

Application

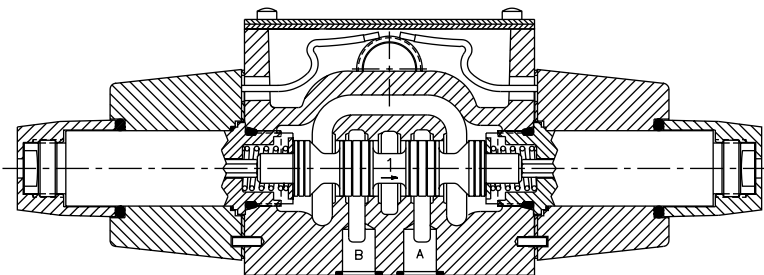
Parker D3 Series hydraulic directional control valves are high performance, direct operated 4-way valves, available in 2 or 3 position. They are manifold mounted which conform to NFPA's D05/CETOP 5 mounting patterns. These valves were designed for industrial and mobile hydraulic applications which require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

Operation

Parker's D3 Series directional control valves consist of a four 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.

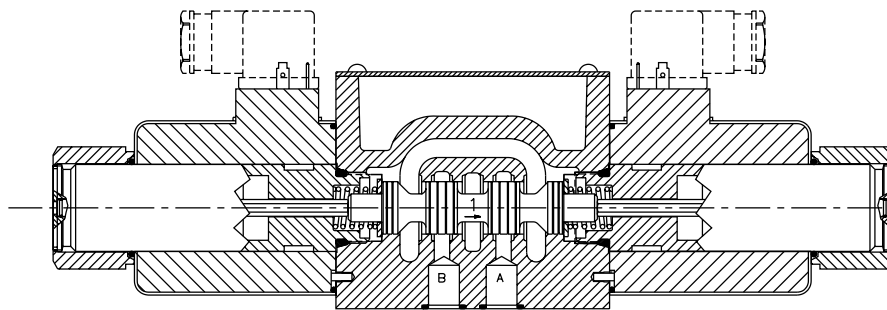
A

D3W Solenoid Operated Conduit Box Style



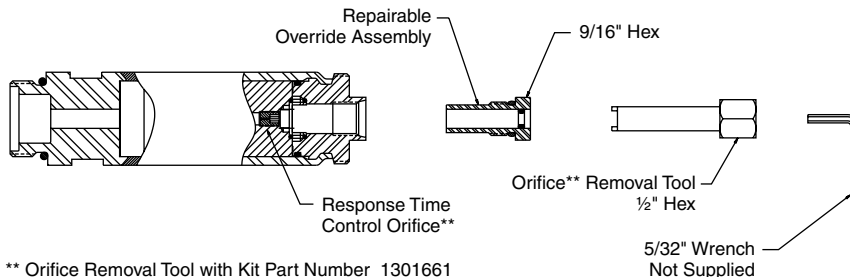
- Easy access mounting bolts
- No tools required for coil removal
- 22 spool styles available
- Three electrical connection options
- AC & DC lights available
- CSA approved
- Available in low-watt DC version

D3W Solenoid Operated Hirschmann (DIN) Style



- DIN Style (43650) Hirschmann
- Dual spade (SAE type 1B) lug style also available
- 22 spool styles available
- No tools required for coil removal
- Easy coil replacement
- AC & DC lights available
- CSA approved
- Available in low-watt DC version

D3W Soft Shift Tube



** Orifice Removal Tool with Kit Part Number 1301661

Repairable manual overrides must be specified to gain access to soft shift orifice.

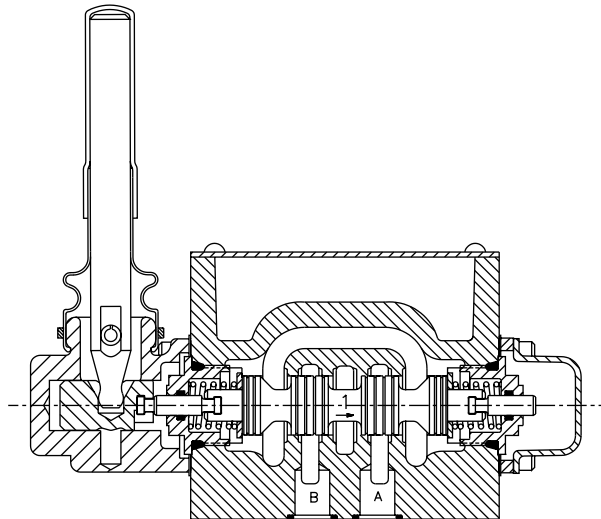


Features

- 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 (except manual operators)
- Proportional spool available

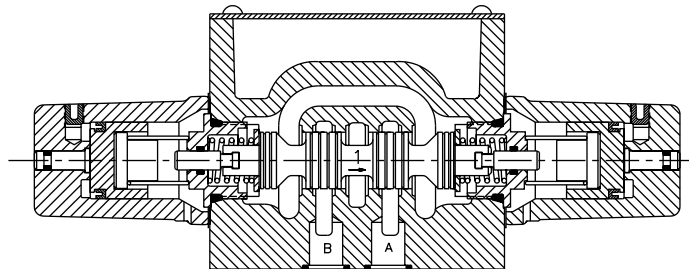
D3L Lever Operated

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



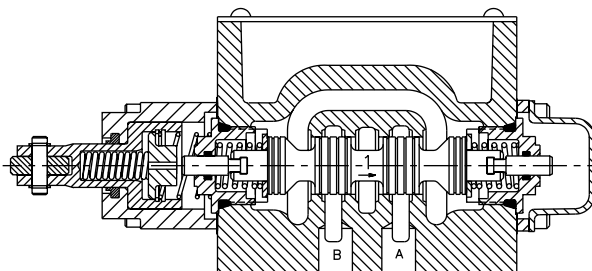
D3A Air Operated

- Low pilot pressure required – 3.4 Bar (50 PSI) minimum
- Manual overrides standard
- 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

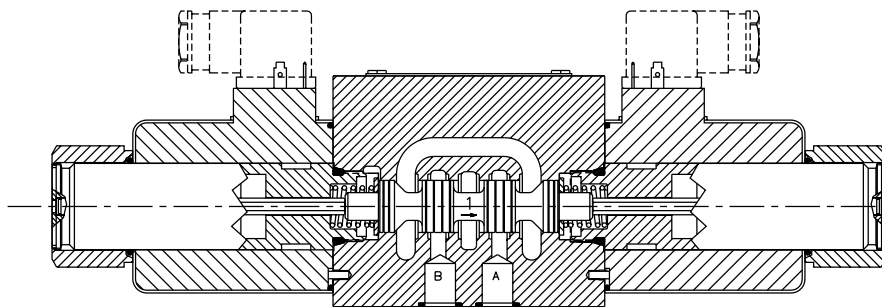
Parker D3D Series hydraulic directional control valves are high performance, direct operated 4-way valves, available in 2 or 3 position. They are manifold mounted which conform to NFPA's D05/CETOP 5 mounting pattern. These valves were designed for industrial and mobile hydraulic applications which require high cycle rates, long life and high efficiency.

Operation

Parker's D3D Series directional control valves consist of a five chamber style body, and a case hardened sliding spool.

A

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 Quick 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. ‡ 4300 PSI Max. # 1500 PSI Max.

D3L, D3A, D3C Quick 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.

HVD = Hydraulic Valve Division HCD = Hydraulic Controls Division

		Closed Crossover	Open Crossover	Symmetrical	Standard	Spool Symbol					Spool: D1V*	Spool: D1V*	Spool: D3W	Spool: D31DW	Spool: D41	Spool: D41*W	Spool: D61VW	Spool: D81/D91	Spool: D101VW	Spool: D111
Spool Number						A		0		B	D1VW: D1VHW	D1V*: A/C/P/D/G/L	D3DW/D31DW	Double Monitor Switch	HCD	Double Monitor Switch	HVD	HCD	HVD	HCD
001	x		x	x																
002		x		x																
003	x																			
004	x			x																
005	x																			
006	x			x																
007		x																		
008	x			x																
009		x																		
010	x																			
011		x																		
012		x	x																	
014		x																		
015	x																			
016	x																			
020B	x																			
020D	x																			
020H	x																			
021	x																			
022	x																			
023		x																		
026B	x																			
026H	x																			
030B		x																		
030D		x																		
030H		x																		
031	x																			
032	x																			
033																				
034	x																			
035	x																			
038																				
039																				
042	x			x																
043B																				
043H																				
044		x																		
044B		x																		
044H		x																		
047																				

Spools shown may be nonstandard. Please contact HVD for availability.

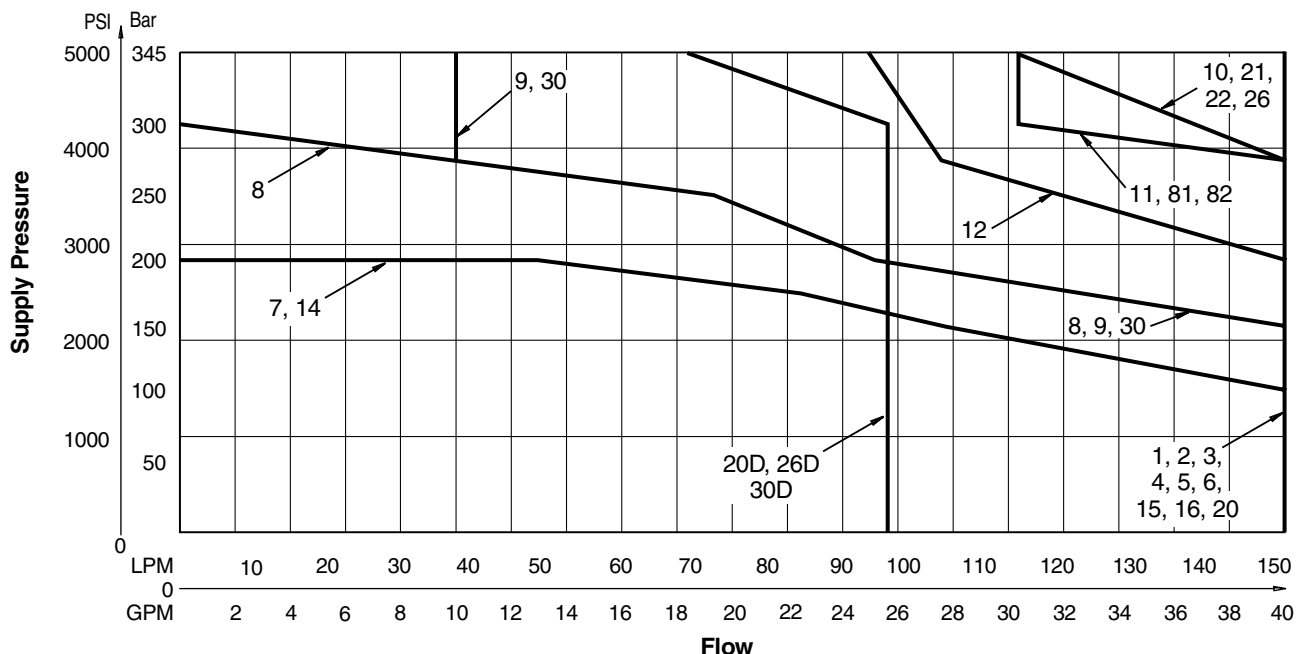
HVD = Hydraulic Valve Division HCD = Hydraulic Controls Division

Parker	Spool Number	Closed Crossover	Open Crossover	Symmetrical	Standard	Spool Symbol				Spool: D1V*	Spool: D1V*	Spool: D3W	Spool: D31DW	Spool: D41	Spool: D41*W	Spool: D61VW	Spool: D81/D91	Spool: D101VW	Spool: D111
						A		0	B	D1VW: D1VHW	D1V*: A/C/P/ D/G/L	D3DW/ D31DW	Double Monitor Switch	HCD	Double Monitor Switch	HVD	HCD	HVD	HCD
049B	x				x														
049H	x																		
051	x																		
054			x																
055																			
056	x																		
058			x																
059			x																
061			x																
062			x																
065B																			
065H																			
066																			
067	x																		
068B	x																		
068H	x																		
069B	x																		
069H	x																		
070B																			
070H																			
071B	x																		
071H	x																		
073																			
074H																			
076	x				x														
078	x				x														
079																			
080																			
081	x			x	x														
081B																			
081H																			
082	x			x	x														
083B	x																		
083H	x																		
084																			
085																			
098																			
099																			
100																			
101B	x																		

Spools shown may be nonstandard. Please contact HVD for availability.



D3W-30 DC and AC Rectified Shift Limits



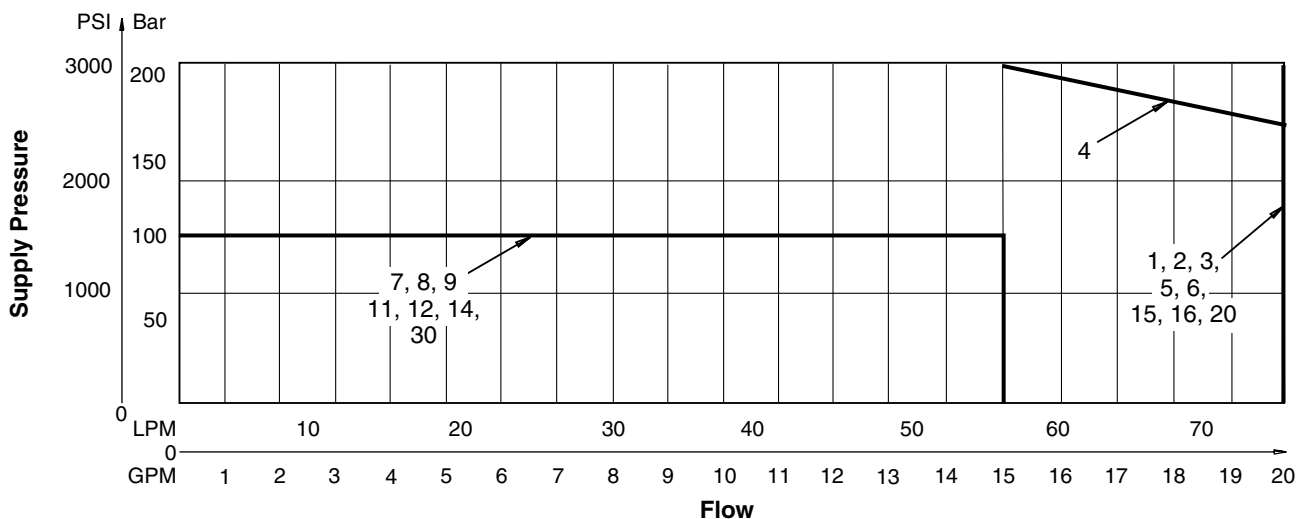
Example:

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).

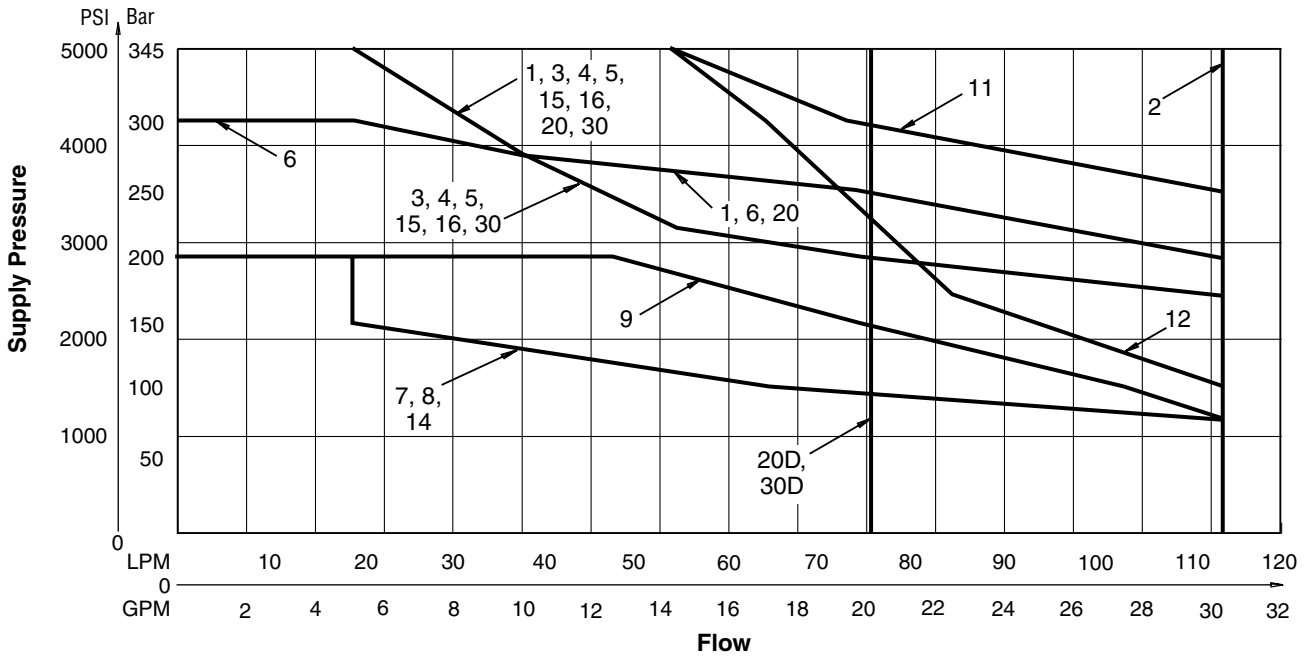
Important Notes for Switching Limit Charts

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.

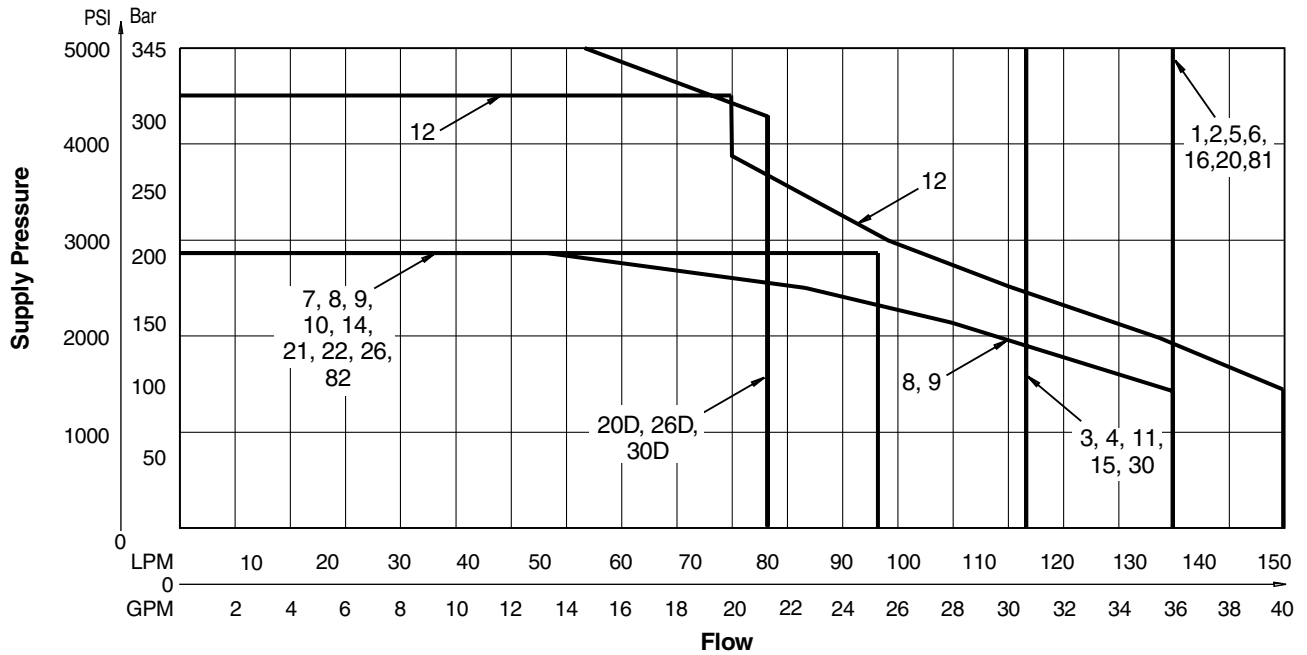
D3W-30 Low Watt DC and AC Rectified Shift Limits



D3W-30 AC Shift Limits



D3W-30 Soft Shift Limits

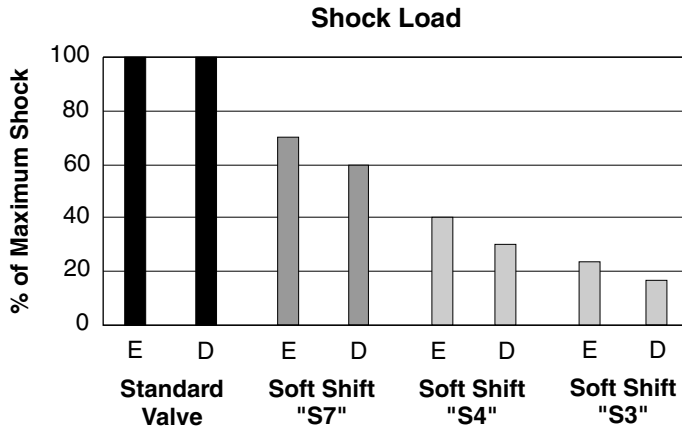


Important Notes for Switching Limit Charts

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.

D3W-30 Soft Shift Response

A



E = Energize
 D = De-energize

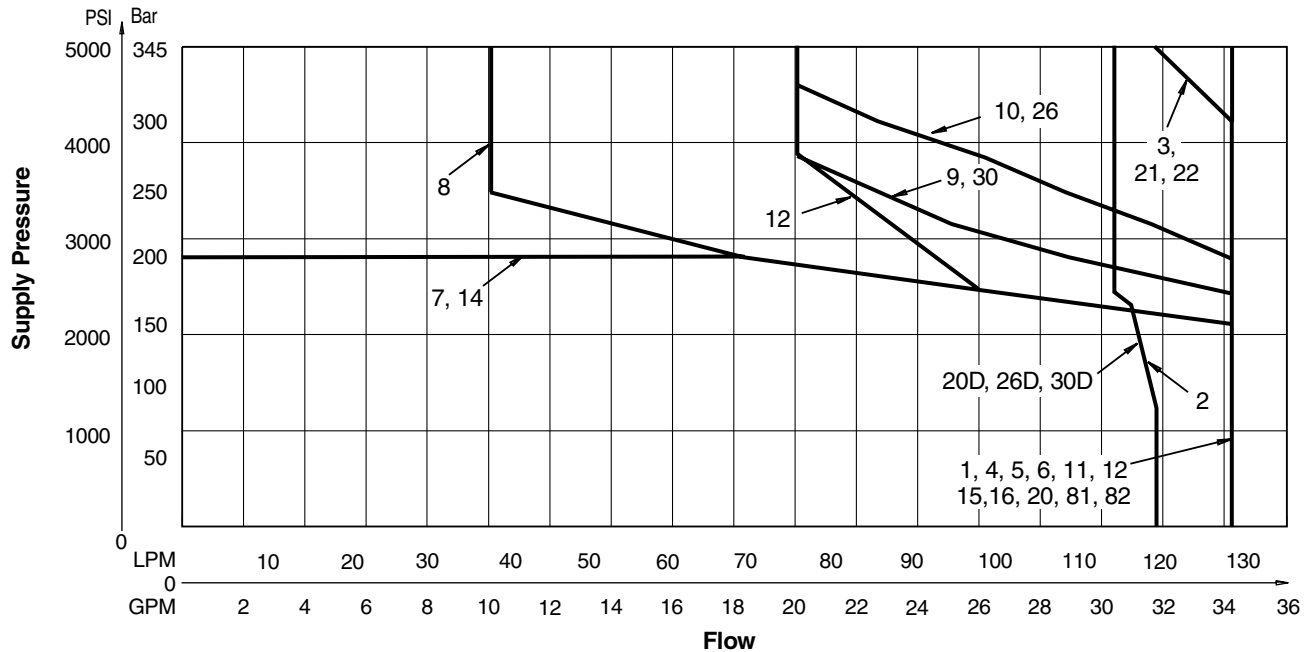
Response Time*

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 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.

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 L/M (20 GPM) at 207 Bar (3000 PSI).

D3W/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)
001	5	5	2	2	—	—	—	—	—	—	—
002	4	4	1	1	2	3	3	3	3	1	1
003	5	5	2	3	—	—	—	—	—	1	—
004	4	4	3	3	—	—	—	—	—	1	1
005	6	5	2	2	—	—	—	2	—	—	—
006	6	6	2	2	—	4	4	2	2	—	—
007	5	4	2	1	3	—	—	—	3	—	1
008	8	8	7	7	6	—	—	—	—	—	—
009	5	5	4	4	7	—	—	—	—	—	—
010	5	5	—	—	—	—	—	—	—	—	—
011	5	5	2	2	—	—	—	—	—	10	10
012	5	5	2	2	11	—	—	10	10	10	10
014	4	5	1	2	3	—	—	3	—	1	—
015	5	5	3	2	—	—	—	—	—	—	1
016	5	6	2	2	—	—	—	—	2	—	—
020	5	5	2	2	—	—	—	—	—	—	—
021	5	4	—	1	—	9	—	—	—	—	—
022	4	5	1	—	—	—	9	—	—	—	—
026	5	5	—	—	—	—	—	—	—	—	—
030	5	5	2	2	—	—	—	—	—	—	—



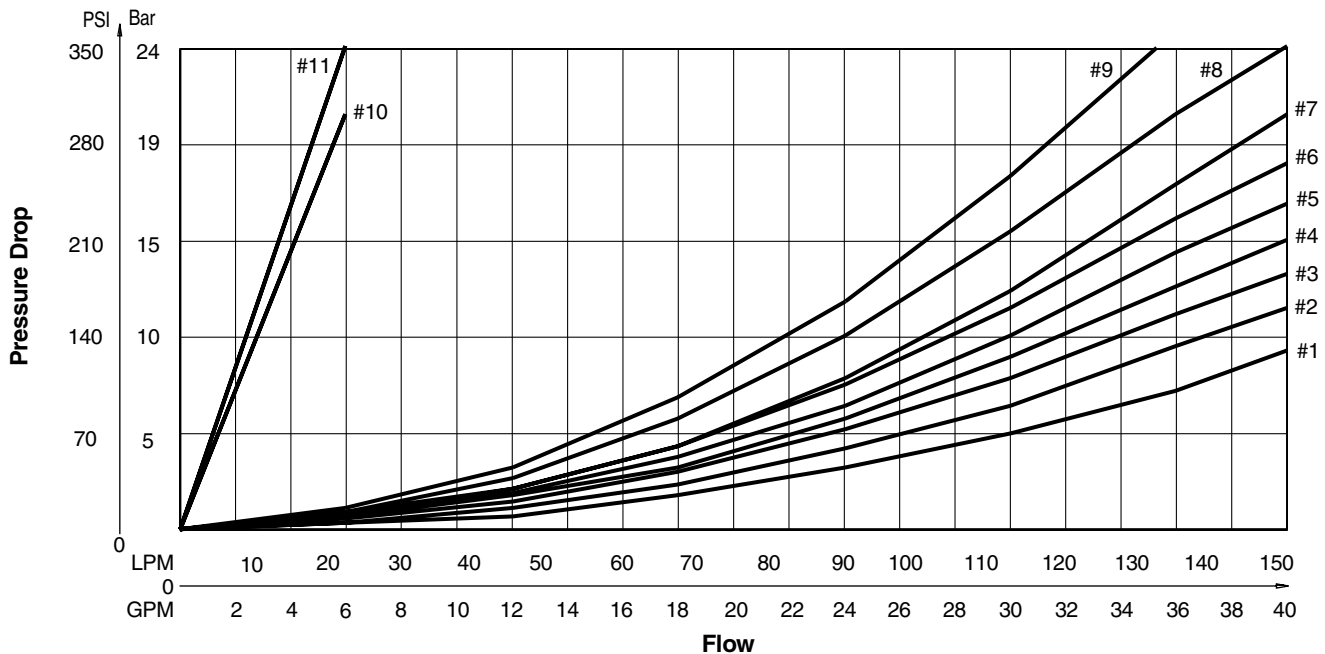
Note:
 For 081 and 082 spools, consult factory.

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



2502-A2.p65, dd



General Description

The D3W Series 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.

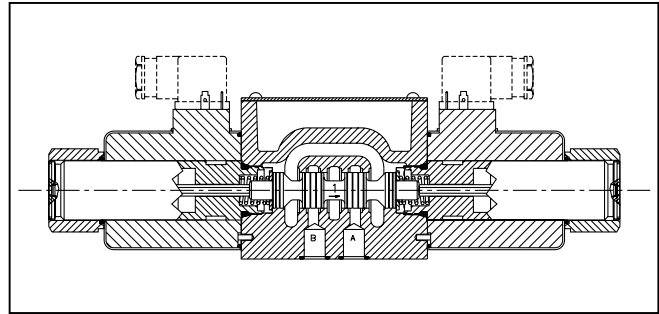
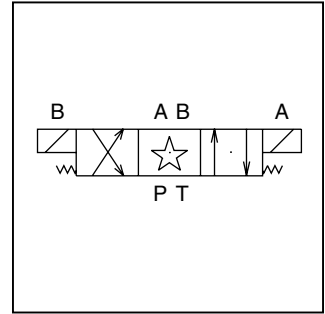
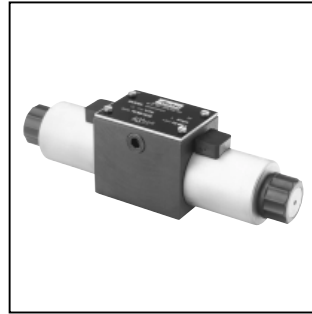
Features

- Worldwide, high flow, low pressure drop design.
- Mechanically tunable soft shift.
- 22 spools available including proportional.
- Repairable manual override for easy seal replacement.
- 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	Pull-In	Drop-Out
AC	21	35
DC	110	85

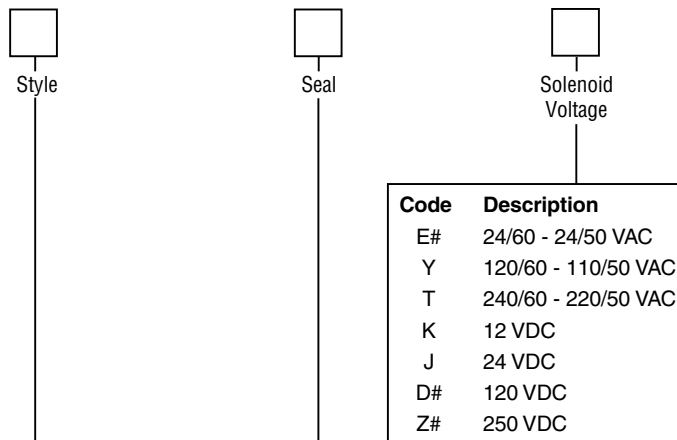
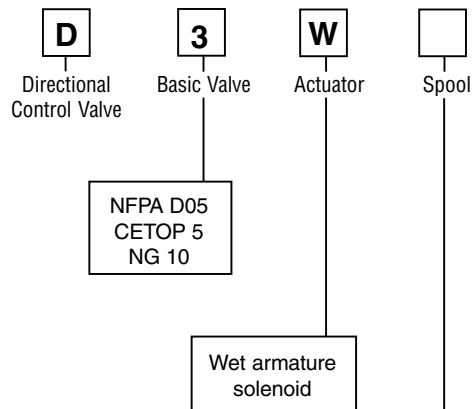


Specifications

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) Standard CSA  103 Bar (1500 PSI)
CSA File Number	LR060407



A



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			

Code	Description
N	Nitrile
V	Fluorocarbon
E	EPR

* Contact HVD for availability.

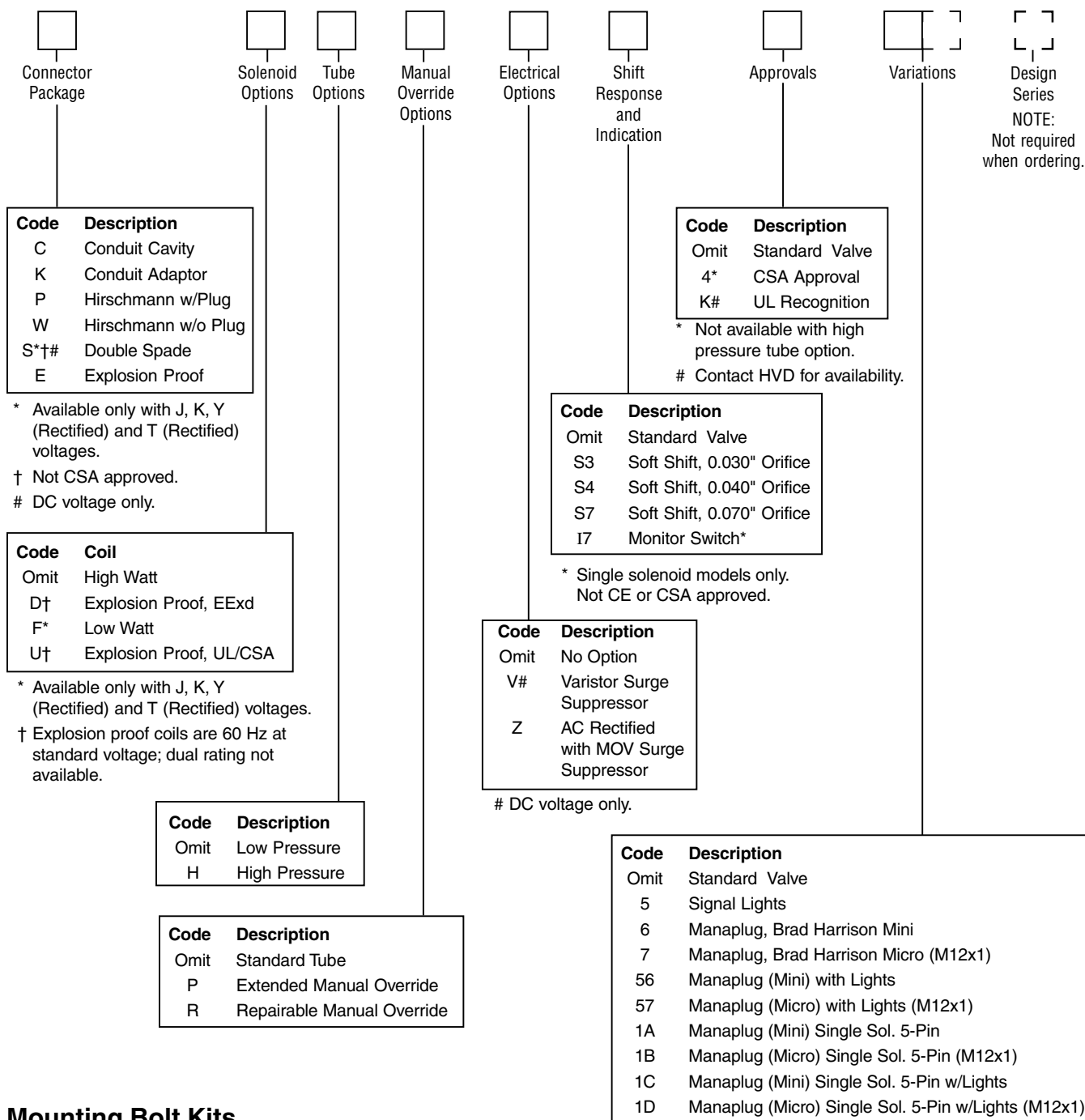
Code	Description	Symbol
B *	Single solenoid, 2 position, spring offset P to A and B to T in offset position	
C	Double solenoid, 3 position, spring centered.	
D †	Double solenoid, 2 position, detent	
E	Single solenoid, 2 position, spring centered. P to B and A to T when energized.	
F	Single solenoid,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

* 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.

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

This condition varies with spool code.



Mounting Bolt Kits

UNC Bolt Kits for use with D3W Directional Control Valves & Manapak/Cartpak				
	Number of Manapaks/Cartpaks @ 2.00" (50mm) thickness			
	0	1	2	3
D3W	BK98 1.62"	BK141 3.50"	BK142 5.50"	BK143 7.50"
D3W with explosion proof coils	BK144 2.37"	BK61 4.25"	BK62 6.25"	BK63 8.25"

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

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.)

Standard Bolt Kit: BK98
Metric Bolt Kit: BKM98

Solenoid Ratings**

Insulation	Class H
Allowable Deviation from rated voltage	DC, AC Rect -10% to +15% AC -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	—	3.00	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	298	95	32
	110/50	294	102	
T	240/60	288	96	32
	220/50	288	101	
E	24/60	290	77	32
	24/50	381	110	
K	12 VDC	—	3.00†	36
J	24 VDC	—	1.50†	36
D	120 VDC	—	0.30†	36

† DC holding amps.

D3W Rectified AC Solenoid Electrical Characteristics‡

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

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

Explosion Proof Solenoids

Explosion Proof Solenoid Ratings

U.L. (EU) C.S.A.	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

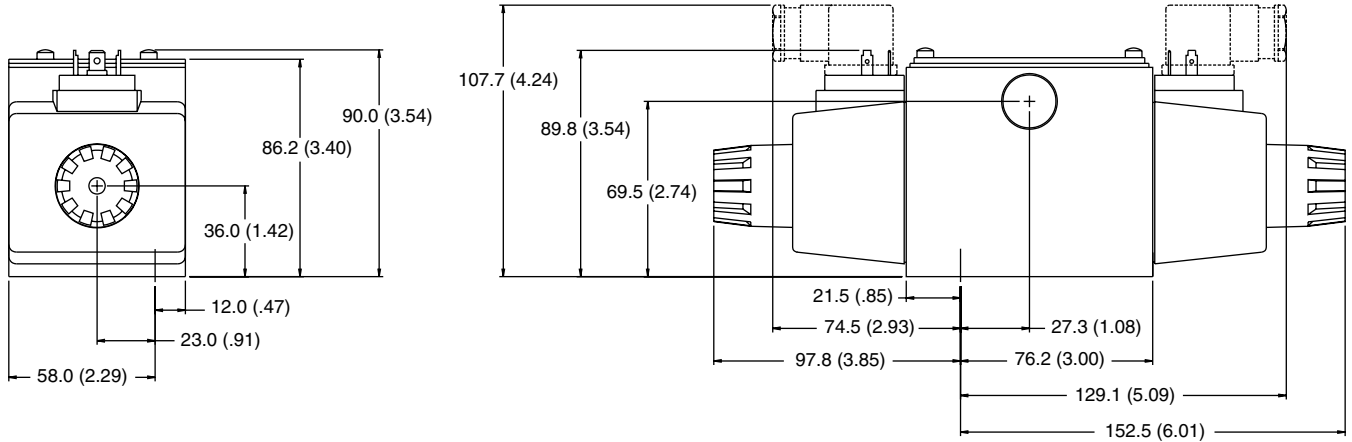
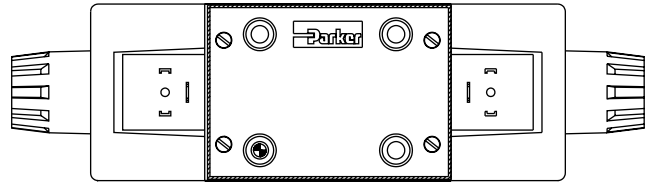
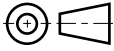
* Dual frequency not available on explosion proof coils.

† DC holding amps.

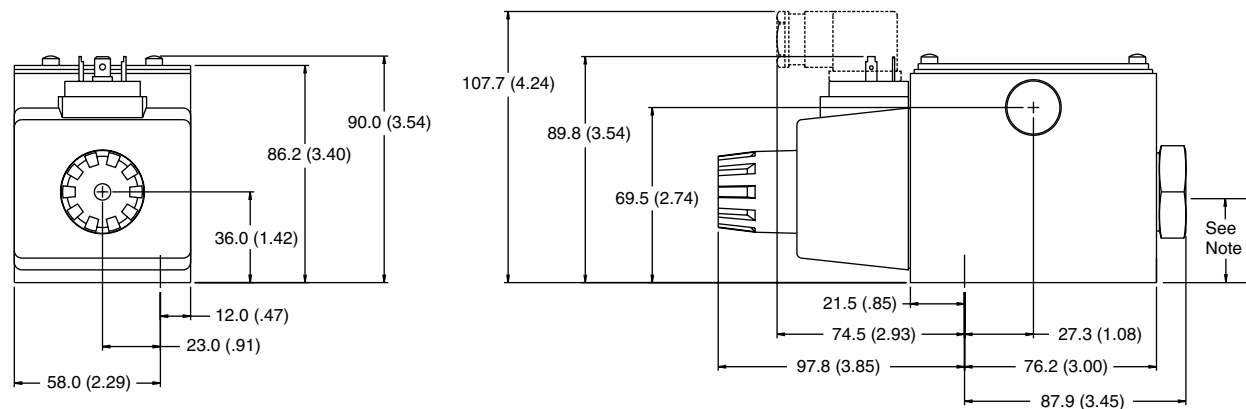
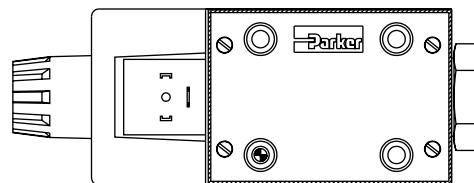
Inch equivalents for millimeter dimensions are shown in (**)

Hirschmann, Double AC Solenoid

A



Hirschmann, Single AC Solenoid

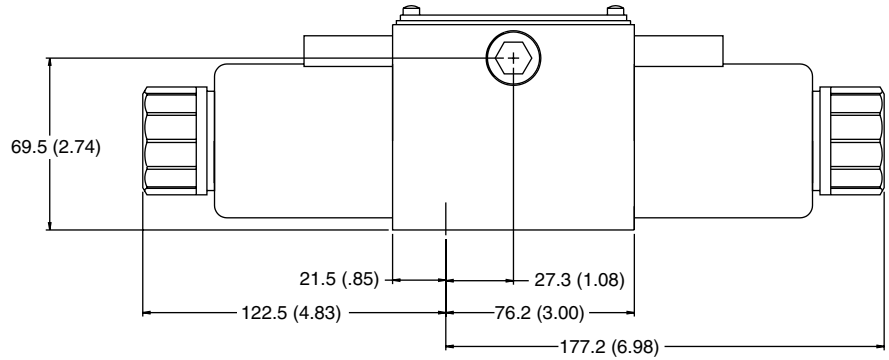
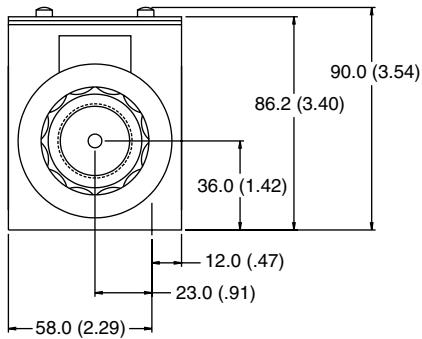
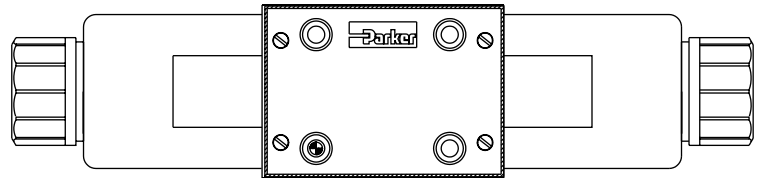
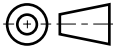


Note: 30.0mm (1.18") from bottom of bolt counterbore.

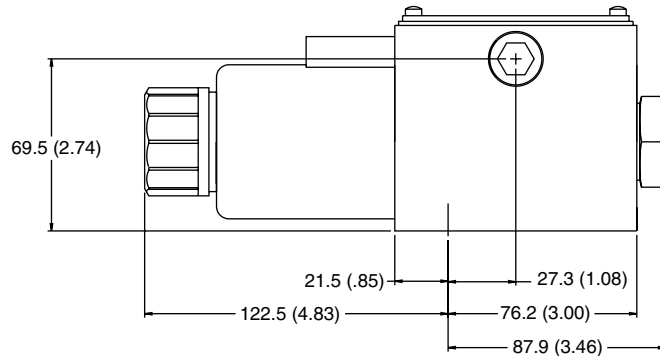
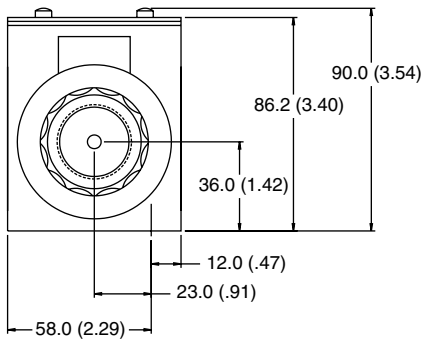
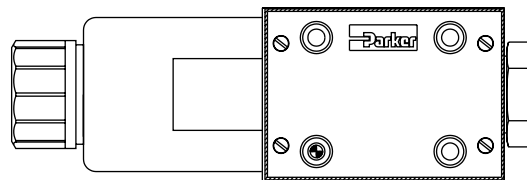
Inch equivalents for millimeter dimensions are shown in (**)

A

Conduit Cavity, Double DC Solenoid

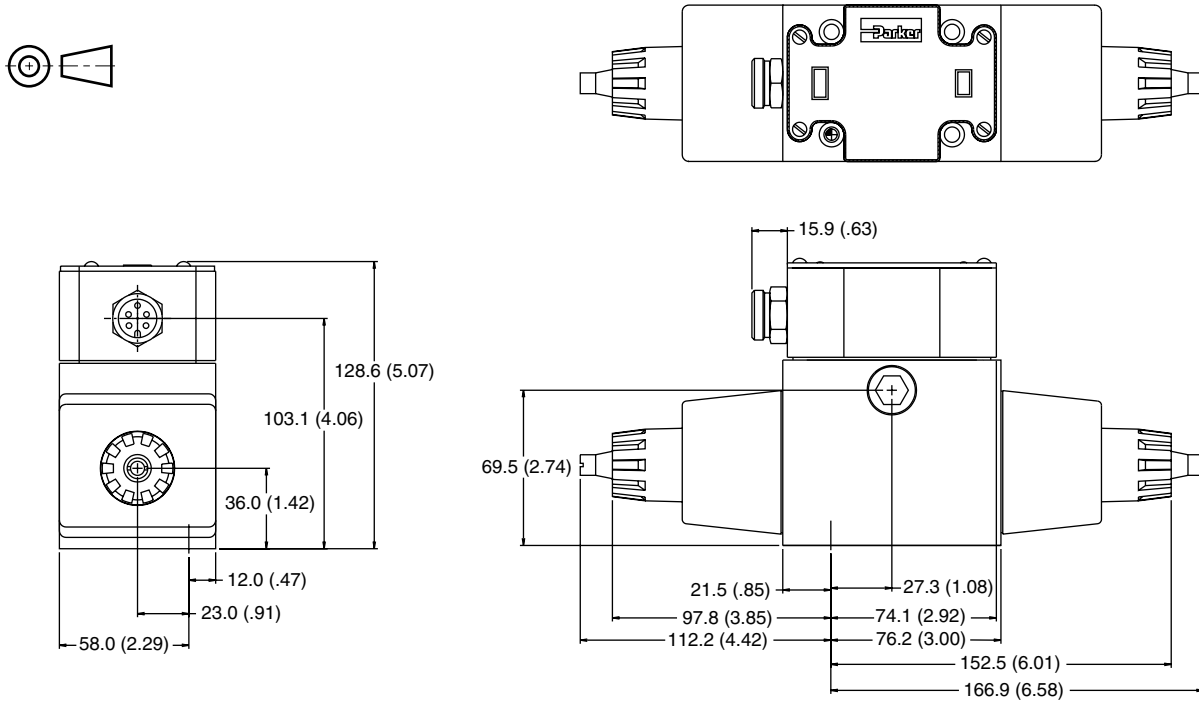


Conduit Cavity, Single DC Solenoid

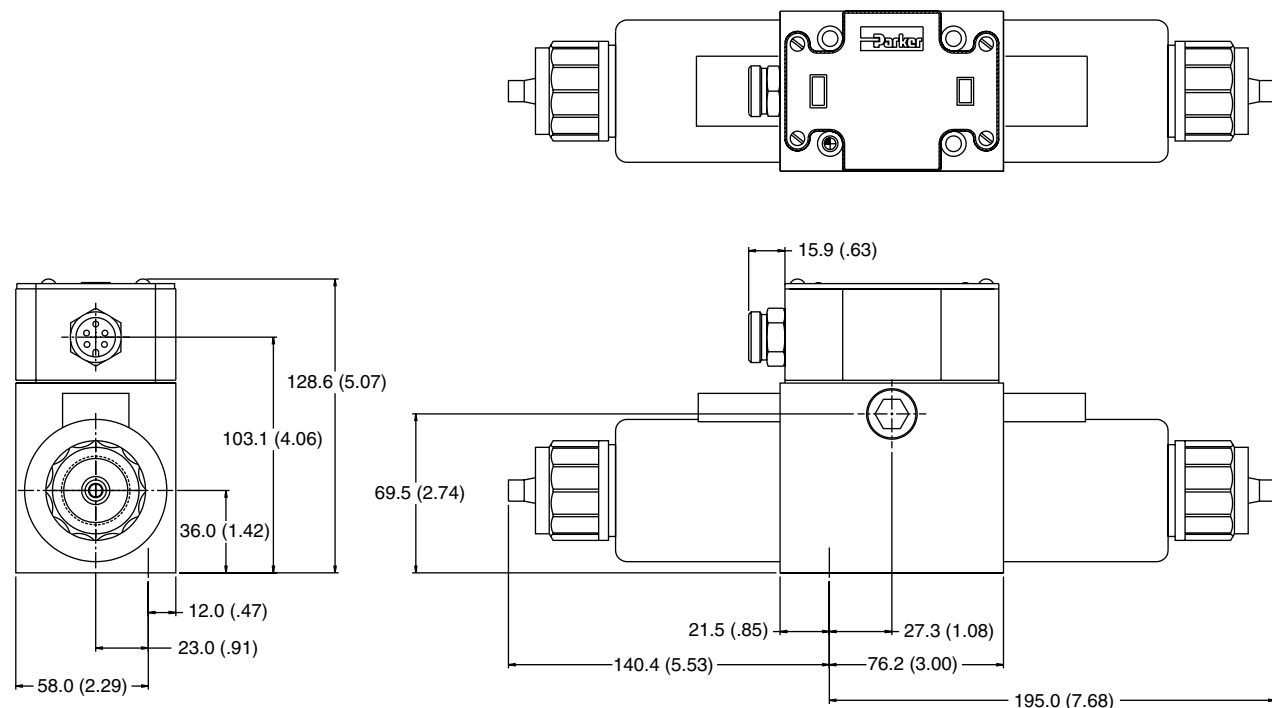


Inch equivalents for millimeter dimensions are shown in (**)

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



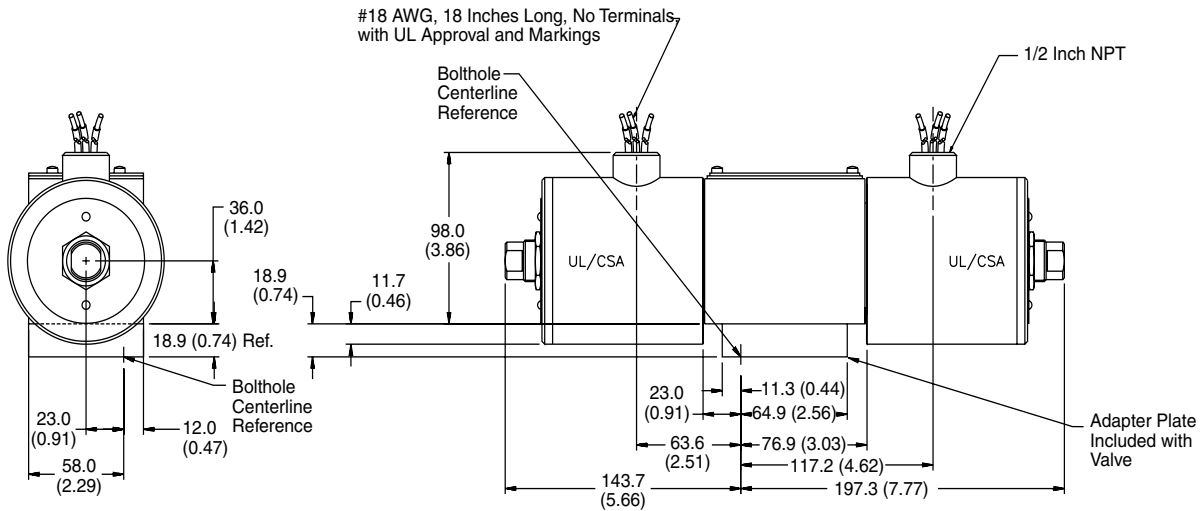
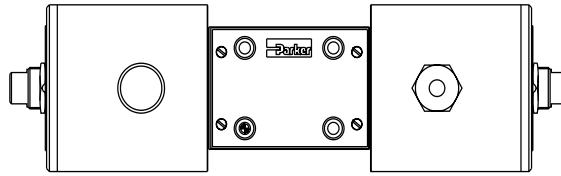
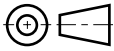
**Conduit Box Extension, Double DC Solenoid
with Variation 6 (Manaplug) & Variation P (Extended Manual Override)**



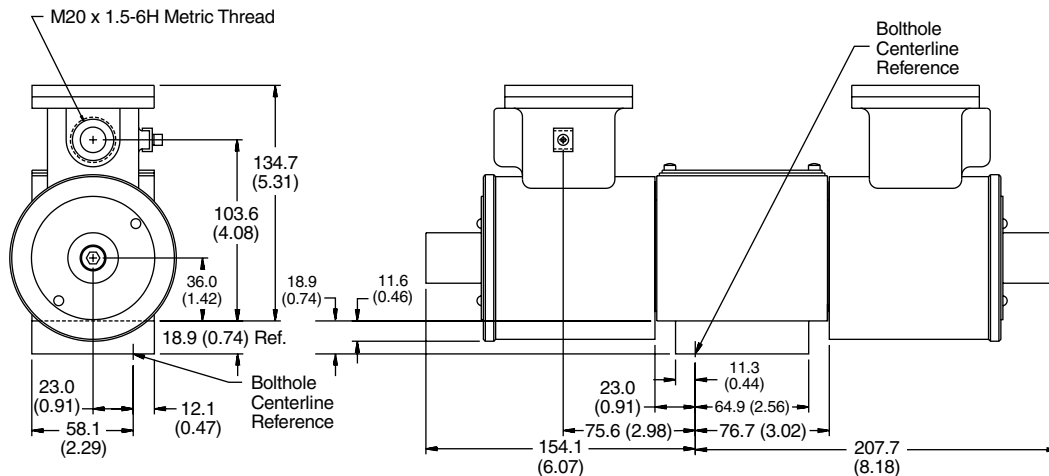
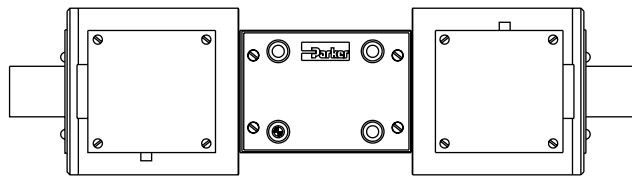
Inch equivalents for millimeter dimensions are shown in (**)

A

Explosion Proof U.L. & CSA, Double Solenoid



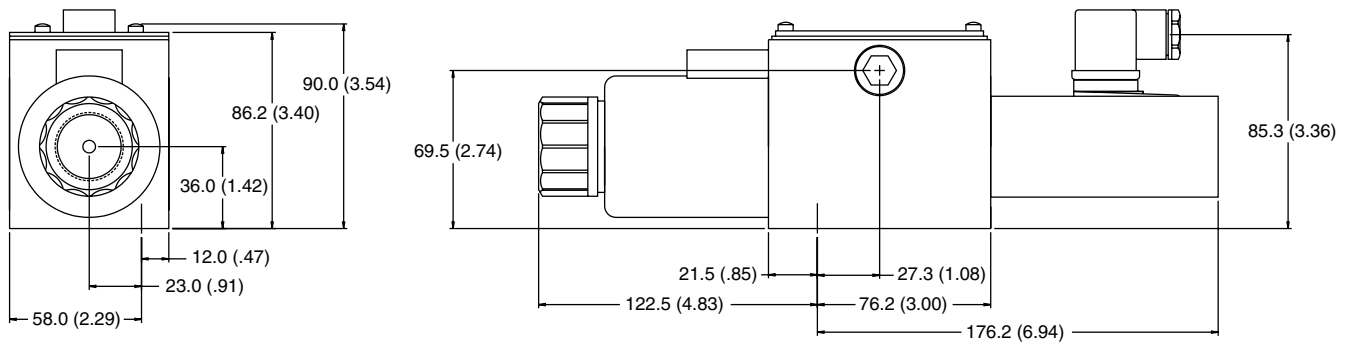
Explosion Proof ATEX, Double Solenoid



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

**Conduit Box, Single DC Solenoid
with Variation I7 (Monitor Switch)**

A

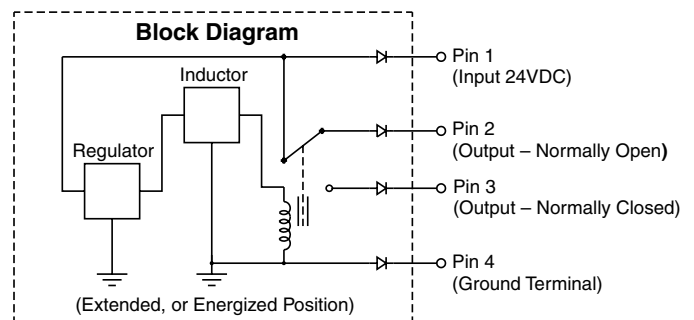


**Monitor Switch
(valve variation I7)**

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

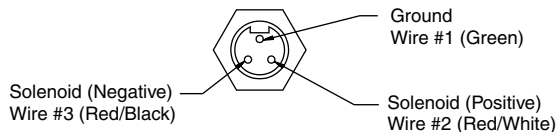
(connection option K)

- Interface – 152.4 cm (6.0 inch) lead wires, 18 awg.
- NEMA 4 rating available (consult factory)
- Waterproof

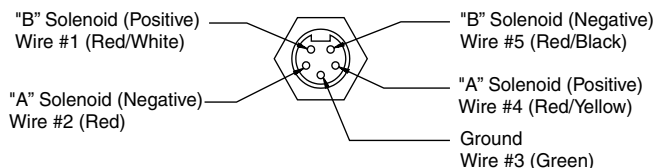
Manaplug

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

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

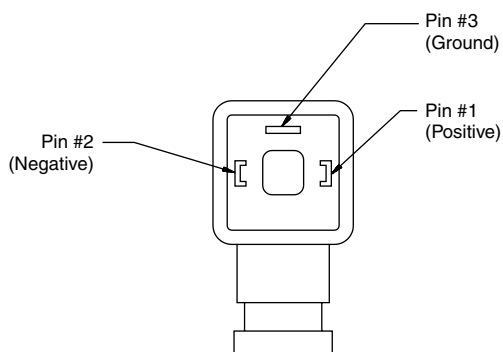


3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves



5-Pin Manaplug (Mini) with Lights
Single and Double Solenoid Valves
(*"A" and "B" Solenoids Reversed for #8 and #9 Spools)

Hirschmann Plug with Lights

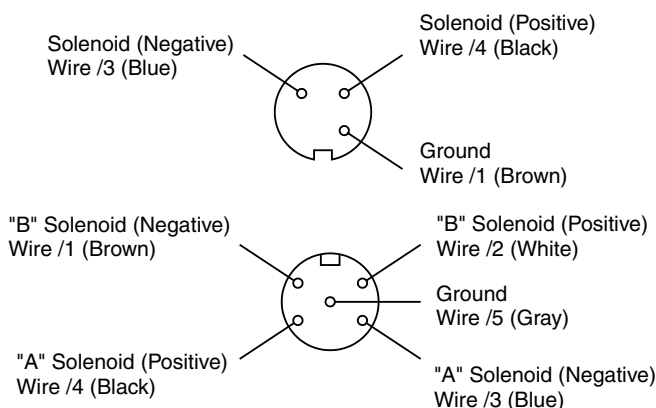


Face View of Plug

Conforms to DIN43650, ISO4400, Form A 3-Pin

Manaplug - Micro Connector

(valve variations 7, 57, 1B, 1D)



Fluid Recommendations

Premium quality hydraulic oil with a viscosity range between 150-250 SSU (32 -54 cst) at 38° C (100°F) is recommended. The absolute operation viscosity range is from 80-1000 SSU (16-220 cst). 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:
-7° to +71°C (-20 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

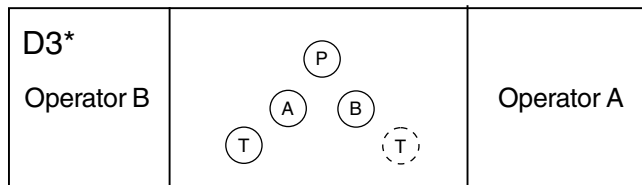
Silting

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 approximately 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).