



**Application**

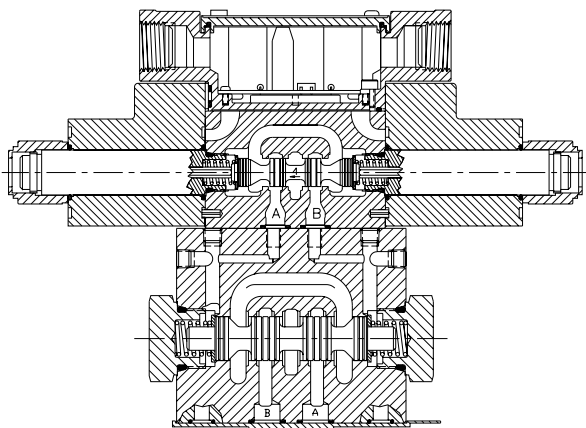
Parker D31 series hydraulic directional control valves are high performance, solenoid controlled, pilot operated, two-stage 4-way valves. They are available in 2 or 3 position styles and are manifold mounted. These valves conform to NFPA's D05H and can also be manufactured to a CETOP 5H configuration.

**Operation**

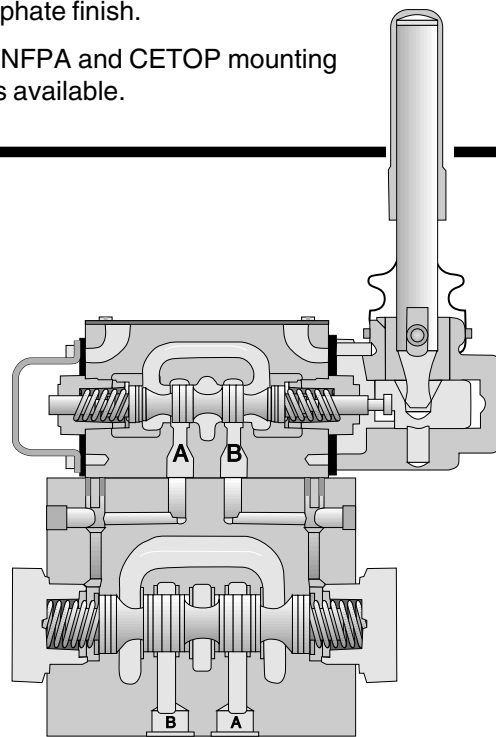
Parker's D31 series directional valves consist of a five chamber style main body, a case hardened sliding spool, and a pilot valve or pilot operators (hydraulic or pneumatic).

**Features**

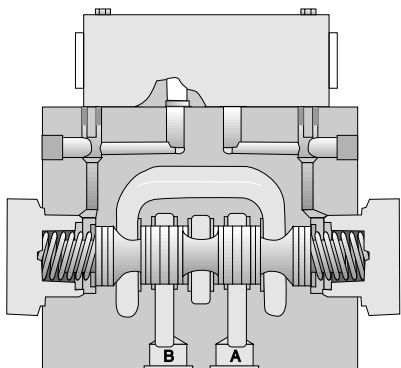
- Easy access mounting bolts.
- 345 Bar (5000 PSI) pressure rating.
- Flows to 175 L/M (45 GPM) depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.
- Both NFPA and CETOP mounting styles available.



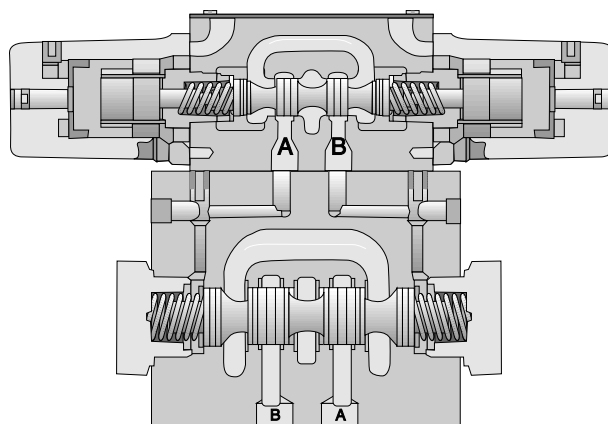
**D31\*W Solenoid Operated Conduit Box Style**



**D31\*L Lever Operated**



**D3\*P Oil Pilot Operated**



**D31\*A Air Pilot Operated**





**General Description**

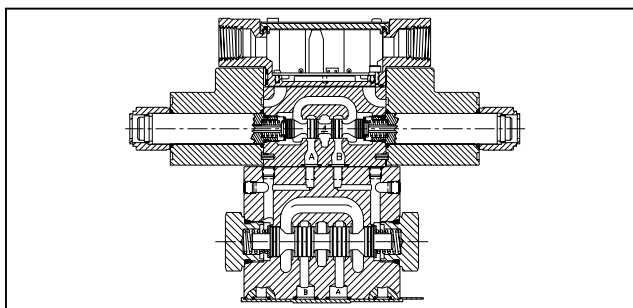
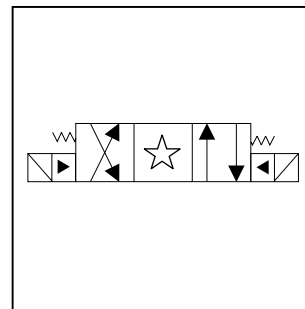
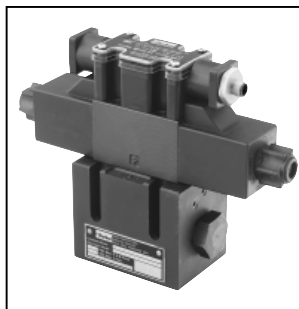
Parker's D31\*W is a five-chamber, pilot operated, solenoid controlled, directional control valve. The valve is suitable for manifold or subplate mounting.

**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**

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



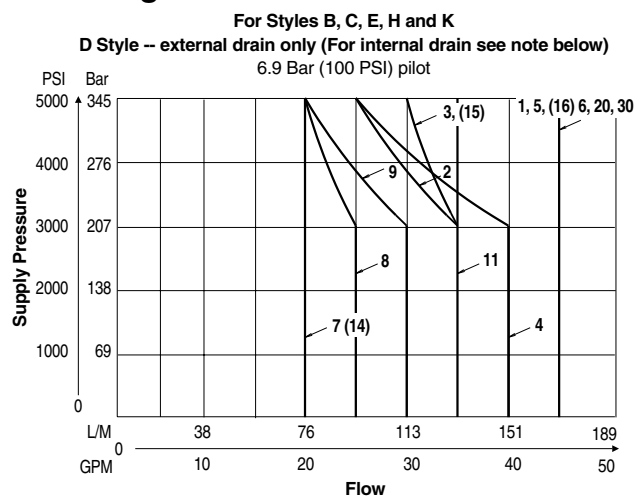
**A**

**Response Time**

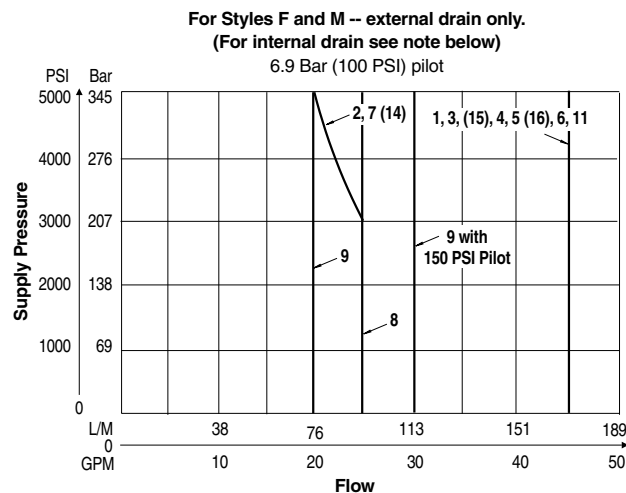
Nominal response time (milliseconds)  
 at 345 Bar (5000 PSI) is 76 L/M (20 GPM)

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**

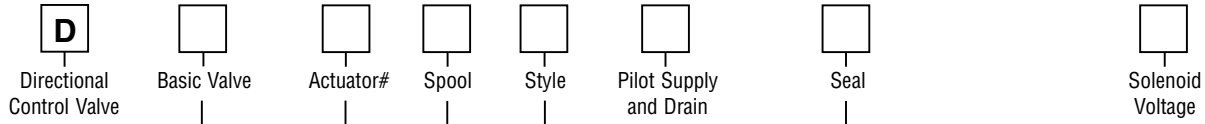


Note: Internal Drain  
 1, 4 spools -- 113 L/M (30 GPM) max., 7 spool -- per curve  
 All others -- 95 L/M (25 GPM) max.



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

**A**



Code	Description
31D	NFPA D05, CETOP 5, DIN NG10, D03 Pilot, ISO Port
31V	NFPA D05, CETOP 5, DIN NG10, D03 Pilot, NFPA Port

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

Code	Description
N	Nitrile
V	Fluorocarbon

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

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, 008, 009 or 014 spools.

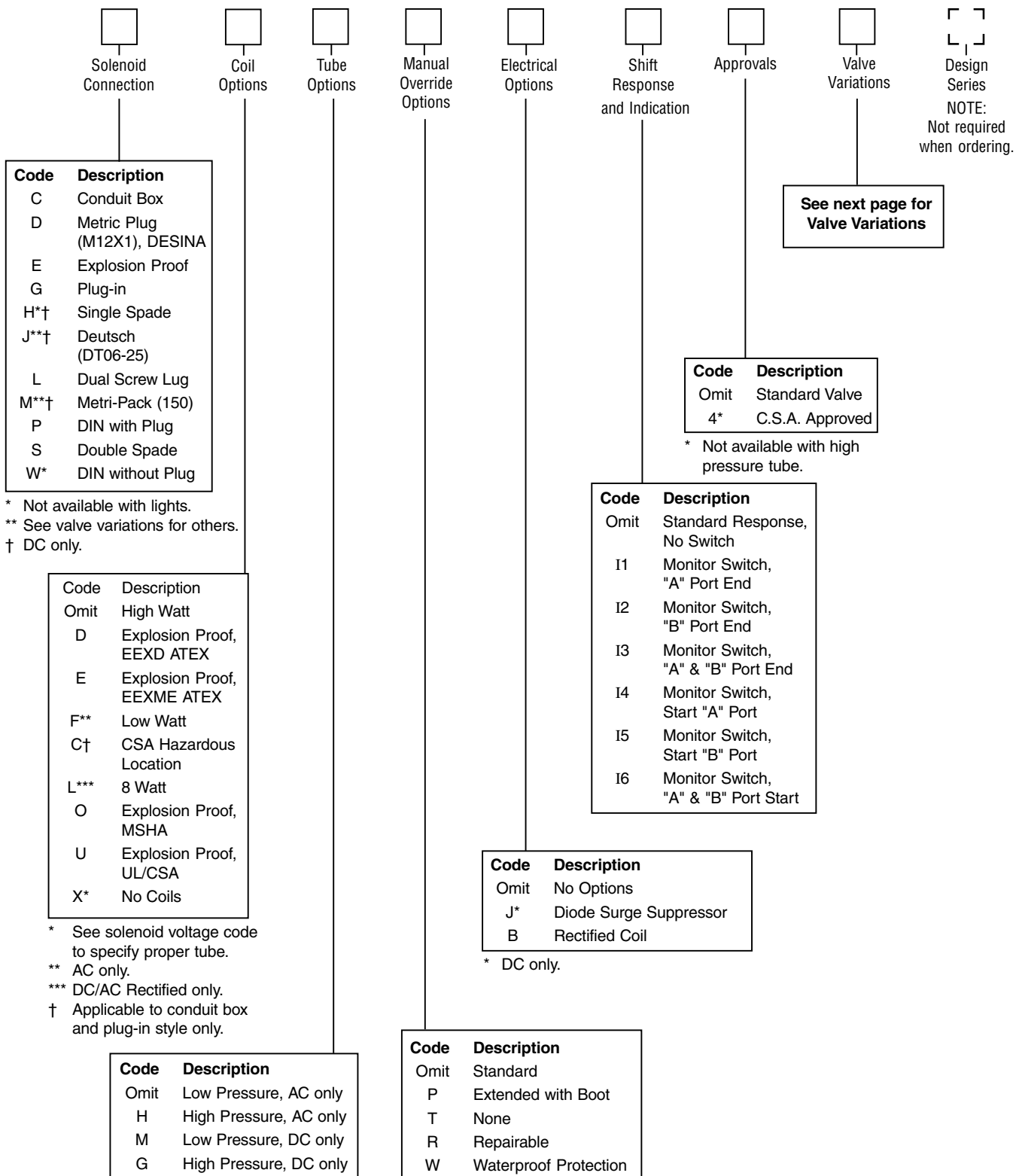
# Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing solenoid A. Note operators reverse sides for #008 and #009 spools. See installation information for details. To configure per DIN standards (A coil over A port, B coil over B port) code valves as D31VHW\*\*\*.

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

Code	Description	Symbol
B*	2 position, spring offset P to A	
C	3 position, spring centered	
D†	2 position, detent, P to A and B to T	
E	2 position, spring centered and P to B	
F	2 position, spring offset P to A and centered	
H*	2 position, spring offset P to B	
K	2 position, spring centered and P to A	
M	2 position, spring offset P to B and centered	

\* 020 and 030 spools only.  
 † 020 and 030 spools only.

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



**Valve Weight:**

Double Solenoid 5.4 kg (12.0 lbs.)

**Standard Bolt Kit:**

BK98

**Valve Variations**

**A**

Code	Description	D31*W	D61*W	D81*W	D101*W
5	Signal Lights				
6	Manaplug – Brad Harrison Mini				
7A	Manaplug – Brad Harrison (12x1) Micro				
56	Manaplug (Mini) with Lights				
7B	Manaplug (Micro) with Lights (D1 only)				
20	Fast Response				
1A	Manaplug (Mini) Single Sol. 5-pin				
1B	Manaplug (Micro) Single Sol. 5-pin				
1C	Manaplug (Mini) Single Sol. 5-pin, with Lights				
1D	Manaplug (Micro) Single Sol. 5-pin, with Lights				
1E	Manaplug (Mini) Single Sol. 5-pin, with Stroke Adjust "A" & "B" End				
1F	Manaplug (Micro) Single Sol. 5-pin, with Stroke Adjust "A" & "B" End				
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				
2B	On Board Bus – SDS				
2C	Manaplug (Micro) with Bus Wiring				
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 and Brad Harrison Mini				
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust "A" & "B" End				
4B	Protection Cap for Monitor Switch				
4D	Twist & Lock Override (Old 5426)				
4E	Push Manual Override (Old x5450)				

**Bolt Kits**

**BK**

Bolt Kits

□

Number of Manapaks

Code	Description
BK98	Valve alone
141	1 Manapak
142	2 Manapaks
143	3 Manapaks

**Solenoid Ratings**

Insulation System	Class F
Allowable Deviation from rated voltage	-10% to +15% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids are rated at NEMA 4 (IP67) or better 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 NEC
M.S.H.A. (EO)	Complies with 30CFR, Part 18
ATEX (ED)	Complies with ATEX requirements for: Exd, Group IIB; EN50014: 1999+ Amds. 1 & 2, EN50018: 2000
CSA Hazardous Location	Class II, Groups E, F & G

\* Allowable Voltage Deviation +/- 10%  
 Note that AC coils are single frequency only.



Code		Voltage	In Rush Amps Amperage	In Rush Amps D1VW VA @ 3MM	Holding Amps D1VW	Watts D1VW	Resistance D1VW
Voltage Code	Power Code						
A		24/50 VAC, High Watt	7.00 Amps	168 VA	2.65 Amps	28 W	1.67 ohm(s)
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohm(s)
			N/A	N/A	0.26 Amps	30 W	528.00 ohm(s)
E		24/60 VAC, High Watt	6.00 Amps	144 VA	1.85 Amps	20 W	1.67 ohm(s)
		24/50 VAC, High Watt	7.00 Amps	168 VA	2.65 Amps	28 W	1.67 ohm(s)
G	L	198 VDC	N/A	N/A	0.05 Amps	10 W	3920.40 ohm(s)
			N/A	N/A	0.15 Amps	30 W	1306.80 ohm(s)
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 ohm(s)
			N/A	N/A	1.32 Amps	30 W	17.27 ohm(s)
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 ohm(s)
			N/A	N/A	2.64 Amps	30 W	4.32 ohm(s)
L	L	6 VDC	N/A	N/A	1.67 Amps	10 W	3.59 ohm(s)
			N/A	N/A	5.00 Amps	30 W	1.20 ohm(s)
M	L	9 VDC	N/A	N/A	1.11 Amps	10 W	8.12 ohm(s)
			N/A	N/A	3.35 Amps	30 W	2.67 ohm(s)
P		110/50 VAC			0.38 Amps	19 W	135.00 ohm(s)
R		24/60 VAC, High Watt	8.00 Amps	192 VA	2.70 Amps	27 W	1.40 ohm(s)
	F	24/60 VAC, Low Watt	6.67 Amps	160 VA	2.20 Amps	23 W	1.52 ohm(s)
S	***Specials***	SEE BELOW					
T		240/60 VAC, High Watt	0.77 Amps	185 VA	0.26 Amps	25 W	134.50 ohm(s)
		220/50 VAC, High Watt	0.82 Amps	180 VA	0.31 Amps	27 W	134.50 ohm(s)
	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohm(s)
	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohm(s)
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohm(s)
X	L	16 VDC	N/A	N/A	0.63 Amps	10 W	25.60 ohm(s)
Y		120/60 VAC, High Watt	1.55 Amps	186 VA	0.49 Amps	25 W	33.70 ohm(s)
		110/50 VAC, High Watt	1.65 Amps	182 VA	0.58 Amps	27 W	33.70 ohm(s)
	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohm(s)
	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohm(s)
	L*B	120/60 VAC, 10 Watt	0.63 Amps	83 VA	0.18 Amps	10 W	75.00 ohm(s)
	L*B	110/50 VAC, 10 Watt	0.73 Amps	79 VA	0.20 Amps	10 W	75.00 ohm(s)
	*H	120/60 VAC, High Pressure	1.40 Amps	168 VA	0.50 Amps	26 W	36.50 ohm(s)
	*H	110/50 VAC, High Pressure	1.48 Amps	163 VA	0.60 Amps	28 W	36.50 ohm(s)
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohm(s)
			N/A	N/A	0.13 Amps	30 W	1889.64 ohm(s)
<b>Specials</b>	<b>S</b>	Other voltages/frequencies may be available Contact HVD for more information					
<b>Explosion Proof Solenoids</b>							
R		24/60 VAC	7.63 Amps	183 VA	2.85 Amps	27 W	1.99 ohm(s)
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohm(s)
N		220/50 VAC	0.77 Amps	169 VA	0.31 Amps	27 W	1.38 ohm(s)
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohm(s)
P		110/50 VAC	1.47 Amps	162 VA	0.57 Amps	27 W	34.70 ohm(s)
Q		100/60 VAC	1.90 Amps	192 VA	0.70 Amps	27 W	38.60 ohm(s)
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohm(s)
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohm(s)
D		120 VDC	N/A	N/A	0.28 Amps	33 W	420.92 ohm(s)
Z		250 VDC	N/A	N/A	0.13 Amps	33 W	1952.66 ohm(s)

**D31\*W Series Pressure Drop vs. Flow**

The chart below provides the flow vs. pressure drop curve reference for the D31VW Series valves by spool type.

**Example:**

Find the pressure drop at 76 L/M (20 GPM) for a D31VW 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\*W Pressure Drop Reference Chart**

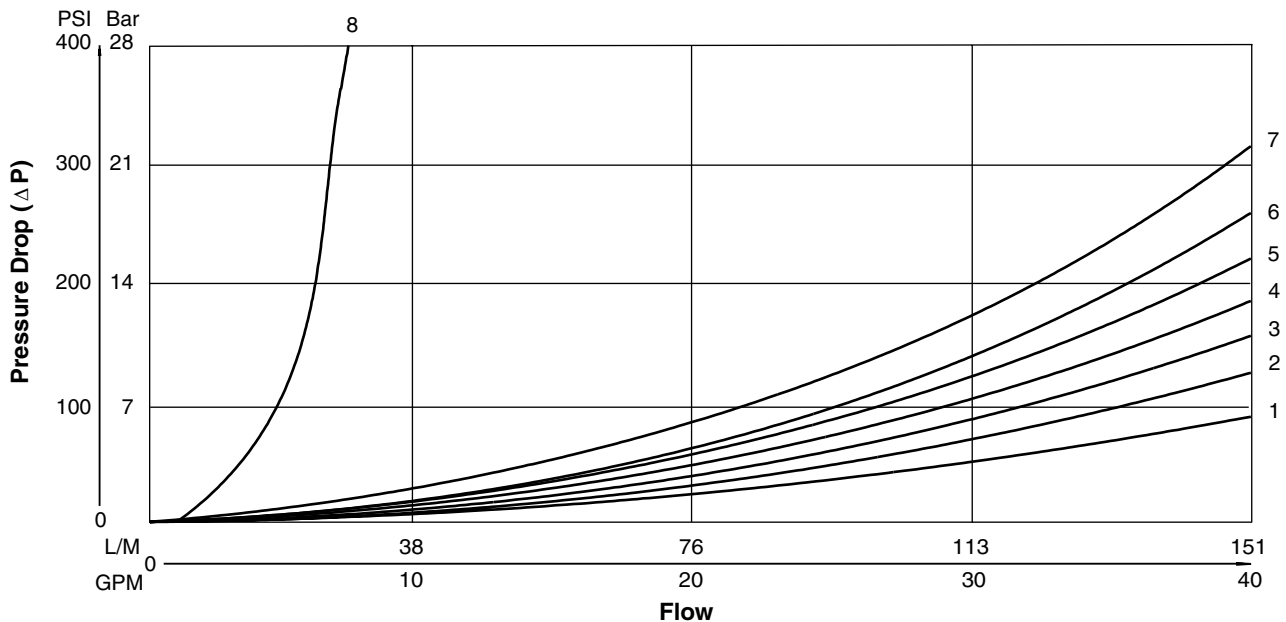
Spool No.	Curve Number										
	Shifted				Center Condition						
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	1	-	-	-	-	-	-	-
002	3	3	1	1	3	3	3	4	4	1	1
003	3	3	1	1	-	-	-	-	-	3	-
004	3	3	1	1	-	-	-	-	-	1	1
005	3	3	1	1	-	-	-	5	-	-	-
006	3	3	1	1	-	5	7	6	5	-	-
007	4	2	1	1	4	-	-	-	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.

**Pressure Drop Chart**



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			x															
004	x			x															
005	x			x															
006	x			x															
007		x		x															
008	x			x															
009		x		x															
010	x			x															
011		x		x															
012		x	x	x															
014		x		x															
015	x			x															
016	x			x															
020B	x			x															
020D	x			x															
020H	x			x															
021	x			x															
022	x			x															
023		x																	
026B	x			x															
026H	x			x															
030B		x		x															
030D		x		x															
030H		x		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

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																	

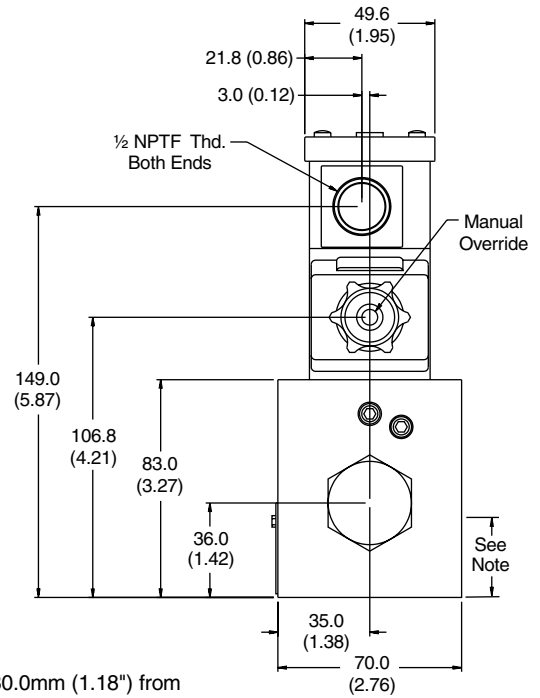
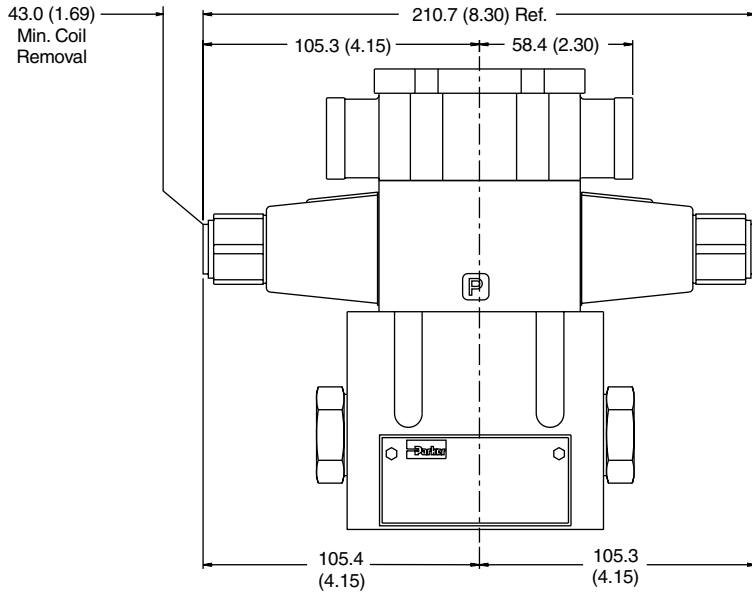
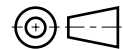
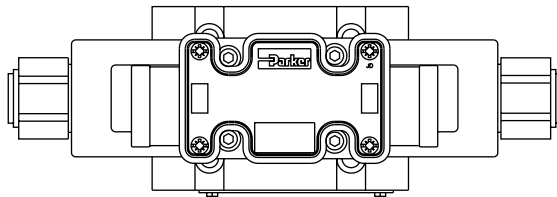
Spools shown may be nonstandard. Please contact HVD for availability.



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

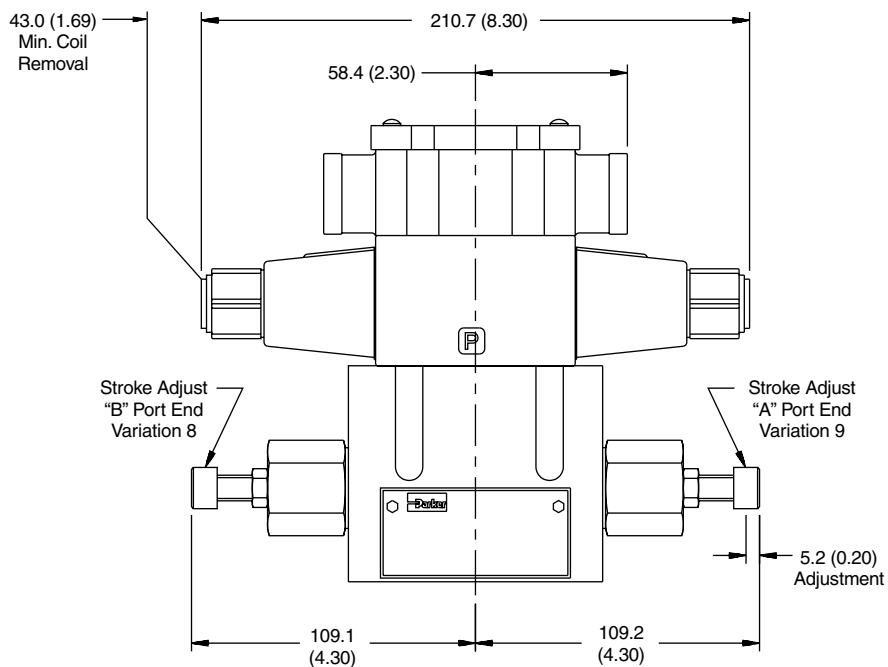
**Conduit Box, Double AC Solenoid**

**A**



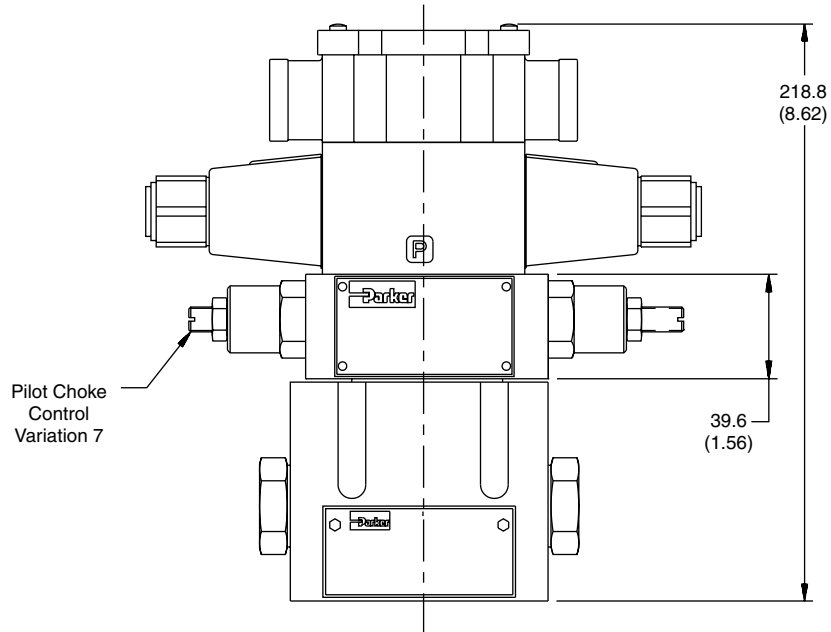
**Note:** 30.0mm (1.18") from bottom of bolt counterbore.

**Conduit Box and Stroke Adjust, Double AC Solenoid**

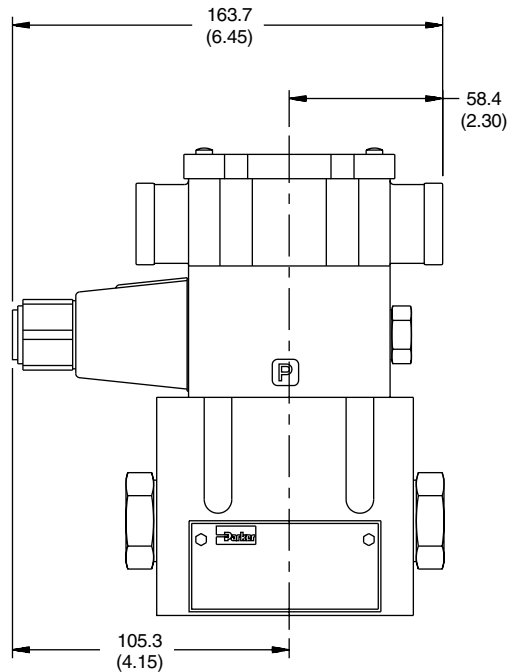


Inch equivalents for millimeter dimensions are shown in (\*\*)

**Conduit Box and Pilot Choke Control, Double AC Solenoid**

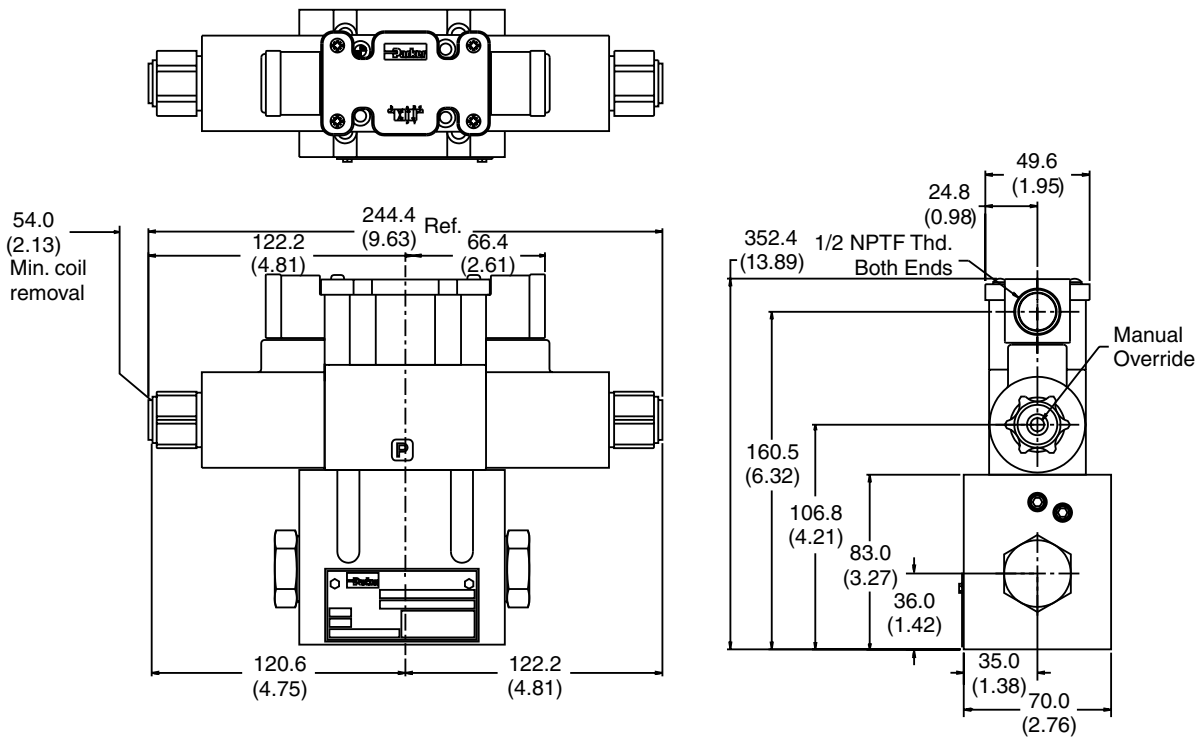


**Conduit Box, Single AC Solenoid**

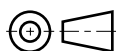
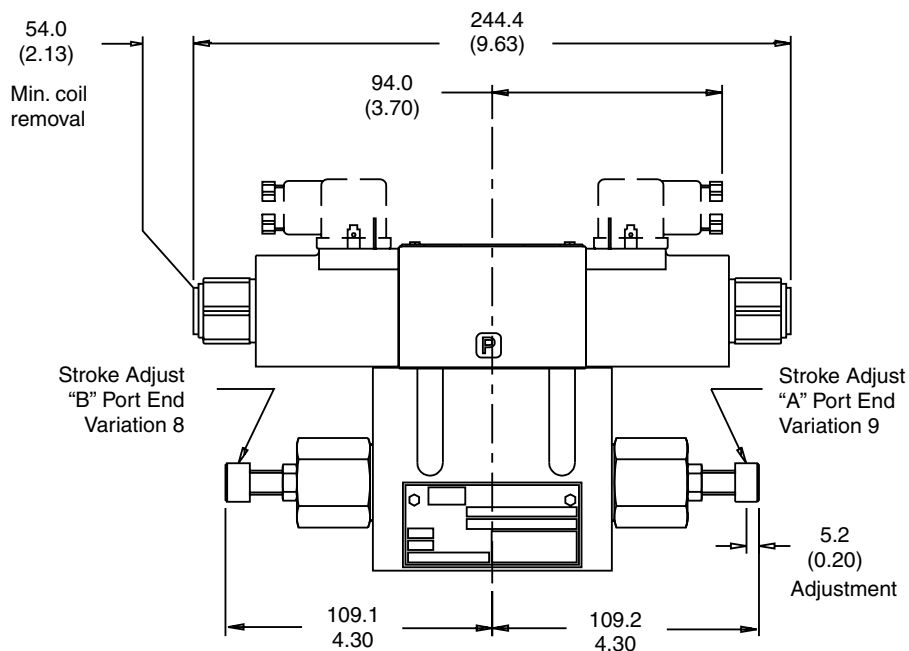


Inch equivalents for millimeter dimensions are shown in (\*\*)

**Plug-In Conduit Box, Double DC Solenoid**

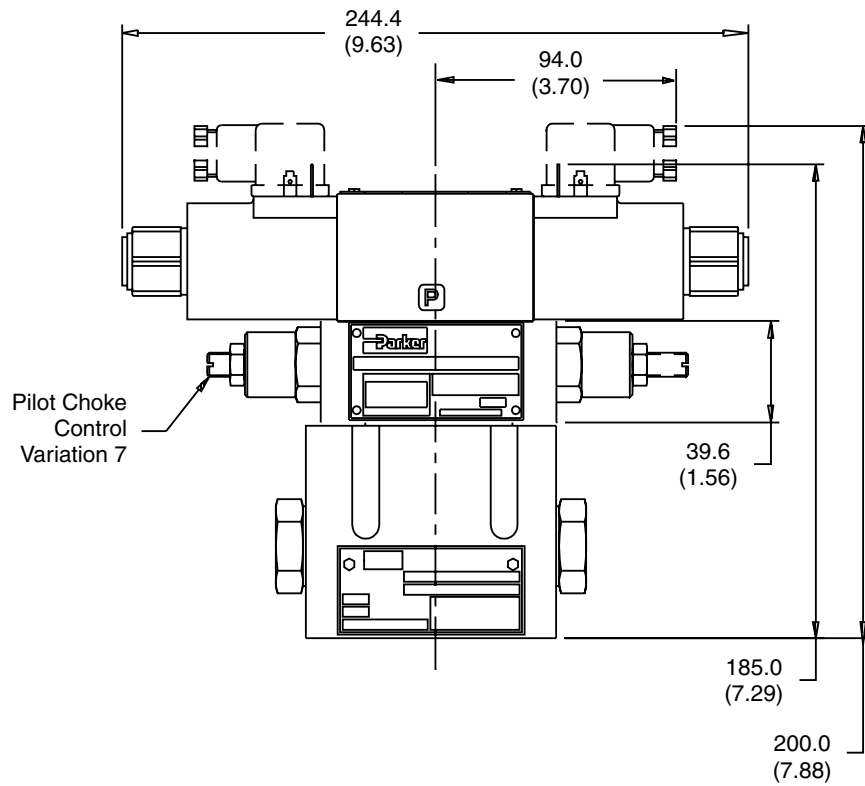


**Hirschmann and Stroke Adjust, Double DC Solenoid**

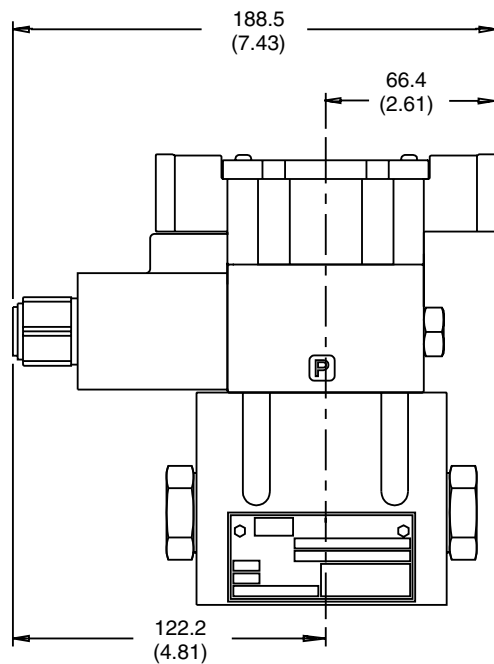


Inch equivalents for millimeter dimensions are shown in (\*\*)

**Hirschmann and Pilot Choke Control, Double DC Solenoid**



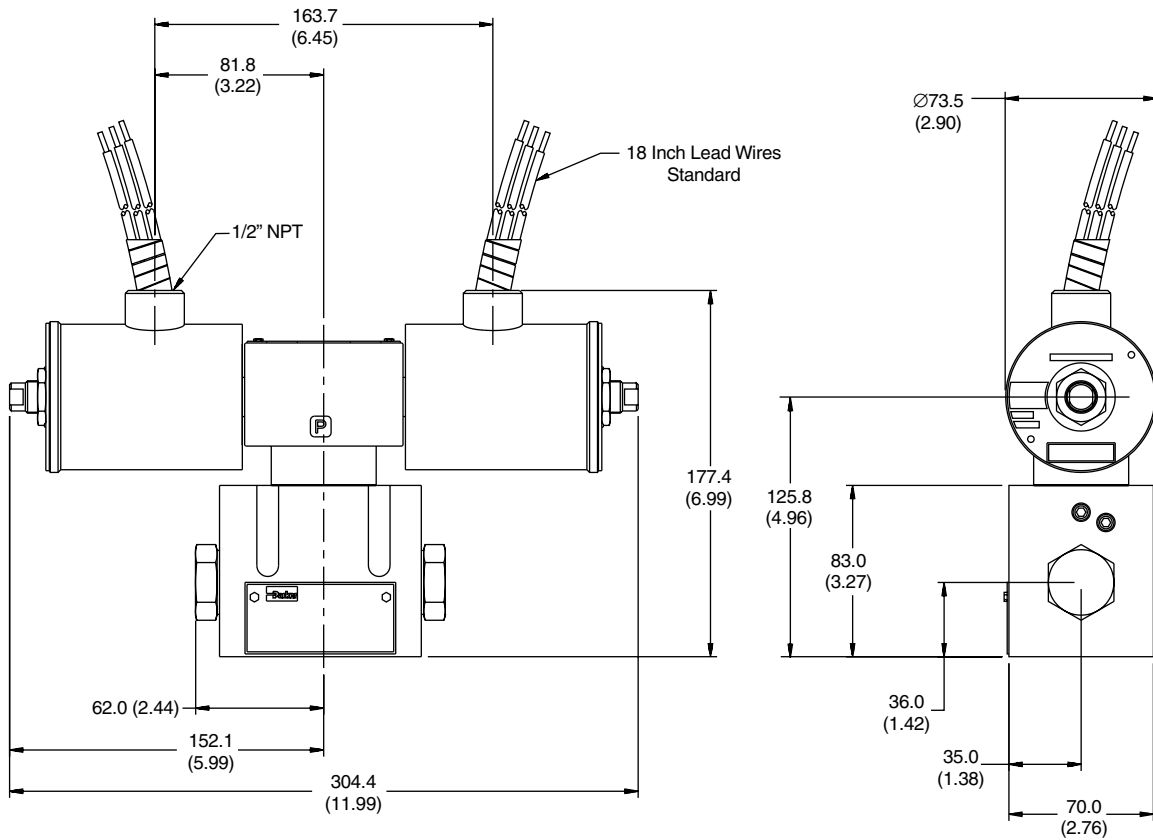
**Conduit Box, Single DC Solenoid**



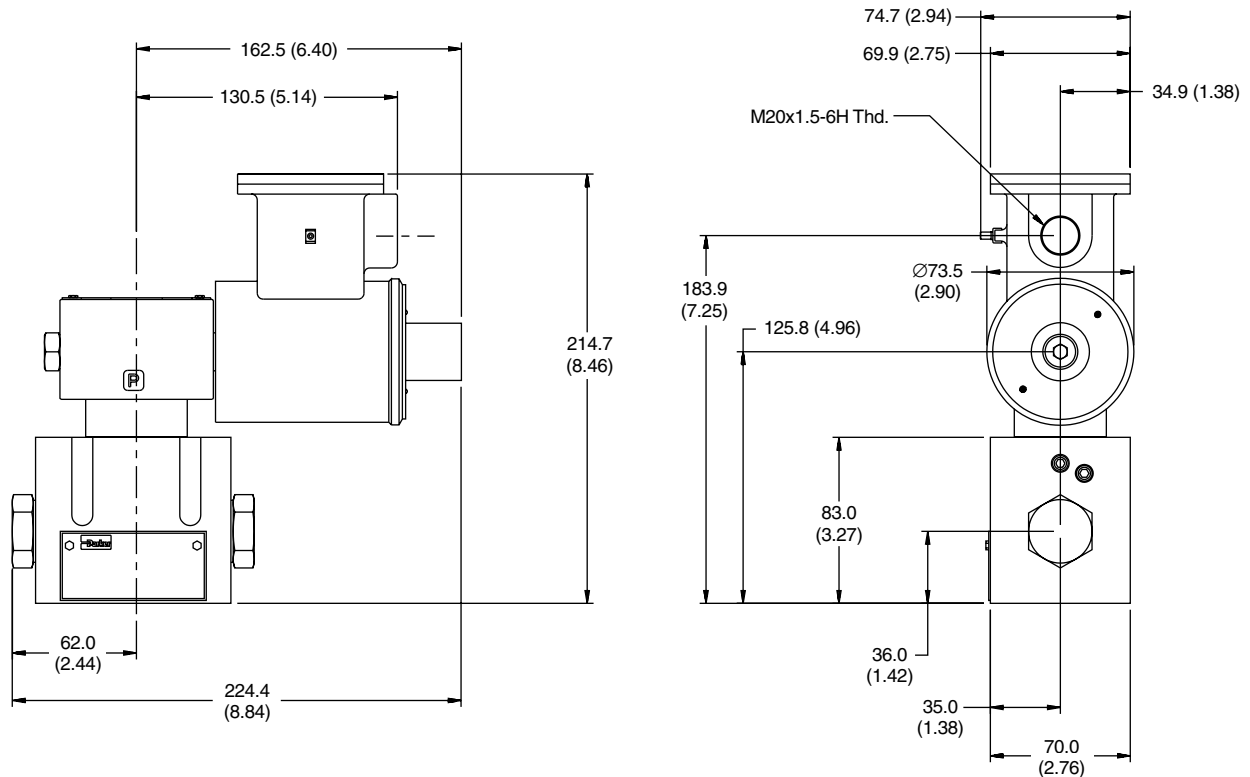
Inch equivalents for millimeter dimensions are shown in (\*\*)

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

**A**

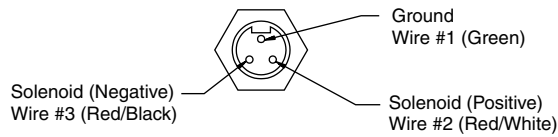


**ATEX, Single Solenoid**

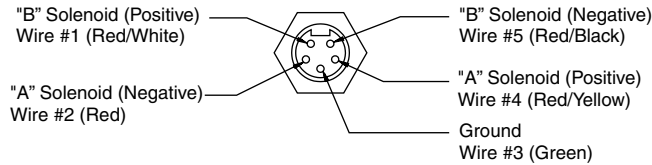


**Manaplug (option 6, 630)**

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



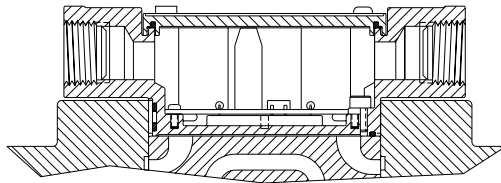
**3-Pin Manaplug (Mini) with Lights**  
Single Solenoid Valves



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

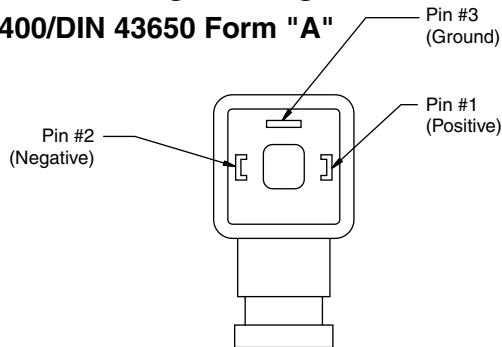
**Conduit Box (Standard/Plug-In)**

- Interface – 6" lead wires, 18 awg.  
 Nema 4 rated – Waterproof



**Hirschmann Plug with Lights**

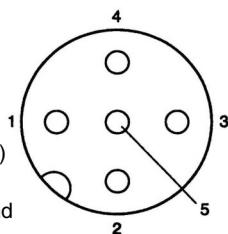
**ISO 4400/DIN 43650 Form "A"**



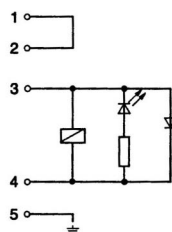
Face View of Plug

**DESINA Connector**  
**M12 pin assignment**  
**Standard**

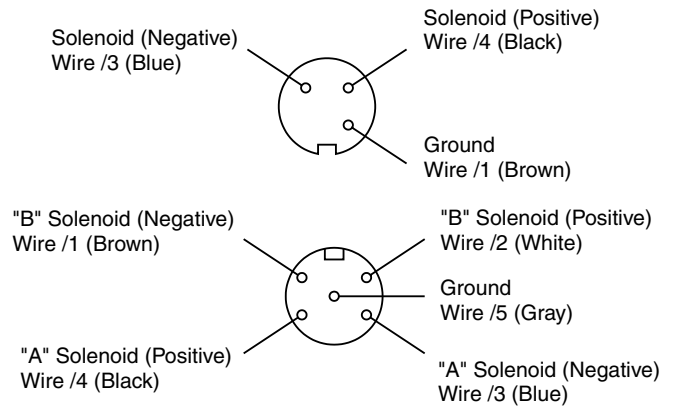
- 1 = Not used
- 2 = Not used
- 3 = 0V
- 4 = Signal (24 V)
- 5 = Earth Ground



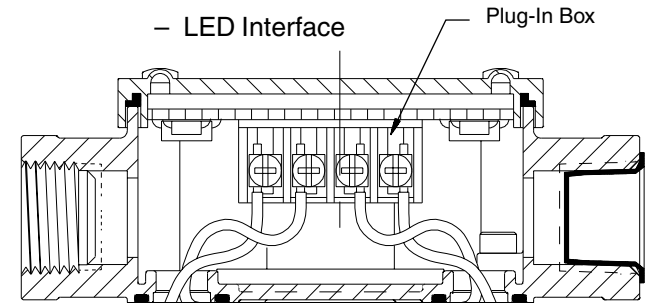
DESINA – design  
Pin 1 and 2  
connected



**Micro Connector Options**

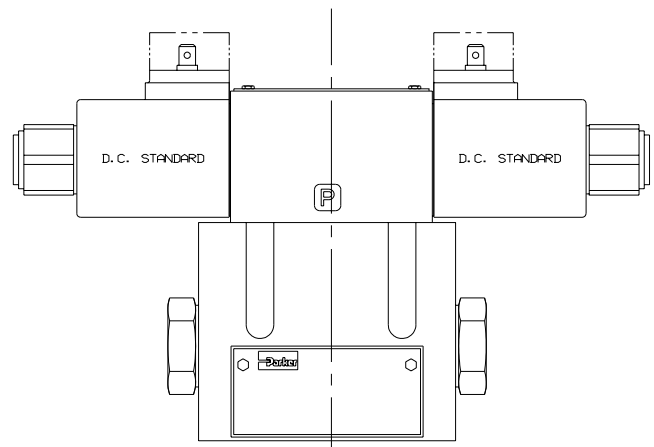
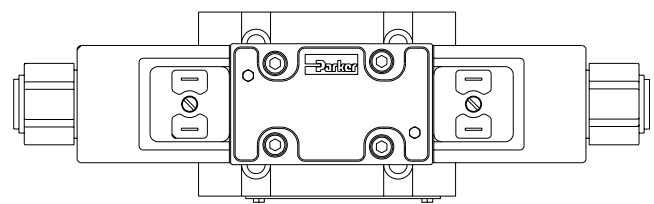


**Signal Lights**



**Dual Spade Lug (option S, DC only)**

- Interface – SAE 1 B-0.25  
 Automotive-type Spade





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**

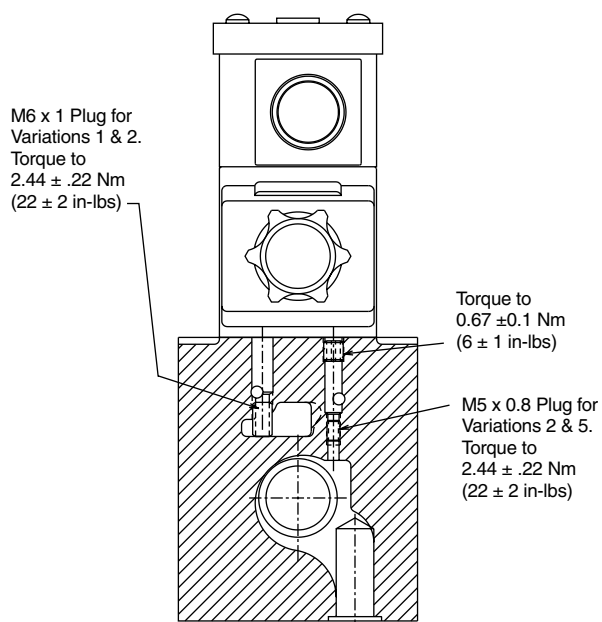
Premium quality hydraulic oil with a viscosity range between 150-250 SSU (32-54 cst.) At 100°F (38°C) is recommended. The absolute operating viscosity range is from 80-1000 SSU (16-220 cst.). Oil should have maximum anti-wear properties and rust and oxidation treatment.

**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:

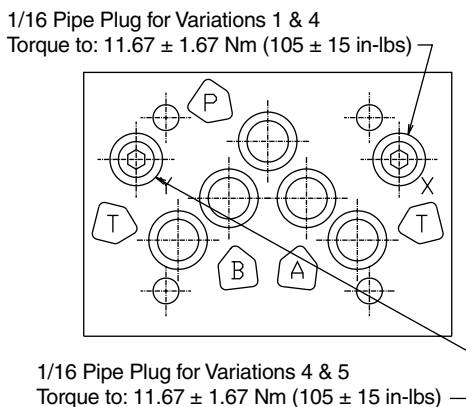
- Pressure above rating
- Fluid other than those specified
- Oil temperature above 160°F (71.1°C)
- Flow path other than normal.

**Mounting Patterns**

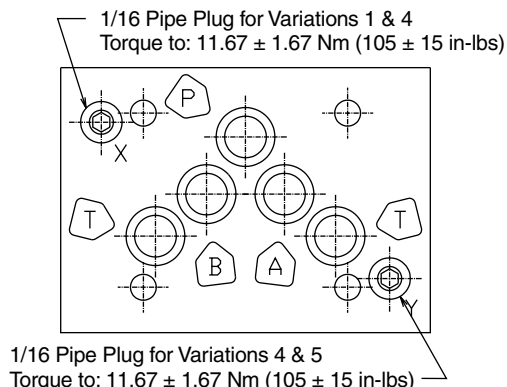
Series	NFPA	Size
D31V*, D3P	D05H	3/8"
D31D*, D3DP	D05HE	3/8"

**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).



**CETOP Pattern D31DW**



**NFPA 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 both AC and DC voltages. 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.

**Pilot/Drain Characteristics**

**Pilot Pressure:** 100 to 3000 PSI (6.9 to 207 Bar)

**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 1500 PSI (102 Bar), 3000 PSI (207 Bar) 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 1500 PSI (102 Bar), 3000 PSI (207 Bar) 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 1500 PSI (102 Bar), 3000 PSI (207 Bar) 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.

2502-A3.p65, dd





**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: 100 to 3000 PSI (6.9 to 210 Bar)

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**



**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).

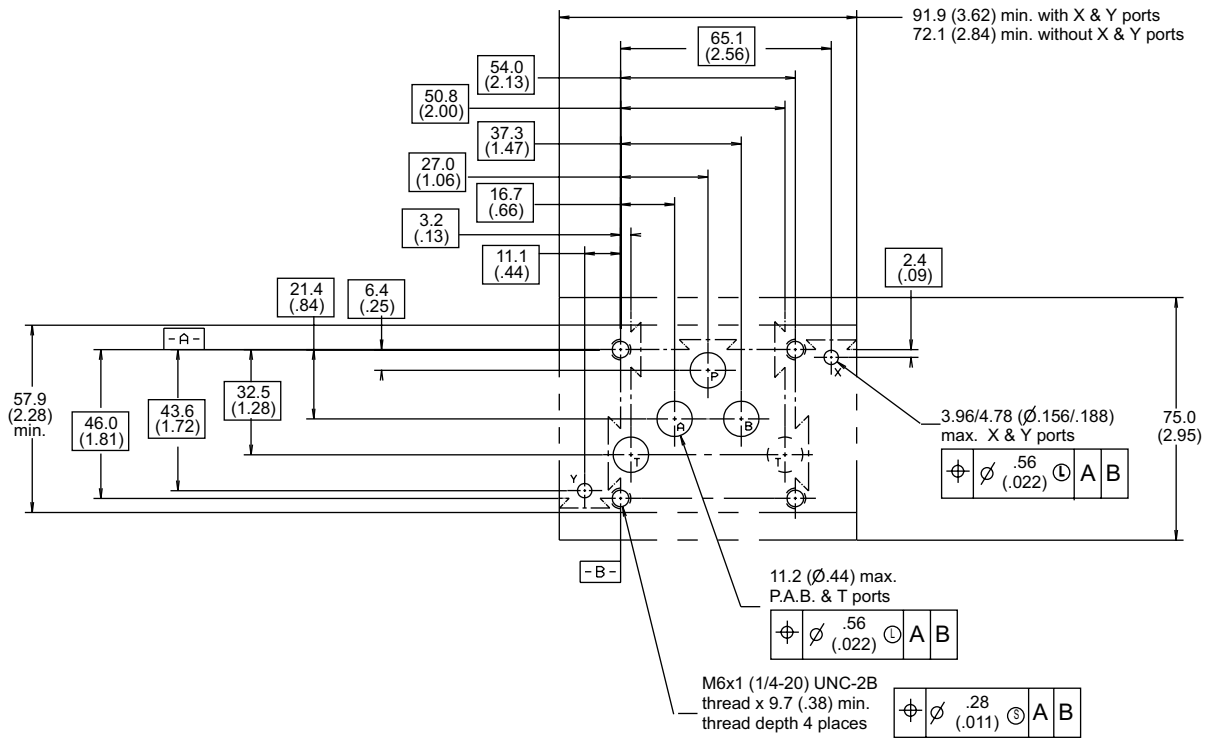
***For maximum valve reliability,  
 adhere to the following  
 installation information.***

**Mounting Position**

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

**Mounting Pattern**

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



**Series D31DW, D31DA, D31DL, D3DP**

**A**

**Subplate Mounting**  
**NFPA D05HE**

**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**

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

