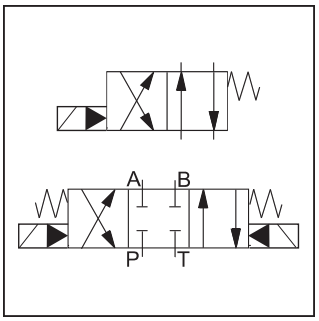
General Description

Series D111VW valves are piloted by a D1VW valve. The valves can be ordered with position control.

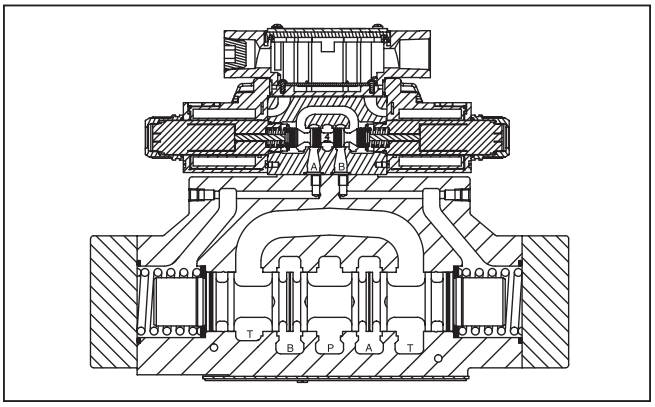
The minimum pilot pressure must be ensured for all operating conditions of the directional valve.

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



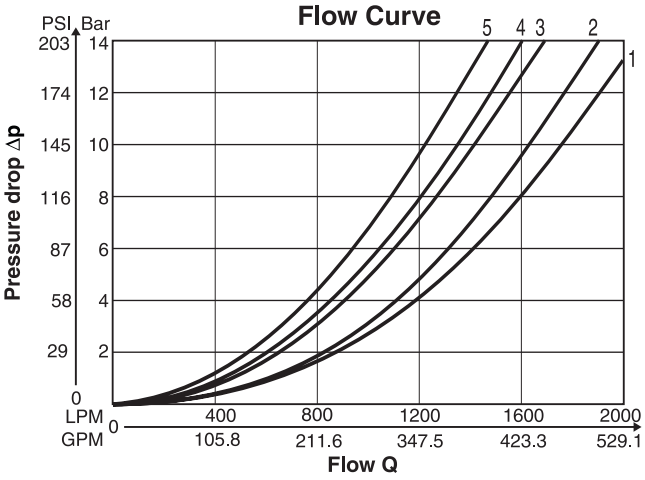
Features

- 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.



All characteristic curves measured with HLP46 at 50°C.

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

A

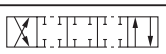
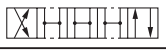
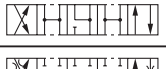
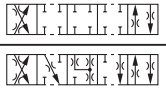
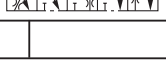
D	111V	W	☐	☐	☐
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Pilot Supply and Drain

Basic Valve: NFPA 10, CETOP 10, DIN NG32, 50 mm

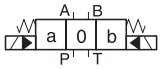
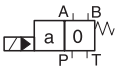
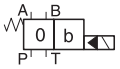
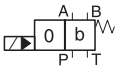
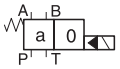
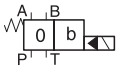
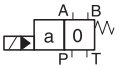
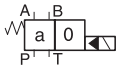
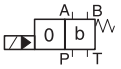
Actuator: Solenoid Wet Pin

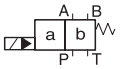
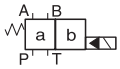
Code	Description	
1	**Internal Pilot**	**External Drain**
2	External Pilot	External Drain
4*	**Internal Pilot**	**Internal Drain**
5	External Pilot	Internal Drain

* 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.

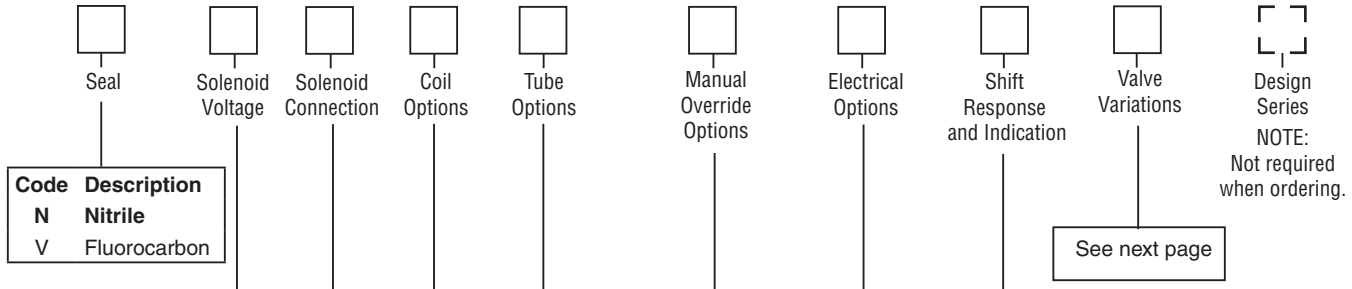
Weight:
Single Solenoid: 67.4 kg (148.6 lbs.)
Double Solenoid: 68.0 kg (149.9 lbs.)

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



NOTE: Not required when ordering.

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. C style with 001 and 009 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 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.

A

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.

A

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

A

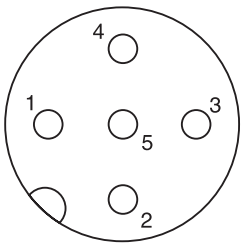
General				
Design			Directional Spool Valve	
Actuation			Solenoid	
Size			NG32	
Mounting Interface			DIN 24340 A32 / ISO 4401 / NFPA D10 / CETOP RP 121-H	
Mounting Position			Unrestricted, preferably horizontal	
Ambient Temperature		**[°C]** **[°C]**	-25...+50; (-13°F...+122°F) (without inductive position 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

A

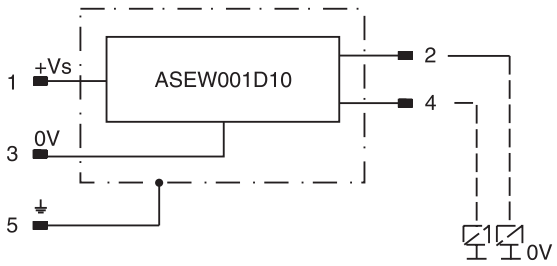
Position Control M12x1

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.

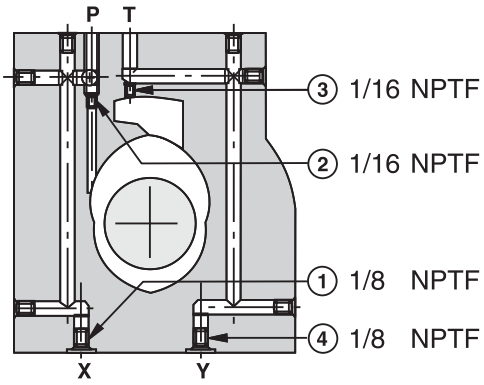
End position monitored:

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).

A

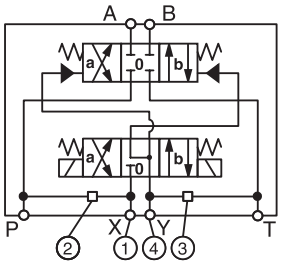
Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

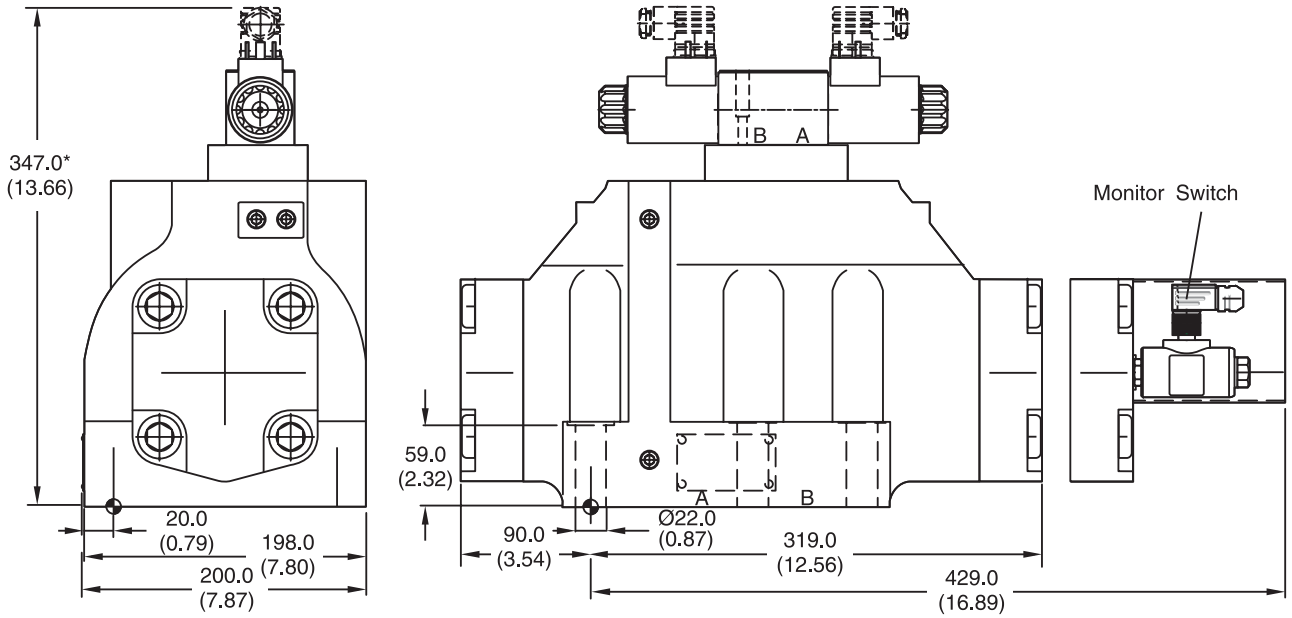
Pilot Oil Inlet	Pilot Oil Outlet	1	2	3	4
internal	external	●	Orifice Ø1.5	●	○
external	external	Orifice Ø1.5	●	●	○
internal	internal	●	Orifice Ø1.5	○	●
external	internal	Orifice Ø1.5	●	○	●

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).

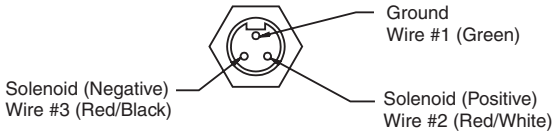
Surface Finish	Kit			Seal Kit
R_{max}6.3 0.01/100	BK386	6x M20x90 DIN 912 12.9	517 Nm (381.3 lb.-ft.)	**Nitrile: SK-D111VW-N-91** Fluorocarbon: SK-D111VW-V-91

The space necessary to remove the plug per DIN 43650, design type AF is at least 15 mm (0.59 in.).

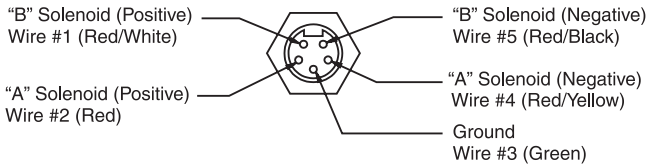
The torque for the screw M3 of the plug has to be 0.5 Nm (3.7 lb.-ft.) to 0.6 Nm (4.4 lb.-ft).

Manaplug (Options 56 & 1C)

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

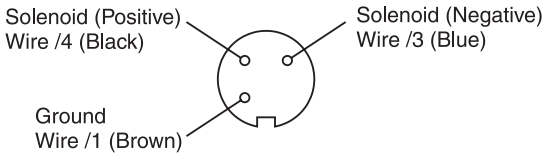


3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

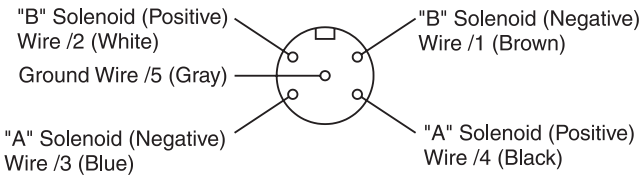


5-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7B & 1D)



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

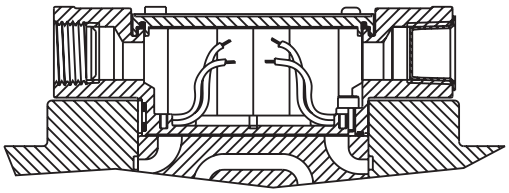


5-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

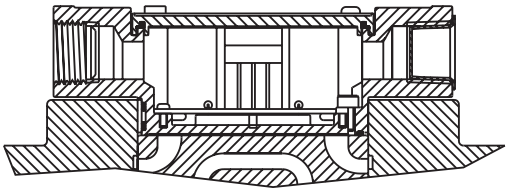
Conduit Box Option C

– No Wiring Options Available



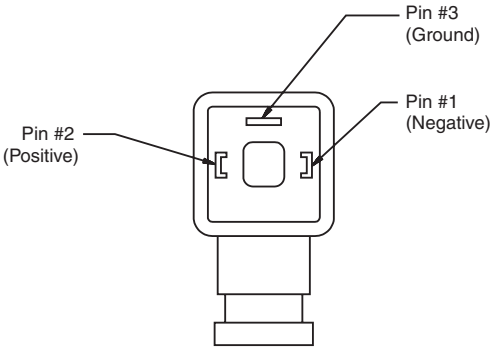
Signal Lights (Option 5) — Plug-in Only

– LED Interface
– Meets Nema 4/IP67



Hirschmann Plug with Lights (Option P5)

ISO 4400/DIN 43650 Form "A"

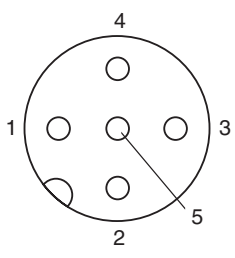


Face View of Plug

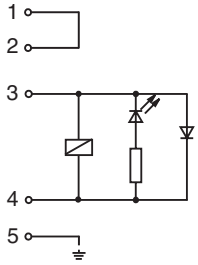
DESINA Connector (Option D)

M12 pin assignment
Standard

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



DESINA – design
Pin 1 and 2
connected



Pins are as seen on valve (male pin connectors)

A

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	—

A

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).

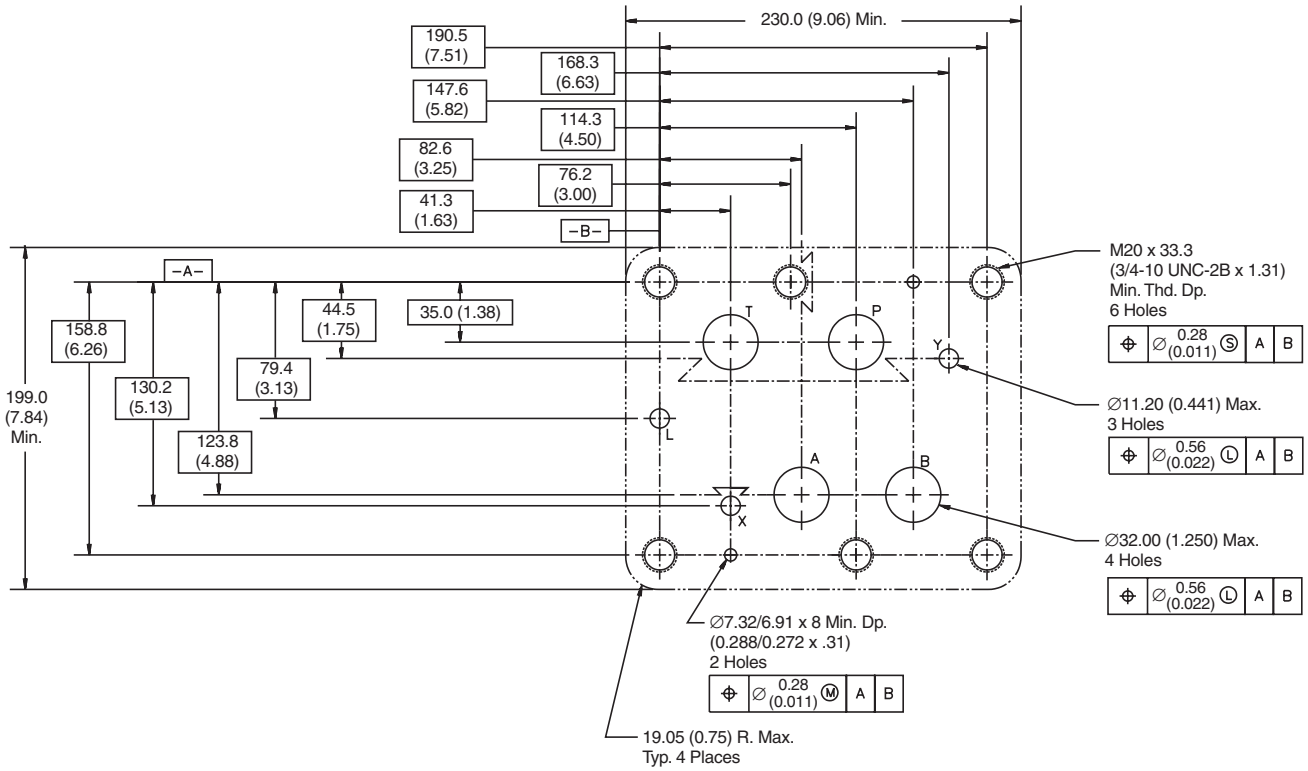
For maximum valve reliability, adhere to the following installation information.

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 (**)

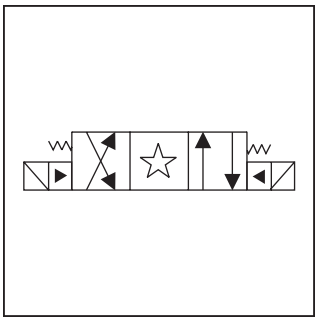


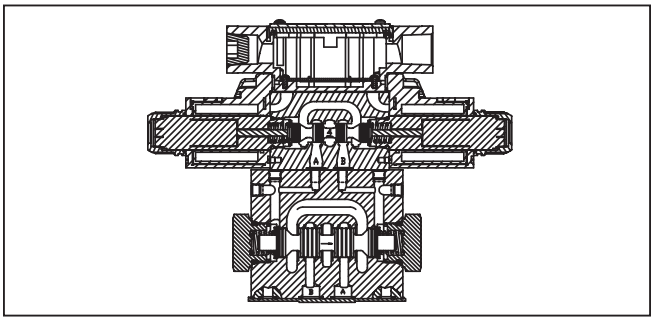
General Description

Series 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

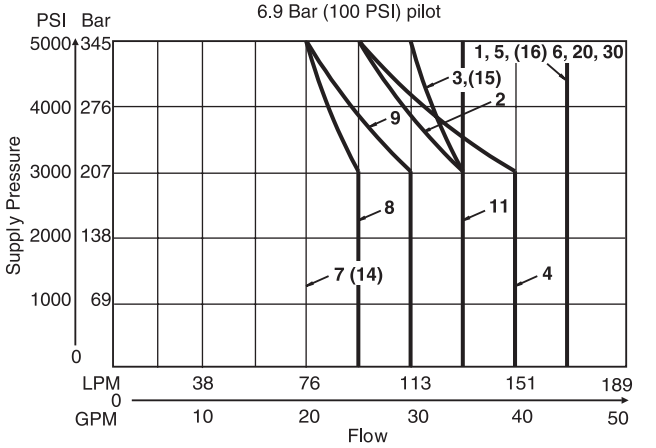
Response Time

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

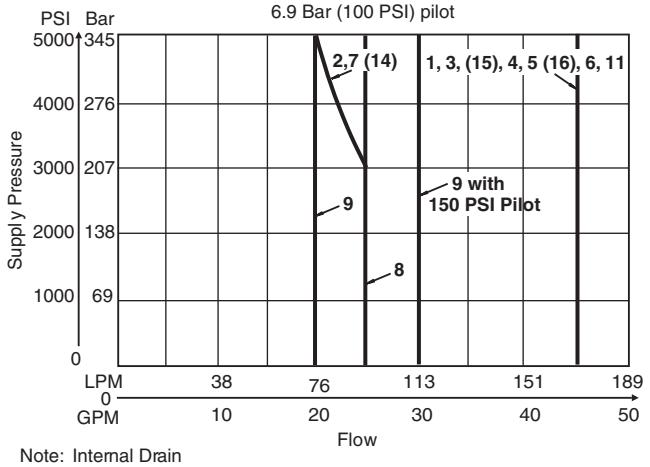
Switching Limit Charts

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.

D31.indd, dd

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***.

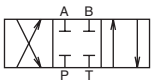
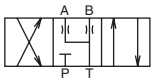
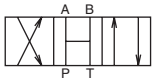
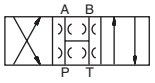
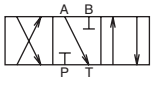
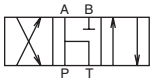
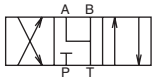
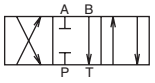
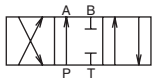
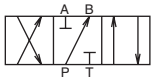
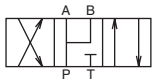
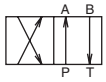
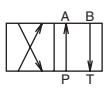
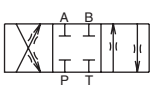
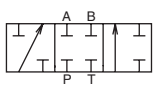
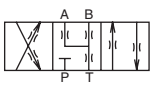
Code	Description
1*	**Internal Pilot, External Drain**
2*	**External Pilot, External Drain**
4#	**Internal Pilot, Internal Drain**
5	**External Pilot, Internal Drain**

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

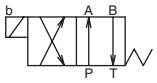
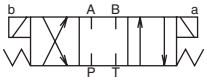
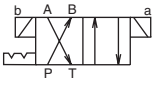
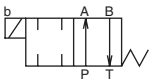
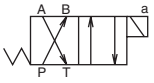
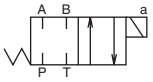
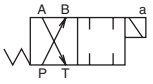
Code	Description
N	**Nitrile**
V	**Fluorocarbon**

Code	Description
A**	24/50 VAC
D	120 VDC
G	198 VDC
J	**24 VDC**
K	**12 VDC**
N***	220/50 VAC
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.

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.

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.

See next page for Valve Variations

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.

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.

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.

A

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

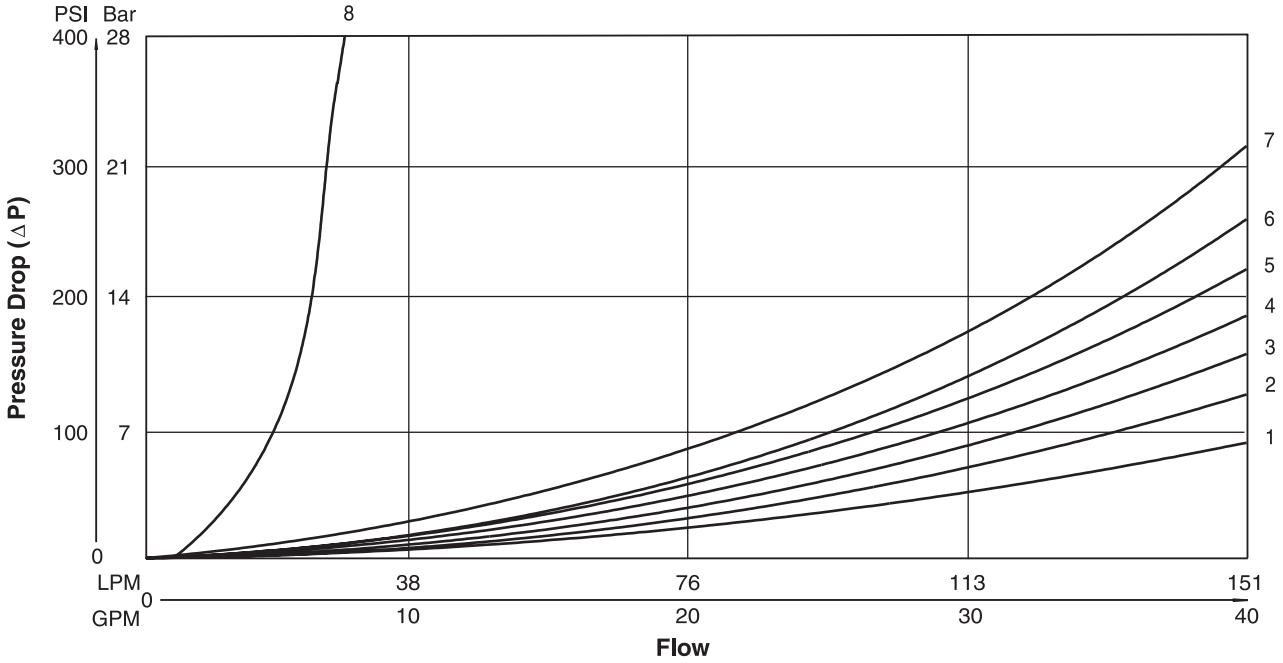
Spool No.	Curve Number										
	Shifted				Center Condition						
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	1	-	-	-	-	-	-	-
002	3	3	1	1	3	3	3	4	4	1	1
003	3	3	1	1	-	-	-	-	-	3	-
004	3	3	1	1	-	-	-	-	-	1	1
005	3	3	1	1	-	-	-	5	-	-	-
006	3	3	1	1	-	5	7	6	5	-	-
007	4	2	1	1	4	-	-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



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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.

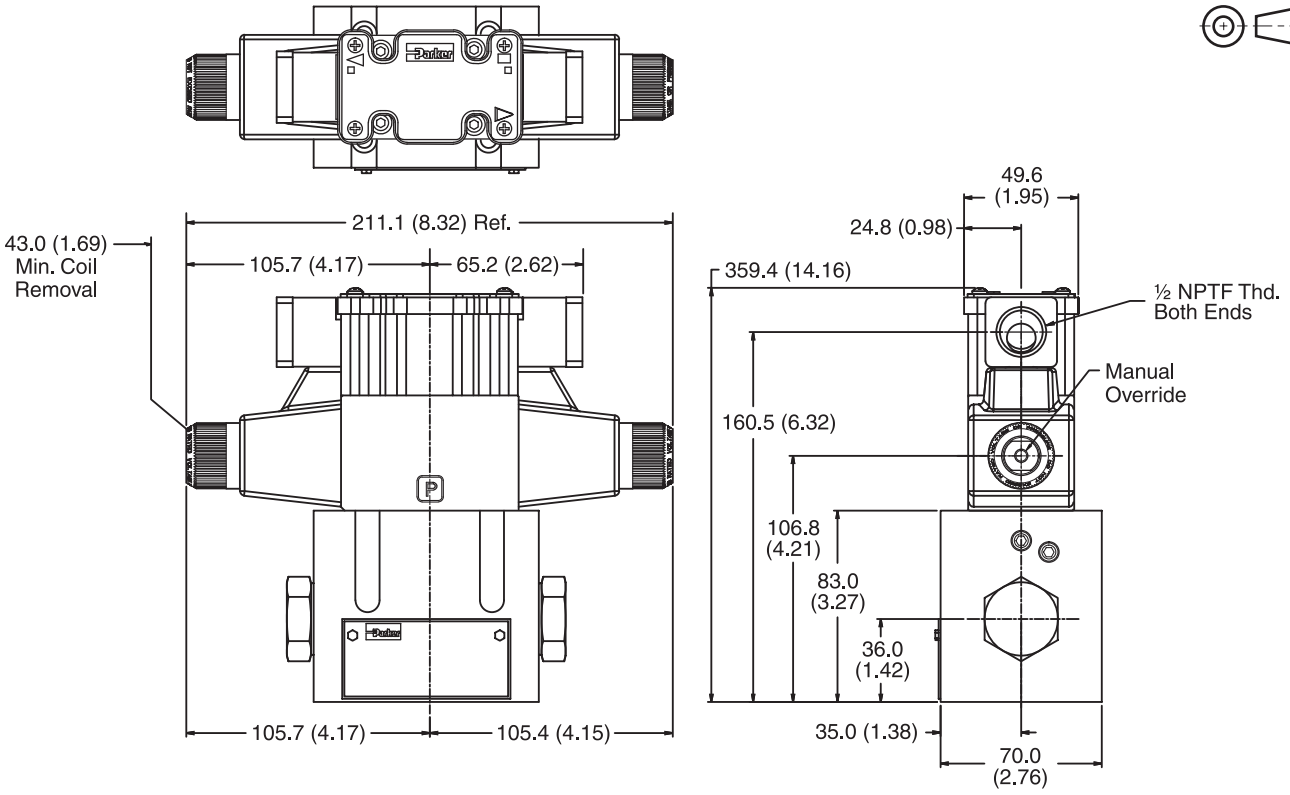
Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
G	Omit	198 VDC	N/A	N/A	0.15 Amps	30 W	1306.80 ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 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

D31.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

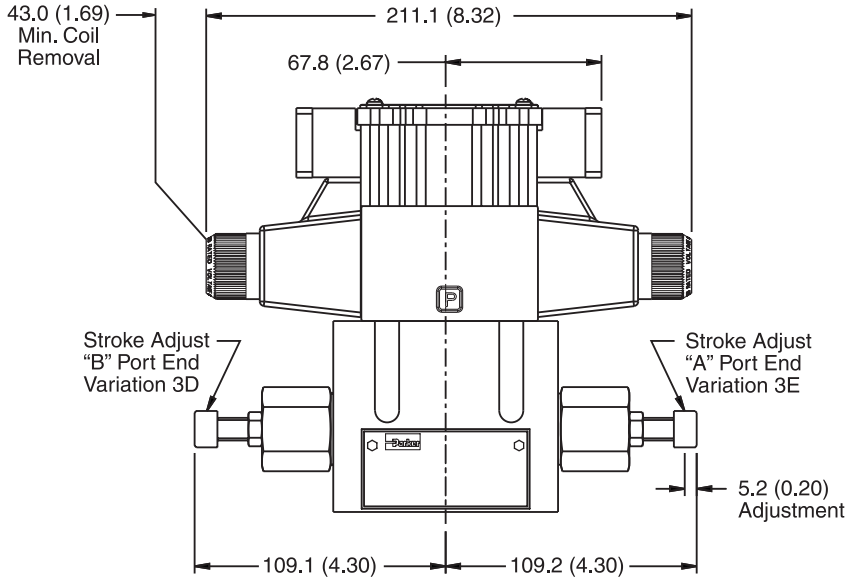
Inch equivalents for millimeter dimensions are shown in (**)

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

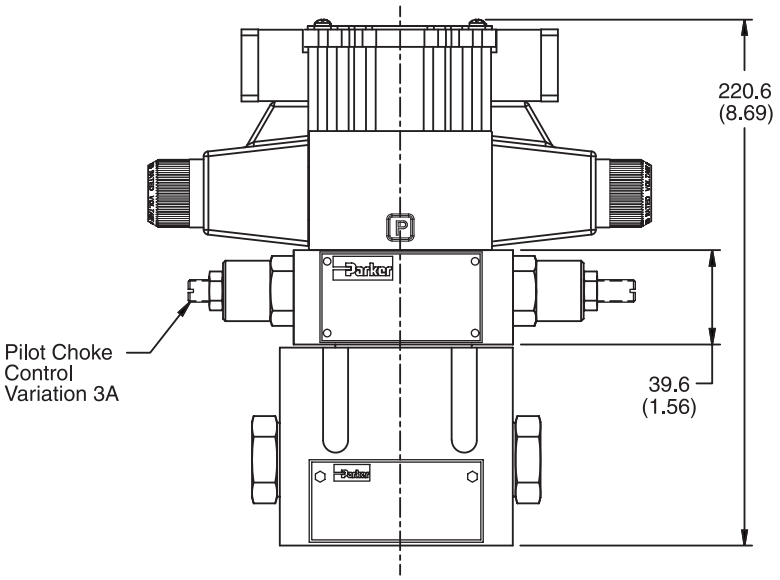


Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

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

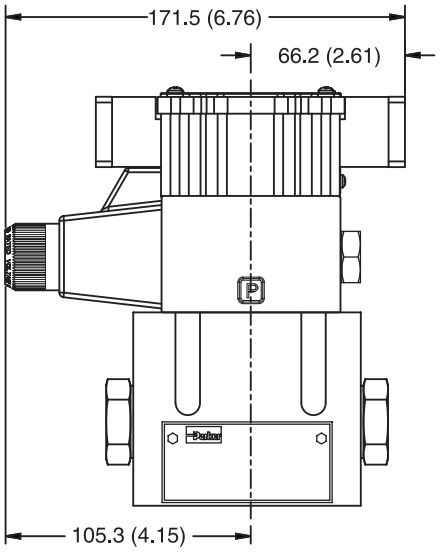
A

Conduit Box and Pilot Choke Control, Double AC Solenoid



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

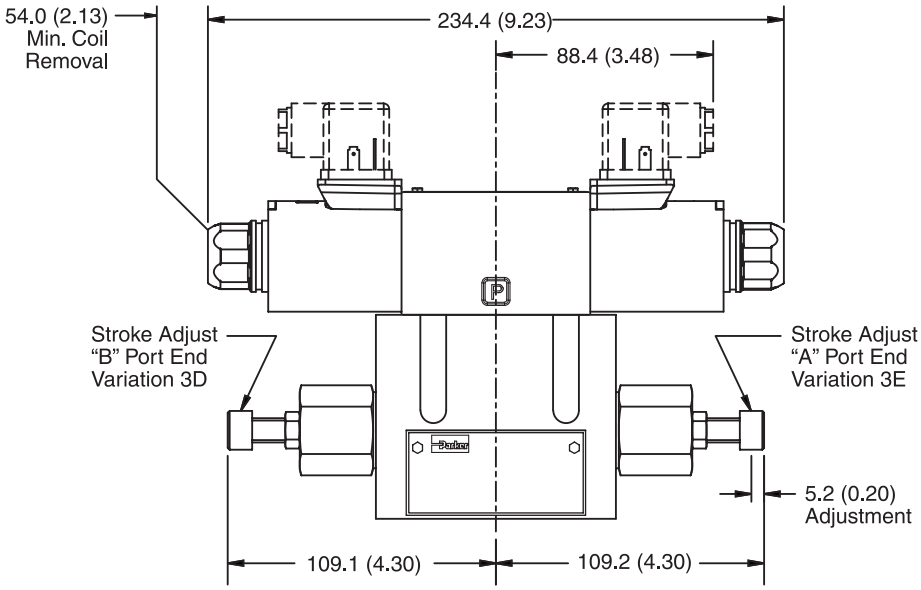
Conduit Box, Single AC Solenoid



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

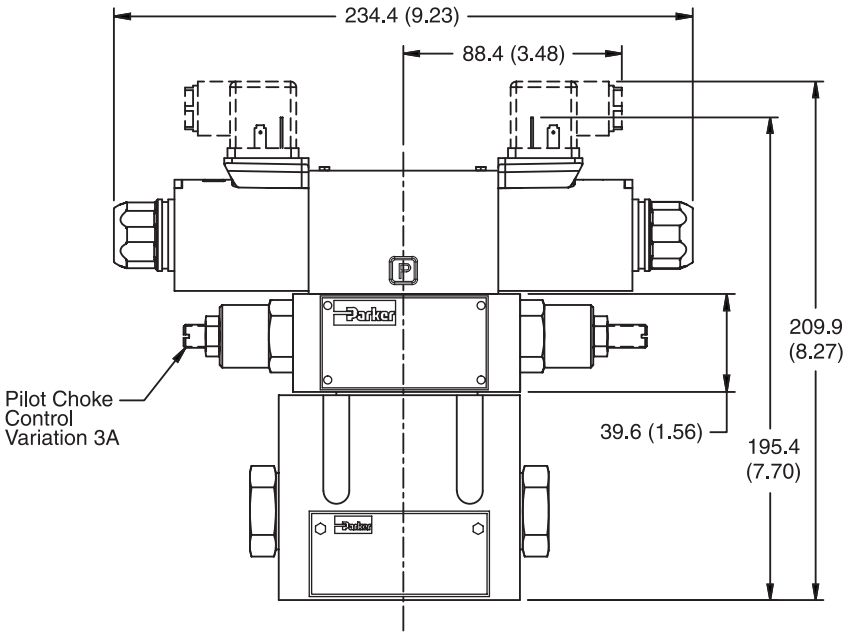
Inch equivalents for millimeter dimensions are shown in (**)

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

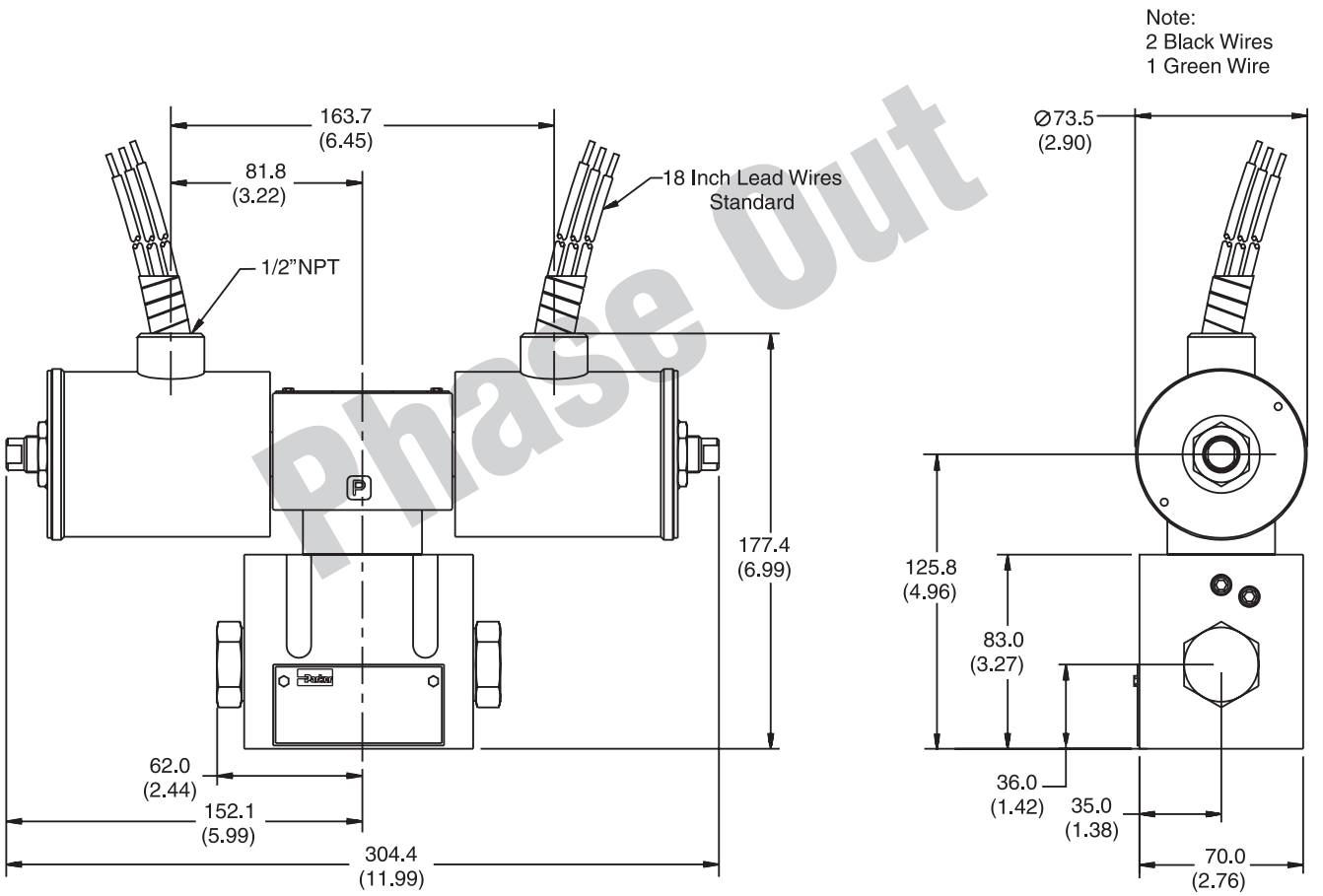


Note: 30.0mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

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

A

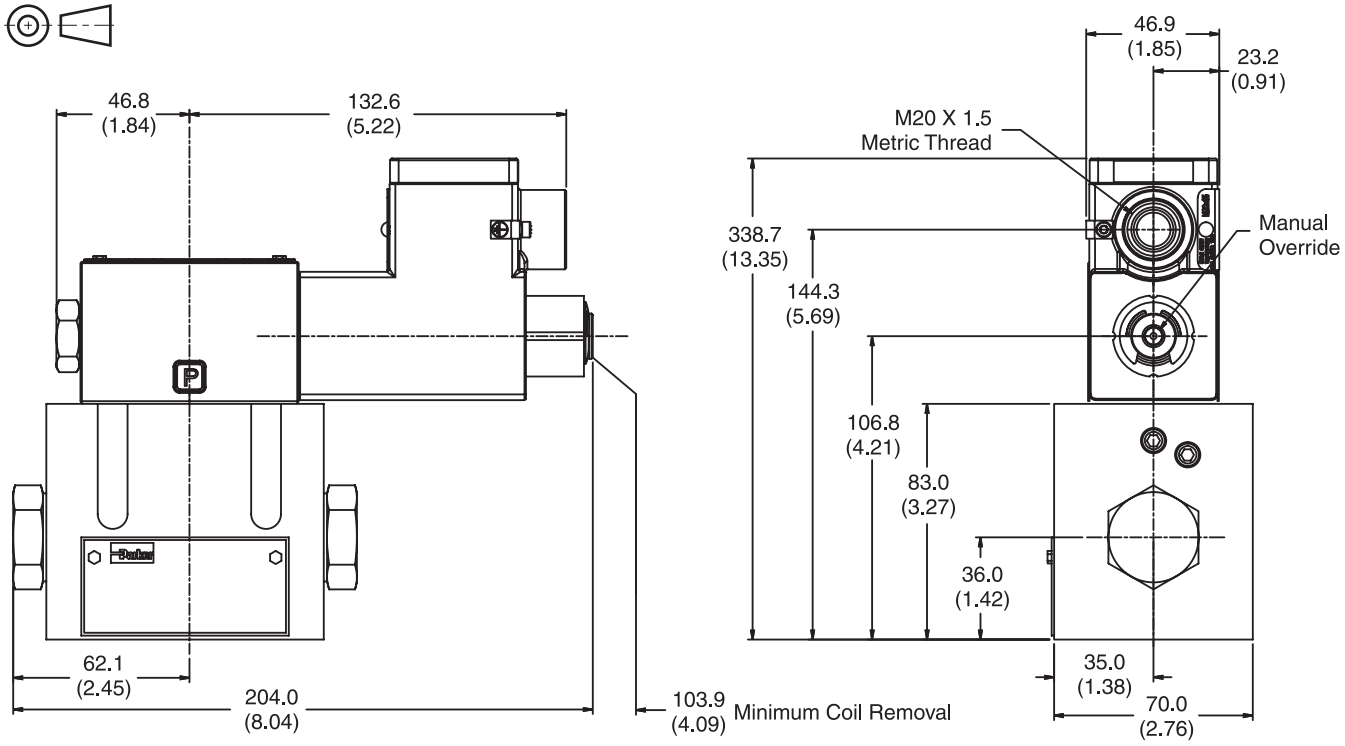
Explosion Proof U.L. and C.S.A. Approved, Double Solenoid



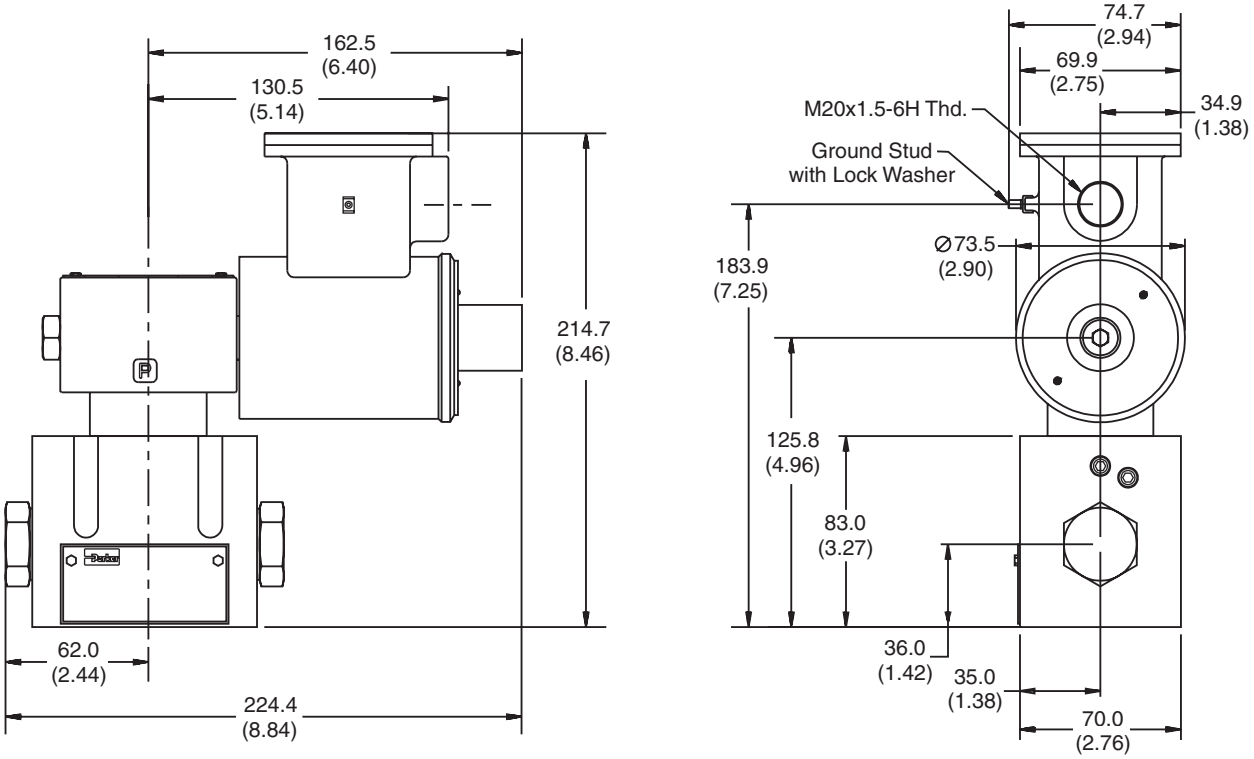
Inch equivalents for millimeter dimensions are shown in (**)

A

Explosion Proof, EX d IIC ATEX/CSA Single Solenoid



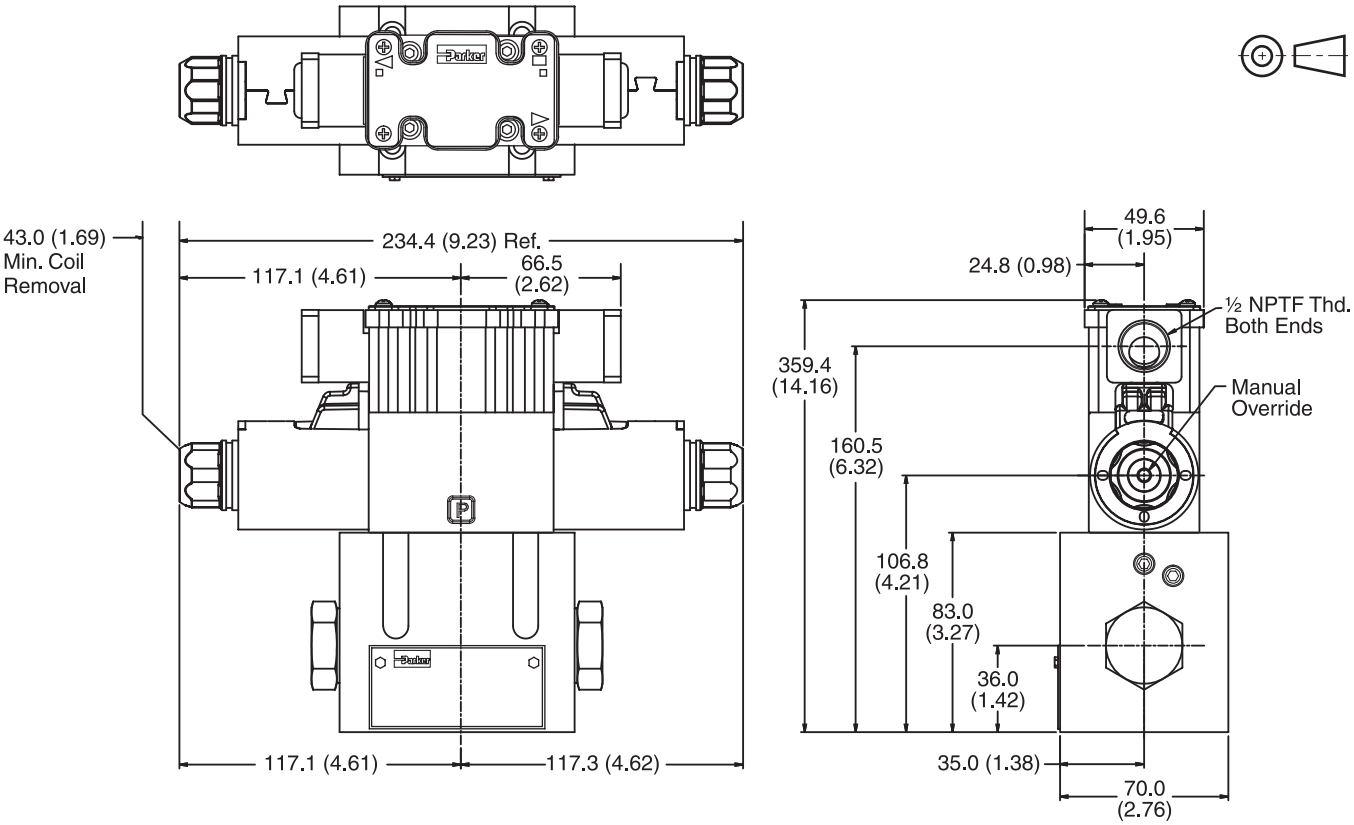
Explosion Proof, EEXD ATEX, Single Solenoid



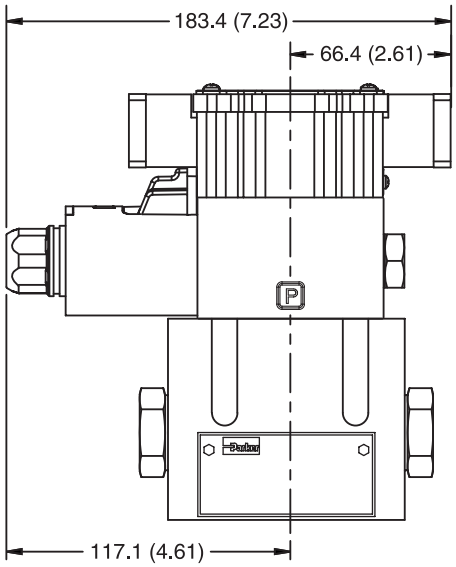
Inch equivalents for millimeter dimensions are shown in (**)

A

Plug-in Conduit Box, Double DC Solenoid



Plug-in Conduit Box, Single DC Solenoid

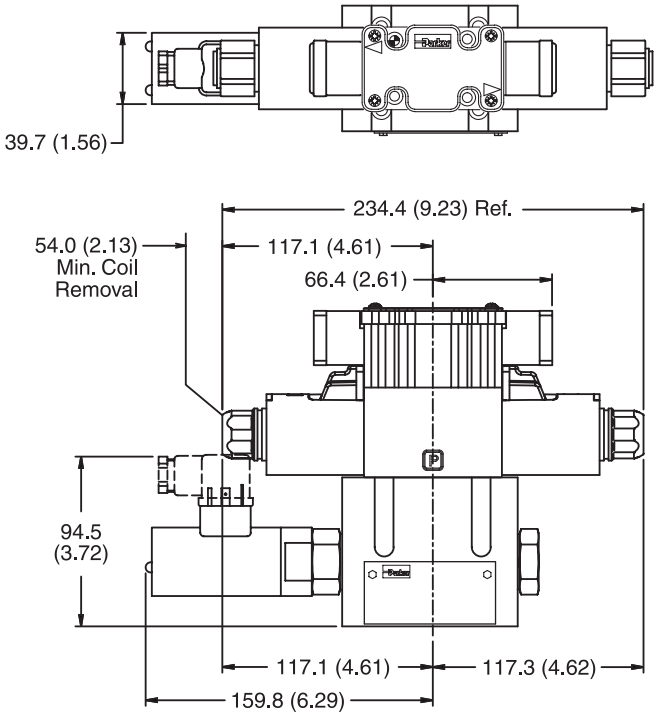


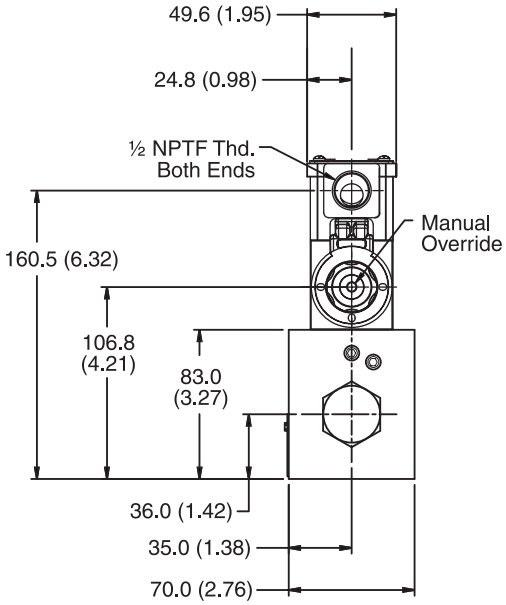
Inch equivalents for millimeter dimensions are shown in (**)

A

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.



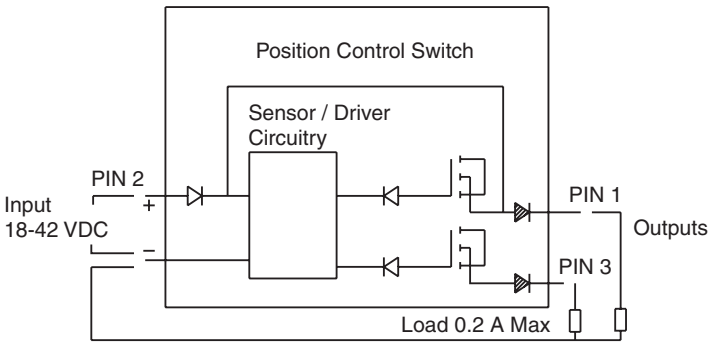


Monitor Switch
(Variation I3 and I6)

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

Switch Data

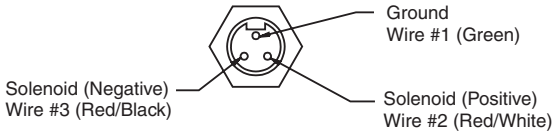
Pin 1 and Pin 3 have outputs equal to the input. When the monitor switch has the output to Pin 1, Pin 3 will have an output of zero, and vice-versa. When the valve is switched, Pin 1 and Pin 3 will switch outputs.



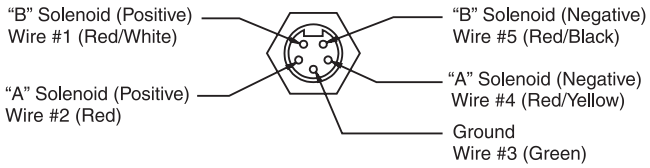
A

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

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

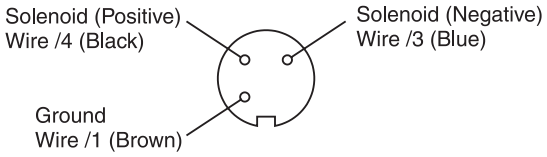


3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

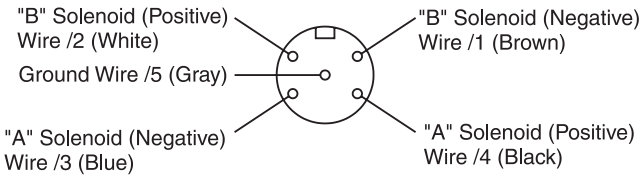


5-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

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

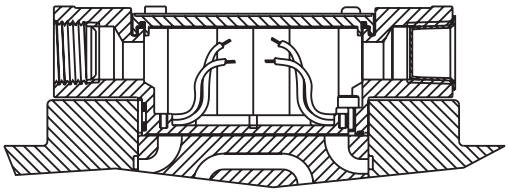
EP336-30	3 Pin Plug
EP316-30	5 Pin Plug (Double Solenoid)
EP31A-30	5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

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

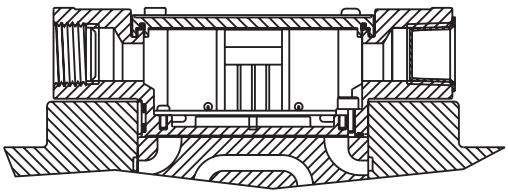
Conduit Box Option C

– No Wiring Options Available

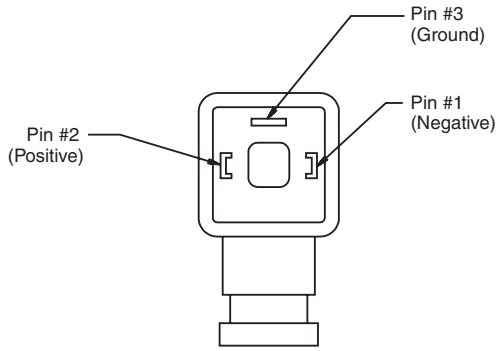


Signal Lights (Option 5) — Plug-in Only

– LED Interface
– Meets Nema 4/IP67



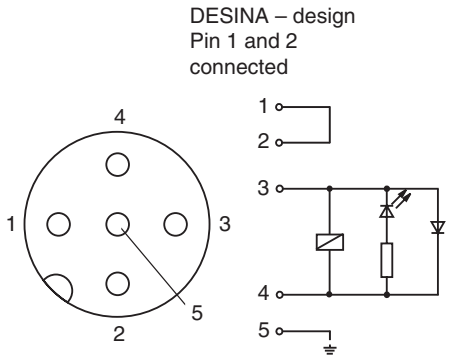
Hirschmann Plug with Lights (Option P5)
ISO 4400/DIN 43650 Form "A"



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)

D31.indd, dd

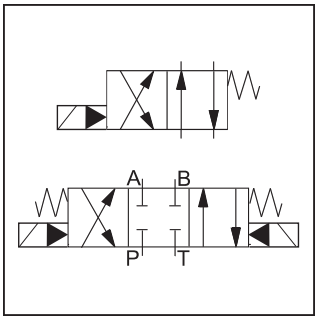
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

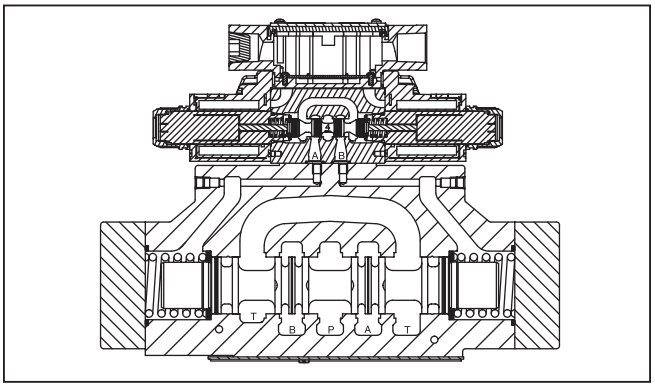
General Description

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.



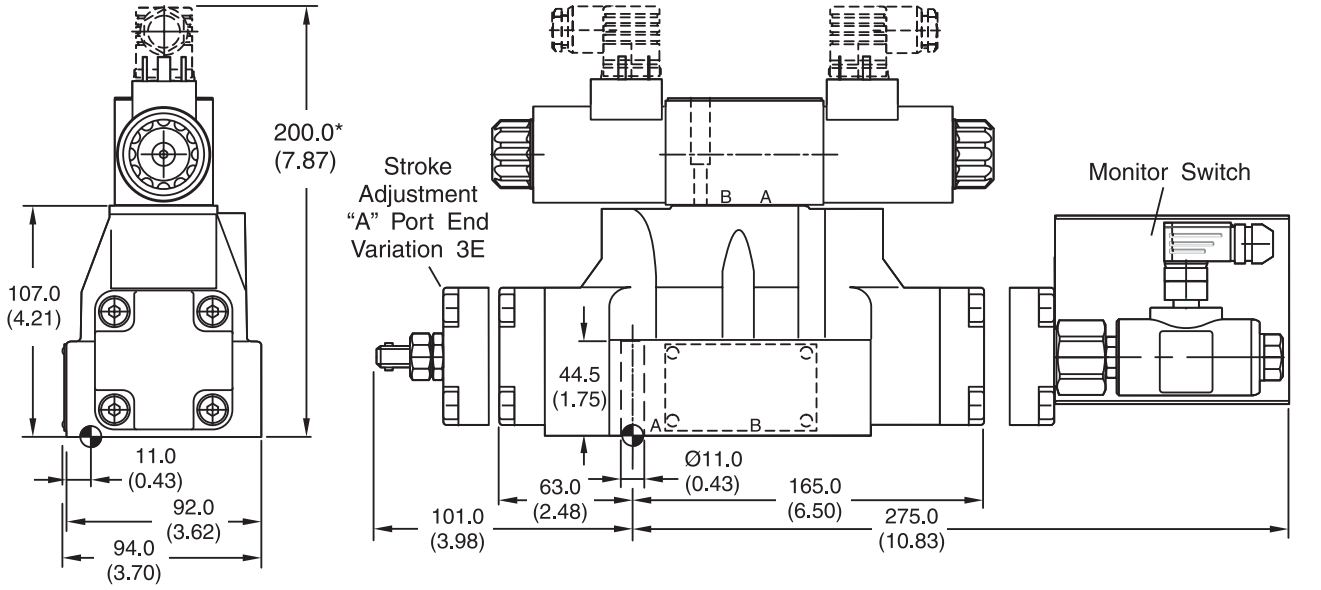


Features

- **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.

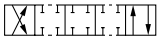
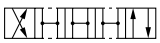
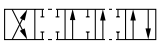
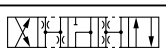
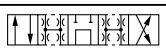
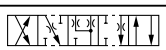
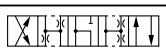
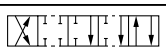
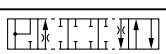
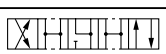
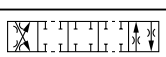
A

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

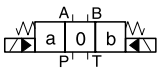
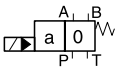
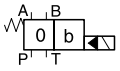
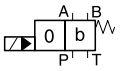
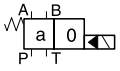
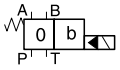
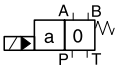
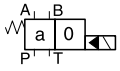
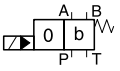
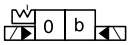
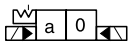
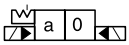
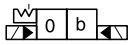
NFPA D07, CETOP 7 DIN NG16

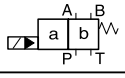
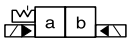
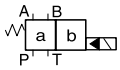
Code	Description	
1	**Internal Pilot**	**External Dain**
2	External Pilot	External Drain
3	Internal Pilot w/ Check	Internal Drain
4	**Internal Pilot**	**Internal Drain**
5	External Pilot	Internal Drain
6	Internal Pilot w/ Check	Internal Drain

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

3-Position Spools	
Code	**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	

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.)

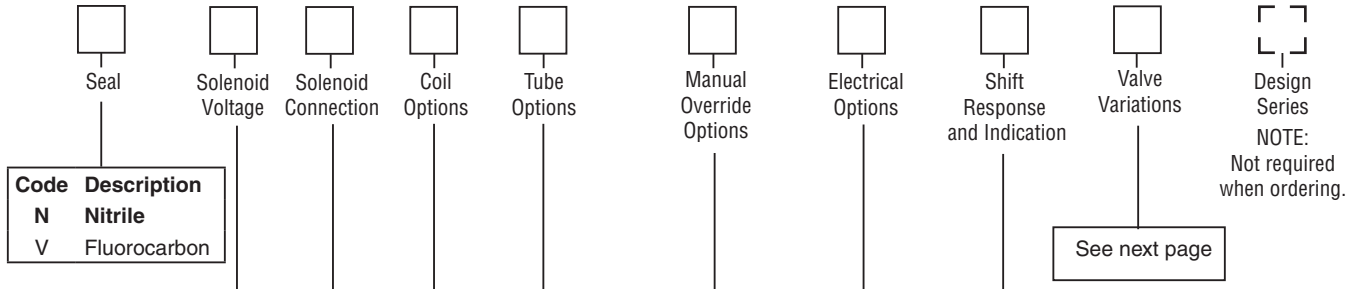
Double Solenoid: 10.3 kg (22.7 lbs.)

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



NOTE: Not required when ordering.

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.

A

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.

A

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

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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

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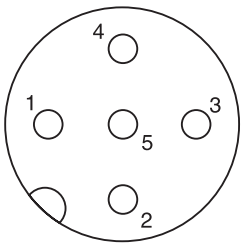
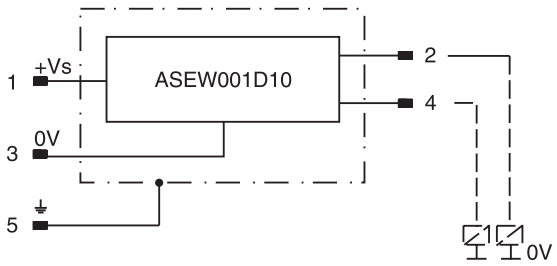
Position Control M12x1

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).

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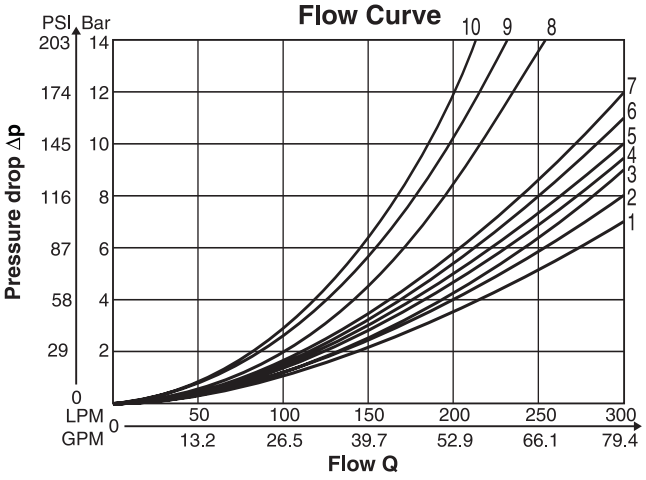
Performance Curves

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.

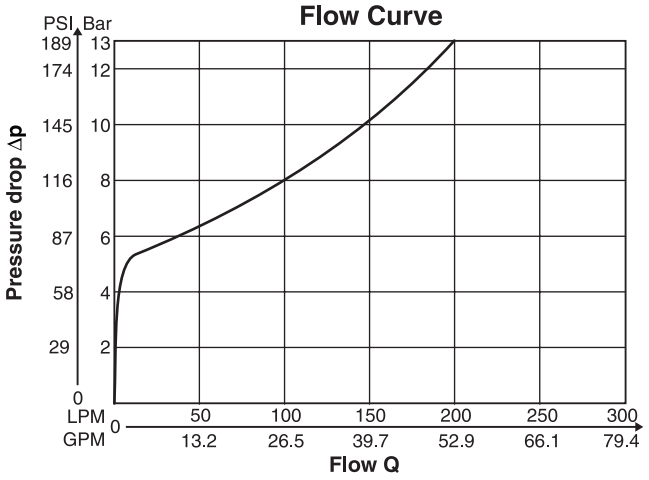


All characteristic curves measured with HLP46 at 50°C.

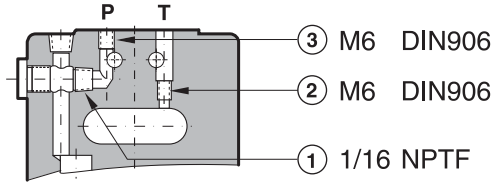
Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
001	1	1	–	4	5
002	1	2	6	4	6
003	1	2	–	5	6
004	1	1	–	5	5
005	2	2	–	3	5
006	1	2	–	3	6
007	1	1	6	4	5
009	2	9	8	7	10
011	1	1	–	4	5
014	1	1	6	4	5
015	1	2	–	4	6
016	2	2	–	3	5
020	3	5	–	3	5
021	2	8	–	2	–
022	8	2	–	–	3
026	3	5	–	–	–
030	2	3	–	6	7
054	2	3	–	6	7

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.

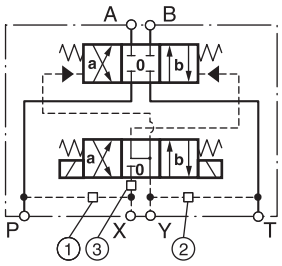


Pilot Oil Inlet (Supply) and Outlet (Drain)



○ 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



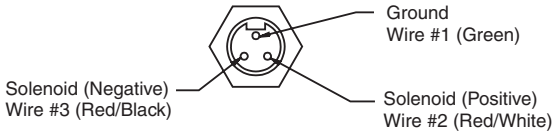
All orifice sizes for standard valves

D41.indd, dd

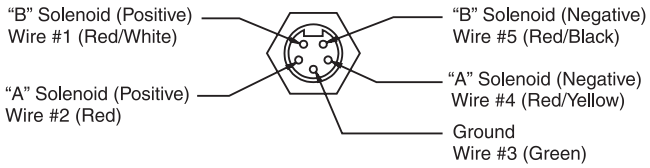
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

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

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

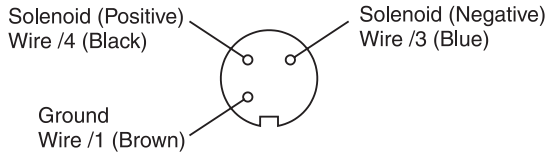


3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

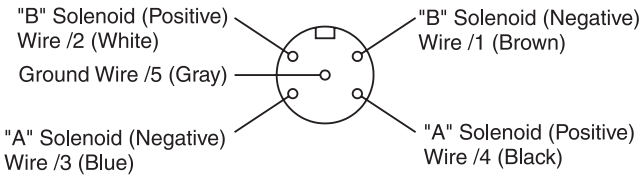


5-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

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

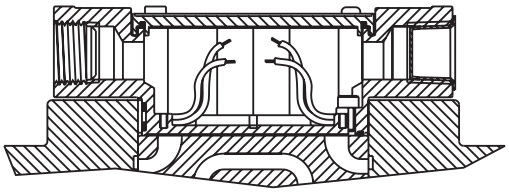
EP336-30	3 Pin Plug
EP316-30	5 Pin Plug (Double Solenoid)
EP31A-30	5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

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

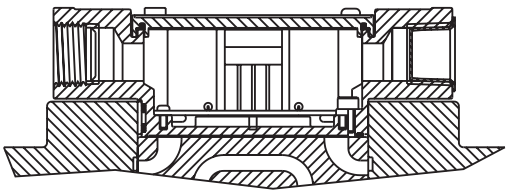
Conduit Box Option C

– No Wiring Options Available

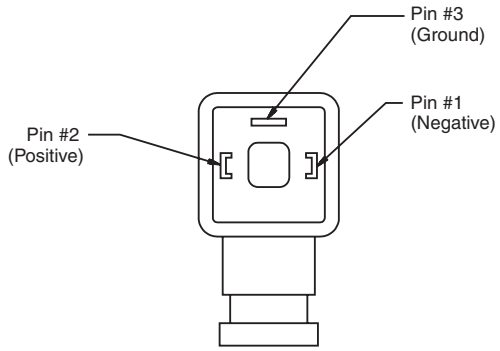


Signal Lights (Option 5) — Plug-in Only

- LED Interface
- Meets Nema 4/IP67



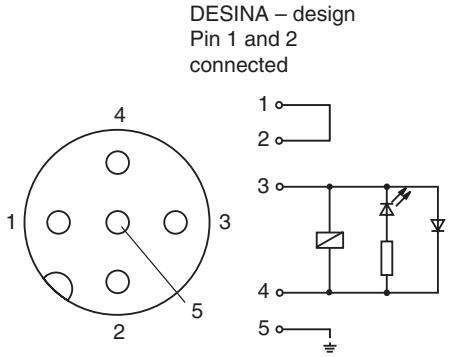
Hirschmann Plug with Lights (Option P5)
ISO 4400/DIN 43650 Form "A"



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)

A

General Description

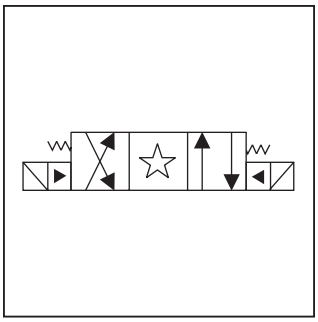
Series D81VW directional control valves are 5-chamber, pilot operated, solenoid controlled valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting pattern.

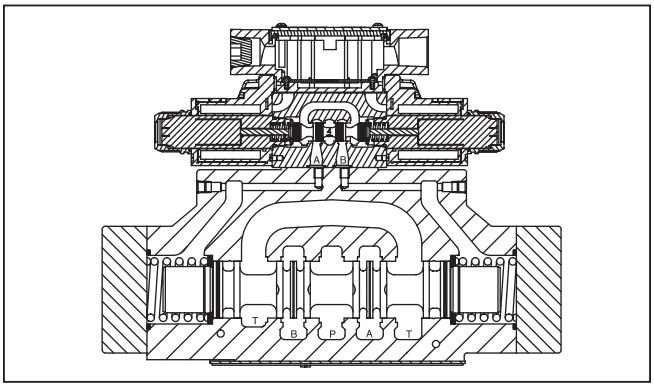
Operation

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).

A

D	81V	☐	☐	☐	☐	☐	☐
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Pilot Supply and Drain	Seal	Solenoid Voltage

NFPA D08
CETOP 8
DIN NG25
High 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 D81VHW***.

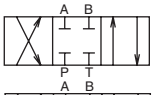
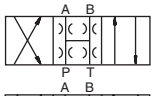
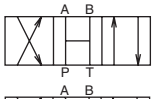
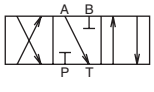
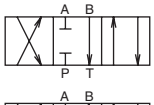
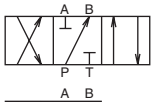
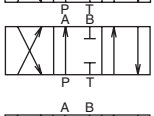
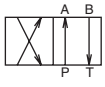
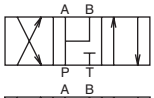
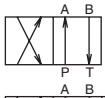
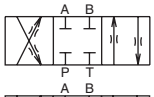
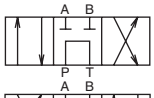
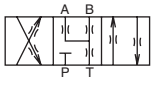
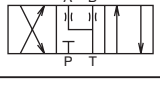
Code	Description
1	**Internal Pilot, External Drain**
2	**External Pilot, External Drain**
3	Internal Pilot w/Check, External Drain
4*	**Internal Pilot, Internal Drain**
5	**External Pilot, Internal Drain**
6	Internal Pilot w/Check, Internal Drain

* Not availble with 002, 007, 008, 009, 014 & 030 spools.

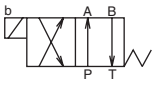
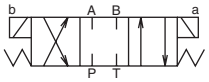
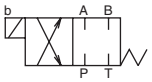
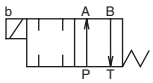
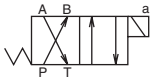
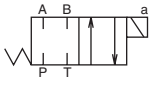
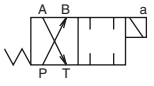
Code	Description
N	**Nitrile**
V	**Fluorocarbon**

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

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.

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.

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 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

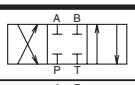
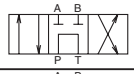
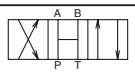
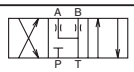
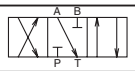
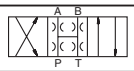
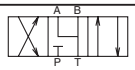
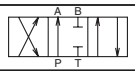
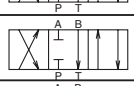
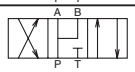
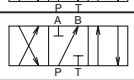
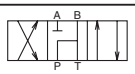
A

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)

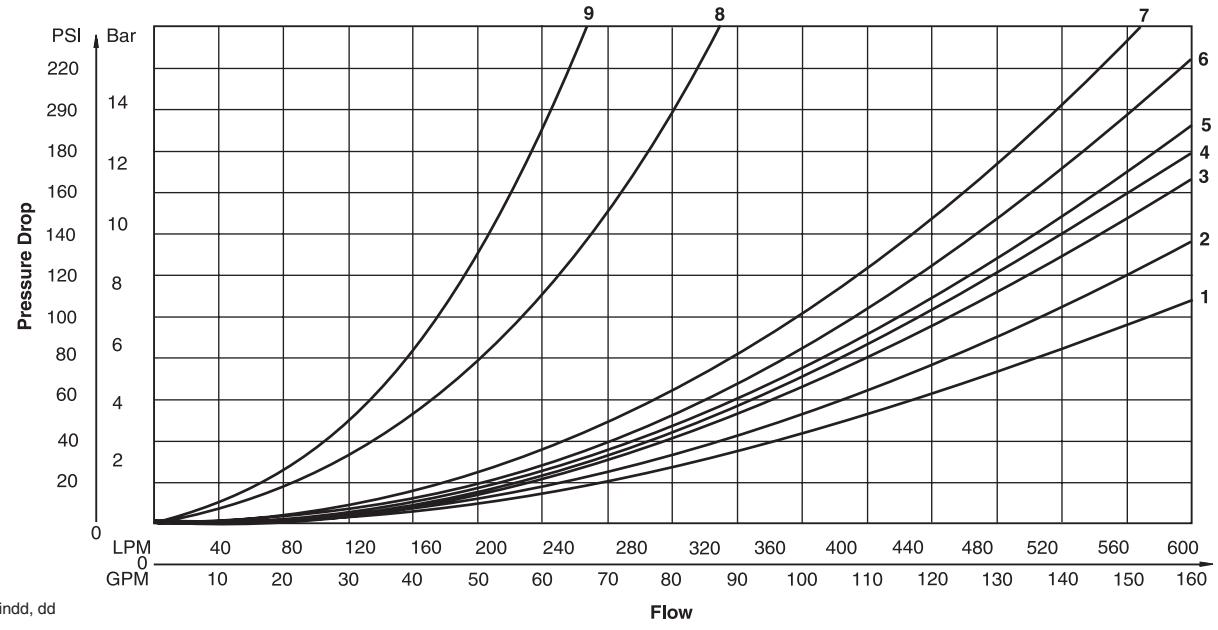
D81V* Series Pressure Drop Chart

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

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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

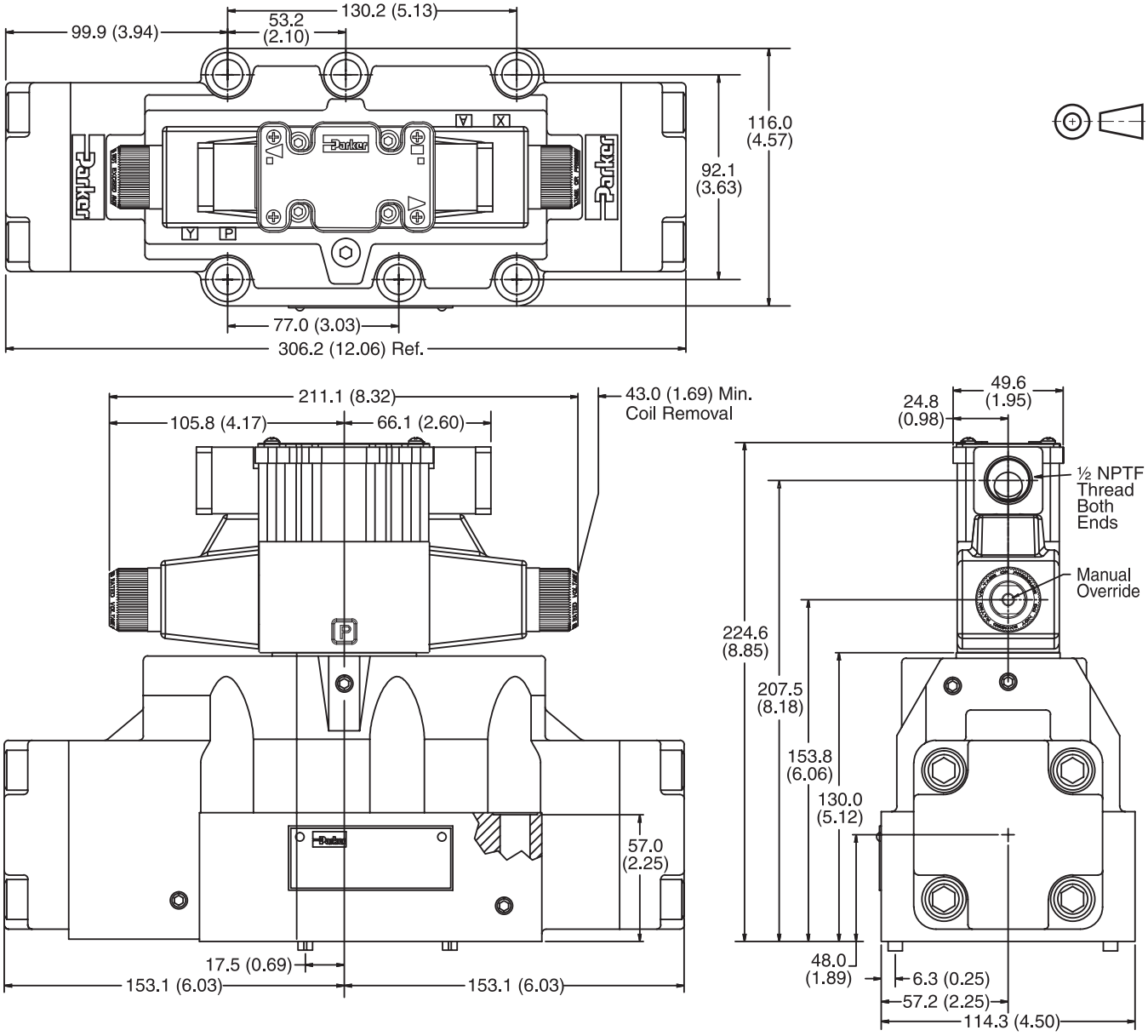
* Allowable Voltage Deviation ±10%.
Note that Explosion Proof AC coils are single frequency only.

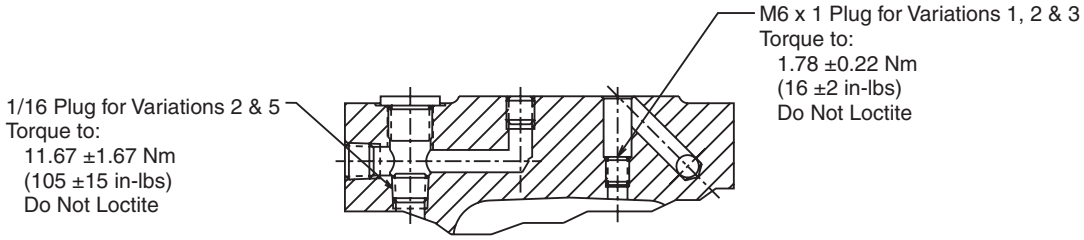
Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
G	Omit	198 VDC	N/A	N/A	0.15 Amps	30 W	1306.80 ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 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

D81.indd, dd

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

Plug-in Conduit Box, Double AC Solenoid



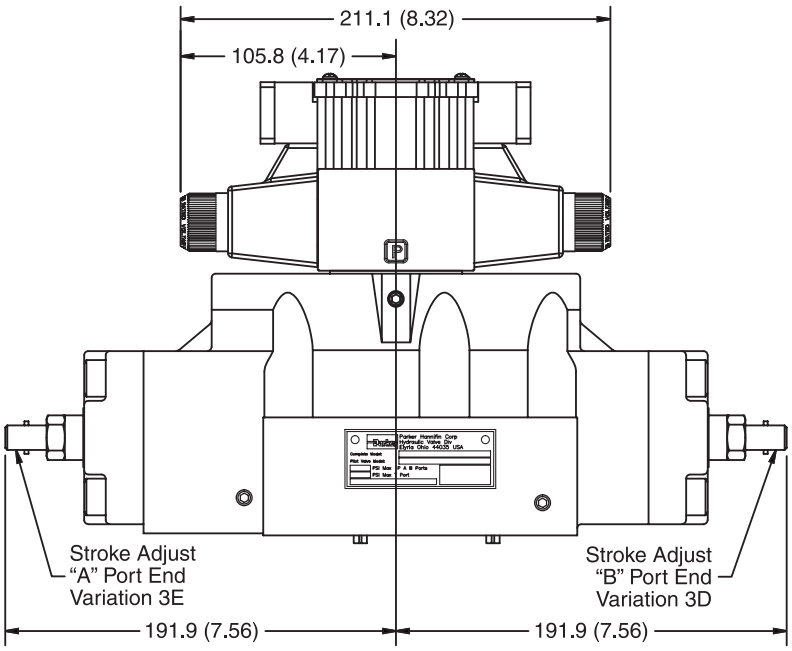


Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

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

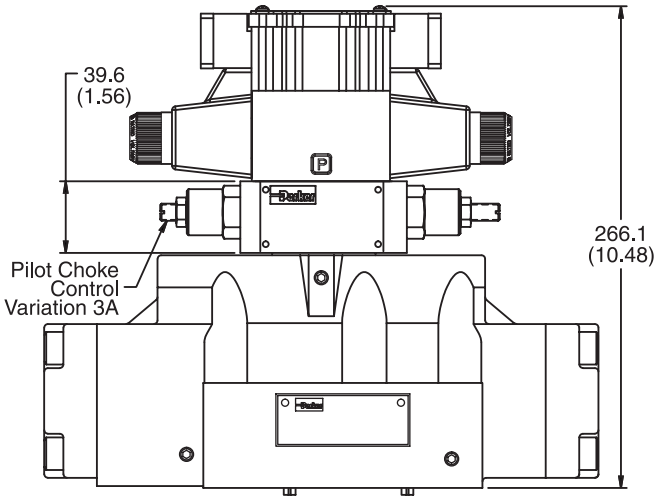
A

Conduit Box and Stroke Adjust, Double AC Solenoid

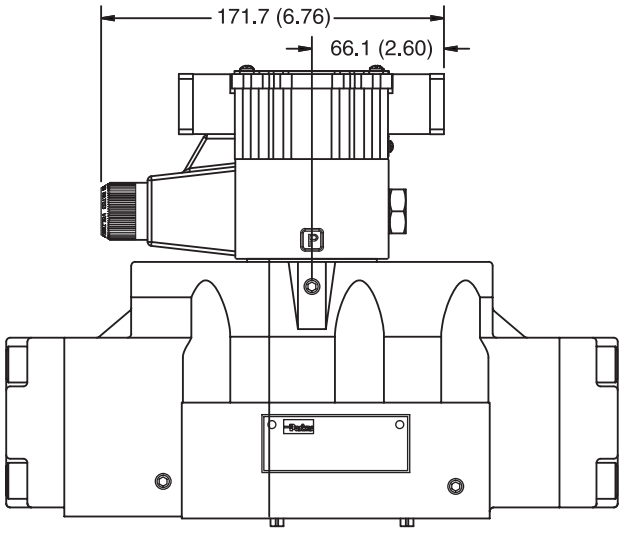


Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

Conduit Box and Pilot Choke Control, Double AC Solenoid



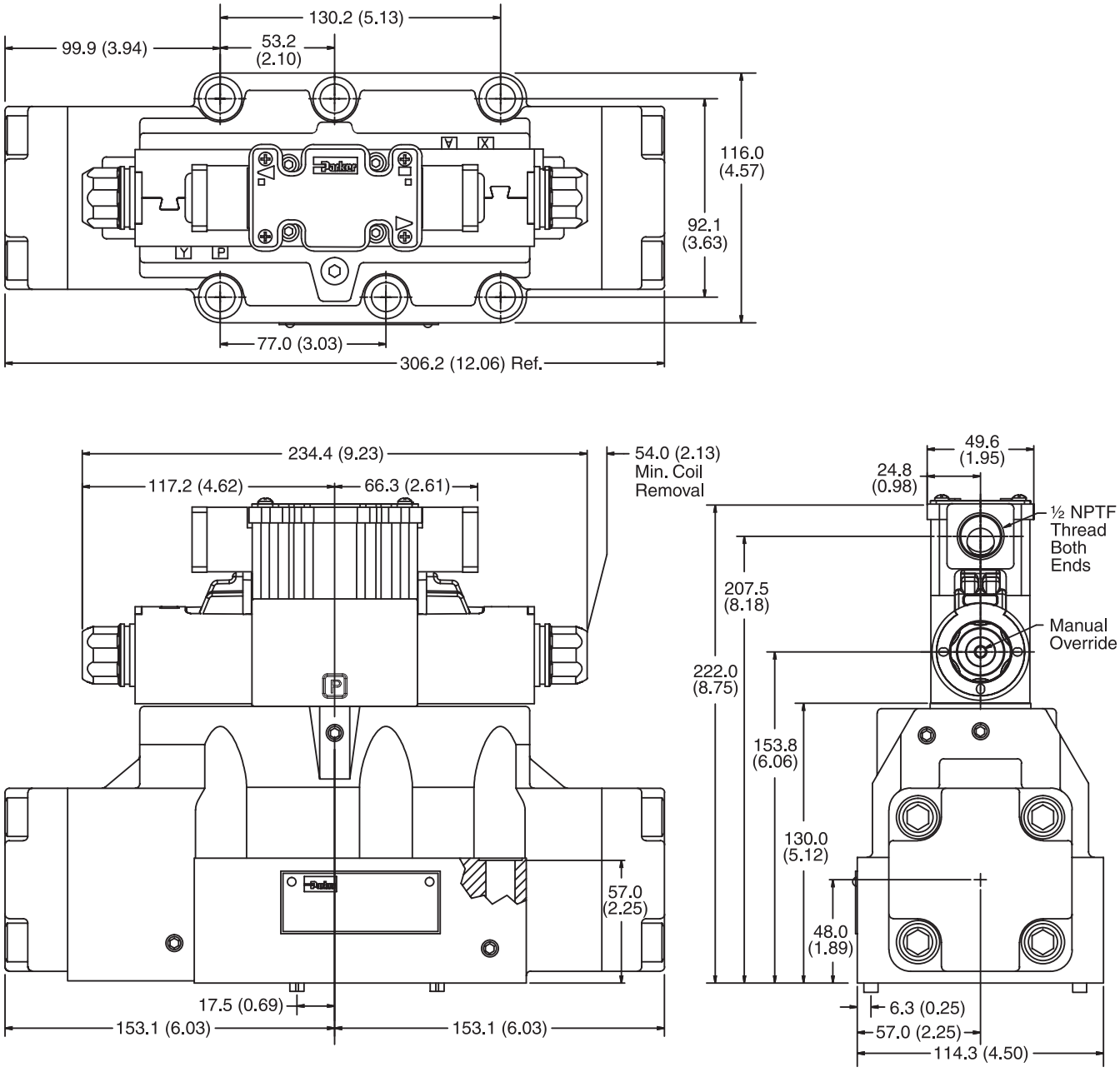
Conduit Box, Single AC Solenoid



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

A

Plug-In Conduit Box, Double DC Solenoid

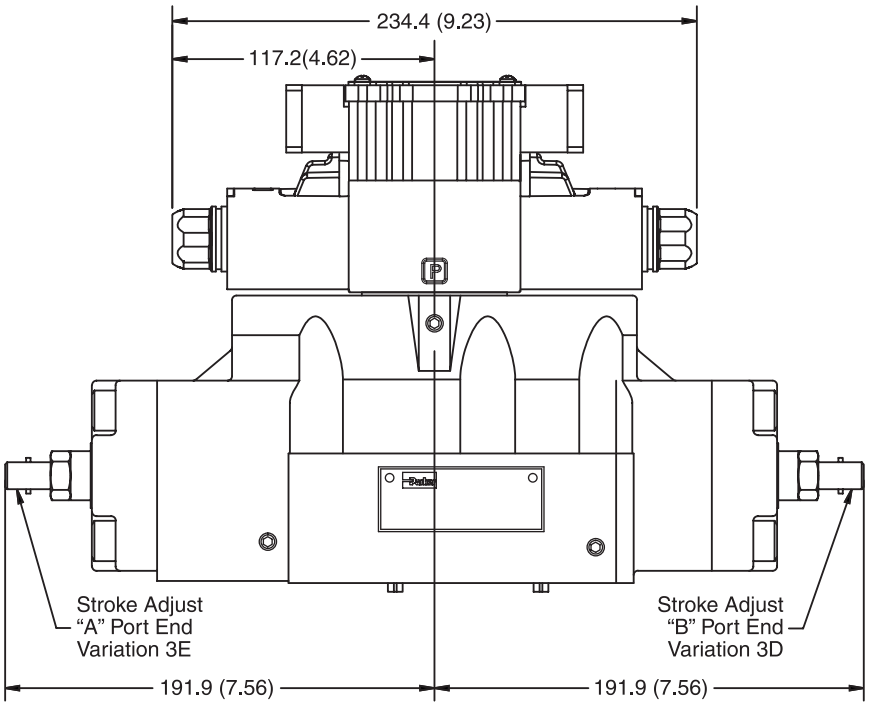


Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

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

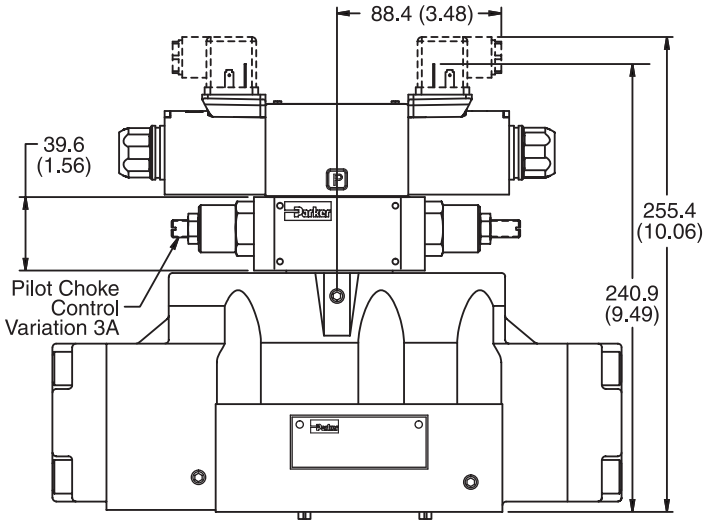
A

Plug-In Conduit Box and Stroke Adjust, Double DC Solenoid

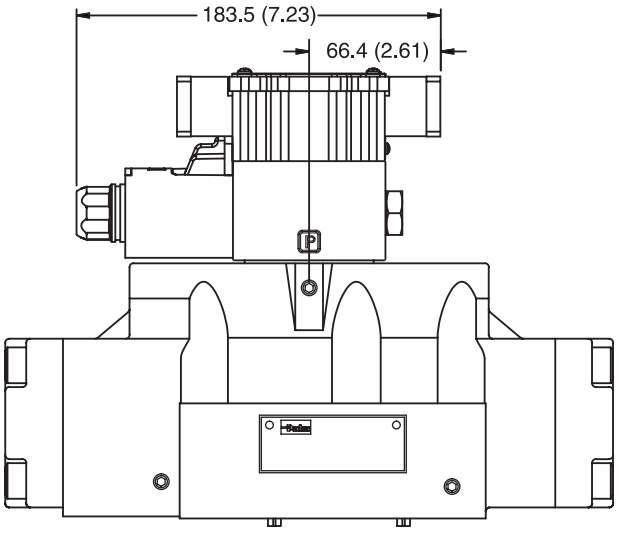


Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

Hirschmann and Pilot Choke Control, Double DC Solenoid



Plug-In Conduit Box, Single DC Solenoid

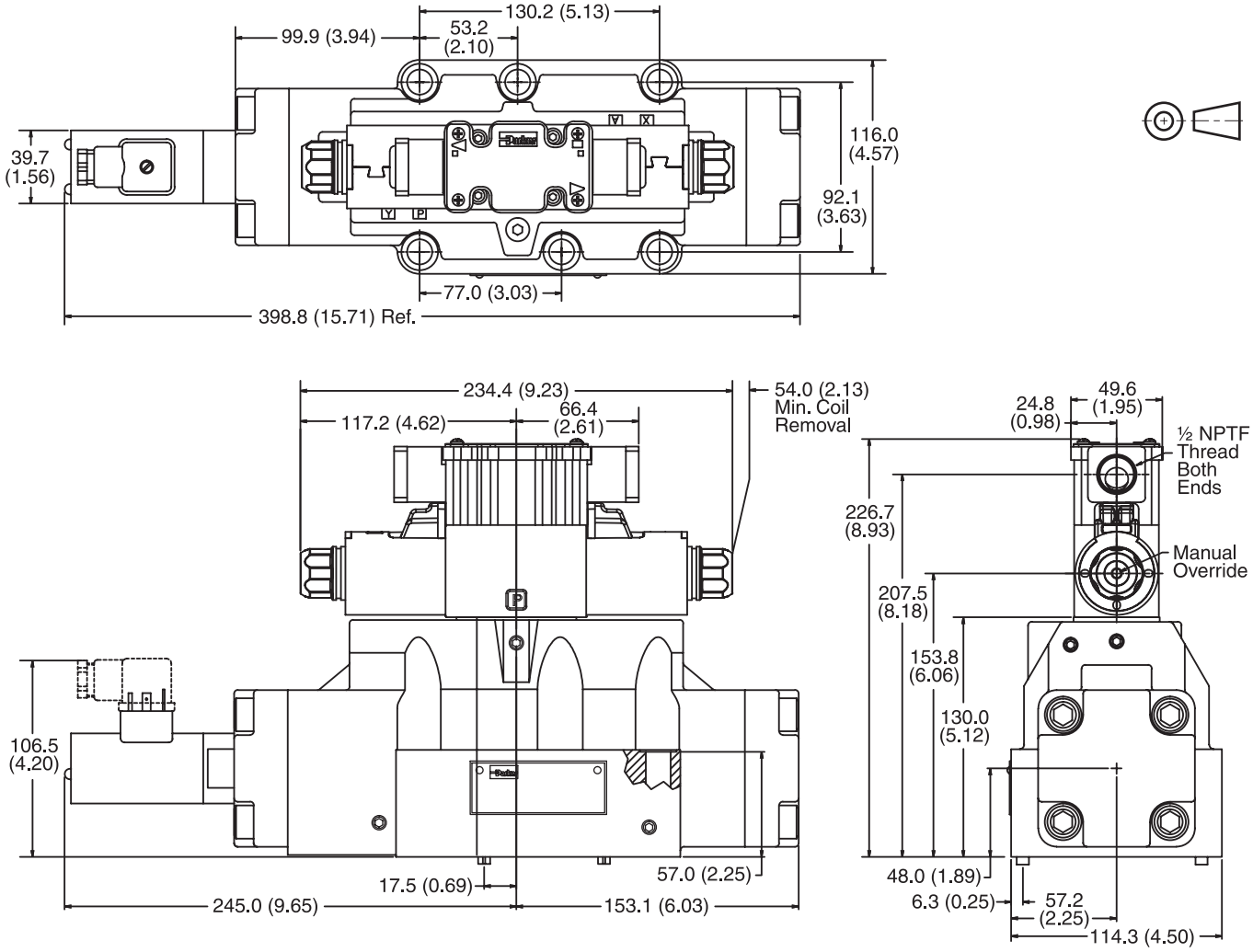


D81.indd, dd

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

A

Plug-In Conduit Box, Double AC Solenoid
with Variation I3 (Monitor Switch)

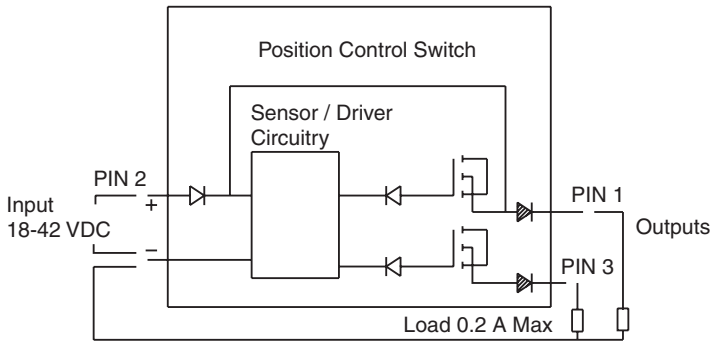


Monitor Switch
(Variation I3 and I6)

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

Switch Data

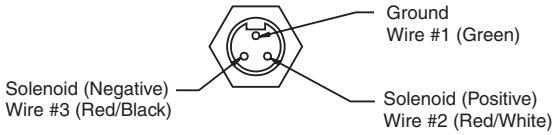
Pin 1 and Pin 3 have outputs equal to the input. When the monitor switch has the output to Pin 1, Pin 3 will have an output of zero, and vice-versa. When the valve is switched, Pin 1 and Pin 3 will switch outputs.



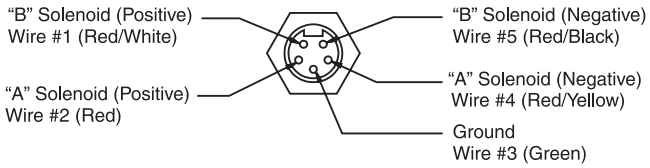
A

Manaplug (Options 56 & 1C)

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

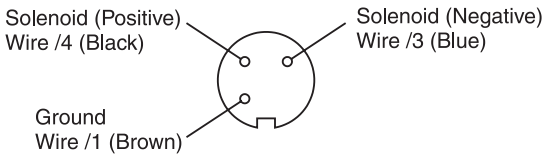


3-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid

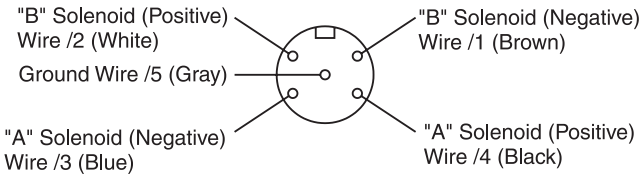


5-Pin Manaplug (Mini) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7B & 1D)



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

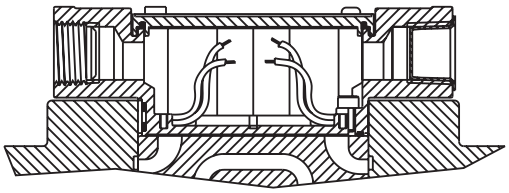


5-Pin Manaplug (Micro) with Lights
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

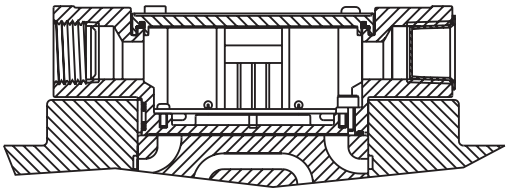
Conduit Box Option C

– No Wiring Options Available



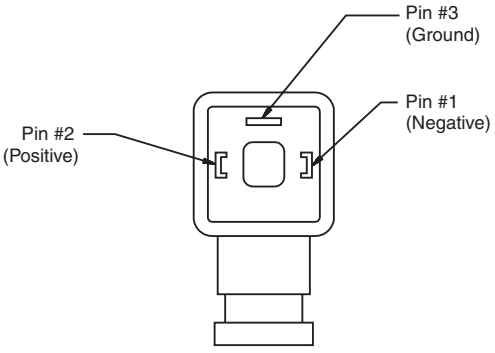
Signal Lights (Option 5) — Plug-in Only

– LED Interface
– Meets Nema 4/IP67



Hirschmann Plug with Lights (Option P5)

ISO 4400/DIN 43650 Form "A"

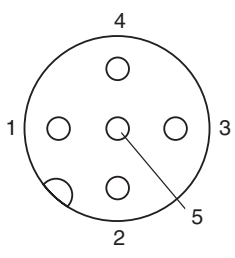


Face View of Plug

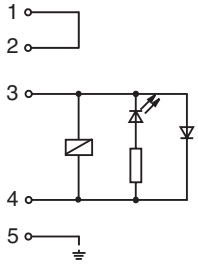
DESINA Connector (Option D)

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)

D81.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA