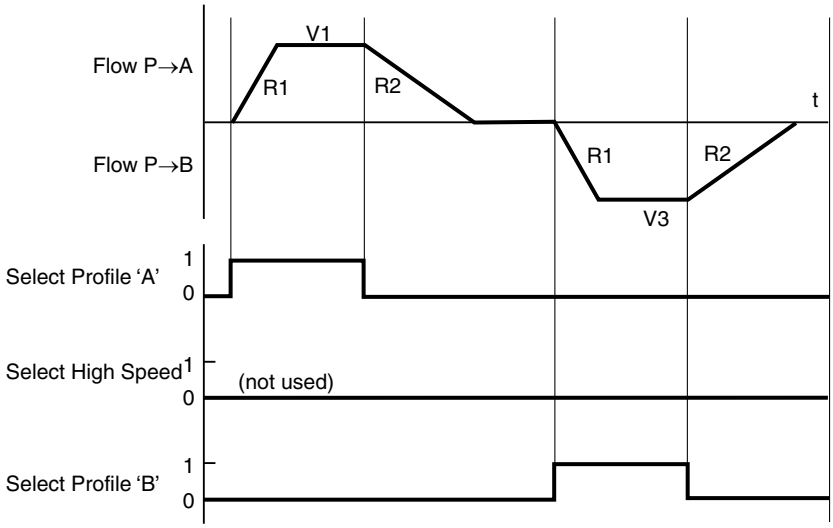
Interface — 'Motion Profiler' mode (see timing diagram below)

The 'Motion Profiler' mode is selected by removing connecting jumper 'JP1' on the electronics card inside the electronics enclosure. To trigger a rapid traverse, opening the valve P→A / B→T; apply a positive logic signal to logic inputs 'Select Profile A', and 'Select High Speed' (6-pin connector input pins A&B, and C&D). The valve will smoothly accelerate the actuator to the velocity set by potentiometer 'V1', at a ramp rate set by potentiometer 'R1'. When logic input 'Select High Speed' is deselected the actuator will smoothly decelerate the actuator to the feed velocity set by Potentiometer 'V2', at a ramp rate set by potentiometer 'R2'. When logic input 'Select ProfileA' is deselected the actuator will smoothly decelerate the actuator to a stop at a ramp rate set by potentiometer 'R3'. When neither 'Select Profile' inputs are selected, regardless of the 'Select High Speed' input state, the valve is held in the centered hydraulic condition. Reversing the actuator, directing flow P→B / A→T, follows the same logic using logic input 'Select Profile B'. Refer to the timing diagram below for the corresponding potentiometers. Note that although all four speeds are independent, the three ramps are shared by both 'A' and 'B' profiles.

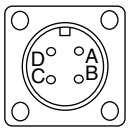


Interface — 'Slow Shift' mode (see timing diagram below)

The 'Slow Shift' mode is selected by connecting jumper 'JP1' on the electronics card inside the electronics enclosure. The 'Slow Shift' mode logically operates the same as the 'Motion Profiler' mode, except the 'Select High Speed' logic input is not used and only one speed for each actuator direction is available.

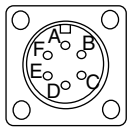


4-Pin Power Supply Plug



Pin	Description
A	Supply Voltage
B	Protective Ground
C	Supply 0V
D	Not Used

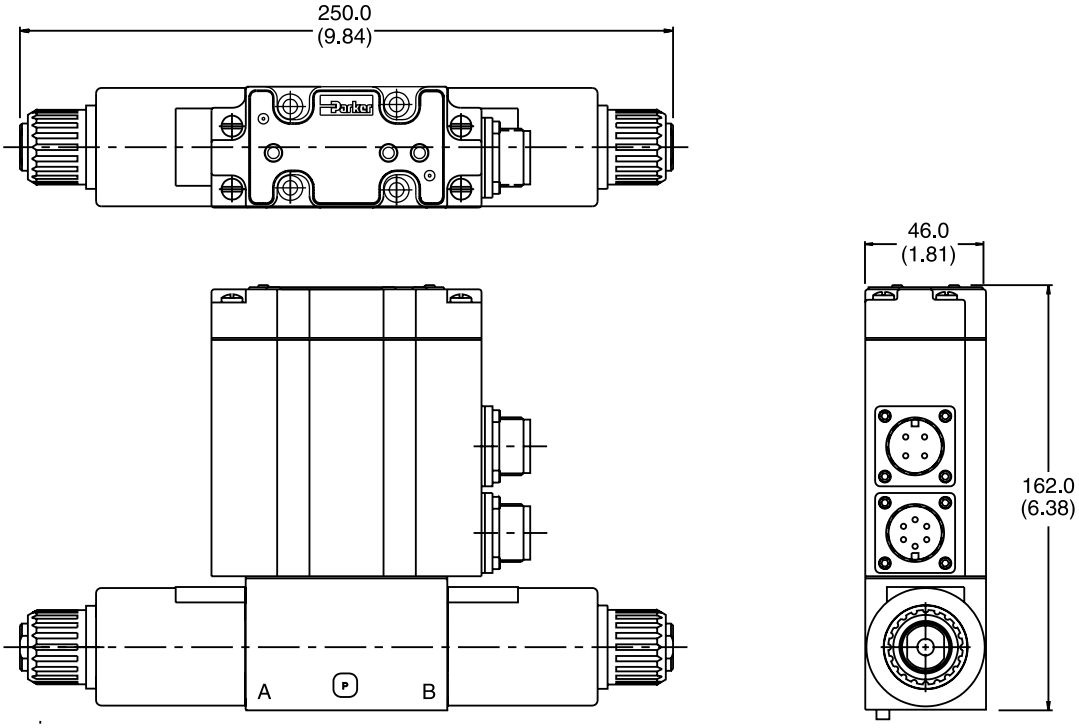
6-Pin Logic Input Plug



Pin	Description
A	Select Profile "A" (+)
B	Select Profile "A" (0V or neutral)
C	Select "High Speed" (+)
D	Select "High Speed" (0V or neutral)
E	Select Profile "B" (+)
F	Select Profile "B" (0V or neutral)

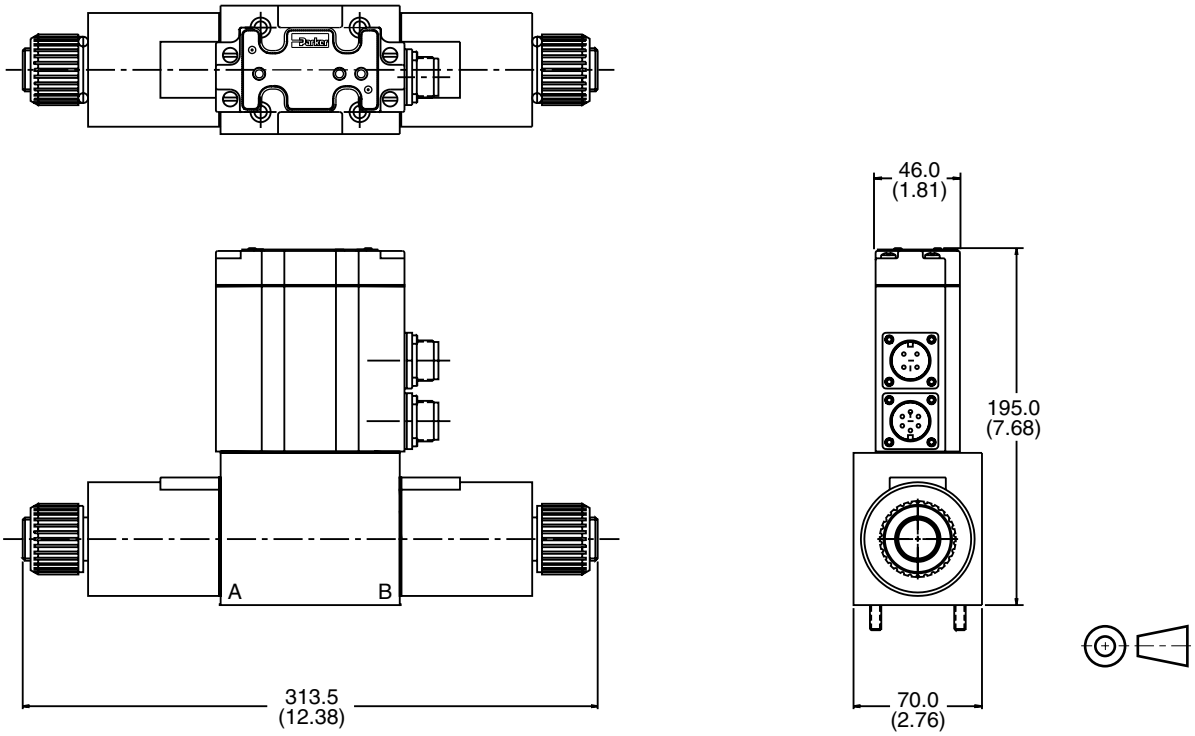
D1FL

Inch equivalents for millimeter dimensions are shown in (**)



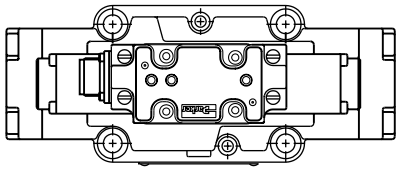
D3FL

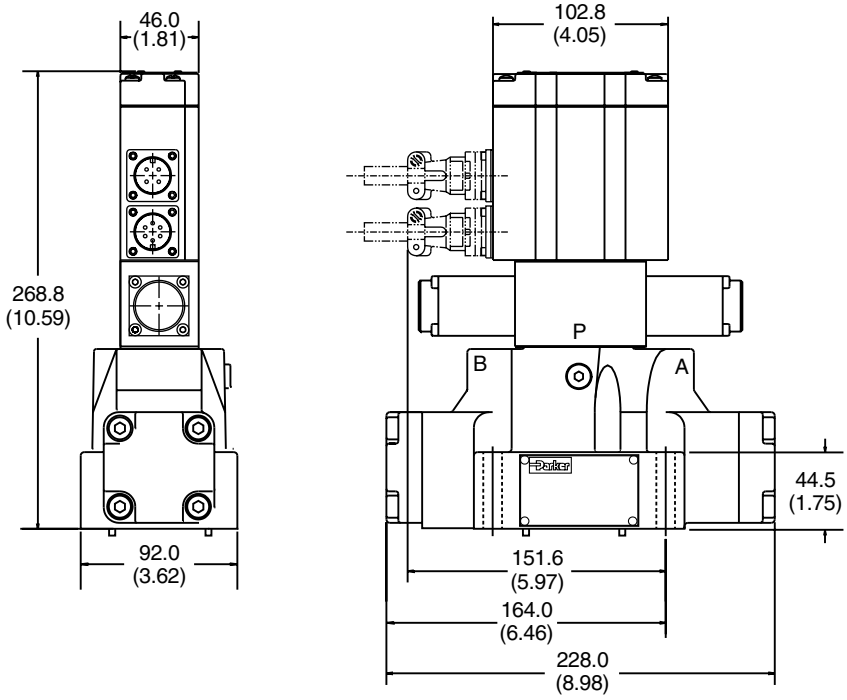
Inch equivalents for millimeter dimensions are shown in (**)



D41FL

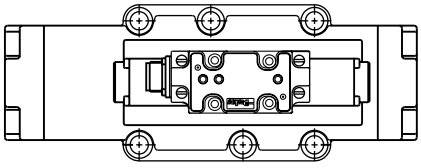
Inch equivalents for millimeter dimensions are shown in (**)

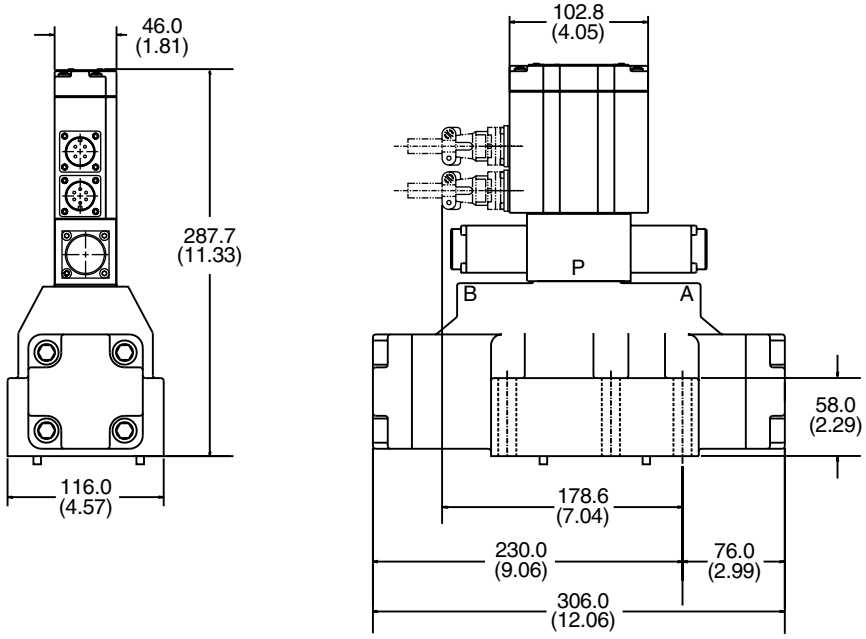




D91FL

Inch equivalents for millimeter dimensions are shown in (**)

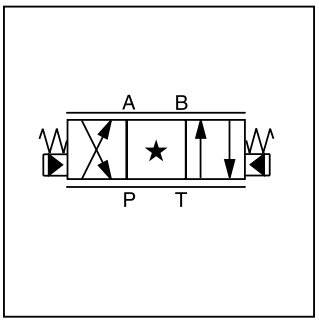


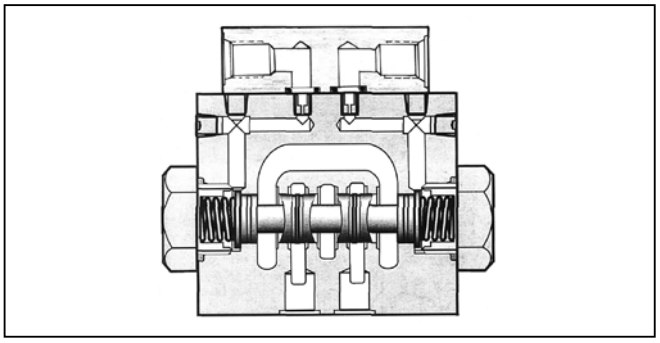


General Description

Series D*9FF main-stage, pilot operated, proportional directional control valves are operated with remote hydraulic hand controllers. Valves are available in sizes NG10 (CETOP 5), NG16 (CETOP 7), NG25 (CETOP 8) and NG32 (CETOP 10).

Typical applications include reproducible control of actuator speed in rapid/slow speed profiling, and smooth acceleration and deceleration performance.





Features

- Standard DIN/ISO/CETOP/NFPA interfaces.
- Progressive flow characteristics for improved low flow resolution.
- Spring centered main stage spool.
- 2:1 ratio spool options.

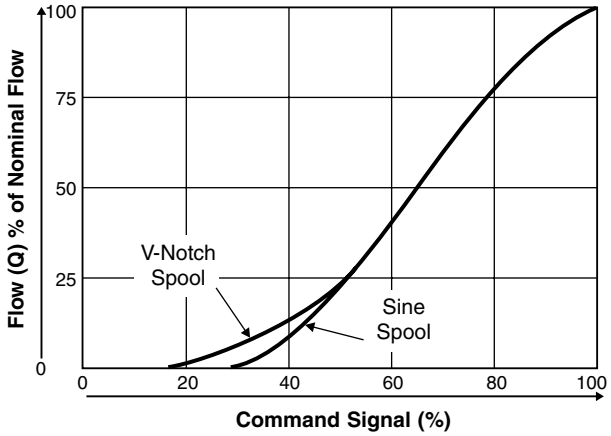
CE

Specifications

Interface DIN			**NG10 (CETOP 5)**	**NG16 (CETOP 7)**	**NG25 (CETOP 8)**	**NG32 (CETOP 10)**
Flow Rating @10 Bar (150 PSI) Δp (P→A, B→T) (Spool options up to)		LPM (GPM)	75 (20)	200 (53)	400 (106)	1000 (264)
Pilot Flow – Continuous		LPM (GPM)	1.2 (0.3)	1.2 (0.3)	1.2 (0.3)	1.2 (0.3)
Step Response (time to reach 90% of a 100% step command)		ms	60	75	100	200
Hysteresis	%	<5				
Repeatability	%	<2				
Operating Pressure Port P, A, B, T	Bar (PSI)	345 (5000) max.				
Pilot Pressure Ranges	Bar (PSI)	0-25 (0-363 PSI)				
Fluid Cleanliness Level		ISO Class 16/13				
Fluid Viscosity, Recommended		80 – 1000 SSU				
Fluid Temperature, Recommended		0°C to +60°C (+32°F to +140°F)				
Ambient Operating Temperature		-50°C to +100°C (-58°F to +212°F)				

Performance Curves

D*9FF Flow Characteristics
at Δp = 5 Bar (72.5 PSI) per metering edge



D		9	F	F			C	2		
Directional Control Valve	Size	No Pilot	Flow Control	Remote Pilot	Spool Type	Flow	Style	Pilot Connection	Seal	Design Series

NOTE: Not required when ordering.

Code	Description
3	NG10/CETOP 5
4	NG16/CETOP 7
9	NG25/CETOP 8*
11	NG32/CETOP 10

* 32mm Ø ports

Code	Style
C	

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Pilot	Drain
2	External	External

Sine Spool Options - Spool Type and Flow Codes

Code		Sine Spool Type
$Q_A=Q_B$	$Q_A>Q_B$ [1]	
E01	B31	
E02	B32	

Code	Flow at Δp 5 Bar (72.5 PSI) per metering edge			
	D39 LPM (GPM)	D49 LPM (GPM)	D99 LPM (GPM)	D119 LPM (GPM)
C	75 (20)	–	–	–
F	–	200 (53)	–	–
H	–	–	400 (106)	_
L	_	_	_	1000 (264)

V-Notch Spool Options - Spool Type and Flow Codes

Code		V-Notch Spool Type
$Q_A=Q_B$	$Q_A>Q_B$ [1]	
E21	B41	
E22	B42	

Code	Flow at Δp 5 Bar (72.5 PSI) per metering edge			
	D39 LPM (GPM)	D49 LPM (GPM)	D99 LPM (GPM)	D119 LPM (GPM)
B	–	–	–	–
D	–	120 (32)	–	–
F	–	–	300 (79)	–
L	_	_	_	1000 (264)

1) Reduced Flow Rate on Port B, Nominal Flow Rate on Port A
Code A* for spool $Q_B>Q_A$ optional

Bolt Kits:

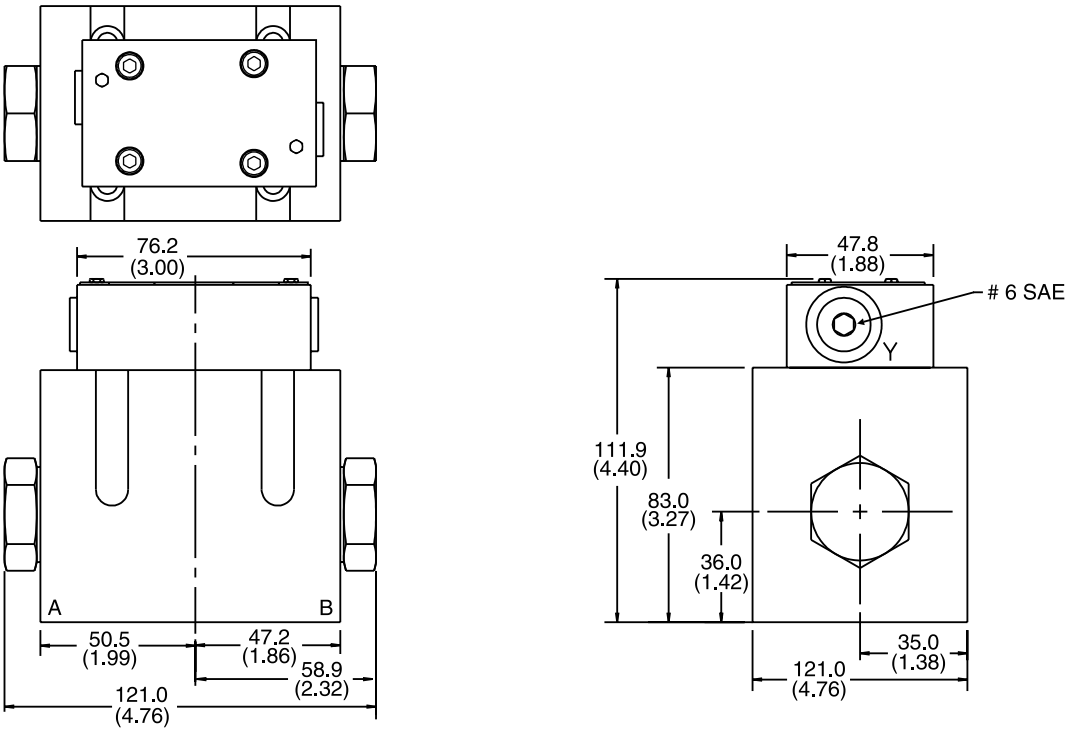
D39FF	BK98	(4) 1/4-20x1.62 SHCS
D49FF	BK160	(4) 3/8-16x2.5 SHCS (2) 1/4-20x2.5 SHCS
D99FF	BK228	(6) 1/2-13x3.0 SHCS
D119FF	BK150	(6) 3/4-10x3.5 SHCS

Weight:

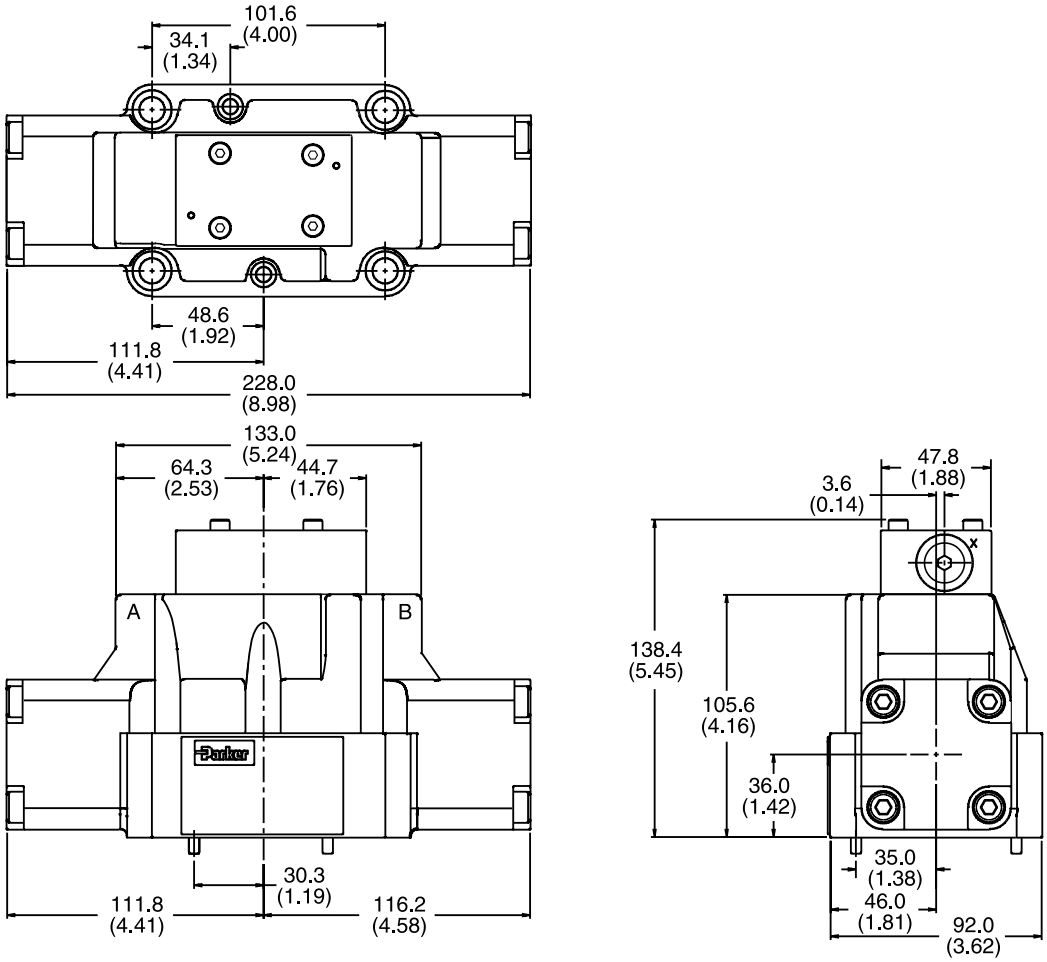
D39FF	7.1 kg (16.0 lbs.)
D49FF	10.8 kg (25.0 lbs.)
D99FF	19.0 kg (42.0 lbs.)
D119FF	62.0 kg (136.0 lbs.)

Inch equivalents for millimeter dimensions are shown in (**)

D39FF

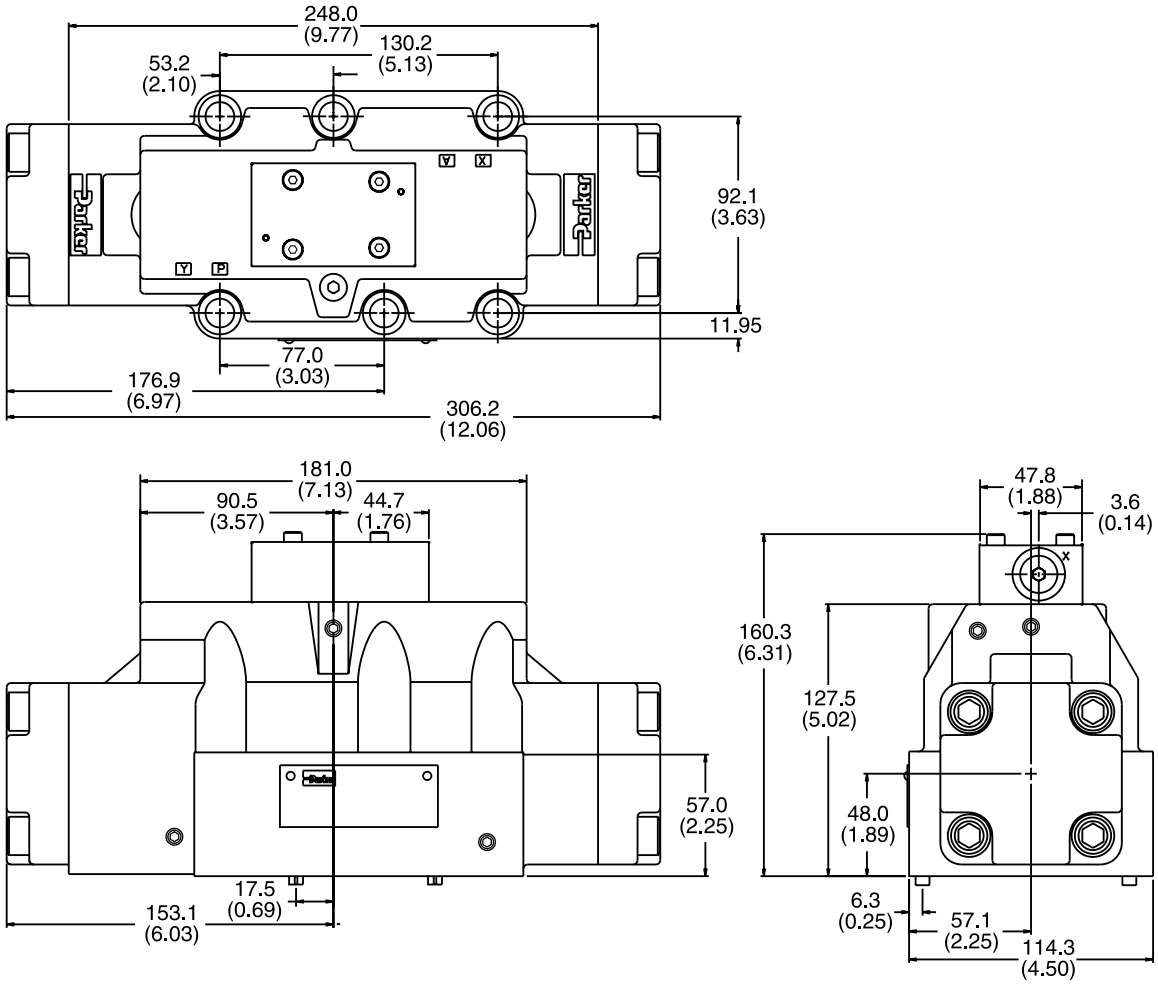


D49FF



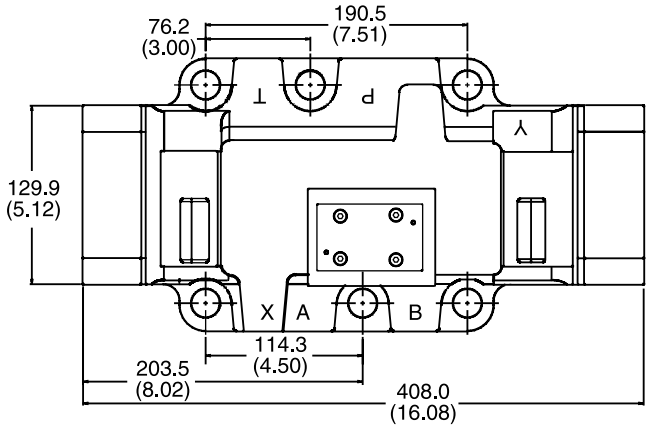
D99FF

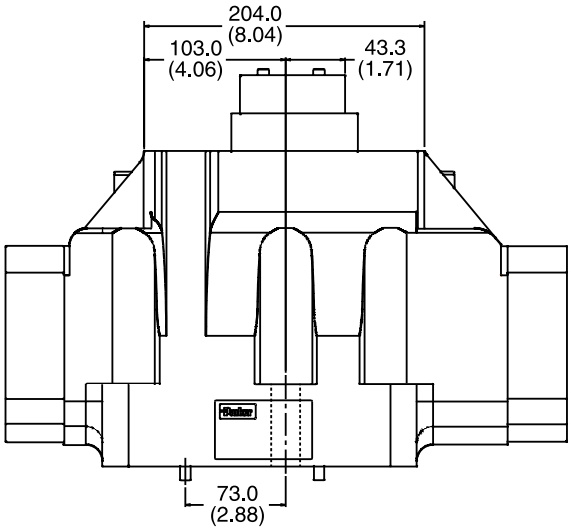
Inch equivalents for millimeter dimensions are shown in (**)

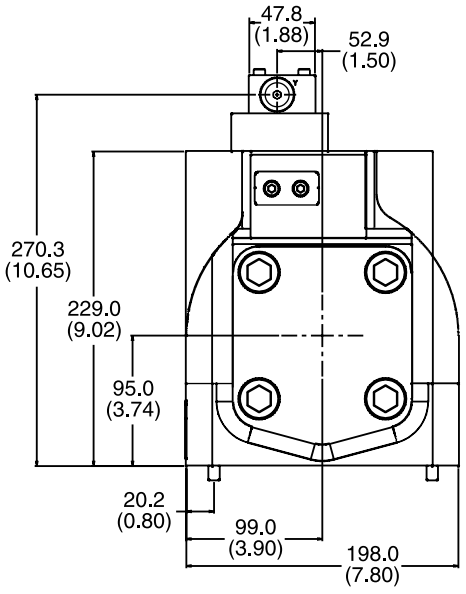


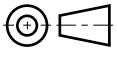
D119FF

Inch equivalents for millimeter dimensions are shown in (**)









Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Bolt Kits, Subplates, Mounting Interface

Interface	Valve	Bolt Kit	Qty	Size	Subplate(1)	Port Size	Port Location
NG10	D39F*	BK98	4	1/4-20 x 1.62"	SPD31D6NS35	3/4" NPTF	Bottom
CETOP 5		BK385	4	M6 x 40mm	SPD31D6NAS35	3/4" NPTF	Side
					SPD31D6SS35	#12 SAE	Bottom
					SPD31D6SAS35	#12 SAE	Side
NG16	D49F*	BK160	4	3/8-16 x 2.5"	SPD46SA	#12 SAE	Side
CETOP 7			2	1/4-20 x 2.25"			
		BK320	4	M10 x 60mm			
			2	M6 x 55mm			
NG25	D99F*	BK228	6	1/2-13 x 3"	SPD66NS35	3/4" NPTF	Bottom
CETOP 8		BK360	6	M12 x 75	SPD66NAS35	3/4" NPTF	Side
					SPD68NS35	1" NPTF	Bottom
					SPD68NAS35	1" NPTF	Side
					SPD610NS35	1 1/4" NPTF	Bottom
					SPD610NAS35	1 1/4" NPTF	Side
					SPD610SS35	#20 SAE	Bottom
					SPD610SAS35	#20 SAE	Side
NG32	D119F*	BK150	6	3/4-10 x 3.5"	SPD1010N35	1 1/4" NPTF	Bottom
CETOP 10		BK386	6	M20 x 90	SPD1012N35	1 1/2" NPTF	Bottom

(1) Ductile iron; maximum operating pressure: 350 Bar (5075 PSI). Refer to valve specificatons for actual recommended maximums.

Note: All subplates listed use SAE mounting bolt hardware. Refer to Catalog HY14-2500/US for metric options.

Return to ALPHA TOC
Return to SECTION TOC
A

General Description

Series D*1FC pilot operated proportional directional valves come in 4 sizes:

D31FC NG10 (CETOP 5)
D41FC NG16 (CETOP 7)
D91FC NG25 (CETOP 8)
D111FC NG32 (CETOP 10)

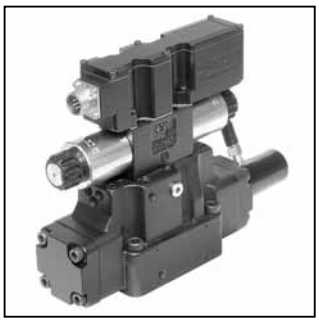
The digital onboard electronics is situated in a robust metal housing, which allows usage under rough environmental conditions.

The nominal values are factory set. The cable connection to a serial RS-232 interface is available as an accessory.

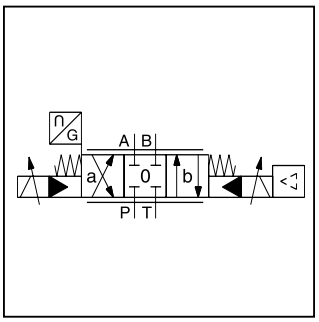
The innovative integrated regenerative function into the A-line (optional) allows energy saving circuits for differential cylinders. The hybrid version can be switched between regenerative mode and standard mode at any time.

Features

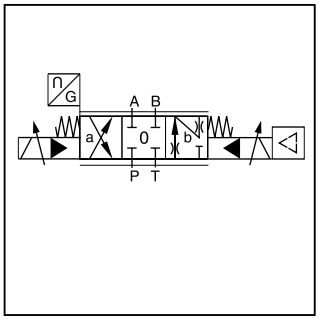
- Progressive flow characteristics for precise adjustment of flow rate.
- Low hysteresis.
- High dynamics.
- High flow capacity.
- Center position monitoring optional.
- Energy saving A-regeneration optional.
- Switchable hybrid version optional.



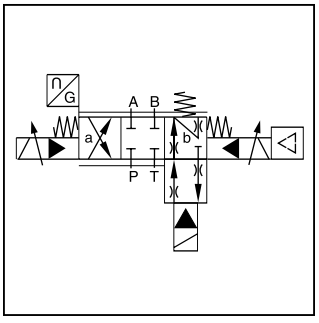
D41FC



Standard D*1FC



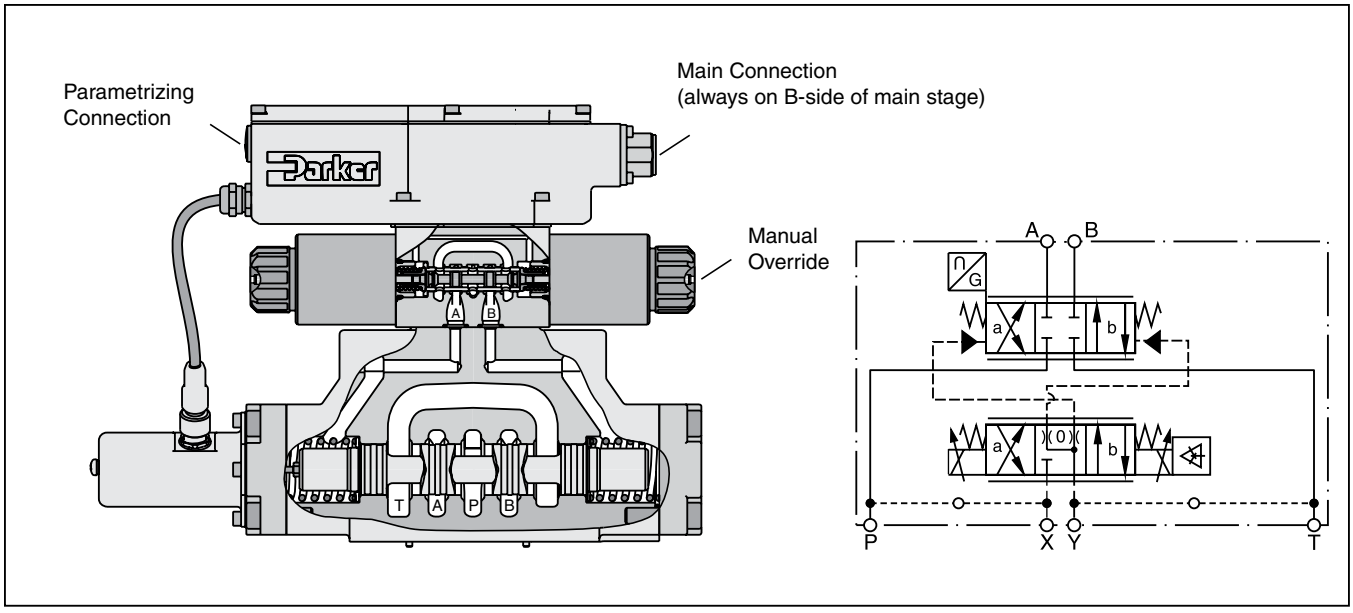
Regeneration D*1FCR



Hybrid D*1FCZ

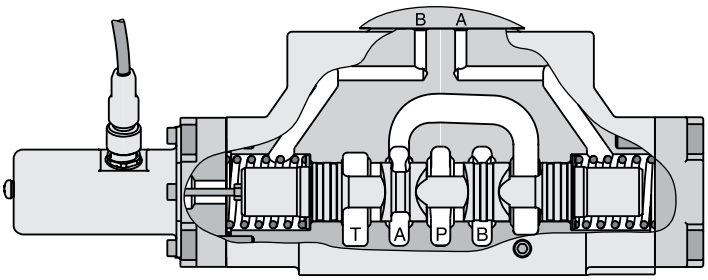
Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request at Parker HVD Technical Service.

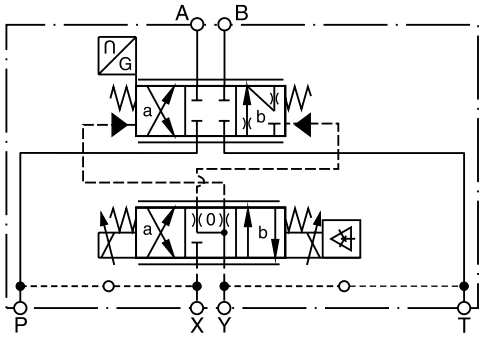
D41FC



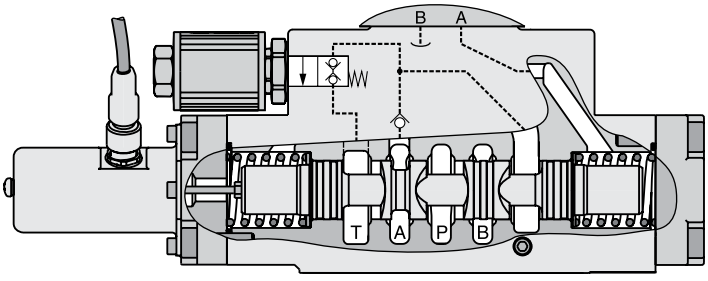
D*1FCR and D*1FCZ

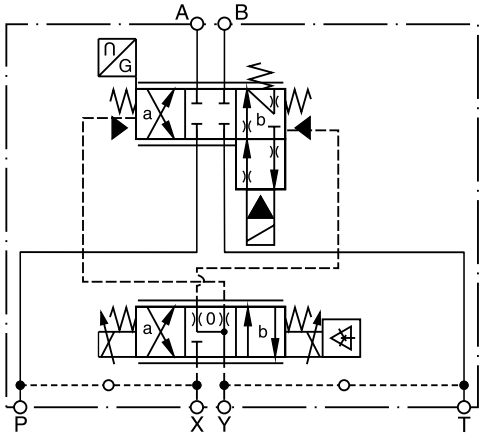
Regenerative Valve D*1FCR





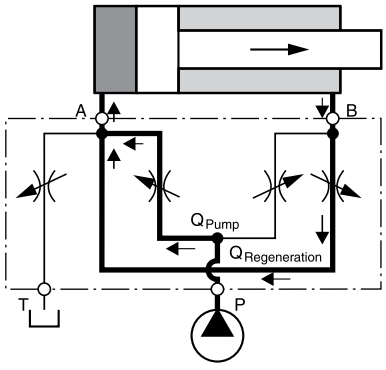
Hybrid Valve D*1FCZ





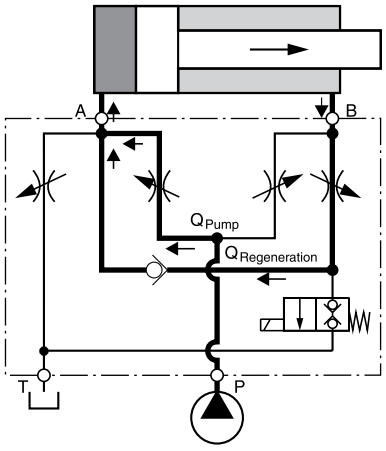
D*1FCR (Regenerative Valve)

Cylinder extending
(high speed)

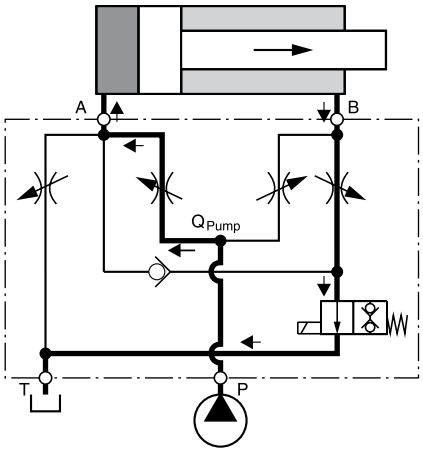


D*1FCZ (Hybrid Valve)

Cylinder extending
regenerative mode
(high speed)



Cylinder extending
standard mode
(high force)



Flow Rate in % of Nominal Flow

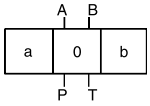
Size	Spool	Port					
		A-T	P-A	P-B	B-A (R-Valve)	B-A (Hybrid)	B-T (Hybrid)
D41FCR/Z	31/32	100%	50%	100%	50%	45%	20%
D91FCR/Z	31/32	100%	50%	100%	50%	50%	25%
D111FCR/Z	31/32	100%	50%	100%	50%	50%	20%

D		1	F	C			C						
Directional Control Valves	Size	NG6 Pilot	Flow Control	Intergrated Electronics with Position Feedack	Spool	Flow	Spool Position on Power Down	Pilot Connection	Seal	Input Signal	Options [4]	Valve Accessories	Design Series

NOTE: Not required when ordering.

Code	Description
3	NG10 / CETOP 5
4	NG16 / CETOP 7
9 [1]	NG25 / CETOP 8
11	NG32 / CETOP 10

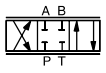
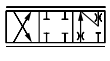
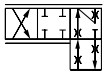
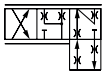
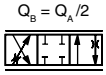
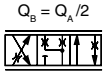
[1] For enlarged connections Ø 32 mm

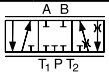
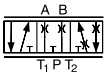


Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
0	Standard for Spool Type B, E, R
8 [6] [7]	Monitor Switch
L [5]	Hybrid valve 24V normally closed for spool type Z

[5] See previous page for regenerative and hybrid spool information. (not available in D31FC)
[6] Not for D111FCZ*
[7] Monitor switch for hybrid valves: Code 8 includes options of Code L (24 normally closed).

Standard		NEW: Regenerative Function [2]		NEW: Hybrid Function [2]	
Code	Spool Type	Code	Spool Type	Code	Spool Type
E01		R31		Z31	
E02		R32		Z32	
B31					
B32					

D31FC spool type: R31  R32 

[2] For regenerative and hybrid function at D31FC (NG10) please refer to solutions with sandwich and adapter plates: A10-1664 / A10-1665L / H10-1662 / H10-1666L.

Code	Inlet	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

Code	Signal	Function
B	0...±10V	0...+10V P->B
E	0...±20mA	0...+20mA P->B
K	0...±10V	0...+10V P->A
S	4...20mA	12...20mA P->A

Code	Description
0	6+PE acc. EN175201-804
7	6+PE + enable

[4] Please order plugs separately. See Accessories.

Code	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge			
	D31	D41	D91	D111
D	90 (23.8)	—	—	—
E	120 (31.7)	—	—	—
F	—	200 (52.8)	—	—
H	—	—	450 (119.0)	—
L	—	—	—	1000 (264.2)

Bolt Kits:

D31FC	BK385
D41FC	BK320
D91FC	BK360
D111FC	BK386

Weight:

D31FC	9.0 kg (19.8 lbs.)
D41FC	12.5 kg (27.6 lbs.)
D91FC	21.0 kg (46.3 lbs.)
D111FC	68.5 kg (151.0 lbs.)

General					
Design		Pilot operated DC valve			
Actuation		Proportional solenoid			
Size		**NG10 (CETOP 5) D31**	**NG16 (CETOP 7) D41**	**NG25 (CETOP 8) D91**	**NG32 (CETOP 10) D111**
Mounting Interface		DIN 24340 / ISO 4401 / CETOP RP121 / NFPA			
Mounting Position		Unrestricted			
Ambient Temperature	**[°C]**	-20...+60; (-4°F...+140°F)			
$MTTF_D$ Value	**[years]**	50			
Vibration Resistance	**[g]**	10 Sinus 5...200 Hz acc. IEC 68-2-6 30 Random noise 20...20 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27			
Hydraulic					
Maximum Operating Pressure		Pilot Drain Internal Ports P, A, B, X 350 Bar (5075 PSI); Ports T, Y 210 Bar (3045 PSI) Pilot Drain External Ports P, A, B, T, X 350 Bar (5075 PSI); Port Y 210 Bar (3045 PSI)			
Fluid		Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature	**[°C]**	-20...+60; (-4°F...+140°F)			
Viscosity **Permitted** **Recommended**	 **[cSt] / [mm²/s]** **[cSt] / [mm²/s]**	 20...380 (93...1761 SSU) 30...80 (139...371 SSU)			
Filtration		ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Nominal Flow at Δp= 5 Bar (72.5 PSI) per Control Edge [1]		90/120 LPM (23.8/31.7 GPM)	200 LPM (52.9 GPM)	450 LPM (119.0 GPM)	1000 LPM (264.6 GPM)
Leakage at 100 Bar (1450 PSI) **Main Stage**	**[ml/min]**	200 (12 cu. in.)	200 (12 cu. in.)	600 (37 cu. in.)	1000 (61 cu. in.)
Pilot Stage	**[ml/min]**	<100 (6.1 cu. in.)			
Pilot Supply Pressure		20 Bar (290 PSI) to 350 Bar (5075 PSI)			
Pilot Flow, Step Response		2.9 LPM (0.8 GPM)	4.1 LPM (1.1 GPM)	6.7 LPM (1.8 GPM)	15.0 LPM (4.0 GPM)
Static / Dynamic					
Step Response at 100% Step [2]	**[ms]**	35	37	66	120
Hysteresis	**[%]**	≤ 0.1			
Sensitivity	**[%]**	≤ 0.5			

[1] Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

[2] Measured with load [210 Bar (3045 PSI) pressure drop/two control edges].

Continued on the next page

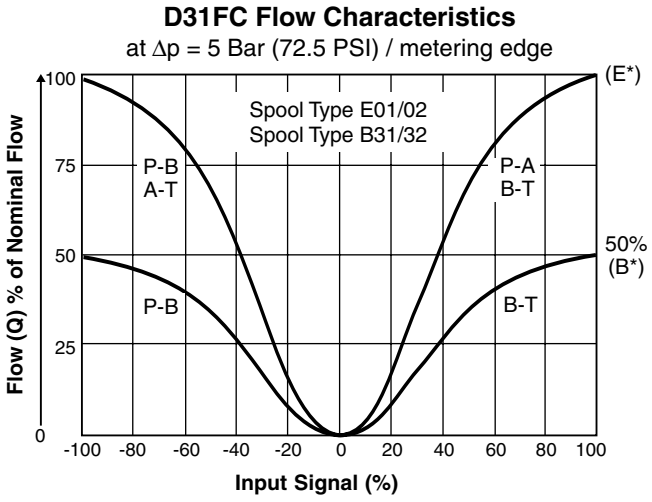
Electrical			
Duty Ratio		**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class			IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/Ripple DC		**[V]**	18...30, ripple < 5% eff., surge free
Current Consumption Maximum		**[A]**	2.0
Pre-fusing Medium Lag		**[A]**	2.5
Input Signal			
Code K (B)	**Voltage**	**[V]**	+10...0...-10, ripple < 0.01 % eff., surge free, 0...+10V P—>A (P—>B)
	Impedance	**[kOhm]**	100
Code E	**Current**	**[mA]**	20...0...-20, ripple < 0.01 % eff., surge free, 0...+20 mA P—>A (P—>B)
	Impedance	**[Ohm]**	200
Code S	**Current**	**[mA]**	4...12...20, ripple < 0.01 % eff., surge free, 12...20mA P—>A < 3.6 mA = enable off, > 3.8 mA = enable on (acc. to NAMUR NE43)
	Impedance	**[Ohm]**	200
Differential Input Maximum			
Code 0/7		**[V]**	30 for terminal D and E against PE (terminal G)
Code 0		**[V]**	11 for terminal D and E against 0V (terminal B)
Adjustment Ranges:			
Minimum		**[%]**	0...50
Maximum		**[%]**	50...100
Ramp		**[s]**	0...32.5
Interface			RS-232, parametrizing connection 5 pole
EMC			EN 61000-6-2, EN 61000-6-4
Electrical Connection			6 + PE acc. to EN 175201-804
Wiring Minimum		**[mm²]**	7 x 1.0 (AWG16) overall braid shield
Wiring Length Maximum		**[m]**	50 (164 ft.)
Electrical (Hybrid Option)			
Duty Ratio		**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class			IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage		**[V]**	24
Tolerance Supply Voltage		**[%]**	±10
Current Consumption		**[A]**	1.21
Power Consumption		**[W]**	29
Solenoid Connection			Connector as per EN 175301-803
Wiring Minimum		**[mm²]**	3 x 1.5 recommended
Wiring Length Maximum		**[m]**	50 (164 ft.) recommended

With electrical connections the protective conductor (PE ⏚) must be connected according to the relevant regulations.

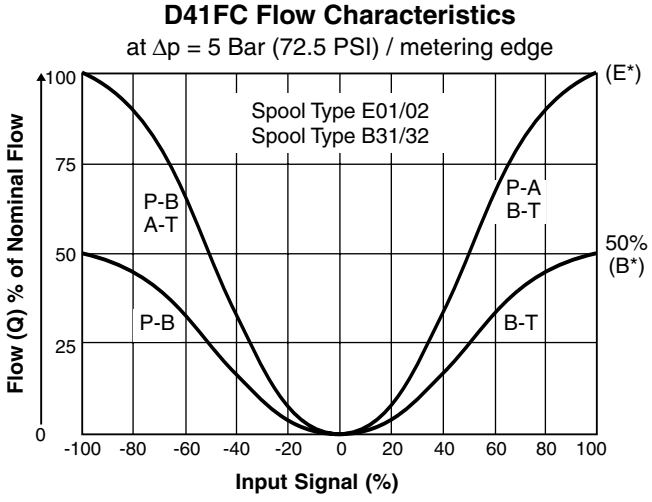
D*1FC B/E

A

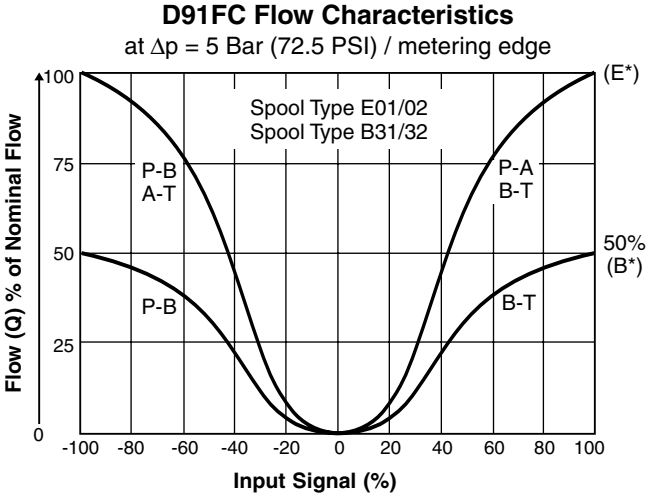
D31FC



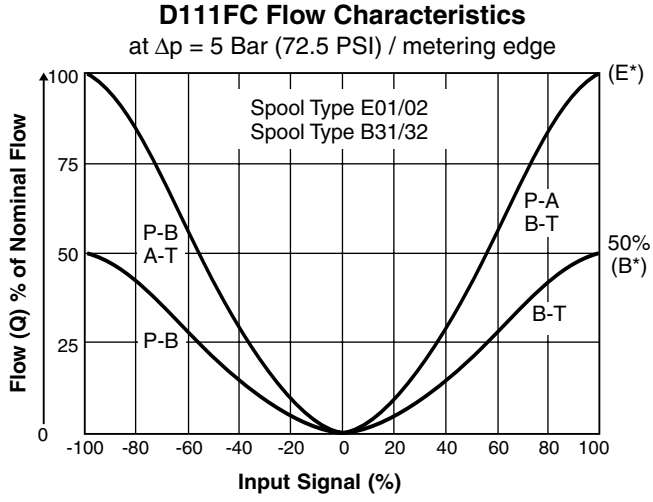
D41FC



D91FC



D111FC

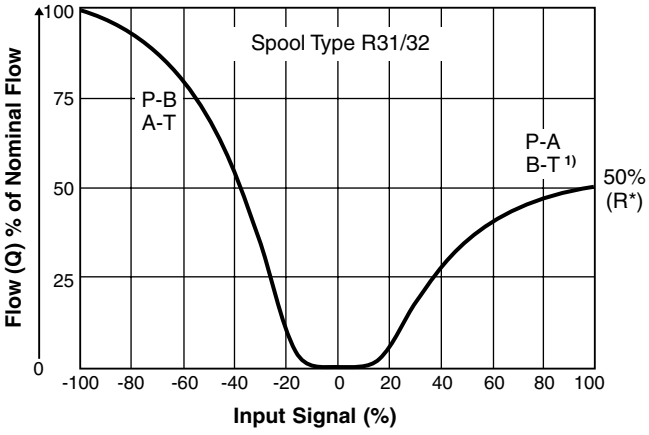


All performance curves measured with HLP46 at 50°C (122°F).

D*1FCR/Z

D31FC

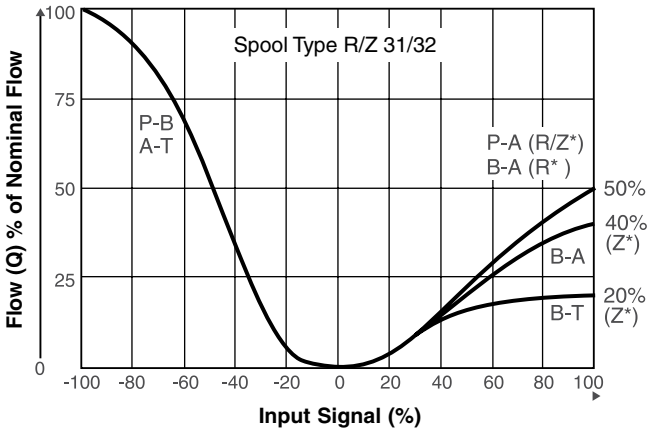
D31FCR Flow Characteristics
at Δp = 5 Bar (72.5 PSI) / metering edge



1) with 2 tank ports

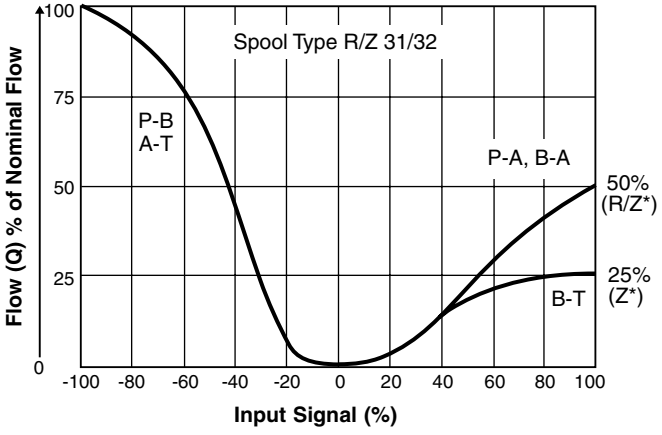
D41FC

D41FCR/Z Flow Characteristics
at Δp = 5 Bar (72.5 PSI) / metering edge



D91FC

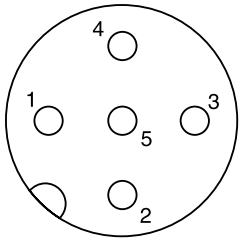
D91FCR/Z Flow Characteristics
at Δp = 5 Bar (72.5 PSI) / metering edge



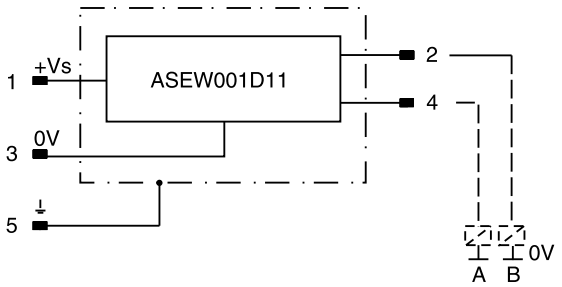
D111FC – Spool Type R/Z on request

All performance curves measured with HLP46 at 50°C (122°F).

Monitor Switch M12x1 Pin Assignment



1 + Supply 18...42V
2 Output B (normally closed)
3 0V
4 Output A (normally closed)
5 Earth ground



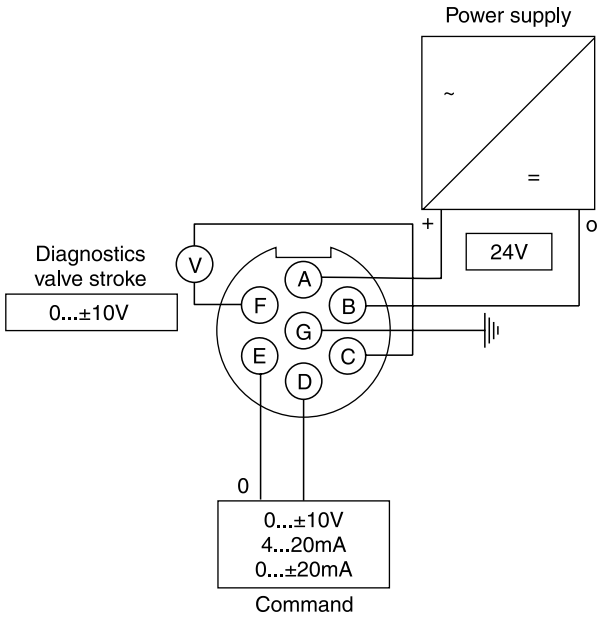
Signal	Output A (pin 4)	Output B (pin 2)
neutral	closed	closed
	open	closed
	closed	open

The neutral position is monitored. The signal changes after less than 10% of the spool stroke.

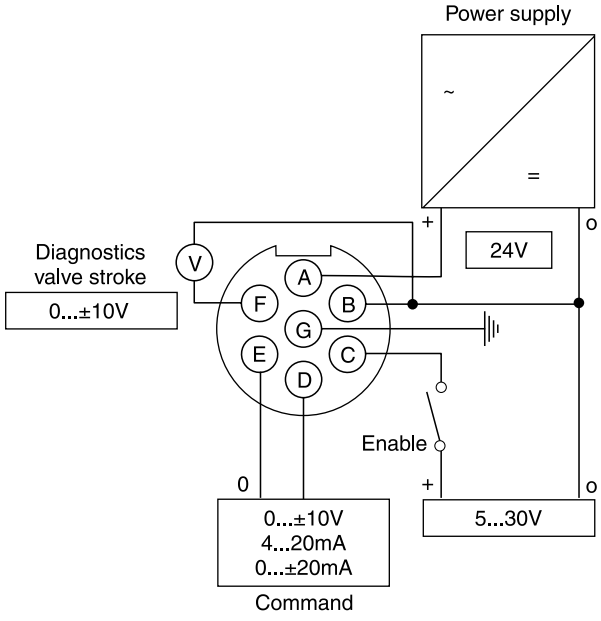
Electrical Monitor Switch

Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature	**[°C]**	0...70; (32°F...158°F)
Supply Voltage/Ripple	**[V]**	18...42, ripple < 10% eff.
Current Consumption without Load	**[mA]**	< 30
Maximum Output Current per Channel, Ohmic	**[mA]**	400
Minimum Output Load per Channel, Ohmic	**[kOhm]**	100
Maximum Output Drop at 0.2A	**[V]**	< 1.1
Maximum Output Drop at 0.4A	**[V]**	< 1.6
EMC		EN 61000-6-2, EN61000-6-4
Maximum tol. Ambient Field Strength	**[A/m]**	1200
Minimum Distance to Next AC solenoid	**[m]**	0.1
Interface		4+PE acc. IEC 61076-2-101 (M12)
Wiring Minimum	**[mm²]**	5 x 0.5 (AWG 20) overall braid shield
Wiring Length Maximum	**[m]**	50 (164 ft.)

Code 0
6 + PE acc. to EN 175201-804



Code 7
6 + PE acc. to EN 175201-804 + enable



ProPxD Interface Program

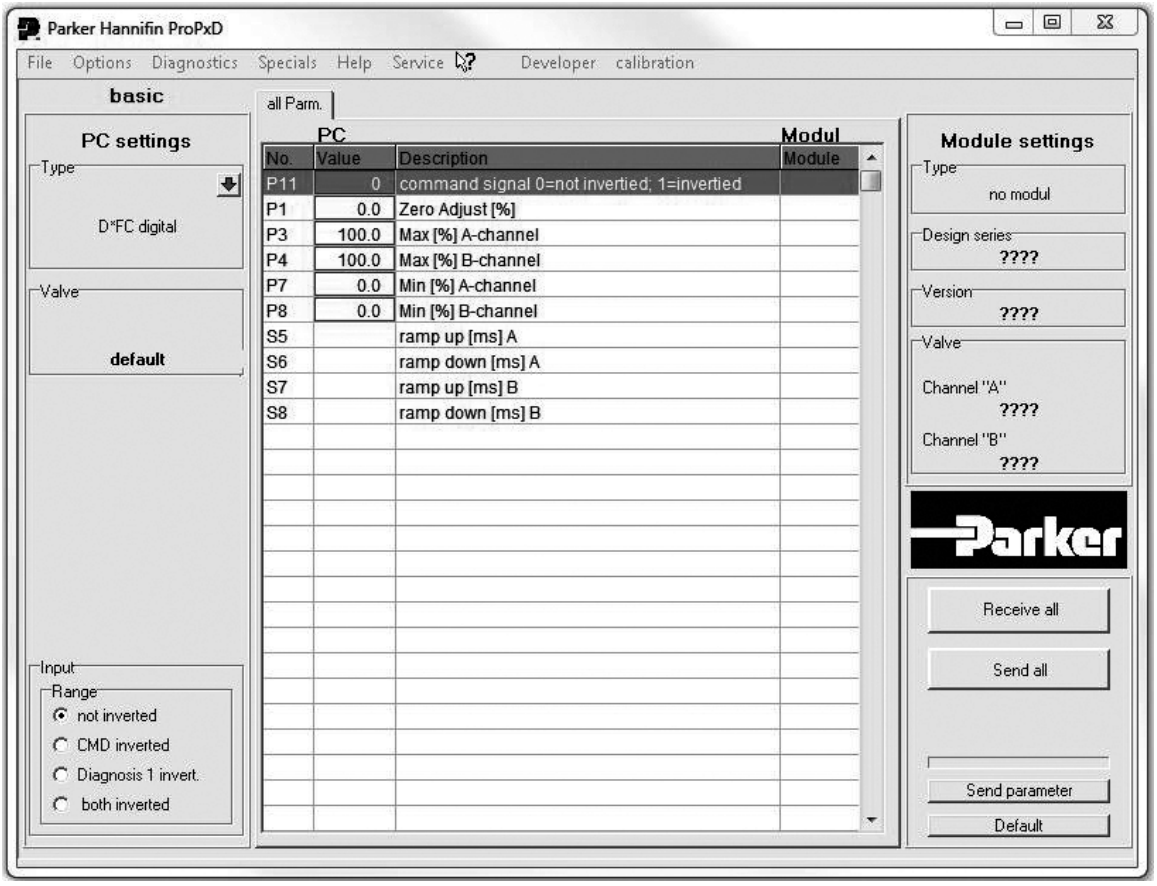
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

Simple to use interface program. Download free of charge **www.parker.com/euro_hcd → Services → downloads**

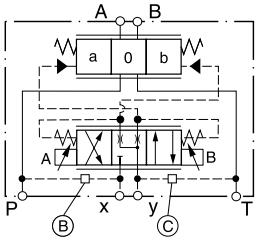


The parametrizing cable may be ordered under item no. 40982923.

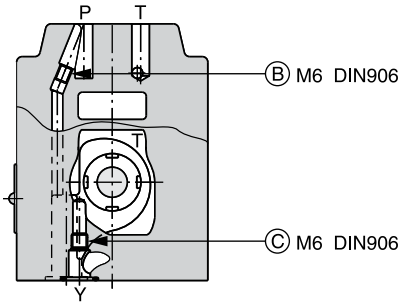
Pilot Flow — Pilot Oil Inlet (Supply) and Outlet (Drain)

○ open, ● closed

Pilot oil Inlet	Pilot oil Drain	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○

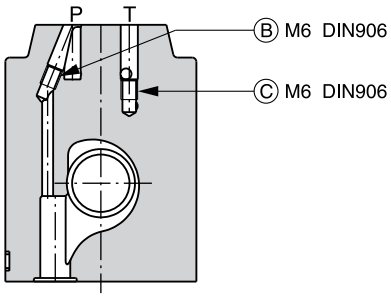


D31FCB/E

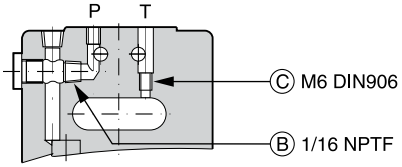


(drawn offset)

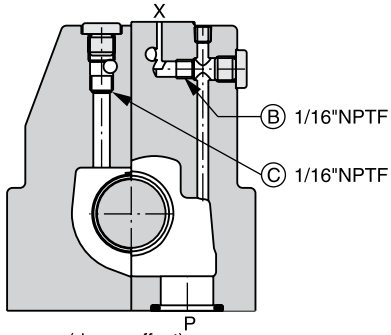
D31FCR



D41FCB/E



D41FCR



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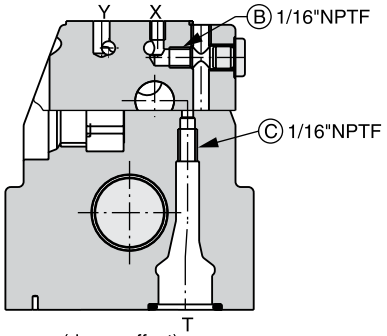
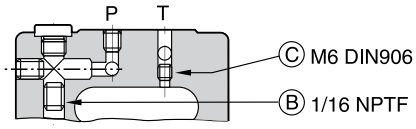
D41FCZ

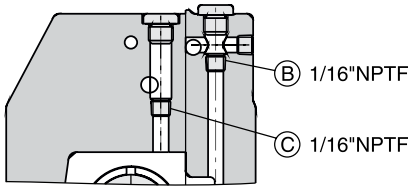


(drawn offset)

D91FCB/E



D91FCR



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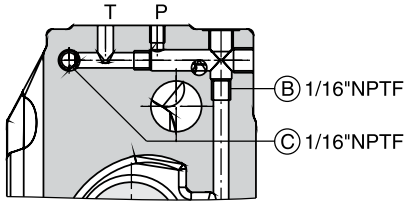
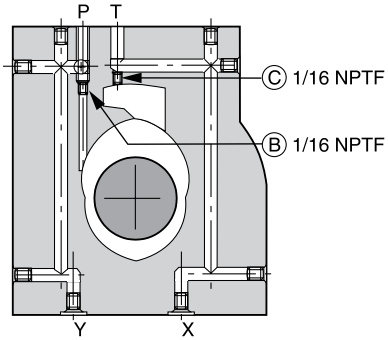
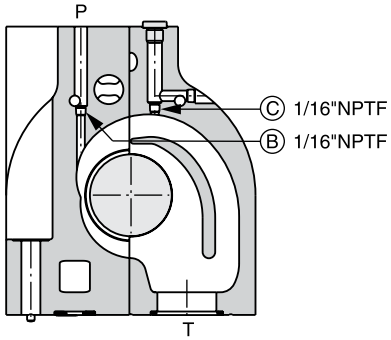
D91FCZ



D111FCB/E



D111FCR



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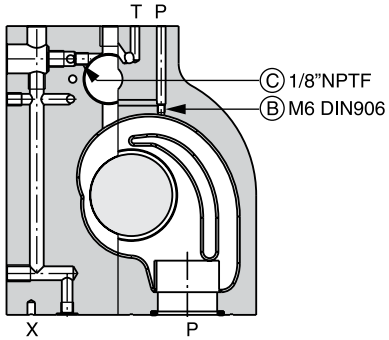
D111FCZ



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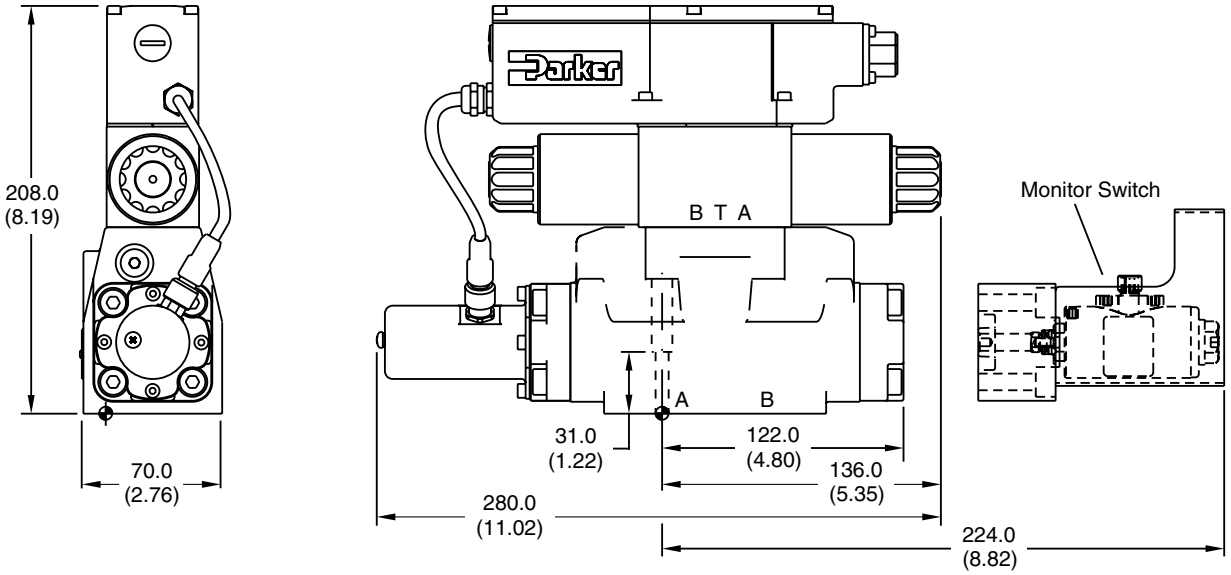
D_1FC.indd, ddp

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

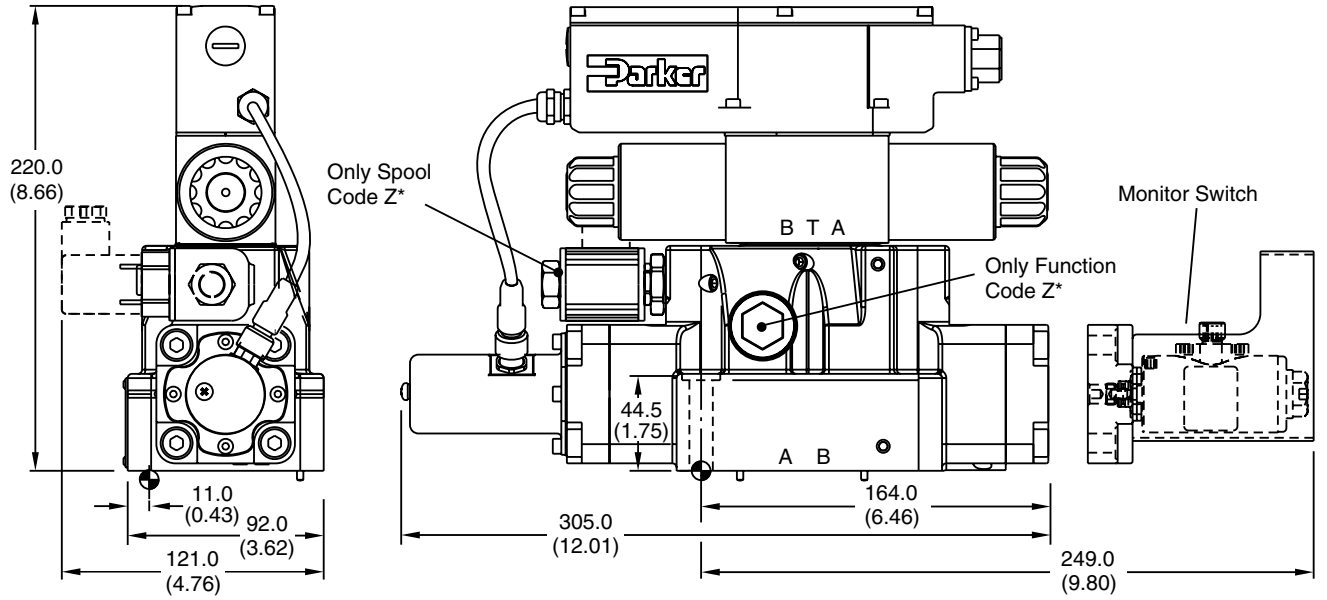
D31FC



Regenerative and hybrid function with additional plate H10-1666L, H10-1662, A10-1664, A10-1665L.

Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D31FC Fluorocarbon: SK-D31FC-V

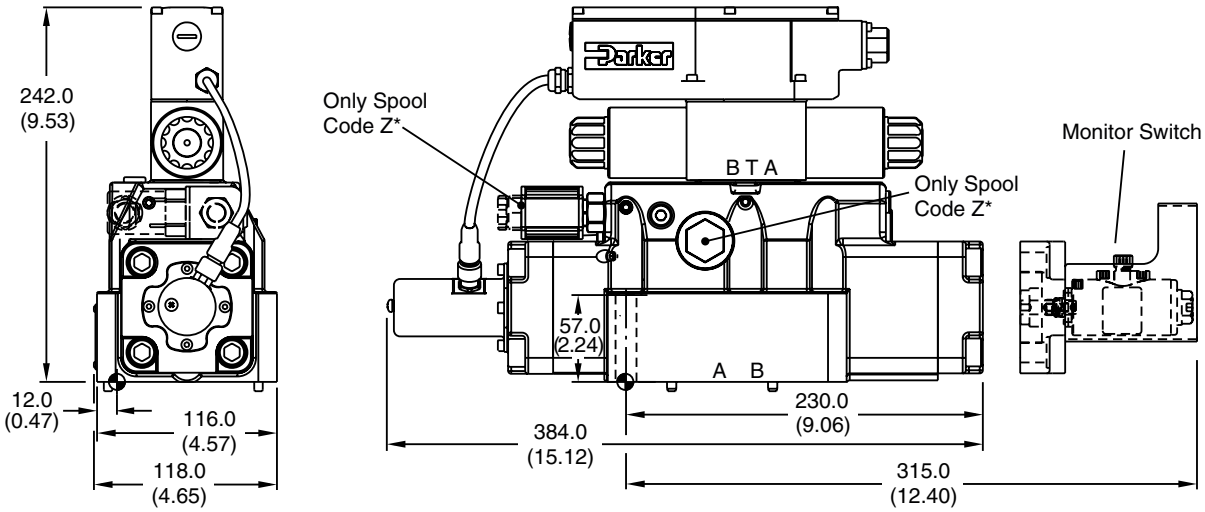
D41FC



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK320	2x M6x55 4x M10x60 ISO 4762-12.9	13.2 Nm (9.7 lb.-ft.) 63 Nm (46.5 lb.-ft.) ±15 %	Nitrile: SK-D41FC Fluorocarbon: SK-D41FC-V

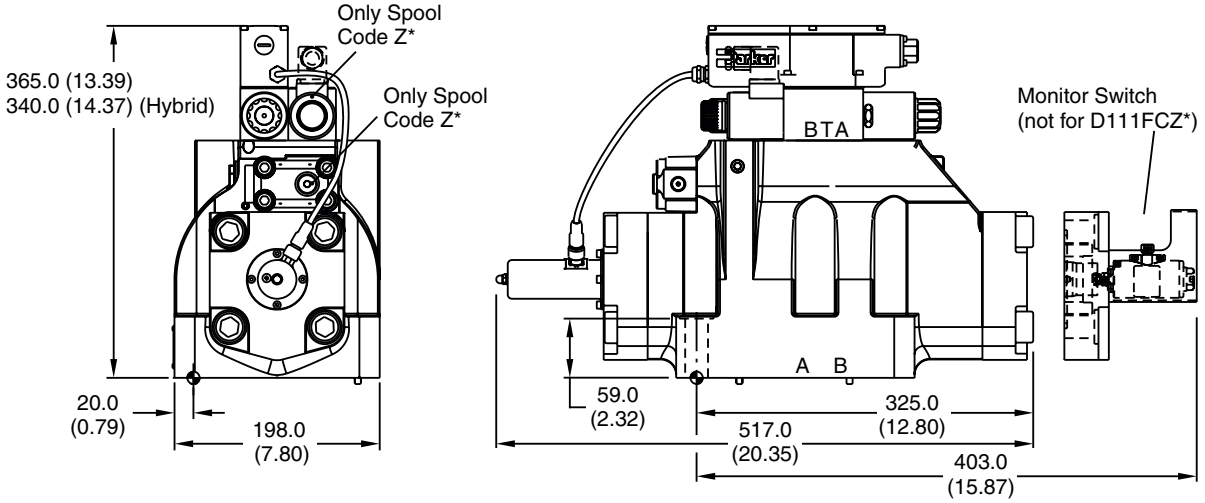
Inch equivalents for millimeter dimensions are shown in (**)

D91FC



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK360	6x M12x75 ISO 4762-12.9	108 Nm (79.7 lb.-ft.) ±15 %	Nitrile: SK-D91FC Fluorocarbon: SK-D91FC-V

D111FC



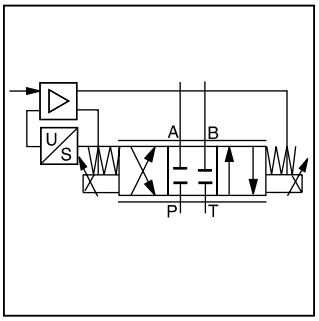
Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK386	6x M20x90 ISO 4762-12.9	517 Nm (381.3 lb.-ft.) ±15 %	Nitrile: SK-D111FC Fluorocarbon: SK-D111FC-V

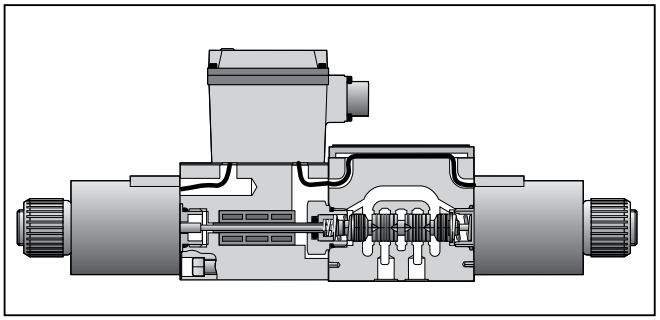
General Description

Series D*FX proportional directional control valves are direct operated solenoid valves with electronic spool position feedback, and on-board integrated control electronics. D*FX valves are user configurable to proportionally control flow in response to voltage or current command signals. Valves are available in sizes NG6 (CETOP 3) and NG10 (CETOP 5).

Three electronic control options are available simplifying user application. Configurations include the industrial standard 7-pin interface, or options for a user configurable simple proportional analog outer closed loop, or ± 10V reference outputs which can be used as user command voltage references.

D*FX valve performance is characterized by high resolution flow control, repeatability, and good dynamic performance. Typical applications include precise and reproducible control of actuator speed in rapid/slow speed profiling, and smooth acceleration and deceleration performance.





Features

- Integrated valve electronics.
- Versatile electronic control options.
- Spool position feedback.
- Spring centered spool.
- Manual override.
- Progressive flow characteristics for high resolution flow rate adjustment for small commands.
- LED functional diagnostics.

Specifications

Interface DIN	**NG6 (CETOP 3)**	**NG10 (CETOP 5)**
Flow Rating @10 Bar (150 PSI) Δp (P→A, B→T) (spool options up to)[1] LPM (GPM)	20 (5.3)	60 (15.9)
Maximum Flow LPM (GPM)	47 (12.5)	170 (45)
Step Response (time to reach 90% of a 100% step command) ms	60	75

Hysteresis %	<1.5
Repeatability %	<0.5
Max. Operating Pressure Port P, A, B Bar (PSI) Port T	 315 (4500) 35 (500)
Fluid Cleanliness Level	ISO Class 18/16/13
Fluid Viscosity, Recommended	75 – 600 SSU
Fluid Temperature, Recommended	0°C to +60°C (+32°F to +140°F)
Ambient Operating Temperature	-20°C to +60°C (-4°F to +140°F)
Electrical Power Requirements 24V Version 'J': NG6 (03) 24V Version 'J': NG10 (05) 12V Version 'K': NG06 (03) only	 18 to 30 VDC, 3A 18 to 30 VDC, 4A 11.5 to 15 VDC, 4A

Command Signal (impedance) (select by ordering code) 24V Version 'J'	 0 ± 10 VDC (100K ohm) 0 ± 20 mA (499 ohm)
Command Polarity	Pin 'D' more positive than 'E'; Flow P to A
Spool Position Monitor 24V Version 'J' 12V Version 'K'	 0 ± 10 VDC 0 ± 5 VDC
Voltage References:	Not a powered output Only for 10K Ohm pots
Mating Connector Only for 10K Ohm pots 7-Pin CE for Electronic Design 'B' 6-Pin for Electronic Design 'C' & 'D'	Not a powered output Part #5004072 Part #697561
Environmental Protection Class	NEMA 4 (IP65)

1) Actual pressure drop required for each metering land, up to the specified maximum flow rate is:

$$\Delta P_{actual} = (5)\left(\frac{Q_{actual}}{Q_{rated}}\right)^2 \text{ Bar; (Q in LPM)} \quad [or] \quad = (75)\left(\frac{Q_{actual}}{Q_{rated}}\right)^2 \text{ PSI; (Q in GPM)}$$

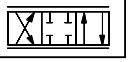
Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

D*FX

Proportional Directional Flow Control Valve with Spool Position Feedback and Integrated Electronics

Code	Description
D1FX	NG6/CETOP 3
D3FX	NG10/CETOP 5

Spool Type

Code			Spool Type
$Q_A=Q_B$	$Q_A>Q_B$*	$Q_B>Q_A$**	
E01	B31	A31	
E02	B32	A32	
E85***	–	–	

* Reduced flow rate on port B.

** Reduced flow rate on port A.

*** 5% lap spool for special applications. Consult Factory;
D1FX: Flow code F, C style only.
D3FX: Flow code M, C style only.

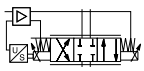
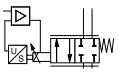
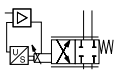
Flow

Code	Flow at Δp 5 Bar (72.5 PSI) per metering edge	
	D1FX LPM (GPM)	D3FX LPM (GPM)
C	7.5 (2)*	–
F	15 (4)	–
H	20 (5.3)*	20 (5.3)*
K**	–	30 (7.9)
M	–	40 (10.6)
S	–	60 (15.9)*

* Spool type E only.

** Spool type E01 only.

Style

Code	Style
C	
K	
E*	

* Only available on D1FX

Seal

Code	Description
N	Nitrile
V	Fluorocarbon

Electronic Design

Code	Description*
B	Standard CE Compliant
C	On-board Configurable Outer Closed Loop
D	On-board ±10V Reference Voltages

*All designs are user configurable to voltage or current command.

Supply Voltage

Code	Description
J	24 VDC
K	12 VDC*

* Available only with D1FX Electronic Design Codes C & D.

Electronic Accessories: 0

Valve Accessories: 0

Design Series

NOTE: Not required when ordering.

Note: NG10 (CETOP5) valves are supplied with bolt kit BK98 (1/4 – 20 x 1.625). For metric bolt kit BK385 (M6 x 40 mm), add "-X6181" to ordering code.

Weight:

D1FX	3.4 kg (7.5 lbs.)
D3FX	8.3 kg (18.3 lbs.)

Mounting Interface

Refer to Mounting Interface Dimensions in the Proportional Directional Valve section of this catalog.

Accessories

Refer to the Accessories section for bolt kits, subplates, connectors and pre-assembled cable assemblies.

Application Guidelines

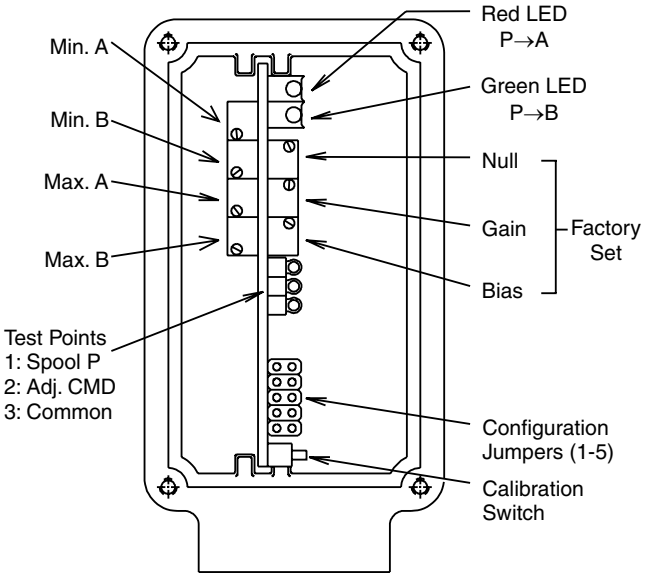
D*FX proportional valves are available in three control configurations. Option 'B' conforms to the industrial proportional valve standard and is interchangeable with most competitors' valves of this type. Options 'C' and 'D' are designed to simplify user application by providing specific features. Note that the 'B' control option uses the industrial standard CE compliant 7-pin MS connector while options 'C' and 'D' use a 6-pin MS connector. Refer to the table below for connector pin-out assignments.

Specifications		Electronic Design Option		
		'-B'	'-C'	'-D'
Function		Connector Pin Assignment		
Power Supply	+V	A	E	E
	0V	B	D	D
Reference	+10V	–	A	A
Outputs	-10V	–	F	F
Enable		C	–	–
Command	+CMD	D	B	B
	-CMD	E	–	–
Spool Position Monitor		F	–	C
Outer Loop Feedback – user		–	C	–
Protective Ground		G	–	–

Internal Adjustment

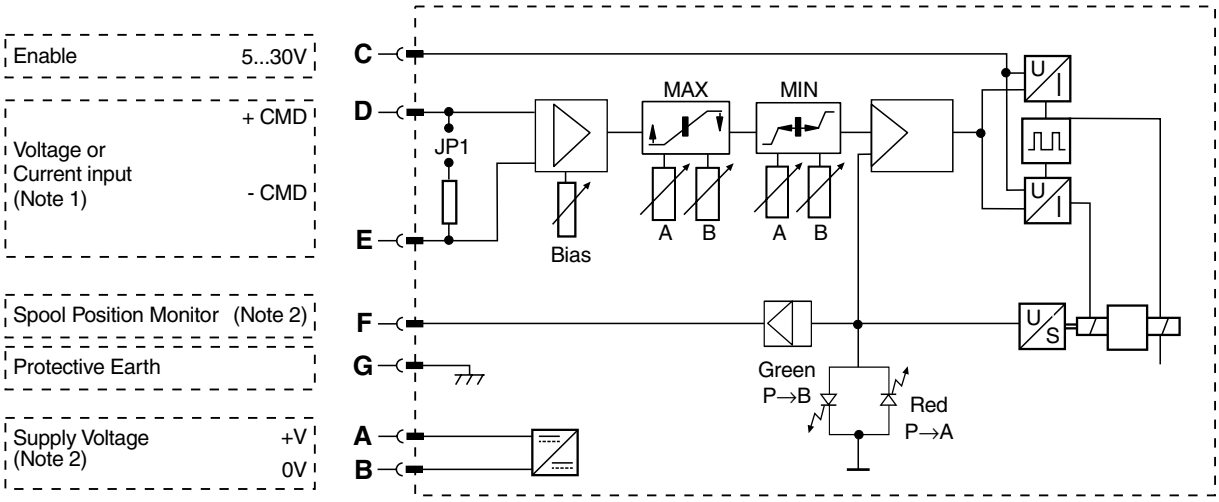
Refer to the Installation Guide for set-up, configuration, and application guidelines (packaged with each valve).

D1FX: Installation Bulletin 2583-M1/USA
D3FX: Installation Bulletin 2587-M1/USA



Design 'B' Option — Industrial Standard 7-Pin MS Connector Interface

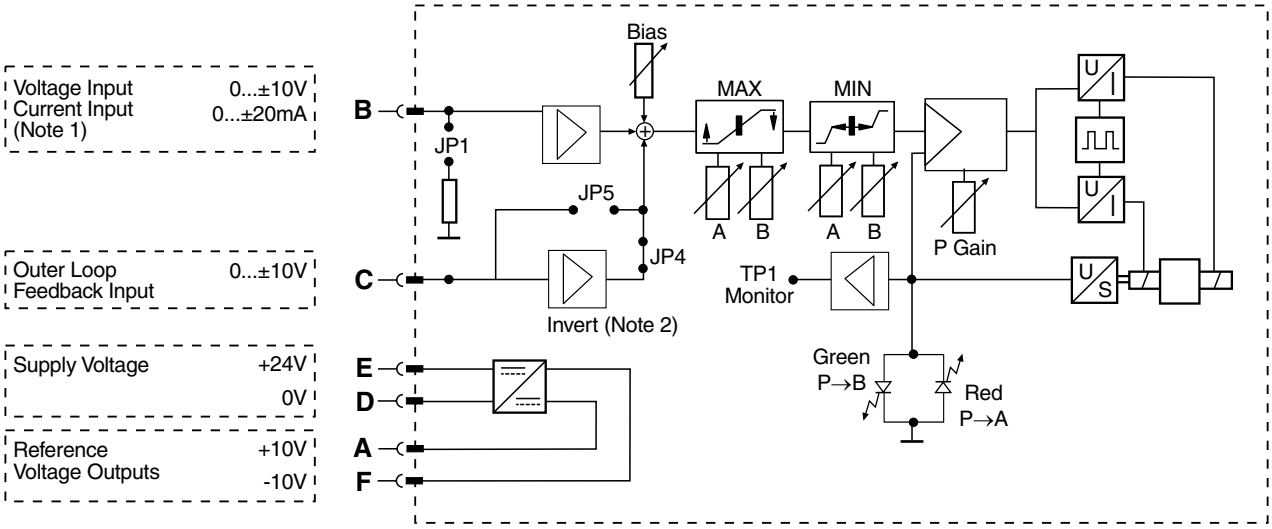
Electronic design option 'B' implements the industrial standard 7-pin MS connector interface. The design provides a differential command input that is user configurable as voltage or current, an external valve enable feature, and a spool position monitor output. To specify this option, refer to the Ordering Information page, Electronic Design block.



Note 1: Install jumper JP1 for current command input. Refer to Installation Bulletin 2583-M1/USA (D1FX).
Note 2: Refer to specifications.

Design 'C' Option — User Configurable Analog Outer Closed Loop

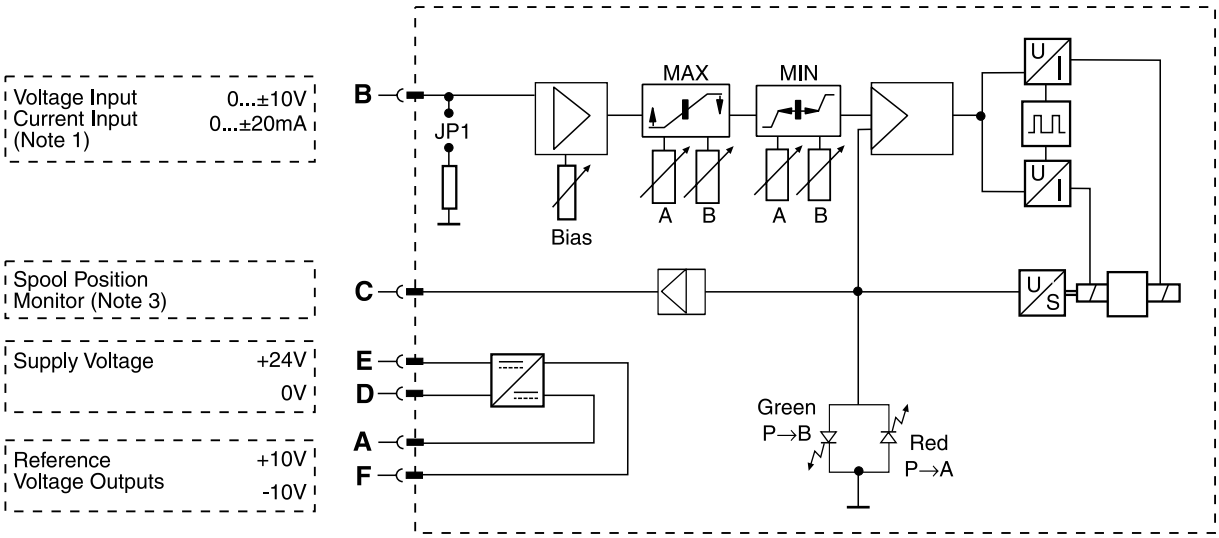
Electronic design option 'C' provides an additional analog closed outer loop function for user application. This feature can be used to control simple position control loops where analog resolution and a single proportional gain control are adequate. The design provides a single ended command input that is user configurable as voltage or current, and an outer loop feedback sensor voltage input. ±10 volt outputs are available to reference the outer loop feedback sensor if required. To specify this option, refer to the Ordering Information page, Electronic Design block.



Note 1: Install jumper JP1 for current command input. Refer to Installation Bulletin 2583-M1/USA (D1FX).
Note 2: Install jumper JP4 to invert user outer loop feedback input signal.

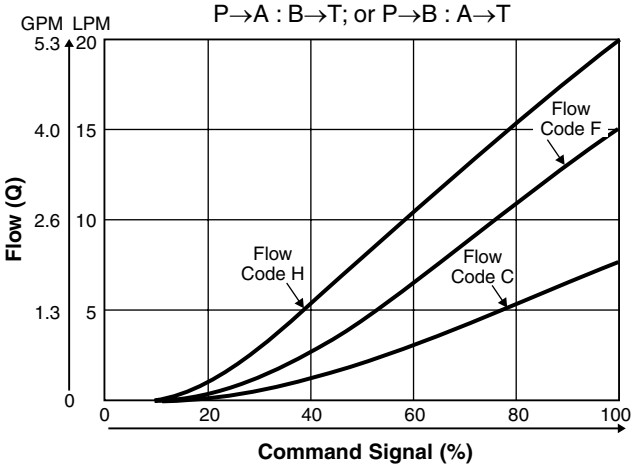
Design 'D' Option — Single Ended, Bipolar Command Input, with ± Volt Reference Output

Electronic design option 'D' provides a single ended, bipolar command input that is user configurable as voltage or current. ±10 volt references are available for user supplied off-board command potentiometers. A spool position monitor output is also provided. To specify this option, refer to the Ordering Information page, Electronic Design block.

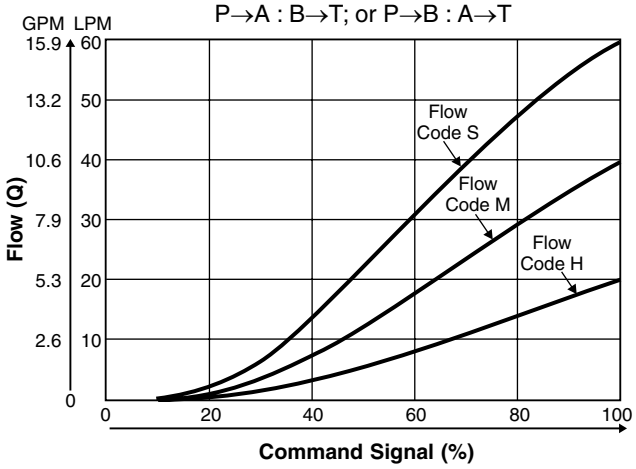


Note 1: Install jumper JP1 for current command input. Refer to Installation Bulletin 2583-M1/USA (D1FX).
Note 2: Refer to specifications.

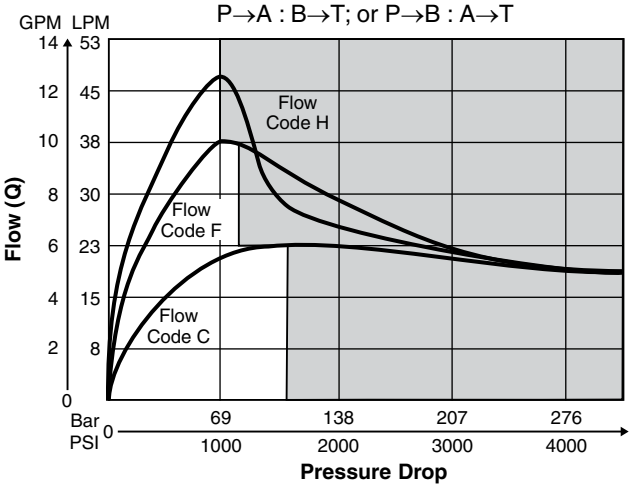
D1FX Flow Characteristics
at Δp = 5 Bar (72.5 PSI) per metering edge
P→A : B→T; or P→B : A→T



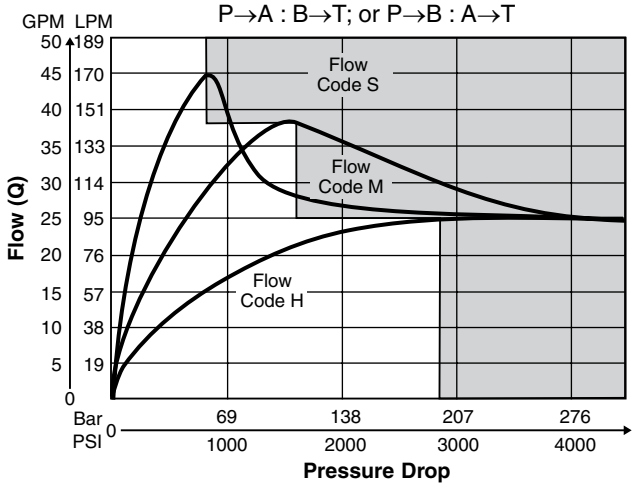
D3FX Flow Characteristics
at Δp = 5 Bar (72.5 PSI) per metering edge
P→A : B→T; or P→B : A→T



D1FX Operating Limits [1]
at 100% Command
P→A : B→T; or P→B : A→T

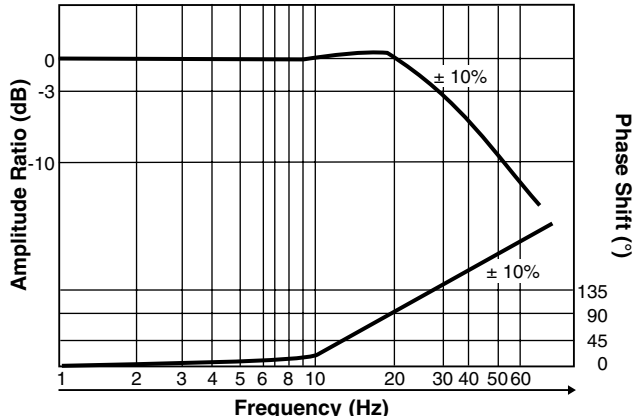


D3FX Operating Limits [1]
at 100% Command
P→A : B→T; or P→B : A→T

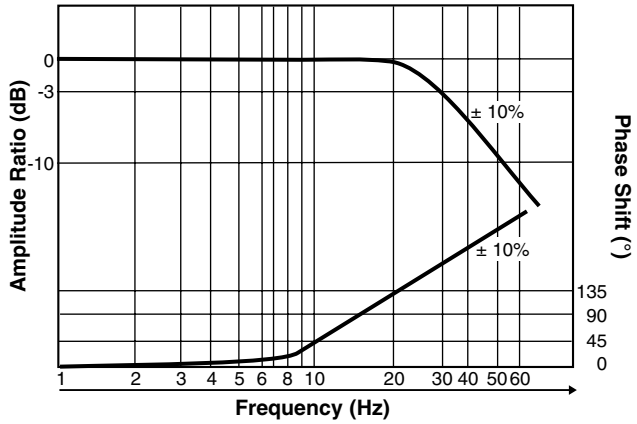


[1] Shaded area: Actual flow subject to the system load dynamics
Note: 81 and 82 spools - decrease limits by 15%

D1FX Frequency Response
at 10% Command, 50% Offset

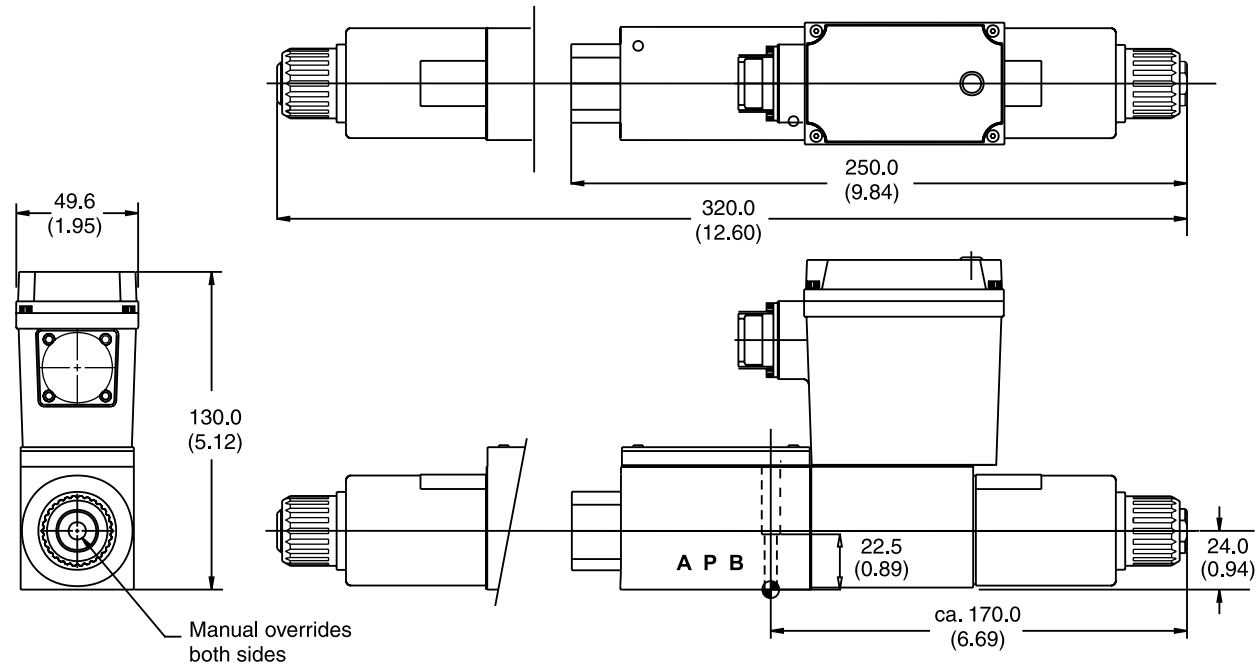


D3FX Frequency Response
at 10% Command, 50% Offset



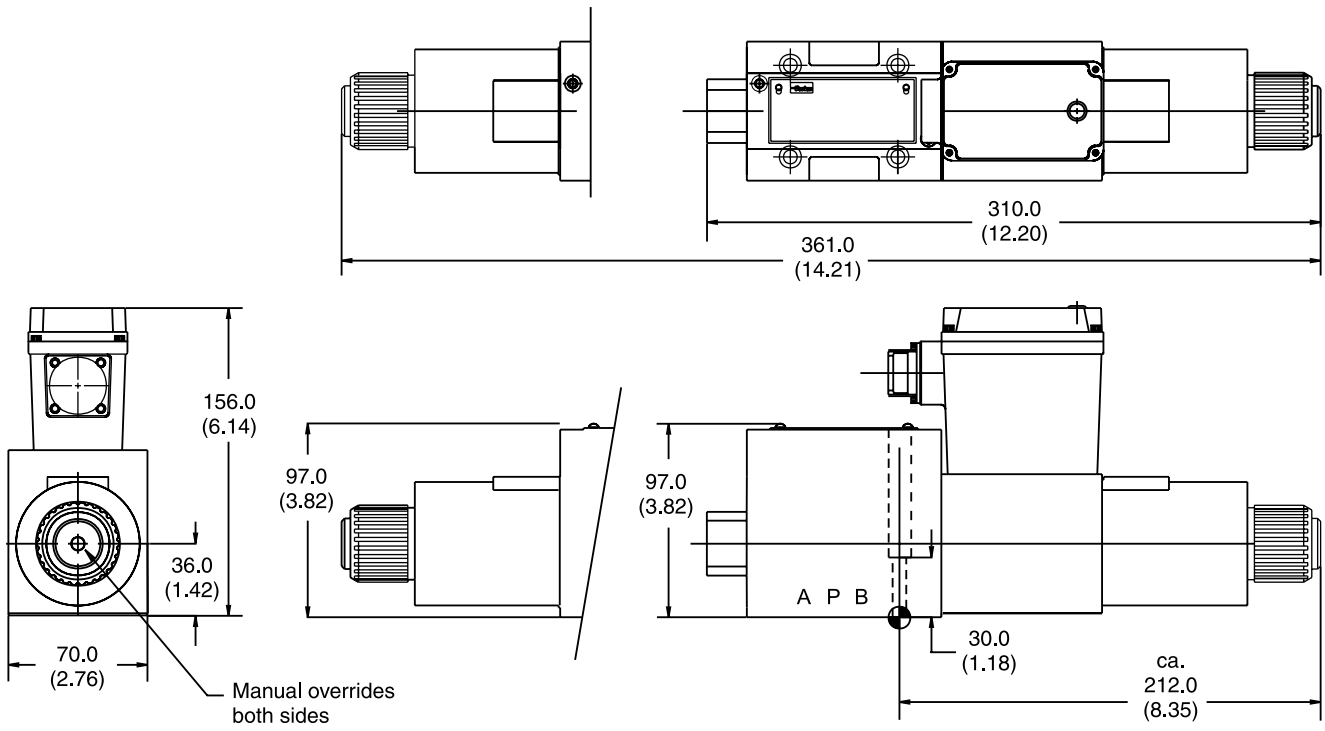
D1FX

Inch equivalents for millimeter dimensions are shown in (**)



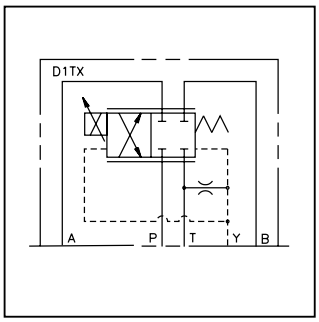
D3FX

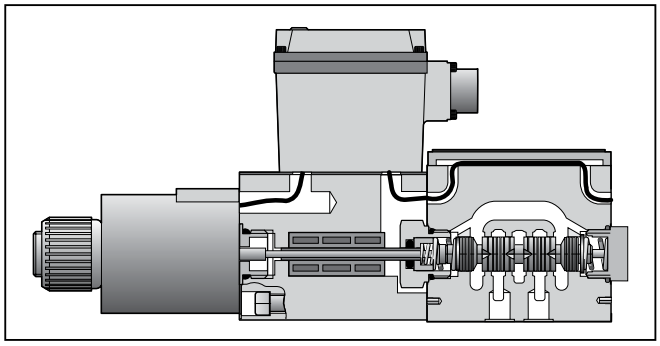
Inch equivalents for millimeter dimensions are shown in (**)



General Description

The D1TX throttle valve is designed to vary the amount of fluid flow in proportion to a variable input command signal. The valve will respond to voltage command signals of 0 to +10 VDC, or current command signals of 4-20 mA. The valve features on-board electronics and built-in spool position feedback for low hysteresis.





Operation

A minimum of 20 PSI must be maintained on the “Y or L” ports for proper operation. An external supply of 20 PSI or a 20 PSI check valve may be used for this purpose.

To simplify piping of the valve for the maximum flow output, order our flow conversion module, FCB03** which has the 20 PSI check valve already installed. This module converts all of the flow paths internally. Connect the “P” for supply pressure, “B” for outlet flow, and “Y or L” for drain line flow.

Features

- **Integral Electronics** — Eliminates the time consuming and often costly wiring between the valve and driver card. Provides a fully tested valve/driver package.
- **LVDT** — The spool position feedback provides low hysteresis.
- **Manual Override**
- **Diagnostic Indicator** — An LED confirms movement of the spool.
- **Rugged Construction** — Integral electronics are packaged in a rugged die cast aluminum enclosure to protect it from harsh environments.
- **Electrical Interface** — Standard MS style connector for interface to computers and PLC's.

Specifications

Interface	NFPA D03, CETOP 3
Maximum Pressure	207 Bar (3000 PSI)
Drain Line Pressure ("T" and "Y" or "L")	1.4 Bar (20 PSI) minimum 35 Bar (500 PSI) maximum
Flow	Up to 61 LPM (16 GPM) (Dual Ported)
Frequency Response	> 20 Hz with 10% CMD at 50% spool stroke
Step Response	Versions BJ, DJ: Full Shift, <60 mS Version DK: Full Shift, <70 mS
Repeatability	< 0.5% of spool stroke
Hysteresis	< 1.5%
Nominal Deadband	10%
Power Requirements	24 VDC @ 3 amps nom.** (BJ, DJ) Range 21 to 30 VDC regulated 12 VDC @ 3 amps nom. (DK)** Range 11.5 to 15 VDC regulated ****4 amp regulated power supply recommended**

Version	Command Signal	Input Impedance
BJ, DJ	0 to + 10 VDC Sgl. Coil	100 k ohms
DK	0 to + 5 VDC Sgl. Coil	100 k ohms
BJ, DJ	4 to 20 mA Command	499 ohms
DK	4 to 20 mA Command	249 ohms

Operating Temp. Range (Ambient)	24 volt model: -20° to 60°C (-4° to 140°F) 12 volt model: -29° to 60°C (-20° to 140°F)
Spool Position Voltage	Version BJ, DJ: (-10 VDC) Version DK: (-5 VDC)
Reference Supply	+10 VDC @ 10 mA (BJ, DJ) +5 VDC @ 10 mA (DK)
Low Power Fault Protection	20 VDC (BJ, DJ) 11 VDC (DK)
Diagnostics	Red LED for spool position
Viscosity Range	75 - 600 SSU
Fluid Cleanliness	ISO Class 16/13, SAE Class 4 or better
Protection Class	Nema 4 (IP65)

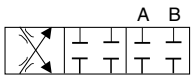
D1T	X	E	01		E	9				0	0	
D03 Electrohydraulic Directional Flow Control Valve	Control Option	Equal Metering	Spool Type	Flow	Style	External Drain	Seal	Electronic Variations	Supply Voltage	Electronic Accessories	Valve Accessories	Design Series

NOTE: Not required when ordering

Control Option

Code	Description
X	Integral LVDT & Control Electronics

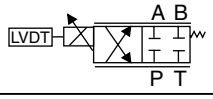
Spool Type

Code	Spool
01	

Flow

Code	Flow @ ΔP = 5 Bar (72.5 PSI) per metering edge
C	15 LPM (4.0 GPM)
F	30 LPM (7.9 GPM)

Style

Code	Description	Style
E	Uni-Directional	

External Drain

Code	Description
N	Nitrile
V	Fluorocarbon

Seal

Code	Description
B	Euro Driver (7 pin MS) w/external shutdown
D	Standard Driver w/deadband eliminator & 6 pin MS

Electronic Variations

Supply Voltage

Code	Description
J	24 VDC
*K	12 VDC

* Only available in version 'D'

Electronic Accessories

Valve Accessories

Design Series

Bolt Kit:
BK209 (4) 10-24x1.25 SHCS

Weight:
Single Solenoid 3.2 kg (7.0 lbs.)

FCB	03		
Flow Conversion Block	Size	Subplate Drain Port	Seal

Size

Code	Description
03	D03

Subplate Drain Port

Code	Description
Y	"Y" Drain Port (standard)
L	"L" Drain Port (optional)

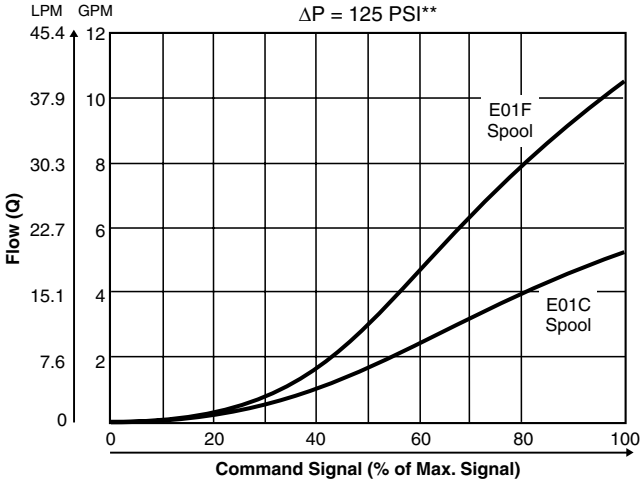
Seal

Code	Description
N	Nitrile
V	Fluorocarbon

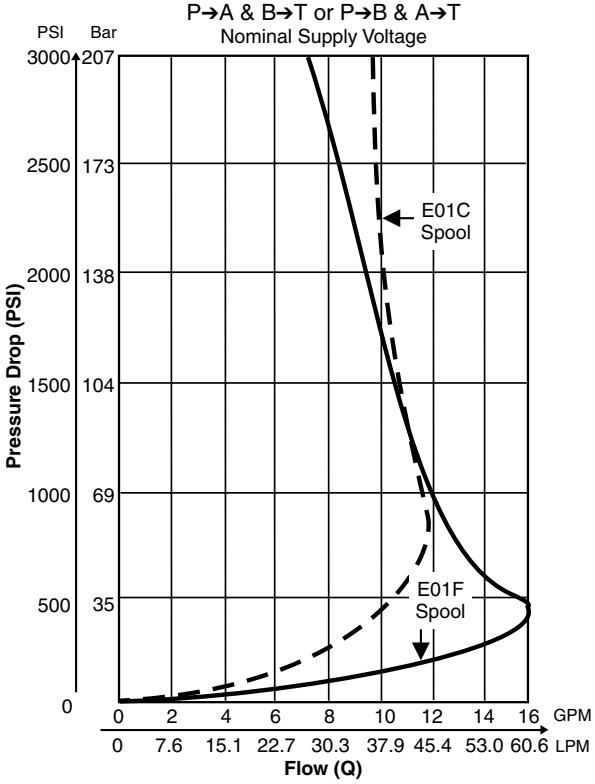
Use Bolt Kit BK243 when including the FCB under the D1TX.

Performance Curves

Flow vs. Input Command
Parallel Flow Path Connected*
ΔP = 125 PSI**



Operating Limits
Max. Pressure Drop/Flow Envelope at 100% Command Signal
Parallel Flow Path*
P→A & B→T or P→B & A→T
Nominal Supply Voltage

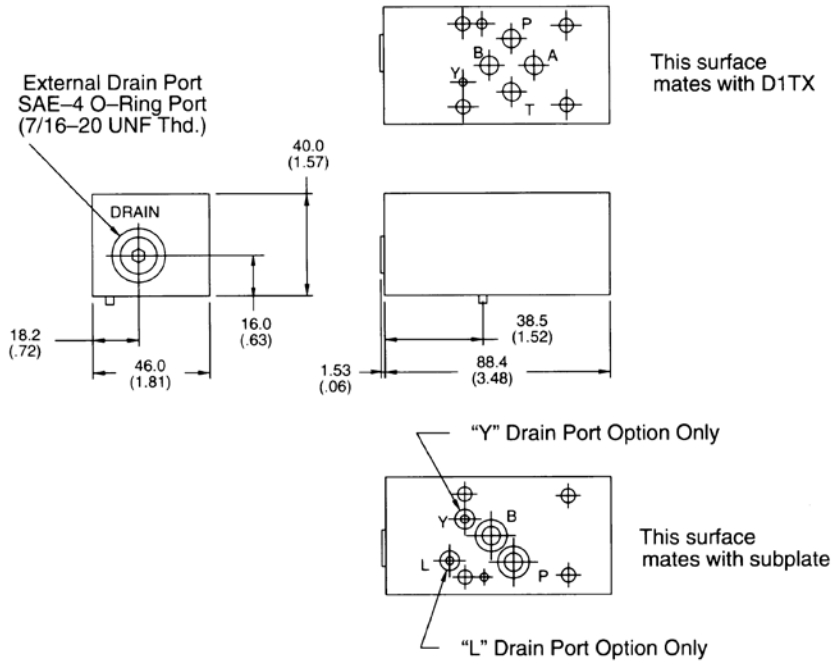


* Requires Flow Conversion Block FCB**

** Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

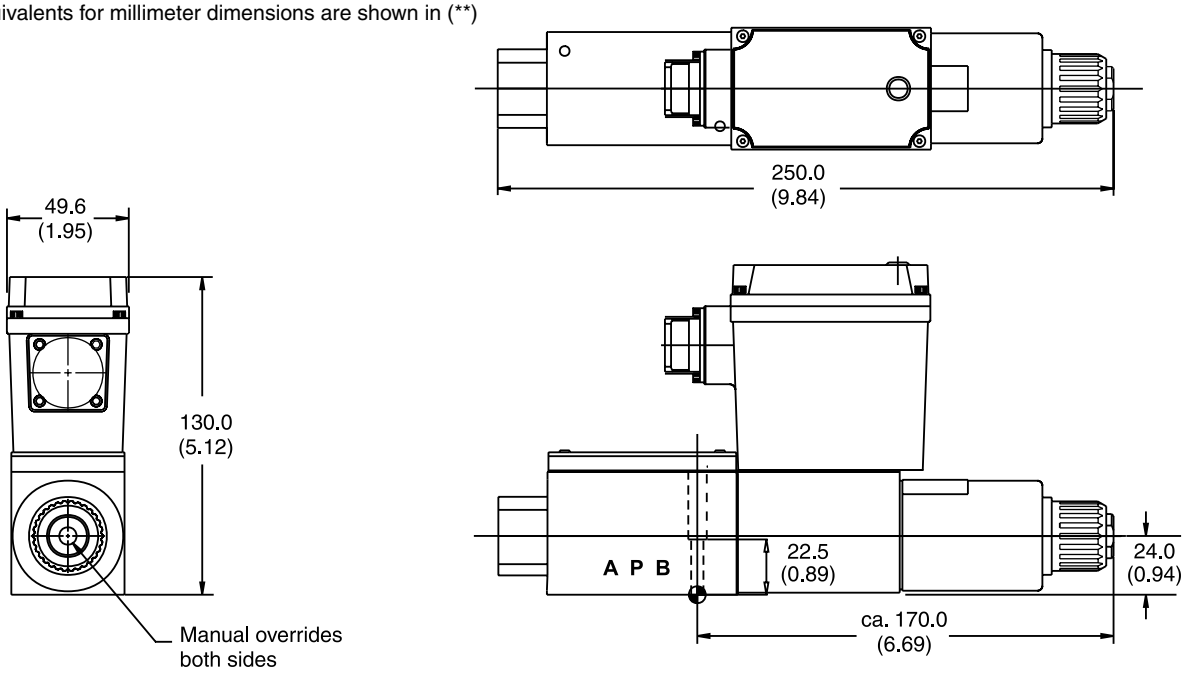
Flow Conversion Block FCB03

Inch equivalents for millimeter dimensions are shown in (**)



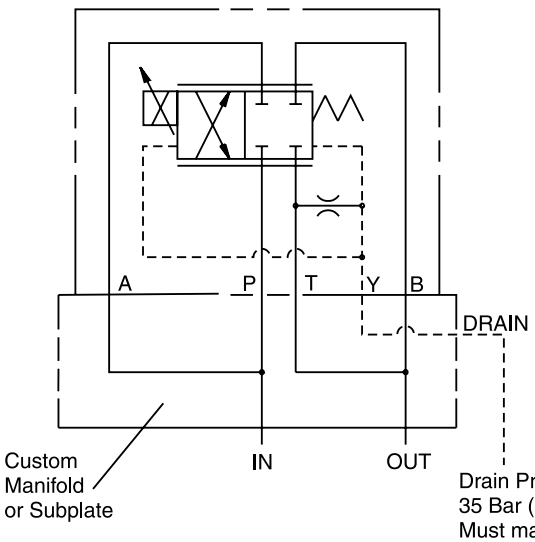
Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

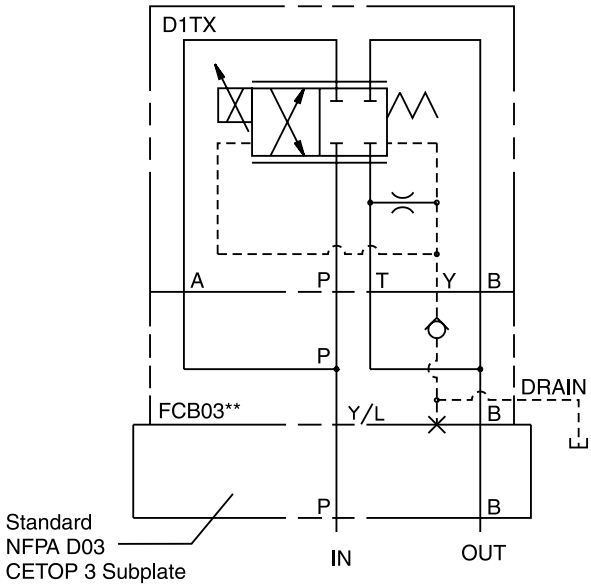


Hydraulic Connections

Parallel Flow Hydraulic Connections for D1TX Valve



Parallel Flow Hydraulic Connections for D1TX Valve with Flow Conversion Block



Mounting Surface

Surface must be flat within 0.10 (.0004) T.I.R. and smooth within 32 micro-inch.

Torque bolts to 5.6 N.m. (50 in.-lbs.)

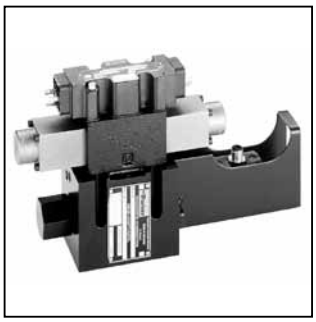
COMBINATION	Required Ports					
	P	A	B	T	Y	L
D1TX valve alone	✓	✓	✓	✓	✓	
D1TX w/FCB03Y	✓		✓		✓*	
D1TX w/FCB03L	✓		✓			✓*

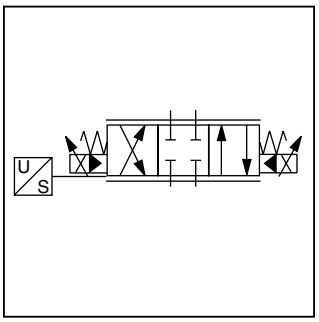
*Y & L port not required if external drain port (SAE-4) is used.

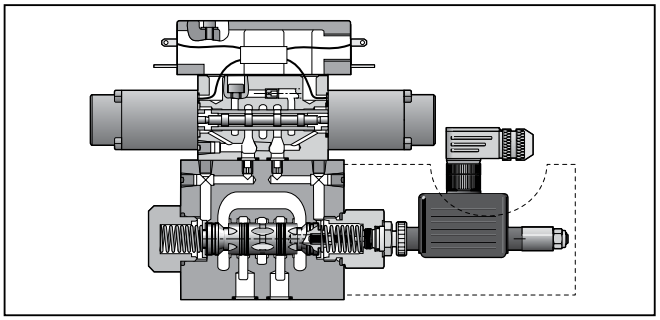
General Description

Series D*1FS proportional directional control valves are high performance, two stage pilot operated solenoid valves with electronic spool position feedback. Valves are controlled by 'PWD' Series DIN electronics. Valves are available in sizes NG10 (CETOP 5), NG16 (CETOP 7), NG25 (CETOP 8) and NG32 (CETOP 10).

D*1FS valve performance is characterized by high resolution flow control, repeatability and good dynamic performance. Typical applications include precise and reproducible control of actuator speed in rapid / slow speed profiling, and smooth acceleration and deceleration performance.

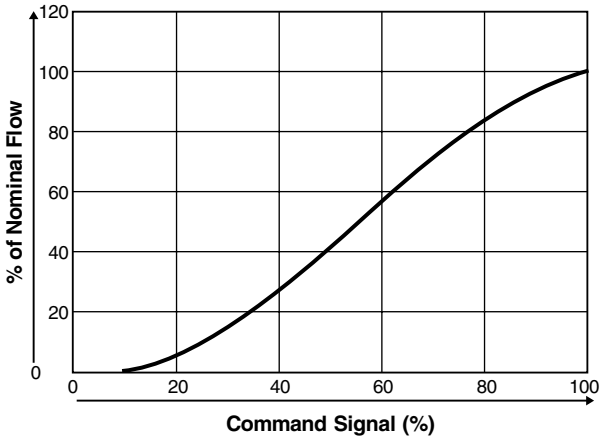






Performance Curve

Flow Characteristics
at 5 Bar (72.5 PSI) per metering edge
Typical flow curve



Features

- Standard DIN/ISO/CETOP/NFPA interfaces.
- Spool position feedback.
- High Frequency response.
- Spring centered main stage spool.
- LED functional diagnostic indicator.
- Wide selection of spool options, and flow capacity.
- 2:1 ratio, and Regeneration spool options.

Specifications

Interface DIN	**NG10 (CETOP 5)**	**NG16 (CETOP 7)**	**NG25 (CETOP 8)**	**NG32 (CETOP 10)**
Flow Rating @10 Bar (150 PSI) Δp (P→A, B→T) LPM (GPM)	45 (12)	120 (32)	300/400 (79/106)	1000 (264)
Maximum Flow	389@ 1500 PSID	1208@ 2700 PSID	193@ 1500 PSID	
Step Response (time to reach 90% of a 100% step command) ms	35	60	80	200

Repeatability	%	<0.5		
Hysteresis	%	<0.5		
Pilot Flow Continuous	LPM (GPM)	<1.2 (0.3)		
Operating Pressure				
Port P, A, B	Bar (PSI)	345 (5000) max.		
Port P, internal pilot		20 (290) min.		
Port T, internal drain		10 (150) max.		
Port T, external drain		345 (5000) max.		
Port Y, pilot drain		10 (150) max.		
Port X, external pilot		20-345 (290-5000)		
Fluid Viscosity, Recommended		80 – 1000 SSU		

Fluid Cleanliness Level	ISO Class 16/13
Fluid Temperature, Recommended	0°C to +60°C (+32°F to +140°F)
Ambient Operating Temperature	-20°C to +60°C (-4°F to +140°F)
Electronic Driver Boards (refer to electronics section)	PWD Series Drivers
Mating Connector Solenoid (DIN 43650)	Part #692914 (black) Part #692915 (gray)
LVDT (M12, 5 pin)	included w/valve
Environmental Protection Class	NEMA 1 (IP54)

D		1	F	S							W		
Directional Control Valve	Size	Pilot Operated	Flow Control	With Spool Position Feedback	Spool Type	Flow	Pilot Connection	Seal	Solenoid Voltage	Solenoid Connection	Valve Accessories	Design Series

NOTE: Not required when ordering.

Code	Description
3	NG10/CETOP 5
4	NG16/CETOP 7
8	NG25/CETOP 8
9[1)]	NG25/CETOP 8
11	NG32/CETOP 10

[1)] with enlarged ∅ 32mm ports

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
W	Socket connector DIN 43650 without plugs

Code	Pilot	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

Code	Description
L	6 VDC
X*	16 VDC

* For use with "EW" driver card

Code	Description
0	Std., no accessories
2	Pilot pressure reducer

V-Notch Spool Options - Spool Type and Flow Codes

Code $Q_A=Q_B$	Code $Q_A>Q_B$ [2)]	Spool Type
E01	B31	
E02	B32	

2) Reduced flow rate on port B, nominal flow at port A

Code A* for spool $Q_B > Q_A$ optional

Code	Flow: LPM (GPM) at ∆p 5 Bar (72.5 PSI) per metering edge				
	D31	D41	D81	D91	D111
B	45 (12)	–	–	–	–
C	–	120 (32)	–	–	–
E	–	–	300 (79)	–	–
H	–	–	–	400 (106)	–
L	–	–	–	–	1000 (264)

Weight:

D31FS	7.1 kg (15.7 lbs.)
D41FS	10.8 kg (23.8 lbs.)
D81/91FS	19.0 kg (41.9 lbs.)

Accessories

Refer to the Accessories section for bolt kits, subplates, connectors.

Driver Cards

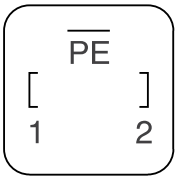
Refer to the Electronics section for driver cards and support electronics.

Mounting Interface

Refer to Mounting Interface Dimensions in the Proportional Directional Valve Section of this catalog.

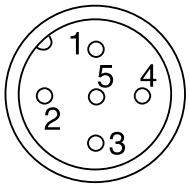
Wiring

Solenoid Coil



1 = coil connection
2 = coil connection
PE = ground potential

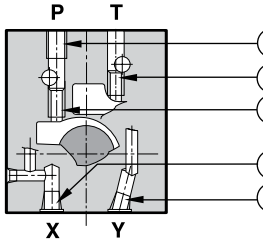
Spool position sensor (LVDT)



1 = output, spool position
2 = supply (+24V)
3 = GND (0V)
4 = not used
5 = protective ground

Pilot Connection

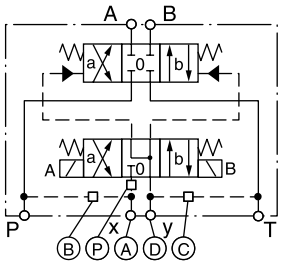
D31FS



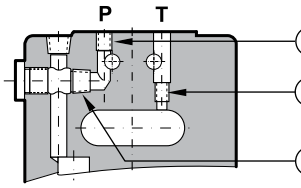
P M6 DIN906
C M6 DIN906
B M6 DIN906
A 1/16 NPTF
D 1/16 NPTF

○ open, ● closed

Pilot oil Inlet	Pilot oil Drain	A	B	C	D
internal	external	●	○	●	○
external	external	○	●	●	○
internal	internal	●	○	○	●
external	internal	○	●	○	●



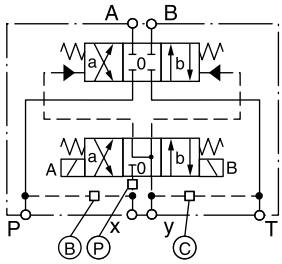
D41FS



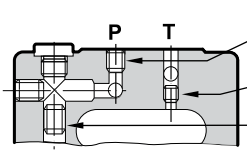
P M6 DIN906
C M6 DIN906
B 1/16 NPTF

○ open, ● closed

Pilot oil Inlet	Pilot oil Drain	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



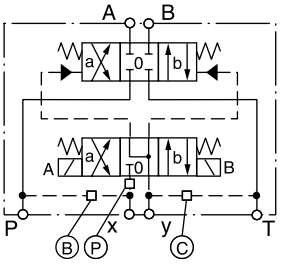
D91FS



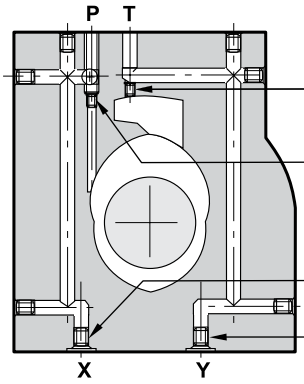
P M6 DIN906
C M6 DIN906
B 1/16 NPTF

○ open, ● closed

Pilot oil Inlet	Pilot oil Drain	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



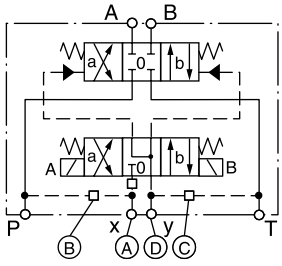
D111FS



C 1/16 NPTF
B 1/16 NPTF
A 1/8 NPTF
D 1/8 NPTF

○ open, ● closed

Pilot oil Inlet	Pilot oil Drain	A	B	C	D
internal	external	●	○	●	○
external	external	○	●	●	○
internal	internal	●	○	○	●
external	internal	○	●	○	●



D_1FS.indd, ddp

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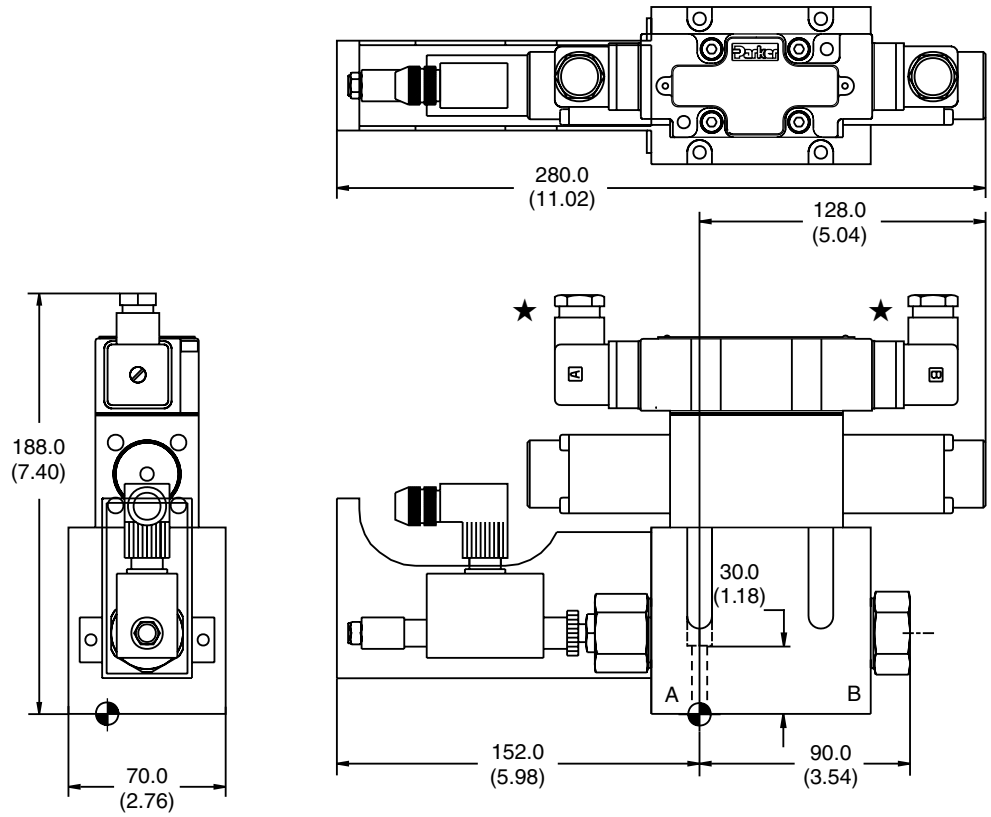
D31FS

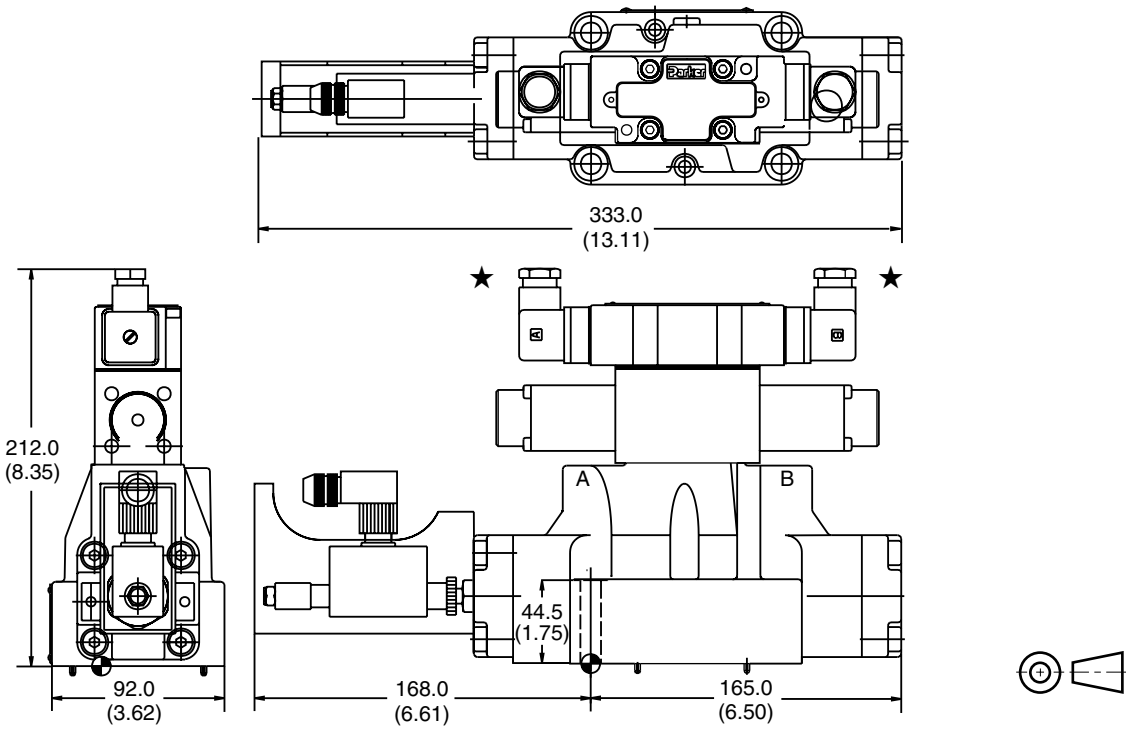
Inch equivalents for millimeter dimensions are shown in (**)



★ Order plugs separately.

D41FS

Inch equivalents for millimeter dimensions are shown in (**)



D_1FS.indd, ddp

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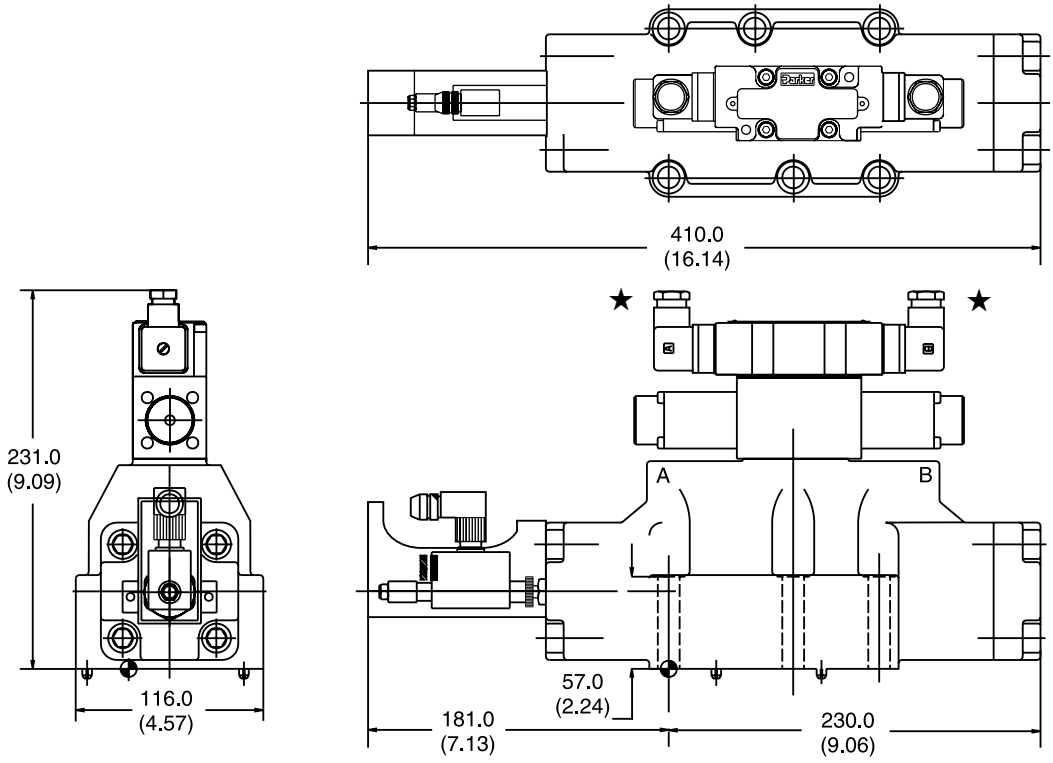
Hydraulic Valve Division
Elyria, Ohio, USA

D81FS and D91FS

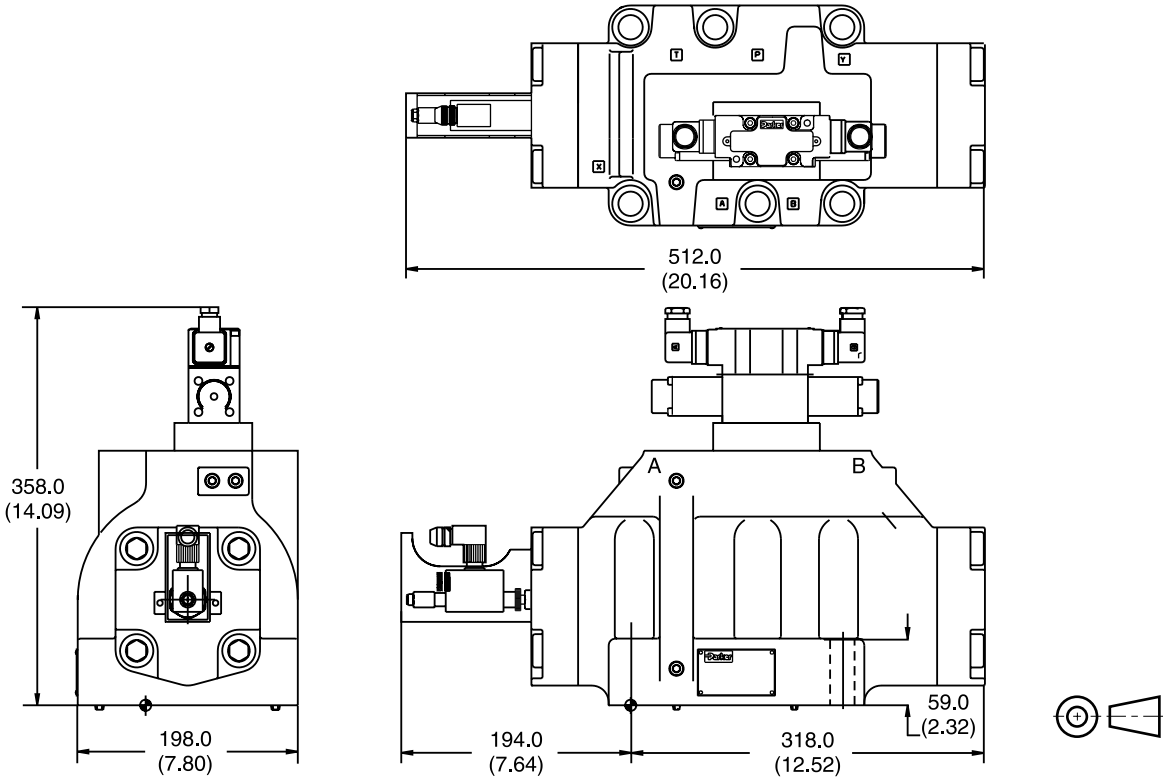
Inch equivalents for millimeter dimensions are shown in (**)



★ Order plugs separately.

D111FS

Inch equivalents for millimeter dimensions are shown in (**)



General Description

Series D*FH is a high response, proportional servo-valve with an on-board drive amplifier. The D*FM is a high response, direct actuated servovalve with high resolution around low command inputs. The D*FM is designed for more precise control of position loops, force loops, and machine tool feed rates.

Series D*FH and D*FM incorporate the use of state-of-the-art drive electronics with an LVDT for continuous monitoring of the spool position. Zero lap spools are standard for closed loop applications with two different 'power down' configurations. The valves feature frequency response levels greater than 100 Hz for D1FH and D1FM, and 45 Hz for D3FH and D3FM, along with low hysteresis and excellent repeatability.

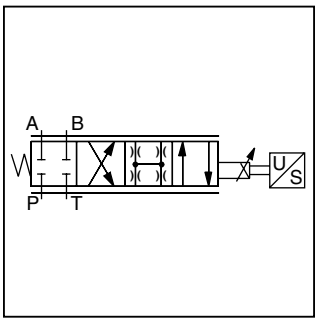
Operation

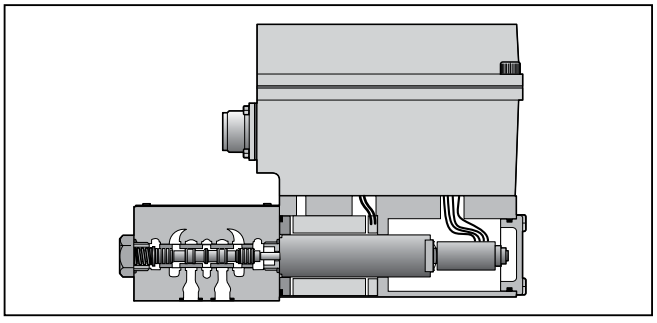
Series D*FH

Series D*FH valve uses a precision lapped spool and sleeve configured with four control positions. During normal operation, the valve will shift from the center position to either side providing flow out the 'A' or 'B' port. When the drive amplifier is disabled by either removing the enable or loss of electrical power, the valve will shift through P→B in less than 10ms to a fourth position. The fourth position will block all four ports in one version. A second version that is available will block the 'P' port and allow the 'A' and 'B' ports to bleed to the 'T' (tank line). (Refer to the "Flow With No Enable" in Troubleshooting section)

Series D*FM

The high resolution Series D*FM adds hydraulic and electronic control compensation to the standard D*FH valve. This feature enhances the tuning and accuracy of systems utilizing high resolution feedback transducers and control compensation available in high performance motion controllers. The D*FM valve uses a precision lapped spool and sleeve configured with four control positions. The fourth position (disabled) is available in an all ports blocked configuration or 'A' and 'B' ports bleed to tank configuration.





Features

- **On-Board Electronic Drive Amplifier —** The unit is shipped as a factory preset and tested unit. (No adjustment is necessary)
- **High Frequency Response —** The valve has a very high frequency response which is necessary for many closed loop applications.
- **Four Position Spool Capability —** The four position spool provides predictable flow in the event of a power failure to the drive electronics, within the limits of the power curve.
- **315 Bar Pressure Capability —** The maximum operating pressure rating for the D*FH and D*FM is 315 Bar or 4500 PSI (Port P, A, B).
- **Spool Position Feedback —** The LVDT continuous feedback monitoring circuit provides low hysteresis and excellent repeatability.
- **Drive Enable Feature —** Output to the coil is shut down when the enable signal (10 to 30 VDC) is not present. The valve will then shift to the fourth position flow path selected by the user. (E50 or E80 spool)
- **High Resolution Around Null —** For precise control of critical position, force, or feed rates (D*FM Version only)
- **Cylinder Ratio Adjust —** To match following error on extend and retract. (D*FM Version only)

Note:
The tank line of either style valve must have a minimum pressure of 1.4 Bar (20 PSI). Maximum tank line pressure is 35 Bar (500 PSI).

D		F				C		B	J	0	0		
Directional Control Valve	Size	Flow Control	Style	Spool Type	Flow	Style	Seal	Electronic Variation	Supply Voltage	Electric Accessories	Valve Accessories	Design Series	Product Variation

NOTE: Not required when ordering.

Code	Description
1	NG6/CETOP 3
3	NG10/CETOP 5

Code	Description
J	24 VDC

Code	Description
B	Voltage Input 0 ... ±10 V (user configurable to 0 ... ± 20 mA)

Code	Description
H	High Response
M	High Response, Dual Gain

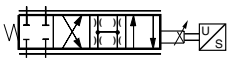
Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
C	Bi-directional, 4 way, with 4th position on power down

Code	Description
Omit	Standard (with enable)
X6262	Pin 'C' is 0V reference instead of an enable (for competitive interchange only). Valve enables with power. (note 4)

Note 4: **Do NOT apply an enable signal to Pin C.** Unlike many other valves with the same 7-pin connector, Pin C is not for an enable signal. Pin C is a 0V reference used for DMMs or scopes to monitor pin F. It is not a power supply common. Using it as a power supply common will damage the PC board.

Spool Type
Flow QA equal to flow QB

Code	Symbol
E50[1]	
E80[1]	
E53[2] (60/40)	
E83[2] (60/40)	
E84[2,3] (40/60)	

1) D1FH and D3FH only
2) D1FM only
3) D1FM*M flow code only
D3FM*Y flow code only

Flow
Code **at Δp 35 Bar (500 PSI) per metering edge**

Code	D1FH LPM (GPM)	D1FM LPM (GPM)	D3FH LPM (GPM)	D3FM LPM (GPM)
B	5 (1.3)	–	–	–
D	10 (2.6)	–	–	–
F	–	12 (3.2)	–	–
H	20 (5.3)	–	–	–
M	40 (10.6)	40 (10.6)	–	–
P	–	–	50 (13.2)	–
Y	–	–	100 (26.5)	100 (26.5)

Maximum supply pressure is 315 Bar (4500 PSI). This is the pressure drop across the load and the valve. For maximum pressure drop per land, refer to the table on page A111.

Weight:

D1F	3.7 kg (8.2 lbs.)
D3F	7.7 kg (17.0 lbs.)

Mounting Interface

Refer to the Mounting Interface Dimensions in the Proportional Directional Valve section of this catalog.

Accessories

Refer to the Accessories section for bolt kits, subplates, connectors and pre-assembled cable assemblies.

Specifications

	D1FH, D1FM	D3FH, D3FM
Interface	NFPA D03, CETOP 3, NG6	NFPA D05, CETOP 5, NG10
Flow Rating At 35 Bar DP (500 PSI) per metering edge	1) B spool 5 LPM (1.3 GPM) 1) D spool 10 LPM (2.6 GPM) 1) H spool 20 LPM (5.3 GPM) 1,2) M spool 40 LPM (10.6 GPM) 2) F spool 12 LPM (3.2 GPM)	1) P spool 50 LPM (13.2 GPM) 1,2) Y spool 100 LPM (26.4 GPM)
Frequency Response	> 100 Hz (-3 dB at 5% signal)	> 45Hz (-3 dB at 5% signal)
Step Response	< 12 ms at 100% signal	< 25 ms at 100% signal
Power Consumption	40 VA max (See voltage supply)	60 VA max (See voltage supply)

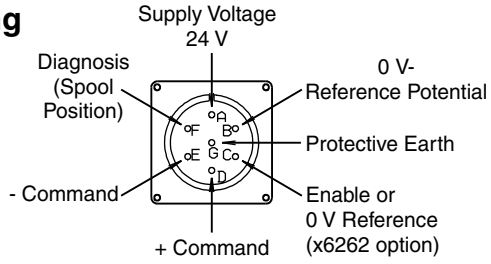
D1FH, D1FM, D3FH, D3FM			
Max. Operating Press. **Port P, A, B** **Port T**	315 Bar (4500 PSI) 35 Bar (500 PSI)	**Operating Temp. Range (Ambient)**	0 to 60° C (32 to 140° F)
Min. Tank Line Press.	1.4 Bar (20 PSI)	**Fluid Cleanliness Level**	ISO Class 15/12/10 (For longer life) ISO Class 16/14/11 (For normal operation)
Typical Spool Overlap	Zero Lap	**Voltage Supply**	24 VDC (21 VDC Min., 30 VDC Max.) Peak Current 4A (PSD24 power supply recommended)
Pressure Gain **% of Change/1%** **Change in Command**	1) Typical 40% 1) Minimum 25% 2) Typical 90%	**Command Signals**	± 10 VDC at 100 K ohm input impedance ± 20 mA at 499 ohm input impedance
Hysteresis	< 0.5%		
Repeatability	< 0.5%		
Viscosity Range	17 to 65 cSt / mm^2/s (79 to 301 SSU)		
Fluids	Mineral base hydraulic fluid	**Protection Class**	IP65, NEMA 4 (As factory sealed)

Note: 1) D*FH only 2) D*FM only

Maximum Flow and Pressure Differential

Spool Code		Flow Code						
		B	D	F	H	M	P	Y
E50	Max ΔP Per Land	100 Bar (1500 PSI)	100 Bar (1500 PSI)	60 Bar (850 PSI)	70 Bar (1000 PSI)	52 Bar (750 PSI)	70 Bar (1000 PSI)	50 Bar (725 PSI)
	Max Flow	8.3 LPM (2.2 GPM)	16.3 LPM (4.3 GPM)	9.7 LPM (5.2 GPM)	26.9 LPM (7.1 GPM)	46.2 LPM (12.2 GPM)	69.6 LPM (18.4 GPM)	121 LPM (32 GPM)
E80	Max ΔP Per Land	100 Bar (1500 PSI)	100 Bar (1500 PSI)	60 Bar (850 PSI)	70 Bar (1000 PSI)	52 Bar (750 PSI)	70 Bar (1000 PSI)	50 Bar (725 PSI)
	Max Flow	8.3 LPM (2.2 GPM)	16.3 LPM (4.3 GPM)	9.7 LPM (5.2 GPM)	26.9 LPM (7.1 GPM)	46.2 LPM (12.2 GPM)	69.6 LPM (18.4 GPM)	121 LPM (32 GPM)

Wiring

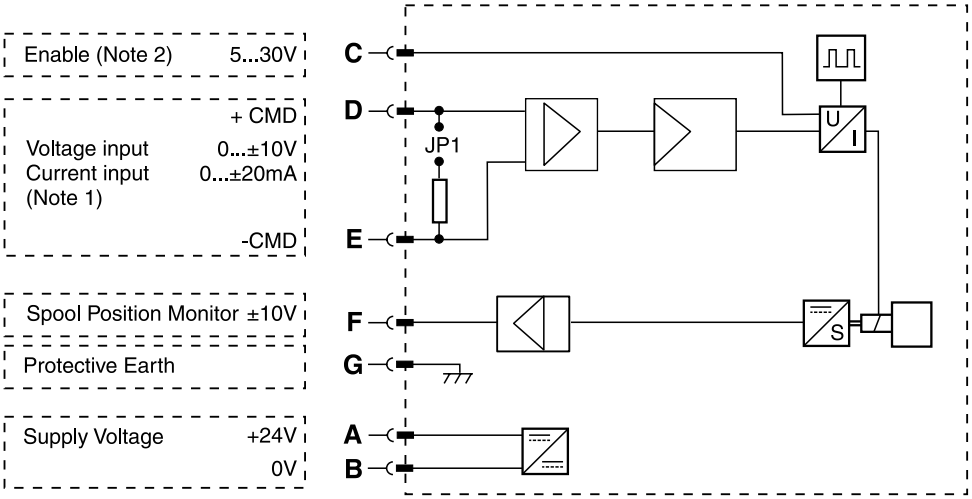


Installation Guidelines

Refer to the Installation Guide for set-up, configuration, and application guidelines (packaged with each valve).

D*FH and D*FM: Bul. HY14-2599-M1/US

Block Diagram

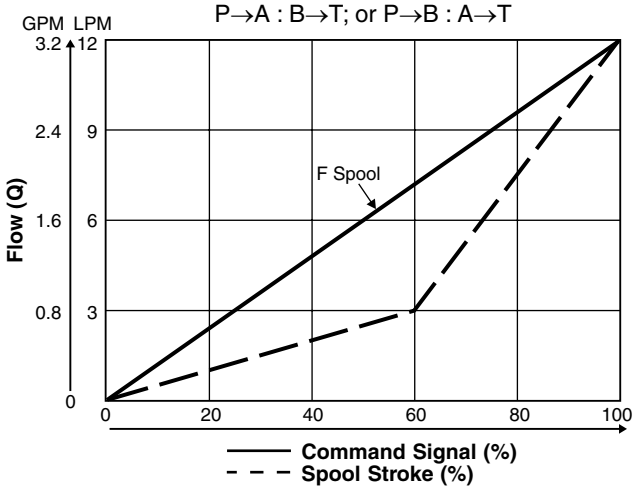


Note 1: Install jumper JP1 for current command input. Refer to installation guide Bul. HY14-2599-M1/US.
Note 2: Valves can be ordered with pin 'C' internally grounded to be interchangeable with some competitor products. Refer to Ordering Information page.

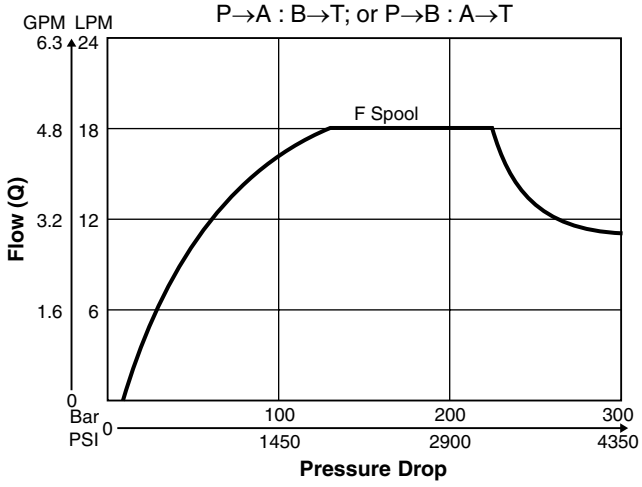
Performance Curves

D1FM series proportional valves are electronically compensated dual flow-gain valves. The command voltage/flow transfer function is linear while the actual spool stroke/flow gain is designed to provide very high resolution at low flows. The D1FM series proportional valves are particularly well suited for machine tool feed applications, or where very fine flow resolution is required while maintaining a rapid advance function in a single valve. The D1FM frequency response is the same as the D1FH; refer to the next page.

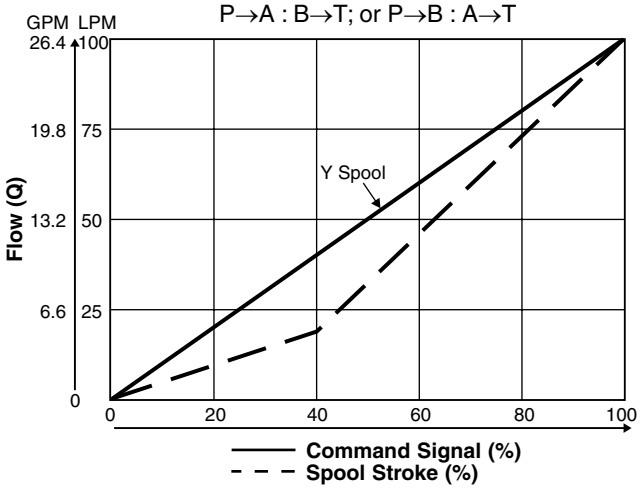
D1FM Flow Characteristics
at Δp = 35 Bar (500 PSI) per metering edge
P→A : B→T; or P→B : A→T



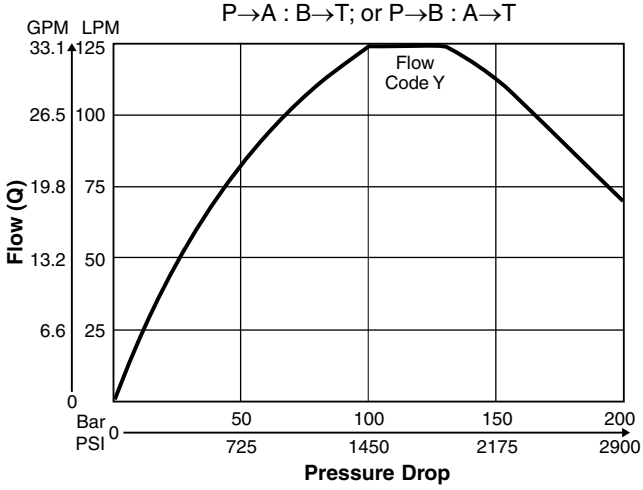
D1FM Operating Limits
at 100% Command
P→A : B→T; or P→B : A→T



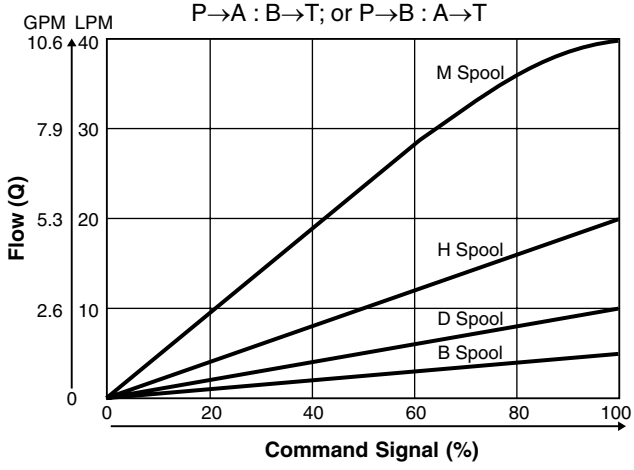
D3FM Flow Characteristics
at Δp = 35 Bar (500 PSI) per metering edge
P→A : B→T; or P→B : A→T



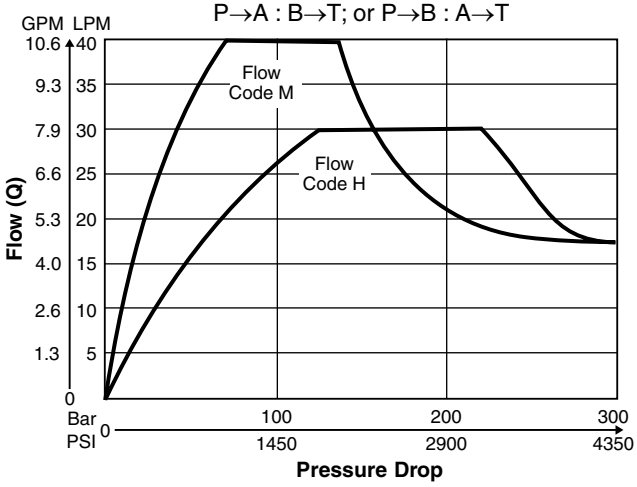
D3FM Operating Limits
at 100% Command
P→A : B→T; or P→B : A→T



D1FH Flow Characteristics
at Δp = 35 Bar (500 PSI) per metering edge
P→A : B→T; or P→B : A→T



D1FH Operating Limits
at 100% Command
P→A : B→T; or P→B : A→T



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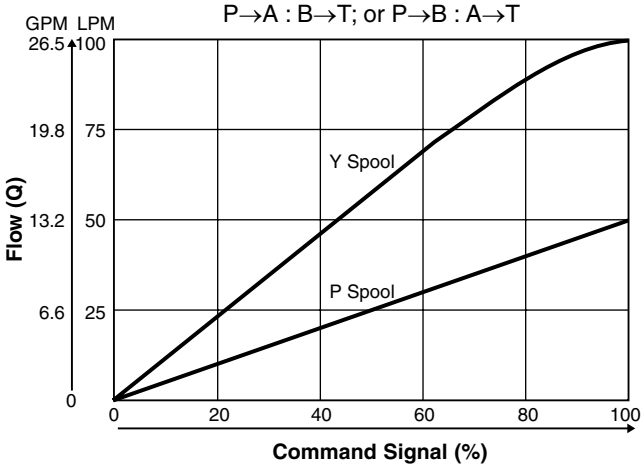
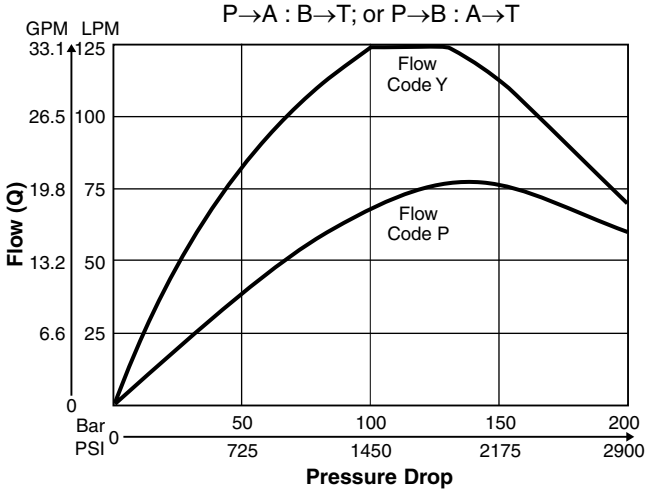
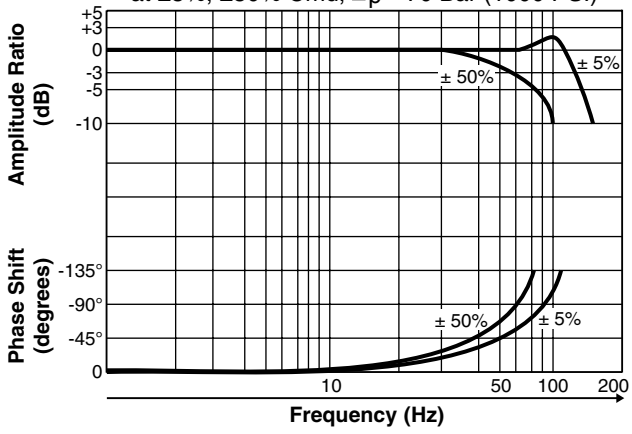
D3FH Flow Characteristics
at Δp = 35 Bar (500 PSI) per metering edge
P→A : B→T; or P→B : A→T



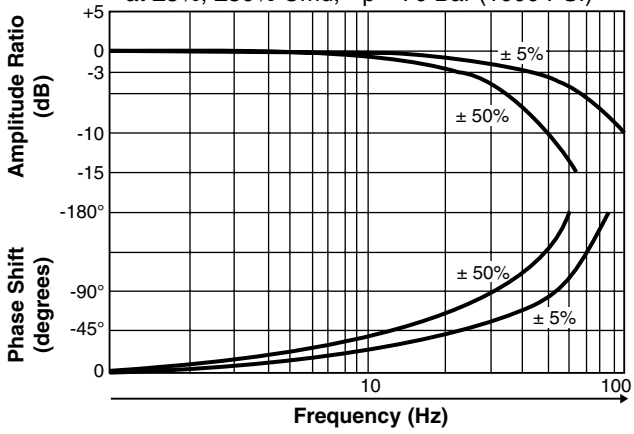
D3FH Operating Limits
at 100% Command
P→A : B→T; or P→B : A→T



D1FH and D1FM Frequency Response
at ±5%, ±50% Cmd, Δp = 70 Bar (1000 PSI)

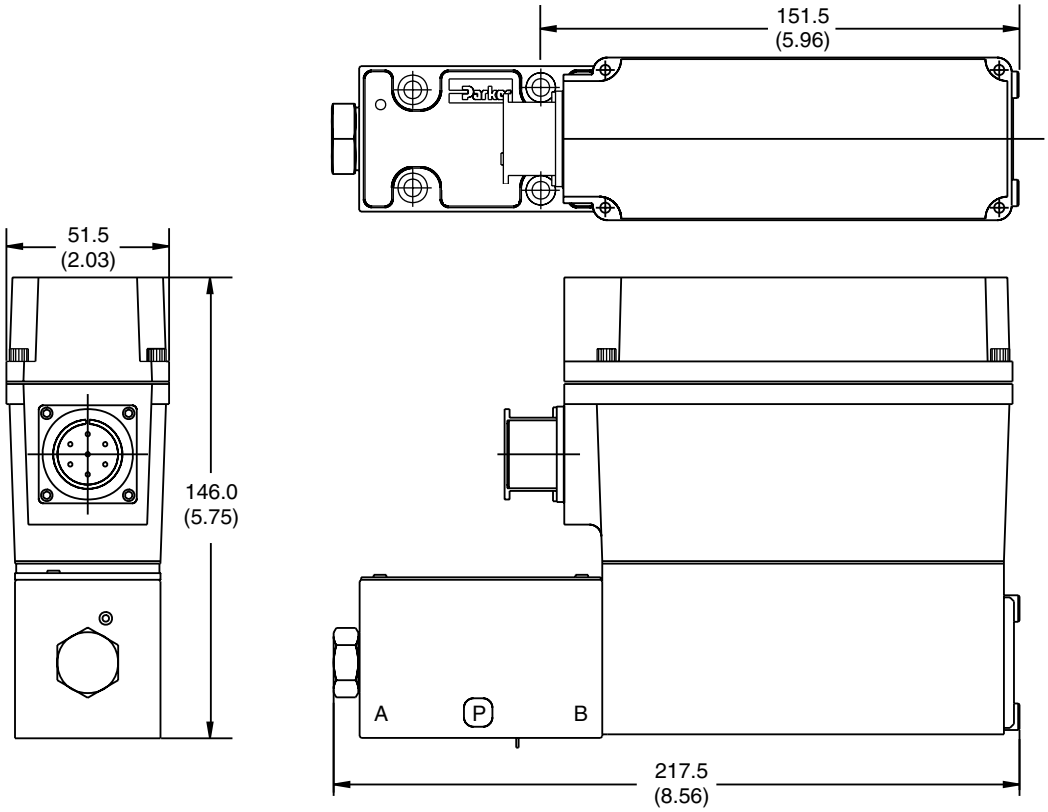


D3FH and D3FM Frequency Response
at ±5%, ±50% Cmd, Δp = 70 Bar (1000 PSI)



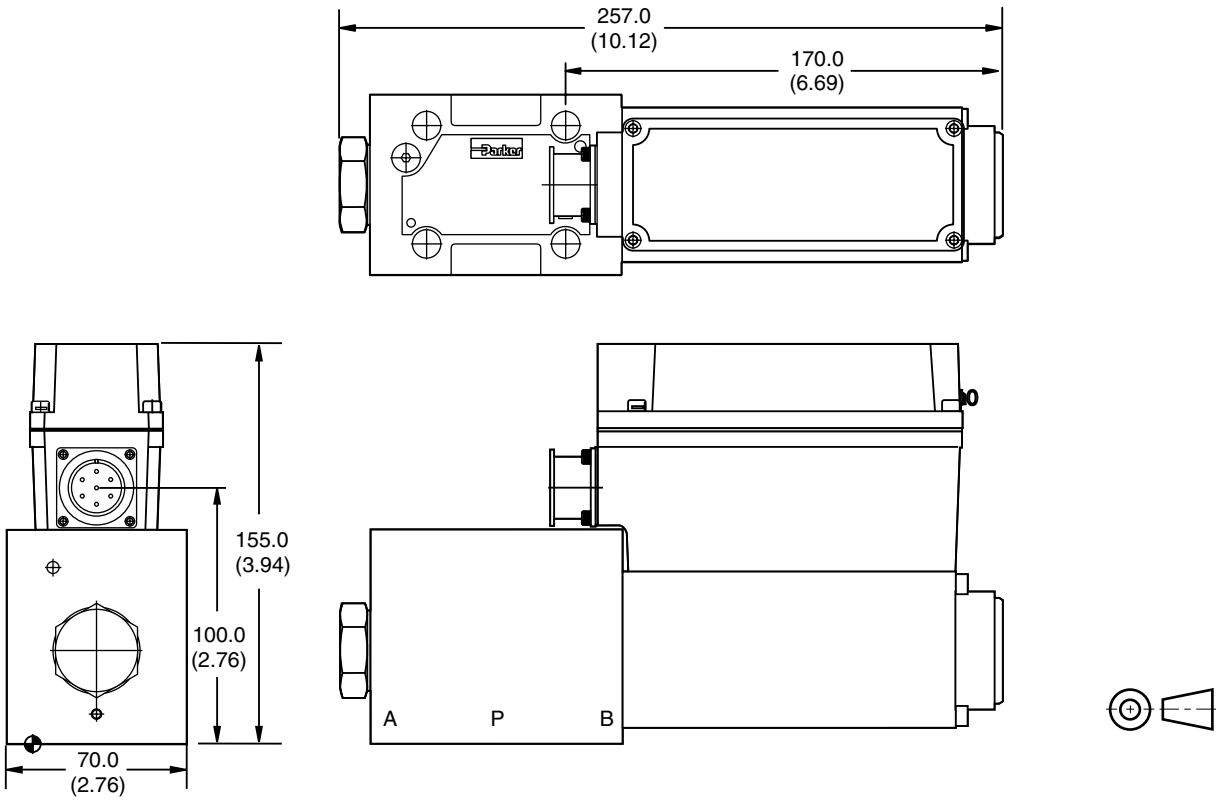
D1FH and D1FM

Inch equivalents for millimeter dimensions are shown in (**)



D3FH and D3FM

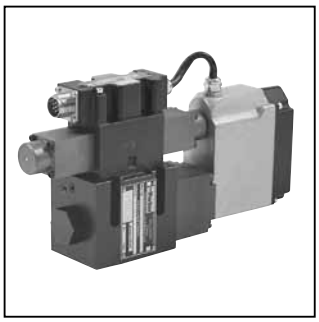
Inch equivalents for millimeter dimensions are shown in (**)

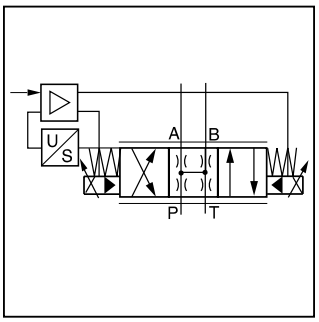


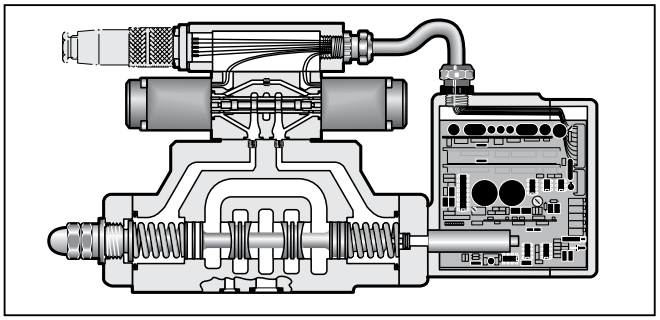
General Description

Series D*1FH proportional directional control valves are high performance, two stage pilot operated solenoid valves with electronic spool position feedback, and on-board integrated control electronics. Valves are available in sizes NG10 (CETOP 5), NG16 (CETOP 7), NG25 (CETOP 8) and NG32 (CETOP 10).

D*1FH valve performance is characterized by high resolution flow control, repeatability and high dynamic performance. Typical applications include precise and reproducible control of actuator speed in rapid/slow speed profiling, and smooth acceleration and deceleration performance. Zero lap spools are available for closed loop applications.







Features

- Standard DIN/ISO/CETOP/NFPA interfaces.
- Integrated valve electronics.
- Spool position feedback.
- High frequency response.
- Spring centered main stage spool.
- LED functional diagnostic indicator.
- Wide selecton of spool options, and flow capacity.
- 2:1 ratio spool options.

CE

Specifications

Use D*1FC for new applications

Interface DIN	**NG10 (CETOP 5)**	**NG16 (CETOP 7)**	**NG25 (CETOP 8)**	**NG32 (CETOP 10)**
Flow Rating @10 Bar (150 PSI) Δp (P→A, B→T) (spool options up to)[1] LPM (GPM)	80 (21)	240 (63)	400 (106)	1000 (264)
Pressure Gain (Zero Lap Spool) %	3.5	3.0	2.5	—
Maximum Flow (spool options up to)[1] LPM (GPM)	170 (45)	420 (111)	900 (238)	2000 (528)
Pilot Flow				
Continuous LPM (GPM)	<1.2 (0.3)	<1.2 (0.3)	<1.2 (0.3)	<1.2 (0.3)
Step Input LPM (GPM)	2 (0.5)	4 (1.1)	9 (2.4)	18 (4.8)
Step Response (time to reach 90% of a 100% step command) ms	25	45	65	150

Hysteresis %	<0.5
Repeatability %	<0.5
Operating Pressure	
Port P, A, B Bar (PSI)	345 (5000) max.
Port P, internal pilot	20 (290) min.
Port T, internal drain	10 (150) max.
Port T, external drain	345 (5000) max.
Port Y, pilot drain	10 (150) max.
Port X, external pilot	20-345 (290-5000)
Electrical Power Requirements	18 to 30 VDC, 2.2A
Command Signal (impedance) (select by ordering code)	0 ± 10 VDC (100K ohm) 0 ± 20 mA (500 ohm)
Command Polarity	Pin 'D' more positive than 'E' produces flow P to B

Mating Connector (order separately)	Part #5004072 (7-pin CE)
Fluid Cleanliness Level	ISO Class 16/13
Fluid Viscosity, Recommended	80 – 1000 SSU
Fluid Temperature, Recommended	0°C to +60°C (+32°F to +140°F)
Environmental Protection Class	NEMA 4 (IP65)
Ambient Operating Temperature	-20°C to +60°C (-4°F to +140°F)
Temperature Drift	0.005%/°C (0.009%/°F)

1) Actual pressure drop required for each metering land, up to the specified maximum flow rate is:

$$\Delta P_{actual} = (5)\left(\frac{Q_{actual}}{Q_{rated}}\right)^2 \text{ Bar; (Q in LPM)} \quad [or] \quad = (75)\left(\frac{Q_{actual}}{Q_{rated}}\right)^2 \text{ PSI; (Q in GPM)}$$

Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

D		1	F	H								
Directional Control Valve	Size	Pilot Operated	Flow Control	High Response	Spool Type	Flow	Pilot Oil Connection	Seal	Input Signal	Options	Valve Accessories	Design Series

NOTE: Not required when ordering.

Code	Description
3	NG10/CETOP 5
4	NG16/CETOP 7
8	NG25/CETOP 8
9[1]	NG25/CETOP 8
11	NG32/CETOP 10

1) with enlarged ports ∅ 32mm

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
B	Voltage Input 0 ... ±10V
E	Current Input 0 ... ±20 mA
S	Current Input 4 ... 20 mA

Code	Pilot	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

Code	Description
0	Standard
8	Monitor Switch

Code			Spool Type
$Q_A=Q_B$	$Q_A>Q_B$ [2]	$Q_B>Q_A$ [3]	Overlap Sine
E01	B31	A31	
E02	B32	A32	

2) 2:1 Ratio: Reduced Flow Rate; Port B, Rated Flow Rate; Port A
3) 2:1 Ratio: Reduced Flow Rate; Port A, Rated Flow Rate; Port B

Code	Flow at Δp 5 Bar (72.5 PSI) per Metering Edge Sine Notch Spools			
	D31 LPM (GPM)	D41 LPM (GPM)	D81/91 LPM (GPM)	D111 LPM (GPM)
A	55 (14.6)	–	–	–
B	–	105 (27.8)	–	–
C	80 (21)	140 (37)	–	–
E	–	190 (50)	250 (66)	–
F	–	240 (63)	310 (82)	–
H	–	–	400 (106)	500 (32)
L	–	–	–	1000 (264)

V-Notch Spool Options - Spool Type and Flow Codes

Code		V-Notch
$Q_A=Q_B$	$Q_A>Q_B$ [4]	Spool Type
E21	B41	
E22	B42	

4) 2:1 Ratio: Reduced Flow Rate on Port B, Rated Flow Rate on Port A
Code A* for spool $Q_B>Q_A$ optional

Code	Flow at Δp 5 Bar (72.5 PSI) per metering edge		
	D31 LPM (GPM)	D41 LPM (GPM)	D81/D91 LPM (GPM)
B	–	–	–
D	–	120 (32)	–
F	–	–	300 (79)

Bolt Kit:		Weight:	
D31FH	BK98	D31FH	8.1 kg (17.9 lbs.)
D41FH	BK160	D41FH	11.6 kg (25.6 lbs.)
D81/91FH	BK228	D81/91FH	20.7 kg (45.6 lbs.)
D111FH	BK150	D111FH	62.0 kg (137.0 lbs.)

Mating Connector: Part # 5004072 (7-Pin CE) Order Separately

Use D*1FC for new applications

Mounting Interface

Refer to the Mounting Interface Dimensions in the Proportional Directional Valve section of this catalog.

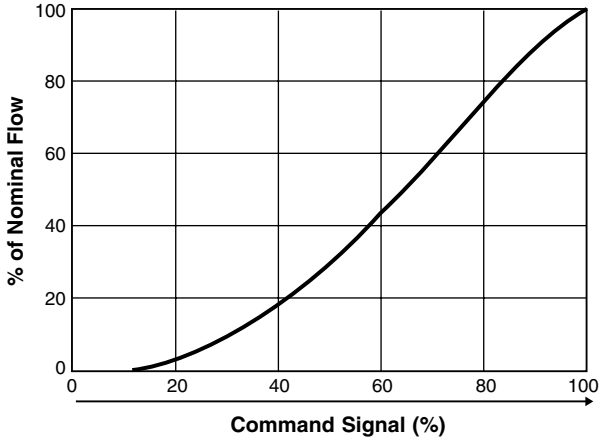
Accessories

Refer to the Accessories section for bolt kits, subplates, connectors and pre-assembled cable assemblies.

Note: Depending on the spool type selected, the actual flow characteristic may deviate from the typical flow curves as shown.

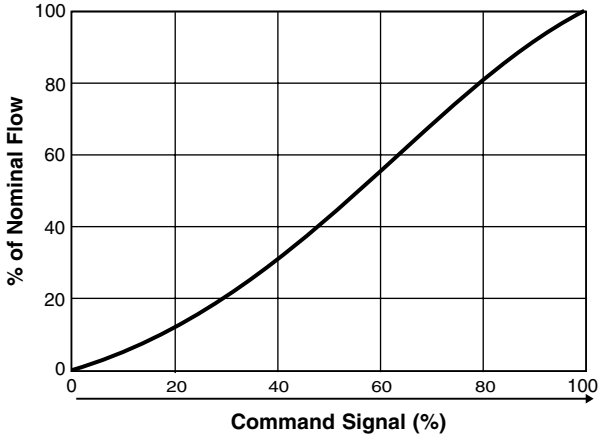
Flow Characteristics – Overlap Spools

Typical, at 5 Bar (72.5 PSI) per metering edge

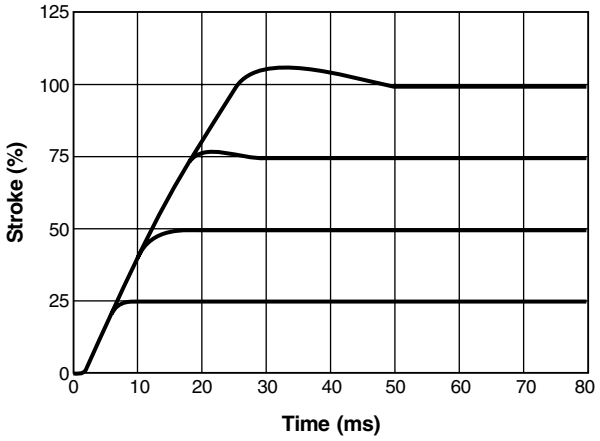


Flow Characteristics – Zero Lap Spools

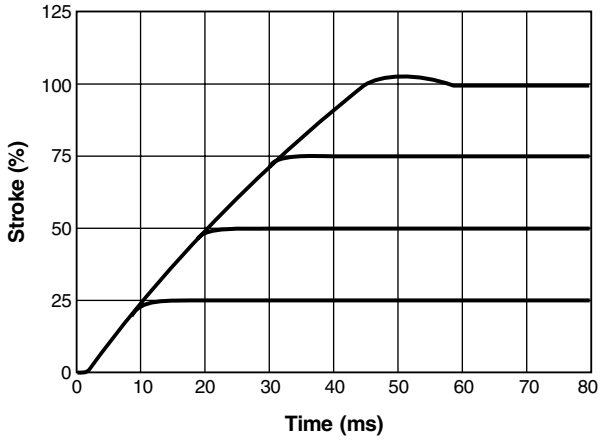
Typical, at 5 Bar (72.5 PSI) per metering edge



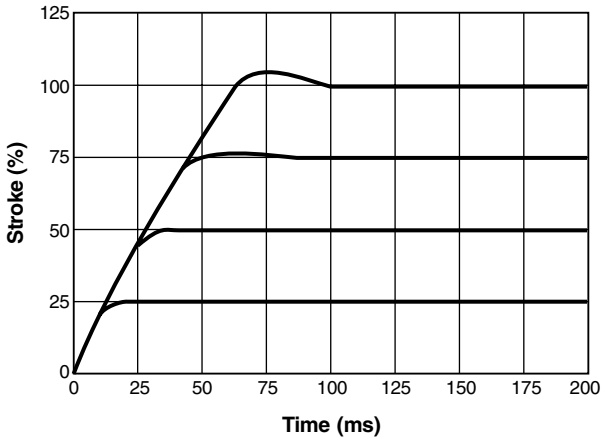
D31FH Step Response



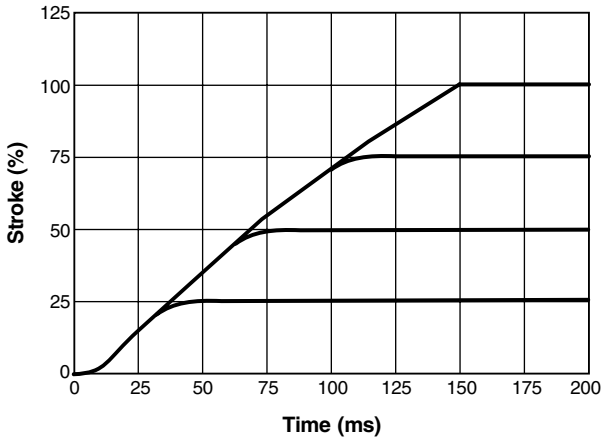
D41FH Step Response



D81FH and D91FH Step Response

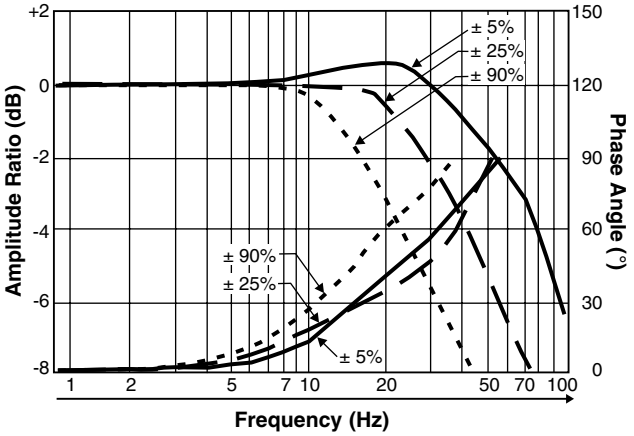


D111FH Step Response

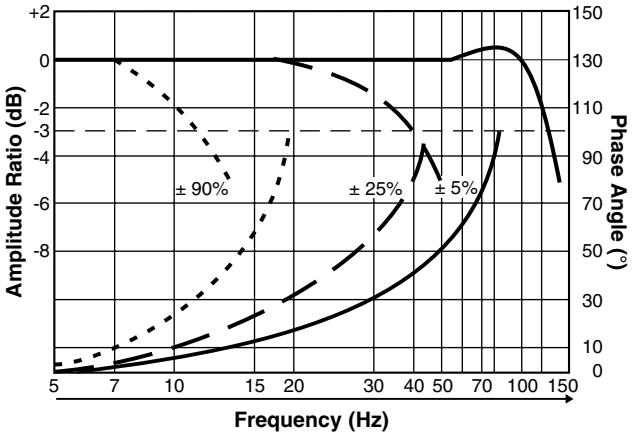


Use D*1FC for new applications

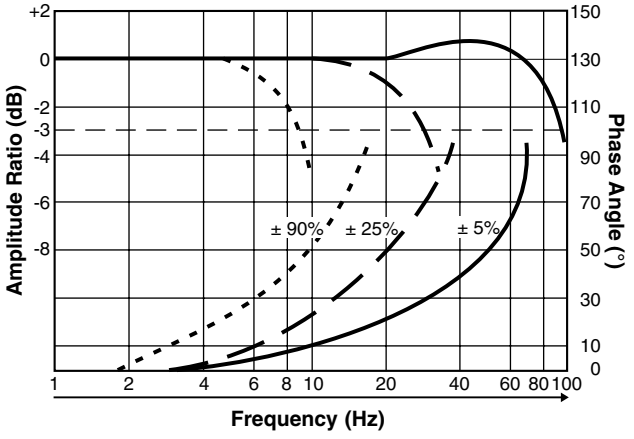
D31FH Frequency Response



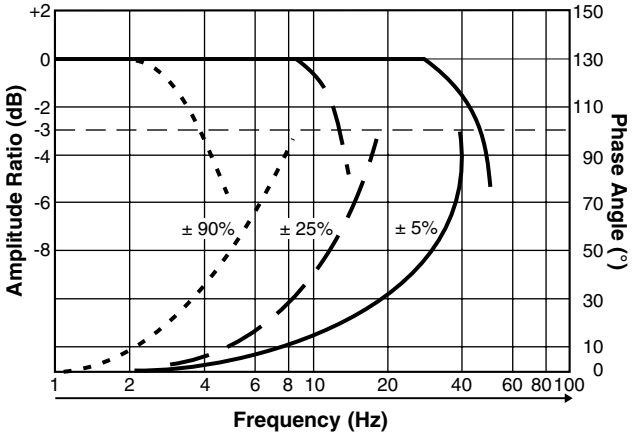
D41FH Frequency Response



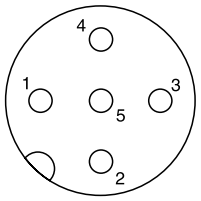
D81FH and D91FH Frequency Response



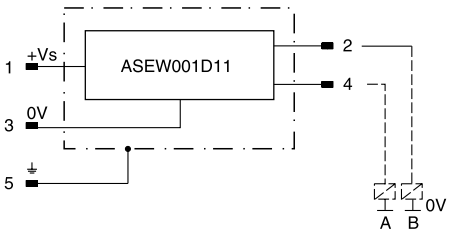
D111FH Frequency Response



Monitor Switch M12x1 Pin Assignment



1 + Supply 18...42V
2 Output B (normally closed)
3 0V
4 Output A (normally closed)
5 Earth ground



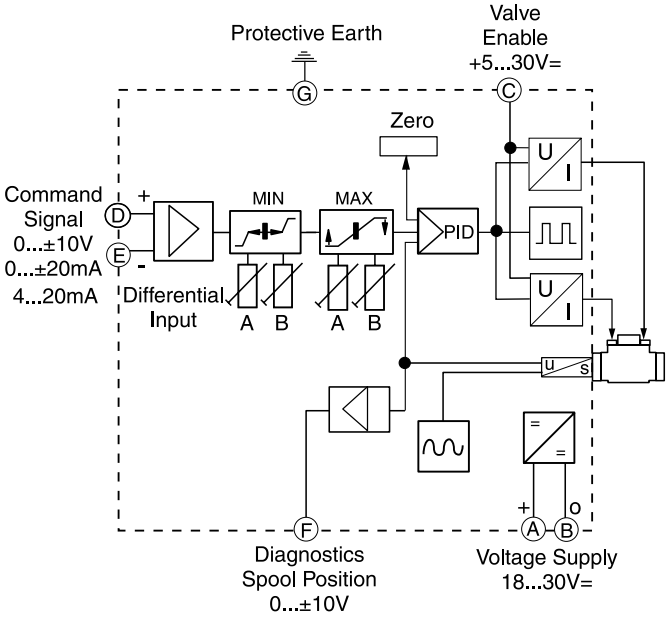
Signal	Output A (pin 4)	Output B (pin 2)
Neutral	Closed	Closed
	Open	Closed
	Closed	Open

The neutral position is monitored. The signal changes after less than 10% of the spool stroke.

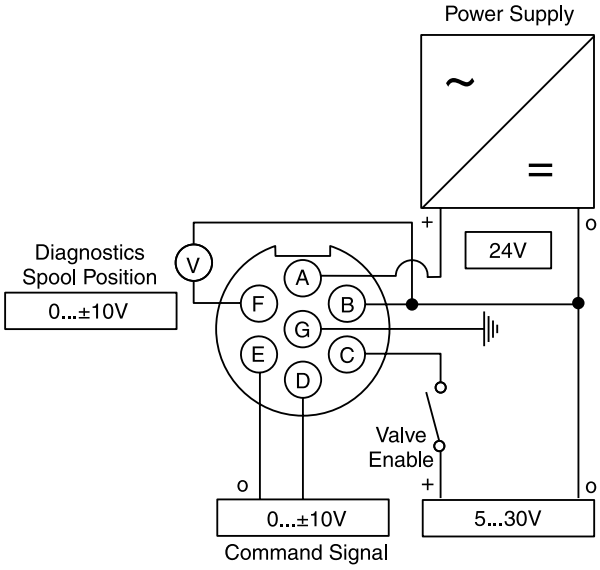
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature	**[°C]**	0...70; (32°F...158°F)
Supply Voltage/Ripple	**[V]**	18...42, ripple < 10% eff.
Current Consumption without Load	**[mA]**	< 30
Maximum Output Current per Channel, Ohmic	**[mA]**	400
Minimum Output Load per Channel, Ohmic	**[kOhm]**	100
Maximum Output Drop at 0.2A	**[V]**	< 1.1
Maximum Output Drop at 0.4A	**[V]**	< 1.6
EMC		EN 61000-6-2, EN61000-6-4
Maximum tol. Ambient Field Strength	**[A/m]**	1200
Minimum Distance to Next AC solenoid	**[m]**	0.1
Interface		4+PE acc. IEC 61076-2-101 (M12)
Wiring Minimum	**[mm²]**	5 x 0.5 (AWG 20) overall braid shield
Wiring Length Maximum	**[m]**	50 (164 ft.)

Use D*1FC for new applications

Function Diagram, Valve Electronics



Wiring Connection



Valve Enable Input

The valve power stage electronics is enabled by applying a positive voltage to pin 'C' with respect to power supply 0V pin 'B'. A voltage between 5 and 30 volts is a logical enable, less than 5 volts disables the valve.

Diagnostics — Valve Spool Position

Spool position can be monitored by measuring the voltage on pin 'F' with respect to power supply 0V pin 'B' of the valve input connector. The same signal is available inside the enclosure as a calibration aid as shown.

Status LED

A status lamp (LED) is located inside the electronics enclosure and visible through a transparent lens. Refer to the table below.

Display Color	Indicates
Green	Normal operation
Off	Supply voltage outside permissible range of 18 to 30 VDC
Red	Spool position error / Low pilot pressure

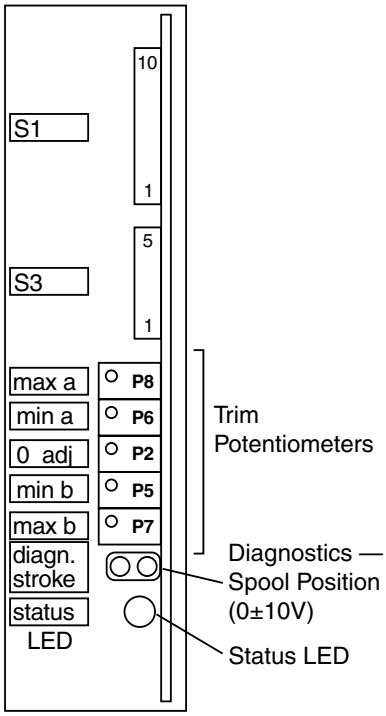
Use D*1FC for new applications

Electronics Adjustment

Electronic valve adjustments are located inside the electronics enclosure. Refer to installation manual: DFH- (Series 30) 2573 / GB.

Integrated Control Electronics

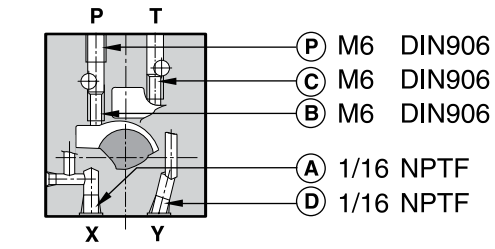
Arrangement of potentiometers, status LED, and internal valve spool monitor point.



Pilot Flow
Oil Inlet (Supply) and Outlet (Drain)

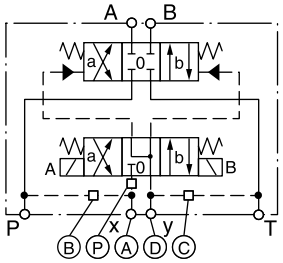
Use D*1FC for new applications

D31FH

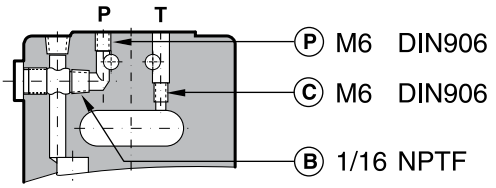


○ open, ● closed

Pilot oil Inlet	Pilot oil Drain	A	B	C	D
internal	external	●	○	●	○
external	external	○	●	●	○
internal	internal	●	○	○	●
external	internal	○	●	○	●

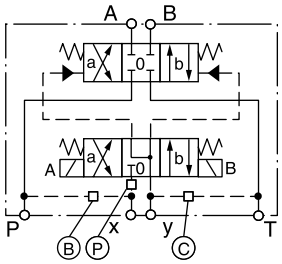


D41FH

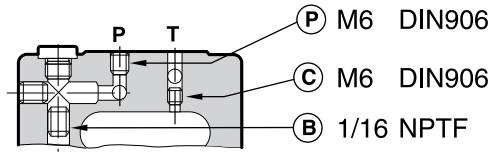


○ open, ● closed

Pilot oil Inlet	Pilot oil Drain	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○

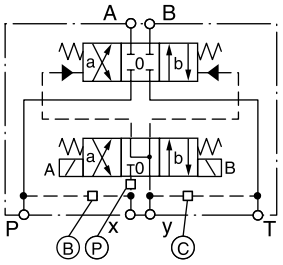


D81FH and D91FH

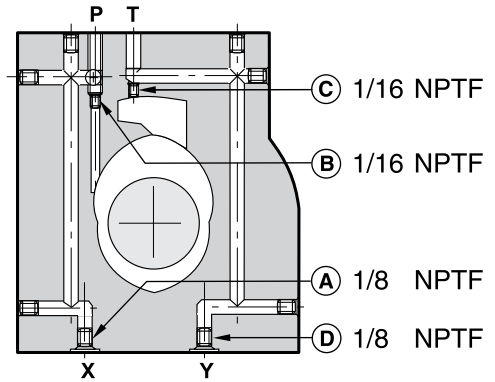


○ open, ● closed

Pilot oil Inlet	Pilot oil Drain	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○

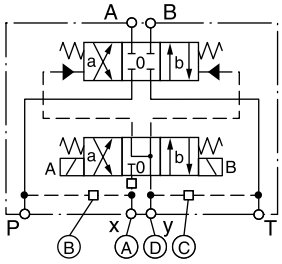


D111FH



○ open, ● closed

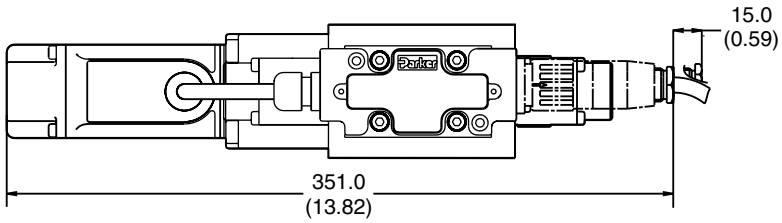
Pilot oil Inlet	Pilot oil Drain	A	B	C	D
internal	external	●	○	●	○
external	external	○	●	●	○
internal	internal	●	○	○	●
external	internal	○	●	○	●

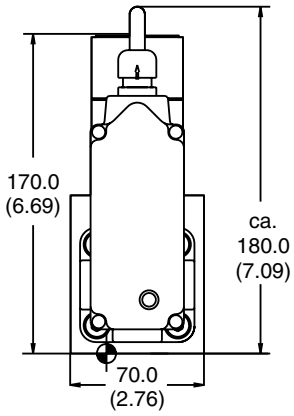


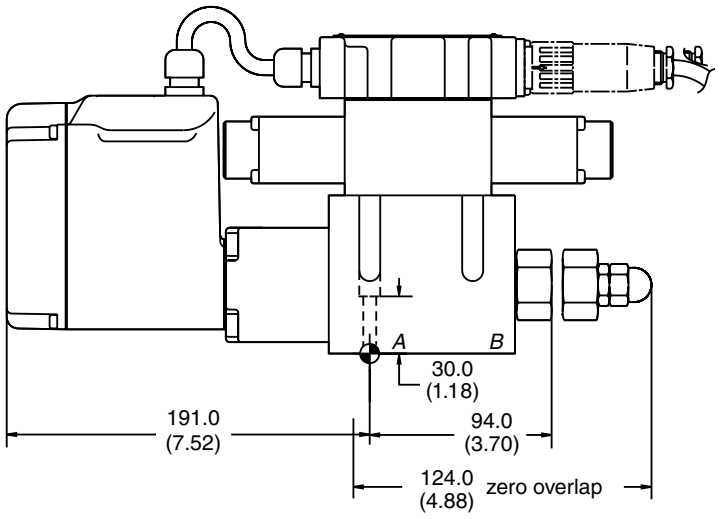
D31FH

Inch equivalents for millimeter dimensions are shown in (**)

Use D31FC for new applications



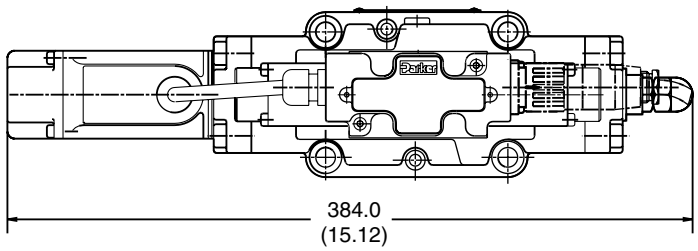


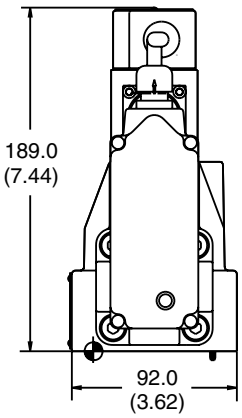


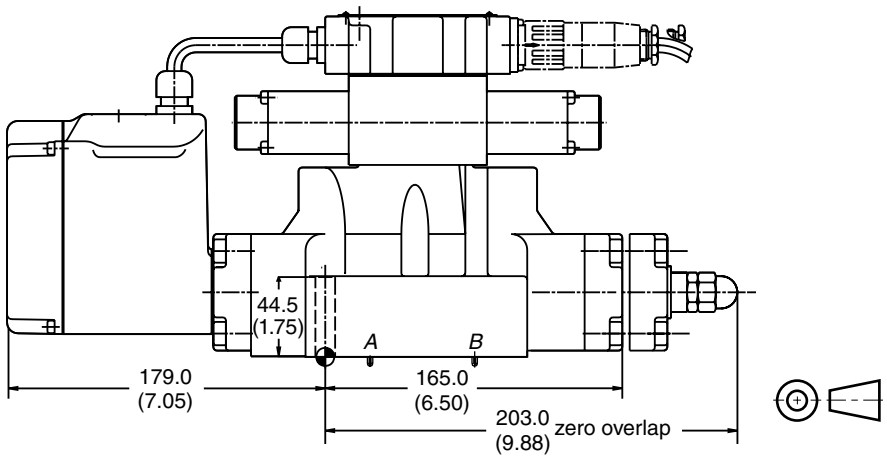
D41FH

Inch equivalents for millimeter dimensions are shown in (**)

Use D41FC for new applications



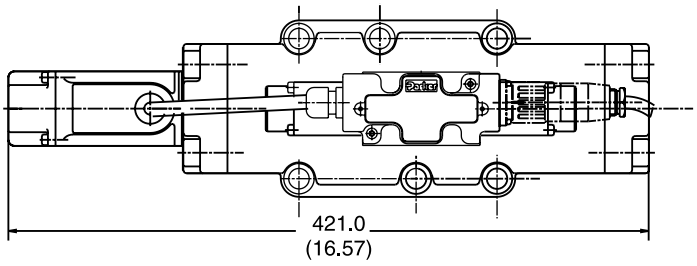


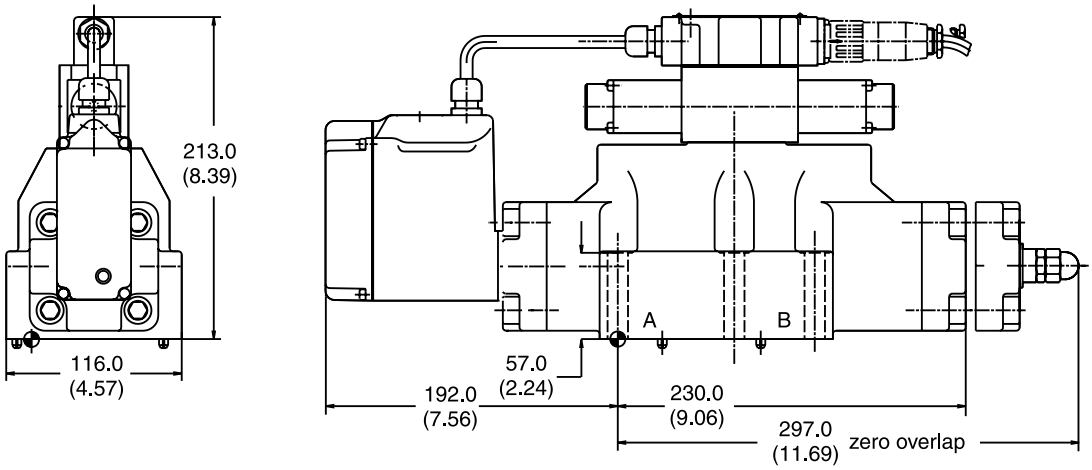


D81FH and D91FH

Inch equivalents for millimeter dimensions are shown in (**)

Use D81FC and D91FC for new applications

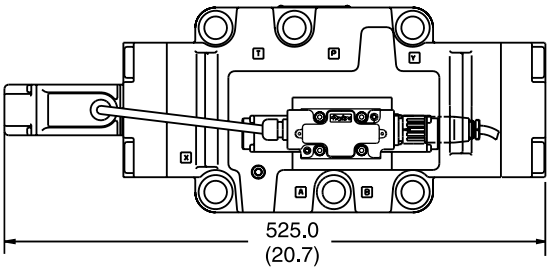


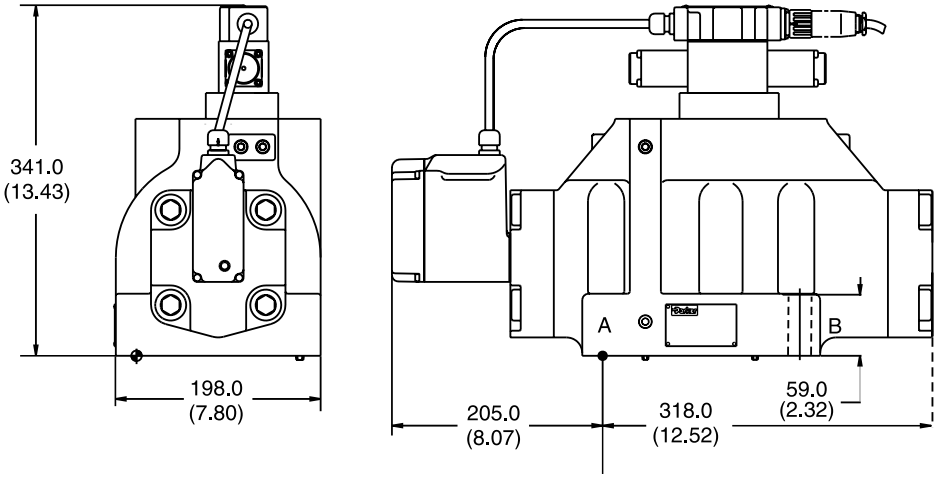


D111FH

Inch equivalents for millimeter dimensions are shown in (**)

Use D111FC for new applications





General Description

Series D*1FE pilot operated proportional valves are designed for high precision applications that require a safe middle position of the main spool at power down.

The pilot is a 3-position valve with an overlapped middle position. This ensures that the main stage spring pushes the spool into the middle position at power down without an unintended jerk of the actuator.

The D*1FE series is available in 5 sizes:

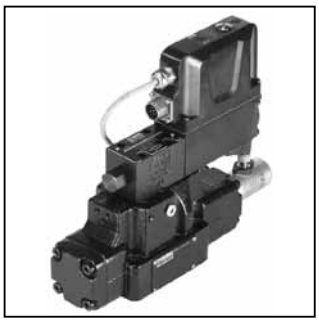
D31FE NG10 (CETOP 5)

D41FE NG16 (CETOP 7)

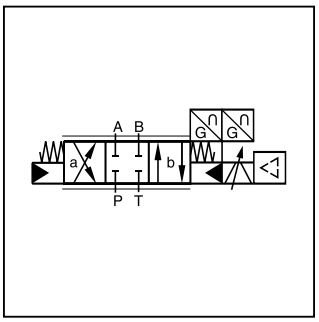
D91FE NG25 (CETOP 8) for port diam. up to 32 mm

D111FE NG32 (CETOP10)

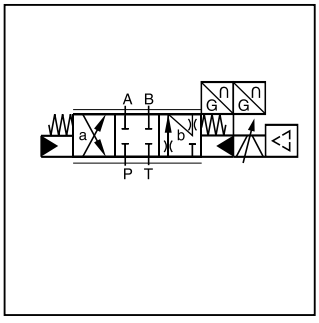
The innovative integrated regenerative function in the A-line (optional) allows new energy saving circuits with differential cylinders. The hybrid version can switch between regenerative mode and standard mode at any time.



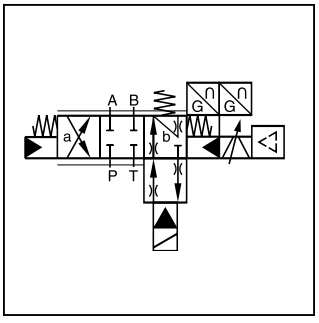
D41FE Standard



Standard D*1FE



NEW: A-Regeneration D*1FER

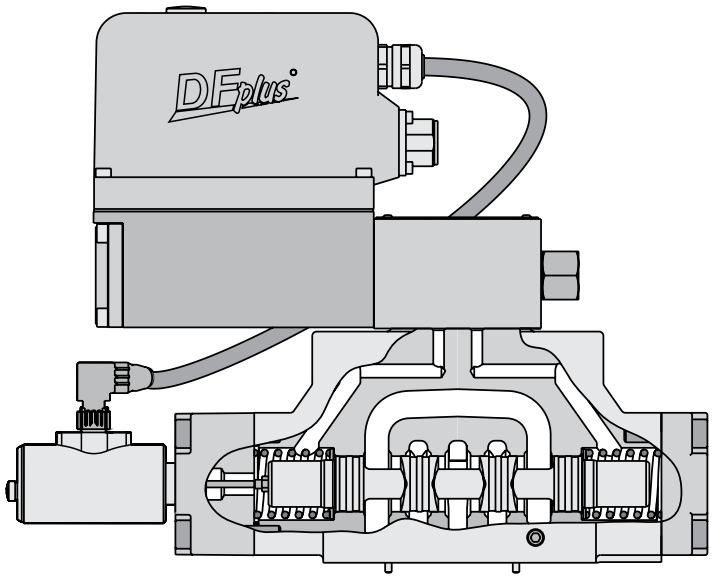


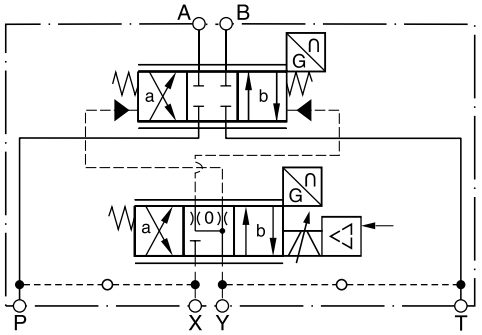
NEW: Hybrid D*1FEZ

Features

- High dynamics.
- High flow.
- Defined spool positioning at power-down.
- Onboard electronics.
- **NEW:** Energy saving A-regeneration optionally integrated.
- **NEW:** Switchable hybrid version.

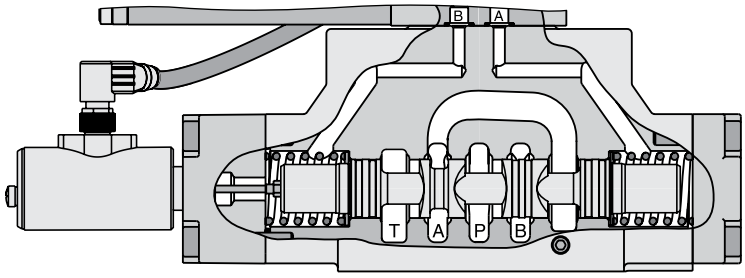
D41FEE01 (Standard)

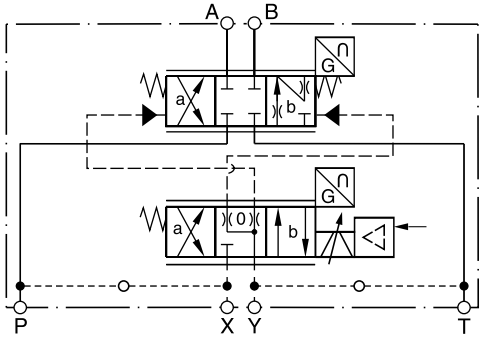




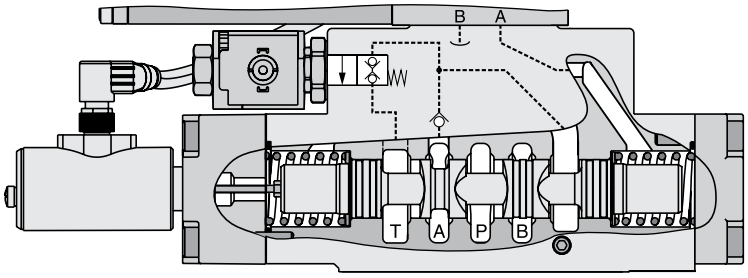
D*1FER and D*1FEZ

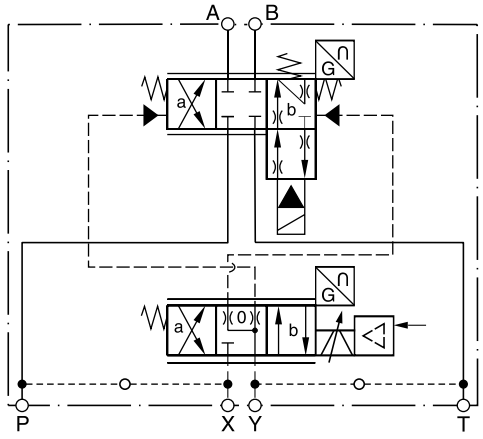
Regenerative Valve D*1FER





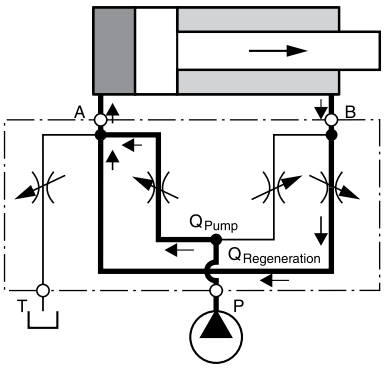
Hybrid Valve D*1FEZ





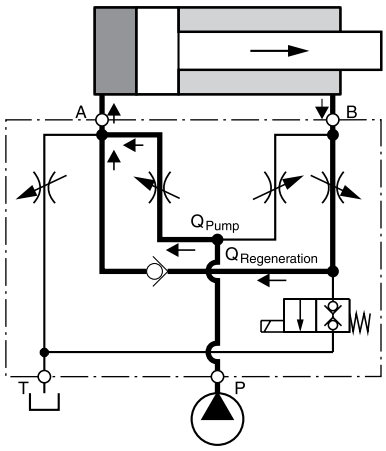
D*1FER (Regenerative Valve)

Cylinder extending

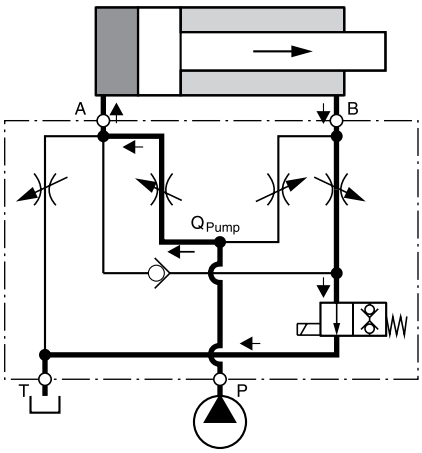


D*1FEZ (Hybrid Valve)

Cylinder extending
in regenerative mode (high speed)



Cylinder extending
in standard mode (high force)



Flow Rate in % of Nominal Flow

Size	Spool	Port					
		A-T	P-A	P-B	B-A (R-Valve)	B-A (Hybrid)	B-T (Hybrid)
D41FER/Z	31/32	100%	50%	100%	50%	40%	20%
D91FER/Z	31/32	100%	50%	100%	50%	50%	25%
D111FER/Z	31/32	100%	50%	100%	50%	50%	20%

D		1	F	E			C						
Directional Control Valves	Size	NG6 Pilot	Flow Control	High Response	Spool	Flow	Spool Position	Pilot Connection	Seal	Input Signal	Options	Hybrid Option	Design Series

NOTE: Not required when ordering.

Code	Description
3	NG10 / CETOP 5
4	NG16 / CETOP 7
9 [1]	NG25 / CETOP 8
11	NG32 / CETOP 10

[1] With enlarged connections Ø 32 mm

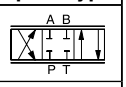
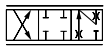
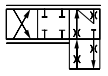
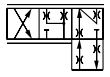
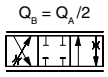
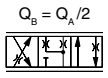
Code	Description
N	Nitrile
V	Fluorocarbon
H	For HFC fluid

Code	Description
0	Standard for Spool Codes B, E, R
8 [5]	Monitor Switch
L [6]	Hybrid valve 24V normaly closed for spool type Z

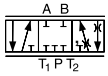
[5] Not available for D111FEZ.
[6] See previous page for regenerative and hybrid spool information. (not available in D31FE).

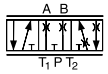
Code	Inlet	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

Code	Description
0	6+PE acc. EN175201-804
5	11+PE acc. EN175201-804
7	6+PE + Enable

Standard		NEW: Regenerative Function [2]		NEW: Hybrid Function [4]	
Code	Spool Type	Code	Spool Type	Code	Spool type
E01		R31		Z31	
E02		R32		Z32	
B31					
B32					

[2] Not available in D91FE.
[4] Not available in D31FE.

D31FE spooltype: R31 

R32 

Code	Signal	Function
B	0...±10V	0...+10V P -> B
E	0...±20mA	0...+20mA P -> B
K	0...±10V	0...+10V P -> A
S	4...20mA	12...20mA P -> A

Code	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge			
	D31	D41	D91	D111
D	90 (24)	—	—	—
E	120 (32)	—	—	—
F	—	200 (53)	—	—
H	—	—	450 (119)	—
L	—	—	—	1000 (265)

Weight:

D31FE	11.3 kg (24.9 lbs.)
D41FE	14.2 kg (31.3 lbs.)
D91FE	23.5 kg (51.8 lbs.)
D111FE	64.5 kg (142.2 lbs.)

General					
Design		Proportional directional control valve, pilot operated			
Actuation		VCD® actuator			
Size		**NG10 (CETOP 5) D31**	**NG16 (CETOP 7) D41**	**NG25 (CETOP 8) D91**	**NG32 (CETOP 10) D111**
Mounting Interface		DIN 24340 / ISO 4401 / CETOP RP121 / NFPA			
Mounting Position		Unrestricted			
Ambient Temperature	**[°C]**	-20...+60; (-4°F...+140°F)			
$MTTF_D$ Value	**[years]**	50			
Vibration Resistance	**[g]**	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27			
Hydraulic					
Maximum Operating Pressure		Pilot Drain Internal: Ports P, A, B, X 350 Bar (5075 PSI); Port T, Y 35 Bar (507.5 PSI) Pilot Drain External: Ports P, A, B, T, X 350 Bar (5075 PSI); Port Y 35 Bar (507.5 PSI)			
Fluid		Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature	**[°C]**	-20...+60; (-4°F...+140°F)			
Viscosity					
Permitted	**[cSt] / [mm²/s]**	20...380 (93...1761 SSU)			
Recommended	**[cSt] / [mm²/s]**	30...80 (139...371 SSU)			
Filtration		ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Nominal Flow at Δp=Bar (72.5 PSI) per Control Edge [1]	**LPM (GPM)**	120 (31.7)	200 (52.9)	400/450 (105.8/119.0)	1000 (264.2)
Max. Recommended Flow (Standard)	**LPM (GPM)**	250 (66.1)	600 (158.7)	1000 (264.2)	3000 (792.5)
Regenerative B-A / B-T		Depending on application, all flow curves			
Leakage at 100 Bar (1450 PSI)	**[ml/min]**	200 (12 cu. in.)	200 (12 cu. in.)	600 (37 cu. in.)	1000 (61 cu. in.)
Pilot	**[ml/min]**	<100 (6.1 cu. in.)	<100 (6.1 cu. in.)	<100 (6.1 cu. in.)	<100 (6.1 cu. in.)
Pilot Supply Pressure		20 Bar (290 PSI) 350 Bar (5075 PSI)			
Pilot Flow, Step Response @ 210 Bar		9 LPM (2.4 GPM)	10 LPM (2.6 GPM)	18 LPM (4.8 GPM)	30 LPM (7.9 GPM)
Static / Dynamic					
Step Resp. at 100% Stroke [2]	**[ms]**	13	19	24	60
Frequency Response					
Amplitude ±5% at 210 Bar (3045 PSI)	**[Hz]**	180	80	65	38
Phase ±5% at 210 Bar (3045 PSI)	**[Hz]**	130	100	75	64
Hysteresis	**[%]**	<0.1			
Sensitivity	**[%]**	<0.05			
Temperature Drift of Center Position	**[%K]**	<0.025			

[1] Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

[2] Measured with load [210 Bar (3045 PSI) pressure drop/two control edges].

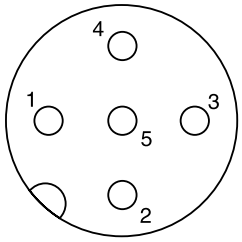
Continued on the next page

Electrical (Onboard Electronics)			
Duty Ratio		**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class			IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/Ripple		**[V]**	18...30, ripple < 5% eff., surge free
Current Consumption Maximum		**[A]**	3.5
Pre-fusing Medium Lag		**[A]**	4.0
Input Signal			
Code K (B)	**Voltage**	**[V]**	+10...0...-10, ripple < 0.01 % eff., surge free, 0...+10 P–>A (P–>B)
	Impedence	**kOhm**	100
Code E	**Voltage**	**[mA]**	+20...0...-20 ripple < 0.01 % eff., surge free, 0...+20mA P–>B
	Impedence	**[Ohm**	250
Code S	**Current**	**[mA]**	4...12...20, ripple < 0.01 % eff., surge free, 12...20mA P–>A < 3.6 mA = enable off, > 3.8 mA = enable on (acc. to NAMUR NE43)
	Impedence	**[Ohm**	250
Input Capacitance Typ.		**[nF]**	1
Differential Input Maximum			
Code 0		**[V]**	30 for terminal D and E against PE (terminal G) 11 for terminal D and E against 0V (terminal B)
Code 5		**[V]**	30 for terminal 4 and 5 against PE (terminal ⏚) 11 for terminal 4 and 5 against 0V (terminal 2)
Code 7		**[V]**	30 for terminal D and E against PE (terminal G)
Enable Signal	**Code 5 / 7**	**[V]**	5...30, Ri = 9 kOhm
Diagnostic Signal		**[V]**	+10...0...-10 / +ub, rated max. 5 mA
EMC			EN 61000-6-2, EN 61000-6-4
Electrical Connection			
Code 0 / 7			6 + PE acc. to EN 175201-804
Code 5			11 + PE acc. to EN 175201-804
Wiring Minimum			
Code 0 / 7		**[mm²]**	7 x 1.0 (AWG16) overall braid shield
Code 5		**[mm²]**	11 x 1.0 (AWG20) overall braid shield
Wiring Length Maximum		**[m]**	50 (164 ft.)

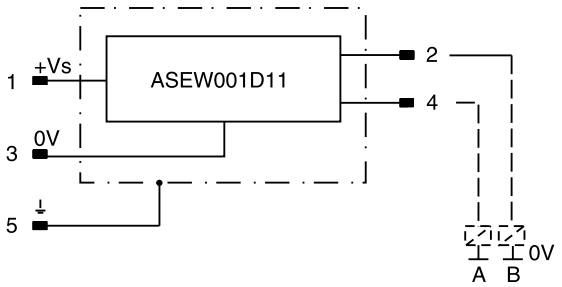
Electrical (Hybrid Option)				
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible		
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)		
		D41	**D91**	**D111**
Supply Voltage	**[V]**	24	24	24
Tolerance Supply Voltage	**[%]**	±10	±10	±10
Current Consumption	**[A]**	1.21	0.96	1.29
Power Consumption	**[W]**	29	23	31
Solenoid Connection		Connector as per EN 175301-803		
Wiring Minimum	**[mm²]**	3 x 1.5 recommended		
Wiring Length Maximum	**[m]**	50 (164 ft.) recommended		

With electrical connections the protective conductor (PE ⏚) must be connected according to the relevant regulations.

Monitor Switch M12x1 Pin Assignment



1 + Supply 18...42V
2 Output B (normally closed)
3 0V
4 Output A (normally closed)
5 Earth ground



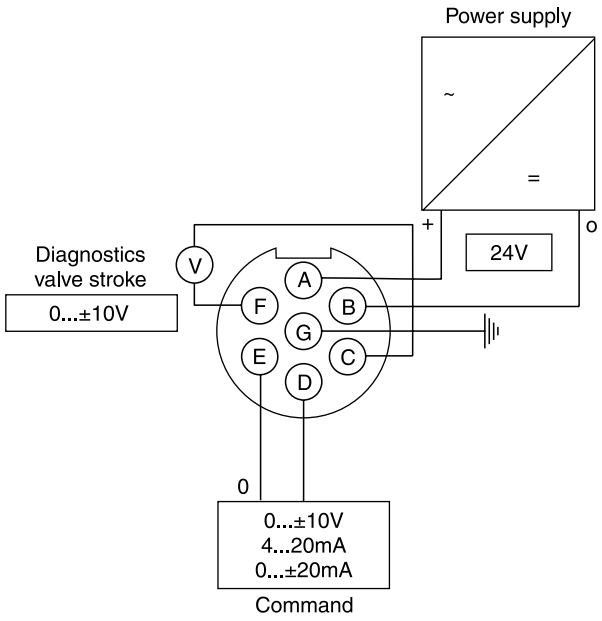
Signal	Output A (pin 4)	Output B (pin 2)
neutral	closed	closed
	open	closed
	closed	open

The neutral position is monitored. The signal changes after less than 10% of the spool stroke.

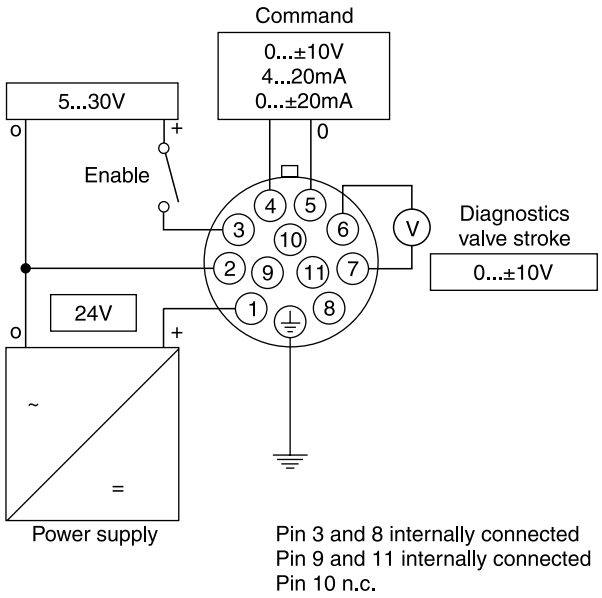
Electrical Monitor Switch

Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature	**[°C]**	0...70; (32°F...158°F)
Supply Voltage/Ripple	**[V]**	18...42, ripple < 10% eff.
Current Consumption without Load	**[mA]**	< 30
Maximum Output Current per Channel, Ohmic	**[mA]**	400
Minimum Output Load per Channel, Ohmic	**[kOhm]**	100
Maximum Output Drop at 0.2A	**[V]**	< 1.1
Maximum Output Drop at 0.4A	**[V]**	< 1.6
EMC		EN 61000-6-2, EN61000-6-4
Maximum Tol. Ambient Field Strength	**[A/m]**	1200
Minimum Distance to Next AC solenoid	**[m]**	0.1
Interface		4+PE acc. IEC 61076-2-101 (M12)
Wiring Minimum	**[mm²]**	5 x 0.5 (AWG 20) overall braid shield
Wiring Length Maximum	**[m]**	50 (164 ft.)

Code 0
6 + PE acc. EN 175201-804

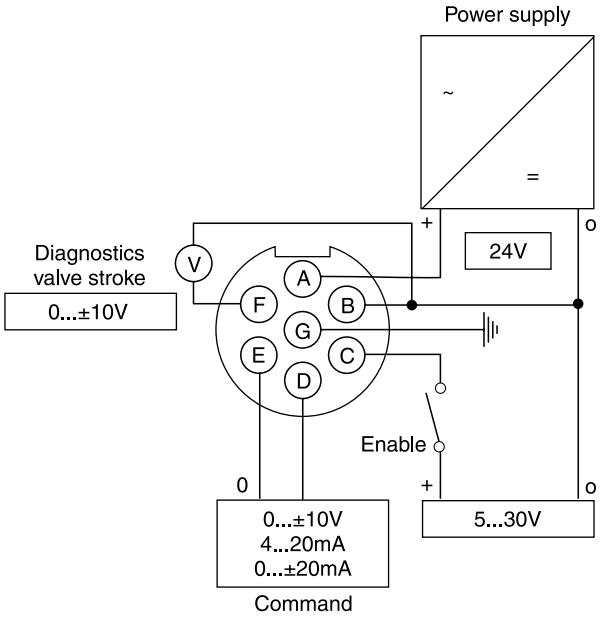


Code 5
11 + PE acc. EN 175201-804



Pin 3 and 8 internally connected
Pin 9 and 11 internally connected
Pin 10 n.c.

Code 7
6 + PE acc. EN 175201-804 + Enable

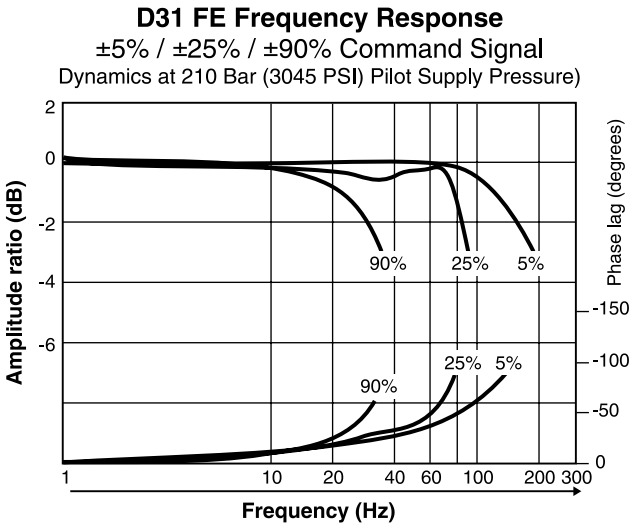


Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

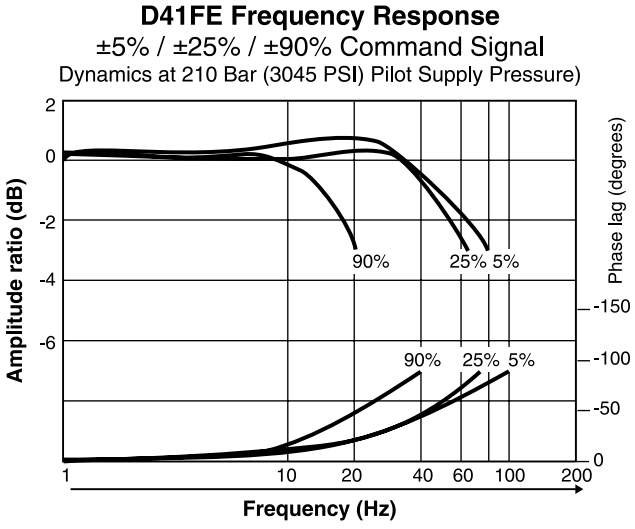
Frequency Response

±5% / ±25% / ±90% command signal
Dynamics at 210 bar pilot supply pressure

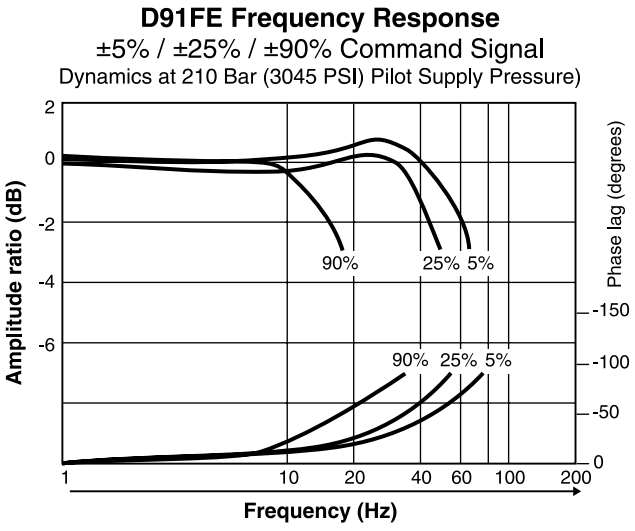
D31FE



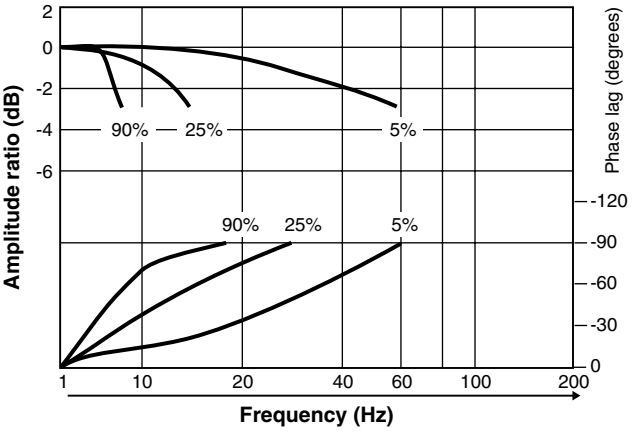
D41FE



D91FE



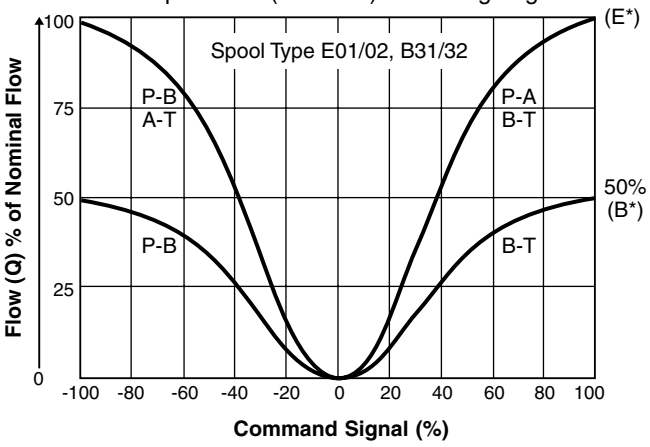
D111FE



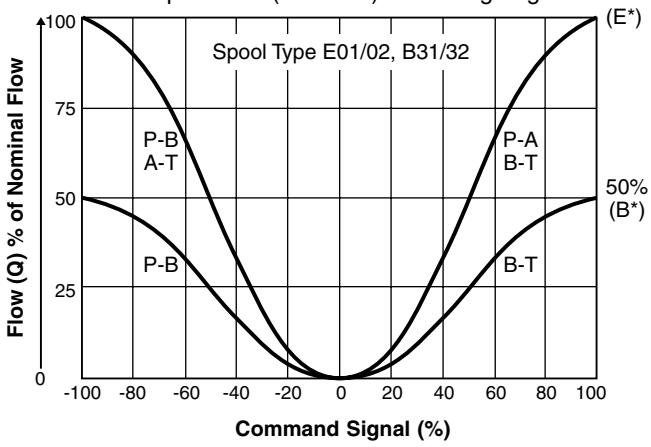
All performance curves measured with HLP46 at 50°C (122°F).

D*1FEB/E Flow

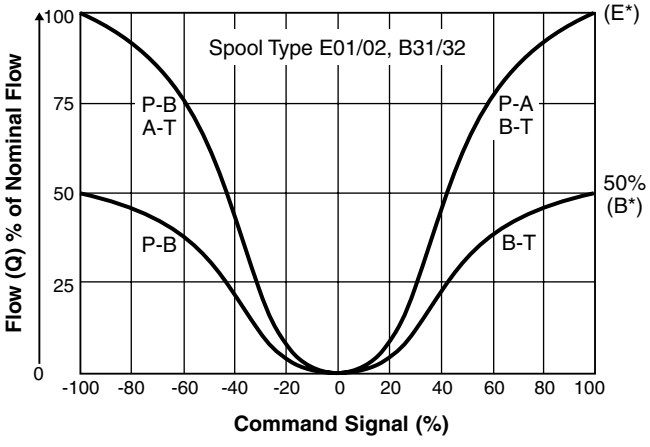
D31FE Flow Characteristics
at Δp = 5 Bar (72.5 PSI) / metering edge



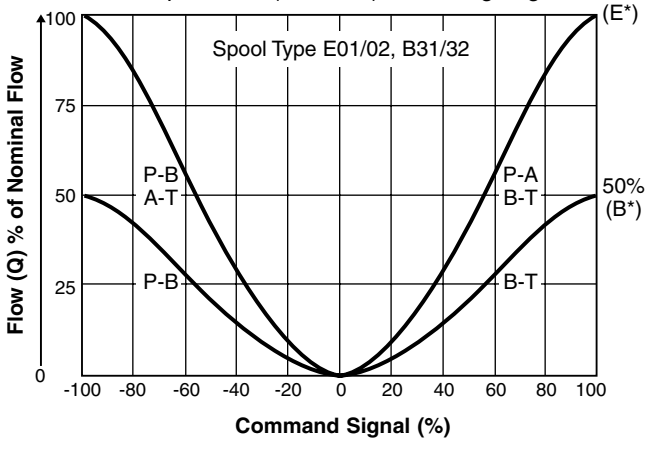
D41FE Flow Characteristics
at Δp = 5 Bar (72.5 PSI) / metering edge



D91FE Flow Characteristics
at Δp = 5 Bar (72.5 PSI) / metering edge



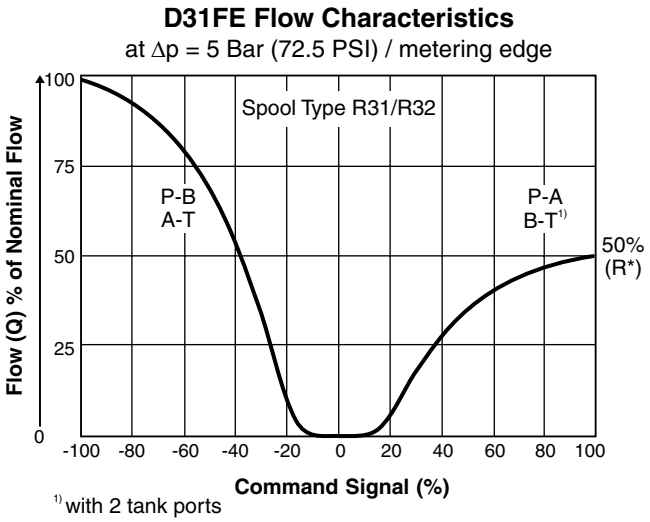
D111FE Flow Characteristics
at Δp = 5 Bar (72.5 PSI) / metering edge



All performance curves measured with HLP46 at 50°C (122°F).

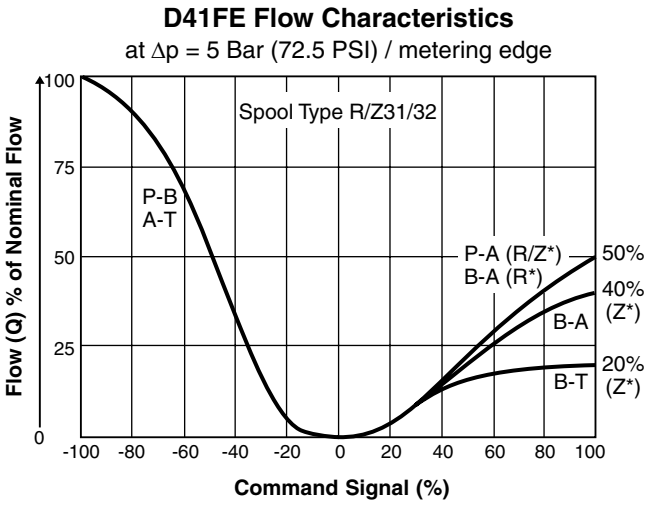
D*1FE R/Z Flow

D31FE R/Z

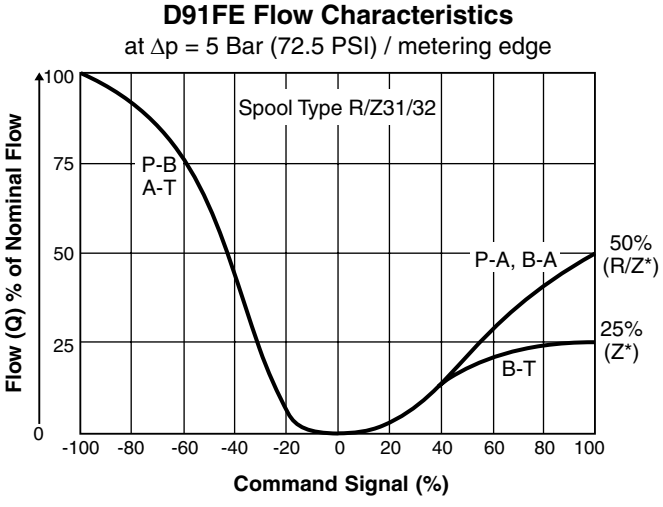


1) with 2 tank ports

D41FE R/Z



D91FE R/Z



D111FE R/Z*

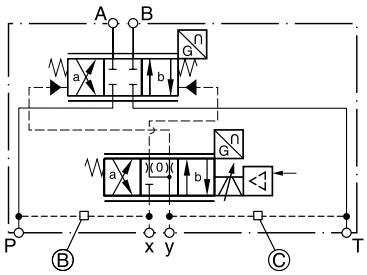
SpoolType R/Z* on request

All performance curves measured with HLP46 at 50°C (122°F).

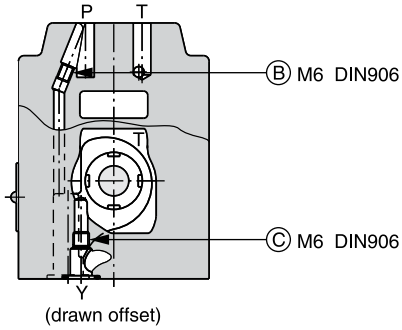
Pilot Flow — Pilot Oil Inlet (supply) and Outlet (drain)

○ open, ● closed

Pilot oil Inlet	Pilot oil Drain	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



D31FEB/E



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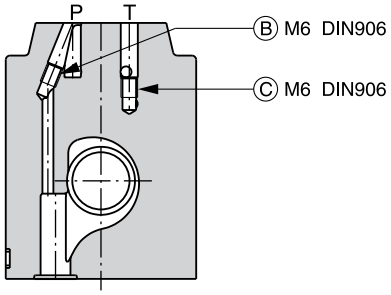
D31FER



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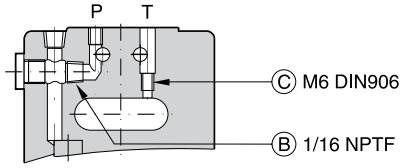

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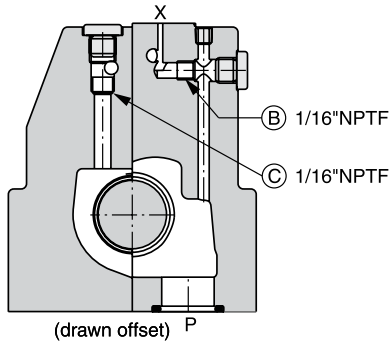

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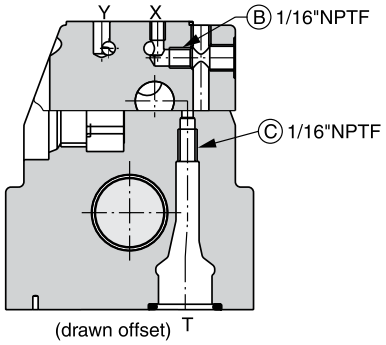

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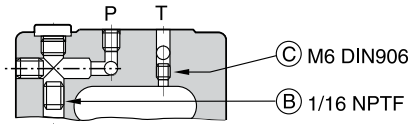
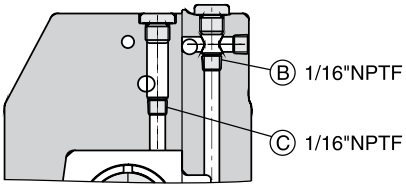
D91FEB/E

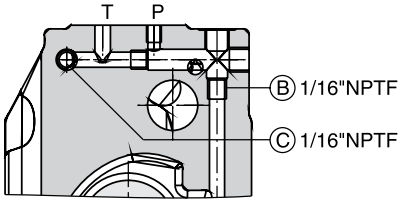


D91FER

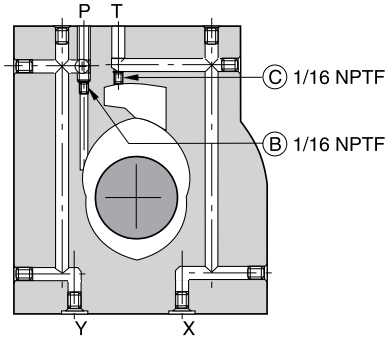


(drawn offset)

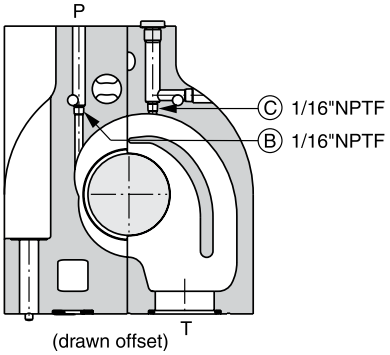
D91FEZ



D111FEB/E

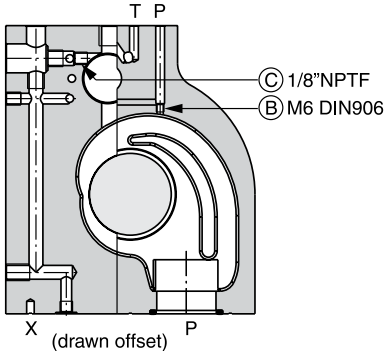


D111FER



(drawn offset)

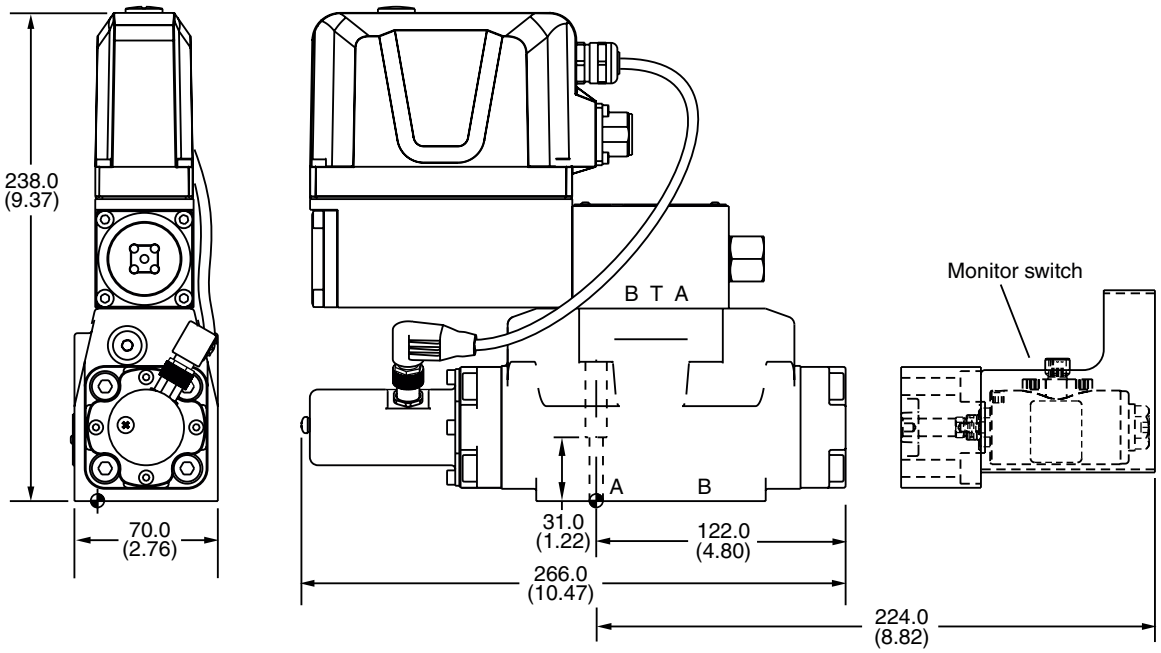
D111FEZ



(drawn offset)

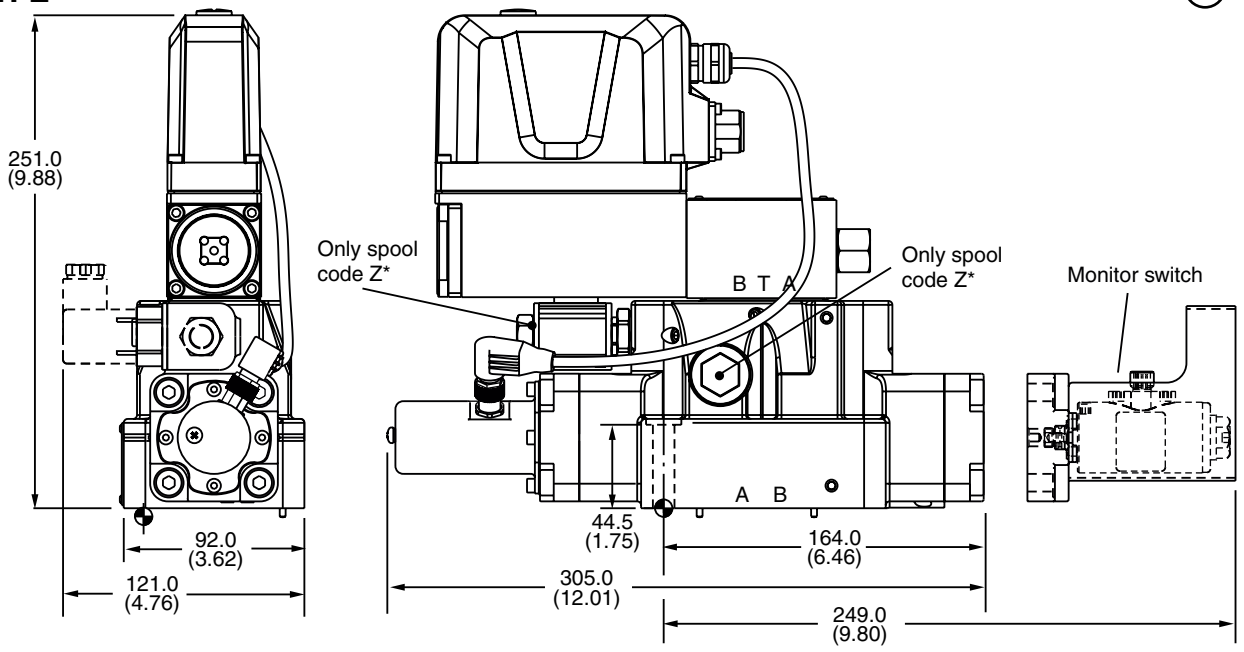
Inch equivalents for millimeter dimensions are shown in (**)

D31FE



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.625	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D31FP Fluorocarbon: SK-D31FP-V

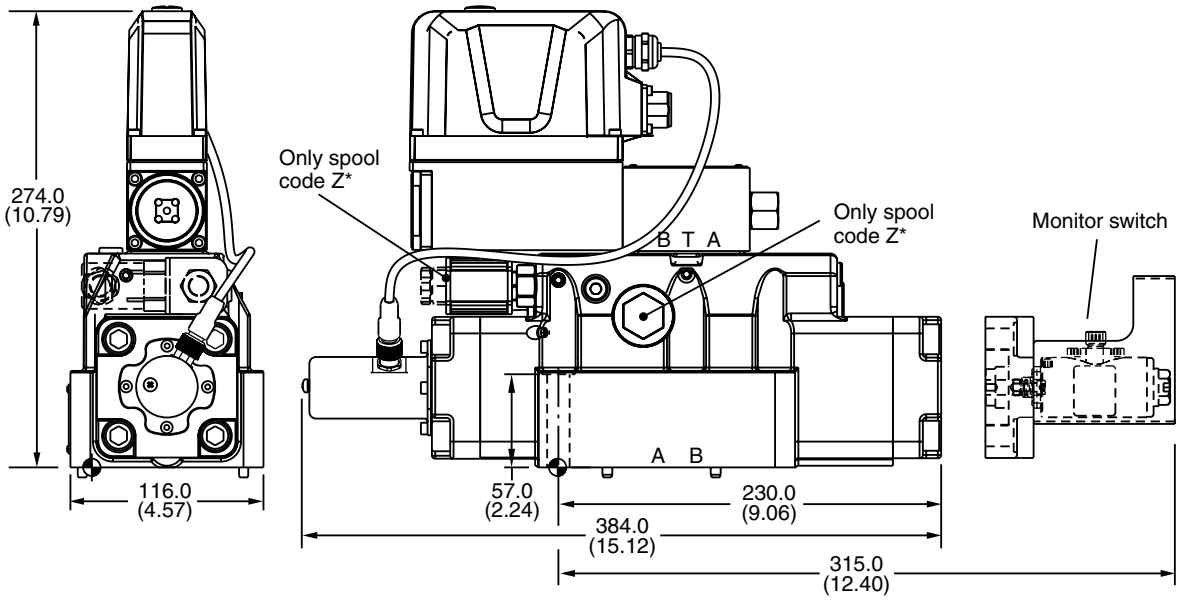
D41FE



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK320 BK160	2x M6x55 4x M10x60 DIN 912 12.9 4x 3/8-16x2.5 2x 1/4-20x2.5	13.2 Nm (9.7 lb.-ft.) 63 Nm (46.5 lb.-ft.) ±15 %	Nitrile: SK-D41FP Fluorocarbon: SK-D41FP-V

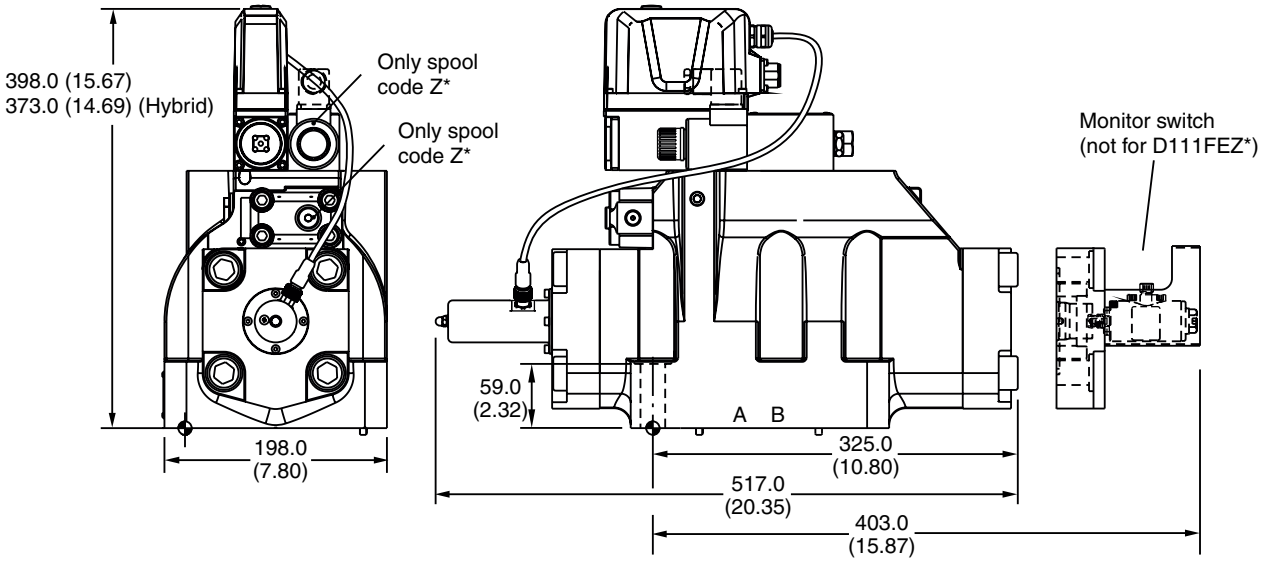
Inch equivalents for millimeter dimensions are shown in (**)

D91FE



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK360 BK228	6x M12x75 DIN 912 12.9 6x 1/2-13x3.0	108 Nm (79.7 lb.-ft.) ±15 %	Nitrile: SK-D91FP Fluorocarbon: SK-D91FP-V

D111FE



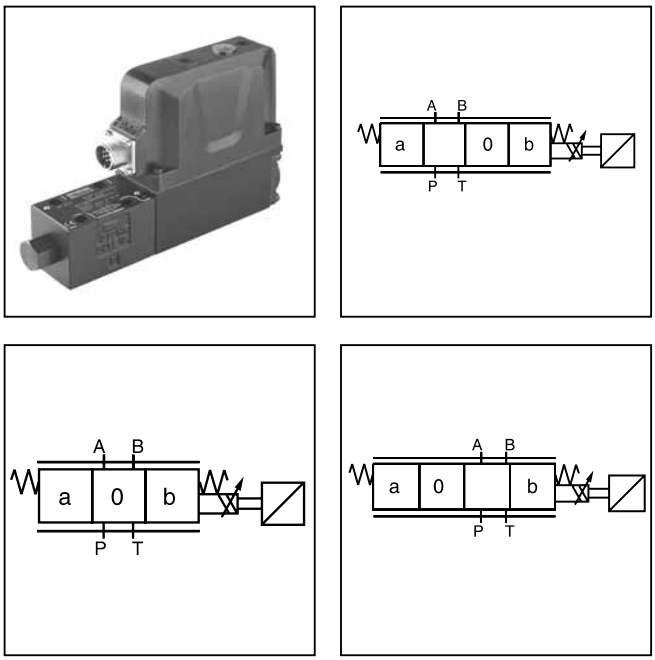
Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK386 BK150	6x M20x90 DIN 912 12.9 6x 3/4-10x3.5	517 Nm (381.3 lb.-ft.) ±15 %	Nitrile: SK-D111FP Fluorocarbon: SK-D111FP-V

General Description

Series D1FP direct operated control NG6 (CETOP 3) valve features extremely high dynamics combined with maximum flow. It is used for high accuracy in positioning of a hydraulic axis, and for controlling force and velocity.

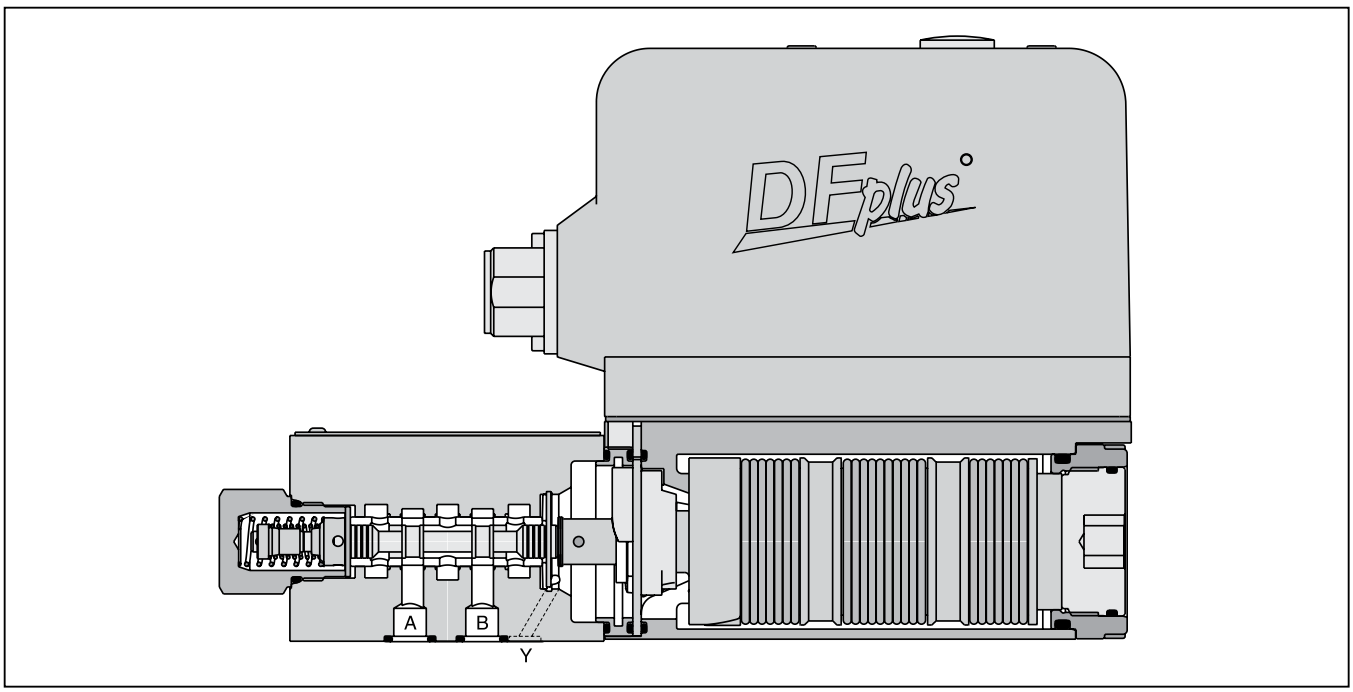
Driven by the new patented VCD® actuator, the D1FP reaches the frequency response of servovalves. Compared with solenoid driven valves, the D1FP can also be used in applications with pressure drops up to 350 Bar (5075 PSI) across the valve. Because of the high flow capability the D1FP can be a substitute for NG10 valves in some cases.

At power-down the spool moves in a defined position. All common input signals are available.

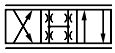
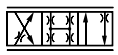
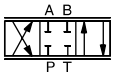


Features

- Servovalve dynamics:
  -3dB/350Hz at ±5% input signal
- Full flow capacity up to 350 Bar (5075 PSI) pressure drop through the valve.
- Maximum tank pressure 350 Bar (5075 PSI) with external drain Y-port.
- High flow.
- Defined spool positioning in case of loss of electric power supply.
- Defined spool positioning at power-down.
- Onboard electronics.



D	1	F	P									
Directional Control Valve	Size DIN NG6 CETOP 3 NFPA D03	Proportional Control	VCD	Spool Type	Spool Position on Power Down [1]	Y-Port Plugged [4]	Seal	Input Signal	Options	Spool/ Sleeve Design	Design Series NOTE: Not required when ordering.

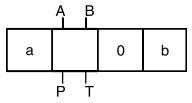
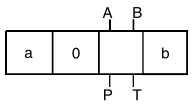
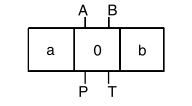
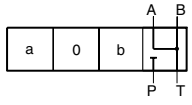
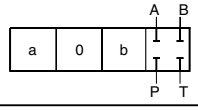
Code	Spool	Flow LPM (GPM) at Δp 35 Bar (508 PSI) per metering edge
Zerolap		
E50M E50H E50G E50F E50C E50B		40 (10.6) 25 (6.6) 16 (4.2) 12 (3.2) 6 (1.6) 3 (0.8)
B60M B60H B60G B60F B60C	$Q_B = Q_A/2$ 	40 (10.6) / 20 (5.3) 25 (6.6) / 12.5 (3.3) 16 (4.2) / 8 (2.1) 12 (3.2) / 6 (1.6) 6 (1.6) / 3 (0.8)
Underlap approximately -0.5%		
E55M E55H E55G E55F E55C E55B		40 (10.6) 25 (6.6) 16 (4.2) 12 (3.2) 6 (1.6) 3 (0.8)
Overlap 25%		
E01M E01H E01G E01F E01C E01B		40 (10.6) 25 (6.6) 16 (4.2) 12 (3.2) 6 (1.6) 3 (0.8)
B31M B31H B31G B31F B31C	$Q_B = Q_A/2$	40 (10.6) / 20 (5.3) 25 (6.6) / 12.5 (3.3) 16 (4.2) / 8 (2.1) 12 (3.2) / 6 (1.6) 6 (1.6) / 3 (0.8)
E02M E02H E02G E02F E02C E02B		40 (10.6) 25 (6.6) 16 (4.2) 12 (3.2) 6 (1.6) 3 (0.8)
B32M B32H B32G B32F B32C	$Q_B = Q_A/2$	40 (10.6) / 20 (5.3) 25 (6.6) / 12.5 (3.3) 16 (4.2) / 8 (2.1) 12 (3.2) / 6 (1.6) 6 (1.6) / 3 (0.8)

Please order plugs separately. See Accessories.

Code	Description
N	Nitrile
V	Fluorocarbon
H	For HFC Fluid

Code	Description
0	6 + PE acc. EN175201-804
5	11 + PE acc. EN175201-804
7	6 + PE + Enable

Code	Signal	Flow Direction [5]
B	+/- 10V	0...+10V -> P-A
E	+/- 20mA	0...+20mA -> P-A
S	4...20mA	12...20mA -> P-A

Code	Spool Position on Power Down
A [2]	
B [2]	
C [3]	
H [6]	
J [6]	

[1] On power down the spool moves in a defined position. This cannot be guaranteed in case of single flow path on the control edge A→ T resp. B→ T with pressure drops above 120 Bar (1740 PSI) or contamination in the hydraulic fluid.

[2] Approximately 10% opening, only available with zerolap spools and underlap spools.

[3] Only available with overlap spools.

[4] Needs to be removed at tank pressure >35 Bar (507.5 PSI).

[5] Flow direction P→ A with Pin D > Pin E.

[6] Not for flow code M.

Bolt Kit:
BK209 (4) 10-24x1.25
BK375 (4) M5x30
Weight: 5.0 kg (11.0 lbs.)

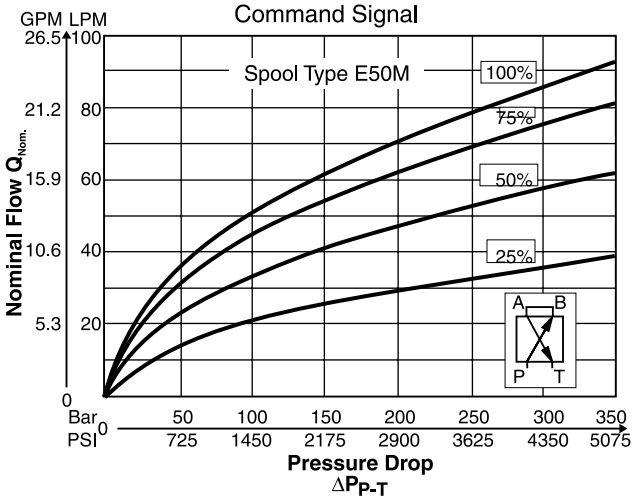
General		
Design		Direct operated proportional DC valve
Actuation		VCD® actuator
Size		NG6 / CETOP 3 / NFPA D03
Mounting Interface		DIN 24340 / ISO 4401 / CETOP RP121 / NFPA
Mounting Position		Unrestricted
Ambient Temperature	**[°C]**	-20...+50; (-4°F...+122°F)
MTTF$_D$ Value	**[years]**	75
Vibration Resistance	**[g]**	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27
Hydraulic		
Maximum Operating Pressure		Ports P, A, B 350 Bar (5075 PSI) Port T max. 35 Bar (508 PSI), port Y max. 35 Bar (508 PSI) [1]
Fluid		Hydraulic oil as per DIN 51524...51535, other on request
Fluid Temperature	**[°C]**	-20...+60; (-4°F...+140°F)
Viscosity		
Permitted	**[cSt] / [mm²/s]**	20...380 (93...1761 SSU)
Recommended	**[cSt] / [mm²/s]**	30...80 (139...371 SSU)
Filtration		ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)
Nominal Flow at Δp=35 Bar (508 PSI) per Control Edge [2]		3 LPM (0.08 GPM) / 6 LPM (1.6 GPM) / 12 LPM (3.2 GPM) / 25 LPM (6.6 GPM) / 40 LPM (10.6 GPM)
Flow Maximum		90 LPM (23.8 GPM) at Δp=350 Bar (5075 PSI) over two control edges
Leakage at 100 Bar (1450 PSI)	**[ml/min]**	<400 (zerolapped spool); <50 (overlapped spool)
Static / Dynamic		
Step Response at 100% Step [3]	**[ms]**	<3.5
Frequency Response (±5% signal) [3]	**[Hz]**	350 (amplitude ratio -3dB), 350 (phase lag -90°)
Hysteresis	**[%]**	<0.05
Sensitivity	**[%]**	<0.03
Temperature Drift	**[%/K]**	<0.025
Electrical		
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/Ripple	**[V]**	DC 22 ... 30, ripple <5% eff., surge free
Current Consumption Maximum	**[A]**	3.5
Pre-Fusing	**[A]**	4.0 medium lag
Input Signal		
Voltage	**[V]**	10...0...-10, ripple <0.01% eff., surge free, 0...+10V P->A
Impedance	**[kOhm]**	100
Current	**[mA]**	20...0...-20, ripple <0.01% eff., surge free, 0...+20mA P->A
Impedance	**[Ohm]**	250
Current	**[mA]**	4...12...20, ripple <0.01% eff., surge free, 12...20mA P->A <3.6 mA = disable, >3.8 mA = according to NAMUR NE43
Impedance	**[Ohm]**	250
Differential Input Maximum		
Code 0	**[V]**	30 for terminal D and E against PE (terminal G)
Code 5 / 7	**[V]**	30 for terminal 4 and 5 against PE (terminal ⏚)
Enable Signal (Only Code 5 / 7)	**[V]**	5...30, Ri = 9 kOhm
Diagnostic Signal	**[V]**	+10...0...-10 / +Ub, rated max. 5mA
EMC		EN61000-6-2 / EN61000-6-4
Electrical Connection	**Code 0**	6 + PE acc. EN 175201-804
	Code 5	11 + PE acc. EN 175201-804
	Code 7	6 + PE + Enable
Wiring Miniimum		
Code 0	**[mm²]**	7x1.0 (AWG 18) overall braid shield
Code 5	**[mm²]**	12x1.0 (AWG 20) overall braid shield
Code 7	**[mm²]**	12x1.0 (AWG 18) overall braid shield
Wiring Length Maximum	**[m]**	50 (164 ft.)

[1] For applications with pT>35 Bar (508 PSI) the Y-port has to be connected and the plug in the Y-port has to be removed.

[2] Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

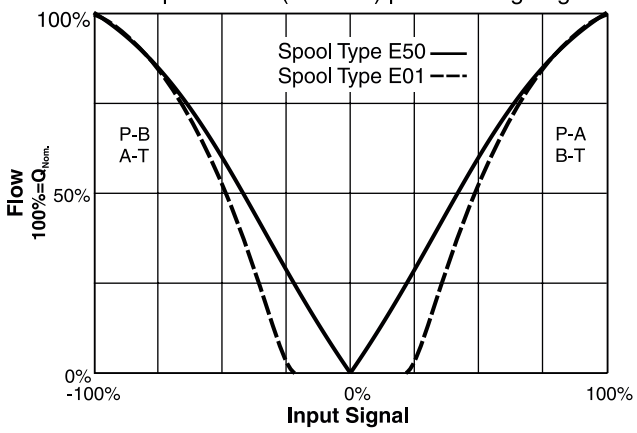
[3] Measured with load 100 Bar (1450 PSI) pressure drop/two control edges.

Functional Limit
at 25%, 50%, 75% and 100%
Command Signal

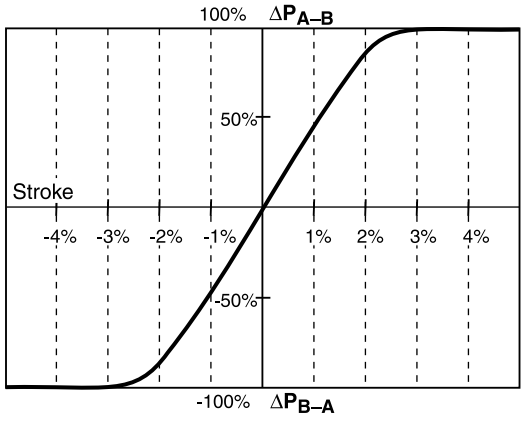


Spool Type **E01/E50**

Flow Curves
at Δp = 35 Bar (508 PSI) per metering edge

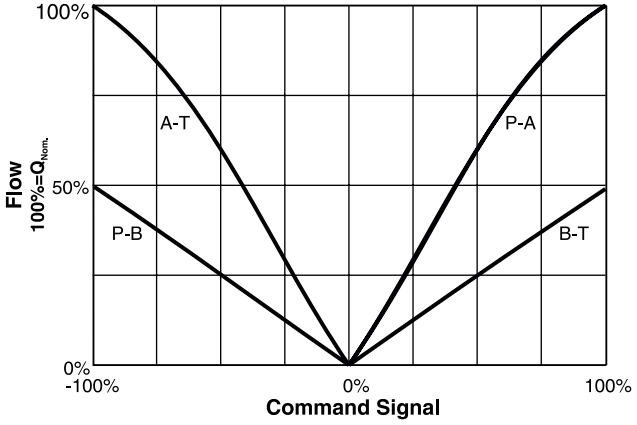


Pressure Gain

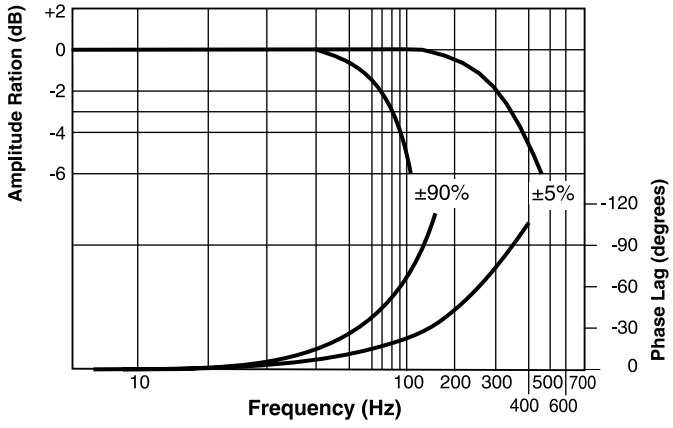


Spool Type **B60**

Flow Curves
at Δp = 35 Bar (508 PSI) per metering edge

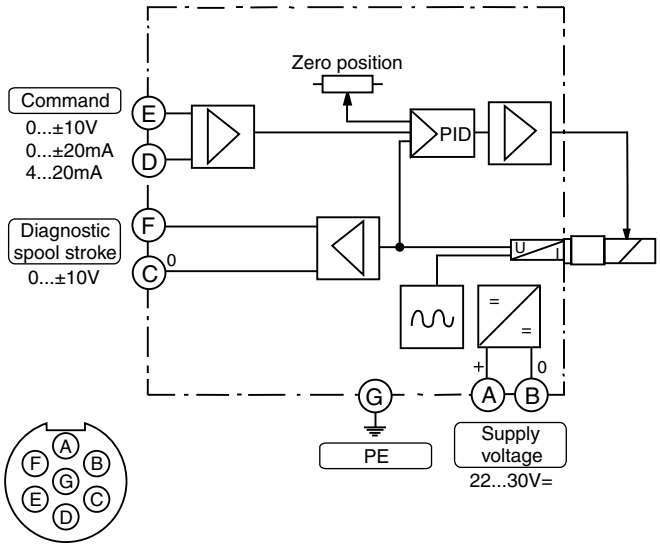


Frequency Response
±5% Command Signal
±90% Command Signal

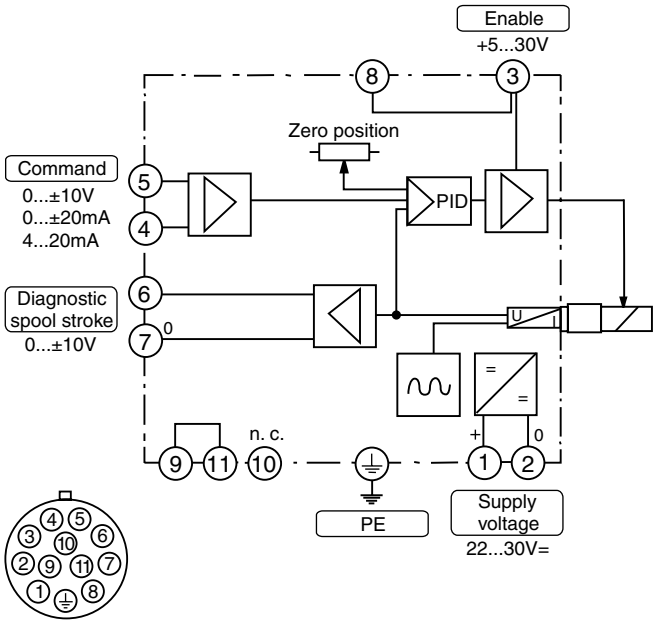


Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Code 0
6 + PE acc. to EN 175201-804

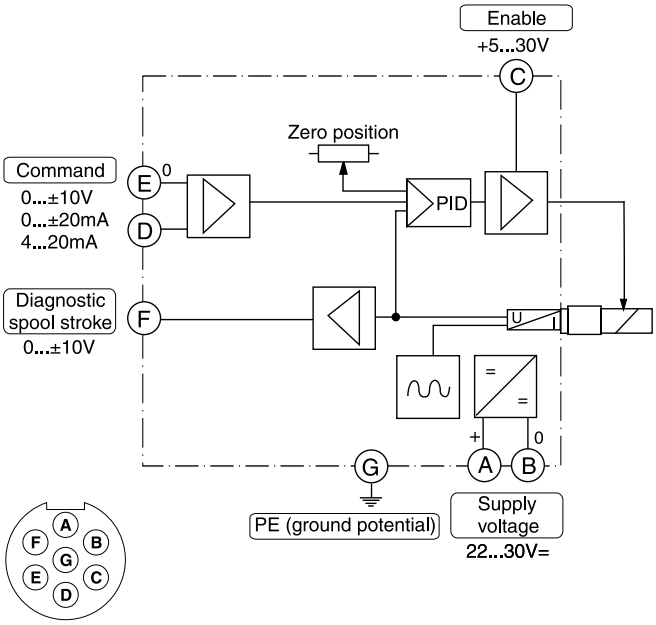


Code 5
11 + PE acc. to EN 175201-804

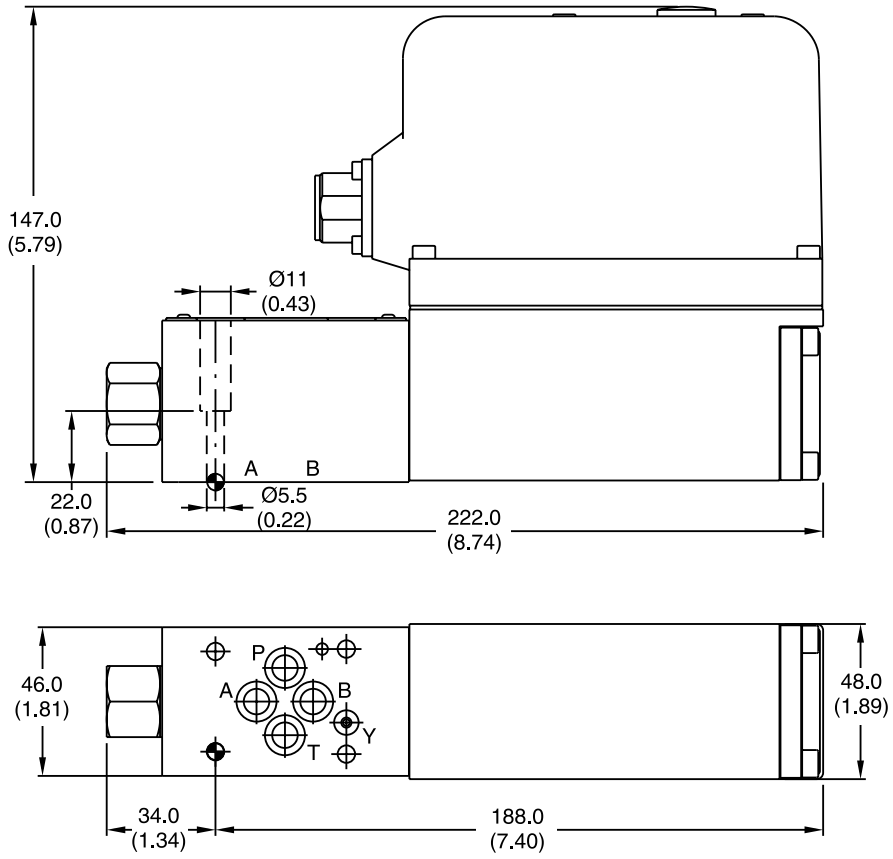


Note: When replacing another valve, verify Pin C is 0 V and not wired as an enable.

Code 7
6 + PE + Enable acc. to EN 175201-804



Inch equivalents for millimeter dimensions are shown in (**)



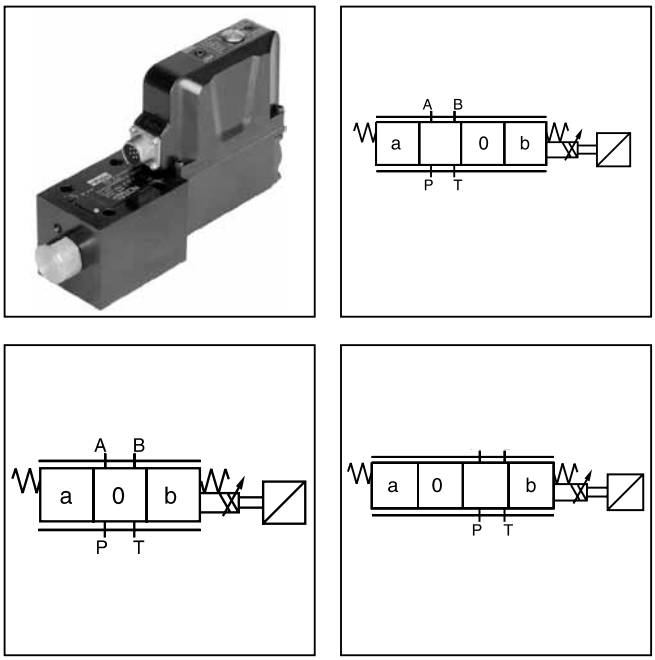
Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK375 BK209	4x M5x30 DIN 912 12.9 4x 10-24x1.25	7.6 Nm (5.6 lb.-ft.) ±15 %	Nitrile: SK-D1FP Fluorocarbon: SK-D1FP-V for HFC Fluid: SK-D1FP-H

General Description

Series D3FP direct operated control NG10 (CETOP 5) valve features extremely high dynamics combined with maximum flow. It is used for high accuracy positioning of a hydraulic axis, and for controlling force and velocity.

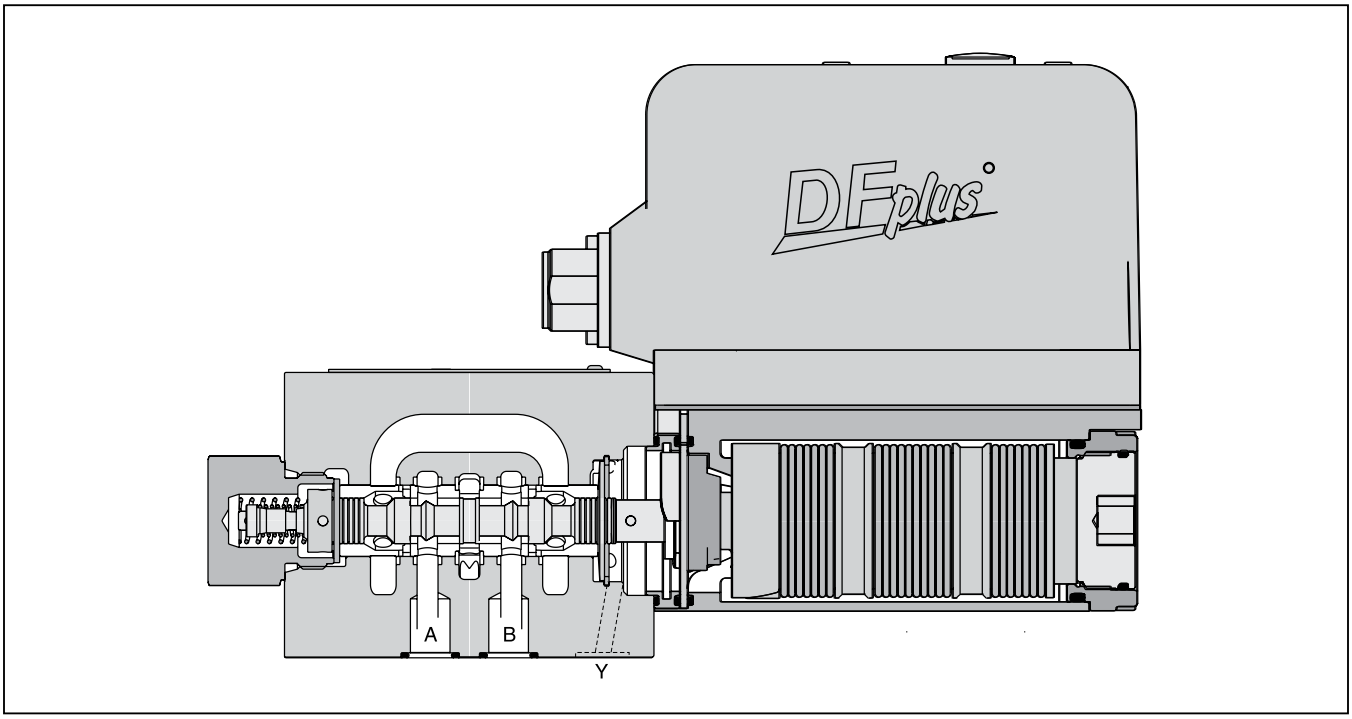
Driven by the new patented VCD® actuator, the D3FP reaches the frequency response of servovalves.

At power-down the spool moves in a defined position. All common input signals are available.

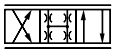
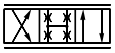
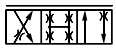
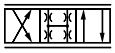
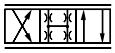
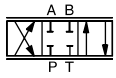
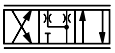


Features

- Extremely high dynamics.
- Maximum tank pressure 250 Bar (3600 PSI) with external drain Y-port.
- Defined spool positioning at power down.
- Onboard electronics.
- Spool/Sleeve design.

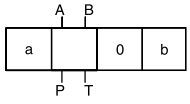
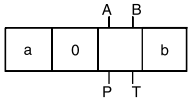
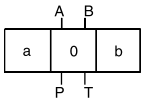


D	3	F	P	☐	☐	9	☐	☐	☐	0	⌜⌝
Directional Control Valve	Size DIN NG10 CETOP 5 NFPA D05	Proportional Control	VCD	Spool Type	Spool Position on Power Down [1]	Y-Port Plugged [4]	Seal	Input Signal	Options	Spool/ Sleeve Design	Design Series NOTE: Not required when ordering.

Code	Spool	Flow LPM (GPM) at Δp 35 Bar (508 PSI) per metering edge
Zerolap		
E50Y		100 (26.5)
E50P		50 (13.2)
B60Y	$Q_B = Q_A/2$	100 (26.5)
B60P	$Q_B = Q_A/2$ 	50 (13.2)
Underlap approximately -0.5%		
E55Y		100 (26.5)
E55P		50 (13.2)
Overlap 18%		
E01Y E01P		100 (26.5) 50 (13.2)
E02Y E02P		100 (26.5) 50 (13.2)
B31Y B31P		100 / 50 (26.5 / 13.2) 50 / 25 (13.2 / 6.6)
B32Y B32P		100 / 50 (26.5 / 13.2) 50 / 25 (13.2 / 6.6)

Code	Description
N	Nitrile
V	Fluorocarbon
H	For HFC Fluid

Code	Description
0	6 + PE acc. EN175201-804
5	11 + PE acc. EN175201-804
7	6 + PE + Enable

Code	Spool Position on Power Down
A [2]	
B [2]	
C [3]	

Code	Signal	Flow Direction [5]
B	+/- 10V	0...+10V -> P-A
E	+/- 20mA	0...+20mA -> P-A
S	4...20mA	12...20mA -> P-A

[1] On power down the spool moves in a defined position. This cannot be guaranteed in case of single flow path on the control edge A→ T resp. B→ T with pressure drops above 120 Bar (1740 PSI) or contamination in the hydraulic fluid.

[2] Approximately 10% opening, only available with zerolap spools and underlap spools.

[3] Only available with overlap spools.

[4] Needs to be removed at tank pressure >35 Bar (507.5 PSI).

[5] Flow direction P→ A with Pin D > Pin E.

Bolt Kit:
BK98 (4) 1/4-20x1.62
BK385 (4) M6x40
Weight: 6.5 kg (14.3 lbs.)

Please order plugs separately. See Accessories.

General		
Design		Direct operated proportional DC valve
Actuation		VCD® actuator
Size		NG10 / CETOP 5 / NFPA D05
Mounting Interface		DIN 24340 / ISO 4401 / CETOP RP121 / NFPA
Mounting Position		Unrestricted
Ambient Temperature	**[°C]**	-20...+50; (-4°F...+122°F)
MTTF$_D$ Value	**[years]**	75
Vibration Resistance	**[g]**	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27
Hydraulic		
Maximum Operating Pressure		Ports P, A, B 350 Bar (5075 PSI) Port T max. 250 Bar (3600 PSI), port Y max. 35 Bar (508 PSI) [1]
Fluid		Hydraulic oil as per DIN 51524...51535, other on request
Fluid Temperature	**[°C]**	-20...+60; (-4°F...+140°F)
Viscosity		
Permitted	**[cSt] / [mm²/s]**	20...380 (93...1761 SSU)
Recommended	**[cSt] / [mm²/s]**	30...80 (139...371 SSU)
Filtration		ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)
Nominal Flow at Δp=35 Bar (508 PSI) per Control Edge [2]		50 LPM (13.2 GPM) / 100 LPM (26.5 GPM)
Flow Maximum		150 LPM (39.7 GPM)
Leakage at 100 Bar (1450 PSI)	**[ml/min]**	<400 (zerolap spool); <50 (overlap spool)
Static / Dynamic		
Step Response at 100% Step [3]	**[ms]**	<6
Frequency Response (±5% signal) [3]	**[Hz]**	350 (amplitude ratio -3dB), 350 (phase lag -90°)
Hysteresis	**[%]**	<0.05
Sensitivity	**[%]**	<0.03
Temperature Drift	**[%/K]**	<0.025
Electrical		
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/Ripple	**[V]**	DC 22 ... 30, ripple <5% eff., surge free
Current Consumption Maximum	**[A]**	3.5
Pre-Fusing	**[A]**	4.0 medium lag
Input Signal		
Voltage	**[V]**	10...0...-10, ripple <0.01% eff., surge free, 0...+10V P->A
Impedance	**[kOhm]**	100
Current	**[mA]**	20...0...-20, ripple <0.01% eff., surge free, 0...+20mA P->A
Impedance	**[Ohm]**	250
Current	**[mA]**	4...12...20, ripple <0.01% eff., surge free, 12...20mA P->A <3.6 mA = disable, >3.8 mA = according to NAMUR NE43
Impedance	**[Ohm]**	250
Differential Input Maximum		
Code 0	**[V]**	30 for terminal D and E against PE (terminal G)
Code 5 / 7	**[V]**	30 for terminal 4 and 5 against PE (terminal ⏚)
Voltage References:		Not a powered output Only for 10K Ohm pots
Enable Signal (Only Code 5 / 7)	**[V]**	5...30, Ri = 9 kOhm
Diagnostic Signal	**[V]**	+10...0...-10 / +Ub, rated max. 5mA
EMC		EN61000-6-2 / EN61000-6-4
Electrical Connection	**Code 0**	6 + PE acc. EN 175201-804
	Code 5	11 + PE acc. EN 175201-804
	Code 7	6 + PE + Enable
Wiring Minimum	**Code 0** **[mm²]**	7x1.0 (AWG 18) overall braid shield
	Code 5 **[mm²]**	12x1.0 (AWG 20) overall braid shield
	Code 7 **[mm²]**	12x1.0 (AWG 18) overall braid shield
Wiring Length Maximum	**[m]**	50 (164 ft.)

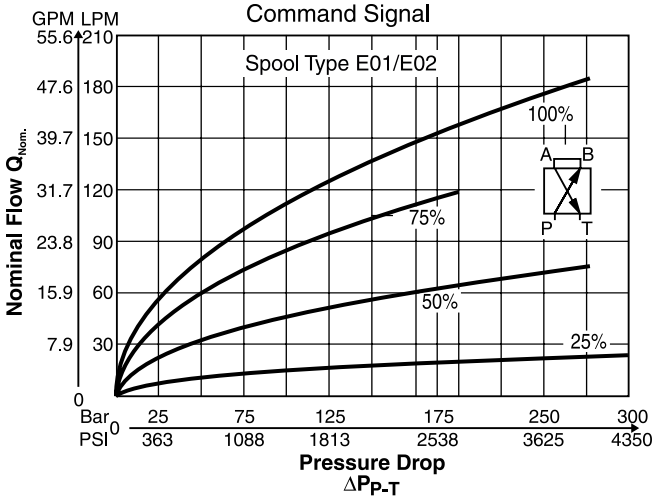
[1] For applications with pT>35 Bar (508 PSI) the Y-port plug must be removed and the Y-port connected to tank.

[2] Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

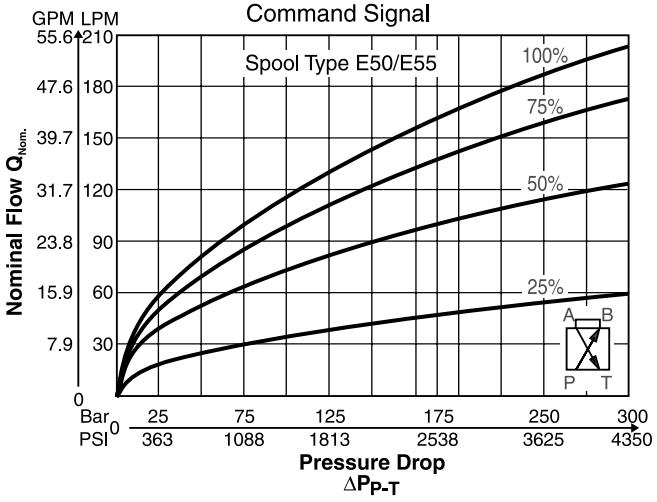
$$\Delta P_{Nom.} \cdot \left(\frac{Qx}{Q_{Nom.}}\right)^2 = \Delta Px$$

[3] Measured with load 100 Bar (1450 PSI) pressure drop/two control edges)

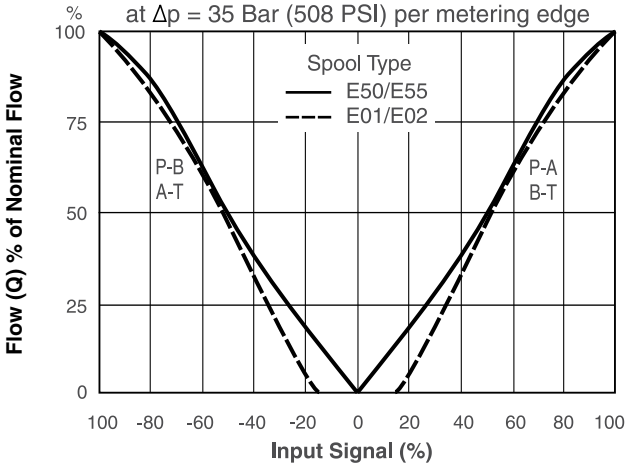
Functional Limit
at 25%, 50%, 75% and 100% Command Signal



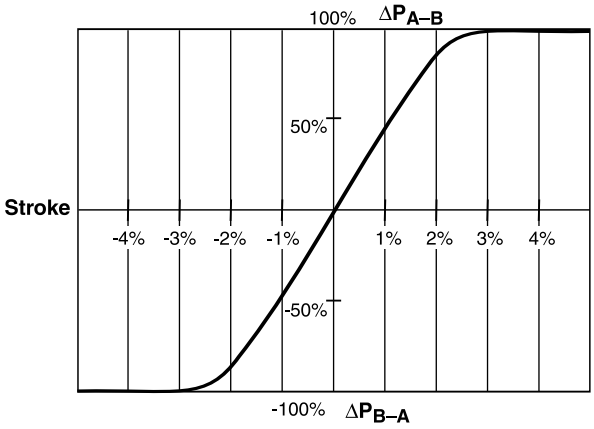
Functional Limit
at 25%, 50%, 75% and 100% Command Signal



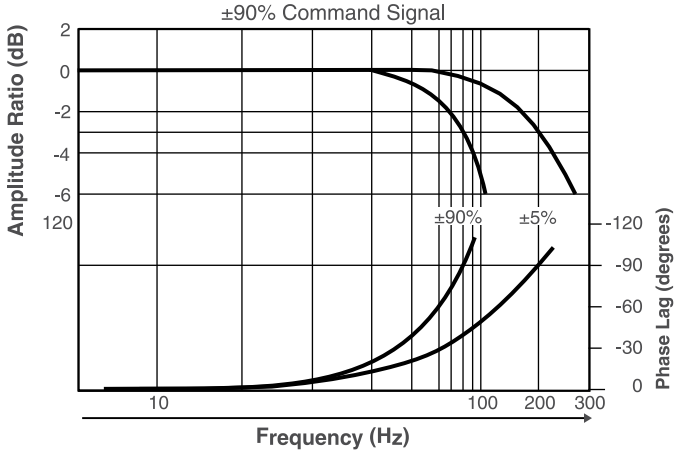
Flow Curves
at Δp = 35 Bar (508 PSI) per metering edge



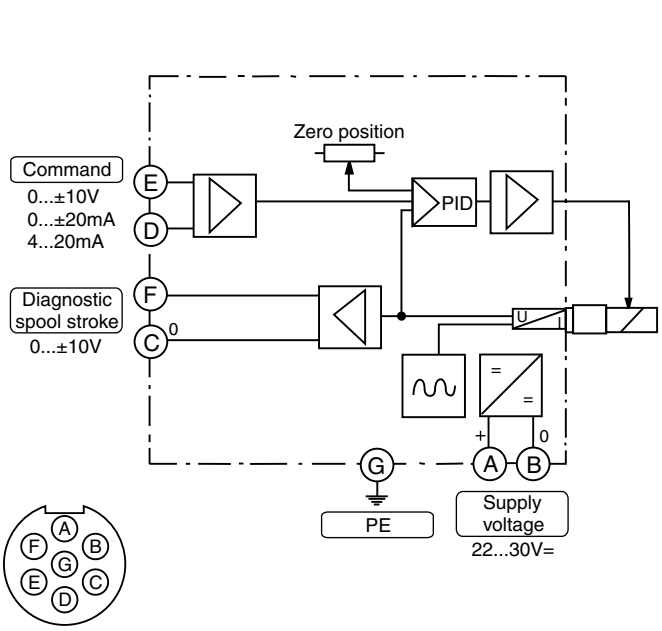
Pressure Gain



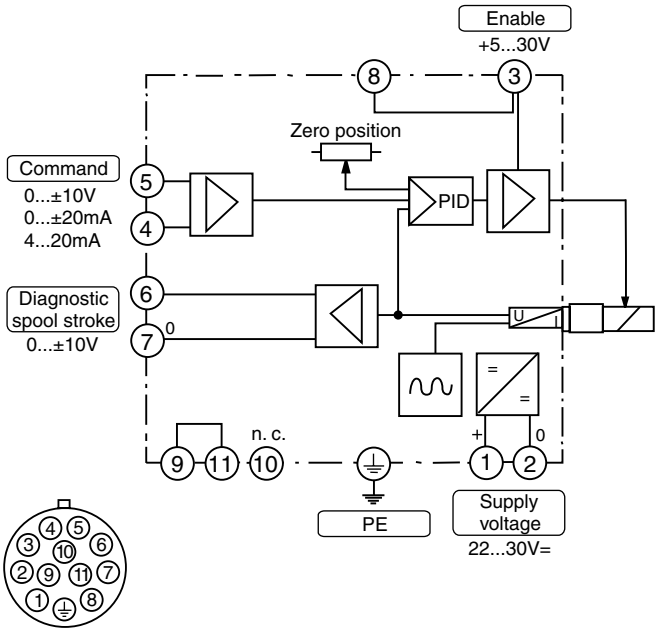
Frequency Response
±5% Command Signal
±90% Command Signal



Code 0
6 + PE acc. to EN 175201-804

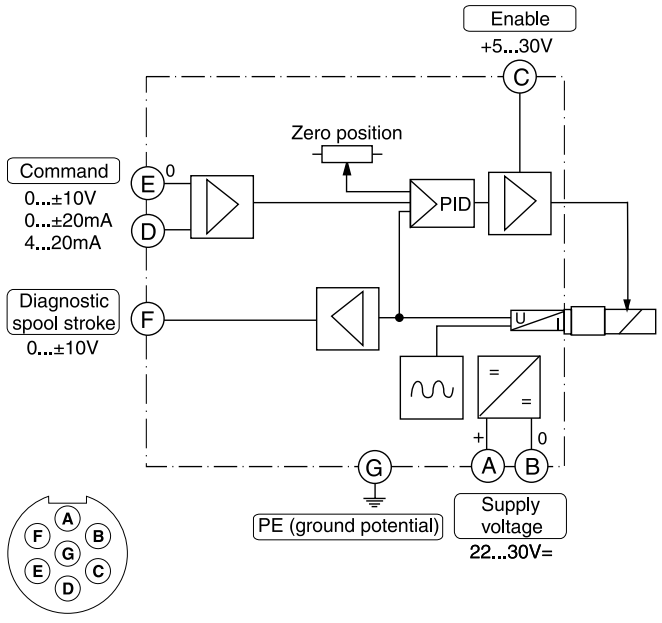


Code 5
11 + PE acc. to EN 175201-804

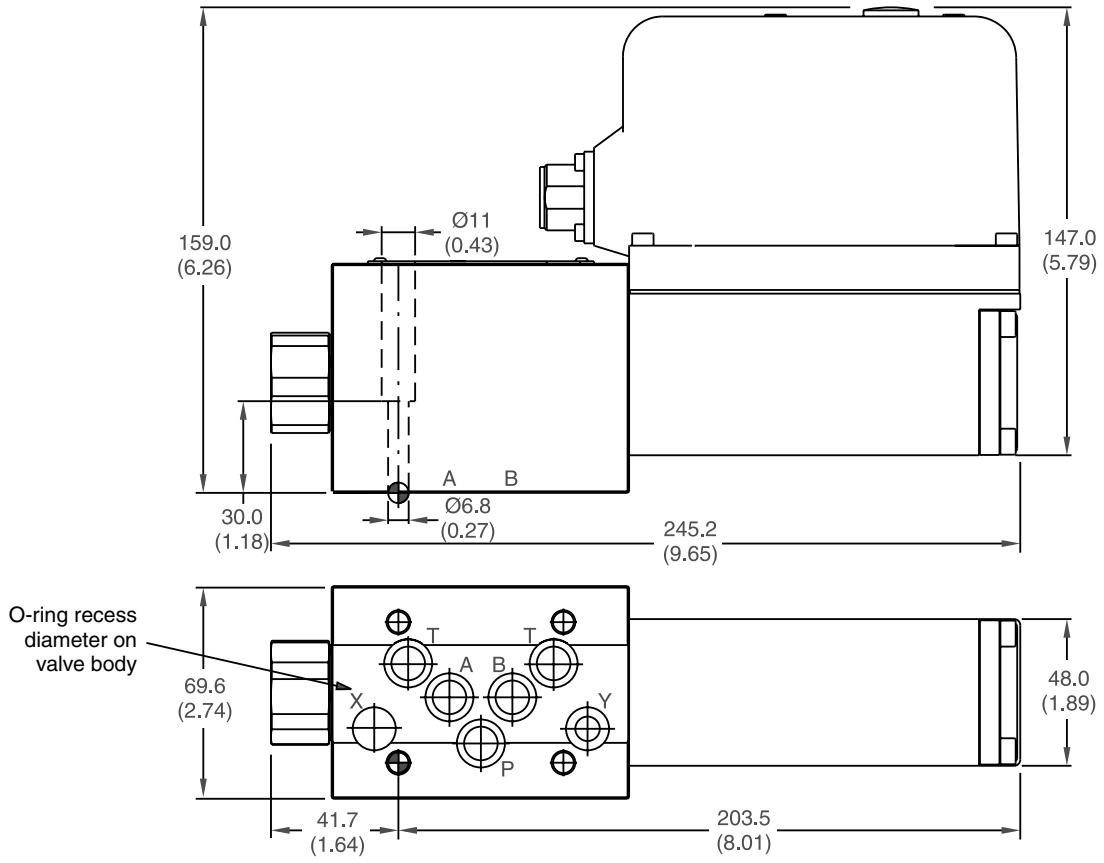


Note: When replacing another valve, verify Pin C is 0 V and not wired as an enable.

Code 7
6 + PE + Enable acc. to EN 175201-804



Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D3FP Fluorocarbon: SK-D3FP-V for HFC Fluid: SK-D3FP-H

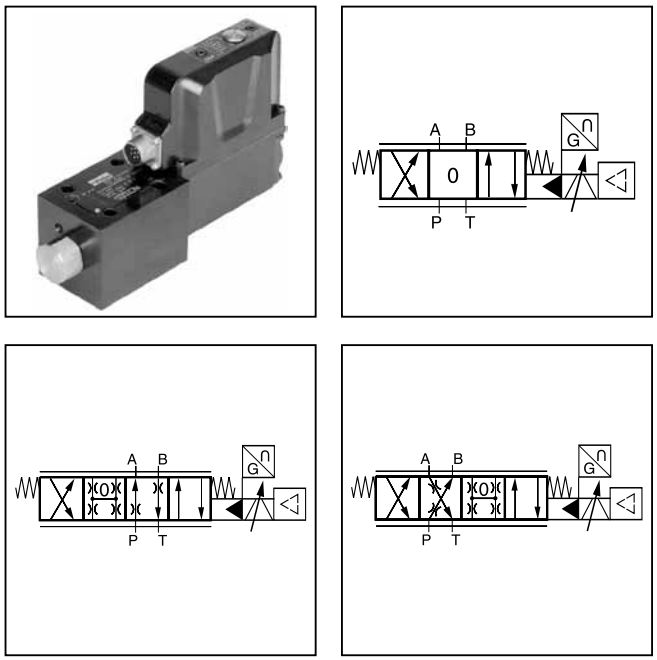
Return to ALPHA TOC
Return to SECTION TOC
A

General Description

Series D30FP pilot operated control valve closes the gap between the direct operated D3FP valves and the conventional pilot operated D31FP valves.

Providing high flow capacity and practically no flow limits like D31FP in the envelope size of the D3FP.

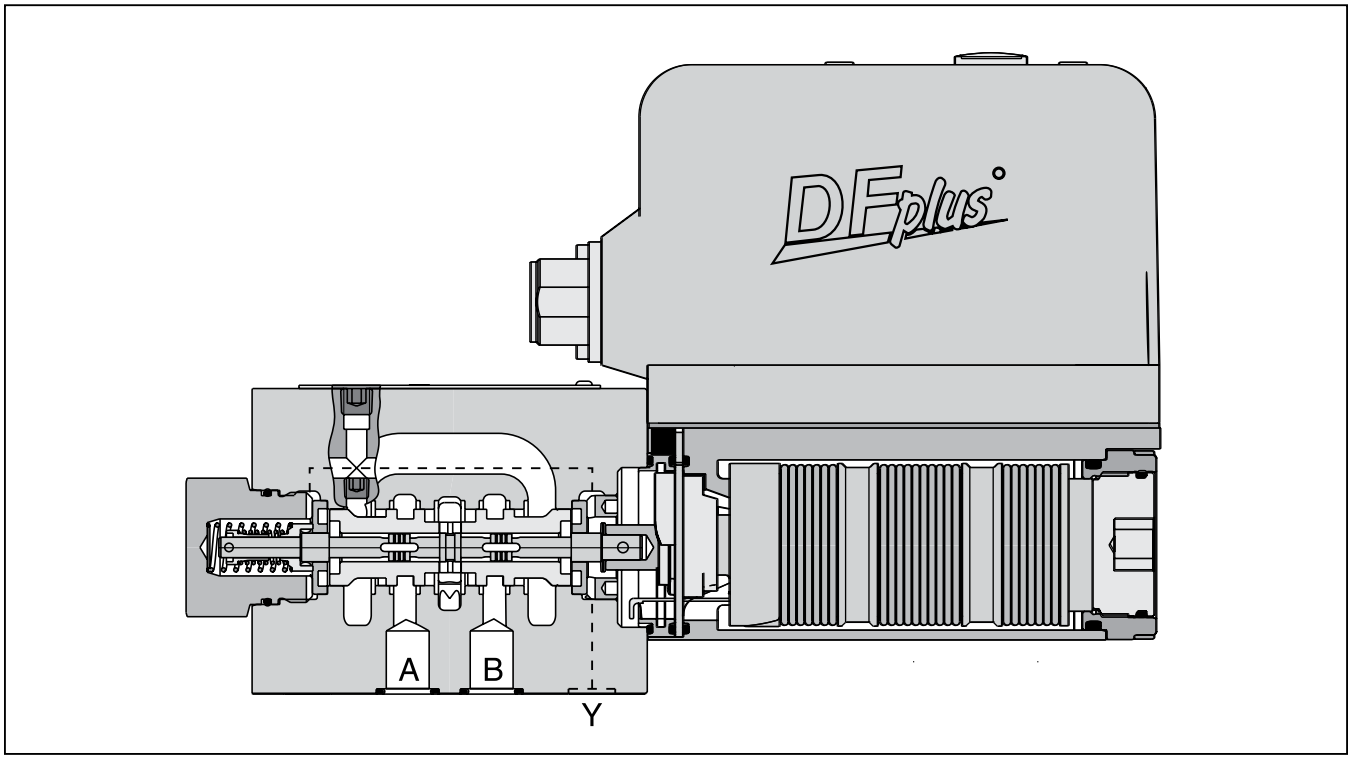
The valve works with the hydraulic follower principle, with a moving sleeve as main spool.



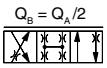
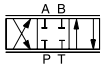
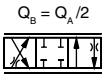
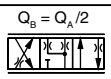
Features

- Pilot operated with hydraulic follower sleeve.
- No flow limit up to 350 bar through the valve.
- Defined spool positioning at power down.

CE



D	30	F	P	☐	☐	☐	☐	☐	3	⌜ ⌟
Directional Control Valve	Size DIN NG10 CETOP 5 NFPA D05	Proportional Control	VCD	Spool Type	Spool Position on Power Down	Pilot Connection	Seal	Input Signal	Options	Spool/ Sleeve Design	Design Series NOTE: Not required when ordering.

Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
Zerolap		
E50U		80 (21.2)
B60U	$Q_B = Q_A/2$ 	80 (21.2)
Overlap 18%		
E01U	A B T T P T 	80 (21.2)
E02U		80 (21.2)
B31U	$Q_B = Q_A/2$ 	80 (21.2)
B32U	$Q_B = Q_A/2$ 	80 (21.2)

Code	Description
N	Nitrile
V	Fluorocarbon

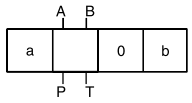
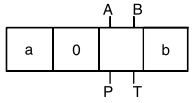
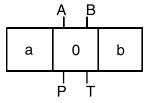
Code	Description
0	6 + PE acc. EN175201-804
5	11 + PE acc. EN175201-804
7	6 + PE + Enable

Code	Inlet	Dain
1 [1]	Internal	External
4	Internal	Internal

[1] For tank pressure >35 Bar (508 PSI).

Code	Signal	Flow Direction [4]
B	+/- 10V	0...+10V -> P-A
E	+/- 20mA	0...+20mA -> P-A
S	4...20mA	12...20mA -> P-A

[4] Flow direction P→ A with Pin D > Pin E.

Code	Spool Position on Power Down
A [2]	
B [2]	
C [3]	

[2] Approximately 10% opening, only available with zerolap spools and underlap spools.

[3] Only available with overlap spools.

Please order plugs separately. See Accessories.

Bolt Kit:

BK98	(4)	1/4-20x1.62
BK385	(4)	M6x40

Weight: 6.5 kg (14.3 lbs.)

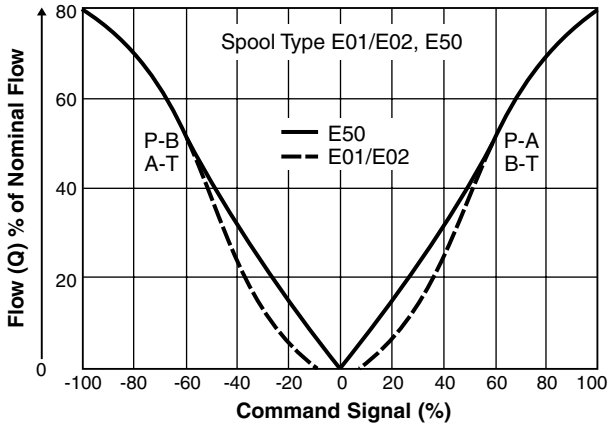
General		
Design		Pilot operated proportional DC valve
Actuation		VCD® actuator
Size		NG10 / CETOP 5 / NFPA D05
Mounting Interface		DIN 24340 / ISO 4401 / CETOP RP121 / NFPA
Mounting Position		Unrestricted
Ambient Temperature	**[°C]**	-20...+50; (-4°F...+122°F)
MTTF$_D$ Value	**[years]**	50
Vibration Resistance	**[g]**	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27
Hydraulic		
Maximum Operating Pressure		Ports P, A, B 350 Bar (5075 PSI) Port T 35 Bar (508 PSI) for internal drain, 250 Bar (3600 PSI) for external drain Port Y 35 Bar (508 PSI)
Fluid		Hydraulic oil as per DIN 51524...51535, other on request
Fluid Temperature	**[°C]**	-20...+60; (-4°F...+140°F)
Viscosity		
Permitted	**[cSt] / [mm²/s]**	20...380 (93...1761 SSU)
Recommended	**[cSt] / [mm²/s]**	30...80 (139...371 SSU)
Filtration		ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)
Nominal Flow at Δp=5 Bar (72.5 PSI) per Control Edge [1]		80 LPM (21.2 GPM)
Flow Maximum		250 LPM (66.1 GPM)
Leakage at 100 Bar (1450 PSI)	**[ml/min]**	<1800 (zerolap spool); <1000 (overlap spool)
Pilot Supply Pressure		5 Bar (72.5 PSI) greater than the tank line pressure
Static / Dynamic		
Step Response at 100% Step [2]	**[ms]**	<7
Frequency Response (±5% signal) [2]	**[Hz]**	120 (amplitude ratio -3dB), 120 (phase lag -90°)
Hysteresis	**[%]**	<0.05
Sensitivity	**[%]**	<0.03
Temperature Drift	**[%/K]**	<0.025
Electrical		
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/Ripple	**[V]**	DC 22 ... 30, ripple <5% eff., surge free
Current Consumption Maximum	**[A]**	3.5
Pre-Fusing	**[A]**	4.0 medium lag
Input Signal **Voltage**	**[V]**	10...0...-10, ripple <0.01% eff., surge free, 0...+10V P->A
Impedance	**[kOhm]**	100
Current	**[mA]**	20...0...-20, ripple <0.01% eff., surge free, 0...+20mA P->A
Impedance	**[Ohm]**	250
Current	**[mA]**	4...12...20, ripple <0.01% eff., surge free, 12...20mA P->A
Impedance		<3.6 mA = disable, >3.8 mA = according to NAMUR NE43
	[Ohm]	250
Differential Input Maximum		
Code 0	**[V]**	30 for terminal D and E against PE (terminal G)
Code 5 / 7	**[V]**	30 for terminal 4 and 5 against PE (terminal ⏚)
Enable Signal (Only Code 5 / 7)	**[V]**	5...30, Ri = 9 kOhm
Diagnostic Signal	**[V]**	+10...0...-10 / +Ub, rated max. 5mA
EMC		EN 50081-2 / EN50082-2
Electrical Connection	**Code 0**	6 + PE acc. EN 175201-804
	Code 5	11 + PE acc. EN 175201-804
	Code 7	6 + PE + Enable
Wiring Minimum **Code 0**	**[mm²]**	7 x 1.0 (AWG 18) overall braid shield
Code 5	**[mm²]**	12 x 1.0 (AWG 20) overall braid shield
Code 7	**[mm²]**	12 x 1.0 (AWG 18) overall braid shield
Wiring Length Maximum	**[m]**	50 (164 ft.)

1) Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

2) Measured with load (100 Bar (1450 PSI) pressure drop/two control edges)

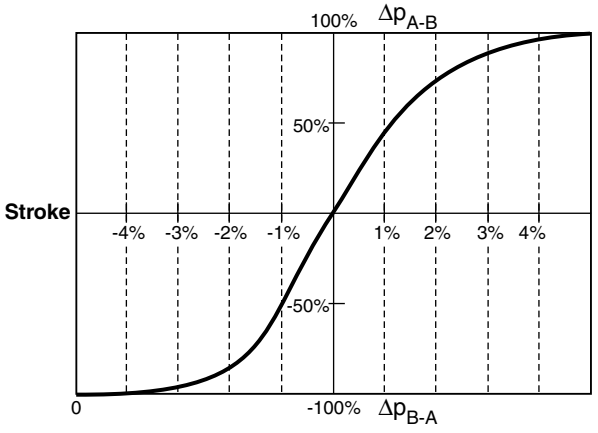
Flow

D30FP Flow Characteristics
at Δp = 5 Bar (72.5 PSI) / metering edge



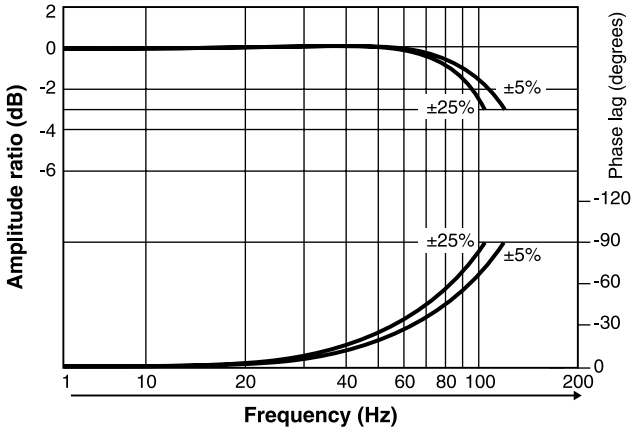
Pressure Gain

D30FP Pressure Gain

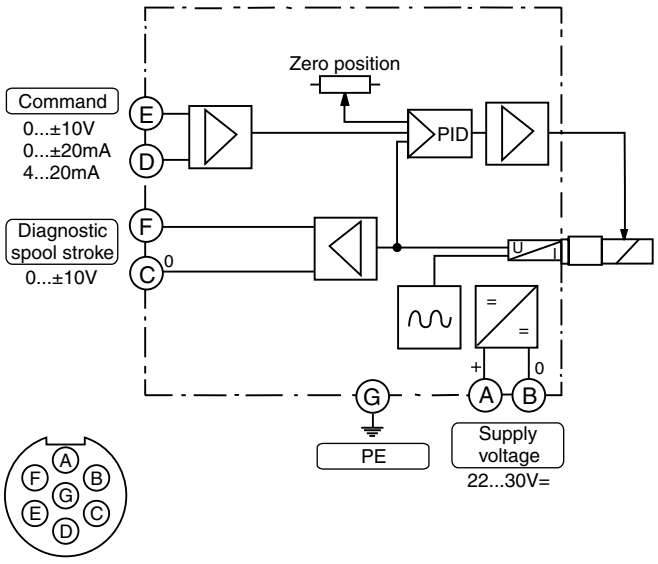


Frequency Response

D30FP Frequency Response
±5% / ±25% Command Signal



Code 0
6 + PE acc. to EN 175201-804



Code 5
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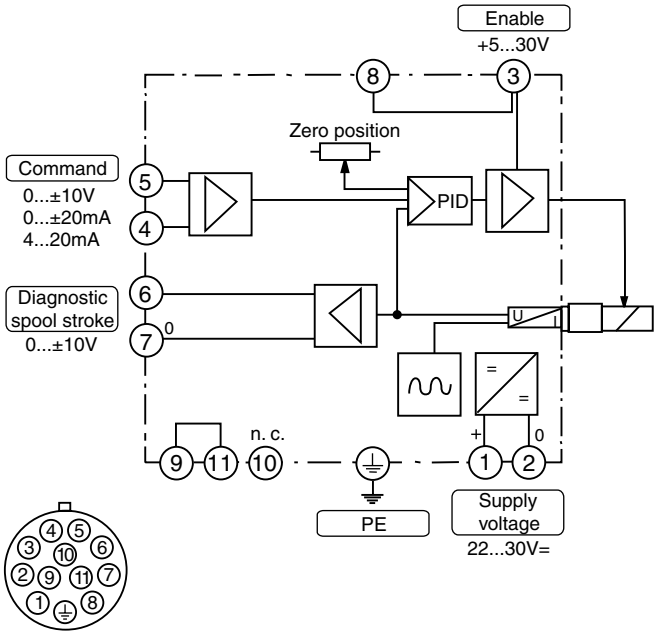
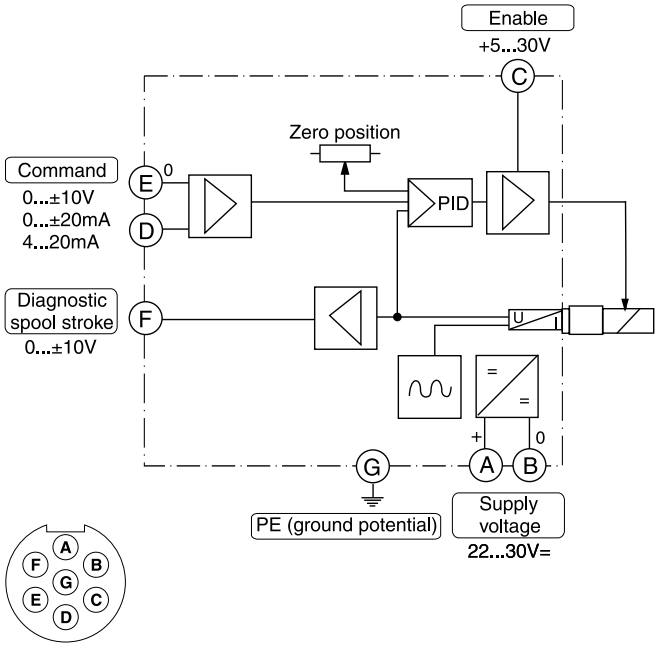
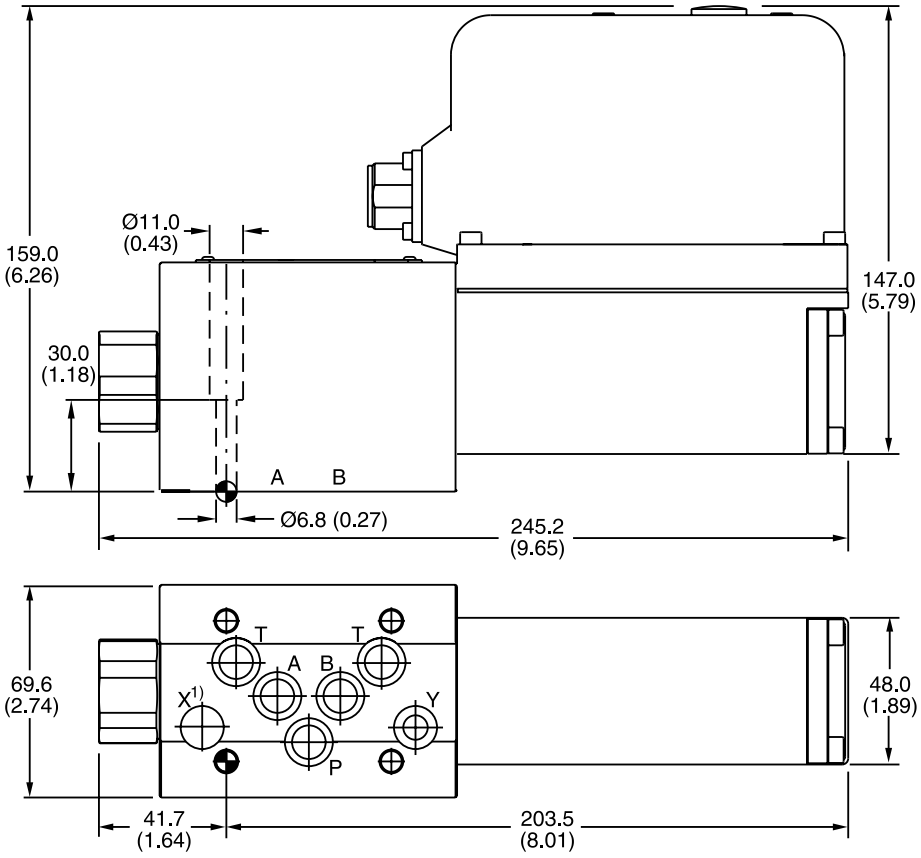


Code 7
6 + PE + Enable acc. to EN 175201-804



Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D3FP Fluorocarbon: SK-D3FP-V

General Description

Series D*1FP pilot operated servo proportional valves transfer the advantages of the Parker patented Voice Coil Drive (VCD®) to larger frame sizes for high flow rates. The high dynamic / high precision drive of the pilot valve allows the optimum control of the main spool and results in servo performance of the complete valve.

Series D*1FP is available in 5 sizes:

D31FP NG10 (CETOP 5)

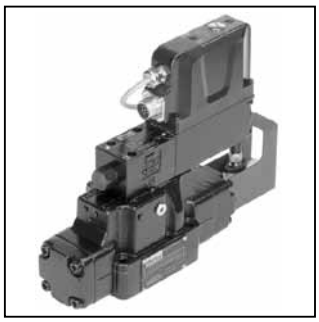
D41FP NG16 (CETOP 7)

D91FP NG25 (CETOP 8)
for port diameter up to 32 mm (1.26 in.)

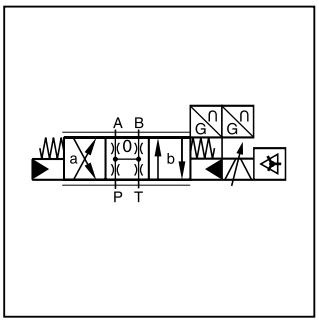
D111FP NG32 (CETOP 10)

The power down mode works with a safe 4th position of the D1FP pilot valve. This ensures that the main stage is hydraulically balanced at power down and allows the main spool spring to center (for overlapped spools), or approximately 10% spring offset to spool position A or B (for zerolap spools).

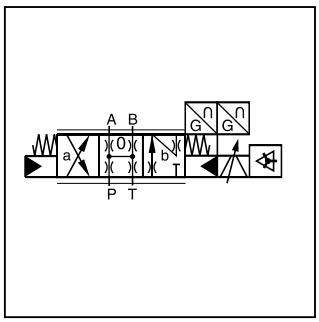
The innovative integrated regenerative function into the A-line (optional) allows new energy saving circuits for differential cylinders. The hybrid version can be switched between regenerative mode and standard mode at any time.



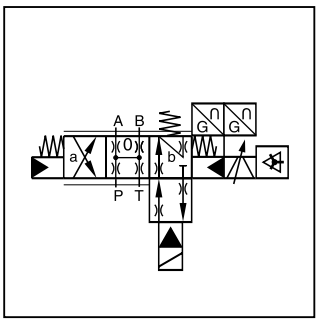
D41FP Standard



Standard D*1FPE



NEW: A-Regeneration D*1FPR



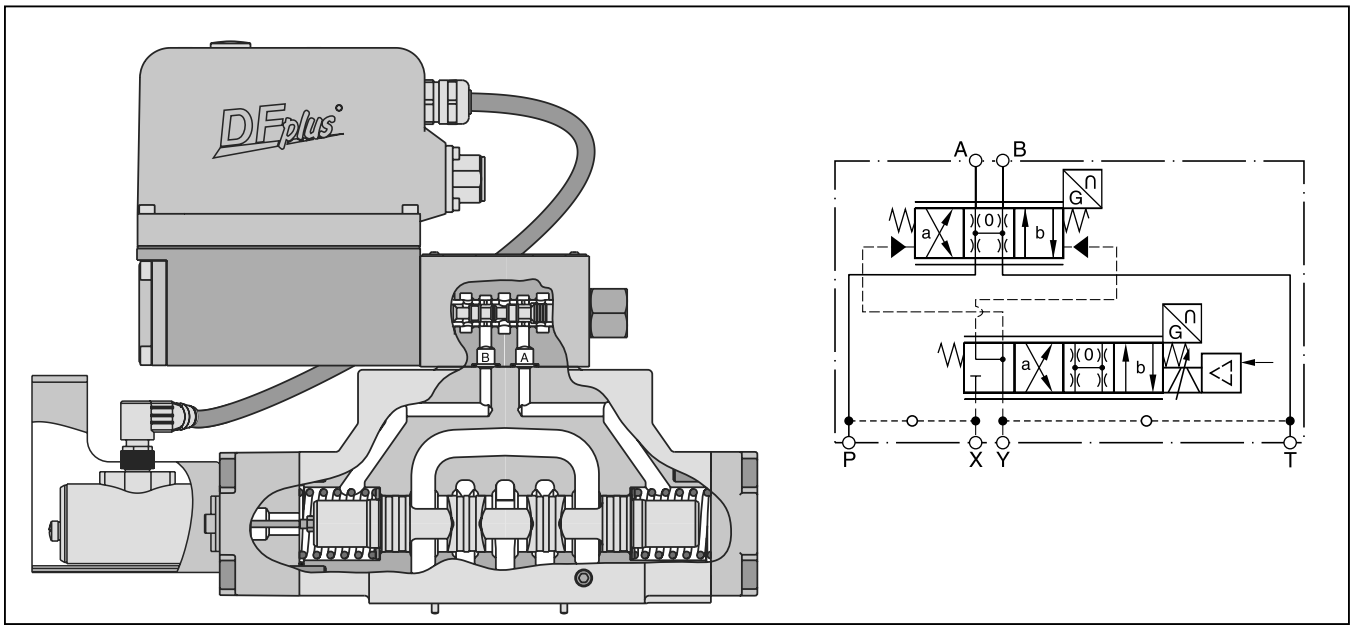
NEW: Hybrid D*1FPZ

Features

- High dynamics.
- High flow.
- Defined spool positioning at power-down – optional P-A/B-T or P-B/A-T or center position (for overlapped spools).
- Onboard electronics.
- Closed loop position – controlled pilot valve and main stage.
- **NEW:** Energy saving A-Regeneration.
- **NEW:** Switchable hybrid version.

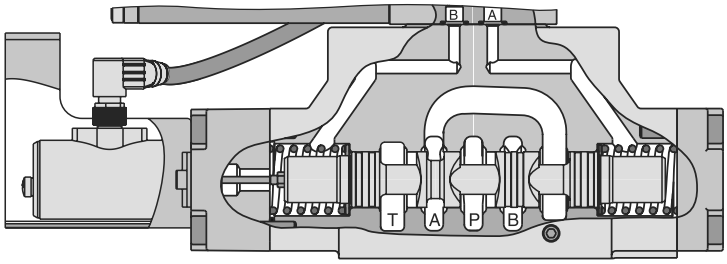
CE

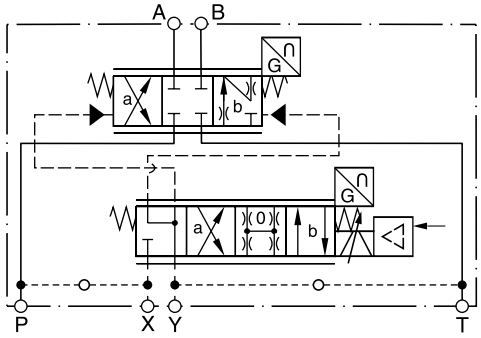
D41FPE52 (Standard)



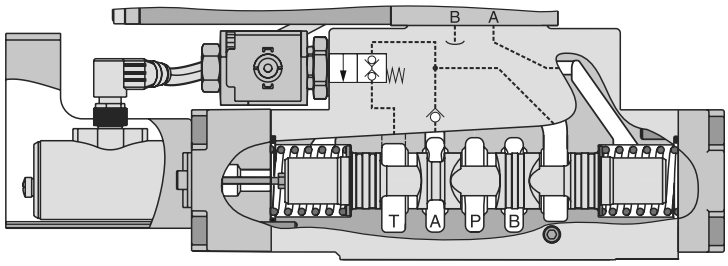
D*1FPR and D*1FPZ

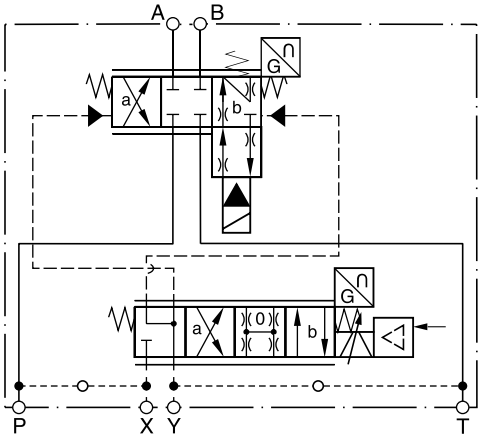
Regenerative Valve D*1FPR





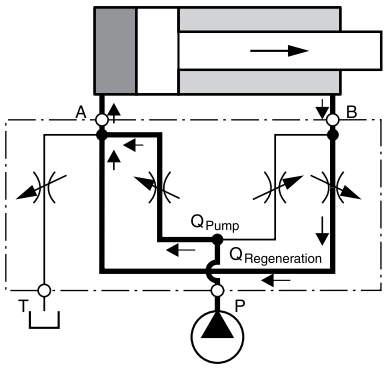
Hybrid Valve D*1FPZ





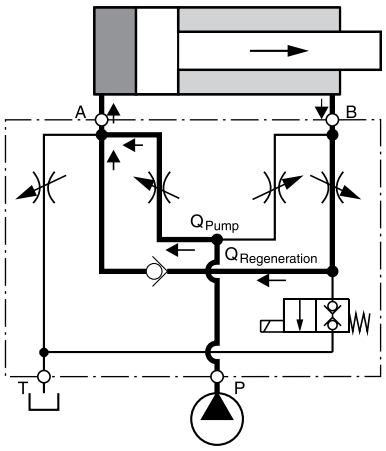
D*1FPR (Regenerative Valve)

Cylinder extending

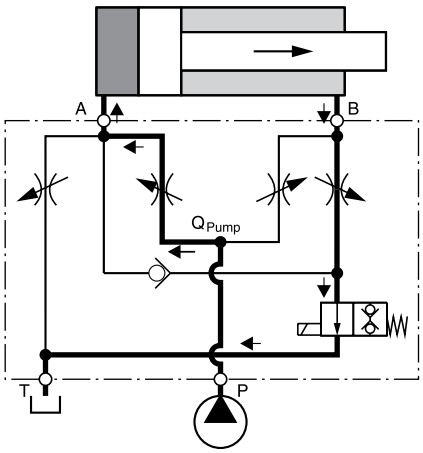


D*1FPZ (Hybrid Valve)

Cylinder extending
regenerative mode
(high speed)



Cylinder extending
standard mode
(high force)



Flow Rate in % of Nominal Flow

Size	Spool	Port					
		A-T	P-A	P-B	B-A (R-Valve)	B-A (Hybrid)	B-T (Hybrid)
D41FPR/Z	31/32/61	100%	50%	100%	50%	40%	20%
D91FPR/Z	31/32/61	100%	50%	100%	50%	50%	25%
D111FPR/Z	31/32/61	on request					

D		1	F	P										
Directional Control Valve	Size	NG6 Pilot	Proportional Control	High Response	Spool Type	Flow	Spool Position on Power Down	Pilot Connections	Seal	Input Signal	Options	Hybrid Options	Design Series	

NOTE: Not required when ordering.

Code	Description
3	NG10 / CETOP 5
4	NG16 / CETOP 7
9 [1]	NG25 / CETOP 8
11	NG32 / CETOP 10

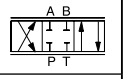
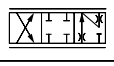
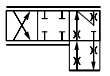
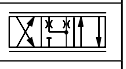
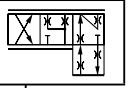
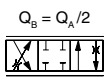
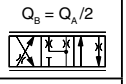
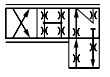
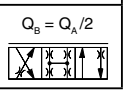
[1] For enlarged connections Ø 32 mm

Code	Inlet	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

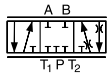
Code	Description
N	Nitrile
V	Fluorocarbon
H	For HFC fluid

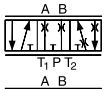
Code	Signal	Function
B	0...±10V	0...+10V P -> B
E	0...±20mA	0...+20mA P -> B
K	0...±10V	0...+10V P -> A
S	4...20mA	12...20mA P -> A

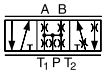
Code	Description
0	6+PE acc. EN175201-804
5	11+PE acc. EN175201-804
7	6+PE + Enable

Standard		NEW: Regenerative Function [4]		NEW: Hybrid Function [5]	
Code	Spool Type	Code	Spool Type	Code	Spool Type
Overlap 10%		Overlap 10%		Overlap 10%	
E01		R31		Z31	
E02		R32		Z32	
B31					
B32					
Zerolap		Zerolap		Zerolap	
E52		R61		Z61	
B61					

[4] Not available with D91FP.

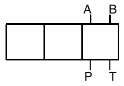
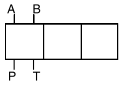
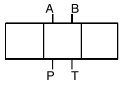
D31FP spool style: R31 

R32 

R61 

For regenerative and hybrid function at D31FP (NG10) please refer to solutions with sandwich and adapter plates: A10-1664 / A10-1665L / H10-1662 / H10-1666L.

[5] Not available in valve D31FP.

Code	Spool Position on Power Down
A [2]	
B [2]	
C [3]	

[2] Approx. 10% opening, only zerolap spools.
[3] Only overlap spools.

Code	Description
0	Standard
L [6]	Hybrid valve 24V normally closed for spool type Z

[6] See previous page for regenerative and hybrid spool information. (not available in D31FP)

Code	Flow LPM (GPM) at Δp = 5 Bar (72.5 PSI) per metering edge			
	D31	D41	D91	D111
D	90 (23.8)			
E	120 (32)	—	—	—
F	—	200 (53)	—	—
H	—	—	450 (119)	—
L	—	—	—	1000 (265)

Please order plugs separately. See Accessories.

Bolt Kit:

D31FP	BK98
D41FP	BK160
D91FP	BK228
D111FP	BK150

Weight:

D31FP	11.3 kg (24.9 lbs.)
D41FP	14.2 kg (31.3 lbs.)
D91FP	23.5 kg (51.8 lbs.)
D111FP	64.5 kg (142.2 lbs.)

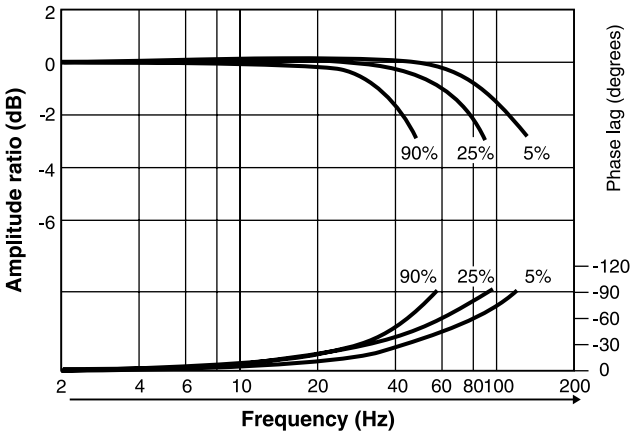
General					
Size		**NG10 (CETOP 5)**	**NG16 (CETOP 7)**	**NG25 (CETOP 8)**	**NG32 (CETOP 10)**
Mounting		DIN 24340 / ISO 4401 / CETOP RP121 / NFPA			
Mounting Position		Unrestricted			
Ambient Temperature Range		-20°C to +50°C (-4°F to +122°F)			
Hydraulic					
Maximum Operating Pressure		Internal Pilot Drain P, A, B, X: 350 Bar (5075 PSI); T, Y: 35 Bar (508 PSI) External Pilot Drain P, A, B, T, X: 350 Bar (5075 PSI); Y: 35 Bar (508 PSI)			
Fluid		Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature		-20°C to +60°C (-4°F to +140°F)			
Viscosity	**Permitted** **Recommended**	20 to 380 cSt / mm²/s (93 to 1761 SSU) 30 to 80 cSt / mm²/s (139 to 371 SSU)			
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Nominal Flow at Δp=5 Bar (72.5 PSI) per control edge [1]	**LPM (GPM)**	120 (32)	200 (53)	450 (119)	1000 (265)
Max. Recommended Flow Std	**LPM (GPM)**	250 (66)	600 (159)	1000 (265)	3000 (794)
Regenerative B-A /B-T		Depending on application, see flow curves			
Leakage at 100 Bar (1450 PSI)					
Overlap Spool	**LPM (GPM)**	0.2 (0.05)	0.2 (0.05)	0.6 (0.16)	1 (0.26)
Zerolap Spool	**LPM (GPM)**	0.9 (0.24)	0.9 (0.24)	1 (0.26)	—
Pilot	**LPM (GPM)**	< 1 LPM (0.26 GPM)			
Pilot Supply Pressure		20 Bar (290 PSI) to 350 Bar (5075 PSI)			
Pilot Flow, Step Response at 210 Bar (3045 PSI)	**LPM (GPM)**	10 (2.6)	12 (3.2)	24 (6.3)	40 (10.6)
Static / Dynamic					
Step Response at 100% Stroke [2]		10 ms	13 ms	19 ms	45 ms
Frequency Response ± 5% at 210 Bar (3045 PSI)	**Amplitude** **Phase**	28 Hz 118 HZ	95 Hz 95 Hz	95 Hz 90 Hz	40 Hz 75 Hz
Hysteresis		< 0.1%			
Sensitivity		< 0.05%			
Temperature Drift		< 0.025%			
Electrical					
Duty Ratio		100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible			
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)			
Supply Voltage / Ripple		22...30V, ripple < 0.5% eff., surge free			
Current Consumption		3.5 A maximum			
Input Signal	**Voltage**	+10...0...-10V, ripple < 0.01% eff., surge free, 0...+10V P→A			
	Impedance	100k Ohm			
	Current	4...12...20 mA, ripple < 0.01% eff., surge free, 12...20 mA P→A < 3.6 mA = enable off, > 3.8 mA = enable on acc. NAMUR NE43			
	Impedance	250 Ohm			
	Input Capacitance	1 nF, typical			
Differential Input Maximum	**Code 0**	30V for terminal D and E against PE (terminal G) 11V for terminal D and E against 0V (terminal B)			
	Code 5	30V for terminal 4 and 5 against PE (terminal W) 11V for terminal 4 and 5 against 0V (terminal 2)			
	Code 7	30V for terminal D and E against PE (terminal G)			
Enable Signal	**Code 5 / 7**	5...30V, Ri = 9 kOhm			
Diagnostic Signal		+10...0...-10V / +Ub, rated maximum 5 mA			
Pre-fusing		4.0 A medium lag			
EMC		EN 61000-6-2, EN 61000-6-4			
Electrical Connection	**Code 0 / 7** **Code 5**	6 + PE acc. EN 175201-804 11 + PE acc. EN 175201-804			
Wiring Min.	**Code 0 / 7** **mm²** **Code 5** **mm²**	7 x 1.0 (AWG16) overall braid shield 11 x 1.0 (AWG20) overall braid shield			
Wiring Length		50m (164 ft.) maximum			

[1] Flow rate for different Δp per control edge: $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

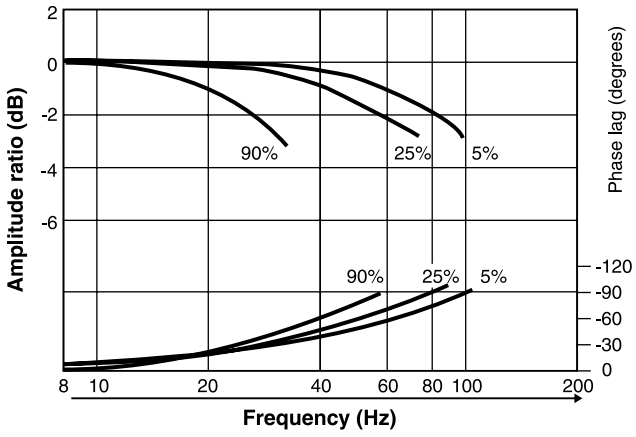
[2] Measured with load 210 Bar (3045 PSI) pressure drop; two control edges

Frequency Response

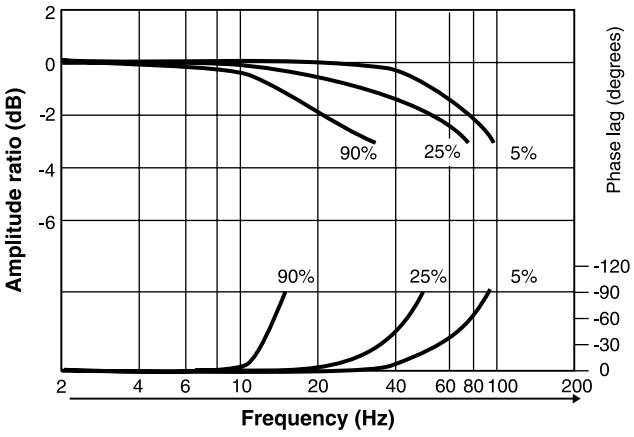
D31FP Frequency Response
±5% / ±25% / ±90% Command Signal
Dynamics at 210 Bar (3045 PSI) Pilot Supply Pressure



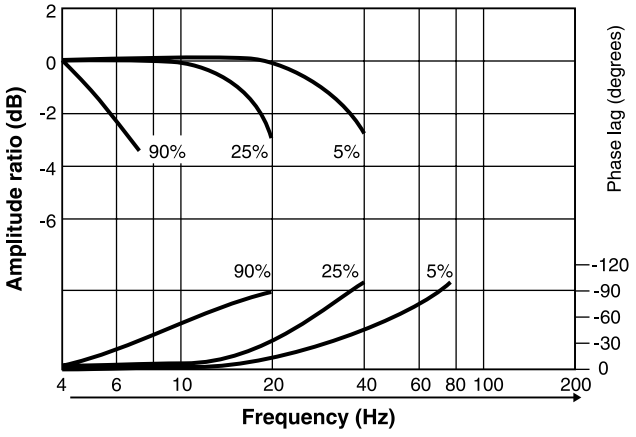
D41FP Frequency Response
±5% / ±25% / ±90% Command Signal
Dynamics at 210 Bar (3045 PSI) Pilot Supply Pressure



D91FP Frequency Response
±5% / ±25% / ±90% Command Signal
Dynamics at 210 Bar (3045 PSI) Pilot Supply Pressure

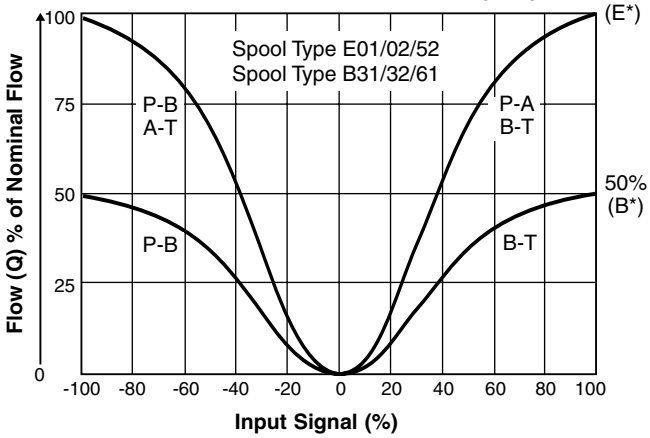


D111FP Frequency Response
±5% / ±25% / ±90% Command Signal
Dynamics at 210 Bar (3045 PSI) Pilot Supply Pressure

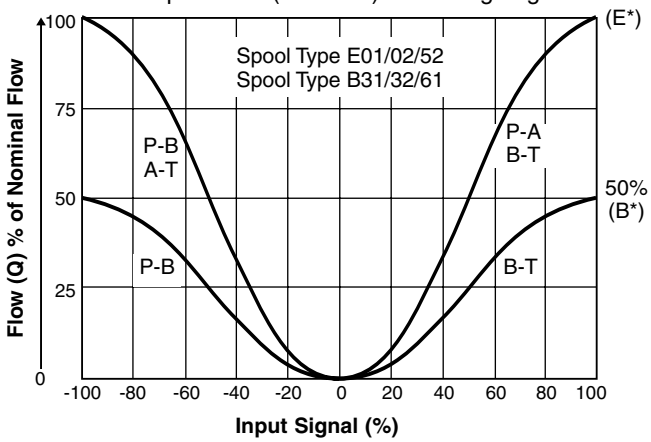


D*1FPB/E Flow

D31FP Flow Characteristics
at Δp = 5 Bar (72.5 PSI) / metering edge



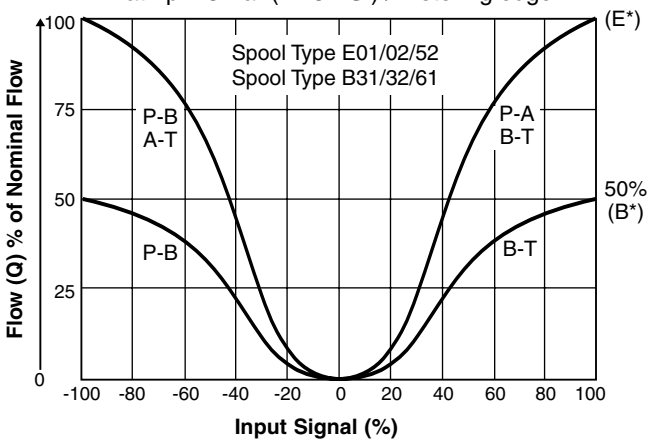
D41FP Flow Characteristics
at Δp = 5 Bar (72.5 PSI) / metering edge



D*1FPB/E Flow

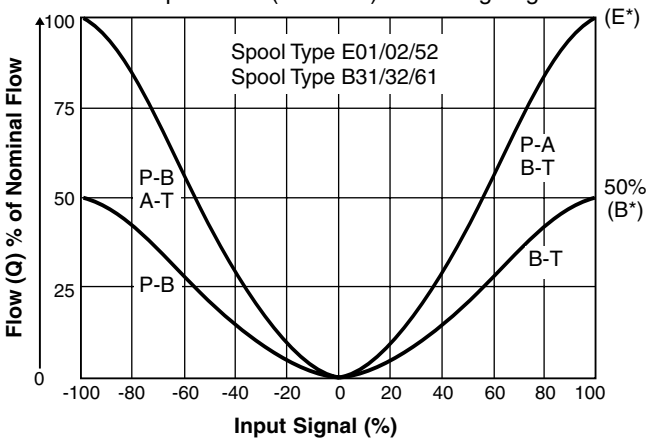
D91FP Flow Characteristics

at Δp = 5 Bar (72.5 PSI) / metering edge



D111FP Flow Characteristics

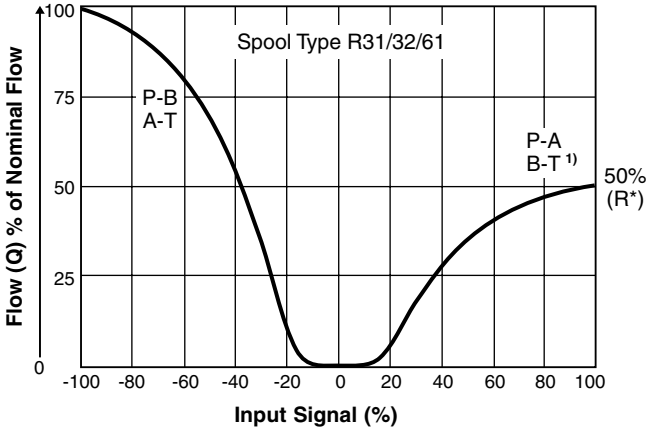
at Δp = 5 Bar (72.5 PSI) / metering edge



D*1FPR/Z Flow

D31FPR Flow Characteristics

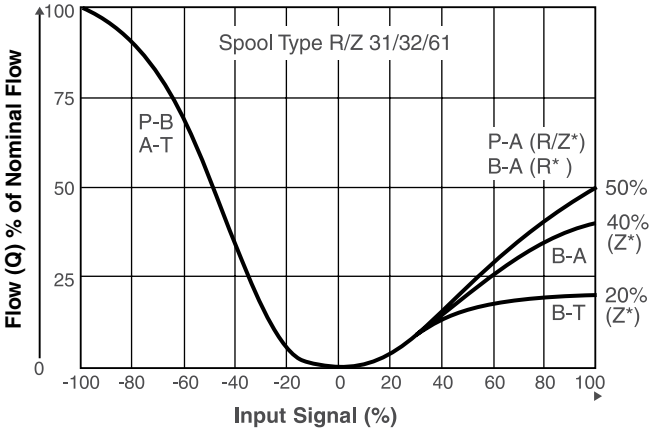
at Δp = 5 Bar (72.5 PSI) / metering edge



1) with 2 tank ports

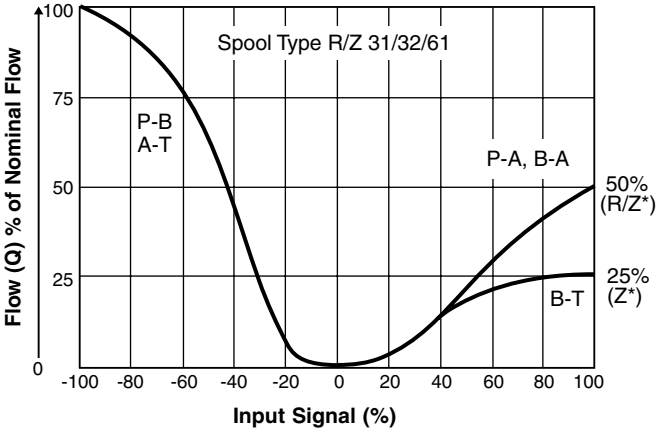
D41FPR/Z Flow Characteristics

at Δp = 5 Bar (72.5 PSI) / metering edge



D91FPR/Z Flow Characteristics

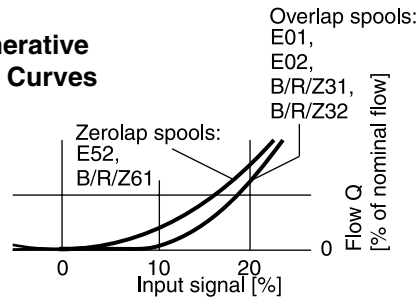
at Δp = 5 Bar (72.5 PSI) / metering edge



D111FP R/Z *

Spool Type R/Z* on request

Detail:
Standard, Regenerative and Hybrid Flow Curves

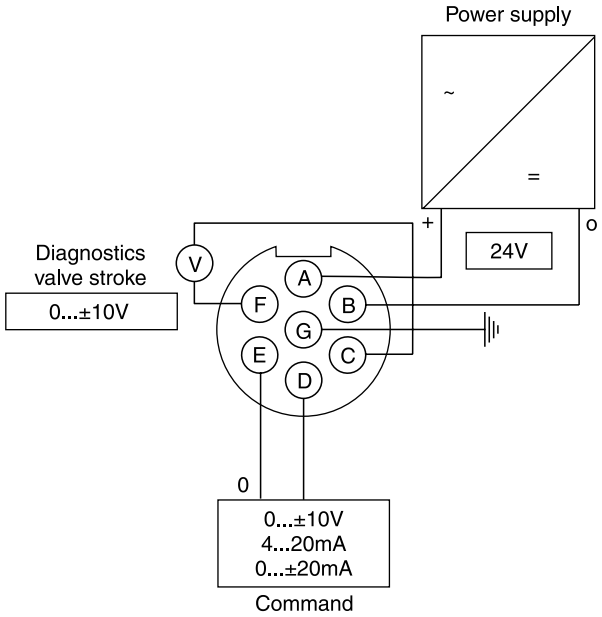


Electrical Specifications Hybrid Option

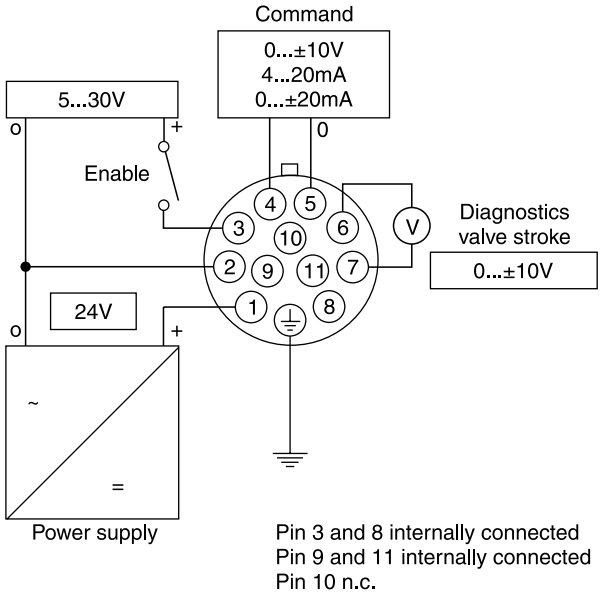
Duty Ratio		100%		
Protection Class		IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)		
		D41	**D91**	**D111**
Supply Voltage	**[V]**	24	24	24
Tolernace Supply Voltage	**[%]**	±10	±10	±10
Current Consumption	**[A]**	1.21	0.96	1.29
Power Consumption	**[W]**	29	23	31
Solenoid Connection		Connector as per EN 175301-803		
Wiring Minimum	**[mm²]**	3 x 1.5 recommended		
Wiring Length Maximum	**[m]**	50 (164 ft.) recommended		

With electrical connections the protective conductor (PE ⏚) must be connected according to the relevant regulations.

Code 0
6 + PE acc. EN 175201-804

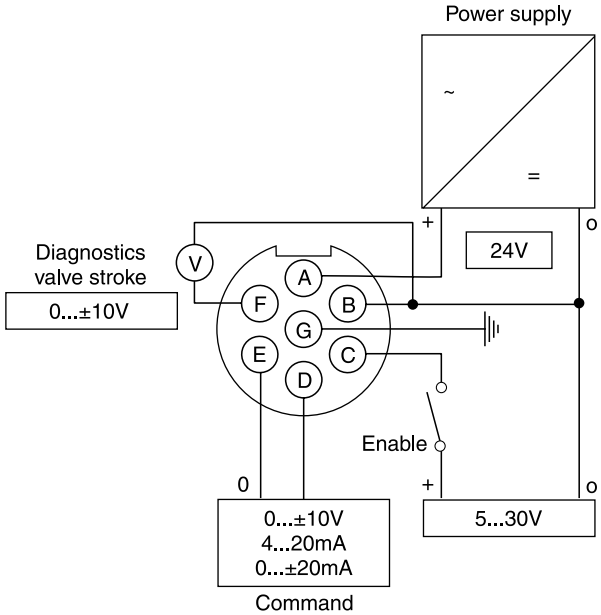


Code 5
11 + PE acc. EN 175201-804



Pin 3 and 8 internally connected
Pin 9 and 11 internally connected
Pin 10 n.c.

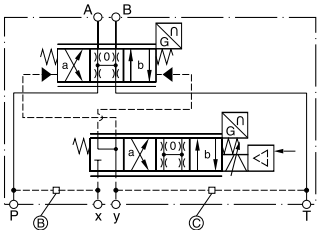
Code 7
6 + PE acc. EN 175201-804 + Enable



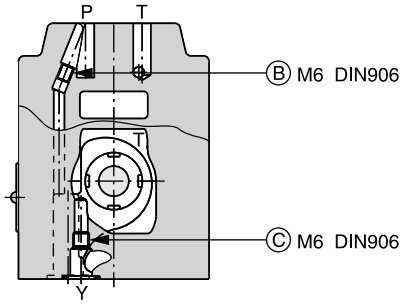
Pilot Flow — Pilot Oil Inlet (Supply) and Outlet (Drain)

○ open, ● closed

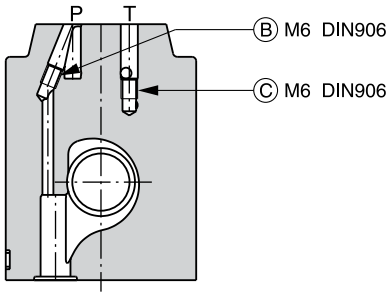
Pilot oil Inlet	Drain	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



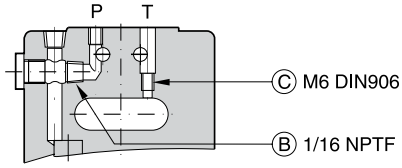
D31FPB/E



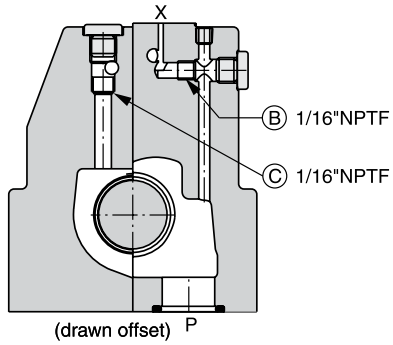
D31FPR



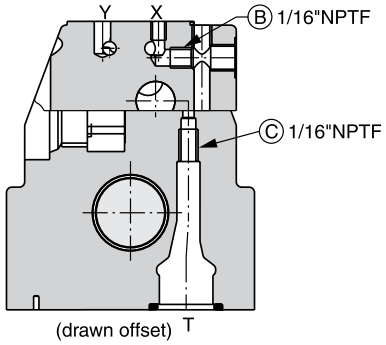
D41FPB/E



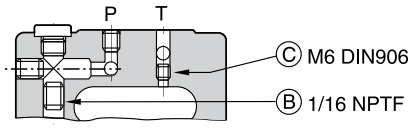
D41FPR



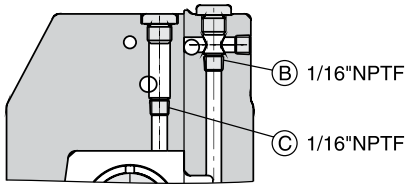
D41FPZ



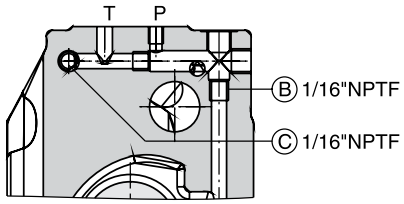
D91FPB/E



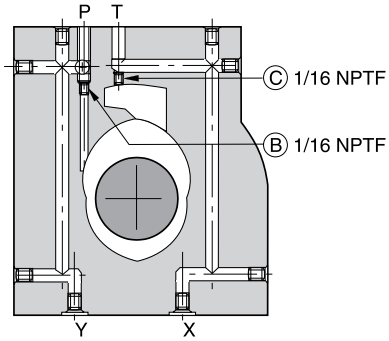
D91FPR



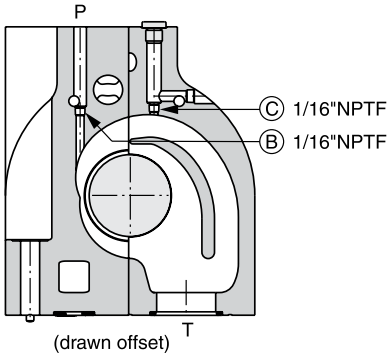
D91FPZ



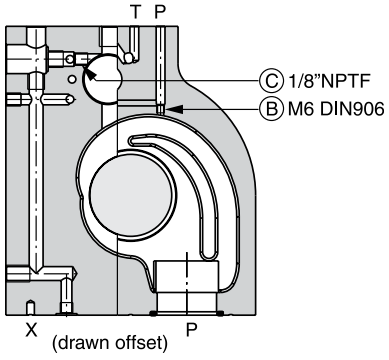
D111FPB/E



D111FPR

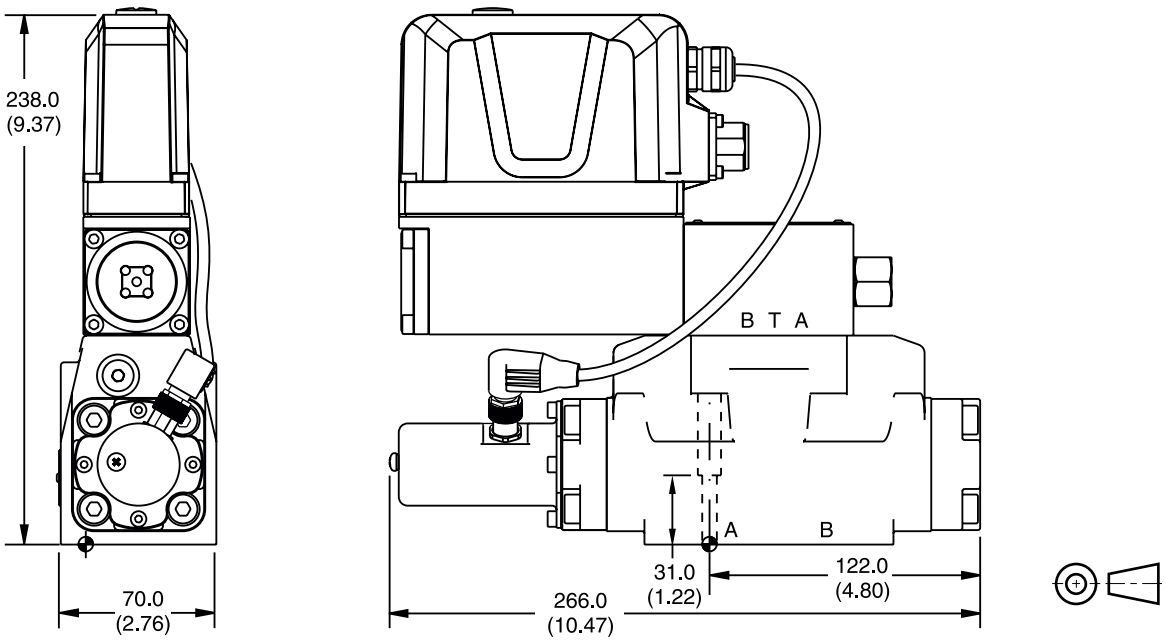


D111FPZ



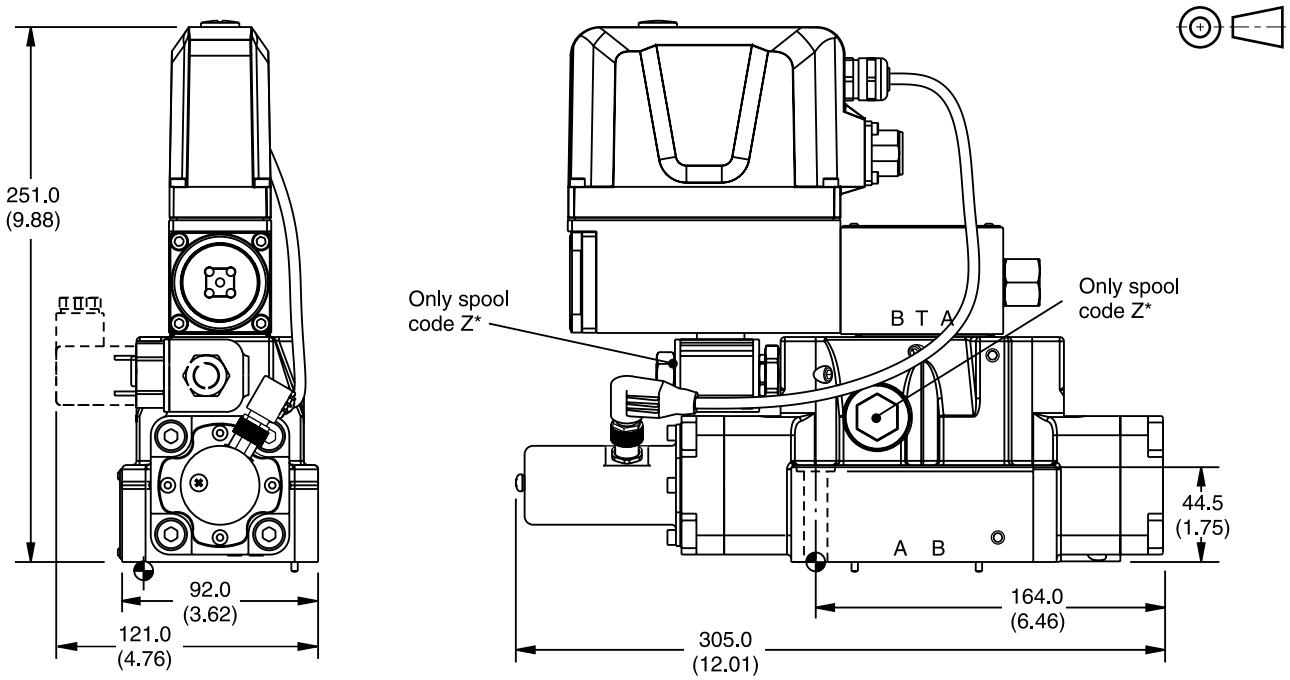
Inch equivalents for millimeter dimensions are shown in (**)

D31FP



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D31FP Fluorocarbon: SK-D31FP-V

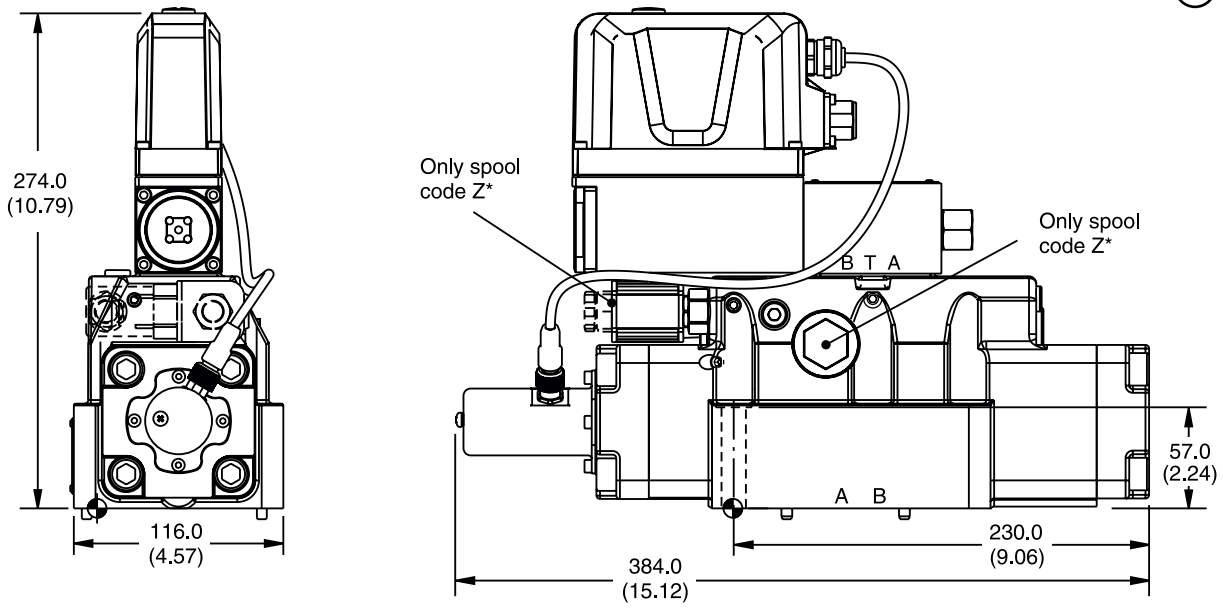
D41FP



Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK320 BK160	2x M6x55 4x M10x60 DIN 912 12.9 4x 3/8-16x2.5 2x 1/4-20x2.5	13.2 Nm (9.7 lb.-ft.) 63 Nm (46.5 lb.-ft.) ±15 %	Nitrile: SK-D41FP Fluorocarbon: SK-D41FP-V

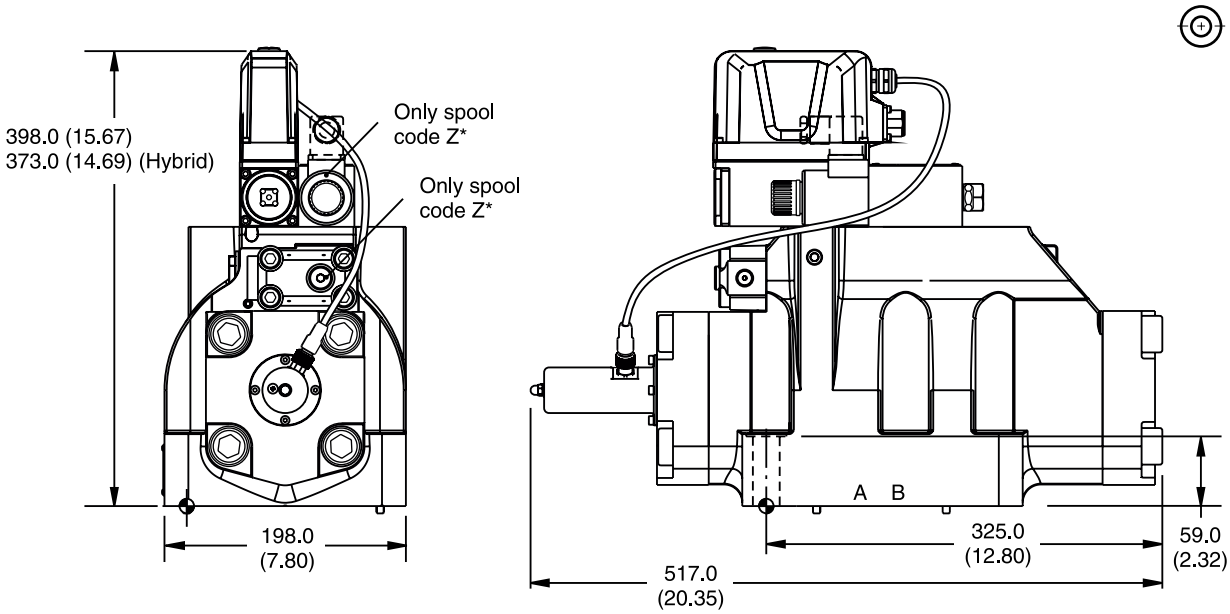
Inch equivalents for millimeter dimensions are shown in (**)

D91FP



Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}6.3}$ 0.01/100	BK360 BK228	6x M12x75 DIN 912 12.9 6x 1/2-13x3.0	108 Nm (79.7 lb.-ft.) ±15 %	Nitrile: SK-D91FP Fluorocarbon: SK-D91FP-V

D111FP



Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}6.3}$ 0.01/100	BK386 BK150	6x M20x90 DIN 912 12.9 6x 3/4-10x3.5	517 Nm (373.9 lb.-ft.) ±15 %	Nitrile: SK-D111FP Fluorocarbon: SK-D111FP-V

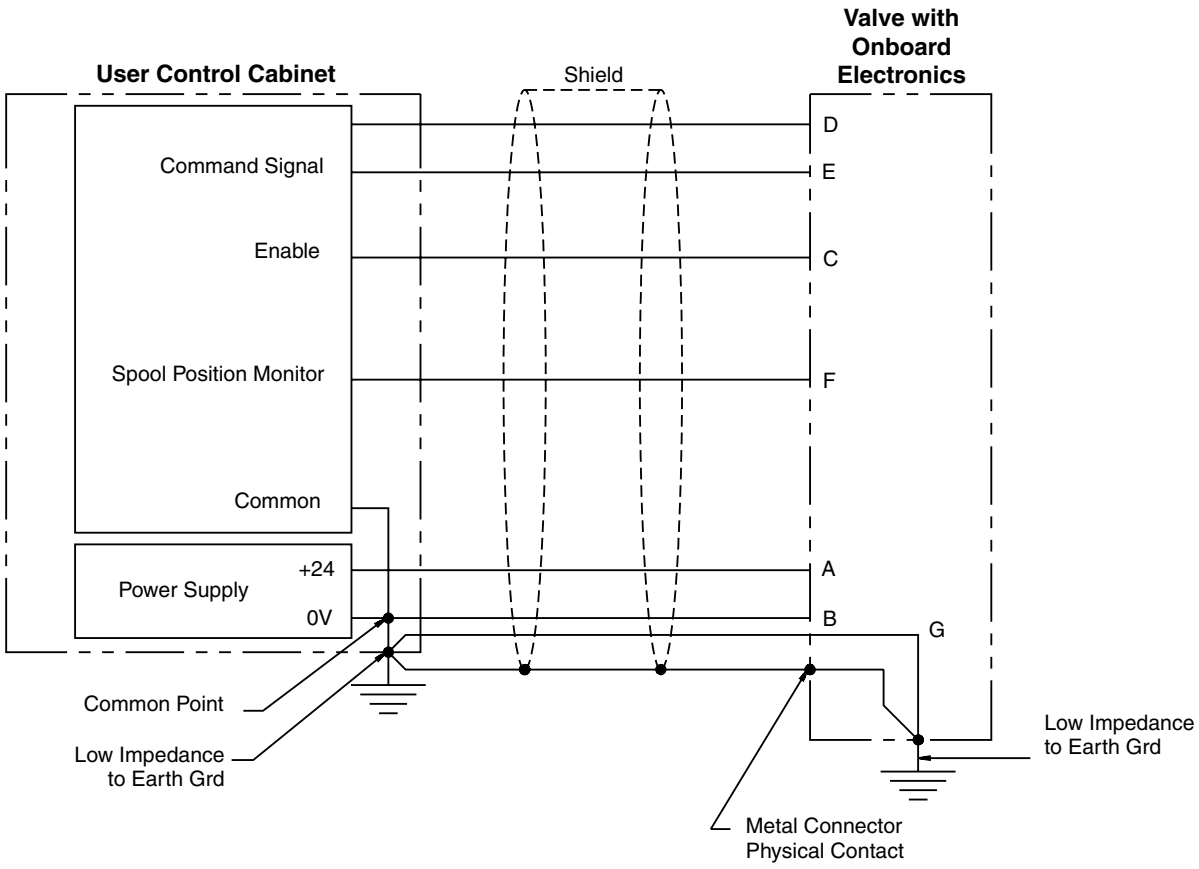
RFI/EMC Immunity for Valves with Integrated Electronics

Conformance to the CE RFI/EMC susceptibility and emissions regulations require valves with integrated electronics be properly wired and grounded. The wiring diagram below suggests proper practices, and should be used as a guide for wiring any new application. In some retrofit applications it may be necessary to significantly alter an existing wiring layout and grounding methods to achieve the desired RFI/EMC immunity and avoid ground loops. Note that an improperly wired application can render a system unusable.

Valves should be wired to the user control cabinet by shielded cable where the shield is grounded at both ends. These ground points must be very low impedance earth grounds, and proper wiring practices are required to avoid system ground loops. In some applications it may be necessary to install a low impedance ground strap between the valve or manifold and earth to achieve a proper ground.

Note that when assembling cable/connector assemblies, the shield must be in electrical contact with the connector shell to complete the shield circuit through the valve mating receptacle. (Refer to the Accessories section of this catalog for pre-assembled 'EHC' cable assemblies)

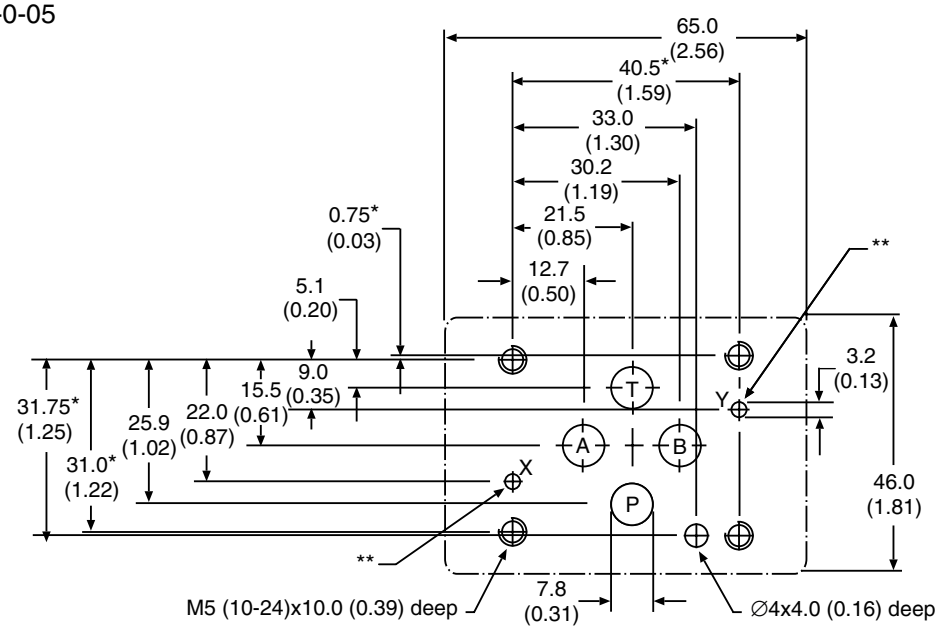
To minimize the exposure to RFI/EMC radiation, electronic equipment should be isolated from sources of high-energy electromagnetic radiation such as cables carrying high currents, radio transmitters, electrical load control centers and contactors.



Note: PE on Functional Block Diagrams refers to "Potential Earth".

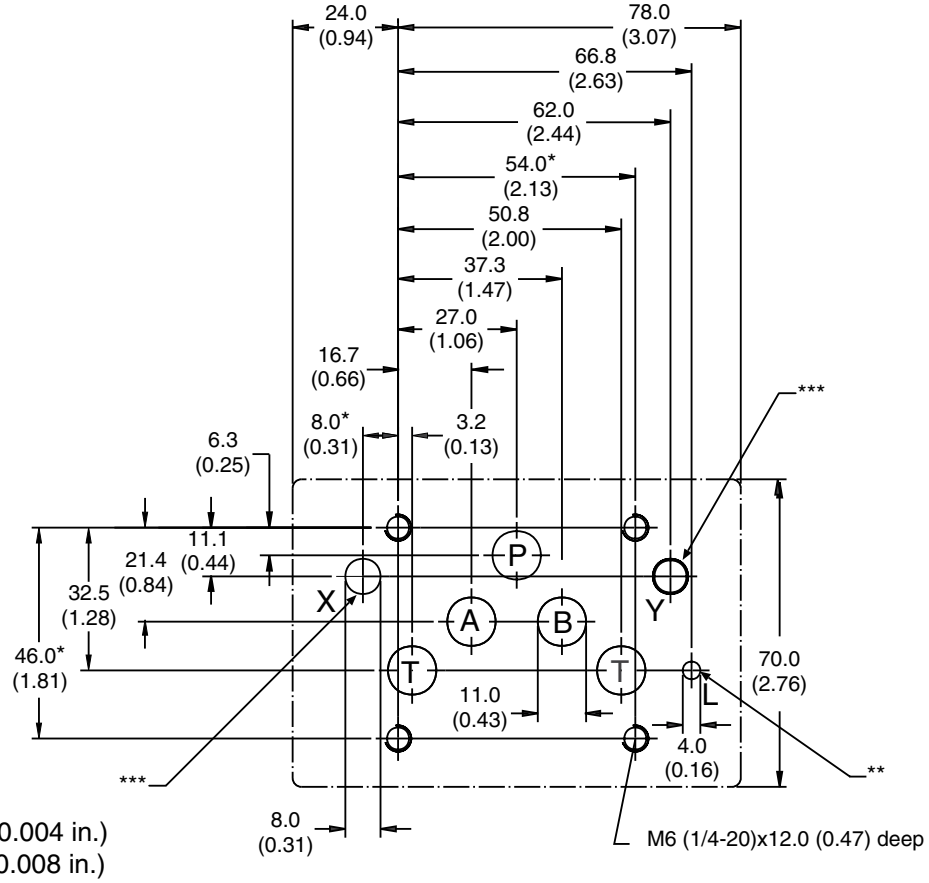
Size NG6 (NFPA/ISO/CETOP 3)

mounting pattern per DIN24340-A6,
ISO 4401-03-03-0-05



Size NG10 (NFPA/ISO/CETOP 5HE)

mounting pattern per DIN 24340-A6,
ISO 4401-05-05-0-05



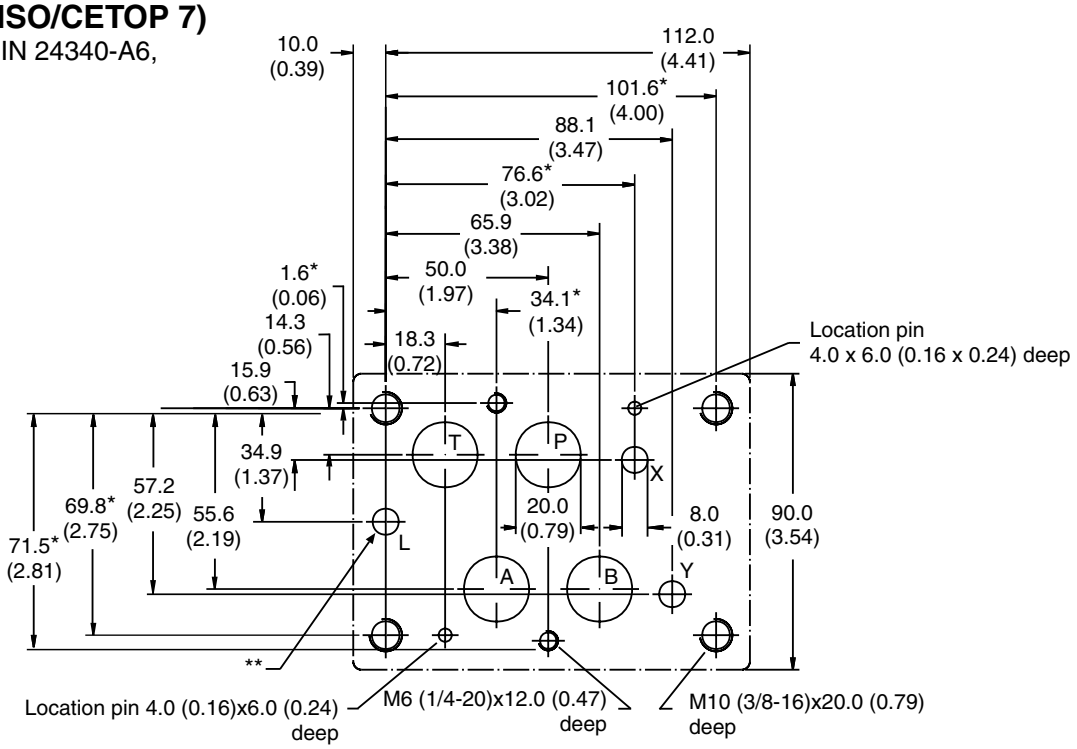
* Dimension tolerance ±0.1 mm (0.004 in.)
All other dimensions ±0.2 mm (0.008 in.)
** Port not used with valves in this catalog
*** Ports only used for pilot operated valves

D_techinfo.indd, ddp

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

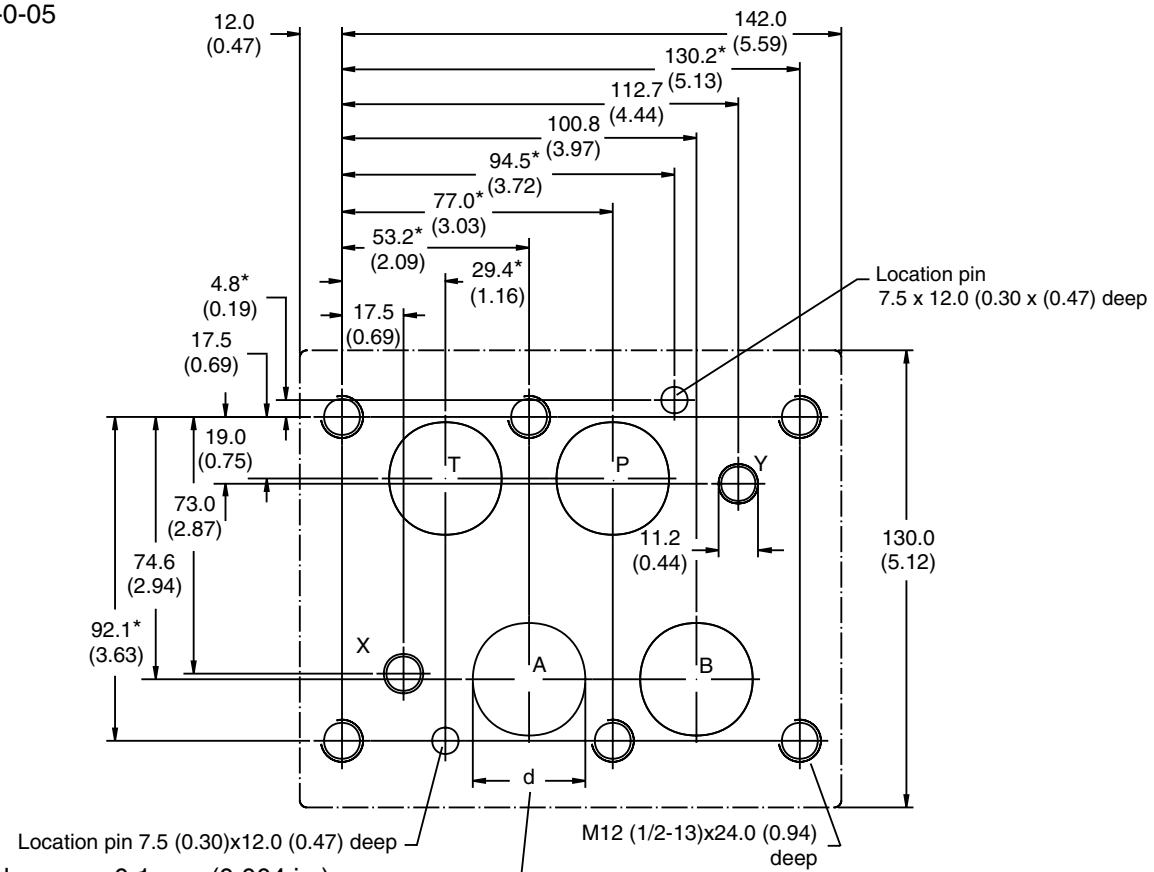
Size NG16 (NFPA/ISO/CETOP 7)

mounting pattern per DIN 24340-A6,
ISO 4401-07-07-0-05



Size NG25 (NFPA/ISO/CETOP 8)

mounting pattern per DIN 24340-A6,
ISO 4401-08-08-0-05



* Dimension tolerance ±0.1 mm (0.004 in.)
All other dimensions ±0.2 mm (0.008 in.)

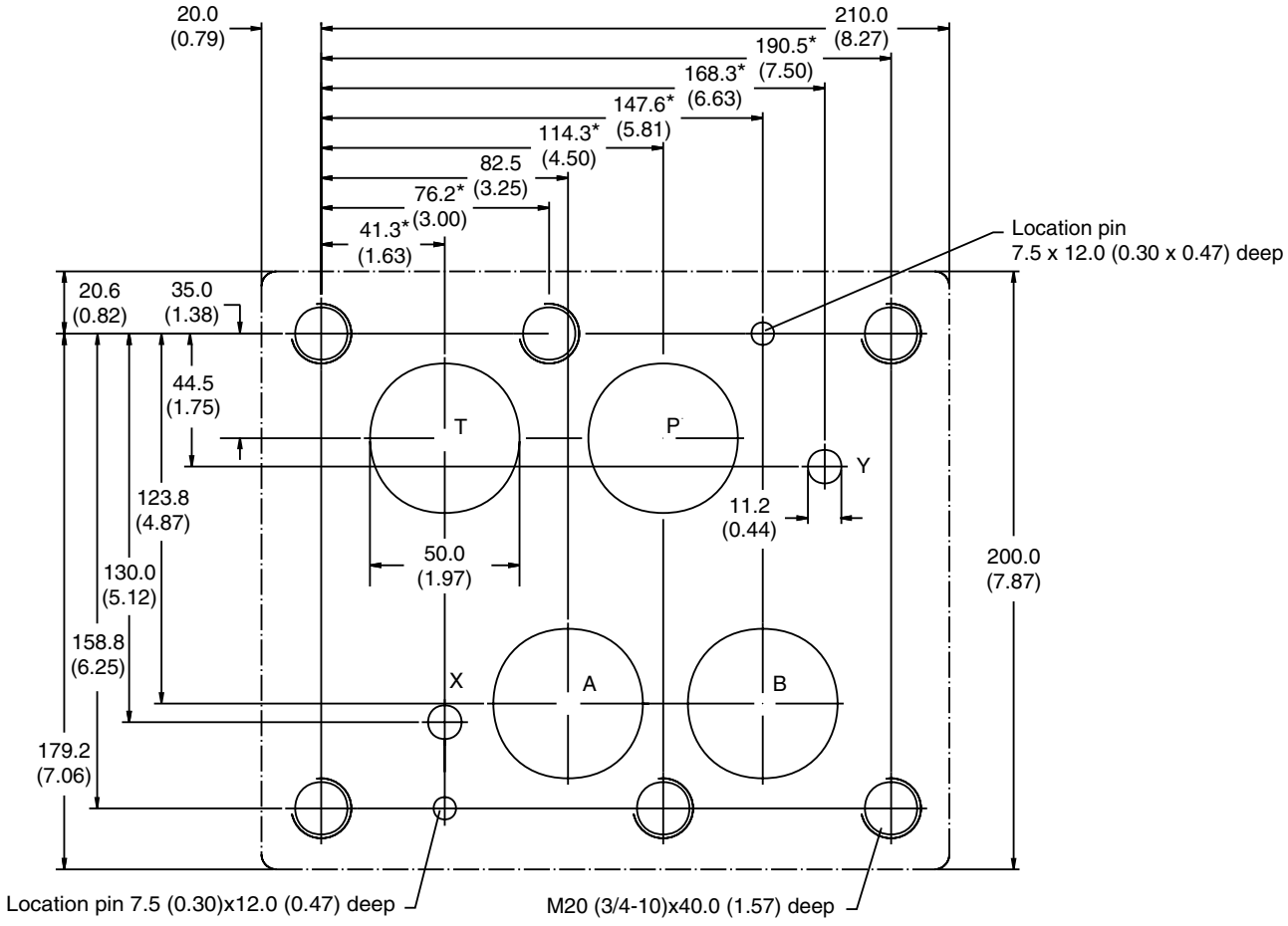
** Port not used with valves in this catalog

D_techinfo.indd, ddp

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Size NG32 (NFPA/ISO/CETOP 10)

mounting pattern per DIN 24340-A6,
ISO 4401-10-09-0-05



* Dimension tolerance ±0.1 mm (0.004 in.)
All other dimensions ±0.2 mm (0.008 in.)

Return to ALPHA TOC
Return to SECTION TOC

Contents

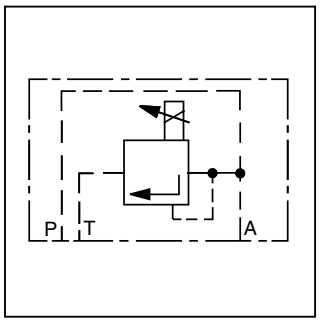
Series	Description	Direct Operated	Pilot Operated	Flange Mount	Threaded Body	Page
	[size: NG] [size: ISO/CETOP]	6 3	6 10 25 32 3 5 8 10	Inch 3/4 1 1 1/4 1 1/2	Inch 1/2 3/4 1 1 1/4	
RE06M*W	Prop. Press. Relief Valves Offboard	•				B2
4VP01	Prop. Press. Relief Valves	• PHASE OUT				B6
RE06M*T	Prop. Press. Relief Valves Onboard	•				B10
R4V, R6V	Prop. Press. Relief Valves Offboard (Replaces Series RE*W)	PHASE OUT	• • •			B17
R4V, R6V	Prop. Press. Relief Valves Onboard (Replaces Series RE*T)	PHASE OUT	• • •			B27
R4V*P2	Prop. Press. Relief Valves In-line Mounted				• • • •	B38
R5V*P2	Prop. Press. Relief Valves Flange Mounted			• • • •		B43
RPDM2	Prop. Press. Relief Valves	•				B50
VBY*K	Prop. Press. Relief/Sequence Valves		• •			B51
VMY*K	Prop. Press. Reducing Valves		• •			B57
D1FV	Prop. Press. Reducing Valves Offboard	•				B64
D1FV OBE	Prop. Press. Reducing Valves Onboard	•				B64
R4R*P2	Prop. Press. Reducing Valves Subplate Mounted		• • •			B73
R4R*P2	Prop. Press. Reducing Valves In-line Mounted				• • • •	B78
R5R*P2	Prop. Press. Reducing Valves Flange Mounted			• • •		B83
PRPM	Prop. Press. Reducing Valves		• •			B87
DUR*L06	Prop. Flow Control Valves		•			B92
F5C	Proportional Throttle Valves Flange Mounted			• • •		B96
R5A	Pressure Compensator Valves Direct Operated, SAE Flange			• • •		B100
R5P	Pressure Compensator Valves Direct Operated, SAE Flange			• • •		B103
LCM	Pressure Compensator Valves		• •			B110
SPC	Pressure Compensator Valves (Available in Size NG16 also)		• • •			B111

B

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

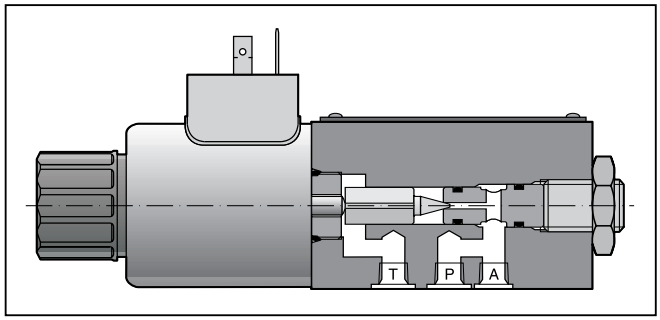
Series RE06M*W proportional relief valves are direct operated proportional valves typically used as remote control valves for flow rates of below 3 LPM (0.8 GPM).



Function

When the pressure in port P or A exceeds the pressure setting at the solenoid, the cone opens to port T and limits the pressure in port P to the adjusted level.

The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.



Features

- Direct operated by proportional solenoid.
- Very low pressure adjustment of $p_{min.}$
- Two pressure ports, A and P.
- Subplate mounting according to ISO 6264.
- Four pressure ranges available.

Specifications

General		
Nominal Size		DIN NG6 / CETOP 3 / NFPA D03
Interface		Subplate mounting according to ISO 6264
Mounting Position		as desired, horizontal mounting prefered
Ambient Temperature	**[°C]**	-20 ... +70 (-4°F ... +158°F)
MTTF$_D$ value	**[years]**	150
Hydraulic		
Maximum Operating Pressure		Ports P and A up to 350 (5075 PSI); port T 30 Bar (435 PSI)
Pressure Range		105 Bar (1523 PSI), 175 Bar (2538 PSI), 250 Bar (3625 PSI), 350 (5075 PSI)
Nominal Flow	**[l/min]**	See p/Q curves
Fluid		Hydraulic oil as per DIN 51524...51535, other on request
Viscosity, Recommended	**[cSt] / [mm²/s]**	30 ... 80 (139 ... 371 SSU)
Permitted	**[cSt] / [mm²/s]**	12 ... 380 (56 ... 1761SSU)
Fluid Temperature	**[°C]**	-20 ... +60; (-4°F ... +140°F)
Filtration		ISO 4406 (1999), 18/16/13 (acc. NAS 1638: 7)
Linearity	**[%]**	±2.8
Repeatability	**[%]**	<±1
Hysteresis	**[%]**	±1.5 of p_{max}
Electrical		
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		IP 65 in accordance with EN 60529 (plugged and mounted)
Nominal Voltage	**[V]**	12 (2.3 A max. current), 16 (1.3 A max. current)
Coil Resistance	**[Ohm]**	4 at 20°C (68°F) = K Coil 11.4 - 12 for X Coil
Solenoid Connection		Connector as per DIN 43650
Power Amplifier, Recommended		PCD00A-400

Ordering Information

RE	06	M		W	2		1		W	
Proportional Pressure Relief Valve	Size	Manifold Mounting	Pressure Range	Offboard Electronics		Seal	Valve Open at Zero Command	Solenoid Type	Electronic Connection	Design Series

NOTE: Not required when ordering.

Code	Description
06	NG6 D03, CETOP 3

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Solenoid Voltage
K*	12 V, 2.5 A
X**	16 V, 1.3 A

* Use with “PCD” Series Driver cards

** Order if currently using “ED” card

Code	Description
W	Socket Connector DIN 43650 without plug

Please order plug separately. See Accessories.

Code	Description
10	up to 105 Bar (1522 PSI)
17	up to 175 Bar (2538 PSI)
25	up to 250 Bar (3625 PSI)
35	up to 350 Bar (5075 PSI)

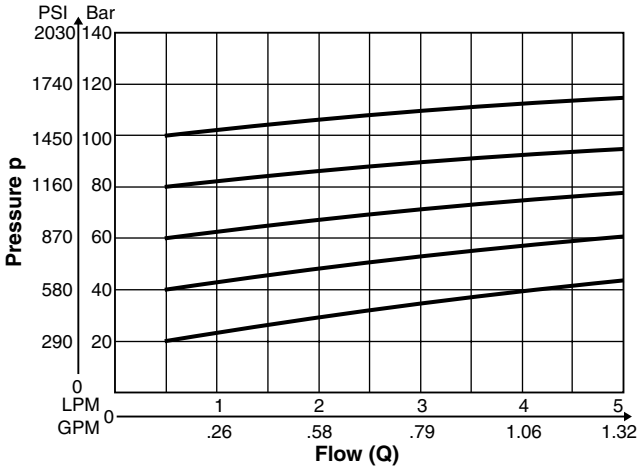
Bolt Kit	Qty	Size
BK209	4	10-24 X 1.25”
BK375	4	M5 x 30mm

Weight: 1.8 kg (4.0 lbs.)

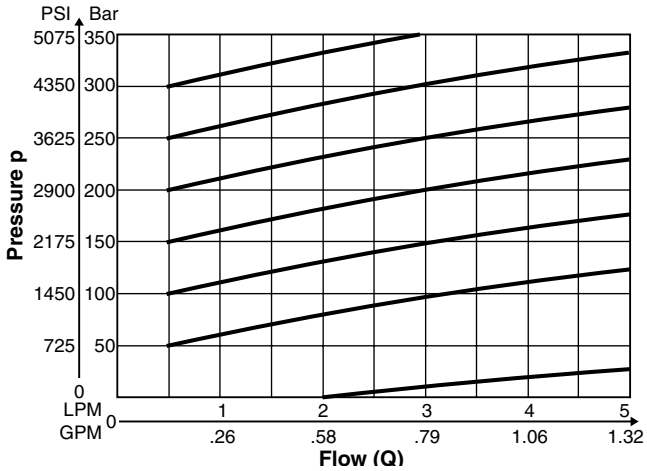
Performance Curves

p/Q Curves

Pressure Stage 105 Bar

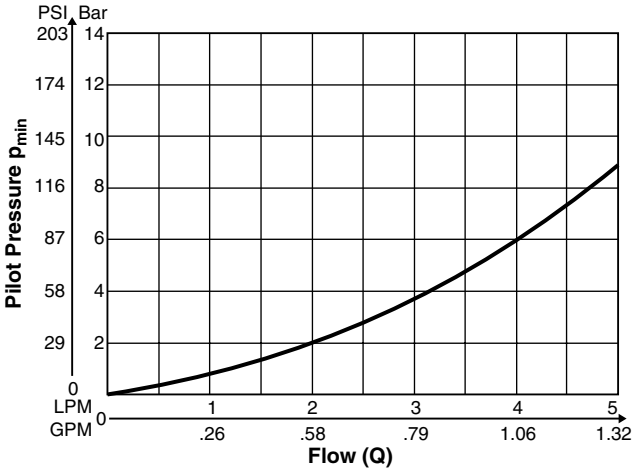


Pressure Stage 350 Bar

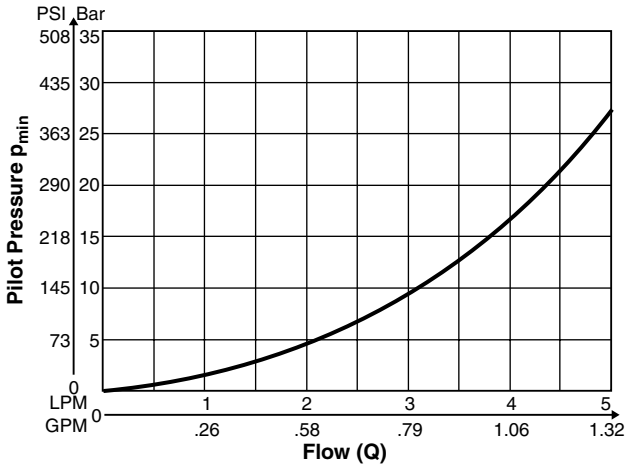


p_{min}/Q Curves

Pressure Stage 105 Bar

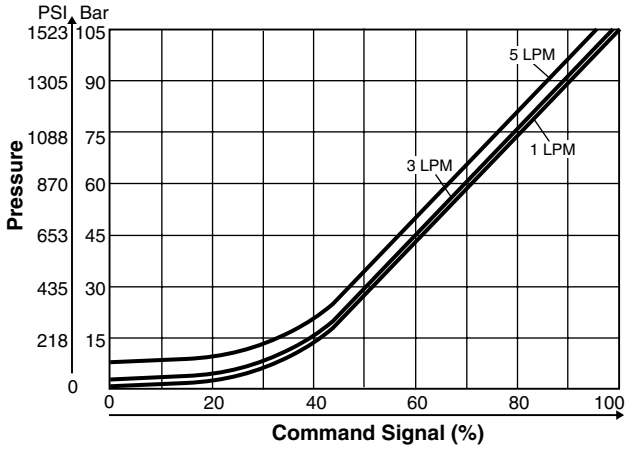


Pressure Stage 350 Bar

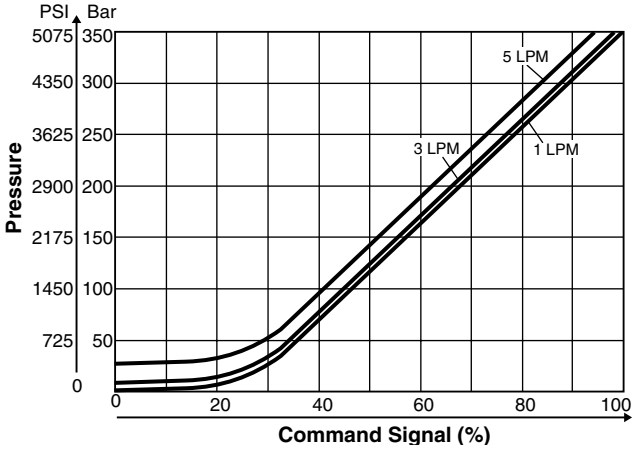


$p_{set\text{-}voltage}$ Curves

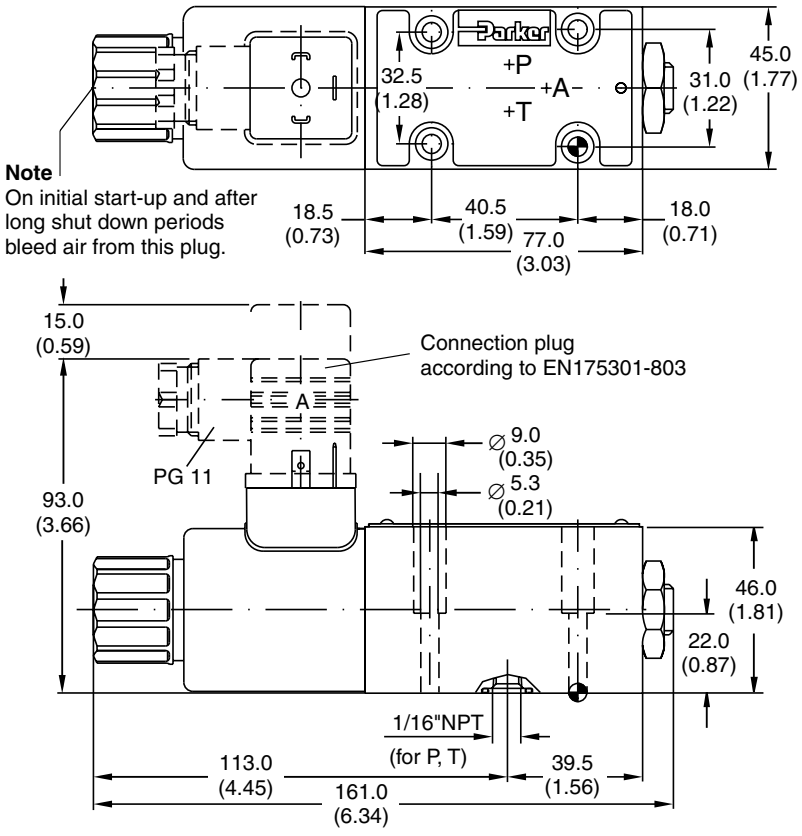
Pressure Stage 105 Bar



Pressure Stage 350 Bar



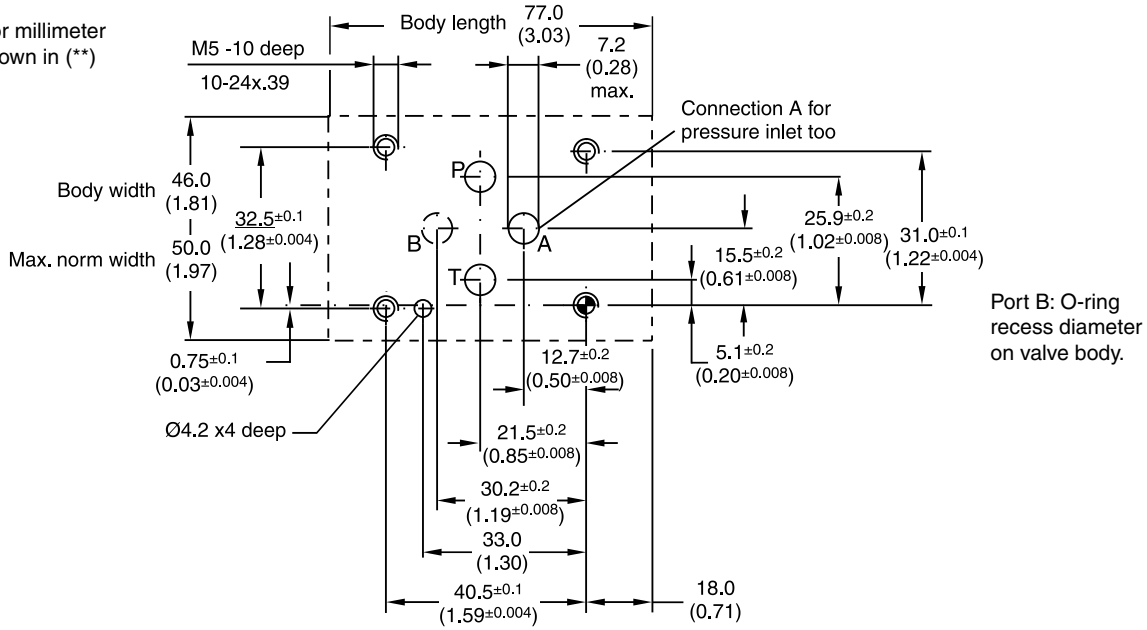
Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Bolt Kit			Seal Kit Nitrile	Seal Kit Fluorocarbon
R_{max}6.3 ⏥ 0.01/100	BK375 BK209	4x M5x30 DIN 912 12.9 4x 10-24x1.25	7.6 Nm (5.6 lb.-ft.) ±15%	SK-RE06MWN	SK-RE06MWV

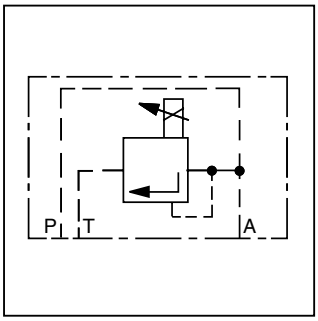
Mounting Pattern ISO 6264-03-04-*-97

Inch equivalents for millimeter dimensions are shown in (**)



General Description

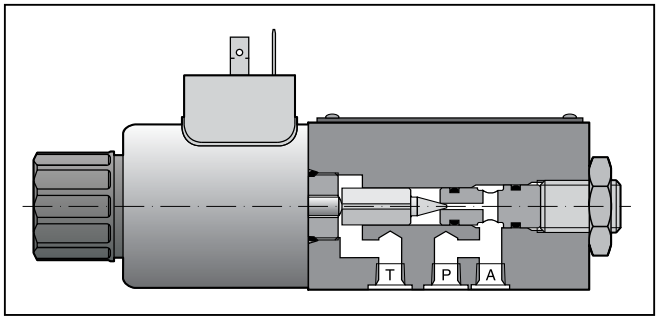
Series 4VP01 direct operated proportional pressure relief valves are equipped with one pressure port (port P). The solenoid is located on the A port side of the mounting pattern.



Function

When the pressure in port P exeeds the pressure setting at the solenoid, the cone opens to port T and limits the pressure in port P to the adjusted level.

Optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.



Features

- Direct operated by proportional solenoid.
- Very low pressure adjustment of $p_{min.}$
- 1 pressure port.
- Subplate mounting according to ISO 6264.
- 4 pressure ranges.

Use RE0M*W2 for new applications

Ordering Information

4VP01	☐	☐	G12	B	☐	☐
Proportional Pressure Relief Valve	Pressure Range	Orifice in Port P	Solenoid Voltage 12V / 2.3 A	Design Series	Seal	Options Check with Factory

Code	Description
1	up to 50 Bar (725 PSI)
2	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
0	Without (Standard)
1	Ø 0.6 mm
2	Ø 0.8 mm
3	Ø 1.0 mm
4	Ø 1.2 mm

Code	Description
1	Nitrile
5	Fluorocarbon

Bolt Kits:

BK209	(4) 10-14x1.25 SHCS
BK375	(4) M5x30 SHCS

Weight: 1.8 kg (4.0 lbs.)

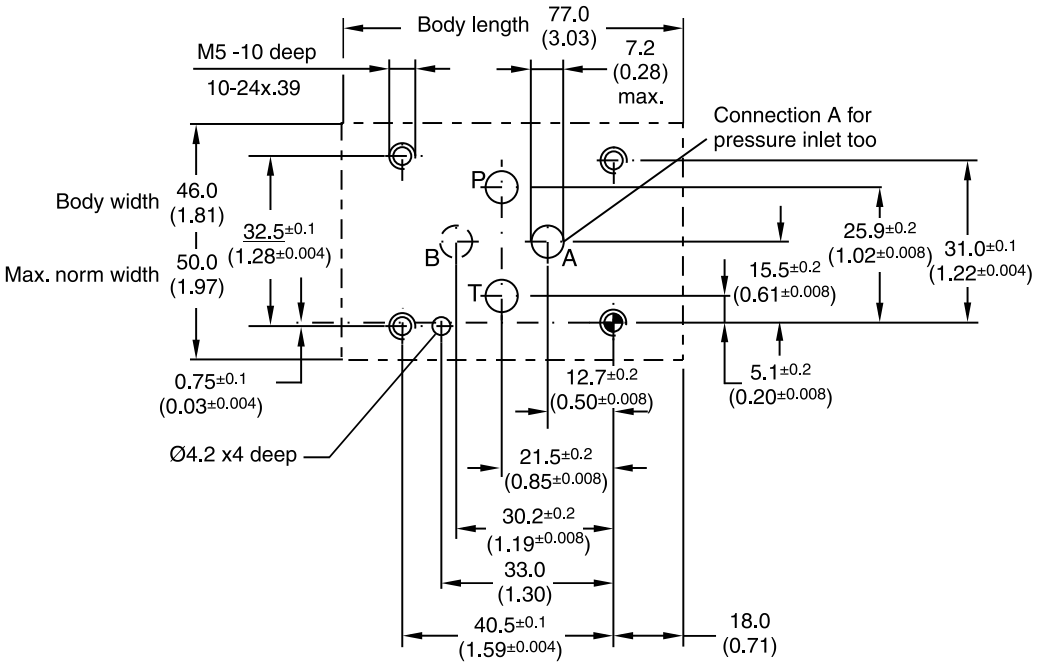
Specifications

General	
Size	DIN NG6 / CETOP 3 / NFPA D03
Interface	Subplate Mounting acc. ISO 6264
Mounting Position	As desired, horizontal position preferred
Ambient Temperature Range	-20°C to +70°C (-4°F to +158°F)
Hydraulic	
Maximum Operating Pressure	Port P 350 Bar (5075 PSI); Port T depressurized
Pressure Range	50 Bar (725 PSI), 105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)
Nominal Flow	See p/Q Curves
Fluid	Hydraulic oil as per DIN 51524...51535, other on request
Fluid Temperature	-20°C to +60°C (-4°F to +140°F)
Viscosity Permitted Recommended	12 to 380 cSt / mm²/s (56 to 1761 SSU) 30 to 80 cSt / mm²/s (139 to 371 SSU)
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)
Linearity	±2.8%
Repeatability	<±1%
Hysteresis	±1.5 of p_{max}
Electrical	
Duty Ratio	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)
Supply Voltage	12 VDC
Maximum Current	2.3 amps
Coil Resistance	4 Ohm at 20°C (68°F)
Solenoid Connection	Connector as per EN 175301-803
Power Amplifier	PCD00A-400, recommended

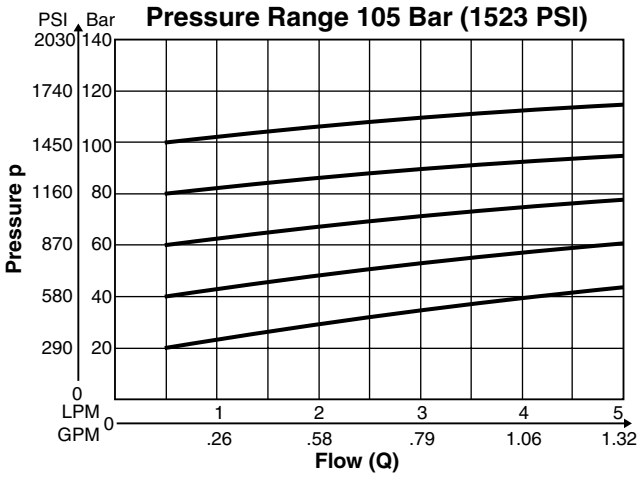
Mounting Pattern ISO 6264-03-04-*-97

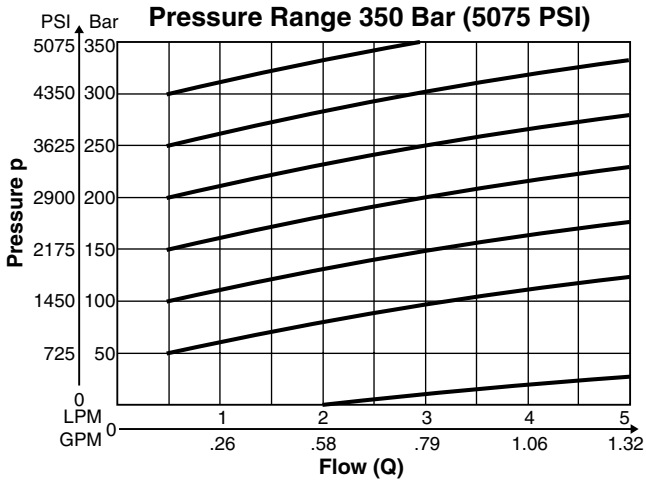
Use RE0M*W2 for new applications

Inch equivalents for millimeter dimensions are shown in (**)

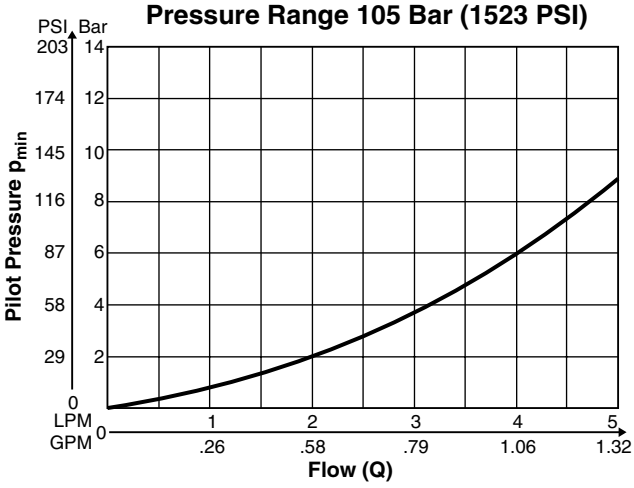


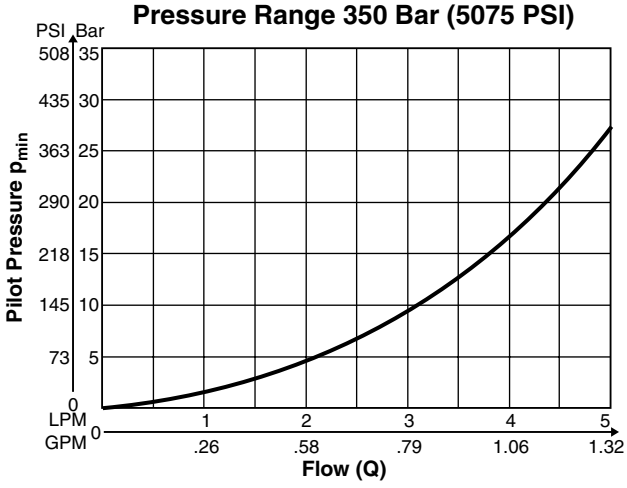
p/Q Curves



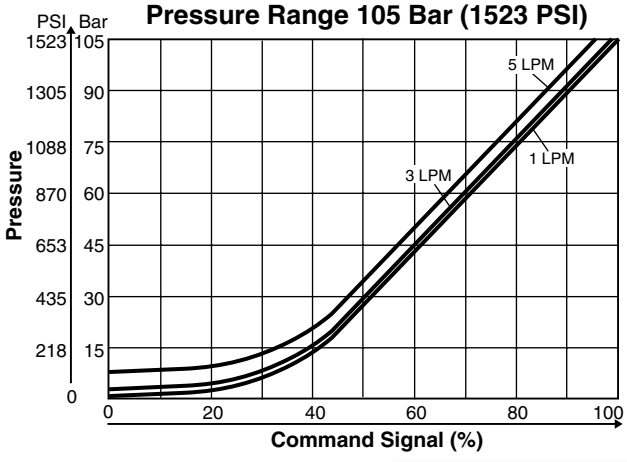


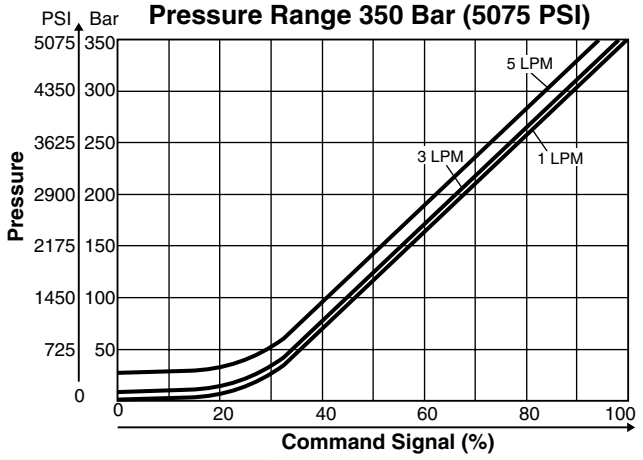
Minimum Adjusted Pressure





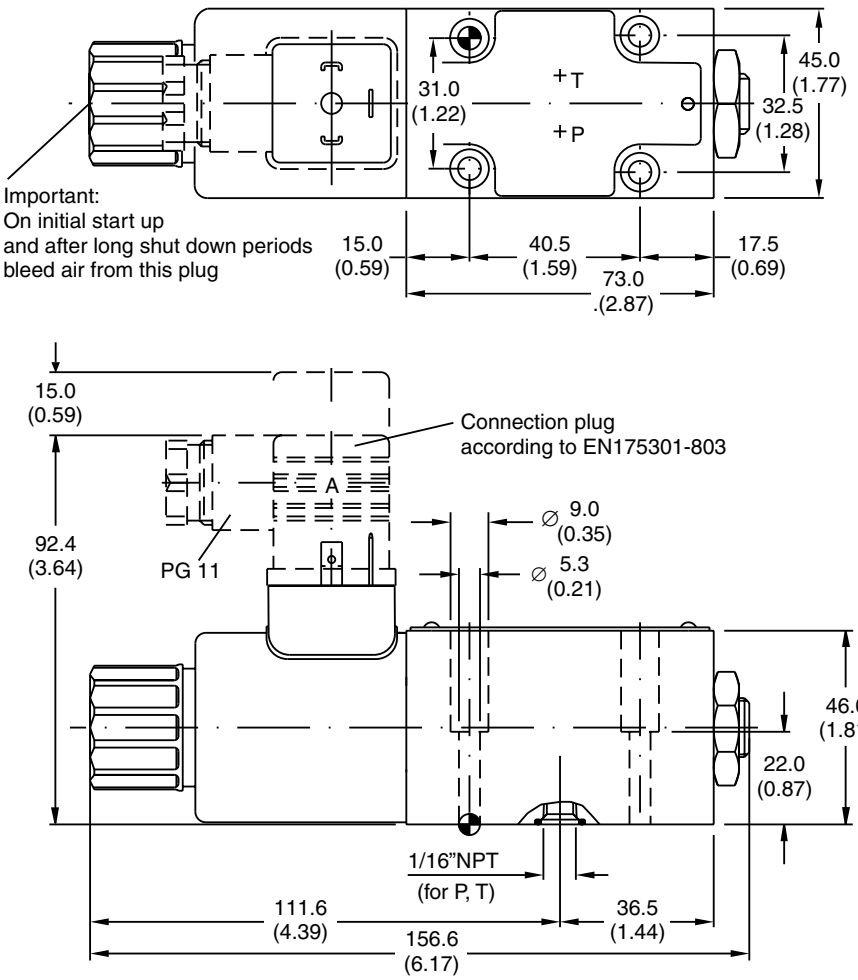
Pressure / Signal Curve





Use RE0M*W2 for new applications

Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Bolt Kit			Seal Kit	
				Nitrile	Fluorocarbon
R_{max}6.3 ▱ 0.01/100	BK375 BK209	4x M5x30 DIN 912 12.9 4x 10-24x1.25	7.6 Nm (5.6 lb.-ft.) ±15%	SK-RE06MWN	SK-RE06MWV

Use RE0M*W2 for new applications

General Description

Series RE06*T (NG6) proportional pressure relief valves are direct operated proportional solenoid valves with integral control electronics.

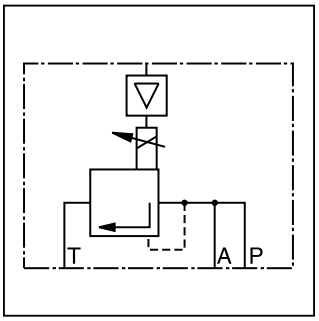
The digital onboard electronic is situated in a robust metal housing and can be used in rough environments. The nominal values of the valves are factory set. Additionally the ProPxD software permits the editing of all parameters. The software is also used for the digital electronic modules. The cable for connection to a serial RS232 interface is available as accessory.

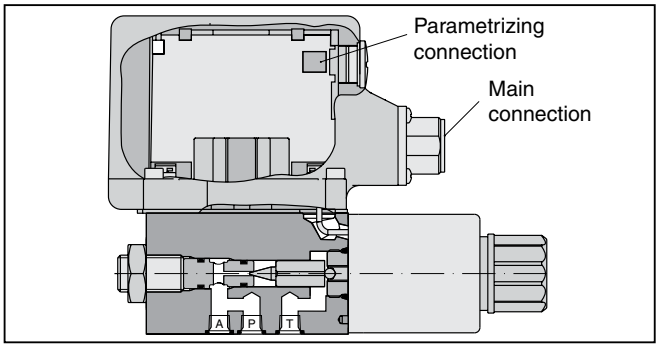
The electrical connection is available in 2 options:
Code F: 6 + PE central connection
+/- 10V command signal (preset)
+10V reference voltage output
Code R: 6 + PE central connection
4…20mA command signal (preset)

Function

When the pressure in port P or A exceeds the pressure setting at the solenoid, the cone opens to port T and limits the inlet pressure to the adjusted level.

The pressure adjustment is effected by applying current to the solenoid. The control signal is modulated to the solenoid current by the electronics.





Features

- Direct operated pressure relief valve.
- Onboard electronics.
- Very low pressure adjustment of $p_{min.}$
- Subplate mounting acc. to ISO 6264.
- 6 pressure ranges.
- 2 pressure inlet ports, A and P.

Ordering Information

RE	06	M		T	2		1		0	
Proportional Pressure Relief Valve	Size	Manifold Mounting	Pressure Range	Integrated Electronics	Configuration	Seal	Valve Open at Zero Command	Electronic Variations	Electronic Option	Design Series

NOTE: Not required when ordering.

Code	Description
06	NG6 D03, CETOP 3

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
05	50 Bar (725 PSI)
10	105 Bar (1523 PSI)
17	175 Bar (2538 PSI)
21	210 Bar (3045 PSI)
25	250 Bar (3625 PSI)
35	350 Bar (5075 PSI)

Code	Description
F	Voltage input 0...+10V with reference output +10V
R	Current input 4...20mA

Weight: NG6 2.2 kg (4.9 lbs.)

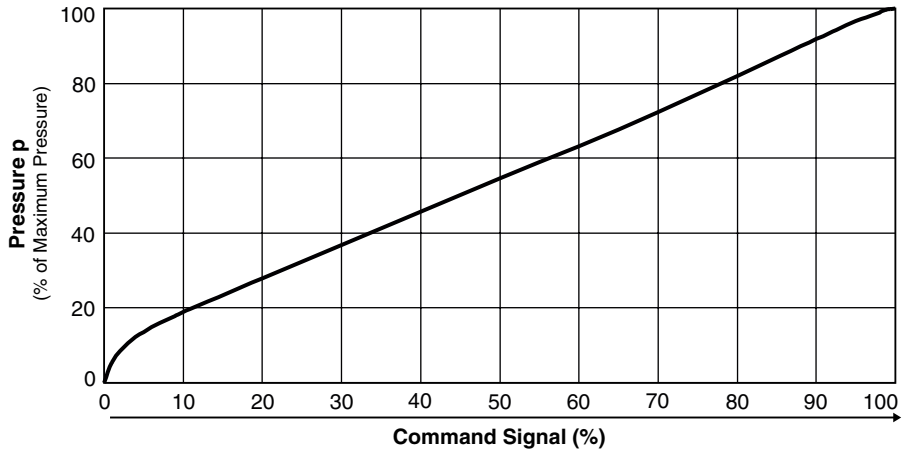
Bolt Kit	Qty	Size
BK375	4	M5x30mm
BK209	4	10-24x1.25

Please order plugs separately. See Accessories.

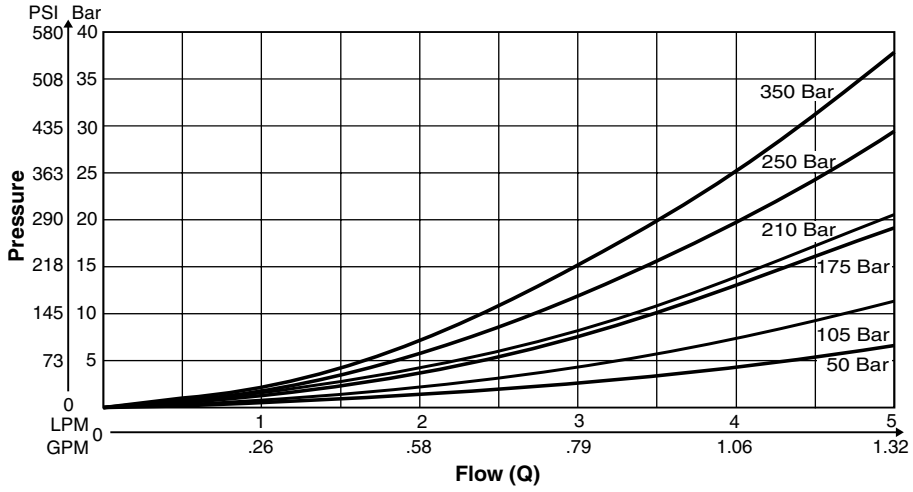
Parametrizing cable OBE => RS232
Item no. 40982923

General		
Size		DIN NG6 / CETOP 3 / NFPA D03
Interface		Subplate mounting according to ISO 6264
Mounting Position		as desired, horizontal mounting prefered
Ambient Temperature	**[°C]**	-20...+60; (-4°F ... +140°F)
$MTTF_D$ value	**[years]**	75
Vibration Strength	**[g]**	10 sinus 5...2000 Hz acc. to IEC 68-2-6 30 noise 20...2000 Hz acc. to IEC 68-2-36 15 shock acc. to IEC 68-2-27
Hydraulic		
Maximum Operating Pressure		Ports A and P 350 Bar (5075 PSI), Port T 30 Bar (435 PSI)
Pressure Range		50 Bar (725 PSI), 105 Bar (1523 PSI),175 Bar (2538 PSI), 210 Bar (3045 PSI), 250 Bar (3625 PSI), 350 (5075 PSI)
Nominal Flow		See p/Q curves
Fluid		Hydraulic oil according to DIN 51524...51535, other on request
Viscosity		
Recommended	**[cSt] / [mm²/s]**	30 ... 80 (139 ... 371 SSU)
Permitted	**[cSt] / [mm²/s]**	12 ... 38 (56 ... 1761 SSU)
Fluid Temperature	**[°C]**	-20 ... +60; (-4°F ... +140°F)
Filtration		ISO 4406 (1999), 18/16/13 (acc. NAS 1638: 7)
Linearity	**[%]**	See curve
Repeatability	**[%]**	<±1
Hysteresis	**[%]**	±1.5 of p_{max}
Electrical		
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Supply Voltage	**[VDC]**	18...30, ripple < 5% eff., surge free
Current Consumption Maximum	**[A]**	2.0
Pre-fusing	**[A]**	2.5 medium lag
Potentiometer Supply	**[V]**	+10 / ±5% max. 10mA
Command Signal **Code F Voltage** **Code R Current**	**[V]** **[mA]**	0...+10, ripple < 0.01 % eff., surge free, Ri = 100 kOhm 4...20, ripple < 0.01 % eff., surge free, Ri = 200 Ohm < 3.6 mA = enable off, > 3.8 mA = enable on (acc. NAMUR NE43)
Differential Input Voltage Max.	**[V]** **[V]**	30 for terminal D and E against PE (terminal G) 11 for terminal D and E against 0V (terminal B)
Adjustment Ranges		
Minimum Current	**[%]**	0...50
Maximum Current	**[%]**	50...100
Ramp	**[s]**	0...32.5
Interface		RS 232, parametrizing connection 5pole
EMC		EN 61000-6-2, EN 61000-6-4
Central Connection		6 + PE acc. EN 175201-804
Cable Specification	**[mm²]**	7 x 1.0 (AWG 18) overall braid shield
Cable Length Maximum	**[m]**	50 (164 ft.)

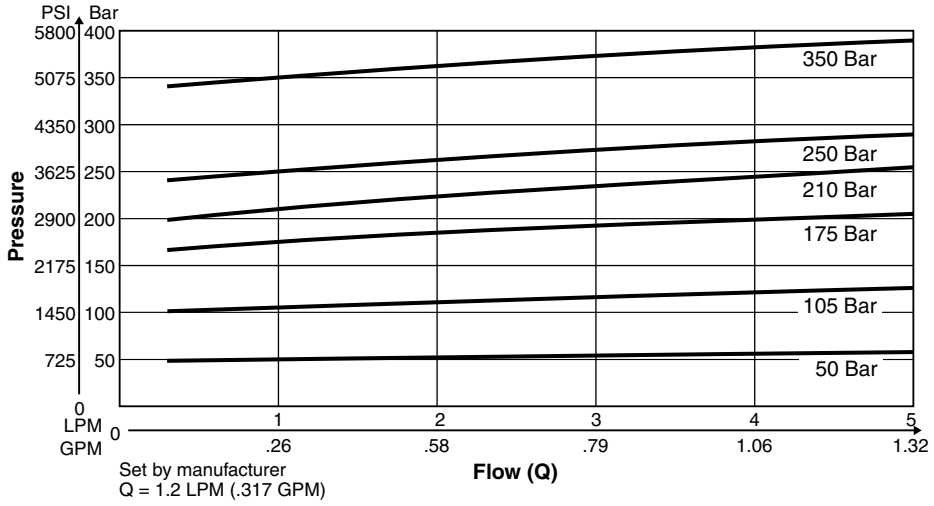
Command/Pressure Curve



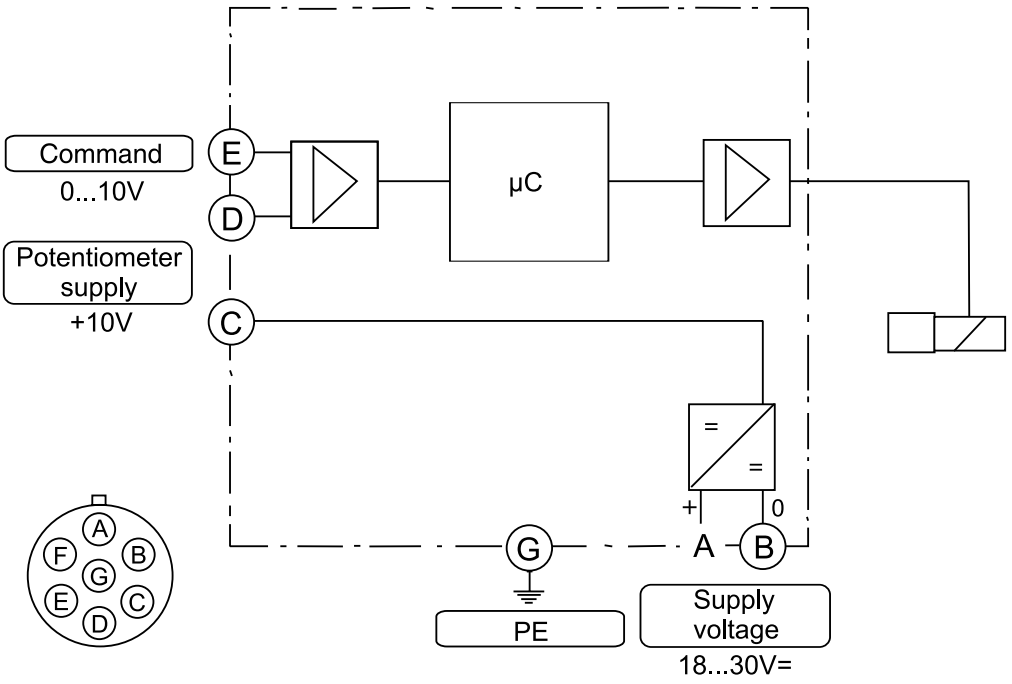
p_{min}/Q Curves



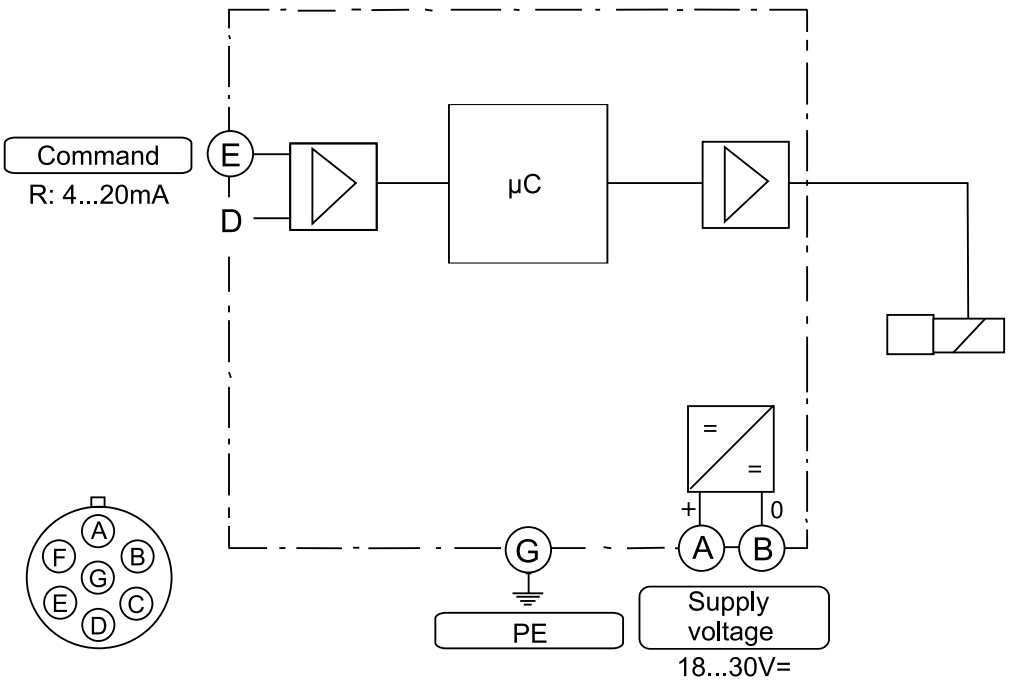
P/Q Curves



Code F
6 + PE acc. EN 175201-804



Code R
6 + PE acc. EN 175201-804



ProPxD Interface Program

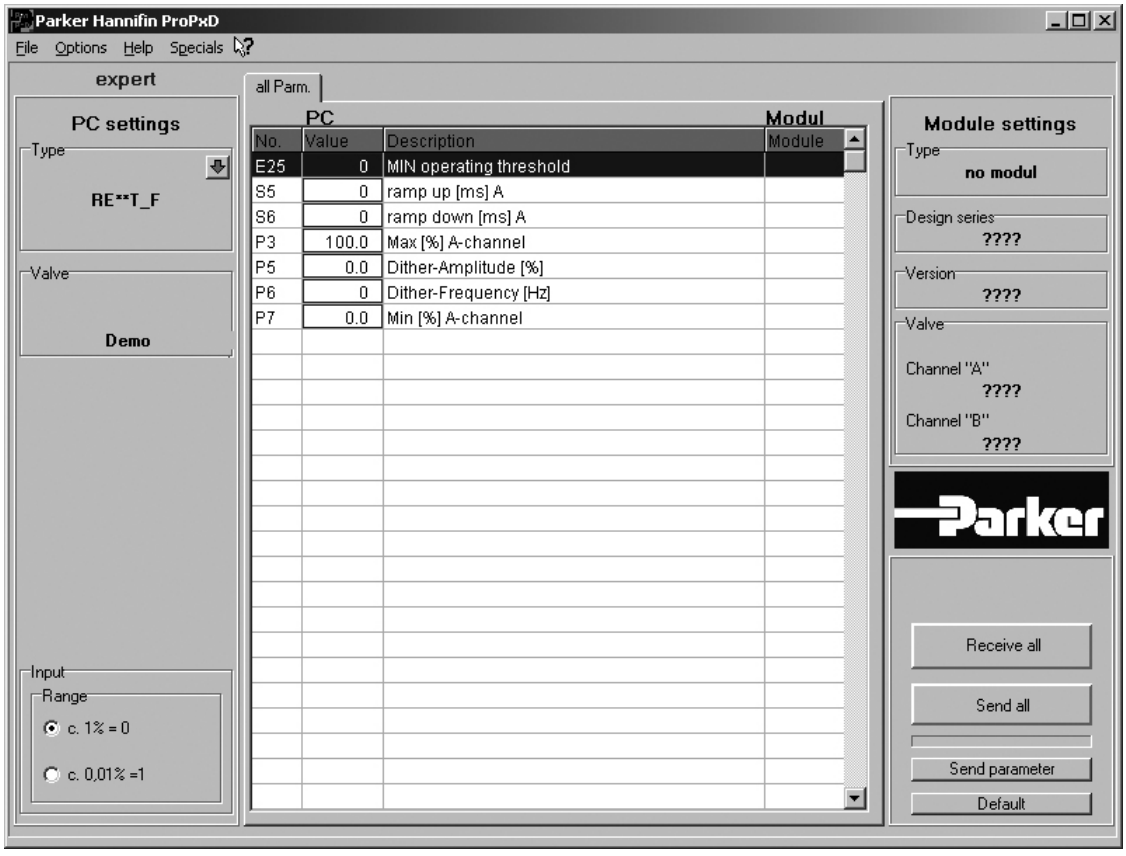
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

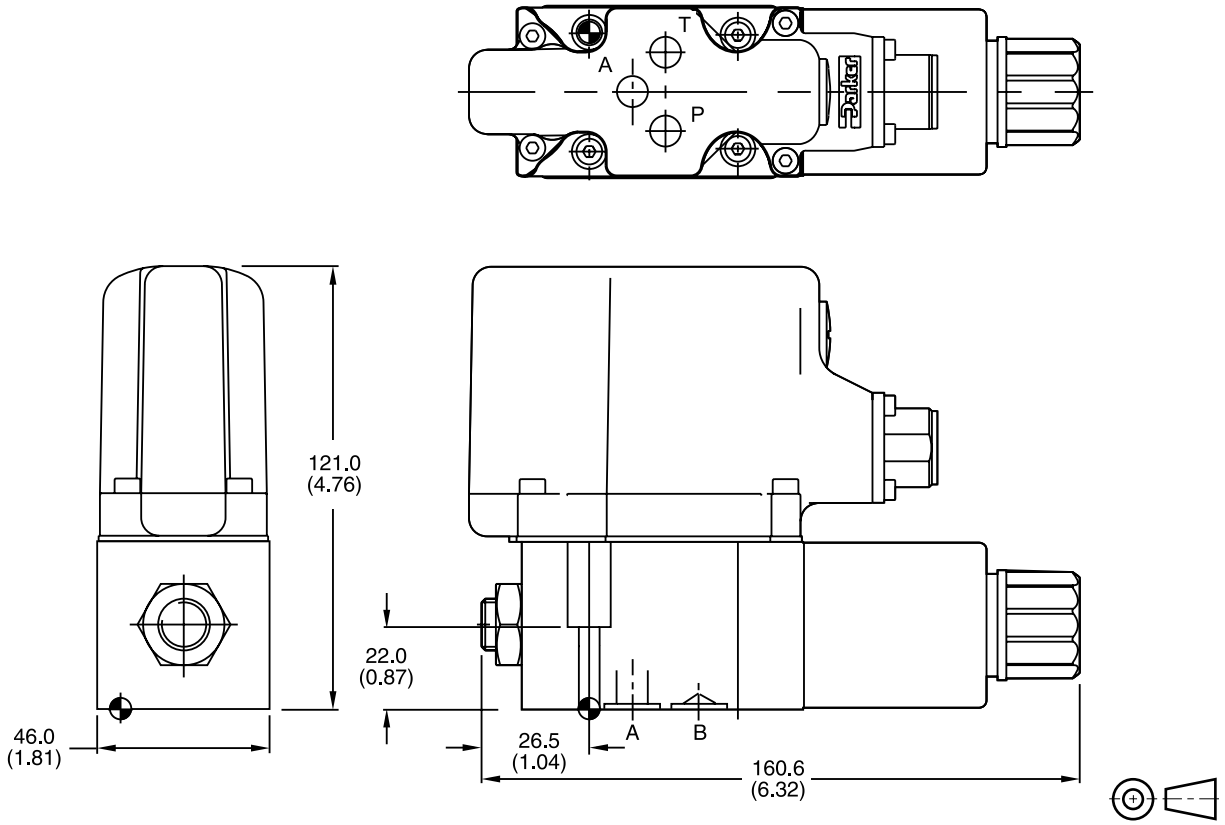
The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

Simple to use interface program. Download free of charge **www.parker.com/euro_hcd → Services → downloads**



The parametrizing cable may be ordered under item no. 40982923.

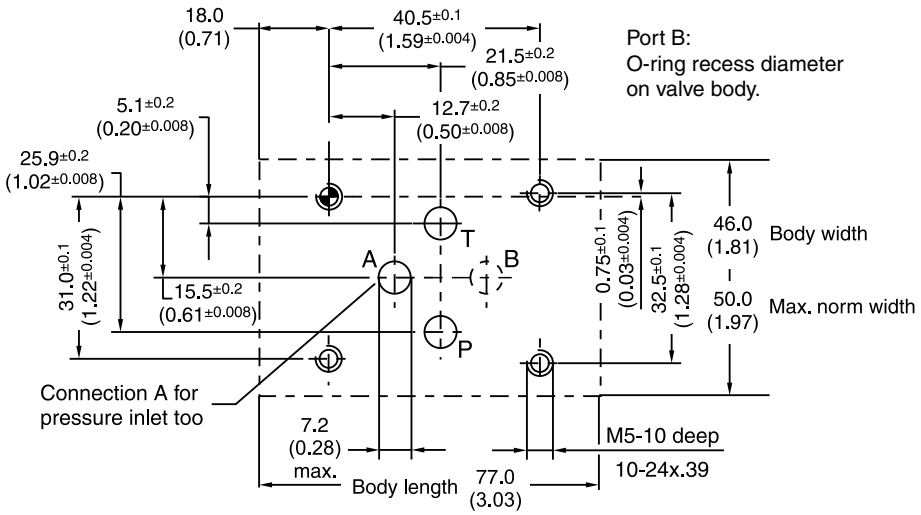
Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Bolt Kit			Seal Kit	
				Nitrile	Fluorocarbon
R_{max}6.3 0.01/100	BK375 BK209	4x M5x30 DIN 912 12.9 4x 10-24x1.25	7.6 Nm (5.6 lb.-ft.) ±15%	SK-RE06MTN	SK-RE06MTV

Mounting Pattern ISO 6264-03-04-*-97

Inch equivalents for millimeter dimensions are shown in (**)



Notes

General Description

Series R4V and R6V proportional pressure relief valves for external electronics feature a proportionally adjusted pilot stage which controls a seated type main stage. The valves are equipped with a mechanical maximum pressure stage (optional for R6V).

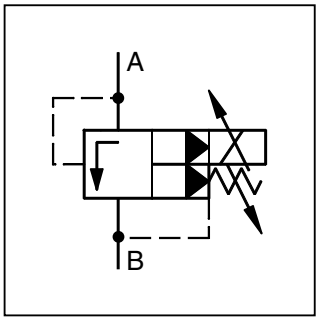
The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.

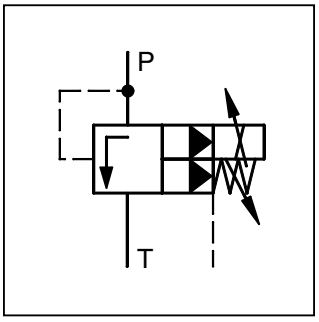
Features

- Pilot operated with proportional solenoid.
- Continuous adjustment by proportional solenoid.
- 3 pressure ranges.
- Optional mechanical maximum pressure adjustment.
- 2 interfaces
  R4V Subplate ISO 6264 (DIN 24340 Form D)
  R6V Subplate ISO 6264 (DIN 24340 Form E).

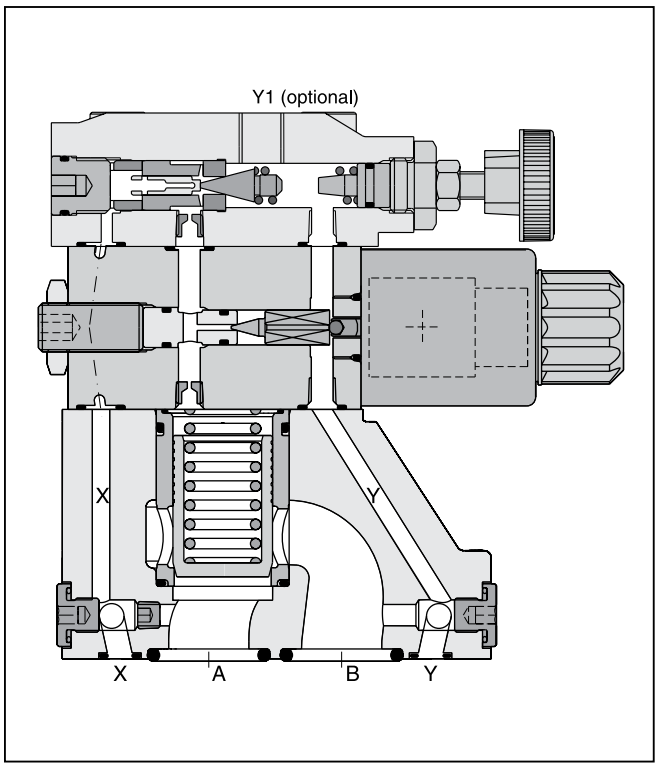
R4V

R6V

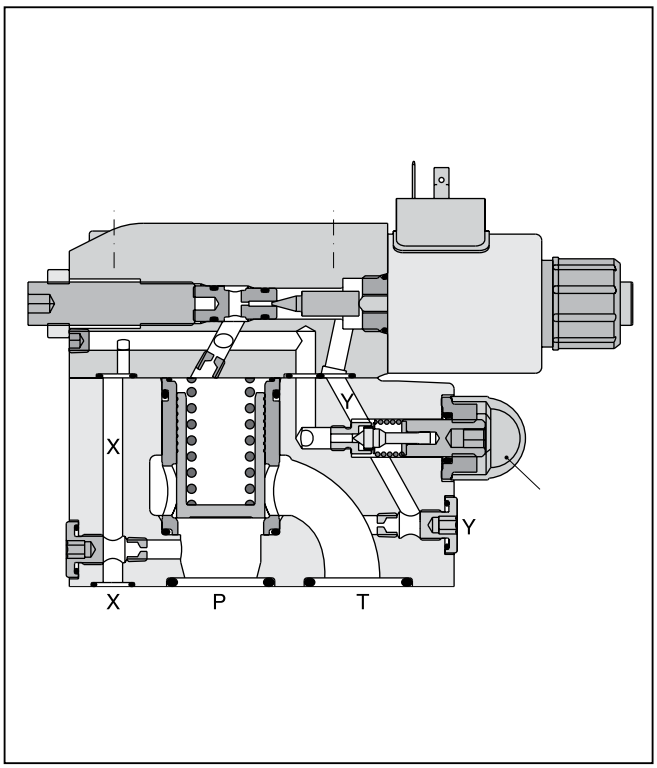




R4V



R6V



R		V		—	5										
Pressure Relief Valve	Interface	Relief Function	Size		Maximum Pressure 350 Bar (5075 PSI)	Drain Port	Pressure Range	Mechanical Adjustment	Pilot Oil	Options	Solenoid Voltage	Design Series	Seal	Options Check with Factory

Code	Description
03	NG10
06	NG25
10	NG32

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Interface	Drain
3	R4V	Y-port in mounting pattern
9	R6V	Y-port = G1/8"

Code	Description
A	R4V
B	R6V

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
G0R	12V 2.3A
G0S	16V 1.3A

Code	Interface	Mechanical Adj.
P [1]	R6V	Hexagon Screw with Lock Nut
1	R4V	Hand Knob
3	R4V	Acorn Nut with Lead Seal

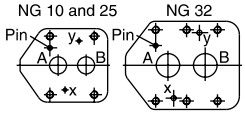
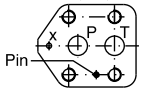
[1] Use Code P also for valve without mechanical adjustment.

Code	Description
P2	with Mechanical maximum adjustment
PS [4]	without Mechanical maximum adjustment

[4] R6V only

Code	Drain Port
0	Internal
1 [2]	External from Subplate
2	External from Valve Body (Y-port)

[2] R4V only

Code	Description	
4	Subplate Mounting ISO 6264	NG 10 and 25 / NG 32 
6		NG 10; 25; 32 

Bolt Kits:

R4V03	BK505
R4V06	BK485
R4V10	BK506
R6V03	BK494
R6V06	BK366
R6V10	BK507

Weight:

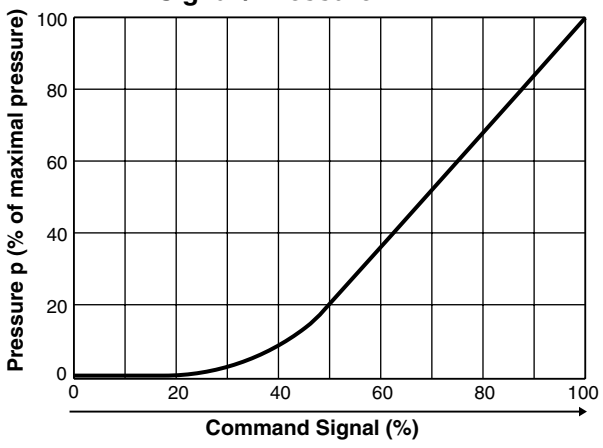
R4V03	4.5 kg (9.9 lbs.)
R4V06	6.3 kg 13.9 (lbs.)
R4V10	7.8 kg (17.2 lbs.)
R6V03	5.2 kg (11.5 lbs.)
R6V06	6.4 kg (14.1 lbs.)
R6V10	8.3 kg (18.3 lbs.)

Specifications

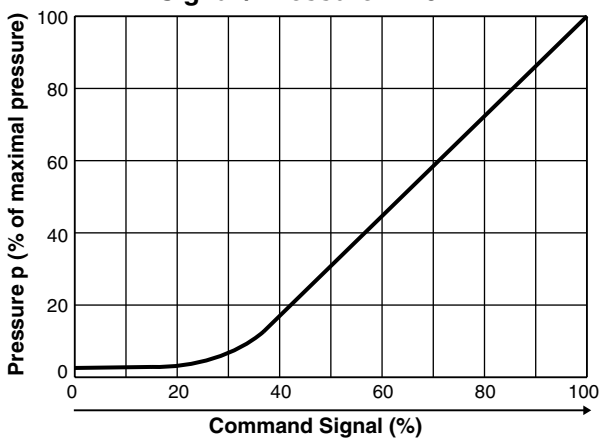
General			
Size	**NG10**	**NG25**	**NG32**
Interface	Subplate Mounting acc. ISO 6264		
Mounting Position	As desired, horizontal position preferred		
Ambient Temperature Range	-20°C to +80°C (-4°F to +176°F)		
Hydraulic			
Maximum Operating Pressure	Ports P (or A) and X 350 Bar (5075 PSI); Port T (or B) and Y depressurized		
Pressure Range	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)		
Nominal Flow **R4V** **R6V**	150 LPM (39.7 GPM) 250 LPM (66.1 GPM)	350 LPM (92.6 GPM) 500 LPM (132.3 GPM)	650 LPM (172.0 GPM 650 LPM (172.0 GPM)
Fluid	Hydraulic oil as per DIN 51524...51535, other on request		
Fluid Temperature	-20°C to +70°C (-4°F to +158°F)		
Viscosity **Permitted** **Recommended**	20 to 380 cSt / mm²/s (93 to 1761 SSU) 30 to 50 cSt / mm²/s (139 to 232 SSU)		
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		
Electrical (Proportional Solenoid)			
Duty Ratio	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible		
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)		
Supply Voltage	12 VDC (maximum current 2.3 amps) or 16 VDC (maximum current 1.3 amps)		
Coil Resistance	4 Ohm at 20°C (68°F) for 12V; 12 Ohm at 20°C (68°F) for 16V		
Solenoid Connectors	Connector as per EN 175301-803		
Power Amplifier, Recommended	PCD00A-400		

Performance Curves

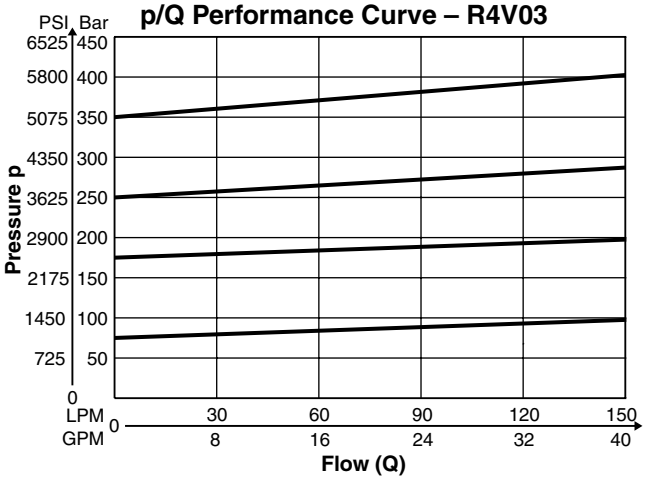
Signal / Pressure – R4V



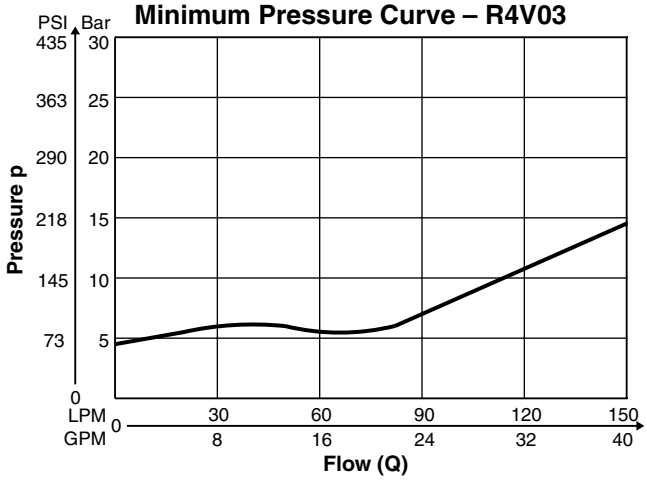
Signal / Pressure – R6V



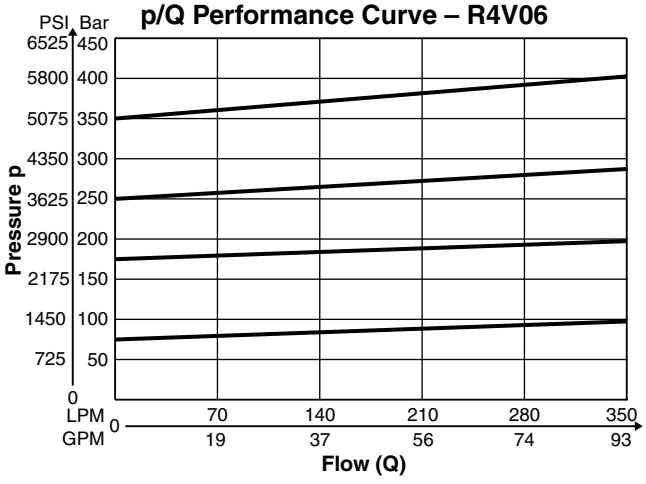
p/Q Performance Curve – R4V03



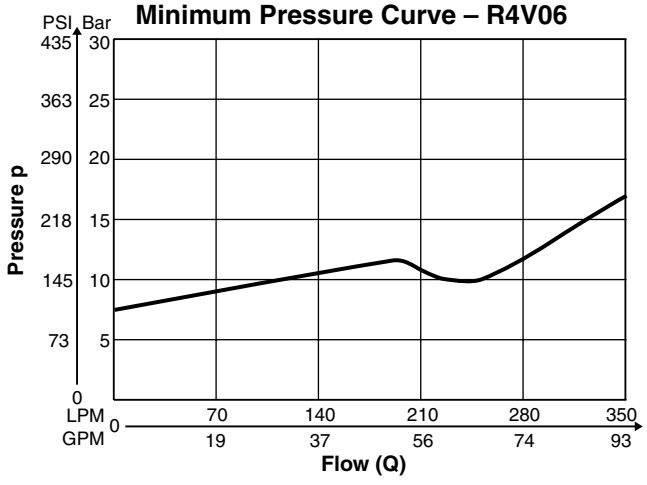
Minimum Pressure Curve – R4V03



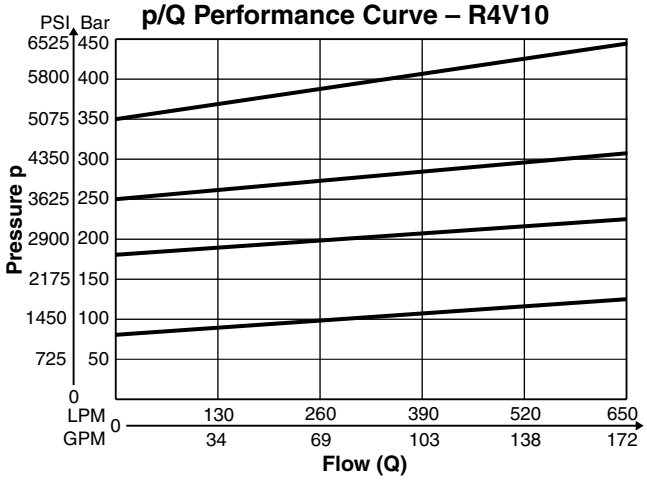
p/Q Performance Curve – R4V06



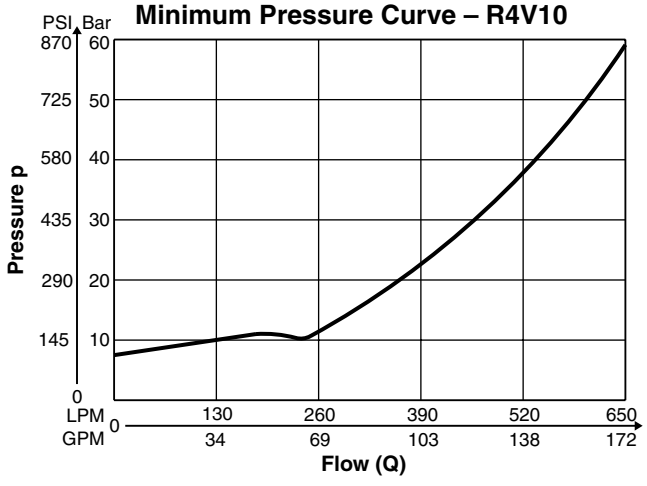
Minimum Pressure Curve – R4V06



p/Q Performance Curve – R4V10

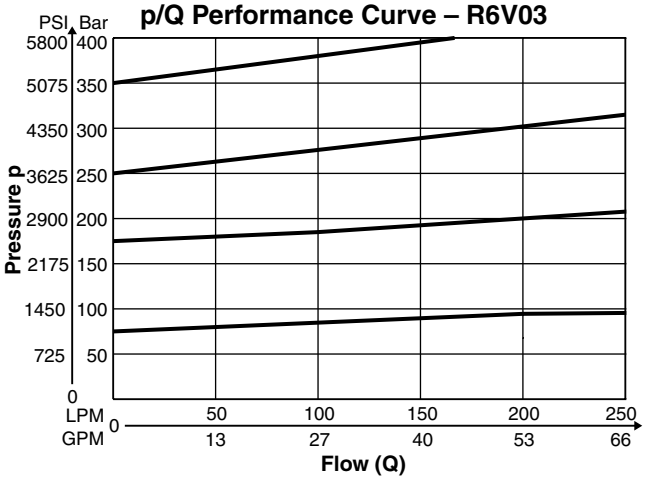


Minimum Pressure Curve – R4V10

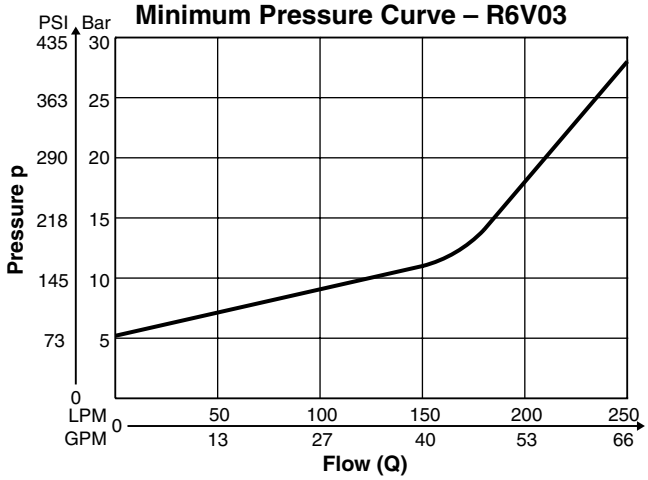


The performance curves are measured with external drain.
For internal drain the tank pressure has to be added to curve.

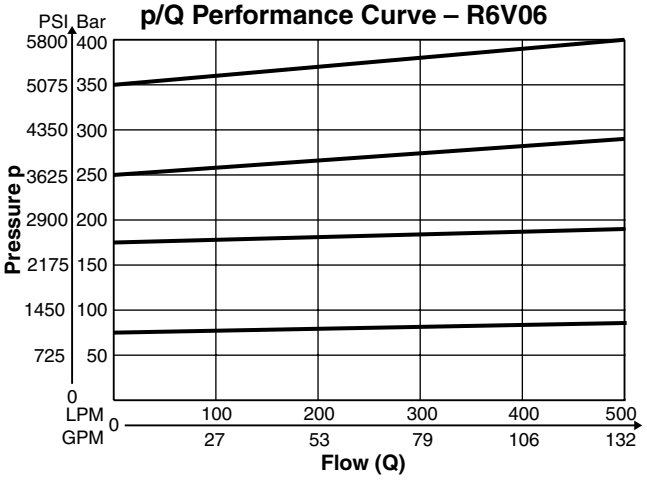
p/Q Performance Curve – R6V03



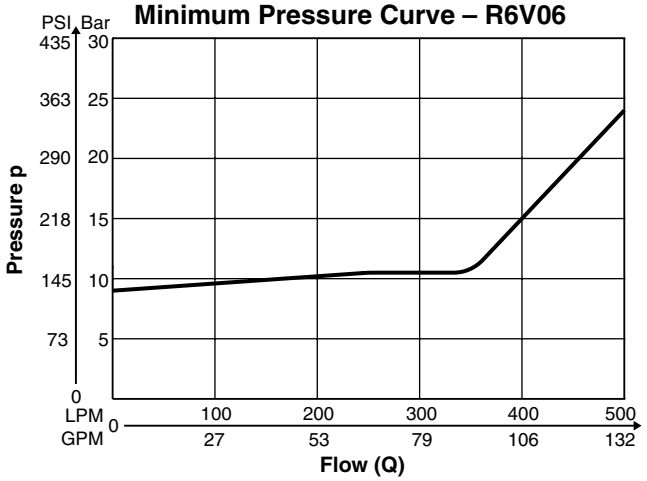
Minimum Pressure Curve – R6V03



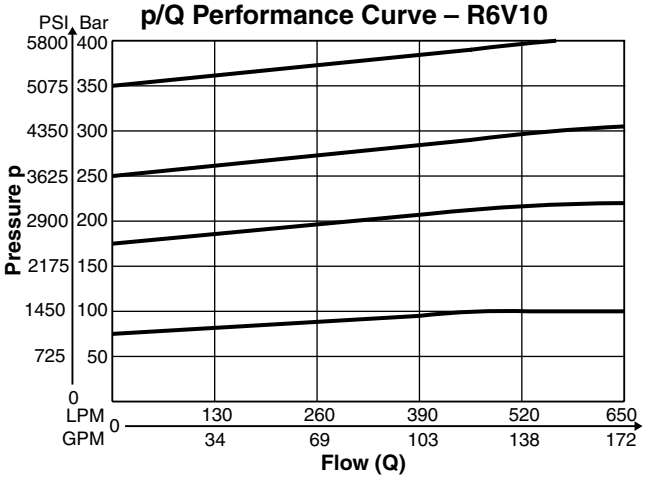
p/Q Performance Curve – R6V06



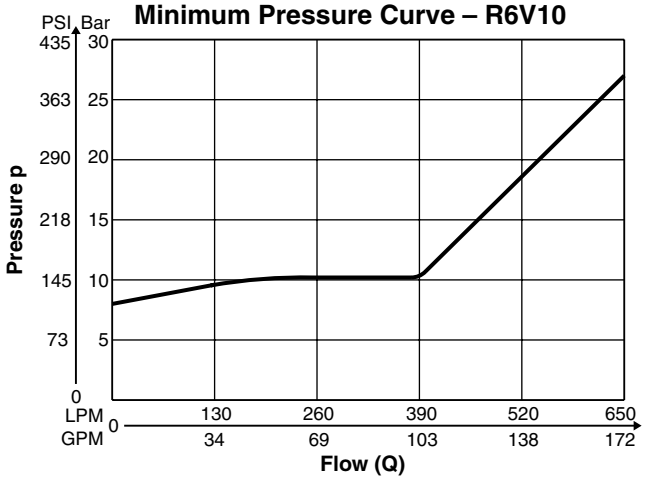
Minimum Pressure Curve – R6V06



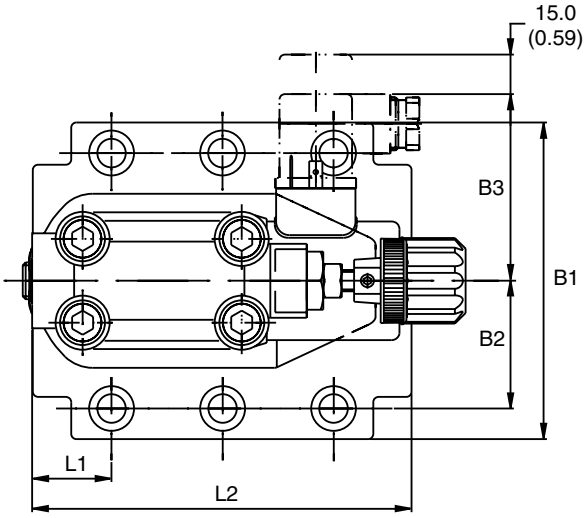
p/Q Performance Curve – R6V10

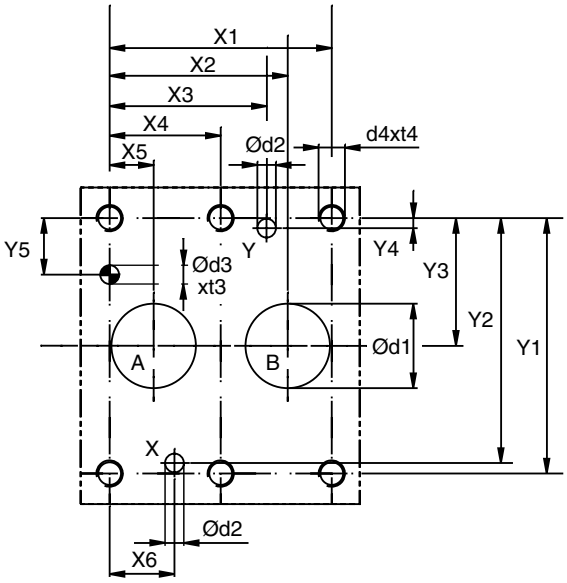


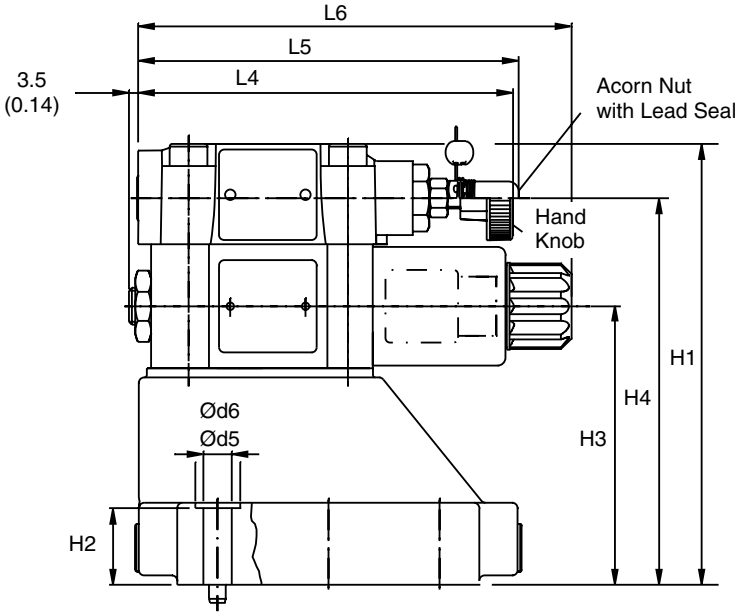
Minimum Pressure Curve – R6V10

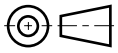


The performance curves are measured with external drain.
For internal drain the tank pressure has to be added to curve.


15.0
(0.59)
B3
B1
B2
L1
L2


X1
X2
X3
X4
X5
Ød2
d4xt4
Y5
Ød3
xt3
Y
Y4
Y3
Y2
Y1
A
B
Ød1
X
Ød2
X6


L6
L5
L4
3.5
(0.14)
Acorn Nut
with Lead Seal
Hand
Knob
H1
H4
H3
Ød6
Ød5
H2



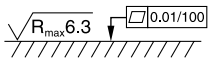
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-07-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	–	7.2 (0.28)	21.5 (0.85)	0	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	14.3 (0.56)	–
25	6264-08-11-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	–	11.1 (0.44)	20.6 (0.81)	0	79.4 (3.13)	73 (2.87)	39.7 (1.56)	6.4 (0.25)	15.9 (0.63)	–
32	6264-10-15-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	0	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	21.4 (0.84)	–

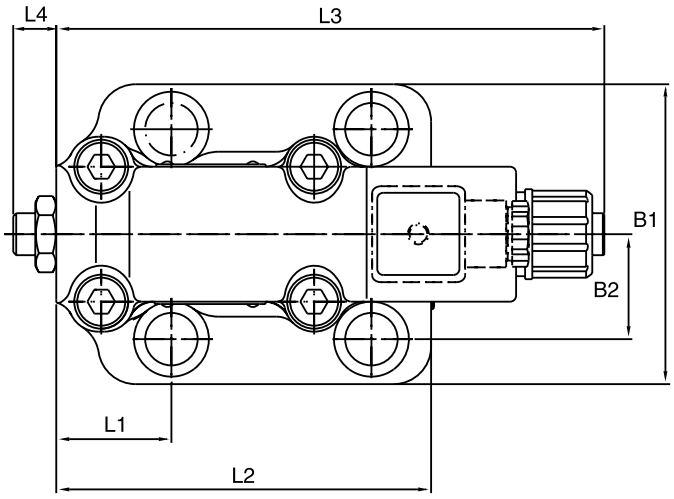
Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

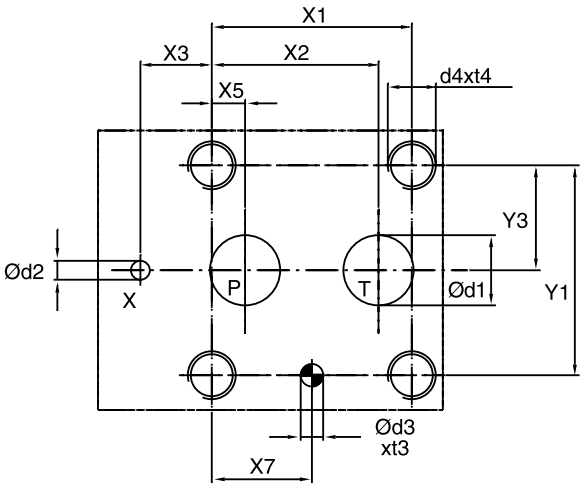
NG	ISO-code	B1	B2	B3	H1	H2	H3	H4	H6	L1	L2	L3	L4	L5	L6
10	6264-06-07-*-97	87.3 (3.44)	33.4 (1.31)	71.0 (2.80)	130.0 (5.12)	21.0 (0.83)	68.5 (2.70)	109.5 (4.31)	–	25.0 (0.98)	90.8 (3.57)	–	143.0 (5.63)	144.8 (5.70)	164.8 (6.49)
25	6264-08-11-*-97	105.0 (4.13)	39.7 (1.56)	71.0 (2.80)	154.5 (6.08)	29.0 (1.14)	95.0 (3.74)	136.0 (5.35)	–	30.9 (1.22)	123.0 (4.84)	–	143.0 (5.63)	144.8 (5.70)	164.8 (6.49)
32	6264-10-15-*-97	120.0 (4.72)	48.4 (1.91)	71.0 (2.80)	167.0 (6.57)	30.0 (1.18)	105.5 (4.15)	146.5 (5.77)	–	29.8 (1.17)	143.5 (5.65)	–	143.0 (5.63)	144.8 (5.70)	164.8 (6.49)

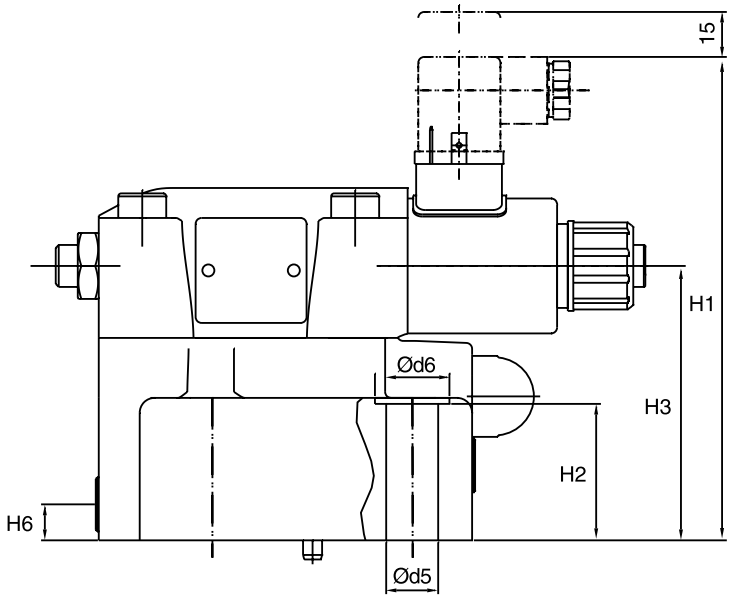
NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6	Subplate
10	6264-06-07-*-97	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)	SPP3M6B910
25	6264-08-11-*-97	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)	SPP6M8B910
32	6264-10-15-*-97	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)	SPP10M12B910

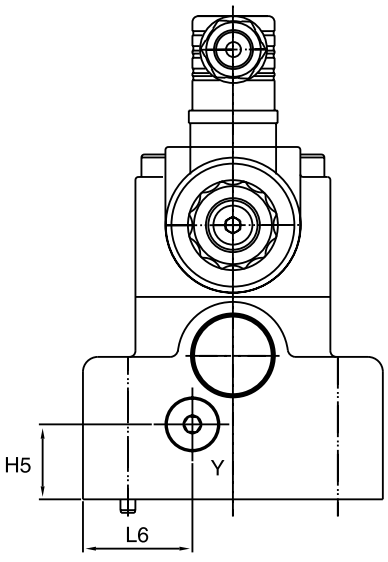
NG	ISO-code	Bolt Kit			Seal Kit		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-07-*-97	BK505	4x M10 x 35 DIN912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58507-0	S26-58507-5	
25	6264-08-11-*-97	BK485	4x M10 x 45 DIN912 12.9		S26-58475-0	S26-58475-5	
32	6264-10-15-*-97	BK506	6x M10 x 45 DIN912 12.9		S26-58508-0	S26-58508-0	
Prop Section P2*					S26-58473-0	S26-58473-5	

* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.









Y: external drain port G 1/8"

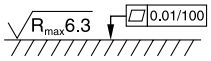
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.00)	–	22.1 (0.87)	–	22.1 (0.87)	53.8 (2.12)	–	26.9 (1.06)	–	–	–
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.94)	–	11.1 (0.44)	–	33.4 (1.31)	70.0 (2.76)	–	35.0 (1.38)	–	–	–
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	–	12.7 (0.50)	–	44.5 (1.75)	82.6 (3.25)	–	41.3 (1.63)	–	–	–

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-09-*-97	80.0 (3.15)	26.9 (1.06)	158.7 (6.25)	27.0 (1.06)	88.0 (3.46)	–	20.5 (0.81)	25.0 (0.98)	52.0 (2.05)	117.0 (4.61)	182.3 (7.18)	14.4 (0.57)	–	29.5 (1.16)
25	6264-08-13-*-97	100.0 (3.94)	35.0 (1.38)	161.2 (6.35)	45.5 (1.19)	91.5 (3.60)	–	25.0 (0.98)	12.0 (0.47)	37.9 (1.49)	124.5 (4.90)	182.3 (7.18)	14.4 (0.57)	–	36.5 (1.44)
32	6264-10-17-*-97	120.0 (4.72)	41.3 (1.63)	166.7 (6.56)	52.0 (2.05)	97.0 (3.82)	–	26.5 (1.04)	13.5 (0.53)	44.3 (1.74)	153.0 (6.02)	182.3 (7.18)	14.4 (0.57)	–	46.5 (1.83)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6	Subplate
10	6264-06-09-*-97	14.7 (0.58)	4.8 (0.19)	7.5 (0.30)	10.0 (0.39)	M12	20.0 (0.79)	13.5 (0.53)	20.0 (0.79)	SPP3R6B910
25	6264-08-13-*-97	23.4 (0.92)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M16	27.0 (1.06)	17.5 (0.69)	25.0 (0.98)	SPP6R10B910
32	6264-10-17-*-97	32.0 (1.26)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M18	28.0 (1.10)	20.0 (0.79)	30.0 (1.18)	SPP10R12B910

NG	ISO-code	Bolt Kit			Seal Kit		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-09-*-97	BK494	4x M12 x 45 DIN912 12.9	108 Nm (79.7 lb.-ft.) ±15%	S26-98589-0	S26-98589-5	
25	6264-08-13-*-97	BK366	4x M16 x 70 DIN912 12.9	264 Nm (194.7 lb.-ft.) ±15%	S26-96396-0	S26-96396-5	
32	6264-10-17-*-97	BK507	4x M18 x 75 DIN912 12.9	398 Nm (293.5 lb.-ft.) ±15%	S26-96392-0	S26-96392-5	

Notes

General Description

Series R4V and R6V proportional pressure relief valves feature onboard electronics based on the functionality of the digital amplifier PCD00.

The digital onboard electronic is situated in a robust metal housing and can be used in rough environments.

The nominal values of the valves are factory set. Additionally the ProPxD software permits the editing of all parameters. The software is also used for the digital electronic modules. The cable for connection to a serial RS-232 interface is available as accessory.

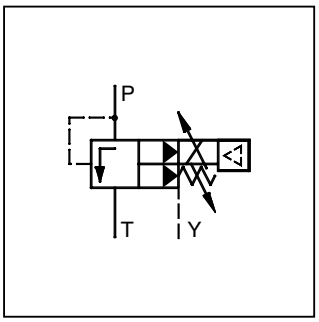
The electrical connection is available in 2 options:

Code 10V: 6 + PE central connection
0...+10V command signal (preset)
+10V reference voltage output

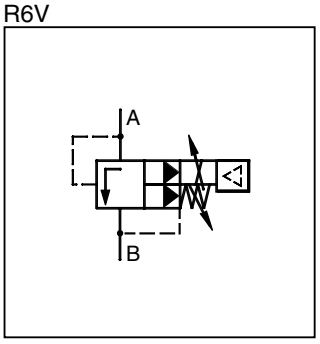
Code 4MA: 6 + PE central connection
4…20mA command signal (preset)

The proportional solenoid operated pilot stage with integrated electronics controls a seated type main stage. The valves are available with an optional mechanical maximum pressure adjustment.

R6V06



R6V

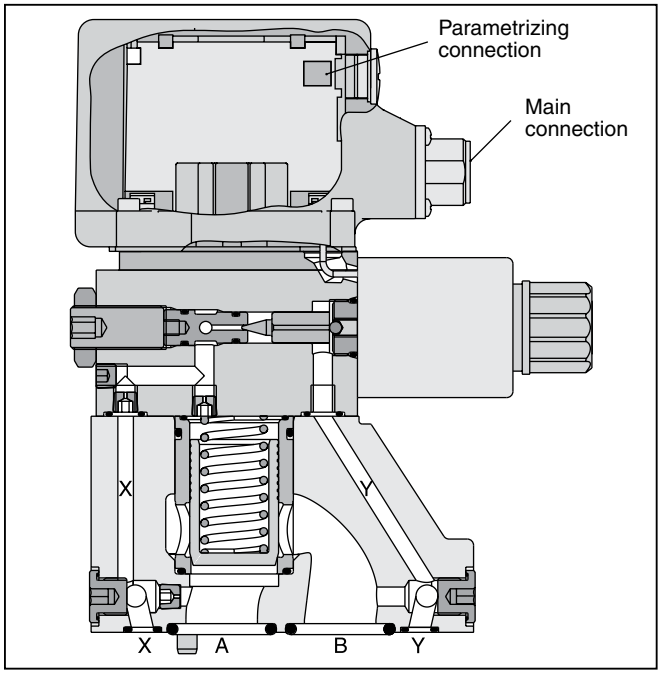


R4V

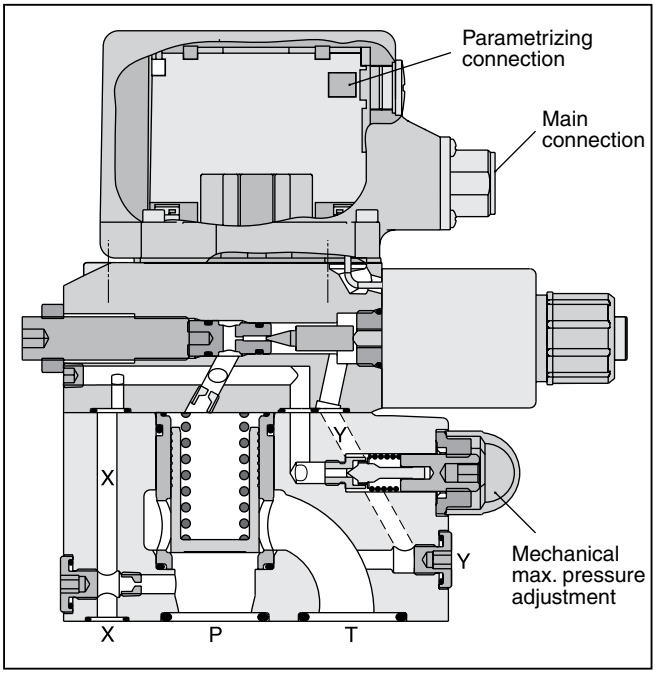
Features

- Pilot operated pressure relief valve.
- Onboard electronics.
- Factory set.
- Ramp time adjustment.
- Linearized characteristics.
- 3 pressure ranges.
- 2 interfaces:
  R4V Subplate, ISO 6264 (DIN 24340 Form D)
  R6V Subplate, ISO 6264 (DIN 24340 Form E)
- Optional mechanical maximum pressure adjustment.

R4V OBE



R6V OBE



Ordering Information

R		V		–	5				P							
Pressure Relief Valve	Interface	Relief Function	Size		Maximum Pressure 350 Bar (5075 PSI)	Drain Port	Pressure Range	Proportional Operation	Pilot Oil	Options	Input Signal	Design Series	Seal	Options Check with Factory

Code	Description
03	NG10
06	NG25
10	NG32

Code	Interface	Drain
3	R4V	Y-port in mounting pattern
9	R6V	Y-port = G1/8"

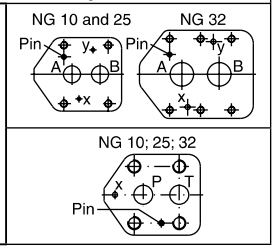
Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
A	R4V
B	R6V

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
10V	0...+10V with ref. output +10V
4MA	4...20mA

Code	Description
4	Subplate Mounting ISO 6264
6	Subplate Mounting ISO 6264



Code	Drain Port
0	Internal
1 [1]	External from Subplate
2	External from Valve Body (Y-port)

[1] R4V only

Code	Description
PN	without Mechanical maximum adjustment
PM	with Mechanical maximum adjustment

Bolt Kits:

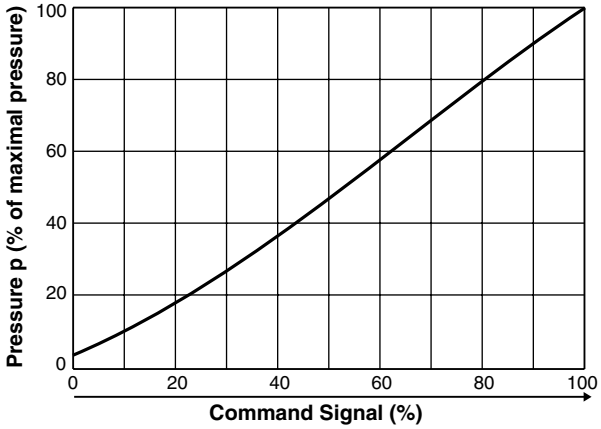
R4V03	BK505
R4V06	BK485
R4V10	BK506
R6V03	BK494
R6V06	BK366
R6V10	BK507

Weight:

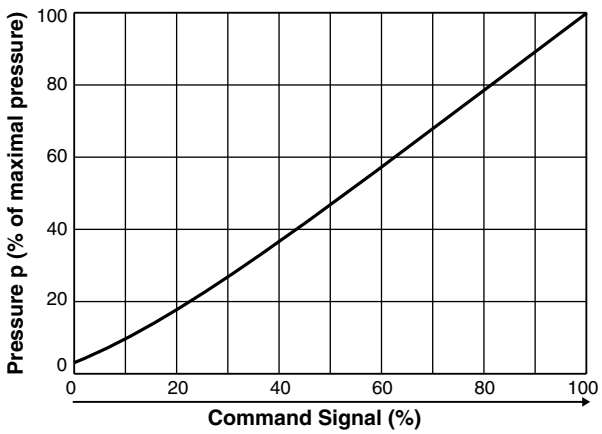
R4V03	4.5 kg (9.9 lbs.)
R4V06	6.3 kg (13.9 lbs.)
R4V10	7.8 kg (17.2 lbs.)
R6V03	5.4 kg (11.9 lbs.)
R6V06	6.6 kg (14.6 lbs.)
R6V10	8.6 kg (19.0 lbs.)

Performance Curves

Signal/Pressure Curve – R4V

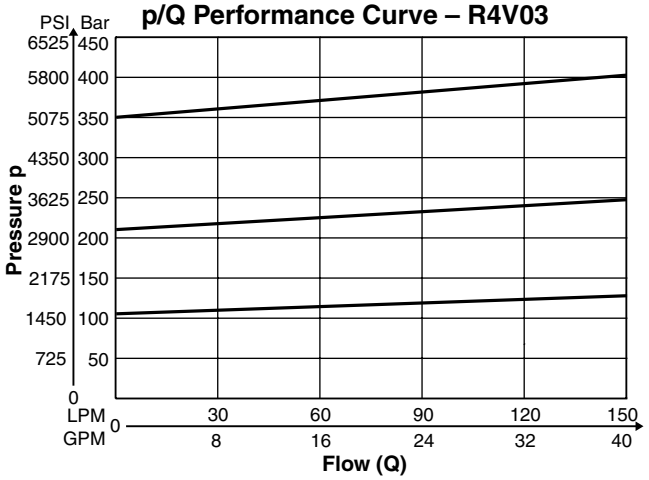


Signal/Pressure Curve – R6V

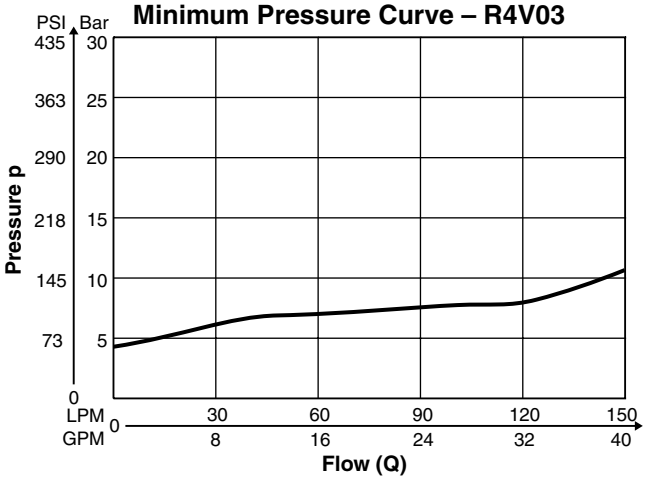


General				
Size		**NG10**	**NG25**	**NG32**
Interface		Subplate mounting acc. ISO 6264		
Mounting Position		as desired, horizontal mounting prefered		
Ambient Temperature	**[°C]**	-20...+60; (-4°F ... +140°F)		
$MTTF_D$ Value	**[years]**	50		
Vibration Strength	**[g]**	10 sinus 5...2000 Hz acc. to IEC 68-2-6 30 noise 20...2000 Hz acc. to IEC 68-2-36 15 shock acc. to IEC 68-2-27		
Hydraulic				
Maximum Operating Pressure		Ports P (or A) and X up to 350 Bar (5075 PSI), port T (or B) and Y 30 Bar (435 PSI)		
Pressure Range		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 (5075 PSI)		
Nominal Flow **Series R4V** **Series R6V**		 150 LPM (39.7 GPM) 250 LPM (66.1 GPM)	 350 LPM (92.6 GPM) 500 LPM (132.3 GPM)	 650 LPM (172.0 GPM) 650 LPM (172.0 GPM)
Fluid		Hydraulic oil according to DIN 51524...51535, other on request		
Viscosity **Recommended** **Permitted**	 **[cSt] / [mm²/s]** **[cSt] / [mm²/s]**	 30 ... 50 (139 ... 232 SSU) 20 ... 380 (93 ... 1761 SSU)		
Fluid Temperature	**[°C]**	-20 ... +60; (-4°F ... +140°F)		
Filtration		ISO 4406 (1999); 18/16/13 (acc. NAS 1638: 7)		
Hysteresis	**[%]**	< 1.5		
Electrical				
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible		
Supply Voltage	**VDC**	18...30, ripple < 5% eff., surge free		
Current Consumption Maximum	**[A]**	2.0		
Pre-fusing	**[A]**	2.5 medium lag		
Potentiometer Supply	**[V]**	+10 / ±5% max. 10mA		
Command Signal **Code 10V Voltage** **Code 4MA Current**	 **[V]** **[mA]**	 0...+10, ripple < 0.01 % eff., surge free, Ri = 100 kOhm 4...20, ripple < 0.01 % eff., surge free, Ri = 200 Ohm < 3.6 mA = enable off, > 3.8 mA = enable on (acc. NAMUR NE43)		
Differential Input Voltage Max.	**[V]** **[V]**	30 for terminal D and E against PE (terminal G) 11 for terminal D and E against 0V (terminal B)		
Adjustment Ranges **Minimum current** **Maximum current** **Ramp**	 **[%]** **[%]** **[s]**	 0...50 50...100 0...32.5		
Interface		RS-232, parametrizing connection 5 pole		
EMC		EN 61000-6-2, EN 61000-6-4		
Central Connection		6 + PE acc. EN 175201-804		
Cable Specification	**[mm²]**	7 x 1.0 (AWG 18) overall braid shield		
Cable Length Maximum	**[m]**	50 (164 ft.)		

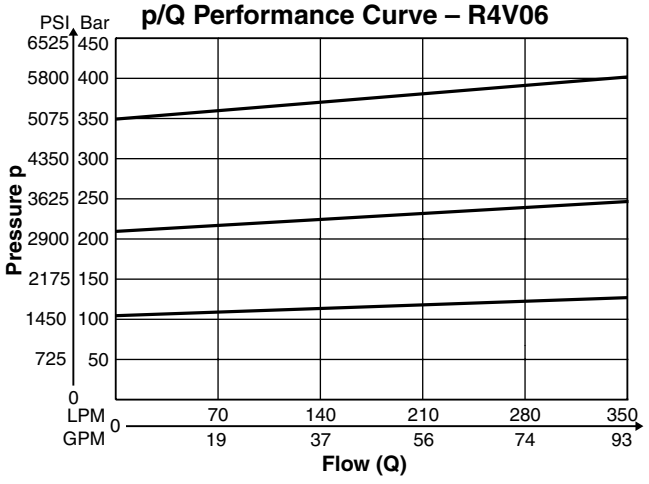
p/Q Performance Curve – R4V03



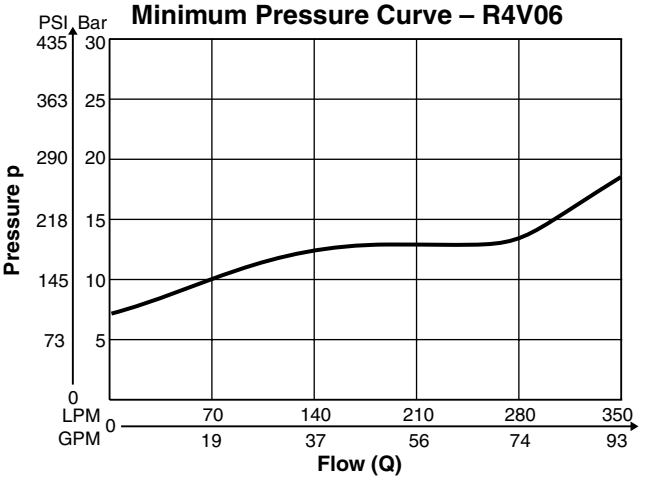
Minimum Pressure Curve – R4V03



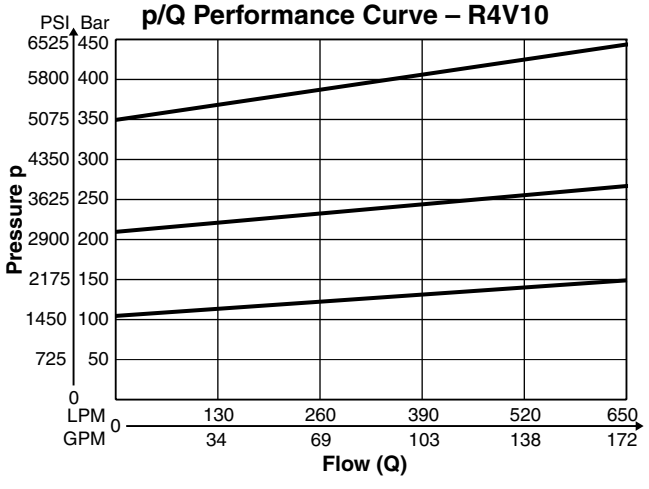
p/Q Performance Curve – R4V06



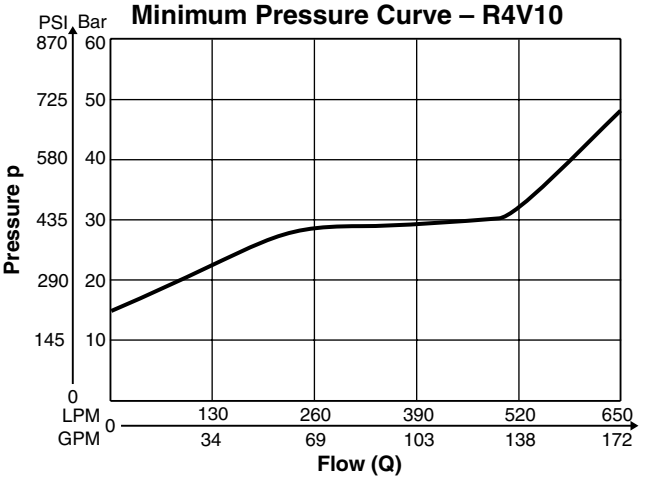
Minimum Pressure Curve – R4V06



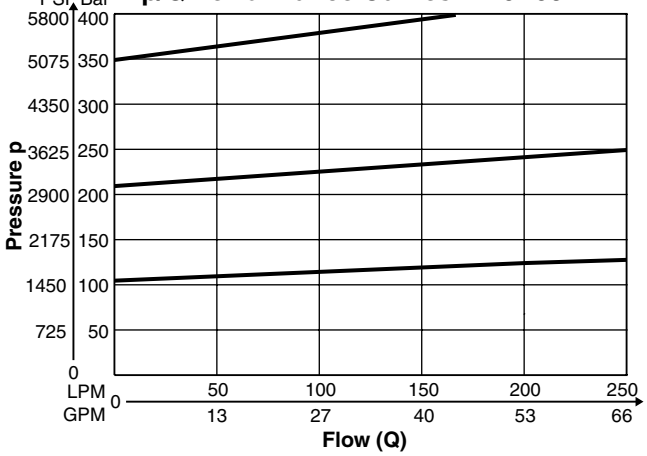
p/Q Performance Curve – R4V10



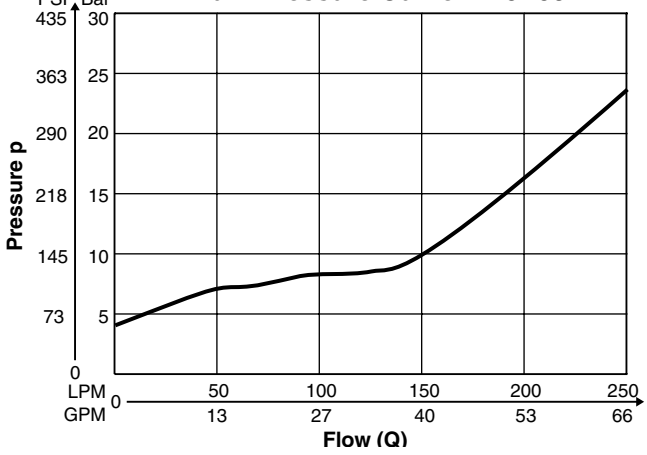
Minimum Pressure Curve – R4V10



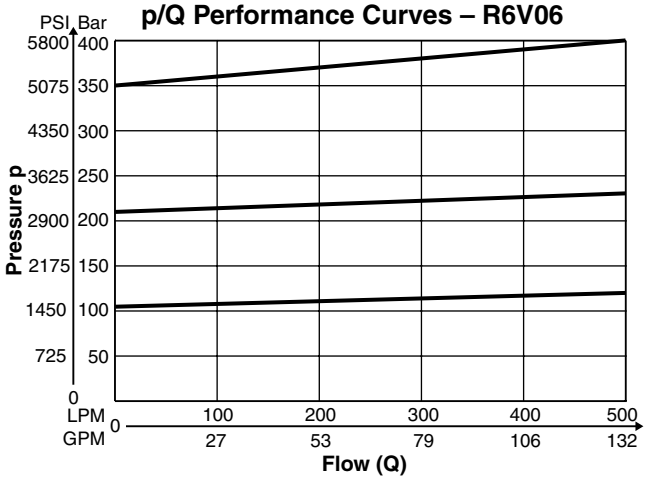
p/Q Performance Curves – R6V03



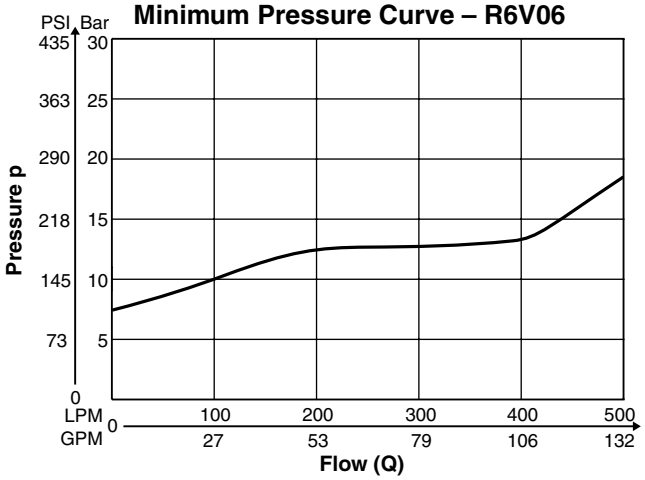
Minimum Pressure Curve – R6V03



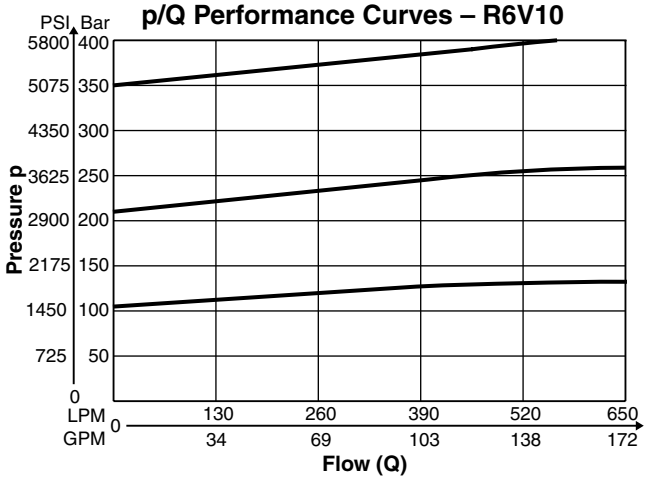
p/Q Performance Curves – R6V06



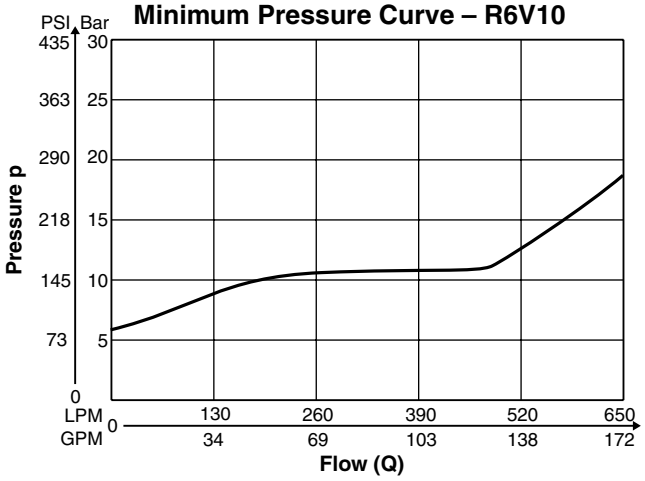
Minimum Pressure Curve – R6V06



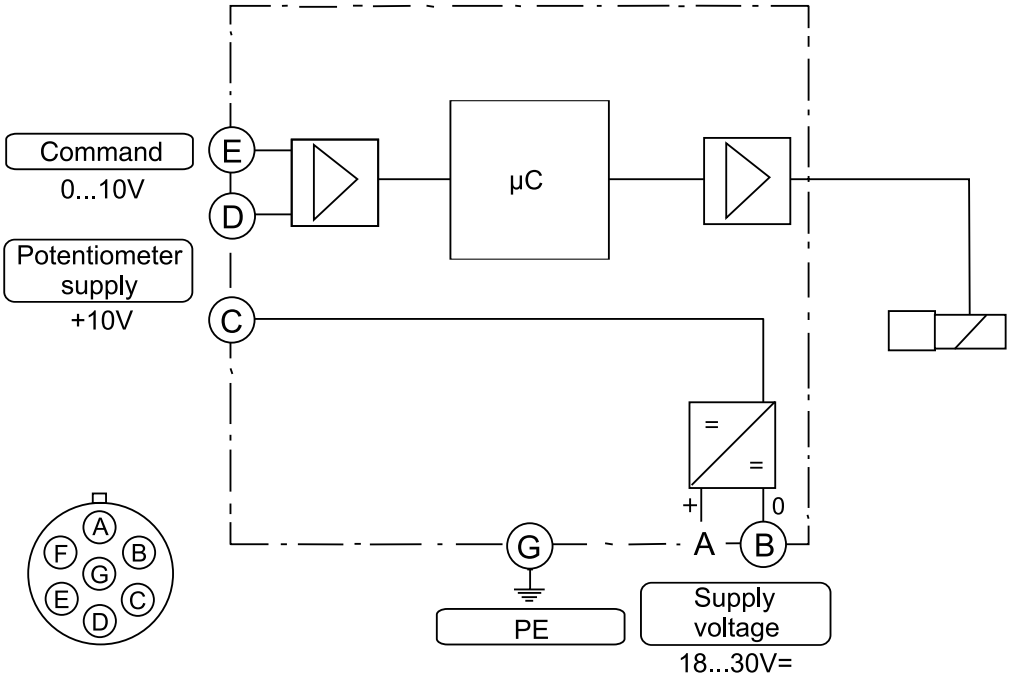
p/Q Performance Curves – R6V10



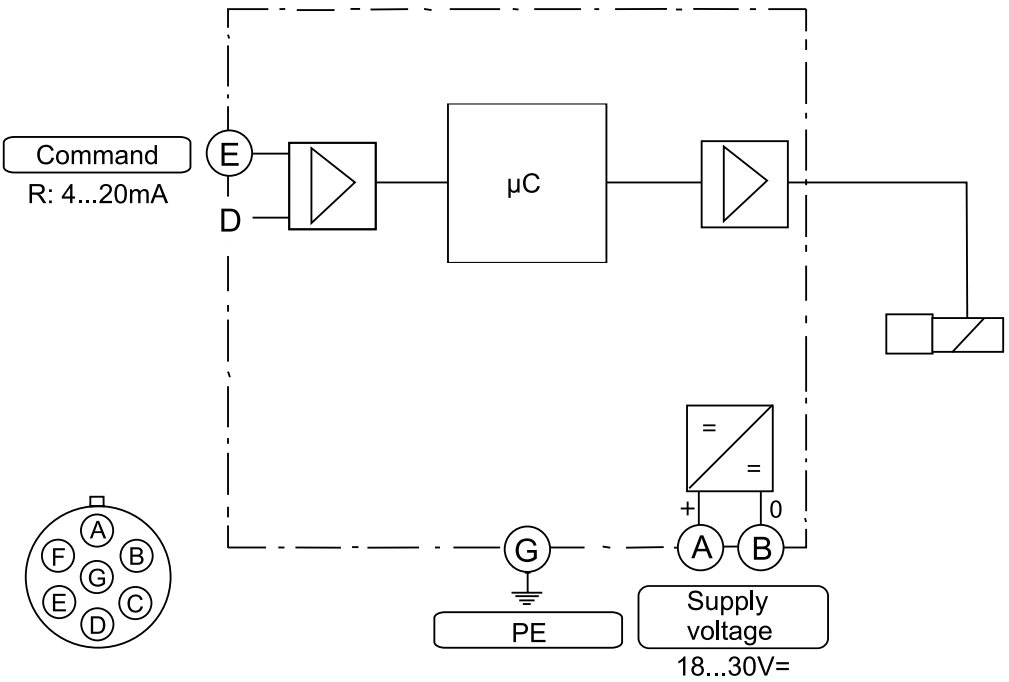
Minimum Pressure Curve – R6V10



Code 10V
6 + PE acc. EN 175201-804



Code 4MA
6 + PE acc. EN 175201-804



ProPxD Interface Program

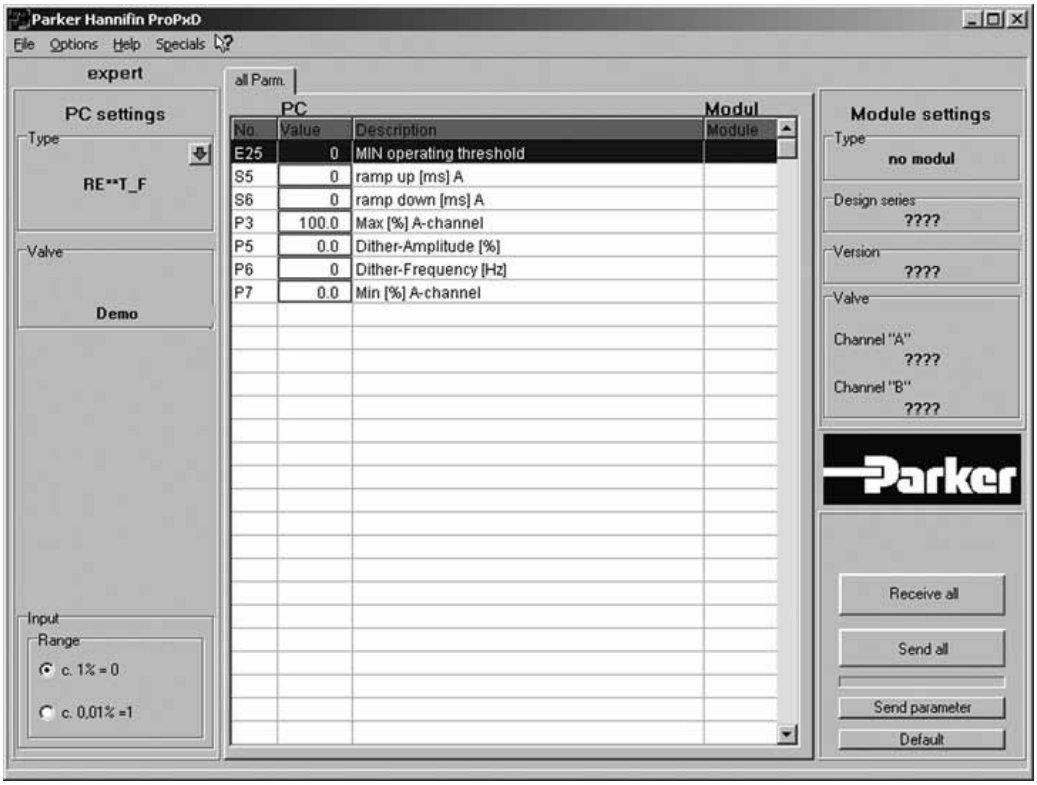
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

Features

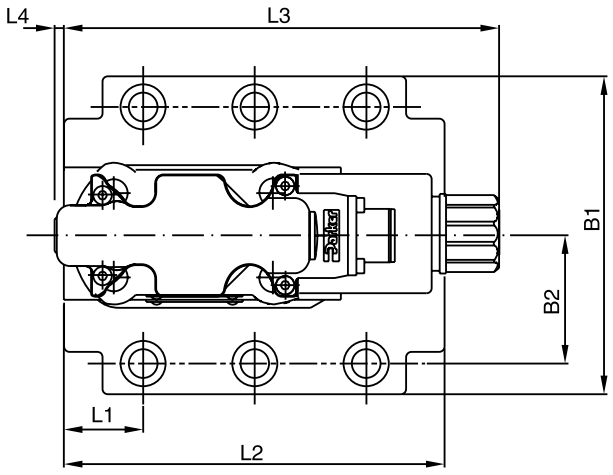
- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

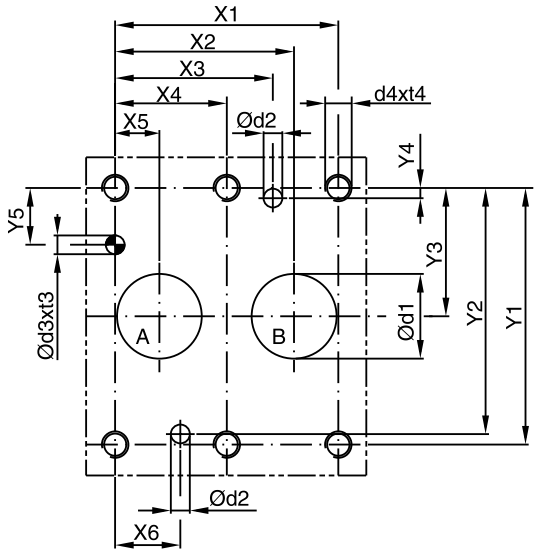
The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

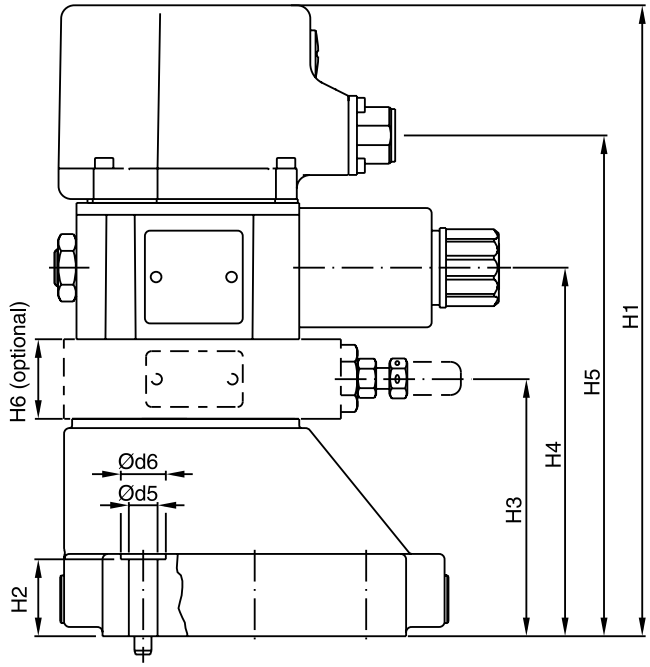
Simple to use interface program. Download free of charge **www.parker.com/euro_hcd** → **Services** → **downloads**

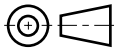


The parametrizing cable may be ordered under item no. 40982923.


L4
L3
B1
B2
L1
L2


X1
X2
X3
X4
X5
Ød2
d4xt4
Y4
Y5
Y3
Y2
Y1
Ød3xt3
A
B
Ød1
Ød2
X6


H6 (optional)
Ød6
Ød5
H2
H3
H4
H5
H1



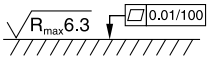
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-Code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-07-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	–	7.2 (0.28)	21.5 (0.85)	0	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	14.3 (0.56)	–
25	6264-08-11-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	–	11.1 (0.44)	20.6 (0.81)	0	79.4 (3.13)	73 (2.87)	39.7 (1.56)	6.4 (0.25)	15.9 (0.63)	–
32	6264-10-15-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	0	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	21.4 (0.84)	–

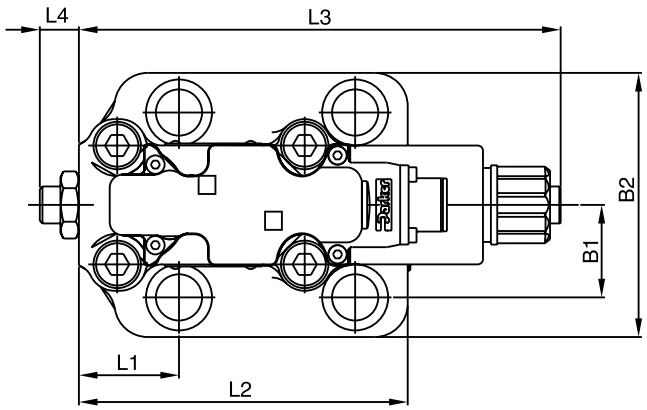
Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

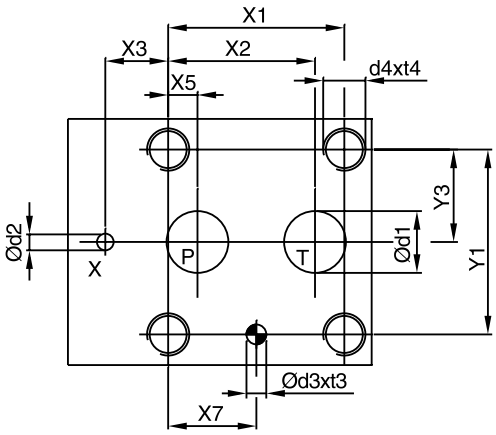
NG	ISO-Code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-07-*-97	87.3 (3.44)	33.4 (1.31)	200.3 (7.89)	21.0 (0.83)	60.0 (2.36)	102.0 (4.02)	151.0 (5.94)	30.0 (1.18)	25.0 (0.98)	90.8 (3.57)	164.2 (6.46)	4.5 (0.18)	–	–
25	6264-08-11-*-97	105.0 (4.13)	39.7 (1.56)	226.8 (8.93)	29.0 (1.14)	86.5 (3.41)	128.5 (5.06)	184.0 (7.24)	30.0 (1.18)	30.9 (1.22)	123.0 (4.84)	164.2 (6.46)	4.5 (0.18)	–	–
32	6264-10-15-*-97	120.0 (4.72)	48.4 (1.91)	237.3 (9.34)	29.0 (1.14)	97.0 (3.82)	139.0 (5.47)	194.5 (7.66)	30.0 (1.18)	29.8 (1.17)	143.5 (5.65)	164.2 (6.46)	4.5 (0.18)	–	–

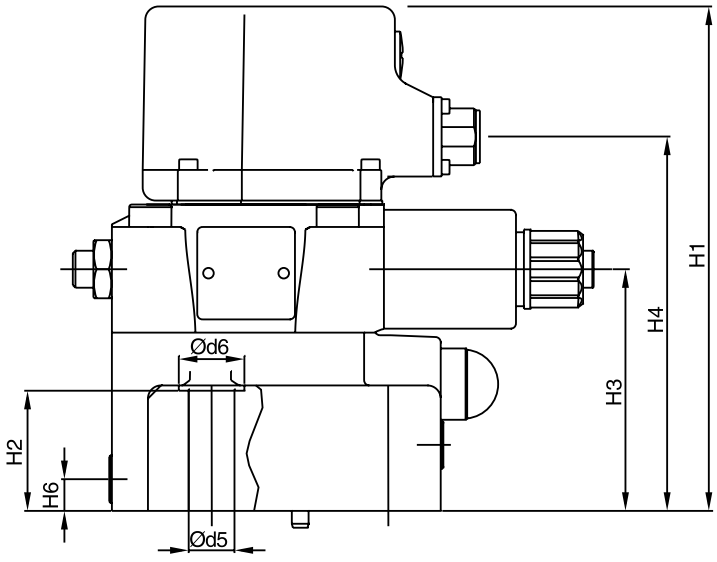
NG	ISO-Code	d1max	d2max	d3	t3	d4	t4	d5	d6	Subplate
10	6264-06-07-*-97	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)	SPP3M6B910
25	6264-08-11-*-97	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)	SPP6M8B910
32	6264-10-15-*-97	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)	SPP10M12B910

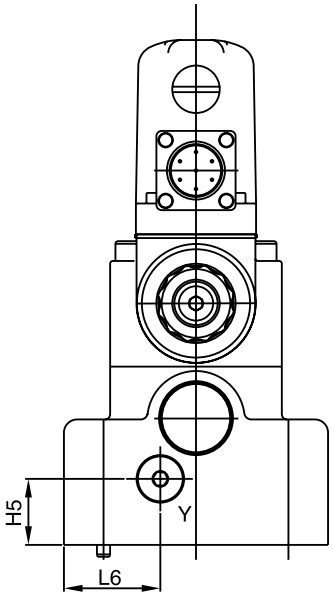
NG	ISO-Code	Bolt Kit			Seal Kit		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-07-*-97	BK505	4x M10 x 35 DIN912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58507-0*	S26-58507-5*	
25	6264-08-11-*-97	BK485	4x M10 x 45 DIN912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58475-0*	S26-58475-5*	
32	6264-10-15-*-97	BK506	6x M10 x 45 DIN912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58508-0*	S26-58508-5*	
Prop. Section P2*					S26-58473-0	S26-58473-5	

* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.









Y: external drain port G 1/8"

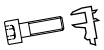
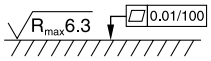
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-Code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.00)	–	22.1 (0.87)	–	22.1 (0.87)	53.8 (2.12)	–	26.9 (1.06)	–	–	–
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.94)	–	11.1 (0.44)	–	33.4 (1.31)	70.0 (2.76)	–	35.0 (1.38)	–	–	–
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	–	12.7 (0.50)	–	44.5 (1.75)	82.6 (3.25)	–	41.3 (1.63)	–	–	–

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

NG	ISO-Code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-09-*-97	80.0 (3.15)	26.9 (1.06)	185.1 (7.29)	27.0 (1.06)	88.0 (3.46)	135.8 (5.35)	20.5 (0.81)	25.0 (0.98)	52.0 (2.05)	117.0 (4.61)	182.3 (7.18)	14.4 (0.57)	–	29.5 (1.16)
25	6264-08-13-*-97	100.0 (3.94)	35.0 (1.38)	188.6 (7.43)	45.5 (1.79)	91.5 (3.60)	139.8 (5.50)	25.0 (0.98)	12.0 (0.47)	37.9 (1.49)	124.5 (4.90)	182.3 (7.18)	14.4 (0.57)	–	36.5 (1.44)
32	6264-10-17-*-97	120.0 (4.72)	41.3 (1.63)	194.1 (7.64)	52.0 (2.05)	97.0 (3.82)	144.8 (5.70)	26.5 (1.04)	13.5 (0.53)	44.3 (1.74)	153.0 (6.02)	182.3 (7.18)	14.4 (0.57)	–	46.5 (1.83)

NG	ISO-Code	d1max	d2max	d3	t3	d4	t4	d5	d6	Subplate
10	6264-06-09-*-97	14.7 (0.58)	4.8 (0.19)	7.5 (0.30)	10.0 (0.39)	M12	20.0 (0.79)	13.5 (0.53)	20.0 (0.79)	SPP3R6B910
25	6264-08-13-*-97	23.4 (0.92)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M16	27.0 (1.06)	17.5 (0.69)	25.0 (0.98)	SPP6R10B910
32	6264-10-17-*-97	32.0 (1.26)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M18	28.0 (1.10)	20.0 (0.79)	30.0 (1.18)	SPP10R12B910

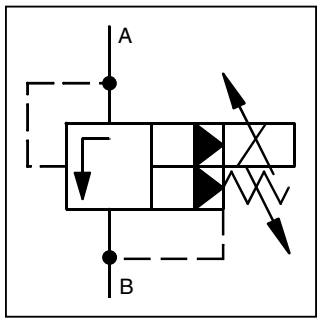
NG	ISO-Code	Bolt Kit			Seal Kit		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-09-*-97	BK494	4x M12 x 45 DIN912 12.9	108 Nm (79.7 lb.-ft.) ±15%	S26-98589-0	S26-98589-5	
25	6264-08-13-*-97	BK366	4x M16 x 70 DIN912 12.9	264 Nm (194.7 lb.-ft.) ±15%	S26-96396-0	S26-96396-5	
32	6264-10-17-*-97	BK507	4x M18 x 75 DIN912 12.9	398 Nm (293.5 lb.-ft.) ±15%	S26-96392-0	S26-96392-5	

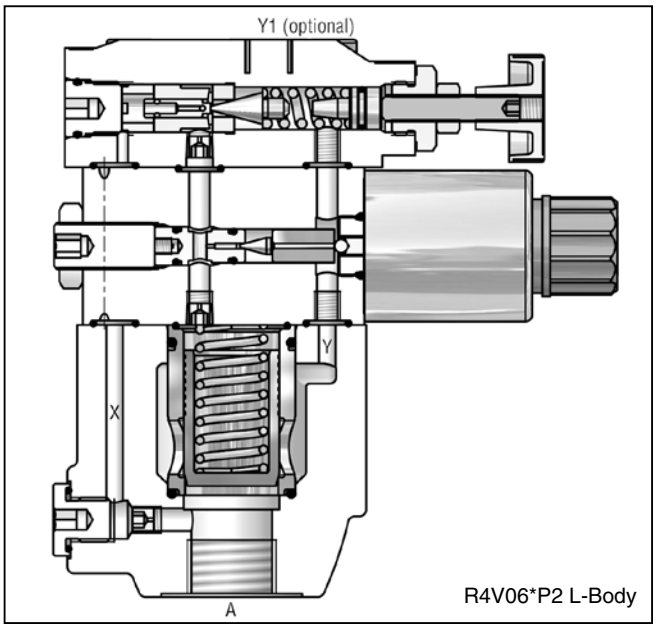
General Description

Series R4V*P2 proportional pressure relief valves are based on the mechanically adjusted Series R4V. The additional proportional unit between the mechanical pilot valve and the main stage allows continuous pressure adjustment.

The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.

R4V*P2 L-Body





R4V06*P2 L-Body

Features

- Pilot operated with manual adjustment.
- Continuous adjustment by proportional solenoid.
- 2 interfaces:
  – L-body (R4V06-G3/4", R4V10-G1 1/4")
  – T-body (R4V03-G1/2", R4V06-G1")
- 3 pressure ranges.
- With mechanical maximum pressure adjustment.

Specifications

General				
	T-Body		**L-Body**	
Size	**03 (1/2")**	**06 (1")**	**06 (3/4")**	**10 (1-1/4")**
Mounting	Threaded Body			
Mounting Position	Unrestricted			
Ambient Temp. Range	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Max. Operating Pressure	Ports A and X up to 350 Bar (5075 PSI); Ports B and Y 30 Bar (435 PSI)			
Pressure Range	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)			
Nominal Flow	60 LPM (15.9 GPM)	200 LPM (52.9 GPM)	200 LPM (52.9 GPM)	450 LPM (119.0 GPM)
Fluid	Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature	-20°C to 80°C (-4°F to 176°F)			
Viscosity Permitted **Recommended**	10 to 380 cSt / mm²/s (46 to 1761 SSU) 30 to 80 cSt / mm²/s (139 to 371 SSU)			
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Electrical (Proportional Solenoid)				
Duty Ratio	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible			
Nominal Voltage	12 VDC			
Max. Current	2.3 amps			
Coil Resistance	4 Ohm at 20°C (68°F)			
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)			
Power Amplifier	PCD00A-400			

Ordering Information

R4V	☐	—	5	☐	☐	☐	☐	P2	G0R	A	☐	☐
Proportional Pressure Relief Valve	Size		Max Pressure 350 Bar (5075 PSI)	Body	Pressure Range	Adjustment	Drain Line	Proportional Pressure Control	Solenoid Voltage 12V 2.3A	Design Series	Seal	Options Check with Factory

Size

Code	Description
03	NG10 (G1/2")
06	NG25 (G1" – T-Body) (G3/4" – L-Body)
10	NG32 (G1-1/4")

Body

Code	Description
6	R4V03 T-Body R4V06 T-Body
D	R4V06 L-Body R4V10 L-Body

Pressure Range

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Adjustment

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal

Drain Line

Code	Description
0	Internal
2	External from Pilot Head (Y1)

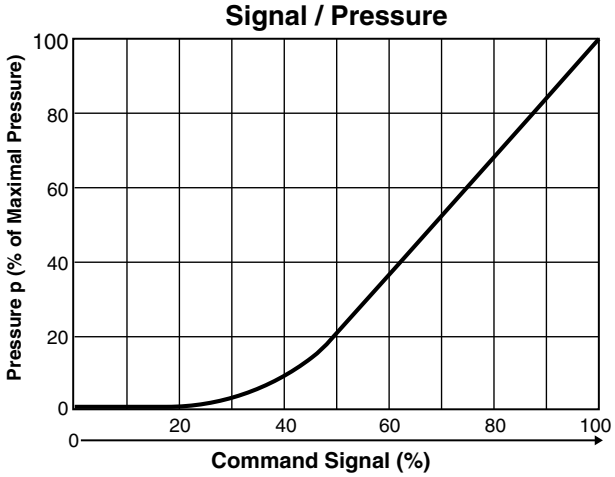
Seal

Code	Description
1	Nitrile
5	Fluorocarbon

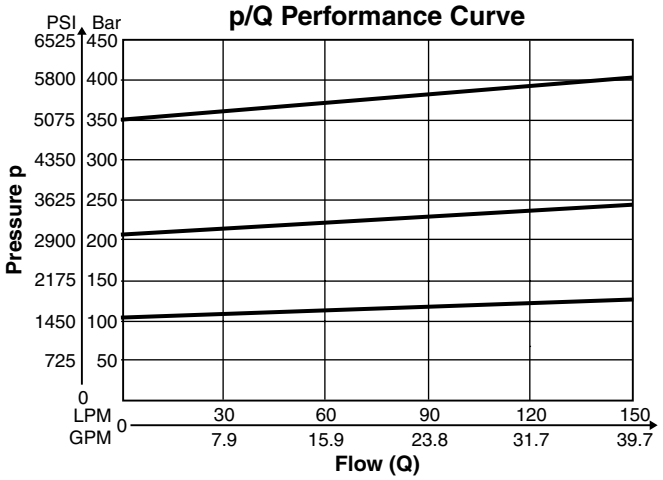
Weight:

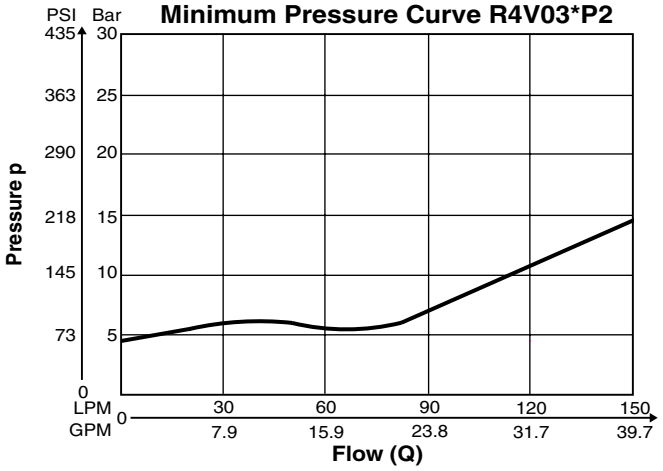
R4V03*P2	5.0 kg (11.0 lbs.)
R4V06*6*P2	5.1 kg (11.2 lbs.)
R4V06*D*P2	7.4 kg (16.3 lbs.)
R4V10*P2	8.4 kg (18.5 lbs.)

Performance Curve

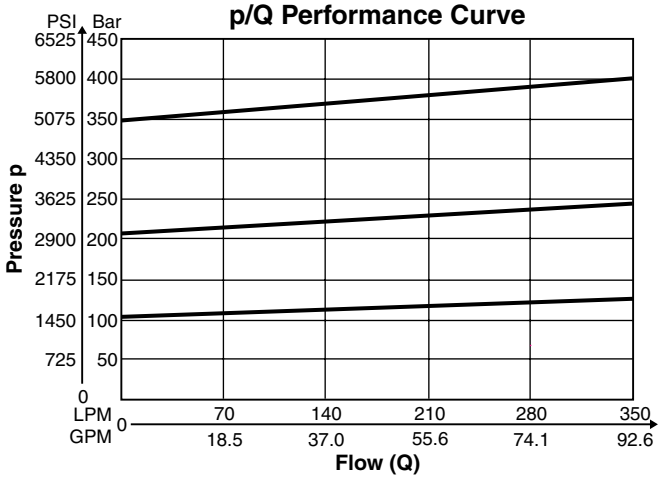


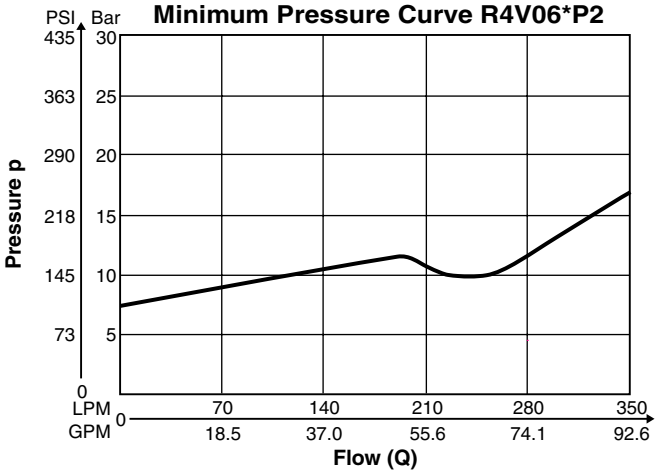
R4V03*P2 [1)]



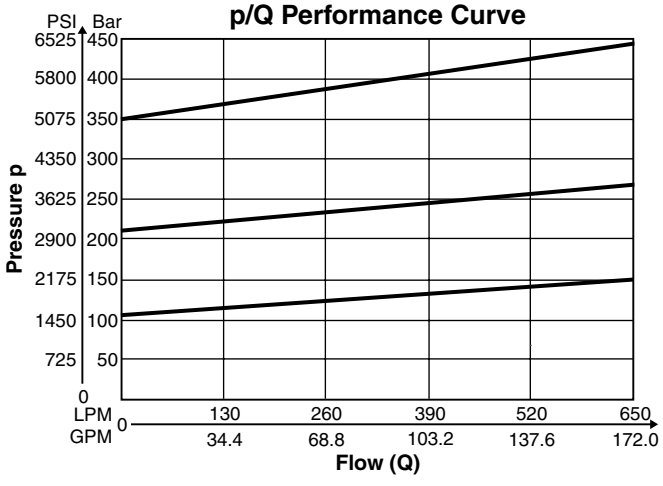


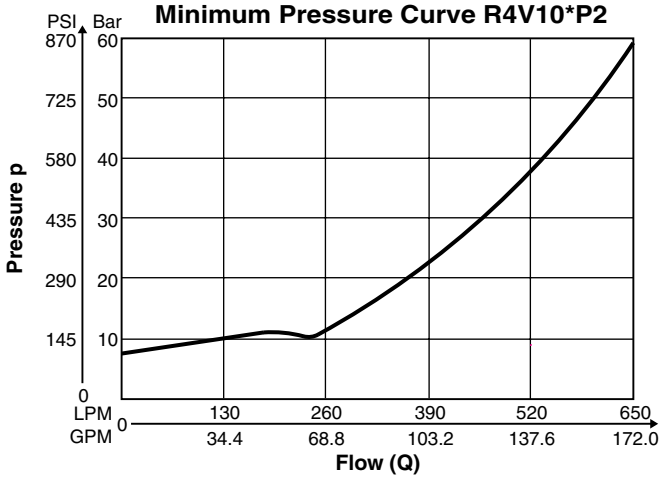
R4V06*P2 [1)]





R4V10*P2 [1)]

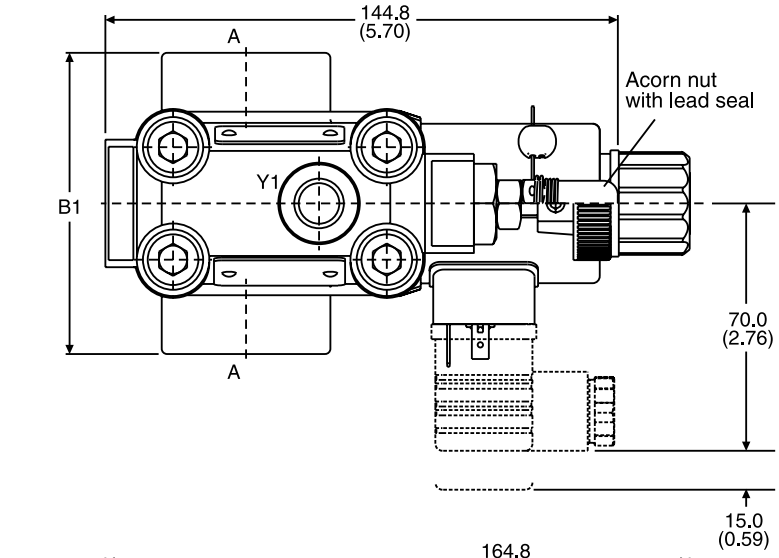


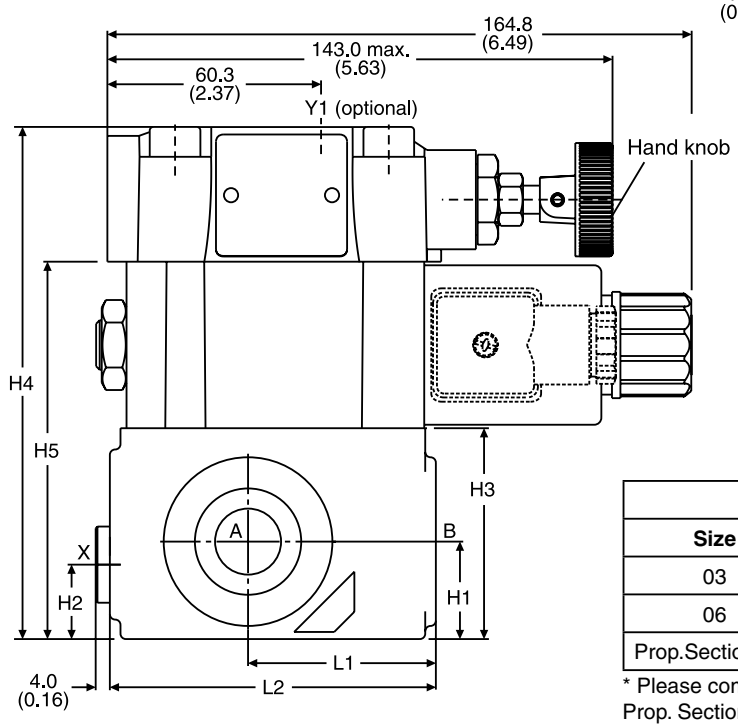


[1)] The performance curves are measured with external drain.
For internal drain, the tank pressure has to be added to the curve.

T-Body

Inch equivalents for millimeter dimensions are shown in (**)





Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
03	S26-58507-0	S26-58507-5
06	S26-58475-0	S26-58475-5
Prop.Section P2*	S26-58473-0	S26-58473-5

* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.

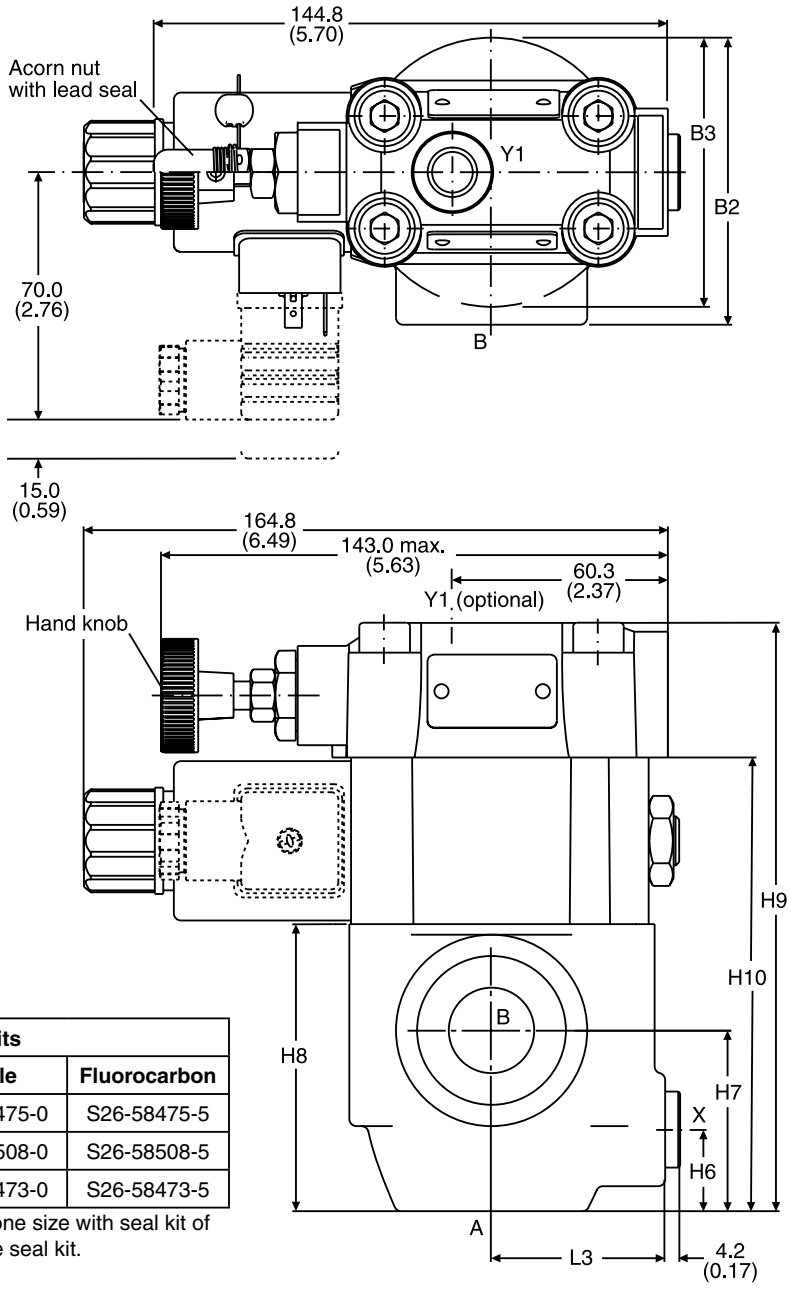
Size	Body	B1	H1	H2	H3	H4	H5	L1	L2
03	T-body	85.0 (3.35)	27.5 (1.08)	21.0 (0.83)	59.5 (2.34)	144.5 (5.69)	106.5 (4.19)	53.0 (2.09)	92.0 (3.62)
06	T-body	136.0 (5.35)	38.0 (1.50)	28.0 (1.10)	93.0 (3.66)	178.0 (7.01)	140.0 (5.51)	66.5 (2.62)	117.5 (4.63)

Ports	Function	Port Size	
		R4V03*P2 T-body	R4V06*P2 T-body
A	Pressure (inlet)	G1/2"	G1"
B	Tank (outlet)	G1/2"	G1"
X[1)]	Ext. Remote Control or Vent Connection	G1/4"	
Y1[2)]	External Drain		

[1)] Closed when supplied
[2)] Port Y1 is only available at drain line (code 2) external from the pilot head

L-Body

Inch equivalents for millimeter dimensions are shown in (**)



Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S26-58475-0	S26-58475-5
10	S26-58508-0	S26-58508-5
Prop.Section P2*	S26-58473-0	S26-58473-5

* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.

Size	Body	B2	B3	H6	H7	H8	H9	H10	L3
06	L-body	81.0 (3.19)	76.0 (2.99)	23.0 (0.91)	51.0 (2.01)	81.0 (3.19)	166.0 (6.54)	128.0 (5.04)	49.0 (1.93)
10	L-body	120.7 (4.75)	85.8 (3.38)	31.8 (1.25)	50.8 (2.00)	96.0 (3.78)	181.0 (7.13)	143.0 (5.63)	49.8 (1.96)

Ports	Function	Port size	
		R4V06 L-body	R4V10 L-body
A	Pressure (inlet)	G3/4"	G1-1/4"
B	Tank (outlet)	G3/4"	G1-1/4"
X[1)]	Ext. Remote Control or Vent Connection	G1/4"	
Y1[2)]	External Drain		

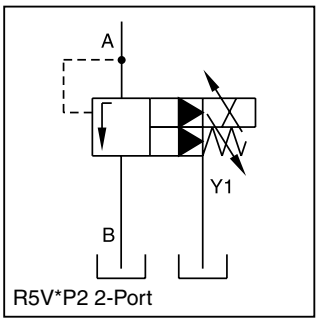
[1)] Closed when supplied
[2)] Port Y1 is only available at drain line (code 2) external from the pilot head

General Description

Series R5V*P2 proportional pressure relief valves are based on the mechanical adjusted Series R5V. The additional proportional unit between the mechanical pilot valve and the main stage allows continuous pressure adjustment.

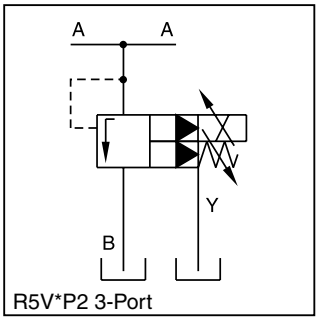
The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.

R5V*P2 2-Port



R5V*P2 2-Port

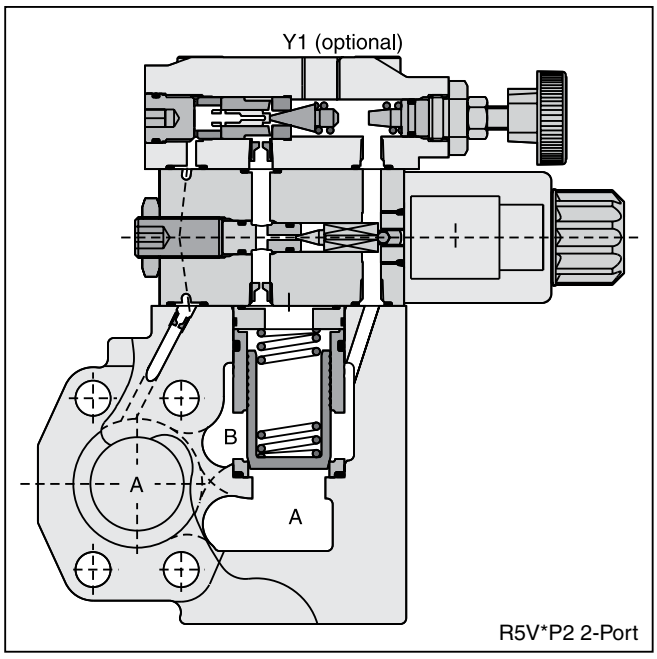
R5V*P2 3-Port



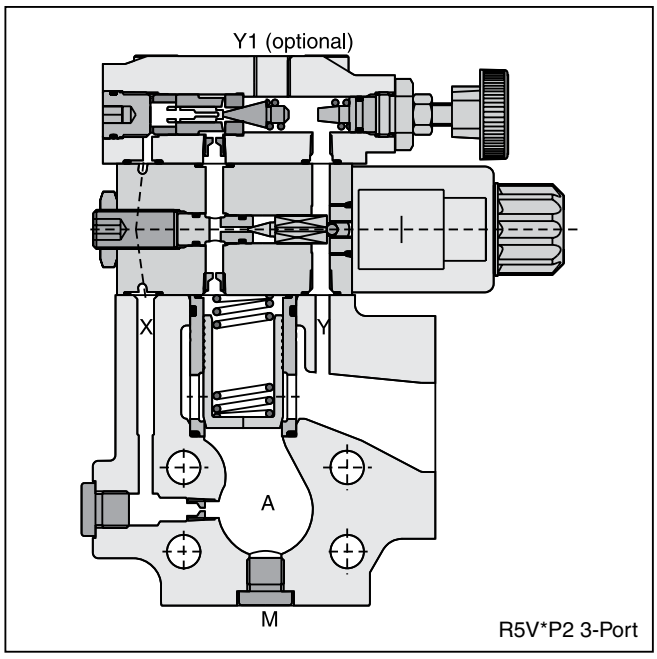
R5V*P2 3-Port

Features

- Pilot operated with manual adjustment.
- Continuous adjustment by proportional solenoid.
- R5V with 2-port body:
  – 3 sizes (SAE 3/4", 1", 1-1/4")
  – SAE 61 flange
- R5V with 3-port body:
  – 4 sizes (SAE 3/4", 1", 1-1/4", 1-1/2")
  – SAE 61 and SAE 62 flange
- 3 pressure ranges.
- With mechanical maximum pressure adjustment.



R5V*P2 2-Port



R5V*P2 3-Port

General					
Size		**06 (3/4")**	**08 (1")**	**10 (1-1/4")**	**12 (1-1/2")**
Mounting		Flanged according to SAE 61			
Mounting Position		Unrestricted			
Ambient Temperature Range		-20°C to +50°C (-4°F to +122°F)			
Hydraulic					
Maximum Operating Pressure	**SAE 61 Ports A, B**	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)	210 Bar (3045 PSI)
	SAE 61 Port Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)
	SAE 62 Ports A, B	350 Bar (5075 PSI)	350 Bar (5075 PSI)	350 Bar (5075 PSI)	350 Bar (5075 PSI)
	SAE 62 Port Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)
Pressure Range		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)			
Nominal Flow		90 LPM (23.8 GPM)	300 LPM (79.4 GPM)	600 LPM (158.7 GPM)	600 LPM (158.7 GPM)
Fluid		Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature		-20°C to +80°C (-4°F to +176°F)			
Viscosity	**Permitted**	10 to 650 cSt / mm^2/s (46 to 3013 SSU)			
	Recommended	30 to 80 cSt / mm^2/s (139 to 371 SSU)			
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Electrical (Proportional Solenoid)					
Duty Ratio		100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible			
Nominal Voltage		12 VDC			
Max. Current		2.3 amps			
Coil Resistance		4 Ohm at 20°C (68°F)			
Solenoid Connection		Connector as per EN175301-803			
Protection Class		IP65 in accordance with EN60529 (plugged and mounted)			
Power Amplifier		PCD00A-400			

Ordering Information

R5V	☐	—	☐	☐	☐	☐	☐	☐	P2	G0R	A	☐	☐
Proportional Pressure Relief Valve	Size		SAE Interface	Pilot Ports	Pressure Range	Adjustment	Pilot Oil		Proportional Pressure Control	Solenoid Voltage 12V 2.3A	Design Series	Seal	Options

Size

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"
12*	SAE 1-1/2"

* R5V 3-Port only

SAE Interface

SAE 61

Code	Size	Maximum Pressure
3*	12	210 Bar (3045 PSI)
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

SAE 62

Code	Size	Maximum Pressure
6*	06/08/ 10/12	350 Bar (5075 PSI)

* R5V 3-Port only

Pilot Ports

2-Port Body

Code	Description
3*	No Ports
7	Y1 = G1/4"

3-Port Body

Code	Description
9	Y1**, X1, M = G1/4"

* 2-Port: only in combination with pilot oil code 2.

** 3-Port: Y1 only available at external drain (pilot oil code 6).

Pressure Range

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Adjustment

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal

Pilot Oil

Code	Drain Line
2	Internal
6	External from Y1-Port

Seal

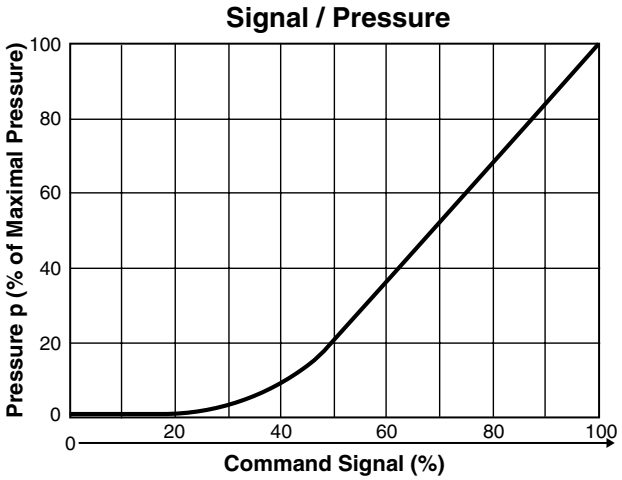
Code	Description
1	Nitrile
5	Fluorocarbon

Options

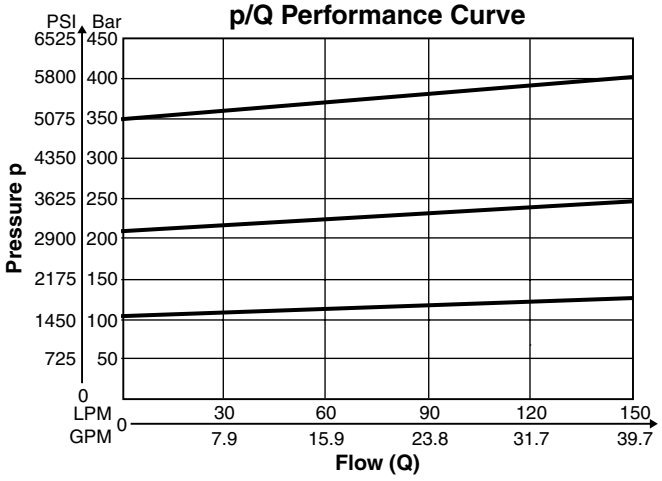
Code	Description
Omit	Standard
152	3-Port body with metric threads

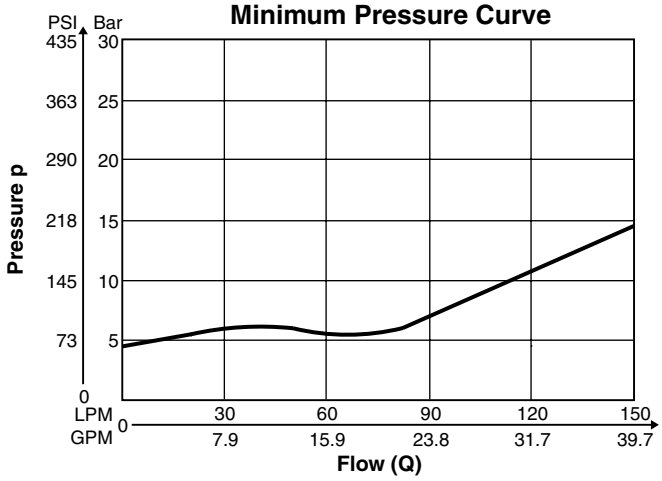
Weight:	2-Port	3-Port
R5V06*P2	5.8 kg (12.8 lbs.)	5.4 kg (11.9 lbs.)
R5V08*P2	6.4 kg (14.1 lbs.)	6.4 kg (14.1 lbs.)
R5V10*P2	7.7 kg (17.0 lbs.)	7.0 kg (15.4 lbs.)
R5V12*P2	——	9.8 kg (21.6 lbs.)

Performance Curve

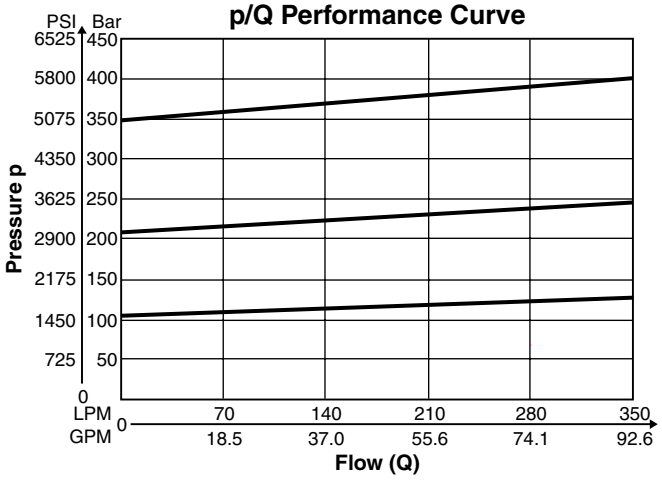


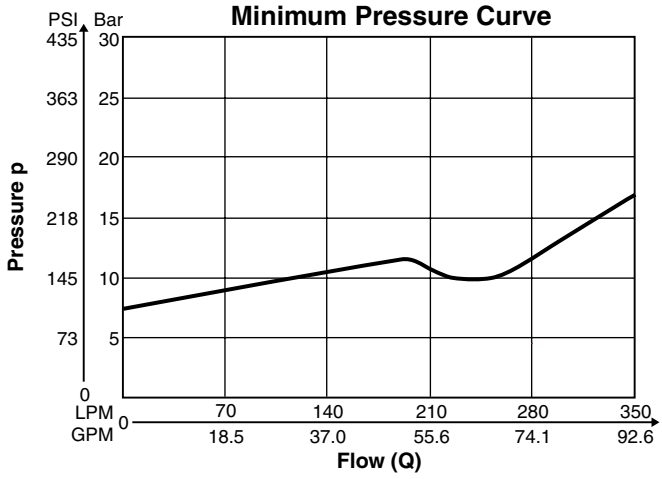
R5V06*P2 [1)]



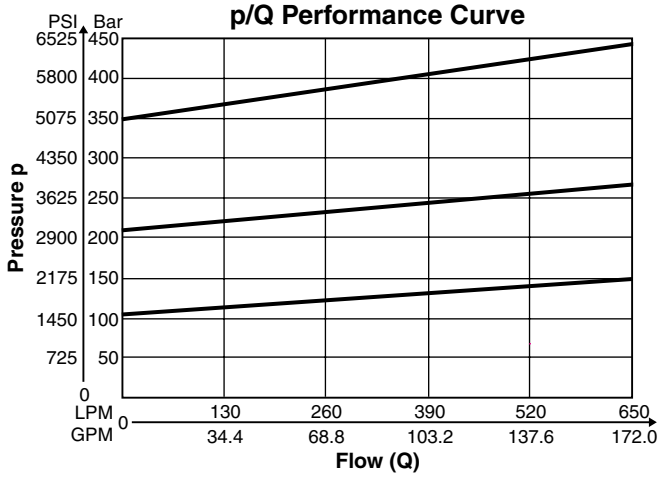


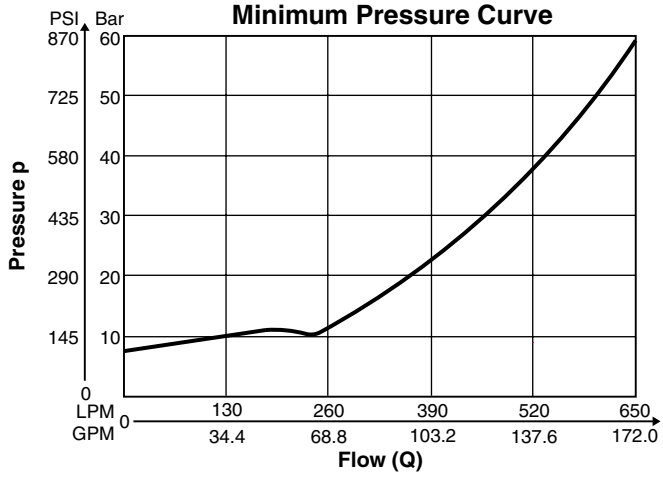
R5V08*P2 [1)]





R5V10*P2 [1)]

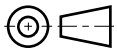




[1)] The performance curves are measured with external drain.
For internal drain, the tank pressure has to be added to the curve.

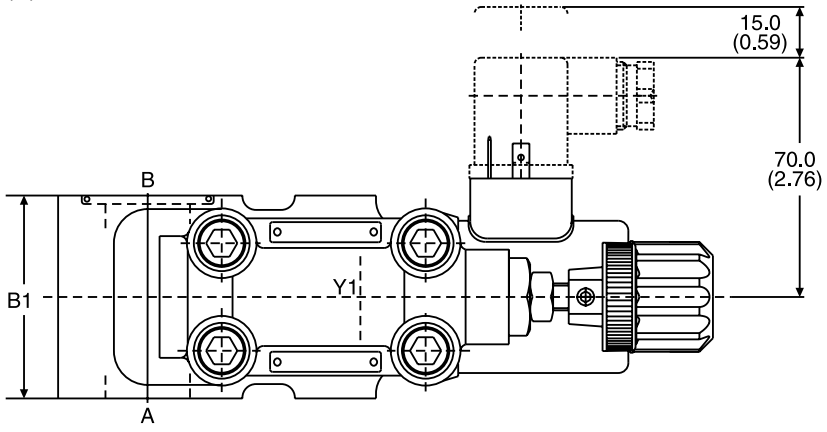
Inch equivalents for millimeter dimensions are shown in (**)

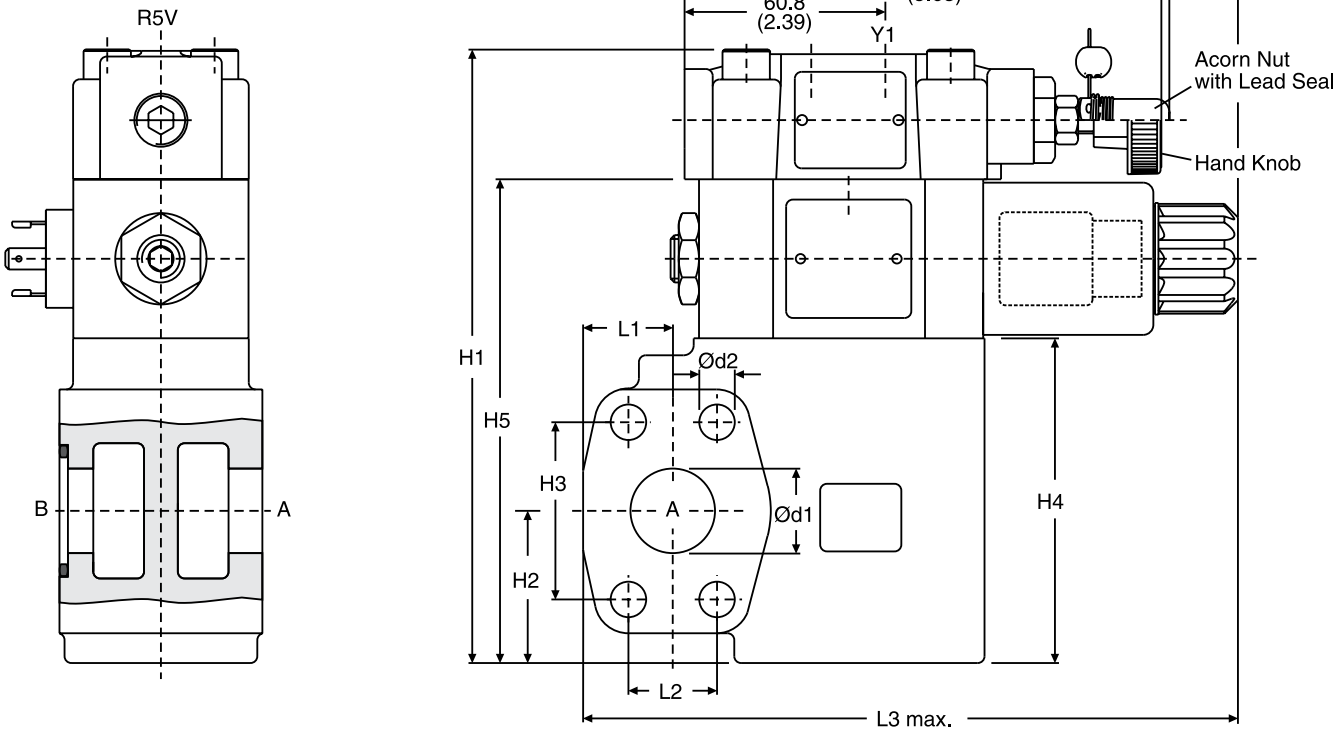
2-Port



Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
Prop. Section P2*	S26-58473-0	S26-58473-5

* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.





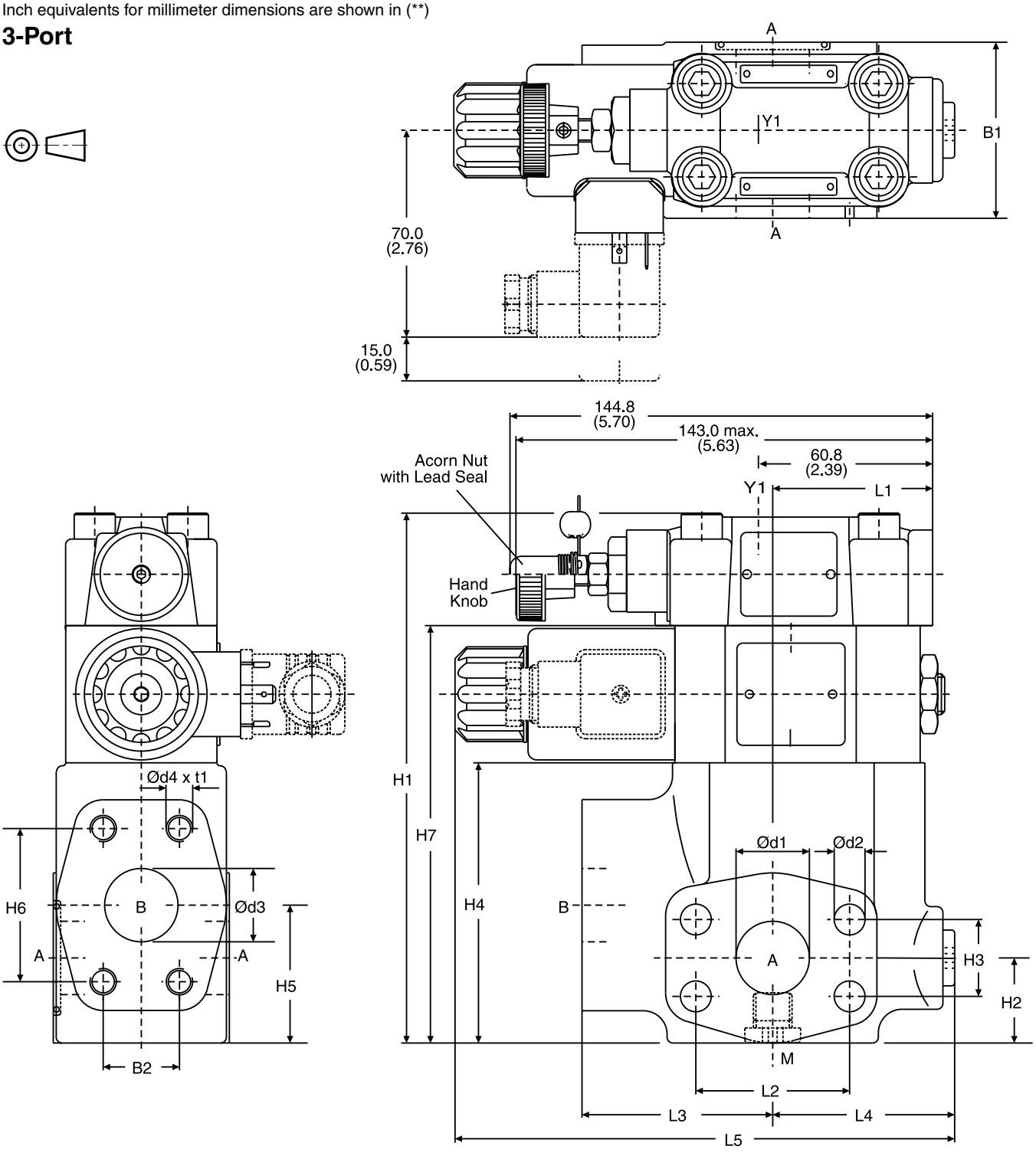
SAE 61

Size	B1	H1	H2	H3	H4	H5	L1	L2	L3	d1	d2
06	60.0 (2.36)	175.0 (6.89)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	137.0 (5.39)	24.6 (0.97)	22.2 (0.87)	174.0 (6.85)	19.0 (0.75)	10.5 (0.41)
08	60.0 (2.36)	181.0 (7.13)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	143.0 (5.63)	26.5 (1.04)	26.2 (1.03)	193.6 (7.62)	25.0 (0.98)	10.5 (0.41)
10	75.0 (2.95)	194.0 (7.64)	48.0 (1.89)	58.7 (2.31)	109.0 (4.29)	156.0 (6.14)	34.0 (1.34)	30.2 (1.19)	201.0 (7.91)	32.0 (1.26)	12.5 (0.49)

Port	Function	Port size		
		R5V06	**R5V08**	**R5V10**
A	Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
B	Tank	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
Y1	External Drain	G1/4"		

Inch equivalents for millimeter dimensions are shown in (**)

3-Port



Inch equivalents for millimeter dimensions are shown in (**)

3-Port

SAE 61

Size	B1	B2	H1	H2	H3	H4	H5	H6	H7	L1	L2	L3	L4	L5	d1	d2	d3	d4 (option 152)	t1
06	60.0 (2.36)	22.2 (0.87)	166.0 (6.54)	28.0 (1.10)	22.2 (0.87)	81.0 (3.19)	41.6 (1.64)	47.6 (1.87)	128.0 (5.04)	50.3 (1.98)	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	174.6 (6.87)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	3/8"-16 UNC (M10)	20.0 (0.79)
08	60.0 (2.36)	26.2 (1.03)	188.0 (7.40)	29.0 (1.14)	26.2 (1.03)	103.0 (4.06)	47.0 (1.85)	52.4 (2.06)	150.0 (5.91)	55.8 (2.20)	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	177.0 (6.97)	25.0 (0.98)	10.5 (0.41)	25.0 (0.98)	3/8"-16 UNC (M10)	23.0 (0.91)
10	75.0 (2.95)	30.2 (1.19)	198.0 (7.80)	34.5 (1.36)	30.2 (1.19)	113.0 (4.45)	64.0 (2.52)	58.7 (2.31)	160.0 (6.30)	57.8 (2.28)	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	179.1 (7.05)	32.0 (1.26)	12.5 (0.49)	32.0 (1.26)	7/16"-14 UNC (M12)	22.0 (0.87)
12	80.0 (3.15)	35.7 (1.41)	225.0 (8.86)	34.0 (1.34)	35.7 (1.41)	140.0 (5.51)	73.0 (2.87)	69.8 (2.75)	187.0 (7.36)	37.3 (1.47)	69.8 (2.75)	92.5 (3.64)	55.2 (2.17)	186.8 (7.35)	38.0 (1.50)	13.5 (0.53)	38.0 (1.50)	1/2"-13 UNC (M12)	27.0 (1.06)

SAE 62

Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	d4 (option 152)	t1
06	60.0 (2.36)	23.8 (0.94)	119.0 (4.69)	28.0 (1.10)	23.8 (0.94)	81.0 (3.19)	41.6 (1.64)	50.8 (2.00)	50.3 (1.98)	50.8 (2.00)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	3/8"-16 UNC (M10)	20.0 (0.79)
08	60.0 (2.36)	27.8 (1.09)	141.0 (5.55)	29.0 (1.14)	27.8 (1.09)	103.0 (4.06)	47.0 (1.85)	57.2 (2.25)	55.8 (2.20)	57.2 (2.25)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.98)	12.5 (0.49)	25.0 (0.98)	7/16"-14 UNC (M12)	22.0 (0.87)
10	75.0 (2.95)	31.8 (1.25)	151.0 (5.94)	34.5 (1.36)	31.8 (1.25)	113.0 (4.45)	64.0 (2.52)	66.7 (2.63)	57.8 (2.28)	66.7 (2.63)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	13.5 (0.53)	32.0 (1.26)	1/2"-13 UNC (M12)	24.0 (0.94)
12	80.0 (3.15)	36.5 (1.44)	178.0 (7.01)	34.0 (1.34)	36.5 (1.44)	140.0 (5.51)	73.0 (2.87)	79.4 (3.13)	37.3 (1.47)	79.4 (3.13)	92.5 (3.64)	55.2 (2.17)	171.2 (6.74)	38.0 (1.50)	17.0 (0.67)	38.0 (1.50)	5/8"-11 UNC (M16)	33.0 (1.30)

Port	Function	Port Size			
		R5V06	R5V08	R5V10	R5V12
A (2)	Pressure	3/4" SAE61/62	1" SAE61/62	1-1/4" SAE61/62	1-1/2" SAE61/62
B	Tank	3/4" SAE61/62	1" SAE61/62	1-1/4" SAE61/62	1-1/2" SAE61/62
Y1	External Drain	G1/4"			
M	Pressure Gauge	G1/4"			

Seal Kits		
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
12	S26-27421-0	S26-27421-5
Prop. Section P2*	S26-58473-0	S26-58473-5

* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.

General Description

Series RPDM2 pressure relief valves are direct operated proportional valves typically used as remote control valves for flow rates of below 3 LPM (0.8 GPM).

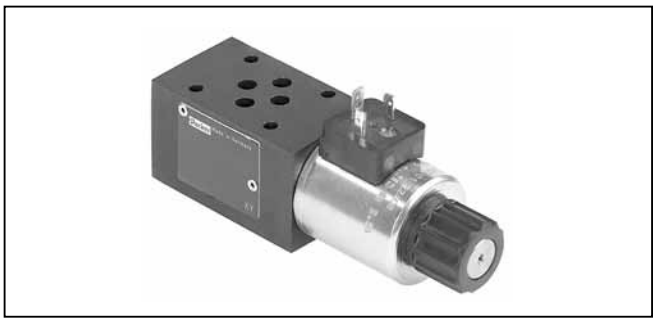
Function

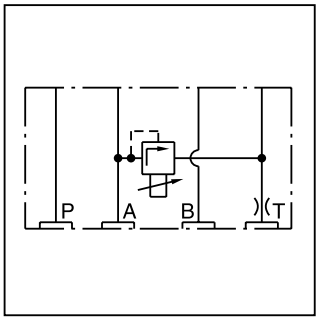
When the pressure in port P exceeds the pressure setting at the solenoid, the cone opens to port T and limits the pressure in port P to the adjusted level.

The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.

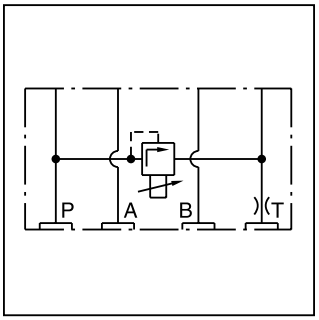
Features

- Direct operated by proportional solenoid.
- Very low pressure adjustment of $p_{min.}$
- $MTTF_D$ value 150 years.
- Sandwich style NG6 / D03 mount.
- 4 pressure ranges.





RPDM2AT



RPDM2PT

Ordering Information

RPDM	2				V	
Pressure Control Valve	Size NG6 / D03	Pressure Relief	Pressure Range	Solenoid Voltage	Seal Fluorocarbon	Design Series

NOTE: Not required when ordering.

Code	Description
AT	A to T
PT	P to T

Code	Description
10	105 Bar (1523 PSI)
17	175 Bar (2538 PSI)
25	250 Bar (3625 PSI)
35	350 Bar (5075 PSI)

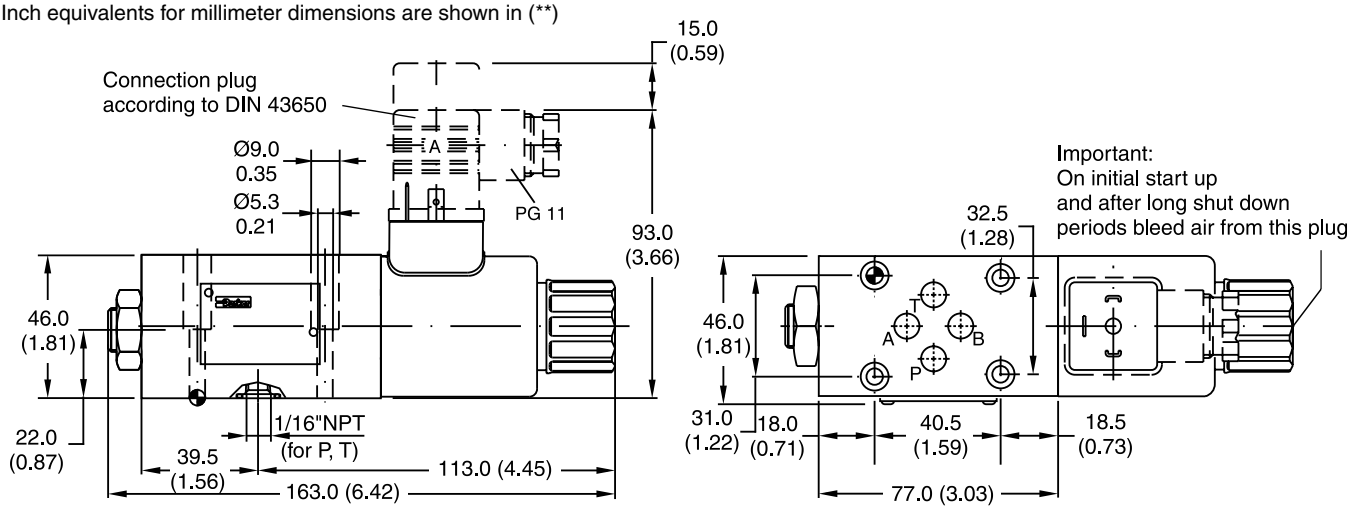
Code	Description
K	12V, 2.3A
X	16V, 1.3A

Seal Kit: SK-RPDM20

Weight: 1.3 kg (2.9 lbs.)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

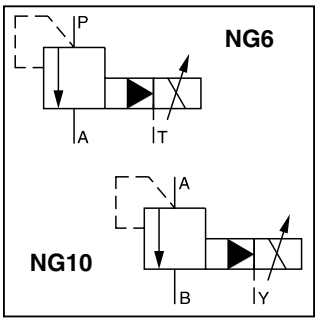


Please order plugs separately. See Accessories.

General Description

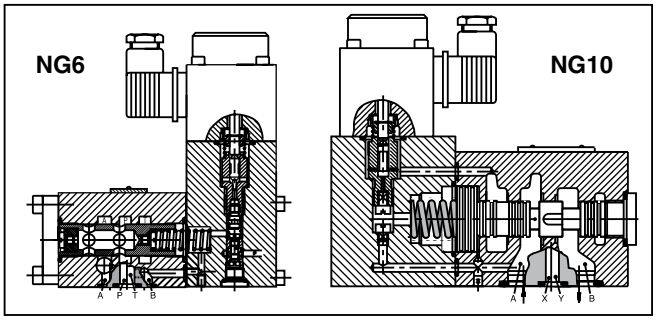
Series VBY*K pilot operated sequence valves feature proportional adjustment and an external drain. The external drain allows application as both a sequence valve and as a pressure relief valve.

These valves can also be used as a pressure relief valve. Please observe hydraulic connection.



Features

- Proportional adjustment.
- Manifold mounting acc. to ISO 5781.
- External drain.
- Main stage spool type valve.
- Pilot stage seated type valve.



Specifications

General		
Size	**NFPA D03 / NG6 / CETOP 3**	**NFPA D05 / NG10 / CETOP 5**
Design	Proportional Pressure Valve	
Mounting Pattern	ISO 5781	
Actuation	Proportional Solenoid	
Mounting Position	Any	
Ambient Temperature	-20°C to +70°C (-4°F to +158°F)	
Hydraulics		
Operating Pressure, Ports	P, A 315 Bar (4500 PSI) T depresssurized	A, B 315 Bar (4500 PSI) Y depressurized
Flow	40 LPM (10.6 GPM)	160 LPM (42.3 GPM)
Pressure Ranges	64, 100, 160, 210, 315 Bar (928, 1450, 2320, 3045, 4568 PSI)	
Fluid	Hydraulic oil as per DIN 51524...51535, other on request	
Fluid Temp. Recommended Permitted	+30°C to +50°C (+86°F to +122°F) -20°C to +70°C (-4°F to +158°F)	
Viscosity Range Recommended Permitted	 30 to 50 cST / mm²/s (139 to 232 SSU) 20 to 380 cST / mm²/s (93 to 1761 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	
Linearity	±3.5% at > 15% p_{nom}	
Repeatability	<±2%	
Hysteresis	<3%	
Response Time	<150 ms	<200 ms
Manufacturing Tolerance	±5% to p_{max}	
Electrical		
Duty Cycle	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible	
Protection Class	IP54 at DIN 40050 (plugged and mounted)	
Nominal Voltage	9 VDC	
Maximum Current	2.5 A	
Coil Resistance	21 ohm at 20°C (68°F)	
Plug Connectors	2 pole + PE / connector EN 175301-803 / cable Ø 8 to 10mm	
Power Amplifier	PCD00A-400	

Ordering Information

VBY Sequence Valve | ☐ Pressure Range | **K** Linear Solenoid | ☐ Size | ☐ Seal | ⌜⌝ Design Series

Code	Description
064	64 Bar (928 PSI)
100	100 Bar (1450 PSI)
160	160 Bar (2320 PSI)
210	210 Bar (3000 PSI)
315	315 Bar (4500 PSI)

Code	Description
K	9 VDC, 2.5 A

Code	Description
06	NG6
10	NG10

Code	Description
N	Nitrile
V	Fluorocarbon

NOTE:
Not required when ordering.

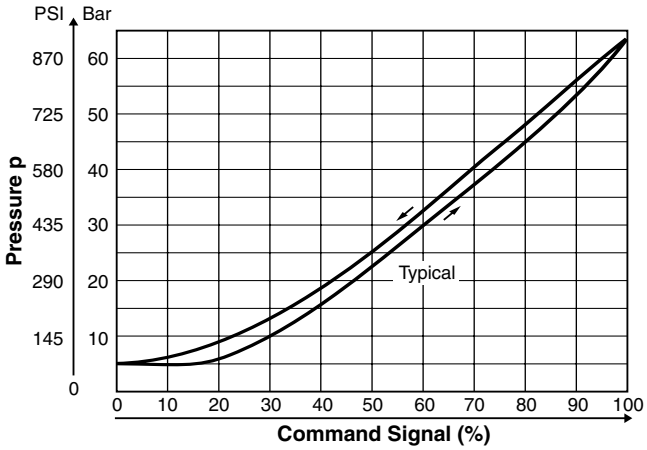
Weight:

VBY*K06	2.4 kg (5.3 lbs.)
VBY*K10	4.5 kg (8.9 lbs.)

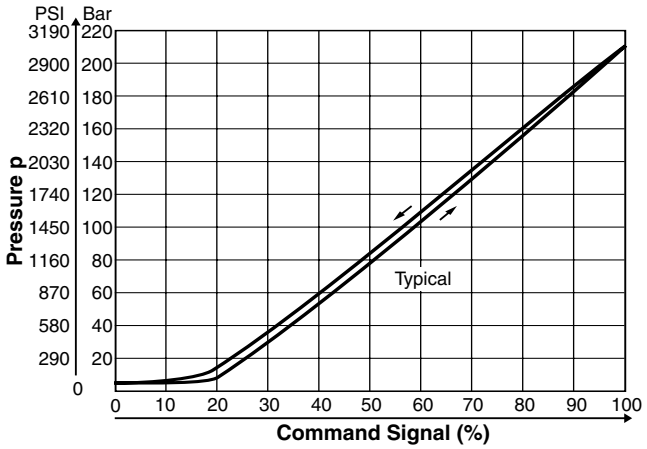
Performance Curves - NG6

Pressure Curves where $p = f(U_{set})$

Setting Range max. 64 Bar (928 PSI)

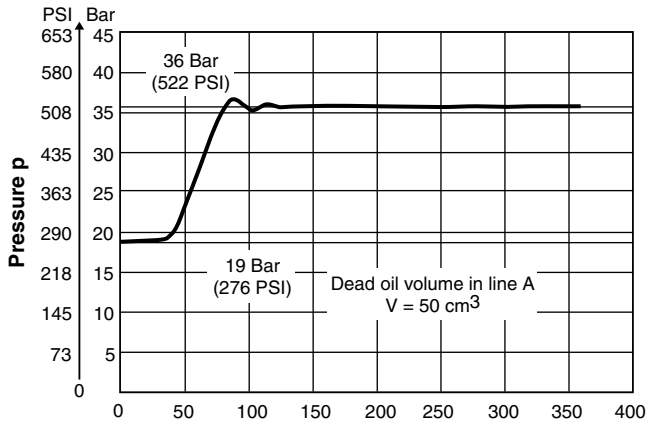


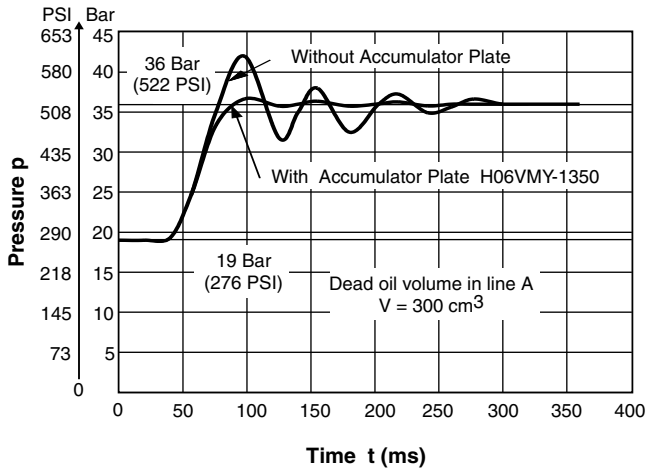
Setting Range max. 210 Bar (3045 PSI)



Step Response Signal

Setting Range max. 210 Bar (3045 PSI)

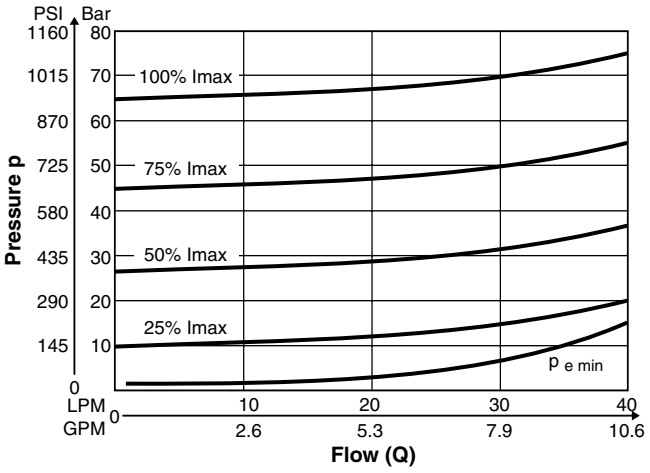




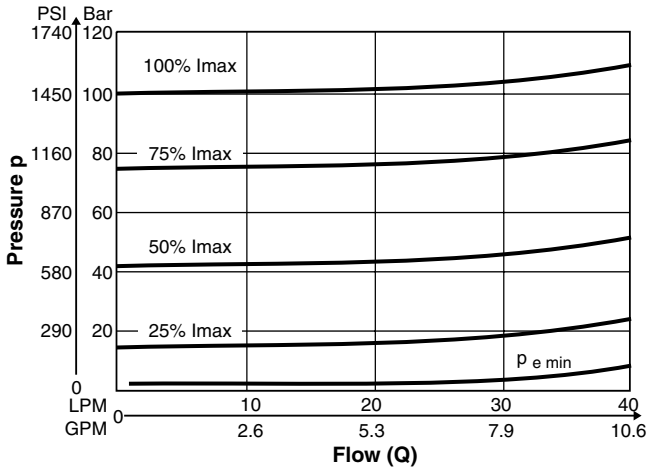
NG6

p/Q Performance Curves measured at t = 50°C (122°F) and v = 36mm²/s

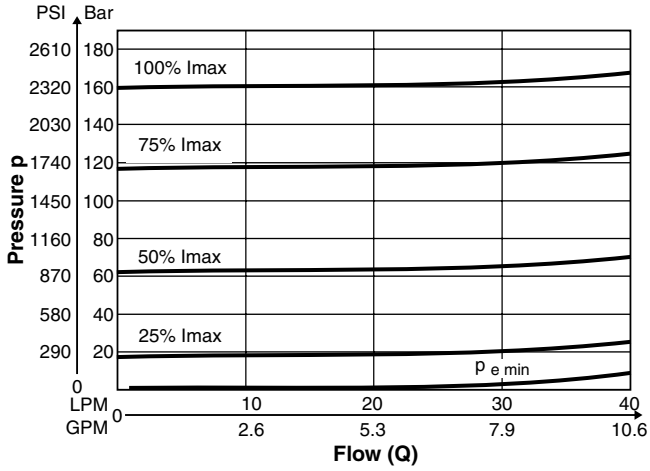
Setting Range max. 64 Bar (928 PSI)



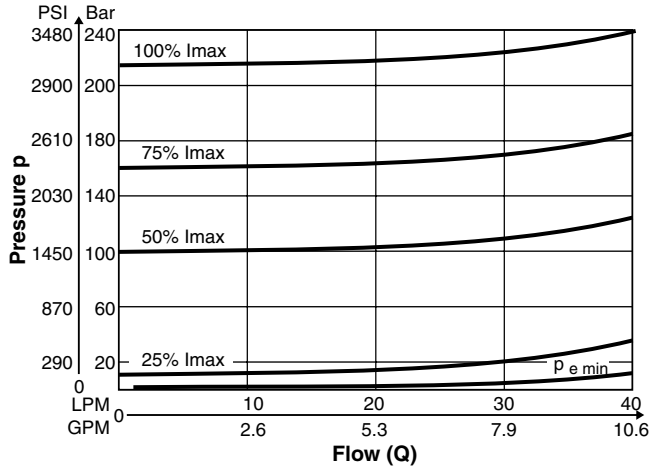
Setting Range max. 100 Bar (1450 PSI)



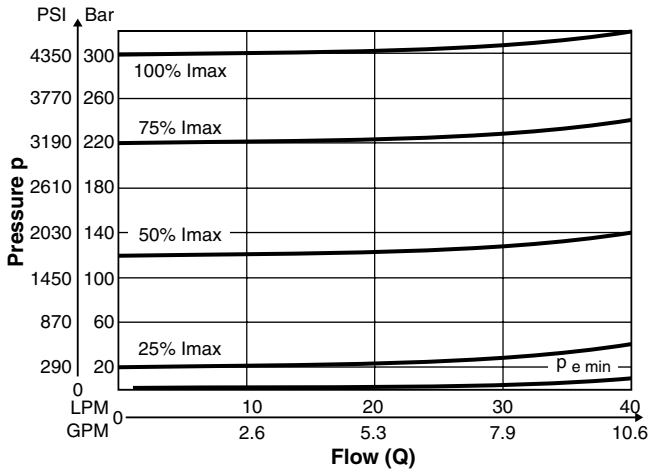
Setting Range max. 160 Bar (2320 PSI)



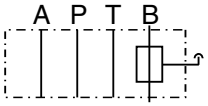
Setting Range max. 210 Bar (3000 PSI)



Setting Range max. 315 Bar (4500 PSI)



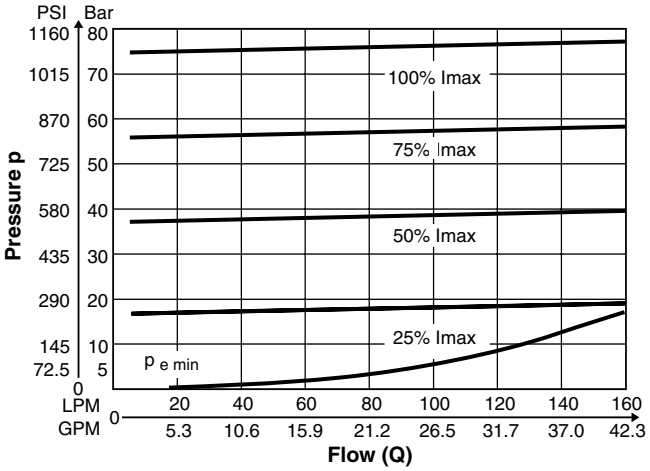
Note:
Accumulator Plate
H06VMY-1350
Height: 40 mm (1.58 in.)



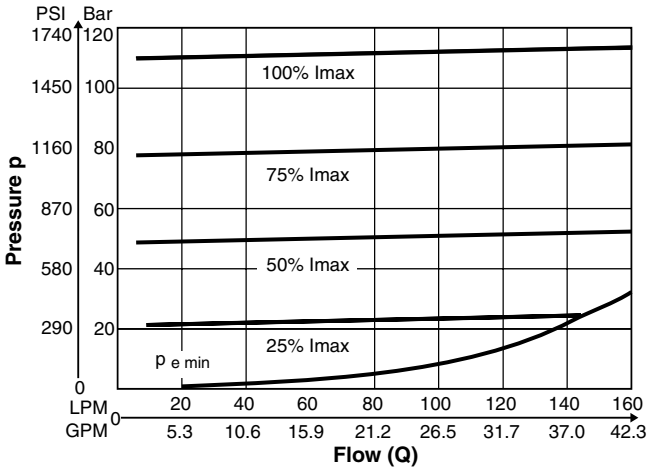
NG10

p/Q Performance Curves measured at t = 50°C (122°F) and v = 36mm²/s

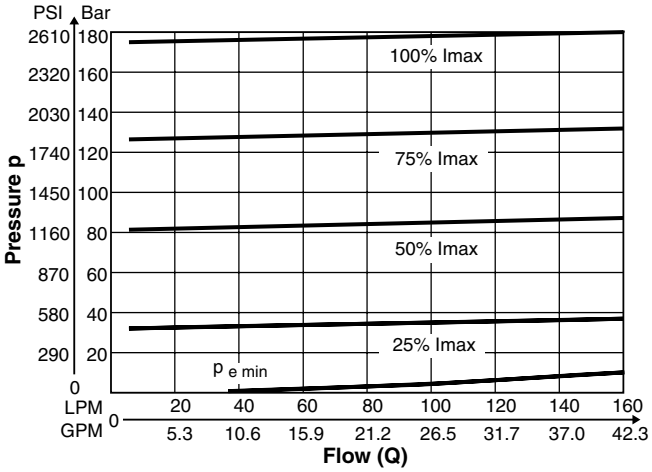
Setting Range max. 64 Bar (928 PSI)



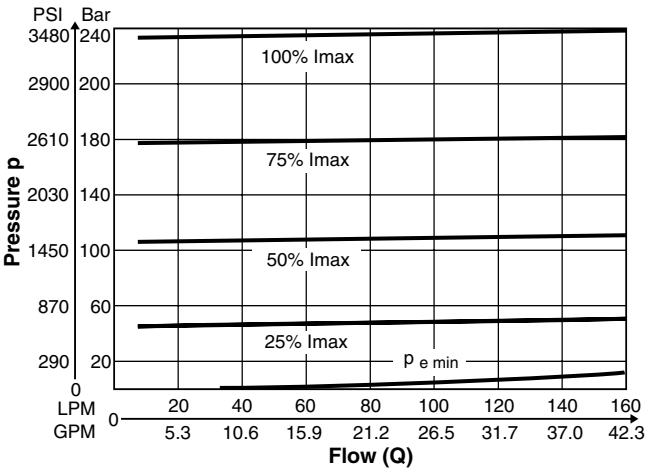
Setting Range max. 100 Bar (1450 PSI)



Setting Range max. 160 Bar (2320 PSI)

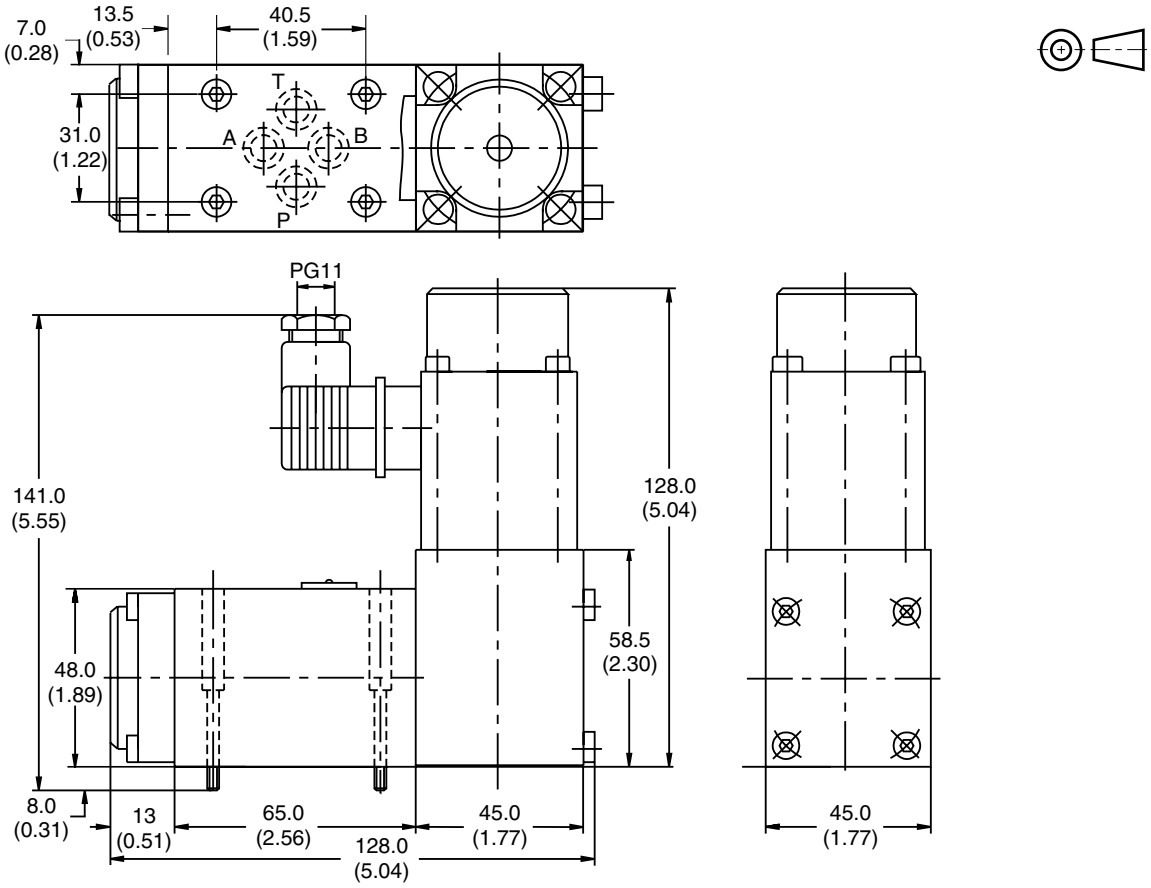


Setting Range max. 210 Bar (3045 PSI)



Size NG6

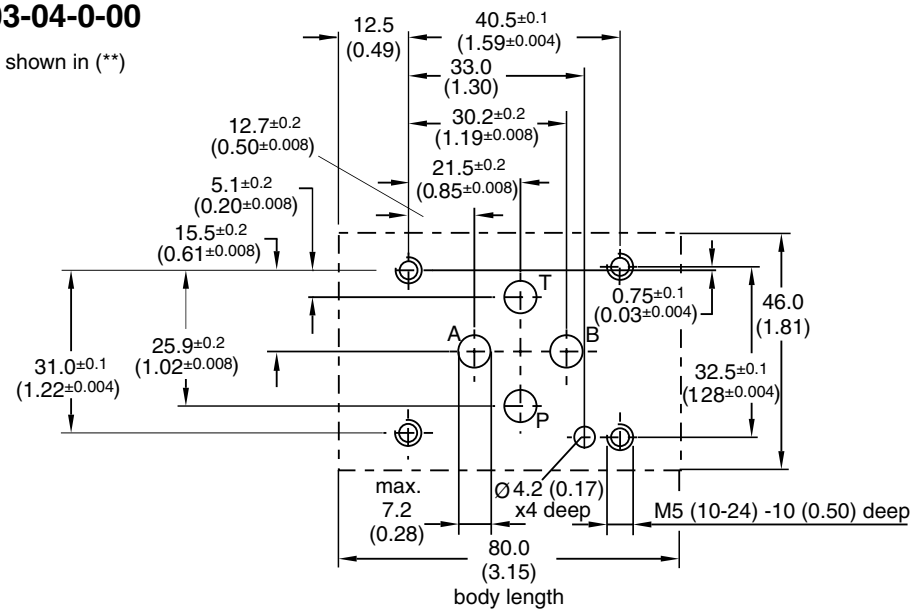
Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Bolt Kit DIN912 12.9		Seal Kit	
			Nitrile	Fluorocarbon
R_{max}6.3 0.01/100	BK375 4x-M5x30 BK209 4x10-24x1.25"	7.5 Nm (5.5 lb.-ft.)	SK-VMY-L06-N	SK-VMY-L06-V

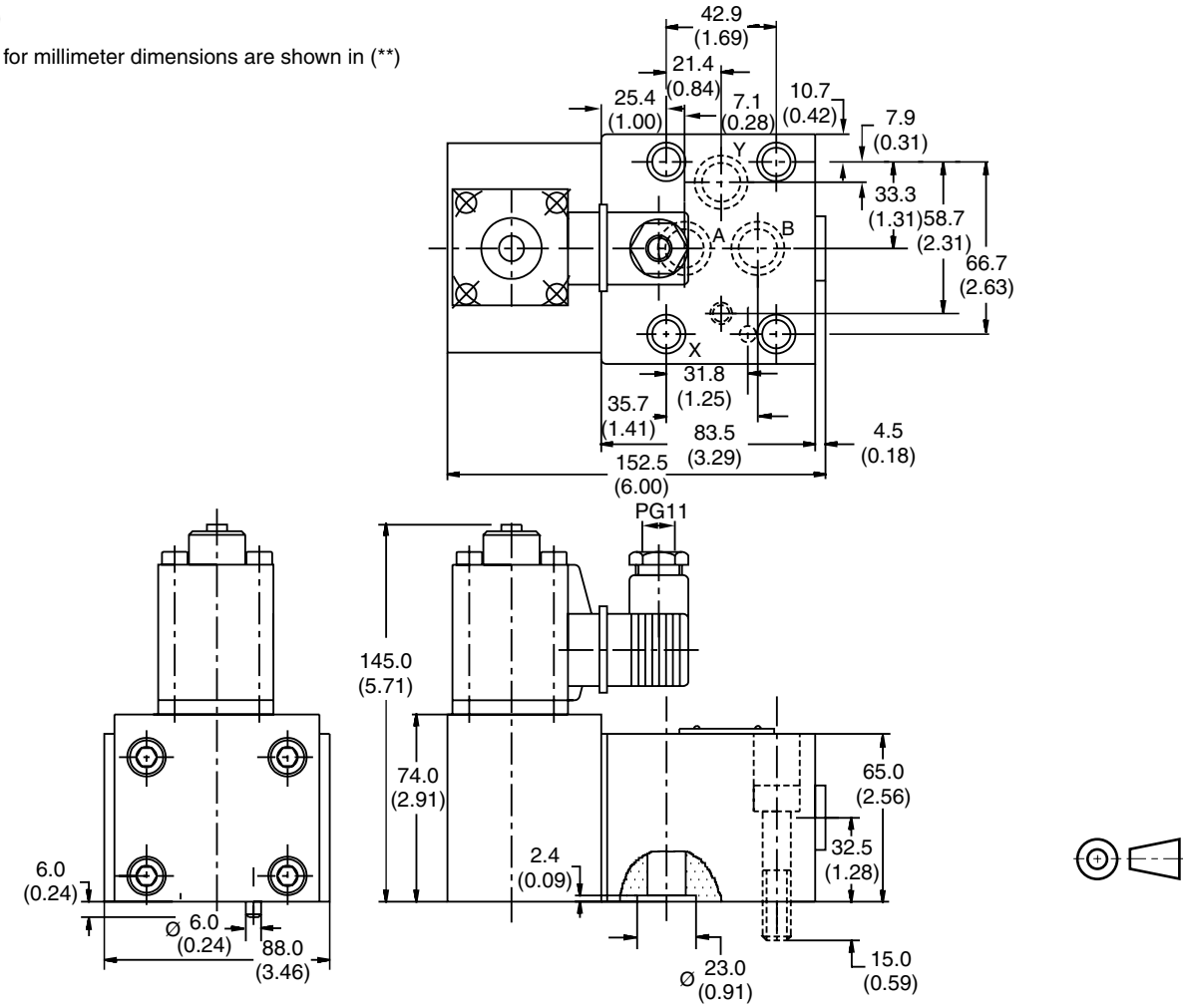
Mounting Pattern ISO 5781-03-04-0-00

Inch equivalents for millimeter dimensions are shown in (**)



Size NG10

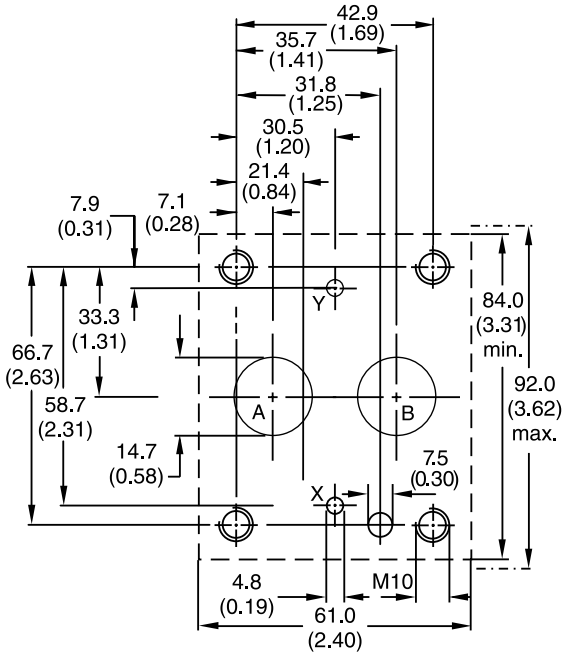
Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Bolt Kit DIN912 12.9		Seal Kit
$R_{max}6.3$ 0.01/100	BK389 4xM10x50 BK242 4x3/8-16x2	65 Nm (47.9 lb.-ft.)	Nitrile: SK-VB/VM-A10 Fluorocarbon: SK-VB/VM-A10V

Mounting Pattern ISO 5781-06-07-0-00

Inch equivalents for millimeter dimensions are shown in (**)



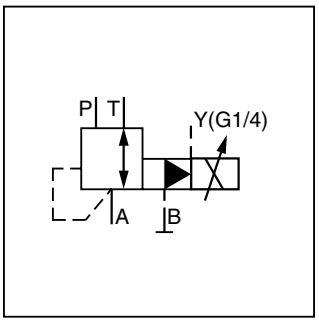
General Description

Series VMY*K valves consist of the main stage with valve spools and the pilot stage with the proportional solenoids. The desired pressure can be variably set corresponding to the command signal specified on the amplifier. The proportional solenoid converts the current of the amplifier into force on the valve poppet of the pilot stage.

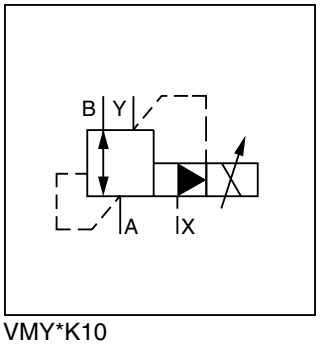
In the pilot stage, there is a flow limiter which supplies the pilot valve with pressure-independent pilot oil flow from the pressure port P.

The proportional pressure reducing valves of the series VMY*06 allow the variable adjustment of the reduced pressure from 0 bar up to p_{max}. Typical applications are pressure systems, test equipment, or counterweight systems. The electrical control of the valve takes place using the digital amplifier module PCD00A-400. Used in closed loop pressure control circuits with the PWDXXA-400.

VMY*K06



VMY*K06



VMY*K10

Function

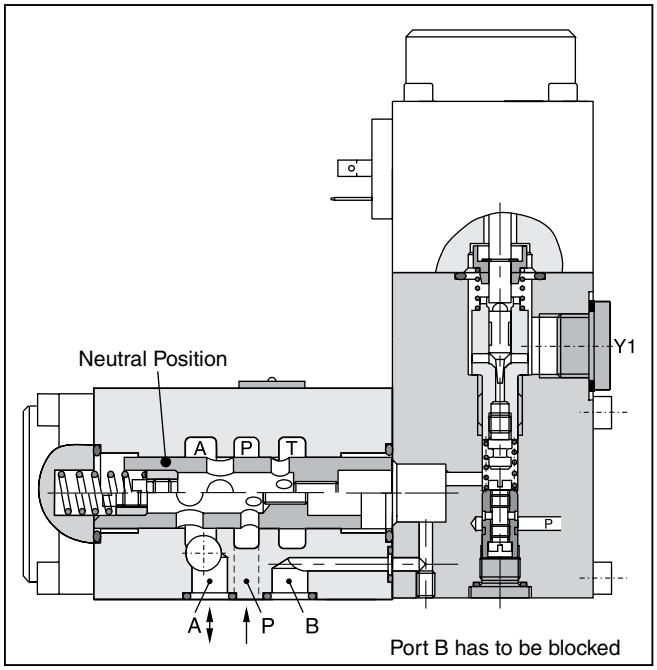
With the proportional solenoids de-energized the main spring forces the main spool into the neutral position. Port A is connected to port T. Thus the reduced pressure only depends on the back pressure in the external drain pipe and/or the tank pressure and can accordingly be reduced down to 0 bar. The pressure present in the P line delivers the pilot oil to the pilot stage via a flow control valve.

When the proportional solenoid is energized, the pilot pressure is increased in the pilot pressure area, and the main spool moves against the spring until the connection P - A opens. The regulation of the reduced pressure on connection A takes place by the constant comparison of the actual pressure and the reference pressure of the pilot stage.

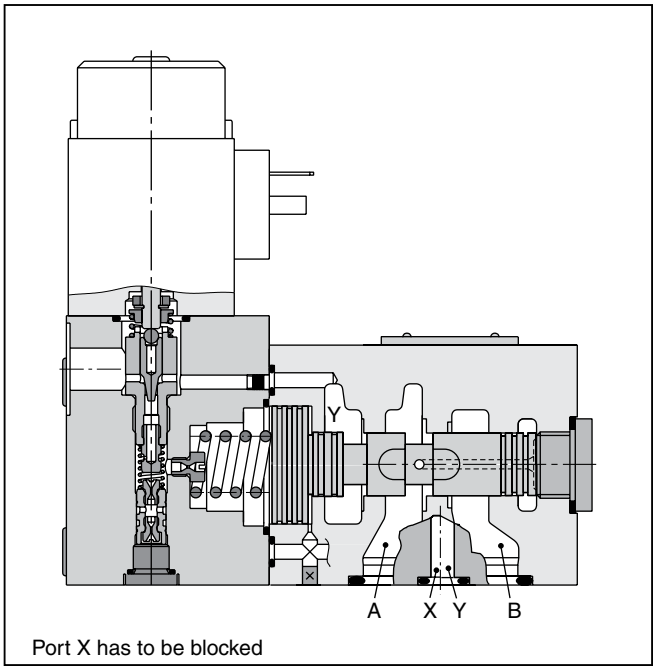
Features

- Consistent performance.
- Variable adjustment.
- Pilot operated with proportional solenoid.
- Subplate according to ISO 5781

VMY*K06N



VMY*K10



Ordering Information

VMY	[ ]	K	[ ]	[ ]	[ ]	[1]	P
Reducing Valve	Pressure Range	Linear Solenoid 9V / 2.5A	Size	Pilot Oil	Seal	Design Series	High Pressure Channel

Code	Description
064	64 Bar (928 PSI)
100	100 Bar (1450 PSI)
160	160 Bar (2320 PSI)
210	210 Bar (3000 PSI)
315	315 Bar (4568 PSI)

Code	Description
06	NG6
10	NG10

Code	Description
N*	Nitrile
V	Fluorocarbon

* Size 10 only

Pilot Oil

Code	Size	Pilot	Drain	p_{min}
Omit	10	Internal	Internal	3 - 4 Bar (43.5 - 58 PSI)
N [1]	06	Internal	External [2]	0.5-1 Bar (7 - 14.5 PSI)
T	06	Internal	Internal	1-2 Bar (14.5 - 29 PSI)

[1] Connection on port Y
[2] p_{min} = 0 Bar (0 PSI) possible

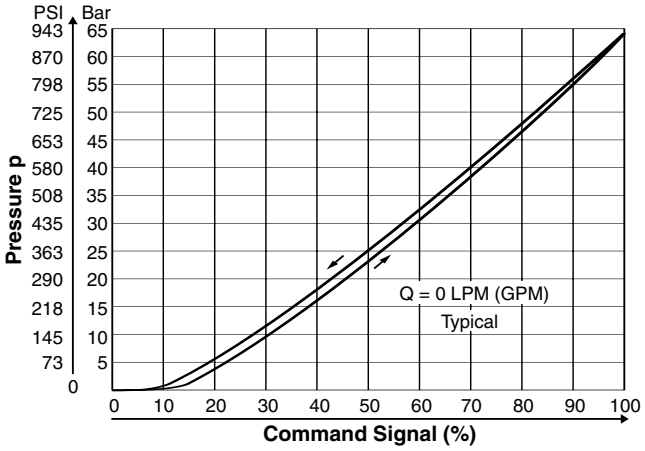
Weight:
VMY*06 2.8 kg (6.2 lbs.)
VMY*10 5.0 kg (11.0 lbs.)

Specifications

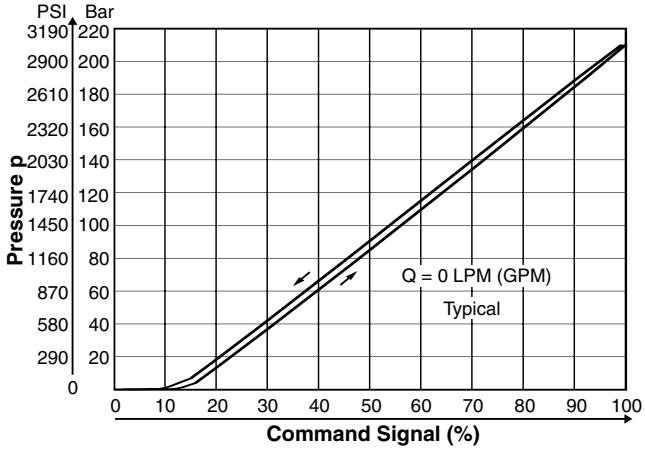
General		
Design	Proportional Reducing Valve	
Size	**NFPA D03 / CETOP 3 / DIN NG6**	**DIN NG10**
Mounting Pattern	ISO 5781	
Actuation	Proportional Solenoid	
Mounting Position	Any	
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)	
Hydraulics		
Operating Pressure, Ports	Ports P, A 315 Bar (4500 PSI) Ports T, Y depressurized; Port B has to be blocked	Ports A, B 350 Bar (5075 PSI) Port Y depressurized; Port X has to be blocked
Flow	40 LPM (10.6 GPM)	160 LPM (42.2 GPM)
Pilot Flow	0.3 - 0.4 LPM (.08 - .011 GPM), not dependent on pressure	
Pressure Ranges	64, 100, 160, 210, 315 Bar (928, 1450, 2320, 3045, 4568 PSI)	
Fluid	Hydraulic oil as per DIN 51524...51535, other on request	
Fluid Temperature **Recommended** **Permitted**	+30°C to +50°C (+86°F to +122°F) -20°C to +70°C (-4°F to +158°F)	
Viscosity **Recommended** **Permitted**	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	
Linearity	See Performance Curves	±3.5 at >15% p_{nom}
Repeatability	<±2%	
Hysteresis	<3%	
Response Time	<150 ms	<200 ms
Electrical		
Duty Cycle	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible	
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)	
Nominal Voltage	9 VDC	
Maximum Current	2.5 A	
Ambient Temperature	-20°C to +70°C (-4°F to +158°F)	
Coil Resistance	2.1 ohm at 20°C (68°F)	
Plug Connectors	2 pole + PE / connector EN 175301-803 / cable Ø 8 to 10mm	
Power Amplifier	PCD00A-400	

Presssure Curves where p = f(U_{set})

Setting Range max. 64 Bar (928 PSI)

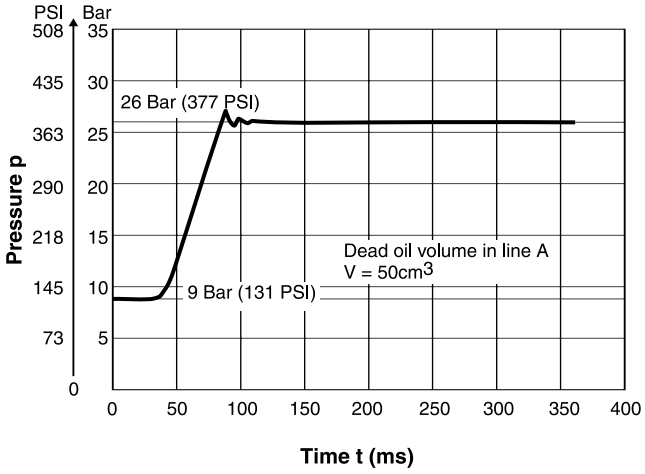


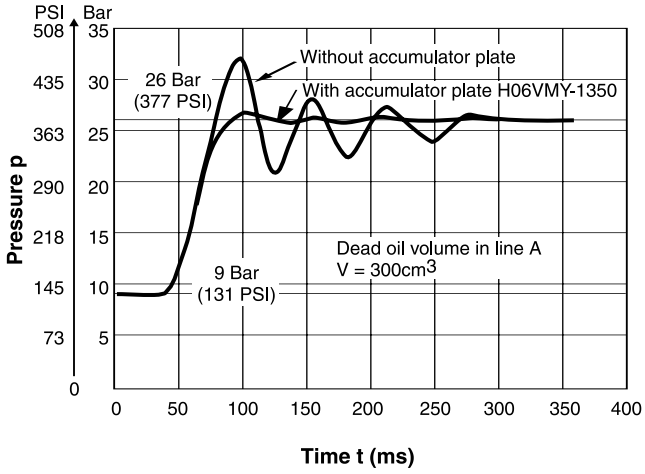
Setting Range max. 210 Bar (3045 PSI)



Step Response

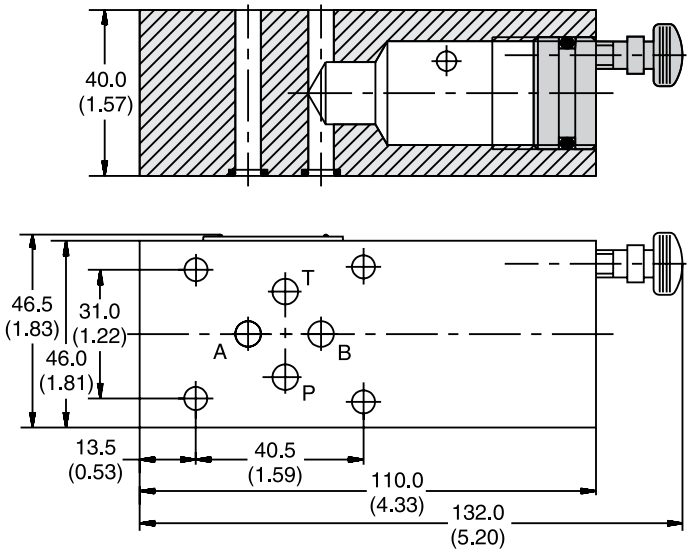
Typical Curve





Accumulator Plate H06VMY-1350

Inch equivalents for millimeter dimensions are shown in (**)

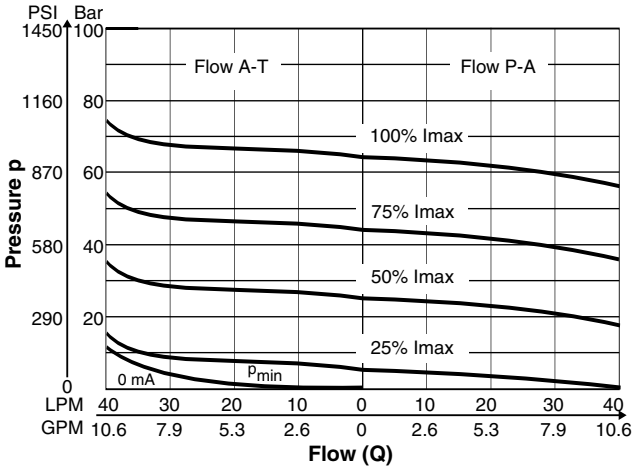


VMY.indd, ddp

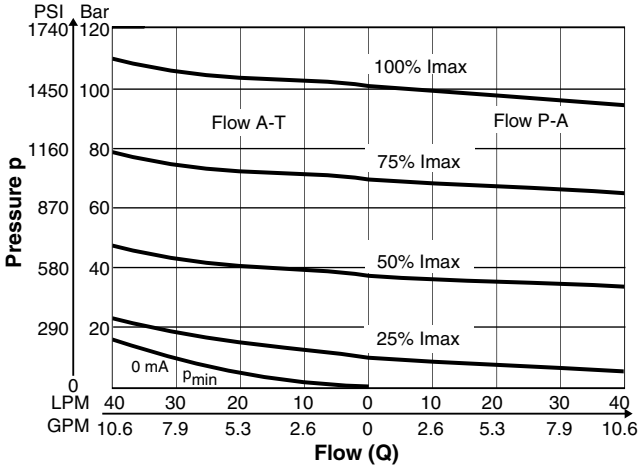
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

p/Q Performance Curves measured at t = 50°C (122°F) and v = 35mm²/s.

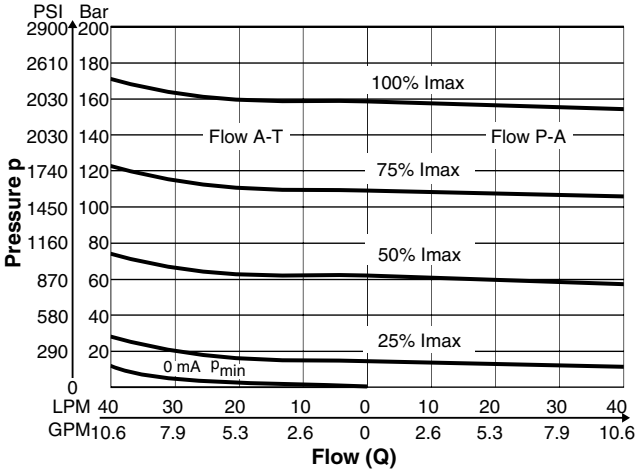
Setting Range max. 64 Bar (928 PSI)



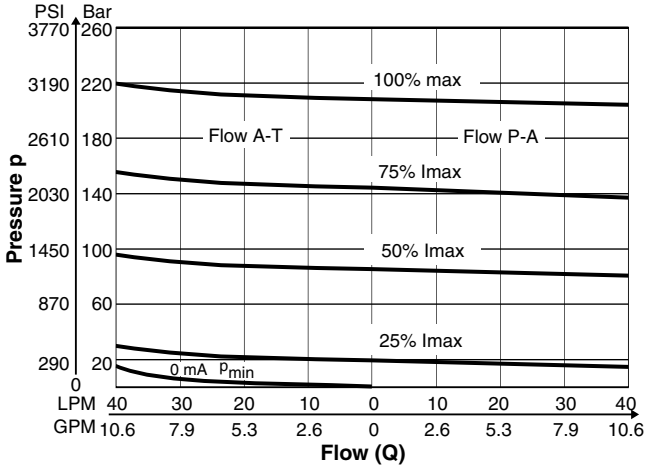
Setting Range max. 100 Bar (1450 PSI)



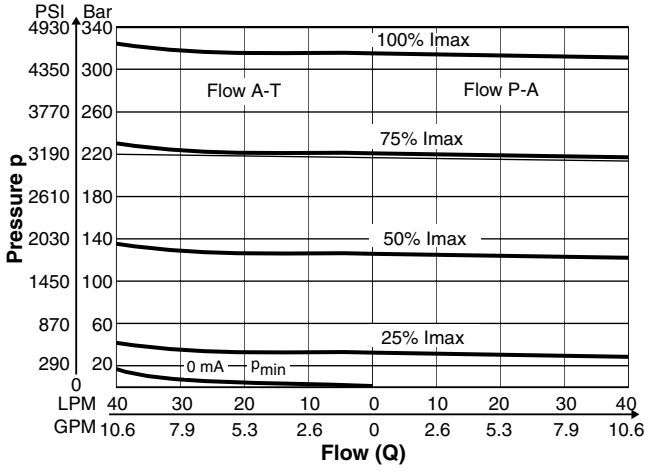
Setting Range max. 160 Bar (2320 PSI)



Setting Range max. 210 Bar (3045 PSI)

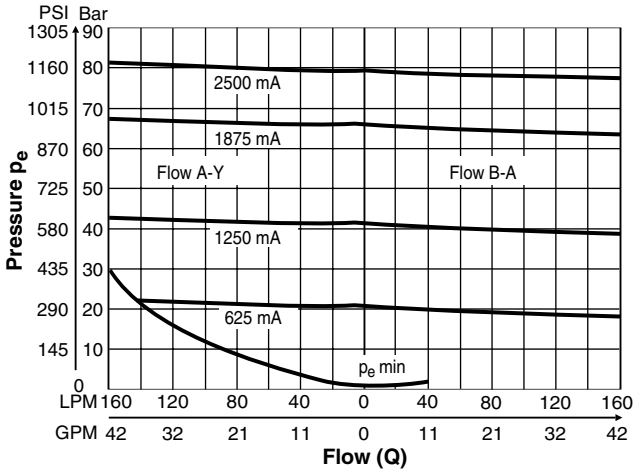


Setting Range max. 315 Bar (4568 PSI)

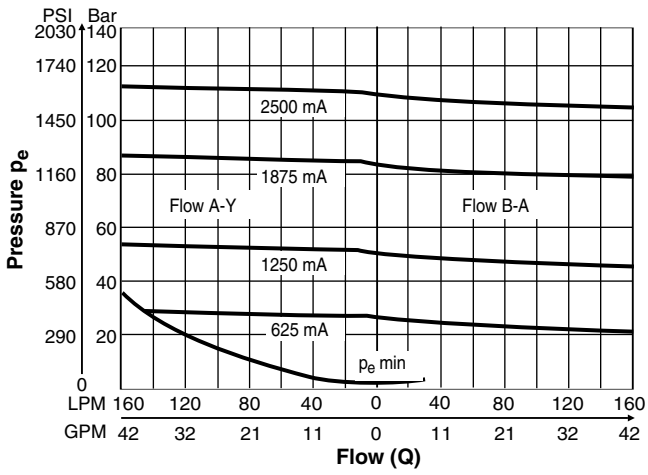


p/Q Performance Curves for pilot oil supply from high pressure channel P, measured with HLP46 at 50°C (122°F).

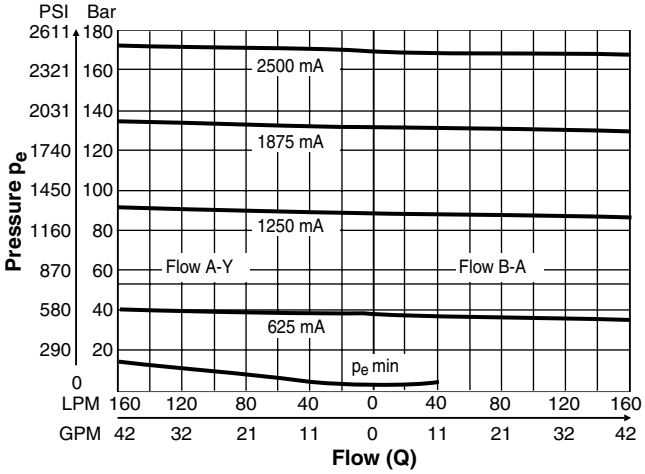
Setting Range max. 64 Bar (928 PSI)



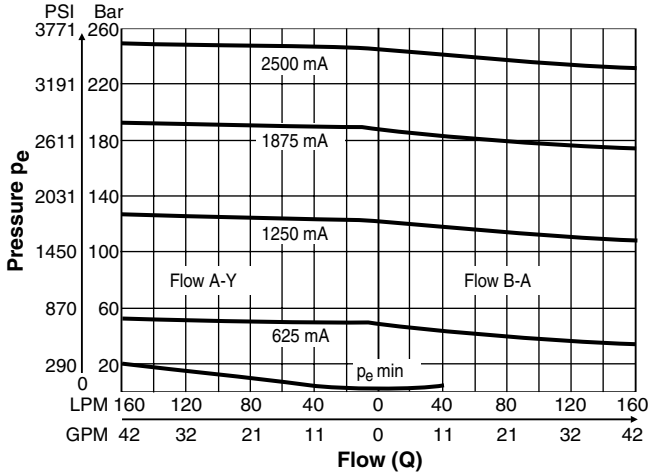
Setting Range max. 100 Bar (1450 PSI)



Setting Range max. 160 Bar (2320 PSI)

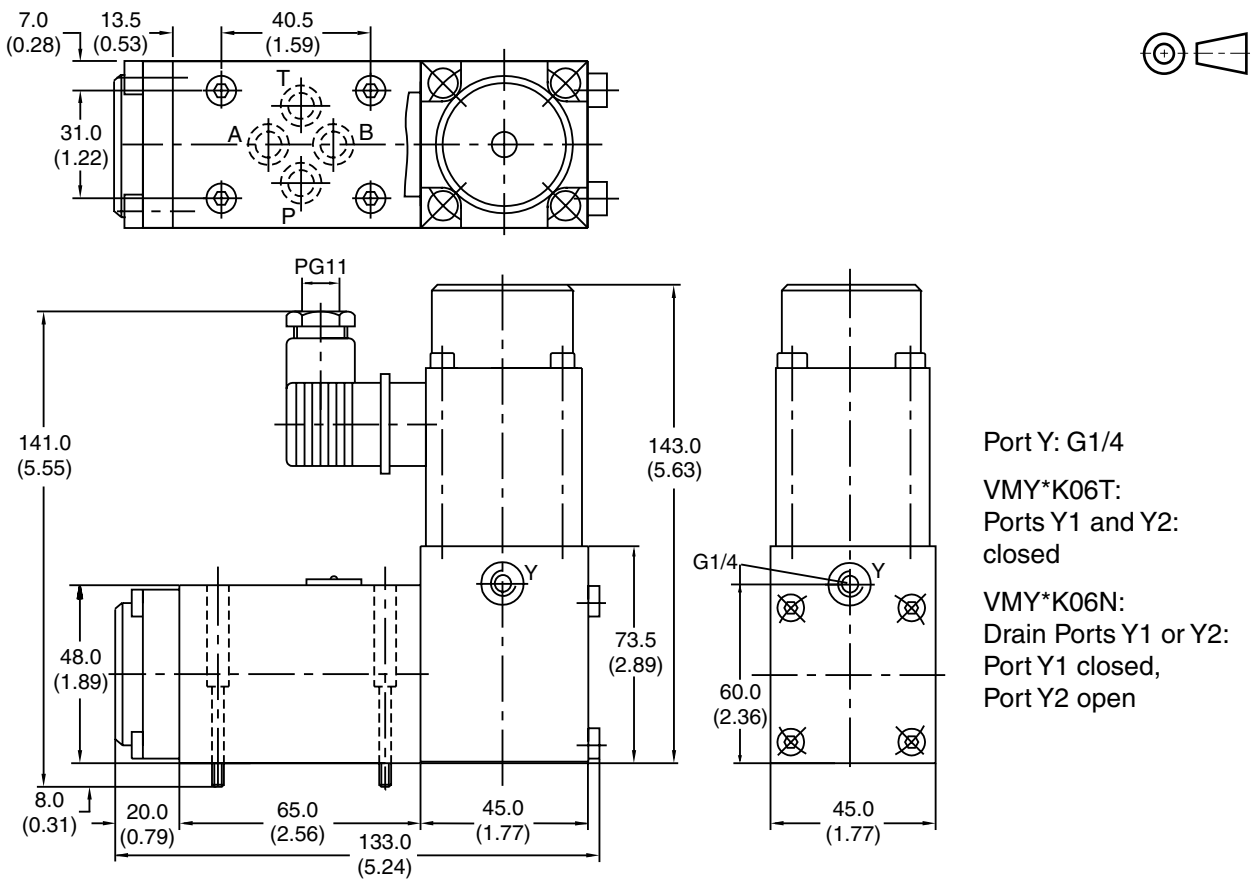


Setting Range max. 210 Bar (3045 PSI)



Size NG6

Inch equivalents for millimeter dimensions are shown in (**)



Port Y: G1/4

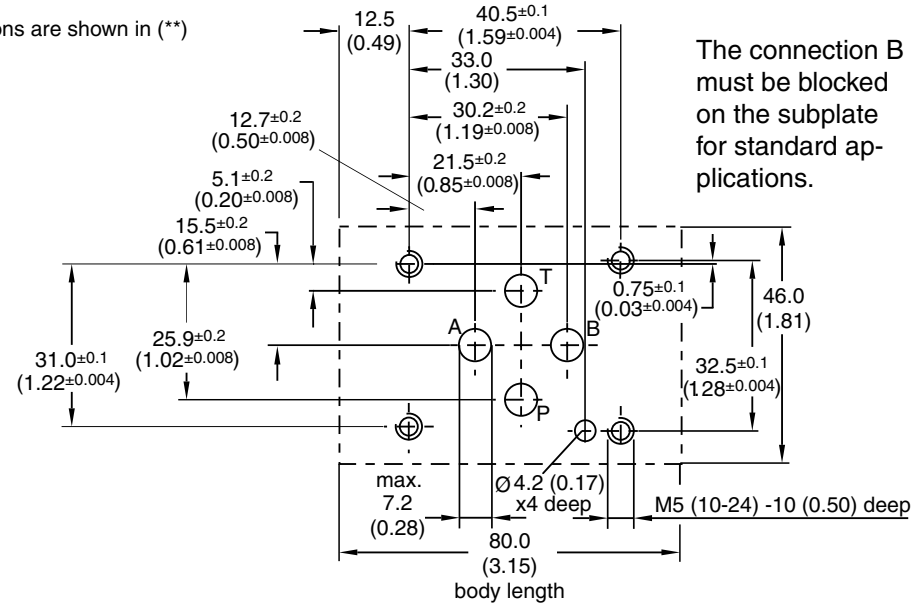
VMY*K06T:
Ports Y1 and Y2: closed

VMY*K06N:
Drain Ports Y1 or Y2: Port Y1 closed, Port Y2 open

Surface Finish	Bolt kit DIN912 12.9		Seal Kit
R_{max}6.3 ⏥ 0.01/100	BK209 (4) 10-24x1.25 BK375 (4) M5x30	7.5 Nm (5.5 lb.-ft.)	Fluorocarbon: SK-VB/VM-A06V

Mounting Pattern ISO 5781-03-04-0-00

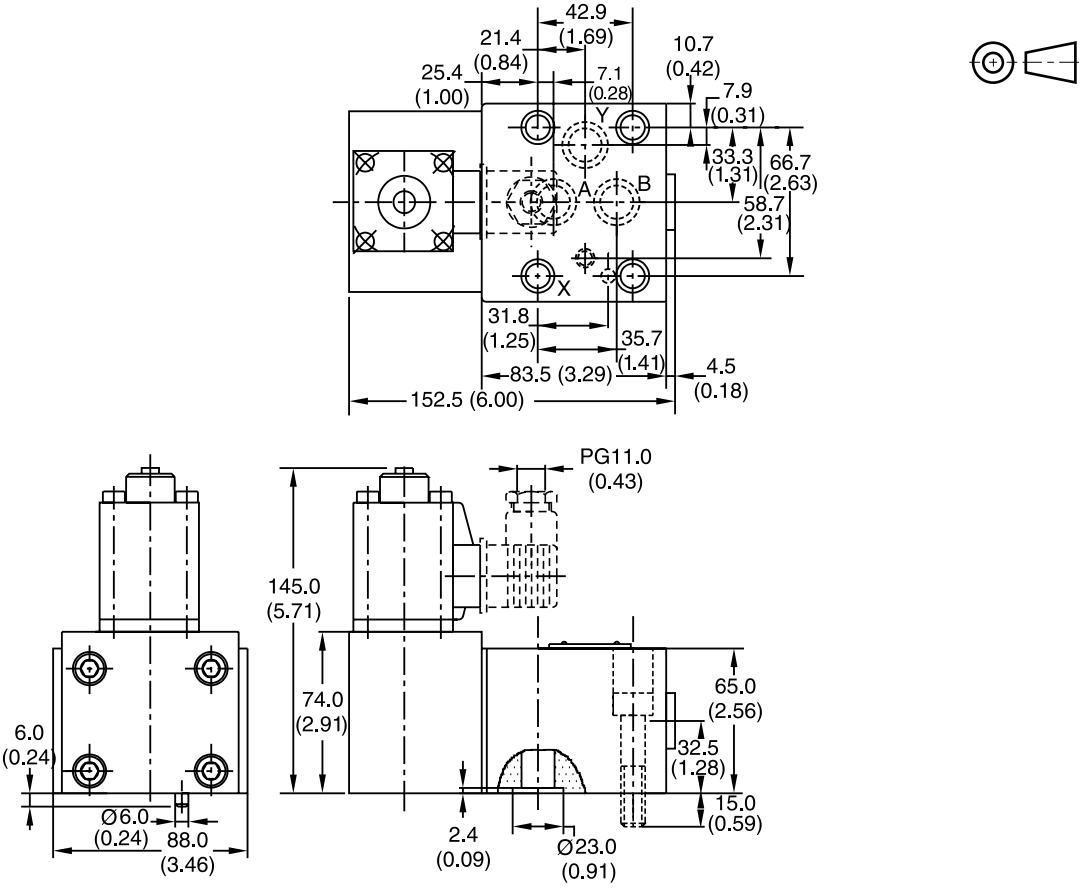
Inch equivalents for millimeter dimensions are shown in (**)



The connection B must be blocked on the subplate for standard applications.

Size NG10

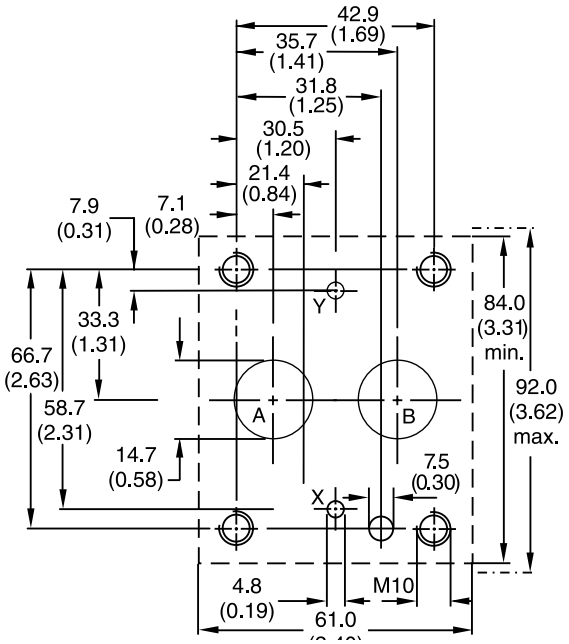
Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Bolt kit DIN912 12.9		Seal Kit
R_{max}6.3 0.01/100	BK153 (4) 3/8-16x2 BK242 (4) M10x50	63 Nm (5.5 lb.-ft.)	Nitrile: SK-VB/VM-A10 Fluorocarbon: SK-VB/VM-A10V

Mounting Pattern ISO 5781-06-07-0-00

Inch equivalents for millimeter dimensions are shown in (**)



General Description

Series D1FV proportional pressure reducing valves are available with and without onboard electronics (OBE).

D1FV OBE

The digital onboard electronics is situated in a robust metal housing, which allows the usage under rough environmental conditions.

The nominal values are factory set. The cable for connection to a serial RS-232 interface is available as accessory.

D1FV for External Electronics

The parameters can be saved, changed and duplicated in combination with the digital power amplifier PWD00A-400. The value parameters can be edited with the common ProPxD software for both versions.

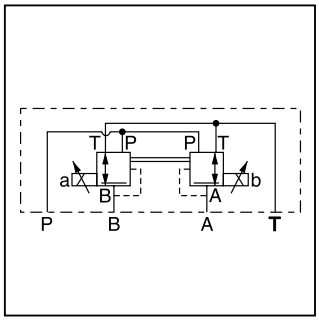
The D1FV values control the pressure in the A- or B-ports using the barometric feedback principle.

Features

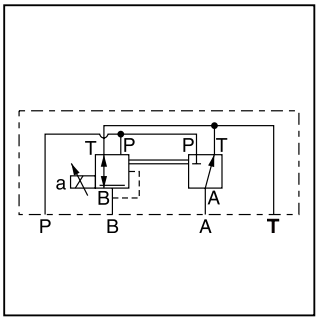
- Barometric feedback.
- 3 command options for D1FV OBE: ±10V, 4...20mA, ±20mA.
- High repeatability from valve to valve.
- Low hysteresis.
- Manual override.
- Pressure ranges 25 Bar (363 PSI) and 45 Bar (653 PSI).

D1FV

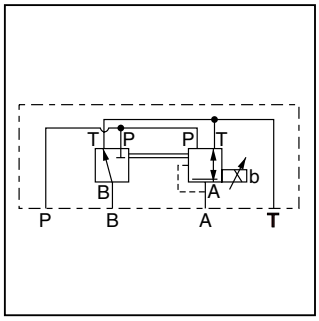
D1FV OBE



Function C

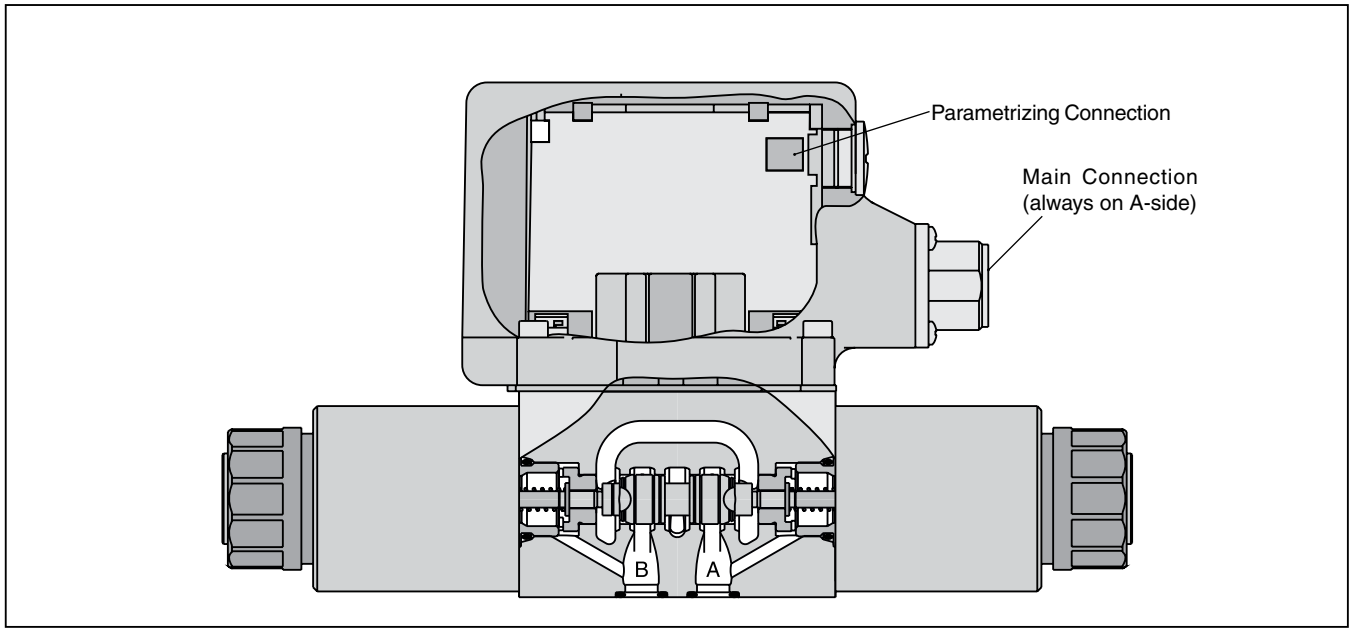


Function E



Function K

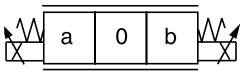
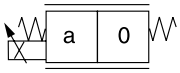
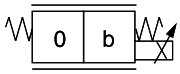
D1FV*3 OBE



D1FV Offboard Electronics

D	1	F	V	E02			0		K		3	
Proportional Pressure Reducing Valve	Size DIN NG6 CETOP 3 NFPA D03	Proportional Control		Spool Type	Pressure Range	Spool Position		Seal	Solenoid Voltage 12V 2.2A	Connector	Spool / Body Design	Design Series NOTE: Not required when ordering.

Code	Description
C	25 Bar (363 PSI)
D	45 Bar (653 PSI)

Code	Style
C	
E	
K	

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
W*	Connector as per DIN 185301-803 without plug
J*	Connector DT04-2P "Deutsch"

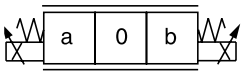
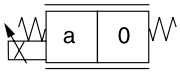
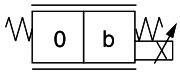
* Please order plugs separately. See Accessories.

Weight: Offboard
D1FV 2.2 kg (4.9 lbs.)

D1FV Onboard Electronics

D	1	F	V	E02			0				3	
Proportional Pressure Reducing Valve	Size DIN NG6 CETOP 3 NFPA D03	Proportional Control		Spool Type	Pressure Range	Spool Position		Seal	Input Signal	Options	Spool / Body Design	Design Series NOTE: Not required when ordering.

Code	Description
C	25 Bar (363 PSI)
D	45 Bar (653 PSI)

Code	Style
C	
E	
K	

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Input Signal [1]	Function	Port	Options
F0	0...+/-10V	0...+10V > P-A	6 + PE	Potentiometer supply
G0	0...+/-20mA	0...+20mA > P-A	6 + PE	—
M0	0...+/-10V	0...+10V > P-B	6 + PE	Potentiometer supply
S0	4...20mA	12...20mA > P-A	6 + PE	—
W5 [2]	0...+/-10V 4...20mA 0...+/-20mA	0...+10V > P-A 12...20mA > P-A 0... 20mA > P-A	11 + PE	Potentiometer supply & command preset channel

[1] Single solenoid always 0...+/-10V respectively 4...20mA.
[2] Factory set ± 10V on delivery.

Bolt Kit:
BK209 (4) 10-24x1.25
BK375 (4) M5x30

Weight: Onboard
D1FV 2.9 kg (6.4 lbs.)

Please order plugs separately. See Accessories.

Parametrizing cable OBE => RS-232
Item no. 40982923

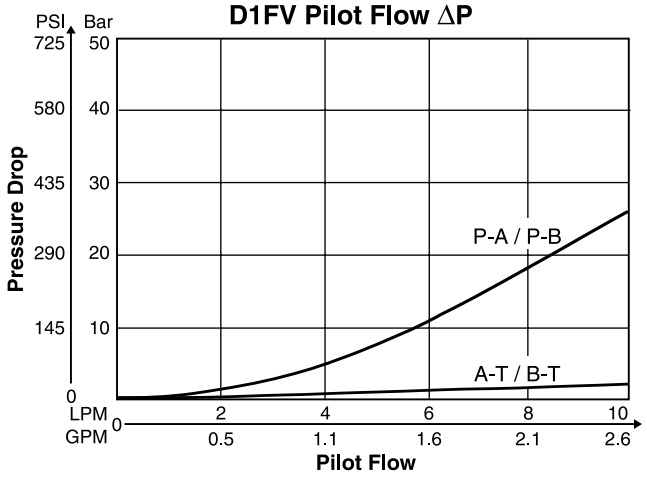
General		
Design		Direct operated proportional pressure reducing valve
Actuation		Proportional solenoid
Size		NG6 / CETOP 3 / NFPA D03
Mounting Interface		DIN 24340 / ISO 4401 / CETOP RP121 / NFPA
Mounting Position		Unrestricted
Ambient Temperature	**[°C]**	-20...+40; (-4°F...+104°F)
MTTF$_D$ Value	**[years]**	150 (75)
Vibration Resistance	**[g]**	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27
Hydraulic		
Maximum Operating Pressure		Ports P, A, B 350 Bar (5075 PSI) Port T 185 Bar (2683 PSI)
Maximum Pressure Drop PABT / PBAT		350 Bar (5075 PSI)
Fluid		Hydraulic oil as per DIN 51524...51535, other on request
Fluid Temperature	**[°C]**	-20...+40 (-4°F...+104°F)
Viscosity **Permitted** **Recommended**	 **[cSt] / [mm²/s]** **[cSt] / [mm²/s]**	 20...380 (93...1761 SSU) 30...80 (139...371 SSU)
Filtration		ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)
Maximum Flow		10 LPM (2.6 GPM)
Minimum Primary Pressure		30 Bar (435 PSI)
Static / Dynamic		
Hysteresis	**[%]**	<4
Temperature Drift Solenoid Current	**[%/K]**	<0.02
Electrical		
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		Standard (as per EN175301-803) IP65 in accordance with EN60529 (with correctly mounted plug-in connector); DT04-2P “Deutsch“ IP69K (with correctly mounted plug-in connector)
Supply Voltage	**[V]**	12
Current Consumption	**[A]**	2.2
Resistance	**[Ohm]**	4.4
Coil Insulation Class		F (155 °C) (311°F)
Solenoid Connection		Connector as per EN 175301-803 (code W), DT04-2P “Deutsch“ connector (code J). Solenoid identification as per ISO 9461.
Wiring Minimum	**[mm²]**	3x1.5 (AWG 16) overall braid shield (Code W), "Deutsch" connector DP4 2-Pin (Code J)
Wiring Length Maximum	**[m]**	50 (164 ft.) recommended

With electrical connections the protective conductor (PE ⏚) must be connected according to the relevant regulations.

Electrical Specifications

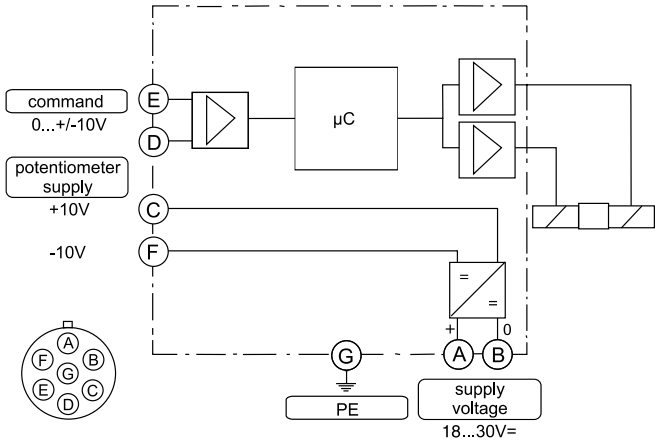
Electrical		
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/ripple DC	**[V]**	18...30, ripple < 5% eff., surge free
Current Consumption Maximum	**[A]**	2.0
Pre-fusing Medium Lag	**[A]**	2.5
Input Signal		
Codes F0 & W5 Voltage	**[V]**	+10...0...-10, ripple < 0.01 % eff., surge free, Ri = 100kOhm, 0...+10V => P -> A
Code M0 Voltage	**[V]**	+10...0...-10, ripple < 0.01 % eff., surge free, Ri = 100kOhm, 0...+10V => P -> B
Codes S0 & W5 Current	**[mA]**	4...12...20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 12...20mA => P -> A < 3.6 mA = enable off, > 3.8 mA = enable on (acc. to NAMUR NE43)
Code G0	**[mA]**	+20...0...-20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 0...+20mA => P -> A
Differential input max.		
Codes F0, G0, M0 & S0	**[V]**	30 for terminal D and E against PE (terminal G) 11 for terminal D and E against 0V (terminal B)
Code W5	**[V]**	30 for terminal 4 and 5 against PE (terminal PE) 11 for terminal 4 and 5 against 0V (terminal 2)
Channel Recall Signal	**[V]**	0...2.5: off / 5...30: on / Ri = 100 kOhm
Adjustment Ranges:		
Min	**[%]**	0...50
Max	**[%]**	50...100
Ramp	**[s]**	0...32.5
Interface		RS-232, parametrizing connection 5 pole
EMC		EN 61000-6-2, EN 61000-6-4
Central Connection		
Codes F0, G0 M0 & S0		6 + PE acc. to EN 175201-804
Code W5		11 + PE acc. to EN 175201-804
Wiring Minimum		
Codes F0, G0 M0 & S0	**[mm²]**	7 x 1.0 (AWG16) overall braid shield
Code W5	**[mm²]**	11 x 1.0 (AWG16) overall braid shield
Wiring Length Maximum	**[m]**	50 (164 ft.)

Performance Curves

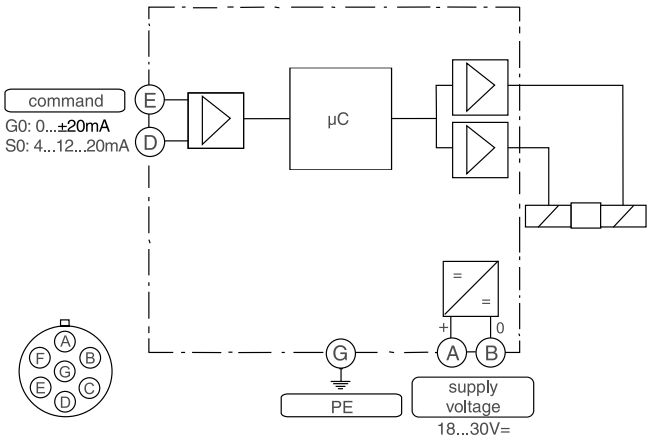


All performance curves measured with HLP46 at 50°C (122°F).

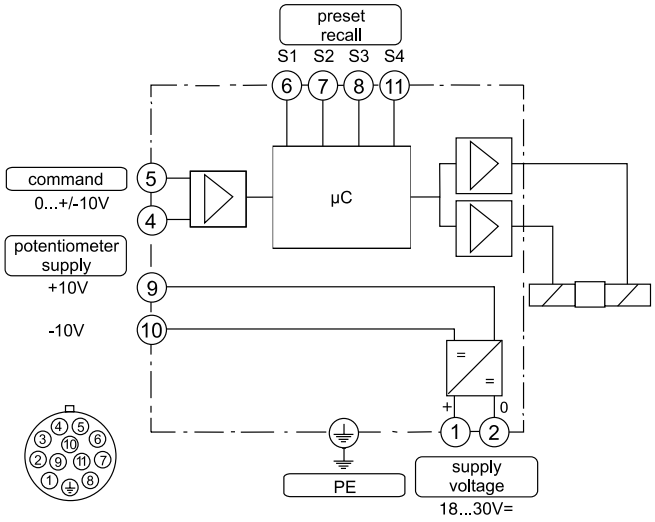
Code F0, M0
6 + PE acc. to EN 175201-804



Code G0, S0
6 + PE acc. to EN 175201-804



Code W5
11 + PE acc. to EN 175201-804



ProPxD Interface Program

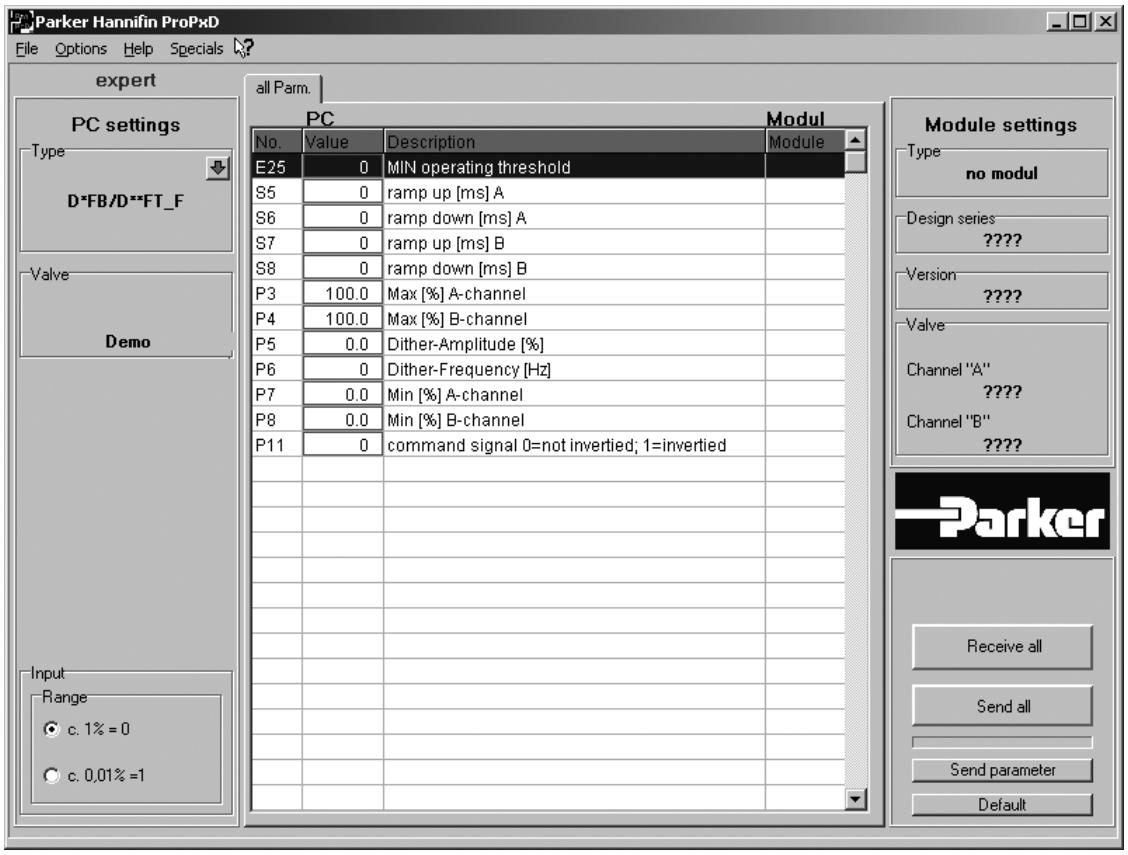
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

Simple to use interface program. Download free of charge **www.parker.com/euro_hcd → Services → downloads**

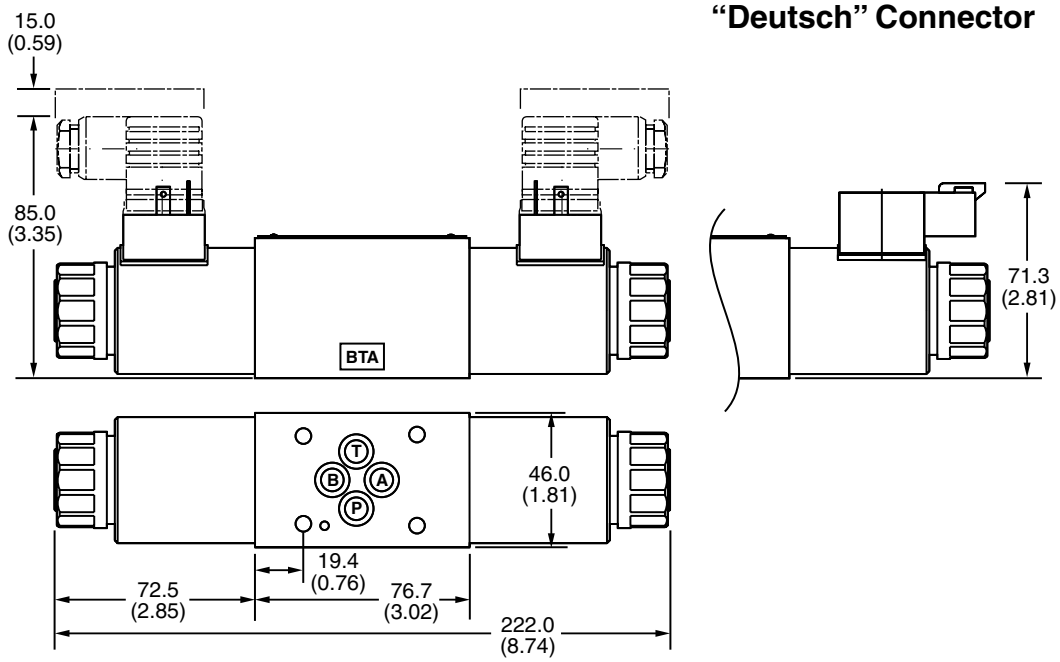


The parametrizing cable may be ordered under item no. 40982923.

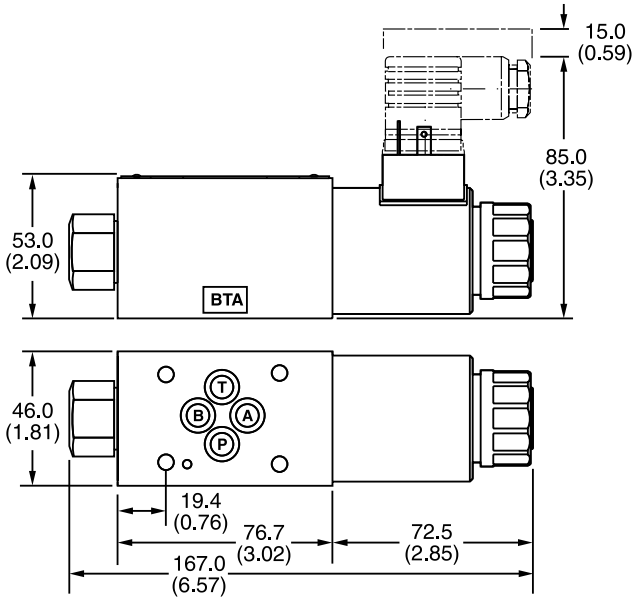
Inch equivalents for millimeter dimensions are shown in (**)

D1FV*C

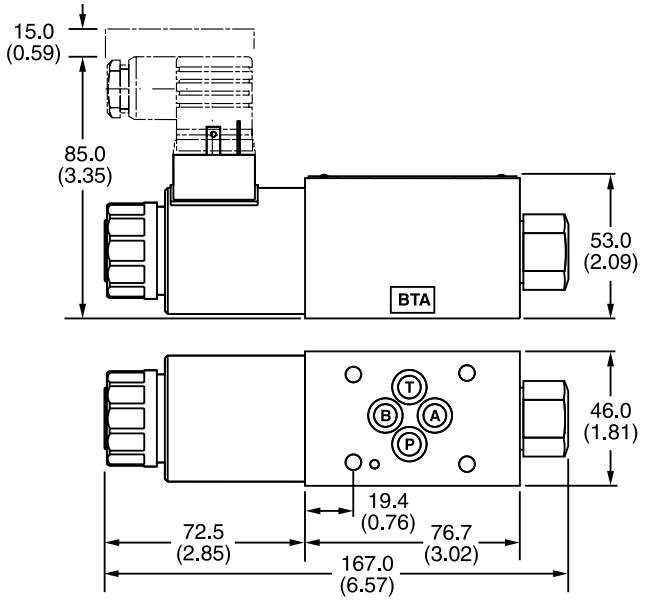
with DT04-2P "Deutsch" Connector



D1FV*E



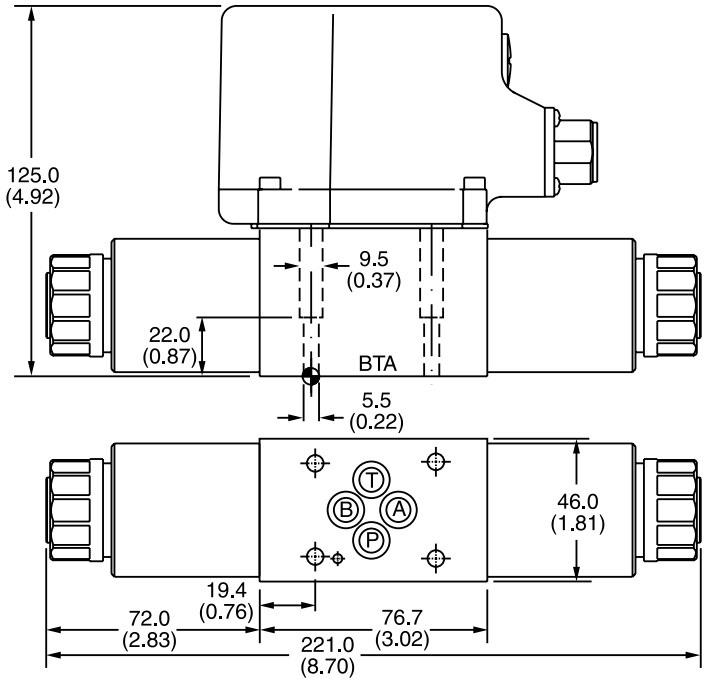
D1FV*K



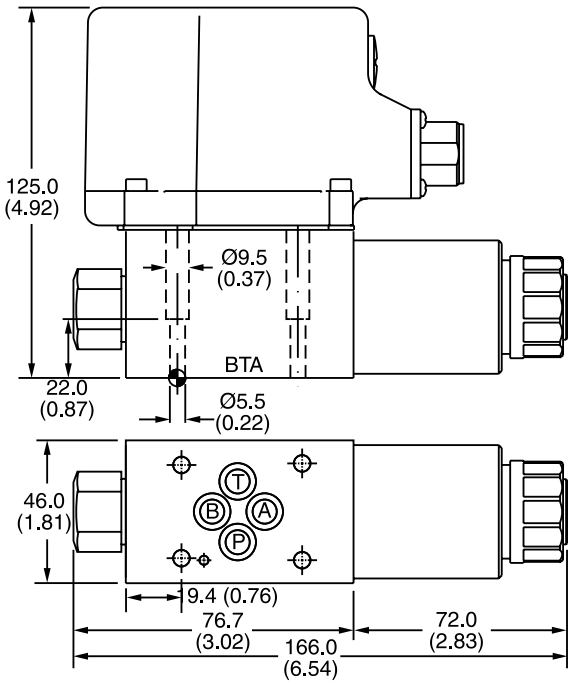
Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}6.3}$ 0.01/100	BK375	4x M5x30 DIN 912 12.9	7.6 Nm (5.6 lb.-ft.) ±15 %	Nitrile: SK-D1FB-N Fluorocarbon: SK-D1FBV

Inch equivalents for millimeter dimensions are shown in (**)

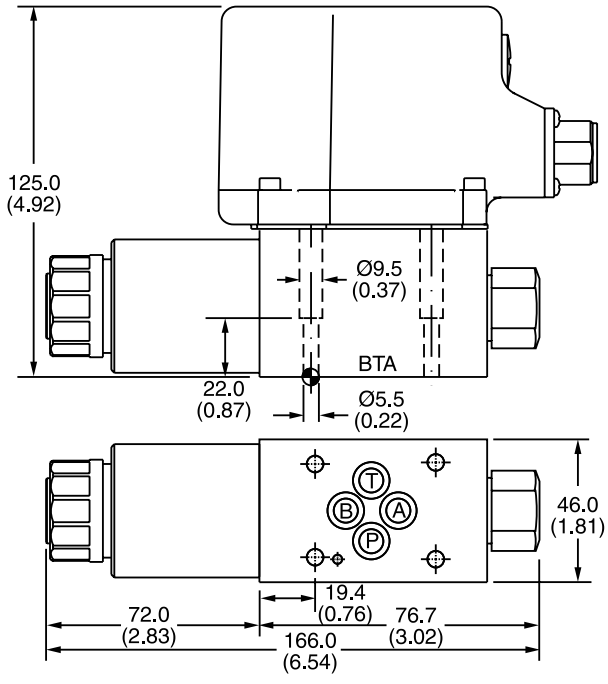
D1FV*C OBE



D1FV*E OBE



D1FV*K OBE



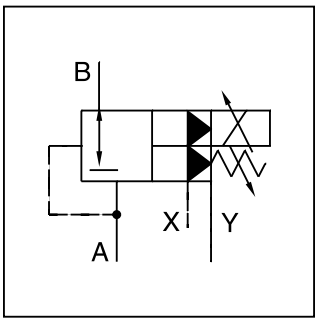
Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}}6.3$ ⏥ 0.01/100	BK375	4x M5x30 DIN 912 12.9	7.6 Nm (5.6 lb.-ft.) ±15 %	Nitrile: SK-D1FB-N Fluorocarbon: SK-D1FBV

Notes

General Description

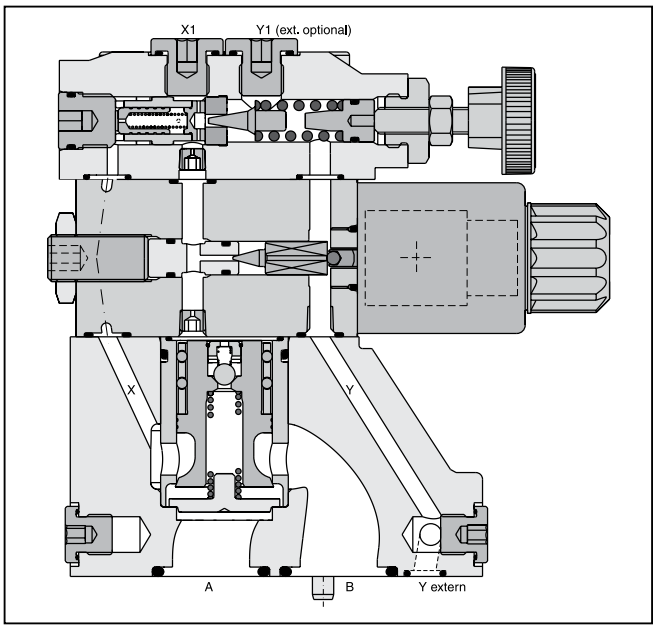
Series R4R*P2 subplate mounted proportional pressure reducing valves have a proportional solenoid operated pilot stage and a cartridge main stage.

The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.



Features

- Pilot operated with proportional solenoid.
- Continuous adjustment by proportional solenoid.
- Subplate mounting according to ISO 5781.
- 3 pressure ranges.
- Mechanical maximum pressure adjustment.



Ordering Information

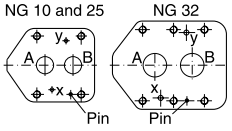
R	4	R		—	5	9					P2	G0R	B		
Pressure Reducing Valve	Interface	Reducing Function	Size		Maximum Pressure 350 Bar (5075 PSI)	Pilot Ports G1/4"	Pressure Range	Adjustment	Drain Line Ext. from Pilot Head (Y1)		Proportional Pressure Control	Solenoid Voltage 12V 2.3A	Design Series	Seal	Options Check with Factory

Code	Description
03	NG10
06	NG25
10	NG32

Code	Pilot	Drain
1	Internal	External from Y
2	Internal	External from Y1

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
4	Subplate Mounting ISO 5781



Code	Description
1	Hand Knob 32mm dia. Standard
3	Acorn Nut with Lead Seal

Code	Description	
1	up to 105 Bar	(1523 PSI)
3	up to 210 Bar	(3045 PSI)
5	up to 350 Bar	(5075 PSI)

Bolt Kit:

R4R03*P2	BK505
R4R06*6*P2	BK485
R4R10*P2	BK506

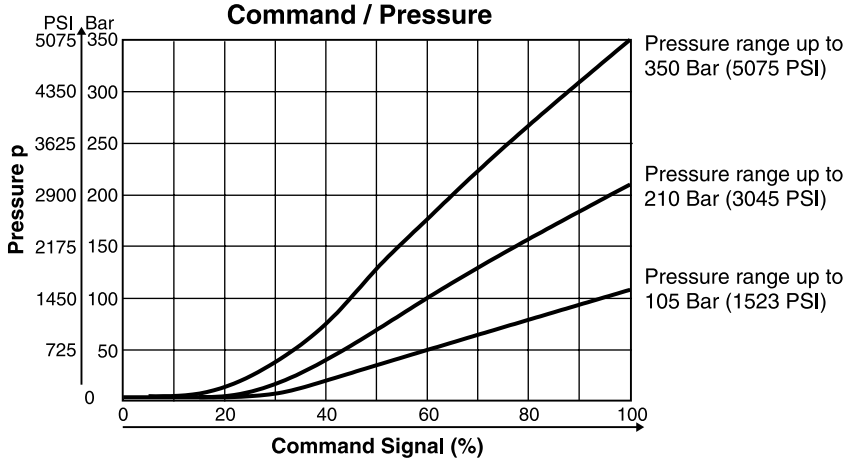
Weight:

R4R03*P2	2.7 kg (6.0 lbs.)
R4R06*6*P2	4.5 kg (9.9 lbs.)
R4R10*P2	6.0 kg (13.2 lbs.)

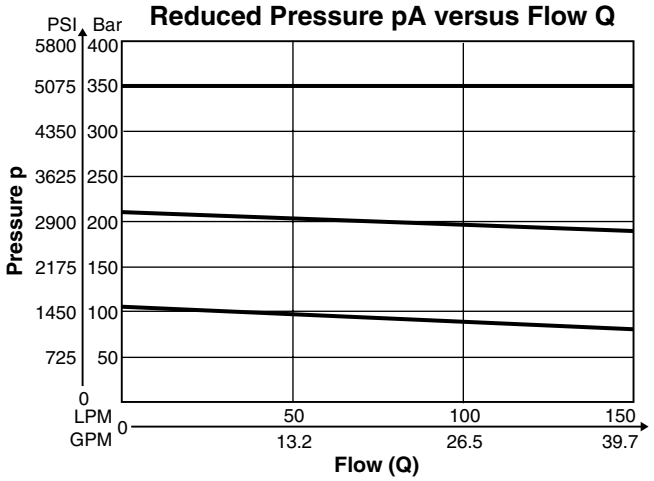
Specifications

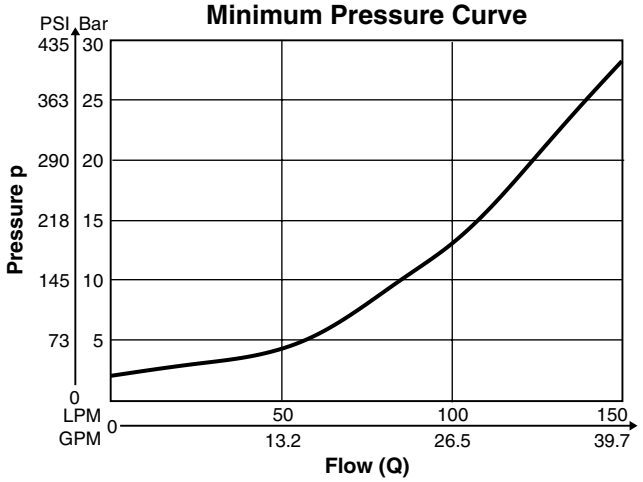
General				
Size		**NG10**	**NG25**	**NG32**
Interface		Subplate mounting acc. ISO 5781		
Mounting Position		Unrestricted, horizontal mounting preferred		
Ambient Temperature	**[°C]**	-20 ... +80; (-4°F ... +176°F)		
$MTTF_D$ Value	**[years]**	75		
Hydraulic				
Maximum Operating Pressure		Ports A, B and X 350 Bar (5075 PSI), Port Y depressurized		
Pressure Ranges		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)		
Nominal Flow		150 LPM (39.7 GPM)	350 LPM (92.6 GPM)	500 LPM (132.3 PSI)
Fluid		Hydraulic oil according to DIN 51524...51535, other on request		
Viscosity				
Recommended	**[cSt] / [mm²/s]**	30 ... 50 (139 ... 232 SSU)		
Permitted	**[cSt] / [mm²/s]**	20 ... 380 (93 ... 1761 SSU)		
Fluid Temperature	**[°C]**	-20 ... +70 (-4°F ... +158°F)		
Filtration		ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		
Electrical				
Duty Ratio	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible		
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)		
Nominal Voltage	**[V]**	12		
Maximum Current	**[A]**	2.3		
Coil Resistance	**[Ohm]**	4 at 20°C (68°F)		
Solenoid Connection		Connector as per EN 175301-803, Solenoid identificaton as per ISO9461		
Power Amplifier, Recommended		PCD00A-400		

Performance Curves

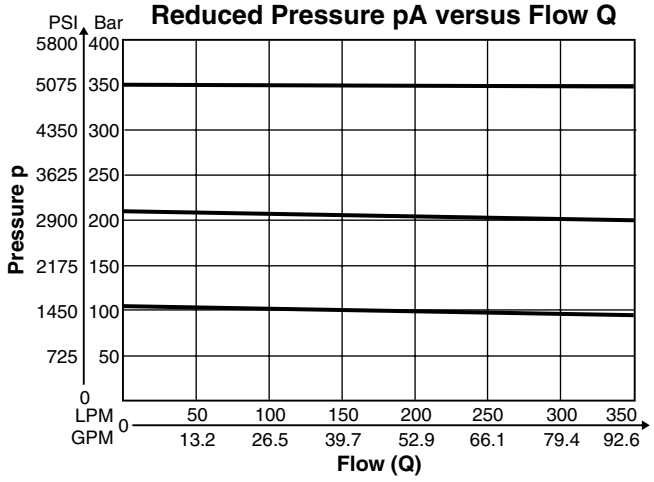


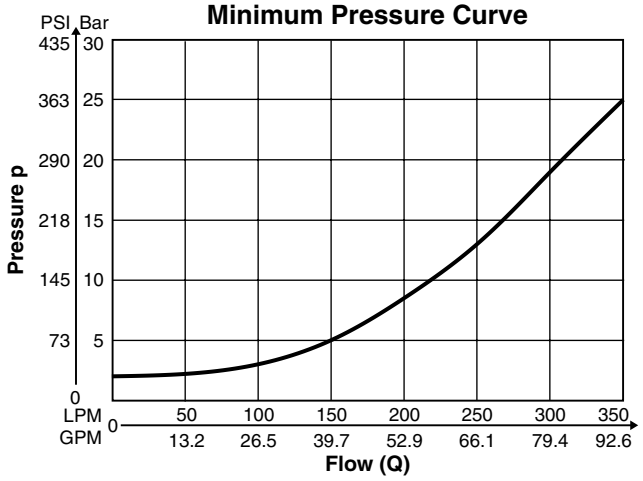
R4R03*P2 [1)]



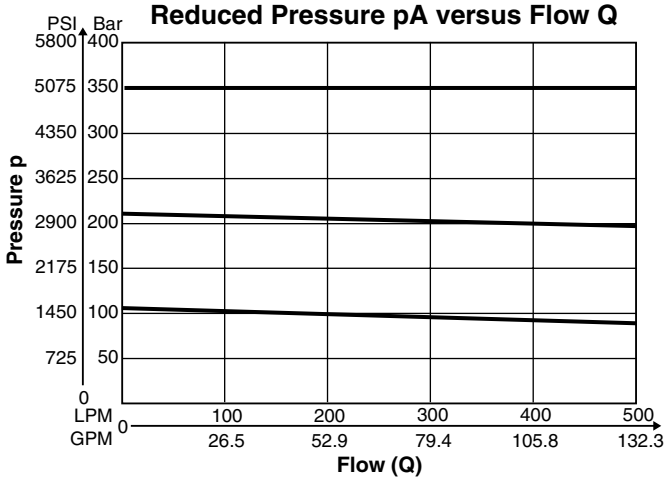


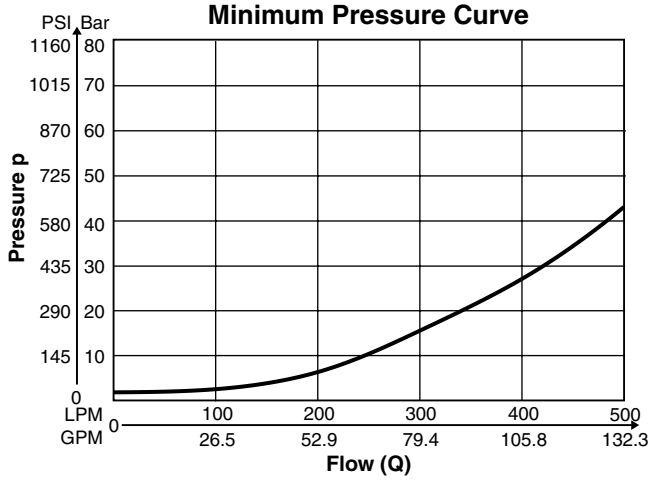
R4R06*P2 [1)]





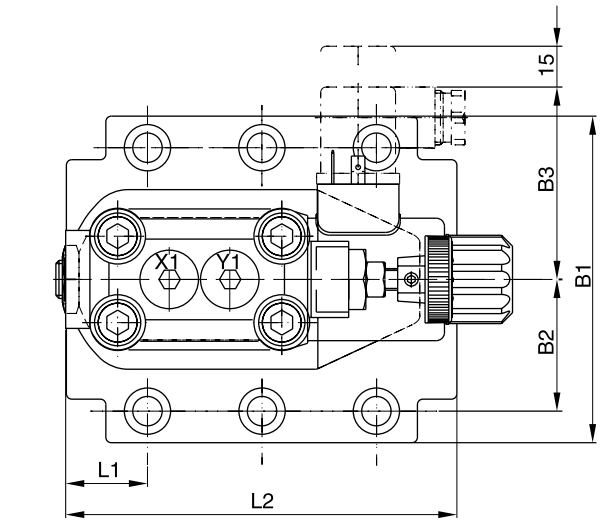
R4R10*P2 [1)]

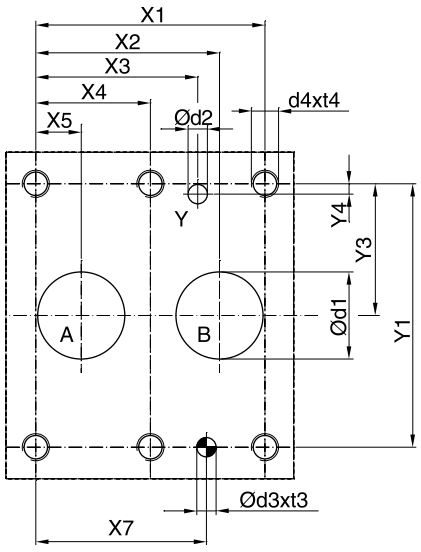


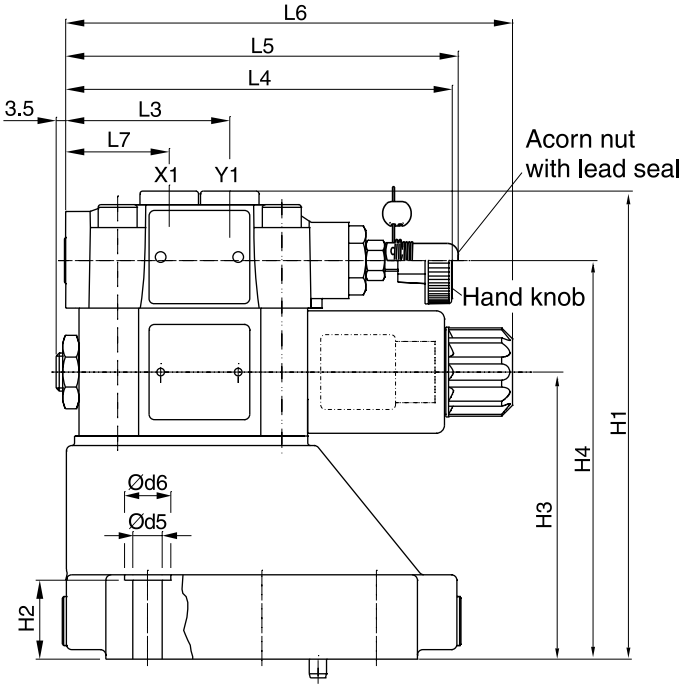


[1)] Measured at 350 Bar (5075 PSI) primary pressure pB.

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA


15
B3
B1
B2
X1
Y1
L1
L2


X1
X2
X3
X4
X5
Ød2
d4xt4
Y
Y4
Y3
Y1
Ød1
A
B
Ød3xt3
X7


L6
L5
L4
3.5
L3
L7
X1
Y1
Acorn nut
with lead seal
Hand knob
H1
H4
H3
Ød6
Ød5
H2

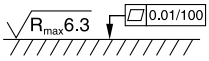
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-Code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	–	7.2 (0.28)	–	31.8 (1.25)	66.7 (2.63)	–	33.4 (1.31)	7.9 (0.31)	–	–
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	–	11.1 (0.44)	–	44.5 (1.75)	79.4 (3.13)	–	39.7 (1.56)	6.4 (0.25)	–	–
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	–	62.7 (2.47)	96.8 (3.81)	–	48.4 (1.91)	3.8 (0.15)	–	–

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

NG	ISO-Code	B1	B2	B3	H1	H2	H3	H4	L1	L2	L3	L4	L5	L6	L7
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	71.0 (2.80)	134.0 (5.28)	21.0 (0.83)	68.5 (2.70)	109.5 (4.31)	25.0 (98.0)	90.8 (3.57)	60.8 (2.38)	143.0 (5.63)	144.8 (5.70)	164.0 (6.49)	38.6 (1.52)
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	71.0 (2.80)	158.5 (6.24)	29.0 (1.14)	95.0 (3.74)	136.0 (5.35)	30.9 (1.22)	123.0 (4.84)	60.8 (2.38)	143.0 (5.63)	144.8 (5.70)	164.0 (6.49)	38.6 (1.52)
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	71.0 (2.80)	171.0 (6.73)	30.0 (1.18)	105.5 (4.15)	146.5 (5.77)	29.8 (1.17)	143.5 (5.65)	60.8 (2.38)	143.0 (5.63)	144.8 (5.70)	164.0 (6.49)	38.6 (1.52)

NG	ISO-Code	d1max	d2max	d3	t3	d4	t4	d5	d6	Subplate
10	5781-06-07-0-00	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)	SPP3M6B910
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)	SPP6M8B910
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)	SPP10M12B910

NG	ISO-Code	Bolt Kit			Seal Kit		Surface Finish
					Nitrile	Fluorocarbon	
10	5781-06-07-0-00	BK505	4x M10 x 35 DIN912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58507-0*	S26-58507-5*	
25	5781-08-10-0-00	BK485	4x M10 x 45 DIN912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58475-0*	S26-58475-5*	
32	5781-10-13-0-00	BK506	6x M10 x 45 DIN912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58508-0*	S26-58508-5*	
Prop. Section P2					S26-58473-0	S26-58473-5	

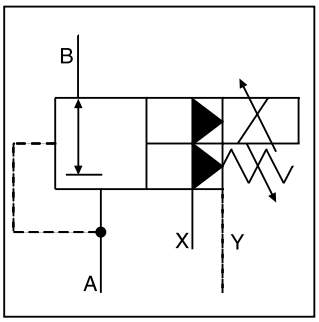
* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit

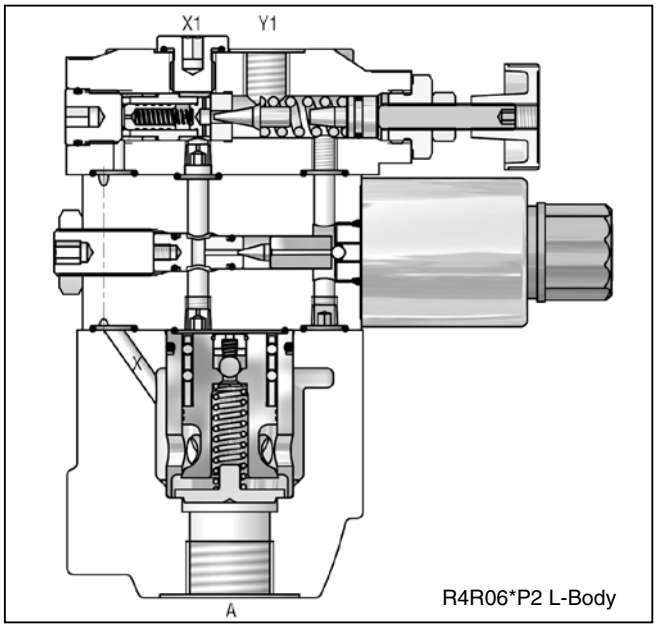
General Description

Series R4R*P2 proportional pressure reducing valves are based on the mechanically adjusted Series R4R. The additional proportional unit between the mechanical pilot valve and the main stage allows continuous pressure adjustment.

The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.

R4R10*P2 L-Body





R4R06*P2 L-Body

Features

- Pilot operated with proportional solenoid.
- Normally closed to avoid undesired motion.
- Continuous adjustment by proportional solenoid.
- 2 interfaces:
  – L-body (R4R06-G3/4", R4R10-G1-1/4") BSPP
  – T-body (R4R03-G1/2", R4R06-G1") BSPP
- 4 sizes (SAE 1/2", 3/4", 1", 1-1/4").
- 3 pressure ranges.
- With mechanical maximum pressure adjustment.

Ordering Information

R4R	☐	—	5	☐	☐	☐	2	P2	G0R	B	☐	☐
Pressure Reducing Valve	Size		Max Pressure 350 Bar (5075 PSI)	Body	Pressure Range	Adjustment	Drain Line Ext. from Pilot Head (Y1)	Proportional Pressure Control	Solenoid Voltage 12V 2.3A	Design Series	Seal	Options Check with Factory

Code	Description
03	NG10 (G1/2")
06	NG25 (G1" – T-Body) (G3/4" – L-Body)
10	NG32 (G1-1/4")

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
6	R4R03 T-Body R4R06 T-Body
D	R4R06 L-Body R4R10 L-Body

Code	Description	
1	up to 105 Bar	(1523 PSI)
3	up to 210 Bar	(3045 PSI)
5	up to 350 Bar	(5075 PSI)

Bolt Kits:

R4R03:	BK505	(4) M10x35
R4R06:	BK485	(4) M10x45
R4R10	BK506	(6) M10x45

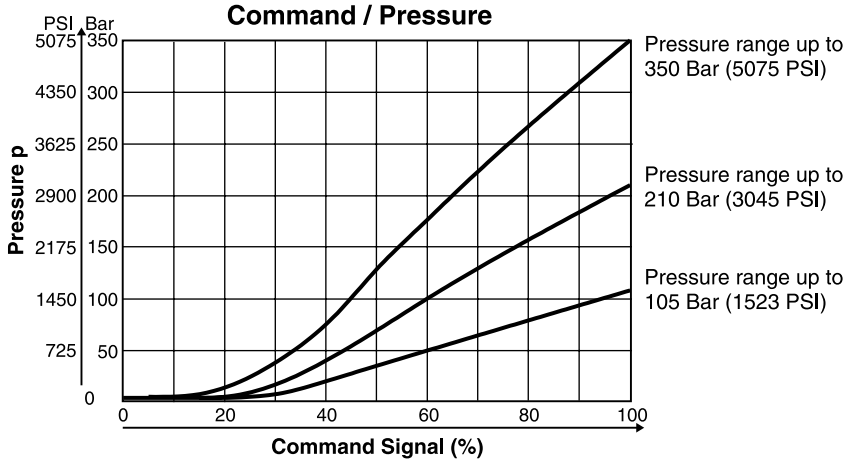
Weight:

R4R03*P2:	5.0 kg (11.0 lbs.)
R4R06*6*P2:	5.1 kg (11.2 lbs.)
R4R06*D*P2:	7.4 kg (16.3 lbs.)
R4R10*P2	8.4 kg (18.5 lbs.)

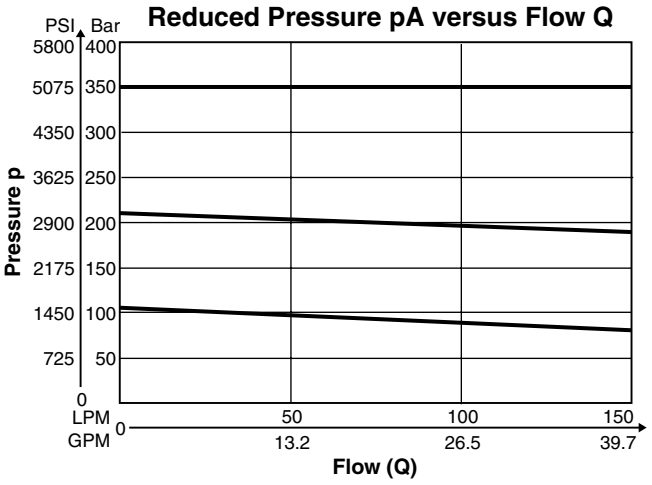
Specifications

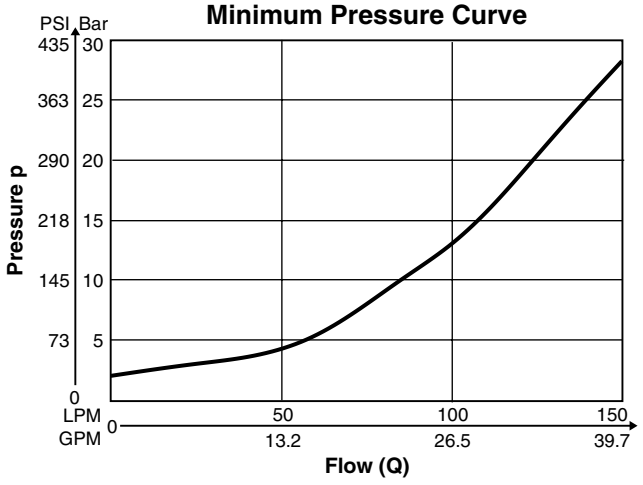
General				
Size	**T-Body**		**L-Body**	
	03 (1/2")	**06 (1")**	**06 (3/4")**	**10 (1-1/4")**
Mounting	Threaded Body			
Mounting Position	Unrestricted			
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)			
MTTF$_D$ Value	75 years			
Hydraulic				
Max. Operating Pressure	Ports A, B and X 350 Bar (5075 PSI); Port Y depressurized			
Pressure Ranges	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)			
Nominal Flow	60 LPM (15.9 GPM)	200 LPM (52.9 GPM)	200 LPM (52.9 GPM)	450 LPM (119.0 GPM)
Fluid	Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity Permitted **Recommended**	10 to 380 cSt / mm²/s (46 to 1761 SSU) 30 to 80 cSt / mm²/s (139 to 371 SSU)			
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Electrical (Proportional Solenoid)				
Duty Ratio	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible			
Nominal Voltage	12 VDC			
Maximum Current	2.3 amps			
Coil Resistance	4 Ohm at 20°C (68°F)			
Solenoid Connection	Connector as per EN175301-803, Solenoid identificaton as per ISO9461			
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)			
Power Amplifier	PCD00A-400			

Performance Curves

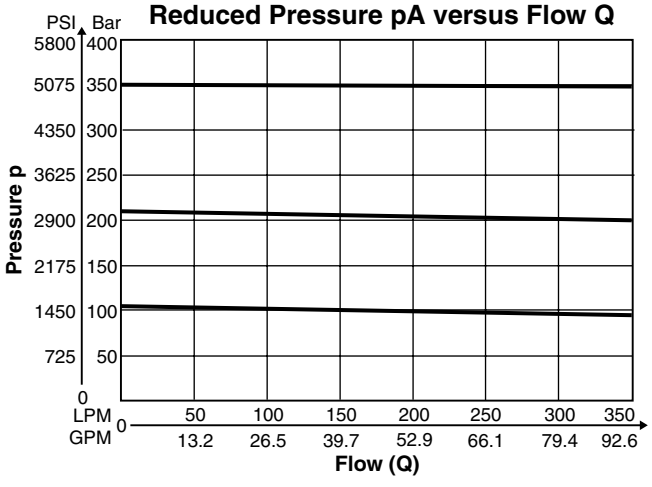


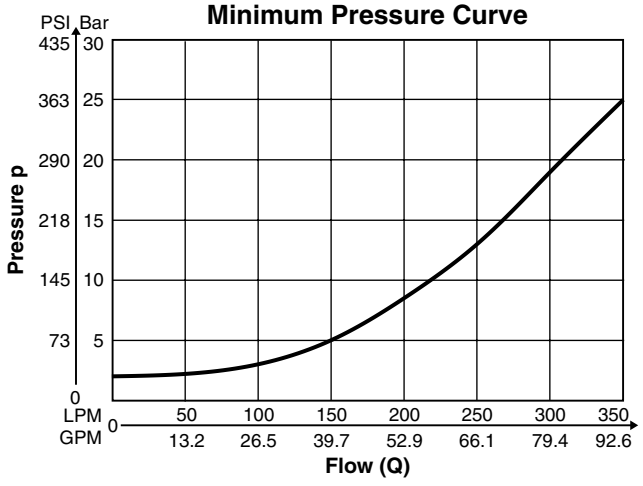
R4R03*P2 [1)]



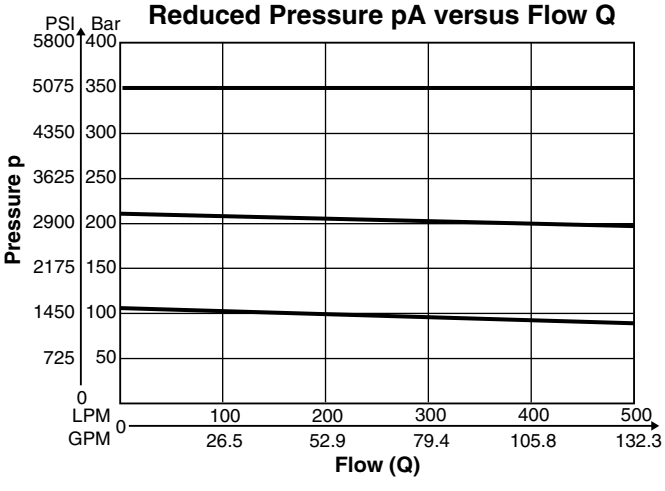


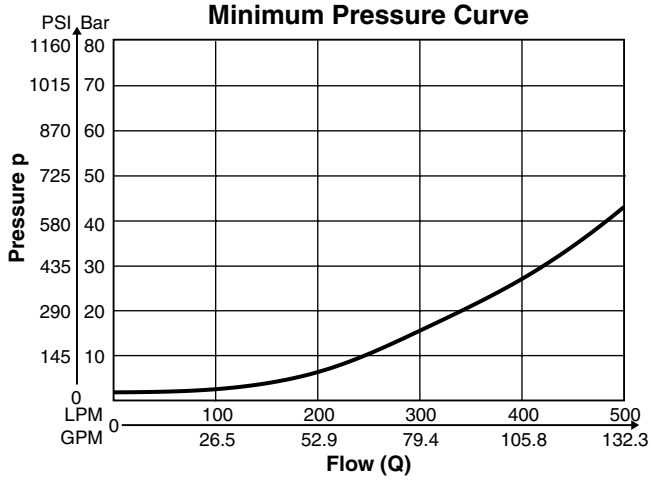
R4R06*P2 [1)]





R4R10*P2 [1)]

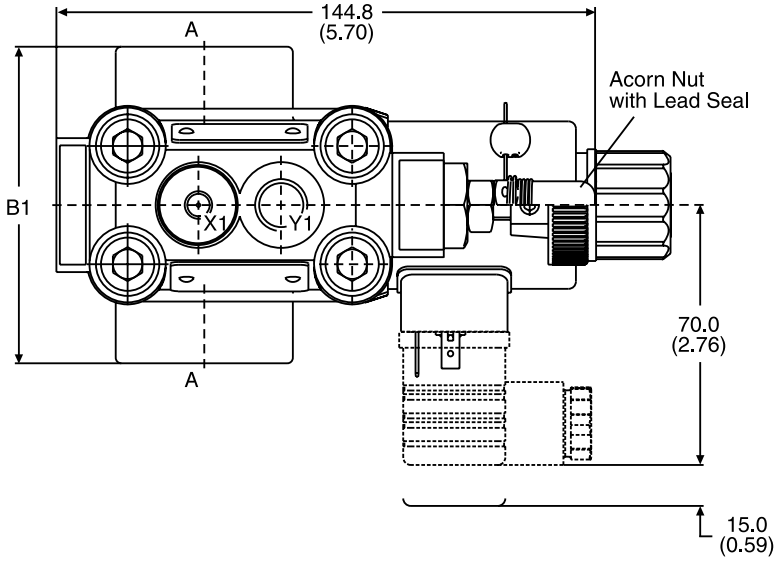


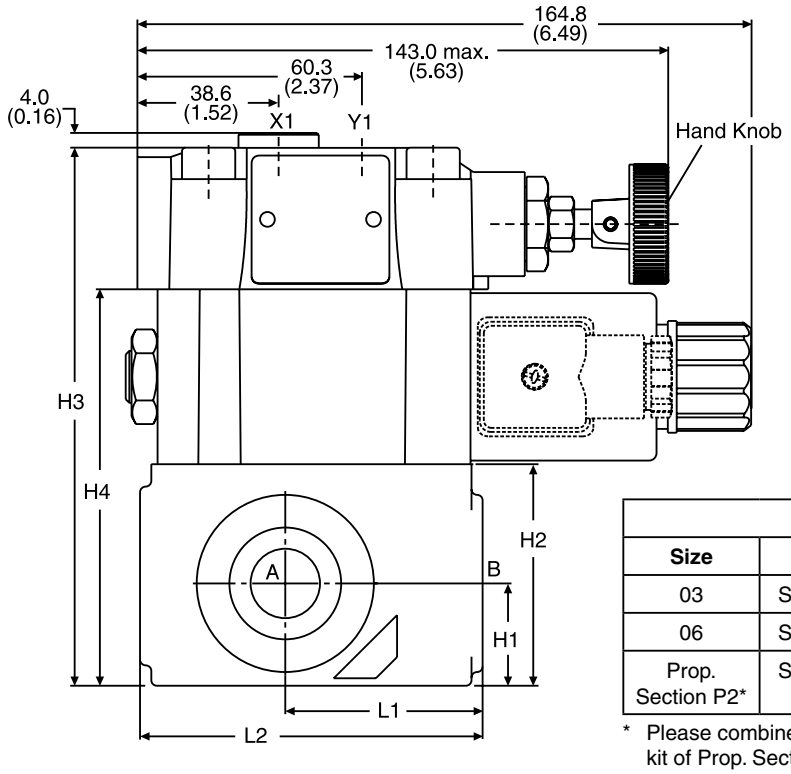


[1)] Measured at 350 Bar (5075 PSI) primary pressure pB.

Inch equivalents for millimeter dimensions are shown in (**)

T-Body





Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
03	S26-58507-0	S26-58507-5
06	S26-58475-0	S26-58475-5
Prop. Section P2*	S26-58473-0	S26-58473-5

* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.

Size	Body	B1	H1	H2	H3	H4	L1	L2
03	T-Body	85.0 (3.35)	27.5 (1.08)	59.5 (2.34)	144.5 (5.69)	106.5 (4.19)	53.0 (2.09)	92.0 (3.62)
06	T-Body	136.0 (5.35)	38.0 (1.50)	93.0 (3.66)	178.0 (7.01)	140.0 (5.51)	66.5 (2.62)	117.5 (4.63)

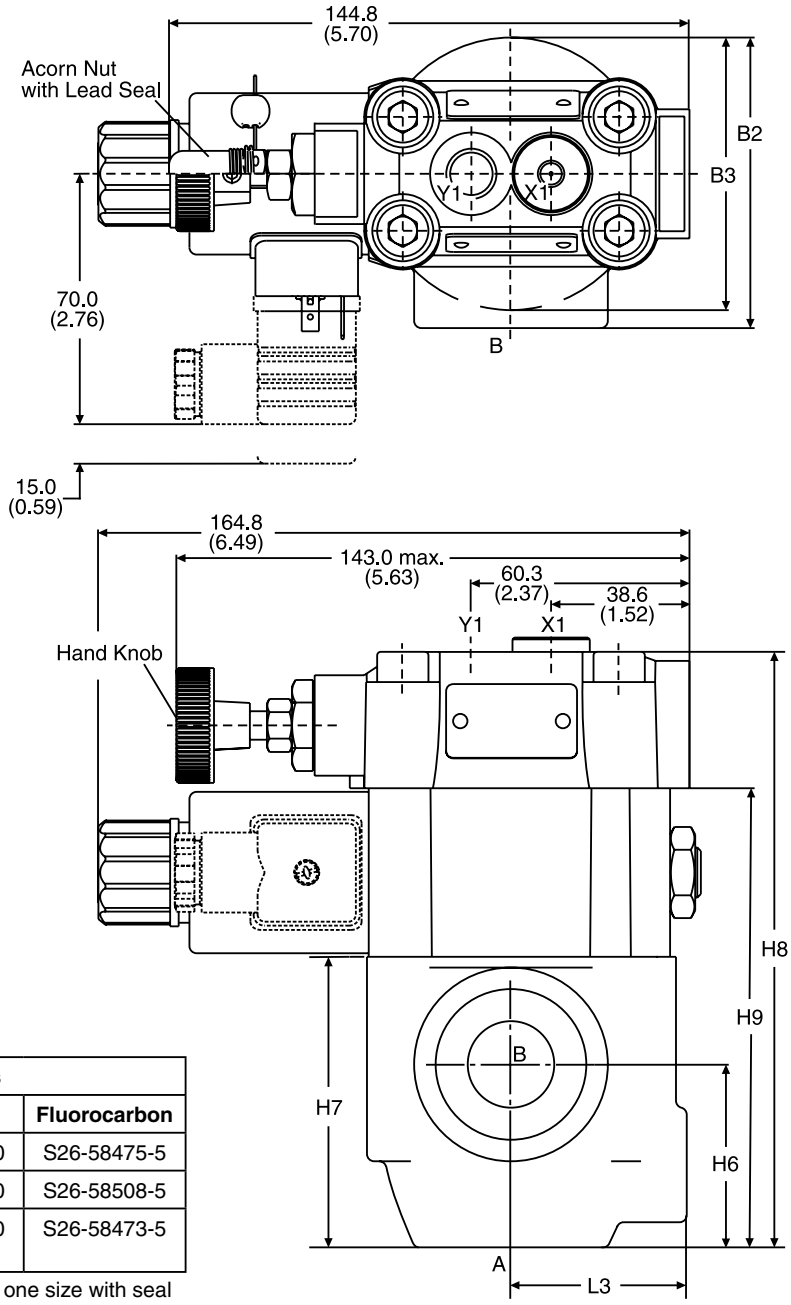
Port	Function	Port Size	
		R4R03*P2 T-Body	R4R06*P2 T-Body
B	Inlet Pressure	G1/2"	G1"
A	Outlet Pressure	G1/2"	G1"
X1*	External Remote Control or Vent Connection	G1/4"	
Y1	External Drain		

* Closed when supplied.

B

Inch equivalents for millimeter dimensions are shown in (**)

L-Body



Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S26-58475-0	S26-58475-5
10	S26-58508-0	S26-58508-5
Prop. Section P2*	S26-58473-0	S26-58473-5

* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.

Size	Body	B2	B3	H6	H7	H8	H9	L3
06	L-Body	81.0 (3.19)	76.0 (2.99)	51.0 (2.01)	81.0 (3.19)	166.0 (6.54)	128.0 (5.04)	49.0 (1.93)
10	L-Body	120.7 (4.75)	85.8 (3.38)	50.8 (2.00)	96.0 (3.78)	181.0 (7.13)	143.0 (5.63)	49.8 (1.96)

Port	Function	Port Size	
		R4R06*P2 L-Body	R4R10*P2 L-Body
B	Inlet Pressure	G3/4"	G1-1/4"
A	Outlet Pressure	G3/4"	G1-1/4"
X1*	External Remote Control or Vent Connection	G1/4"	
Y1	External Drain		

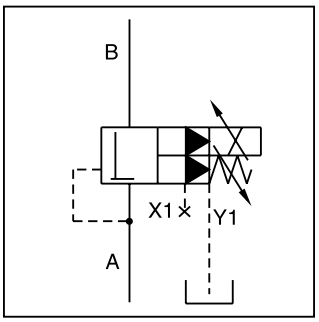
* Closed when supplied.

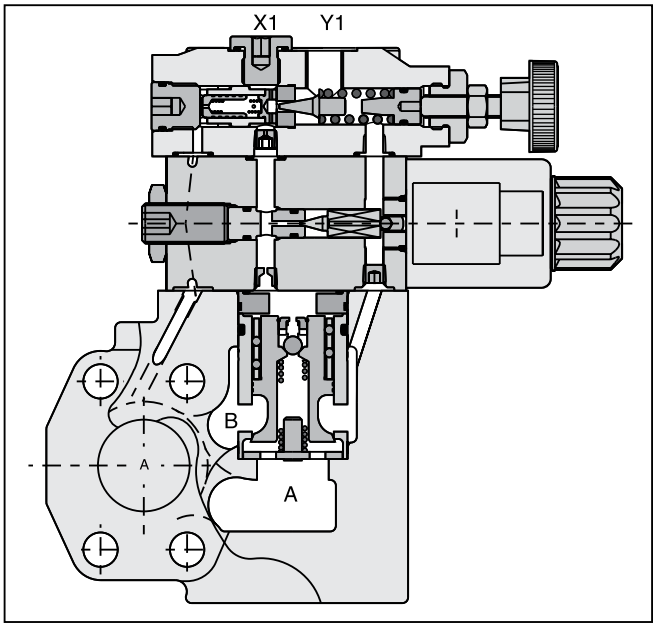
R4R_P2-Inline.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series R5R*P2 proportional pressure reducing valves are based on the mechanical adjusted Series R5R. The additional proportional unit between the mechanical pilot valve and the main stage allows continuous pressure adjustment. The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.





Features

- Pilot operated with proportional solenoid.
- Continuous adjustment by proportional solenoid.
- 2-port body with SAE 61 flange.
- 3 sizes (SAE Code 61 3/4", 1", 1-1/4").
- 3 pressure ranges.
- With mechanical maximum pressure adjustment.

Ordering Information

R5R	☐	—	☐	8	☐	☐	6	P2	G0R	A	☐	☐
Pressure Reducing Valve	Size		SAE 61 Interface	Body 2-Port X1, Y1 = G1/4"	Pressure Range	Adjustment	External Drain from Y1 Port	Proportional Pressure Control	Solenoid Voltage 12V 2.3A	Design Series	Seal	Options Check with Factory

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Size	Max. Pressure
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

Further options on request.

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

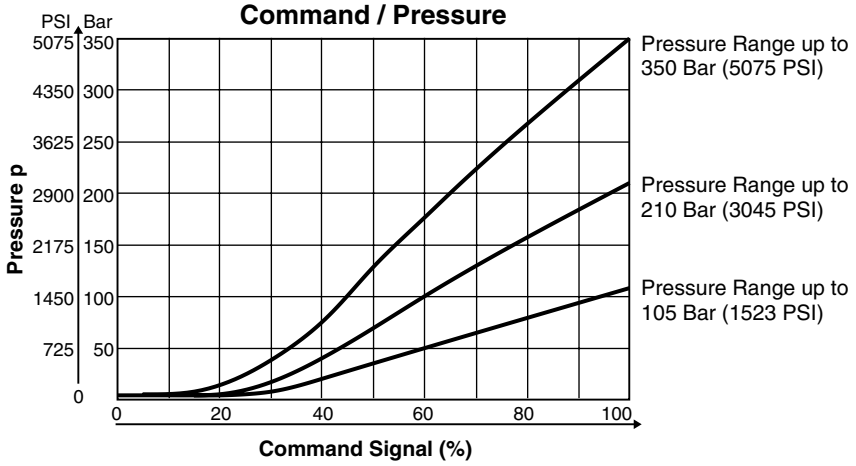
Weight:

R5R06*P2	5.8 kg (12.8 lbs.)
R5R08*P2	6.4 kg (14.1 lbs.)
R5R10*P2	7.7 kg (17.0 lbs.)

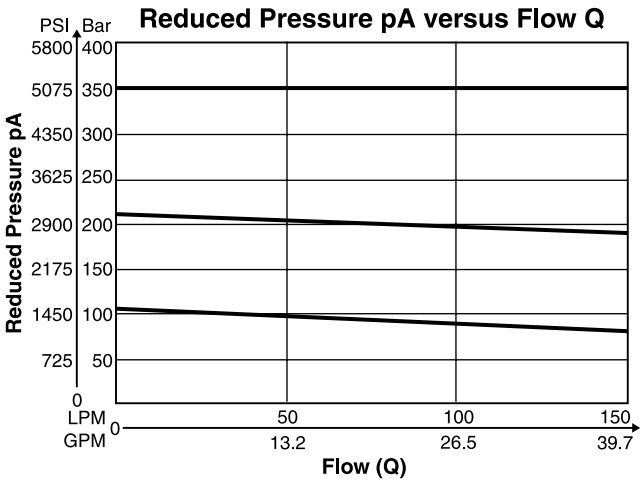
Specifications

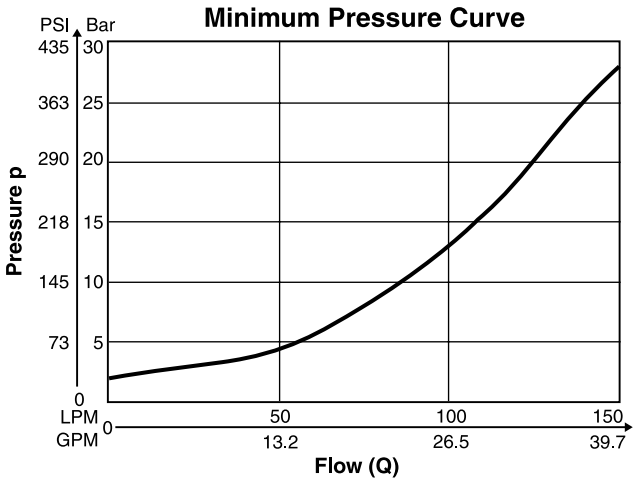
General				
Size		**06**	**08**	**10**
Mounting		Flanged according to SAE 61		
Mounting Position		Unrestricted		
Ambient Temperature Range		-20°C to +50°C (-4°F to +122°F)		
Hydraulic				
Max. Operating Pressure	**Ports A,B, X1**	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)
	Port Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)
Pressure Ranges		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)		
Nominal Flow		90 LPM (23.8 GPM)	300 LPM (79.4 GPM)	500 LPM (132.3 GPM)
Fluid		Hydraulic oil as per DIN 51524...51535, other on request		
Fluid Temperature		-20°C to +80°C (-4°F to +176°F)		
Viscosity	**Permitted**	10 to 650 cSt / mm²/s (46 to 3013 SSU)		
	Recommended	30 to 80 cSt / mm²/s (139 to 371 SSU)		
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		
Electrical (Solenoid)				
Duty Ratio		100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible		
Nominal Voltage		12 VDC		
Maximum Current		2.3 amps		
Coil Resistance		4 Ohm at 20°C (68°F)		
Solenoid Connection		Connector as per EN175301-803, Solenoid identificaton as per ISO9461		
Protection Class		IP65 in accordance with EN60529 (plugged and mounted)		
Power Amplifier		PCD00A-400		

Performance Curves

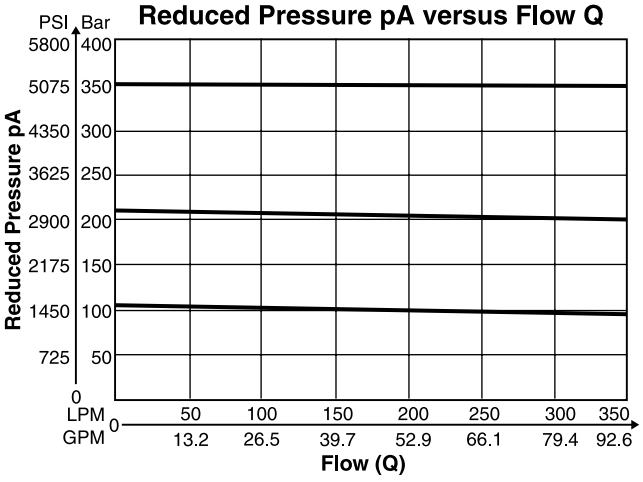


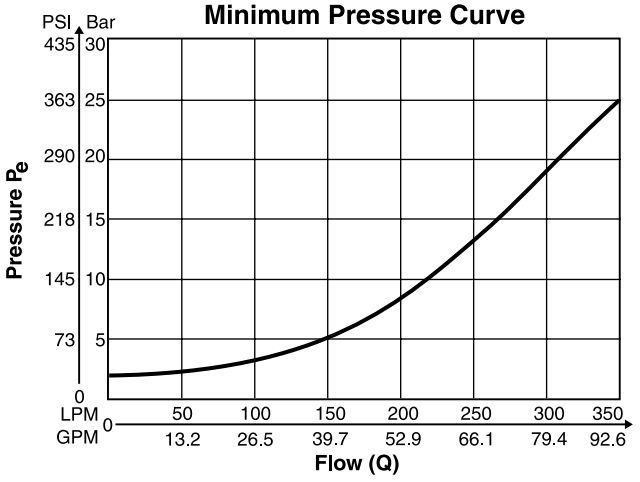
R5R06*P2 [1)]



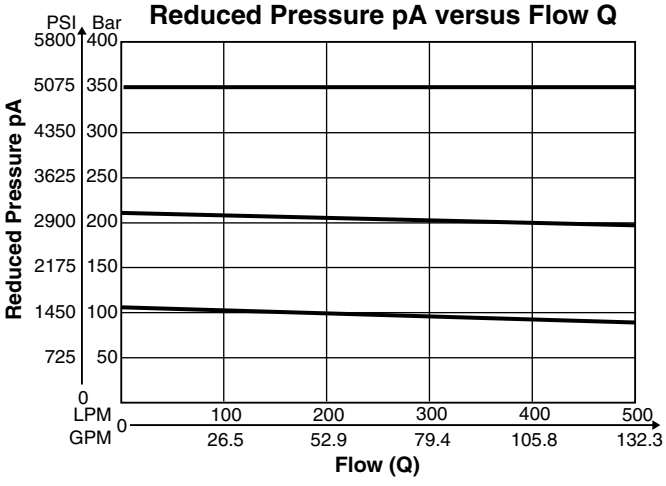


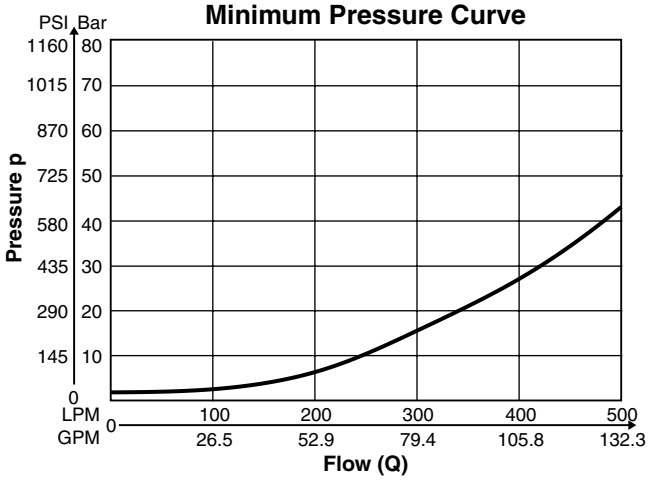
R5R08* P2 [1)]





R5R10* P2 [1)]



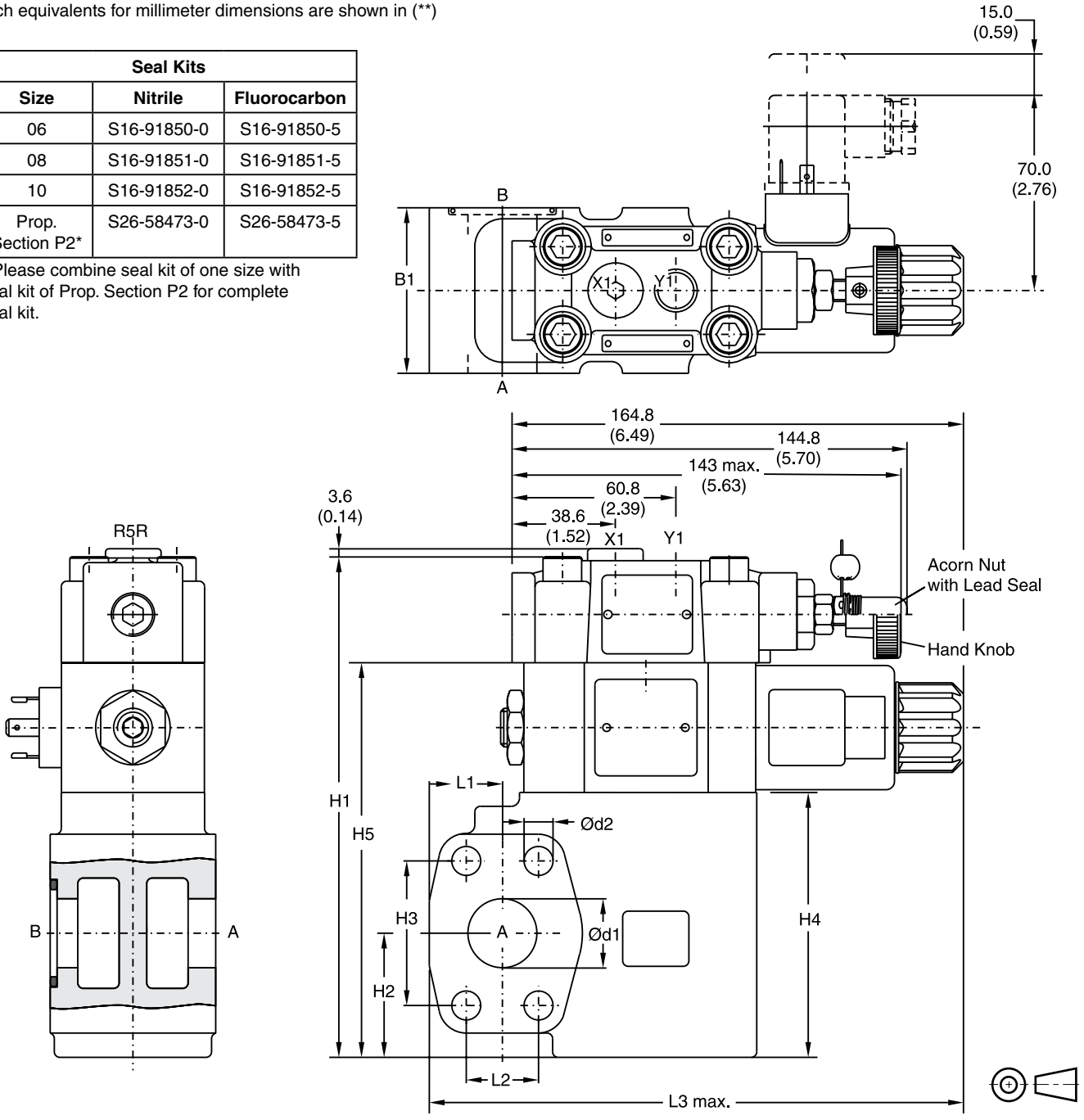


[1)] Measured at 350 Bar (5075 PSI) primary pressure pB.

Inch equivalents for millimeter dimensions are shown in (**)

Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
Prop. Section P2*	S26-58473-0	S26-58473-5

* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.



Size	B1	H1	H2	H3	H4	H5	L1	L2	L3	d1	d2
06	60.0 (2.36)	175.0 (6.89)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	137.0 (5.39)	24.6 (0.97)	22.2 (0.87)	174.0 (6.85)	19.0 (0.75)	10.5 (0.41)
08	60.0 (2.36)	181.0 (7.13)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	143.0 (5.63)	26.5 (1.04)	26.2 (1.03)	193.6 (7.62)	25.0 (0.98)	10.5 (0.41)
10	75.0 (2.95)	194.0 (7.64)	48.0 (5.93)	58.7 (2.31)	109.0 (4.29)	156.0 (6.14)	34.0 (1.34)	30.2 (1.19)	201.0 (7.91)	32.0 (1.26)	12.5 (0.49)

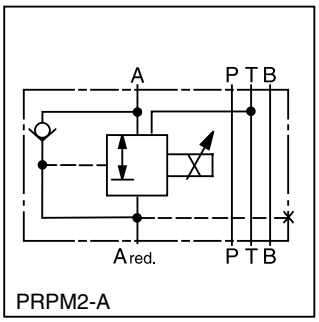
Port	Function	Port Size		
		R5R06	**R5R08**	**R5R10**
B	Inlet Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
A	Reduced Outlet Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
Y1	External Drain	G1/4"		
X1	Pressure Gauge	G1/4"		

General Description

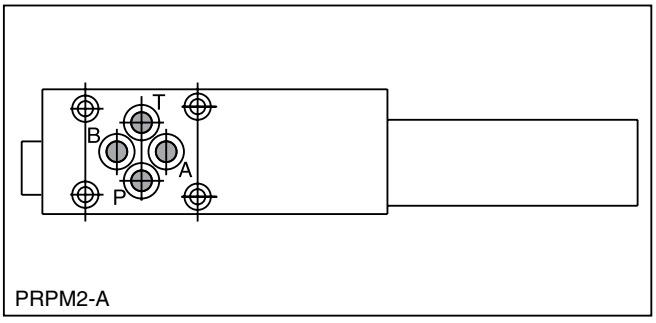
Series PRPM proportional pressure reducing valves keep a constant pressure p_{red} on the secondary, or regulated, side, independent of pressure fluctuations on the primary side. The integrated pressure relief function eliminates the need for an additional pressure relief valve on the secondary side and reliefs to tank, if p_{red} rises above the set pressure.

The proportional pressure reducing valve reduces the pressure in output port p_{red} in proportion to the solenoid current. The PRPM works practically independent of the inlet pressure p_E. In non-activated mode, the connection to the tank is fully open with a min. pressure corresponding to the spring force.

The gauge port is connected to the secondary side. Types A and B have an integrated bypass check valve. The PRPM provides optimum performance in combination with a digital amplifier module PCD00A-400.



PRPM2-A



PRPM2-A

Specifications

General		
Size (according to ISO 4401)	**NFPA D03 / NG6 / CETOP 3**	**NFPA D05 / NG10 / CETOP 5**
Construction	Sandwich type	
Operation	Proportional solenoid	
Mounting	4 holes for socket cap screws M5 (NG10: M6) or studs M5 (NG10: M6)	
Port	Sandwich valve	
Mounting Position	Horizontal preferred	
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)	
Fastening Torque	M_D = 5.5 Nm (4.1 lb.-ft.) (qual. 8.8 Nm (6.5 lb.-ft.) for socket cap screws M_D = 50 Nm (36.9 lb.-ft.) for cartridges	M_D = 9.5 Nm (7.0 lb.-ft.) (qual. 8.8 (6.5 lb.-ft.) for socket cap screws M_D = 50 Nm (36.9 lb.-ft.) for cartridges
Hydraulic		
Max. Operating Pressure	350 Bar (5075 PSI)	
Pressure Range	100 Bar (1450 PSI), 200 Bar (2900 PSI), 350 Bar (5075 PSI)	
Maximum Flow	0 to 60 LPM (0 to 15.9 GPM)	
Pilot Flow	See performance curves	
Fluid	Mineral oil (other fluid on request)	
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)	
Viscosity Permitted	10 to 380 cSt / mm^2/s (46 to 1761 SSU)	
Filtration	ISO Class 1406 16/13, to be achieved with $\beta_{6...10} > 75$	
Resolution	1 mA	
Repeatability	≤1% (with optimal dither signal)	
Hysteresis	≤4% (with optimal dither signal)	
Electrical		
Solenoid	Proportional solenoid, wet-pin push type, pressure tight	
Duty Ratio	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible	
Protection Class	IP65 in accordance with EN 60529	
Supply Voltage	12 VDC (1320 mA) / 24 VDC (680 mA)	
Solenoid Connection	Connector as per EN 175301-803	
Amplifier	PCD00A-400	

Ordering Information

PRP	M					V
Proportional Pressure Reducing Valve	Sandwich	Size	Red. Port	Pressure Range	Soleoid Voltage	Seal Fluorocarbon

Code	Description
2	NG6
3	NG10

Code	Port
AA	A
BB	B
PP	P

Code	Description
10	100 Bar (1450 PSI)
20	200 Bar (2900 PSI)
35	350 Bar (5075 PSI)

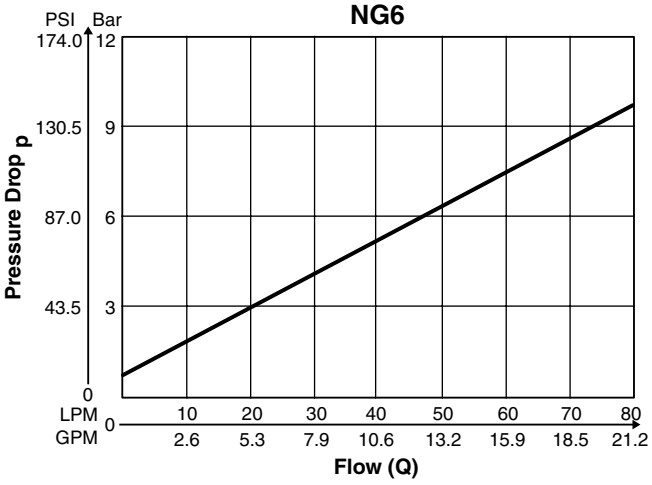
Code	Description
J	24V, 680 mA
K	12V, 1250 mA

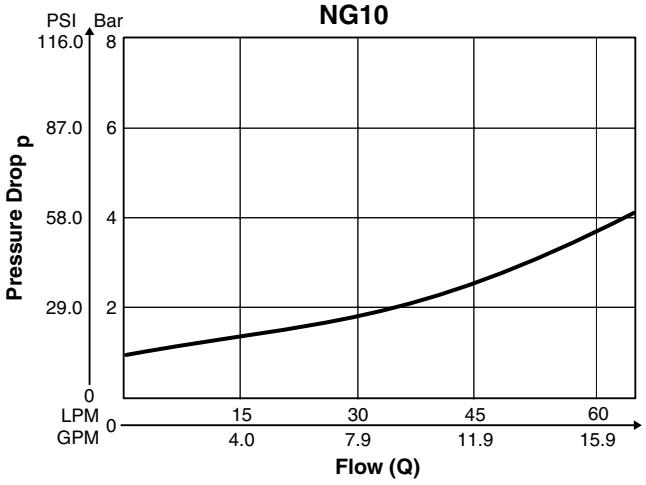
Weight:

PRPM2 0.2 kg (0.4 lbs.)
PRPM3 3.2 kg (7.1 lbs.)

Performance Curves

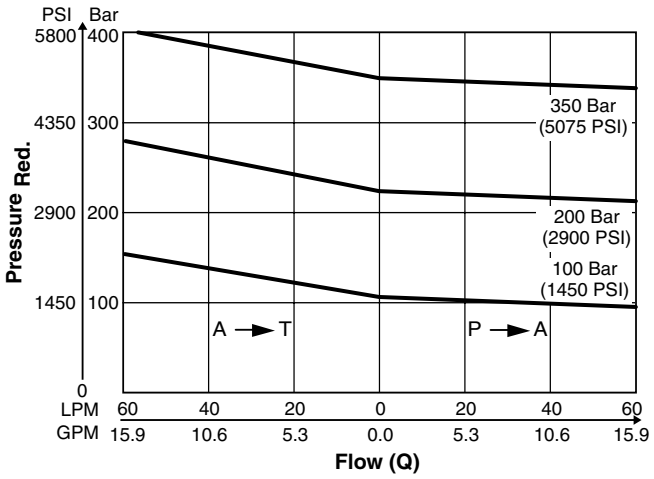
Pressure Drop/Flow over check valve



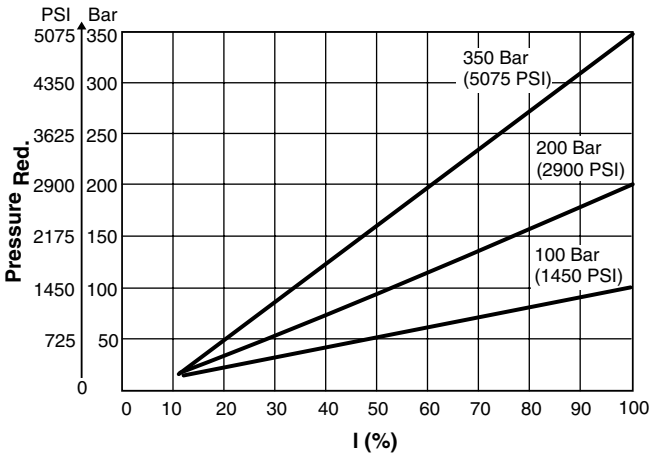


All measures taken at viscosity υ = 30mm²/s.

Pressure/Flow NG6/NG10 $p_{red} = f(Q)$

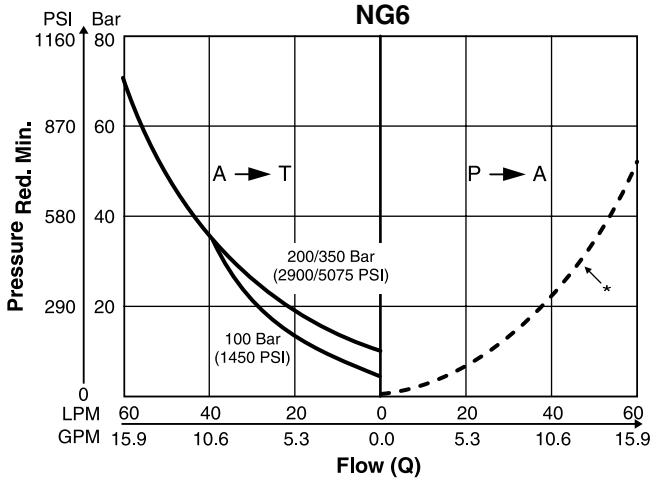


Pressure/Adjustment $p_{red} = f(I)$, at Q=0 LPM (static)



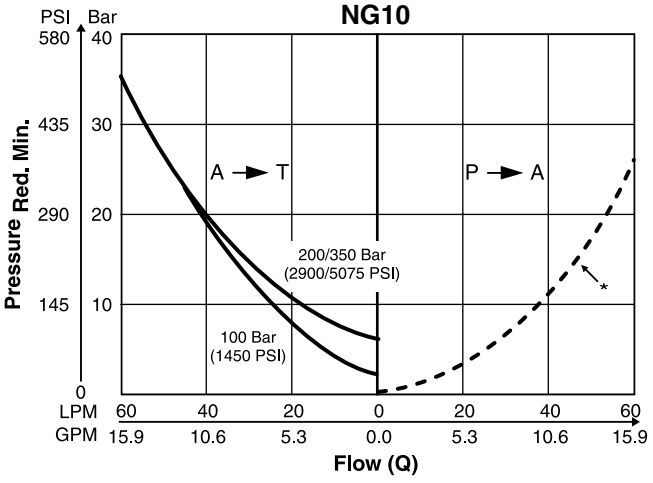
Pressure/Flow (min. adjustable) $p_{red} = f(Q)$

NG6



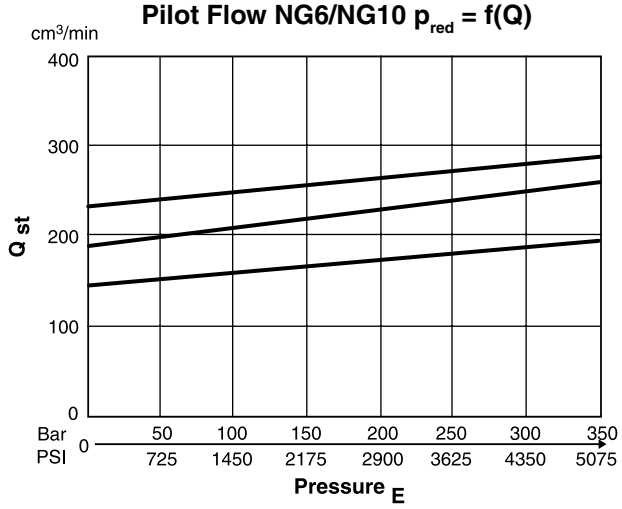
* Backpressure depends on system

NG10



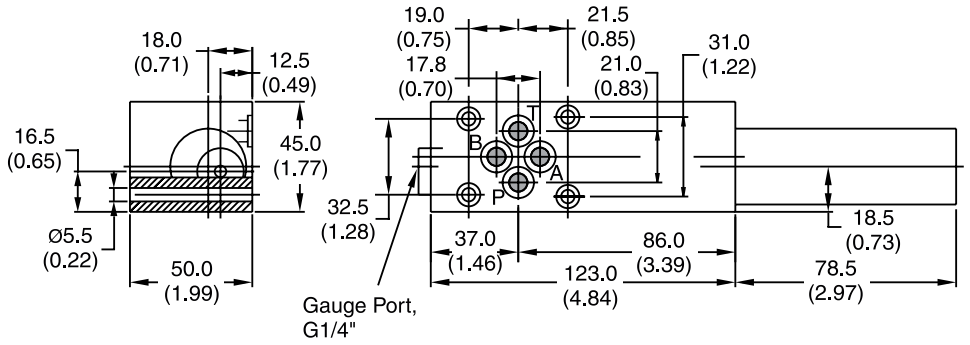
* Backpressure depends on system

Pilot Flow NG6/NG10 $p_{red} = f(Q)$



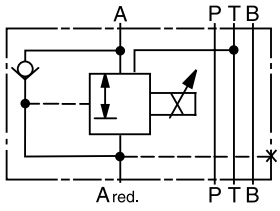
PRPM2A*, B*

Inch equivalents for millimeter dimensions are shown in (**)

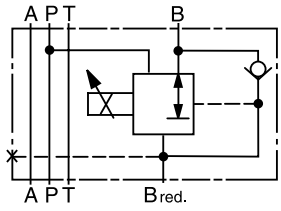


Sandwich type: Pressure reduction code B is located on cartridge side B.

Symbol PRPM2A*

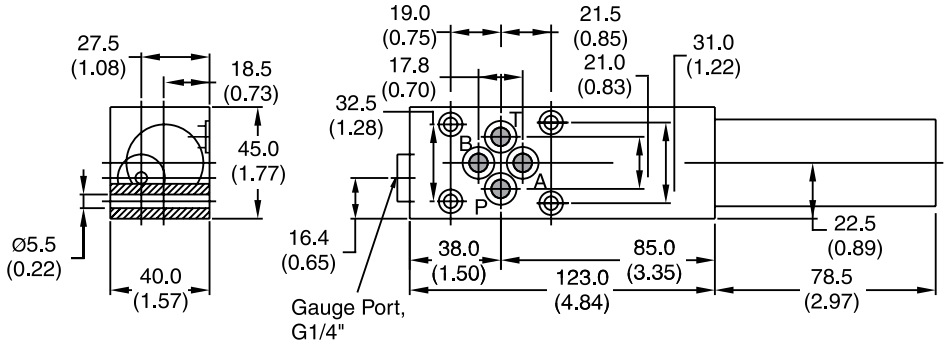


Symbol PRPM2B*

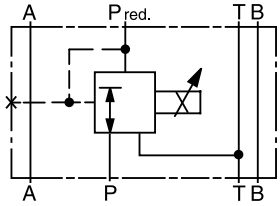


PRPM2P*

Inch equivalents for millimeter dimensions are shown in (**)

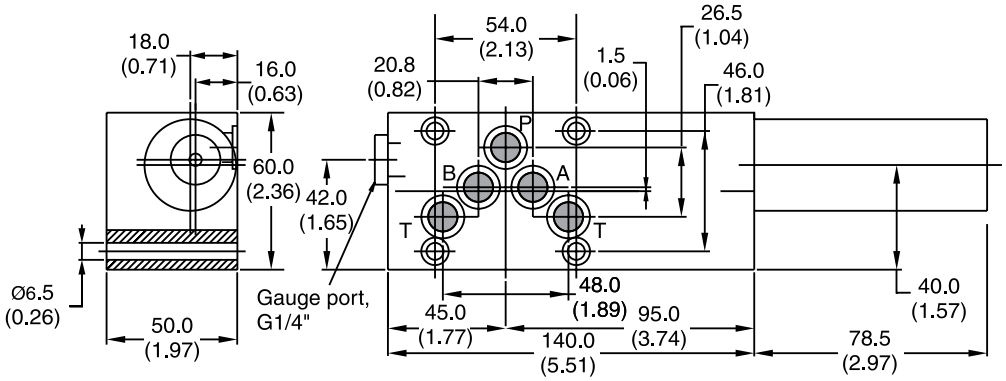


Symbol PRPM2P*



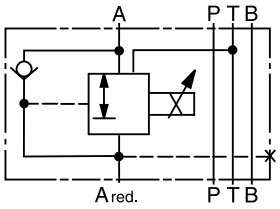
PRPM3A*, B*

Inch equivalents for millimeter dimensions are shown in (**)

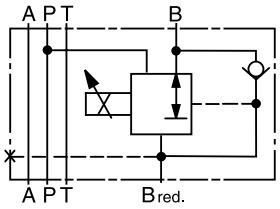


Sandwich type: Pressure reduction code B is located on cartridge side B.

Symbol PRPM3A*

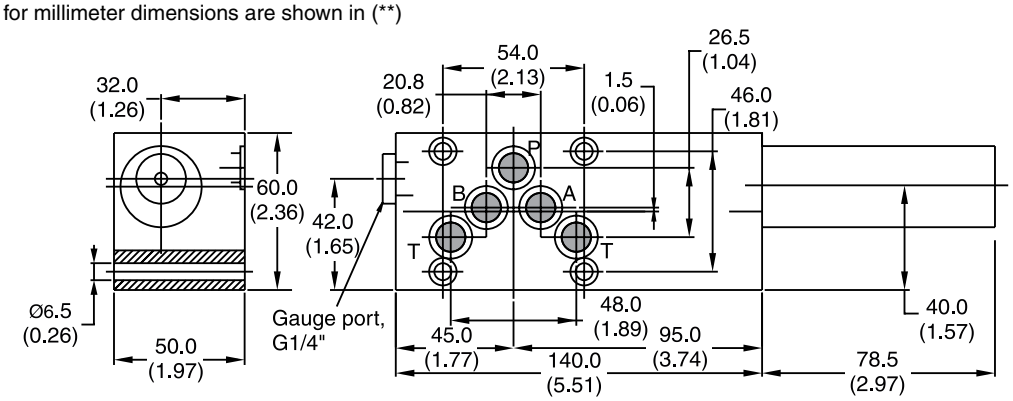


Symbol PRPM3B*

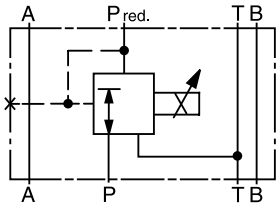


PRPM3P*

Inch equivalents for millimeter dimensions are shown in (**)



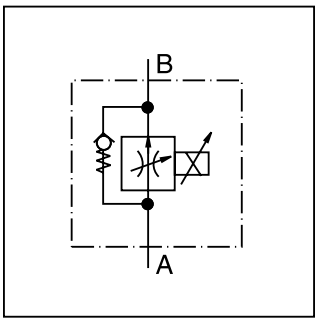
Symbol PRPM3P*



General Description

Series DUR*L06 proportional flow control valves are used to generate pressure-compensated flow from A to B. The valves are equipped with a built-in check valve for the return flow.

A rectifier plate can be used for meter-in and meter-out control of an actuator.

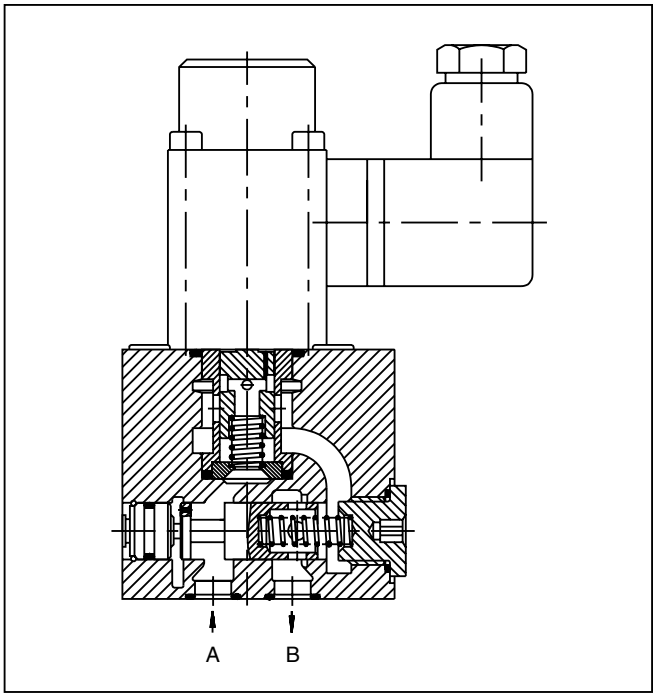


Function

When solenoid current is applied, the metering spool opens against the reset spring and the flow is regulated by the pressure compensating spool to port B.

With the aid of the pressure compensating spool, the pressure drop is held constant on the metering window. Thus pressure load changes are compensated, and the oil flow remains constant.

The valve parameters can be saved, changed and duplicated in combination with the digital electronic module PCD00A-400.



Features

- Low hysteresis
- High reproducibility
- Load-independent oil flow
- Bypass check valve
- Mounting pattern to ISO 6263
- 5 flow rates

Ordering Information

DUR		L	06	P	K		
Proportional Pressure Reducing Valve	Nominal Flow	Lineaer Solenoid 24V / 0.68 A	Size NG6	Progressive Performance Curve		Seal	Design Series NOTE: Not required when ordering.

Code	Description
1.6	1.6 LPM (0.4 GPM)
3.2	3.2 LPM (0.8 GPM)
6.3	6.3 LPM (1.7 GPM)
12	12.0 LPM (3.2 GPM)
18	18.0 LPM (4.8 GPM)

Code	Description
A	Nitrile
1	Fluorocarbon

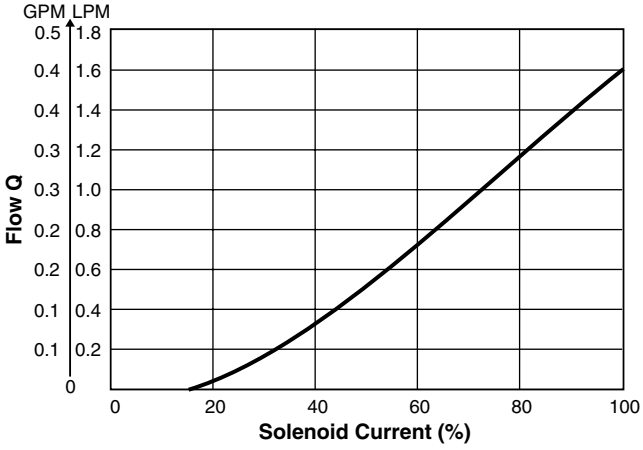
Weight: 1.6 kg (3.5 lbs.)

Specifications

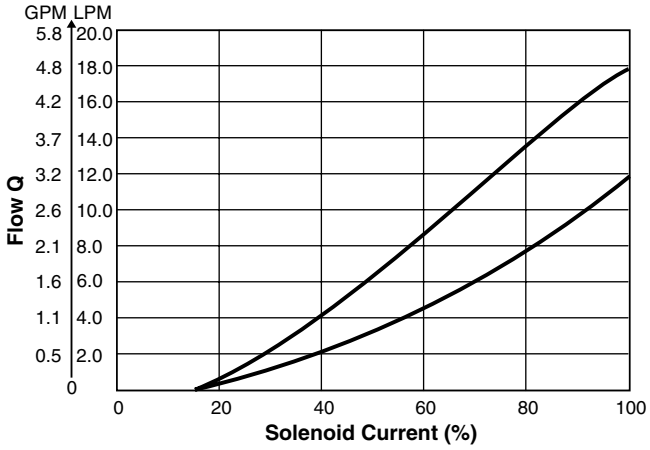
General		
Design		Electrically adjustable orifice valve with load sensing
Mounting Interface		Subplate NG6, Interface DIN 24340, ISO, CETOP
Mounting Position		Unrestricted, preferably horizontal
Ambient Temperature	**[°C]**	-20...+50; (-43°F...+122°F)
$MTTF_D$ Value	**[years]**	150
Supply Voltage	**[V]**	24
Solenoid Nominal Current	**[mA]**	680
Duty Cycle	**[%]**	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Solenoid Connection		Connector as per EN 175301-803
Protection Class		IP 65 in accordance with EH 60529 (plugged and mounted)
Amplifier Module		PCD00A-400
Operating Pressure		210 Bar (3045 PSI)
Fluid		Hydraulic oil according to DIN 51524...51535, other on request
Fluid Temperature	**[°C]**	+20 ... +70 (+68°F...+158°F)
Viscosity Range	**[cSt]/[mm²/s]**	12...230 (56...1066 SSU)
Filtration		ISO 4406 (1999); 18/16/13 (acc. NAS 1638: 7)
Minimum Pressure Difference		DUR 1.6/3.2: 3 Bar (43.5 PSI); DUR 6.3/12: 5 Bar (72.5 PSI); DUR 18: 8 Bar (116 PSI)
Hysteresis at Q_{nom}	**[%]**	6
Hysteresis at $Q \leq 20\ \% \bullet Q_{nom}$	**[%]**	6
Repeatability at ΔU_{set} = 5 V	**[%]**	2

Performance Curves

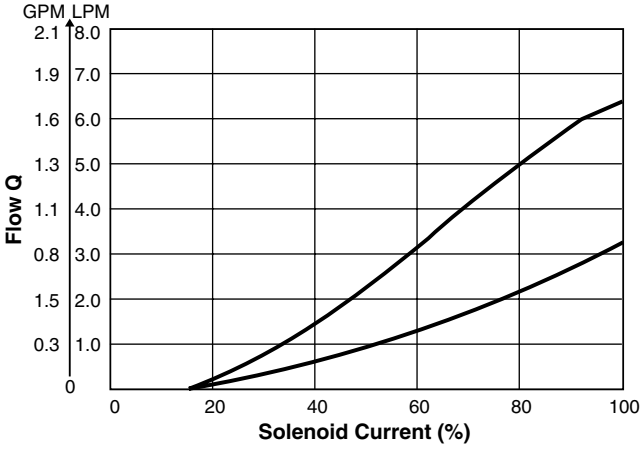
DUR 1.6 L 06 PK*



DUR 12 L 06 PK* / DUR 18 L 06 PK*



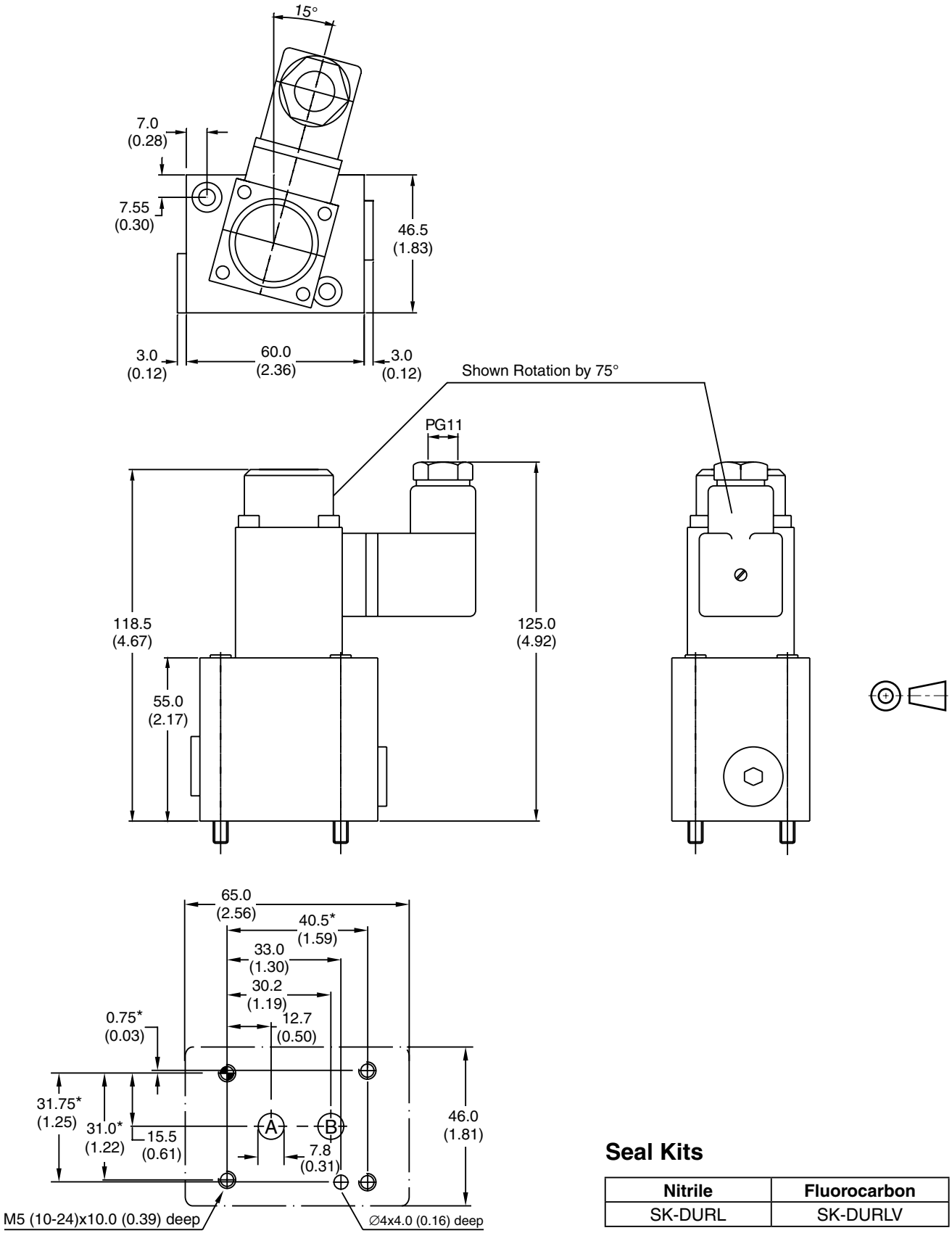
DUR 3.2 L 06 PK* / DUR 6.3 L 06 PK*



All performance curves measured with HLP46 at 50 °C (122 °F).

DUR_L06.indd, ddp

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA



* … ± 0.1mm
Others … ± 0.2mm

Seal Kits

Nitrile	Fluorocarbon
SK-DURL	SK-DURLV

DUR_L06.indd, ddp

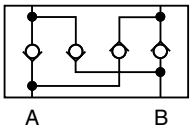
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Sandwich Rectifier Plate

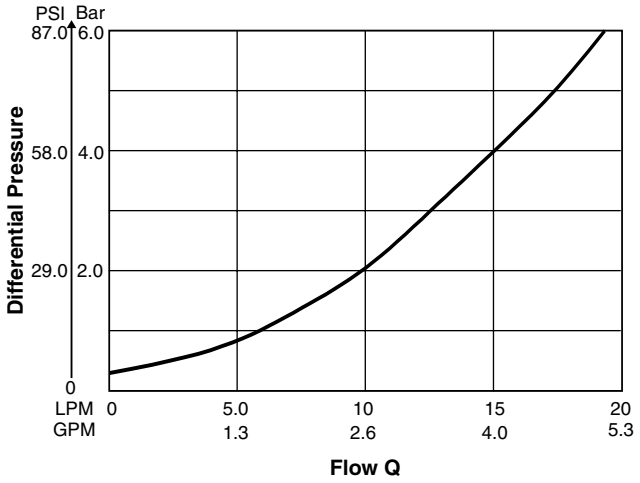
If a 2-way flow control valve is used in combination with a rectifier plate, the valve can be used for meter-in and meter-out flow control of an actuator.

Design

The intermediate rectifier plate is designed with four identical, symmetrically arranged check valves. Thus the differential pressure is the same in both flow directions.

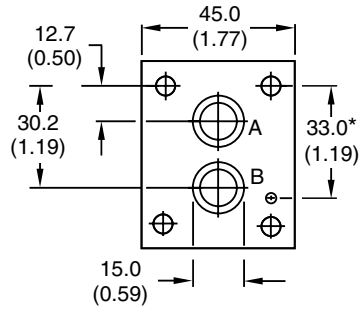


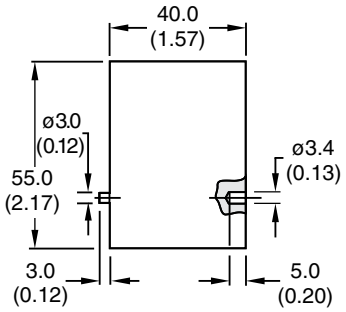
Performance Curve Δp/Q

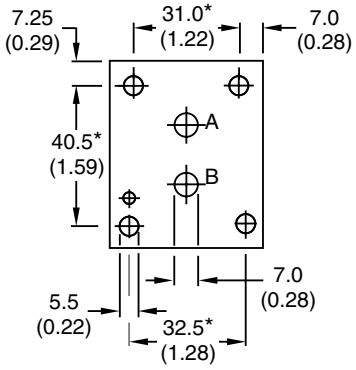


All performance curves measured with HLP46 at 50 °C (122 °F).

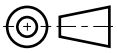
Dimensions







Dimension Tolerances



* … ± 0.1mm

Others … ± 0.2mm

Holes and Silhouette of Valve Body … Untoleranced Dimension

Rectifier Plate
Ordering Code: HROA06C

O-ring for sealing the connecting surface (not included)

Connections	Dimensions	Required Units
A, B	12 x 1.5	2

Subplates

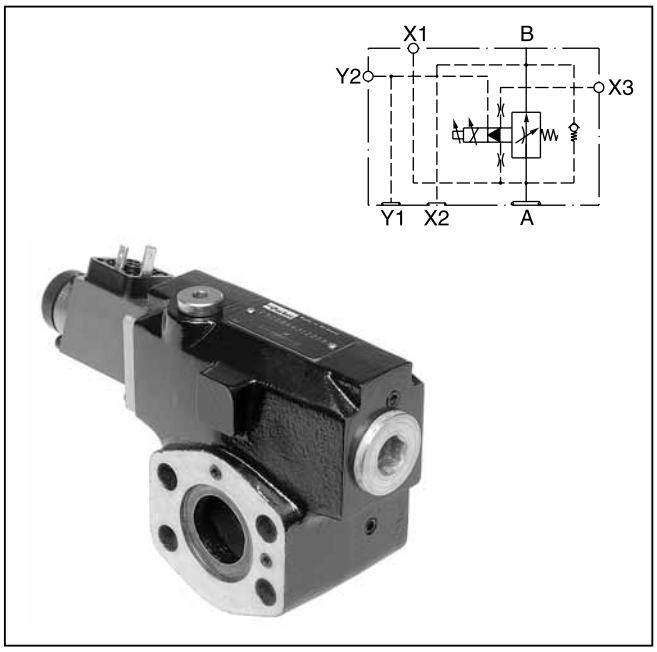
Ordering Code	Description
SPD22B910	P, A, B and T = G1/4
SPD23B910	P, A, B and T = G1/8

General Description

Series F5C proportional throttle valves adjust flow in proportion to the input signal. The combination of the F5C with pressure compensators R5A or R5P serves as a flow control valve, providing load compensated flow.

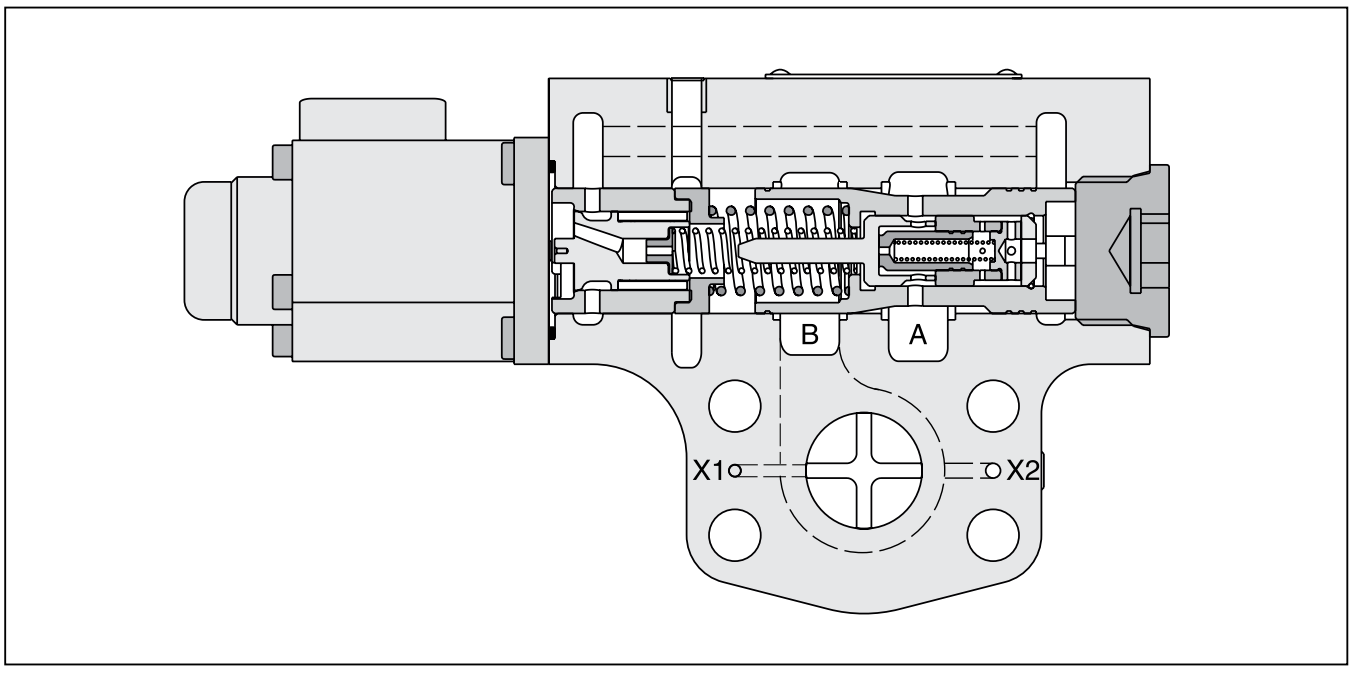
The F5C is offered with two types of response time:

Standard	350 ms at 1 LPM (0.3 GPM) pilot flow
Code A	250 ms at 2 LPM (0.5 GPM) pilot flow



Features

- Spool type proportional throttle valve.
- SAE 61 flange.
- Maximum pressure 270 Bar (3915 PSI).
- Maximum flow 380 LPM (100.5 GPM).
- 3 sizes: SAE 3/4", 1", 1 1/4".
- Load compensated flow in combination with R5A and R5P.



F5C			4			X		0	C		
Proportional Throttle Valve	Size	Pilot Flow and Response	SAE 61 Interface	Pilot Ports	Spool Type	Proportional Solenoid 16V / 1.05A	Pilot Connection	Accessories	Design Series	Seal	Options Check with Factory

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1 3/4"

Code	Description
3	G1/4"
N	1/4" NPT

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Pilot Flow	Maximum Response
Omit	1 LPM (0.3 GPM)	350 ms
A	2 LPM (0.5 GPM)	250 ms

Code	Size	Maximum Flow*
A	06	23 LPM (6.1 GPM)
B	06/08	45 LPM (11.9 GPM)
1	06/08/10	95 LPM (25.1 GPM)
2	08/10	190 LPM (50.3 GPM)
3	10	380 LPM (100.5 GPM)

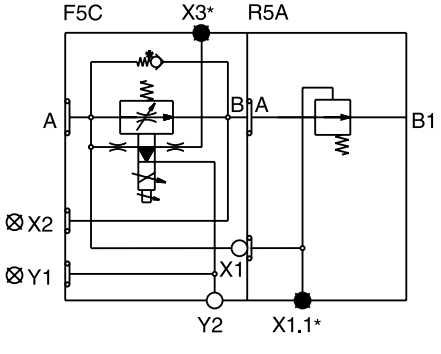
* At nominal pressure drop (Δp = 8.4 Bar (121.8 PSI)

Code	Pilot Connections	F5C without Compensators R5A, R5P	F5C for Combined with R5A	F5C for Combined with R5P
2	Internal PD (Y) Internal PP (X)			X1, X3, Y2 ● X2, Y1 ○ X2, Y1 ○
3	External PD (Y) External PP (X)		X1, X3, Y2 ○ X2, Y1 ⊗	
4	External PD (Y) External PP (X)	X3, Y2 ○ X1 ● X2, Y1 ⊗		X2, X3, Y1, Y2 ○ X1 ●
5	External PD (Y) Internal PP (X)		X1, Y2 ○ X3 ● X2, Y1 ⊗	
6	External PD (Y) Internal PP (X)	X1, X3 ● X2, Y1 ⊗ Y2 ○		X1, X3 ● X2, Y1, Y2 ○

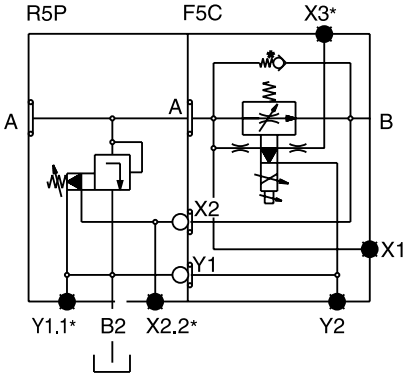
Weight:

F5C06	3.9 kg (8.6 lbs.)
F5C08	4.1 kg (9.0 lbs.)
F5C10	5.8 kg (12.8 lbs.)

F5C with R5A



F5C with R5P



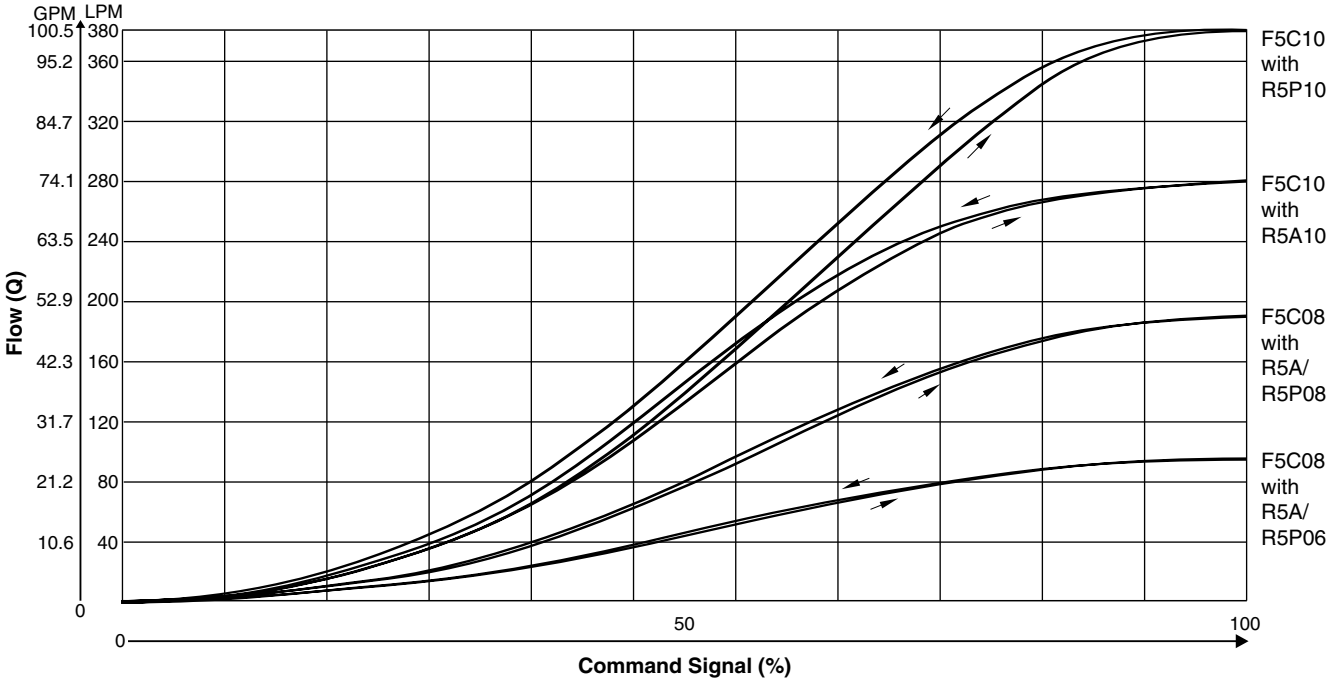
* optional

○ open ● closed ⊗ closed by counterpart

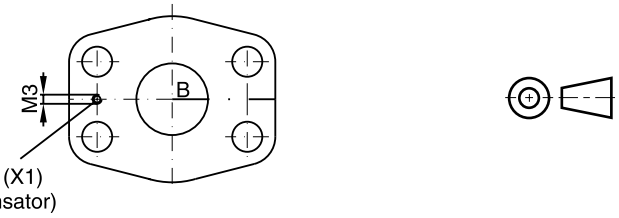
Specifications

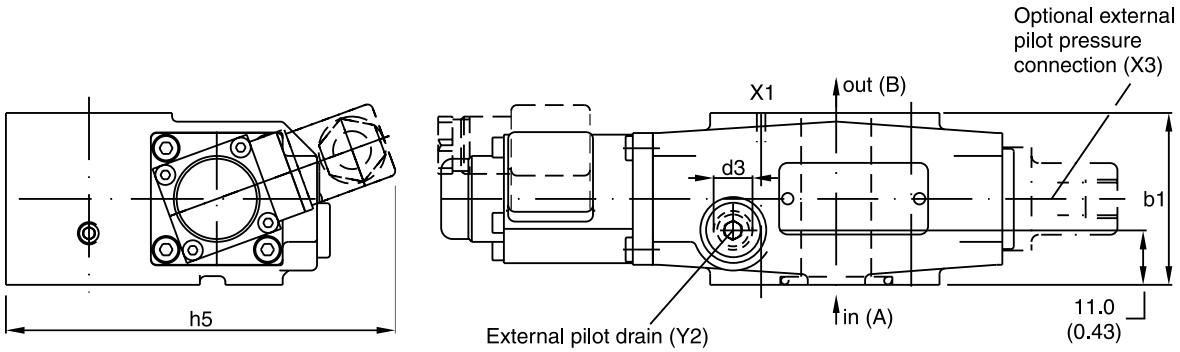
General			
Size	**06**	**08**	**10**
Mounting	Flanged according to SAE 61		
Mounting Position	Unrestricted		
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)		
Hydraulic			
Maximum Operating Pressure	Ports A, B, X1, X2, X3 270 Bar (3915 PSI) Ports Y1, Y2 70 Bar (1015 PSI)		
Maximum Pressure Drop (from A to B)	21 Bar (304.5 PSI)		
Flows	26 LPM (6.1 GPM) 45 LPM (11.9 GPM) 95 LPM (25.1 GPM)	45 LPM (11.9 GPM) 95 LPM (25.1 GPM) 190 LPM (50.3 GPM)	95 LPM (25.1 GPM) 190 LPM (50.3 GPM) 380 LPM (100.5 GPM)
Fluid	Hydraulic oil as per DIN 51524...51535, other on request		
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)		
Viscosity **Permitted** **Recommended**	 10 to 380 cSt / mm²/s (46 to 1761 SSU) 30 to 80 cSt / mm²/s (139 to 371 SSU)		
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		
Electrical			
Duty Ratio	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible		
Solenoid Connection	Connector as per EN175301-803		
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)		
Supply Voltage	16 VDC		
Power Consumption	1.05A		
Resistance	11.3 Ohm		
Response Time	See Ordering information		
Coil Insulation Class	H (180°C) (356°F)		

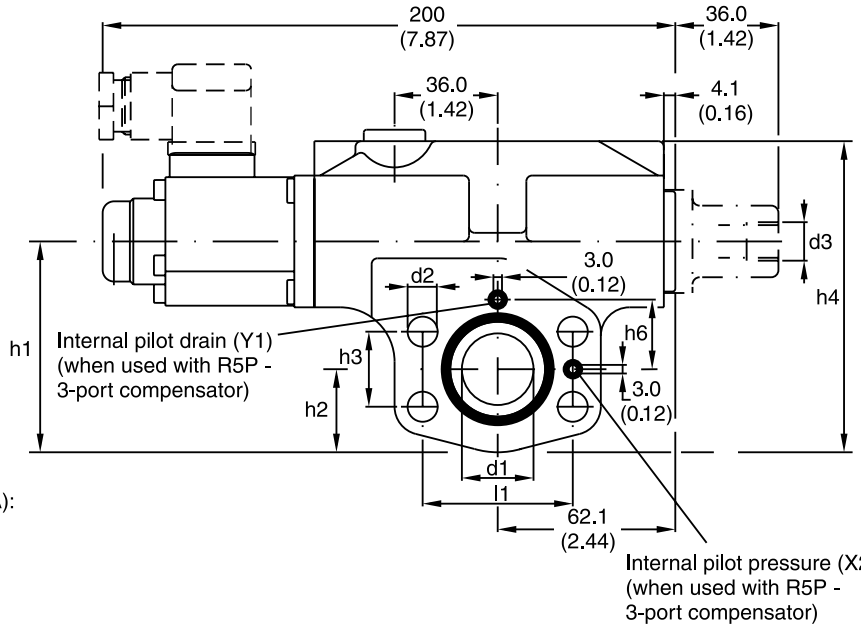
Performance Curves



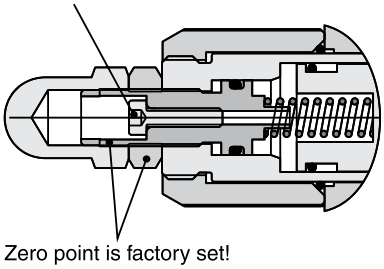
Inch equivalents for millimeter dimensions are shown in (**)







Important (only for solenoid type 1-220 mA):
On initial start up and after long shut down periods bleed air from this plug.



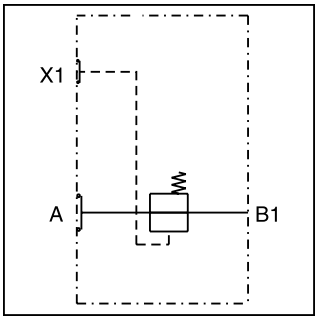
Zero point is factory set!
Lock nut must not be loosened!

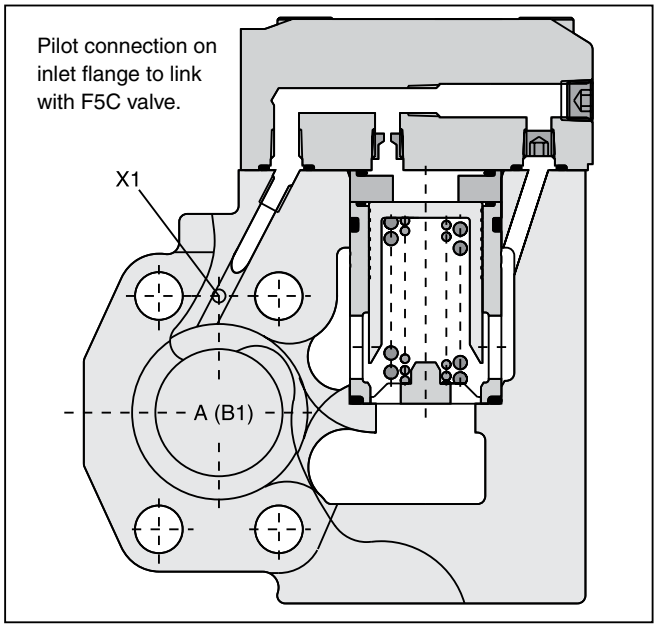
Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06 / 08 / 10	S16-91850-0	S16-91850-5

Size	l1	b1	h1	h2	h3	h4	h5	h6	d1	d2	d3
06	47.6 (1.87)	60.0 (2.36)	68.2 (2.69)	26.0 (1.02)	22.2 (0.87)	103.2 (4.06)	183.0 (7.20)	20.8 (0.82)	19.0 (0.75)	10.5 (0.41)	G1/4"
08	52.4 (2.06)	60.0 (2.36)	73.6 (2.90)	29.0 (1.14)	26.2 (1.03)	108.6 (4.28)	187.0 (7.36)	24.3 (0.96)	25.0 (0.98)	10.5 (0.41)	G1/4"
10	58.7 (2.31)	75.0 (2.95)	83.5 (3.29)	36.5 (1.44)	30.2 (1.19)	118.5 (4.67)	198.0 (7.80)	29.3 (1.15)	32.0 (1.26)	12.5 (0.49)	G1/4"

General Description

Series R5A direct operated, 2-way pressure compensators can be combined with any type of fixed or adjustable flow valve (throttle) to provide a load compensated flow. The combination with the proportional throttle valve F5C serves as a compact 2-way flow control unit in SAE flange design. The R5A is typically used as meter-out compensator behind the flow resistor.





Features

- Seated type, 2-way pressure compensator.
- SAE 61 flange.
- 8.4 bar (121.8 PSI) control pressure.
- 3 sizes, SAE Code 61 3/4", 1", 1 1/4".
- Load compensated flow in combination with F5C.

Specifications

General			
Size	**06**	**08**	**10**
Subplate Mounting	Flanged according to SAE 61		
Mounting Position	Unrestricted		
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)		
Hydraulic			
Control Pressure	8.4 Bar (121 PSI)		
Maximum Operating Pressure	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)
Nominal Flow	90 LPM (23.8 GPM)	300 LPM (79.4 GPM)	600 LPM (158.7 GPM)
Fluid	Hydraulic oil as per DIN 51524...51535, other on request		
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)		
Viscosity **Recommended** **Permitted**	30 to 80 cSt / mm²/s (139 to 371 SSU) 10 to 650 cSt / mm²/s (46 to 1761 SSU)		
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		

Ordering Information

R5A	□	—	□	4	1	01	B	□	□
2-Port Compensator	Size		SAE 61 Interface	2-Port Body	Plain Cap	Pilot Connection thru Port X1	Design Series	Seal	Options Check with Factory

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"

Code	Size	Max. Pressure
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

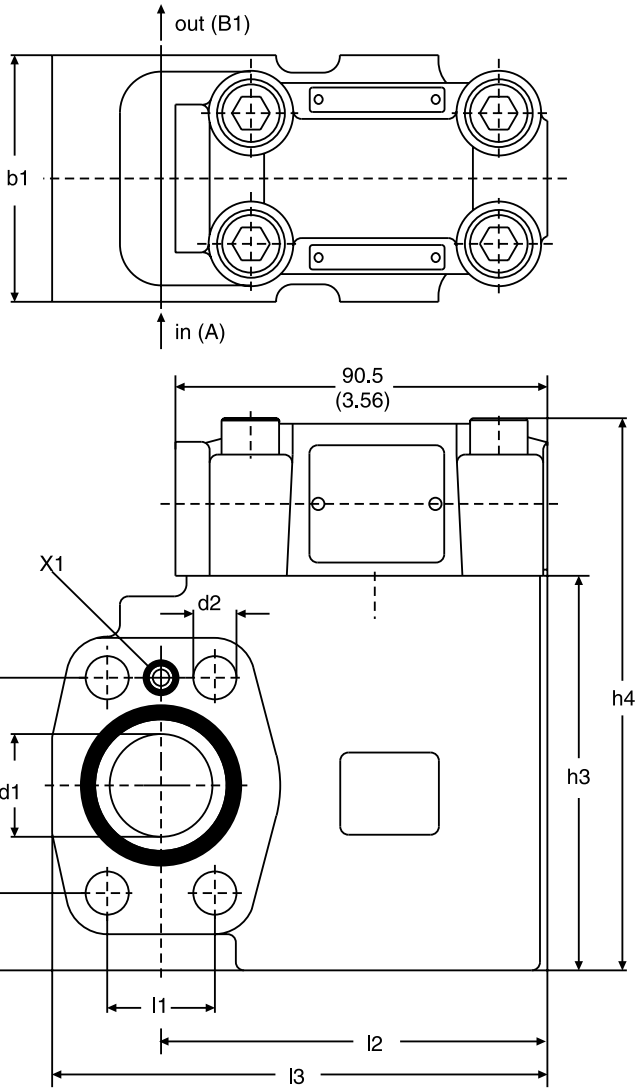
Code	Description
1	Nitrile
5	Fluorocarbon

Weight

R5A06	3.6 kg (7.9 lbs.)
R5A08	4.3 kg (9.5 lbs.)
R5A10	5.6 kg (12.3 lbs.)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



Seal Kits		
Size	**Nitrile**	**Fluorocarbon**
06	S16-91458-0	S16-91458-5
08	S16-91457-0	S16-91457-5
10	S16-91456-0	S16-91456-5

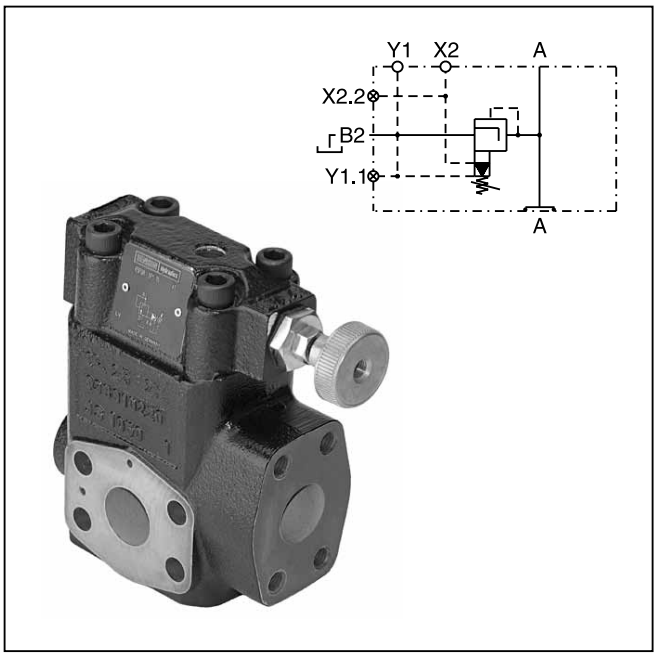
Size	l1	l2	l3	b1	h1	h2	h3	h4	d1	d2
06	22.2 (0.87)	84.0 (3.31)	108.0 (4.25)	60.0 (2.36)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	128.0 (5.04)	19.0 (0.75)	10.5 (0.41)
08	26.2 (1.03)	101.0 (3.98)	128.0 (5.04)	60.0 (2.36)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	134.0 (5.28)	25.0 (0.98)	10.5 (0.41)
10	30.2 (0.44)	101.0 (3.98)	135.0 (5.31)	75.0 (2.95)	48.0 (1.89)	58.7 (2.31)	109.0 (4.29)	147.0 (5.79)	32.0 (1.26)	12.5 (0.49)

Notes

General Description

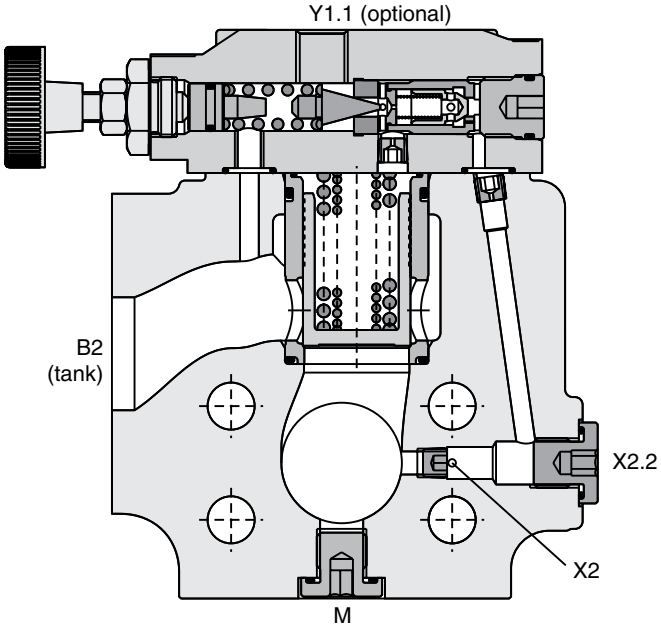
Series R5P direct operated, 3-way pressure compensators can be combined with any type of fixed or adjustable flow resistor (throttle) to provide a load compensated flow. The combination with the proportional throttle valve F5C serves as a compact 3-way flow control unit in SAE flange design. The R5P is typically used as meter-in compensator in front of the flow resistor.

The R5P is additionally equipped with a pressure relief pilot that controls the compensator cartridge and operates a system pressure relief valve. The R5P*P2 provides a proportional relief function.



Features

- Seated type 3-way pressure compensator.
- SAE 61 flange.
- 8.4 Bar (121.8 PSI) control pressure.
- Pressure relief function (optionally proportional).
- With optional vent function.
- 3 sizes (SAE Code 61 3/4", 1", 1-1/4").
- Load compensated flow in combination with F5C.



R5P	☐	—	☐	☐	☐	☐	☐	☐	☐	A	☐	☐
3-Port Compensator	Size		SAE 61 Interface	Pilot Ports	Pressure Range	Adjustment	Pilot Connection	Switching Type	Solenoid Voltage	Design Series	Seal	Options Check with Factory

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal

Code	Description
Omit	Standard w/o vent function
G0R	12 VDC
G0Q	24 VDC
G0H	48 VDC
GAR	98 VDC
W30	110V 50Hz/ 120V 60Hz
W31	220V 50Hz/ 240V 60Hz

Code	Descripton*
1	Nitrile
5	Fluorocarbon

* Further seals on request.

Code	Size	Max. Pressure
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

Code	Description
2	Internal PD Internal PP*
6	External PD** Internal PP*

* PP through port X1 in outlet flange.

** Through port Y1.1.

Code	Pilot Port	Port Y1*
3	SAE	Plugged
S	SAE	Open

* Y1 port is used in combination with F5C, when the F5C should be drained through the R5P (internal or external drain).

Code	Description
Omit	Standard w/o vent function
09*	Solenoid not activated unload circulation
11**	Solenoid activated unload circulation

* Solenoid de-energized: open to tank solenoid energized: vent line blocked.

** Solenoid de-energized: vent line blocked solenoid energized: open to tank.

Code	Description
1	7 to 105 Bar (102 to 1523 PSI)
3	7 to 210 Bar (102 to 3045 PSI)
5	7 to 350 Bar (102 to 5075 Bar)

Weight:	R5P	R5P with VV01
R5P06	3.7 kg (8.2 lbs.)	5.4 kg (11.9 lbs.)
R5P08	4.4 kg (9.7 lbs.)	6.1 kg (13.5 lbs.)
R5P10	5.3 kg (11.7 lbs.)	7.0 kg (15.4 lbs.)

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

R5P □ — □ □ □ □ □ □ **P2** **G0R** **A** □ □

R5P	Size	—	SAE 61 Interface	Pilot Ports	Pressure Range	Adjustment	Pilot Connection	Proportional Pressure Control	Solenoid Voltage	Design Series	Seal	Options Check with Factory
3-Port Compensator												

Code	Description
06	SAE ¾"
08	SAE 1"
10	SAE 1¼"

Code	Description
1	Hand knob
3	Acorn nut with lead seal

Code	Description
G0R	12V, 2.3A

Code	Description
1	Nitrile
5	Fluorocarbon

Further seals on request

Code	Size	Max. Pressure
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

Code	Description
2	Internal PD Internal PP [4]
6	External PD [3] Internal PP [4]

[3] Through port Y1.1
[4] PP through port X1 in outlet flange

Code	Pilot Ports	Port Y1 [1]
3	SAE	Plugged
S	SAE	Open

[1] Y1 port is used in combination with F5C, when the F5C should be drained through the R5P (internal or external drain)

Code	Description
1	7 to 105 Bar (102 to 1523 PSI)
3	7 to 210 Bar (102 to 3045 PSI)
5 [2]	7 to 350 Bar (102 to 5075 Bar)

[2] R5P10-4*5 up to 280 Bar (4060 PSI)

Weight:	R5P*P2
R5P06*P2	5.5 kg (12.1 lbs.)
R5P08*P2	6.2 kg (13.7 lbs.)
R5P10*P2	7.1 kg (15.7 lbs.)

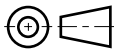
R5P

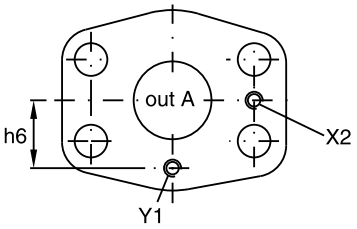
General							
Size		**06 (3/4")**		**08 (1")**		**10 (1 1/4")**	
Mounting		Flanged according to SAE 61					
Mounting Position		Unrestricted					
Ambient Temperature Range		-20°C to +50°C (-4°F to +122°F)					
MTTF$_D$		150 years					
Hydraulic							
Max. Operating Pressure	**Ports A, B**	350 Bar (5075 PSI)		350 Bar (5075 PSI)		280 Bar (4060 PSI)	
Pressure Ranges		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)					
Nominal Flow		90 LPM (23.8 GPM)		300 LPM (79.4 GPM)		600 LPM (158.7 GPM)	
Fluid		Hydraulic oil as per DIN 51524...51535, other on request					
Fluid Temperature		-20°C to +80°C (-4°F to +176°F)					
Viscosity	**Permitted** **Recommended**	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 to 80 cSt / mm²/s (139 to 371 SSU)					
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)					
Electrical (Solenoid) R5P with VV01							
Duty Ratio		100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible					
Solenoid Connection		Connector as per EN175301-803					
Protection Class		IP65 in accordance with EN60529 (plugged and mounted)					
	Code	**G0R**	**G0Q**	**GAR**	**GOH**	**W30**	**W31**
Supply Voltage		12 VDC	24 VDC	98 VDC	48 VDC	110V at 50Hz 120V at 60Hz	230V at 50Hz 240V at 60Hz
Tolerance Supply Voltage	**[%]**	±10	±10	±10	±10	±5	±5
Power Consumption	**Hold [W]**	32.7	31	32	30	70 / 70 VA	70 / 70 VA
	In Rush [W]	32.7	31	32	30	280 / 290 VA	280 / 290 VA
Response Time		Energized / De-energized AC 20/18ms, DC 46/27 ms					
Maximum Switching Frequency		AC up to 7200, DC 70 to 16,000 switchings/hour					
Coil Insulation Class		H (180°C) (356°F)					

R5P*P2 (Proportional)

General				
Size		**06 (3/4")**	**08 (1")**	**10 (1-1/4")**
Mounting		Flanged according to SAE 61		
Mounting Position		Unrestricted		
Ambient Temperature Range		-20°C to +50°C (-4°F to +122°F)		
MTTF$_D$		150 years		
Hydraulic				
Max. Operating Pressure	**Ports A, B**	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)
Pressure Range		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)		
Nominal Flow		90 LPM (23.8 GPM)	300 LPM (79.4 GPM)	600 LPM (158.7 GPM)
Fluid		Hydraulic oil as per DIN 51524...51535, other on request		
Fluid Temperature		-20°C to +80°C (-4°F to +176°F)		
Viscosity	**Permitted** **Recommended**	10 to 380 cSt / mm²/s (46 to 1761 SSU) 30 to 80 cSt / mm²/s (139 to 371 SSU)		
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		
Electrical (Solenoid) R5P with VV01				
Duty Ratio		100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible		
Nominal Voltage		12 VDC		
Maximum Current		2.3 A		
Coil Resistance		4 Ohm at 20°C (68°F)		
Solenoid Connection		Connector as per EN175301-803, Solenoid indentification as per ISO 9461		
Protection Class		IP65 in accordance with EN60529 (plugged and mounted)		
Power Amplifier		PCD00A-400		

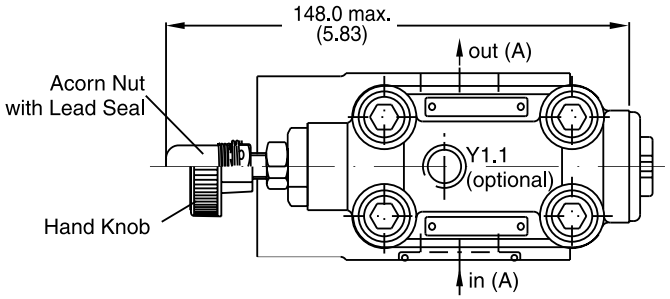
Inch equivalents for millimeter dimensions are shown in (**)

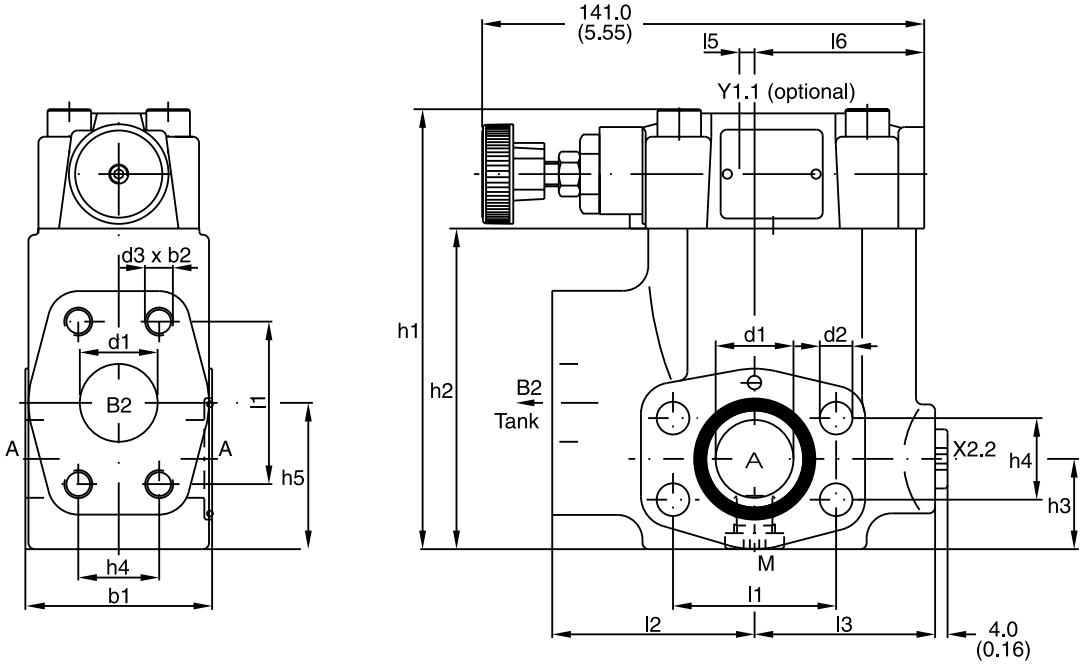




Seal Kits*		
Size	**Nitrile**	**Fluorocarbon**
06	S16-91461-0	S16-91461-5
08	S16-91460-0	S16-91460-5
10	S16-91459-0	S16-91459-5

* Does not inlcude P2 seal kit.



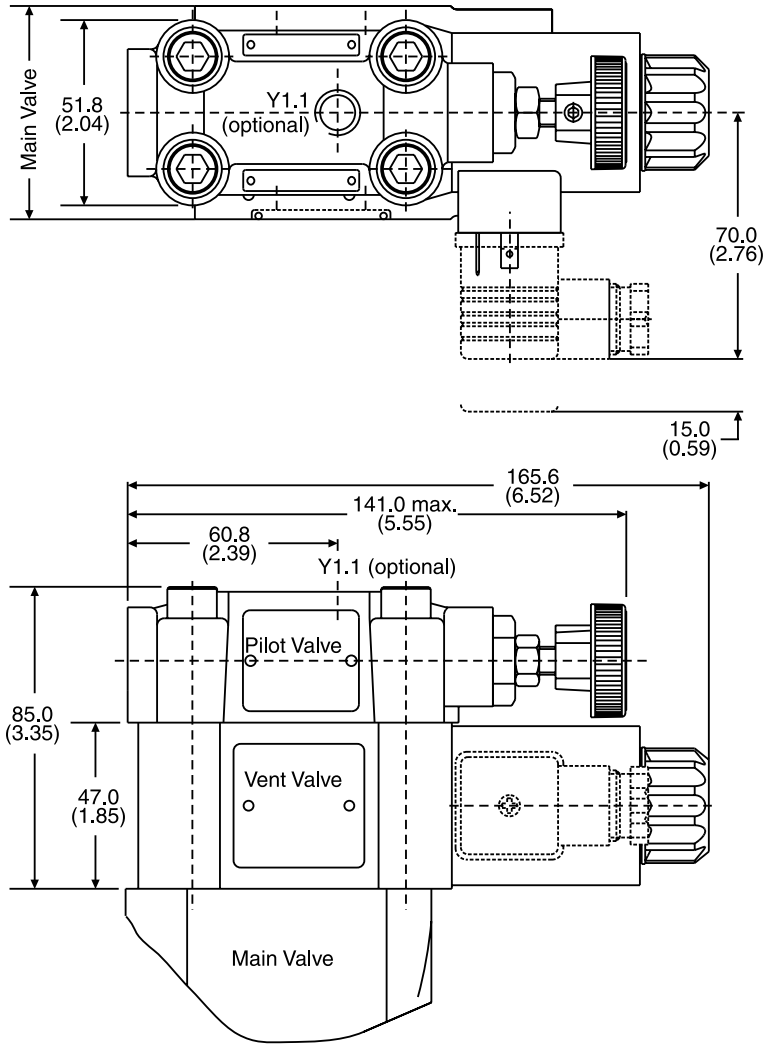


Size	l1	l2	l3	l4	l5	l6	b1	b2	h1	h2	h3	h4	h5	h6	d1	d2	d3
06	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	148.0 (5.83)	1.0 (0.04)	49.0 (1.93)	60.0 (2.36)	20.0 (0.79)	119.0 (4.69)	81.6 (3.21)	28.5 (1.13)	22.2 (0.87)	41.6 (1.64)	20.8 (0.82)	19.0 (0.75)	10.5 (0.41)	3/8" UNC
08	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	144.6 (5.69)	5.0 (0.20)	54.5 (2.15)	60.0 (2.36)	23.0 (0.91)	142.0 (5.59)	103.0 (4.06)	30.5 (1.20)	26.2 (1.03)	48.6 (1.91)	24.3 (0.96)	25.0 (0.98)	10.5 (0.41)	3/8" UNC
10	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	146.6 (5.77)	3.0 (0.12)	56.5 (2.22)	75.0 (2.95)	22.0 (0.87)	149.0 (5.87)	111.5 (4.39)	37.5 (1.48)	30.2 (1.19)	64.1 (2.52)	29.3 (1.15)	32.0 (1.26)	12.5 (0.49)	7/16" UNC

Port	Function	Port size		
		R5P06	**R5P08**	**R5P10**
A	Inlet/Outlet	3/4"	1"	1-1/4"
B2	Tank	3/4"	1"	1-1/4"
X2	Internal Pilot Pressure	M3		
X2.2	External Pilot Pressure	G1/4"		
Y1	Internal Pilot Drain	M3		
Y1.1	External Pilot Drain	G1/4"		
M	Pressure Gauge	G1/4"		

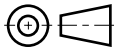
R5P with Vent Function

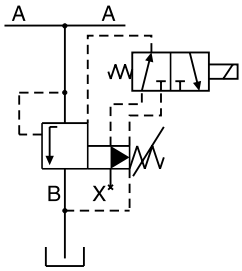
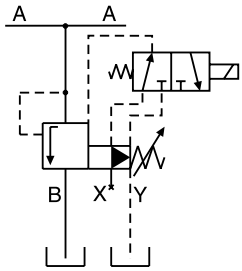
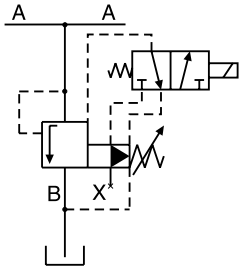
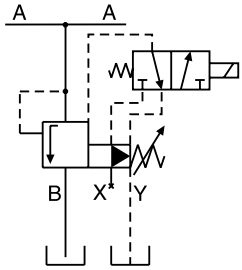
Inch equivalents for millimeter dimensions are shown in (**)



Seal Kits*	
Nitrile	**Fluorocarbon**
DC solenoid	
S26-58515-0	S26-58515-5
AC solenoid	
S26-35237-0	S26-35237-5

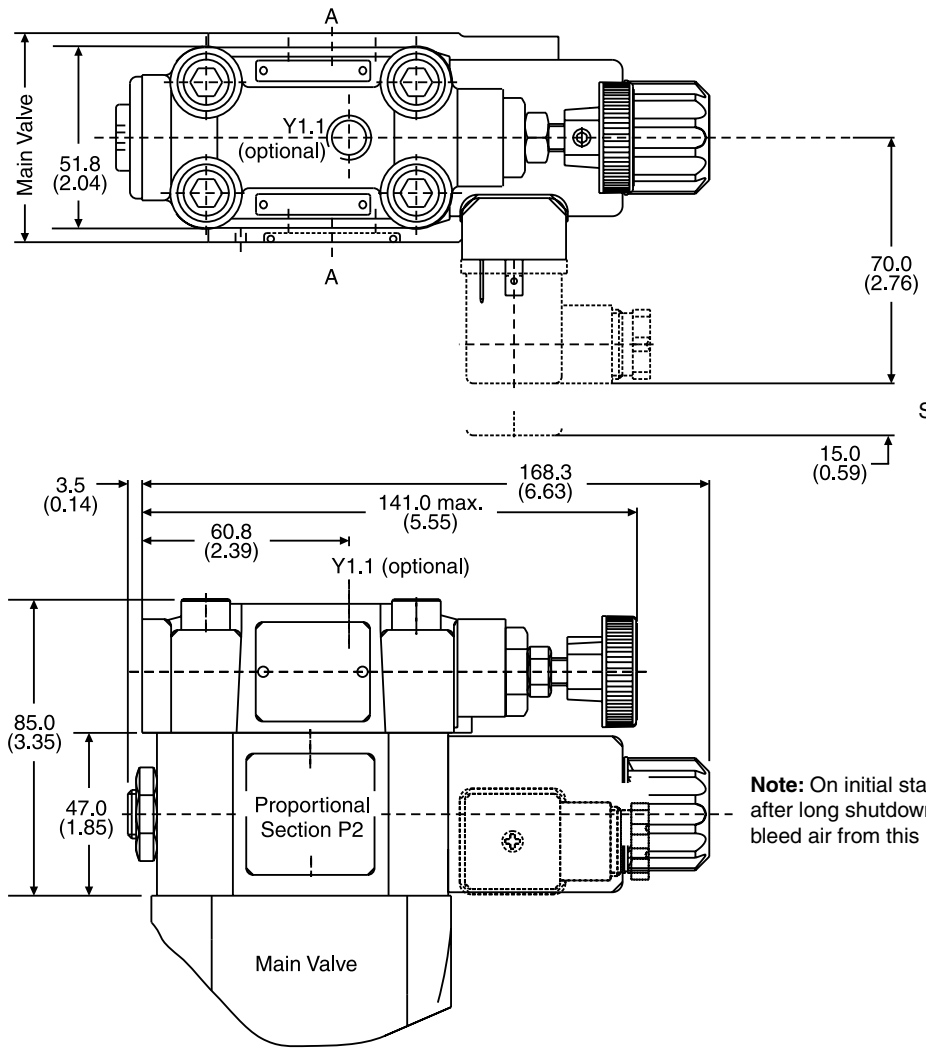
* For vent valve only.



Code	Internal Drain	External Drain
11		
09		

R5P with Proportional Function

Inch equivalents for millimeter dimensions are shown in (**)



Drain line only external from the pilot head (Y1.1).

The pilot drain port must be connected to a stable low pressure tank line. Pressure variations in the drain port should be avoided.

Space for plug removal

Note: On initial start-up and after long shutdown periods, bleed air from this plug.

	Seal Kit *	
	Nitrile	**Fluorocarbon**
Prop. Section P2	S26-58473-0	S26-58473-5

* P2 seal kit only.

See previous page for full valve seal kit

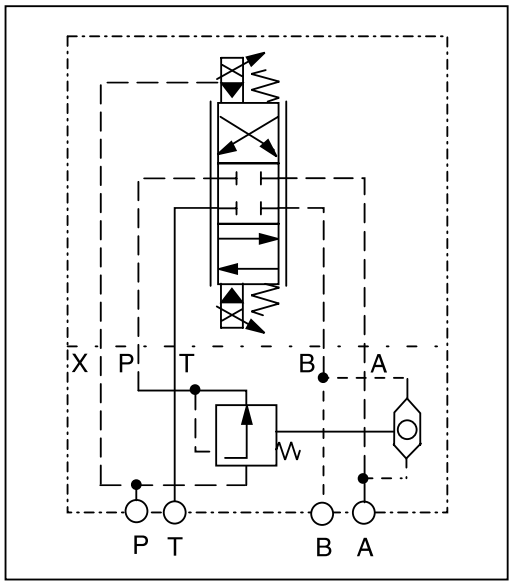
General Description

Series LCM 2-way pressure compensators are sandwich valves designed for stacking beneath a proportional directional control valve with a standardized mounting pattern.

The valve maintains a constant pressure differential between ports P and A or P and B across the directional valve. When the cross sectional opening of the directional valves is held steady, a constant flow rate is achieved, regardless of load fluctuations.

The control pressure applied to the spring side of the compensator spool is supplied from port A or B via a shuttle valve. Flow rate regulation is automatically effective in the port with the highest pressure.

Application Example



Proportional DC valve model D31FB with 2-way pressure conpensator LCM3 maintains a constant flow rate.
The diagram shows the design according to Code X

Specifications

General		
Size	**NG6**	**NG10**
Mounting Position	NFPA D03 CETOP 3	NFPA D05 CETOP 5
Maximum Flow	20 LPM (5.28 GPM)	52 LPM (13.73 GPM)
Maximum Operating Pressure	350 Bar (5075 PSI)	
Pressure Differential	10 Bar (145 PSI)	

Ordering Information

LCM — Pressure Compensator

[ ] — Size

Code	Description
2	NG6
3	NG10

PP — Control Connection

[ ] — Pilot Oil

Code	Description
Omit	Internal
X*	External

* NG10 only.

02 — Differential Pressure 10 Bar (14.5 PSI)

V — Seal Fluorocarbon

[ ] — Design Series

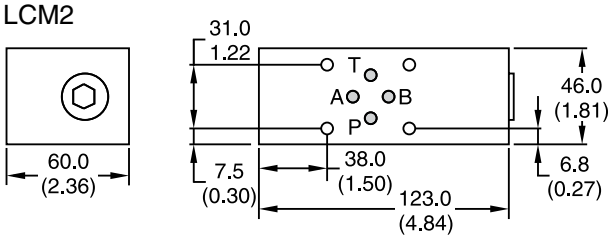
NOTE:
Not required when ordering.

Weight:

LCM2	2.5 kg (5.5 lbs.)
LCM3	3.1 kg (6.8 lbs.)

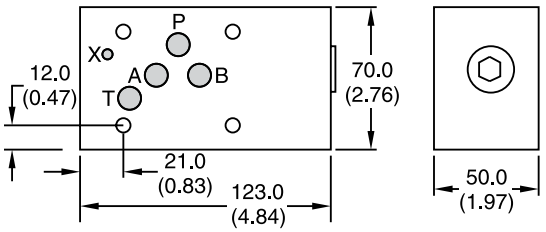
Dimensions – Inch equivalents for millimeter dimensions are shown in (**)

LCM2



Mounting Screws: BK403 (4) M5 x 90
For mounting screws connected with directional valves D1 or 2-stage valves

LCM3



Mounting Screws: BK412 (4) M6 x 90
The views show the mounting surface for the directional valve

General Description

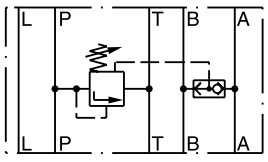
Series SPC sandwich type pressure compensators are typically used in combination with proportional directional control valves. The compensator keeps the pressure drop over the directional valve constant and thus provides load-independent flow to the actuator.

Features

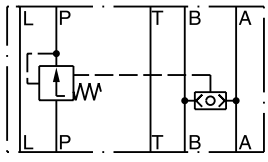
- 2-way or 3-way pressure compensators.
- Standard pressure differential 5 Bar (73 PSI).
- Adjustable differential (2 to 5 Bar) (29 to 73 PSI) and 10 Bar (145 PSI) optional.
- Sizes:

NG6 / CETOP 3	SPC01
NG10 / CETOP 5	SPC02
NG16 / CETOP 7	SPC03
NG25 / CETOP 8	SPC04

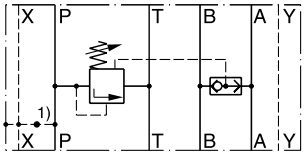
SPC*01 (2-way)



SPC*01/02 (3-way)

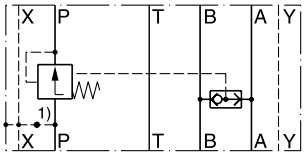


SPC*01/02 (2-way)



1) Plug for pilot connection (external or internal PP)

SPC03/06 (3-way)



1) Plug for pilot connection (external or internal PP)

SPC03/06 (2-way)

Specifications

General				
Size	**NG6**	**NG10**	**NG16**	**NG25**
Mounting Interface	DIN 24340 A6 ISO 4401 NFPA D03 CETOP 3	DIN 24340 A10 ISO 4401 NFPA D05 CETOP 5	DIN 24340 A16 ISO 4401 NFPA D07 CETOP 7	DIN 24340 A25 ISO 4401 NFPA D08 CETOP 8
Mounting Position	Unrestricted			
Ambient Temprature	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Max. Operating Pressure **Drain Port L Connected:**	P, A, B: 350 Bar (5075 PSI) T: 210 Bar (3045 PSI) L: 10 Bar (145 PSI)	P, A, B: 315 Bar (4568 PSI) T: 210 Bar (3045 PSI) L: 10 Bar (145 PSI)	—	—
Without Drain Port:	P, A, B: 350 Bar (5075 PSI) T: 160 Bar (2320 PSI) L: 160 Bar (2320 PSI)	P, A, B: 315 Bar (4568 PSI) T: 210 Bar (3045 PSI) L: 210 Bar (3045 PSI)	P, A, B, X: 350 Bar (5075 PSI) T, Y: 105 Bar (1523 PSI)	P, A, B, X: 350 Bar (5075 PSI) T, Y: 105 Bar (1523 PSI)
Nominal Flow	30 LPM (7.9 GPM)	80 LPM (21.1 GPM)	200 LPM (52.9 GPM)	400 LPM (105.8 GPM)
Fluid	Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity **Permitted** **Recommended**	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 to 80 cSt / mm²/s (139 to 371 SSU)			
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			

SPC				1	C	5	A	
Direct Operated Pressure Compensator	Size	Function	Pressure Differential	Circuit Type	Load Sensing Port	Steel Body	Design Series	Seal

Code	Description
01	NG6
02	NG10

Code	Description
04*	2 to 5 Bar (29 to 73 PSI) Adjustable
05	5 Bar (73 PSI)
10*	10 Bar (145 PSI)

* For 3-way compensator only.

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
01	3-Way Pressure Compensation
11	2-Way Pressure Compensation

Weight:	2-Way Compensator	3-Way Compensator
SPC01	1.5 kg (3.3 lbs)	1.6 kg (3.5 lbs)
SPC02	3.1 kg (6.8 lbs.)	3.5 kg (7.7 lbs.)

SPC01

Type	Model No.
3-Way Compensators with Shuttle Valve P-A/B	SPC0101041C5A1
	SPC0101051C5A1
	SPC0101101C5A1
2-Way Compensators with Shuttle Valve P-A/B	SPC0111051C5A1

SPC02

Type	Model No.
3-Way Compensators with Shuttle Valve P-A/B	SPC0201041C5A1
	SPC0201051C5A1
	SPC0201101C5A1
2-Way Compensators with Shuttle Valve P-A/B	SPC0211051C5A1

SPC					C	B	
Direct Operated Pressure Compensator	Size	Function	Pilot Connection	Pressure Differential	Load Sensing Port	Design Series	Seal

Code	Description
03	NG16
06	NG25

Code	Description
P	Internal Pilot Pressure
X	External Pilot Pressure

Code	Description
05	5 Bar (73 PSI) Standard
10*	10 Bar (145 PSI)

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
01	3-Way Pressure Compensation
11	2-Way Pressure Compensation

Weight:	
SPC03	8.3 kg (18.3 lbs)
SPC06	11.9 kg (26.2 lbs.)

SPC03

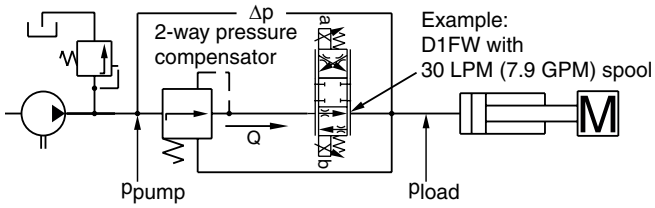
Type	Model No.
3-Way Compensators with Shuttle Valve P-A/B	SPC0301P05CB1
	SPC0301X05CB1
2-Way Compensators with Shuttle Valve P-A/B	SPC0311P05CB1
	SPC0311P10CB1
	SPC0311X05CB1
	SPC0311X10CB1

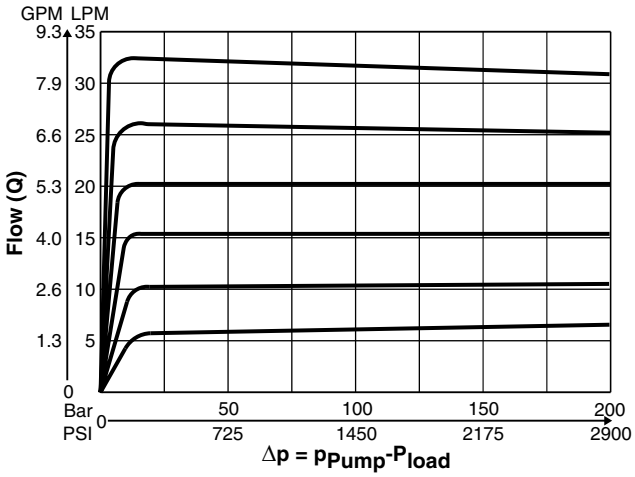
SPC06

Type	Model No.
3-Way Compensators with Shuttle Valve P-A/B	SPC0601P05CB1
	SPC0601X05CB1
2-Way Compensators with Shuttle Valve P-A/B	SPC0611P05CB1
	SPC0611P10CB1
	SPC0611X05CB1
	SPC0611X10CB1

SPC01

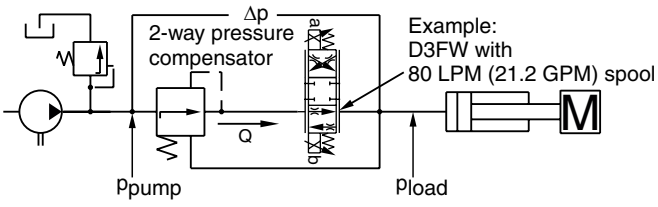
Flow Regulation Example:
2-Way Pressure Compensator at Δp = 5 Bar

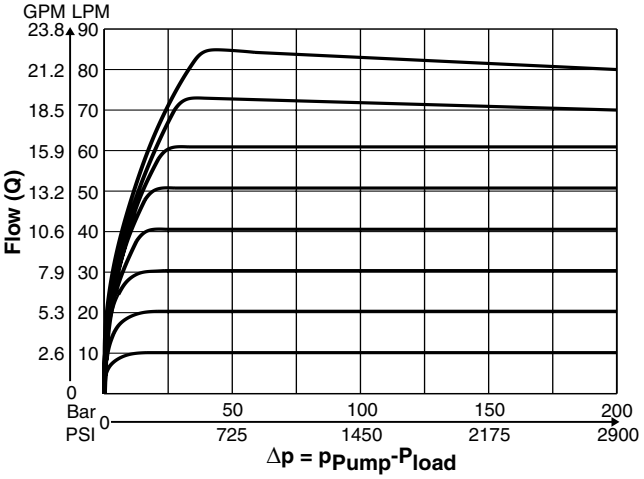




SPC02

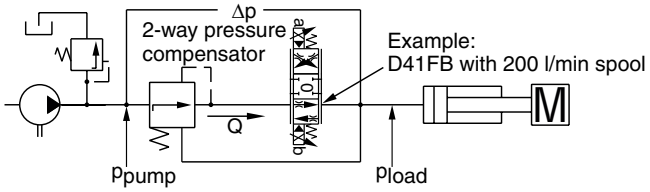
Flow Regulation Example:
2-Way Pressure Compensator at Δp = 5 Bar

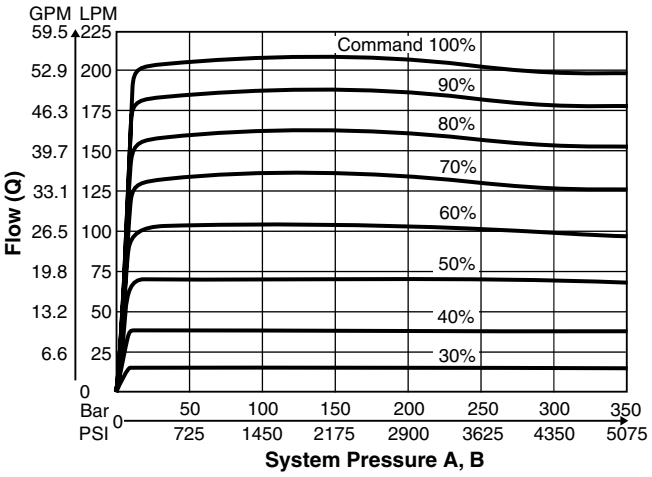




SPC03

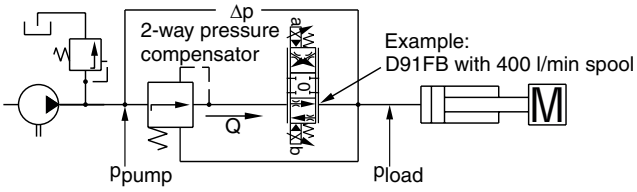
Flow Regulation Example:
2-Way Pressure Compensator at Δp = 5 Bar

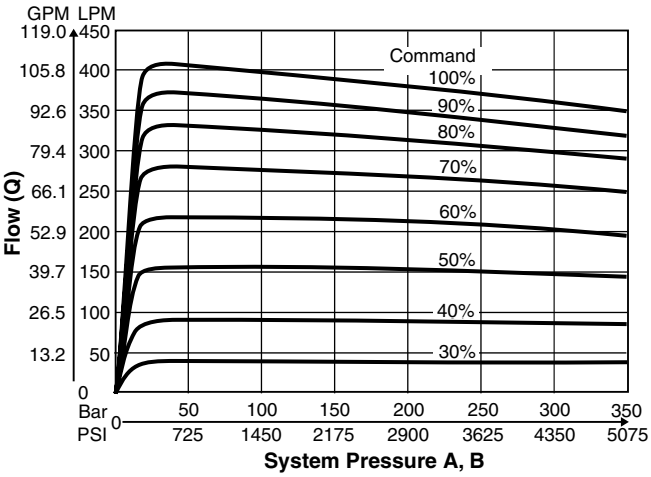




SPC06

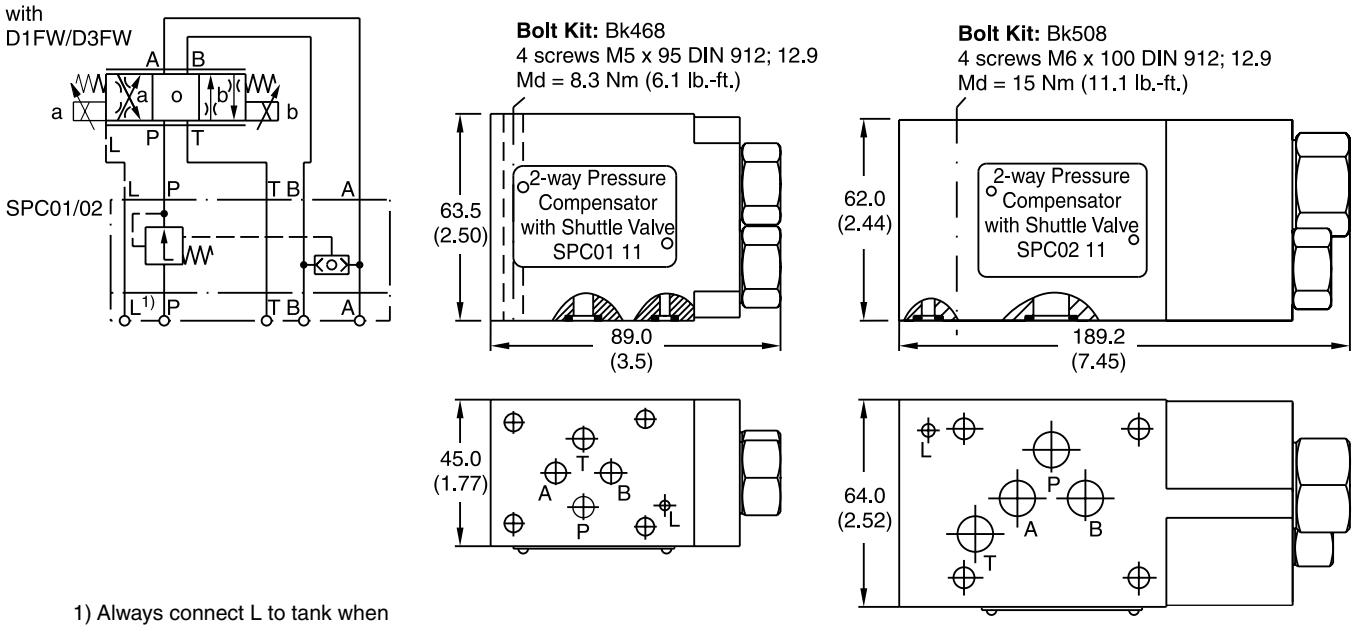
Flow Regulation Example:
2-Way Pressure Compensator at Δp = 5 Bar





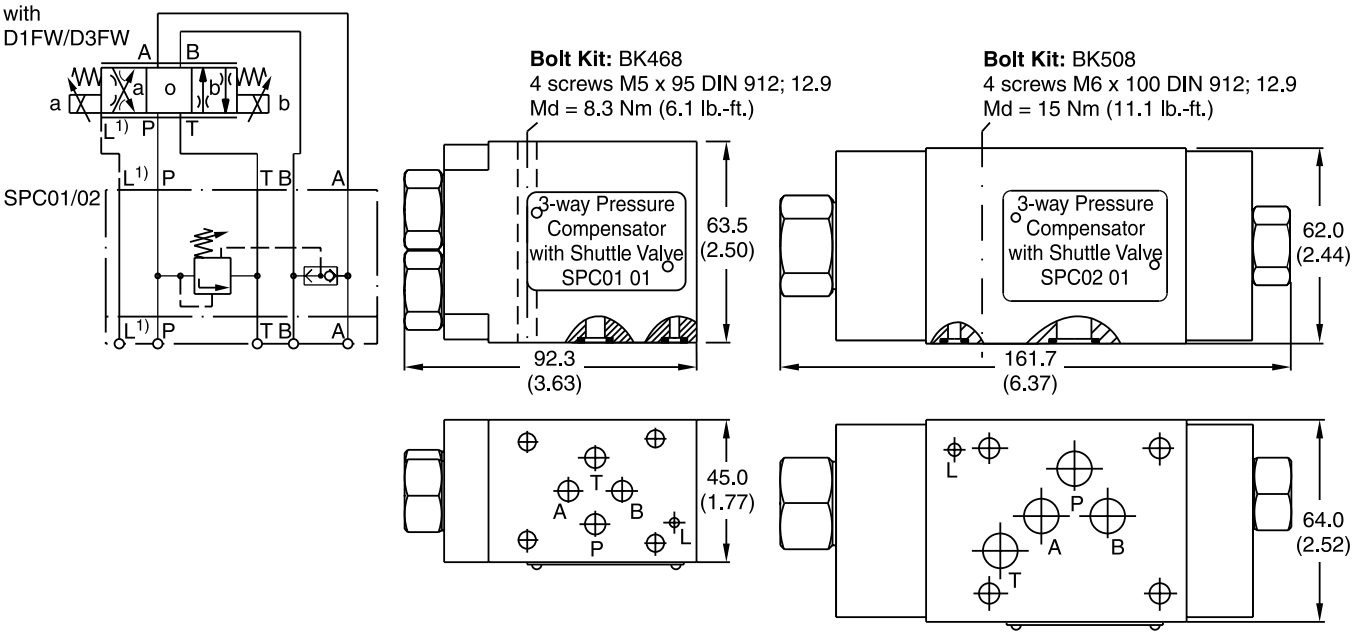
Inch equivalents for millimeter dimensions are shown in (**)

2-Way Pressure Compensator



1) Always connect L to tank when
SPC01 T > 160 Bar (2320 PSI)
SPC02 T > 210 Bar (3045 PSI)

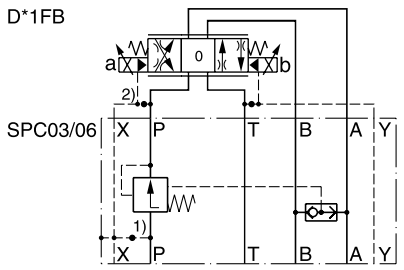
3-Way Pressure Compensator



1) Always connect L to tank when
SPC01 T > 160 Bar (2320 PSI)
SPC02 T > 210 Bar (3045 PSI)

2-Way Pressure Compensator

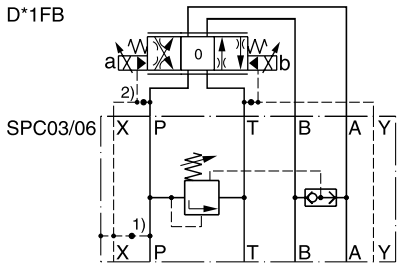
SPC03/SPC06



2)Plug in PX (obligatory for the use with pressure compensator)
1)Plug for pilot connection (external or internal PP)

3-Way Pressure Compensator

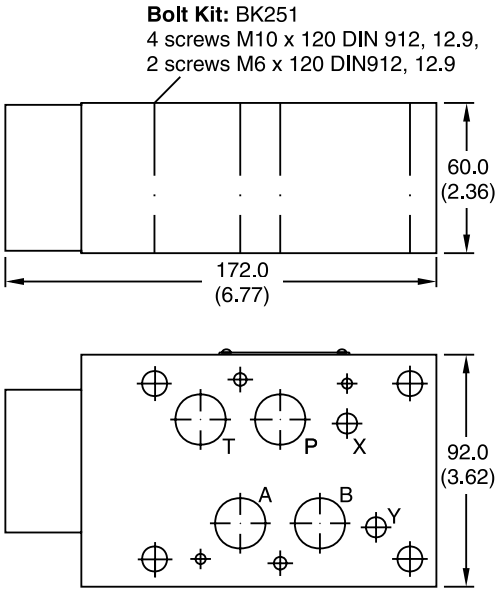
SPC03/SPC06



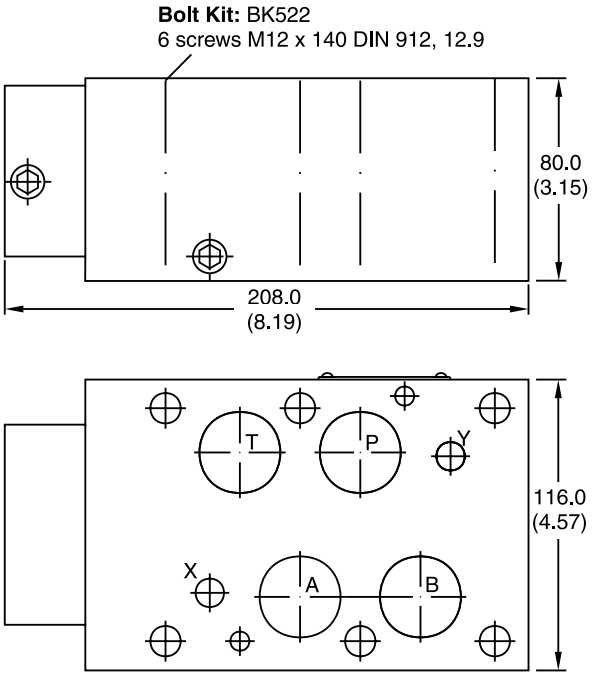
2)Plug in PX (obligatory for the use with pressure compensator)
1)Plug for pilot connection (external or internal PP)

Inch equivalents for millimeter dimensions are shown in (**)

SPC03



SPC06



Notes

Contents

Return to ALPHA TOC
Return to SECTION TOC

Manifold Mounted Valves

Series	Description	Page
BD15	Two-Stage Torque Motor Servovalve (up to 20 GPM)	C2 - C8
BD30	Two-Stage Torque Motor Servovalve (up to 40 GPM)	C2 - C5, C9 - C11

Flapper Nozzle

Series	Description	Page
PH76	Two-Stage Torque Motor Servovalve (up to 15 GPM)	C12 - C15
DY1S	One-Stage Torque Motor Servovalve (Pressure Control)	C16 - C18
DY3H/DY6H	Two-Stage Torque Motor Servovalve (up to 6 GPM)	C19 - C22
DY01	Two-Stage Torque Motor Servovalve (up to 3 GPM)	C23 - C26
DY05	Two-Stage Torque Motor Servovalve (.25 to 5 GPM)	C27 - C30
DY10	Two-Stage Torque Motor Servovalve (7.5 to 10 GPM)	C31 - C34
DY12	Two-Stage Torque Motor Servovalve (12.5 to 15 GPM)	C35 - C38
DY15	Two-Stage Torque Motor Servovalve (15 to 25 GPM)	C39 - C42
DY25	Two-Stage Torque Motor Servovalve (25 to 30 GPM)	C43 - C46
DY45	Two-Stage Torque Motor Servovalve (40 to 60 GPM)	C47 - C50
SEMT	Two-stage, 4-way, Flapper and Nozzle Servovalve	C51 - C54
SE05, SE10, SE15	Two-stage, 4-way, Flapper and Nozzle Servovalve	C55 - C61
SE2N	Two-stage, 4-way, Flapper and Nozzle Servovalve	C62 - C65
SE20	Two-stage, 4-way, Flapper and Nozzle Servovalve	C66 - C70
SE2E	Two-stage, 4-way, Flapper and Nozzle Servovalve	C71 - C75
SE31	Two-stage, 4-way, Flapper and Nozzle Servovalve	C76 - C80
SE60	Two-stage, 4-way, Flapper and Nozzle Servovalve	C81 - C84

C

Description

Series BD servovalves provide high resolution in the control of position, velocity and force in motion control applications.

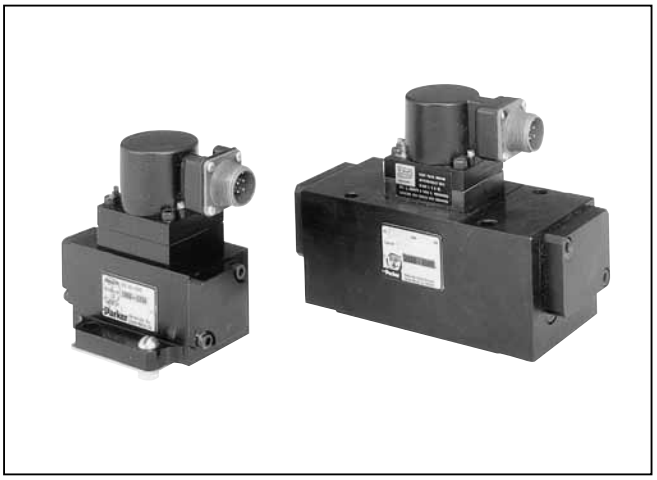
Features

- Rugged reliable trouble-free operation.
- Reduced contaminant sensitivity.
- Linear flow gain characteristics.
- Intrinsically safe model available.
- Explosion proof model available.

C

Operation

When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.



Specifications

Rated Flow @ 1000 PSI ΔP	3.78–151 LPM (1.0 – 40 GPM)
Linearity	≤ 5%
Hysteresis	≤ 3%
Threshold	≤ 0.5%
Fluid	Mineral oil, 60–225 SSU, max. 1000 SSU
Oper. Temp.	-1 to +82°C (+30 to +180°F)
Pressure Gain	3% of spool shift
Null Shift with Temperature with Supply Pressure	 < ± 2% per 38°C (100°F) < 2% per 69 Bar (1000 PSI)
Quiescent Flow (Std. Spool Lap)	BD15 – 1.5–2.1 LPM (.40–.55 GPM) BD30 – 2.1–3.78 LPM (.55 – 1.0 GPM)

Step Response Input	Model	Typical Step Response Input
	BD15	10 to 90%, 26 ms
	BD30	10 to 90%, 30 ms

Pressure Ranges

For optimum performance, Parker Servo Valves are designed to operate within specific system supply pressure ranges.

System Supply Pressure

180–210 Bar	(2600–3000 PSI)	48–66 Bar	(700–950 PSI)
138–172 Bar	(2000–2500 PSI)	14–45 Bar	(200–650 PSI)
95–133 Bar	(1400–1950 PSI)	0–210 Bar	(0–3000 PSI)
68–90 Bar	(1000–1300 PSI)		External Pilot

Filtration	SAE Class 3 or better, ISO Code 17/15/12
Protection Class	NEMA 1 (IP54)

Flow–Load Characteristics

Control flow to the load will change with load pressure and valve current as shown in figure 1. These characteristics closely follow the theoretical square–root relationship for sharp–edged orifices as illustrated in the equation below.

$$Q = K\sqrt{\Delta P}$$

Q = Control flow, cubic inches/sec
K = Valve constant
ΔP = Valve pressure drop

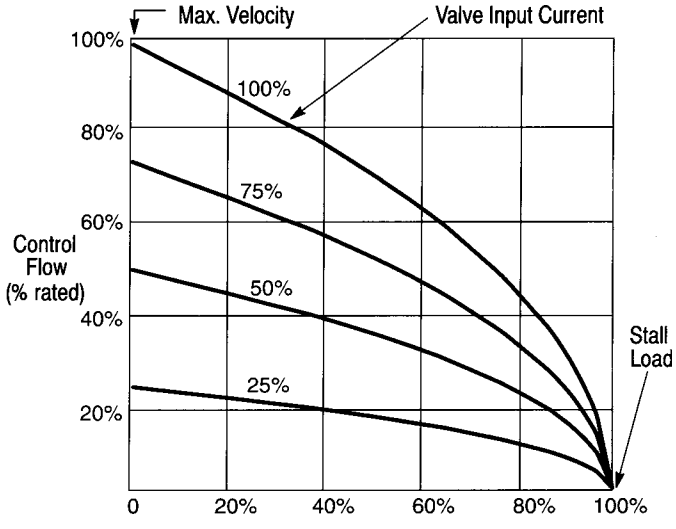


Figure 1. Change in flow with current and load pressure

Quick Reference Data Chart

Model	Flow Capacity @ 1000 PSID LPM (GPM)	Max. Pressure Rating	Max. Tank Pressure	Port Circle	Electrical Input (Std.) Single Coil	Coil Resistance (Std.) Each Coil	Weight
BD15	3.8, 9.5, 19, 37, 57, 76 (1, 2.5, 5, 10, 15, 20)	210 Bar (3000 PSI)	14 Bar (200 PSI)	.875	60 mA (Full Flow)	60 ohms	1.2 kg (2.6 lbs.)
BD30	76, 95, 113, 151 (20, 25, 30, 40)	210 Bar (3000 PSI)	14 Bar (200 PSI)	1.75	60 mA (Full Flow)	60 ohms	2.9 kg (6.3 lbs.)

BD — Basic Model

Size

Code
15
30

Options

Code	Description
A	Standard Valve
B	Intrinsic Safe, Factory Mutual
C	Explosion Proof, Factory Mutual
J	Explosion Proof, CSA Approved
N	Explosion Proof, ATEX Approved

See Note 1.

Coil

Code	m(A)	Ohm
A	60 (Std.)	60
B	15	1016
C	20	591
D	30	243
E	40	138
F	50	90
G	100	22
H	200	5.7
J*	30/30	118/118
K	80	36

* For intrinsic safe only.

Connector

BD15

Code	Description
A	C_2B (Std.)
B	C_2D
C	C_1B
D	C_1D
J	Intrinsic Safe
L	Explosion Proof

BD30

Code	Description
E	C_2B (Std.)
F	C_2D
G	C_1B
H	C_1D
K	Intrinsic Safe
M	Explosion Proof

See Note 2.

Seal

Code	Description
N	Nitrile (Std.)
V	Fluorocarbon

Supply Pressure

Code	Description
B	2600–3000 (Standard)
C	2000–2500
D	1400–1950
E	1000–1300
F	700–950
G	200–650
H	0–3000 (5th Port)

See Note 3.

Flow

BD 15

Code	Flow (GPM)
1	3.8 LPM (1 GPM)
2.5	9.5 LPM (2.5 GPM)
5	18.9 LPM (5 GPM)
10	37.9 LPM (10 GPM)
15	56.8 LPM (15 GPM)
20	75.7 LPM (20 GPM)

BD 30

Code	Flow (GPM)
20	75.7 LPM (20 GPM)
25	94.6 LPM (25 GPM)
30	113.6 LPM (30 GPM)
40	151.4 LPM (40 GPM)

Mounting Bolt Kit (U.S.)

BD15	BK07 (4) 5/16-18 x 1
BD30	BK46 (4) 5/16-10 x 3 1/4

Note 1: **"B" Intrinsic Safe Option meets** Factory Mutual Intrinsically Safe Class I, II and III, Division 1 Groups A through G. Refer to Parker Bulletin 1452.

"C" Explosion Proof meets:
Factory Mutual Explosion Proof
Class I, II, III, Division 1, Groups A through G

"J" Exposion Proof meets:
Canadian Standards Association
Class I, Groups A through D
Class II, Groups E, F and G
Class III
Refer to Parker Bulletin 1451.

"N" Explosion Proof meets:
ATEX Ex⬡II2G EExm II T3 T_{amb} 45°C to -50°C
Request Parker Documentation Package: 1200074

Note 2: Connector Location & Flow Polarity
(Standard connector over C_2 + to B = P to C_1 flow).

C_2B = Connector over Port C_2, + to Pin B = P to C_1 flow.

C_2D = Connector over Port C_2, + to Pin D = P to C_1 flow.

C_1B = Connector over Port C_1, + to Pin B = P to C_1 flow.

C_1D = Connector over Port C_1, + to Pin D = P to C_1 flow.

Note 3: Supply Pressure: Code "H" applies to 5th Port/External Pilot Option. This requires the use of a blank orifice "-00". First stage pressure should be limited to 41.4 Bar (600 PSI) and no less than 27.6 Bar (400 PSI).

Servo valve rated flow at 1000 PSID ±10%.

Accessories

Model	Description	Model	Description
6522A11	1/16" Hex Allen Wrench	820089-1	BD30 Servovalve Shippping Container
810005-1	Orifice Filter	BD830008	BD90/95 Amplifier Board Shipping Container
810013-**	Valve Orifice Kit, Fluorocarbon		
810014-**	Valve Orifice Kit, Nitrile	810089-1	BD15 Servovalve Shipping Container
****Dash #**	**Operating Pressure**	820000TF3	Filter Wrench
-16	180 – 210 Bar (2600 – 3000 PSI) B		
-18	138 – 176 Bar (2000 – 2550 PSI) C		
-20	96 – 134 Bar (1400 – 1950 PSI) D	MS3106E-14S-2S	SV Mating Connector
-22	69 – 93 Bar (1000 – 1350 PSI) E		
-33	48 – 66 Bar (700 – 950 PSI) F	1200127	Flushing valve for BD15
-50	14 – 45 Bar (200 – 650 PSI) G	1200128	Flushing valve for BD30
-00	0 – 210 Bar (0 – 3000 PSI) 5th Port H	810107	BD15 Block off Plate

Adapters

☐ — ☐

Type of Adapter — Seals

Code	To Mount A _____	Onto A _____ Pattern
810092-1	BD15	BD30 (1.75)
810093-5	BD15	D05
810094-5	BD15	D03
810098-1	BD15	.937 Port Circle
810097-3	BD15	.785 Port Circle
810096-5	BD15	.625 Port Circle
820006-1	BD30	Moog 62-303B & Atchley 231
820007-1	BD30	D08
820091-1	BD30	BD15 (.875)
Consult Factory	BD30	1.375
Consult Factory	BD15	D05H

Code	Description
Omit	Nitrile
V	Fluorocarbon

Subplates

Valve Model	Subplate	Port Size	Location	Bolt Kit	Torque Specifications (Lubricated)
BD15	810090-3	SAE12	Side	BK07	17 ft. lbs.
BD30	820090-3	SAE16	Side	BK46	17 ft. lbs.

Cables

EHC — ☐ — **4** — **S**

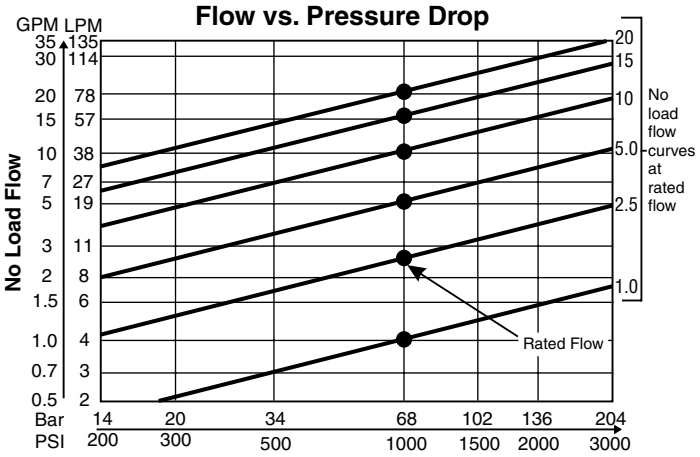
Electrohydraulic Cable for BD Series Valves — Length — Cable Type — Pin Orientation

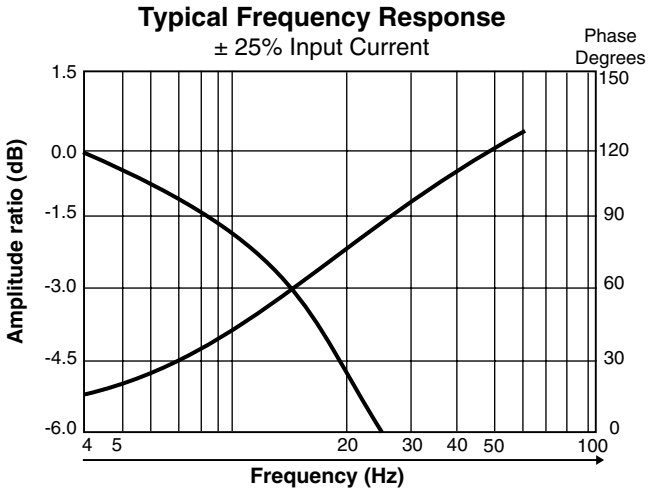
Code	Length
9	Length
15	in Feet

Code	Description
4	4-wire, 20 awg. shielded (Belden 9402)

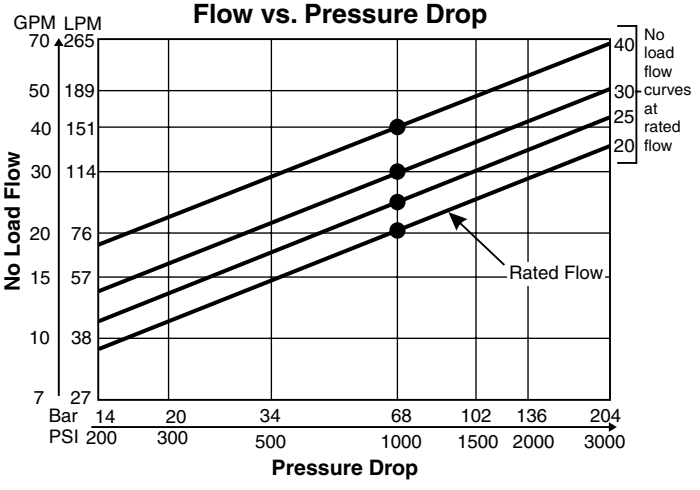
Code	Description
S	BD Series

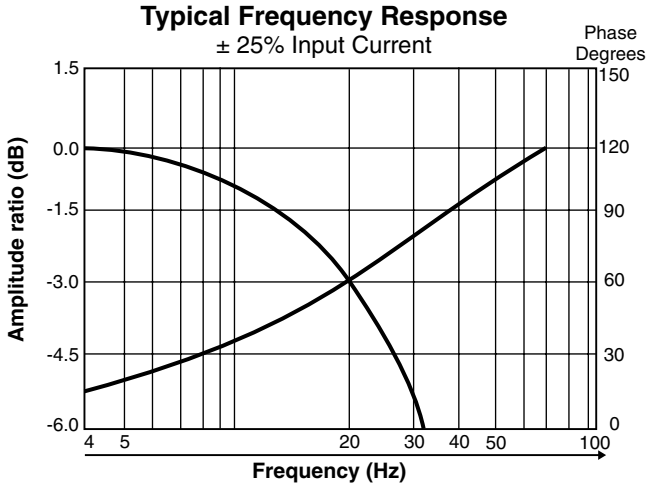
Series BD15



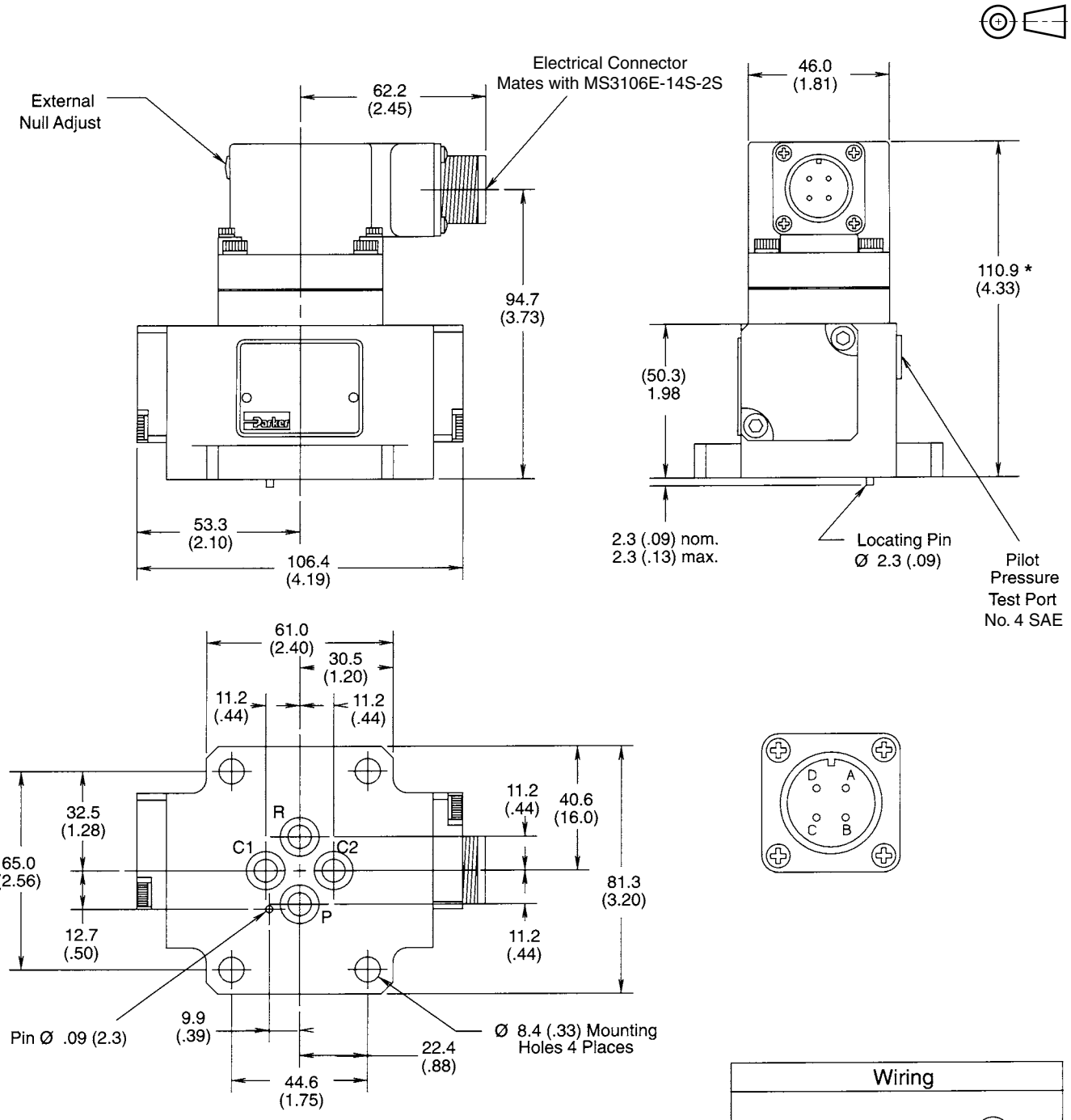


Series BD30





Inch eqivalents for millimeter dimensions are shown in (**)

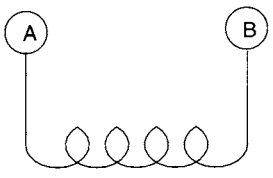


Note: Valve mating surface to be flat within 0.002 TIR, and smooth to within 63 RMS

*** 140 (5.50) for BD15C; explosion proof, FM approved.**

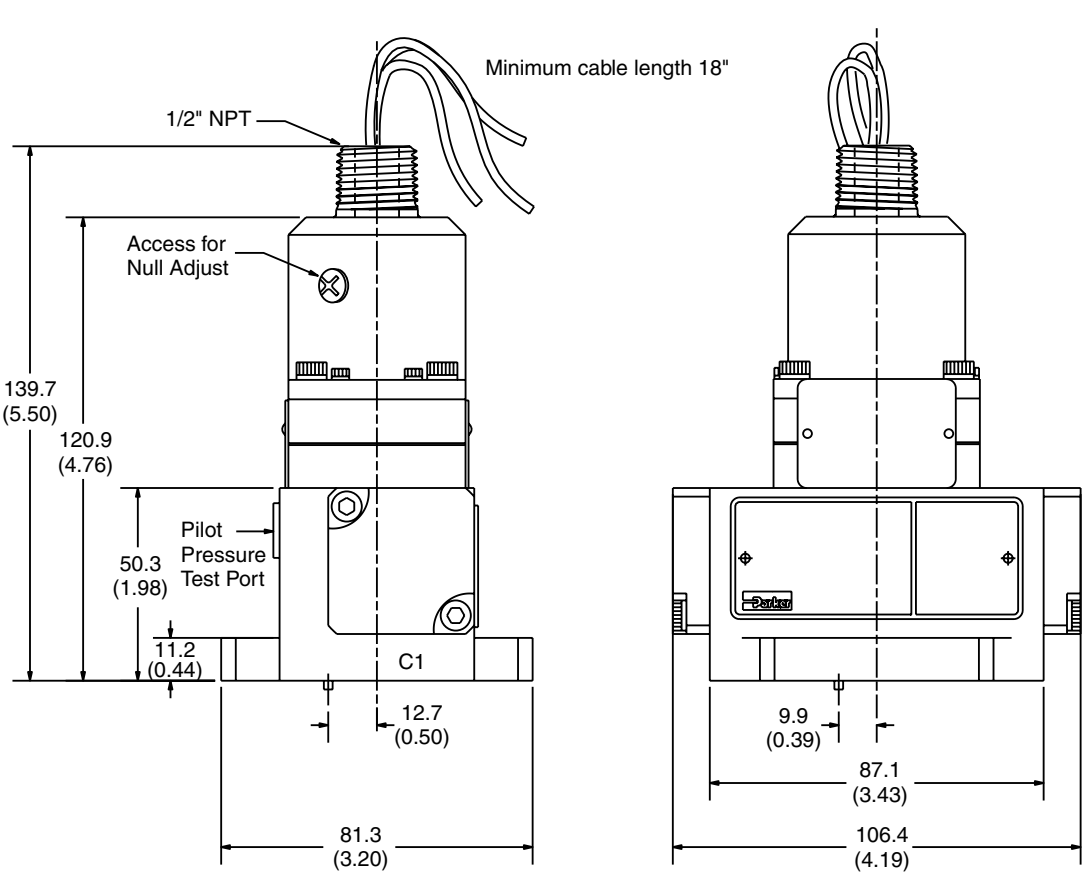
Note: Vertically oriented 1/2 NPT threaded male conduit connection with lead wires (not as shown).

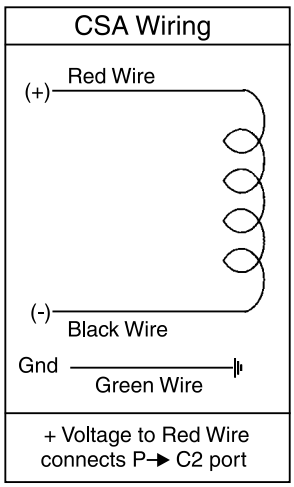
Wiring

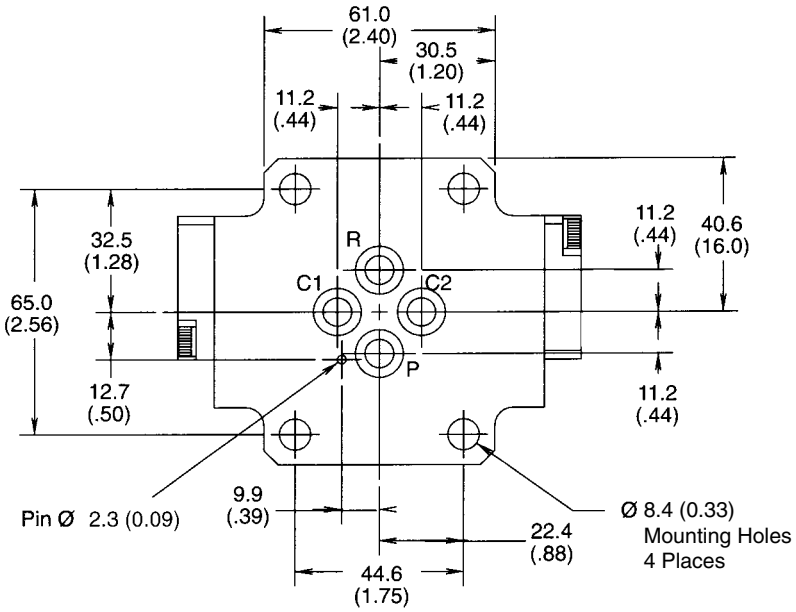


Positive current to the Pin "B" yields flow from the C1 port.

Inch eqivalents for millimeter dimensions are shown in (**)



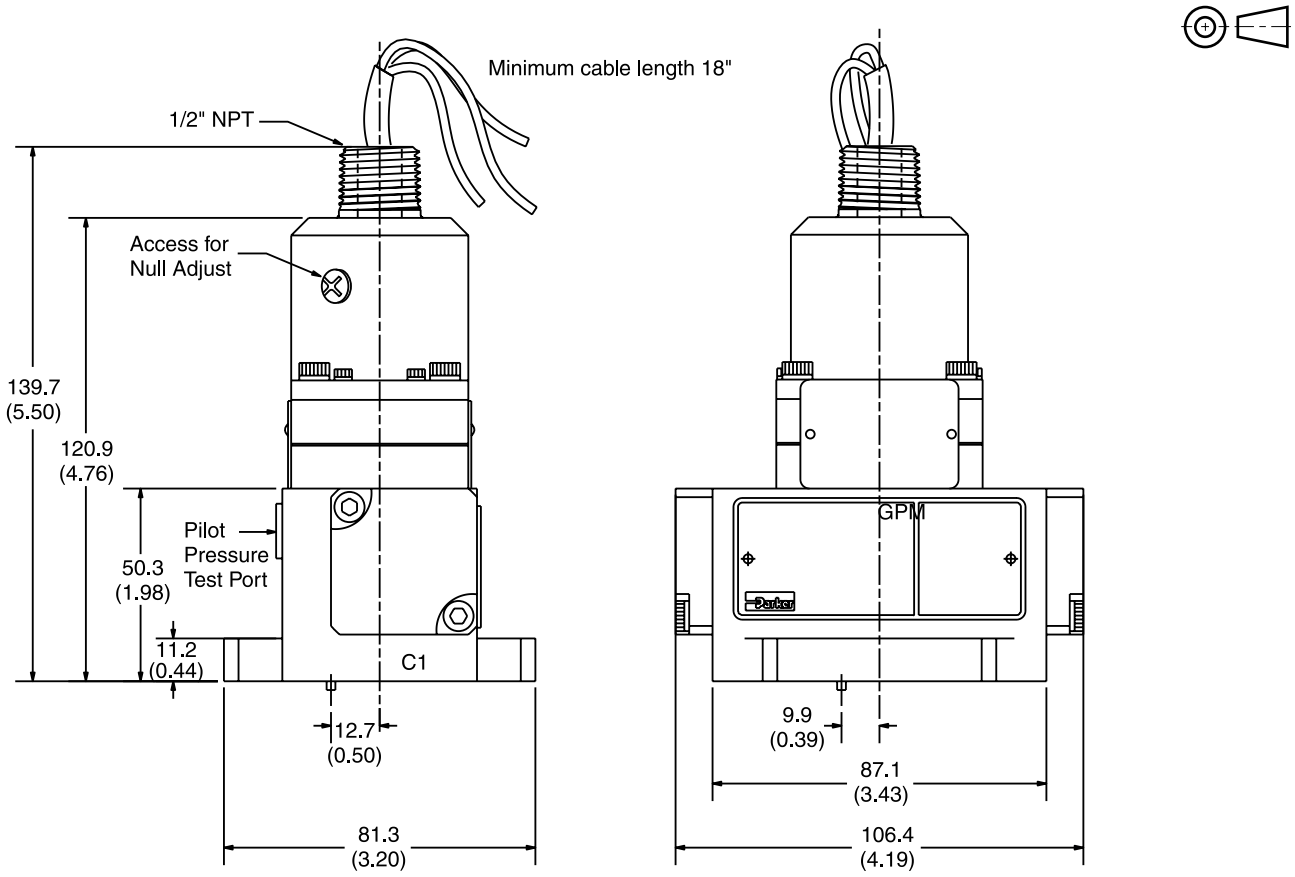


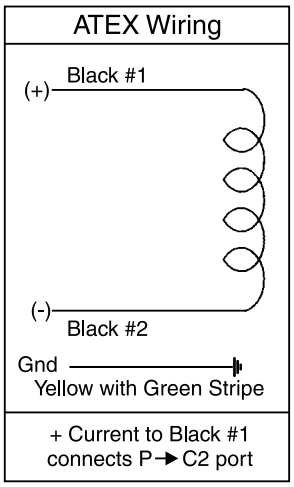


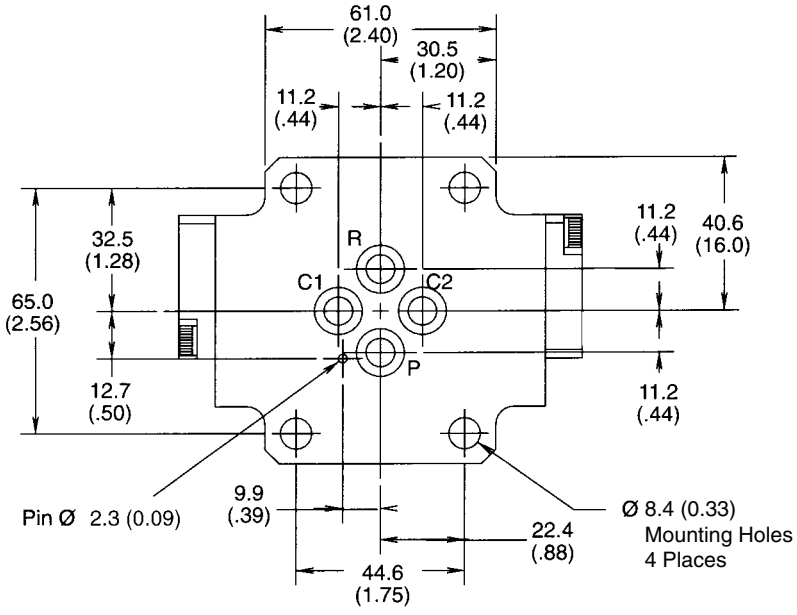
Note: Valve mating surface to be flat within 0.002 TIR, and smooth to within 63 RMS

C

Inch eqivalents for millimeter dimensions are shown in (**)

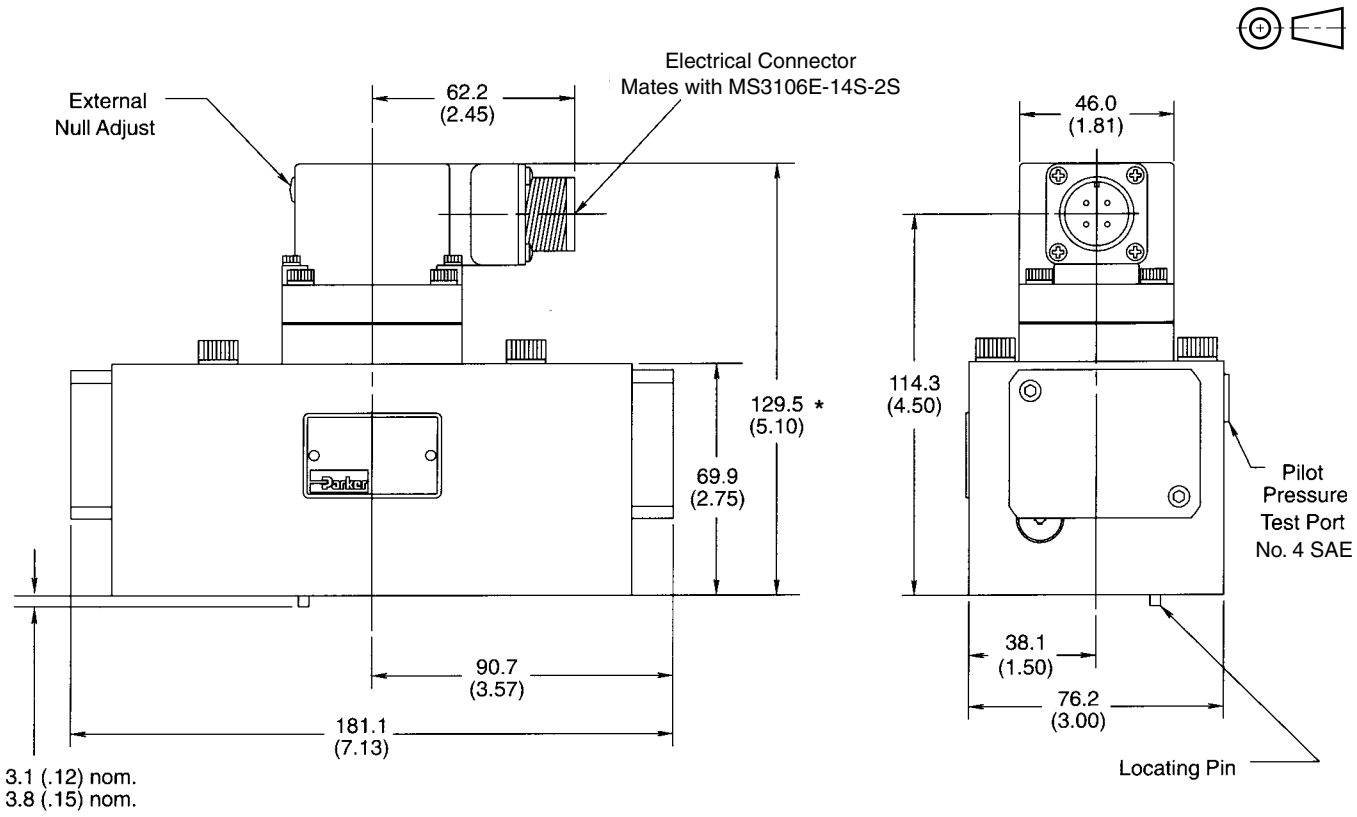


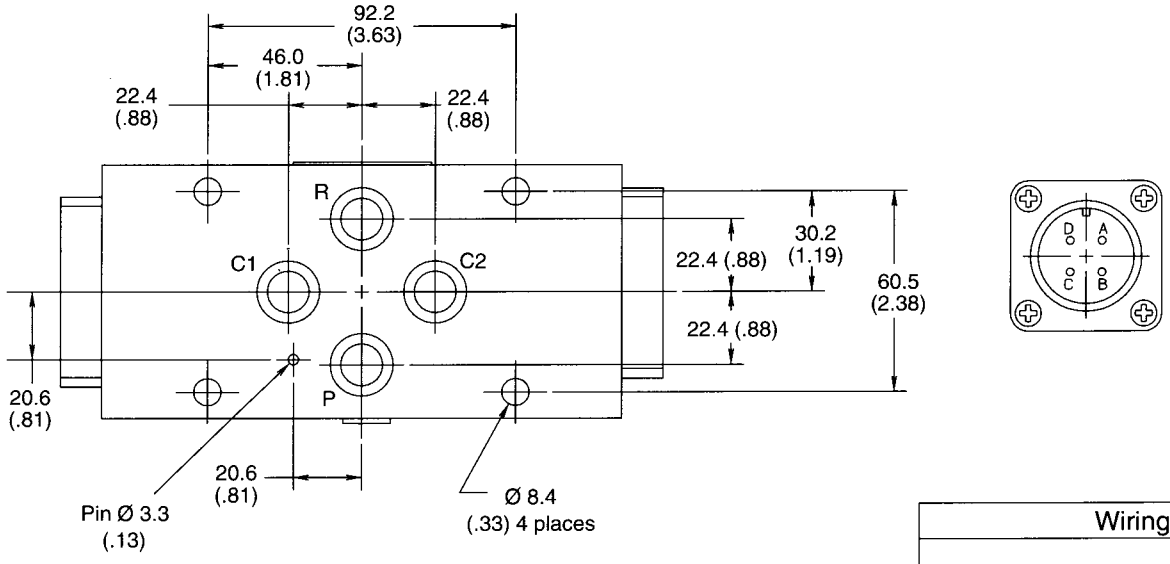




Note: Valve mating surface to be flat within 0.002 TIR, and smooth to within 63 RMS

Inch eqivalents for millimeter dimensions are shown in (**)

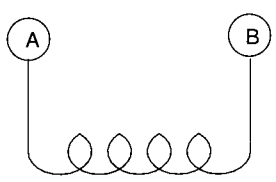




Note: Valve mating surface to be flat within 0.002 TIR, and smooth to within 63 RMS

* 160 (6.25) for BD30C; explosion proof, FM approved. Note: Vertically oriented 1/2 NPT threaded male conduit connection with lead wires (not as shown).

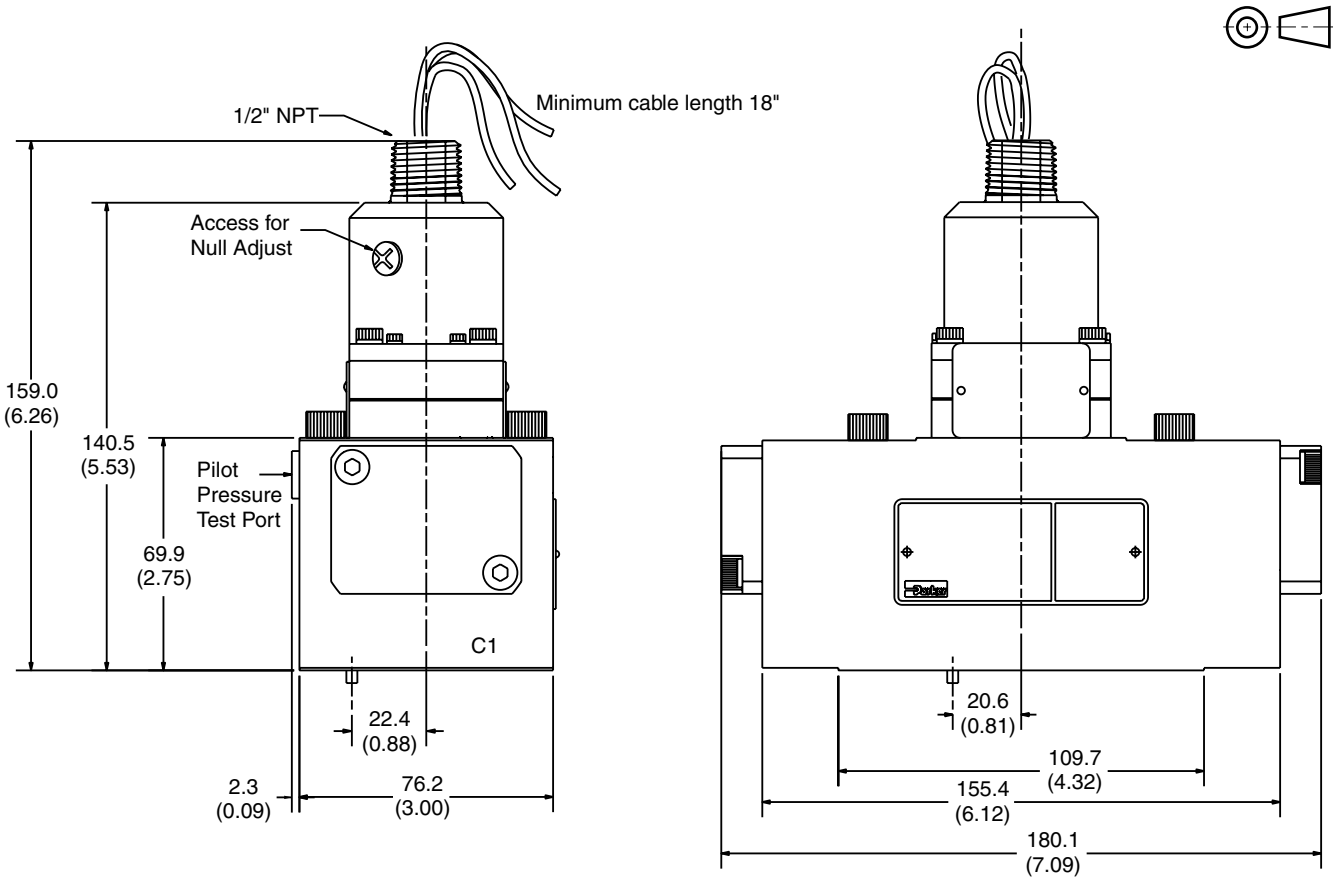
Wiring

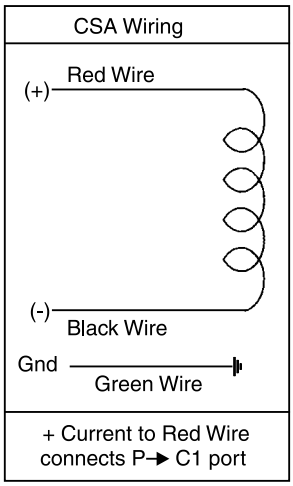


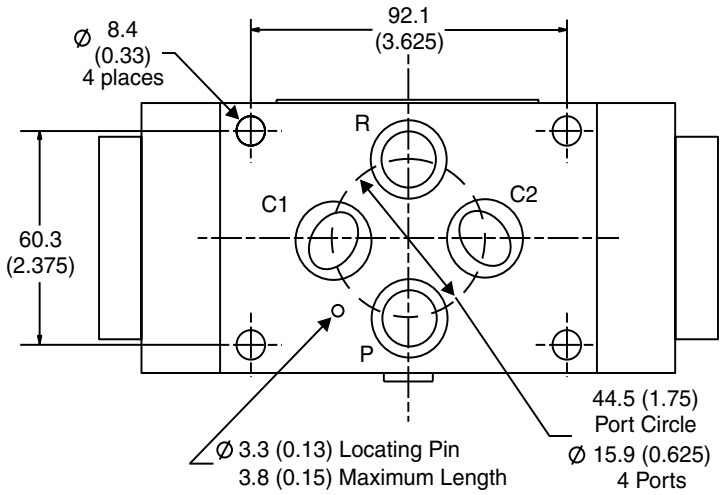
Positive current to the Pin "B" yields flow from the C1 port.

Inch eqivalents for millimeter dimensions are shown in (**)

C

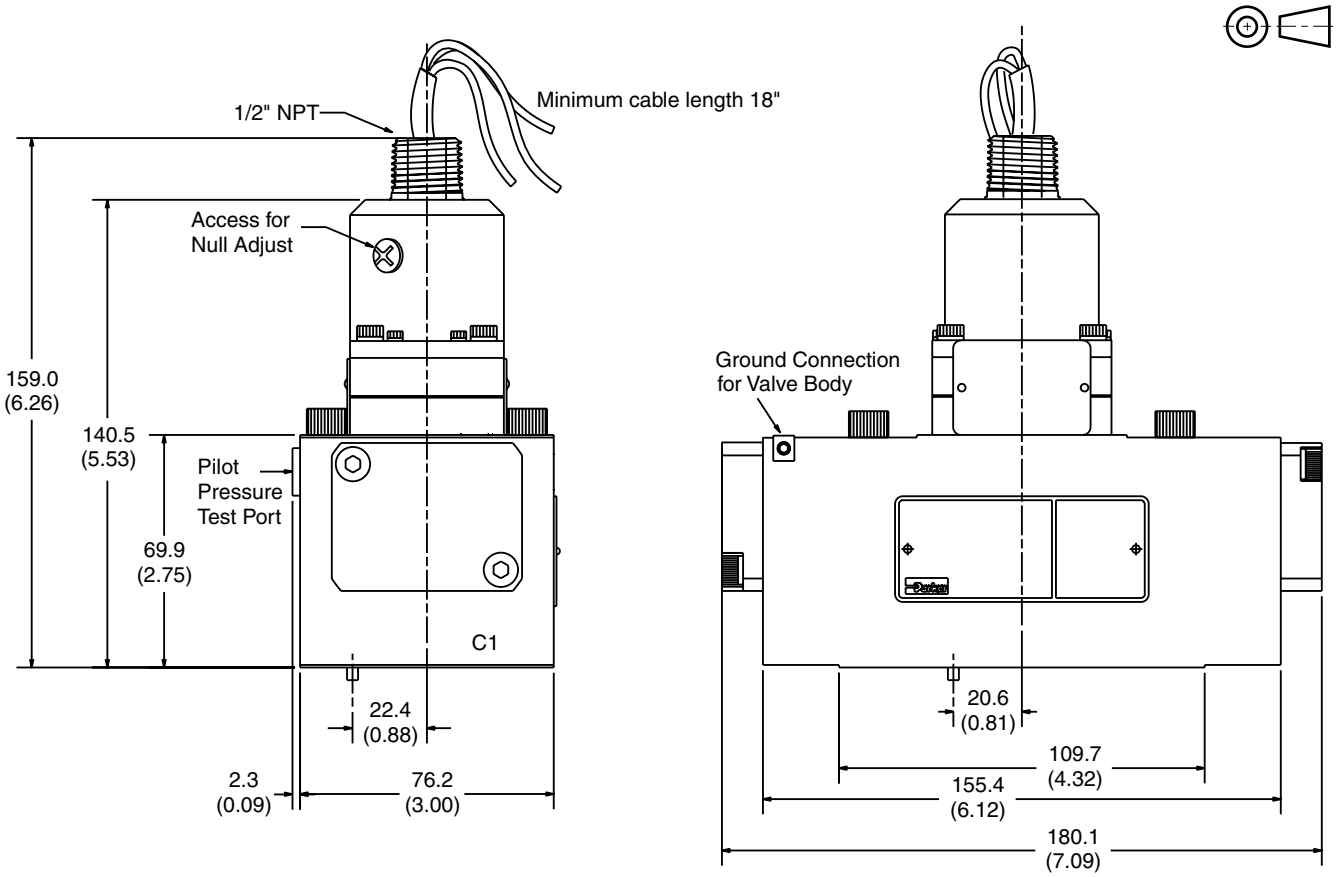


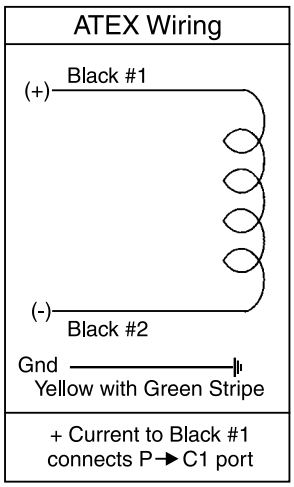


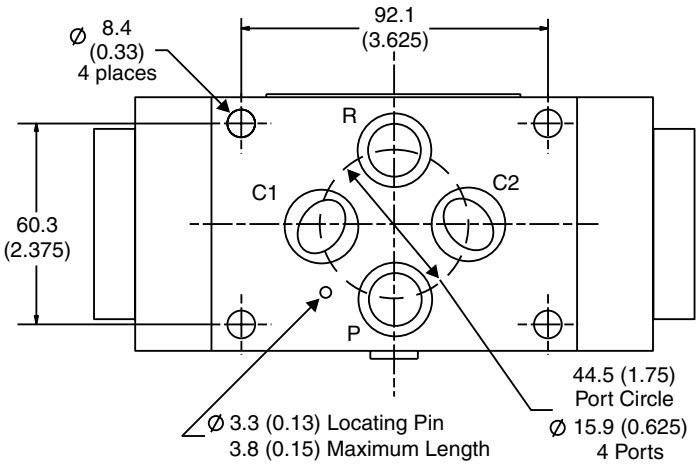


Note: Valve mating surface to be flat within 0.002 TIR, and smooth to within 63 RMS

Inch eqivalents for millimeter dimensions are shown in (**)



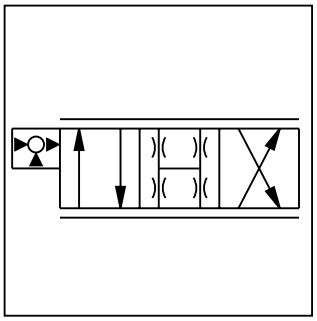


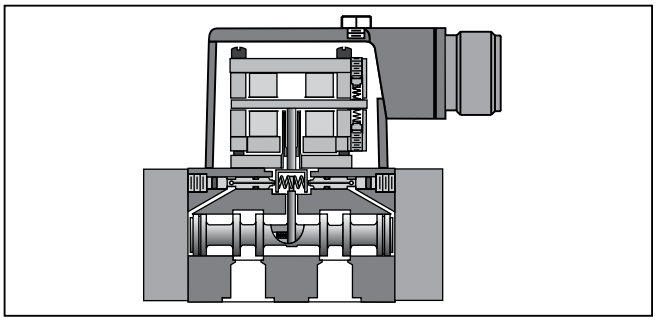


Note: Valve mating surface to be flat within 0.002 TIR, and smooth to within 63 RMS

General Description

Series PH76 servovalves are high performance, two stage valves, with a range of rated flows from 3.8 to 57 LPM (1 to 15 GPM). The pilot stage is a symmetrical double-nozzle and flapper, driven by a double air gap, dry torque motor. A low current signal to the torque motor pilot stage results in a proportional flow from the output stage. The output stage is a 4-way, sliding spool which provides a mechanical feedback using an exclusive “no ball glitch” design.





C

Features

- Built to survive tank port pressure spikes.
- No ball glitch.
- Tool steel spool and body.
- Optional 5th port for external pilot.
- ISO 10372 standard 22.23 mm (0.875 in) port circle.

Specifications

Flow Rating ±10% @ 70 Bar (1000 PSID)	3.8, 9.5, 19, 28, 38, 57 LPM (1, 2.5, 5, 7.5, 10, 15 GPM)	**Threshold**	≤ 0.5%
Supply Pressure	10 – 210 Bar (145 – 3000 PSI)	**Null Shift** with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance	**Pressure Gain** % change in pressure per 1% change in input command	30% minimum, 70% max.
Null Leakage Flow per 70 Bar (1000 PSID)	0.2 – 0.8 LPM (0.05 – 0.20 GPM)	**Step Response**	10 – 90%, < 6 ms
Pilot Flow @ 210 Bar (3000 PSID)	0.8 – 1.2 LPM (0.21 – 0.33 GPM)	**Fluid**	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
Input Command	±50 mA std.	**Operating Temperature**	-1°C to +82°C (+30°F to +180°F)
Frequency Response @ 90° phase shift	> 90 Hz (See Performance Curves)	**Protection Class**	NEMA 4, IP65
Non-Linearity	≤ 10%	**Fluid Cleanliness**	ISO 4406 15/12 or better

PH76 □ □ □ □ □ □ □ □ □ □

Series | Pilot Source | Material Options | Coils | Wiring | Seal | Operating Pressure | Flows | Special Options | Factory Code for Special Options

Code	Description
C	External (5th port)
A	Internal

For internal pilot the 5th port is blocked internally.

Code	Description
A	Steel (standard)
Z	Special (specify)

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	40 mA	20 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
M	475 ohm	40 mA	20 mA
T	1000 ohm	8 mA	4 mA
Z	Special (Specify)		

Code	Connector over	Flow P to C2 with:
B	Port C2	(+) signal to A, C
A	Port C1	(+) signal to A, C
P	Port P	(+) signal to A, C
T	Port T	(+) signal to A, C

Code	Description
V	Fluorocarbon (std.)
N	Nitrile
E *	EPR
Z *	Special (specify)

* Consult factory for delivery.

Code	Description
A	210 Bar (3000 PSI)
B	450 Bar (5000 PSI)
Z	Special (specify)

Code	Description
1	3.8 LPM (1.0 GPM)
2.5	9.5 LPM (2.5 GPM)
5	19.0 LPM (5.0 GPM)
7.5	28.0 LPM (7.5 GPM)
10	38.0 LPM (10.0 GPM)
15	57.0 LPM (15.0 GPM)

Code	Description
Omit	Standard
D	(Specify) Consult factory for price, delivery, and availability of special options.

Weight: 1 kg (2.2 lb)
Cable with mating connector: EHC154S
Mating connector: MS3106E-14S-2S
Bolt kit: Included with valve. BK07 (4) 5/16-18x1"
Flushing valve: 1200127 (same for 4 or 5 port PH76 valve)
Subplate, 5 ports: 1402303 (4) #12 SAE side ports, (1) #4 SAE side port
Subplate, 4 ports: 810090-3 (4) #12 SAE side ports
Null adjust tool: 6522A13
Driver cards: 23-7030, BD90*, BD101*

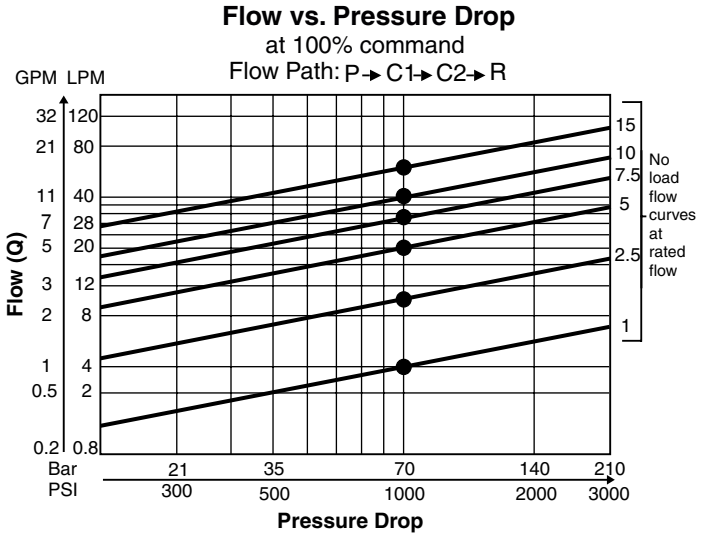
When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.
* For output currents >15 mA

Flushing valve is rated for 3000 psi operation.

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

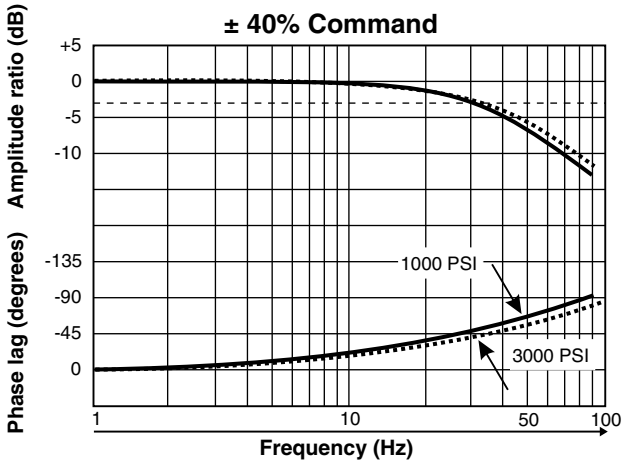
Performance Curves

Servovalve flow is proportional to the square root of the pressure drop through the valve. The nominal flow rating for the servovalves is based upon a 70 Bar (1000 PSI) pressure drop.



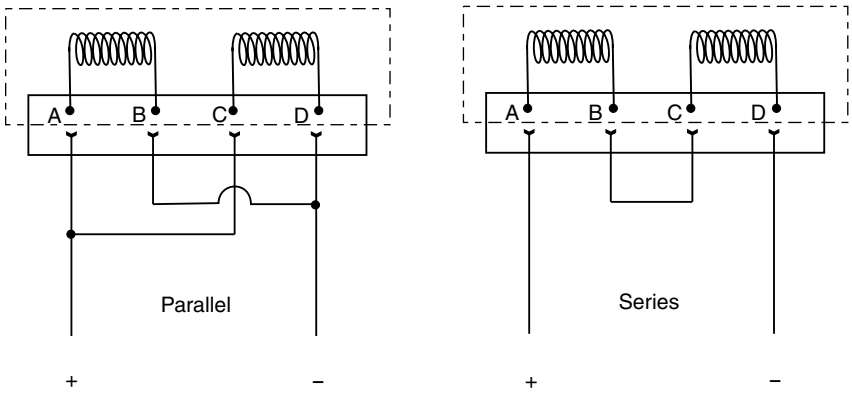
Frequency Response

The frequency response curves for the PH76 servovalves show no significant change for signal amplitudes between ±10% and ±40%. Frequency response is unaffected by changes in supply pressures above 70 Bar (1000 PSI).



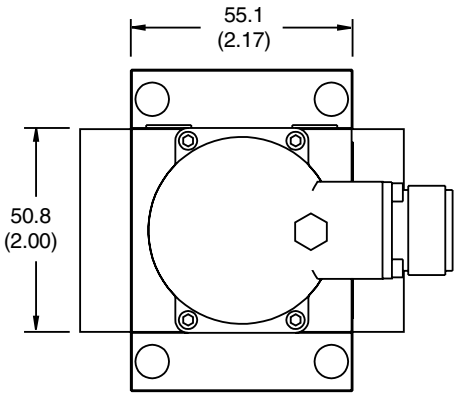
Installation Wiring Options

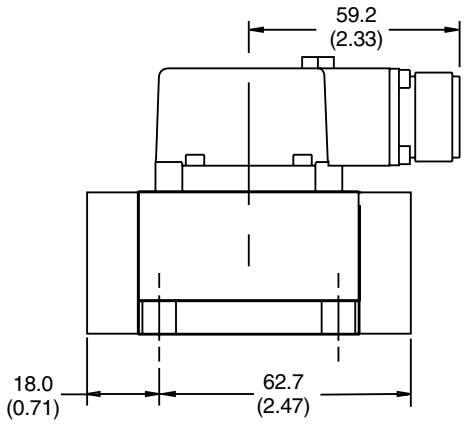
The PH76 servovalve has two coils. One is wired across pins A to B, the other across pins C to D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. In either case, a positive voltage to pin A connects valve flow from ports P to C2 and ports C1 to R.



Polarity shown (+A, -B, +C, -D) connects flow from P to C2 port.

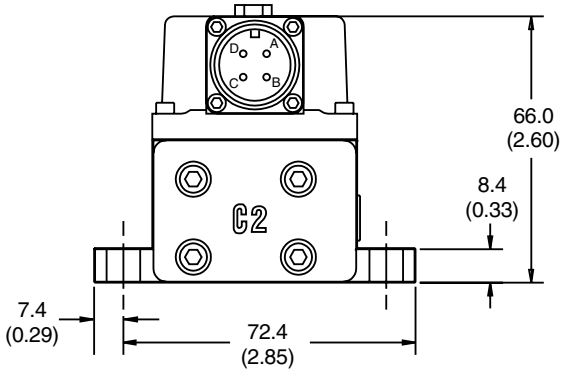
Inch equivalents for millimeter dimensions are shown in (**)





Connector shown over C2 port. See ordering information for other connector locations.

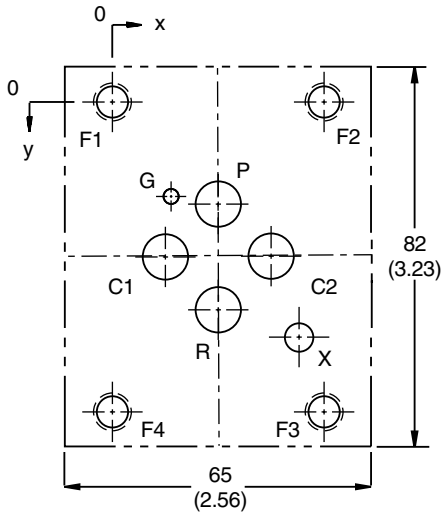
The connector location is factory set and is not field changeable.



Mounting Surface Dimensions

Metric Dimensions (millimeters)						± 0.1 mm				
Axis	**P**	**C1**	**R**	**C2**	**G**	**X**	**F1**	**F2**	**F3**	**F4**
	∅ 8.2 max.	∅ 8.2 max.	∅ 8.2 max.	∅ 8.2 max.	∅ 3.5 max.	∅ 5	M8	M8	M8	M8
X	22.2	11.1	22.2	33.3	12.3	49.5	0	44.4	44.4	0
Y	21.4	32.5	43.6	32.5	19.8	39	0	0	65	65

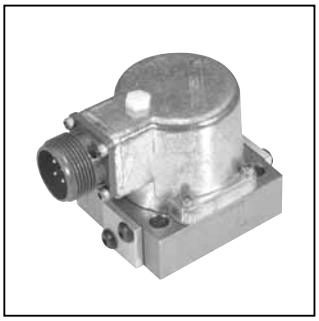
U.S. Dimensions (inches)						± .004 in				
Axis	P	C1	R	C2	G	X	F1	F2	F3	F4
	∅ 0.32 max.	∅ 0.32 max.	∅ 0.32 max.	∅ 0.32 max.	∅ 0.14 max.	∅ 0.2	5/16 - 18			
X	0.875	0.437	0.875	1.311	0.484	1.531	0	1.750	1.750	0.000
Y	0.846	1.280	1.717	1.280	0.780	1.950	0	0	2.562	2.562

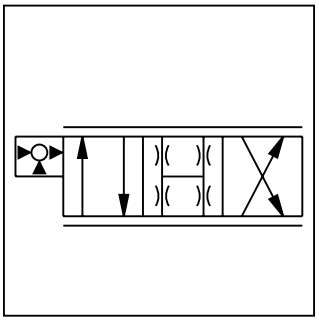


Minimum depth of G is 2 mm (0.08 in)
Recommended full thread depth for bolt holes 22 mm (0.87 in)
Surface roughness: Ra < 0.8 µm (0.031 in) as specified in ISO 468 and 1302
Surface flatness: 0.025 mm (0.001 in) as specified in ISO 1101

General Description

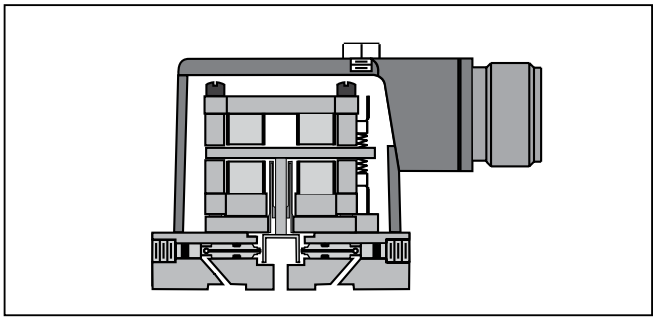
Series DY1S are open center, single stage differential pressure control valves. They are operated by a current driven torque motor. These valves controls the pressure difference between the two actuator ports, C1 and C2, by varying the resistance to flow through their nozzles.





Features

- No mechanical wear points.
- High frequency response.
- Nozzle and flapper design.
- Versatile 21.59 mm (0.850 in.) port circle, can mount to standard 19.81 mm (0.780 in.) and 23.62 mm (0.930 in.) port circle patterns.



Specifications

Flow Rating @ 90 Bar (1300 PSI)	0.4 LPM (0.1 GPM)
Quiescent Flow @ 90 Bar (1300 PSI)	1.3 – 1.9 LPM (0.3 – 0.5 GPM)
Supply Pressure	7 – 90 Bar (100 – 1300 PSI)
Tank Port Pressure	90 Bar (1300 PSI) Max. < 10 Bar (145 PSI) for best performance
Input Command	±50 mA std.
Frequency Response @ 90° phase shift	> 100 Hz
Non-Linearity	≤ 10%
Threshold	≤ 0.5%

Null Shift with temperature with pressure	 ≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Presssure Gain % change in pressure per 1% change in input command	1% minimum
Step Response	10 – 90%, < 5 ms
Fluid	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
Operating Temperature	-1°C to +82°C (+30°F to +180°F)
Protection Class	NEMA 4, IP65
Filtration	ISO 4406 15/12 or better

DY1S — Series

Description
0.4 LPM (0.1 GPM)
90 Bar (1300 PSI)

Material Options

Code	Description
A	Standard
Z	Special (specify)

Coils

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
F	80 ohm	80 mA	40 mA
L	360 ohm	30 mA	15 mA
M	475 ohm	40 mA	20 mA
R	650 ohm	30 mA	15 mA
T	1000 ohm	10 mA	5 mA
V	1200 ohm	40 mA	20 mA
Z	Special (specify)		

Wiring

Code	Description
C	Standard
Z	Special

Seal

Code	Description
N	Nitrile
V	Fluorocarbon (standard)
E *	EPR
Z *	Special (specify)

* Consult factory for delivery

Special Options

Code	Description
Omit	Standard
D	(Specify) See list below

Factory Code for Special Options

Accessories

Cable with Mating Connector: EHC154S

Mating Connector: MS3106E-14S-2S

Bolt Kit: Included with valve

Flushing Valve: 11-0500

Subplate: 55-0100-2 SAE-6 Side ports

Null Adjust Tool: 6522A13

Electronic Drivers: 23-7030, BD90*, BD101*

When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

* For output currents >15 mA

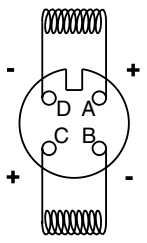
Special Options:

Consult factory for price, delivery and availability of special options.

Special coil
Special wiring
Special seals

Weight: 0.5 kg (1.2 lbs.)

Wiring Option C
(Standard)

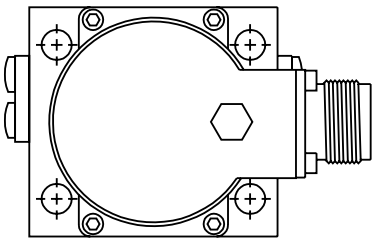


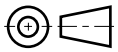
Polarity shown connects
P to C2 port.

Flushing valve is rated for 3000 psi operation.

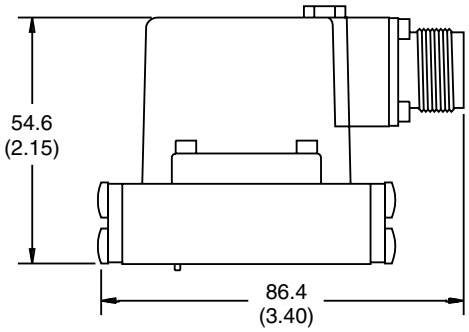
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

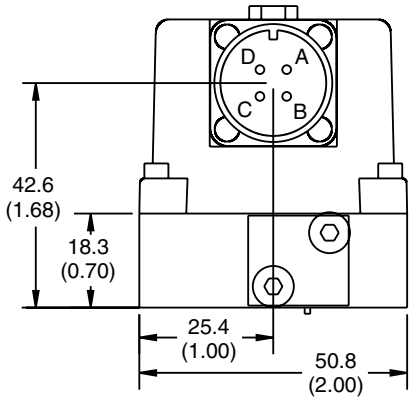




C

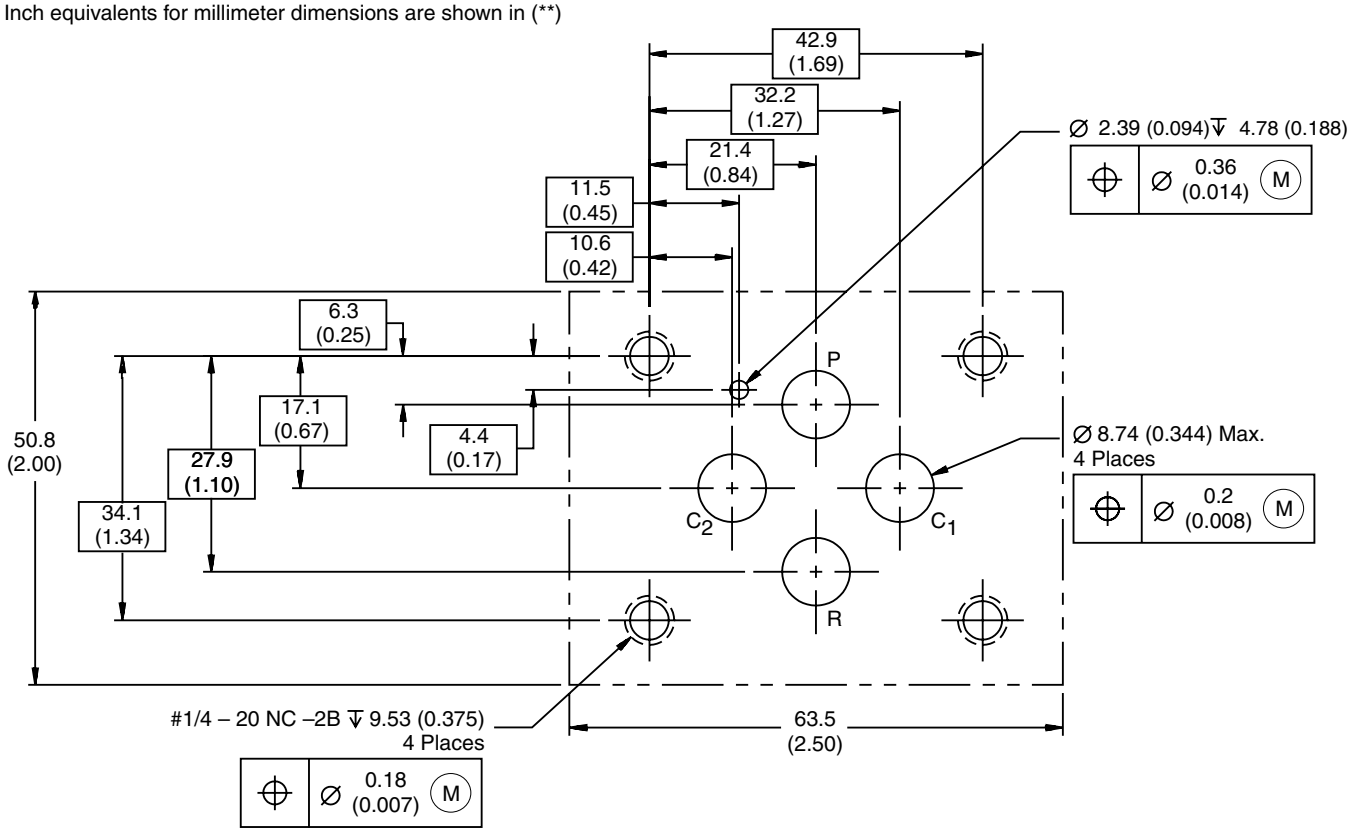


Connector over C1 port



Mounting Interface

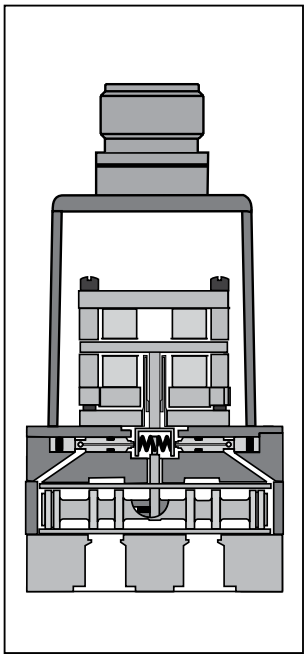
Inch equivalents for millimeter dimensions are shown in (**)

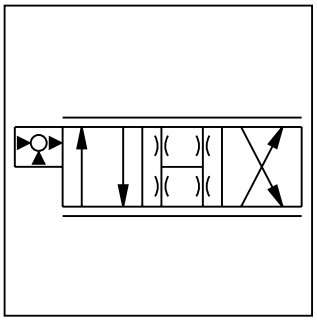


General Description

Series DY3H and DY6H are two stage, 4-way, high frequency, closed loop servovalves, with mechanical spool position feedback. These valves use a flapper and nozzle type, torque motor driven pilot stage to drive the sliding spool second stage. The unique rigid pin feedback design avoids ball glitch problems, which can occur in other types of servovalves.

The DY3H and DY6H offer a compact, lower cost alternative without sacrificing performance in systems operating at 105 Bar (1500 PSI) or less.





Features

- Precision lapped spool and sleeve.
- No ball glitch.
- High frequency response.
- Nozzle and flapper design.
- Adapters available for mounting to D03 or ISO port patterns.

Specifications

Flow Rating @ 70 Bar (1000 PSID)	11 and 22 LPM (3 and 6 GPM)
Supply Pressure	10 – 105 Bar (145 – 1500 PSI)
Leakage Flow @ 70 Bar (1000 PSID)	1.3 – 1.9 LPM (0.3 – 0.5 GPM)
Tank Port Pressure	105 Bar (1500 PSI) Max. < 10 Bar (145 PSI) for best performance
Input Command	±50 mA std.
Frequency Response @ 90° phase shift	> 190 Hz (See Performance Curves)
Non-Linearity	≤ 10%
Threshold	≤ 0.5%

Null Shift with temperature with pressure	 ≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Presssure Gain % change in pressure per 1% change in input command	30% minimum, 70% maximum
Step Response	10 – 90%, < 6 ms for DY3H < 8 ms for DY6H
Fluid	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
Operating Temperature	-1°C to +82°C (+30°F to +180°F)
Protection Class	NEMA 4, IP65
Filtration	ISO 4406 15/12 or better

Series

Code
DY3H
DY6H

Material Options

Code	Description
A	Standard
Z	Special (specify)

Coils

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
L	360 ohm	30 mA	15 mA
M	475 ohm	40 mA	20 mA
R	650 ohm	30 mA	15 mA
T	1000 ohm	10 mA	5 mA
V	1200 ohm	40 mA	20 mA
Z	Special (specify)		

Wiring

Code	Description
C	Standard
Z	Special

Seal

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E *	EPR
Z *	Special (specify)

***Consult factory for delivery**

Operating Pressure: **E**

Code	Description
E	105 Bar (1500 PSI)

Flows

Code	Description
3	11 LPM (3 GPM)
6 *	22 LPM (6 GPM)

* 6 GPM for DY6H only.

Special Options

Code	Description
Omit	Standard
D	(Specify) See list below

Factory Code for Special Options

Accessories

Cable with Mating Connector: EHC154S

Mating Connector: MS3106E-14S-2S

Bolt Kit: Included with valve

Flushing Valve: 11-0300

Subplate: 55-0800-2 SAE-4 Side ports

Null Adjust Tool: 6522A13

Electronic Drivers: 23-7030, BD90*, BD101*

When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.
* For output currents >15 mA

Special Options:

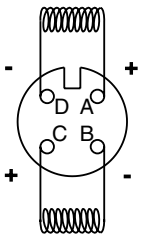
Consult factory for price, delivery and availability of special options.

Special coil
Special wiring
Special seals

Weight:

DY3H	0.34 kg (0.56 lbs.)
DY6H	0.34 kg (0.56 lbs.)

Wiring Option C
(Standard)

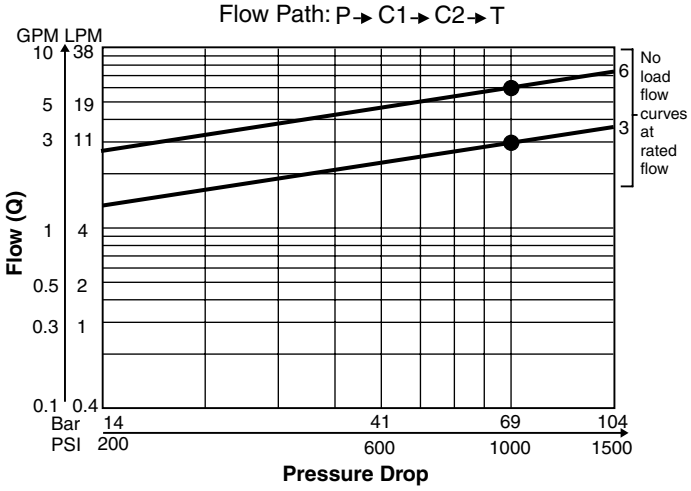


Polarity shown connects
P to C2 port.

Flushing valve is rated for 3000 psi operation.

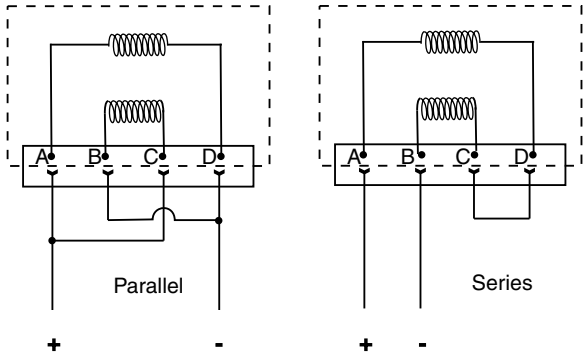
Performance Curves

Flow vs. Pressure Drop
at 100% command
Flow Path: P→C1→C2→T



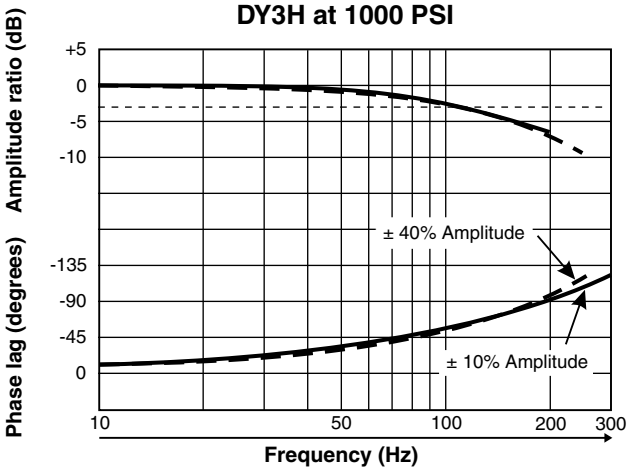
Installation Wiring Options

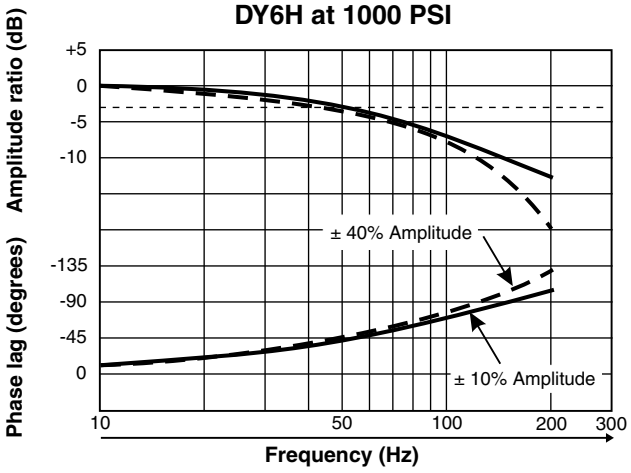
This servovalve has two coils. This illustration shows the internal wiring configurations for these valves. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustration below and to the mounting pattern for this valve to insure proper control phasing.



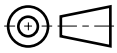
Polarity shown connects flow from P to C2 port.

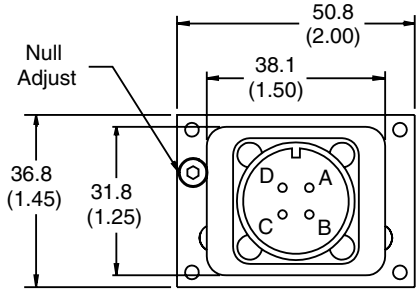
Frequency Response



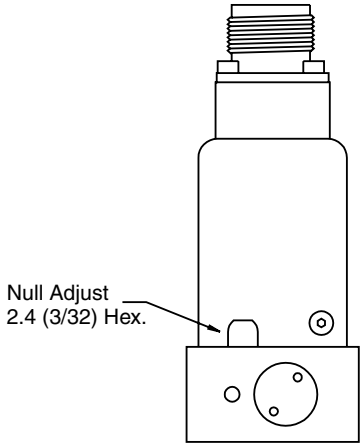


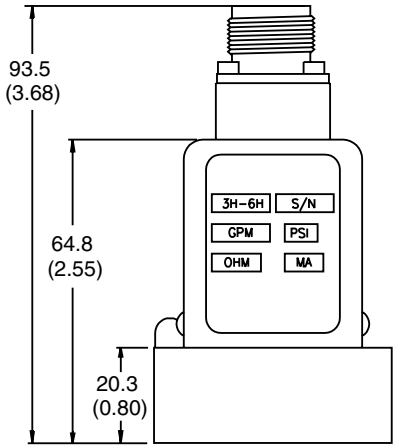
Inch equivalents for millimeter dimensions are shown in (**)





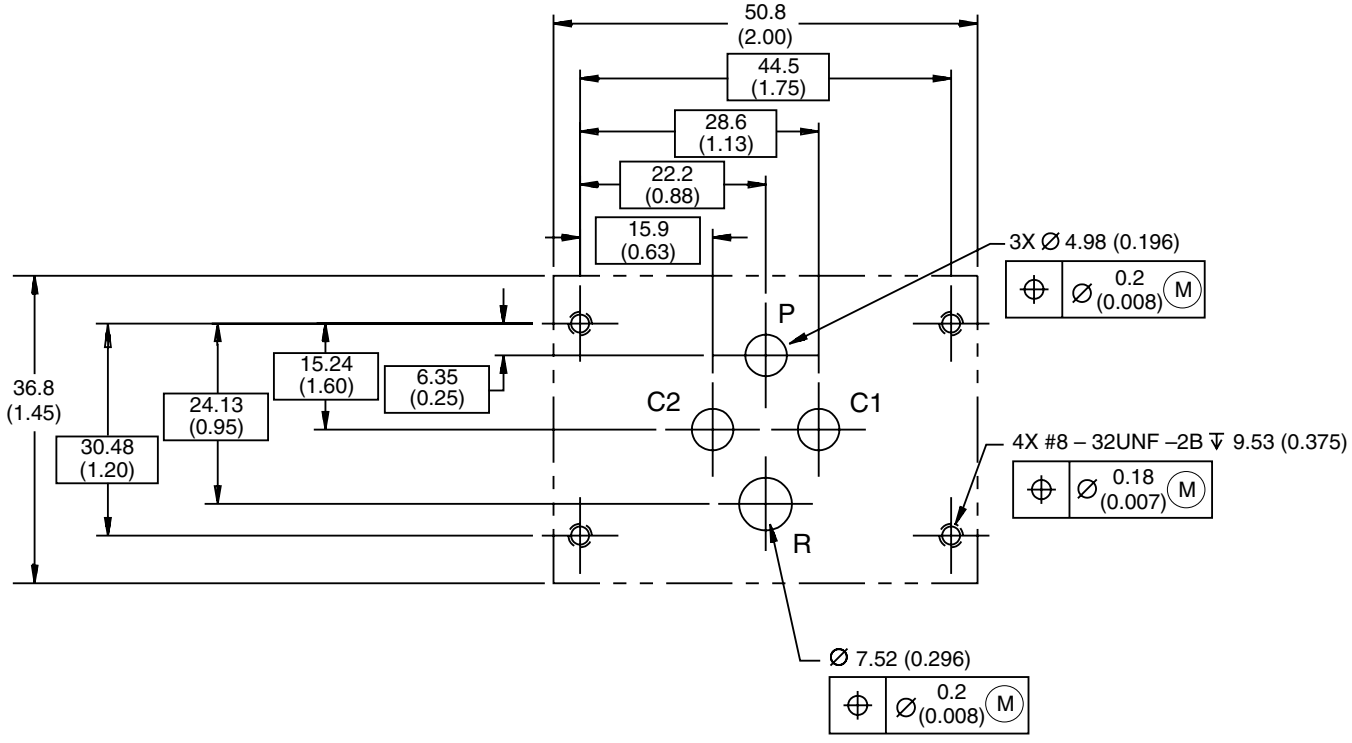
C





Mounting Interface

Inch equivalents for millimeter dimensions are shown in (**)

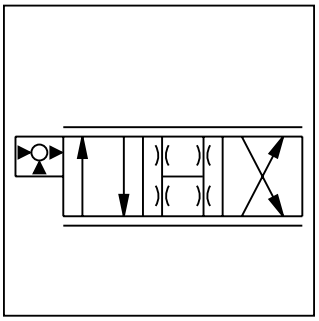


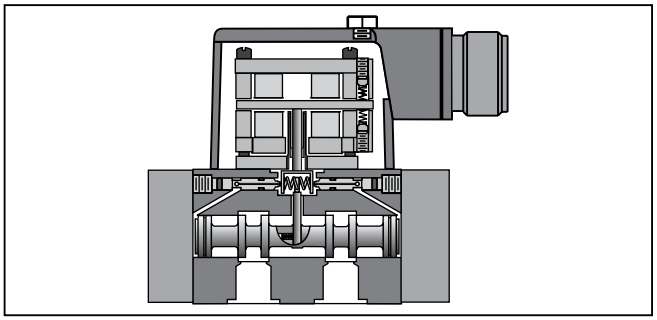
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series DY01 are two stage, 4-way, flapper and nozzle style servovalves. The DY01 servovalve combines a spool and sleeve construction, and a high frequency torque motor, for optimal performance. The unique rigid pin feedback design avoids ball glitch problems, which can occur in other types of servovalves. This valve is rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction or the optional stainless steel spool and body.

The DY01 servovalve was specially designed for high precision flight simulator applications.





Features

- Precision lapped spool and sleeve.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Versatile 21.59 mm (0.850 in.) port circle, can mount to standard 19.81 mm (0.780 in.) and 23.62 mm (0.930 in.) port circle patterns.

Specifications

Flow Rating @ 70 Bar (1000 PSID)	3 and 11 LPM (1 and 3 GPM)
Supply Pressure	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)
Leakage Flow @ 70 Bar (1000 PSID)	0.42 – 0.95 LPM (0.11 – 0.25 GPM)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Input Command	±50 mA std.
Frequency Response @ 90° phase shift	> 180 Hz (See Performance Curves)
Non-Linearity	≤ 10%
Threshold	≤ 0.5%

Null Shift with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Presssure Gain % change in pressure per 1% change in input command	30% Minimum, 70% Maximum
Step Response	10 – 90%, < 8 ms
Fluid	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
Operating Temperature	-1°C to + 82°C (+30°F to +180°F)
Protection Class	NEMA 4, IP65
Filtration	ISO 4406 15/12 or better

DY01 — Series | Material Options | Coils | Wiring | Seal | Operating Pressure | Flows | Special Options | Factory Code for Special Options

Code	Description
A	Steel (standard)
B	Stainless Steel
Z*	Special (specify)

* Material selection does not not affect operating pressure.

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
L	360 ohm	30 mA	15 mA
M	475 ohm	40 mA	20 mA
R	750 ohm	30 mA	15 mA
T	1000 ohm	10 mA	5 mA
V	1200 ohm	40 mA	20 mA
Z	Special (specify)		

Code	Connector over:	Flow P to C2 with:
C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z	Special (specify)	

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E *	EPR
Z *	Special (specify)

* Consult factory for delivery

Code	Description
A	210 Bar (3000 PSI)
B	350 Bar (5000 PSI)
Z	Special (specify)

Operating pressure is independent of material selection.

Code	Description
1	3.8 LPM (1 GPM)
1.5	5.7 LPM (1.5 GPM)
3	11 LPM (3 GPM)

Code	Description
Omit	Standard
D	(Specify) See list below

Weight: 1.0 kg (2.1 lbs.)

Special Options:

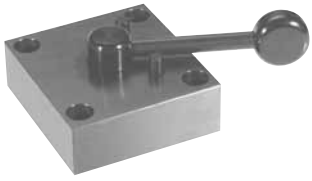
Consult factory for price, delivery and availability of special options.

Special coil
Special wiring
Special seals
Special flow rate
Dual flow rate
Dual gain
Zener barriers

Accessories

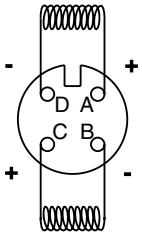
Cable with Mating Connector: EHC154S
Mating Connector: MS3106E-14S-2S
Bolt Kit: Included with valve
Flushing Valve: 11-0500
Subplate: 55-0100-8S SAE-8 Side ports
Null Adjust Tool: 6522A13
Electronic Drivers: 23-7030, BD90*, BD101*

When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.
* For output currents >15 mA



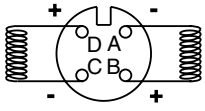
Flushing valve is rated for 3000 psi operation.

Wiring Option C
(Standard)



Polarity shown connects P to C2 port.

Wiring Option D

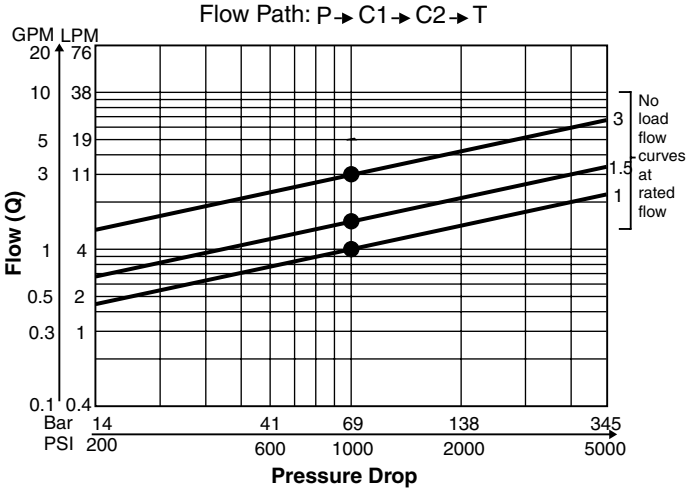


Moog, Atchley and Vickers standard.

Performance Curves

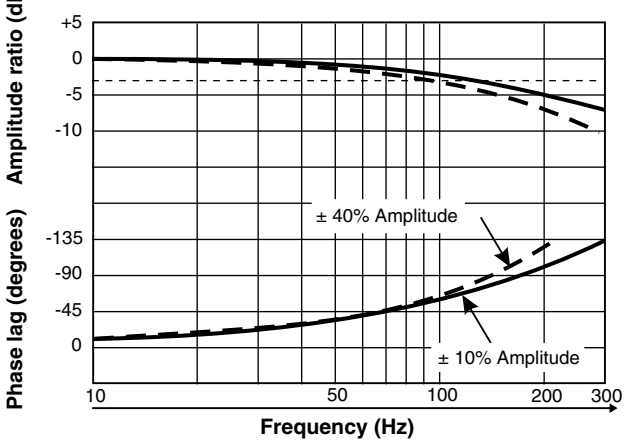
DY01 Flow vs. Pressure Drop

at 100% command
Flow Path: P → C1 → C2 → T



Frequency Response

DY01 at 3000 PSI

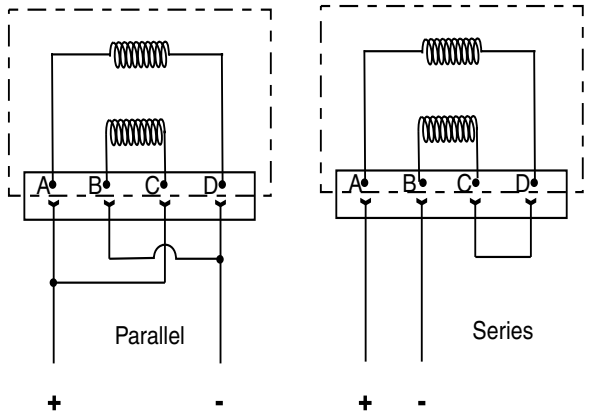


C

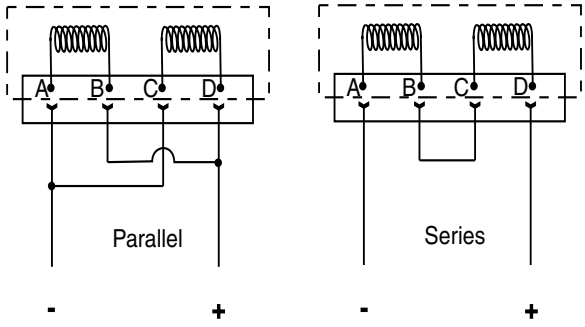
Installation Wiring Options

This servovalve has two coils. This illustration shows the internal wiring configurations for options C and D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

Option C

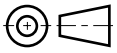


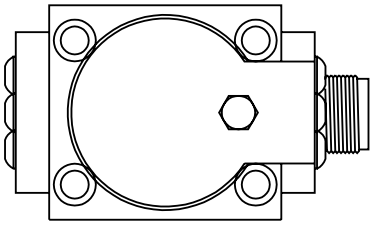
Option D



Polarity shown connects flow from P to C2 port.

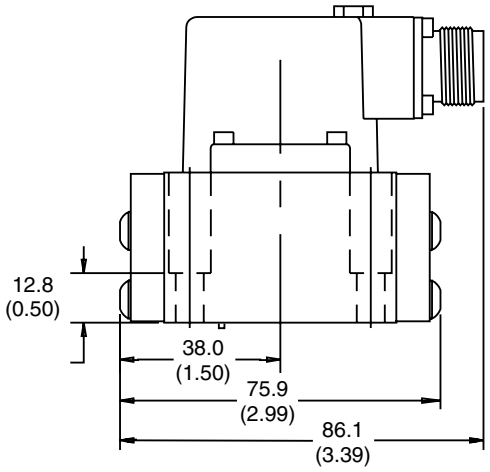
Inch equivalents for millimeter dimensions are shown in (**)

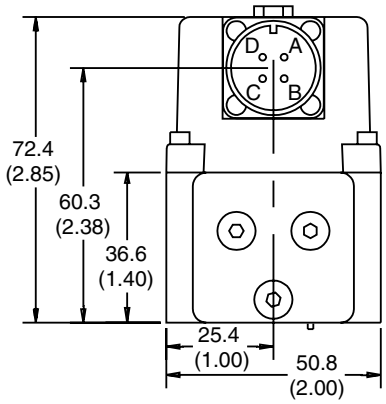




C

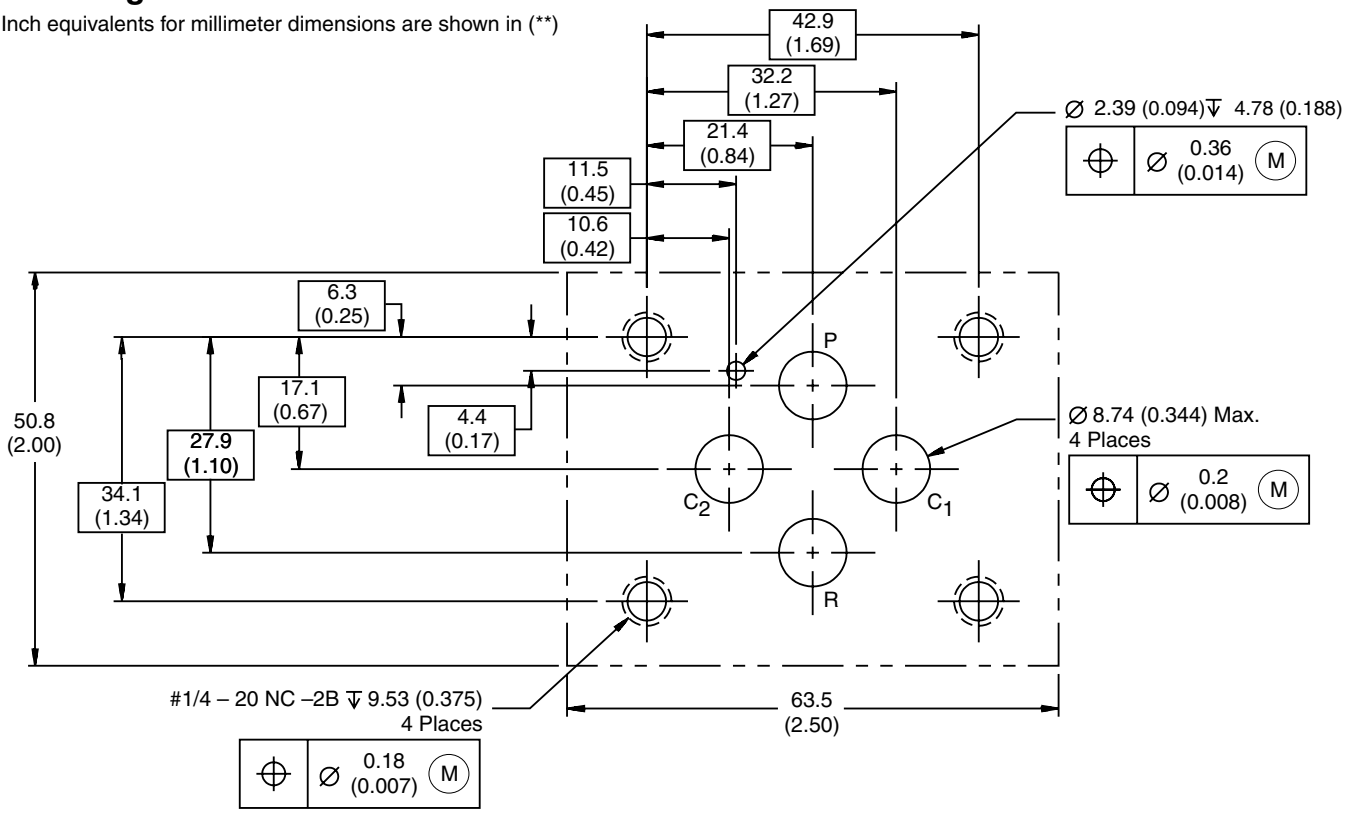
Connector over port C1





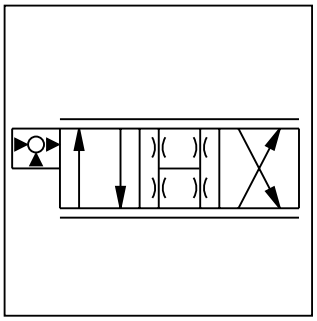
Mounting Interface

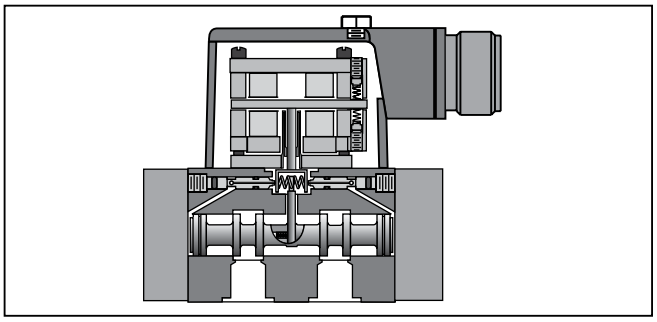
Inch equivalents for millimeter dimensions are shown in (**)



General Description

Series DY05 are two stage, 4-way, flapper and nozzle style servovalves. The DY05 has a wide range of flow ratings within a lower cost spool and body design. The unique rigid pin feedback design avoids ball glitch problems, which can occur in other types of servo-valves. These valves are rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction or the optional stainless steel spool and body.





Features

- Lapped spool and body.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Versatile 21.59 mm (0.850 in.) port circle, can mount to standard 19.81 mm (0.780 in.) and 23.62 mm (0.930 in.) port circle patterns.
- Survives high tank port pressures.

Specifications

Flow Rating @ 70 Bar (1000 PSID)	0.95, 1.9, 3.8. 9.5 and 19 LPM (0.25, 0.5, 1.0, 2.5 & 5 GPM)
Supply Pressure	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)
Leakage Flow @ 70 Bar (1000 PSID)	0.42 – 0.95 LPM (0.11 – 0.25 GPM)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Input Command	±50 mA std.
Frequency Response @ 90° phase shift	> 100 Hz (See Performance Curves)
Non-Linearity	≤ 10%
Threshold	≤ 0.5%

Null Shift with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Presssure Gain % change in pressure per 1% change in input command	30% minimum, 70% maximum
Step Response	10 – 90%, < 11 ms
Fluid	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
Operating Temperature	-1°C to +82°C (+30°F to +180°F)
Protection Class	NEMA 4, IP65
Filtration	ISO 4406 15/12 or better

DY05 — Series

□ Material Options

Code	Description
A	Steel (standard)
B	Stainless Steel
Z*	Special (specify)

* Material selection does not not affect operating pressure.

□ Coils

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
L	360 ohm	30 mA	15 mA
M	475 ohm	40 mA	20 mA
R	750 ohm	30 mA	15 mA
T	1000 ohm	10 mA	5 mA
V	1200 ohm	40 mA	20 mA
Z	Special (specify)		

□ Wiring

Code	Connector over:	Flow P to C2 with:
C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z	Special (specify)	

□ Seal

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E *	EPR
Z *	Special (specify)

* Consult factory for delivery

□ Operating Pressure

Code	Description
A	210 Bar (3000 PSI)
B	350 Bar (5000 PSI)
Z	Special (specify)

Operating pressure is independent of material selection.

□ Flows

Code	Description
0.25	0.95 LPM (0.25 GPM)
0.5	1.9 LPM (0.5 GPM)
1	3.8 LPM (1 GPM)
2.5	9.5 LPM (2.5 GPM)
5	19 LPM (5 GPM)

□ Special Options

Code	Description
Omit	Standard
D	(Specify) See list below

□□□□□ Factory Code for Special Options

Weight: 1.0 kg (2.1 lbs.)

Accessories

Cable with Mating Connector: EHC154S

Mating Connector: MS3106E-14S-2S

Bolt Kit: Included with Valve

Flushing Valve: 11-0500

Subplate: 55-0100-8S SAE-8 Side ports

Null Adjust Tool: 6522A13

Electronic Drivers: 23-7030, BD90*, BD101*

When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

* For output currents >15 mA

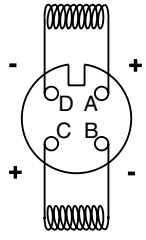
Flushing valve is rated for 3000 psi operation.

Special Options:

Consult factory for price, delivery and availability of special options.

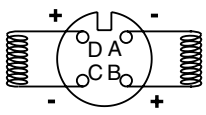
Special coil
Special wiring
Special seals
Special flow rate
Dual flow rate
Dual gain
Zener barriers
High frequency torque motor (Models 5, 10, 12 & 15 only)

Wiring Option C
(Standard)



Dyval and Pegasus standard.

Wiring Option D



Moog, Atchley and Vickers standard.

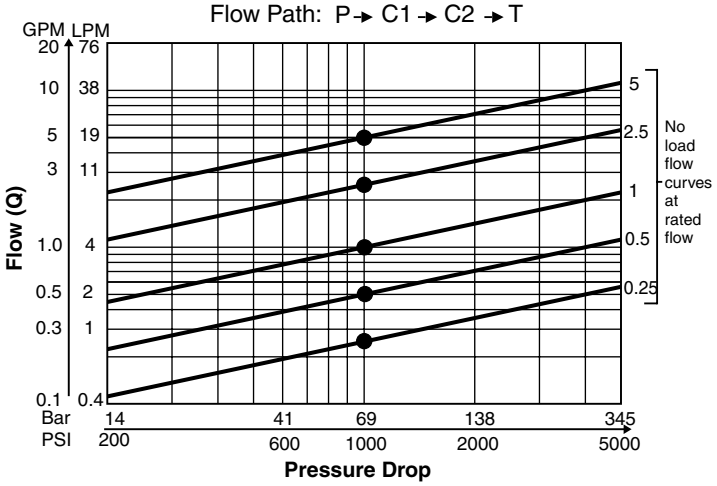
In both cases, polarity shown connects P to C2 port.

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Performance Curves

DY05 Flow vs. Pressure Drop

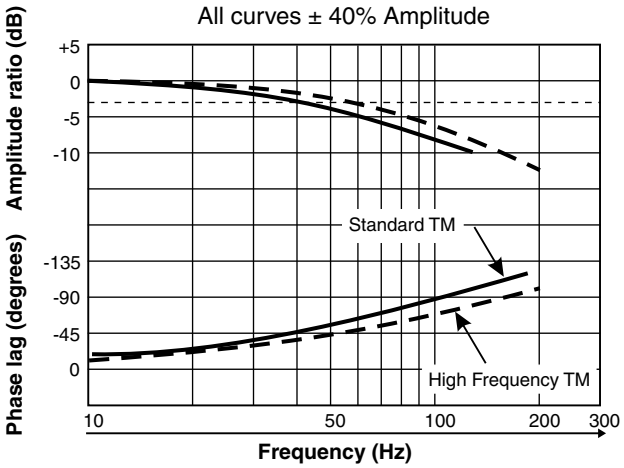
at 100% command
Flow Path: P → C1 → C2 → T



Frequency Response

DY05 at 3000 PSI

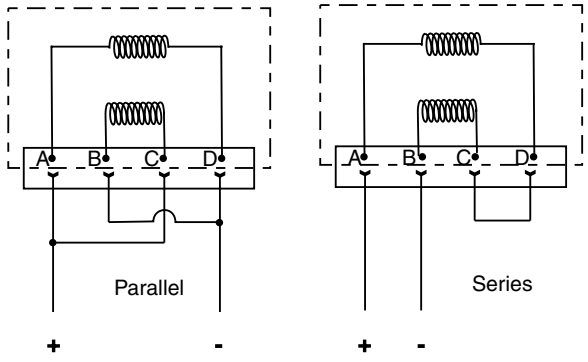
All curves ± 40% Amplitude



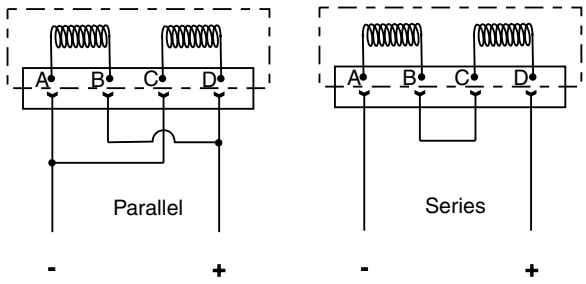
Installation Wiring Options

This servovalve has two coils. This illustration shows the internal wiring configurations for options C and D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

Option C

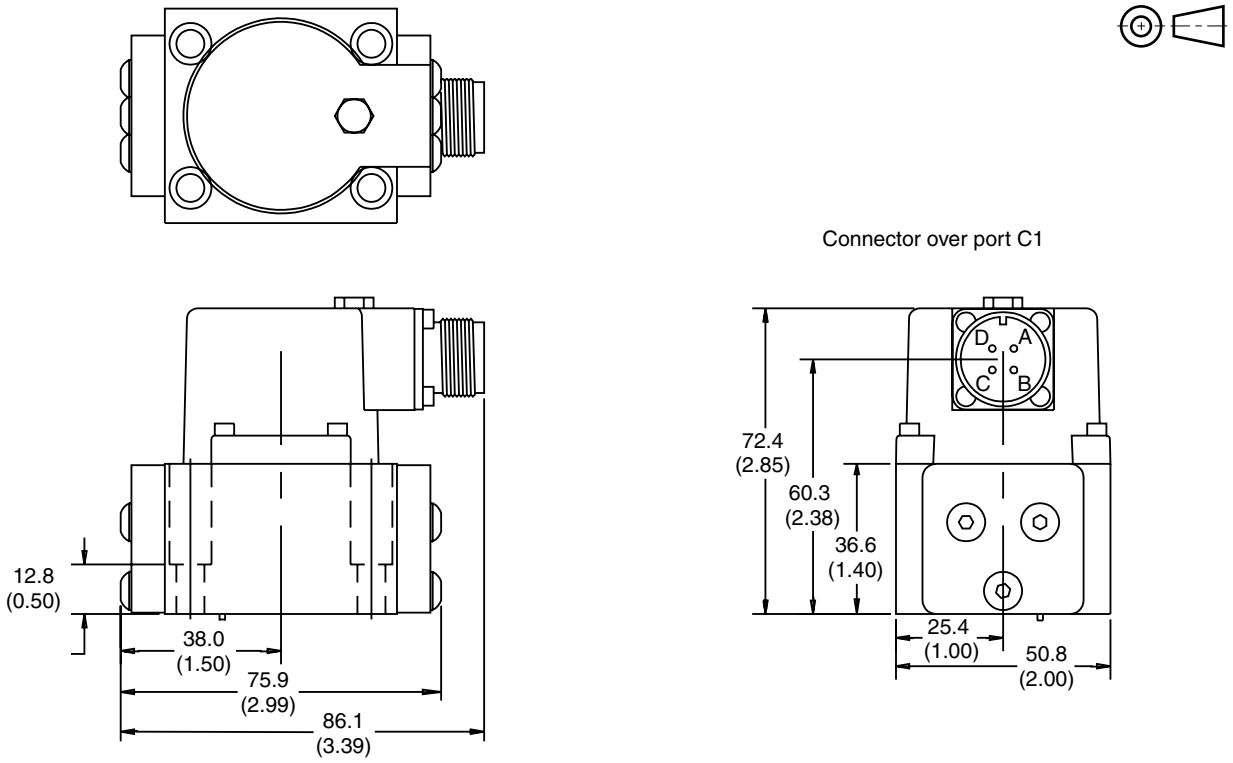


Option D



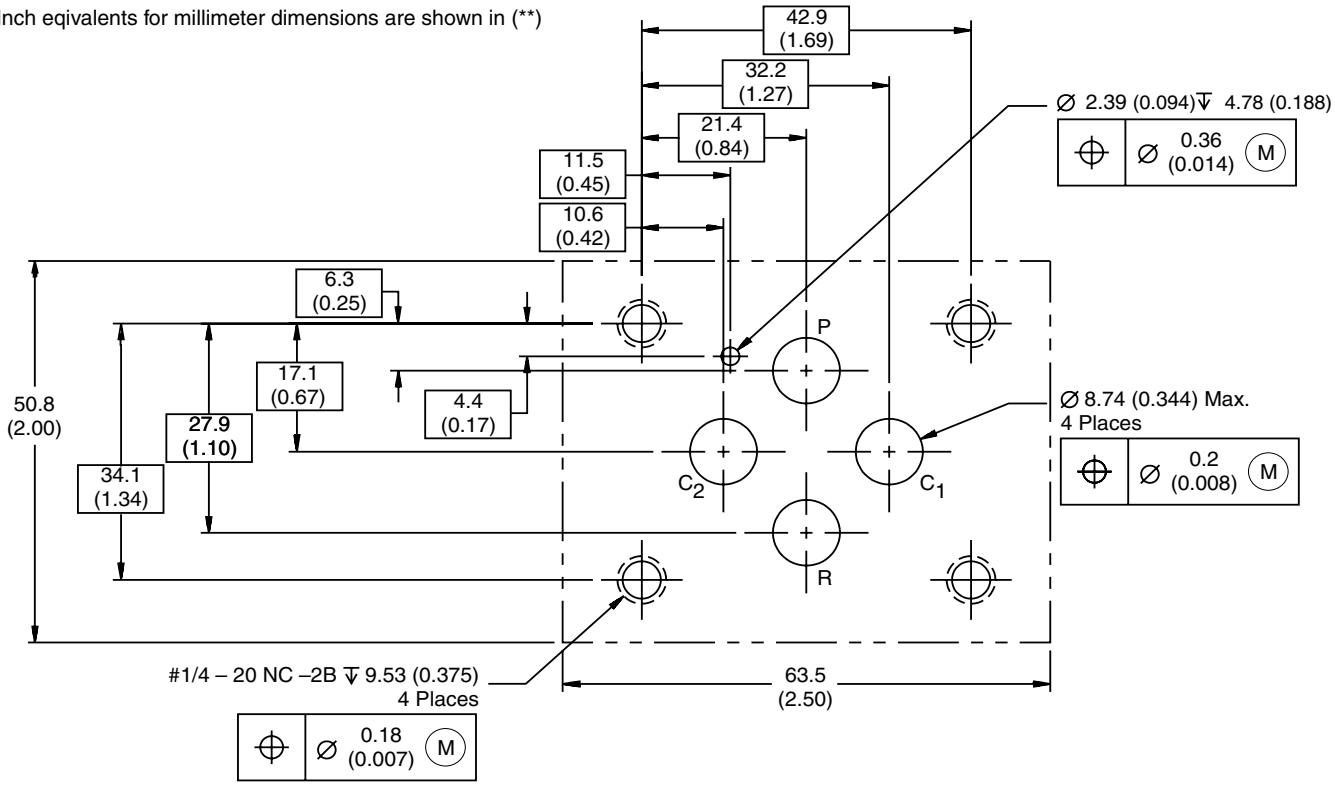
Polarity shown connects flow from P to C2 port.

Inch eqivalents for millimeter dimensions are shown in (**)



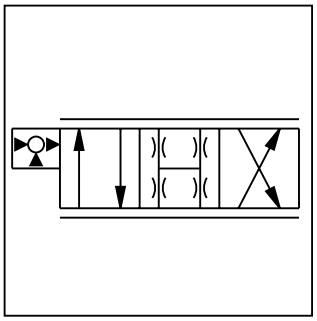
Mounting Interface

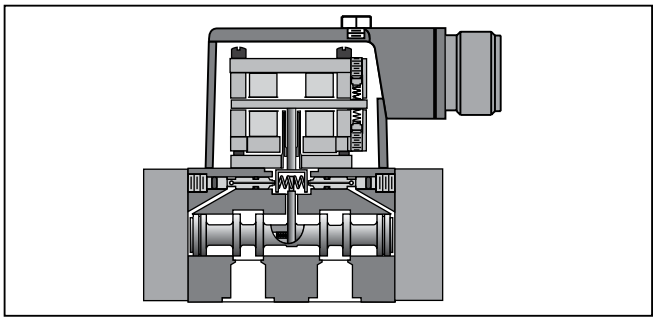
Inch eqivalents for millimeter dimensions are shown in (**)



General Description

Series DY10 are two stage, 4-way, flapper and nozzle style servovalves. The DY10 is a higher flow version of the DY05. The unique rigid pin feedback design avoids ball glitch problems, which can occur in other types of servovalves. These valves are rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction or the optional stainless steel spool and body.





Features

- Lapped spool and body.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Versatile 21.59 mm (0.850 in.) port circle, can mount to standard 19.81 mm (0.780 in.) and 23.62 mm (0.930 in.) port circle patterns.
- Survives high tank port pressures.

Specifications

Flow Rating @ 70 Bar (1000 PSID)	28 and 38 LPM (7.5 and 10 GPM)
Supply Pressure	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)
Leakage Flow @ 70 Bar (1000 PSID)	0.57 – 1.1 LPM (0.15 – 0.3 GPM)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Input Command	±50 mA std.
Frequency Response @ 90° phase shift	> 100 Hz (See Performance Curves)
Non-Linearity	≤ 10%
Threshold	≤ 0.5%

Null Shift with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Presssure Gain % change in pressure per 1% change in input command	30% minimum, 70% maximum
Step Response	10 – 90%, < 13 ms
Fluid	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
Operating Temperature	-1°C to +82°C (+30°F to +180°F)
Protection Class	NEMA 4, IP65
Filtration	ISO 4406 15/12 or better

DY10 — Series | Material Options | Coils | Wiring | Seal | Operating Pressure | Flows | Special Options | Factory Code for Special Options

Code	Description
Omit	Standard
D	(Specify) See list below

Code	Description
A	Steel (standard)
B	Stainless Steel
Z*	Special (specify)

* Material selection does not affect operating pressure.

Code	Description
7.5	28 LPM (7.5 GPM)
10	38 LPM (10 GPM)

Code	Description
A	210 Bar (3000 PSI)
B	350 Bar (5000 PSI)
Z	Special (specify)

Operating pressure is independent of material selection.

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
L	360 ohm	30 mA	15 mA
M	475 ohm	40 mA	20 mA
R	750 ohm	30 mA	15 mA
T	1000 ohm	10 mA	5 mA
V	1200 ohm	40 mA	20 mA
Z	Special (specify)		

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E *	EPR
Z *	Special (specify)

* Consult factory for delivery

Weight: 1.0 kg (2.1 lbs.)

Code	Connector over:	Flow P to C2 with:
C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z	Special (specify)	

Special Options:

Consult factory for price, delivery and availability of special options.

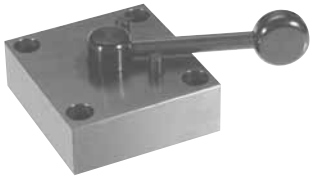
Special coil
Special wiring
Special seals
Special flow rate
Dual flow rate
Dual gain
Zener barriers
High frequency torque motor (Models 5, 10, 12 & 15 only)

Accessories

Cable with Mating Connector: EHC154S
Mating Connector: MS3106E-14S-2S
Bolt Kit: Included with valve
Flushing Valve: 11-0500
Subplate: 55-0100-8S SAE-8 Side ports
Null Adjust Tool: 6522A13
Electronic Drivers: 23-7030, BD90*, BD101*

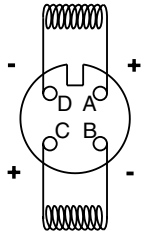
When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

* For output currents >15 mA



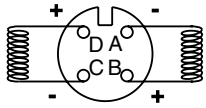
Flushing valve is rated for 3000 psi operation.

Wiring Option C
(Standard)



Dyval and Pegasus standard.

Wiring Option D



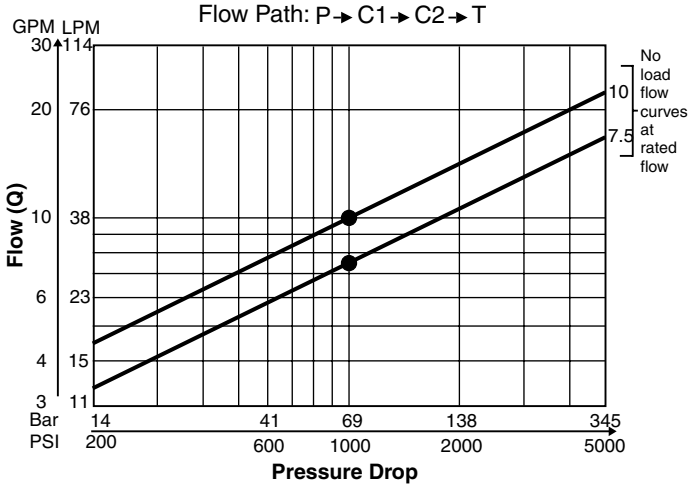
Moog, Atchley and Vickers standard.

In both cases, polarity shown connects P to C2 port.

Performance Curves

DY10 Flow vs. Pressure Drop

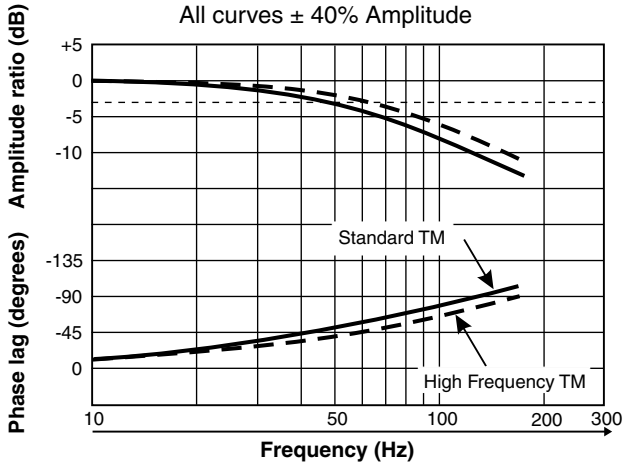
at 100% command
Flow Path: P→C1→C2→T



Frequency Response

DY10 at 3000 PSI

All curves ± 40% Amplitude

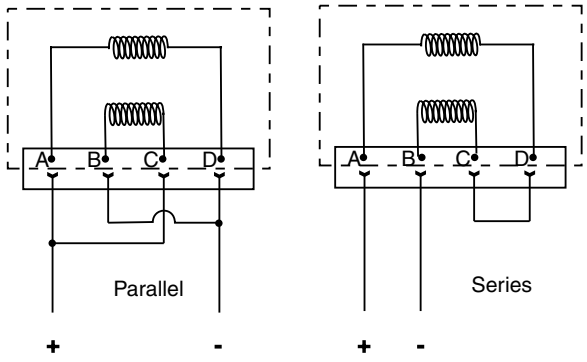


C

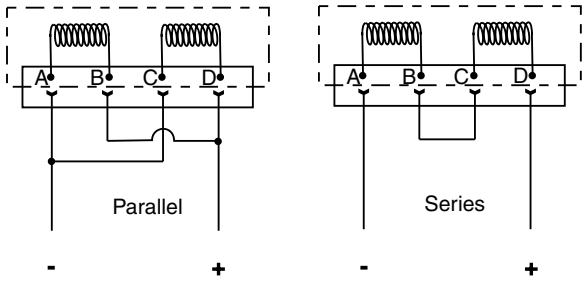
Installation Wiring Options

This servovalve has two coils. This illustration shows the internal wiring configurations for options C and D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

Option C



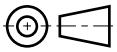
Option D

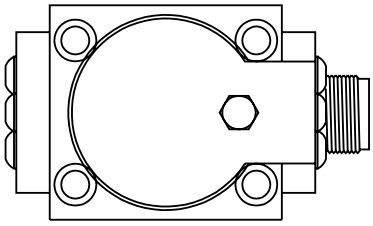


Polarity shown connects flow from P to C2 port.

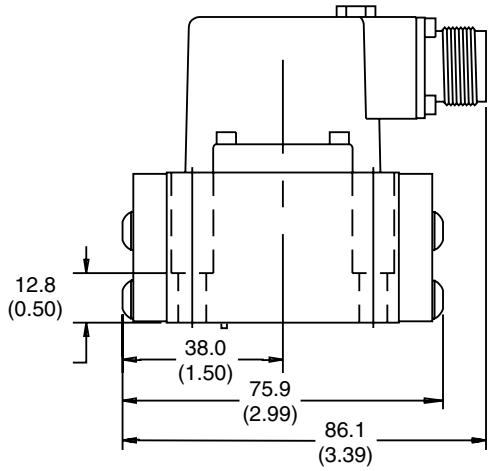
Inch equivalents for millimeter dimensions are shown in (**)

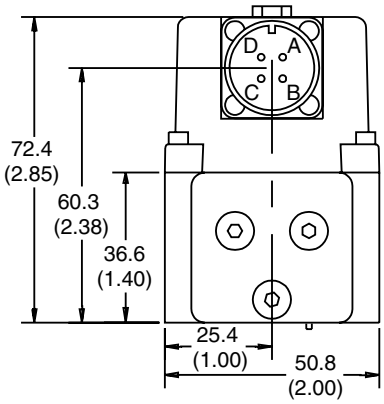
C





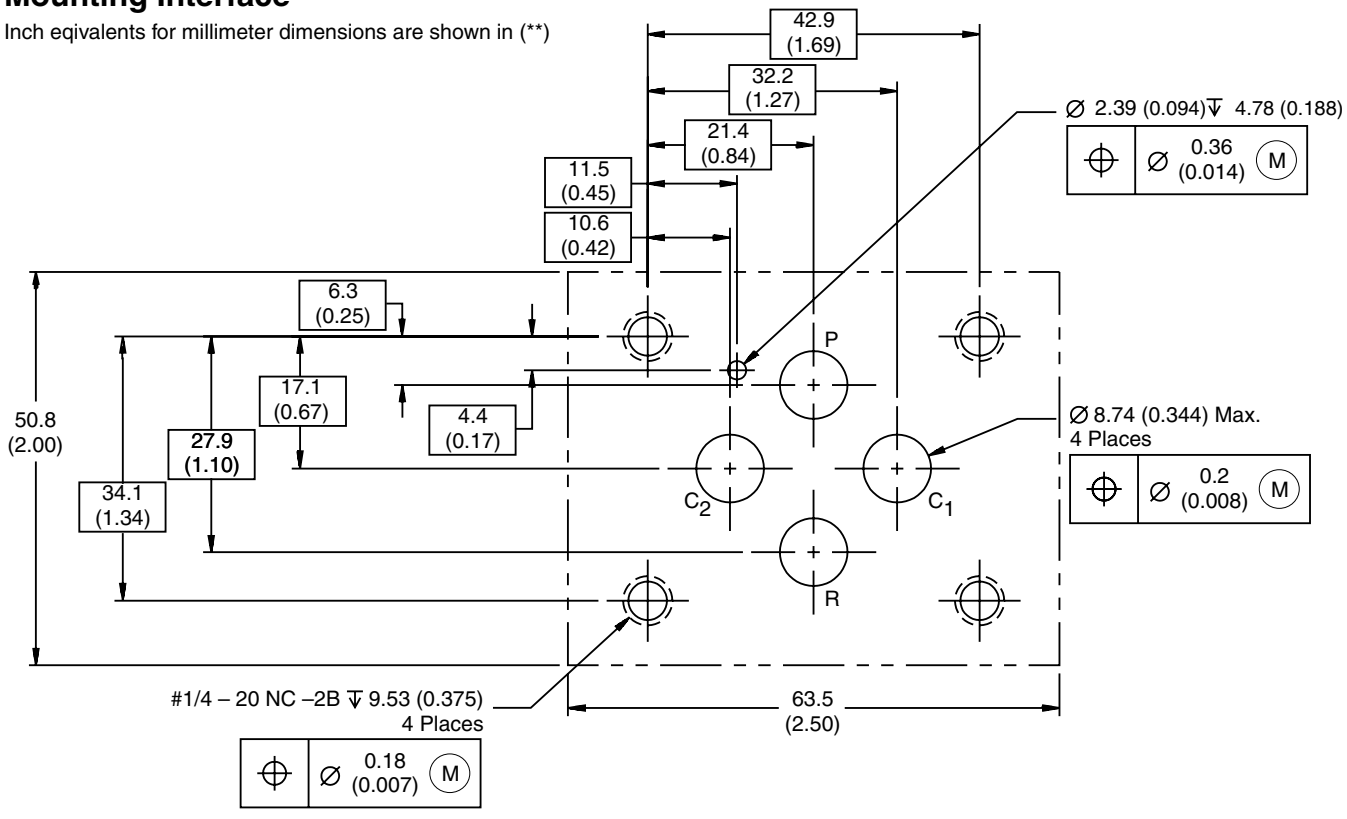
Connector over port C1





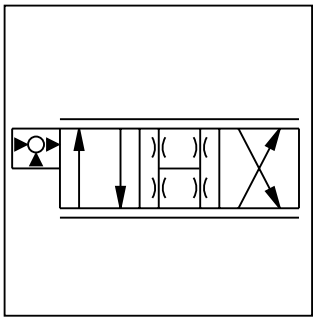
Mounting Interface

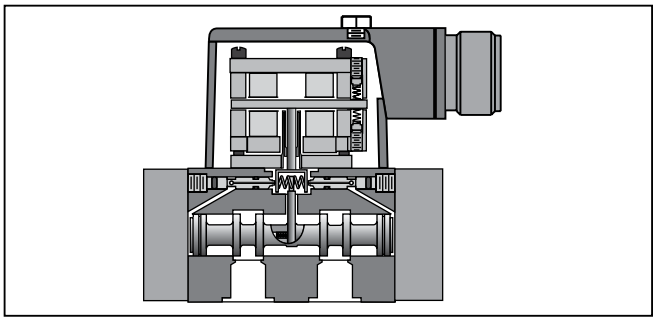
Inch eqivalents for millimeter dimensions are shown in (**)



General Description

Series DY12 are two stage, 4-way, flapper and nozzle style servovalves. They have the same port pattern and body as the DY10 valve, but have a longer spool stroke for higher flow. The unique rigid pin feedback design avoids ball glitch problems, which can occur in other types of servovalves. These valves are rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction or the optional stainless steel spool and body.





Features

- Lapped spool and body.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Nozzle and flapper design.
- Versatile 21.59 mm (0.850 in.) port circle, can mount to standard 19.81 mm (0.780 in.) and 23.62 mm (0.937 in.) port circle patterns.
- Survives high tank port pressures.

Specifications

Flow Rating @ 70 Bar (1000 PSID)	47 and 57 LPM (12.5 and 15 GPM)
Supply Pressure	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)
Leakage Flow @ 70 Bar (1000 PSID)	0.57 – 1.1 LPM (0.15 – 0.3 GPM)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Input Command	±50 mA std.
Frequency Response @ 90° phase shift	> 100 Hz (See Performance Curves)
Non-Linearity	≤ 10%
Threshold	≤ 0.5%

Null Shift with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Presssure Gain % change in pressure per 1% change in input command	30% minimum, 70% maximum
Step Response	10 – 90%, < 13 ms
Fluid	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
Operating Temperature	-1°C to +82°C (+30°F to +180°F)
Protection Class	NEMA 4, IP65
Filtration	ISO 4406 15/12 or better

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Hydraulic Valve Division
Elyria, Ohio, USA

DY12 — Series

□ Material Options

Code	Description
A	Steel (standard)
B	Stainless Steel
Z*	Special (specify)

* Material selection does not affect operating pressure.

□ Coils

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
L	360 ohm	30 mA	15 mA
M	475 ohm	40 mA	20 mA
R	750 ohm	30 mA	15 mA
T	1000 ohm	10 mA	5 mA
V	1200 ohm	40 mA	20 mA
Z	Special (specify)		

□ Wiring

Code	Connector over:	Flow P to C2 with:
C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z*	Special (specify)	

□ Seal

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E *	EPR
Z *	Special (specify)

* Consult factory for delivery

□ Operating Pressure

Code	Description
A	210 Bar (3000 PSI)
B	350 Bar (5000 PSI)
Z	Special (specify)

Operating pressure is independent of material selection.

□ Flows

Code	Description
12.5	47 LPM (12.5 GPM)
15	57 LPM (15 GPM)

□ Special Options

Code	Description
Omit	Standard
D	(Specify) See list below

□ □ □ □ □ Factory Code for Special Options

Weight: 1.0 kg (2.1 lbs.)

Special Options:

Consult factory for price, delivery and availability of special options.

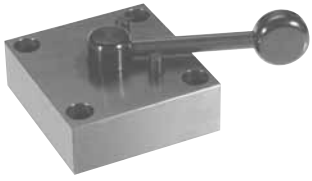
Special coil
Special wiring
Special seals
Special flow rate
Dual flow rate
Dual gain
Zener barriers
High frequency torque motor (Models 5, 10, 12 & 15 only)

Accessories

Cable with Mating Connector: EHC154S
Mating Connector: MS3106E-14S-2S
Bolt Kit: Included with valve
Flushing Valve: 11-0500
Subplate: 55-0100-8S SAE-8 Side ports
Null Adjust Tool: 6522A13
Electronic Drivers: 23-7030, BD90*, BD101*

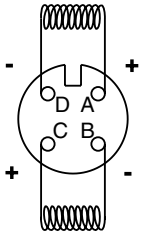
When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

* For output currents >15 mA



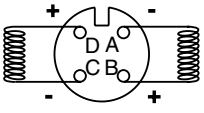
Flushing valve is rated for 3000 psi operation.

Wiring Option C
(Standard)



Dyval and Pegasus standard.

Wiring Option D

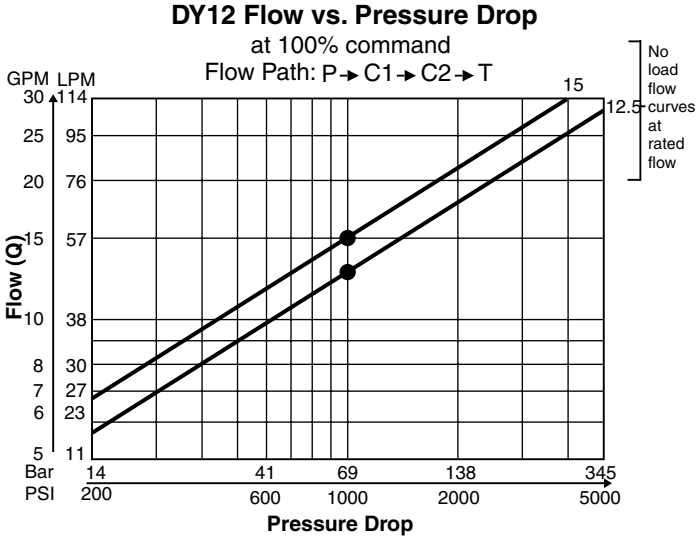


Moog, Atchley and Vickers standard.

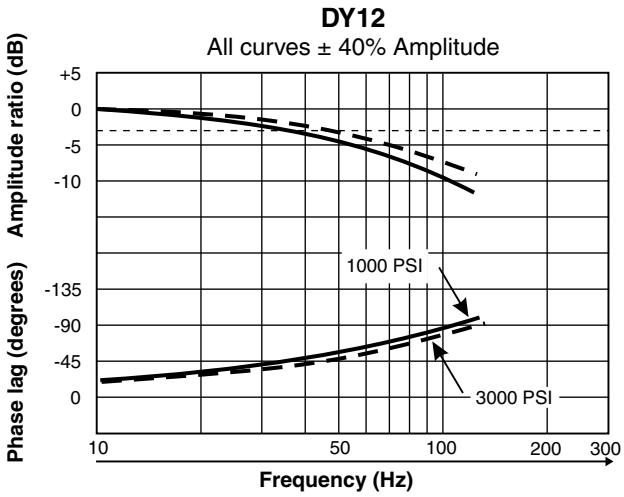
In both cases, polarity shown connects P to C2 port.

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Performance Curves

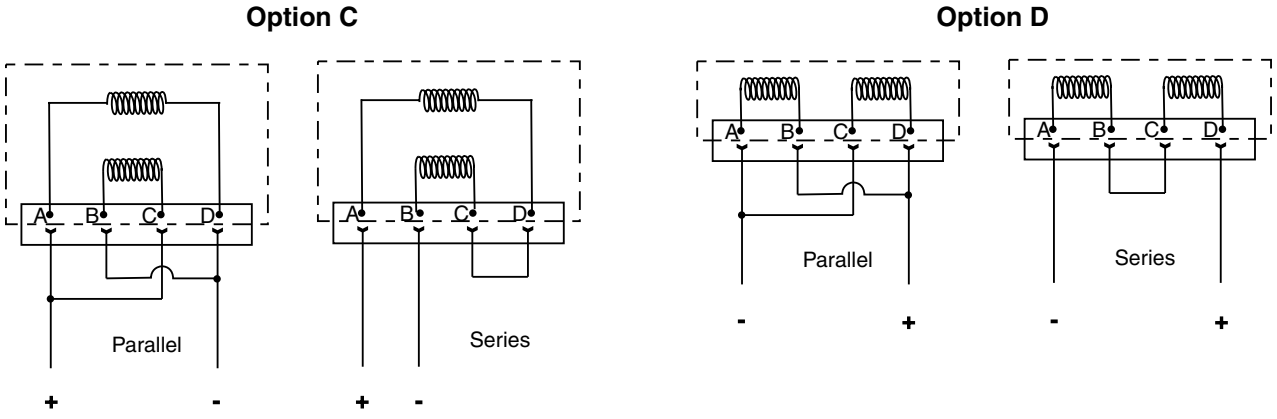


Frequency Response



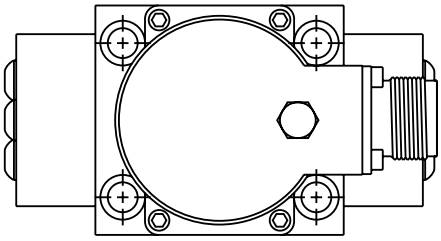
Installation Wiring Options

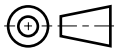
This servovalve has two coils. This illustration shows the internal wiring configurations for these valves. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustration below and to the mounting pattern for this valve to insure proper control phasing.



Polarity shown connects flow from P to C2 port.

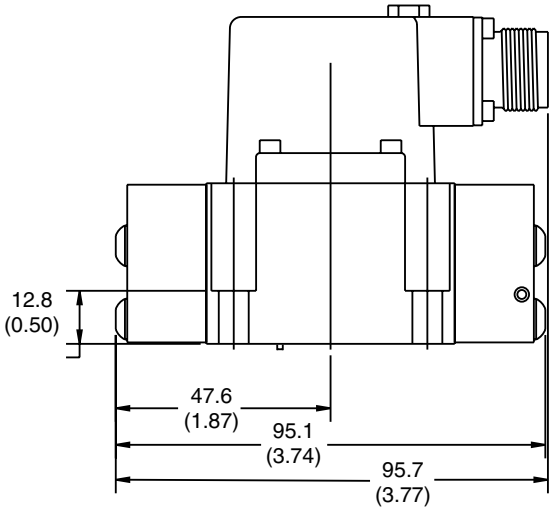
Inch equivalents for millimeter dimensions are shown in (**)

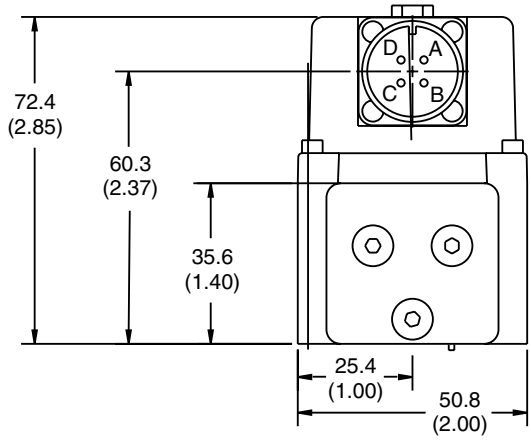




C

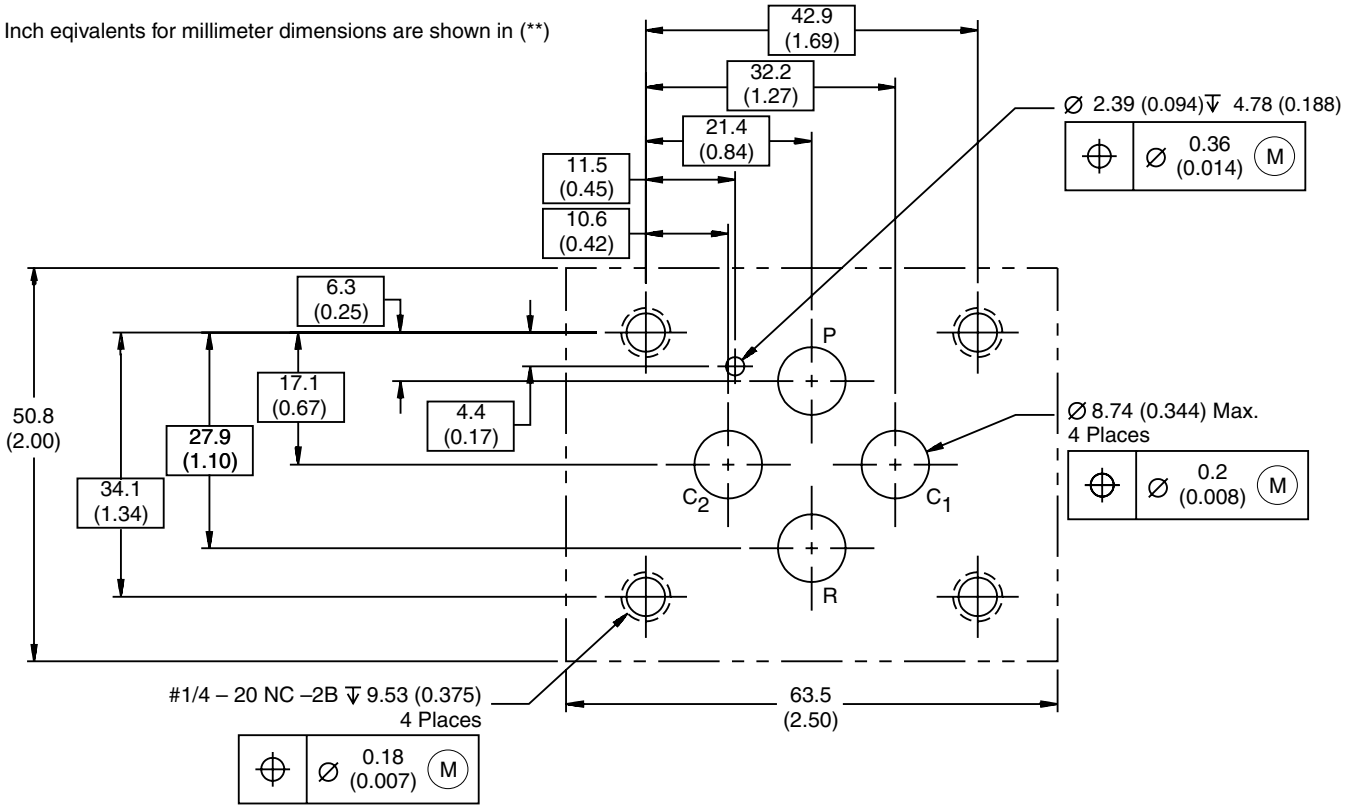
Connector over C1 port





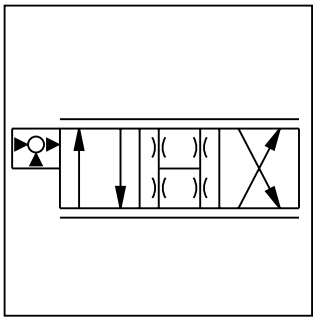
Mounting Interface

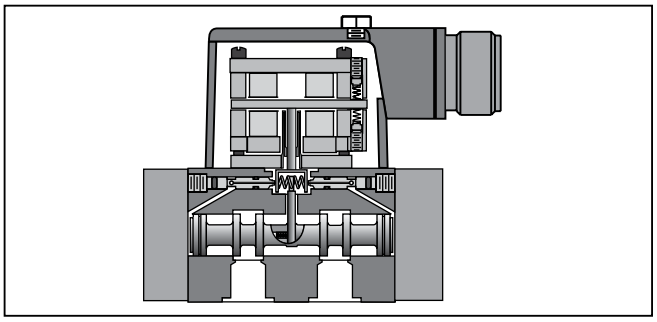
Inch eqivalents for millimeter dimensions are shown in (**)



General Description

Series DY15 are two stage, 4-way, flapper and nozzle style servovalves. This valve is rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction or the optional stainless steel spool and body.





Features

- Lapped spool and body.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Nozzle and flapper design.
- Unique port pattern (see next page). (1 in. port circle)
- Survives high tank port pressures.

Specifications

Flow Rating @ 70 Bar (1000 PSID)	57, 75 and 95 LPM (15, 20 and 25 GPM)
Supply Pressure	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)
Leakage Flow @ 70 Bar (1000 PSID)	0.95 – 1.7 LPM (0.25 – 0.45 GPM)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Input Command	±50 mA std.
Frequency Response @ 90° phase shift	> 45 Hz (See Performance Curves)
Non-Linearity	≤ 10%
Threshold	≤ 0.5%

Null Shift with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Presssure Gain % change in pressure per 1% change in input command	30% minimum, 70% maximum
Step Response	10 – 90%, < 18 ms < 18 ms up to 75 LPM (20 GPM) < 20 ms up to 95 LPM (25 GPM)
Fluid	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
Operating Temperature	-1°C to +82°C (+30°F to +180°F)
Protection Class	NEMA 4, IP65
Filtration	ISO 4406 15/12 or better

DY15 — Series | Material Options | Coils | Wiring | Seal | Operating Pressure | Flows | Special Options | Factory Code for Special Options

Code	Description
Omit	Standard
D	(Specify) See list below

Code	Description
A	Steel (standard)
B	Stainless Steel
Z*	Special (specify)

* Material selection does not affect operating pressure

Code	Description
15	57 LPM (15 GPM)
20	76 LPM (20 GPM)
25	95 LPM (25 GPM)

Code	Description
A	210 Bar (3000 PSI)
B	350 Bar (5000 PSI)
Z	Special (specify)

Operating pressure is independent of material selection.

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
L	360 ohm	30 mA	15 mA
M	475 ohm	40 mA	20 mA
R	750 ohm	30 mA	15 mA
T	1000 ohm	10 mA	5 mA
V	1200 ohm	40 mA	20 mA
Z	Special (specify)		

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E *	EPR
Z *	Special (specify)

* Consult factory for delivery

Weight: 1.8 kg (3.9 lbs.)

Code	Connector over:	Flow P to C2 with:
C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z	Special (specify)	

Special Options:

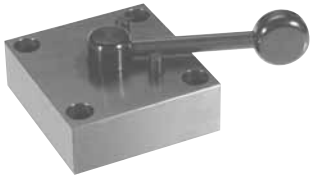
Consult factory for price, delivery and availability of special options.

Special coil
Special wiring
Special seals
Special flow rate
Dual flow rate
Dual gain
Zener barriers
High frequency torque motor (Models 5, 10, 12 & 15 only)

Accessories

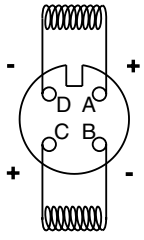
Cable with Mating Connector: EHC154S
Mating Connector: MS3106E-14S-2S
Bolt Kit: Included with valve
Flushing Valve: 11-0600
Subplate: 55-0300-2 SAE-16 Side ports
Null Adjust Tool: 6522A13
Electronic Drivers: 23-7030, BD90*, BD101*

When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.
* For output currents >15 mA



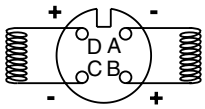
Flushing valve is rated for 3000 psi operation.

Wiring Option C
(Standard)



Dyval and Pegasus standard.

Wiring Option D

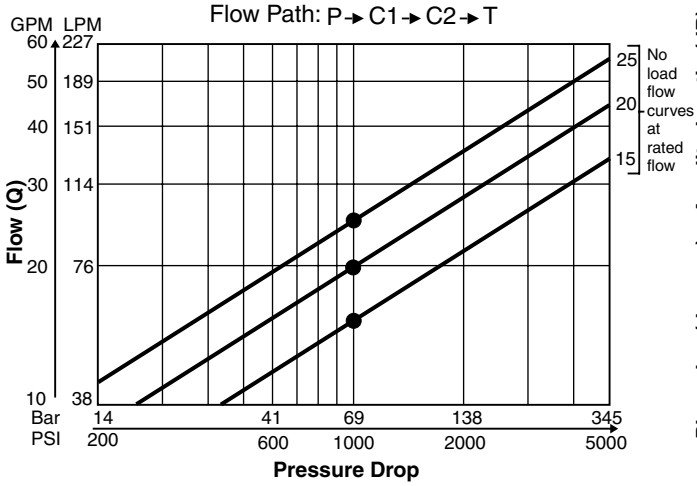


Moog, Atchley and Vickers standard.

In both cases, polarity shown connects P to C2 port.

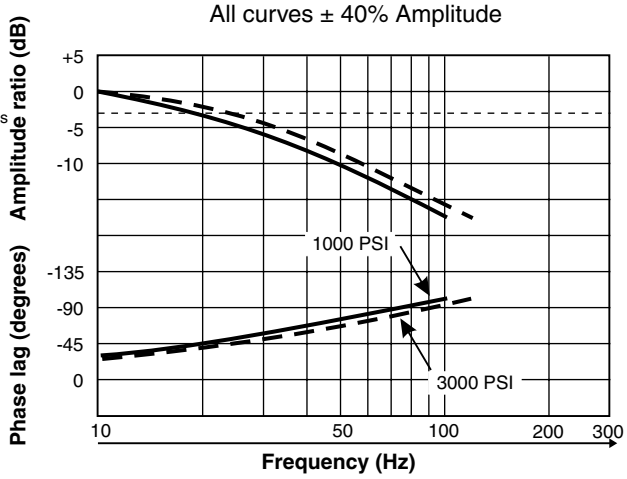
Performance Curves

DY15 Flow vs. Pressure Drop
at 100% command
Flow Path: P→C1→C2→T



Frequency Response

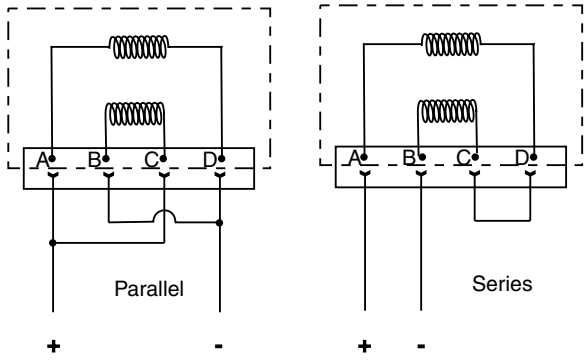
DY15
All curves ± 40% Amplitude



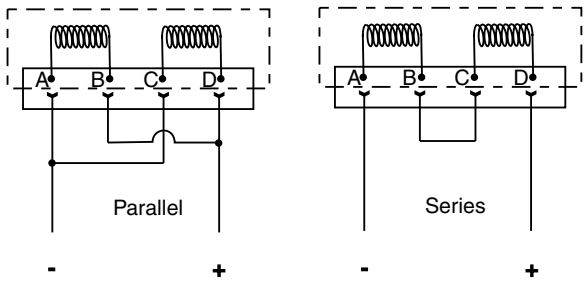
Installation Wiring Options

This servovalve has two coils. This illustration shows the internal wiring configurations for options C and D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

Option C



Option D



Polarity shown connects flow from P to C2 port.

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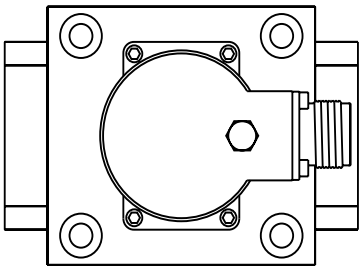
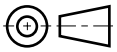
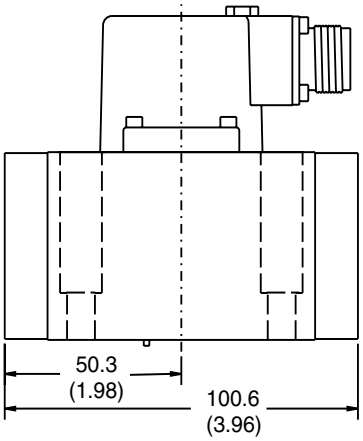
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

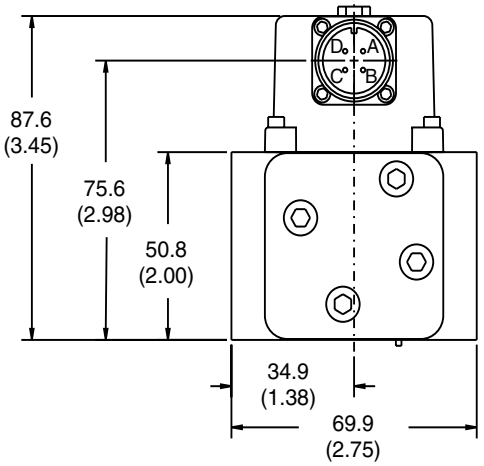




C

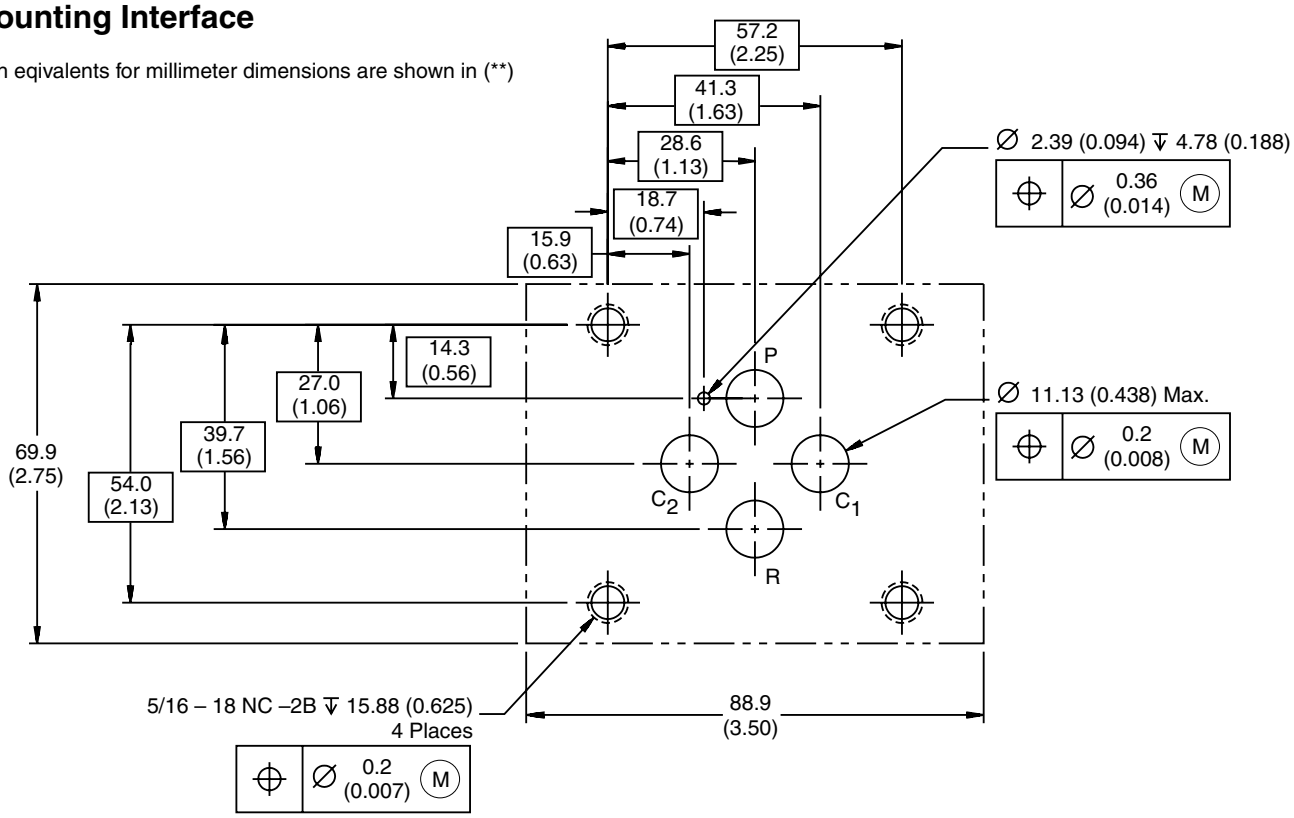


Connector over port C1



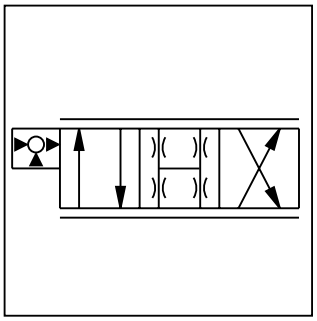
Mounting Interface

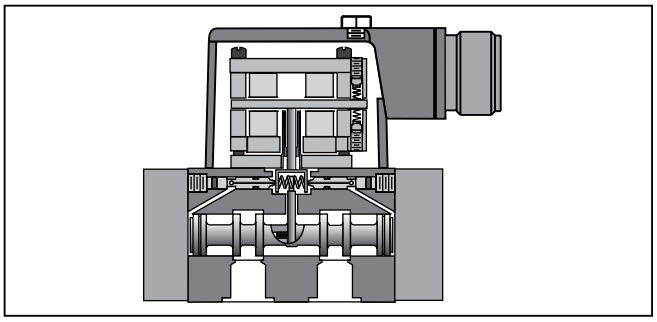
Inch eqivalents for millimeter dimensions are shown in (**)



General Description

Series DY25 are two stage, 4-way, flapper and nozzle style servovalves. They have the same port pattern and body dimensions as the DY15, but use a higher force torque motor pilot. These valves are rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction, and the optional stainless steel spool and body.





Features

- Lapped spool and body.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Nozzle and flapper design.
- Unique port pattern (see next page). (1 in. port circle)
- Survives high tank port pressures.

Specifications

Flow Rating @ 70 Bar (1000 PSID)	57 and 75 LPM (25 and 30 GPM)
Supply Pressure	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)
Leakage Flow @ 70 Bar (1000 PSID)	0.95 – 1.7 LPM (0.25 – 0.45 GPM)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Input Command	±50 mA std.
Frequency Response @ 90° phase shift	> 35 Hz (See Performance Curves)
Non-Linearity	≤ 10%
Threshold	≤ 0.5%

Null Shift with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Presssure Gain % change in pressure per 1% change in input command	30% minimum, 70% maximum
Step Response	10 – 90%, < 18 ms @ 95 LPM (25 GPM) < 20 ms @ 114 LPM (30 GPM)
Fluid	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
Operating Temperature	-1°C to +82°C (+30°F to +180°F)
Protection Class	NEMA 4, IP65
Filtration	ISO 4406 15/12 or better

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

C

DY25 — Series

□ Material Options

Code	Description
A	Steel (standard)
B	Stainless Steel
Z*	Special (specify)

* Material selection does not affect operating pressure

□ Coils

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
R	750 ohm	30 mA	15 mA
Z	Special (specify)		

□ Wiring

Code	Connector over:	Flow P to C2 with:
C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z	Special (specify)	

□ Seal

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E *	EPR
Z *	Special (specify)

* Consult factory for delivery

□ Operating Pressure

Code	Description
A	210 Bar (3000 PSI)
B	350 Bar (5000 PSI)
Z	Special (specify)

Operating pressure is independent of material selection.

□ Flows

Code	Description
25	95 LPM (25 GPM)
30	114 LPM (30 GPM)

□ Special Options

Code	Description
Omit	Standard
D	(Specify) See list below

□□□□□ Factory Code for Special Options

Weight: 1.9 kg (4.2 lbs.)

Special Options:

Consult factory for price, delivery and availability of special options.

Special coil
Special wiring
Special seals
Special flow rate
Dual flow rate
Dual gain
Zener barriers

Accessories

Cable with Mating Connector: EHC154S

Mating Connector: MS3106E-14S-2S

Bolt Kit: Included with valve

Flushing Valve: 11-0600

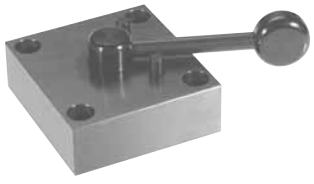
Subplate: 55-0300-2 SAE-16 Side ports

Null Adjust Tool: 6522A13

Electronic Drivers: 23-7030, BD90*, BD101*

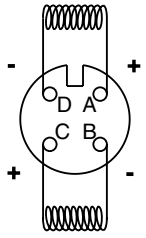
When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

* For output currents >15 mA



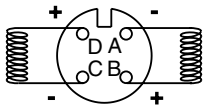
Flushing valve is rated for 3000 psi operation.

Wiring Option C
(Standard)



Dyval and Pegasus standard.

Wiring Option D



Moog, Atchley and Vickers standard.

In both cases, polarity shown connects P to C2 port.

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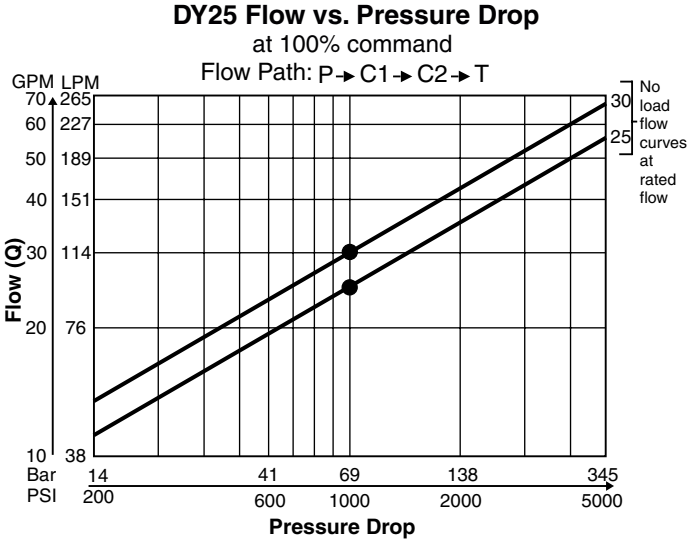
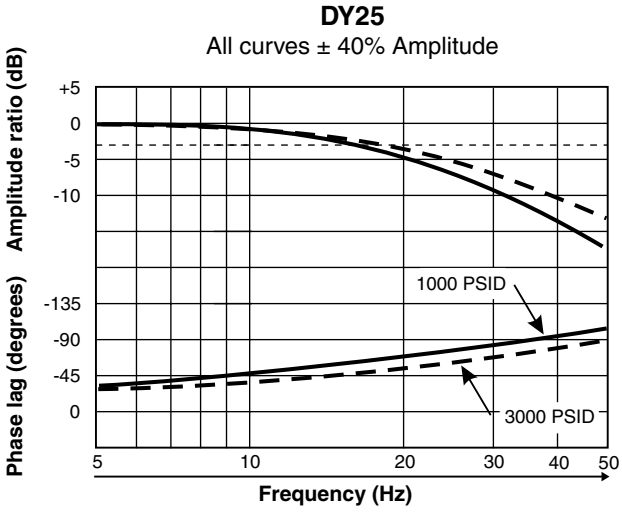
Elyria, Ohio, USA

Performance Curves

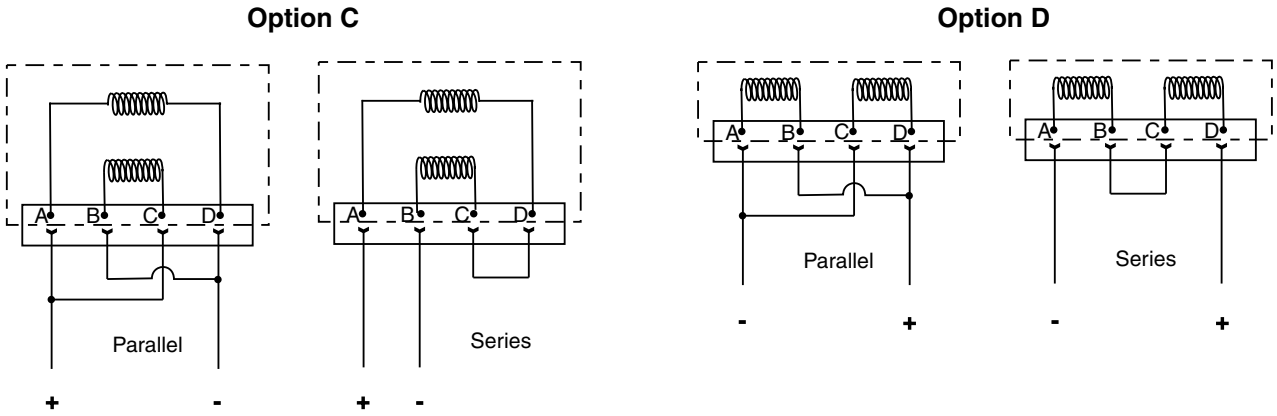


Frequency Response



Installation Wiring Options

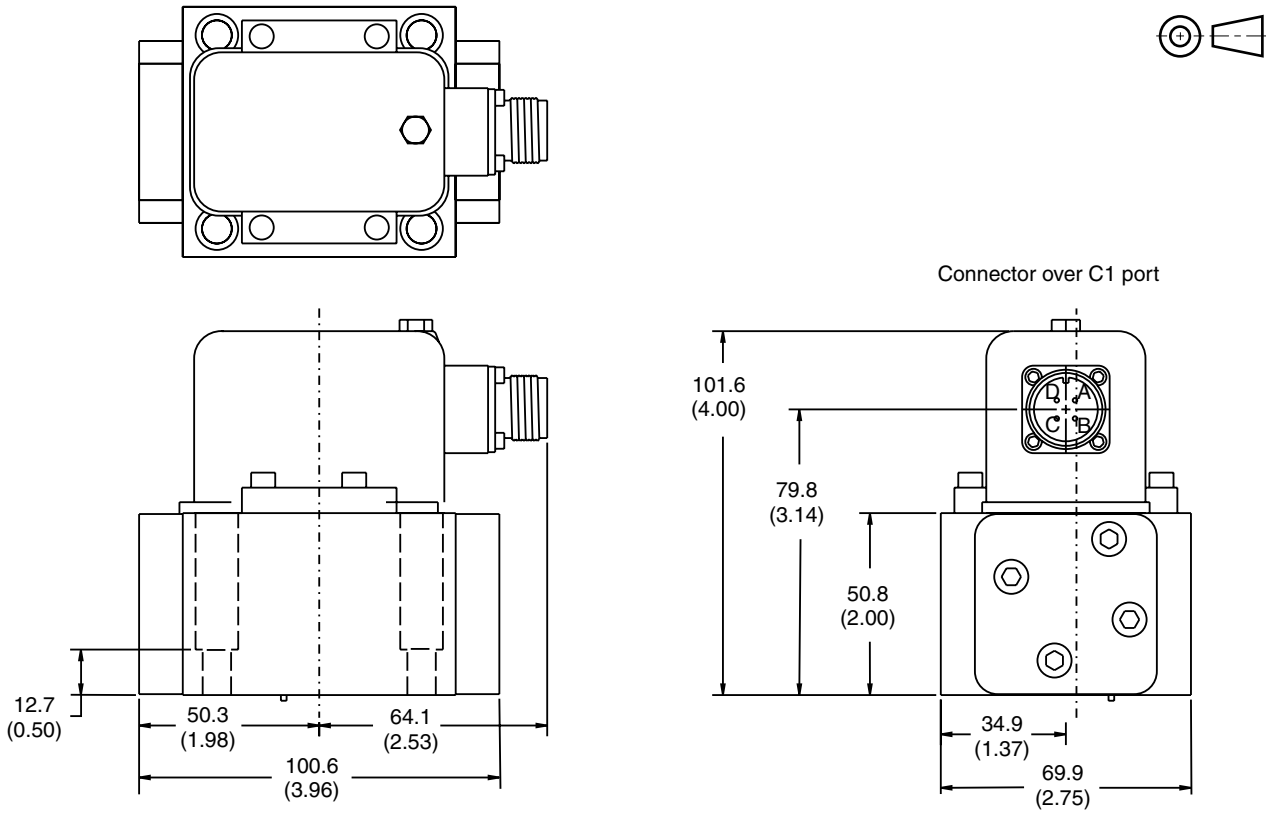
This servovalve has two coils. This illustration shows the internal wiring configurations for options C and D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.



Polarity shown connects flow from P to C2 port.

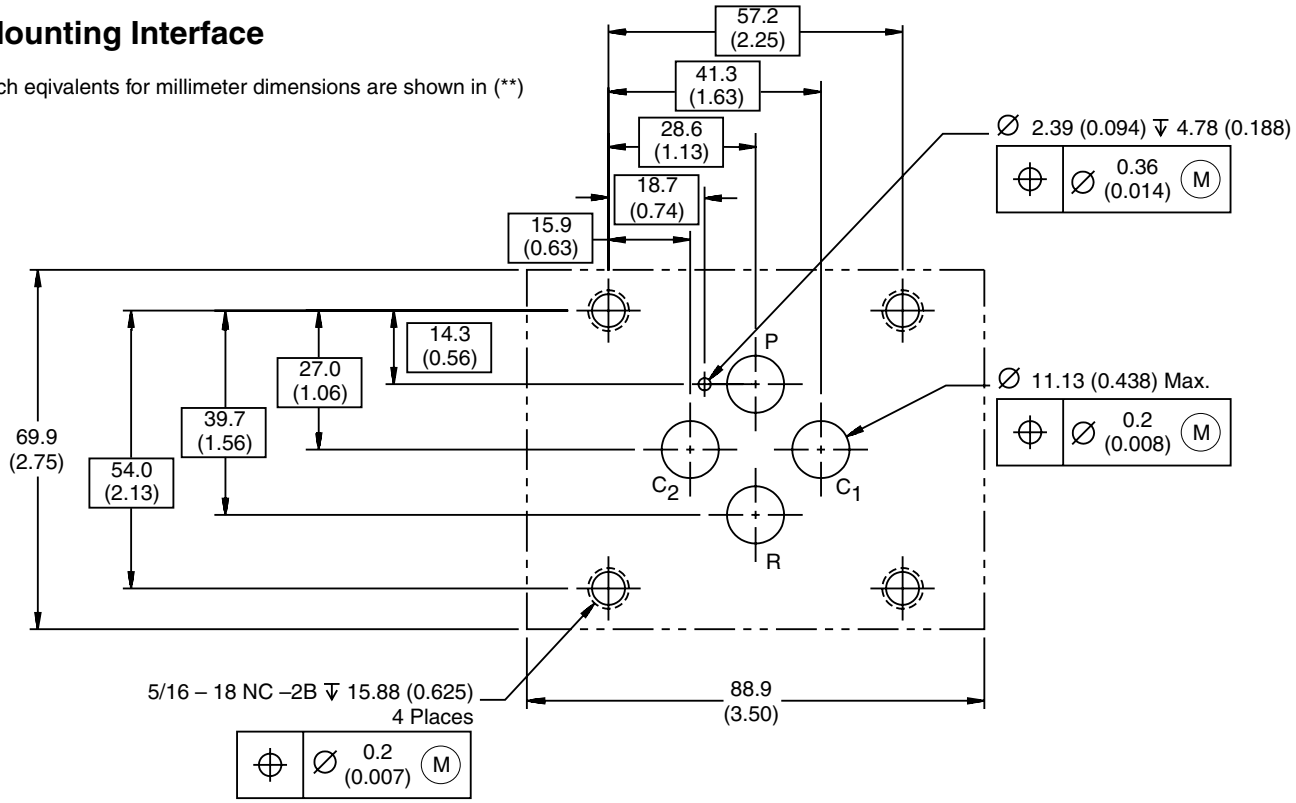
Inch equivalents for millimeter dimensions are shown in (**)

C



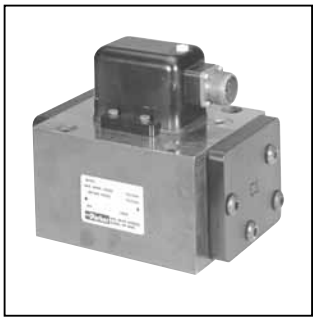
Mounting Interface

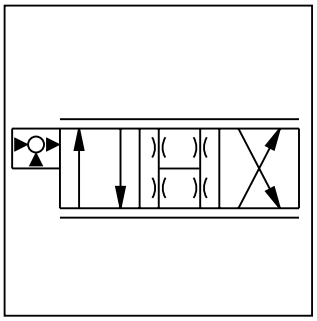
Inch eqivalents for millimeter dimensions are shown in (**)

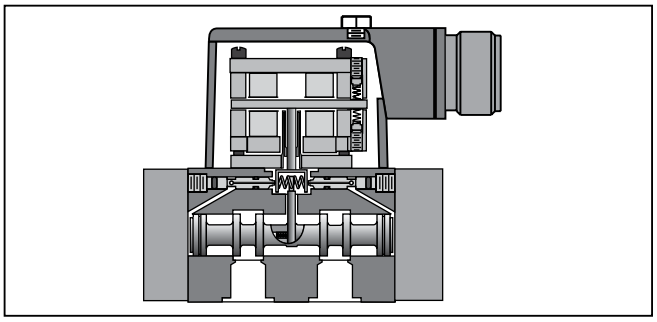


General Description

Series DY45 are two stage, 4-way, flapper and nozzle style servovalves. These valves are rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction, and the optional stainless steel spool and body.







Features

- Lapped spool and body.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Nozzle and flapper design.
- Unique port pattern (see mounting pattern). (1.8” port circle)
- Survives high tank port pressures.

Specifications

Flow Rating @ 70 Bar (1000 PSID)	150, 190 and 225 LPM (40, 50 and 60 GPM)
Supply Pressure	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)
Leakage Flow @ 70 Bar (1000 PSID)	1.3 – 2.7 LPM (0.35 – 0.70 GPM)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Input Command	±50 mA std.
Frequency Response @ 90° phase shift	> 30 Hz at ±10% amplitude
Non-Linearity	≤ 10%
Threshold	≤ 0.5%

Null Shift with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Presssure Gain % change in pressure per 1% change in input command	30% minimum, 70% maximum
Step Response	10 – 90%, < 25 ms
Fluid	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
Operating Temperature	-1°C to +82°C (+30°F to +180°F)
Protection Class	NEMA 4, IP65
Filtration	ISO 4406 15/12 or better

DY45 — Series

□ Material Options

Code	Description
A	Steel (standard)
B	Stainless Steel
Z*	Special (specify)

* Material selection does not affect operating pressure

□ Coils

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
R	750 ohm	30 mA	15 mA
Z	Special (specify)		

□ Wiring

Code	Connector over:	Flow P to C2 with:
C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z	Special (specify)	

□ Seal

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E *	EPR
Z *	Special (specify)

* Consult factory for delivery

□ Operating Pressure

Code	Description
A	210 Bar (3000 PSI)
B	350 Bar (5000 PSI)
Z	Special (specify)

Operating pressure is independent of material selection.

□ Flows

Code	Description
40	150 LPM (40 GPM)
50	190 LPM (50 GPM)
60	225 LPM (60 GPM)

□ Special Options

Code	Description
Omit	Standard
D	(Specify) See list below

□□□□□ Factory Code for Special Options

Weight: .3 kg (16.0 lbs.)

Special Options:

Consult factory for price, delivery and availability of special options.

Special coil
Special wiring
Special seals
Special flow rate
Dual flow rate
Dual gain
Zener barriers

Accessories

Cable with Mating Connector: EHC154S

Mating Connector: MS3106E-14S-2S

Bolt Kit: Included with valve

Flushing Valve: 11-0700

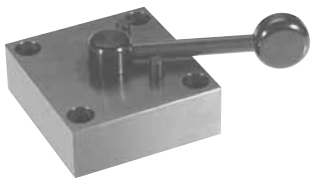
Subplate: 55-0200-2 SAE-24 Side ports

Null Adjust Tool: 6522A13

Electronic Drivers: 23-7030, BD90*, BD101*

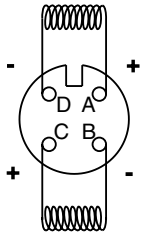
When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

* For output currents >15 mA



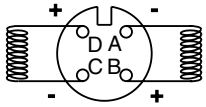
Flushing valve is rated for 3000 psi operation.

Wiring Option C
(Standard)



Dyval and Pegasus standard.

Wiring Option D



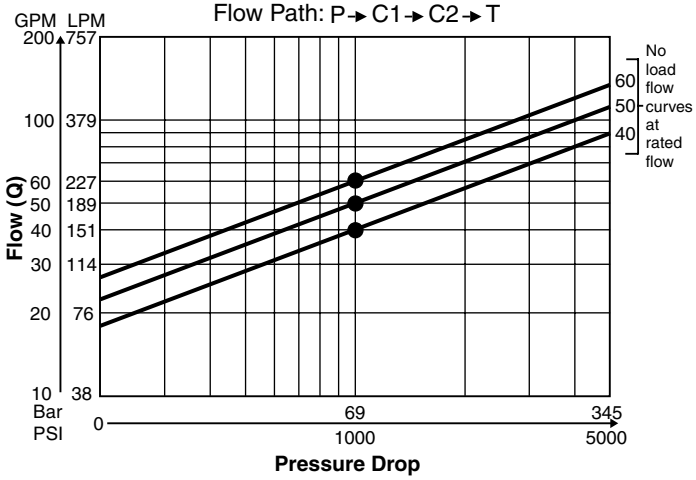
Moog, Atchley and Vickers standard.

In both cases, polarity shown connects P to C2 port.

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Performance Curves

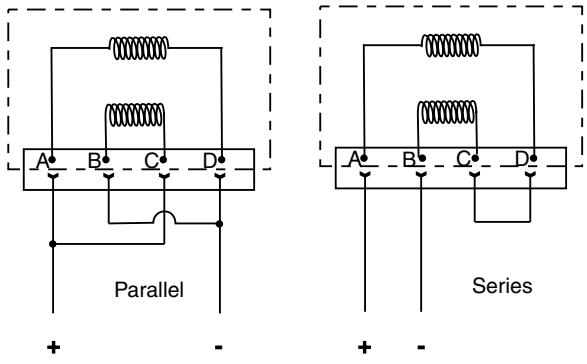
DY45 Flow vs. Pressure Drop
at 100% command
Flow Path: P → C1 → C2 → T



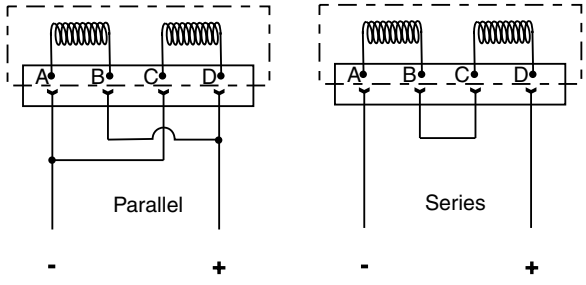
Installation Wiring Options

This servovalve has two coils. This illustration shows the internal wiring configurations for options C and D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

Option C

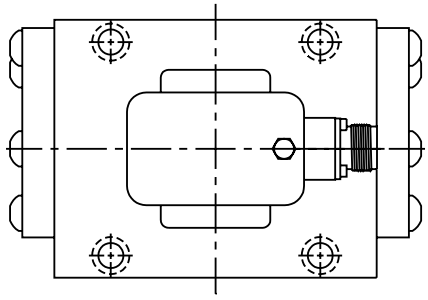


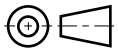
Option D



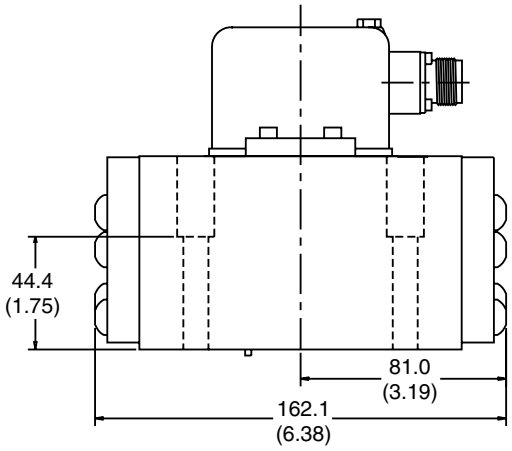
Polarity shown connects flow from P to C2 port.

Inch equivalents for millimeter dimensions are shown in (**)

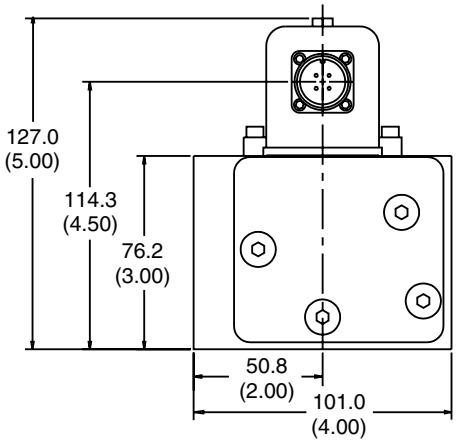




C

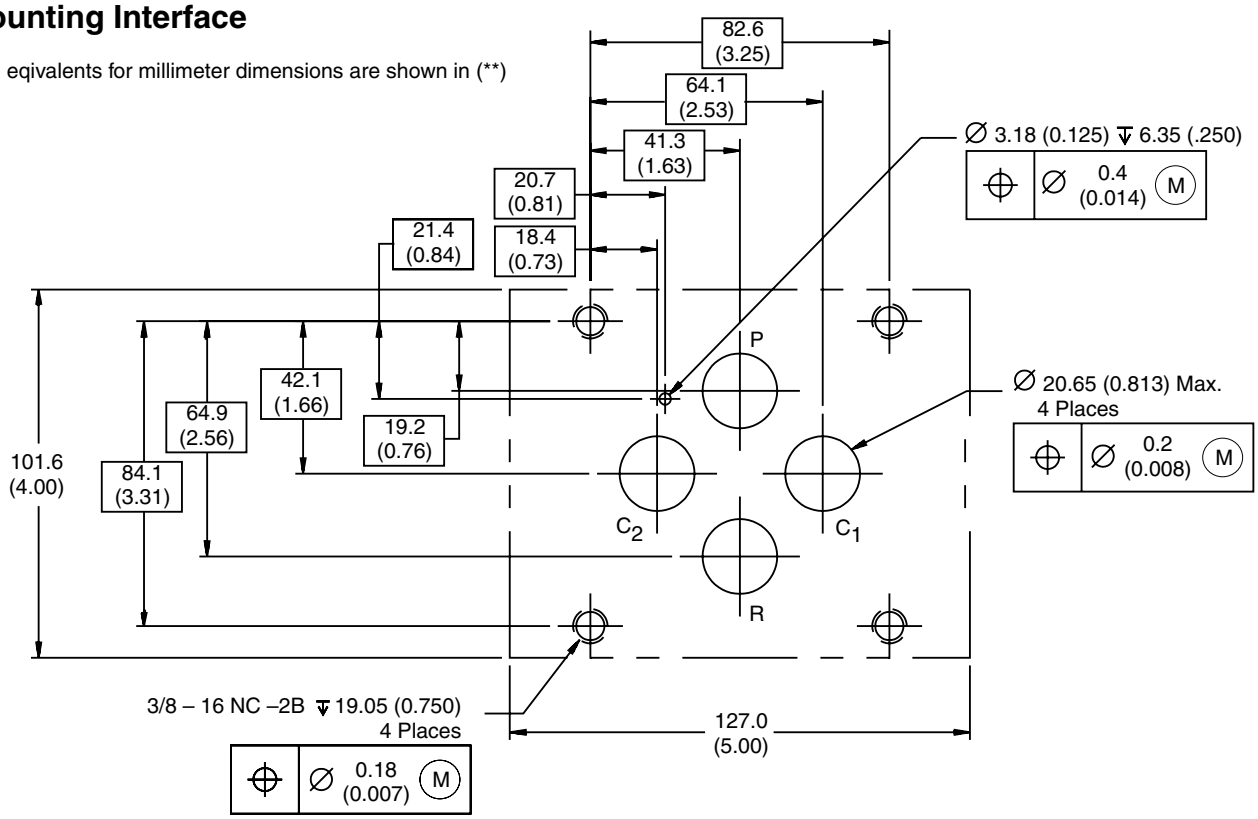


Connector over C1 port



Mounting Interface

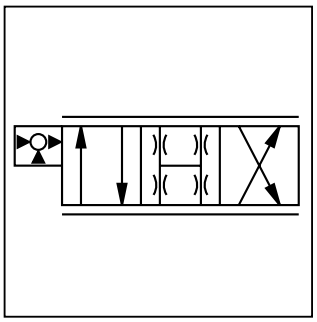
Inch eqivalents for millimeter dimensions are shown in (**)

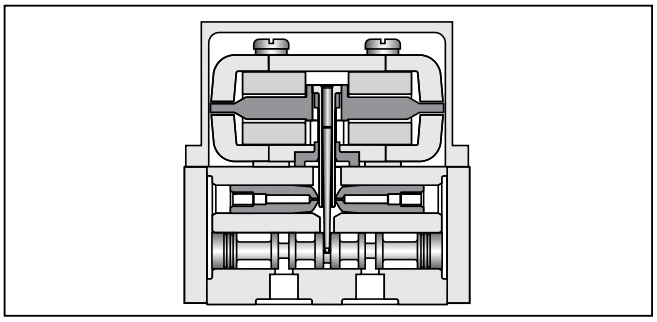


General Description

Series SEMT mini-valve is a two stage, 4-way, flapper and nozzle style servovalve. Its remarkably small size makes it optimal for Remotely Operated Vehicles (ROV), motorsport suspension control, or any application requiring a compact, and light-weight, high performance servovalve.

A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. This valve is rated for 210 Bar (3000 PSI) service. Higher pressure capability is available upon request.





Features

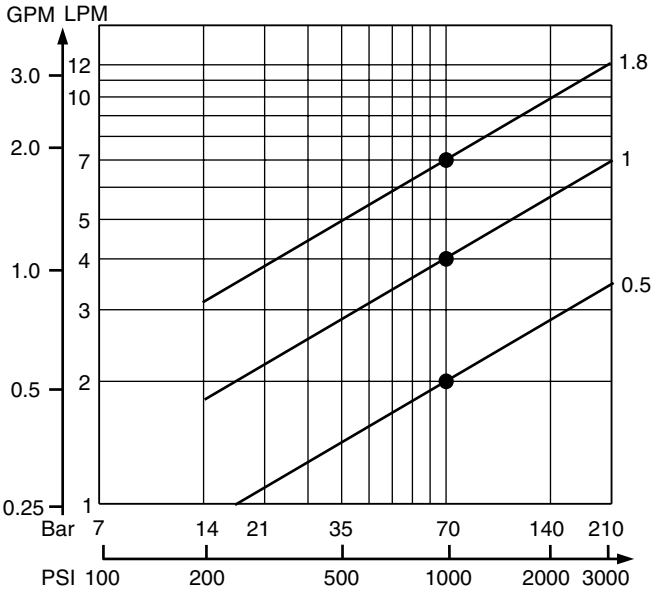
- Jewel feedback ball for durability
- Compact steel body
- High performance
- ISO 10372 standard 12.2 mm (0.480 in.) port circle

Specifications

Flow Rating ±10% @ 70 Bar (1000 PSI)	2, 4, 7 LPM (0.5, 1.0, 1.8 GPM)
Supply Pressure	15 – 210 Bar (220 – 3000 PSI)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Pilot & Null Leakage Flow per 140 Bar (2000 PSI)	0.4 – 0.7 LPM (0.1 – 0.2 GPM)
Input Command	±10 mA std.
Frequency Response @ 90° phase shift	> 170 Hz (See Performance Curves)
Non-Linearity	≤ 10%
Hysteresis	≤ 3%
Threshold	≤ 0.5%
Null Shift with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Pressure Gain change in pressure per 1% change in input command	60% typical
Step Response	10 – 100%, < 4 ms
Fluid	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
Fluid Cleanliness	ISO 4406 15/12 or better
Operating Temperature	-30°C to +130°C (-22°F to +266°F)
Protection Class	NEMA 4, IP65

Flow vs. Pressure Drop

at 100% command
Flow Path: P→C1→C2→R



SEMT	A	A				A						
Series	Pilot Source Internal	Material Steel	Coils	Wiring	Seal	Operating Pressure 210 Bar (3000 PSI)	Flows	Special Options	Factory Code for Special Options			

Code	Description	Parallel	Series
F	80 Ohms	40 mA	20 mA
H	200 Ohms	15 mA	7.5 mA
T	1000 Ohms	10 mA	5 mA

Consult factory for other coil options.

Code	Description
Omit	Standard
S	(Specify) [1]

[1] Consult factory for price and availability.

Code	Connector over	Flow P to C2 with:
P	Port P	(+) signal to Green & Yellow (-) signal to Red & Blue
T	Port T	(+) signal to Green & Yellow (-) signal to Red & Blue

Code	Description
0.5	2 LPM (0.5 GPM)
1	4 LPM (1.0 GPM)
1.8	7 LPM (1.8 GPM)

Code	Description
V	Fluorocarbon (std.)
N	Nitrile

Weight: 0.23 kg (0.5 lbs.)
Bolt kit: Qty 4 of M4 x 10 mm, or Qty 4 of # 6-32 x 7/16"
Subplate: Consult factory.
Electronics: BD101, 23-7030, BD90, or BD95

Performance Curves

Frequency Response at 210 Bar (3000 PSI)

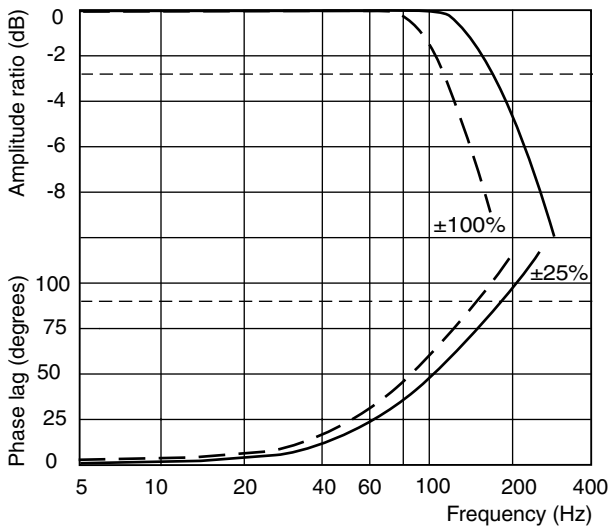
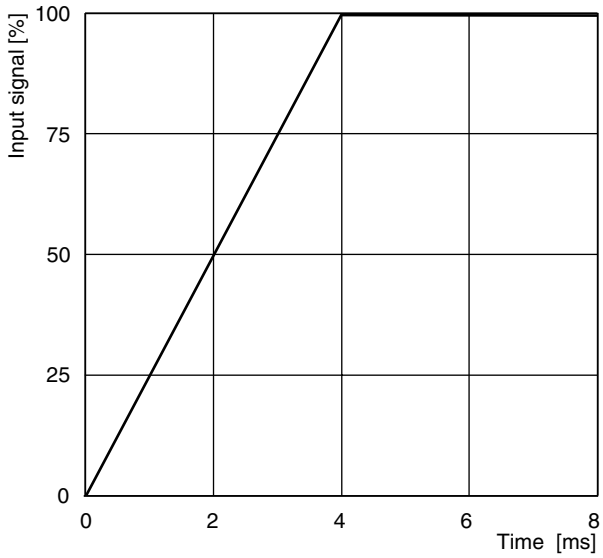


Figure for 7 LPM (1.8 GPM).

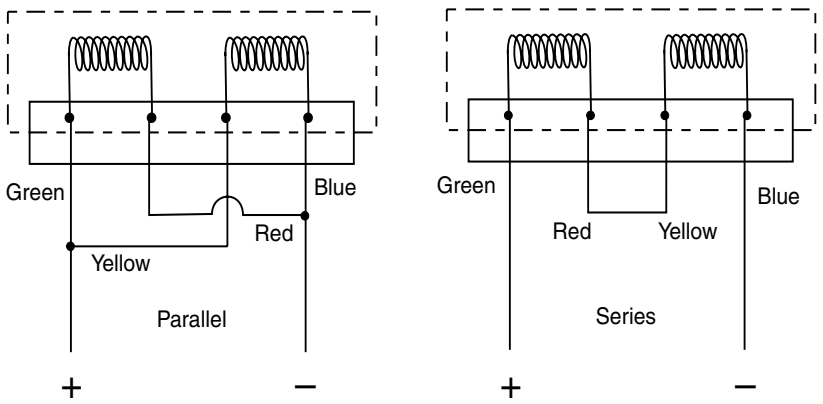
Step Response

at 100% commmand



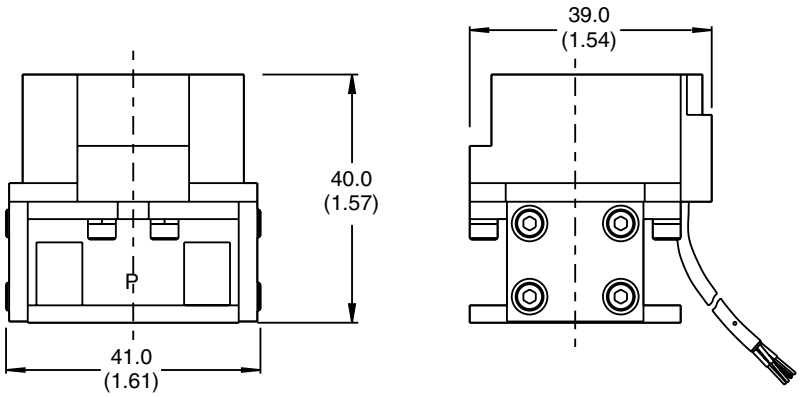
Installation Wiring Options

This servovalve has two coils. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

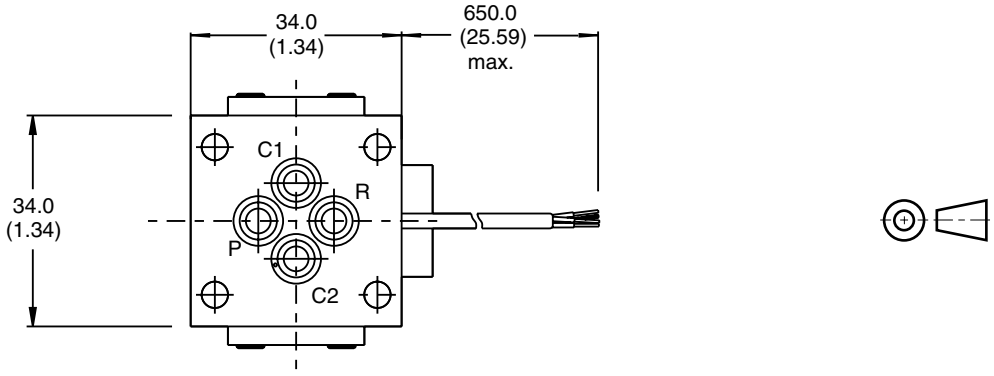


Polarity shown connects flow from P to C2 port.

Inch equivalents for millimeter dimensions are shown in (**)

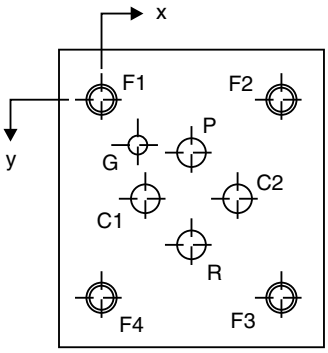


1. Recommended mounting bolts M4 x 10 mm or #6-32 x 7/16" high tensile steel socket-head cap screws.
2. Base O-Rings: 6 mm x 1 mm section, 70 durometer.



Mounting Surface

ISO 10372-01-01-0-92



1. The minimum engagement of mounting threads is 1.5D, where D is the screw diameter.

   The ISO recommended full-thread depth is 14 mm (0.551 in.).
2. The minimum depth of hole G is 2 mm (0.079 in.).
3. Surface roughness Ra < 0.8 µm [N6], as specified in ISO 468 and ISO 1302.
4. Surface flatness: 0.025 mm (0.001) as specified in ISO 1101.

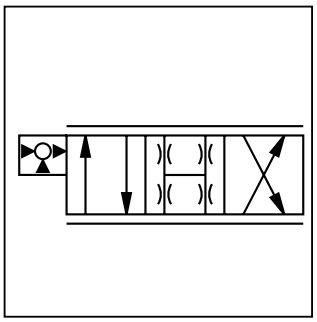
Metric Dimensions (mm)						(± 0.1 mm)			
	P	C1	R	C2	G	F1	F2	F3	F4
Axis	Ø 3.8 max	Ø 3.8 max	Ø 3.8 max	Ø 3.8 max	Ø 2.5	M4	M4	M4	M4
x	11.9	5.8	11.9	18.0	4.8	0	23.8	23.8	0
y	7.0	13.1	19.2	13.1	6.0	0	0	26.2	26.2

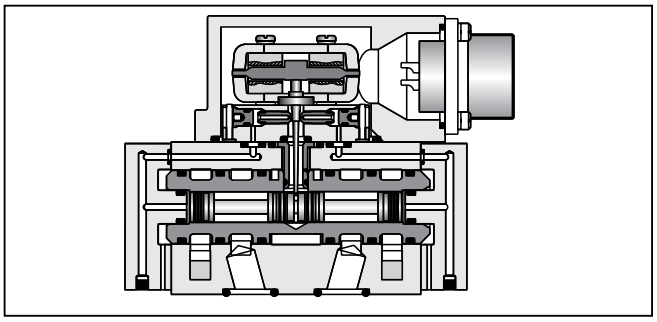
U.S. Dimensions (inches)						(± 0.004 in.)			
	P	C1	R	C2	G	F1	F2	F3	F4
Axis	Ø 0.15 max	Ø 0.15 max	Ø 0.15 max	Ø 0.15 max	Ø 0.10	# 6 - 32	# 6 - 32	# 6 - 32	# 6 - 32
x	0.469	0.228	0.469	0.709	0.189	0	0.937	0.937	0
y	0.276	0.516	0.756	0.516	0.238	0	0	1.031	1.031

General Description

Series SE05, SE10 and SE15 are two stage, 4-way, flapper and nozzle style servovalves. These valves have high performance spool and sleeve designs.

A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. These valves are rated for 315 Bar (4500 PSI) service.





Features

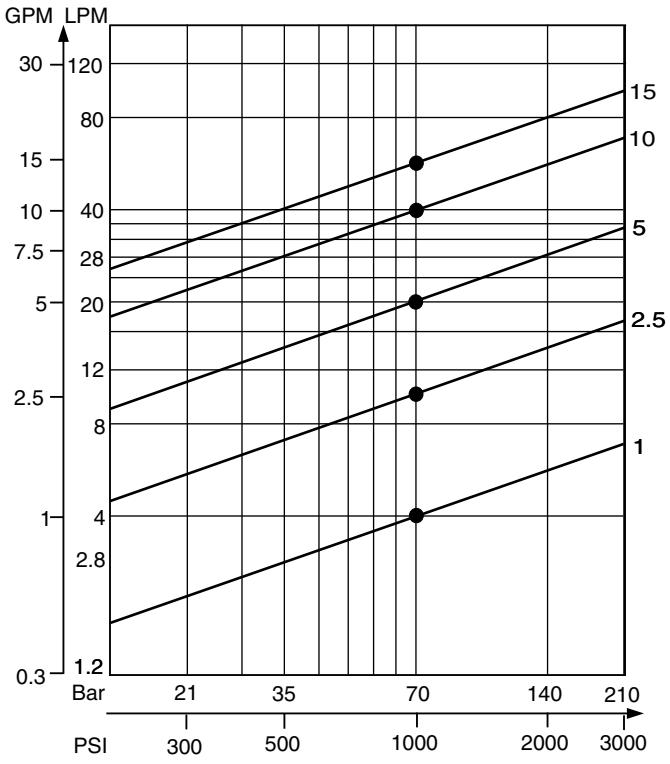
- Lapped spool and sleeve
- Jewel feedback ball for durability
- Aluminum body
- Medium and High performance
- SE05 15.88 mm (0.625 in.) port circle
- SE10 19.81 mm (0.780 in.) port circle
- SE15 23.80 mm (0.937 in.) port circle

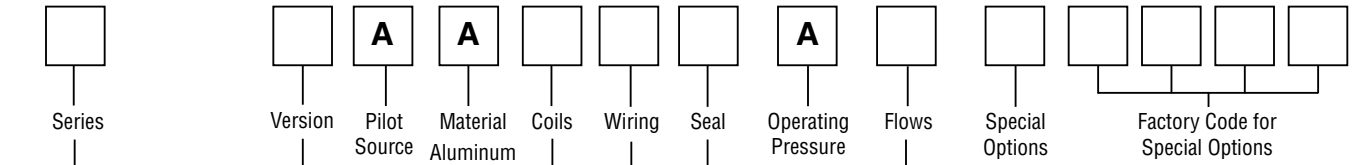
Specifications

Flow Rating ±10% @ 70 Bar (1000 PSI)	4, 10, 20, 40, 60 LPM (1.0, 2.5, 5, 10, 15 GPM)
Supply Pressure	10 – 315 Bar (145 – 4500 PSI)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Null Leakage Flow per 70 Bar (1000 PSI)	0.6 – 1.0 LPM (0.16 – 0.26 GPM)
Pilot Flow @ 210 Bar (3000 PSI)	0.4 – 0.7 LPM (0.1 – 0.2 GPM)
Input Command @ 210 Bar (3000 PSI)	±40 mA std.
Frequency Response @ 90° phase shift	> 100 Hz (See Performance Curves)
Non-Linearity	≤ 10%
Hysteresis	≤ 3%
Threshold	≤ 0.5%
Null Shift with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Pressure Gain change in pressure per 1% change in input command	60% typical
Step Response	10 – 100%, < 6 ms
Fluid	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
Fluid Cleanliness	ISO 4406 15/12 or better
Operating Temperature	-30°C to +130°C (-22°F to +266°F)
Protection Class	NEMA 4, IP65

Flow vs. Pressure Drop

at 100% command
Flow Path: P→C1→C2→R





C

Code	Description
SE05	15.8 mm (0.625 in.)
SE10	19.8 mm (0.780 in.)
SE15	23.8 mm (0.937 in.)

Code	Description
H	High Performance [1]
S	Standard

[1] Only available up to 40 LPM (10 GPM)

Code	Description	Parallel	Series
F	80 Ohms	40 mA	20 mA
H	200 Ohms	15 mA	7.5 mA
G	22 Ohms	200 mA	100 mA
T	1000 Ohms	10 mA	5 mA
M	27 Ohms	100 mA	50 mA
L	1200 Ohms	20 mA	10 mA
A	40 Ohms	60 mA	30 mA
B	300 Ohms	30 mA	15 mA
C	800 Ohms	30 mA	15 mA
D	22 Ohms	80 mA	40 mA

Code	Description
V	Fluorocarbon (std.)
N	Nitrile

Code	Connector over	Flow P to C2 with:
B	Port C2	(+) signal to A, C
A	Port C1	(+) signal to A, C

Code	Description		
1	4 LPM	(1.0 GPM)	SE05 Only
2.5	10 LPM	(2.5 GPM)	SE05 Only
5	20 LPM	(5.0 GPM)	SE10 Only
10	40 LPM	(10.0 GPM)	SE10 Only
15	60 LPM	(15.0 GPM)	SE15 Only

Code	Description
Omit	Standard
S	(Specify) [2]

[2] Consult factory for price and availability of special options.

Weight: 1.0 kg (2.2 lbs.)
Cable with mating connector: EHC154S
Mating connector: MS3106E-14S-2S
Electronics: BD101, 23-5030, 23-7030, PMC10, BD90, or BD95

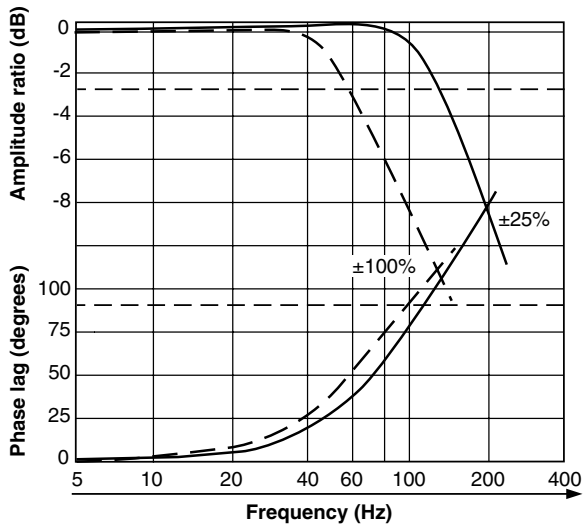
SE05
Bolt kit: 4 of M5 x 60 mm, or 4 of #10-32x2.25"
Flushing valve: 11-0500
Metric Subplate: DS02SPS8M (M18x1.5 ISO 6149 side ports)
SAE Subplate: DS02SPS8S (#8 SAE side ports)

SE10
Bolt kit: 4 of M5 x 60 mm, or 4 of #10-32x2.25"
Flushing valve: 11-0500
Metric Subplate: DS71SPS8M (M18x1.5 ISO 6149 side ports)
SAE Subplate: DS71SPS8S (#8 SAE side ports)

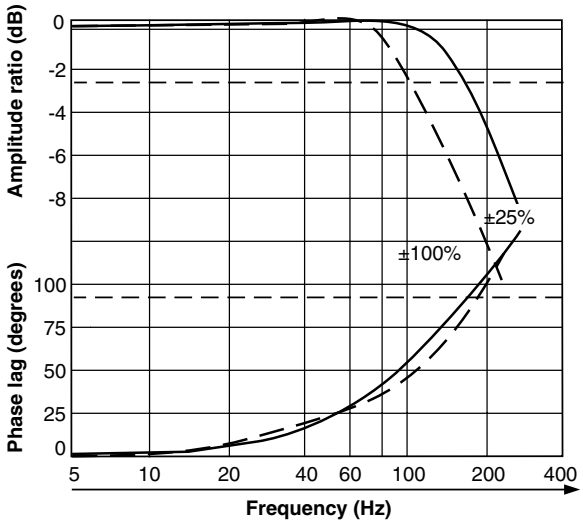
SE15
Bolt kit: 4 of M6 x 60 mm, or 4 of 1/4-20x2.25"
Flushing valve: 11-0500
Metric Subplate: DS72SPS8M (M18x1.5 ISO 6149 side ports)
SAE Subplate: DS72SPS8S (#8 SAE side ports)

Frequency Response at 210 Bar (3000 PSI)

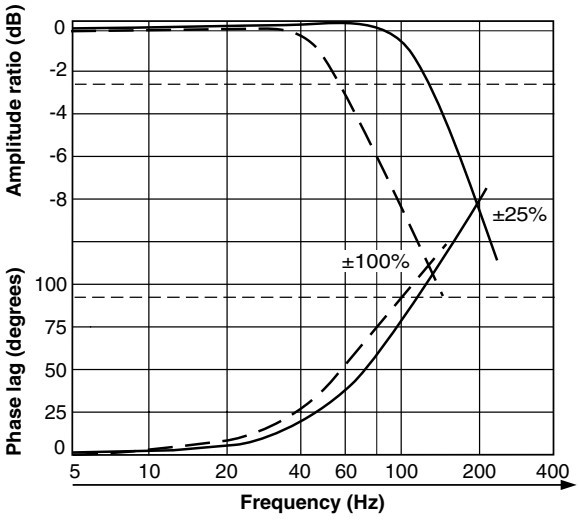
Standard Response
SE05: 4 – 20 LPM (1 – 5 GPM)



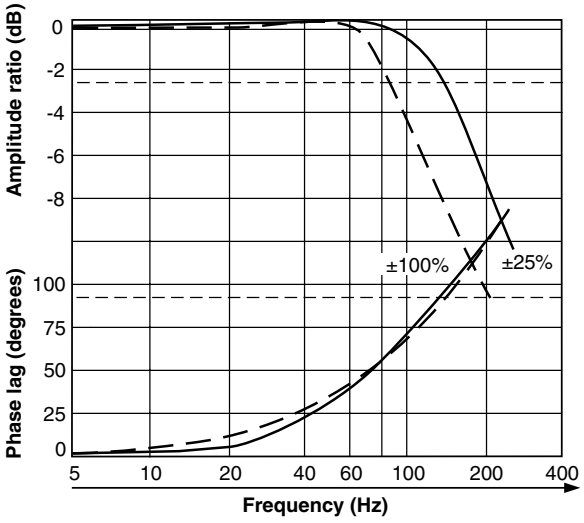
High Response
SE05: 4 – 20 LPM (1 – 5 GPM)



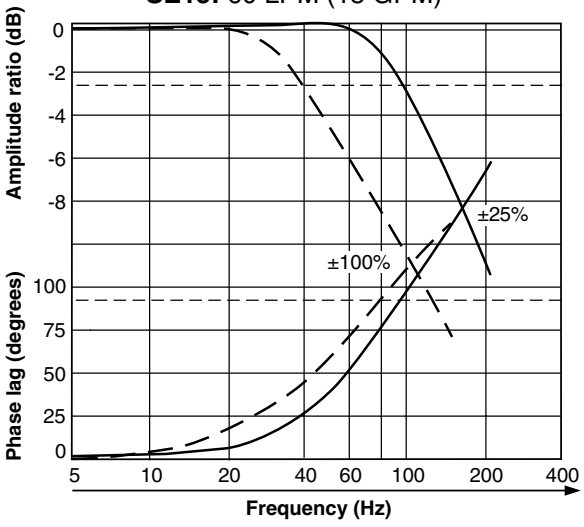
Standard Response
SE10: 40 LPM (10 GPM)



High Response
SE10: 40 LPM (10 GPM)



Standard Response
SE15: 60 LPM (15 GPM)

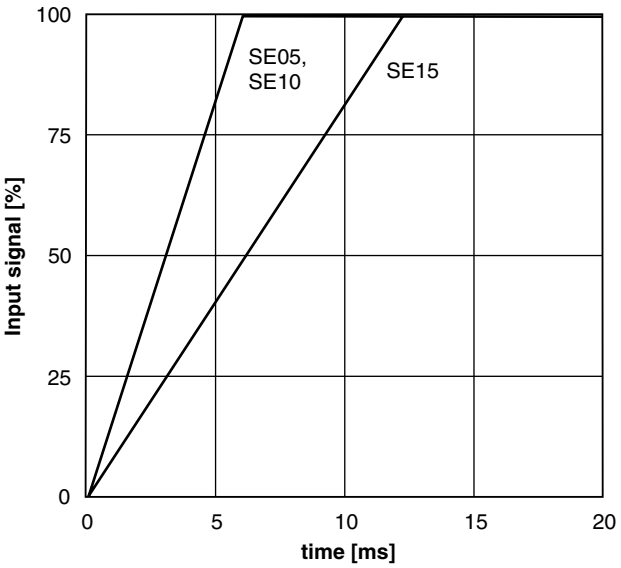


C

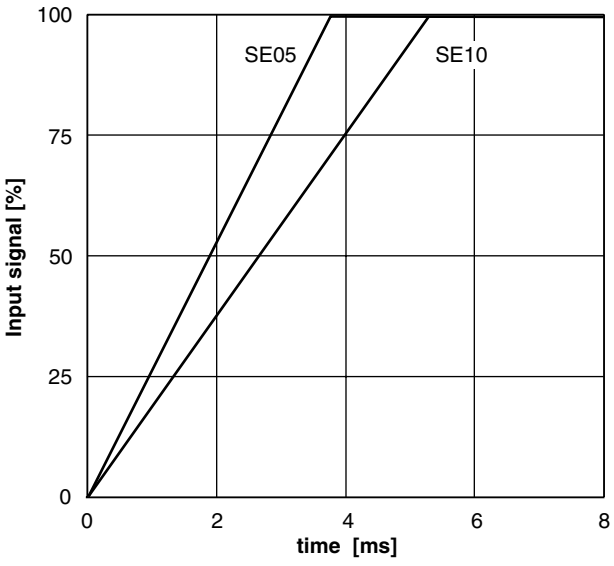
Performance Curves

Step Response at 210 Bar (3000 PSI)

Standard Response
SE05, SE10 & SE15: 4 – 40 LPM (1 – 10 GPM)

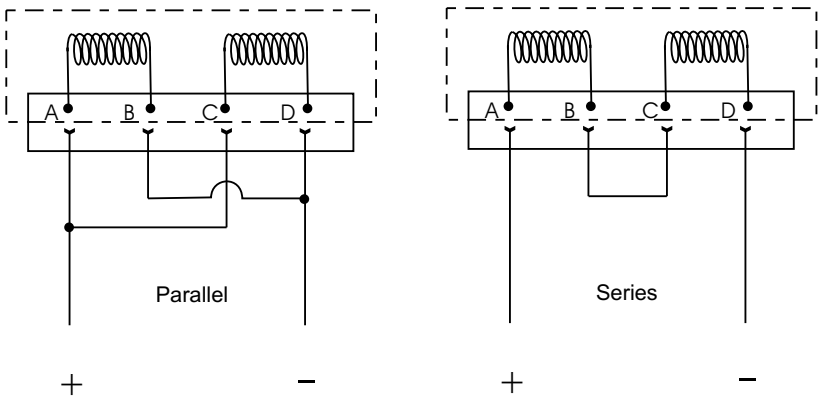


High Response
SE05, SE10 & SE15: 4 – 40 LPM (1 – 10 GPM)



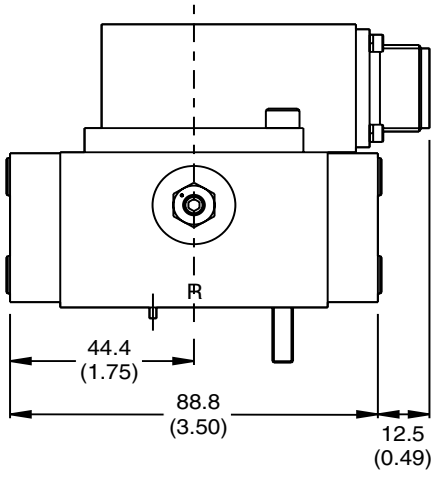
Installation Wiring Options

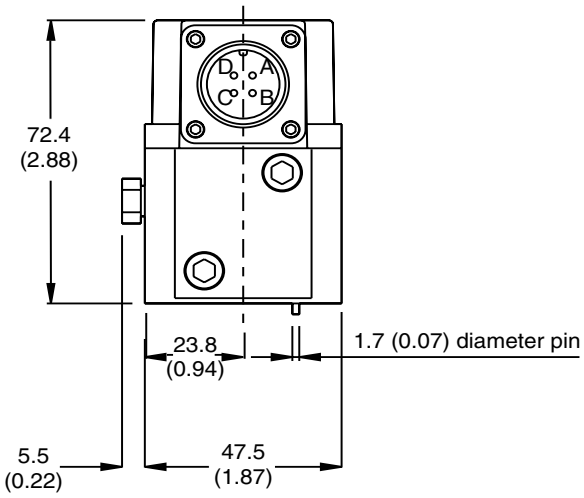
This servovalve has two coils. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.



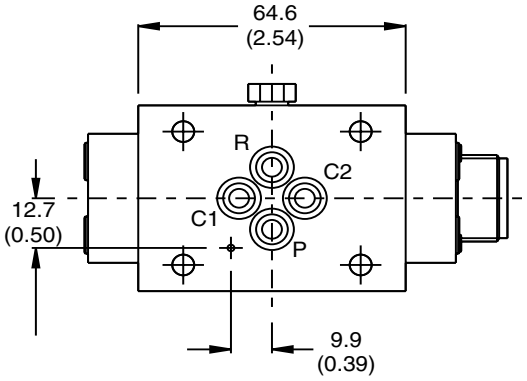
Polarity shown connects flow from P to C2 port.

Inch equivalents for millimeter dimensions are shown in (**)

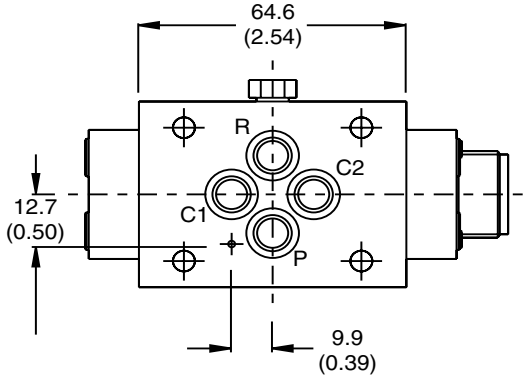




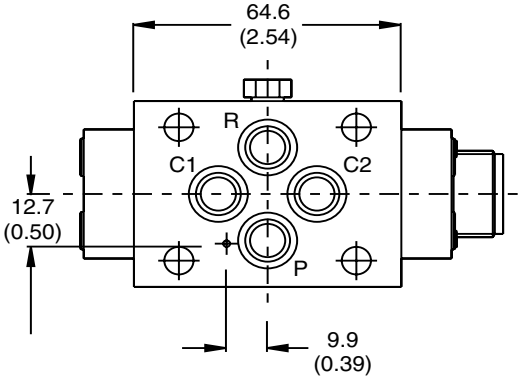
SE05



SE10



SE15



1. Suggested mounting bolts: For SE05 and SE10 use M5 x 60 mm or #10-32 x 2.25" long high tensile steel, socket-head cap screws. For SE15 use M6 x 60 mm or ¼-20 x 2.25" long high tensile steel, socket-head cap screws.
2. 4-way electrical connector mates with MS3106E-14S-2S or equivalent. Is available at 180° to position shown (advise desired position at time of order).
3. Base O-Rings:

   SE05 use Parker 2011V-9 (7.66 mm I/D x 1.78 section)

   SE10 use Parker 2012V-9 (9.25 mm I/D x 1.78 section)

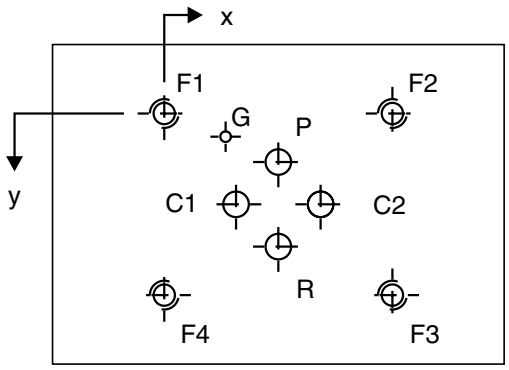
   SE15 use Parker 2013V-9 (10.82 mm I/D x 1.78 section)
4. Null adjust requires 10 A/F ring spanner (10 mm box end wrench) and 2.5 hexagon key. Flow out of C1 will increase with clockwise rotation of key.
5. See mounting dimensions for port size and locations.

C

SE05 Mounting Surface

1. The recommended full-thread depth is 16 mm (0.630 in.).
2. The minimum depth of hole G is 4 mm (0.157 in.).
3. Surface roughness Ra < 0.8 µm [N6], as specified in ISO 468 and ISO 1302.
4. Surface flatness: 0.025 mm (0.001) as specified in ISO 1101.

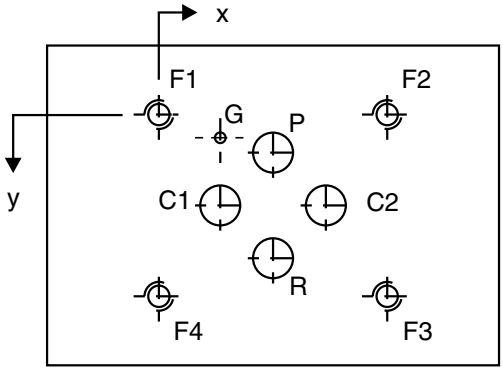
15.88 (0.625) port circle



SE10 Mounting Surface

1. The recommended full-thread depth is 16 mm (0.630 in.).
2. The minimum depth of hole G is 4 mm (0.157 in.).
3. Surface roughness Ra < 0.8 µm [N6], as specified in ISO 468 and ISO 1302.
4. Surface flatness: 0.025 mm (0.001) as specified in ISO 1101.

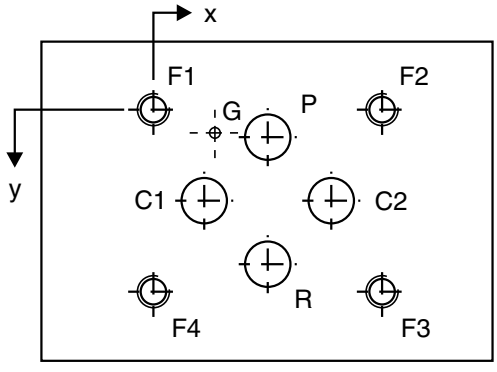
19.81 (0.780) port circle



SE15 Mounting Surface

1. The recommended full-thread depth is 18 mm (0.709 in.).
2. The minimum depth of hole G is 4 mm (0.157 in.).
3. Surface roughness Ra < 0.8 µm [N6], as specified in ISO 468 and ISO 1302.
4. Surface flatness: 0.025 mm (0.001 in.) as specified in ISO 1101.

23.80 (0.937) port circle



SE05

Metric Dimensions (mm)						(± 0.1 mm)			
Axis	**P**	**C1**	**R**	**C2**	**G**	**F1**	**F2**	**F3**	**F4**
	Ø 5 max	Ø 5 max	Ø 5 max	Ø 5 max	Ø 3.5	M5	M5	M5	M5
x	21.4	13.5	21.4	29.3	11.5	0	42.8	42.8	0
y	9.2	17.1	25.0	17.1	4.4	0	0	34.2	34.2

U.S. Dimensions (inches)						(± 0.004 in.)			
Axis	**P**	**C1**	**R**	**C2**	**G**	**F1**	**F2**	**F3**	**F4**
	Ø 0.195 max	Ø 0.195 max	Ø 0.195 max	Ø 0.195 max	Ø 0.136	# 10 -32	# 10 -32	# 10 -32	# 10 -32
x	0.843	0.531	0.843	1.153	0.453	0	1.685	1.685	0
y	0.362	0.673	0.984	0.673	0.173	0	0	1.347	1.347

SE10

Metric Dimensions (mm)						(± 0.1 mm)			
Axis	**P**	**C1**	**R**	**C2**	**G**	**F1**	**F2**	**F3**	**F4**
	Ø 7.5 max	Ø 7.5 max	Ø 7.5 max	Ø 7.5 max	Ø 3.5	M5	M5	M5	M5
x	21.4	11.5	21.4	31.3	11.5	0	42.8	42.8	0
y	7.2	17.1	27.0	17.1	4.4	0	0	34.2	34.2

U.S. Dimensions (inches)						(± 0.004 in.)			
Axis	**P**	**C1**	**R**	**C2**	**G**	**F1**	**F2**	**F3**	**F4**
	Ø 0.290 max	Ø 0.290 max	Ø 0.290 max	Ø 0.195 max	Ø 0.14	# 10 - 32	# 10 - 32	# 10 - 32	# 10 - 32
x	0.843	0.453	0.843	1.232	0.453	0	1.685	1.685	0
y	0.283	0.673	1.063	0.673	0.173	0	0	1.347	1.347

SE15

Metric Dimensions (mm)						(± 0.1 mm)			
Axis	**P**	**C1**	**R**	**C2**	**G**	**F1**	**F2**	**F3**	**F4**
	Ø 8 max	Ø 8 max	Ø 8 max	Ø 8 max	Ø 3.5	M6	M6	M6	M6
x	21.4	9.5	21.4	33.3	11.5	0	42.8	42.8	0
y	5.1	17.1	29.0	17.1	4.4	0	0	34.2	34.2

U.S. Dimensions (inches)						(± 0.004 in.)			
Axis	**P**	**C1**	**R**	**C2**	**G**	**F1**	**F2**	**F3**	**F4**
	Ø 0.312 max	Ø 0.312 max	Ø 0.312 max	Ø 0.312 max	Ø 0.14	1/4 - 20	1/4 - 20	1/4 - 20	1/4 - 20
x	0.843	0.374	0.843	1.311	0.453	0	1.685	1.685	0
y	0.201	0.673	1.142	0.673	0.173	0	0	1.347	1.347

General Description

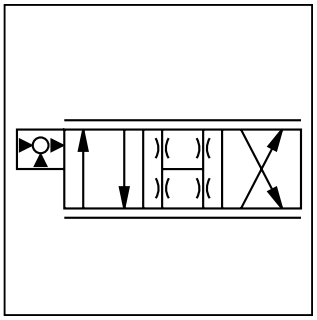
Series SE2N is a two stage, 4-way, flapper and nozzle style servovalve. The SE2N has a narrow body that is a popular size for steam turbine control applications. This valve uses a high performance spool and sleeve design.

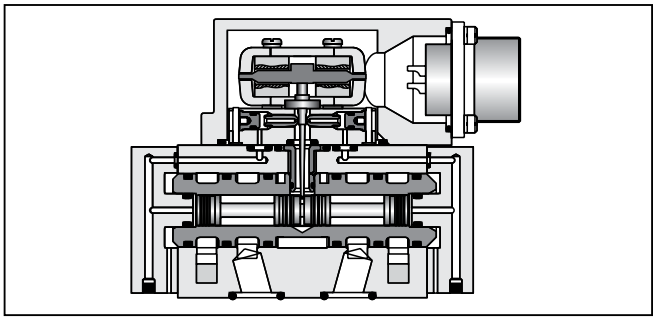
A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. This valve is rated for 210 Bar (3000 PSI) service.

C

Features

- Lapped spool and sleeve
- Jewel feedback ball for durability
- Aluminum body
- Medium and High performance
- Steam turbine pattern 34.93 mm (1.375 in.) port circle



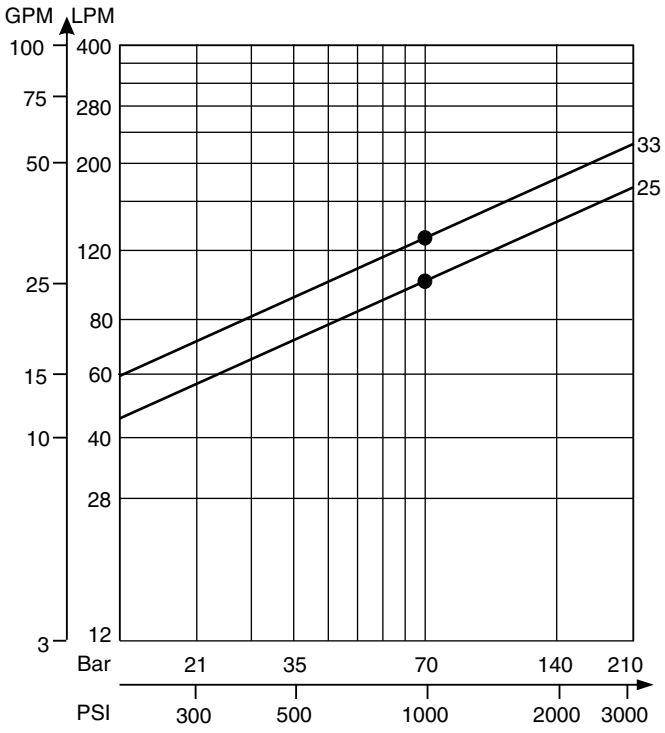


Specifications

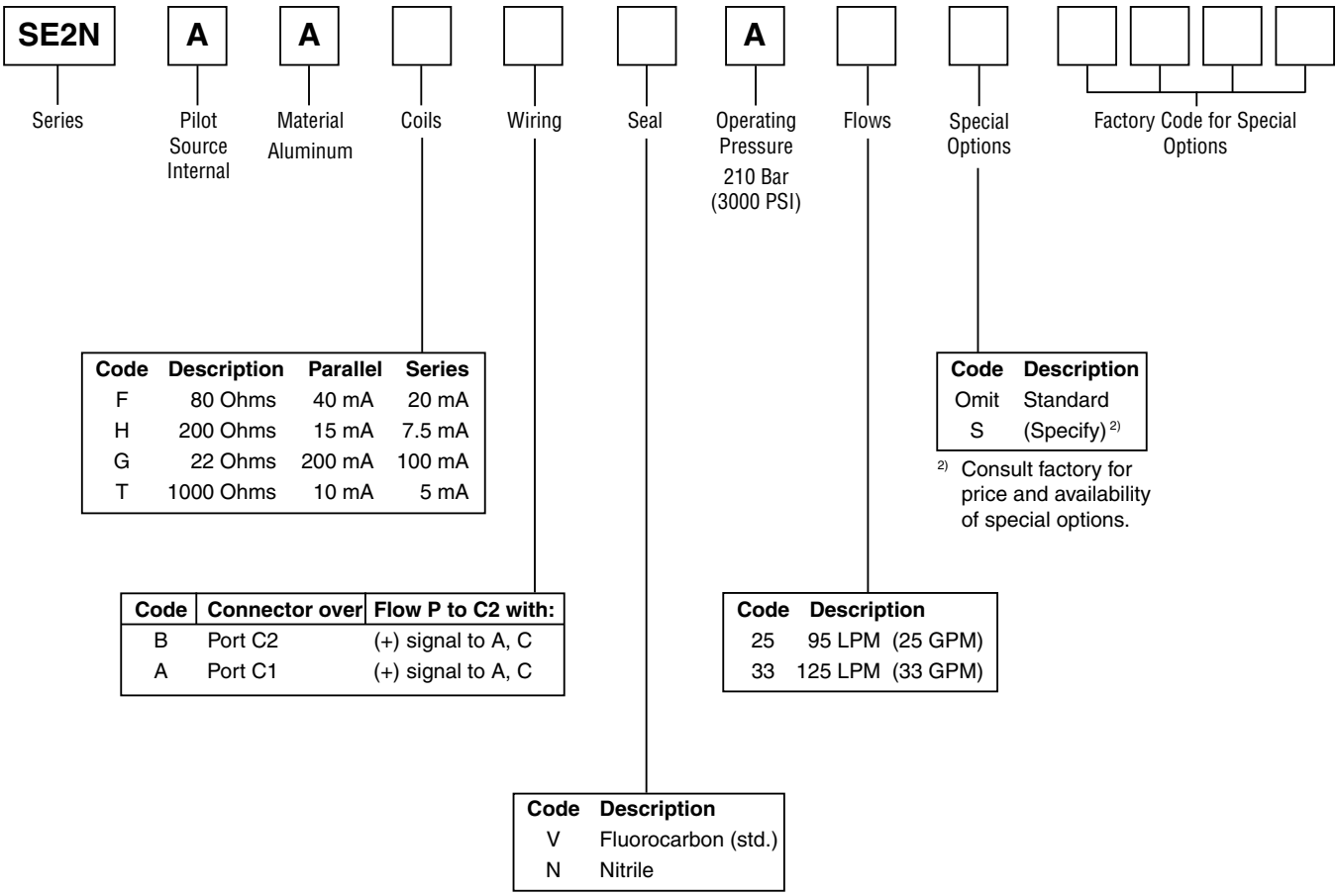
Flow Rating ±10% @ 70 Bar (1000 PSI)	95, 125 LPM (25, 33 GPM)
Supply Pressure	10 – 210 Bar (145 – 3000 PSI)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Null Leakage Flow per 70 Bar (1000 PSI)	2.4 LPM (0.6 GPM)
Pilot Flow @ 210 Bar (3000 PSI)	0.4 LPM (0.1 GPM)
Input Command	±40 mA std.
Frequency Response @ 90° phase shift	> 50 Hz (See Performance Curves)
Non-Linearity	≤ 10%
Hysteresis	≤ 3%
Threshold	≤ 0.5%
Null Shift with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Pressure Gain change in pressure per 1% change in input command	60% typical
Step Response	10 – 100%, < 30 ms
Fluid	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
Fluid Cleanliness	ISO 4406 15/12 or better
Operating Temperature	-30°C to +130°C (-4°F to +266°F)
Protection Class	NEMA 4, IP65

Flow vs. Pressure Drop

at 100% command
Flow Path: P→C1→C2→R



Return to ALPHA TOC
Return to SECTION TOC
C

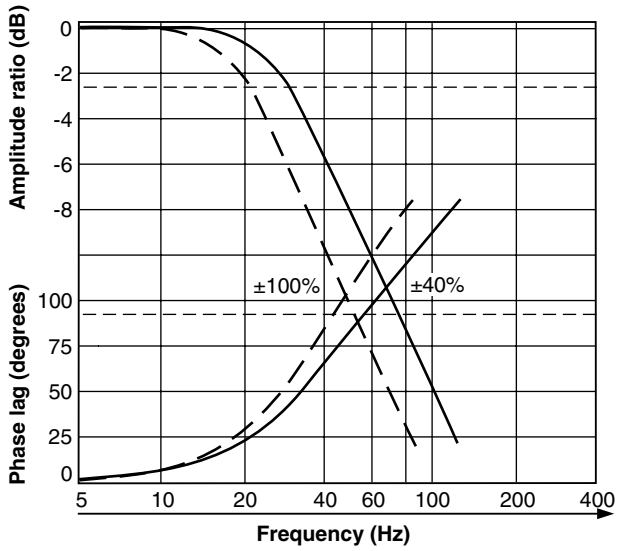


Weight: 1.1 kg (2.4 lbs.)
Cable with mating connector: EHC154S
Mating connector: MS3106E-14S-2S
Bolt kit: 4 of M8 x 70 mm, or 4 of 5/16-18 x 2.75”
Flushing valve: Consult factory
U.S. subplate: AS73SPS8S (SAE #8 side ports)
Metric subplate: AS73SPS8M (M18 x 1.5 ISO 6149 side ports)
Electronics: BD101, 23-7030, BD90, or BD95

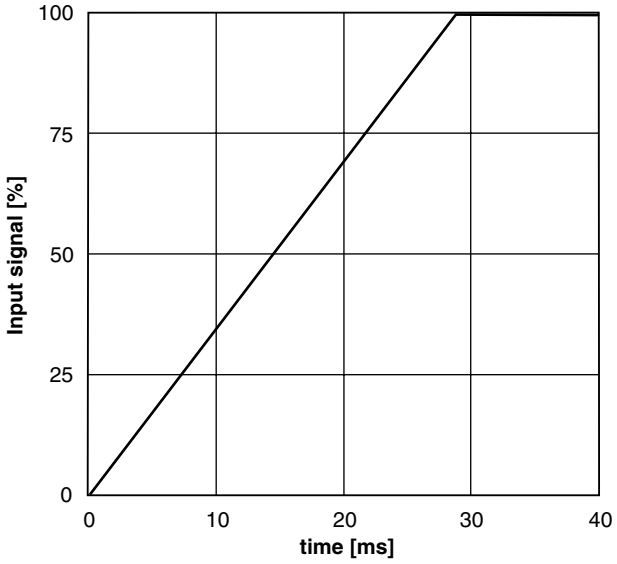
C

Performance Curves

Frequency Response at 210 Bar (3000 PSI)
Standard Response
SE2N – 95 LPM (25 GPM)

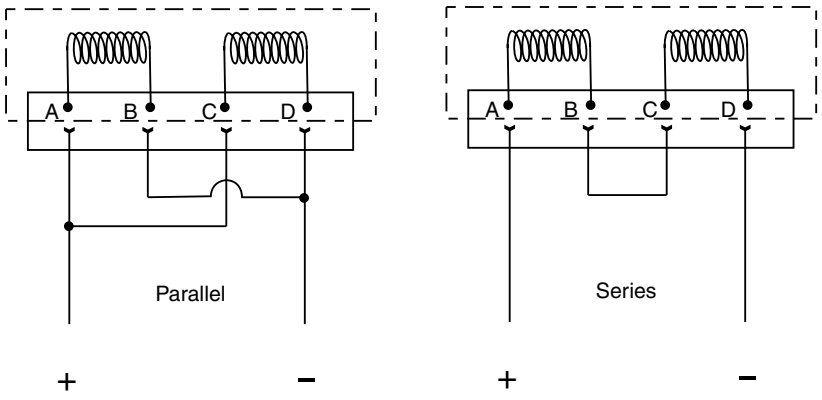


Step Response at 210 Bar (3000 PSI)
Standard Response
SE2N – 95 LPM (25 GPM)



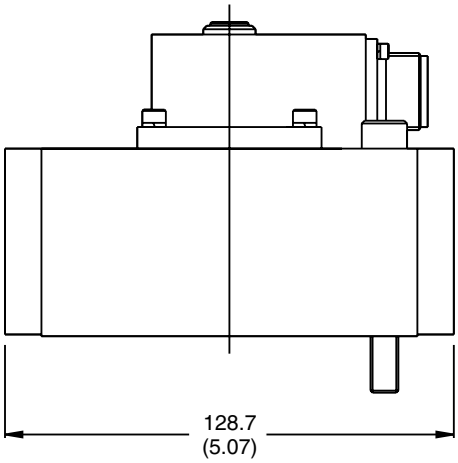
Installation Wiring Options

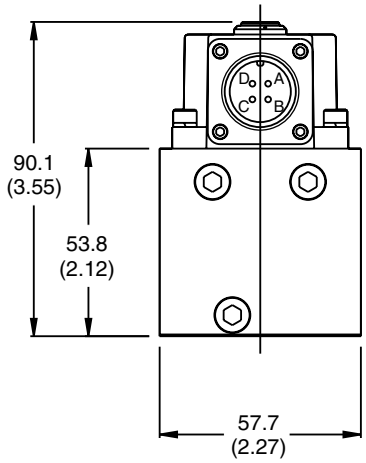
This servovalve has two coils. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

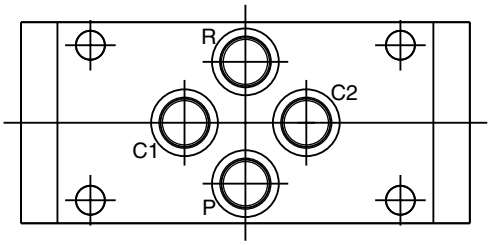


Polarity shown connects flow from P to C2 port.

Inch equivalents for millimeter dimensions are shown in (**)



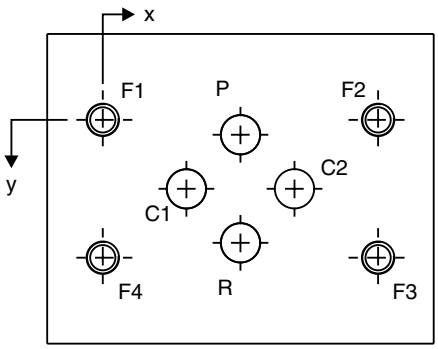




1. Suggested mounting bolts M8 x 70 mm or 5/16-18 x 2.75" long high tensile steel, socket-head cap screws.
2. The 4-way electrical connector mates with MS3106E-14S-2S or equivalent. Is available at 180° to position shown (advise desired position at time of order).
3. Base O-Rings: 14.6 I/D x 2.4 section
4. Null adjust requires 2.5 hexagon key. Flow out of C2 will increase with clockwise rotation of key.

Mounting Surface

1. The recommended full-thread depth is 22 mm (0.866 in.).
2. Surface roughness Ra < 0.8 µm [N6], as specified in ISO 468 and ISO 1302.
3. Surface flatness: 0.025 mm (0.001 in.) as specified in ISO 1101.



Metric Dimensions (mm)						(± 0.1 mm)		
Axis	**P**	**C1**	**R**	**C2**	**F1**	**F2**	**F3**	**F4**
	Ø 12.7 max	Ø 12.7 max	Ø 12.7 max	Ø 12.7 max	M10	M10	M10	M10
x	44.5	27.0	44.5	61.9	0	88.9	88.9	0
y	4.8	22.3	39.7	22.3	0	0	44.5	44.5

U.S. Dimensions (inches)						(± 0.004 in.)		
Axis	**P**	**C1**	**R**	**C2**	**F1**	**F2**	**F3**	**F4**
	Ø 0.5 max	Ø 0.5 max	Ø 0.5 max	Ø 0.5 max	3/8 - 16	3/8 - 16	3/8 - 16	3/8 - 16
x	1.750	1.063	1.750	2.437	0	3.500	3.500	0
y	0.189	0.876	1.563	0.876	0	0	1.750	1.750

General Description

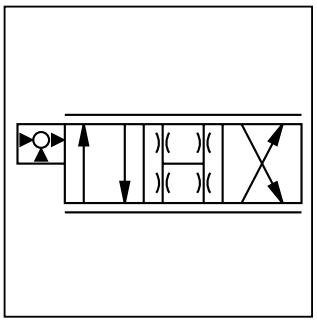
Series SE20 is a two stage, 4-way, flapper and nozzle style servovalve. The SE20 has a wide range of flow ratings and a high performance spool and sleeve design.

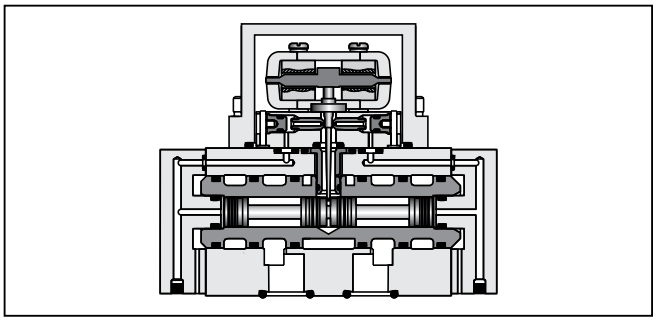
A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. This valve is rated for 315 Bar (4500 PSI) service with an option for 500 Bar (7250 PSI).

C

Features

- Lapped spool and sleeve
- Jewel feedback ball for durability
- Aluminum body
- Medium and High performance
- ISO 10372 standard 22.23 mm (0.875 in.) port circle



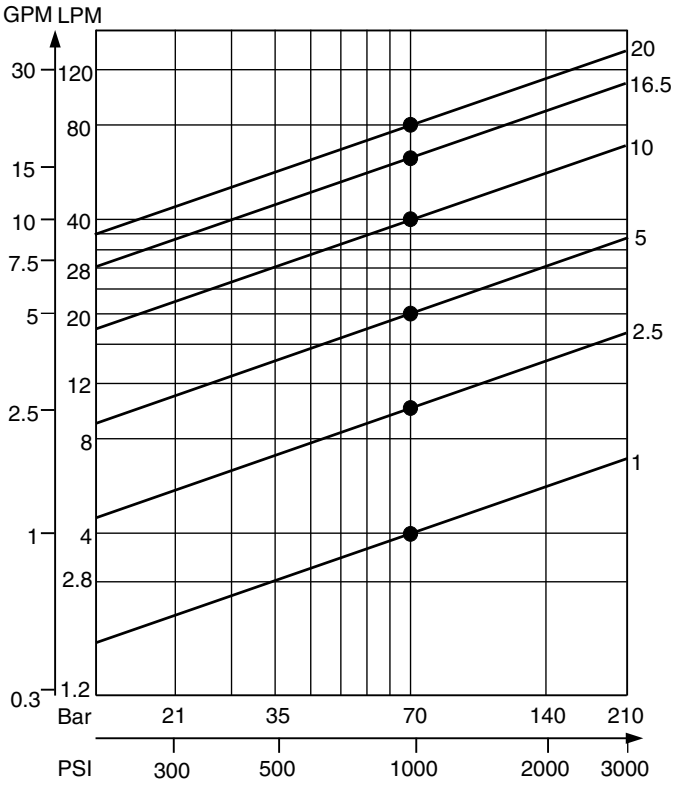


Specifications

Flow Rating ±10% @ 70 Bar (1000 PSI)	3.8, 9.5, 19, 38, 63, 75 LPM (1, 2.5, 5, 10, 16.5, 20 GPM)
Supply Pressure	10 – 315 Bar (145 – 4500 PSI) 500 Bar (7250 PSI) Optional
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Null Leakage Flow per 70 Bar (1000 PSI)	1.2 – 1.9 LPM (0.3 – 0.5 GPM)
Pilot Flow @ 210 Bar (3000 PSI)	0.4 – 0.7 LPM (0.1 – 0.2 GPM)
Input Command	±40 mA std.
Frequency Response @ 90° phase shift	> 100 Hz (See Performance Curves)
Non-Linearity	≤ 10%
Hysteresis	≤ 3%
Threshold	≤ 0.5%
Null Shift with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Pressure Gain change in pressure per 1% change in input command	60% typical
Step Response	See graphs
Fluid	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
Fluid Cleanliness	ISO 4406 15/12 or better
Operating Temperature	-30°C to +130°C (-22°F to +266°F)
Protection Class	NEMA 4, IP65

Flow vs. Pressure Drop

at 100% command
Flow Path P →C1 →C2 →R



Return to ALPHA TOC
Return to SECTION TOC

C

SE20 | Series | Version | Pilot Source | Material Options | Coils | Wiring | Seal | Operating Pressure | Flows | Special Options | Factory Code for Special Options

Code	Description
H	High performance [1]
S	Standard

[1] only available up to 40 LPM (10 GPM)

Code	Description
A	Internal
C	External (5th port)

Code	Description
A	Aluminum (std.)
S	Stainless Steel

Code	Description	Parallel	Series
F	80 Ohms	40 mA	20 mA
H	200 Ohms	15 mA	7.5 mA
G	22 Ohms	200 mA	100 mA
T	1000 Ohms	10 mA	5 mA
M	27 Ohms	100 mA	50 mA
L	1200 Ohms	20 mA	10 mA
A	40 Ohms	60 mA	30 mA
B	300 Ohms	30 mA	15 mA
C	800 Ohms	30 mA	15 mA
D	22 Ohms	80 mA	40 mA

Code	Connector over	Flow P to C2 with:
P	Port P	(+) signal to A, C
B	Port C2	(+) signal to A, C
A	Port C1	(+) signal to A, C
T	Port T	(+) signal to A, C

Code	Description
V	Fluorocarbon (std.)
N	Nitrile

Code	Description
A	315 Bar (4500 PSI)
B	500 Bar (7250 PSI) [3]

[3] Requires steel body

Code	Description
Omit	Standard
S	(Specify) [2]

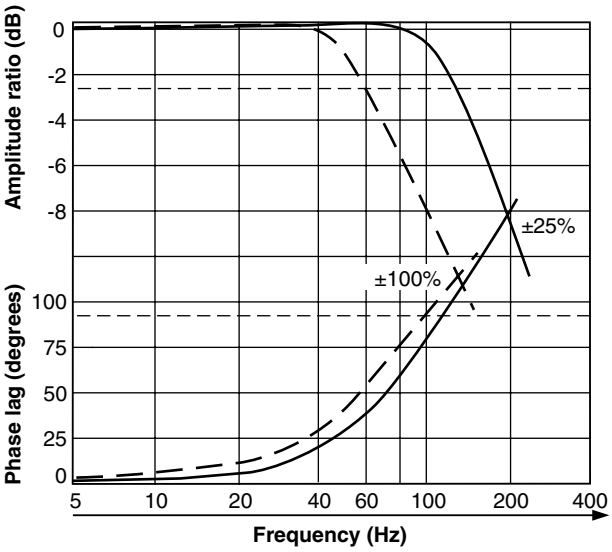
[2] Consult factory for price, delivery and availability of special options.

Code	Description
1	4 LPM (1.0 GPM)
2.5	10 LPM (2.5 GPM)
5	20 LPM (5.0 GPM)
10	40 LPM (10.0 GPM)
16.5	63 LPM (16.5 GPM)
20	75 LPM (20.0 GPM)

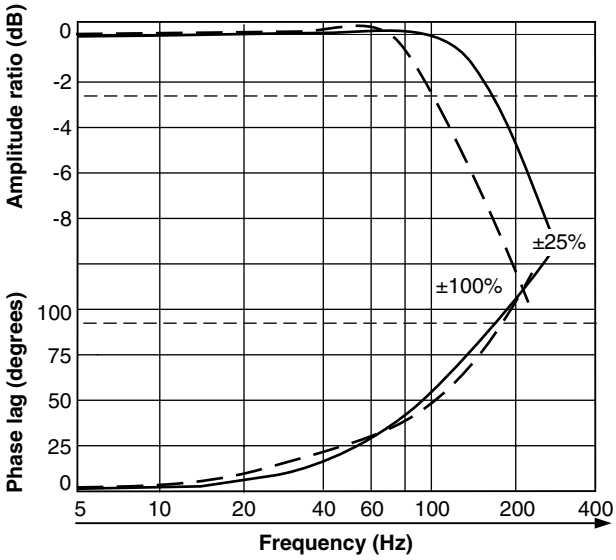
Weight: 1.0 kg (2.2 lbs.)
Cable with mating connector: EHC154S
Bolt kit: 4 of M8 x 60 mm, or 4 of 5/16-18x2.25"
Flushing valve: 1200127 (does not cover 5th port)
U.S. Subplate, 5 ports: 1402303 (4) #12 SAE side ports, (1) #4 SAE side ports
U.S. Subplate, 4 ports: 810090-3 (4) #12 SAE side ports
Metric Subplate, 4 ports: DS04SPS12M (M27 x 2.0 ISO 6149 side ports)
Electronics: BD101, 23-7030, BD90, or BD95

Frequency Response at 210 Bar (3000 PSI)

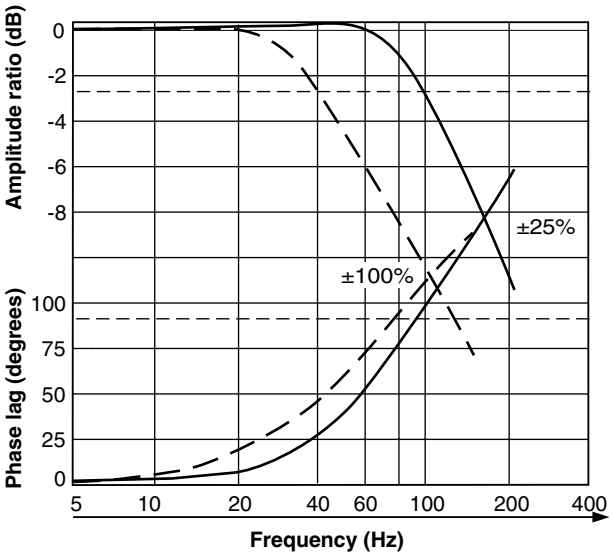
Standard Response
SE20 – 4 LPM (1.0 GPM)



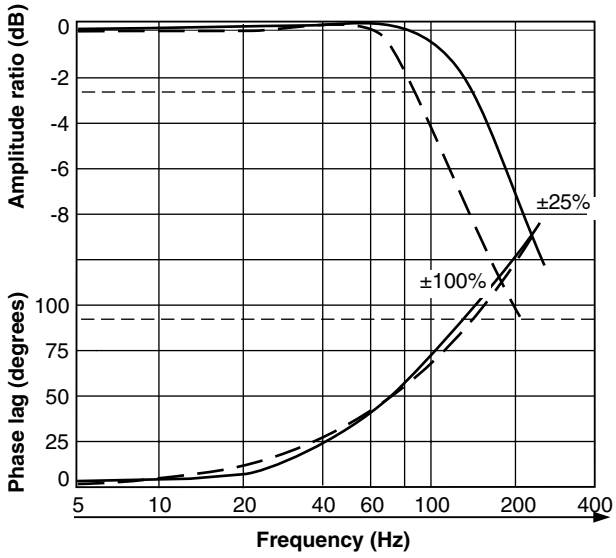
High Response
SE20 – 4 LPM (1.0 GPM)



Standard Response
SE20 – 63 LPM (16.5 GPM)



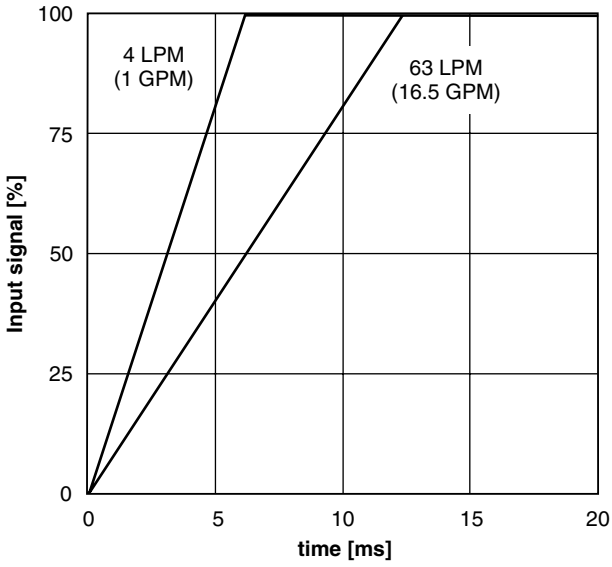
High Response
SE20 – 40 LPM (10 GPM)



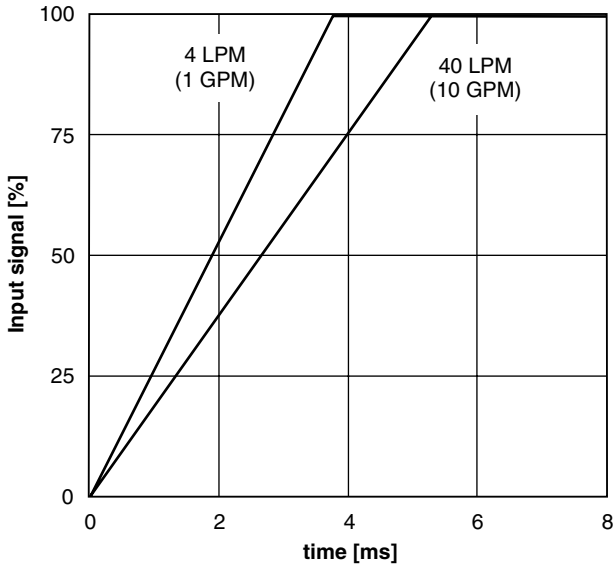
Performance Curves

Step Response at 210 Bar (3000 PSI)

Standard Response

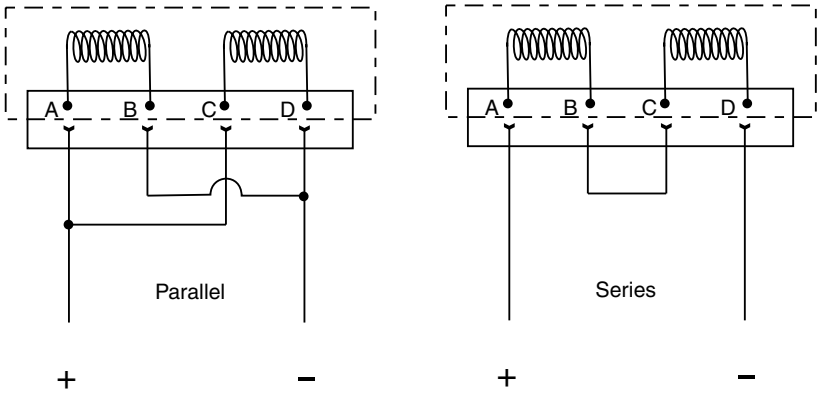


High Response



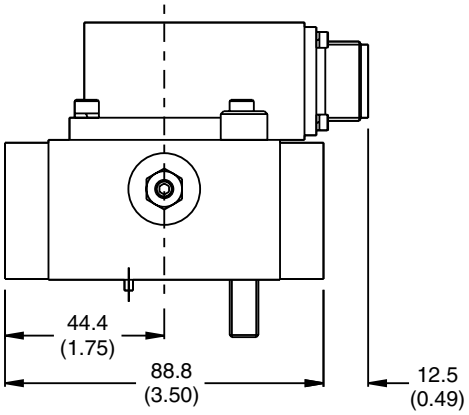
Installation Wiring Options

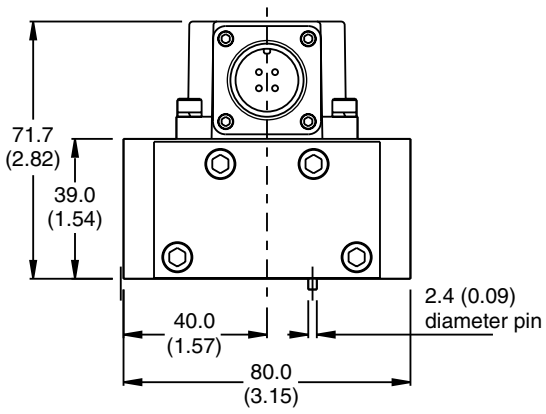
This servovalve has two coils. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

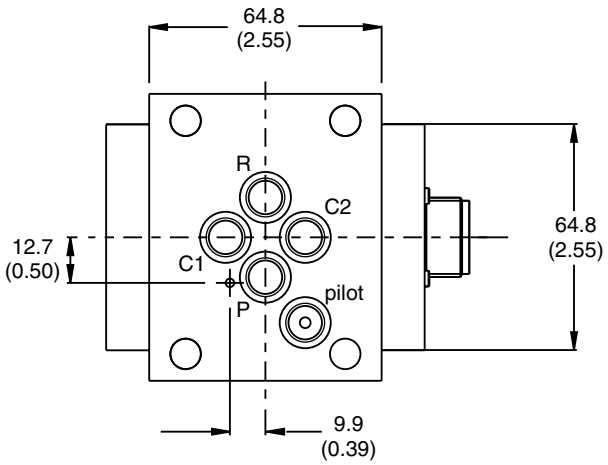


Polarity shown connects flow from P to C2 port.

Inch equivalents for millimeter dimensions are shown in (**)





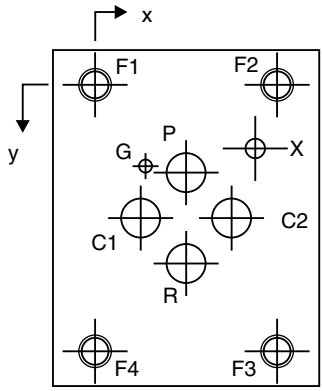


Mounting Torque
29 Nm (21.4 lb.-ft.)

1. Suggested mounting bolts M8 x 60 mm or 5/16-18 x 2.25" high tensile steel, socket-head cap screws.
2. The 4-way electrical connector mates with MS3106-14S-2S or equivalent. It is available at ±90° and 180° to position shown (advise desired position at time of order).
3. Base O-Rings: 10.82 I/D x 1.78 section (2013N-9 or 2013V-9) 5 pcs.
4. Null adjust requires 10 A/F ring spanner (10 mm box-end wrench) and 2.5 hexagon key. Flow out of C1 will increase with clockwise rotation of key.

Mounting Surface

1. The minimum depth of hole G is 2 mm (0.079 in.). The ISO recommended full-thread depth is 22 mm (0.866 in.).
2. Surface roughness Ra < 0.8 µm [N6], as specified in ISO 468 and ISO 1302.
3. Surface flatness: 0.025 mm (0.001 in.) as specified in ISO 1101.



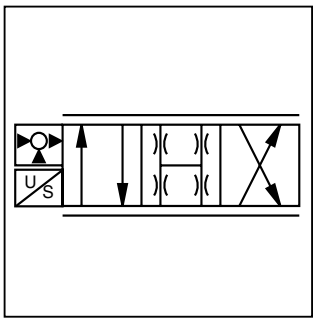
Metric Dimensions (mm)										(± 0.1 mm)
Axis	**P**	**C1**	**R**	**C2**	**G**	**X**	**F1**	**F2**	**F3**	**F4**
	Ø 8.2 max	Ø 8.2 max	Ø 8.2 max	Ø 8.2 max	Ø 3.5	Ø 5	M8	M8	M8	M8
x	22.2	11.1	22.2	33.3	12.3	33.3	0	44.4	44.4	0
y	21.4	32.5	43.6	32.5	19.8	8.7	0	0	65.0	65.0

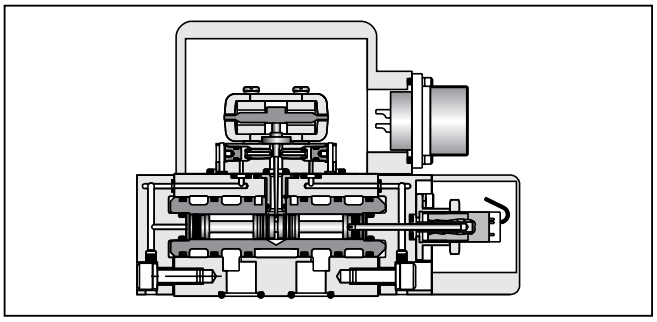
U.S. Dimensions (inches)										(± 0.004 in.)
Axis	**P**	**C1**	**R**	**C2**	**G**	**X**	**F1**	**F2**	**F3**	**F4**
	Ø 0.32 max.	Ø 0.32 max.	Ø 0.32 max.	Ø 0.32 max.	Ø 0.14 max.	Ø 0.2	5/16 - 18	5/16 - 18	5/16 - 18	5/16 - 18
x	0.875	0.437	0.875	1.311	0.484	1.310	0	1.750	1.750	0
y	0.846	1.280	1.717	1.280	0.780	0.343	0	0	2.562	2.562

General Description

Series SE2E features electronic spool position feedback and on-board electronics. Spool position feedback can be used as a safety monitoring tool, or for minimizing valve hysteresis. The SE2E is a two stage, 4-way, flapper and nozzle style servovalve.

A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. This valve is rated for 315 Bar (4500 PSI) service.





Features

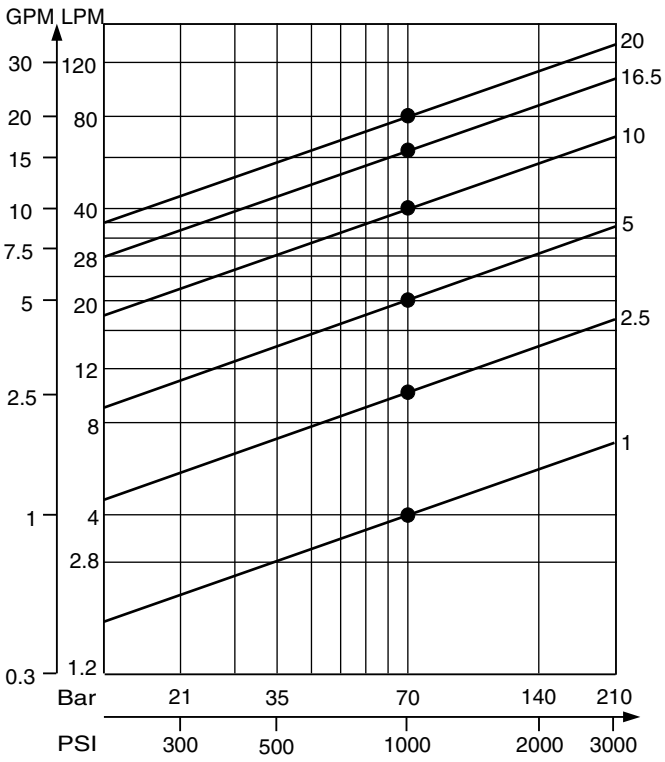
- On-board electronics
- Electronic spool position feedback
- Jewel feedback ball for durability
- High performance
- ISO 10372 standard 22.23 mm (0.875 in.) port circle

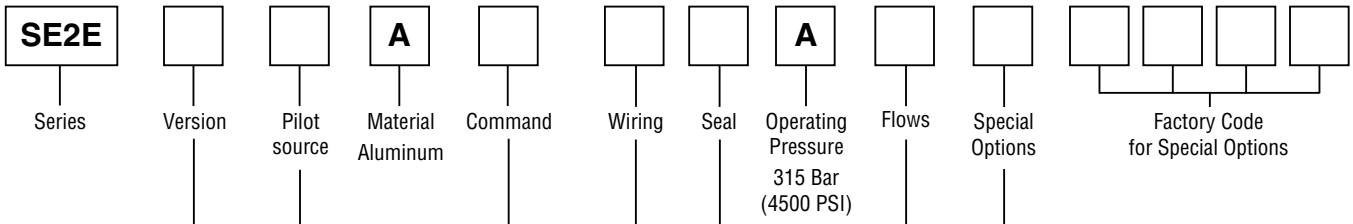
Specifications

Flow Rating ±10% @ 70 Bar (1000 PSI)	3.8, 9.5, 19, 38, 63, 75 LPM (1, 2.5, 5, 10, 16.5, 20 GPM)
Supply Pressure	10 – 315 Bar (145 – 4500 PSI)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Null Leakage Flow per 70 Bar (1000 PSI)	1.2 – 1.9 LPM (0.3 – 0.5 GPM)
Pilot Flow @ 210 Bar (3000 PSI)	0.4 – 0.8 LPM (0.1 – 0.2 GPM)
Input Command	±10 V std.
Frequency Response @ 90° phase shift	≥ 300 Hz (See Performance Curves)
Non-Linearity	≤ 5%
Hysteresis	≤ 0.5%
Threshold	≤ 0.1%
Null Shift with temperature with pressure	≤ 1% per 55°C (100°F) ≤ 1% per 70 Bar (1000 PSI)
Pressure Gain change in pressure per 1% change in input command	80% typical
Step Response	0 - 100%, 4 to 9 ms
Fluid	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
Fluid Cleanliness	ISO 4406 15/12 or better
Operating Temperature	-20°C to +85°C (-4°F to +185°F)
Protection Class	NEMA 4, IP65

Flow vs. Pressure Drop

at 100% command
Flow Path P →C1 →C2 →R





Code	Description
H	High performance
S	Standard

Code	Description
A	Internal
C	External (5th port)

Code	Description	Input Impedence	Power Supply
1	± 10 volts	Re > 50k Ohms	± 15 volts DC power
2	± 10 mA	Re > 1k Ohms	± 15 volts DC power
3	± 10 volts	Re > 50k Ohms	24 volts DC power
4	± 10 mA	Re > 1k Ohms	24 volts DC power

Code	Description	
1	4 LPM	(1.0 GPM)
2.5	10 LPM	(2.5 GPM)
5	20 LPM	(5.0 GPM)
10	40 LPM	(10.0 GPM)
16.5	60 LPM	(16.5 GPM)
20	75 LPM	(20.0 GPM)

Code	Description
V	Fluorocarbon (std.)
N	Nitrile

Code	Connector over	Flow P to C2 with:
B	Port C2	Pin D more positive than Pin E

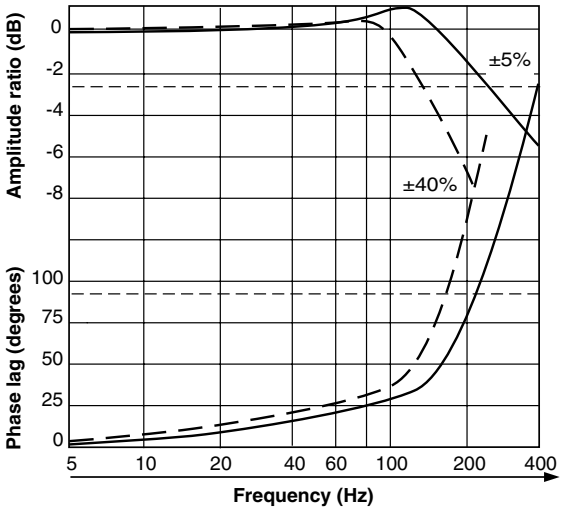
Code	Description
Omit	Standard
S	(Specify) [1]

[1] Consult factory for price and availability of special options.

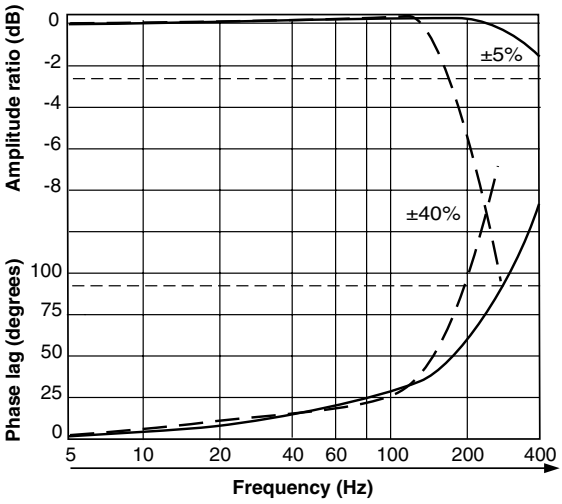
Weight: 1.5 kg (3.3 lbs.)
Cable with mating connector: EHC158GE
Mating connector: 5004072 (a 7-pin metal CE connector)
Bolt kit: 4 of M8 x 60 mm, or 4 of 5/16-18x2.25"
Flushing valve: 1200127 (does not cover 5th port)
U.S. Subplate, 5 ports: 1402303 (4) #12 SAE side ports, (1) #4 SAE side ports
U.S. Subplate, 4 ports: 810090-3 (4) #12 SAE side ports
Metric Subplate, 4 ports: DS04SPS12M (M27 x 2.0 ISO 6149 side ports)
Electronics: BD101, 23-7030, BD90, or BD95

Frequency Response at 210 Bar (3000 PSI)

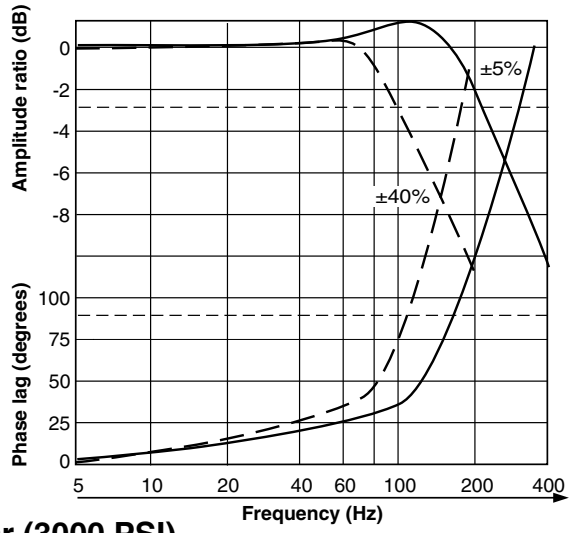
Standard Response
SE2E – 20 LPM (5 GPM)



High Response
SE2E – 4 - 40 LPM (1.0 - 10 GPM)

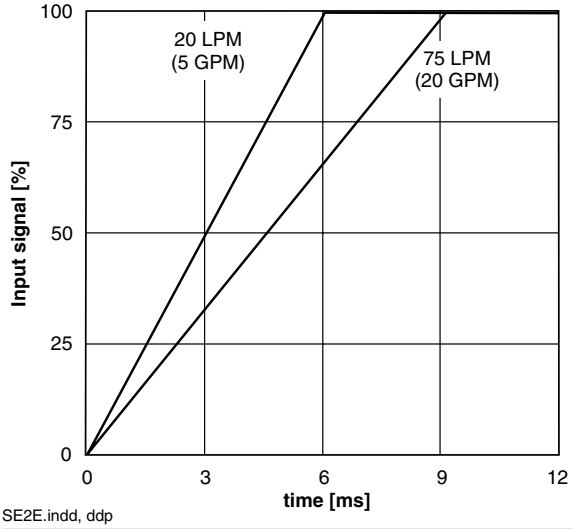


Standard Response
SE2E – 75 LPM (20 GPM)

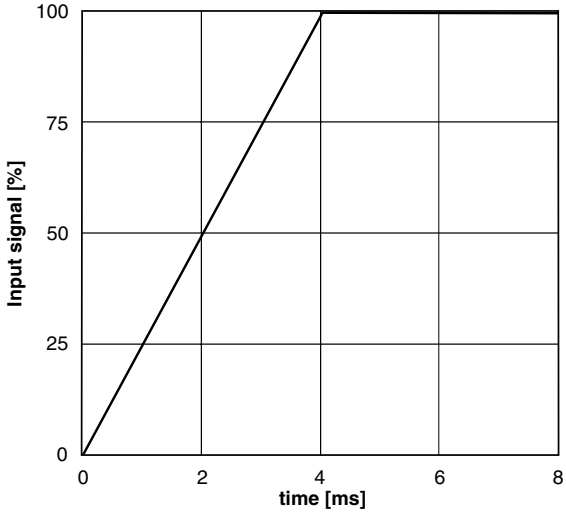


Step Response at 210 Bar (3000 PSI)

Standard Response



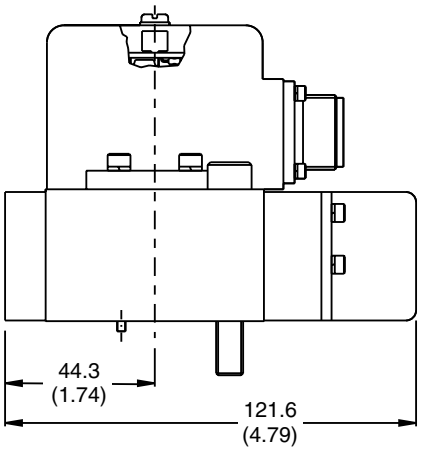
High Response
SE2E – 4 - 40 LPM (1.0 - 10 GPM)

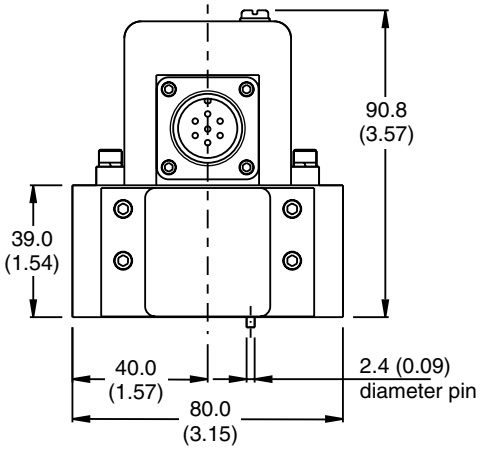


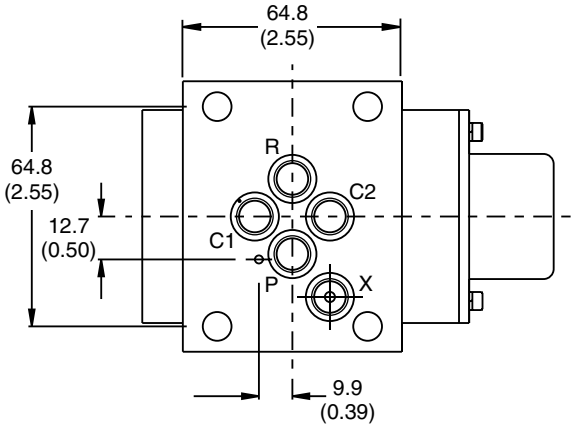
SE2E.indd, ddp

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)



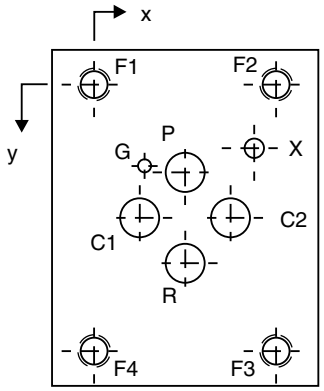




1. Suggested mounting bolts M8 x 60 mm or 5/16-18 x 2.25" long high tensile steel, socket-head cap screws.
2. The 7-pin electrical connector mates with Parker 5004072 connector or equivalent. The connector is available at 180° to position shown (advise desired position at time of order).
3. Base O-Rings: 10.82 I/D x 1.78 section (2013N-9 or 2013V-9) 5 pcs.
4. Null adjustment potentiometer.

Mounting Surface

1. The minimum depth of hole G is 2 mm (0.079 in.). The ISO recommended full-thread depth is 22 mm (0.866 in.).
2. Surface roughness Ra < 0.8 µm [N6], as specified in ISO 468 and ISO 1302.
3. Surface flatness: 0.025 mm (0.001 in.) as specified in ISO 1101.



Metric Dimensions (mm)										(± 0.1 mm)
Axis	**P**	**C1**	**R**	**C2**	**G**	**X**	**F1**	**F2**	**F3**	**F4**
	Ø 8.2 max	Ø 8.2 max	Ø 8.2 max	Ø 8.2 max	Ø 3.5	Ø 5	M8	M8	M8	M8
x	22.2	11.1	22.2	33.3	12.3	33.3	0	44.4	44.4	0
y	21.4	32.5	43.6	32.5	19.8	8.7	0	0	65.0	65.0

U.S. Dimensions (inches)										(± 0.004 in.)
Axis	**P**	**C1**	**R**	**C2**	**G**	**X**	**F1**	**F2**	**F3**	**F4**
	Ø 0.32 max.	Ø 0.32 max.	Ø 0.32 max.	Ø 0.32 max.	Ø 0.14 max.	Ø 0.2	5/16 - 18	5/16 - 18	5/16 - 18	5/16 - 18
x	0.875	0.437	0.875	1.311	0.484	1.310	0	1.750	1.750	0
y	0.846	1.280	1.717	1.280	0.780	0.343	0	0	2.562	2.562

	Pin	Voltage Command		Current Command	
Supply voltage +15/0/-15 VDC ±3% Ripple < 50 mV_{p-p}	A	+15 VDC	I_{max} = 200 mA		
	B	-15 VDC	I_{max} = 200 mA		
	C	⏚			
Command signal R_e	D	0...±10 VDC	$R_e \geq 50$ kΩ	0...±10 mA	$R_e \geq 1$ kΩ
	E				
Spool position output	F	0...±10 VDC	load resistance 10 kΩ	0...±10 VDC	load resistance 10 kΩ
Protective Earth	G	⏚			

	Pin	Voltage Command		Current Command	
Supply voltage +24 VDC ±3% Ripple < 50 mV_{p-p}	A	+24 VDC	I_{max} = 200 mA		
	B	⏚			
	C	Not used			
Command signal R_e	D	0...±10 VDC	$R_e \geq 50$ kΩ	0...±10 mA	$R_e \geq 1$ kΩ
	E				
Spool position output	F	0...±10 VDC	load resistance 10 kΩ	0...±10 VDC	load resistance 10 kΩ
Protective Earth	G	⏚			

Spool stroke is proportional to command signal.
+10 VDC to pin D causes 100% rated flow in the direction of P→C2, C1→R.

One input D or E must be connected to common if a single ended driver is used.

Connection cable to be 6-core, 0.75 mm^2 (0.03 in^2), screened.
External diameter 6.5~9.5 mm (0.26 - 0.37 in.).
Connect screening to ⏚ on supply side only.

Mating connector is Parker number 5004072.
A mating cable with connector is Parker number EHC158GE.

CE

General Description

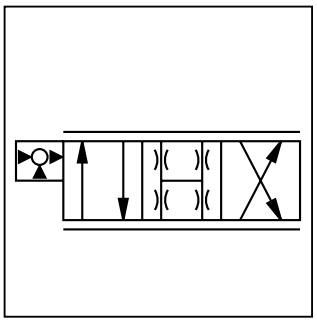
Series SE31 is a two stage, 4-way, flapper and nozzle style servovalve. This valve is designed to fit onto DIN NG10 or NFPA D05 port patterns. The SE31 has a wide range of flow ratings and a high performance spool and sleeve design.

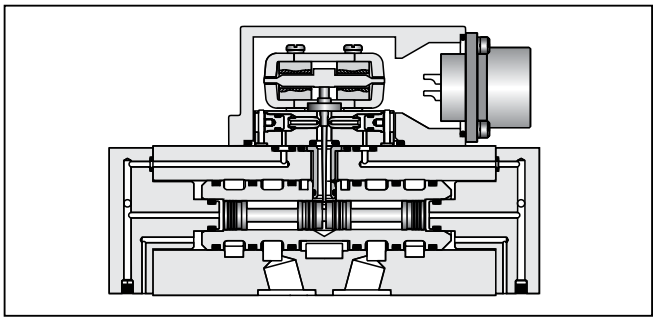
A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. This valve is rated for 210 Bar (3000 PSI) service.

C

Features

- Lapped spool and sleeve
- Jewel feedback ball for durability
- Aluminum body
- Medium and High performance
- ISO 440 -05-05-0-94 (4-ports), DO5HE (no "Y" port)



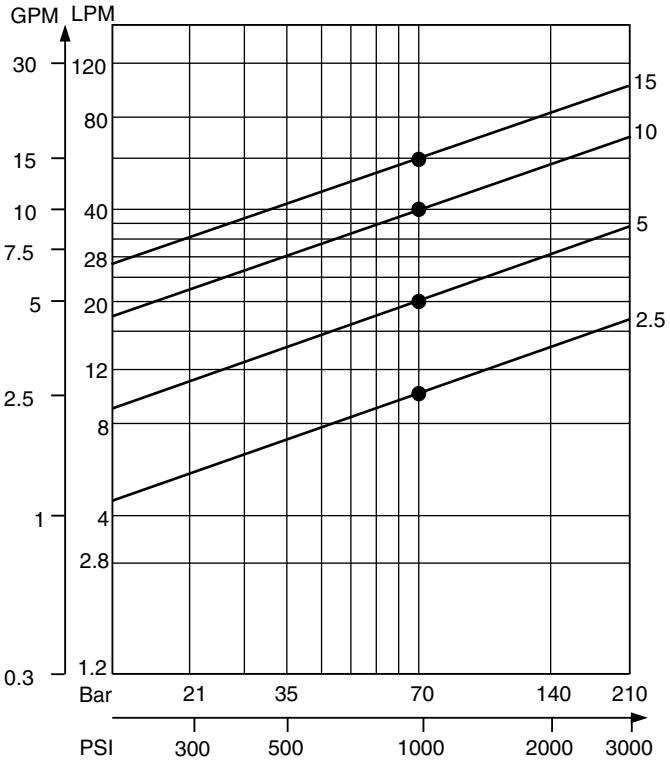


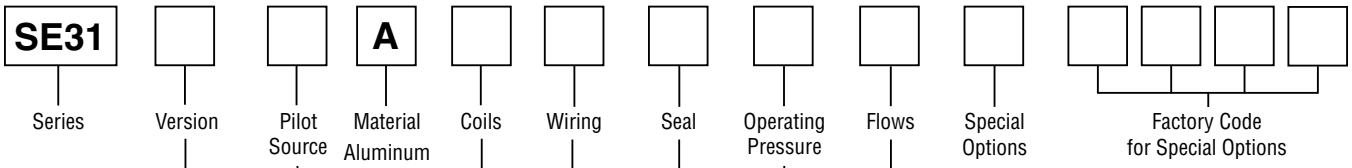
Specifications

Flow Rating ±10% @ 70 Bar (1000 PSI)	10, 20, 40, 60 LPM (2.5, 5, 10, 15 GPM)
Supply Pressure	10 – 210 Bar (145 – 3000 PSI)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Null Leakage Flow per 70 Bar (1000 PSI)	1.2 – 1.9 LPM (0.3 – 0.5 GPM)
Pilot Flow @ 210 Bar (3000 PSI)	0.4 – 0.7 LPM (0.1 – 0.2 GPM)
Input Command	±100 mA std.
Frequency Response @ 90° phase shift	> 100 Hz (See Performance Curves)
Non-Linearity	≤ 10%
Hysteresis	≤ 3%
Threshold	≤ 0.5%
Null Shift with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Pressure Gain change in pressure per 1% change in input command	60% typical
Step Response	0 - 100%, < 15 ms
Fluid	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
Fluid Cleanliness	ISO 4406 15/12 or better
Operating Temperature	-30°C to +130°C (-22°F to +266°F)
Protection Class	NEMA 4, IP65

Flow vs. Pressure Drop

at 100% command
Flow Path P →C1 →C2 →R





Code	Description
H	High performance [1]
S	Standard

[1] Only available up to 40 LPM (10 GPM)

Code	Description
A	Internal
C	External (5th port)

Code	Description	Parallel	Series
M	27 Ohms	100 mA	50 mA
B	300 Ohms	30 mA	15 mA
F	80 Ohms	40 mA	20 mA
H	200 Ohms	15 mA	7.5 mA
G	22 Ohms	200 mA	100 mA
T	1000 Ohms	10 mA	5 mA
L	1200 Ohms	20 mA	10 mA
A	40 Ohms	60 mA	30 mA
C	800 Ohms	30 mA	15 mA
D	22 Ohms	80 mA	40 mA

Code	Connector over	Flow P to C2 with:
B	Port C2	(+) signal to A, C
A	Port C1	(+) signal to A, C

Code	Description
V	Fluorocarbon (std.)
N	Nitrile

Code	Description
A	210 Bar (3000 PSI)

Consult factory for other options.

Code	Description
2.5	10 LPM (2.5 GPM)
5	20 LPM (5.0 GPM)
10	40 LPM (10.0 GPM)
15	60 LPM (15.0 GPM)

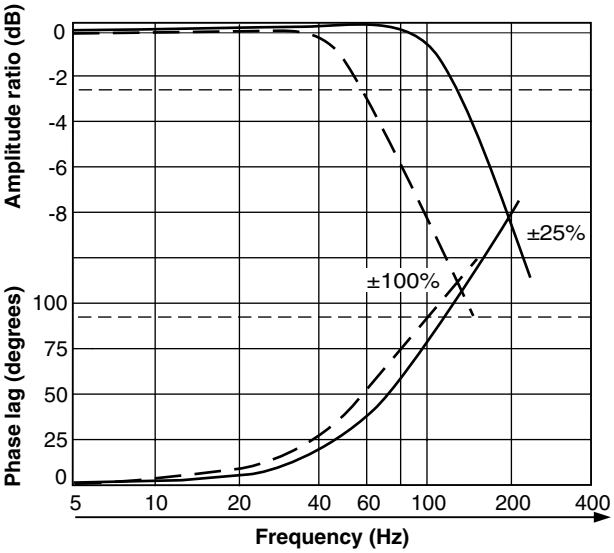
Code	Description
Omit	Standard
S	(Specify) [2]

[2] Consult factory for price, delivery and availability of special options.

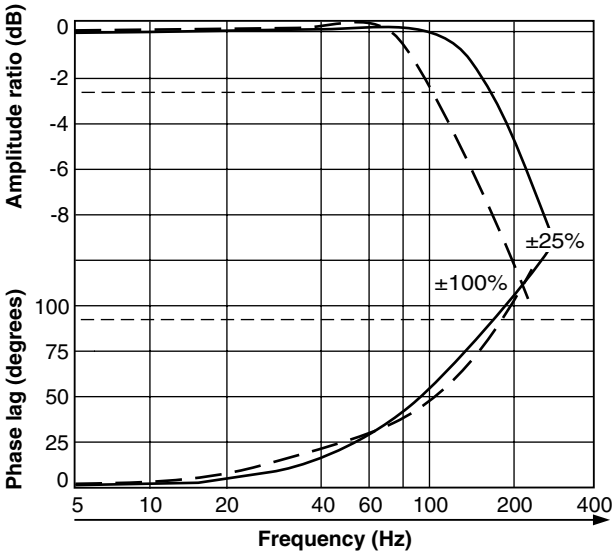
Weight: 1.1 kg (2.4 lbs.)
Cable with mating connector: EHC154S
Mating connector: MS3106E-14S-2S
Bolt kit: 4 of M6 x 50 mm, or 4 of 1/4-20x2.00"
Flushing valve: D3L8CV
Subplate, 5 ports: D31D6SA35 (4 side ports #12 SAE, 1 pilot port on P side is #4 SAE)
Subplate, 4 ports: D3H6SA35 (4 side ports #12 SAE)
Electronics: BD101, 23-7030, BD90, or BD95

Frequency Response at 210 Bar (3000 PSI)

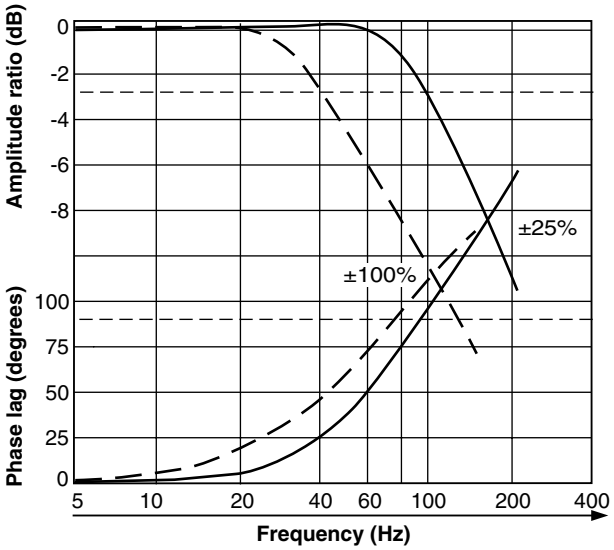
Standard Response
SE31 – 4 LPM (1.0 GPM)



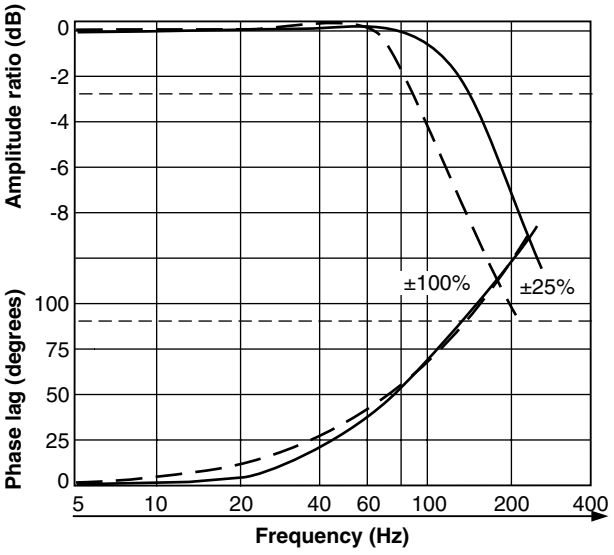
High Response
SE31– 4 LPM (1.0 GPM)



Standard Response
SE31 – 60 LPM (15 GPM)



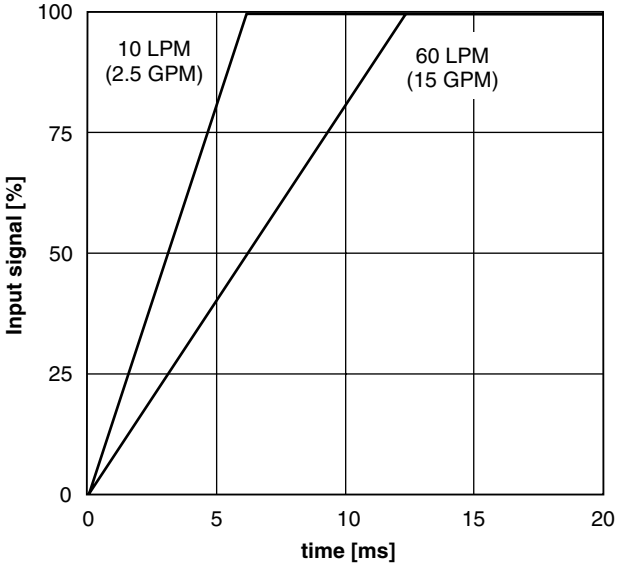
High Response
SE31 – 40 LPM (10 GPM)



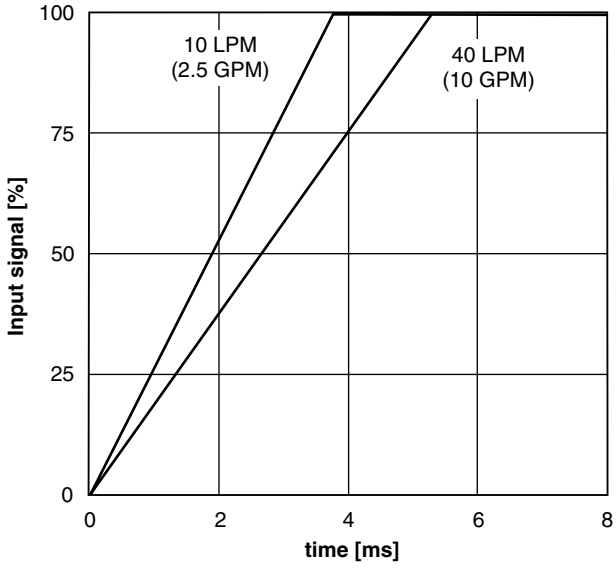
Performance Curves

Step Response at 210 Bar (3000 PSI)

Standard Response

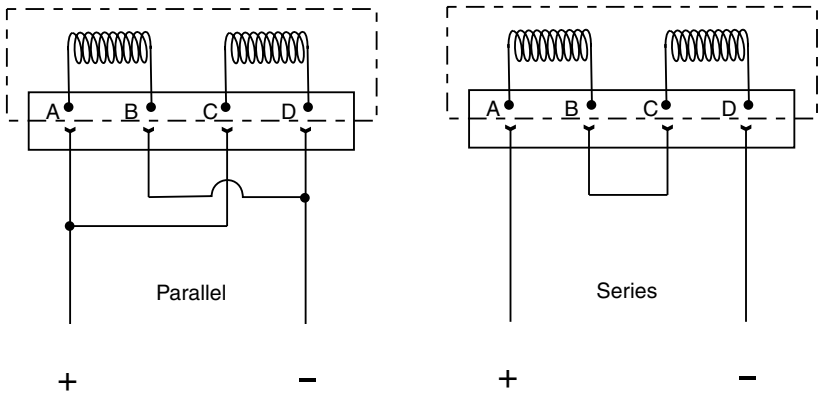


High Response



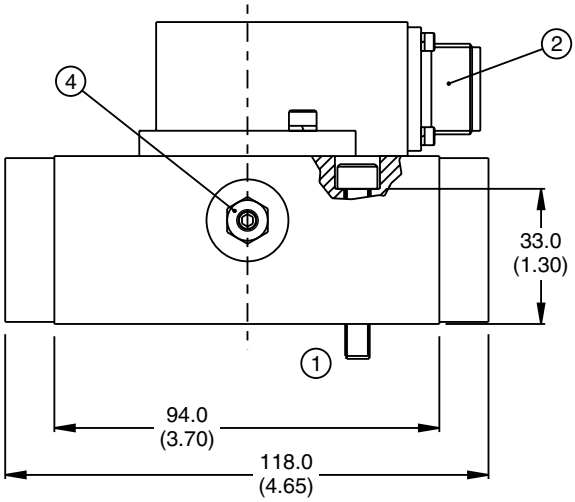
Installation Wiring Options

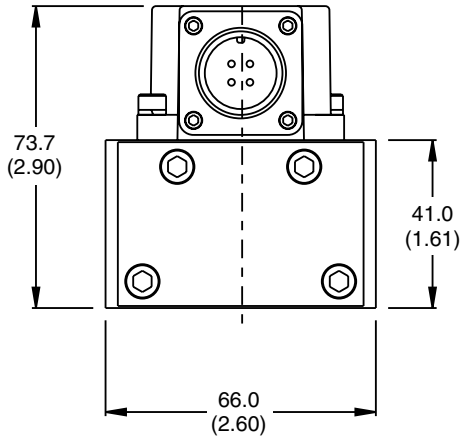
This servovalve has two coils. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

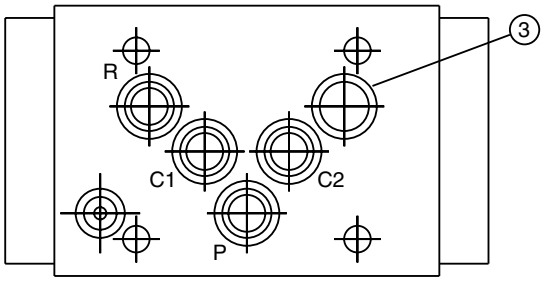


Polarity shown connects flow from P to C2 port.

Inch equivalents for millimeter dimensions are shown in (**)



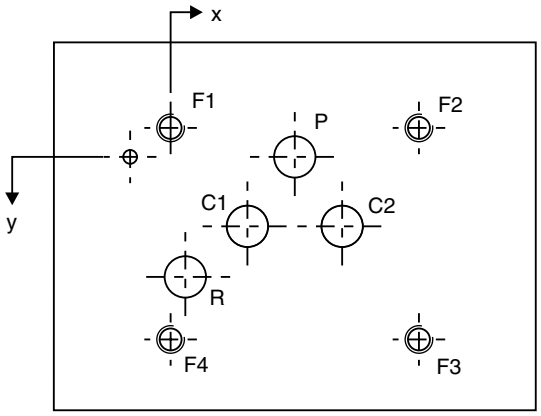




1. Suggested mounting bolts M6 x 50 mm or ¼-20 x 2.25" long high tensile steel, socket-head cap screws.
2. The 4-pin electrical connector mates with MS3106E-14S-2S or equivalent. The valve connector is available ±90° or 180° from the position shown.
3. Base O-Rings: 12 mm I.D. by 2.0 mm section, 90 durometer.
4. Null adjust requires a 10 A/F ring spanner (10 mm box end wrench) and a 2.5 hexagon key. Flow out of C1 will increase with clockwise rotation of key.

Mounting Surface

1. The minimum depth of hole G is 2 mm (0.079 in.). The ISO recommended full-thread depth is 18 mm (0.709 in.).
2. Surface roughness Ra < 0.8 µm [N6], as specified in ISO 468 and ISO 1302.
3. Surface flatness: 0.025 mm (0.001 in.) as specified in ISO 1101.



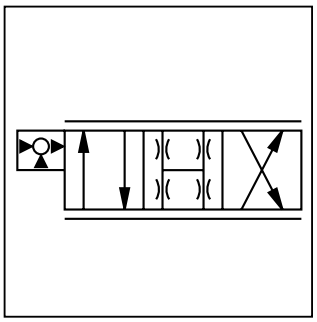
Metric Dimensions (mm)						(± 0.1 mm)			
Axis	**P**	**C1**	**R**	**C2**	**X**	**F1**	**F2**	**F3**	**F4**
	Ø 9 max	Ø 9 max	Ø 9 max	Ø 9 max	Ø 3	M6	M6	M6	M6
x	27.0	16.7	3.2	37.3	-8.8	0	54.0	54.0	0
y	6.3	21.4	32.4	21.4	6.3	0	0	46.0	46.0

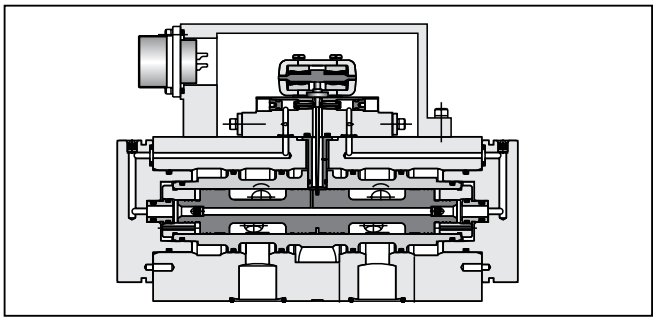
U.S. Dimensions (inches)						(± 0.004 in.)			
Axis	**P**	**C1**	**R**	**C2**	**X**	**F1**	**F2**	**F3**	**F4**
	Ø 0.354 max	Ø 0.354 max	Ø 0.354 max	Ø 0.354 max	Ø 0.12	1/4 - 20	1/4 - 20	1/4 - 20	1/4 - 20
x	1.063	0.657	0.126	1.469	-0.347	0	2.126	2.126	0
y	0.248	0.843	1.275	0.843	0.248	0	0	1.811	1.811

General Description

Series SE60 is a two stage, 4-way, flapper and nozzle style servovalve. The SE60 has a wide range of flow ratings and a high performance spool and sleeve design.

A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. This valve is rated for 210 Bar (3000 PSI) service.





Features

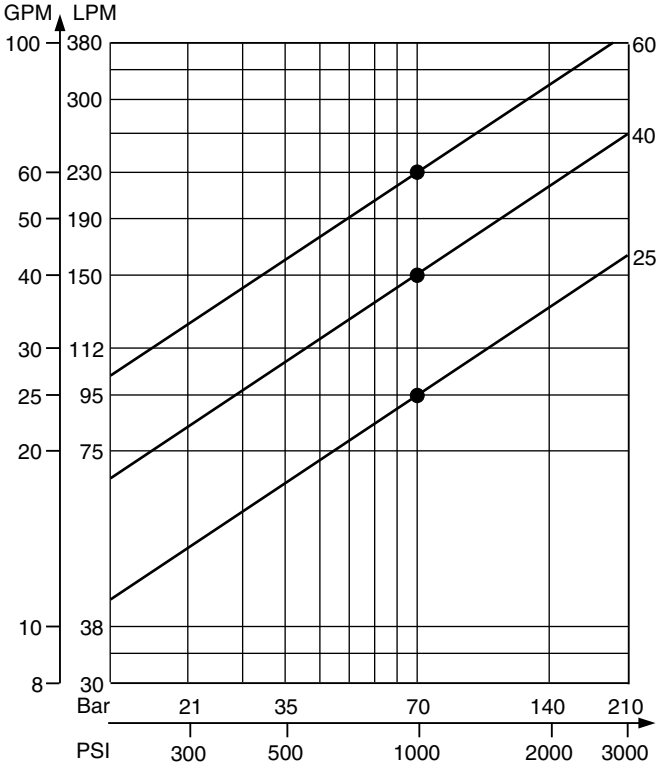
- Lapped spool and sleeve
- Jewel feedback ball for durability
- Aluminum body
- Medium and High performance
- ISO 10372 size 6 standard 50.8 mm (2.000 in.) port circle

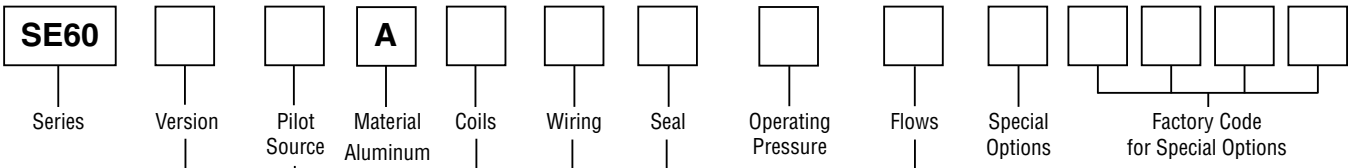
Specifications

Flow Rating ±10% @ 70 Bar (1000 PSI)	95, 150, 230 LPM (25, 40, 60 GPM)
Supply Pressure	10 – 210 Bar (145 – 3000 PSI)
Tank Port Pressure	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
Null Leakage Flow per 70 Bar (1000 PSI)	2.4 – 3.6 LPM (0.6 – 1.0 GPM)
Pilot Flow @ 210 Bar (3000 PSI)	0.4 LPM (0.1 GPM)
Input Command	±40 mA std.
Frequency Response @ 90° phase shift	> 100 Hz (See Performance Curves)
Non-Linearity	≤ 10%
Hysteresis	≤4%
Threshold	≤ 1%
Null Shift with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
Pressure Gain change in pressure per 1% change in input command	60% typical
Step Response	0 - 100%, < 15 ms
Fluid	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
Fluid Cleanliness	ISO 4406 15/12 or better
Operating Temperature	-30°C to +130°C (-22°F to +266°F)
Protection Class	NEMA 4, IP65

Flow vs. Pressure Drop

at 100% command
Flow Path P →C1 →C2 →R





C

Code	Description
H	High performance [1]
S	Standard

[1] Consult factory for price, delivery and availability of high performance version.

Code	Description
A	Internal
C	External

Code	Description	Parallel	Series
F	80 Ohms	40 mA	20 mA
H	200 Ohms	15 mA	7.5 mA
G	22 Ohms	200 mA	100 mA
T	1000 Ohms	10 mA	5 mA
M	27 Ohms	100 mA	50 mA
L	1200 Ohms	20 mA	10mA
A	40 Ohms	60mA	30mA
B	300 Ohms	30mA	15 mA
C	800 Ohms	30mA	15mA
D	22 Ohms	80mA	40mA

Code	Connector over	Flow P to C2 with:
B	Port C2	(+) signal to A, C
A	Port C1	(+) signal to A, C

Code	Description
V	Fluorocarbon (std.)
N	Nitrile

Code	Description
A	210 Bar (3000 PSI)
B	275 LPM (4000 PSI)*

* 4000 PSI requires nitrile seals.

Code	Description
25	95 LPM (25 GPM)
40	150 LPM (40 GPM)
60	230 LPM (60 GPM)

Code	Description
Omit	Standard
F	Field Replaceable Filter
S	(Specify) [2]

[2] Consult factory for price, delivery and availability of special options.

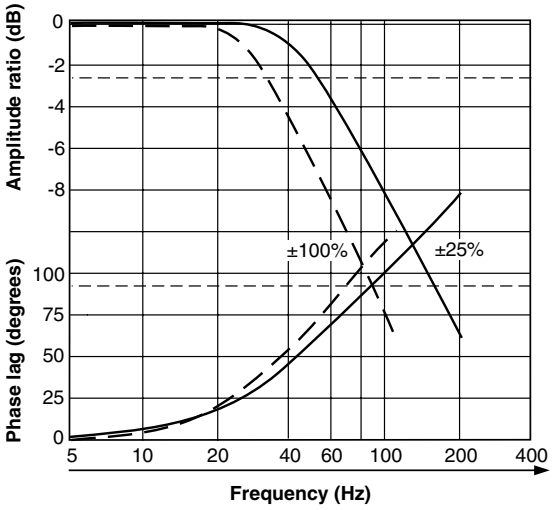
Weight: 3.4 kg (7.5 lbs.)
Cable with mating connector: EHC154S
Mating connector: MS3106E-14S-2S
Bolt kit: 4 of M10 x 60 mm, or 4 of 3/8-16x2.375"
Flushing valve: Consult factory. Use 1278007 and 11-0700.
US Subplate, 4 ports: AS06SPS20S (# 20 SAE side ports)
Metric Subplate, 4 ports: AS06SPS20M (M42 x 2.0 ISO 6149 side ports)
Electronics: BD101, 23-7030, BD90, or BD95

Performance Curves

Frequency Response at 210 Bar (3000 PSI)

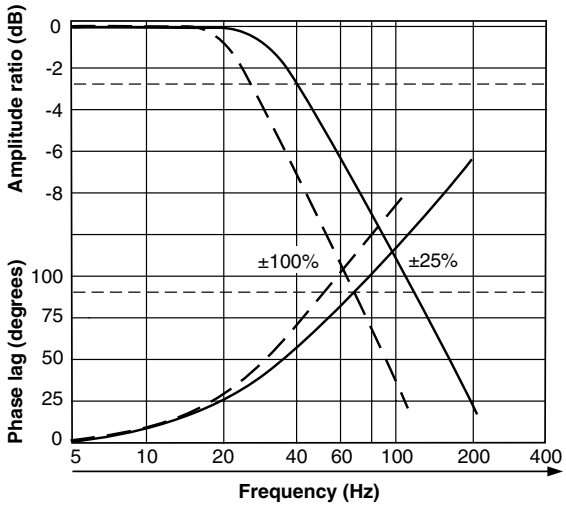
Standard Response

SE60 – 95 LPM (25 GPM)



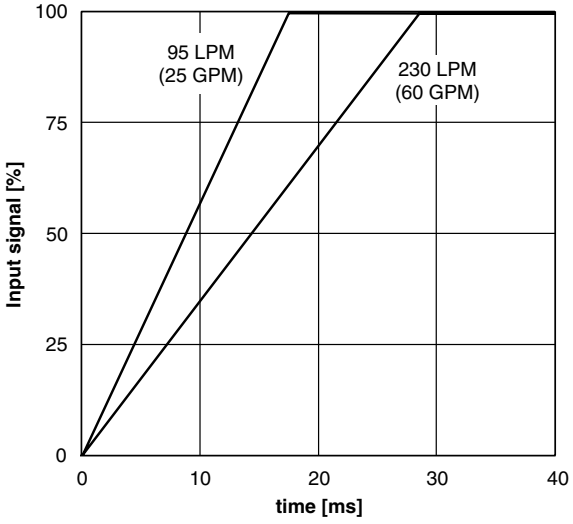
High Response

SE60 – 230 LPM (60 GPM)



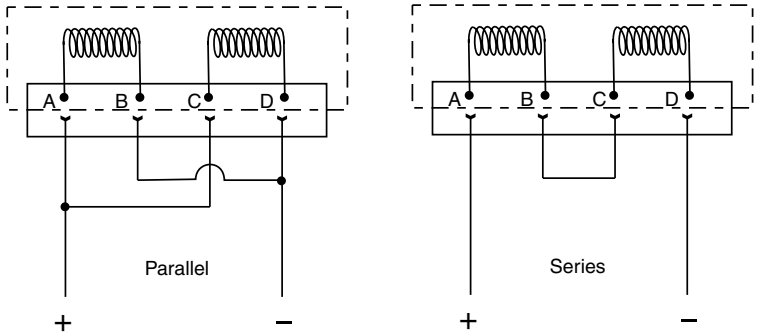
Step Response at 210 Bar (3000 PSI)

Standard Response



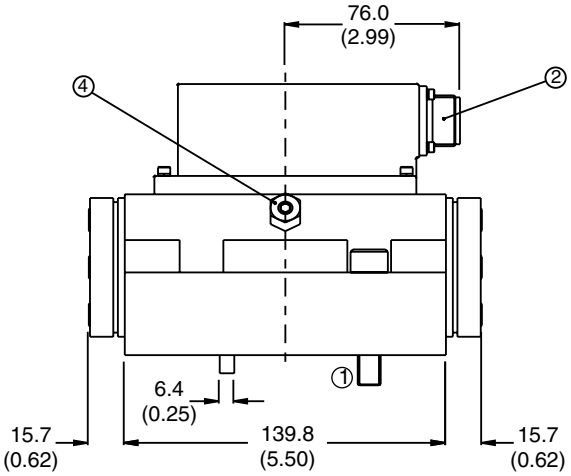
Installation Wiring Options

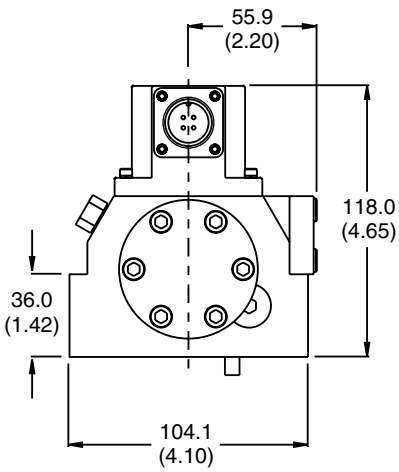
This servovalve has two coils. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

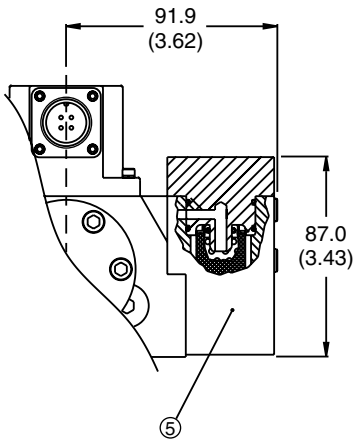


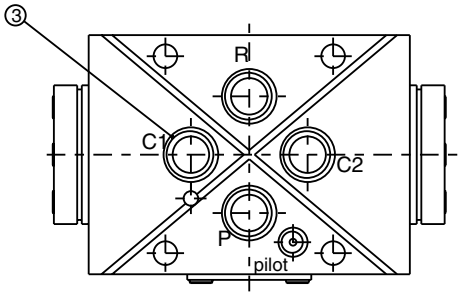
Polarity shown connects flow from P to C2 port.

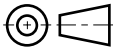
Inch equivalents for millimeter dimensions are shown in (**)







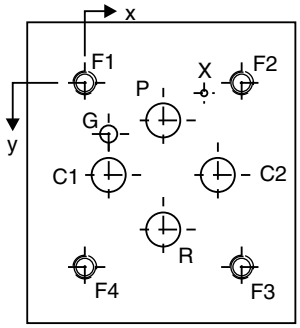




1. Suggested mounting bolts M10 x 60 mm or 3/8-16 x 2.375" long high tensile steel, socket-head cap screws.
2. 4-way electrical connector mates with MS3106-14S-2S or equivalent. Is available at 180° to position shown (advise desired position at time of order).
3. Base O-Rings: 4 of Parker 2019V-7, 1 of Parker 2012V-7 (if external pilot is used).
4. Null adjust requires 12 A/F ring spanner (12 mm box end wrench) and 3.0 hexagon key. Flow out of C2 will increase with clockwise rotation of key.
5. Optional field replaceable filter housing. Element P/N SRS1479.

Mounting Surface

1. The minimum depth of hole G is 2 mm (0.079 in.). The ISO recommended full-thread depth is 30 mm (1.181 in.).
2. Surface roughness Ra < 0.8 µm [N6], as specified in ISO 468 and ISO 1302.
3. Surface flatness: 0.025 mm (0.001 in.) as specified in ISO 1101.



Metric Dimensions (mm)							(± 0.1 mm)			
Axis	P	C1	R	C2	G	X	F1	F2	F3	F4
	Ø 17.5 max	Ø 17.5 max	Ø 17.5 max	Ø 17.5 max	Ø 8	Ø 5	M10	M10	M10	M10
x	36.5	11.1	36.5	61.9	11.1	55.6	0	73.0	73.0	0
y	17.4	42.8	68.2	42.8	23.7	4.7	0	0	85.7	85.7

U.S Dimensions (inches)							(± 0.004 in.)			
Axis	P	C1	R	C2	G	X	F1	F2	F3	F4
	Ø 0.688 max	Ø 0.688 max	Ø 0.688 max	Ø 0.688 max	Ø 0.39	Ø 0.20	3/8 - 16	3/8 - 16	3/8 - 16	3/8 - 16
x	1.437	0.437	1.437	2.437	0.437	2.187	0	2.875	2.875	0
y	0.687	1.687	2.687	1.687	0.937	0.187	0	0	3.375	3.375

Return to ALPHA TOC
Return to SECTION TOC

Proportional Directional Valves

Series	Valve Application	Description	Page
PWD00A-400	D**FW, D*FB, WLL, RLL	Programmable, Min, Max, Ramps, Setpoints	D2 - D4
PWDXXA-40*	D**FS, D*FC, RLL*R	Programmable, Feedback, Min, Max, Ramps	D5 - D8
EW*104	D**FS	Adjustable; Min, Max, 2 Ramps PHASE OUT	D9 - D10

Proportional Pressure Control Valves

Series	Valve Application	Description	Page
ED00104	DWE, DWU, RE*W	Adjustable; Min, Max, 2 Ramps PHASE OUT	D11 - D12
PCD00A-400	VBY, VMY, RE*W, PE*W	Programmable, Min, Max, Ramp	D13 - D16

Proportional Throttle Valves

Series	Valve Application	Description	Page
PCD00A-400	TDA, TEA	Programmable, Min, Max, Ramp	D13 - D16
ET*104	TDA	Adjustable; Min. Max., 2 Ramps ("L" Solenoid) PHASE OUT	D17 - D18

Servovalves

Series	Valve Application	Description	Page
BD90	BD15/BD30/Dyval	Closed Loop, Dual PID, Snap Track	D19 - D20
BD101	BD15/BD30/Dyval	Closed Loop, PI, Snap Track	D21 - D22

Auxiliary Function Cards

Series	Valve Application	Description	Page
BD101	D*FP, D*FH, D*FX, BD**	Closed Loop PI, Snap Track	D21 - D22
PID000A-40		Electronic Module for Closed Loop Control	D23 - D26
PZD00A-40*	all	Programmable, Signal Conditioning	D27 - D30

Motion Controllers

Series	Valve Application	Description	Page
C3F Compax		Motion Controller	D31 - D49

Power Supplies

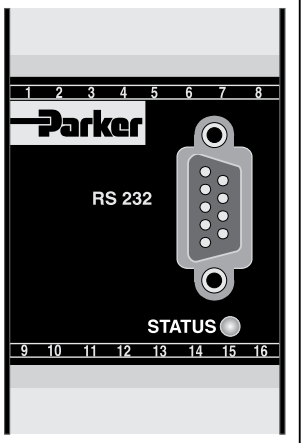
Series	Valve Application	Description	Page
PSD24	all	24 Volt Power Supply	D50 - D51
Card Holders	all	DIN Card Holders	D52

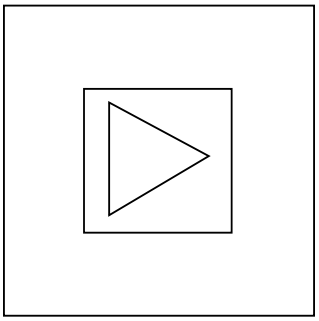
D

General Description

Series PWD00A-400 electronic module for driving open loop proportional valves is compact and easy to install with DIN rail mounting and plug-in terminals. The digital design allows for programmable parameters such as solenoid drive current, mins and maxs, and ramps. Profiles controlled by on-off logic signals can be configured through internal velocity setpoints and ramps. The module provides flexibility for different applications and repeatability from unit to unit. The module parameters are programmed with an RS-232 interface and user friendly software (ProPxD) with default values for the standard valves.

The PWD00A-400 module contains the functions required by typical open loop proportional valve applications (series D*FB, D*FW, D*1FW, WLL, RLL valves).





Features

- Programmable parameters.
- Analog or Profile Capability.
- RS-232 Interface.
- User friendly programming software.
- Plug-in terminals.
- Four independent ramps.
- Input Enable with Status indicator.
- Differential input on analog command.
- Compliant with European EMC Standards.

CE

Specifications

General			
Model	Module package for snap-on mounting on EN 50022 rail	**Mounting Position**	Any
Package Material	Polycarbonate	**Ambient Temperature Range**	-20°C to +60°C (-4°F to +140°F)
Inflammability Class	V2 to V0 acc. UL 94	**Protection Class**	IP 20 acc. DIN 40050

Electrical			
Duty Ratio	100%	**Channel Recall Signal**	Off – 0 to 5.0 VDC; On – 8.5 to 30 VDC; Ri = 30K ohm
Supply Voltage	18 VDC to 30 VDC, ripple < 5% eff., surge free (29 VDC to 30 VDC for 24V coils)	**Status Signal**	Off – 0 to 0.5 VDC; On – Supply Voltage; rated max. 15 mA
Switch-on Current Typ.	22A for 0.2 mS	**Adjustment Ranges** Minimum Maximum Ramp Time Zero Offset Current	**preset** 0 to 50% 0 to 1000 50 to 100% 0 to 1000 0 to 32.5 s 0 to 32.5 +75 to -75% +1000 to -1000 0.8/3.5/2.7/1.8/1.3 A 0/1/2/3/4/5
Current Consumption Max.	2.0A		
Pre-fusing	2.5A medium lag		
Command Signal	+10 to 0 to -10 VDC, ripple < 0.01 % eff., surge free, Ri = 150K ohm **Do not input a command greater than ±10 VDC.**	**Interface**	RS 232C, DSub 9p. male for null modem cable
		EMC	EN 50081-2, EN 50082-2
Input Signal Resolution	0.025%	**Connection**	Screw terminals 0.2 to 2.5 mm², plug-in
Differential Input Voltage Maximum	30V for terminals 5 and 6 against PE (terminal 8)	**Cable Specification**	16 AWG overall braid shield for supply voltage and solenoids 20 AWG overall braid shield for sensor and signal
Enable Signal	Off – 0 to 5.0 VDC On – 8.5 to 30 VDC; Ri = 30K ohm	**Cable Length**	50m (164 ft.)

Ordering Information

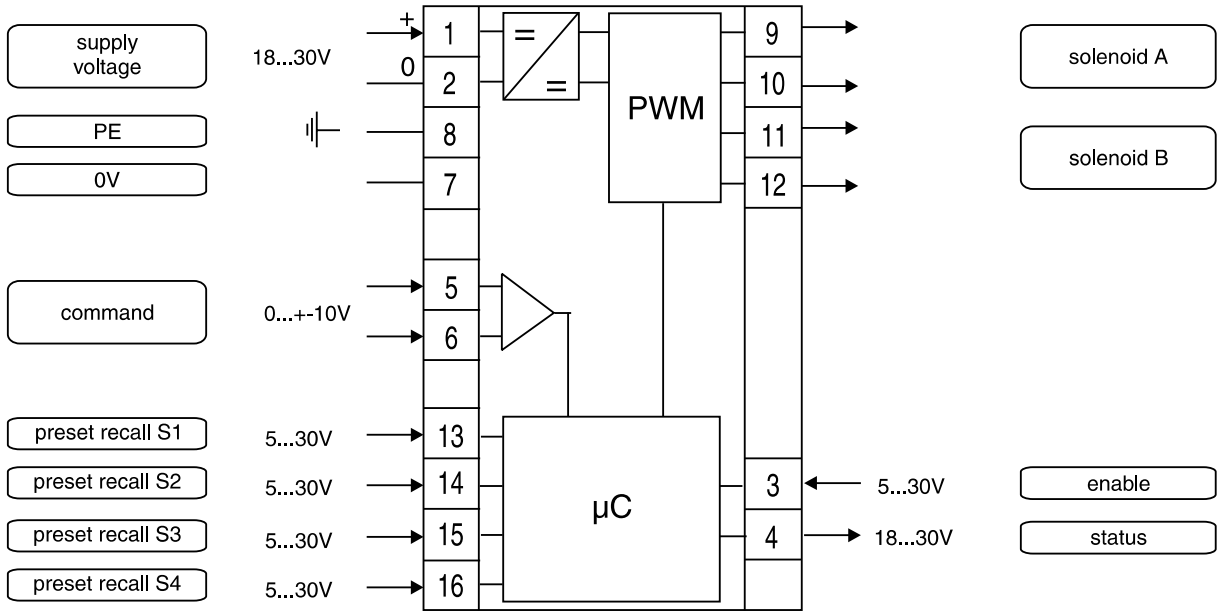
PWD — Electronic Module DC Valve
00 — Position Control Universal
A
400 — Module Type
[ ] — Design Series

NOTE: Not required when ordering.

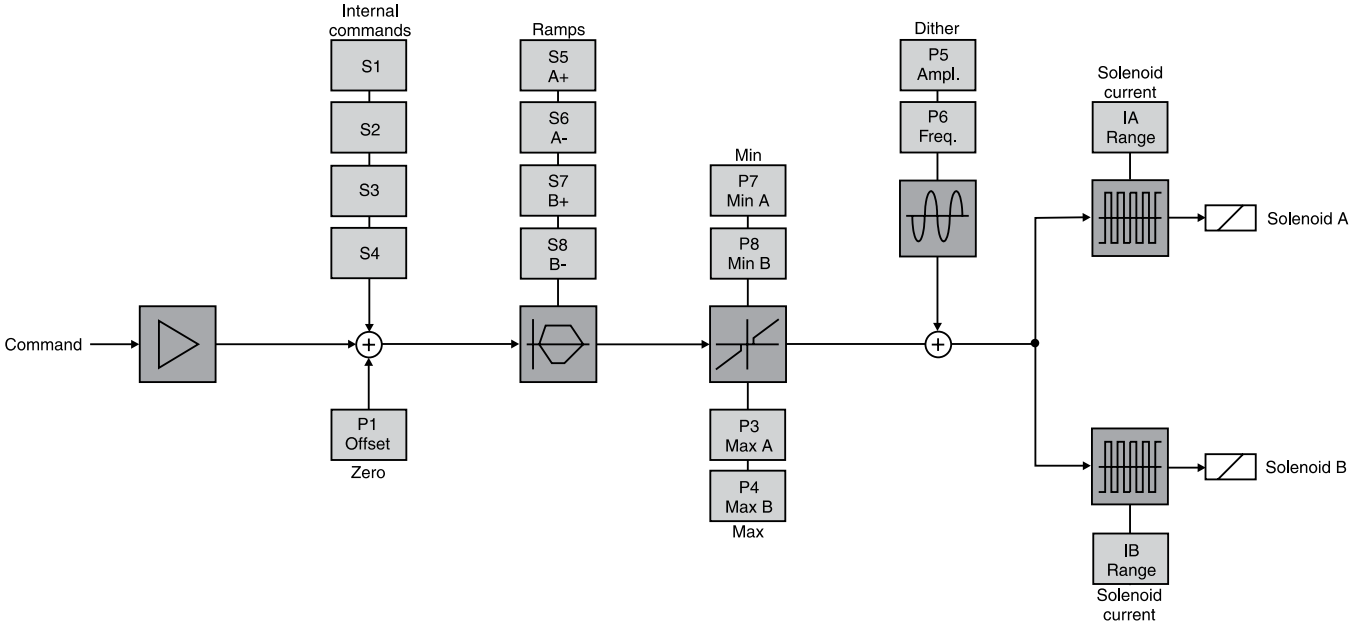
Code	Description
400	Amplifier, MIN/MAX adjustable, UP/DOWN ramps, Command inputs

Weight: 160 g (0.35 lbs.)

Block Diagram — Wiring



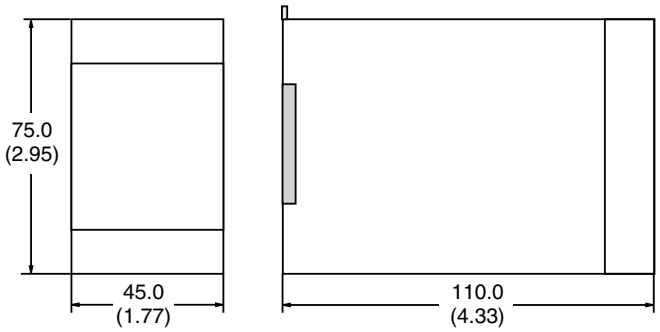
Signal Flow Diagram



Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



D

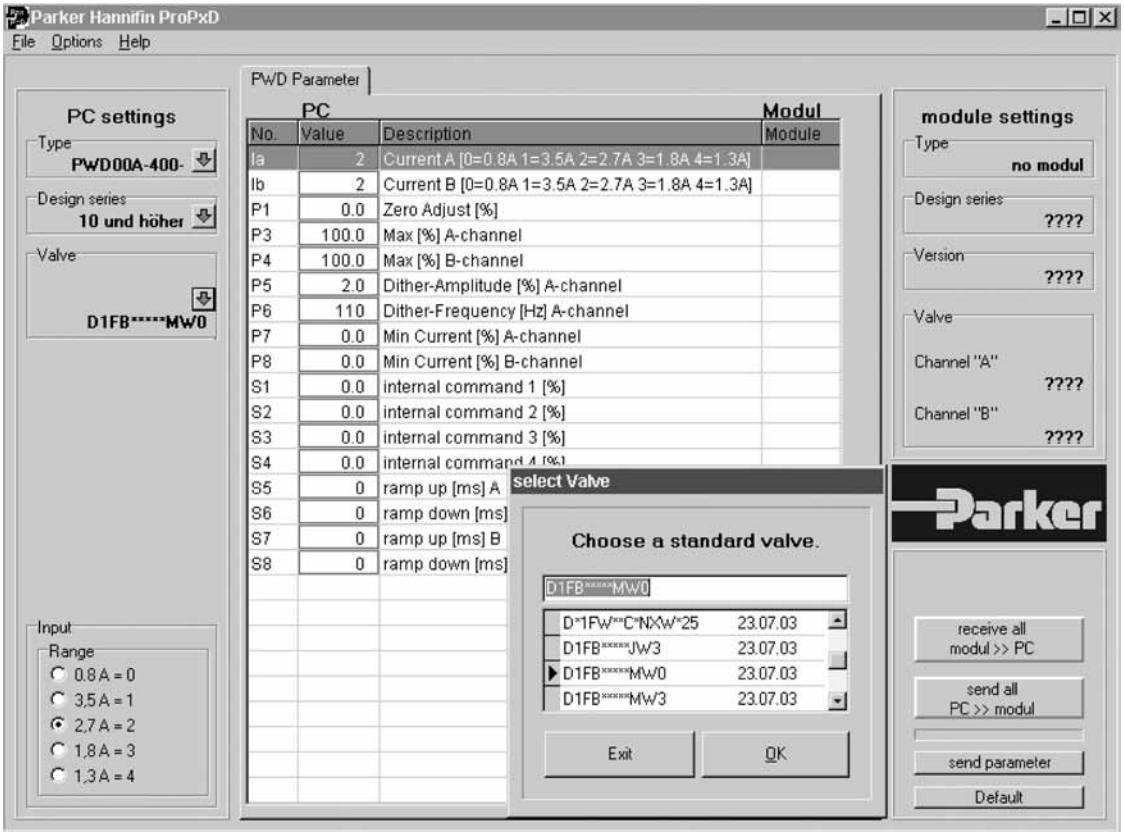
ProPxD Interface Program

The new ProPxD software permits comfortable parameter setting for the electronic module series PCD, PWD, PZD and PID.

Via the clearly arranged entry mask the parameters can be noticed and modified. Storage of complete parameter sets to floppy or hard disk is possible as well as printout or record as a text file for further documentation. Stored parameter sets may be loaded anytime and transmitted to the electronic module in the same manner as the basic parameters which are available for all usable valve series. Inside the electronic a nonvolatile memory stores the data with the option for recalling or modification.

Features

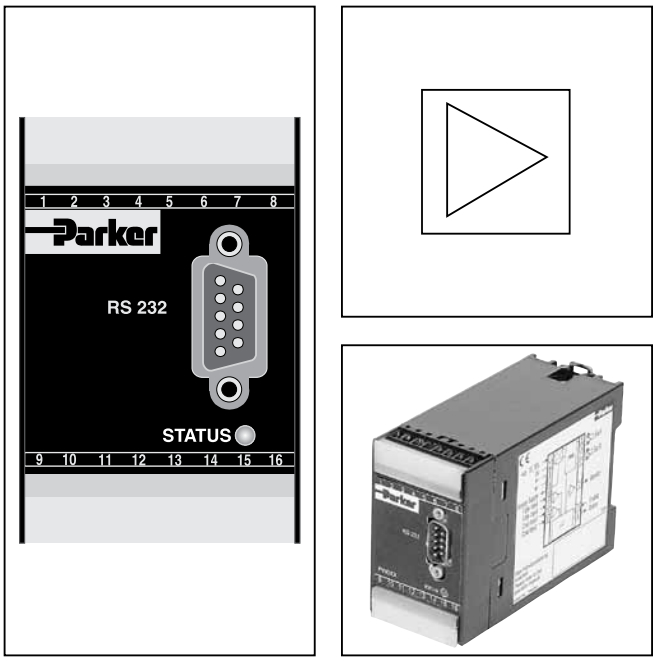
- User-friendly editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronic via serial interface RS-232 and null modem cable.
- Simple to use interface program. Download free of charge **www.parker.com/euro_hcd → Services → downloads**



General Description

Series PWDXXA-40* electronic module for driving proportional valves with spool position feedback is compact and easy to install with DIN rail mounting and plug-in terminals. The digital design allows for programmable parameters such as solenoid drive current, mins, maxs, ramps and a range of position feedback signals. The module provides flexibility and repeatability from unit to unit. The module parameters are programmed with an RS-232 interface and user friendly software (ProPxD) with default values for standard valves.

The PWDXXA-40* module contains the functions required by typical internal closed loop proportional valve applications (series D*FC, D*1FS, RLL*R, WLL*R and TEL valves).

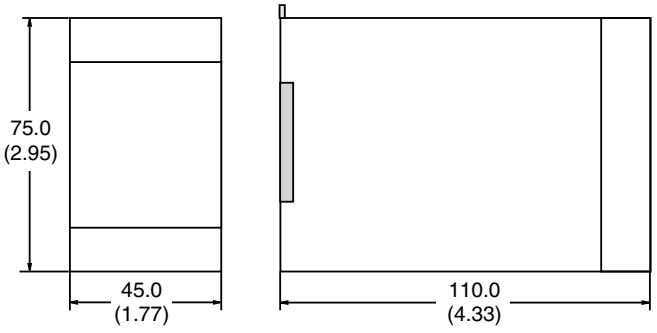


Features

- Interface and tuning for spool position feedback.
- Programmable parameters.
- ±10V, ± 20 mA, 4-20 mA position transducer input.
- RS-232 Interface.
- User friendly programming software.
- Plug-in terminals.
- Four independent ramps.
- Input Enable with Status indicator.
- Differential command input.
- Compliant with European EMC Standards.

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



Ordering Information

PWD	XX	A	—	40		—	
Electronic Module DC Valve	Position Control Universal			Module Type	Technology Function		Design Series NOTE: Not required when ordering.

Code	Description
40	Amplifier, MIN/MAX adjustment, UP/DOWN ramps, Command input

Code	Description
0	Standard
1	Linearization Option

Weight: 160g (.35 lbs.)

D

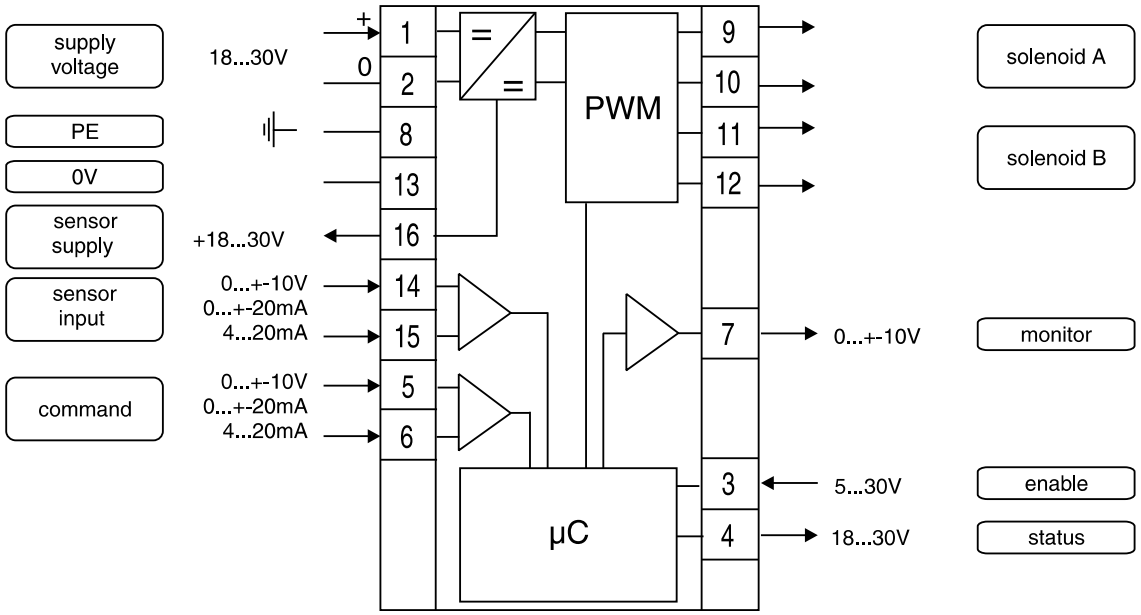
Specifications

General			
Model	Module package for snap-on mounting on EN 50022 rail	**Mounting Position**	Any
Package Material	Polycarbonate	**Ambient Temperature Range**	-20°C to +60°C (-4°F to +140°F)
Inflammability Class	V2 to V0 acc. UL 94	**Protection Class**	IP 20 acc. DIN 40050

Electrical			
Duty Ratio	100%	**Status Signal**	Off – 0 to 0.5 VDC; On – Supply Voltage; rated max. 15 mA
Supply Voltage	18 VDC to 30 VDC, ripple < 5% eff., surge free	**Monitor Signal**	+10 to 0 to -10 VDC, rated max. 5 mA, signal resolution 0.4%
Switch-on Current Typ.	22A for 0.2 mS	**Adjustment Ranges**	Minimum 0 to 50% Maximum 50 to 100% Ramp Time 0 to 32.5 s Zero Offset +100 to -100% Current 1.3/2.7/3.5 A Initial Current 0 to 25%
Current Consumption Max.	2.0A		
Pre-fusing	2.5A medium lag	**Interface**	RS 232C, DSub 9p. male for null modem cable
Command Signal	+10 to 0 to -10 VDC, ripple < 0.01 % eff., surge free, Ri = 100K ohm +20 to 0 to -20 mA, ripple < 0.01 % eff., surge free, Ri = 200 Ohm 4 to 12 to 20 mA, ripple < 0.01 % eff., surge free, Ri = 200 Ohm < 3.6 mA = solenoid output off, > 3.8 mA = solenoid output on (acc. NAMUR NE43)	**EMC**	EN 50081-2, EN 50082-2
		Connection	Screw terminals 0.2 to 2.5 mm², plug-in
		Cable Specification	16 AWG overall braid shield for supply voltage and solenoids 20 AWG overall braid shield for sensor and signal
Input Signal Resolution	0.025%		
Differential Input Voltage Max.	30V for terminals 5 and 6 against PE (terminal 8)	**Cable Length**	50m (164 ft.)
Enable Signal	Off – 0 to 2.5 VDC On – 5 to 30 VDC; Ri = 30K ohm		

Options	
Technology Function	Code 1 – Software adjustable transfer function with 10 compensation points for linearization of valve behavior.

Block Diagram — Wiring



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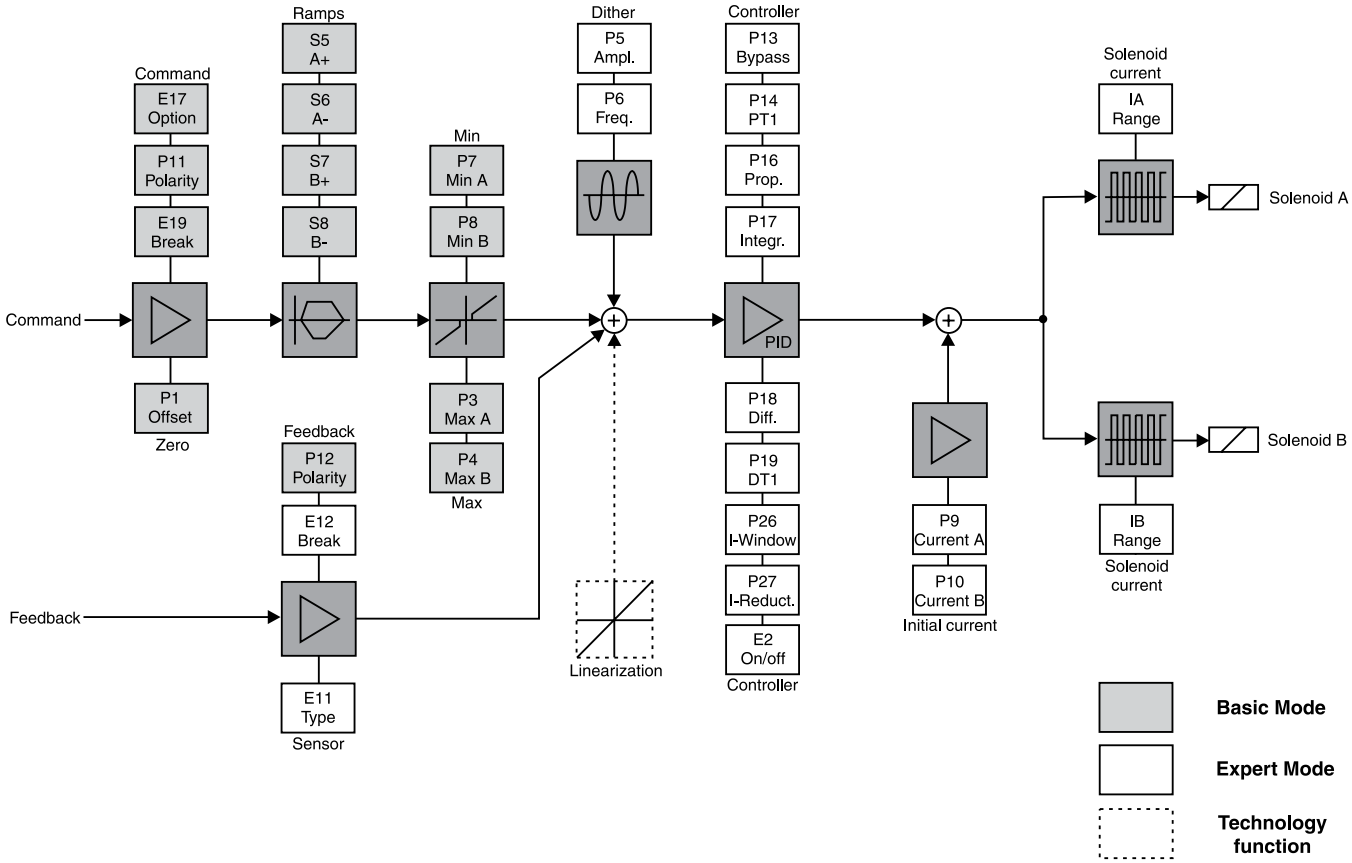
Signal Flow Diagram



ProPxD Interface Program

The new ProPxD software permits comfortable parameter setting for the electronic module series PCD, PWD, PZD and PID.

Via the clearly arranged entry mask the parameters can be noticed and modified. Storage of complete parameter sets to floppy or hard disk is possible as well as printout or record as a text file for further documentation. Stored parameter sets may be loaded anytime and transmitted to the electronic module in the same manner as the basic parameters which are available for all usable valve series. Inside the electronic a nonvolatile memory stores the data with the option for recalling or modification.

Features

- User-friendly editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronic via serial interface RS-232 and null modem cable.
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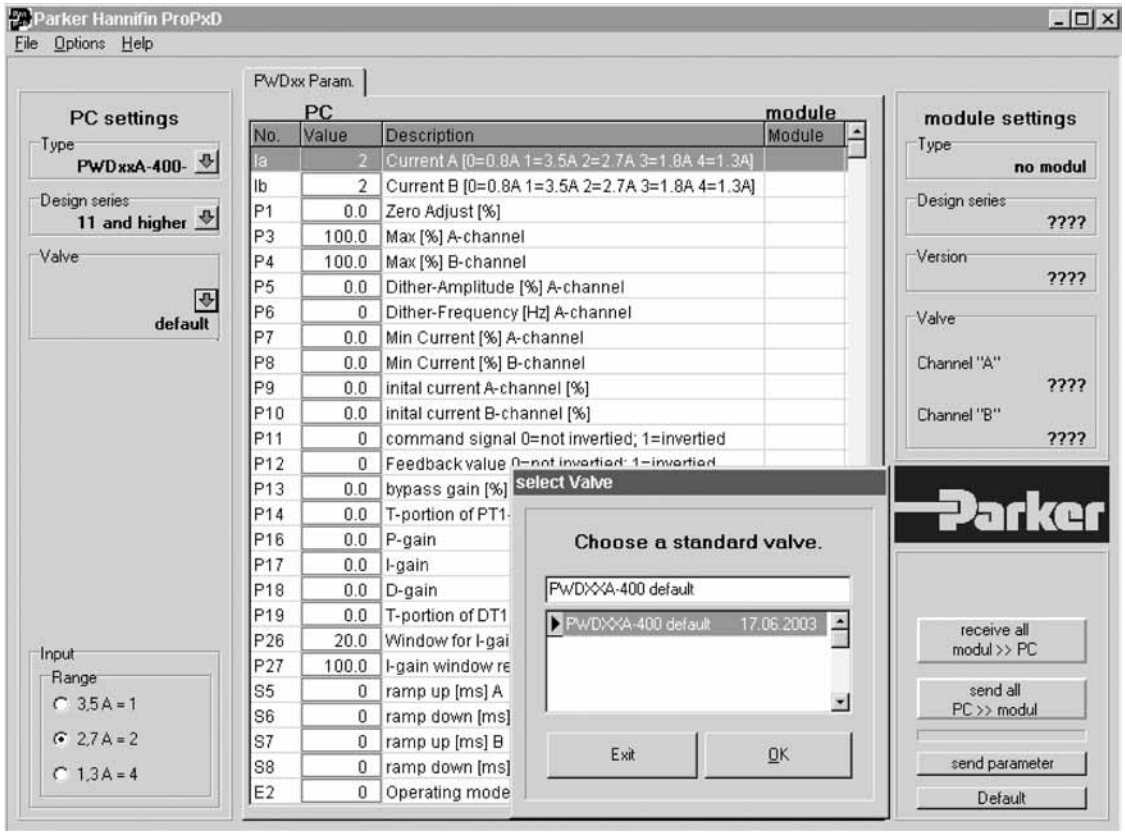
D

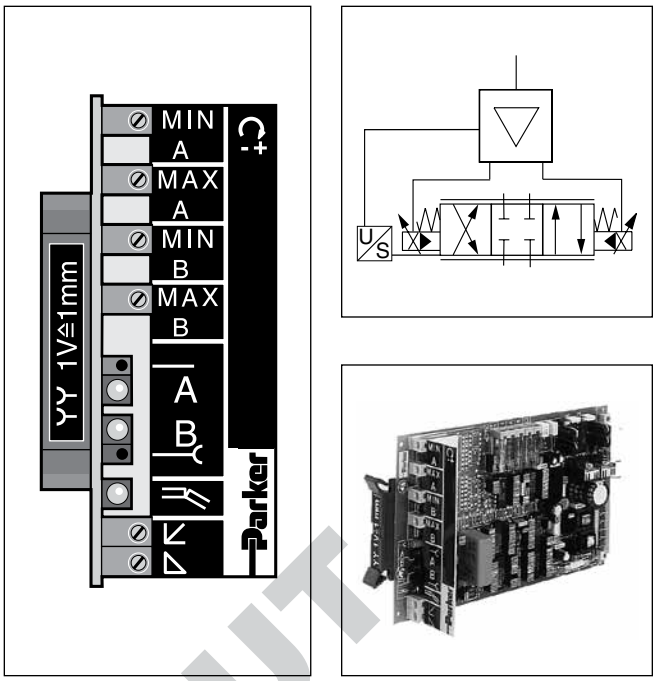


General Description

Series EW*104 electronic module is used to control pilot operated D**FS proportional directional valves with main stage spool position feedback. The module accepts a ±10 volt command signal where spool position is controlled by a closed loop PID circuit on the module.

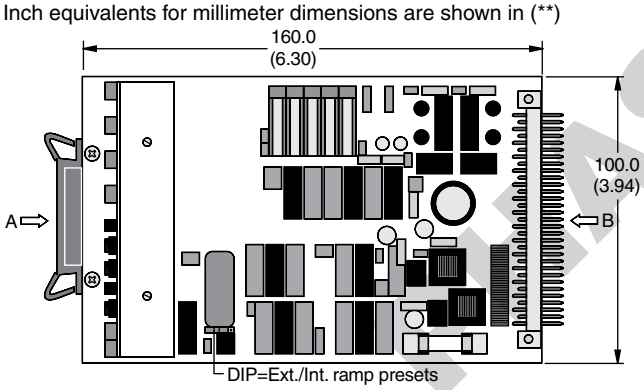
Features

- Spool overlap range can be manipulated with MIN potentiometer, adjustable by feeding a constant set value of 0.2V.
- MAX limiting of spool stroke with full set value range. Can be set up after MIN has been set and feeding a constant set value of 10V.
- DIP-switch from internal ramp generation to external ramp supply.
- Pulsed low-loss amplifier power stage with supporting constant current control for consistent temperature-independent solenoid forces.
- Dither generator with applied frequency to improve static characteristics.
- Diagnosis of spool stroke by means of measuring sockets as well as LEDs for indicating working conditions.



Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



For new applications:
EW*104: Refer to PWDXXA-400

Specifications

Connection	31 Pole Male Connector, DIN 41617
Power Supply	Regulated: 18-26V Unregulated: 22-38V
Command Signal	0 to +10 VDC and 0 to -10 VDC
Input Select Voltage	5 to 30 VDC
Power Required	40 VA
Reference Outputs	±10 VDC @10 mA
Max. Solenoid Output Current	1.3A
Ambient Temp. Range	0°C to +70°C (+32°F to +158°F), Standard Range
Ramps	0 to 5 seconds adjustable
Shielded Cable Connection	Supply connections + valve: 1.5 sq. mm (16 AWG) Transducer + Command Signals: 0.5 sq. mm (20 AWG)
Fuse	2A medium lag, DIN 41571/5x20 mm

Ordering Information

EW — Electronic Module Directional Valve

[ ] — Size

Code	Valve Size	Mounting Pattern	Valve Spool Stroke	
10	D31FS	NG10	±5.0 mm	(0.20 in.)
16	D41FS	NG16	±6.0 mm	(0.24 in.)
25	D81FS	NG25	±9.3 mm	(0.37 in.)
26	D91FS	NG25	±9.3 mm	(0.37 in.)
32	D111FS	NG32	±15.0 mm	(0.59 in.)

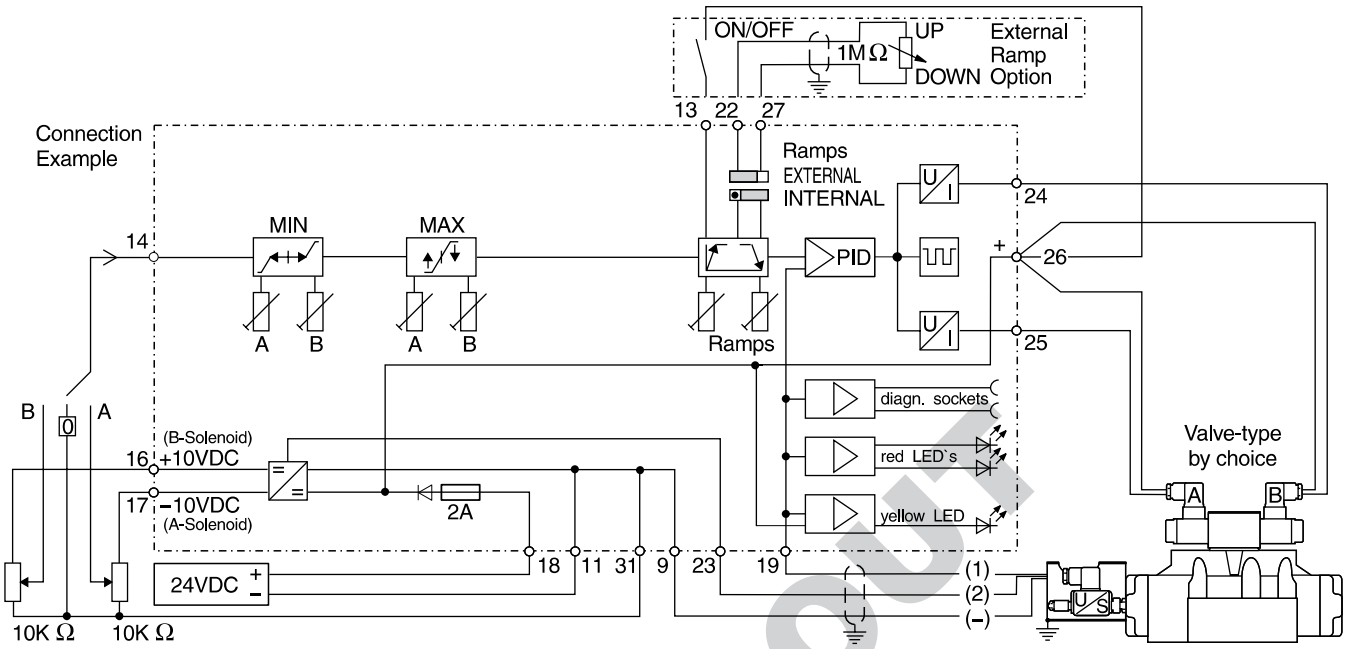
104 — Module Type

Code	Description
104	Amplifier, adjustable, MIN/MAX-limiting Up/Down ramps

[ ] — Design Series

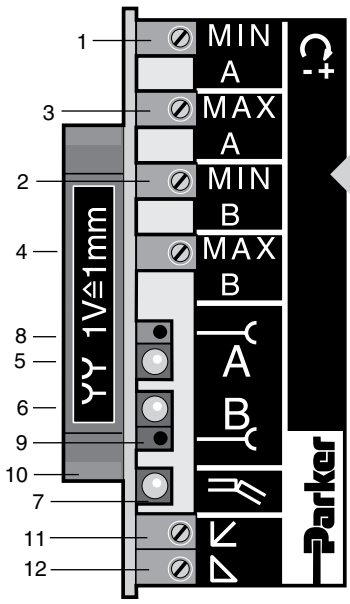
PHASE OUT

Block Diagram — Wiring



PHASE OUT

Operating and Diagnostic Elements (Elevation A)



1–2 MIN limiting potentiometers for A and B sides

3–4 MAX limiting potentiometers for A and B sides

5–6 Red LEDs for: stroke direction indication

7 Yellow LED for:
- correct voltage supply,
- correct connection of transducer

8 Red socket for spool diagnostic

9 Black socket for spool diagnostic (0V potential)

10 Blue grip strip with reference information for measured values on the measuring sockets.

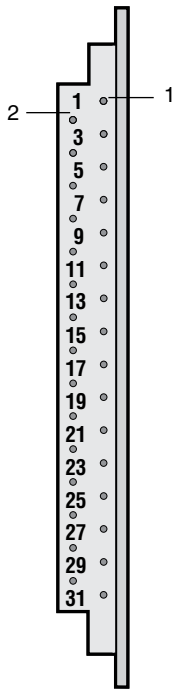
11 UP ramp potentiometer

12 DOWN ramp potentiometer

Notes:

- Turn off the electrical power to this board whenever the hydraulic supply to the valve is not on.
- Always turn off the power to this board before removing it from the card holder.

Connector (Elevation B)



9 Reference potential 0V Transducer
11 Reference potential 0V supply
13 Input ramp disable
14 Input command voltage 0...+/-10 VDC
16 Output +10V reference
17 Output -10V reference
18 Input 24 VDC supply
19 Input transducer signal
22 Input external ramp option
23 Output transducer supply
24 Output control solenoid B
25 Output control solenoid A
26 Output control solenoid A+B with possibility for external switch connection
27 Input external ramp option
31 Reference potential 0V set value

EW104.indd, ddp

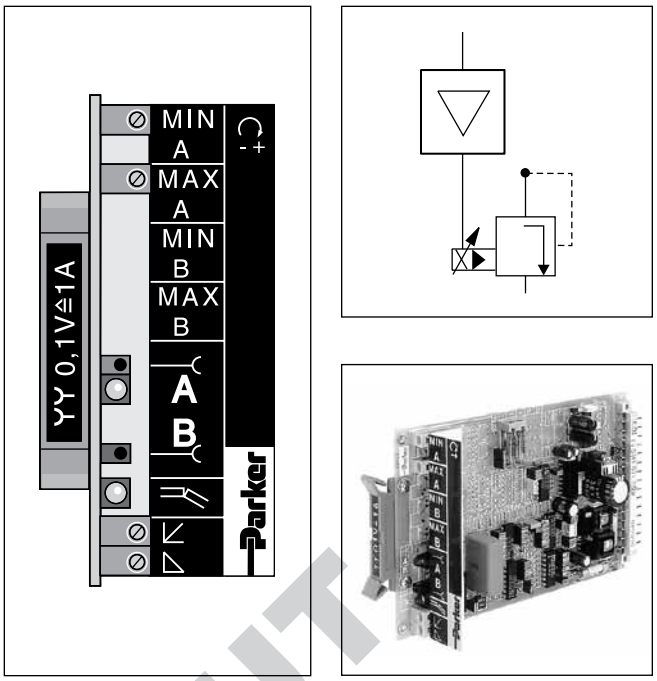
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series ED00104 electronic module is used to control DSA/DWE/DWU pressure control valves. The module accepts a 0 to 10 volt command signal, and produces a proportionally linear output current used to drive the valve's proportional solenoid. Two ramp adjustments provide smooth transition between selected pressures. Note that the linearity of the valve itself determines the linearity of the system. Refer to the specific valve data for actual linearity performance.

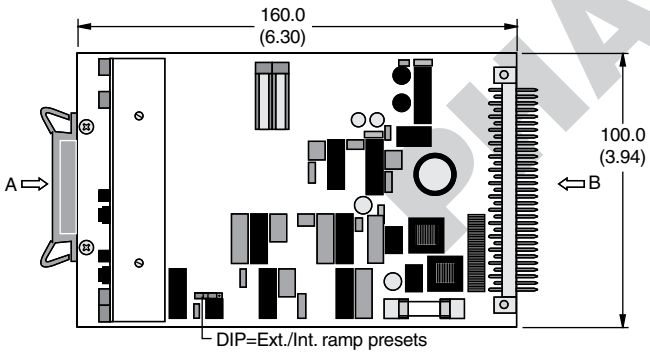
Features

- Processing and amplification of the externally supplied positive set-values into output signals for the control solenoid.
- Can be combined with PZD00A-400 or external programmable control.
- DIP switch from internal ramp generation to external ramp setting.
- MIN/MAX limiters for matching the working range to the full set value range.
- Pulsed low-loss amplifier power stage with supporting constant current control for consistent, temperature-independent, solenoid forces.
- Dither generator with applied frequency to improve static characteristics.
- Diagnosis by means of diagnostic sockets as well as LEDs for indicating working conditions.



Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



Specifications

Connection	31 Pole Male Connector, DIN 41617
Power Supply	Regulated: 18-26V Unregulated: 22-38V
Command Signal	0 to +10 VDC and 0 to -10 VDC
Input Select Voltage	5 to 30 VDC
Power Required	40 VA
Reference Outputs	+10 VDC 10 mA
Max. Solenoid Output Current	1.3A with set value 10V
Ambient Temp. Range	0°C to +70°C (+32°F to +158°F), Standard Range
Ramps	0 to 5 seconds adjustable
Shielded Cable Connection	Supply connections + valve: 1.5 sq. mm (16 AWG) Command Signals: 0.5 sq. mm (20 AWG)
Fuse	2A medium lag, DIN 41571/5x20 mm

PHASE OUT

For new applications:
ED00104: Refer to PCD00A-400

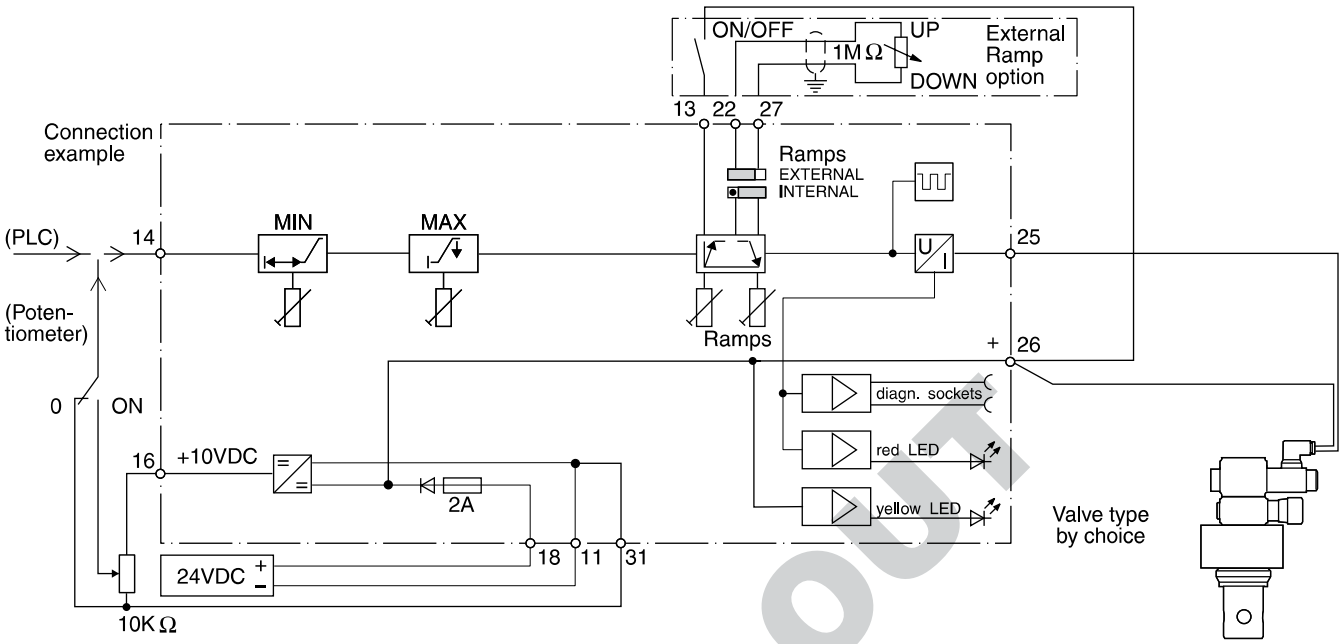
Ordering Information

ED	00	104	
Electronic Module Pressure Valve		Module Type	Design Series

For:
DSA
DWE
DWU

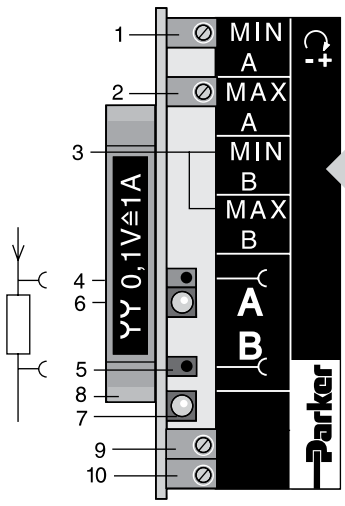
Code	Description
104	Amplifier, adjustable MIN/MAX-limits, Up/Down Ramps

Block Diagram — Wiring



D

Operating and Diagnostic Elements (Elevation A)



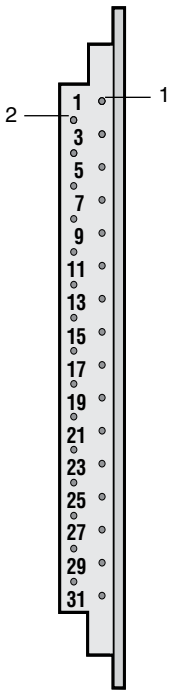
1 MIN-limiting for matching the lowest pressure
2 MAX-limiting for matching the highest pressure
3 Not used
4 Red socket for current diagnostic
5 Black socket for current diagnostic
6 Red LED (A) for:
- function indicator control solenoid
- (B unused here)
7 Yellow LED for:
- correct voltage supply
8 Red grip strip with reference information for measured values on the diagnostic sockets
9 UP ramp potentiometer
10 Down ramp potentiometer

Only potential-free measuring equipment to be used

Notes:

- Turn off the electrical power to this board whenever the hydraulic supply to the valve is not on.
- Always turn off the power to this board before removing it from the card holder.

Connector (Elevation B)



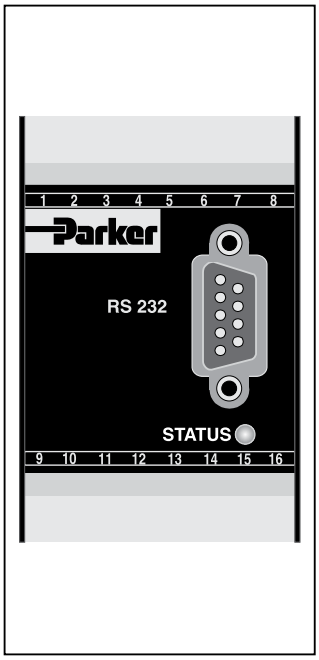
11 Reference potential 0V supply
13 Input ramp disable
14 Input command voltage 0 to +10 VDC
16 Output +10V reference
18 Input 24 VDC supply
22 Input external ramp option
25 Output control solenoid
26 Output control solenoid
27 Input external ramp option
31 Reference potential 0V set value

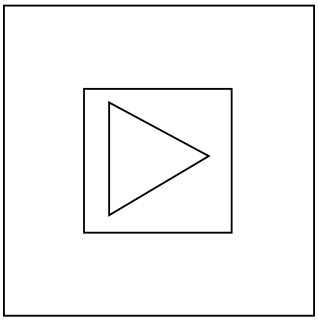
PHASE OUT

General Description

Series PCD00A-400 electronic module for driving proportional pressure control and proportional throttle valves is compact and easy to install with DIN rail mounting and plug-in terminals. The module is designed to drive two coils independent of each other. The digital design allows for programmable parameters such as solenoid drive current, mins, maxs, ramps and setpoints. The module provides flexibility and repeatability from unit to unit. The module parameters are programmed with an RS-232 interface and user friendly software (ProPxD) with default values for standard valves.

The PCD00A-400 module contains the functions required by typical pressure control and throttle valve applications (series RE*W, PE*W, DSAE, VBY, VMY, TDA, and TEA valves).





Features

- Two independent valve drivers.
- Ramps, Setpoints, Mins, Maxs.
- 5 output current selections.
- Programmable parameters.
- RS-232 Interface.
- User friendly programming software.
- Plug-in terminals.
- Compliant with European EMC Standards.

Specifications

General			
Model	Module package for snap-on mounting on EN 50022 rail	**Mounting Position**	Any
Package Material	Polycarbonate	**Ambient Temperature Range**	-20°C to +60°C (-4°F to +140°F)
Inflammability Class	V2 to V0 acc. UL 94	**Protection Class**	IP 20 acc. DIN 40050

Electrical			
Duty Ratio	100%	**Status Signal**	Off – 0 to 0.5 VDC; On – Us; rated max. 15 mA
Supply Voltage	18 VDC to 30 VDC, ripple < 5% eff., surge free* (29 VDC to 30 VDC for 24 V coils)	**Adjustment Ranges**	**preset**
		Minimum	0 to 50% 0 to 1000
		Maximum	50 to 100% 0 to 1000
		Ramp Time	0 to 32.5 s 0 to 32.5
		Current	0.8/3.5/2.7/1.8/1.3 A 0/1/2/3/4/5
Switch-on Current Typ.	22A for 0.2 mS	**Interface**	RS 232C, DSub 9p. male for null modem cable
Current Consumption Max.	5.0A	**EMC**	EN 50081-2, EN 50082-2
Pre-fusing	6.3A medium lag	**Connection**	Screw terminals 0.2 to 2.5 mm², plug-in
Command Signal	0 to +10 VDC, ripple < 0.01 % eff., surge free, Ri = 150K ohm	**Cable Specification**	16 AWG overall braid shield for supply voltage and solenoids 20 AWG overall braid shield for sensor and signal
Input Signal Resolution	0.025%		
Differential Input Voltage Max.	30V for terminals 5 and 6 against PE (terminal 8)	**Cable Length**	50m (164 ft.)
Enable Signal	Off – 0 to 5.0 VDC; On – 8.5 to 30 VDC; Ri = 30K ohm		
Channel Recall Signal	Off – 0 to 5.0 VDC; On – 8.5 to 30 VDC; Ri = 30K ohm		

Ordering Information

PCD — Electronic Module Pressure/Throttle Valves

00 — Without Position Control Universal

A —

400 — Module Type

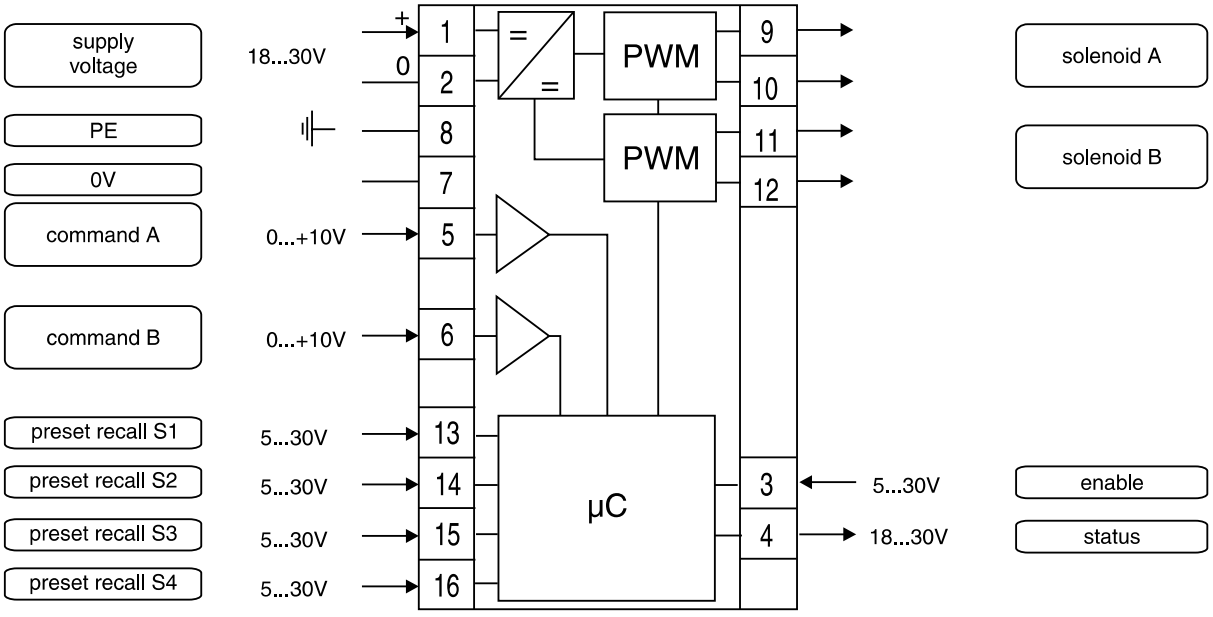
[ ] — Design Series
NOTE: Not required when ordering.

Weight: 160 g (0.35 lbs.)

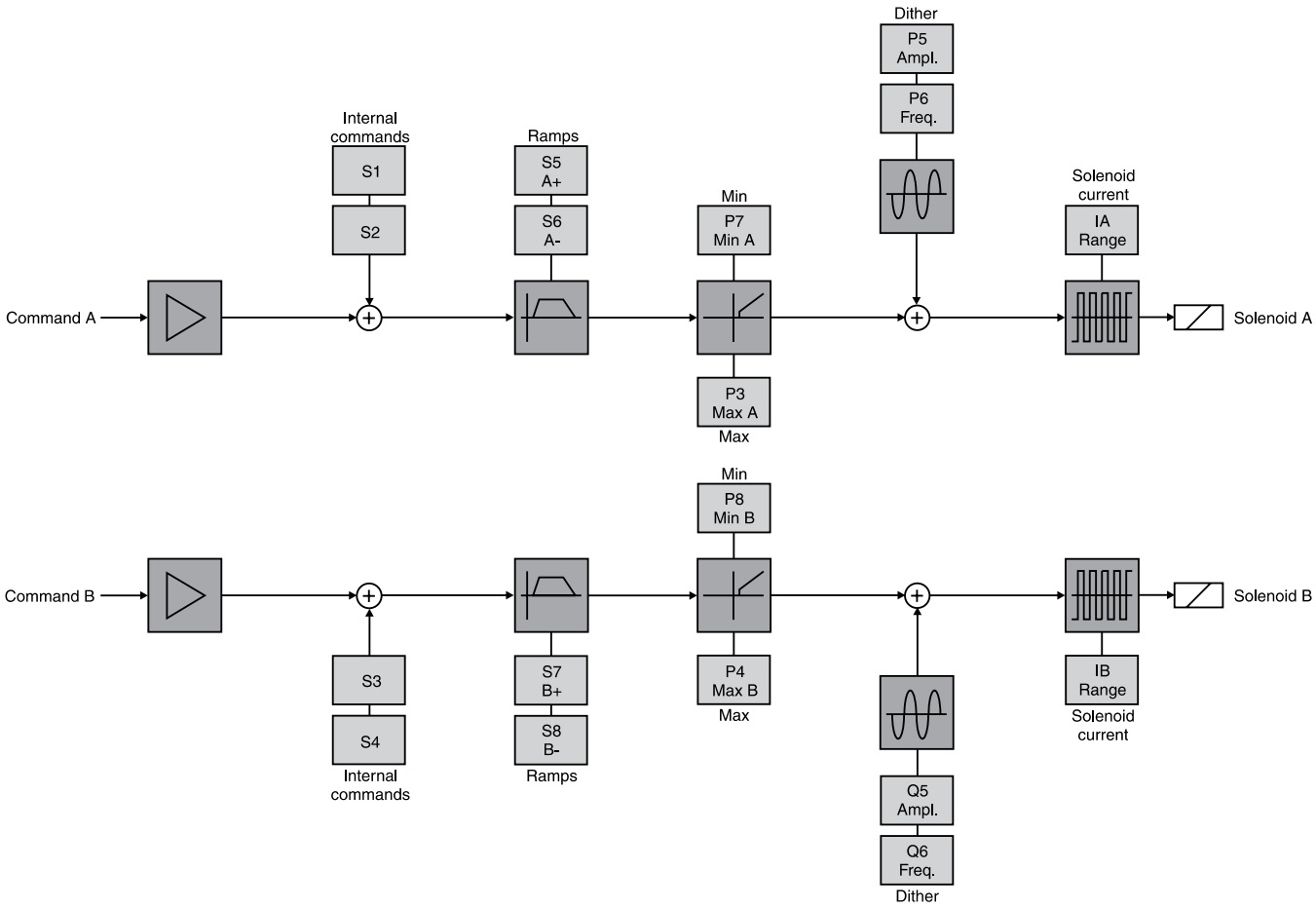
Code	Description
400	2 Amplifiers, MIN/MAX-adjustment, UP/DOWN ramps, Command inputs, 4 Command signal presets

D

Block Diagram — Wiring

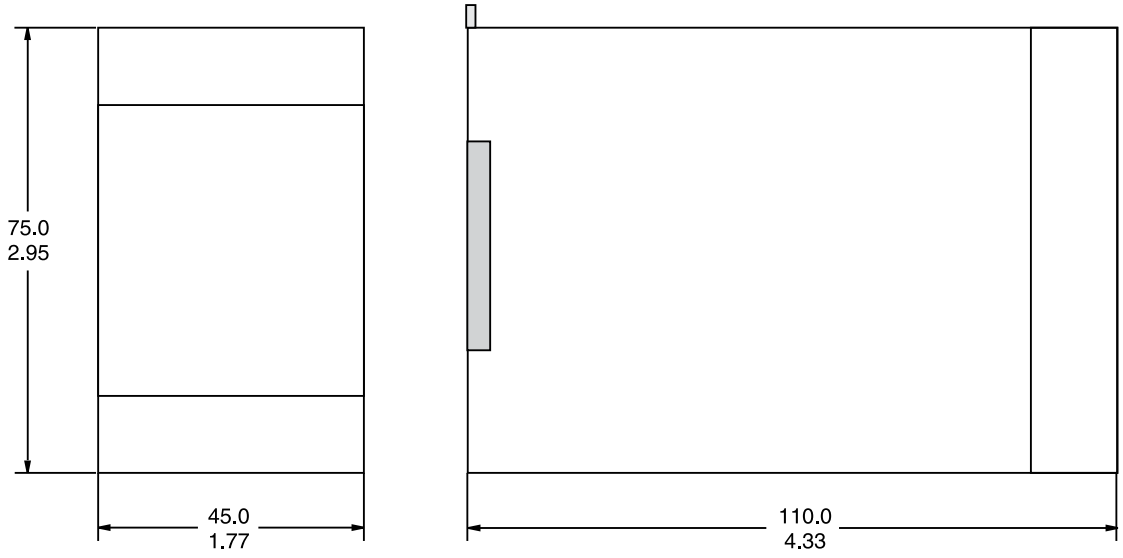


Signal Flow Diagram



Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



ProPxD Interface Program

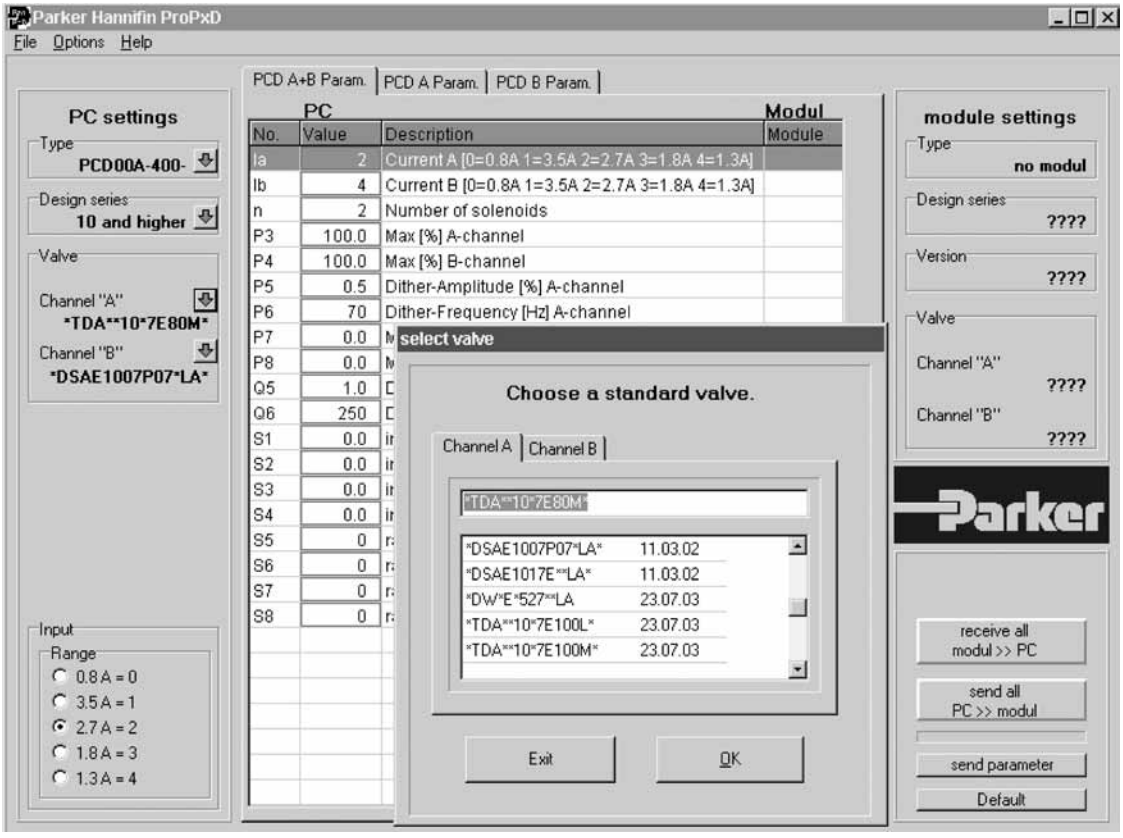
The new ProPxD software permits comfortable parameter setting for the electronic module series PCD, PWD, PZD and PID.

Via the clearly arranged entry mask the parameters can be noticed and modified. Storage of complete parameter sets to floppy or hard disk is possible as well as printout or record as a text file for further documentation. Stored parameter sets may be loaded anytime and transmitted to the electronic module in the same manner as the basic parameters which are available for all usable valve series. Inside the electronic a nonvolatile memory stores the data with the option for recalling or modification.

Features

- User-friendly editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronic via serial interface RS-232 and null modem cable.
- Simple to use interface program. Download free of charge **www.parker.com/euro_hcd → Services → downloads**

D

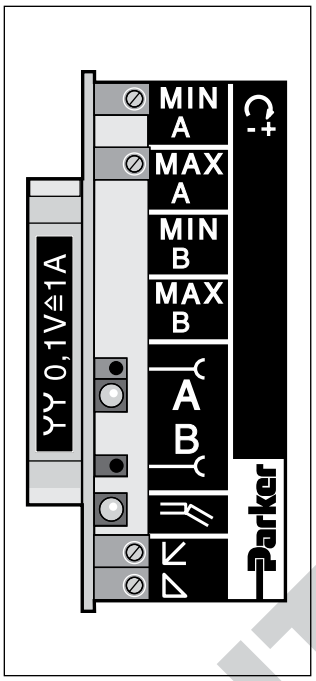


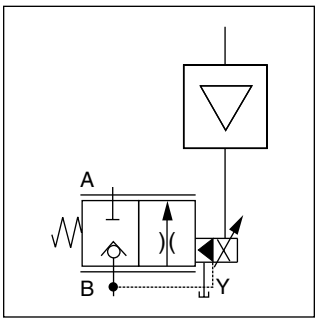
General Description

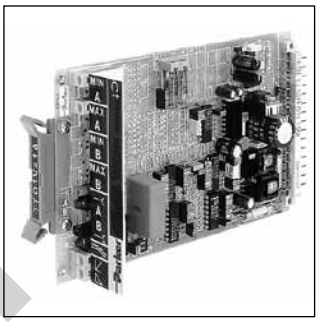
Series ET*104 electronic module is used to control TDA and TEA proportional throttle valves configured with the 'L' solenoid option. For valves configured with the 'M' solenoid option, refer to driver card PC-D00A-400. The module accepts a 0 to 10 volt command signal, and produces a proportionally linear output current used to drive the valve's proportional solenoid. Note that the linearity of the valve itself determines the linearity of the system. Refer to the specific valve data for actual linearity performance. Two ramp adjustments provide control of actuator acceleration and deceleration.

Features

- Processing and amplification of the externally supplied positive set-values into output signals for the control solenoid.
- Can be combined with PZD00A-400 or external programmable control.
- DIP switch from internal ramp generation to external ramp setting.
- MIN/MAX limiters for matching the working range to the full set value range.
- Pulsed low-loss amplifier power stage with supporting constant current control for constant, temperature-independent, solenoid forces.
- Dither generator with applied frequency to improve static characteristics.
- Diagnosis by means of diagnostic sockets as well as LEDs for indicating working conditions.





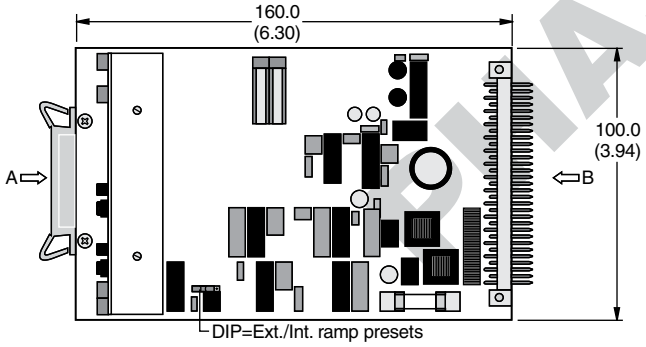


Specifications

Connection	31 Pole Male Connector, DIN 41617
Power Supply	Regulated: 18-26V Unregulated: 22-38V
Power Required	40 VA
Command Signal	0 to +10 VDC
Input Select Voltage	5 to 30 VDC
Reference Outputs	+10 VDC 10 mA
Max. Solenoid Output Current	1.05A with set value 10V
Ambient Temp. Range	0°C to +70°C (+32°F to +158°F), Standard Range
Ramps	0 to 5 seconds adjustable
Shielded Cable Connection	Supply connections + valve: 1.5 sq. mm (16 AWG) Command Signals: 0.5 sq. mm (20 AWG)
Fuse	2A medium lag, DIN 41571/5x20 mm

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



For new applications:
ET*104: Refer to PCD00A-400

Ordering Information

ET		104	
Electronic Module Pressure Valve	Size	Module Type	Design Series

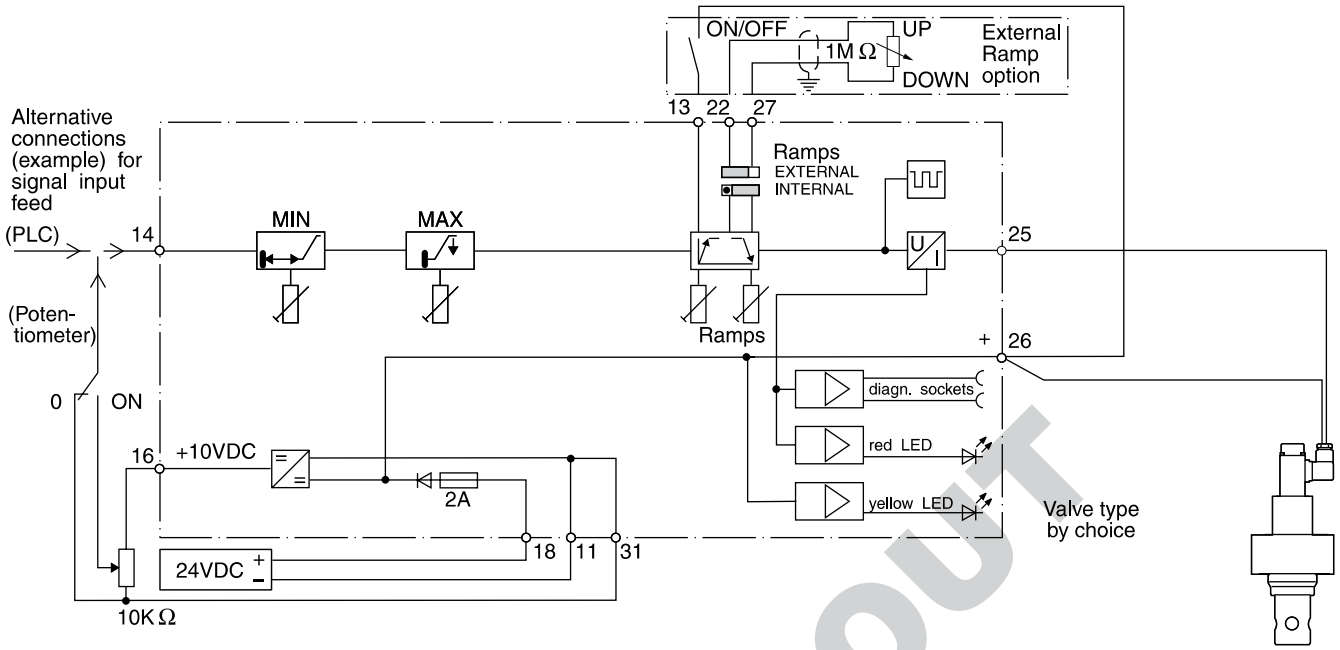
Code	Valve	Sol.
00	TDA...LAF E16 to E50	35mm
00	TEA...LAF E16 to E50	35mm
99	TDA...LAF E63 to E100	60mm
99	TEA...LAF E63 to E100	60mm

Code	Description
104	Amplifier, adjustable MIN/MAX limits, UP/DOWN ramps for valves with 'L' solenoid option

PHASE OUT

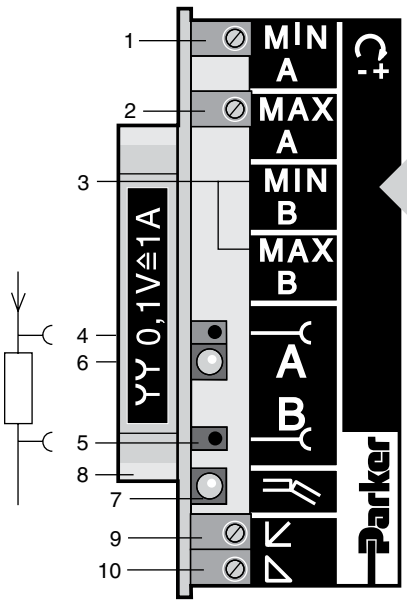
Return to ALPHA TOC
Return to SECTION TOC

Block Diagram — Wiring



PHASE OUT

Operating and Diagnostic Elements (Elevation A)



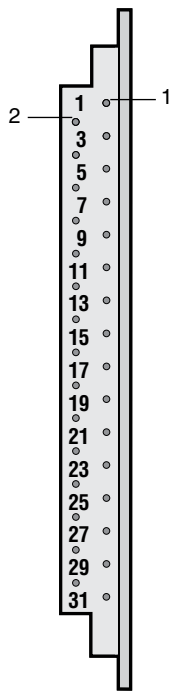
1 MIN limiter for matching the smallest throttle aperture
2 MAX limiter for matching the largest throttle aperture
3 not used
4 Red socket for current diagnostic
5 Black socket for current diagnostic
6 Red LED (A) for:
- function indicator control solenoid
- (B not used)
7 Yellow LED for:
- correct voltage supply
8 Green grip strip with reference information for measured values
9 UP ramp potentiometer
10 DOWN ramp potentiometer

Only potential-free measuring equipment to be used

Notes:

- Turn off the electrical power to this board whenever the hydraulic supply to the valve is not on.
- Always turn off the power to this board before removing it from the card holder.

Connector (Elevation B)



11 Reference potential 0V supply
13 Input ramp disable
14 Input command voltage 0...+10 VDC
16 Output +10V reference
18 Input 24 VDC supply
22 Input external ramp option
25 Output control solenoid
26 Output control solenoid
27 Input external ramp option
31 Reference potential 0V set value

ET104.indd, ddp

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series BD90 servo amplifiers are high performance amplifiers designed to work with Series BD and DY servovalves. The amplifiers are packed with many desirable features that make them extremely versatile performers in motion control systems.

Features

- **Voltage or Current Commands —** The user has the option of command input ranges of either ±14 VDC or ±28 mA.
- **Two Differential Input Feedback Amplifiers —** Both inner and outer loops have Proportional-Integral-Derivative gain.
- **Built-in Power Supply —** The BD90 has its own power supply with inputs rated at either 115 VAC or 230 VAC.
- **Dither Circuitry —** The user can select either the on-board 60 Hz dither circuit, or input his own external dither frequency.
- **Reference Power Supply —** A reference suply voltage of ±15 VDC @ 350 mA, and ±10 VDC @ 50 mA.
- **External Logic Shutdown —** Allows the user to shut down the output to the valve by applying an external voltage signal.
- **Convenient Mounting —** The BD90 mounts in a convenient standard “Snap-Trac” mount.
- **Plug-in Terminal Strips —** This feature makes it unnecessary to remove the wires from the terminal strip.

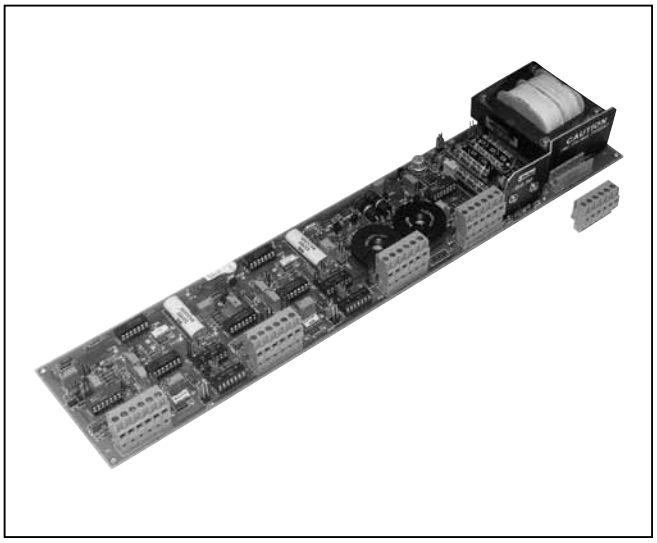
Ordering Information

BD — Servo Amplifier for BD Series and DY (>15mA) Series Servovalves

90 — Input Power

Code	Description
90	115 VAC

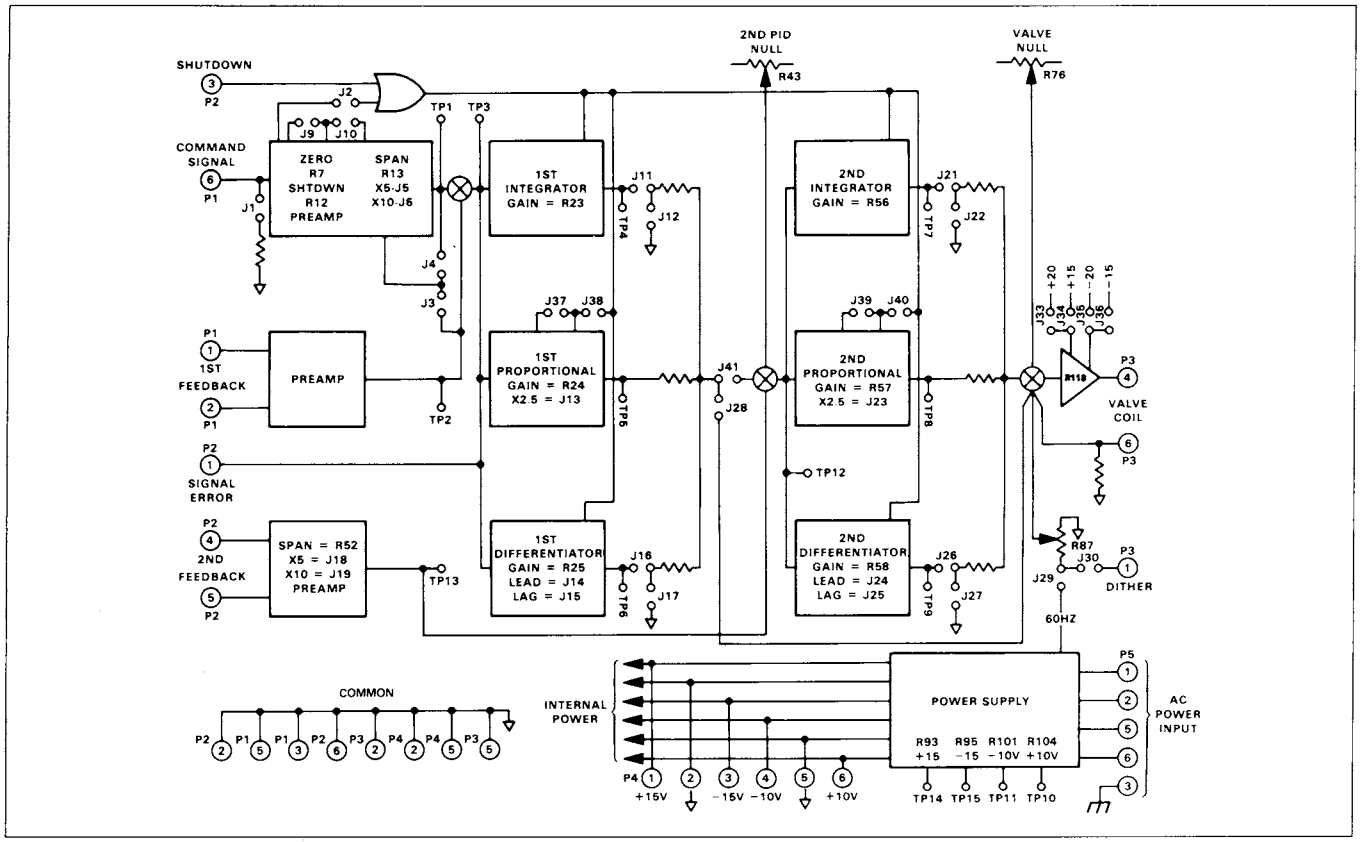
BD90 Connector 1000177
Snap-Trac BD90 830007-15
Snap-Trac is included with delivery



Specifications

Power Supply	BD90 – 115 VAC or 230 VAC @ 30 VA, 50/60 Hz
Command Signal Range	±14 VDC, ± 28 mA
Input Impedance on Command Terminals	100k ohm minimum
Input Impedance on Feedback Terminals	50K ohm minimum
Current Output	15 to 150 mA Icoil x Rcoil ≤12.5V (BD90 up to 200 mA with J33 and J35)
Operating Temperature Range	0°C to 70°C (32°F to 158°F)
Reference Voltage	±15 VDC @ 350 mA
Supplies	±10 VDC @ 50 mA
External Logic Shutdown Voltage Required	+4 to +10 VDC, sink input
Shutdown Input Impedance	10K ohm
Protection Class	Open, not rated

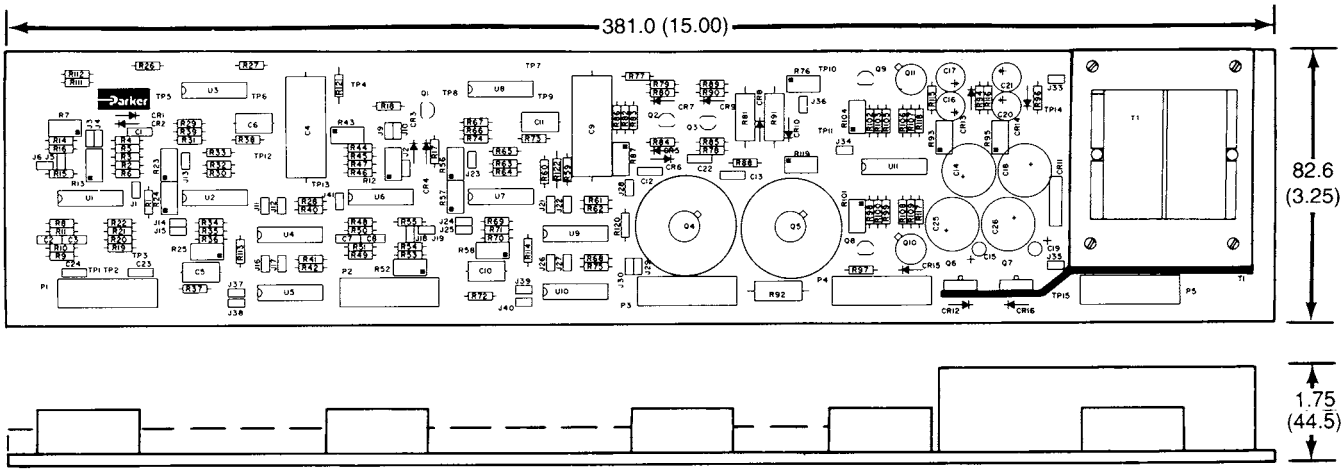
Block Diagram — Wiring



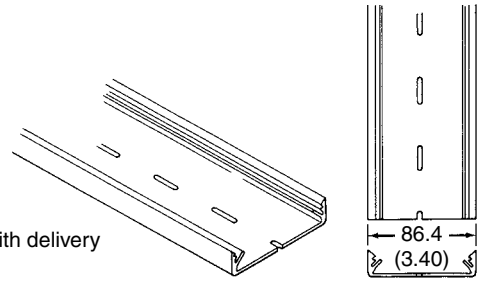
BD90 Servo Amplifier

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



BD90 Servo Amplifier



Snap-Trac is included with delivery

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

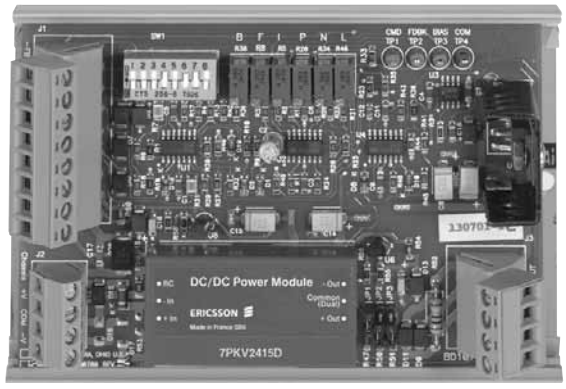
General Description

Series BD101 is an accessory card designed to solve a variety of common system problems. It is available in both ±15 VDC and 24 VDC versions.

This card can function as a current driver for the BD servo valves. Maximum current outputs of ±30 mA, ±60 mA, ±100 mA and ±150 mA are jumper configurable.

Closed loop options are switch selectable with integral and proportional control. Feedback scaling, input bias, and gain adjustments are provided. Outputs currents up to ±150 mA or voltage output of ±10 VDC are available.

Current command of ±20 mA can be converted to ±10 VDC.



Features

- Open loop current driver for up to ±150 mA.
- ±20 mA input to ±10 VDC output option.
- Closed loop option with proportional and/or integral control.
- ±10 VDC reference voltages available.
- Available in ±15 VDC and +24 VDC versions.
- Differential inputs provide better noise immunity.
- Scaling and bias available on input signals.

Specifications

Power Supply Input	BD101-15 ±15 VDC @ 200 mA BD101-24 24 VDC Nominal (22-28 VDC) @ 250 mA
CMD and FDBK Inputs **Voltage** **Current**	Differential Inputs ±10 VDC max. 100K ohm input impedance ±20 mA max switch configurable 499 ohm input impedance
Reference Voltages	±10 VDC @ 10 mA
Current Output	±30 mA, ±60 mA, ±l00 mA, or ±150 mA Fixed up to ±150 mA Adjustable Icoil Rcoil ≤12.5 V
Voltage Output	±10 VDC @ 10 mA 1000 ohm output impedance
Operating Temperature Range (Ambient)	BD101-15: 0°C to 70°C (32°F to 158°F) BD101-24: 0°C to 70°C (32°F to 158°F) (≤ 100 mA load) 0°C to 55°C (32°F to 131°F) (> 100 mA load)
Size	82.6mm (3.25") wide x 127mm (5.00") long x 38.1mm (1.5") high
Mounting	Snap-Trac Parker PN 830007-5.25

Ordering Information

BD — Signal Conditional Card

101 — Style

—

□ — Power Supply

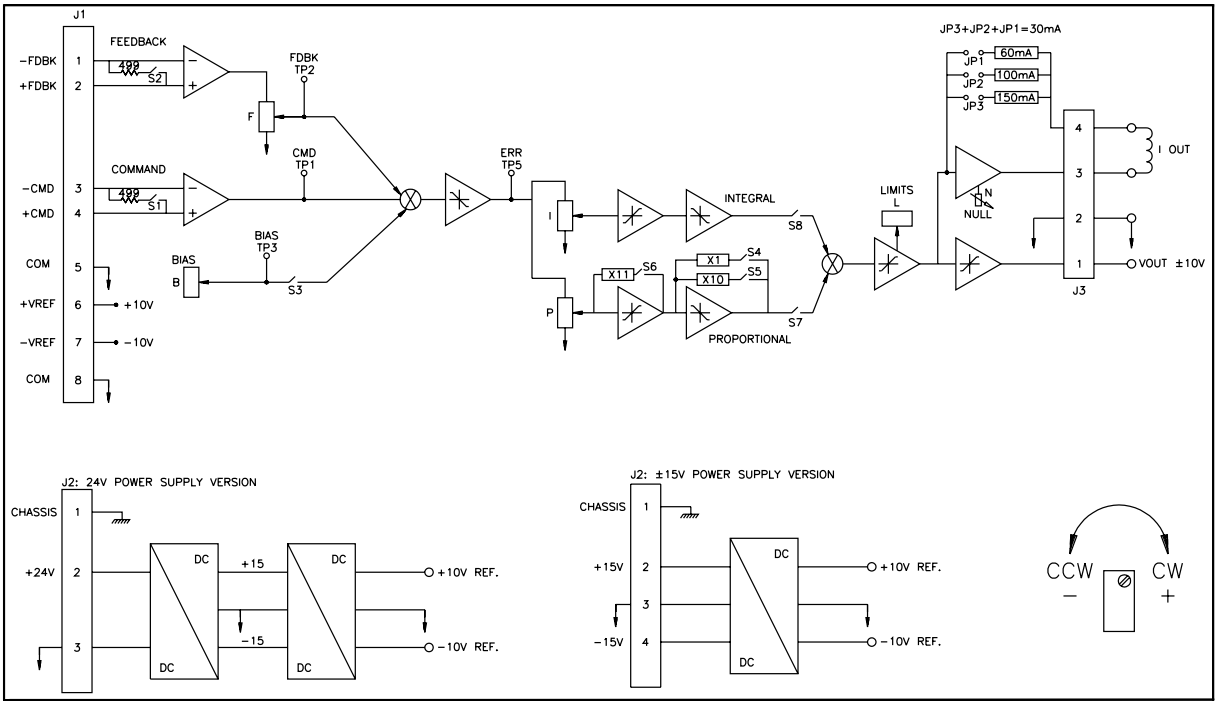
Code	Description
15	±15 VDC @ 200 mA
24	24 VDC nominal

Design Series

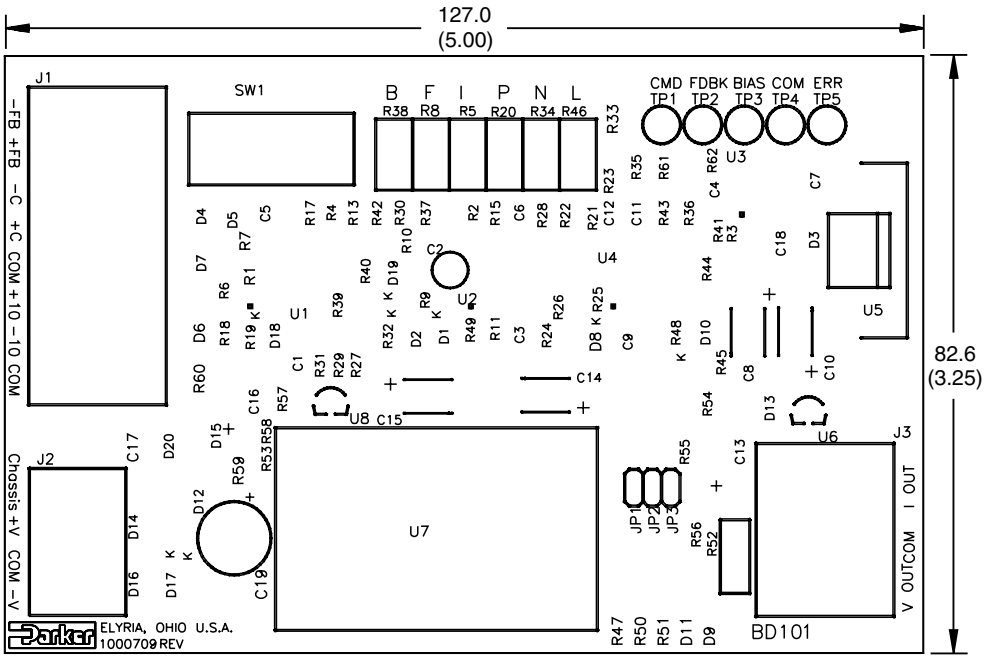
NOTE: Not required when ordering.

Note: Snap-Trac is included with delivery

Block Diagram — Wiring



Dimensions – Inch eqivalents for millimeter dimensions are shown in (**)

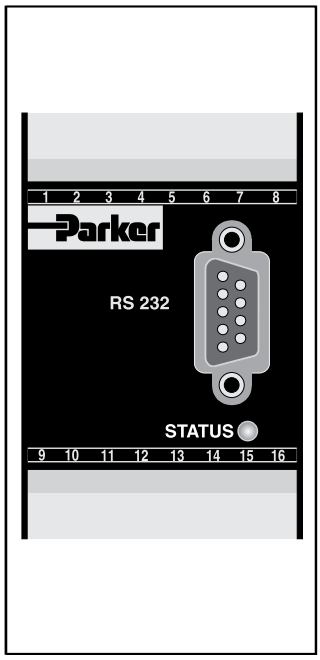


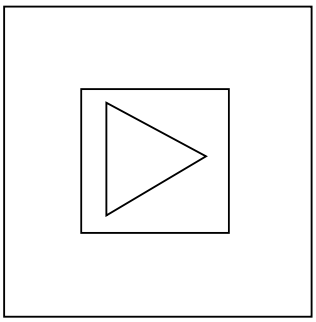
BD101.indd, ddp

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Parker electronic modules PID00A-40* for rail mounting are compact, easy to install and provide time saving wiring by disconnectable terminals. The digital design of the circuit results in good accuracy and optimal adaption for closed loop controls by a comfortable interface program.





CE

Features

The described electronic unit combines all necessary functions for the optimal operation of closed loop controls. The most important features are:

- Extended PID controls.
- Speed control with position feedback.
- Differential input stage with different signal options.
- Output stage with different output options.
- Four-quadrant ramp function.
- Status indicator.
- Digital circuit design.
- Parametering by serial interface RS-232.
- Connection by disconnectable terminals.
- Compatible to the relevant European EMC standards.
- Optional technology function "linearization"
- Simple to use interface program.

Ordering Information

PID	00	A	—	40	—	□	—	⌜⌝
Electronic Module Closed Loop Control	Universal			Min/Max Ajustment Accel/Decel Ramps Command Input		Technology Function		Design Series NOTE: Not required when ordering.

Code	Function
0	Standard
1	Linearization Option

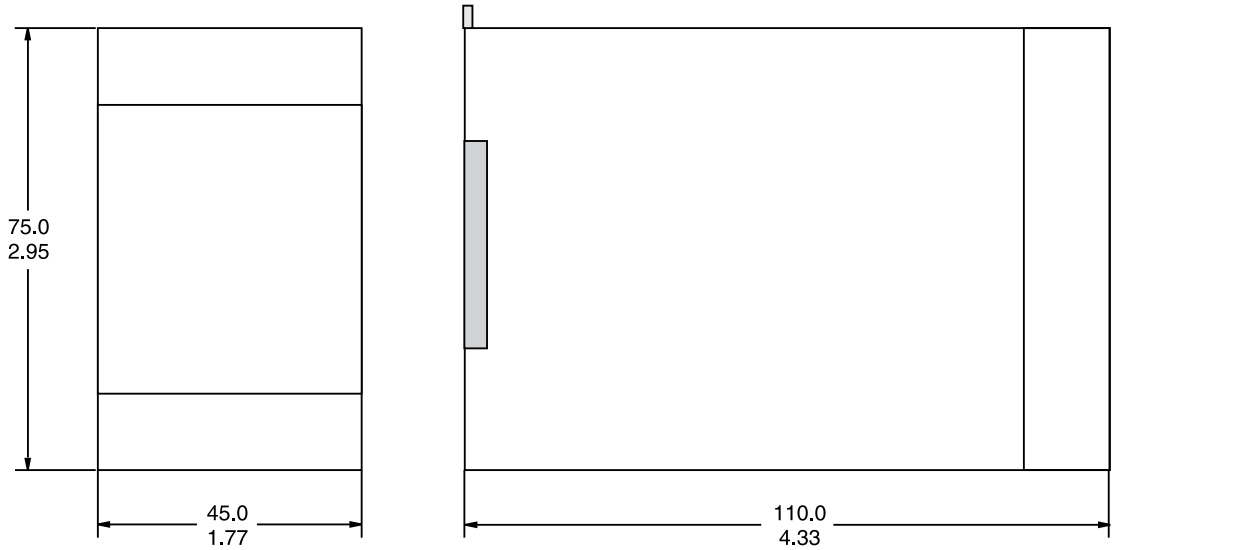
Specifications

General	
Model	Module package for snap-on mounting on EN 50022 rail
Package Material	Polycarbonate
Inflammability Class	V2...V0 acc. UL 94
Mounting Position	Any
Ambient Temperature	-20°C to +60°C (-4°F to +140°F)
Protection Class	IP 20 acc. DIN 40050
Weight	0.16 kg (0.35 lbs.)
Electrical	
Duty Ratio	100%
Supply Voltage	18...30 VDC, ripple <5% eff., surge free
Current Consumption Max.	100 mA
Pre-fusing	500 mA
Command Signal Options	+10...0...-10 V, ripple <0.01 eff., surge free, Ri = 100 kOhm +20...0...-20 mA, ripple <0.01 eff., surge free, Ri = 200 kOhm 4...12...20 mA, ripple <0.01 eff., surge free, Ri = 200 kOhm <3.6 mA = solenoid output OFF, <3.8 mA = solenoid output ON, (acc. NAMUR NE43)

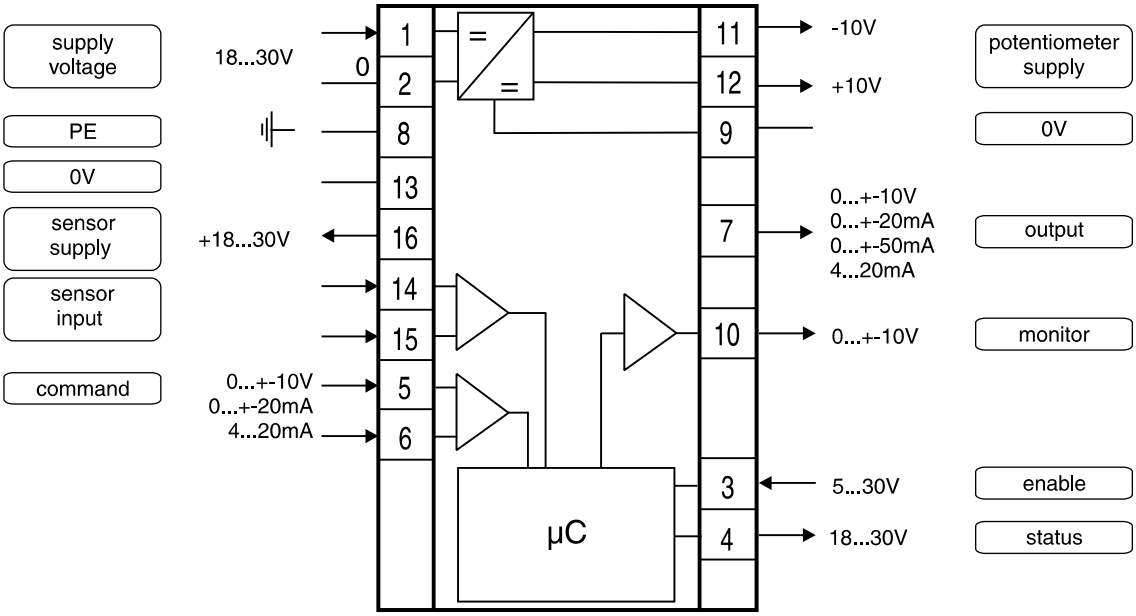
Electrical (cont.)	
Input Signal Resolution	0.025 %
Differential Input Voltage Max.	30 V for terminals 5 and 6 against PE (terminal 8)
Enable Signal	0...2.5 V: OFF / 5...30 V: ON Ri = 100 kOhm
Status Signal	0...0.5 V: OFF / Us: ON rated 15 mA maximum
Monitor Signal	+10...0...-10 V, rated 5 mA max., signal resolution 0.4%
Adjustment Ranges	Minimum: 0...50 % Maximum: 50...100% Ramp: 0...32.5 s Zero Offset +100%...-100%
Interface	RS 232C, DSub 9p. male for null modem cable
EMC	EN 50081-2, EN 50082-2
Connection	Screw Terminals 0.2...2.5 mm², disconnectable
Cable Specification	20 AWG overall braid shield
Cable Length	50 m (164 ft.)
Options	
Technology Function	Code 1: Software adjustable transfer function with 10 compensation points for linearization of valve behavior

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

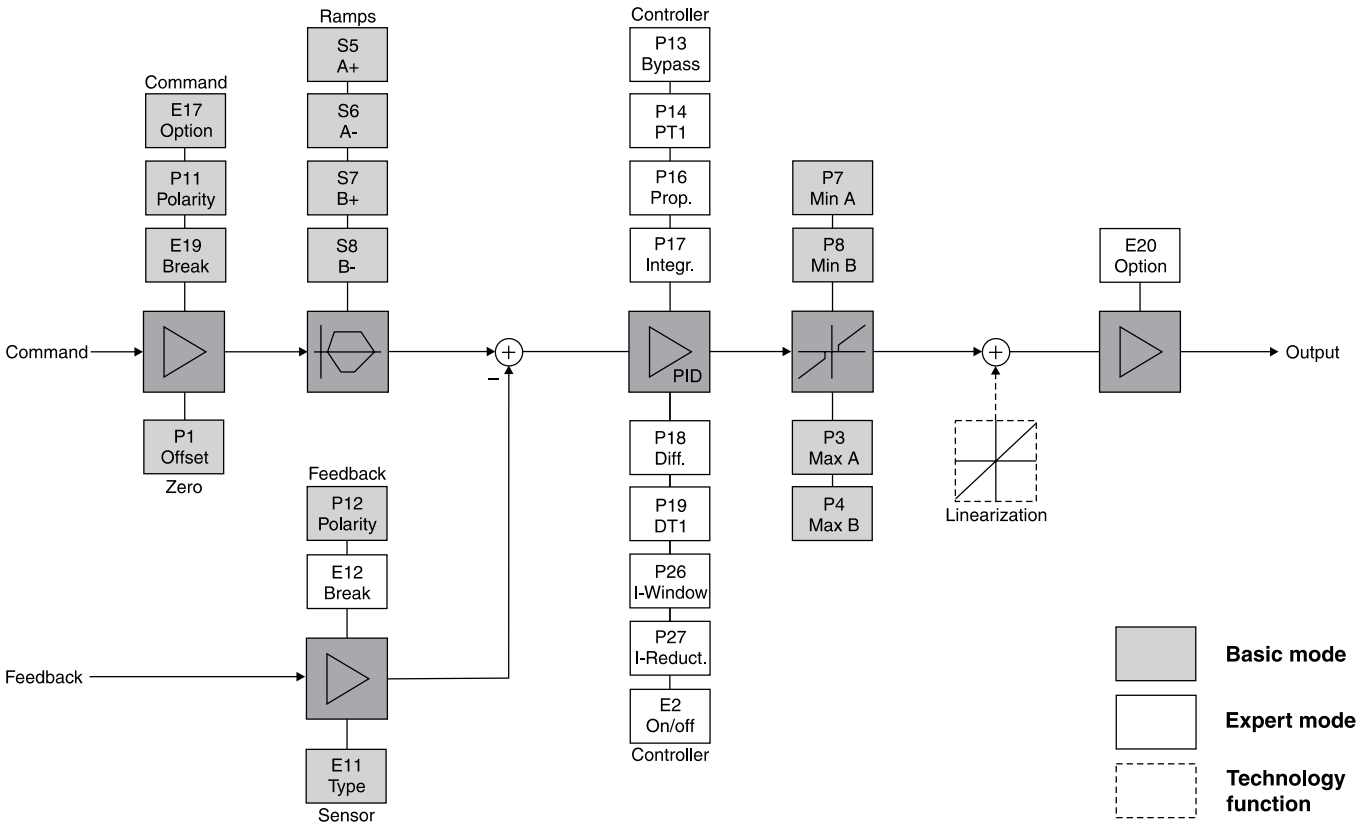


Block Diagram — Wiring



D

Signal Flow Diagram



ProPxD Interface Program

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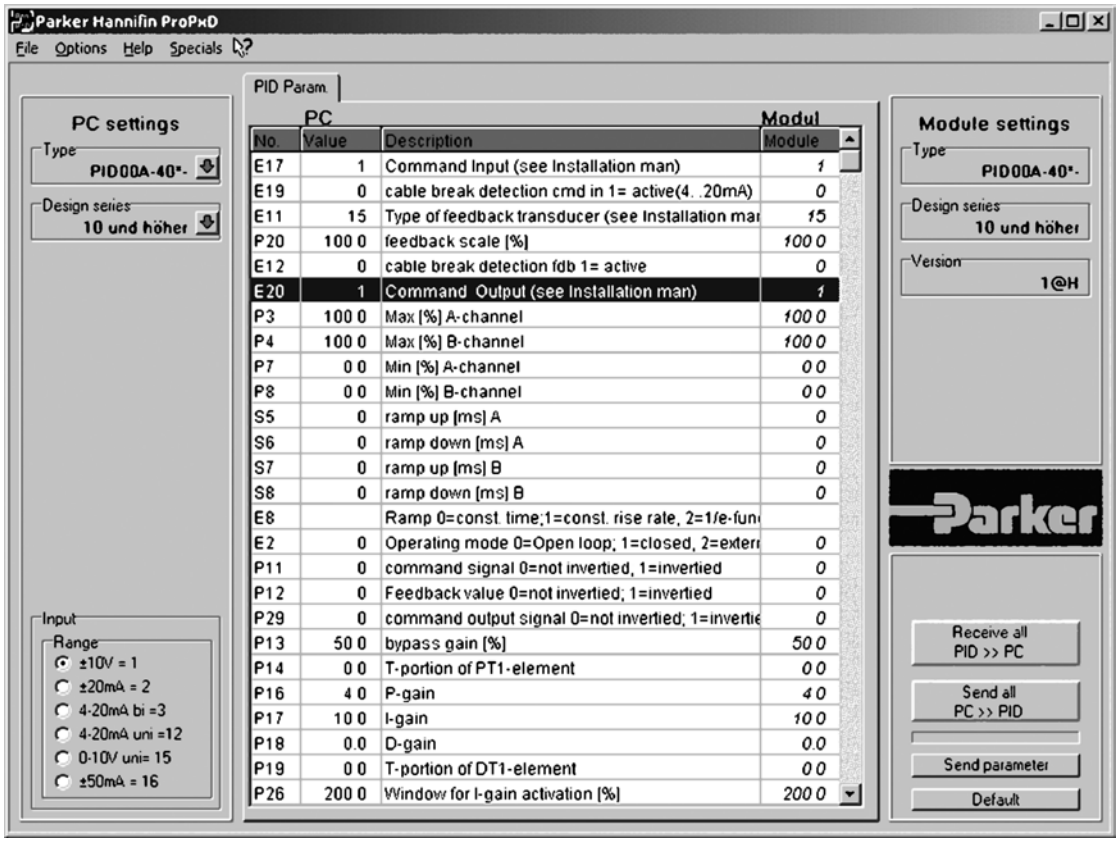
Via the clearly arranged entry mask the parameters can be noticed and modified. Storage of complete parameter sets to floppy or hard disk is possible as well as printout or record as a text file for further documentation. Stored parameter sets may be loaded anytime and transmitted to the electronic module in the same manner as the basic parameters which are available for all usable valve series. Inside the electronic a nonvolatile memory stores the data with the option for recalling or modification.

Features

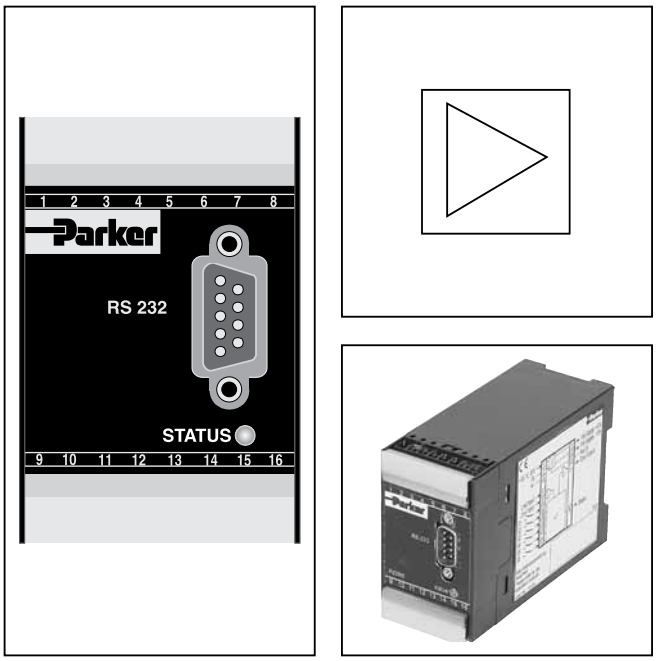
- User-friendly editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronic via serial interface RS-232 and null modem cable.
- Simple to use interface program. Download free of charge **www.parker.com/euro_hcd → Services → downloads**



General Description

Series PZD00A-40* electronic modules provide options to enhance PWD, PCD driver modules and valves with onboard electronics. The modules are compact and easy to install with DIN rail mounting and plug-in terminals. The digital design allows for programmable parameters such as input signal conditioning, setpoints, ramps, mins, maxs, and command output options. The modules provide flexibility for different applications and repeatability from unit to unit. The module parameters are programmed with an RS-232 interface and user friendly software (ProPxD) with default values for the standard valves.

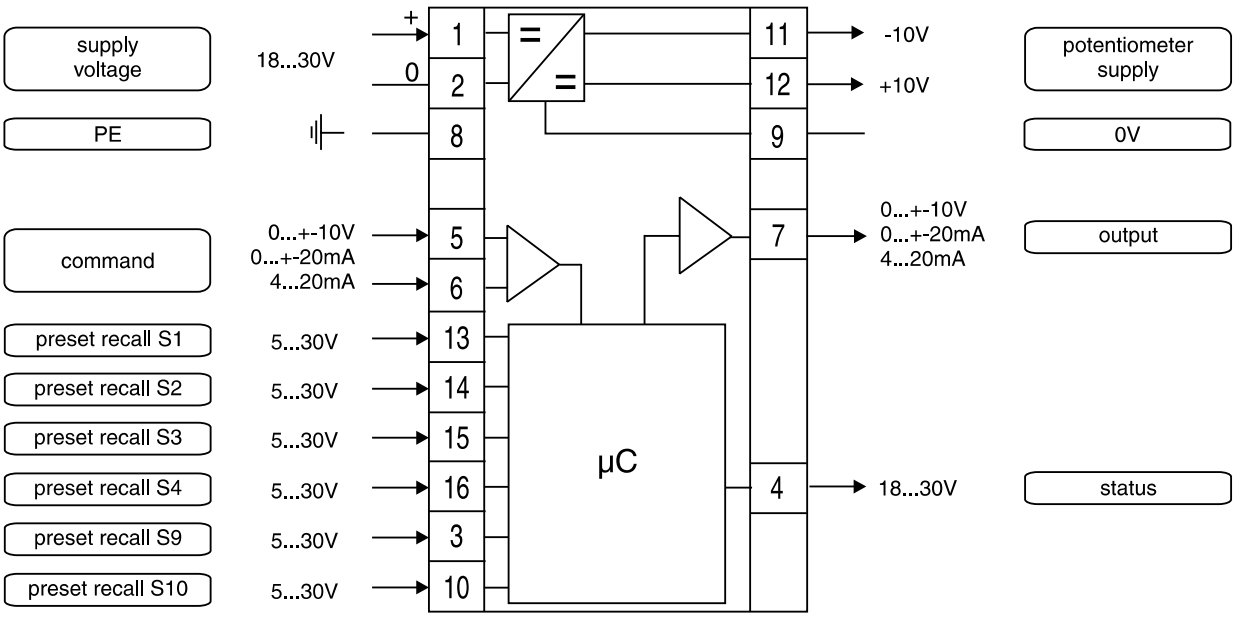
The PZD00A-40* module contains the functions required by typical proportional valve applications (series D*FP, D**FH valves, PWD, PCD modules).



Features

- Setpoints, ramp options, mins, maxs.
- Command output options.
- Programmable parameters.
- Reference voltages.
- RS-232 Interface.
- User friendly programming software.
- Plug-in terminals.
- Compliant with European EMC Standards.

Block Diagram — Wiring



Ordering Information

PZD — Electronic Module Auxiliary Function
00 — Universal
A
—
40 — Module Type

Code	Description
40	6 Command signal presets Command input UP/DOWN ramps

Technology Function

Code	Description
0	Standard
1	Linearization option

—
Design Series
NOTE: Not required when ordering.

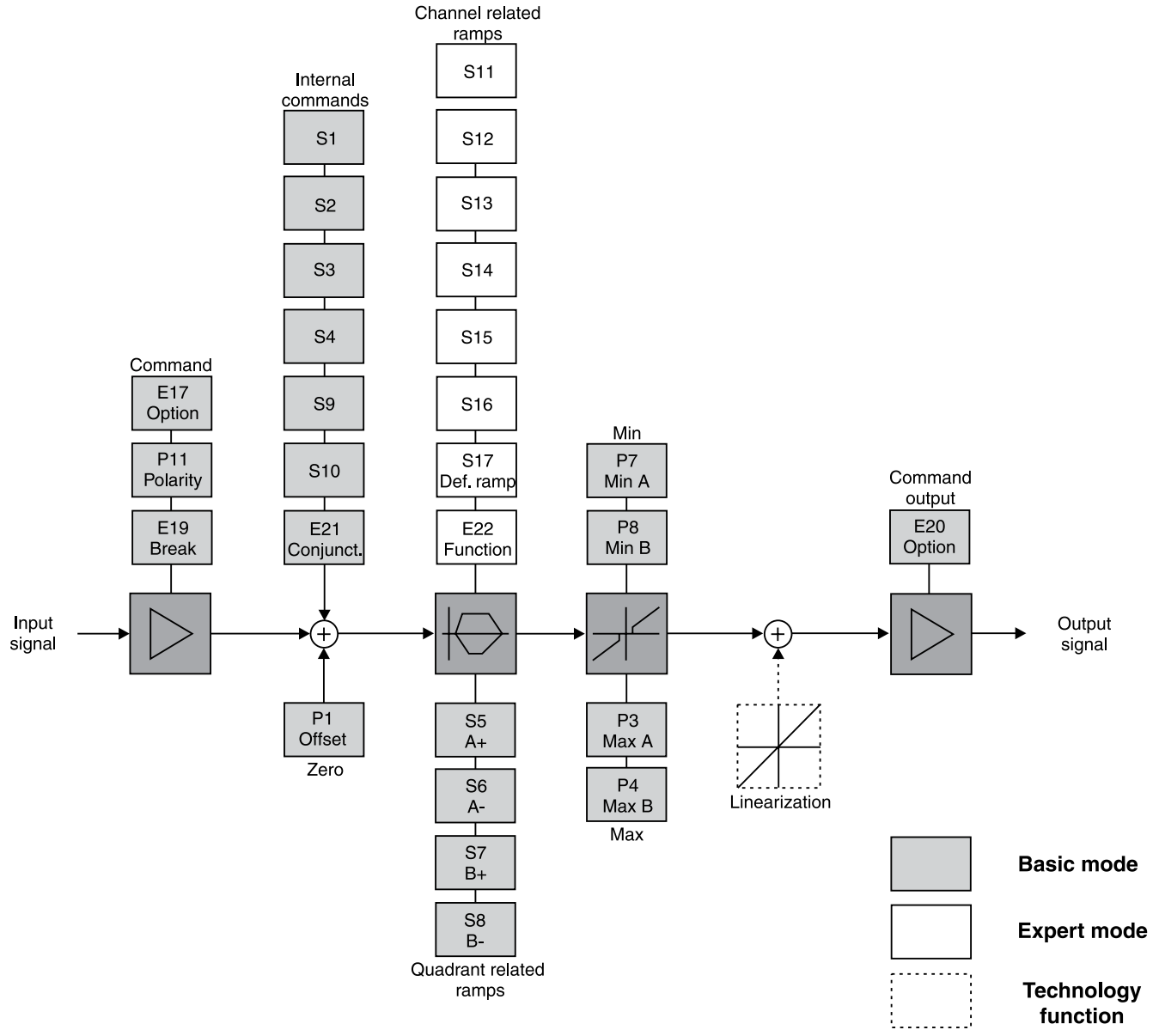
Weight: 160g (0.35 lbs.)

D

Specifications

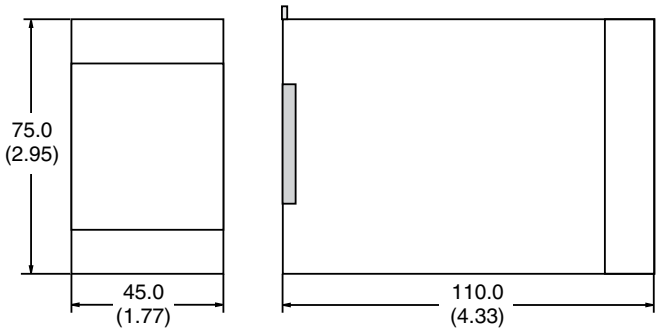
General			
Model	Module package for snap-on mounting on EN 50022 rail	**Mounting Position**	Any
Package Material	Polycarbonate	**Ambient Temperature Range**	-20°C to +60°C (-4°F to +140°F)
Inflammability Class	V2 to V0 acc. UL 94	**Protection Class**	IP 20 acc. DIN 40050
Electrical			
Duty Ratio	100%	**Status Signal**	Off – 0 to 0.5 VDC; On – Supply Voltage; rated max. 15 mA
Supply Voltage	18 VDC to 30 VDC, ripple < 5% eff., surge free	**Output Signal**	+10 to 0 to -10 VDC, rated max. 15 mA +20 to 0 to -20 mA, Ro < 500 ohm 4 to 12 to 20 mA, Ro < 500 ohm
Current Consumption Max.	100 mA		
Pre-fusing	500 mA medium lag		
Command Signal	+10 to 0 to -10 VDC, ripple < 0.01 % eff., surge free, Ri = 100K ohm +20 to 0 to -20 mA, ripple < 0.01 % eff., surge free, Ri = 200 Ohm 4 to 12 to 20 mA, ripple < 0.01 % eff., surge free, Ri = 200 Ohm < 3.6 mA = output signal 0 V / 0 mA / 12 mA acc. to output option > 3.8 mA = output signal on (acc. NAMUR NE43)	**Output Signal Resolution**	0.025%
		Reference output	+10 / -10, 2%, rated max. 15 mA
		Adjustment Ranges Minimum Maximum Cmd Channels Ramp Time Zero Offset	 0 to 50% 50 to 100% +100 to -100% 0 to 32.5 s +100 to -100%
		Interface	RS 232C, DSub 9p. male for null modem cable
Input Signal Resolution	0.025%	**EMC**	EN 50081-2, EN 50082-2
Differential Input Voltage Max.	30 VDC for terminals 5 and 6 against PE (terminal 8)	**Connection**	Screw terminals 0.2 to 2.5 mm², disconnectable
Channel Recall Signal	Off – 0 to 2.5 VDC On – 5 to 30 VDC Ri = 100K ohm	**Cable Specification**	20 AWG overall braid shield
		Cable Length	50m (164 ft.)
Options			
Technology Function	Code 1: Software adjustable transfer function with 10 compensation points for linearization of valve behavior.		

Signal Flow Diagram



Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



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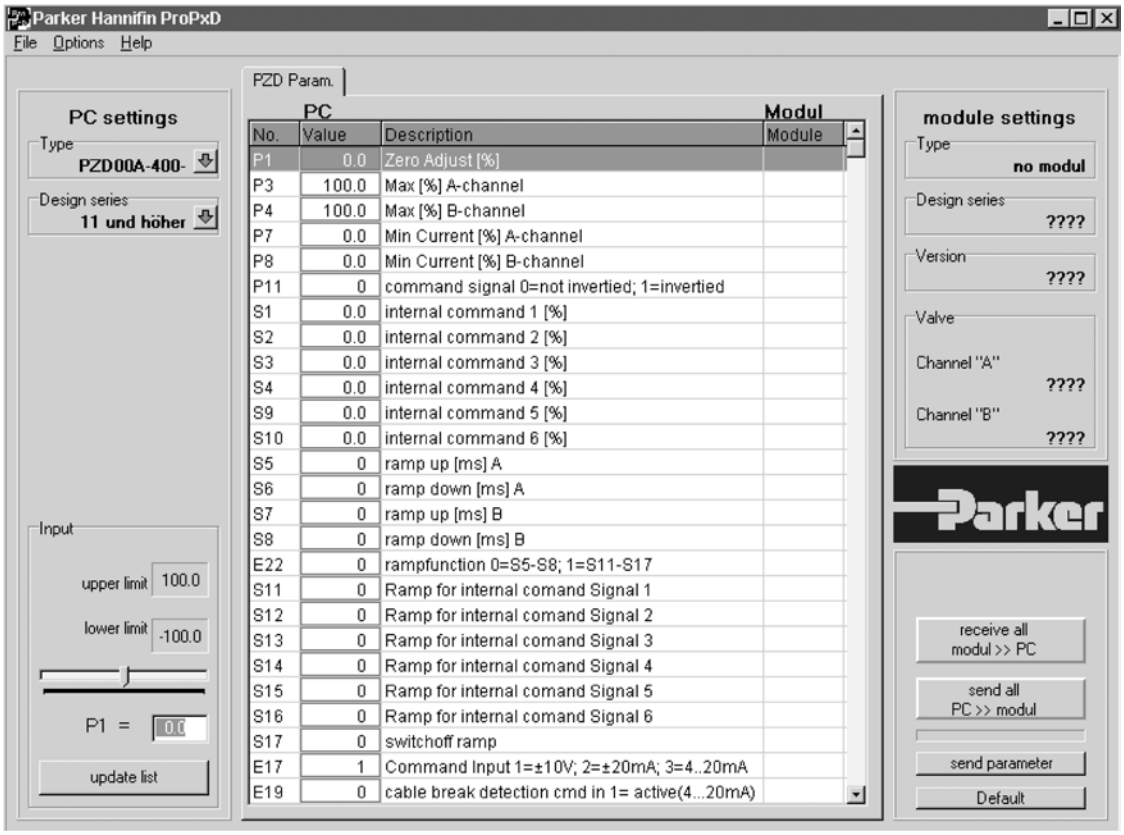
ProPxD Interface Program

The new ProPxD software permits comfortable parameter setting for the electronic module series PCD, PWD, PZD and PID.

Via the clearly arranged entry mask the parameters can be noticed and modified. Storage of complete parameter sets to floppy or hard disk is possible as well as printout or record as a text file for further documentation. Stored parameter sets may be loaded anytime and transmitted to the electronic module in the same manner as the basic parameters which are available for all usable valve series. Inside the electronic a nonvolatile memory stores the data with the option for recalling or modification.

Features

- User-friendly editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronic via serial interface RS-232 and null modem cable.
- Simple to use interface program. Download free of charge **www.parker.com/euro_hcd → Services → downloads**



General Description

Series Compax3F is the new member of the servo drive family of Parker Hannifin. It is especially designed for the requirements of electrohydraulic systems and in particular for position and force control of electrohydraulic axis.

Attention:

For application support and customized software, please contact your local Parker representative.

Large Drive Range

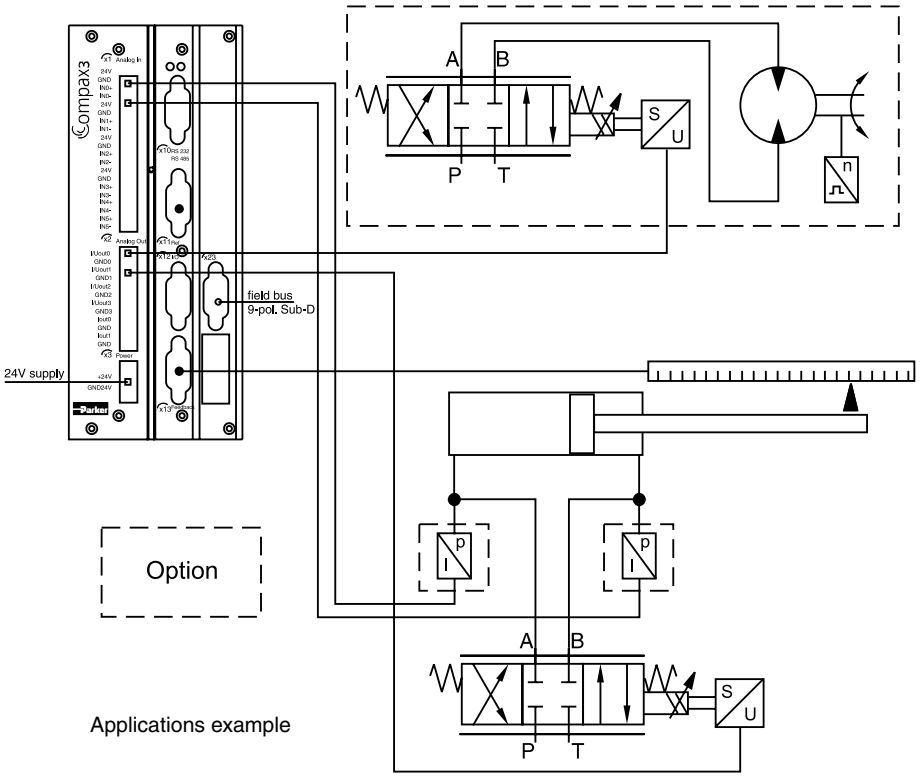
- Valves:
  - Proportional direction control valves
  - Proportional pressure relief and pressure reducing valves
  - Flow valves
- Drives:
  - Cylinders
  - Rotary drives
  - Motors

Range of Application

- Closed loop position and force control of linear cylinders and rotary drives
- Switching between position and force control
- Synchronous run with up to 64 axes

Typical Applications

- Feeder axis
- Position and force control of press cylinders in material forming machines
- Roller clearance control in roller presses
- Die casting machines



Applications example

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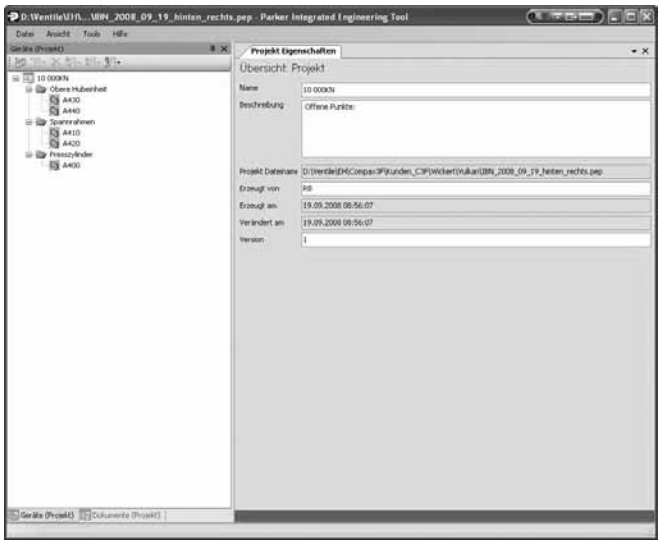
Project Development, Commissioning and Programming

PC-Tools - Open and Transparent



- Compax3 ServoManager
  - Intuitively understandable user interface
  - Wizard technology
  - Online help
  - Oscilloscope function
  - Optimized co-ordination of complete mechatronic systems
- Valve and Drive manager
  - All technical data of Parker valves, cylinders and drives available
  - Additionally support through the Compax3F Hydraulics-Manager by configuration of user defined valves and drives.

Software download, free of charge:
www.compax3.com

Monitoring and Control

Operator Panels

Control equipment for all text and graphics applications in industrial environments, from two-line displays to touch-panels using field busses:
- Profibus DP
- CANopen
- DeviceNET
- Interbus-S

For further information please refer to POP:
"Parker Operator Panels".
Download: www.parker-eme.com/pop.

In addition to drivers for Compax3/Compax3 powerPLmC, drivers for other PLC products can be integrated on request.

Flexible Service and Maintenance

Operating Module

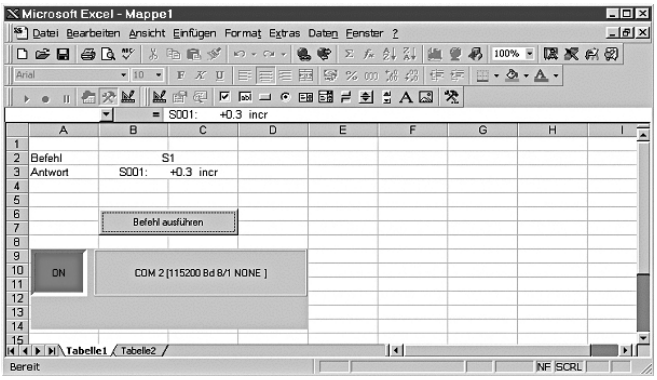
- Backlit plug-in module, text display with two sixteen-character lines
- Simple menu navigation with 4 keys
  - Display of status values and
  - clear text error messages
- Used for changing parameters and manual operation

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Integration with the Office Enviroment

ActiveX Plug-in

- Office and industrial environments are constantly growing closer together.
- The use of ActiveX technology allows simple integration into Office application.



Interface

Field Bus

- Profibus DP
- CANopen (CiADS402)
- DeviceNet
- PowerLink
- EtherCAT
- Address configurable via Dip switch

Connection of External Inputs/Outputs

Parker E/A-System (PIO)

Additional external digital and analog inputs and outputs can be integrated via the CANopen.

International Standards in Programming

Advantages Offered by Integrated Standards

- Programming system
  - CoDeSys
- Programming language
  - IEC61131-3
  - Function modules based on PLCopen

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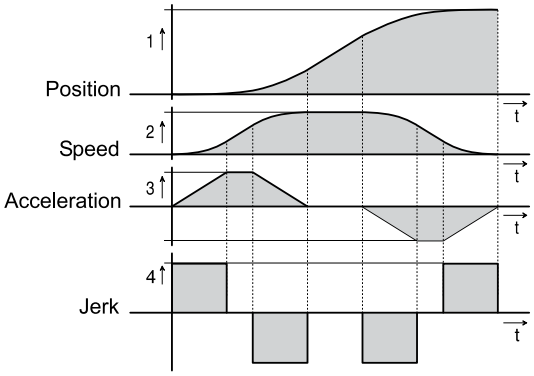
Jerk-limited Set Point Generation, Resulting In:

- Gentle handling of the items being moved
- Increased service life of mechanical components
- Overshoot-free positioning
- Reduced excitation of mechanical resonance frequencies



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Control

- 2 control loops for each axis for combined position and force/pressure control

Position Control

- Automatic controller design for position control
  - User-oriented optimization of parameters
- Feed forward control of speed and acceleration which results in:
  - Optimization of the response behaviour
  - Minimization of the following error

Force/Pressure Controller

- PID controller with feed forward control of speed

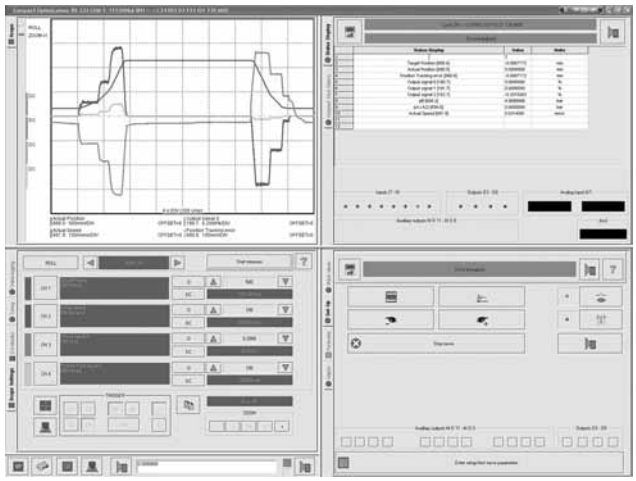
2-Axis Synchronous Run

Hydraulic Specific Functions

- Realization of many different circuit concepts with up to 4 proportional valves possible
- Linearization functions:
  - Consideration of the area of differential cylinders
  - Inverting of the valve set value
  - Compensation of the load pressure (additional pressure sensors necessary)
  - Correction of the nonlinear flow characteristic of the valve
  - Overlap compensation
  - Valve zero point correction
  - Valve set value filters
  - Valve set value limitation
  - All functions for each valve individually available
  - Automatic configuration by component selection in the Compax3 ServoManager

Set Up Controller Optimization

- Compax3F HydraulicsManager
  - All necessary technical data of Parker valves and drives are available
  - additional supported
- Test movement for automatic controller attitude
- Optimization with integrated oscilloscope function
- Automatic pre-setting of the controller for position control possible



Function	Motion control with motion profils. Suitable for position and force/pressure control
Housing / Protection Class	closed metal housing, isolation according to VDE 0160 / IP 20
Supply Voltage [VDC]	21...27VDC, ripple <1VSS
Current Requirements [A]	0,8 for the device, digital outputs 100mA each
Supported Feedback-Systems	• Analog 0..20mA, 4..20mA, ±10V • Start-Stop-Interface • SSI-Interface • EnDat2.1-Interface • 1VSS (max. 400kHz) Interface, 13.5Bit / Distance coding • TTL (RS422) (max. 5MHz), internal post-quadrature resolution
Set Point Generator	• Jerk-limited ramps • Travel data in increments, mm, inches or variable by scale factor • Specification of speed, acceleration, delay and jerk factor • Force/pressure inputs in N, psi, etc. variable by scale factor
Monitoring Functions	• Power/auxiliary supply range • Following error monitoring • Hard- and Software switches
Inputs and Outputs	• 8 control inputs: 24V DC / 10kOhm. • 4 control inputs Active HIGH / short-circuit protected / 24V / 100mA. • 4 analog current input (14Bit). • 2 analog voltage input (14Bit). • 4 analog output (16Bit, current or voltage) switchable in pairs.
RS232 / RS485 (switchable)	
RS232:	• 115200Baud • Word length 8 bits, 1 start bit, 1 stop bit • Hardware handshake XON, XOFF
RS485 (2 or 4-wire):	• 9600, 19200, 38400, 57600 or 115200 Baud • Word length 7/8Bit, 1 Start-, 1 Stop bit • Parity (switchable) even/odd
Bus Systems	• Profibus DP V0-V2 (I20), 12Mbit/s, PROFIdrive-Profil Drive technology • CANopen (CiADS402) (I21) • DeviceNet (I22) • PowerLink (I30) • EtherCAT (I31)
CE Compliance	• EMC interference emission/limit values for industrial utilization according to EN61 800-3 first environment (commercial and residential area), class A via integrated mains filter for up to 10mCable length, otherwise with external mains filter • EMC immunity/limit values for industrial utilization according to EN61 800-3
Insulation Requirements	• Protection class I according to EN 50178 (VDE 0160 part 1) • Contact protection: according to DIN VDE 0106, part 100 • Overvoltage: Voltage class III according to HD 625 (VDE 0110-1) • Degree of contamination 2 according to HD 625 (VDE 0110 part 1) and EN 50178 (VDE 0160 part 1)
Environmental Conditions	• Climate (temperature / humidity / barometric pressure)
General environmental condi tions acc. to EN 60 721-3-1 to 3-3	• Class 3K3
Permissible ambient temperature	• Operation: 0 to +45 °C class 3K3 • Storage: -25 to +70 °C class 2K3 • Transport: -25 to +70 °C class 2K3
Tolerated humidity: non condensing	• Operation: <= 85% class 2K3 • Storage: <= 95% class 3K3 (relative humidity) • Transport: <= 95% class 2K3
Elevation of operating site: <=1000m above sea level for 100% load ratings	• Please inquire for greater elevations Protection class IP20 according EN 60 529
EMC Directives and Harmonized EC Norms	• EC low voltage directive 73/23/EEC and RL 93/68/EEC: EN 50 178, General industrial safety norm Equipping electric power systems with electronic operating equipment HD 625, general electrical safety. Insulation principles for electrical operating equipment EN 60 204-1, Machinery norm, partly applied • EC-EMC directive 89/336/EEC: EN 61 800-3, EMC norm Product standard for variable speed drives EN 50 081-2 ... 50 082-2, EN 61 000-4-2 ...61 000-4-5
UL Certification	USL according to UL508 (listed) / CNL according to C22.2 No: 142-M1987 (listed) Certified: E-File-No: E198563

C3 **F001** **D2** **F12** ☐ ☐ ☐

Series | Interface | Technology Functions | Options

Code	Interface	T11	T30	T40
I11	Digital inputs/outputs		•	•
I12	Digital inputs/outputs	•		
I20	Profibus DP V0/V1/V2 (12Mbit/s)	•	•	•
I21	CANopen		•	•
I22	DeviceNet		•	•
I30	PowerLink		•	•
I31	EtherCAT		•	•

Code	Technology Functions
T11	Positioning/pressure and force control
T30	Programmable motion control according to IEC61131
T40	Electronic Cam

Code	Options
M00	Standards
M10	Extension 12 digital I/Os & HEDA (motion bus)
M11	HEDA (motionbus)
M12	Extension 12 digital I/Os

Weight: 2.0 kg (4.4 lbs.)

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Please order connection set ZBH02/04 for Compax 3F separately.

Complete kit with mating plug connectors (X1, X2 and X3) for Compax3 connectors and special shield connecting terminal

Overview Technology Functions

	T11	T30	T40
Set tables for up to 31 motion profiles	x		
Absolute or relative positioning	x	x	x
Force/pressure control	x	x	x
Electronic Gearbox	x	x	x
Dynamic positioning	x	x	x
Hydraulic specific control technology	x	x	x
Reg-related positioning	x	x	x
Programmable according to IEC61131-3		x	x
Programming system DoDeSys		x	x
Up to 6500 instructions		x	x
Recipe table with 288 variables		x	x
PLCopen		x	x
Mark synchronization			x
Cam switching mechanism			x
Cam profiles			x
Coupling and decoupling function			x
Digital I/Os (RS232/485)	x	x	x
Profibus	O	O	O
CANopen		O	O
DeviceNet		O	O
Ethernet Powerlink		O	O
EtherCAT		O	O

x = Standard

O = Optional

Compax3F T11

Benefits

- No programming skills necessary
- Set table with various motion
- Full controller range available
- an ideal basis for many applications in high-performance motion automation

Function Range T11

- Set tables for positioning, pressure and force control up to 31 motion profiles:
  - Absolute or relative positioning
  - Force/pressure control
  - speed control
  - electronic gearing
- superimposed force and pressure control
- Controller switching between position and force/pressure control

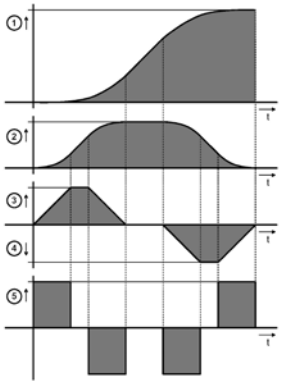
Extended Function Range

- Absolute force control
- superimposed force and pressure control
- Controller switching between position and force/pressure control
- 2-axis synchronous

Absolute or Relative Positioning

A motion set defines a complete motion with all settable parameters

1. Target position
2. Travel speed
3. Maximum acceleration
4. Maximum deceleration
5. Maximum jerk



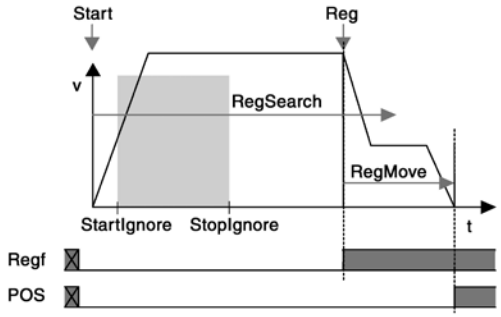
Stop Movement

The Stop set interrupts the current motion set.

Reg-related Positioning

For registration mark-related positioning, 2 motions are defined:

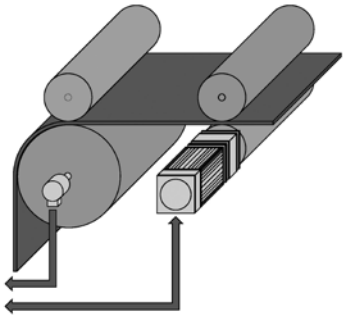
- RegSearch: Search of an external signal, e.g. a registration mark on a product
- RegMove: The external signal interrupts the search movement and the second movement by an offset follows without transition
- Precision of the registration mark detection: <1µs



Electronic Gearbox:

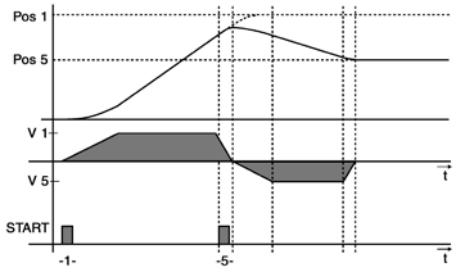
Motion synchronized to a master axis with any transmission ratio. The position of a master axis can be detected via:

- +/-10V analog input
- Step/direction command Input
- the encoder input or
- HEDA, with Compax3 Master



Dynamic Positioning

A new motion profile can be selected during a positioning sequence - a smooth transition takes place.



Compax3 T30 Motion Control According to PLCopen

General

Due to its high flexibility and efficiency the Compax3 motion control according to PLCopen is for most applications the optimal basis for decentralized motion control.

Positioning with function modules based on PLCopen

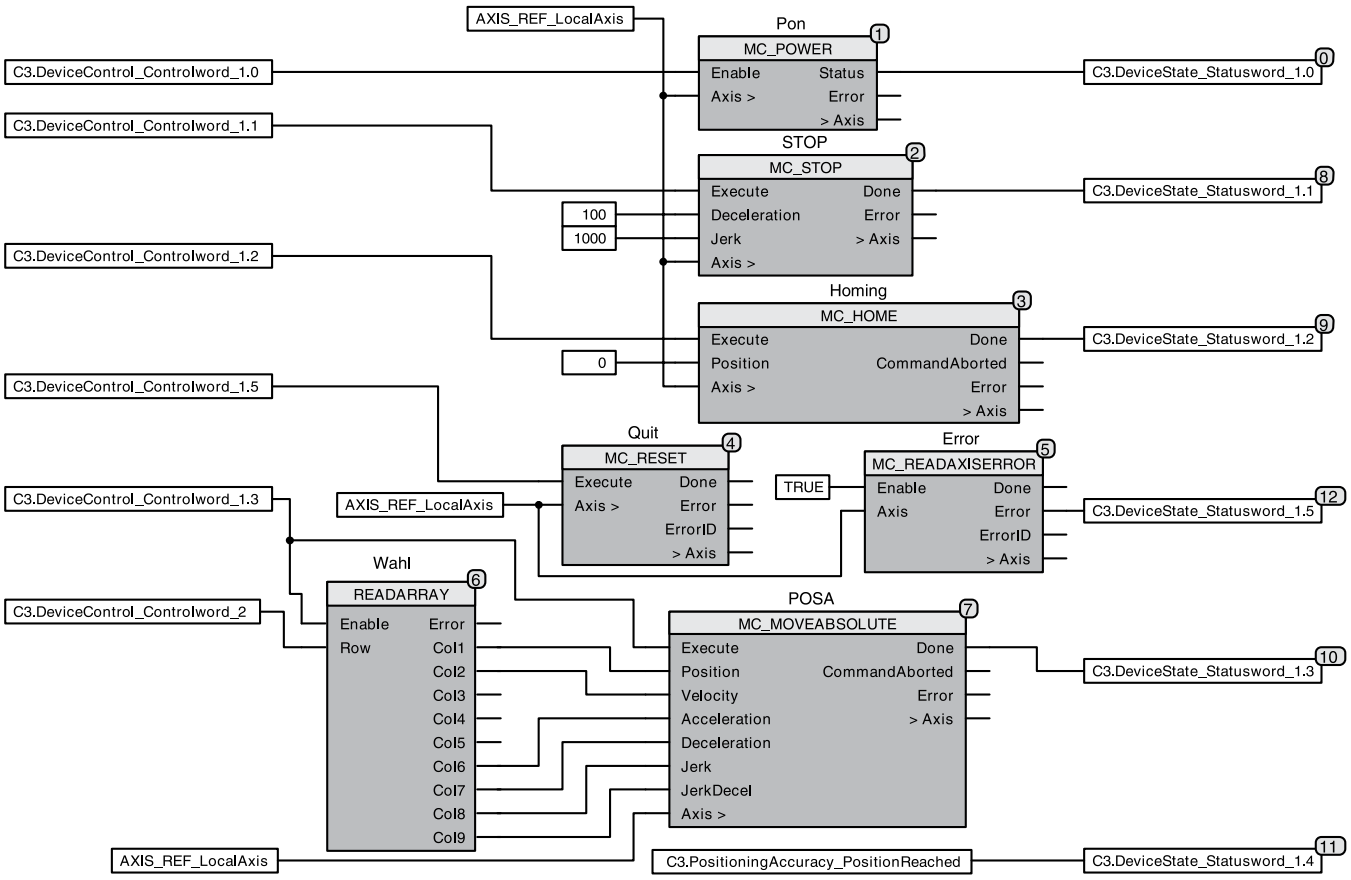
- Programmable based on IEC61131-3
- Programming system: CoDeSys
- Up to 5000 instructions
- 500 16-bit variables / 150 32-bit variables
- Recipe table with 288 variables
- 3 16-bit saved variables (power failure protected) / 3 32-bit saved variables (power failure protected)
- PLCopen-function modules:
  - Positioning: absolute, relative, additive and continuous
  - Machine Zero.
  - Stop, energizing the power stage, quit
  - Position, device status, reading axis error
  - Electronic gearbox (Mc_GearIn)
- IEC61131-3-standard modules:
  - Up to 8 timers (TON, TOF, TP)
  - Trigger (R_TRIG, F_TRIG)
  - Flip-flops (RS, SR)
  - Counters (CTU, CTD, CTUD)
- Device-specific function modules:
  - C3_Input: reading digital inputs
  - C3_Output: writing digital inputs
  - C3_ReadArray: access to recipe table
- Inputs/outputs:
  - 8 digital inputs (24V level)
  - 4 digital outputs (24V level)
  - 6 analog inputs (14 bits)
  - 4 analog outputs (16 bits)
  - Optional addition of 12 digital inputs/outputs

PLCopen function blocks

- Absolute positioning
- Relative positioning
- Additive positioning
- Continuous positioning
- Stop
- Machine zero
- Energizing the power output stage
- Reading device status
- Reading axis error
- Acknowledging errors
- Reading the current position
- Electronic gearbox (gearing)

Example of an field bus interface controlled IEC61131-application

- 2 control words are placed on the cyclic channel of the bus.
- The position data records (position, speed, acceleration etc.) are stored in a table (array).
- The desired position data record is selected with Controlword_2.
- The individual bits of Controlword_1 control positioning.
- A return message is sent via a status word on the cyclic channel of the bus.



Example of a bus interface controlled IEC61131 application

Compax3 T40 IEC61131-3 Positioning with Cam Function Modules

General

Compax3 T40 is able to simulate mechanical cams and cam switching mechanisms electronically. The T40 electronic cam was especially optimized for:

- The packaging machine industry
- For the printing industry
- All applications, where a mechanical cam is to be replaced by a flexible, cyclic electronic solution

This helps to solve discontinuous material supply, flying-knive and similar drive applications using distributed drive technology.

Compax3 T40 supports both real and virtual master movements. In addition, the user can switch to other cam profiles or cam segments on the fly.

Programming is carried out in the well-known IEC61131-3 environment.

With the aid of the cam function modules and CamDesigner, cam applications can be implemented very easily.

Function T40

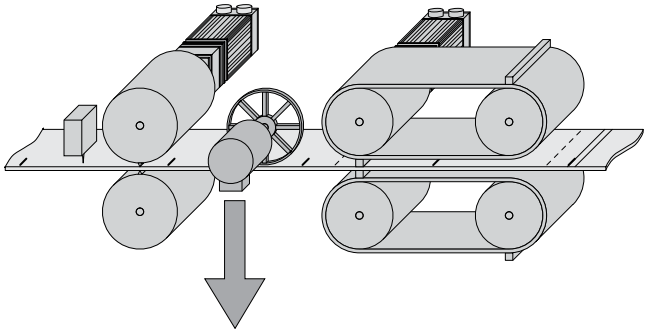
- Technology functions of the T30 version fully integrated and available
- Master position acquisition
- Mark synchronization
- Cam switching mechanism
- Coupling and decoupling function
- Cam profiles
- Cam memory
- Cam creation with CamDesigner

Master Position Acquisition

- Acquisition by incremental encoder
- Acquisition by the HEDA real-time bus

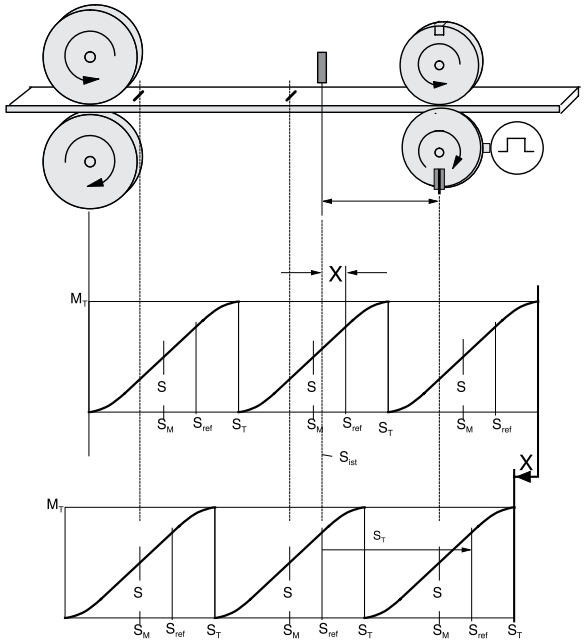
Virtual Master:

A second axis in the IEC program can be used to program a motion profile, which serves as a master for one or several axes.



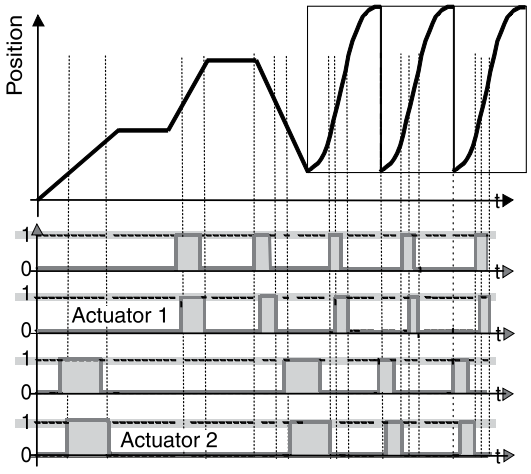
Mark Synchronization

- Master or slave oriented (simultaneous, cam-independent)
- Highly-precise mark recognition (accuracy <1µs; Touchprobe)



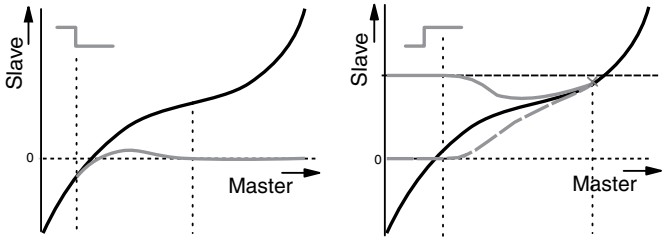
Cam Switching Mechanism

- 36 cams with individual profiles
- 4 fast cams (125µs per cam) standard: 500µs
- 32 serial cams, 16ms/cam cycle (0.5ms/cam)
- Delay-time compensated cams: Compax3 can advance the cam to compensate for delays in switching elements.



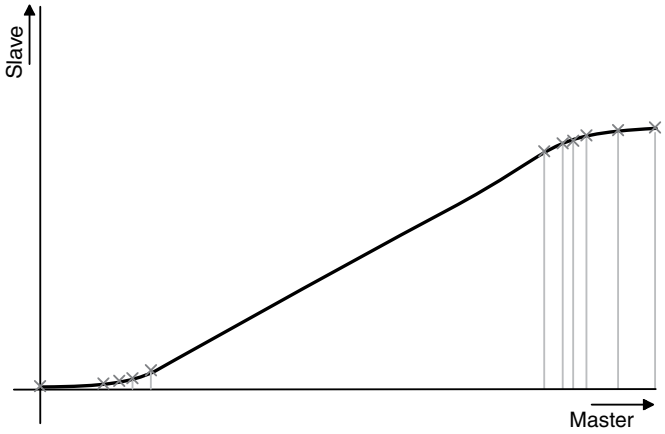
Coupling and Decoupling Functions

- By means of a set point generator
- By means of a change-over function
- Without overspeeding by coupling over several master cycles
- Virtually free set-up of the coupling and decoupling movement
- Master-guided coupling movement
- Random standstill position



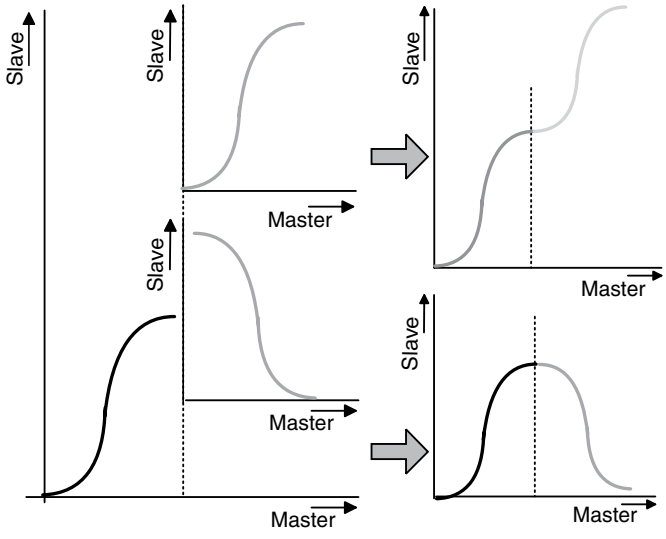
Cam Memory

- 10,000 points (Master/Slave) in 24-bit format
- High-precision profile generation:
  - Variable point spacing with full backup of the current master and slave coordinates (even if the power fails)
  - Linear interpolation between points
- Cam memory for up to 20 curves



Cam Profiles

- Up to 20 cam segments can be produced by:
- Virtually random cam links (forwards and backwards)
- Freely programmable event-controlled cam branches
- Scalable cam segments and complete cam profiles



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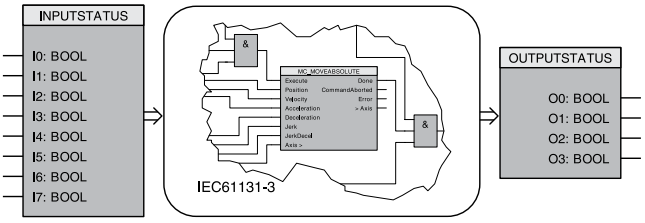
Connection of High-Level Controllers

Control via Digital Inputs/Outputs Compax3 I11T30 / I11T40 / I12T11



The digital I/Os can be optionally extended by 12 I/Os (M10 and M12 option).

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Control via Profibus, Compax3 I20T11 / I20T30 / I20T40

Profibus-ratings	
DP-Versions	DPV0 / DPV1
Baud rate [MBit/s]	up to 12
Profibus ID	C320

Control via CANopen, Compax3 I21T30 / I21T40

CANopen-ratings	
Baud rate [kBit/s]	20, 50, 100, 125, 250, 500, 800, 1000
Service-Data-Object	SDO1
Process-Data-Objects	PDO1, ... PDO4

Control via DeviceNet, Compax3 I22T30 / I22T40

DeviceNet-ratings	
I/O - data	up to 32 bytes
Baud rate [kBit/s]	125...500
Nodes	up to 63 Slaves

Control via Ethernet Powerlink, Compax3 I30T30 / I30T40

Ethernet Powerlink ratings	
Baud rate	100Mbits (FastEthernet)
Cycle time	<200µs; to 240 nodes

Control via EtherCAT Compax3 I30T30 / I30T40

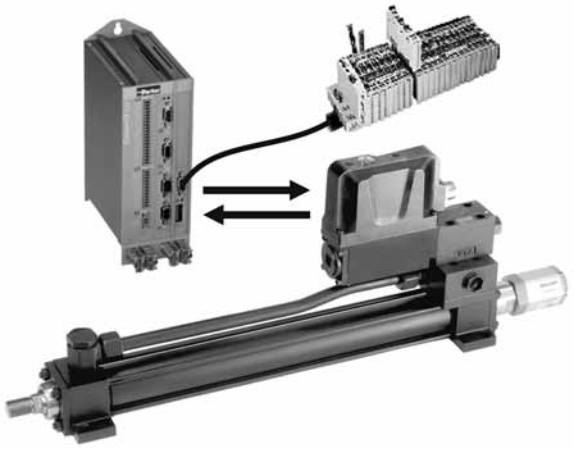
EtherCAT-ratings	
Bau drate	100Mbits (FastEthernet)
Cycle time	<200µs; to 240 nodes

Decentralized Control via CANopen, I21T30 / I21T40

With External Inputs/Outputs (PIO)

Additional external digital and analog inputs and outputs can be integrated via the CANopen master function. For this purpose we offer the Parker I/O system (PIO):

- CANopen field bus coupler: 650mA/5V, 1650mA/5V
- Digital input terminals: 2-, 4-, and 8-channel
- Analog input terminals: 2-channel (0-10V), 4-channel (0-20mA)
- Digital output terminals: 2-, 4-, and 8-channel
- Analog output terminals: 2-channel (0-10V, 0-20mA, +/-10V)

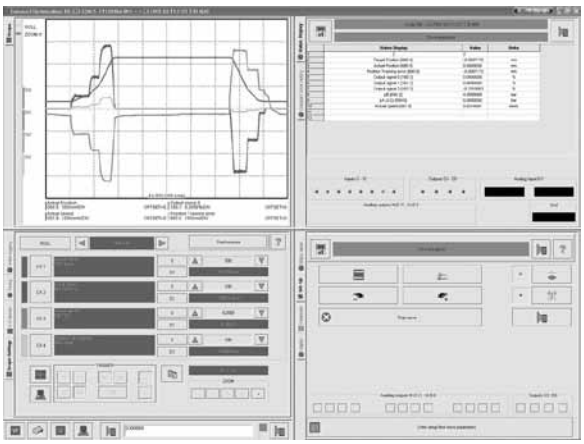


Simple, Wizard-guided Configuration and Commissioning Compax3 ServoManager

Software Tool C3 ServoManager

Configuration is carried out on a PC using the Compax3 ServoManager.

- Wizard-guided configuration
  - Automatic querying of all necessary entries
  - Graphically supported selection
- Setup mode
  - Moving individual axes
  - Predefined profiles
  - Convenient operation
  - Storage of defined profiles
  - Controller pre-setting possible
- Integrated 4-channel oscilloscope
  - Signal tracing directly on the PC
  - Various modes (single/normal/auto/roll)
  - Zoom function
  - Export as image or table (for example to Excel)



Software Tool HydraulicsManager

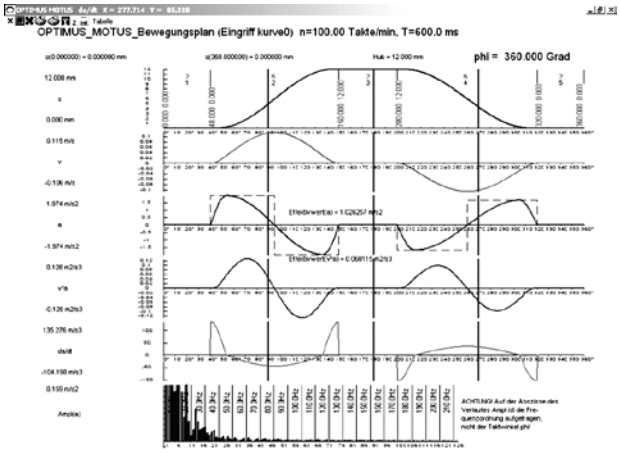
- Simple set up of customer valves, cylinders and drives.
- Technical data of all Parker valves, cylinders and drives available.

C3 HydraulicsManager valve database

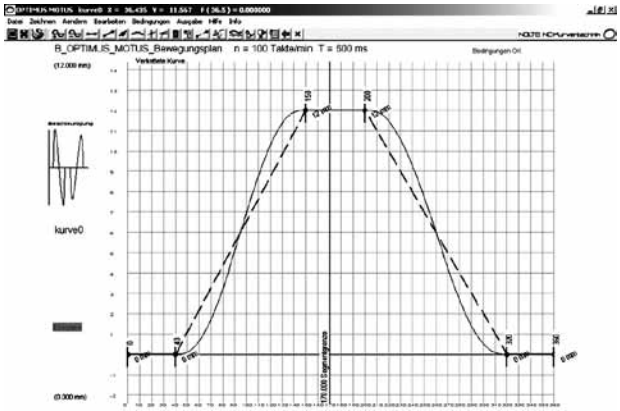
Cam Creation with CamDesigner

Software Tool CamDesigner

- Standardized Nolte cam generating tool with:
  - Standard or extended range of functions
  - Evaluation of the motion profiles
  - Verification of the drive sizing
- Transition laws from VDI directive 2143:
  - Selection of motion laws
  - The CamDesigner basic version features 15 motion laws (based on the dwell-to-dwell (interpolation method)



Evaluation of the motion profile



Cam generation with the integrated CamEditor

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Advantages Offered by International Standards in Programming

IEC61131-3 Programming Language

IEC61131-3 is the only company- and product-independent programming language with worldwide support for industrial automation devices.

- IEC61131-3 includes graphical and textual programming languages:
  - Instruction list
  - Structured text
  - Ladder diagram
  - Sequential function chart
  - Function block diagram

Integrated standards offer:
- A trusted programming environment
- Standardized programming

Integrated standards reduce:
- The overhead of development
- Maintenance costs
- Software upkeep
- Training overhead

Integrated standards increase:
- Productivity
- Software quality
- Concentration on core competence

Examples:

- Program development in IL

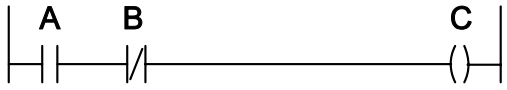
```
0001 FUNCTION_BLOCK AWL_EXAMPLE
0002 (* Sinus und CoSinus einer Zahl berechnen *)
0003 VAR_INPUT
0004    r1: REAL := 0.0;
0005 END_VAR
0006 VAR_OUTPUT
0007    sinus: REAL;
0008    cosinus: REAL := 9.9;
0009 END_VAR
```

```
0001    (* Den Sinus einer Zahl berechnen und mit 1000 multiplizieren *)
0002    LD      r1
0003    SIN
0004    MUL         1000.0
0005    ST      sinus
0006    (* Den Cosinus  einer Zahl berechnen und mit 1000 multiplizieren *)
0007    LD      r1
0008    COS
0009    MUL         1000.0
0010    ST      cosinus
0011
0012    (* Die Zahl weiterschalten *)
0013    LD      r1
0014    ADD         0.1
0015    ST      r1
0016
```

- Instruction list (IL)

```
LD      A
ANDN    B
ST      C
```

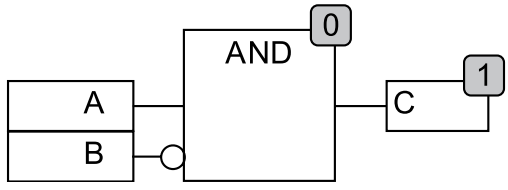
- Ladder diagram



- Structured text

C := A AND NOT B

- Function plan



Function Modules Based on PLCopen

PLCopen is a product and company independent organization that plays a significant role in supporting the IEC61131-3 programming language. Its specific tasks also include defining basic processes relevant to motion. The PLCopen organization consists of both users and manufacturers of automation components.

Parker Hannifin is an active member of the “Motion Control“ task force. This is a great advantage for the users of Parker drive technology, since they are constantly able to profit directly from the latest developments in PLCopen.

Professional Development Tool CoDeSys

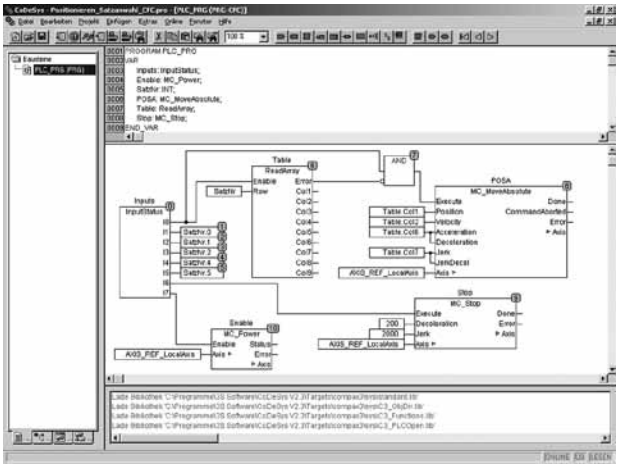
CoDeSys is a development environment for programming that saves a significant amount of time as applications are created.

- One of the most powerful development environments available, established world-wide
- Universal programming platform for various devices
- Visual elements
- Library management for user-defined applications
- Context-sensitive help wizard
- Data exchange between devices from different manufacturers
- Complete online functionality
- Sophisticated technological features
- Standard function modules deposited

. . . and all this for no additional cost

Parker is a member of the “CoDeSys Automation Alliance“.

Program Development in CFC

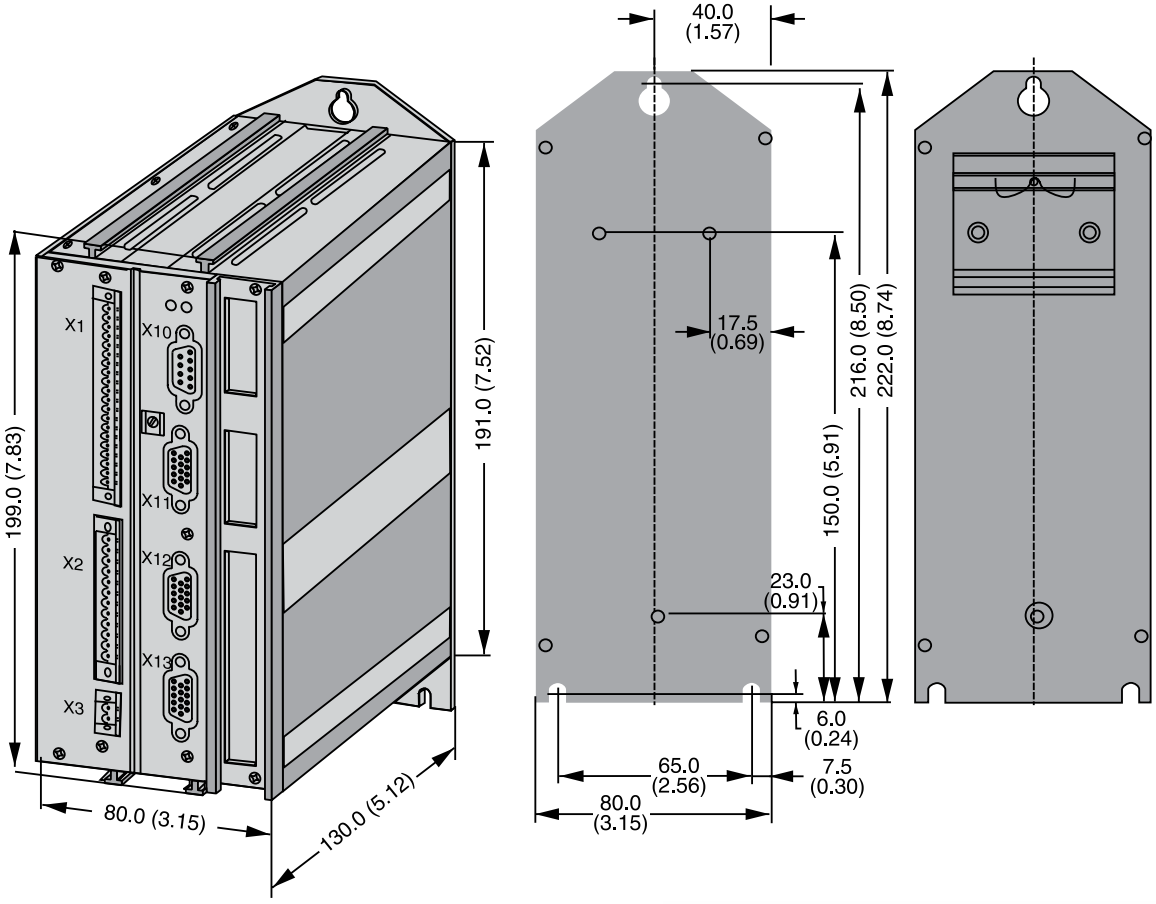


Project Management

Saving an entire project (source file) including symbols and comments to make service calls easier, because there is no need for any project data on the device itself

- Archiving projects as ZIP files
- Creating user-specific libraries that can be reused as tested sections of programs
  - These libraries can be protected
  - Examples include winders, synchronization components etc.
- Various user levels make it possible to lock sections of the program with passwords
- Depending on the task at hand, users can select from among 5 IEC languages plus CFC. These languages can also be mixed

Inch equivalents for millimeter dimensions are shown in (**)



D

Connection Set ZBH02/04

Complete kit with mating plug connectors (X1, X2 and X3) for Compax3 connectors and special shield connecting terminal

Feedback Cable GBK../..

Connection to the Motor:

Under the designation “REK.. + GBK..“ (Feedback cable) we can deliver feedback connecting cables in various lengths to order.

- Prefabricated with plug and cable eye
- The plugs of the Parker motor and feedback cables contain a special surface area screening.
- Cable plans, if you wish to make up your own cables

Terminal Block EAM06/..

For additional wiring of the inputs and outputs:

- Available with or without LED display
- Can be mounted in the control cabinet on a supporting rail
- Connection EAM06/.. via SSK23/..to X11, SSK24/.. to X12

RS232 Cable SSK01 (in various lengths)

Configuration:

Via a PC with the aid of the Compax3 ServoManager.

Communication:

Communication with Compax3 either via RS232 or via RS485 in order to read or write into objects.

Profibus plug BUS08/01

- BUS08/01 with 2 cable inputs (1x BUS08/01 incoming, 1x BUS08/01 continuing) and screw terminals, as well as a switch for activating the terminating resistor. Set to ON for first and last bus node terminating resistor activated.

Profibus cable: SSL01/.. not prefabricated

- Special cable in any length for Profibus wiring (colors according to DESINA).

Operating module BDM01/01

For display and diagnosis purposes:

- Can be plugged in during operation
- Power supply via Compax3 servo control
- For displaying and changing values

HEDA Bus

HEDA bus terminal connector (RJ45) BUS07/01:

- For the first and last Compax3 in the HEDA bus.

HEDA cable: SSK28/.. prefabricated in various lengths:

- Cable for HEDA bus wiring from Compax3-to-Compax3 or PC-to-Compax3 powerPLmC.

CANbus plug BUS10/01

- BUS10/01 with 2 cable inputs (1x BUS10/01 incoming, 1x BUS10/01 continuing) and screw terminals, as well as a switch for activating the terminating resistor. Set to ON for first and last bus node terminating resistor activated

CANbus cable SSL02/.. not prefabricated

- Special cable in any length for CANbus wiring (colors according to DESINA)

External Inputs/Outputs PIO...

For Compax3 I21 from technology function T30 onwards via CANopen:

- Integration of additional external input and output modules (digital and analog)

Connection set for Compax 3										
for C3F001 D2 F12xxx	ZBH 02/04	Z	B	H	0	2	/		0	4
Operating module										
Operating module		B	D	M	0	1	/		0	1
Terminal block										
for I/Os without luminous indicator	for X11, X12	E	A	M	0	6	/		0	1
for I/Os with luminous indicator	for X12	E	A	M	0	6	/		0	2
Interface cables and connectors										
PC-Compax3 (RS232)		S	S	K	0	1	/		...	...[1]
on X11/X13 (Transducer)	With flying leads	S	S	K	2	1	/		...	...[1]
on X12 (I/O digital)	With flying leads	S	S	K	2	2	/		...	...[1]
on X11(Ref/Analog)	For I/O terminal	S	S	K	2	3	/		...	...[1]
on X12 (I/Os digital)	For I/O terminal	S	S	K	2	4	/		...	...[1]
PC - POP (RS232)		S	S	K	2	5	/		...	...[1]
Compax3 - POP (RS485)		S	S	K	2	7	/	../	...	...[3]
Compax3 HEDA - Compax3 HEDA or PC - C3powerPLmC		S	S	K	2	8	/		...	...[2]
Compax3 X11 - Compax3 X11 (Encoder coupling of 2 axes)		S	S	K	2	9	/		...	...[1]
HEDA bus terminal connector (for the 1st and the last Compax3 in the HEDA Bus)		B	U	S	0	7	/		0	1
Feedback cable for Balluff SSI transducer and start/stop		G	B	K	4	0	/		...	...[1]
Feedback cable for SSI transducer and start/stop	With flying leads	G	B	K	5	3	/		...	...[1]
Profibus cable [4]	Not prefabricated	S	S	L	0	1	/		...	...[1]
Profibus connector		B	U	S	0	8	/		0	1
CAN-Bus cable [4]	Not prefabricated	S	S	L	0	2	/		...	...[1]
CAN-Bus connector		B	U	S	1	0	/		0	1

[1] Length code

Length code 1 (Example: SSK01/09: Length 25m)

Length [m]	1.0	2.5	5.0	7.5	10.0	12.5	15	20	25	30	50
Code	01	02	03	04	05	06	07	08	09	10	14

[2] Length code for SSK28

Length code 2 (Example: SSK28/22: Length 3m)

Length [m]	0.25	0.5	1.0	3.0	5.0	10.0
Code	20	21	01	22	03	05

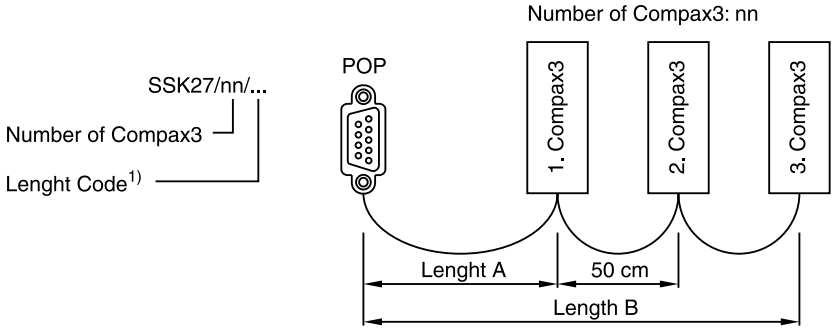
[3] Length code for SSK27

Length A: Cable or connection from POP with **one** Compax3 (POP - 1.Compax3), variable length according to length code[1]
(Example: SSK27/01/01: Length 1.0m)

Length B: Cable or connection from POP with **more than one** Compax3 (nn > 01) (1.Compax3 - 2.Compax3 - …), length between Compax connectors is fixed to 50cm, variable length A from POP with first Compax according to length code[1]
(Example: SSK27/03/01: Length 1.0m)

[4] Colors according to DESINA

Length Code for SSK27



Decentralized Input terminals									
PIO 2DI 24V DC 3.0ms	2-Channel Digital-Input terminal		P	I	O	4	0	0
PIO 4DI 24V DC 3.0ms	4-Channel Digital-Input terminal		P	I	O	4	0	2
PIO 8DI 24V DC 3.0ms	8-Channel Digital-Input terminal		P	I	O	4	3	0
PIO 2AI DC ±10V	2-Channel Analog-Input terminal	(± 10V Differential input)	P	I	O	4	5	6
PIO 4AI 0-10V DC S.E.	4-Channel Analog-Input terminal	(0-10V Signal voltage)	P	I	O	4	6	8
PIO 2AI 0-20mA	2-Channel Analog-Input terminal	(0 - 20mA Differential input)	P	I	O	4	8	0
Decentralized Output terminals									
PIO 2DO 24V DC 0.5A	2-Channel Digital-Output terminal	(Output current 0.5A)	P	I	O	5	0	1
PIO 4DO 24V DC 0.5A	4-Channel Digital-Output terminal	(Output current 0.5A)	P	I	O	5	0	4
PIO 8DO 24V DC 0.5A	8-Channel Digital-Output terminal	(Output current 0.5A)	P	I	O	5	3	0
PIO 2AO 0-10V DC	2-Channel Analog-Output terminal	(0-10V Signal voltage)	P	I	O	5	5	0
PIO 4AO 0-20mA	2-Channel Analog-Output terminal	(0-20mA Signal voltage)	P	I	O	5	5	2
PIO 2AO DC ±10V	2-Channel Analog-Output terminal	(±10V Signal voltage)	P	I	O	5	5	6
CANopen Fieldbus coupler									
CANopen Standard			P	I	O	3	3	7
CANopen ECO			P	I	O	3	4	7

General Description

Series PSD24 power supplies are the compact DIN Rail mount version for easy installation with use of the Digital Modules. This single phase power supply automatically adjusts for either 115 or 230 VAC, 50 or 60 Hz input. The nominal output is a filtered and regulated 24 VDC / 120 Watts 5 amperes. Series PSD power supplies are UL recognized, meet CSA standards and also the CE ms. It is ATEX approved for Class 1, Div 2 Hazardous Locations.

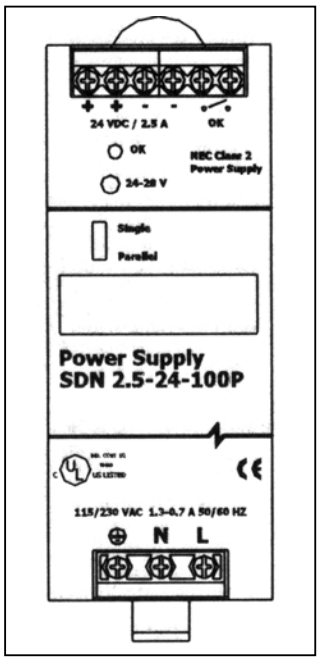
These power supplies provide the power necessary to operate the following Electrohydraulic products:

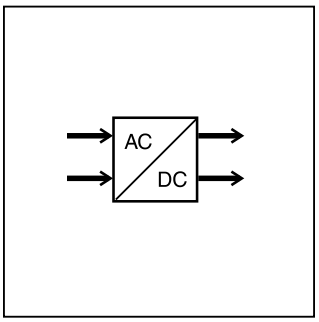
- D*FP, D*1FP, D*FH, D*FL, D*FX, D*FB and RE* valves
- PWD00, PCD00, PWDXX, PID, PZD and EW, electronics

D

Operation

Series PSD24 power supplies have capability for parallel operation. Conductor sizes are listed below in the specification. DIN rail design provides easy installation. A green LED and power on logic is provided (DC OK signal). Compact, rugged, and with > 640,000 hours MTBF make this ideal for idustrial applications.



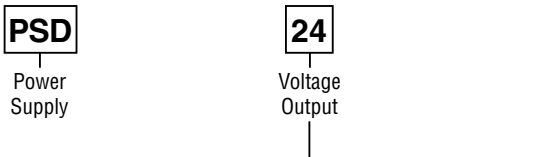


UL 508 Listed
IND. CONT. EQ.
E61379

UL 60950
E137632
CUL/CSA-C22.2
No. 234-M90

EMC and
Low Volt.
Directive

Ordering Information

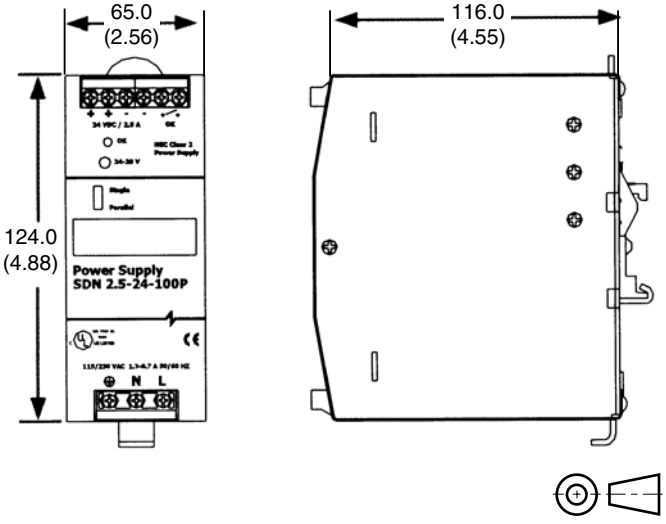


Code	Description
24	24 VDC, 5.0 amp, on Rail Power Supply

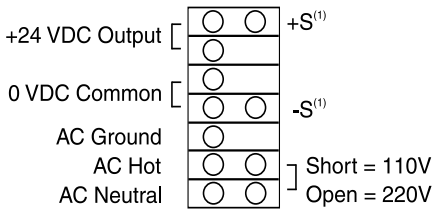
Weight: 0.62 kg (1.5 lbs)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



Connector - Pinout



(1) Refer to Operation

Specifications
SDN 2.5-24-100P

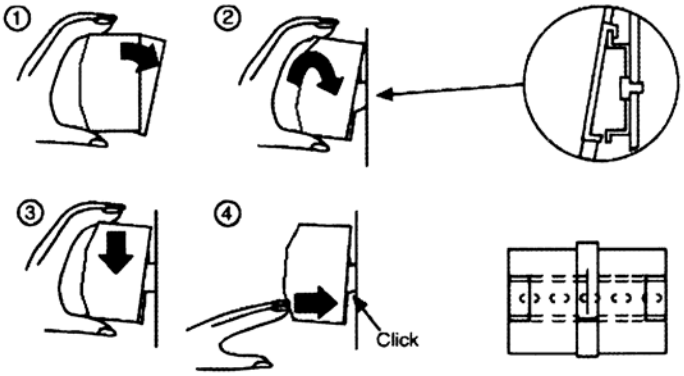
Input Power Requirements	
Nominal Voltage **AC Range** **DC Range** [2] **Frequency**	115/230 VAC auto select 85 - 132 / 176 - 264 VAC 210 - 375 VDC 47 - 63 Hz
Nominal Current [1]	2.2 A / 1.0 A
Inrush Current Maximum	typ. < 20 A
Output Power Specifications	
Nominal Voltage **Tolerance** **Ripple** [3]	24 VDC (22.5 - 28.5 VDC adjustable) < ± 2% overall (combination line, load, time and temperature related changes) < 50m Vpp
Nominal Current **Peak Current** [4]	5 A (120 W) 6 A 2x Nominal Current < 2 sec.
General Protection Safety	Protected against continuous short-circuit, overload, open-circuit. Protection class 1 (IEC 536), degree of protection IP20 (IEC 529). Safe low voltage: SELV (acc. EN60950)
Installation	
Fusing Input	Internally fused. External 10 A slow acting fusing for the input is recommended to protect input wiring
Mounting	Simple snap on system for DIN Rail TS35/7.5.
Input Connections	IP20-rated screw terminals; connector size range: 16-10 AWG (1.5-6 mm2) for solid conductors, 16-12 AWG (0.5-4 mm2) for flexible conductors
Output Connections	Two connectors per output; Connector size range: 16-10 AWG (1.5-6 mm2) for solid conductors

Notes:
1. Input current ratings are conservatively specified with low input, worst case efficiency and power factor.
2. Losses are heat dissipation in watts at full load, nominal input line.
3. Ripple/noise is stated as typical values when measured with a 20 MHz bandwidth scope and 50 Ohm resistor.
4. All peak current is calculated at 24V levels.

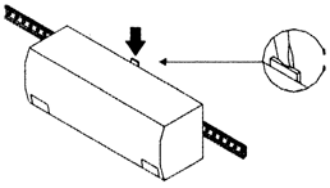
DIN Rail Mounting

Snap on the DIN Rail

1. Tilt unit slightly backwards
2. Put it onto the DIN Rail
3. Push downwards until stopped
4. Push at the lower front edge to lock
5. Shake the unit slightly to ensure that the retainer has locked



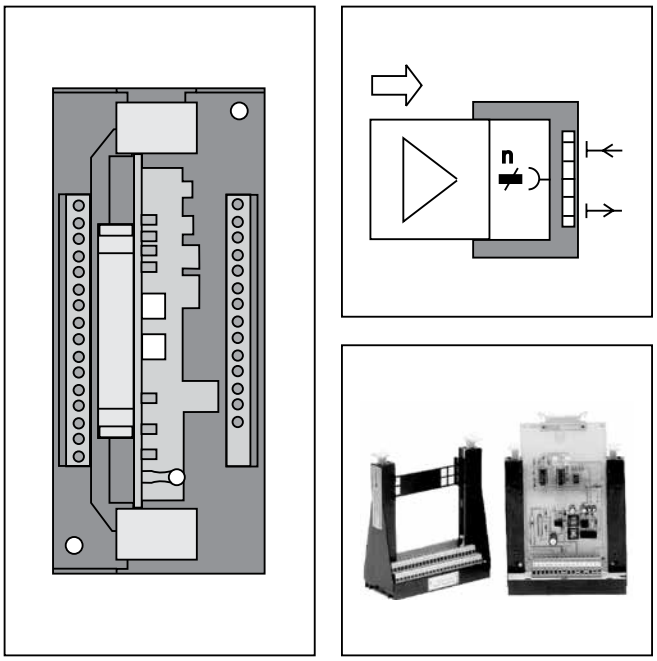
Detachment from DIN Rail



Press button downwards (to unlock) and remove the unit from the DIN Rail.

General Description

Card holders allow easy assembly and wiring of individual electronic driver card models EW, ED, EZ, and ET.



Technical Data

Base-unit	Fastened with screws or DIN rails 35mm
Printed circuit board	Carries the female connector and connection component for the terminal strip
Terminals	Screw terminals per DIN 41617 with wire prot. nominal cross-section AWG11, 5mm pitch
Female connector (per order code)	31 pole to DIN 41617, double row contacts. 15-, 48-, 96 pole to DIN 41612, 2 or 3 rows of contacts

D

Ordering Code

K Card Holder

For Driver card models:
EW 101, 102, 104
ED 101, 102, 104
ET 101, 102, 104, 105
EZ 150, 154, 155, 305

PHASE OUT

Ordering Code

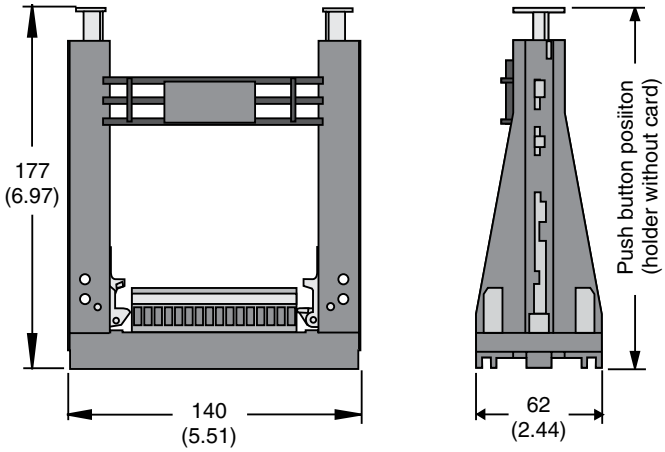
KH32F = **EX00-S05**

For Driver card models:
ET 154
EZ 595

Weight: 0.5 kg (1.0 lbs)

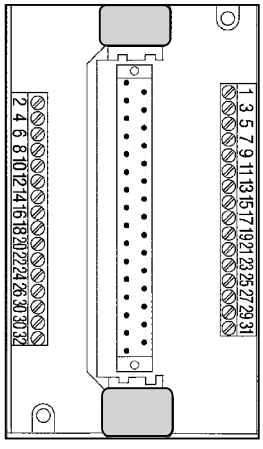
Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

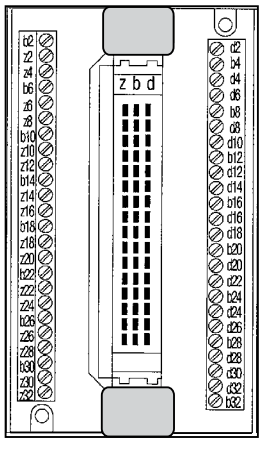


Card Holder for Denison 32 Pin Boards = EX00-S07

Terminal Locations



Model K



Model KH32F

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

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EHC Cable Asemblies Wire Color Assignments E4
Terms of Sale and Warranty Limitations E5
Safety Guide ..... E6 - E7

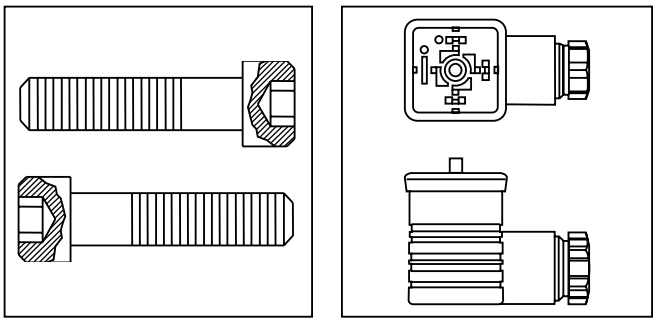
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

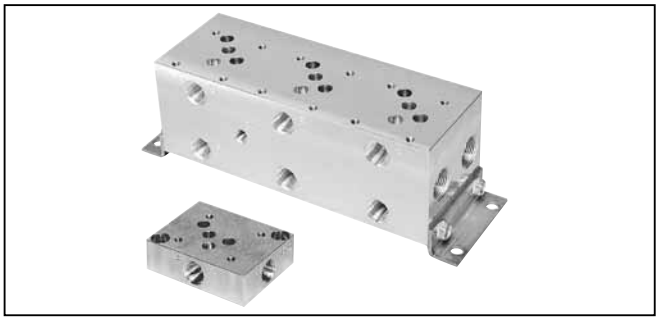
General Description

Supporting accessory products for proportional valves listed in this section include cable assemblies, connectors, bolt kits, and subplates. Valve drivers and power supplies can be found in the electronics section.

EHC cable assemblies are listed for specific valves, by function, and are supplied with an installed connector as specified at one end, pig-tails leads at the other.

Note that all valves are not shipped with a mating connector. Mating connectors are listed by valve application.





Electronic Accessories

Refer to the Electronics section for valve driver electronics, power supplies and accessories.

E

EHC Cable Assemblies

Valve Application	Connector		Function	Model
	Option	Pins		
D*FB OBE D*1FB OBE D*FH D*1FH D*FP D*1FP D*FX ('B' ele. option) D*6FH D*FT D*1FT RE**T RE06*T	CE compliant, 'MS' style (Preferred)	7	Primary cable assembly	EHC158GE
D*FX ('C' and 'D' ele. option)	'MS' Style	6	Primary cable assembly	EHC158
D*FL	Environmental 'MS' style Environmental 'MS' style CE compliant 'MS' style CE compliant 'MS' style	4 6 4 6	Power cable Logic I/O Power cable Logic I/O	EHC154LR EHC156R EHC154LRE EHC156RE
BD, DY	'MS' style	4	Primary cable assembly	EHC154S
D*FP B50 D*1FP B50 D*FB W5 D*1FB W5	CE compliant	12	Primary cable assembly	EHC1512GE

Communication Cable Assemblies

Valve Application	Cable	Function	Model
D*FB OBE D*1FB OBE D*FP D*1FP D*1FC D*FT 52 Design D*1FT 40 Design RE06*T 26 Design	RS-232 to Mini USB	Parameter change via "ProPXD" software	40982923
D*FB OBE D*1FB OBE D*FT 52 Design D*1FT 40 Design RE06*T 26 Design	USB to Mini USB	Parameter change via "ProPxD" software	1210846 * * Not for Windows 7 or newer.

accessories.indd, ddp

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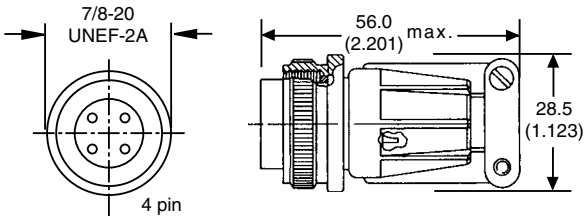
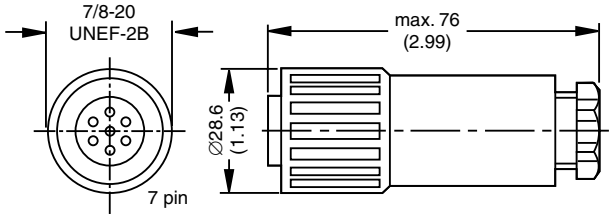
Power Connector — D*FL



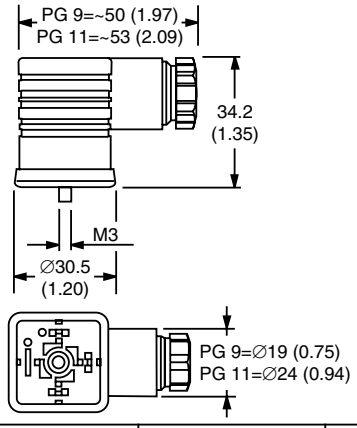
Description	Order Number
4 pin	1210292

Primary Connector — D*FT, D*FH, D*FM, D*FX (Ele. Design 'B'), RE06*T, RE**T, D*FB and D*1FB (OBE), D*FP*0 and D*FP*3



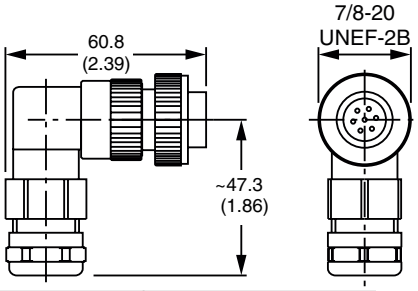
Description	Order Number
DIN 43563 6+PE	5004072

Solenoid Connectors



Description	Variation	Order Number
DIN 43650	Black	692914
DIN 43650	Grey	692915

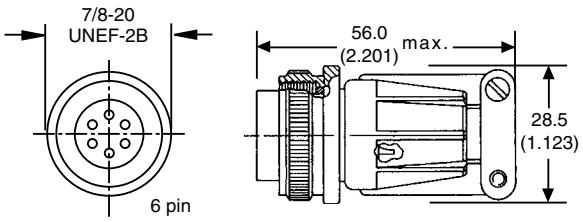
Primary Connector — TDP025 and TDP050



Can be used on any 6+PE valve.

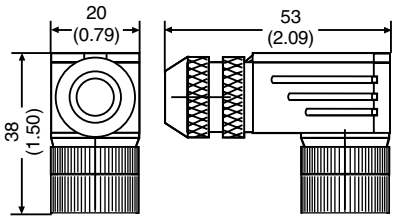
Description	Order Number
90° 7-Pin	5005160

I/O Connector — D*FL



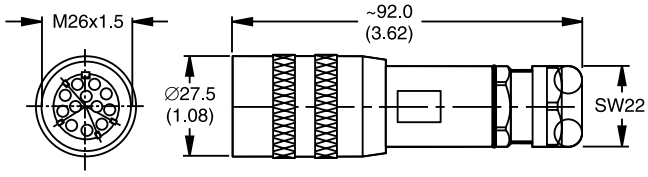
Description	Order Number
6 pin D*FL	MS3106E-14S-6S
Rubber Boot	801227
6 pin D*FX (ele. design A, C & D)	697561

LVDT Connector — D*1FS



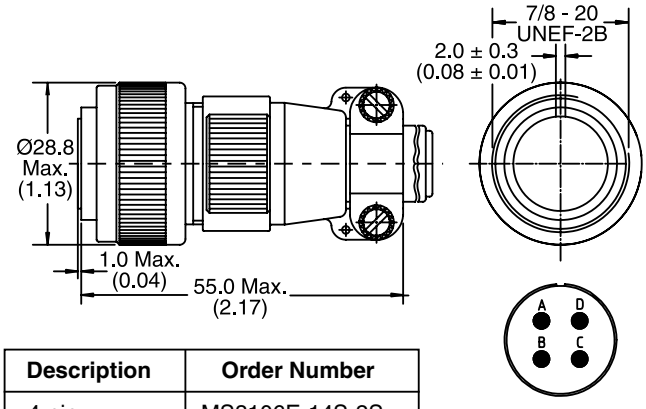
Description	Order Number
M12 / 5 pin	5004109

Primary Connector — D*FP*5, D*1FP*5, D*FB*W5 and D*1FB*W5



Description	Order Number
EN 175201-804 11+PE	5004711

Primary Connector — BD, PH, DY and SE



Description	Order Number
4-pin	MS3106E-14S-2S

Interface	Valve	Bolt Kit	Qty	Size	Subplate(1)	Port Size	Port Location
NG6	D1F*	BK209	4	10-24 x 1.25"	SPD23NS35	3/8" NPTF	Bottom
CETOP 3		BK375	4	M5 x 30mm	SPD23NAS35	3/8" NPTF	Side
	RE06	BK210	4	10-24 x 1.875"	SPD26SS35	#12 SAE	Bottom
					SPD26SAS35	#12 SAE	Side
NG10	D3F*	BK98	4	1/4-20 x 1.625"	SPD31D6NS35	3/4" NPTF	Bottom
CETOP 5		BK385	4	M6 x 40mm	SPD31D6NAS35	3/4" NPTF	Side
					SPD31D6SS35	#12 SAE	Bottom
					SPD31D6SAS35	#12 SAE	Side
	D31F*	BK02	4	1/4-20 x 1.5"	SPD31D6NS35	3/4" NPTF	Bottom
		BK385	4	M6 x 40mm	SPD31D6NAS35	3/4" NPTF	Side
					SPD31D6SS35	#12 SAE	Bottom
					SPD31D6SAS35	#12 SAE	Side
	D36F*	BK03	6	1/4-20 x 1.5"	1402190	#16 SAE	Side
		BK439	6	M6 x 40mm			
NG16	D41F*	BK160	4	3/8-16 x 2.5"	DD07SPS012S	#12 SAE	Side
CETOP 7			2	1/4-20 x 2.25"			
		BK320	4	M10 x 60mm	SPD46B910	G3/4"	Bottom
			2	M6 x 55mm			
	D46F*	BK153	6	3/8-16 x 2.0"	1402191	#20 SAE	Side
		BK440	6	M10 x 50mm			
NG25	D81F*	BK228	6	1/2-13 x 3"	SPD66NS35	3/4" NPTF	Bottom
CETOP 8	D91F*	BK360	6	M12 x 75	SPD66NAS35	3/4" NPTF	Side
					SPD68NS35	1" NPTF	Bottom
					SPD68NAS35	1" NPTF	Side
					SPD610NS35	1 1/4" NPTF	Bottom
					SPD610NAS35	1 1/4" NPTF	Side
					SPD610SS35	#20 SAE	Bottom
					SPD610SAS35	#20 SAE	Side
	D96F*	BK227	6	1/2-13 x 2.5"	1402192	#24 SAE	Side
		BK462	6	M12 x 60mm			
NG32	D111F*	BK150	6	3/4-10 x 3.5"	SPD1010N35	1 1/4" NPTF	Bottom
CETOP 10		BK386	6	M20 x 90	SPD1012N35	1 1/2" NPTF	Bottom

(1) Ductile iron; maximum operating pressure: 350 Bar (5075 PSI). Refer to valve specificatons for actual recommended maximums.

Note: All subplates listed use SAE mounting bolt hardware.

EHC Cable Assemblies Wire Color Assignments

Pin	Cable Model – Wire Color					
	154LR 154LRE	156R 156RE	Metal 158	Plastic 158G	Metal 158GE	154S
A	Red	Black	Orange	Red	Red	Black
B	Green	Red	Blue	Black	Black	Red
C	Black	White	Black	Yellow	Red/Black	Green
D	White	Green	Green/Yellow	Blue	Blue	White
E	–	Orange	Red	Orange	Orange	–
F	–	Blue	White	White	White	–
G	–	–	–	Green	Green	–

Return to ALPHA TOC
Return to SECTION TOC

Offer of Sale

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors ("Seller") are hereby offered for sale at prices to be established by Seller. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods, services or work described will be referred to as "Products".

1. **Terms and Conditions**. Seller's willingness to offer Products, or accept an order for Products, to or from Buyer is subject to these Terms and Conditions or any newer version of the terms and conditions found on-line at www.parker.com/saleterms/. Seller objects to any contrary or additional terms or conditions of Buyer's order or any other document issued by Buyer.

2. **Price Adjustments; Payments**. Prices stated on Seller's quote or other documentation offered by Seller are valid for 30 days, and do not include any sales, use, or other taxes unless specifically stated. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). Payment is subject to credit approval and is due 30 days from the date of invoice or such other term as required by Seller's Credit Department, after which Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. **Delivery Dates; Title and Risk; Shipment**. All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the manner of shipment, title to any products and risk of loss or damage shall pass to Buyer upon placement of the products with the shipment carrier at Seller's facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.

4. **Warranty**. Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of eighteen months from the date of delivery to Buyer. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

5. **Claims; Commencement of Actions**. Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 30 days after delivery. Buyer shall notify Seller of any alleged breach of warranty within 30 days after the date the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for an amount due on any invoice) must be commenced within 12 months from the date of the breach without regard to the date breach is discovered.

6. **LIMITATION OF LIABILITY.** UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. **IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.**

7. **User Responsibility**. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

8. **Loss to Buyer's Property**. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, will be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. **Special Tooling**. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

10. **Buyer's Obligation; Rights of Seller**. To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.

11. **Improper Use and Indemnity**. Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

12. **Cancellations and Changes**. Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

13. **Limitation on Assignment**. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

14. **Force Majeure**. Seller does not assume the risk and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

15. **Waiver and Severability**. Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

16. **Termination**. Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days written notice of termination. Seller may immediately terminate this agreement, in writing, if Buyer: (a) commits a breach of any provision of this agreement (b) appointments a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or by a third party (d) makes an assignment for the benefit of creditors, or (e) dissolves or liquidates all or a majority of its assets.

17. **Governing Law**. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.

18. **Indemnity for Infringement of Intellectual Property Rights**. Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

19. **Entire Agreement**. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

20. **Compliance with Law, U. K. Bribery Act and U.S. Foreign Corrupt Practices Act**. Buyer agrees to comply with all applicable laws and regulations, including both those of the United Kingdom and the United States of America, and of the country or countries of the Territory in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA") and the U.S. Anti-Kickback Act (the "Anti-Kickback Act"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that they are familiar with the provisions of the U. K. Bribery Act, the FCPA and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer shall not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase products or otherwise benefit the business of Seller.

02/12

Parker Safety Guide for Selecting and Using Hydraulic Valves and Related Accessories

WARNING: Failure or improper selection or improper use of Parker Hydraulic Valve Division (HVD) Valves or related accessories ("Products") can cause death, personal injury and property damage. Possible consequences of failure or improper use of these Products include but are not limited to:

- Valves or parts thereof thrown off at high speed
- High velocity fluid discharge
- Explosion or burning of the conveyed fluid
- Contact with suddenly moving or falling objects controlled by the Valve
- Injections by high-pressure fluid discharge
- Contact with fluid that may be hot, cold, toxic or otherwise injurious
- Injuries resulting from injection, inhalation or exposure to fluids
- Injury from handling a heavy item (dropped, awkward lift)
- Electric shock from improper handling of solenoid connections
- Injury from slip or fall on spilled or leaked fluid

Before selecting or using any of these Products, it is important that you read and follow the instructions below. In general, the Products are not approved for in-flight aerospace applications. Consult the factory for the few that are FAA approved.

1.0 GENERAL INSTRUCTIONS

1.1 **Scope**: This safety guide provides instructions for selecting and using (including assembling, installing and maintaining) these Products. For convenience all items in this guide are called "Valves". This safety guide is a supplement to and is to be used in conjunction with the specific Parker catalogs for the specific Valves and/or accessories being considered for use. See item 1.6 below for obtaining those catalogs.

1.2 **Fail-Safe:** Valves can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of the Valve or Valve Assembly will not endanger persons or property.

1.3 **Safety Devices:** Never disconnect, override, circumvent or otherwise disable any safety lockout on any system whether powered by HVD Valves or any motion control system of any manufacturer. (e.g. Automatic shut-off on a riding lawn mower should the operator get out of the seat).

1.4 **Distribution:** Provide a copy of this safety guide to each person that is responsible for selecting or using HVD Valve Products. Do not select HVD Valves without thoroughly reading and understanding this safety guide as well as the specific Parker catalogs for the Products considered or selected.

1.5 **User Responsibility:** Due the wide variety of operating conditions and applications for Valves, HVD and its distributors do not represent or warrant that any particular Valve is suitable for any specific system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing is solely responsible for:

- Making the final selection of the Valve
- Assuring that the user's requirements are met and that the application presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the Valves are used.
- Assuring compliance with all applicable government and industry standards.

1.6 **Additional Questions:** Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com , for the telephone numbers of the appropriate technical service department. For additional copies of this or any other Parker Safety Guide go to www.parker.com and click on the safety button on the opening page. Catalogs and/or catalog numbers for the various HVD Valve Products can be obtained by calling HVD at 440-366-5100. Phone numbers and catalog information is also available on the Parker website, www.parker.com .

2.0 VALVE SELECTION INSTRUCTIONS

2.1 **Pressure:** Valve selection must be made so that the maximum working pressure of the Valve is equal to or greater than the maximum system pressure. Surge, impulse or peak transient pressures in the system must be below the maximum working pressure of the Valve. Surge, impulse and peak pressures can usually be determined by sensitive electrical instrumentation that measures and indicates pressures at millisecond intervals. Mechanical pressure gauges indicate only average pressure and cannot be used to determine surge, impulse or peak transient pressures. Burst pressure ratings if given or known are for manufacturing purposes only and are not an indication that the Product can be used in applications at the burst pressure or otherwise above the maximum working pressure.

2.2 **Temperature:** The fluid temperature must be regulated or controlled so that the operating viscosity of the fluid is maintained at a level specified for the particular Valve product. Such ranges are given in the product catalogs or can be obtained from the appropriate customer service department for the particular Valve product.

2.3 **Fluid Compatibility:** The fluid conveyed in Valves has direct implications on the Valve selection. The fluid must be chemically compatible with the Valve component materials. Elastomer seals, brass, cast iron, aluminum for example all are potentially affected by certain fluids. Additionally, fluid selection affects the performance of various Valves. Considerations relative to fluid selection are outlined in the specific HVD Valve product catalog. Of particular importance is that the fluid be for hydraulic use, contain the proper additives and wear inhibitors. See 1.6 "Additional Questions" above for information to obtain such HVD catalogs.

2.4 **Changing Fluids:** If a system requires a different fluid, it should be done with the guidance in number 2.3 above. Additionally, it may be necessary to flush the system (including the Valves) to remove any of the previous fluid. Consult the Parker Valve Division for guidance.

2.5 **Size:** Transmission of power by means of pressurized fluid varies with pressure and rate of flow. The size of the components must be adequate to keep pressure losses to a minimum and avoid damage due to heat generation or excessive fluid velocity.

2.6 **Placement:** Installation of Valves must take into account the orientation of the Valve and the proximity of the Valve to other parts of the system. This includes but is not limited to closeness to hot and cold areas, access for servicing and operation as well as orientation for proper connectors.

2.7 **Ports:** Connection of Valves in systems can be by threaded ports, sub-base surfaces, flanges and manifolds. In all cases, the proper fitting, surface or mounting hardware must be selected to properly seal and contain the system fluid so as to avoid the adverse conditions listed in the initial warning box above. Specifically, if using threaded ports, the designer must make sure that the mating fitting is of the compatible thread. Also, the instructions provided by the connector hardware supplier must be read and understood so as to properly assemble the connector. The Parker Safety Guide for using Hose, Tubing and Fittings and Related Accessories is but one reference to this end.

2.8 **Environment:** Care must be taken to insure that the Valve and Valve Assemblies are either compatible with or protected from the environment (that is, surrounding conditions) to which they are exposed. Environmental conditions including but not limited to ultraviolet radiation, sunlight, heat, ozone, moisture, water, salt water, chemicals and air pollutants can cause degradation and premature failure.

2.9 **Electric Power:** For Valves requiring electric power for control, it is imperative that the electricity be delivered at the proper voltage, current and wattage requirements. To obtain the proper control requirements please refer to the respective Parker product catalog for the specific Valve that is intended for use. If further guidance is required, call the appropriate technical service department identified in the respective Parker product catalog.

2.10 **Specifications and Standards:** When selecting Valves, government, industry and Parker specifications and recommendations must be reviewed and followed as applicable.

2.11 **Accessories:** All accessories used in conjunction with any Parker Valve product must be rated to the same requirements of the Valve including but not limited to pressure, flow, material compatibility, power requirements. All of these items must be examined as stated in the "VALVE INSTALLATION INSTRUCTIONS" paragraph 3.0.

(continued on next page)

3.0 VALVE INSTALLATION INSTRUCTIONS

3.1 **Component Inspection:** Prior to use, a careful examination of the Valve(s) must be performed. The Valve intended for use must be checked for correct style, size, catalog number and external condition. The Valve must be examined for cleanliness, absence of external defects or gouges, cracked or otherwise deformed parts or missing items. The mounting surface or port connections must be protected and free of burrs, scratches, corrosion or other imperfections. Do NOT use any item that displays any signs of nonconformance. In addition, any accessory including but not limited to fittings, bolt kits, hoses, sub bases, manifolds, and electrical connectors must be subjected to the same examination.

3.2 **Handling Valves:** Many Valves whether HVD Valves or of another manufacturer can be large, bulky or otherwise difficult to handle. Care must be taken to use proper lifting techniques, tools, braces, lifting belts or other aids so as not to cause injury to the user, any other person or to property.

3.3 **Filtration:** Fluid cleanliness is a necessity in any hydraulic system. Fluid filters must be installed and maintained in the system to provide the required level of fluid cleanliness. Filters can be placed in the inlets, pressure lines and return lines. The level of cleanliness required is specified in the HVD product catalog for the specific Valve(s) selected or intended for use. For additional information on Filter selection contact Parker Filter Division at 800-253-1258 or 419-644-4311.

3.4 **Servo Valves:** Application of Servo Valves in general requires knowledge and awareness of "closed loop control theory" and the use of electronic controls for successful and safe operation. Individuals who do not have such experience or knowledge must gain training before use of such Products. Parker offers both classroom training as well as manuals to assist in gaining this knowledge. These aids can be obtained by contacting Hydraulic Valve Division at 440-366-5100, calling the general Parker help line 800-CPARKER or going to the Parker web site at www.parker.com.

3.5 **Accessory Ratings:** All accessories used in combination with the selected or intended Valve product must be rated and compatible with the selected Valve. Specifically, the items must be of equal or greater rating including but not limited to pressure, flow, power, size, port style, thread connectors and material.

3.6 **Connection Styles:** It is the responsibility of the user of the Parker product to properly select connectors and accessories that match the connections on the sub plate, Valve, flange or threaded connection or manifold. It is also the responsibility of the installer to possess adequate skill and knowledge including but not limited to thread preparation, torque technique, hose assembly and inspection, tube preparation and assembly, and fitting installation. Parker Tube Fitting Division (www.parker.com/tfd) catalog 4300 and Parker Hose Products (www.parkerhose.com) catalog 4400 describe some basic technical information relative to proper fitting assembly.

3.7 **Electrical Connections:** All electrical connections must be made to the applicable codes and local safety requirements.

3.8 **Gauges and Sensors:** The user must install sufficient gauges and sensors in the system so as to be able to determine the condition of the system. This includes but is not limited to pressure gauges, flow meters, temperature sensors and site gauges. These are of utmost importance should removal or disassembly of a Valve, portion of a Valve or portion of the system become necessary. Refer to "VALVE MAINTENANCE AND REPLACEMENT INSTRUCTIONS" for details and especially item 4.8.

3.9 **System Checkout:** Once installed, the Valve installation must be tested to insure proper operation and that no external leakage exists. All safety equipment must be in place including but not limited to safety glasses, helmets, ear protection, splash guards, gloves, coveralls and any shields on the equipment. All air entrapment must be eliminated and the system pressurized to the maximum system pressure (at or below the Valve maximum working pressure) and checked for proper function and freedom from leaks. Personnel must stay out of potentially hazardous areas while testing and using.

4.0 VALVE MAINTENANCE AND REPLACEMENT INSTRUCTIONS

4.1 **Maintenance Program:** Even with proper installation, Valves and Valve System life may be significantly reduced without a continuing maintenance program. The severity of the application and risk potential must determine the frequency of the inspection and the replacement of the Products so that Products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at a minimum, must include instructions 4.2 through 4.10. An FMEA (Failure Mode and Effects Analysis) is recommended in determining maintenance requirements.

4.2 **Visual Inspection-Valves:** Any of the following conditions require immediate shut down and replacement of the Valve.

- Evidence that the Valve is in partial dis-assembly.
- Visible crack or suspicion of a crack in the Valve housing or bent, cracked or otherwise damaged solenoid.
- Missing or partially extending drive pin on a flow control knob.
- Missing, loose components, obstructions or other condition impeding the motion or function of the manual knob, lever, foot pedal or other mechanical operator of a hydraulic Valve.
- Any evidence of burning or heat induced discoloration.
- Blistered, soft, degraded or loose cover of any kind.
- Loose wire or electrical connector.

4.3 **Visual Inspection-Other:** The following conditions must be tightened, repaired, corrected or replaced as required.

1. Fluid on the ground must be cleaned immediately. Also, the source of the fluid must be determined prior to running the equipment again.
2. Leaking port or excessive external dirt build-up.
3. System fluid level is too low or air is entrapped or visible in the reservoir.
4. Equipment controlled by the Valve or Valve assembly has been losing power, speed, efficiency

4.4 **Filter Maintenance:** System filters must be maintained and kept in proper working order. The main service requirement is periodic replacement of the filter element or screen. Contact Parker Filter Division at 800-253-1258 or 419-644-4311 for further filter maintenance details.

4.5 **Functional Test:** See "System Checkout" number 3.9 above in "VALVE INSTALLATION INSTRUCTIONS".

4.6 **Replacement Intervals:** Valves and Valve Systems will eventually age and require replacement. Seals especially should be inspected and replaced at specific replacement intervals based on previous experience, government or industry recommendations, or when failures could result in unacceptable downtime, damage or injury risk. At a minimum seals must be replaced whenever service is rendered to a Valve product.

4.7 **Adjustments, Control Knobs, and Other Manual Controls:** System Pressure and Flow are typically adjusted by knobs and/or handles. A set-screw or lock-nut secures the adjustment device so as to maintain the desired setting. This set-screw or lock-nut must first be loosened prior to making any adjustments and re-tightened after adjustment on the HVD Valve. All adjustments must be made in conjunction with pressure gauges and/or flow meters (or by watching the speed of the actuator in the case of setting flow only). See paragraph "Gauges and Sensors" above in the section "VALVE INSTALLATION INSTRUCTIONS'. Under no circumstances should any control knob, adjustment stem, handle, foot pedal or other actuating device be forced beyond the mechanical stop(s) on the Valve. For example, the Parker Safety Notice Bulletin **HY14-3310-B1/US** for HVD Colorflow Valves specifically restricts the adjustment torque to "hand adjust" or "less than 10 ft/lbs" if it cannot be adjusted by hand. Failure to adhere to this may force the knob beyond the stop point allowing it to be ejected at high speed resulting in death, personal injury and property damage. For complete safety instructions on HVD Colorflow Valves, copies of Safety Notice **Bulletin HY14-3310-B1/US** can be obtained directly from the Hydraulic Valve Division at 440-366-5100 or from the Parker web site at www.parker.com by selecting the "Safety" button. Parker help line 800-CPARKER is on call 24/7 as well should there be any question about the use of a HVD Valve. Additionally, when making adjustments, always adjust the Valve with all parts of your body to the side of the Valve (that is, the knob is not pointing toward you or anyone else).

4.8 **High pressure Warning:** Hydraulic power is transmitted by high-pressure fluids through hoses, fittings and valves, pumps and actuators. This condition can be dangerous and potentially lethal and, therefore, extreme caution must be exercised when working with fluids under pressure. From time to time, hoses, Valves, tubes or fittings fail if they are not replaced at proper time intervals. Typically these failures are the result of some form of misapplication, abuse, wear, or failure to perform proper maintenance. When such failure occurs, generally the high pressure fluid inside escapes in a stream which may or may not be visible to the user. Under no circumstances should the user attempt to locate the leak by "feeling" with their hands or any other part of their body. High-pressure fluids can and will penetrate the skin and cause severe tissue damage and possible loss of limb or life. Even seemingly minor hydraulic fluid injection injuries must be treated immediately by a physician with knowledge of the tissue damaging properties of hydraulic fluid.
If a hose, tube, fitting or Valve failure occurs, immediately shut down the equipment and leave the area until pressure has been completely released from the system. Simply shutting down the pump may or may not eliminate the pressure in the system. It may take several minutes or even hours for the pressure to be relieved so that the leak area can be examined safely. Once the pressure has been reduced to zero, the suspected leaking item can be taken off the equipment and examined. It must always be replaced if a failure has occurred. Never attempt to patch or repair a connector (especially a hose) or Valve that has failed. Consult the nearest Parker distributor or the appropriate Parker division for component replacement information. Never touch or examine a failed hydraulic component unless it is obvious that the item no longer contains fluid under pressure.

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