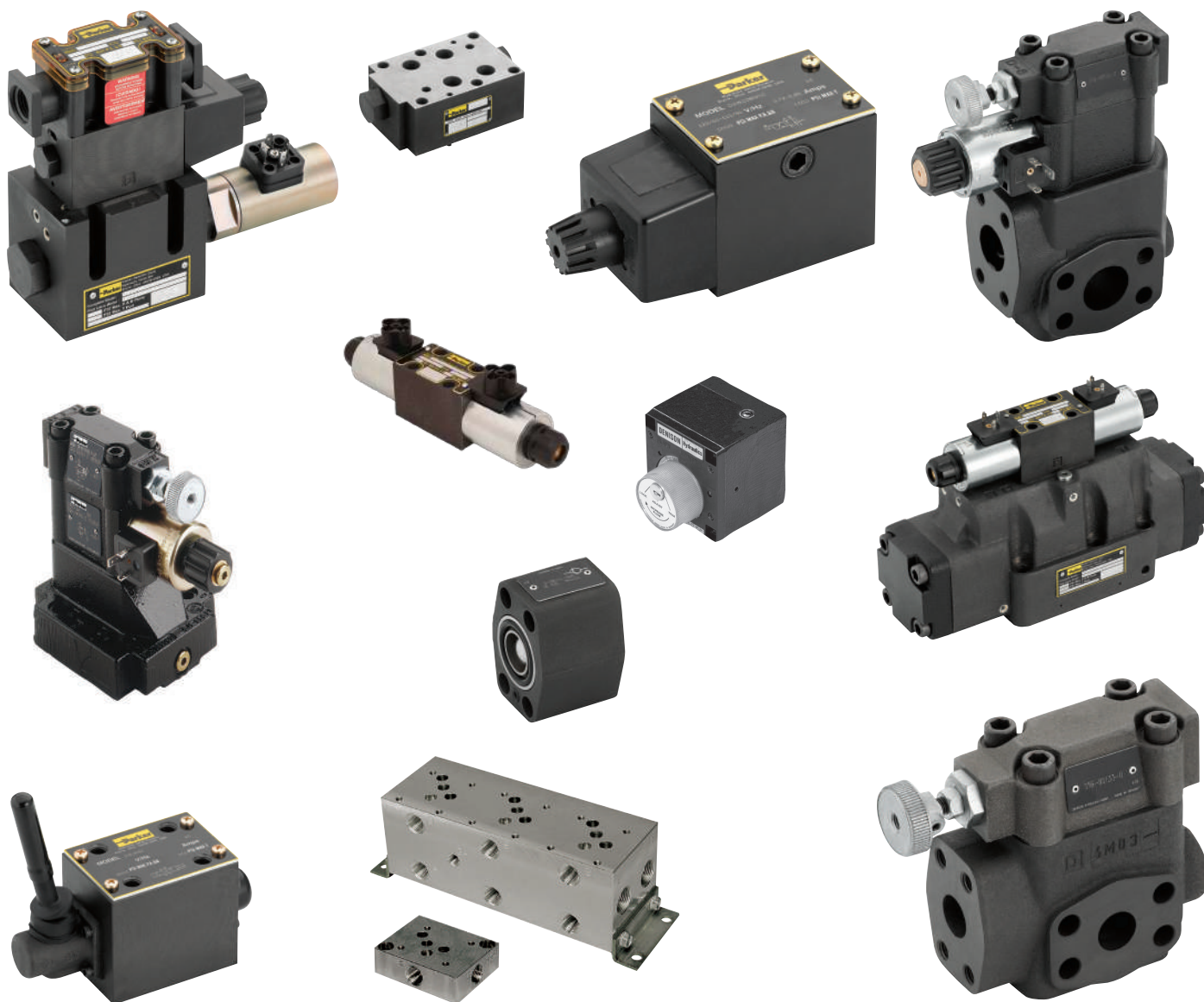




INDUSTRIAL HYDRAULIC VALVES

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

Revision History		
Date	Rev Level	Description
6/12/2026	-	Release



WARNING - USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

OFFER OF SALE

The items described in this document are hereby offered for sale by Parker-Hannifin Corporation, its subsidiaries or its authorized distributor. This offer and its acceptance are governed by the provisions stated in the detailed "Offer of Sale" Available from your local Parker representative.

Safety Guide

For safety information, see Safety Guide SG HY14- 1000 at www.parker.com/safety or call 1-800-CParker.

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If you have questions about the products contained in this catalog, or their applications, please contact:

Hydraulic Valve Systems Division

phone: 1-440-366-5100

email: HVD.Support@support.parker.com

Extra care is taken in the preparation of this literature, but Parker is not responsible for any inadvertent typographical errors or omissions.

Information in this catalog is only accurate as of the date of publication.

For a more current information base, please consult the division web site at

www.parker.com/hvs

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Position Paper of HCD regarding machinery directive 2006/42/EG DIN EN ISO 13849

Products made by the Hydraulic Controls Division (HCD) of Parker Hannifin GmbH are excluded from the scope of the machinery directive following the "VDMA Position Paper on the implementation of the Machinery Directive 2006/42/EC in the Fluid Power Industry" (Rev. 23.06.2010).

The only exceptions are products that comply to the definition of a safety component (defined in article 2 c) of the machinery directive.

All HCD products are designed and manufactured considering the basic, as well as, the proven safety principles according to EN 13849-2:2012, so that the machines in which the products are incorporated meet the essential health - and safety requirements.

Components that fall within the scope of DIN EN ISO 13849-1, *Safety of machinery - Safety related components of controls - part 1: General principles for design*, do not necessarily have to be placed on the market as safety components in accordance with the machinery directive. A component that is placed on the market, but not as a safety component, does not necessarily provide a lower safety level.

Confirmations for components to be proven components, e.g. for validation of hydraulic systems, can only be provided after an analysis of the specific application, as the fact to be a proved component mainly depends on the specific application.

MTTF_d values for our products are part of the technical data within our catalogue.

B10_d, DC and CCF values depend on cycle time, running time and system design. Therefore they can only be provided application specific.

Position Paper Machinery Directive 2006/42/EG “Safety Components”

Parker Hannifin GmbH confirms, that our safety components comply with the machinery directive 2006/42/EC, as long as they are used as intended. The EC Declaration of conformity includes possible conformity to other directives as well.

Safety components are:

Pressure relief valves according to directive 97/23/EG

Type R4V*V, R4V*W

Type R6V*V, R6V*W

Type DSDU 578 P20E TÜV

Type DSDU 1078 E*E TÜV

Intended usage:

Pilot operated pressure relief valves to limit a maximum pressure, pre-adjusted unchangeable to this maximum pressure.

The intended usage is provided as long as the valves are integrated into the system as follows:

- P-port connected directly to the point where the pressure should be limited
- T-port connected directly to tank without any backpressure

Size of the valve and the pipes have to be matched to the maximum possible flow and pressure.

Clamping valves according to EN 201:2010

2-way slip-in cartridges Type C10C1 E-SC, C10C3 E-SC

Type C13-DEC 107-SC, C18-DEC 107-SC

Direct operated directional control valves NG06 Type D1VW*-SC, D1DW*-SC

Direct operated directional control valves NG10 Type D3W*-SC, D3DW*-SC

Pilot operated directional control valves NG10 Type D31DW*-SC

Pilot operated directional control valves NG16 Type D41VW*-SC

Pilot operated directional control valves NG25 Type D81VW*-SC, D91VW*-SC

Intended usage:

To be incorporated into hydraulic presses according to DIN EN 693:2011.

Declaration conformity is valid from 29.12.2009 for all new above listed products. For earlier delivered products, conformity is not possible to declare.

The declaration of product conformity does not include a declaration of conformity for the machinery in which our product is incorporated. The conformity for the machinery only can be declared by the person who places the machinery on the market inside the EU for the first time.

If the listed components are incorporated in already used machinery (placed on the market before 1995) and if they do not change the function of this machinery significantly, the machinery must not be put into operation until the conformity of the machinery to national regulations, especially safety regulations, is declared.

If the function of the machinery is changed significantly, conformity to the machinery directive 2006/42/EC has to be declared.

A declaration of conformity according to machinery directive 2006/42/EC for other Parker products has to be proved depending on the special application.

Directional Control Valves

D1V - Introduction

A5

WWW.SUMY.IR

Application

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

Operation

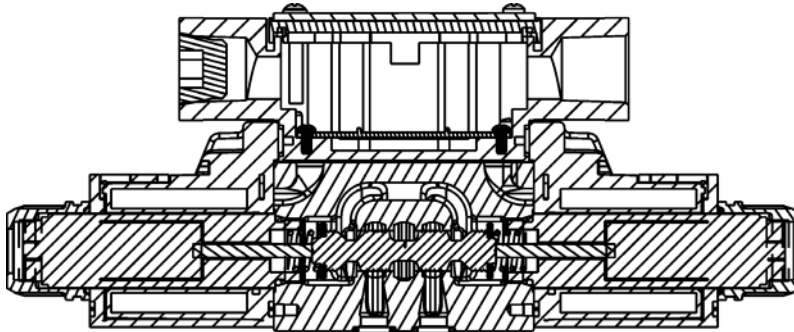
Series D1V directional control valves consist of a 4-chamber style body, and a case hardened sliding spool. The spool is directly shifted by a variety of operators including: solenoid, lever, cam, air or oil pilots.

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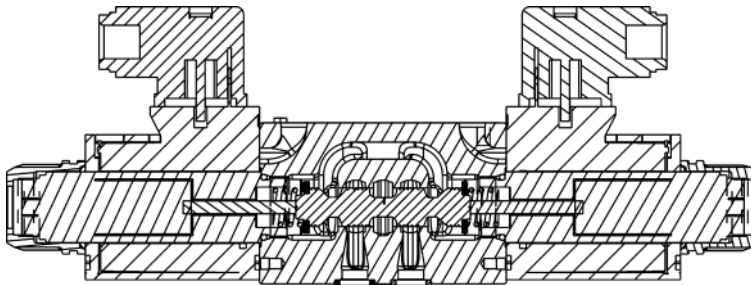
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D1W Solenoid Operated Plug-In Conduit Box Style



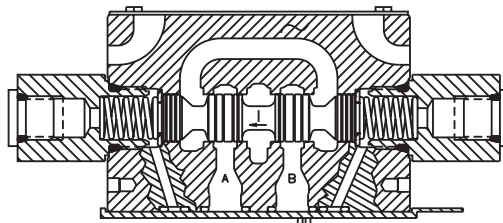
- Easy access mounting bolts.
- Waterproof NEMA 4, IP67.
- No tools required for coil removal.
- 15 standard spool styles available.
- Four electrical connection options.
- Lights included (CSA approval and CE approval).
- Easy coil replacement.
- Plug-In design offered with lights & other options.

D1W Solenoid Operated Hirschmann (DIN) Style



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

D1VP Oil Pilot Operated



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

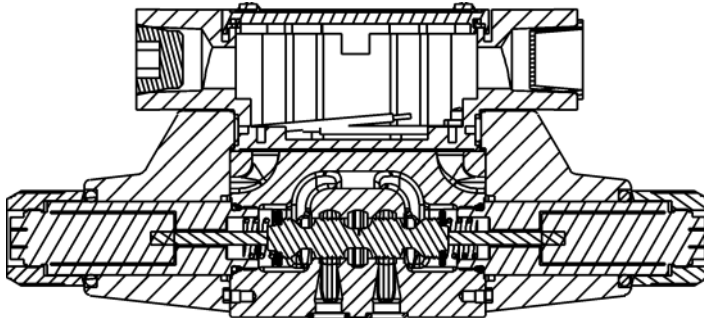
 **WARNING:** This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Electrical Connections

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

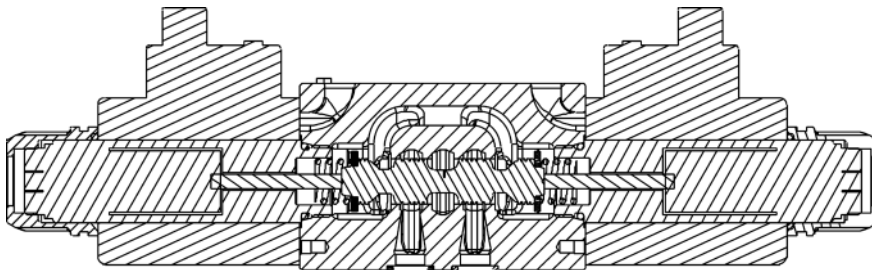
Plug-in Conduit Box	Explosion Proof	Dual Spade (DC only)
DESINA (DC only)	Hirschmann (DIN)	Wire Lead Conduit Box
Deutsch (DC only)	Metri-Pack (DC only)	

D1VW Solenoid Operated Wire Lead Conduit Box Style



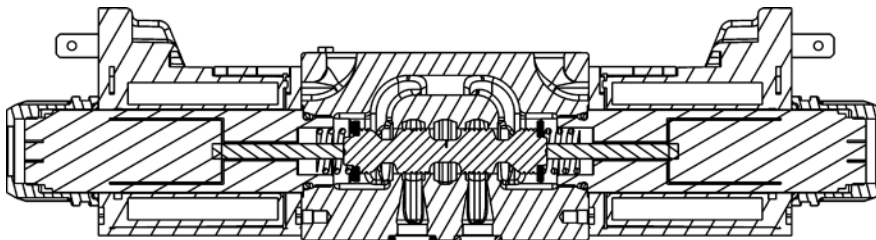
- Easy access mounting bolts.
- Waterproof NEMA 4, IP67.
- No tools required for coil removal.
- 15 spool styles available.
- No lights available

D1VW Solenoid Operated DESINA Style



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

D1VW Solenoid Operated Dual Spade Style



- Dual spade connection (SAE Style 1B).
- Easy coil replacement.
- 15 standard spool styles available.
- 12 VDC, 30 watt only.

Directional Control Valves

D1V - Introduction

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WWW.SUMY.IR

Features

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

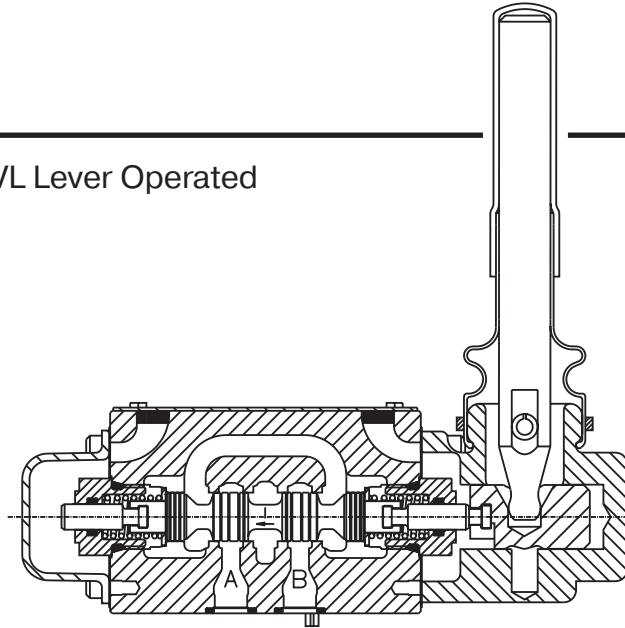
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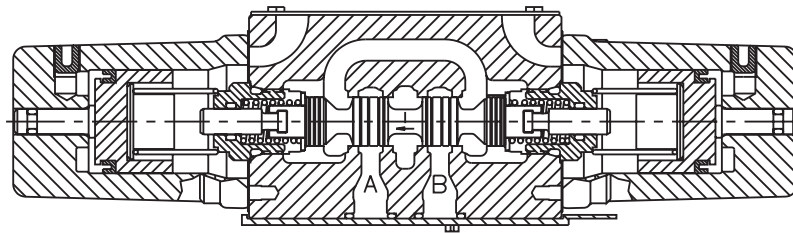
D1VL Lever Operated

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



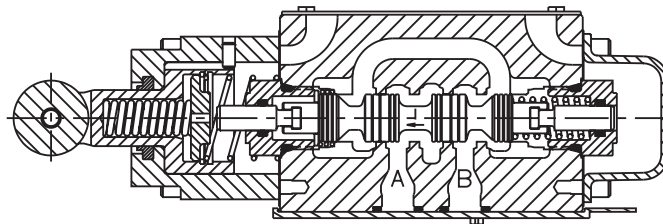
D1VA Air Operated

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

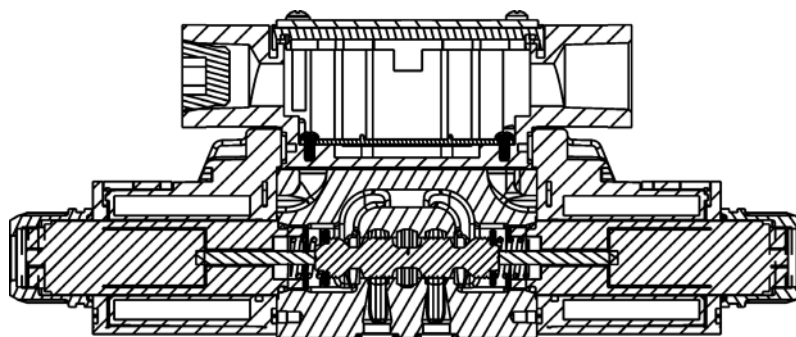


D1VC Cam Operated

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

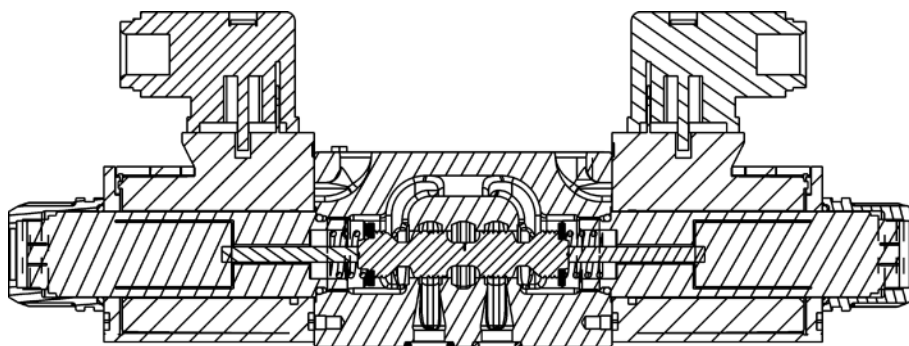


D1W AC Input Solenoid Operated Soft Shift



- 3 standard orifice sizes available.
- 15 spool styles available.
- AC Rectified or DC input.

D1W DC Solenoid Operated Soft Shift

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Directional Control Valves

D1V - Technical Information

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Standard Spool Reference Data				
Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction		
		High Watt DC	Low Watt AC	Low Watt DC
D1V*001		78 (20)	49 (13)	37 (10)
D1V*002		78 (20)	45 (12)	68 (18)
D1V*003		70 (18)	30 (8)	34 (9)
D1V*004		37 (10)	30 (8)	49 (13)
D1V*006		78 (20)	49 (13)	52 (14)
D1V*007		45 (12)	18 (5)	18 (5)
D1V*008		49 (13)	45 (12)	37 (10)
D1V*009		58 (15)	45 (12)	45 (12)
D1V*011		58 (16)	30 (8)	37 (10)
D1V*015		79 (21)	30 (8)	34 (9)
D1V*020		78 (20)	45 (12)	75 (20)
D1V*026		37 (10)	11 (3)	7 (2)
D1V*030		70 (18)	18 (5)	75 (20)
D1V*081		32 (9)	26 (7)	30 (8)
D1V*082		32 (9)	26 (7)	34 (9)
NOTE: Center or De-energized position is indicated by P, A, B & T notation				

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Directional Control Valves

D1V - Technical Information

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D1VA, D1VP, D1VC, D1VL Reference Data

Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction	Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction
D1V*001		83 (22)	D1V*020 #		53 (14)
D1V*002		83 (22)	D1V*026 #		11 (3)
D1V*004		45 (12)	D1V*030 #		19 (5)
D1V*008		45 (12)	D1V*081 #		30 (8)
D1V*009		57 (15)	D1V*082 #		30 (8)

*NOTE: Center or De-energized position is indicated by P, A, B & T notation
D1VP only*

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Manaplug – Electrical Mini Plug

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

Desina – 12 mm Connector

5004109

Electrical Cords – Mini Plug

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

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

Directional Control Valves

D1V - Technical Information

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Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-10% 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 HVS 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.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (ER, ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013; Ex d IIC Gb; Ex tb IIIC Db IP66; IECEx BAS 14.0164X ATEX: EN60079-0, EN60079-1, EN60079-31; CE 1180 Ex II 2G BASEEFA08ATEX0041X CSA 22.2 No. 60079-0:07, 60079-1:07 and UL 60079-0:05, UL 60079-1:05; CSA listed to US and Canada Safety Standards. File 08-CSA-1932102 CSA Ex d IIC, AEx d IIC for Class I Zone 1; Class I Div 1 Grp. C & D; Class II Div 1 Grp. E, F & G

* Allowable Voltage Deviation +/-10%

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3 mm	Watts	Resistance
Voltage Code	Power Code						
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 Ohms
E	F	24 VAC	4.8 Amps	120 VA	2.07 Amps	21 W	1.29 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
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 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	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

Explosion Proof Solenoids

Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms

Explosion Proof Solenoids (German)

J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
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ER & ET Explosion Proof Solenoids

J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

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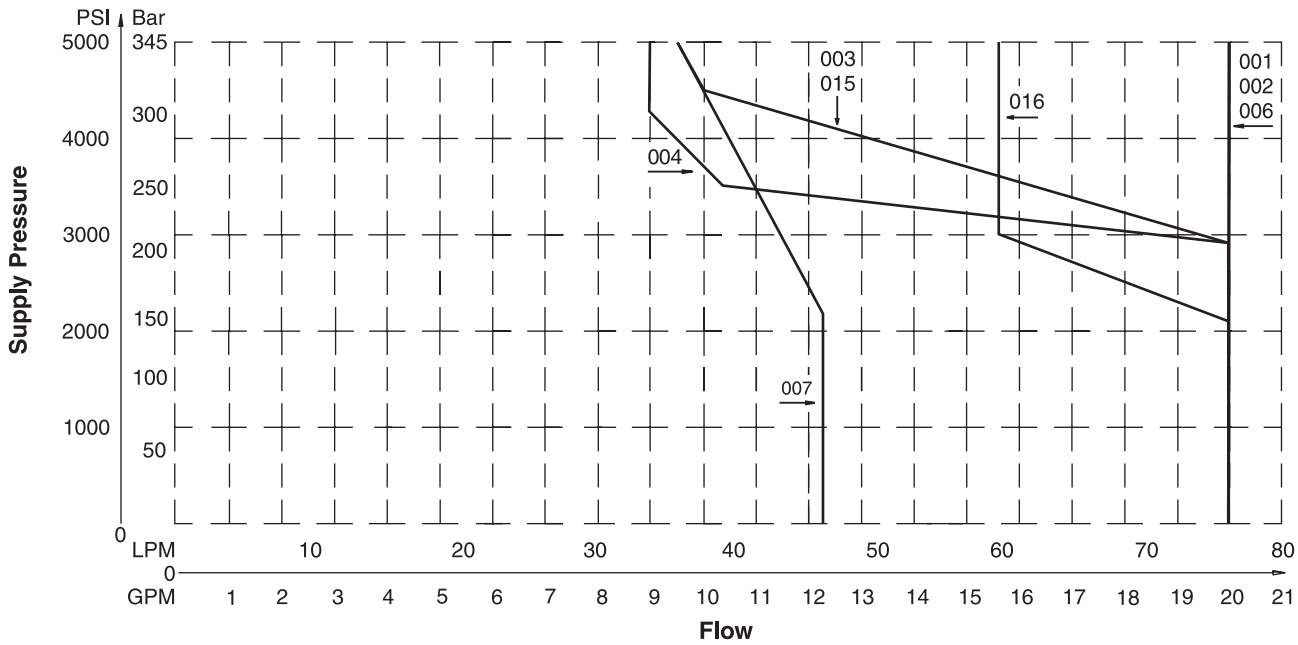
Directional Control Valves

D1V - Performance Curves

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D1V Shift Limits, DC & AC Rectified 30 Watt



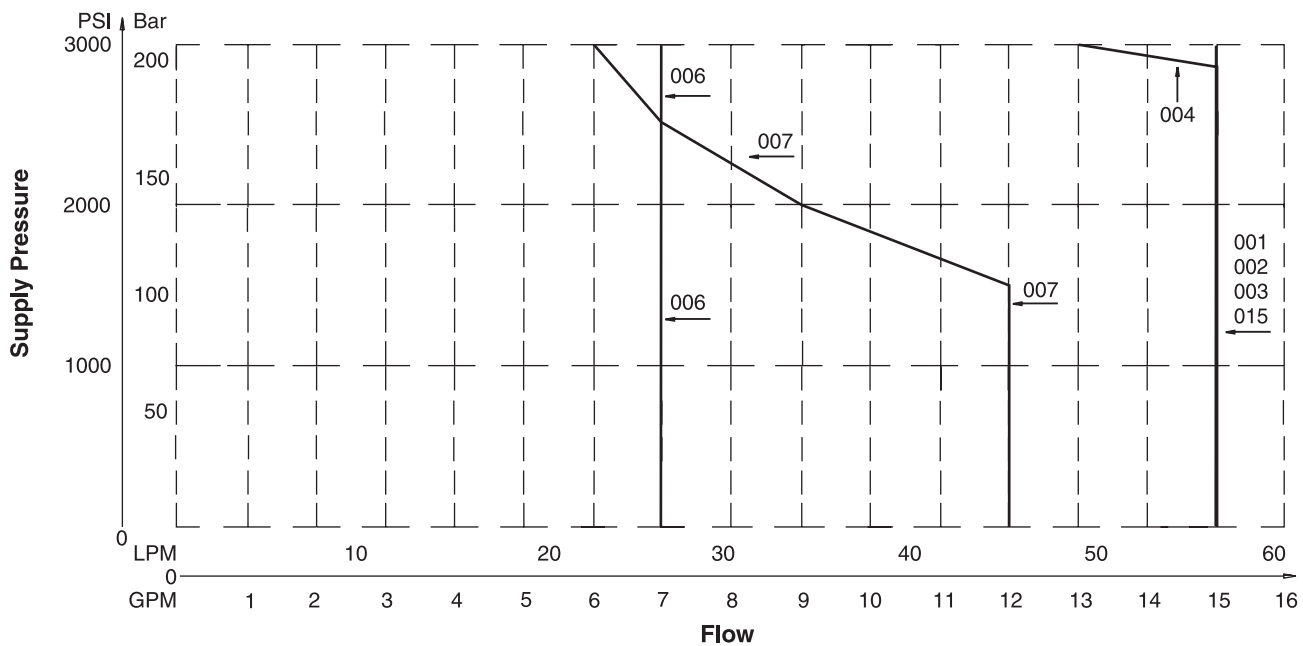
Example:

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

Important Notes for Switching Limit Charts

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

D1W*****L Shift Limits



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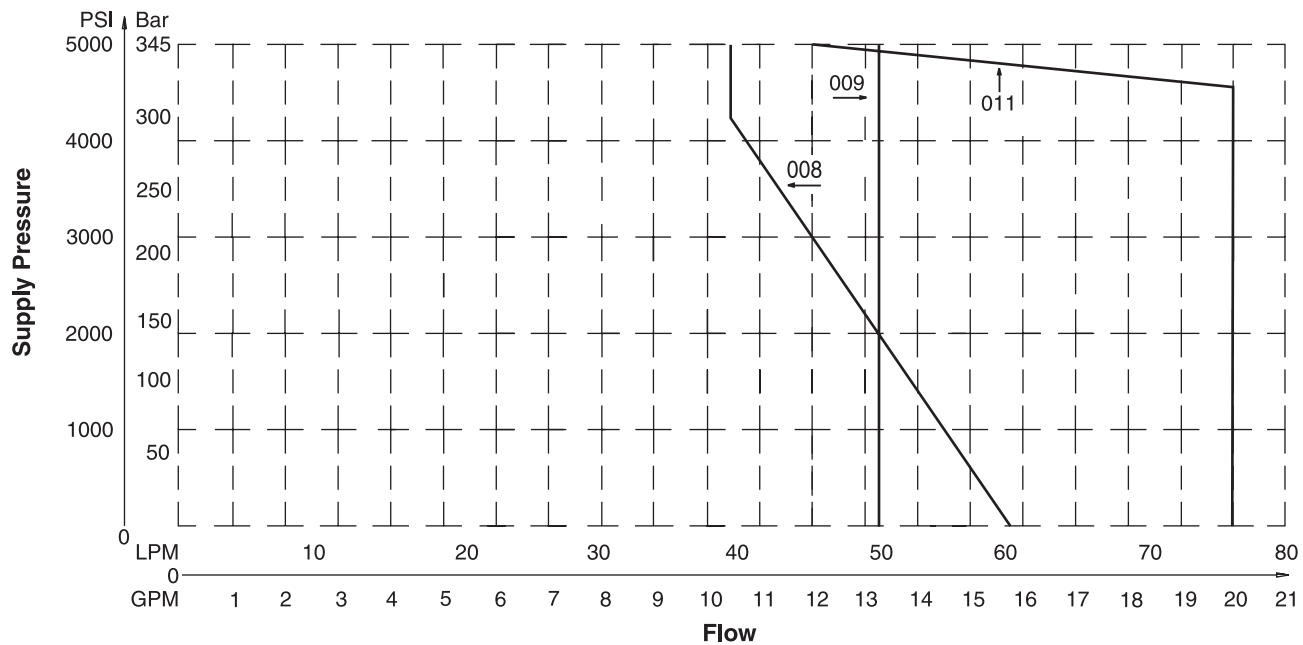
Directional Control Valves

D1V - Performance Curves

A13

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D1V Shift Limits, DC & AC Rectified 30 Watt



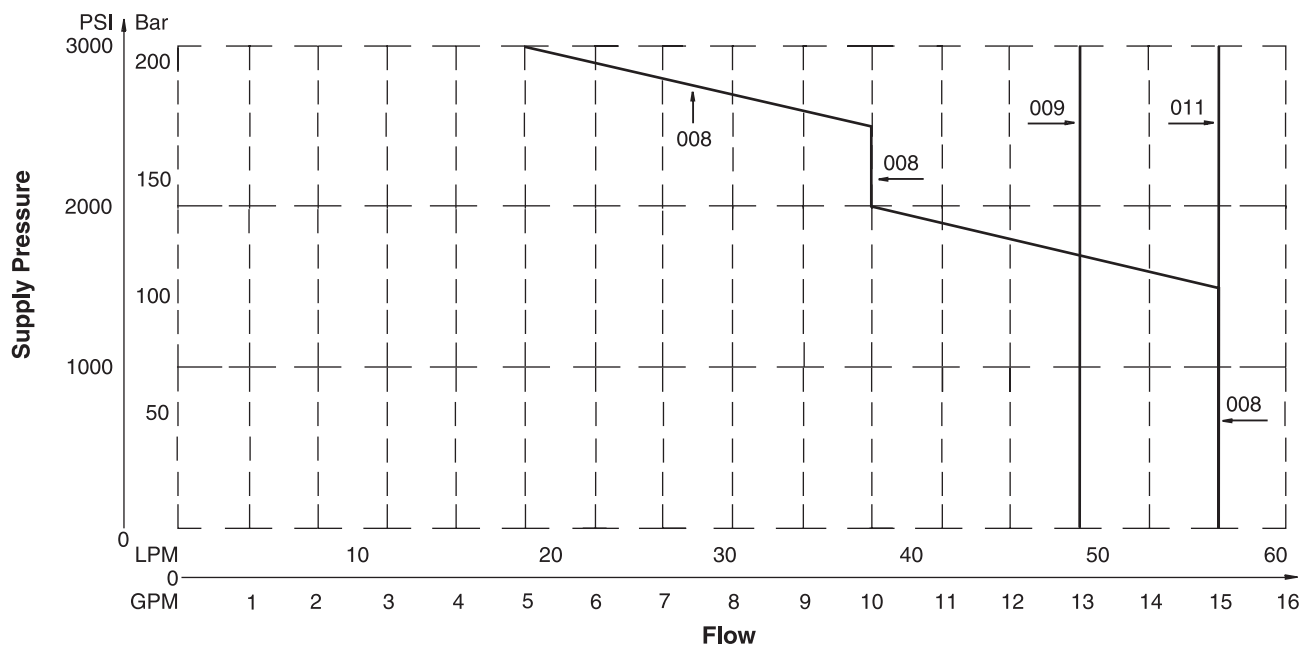
Example:

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

Important Notes for Switching Limit Charts

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

D1W*****L Shift Limits



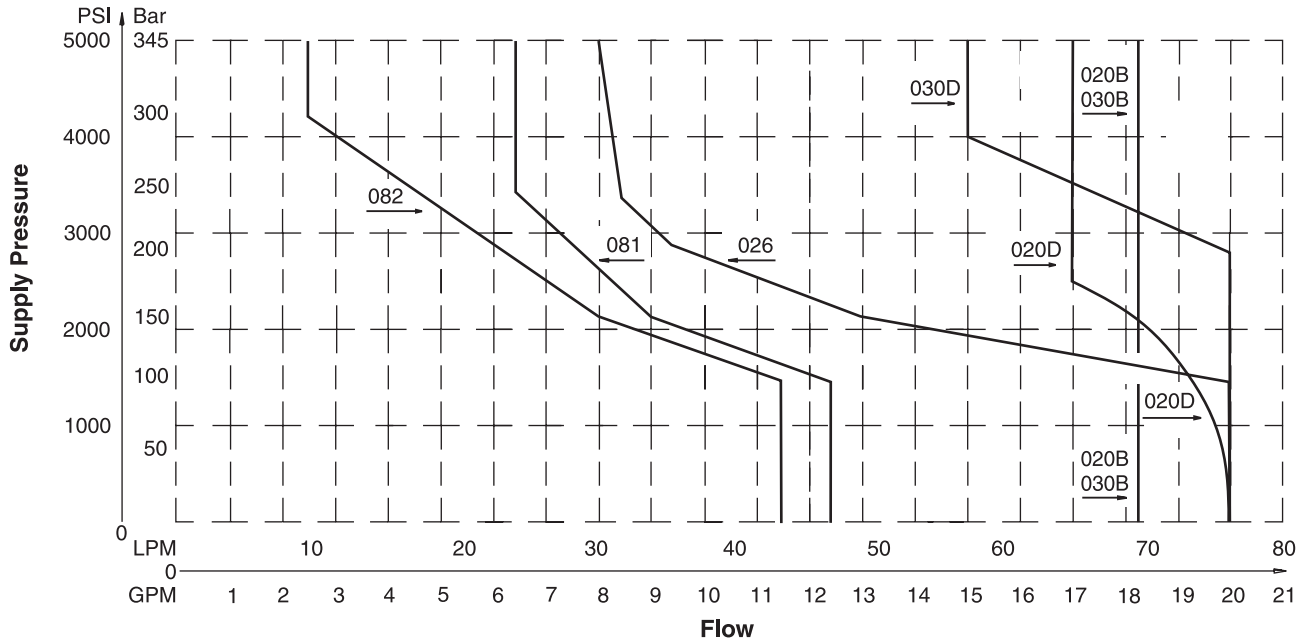
Directional Control Valves

D1V - Performance Curves

A14

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D1V Shift Limits, DC & AC Rectified 30 Watt



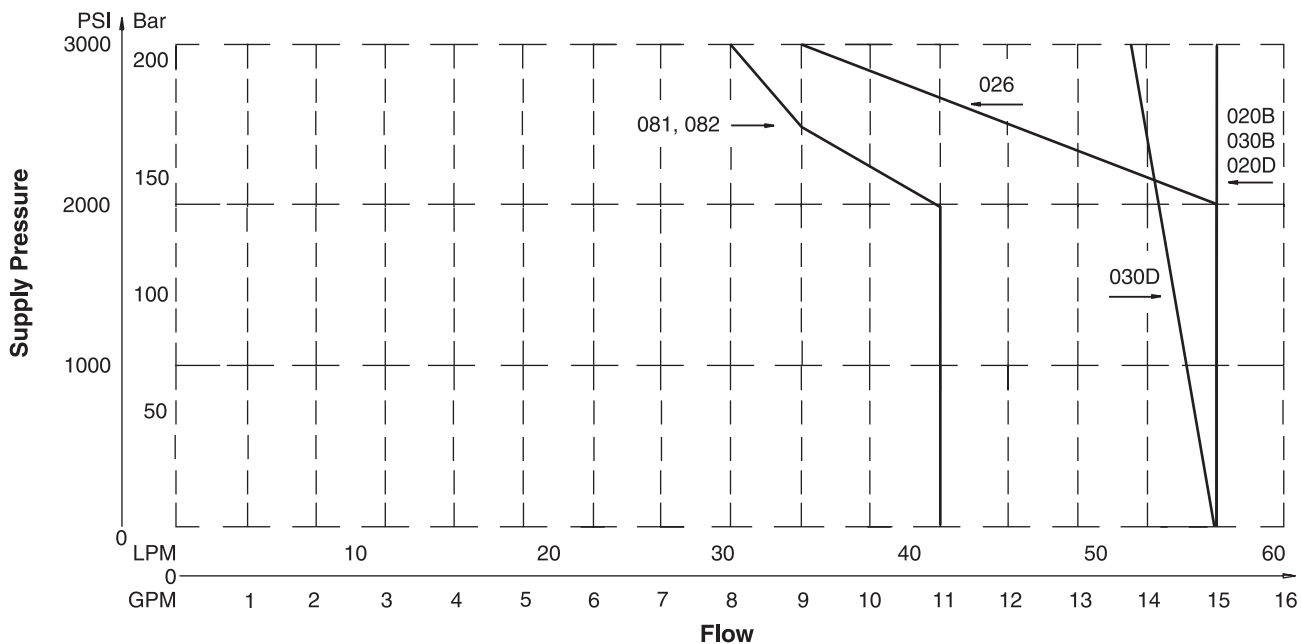
Example:

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

Important Notes for Switching Limit Charts

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

D1W*****L Shift Limits



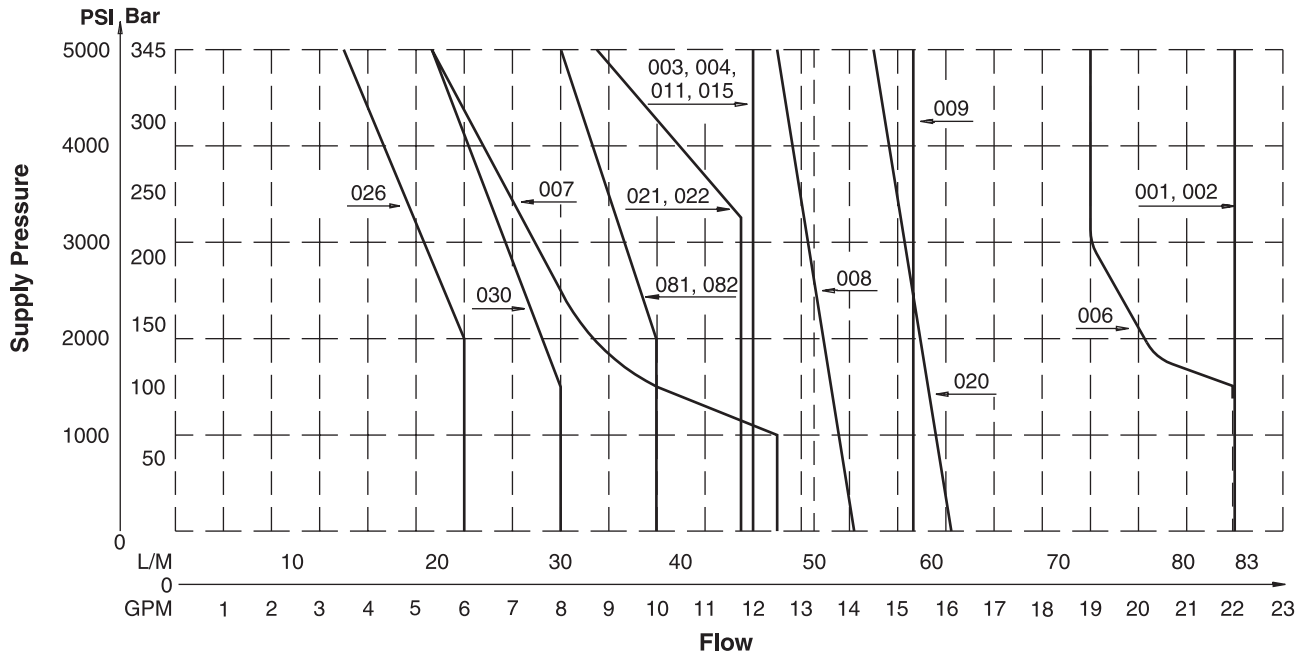
Directional Control Valves

D1V - Performance Curves

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D1V Shift Limits, AC 30 Watt



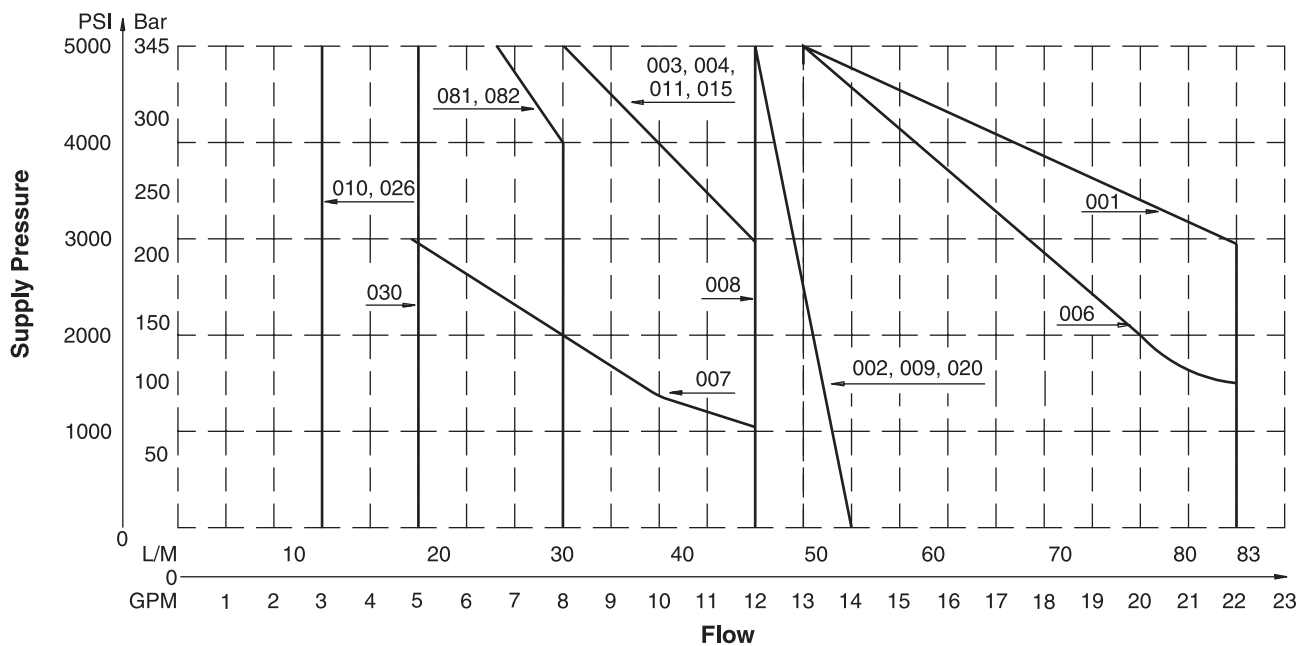
Example:

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

Important Notes for Switching Limit Charts

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

D1W*****F Shift Limits, AC



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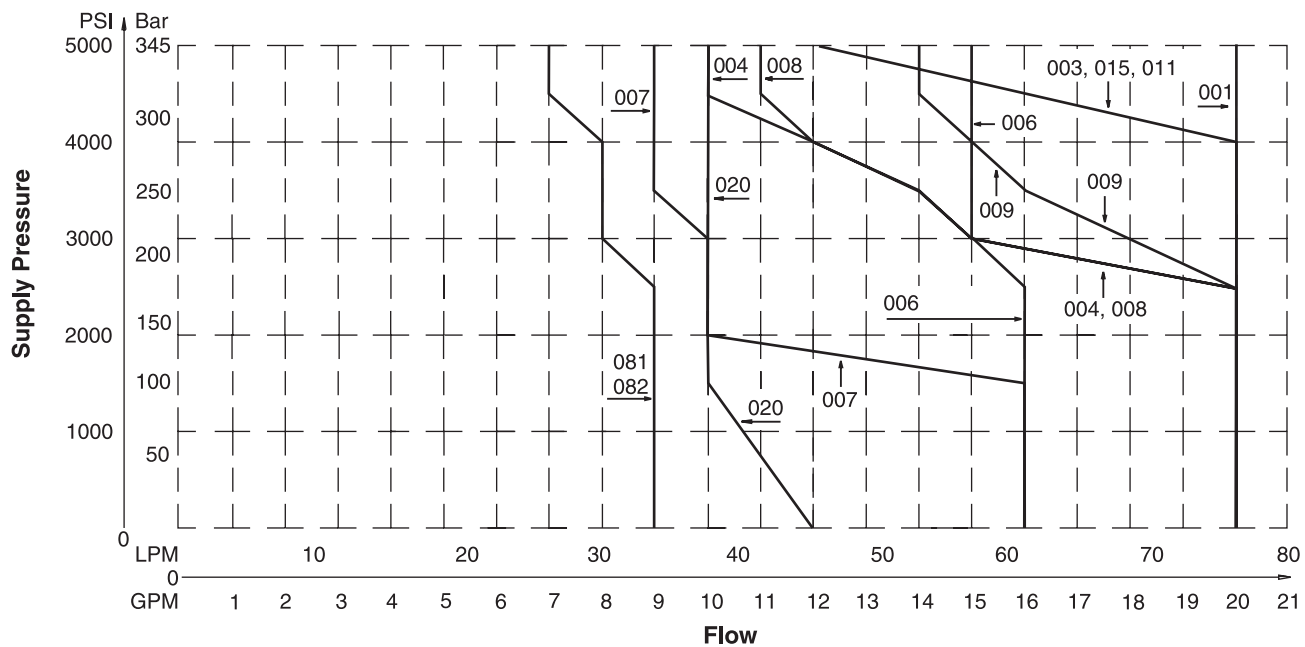
D1V - Performance Curves

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Soft Shift Limit Curves

DC Power Supply



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Directional Control Valves

D1V - Technical Information

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Pressure Drop vs. Flow, High Watt

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

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

D1VW Pressure Drop Reference Chart – 30 Watt Coil											
Spool No.	Curve Number										
	Shifted				Center Condition						
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	2	–	–	–	–	–	–	–
002	2	2	1	1	2	1	1	1	1	1	1
003	2	2	1	1	–	–	–	–	–	1	–
004	2	2	1	1	–	–	–	–	–	2	2
006	2	2	1	1	–	6	6	6	6	–	–
007	2	3	1	1	4	–	1	–	–	–	–
008	5	5	5	5	5	–	–	–	–	–	–
009	4	4	4	4	4	–	–	–	–	–	–
011	3	3	1	1	–	–	–	–	–	8	8
015	2	2	1	1	–	–	–	–	–	–	1
020	4	4	2	2	–	–	–	–	–	–	–
026	4	4	–	–	–	–	–	–	–	–	–
030	2	2	1	1	–	–	–	–	–	–	–
081	7	7	8	8	–	–	–	–	–	–	–
082	7	7	8	8	–	–	–	–	–	–	–

A

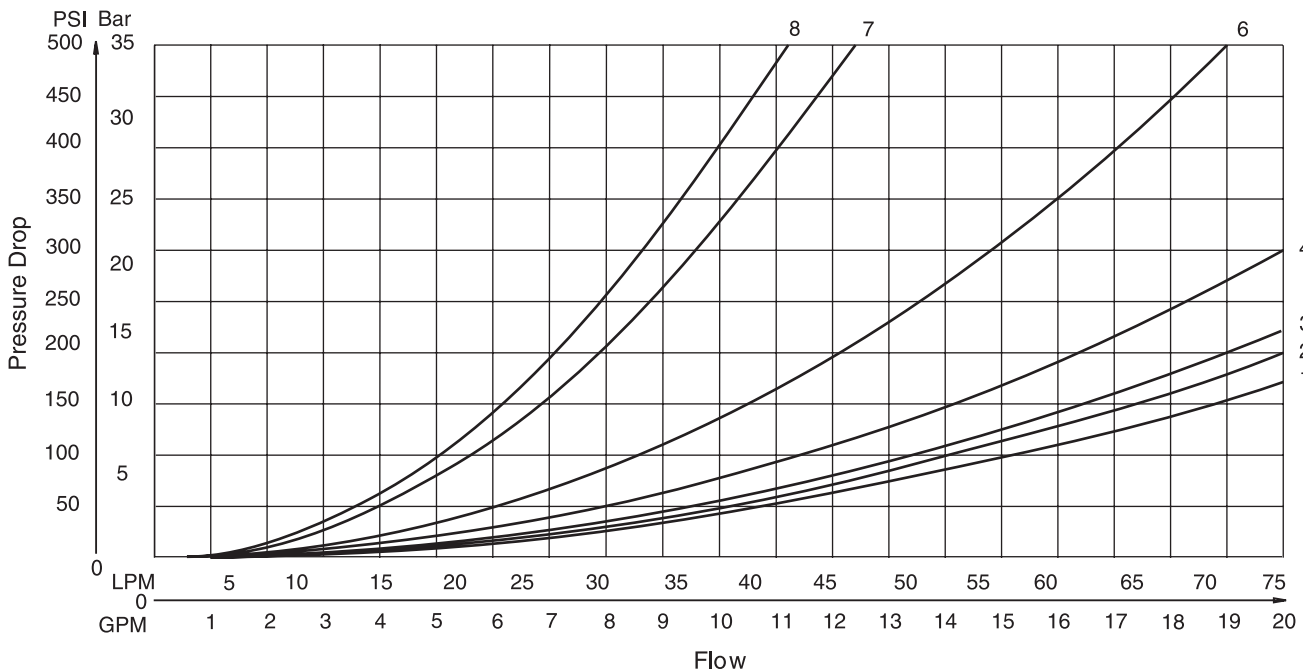
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Viscosity Correction Factor

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

Performance Curves – 30 Watt Coil



Directional Control Valves

D1V - Technical Information

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WWW.SUMY.IR

Pressure Drop vs. Flow, High Watt

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

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

D1VW Pressure Drop Reference Chart – 30 Watt Coil											
Spool No.	Curve Number										
	Shifted				Center Condition						
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	2	–	–	–	–	–	–	–
002	2	2	1	1	2	2	2	2	2	1	1
003	3	3	2	1	–	–	–	–	–	4	–
004	3	3	1	1	–	–	–	–	–	6	6
006	3	3	1	1	–	8	8	7	7	–	–
007	3	3	1	1	5	–	4	–	–	–	–
008	5	5	6	6	7	–	–	–	–	–	–
009	6	6	6	6	5	–	–	–	–	–	–
011	3	3	1	1	–	–	–	–	–	11	11
015	3	3	1	2	–	–	–	–	–	–	4
020	7	7	4	4	–	–	–	–	–	–	–
026	6	6	–	–	–	–	–	–	–	–	–
030	2	2	1	1	–	–	–	–	–	–	–
081	9	9	10	10	–	–	–	–	–	–	–
082	10	10	10	10	–	–	–	–	–	–	–

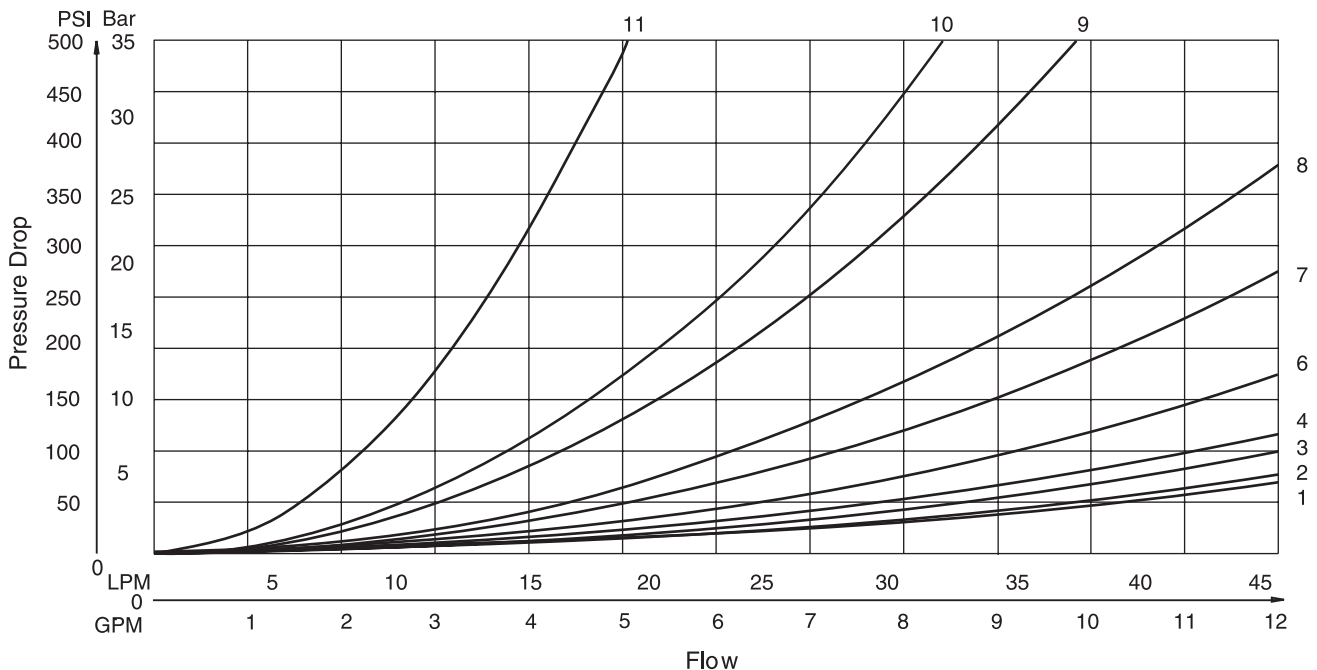
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Viscosity Correction Factor

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

Performance Curves – 10 Watt Coil



Directional Control Valves

D1VW (Solenoid Operated) - Technical Information

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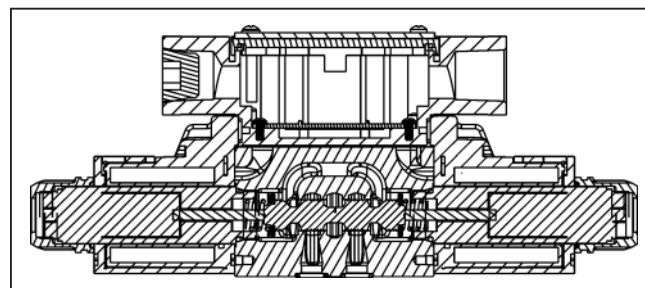
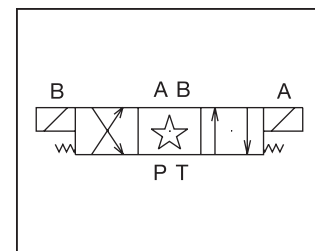
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General Description

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

Features

- Soft shift available.
- Thirteen standard spool styles available (for other spools – Consult Factory).
- Two proportional spools.
- DC surge suppression.
- Seven electrical connection options.
- AC & DC lights available (CSA approval for solenoids and lights).
- Internally ground.
- Easy access mounting bolts.
- Waterproof (meets NEMA 4, up to IP69 on some models).
- Explosion proof.



- CSA approvals. CE approvals and Dual Rated approvals available.
- U.L. recognized coils standard, expect Expl Pf.
- No tools required for coil removal.
- AC rectified coils.

Specifications	
Mounting Pattern	NFPA D03, CETOP 3, NG 6
Mounting Interface	DIN 24340-A6 ISO 4401-AB-03-4-A CETOP R35H 4.2-4-03, NFPA D03
Maximum Pressure	P, A, B 345 Bar (5000 PSI) Standard 207 Bar (3000 PSI) 10 Watt CSA 276 Bar (4000 PSI) Tank: 103 Bar (1500 PSI) AC only 207 Bar (3000 PSI) DC/AC Rectified Standard 207 Bar (3000 PSI) AC Optional CSA 103 Bar (1500 PSI)

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

Response Time

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

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

Soft Shift	Orifice Size	Voltage	Spool Center Condition					
			Closed		Open		2-Position	
			Energize	De-Energize	Energize	De-Energize	Energize	De-Energize
S2	0.020	AC	175 ms	700 ms	600 ms	800 ms	150 ms	200 ms
		DC	200 ms	650 ms	700 ms	650 ms	175 ms	225 ms
S3	0.030	AC	150 ms	400 ms	500 ms	600 ms	100 ms	150 ms
		DC	125 ms	325 ms	550 ms	550 ms	100 ms	100 ms
S4	0.040	AC	125 ms	300 ms	450 ms	500 ms	100 ms	100 ms
		DC	100 ms	250 ms	500 ms	450 ms	75 ms	60 ms

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Industrial
Hydraulics Valves

MSG14-2500/US
Directional Control Valves

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Directional Control Valves

D1WW (Solenoid Operated) - Ordering Information

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Code	Description
1V	NFPA D03 CETOP 03 DIN NG06

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 D1VHW***.

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

Code	Symbol
001	
002	
003	
004	
006	
007	
008*, 009**	
011	
015	
020*	
026*	
030**	
081†	
082†	

* 008, 020, and 026 spools have closed crossover.
** 009 and 030 spools have open crossover. Only DC or AC rectified.
† Only DC or AC rectified.

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
D†#	120 VDC
E*	24/60 - 24/50 VAC
J	24 VDC
K**	12 VDC
Q††#	100/60 VAC
QD††#	100 VAC/60 Hz - 100 VAC/50 Hz
T^	240/60 - 220/50 VAC
U***#	98 VDC
Y	120/60 - 110/50 VAC

High watt only.
* Leadwire only, low watt only.
** DIN, low watt available.
*** Leadwire not available.
^ Plug-in is low watt only.
† DIN & Leadwire only.
†† DIN only.

Code	Description	Symbol
A*	Double solenoid, 2-position, no springs.	
B**	Single solenoid, 2-position, spring offset. P to A and B to T in offset position.	
C	Double solenoid, 3-position, spring centered.	
D†	Double solenoid, 2-position, detent.	
E	Single solenoid, 2-position, spring centered. P to B and A to T when energized.	
F†	Single solenoid, 2-position. Spring offset, energized to center. Position spool spacer on A side. P to A and B to T in spring offset position.	
H**	Single solenoid, 2-position, spring offset. P to B and A to T in offset position.	
K	Single solenoid, 2-position, spring centered. P to A and B to T when energized.	
M†	Single solenoid, 2-position, spring offset, energized to center position. Spool spacer on B side. P to B and A to T in spring offset position.	

* 020 spool only.
** 020, 026, and 030 spools only.
† 020 and 030 spools only. Must be standard high watt coil (30 watt) or L (10 watt coil) only (stroke is reduced by 0.5mm, therefore max flow is reduced to 13 - 14 GPM). Not available with F (low watt) coil option for AC coils 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.

Directional Control Valves

D1WW (Solenoid Operated) - Ordering Information

A21

WWW.SUMY.IR

Code	Description
C*	Leadwire Conduit Box
D**	Metric Plug (M12X1) DESINA
E†	Explosion Proof
F^	Flying Leadwire
G††	Plug-In Conduit Box
J++	Deutsch (DT04-2P)
P	DIN with Plug
S‡	Double Spade
W†	DIN w/o Plug

* No conduit box variations – See Plug-in G.
** 24 VDC only, low watt only, lights, diode surge suppressor, not CSA approved.
† Not available with lights.
†† Required for variations on conduit box style, must have lights.
++ 12 and 24 VDC only.
‡ Only 12 VDC high watt.
x 6" leadwire only.

Code	Description
Omit*	High watt
D**	Explosion Proof, EExd ATEX
E**	Explosion Proof, EExme ATEX, IECEx, from Germany
F†	Low Watt
L††	10 Watt
R#	Explosion Proof, ATEX/UL/CSA/IECEx, configurable cable connections
U##	Explosion Proof, UL/CSA

* AC ambient temperature must not exceed 60°C (140°F).
** J voltage only, no options
† AC only.
†† DC (J and K coils) only.
J and Y voltages only. Y voltage is rectified (must have Z rectified coil)
J voltage only.
NOTE: For Y voltage code with E connection and R coil, must include P override and Z electrical option (YERPZ)

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

Plug-In – 24 VDC only. DIN – DC only with Lighted Plug (5), which has integrated Surge Suppression. "J" not required here.
Deutsch – as follows:
• 12 VDC Hi watt only
• 24 VDC Hi & Lo watt
• 24 VDC Hi & Lo watt available.
Required for Low watt. ER Explosion Proof – 24 VDC "JERP" required. Adds dust rating, not polarity sensitive [IIC, D].
† DC tube standard, Plug-In conduit box only. Not polarity sensitive. Only available with Y voltage.

Code	Description
Omit	Standard
P*	Extended Manual Override with Boot
T	Covered Manual Override, DC only, or AC Rectified

* Manual override options not available on most Explosion Proof, required only on JERPJ, YERPZ. Not available with high pressure AC tube H, or with DC soft shift option. Not available with any other tube options.

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

* Not available with CSA or Explosion Proof.

Code	Description
Omit	Standard Response
S2*†	Soft Shift, 0.020" Orifice
S3*	Soft Shift, 0.030" Orifice
S4*	Soft Shift, 0.040" Orifice

* Not available with low watt, detent, or DESINA. Available in DC or AC Rectified only
† Not available with Spool Codes 020, 026, and 030

Code	Description
Omit	Standard Valve
4†#	CSA Canada CSA22.2 No. 139-13
N	CE Approved
Q†#	CE + CSA Approved

† Not available with AC high pressure tube.
Valve is derated.

Code	Description
Omit	Standard – No Variations
1C*	Manaplug – Brad Harrison Style 7/8-16 with Lights (Single Solenoid = 5 pin)
1D*	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 5 pin)
1M*	Manaplug Opposite Normal
1P	Painted Body
2D	Zinc-Nickel Plated Body
2P	Complete Painted Valve, 1 mil thick, spec. (Check factory for availability)
4D†	Twist & Lock Override
5**	Signal Lights – Standard Signal Lights – Hirsch.* (DIN with Plug) (the DC Lighted Plug has Integral Surge Suppression)
7B*	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
7W^	4-pin Micro Manaplug, Special Wiring with Lights
7Y^	Manaplug – Brad Harrison Style M12x1 Micro with Lights and Special Wiring (4 pin)
56*	Manaplug – Brad Harrison Style 7/8-16 Mini with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)

* Solenoid connection option G only. Requires manaplug code (56, 1C, 7B, etc.).
^ Requires G code (Plug-in Conduit Box) and J code (Diode Surge Suppressor) and lights.
** Plug-in, DIN, or DESINA only.
† DC/AC Rectified only. Not available with soft shift. Not available with option P, Extended Manual Override with Boot.

CAUTION: Manaplug Micro = M12X1 Connection, 4 or 5 pin
Manaplug Mini = 7/8-16 UN-2A Connection

Bold: Designates Tier I products and options.**Non-Bold: Designates Tier II products and options. These products will have longer lead times.**Industrial
Hydraulics ValvesMSG14-2500/US
Directional Control Valves

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Directional Control Valves

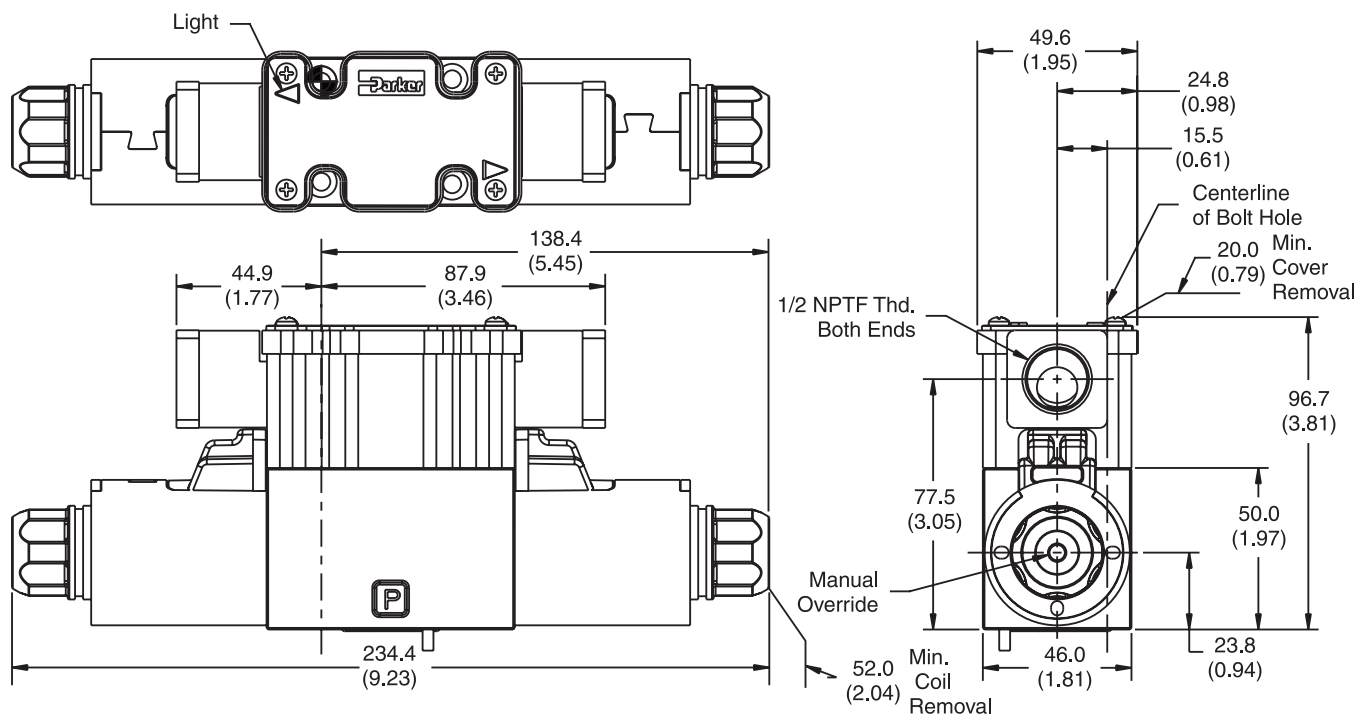
D1WW (Solenoid Operated) - Dimensions

A22

WWW.SUMY.IR

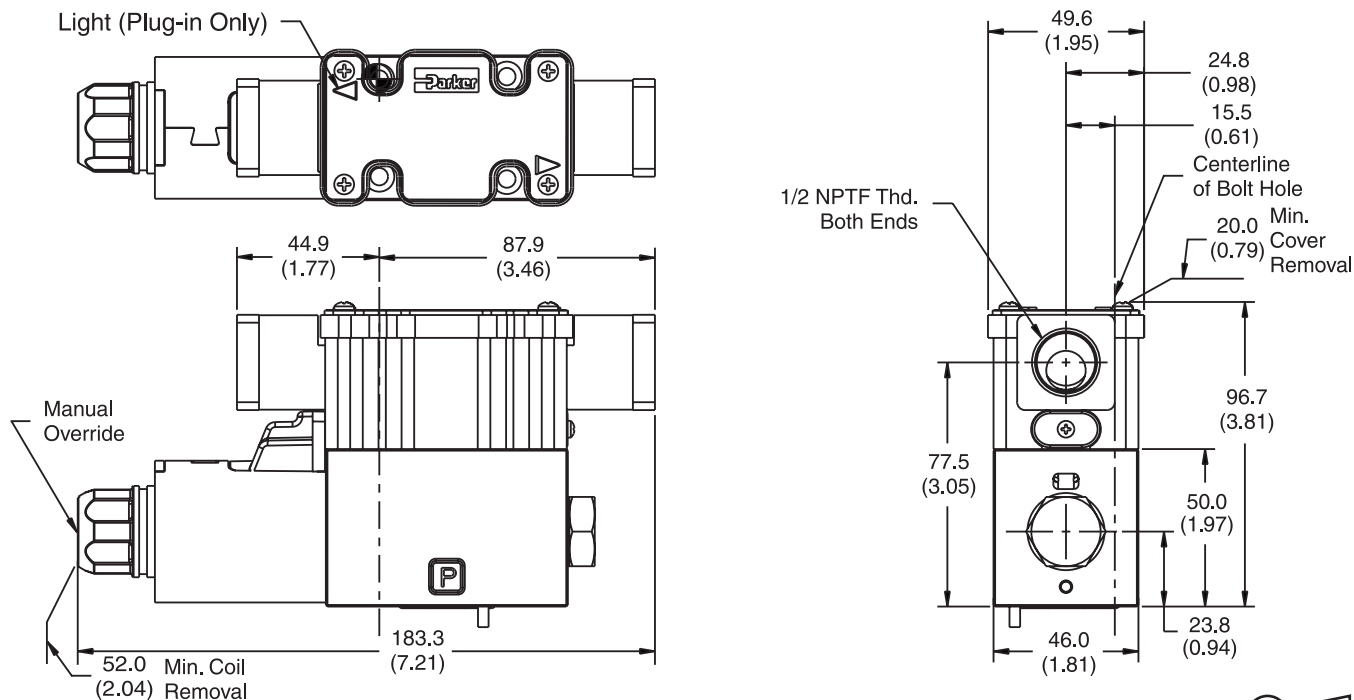
Inch equivalents for millimeter dimensions are shown in (**)

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



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

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



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



Directional Control Valves

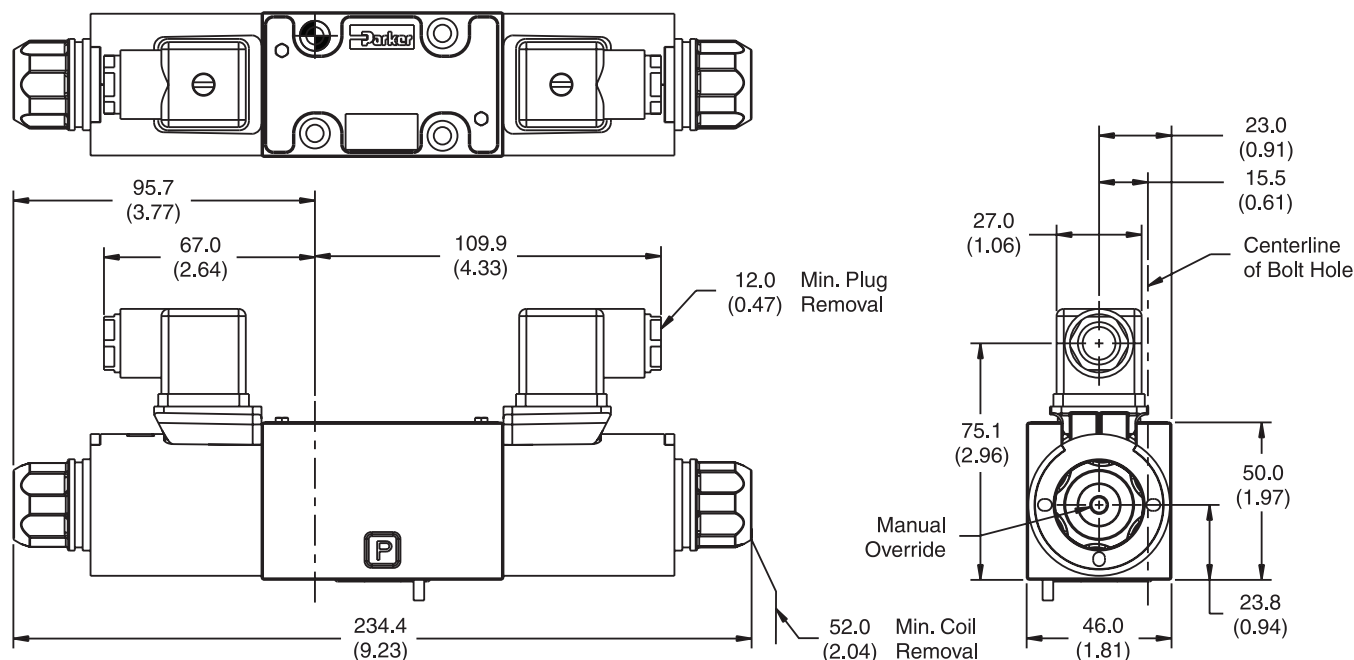
D1WW (Solenoid Operated) - Dimensions

A23

WWW.SUMY.IR

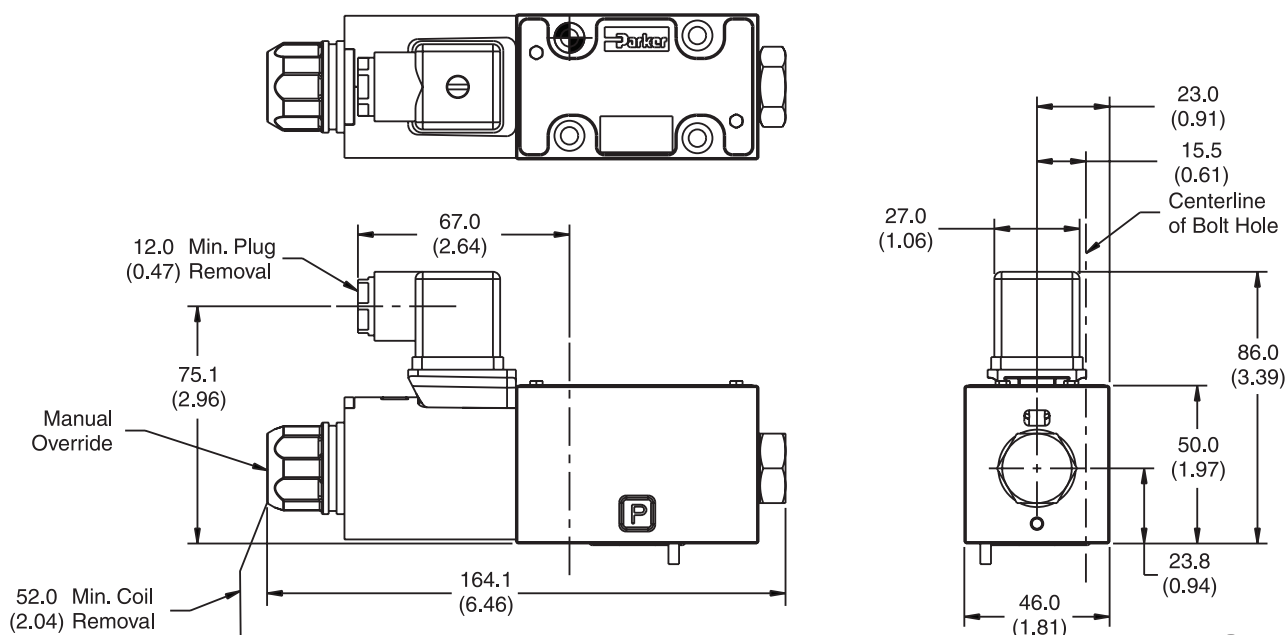
Inch equivalents for millimeter dimensions are shown in (**)

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



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

DC DIN Connector, Single Solenoid "P" Option Shown



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

Directional Control Valves

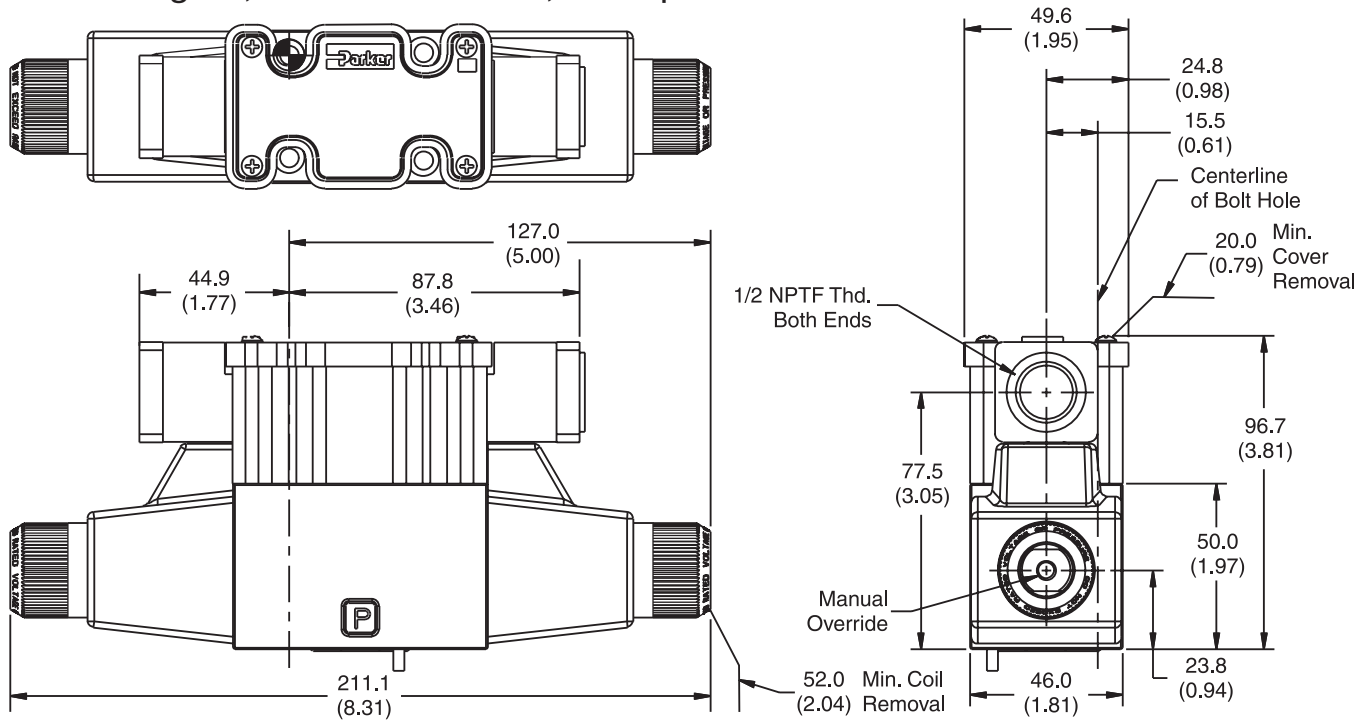
D1WW (Solenoid Operated) - Dimensions

A24

WWW.SUMY.IR

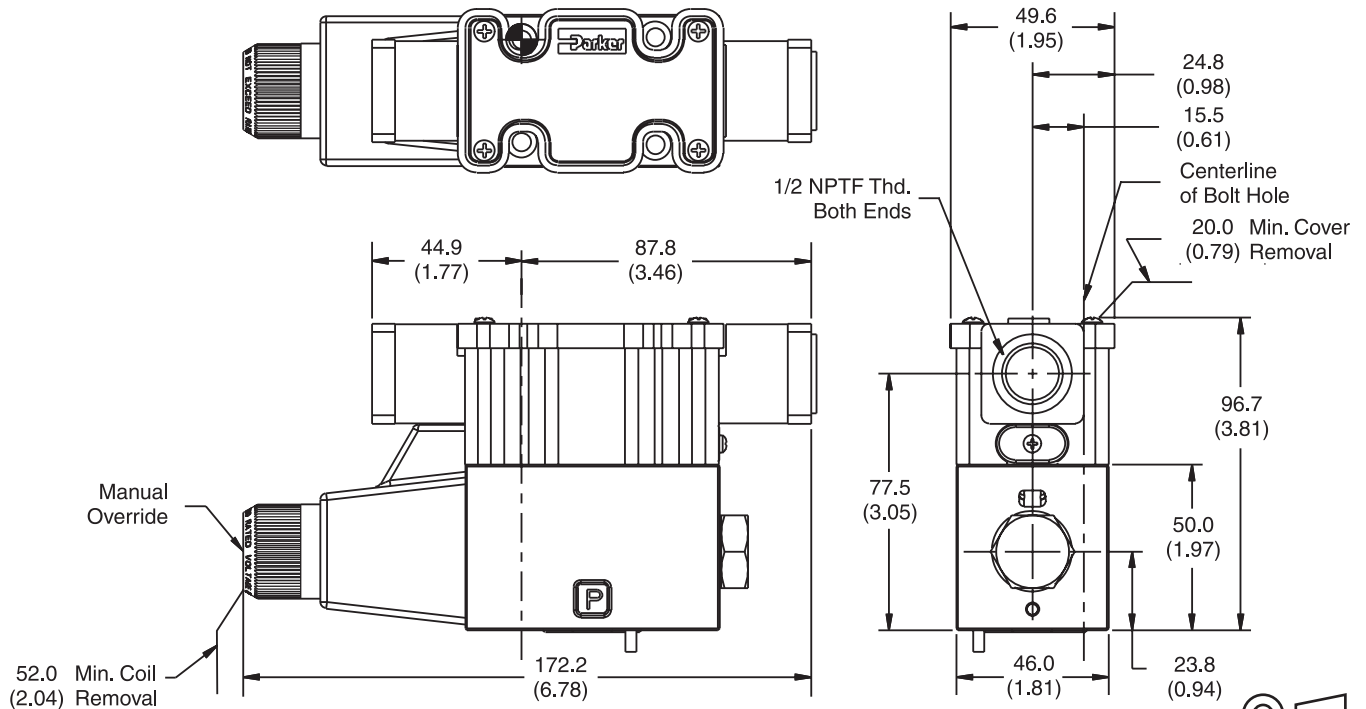
Inch equivalents for millimeter dimensions are shown in (**)

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



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

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



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

Directional Control Valves

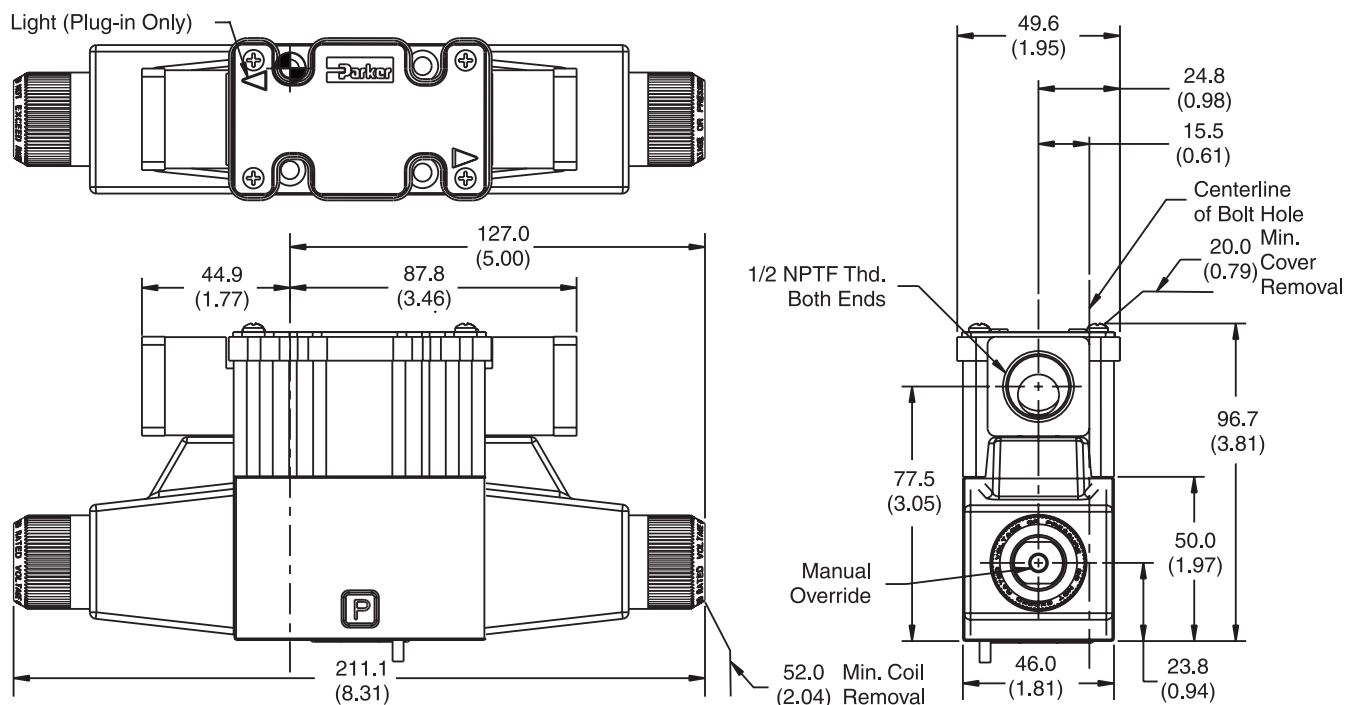
D1WW (Solenoid Operated) - Dimensions

A25

WWW.SUMY.IR

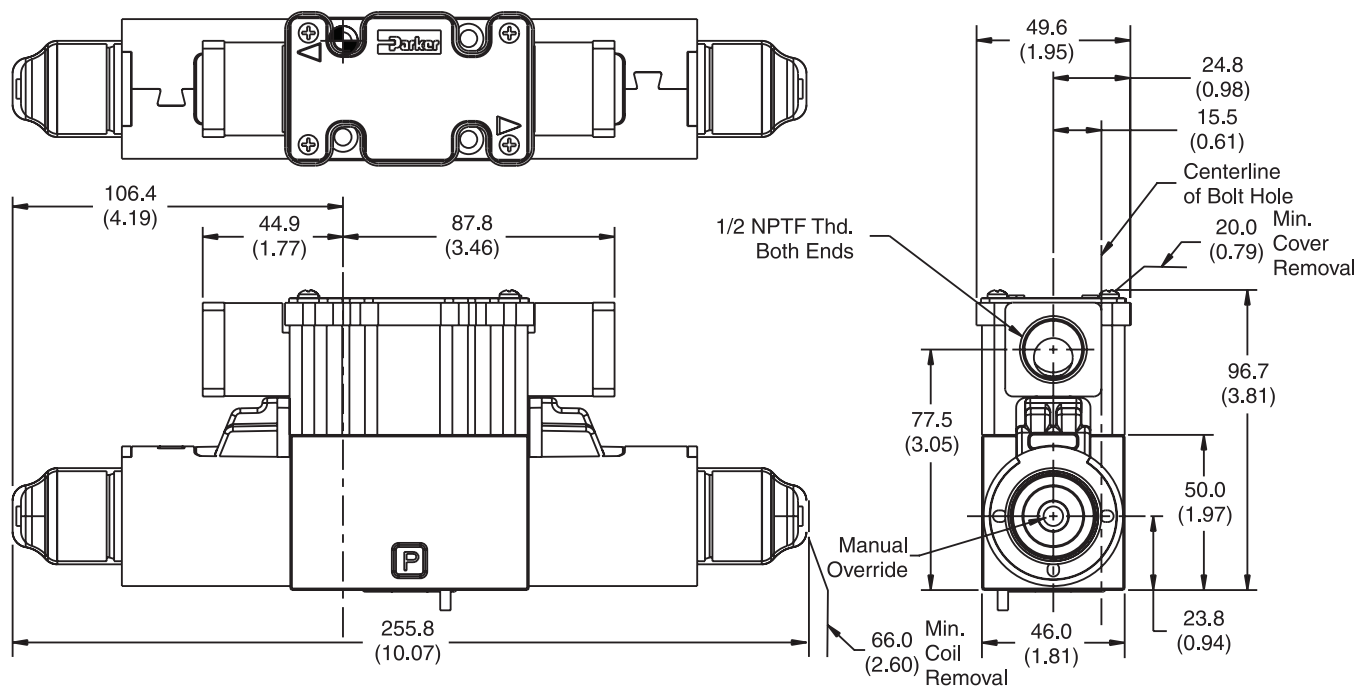
Inch equivalents for millimeter dimensions are shown in (**)

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



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

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



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



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Directional Control Valves

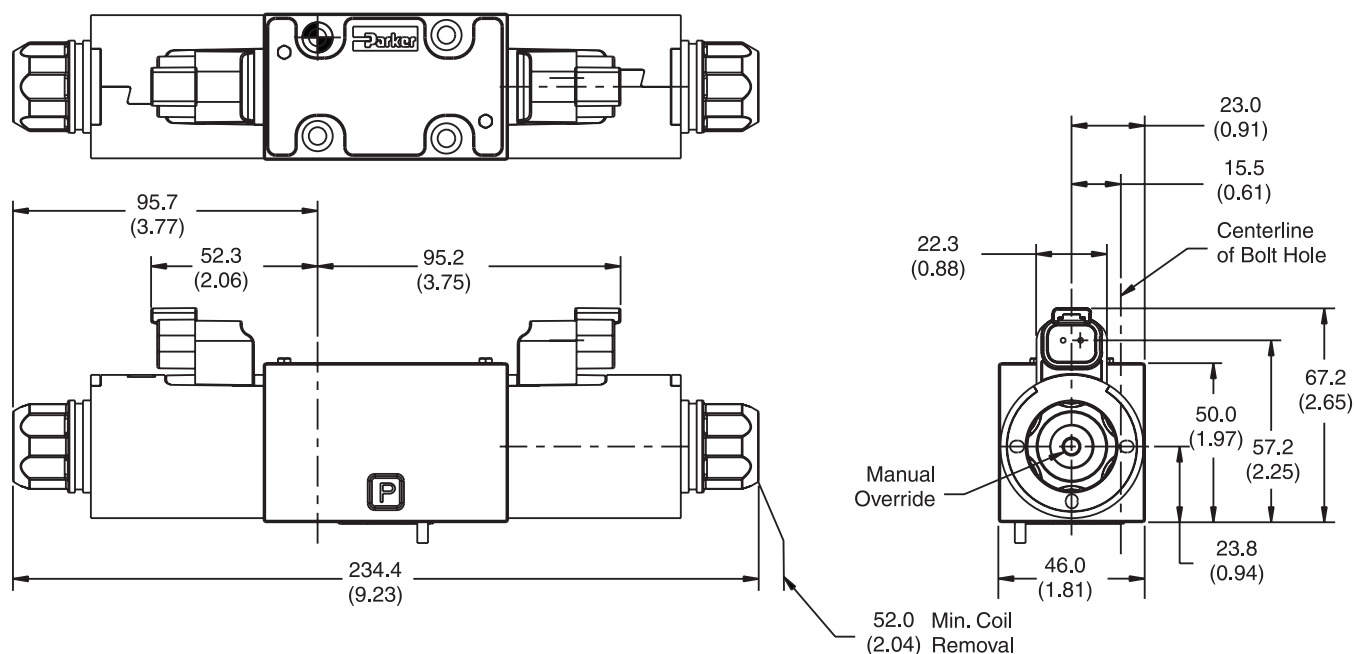
D1WW (Solenoid Operated) - Dimensions

A26

WWW.SUMY.IR

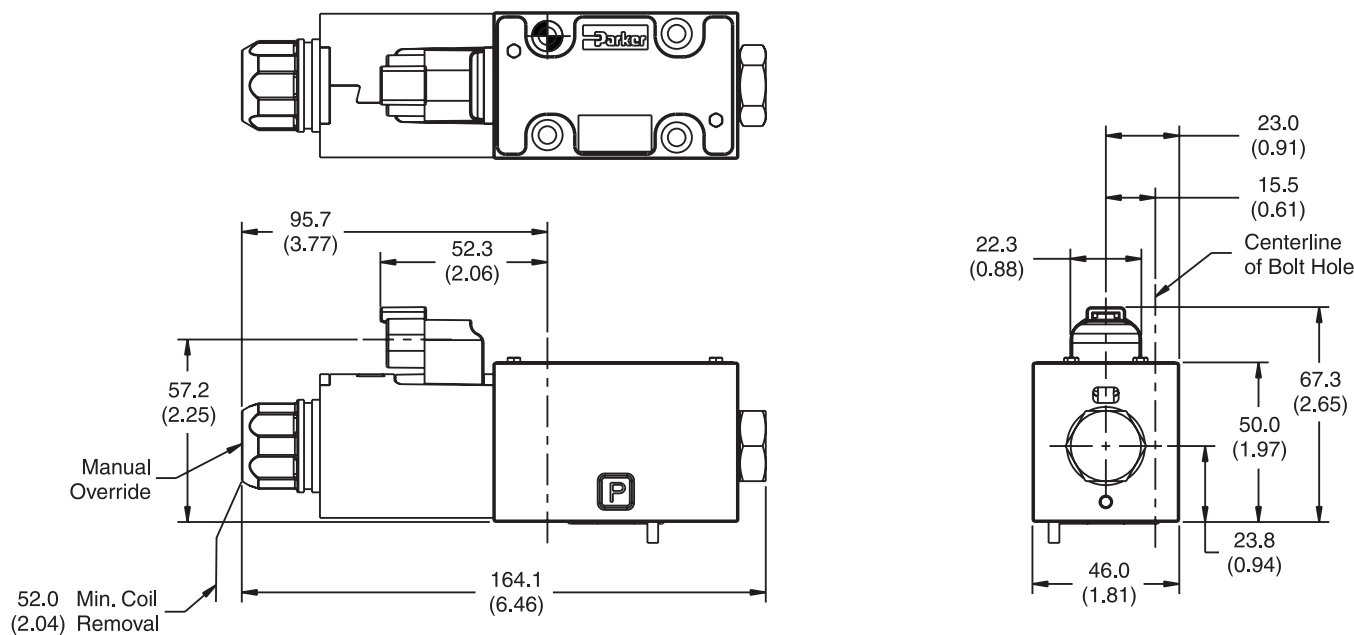
Inch equivalents for millimeter dimensions are shown in (**)

DC Deutsch Connector, Double Solenoid (DT04-2P)



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

DC Deutsch Connector, Single Solenoid



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



Directional Control Valves

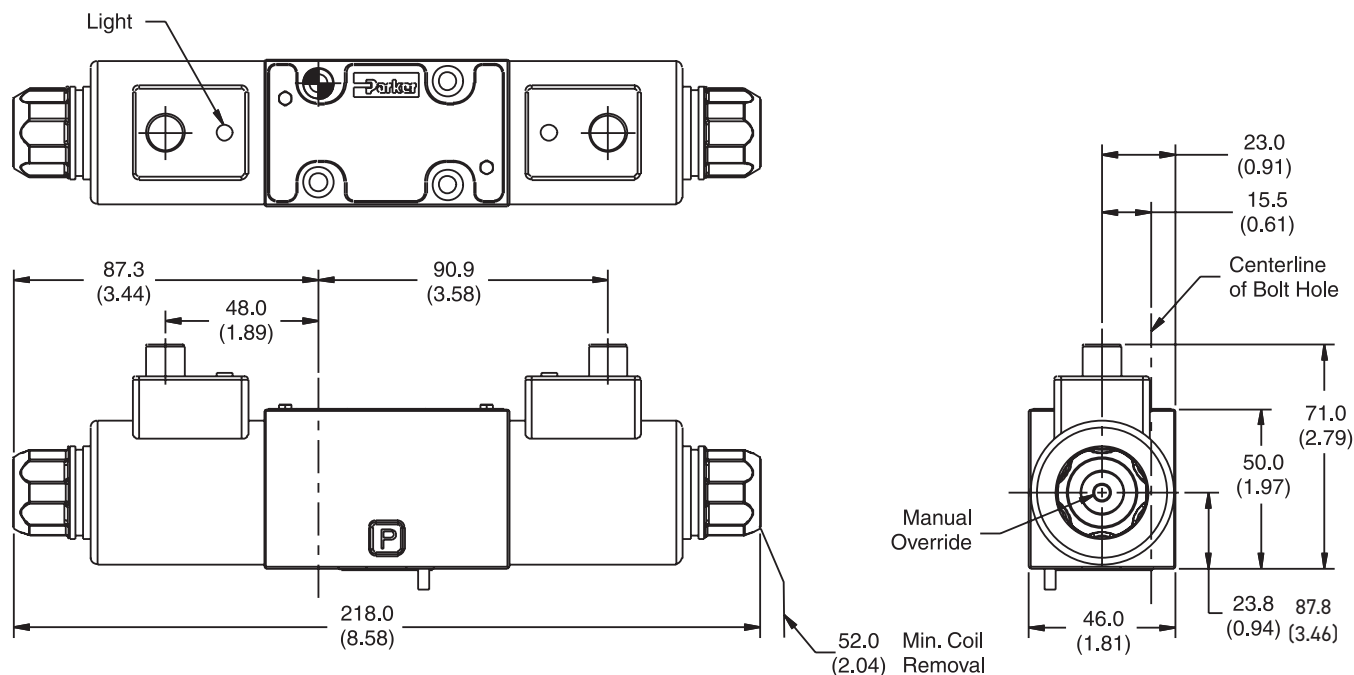
D1WW (Solenoid Operated) - Dimensions

A27

WWW.SUMY.IR

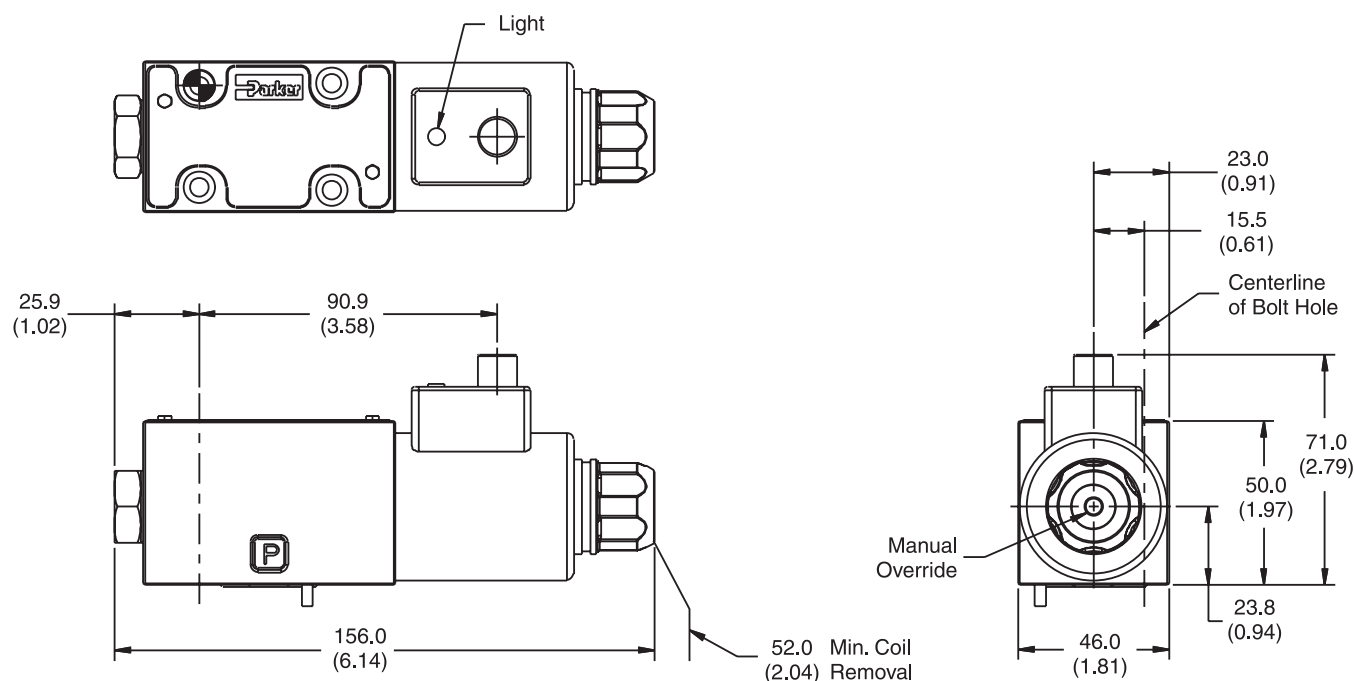
Inch equivalents for millimeter dimensions are shown in (**)

DC Desina Connector, Double Solenoid



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

DC Desina Connector, Single Solenoid



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



Directional Control Valves

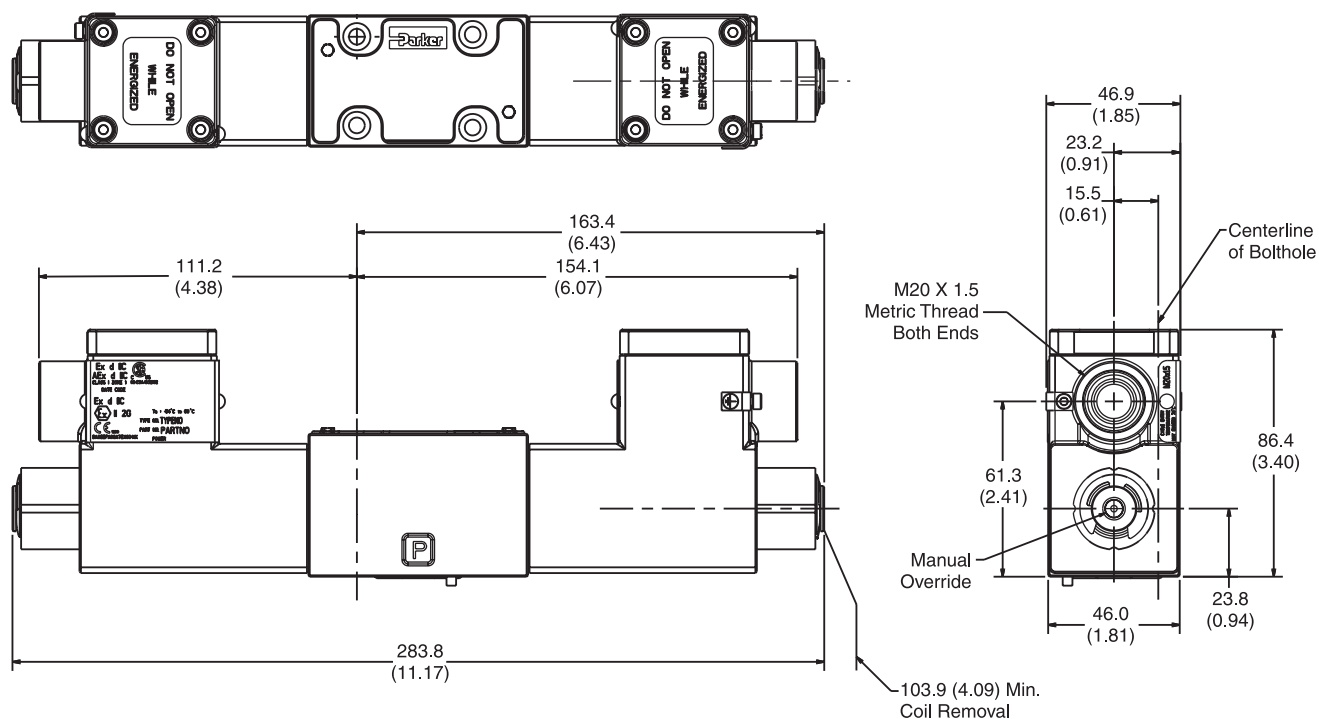
D1WW (Solenoid Operated) - Dimensions

A28

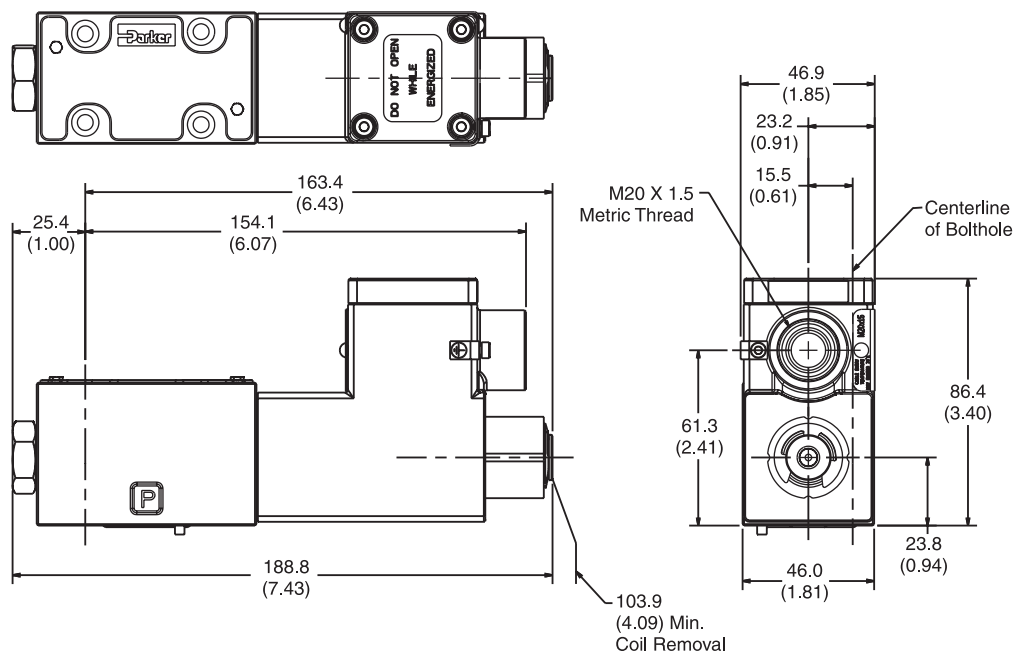
WWW.SUMY.IR

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

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



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



Directional Control Valves

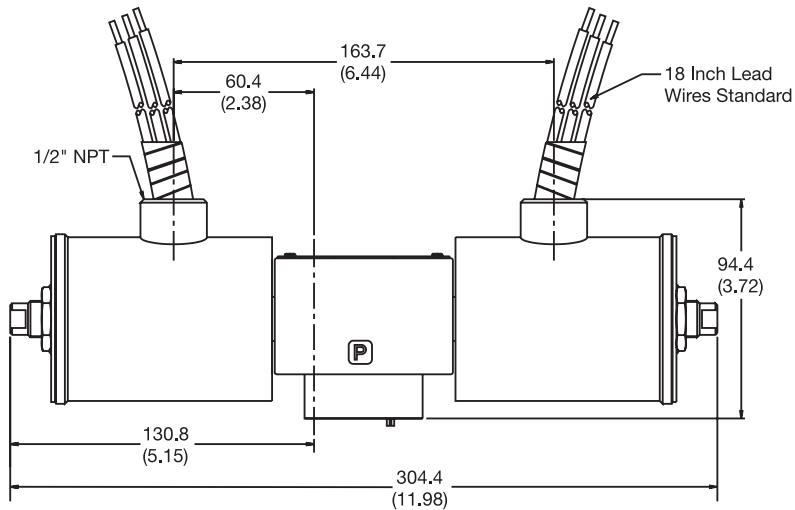
D1WW (Solenoid Operated) - Dimensions

A29

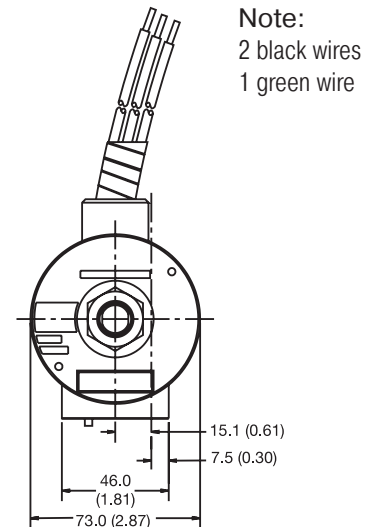
WWW.SUMY.IR

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

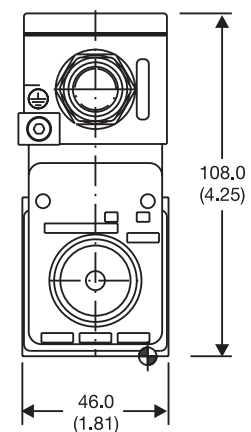
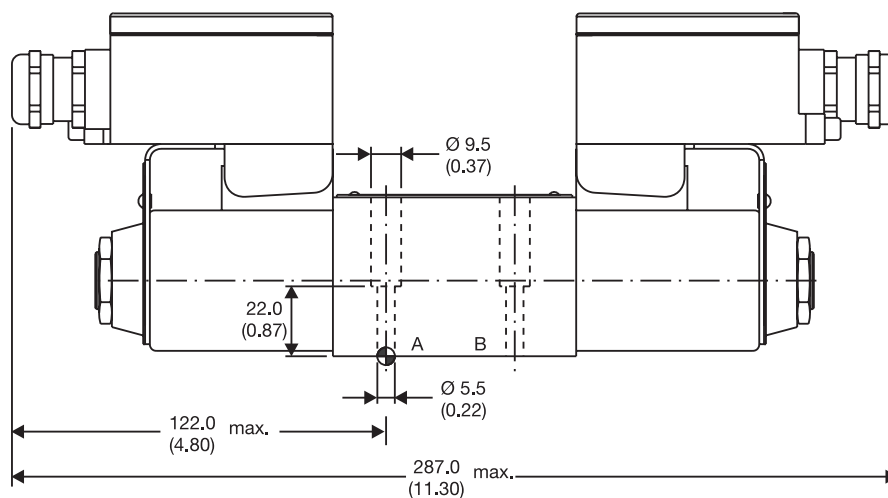
Explosion Proof U.L. & C.S.A., Double Solenoid



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



Explosion Proof, EExme ATEX, Double Solenoid, from Germany



Directional Control Valves

D1VW (Solenoid Operated) - Accessories

A30

WWW.SUMY.IR

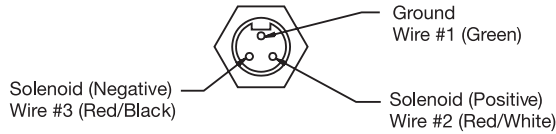
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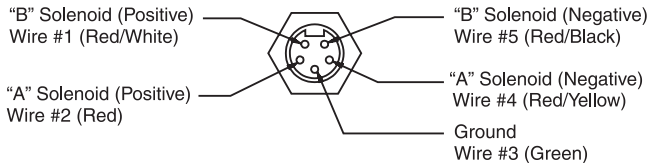
Manaplug (Options 56 & 1C)

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



3-Pin Manaplug (Mini) with Lights

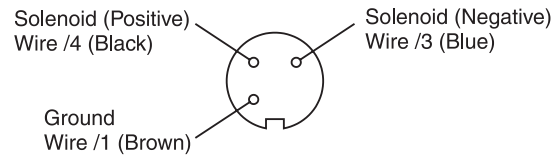
Single Solenoid Valves – Installed Opposite Side of Solenoid



5-Pin Manaplug (Mini) with Lights

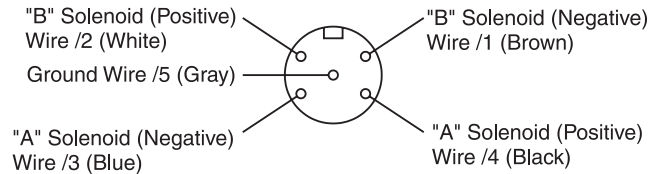
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7B & 1D)



3-Pin Manaplug (Micro) with Lights

Single Solenoid Valves – Installed Opposite Side of Solenoid



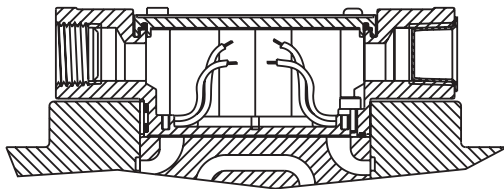
5-Pin Manaplug (Micro) with Lights

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)

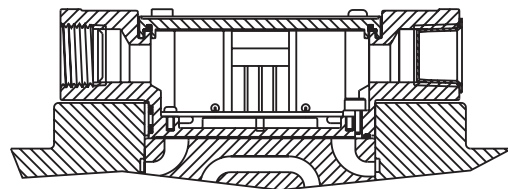
Conduit Box Option C

- No Wiring Options Available



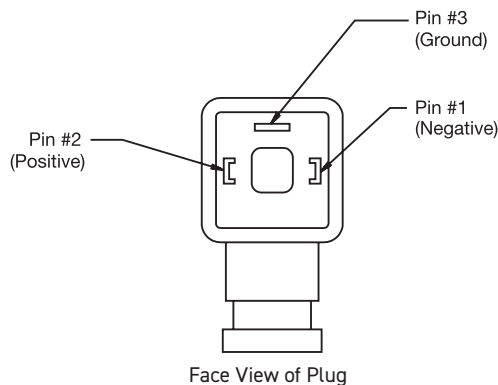
Signal Lights (Option 5) — Plug-in Only

- LED Interface
- Meets Nema 4/IP67



Hirschmann Plug with Lights (Option P5) DESINA Connector (Option D)

ISO 4400/DIN 43650 Form "A"

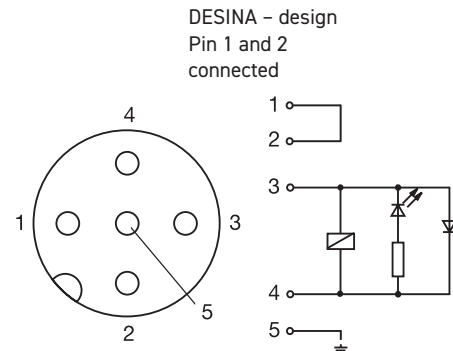


Pins are as seen on valve (male pin connectors)

DESINA Connector (Option D)

M12 Pin Assignment
Standard

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



Directional Control Valves

D1VW (Solenoid Operated) - Accessories

A31

WWW.SUMY.IR

Mounting Bolt Kits

Bolt kits for use with D1V Directional Control Valves, ER, and ET Explosion Proof and Sandwich Valves
(D1V*-94 Design back to 82 Design Valves)

Number of Sandwich Valves at 40.0mm (1.57") Thickness	Number of Sandwich Valves at 40.0mm (1.57") Thickness									
	0		1		2		3		4	
0	BK209	1.25 in	BK243	2.88 in	BK225	4.38 in	BK244	6.00 in	BK245	7.50 in
	BKM209	30 mm	BKM243	70 mm	BKM225	110 mm	BKM244	150 mm	BKM245	190 mm
1	BK246	3.00 in	BK247	4.62 in	BK248	6.12 in	BK249	7.75 in		
	BKM246	75 mm	BKM247	115 mm	BKM248	155 mm	BKM249	195 mm		
2	BK250	4.75 in	BK251	6.38 in	BK252	7.88 in				
	BKM250	120 mm	BKM251	160 mm	BKM252	200 mm				
3	BK253	6.50 in	BK254	8.12 in						
	BKM102	170 mm	BKM254	205 mm						
4	BK103	8.25 in								
	BKM103	210 mm								

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

Bolt kits for use with D1V Directional Control Valves with Explosion Proof Coils and Sandwich Valves

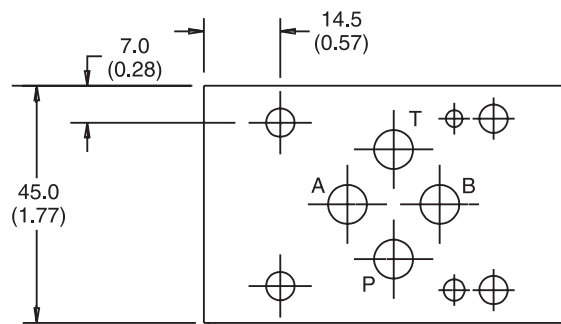
(D1V*-94 Design back to 82 Design, except for ER and ET Coils)

Number of Sandwich Valves at 40.0mm (1.57") Thickness	Number of Sandwich Valves at 40.0mm (1.57") Thickness									
	0		1		2		3		4	
0	BK50	2.00 in	BK211	3.63 in	BK101	5.12 in	BK102	6.75 in	BK103	8.25 in
	BKM50	50 mm	-		BKM101	130 mm	BKM102	170 mm	BKM103	210 mm
1	BK51	3.75 in	BK212	5.37 in	BK105	6.87 in	BK106	7.75 in		
	BKM51	95 mm	-		BKM105	180 mm	BKM106	195 mm		
2	BK52	5.50 in	BK213	7.13 in	BK108	8.62 in				
	BKM52	140 mm	-		BKM108	220 mm				
3	BK53	7.25 in	BK214	8.87 in						
	BKM53	185 mm	-							
4	BK54	9.00 in								
	BKM54	230 mm								

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

Sandwich Valve Dimensional Data

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



Directional Control Valves

D1WV (Inductive Pos. Control) - Technical Information

A32

WWW.SUMY.IR

General Description

Series D1WV Inductive Control Valves are direct operated directional valves with inductive position control and are typically used in safety relevant applications. The start or end position can be monitored. The position control is available for single and double solenoid valves.

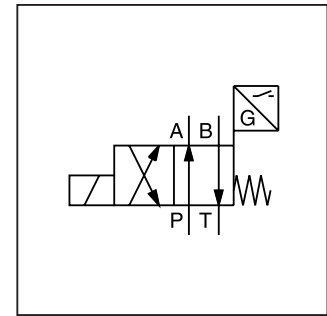
The fail-safe position of the directional valve during power failure is the spring offset or center position.

Detailed information on the machine directive is available in the position papers (see pages A3 and A4).

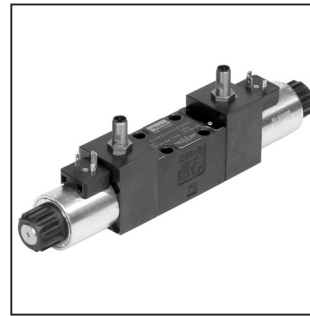
Note: The adjustment of the position control is factory set and sealed. Replacement and repairs can only be made by the manufacturer.



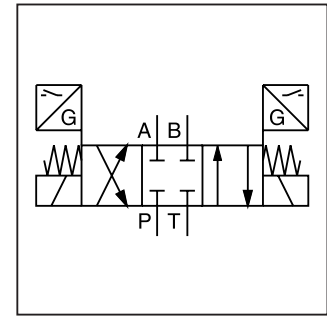
D1WV*B



D1WV*B

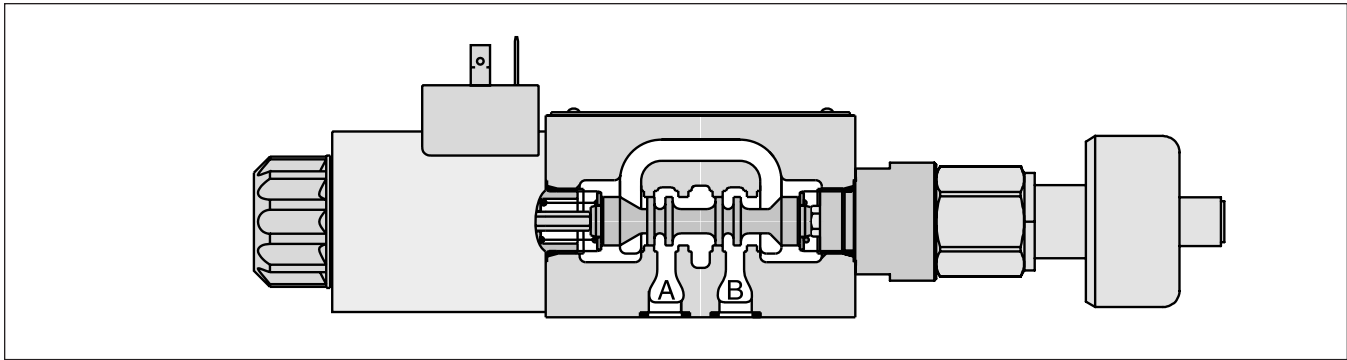


D1WV*C

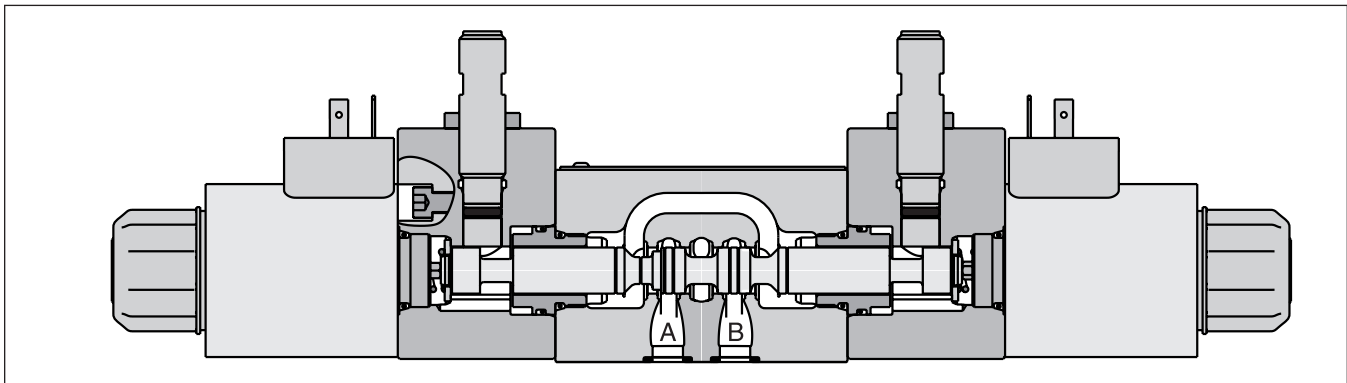


D1WV*C

D1WV*B



D1WV*C



⚠ WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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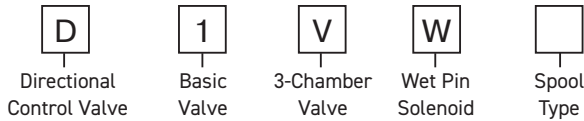
Directional Control Valves

D1WW (Inductive Pos. Control) - Ordering Information

A33

WWW.SUMY.IR

Single Solenoid Valve



Code	Description
1	NFPA D03 CETOP 03 DIN NG06

Code	Symbol
	A 0 B

3-Position Spools	
Code	Symbol
	A 0 B
001	
002	
003*	
004	
015**	
076	
078	

2-Position Spools	
Code	Symbol
	A 0 B
020	
026†	
030†	

* Only available for spool position "E" and "F"

** Only available for spool position "K" and "M"

† Only available for spool position "R" and "H"



Code	Description
N	Nitrile
V	Fluorocarbon

3-Position Spools	
Code	Spool Position
E	 2 positions Spring offset in position "0" Operated in position "A"
F	 2 positions Operated in position "0" Spring offset in position "B"
K	 2 positions Spring offset in position "0" Operated in position "B"
M	 2 positions Operated in position "0" Spring offset in position "A"
2-Position Spools	
Code	Spool Position
B	 2 positions Spring offset in position "B" Operated in position "A"
H	 2 positions Spring offset in position "A" Operated in position "B"

Weight:
Single Solenoid: 1.8 kg (4.0 lbs.)

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

Directional Control Valves

D1WW (Inductive Pos. Control) - Ordering Information

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WWW.SUMY.IR

Single Solenoid Valve



Solenoid
Voltage



Connector as per
EN 175301-803,
without plug
(Please order
plug separately. See
Series D1V Technical
Information.)



Manual
Override



Position
Control*



Design
Series
NOTE:
Not required
when ordering.

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

* To be used in combination with rectifier plugs at 120VAC/230VAC power supply. (Please order plug separately. See Series D1V Technical Information)

Code	Description
Omit	Standard
T*	No Override

* For hydraulic presses, according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessories "I4N" or "I5N" (start position monitored) are required

Code	Position Control*	Spool Position
I2N	End position monitored side B	E, F, B (Solenoid on A-side)
I5N**	Start position monitored side B	
I1N	End position monitored side A	K, M, H (Solenoid on B-side)
I4N**	Start position monitored side A	

* Please order female connector M12x1 separately. See Accessories, Female Connector M12x1 (order no. 5004109)

** For hydraulic presses, according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessories "I4N" or "I5N" (start position monitored) are required

Bold: Designates Tier I products and options.

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

Directional Control Valves

D1W (Inductive Pos. Control) - Ordering Information

A35

WWW.SUMY.IR

Double Solenoid Valve

Code	Description
1	NFPA D03 CETOP 03 DIN NG06

Code	Description
N	Nitrile
V	Fluorocarbon

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

* To be used in combination with rectifier plugs at 120VAC/230VAC power supply. (Please order plug separately. See Series D1V Technical Information)

Code	Description
Omit	Standard
T*	No Override

* For hydraulic presses, according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessory "I6N" (start position) is required

Code	Position Control*	Spool Position
I3N	End positions	C,D
I6N**	Start positions	C

* Please order female connector M12x1 separately. Straight plug recommended - no defined position possible for angled plug
** For hydraulic presses, according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessory "I6N" (start position) is required

Weight:
Double Solenoid: 3.8 kg (8.4 lbs.)

3-Position Spools

Code	Symbol
	A 0 B
001	
002	
003*	
004	
015*	

2-Position Spools

Code	Symbol
	A 0 B
020	

* Only available for position control "I6N"

3-Position Spools

Code	Spool Position
C	 3 positions Spring offset in position "0"

2-Position Spools

Code	Spool Position
D*	 3 positions No center or offset position

* Only for position "I3N"

Bold: Designates Tier I products and options.

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

Directional Control Valves

D1WW (Inductive Pos. Control) - Specifications

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General				
Design	Directional Spool Valve			
Actuation	Solenoid			
Size	NG 06 / CETOP 03 / NFPA D03			
Mounting Interface	DIN 24340 A6 / ISO 4401 / CETOP RP121-H / NFPA D03			
Mounting Position	Unrestricted, preferably horizontal			
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)			
MTTF _D Value (years)	150			
Hydraulic				
Maximum Operating Pressure	Ports P, A, B = 350 Bar (5075 PSI); Port T = 210 Bar (3045 PSI)			
Fluid	Hydraulic oil in accordance with DIN 51524			
Fluid Temperature (°C)	-20 to +70 (-4°F to +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 (acc. NAS 1638:7)			
Maximum Flow (LPM)	80 (21 GPM); See shift limits			
Leakage @50 Bar (725 PSI) per flow path (mm/min)	Up to 10 (0.003 GPM) depending on spool			
Static / Dynamic				
Step Response @ 95% Step (ms)	Energized = 32; De-energized = 40			
Electrical				
Duty Ratio (%)	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible			
Maximum Switching Frequency	15,000 switchings per hour			
Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)			
Code	K	J	U	G
Supply Voltage (V)	12	24	98	205
Tolerance Supply Voltage (%)	+/-10	+/-10	+/-10	+/-10
Current Consumption (A)	2.72	1.29	0.33	0.13
Power Consumption (W)	32.7	31	31.9	28.2
Solenoid Connection	Connector as per EN 175301-803, solenoid connected according to the relevant regulations			
Wiring Minimum (mm²)	3x1.5 recommended			
Wiring Length Maximum (m)	50 (164 ft) recommended			
With electrical connections, the protective conductor (PE ↓) must be connected according to the relevant regulations.				

Single Solenoid Valve

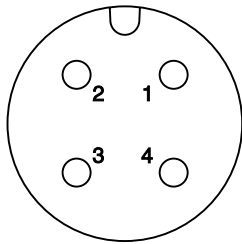
Electrical Specifications of Position Control as per IEC 61076-2-101 (M12x1)

Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)
Supply Voltage / Ripple (V)	24 ≤ 10%
Tolerance Supply Voltage (%)	+/-20
Polarity Protection (V)	300
Current Consumption without Load (mA)	≤20
Switching Hysteresis (mm)	<0.06
Max Output Current per Channel, Ohmic (mA)	250
Min. Distance to Next AC Solenoid (m)	0.1 (0.33 ft)
Interface	M12x1 acc. to IEC 61076-2-101
Wiring Minimum (mm ²)	5 x 0.25 brad shield recommended
Wiring Length Maximum (m)	50 (164 ft) recommended
CE Conform	EN 61000-4-2 / EN 61000-4-4 / EN 61000-4-6 ¹⁾ / ENV 50140 / ENV 50240
¹⁾ Only guaranteed with screened cable and female connector	

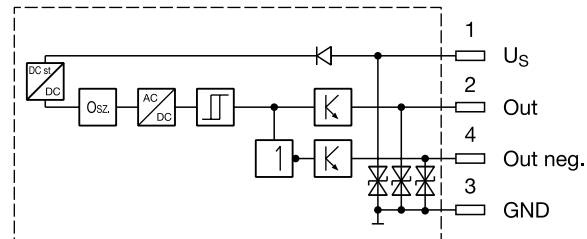
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M12 Pin Assignment



1. U_s 19.2...28.8V
2. Out B: normally open
3. 0V
4. Out A: normally closed



Outputs: Open collector

Definitions

Start position monitored:

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

At the switching point the spool is located within the closed position. It is secured so that only the flow paths of the offset position are granted.

The switch can only be located on the opposite side of the solenoid for direct operated valves. Please order plug M12x1 separately. See Accessories, plug M12x1 (part no.: 5004109).

End position monitored:

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

Double Solenoid Valve

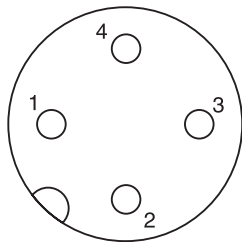
Electrical Specifications of Position Control as per IEC 61076-2-101 (M12x1)

Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)
Supply Voltage / Ripple (V)	10 - 30 / +/- 10%
Current Consumption without Load (mA)	≤ 10
Max Output Current per Channel, Ohmic (mA)	200
Min. Output Load per Channel, Ohmic (kOhm)	100
Max. Output Drop at 0.2A (V)	≤ 2
EMC	EN 61000-6-4 / EN 61000-6-2
Min. Distance to Next AC Solenoid (m)	≥ 0.1 (0.33 ft)
Interface	M12x1 acc. to IEC 61076-2-101
Wiring Minimum (mm ²)	3 x 0.14 braided shield recommended
Wiring Length Maximum (m)	50 (164 ft) recommended

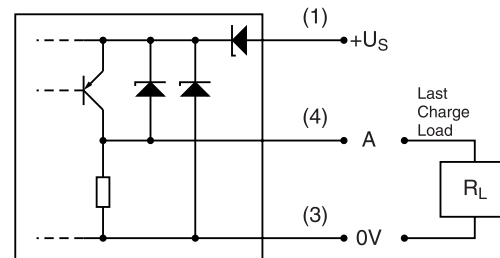
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M12 Pin Assignment



1. U_S 10...30V
2. Not connected
3. 0V
4. Out A: normally open

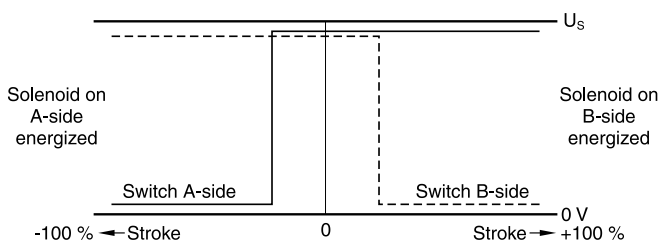


Definitions

Start position monitored:

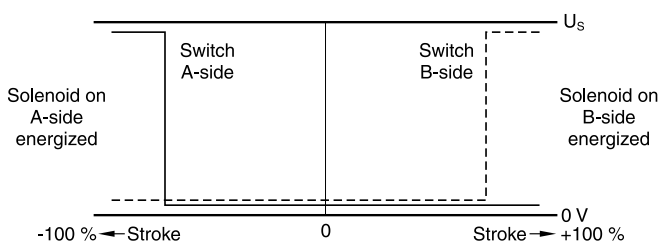
The valve is de-energized. The inductive switch gives a signal at the moment the spool leaves the center position (below 15% spool stroke).

At the switching point the spool is located within the closed position. It is secured so that only the flow paths of the offset position are granted.



End position monitored:

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



Please order plug M12 x 1 separately. Straight plug recommended – no defined position possible for angled plug.

Directional Control Valves

D1WW (Inductive Pos. Control) - Performance Curves

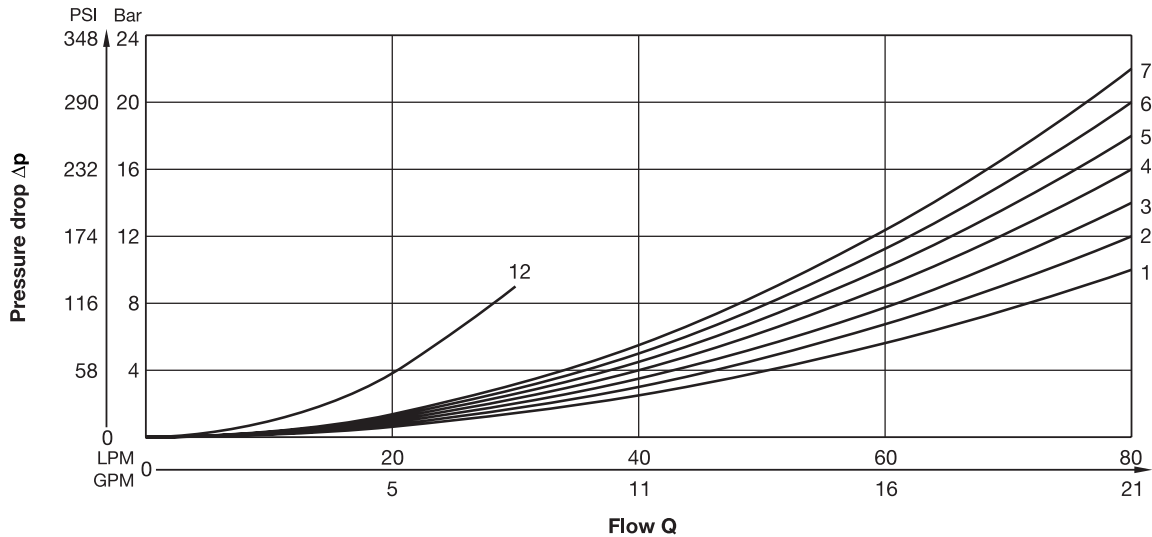
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All performance curves measured with HLP46 at 50°C (122°F).

Performance Curves

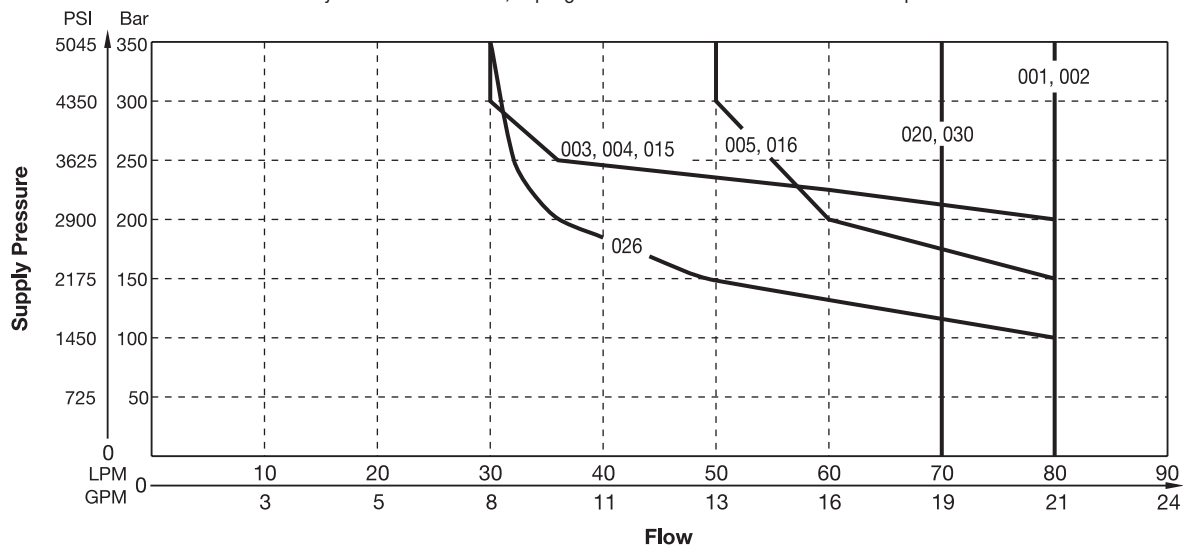
The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.



Spool	Position "B"		Position "A"		Position "0"				
	P-A	B-T	P-B	A-T	P-A	P-B	A-T	B-T	P-T
001	2	2	2	2	–	–	–	–	–
002	1	4	1	4	1	1	5	5	2
003	3	4	3	6	–	–	7	–	–
004	2	3	2	3	–	–	7	7	–
005	2	2	2	2	12	–	–	–	–
015	3	6	3	4	–	–	–	7	–
016	2	2	2	2	–	12	–	–	–
020 B	4	4	2	3	–	–	–	–	–
026 B	4	–	4	–	–	–	–	–	–
030 B	2	3	1	2	–	–	–	–	–

Shift Limit Diagram

The diagram below specifies the shift limits. Valves with spool position "F" or "M" can only be operated up to 70% of the limits. The specifications apply to a viscosity of 40mm²/s and balanced flow conditions. The shift limits can be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.



All characteristic curves measured with HLP46 at 50°C (122°F), 90% U_{nm} and warm solenoids.

Directional Control Valves

D1VA, D1VP - Technical Information

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General Description

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

Features

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

Air Operated

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

Pilot Piston. The pilot piston area is 506 mm² (.785 in.²). Pilot piston stroke is 3.4mm (.135 in.).

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

Oil Operated

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

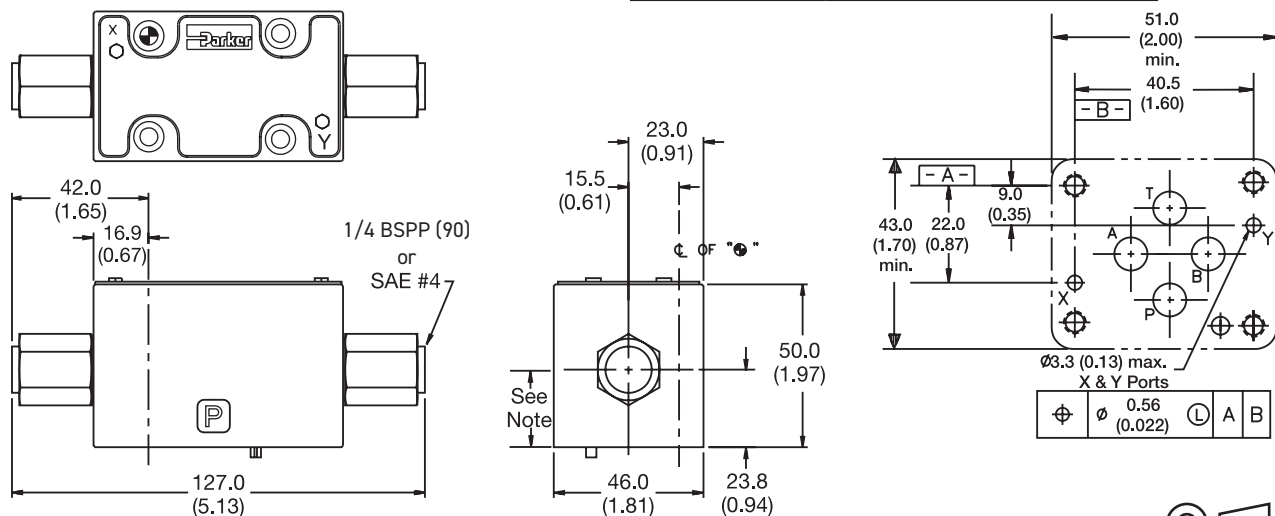
Pilot Piston. The hydraulic piston area is 198 mm² (.307 in.²). Pilot piston stroke is 3.4mm (.135 in.).

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

Dimensions

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

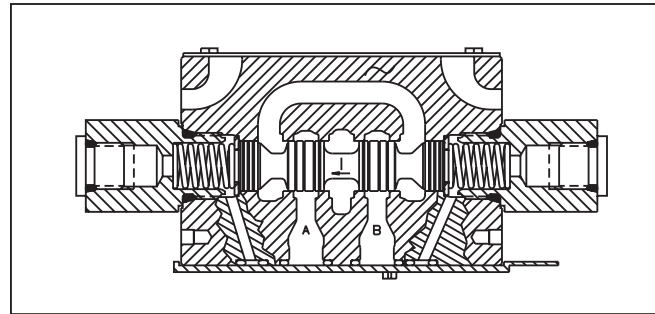
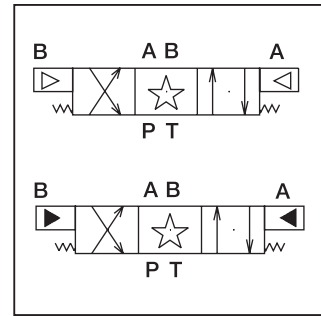
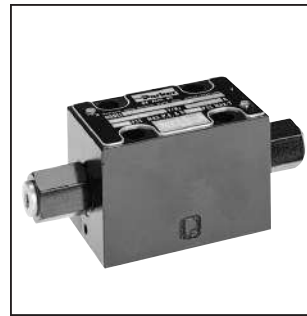
Oil Operated D1VP, Single and Double Pilot



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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MSG14-2500/US
Directional Control Valves



Specifications		
Mounting Pattern	NFPA D03 / CETOP 03 / NG 06	
Maximum Pressure (Bar)	Operating:	345 (5075 PSI)
	Tank Line:	
	D1VA	34 (500 PSI)
	D1VP	207 (3000 PSI)
Maximum Flow	See Reference Data	
Pilot Pressure (Bar)	D1VA:	
	Air Minimum	4.1 (60 PSI)
	Air Maximum	10.2 (150 PSI)
	D1VP:	
	Oil Minimum	15.2 (220 PSI)
	Oil Maximum	207 (3000 PSI)

Directional Control Valves

D1VP - Ordering Information

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D
Directional Control Valve

1V
Basic Valve

P
Actuator

Spool

Style

Seal

Variations

Design Series

NOTE:
Not required when ordering.

Code	Description
1V	NFPA D03 CETOP 03 DIN NG06

Code	Description
P	Oil Operator

Code	Description
Omit	Standard
4F	Heavy Duty Detent
90	BSP Threads

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Symbol
001	
002	
004	
008*, 009**	
020*	
030**	
081	
082	
* 008, and 020 spools have closed crossover. ** 009 and 030 spools have open crossover.	

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

Code	Description	Symbol
B*	Single operator, two position, spring offset, P to A and B to T in offset position	
C	Double operator, three position, spring centered	
D	Double operator, two position, detent	
E*	Two position, spring centered, P to B and A to T in shifted position	
H*	Single operator, two position, spring offset, P to B and A to T in offset position	
K*	Two position, spring centered, P to A and B to T in shifted position	
* D available with 020 and 030 spools only B and H available with 020 and 030 spools only E and K not available with 020 and 030 spools		

This condition varies with spool code.

Valve Weight: 1.90 kg (4.2 lbs.)
Standard Bolt Kit: BK209 10-24x1.25
Metric Bolt Kit: BKM209 M5-0.8x30 mm
Seal Kit:
Nitrile SKD1VP
Fluorocarbon SKD1VPV

Bold: Designates Tier I products and options.

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

Directional Control Valves

D1VA - Ordering Information

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D
Directional Control Valve

1V
Basic Valve

Code	Description
1V	NFPA D03 CETOP 03 DIN NG06

A
Actuator

Code	Description
A	Air Operator

Spool

Style

Seal

Code	Description
N	Nitrile
V	Fluorocarbon

Variations

Code	Description
Omit	Standard
90	BSPP Threads

Design Series

NOTE:
Not required when ordering.

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

Code	Symbol
001	
002	
004	
008*, 009**	
081	
082	
* 008 spool has closed crossover. ** 009 spool has open crossover.	

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



This condition varies with spool code.

Valve Weight: 1.60 kg (3.5 lbs.)
Standard Bolt Kit: BK209 10-24x1.25
Metric Bolt Kit: BKM209 M5-0.8x30 mm
Grade 8 bolts required
Seal Kit:
Nitrile SKD1VA
Fluorocarbon SKD1VAV

Bold: Designates Tier I products and options.

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

Directional Control Valves

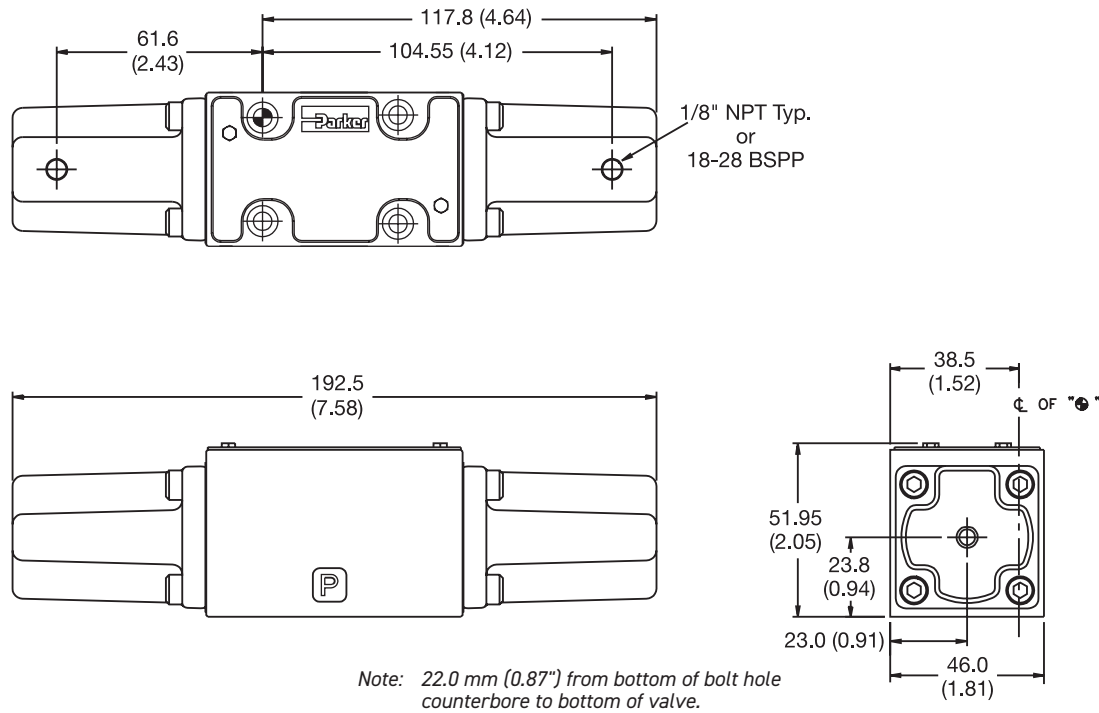
D1VA - Dimensions

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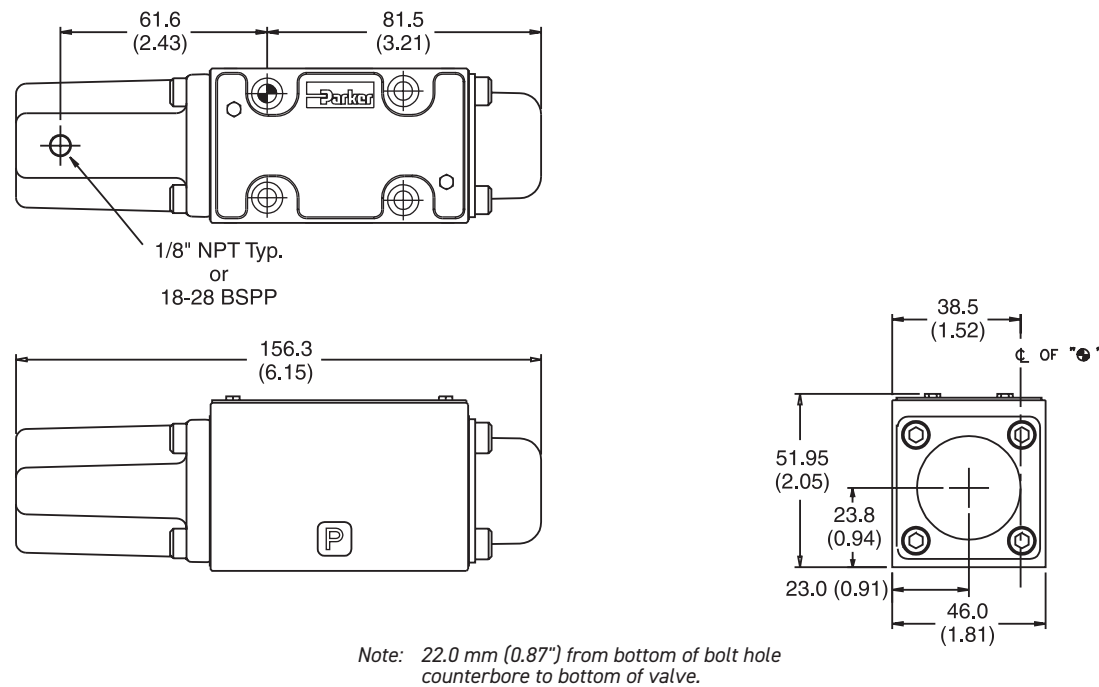
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Inch equivalents for millimeter dimensions are shown in (**)

Air Operated D1VA, Double Pilot



Air Operated D1VA, Single Pilot



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Directional Control Valves

D1VC, D1VD, D1VG - Technical Information

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General Description

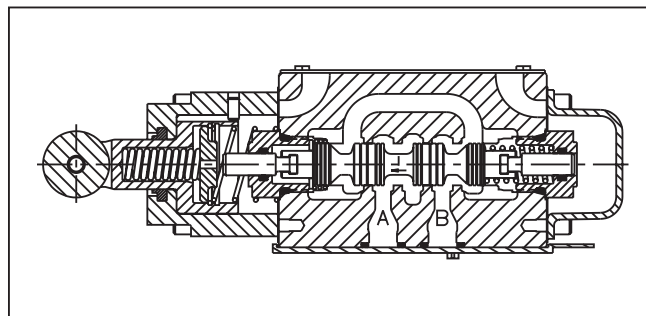
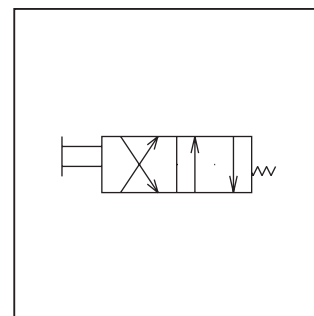
Series D1VC, D1VD and D1VG directional control valves are high performance, 4-chamber, direct operated, cam controlled, 4-way valves. They are available in 2-position and conform to NFPA's D03, CETOP 3 mounting patterns.

Features

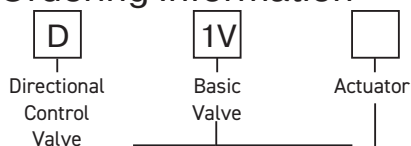
- Choice of 2 cam roller positions (D1VC and D1VD)
- Two styles available (D1VC and D1VG)
- Short stroke option

Specifications

Mounting Pattern	NFPA D03 / CETOP 03 / NG 06	
Maximum Pressure (Bar)	Operating	345 (5075 PSI)
	Tank Line	34 (500 PSI)
Nominal Flow (LPM)	32 (8.5 GPM)	
Maximum Flow	See Reference Data	
Force Required to Shift (N)	D1VC, D1VD = 107 (24 lbs)	
	D1VG = 36 (8 lbs)	
Maximum Cam Angle	30°	



Ordering Information



Code	Description
1V	NFPA D03 CETOP 03 DIN NG06

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

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

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

Code	Description
N	Nitrile
V	Fluorocarbon

Design Series
NOTE: Not required when ordering.

Code	Description
Omit	Standard
P05	Short Stroke

Code	Description	Symbol
B	Two position Spring offset operator at "A" port end	
H	Two position Spring offset operator at "B" port end	

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

Valve Weight: Type C & D 1.44 kg (3.2 lbs.)
Type G 1.6 kg (3.7 lbs.)

Standard Bolt Kit: BK209 1-24x1.25

Metric Bolt Kit: BKM209 M5-0.8x30 mm

Seal Kit:

Nitrile SKD1VC
Fluorocarbon SKD1VCV

Bold: Designates Tier I products and options.

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

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

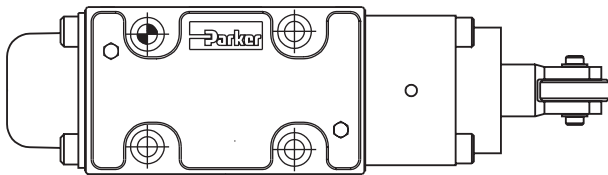
D1VC, D1VD, D1VG - Dimensions

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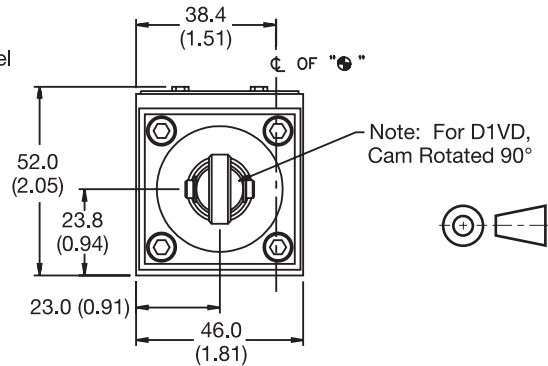
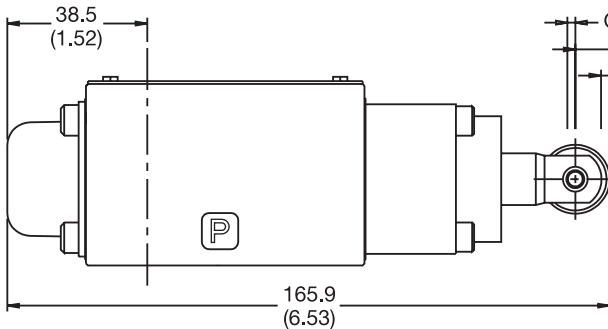
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Inch equivalents for millimeter dimensions are shown in (**)

Cam Operated D1VC and D1VD



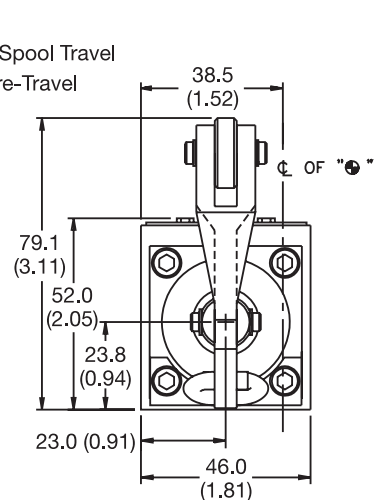
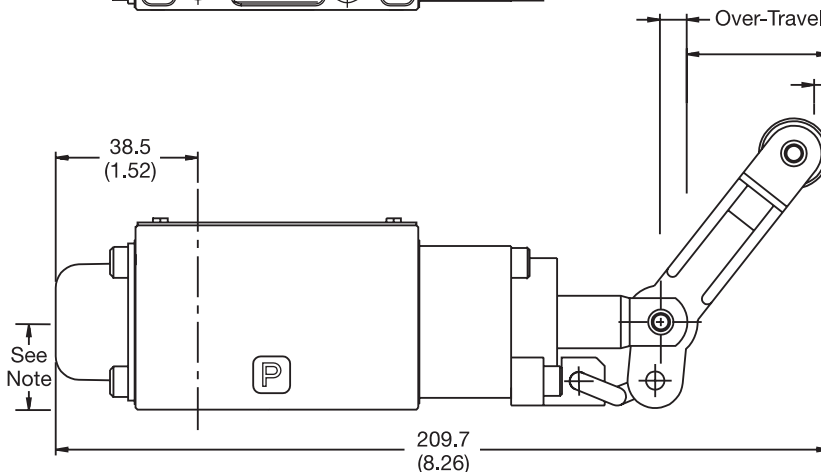
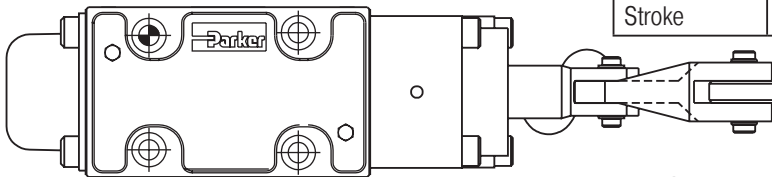
Valve Type	Pre-Travel	Full Spool Travel	Over-Travel
Standard Valve	2.00 (0.079)	9.06 (0.357)	2.03 (0.080)
P05 Short Stroke	0 (0)	7.06 (0.278)	4.03 (0.159)



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

Cam Lever Operated D1VG

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



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

Directional Control Valves

D1VL - Technical Information

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General Description

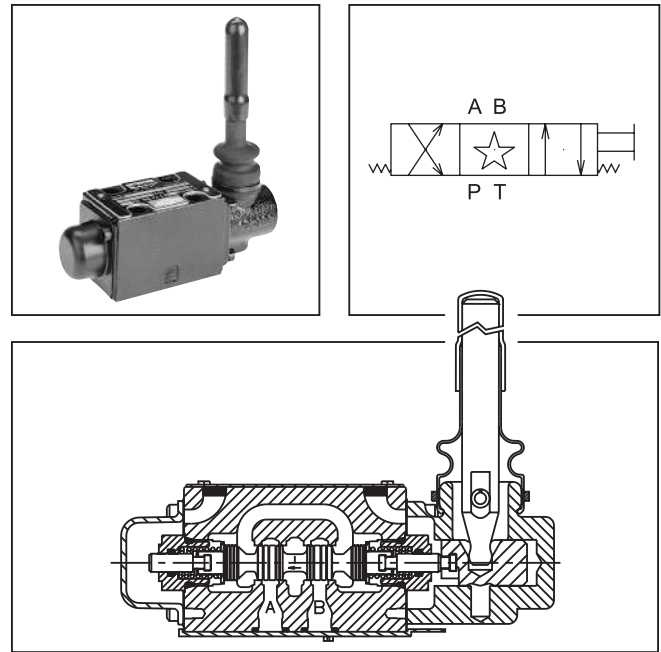
Series D1VL directional control valves are high-performance, 4-chamber, direct operated, lever controlled, 4-way valves. They are available in 2 or 3-position and conform to NFPA's D03, CETOP 3 mounting patterns.

Features

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

Specifications

Mounting Pattern	NFPA D03 / CETOP 03 / NG 06	
Maximum Pressure (Bar)	Operating Tank Line	345 (5075 PSI) 34 (500 PSI)
Maximum Flow	See Reference Data	
Force Required to Shift (N)	25 (5.6 lbs)	



A

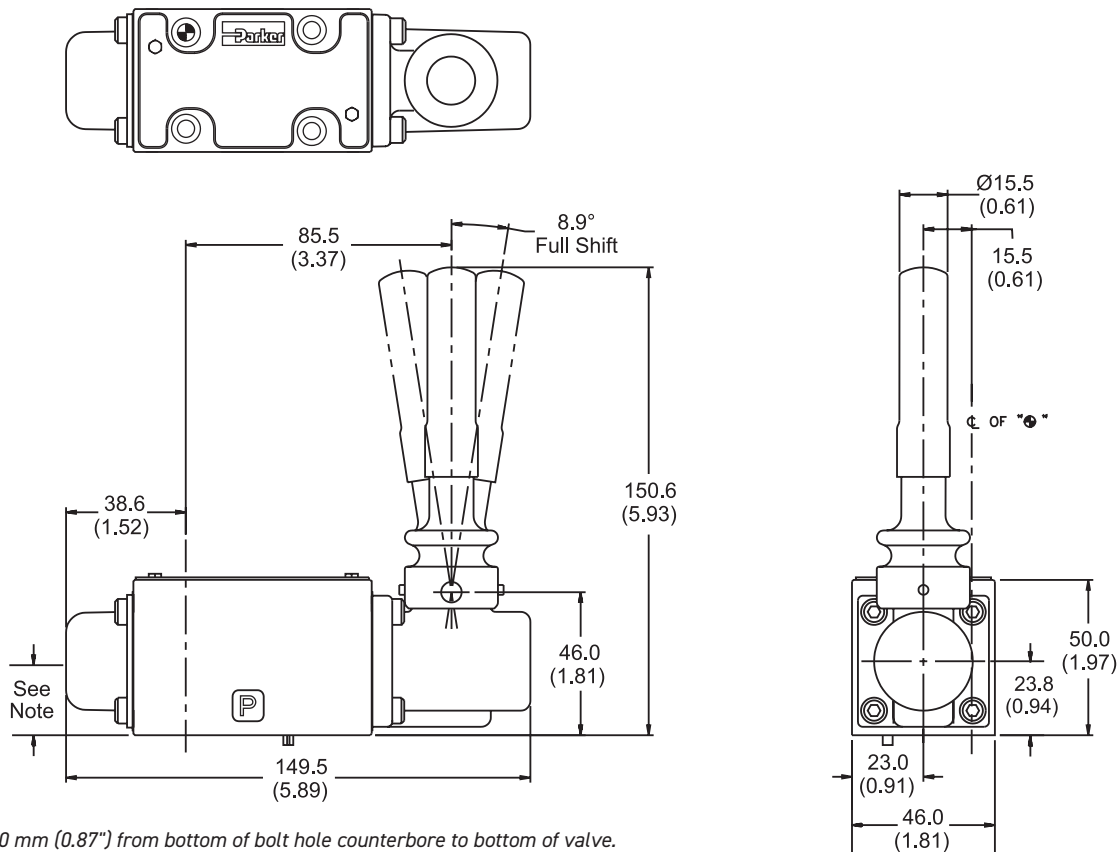
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Dimensions

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

Lever Operated D1VL (Standard)



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

D1VL - Ordering Information

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D
Directional Control Valve

1V
Basic Valve

Code	Description
1V	NFPA D03 CETOP 03 DIN NG06

Operator Type and Location

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

Spool

Style

Seal

Switching Logic

Design Series

NOTE:
Not required when ordering.

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
Omit	Standard
4J*	Center of rotation below spool axis (Parker style)
4K*	Center of rotation above spool axis (Denison style)
* See dimensions for detail	

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

Code	Symbol
001	
002	
004	
008*, 009**	
081	
082	
* 008 spool has closed crossover. ** 009 spool has open crossover.	

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



This condition varies with spool code.

Valve Weight: 1.60 kg (3.5 lbs.)
 Standard Bolt Kit: BK209 10-24x1.25
 Metric Bolt Kit: BKM209 M5-0.8x30 mm
 Grade 8 bolts required
 Seal Kit:
 Nitrile SKD1VL
 Fluorocarbon SKD1VLV

Bold: Designates Tier I products and options.

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

Directional Control Valves

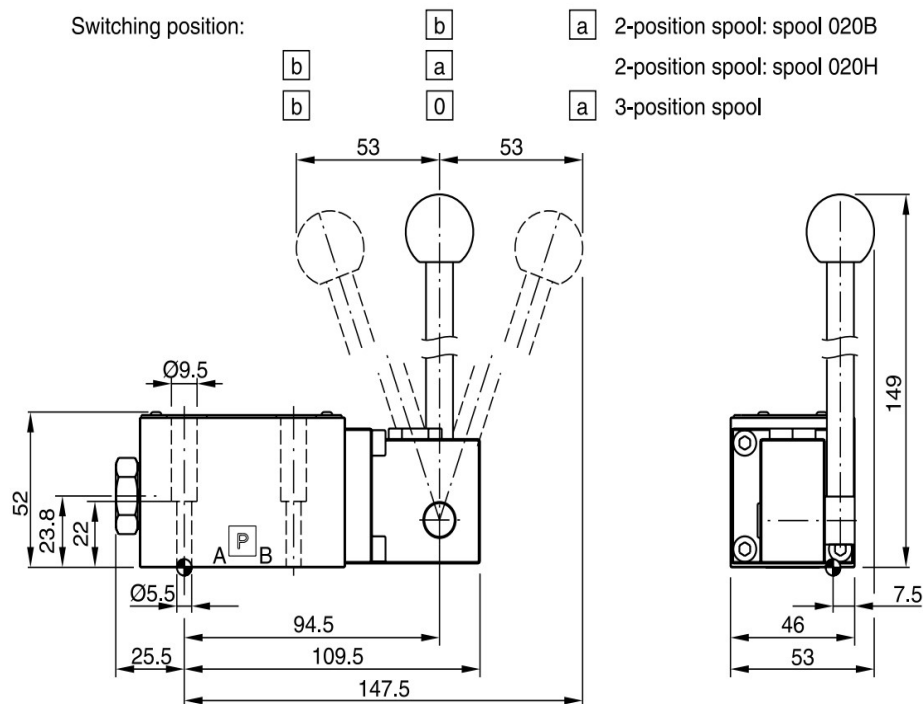
D1VL - Dimensions

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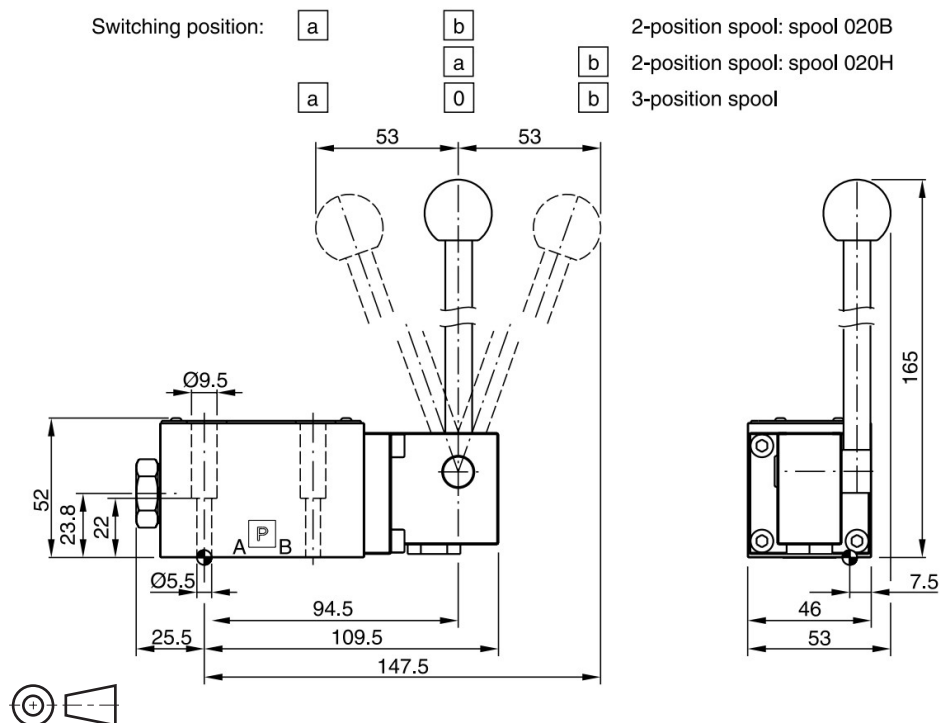
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Inch equivalents for millimeter dimensions are shown in (**)

D1VL*4J



D1VL*4K



Surface Finish	Kit			Seal Kit
$\sqrt{R_{max} 6.3}$ [0.01/100]	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm (5.6 lb-ft) +/- 15%	Nitrile: SK-D1VW-N-91 Fluorocarbon: SK-D1VW-V-91

Directional Control Valves
D1VL - Dimensions

A50

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

D1VLB*4J

Switching position:

- b

a

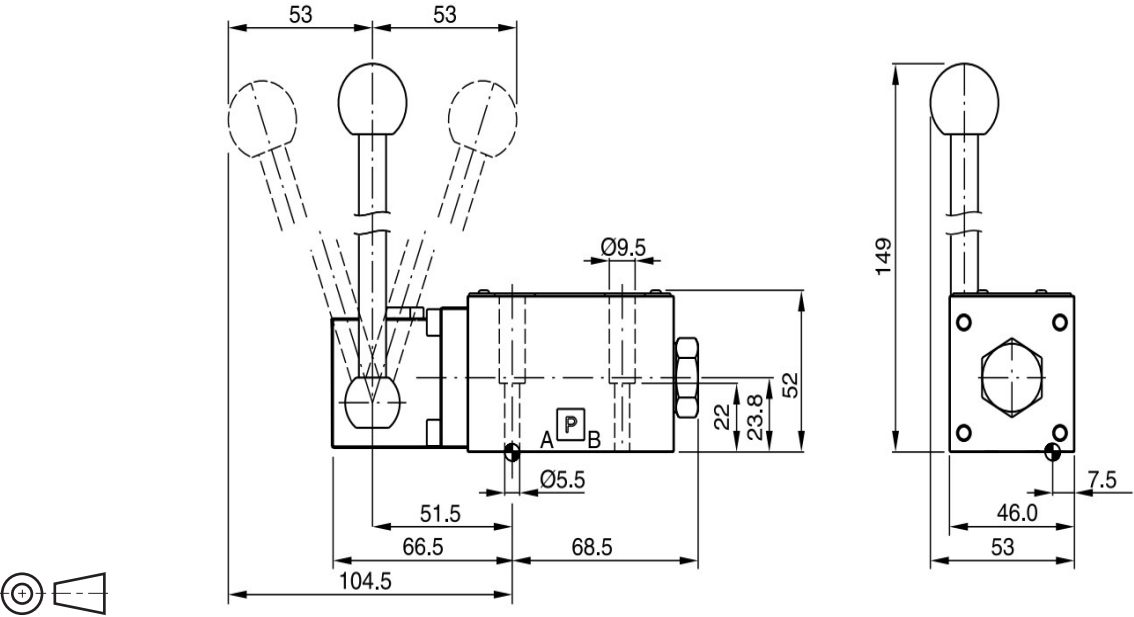
0
- a

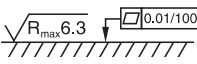
2-position spool: spool 020B

2-position spool: spool 020H

a

3-position spool



Surface Finish	Kit 			Seal Kit 
	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm (5.6 lb-ft) +/- 15%	Nitrile: SK-D1VW-N-91 Flurocarbon: SK-D1VW-V-91

Directional Control Valves

D1V - Installation Information

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Fluid Recommendations

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

Fluids and Seals

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

Temperature Recommendation

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

Ambient temperature:

AC High Watt ambient temperature cannot exceed -26°C (-15°F) low temperature, or +60°C (+140°F) high temperature.

DC High Watt, DC Low Watt and AC Low Watt ambient temperature cannot exceed -26°C (-15°F) low temperature, or +71°C (160°F).

Filtration

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

Tank Line Surges

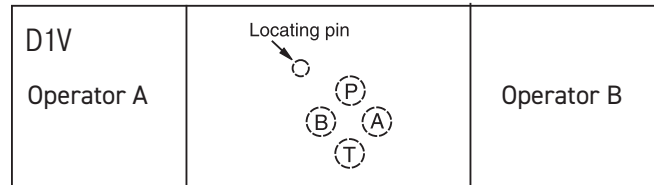
If several valves are piped with a common tank line, flow surges in the line may cause unexpected spool shift. Detent style valves are most susceptible to this. Separate tank lines should be used when line surges are expected in an application.

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

Silting

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

Flow Path Data



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

Single Pass Operation

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

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

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

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

Electrical Failure

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

Torque Specifications

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

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

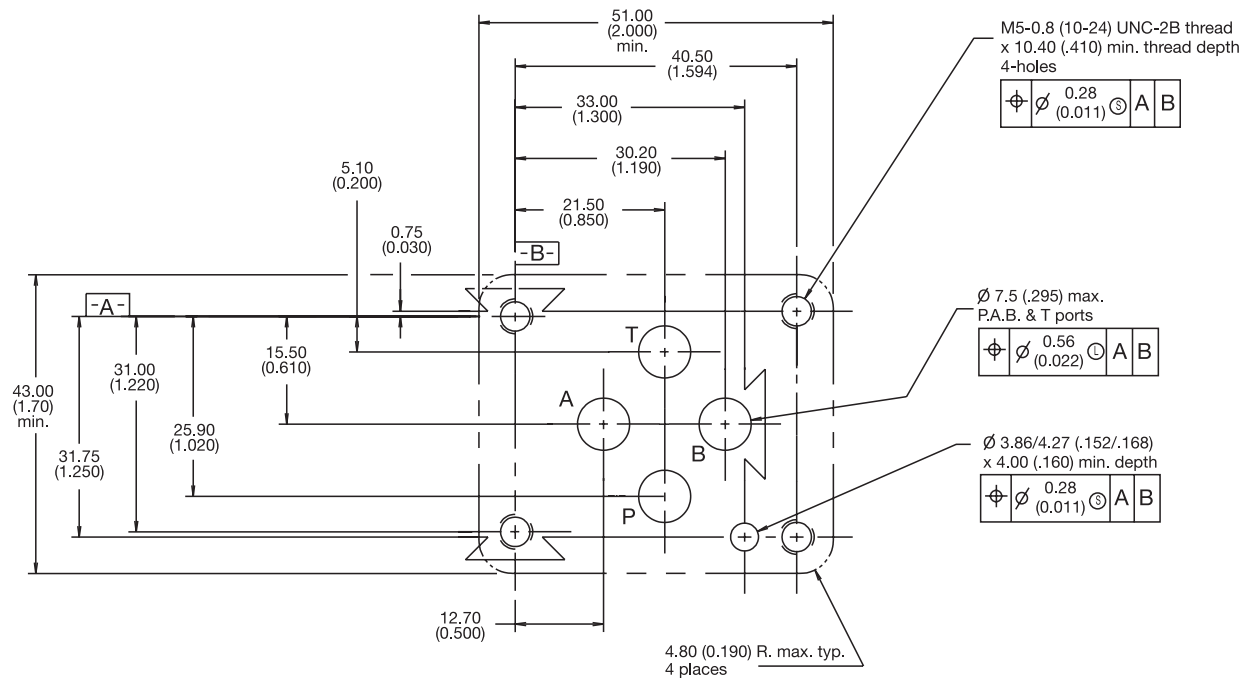
Directional Control Valves

D1V - Installation Information

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



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Directional Control Valves

D1SE - Technical Information

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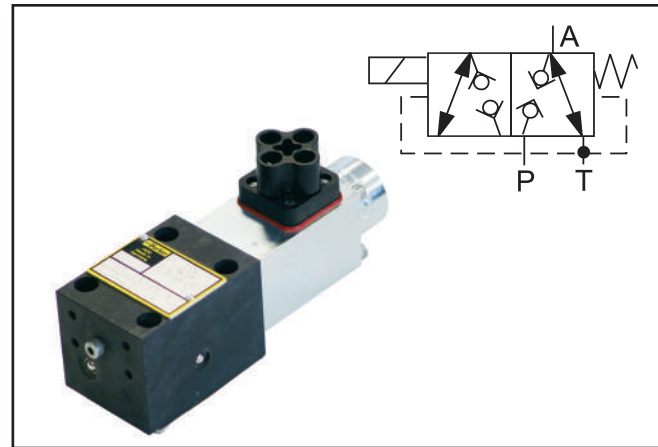
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General Description

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

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

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



Features

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

Ordering Information

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

NOTE: Not required when ordering.

Code	Description
1	NFPA D03 CETOP 03 DIN NG06

Code	Symbol
030	
083	

Code	Description
N	Nitrile
V	Fluorocarbon

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

* For alternating current, use plug with rectifier

Coils for Repair	
Voltage	Ordering Code
12 VDC	7329700-12V
24 VDC	7329700-24V
98 VDC	7329700-98V
205 VDC	7329700-205V

Weight: 0.8 kg (1.76 lbs)

Bold: Designates Tier I products and options.

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

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D1SE - Technical Information

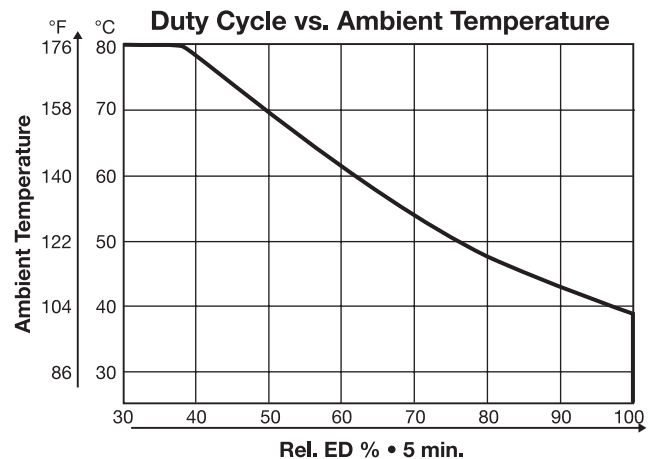
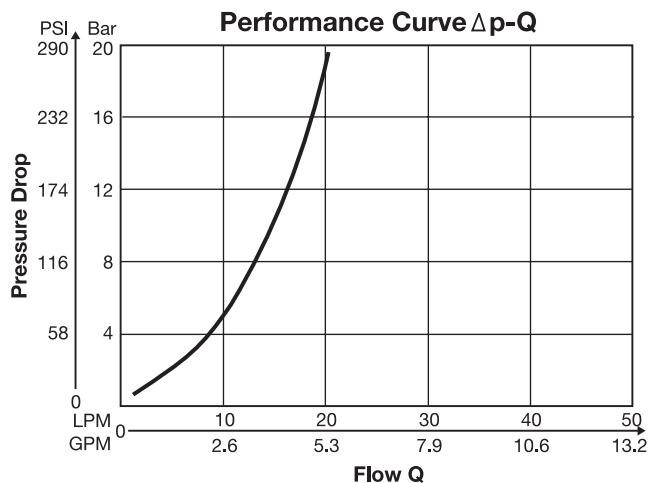
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Specifications

General		Stataic / Dynamic				
Design	Directional Poppet Valve	Step Response	Energized: approx. 50 ms De-energized: approx. 60 ms			
Actuation	Solenoid	Electrical				
Size	DIN NG06 / CETOP 03 / NFPA D03	Duty Ratio	See Diagram			
Mounting Interface	DIN 24340 A3 / ISO 4401 / CETOP RP121-H / NFPA D03	Max Switching Frequency	2000 1/h			
Mounting Position	Unrestricted	Protection Class	IP65 in accordance with DIN 40050 (plugged and mounted)			
Ambient Temperature (°C)	-25 to +50 (-13°F to +122°F), observe permissible duty cycle	Code	K	J	U*	G*
Hydraulic		Supply Voltage (VDC)	12	24	98	205
Maximum Operating Pressure (Bar)	350 (5075 PSI) (P, A, and T)	Tolerance Supply Voltage	+/-10%	+/-10%	+/-10%	+/-10%
Fluid	Hydraulic oil in accordance with DIN 51524, 51525	Current Consumption (A)	1.95	1.1	0.25	0.13
Fluid Temperature (°C)	-25 to +70 (-13°F to +158°F)	Power Consumption (W)	23.4	26.4	24.3	26.6
Viscosity Permitted (cSt / mm²/s) Recommended (cSt / mm²/s)	10 - 500 (46 - 2318 SSU) 30 - 80 (139 - 371 SSU)	Solenoid Connection	Connector as per EN 175301-803			
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)	Min Wiring (mm²)	3x1.5 recommended			
Internal Leakage	3 - 5 DPM per seal	Max Wiring Length (m)	50 (164 ft) recommended			
Maximum Flow (LPM)	20 (5.28 GPM) at Δp = 10 Bar					
* For a silicon bridge rectifier, set up apart from unit for connecting to a 50 or 60 Hz power supply, 110 V~(98=) or 230V~ (205V=). With electrical connections the protective conductor (PE ⊥) must be connected according to the relevant regulations.						

Performance Curves



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MSG14-2500/US
Directional Control Valves

Directional Control Valves

D3 - Introduction

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Application

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

Operation

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

Features

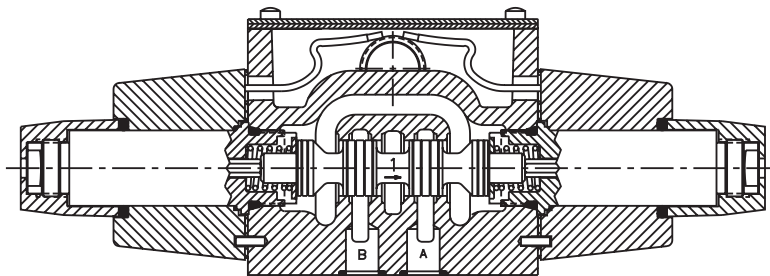
- Easy access mounting bolts.
- 345 Bar (5000 PSI) pressure rating.
- Flows to 40 GPM depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish body.
- CSA approved, and UL recognized coils standard.
- Proportional spool available.

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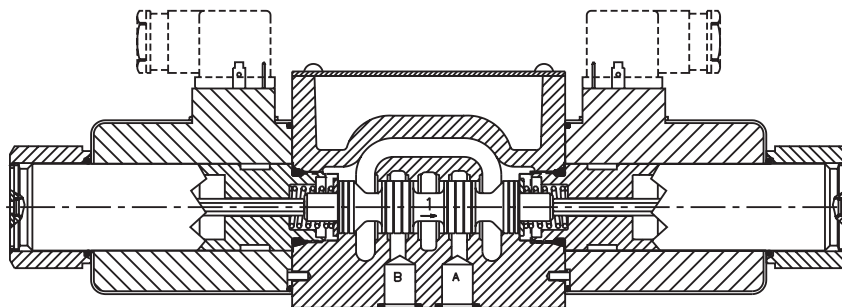
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D3W Solenoid Operated Conduit Cavity Style



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

D3W Solenoid Operated Hirschmann (DIN) Style

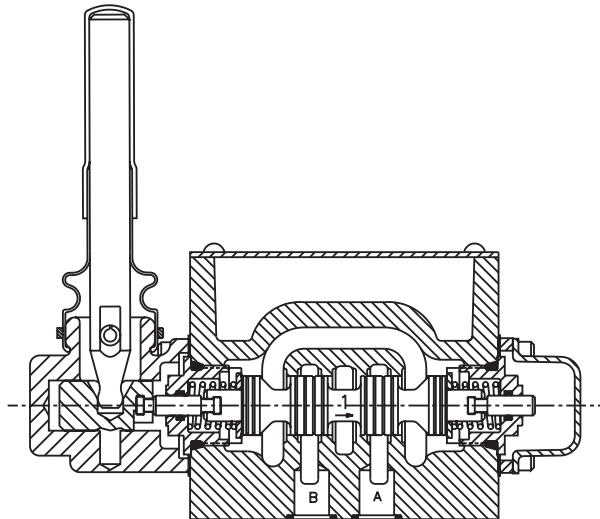


- DIN Style (43650) Hirschmann.
- 16 spool styles available.
- No tools required for coil removal.
- Easy coil replacement.
- AC and DC lights available.
- CSA approved.
- Available in low-watt DC version.

 **WARNING:** This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

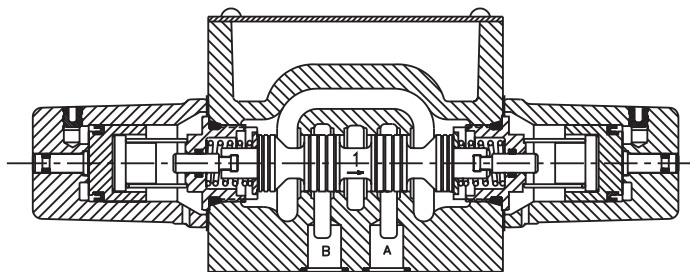
D3L Lever Operated

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



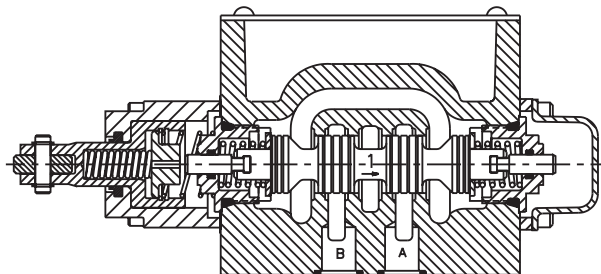
D3A Air Operated

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



D3C Cam Operated

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



Directional Control Valves

D3 - Introduction

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Application

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

Operation

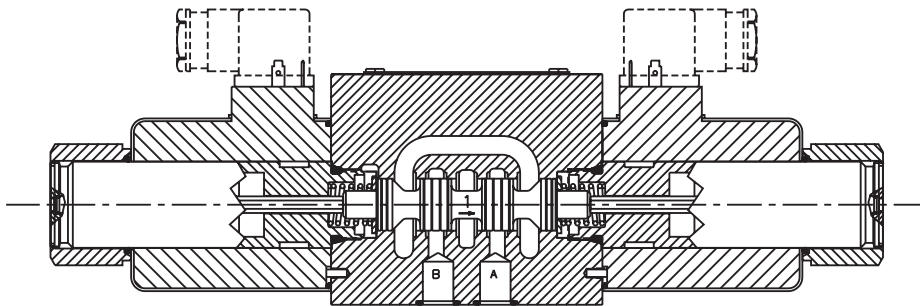
Series D3DW directional control valves consist of a 5-chamber style body, and a case hardened sliding spool.

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D3DW Solenoid Operated Hirschmann (DIN) Style



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

Directional Control Valves

D3 - Technical Information

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D3 Spool Reference Data									
Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction			Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction		
		D3W	D3W*F ¹⁾	D3DW			D3W	D3W*F ¹⁾	D3DW
D3*001		150 (40)	78 (20)	130 (33)	D3*011		115 (30)	59 ³⁾ (15)	130 (33)
D3*002		150 (40)	78 (20)	115 (30)	D3*015		150 (40)	78 (20)	120 (31)
D3*003		150 (40)	78 (20)	120 (31)	D3*016		150 (40)	78 (20)	130 (33)
D3*004		150 (40)	59 (15)	130 (33)	D3*020		150 (40)	78 (20)	130 (33)
D3*005		150 (40)	78 (20)	130 (33)	D3*026		115 (30)	N/A	75 (19)
D3*006		150 (40)	78 (20)	130 (33)	D3*030		39 (10)	59 ³⁾ (15)	75 (19)
D3*008		50 ²⁾ (13)	59 ³⁾ (15)	39 (10)	D3*081		115 ¹⁾ (30)	N/A	130 (33)
D3*009		39 (10)	59 ³⁾ (15)	75 (19)	D3*082		115 ¹⁾ (30)	N/A	130 (33)

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

¹⁾ 3000 PSI Max.

²⁾ 2900 PSI Max.

³⁾ 1500 PSI Max.

D3A, D3C, D3L Spool Reference Data (Four Chamber Body Only)					
Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction	Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction
		D3W			D3W
D3*001		150 (40)	D3*020		150 (40)
D3*002		150 (40)	D3*030		39 (10)
D3*004		150 (40)	D3*081		115 (30)
D3*008		50 (13)	D3*082		115 (30)
D3*009		39 (10)			

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

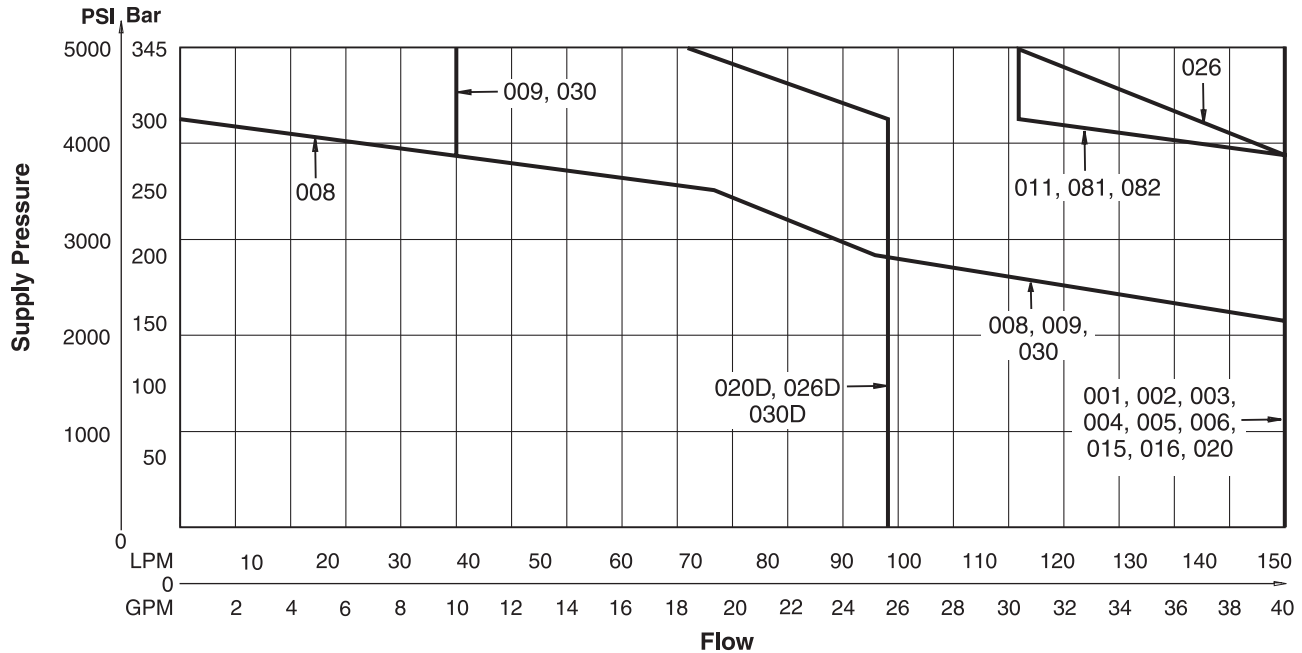
Directional Control Valves

D3 - Performance Curves

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D3W-30/32 DC and AC Rectified Shift Limits



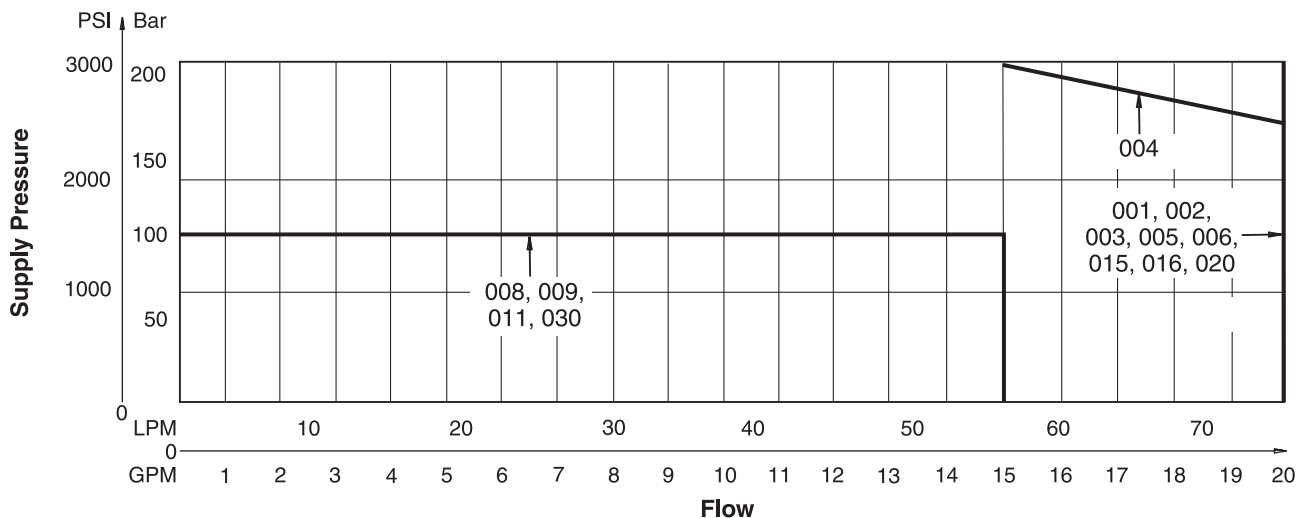
Example:

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

Important Notes for Switching Limit Charts

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

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



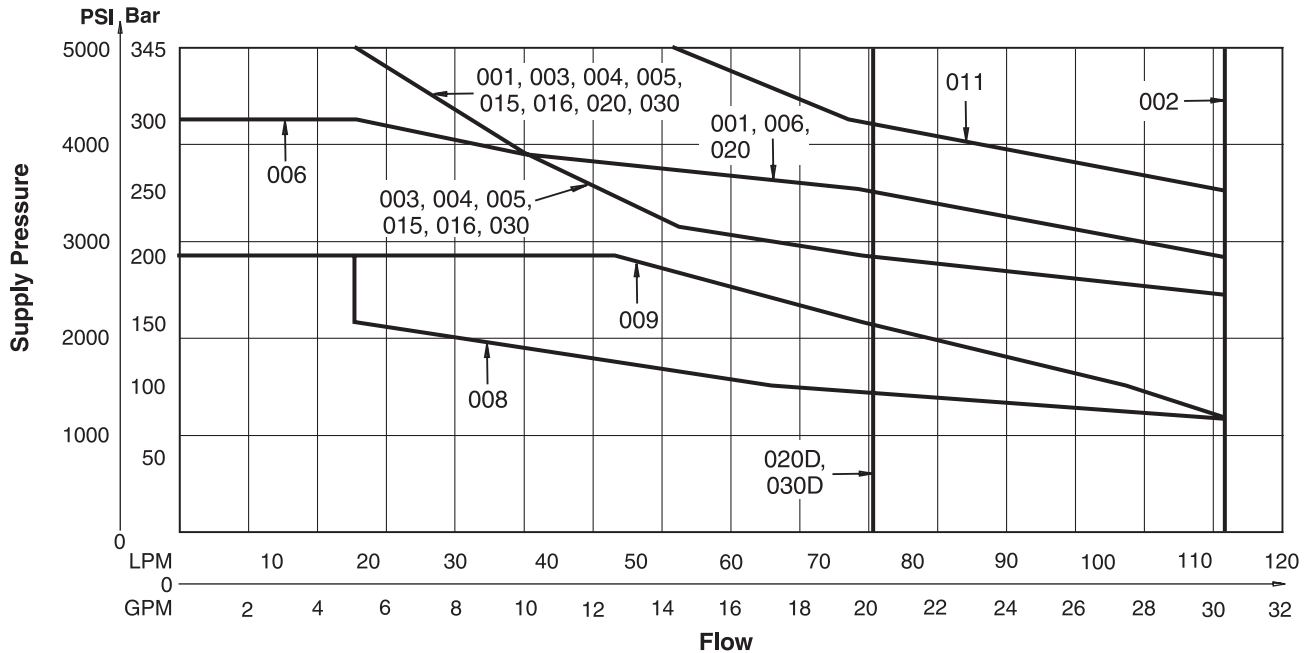
Directional Control Valves

D3 - Performance Curves

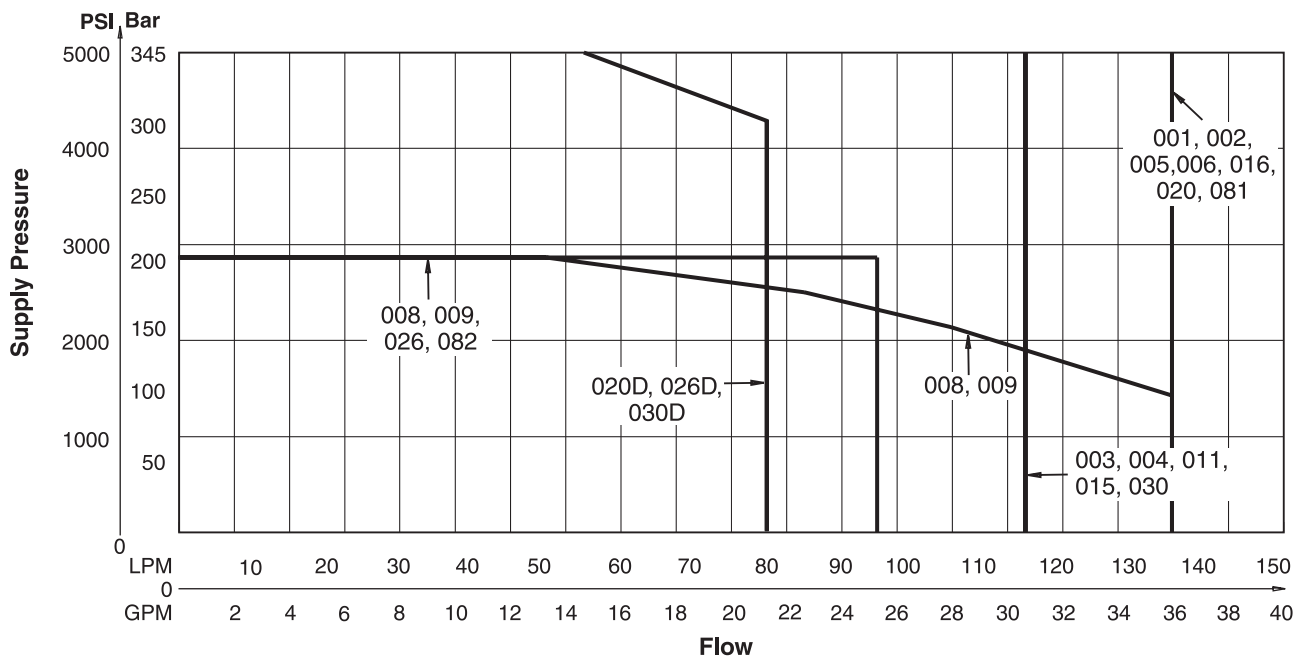
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D3W-30/32 AC Shift Limits



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



Important Notes for Switching Limit Charts

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

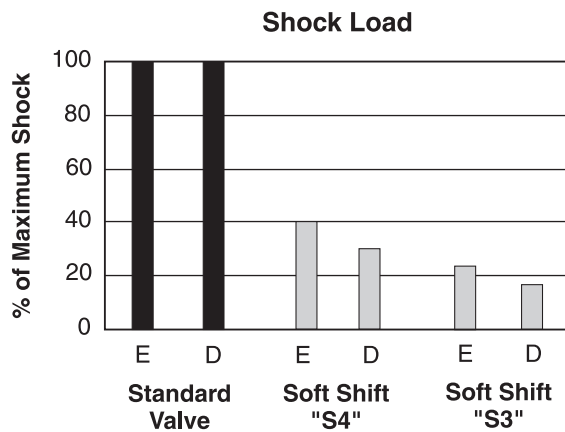
Directional Control Valves

D3 - Performance Curves

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D3W-30/32 Soft Shift Response



E = Energize
D = De-energize

Response Time (ms)*		
Soft Shift Option	Energize	De-energize
60 PSI	23	23
100 PSI	19	38

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

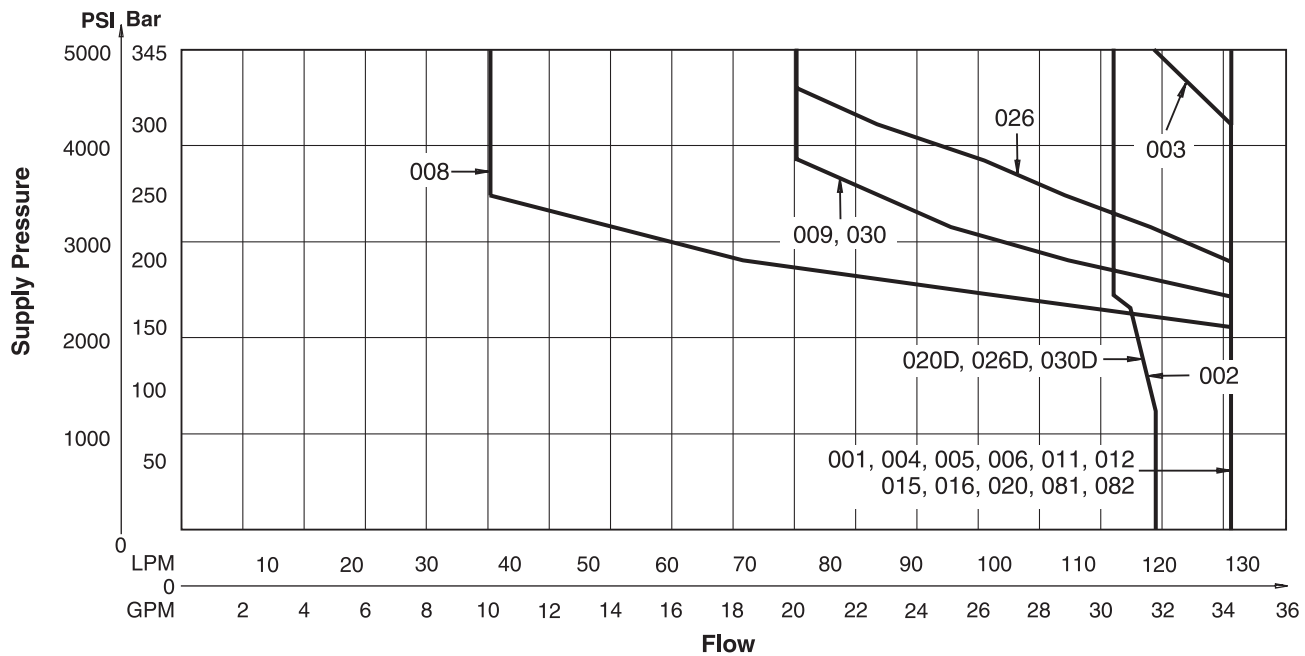
* Chart is for reference only. Response time will vary with pilot line size, length, air pressure and air valve flow capacity (Cv)

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D3DW-40/41 Shift Limits



Important Notes for Switching Limit Charts

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

Directional Control Valves

D3 - Technical Information

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Pressure Drop vs. Flow

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

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

Viscosity Correction Factor

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

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

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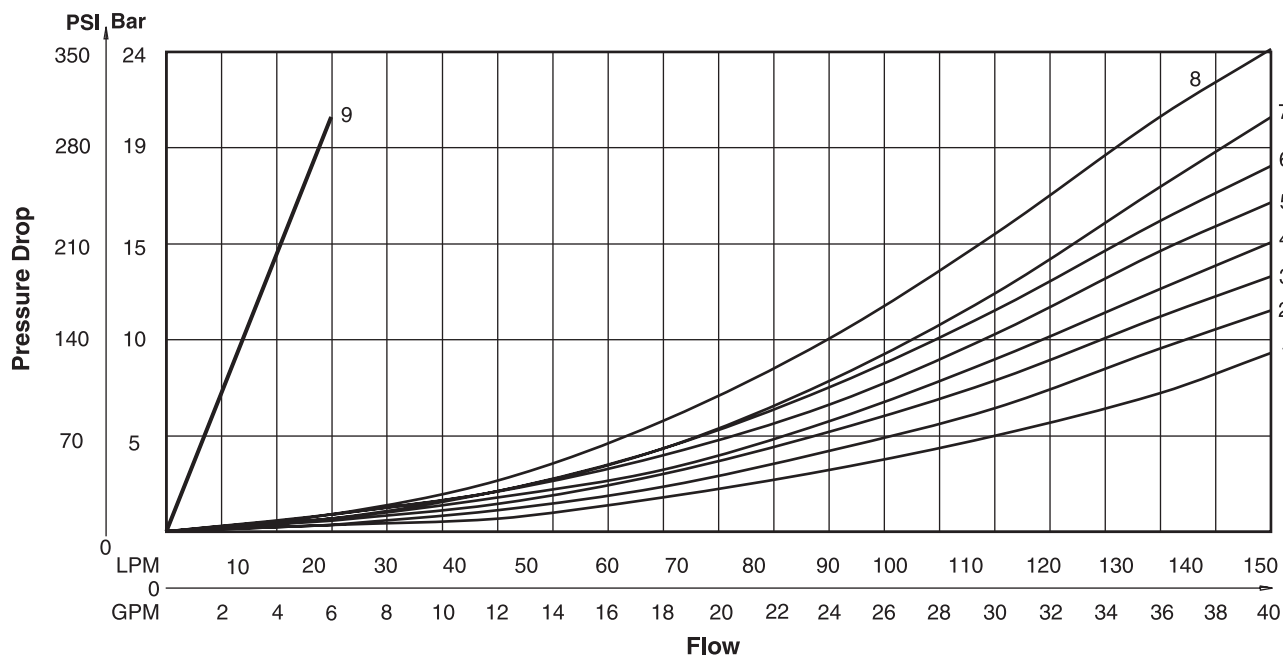
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D3W and D3DW Pressure Drop Reference Chart

Spool No	Curve Number										
	Shifted				Center Condition						
	P - A	P - B	B - T	A - T	(P - T)	(B - A)	(A - B)	(P - A)	(P - B)	(A - T)	(B - T)
001	5	5	2	2	-	-	-	-	-	-	-
002	4	4	1	1	2	3	3	3	3	1	1
003	5	5	2	3	-	-	-	-	-	1	1
004	4	4	3	3	-	-	-	-	-	1	1
005	6	5	2	2	-	-	-	2	-	-	-
006	6	6	2	2	-	4	4	2	2	-	-
008	8	8	7	7	6	-	-	-	-	-	-
009	5	5	4	4	7	-	-	-	-	-	-
011	5	5	2	2	-	-	-	-	-	10	10
015	5	5	3	2	-	-	-	-	-	-	1
016	5	6	2	2	-	-	-	-	2	-	-
020	5	5	2	2	-	-	-	-	-	-	-
026	5	5	-	-	-	-	-	-	-	-	-
030	5	5	2	2	-	-	-	-	-	-	-

NOTE: For 081 and 082 spools, consult factory

Performance Curves



Industrial
Hydraulics Valves

MSG14-2500/US
Directional Control Valves

Directional Control Valves

D3W (w/o Pos. Control) - Technical Information

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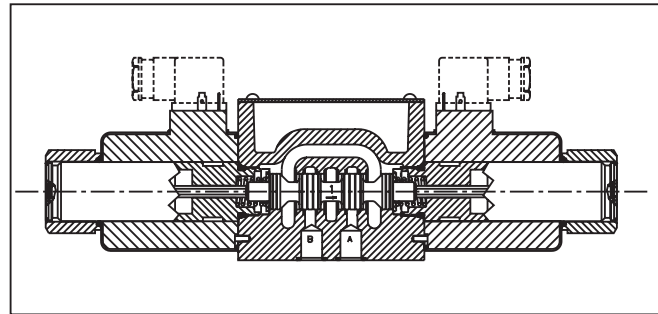
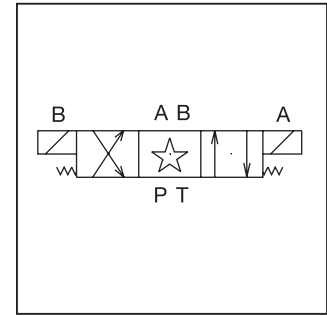
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General Description

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

Features

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



Response Time (ms)

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

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

Specifications

Interface	NFPA D05, CETOP 05, NG 10
Maximum Pressure	P, A, B: 345 Bar (5000 PSI) Standard CSA 207 Bar (3000 PSI) Tank: 103 Bar (1500 PSI) AC standard 207 Bar (3000 PSI) AC optional DC/AC Rectified Standard CSA 103 Bar (1500 PSI)
CSA File Number	LR060407
Leakage Rates 100 SSU @ 49°C (120°F)	Maximum Allowable: 19.6 cc (1.2 Cu.in.) per Minute/Land @ 69 Bar (1000 PSI)* 35 cc (2.19 Cu. in.) per Minute/Land @ 207 Bar (3000 PSI)*
*#008 and #009 spools may exceed these rates. Consult Factory	

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D3W (w/o Pos. Control) - Ordering Information

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D
Directional Control Valve

3
Basic Valve

W
Actuator

Spool

Style

Seal

Solenoid Voltage

Code	Description
3	NFPA D05 CETOP 05 DIN NG 10

Code	Description
W	Wet armature solenoid

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

* 008, 020, and 026 spools have closed crossover.
 ** 009 and 030 spools have open crossover.
 † Only DC or AC rectified.
 †† Styles C, E, F, K, and M only. Not available with explosion proof coils

Code	Description
N	Nitrile
V	Fluorocarbon

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

* Conduit and Hirschmann only.
 High watt only.
 ** High watt only

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

* 020, 026, and 030 spool only.
 ** High watt only.
 † 020 and 030 spools only. Must be standard high watt coil (30 watt) or L (10 watt coil) only (stroke is reduced by 0.5mm, therefore max flow is reduced to 13 - 14 GPM). Not available with F (low watt) coil option for AC coils only.



This condition varies with spool code.

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.

Bold: Designates Tier I products and options.

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

Directional Control Valves

D3W (w/o Pos. Control) - Ordering Information

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Solenoid Connection

Solenoid/Tube Options

Manual Override Options

Electrical Options

Shift Response

Approvals

Variations

Design Series

NOTE:
Not required when ordering.

Code	Description
C+*	Conduit Cavity
E*	Explosion Proof
J†*	Deutsch (DT04-2P)
K	Conduit Box
P	Hirschmann w/Plug
W*	Hirschmann w/o Plug
* Lights not available	
+ No conduit cavity variations	
† 12/24 VDC only. High watt only	

Code	Description
Omit	Standard Tube
P*	Extended Manual Override
* Manual override options not available on Explosion Proof or soft shift. Not available with high pressure AC tube "H"	

Code	Description
Omit	Standard
4 †	CSA Approved
N*#	CE Approved
* Consult factory for available options	
# YC and TC only. Conduit box not allowed at this time	
† Valve is derated.	

Option	Coil	Tube Rating	
		AC	DC/AC Rectified
Omit	High Watt	103.5 Bar (1500 PSI)	207 Bar (3000 PSI)
F*#	Low Watt	N/A	207 Bar (3000 PSI)
H	High Watt	207 Bar (3000 PSI)	N/A
D+†	Explosion Proof, EExd ATEX		
U†*	Explosion Proof, UL/CSA		
* Availability varies based on Solenoid Voltage. Available with J Hirschmann style only. Available with J and Y (Rectified) leadwire style only			
# Not available with soft shift or with F and M style valves			
+ DED and JED only DC available			
x DEU and JEU only DC available			
† Explosion Proof coils are 60 Hz only			

Code	Description
Omit	Standard Valve
S3*	Soft Shift, 0.030" Orifice
S4*	Soft Shift, 0.040" Orifice
* High watt coil only. Not available with F Low Watt. Not compatible with D Style. Not available with Detent. DC or AC rectified	

Code	Description
Omit	Standard – No Variations
1C	Manaplug – Brad Harrison Style 7/8-16 with Lights (Single Solenoid = 5 pin)
1D	Manaplug (Micro) Single Solenoid 5 pin, with Lights
1M*	Manaplug Opposite Normal
1P	Painted Body
2P	Complete Painted Valve, 1 mil thick, spec. (Check factory for availability)
2P	Complete Painted Valve, 1 mil thick, spec. (Check factory for availability)
5	Signal Lights - Standard
6	Manaplug - Brad Harrison Mini
56	Manaplug – Brad Harrison Style 7/8-16 Mini with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
57	Manaplug - Micro Mini with Lights (M12x1)
* Solenoid connection option G only. Requires manaplug code (56, 1C, 7B, etc.).	

Mounting Bolt Kits					
UNC Bolt Kits for use with D3W Directional Control Valves and Sandwich Valves					
		Number of Sandwich Valves @ 2" (50 mm) thickness			
		0	1	2	3
D3W	Standard	BK98 1.62"	BK141 3.5"	BK142 5.5"	BK143 7.5"
	Metric	BKM98 40 mm	BKM141 90 mm	BKM142 140 mm	BKM143 190 mm
D3W with Explosion Proof coils	Standard	BK144 2.37"	BK61 4.25"	BK62 6.25"	BK63 8.25"
	Metric	BKM144 60 mm	BKM61 110 mm	BKM62 160 mm	BKM63 210 mm
NOTE: All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 Nm (12 lb-ft)					

Code	Description
Omit	No Options
V#	Varistor Surge Suppressor
Z†	AC Rectified
# 24 VDC voltage only with Leadwire C and K options. High and Low watt available	
† T voltage DIN only, High watt only.	
Y voltage with Leadwire, high and low watt.	
Y voltage, with DIN, high watt only	

Valve Weight:

Single Solenoid:	
AC	4.3 kg (9.5 lbs.)
DC	5.3 kg (11.6 lbs.)
Double Solenoid:	
AC	5.0 kg (11.0 lbs.)
DC	7.3 kg (16.0 lbs.)

Seal Kit:

Nitrile	SKD3W
Fluorocarbon	SKD3WW

Bold: Designates Tier I products and options.

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

Directional Control Valves

D3W (w/o Pos. Control) - Technical Information

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Solenoid Ratings*

Insulation	Class H	
Allowable Deviation from rated voltage	DC, AC Rect AC	-10% to +10% -5% to +5%
Armature	Wet pin type	
* 24 VDC Solenoids Leadwire coils available with TVS Diode surge suppression. Leadwire length 6" from coil face		

D3W*****F Solenoid Electrical Characteristics‡

Solenoid Code	Nominal Volts/Hz	In Rush Amps	Holding Amps	Watts
JF	24 VDC	-	0.75	18
‡ Based on nominal voltage @ 22°C (72°F)				

D3W Solenoid Electrical Characteristics†

Solenoid Code	Nominal Volts/Hz	In Rush VA	Holding VA	Nominal Watts (Ref)
Y	120/60 110/50	298 294	95 102	32
T	240/60 220/50	288 288	96 101	32
K	12 VDC	-	3.00†	36
J	24 VDC	-	1.50†	36
D	120 VDC	-	0.30†	36
† DC holding amps				

D3W Rectified AC Solenoid Electrical Characteristics‡

Solenoid Code	Nominal Volts/Hz	In Rush VA	Holding VA	Nominal Watts (Ref)
Y	120/60 110/50	-	.37	36
T	240/60 220/50	-	.18	36
YF	120/60 110/50	-	.18	18
TF	240/60 220/50	-	.09	18
‡ Based on nominal voltage @ 22°C (72°F)				

Explosion Proof Solenoids

Explosion Proof Solenoid Ratings

U.L / CSA (EU)	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F, & G As defined by the N.E.C
ATEX (ED)	Complies with ATEX requirements for: Exd, Group IIB EN 50014: 1999+ Amds 1 & 2 EN 50018: 200

Electrical Characteristics* ED and EU†

Solenoid Code	Nominal Volts/Hz	In Rush VA	Holding VA	Nominal Watts (Ref)
Y	120/60	266	82	36
J	24 VDC	-	1.50†	36
D	120 VDC	-	0.30†	36
* Dual frequency not available on Explosion Proof coils † DC holding amps				

Directional Control Valves

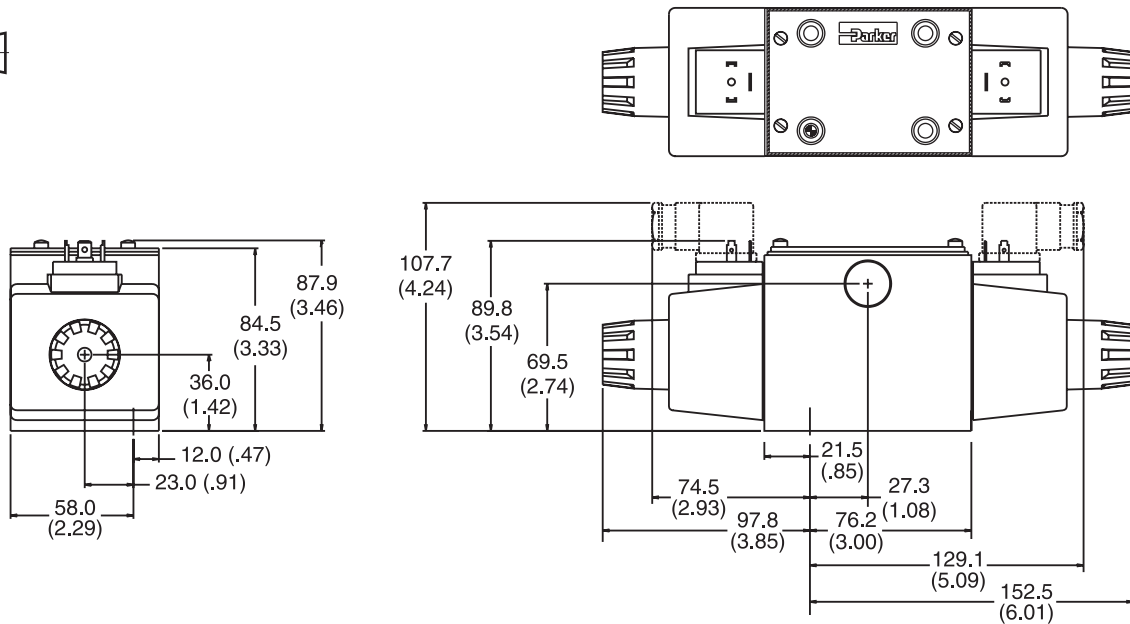
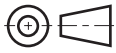
D3W (w/o Position Control) - Dimensions

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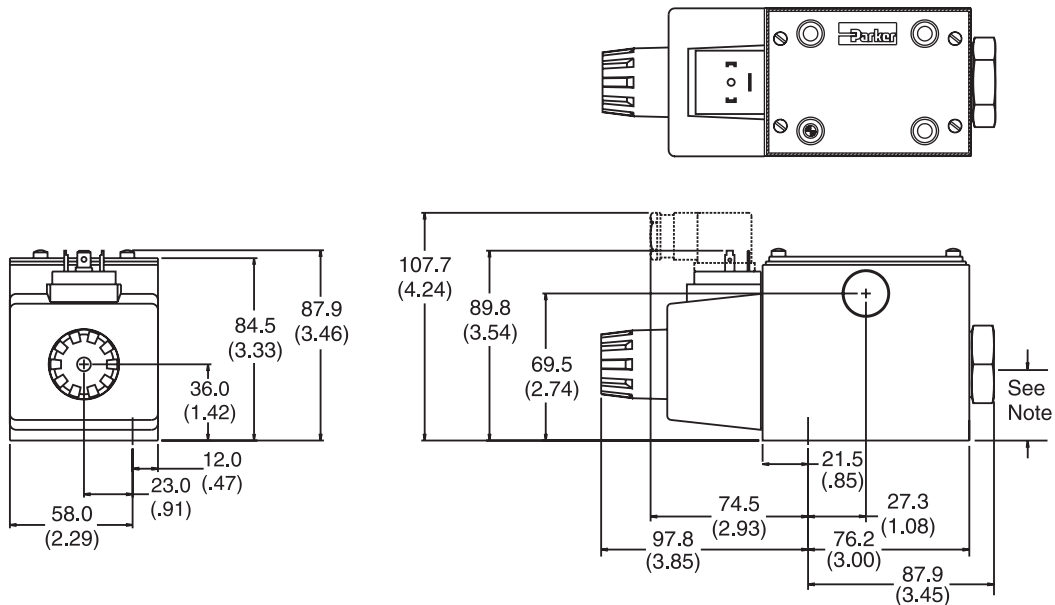
Inch equivalents for millimeter dimensions are shown in (**)

Hirschmann, Double AC Solenoid



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

Hirschmann, Single AC Solenoid



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

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Directional Control Valves

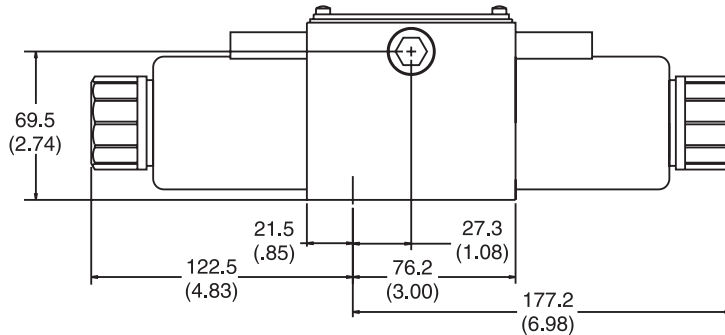
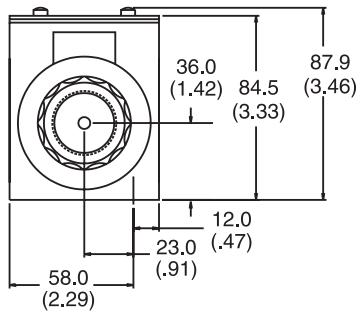
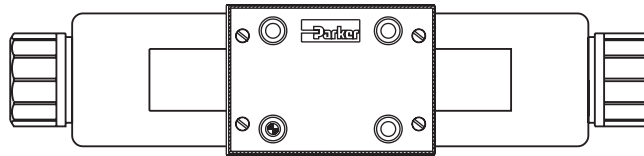
D3W (w/o Position Control) - Dimensions

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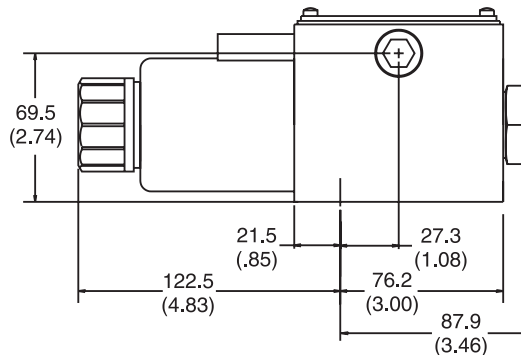
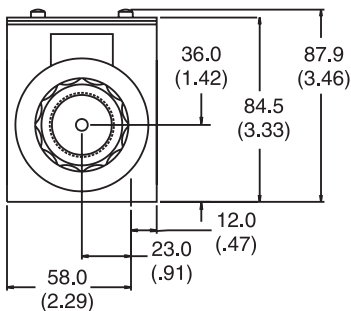
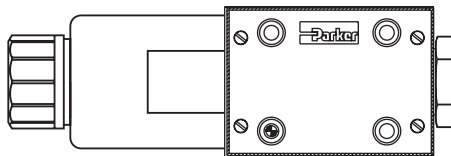
Inch equivalents for millimeter dimensions are shown in (**)

Conduit Cavity, Double DC Solenoid



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

Conduit Cavity, Single DC Solenoid



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

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Directional Control Valves

D3W (w/o Position Control) - Technical Information

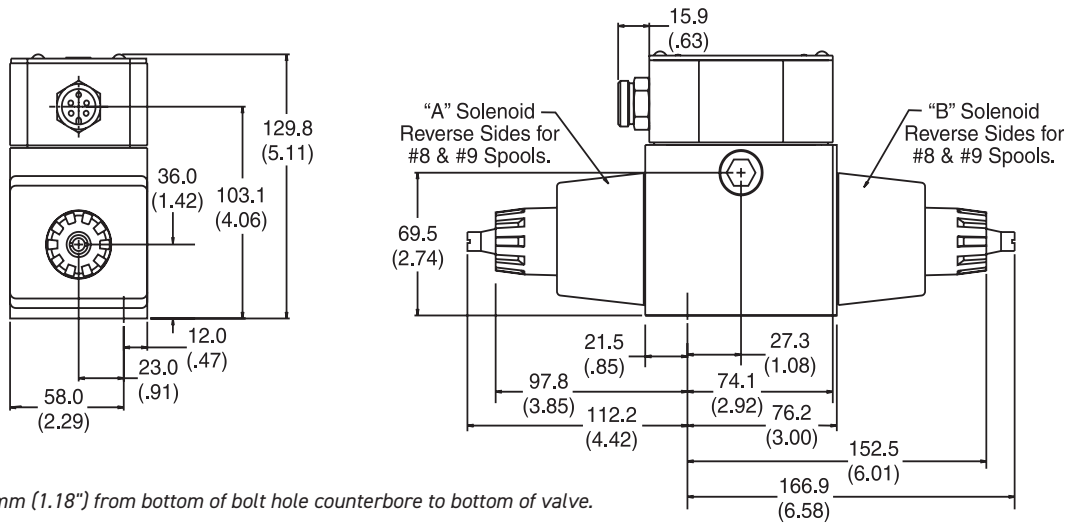
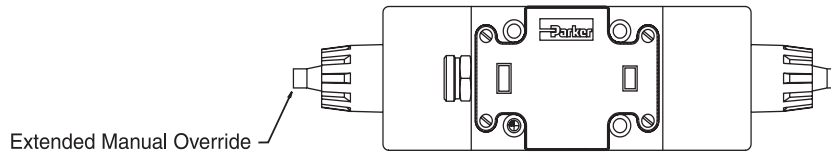
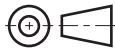
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WWW.SUMY.IR

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

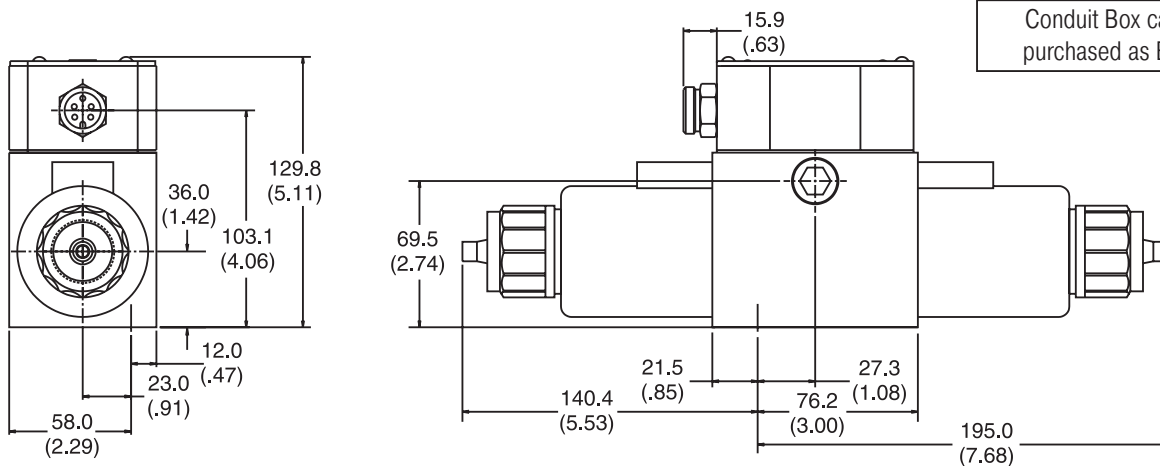
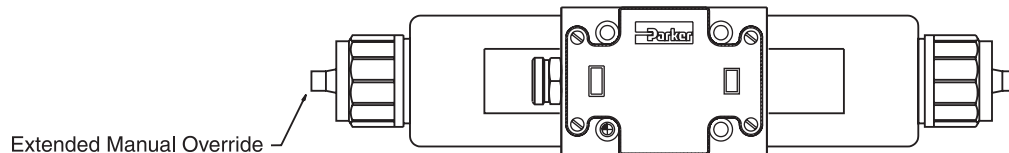
Conduit Box, Single AC Solenoid

with Variation 6 (Manaplug) & Variation P (Extended Manual Override)



Conduit Box, Double DC Solenoid

with Variation 6 (Manaplug) & Variation P (Extended Manual Override)



Directional Control Valves

D3W (w/o Position Control) - Technical Information

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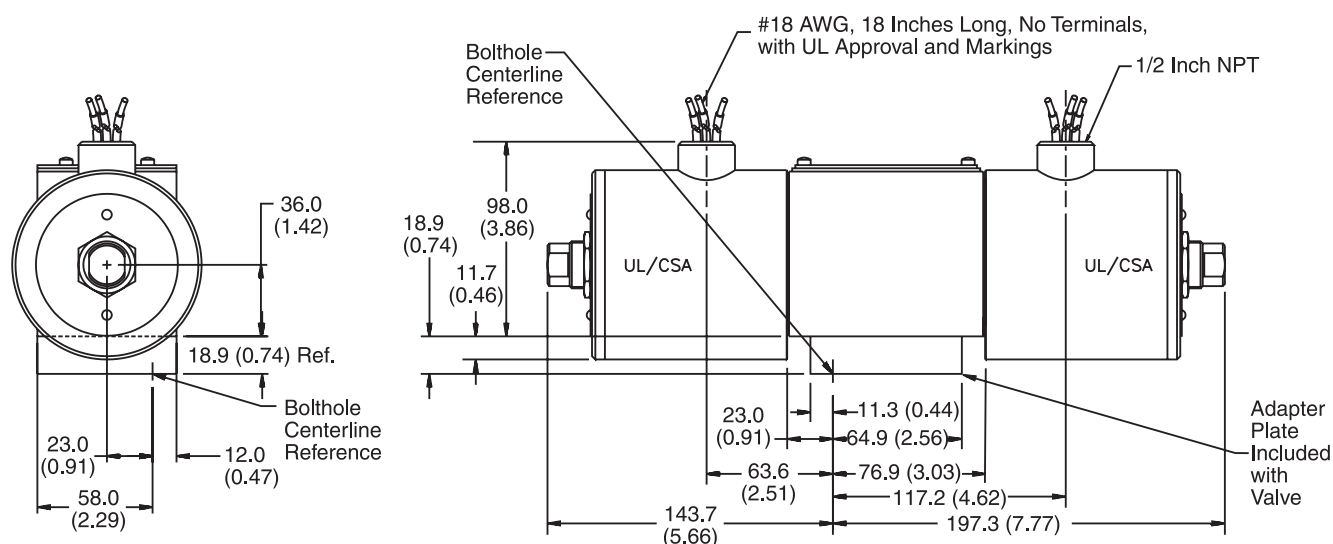
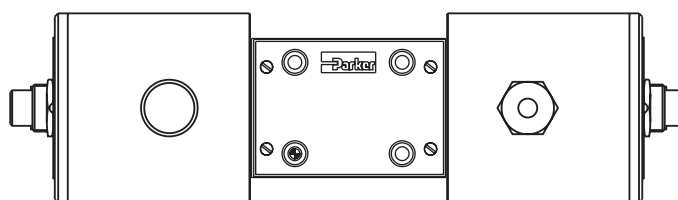
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Inch equivalents for millimeter dimensions are shown in (**)

Explosion Proof U.L. & CSA, Double Solenoid

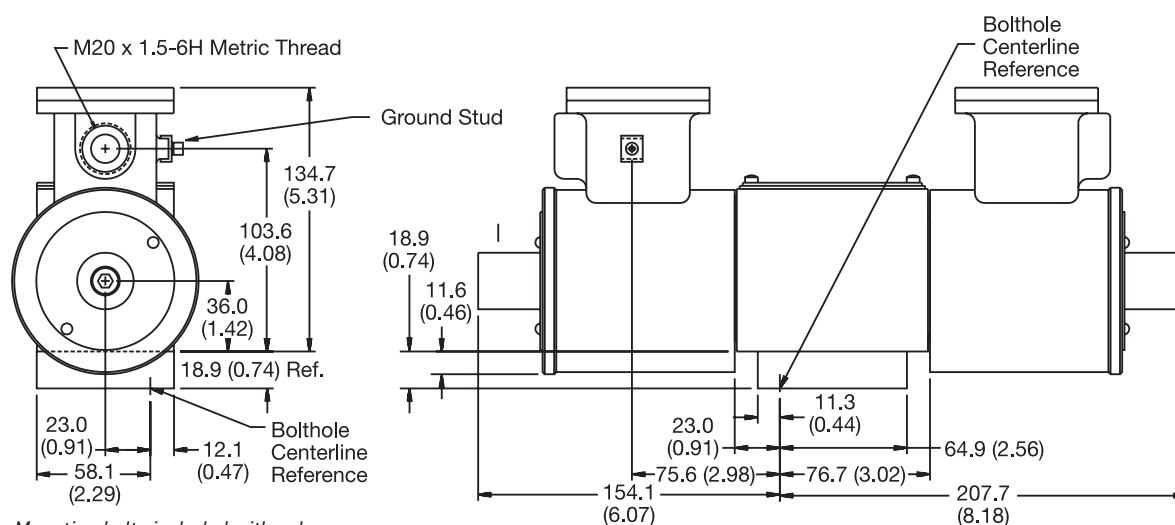
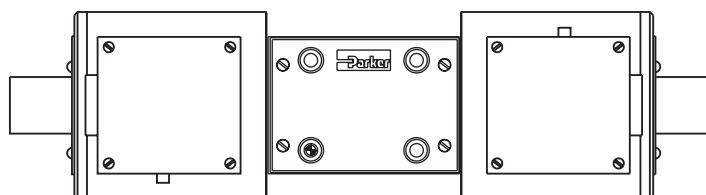


Note:
2 Black Wires
1 Green Wire



Note: Mounting bolts included with valve.

Explosion Proof ATEX, Double Solenoid



Note: Mounting bolts included with valve.

Directional Control Valves

D3W (w/o Position Control) - Accessories

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Conduit Box

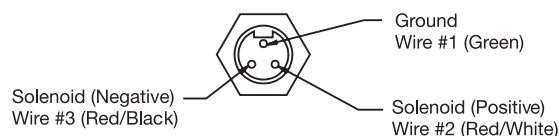
(connection option K)

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

Manaplug

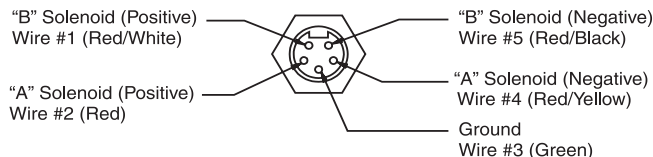
(valve variations 6, 56, 1A, 1C)

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



3-Pin Manaplug (Mini) with Lights

Single Solenoid Valves – Installed Opposite Side of Solenoid

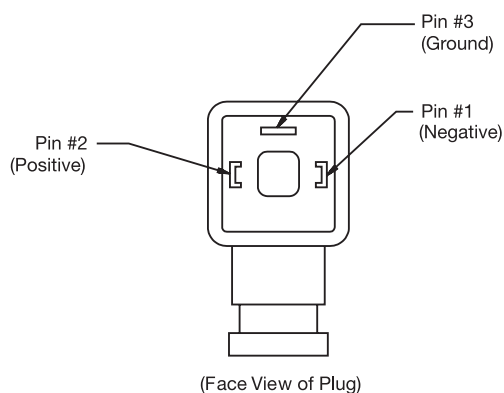


5-Pin Manaplug (Mini) with Lights

Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

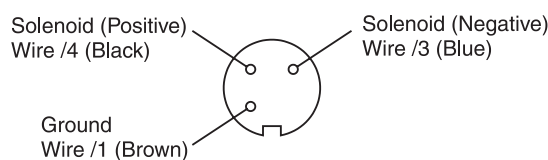
Hirschmann Plug with Lights (P5)



Conforms to DIN43650, ISO4400, Form A 3-Pin

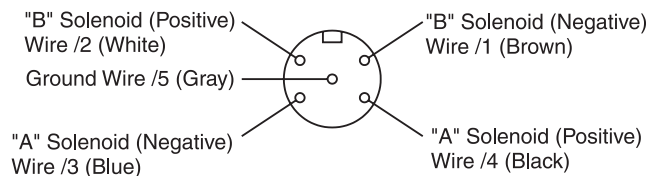
Manaplug - Micro Connector

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



3-Pin Manaplug (Micro) with Lights

Single Solenoid Valves – Installed Opposite Side of Solenoid



5-Pin Manaplug (Micro) with Lights

Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

Directional Control Valves

D3W (Inductive Pos. Control) - Technical Information

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General Description

Series D3W Inductive Control Valves are direct operated directional valves with inductive position control and are typically used in safety relevant applications. The start or end position can be monitored. The position control is available for single and double solenoid valves.

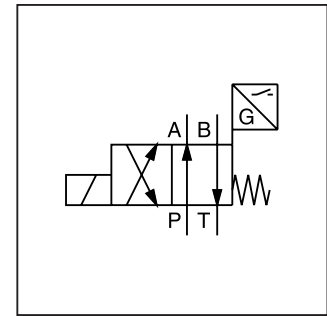
The fail-safe position of the directional valve during power failure is the spring offset position.

Detailed information on the machine directive is available in the position papers (see pages A3 and A4).

Note: The adjustment of the position control is factory set and sealed. Replacement and repairs can only be made by the manufacturer.



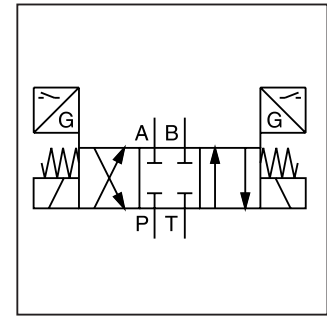
D3W*B



D3W*B

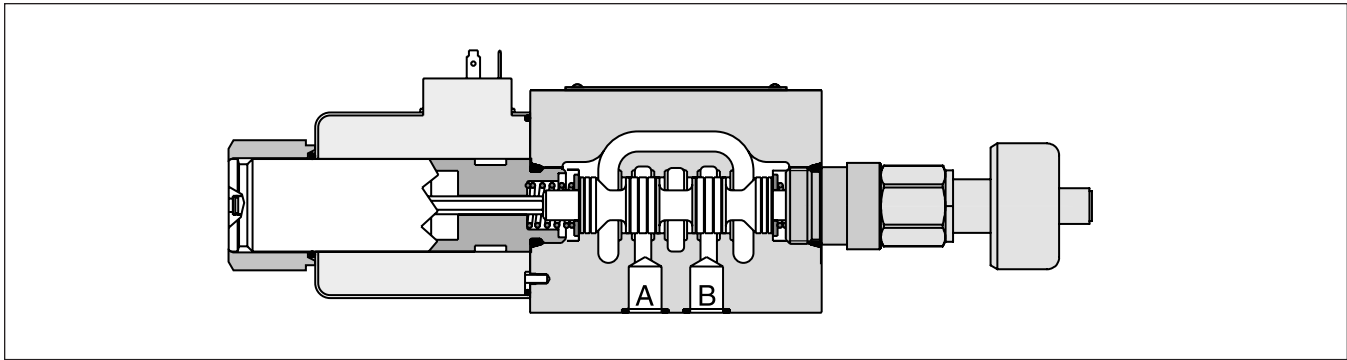


D3W*C

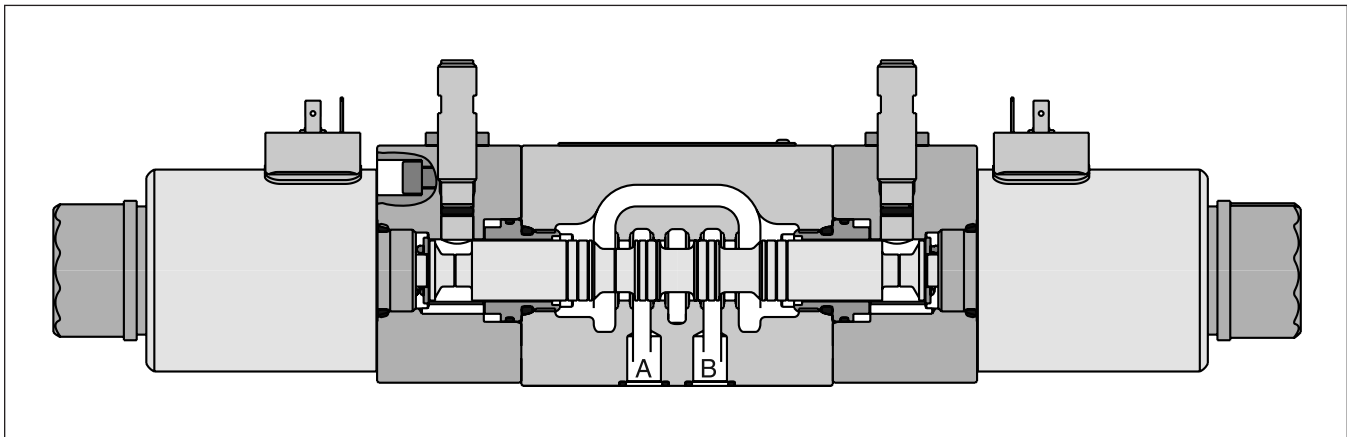


D3W*C

D3W*B



D3W*C



 **WARNING:** This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D3W (Inductive Pos. Control) - Ordering Information

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Single Solenoid Valve

Code	Description
3	NFPA D05 CETOP 05 DIN NG 10

Code	Description
W	Wet armature solenoid

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

* To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
Omit	No Cover
4B	Monitor Switch Protective Cover

Code	Position Control*	Spool Position
I2	End position monitored side B	E, F, B (Solenoid on A-side)
I5**	Start position monitored side B	
I1	End position monitored side A	K, M, H (Solenoid on B-side)
I4**	Start position monitored side A	

* Please order female connector M12x1 separately. See Accessories, Female Connector M12x1 (order no. 5004109)
** For hydraulic presses, according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessories I4 or I5 (start position monitored) are required

Code	Description
Omit	Manual Override (Standard)
T*	Without Manual Override

* For hydraulic presses, according to the safety regulations EN 693, solenoid option T (without manual override) and accessories I4 or I5 (start position monitored) are required

Code	Symbol
001	
002	
003*	
004	
005**	
015**	
016*	
021*	
022**	

3-Position Spools		
Code	Spool Position	Description
E		2 positions Spring offset in position 0 Operated in position A
F		2 positions Spring offset in position B Operated in position 0
K		2 positions Spring offset in position 0 Operated in position B
M		2 positions Spring offset in position A Operated in position 0

2-Position Spools		
Code	Spool Position	Description
B		2 positions Spring offset in position B Operated in position A
H		2 positions Spring offset in position A Operated in position B

* Only available for spools K and M
** Only available for spools E and F

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Directional Control Valves

D3W (Inductive Pos. Control) - Ordering Information

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Double Solenoid Valve

Code	Description
3	NFPA D05 CETOP 05 DIN NG 10

Code	Description
W	Wet armature solenoid

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

* To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
Omit	No Cover
4B	Monitor Switch Protective Cover

Code	Position Control	Spool Position
I3	End positions	C, D
I6*	Start positions	

* For hydraulic presses, according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessory I6 (start positions) is required

Code	Description
Omit	Manual Override (Standard)
T*	Without Manual Override

* For hydraulic presses, according to the safety regulations EN 693, solenoid option T (without manual override) and accessories I4 or I5 (start position monitored) are required

Code	Description
001	
002	
004	

Code	Description
020*	
026*	

* Only available for end position control code I3

3-Position Spools	
Code	Spool Position
C	 3 positions Spring offset in position 0 Operated in position A or B

2-Position Spools	
Code	Spool Position
D	 2 positions Spring offset in position A Operated in position B

Standard Bolt Kit: BK98
Metric Bolt Kit: BKM98
Seal Kit:
Nitrile SKD3W
Fluorocarbon SKD3WW

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

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Directional Control Valves

D3W (Inductive Pos. Control) - Specifications

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General				
Design	Directional Spool Valve			
Actuation	Solenoid			
Size	NG 10 / CETOP 05 / NFPA D05			
Mounting Interface	DIN 24340 A10 / ISO 4401 / CETOP RP121-H / NFPA D05			
Mounting Position	Unrestricted, preferably horizontal			
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)			
MTTF _D Value (years)	150			
Hydraulic				
Maximum Operating Pressure	Ports P, A, B = 350 Bar (5075 PSI); Port T = 210 Bar (3045 PSI)			
Fluid	Hydraulic oil in accordance with DIN 51524			
Fluid Temperature (°C)	-20 to +70 (-4°F to +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			
Maximum Flow (LPM)	150 (40 GPM); See shift limits			
Leakage @50 Bar (725 PSI) per flow path (ml/min)	Up to 20 (0.005 GPM) depending on spool			
Static / Dynamic				
Step Response @ 95% Step (ms)	Energized = 105; De-energized = 85			
Electrical				
Duty Ratio (%)	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible			
Maximum Switching Frequency	10,000 switchings per hour			
Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)			
Code	K	J	U	G
Supply Voltage (V)	12	24	98	205
Tolerance Supply Voltage (%)	+/-10	+/-10	+/-10	+/-10
Current Consumption (A)	3	1.5	0.35	0.18
Power Consumption (W)	36	36	34	36
Solenoid Connection	Connector as per EN 175301-803, solenoid connected according to the relevant regulations			
Wiring Minimum (mm²)	3x1.5 recommended			
Wiring Length Maximum (m)	50 (164 ft) recommended			
With electrical connections, the protective conductor (PE ↓) must be connected according to the relevant regulations.				

Single Solenoid Valve

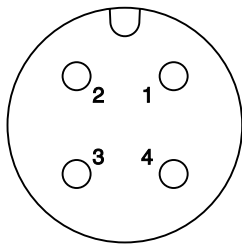
Electrical Specifications of Position Control as per IEC 61076-2-101 (M12x1)

Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)
Supply Voltage / Ripple (V)	24 ≤ 10%
Tolerance Supply Voltage (%)	+/-20
Polarity Protection (V)	300
Current Consumption without Load (mA)	≤20
Switching Hysteresis (mm)	<0.06
Max Output Current per Channel, Ohmic (mA)	250
Min. Distance to Next AC Solenoid (m)	0.1 (0.33 ft)
Interface	M12x1 acc. to IEC 61076-2-101
CE Conform	EN 61000-4-2 / EN 61000-4-4 / EN 61000-4-6 ¹⁾ / ENV 50140 / ENV 50204
¹⁾ Only guaranteed with screened cable and female connector	

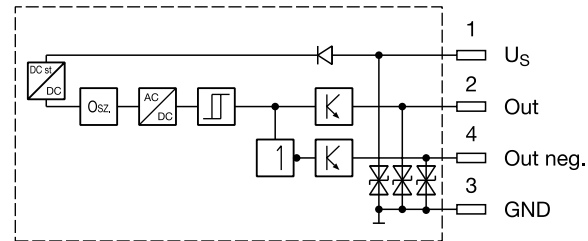
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M12 Pin Assignment



1. U_S 19.2...28.8V
2. Out B: normally open
3. 0V
4. Out A: normally closed



Outputs: Open collector

Definitions

Start position monitored:

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

At the switching point the spool is located within the closed position. It is secured so that only the flow paths of the offset position are granted.

The switch can only be located on the opposite side of the solenoid for direct operated valves. Please order plug M12x1 separately. See Accessories, plug M12x1 (part no.: 5004109).

End position monitored:

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

Double Solenoid Valve

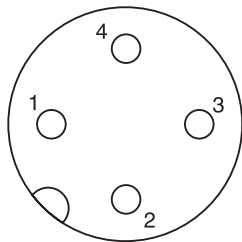
Electrical Specifications of Position Control as per IEC 61076-2-101 (M12x1)

Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)
Supply Voltage / Ripple (V)	10 - 30 / +/-10%
Current Consumption without Load (mA)	≤10
Max Output Current per Channel, Ohmic (mA)	200
Min. Output Load per Channel, Ohmic (kOhm)	100
Max. Output Drop at 0.2A (V)	≤2
EMC	EN 61000-6-4 / EN 61000-6-2
Min. Distance to Next AC Solenoid (m)	≥0.1 (0.33 ft)
Interface	M12x1 acc. to IEC 61076-2-101
Wiring Minimum (mm ²)	3 x 0.14 braid shield recommended
Wiring Length Maximum (m)	50 (164 ft) recommended

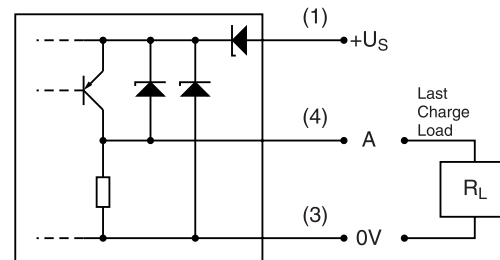
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M12 Pin Assignment



1. U_S 10...30V
2. Not connected
3. 0V
4. Out A: normally open

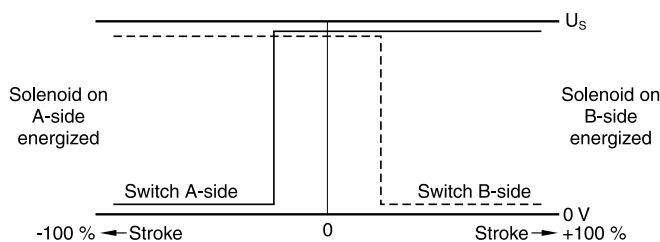


Definitions

Start position monitored:

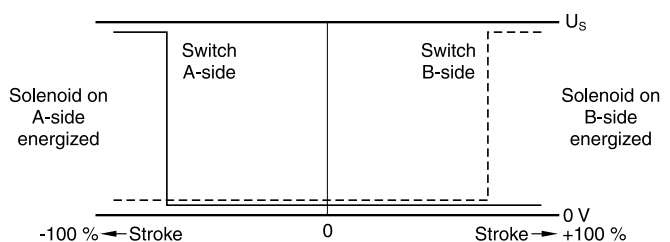
The valve is de-energized. The inductive switch gives a signal at the moment the spool leaves the center position (below 15% spool stroke).

At the switching point the spool is located within the closed position. It is secured so that only the flow paths of the offset position are granted.



End position monitored:

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



Please order plug M12 x 1 separately. Straight plug recommended – no defined position possible for angled plug.

Directional Control Valves

D3W (Inductive Pos. Control) - Technical Information

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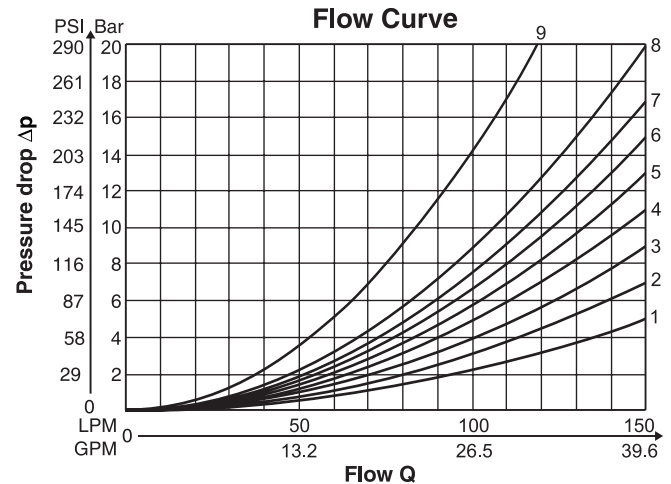
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All performance curves measured with HLP46 at 50°C (122°F).

Performance Curves

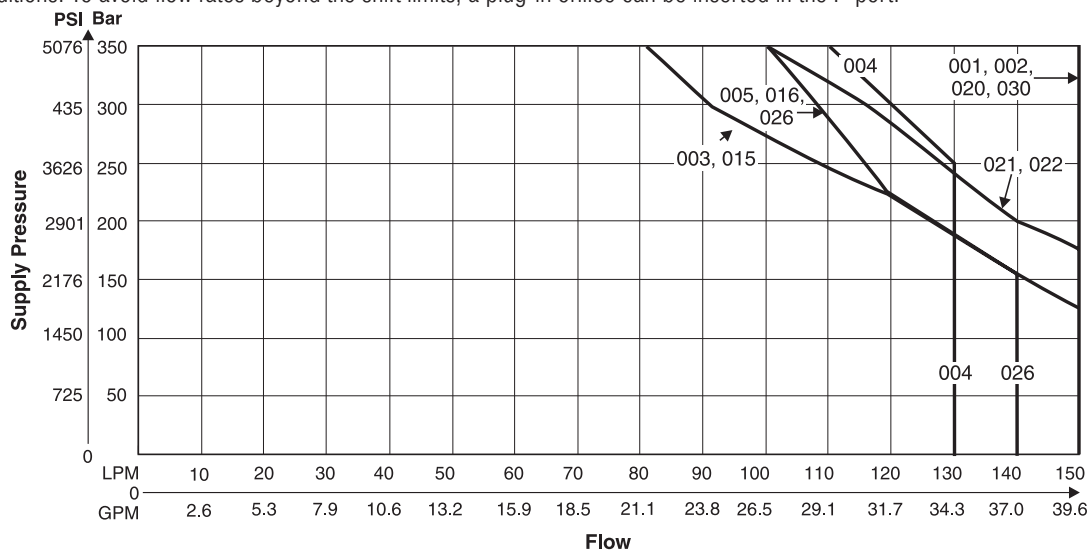
The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.

Spool	Position "B"		Position "A"		Position "O"					
	P-A	B-T	P-B	A-T	P-A	P-B	A-T	B-T	P-T	A-B
001	6	5	6	6	—	—	—	—	—	—
002	3	5	3	3	1	1	4	5	1	6
003	2	2	3	1	—	—	3	—	—	—
004	5	4	4	4	—	—	8	8	—	9
005	2	2	2	2	3	—	—	—	—	—
015	2	1	2	2	—	—	—	3	—	—
016	2	2	1	2	—	2	—	—	—	—
020	6	6	5	7	—	—	—	—	—	—
026 B	5	—	5	—	—	—	—	—	—	—
030	4	5	3	5	—	—	—	—	—	—
Spool	Position "B"			Position "A"						
	P-A	P-B	A-B	P-B	A-T	—				
021	2	4	8	3	2	—				
	P-A	B-T	—	P-A	P-B	A-B				
	022	3	2	—	3	2	8			



Shift Limit Diagram

The diagram below specifies the shift limits. Valves with spool position "F" or "M" can only be operated up to 70% of the limits. The specifications apply to a viscosity of 40mm²/s and balanced flow conditions. The shift limits can be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.



All characteristic curves measured with HLP46 at 50°C (122°F), 90% U_{nom} and warm solenoids.

Directional Control Valves

D3W (Inductive Pos. Control) - Dimensions

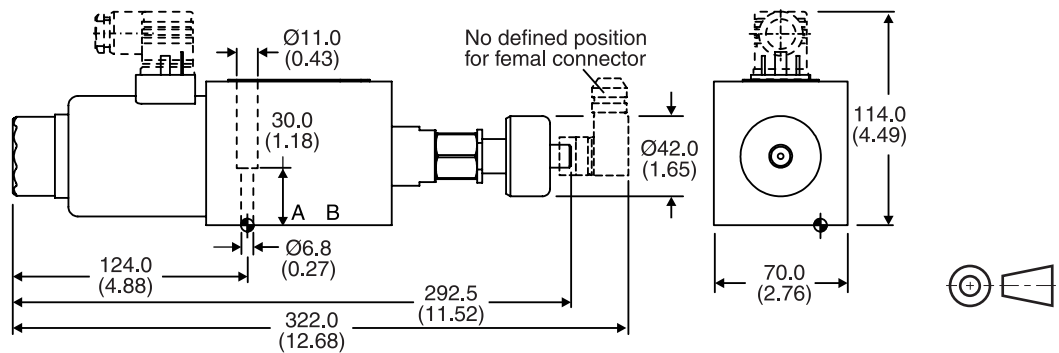
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Inch equivalents for millimeter dimensions are shown in (**)

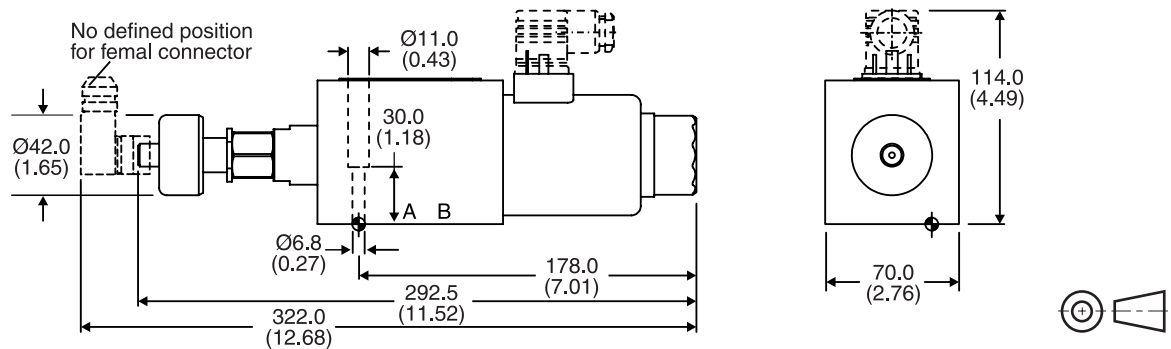
Interface EN 175301-803, DC solenoid, with plug M12x1¹⁾

Styles B, E, F



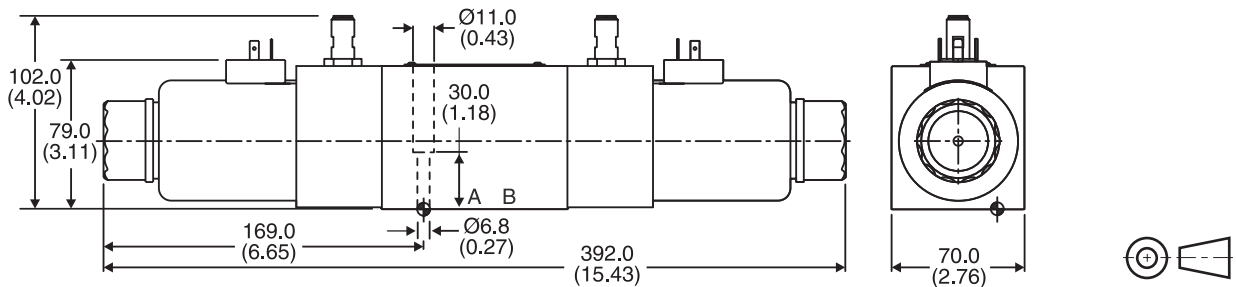
¹⁾ Please order plug M12x1 separately. See Accessories (part no.: 5004109).

Styles H, K, M

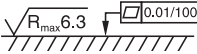


Interface EN 175301-803, DC solenoid, without plug M12x1²⁾

Styles C, D



²⁾ Please order plug M12 x 1 separately. Straight plug recommended – no defined position possible for angled plug.

Surface Finish	Kit 			Seal Kit 
	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm (9.7 lb-ft) +/- 15%	Nitrile: SK-D3W-30 Flurocarbon: SK-D3WV-30

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm (0.59").

The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm (0.37 to 0.44 lb.-ft.).

The space necessary to remove the M12x1 female connector is at least 22mm (0.87").

The adjustment of the position control is factory set and sealed.

Replacement and repairs can only be undertaken by the manufacturer.

Directional Control Valves

D3DW - Technical Information

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General Description

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

Features

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

Response Time (ms)

Solenoid Type	Pull-in	Drop-out
DC	110	85

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

Solenoid Ratings**

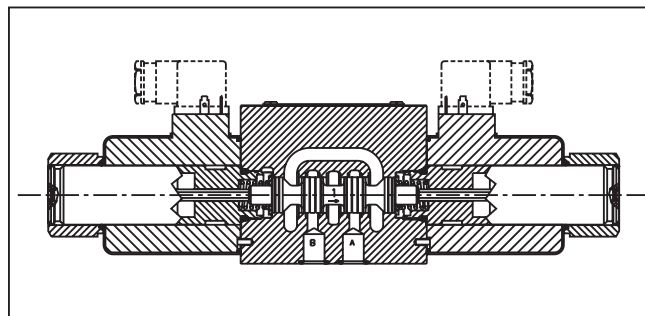
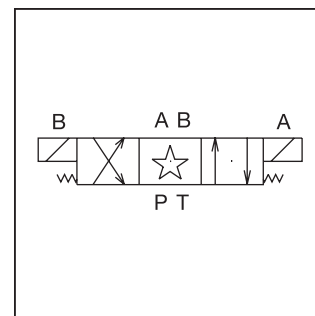
Insulation	Class H
Allowable Deviation from rated voltage	DC only: -10% to +15%
Armature	Wet pin type

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

D3DW Solenoid Electrical Characteristics

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

* AC Input rectified to DC



Specifications

Interface	NFPA D05, CETOP 05, NG 10
Maximum Pressure	P, A, B: 345 Bar (5000 PSI) Standard CSA 207 Bar (3000 PSI) Tank: 207 Bar (3000 PSI) Standard CSA 103 Bar (1500 PSI)
Maximum Flow	See Spool Reference Chart
Leakage Rates 100 SSU @ 49°C (120°F)	Maximum Allowable: 19.7 cc (1.2 Cu.in.) per Minute/Land @ 69 Bar (1000 PSI)* 73.8 cc (4.5 Cu. in.) per Minute/Land @ 207 Bar (3000 PSI)* Typical: 4.9 cc (0.3 Cu. in.) per Minute/Land @ 69 Bar (1000 PSI)* 26.2 cc (1.6 Cu. in.) per Minute/Land @ 345 Bar (5000 PSI)*

*#008 and #009 spools may exceed these rates. Consult Factory

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

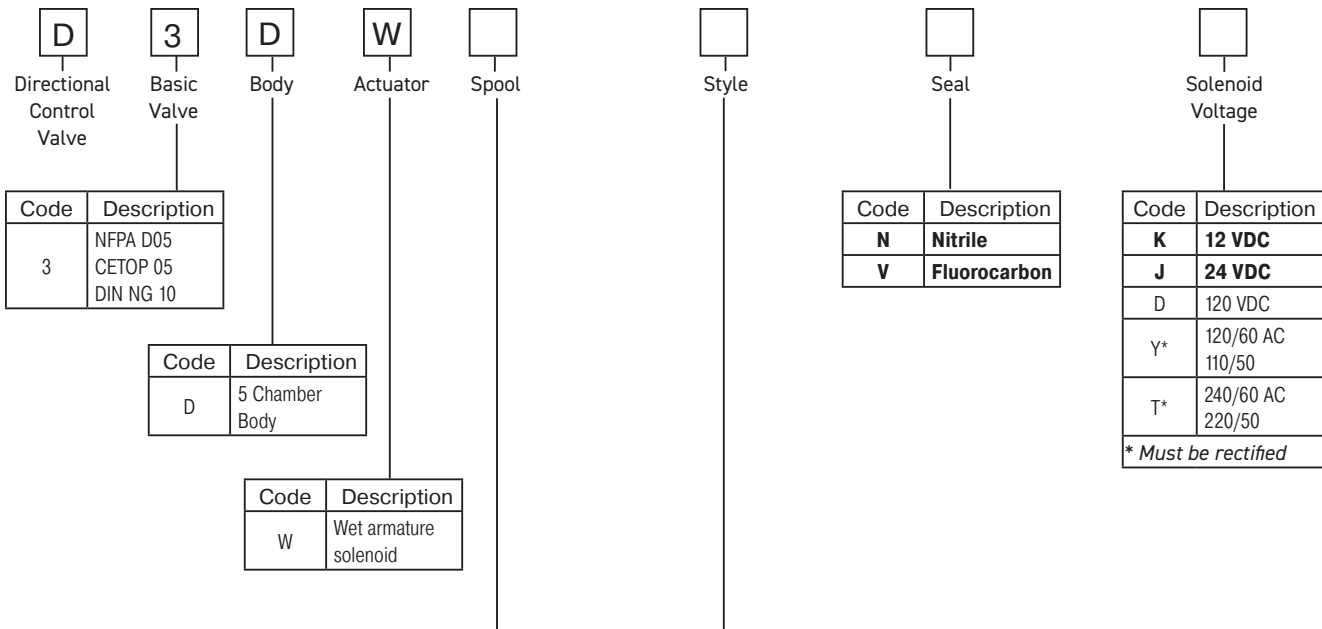
D3DW - Ordering Information

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

* 008 and 020 spools have closed crossover.
 ** 009 and 030 spools have open crossover.
 † Available only with high-watt rectified AC coils or high-watt DC coils.
 †† Spring centered versions C, E, F, K, and M only.

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

* 020 and 030 spools only.

This condition varies with spool code.

Bold: Designates Tier I products and options.

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

Directional Control Valves

D3DW - Ordering Information

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Solenoid
Connector

Code	Description
P	Hirschmann w/Plug
W*	Hirschmann w/o Plug
* Not available with signal lights	

Manual
Override
Options

Code	Description
Omit	Standard Tube
P	Extended Manual Override

Electrical
Options

Code	Description
Omit	No Option
V*	Varistor Surge Suppressor
Z**	AC Rectified
* 24 VDC voltage only. Not available with solenoid connections J and E ** 120 VAC and 240 VAC Hirschmann, high watt only. Not available with Explosion Proof	

Approvals

Code	Description
Omit	Standard
4	CSA Approved

Variations

Code	Description
Omit	Standard Valve
5	Signal Lights

Design
Series

NOTE:
Not required
when ordering.

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Mounting Bolt Kits

UNC Bolt Kits for use with D3DW Directional Control Valves and Sandwich Valves

		Number of Sandwich Valves @ 2" (50 mm) thickness			
		0	1	2	3
D3DW	Standard	BK98 1.62"	BK141 3.5"	BK142 5.5"	BK143 7.5"
	Metric	BKM98 40 mm	BKM141 90 mm	BKM142 140 mm	BKM143 190 mm

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

Valve Weight:

Single Solenoid 5.3 kg (11.6 lbs.)

Double Solenoid 7.3 kg (16.0 lbs.)

Seal Kit:

Nitrile SKD3DW
Fluorocarbon SKD3DWV

Bold: Designates Tier I products and options.

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

Directional Control Valves

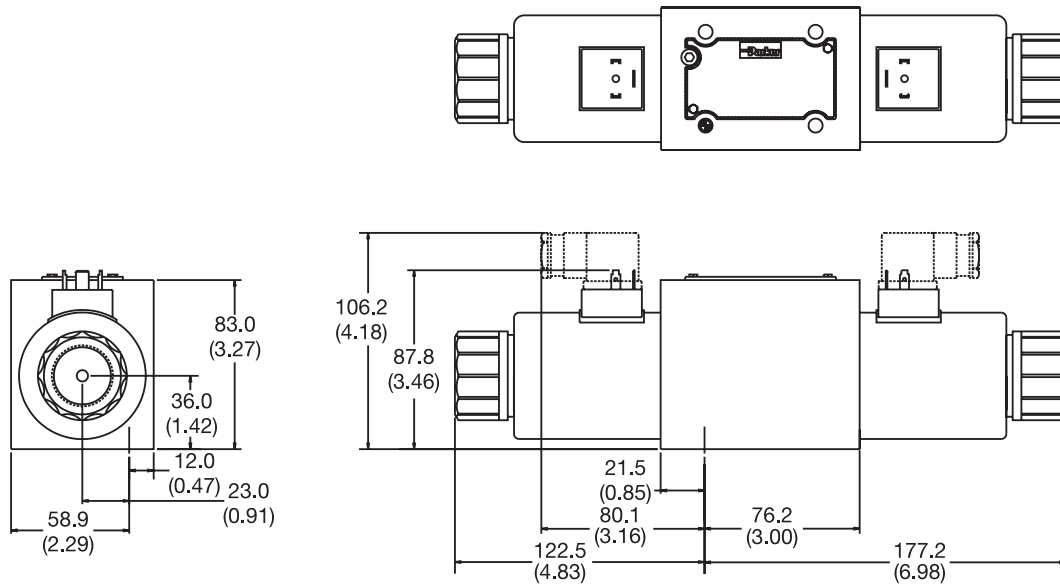
D3DW - Dimensions

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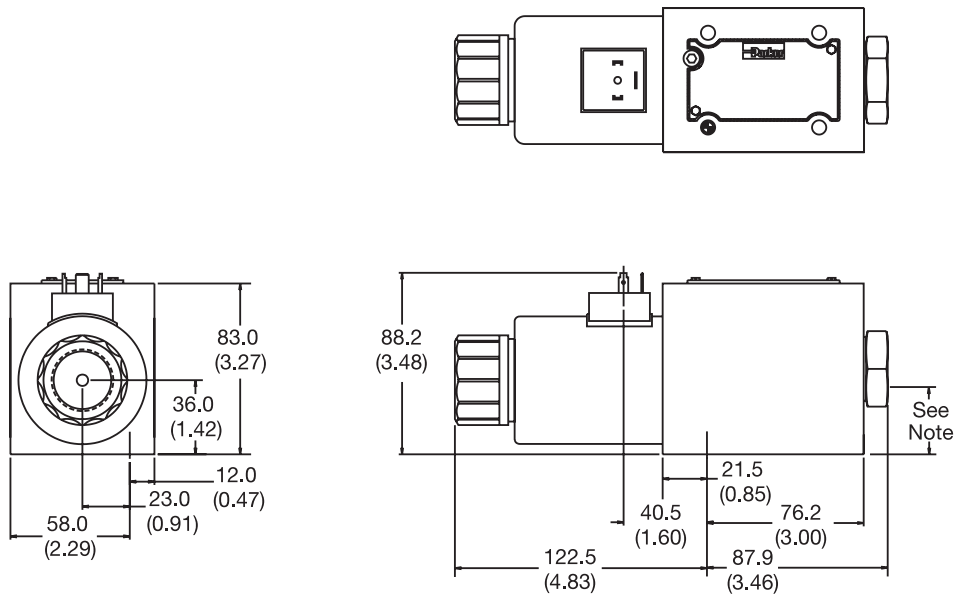
Inch equivalents for millimeter dimensions are shown in (**)

Hirschmann, Double DC Solenoid



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

Hirschmann, Single DC Solenoid



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



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Directional Control Valves

D3A - Technical Information

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General Description

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

Features

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

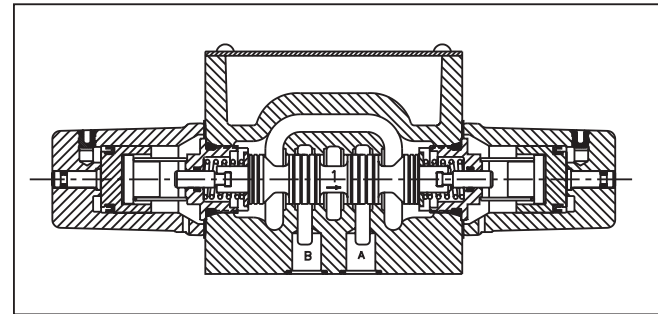
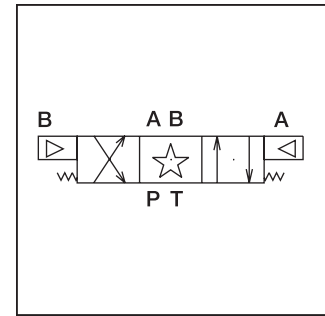
Specifications

Mounting Pattern	NFPA D05 / CETOP 05 / NG 10
Maximum Pressure (Bar)	Operating: 345 (5075 PSI) Tank Line: 34 (500 PSI)
Maximum Flow	See Spool Reference Chart
Pilot Pressure (Bar)	Air Minimum: 4.1 (60 PSI) Air Maximum: 6.9 (100 PSI)

Air Operated

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

Pilot Piston: The pilot piston area is 506 mm² (.785 in.²).
Pilot piston stroke is 3.4 mm (.135 in.).



Response Time (ms)*

Pilot Pressure	Pull-In	Drop-Out
60 PSI	23	23
100 PSI	19	38

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

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

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D3A - Ordering Information

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D	3	A					
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Seal	Variations	Design Series
							NOTE: Not required when ordering.
Code	Description	Code	Description	Code	Description	Code	Description
3	NFPA D05 CETOP 05 DIN NG 10	A	Air Operator	N	Nitrile	Omit	Standard
				V	Fluorocarbon	90	1/4 BSPP Pilot Port

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

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

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

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

* B, D, and H styles available with 020 and 030 spools only

- Indicates air pilot.
- This condition varies with spool code.

Mounting Bolt Kits

UNC Bolt Kits for use with D3A Directional Control Valves and Sandwich Valves

		Number of Sandwich Valves @ 2" (50 mm) thickness			
		0	1	2	3
D3A	Standard	BK98 1.62"	BK141 3.5"	BK142 5.5"	BK143 7.5"
	Metric	BKM98 40 mm	BKM141 90 mm	BKM142 140 mm	BKM143 190 mm

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

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

Bold: Designates Tier I products and options.

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

Directional Control Valves

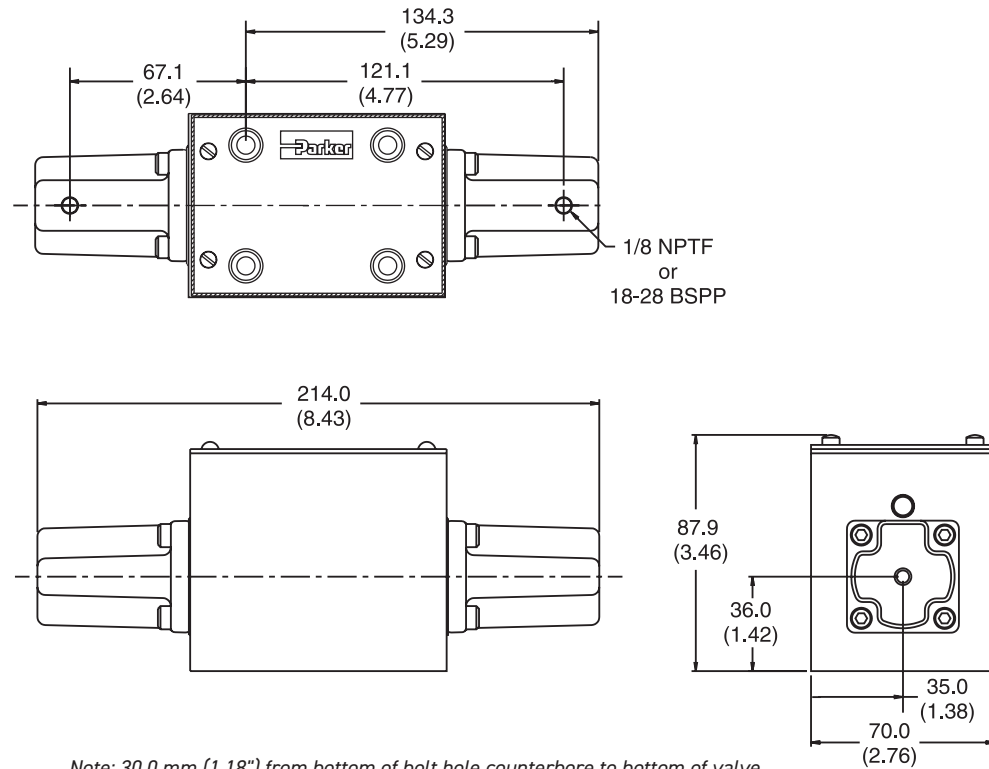
D3A - Dimensions

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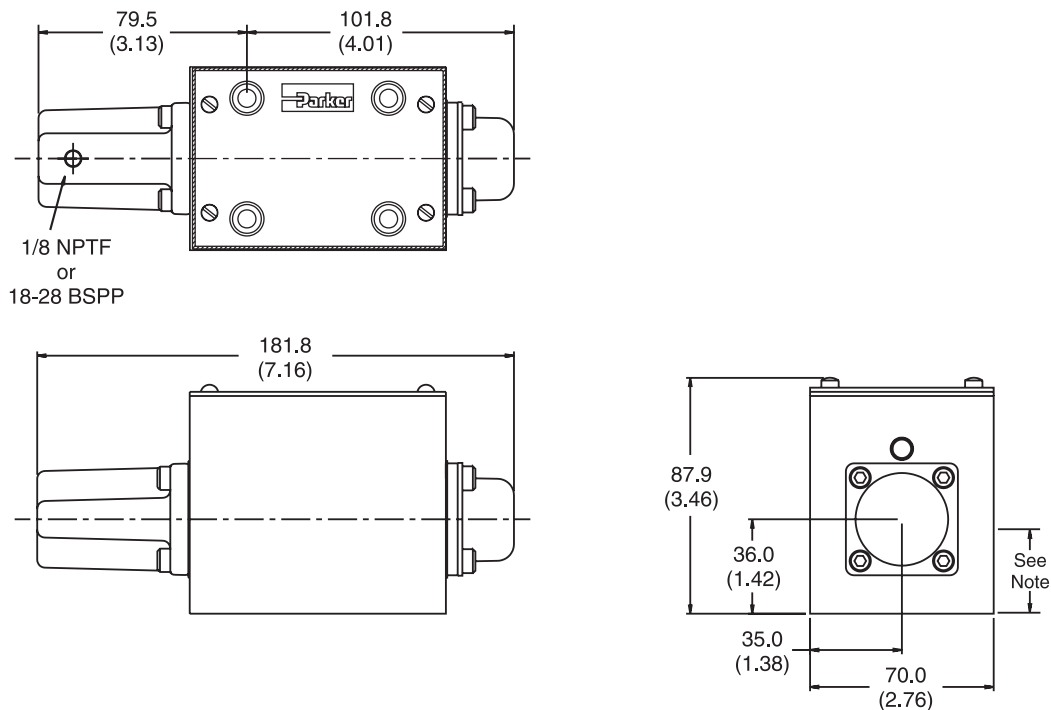
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Inch equivalents for millimeter dimensions are shown in (**)

Air Operated, Double Pilot



Air Operated, Single Pilot



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Directional Control Valves

D3C, D3D - Technical Information

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General Description

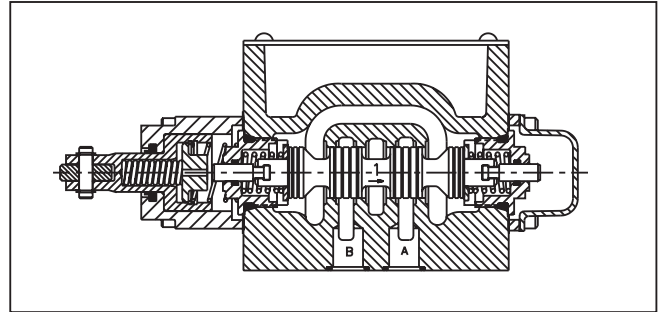
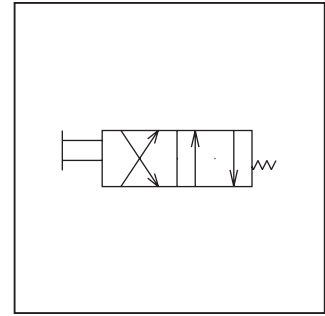
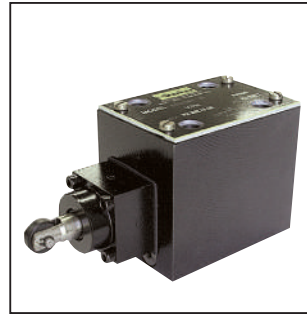
Series D3C and D3D directional control valves are high performance, 4-chamber, direct operated, cam controlled, 3 or 4-way valves. They are available in 2-position and conform to NFPA's D05, CETOP 5 mounting patterns.

Features

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

Specifications

Mounting Pattern	NFPA D05 / CETOP 05 / NG 10
Maximum Pressure (Bar)	Operating: 345 (5000 PSI) Tank Line: 34 (500 PSI)
Maximum Flow	See Spool Reference Chart
Force Required to Shift (N)	235 (53 lbs)
Maximum Cam Angle	30°



Ordering Information

D Directional Control Valve
3 Basic Valve
 Actuator
 Spool

Code	Description
3	NFPA D05 CETOP 05 DIN NG 10

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

Code	Symbol
020*	
030**	
* 020 spool has closed crossover. ** 030 spool has open crossover.	

Style

Seal

Variations

Design Series

NOTE:
Not required when ordering.

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
Omit	Standard
B5	Short Stroke

Code	Description	Symbol
B*	Single operator, two position, spring offset, P to A and B to T in offset position	
H*	Single operator, two position, spring offset, P to B and A to T in offset position	

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

Valve Weight: 3.6 kg (8 lbs.)
 Seal Kit:
 Nitrile SKD3C
 Fluorocarbon SKD3CV

Bold: Designates Tier I products and options.

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

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

D3C, D3D - Technical Information

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Mounting Bolt Kits

UNC Bolt Kits for use with D3C and D3D Directional Control Valves and Sandwich Valves

		Number of Sandwich Valves @ 2" (50 mm) thickness			
		0	1	2	3
D3C, D3D	Standard	BK98 1.62"	BK141 3.5"	BK142 5.5"	BK143 7.5"
	Metric	BKM98 40 mm	BKM141 90 mm	BKM142 140 mm	BKM143 190 mm

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

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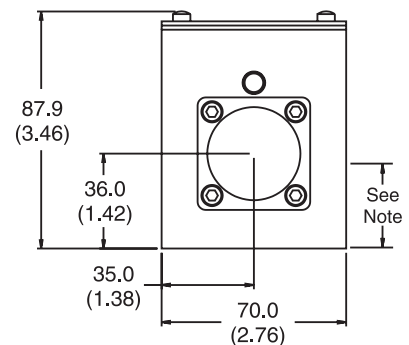
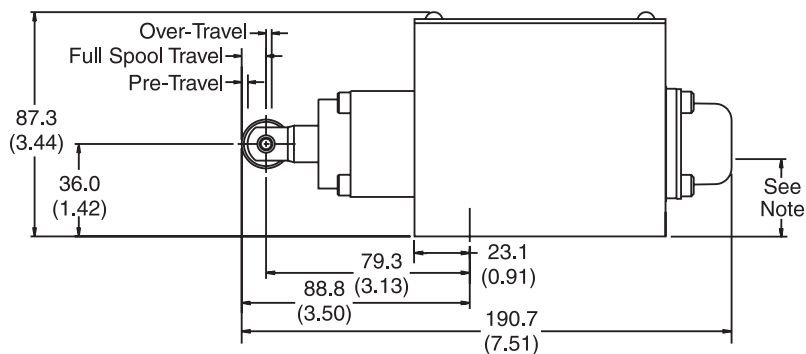
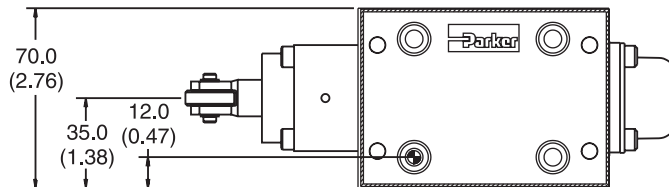
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Dimensions

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

Cam Operated

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



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



Directional Control Valves

D3DWR - Technical Information

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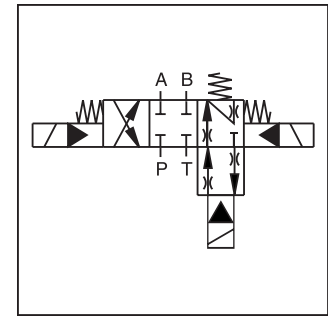
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General Description

Series D3DWR direct operated regenerative and hybrid directional control valve has an innovative integrated regenerative function in the A-line allowing energy saving circuits with differential cylinders. The hybrid version can switch between regenerative mode and standard mode.

Features

- Energy saving A-regeneration
- Switchable hybrid version



Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.

Ordering Information

Code	Description
D	Directional Control Valve
3D	Basic Valve
W	Actuator Solenoid Wet Pin
	Spool
C	Style
	Pilot Supply and Drain
	Seal
J	Solenoid Voltage 24VDC
W	Connector as per EN 175301-803, without connector (please order plug separately)
	Manual Override Options
	Design Series

NOTE: Not required when ordering.

Code	Description
3D	NFPA D05 CETOP 05 DIN NG 10

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
Omit	Standard
9	For high pressure in the connection T1 (tank) or T2 (regenerative function), the connection X and Y can be used as drain ports

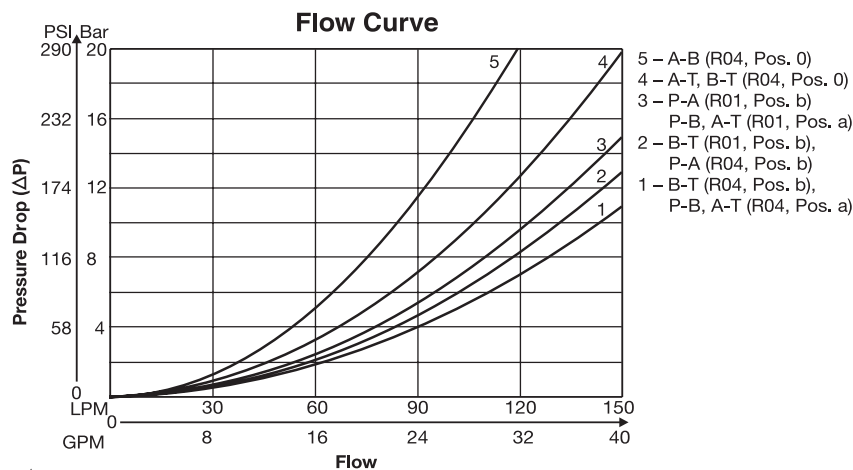
Code	Description
Omit	Standard
T	No override

Code	Description
C	3 positions. Spring offset in position "0". Operated in position "a" or "b".

1) For regenerative and hybrid function, please refer to solutions with sandwich and adapter plates A10-1664, A10-1665L, H10-1662, and H10-166L

Weight: 6.3 kg (13.9 lbs.)
Bolt Kit: BK385
Seal Kit: Nitrile – SK-D3W-30
Fluorocarbon – SK-D3W-V-30

Performance Curves



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

D3DWR - Specifications

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General	
Design	Directional Spool Valve
Actuation	Solenoid
Size	NG 10 / CETOP 05 / NFPA D05
Mounting Interface	DIN 24340 A10 / ISO 4401 / NFPA D05
Mounting Position	Unrestricted, preferably horizontal
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)
MTTF _D Value (years)	150
Hydraulic	
Maximum Operating Pressure	Pilot drain internal: Ports P, A, B = 350 Bar (5075 PSI); Port T = 210 Bar (3045 PSI) Option 9 ¹⁾ : Ports P, A, B, T = 350 Bar (5075 PSI); Ports X, Y = 210 Bar (3045 PSI)
Fluid	Hydraulic oil in accordance with DIN 51524
Fluid Temperature (°C)	-20 to +70 (-4°F to +158°F); Nitrile: -25 to +70 (-13°F to +158°F)
Viscosity	
Permitted (cSt / mm ² /s)	2.8 - 400 (13 - 1854 SSU)
Recommended (cSt / mm ² /s)	30 - 80 (139 - 371 SSU)
Filtration	ISO 4406 (1999) 18/16/13
Flow Maximum (LPM)	150 (40 GPM)
Leakage @ 50 Bar (725 PSI) per flow path (ml/min)	0 - 20 (0.01 GPM) depending on spool
Static / Dynamic	
Step Response @ 95% Step (ms) DC Solenoids @ 65 LPM (17 GPM) Pilot Pressure 175 Bar (2538 PSI)	Energized = 105; De-energized = 85
Electrical	
Duty Ratio (%)	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)
Supply Voltage / Ripple (V)	24
Tolerance Supply Voltage (%)	+/- 10
Current Consumption - Hold (A)	1.5
Current Consumption - In Rush (A)	1.5
Power Consumption - Hold (W)	36
Power Consumption - In Rush (W)	36
Solenoid Connection	Connector as per EN 175301-803, solenoid identification as per ISO 9461
Wiring Minimum (mm ²)	3x1.5 recommended
Wiring Length Maximum (m)	50 (164 ft) recommended
<i>With electrical connections, the protective conductor (PE ↓) must be connected according to the relevant regulations.</i> <i>1) Bolts are not designed for simultaneous loading of all ports with maximum pressure. The total pressure profile must be adapted to the tensile strength of the bolts</i>	

Directional Control Valves

D3DWR - Technical Information

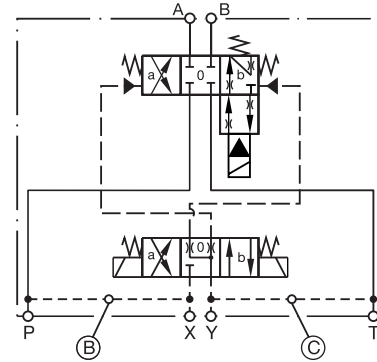
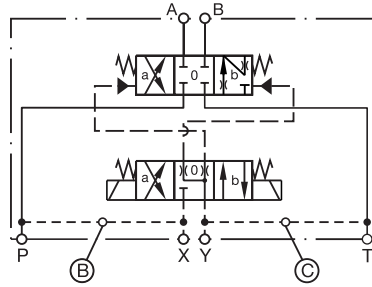
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Pilot Oil Inlet (Supply) and Outlet (Drain)

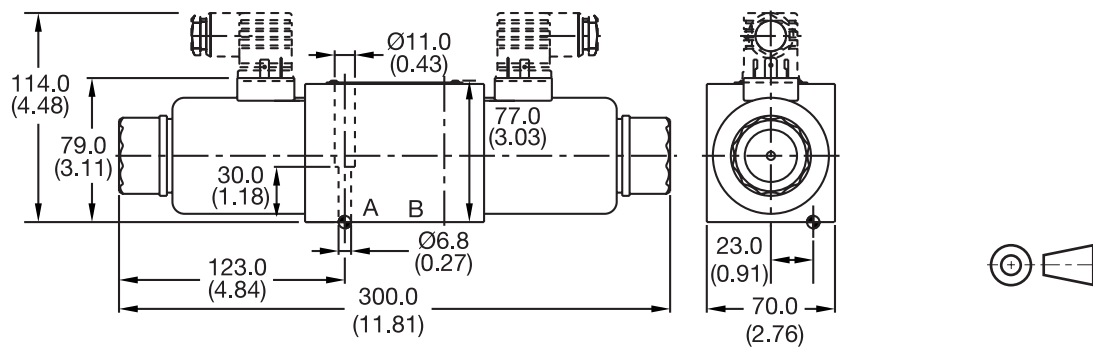
○ open, ● closed

Pilot oil		B	C
Inlet	Drain		
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



Dimensions

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



Surface Finish	Kit			Seal Kit
	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm (9.7 lb-ft) +/- 15%	Nitrile: SK-D3W-30 Fluorocarbon: SK-D3WV-30

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

The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm (0.37 to 0.44 lb.-ft.).

Directional Control Valves

Plates for Regenerative & Hybrid Circuits

A93

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General Description

Adapter plates for regenerative and hybrid functions with Series D31NWR directional control valve. The adapter plate comes as either a sandwich valve (H10) or in a subplate version (A10).

Features

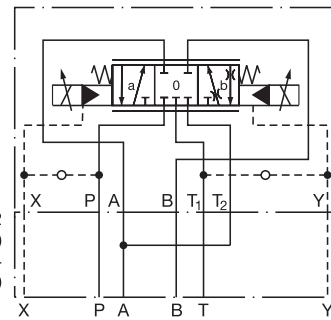
- The valve comes without tank bridge and is shown in Series D31NWR.
- Port T1 is used as single tank port of the valves. Port T2 is separated from port T1 and is used for regeneration into the A port.
- The circuit conception can be integrated into the manifold block.

Regenerative Function

Example D31FBR31

Note:
Proportional

H10-1662
(Sandwich Plate)
A10-1664
(Adaptor Plate)

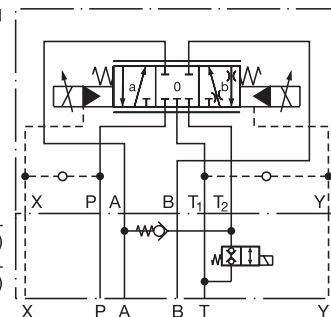


Hybrid Function

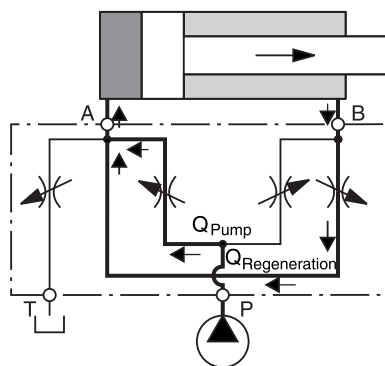
Example D31FBR31

Note:
Proportional

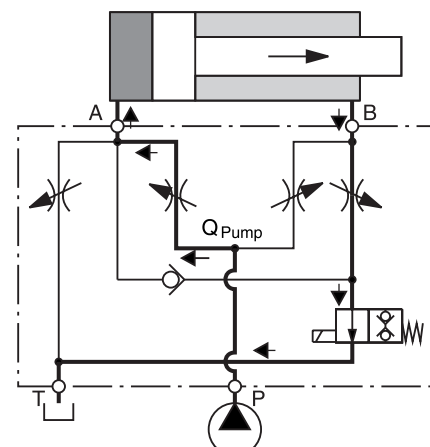
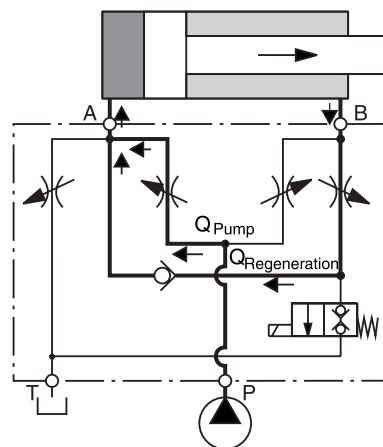
H10-1666L
(Sandwich Plate)
A10-1665L
(Adaptor Plate)



Regenerative Function



Hybrid Function



NEW Energy saving A-regeneration and switchable hybrid version for NG10 valves.

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

Plates for Regenerative & Hybrid Circuits - Specifications

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General				
Actuation	Solenoid - A10-1665L and H10-1666L			
Size	NG 10 / CETOP 05 / NFPA D05			
Mounting Interface	DIN 24340 A10 / ISO 4401 / CETOP RP121-H / NFPA D05			
Mounting Position	Unrestricted			
Ambient Temperature (°C)	-25 to +50 (-13°F to +122°F)			
MTTF _D Value (years)	150			
Adaptor / Sandwich Plate Code	A10-1664	A10-1665L	H10-1662	H10-1666L
Weight (kg)	11.9 (26.5 lbs)	14.4 (31.8 lbs)	2.8 (6.2 lbs)	4.9 (10.8 lbs)
Hydraulic				
Maximum Operating Pressure (Bar)	350 (5075 PSI)			
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525			
Fluid Temperature (°C)	-25 to +70 (-13°F to +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)			
Maximum Flow (LPM)	A10 = 150 (39.7 GPM); H10 = 250 (96.1 GPM)			
Regeneration B-A (LPM)	95 (25.1 GPM)			
Regeneration B-T (LPM)	A10 = 75 (19.8 GPM)			
Electrical				
Duty Ratio (%)	100			
Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)			
Supply Voltage (V)	24			
Tolerance Supply Voltage (%)	+/-10			
Current Consumption (A)	1.21			
Power Consumption (W)	29			
Solenoid Connection	Connector as per EN 175301-803			
Wiring Minimum (mm²)	3x1.5 recommended			
Wiring Length Maximum (m)	50 (164 ft) recommended			
With electrical connections, the protective conductor (PE ↓) must be connected according to the relevant regulations.				

Directional Control Valves

Plates for Regenerative & Hybrid Circuits - Adaptor Plate A10-1664

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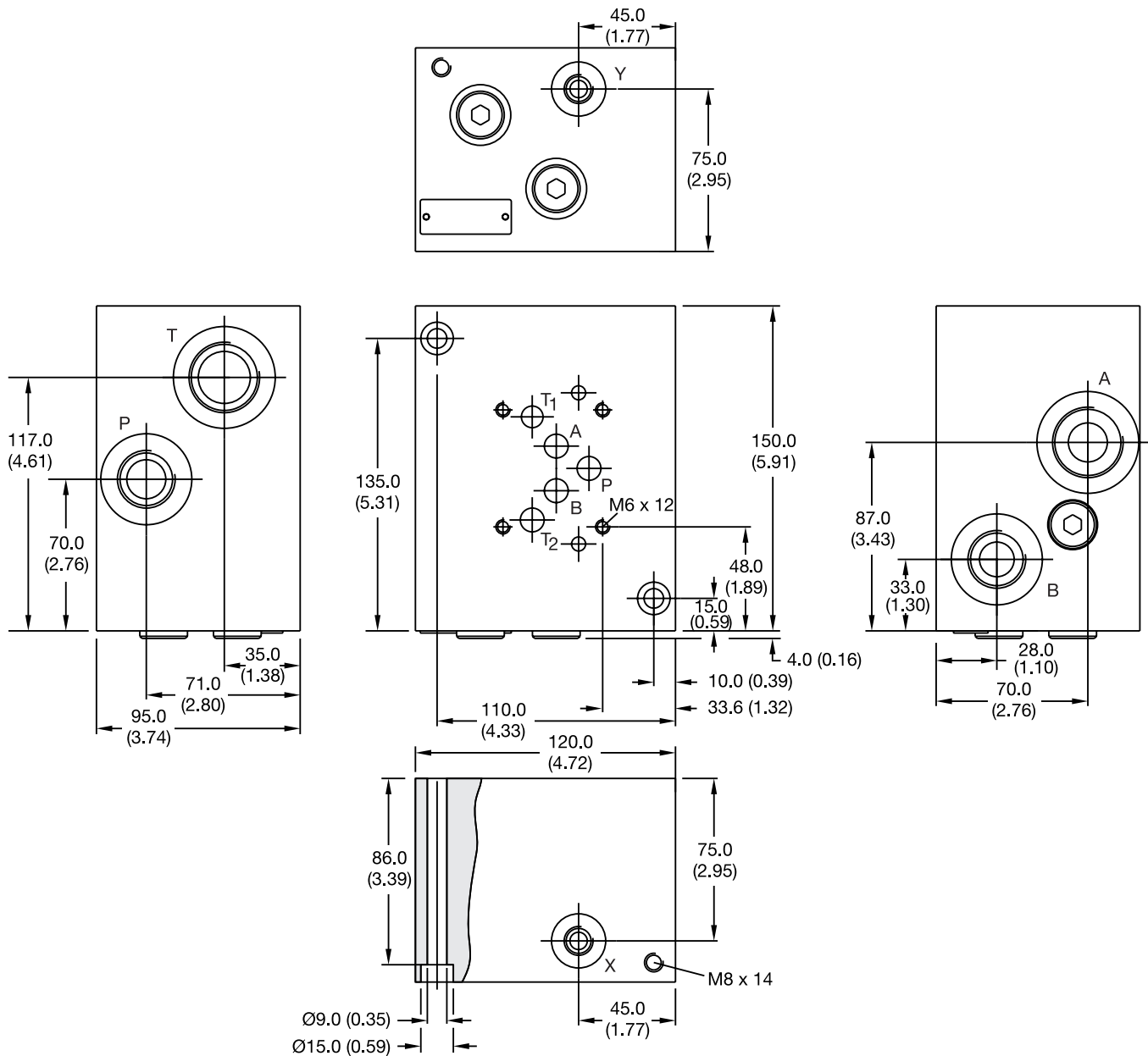
Inch equivalents for millimeter dimensions are shown in (**)

Mounting Interface acc. DIN 24340-A10, CETOP 5H / NG10 for A-regeneration

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Symbol	Ordering Code	Port
Valve Side	A10-1664	A, T = G1 B, P = G3/4 X, Y = G1/4



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Directional Control Valves

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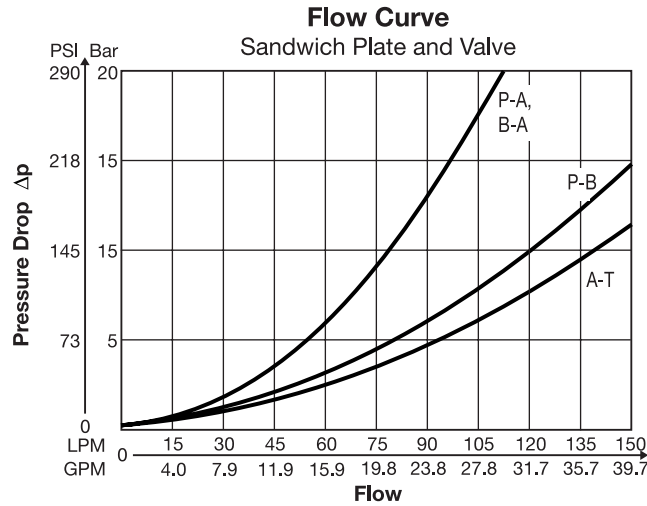
Plates for Regenerative & Hybrid Circuits - Sandwich Plate H10-1662

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Mounting Interface acc. DIN 24340-A10, CETOP 5H / NG10 for A-regeneration

Performance Curves

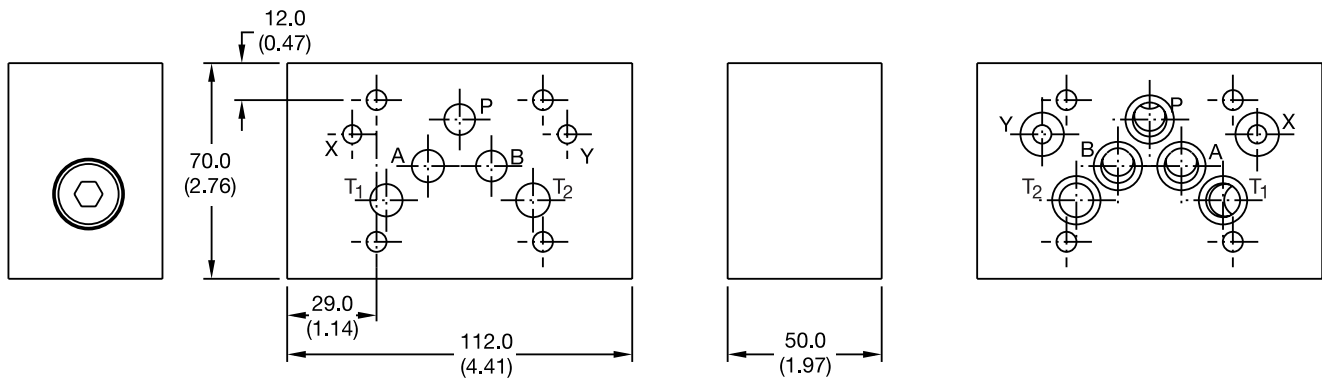
D31FP/FE/FB/VW*



Measured with Spool Z31 at command signal 100%.

Dimensions

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



Symbol	Ordering Code	Kit		Seal Kit
	H10-1662 (O-rings included in delivery)	BK412	4x M6x90 ISO 912-12.9	13.2 Nm (9.7 lb-ft) +/- 15%
				Nitrile: SK-H10-1662

Directional Control Valves

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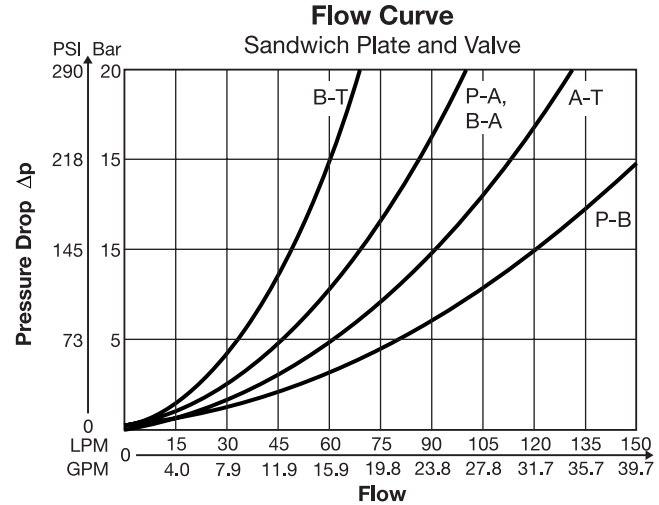
Plates for Regenerative & Hybrid Circuits - Sandwich Plate H10-1666L

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Mounting Interface acc. DIN 24340-A10, CETOP 5H / NG10 for Hybrid Function
Performance Curves

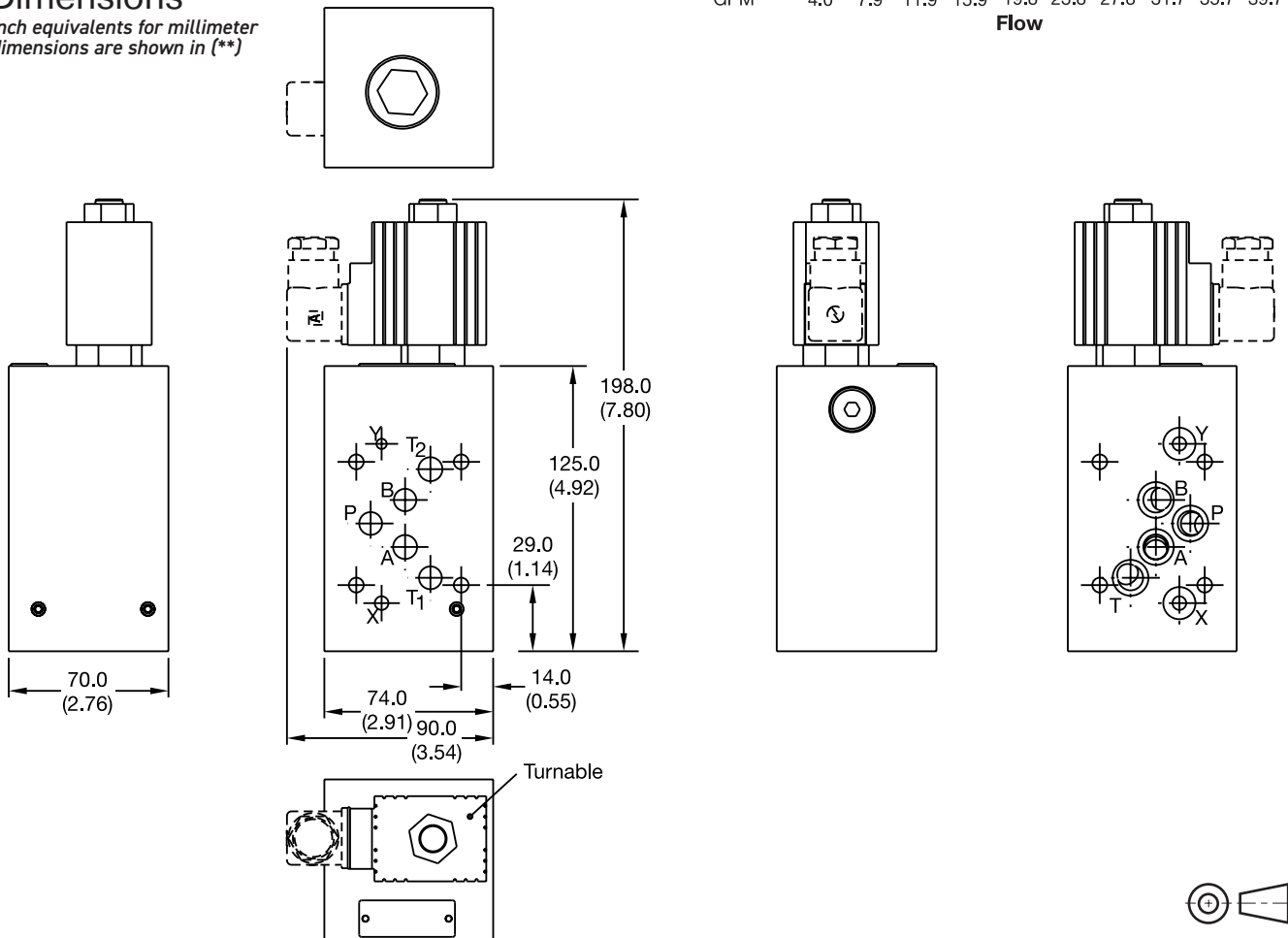
D31FP/FE/FB/VW*

Measured with Spool Z31
at command signal 100%.



Dimensions

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



Symbol	Ordering Code	Kit			Seal Kit
Valve Side Manifold Side	H10-1666L (O-rings included in delivery)	BK528	4x M6x110 ISO 912-12.9	13.2 Nm (9.7 lb-ft) +/- 15%	Nitrile: SK-H10-1666

Directional Control Valves

D3L - Technical Information

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General Description

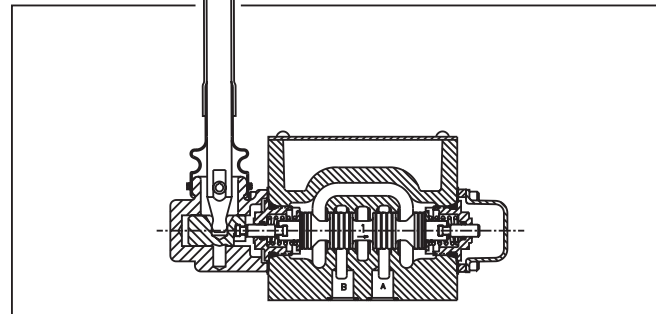
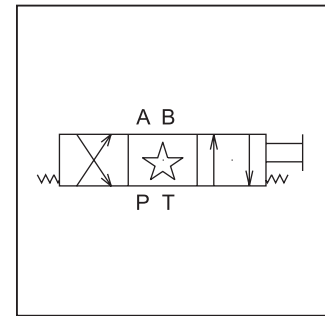
Series D3L directional control valves are high performance, 4-chamber, direct operated, lever controlled, 4-way valves. They are available in 2 or 3-position and conform to NFPA's D05, CETOP 5 mounting patterns.

Features

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

Specifications

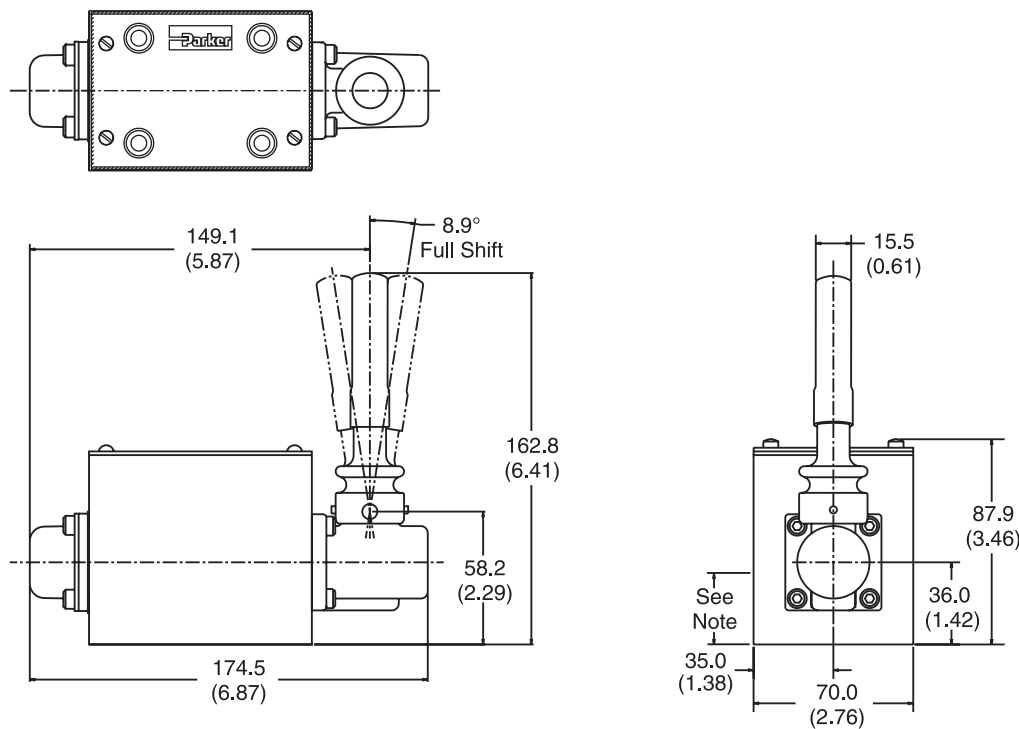
Mounting Pattern	NFPA D05 / CETOP 05 / NG 10
Maximum Pressure (Bar)	Operating: 345 (5000 PSI) Tank Line: 34 (500 PSI)
Maximum Flow	See Spool Reference Chart
Force Required to Shift Lever Operator(N)	173 (53 lbs)



Dimensions

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

Lever Operated D3L



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



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

D3L - Ordering Information

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Directional Control Valve

3

Basic Valve

Code	Description
3	NFPA D05 CETOP 05 DIN NG 10

Operator Type & Location

Spool

Style

Seal

Code	Description
N	Nitrile
V	Fluorocarbon

Design Series

NOTE:
Not required when ordering.

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

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

Code	Symbol	Code	Description	Symbol
001		B*	Single operator, two position, spring offset, P to A and B to T in offset position	
002		C	Double operator, three position, spring centered	
004		D*	Double operator, two position, detent	
008*, 009**		E	Two position, spring centered, P to B and A to T in shifted position	
020*		H*	Single operator, two position, spring offset, P to B and A to T in offset position	
030**		K	Two position, spring centered, P to A and B to T in shifted position	
081		N	Three position, detent	
082				
* B, D, and H styles available with 020 and 030 spools only				
This condition varies with spool code.				
* 008, and 020 spools have closed crossover. ** 009 and 030 spools have open crossover.				

Valve Weight: 3.6 kg (8 lbs.)

Seal Kit:

Nitrile	SKD3L
Fluorocarbon	SKD3LV

Mounting Bolt Kits

UNC Bolt Kits for use with D3L Directional Control Valves and Sandwich Valves

		Number of Sandwich Valves @ 2" (50 mm) thickness			
		0	1	2	3
D3L	Standard	BK98 1.62"	BK141 3.5"	BK142 5.5"	BK143 7.5"
	Metric	BKM98 40 mm	BKM141 90 mm	BKM142 140 mm	BKM143 190 mm

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

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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Directional Control Valves

D3 - Installation Information

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Fluid Recommendations

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

Fluids and Seals

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

Temperature Recommendation

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

Filtration

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

Tank Line Surges

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

Recommended Mounting Position

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

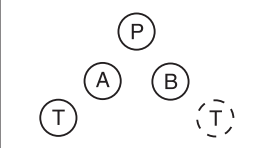
Silting

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

Single Pass Operation

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

Flow Path Data

D3*		Operator A
-----	--	------------

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

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

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

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

Lever Operated (on B end)

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

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

Electrical Failure

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

Loss of Pilot Pressure (D3A)

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

Torque Specifications

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

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

Directional Control Valves

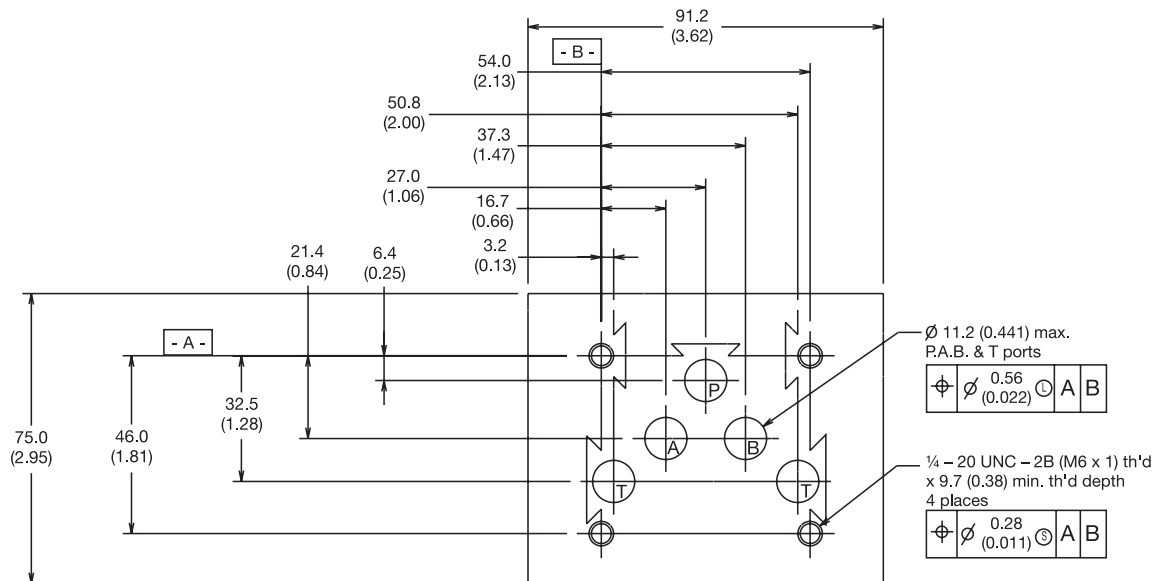
D3 - Installation Information

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

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



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Directional Control Valves

D31 - Introduction

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Application

Series D31 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles and are manifold mounted. These valves conform to NFPA's D05H, CETOP 5 and can also be manufactured to an NFPA D05HE, CETOP 5H configuration.

Operation

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

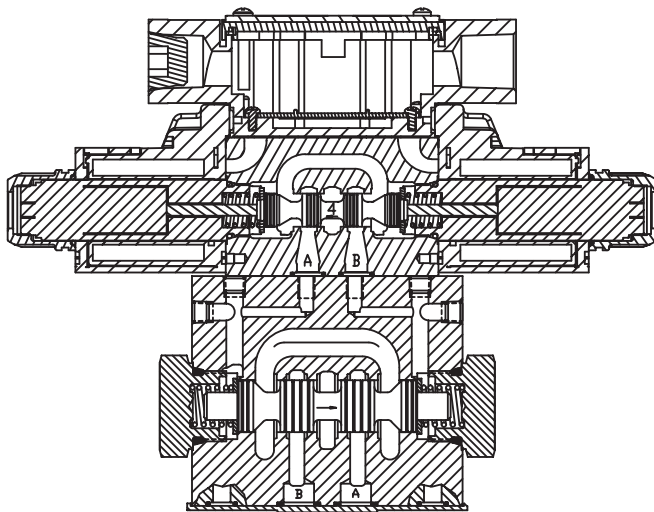
Features

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

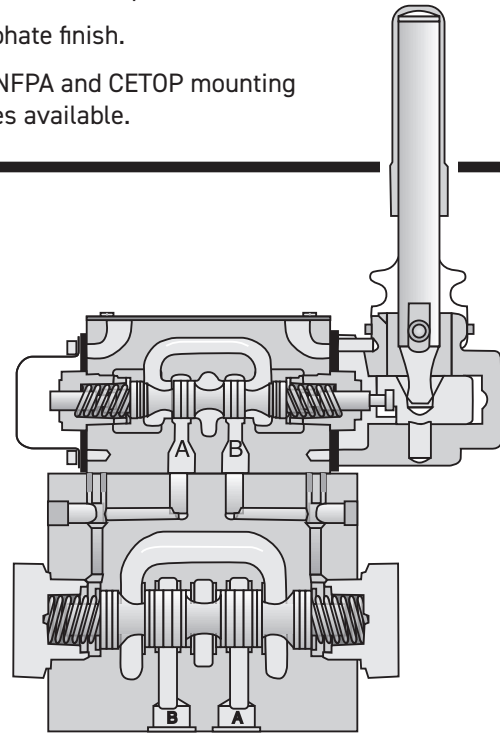
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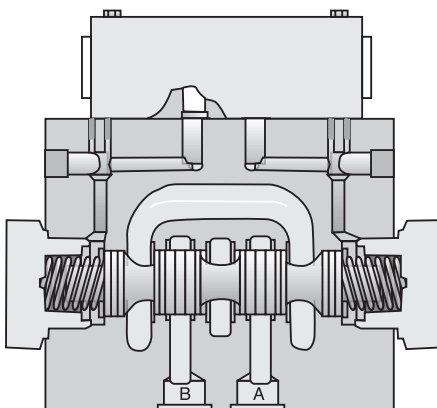
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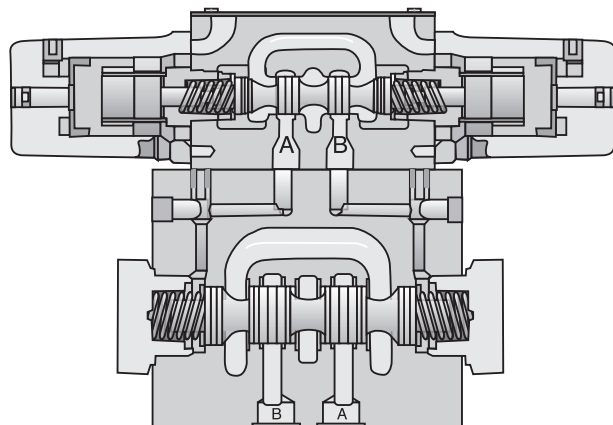
D31*W Solenoid Operated Plug-In Conduit Box



D31*L Lever Operated



D3*P Oil Pilot Operated



D31*A Air Pilot Operated

 **WARNING:** This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D31 - Technical Information

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General Description

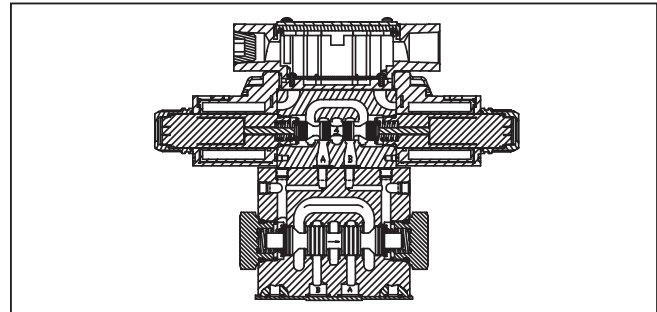
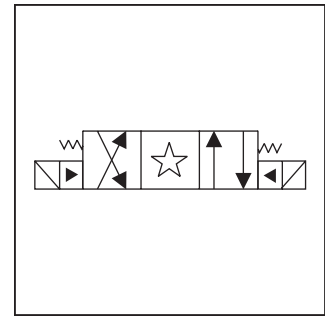
Series D31 directional control valves are 5-chamber, pilot operated, solenoid controlled valves. The valves are suitable for manifold or subplate mounting.

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

Interface	NFPA D05H, CETOP 05 NFPA D05HE, CETOP 05H
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)
Min Pilot Pressure	6.9 Bar (100 PSI)
Max Pilot Pressure	345 Bar (5000 PSI) Std CSA  207 Bar (3000 PSI)
Nominal Flow	76 LPM (20 GPM)
Maximum Flow	See Switching Limit Charts



Response Time (ms)

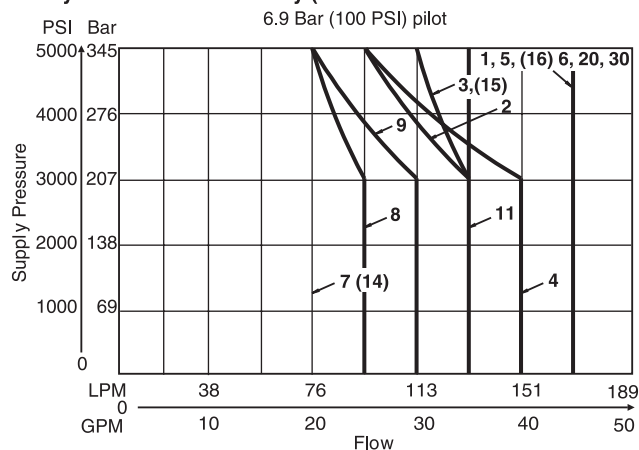
Solenoid Type	Pilot Pressure	Pull-In	Drop-Out
DC	500	40	50
	1000	36	50
	2000	34	50
AC	500	20	33
	1000	18	33
	2000	13	33

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

Switching Limit Charts

For Styles B, C, E, H and K

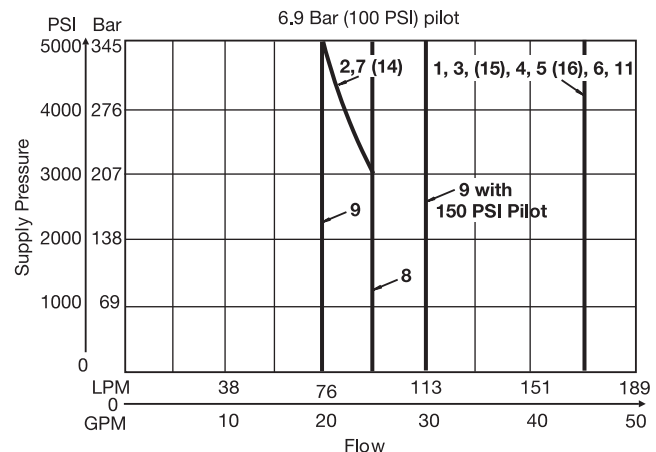
D Style – external drain only (For internal drain see note below)



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.

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

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D																																																																										
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Pilot Supply and Drain	Seal	Solenoid Voltage																																																																			
<table><tr><th>Code</th><th>Description</th></tr><tr><td>31D</td><td>NFPA D05HE, CETOP 5H, DIN NG10, D03 Pilot, ISO Port</td></tr><tr><td>31V</td><td>NFPA D05H, CETOP 5, D03 Pilot, NFPA Port Not available with Position Control</td></tr></table>	Code	Description	31D	NFPA D05HE, CETOP 5H, DIN NG10, D03 Pilot, ISO Port	31V	NFPA D05H, CETOP 5, D03 Pilot, NFPA Port Not available with Position Control					<table><tr><th>Code</th><th>Description</th></tr><tr><td>N</td><td>Nitrile</td></tr><tr><td>V</td><td>Fluorocarbon</td></tr></table>	Code	Description	N	Nitrile	V	Fluorocarbon		<table><tr><th>Code</th><th>Description</th></tr><tr><td>D†#</td><td>120 VDC</td></tr><tr><td>E*</td><td>24/60 - 24/50 VAC</td></tr><tr><td>J</td><td>24 VDC</td></tr><tr><td>K#**</td><td>12 VDC</td></tr><tr><td>Q††#</td><td>100/60 VAC</td></tr><tr><td>QD††#</td><td>100 VAC/60 Hz - 100 VAC/50 Hz</td></tr><tr><td>T^^</td><td>240/60 - 220/50 VAC</td></tr><tr><td>U***#</td><td>98 VDC</td></tr><tr><td>Y</td><td>120/60 - 110/50 VAC</td></tr></table>	Code	Description	D†#	120 VDC	E*	24/60 - 24/50 VAC	J	24 VDC	K#**	12 VDC	Q††#	100/60 VAC	QD††#	100 VAC/60 Hz - 100 VAC/50 Hz	T^^	240/60 - 220/50 VAC	U***#	98 VDC	Y	120/60 - 110/50 VAC																																			
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<table><tr><th>Code</th><th>Description</th></tr><tr><td>W*</td><td>Solenoid, Wet Pin, Screw-in</td></tr><tr><td>HW*</td><td>Reversed Wiring</td></tr></table> *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	W*	Solenoid, Wet Pin, Screw-in	HW*	Reversed Wiring	<table><tr><th>Code</th><th>Symbol</th></tr><tr><td>001</td><td></td></tr><tr><td>002</td><td></td></tr><tr><td>003</td><td></td></tr><tr><td>004</td><td></td></tr><tr><td>006</td><td></td></tr><tr><td>008*, 009**</td><td></td></tr><tr><td>011</td><td></td></tr><tr><td>012</td><td></td></tr><tr><td>015</td><td></td></tr><tr><td>020*</td><td></td></tr><tr><td>030**</td><td></td></tr><tr><td>081</td><td></td></tr><tr><td>082</td><td></td></tr></table> * 008 and 020 spools have closed crossover. ** 009 and 030 spools have open crossover.	Code	Symbol	001		002		003		004		006		008*, 009**		011		012		015		020*		030**		081		082		<table><tr><th>Code</th><th>Description</th></tr><tr><td>1*</td><td>Internal Pilot, External Drain</td></tr><tr><td>2*</td><td>External Pilot, External Drain</td></tr><tr><td>4#</td><td>Internal Pilot, Internal Drain</td></tr><tr><td>5</td><td>External Pilot, Internal Drain</td></tr></table> * F and M style available only with external drain # Not available with 002, 008, 009, or 014 spools	Code	Description	1*	Internal Pilot, External Drain	2*	External Pilot, External Drain	4#	Internal Pilot, Internal Drain	5	External Pilot, Internal Drain	<table><tr><th>Code</th><th>Description</th><th>Symbol</th></tr><tr><td>B*</td><td>Single solenoid, 2-position, spring offset. P to A and B to T in offset position.</td><td></td></tr><tr><td>C</td><td>Double solenoid, 3-position, spring centered.</td><td></td></tr><tr><td>D*</td><td>Double solenoid, 2-position, detent.</td><td></td></tr><tr><td>E</td><td>Single solenoid, 2-position, spring centered. P to B and A to T when energized.</td><td></td></tr><tr><td>F**</td><td>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.</td><td></td></tr><tr><td>H*</td><td>Single solenoid, 2-position, spring offset. P to B and A to T in offset position.</td><td></td></tr><tr><td>K</td><td>Single solenoid, 2-position, spring centered. P to A and B to T when energized.</td><td></td></tr><tr><td>M**</td><td>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.</td><td></td></tr></table> * 020 and 030 spools only. Must be standard high watt coil (30 watt) or L (10 watt coil) only (stroke is reduced by 0.5mm, therefore max flow is reduced to 13 - 14 GPM). Not available with F (low watt) coil option for AC coils only. ** 020, 026, and 030 spools only.	Code	Description	Symbol	B*	Single solenoid, 2-position, spring offset. P to A and B to T in offset position.		C	Double solenoid, 3-position, spring centered.		D*	Double solenoid, 2-position, detent.		E	Single solenoid, 2-position, spring centered. P to B and A to T when energized.		F**	Single solenoid, 2-position. Spring offset, energized to center. Position spool spacer on A side. P to A and B to T in spring offset position.		H*	Single solenoid, 2-position, spring offset. P to B and A to T in offset position.		K	Single solenoid, 2-position, spring centered. P to A and B to T when energized.		M**	Single solenoid, 2-position, spring offset, energized to center position. Spool spacer on B side. P to B and A to T in spring offset position.	
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Directional Control Valves

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Solenoid Connection



Coil Options



Tube Options



Manual Override Options



Electrical Options



Shift Indication



Approvals



Valve Variations



Design Series

NOTE:
Not required when ordering.

See next page for Valve Variations

Code	Description
C*	Leadwire Conduit Box
D**	Metric Plug (M12X1) DESINA
E†	Explosion Proof
F*	Flying Leadwire
G††	Plug-In Conduit Box
J++	Deutsch (DT04-2P)
P	DIN with Plug
S‡	Double Spade
W†	DIN w/o Plug
* No conduit box variations - See Plug-in G.	
** 24 VDC only, low watt only, lights, diode surge suppressor, not CSA approved.	
† Not available with lights.	
†† Required for variations on conduit box style, must have lights.	
++ 12 and 24 VDC only.	
‡ Only 12 VDC high watt.	
x 6" leadwire only.	

Code	Description
Omit*	High watt
D**	Explosion Proof, EExd ATEX
E**	Explosion Proof, EExme, ATEX, IECEX, from Germany
F†	Low Watt
L††	10 Watt
R#	Explosion Proof, ATEX / UL / CSA / IECEX, configurable cable connection
T#	Explosion Proof, ATEX / UL / CSA / IECEX, fixed horizontal cable connection
U##	Explosion Proof, UL/CSA
* AC ambient temperature must not exceed 60°C (140°F).	
** J voltage only, no options	
† AC only.	
†† DC (J and K coils) only.	
# J and Y voltages only. Y voltage is rectified.	
## J and Y voltages only. Y voltage is not rectified.	

Valve Weight:

Double Solenoid 5.4 kg (12.0 lbs.)

Seal Kit:

Nitrile SKD31VWN91

Fluorocarbon SKD31VWV91

Code	Description
Omit	No Options
J#	Diode Surge Suppressor
Z†	Rectified Coil
# Plug-In - 24 VDC only. DIN - DC only with Lighted Plug (5), which has integrated Surge Suppression. "J" not required here.	
Deutsch - as follows:	
• 12 VDC Hi watt only	
• 24 VDC Hi & Lo watt	
• 24 VDC Hi & Lo watt available.	
Required for Low watt.	
ER Explosion Proof - 24 VDC "JERP" required. Adds dust rating, not polarity sensitive [IIC, D].	
Leadwire - not available	
† DC tube standard, Plug-In conduit box only. Not polarity sensitive. Only available with Y voltage.	

Code	Description
Omit	Standard
P*	Extended Manual Override with Boot
T	Covered Manual Override, DC only, or AC Rectified
* Manual override options not available on most Explosion Proof, required only on JERPJ, YERPZ. Not available with high pressure AC tube H, or with DC soft shift option. Not available with any other tube options.	

Code	Description
Omit	Standard Pressure 103.5 Bar (1500 PSI) AC 207 Bar (3000 PSI) DC
H*	High Pressure, AC only 207 Bar (3000 PSI)
* Not available with CSA or Explosion Proof.	

Code	Description
Omit	Standard Valve
4†#	CSA Canada CSA22.2 No. 139-13
N	CE Approved
Q†#	CE + CSA Approved
† Not available with AC high pressure tube.	
# Valve is derated.	

Code	Spool Position	Position Control
Omit	All	Standard Response
I3N	C	End position monitored, side A and B
I6N		Start position monitored, side A and B
I2N	C, B, E, F (all spools)	End position monitored, side B
I5N	C, K, M (spool 9)	Start position monitored, side B
I1N	C, H, K, M (all spools)	End position monitored, side A
I4N	C, E, F (spool 9)	Start position monitored, side A

Note: The plug M12 x 1 for the position control is included. The monitor switch has to be located on the side to which the spool moves from the spring offset position. For 4/3-way valves two switches are required. Not CSA approved. Not available with 'F' or 'M' styles. **DC DIN, high watt coils only.** Not available on D31VW.

Mounting Bolt Kits

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

		Number of Sandwich Valves @ 2" (50 mm) thickness			
		0	1	2	3
D31*W	Standard	BK98 1.62"	BK141 3.5"	BK142 5.5"	BK143 7.5"
	Metric	BKM98 40 mm	BKM141 90 mm	BKM142 140 mm	BKM143 190 mm

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

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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Valve Variations

(OPTIONS ARE NOT AVAILABLE ON MONITOR SWITCH VALVES.)

Code	Description
Omit	Standard – No Variations
1C**	Manaplug – Brad Harrison Style 7/8-16 with Lights (Single Solenoid = 5 pin)
1D**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 5 pin)
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
2P	Complete Painted Valve, 1 mm thick spec. (check factory for availability)
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 Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Pilot Choke Meter Out with Lights and Manaplug – Brad Harrison Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
5*	Signal Lights – Standard Signal Lights – Hirsch. (DIN with Plug) (the DC Lighted Plug has Integral Surge Suppression)
7B**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
7W^	4-pin Micro Manaplug, Special Wiring with Lights
7Y^	Manaplug – Brad Harrison Style M12x1 Micro with Lights and Special Wiring (4 pin)
20	Fast Response
56**	Manaplug – Brad Harrison Style 7/8-16 Mini with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
* DESINA, plug-in conduit box, and DIN with plug styles only. ** Solenoid connection option G only. Requires manaplug code (56, 1C, 7B, etc.). ^ Requires G code (Plug-in Conduit Box) and J code (Diode Surge Suppressor) and lights.	

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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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.

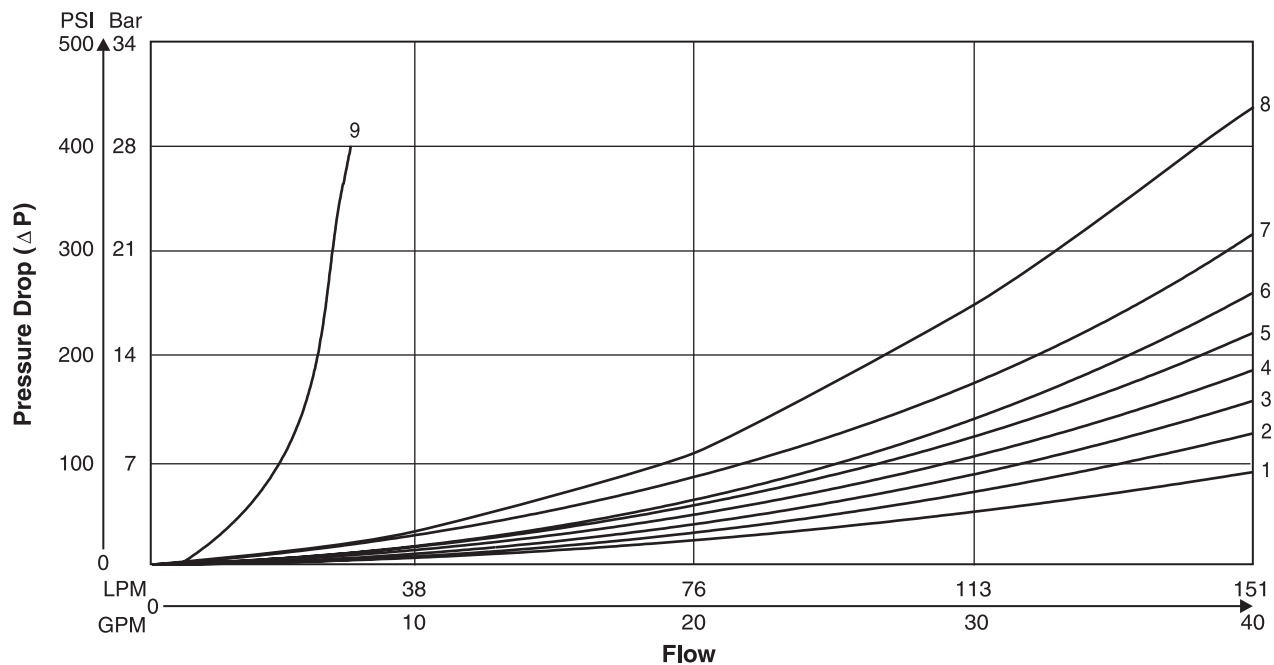
Spool No.	Curve Number											
	Shifted				Center Condition							
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)	
001	3	3	2	1	–	–	–	–	–	–	–	
002	3	3	1	1	3	3	3	4	4	1	1	
003	3	3	1	1	–	–	–	–	–	3	–	
004	3	3	1	1	–	–	–	–	–	1	1	
006	3	3	1	1	–	5	7	6	5	–	–	
008	3	3	1	1	7	–	–	–	–	–	–	
009	9	9	6	7	5	–	–	–	–	–	–	
011	3	2	1	1	–	–	–	–	–	8	8	
012	4	4	2	2	–	–	–	–	–	–	–	
015	3	2	4	1	–	–	–	–	–	–	4	
020	5	4	–	2	2	–	–	–	–	–	–	
030	4	3	–	1	1	–	–	–	–	–	–	
081	7	7	7	6	–	–	–	–	–	–	–	
082	7	6	7	6	–	–	–	–	–	–	–	

Viscosity Correction Factor

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

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

Performance Curves



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Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-10% 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 HVS 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.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (ER, ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013; Ex d IIC Gb; Ex tb IIIC Db IP66; IECEx BAS 14.0164X ATEX: EN60079-0, EN60079-1, EN60079-31; CE 1180 Ex II 2G BASEEFA08ATEX0041X CSA 22.2 No. 60079-0:07, 60079-1:07 and UL 60079-0:05, UL 60079-1:05; CSA listed to US and Canada Safety Standards. File 08-CSA-1932102 CSA Ex d IIC, AEx d IIC for Class I Zone 1; Class I Div 1 Grp. C & D; Class II Div 1 Grp. E, F & G

* Allowable Voltage Deviation +/-10%

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3 mm	Watts	Resistance
Voltage Code	Power Code						
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 Ohms
E	F	24 VAC	4.8 Amps	120 VA	2.07 Amps	21 W	1.29 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
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 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	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

Explosion Proof Solenoids

Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms

Explosion Proof Solenoids (German)

J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
---	--	--------	-----	-----	----------	------	---------

ER & ET Explosion Proof Solenoids

J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

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Directional Control Valves

D31 - Electrical Specifications

A110

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Electrical Characteristics of Position Control as per IEC 61076-2-101 (M12x1)

Supply Voltage (VDC)	24
Tolerance Supply Voltage (%)	+/-20
Polarity Protection (V)	300
Current Consumption without Load (mA)	≤20
Switching Hysteresis (mm)	<0.06
Max Output Current per Channel, Ohmic (mA)	250
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)
Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)
Min. Distance to Next AC Solenoid (m)	0.1 (0.33 ft)
Interface	M12x1 acc. to IEC 61076-2-101
CE Conform	EN 61000-4-2 / EN 61000-4-4 / EN 61000-4-6* / ENV 50140 / ENV 50204

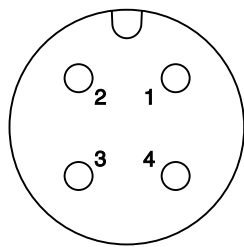
* Only guaranteed with screened cable and female connector

A

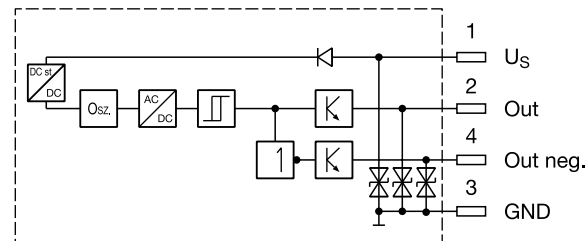
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M12 Pin Assignment



1. U_S 19.2...28.8V
2. Out B: normally open
3. 0V
4. Out A: normally closed



Outputs: Open collector

Definitions

Start position monitored:

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

At the switching point the spool is located within the closed position. It is secured so that only the flow paths of the offset position are granted.

Please order plug M12x1 separately. See Accessories, plug M12x1 (part no.: 5004109).

End position monitored:

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

Directional Control Valves

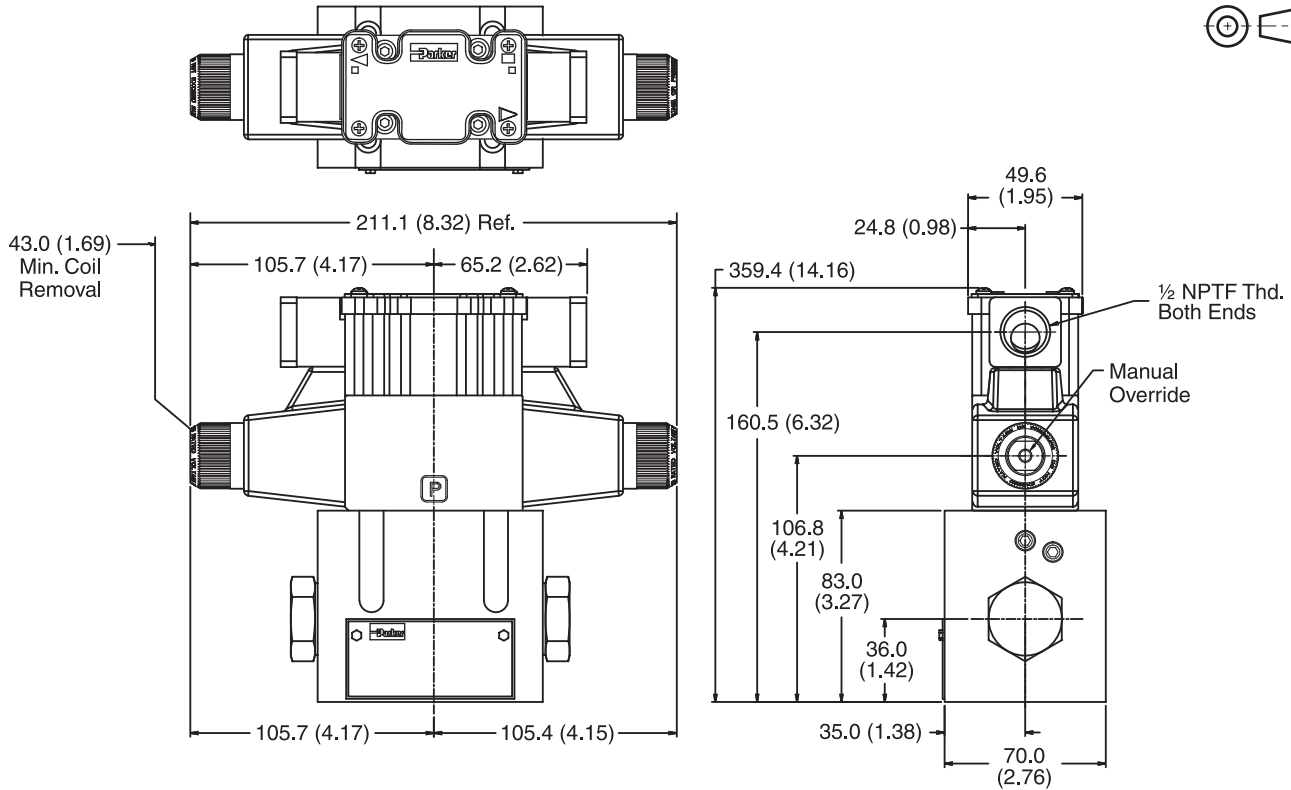
D31 - Dimensions

A111

WWW.SUMY.IR

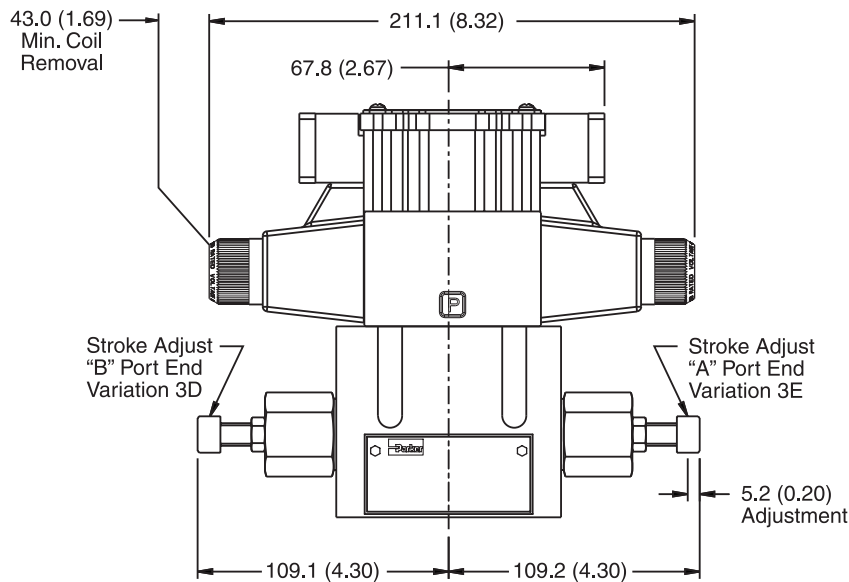
Inch equivalents for millimeter dimensions are shown in (**)

Conduit Box, Double AC Solenoid



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

Conduit Box and Stroke Adjust, Double AC Solenoid



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

Directional Control Valves

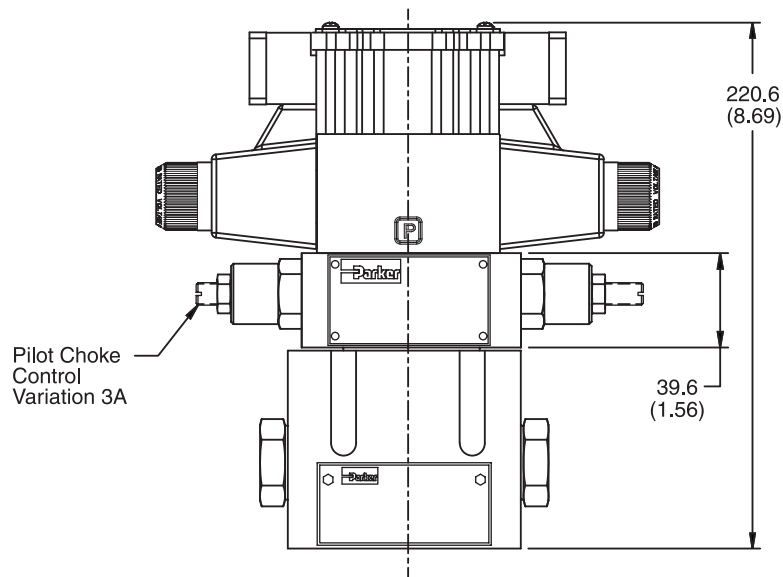
D31 - Dimensions

A112

WWW.SUMY.IR

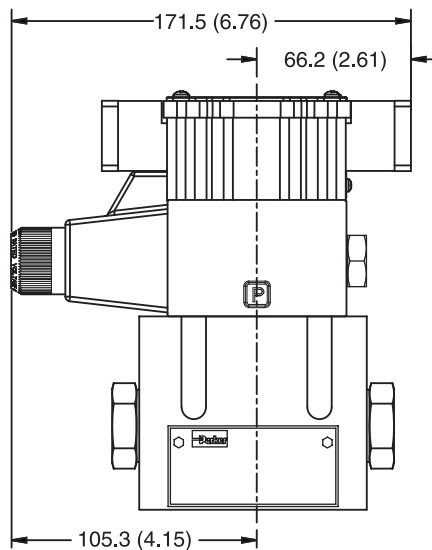
Inch equivalents for millimeter dimensions are shown in (**)

Conduit Box and Pilot Choke Control, Double AC Solenoid



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

Conduit Box, Single AC Solenoid



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

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Directional Control Valves

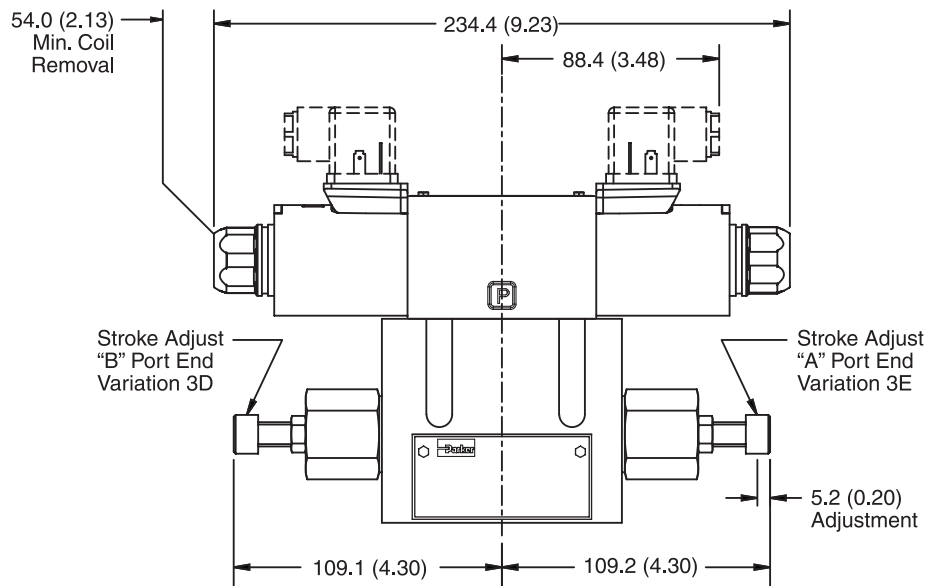
D31 - Dimensions

A113

WWW.SUMY.IR

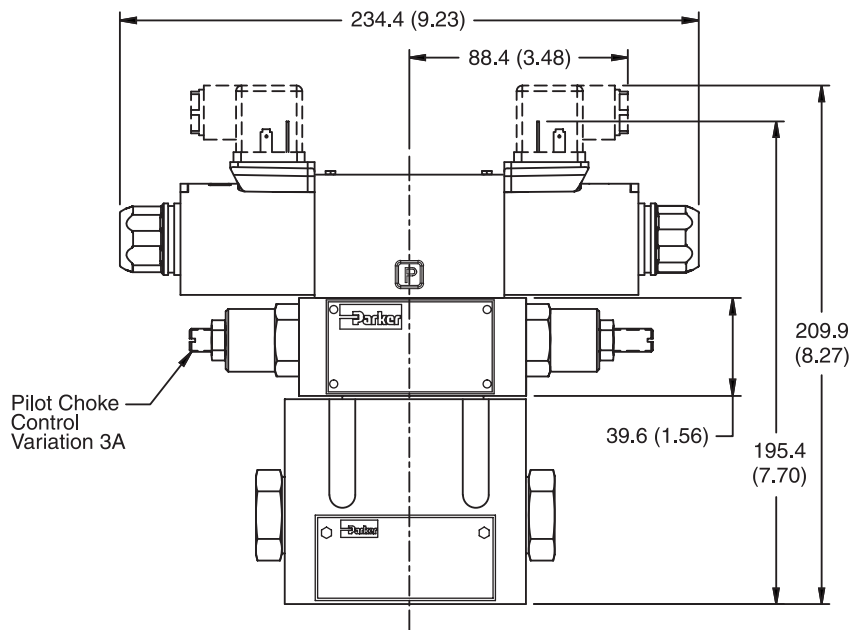
Inch equivalents for millimeter dimensions are shown in (**)

Hirschmann and Stroke Adjust, Double DC Solenoid



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

Hirschmann and Pilot Choke Control, Double DC Solenoid



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

Directional Control Valves

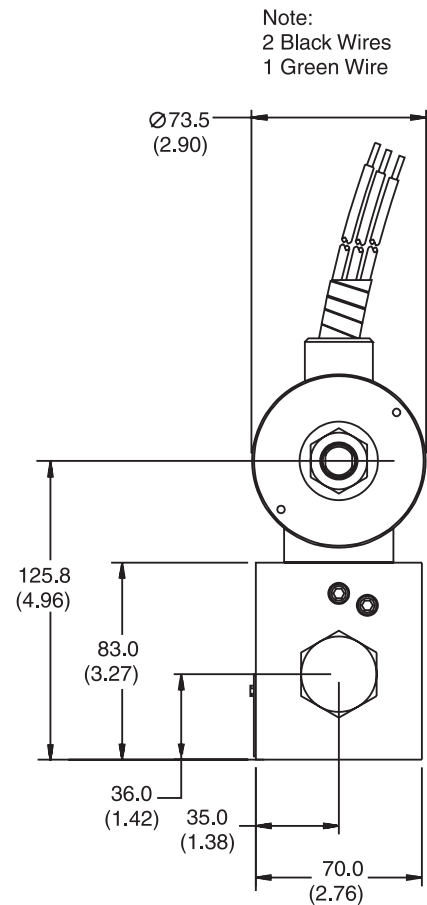
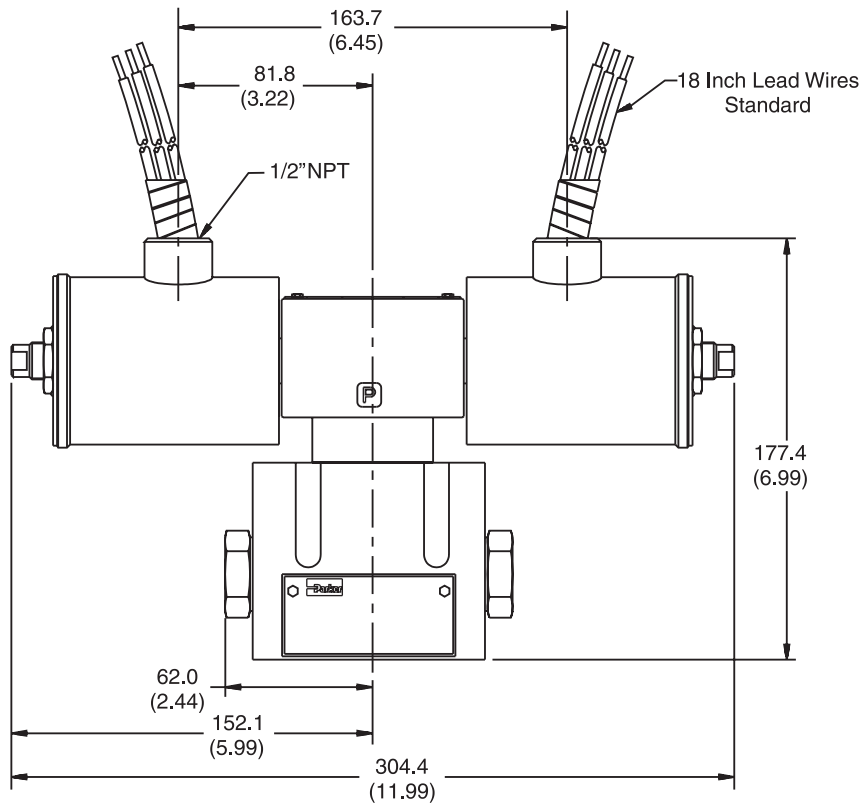
D31 - Dimensions

A114

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

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



Note:
2 Black Wires
1 Green Wire

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Directional Control Valves

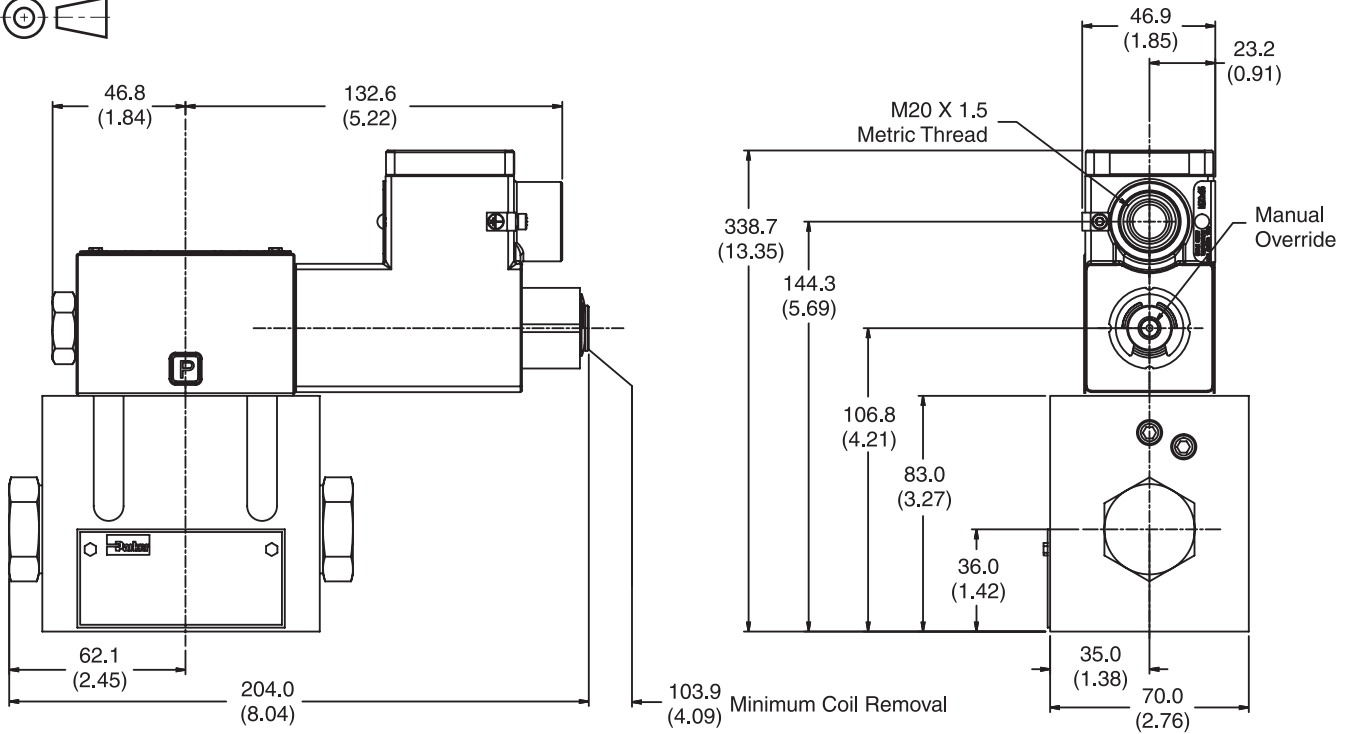
D31 - Dimensions

A115

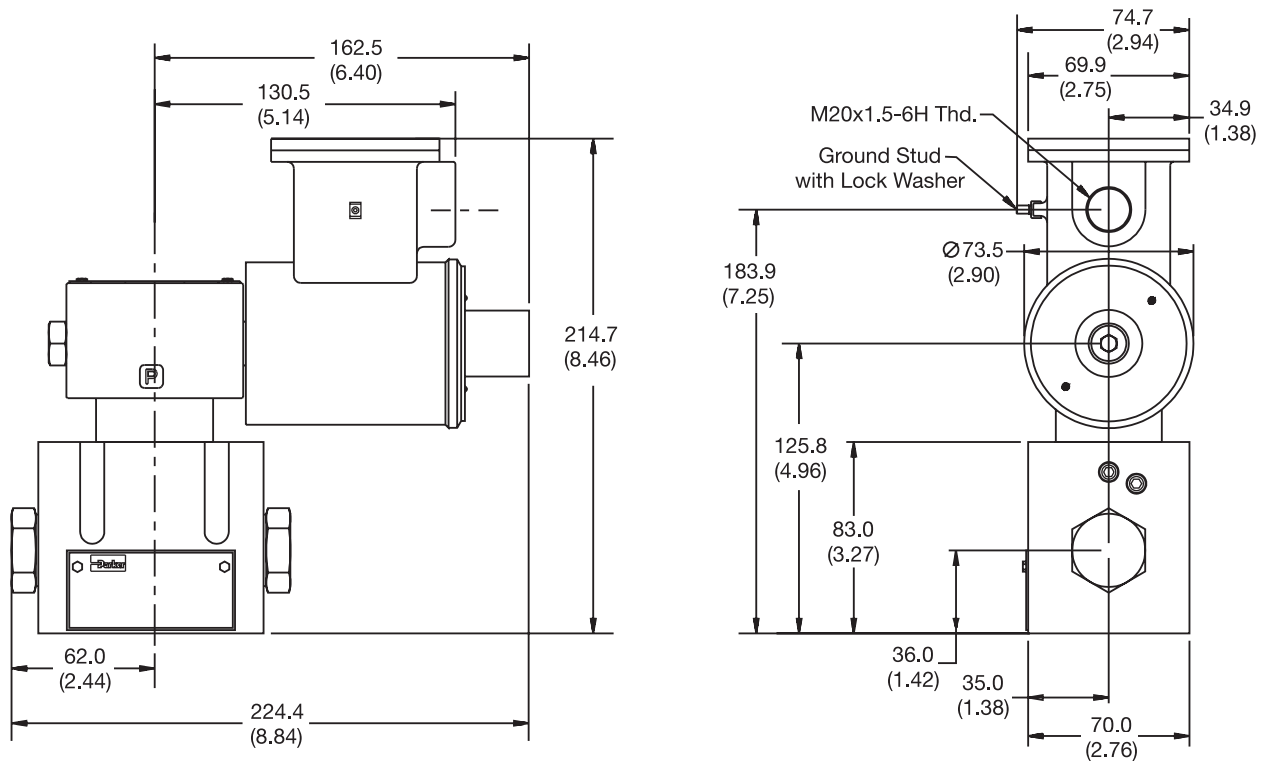
WWW.SUMY.IR

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

Explosion Proof, EX d IIC ATEX/CSA/IECEX Single Solenoid



Explosion Proof, EExd ATEX, Single Solenoid



Directional Control Valves

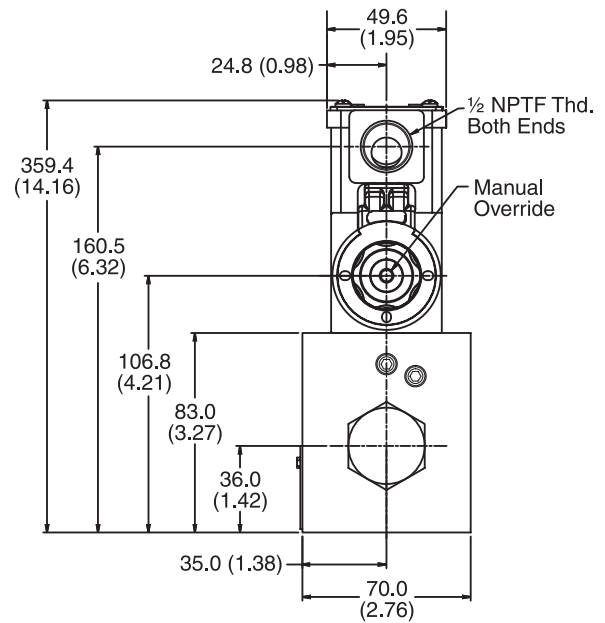
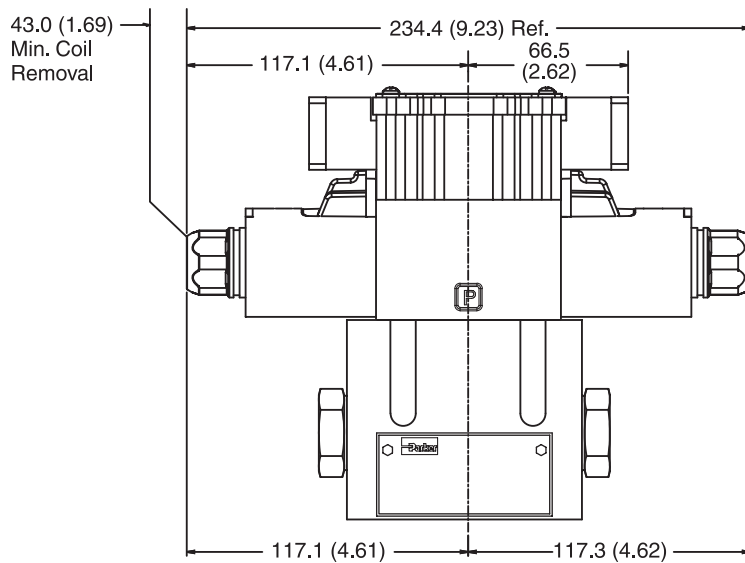
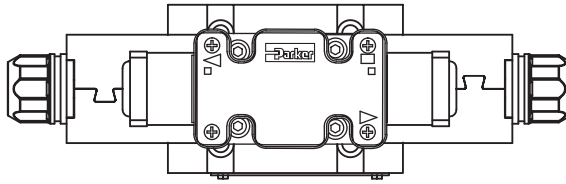
D31 - Dimensions

A116

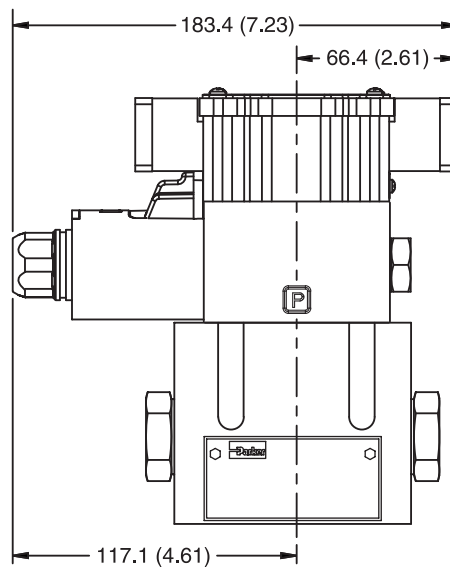
WWW.SUMY.IR

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

Plug-in Conduit Box, Double DC Solenoid



Plug-in Conduit Box, Single DC Solenoid



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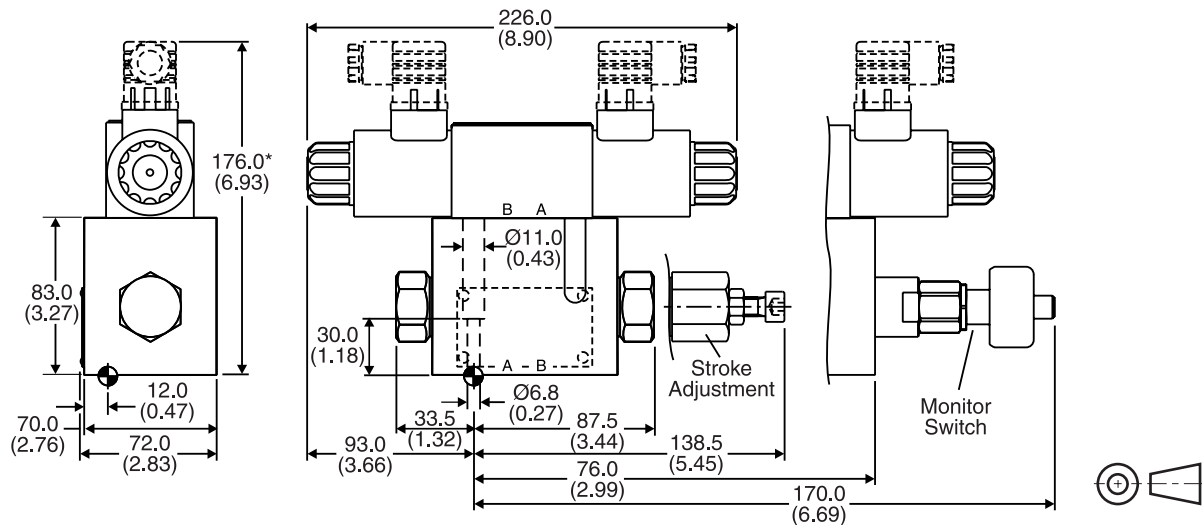
Directional Control Valves

D31DW - Dimensions

A117

WWW.SUMY.IR

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



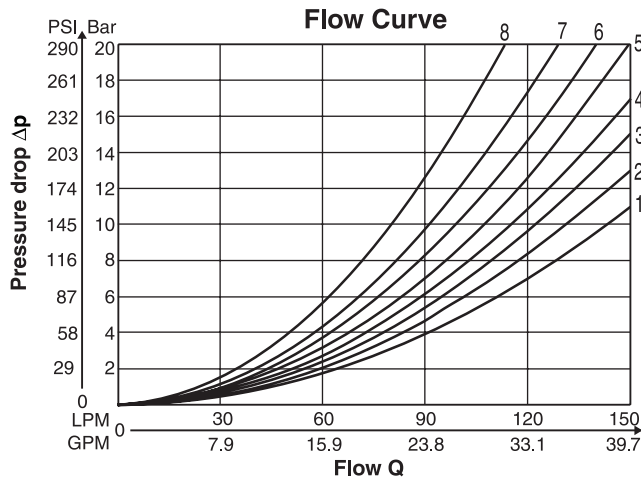
* For each sandwich plate, please add +40mm (1.58") (pressure reducing valve, choke valve meter-in / -out),

Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}6.3}$	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm (9.7 lb-ft) +/- 15%	Nitrile: SK-D31NW-N-91 Flurocarbon: SK-D31NW-V-91

The space necessary to remove the plug per DIN 43650, design type AF, is at least 15 mm (0.59").
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm (0.37 to 0.44 lb.-ft.).

Performance Curves

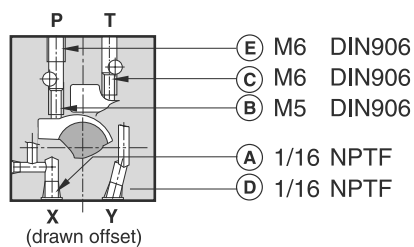
The flow curve diagrams show the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.



All characteristic curves measured with HLP46 at 50°C.

Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
001	4	4	–	3	3
002	2	3	3	3	4
003	2	4	–	1	2
004	4	3	–	2	3
005	1	4	–	2	3
006	2	3	–	3	4
007	4	2	5	2	2
009	2	2	8	5	6
011	3	2	–	3	3
014	2	4	5	2	3
015	4	2	–	2	2
016	4	1	–	1	2
020	4	4	–	4	4
021	3	4	–	2	–
022	5	2	–	–	4
026	3	3	–	–	–
030	4	3	–	3	3
031	3	4	–	1	–
032	5	2	–	–	2
081	6	6	–	7	7
082	7	6	–	5	7

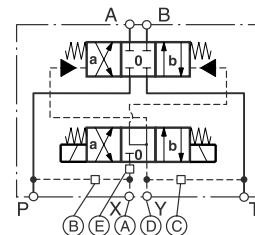
Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

Pilot oil Inlet	Outlet	A	B	C	D	E
internal	external	●	○	●	○	Orifice Ø1.2
external	external	○	●	●	○	Orifice Ø1.2
internal	internal	●	○	○	●	Orifice Ø1.2
external	internal	○	●	○	●	Orifice Ø1.2

All orifice sizes for standard valves



Directional Control Valves

D31 - Accessories

A119

WWW.SUMY.IR

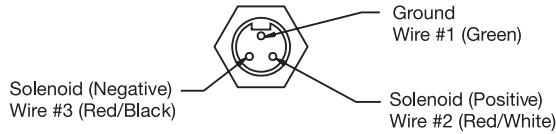
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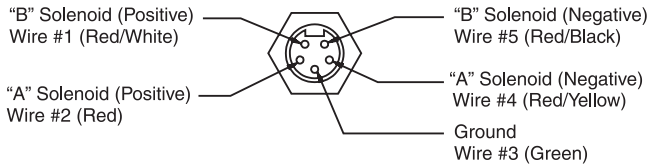
Manaplug (Options 6, 56, 1A, & 1C)

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



3-Pin Manaplug (Mini) with Lights

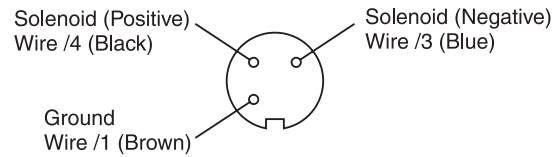
Single Solenoid Valves – Installed Opposite Side of Solenoid



5-Pin Manaplug (Mini) with Lights

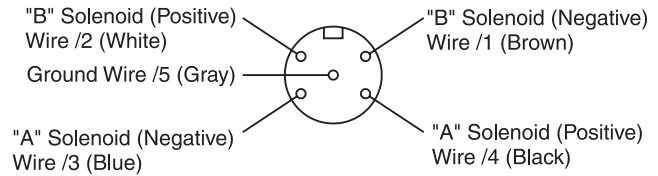
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

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

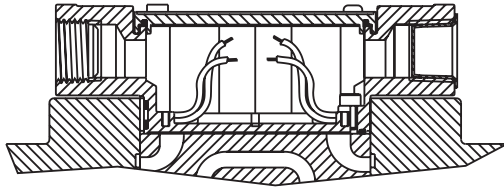
- EP336-30 3 Pin Plug
- EP316-30 5 Pin Plug (Double Solenoid)
- EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

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

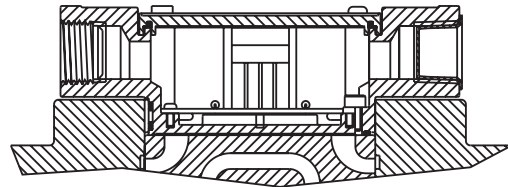
Conduit Box Option C

- No Wiring Options Available



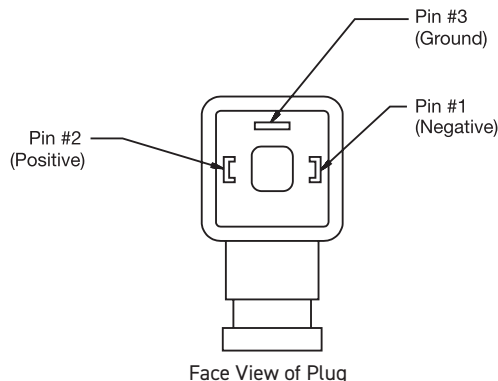
Signal Lights (Option 5) — Plug-in Only

- LED Interface
- Meets Nema 4/IP67



Hirschmann Plug with Lights (Option P5)

ISO 4400/DIN 43650 Form "A"

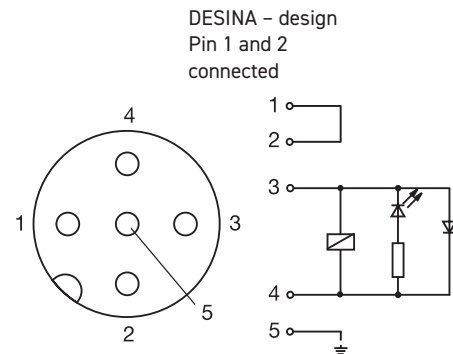


Pins are as seen on valve (male pin connectors)

DESINA Connector (Option D)

M12 Pin Assignment
Standard

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



Directional Control Valves

D31NW - Technical Information

A120

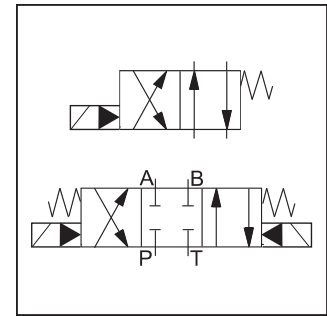
WWW.SUMY.IR

General Description

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

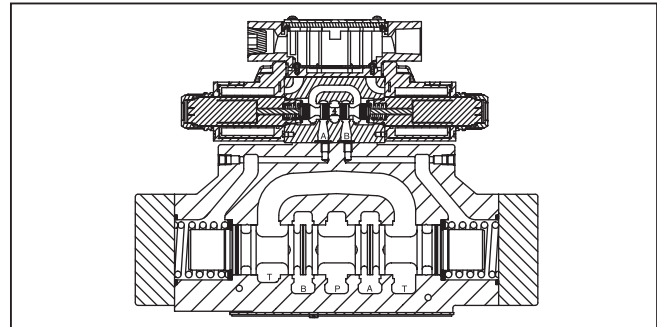
The minimum pilot pressure must be ensured for all operating conditions of the directional valve.

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



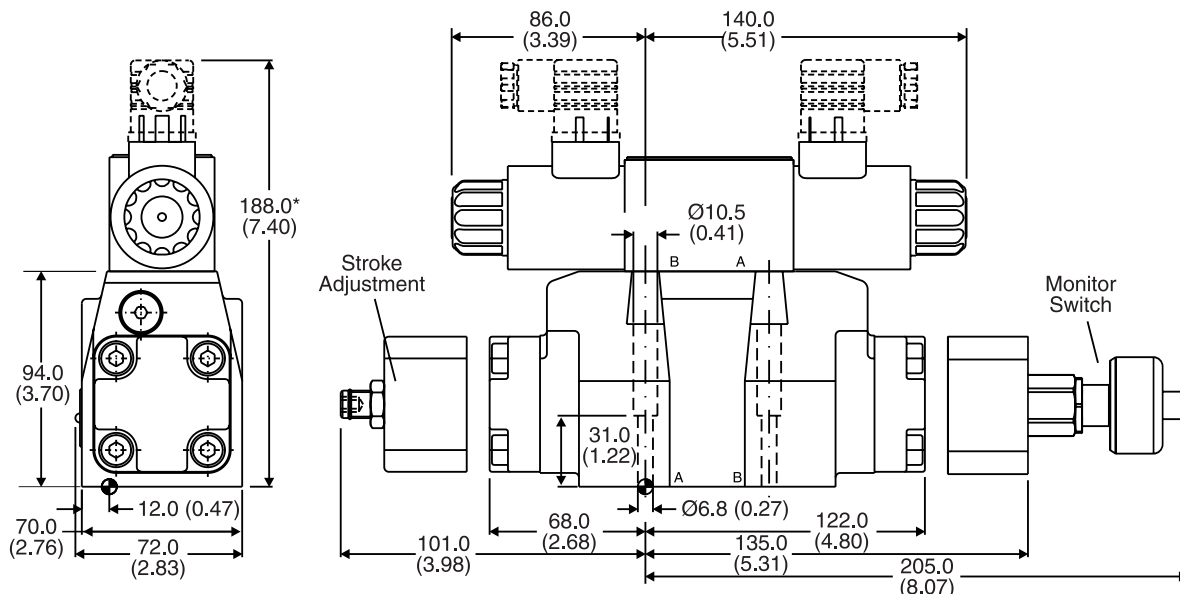
Features

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



Dimensions

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



* For each sandwich plate, please add +40mm (1.58") (pressure reducing valve, choke valve meter-in / -out),



Surface Finish	Kit			Seal Kit
	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm (9.7 lb-ft) +/- 15%	Nitrile: SK-D31NW-N-91 Fluorocarbon: SK-D31NW-V-91

The space necessary to remove the plug per DIN 43650, design type AF, is at least 15 mm (0.59").
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm (0.37 to 0.44 lb.-ft.).

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

D31NW - Ordering Information

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D	31N	W					
Directional Control Valve	Basic Valve	Actuator Solenoid Wet Pin	Spool	Style	Pilot Supply and Drain	Seal	Solenoid Voltage
Code	Description	Code	Description	Code	Description	Code	Description
31N	NFPA D05HE, CETOP 5H, DIN NG10, D03 Pilot, High Flow	1	Internal Pilot, External Drain	N	Nitrile	D†#	120 VDC
		2	External Pilot, External Drain	V	Fluorocarbon	E*	24/60 - 24/50 VAC
		4*	Internal Pilot, Internal Drain			J	24 VDC
		5	External Pilot, Internal Drain			K#**	12 VDC
		* Not available with 002, 008, 009, and 030 spools				Q††#	100/60 VAC
						QD††#	100 VAC/60 Hz - 100 VAC/50 Hz
						T^^	240/60 - 220/50 VAC
						U***#	98 VDC
						Y	120/60 - 110/50 VAC
						# High watt only.	
						* Leadwire only, low watt only.	
						** DIN, low watt available.	
						*** Leadwire not available.	
						^^ Plug-in is low watt only.	
						† DIN & Leadwire only.	
						†† DIN only.	

3-Position Spools		
Code	Spool Type	
	A 0 B	
001		
002		
003		
004		
005†		
006†		
009**		
011		
015		
016†		
021		
022		
2-Position Spools		
Code	Spool Type	
	A B	
020*		
030**		
* 020 spool has closed crossover.		
** 009 and 030 spools have open crossover.		
† Not available with monitor switch.		

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		2 positions. Spring offset in position "0".
F†		2 positions. Operated in position "0".
K		2 positions. Spring offset in position "0".
M†		2 positions. Operated in position "0".
R		2 positions, detent. Operated in position "0" or "b".
S		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".
* 020 and 030 spools only.		
† 020 and 030 spools only. Must be standard high watt coil (30 watt) or L (10 watt coil) only (stroke is reduced by 0.5mm, therefore max flow is reduced to 13 - 14 GPM). Not available with F (low watt) coil option for AC coils only.		
± High Watt only.		

Weight:

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

Bold: Designates Tier I products and options.

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

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Directional Control Valves

D31NW - Ordering Information

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Solenoid Connection


Coil Options


Tube Options


Manual Override Options


Electrical Options


Shift Indication


Approvals


Valve Variations


Design Series
NOTE: Not required when ordering.


Monitor Switch Cover

Code	Description
C*	Leadwire Conduit Box
D**	Metric Plug (M12X1) DESINA
E†	Explosion Proof
F‡	Flying Leadwire
G††	Plug-In Conduit Box
J++	Deutsch (DT04-2P)
P	DIN with Plug
S‡	Double Spade
W†	DIN w/o Plug

* No conduit box variations - See Plug-in G.
** 24 VDC only, low watt only, lights, diode surge suppressor, not CSA approved.
† Not available with lights.
†† Required for variations on conduit box style, must have lights.
++ 12 and 24 VDC only.
‡ Only 12 VDC high watt.
x 6" leadwire only.

Code	Description
Omit*	High watt
D**	Explosion Proof, EExd ATEX
E**	Explosion Proof, EExme, ATEX, IECEX, from Germany
F†	Low Watt
L††	10 Watt
R#	Explosion Proof, ATEX / UL / CSA / IECEX, configurable cable connection
T#	Explosion Proof, ATEX / UL / CSA / IECEX, fixed horizontal cable connection
U##	Explosion Proof, UL/CSA

* AC ambient temperature must not exceed 60°C (140°F).
** J voltage only, no options
† AC only.
†† DC (J and K coils) only.
J and Y voltages only. Y voltage is rectified.
J and Y voltages only. Y voltage is not rectified.

Code	Description
Omit	Standard
P*	Extended Manual Override with Boot
T	Covered Manual Override, DC only, or AC Rectified

* Manual override options not available on most Explosion Proof, required only on JERPJ, YERPZ. Not available with high pressure AC tube H, or with DC soft shift option. Not available with any other tube options.

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

Plug-In - 24 VDC only. DIN - DC only with Lighted Plug (5), which has integrated Surge Suppression. "J" not required here.
Deutsch - as follows:
• 12 VDC Hi watt only
• 24 VDC Hi & Lo watt
• 24 VDC Hi & Lo watt available.
Required for Low watt. ER Explosion Proof - 24 VDC "JERP" required. Adds dust rating, not polarity sensitive [IIC, D].
Leadwire - not available
† DC tube standard, Plug-In conduit box only. Not polarity sensitive. Only available with Y voltage.

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 or Explosion Proof.

See next page for Valve Variations

Code	Description
Omit	Standard Valve
4†#	CSA Canada CSA22.2 No. 139-13
N	CE Approved
Q†#	CE + CSA Approved

† Not available with AC high pressure tube.
Valve is derated.

Code	Description
Omit	No Variation
4B	Monitor Switch Cover

Code	Spool Position	Position Control
Omit	All	Standard Response
I3N	C	End position monitored, side A and B
I6N		Start position monitored, side A and B
I2N	C, B, E, F (all spools)	End position monitored, side B
I5N	C, K, M (spool 9)	Start position monitored, side B
I1N	C, H, K, M (all spools)	End position monitored, side A
I4N	C, E, F (spool 9)	Start position monitored, side A

Note: The plug M12 x 1 for the position control is included. The monitor switch has to be located on the side to which the spool moves from the spring offset position. For 4/3-way valves two switches are required. Not CSA approved. Not available with 'F' or 'M' styles. DC DIN, high watt coils only. Not available on D31VW.

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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MSG14-2500/US
Directional Control Valves

Directional Control Valves

D31NW - Ordering Information

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Valve Variations

(OPTIONS ARE NOT AVAILABLE ON MONITOR SWITCH VALVES.)

Code	Description
Omit	Standard – No Variations
1C**	Manaplug – Brad Harrison Style 7/8-16 with Lights (Single Solenoid = 5 pin)
1D**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 5 pin)
1M**	Manaplug Opposite Normal
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 Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Pilot Choke Meter Out with Lights and Manaplug – Brad Harrison Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
5*	Signal Lights – Standard Signal Lights – Hirsch. (DIN with Plug) (the DC Lighted Plug has Integral Surge Suppression)
7B**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
7W^	4-pin Micro Manaplug, Special Wiring with Lights
7Y^	Manaplug – Brad Harrison Style M12x1 Micro with Lights and Special Wiring (4 pin)
20	Fast Response
56**	Manaplug – Brad Harrison Style 7/8-16 Mini with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
* DESINA, plug-in conduit box, and DIN with plug styles only. ** Solenoid connection option G only. Requires manaplug code (56, 1C, 7B, etc.). ^ Requires G code (Plug-in Conduit Box) and J code (Diode Surge Suppressor) and lights.	

Bold: Designates Tier I products and options.

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



Directional Control Valves

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Solenoid Ratings	
Insulation System	Class F
Allowable Deviation from rated voltage	-10% 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 HVS 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.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (ER, ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013; Ex d IIC Gb; Ex tb IIIC Db IP66; IECEx BAS 14.0164X ATEX: EN60079-0, EN60079-1, EN60079-31; CE 1180 Ex II 2G BASEEFA08ATEX0041X CSA 22.2 No. 60079-0:07, 60079-1:07 and UL 60079-0:05, UL 60079-1:05; CSA listed to US and Canada Safety Standards. File 08-CSA-1932102 CSA Ex d IIC, AEx d IIC for Class I Zone 1; Class I Div 1 Grp. C & D; Class II Div 1 Grp. E, F & G
* Allowable Voltage Deviation +/-10%	



Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3 mm	Watts	Resistance
Voltage Code	Power Code						
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 Ohms
E	F	24 VAC	4.8 Amps	120 VA	2.07 Amps	21 W	1.29 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
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 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	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
Explosion Proof Solenoids							
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
ER & ET Explosion Proof Solenoids							
J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

Industrial
Hydraulics Valves

MSG14-2500/US
Directional Control Valves

Directional Control Valves

D31NW - Specifications

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General		
Design	Directional Spool Valve	
Actuation	Solenoid	
Size	NG 10 / CETOP 05 / NFPA D05	
Mounting Interface	DIN 24340 A10 / ISO 4401 / CETOP RP121-H / NFPA D05	
Mounting Position	Unrestricted, preferably horizontal	
Ambient Temperature (°C)	-25 to +50 (-13°F to +122°F) without inductive position control 0 to +50 (+32°F to +122°F) with inductive position control	
MTTF _D Value (years)	75	
Hydraulic		
Maximum Operating Pressure (Bar)	Pilot Drain Internal: Ports P, A, B, X = 315 (4568 PSI); Ports T, Y = 140 (2030 PSI) Pilot Drain External: Ports P, A, B, X = 315 (4568 PSI); Ports T, Y = 140 (2030 PSI)	
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature (°C)	-25 to +70 (-13°F to +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)	
Maximum Flow (LPM)	170 (45 GPM)	
Leakage @350 Bar (5075 PSI) per flow path (ml/min)	72 - 422 (0.02 - 0.11 GPM) depending on spool	
Minimum Pilot Supply Pressure (Bar)	7 (102 PSI)	
Static / Dynamic		
Step Response at 85%	Energized	De-energized
DC Solenoids Pilot Pressure		
50 & 100 Bar (725 & 1450 PSI) (ms)	470	390
250 & 350 Bar (3625 & 5075 PSI) (ms)	320	390
AC Solenoids Pilot Pressure		
50, 100, 250, & 350 Bar (725, 1450, 3625, & 5075 PSI) (ms)	30 / 50	375

Single Solenoid Valve

Electrical Specifications of Position Control as per IEC 61076-2-101 (M12x1)

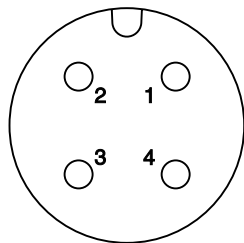
Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)
Supply Voltage / Ripple (V)	24 ≤ 10%
Tolerance Supply Voltage (%)	+/-20
Polarity Protection (V)	300
Current Consumption without Load (mA)	≤20
Switching Hysteresis (mm)	<0.06
Max Output Current per Channel, Ohmic (mA)	250
Min. Distance to Next AC Solenoid (m)	0.1 (0.33 ft)
Interface	M12x1 acc. to IEC 61076-2-101
Wiring Minimum (mm ²)	5x0.25 braid shield recommended
Wiring Length Maximum (m)	50 (164 ft) recommended
CE Conform	EN 61000-4-2 / EN 61000-4-4 / EN 61000-4-6 ¹⁾ / ENV 50140 / ENV 50204

¹⁾ Only guaranteed with screened cable and female connector

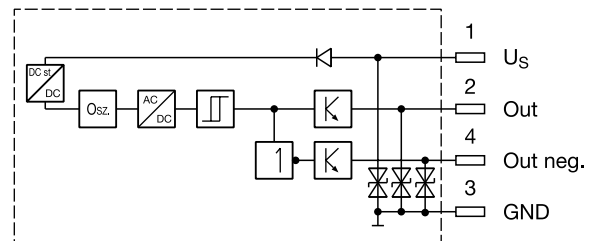
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M12 Pin Assignment



1. U_s 19.2...28.8V
2. Out B: normally open
3. 0V
4. Out A: normally closed



Outputs: Open collector

Definitions

Start position monitored:

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

At the switching point the spool is located within the closed position. It is secured so that only the flow paths of the offset position are granted.

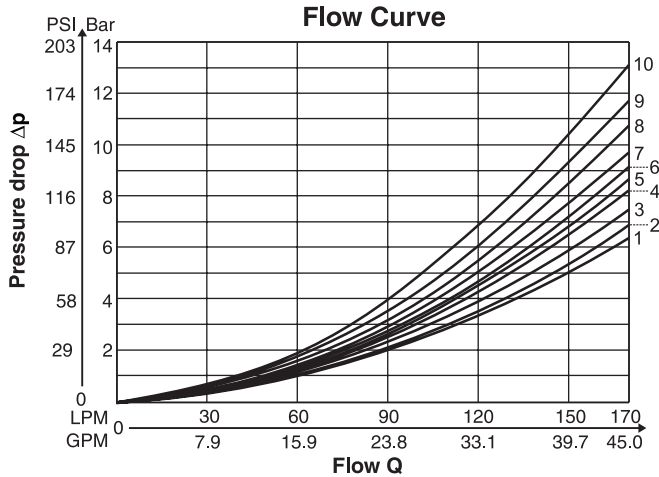
The switch can only be located on the opposite side of the solenoid for direct operated valves. Please order plug M12x1 separately. See Accessories, plug M12x1 (part no.: 5004109).

End position monitored:

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

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.

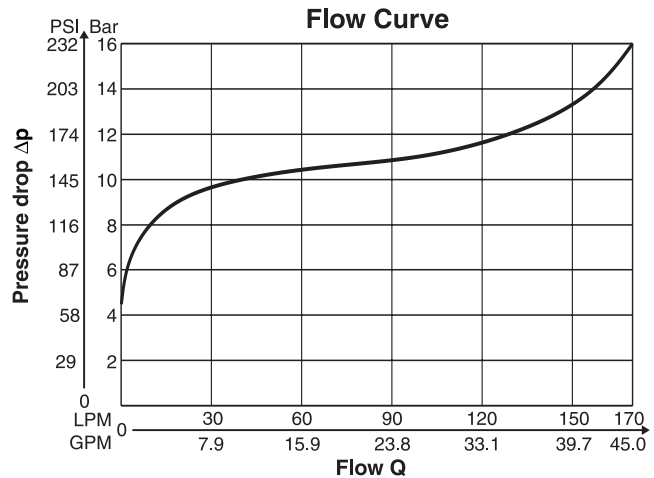


All characteristic curves measured with HLP46 at 50°C.

Spool No.	Curve Number				
	P-A	P-B	P-T	A-T	B-T
001	3	3	-	2	5
002	3	3	7	4	3
003	2	3	-	4	4
004	2	3	-	4	4
005	2	4	-	1	4
006	8	9	-	7	9
007	-	-	-	-	-
009	4	6	6	4	10
011	3	3	-	2	4
014	-	-	-	-	-
015	2	2	-	1	4
016	4	3	-	2	4
020	6	4	-	3	6
021	-	7	-	8	-
022	4	-	-	9	-
026	-	-	-	-	-
030	5	3	-	2	5
031	-	-	-	-	-
032	-	-	-	-	-
081	-	-	-	-	-
082	-	-	-	-	-

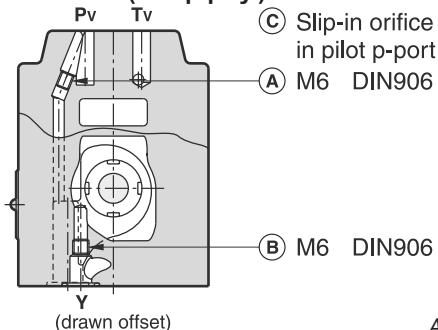
Integral Check Valve in the P port

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.



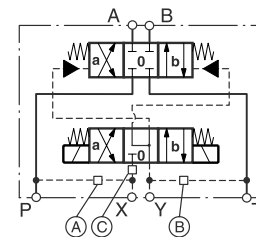
All characteristic curves measured with HLP46 at 50°C.

Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

Pilot oil Inlet	Outlet	A	B	C
internal	external	○	●	Orifice Ø1.0
external	external	●	●	Orifice Ø1.0
internal	internal	○	○	Orifice Ø1.0
external	internal	●	○	Orifice Ø1.0



All orifice sizes for standard valves

Directional Control Valves

D31NW - Accessories

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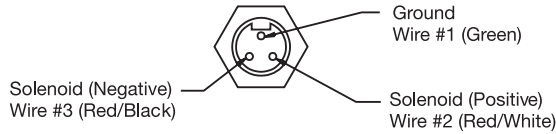
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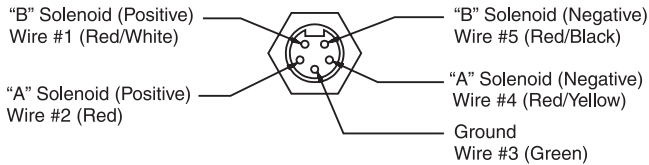
Manaplug (Options 6, 56, 1A, & 1C)

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



3-Pin Manaplug (Mini) with Lights

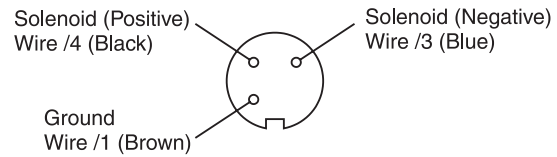
Single Solenoid Valves – Installed Opposite Side of Solenoid



5-Pin Manaplug (Mini) with Lights

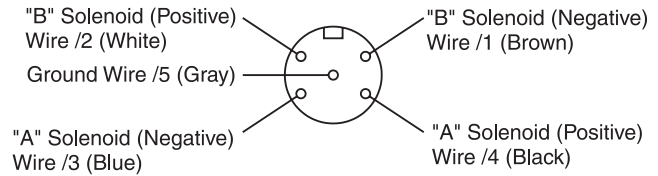
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

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

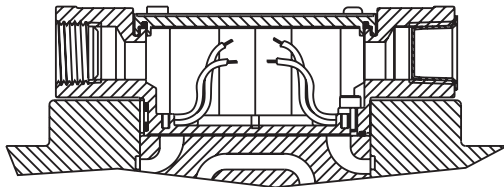
- EP336-30 3 Pin Plug
- EP316-30 5 Pin Plug (Double Solenoid)
- EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

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

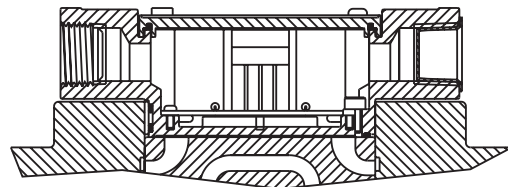
Conduit Box Option C

- No Wiring Options Available



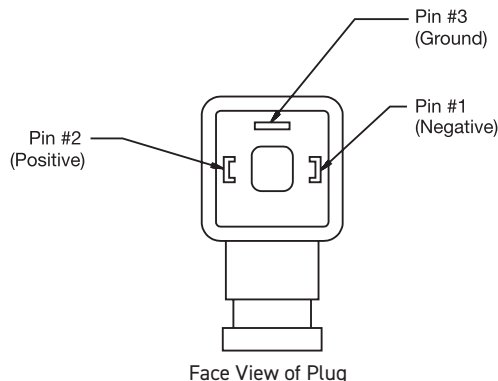
Signal Lights (Option 5) — Plug-in Only

- LED Interface
- Meets Nema 4/IP67



Hirschmann Plug with Lights (Option P5)

ISO 4400/DIN 43650 Form "A"

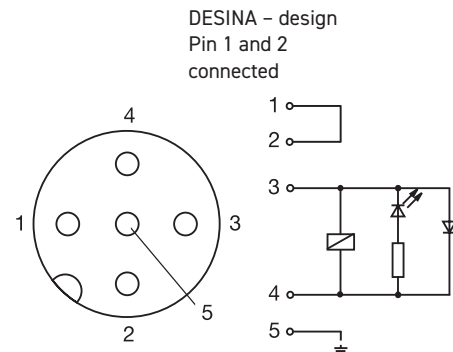


Pins are as seen on valve (male pin connectors)

DESINA Connector (Option D)

M12 Pin Assignment
Standard

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



Directional Control Valves

D31NWR - Technical Information

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General Description

Series D31NWR directional control valve when combined with adapter blocks, provides a fulltime regenerative function, or a hybrid version that can switch between regen and conventional 4-way function.

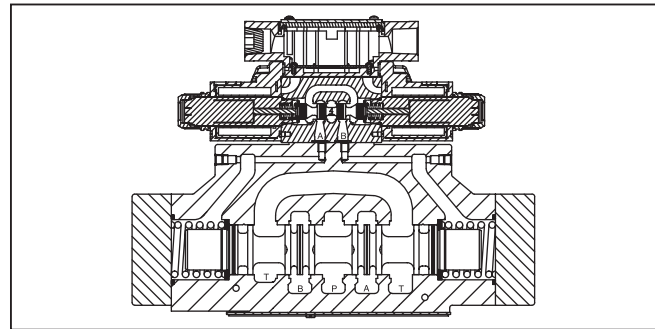
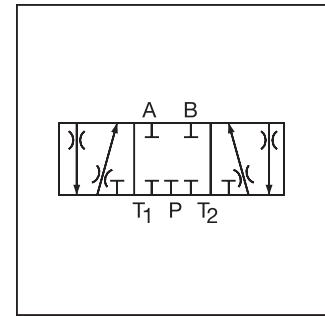
Features

- Energy saving A-regeneration optionally integrated
- Switchable hybrid version

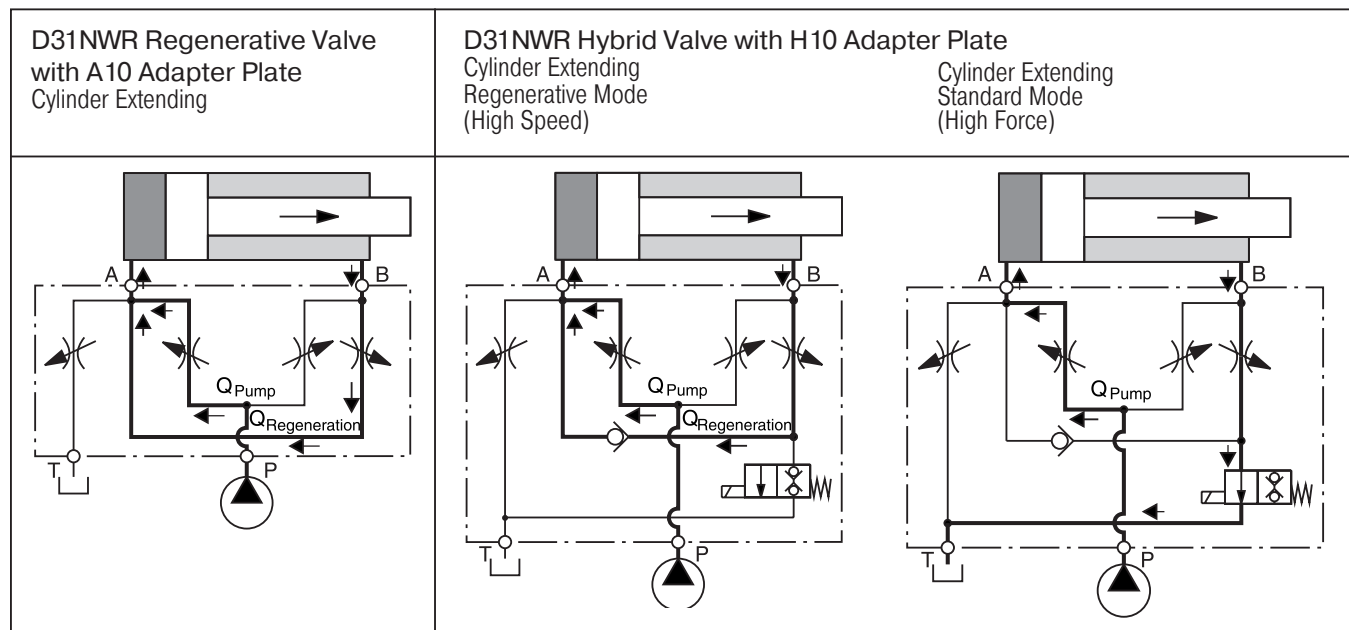
Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



D31NW shown



D31NW shown



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D31NWR - Technical Information

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Ordering Information

D	31N	W	R		C			J	W																																																										
Directional Control Valve	Basic Valve	Actuator Solenoid Wet Pin	Regenerative	Spool	Style	Pilot Supply and Drain	Seal	Solenoid Voltage 24VDC	Connector as per EN 175301-803, without connector (please order plug separately)	Manual Override Options	Valve Variations	Design Series																																																							
<table border="1"> <tr> <th>Code</th> <th>Description</th> </tr> <tr> <td>31N</td> <td>NFPA D05HE, CETOP 5H, DIN NG10, D03 Pilot, High Flow</td> </tr> </table>		Code	Description	31N	NFPA D05HE, CETOP 5H, DIN NG10, D03 Pilot, High Flow	<table border="1"> <tr> <th>Code</th> <th>Symbol</th> </tr> <tr> <td>01</td> <td></td> </tr> <tr> <td>04</td> <td></td> </tr> <tr> <td>81</td> <td></td> </tr> <tr> <td>82</td> <td></td> </tr> </table> <i>For D31NWR regenerative and hybrid function, you must have adapter plates (A10-1664/A10-1665L).</i>		Code	Symbol	01		04		81		82		<table border="1"> <tr> <th>Code</th> <th>Description</th> </tr> <tr> <td>N</td> <td>Nitrile</td> </tr> <tr> <td>V</td> <td>Fluorocarbon</td> </tr> </table>		Code	Description	N	Nitrile	V	Fluorocarbon	<table border="1"> <tr> <th>Code</th> <th>Description</th> </tr> <tr> <td>Omit</td> <td>Standard</td> </tr> <tr> <td>T</td> <td>No override</td> </tr> </table>		Code	Description	Omit	Standard	T	No override	<table border="1"> <tr> <th>Code</th> <th>Description</th> </tr> <tr> <td>1</td> <td>Internal Pilot, External Drain</td> </tr> <tr> <td>2</td> <td>External Pilot, External Drain</td> </tr> <tr> <td>4*</td> <td>Internal Pilot, Internal Drain</td> </tr> <tr> <td>5</td> <td>External Pilot, Internal Drain</td> </tr> </table> <i>* Not available with 002, 008, 009, and 030 spools</i>		Code	Description	1	Internal Pilot, External Drain	2	External Pilot, External Drain	4*	Internal Pilot, Internal Drain	5	External Pilot, Internal Drain	<table border="1"> <tr> <th>Code</th> <th>Description</th> </tr> <tr> <td>Omit</td> <td>Standard without accessories</td> </tr> <tr> <td>3A</td> <td>Pilot Choke Meter Out</td> </tr> <tr> <td>3B</td> <td>Pilot Choke Meter In</td> </tr> <tr> <td>3C</td> <td>Pilot Pressure Reducer</td> </tr> <tr> <td>3D</td> <td>Stroke Adjust 'B' End</td> </tr> <tr> <td>3E</td> <td>Stroke Adjust 'A' End</td> </tr> <tr> <td>3F</td> <td>Stroke Adjust 'A' and 'B' End</td> </tr> <tr> <td>3R</td> <td>Pilot Choke Meter Out and Pilot Pressure Reducer</td> </tr> <tr> <td>1T</td> <td>Pilot Choke Meter In and Pilot Pressure Reducer</td> </tr> </table>		Code	Description	Omit	Standard without accessories	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' and 'B' End	3R	Pilot Choke Meter Out and Pilot Pressure Reducer	1T	Pilot Choke Meter In and Pilot Pressure Reducer
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Weight:
8.1 kg (17.9 lbs.)

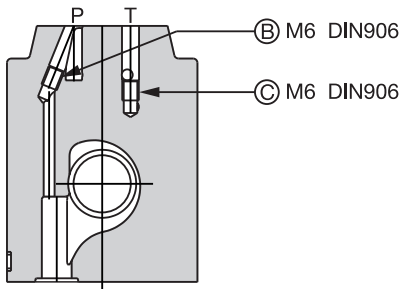
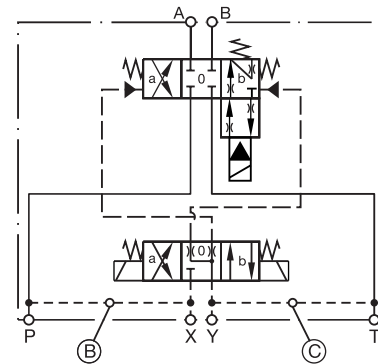
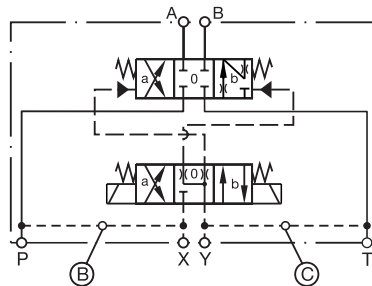
Bold: Designates Tier I products and options.

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

Pilot Oil Inlet (Supply) and Outlet (Drain)

○ open, ● closed

Pilot oil		B	C
Inlet	Drain		
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



Directional Control Valves

D31NWR - Technical Information

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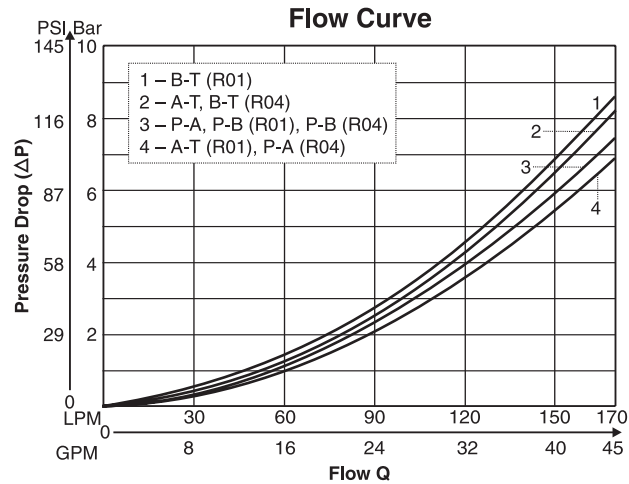
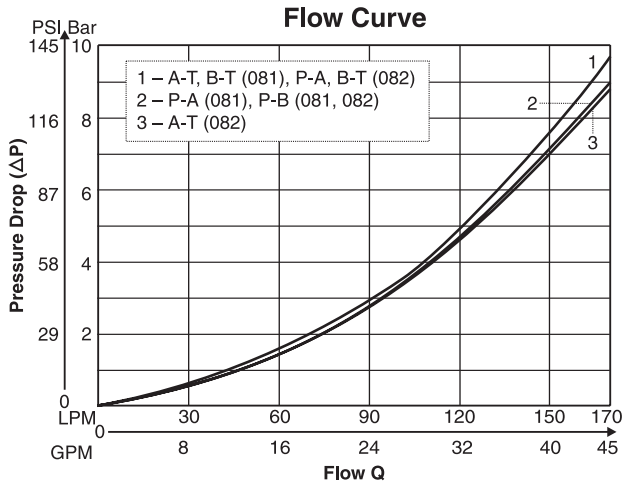
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General		
Design	Directional Spool Valve	
Actuation	Solenoid	
Size	NG 10 / CETOP 05 / NFPA D05	
Mounting Interface	DIN 24340 A10 / ISO 4401 / CETOP RP121-H / NFPA D05	
Mounting Position	Unrestricted, preferably horizontal	
Ambient Temperature (°C)	-25 to +50 (-13°F to +122°F) without inductive position control	
MTTF _D Value (years)	75	
Hydraulic		
Maximum Operating Pressure (Bar)	Pilot Drain Internal: Ports P, A, B, X = 315 (4568 PSI); Ports T, Y = 140 (2030 PSI) Pilot Drain External: Ports P, A, B, X = 315 (4568 PSI); Ports T, Y = 140 (2030 PSI)	
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature (°C)	-25 to +70 (-13°F to +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)	
Maximum Flow (LPM)	170 (45 GPM)	
Leakage @350 Bar (5075 PSI) per flow path (ml/min)	72 - 422 (0.02 - 0.11 GPM) depending on spool	
Minimum Pilot Supply Pressure (Bar)	7 (102 PSI)	
Static / Dynamic		
Step Response at 85% DC Solenoids Pilot Pressure	Energized	De-energized
50 & 100 Bar (725 & 1450 PSI) (ms)	470	390
250 & 350 Bar (3625 & 5075 PSI) (ms)	320	390
Electrical		
Duty Ratio (%)	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible	
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)	
Supply Voltage / Ripple (V)	24	
Tolerance Supply Voltage (%)	+/- 10	
Current Consumption - Hold (A)	1.5	
Current Consumption - In Rush (A)	1.5	
Power Consumption - Hold (W)	36	
Power Consumption - In Rush (W)	36	
Solenoid Connection	Connector as per EN 175301-803, solenoid identification as per ISO 9461	
Wiring Minimum (mm²)	3x1.5 recommended	
Wiring Length Maximum (m)	50 (164 ft) recommended	
With electrical connections, the protective conductor (PE ⚡) must be connected according to the relevant regulations.		

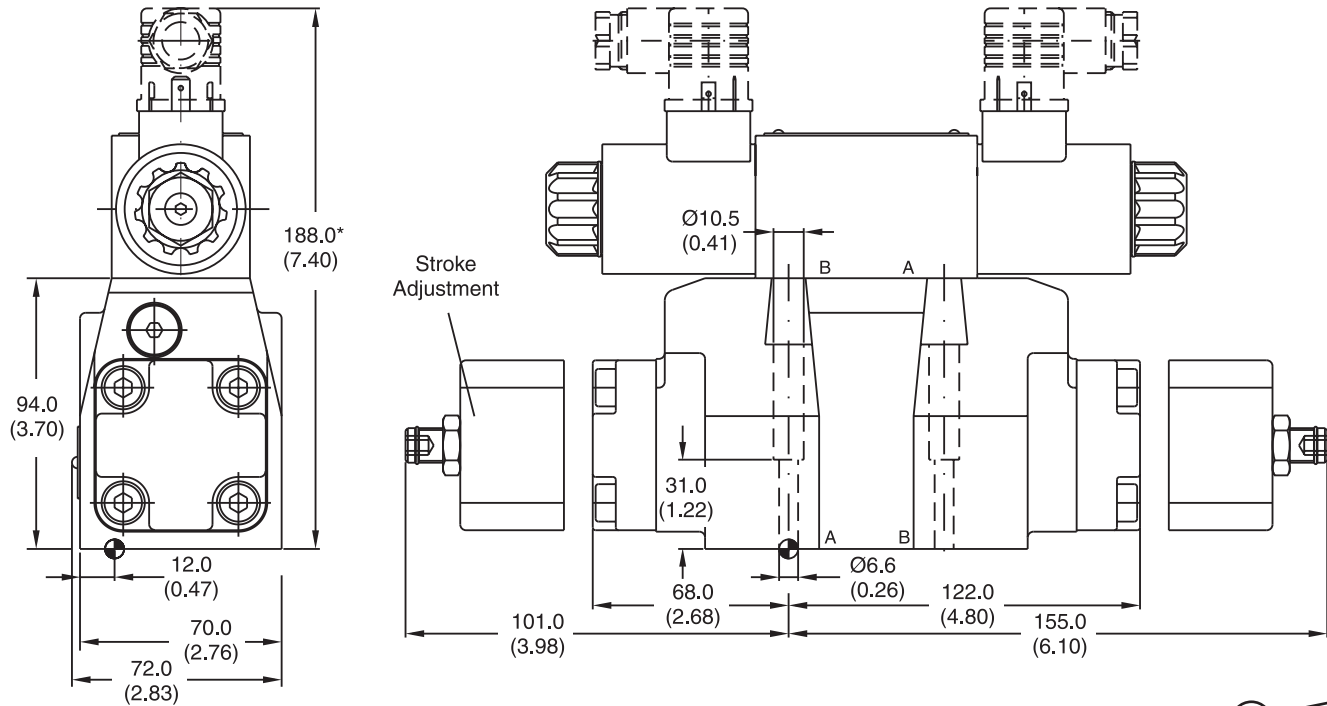
Performance Curve



Regenerative and Hybrid Function with Additional Plate

H10-1666L / H10-1662 / A10-1664 / A10-1666L

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



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



General Description

Adapter plates for regenerative and hybrid functions with Series D31NWR directional control valve. The adapter plate comes as either a sandwich valve (H10) or in a subplate version (A10).

Features

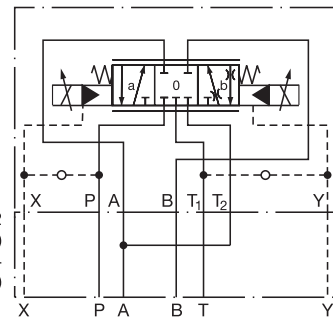
- The valve comes without tank bridge and is shown in Series D31NWR.
- Port T1 is used as single tank port of the valves. Port T2 is separated from port T1 and is used for regeneration into the A port.
- The circuit conception can be integrated into the manifold block.

Regenerative Function

Example D31FBR31

Note:
Proportional

H10-1662
(Sandwich Plate)
A10-1664
(Adaptor Plate)

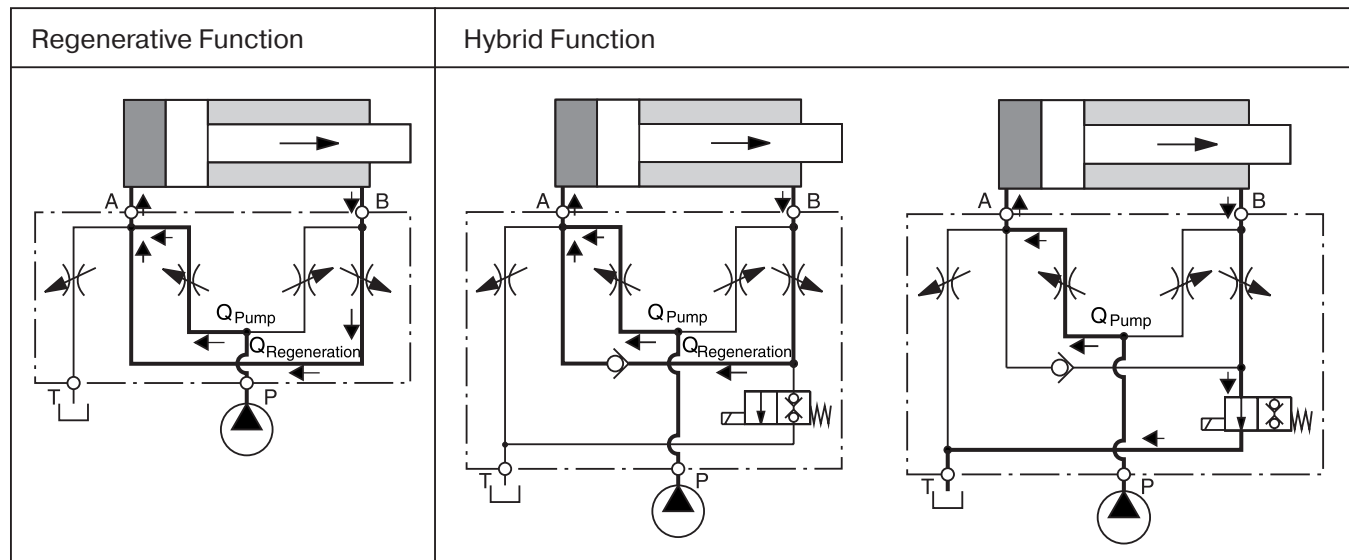
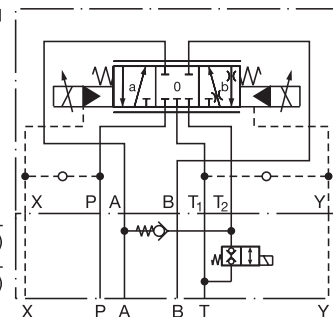


Hybrid Function

Example D31FBR31

Note:
Proportional

H10-1666L
(Sandwich Plate)
A10-1665L
(Adaptor Plate)



NEW Energy saving A-regeneration and switchable hybrid version for NG10 valves.

⚠ WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

Plates for Regenerative & Hybrid Circuits - Specifications

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General				
Actuation	Solenoid - A10-1665L and H10-1666L			
Size	NG 10 / CETOP 05 / NFPA D05			
Mounting Interface	DIN 24340 A10 / ISO 4401 / CETOP RP121-H / NFPA D05			
Mounting Position	Unrestricted			
Ambient Temperature (°C)	-25 to +50 (-13°F to +122°F)			
MTTF _D Value (years)	150			
Adaptor / Sandwich Plate Code	A 10- 1664	A10- 1665L	H 10- 1662	H10- 1666L
Weight (kg)	11.9 (26.5 lbs)	14.4 (31.8 lbs)	2.8 (6.2 lbs)	4.9 (10.8 lbs)
Hydraulic				
Maximum Operating Pressure (Bar)	350 (5075 PSI)			
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525			
Fluid Temperature (°C)	-25 to +70 (-13°F to +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)			
Maximum Flow (LPM)	A10 = 150 (39.7 GPM); H10 = 250 (96.1 GPM)			
Regeneration B-A (LPM)	95 (25.1 GPM)			
Regeneration B-T (LPM)	A10 = 75 (19.8 GPM)			
Electrical				
Duty Ratio (%)	100			
Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)			
Supply Voltage (V)	24			
Tolerance Supply Voltage (%)	+/-10			
Current Consumption (A)	1.21			
Power Consumption (W)	29			
Solenoid Connection	Connector as per EN 175301-803			
Wiring Minimum (mm²)	3x1.5 recommended			
Wiring Length Maximum (m)	50 (164 ft) recommended			
With electrical connections, the protective conductor (PE ↓) must be connected according to the relevant regulations.				

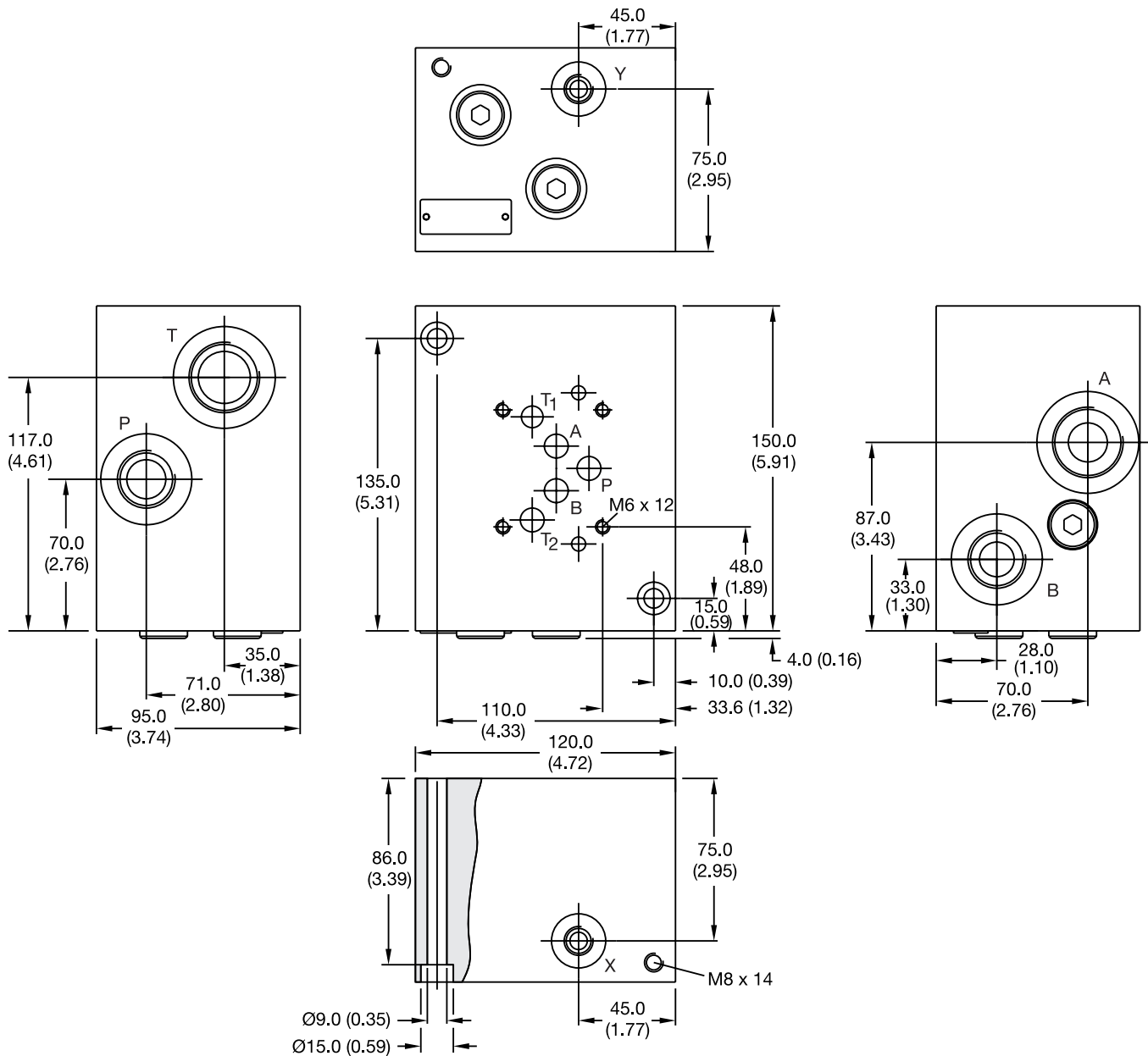
Inch equivalents for millimeter dimensions are shown in (**)

Mounting Interface acc. DIN 24340-A10, CETOP 5H / NG10 for A-regeneration

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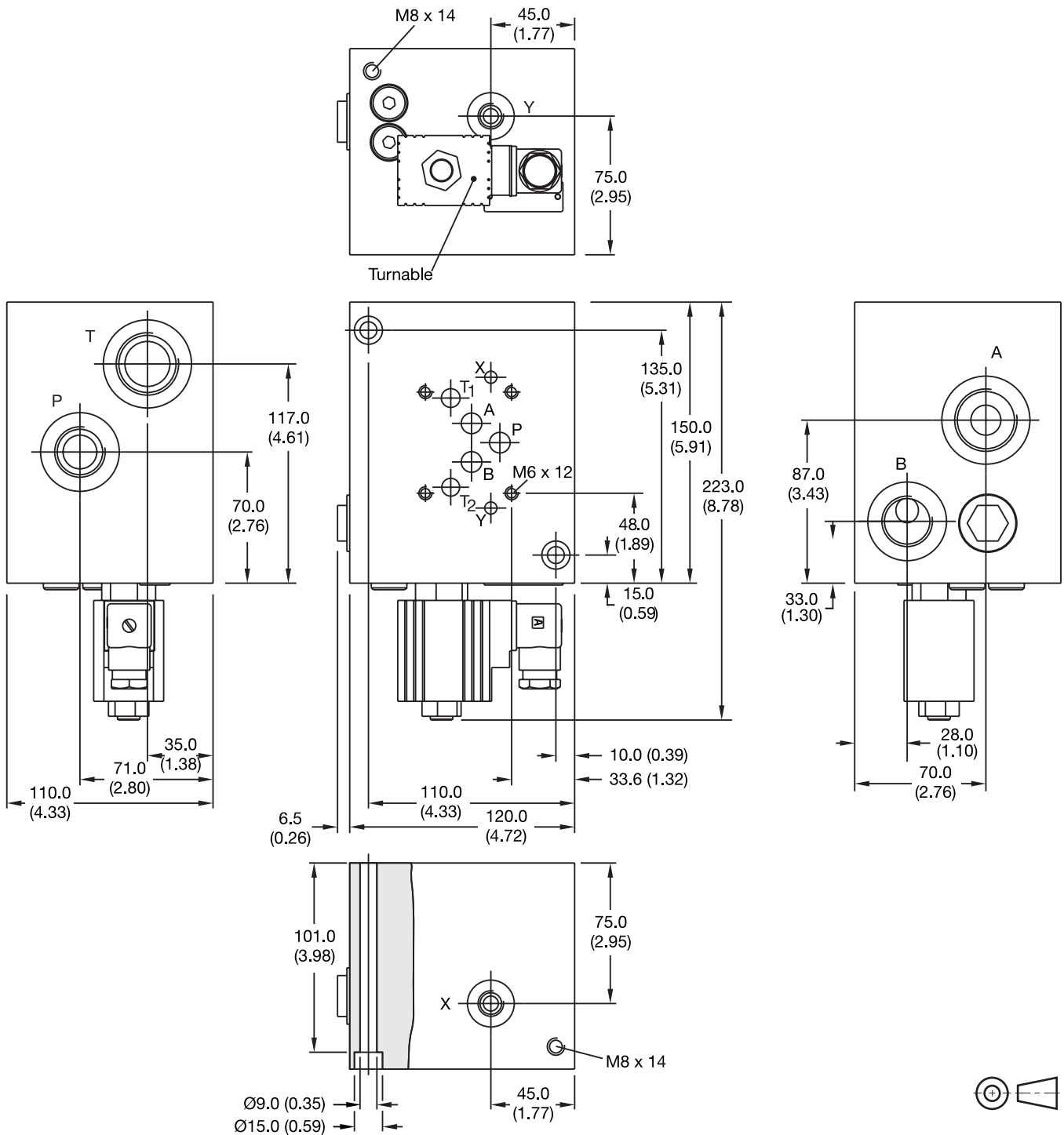


Symbol	Ordering Code	Port
	A10-1664	A, T = G1 B, P = G3/4 X, Y = G1/4



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

Mounting Interface acc. DIN 24340-A10, CETOP 5H / NG10 for Hybrid Function



Symbol	Ordering Code	Port	Seal Kit
	A10-1665L	A, T = G1 B, P = G3/4 X, Y = G1/4	Nitrile: SK-A10-1665

Directional Control Valves

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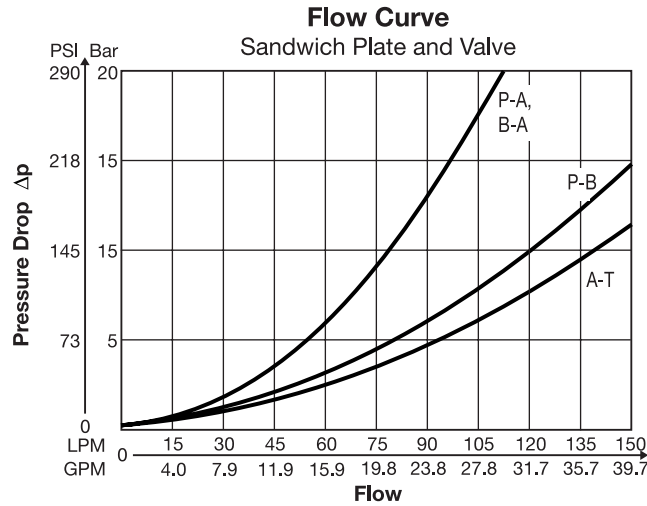
Plates for Regenerative & Hybrid Circuits - Sandwich Plate H10-1662

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Mounting Interface acc. DIN 24340-A10, CETOP 5H / NG10 for A-regeneration

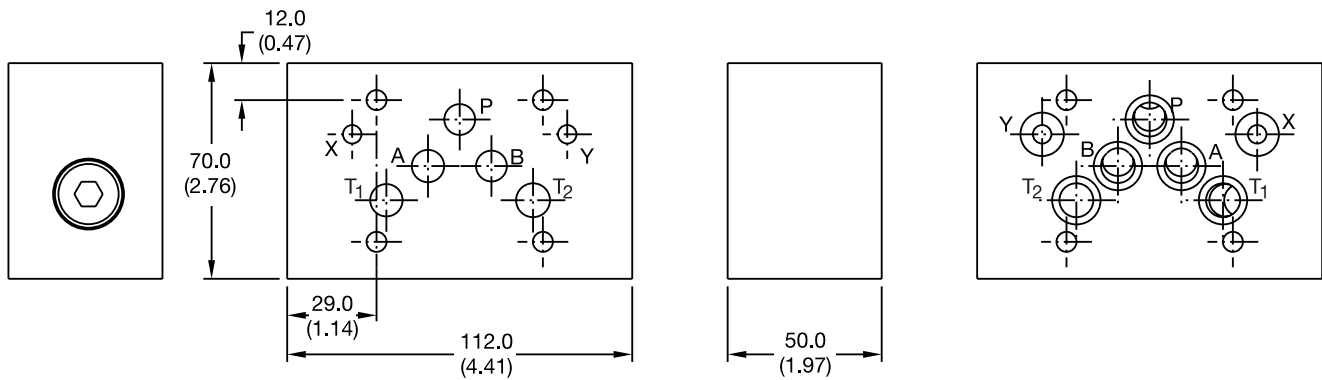
Performance Curves

D31FP/FE/FB/VW*



Dimensions

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



Symbol	Ordering Code	Kit			Seal Kit
Valve Side Manifold Side	H10-1662 (O-rings included in delivery)	BK412	4x M6x90 ISO 912-12.9	13.2 Nm (9.7 lb-ft) +/- 15%	Nitrile: SK-H10-1662

Directional Control Valves

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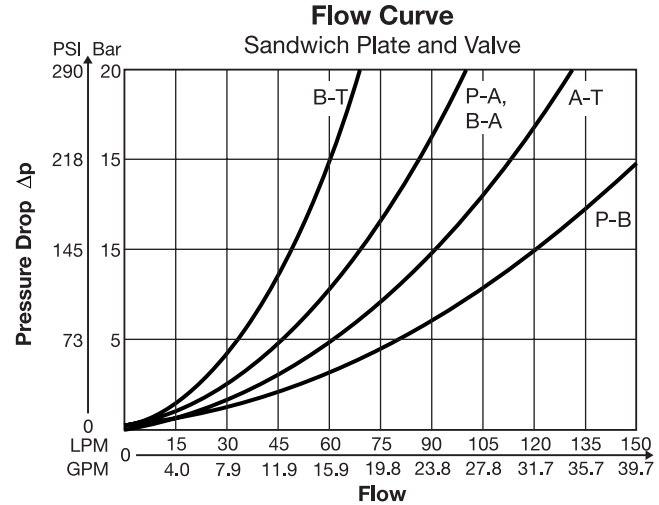
Plates for Regenerative & Hybrid Circuits - Sandwich Plate H10-1666L

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Mounting Interface acc. DIN 24340-A10, CETOP 5H / NG10 for Hybrid Function
Performance Curves

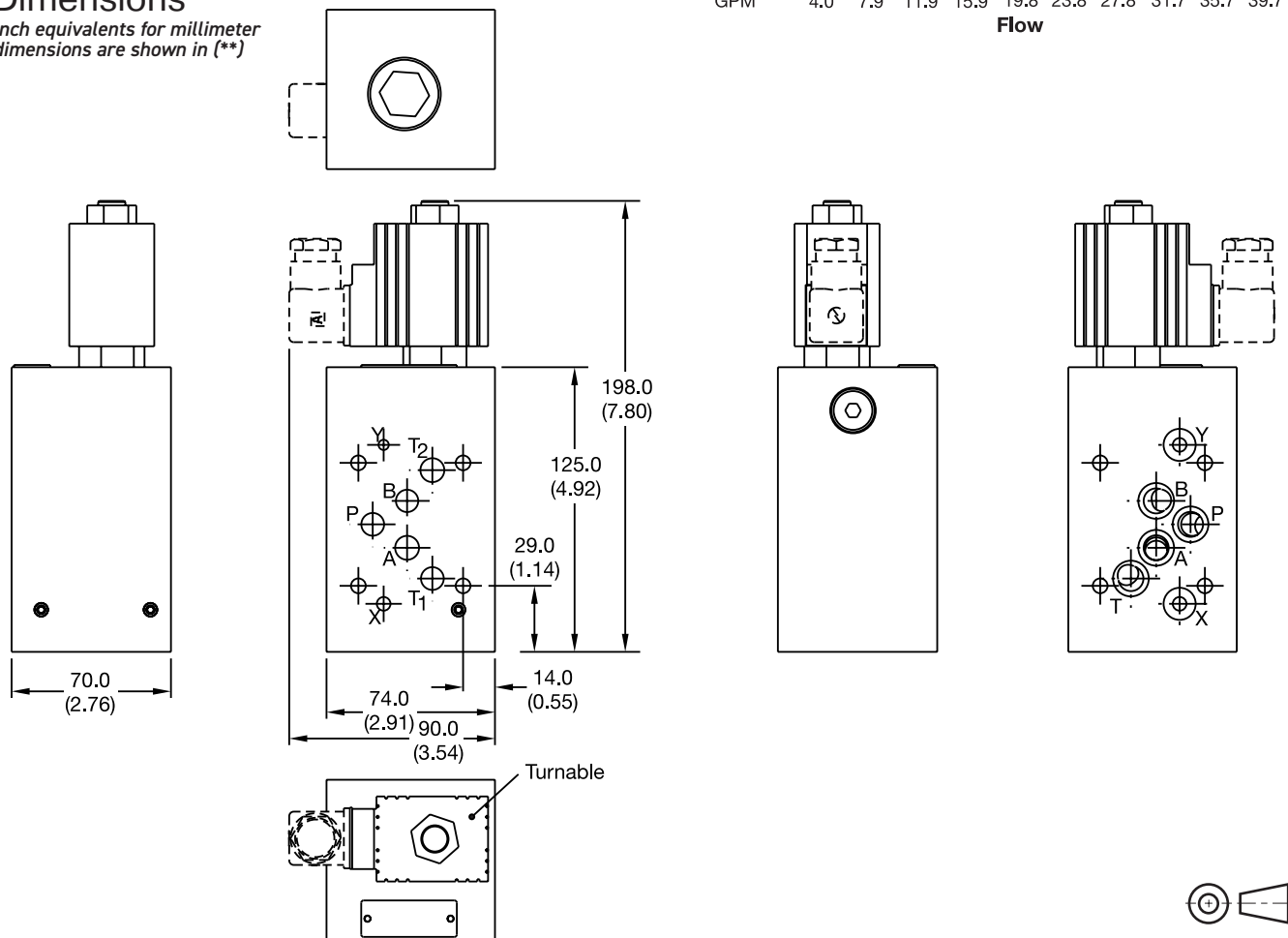
D31FP/FE/FB/VW*

Measured with Spool Z31
at command signal 100%.



Dimensions

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



Symbol	Ordering Code	Kit			Seal Kit
Valve Side Manifold Side	H10-1666L (O-rings included in delivery)	BK528	4x M6x110 ISO 912-12.9	13.2 Nm (9.7 lb-ft) +/- 15%	Nitrile: SK-H10-1666

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Directional Control Valves

D31*A - Technical Information

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General Description

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

Features

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

Specifications

Mounting Pattern	NFPA D05H / CETOP 05 NFPA D05HE / CETOP 05H
Max Op Press (Bar)	345 (5075 PSI)
Max Tank Line Press (Bar)	Internal Drain Model: 34 (500 PSI) External Drain Model: 207 (3000 PSI)
Max Drain Press (Bar)	34 (500 PSI)
Max Flow (LPM)	See Switching Limit Charts
Pilot Press (Bar)	Air Min: 3.4 (50 PSI) Air Max: 10.2 (150 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time, and flow capacity (GPM)

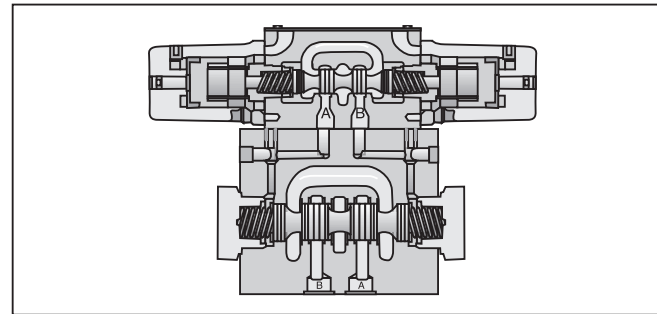
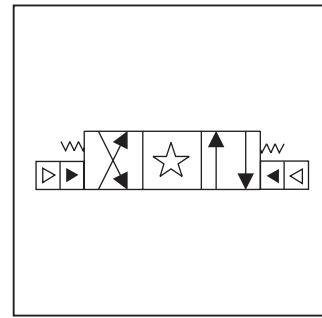
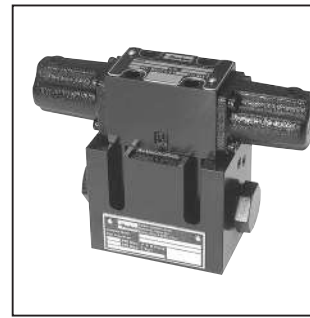
Viscosity Correction Factor

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

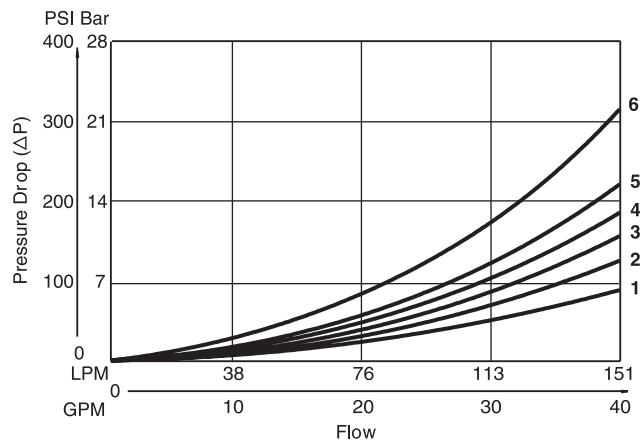
Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change per chart.

D31VA Pressure Drop Reference Chart - Curve Number

Spool No.	Shifted				Center Condition						
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	1	–	–	–	–	–	–	–
002	3	3	1	1	3	3	3	4	4	1	1
004	3	3	1	1	–	–	–	–	–	1	1
009	3	3	1	1	6	–	–	–	–	–	–
020	5	4	2	2	–	–	–	–	–	–	–
030	4	3	1	1	–	–	–	–	–	–	–



Pressure Drop Chart



D31VA Pressure Drop vs. Flow

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

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

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

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

D31*A - Technical Information

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Ordering Information

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

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
Omit	Standard
3A	Pilot Choke Meter Out
3B	Pilot Choke Meter In
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' and 'B' End
90	1/4 BSPP Threads

Code	Description
1	Int Pilot, Ext Drain
2	Ext Pilot, Ext Drain
4*	Int Pilot, Int Drain
5	Ext Pilot, Int Drain

* Not available with 002, 008, and 009 spools

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

* B, D, and H styles available with 020 and 030 spools only

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

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

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

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

Standard Bolt Kit:
BK98

Metric Bolt Kit:
BKM98

Design Series
NOTE:
Not required when ordering.

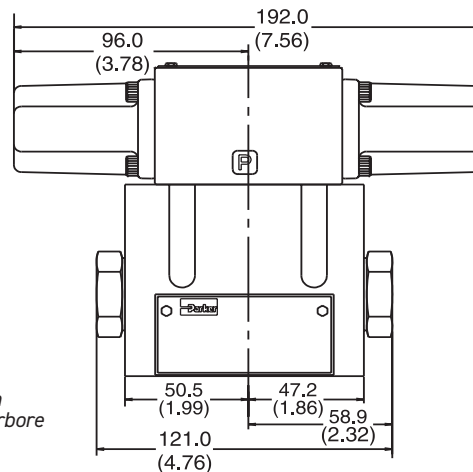
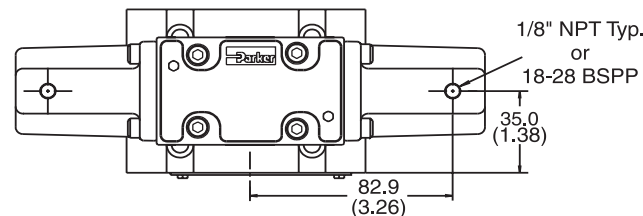
This condition varies with spool code.

Bold: Designates Tier I products and options.

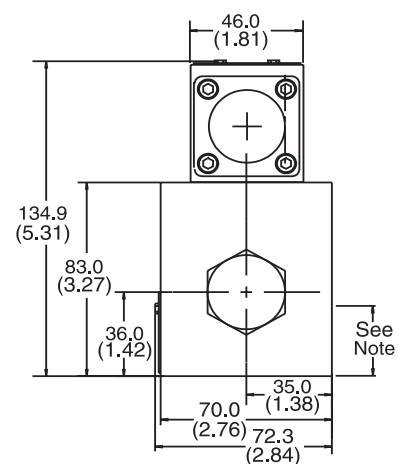
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Dimensions – Air Operated

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



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



See Note

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Directional Control Valves

D31*L - Technical Information

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General Description

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

Features

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

Specifications

Mounting Pattern	NFPA D05H / CETOP 05 NFPA D05HE / CETOP 05H
Max Op Press (Bar)	345 (5075 PSI)
Max Tank Line Press (Bar)	Internal Drain Model: 34 (500 PSI) External Drain Model: 207 (3000 PSI)
Max Drain Press (Bar)	34 (500 PSI)
Max Flow (LPM)	See Switching Limit Charts
Pilot Press (Bar)	Oil Min: 6.9 (100 PSI) Oil Max: 345 (5000 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time, and flow capacity (GPM)

Viscosity Correction Factor

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

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

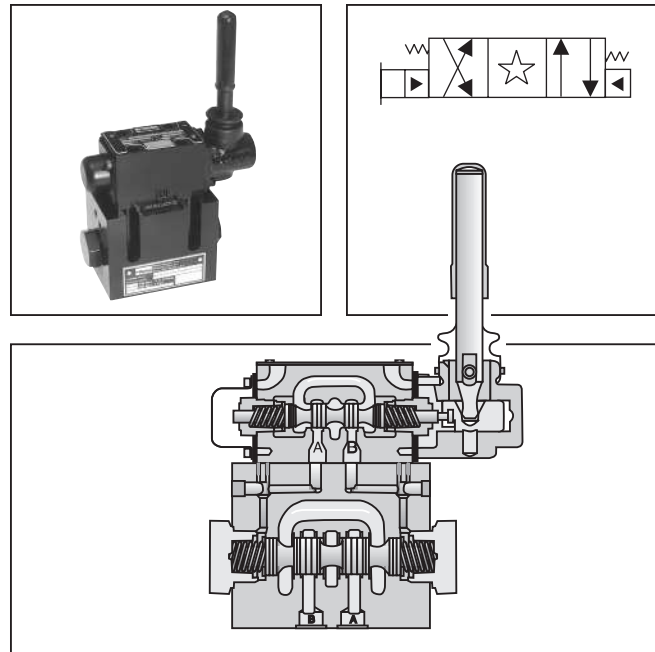
D31VA Pressure Drop Reference Chart - Curve Number

Spool No.	Shifted				Center Condition							
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)	
001	3	3	2	1	–	–	–	–	–	–	–	
002	3	3	1	1	3	3	3	4	4	1	1	
004	3	3	1	1	–	–	–	–	–	1	1	
009	3	3	1	1	6	–	–	–	–	–	–	
020	5	4	2	2	–	–	–	–	–	–	–	
030	4	3	1	1	–	–	–	–	–	–	–	

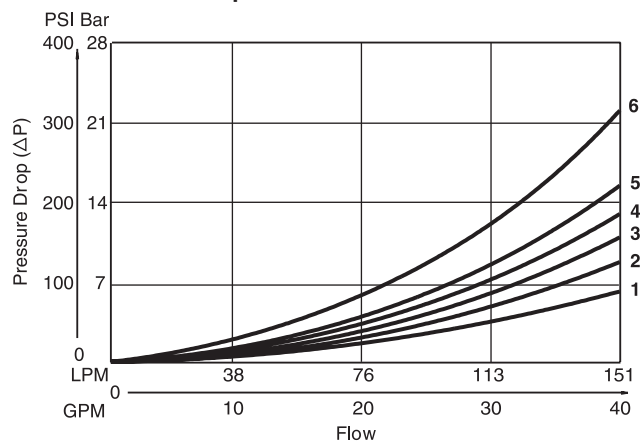


WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Pressure Drop Chart



D31VL Pressure Drop vs. Flow

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

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

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

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Directional Control Valves

Directional Control Valves

D3*P - Technical Information

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General Description

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

Features

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

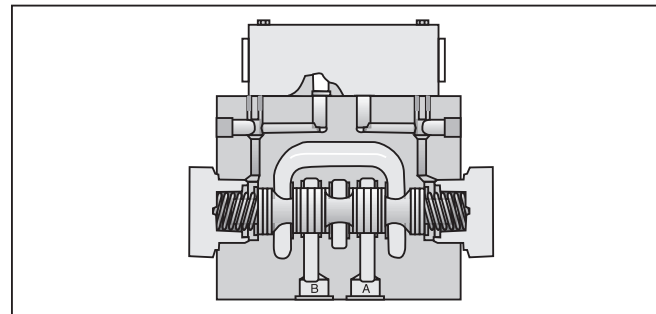
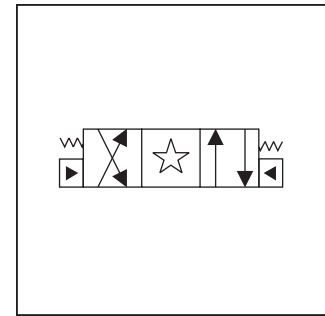
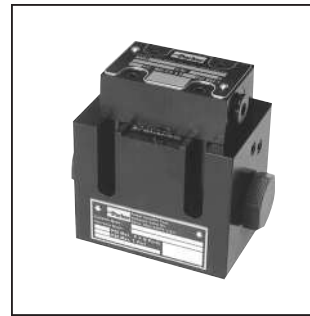
Specifications

Mounting Pattern	NFPA D05H / CETOP 05 NFPA D05HE / CETOP 05H
Max Op Press (Bar)	345 (5075 PSI)
Max Tank Line Press (Bar)	207 (3000 PSI)
Pilot Press (Bar)	Oil Min: 6.9 (100 PSI) Oil Max: 345 (5000 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time, and flow capacity (GPM)

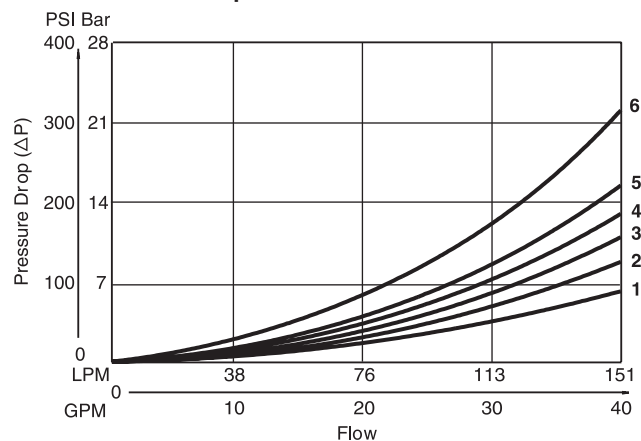
Viscosity Correction Factor

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

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



Pressure Drop Chart



D31P Pressure Drop vs. Flow

The chart to the left provides the flow vs. pressure drop curve reference for the D31P Series valves by spool type.

Example: Find the pressure drop at 76 LPM (20 GPM) for a D31P with a number 001 spool. To the right of spool number 001, locate the number 3 in the P-A column, and 2 in the B-T column.

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

D31VA Pressure Drop Reference Chart - Curve Number

Spool No.	Shifted				Center Condition				Center Condition			
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)	
001	3	3	2	1	—	—	—	—	—	—	—	—
002	3	3	1	1	3	3	3	4	4	1	1	—
004	3	3	1	1	—	—	—	—	—	1	1	—
009	3	3	1	1	6	—	—	—	—	—	—	—
020	5	4	2	2	—	—	—	—	—	—	—	—
030	4	3	1	1	—	—	—	—	—	—	—	—

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

D3*P - Technical Information

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Ordering Information

Code	Description
3D	NFPA D05HE, CETOP 5H (ISO)
3	NFPA D05H, CETOP 5

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

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

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

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
2	Ext Pilot, Ext Drain
5*	Ext Pilot, Int Drain

* Available on "B" style only

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

* B, D, and H styles available with 020 and 030 spools only

Valve Weight:
Single Operator: 1.4 kg (3 lbs.)
Double Operator: 1.6 kg (3.5 lbs.)
Standard Bolt Kit: BK98
Metric Bolt Kit: BKM98
Seal Kit:
Nitrile: SKD3P
Fluorocarbon: SKD3PV

Design Series NOTE: Not required when ordering.

This condition varies with spool code.

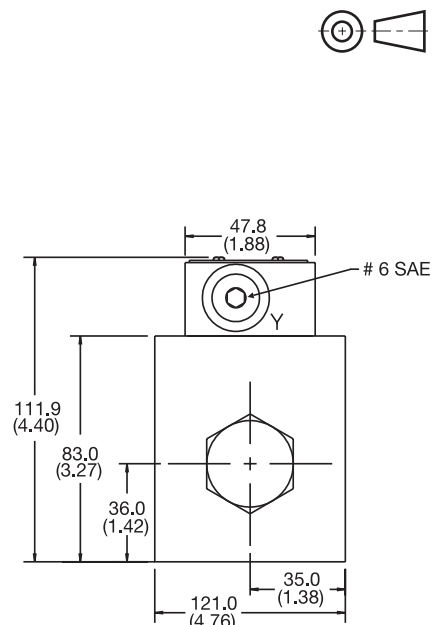
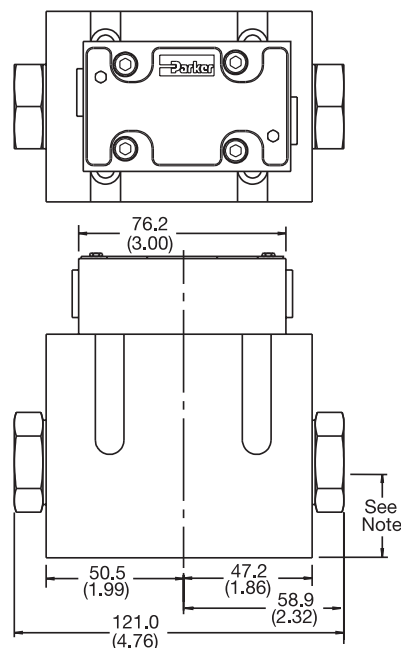
Bold: Designates Tier I products and options.

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

Dimensions – Oil Operated

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

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



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

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

Mounting Position

Detent – Horizontal
Spring Offset – Unrestricted
Spring Centered – Unrestricted

Fluid Recommendations

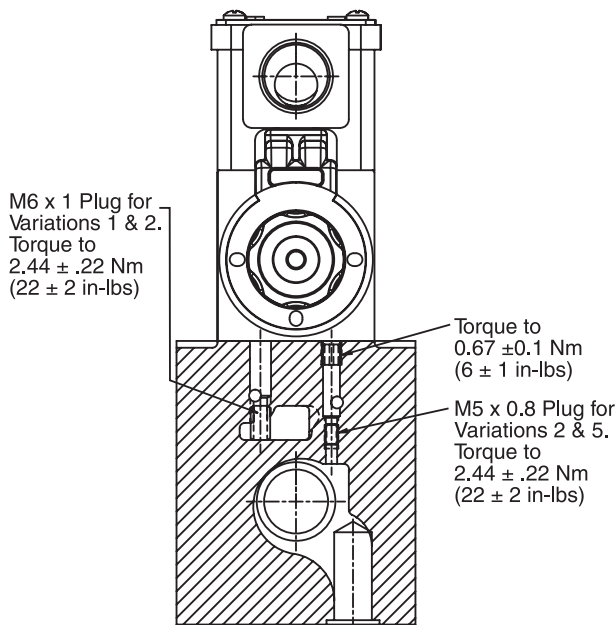
Premium quality hydraulic oil with a viscosity range between 32-54 cst. (150-250 SSU) At 38°C (100°F) is recommended. The absolute operating viscosity range is from 16-220 cst. (80-1000 SSU). Oil should have maximum anti-wear properties and rust and oxidation treatment.

Fluids and Seals

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

Filtration

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



Silting

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

Special Installations

Consult your Parker representative for any application requiring the following:

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

Mounting Patterns

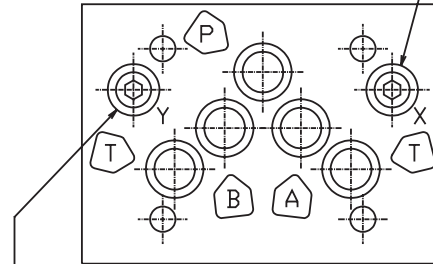
Series	NFPA	Size
D31V*, D3P	D05H, CETOP 05	3/8"
D31D*, D3DP, D31NW	D05HE, CETOP 05H	3/8"

Torque Specifications

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

1/16 Pipe Plug for Variations 1 & 4

Torque to: 11.67 ± 1.67 Nm (105 ± 15 in-lbs)



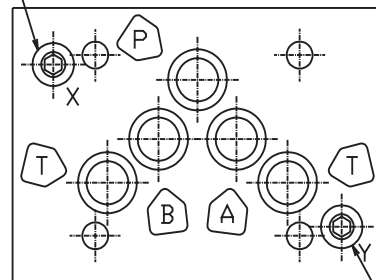
1/16 Pipe Plug for Variations 4 & 5

Torque to: 11.67 ± 1.67 Nm (105 ± 15 in-lbs)

NFPA D05HE, CETOP 5H Pattern D31DW

1/16 Pipe Plug for Variations 1 & 4

Torque to: 11.67 ± 1.67 Nm (105 ± 15 in-lbs)



1/16 Pipe Plug for Variations 4 & 5

Torque to: 11.67 ± 1.67 Nm (105 ± 15 in-lbs)

NFPA D05H, CETOP 5 Pattern D31VW

Directional Control Valves

D31 - Installation Information

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

Tank and Drain Line Surges

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

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

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

Electrical Characteristics (Detented Spool)

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

Pilot/Drain Characteristics

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

External: An oil source sufficient to maintain minimum pilot pressure must be connected to the "X" port of the main body. When using the external pilot variation, an M5 x 0.8 x 6mm long set screw must be present in the main

body pilot passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with pilot code 2 or 5.

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

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

Pilot Valve Drain:

Maximum pressure 102 Bar (1500 PSI), 207 Bar (3000 PSI) optional.

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

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

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

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

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

* D31*W only

SERIES D3P, D3DP PILOT OPERATED DIRECTIONAL CONTROL VALVES

Tank and Drain Line Surges

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

Loss of Pilot Pressure

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

Mounting Pattern

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

Pilot Drain Characteristics

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

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

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

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

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D31*P - Flow Paths / Pilot Pressure

Style Code	Description	"X" and "Y" De-pressurized	"X" Port Pressurized	"Y" Port Pressurized	Special Notes	Recommended Control Valve for Pilot Oil
B	Two Position, Spring Offset	P -> A, and B -> T	P -> A, and B -> T	P -> B and A -> T	"X" Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position, Spring Centered	Centered	P -> A, and B -> T	P -> B and A -> T	Flow paths will be reversed on valves with tandem center (008) spools	
D	Two Position, Spring Offset	P -> B and A -> T	P -> A, and B -> T	P -> B and A -> T	"Y" Port may be pressurized to assist spring in returning spool to offset position (ext. only)	

Directional Control Valves

D31, D3*P - Installation Information

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

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch).

Torque bolts to 16.3 Nm (12 ft-lbs).

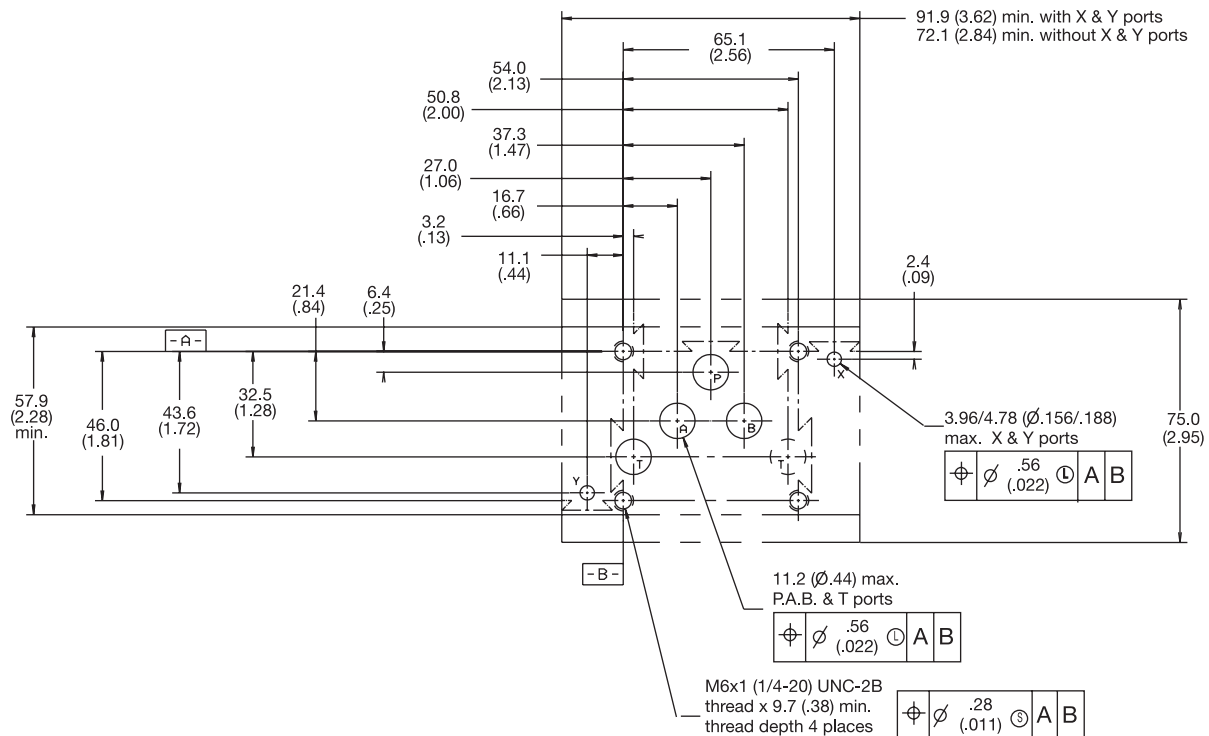
For maximum valve reliability, adhere to the following installation information.

Mounting Position

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

Mounting Pattern — NFPA D05H, CETOP 5

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



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Torque bolts to 16.3 Nm (12 ft-lbs).

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

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



Directional Control Valves

D41 - Introduction

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Application

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

Operation

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

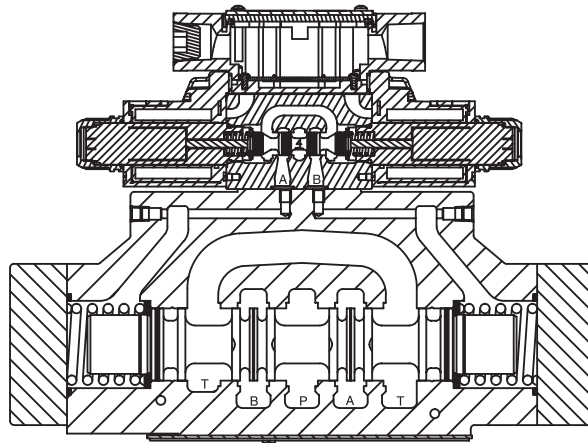
Features

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

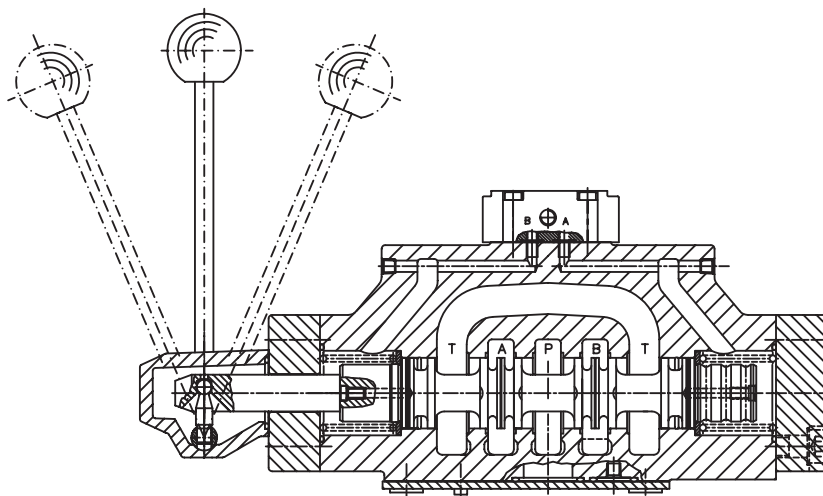
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D41W Solenoid Operated Plug-In Conduit Box



D41L Lever Operated

⚠ WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D41W - Technical Information

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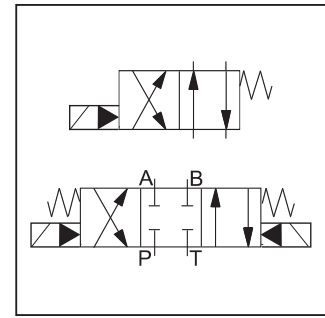
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General Description

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

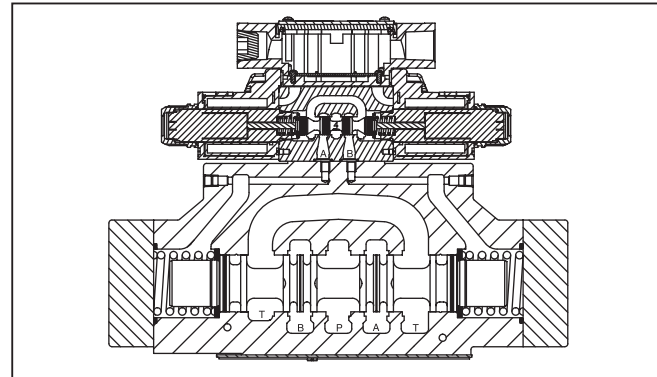
The minimum pilot pressure must be ensured for all operating conditions of the directional valve.

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.



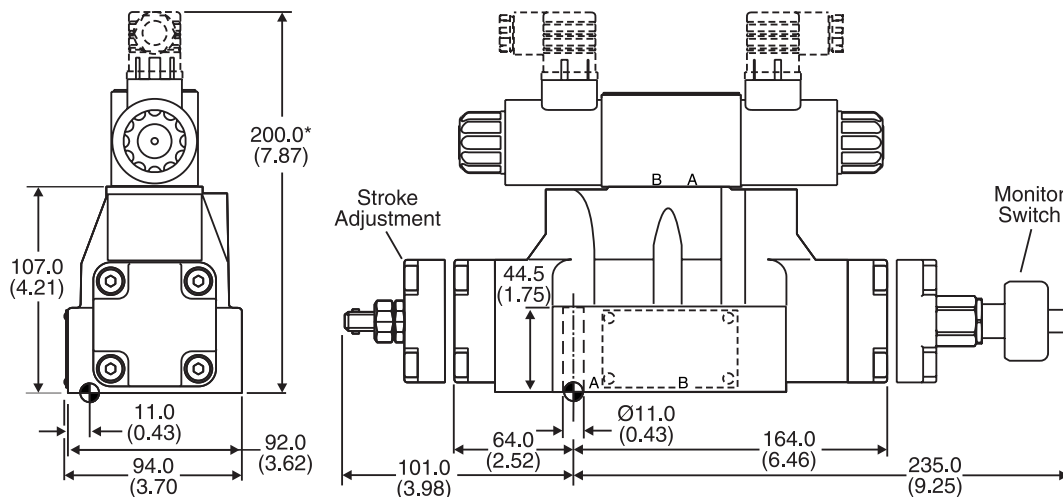
Features

- 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 (**)



Directional Control Valves

D41W - Ordering Information

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D	41V
Directional Control Valve	Basic Valve
Code	Description
41V	NFPA D07, CETOP 07, DIN NG 16

W		
Actuator Solenoid Wet Pin	Spool	Style

Pilot Supply and Drain	
Code	Description
1	Internal Pilot, External Drain
2	External Pilot, External Drain
3	Internal Pilot w/Check, External Drain
4*	Internal Pilot, Internal Drain
5	External Pilot, Internal Drain
6	Internal Pilot w/Check, Internal Drain
* Not available with 002, 009, or 030 spools	

Seal	
Code	Description
N	Nitrile
V	Fluorocarbon

Solenoid Voltage

3-Position Spools	
Code	Spool Type
	A O B
001	
002	
003	
004	
006†	
009**	
011	
015	
021	
022	
2-Position Spools	
Code	Spool Type
	A B
020*	
030**	
* 020 spool has closed crossover.	
** 009 and 030 spools have open crossover.	
† Not available with monitor switch.	

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".
F†	 Spring offset in position "b".	 Spring offset in position "a".
K	 Operated in position "b".	 Operated in position "a".
M†	 Spring offset in position "a".	 Spring offset in position "b".
R	 No center in offset position.	 No center in offset position.
S	 No center in offset position.	 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".
* 020 and 030 spools only.		
† 020 and 030 spools only. Must be standard high watt coil (30 watt) or L (10 watt coil) only (stroke is reduced by 0.5mm, therefore max flow is reduced to 13 - 14 GPM). Not available with F (low watt) coil option for AC coils only.		
± High Watt only.		

Code	Description
D†#	120 VDC
E*	24/60 - 24/50 VAC
J	24 VDC
K#**	12 VDC
Q††#	100/60 VAC
QD††#	100 VAC/60 Hz - 100 VAC/50 Hz
T^~	240/60 - 220/50 VAC
U***#	98 VDC
Y	120/60 - 110/50 VAC
# High watt only.	
* Leadwire only, low watt only.	
** DIN, low watt available.	
*** Leadwire not available.	
^ Plug-in is low watt only.	
† DIN & Leadwire only.	
†† DIN only.	

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.

Directional Control Valves

D41W - Ordering Information

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Code	Description
C*	Leadwire Conduit Box
D**	Metric Plug (M12X1) DESINA
E†	Explosion Proof
F ^x	Flying Leadwire
G††	Plug-In Conduit Box
J++	Deutsch (DT04-2P)
P	DIN with Plug
S‡	Double Spade
W†	DIN w/o Plug

* No conduit box variations - See Plug-in G.
 ** 24 VDC only, low watt only, lights, diode surge suppressor, not CSA approved.
 † Not available with lights.
 †† Required for variations on conduit box style, must have lights.
 ++ 12 and 24 VDC only.
 ‡ Only 12 VDC high watt.
 x 6" leadwire only.

Code	Description
Omit*	High watt
D**	Explosion Proof, EExd ATEX
E**	Explosion Proof, EExme, ATEX, IECEx, from Germany
F†	Low Watt
L††	10 Watt
R#	Explosion Proof, ATEX / UL / CSA / IECEx, configurable cable connection
T#	Explosion Proof, ATEX / UL / CSA / IECEx, fixed horizontal cable connection
U##	Explosion Proof, UL/CSA

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

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 or Explosion Proof.

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

Plug-In - 24 VDC only. DIN - DC only with Lighted Plug (5), which has integrated Surge Suppression. "J" not required here.
 Deutsch - as follows:
 • 12 VDC Hi watt only
 • 24 VDC Hi & Lo watt
 • 24 VDC Hi & Lo watt available.
 Required for Low watt.
 ER Explosion Proof - 24 VDC "JERP" required. Adds dust rating, not polarity sensitive [IIC, D].
 Leadwire - not available
 † DC tube standard, Plug-In conduit box only. Not polarity sensitive. Only available with Y voltage.

Code	Spool Position	Position Control
Omit	All	Standard Response
I3N	C	End position monitored, side A and B
I6N		Start position monitored, side A and B
I2N	C, B, E, F (all spools)	End position monitored, side B
I5N	C, K, M (spool 9)	Start position monitored, side B
I1N	C, H, K, M (all spools)	End position monitored, side A
I4N	C, E, F (spool 9)	Start position monitored, side A

Note: The plug M12 x 1 for the position control is included. The monitor switch has to be located on the side to which the spool moves from the spring offset position. For 4/3-way valves two switches are required.
 Not CSA approved.
DC DIN, high watt coils only.

Code	Description
Omit	Standard
P*	Extended Manual Override with Boot
T	Covered Manual Override, DC only, or AC Rectified

* Manual override options not available on Explosion Proof or soft shift. Not available with high pressure AC tube H.

Code	Description
Omit	Standard Valve
4†#	CSA Canada CSA22.2 No. 139-13
N	CE Approved
Q†#	CE + CSA Approved

† Not available with AC high pressure tube.
 # Valve is derated.

Code	Description
Omit	No Variation
4B	Monitor Switch Cover

NOTE: Not required when ordering.

See next page for Valve Variations

Bold: Designates Tier I products and options.

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

Directional Control Valves

D41W - Ordering Information

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Valve Variations

(OPTIONS ARE NOT AVAILABLE ON MONITOR SWITCH VALVES.)

Code	Description
1C**	Manaplug – Brad Harrison Style 7/8-16 with Lights (Single Solenoid = 5 pin)
1D**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 5 pin)
1M**	Manaplug Opposite Normal
1R	Stroke adjust "A" and "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 Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Pilot Choke Meter Out with Lights and Manaplug – Brad Harrison Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
5*	Signal Lights – Standard Signal Lights – Hirsch. (DIN with Plug) (the DC Lighted Plug has Integral Surge Suppression)
7B**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
7W^	4-pin Micro Manaplug, Special Wiring with Lights
7Y^	Manaplug – Brad Harrison Style M12x1 Micro with Lights and Special Wiring (4 pin)
56**	Manaplug – Brad Harrison Style 7/8-16 Mini with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
* DESINA, plug-in conduit box, and DIN with plug styles only. ** Solenoid connection option G only. Requires manaplug code (56, 1C, 7B, etc.). ^ Requires G code (Plug-in Conduit Box) and J code (Diode Surge Suppressor) and lights.	

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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Directional Control Valves

D41W - Technical Information

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Solenoid Ratings	
Insulation System	Class F
Allowable Deviation from rated voltage	-10% 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 HVS 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.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (ER, ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013; Ex d IIC Gb; Ex tb IIIC Db IP66; IECEx BAS 14.0164X ATEX: EN60079-0, EN60079-1, EN60079-31; CE 1180 Ex II 2G BASEEFA08ATEX0041X CSA 22.2 No. 60079-0:07, 60079-1:07 and UL 60079-0:05, UL 60079-1:05; CSA listed to US and Canada Safety Standards. File 08-CSA-1932102 CSA Ex d IIC, AEx d IIC for Class I Zone 1; Class I Div 1 Grp. C & D; Class II Div 1 Grp. E, F & G
* Allowable Voltage Deviation +/-10%	

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Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3 mm	Watts	Resistance
Voltage Code	Power Code						
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 Ohms
E	F	24 VAC	4.8 Amps	120 VA	2.07 Amps	21 W	1.29 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
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 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	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
Explosion Proof Solenoids							
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
ER & ET Explosion Proof Solenoids							
J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

Industrial
Hydraulics Valves

MSG14-2500/US
Directional Control Valves

Directional Control Valves

D41W - Specifications

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General		
Design	Directional Spool Valve	
Actuation	Solenoid	
Size	NG 16 / CETOP 07 / NFPA D07	
Mounting Interface	DIN 24340 A16 / ISO 4401 / CETOP RP121-H / NFPA D07	
Mounting Position	Unrestricted, preferably horizontal	
Ambient Temperature (°C)	-25 to +50 (-13°F to +122°F) without inductive position control 0 to +50 (+32°F to +122°F) with inductive position control	
MTTF _D Value (years)	75	
Hydraulic		
Maximum Operating Pressure (Bar)	Pilot Drain Internal: Ports P, A, B, X = 350 (5075 PSI); Ports T, Y = 105 (1523 PSI) Pilot Drain External: Ports P, A, B, T, X = 350 (5075 PSI); Port Y = 105 (1523 PSI) 10 Watt = 207 (3000 PSI)	
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature (°C)	-25 to +70 (-13°F to +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)	
Maximum Flow (LPM)	300 (79.4 GPM)	
Leakage @350 Bar (5075 PSI) per flow path (ml/min)	Up to 200 (0.05 GPM) depending on spool	
Minimum Pilot Supply Pressure (Bar)	5 (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 & 350 Bar (ms)	40	55

Single Solenoid Valve

Electrical Specifications of Position Control as per IEC 61076-2-101 (M12x1)

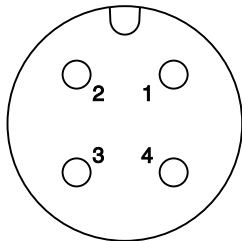
Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)
Supply Voltage / Ripple (V)	24 ≤10%
Tolerance Supply Voltage (%)	+/-20
Polarity Protection (V)	300
Current Consumption without Load (mA)	≤20
Switching Hysteresis (mm)	<0.06
Max Output Current per Channel, Ohmic (mA)	250
Min. Distance to Next AC Solenoid (m)	0.1 (0.33 ft)
Interface	M12x1 acc. to IEC 61076-2-101
Wiring Minimum (mm²)	5x0.25 braid shield recommended
Wiring Length Maximum (m)	50 (164 ft) recommended
CE Conform	EN 61000-4-2 / EN 61000-4-4 / EN 61000-4-6 ¹⁾ / ENV 50140 / ENV 50204
¹⁾ Only guaranteed with screened cable and female connector	

A

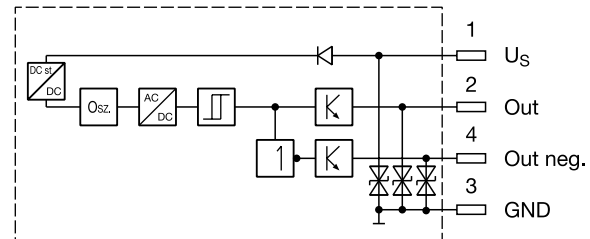
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M12 Pin Assignment



1. U_s 19.2...28.8V
2. Out B: normally open
3. 0V
4. Out A: normally closed



Outputs: Open collector

Definitions

Start position monitored:

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

At the switching point the spool is located within the closed position. It is secured so that only the flow paths of the offset position are granted.

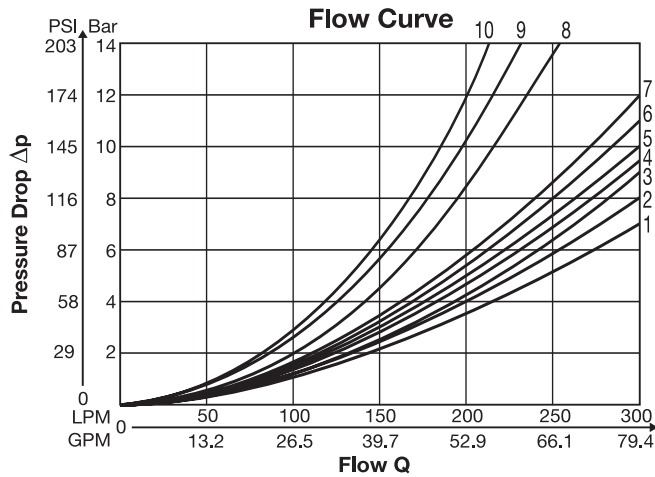
The switch can only be located on the opposite side of the solenoid for direct operated valves. Please order plug M12x1 separately. See Accessories, plug M12x1 (part no.: 5004109).

End position monitored:

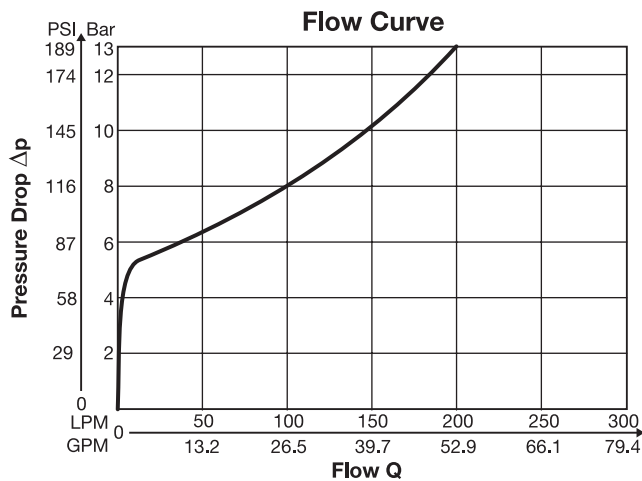
The inductive switch gives a signal before the end position is reached. (above 85% spool stroke).

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.



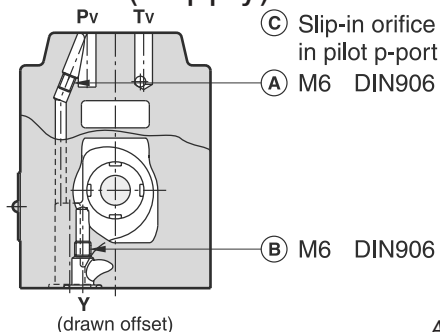
All characteristic curves measured with HLP46 at 50°C.

Spool No.	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
031	-	-	-	-	-
032	-	-	-	-	-
054	2	3	-	6	7
081	-	-	-	-	-
082	-	-	-	-	-

Integral Check Valve in the P port

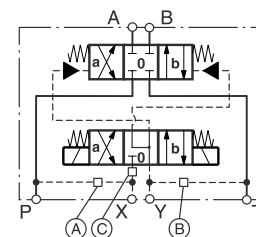
Mounting an integral check valve in the P port is necessary to build up pilot pressure for valves with P to T connection and internal pilot oil supply. The pressure difference at the integral check valve (see performance curves) is to be added to all flow curves of the P-port of the main valve.

Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

Pilot oil Inlet	Outlet	A	B	C
internal	external	○	●	Orifice Ø1.0
external	external	●	●	Orifice Ø1.0
internal	internal	○	○	Orifice Ø1.0
external	internal	●	○	Orifice Ø1.0



All orifice sizes for standard valves

Directional Control Valves

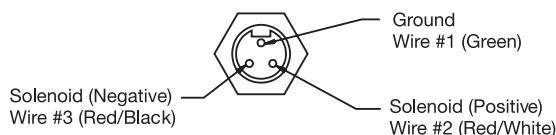
D41W - Accessories

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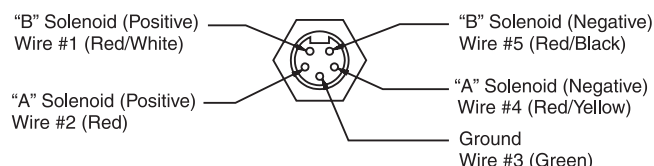
Manaplug (Options 6, 56, 1A, & 1C)

- 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



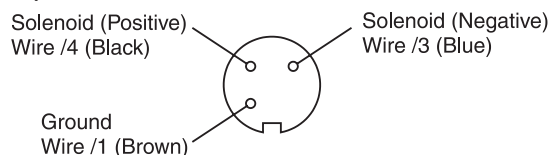
5-Pin Manaplug (Mini) with Lights

Single Solenoid Valves – Installed Opposite Side of Solenoid

Double Solenoid Valves – Installed Over "A" Solenoid

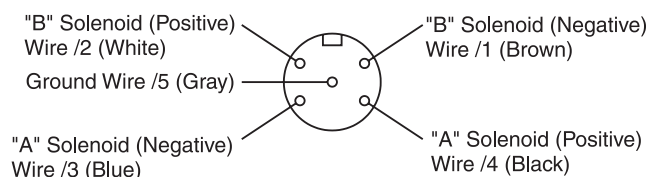
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

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

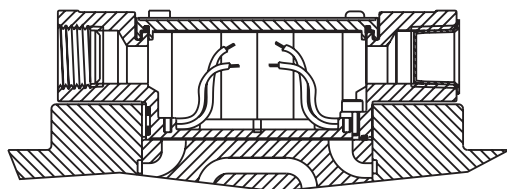
- EP336-30 3 Pin Plug
- EP316-30 5 Pin Plug (Double Solenoid)
- EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

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

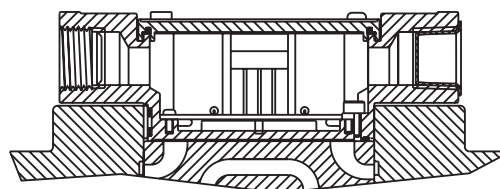
Conduit Box Option C

- No Wiring Options Available



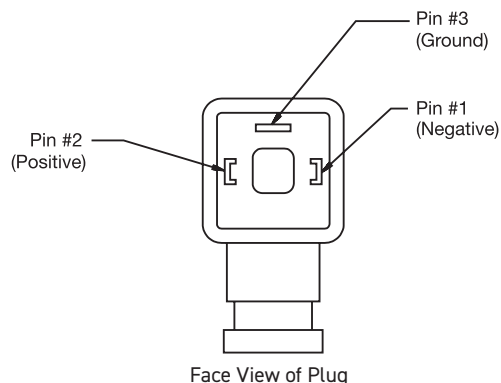
Signal Lights (Option 5) — Plug-in Only

- LED Interface
- Meets Nema 4/IP67



Hirschmann Plug with Lights (Option P5)

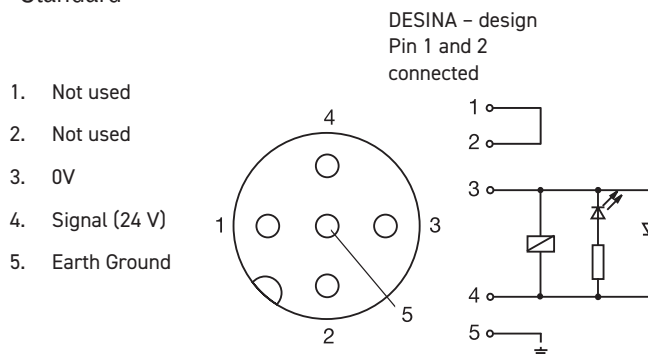
ISO 4400/DIN 43650 Form "A"



Pins are as seen on valve (male pin connectors)

DESINA Connector (Option D)

M12 Pin Assignment Standard



Directional Control Valves

D41VWR, D41VWZ - Technical Information

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General Description

Series D41VWR and D41VWZ are regenerative and hybrid directional control valves (NG16).

The innovative integrated regenerative function in the A-line (optional) allows new energy saving circuits with differential cylinders. The hybrid version can switch between regenerative mode and standard mode at any time.

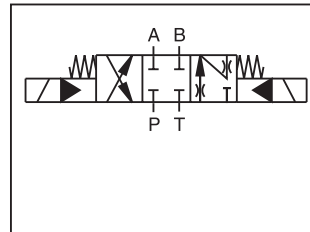
Features

- Energy saving A-regeneration optionally integrated.
- Switchable hybrid version.

Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



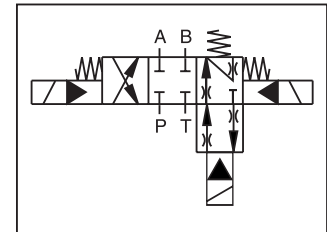
D41VWR



Regenerative D41VWR

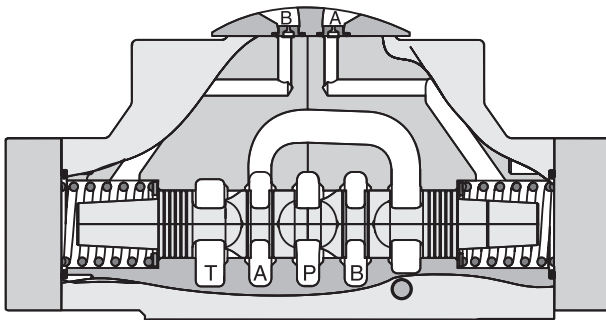


D41VWZ

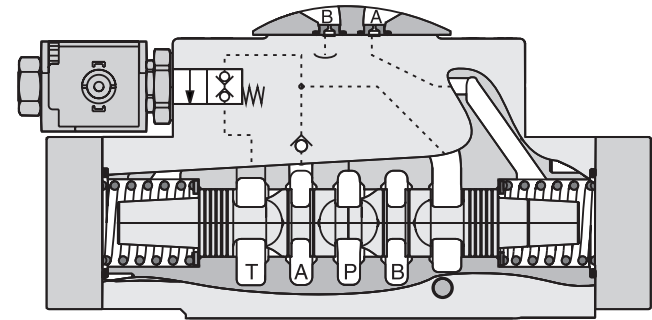


Hybrid D41VWZ

Regenerative Valve D41VWR

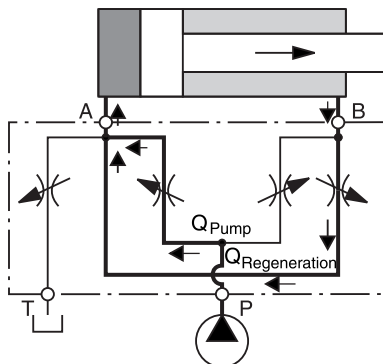


Hybrid Valve D41VWZ



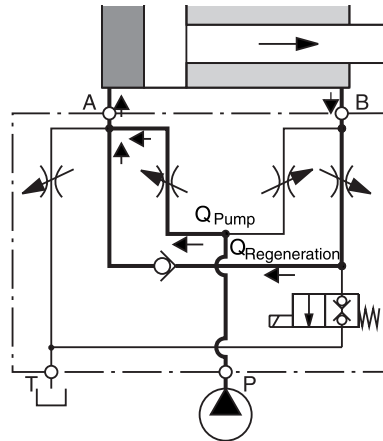
D41VWR Regenerative Valve

Cylinder Extending

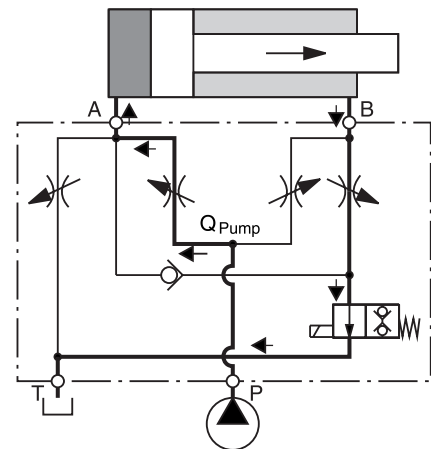


D41VWZ Hybrid Valve

Cylinder Extending
Regenerative Mode
(High Speed)



Cylinder Extending
Standard Mode
(High Force)



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D41WR, D41VWZ - Technical Information

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Ordering Information

D41WW Series **C** Style **J** Solenoid Voltage 24VDC **W** Connector as per EN 175301-803, without connector (Please order plug separately)

Spool **Pilot Supply and Drain** **Seal** **Manual Override** **Valve Variations** **Design Series**

Code **Description**

41VW NFPA D07, CETOP 07, DIN NG 16

Code **Description**

C 3 positions. Spring off in position "0". Operated in position "a" or "b".

Code **Description**

N Nitrile

V Fluorocarbon

Code **Description**

1 Internal Pilot, External Drain

2 External Pilot, External Drain

4* Internal Pilot, Internal Drain

5 External Pilot, Internal Drain

* Not available with 002, 008, 009, and 030 spools

Code **Description**

Omit Standard

T No manual override

Code **Description**

Omit No Variations

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' and 'B' End

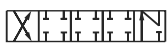
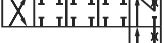
3R Pilot Choke Meter Out and Pilot Pressure Reducer

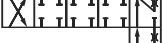
1T Pilot Choke Meter In and Pilot Pressure Reducer

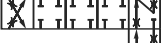
Regenerative Function **Hybrid Function**

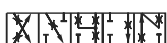
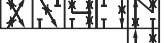
Code **Spool Type** **Code** **Spool Type**

A **B** **0** **A** **B** **0**

R01  **Z01** 

R04  **Z04** 

R81  **Z81** 

R82  **Z82** 

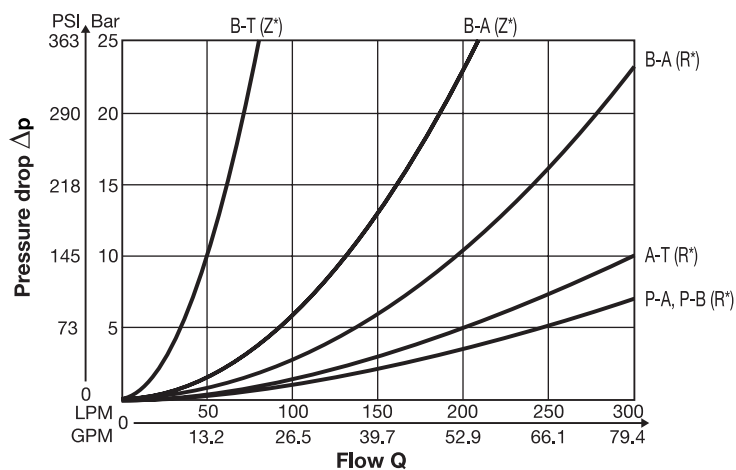
Weight:

D41VWR, D41DWZ 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.

Performance Curves



Flow curves measured with Spool R01, R04, Z01, Z04

Directional Control Valves

D41WR, D41VWZ - Specifications

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General		
Design	Directional Spool Valve	
Actuation	Solenoid	
Size	NG 16 / CETOP 07 / NFPA D07	
Mounting Interface	DIN 24340 A16 / ISO 4401 / CETOP RP121-H / NFPA D07	
Mounting Position	Unrestricted, preferably horizontal	
Ambient Temperature (°C)	-25 to +50 (-13°F to +122°F) without inductive position control	
MTTF _D Value (years)	75	
Hydraulic		
Maximum Operating Pressure (Bar)	Pilot Drain Internal: Ports P, A, B, X = 315 (4568 PSI); Ports T, Y = 105 (1523 PSI) Pilot Drain External: Ports P, A, B, T, X = 315 (4568 PSI); Port Y = 105 (1523 PSI)	
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature (°C)	-25 to +70 (-13°F to +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)	
Maximum Flow (LPM)	300 (79.4 GPM)	
Leakage @350 Bar (5075 PSI) per flow path (ml/min)	Up to 200 (0.05 GPM) depending on spool	
Minimum Pilot Supply Pressure (Bar)	5 (73 PSI)	
Static / Dynamic		
Step Response at 85%	Energized	De-energized
DC Solenoids Pilot Pressure		
50 Bar (725 PSI) (ms)	95	65
100 Bar (1450 PSI) (ms)	75	65
250 & 350 Bar (3625 & 5075 PSI) (ms)	60	65
Electrical		
	Regenerative	Hybrid
Duty Ratio (%)	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible	100
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)	IP65 in accordance with EN60529 (plugged and mounted)
Supply Voltage / Ripple (V)	24	24
Tolerance Supply Voltage (%)	+/- 10	+/- 10
Current Consumption - Hold (A)	1.29	1.21
Current Consumption - In Rush (A)	1.29	–
Power Consumption - Hold (W)	31	29
Power Consumption - In Rush (W)	31	–
Solenoid Connection	Connector as per EN 175301-803, solenoid identification as per ISO 9461	Connector as per EN 175301-803
Wiring Minimum (mm²)	3x1.5 recommended	3x1.5 recommended
Wiring Length Maximum (m)	50 (164 ft) recommended	50 (164 ft) recommended
With electrical connections, the protective conductor (PE ⚡) must be connected according to the relevant regulations.		

Directional Control Valves

D41WR, D41VWZ - Technical Information

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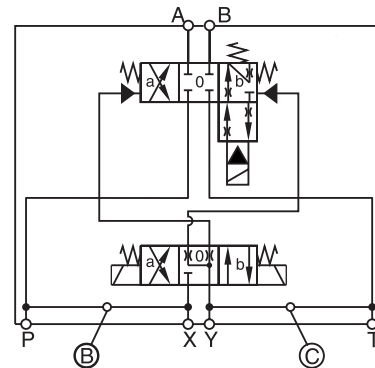
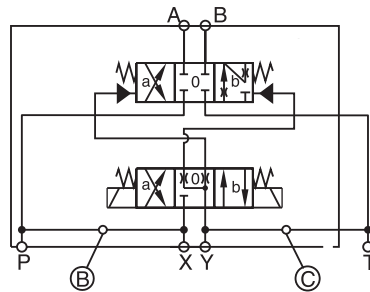
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Pilot Flow

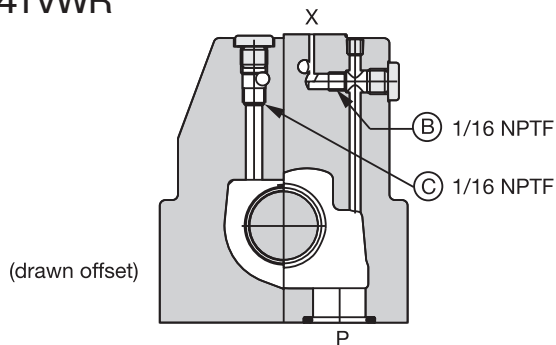
Pilot Oil Inlet (Supply) and Outlet (Drain)

○ open, ● closed

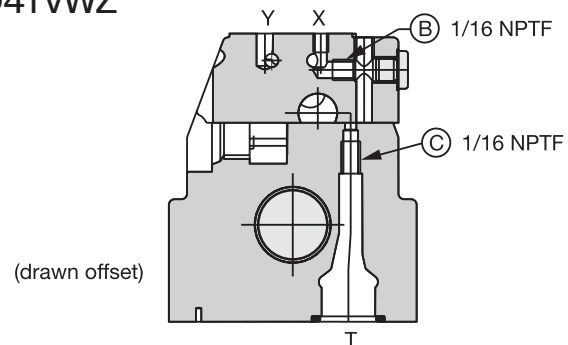
Pilot Oil Inlet	Outlet	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



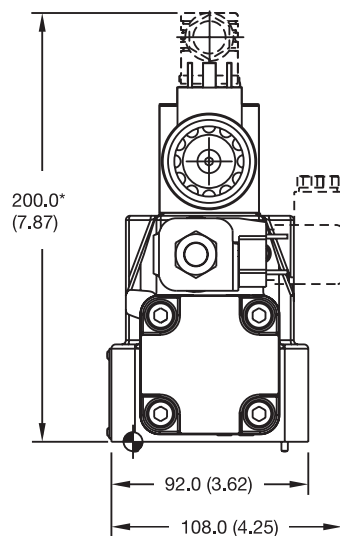
D41VWR



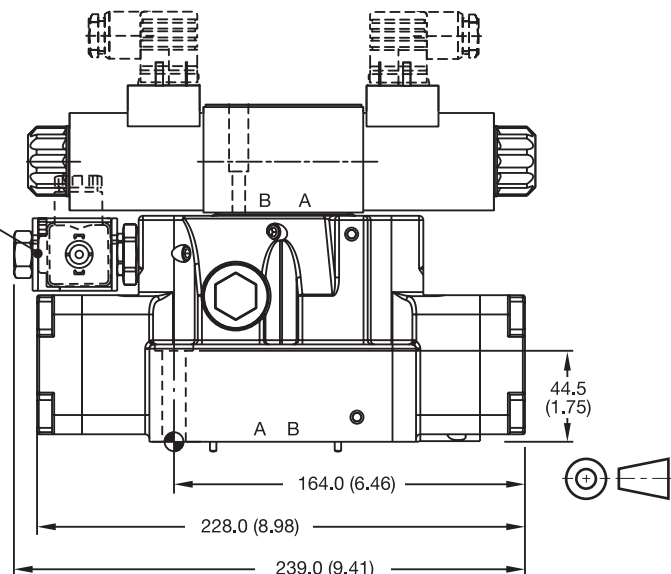
D41VWZ



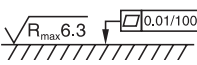
Dimensions — Inch equivalents for millimeter dimensions are shown in (**)



Only D41VWZ



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

Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}6.3}$ 	BK320	4x M10x60 2x M6x55	63 Nm (46.5 lb-ft)	Nitrile: SK-D41VW-N-91 Fluorocarbon: SK-D41VW-V-91
	BK160	4x 3/8-16x2.5 2x 1/4-20x2.25 DIN 912 12.9	13.2 Nm (9.7 lb-ft) +/- 15%	

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

The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm (0.37 to 0.44 lb.-ft.).

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Directional Control Valves

D41VL - Technical Information

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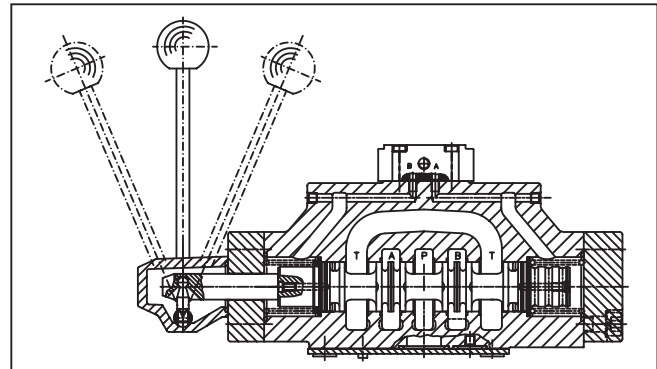
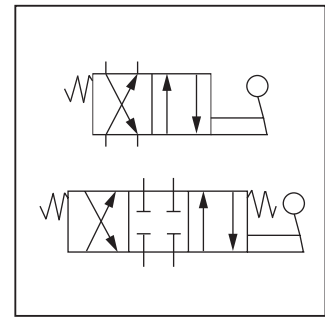
General Description

Series D41VL valves are 5 chamber, directional control valves and are available in 2 or 3-position styles. They are operated by a hand lever which is directly connected to the spool.

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

Features

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



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Specifications

General

Design	Directional Spool Valve
Actuation	Lever
Size	NG 16 / CETOP 07 / NFPA D07
Mounting Interface	DIN 24340 A16 / ISO 4401 / CETOP RP121-H / NFPA D07
Mounting Position	Unrestricted, preferably horizontal
Ambient Temperature (°C)	-25 to +50 (-13°F to +122°F)

Hydraulic

Maximum Operating Pressure (Bar)	Internal Drain: Ports P, A, B, = 350 (5075 PSI); Ports T, X, Y = 10 (145 PSI) External Drain: Ports P, A, B, T = 350 (5075 PSI); Ports X, Y = 10 (145 PSI)
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525
Fluid Temperature (°C)	-25 to +70 (-13°F to +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)
Maximum Flow (LPM)	300 (79.4 GPM)
Leakage @350 Bar (5075 PSI) per flow path (ml/min)	Up to 200 (0.05 GPM) depending on spool

 **WARNING:** This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

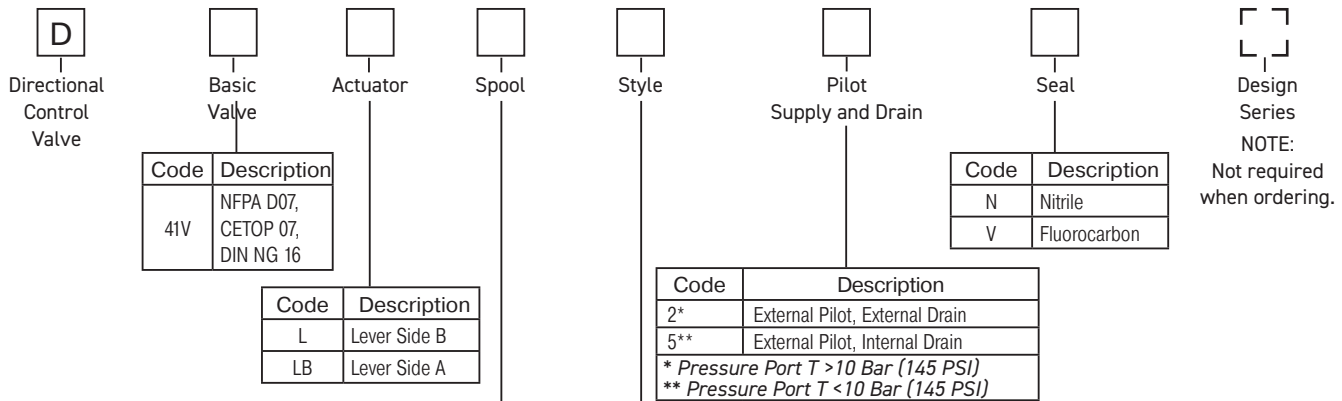
Industrial
Hydraulics Valves

MSG14-2500/US
Directional Control Valves

Directional Control Valves

D41VL - Ordering Information

A165

WWW.SUMY.IR


3 Position Spools	
Code	Spool Type
	A 0 B
001	
002	
003	
004	
006	
007	
009	
011	
014	
015	

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 9	
E			2 positions. Spring offset in position "0".
F			2 positions. Spring offset in position "b".
K			2 positions. Spring offset in position "0".
M			2 positions. Spring offset in position "a".
N			3 positions, detent. Operated in position "a", "0" or "b".
R			2 positions, detent. Operated in position "0" or "b".
S			2 positions, detent. Operated in position "0" or "a". No center in offset position.

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

Weight: 9.0 kg (19.8 lbs.)

Directional Control Valves

D41VL - Performance Curves

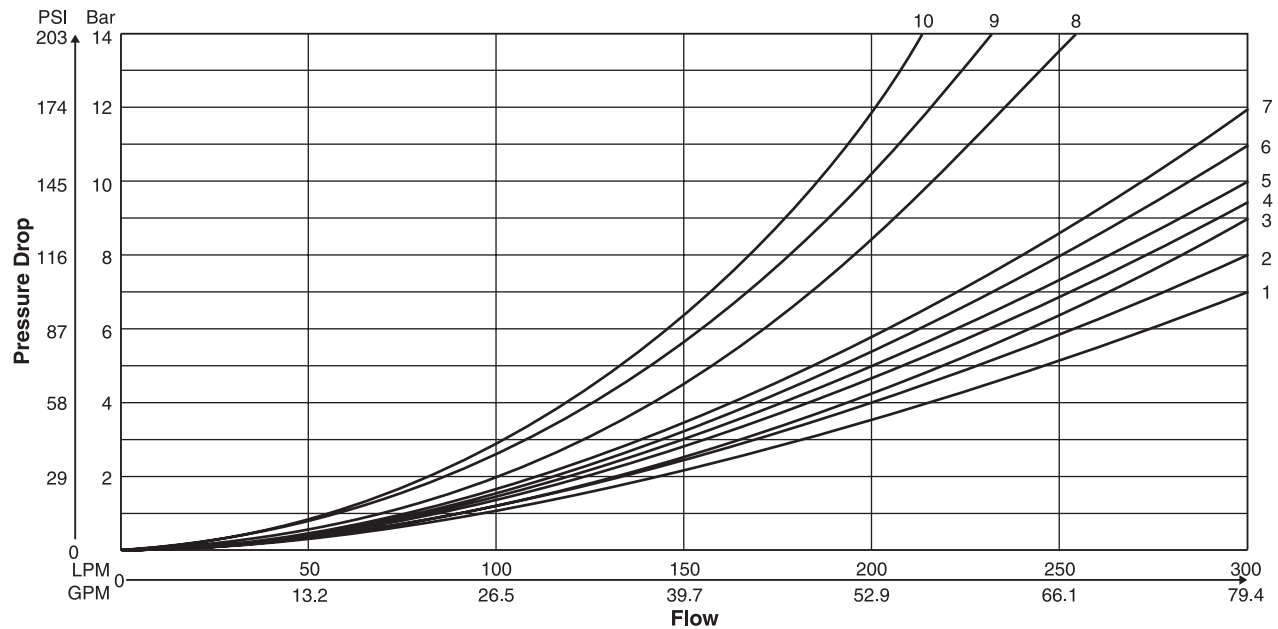
A166

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

Spool No.	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
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	5	4
015	2	1	–	6	5
020	3	5	–	3	5
030	2	3	–	6	7

All characteristic curves measured with HLP46 at 50°C.



Directional Control Valves

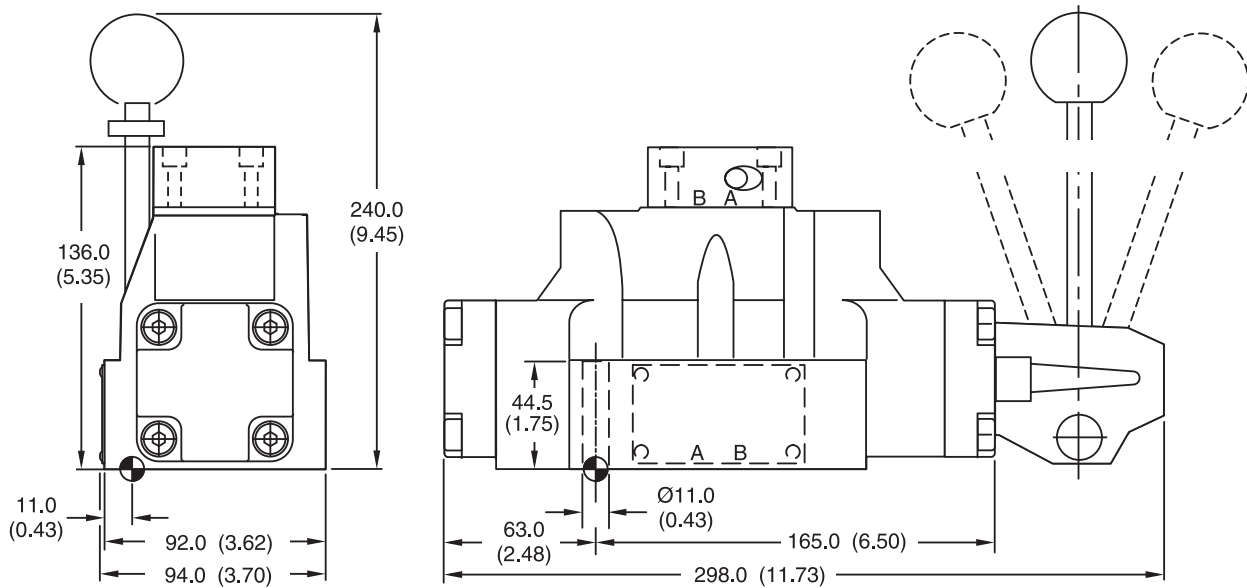
D41VL - Dimensions

A167

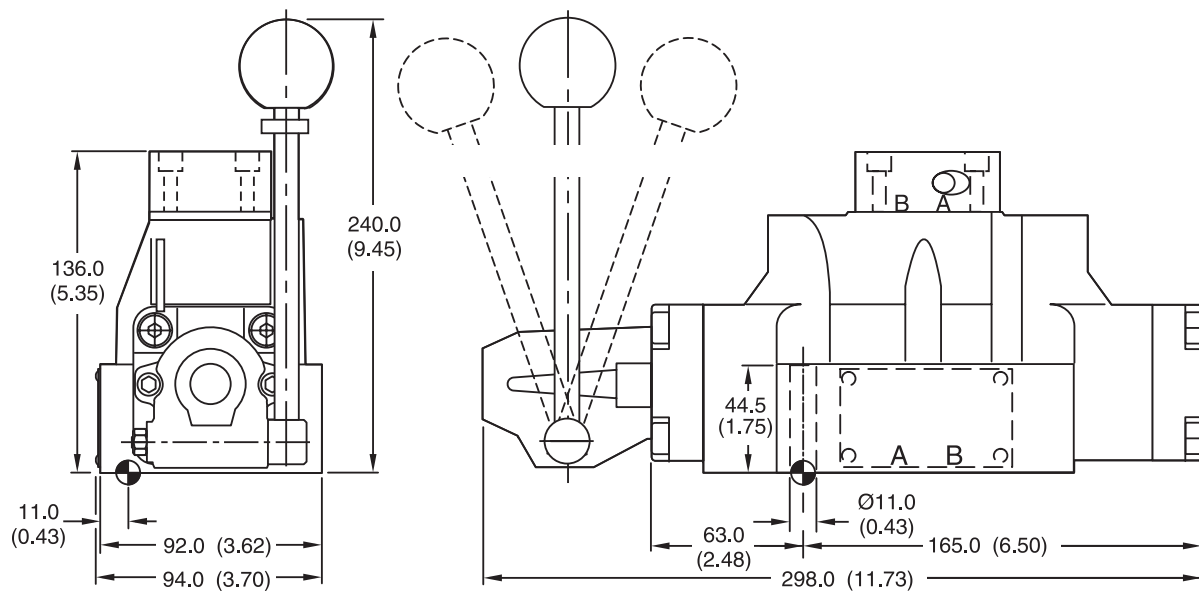
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Inch equivalents for millimeter dimensions are shown in (**)

D41VL



D41VLB



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

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Directional Control Valves

D4P - Technical Information

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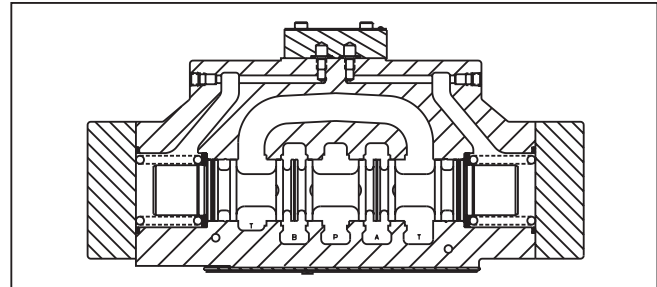
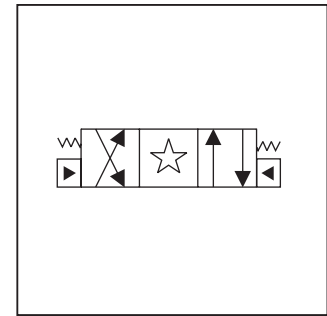
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General Description

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

Features

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



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Specifications

General

Design	Directional Spool Valve
Actuation	Hydraulic
Size	NG 16 / CETOP 07 / NFPA D07
Mounting Interface	DIN 24340 A16 / ISO 4401 / CETOP RP121-H / NFPA D07
Mounting Position	Unrestricted, preferably horizontal
Ambient Temperature (°C)	-25 to +50 (-13°F to +122°F)
MTTF _D Value (years)	150

Hydraulic

Maximum Operating Pressure (Bar)	External Drain: Ports P, A, B, T = 350 (5075 PSI); Ports X, Y = 350 (5075 PSI)
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525
Fluid Temperature (°C)	-25 to +70 (-13°F to +158°F)
Viscosity	
Permitted (cSt / mm ² /s)	2.8 - 400 (13 - 1854 SSU)
Recommended (cSt / mm ² /s)	30 - 80 (139 - 371 SSU)
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638: 7)
Maximum Flow (LPM)	300 (79.4 GPM)
Leakage @350 Bar (5075 PSI) per flow path (ml/min)	Up to 200 (0.05 GPM) depending on spool
Pilot Supply Pressure	
Minimum (Bar)	5 (73 PSI)
Maximum (Bar)	350 (5075 PSI)

Static / Dynamic

Step Response	The response times depend on the pilot oil pressure and on the speed of the increase/decrease of the pilot pressure
---------------	---

⚠ WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

D4P - Ordering Information

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D
Directional Control Valve

4
Basic Valve

P
Hydraulically Operated

Spool

Style

2
Pilot
Supply and Drain
External Pilot /
External Drain

Seal

Valve Variations

Design Series

NOTE:
Not required when ordering.

Code	Description
4	NFPA D07, CETOP 07, DIN NG 16

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
Omit	Standard Valve
3A	Pilot Choke Meter Out
3B	Pilot Choke Meter In
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' and 'B' End

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".

* 020 and 030 spools only

Weight: 9.0 kg (19.8 lbs.)

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Directional Control Valves

D4P - Performance Curves

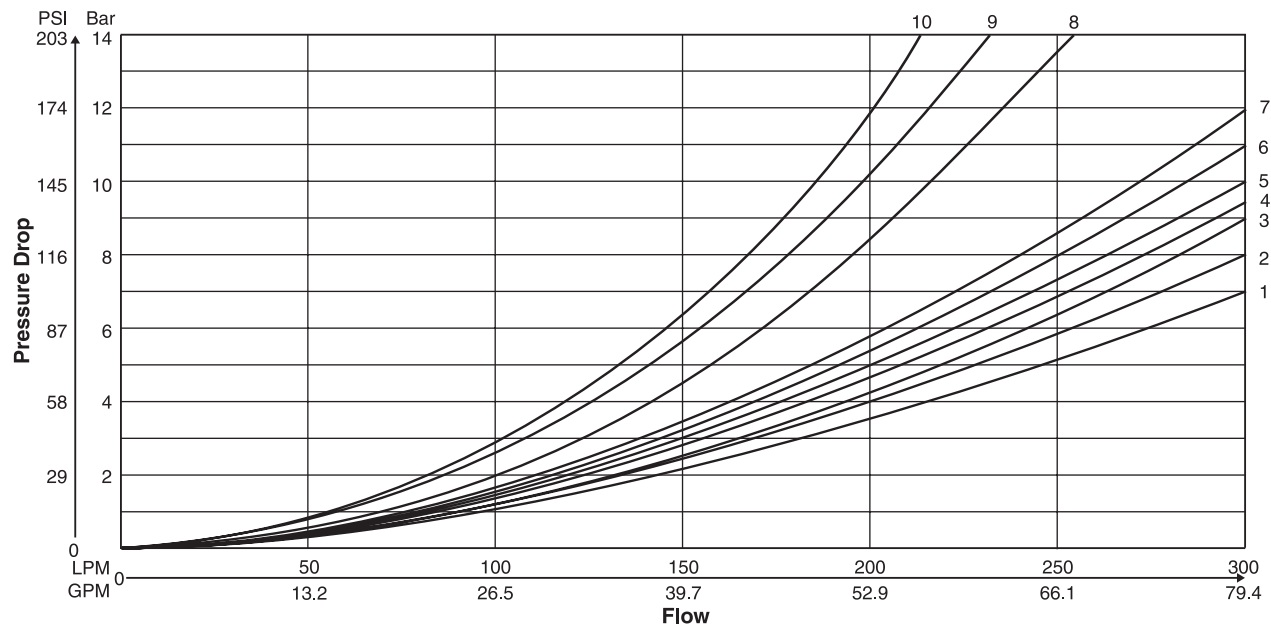
A170

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

Spool No.	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

All characteristic curves measured with HLP46 at 50°C.



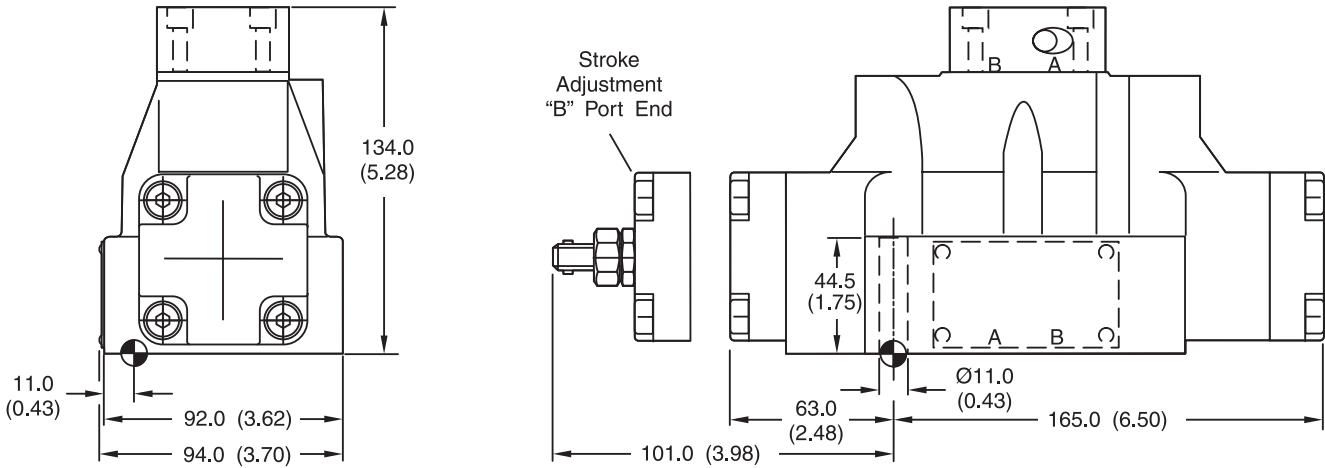
Directional Control Valves

D4P - Dimensions

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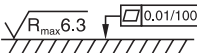
Inch equivalents for millimeter dimensions are shown in (**)



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Surface Finish	Kit 			Seal Kit 
	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



Directional Control Valves

D41 - Installation Information

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

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

Mounting Position

Detent – Horizontal
Spring Offset – Unrestricted
Spring Centered – Unrestricted

Fluid Recommendations

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

Fluids and Seals

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

Filtration

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

Silting

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

Special Installations

Consult your Parker representative for any application requiring the following:

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

Mounting Patterns

Series	NFPA	CETOP
D41V	D07	7

Torque Specifications

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

63 Nm (46.5 lb-ft) for M10
13.2 Nm (9.7 lb-ft) for M6, 1/4-20

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Tank and Drain Line Surges

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

Electrical Failure or Loss of Pilot Pressure

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

Electrical Characteristics (Detented Spool)

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

Pilot/Drain Characteristics

Pilot Pressure:

5 to 345 Bar (73 to 5000 PSI)

6.9 Bar (100 PSI) for spools 002, 007, 009, and 014.

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

Internal: Flow is internally ported from the pressure port of the main valve body to the "P" port of the pilot valve. The pressure developed at the "P" port of the pilot valve must be 5 Bar (73 PSI) minimum at all times, or 6.9 Bar (100 PSI) for spools 002, 007, 009, and 014

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

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

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

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

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

D41V* - Flow Paths

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

Tank and Drain Line Surges

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

Loss of Pilot Pressure

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

Pilot Drain Characteristics

Pilot Pressure:

5 to 345 Bar (73 to 5000 PSI)

6.9 Bar (100 PSI) for spools 002, 007, 009, and 014.

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

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

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

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Flow Paths / Pilot Pressure						
Style Code	Description	"X" and "Y" De-pressurized	"X" Port Pressurized	"Y" Port Pressurized	Special Notes	Recommended Control Valve for Pilot Oil
B	Two Position, Spring Offset	P -> A, and B -> T	P -> A, and B -> T	P -> B and A -> T	"X" Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position, Spring Centered	Center	P -> A, and B -> T	P -> B and A -> T	Flow paths will be reversed on valves with tandem center (009) spools	
H	Two Position, Spring Offset	P -> B and A -> T	P -> A, and B -> T	P -> B and A -> T	"Y" Port may be pressurized to assist spring in returning spool to offset position	

Directional Control Valves

D41WW, D4P, D4L - Installation Information

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Subplate Mounting

NFPA D07, CETOP 7, and NG16

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch).

Torque bolts to 135.6 Nm (100 lb-ft).

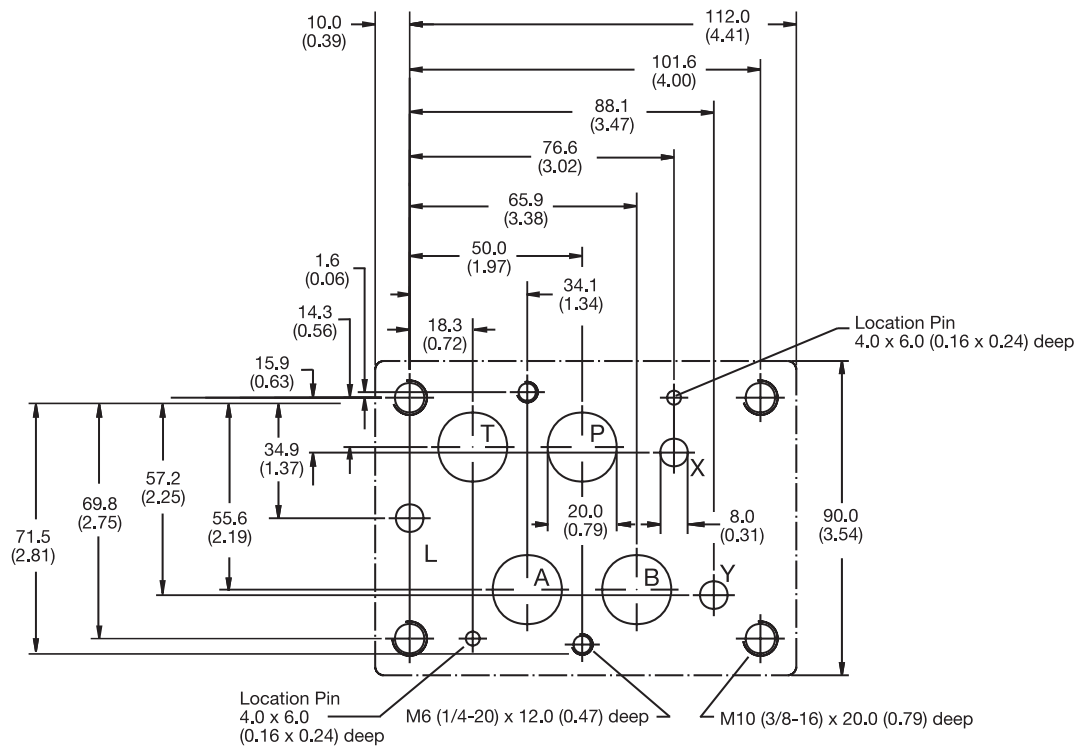
For maximum valve reliability, adhere to the following installation information.

Mounting Position

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

Mounting Pattern — NFPA D07, CETOP 7, and NG16

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



Note: With * marked dimensions ± 0.1 mm. All other dimensions ± 0.2 mm.

Directional Control Valves

D61 - Introduction

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Application

Series D6 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles. These valves are manifold mounted, and conform to NFPA's D08, CETOP 8 mounting patterns.

Operation

Series D61 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or pilot operators (hydraulic or pneumatic).

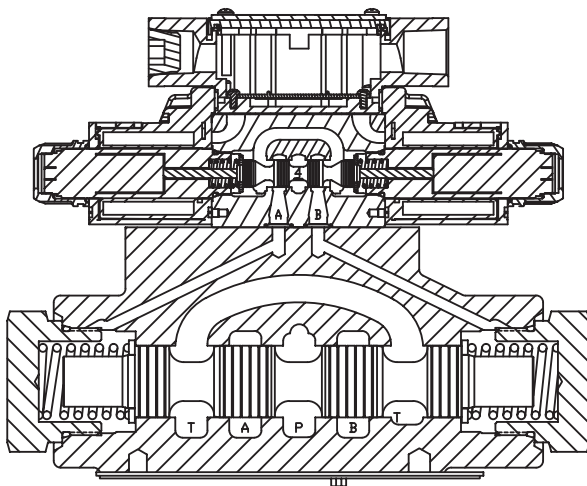
Features

- Easy access mounting bolts.
- 210 Bar (3000 PSI) pressure rating.
- Flows to 380 LPM (100 GPM) depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.

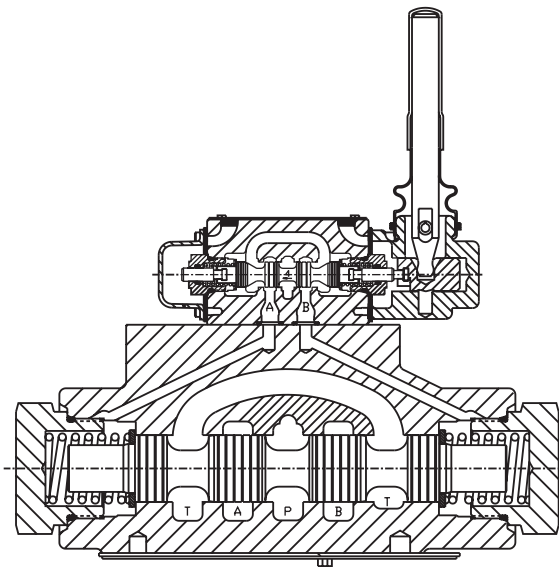
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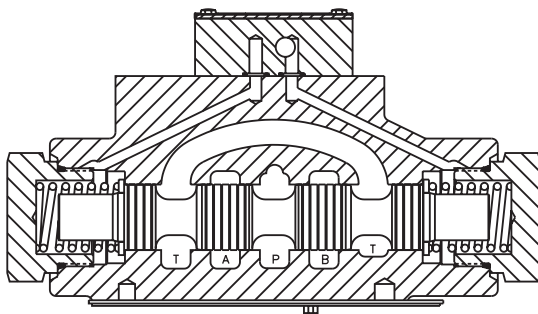
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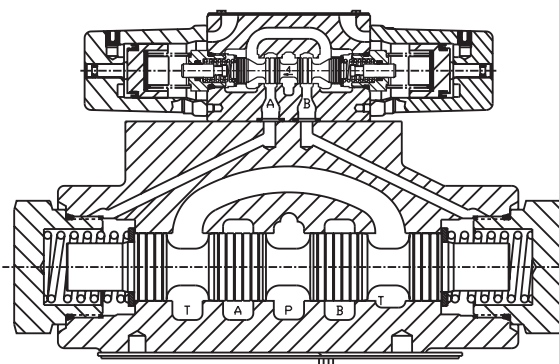
D61*W Solenoid Operated Plug-in Conduit Box



D61*L Lever Operated



D6*P Oil Pilot Operated



D61*A Air Pilot Operated

 **WARNING:** This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D61V - Technical Information

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General Description

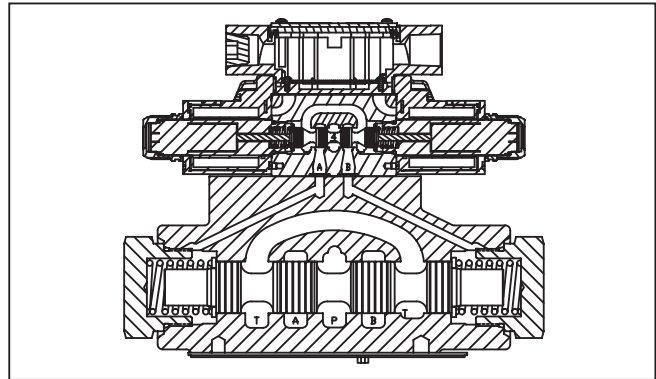
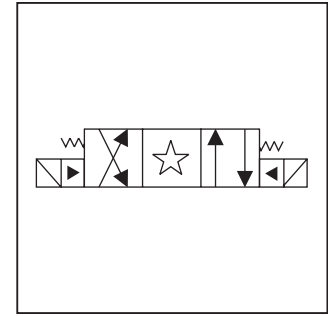
Series D61VW directional control valves are 5-chamber, pilot operated, solenoid controlled valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting patterns.

Operation

Series D61VW pilot operated valves are standard with low shock spools and pilot orifice. The orifice can be removed if a faster shift is required. It is recommended, however, that all systems operating above 138 Bar (2000 PSI) use the standard valve to avoid severe shock.

Features

- Low pressure drop design.
- Hardened spools provide long life.
- Fast response option available.
- Explosion proof availability.
- Wide variety of voltages and electrical connection options.
- No tools required for coil removal.



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Specifications	
Interface	NFPA D08, CETOP 08, NG 25
Max Operating Pressure	207 Bar (3000 PSI) Standard CSA  207 Bar (3000 PSI)
Max Tank Line Pressure	Internal Drain Model: 103 Bar (1500 PSI) AC Only 207 Bar (3000 PSI) DC Std / AC Opt External Drain Model: 207 Bar (3000 PSI) CSA  103 Bar (1500 PSI)
Maximum Drain Pressure	103 Bar (1500 PSI) AC Std 207 Bar (3000 PSI) DC Std / AC Opt CSA  103 Bar (1500 PSI)
Min Pilot Pressure	5.1 Bar* (75 PSI)
Max Pilot Pressure	207 Bar (3000 PSI) Std CSA  207 Bar (3000 PSI)
Nominal Flow	189 LPM (50 GPM)
Maximum Flow	See Switching Limit Charts
* 6.9 Bar (100 PSI) for spool configurations 008 and 009	

Response Time (ms)*					
Solenoid Type	Pilot Pressure	Pull-In		Drop-Out	
		Std	Fast**	Std	Fast**
DC	500	130	100	80	80
	1000	90	90	80	80
	2000	80	80	80	80
AC	500	80	40	72	72
	1000	40	40	72	72
	2000	30	30	72	72
* Response times (milliseconds) are measured at 207 Bar (3000 PSI) and 105 LPM (50 GPM) with various pilot pressures as indicated.					
** 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)					

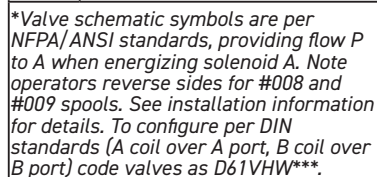
 **WARNING:** This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Industrial
Hydraulics Valves

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Directional Control Valves

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

* Available with 001, 004, 011, and 012 spools only.
 ** High watt coil only

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Directional Control Valves

D61V - Ordering Information

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Solenoid
Connection

Code	Description
C*	Leadwire Conduit Box
D**	Metric Plug (M12X1) DESINA
E†	Explosion Proof
F ^K	Flying Leadwire
G††	Plug-In Conduit Box
J++	Deutsch (DT04-2P)
P	DIN with Plug
S‡	Double Spade
W†	DIN w/o Plug
* No conduit box variations – See Plug-in G. ** 24 VDC only, low watt only, lights, diode surge suppressor, not CSA approved. † Not available with lights. †† Required for variations on conduit box style, must have lights. ++ 12 and 24 VDC only. ‡ Only 12 VDC high watt. x 6" leadwire only.	


Coil
Options


Tube
Options


Manual Override
Options


Electrical
Options


Approvals


Valve
Variations


Design
Series

NOTE:
Not required
when ordering.

See next page for
Valve Variations

Code	Description
Omit	Standard
P*	Extended Manual Override with Boot
T	Covered Manual Override, DC only, or AC Rectified
* Manual override options not available on Explosion Proof, or soft shift. Not available with high pressure AC tube H.	

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 or Explosion Proof.	

Code	Description
Omit*	High watt
D**	Explosion Proof, EExd ATEX
E**	Explosion Proof, EExme, ATEX, IECEX, from Germany
F†	Low Watt
L††	10 Watt
R#	Explosion Proof, ATEX/UL/ CSA/IECEX, configurable cable connection
T#	Explosion Proof, ATEX / UL / CSA / IECEX, fixed horizontal cable connection
U##	Explosion Proof, UL/CSA
* AC ambient temperature must not exceed 60°C (140°F). ** J voltage only, no options † AC only. †† DC (J and K coils) only. # J and Y voltages only. Y voltage is rectified. ## J and Y voltages only. Y voltage is not rectified.	

Code	Description
Omit	Standard Valve
4†#	CSA Canada CSA22.2 No. 139-13
N	CE Approved
Q†#	CE + CSA Approved
† Not available with AC high pressure tube. # Valve is derated.	

Code	Description
Omit	No Options
J#	Diode Surge Suppressor
Z†	Rectified Coil
# Plug-In – 24 VDC only. DIN – DC only with Lighted Plug (5), which has integrated Surge Suppression. "J" not required here. Deutsch – as follows: • 12 VDC Hi watt only • 24 VDC Hi & Lo watt available. Required for Low watt. ER Explosion Proof – 24 VDC "JERP" required. Adds dust rating, not polarity sensitive [IIC, D]. Leadwire – not available † DC tube standard, Plug-In conduit box only. Not polarity sensitive. Only available with Y voltage.	

Mounting Bolt Kits

UNC Bolt Kits for use with D6 and D8 Directional Control Valves and Sandwich Valves				
	Number of Sandwich Valves @ 2.75" (70 mm) thickness			
	0	1	2	3
D6	BK227 2.5"	BK121 5.25"	BK122 8"	BK123 10.75"
D6 plus tapping plate	BK161 3.5"	BK170 6.25"	BK171 9"	BK172 11.75"
D8	BK228 3"	BK131 5.75"	BK132 8.5"	BK133 11.25"
D8 plus tapping plate	BK173 4"	BK174 6.75"	BK175 9.5"	BK114 12.125"
NOTE: All bolts are SAE grade 8, 1/2-13 UNC-3A thread, torque to 133 Nm (100 lb-ft)				

Valve Weight:

Double Solenoid 12.1 kg (26.6 lbs.)

Seal Kit:

Nitrile SKD61VWN91
Fluorocarbon SKD61VWV91

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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Directional Control Valves

Directional Control Valves

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Valve Variations

Code	Description
1C**	Manaplug – Brad Harrison Style 7/8-16 with Lights (Single Solenoid = 5 pin)
1D**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 5 pin)
1M**	Manaplug Opposite Normal
1P	Painted Body
1R	Stroke adjust "A" and "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 Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Pilot Choke Meter Out with Lights and Manaplug – Brad Harrison Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
5*	Signal Lights – Standard Signal Lights – Hirsch. (DIN with Plug) (the DC Lighted Plug has Integral Surge Suppression)
7B**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
7W^	4-pin Micro Manaplug, Special Wiring with Lights
7Y^	Manaplug – Brad Harrison Style M12x1 Micro with Lights and Special Wiring (4 pin)
56**	Manaplug – Brad Harrison Style 7/8-16 Mini with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
20	Fast Response
* DESINA, plug-in conduit box, and DIN with plug styles only. ** Solenoid connection option G only. Requires manaplug code (56, 1C, 7B, etc.). ^ Requires G code (Plug-in Conduit Box) and J code (Diode Surge Suppressor) and lights.	

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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Directional Control Valves

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Reference Data

Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction	Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction
D61V*001		390 (100)	D61V*009		312 (80)
D61V*003		390 (100)	D61V*011		390 (100)
D61V*004		390 (100)	D61V*012		137 (35)
D61V*005		390 (100)	D61V*015		390 (100)
D61V*006		390 (100)	D61V*016		390 (100)
D61V*008		312 (80)			

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D61V* Series Pressure Drop Chart

The following chart provides the flow vs. pressure drop curve reference for the Series D61V valves by spool type.

Viscosity Correction Factor

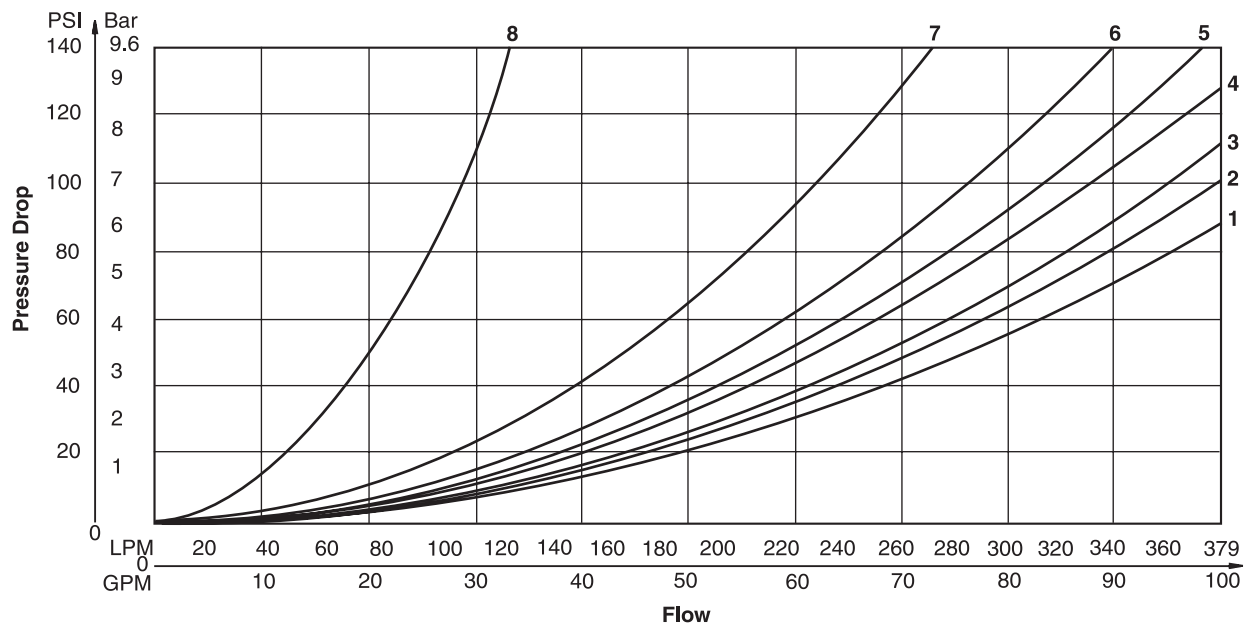
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141

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

D61VW Pressure Drop Reference Chart – Curve Number

Spool No.	P-A	P-B	P-T	A-T	B-T
001	3	3	–	1	2
003	3	3	–	4	2
004	3	3	–	4	5
005	3	4	–	1	2
006	4	4	–	1	2
008 / 009	3	3	7	4	6
011	3	3	–	1	2
012	3	3	8	4	5
015	3	3	–	2	4
016	4	3	–	2	1

Performance Curves



Directional Control Valves

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Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-10% 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 HVS 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.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (ER, ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013; Ex d IIC Gb; Ex tb IIIC Db IP66; IECEx BAS 14.0164X ATEX: EN60079-0, EN60079-1, EN60079-31; CE 1180 Ex II 2G BASEEFA08ATEX0041X CSA 22.2 No. 60079-0:07, 60079-1:07 and UL 60079-0:05, UL 60079-1:05; CSA listed to US and Canada Safety Standards. File 08-CSA-1932102 CSA Ex d IIC, AEx d IIC for Class I Zone 1; Class I Div 1 Grp. C & D; Class II Div 1 Grp. E, F & G

* Allowable Voltage Deviation +/-10%

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3 mm	Watts	Resistance
Voltage Code	Power Code						
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 Ohms
E	F	24 VAC	4.8 Amps	120 VA	2.07 Amps	21 W	1.29 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
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 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	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

Explosion Proof Solenoids

Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms

Explosion Proof Solenoids (German)

J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
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ER & ET Explosion Proof Solenoids

J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

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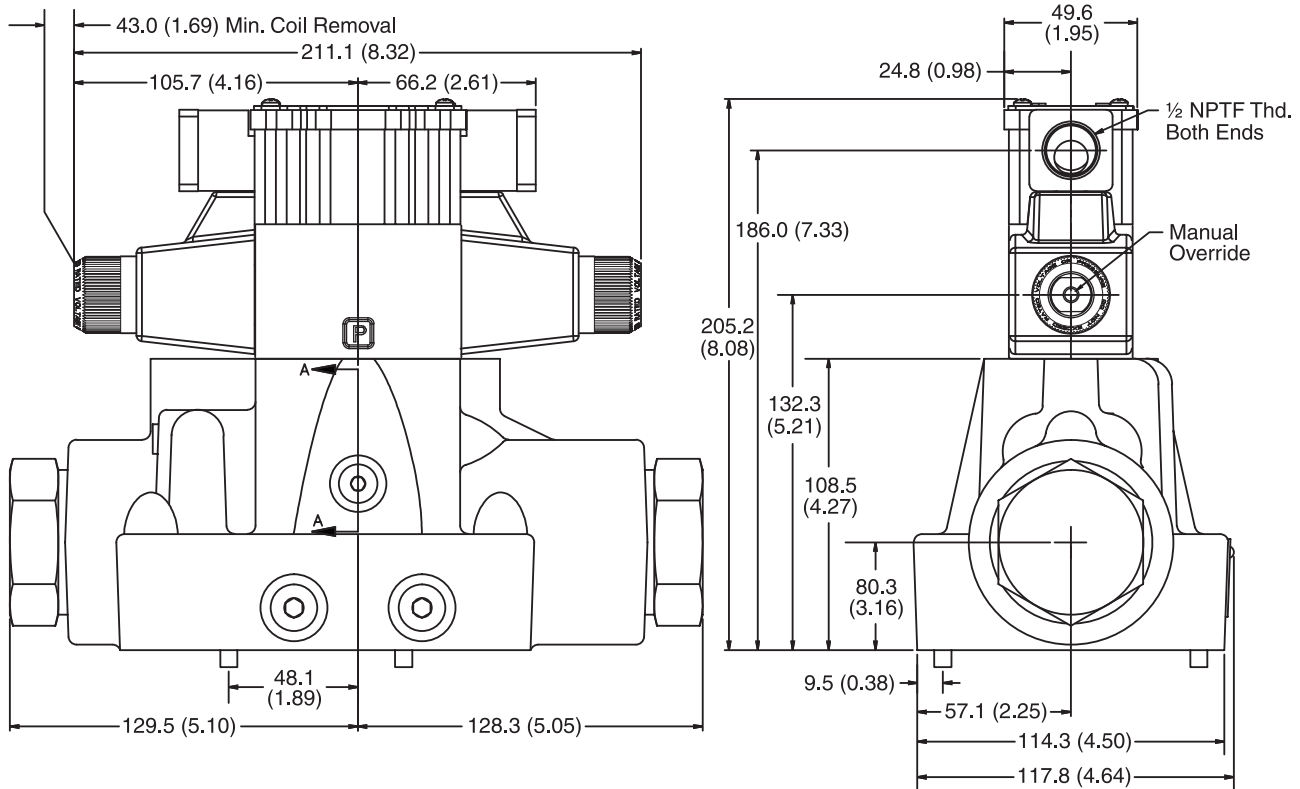
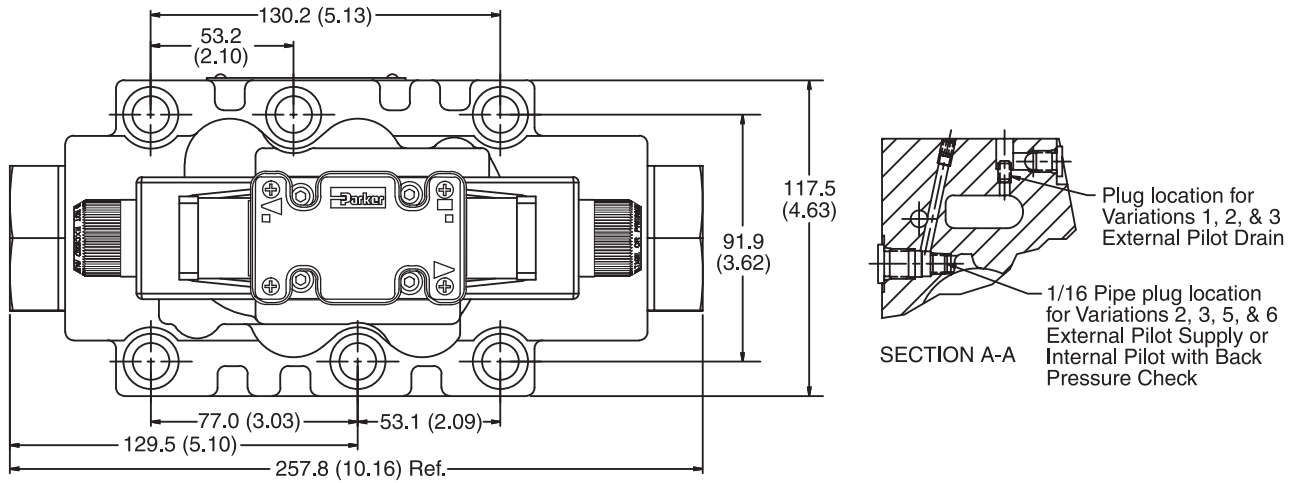
D61V - Dimensions

A183

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

Plug-in Conduit Box, Double AC Solenoid



Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

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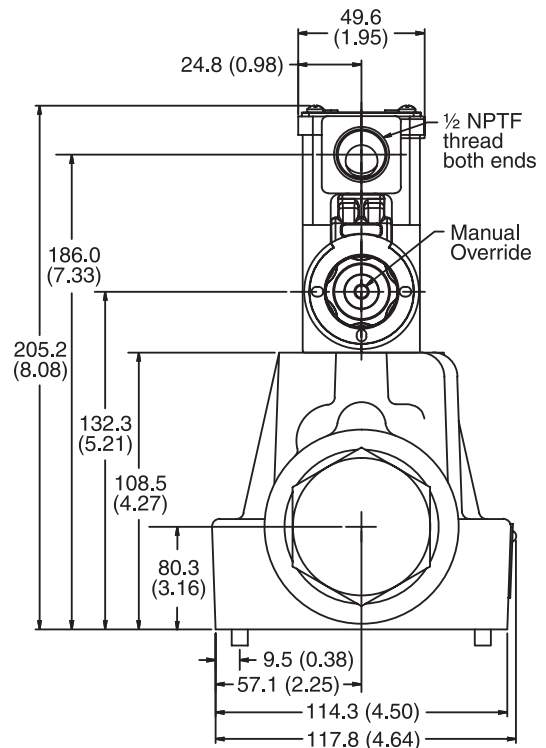
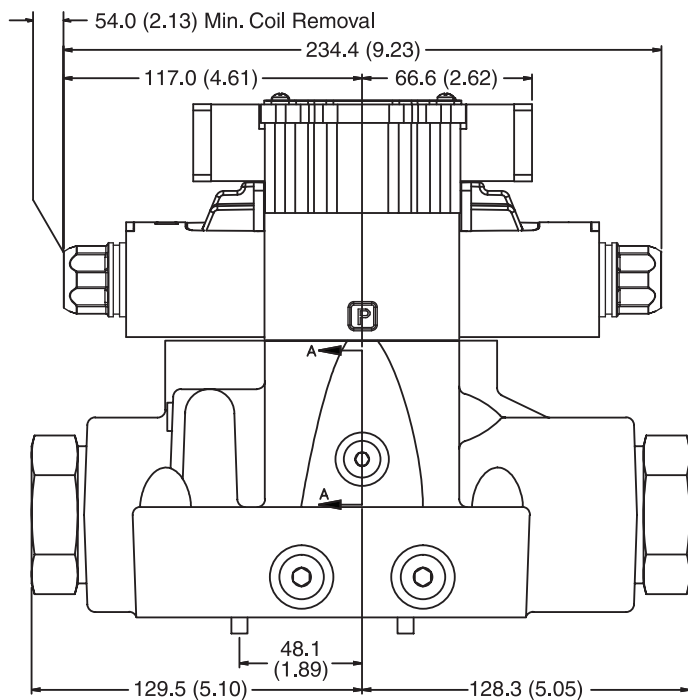
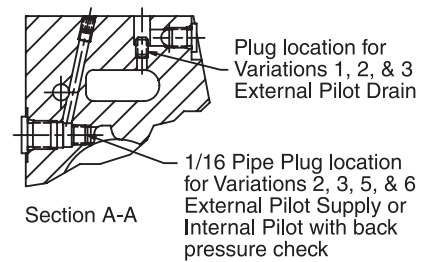
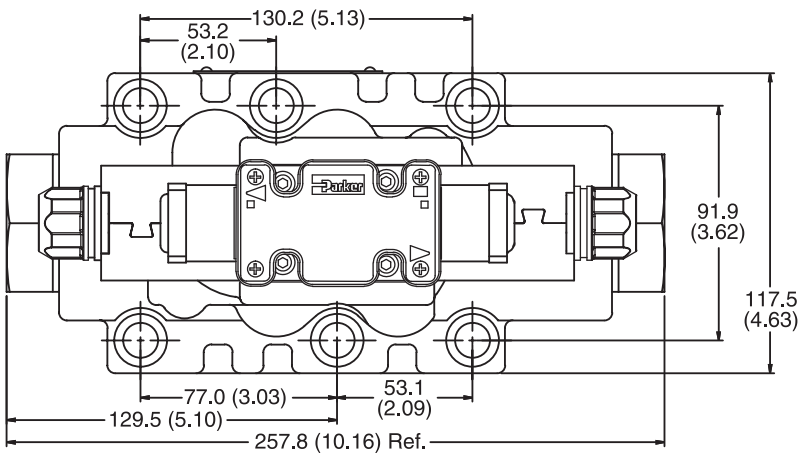
D61V - Dimensions

A185

WWW.SUMY.IR

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

Plug-in Conduit Box, Double DC Solenoid



Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.



Directional Control Valves

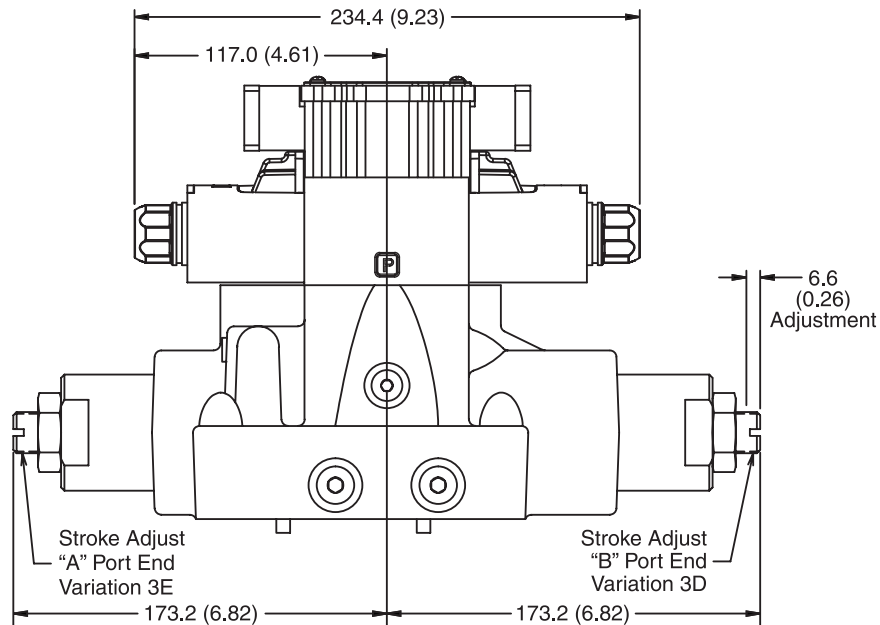
D61V - Dimensions

A186

WWW.SUMY.IR

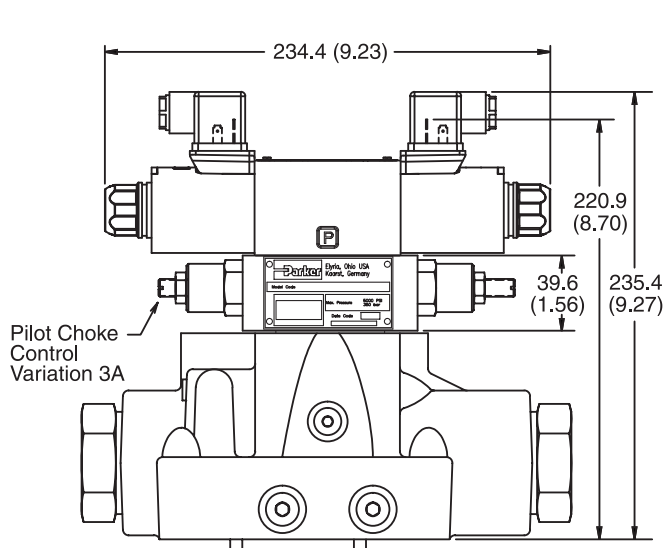
Inch equivalents for millimeter dimensions are shown in (**)

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

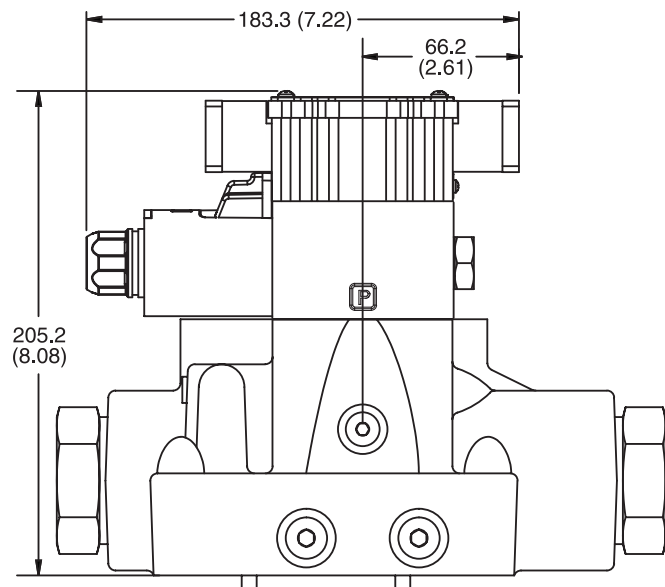


Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

Hirschmann and Pilot Choke Control, Double DC Solenoid



Plug-in Conduit Box, Single DC Solenoid



Directional Control Valves

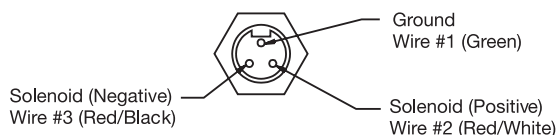
D61V - Accessories

A187

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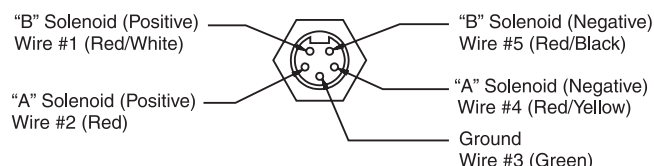
Manaplug (Options 6, 56, 1A, & 1C)

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



3-Pin Manaplug (Mini) with Lights

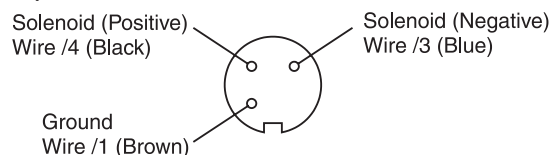
Single Solenoid Valves – Installed Opposite Side of Solenoid



5-Pin Manaplug (Mini) with Lights

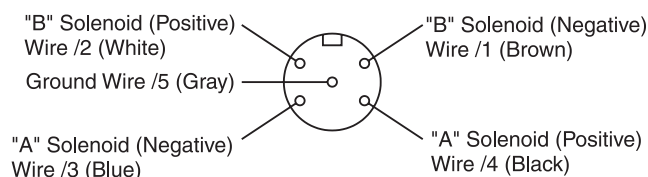
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

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

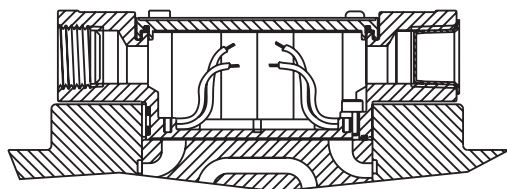
- EP336-30 3 Pin Plug
- EP316-30 5 Pin Plug (Double Solenoid)
- EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

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

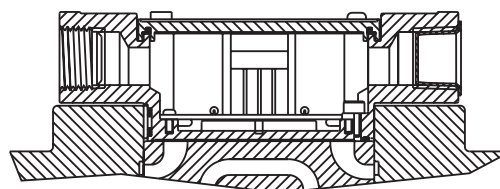
Conduit Box Option C

- No Wiring Options Available



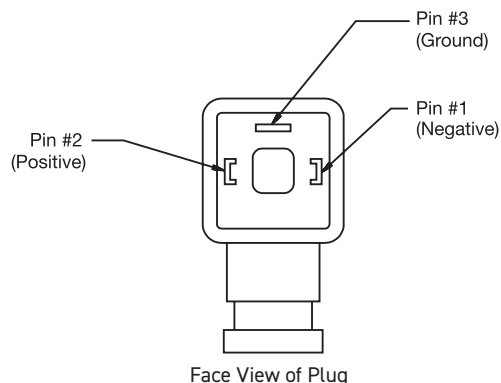
Signal Lights (Option 5) — Plug-in Only

- LED Interface
- Meets Nema 4/IP67



Hirschmann Plug with Lights (Option P5)

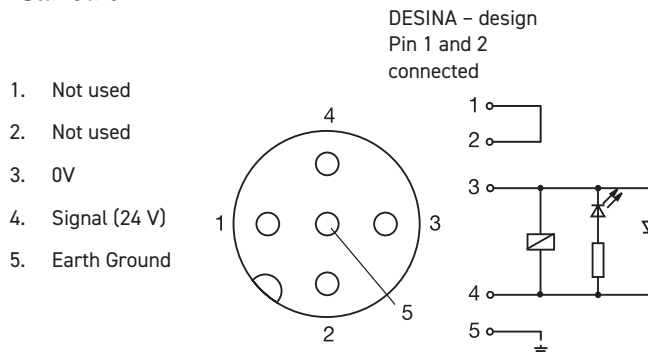
ISO 4400/DIN 43650 Form "A"



Pins are as seen on valve (male pin connectors)

DESINA Connector (Option D)

M12 Pin Assignment Standard



Directional Control Valves

D61VA - Technical Information

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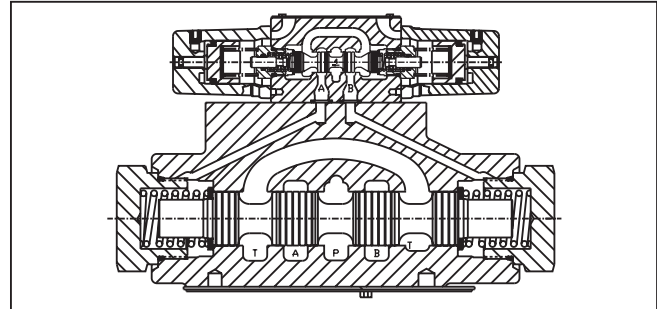
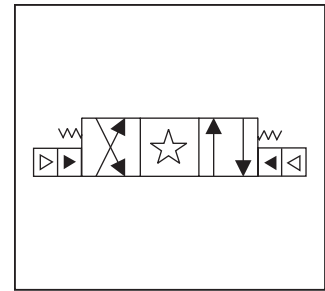
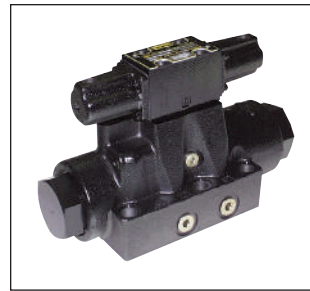
WWW.SUMY.IR

General Description

Series D61VA directional control valves are 5-chamber, air pilot operated valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting patterns.

Specifications

Mounting Pattern	NFPA D08 / CETOP 08 / NG 25
Max Op Press (Bar)	207 (3000 PSI)
Max Tank Line Press (Bar)	Internal Drain Model: 34 (500 PSI) External Drain Model: 207 (3000 PSI)
Max Drain Press (Bar)	34 (500 PSI)
Max Flow (LPM)	See Reference Data
Pilot Press (Bar)	Air Min: 3.4 (50 PSI) Air Max: 10.2 (150 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time, and flow capacity (GPM)

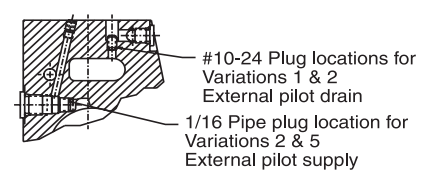
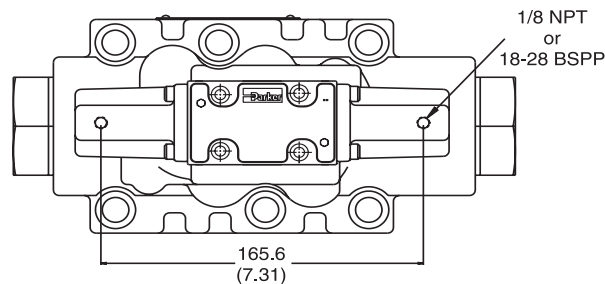


Features

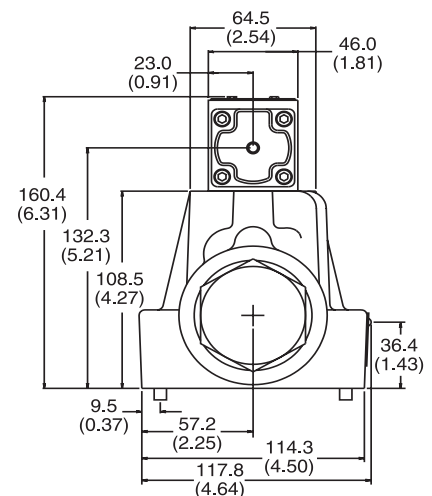
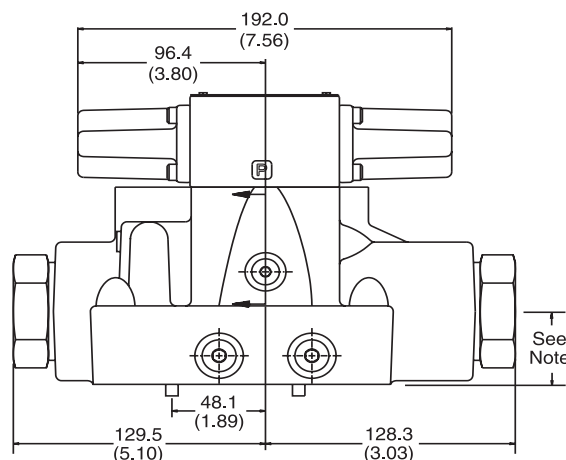
- Low pressure drop.
- Fast response option available.
- Hardened spools provide long life.

Dimensions

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



SECTION A-A



Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

D61VA - Ordering Information

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D	Directional Control Valve
61V	Basic Valve
A	Air Operated Pilot
	Spool
	Style
	Pilot Supply and Drain
	Seal
	Valve Variations



Design Series

NOTE:
Not required when ordering.

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

Code	Symbol
001	
004	
008*, 009**	
011	
012	

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

Code	Description
N	Nitrile
V	Fluorocarbon

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

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

* Not available with 008 or 009 spools

Valve Weight: 12.4 kg (27.3 lbs.)
Standard Bolt Kit: BK227
Metric Bolt Kit: BKM227
Seal Kit:
Nitrile SKD61VA
Fluorocarbon SKD61VAV

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.	
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.	

* Not available with 008 and 009 spools



This condition varies with spool code.

Bold: Designates Tier I products and options.

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

Directional Control Valves

D61VL - Technical Information

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General Description

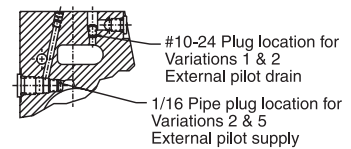
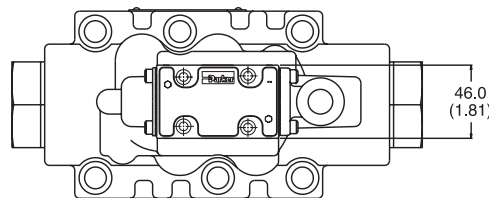
Series D61VL directional control valves are 5-chamber, lever operated valves. They are available in 2 and 3-position styles. They are manifold or subplate mounted valves, which conform to NFPA's D08, CETOP 8 mounting patterns.

Specifications

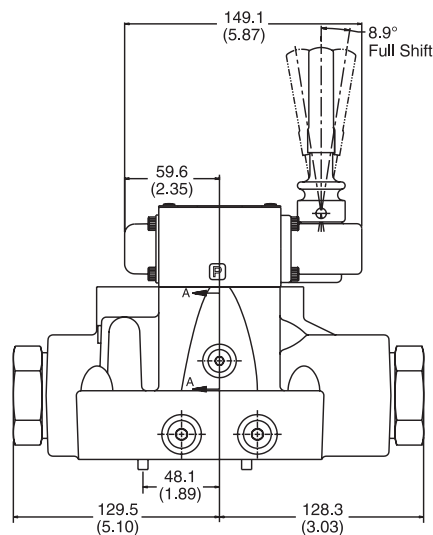
Mounting Pattern	NFPA D08 / CETOP 08 / NG 25
Max Op Press (Bar)	207 (3000 PSI)
Max Tank Line Press (Bar)	Internal Drain Model: 34 (500 PSI) External Drain Model: 207 (3000 PSI)
Max Drain Press (Bar)	34 (500 PSI)
Max Flow (LPM)	See Reference Data
Pilot Press (Bar)	Oil Min: 6.9 (100 PSI) Oil Max: 207 (3000 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time, and flow capacity (GPM)

Dimensions

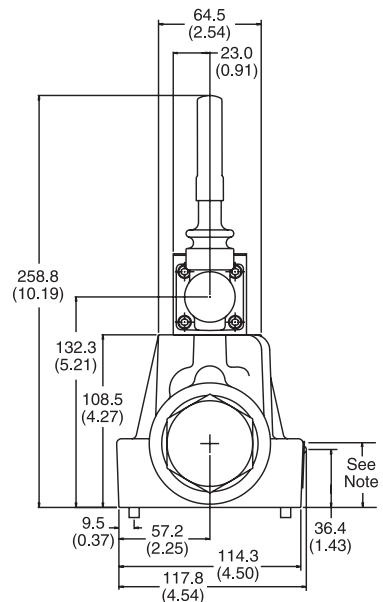
Inch equivalents for millimeter dimensions are shown in (**)



SECTION A-A



Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

D61VL - Ordering Information

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Design Series

NOTE:
Not required when ordering.

D
Directional Control Valve

61V
Basic Valve

L
Lever Operated Pilot

Spool

Style

Pilot Supply and Drain

Seal

Valve Variations

Code	Description
61V	NFPA D08, CETOP 08, DIN NG 25

Code	Description
N	Nitrile
V	Fluorocarbon

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

Code	Symbol
001	
004	
008*, 009**	
011	
012	

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

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

* Not available with 008 or 009 spools

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

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

* B, D, and H styles available with 020 and 030 spools only.



This condition varies with spool code.

Bold: Designates Tier I products and options.

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

Valve Weight: 12.1 kg (26.7 lbs.)

Standard Bolt Kit: BK227

Metric Bolt Kit: BKM227

Seal Kit:

Nitrile SKD61VL
Fluorocarbon SKD61VLV

MSG14-2500/US
Directional Control Valves

Directional Control Valves

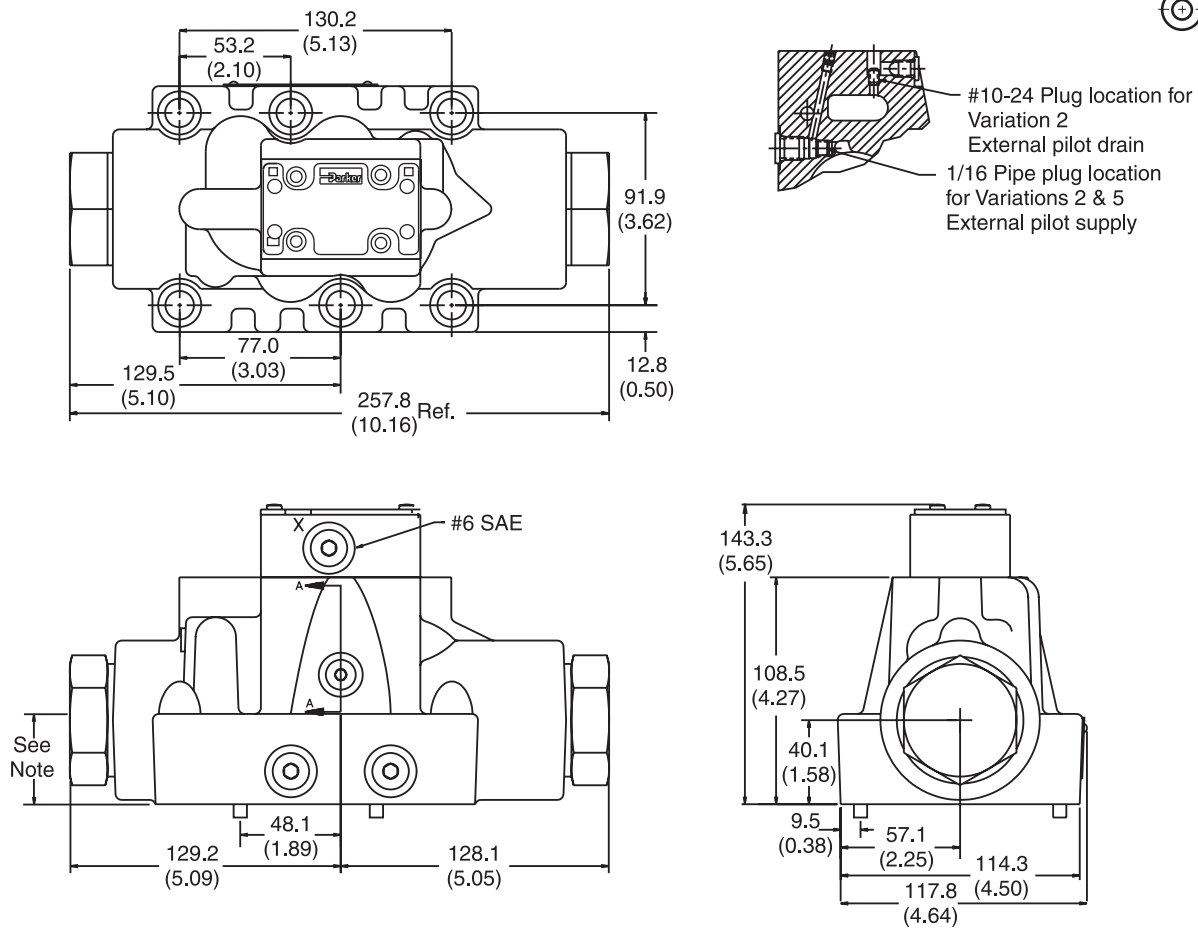
D6P - Dimensions

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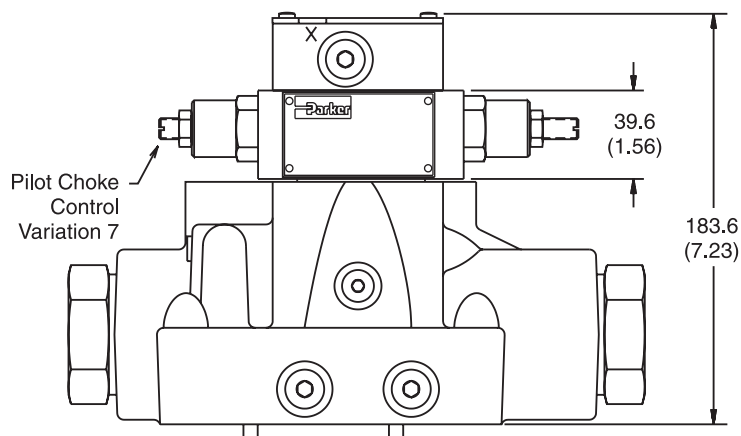
Inch equivalents for millimeter dimensions are shown in (**)

Standard Pilot Operated



Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

Pilot Operated with Pilot Choke Control



Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

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

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

Mounting Position

Detent – Horizontal
Spring Offset – Unrestricted
Spring Centered – Unrestricted

Fluid Recommendations

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

Fluids and Seals

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

Filtration

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

Silting

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

Special Installations

Consult your Parker representative for any application requiring the following:

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

Mounting Patterns

Series	NFPA	Size
D61V*, D6P	D08, CETOP 08	3/4"

Torque Specifications

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

135.6 Nm (100 lb-ft)

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Series D61VW, D61VA, D61VL

Tank and Drain Line Surges

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

Electrical Failure or Loss of Pilot Pressure

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

Electrical Characteristics (Detented Spool)

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

Pilot/Drain Characteristics

Pilot Pressure:

5 to 345 Bar (73 to 5000 PSI)

6.9 Bar (100 PSI) for spools 002, 007, 009, and 014.

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

Internal: Flow is internally ported from the pressure port of the main valve body to the "P" port of the pilot valve. The pressure developed at the "P" port of the pilot valve must be 5 Bar (73 PSI) minimum at all times, or 6.9 Bar (100 PSI) for spools 002, 007, 009, and 014

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

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

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

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

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

D61V* - Flow Paths

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

** D61VW only

Tank and Drain Line Surges

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

Loss of Pilot Pressure

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

Pilot Drain Characteristics

Pilot Pressure:

5.1 to 207 Bar (75 to 3000 PSI)

6.9 Bar (100 PSI) for spools 008, 009, and 012.

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

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

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

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Flow Paths / Pilot Pressure						
Style Code	Description	"X" and "Y" De-pressurized	"X" Port Pressurized	"Y" Port Pressurized	Special Notes	Recommended Control Valve for Pilot Oil
B	Two Position, Spring Offset	P -> A, and B -> T	P -> A, and B -> T	P -> B and A -> T	"X" Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position, Spring Centered	Center	P -> A, and B -> T	P -> B and A -> T	Flow paths will be reversed on valves with tandem center (008) spools	
H	Two Position, Spring Offset	P -> B and A -> T	P -> A, and B -> T	P -> B and A -> T	"Y" Port may be pressurized to assist spring in returning spool to offset position	

Subplate Mounting

NFPA D08, CETOP 08, and NG25

Recommended Mounting Surface

Surface must be flat within .102 mm (0.004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch).

Torque bolts to 135.6 Nm (100 lb-ft).

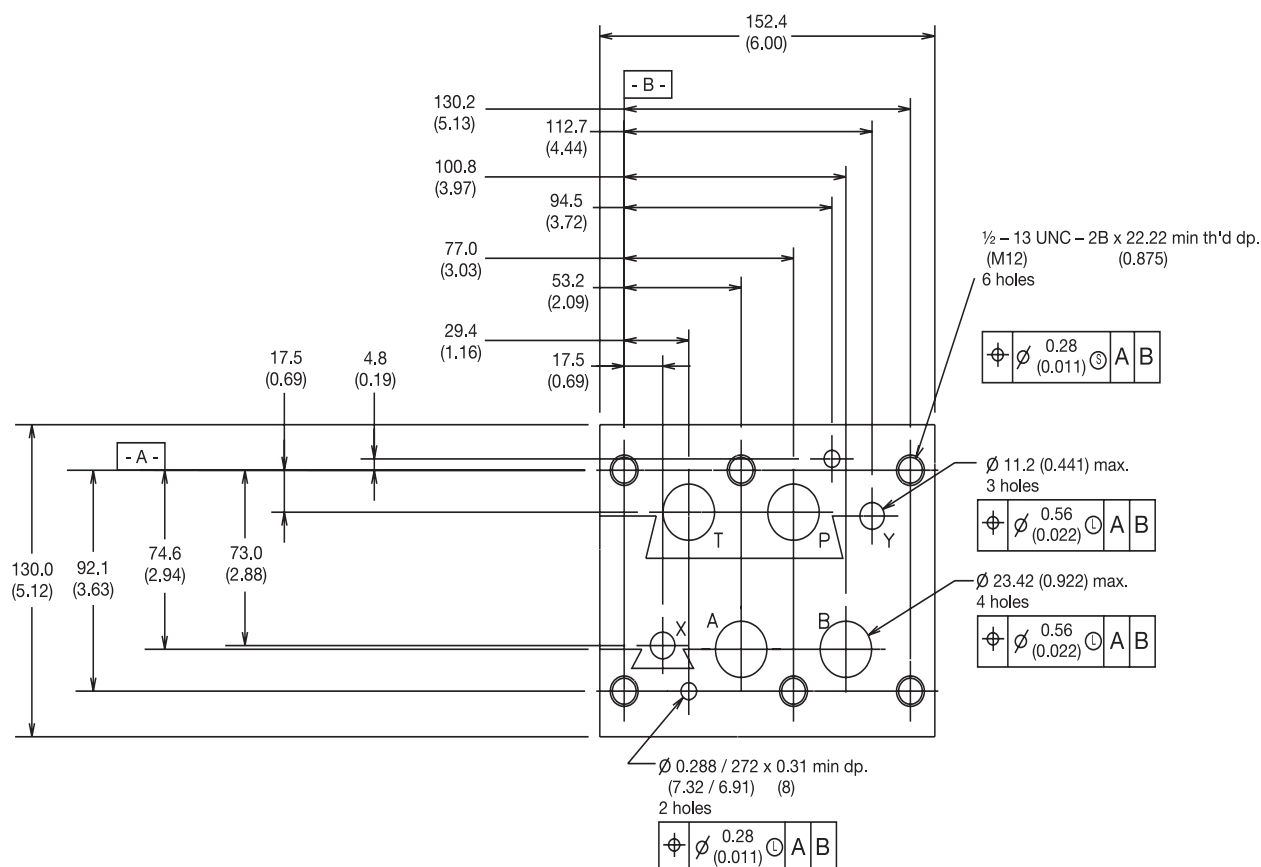
For maximum valve reliability, adhere to the following installation information.

Mounting Position

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

Mounting Pattern — NFPA D08, CETOP 08, and NG25

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



Directional Control Valves

D91 - Introduction

A198

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Application

Series D91 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles and are manifold mounted. These valves conform to NFPA's D08, CETOP 8 mounting pattern.

Operation

Series D91 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or pilot operators (hydraulic or pneumatic).

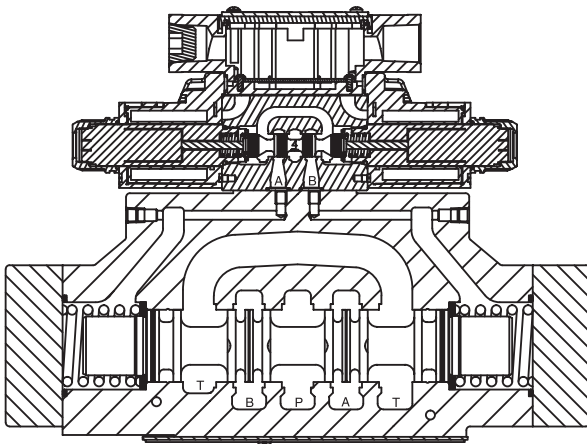
Features

- Easy access mounting bolts.
- 345 Bar (5000 PSI) pressure rating.
- Flows to 622 LPM (160 GPM) depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.

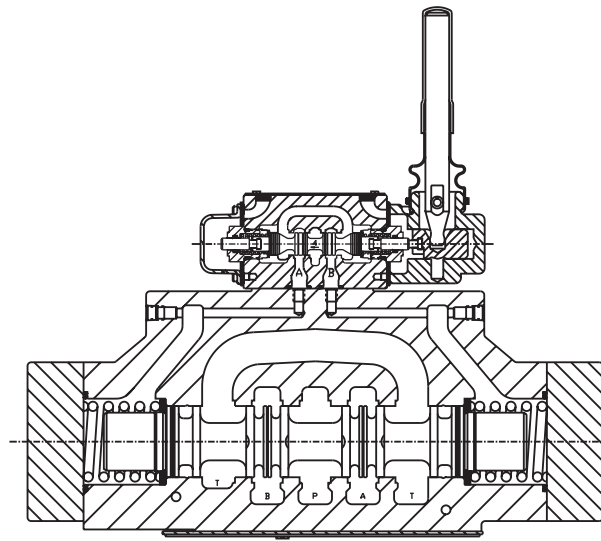
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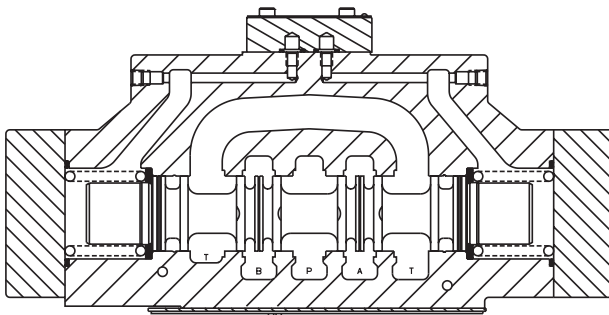
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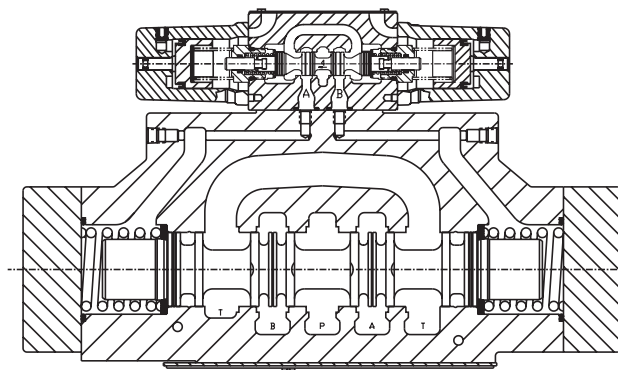
D91WW Solenoid Operated Plug-in
Conduit Box



D91VL Lever Operated



D9P Oil Pilot Operated



D91VA Air Pilot Operated

 **WARNING:** This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D91VW - Technical Information

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General Description

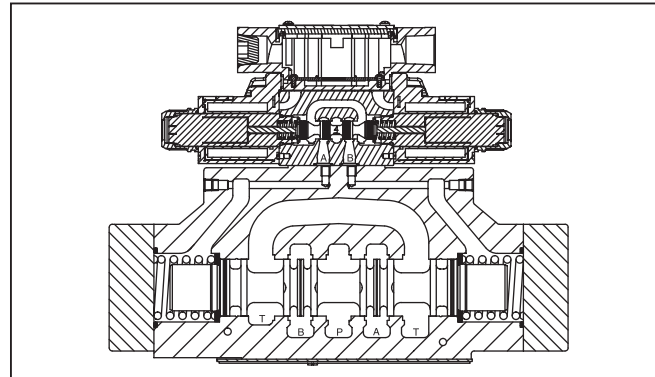
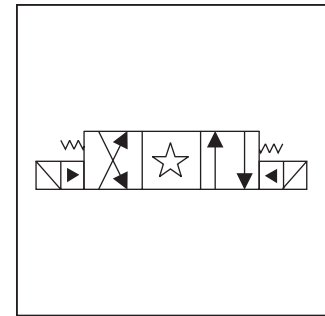
Series D91VW directional control valves are 5-chamber, pilot operated, solenoid controlled valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting pattern, NG25 (for port diameter up to 32mm).

Operation

Series D91VW 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.



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Specifications

Interface	NFPA D08, CETOP 08, NG 25, Ø32 mm
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 Only 207 Bar (3000 PSI) DC Std / AC Opt External Drain Model: 345 Bar (5000 PSI) CSA  103 Bar (1500 PSI)
Maximum Drain Pressure	103 Bar (1500 PSI) AC Std 207 Bar (3000 PSI) DC Std / AC Opt CSA  103 Bar (1500 PSI)
Min Pilot Pressure	5.1 Bar* (75 PSI)
Max Pilot Pressure	345 Bar (5000 PSI) Std CSA  207 Bar (3000 PSI)
Nominal Flow	302 LPM (80 GPM)

* 6.9 Bar (100 PSI) for spool configurations 002, 007, 008, 009, and 014

Response Time (ms)*

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

* Response times (milliseconds) are measured at 345 Bar (5000 PSI) and 300 LPM (88 GPM) with various pilot pressures as indicated.

** 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)

 **WARNING:** This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

D91VW - Ordering Information

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D

Directional
Control
Valve

91V

Basic
Valve

W

Actuator

Spool

Style

Pilot Supply
and Drain

Seal

Solenoid
Voltage

Code	Description
91V	NFPA D08, CETOP 08, DIN NG 25, High Flow, Bore dia Ø32mm, D03 Pilot

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
D†#	120 VDC
E*	24/60 - 24/50 VAC
J	24 VDC
K##	12 VDC
Q††#	100/60 VAC
QD††#	100 VAC/60 Hz - 100 VAC/50 Hz
T^^	240/60 - 220/50 VAC
U***#	98 VDC
Y	120/60 - 110/50 VAC
#	High watt only.
*	Leadwire only, low watt only.
**	DIN, low watt available.
***	Leadwire not available.
^^	Plug-in is low watt only.
†	DIN & Leadwire only.
††	DIN only.

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

*Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing solenoid A. Note operators reverse sides for #008 and #009 spools. See installation information for details. To configure per DIN standards (A coil over A port, B coil over B port) code valves as D61VHW***.

Code	Symbol
001	
002	
003	
004	
006	
008*, 009**	
011	
012	
015	
016	
020*	
021	
030**	
081	
082	

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

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

* Not available with 002, 008, 009, and 030 spools

3-Position Spools			
Code	All 3-Position Spools		
C			3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool Type 009	
E			2 positions. Spring offset in position "0".
F			2 positions. Operated in position "0".
K			2 positions. Spring offset in position "0".
M			2 positions. Operated in position "0".
R			2 positions, detent. Operated in position "0" or "b".
S			2 positions, detent. Operated in position "0" or "a".

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".

* 020 and 030 spools only. Must be standard high watt coil (30 watt) or L (10 watt coil) only (stroke is reduced by 0.5mm, therefore max flow is reduced to 13 - 14 GPM). Not available with F (low watt) coil option for AC coils only.

Bold: Designates Tier I products and options.

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

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MSG14-2500/US
Directional Control Valves

Directional Control Valves

D91VW - Ordering Information

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Code	Description
C*	Leadwire Conduit Box
D**	Metric Plug (M12X1) DESINA
E†	Explosion Proof
F ^x	Flying Leadwire
G††	Plug-In Conduit Box
J++	Deutsch (DT04-2P)
P	DIN with Plug
S†	Double Spade
W†	DIN w/o Plug
* No conduit box variations - See Plug-in G.	
** 24 VDC only, low watt only, lights, diode surge suppressor, not CSA approved.	
† Not available with lights.	
†† Required for variations on conduit box style, must have lights.	
++ 12 and 24 VDC only.	
x Only 12 VDC high watt.	
6" leadwire only.	

Code	Description
Omit*	High watt
D**	Explosion Proof, EExd ATEX
E**	Explosion Proof, EExme, ATEX, IECEx, from Germany
F†	Low Watt
L††	10 Watt
R#	Explosion Proof, ATEX/UL/CSA/IECEx, configurable cable connection
U##	Explosion Proof, UL/CSA
* AC ambient temperature must not exceed 60°C (140°F).	
** J voltage only, no options	
† AC only.	
†† DC (J and K coils) only.	
# J and Y voltages only. Y voltage is rectified.	
## J and Y voltages only. Y voltage is not rectified.	

Code	Description
Omit	No Options
J#	Diode Surge Suppressor
Z†	Rectified Coil
# Plug-In - 24 VDC only. DIN - DC only with Lighted Plug (5), which has integrated Surge Suppression. "J" not required here.	
Deutsch - as follows:	
• 12 VDC Hi watt only	
• 24 VDC Hi & Lo watt available. Required for Low watt.	
ER Explosion Proof - 24 VDC "JERP" required. Adds dust rating, not polarity sensitive [IIC, D].	
Leadwire - not available	
† DC tube standard, Plug-In conduit box only. Not polarity sensitive. Only available with Y voltage. Required with YERPZ option.	

Code	Description
Omit	Standard
P*	Extended Manual Override with Boot
T	Covered Manual Override, DC only, or AC Rectified
* Manual override options not available on Explosion Proof. Required only on JERPJ, YERPZ. Not available with high pressure AC tube H. Not available with any other tube options.	

Code	Description
Omit	Standard Pressure
	103.5 Bar (1500 PSI) AC
	207 Bar (3000 PSI) DC
H*	High Pressure, AC only
	207 Bar (3000 PSI)
* Not available with CSA or Explosion Proof.	

Code	Description
Omit	Standard Valve
4†#	CSA Canada
	CSA22.2 No. 139-13
N	CE Approved
Q†#	CE + CSA Approved
† Not available with AC high pressure tube.	
# Valve is derated.	

Code	Spool Position	Position Control
Omit	All	Standard Response
I3N	C	End position monitored, side A and B
I6N		Start position monitored, side A and B
I2N	C, B, E, F (all spools)	End position monitored, side B
I5N	C, K, M (spool 9)	Start position monitored, side B
I1N	C, H, K, M (all spools)	End position monitored, side A
I4N	C, E, F (spool 9)	Start position monitored, side A

Note: The plug M12 x 1 for the position control is included. The monitor switch has to be located on the side to which the spool moves from the spring offset position. For 4/3-way valves two switches are required. Not CSA approved. DC DIN, high watt coils only.

Mounting Bolt Kits				
UNC Bolt Kits for use with D6 and D8 Directional Control Valves and Sandwich Valves				
	Number of Sandwich Valves @ 2.75" (70 mm) thickness			
	0	1	2	3
D9	BK227 2.5"	BK121 5.25"	BK122 8"	BK123 10.75"
D9 plus tapping plate	BK161 3.5"	BK170 6.25"	BK171 9"	BK172 11.75"
D9	BK228 3"	BK131 5.75"	BK132 8.5"	BK133 11.25"
D9 plus tapping plate	BK173 4"	BK174 6.75"	BK175 9.5"	BK114 12.125"

NOTE: All bolts are SAE grade 8, 1/2-13 UNC-3A thread, torque to 133 Nm (100 lb-ft)

Valve Weight:

Double Solenoid 19.6 kg (43.2 lbs.)

Seal Kit:

Nitrile SKD91VWN94
Fluorocarbon SKD91VWV94**Bold: Designates Tier I products and options.****Non-Bold: Designates Tier II products and options. These products will have longer lead times.**Industrial
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Directional Control Valves

Directional Control Valves

D91VW - Ordering Information

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Valve Variations

(OPTIONS ARE NOT AVAILABLE ON MONITOR SWITCH VALVES)

Code	Description
1C**	Manaplug – Brad Harrison Style 7/8-16 with Lights (Single Solenoid = 5 pin)
1D**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 5 pin)
1M**	Manaplug Opposite Normal
1P	Painted Body
1R	Stroke adjust "A" and "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 Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Pilot Choke Meter Out with Lights and Manaplug – Brad Harrison Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
4D#	Twist and Lock Override
5*	Signal Lights – Standard Signal Lights – Hirsch. (DIN with Plug) (the DC Lighted Plug has Integral Surge Suppression)
7B**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
7W^	4-pin Micro Manaplug, Special Wiring with Lights
7Y^	Manaplug – Brad Harrison Style M12x1 Micro with Lights and Special Wiring (4 pin)
56**	Manaplug – Brad Harrison Style 7/8-16 Mini with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
20	Fast Response
* DESINA, plug-in conduit box, and DIN with plug styles only. ** Solenoid connection option G only. Requires manaplug code (56, 1C, 7B, etc.). ^ Requires G code (Plug-in Conduit Box) and J code (Diode Surge Suppressor) and lights.	

Model	Spool Symbol	Maximum Flow, LPM (GPM) 345 Bar (5000 PSI) w/o Malfunction
D91V*001		624 (160)
D91V*002		624 (160)
D91V*003		624 (160)
D91V*004		624 (160)
D91V*006		624 (160)
D91V*008 D91V*009		312 (80)
D91V*011		624 (160)
D91V*012		312 (80)
D91V*015		624 (160)
D91V*016		624 (160)
D91V*020 D91V*030		624 (160)

Bold: Designates Tier I products and options.

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

D91V* Series Pressure Drop Chart

The following chart provides the flow vs. pressure drop curve reference for the Series D91V valves by spool type.

Viscosity Correction Factor

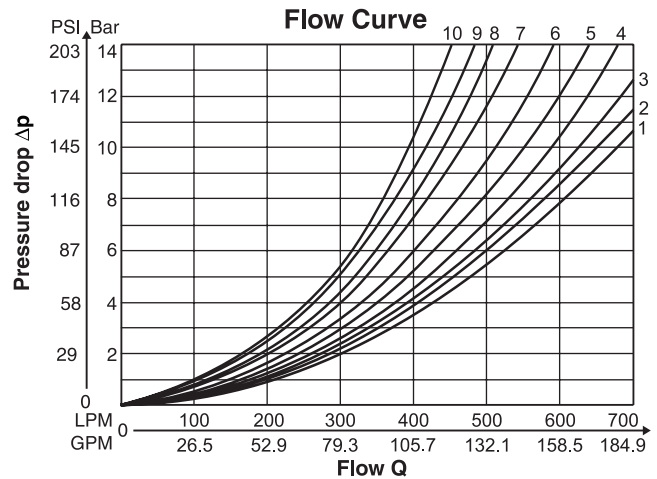
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141

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

D91VW Pressure Drop Reference Chart – Curve Number

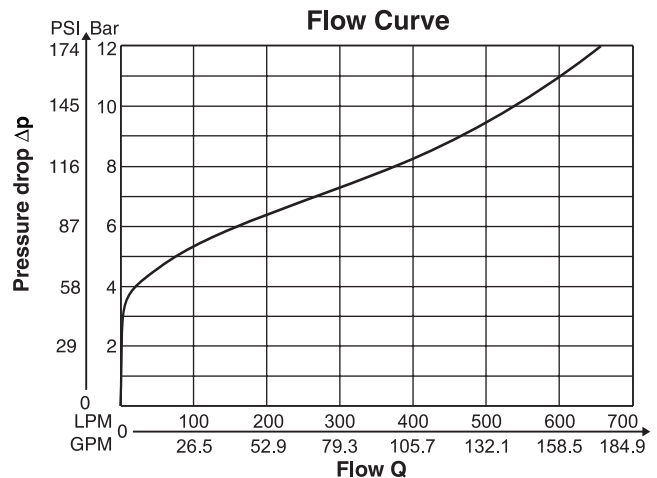
Spool No.	P-A	P-B	P-T	A-T	B-T
001	3	2	–	3	5
002	2	1	1	3	5
003	4	2	–	3	6
004	4	3	–	3	5
005	1	2	–	4	5
006	2	2	–	4	6
007	3	1	7	3	5
009	4	8	9	4	10
011	3	2	–	3	5
014	1	2	8	3	5
015	3	3	–	4	5
016	3	3	–	4	5
020	6	5	–	6	8
021	5	10	–	3	–
022	10	5	–	–	5
026	6	5	–	–	–
030	3	2	–	3	5
054	4	3	–	3	5

Performance Curves



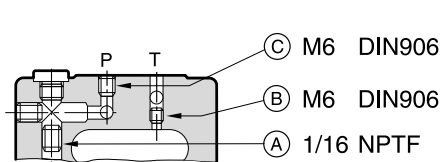
Integral Check Valve in the P Port

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.



All characteristic curves measured with HLP46 at 50°C.

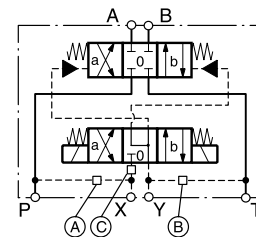
Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

Pilot oil Inlet	Outlet	A	B	C
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



Directional Control Valves

D91VW - Technical Information

A204

WWW.SUMY.IR

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Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3 mm	Watts	Resistance
Voltage Code	Power Code						
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 Ohms
E	F	24 VAC	4.8 Amps	120 VA	2.07 Amps	21 W	1.29 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
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 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	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
Explosion Proof Solenoids							
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
ER & ET Explosion Proof Solenoids							
J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

Industrial
Hydraulics Valves

MSG14-2500/US
Directional Control Valves

Single Solenoid Valve

Electrical Specifications of Position Control as per IEC 61076-2-101 (M12x1)

Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)
Supply Voltage / Ripple (V)	24 ≤10%
Tolerance Supply Voltage (%)	+/-20
Polarity Protection (V)	300
Current Consumption without Load (mA)	≤20
Switching Hysteresis (mm)	<0.06
Max Output Current per Channel, Ohmic (mA)	250
Min. Distance to Next AC Solenoid (m)	0.1 (0.33 ft)
Interface	M12x1 acc. to IEC 61076-2-101
Wiring Minimum (mm²)	5x0.25 braid shield recommended
Wiring Length Maximum (m)	50 (164 ft) recommended
CE Conform	EN 61000-4-2 / EN 61000-4-4 / EN 61000-4-6 ¹⁾ / ENV 50140 / ENV 50204

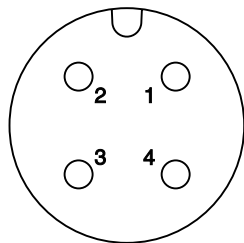
¹⁾ Only guaranteed with screened cable and female connector

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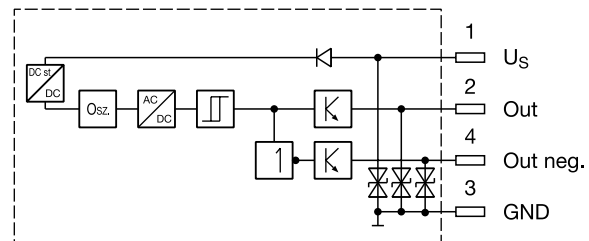
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M12 Pin Assignment



1. U_s 19.2...28.8V
2. Out B: normally open
3. 0V
4. Out A: normally closed



Outputs: Open collector

Definitions

Start position monitored:

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

At the switching point the spool is located within the closed position. It is secured so that only the flow paths of the offset position are granted.

The switch can only be located on the opposite side of the solenoid for direct operated valves. Please order plug M12x1 separately. See Accessories, plug M12x1 (part no.: 5004109).

End position monitored:

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

Directional Control Valves

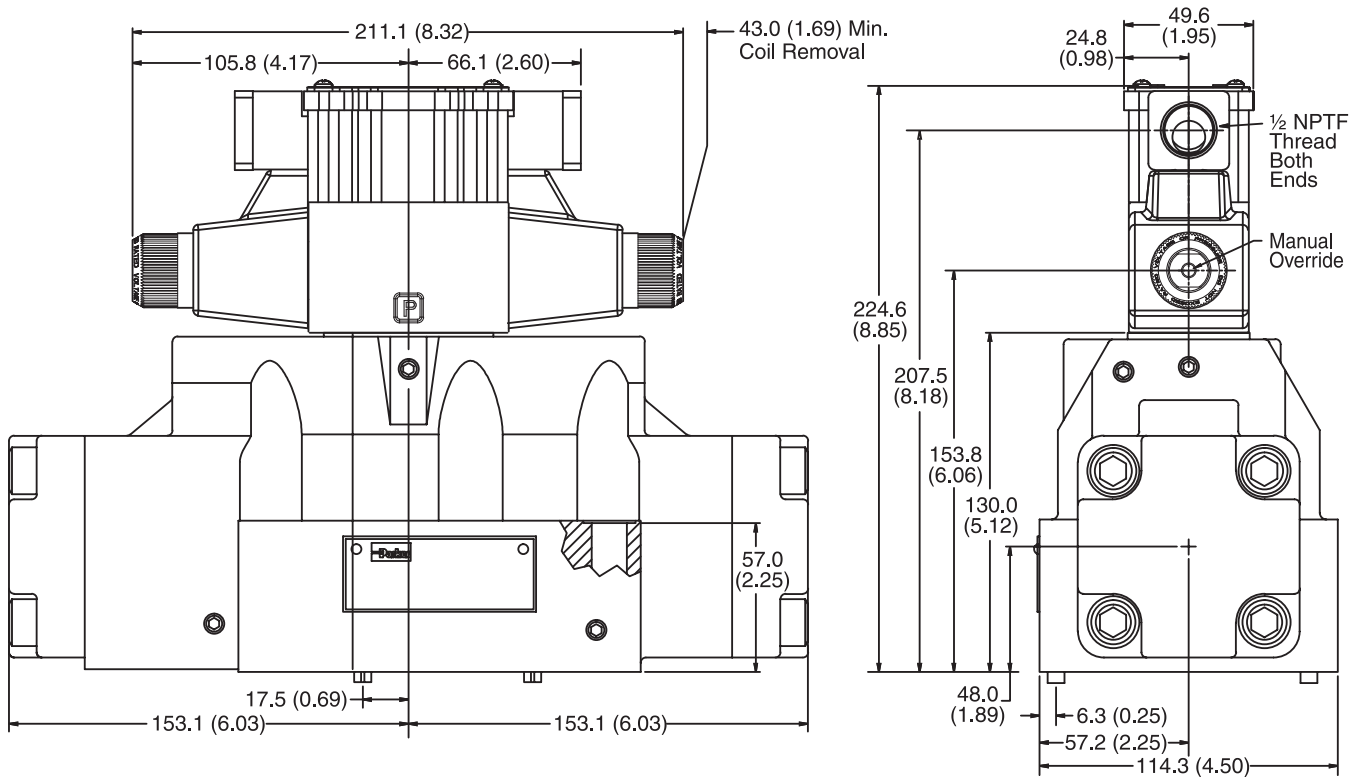
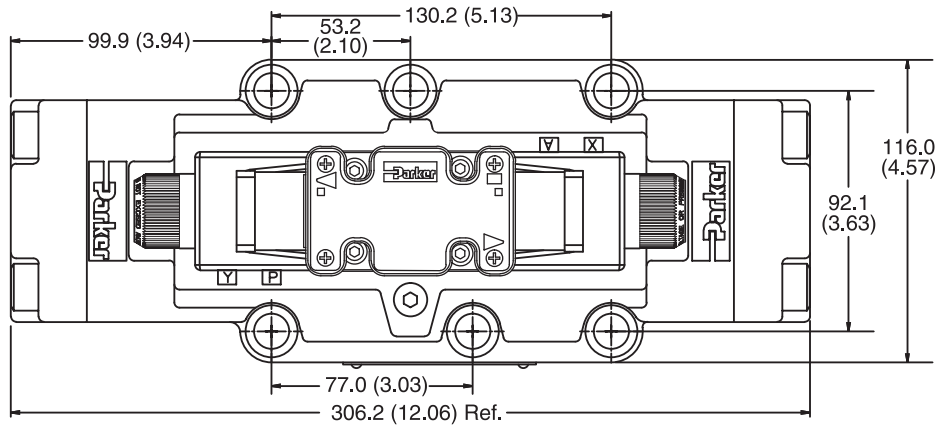
D91VW - Dimensions

A206

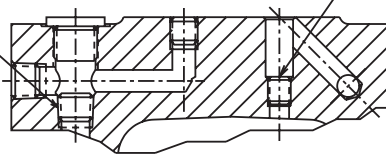
WWW.SUMY.IR

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

Plug-in Conduit Box, Double AC Solenoid



1/16 Plug for Variations 2 & 5
Torque to:
11.67 ±1.67 Nm
(105 ±15 in-lbs)
Do Not Loctite



M6 x 1 Plug for Variations 1, 2, & 3
Torque to:
1.78 ±0.22 Nm
(16 ±2 in-lbs)
Do Not Loctite

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

Directional Control Valves

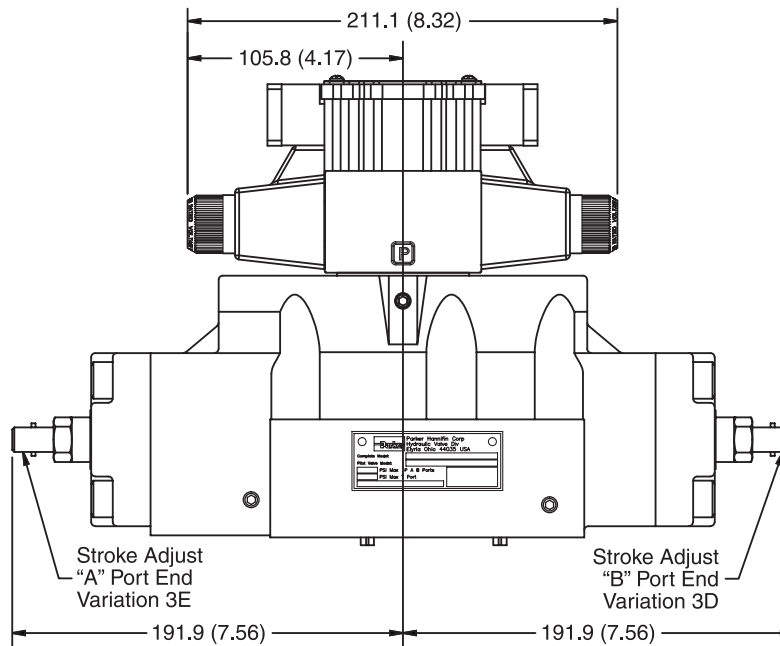
D91VW - Dimensions

A207

WWW.SUMY.IR

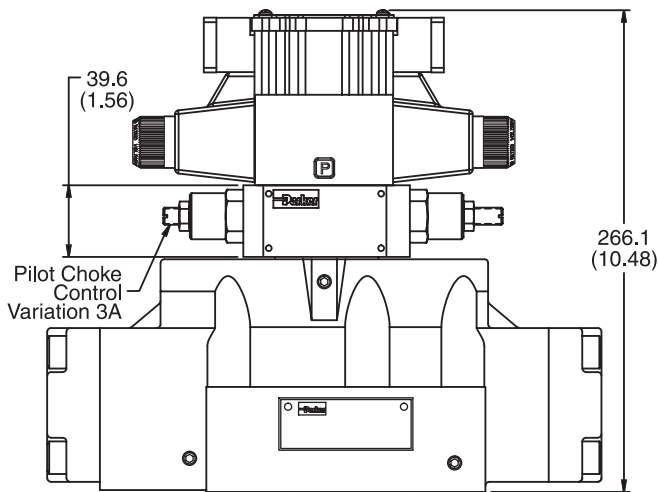
Inch equivalents for millimeter dimensions are shown in (**)

Conduit Box and Stroke Adjust, Double AC Solenoid

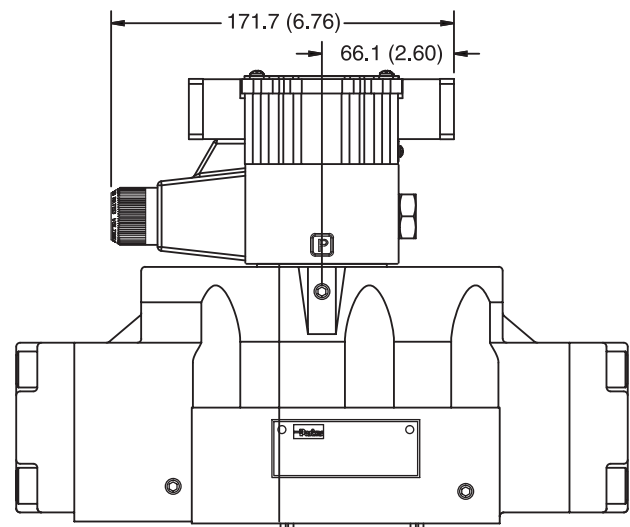


Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

Conduit Box and Pilot Choke Control, Double AC Solenoid



Conduit Box, Single AC Solenoid



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Directional Control Valves

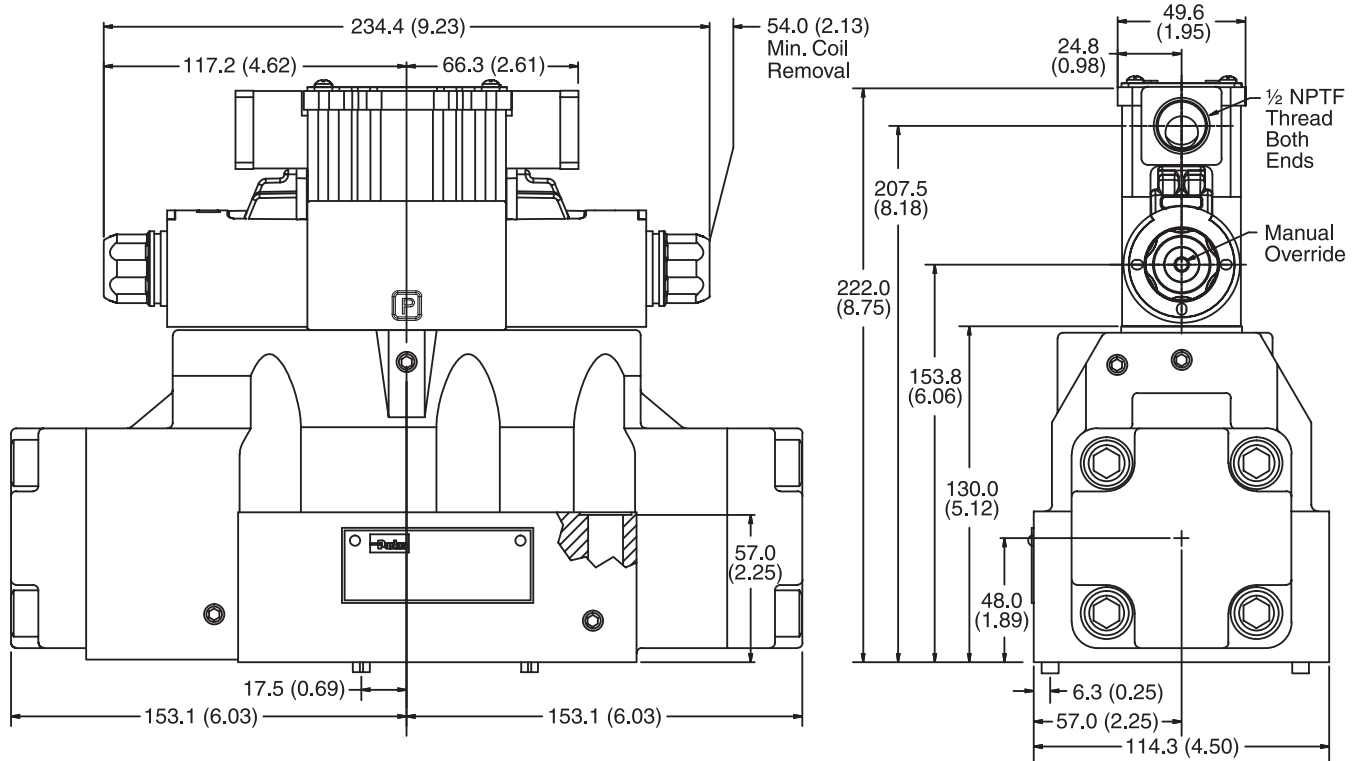
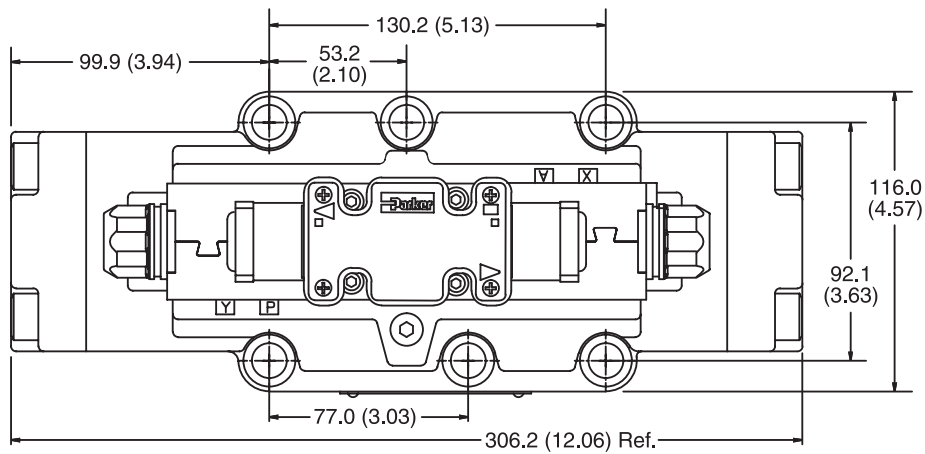
D91VW - Dimensions

A208

WWW.SUMY.IR

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

Plug-In Conduit Box, Double DC Solenoid



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



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Directional Control Valves

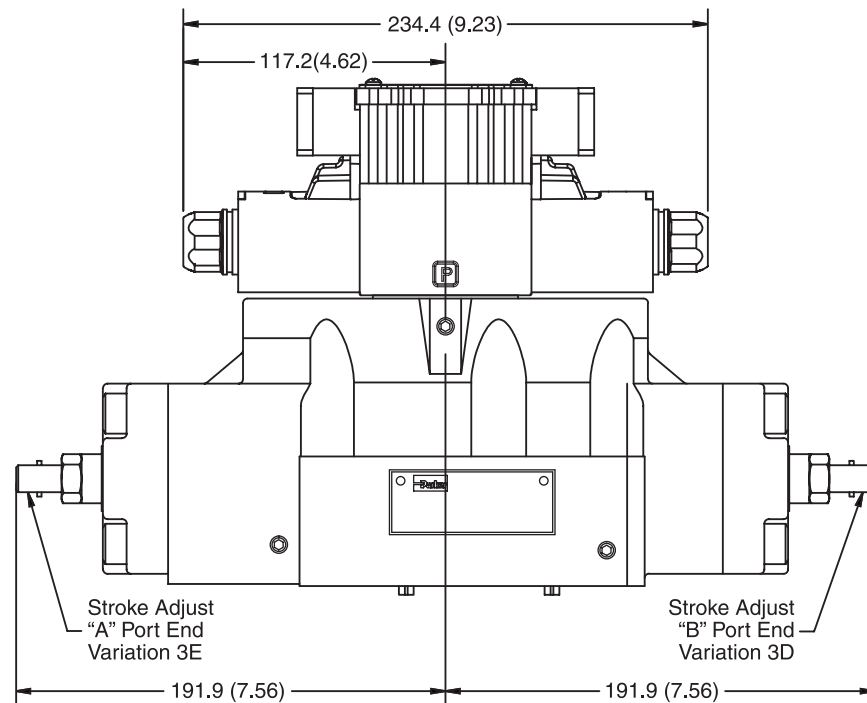
D91VW - Dimensions

A209

WWW.SUMY.IR

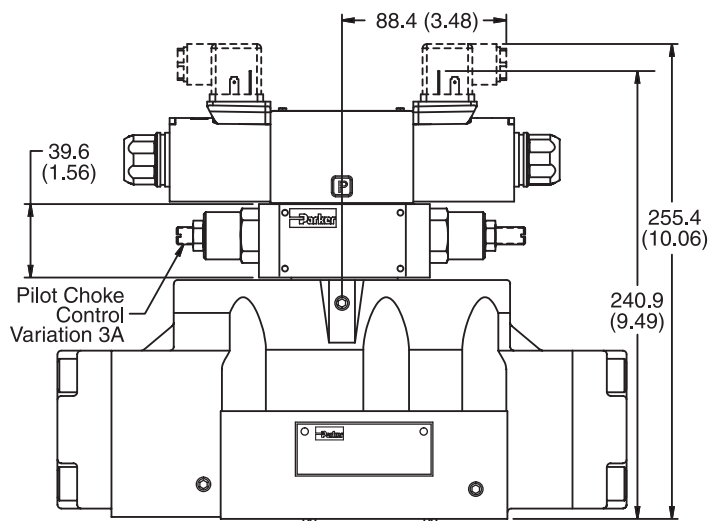
Inch equivalents for millimeter dimensions are shown in (**)

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

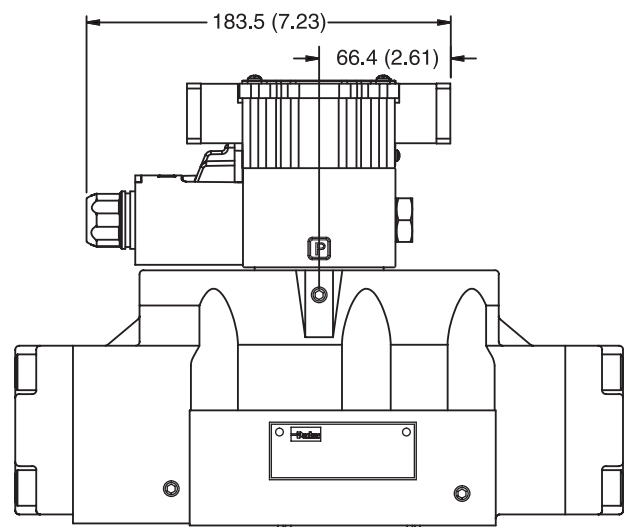


Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

Hirschmann and Pilot Choke Control, Double DC Solenoid



Plug-In Conduit Box, Single DC Solenoid



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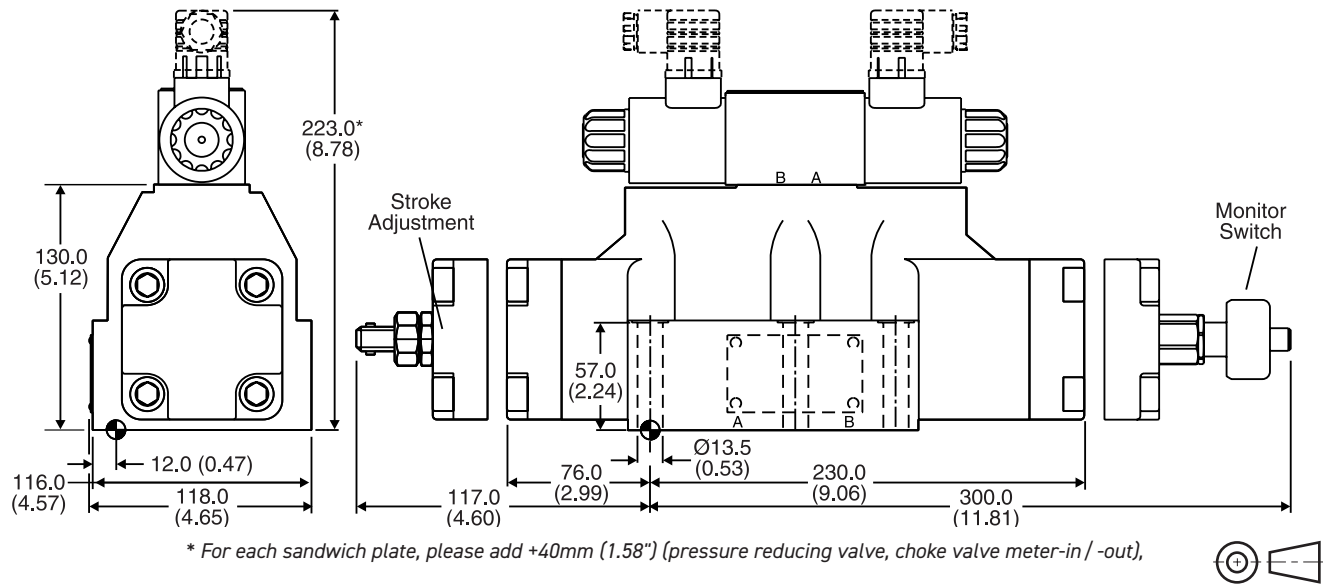
Directional Control Valves

D91VW - Dimensions

A210

WWW.SUMY.IR

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



Surface Finish	Kit			Seal Kit
$\sqrt{R_{max} 6.3}$	BK360	 6x M12x75 ISO 4762-12.9	 108 Nm (79.7 lb-ft) +/- 15%	 Nitrile: SKD91VWN94 Flurocarbon: SKD91VWV94

The space necessary to remove the plug per DIN 43650, design type AF, is at least 15 mm (0.59").
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm (0.37 to 0.44 lb.-ft.).

Directional Control Valves

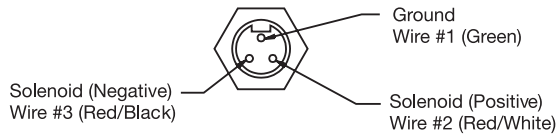
D91WW - Accessories

A211

WWW.SUMY.IR

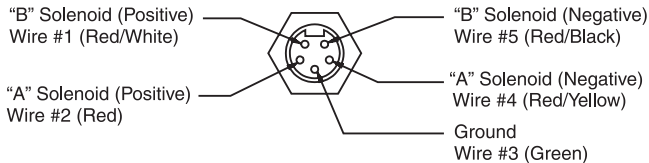
Manaplug (Options 56 & 1C)

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



3-Pin Manaplug (Mini) with Lights

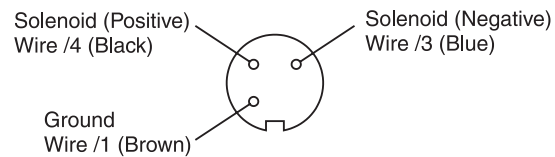
Single Solenoid Valves – Installed Opposite Side of Solenoid



5-Pin Manaplug (Mini) with Lights

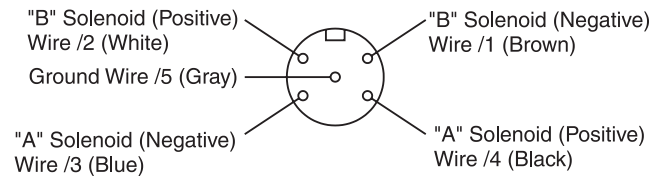
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7B & 1D)



3-Pin Manaplug (Micro) with Lights

Single Solenoid Valves – Installed Opposite Side of Solenoid



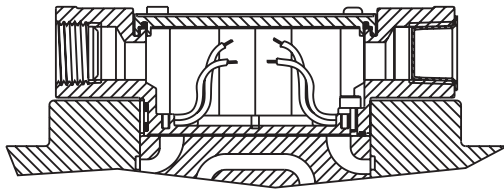
5-Pin Manaplug (Micro) with Lights

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)

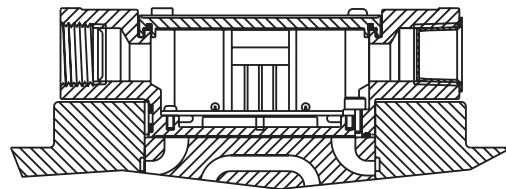
Conduit Box Option C

- No Wiring Options Available



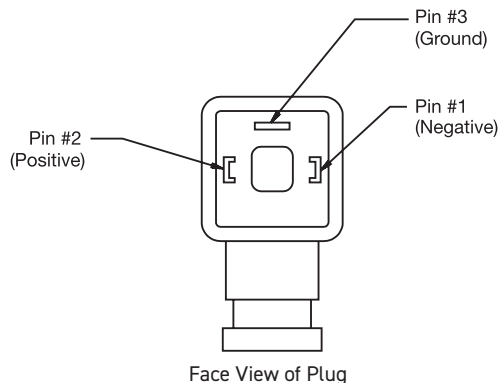
Signal Lights (Option 5) — Plug-in Only

- LED Interface
- Meets Nema 4/IP67



Hirschmann Plug with Lights (Option P5)

ISO 4400/DIN 43650 Form "A"



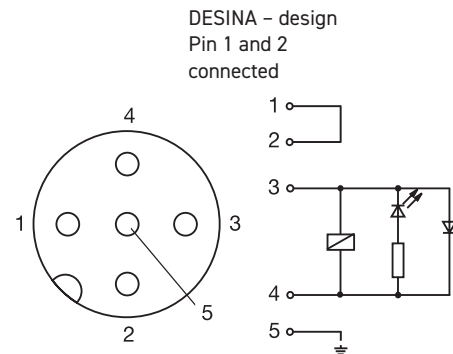
Face View of Plug

Pins are as seen on valve (male pin connectors)

DESINA Connector (Option D)

M12 Pin Assignment
Standard

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



Directional Control Valves

D91VWR, D91VWZ - Technical Information

A212

WWW.SUMY.IR

General Description

Series D91VWR and D91VWZ are regenerative and hybrid directional control valves (NG25).

The innovative integrated regenerative function in the A-line (optional) allows new energy saving circuits with differential cylinders. The hybrid version can switch between regenerative mode and standard mode at any time.

Features

- Energy saving A-regeneration optionally integrated.
- Switchable hybrid version.

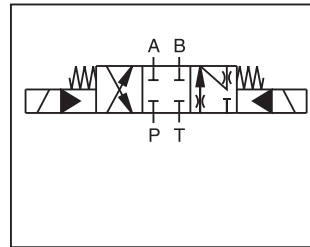
Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



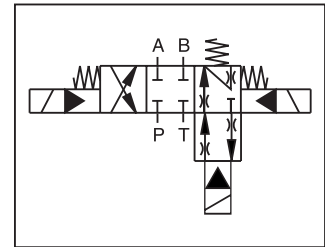
D41VWR (shown)



D41VWZ (shown)

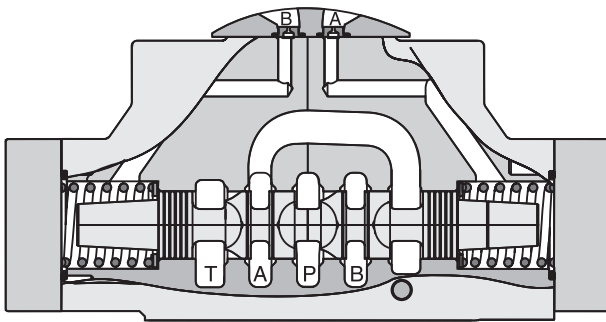


Regenerative D91VWR

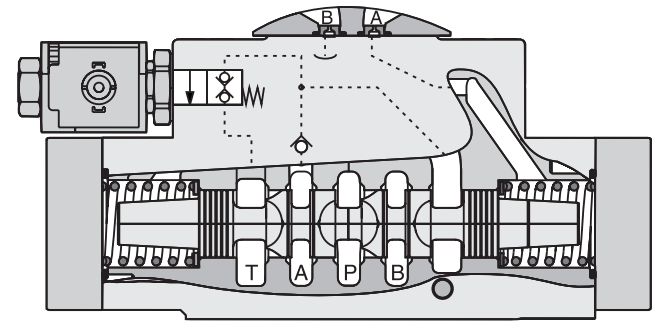


Hybrid D91VWZ

Regenerative Valve D91VWR

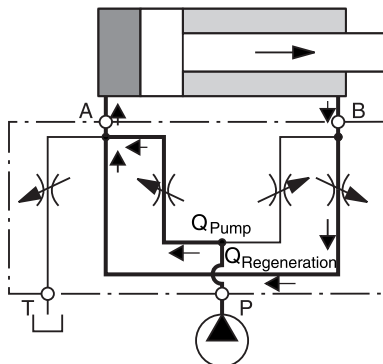


Hybrid Valve D91VWZ



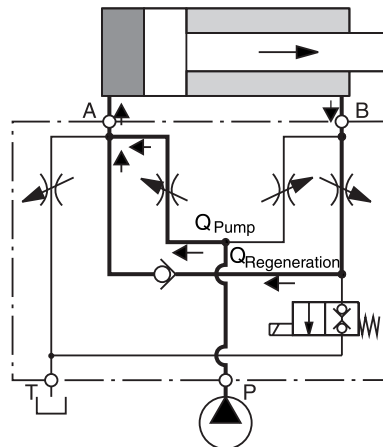
D91VWR Regenerative Valve

Cylinder Extending

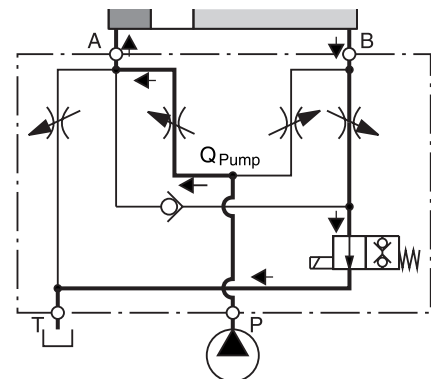


D91VWZ Hybrid Valve

Cylinder Extending
Regenerative Mode
(High Speed)



Cylinder Extending
Standard Mode
(High Force)



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D91VWR, D91VWZ - Technical Information

A213

WWW.SUMY.IR

Ordering Information

D91WW

Series

Code	Description
91WW	NFPA D08, CETOP 08, DIN NG 25, Ø32 mm

Spool

Code	Description
R01	Regenerative Function
R04	Regenerative Function
R81	Regenerative Function
R82	Regenerative Function

C

Style

Code	Description
C	3 positions. Spring off in position "0". Operated in position "a" or "b".

Pilot Supply and Drain

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

* Not available with 002, 008, 009, and 030 spools

Seal

Code	Description
N	Nitrile
V	Fluorocarbon

J

Solenoid Voltage 24VDC

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

* Not available with 002, 008, 009, and 030 spools

W

Connector as per EN 175301-803, without connector (Please order plug separately)

Code	Description
Omit	Standard
T	No manual override

Manual Override

Code	Description
Omit	Standard
T	No manual override

Valve Variations

Code	Description
Omit	No Variations
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' and 'B' End
3R	Pilot Choke Meter Out and Pilot Pressure Reducer
1T	Pilot Choke Meter In and Pilot Pressure Reducer

Design Series

NOTE: Not required when ordering.

Regenerative Function			Hybrid Function		
Code	Spool Type		Code	Spool Type	
	A	B 0		A	B 0
R01			Z01		
R04			Z04		
R81			Z81		
R82			Z82		

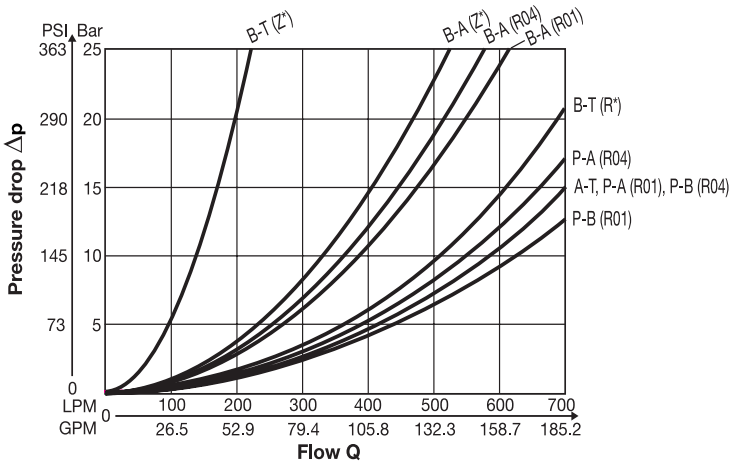
Weight:

D91VWR, D91DWZ 18.6 kg (41 lbs.)

Bold: Designates Tier I products and options.

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

Performance Curves



Flow curves measured with Spool R01, R04, Z01, Z04

Directional Control Valves

D91VWR, D91VWZ - Specifications

A214

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General		
Design	Directional Spool Valve	
Actuation	Solenoid	
Size	NG 25 / CETOP 08 / NFPA D08	
Mounting Interface	DIN 24340 A25 / ISO 4401 / CETOP RP121-H / NFPA D08	
Mounting Position	Unrestricted, preferably horizontal	
Ambient Temperature (°C)	-25 to +50 (-13°F to +122°F) without inductive position control	
MTTF _D Value (years)	75	
Hydraulic		
Maximum Operating Pressure (Bar)	Pilot Drain Internal: Ports P, A, B, X = 350 (5075 PSI); Ports T, Y = 105 (1523 PSI) Pilot Drain External: Ports P, A, B, T, X = 350 (5075 PSI); Port Y = 105 (1523 PSI)	
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature (°C)	-25 to +70 (-13°F to +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)	
Maximum Flow (LPM)	700 (185.2 GPM)	
Leakage @350 Bar (5075 PSI) per flow path (ml/min)	Up to 800 (0.21 GPM) depending on spool	
Minimum Pilot Supply Pressure (Bar)	5 (73 PSI)	
Static / Dynamic		
Step Response at 85% DC Solenoids Pilot Pressure	Energized	De-energized
50 Bar (725 PSI) (ms)	150	170
100 Bar (1450 PSI) (ms)	110	170
250 Bar (3625 PSI) (ms)	90	170
350 Bar (5075 PSI) (ms)	85	170
Electrical		
	Regenerative	Hybrid
Duty Ratio (%)	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible	100
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)	IP65 in accordance with EN60529 (plugged and mounted)
Supply Voltage / Ripple (V)	24	24
Tolerance Supply Voltage (%)	+/- 10	+/- 10
Current Consumption - Hold (A)	1.29	0.96
Current Consumption - In Rush (A)	1.29	–
Power Consumption - Hold (W)	31	23
Power Consumption - In Rush (W)	31	–
Solenoid Connection	Connector as per EN 175301-803, solenoid identification as per ISO 9461	Connector as per EN 175301-803
Wiring Minimum (mm²)	3x1.5 recommended	3x1.5 recommended
Wiring Length Maximum (m)	50 (164 ft) recommended	50 (164 ft) recommended
With electrical connections, the protective conductor (PE ↓) must be connected according to the relevant regulations.		

Directional Control Valves

D91VWR, D91VWZ - Technical Information

A215

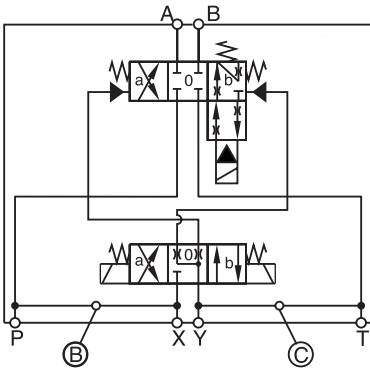
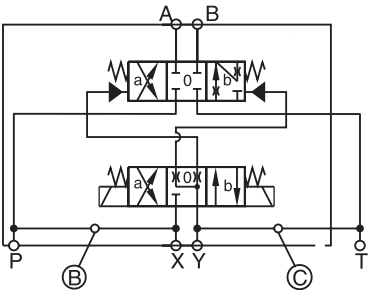
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Pilot Flow

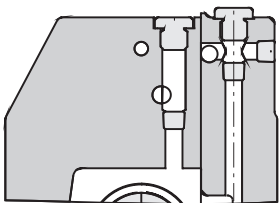
Pilot Oil Inlet (Supply) and Outlet (Drain)

○ open, ● closed

Pilot Oil Inlet	Pilot Oil Outlet	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



D91VWR

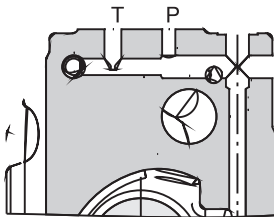


(drawn offset)

② 1/16 NPTF

③ 1/16 NPTF

D91VWZ

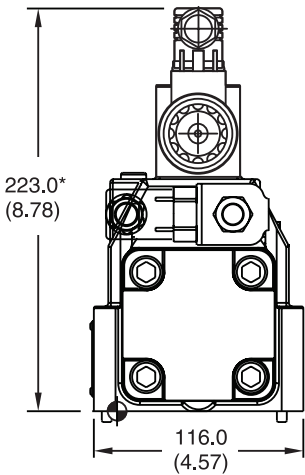


② 1/16 NPTF

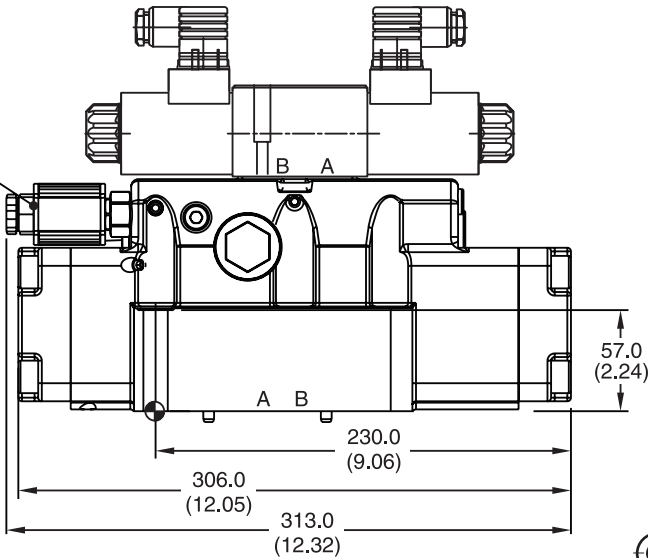
③ 1/16 NPTF

Dimensions

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



Only D91VWZ



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

Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}6.3}$ [0.01/100]	BK360	6x M12x75 ISO 4762-12.9	108 Nm (79.7 lb-ft) +/- 15%	Nitrile: SKD91VWN94 Fluorocarbon: SKD91VWV94

The space necessary to remove the plug per DIN 43650, design type AF, is at least 15 mm (0.59").
The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm (0.37 to 0.44 lb.-ft.).

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Directional Control Valves

D91VL - Technical Information

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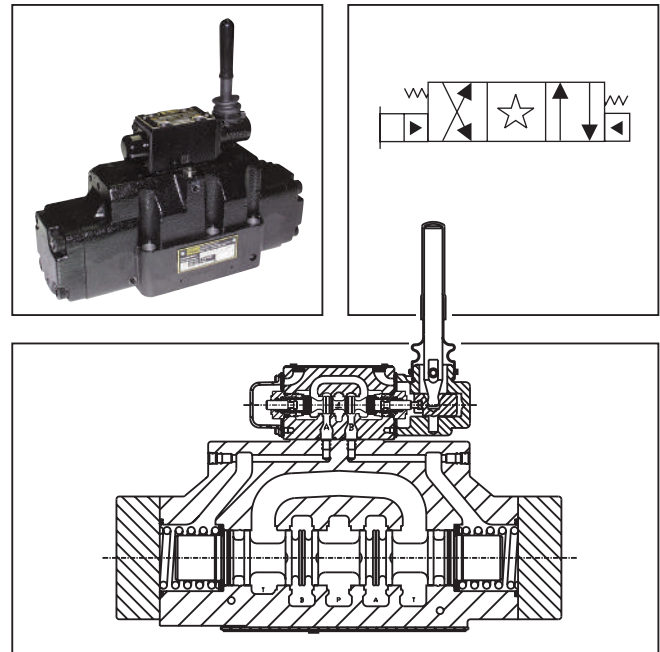
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General Description

Series D91VL directional control valves are 5-chamber, lever operated valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting pattern.

Specifications

Mounting Pattern	NFPA D08, CETOP 08, NG 25, Ø32 mm
Max Op Press (Bar)	350 (5075 PSI)
Max Tank Line Press (Bar)	Internal Drain Model: 34 (500 PSI) External Drain Model: 350 (5075 PSI)
Max Drain Press (Bar)	34 (500 PSI)
Max Flow (LPM)	See Reference Charts
Pilot Press (Bar)	Oil Min: 6.9 (100 PSI) Oil Max: 350 (5075 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time, and flow capacity (GPM)



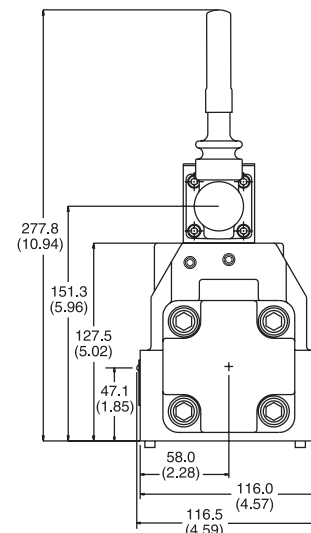
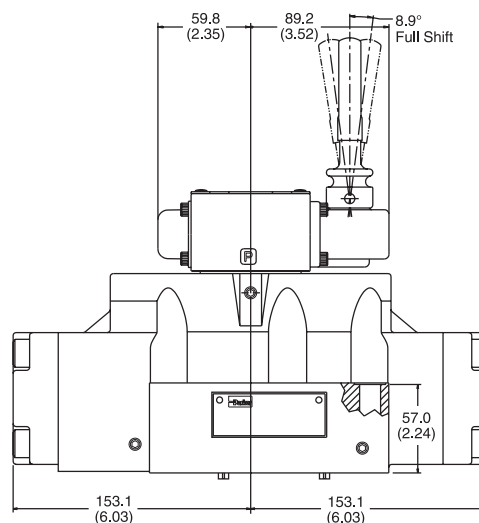
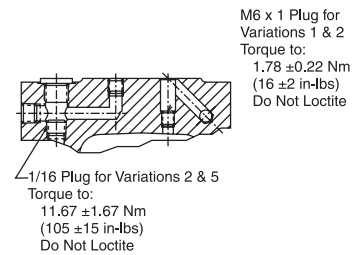
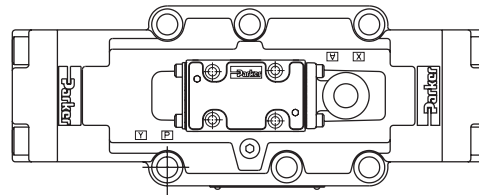
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Dimensions

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



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

⚠ WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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MSG14-2500/US
Directional Control Valves

Directional Control Valves

D91VL - Ordering Information

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Design Series

NOTE:
Not required when ordering.

D	91V
Directional Control Valve	Basic Valve
Code	Description
91V	NFPA D08, CETOP 08, DIN NG 25

L
Lever Operated Pilot



Spool



Style

Pilot Supply and Drain



Seal

Valve Variations

Code	Description
N	Nitrile
V	Fluorocarbon

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

Code	Description
1	Internal Pilot, External Drain
2	External Pilot, External Drain
4*	Internal Pilot, Internal Drain
5	External Pilot, Internal Drain
* Not available with 002, 008, 009, and 030 spools	

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

Code	Symbol
001	
002	
004	
008* , 009**	
011	
012	
020*	
030**	
* 008 and 020 spools have closed crossover.	
** 009 and 030 spools have open crossover.	

Code	Description	Symbol
B*	Two position, spring offset, P to A and B to T in offset position	
C	Three position, spring centered	
D*	Two position, detent	
E	Two position, spring centered, P to B and A to T in shifted position	
H*	Two position, spring offset, P to B and A to T in offset position	
K	Two position, spring centered, P to A and B to T in shifted position	
N	Three position, detent	
* B, D, and H styles available with 020 and 030 spools only.		



This condition varies with spool code.

Valve Weight: 19.6 kg (43.2 lbs.)
Standard Bolt Kit: BK228
Metric Bolt Kit: BKM228

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

Bold: Designates Tier I products and options.

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

Directional Control Valves

D9P - Technical Information

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General Description

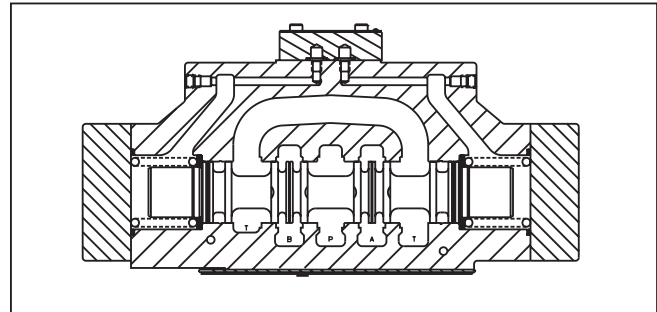
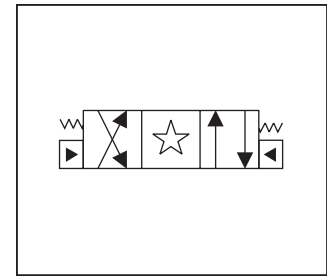
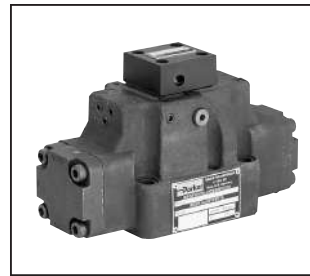
Series D9P directional control valves are 5-chamber, pilot operated valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting pattern.

Features

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

Specifications**

Mounting Pattern	NFPA D08 / CETOP 08 / NG 25, Ø32 mm
Max Op Press (Bar)	345 (5000 PSI)
Max Tank Line Press (Bar)	345 (5000 PSI)
Max Drain Press (Bar)	345 (5000 PSI)
Min Pilot Press (Bar)	5.1* (75 PSI)
Max Pilot Press (Bar)	345 (5000 PSI)
Nominal Flow (LPM)	302 (80 GPM)
Max Flow (LPM)	See Reference Data Chart
* 6.9 Bar (100 PSI) for 002, 008, 009, and 012 spools	
** For flow path, pilot drain, and pilot pressure details, see installation information	



Response Time

Response time will vary with pilot line size, pilot line length, pilot pressure shift time and flow capacity of the control valve.

Shift Volume

The pilot chamber requires a volume of 1.35 in³ (22.1 cc) for center to end.

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

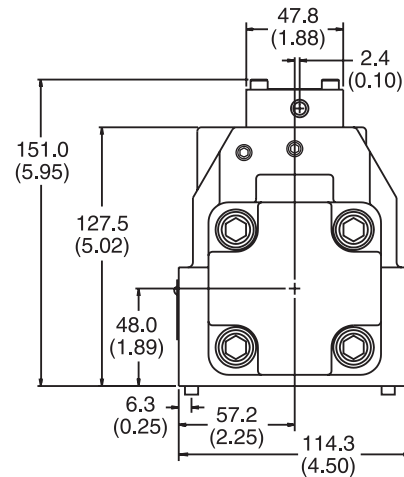
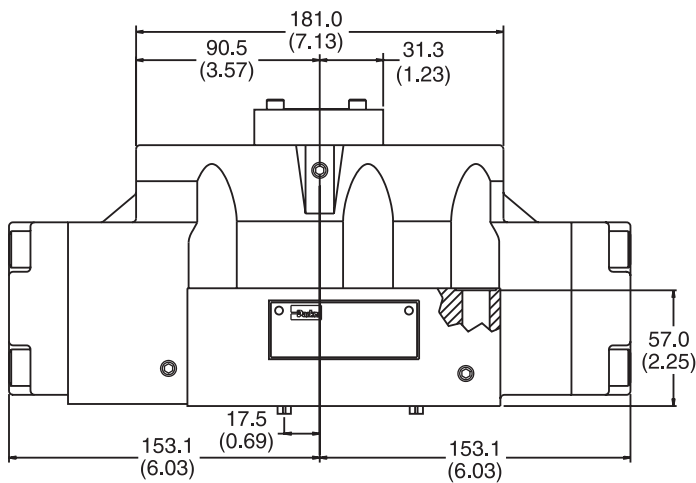
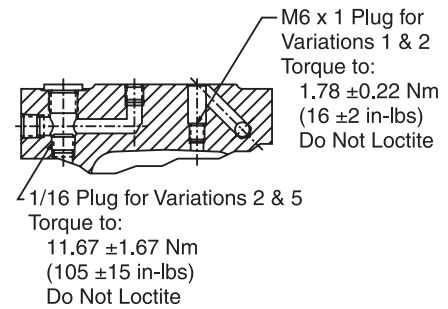
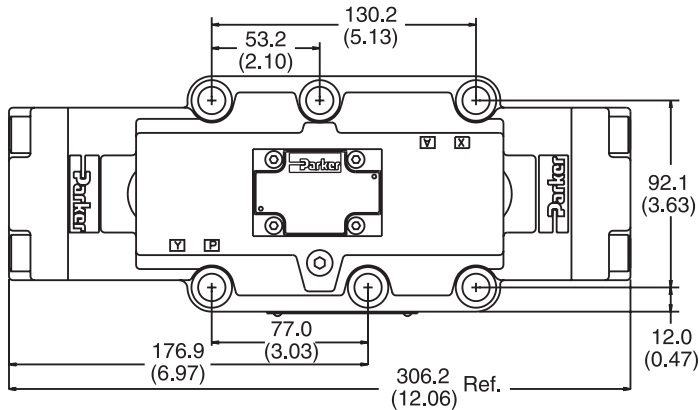
D9P - Dimensions

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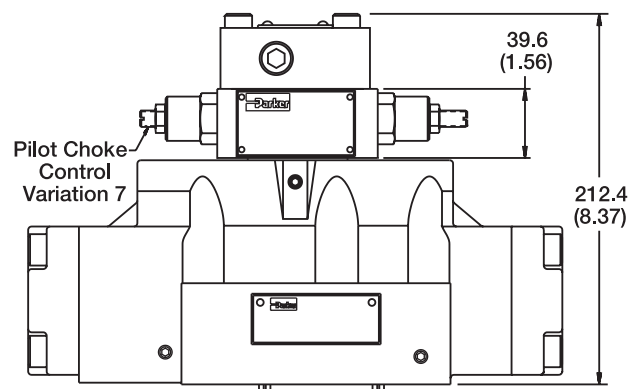
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Inch equivalents for millimeter dimensions are shown in (**)

Standard Pilot Operated



Pilot Operated with Pilot Choke Control



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

**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
D91V*, D9P	D08, CETOP 08	3/4"

Torque Specifications

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

135.6 Nm (100 lb-ft)

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Directional Control Valves

D91 - Installation

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Tank and Drain Line Surges

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

Loss of Pilot Pressure

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

Pilot Drain Characteristics

Pilot Pressure:

5.1 to 207 Bar (75 to 3000 PSI)

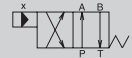
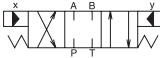
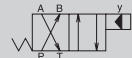
6.9 Bar (100 PSI) for spools 002, 007, 008, 009, and 014.

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

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

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

Flow Paths / Pilot Pressure

Style Code	Description	"X" and "Y" De-pressurized	"X" Port Pressurized	"Y" Port Pressurized	Special Notes	Recommended Control Valve for Pilot Oil
B	Two Position, Spring Offset	P -> A, and B -> T	P -> A, and B -> T	P -> B and A -> T	"X" Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position, Spring Centered	Center	P -> A, and B -> T	P -> B and A -> T	Flow paths will be reversed on valves with tandem center (008) spools	
H	Two Position, Spring Offset	P -> B and A -> T	P -> A, and B -> T	P -> B and A -> T	"Y" Port may be pressurized to assist spring in returning spool to offset position	

Directional Control Valves

D91 - Installation

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Subplate Mounting

NFPA D08, CETOP 08, and NG25

Recommended Mounting Surface

Surface must be flat within .102 mm (0.004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch).

Torque bolts to 135.6 Nm (100 lb-ft).

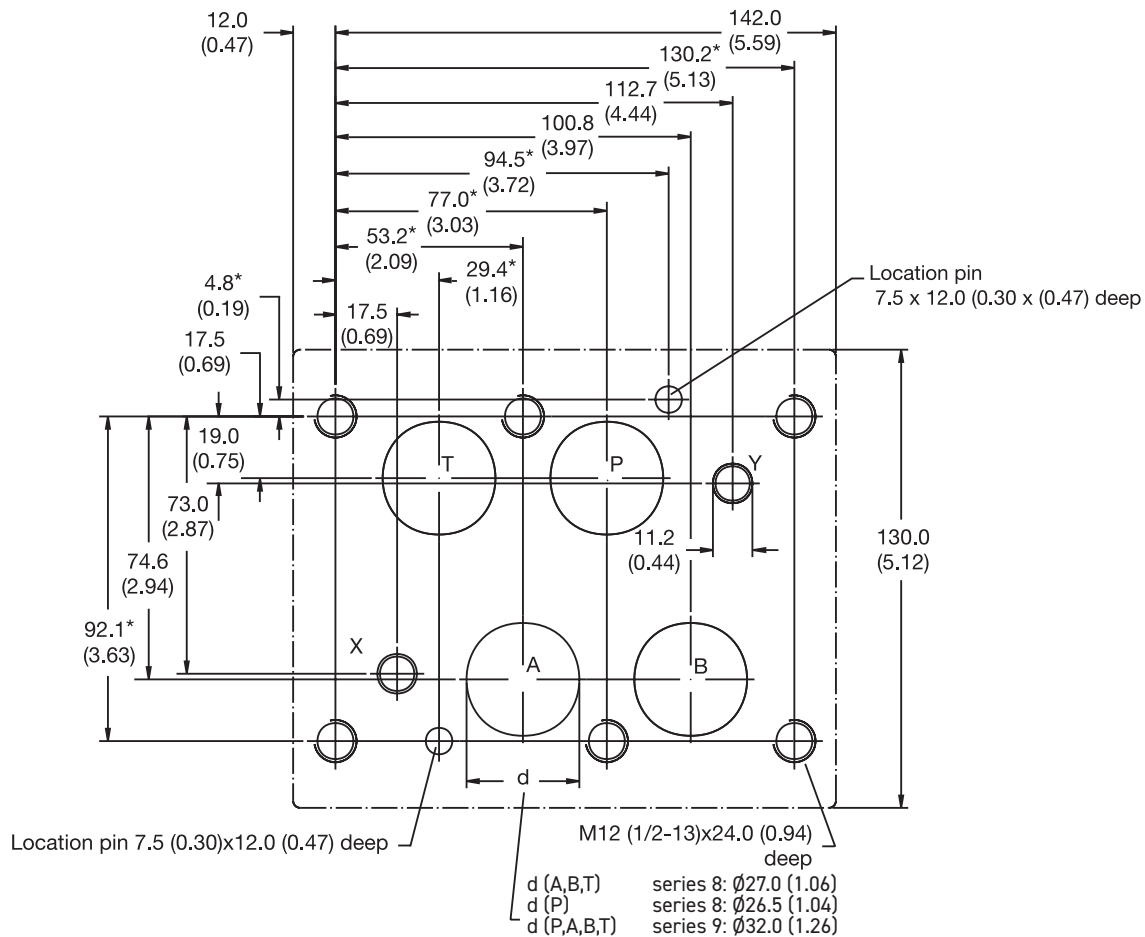
For maximum valve reliability, adhere to the following installation information.

Mounting Position

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

Mounting Pattern — NFPA D08, CETOP 08, and NG25

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



Directional Control Valves

D101 - Introduction

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Application

Series D101 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles and are manifold mounted. These valves conform to NFPA's D10, CETOP 10 mounting pattern.

Operation

Series D101 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or pilot operators (hydraulic or pneumatic).

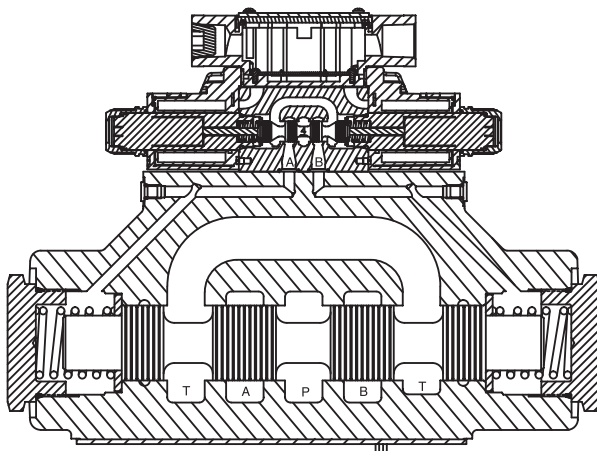
Features

- Easy access mounting bolts.
- 210 Bar (3000 PSI) pressure rating.
- Flows to 950 LPM (250 GPM) depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.

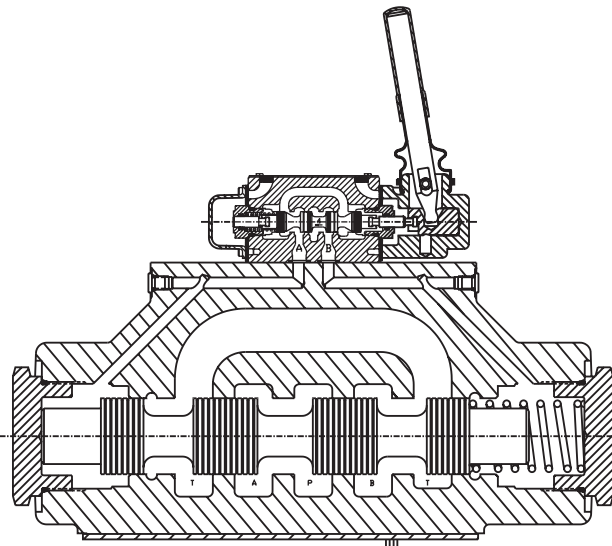
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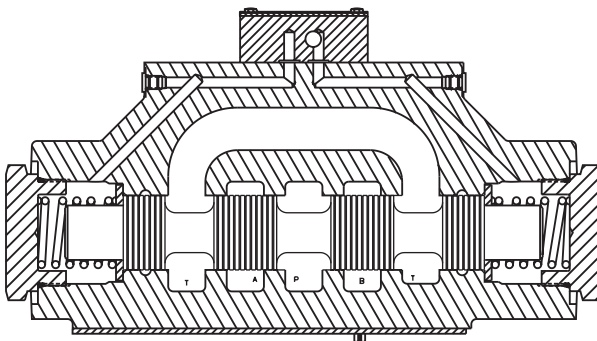
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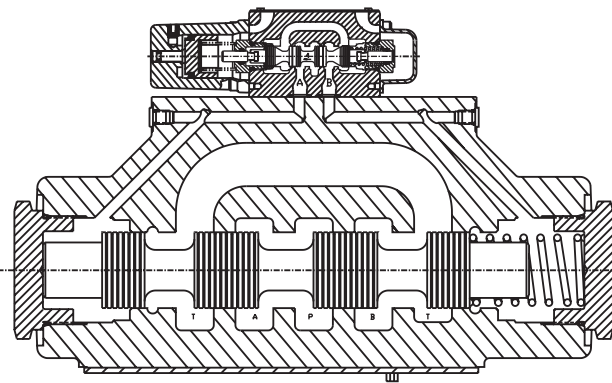
D101VW Solenoid Operated Plug-in
Conduit Box



D101VL Lever Operated



D10P Oil Pilot Operated



D101VA Air Pilot Operated

 **WARNING:** This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D101V - Technical Information

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General Description

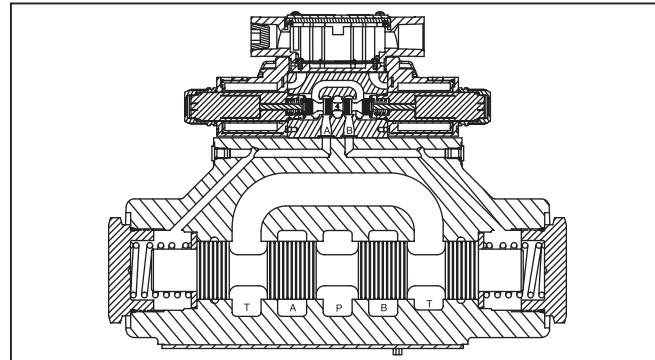
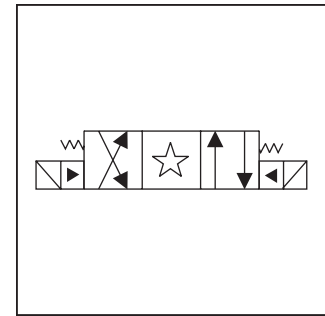
Series D101V directional control valves are 5-chamber, pilot operated, solenoid controlled valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D10, CETOP 10 mounting pattern.

Operation

Series D101V pilot operated valves are standard with low shock spools and pilot orifice. The orifice can be removed if a faster shift is required. However, it is recommended that all systems operating above 138 Bar (2000 PSI) use the standard valve to avoid severe shock.

Features

- Low pressure drop design.
- Hardened spools provide long life.
- Fast response option available.
- Wide variety of voltages and electrical connection options.
- Explosion proof availability.
- No tools required for coil removal.



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Specifications

Interface	NFPA D10, CETOP 10, NG 32
Max Operating Pressure	207 Bar (3000 PSI) Standard CSA  207 Bar (3000 PSI)
Max Tank Line Pressure	Internal Drain Model: 103 Bar (1500 PSI) AC Only 207 Bar (3000 PSI) DC Std / AC Opt External Drain Model: 207 Bar (3000 PSI) CSA  103 Bar (1500 PSI)
Maximum Drain Pressure	103 Bar (1500 PSI) AC Std 207 Bar (3000 PSI) DC Std / AC Opt CSA  103 Bar (1500 PSI)
Min Pilot Pressure	4.4 Bar (65 PSI)
Max Pilot Pressure	207 Bar (3000 PSI) Std CSA  103 Bar (1500 PSI)
Nominal Flow	378 LPM (100 GPM)
Maximum Flow	See Reference Chart



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

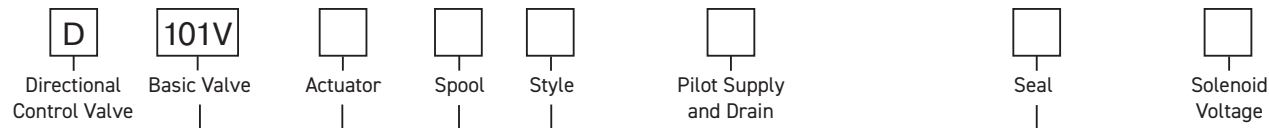
D101V - Ordering Information

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Code	Description
101V	NFPA D10, CETOP 10, DIN NG 32, D03 Pilot

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

* To configure per DIN standards (A coil over A port, B coil over B port) code valves as D101VHW***.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when actuating operator X. Note operators reverse sides for #008 and #009 spools. See installation information for details. To configure per DIN standards (A coil over A port, B coil over B port) code valves as D101VHW***.

Code	Description
N	Nitrile
V	Fluorocarbon

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

* Not available with 002, 007, 008, and 009 spools

Code	Description
D†#	120 VDC
E*	24/60 - 24/50 VAC
J	24 VDC
K***	12 VDC
Q††#	100/60 VAC
QD††#	100 VAC/60 Hz - 100 VAC/50 Hz
T^^	240/60 - 220/50 VAC
U***#	98 VDC
Y	120/60 - 110/50 VAC

High watt only.
* Leadwire only, low watt only.
** DIN, low watt available.
*** Leadwire not available.
^^ Plug-in is low watt only.
† DIN & Leadwire only.
†† DIN only.

Code	Symbol
001	
002	
003	
004	
005	
006	
008*, 009**	
011	

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

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

* Available with 001, 002, 004, and 011 spools only

Bold: Designates Tier I products and options.

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

Directional Control Valves

D101V - Ordering Information

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Solenoid Connection


Coil Options


Tube Options


Manual Override Options


Electrical Options


Approvals


Valve Variations


Design Series

NOTE:
Not required when ordering.

See next page for Valve Variations

Code	Description
C*	Leadwire Conduit Box
D**	Metric Plug (M12X1) DESINA
E†	Explosion Proof
F ^x	Flying Leadwire
G††	Plug-In Conduit Box
J++	Deutsch (DT04-2P)
P	DIN with Plug
S‡	Double Spade
W†	DIN w/o Plug
* No conduit box variations – See Plug-in G.	
** 24 VDC only, low watt only, lights, diode surge suppressor, not CSA approved.	
† Not available with lights.	
†† Required for variations on conduit box style, must have lights.	
++ 12 and 24 VDC only.	
‡ Only 12 VDC high watt.	
x 6" leadwire only.	

Code	Description
Omit	Standard
P*	Extended Manual Override with Boot
T	Covered Manual Override, DC only, or AC Rectified
* Manual override options not available on Explosion Proof or Soft Shift. Not available with high pressure AC tube H.	

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 or Explosion Proof.	

Code	Description
Omit	Standard Valve
4†#	CSA Canada
	CSA22.2 No. 139-13
N	CE Approved
Q†#	CE + CSA Approved
† Not available with AC high pressure tube.	
# Valve is derated.	

Code	Description
Omit*	High watt
D**	Explosion Proof, EExd ATEX
E**	Explosion Proof, EExme, ATEX, IECEx, from Germany
F†	Low Watt
L††	10 Watt
R#	Explosion Proof, ATEX / UL / CSA / IECEx, configurable cable connection
T#	Explosion Proof, ATEX / UL / CSA / IECEx, fixed horizontal cable connection
U##	Explosion Proof, UL/CSA
* AC ambient temperature must not exceed 60°C (140°F).	
** J voltage only, no options	
† AC only.	
†† DC (J and K coils) only.	
# J and Y voltages only.	
Y voltage is rectified.	
## J and Y voltages only.	
Y voltage is not rectified.	

Code	Description
Omit	No Options
J#	Diode Surge Suppressor
Z†	Rectified Coil
# Plug-In – 24 VDC only.	
DIN – DC only with Lighted Plug (5), which has integrated Surge Suppression. "J" not required here.	
Deutsch – as follows:	
• 12 VDC Hi watt only	
• 24 VDC Hi & Lo watt available.	
Required for Low watt.	
ER Explosion Proof – 24 VDC "JERP" required. Adds dust rating, not polarity sensitive [IIC, D].	
Leadwire – not available	
† DC tube standard, Plug-In conduit box only. Not polarity sensitive. Only available with Y voltage.	

Valve Weight:

Double Solenoid 35.0 kg (77.1 lbs.)

Standard Bolt Kit: BK229

Seal Kit:

Nitrile SKD101VWN91

Fluorocarbon SKD101VWV91

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

Directional Control Valves

D101V - Ordering Information

A228

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Valve Variations

Code	Description
1C**	Manaplug – Brad Harrison Style 7/8-16 with Lights (Single Solenoid = 5 pin)
1D**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 5 pin)
1M**	Manaplug Opposite Normal
1P	Painted Body
1R	Stroke adjust "A" and "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 Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Pilot Choke Meter Out with Lights and Manaplug – Brad Harrison Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
5*	Signal Lights – Standard Signal Lights – Hirsch. (DIN with Plug) (the DC Lighted Plug has Integral Surge Suppression)
7B**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
7Y**	Manaplug – Brad Harrison Style M12x1 Micro with Lights and Special Wiring (4 pin)
56**	Manaplug – Brad Harrison Style 7/8-16 Mini with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
20	Fast Response
* DESINA, plug-in conduit box, and DIN with plug styles only. ** Solenoid connection option G only. Requires manaplug code (56, 1C, 7B, etc.).	

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Directional Control Valves

D101V - Technical Information

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D101V Reference Data

Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction	Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction
D101V*001		83 (22)	D101V*006		53 (14)
D101V*002		83 (22)	D101V*007		11 (3)
D101V*003		45 (12)	D101V*008 D101V*009		19 (5)
D101V*004		45 (12)	D101V*011		30 (8)
D101V*005		57 (15)			

D101V* Series Pressure Drop Chart

The following chart provides the flow vs. pressure drop curve reference for the Series D91V valves by spool type.

Viscosity Correction Factor

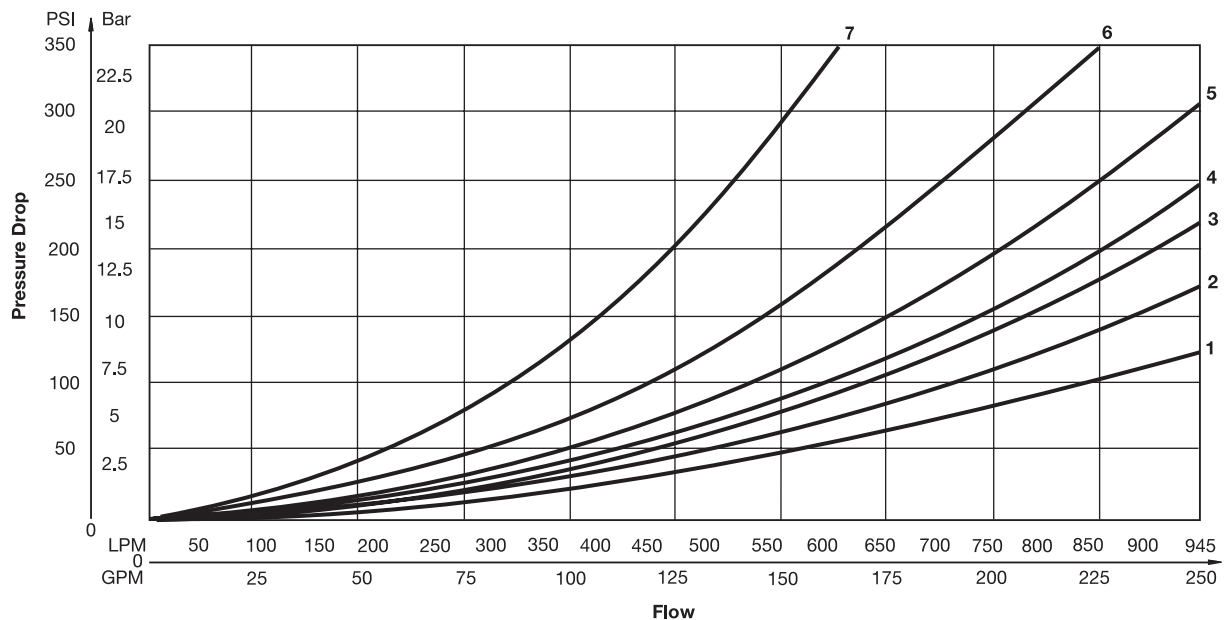
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141

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

D101VW Pressure Drop Reference Chart – Curve Number

Spool No.	P-A	P-B	P-T	A-T	B-T
001	4	4	–	2	3
002	3	3	3	1	2
003	4	4	–	1	3
004	4	4	–	1	2
005	3	4	–	2	3
006	3	3	–	2	3
007	4	3	7	2	2
008/009	5	5	6	2	3
011	4	4	–	2	3

Performance Curves



Directional Control Valves

D101V - Technical Information

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Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3 mm	Watts	Resistance
Voltage Code	Power Code						
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 Ohms
E	F	24 VAC	4.8 Amps	120 VA	2.07 Amps	21 W	1.29 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
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 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	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
Explosion Proof Solenoids							
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
ER & ET Explosion Proof Solenoids							
J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

Industrial
Hydraulics Valves

MSG14-2500/US
Directional Control Valves

Directional Control Valves

D101V - Dimensions

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

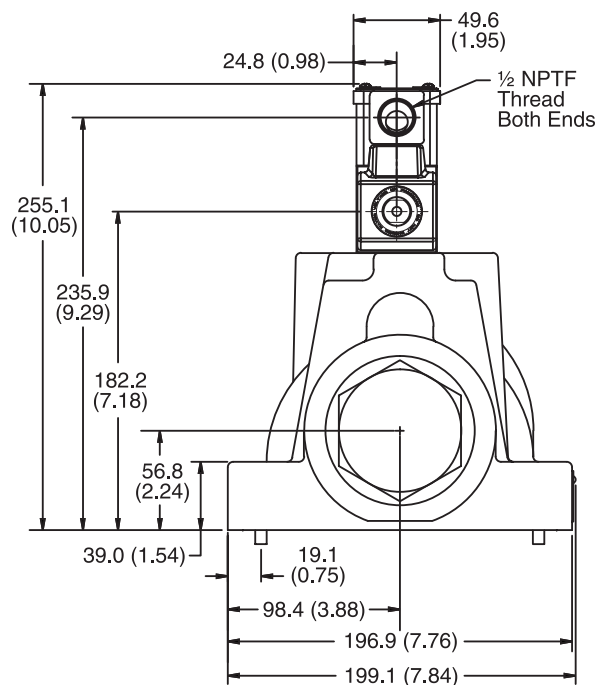
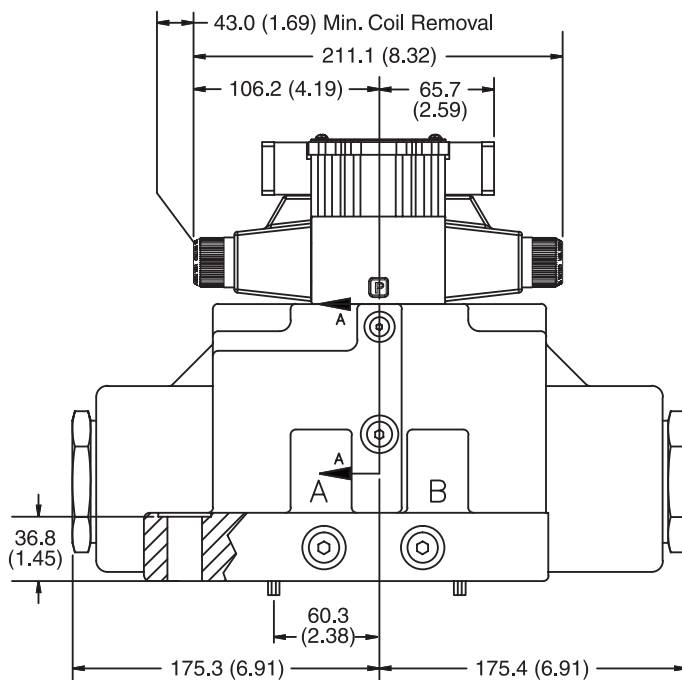
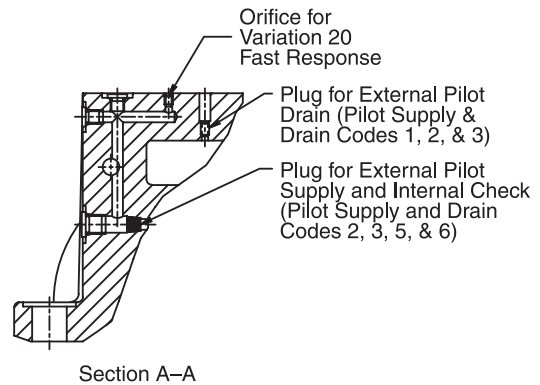
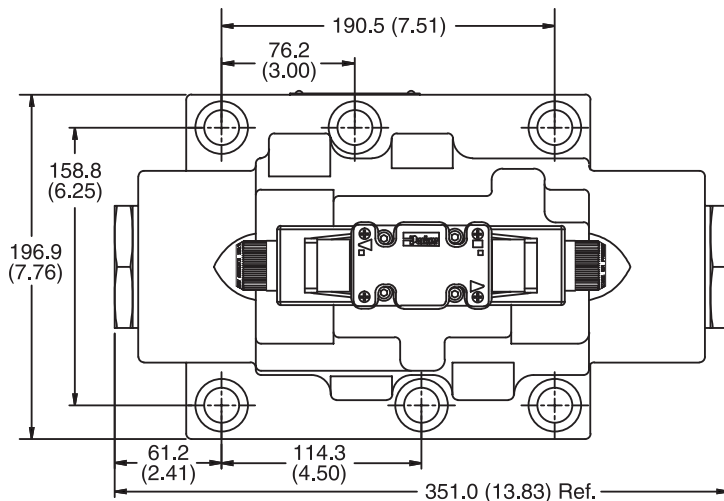
Plug-in Conduit Box, Double AC Solenoid



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Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

Directional Control Valves

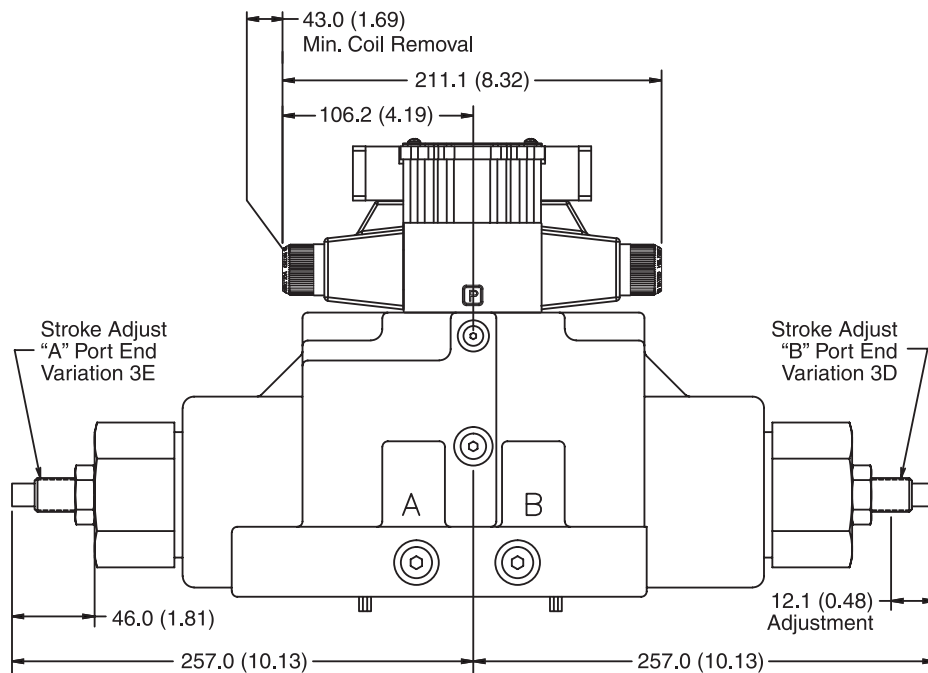
D101V - Dimensions

A232

WWW.SUMY.IR

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

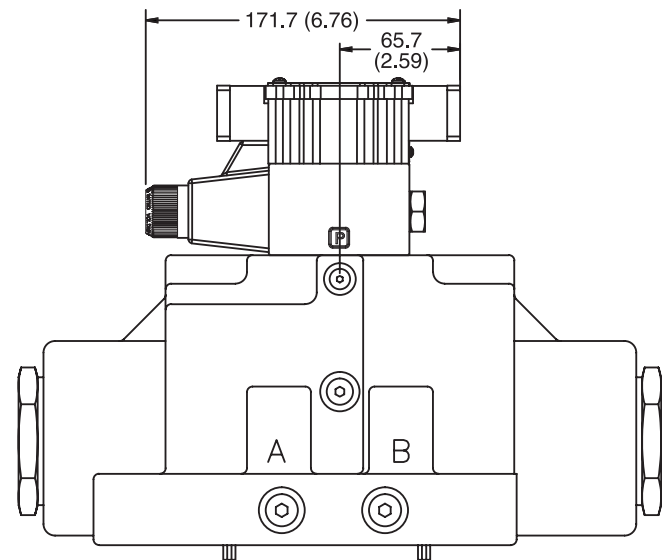
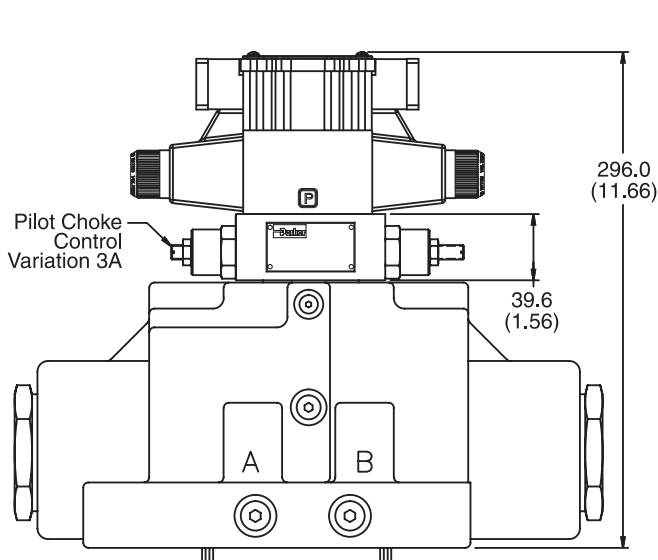
Conduit Box and Stroke Adjust, Double AC Solenoid



Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

Conduit Box and Pilot Choke Control, Double AC Solenoid

Conduit Box, Single AC Solenoid



Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

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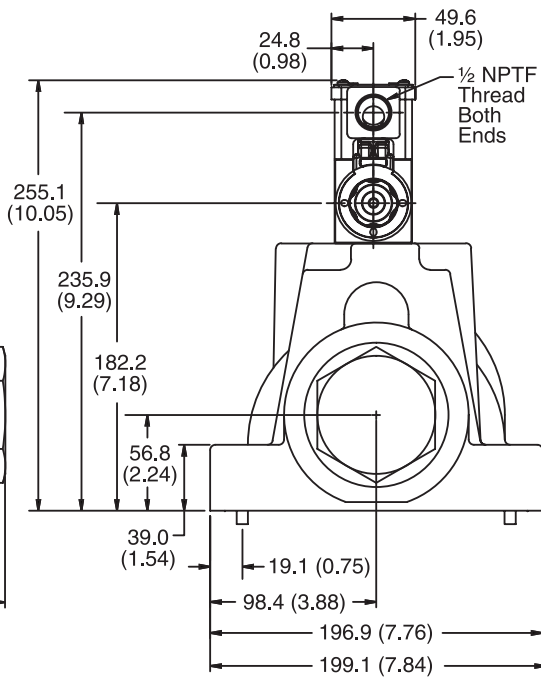
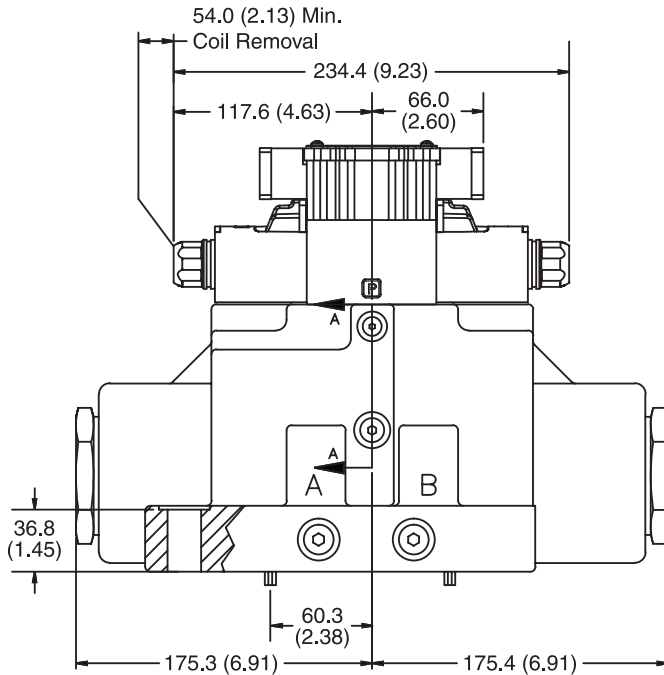
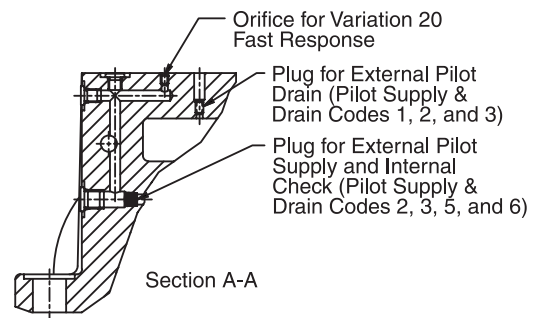
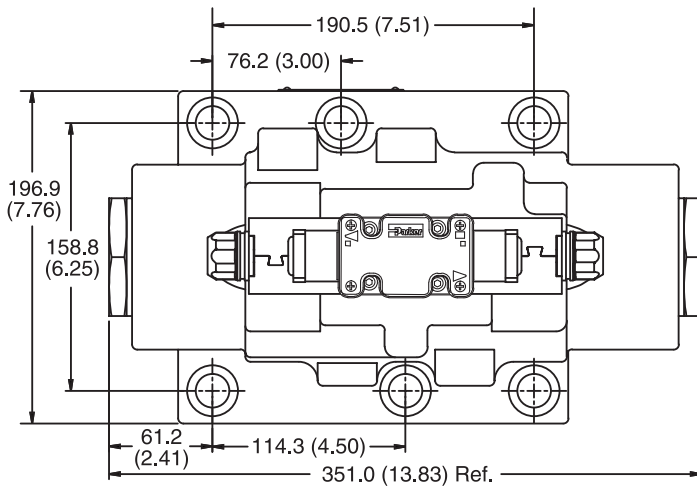
D101V - Dimensions

A233

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

Plug-in Conduit Box, Double DC Solenoid



Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

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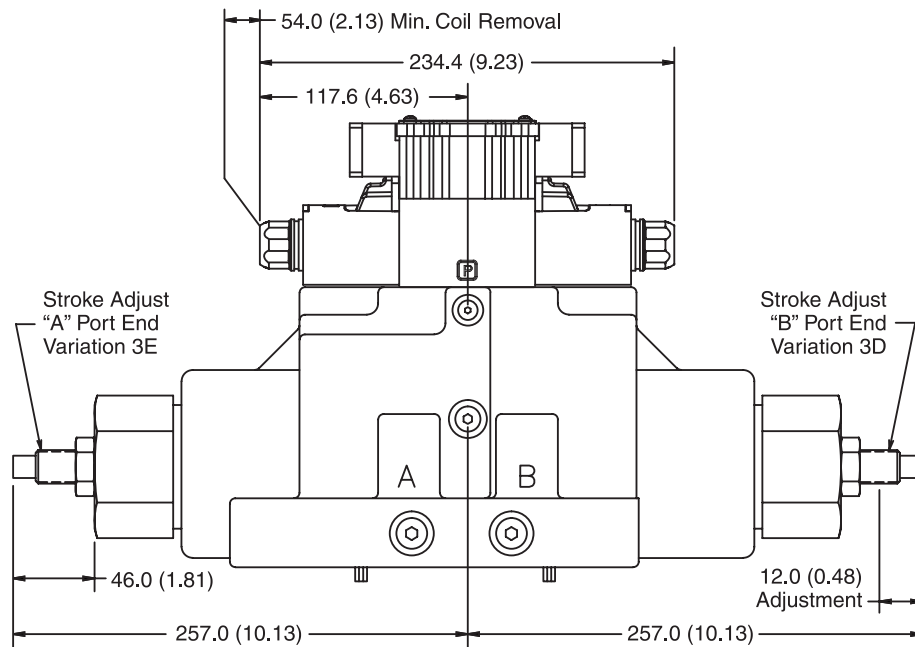
D101V - Dimensions

A234

WWW.SUMY.IR

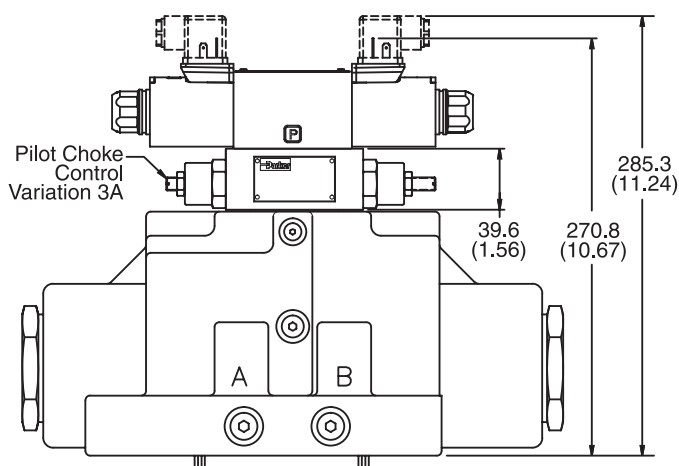
Inch equivalents for millimeter dimensions are shown in (**)

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

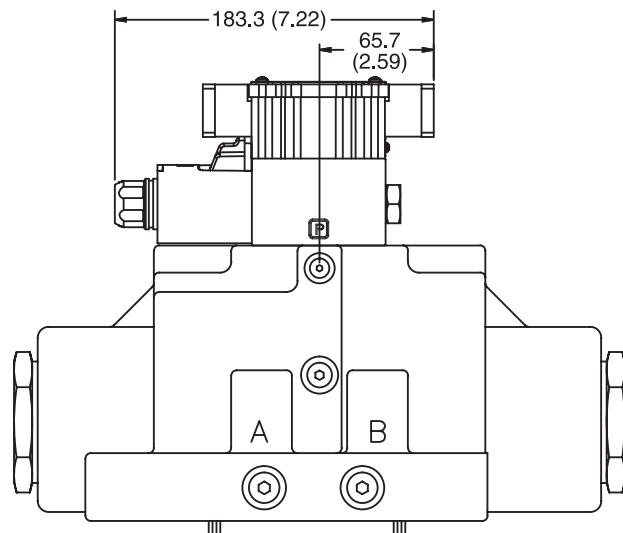


Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

Hirschmann and Pilot Choke Control, Double DC Solenoid



Plug-in Conduit Box, Single DC Solenoid



Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

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D101V - Accessories

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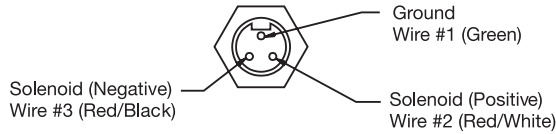
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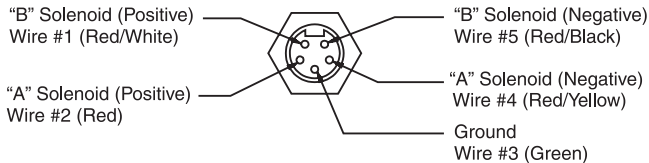
Manaplug (Options 6, 56, 1A, & 1C)

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



3-Pin Manaplug (Mini) with Lights

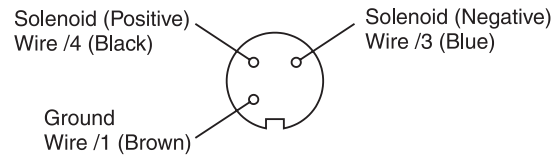
Single Solenoid Valves – Installed Opposite Side of Solenoid



5-Pin Manaplug (Mini) with Lights

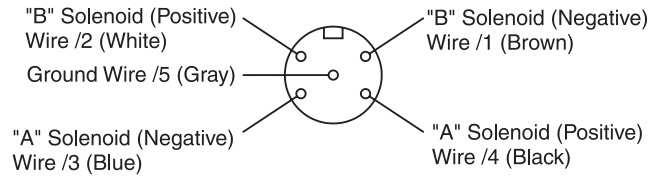
Single Solenoid Valves – Installed Opposite Side of Solenoid
Double Solenoid Valves – Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

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

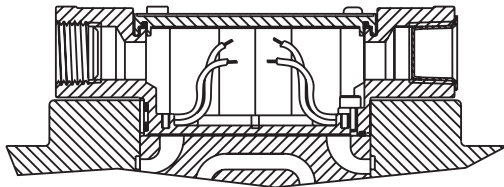
- EP336-30 3 Pin Plug
- EP316-30 5 Pin Plug (Double Solenoid)
- EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

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

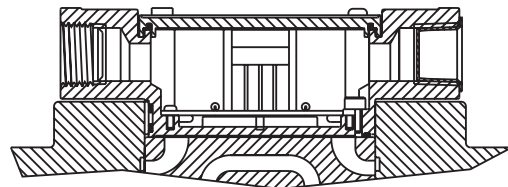
Conduit Box Option C

- No Wiring Options Available



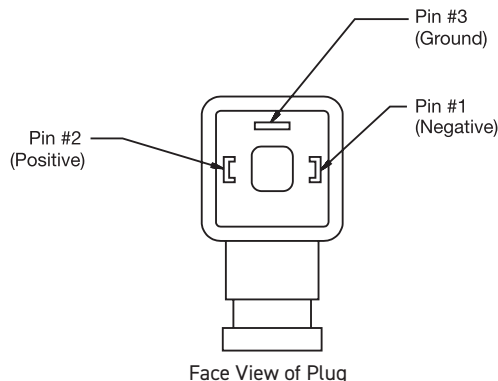
Signal Lights (Option 5) — Plug-in Only

- LED Interface
- Meets Nema 4/IP67



Hirschmann Plug with Lights (Option P5)

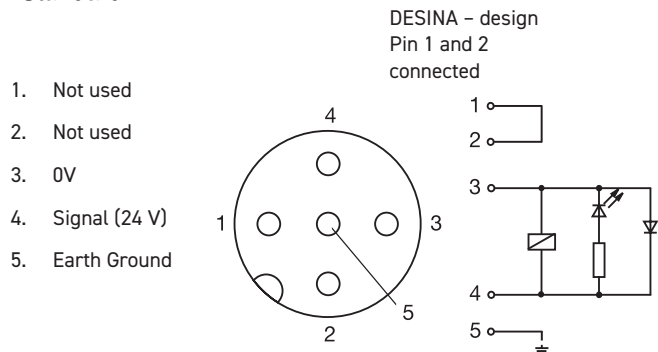
ISO 4400/DIN 43650 Form "A"



Pins are as seen on valve (male pin connectors)

DESINA Connector (Option D)

M12 Pin Assignment
Standard



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Directional Control Valves

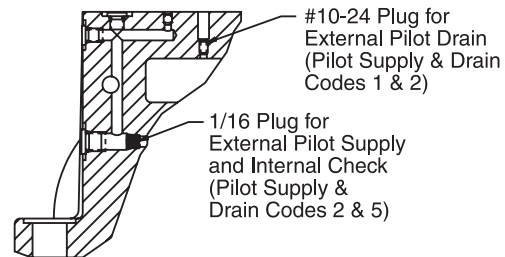
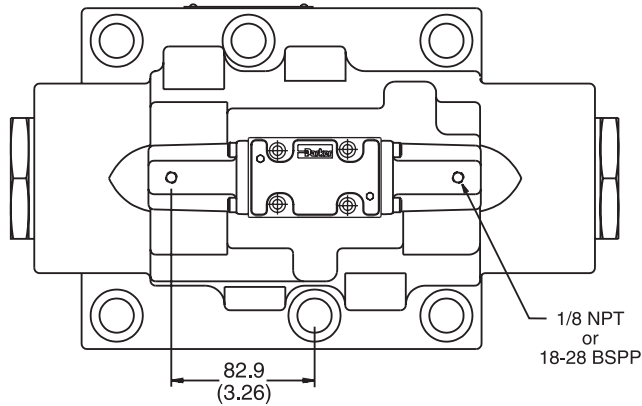
D101VA - Dimensions

A237

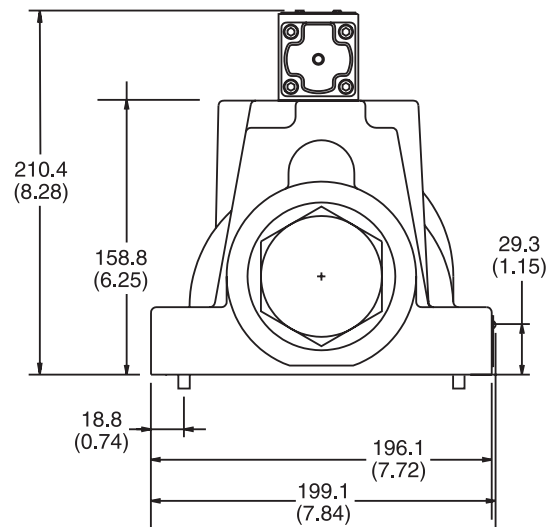
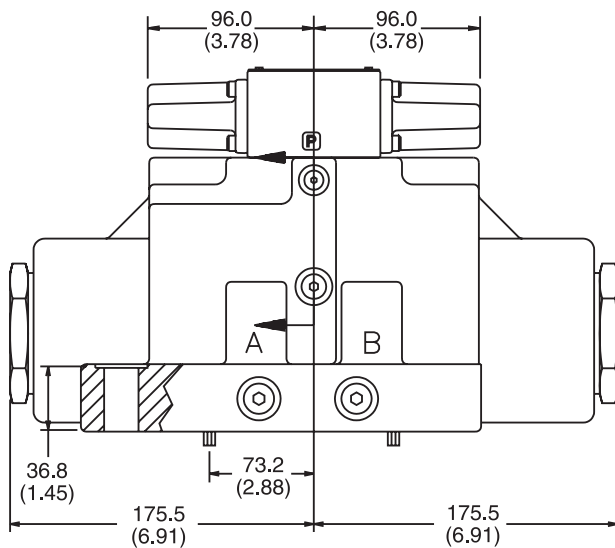
WWW.SUMY.IR

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

Air Operated



Section A-A



Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

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Directional Control Valves

Directional Control Valves

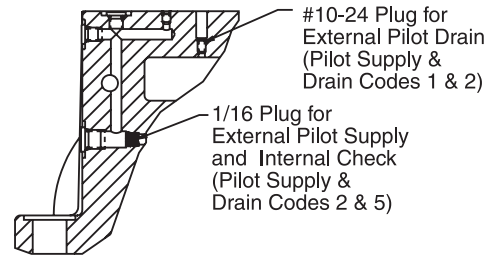
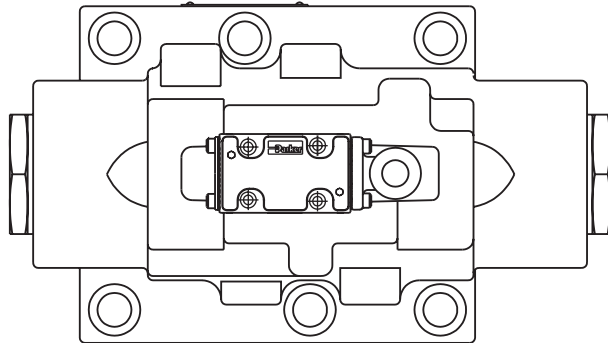
D101VL - Dimensions

A239

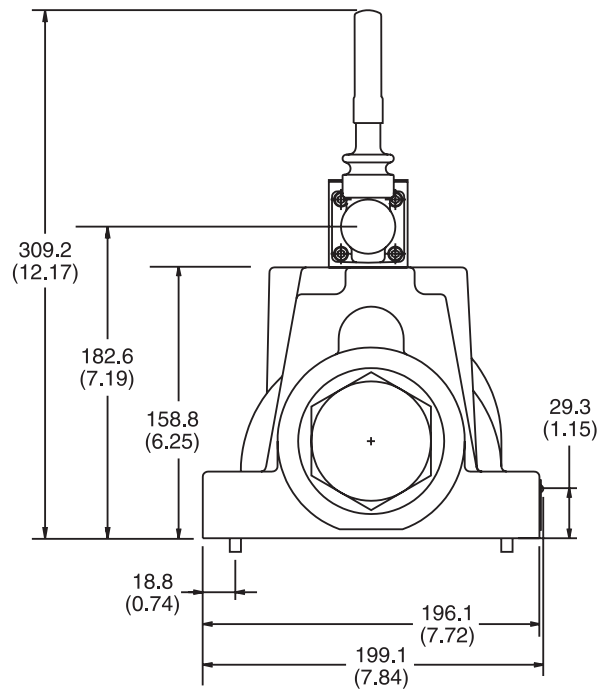
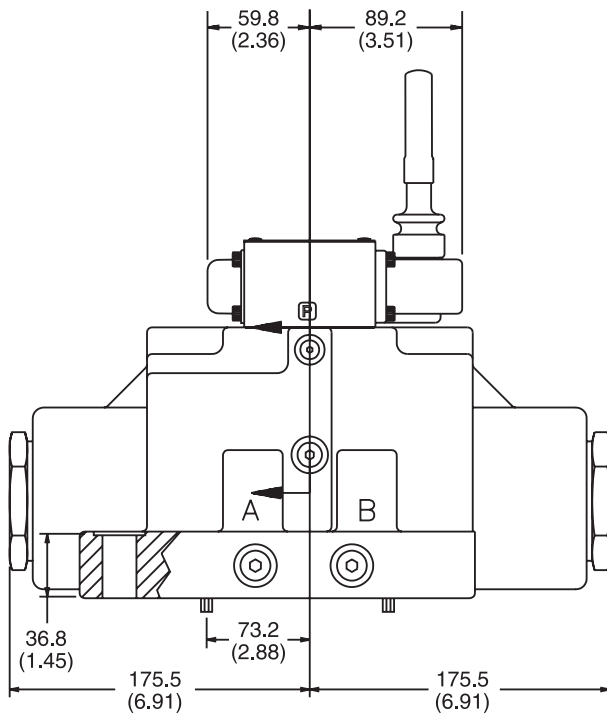
WWW.SUMY.IR

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

Lever Operated



Section A-A



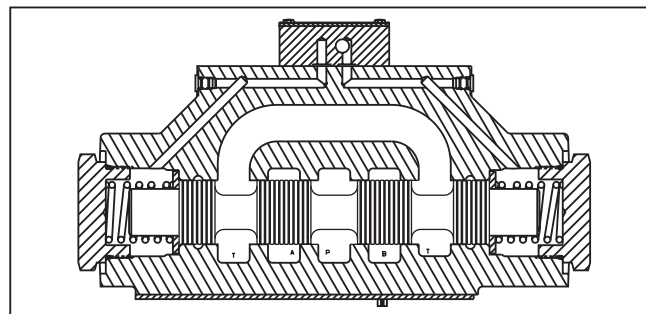
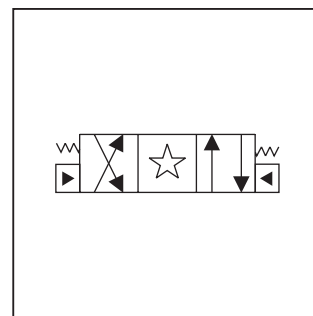
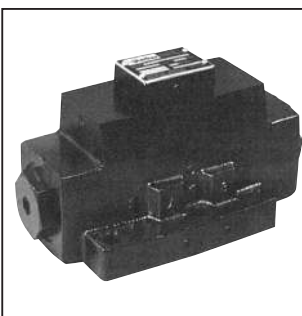
Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

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MSG14-2500/US
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The pilot chamber requires a volume of 0.54 in³ for center to end and 1.08 in³ for end to end.

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Directional Control Valves

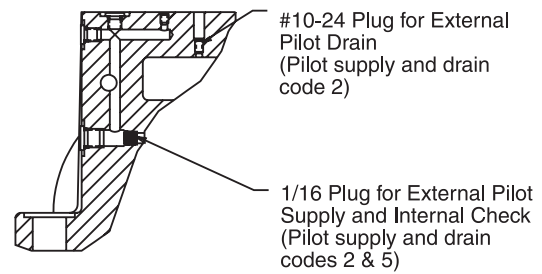
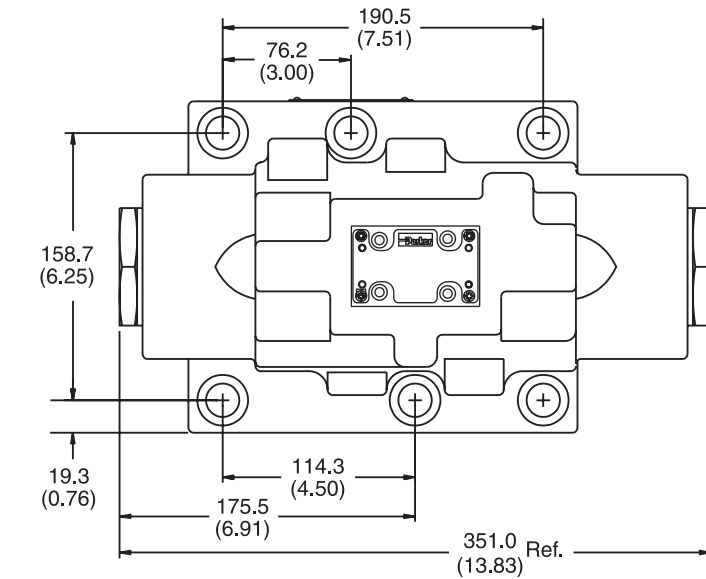
D10P - Dimensions

A241

WWW.SUMY.IR

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

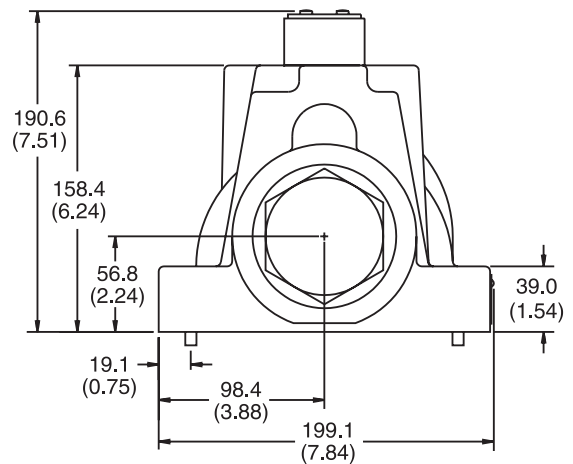
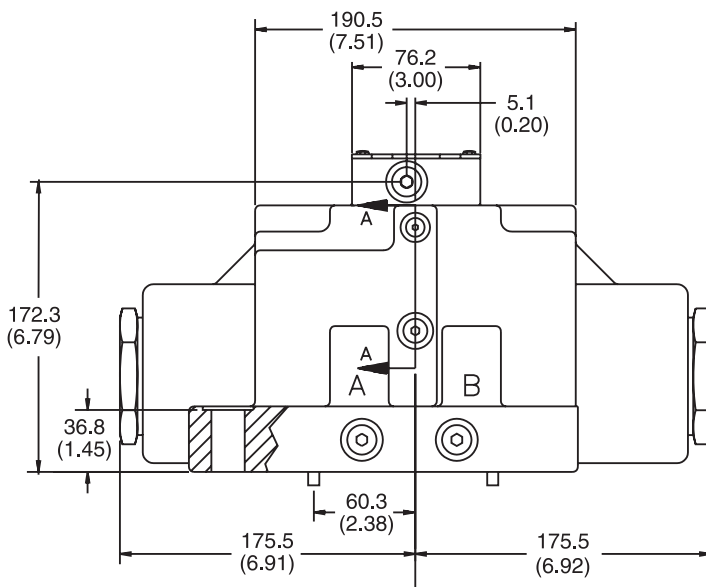
Standard Pilot Operated



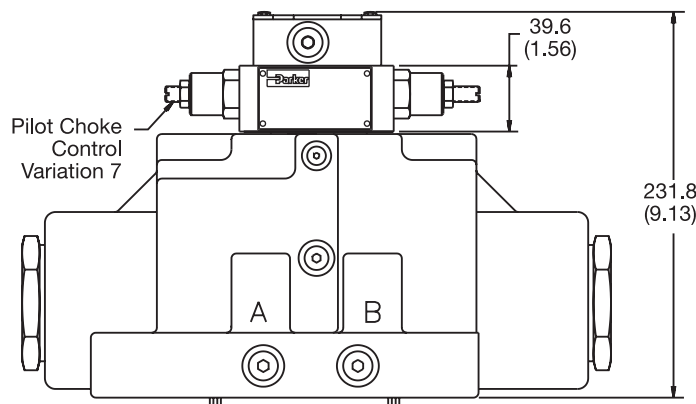
Section A-A



Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.



Pilot Operated with Pilot Choke Control



Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

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

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

Mounting Position

Detent – Horizontal
Spring Offset – Unrestricted
Spring Centered – Unrestricted

Fluid Recommendations

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

Fluids and Seals

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

Filtration

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

Silting

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

Special Installations

Consult your Parker representative for any application requiring the following:

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

Mounting Patterns

Series	NFPA	Size
D101V*, D10P	D10, CETOP 10	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 lb-ft)

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Series D101VW, D101VA, D101VL

Tank and Drain Line Surges

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

Electrical Failure or Loss of Pilot Pressure

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

Electrical Characteristics (Detented Spool)

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

Pilot/Drain Characteristics

Pilot Pressure:

4.4 to 207 Bar (65 to 3000 PSI)

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

Internal: Flow is internally ported from the pressure port

of the main valve body to the "P" port of the pilot valve. The pressure developed at the "P" port of the pilot valve must be 4.4 Bar (65 PSI) minimum at all times.

Integral Check: Valves using internal pilot and internal drain with an open center spool (spools 002, 007, 008, and 009) can be ordered with an integral check valve in the pressure port of the main valve codes 3 and 6. Pilot oil will be internally ported from the upstream side of this check to the "P" port of the pilot valve, ensuring sufficient pilot pressure. A 1/16" pipe plug will be present in the main body. The "X" port in the subplate must be plugged when using the integral check.

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

External: When using an external drain, an 10 x 24 x 0.31 long set screw must be present in the main body drain passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with drain code 1, 2, or 3.

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

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

D101V* - Flow Paths

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

** D101VW only

Directional Control Valves

D10P - Installation Information

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Tank and Drain Line Surges

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

Loss of Pilot Pressure

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

Pilot Drain Characteristics

Pilot Pressure:

4.4 to 207 Bar (65 to 3000 PSI)

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

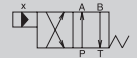
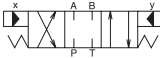
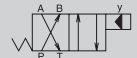
Any back pressure in these lines when they are being used as a drain is additive to the pilot pressure requirement.

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

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Flow Paths / Pilot Pressure

Style Code	Description	"X" and "Y" De-pressurized	"X" Port Pressurized	"Y" Port Pressurized	Special Notes	Recommended Control Valve for Pilot Oil
B	Two Position, Spring Offset	P -> A, and B -> T	P -> A, and B -> T	P -> B and A -> T	"X" Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position, Spring Centered	Center	P -> A, and B -> T	P -> B and A -> T	Flow paths will be reversed on valves with tandem center (008) spools	
H	Two Position, Spring Offset	P -> B and A -> T	P -> A, and B -> T	P -> B and A -> T	"Y" Port may be pressurized to assist spring in returning spool to offset position	

Directional Control Valves

D101V - Installation Information

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Subplate Mounting

NFPA D10, CETOP 10, and NG32

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 lb-ft).

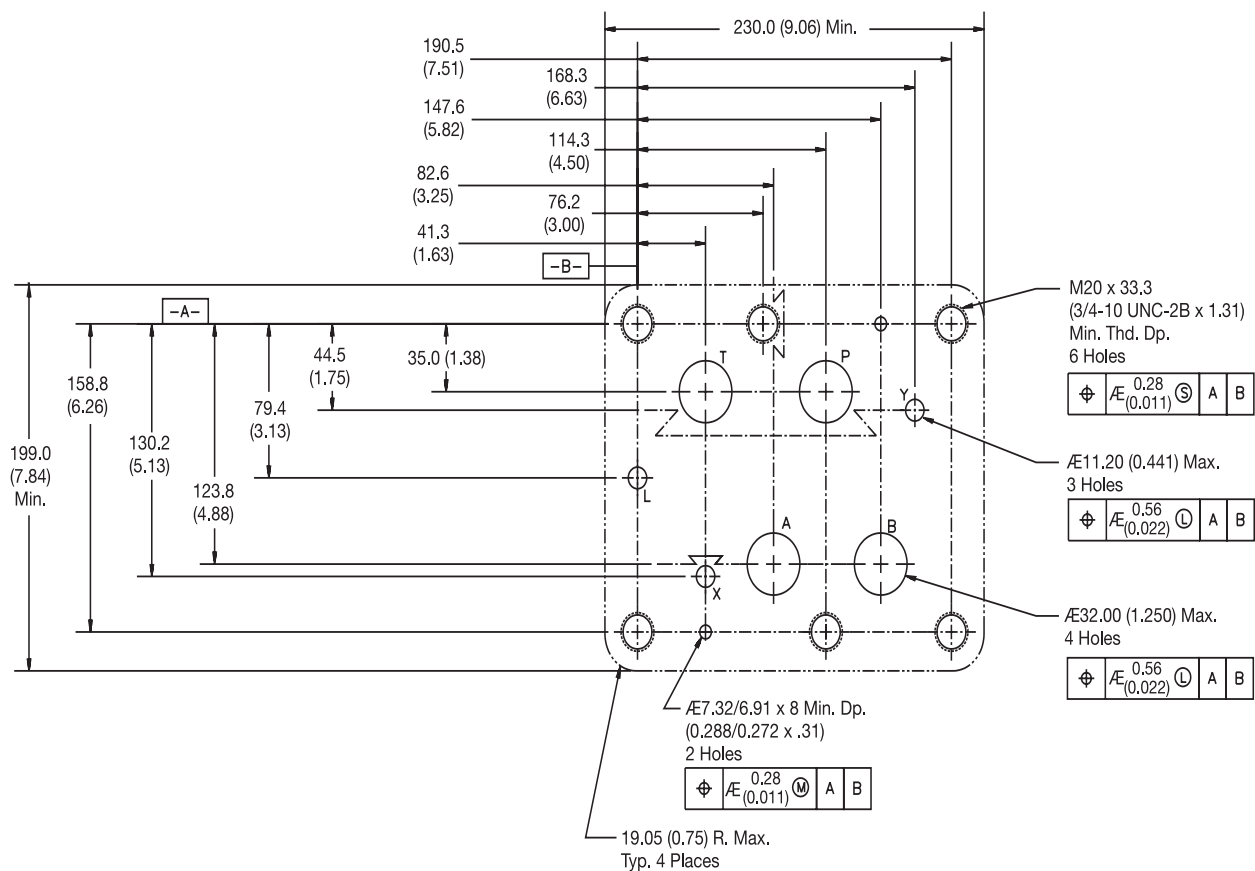
For maximum valve reliability, adhere to the following installation information.

Mounting Position

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

Mounting Pattern — NFPA D10, CETOP 10, and NG32

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



General Description

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

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

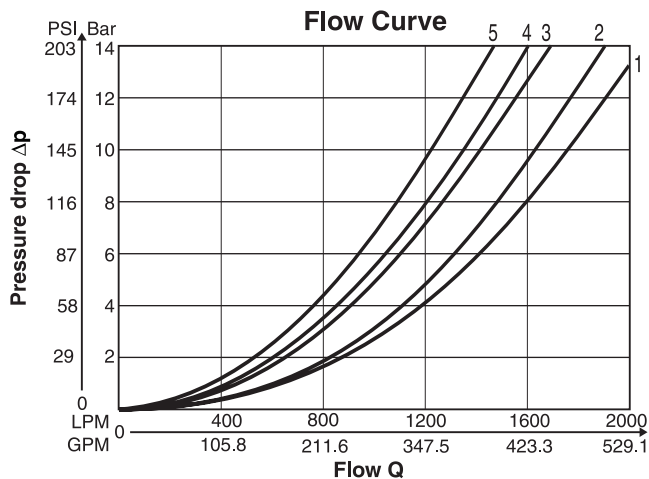
Additionally spools with a P to T connection in the de-energized position need an external pressure supply (external inlet).

Features

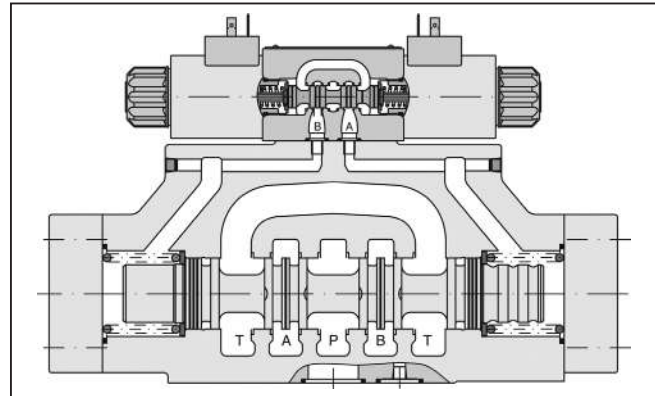
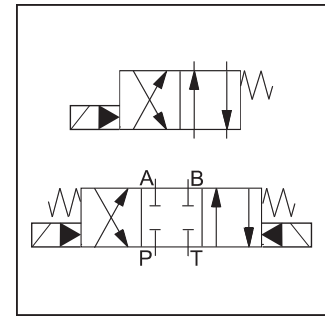
- Low pressure drop design.
- Hardened spools provide long life.
- Wide variety of voltages and electrical connection options.
- Explosion proof availability.
- No tools required for coil removal.

Performance Curves

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



All characteristic curves measured with HLP46 at 50°C.



D111VW Pressure Drop Reference Chart – Curve Number

Spool No.	P-A	P-B	P-T	A-T	B-T
001	5	5	–	4	1
002	5	5	5	4	1
003	–	–	–	–	–
004	5	5	–	4	1
005	–	–	–	–	–
006	–	–	–	–	–
007	–	–	–	–	–
009	3	3	2	3	1
011	–	–	–	–	–
014	–	–	–	–	–
015	–	–	–	–	–
016	–	–	–	–	–
020	5	5	–	3	1
021	–	–	–	–	–
022	–	–	–	–	–
026	–	–	–	–	–
030	5	5	–	4	1
054	5	5	–	4	1

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

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D	111V	W					
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Pilot Supply and Drain	Seal	Solenoid Voltage

Code	Description
111V	NFPA D10, CETOP 10, DIN NG 32, 50 mm

Code	Description
W	Solenoid, Wet Pin

Code	Description
N	Nitrile
V	Fluorocarbon

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

* Not available with 002, 009, and 030 spools

Code	Description
D†#	120 VDC
E*	24/60 - 24/50 VAC
J	24 VDC
K***	12 VDC
Q††#	100/60 VAC
QD††#	100 VAC/60 Hz - 100 VAC/50 Hz
T^^	240/60 - 220/50 VAC
U***#	98 VDC
Y	120/60 - 110/50 VAC

High watt only.
* Leadwire only, low watt only.
** DIN, low watt available.
*** Leadwire not available.
^^ Plug-in is low watt only.
† DIN & Leadwire only.
†† DIN only.

3-Position Spools	
Code	Spool Type
	A 0 B
001	
002	
004	
009**	
054	
081	
082	

2-Position Spools	
Code	Spool Type
	A B
020*	
030**	

* 020 spool has closed crossover.
** 009 and 030 spools have open crossover.

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".

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".

* 020 and 030 spools only. Must be standard high watt coil (30 watt) or L (10 watt coil) only (stroke is reduced by 0.5mm, therefore max flow is reduced to 13 - 14 GPM). Not available with F (low watt) coil option for AC coils only.

Bold: Designates Tier I products and options.

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

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Directional Control Valves

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Solenoid Connection

Code	Description
C*	Leadwire Conduit Box
D**	Metric Plug (M12X1) DESINA
E†	Explosion Proof
F ^x	Flying Leadwire
G††	Plug-In Conduit Box
J++	Deutsch (DT04-2P)
P	DIN with Plug
S†	Double Spade
W†	DIN w/o Plug

* No conduit box variations – See Plug-in G.
 ** 24 VDC only, low watt only, lights, diode surge suppressor, not CSA approved.
 † Not available with lights.
 †† Required for variations on conduit box style, must have lights.
 ++ 12 and 24 VDC only.
 ‡ Only 12 VDC high watt.
 x 6" leadwire only.

Code	Description
Omit*	High watt
D**	Explosion Proof, EExd ATEX
E**	Explosion Proof, EExme, ATEX, IECEx, from Germany
F†	Low Watt
L††	10 Watt
R#	Explosion Proof, ATEX/UL/CSA/IECEx, configurable cable connection
T#	Explosion Proof, ATEX/UL/CSA/IECEx, fixed horizontal cable connection
U##	Explosion Proof, UL/CSA

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


Coil Options


Manual Override Options


Electrical Options


Shift Response and Indication


Approvals


Valve Variations


Design Series
NOTE: Not required when ordering.


Monitor Switch Cover

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

Plug-In – 24 VDC only.
 DIN – DC only with Lighted Plug (5), which has integrated Surge Suppression. "J" not required here.
 Deutsch – as follows:
 • 12 VDC Hi watt only
 • 24 VDC Hi & Lo watt
 • 24 VDC Hi & Lo watt available.
 Required for Low watt.
 ER Explosion Proof – 24 VDC "JERP" required. Adds dust rating, not polarity sensitive [IIC, D].
 Leadwire – not available
 † DC tube standard, Plug-In conduit box only. Not polarity sensitive. Only available with Y voltage.

Code	Description
Omit	Standard
P*	Extended Manual Override with Boot
T	Covered Manual Override, DC only, or AC Rectified

* Manual override options not available on Explosion Proof or soft shift. Not available with high pressure AC tube H.

See next page for Valve Variations

Code	Description
Omit	Standard Valve
4†#	CSA Canada CSA22.2 No. 139-13
N	CE Approved
Q†#	CE + CSA Approved

† Not available with AC high pressure tube.
 # Valve is derated.

Code	Description
Omit	No Variation
4B	Monitor Switch Cover

Code	Spool Position	Position Control
Omit	All	Standard Response
I3N	C	End position monitored, side A and B
I6N		Start position monitored, side A and B
I2N	C, B, E, F (all spools)	End position monitored, side B
I5N	C, K, M (spool 9)	Start position monitored, side B
I1N	C, H, K, M (all spools)	End position monitored, side A
I4N	C, E, F (spool 9)	Start position monitored, side A

Note: The plug M12 x 1 for the position control is included. The monitor switch has to be located on the side to which the spool moves from the spring offset position. For 4/3-way valves two switches are required.
 Not CSA approved.
DC DIN, high watt coils only.

Bold: Designates Tier I products and options.

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

Directional Control Valves

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Valve Variations

(OPTIONS ARE NOT AVAILABLE ON MONITOR SWITCH VALVES.)

Code	Description
1C**	Manaplug – Brad Harrison Style 7/8-16 with Lights (Single Solenoid = 5 pin)
1D**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 5 pin)
1M**	Manaplug Opposite Normal
1R	Stroke adjust "A" and "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 Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Pilot Choke Meter Out with Lights and Manaplug – Brad Harrison Style 7/8-16 Mini (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
5*	Signal Lights – Standard Signal Lights – Hirsch. (DIN with Plug) (the DC Lighted Plug has Integral Surge Suppression)
7B**	Manaplug – Brad Harrison Style M12x1 Micro with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
7W^	4-pin Micro Manaplug, Special Wiring with Lights
7Y^	Manaplug – Brad Harrison Style M12x1 Micro with Lights and Special Wiring (4 pin)
56**	Manaplug – Brad Harrison Style 7/8-16 Mini with Lights (Single Solenoid = 3 pin, Double Solenoid = 5 pin)
* DESINA, plug-in conduit box, and DIN with plug styles only. ** Solenoid connection option G only. Requires manaplug code (56, 1C, 7B, etc.). ^ Requires G code (Plug-in Conduit Box) and J code (Diode Surge Suppressor) and lights.	

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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Directional Control Valves

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Solenoid Ratings	
Insulation System	Class F
Allowable Deviation from rated voltage	-10% 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 HVS for AC coil applications.

Explosion Proof Solenoid Ratings*	
ATEX (EE)	Complies with ATEX requirements for: EExme ATEX, IECEEx, from Germany
* Allowable Voltage Deviation +/-10%	

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Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3 mm	Watts	Resistance
Voltage Code	Power Code						
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 Ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 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
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
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms

Directional Control Valves

D111VW - Specifications

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General		
Design		Directional Spool Valve
Actuation		Solenoid
Size		NG 32 / CETOP 10 / NFPA D10
Mounting Interface		DIN 24340 A32 / ISO 4401 / CETOP RP121-H / NFPA D10
Mounting Position		Unrestricted, preferably horizontal
Ambient Temperature (°C)		-25 to +50 (-13°F to +122°F) without inductive position control 0 to +50 (+32°F to +122°F) with inductive position control
MTTF _D Value (years)		75
Hydraulic		
Maximum Operating Pressure (Bar)		Pilot Drain Internal: Ports P, A, B, X = 350 (5075 PSI); Ports T, Y = 102 (1500 PSI) AC only, 207 Bar (3000 PSI) DC/AC optional Pilot Drain External: Ports P, A, B, T, X = 350 (5075 PSI); Port Y = 102 (1500 PSI) AC only, 207 Bar (3000 PSI) DC/AC optional
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525
Fluid Temperature (°C)		-25 to +70 (-13°F to +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)
Maximum Flow (LPM)		2000 (529.1 GPM)
Leakage @350 Bar (5075 PSI) per flow path (ml/min)		Up to 5000 (1.32 GPM) depending on spool
Minimum Pilot Supply Pressure (Bar)		5 (73 PSI)
Static / Dynamic		
Step Response at 95%		
DC Solenoids	Pilot Pressure	
	50 Bar (ms)	470
	100 Bar (ms)	320
	250 Bar (ms)	210
	350 Bar (ms)	200
AC Solenoids	Pilot Pressure	
	50 Bar (ms)	450
	100 Bar (ms)	300
	250 Bar (ms)	190
	350 Bar (ms)	180

Single Solenoid Valve

Electrical Specifications of Position Control as per IEC 61076-2-101 (M12x1)

Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)
Supply Voltage / Ripple (V)	24 ≤ 10%
Tolerance Supply Voltage (%)	+/-20
Polarity Protection (V)	300
Current Consumption without Load (mA)	≤20
Switching Hysteresis (mm)	<0.06
Max Output Current per Channel, Ohmic (mA)	250
Min. Distance to Next AC Solenoid (m)	0.1 (0.33 ft)
Interface	M12x1 acc. to IEC 61076-2-101
Wiring Minimum (mm²)	5x0.25 braid shield recommended
Wiring Length Maximum (m)	50 (164 ft) recommended
CE Conform	EN 61000-4-2 / EN 61000-4-4 / EN 61000-4-6 ¹⁾ / ENV 50140 / ENV 50204

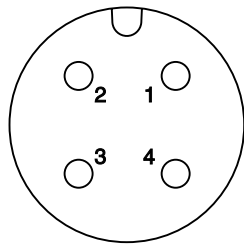
¹⁾ Only guaranteed with screened cable and female connector

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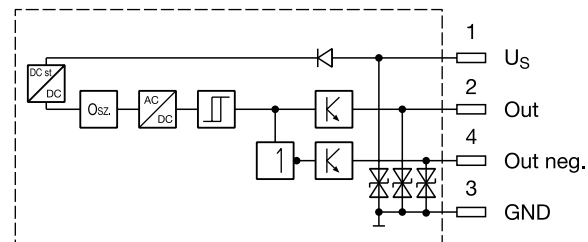
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M12 Pin Assignment



1. U_s 19.2...28.8V
2. Out B: normally open
3. 0V
4. Out A: normally closed



Outputs: Open collector

Definitions

Start position monitored:

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

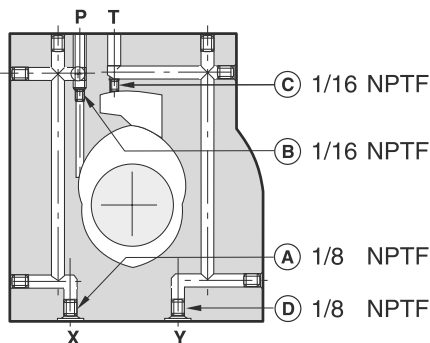
At the switching point the spool is located within the closed position. It is secured so that only the flow paths of the offset position are granted.

The switch can only be located on the opposite side of the solenoid for direct operated valves. Please order plug M12x1 separately. See Accessories, plug M12x1 (part no.: 5004109).

End position monitored:

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

Pilot Oil Inlet (Supply) and Outlet (Drain)

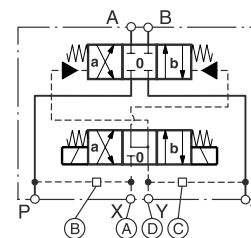


Industrial
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○ open, ● closed

Pilot oil Inlet	Pilot oil Outlet	A	B	C	D
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



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**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, CETOP 10	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 lb-ft)

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Tank and Drain Line Surges

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

Electrical Failure or Loss of Pilot Pressure

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

Electrical Characteristics (Detented Spool)

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

Pilot/Drain Characteristics

Pilot Pressure:

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 Dimension pages.) This plug will be furnished in valves ordered with pilot code 2, or 5.

Internal: Flow is internally ported from the pressure port of the main valve body to the "P" port of the pilot valve. The pressure developed at the "P" port of the pilot valve must be 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, an 10 x 24 x 0.31 long set screw must be present in the main body drain passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with drain code 1, 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) AC optional/DC standard. Any tank line back pressure is also additive to the pilot pressure requirement. If flow surges (a cause of pressure surges) are anticipated in the tank line, an external drain variation is recommended. The "Y" port in subplate must be plugged when using internal drain variations.

D101V* - Flow Paths

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

Torque bolts to 406.8 Nm (300 lb-ft).

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

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MSG14-2500/US
Directional Control Valves

Directional Control Valves

D111VWR, D111VWZ - Technical Information

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General Description

Series D111VWR and D111VWZ are regenerative and hybrid directional control valves (NG32).

The innovative integrated regenerative function in the A-line (optional) allows new energy saving circuits with differential cylinders. The hybrid version can switch between regenerative mode and standard mode at any time.

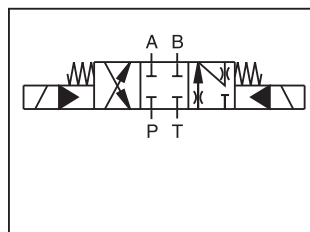
Features

- Energy saving A-regeneration optionally integrated.
- Switchable hybrid version.

Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



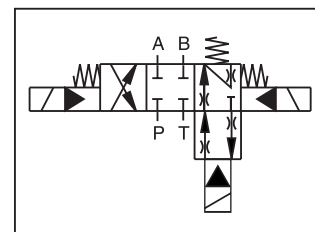
D41VWR (shown)



Regenerative D111VWR

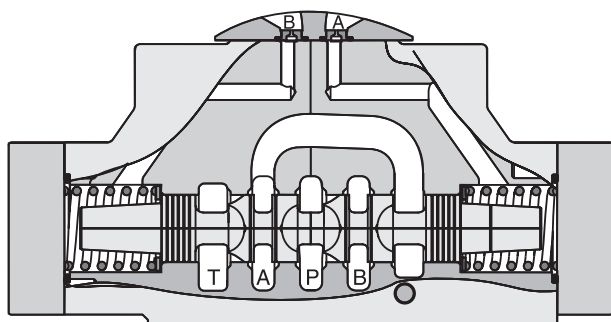


D41VWZ (shown)

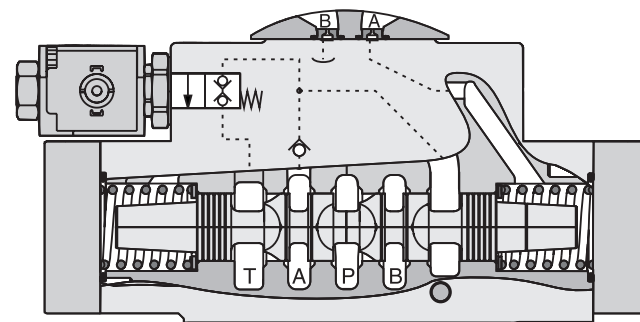


Hybrid D111VWZ

Regenerative Valve D111VWR

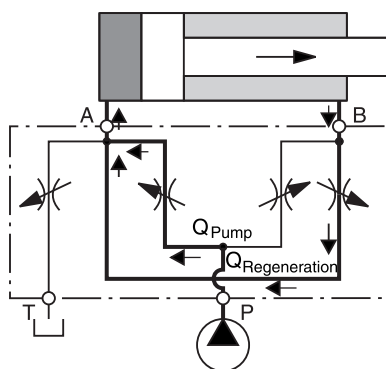


Hybrid Valve D111VWZ



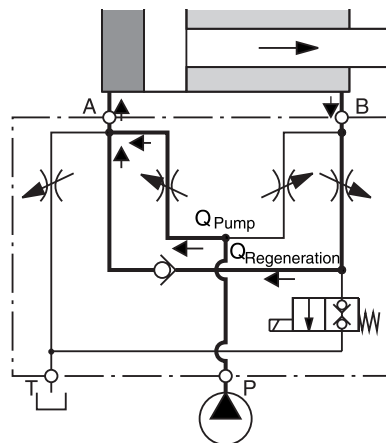
D111VWR Regenerative Valve

Cylinder Extending

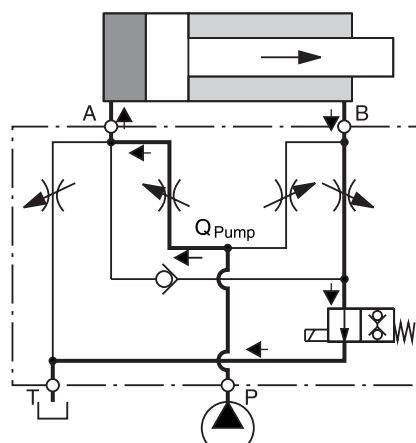


D111VWZ Hybrid Valve

Cylinder Extending
Regenerative Mode
(High Speed)



Cylinder Extending
Standard Mode
(High Force)



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

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Directional Control Valves

D111VWR, D111VWZ - Technical Information

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Ordering Information

D111W

Series

Code	Description
111W	NFPA D10, CETOP 10, DIN NG 32, Ø50 mm

C

Style

Code	Description
C	3 positions. Spring off set in position "0". Operated in position "a" or "b".

W

Connector as per EN 175301-803, without connector (Please order plug separately)

J

Solenoid Voltage 24VDC

N

Seal

Code	Description
N	Nitrile
V	Fluorocarbon

1

Pilot Supply and Drain

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

T

Manual Override

Code	Description
Omit	Standard
T	No manual override

3A

Valve Variations

Code	Description
Omit	No Variations
3A	Pilot Choke Meter Out
3B	Pilot Choke Meter In
3C	Pilot Pressure Reducer
3R	Pilot Choke Meter Out and Pilot Pressure Reducer
1T	Pilot Choke Meter In and Pilot Pressure Reducer

A

Design Series

NOTE: Not required when ordering.

Regenerative Function			Hybrid Function		
Code	Spool Type		Code	Spool Type	
	A	B 0		A	B 0
R01			Z01		
R04			Z04		
R81			Z81		
R82			Z82		

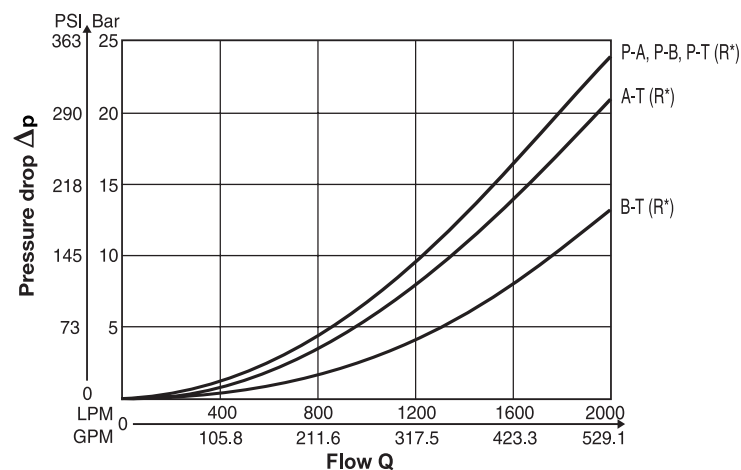
Weight:

D111VWR, D111DWZ 68 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.

Performance Curves



Flow curves measured with Spool R01, R04.
Spool Z* on request.

Directional Control Valves

D111VWR, D111VWZ - Specifications

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General		
Design	Directional Spool Valve	
Actuation	Solenoid	
Size	NG 32 / CETOP 10 / NFPA D10	
Mounting Interface	DIN 24340 A32 / ISO 4401 / CETOP RP121-H / NFPA D10	
Mounting Position	Unrestricted, preferably horizontal	
Ambient Temperature (°C)	-25 to +50 (-13°F to +122°F) without inductive position control	
MTTF _D Value (years)	75	
Hydraulic		
Maximum Operating Pressure (Bar)	Pilot Drain Internal: Ports P, A, B, X = 350 (5075 PSI); Ports T, Y = 105 (1523 PSI) Pilot Drain External: Ports P, A, B, T, X = 350 (5075 PSI); Port Y = 105 (1523 PSI)	
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature (°C)	-25 to +70 (-13°F to +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)	
Maximum Flow (LPM)	2000 (529.1 GPM)	
Leakage @350 Bar (5075 PSI) per flow path (ml/min)	Up to 5000 (3.32 GPM) depending on spool	
Minimum Pilot Supply Pressure (Bar)	5 (73 PSI)	
Static / Dynamic		
Step Response at 85% DC Solenoids Pilot Pressure	Energized	De-energized
50 Bar (725 PSI) (ms)	470	390
100 Bar (1450 PSI) (ms)	320	390
250 Bar (3625 PSI) (ms)	210	390
350 Bar (5075 PSI) (ms)	200	390
Electrical		
	Regenerative	Hybrid
Duty Ratio (%)	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible	100
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)	IP65 in accordance with EN60529 (plugged and mounted)
Supply Voltage / Ripple (V)	24	24
Tolerance Supply Voltage (%)	+/- 10	+/- 10
Current Consumption - Hold (A)	1.29	1.29
Current Consumption - In Rush (A)	1.29	–
Power Consumption - Hold (W)	31	31
Power Consumption - In Rush (W)	31	–
Solenoid Connection	Connector as per EN 175301-803, solenoid identification as per ISO 9461	Connector as per EN 175301-803
Wiring Minimum (mm²)	3x1.5 recommended	3x1.5 recommended
Wiring Length Maximum (m)	50 (164 ft) recommended	50 (164 ft) recommended
With electrical connections, the protective conductor (PE ↓) must be connected according to the relevant regulations.		

Directional Control Valves

D111VWR, D111VWZ - Technical Information

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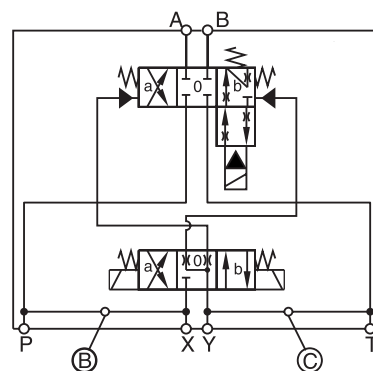
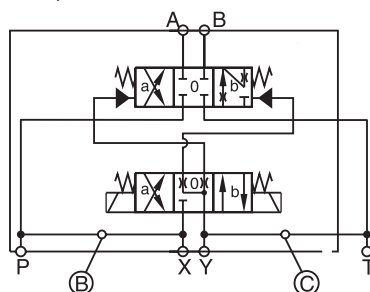
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Pilot Flow

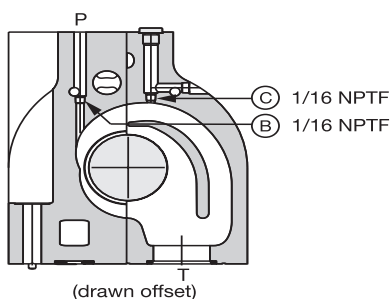
Pilot Oil Inlet (Supply) and Outlet (Drain)

○ open, ● closed

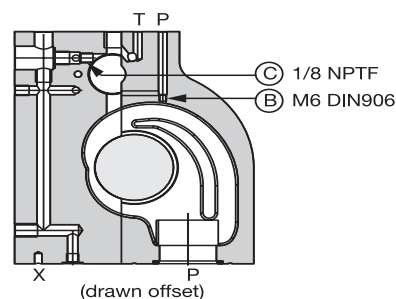
Pilot Oil Inlet	Outlet	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



D111VWR

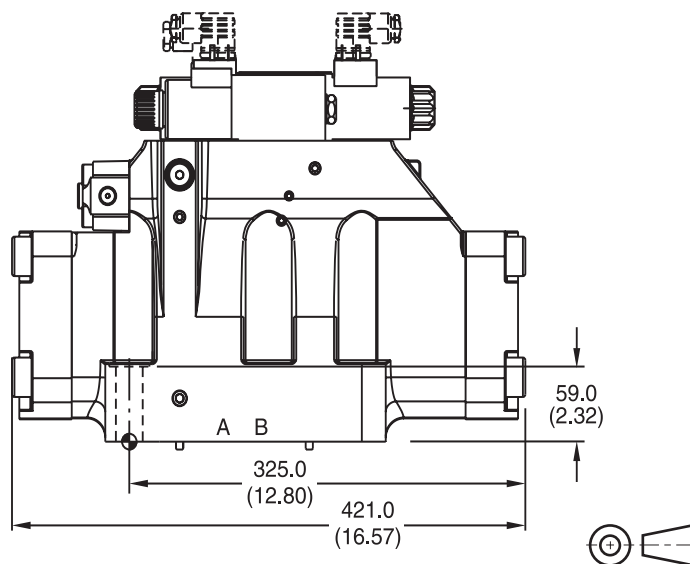
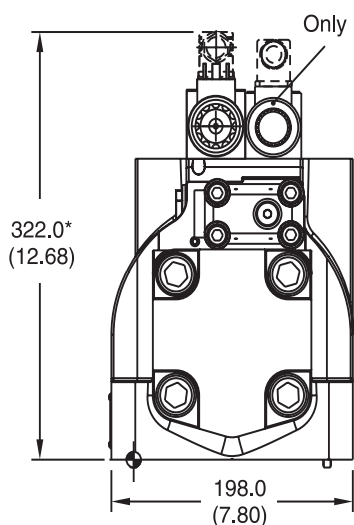


D111VWZ



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
$\sqrt{R_{max}6.3}$ $\square 0.01/100$	BK386	6x M20x90 DIN 912 12.9	517 Nm (381.3 lb-ft) +/- 15%	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").

The torque for the screw M3 of the plug has to be 0.5 to 0.6 Nm (0.37 to 0.44 lb.-ft.).

Directional Control Valves

D4S - Technical Information

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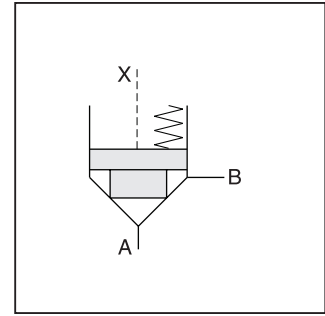
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General Description

Seat valves series D4S are designed for directional control functions. A large variety of poppets, springs and covers – including shuttle valves, stroke limiters, solenoid valves (VV01) and position control – allow to design individual hydraulic solutions for nominal flow up to 600 l/min.

A complete program of 2/2-way seat valves is offered under Parker brand:

subplate mounted valves	series D4S
SAE flange valves	series D5S
slip-in cartridges	series CAR



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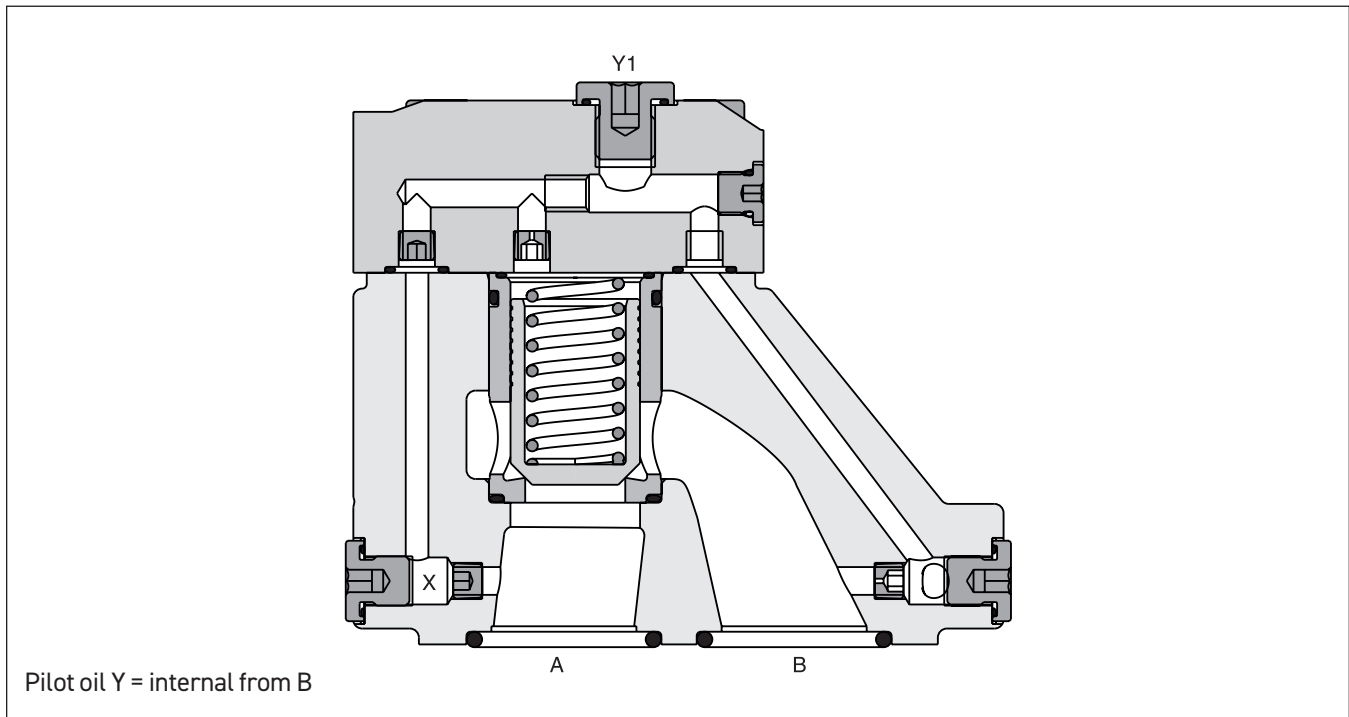
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Features

- Subplate mounting according to ISO 5781
- Leak-free seat valve design
- Numerous pilot options
- 6 poppet types
- D4S03 - NG10
- D4S06 - NG25
- D4S10 - NG32

D4S10-9DC



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Directional Control Valves

Directional Control Valves

D4S - Ordering Information

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D4S		—								B		
Seat valve	Nominal size		Subplate mounting ISO 5781	Pilot connection	Cap version	Sleeve	Spool type	Spring	Switching type	Solenoid voltage	Design series	Seals

Code	Description
03	NG10
06	NG 25
10	NG 32

Code	Description
7	SAE (Y1 port 7/16-20 UNF)
9	BSP (Y1 port G1/4")

Code	Description
1	AA = 95%, AB = 5%
3	AA = 60%, AB = 40%

Code	Description
1	NBR
5	FPM

Code	Description
Omit	Standard w/o vent function
G0R	12 VDC
G0Q	24 VDC
GAR*	98 VDC
GAG*	205 VDC
W01	115 VAC 60 Hz
W30	110 VAC 50 Hz / 120 VAC 60 Hz
W31	230 VAC 50 Hz / 240 VAC 60 Hz

* To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply

Code	Pilot Oil Line in Body	A-X	B-Y
1	Internal from A	●	○
2	External from X	●	○
A ¹⁾	Internal from A	●	●
B ¹⁾	External from X	●	●
C	Internal from A + B	●	●
D	Internal from B	●	●
G	External from Y	●	●

¹⁾ With VV01 only

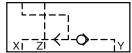
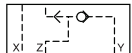
Code	Ports	X	Y	Z	X-Y	Y1	WV01
Standard							
1	Pilot Oil = Pilot Drain	○	●	●	○	●	—
C	Pilot Oil = Pilot Drain	●	○	●	○	●	—
With Solenoid Valve (VV01)							
2	External PD from cap	○	○	●	●	○	●
5	External to subplate	○	○	●	●	●	○
6	Internal pilot drain	○	○	●	●	●	○
With Stroke Limiter (not for D4S03)							
3	Pilot Oil = Pilot Drain	●	●	—	—	—	—
4	Pilot Oil = Pilot Drain	●	●	—	—	—	—

Key: ○ Open Bore ● Closed Bore ● Orifice Ø 1.2

Code	Size	Poppet Type	Sleeve
1	03, 06, 10	With closed bottom and 15° chamfer (pZ max. = pA +20 Bar (290 PSI))	1
2	03	With 0.8 dia. orifice at the bottom and 15° chamfer	1
	06, 10	With 1.2 dia. orifice at the bottom and 15° chamfer	1
4	03, 06, 10	With closed bottom and 45° chamfer	1, 3
A*	06, 10	Safety spool (for end position control only)	3
B*	06, 10	Throttle spool, 10° chamfer	3
C*	06, 10	Throttle spool, 3° chamfer	3

* Springs 2, 3 and 6 only.

Code	Spring — Approx. Cracking Pressure in Bar (PSI)					
	Sleeve Code 1		Sleeve Code 3			
	A -> B		A -> B		B -> A	
	D4S03	D4S06/10	D4S03	D4S06/10	D4S03	D4S06/10
1	2.8 (40.6)	3.5 (50.8)	6.5 (94.3)	6.5 (94.3)	9.5 (137.8)	11.0 (159.5)
2	0.5 (7.3)	0.5 (7.3)	1.0 (14.5)	1.0 (14.5)	1.5 (21.8)	1.7 (24.7)
3	0.3 (4.4)	0.3 (4.4)	0.6 (8.7)	0.6 (8.7)	0.9 (13.1)	1.0 (14.5)
4	2.2 (31.9)	2.2 (31.9)	4.0 (58.0)	3.5 (50.8)	5.5 (79.8)	6.0 (87.0)
5	—	9.0 (130.5)	—	16.0 (232.0)	—	28.0 (406.0)
6	1.2 (17.4)	1.2 (17.4)	2.0 (29.0)	2.2 (31.9)	3.0 (43.5)	3.8 (55.1)
7	3.0 (43.5)	—	8.0 (116.0)	—	12.0 (174.0)	—

Code	Description	
Omit	Standard without Vent Function	
09	VV01 with Manual Override	De-energized; power comp. open
10	VV01 without Manual Override	
11	VV01 with Manual Override	De-energized; power comp. closed
12	VV01 without Manual Override	
CA	Shuttle Valve	
DA	Shuttle Valve	
CB	VV01 Code 09 and Shuttle Valve Code CA	
CD	VV01 Code 11 and Shuttle Valve Code CA	
DB	VV01 Code 09 and Shuttle Valve Code DA	
DD	VV01 Code 11 and Shuttle Valve Code DA	
EH*	VV01 Code 10 and Shuttle Valve Code CA and Position Control with Amplifier	
EK*	VV01 Code 12 and Shuttle Valve Code CA and Position Control with Amplifier	
EN*	VV01 Code 10 and Shuttle Valve Code DA and Position Control with Amplifier	
EQ*	VV01 Code 12 and Shuttle Valve Code DA and Position Control with Amplifier	
EC*	VV01 Code 10 and Position Control with Amplifier	
EE*	VV01 Code 12 and Position Control with Amplifier	
EA*	Position Control with Amplifier	
EF*	Position Control with Amplifier and Shuttle Valve Code CA	
EL*	Position Control with Amplifier and Shuttle Valve Code DA	

* Position control for D4S06/10 only.
Spring 2 or 4. Spool A and sleeve 3.
Valve open: Proximity Switch damped.

Weight:

D4S03	2.7 kg (6.0 lbs)
D4S06	4.5 kg (9.9 lbs)
D4S10	6.0 kg (13.2 lbs)

Directional Control Valves

D4S - Technical Information

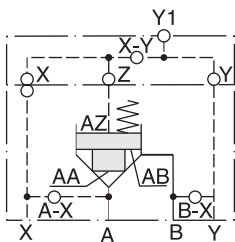
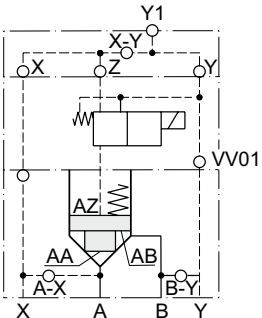
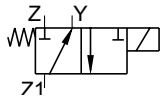
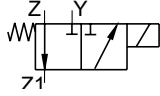
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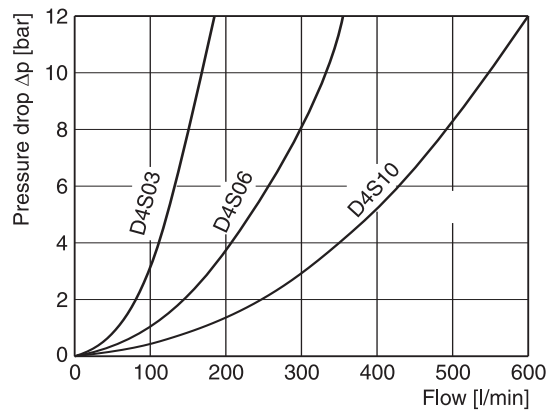
Specifications

General						
Size	NG10		NG25		NG32	
Mounting	Subplate according to ISO 5781					
Mounting Position	Unrestricted					
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)					
MTTF _D Value (years)	150					
Hydraulic						
Operating Pressure (Bar)	Ports A, B up to 350 (5075 PSI); Port Y 140 (2030 PSI) with WV1					
Nominal Flow (LPM)	180 (47.6 GPM)		360 (95.2 GPM)		600 (158.7 GPM)	
Fluid	Hydraulic oil in accordance with DIN 51524					
Fluid Temperature (°C)	-20 to +70 (-4°F to +158°F)					
Viscosity	20 - 400 (100 - 1854 SSU) 30 - 80 (139 - 371 SSU)					
Permitted (cSt / mm²/s)						
Recommended (cSt / mm²/s)						
Filtration	ISO 4406 (1999) 18/16/13					
Electrical						
Duty Ratio (%)	100 ED; CAUTION: coil temperature up to 150°C (302°F) possible					
Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)					
Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage	12 VDC	24 VDC	98 VDC	205 VDC	110 VAC/50 Hz 120 VAC/50 Hz	220 VAC/50 Hz 240 VAC/50 Hz
Tolerance Supply Voltage (%)	+/-10	+/-10	+/-10	+/-10	+/-5	+/-5
Current Consumption, Hold (A)	2.72	1.29	0.33	0.13	0.6 / 0.55	0.3 / 0.27
Current Consumption, In Rush (A)	2.72	1.29	0.33	0.13	2.5 / 2.4	1.25 / 1.2
Power Consumption, Hold (W)	32.7	31	31.9	28.2	70 / 70 VA	70 / 70 VA
Power Consumption, In Rush (W)	32.7	31	31.9	28.2	280 / 290 VA	280 / 290 VA
Solenoid Connection	Connector as per EN 175301-803, solenoid identification as per ISO 9461					
Wiring Minimum (mm²)	3x1.5 recommended					
Wiring Length Maximum (m)	50 (164 ft) recommended					

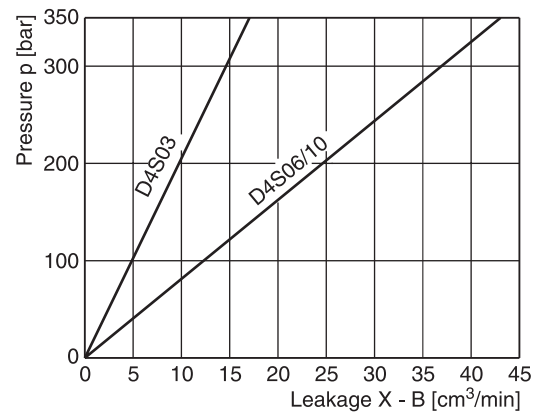
D4S pilot configuration

D4S direct operated	D4S with vent valve VV01	VV01
		de-energized open  de-energized closed 

$\Delta p/Q$ performance curves



Leakage



All characteristic curves measured with HLP46 at 50°C.

Selection of Cartridges

Sleeve 1, Poppet 1	Sleeve 1, Poppet 2	Sleeve 1, Poppet 4	Sleeve 3, Poppet 4	Sleeve 3, Poppet A	Sleeve 3, Poppet B/C
Z	Z	Z	Z	Z	Z
A	A	A	A	A	A
1 : 1.05	1 : 1.05	1 : 1.05	1 : 1.67	1 : 1.67	1 : 1.67
$A_A = 0.95 A_G$	$A_A = 0.95 A_G$	$A_A = 0.95 A_G$	$A_A = 0.6 A_G$	$A_A = 0.6 A_G$	$A_A = 0.6 A_G$
$A_B = 0.05 A_G$	$A_B = 0.05 A_G$	$A_B = 0.05 A_G$	$A_B = 0.4 A_G$	$A_B = 0.4 A_G$	$A_B = 0.4 A_G$
15° chamfer	15° chamfer	45° chamfer	45° chamfer	45° chamfer	45° chamfer
	orifice			safety spool	throttle spool

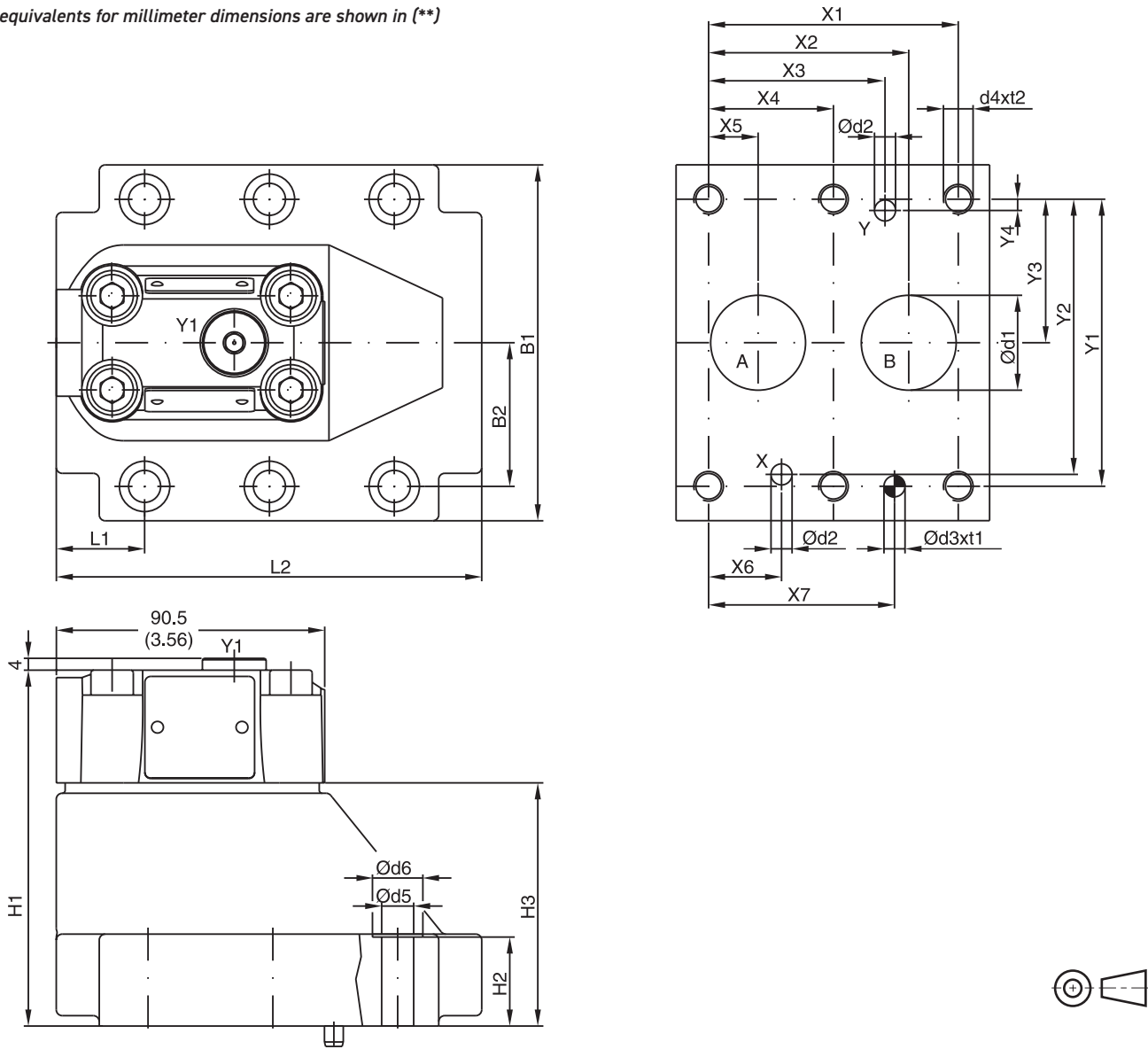
Directional Control Valves

D4S - Dimensions

A265

WWW.SUMY.IR

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



NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	-	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	-	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)

NG	ISO-code	B1	B2	H1	H2	H3	L1	L2	D1	D2	D3	T1	D4	T2	D5	D6
10	5781-06-07-0-00	87.3 (3.44)	33.35 (1.31)	83.0 (3.27)	21.0 (0.83)	45.0 (1.77)	29.0 (1.14)	94.8 (3.73)	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	107.5 (4.23)	29.0 (1.14)	69.5 (2.74)	34.7 (1.37)	126.8 (4.99)	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	30.0 (1.18)	82.0 (3.23)	30.6 (1.20)	144.3 (5.68)	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal Kit	Surface Finish
					Nitrile Fluorocarbon	
10	5781-06-07-0-00	BK 505	4x M10 x 35 ISO 4762-12.9	63 Nm (46.5 lb.-ft.)	S26-58507-0	S26-58507-5
25	5781-08-10-0-00	BK 485	4x M10 x 45 ISO 4762-12.9	±15%	S26-58475-0	S26-58475-5
32	5781-10-13-0-00	BK 506	6x M10 x 45 ISO 4762-12.9		S26-58508-0	S26-58508-5

Directional Control Valves

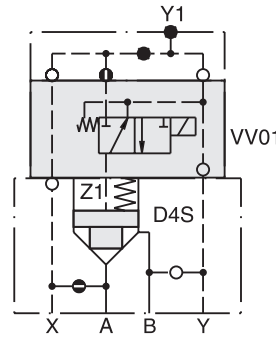
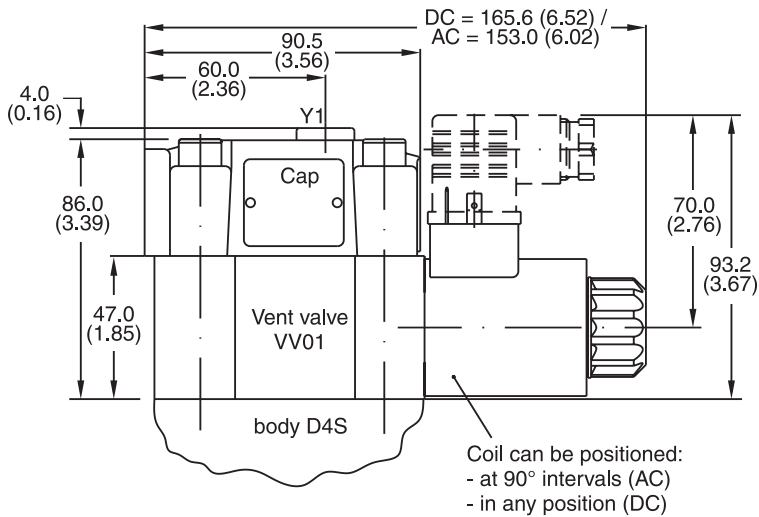
D4S - Dimensions

A266

WWW.SUMY.IR

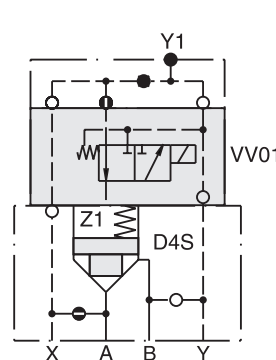
Inch equivalents for millimeter dimensions are shown in (**)

D4S with VV01



with manual override without manual override

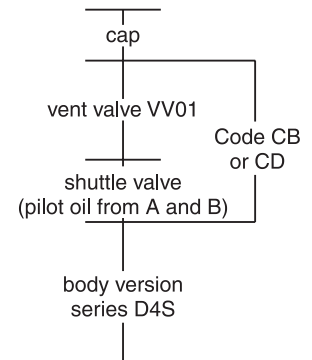
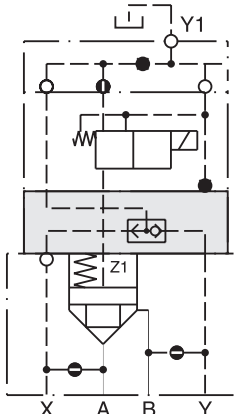
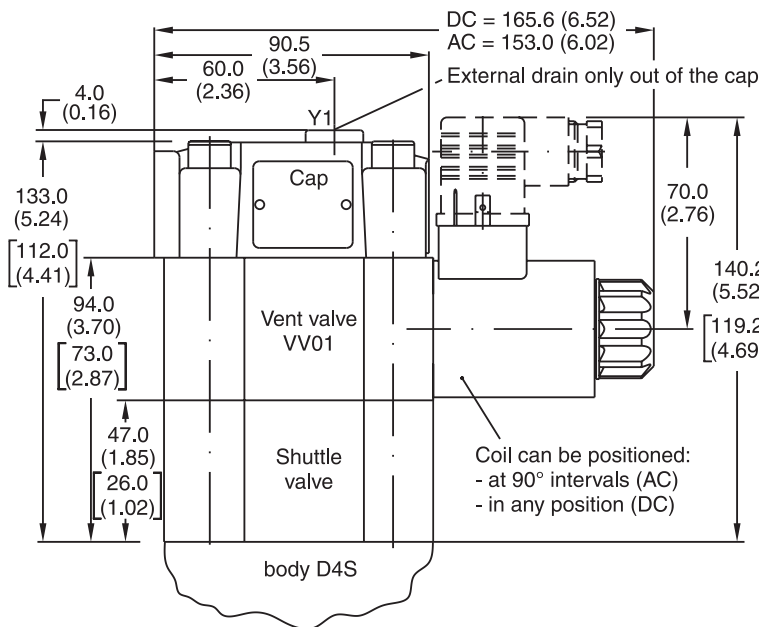
D4S... 09/10
Solenoid energized:
D4S blocked
Solenoid de-energized:
Flow from A-B or B-A



with manual override without manual override

D4S... 11/12
Solenoid energized:
Flow from A-B or B-A
Solenoid de-energized:
D4S Blocked

D4S with Shuttle Valve



Dimensions in brackets [] are for version VV01 with shuttle valve code DB or DD.

¹⁾ Pilot oil from A and B, from B to A check valve function

¹⁾ pilot oil from A and B, from B to A check valve function

Directional Control Valves

D4S - Dimensions

A267

WWW.SUMY.IR

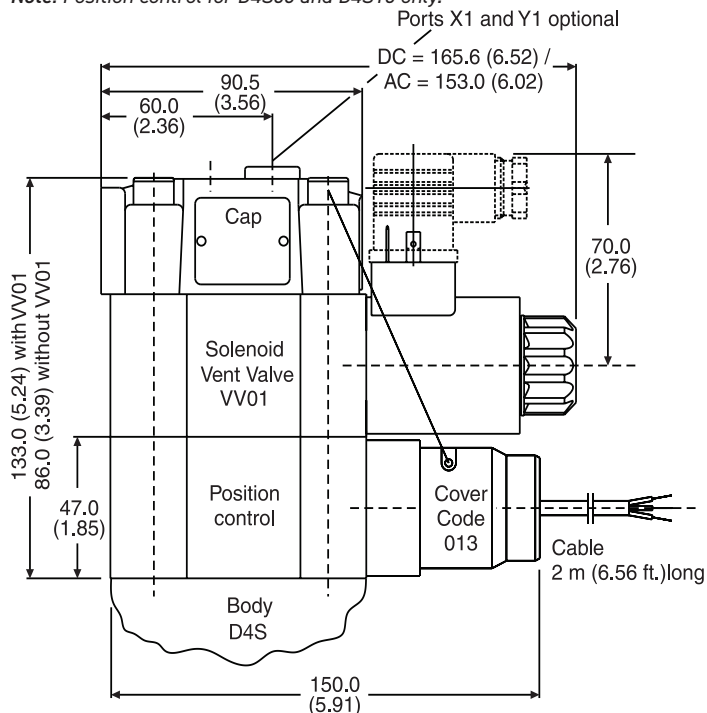
Inch equivalents for millimeter dimensions are shown in (**)

Position Control by Proximity Switch (incl. Amplifier)

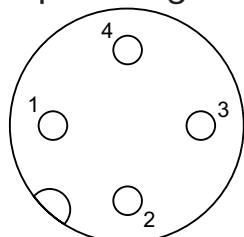
Valve open: proximity switch activated.

This proximity switch is pressure proof and has no wearing parts.

Note: Position control for D4S06 and D4S10 only.



M12 pin assignment

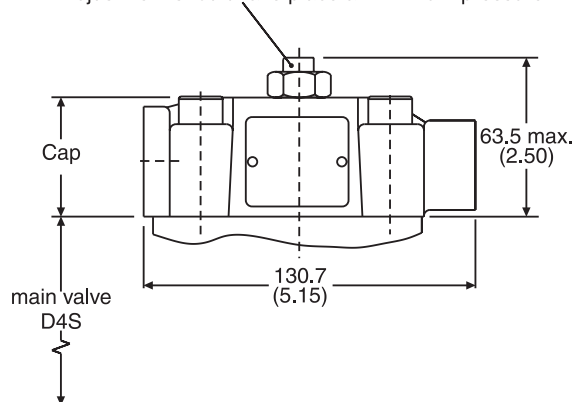


- 1 U_s 10...30 V
- 2 not connected
- 3 0 V
- 4 Out A: normally open

Please order plug M12 x 1 separately. Straight plug recommended – no defined position possible for angled plug.

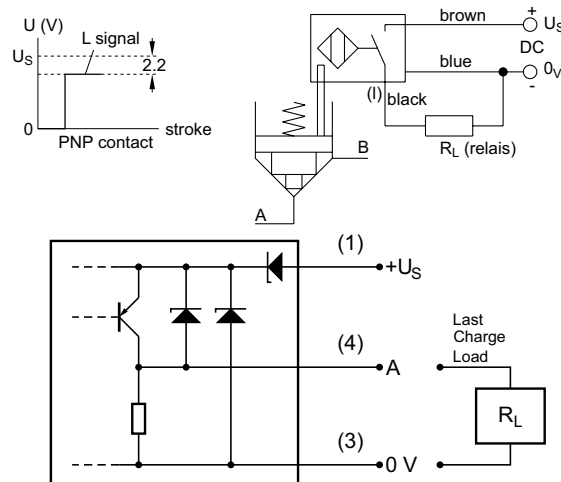
Dimensions D4S Stroke Limiter

Adjustment should take place at minimum pressure

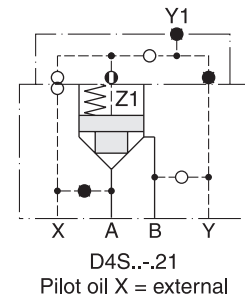
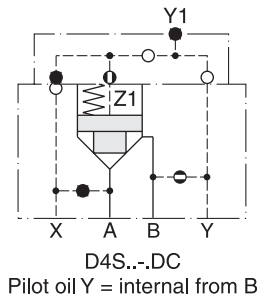


Note: Stroke limiter not for use with D4S03, vent valve VV01, shuttle valve and position control.

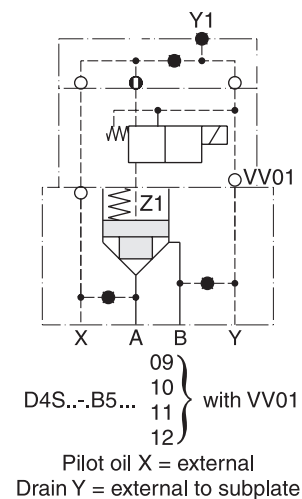
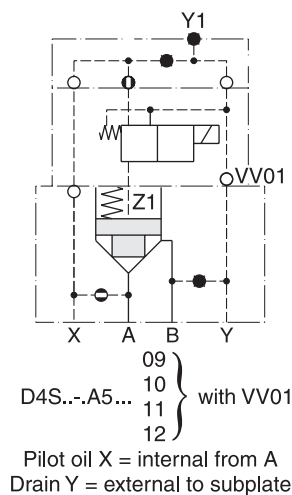
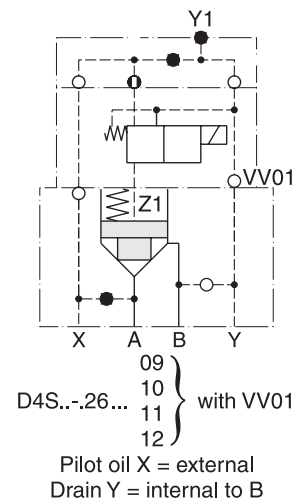
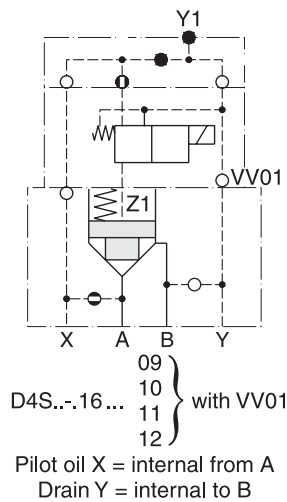
Position Control as per IEC 61076-2-101 (M12x1)	
Protection class	IP67 in accordance with EN 60529
Supply Voltage U_s / Ripple	10 - 30 VDC, +/- 10%
Current Consumption w/o Load	≤ 10 mA
Max Output Current per Channel, ohmic	200 mA
Min Output Current per Channel, ohmic	100 kOhm
Max Output drop at 0.2 A	≤ 2 V
EMC	EN61000-6-4 / EN 61000-6-2
Min Distance to next AC Solenoid	>0.1 m (3.9 in)
Interface	M12x1 acc. to IEC 61076-2-101
Wiring min	3mm ² x0.14 braided shield recommended
Wiring Length Max	50m (164 ft) recommended



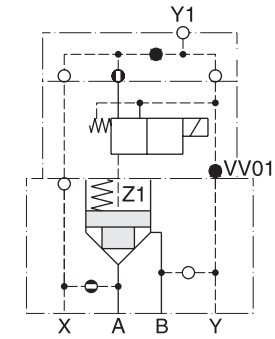
D4S Direct Operated Examples



D4S with VV01 Examples

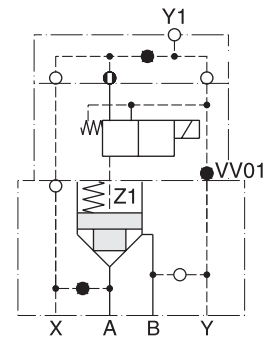


D4S with VV01 Examples



D4S...12...
09 } with VV01
10
11
12

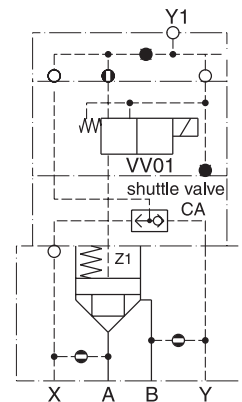
Pilot oil X = internal from A
Drain Y1 = external out of the cap



D4S...22...
09 } with VV01
10
11
12

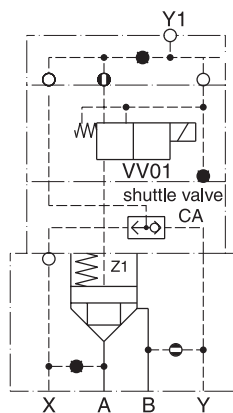
Pilot oil X = external
Drain Y1 = external out of the cap

D4S with Shuttle Valve Examples



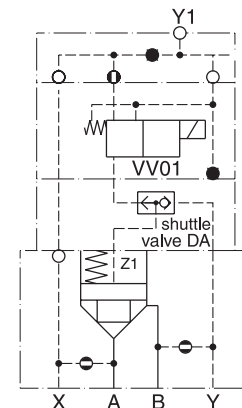
D4S...C2...
CB } with shuttle valve CA
CD } and VV01

Pilot oil = internal from A and B
Drain Y1 = external out of the cap



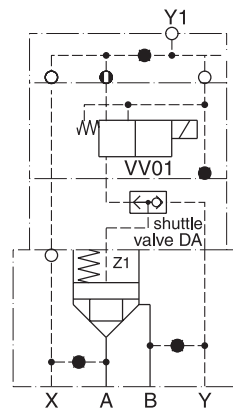
D4S...D2...
CB } with shuttle valve CA
CD } and VV01

Pilot oil = internal from B and
external from X
Drain Y1 = external out of the cap



D4S...C2...
DB } with shuttle valve DA
DD } and VV01

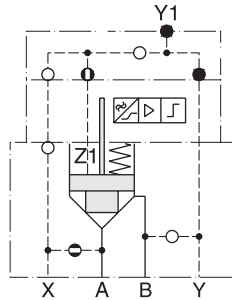
Pilot oil = internal from A and B
(B-A = Check valve function)
Drain Y1 = external out of the cap



D4S...B2...
DB } with shuttle valve DA
DD } and VV01

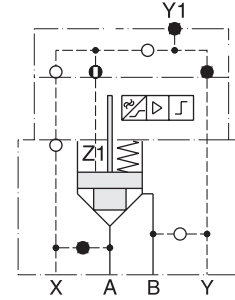
Pilot oil = external from X and Y
Drain Y1 = external out of the cap

D4S with Position Control Examples



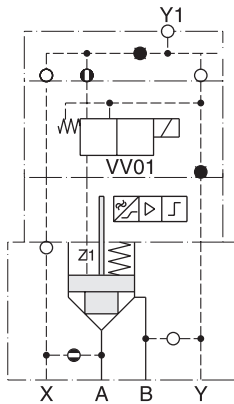
D4S...113A,BA
(with position control)

Pilot oil X = internal from A



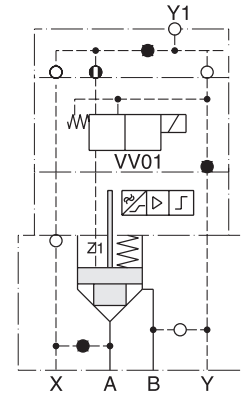
D4S...213A,BA
(with position control)

Pilot oil X = external



D4S...123A. BC } with position control
BE } and VV01

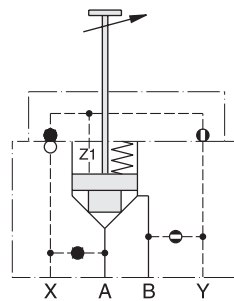
Pilot oil X = internal from A
Drain Y1 = external out of the cap



D4S...223A. BC } with position control
BE } and VV01

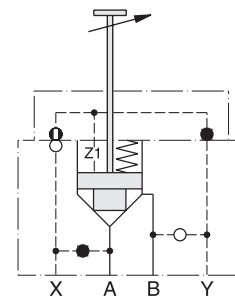
Pilot oil X = external
Drain Y1 = external out of the cap

D4S with Stroke Limiter Examples



D4S...D434. with stroke limiter
Pilot oil Y = internal from B

Note: for D4S06 and D4S10 only



D4S...233B. with stroke limiter
Pilot oil X = external

Note: for D4S06 and D4S10 only

Directional Control Valves

D4S (Inline Mounted) - Technical Information

A271

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General Description

Seat valves series D4S are designed for directional control functions. A large variety of poppets, springs and covers – including shuttle valves, stroke limiters, solenoid valves (VV01) and position control – allows to design individual hydraulic solutions for nominal flow up to 600 l/min.

A complete program is offered under the Parker brand: Subplate mounted valves (D4S),

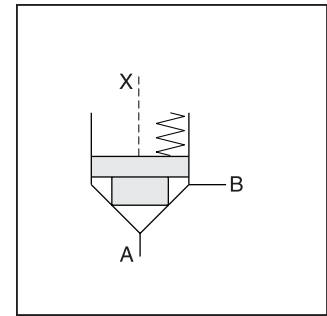
SAE flange valves (D5S),

Pipe mounted valves (D4S),

Slip-in cartridges (CAR - on request).



D4S10 L-Body



A

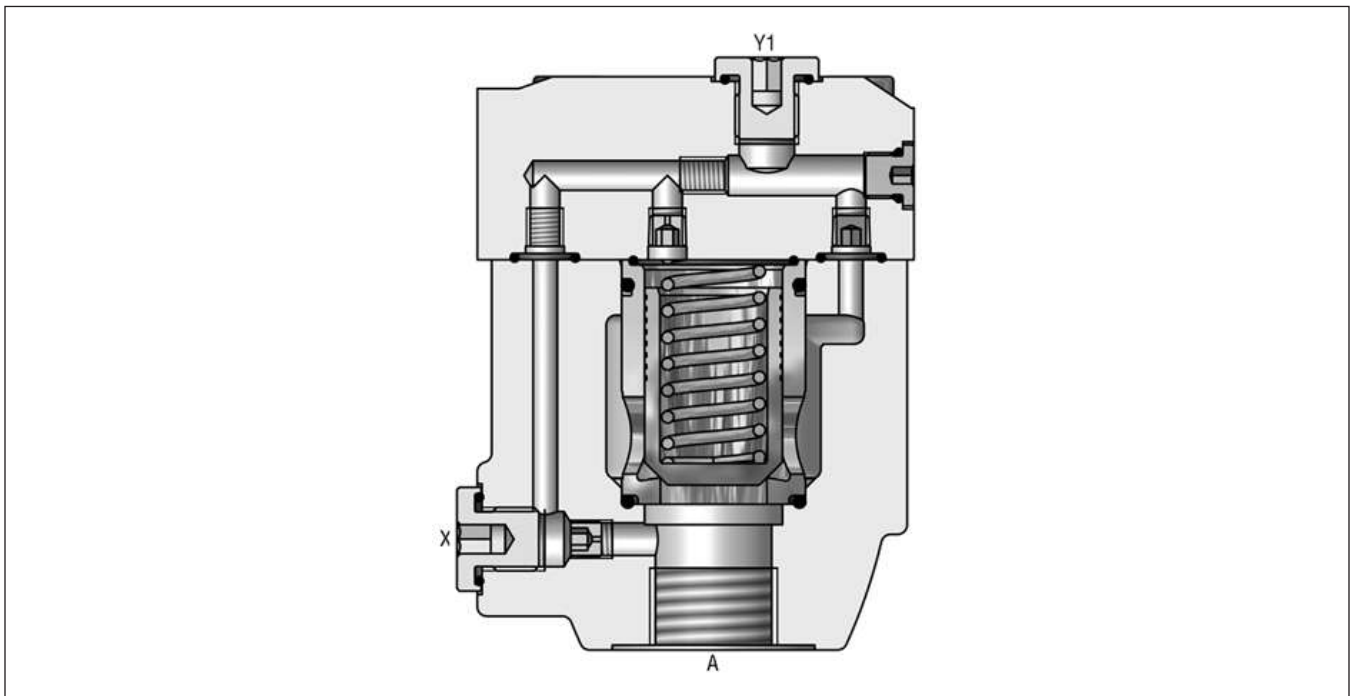
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Features

- Leak-free seat valve design.
- 2 body designs
 - L-body (2-port)
 - T-body (3-port)
- Numerous pilot options.
- 4 port sizes:
 - G 1/2", G 1" for T-body
 - G 3/4", G 1 1/2" for L-body.
- 6 poppet types.

D4S06 L-Body



⚠ WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D4S (Inline Mounted) - Ordering Information

A272

WWW.SUMY.IR

A

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Section A
Index

D4S											B																																																																																	
Seat valve		Nominal size	Body	Pilot connection	Cap version	Sleeve	Spool type	Spring	Switching type	Solenoid voltage	Design series	Seals																																																																																
<table border="1"><thead><tr><th>Code</th><th>Description</th></tr></thead><tbody><tr><td>03</td><td>NG10</td></tr><tr><td>06</td><td>NG 25</td></tr><tr><td>10</td><td>NG 32</td></tr></tbody></table>		Code	Description	03	NG10	06	NG 25	10	NG 32					<table border="1"><thead><tr><th>Code</th><th>Description</th></tr></thead><tbody><tr><td>1</td><td>AA = 95%, AB = 5%</td></tr><tr><td>3</td><td>AA = 60% AB = 40%</td></tr></tbody></table>	Code	Description	1	AA = 95%, AB = 5%	3	AA = 60% AB = 40%					<table border="1"><thead><tr><th>Code</th><th>Description</th></tr></thead><tbody><tr><td>1</td><td>Nitrile</td></tr><tr><td>5</td><td>Fluorocarbon</td></tr></tbody></table>	Code	Description	1	Nitrile	5	Fluorocarbon																																																													
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<table border="1"><thead><tr><th>Code</th><th>Ports</th><th>X</th><th>Y</th><th>Z</th><th>X-Y</th><th>Y1</th><th>WV01</th></tr></thead><tbody><tr><td colspan="8">Standard</td></tr><tr><td>1</td><td>Pilot Oil = Pilot Drain</td><td>○</td><td>●</td><td>●</td><td>○</td><td>●</td><td>-</td></tr><tr><td>C</td><td>Pilot Oil = Pilot Drain</td><td>●</td><td>○</td><td>●</td><td>○</td><td>●</td><td>-</td></tr><tr><td colspan="8">With Solenoid Valve (VW01)</td></tr><tr><td>2</td><td>External PD from cap</td><td>○</td><td>○</td><td>●</td><td>●</td><td>○</td><td>●</td></tr><tr><td>6</td><td>Internal pilot drain</td><td>○</td><td>○</td><td>●</td><td>●</td><td>●</td><td>○</td></tr><tr><td colspan="8">With Stroke Limiter (not for D4S03)</td></tr><tr><td>3</td><td>Pilot Oil = Pilot Drain</td><td>●</td><td>●</td><td>-</td><td>-</td><td>-</td><td>-</td></tr><tr><td>4</td><td>Pilot Oil = Pilot Drain</td><td>●</td><td>●</td><td>-</td><td>-</td><td>-</td><td>-</td></tr></tbody></table> Key: ○ Open Bore ● Closed Bore ● Orifice Ø 1.2		Code	Ports	X	Y	Z	X-Y	Y1	WV01	Standard								1	Pilot Oil = Pilot Drain	○	●	●	○	●	-	C	Pilot Oil = Pilot Drain	●	○	●	○	●	-	With Solenoid Valve (VW01)								2	External PD from cap	○	○	●	●	○	●	6	Internal pilot drain	○	○	●	●	●	○	With Stroke Limiter (not for D4S03)								3	Pilot Oil = Pilot Drain	●	●	-	-	-	-	4	Pilot Oil = Pilot Drain	●	●	-	-	-	-											
Code	Ports	X	Y	Z	X-Y	Y1	WV01																																																																																					
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1	03, 06, 10	With closed bottom and 15° chamfer (pZ max. = pA +20 Bar (290 PSI))	1																																																																																									
2	03	With 0.8 dia. orifice at the bottom and 15° chamfer	1																																																																																									
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Code	Spring — Approx. Cracking Pressure in Bar (PSI)					
	Sleeve Code 1		Sleeve Code 3			
	A -> B		A -> B		B -> A	
	D4S03	D4S06/10	D4S03	D4S06/10	D4S03	D4S06/10
1	2.8 (40.6)	3.5 (50.8)	6.5 (94.3)	6.5 (94.3)	9.5 (137.8)	11.0 (159.5)
2	0.5 (7.3)	0.5 (7.3)	1.0 (14.5)	1.0 (14.5)	1.5 (21.8)	1.7 (24.7)
3	0.3 (4.4)	0.3 (4.4)	0.6 (8.7)	0.6 (8.7)	0.9 (13.1)	1.0 (14.5)
4	2.2 (31.9)	2.2 (31.9)	4.0 (58.0)	3.5 (50.8)	5.5 (79.8)	6.0 (87.0)
5	-	9.0 (130.5)	-	16.0 (232.0)	-	28.0 (406.0)
6	1.2 (17.4)	1.2 (17.4)	2.0 (29.0)	2.2 (31.9)	3.0 (43.5)	3.8 (55.1)
7	3.0 (43.5)	-	8.0 (116.0)	-	12.0 (174.0)	-

* Position control for D4S06/10 only.
Spring 2 or 4. Spool A and sleeve 3.
Valve open: Proximity Switch damped.

Weight:

D4S03 T-body	3.2 kg (7.1 lbs)
D4S06 Tbody	6.6 kg (14.6 lbs)
D4S06 L-body	3.3 kg (7.3 lbs)
D4S10 L-body	5.6 kg (12.3 lbs)

Industrial
Hydraulics Valves

MSG14-2500/US
Directional Control Valves

Directional Control Valves

D4S (Inline Mounted) - Technical Information

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Specifications

General						
Design	T-Body		L-Body			
Size	03 (1/2")	06 (1")	06 (3/4")	10 (1-1/4")		
Mounting	Threaded body					
Mounting Position	Unrestricted					
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)					
MTTF _D Value (years)	150					
Hydraulic						
Maximum Operating Pressure (Bar)	Ports A, B up to 350 (5075 PSI); Port Y 140 Bar (2030 PSI) with WV01					
Nominal Flow (LPM)	180 (47.6 GPM)	360 (95.2 GPM)	360 (95.2 GPM)	600 (158.7 GPM)		
Fluid	Hydraulic oil in accordance with DIN 51524					
Fluid Temperature (°C)	-20 to +70 (-4°F to +158°F)					
Viscosity						
Permitted (cSt / mm²/s)	20 - 400 (100 - 1854 SSU)					
Recommended (cSt / mm²/s)	30 - 80 (139 - 371 SSU)					
Filtration	ISO 4406 (1999) 18/16/13					
Electrical						
Duty Ratio (%)	100 ED; CAUTION: coil temperature up to 150°C (302°F) possible					
Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)					
Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage	12 VDC	24 VDC	98 VDC	205 VDC	110 VAC/50 Hz 120 VAC/50 Hz	220 VAC/50 Hz 240 VAC/50 Hz
Tolerance Supply Voltage (%)	+/-10	+/-10	+/-10	+/-10	+/-5	+/-5
Current Consumption, Hold (A)	2.72	1.29	0.33	0.13	0.6 / 0.55	0.3 / 0.27
Current Consumption, In Rush (A)	2.72	1.29	0.33	0.13	2.5 / 2.4	1.25 / 1.2
Power Consumption, Hold (W)	32.7	31	31.9	28.2	70 / 70 VA	70 / 70 VA
Power Consumption, In Rush (W)	32.7	31	31.9	28.2	280 / 290 VA	280 / 290 VA
Solenoid Connection	Connector as per EN 175301-803; solenoid identification as per ISO 946.1					
Wiring Minimum (mm²)	3x1.5 recommended					
Wiring Length Maximum (m)	50 (164 ft) recommended					

A

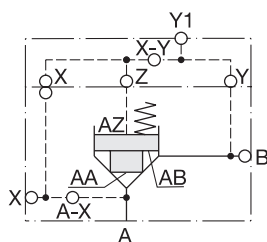
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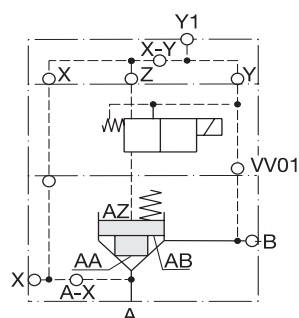
D4S Pilot Configuration

L-body (2-port)

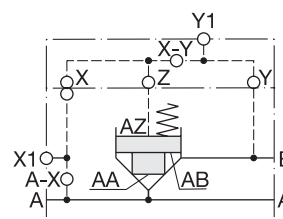
T-body (3-port)



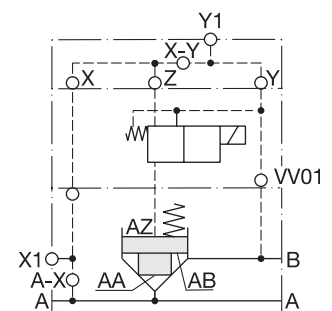
Standard



With Vent Valve VV01

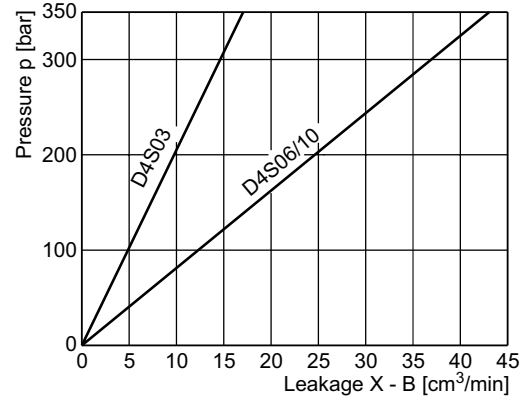
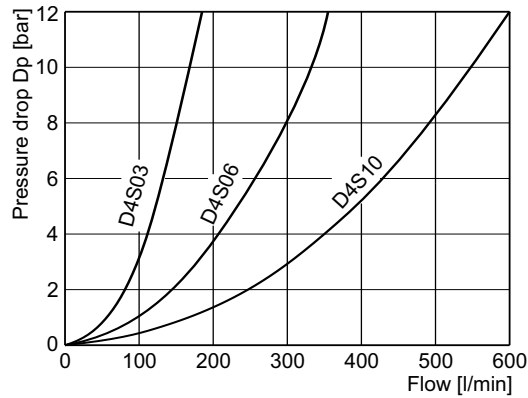


Standard



With Vent Valve VV01

$\Delta p/Q$ performance curves



All characteristic curves measured with HLP46 at 50°C.

Selection of Cartridges

Sleeve 1, Poppet 1	Sleeve 1, Poppet 2	Sleeve 1, Poppet 4	Sleeve 3, Poppet 4	Sleeve 3, Poppet A	Sleeve 3, Poppet B/C
1 : 1.05	1 : 1.05	1 : 1.05	1 : 1.67	1 : 1.67	1 : 1.67
$A_A = 0.95 A_C$	$A_A = 0.95 A_C$	$A_A = 0.95 A_C$	$A_A = 0.6 A_C$	$A_A = 0.6 A_C$	$A_A = 0.6 A_C$
$A_B = 0.05 A_C$	$A_B = 0.05 A_C$	$A_B = 0.05 A_C$	$A_B = 0.4 A_C$	$A_B = 0.4 A_C$	$A_B = 0.4 A_C$
15° chamfer	15° chamfer	45° chamfer	45° chamfer	45° chamfer	45° chamfer
	orifice			safety spool	throttle spool

Directional Control Valves

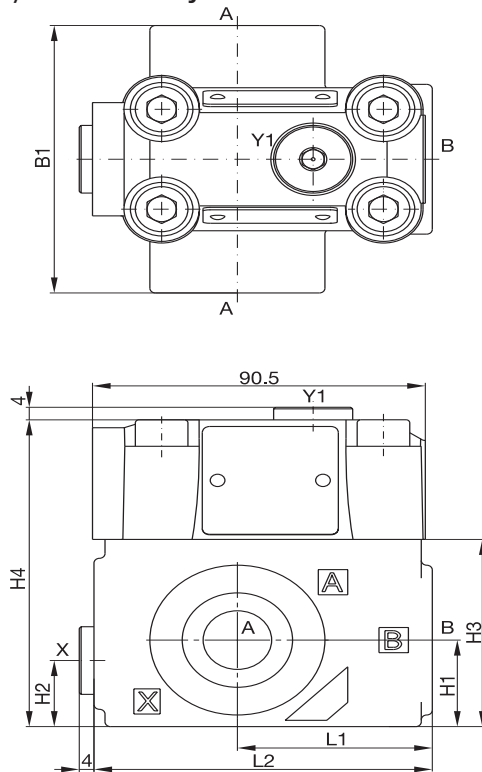
D4S (Inline Mounted) - Dimensions

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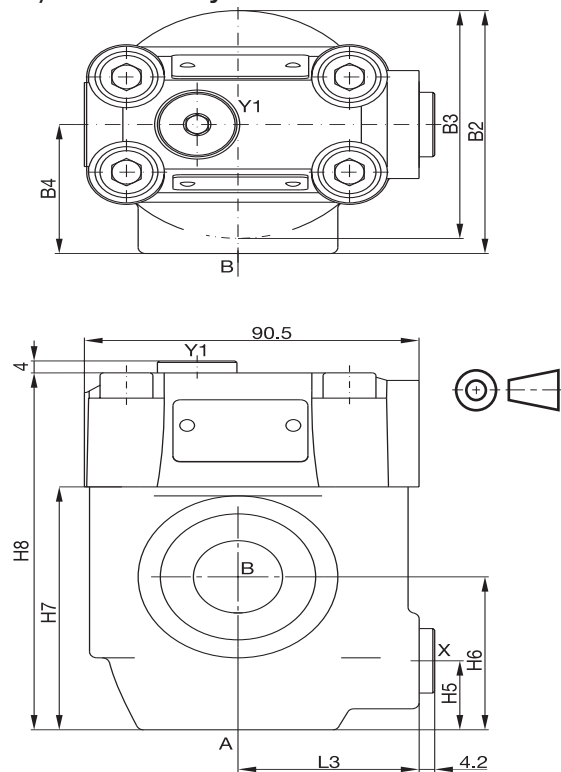
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Inch equivalents for millimeter dimensions are shown in (**)

D4S 03/06 T-body



D4S 06/10 L-body



Size	L1	L2	B1	H1	H2	H3	H4
03 (T-body)	53.0 (2.09)	92.0 (3.62)	85.0 (3.35)	27.5 (1.08)	21.0 (0.83)	59.5 (2.34)	97.5 (3.84)
06 (T-body)	66.5 (2.62)	117.5 (4.63)	136.0 (5.35)	38.0 (1.50)	28.0 (1.10)	93.0 (3.66)	131.0 (5.16)

Size	L3	B2	B3	B4	H5	H6	H7	H8
06 (L-body)	49.0 (1.93)	81.0 (3.19)	76.0 (2.99)	43.0 (1.69)	23.0 (0.91)	51.0 (2.01)	81.0 (3.19)	119.0 (4.69)
10 (L-body)	49.8 (1.96)	120.7 (4.75)	85.6 (3.37)	77.8 (3.06)	38.1 (1.50)	50.8 (2.00)	96.0 (3.78)	134.0 (5.28)

Ports	Function	Port Size**			
		D4S03 T-body	D4S06 T-body	D4S06 L-body	D4S10 L-body
A	Inlet or Outlet	G1/2" or 3/4-16 UNF	G1" or 1-1/16-12 UN	G1" or 1-5/16-12 UN	G1-1/4" or 1-5/8-12 UN
B	Outlet or Inlet	G1/2" or 3/4-16 UNF	G3/4" or 1-1/16-12 UN	G1" or 1-5/16-12 UN	G1-1/4" or 1-5/8-12 UN
X1	External Pilot Port	G1/4" or 7/16-20 UNF			
Y1	External Drain*	G1/4" or 7/16-20 UNF			

* With VV01 only.

** G1/2" and G1" if body 6 or D (BSP). UNF/UN if body 4 or B (SAE)

Seal Kits		
Size	Nitrile	Fluorocarbon
03	S26-58507-0	S26-58507-5
06	S26-58475-0	S26-58475-5
10	S26-58508-0	S26-58508-5

Directional Control Valves

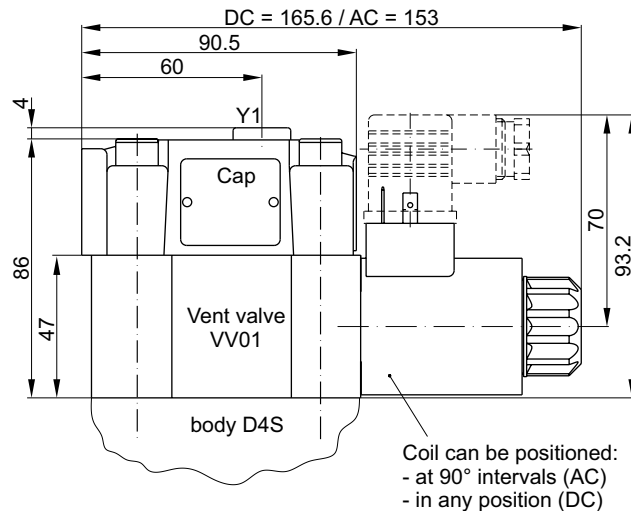
D4S (Inline Mounted) - Dimensions

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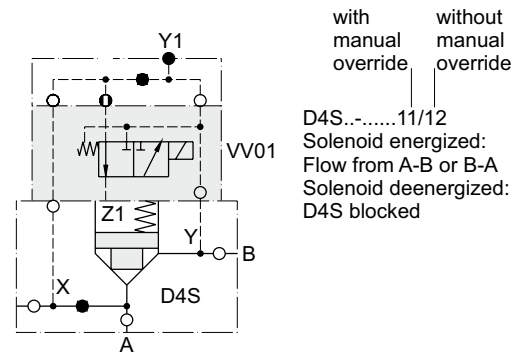
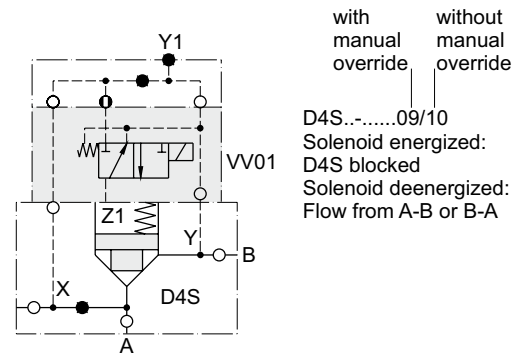
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Inch equivalents for millimeter dimensions are shown in (**)

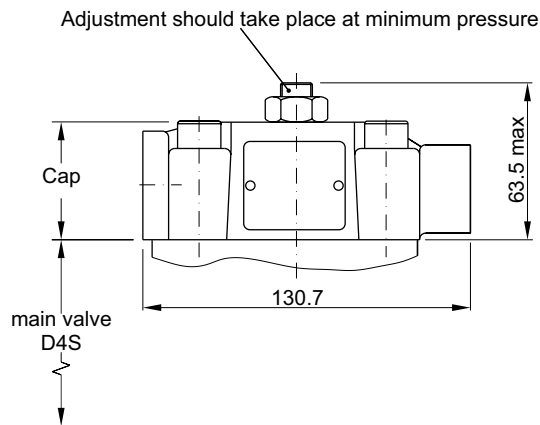
D4S with VV01



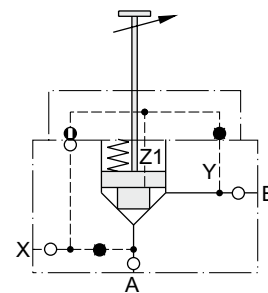
VV01 Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S56-40609-0	S56-40609-5
AC Solenoid	
S26-35237-0	S26-35237-5



D4S stroke limiter



Example: D4S⁰⁶₁₀-233B.



Note: Stroke limiter not for use with D4S03, VV01, shuttle valve and positon control.

Directional Control Valves

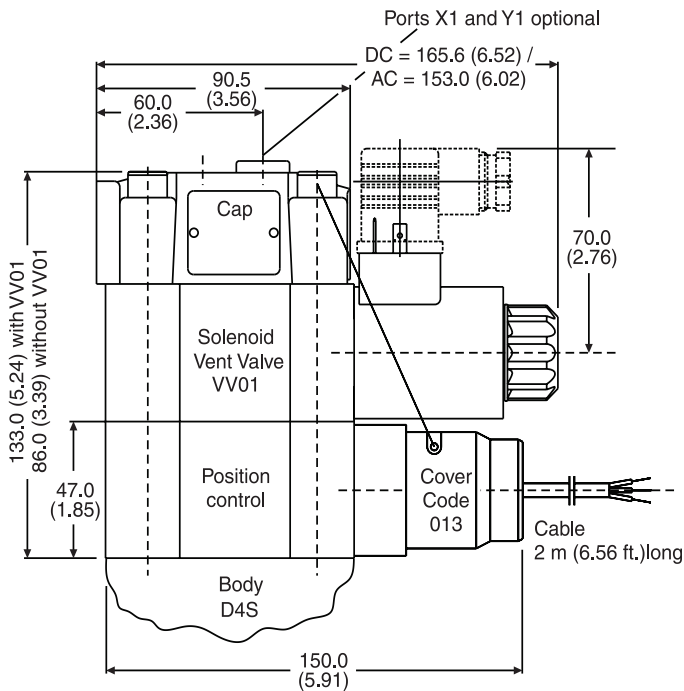
D4S (Inline Mounted) - Technical Information

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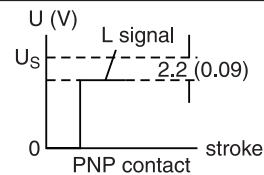
Inch equivalents for millimeter dimensions are shown in (**)

D4S Position Control



Position Control as per IEC 61076-2-101 (M12x1)

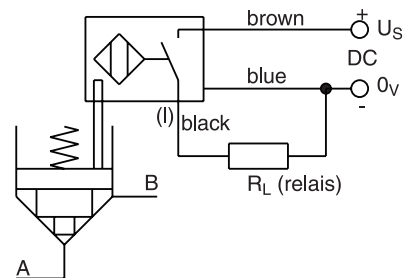
Protection class	IP67 in accordance with EN 60529
Ambient Temperature	-20°C to +60°C (-4°F to +140°F)
Supply Voltage U_s / Ripple	10 - 30 VDC, +/- 10%
Current Consumption w/o Load	≤ 10 mA
Max Output Current per Channel, ohmic	200 mA
Min Output Current per Channel, ohmic	100 kOhm
Max Output drop at 0.2 A	≤ 2 V
EMC	EN61000-6-4 / EN 61000-6-2
Min Distance to next AC Solenoid	>0.1 m (3.9 in)
Interface	M12x1 acc. to IEC 61076-2-101
Wiring min	3mm ² x0.14 brad shield recommended
Wiring Length Max	50m (164 ft) recommended



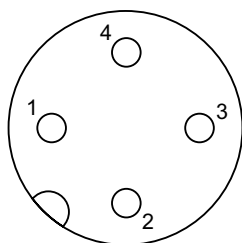
Position Control by Proximity Switch (incl. Amplifier)

Valve open: proximity switch activated.
This proximity switch is pressure proof and has no wearing parts.

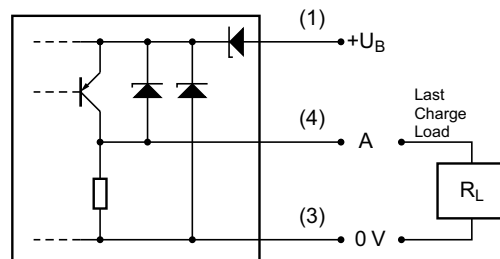
Note: Position control for D4S06 and D4S10 only.



M12 pin assignment



- 1 U_s 10...30 V
- 2 not connected
- 3 0 V
- 4 Out A: normally open



Please order plug M12 x 1 separately. Straight plug recommended – no defined position possible for angled plug.

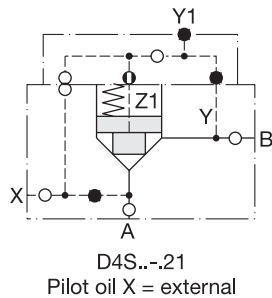
Directional Control Valves

D4S (Inline Mounted) - Technical Information

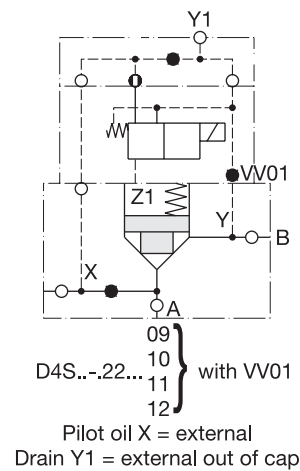
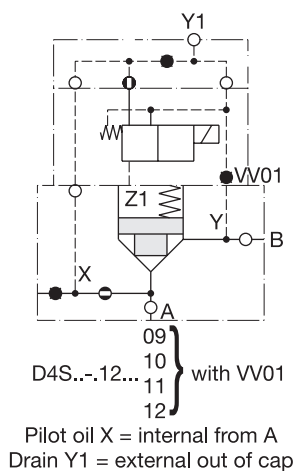
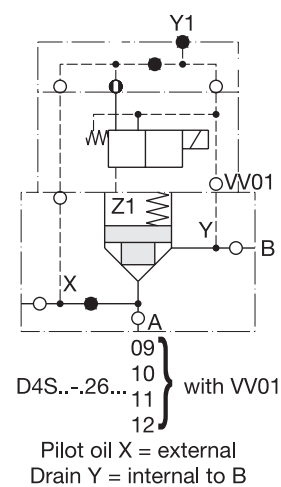
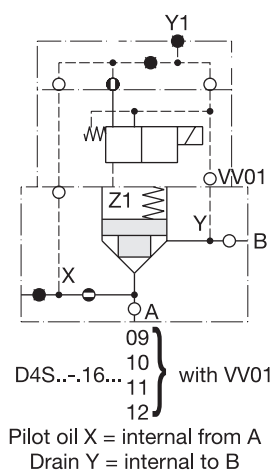
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D4S Direct Operated Example



D4S with Solenoid Valve VV01 Examples



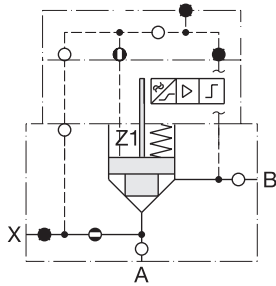
Directional Control Valves

D4S (Inline Mounted) - Technical Information

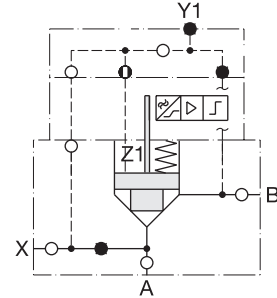
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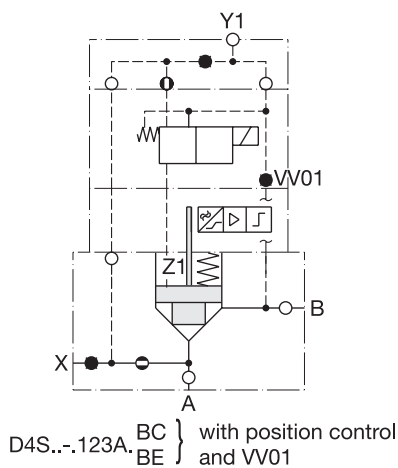
D4S with Position Control Examples



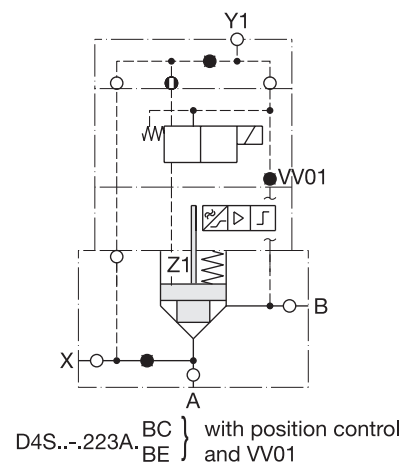
D4S...113A.BA
(with position control)
Pilot oil X = intern from A



D4S...213A.BA
(with position control)
Pilot oil X = external

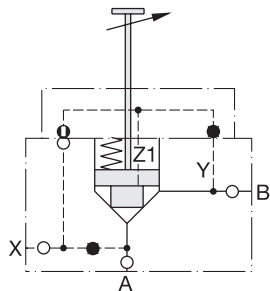


D4S...123A. BC } with position control
BE } and VV01
Pilot oil X = intern from A
Drain Y1 = external out of cap



D4S...223A. BC } with position control
BE } and VV01
Pilot oil X = external
Drain Y1 = external out of cap

D4S with Stroke Limiter Example



D4S...233B. with stroke limiter
Pilot oil X = external
(Note: for D4S06 and D4S10 only)

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Directional Control Valves

D5S - Technical Information

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General Description

Series D5S seat valves are designed for directional control functions. They enable individual hydraulic solutions for nominal flow up to 800 LPM (211.6 GPM) due to a large variety of poppets, springs and covers, including shuttle valves, stroke limiters, solenoid valves (VV01) and position control.

A complete program is offered under the Parker Brand:

Subplate mounted valves (Series D4S),

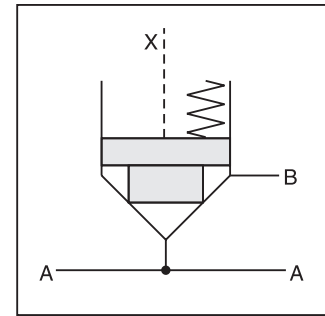
SAE flange valves (Series D5S),

Pipe mounted valves (Series D4S),

Slip-in cartridges (Series CAR).

Features

- Leak-free seat valve design.
- 3-port body.
- SAE61 flange.
- Numerous pilot options.
- 6 poppet types.
- 4 sizes (SAE 3/4", 1", 1 1/4", 1 1/2").

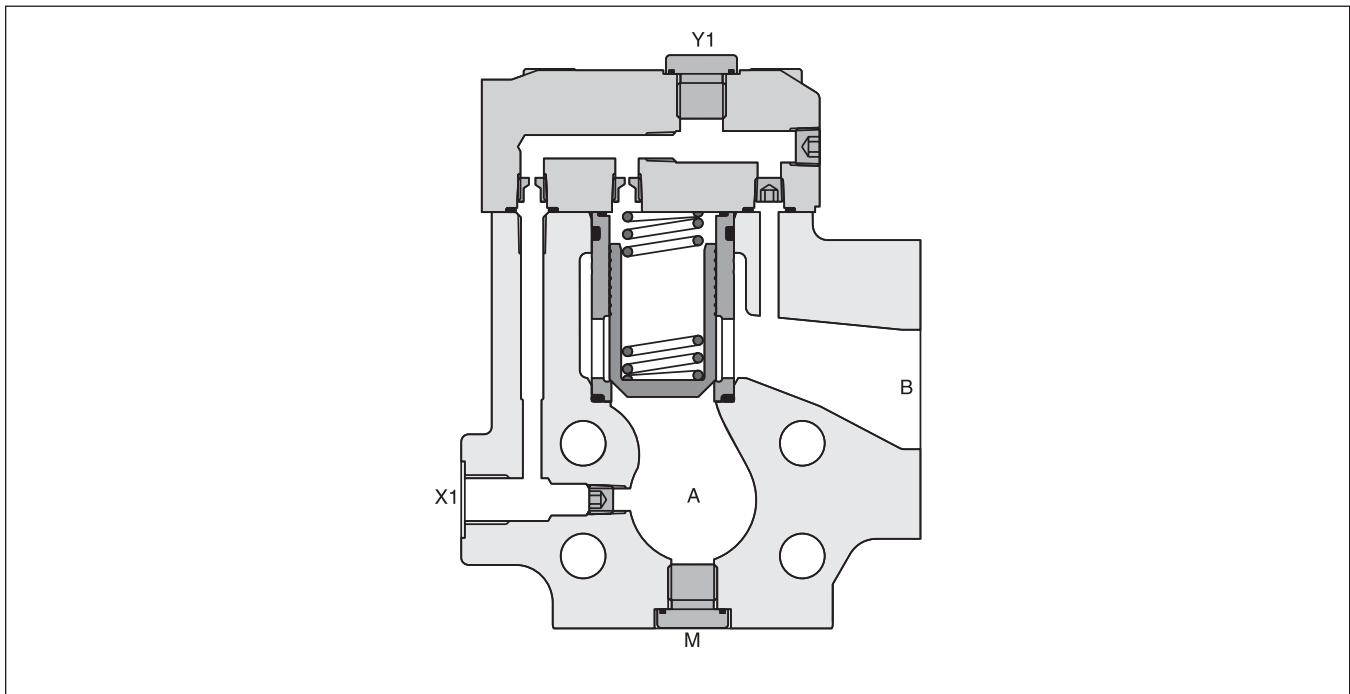


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D5S



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Directional Control Valves

D5S - Ordering Information

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D5S

Seat valve

Nominal size

Body

Pilot connection

Cap version

Sleeve

Spool type

Code	Description
03	NG10
06	NG 25
10	NG 32

Code	Body	Ports
5	3-Port BSP	Seat entry A; X1, Y1, M = G1/4"
9	3-Port SAE	Seat entry A; X1, Y1, M = SAE-4

Code	Pilot Oil Line in Body
1	Internal from A
2	External from X
3	Internal from A and B
4	External from X1
5	Internal from B, External from X1

Code	Ports	X	Y	Z	X-Y	X1	Y1	WV01
Standard								
1	Pilot Oil = Pilot Drain	○	●	●	○	-	●	-
C	Pilot Oil = Pilot Drain	●	○	●	○	-	●	-
With Solenoid Valve (VW01)								
2	Internal to B	○	○	●	●	-	○	●
6	External out of cap	○	○	●	●	-	●	○
With Stroke Limiter (not for D5S06)								
3	Pilot Oil = Pilot Drain	●	●	●	-	●	-	-
4	Pilot Oil = Pilot Drain	●	●	-	-	●	-	-

Key: ○ Open Bore ● Closed Bore ● Orifice Ø 1.2

Code	Size	Poppet Type	Sleeve
1	06, 08, 10, 12	With closed bottom and 15° chamfer (pZ max. = pA +20 Bar (290 PSI))	1
2	06	With 0.8 dia. orifice at the bottom and 15° chamfer	1
	08, 10	With 1.2 dia. orifice at the bottom and 15° chamfer	1
4	06, 08, 10, 12	With closed bottom and 45° chamfer	1, 3
A*	08, 10, 12	Safety spool (for end position control only)	3
B*	08, 10, 12	Throttle spool, 10° chamfer	3
C*	08, 10, 12	Throttle spool, 3° chamfer	3

** Springs 2, 3 and 6 only.*

Spring — Approx. Cracking Pressure in Bar (PSI)						
Code	Sleeve Code 1		Sleeve Code 3			
	A -> B		A -> B		B -> A	
	D5S06	D5S08/12	D5S06	D5S08/12	D5S06	D5S08/12
1	2.8 (40.6)	3.5 (50.8)	6.5 (94.3)	6.5 (94.3)	9.5 (137.8)	11.0 (159.5)
2	0.5 (7.3)	0.5 (7.3)	1.0 (14.5)	1.0 (14.5)	1.5 (21.8)	1.7 (24.7)
3	0.3 (4.4)	0.3 (4.4)	0.6 (8.7)	0.6 (8.7)	0.9 (13.1)	1.0 (14.5)
4	2.2 (31.9)	2.2 (31.9)	4.0 (58.0)	3.5 (50.8)	5.5 (79.8)	6.0 (87.0)
5	-	9.0 (130.5)	-	16.0 (232.0)	-	28.0 (406.0)
6	1.2 (17.4)	1.2 (17.4)	2.0 (29.0)	2.2 (31.9)	3.0 (43.5)	3.8 (55.1)
7	3.0 (43.5)	-	8.0 (116.0)	-	12.0 (174.0)	-

Code	Description
Omit	Standard without Vent Function
09	VW01 with Manual Override
10	VW01 without Manual Override
11	VW01 with Manual Override
12	VW01 without Manual Override
CA	Shuttle Valve
DA	Shuttle Valve
CB	VW01 Code 09 and Shuttle Valve Code CA
CD	VW01 Code 11 and Shuttle Valve Code CA
DB	VW01 Code 09 and Shuttle Valve Code DA
DD	VW01 Code 11 and Shuttle Valve Code DA
EH*	VW01 Code 10 and Shuttle Valve Code CA and Position Control* with Amplifier
EK*	VW01 Code 12 and Shuttle Valve Code CA and Position Control* with Amplifier
EN*	VW01 Code 10 and Shuttle Valve Code DA and Position Control* with Amplifier
EQ*	VW01 Code 12 and Shuttle Valve Code DA and Position Control* with Amplifier
EC*	VW01 Code 10 and Position Control* with Amplifier
EE*	VW01 Code 12 and Position Control* with Amplifier
EA*	Position Control* with Amplifier
EF*	Position Control* with Amplifier and Shuttle Valve Code CA
EL*	Position Control* with Amplifier and Shuttle Valve Code DA

** Position control for D5S08/10 only.
Spring 2 or 4. Spool A and sleeve 3.*

Code	Description
Omit	Standard w/o vent function
G0R	12 VDC
G0Q	24 VDC
GAR*	98 VDC
GAG*	205 VDC
W30	110 VAC 50 Hz / 120 VAC 60 Hz
W31	230 VAC 50 Hz / 240 VAC 60 Hz

** To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply.*

Weight:

D5S06	3.4 kg (7.5 lbs)
D5S08	4.4 kg (9.7 lbs)
D5S10	5.0 kg (11.0 lbs)
D5S12	7.8 kg (17.2 lbs)

Directional Control Valves

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Specifications

General						
Size	06	08	10	12		
Mounting	Flanged according to SAE 61					
Mounting Position	Unrestricted					
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)					
MTTF _D Value (years)	150					
Hydraulic						
Maximum Operating Pressure: SAE 61 Ports A, B (Bar) Port Y1 (Bar)	350 (5075 PSI) 30 (435 PSI)	350 (5075 PSI) 30 (435 PSI)	280 (4060 PSI) 30 (435 PSI)	210 (3045 PSI) 30 (435 PSI)		
Nominal Flow (LPM)	180 (48 GPM)	360 (95 GPM)	600 (159 GPM)	800 (212 GPM)		
Fluid	Hydraulic oil in accordance with DIN 51524					
Fluid Temperature (°C)	-20 to +70 (-4°F to +158°F)					
Viscosity Permitted (cSt / mm²/s) Recommended (cSt / mm²/s)	20 - 400 (100 - 1854 SSU) 30 - 80 (139 - 371 SSU)					
Filtration	ISO 4406; 18/16/13					
Electrical						
Duty Ratio (%)	100 ED; CAUTION: coil temperature up to 150°C (302°F) possible					
Protection Class	IP65 in accordance with EN60529 (with correctly mounted plug-in connector)					
Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage	12 VDC	24 VDC	98 VDC	205 VDC	110 VAC/50 Hz 120 VAC/60 Hz	230 VAC/50 Hz 240 VAC/60 Hz
Tolerance Supply Voltage (%)	+/-10	+/-10	+/-10	+/-10	+/-5	+/-5
Current Consumption, Hold (A)	2.72	1.29	0.33	0.13	0.6 / 0.55	0.3 / 0.27
Current Consumption, In Rush (A)	2.72	1.29	0.33	0.13	2.5 / 2.4	1.25 / 1.2
Power Consumption, Hold (W)	32.7	31	31.9	28.2	70 / 70 VA	70 / 70 VA
Power Consumption, In Rush (W)	32.7	31	31.9	28.2	280 / 290 VA	280 / 290 VA
Solenoid Connection	Connector as per EN 175301-803, solenoid identification as per ISO 9461					
Wiring Minimum (mm²)	3x1.5 recommended					
Wiring Length Maximum (m)	50 (164 ft) recommended					

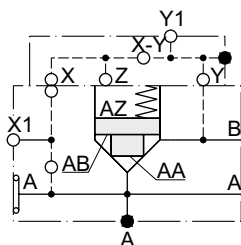
A

Return
to Alpha
Index

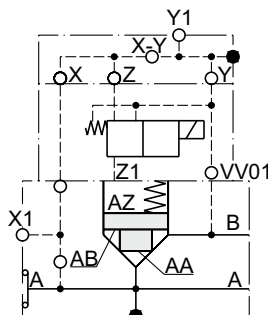
Return to
Section A
Index

D5S Pilot Configuration

Standard

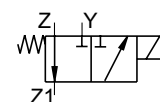


With Vent Valve VV01

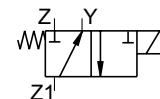


VV01

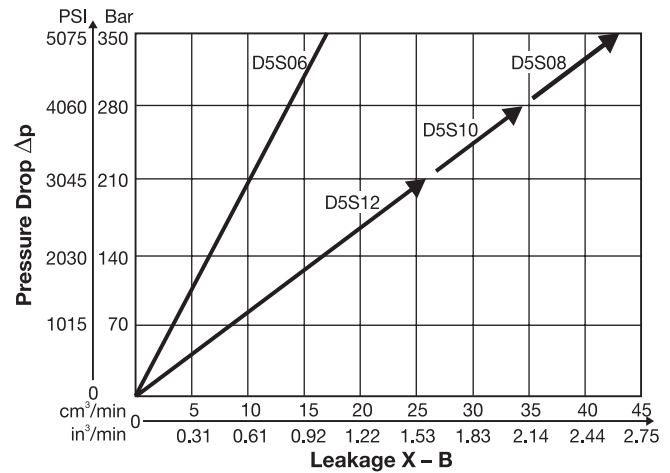
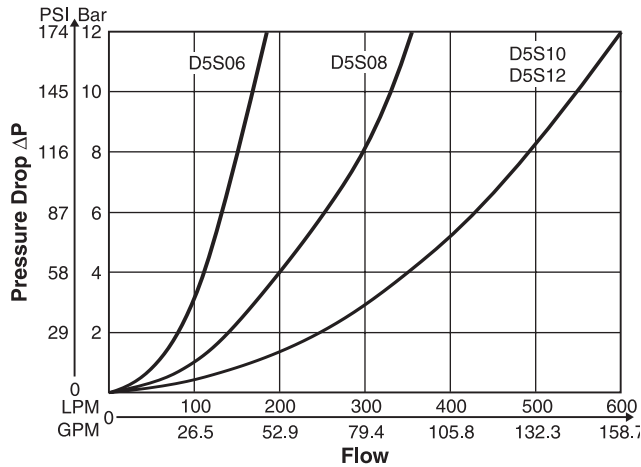
de-energized: open



de-energized: closed



Performance Curves



All characteristic curves measured with HLP46 at 50°C.

Selection of Cartridges

Sleeve 1, Poppet 1	Sleeve 1, Poppet 2	Sleeve 1, Poppet 4	Sleeve 3, Poppet 4	Sleeve 3, Poppet A	Sleeve 3, Poppet B/C
$1 : 1.05$ $A_A = 0.95 A_C$ $A_B = 0.95 A_C$ 15° chamfer	$1 : 1.05$ $A_A = 0.95 A_C$ $A_B = 0.95 A_C$ 15° chamfer orifice	$1 : 1.05$ $A_A = 0.95 A_C$ $A_B = 0.95 A_C$ 45° chamfer	$1 : 1.67$ $A_A = 0.6 A_C$ $A_B = 0.4 A_C$ 45° chamfer	$1 : 1.67$ $A_A = 0.6 A_C$ $A_B = 0.4 A_C$ 45° chamfer safety spool	$1 : 1.67$ $A_A = 0.6 A_C$ $A_B = 0.4 A_C$ 45° chamfer throttle spool

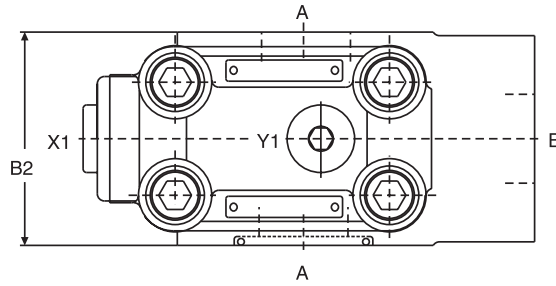
Directional Control Valves

D5S - Dimensions

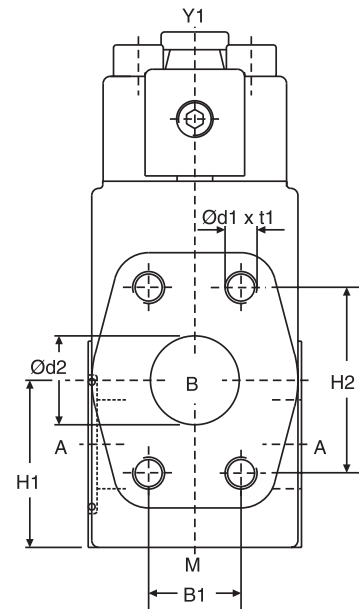
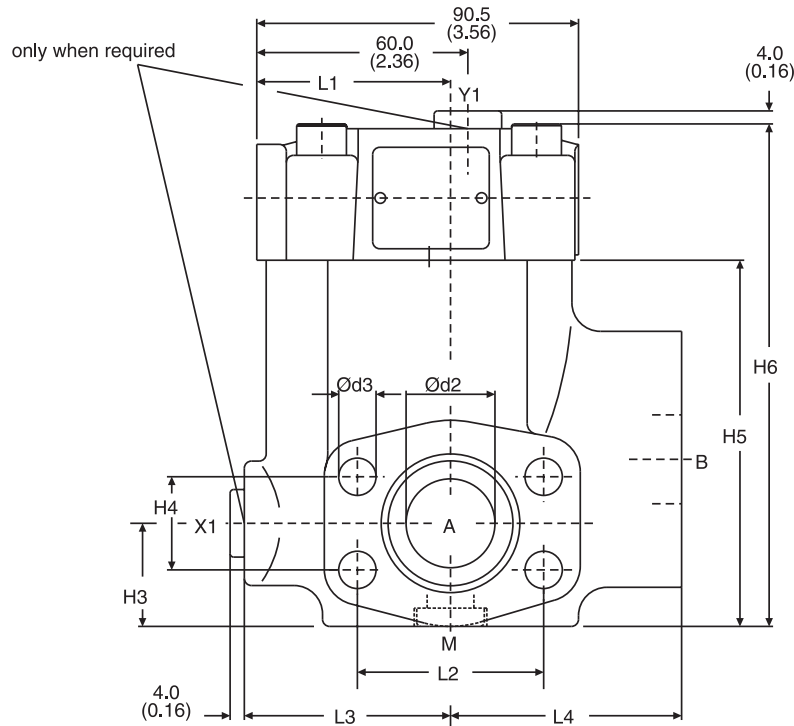
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Inch equivalents for millimeter dimensions are shown in (**)



Seal Kits		
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
12	S26-27421-0	S26-27421-5



Size	I1	I2	I3	I4	b1	b2	h1	h2	h3	h4	h5	h6	d1	t1	d2	d3
06	49.0 (1.93)	47.6 (1.87)	56.0 (2.20)	63.0 (2.48)	22.2 (0.87)	60.0 (2.36)	41.0 (1.61)	47.6 (1.87)	29.5 (1.16)	22.2 (0.87)	82.0 (3.23)	119.0 (4.69)	3/8" UNC	20.0 (0.79)	19.0 (0.75)	10.5 (0.41)
08	55.0 (2.17)	52.4 (2.06)	58.0 (2.28)	65.0 (2.56)	26.2 (1.03)	60.0 (2.36)	47.0 (1.85)	52.4 (2.06)	30.5 (1.20)	26.2 (1.03)	103.0 (4.06)	141.0 (5.55)	3/8" UNC	23.0 (0.91)	25.0 (0.98)	10.5 (0.41)
10	57.0 (2.24)	58.7 (2.31)	64.0 (2.52)	61.0 (2.40)	30.2 (1.19)	75.0 (2.95)	65.0 (2.56)	58.7 (2.31)	37.5 (1.48)	30.2 (1.19)	113.0 (4.45)	150.0 (5.91)	7/16" UNC	22.0 (0.87)	32.0 (1.26)	12.5 (0.49)
12	37.0 (1.46)	69.8 (2.75)	55.0 (2.17)	93.0 (3.66)	35.7 (1.41)	80.0 (3.15)	73.0 (2.87)	69.8 (2.75)	72.0 (2.83)	35.7 (1.41)	140.0 (5.51)	178.0 (7.01)	1/2" UNC	27.0 (1.06)	38.0 (1.50)	13.5 (0.53)

Ports	Function	Port size			
		D5S06	D5S08	D5S10	D5S12
A (2x)	Inlet or outlet	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61	1-1/2" SAE 61
B	Outlet or inlet	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61	1-1/2" SAE 61
X1*	External pilot port	G1/4" or SAE-4**			
Y1	External pilot drain				
M	Pressure gauge				

* Closed when supplied

** G1/4" if body 9 (BSP). SAE-4 if body 5 (SAE)

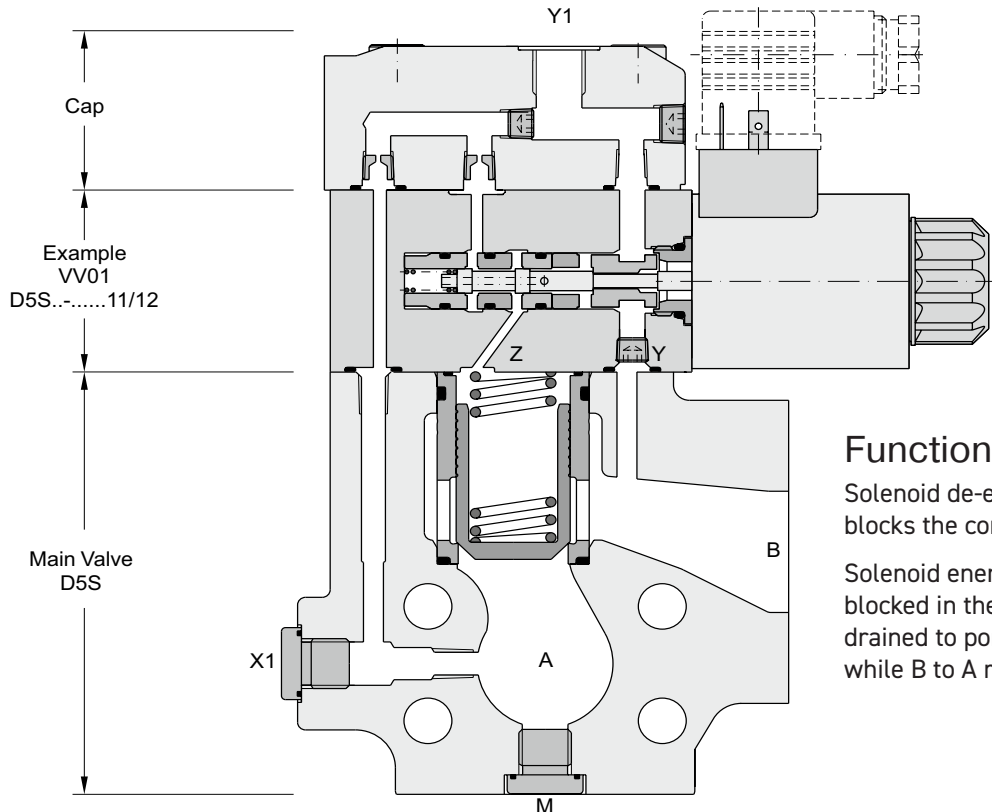
Directional Control Valves

D5S - Technical Information

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Example Pilot Oil External from A, Pilot Drain Internal Out of Y1



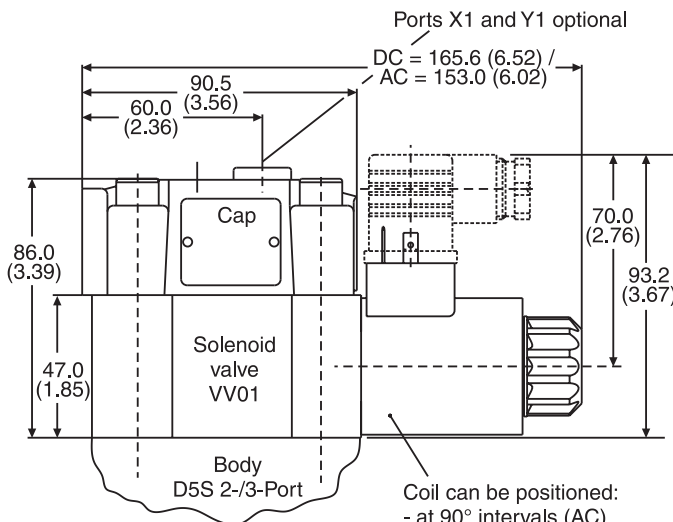
Function

Solenoid de-energized: Pilot oil from A to Z blocks the connection from A to B or B to A.

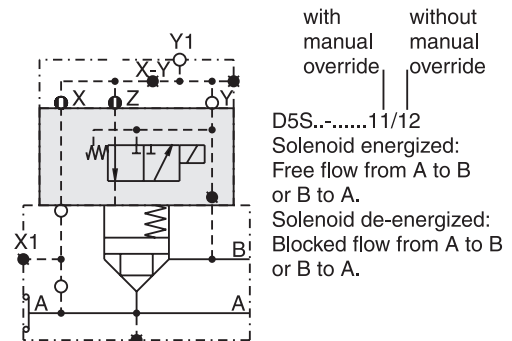
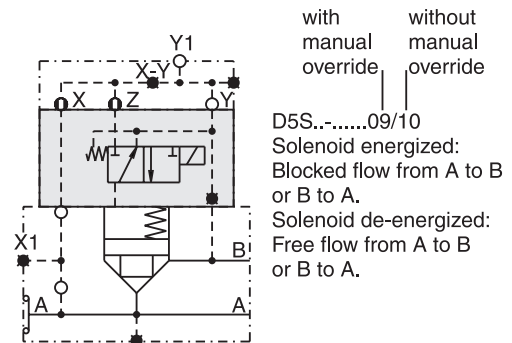
Solenoid energized: Pilot pressure from A is blocked in the VV01. The oil in Z is internally drained to port Y1. Allowing flow from A to B, while B to A remains blocked.

Dimensions — D5S with VV01

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



VV01 Seal Kits	
NBR	FPM
DC Solenoid	
S56-40609-0	S56-40609-5
AC Solenoid	
S6-35237-0	S26-35237-5



Directional Control Valves

D5S - Technical Information

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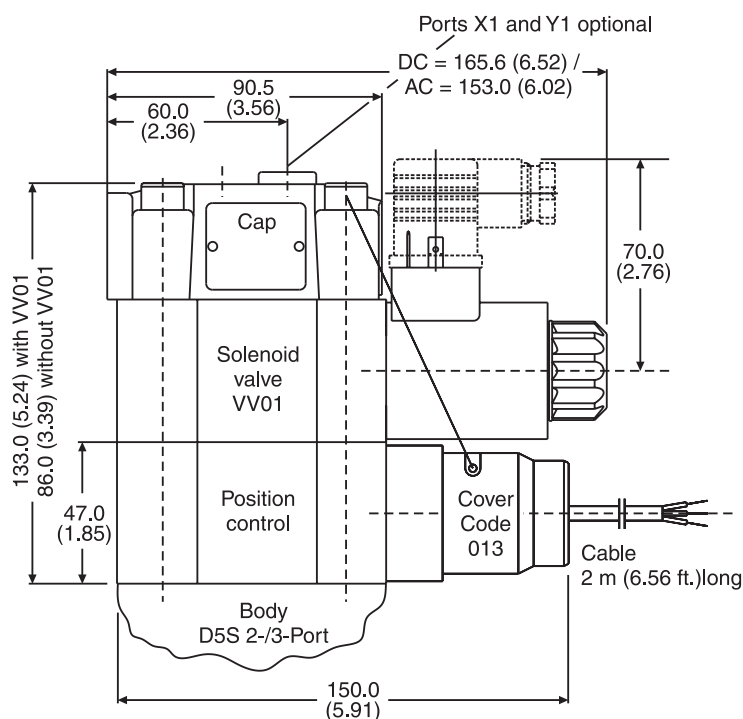
WWW.SUMY.IR

Position Control as per IEC 61076-2-101 (M12x1)

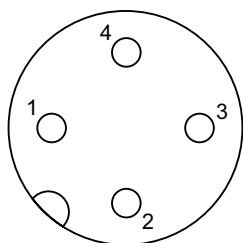
Protection class	IP65 in accordance with EN 60529
Ambient temperature (°C)	-20 - +60; (-4°F - +140° F)
Supply voltage U_s / ripple (VDC)	10 - 30 / +/-10%
Current consumption w/o Load (mA)	≤10
Maximum output current per channel, ohmic (mA)	200
Minimum output current per channel, ohmic (kOhm)	100
Maximum output drop at 0.2A (VDC)	≤2
EMC	EN 61000-6-4 / EN 61000-6-2
Interface	M12x1 acc. to IEC 61076-2-101
Wiring minimum (mm²)	3x0.14 braided shield recommended
Wiring length maximum (m)	50 (164 ft) recommended

Dimensions — D5S with Position Control

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



M12 pin assignment

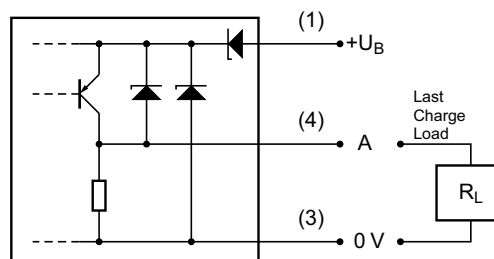
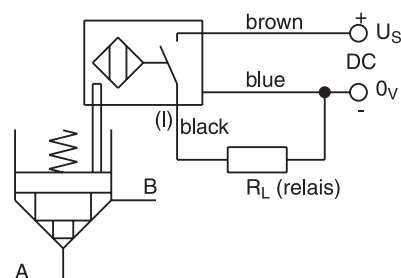
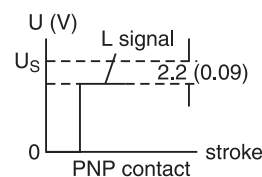
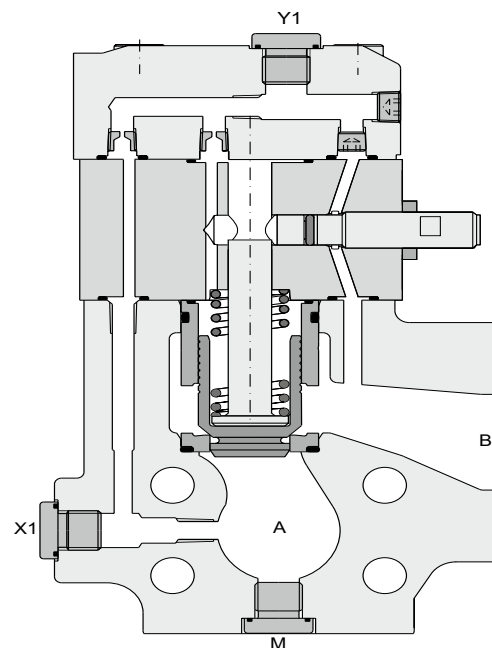


- 1 U_s 10...30 V
- 2 not connected
- 3 0 V
- 4 Out A: normally open

D5S with Position Control

Position control by proximity switch (incl. amplifier)
Valve open: proximity switch activated. This proximity switch is pressure proof and has no wearing parts.

Note: Position control for D5S08 and D5S10 only.



Directional Control Valves

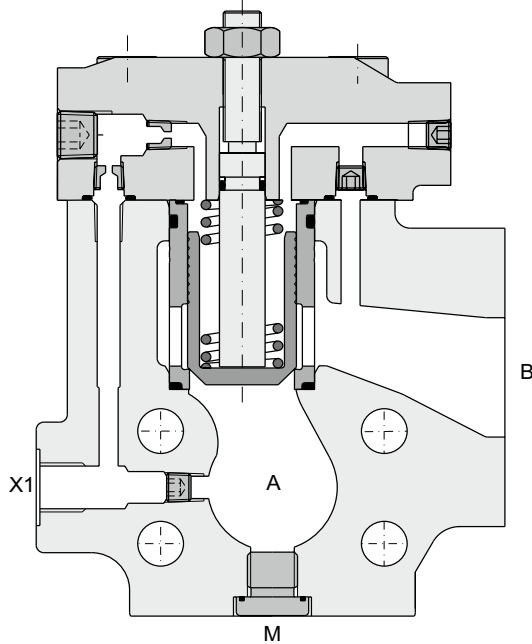
D5S - Technical Information

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

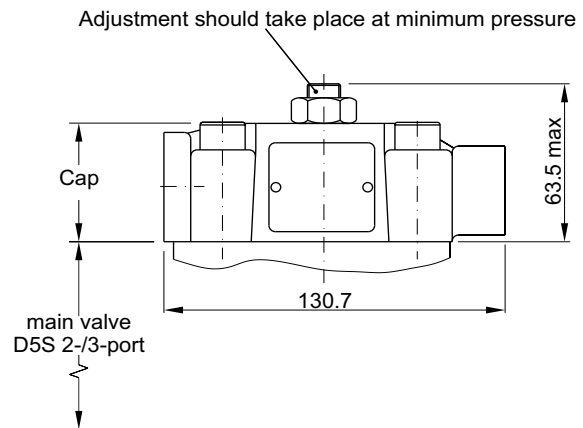
D5S Stroke Limiter



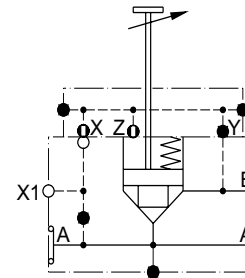
X1 = external pilot-oil (optional)

Note: Stroke limiter not for use with D5S06, solenoid valve VV01, shuttle valve and position control.

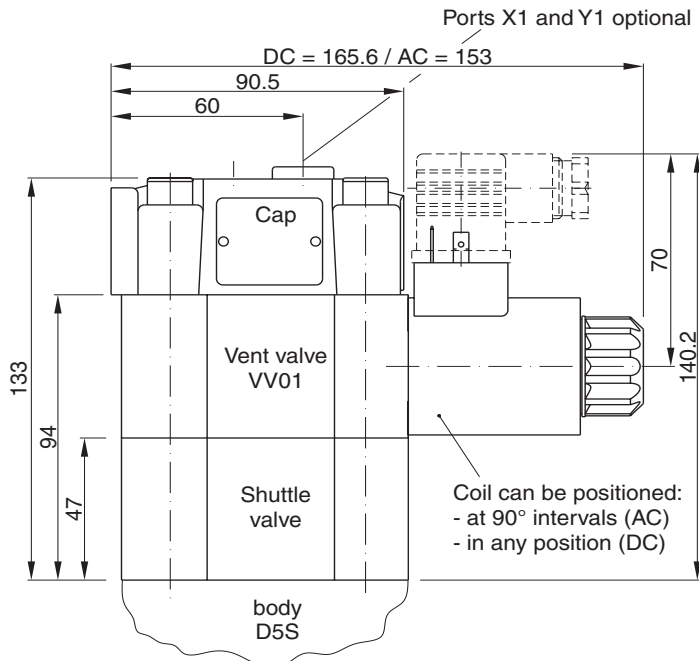
D5S Stroke Limiter Dimensions



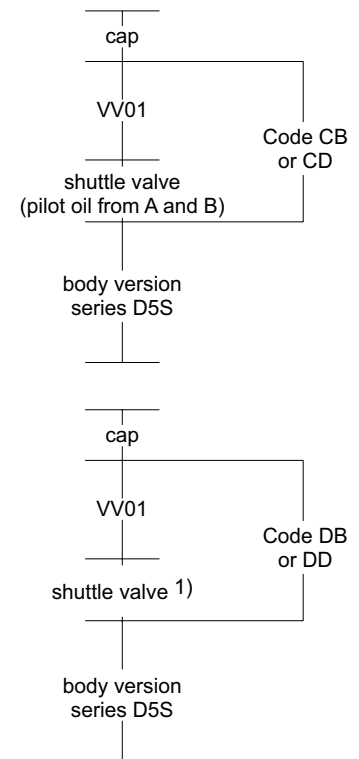
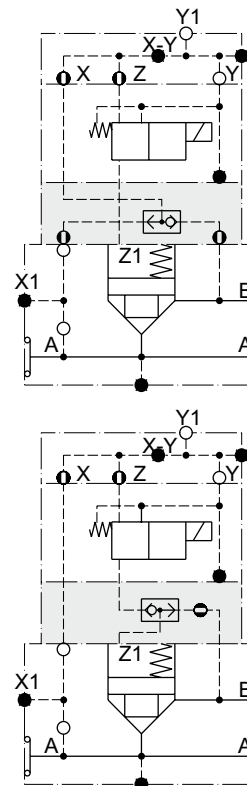
Example
D5S08-54A...
D5S10-54A...
D5S12-54A...



D5S with Shuttle Valve Dimensions

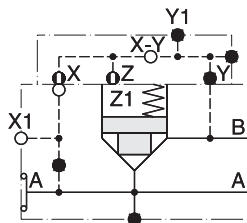


Shuttle valve only in connection with vent valve VV01.



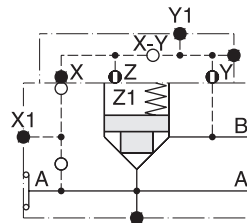
1) Pilot oil from A and B, from B to A check valve function

D5S Examples



D5S ..-541

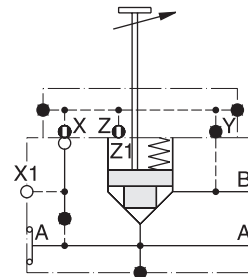
Pilot oil: external from X1



D5S ..-522

Pilot oil: internal from B

D5S with Stroke Limiter Examples

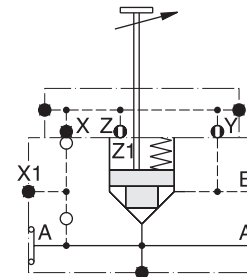


D5S08-54A

10

12

Pilot oil: external from X1



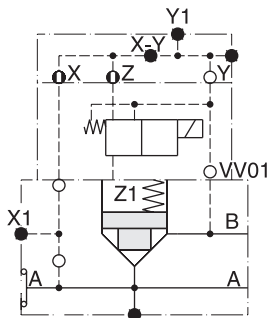
D5S08-52B

10

12

Pilot oil: internal from B

D5S with Solenoid Valve VV01 Examples

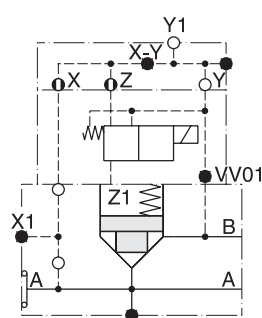


D5S ..-514...09

10

11

12

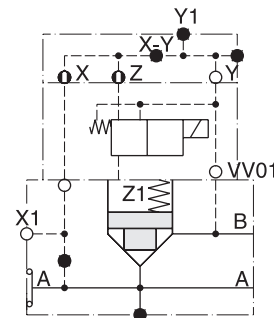
Pilot oil: internal from A
Pilot drain: internal to B


D5S ..-516...09

10

11

12

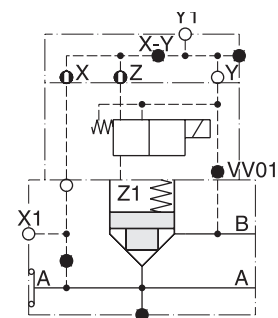
Pilot oil: internal from A
Pilot drain: external out of Y1


D5S ..-544...09

10

11

12

Pilot oil: external from X1
Pilot drain: internal to B


D5S ..-546...09

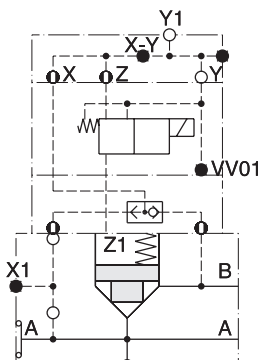
10

11

12

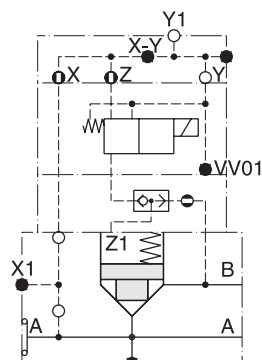
Pilot oil: external from X1
Pilot drain: external out of Y1

D5S with Solenoid Valve VV01 and Shuttle Valve Examples



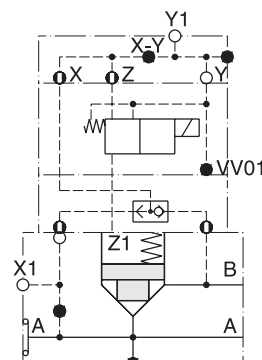
D5S ..-536...CB

CD

Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1


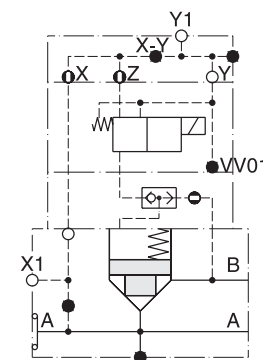
D5S ..-536...DB

DD

Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1


D5S ..-556...CB

CD

Pilot oil: internal from X1 +
internal from B
Pilot drain: external out of Y1


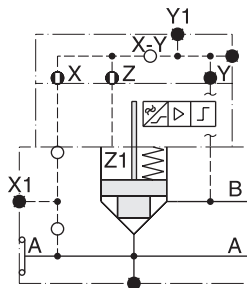
D5S ..-556...DB

DD

Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1

D5S Position Control Examples

Seat Entry

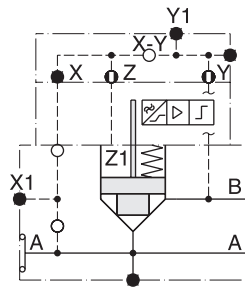


D5S08-5113A.BA

10

12

Pilot oil: internal from A

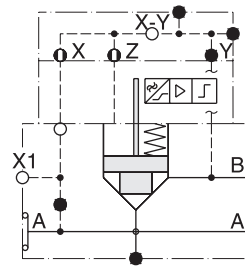


D5S08-5223A.BA

10

12

Pilot oil: internal from B

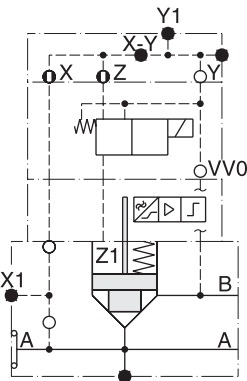


D5S08-5213A.BA

10

12

Pilot oil: external from X1

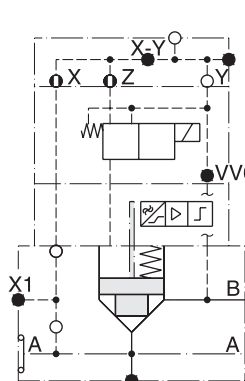


D5S08-5143A.BC

10

12

BE

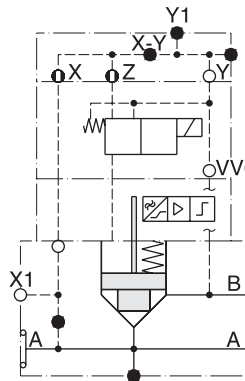
Pilot oil: internal from A
Pilot drain: internal to B


D5S08-5163A.BC

10

12

BE

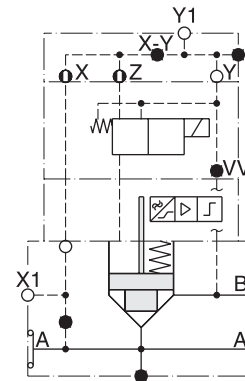
Pilot oil: internal from A
Pilot drain: external out of Y1


D5S08-5443A.BC

10

12

BE

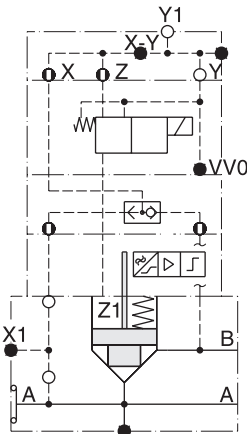
Pilot oil: external from X1
Pilot drain: internal to B


D5S08-5463A.BC

10

12

BE

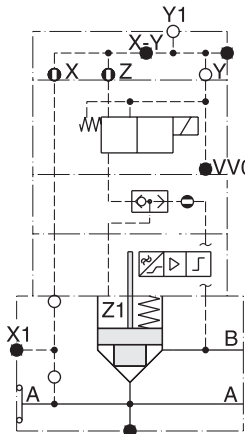
Pilot oil: external from X1
Pilot drain: external out of Y1


D5S08-5363A.BH

10

12

BE

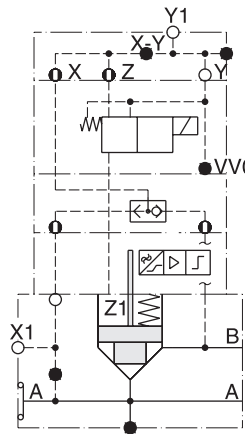
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1


D5S08-5363A.BN

10

12

BQ

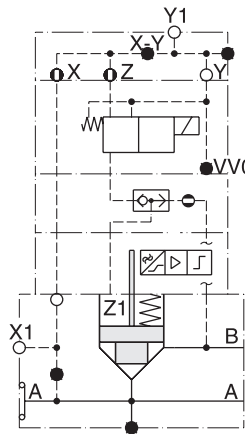
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1


D5S08-5563A.BH

10

12

BK

Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1


D5S08-5563A.BN

10

12

BQ

Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1

Sandwich Valves

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B1

WWW.SUMY.IR

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CH07 Dimensions	D07 Mounted	B18
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FC08DD	D08 Mounted	B50
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FD5HDD	D05HE Mounted	B51
FD07DD	D07 Mounted	B52
FD08DD	D08 Mounted	B52
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PR05 Dimensions	D05 Mounted	B66 - B67
PR05H Dimensions	D05HE Mounted	B67 - B68
PR07 Dimensions	D07 Mounted	B69 - B70
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Sandwich Valves

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B2

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Sandwich Valves

Introduction

B3

WWW.SUMY.IR

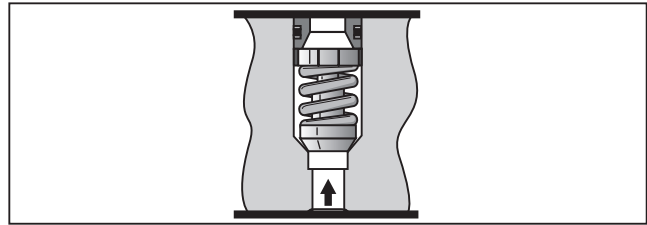
Sandwich valves provide a variety of check, flow control, pressure relief and pressure reducing functions in a compact NFPA D03, D05, D07 and D08 sandwich style valve. The NFPA D03 valve body conforms to the ISO 40 mm (1.57") thickness. These valves are mounted between directional control valves and their mounting surface.

The NFPA D03 Sandwich valves may also be used in conjunction with Parker's Cartpak Series of sandwich valves which offer a wide variety of additional functions including relief, pressure reducing/relieving, load check, back pressure check, needle, flow control, pressure compensated flow control, crossover, relief and directional valves.

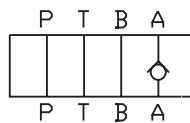
Check Valves

Series CM, ZRV

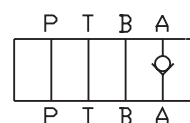
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Positive shut-off is provided by a fully guided poppet and allows full flow in the unchecked position.
- Parker CM, ZRV sandwich style check valves can be used either on the 'P', 'A', 'B', 'T' port or combination.
- Large internal flow paths allow high flow at low pressure drop.



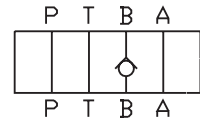
CM*AA



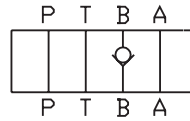
CM*AAF



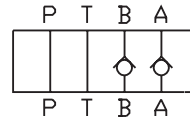
CM*BB



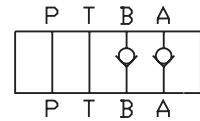
CM*BBF



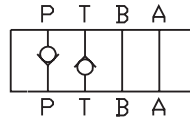
CM*DD



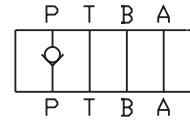
CM*DDF



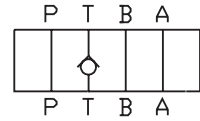
CM*PT



CM*PP, ZRV-P



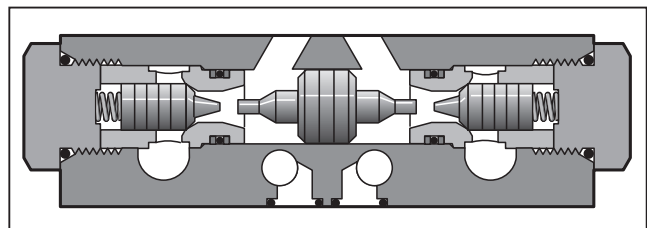
CM*TT, ZRV-T



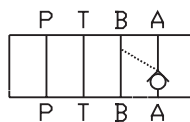
P.O. Check Valves

Series CPOM, ZRE

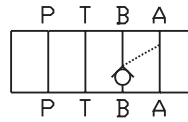
- Parker CPOM, ZRE sandwich style, pilot operated check valves can be provided in either single or double configurations.
- The pilot operated checks may be positioned in 'A' port or 'B' port; or both 'A' and 'B' ports.
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Large internal flow paths allow high flow at low pressure drop.



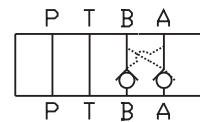
CPOM*AA, ZRE-A



CPOM*BB, ZRE-B



CPOM*DD, ZRE-AB

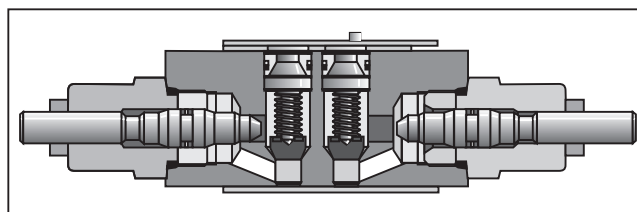


WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Flow Control Valves

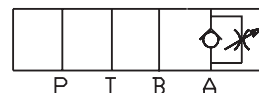
Series FM, ZRD

- Parker FM, ZRD sandwich style flow control valves can be provided in either single or double configurations.
- The flow controls may be positioned in 'P' port, 'A' port, 'B' port, or both 'A' and 'B' ports.
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Two step needles (standard) provide fine adjustment for the first three turns and course adjustment for the last three turns. Fine metering needles are available as an option on D03 and D05 valves.
- Large bypass checks allow high flow at a low pressure drop.
- Reversible (invert 180°) for meter-in or meter-out (D03 & D05 only).



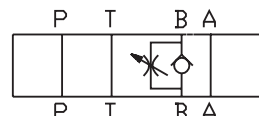
FM*AA, ZRD-AA

(Meter Out)



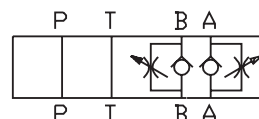
FM*BB, ZRD-BA

(Meter Out)



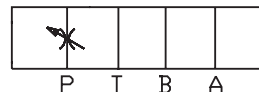
FM*DD, ZRD-ABA

(Meter Out)



FM*PP

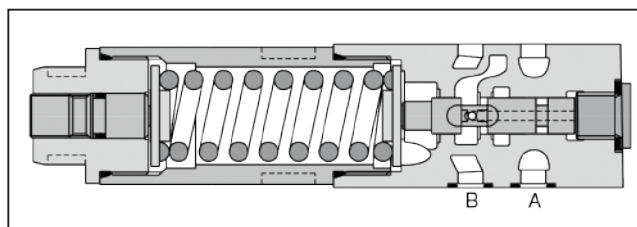
(Meter Out)



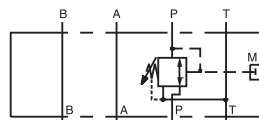
Pressure Reducing Valves

Series PRDM

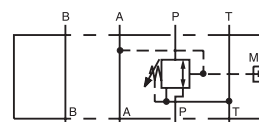
- PRDM sandwich valves have three-way design for pressure relieving of the secondary side.
- The direct operated, cushioned piston design results in fast response, low leakage and minimal hysteresis.
- PRDM sandwich valves may be selected to reduce pressure in the 'P' port, 'A' port or 'B' port.
- Up to nine pressure adjustment ranges are available with maximum pressure settings.
- PRDM2 is NG06 (CETPO 03)
PRDM3 is NG10 (CETOP05)
- Adjustment options include: internal hex screw, hand knob or internal hex with keylock.



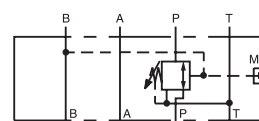
PRDM*PP



PRDM*AA



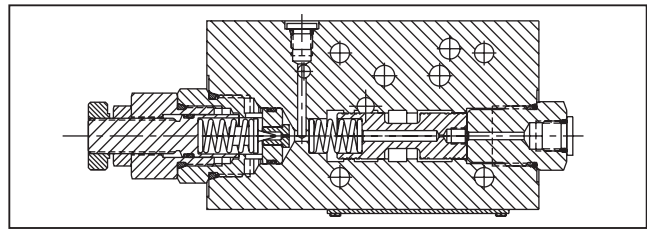
PRDM*BB



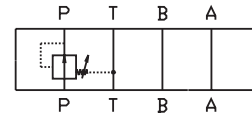
Pressure Reducing Valves

Series PRM, ZDR

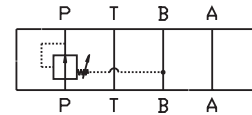
- Parker PRM, ZDR sandwich style pressure reducing valves can be used to reduce pressure on the 'P' port, the 'A' port, or the 'B' port.
- Three pressure adjustment options available: slotted screw, knob and locking knob.
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.



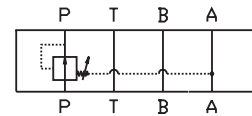
PRM*AA, ZDR-A



PRM*BB, ZDR-B



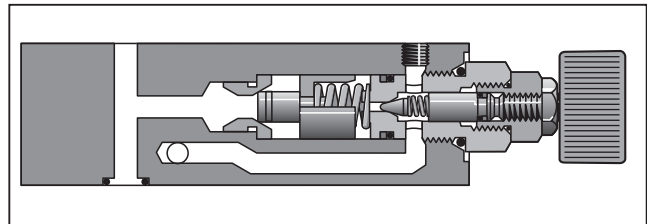
PRM*PP, ZDR-P



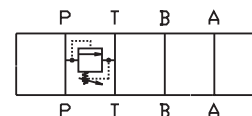
Pressure Relief Valves

Series RM, ZDV

- Parker RM, ZDV sandwich style relief valve is a 'P' port to 'T' port relief.
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Three pressure adjustment options available: slotted screw, knob and locking knob.



RM*PT, ZDV-P

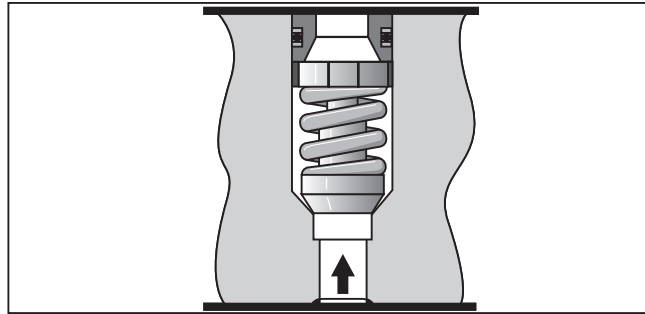
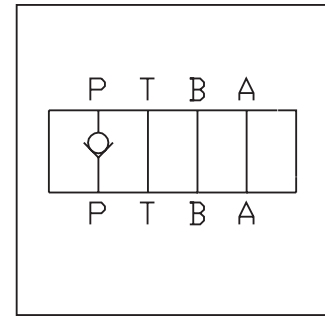


General Description

Series CM check valves provide an integral, full flow check valve in the pressure 'P' port, 'A' port, 'B' port, or the tank 'T' port of the directional valve. Reverse flow is blocked. The CM2 and CM3 sizes offer a combination P&T check version.

Features

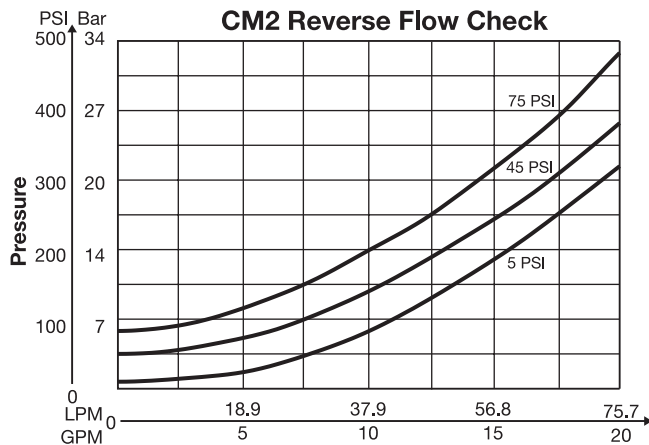
- Valve bodies are manufactured from steel which provides extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Positive shut-off is provided by a fully guided poppet and allows full flow in the unchecked position.
- Parker CM sandwich style check valves can be used either on the 'P', 'A', 'B', 'T' ports, or combinations.
- Large internal flow paths allow high flow at low pressure drop.



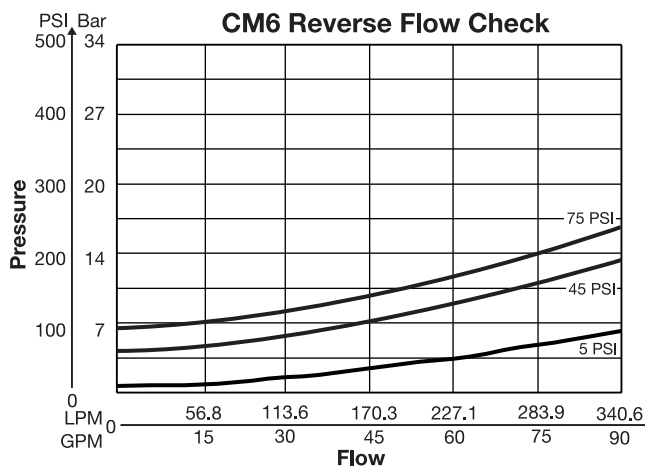
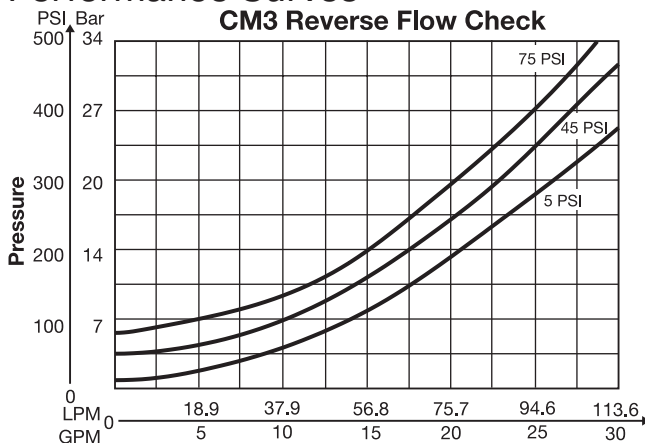
Specifications

Size	CM2	CM3	CM6
Mounting Pattern	NFPA D03, CETOP 03, NG 06	NFPA D05, CETOP 05, NG 10	NFPA D08, CETOP 08, NG 25
Maximum Pressure	345 Bar (5000 PSI)	345 Bar (5000 PSI)	345 Bar (5000 PSI)
Maximum Flow	76 LPM (20 GPM)	113 LPM (30 GPM)	340 LPM (90 GPM)
Cracking Pressure	0.3 Bar (5 PSI), 3 Bar (45 PSI)*, 5 Bar (75 PSI)*	0.3 Bar (5 PSI), 3 Bar (45 PSI)*, 5 Bar (75 PSI)*	0.3 Bar (5 PSI)

*Optional



Performance Curves



Viscosity Correction Factor

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

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

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

CM - Ordering Information

B7

WWW.SUMY.IR

CM
Check
Valve

Size

Port

Cracking
Pressure

Seal

Design
Series

NOTE:
Not required
when ordering.

Code	Description
2	NFPA D03 Subplate Mounting
3	NFPA D05 Subplate Mounting
6	NFPA D08 Subplate Mounting

Code	Description
PP*	P Port Check
PT*	P and T Port Checks
TT*	T Port Check
DD	A and B Port Checks
AA	A Port Check
BB	B Port Check
AAF	A Port Inverted
BBF	B Port Inverted
DDF	A and B Port Inverted
* Not available on 6 Size	

Code	Description
Omit	0.3 Bar (5 PSI)
Y*	3.1 Bar (45 PSI)
Z*	5.2 Bar (75 PSI)
* Not available on 6 size	

Code	Description
N	Nitrile
V	Fluorocarbon

Bold: Designates Tier I products and options.

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

Manapak Bolt Kits (NOTE: Bolt kits must be ordered separately)

Size "2"			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D1	BK243	73.2 (2.88)
2	Sandwich & D1	BK225	111.3 (4.38)
3	Sandwich & D1	BK244	152.4 (6.00)
4	Sandwich & D1	BK245	190.5 (7.50)

Size "3"			
No. of Sandwich	Sandwich & Valve Combination	D3W-30, D3DW, & D31*W*	Bolt Length mm (in)
1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D3	BK143	190.2 (7.50)
* D31VW with internal pilot and internal drain only			

Size "6"				
Sandwich & Valve Combination	Bolt Kit	Description	Qty / Kit	Torque (in-lbs)
Sandwich & D6*VW Valve	BK121	1/2-13 x 5.25	6	80
Sandwich & D6*VW Valve	BK122	1/2-13 x 8.00	6	80
Sandwich & D6*VW Valve	BK123	1/2 -13 x 10.75	6	80
Sandwich & D6*VW Valve	BK124	1/2-13 x 13.50	6	80

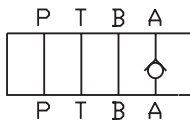
Unit Weight:

CM2 0.8 kg (1.7 lbs.)

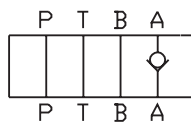
CM3 1.8 kg (3.9 lbs.)

CM6 7.7 kg (17 lbs.)

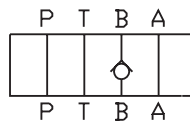
Schematics



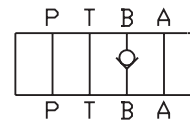
AA Option



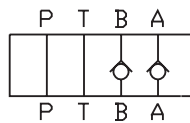
AAF Option



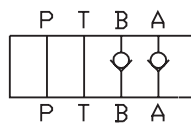
BB Option



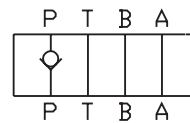
BBF Option



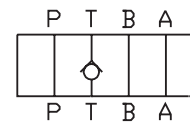
DD Option



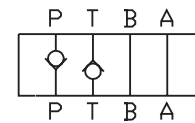
DDF Option



PP Option



TT Option



PT Option

B

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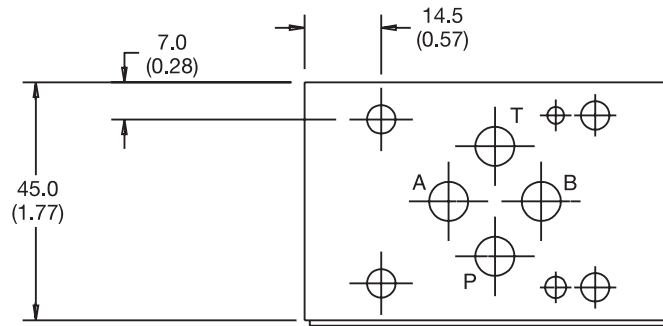
Sandwich Valves

CM2 - Dimensions

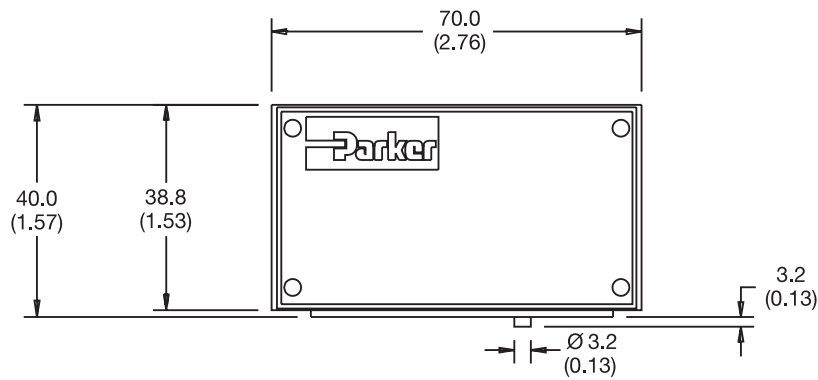
B8

WWW.SUMY.IR

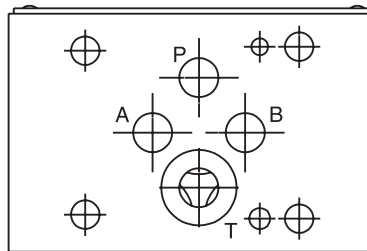
Inch equivalents for millimeter dimensions are shown in (**)



Top View



Face View



SHOWN WITHOUT O-RING PLATE

Bottom View

Note: Transfer the locating pin to the hole on the opposite side of the valve body for 'T' port option (Invert body 180°)

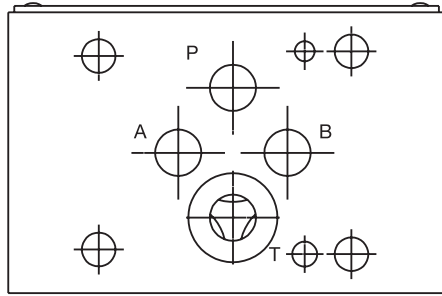


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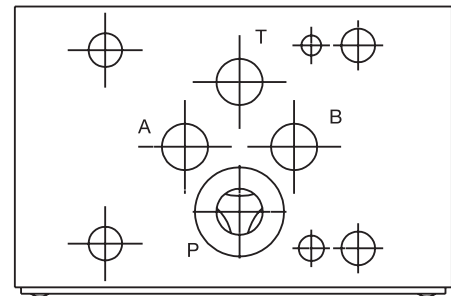
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Bottom Views

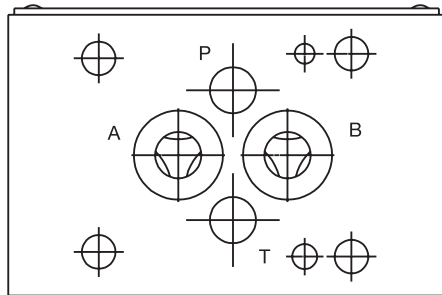


TT

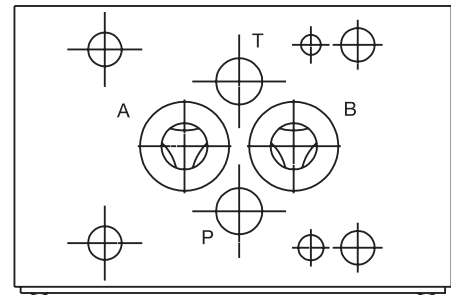
Top Views



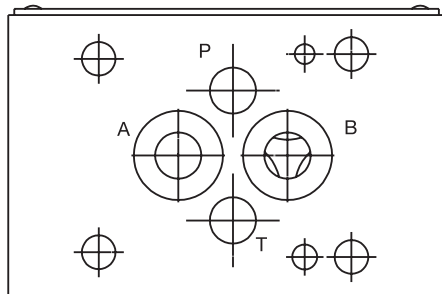
PP/PT



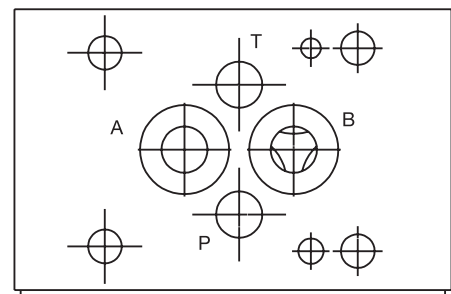
DD



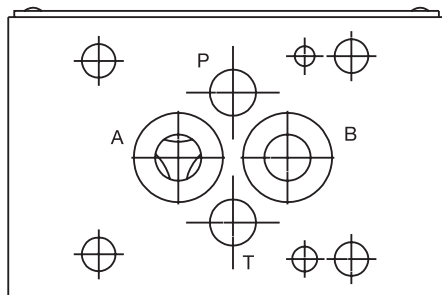
DDF



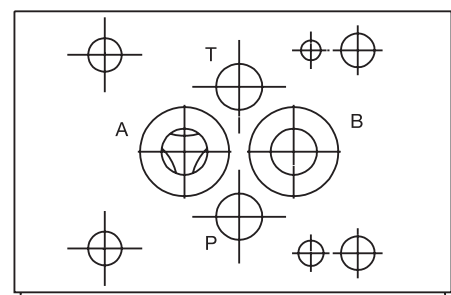
BB



BBF



AA



AAF

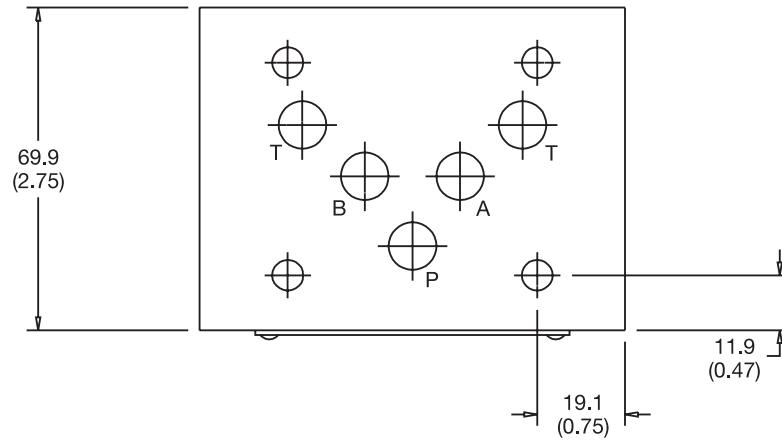
Sandwich Valves

CM3 - Dimensions

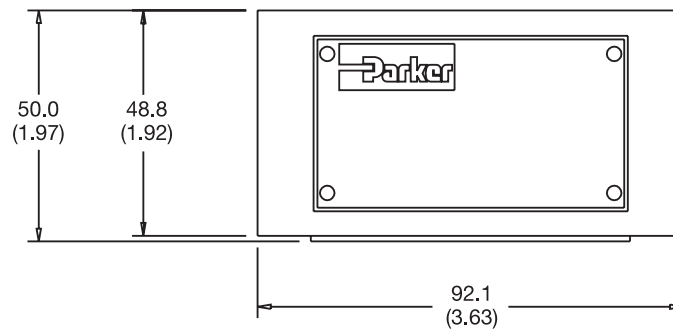
B10

WWW.SUMY.IR

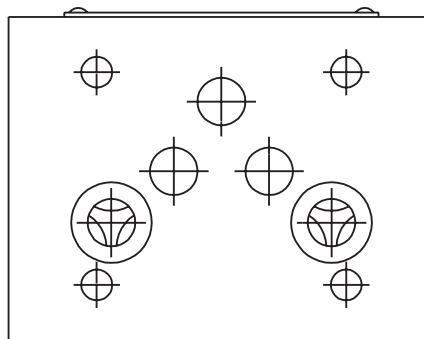
Inch equivalents for millimeter dimensions are shown in (**)



Top View



Face View



SHOWN WITHOUT O-RING PLATE

Bottom View



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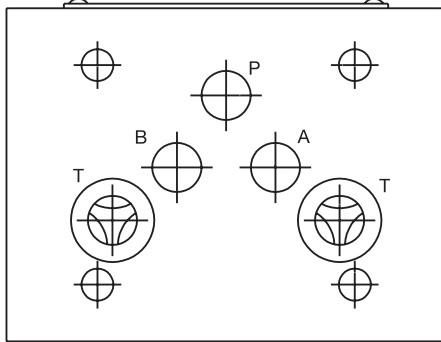
Sandwich Valves

CM3 - Surface Patterns

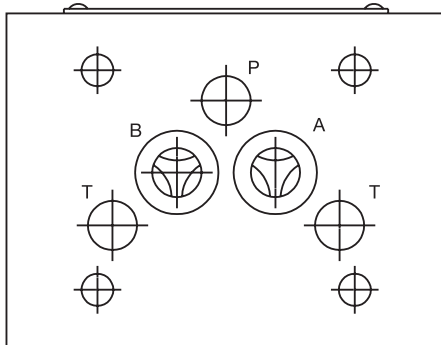
B11

WWW.SUMY.IR

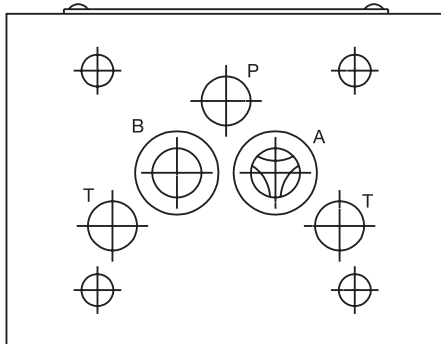
Bottom Views



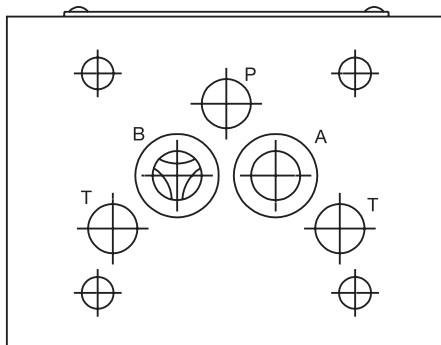
TT



DD

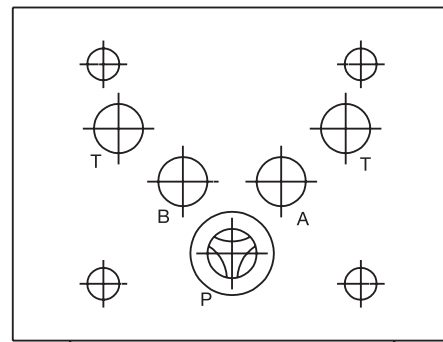


AA

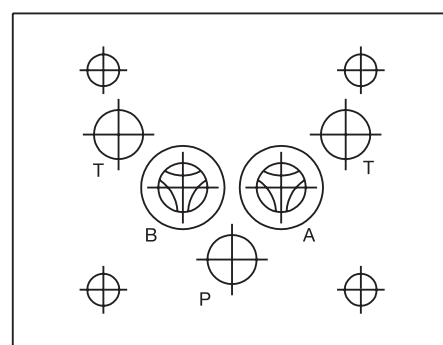


BB

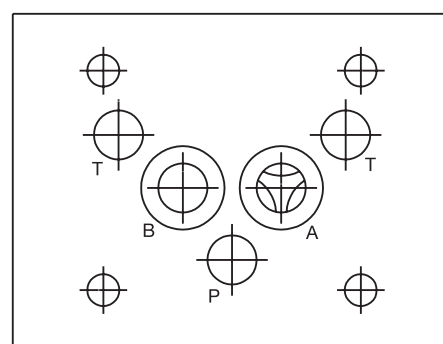
Top Views



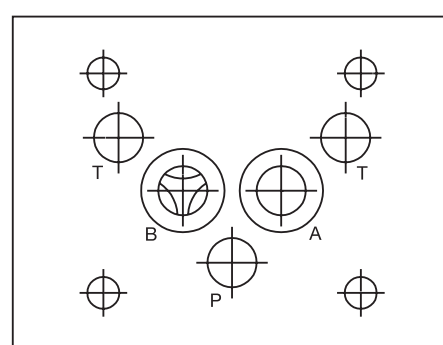
PP/PT



DDF



AAF



BBF

B

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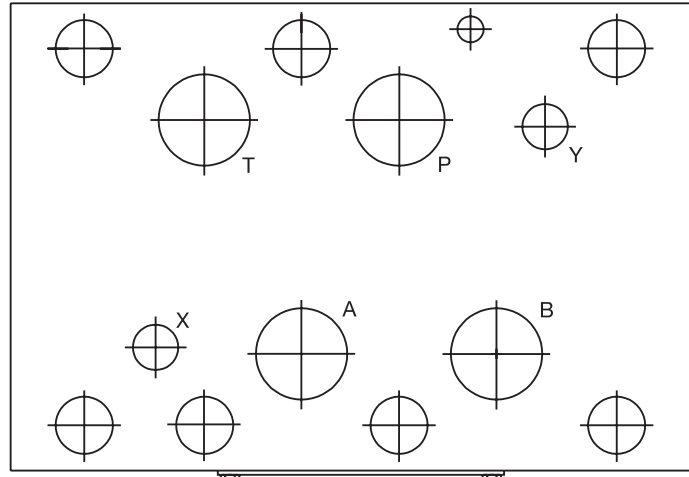
Sandwich Valves

CM6 - Dimensions

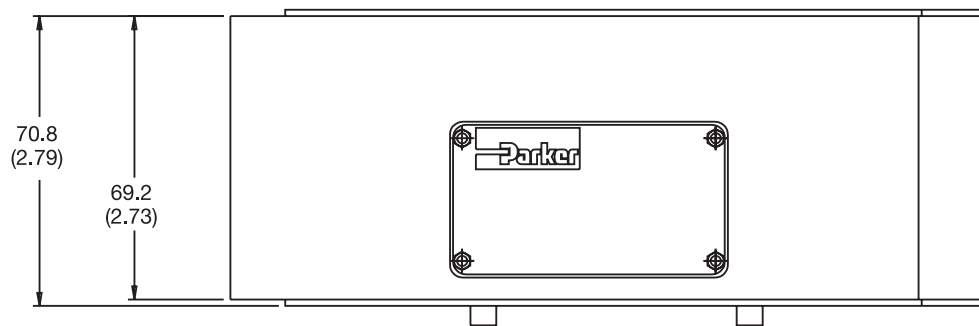
B12

WWW.SUMY.IR

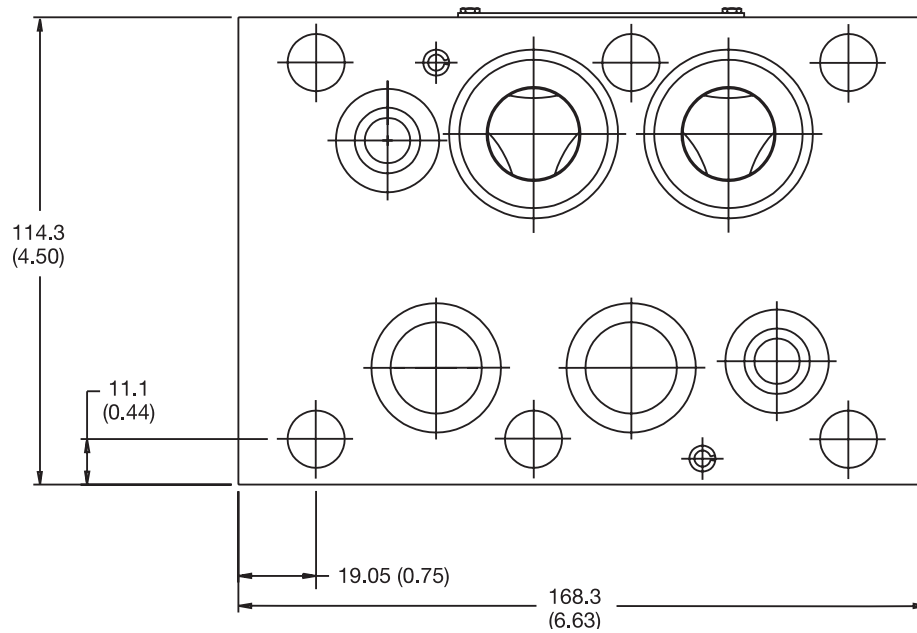
Inch equivalents for millimeter dimensions are shown in (**)



Top View



Face View



Bottom View

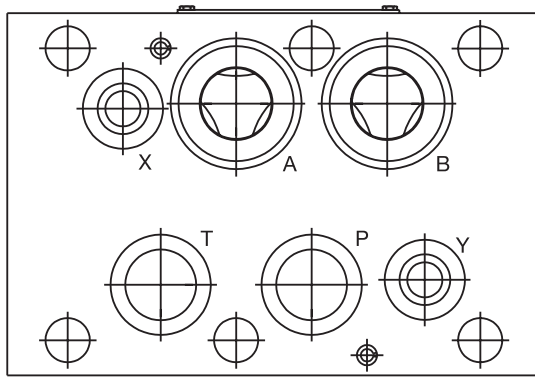


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to Alpha
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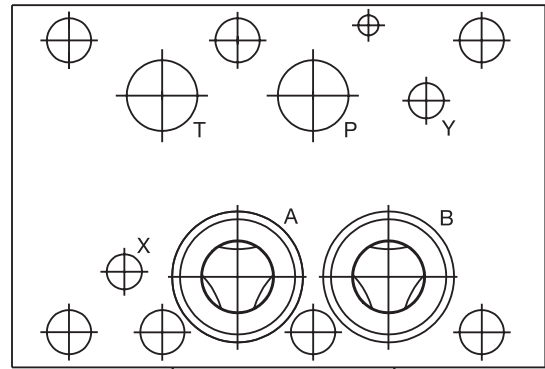
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Bottom Views

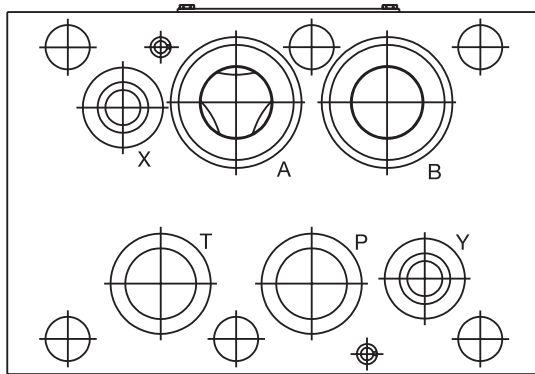


DD

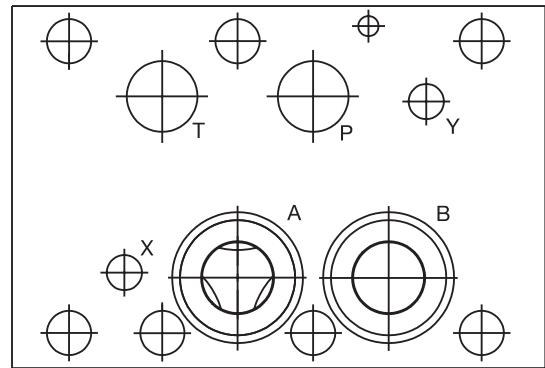
Top Views



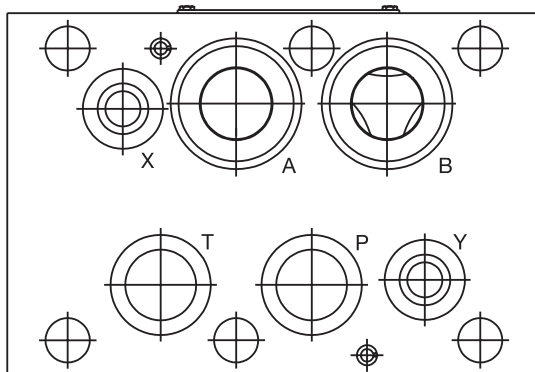
DDF



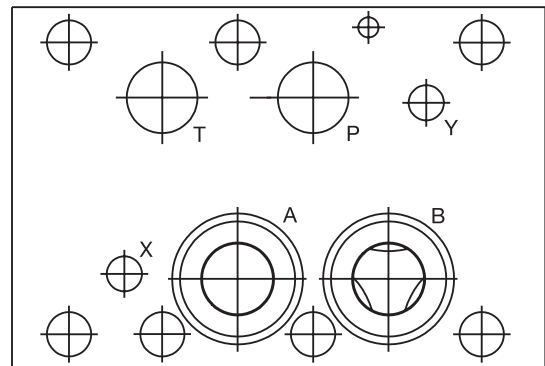
AA



AAF



BB



BBF

B

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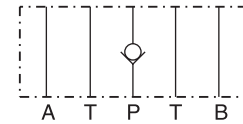
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General Description

Series CH check valves provide free flow in one direction and blocked flow in the reverse direction. The check can be located in the P port or in the T port.

Features

- Cracking pressure 2.0 Bar (30 PSI).
- Sizes:
 - CH05 – NFPA D05 / NG10 / CETOP 5
 - CH5H – NFPA D05HE / NG10 / CETOP 5H
 - CH07 – NFPA D07 / NG16 / CETOP 7
 - CH08 – NFPA D08 / NG25 / CETOP 8



Specifications

General				
Size	D05 / NG 10	D05HE / NG 10	D07 / NG 16	D08 / NG 25
Mounting Position	Unrestricted			
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure (Bar)	Aluminum Body - up to 207 (3000 PSI); Ductile Iron Body - up to 345 (5000 PSI)			
Nominal Flow (LPM)	151 (40 GPM)	151 (40 GPM)	303 (80 GPM)	606 (160 GPM)
Leakage (DPM)	<1	<1	<1	<1
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)			
Viscosity				
Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)			
Recommended (cSt / mm²/s)	30 (139 SSU)			
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)			

⚠ WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

CH - Ordering Information

B15

WWW.SUMY.IR

CH

Direct
Operated
Check Valve

Size

Code	Description
03	See CM2
05	NFPA D05 / NG 10
SH*	NFPA D05HE / NG 10
07	NFPA D07 / NG 16
08	NFPA D08 / NG 25

** Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.*

Style

Code	Description
PP	Blocked in P
TT	Blocked in T

30

Cracking
Pressure

Code	Description
30	2 Bar (30 PSI)

Seal

Code	Description
N	Nitrile
V*	Fluorocarbon

** Upon request*

Body
Material

Code	Description
A	Aluminum
D	Ductile Iron

B

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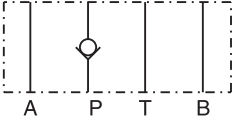
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Weight				
Size	CH**PP30NA	CH**PP30ND	CH**TT30NA	CH**TT30ND
CH05, CH5H	0.8 kg (1.9 lbs)	1.9 kg (4.2 lbs)	0.8 kg (1.9 lbs)	1.9 kg (4.2 lbs)
CH07	2.2 kg (4.9 lbs)	4.9 kg (10.9 lbs)	2.7 kg (6.0 lbs)	6.2 kg (13.7 lbs)
CH08	4.7 kg (10.4 lbs)	10.8 kg (23.8 lbs)	5.3 kg (11.7 lbs)	12.4 kg (27.3 lbs)

Schematics

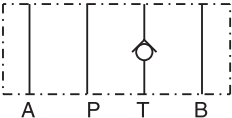
CH**PP

blocked in P

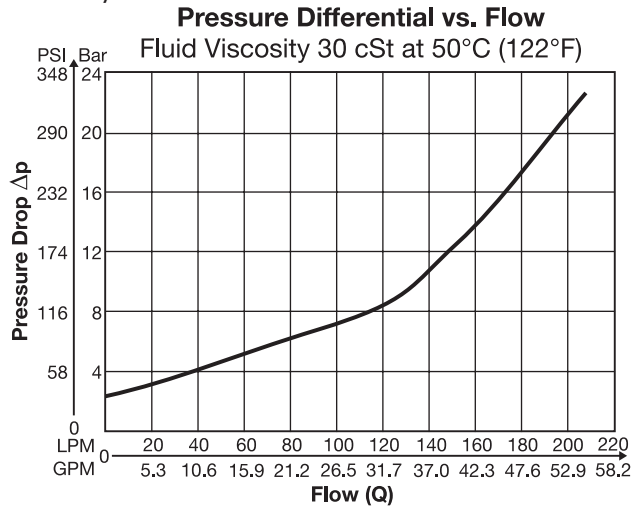


CH**TT

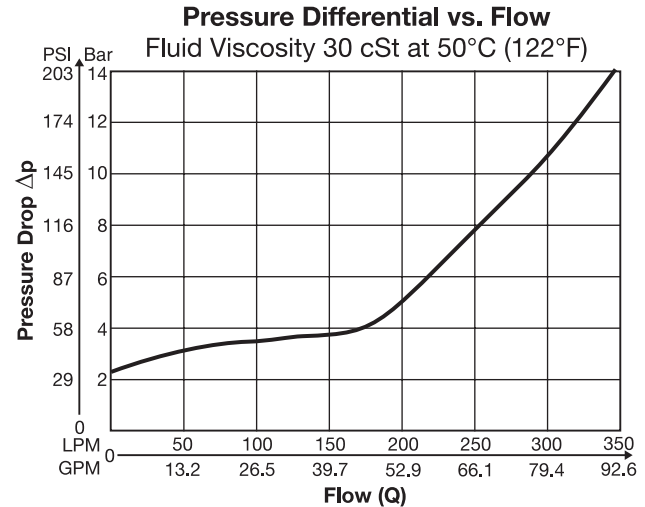
blocked in T



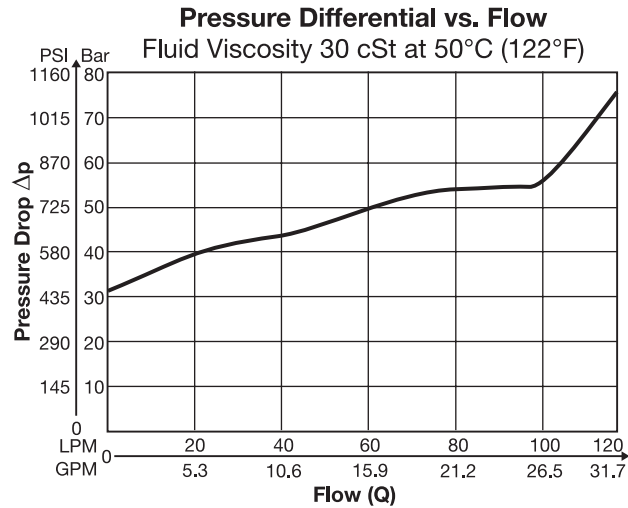
CH05/CH5H



CH07



CH08



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Sandwich Valves

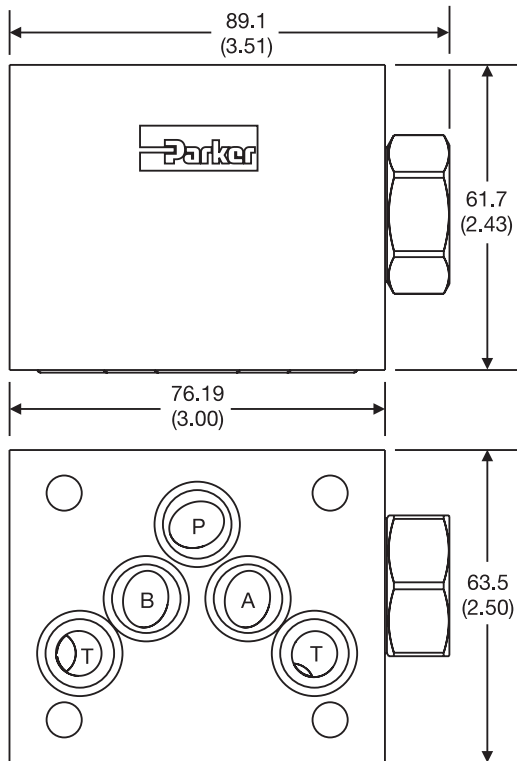
CH05, CH5H - Dimensions

B17

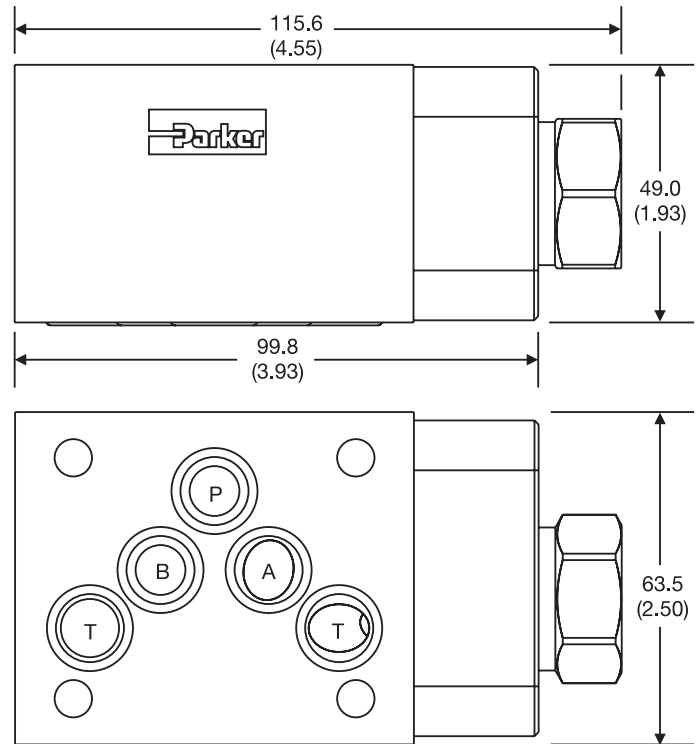
WWW.SUMY.IR

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

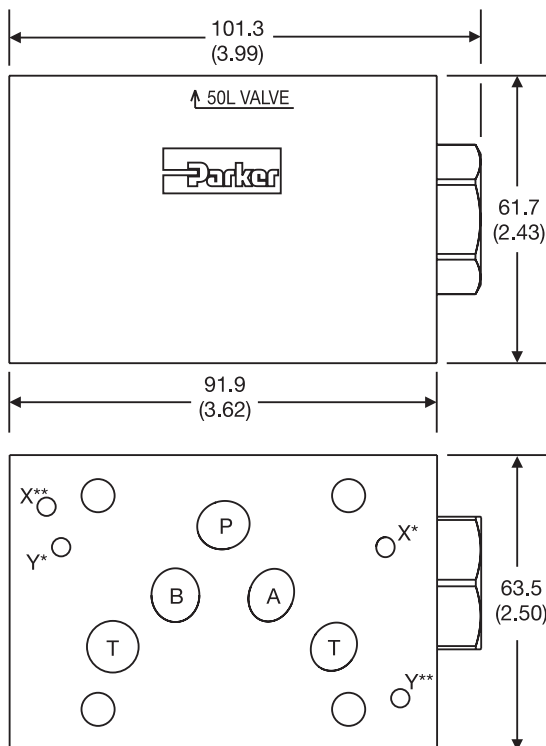
CH05PP



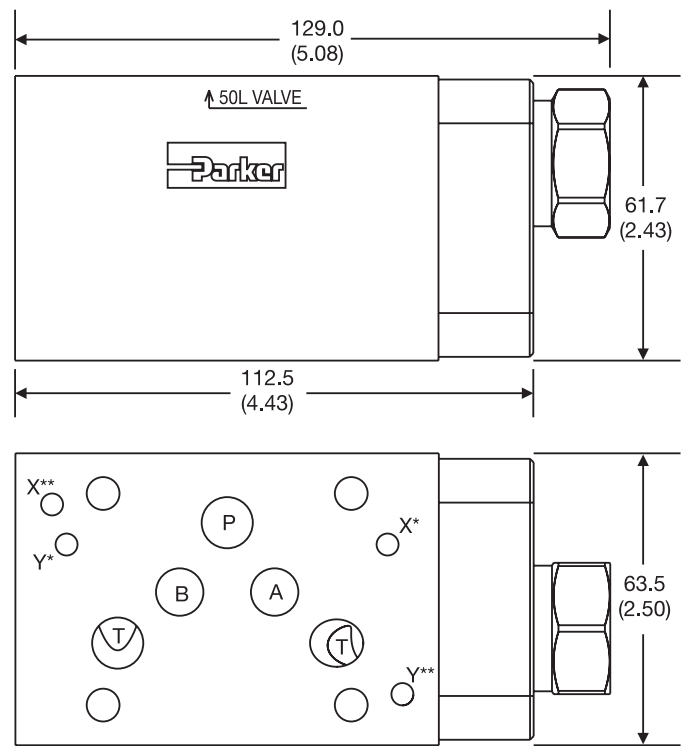
CH05TT



CH5HPP



CH5HTT



* D05HE (Standard)

** D05H

Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.

* D05HE (Standard)

** D05H

Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.



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Sandwich Valves

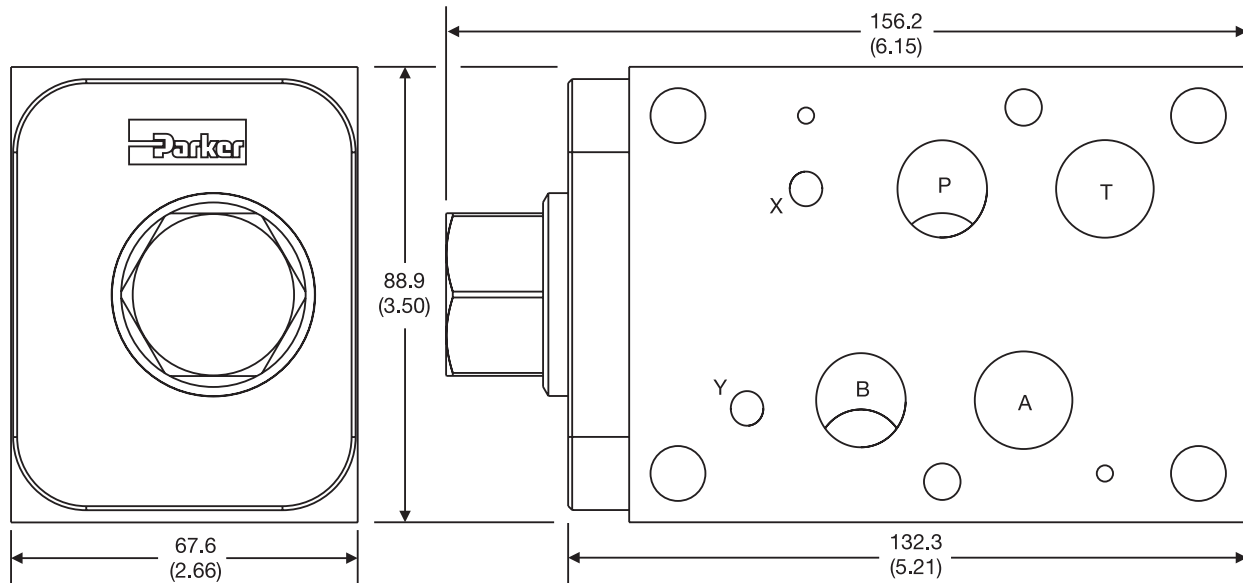
CH07 - Dimensions

B18

WWW.SUMY.IR

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

CH07PP



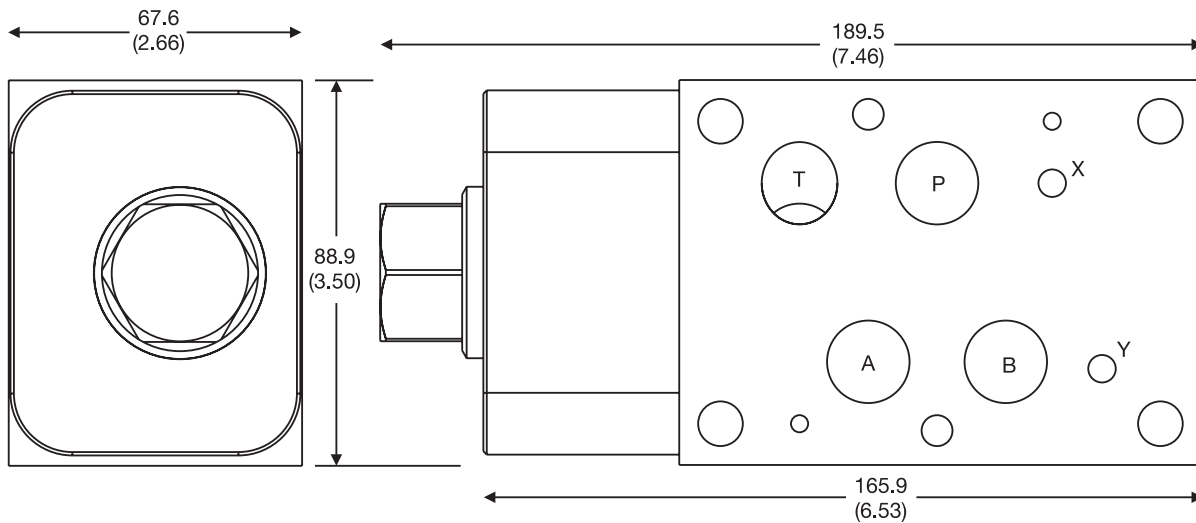
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CH07TT

Note: This is a top view.



Sandwich Valves

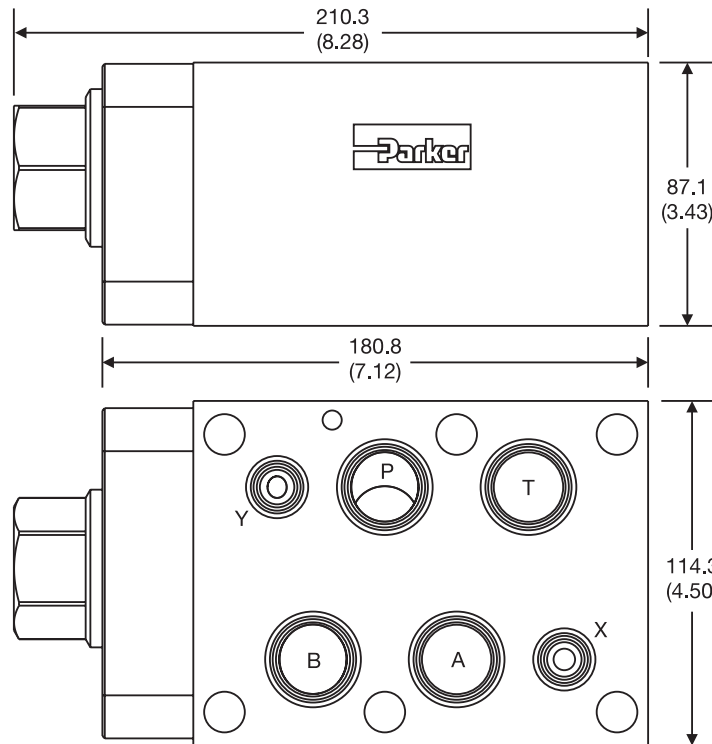
CH08 - Dimensions

B19

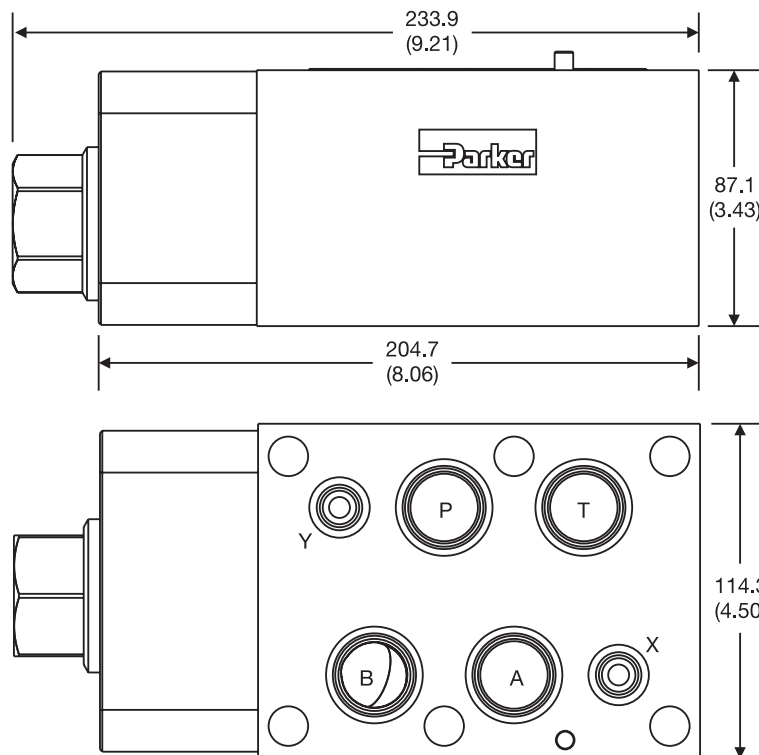
WWW.SUMY.IR

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

CH08PP



CH08TT



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Sandwich Valves

ZRV - Technical Information

B20

WWW.SUMY.IR

General Description

Series ZRV direct operated check valves have a cartridge type insert to provide zero leakage and high life time.

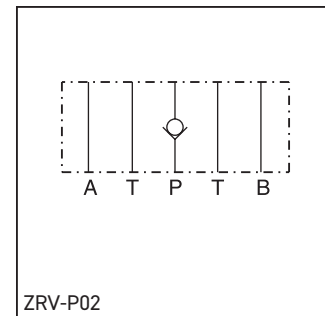
The check function can be located in the P-port or in the T-port.

Features

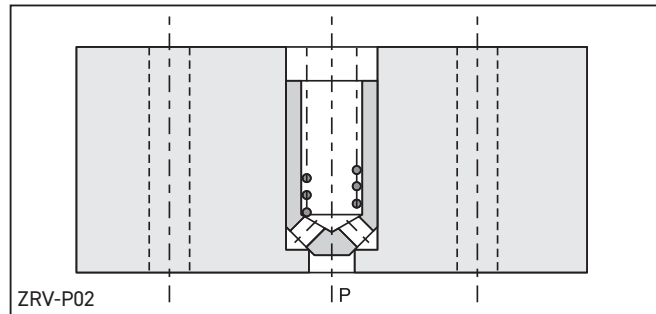
- Leakage-free seat.
- High life time.
- Cracking pressure 0.5 Bar (7.25 PSI).
- Sizes:
 - ZRV01 – NFPA D03 / NG6 / CETOP 3
 - ZRV02 – NFPA D05 / NG10 / CETOP 5



ZRV-P02



ZRV-P02



ZRV-P02

Ordering Information

ZRV
Direct
Operated
Check Valve

**Port
Option**

Code	Description
P	Blocked in P
T	Blocked in T

Size

Code	Description
01	NFPA D03 / NG 06
02	NFPA D05 / NG 10

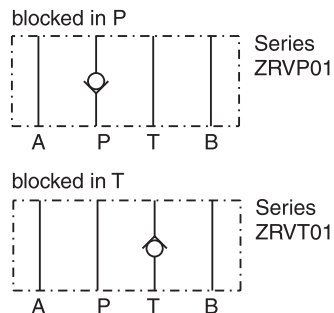
Weight:

ZRV*01 0.7 kg (1.5 lbs)

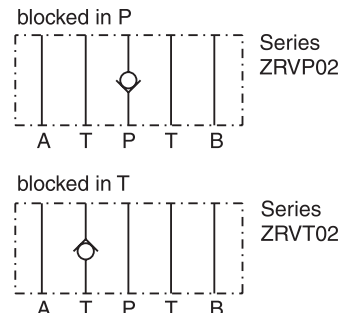
ZRV*02 2.0 kg (4.4 lbs.)

Schematics

ZRV01



ZRV02



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Industrial
Hydraulic Valves

MSG14-2500/US
Sandwich Valves

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Sandwich Valves

ZRV - Technical Information

B21

WWW.SUMY.IR

Specifications

General		
Size	NG 06	NG 10
Mounting Interface	DIN 24340 A6 ISO 4401 NFFPA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFFPA D05 CETOP RP 121 5
Mounting Position	Unrestricted	
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)	
Hydraulic		
Maximum Operating Pressure (Bar)	350 (5075 PSI)	
Nominal Flow (LPM)	40 (10.6 GPM)	100 (26.5 GPM)
Cracking Pressure (Bar)	0.5 (7.25 PSI)	0.5 (7.25 PSI)
Fluid	Hydraulic oil as per DIN 51524 - 51525	
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)	
Viscosity		
Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)	
Recommended (cSt / mm²/s)	30 (139 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)	

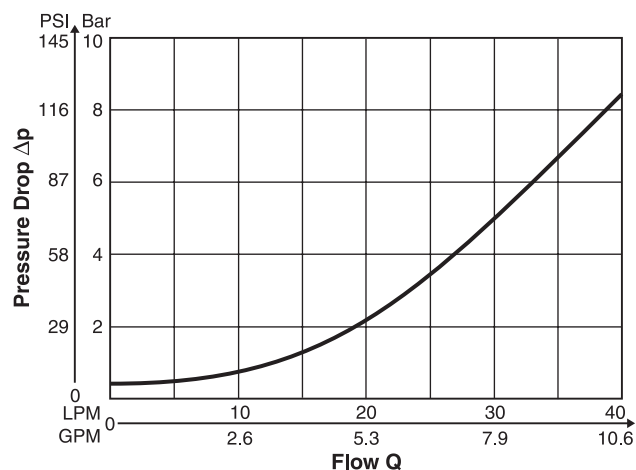
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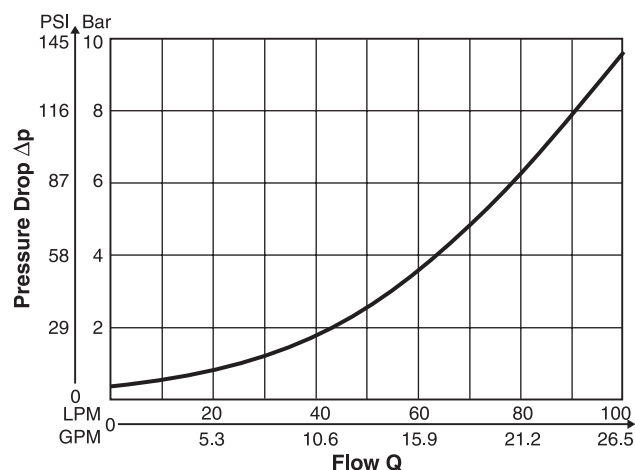
Performance Curves

ZRV P/T01



Fluid Viscosity 30 cSt at 50°C (122°F)

ZRV P/T02



Fluid Viscosity 30 cSt at 50°C (122°F)

Sandwich Valves

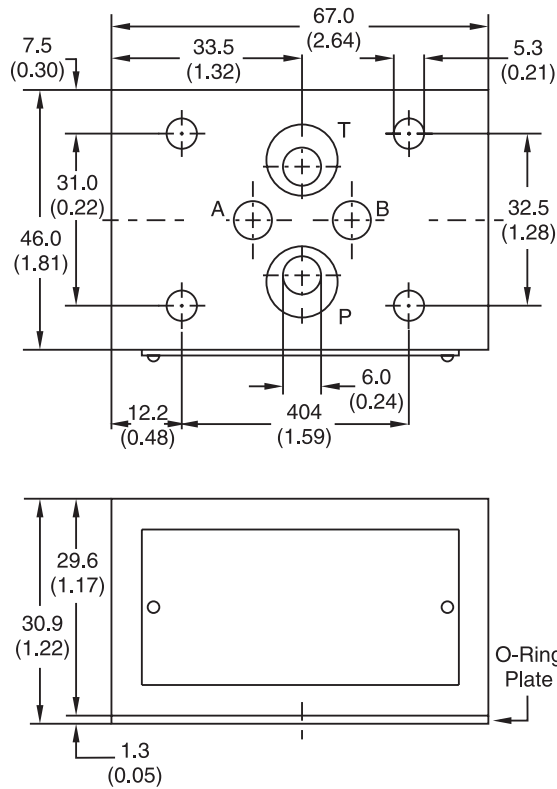
ZRV - Dimensions

B22

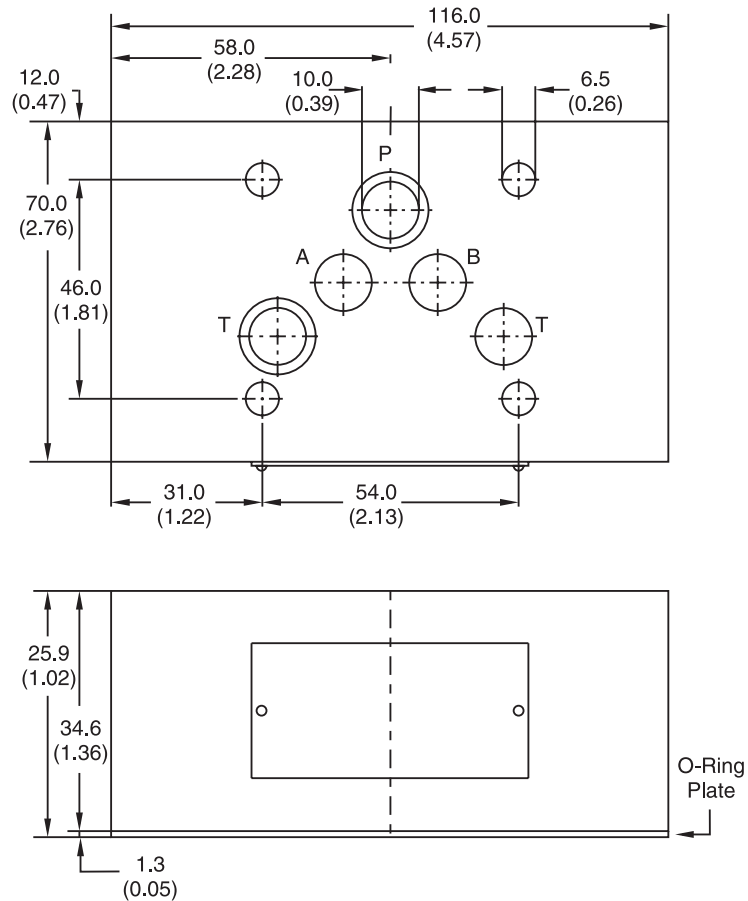
WWW.SUMY.IR

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

ZRV01



ZRV02



Industrial
Hydraulic Valves

MSG14-2500/US
Sandwich Valves

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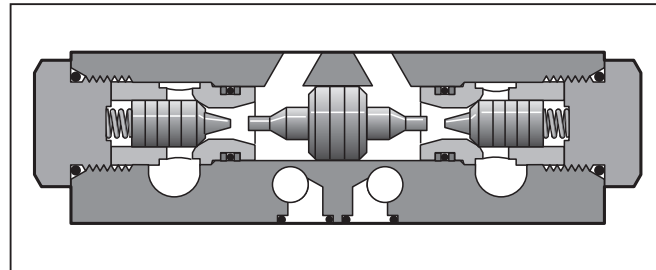
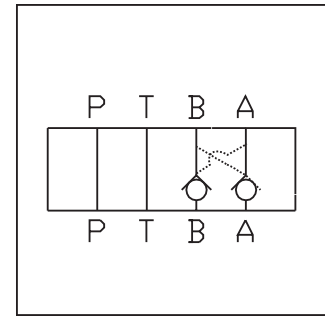
General Description

Series CPOM double pilot operated check valves block leakage from the actuator ports to tank when the directional valve is in the center position.

NOTE: For maximum response and shut off, a directional valve with both cylinder ports drained to tank in the center position is recommended for use with sandwich double pilot operated check valves.

Features

- Sandwich style, pilot operated check valves can be provided in either single or double configurations.
- The pilot operated checks may be positioned in A port or B port; or both A and B ports.
- Valve bodies are manufactured from steel providing extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Positive shut-off is provided by a hardened poppet and cage assembly.
- Large internal flow paths allow high flow at low pressure drop.



Ordering Information

CPOM
Pilot
Operated
Check Valve

Size

Code	Description
2	NFPA D03, CETOP 03, NG 06 Subplate Mounting
3	NFPA D05, CETOP 05, NG 10 Subplate Mounting
6	NFPA D08, CETOP 08, NG 25 Subplate Mounting

Poppet
Style

Code	Description
AA	A Port Only
BB	B Port Only
DD	Double Poppet A and B Ports

Cracking
Pressure

Code	Description
Omit	0.3 Bar (5 PSI)
Y*	3.1 Bar (45 PSI)
Z*	5.2 Bar (75 PSI)

* Size 2 only

Seal

Design
Series

NOTE:
Not required
when ordering.

Code	Description
N	Nitrile
V	Fluorocarbon

CPOM
Pilot
Operated
Check Valve

4

Size
NFPA
D07
CETOP7
NG16

Poppet
Style

Code	Description
AA	A Port Only
BB	B Port Only
DD	A and B Ports

HT

Pilot
Ratio 13:1

V

Seal
Fluorocarbon

Design
Series

NOTE:
Not required
when ordering.

Weight:

CPOM2	0.8 kg (1.7 lbs.)
CPOM3	4.4 kg (9.6 lbs.)
CPOM4	7.7 kg (16.8 lbs.)
CPOM6	9.5 kg (21.0 lbs.)

Bold: Designates Tier I products and options.

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

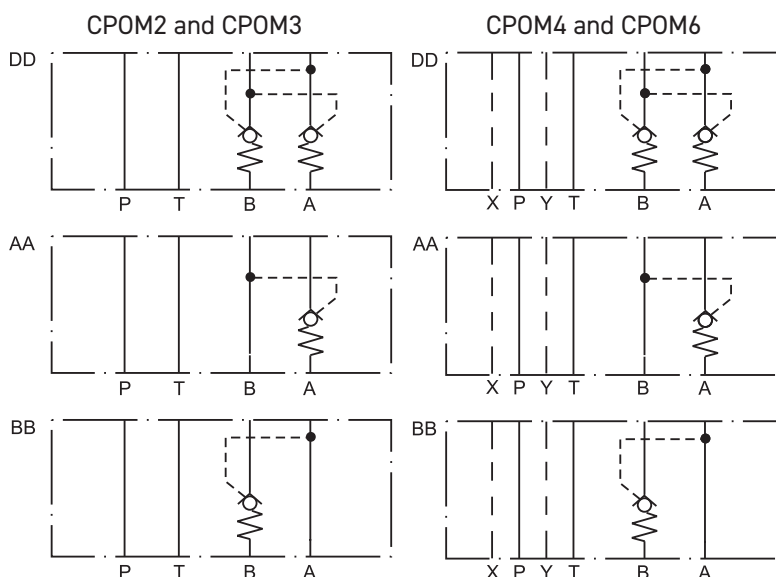
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Specifications				
Size	CPOM2	CPOM3	CPOM4	CPOM6
Mounting Pattern	NFPA D03, CETOP 03, NG 06	NFPA D05, CETOP 05, NG 10	NFPA D07, CETOP 07, NG 16	NFPA D08, CETOP 08, NG 25
Maximum Pressure	345 Bar (5000 PSI)	345 Bar (5000 PSI)	345 Bar (5000 PSI)	205 Bar (3000 PSI)
Maximum Flow	53 LPM (14 GPM) @ 21 Bar (305 PSI) Pressure Drop	76 LPM (20 GPM) @ 11 Bar (155 PSI) Pressure Drop	200 LPM (53 GPM) @ 11 Bar (155 PSI) Pressure Drop	227 LPM (60 GPM) @ 24 Bar (350 PSI) Pressure Drop
Cracking Pressure	1.0 Bar (15 PSI)	0.3 Bar (5 PSI)	2.0 Bar (29 PSI)	0.4 Bar (6 PSI)
Pilot Ratio	3:1	3:1	13:1	3:1
Leakage	5 DPM	5 DPM	Consult Factory	5 DPM

Bolt Kits *(NOTE: Bolt kits must be ordered separately)*

Schematics

Size “2”			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D1	BK243	73.2 (2.88)
2	Sandwich & D1	BK225	111.3 (4.38)
3	Sandwich & D1	BK244	152.4 (6.00)
4	Sandwich & D1	BK245	190.5 (7.50)
Size “3”			
No. of Sandwich	Sandwich & Valve Combination	D3W-30, D3DW, & D31*W*	Bolt Length mm (in)
1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D3	BK143	190.2 7.50)
* D31VW with internal pilot and internal drain only			
Size “4”			
No. of Sandwich	Sandwich & Valve Combination	Bolt Length mm	
1	Sandwich & D4	4x M10 x 140 2x M6 x 135	
2	Sandwich & D4	4x M10 x 220 2x M6 x 215	
3	Sandwich & D4	4x M10 x 300 2x M6 x 295	
Size “6”			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D6	BK121	133.4 (5.25)
2	Sandwich & D6	BK122	203.2 (8.00)
3	Sandwich & D6	BK123	273.1 (10.75)
4	Sandwich & D6	BK124	342.9 (13.50)



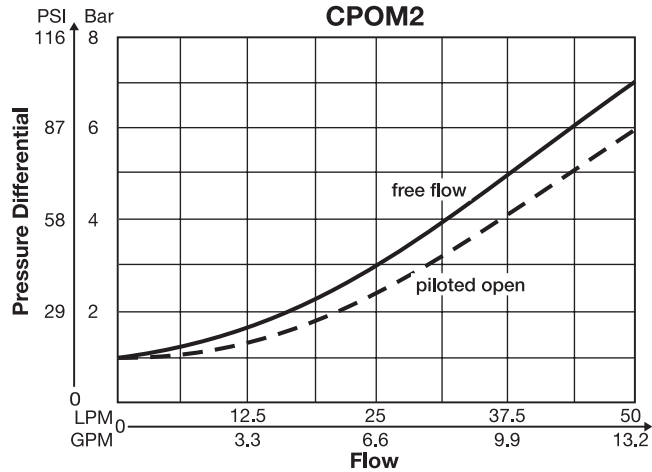
Sandwich Valves

CPOM - Performance Curves

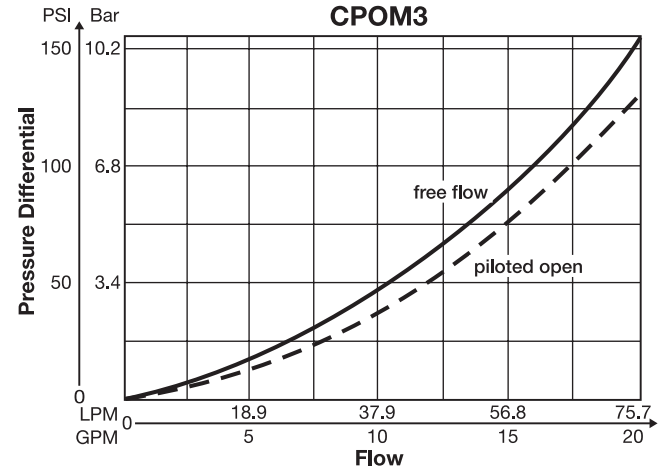
B25

WWW.SUMY.IR

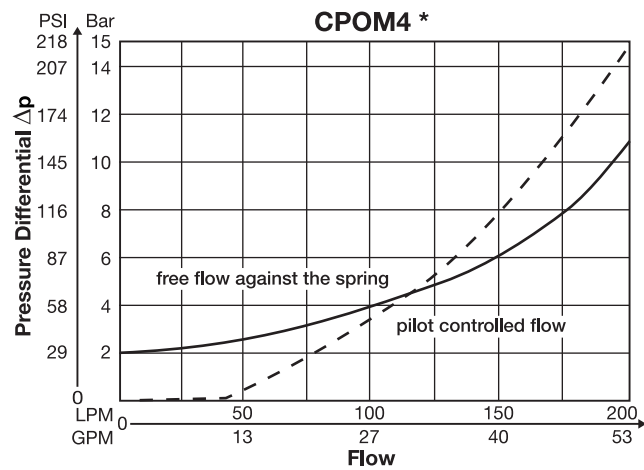
CPOM2



CPOM3

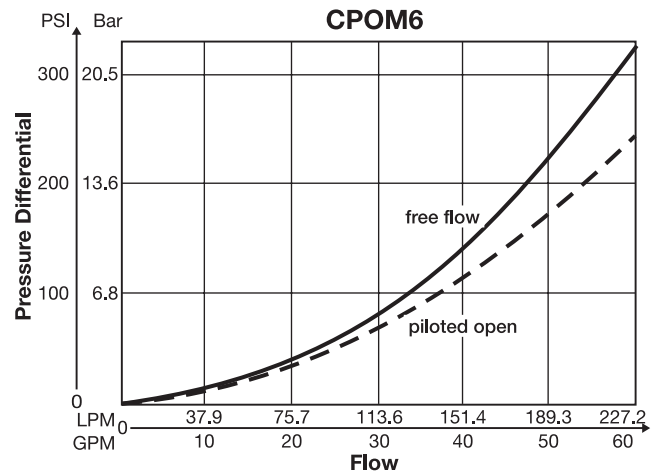


CPOM4



* Curves measured with HLP46 at 50°C (122°F).

CPOM6



Viscosity Correction Factor

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

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

Sandwich Valves

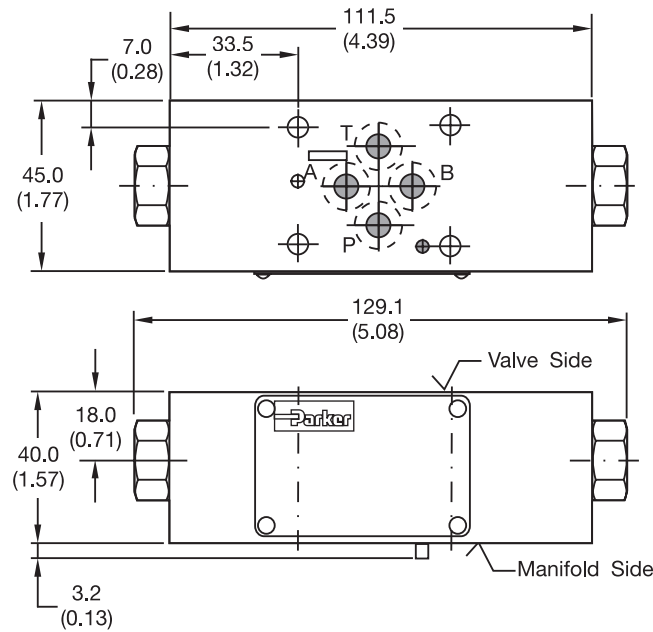
CPOM2, CPOM3 - Dimensions

B26

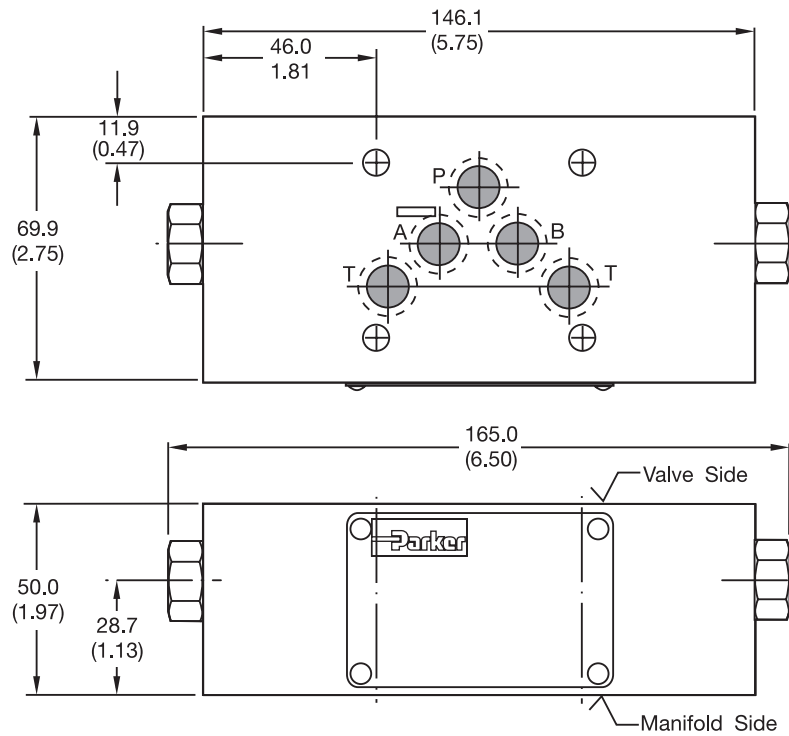
WWW.SUMY.IR

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

CPOM2



CPOM3



B

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Sandwich Valves

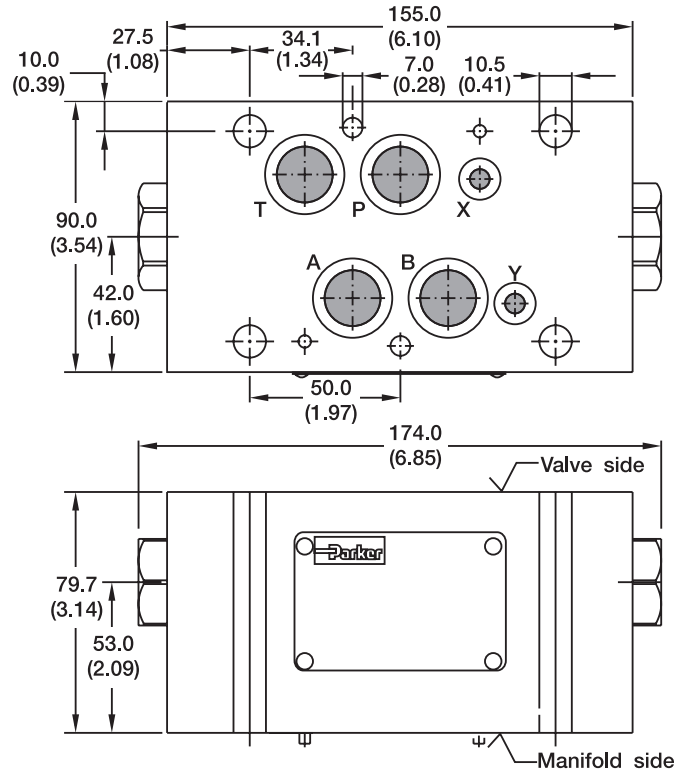
CPOM4, CPOM6 - Dimensions

B27

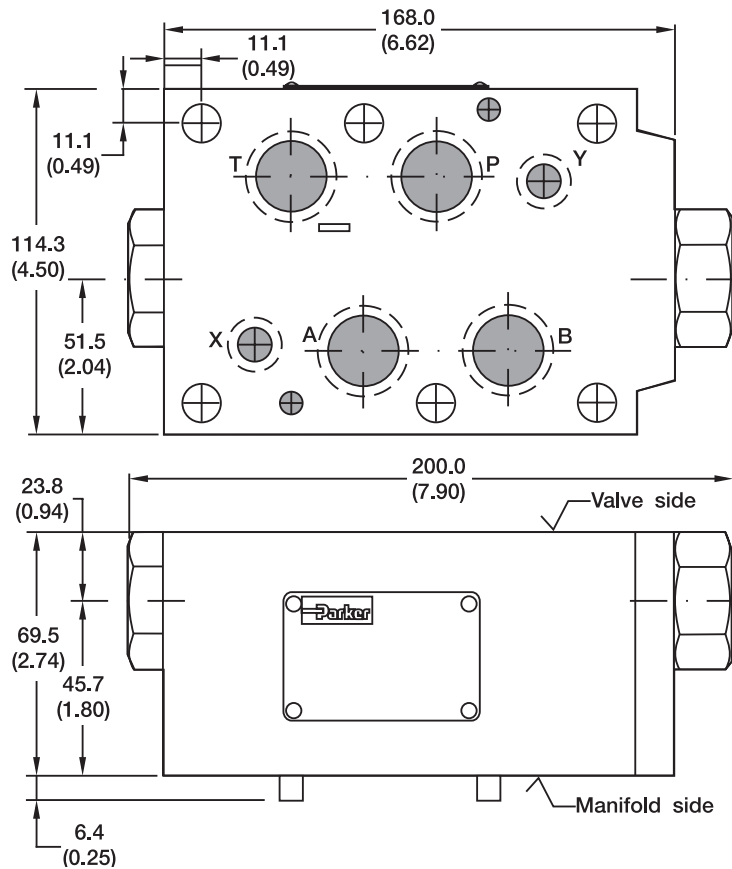
WWW.SUMY.IR

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

CPOM4



CPOM6



B

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General Description

Series CP pilot operated check valves are designed for maximum flow rates.

The valves are typically used in combination with spool type directional control valves to ensure leak free positioning of the actuator.

The inlet flow is free while the outlet flow is blocked. Pressure in the inlet line opens the check valve and allows free outlet flow.

Features

- High life time.
- Check function in A, B or A + B.
- Sizes:
 - CP05 – NFPA D05 / NG10 / CETOP 5
 - CP5H – NFPA D05HE / NG10 / CETOP 5H
 - CP07 – NFPA D07 / NG16 / CETOP 7
 - CP08 – NFPA D08 / NG25 / CETOP 8



B

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Section B
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Specifications

General				
Size	D05 / NG 10	D05HE / NG 10	D07 / NG 16	D08 / NG 25
Mounting Position	Unrestricted			
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure (Bar)	Aluminum Body - up to 207 (3000 PSI); Ductile Iron Body - up to 345 (5000 PSI)			
Nominal Flow (LPM)	114 (30 GPM)	114 (30 GPM)	227 (60 GPM)	454 (120 GPM)
Leakage (DPM)	<1	<1	<1	<1
Cracking Pressure (Bar)	2 +/- 0.2 (30 +/- 3 PSI)			
Pilot Ratio	3:1	3:1	3:1	3:1
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)			
Viscosity				
Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)			
Recommended (cSt / mm²/s)	30 (139 SSU)			
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)			



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

CP - Ordering Information

B29

WWW.SUMY.IR

CP

Pilot Operated
Check Valve

Size

Style

30

Cracking
Pressure

Seal

Body
Material

Code	Description
03	See CM2
05	NFPA D05 / NG 10
SH*	NFPA D05HE / NG 10
07	NFPA D07 / NG 16
08	NFPA D08 / NG 25
* Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.	

Code	Description
30	2 Bar (30 PSI)

Code	Description
AA	Blocked in A
BB	Blocked in B
DD	Blocked in A and B

Code	Description
N	Nitrile
V*	Fluorocarbon
* Upon request	

Code	Description
A	Aluminum
D	Ductile Iron

B

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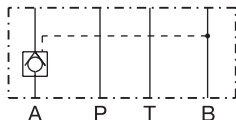
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Weight						
Size	CH**AA30NA	CH**AA30ND	CH**BB30NA	CH**BB30ND	CH**DD30NA	CH**DD30ND
CP05, CP5H	0.8 kg (1.9 lbs)	1.7 kg (3.8 lbs)	0.8 kg (1.9 lbs)	1.7 kg (3.8 lbs)	1.3 kg (2.9 lbs)	2.7 kg (5.9 lbs)
CP07	2.4 kg (5.4 lbs)	5.3 kg (11.8 lbs)	2.4 kg (5.4 lbs)	5.2 kg (11.6 lbs)	3.5 kg (7.6 lbs)	7.2 kg (15.8 lbs)
CP08	5.2 kg (11.4 lbs)	11.6 kg (25.6 lbs)	5.8 kg (12.7 lbs)	13.1 kg (29 lbs)	7.6 kg (16.7 lbs)	15.9 kg (35.1 lbs)

Schematics

CP**AA

blocked in A



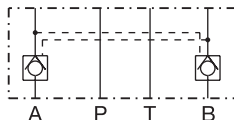
CP**BB

blocked in B



CP**DD

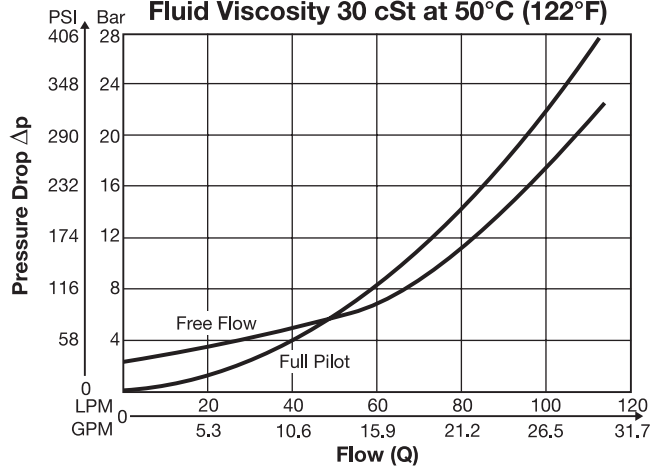
blocked in A and B



CP05/CP5H

Pressure Differential vs. Flow

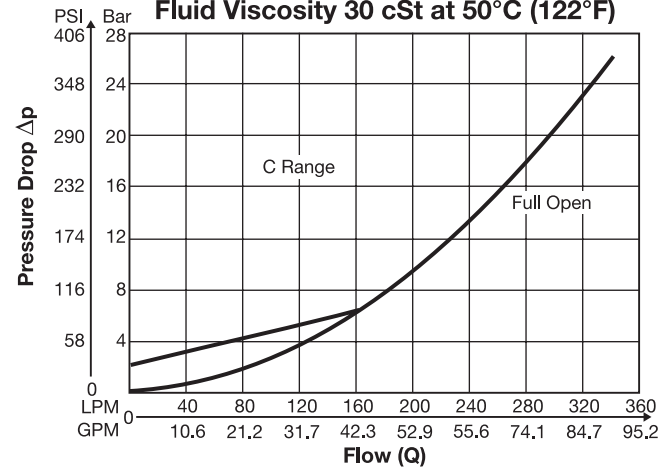
Fluid Viscosity 30 cSt at 50°C (122°F)



CP07

Pressure vs. Flow Relief

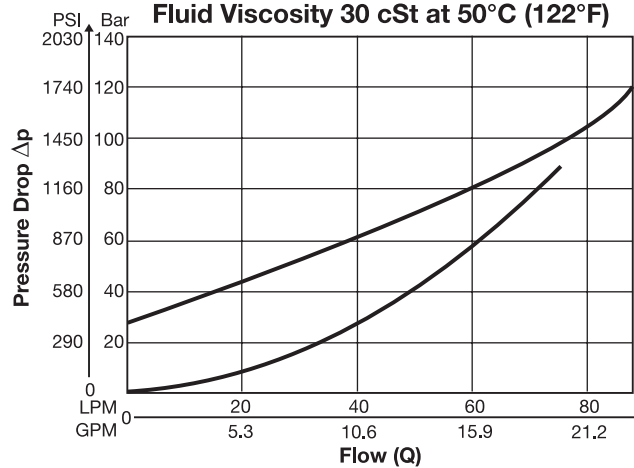
Fluid Viscosity 30 cSt at 50°C (122°F)



CP08

Pressure Differential vs. Flow

Fluid Viscosity 30 cSt at 50°C (122°F)



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Sandwich Valves

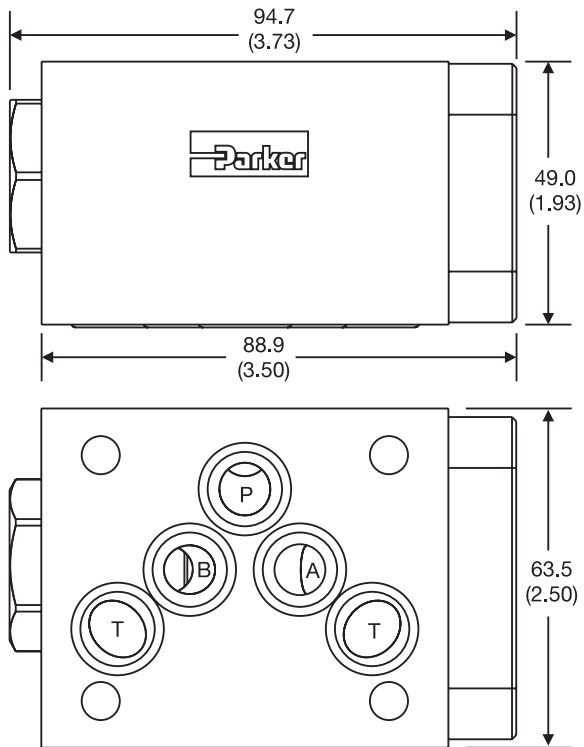
CP05 - Dimensions

B31

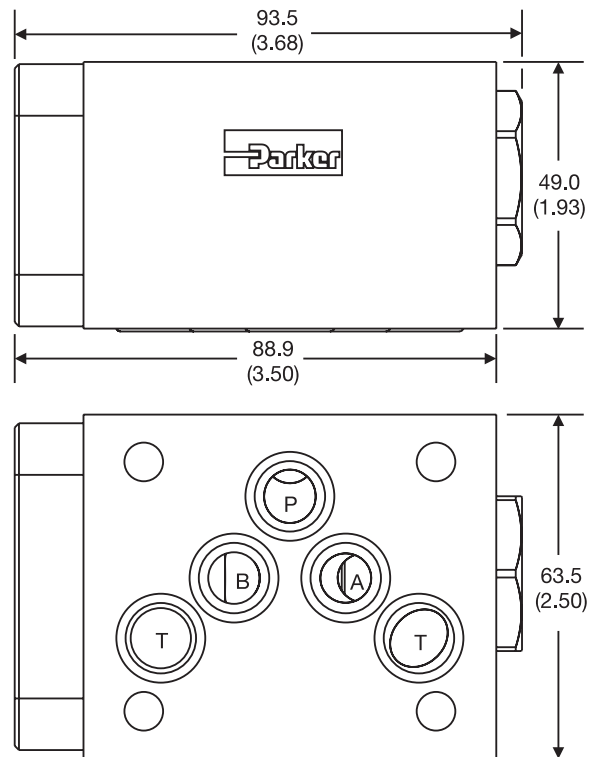
WWW.SUMY.IR

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

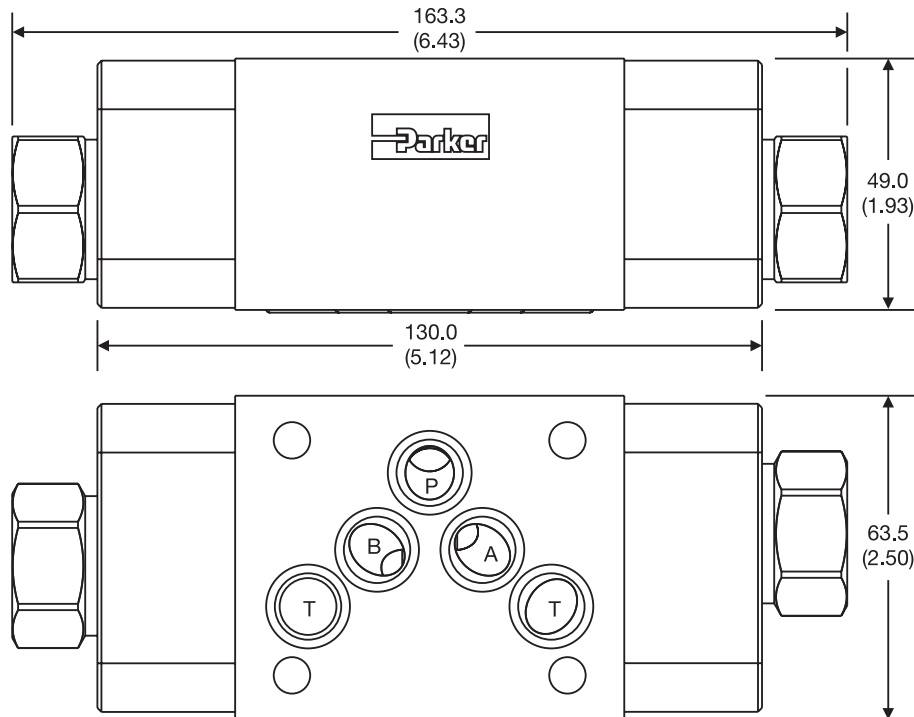
CP05AA



CP05BB



CP05DD



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Sandwich Valves

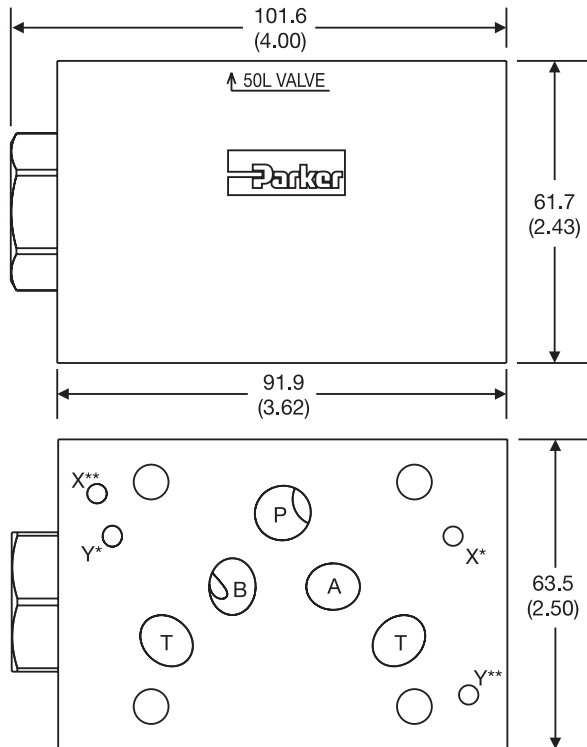
CP5H - Dimensions

B32

WWW.SUMY.IR

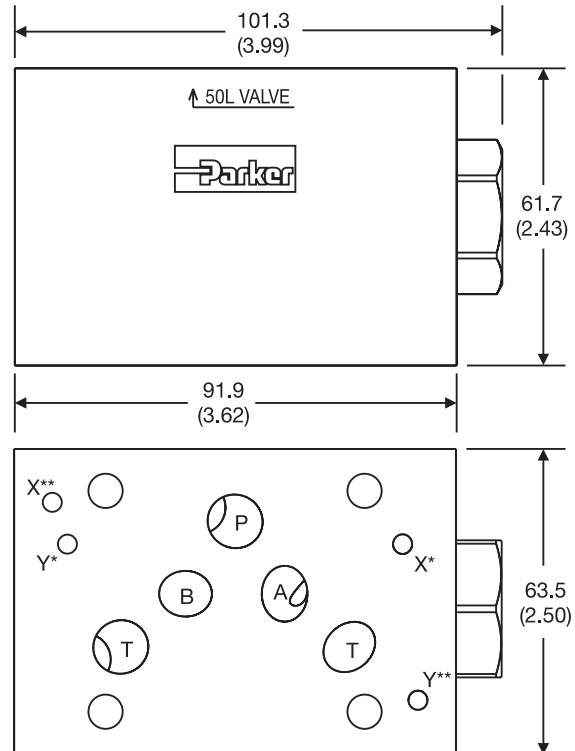
Inch equivalents for millimeter dimensions are shown in (**)

CP5HAA



* D05HE (Standard)
** D05H

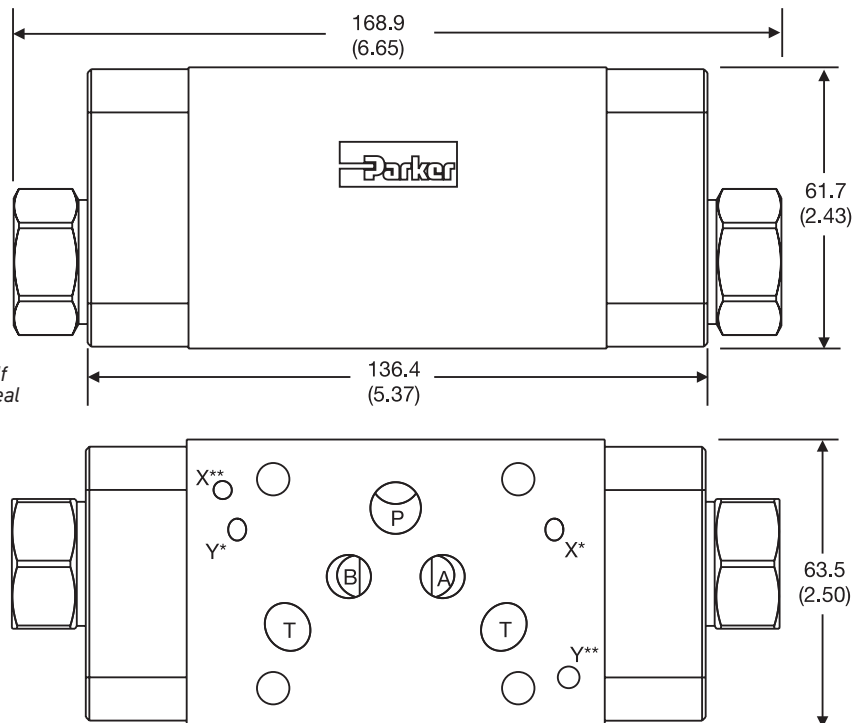
CP5HBB



* D05HE (Standard)
** D05H

Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.

CP5HDD



Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.

* D05HE (Standard)
** D05H



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Sandwich Valves

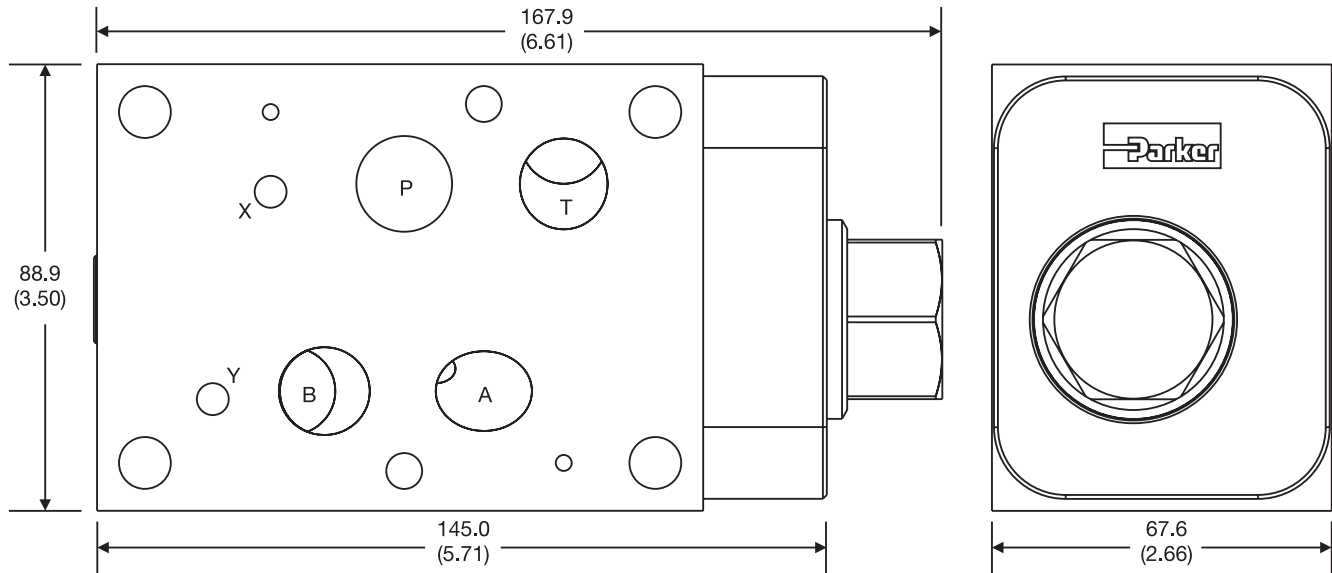
CP07 - Dimensions

B33

WWW.SUMY.IR

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

CP07AA

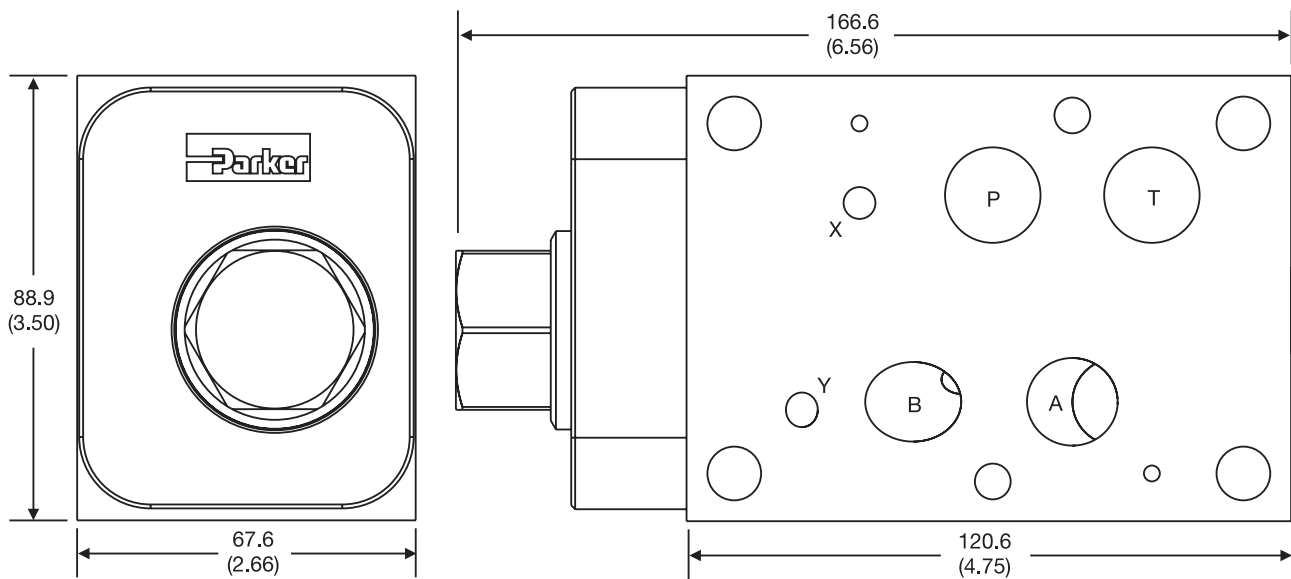


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CP07BB



Sandwich Valves

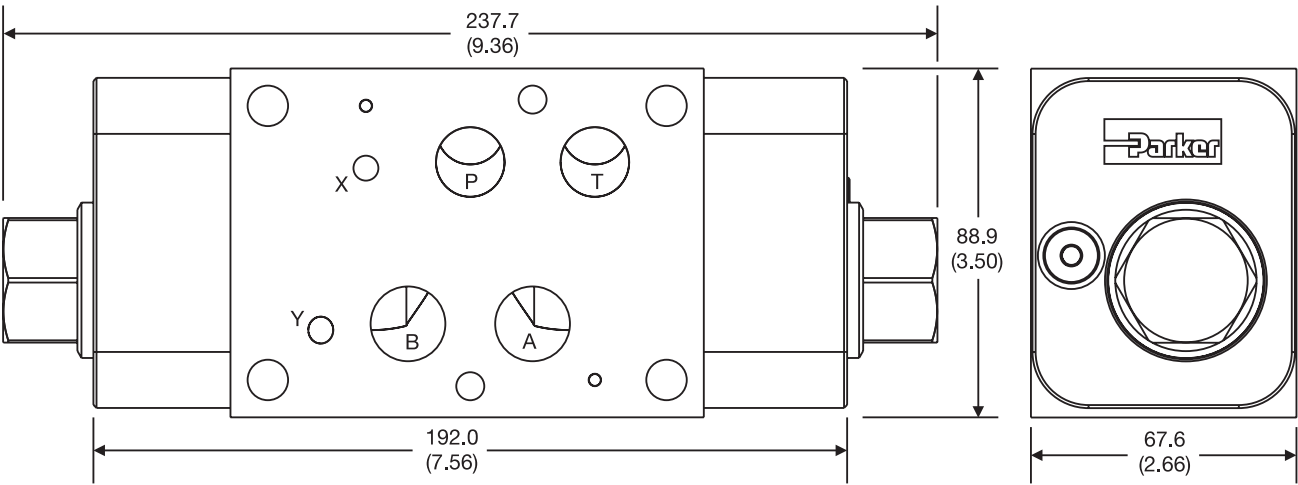
CP07, CP08 - Dimensions

B34

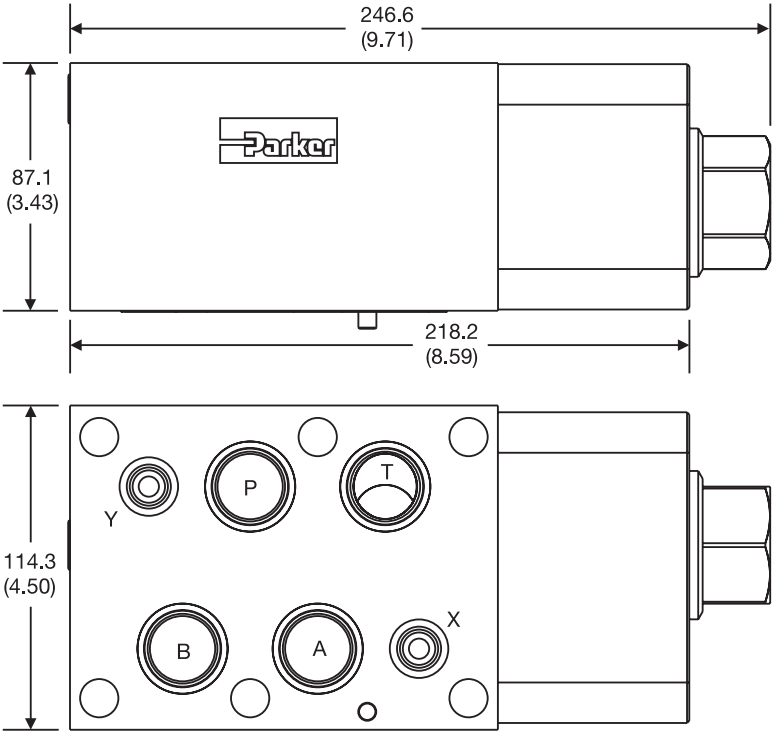
WWW.SUMY.IR

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

CP07DD



CP08AA



Sandwich Valves

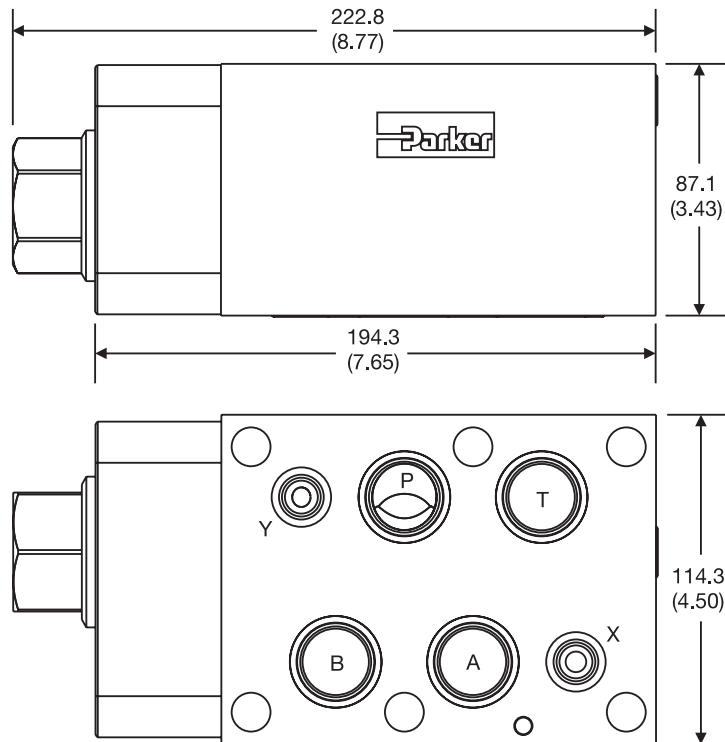
CP08 - Dimensions

B35

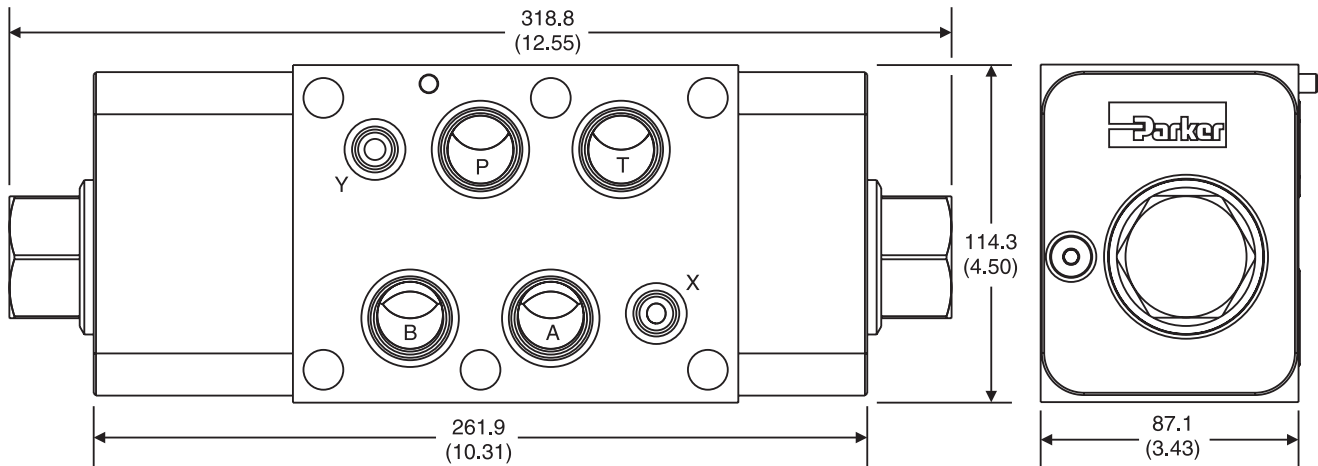
WWW.SUMY.IR

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

CP08BB



CP08DD



General Description

Series ZRE pilot operated check valves are designed for maximum flow rates and long life time.

The valves are typically used in combination with spool type directional control valves to ensure leak free positioning of the actuator.

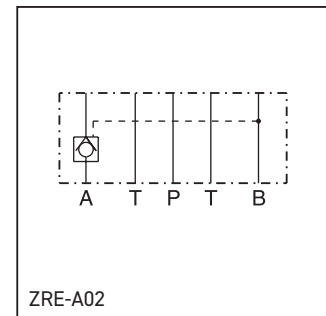
The inlet flow is free while the outlet flow is blocked. Pressure in the inlet line opens the check valve and allows free outlet flow.

Features

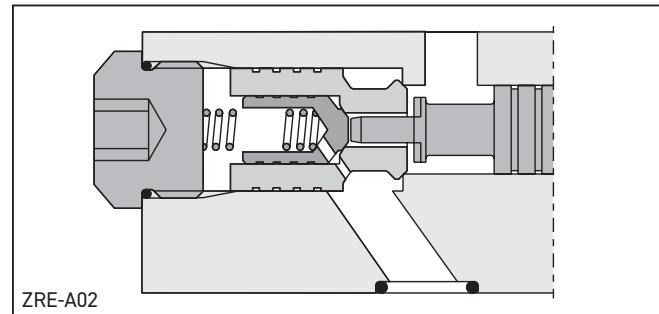
- High life time.
- Check function in A, B or A + B.
- Sizes:
ZRE01 – NFPA D03 / NG6 / CETOP 3
ZRE02 – NFPA D05 / NG10 / CETOP 5



ZRE-A01



ZRE-A02



ZRE-A02

Ordering Information

ZRE

Pilot Operated Check Valve

Port Option

Code	Description
A	Blocked in A
B	Blocked in B
AB	Blocked in A and B

Size

Code	Description
01	NFPA D03 / NG 06
02	NFPA D05 / NG 10

Design Series

Code	Description
D	Size 01
E	Size 02

Seal

Code	Description
01	NFPA D03 / NG 06
02	NFPA D05 / NG 10

Weight:

ZRE*011.2 kg (2.6 lbs)

ZRE*023.1 kg (6.8 lbs.)

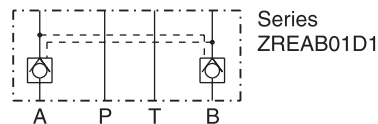
Weight:

ZRE*01	1.2 kg (2.6 lbs)
ZRE*02	3.1 kg (6.8 lbs.)

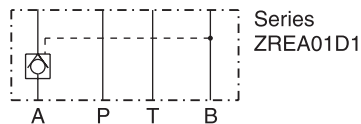
Schematics

ZRE01

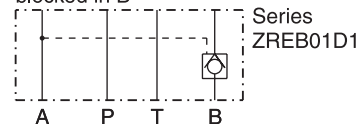
blocked in A and B



blocked in A

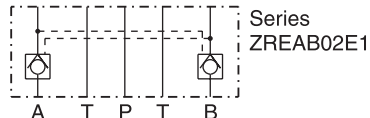


blocked in B



ZRE02

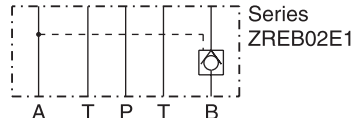
blocked in A and B



blocked in A



blocked in B



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Specifications

General		
Size	NG 06	NG 10
Mounting Interface	DIN 24340 A6 ISO 4401 NFFPA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFFPA D05 CETOP RP 121 5
Mounting Position	Unrestricted	
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)	
Hydraulic		
Maximum Operating Pressure (Bar)	350 (5075 PSI)	
Nominal Flow (LPM)	60 (10.6 GPM)	120 (26.5 GPM)
Opening Ratio (Pilot cone / Main cone)	1:6	1:6
Cracking Pressure (Bar)	1.2 (15.9 PSI)	2.0 (29 PSI)
Fluid	Hydraulic oil as per DIN 51524 - 51525	
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)	
Viscosity		
Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)	
Recommended (cSt / mm²/s)	30 (139 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)	

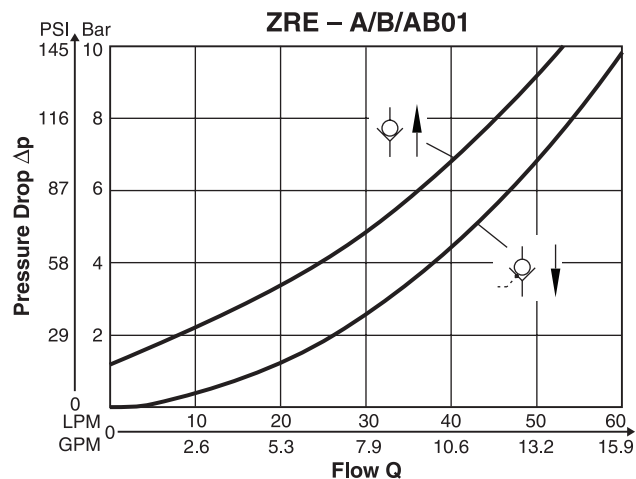
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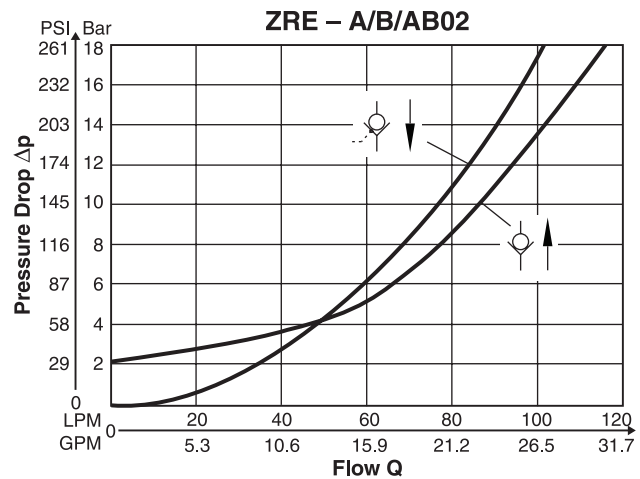
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Performance Curves

ZRE01



ZRE02



Fluid viscosity = 30 cSt at 50°C (122°F).

Sandwich Valves

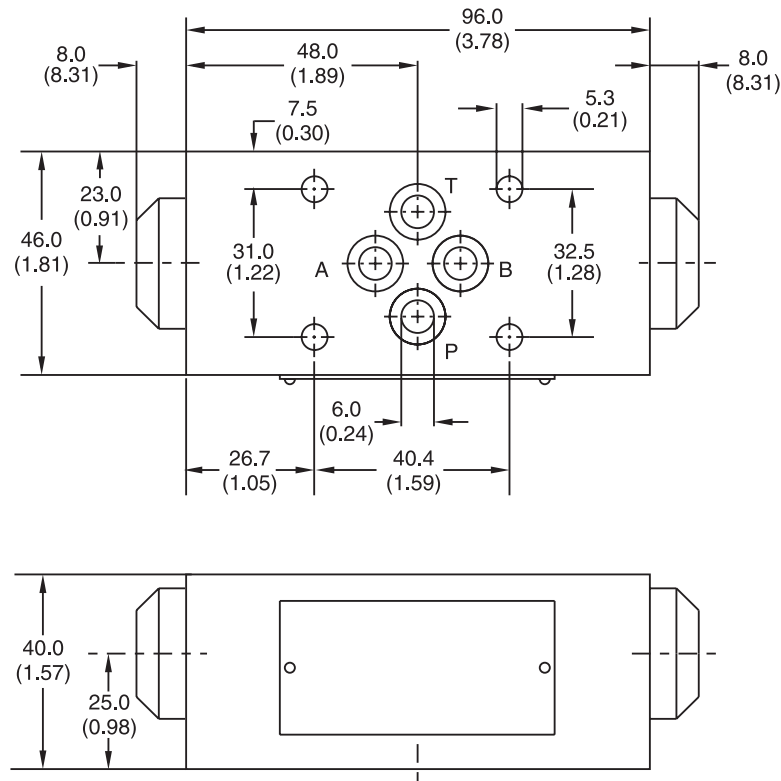
ZRE - Dimensions

B38

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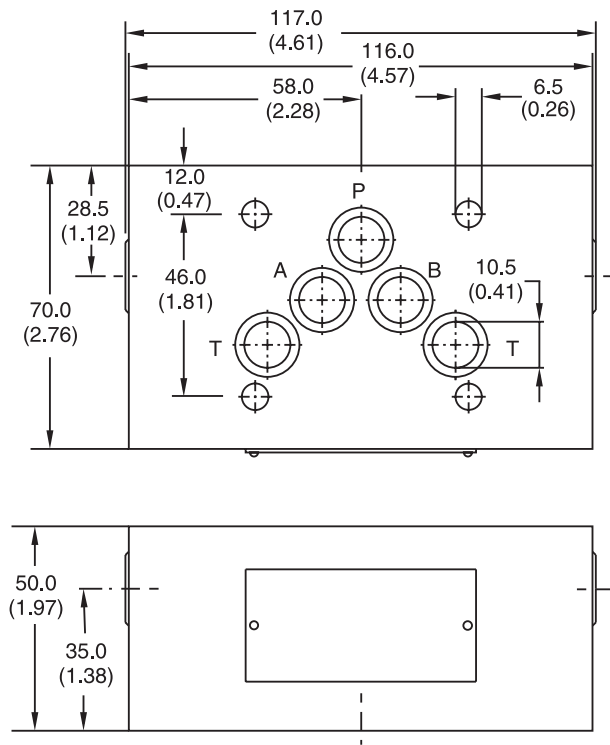
Inch equivalents for millimeter dimensions are shown in (**)

ZRE01



Seal Kit	
Seal	Order Code
1	098-91088-0
5	098-91089-0

ZRE02



Seal Kit	
Seal	Order Code
1	098-91090-0
5	098-91091-0



B

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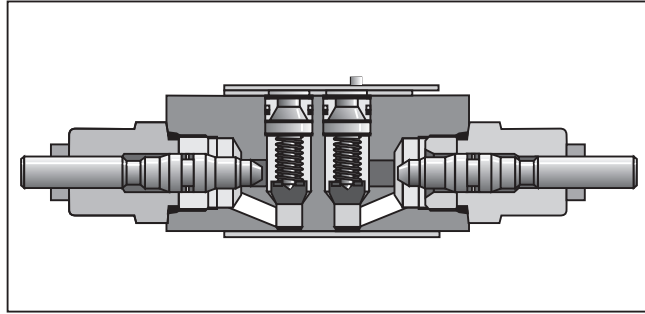
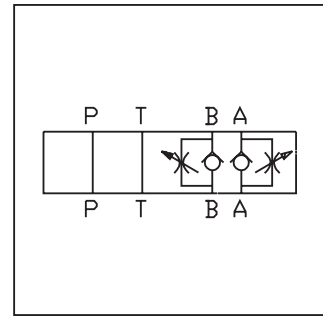
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General Description

Series FM double flow control valves permit free flow from the directional valve to the actuator and adjustable independent flow regulation in each return line from the actuator (meter-out). The FM2 and FM3 have a seal plate and can be inverted for meter-in applications (see installation drawing for flow direction).

Features

- FM style flow control valves can be provided in either single or double configurations.
- The flow controls may be positioned in 'A' port, 'B' port, both 'A' and 'B' ports or 'P' port.
- Valve bodies are manufactured from steel providing extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Two step needles provide fine adjustment for the first few turns and course adjustment for the last few turns. Standard and fine adjustment needles available.
- Large bypass checks allow high flow at a low pressure drop.
- Valve is reversible (invert 180°) for meter-in or meter-out applications (FM2 and FM3 only).
- Adjustment options include Allen hex or hand knob.



Specifications

Size	FM2	FM3	FM6
Mounting Pattern	NFPA D03, CETOP 03, NG 06	NFPA D05, CETOP 05, NG 10	NFPA D08, CETOP 08, NG 25
Maximum Pressure	345 Bar (5000 PSI)	345 Bar (5000 PSI)	207 Bar (3000 PSI)
Maximum Flow	76 LPM (20 GPM)	113 LPM (30 GPM)	341 LPM (90 GPM)
Cracking Pressure	0.3 Bar (5 PSI)	0.3 Bar (5 PSI)	0.3 Bar (5 PSI)

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

FM - Ordering Information

B40

WWW.SUMY.IR

FM

Flow Valve Control

Size

Meter Option

Needles

Adjustment

Seal

Design Series

NOTE:
Not required when ordering.

Code	Description
2	NFPA D03 Subplate Mounting
3	NFPA D05 Subplate Mounting
6*	NFPA D08 Subplate Mounting
* FM6 meter out only	

Code	Description
K	Knob
S	Allen Hex

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
AA	Single Function A Port Only
BB	Single Function B Port Only
DD	A and B Ports Dual Function
PP*	Single Function P Port
DDF	A and B Port Inverted
* Not available on 6 Size	

Code	Description
Omit	Standard
D*	Fine Meter

* D needle is the standard needle in valves used as pilot chokes. Not available on size 6

Bold: Designates Tier I products and options.

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

Sandwich Bolt Kits (NOTE: Bolt kits must be ordered separately)

Size "2"			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D1	BK243	73.2 (2.88)
2	Sandwich & D1	BK225	111.3 (4.38)
3	Sandwich & D1	BK244	152.4 (6.00)
4	Sandwich & D1	BK245	190.5 (7.50)

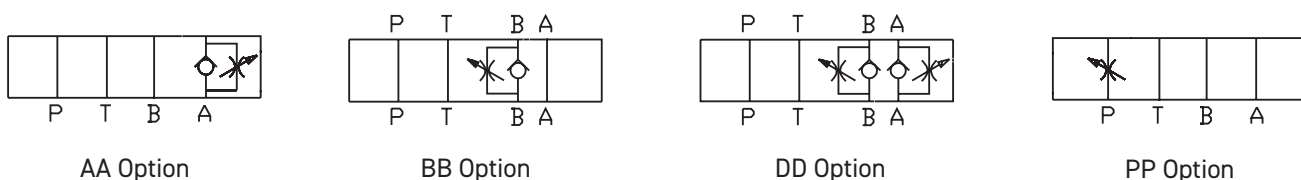
Size "3"			
No. of Sandwich	Sandwich & Valve Combination	D3W-30, D3DW, & D31*W*	Bolt Length mm (in)
1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D3	BK143	190.2 (7.50)
* D31VW with internal pilot and internal drain only			

Size "6"			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D6	BK121	133.4 (5.25)
2	Sandwich & D6	BK122	203.2 (8.00)
3	Sandwich & D6	BK123	273.1 (10.75)
4	Sandwich & D6	BK124	342.9 (13.50)

Unit Weight:

FM2	1.7 kg (3.8 lbs.)
FM3	2.4 kg (5.2 lbs.)
FM6	7.9 kg (17.5 lbs.)

Schematics

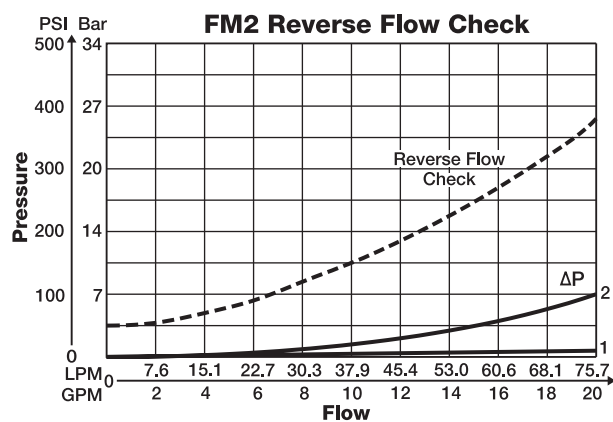


Sandwich Valves

FM - Performance Curves

B41

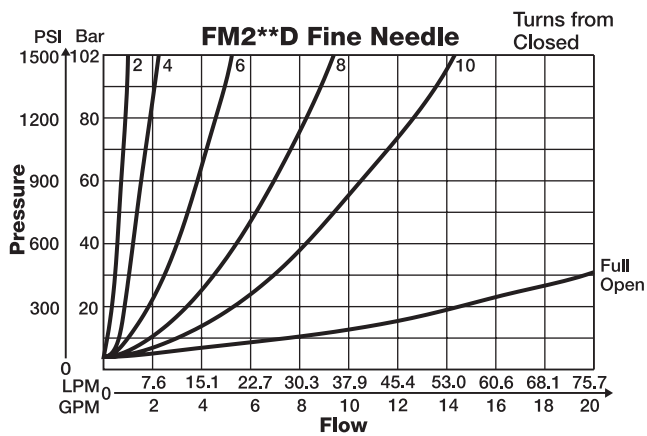
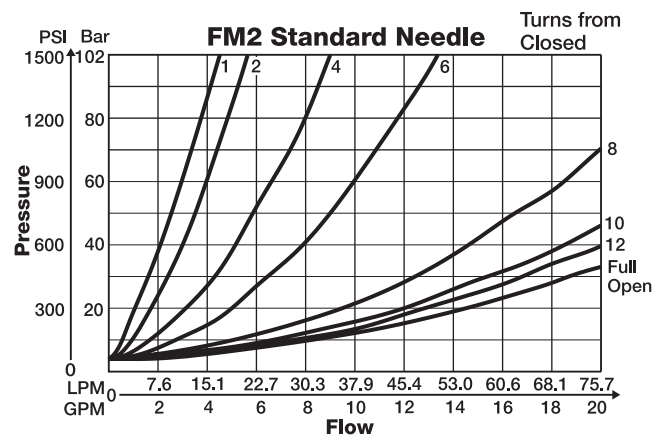
WWW.SUMY.IR



Pressure Drop Reference Chart

	P	A	B	T
PP	*	2	2	1
DD	1	*	*	1
AA	1	*	1	1
BB	1	1	*	1

* See specific flow vs. turns



Viscosity Correction Factor

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

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

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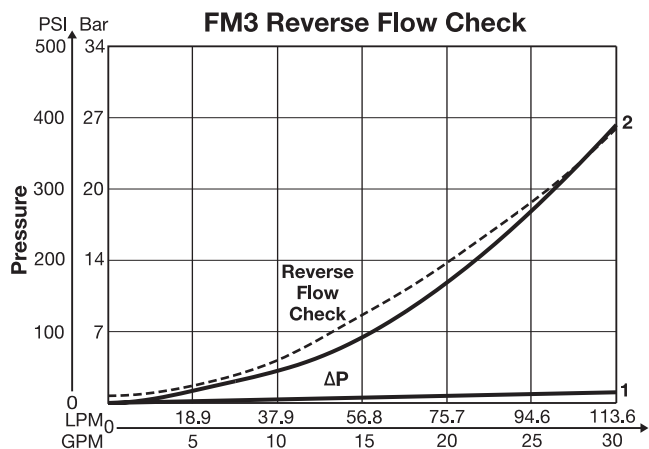
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Sandwich Valves

FM - Performance Curves

B42

WWW.SUMY.IR



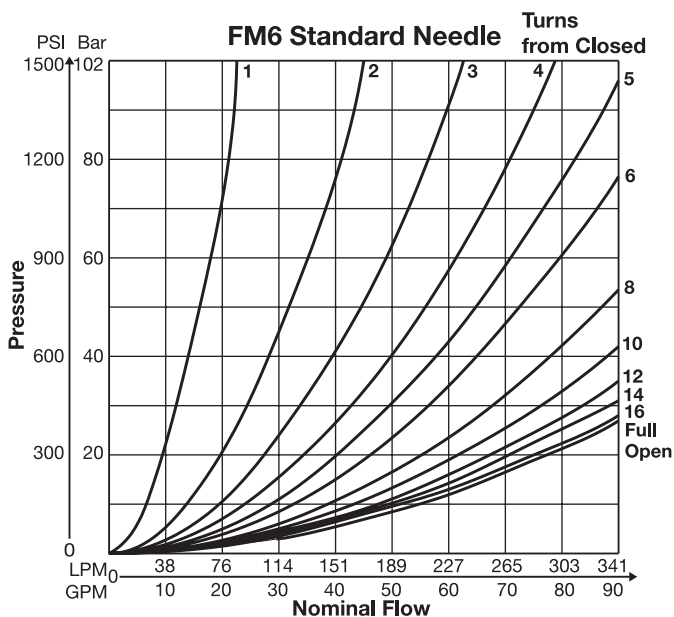
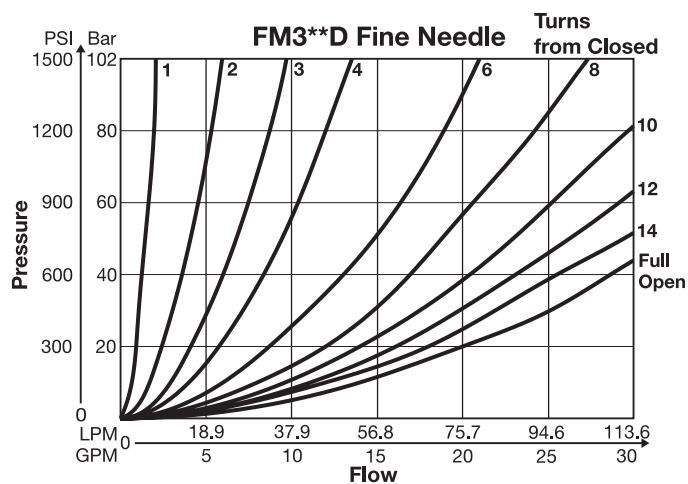
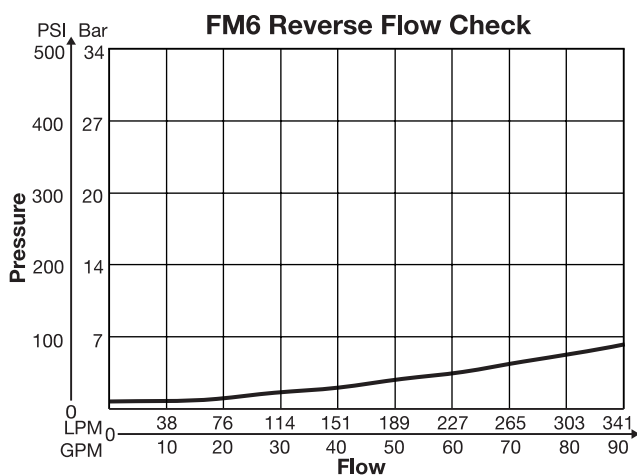
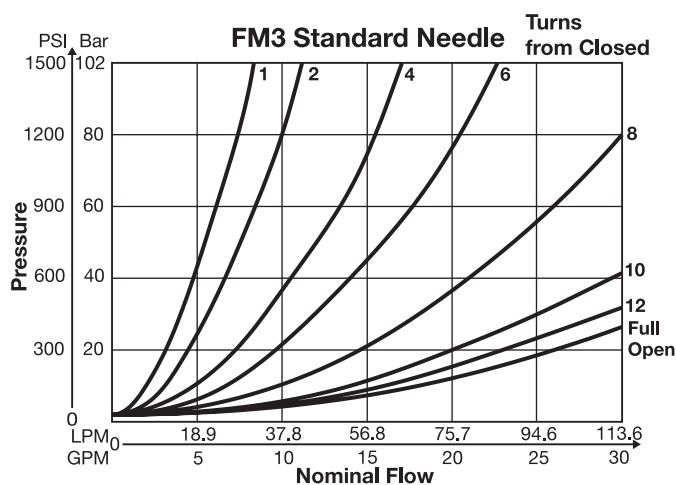
Pressure Drop Reference Chart				
	P	A	B	T
PP	*	2	2	1
DD	1	*	*	1
AA	1	*	1	1
BB	1	1	*	1

* See specific flow vs. turns

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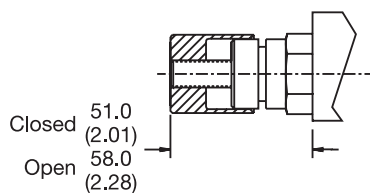
Sandwich Valves

FM2 - Dimensions

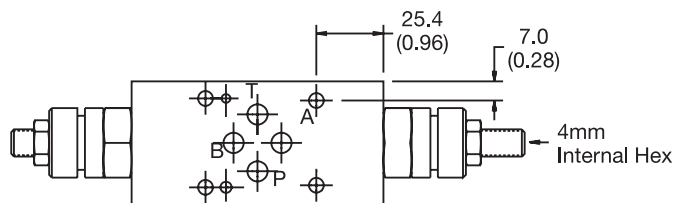
B43

WWW.SUMY.IR

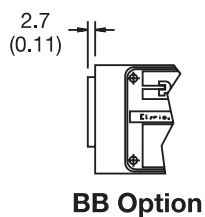
Inch equivalents for millimeter dimensions are shown in (**)



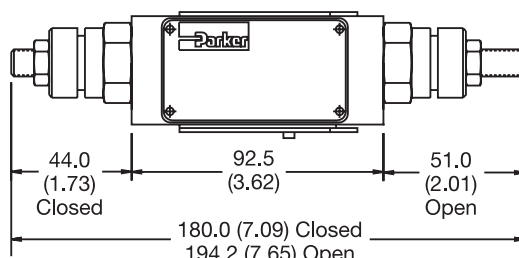
Knob Option



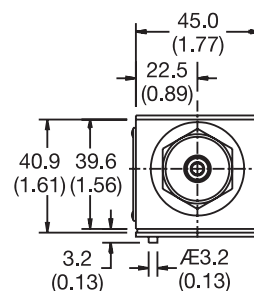
Top View



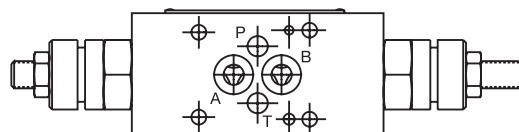
BB Option



Face View



End View



SHOWN WITHOUT O-RING PLATE

Bottom View

Note: For meter-in option, invert body 180°.



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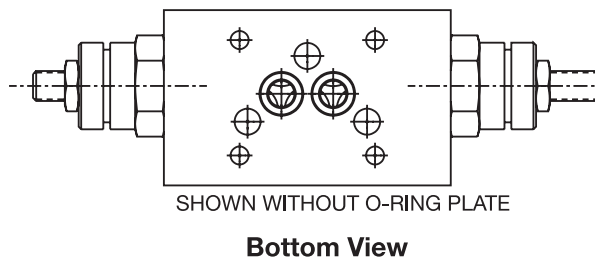
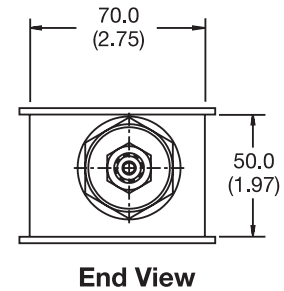
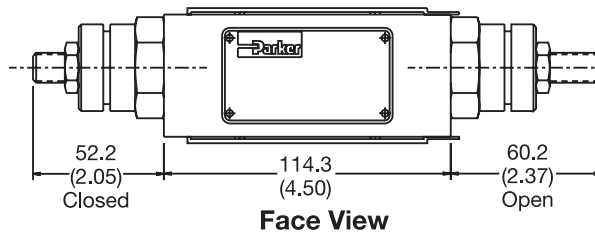
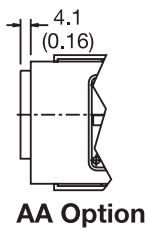
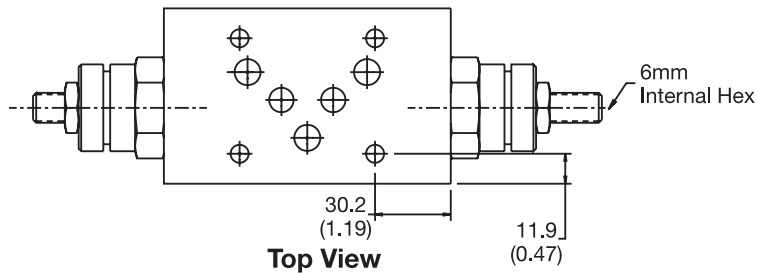
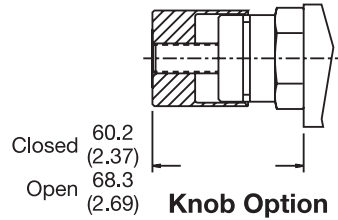
Sandwich Valves

FM3 - Dimensions

B44

WWW.SUMY.IR

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



Note: For meter-in option, invert body 180°.



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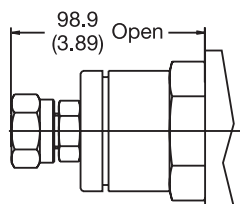
Sandwich Valves

FM6 - Dimensions

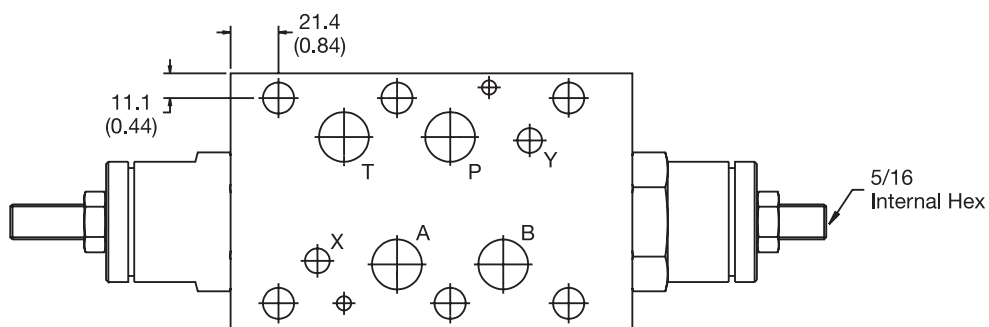
B45

WWW.SUMY.IR

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



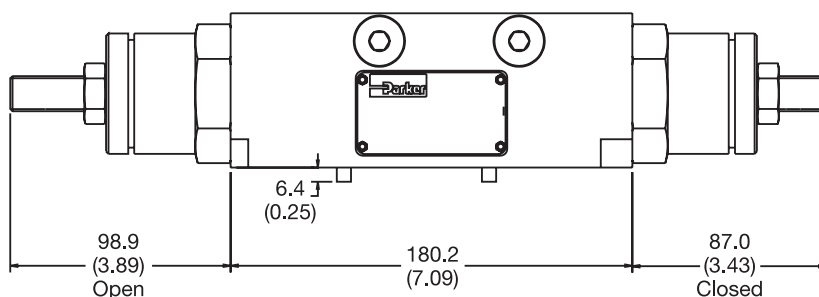
Knob Option



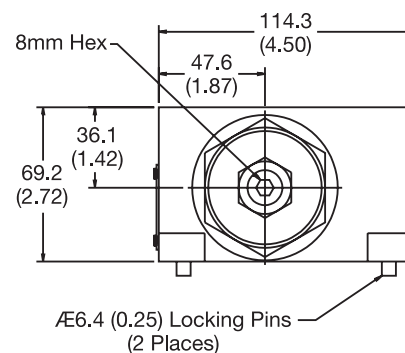
Top View



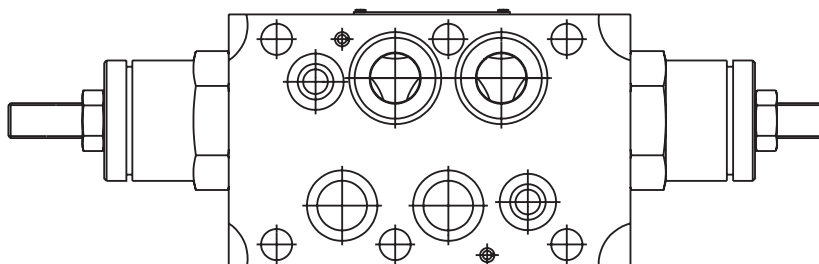
AA Option



Face View



End View



Bottom View

Note: For meter-in option, invert body 180°.



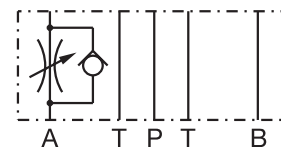
General Description

Series FC, FD throttle check valves are designed for maximum flow rates.

The throttle check function is located in ports A and B. Meter-in or meter-out functionality can be selected by model code.

Features

- High flow capacity.
- Various functional arrangements.
- Sizes:
 - FC05, FD05 – NFPA D05 / NG10 / CETOP 5
 - FC05H, FD5H – NFPA D05HE / NG10 / CETOP 5H
 - FC07, FD07 – NFPA D07 / NG16 / CETOP 7
 - FC08, FD08 – NFPA D08 / NG25 / CETOP 8



Specifications

General				
Size	D05 / NG 10	D05HE / NG 10	D07 / NG 16	D08 / NG 25
Mounting Position	Unrestricted			
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure (Bar)	Aluminum Body - up to 207 (3000 PSI); Ductile Iron Body - up to 345 (5000 PSI)			
Nominal Flow (LPM)	95 (25 GPM)	95 (25 GPM)	227 (60 GPM)	454 (120 GPM)
Leakage (DPM)	<5	<5	<5	<5
Cracking Pressure (Bar)	2 +/- 0.2 (30 +/- 3 PSI)			
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)			
Viscosity				
Permitted (cSt / mm²/s)				
Recommended (cSt / mm²/s)				
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)			

⚠ WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

FC, FD - Ordering Information

B47

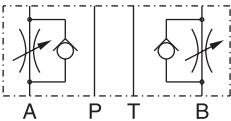
WWW.SUMY.IR

Throttle Valve with Check		Size		DD Meter Option		30 Cracking Pressure		Seal		Body Material	
Code	Description			Code	Description	Code	Description	Code	Description	Code	Description
FC	Flow Control Meter Out			DD	Control A and B	30	2 Bar (30 PSI)			A	Aluminum
FD	Flow Control Meter In									D	Ductile Iron
		Code	Description					Code	Description		
		03	See FM2					N	Nitrile		
		05	NFPA D05 / NG 10					V*	Fluorocarbon		
		SH*	NFPA D05HE / NG 10					* Upon request			
		07	NFPA D07 / NG 16								
		08	NFPA D08 / NG 25								
		* Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.									

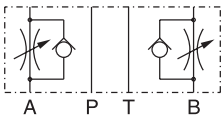
Weight		
Size	FC**DD30NA, FD**DD30NA	FC**DD30ND, FD**DD30ND
FC05, FC5H, FD05, FD5H	1.3 kg (2.9 lbs)	2.6 kg (5.7 lbs)
FC07	3.4 kg (7.6 lbs)	6.9 kg (15.3 lbs)
FC08	7.1 kg (15.7 lbs)	14.7 kg (32.5 lbs)

Schematics

FC
Meter-out control in A and B



FD
Meter-out control in A and B



Sandwich Valves

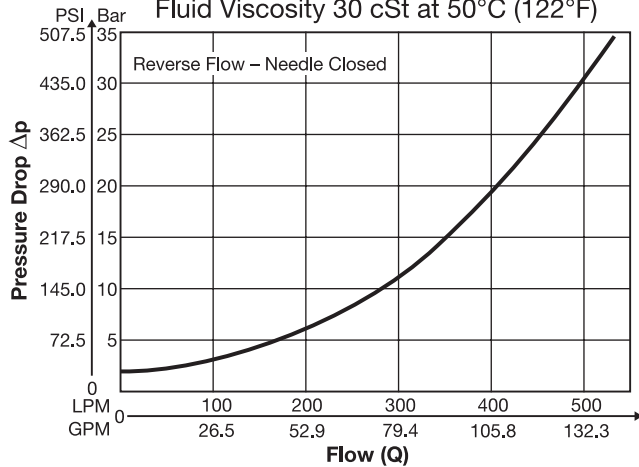
FC, FD - Performance Curves

B48

WWW.SUMY.IR

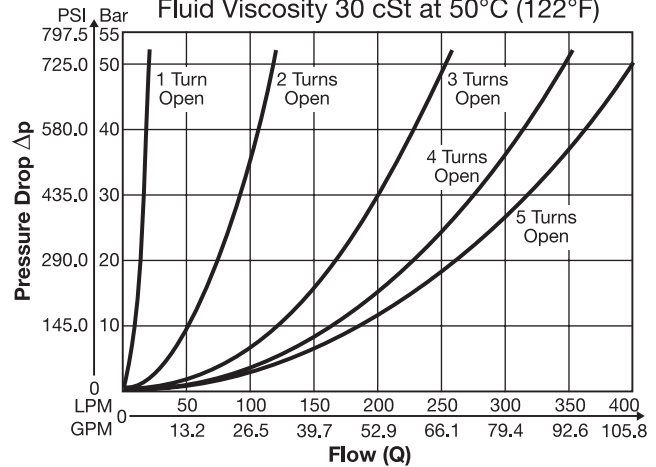
FC05/FC5H, FD05/FD5H

Pressure Differential vs. Free Flow
Fluid Viscosity 30 cSt at 50°C (122°F)



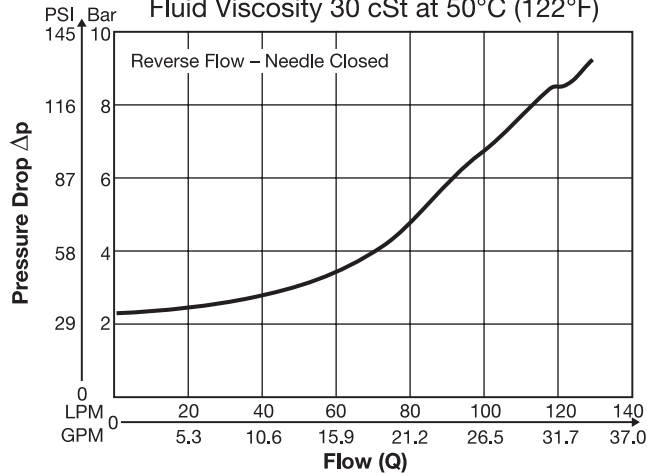
FC05/FC5H, FD05/FD5H

Pressure Differential vs. Metered Flow
Fluid Viscosity 30 cSt at 50°C (122°F)



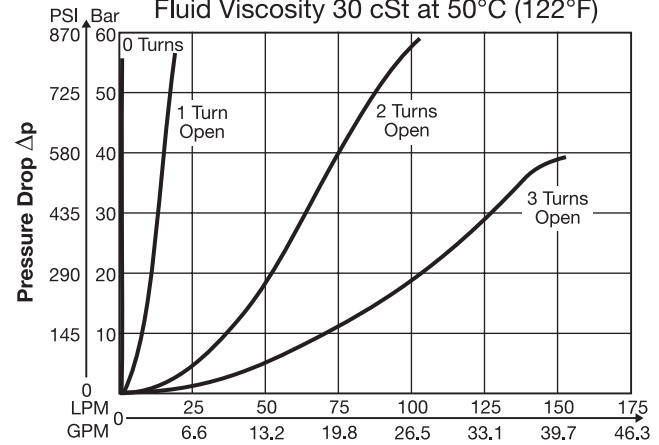
FC07, FD07

Pressure Differential vs. Free Flow
Fluid Viscosity 30 cSt at 50°C (122°F)



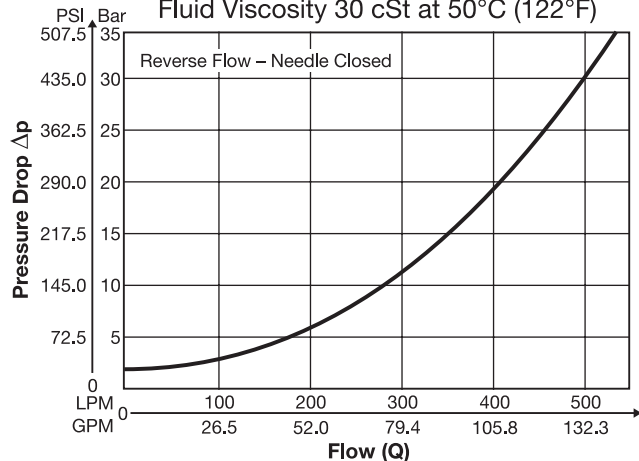
FC07, FD07

Pressure Differential vs. Metered Flow
Fluid Viscosity 30 cSt at 50°C (122°F)



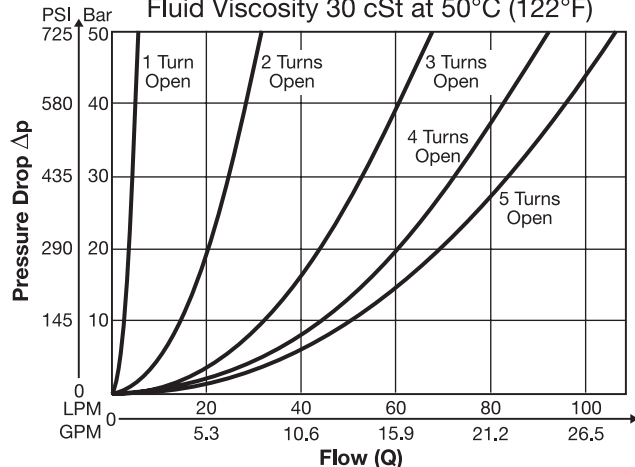
FC08, FD08

Pressure Differential vs. Free Flow
Fluid Viscosity 30 cSt at 50°C (122°F)



FC08, FD08

Pressure Differential vs. Metered Flow
Fluid Viscosity 30 cSt at 50°C (122°F)



Sandwich Valves

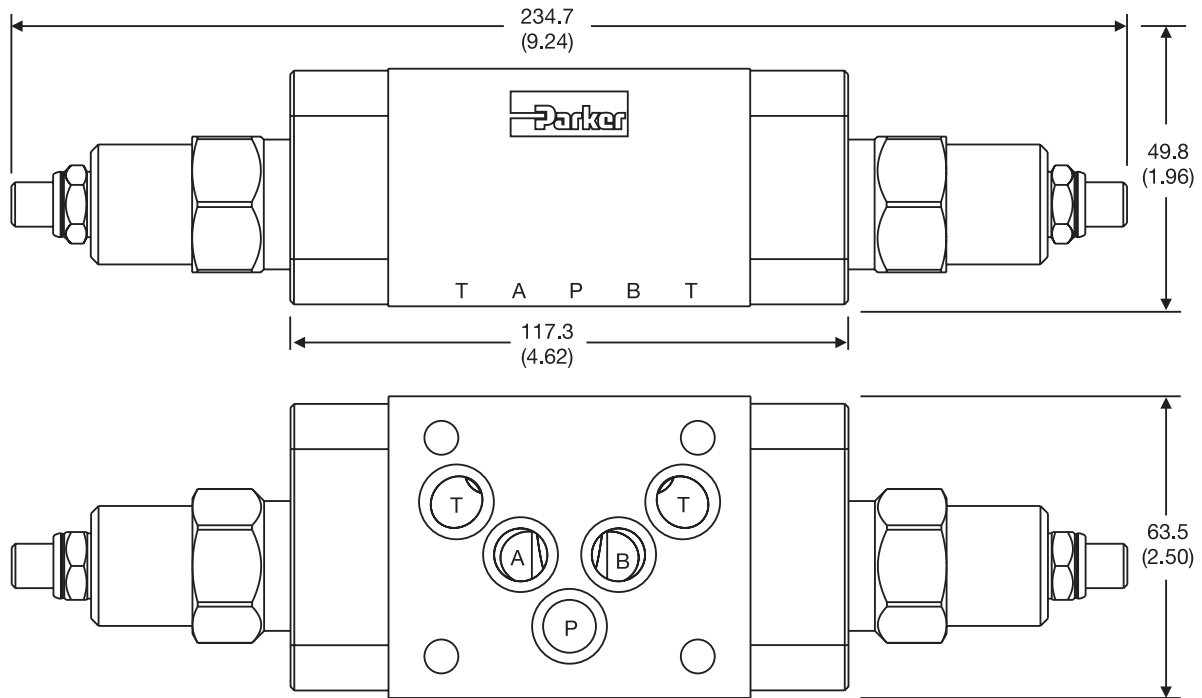
FC05DD, FC5HDD - Dimensions

B49

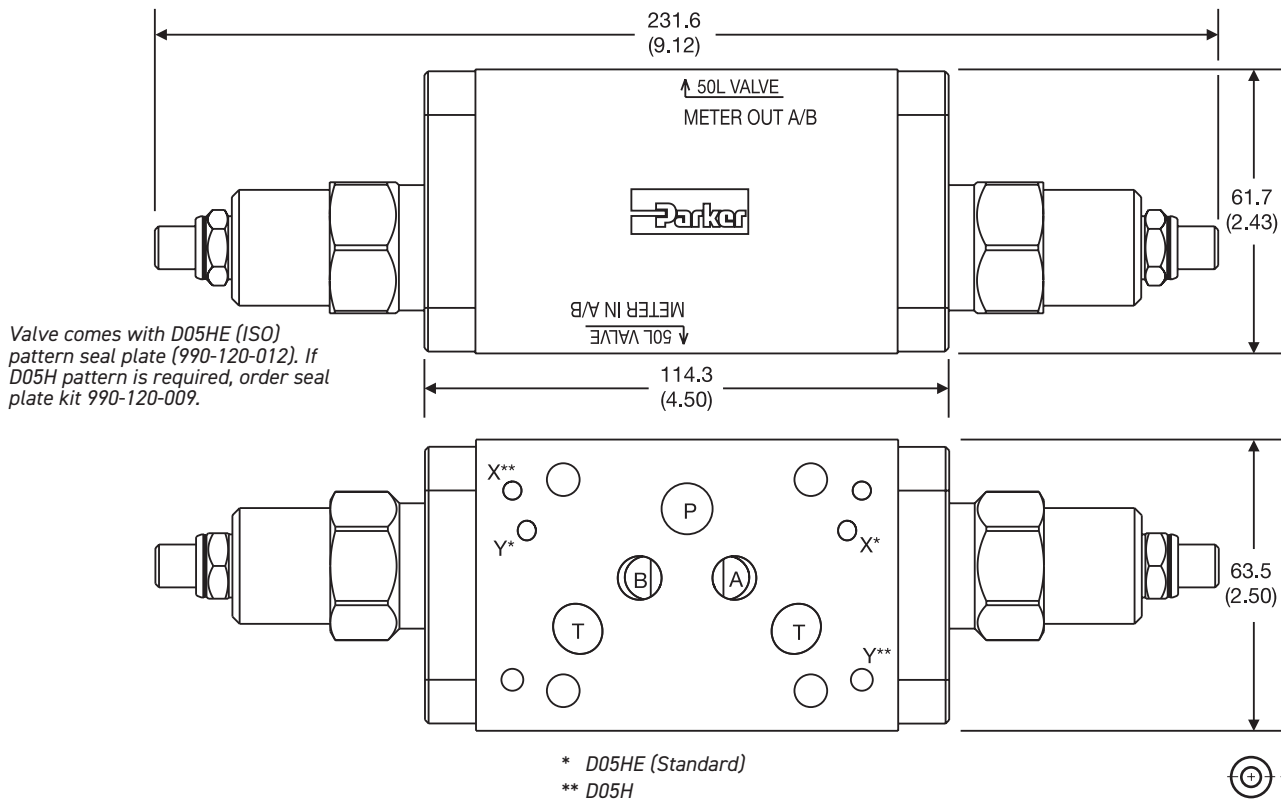
WWW.SUMY.IR

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

FC05DD



FC5HDD



Sandwich Valves

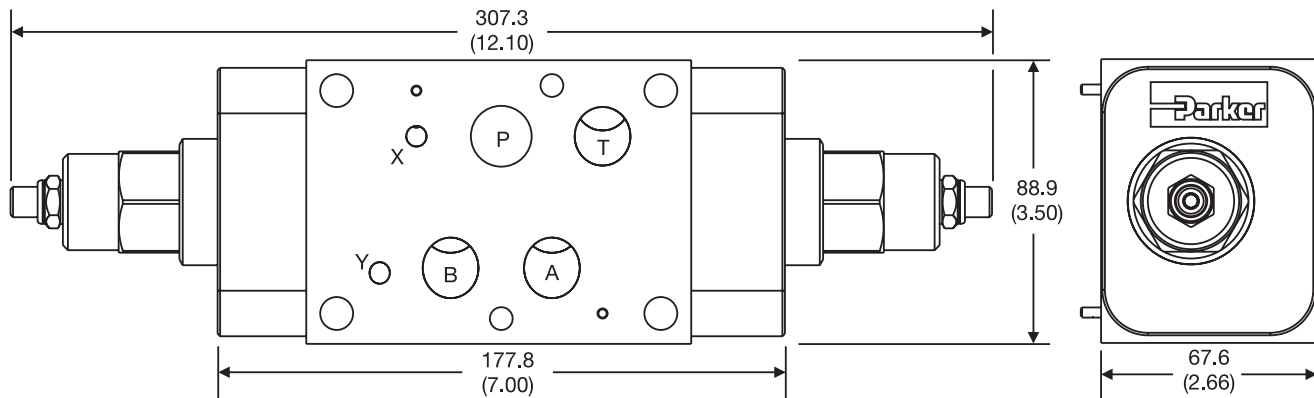
FC07DD, FC08DD - Dimensions

B50

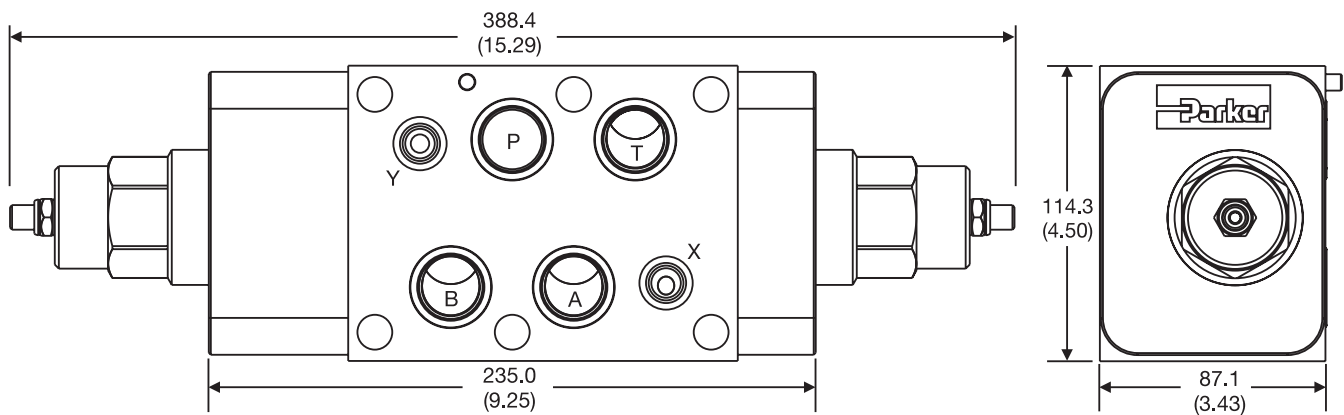
WWW.SUMY.IR

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

FC07DD



FC08DD



Sandwich Valves

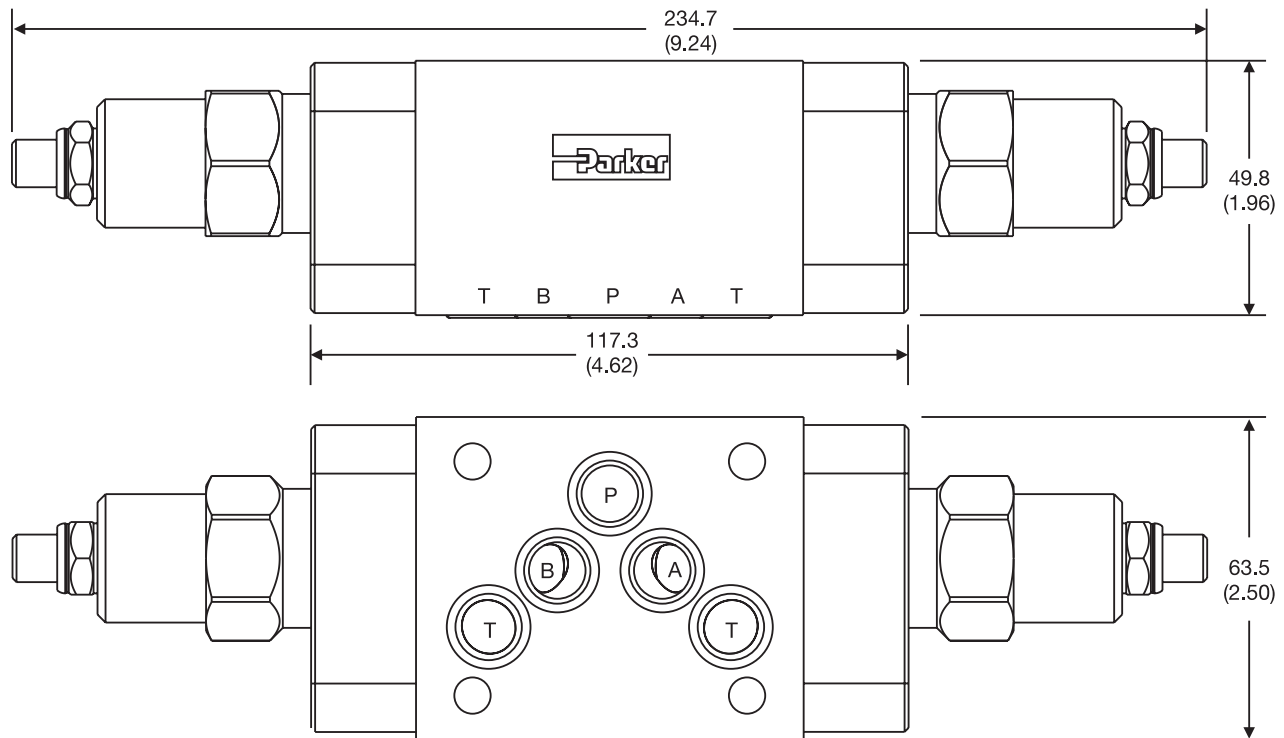
FD05DD, FD5HDD - Dimensions

B51

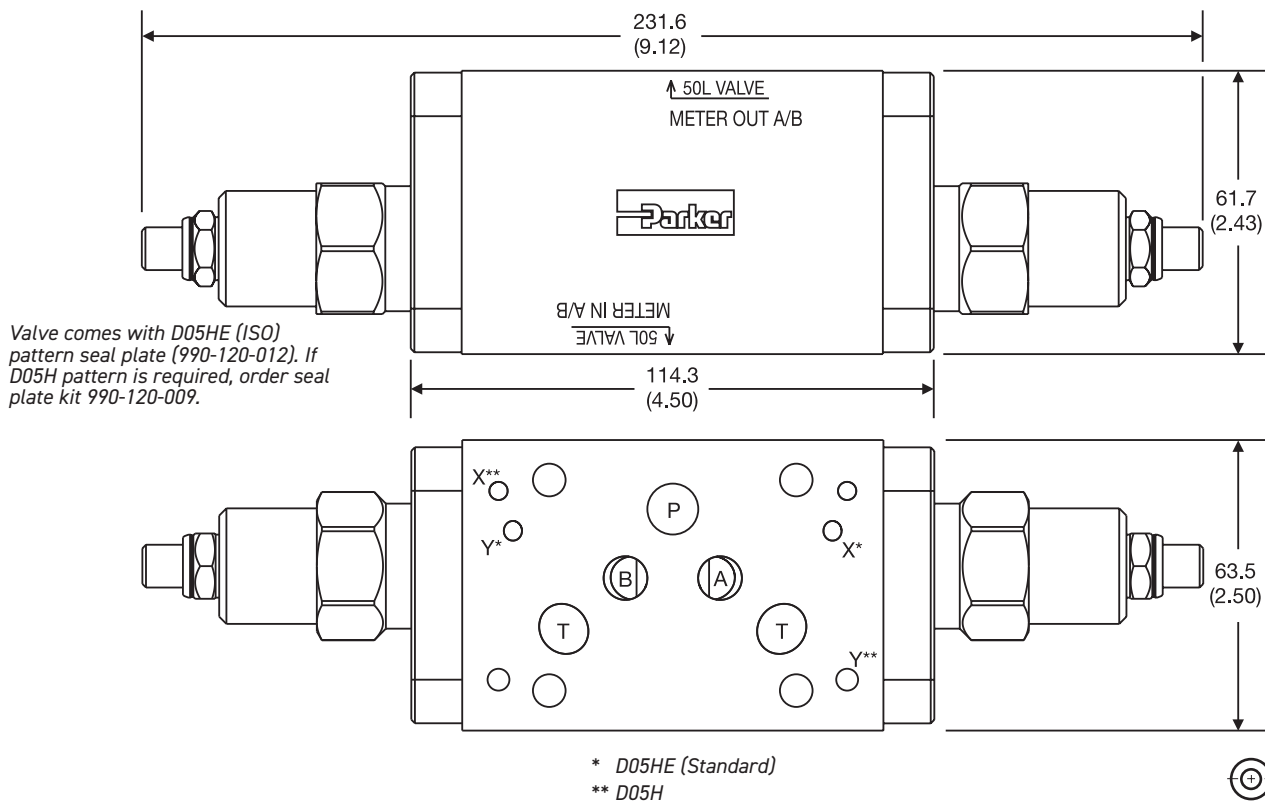
WWW.SUMY.IR

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

FD05DD



FD5HDD



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Sandwich Valves

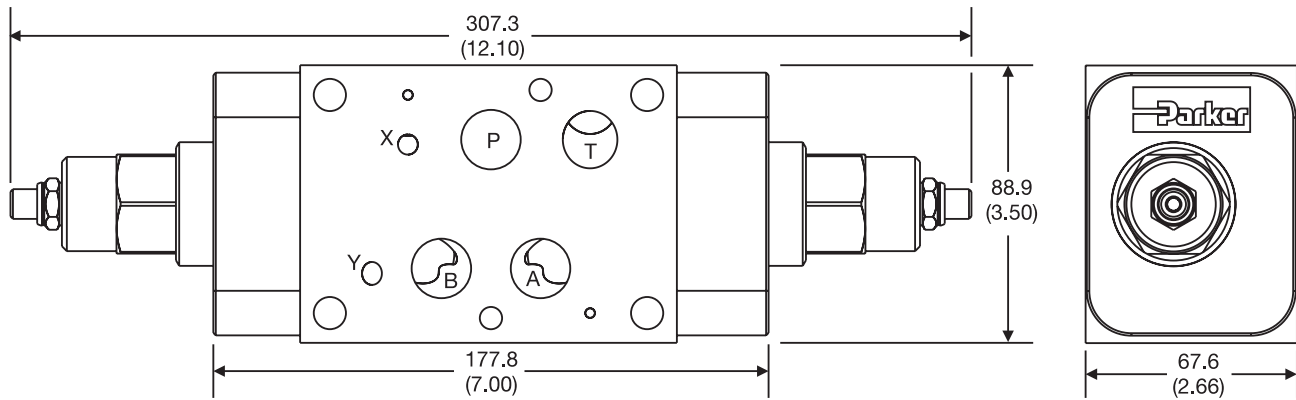
FD07DD, FD08DD - Dimensions

B52

WWW.SUMY.IR

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

FD07DD

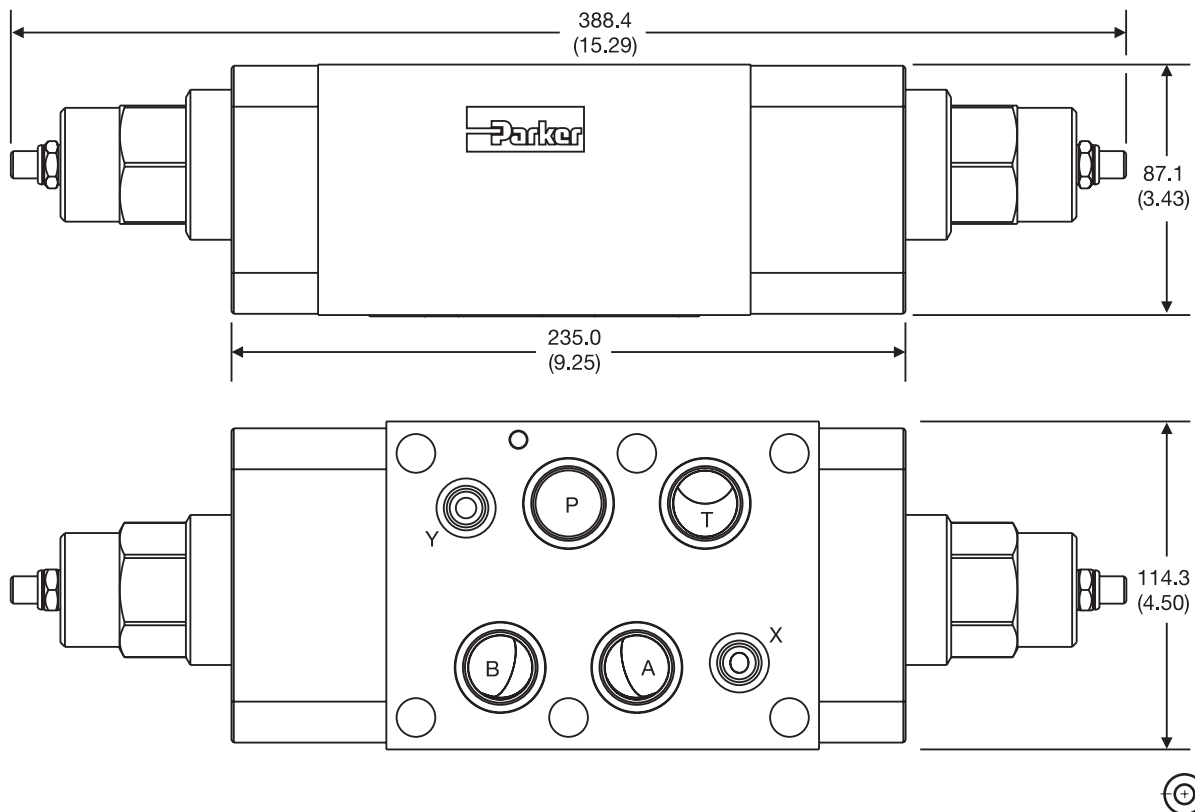


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FD08DD



General Description

Series ZRD throttle check valves are designed for maximum flow rates.

The throttle check function can be located in port A or B as well as in A + B. Meter-in or meter-out functionality can be selected by model code.

A low flow / high resolution version in NFPA 03 / NG6 for sensitive shifting time adjustment of pilot operated directional control valves is available on request.

Features

- High flow capacity.
- Various functional arrangements.

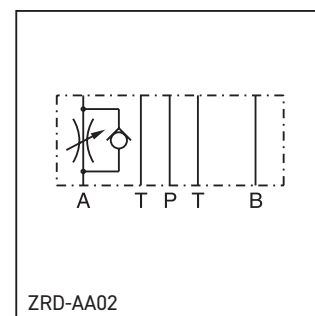
- Sizes:

ZRD01 – NFPA D03 / NG6 / CETOP 3

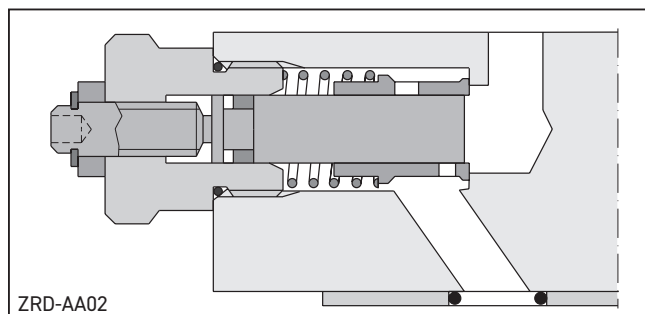
ZRD02 – NFPA D05 / NG10 / CETOP 5



ZRD-ABA01



ZRD-AA02



ZRD-AA02

Specifications

General		
Size	NG 06	NG 10
Mounting Interface	DIN 24340 A6 ISO 4401 NFPA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFPA D05 CETOP RP 121 5
Mounting Position	Unrestricted	
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)	
Hydraulic		
Maximum Operating Pressure (Bar)	350 (5075 PSI)	
Nominal Flow (LPM)	80 (21.2 GPM)	160 (42.3 GPM)
Leakage	–	–
Cracking Pressure (Bar)	–	–
Fluid	Hydraulic oil as per DIN 51524 - 51525	
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)	
Viscosity		
Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)	
Recommended (cSt / mm²/s)	30 (139 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)	

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

ZRD - Ordering Information

B54

WWW.SUMY.IR

ZRD
Throttle Valve
with Check

Meter Option

Size

S0
Hexagon
Screw with
Lock Nut

D
Design
Series

Seal

Code	Description
AA	Meter-out, Control in A
AZ	Meter-in, Control in A
BA	Meter-out, Control in B
BZ	Meter-in, Control in B
ABA	Meter-out, Control in A and B
ABZ	Meter-in, Control in A and B

Code	Description
01	NFPA D03 / NG 06
02	NFPA D05 / NG 10

Code	Description
1	Nitrile
5	Fluorocarbon

Weight:

ZRD*01
ZRD*02

1 Cartridge

1.2 kg (2.6 lbs)
2.8 kg (6.2 lbs.)

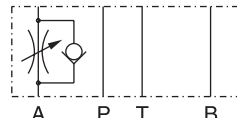
2 Cartridges

1.3 kg (2.9 lbs)
2.9 kg (6.4 lbs.)

Schematics

ZRD01

Meter-in control in A



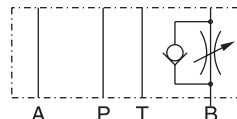
Series
ZRDAZ01S0D1

Meter-out control in B



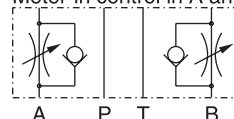
Series
ZRDBA01S0D1

Meter-in control in B



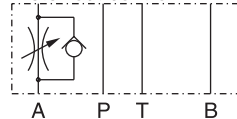
Series
ZRDBZ01S0D1

Meter-in control in A and B



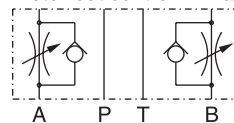
Series
ZRDABZ01S0D1

Meter-out control in A



Series
ZRDAA01S0D1

Meter-out control in A and B



Series
ZRDABA01S0D1

ZRD02

Meter-in control in A



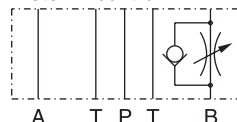
Series
ZRDAZ02S0D1

Meter-out control in B



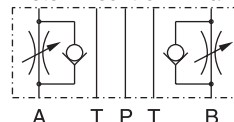
Series
ZRDBA02S0D1

Meter-in control in B



Series
ZRDBZ02S0D1

Meter-in control in A and B



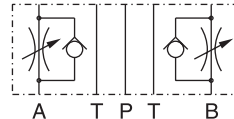
Series
ZRDABZ02S0D1

Meter-out control in A



Series
ZRDAA02S0D1

Meter-out control in A and B



Series
ZRDABA02S0D1

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Sandwich Valves

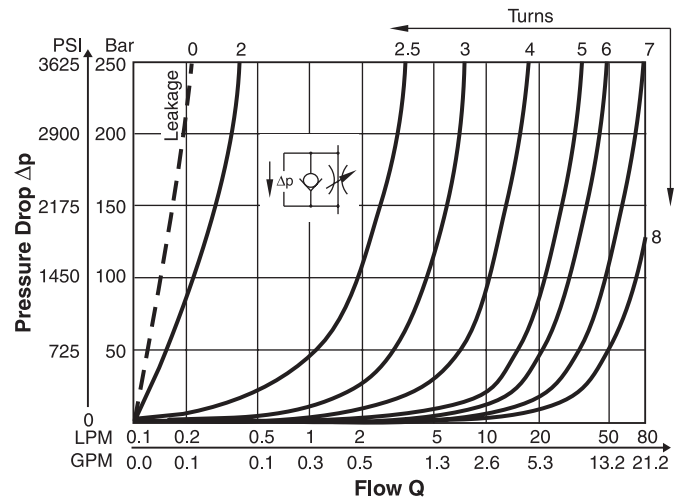
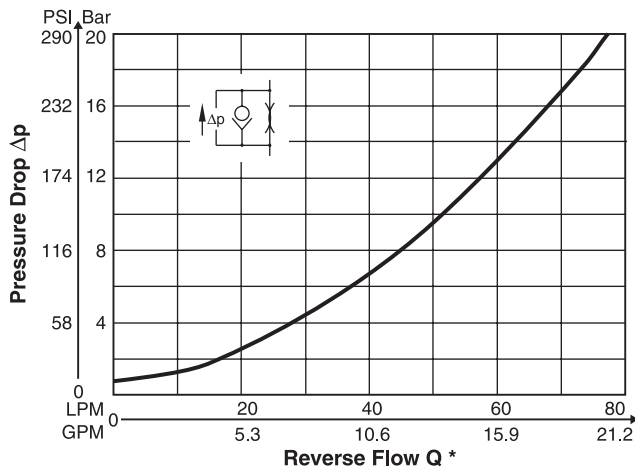
ZRD - Performance Curves

B55

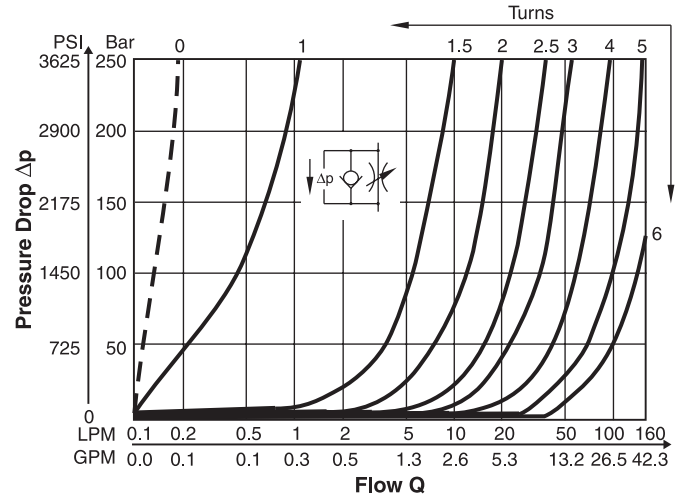
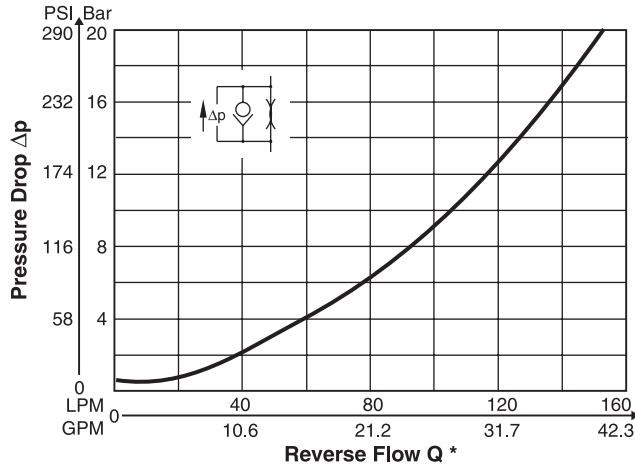
WWW.SUMY.IR

Fluid Viscosity 30 cSt @ 50°C (122°F)

ZRD01



ZRD02



* Throttle closed

B

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Sandwich Valves

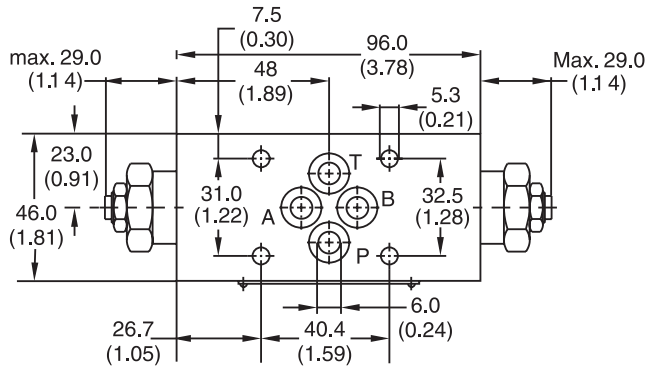
ZRD - Dimensions

B56

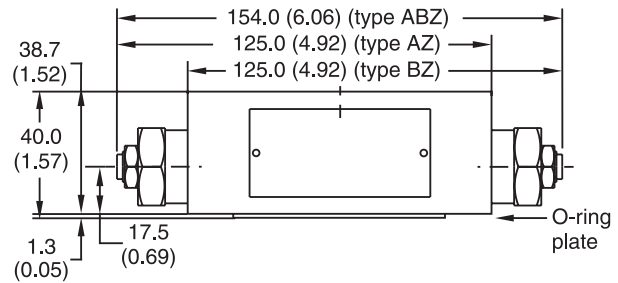
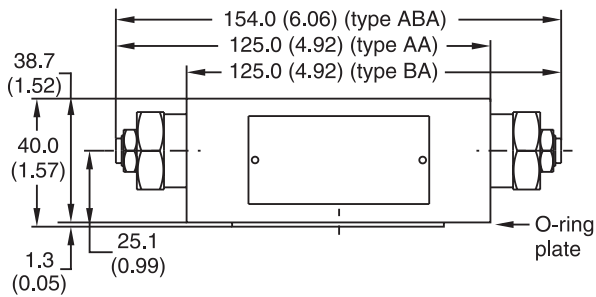
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Inch equivalents for millimeter dimensions are shown in (**)

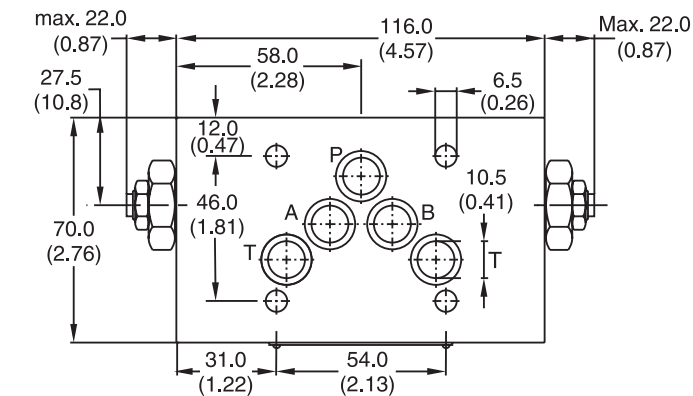
ZRD01



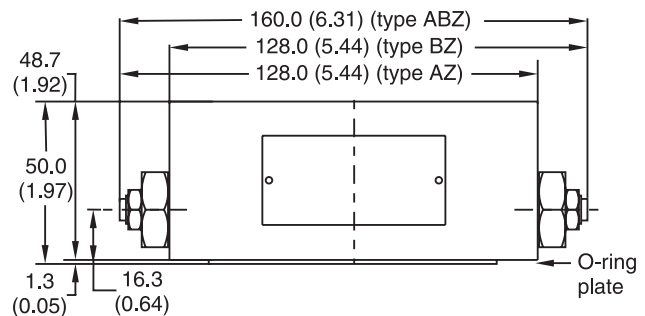
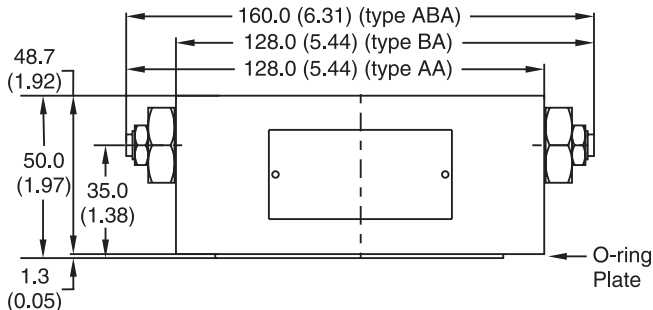
Seal Kit	
Seal	Order Code
1	098-91096-0
5	098-91097-0
Complete Cartridge	
Order Code	
098-91119-0	
O-ring Plate	
Order Code	
S26-27553-0	



ZRD02



Seal Kit	
Seal	Order Code
1	098-91098-0
5	098-91099-0
Complete Cartridge	
Order Code	
098-91120-0	
O-ring Plate	
Order Code	
S16-85742-0	



General Description

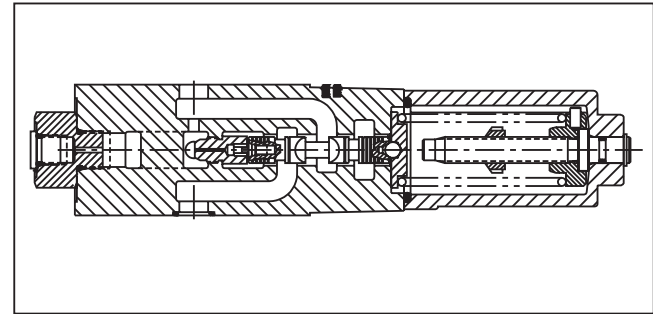
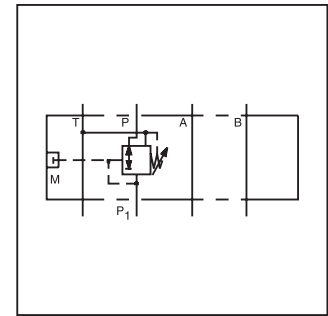
Series PRDM are direct operated pressure reducing valves that are used to regulate pressure in one area of a hydraulic circuit at a predetermined level below normal system pressure. Additionally, an integral pressure relieving function for the secondary reduced pressure circuit is incorporated into the design.

Operation

These valves are "normally open" devices that allow fluid to flow through the controlled port during their non-actuated or "at rest" condition. When downstream pressure exceeds the value set by the spring force, the control piston moves off its seat, closing off the flow path and thus reducing the fluid passing through from the main system. The cushioned piston modulates to maintain the preset pressure in this branch of the hydraulic circuit. If, due to external forces, the pressure continues to rise in this branch circuit, the piston will keep moving against the spring force allowing fluid to be drained to tank, thereby limiting maximum pressure to the valve's setting.

Features

- PRDM sandwich valves may be selected to reduce pressure in the 'P' port, 'A' port or 'B' port.
- The direct operated, cushioned piston design results in fast response, low leakage and minimal hysteresis.
- Up to nine pressure adjustment ranges are available with maximum pressure settings.
- Adjustment options include: internal hex screw, hand knob or internal hex with keylock.
- Fluorocarbon seals are available.
- Available gage port connections include SAE, NPT, Metric and BSPP.



Specifications

Size	PRDM2	PRDM3
Mounting Pattern	NFPA D03, CETOP 03, NG 06	NFPA D05, CETOP 05, NG 10
Maximum Operating Pressure P, A, B T	345 Bar (5000 PSI) 10 Bar (145 PSI)	315 Bar (4560 PSI) 10 Bar (145 PSI)
Maximum Flow	40 LPM (10.5 GPM)	80 LPM (21 GPM)
Maximum Leakage P-A	15 ml/min (1.0 cu. in)	
Pressure Range Code	Range	
01	1.0 - 14 Bar (15 - 200 PSI)	
02*	1.5 - 25 Bar (22 - 363 PSI)	
05**	2.0 - 50 Bar (29 - 725 PSI)	
06*	1.5 - 64 Bar (22 - 928 PSI)	
10**	4.0 - 100 Bar (58 - 1450 PSI)	
15**	6.0 - 150 Bar (87 - 2175 PSI)	
16*	3.0 - 160 Bar (44 - 2320 PSI)	
21	8.0 - 210 Bar (116 - 3045 PSI)	
35*	10 - 315 Bar (147 - 4560 PSI)	
Viscosity Range	12 - 230 cSt/mm ² /s (56 - 1066 SSU)	
Filtration	ISO Code 18/16/13 or Better	
* PRDM2 only		
** PRDM3 only		

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

PRDM - Ordering Information

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PRDM

Pressure
Reducing/
Relieving

Code	Description
2	NFPA D03 Subplate Mounting
3	NFPA D05 Subplate Mounting

Size

Code	Description
PP	P Port Only
AA	A Port Only
BB	B Port Only

Port
Reduction

Pressure
Range

Code	Description
01	1.0 - 14 Bar (15 - 200 PSI)
02*	1.5 - 25 Bar (22 - 363 PSI)
05**	2.0 - 50 Bar (29 - 714 PSI)
06*	1.5 - 64 Bar (22 - 928 PSI)
10**	4.0 - 100 Bar (57 - 1429 PSI)
15**	6.0 - 150 Bar (86 - 2147 PSI)
16*	3.0 - 160 Bar (44 - 2320 PSI)
21	8.0 - 210 Bar (114 - 3000 PSI)
35*	10 - 315 Bar (147 - 4560 PSI)
* PRDM2 only	
** PRDM3 only	

Pressure
Range

Adjustment

Code	Description
L	Hex w/Key Lock
S	Internal Hex Screw Adjustment
K	Knob

Seal

Code	Description
N	Nitrile
V	Fluorocarbon

Gage
Port

Code	Description
N	1/4" NPT
S	SAE #4 (UNF-2B 7/16-20) Adapter in PRDM3
M	Metric
G	1/4" BSPP

Design
Series

NOTE:
Not required
when ordering.

Weights:

PRDM2 1.3 kg (2.9 lbs.)

PRDM3 2.6 kg (5.8 lbs.)

Bold: Designates Tier I products and options.

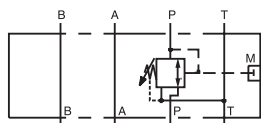
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Sandwich Bolt Kits *(NOTE: Bolt kits must be ordered separately)*

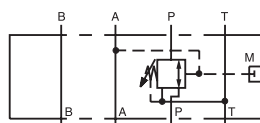
Size "2"			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D1	BK243	73.2 (2.88)
2	Sandwich & D1	BK225	111.3 (4.38)
3	Sandwich & D1	BK244	152.4 (6.00)
4	Sandwich & D1	BK245	190.5 (7.50)

Size "3"			
No. of Sandwich	Sandwich & Valve Combination	D3W-30, D3DW, & D31 *W*	Bolt Length mm (in)
1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D3	BK143	190.2 (7.50)
* D31VW with internal pilot and internal drain only			

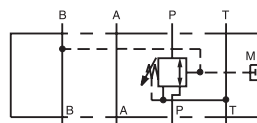
Schematics



PP Option



AA Option



BB Option

B

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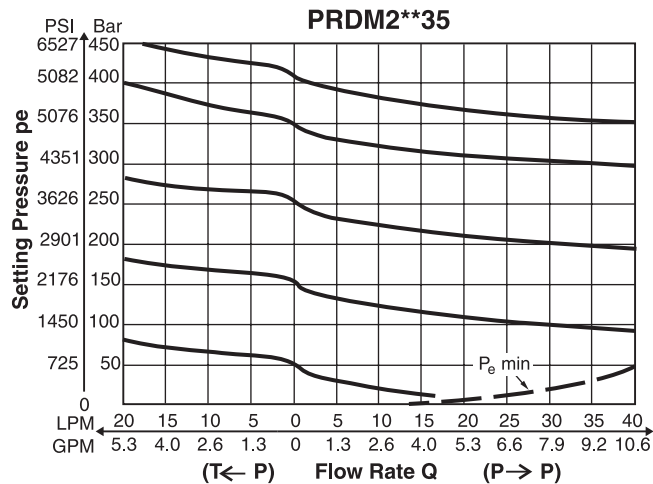
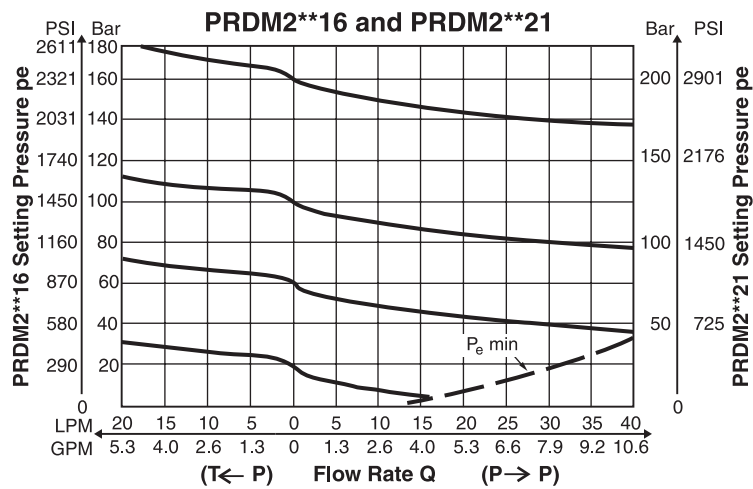
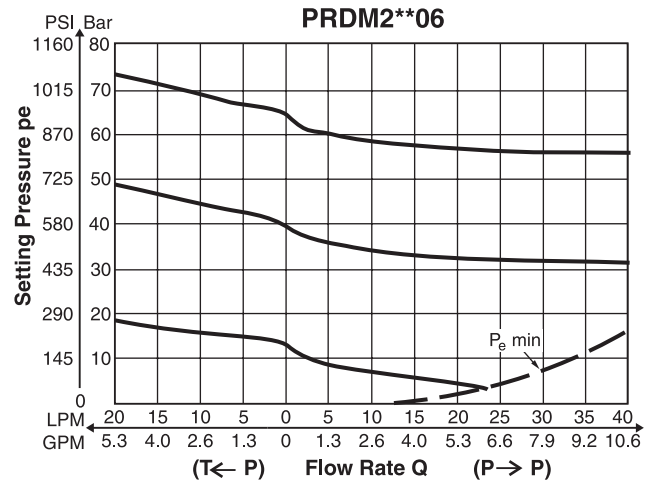
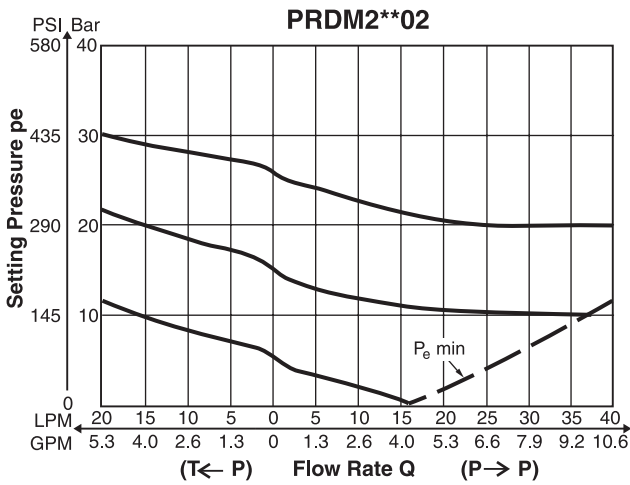
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Sandwich Valves

PRDM2 - Performance Curves

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WWW.SUMY.IR



NOTE: Lowest pressure setting dependent upon system resistance.

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Sandwich Valves

PRDM3 - Performance Curves

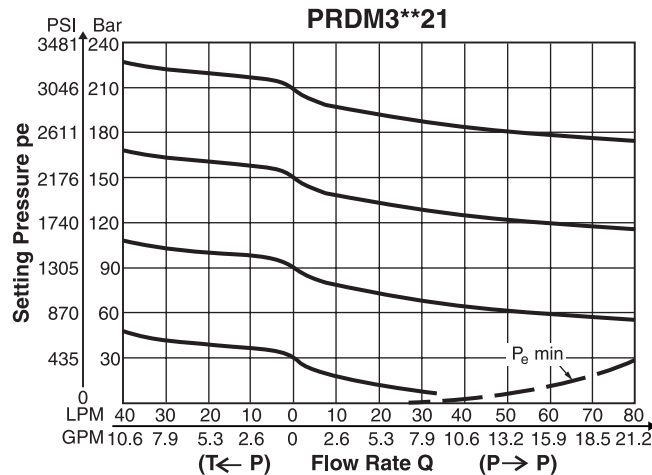
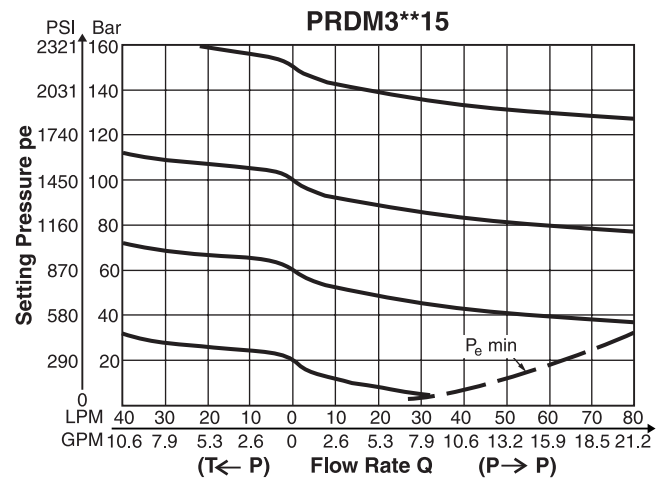
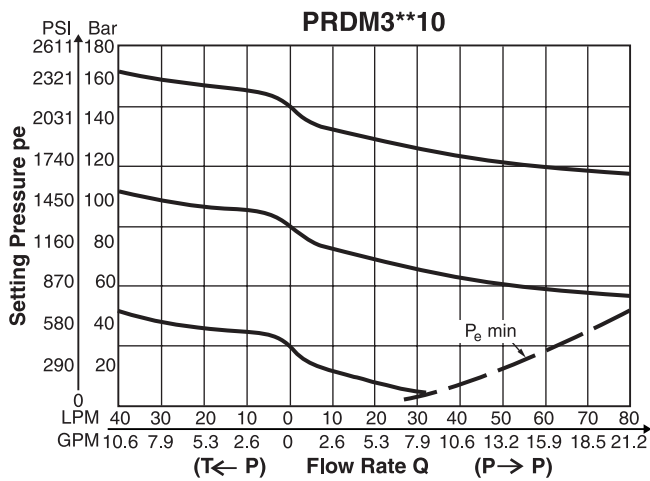
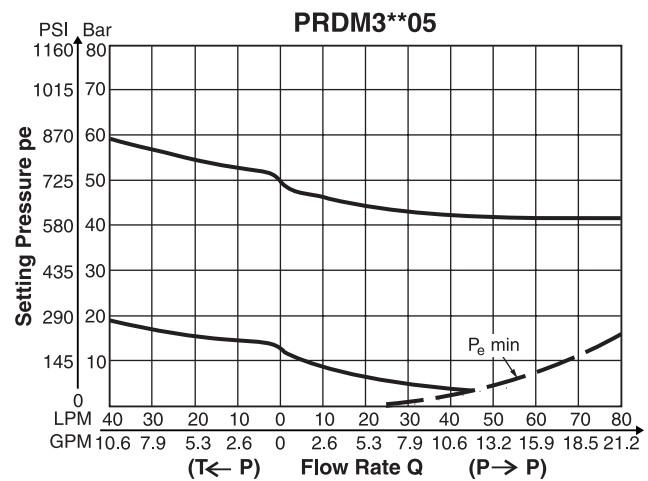
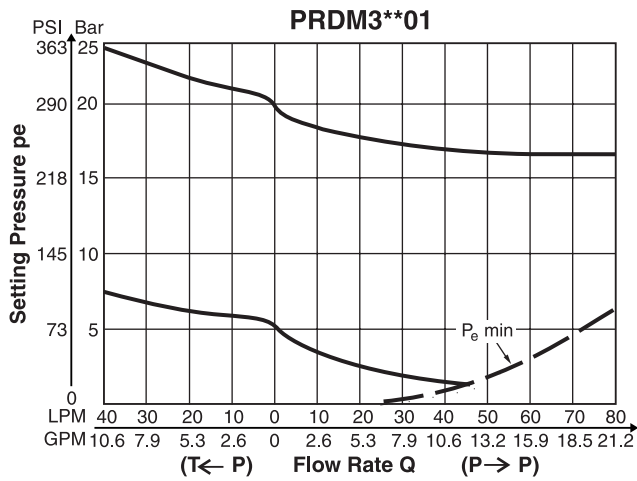
B60

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NOTE: Lowest pressure setting dependent upon system resistance.

Sandwich Valves

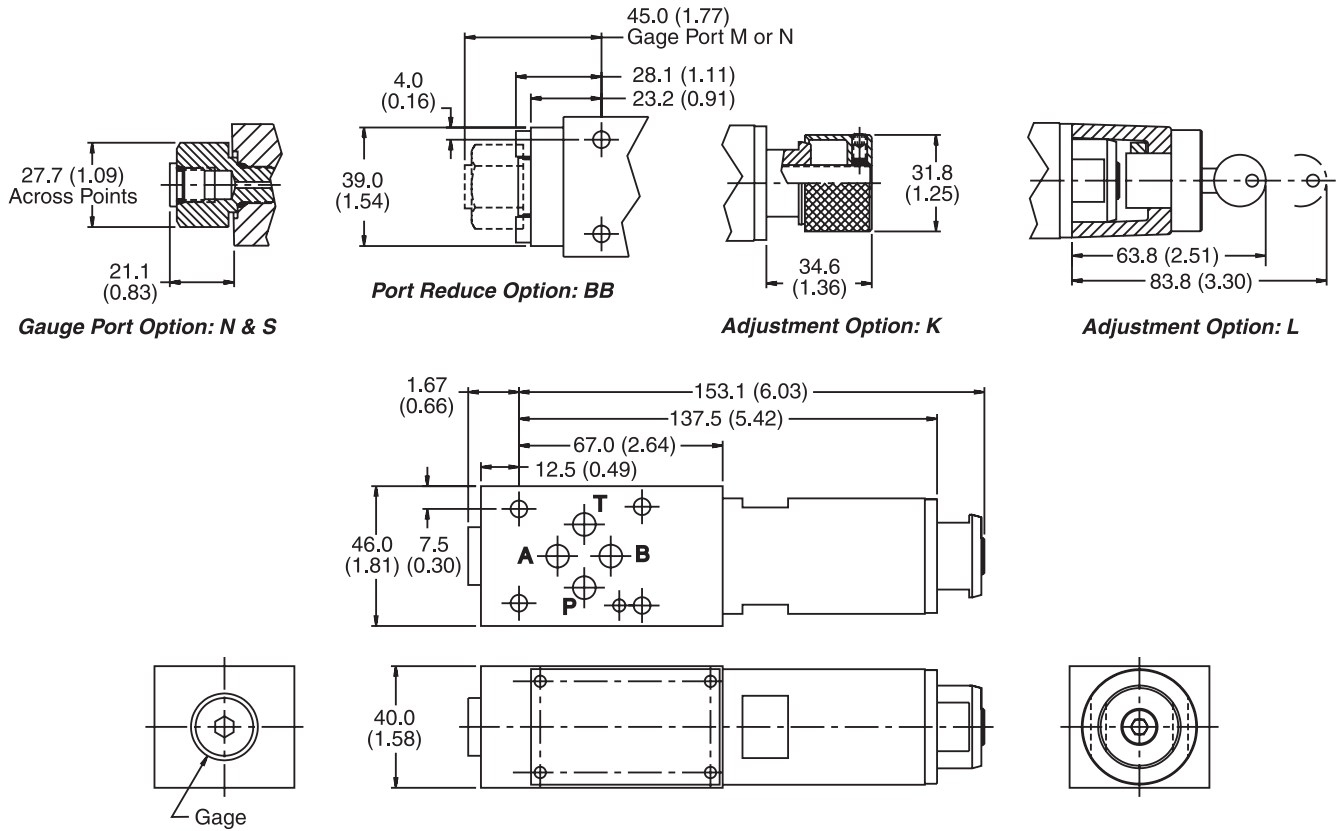
PRDM2, PRDM3 - Dimensions

B61

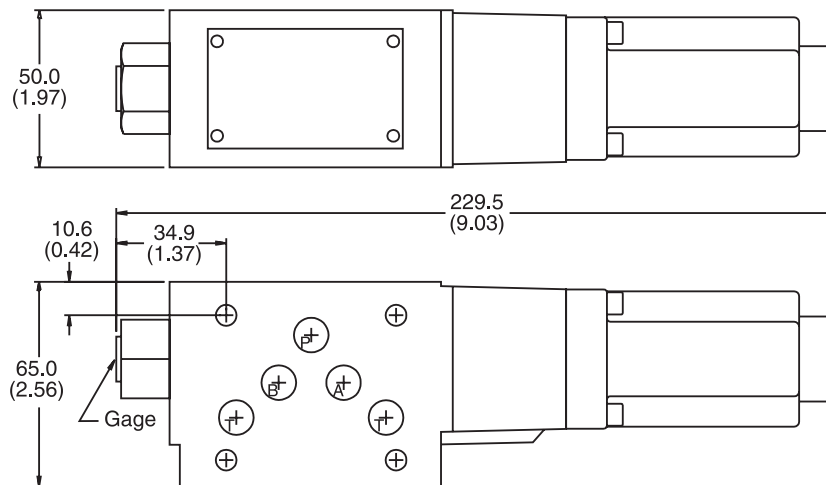
WWW.SUMY.IR

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

PRDM2



PRDM3

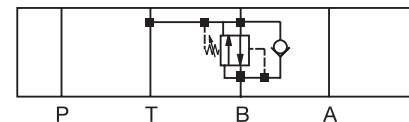


General Description

Series PR pilot operated pressure reducing/relieving valves are used to regulate pressure in one area of a circuit at a set pressure below the normal system pressure. An integral relieving function limits the secondary circuit pressure. Options are A port control, B port control and P port control. The A & B valves feature a reverse flow check.

Features

- High flow capacity.
- Sizes:
 - PR05 – NFPA D05 / NG10 / CETOP 5
 - PR5H – NFPA D05HE / NG10 / CETOP 5H
 - PR07 – NFPA D07 / NG16 / CETOP 7
 - PR08 – NFPA D08 / NG25 / CETOP 8
- With integral return flow check valve on A & B port models.



Specifications

General				
Size	D05 / NG 10	D05HE / NG 10	D07 / NG 16	D08 / NG 25
Mounting Position	Unrestricted			
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure (Bar)	Aluminum Body - up to 207 (3000 PSI); Ductile Iron Body - up to 345 (5000 PSI)			
Nominal Flow (LPM)	76 (20 GPM)	76 (20 GPM)	303 (80 GPM)	303 (80 GPM)
Adjustment Screw Hex Size	5/32	5/32	5/32	5/32
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)			
Viscosity				
Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)			
Recommended (cSt / mm²/s)	30 (139 SSU)			
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)			

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

PR - Ordering Information

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WWW.SUMY.IR

PR

Pressure
Reducing/
Relieving
Valve

Size

Code	Description
03	See PRDM2
05	NFPA D05 / NG 10
SH*	NFPA D05HE / NG 10
07	NFPA D07 / NG 16
08	NFPA D08 / NG 25
* Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.	

Style

Code	Description
AA	Pressure reducing in A with check valve
BB	Pressure reducing in B with check valve
PP	Pressure reducing in P

Pressure
Range

Code	Description
10	13.8 Bar (200 PSI)** 6.9 - 207 Bar (100 - 3000 PSI)
20*	13.8 Bar (200 PSI)** 10.4 - 310 Bar (150 - 4500 PSI)
* Ductile iron body only	
** Standard setting	

Seal

Code	Description
N	Nitrile
V*	Fluorocarbon
* Upon request	

Body
Material

Code	Description
A	Aluminum
D	Ductile Iron

B

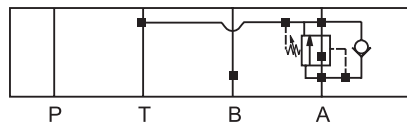
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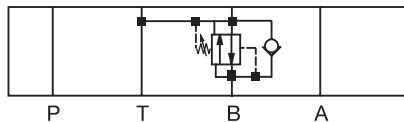
Weight						
Size	PR**AA30NA	PR**AA30ND	PR**BB30NA	PR**BB30ND	PR**PP30NA	PR**PP30ND
PR05, PR5H	1.4 kg (3.1 lbs)	2.8 kg (6.2 lbs)	1.4 kg (3.1 lbs)	2.8 kg (6.2 lbs)	0.9 kg (2.1 lbs)	2.0 kg (4.4 lbs)
PR07	2.9 kg (6.4 lbs)	5.8 kg (12.9 lbs)	2.9 kg (6.4 lbs)	5.7 kg (12.6 lbs)	3.9 kg (8.5 lbs)	7.8 kg (17.1 lbs)
PR08	4.9 kg (10.4 lbs)	9.2 kg (20.4 lbs)	4.9 kg (10.8 lbs)	11.2 kg (24.7 lbs)	5.3 kg (11.6 lbs)	11.7 kg (25.7 lbs)

Schematics

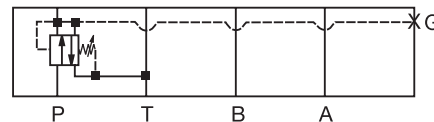
PR**AA



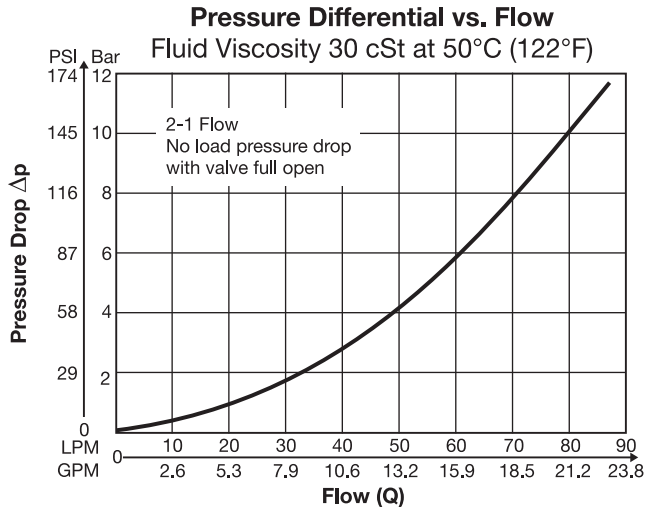
PR**BB



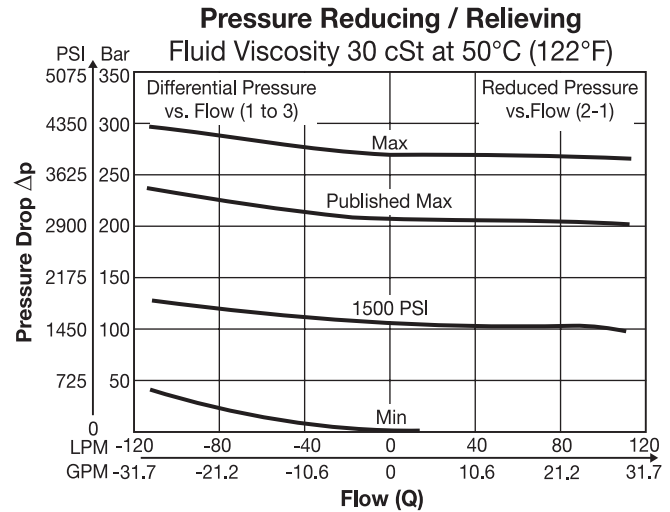
PR**PP



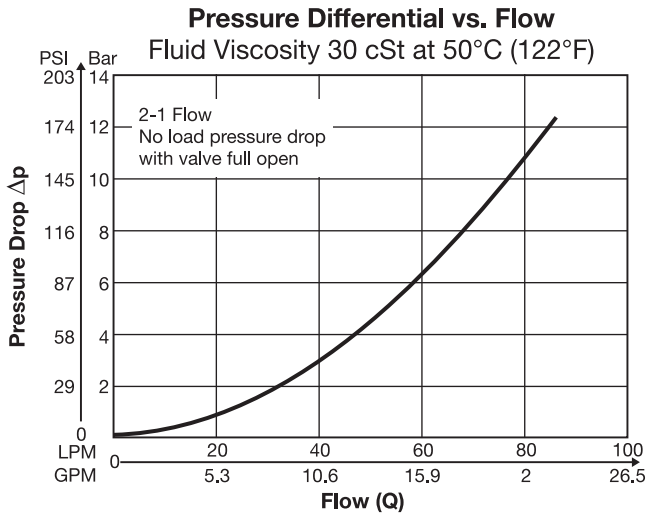
PR05*10*A and PR5H*10*A



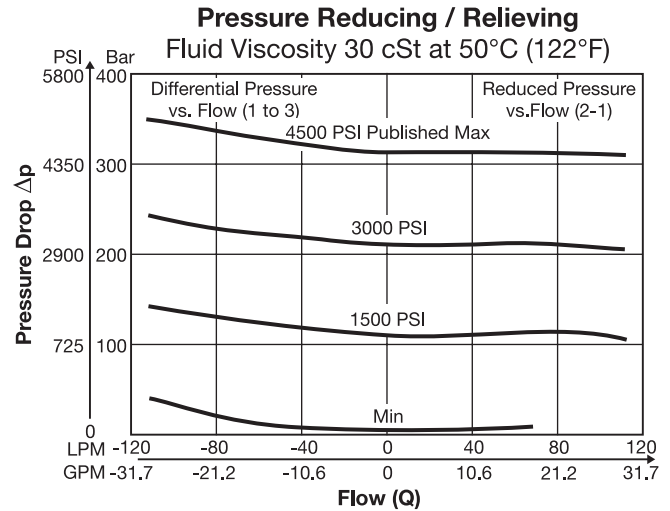
PR05*10*A and PR5H*10A



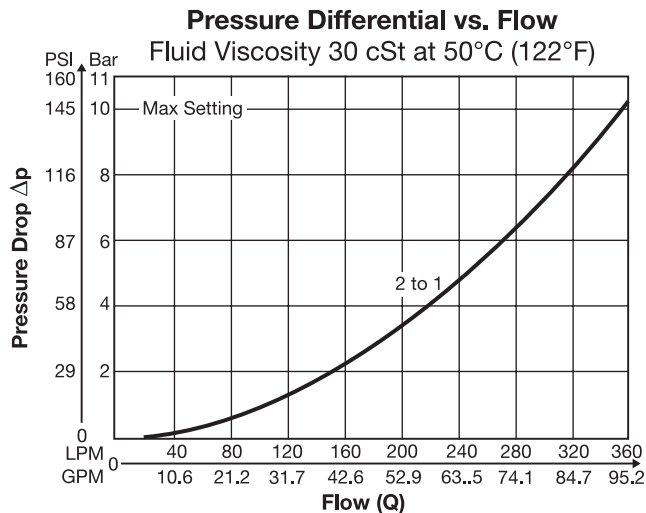
PR05*20*D and PR5H*20*D



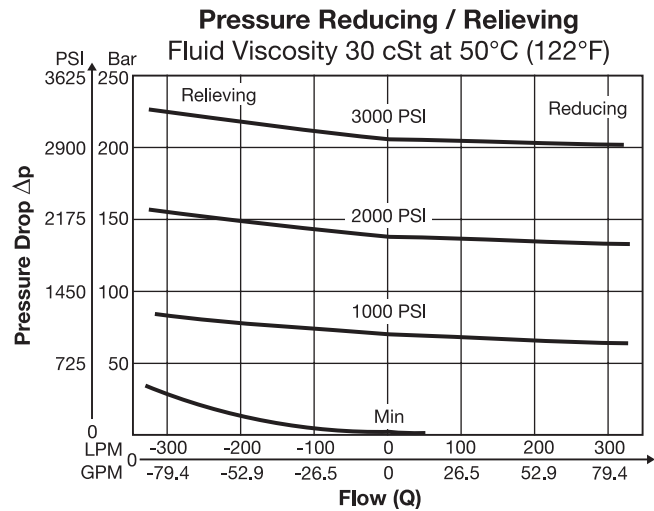
PR05*20*D and PR5H*20*D



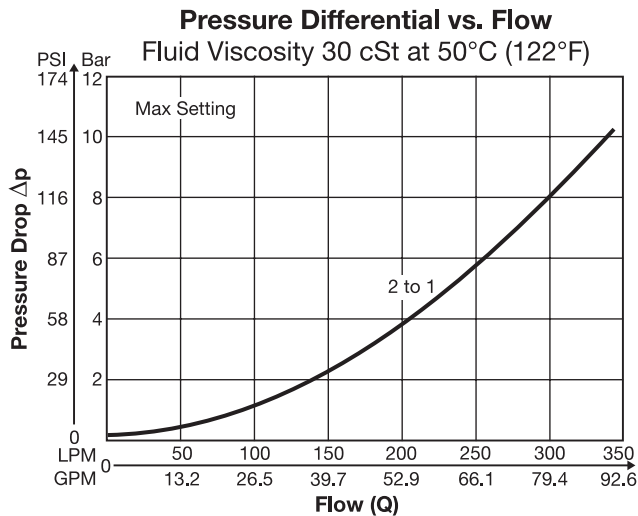
PR07*10*A



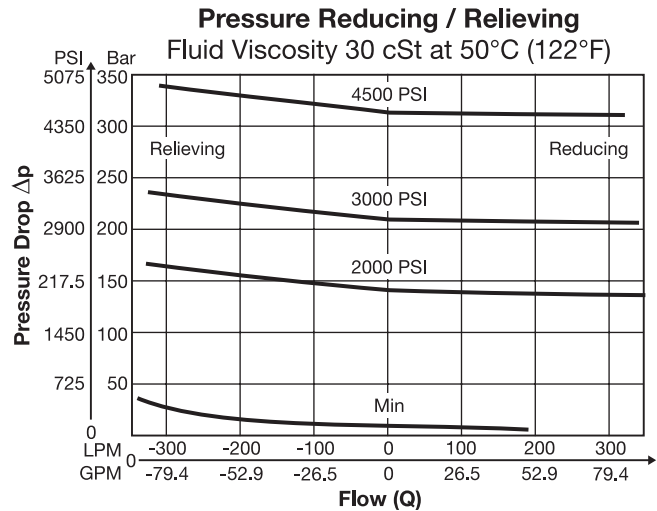
PR07*10*A



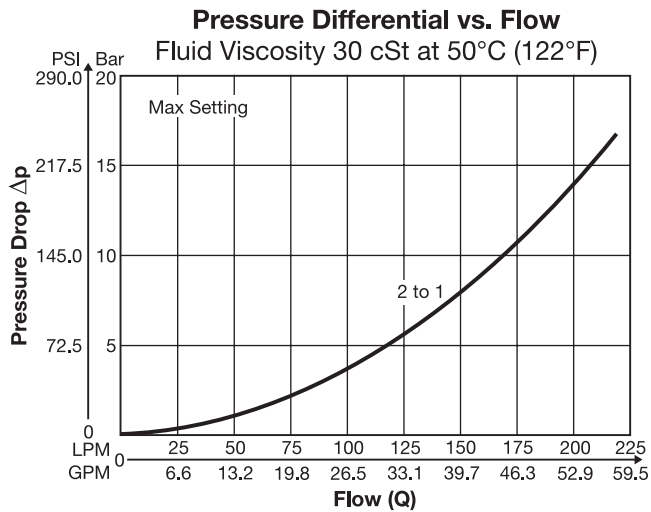
PR07*20*D



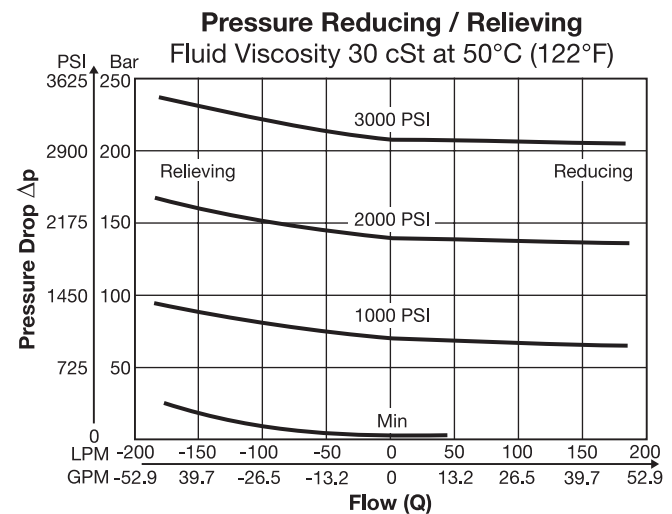
PR07*20*D



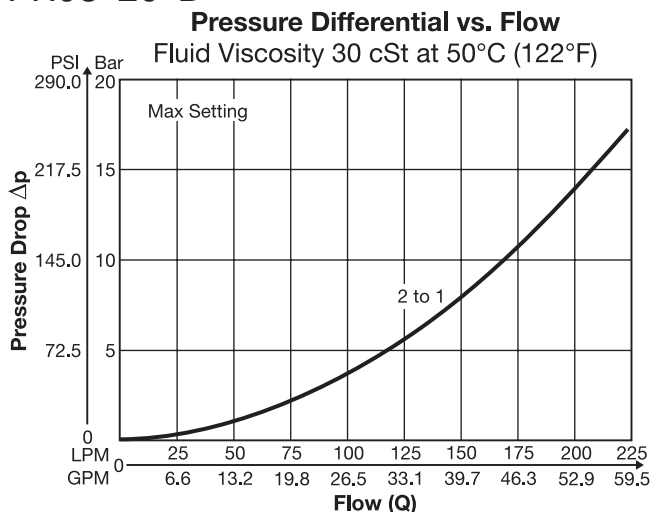
PR08*10*A



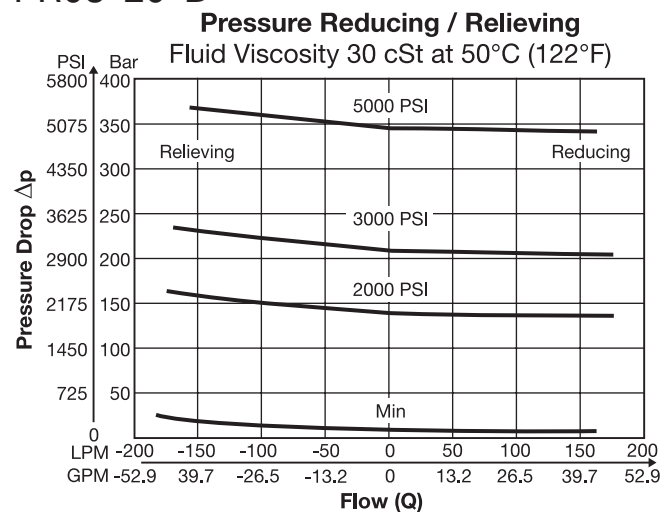
PR08*10*A



PR08*20*D



PR08*20*D



Sandwich Valves

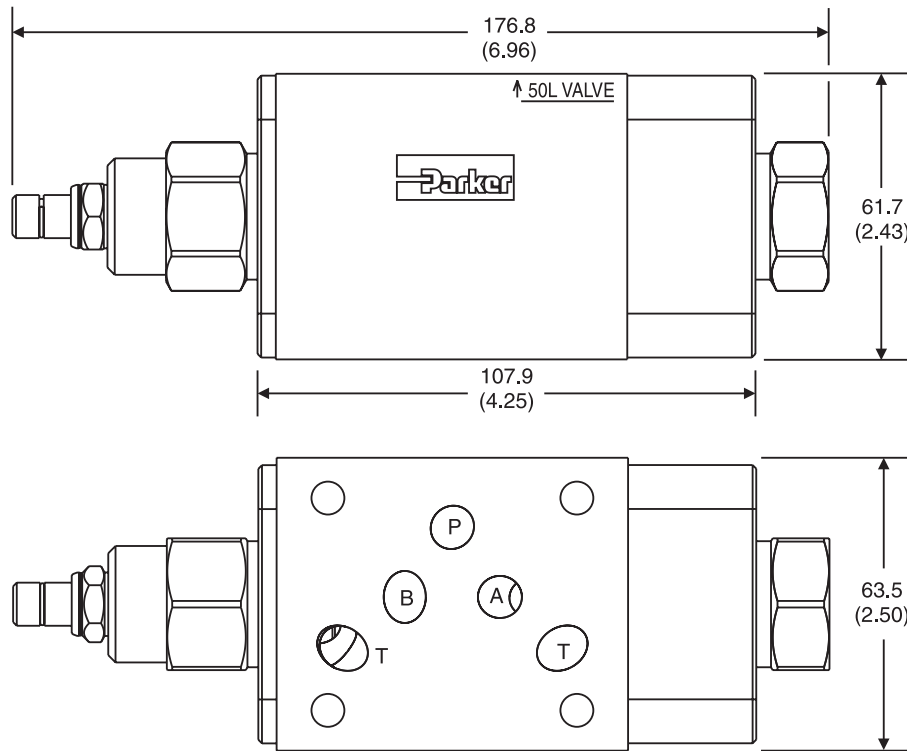
PR05 - Dimensions

B66

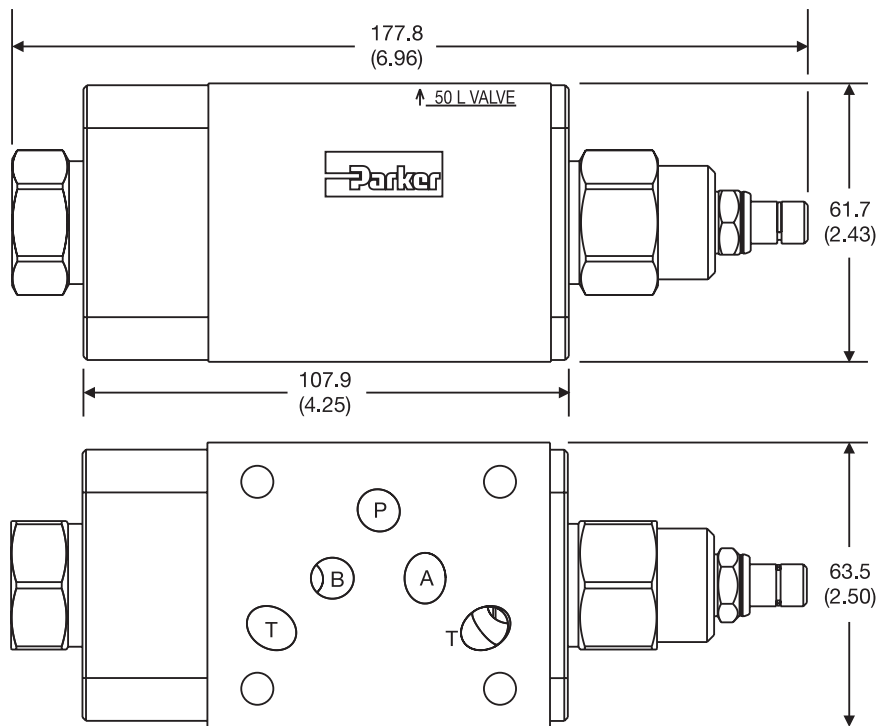
WWW.SUMY.IR

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

PR05AA



PR05BB



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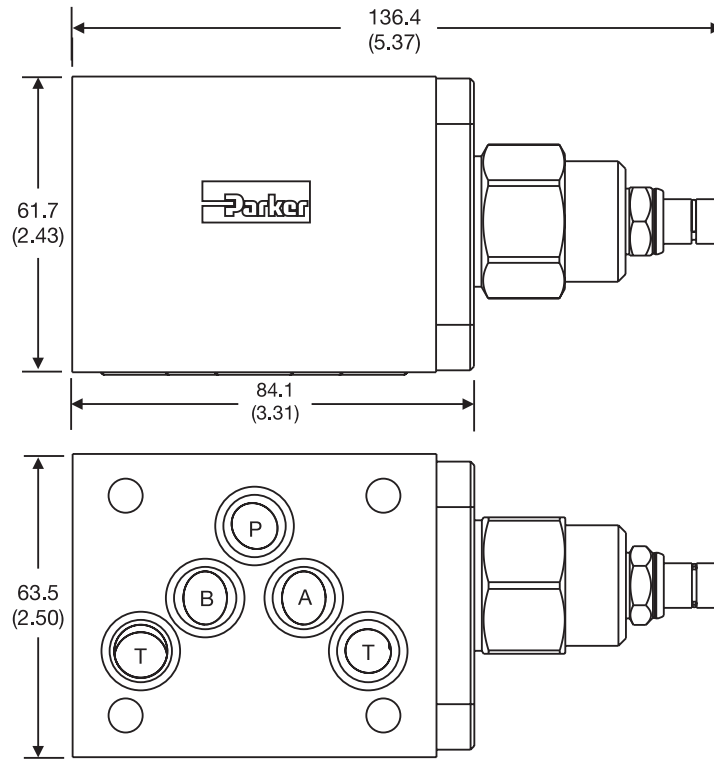
PR05, PR5H - Dimensions

B67

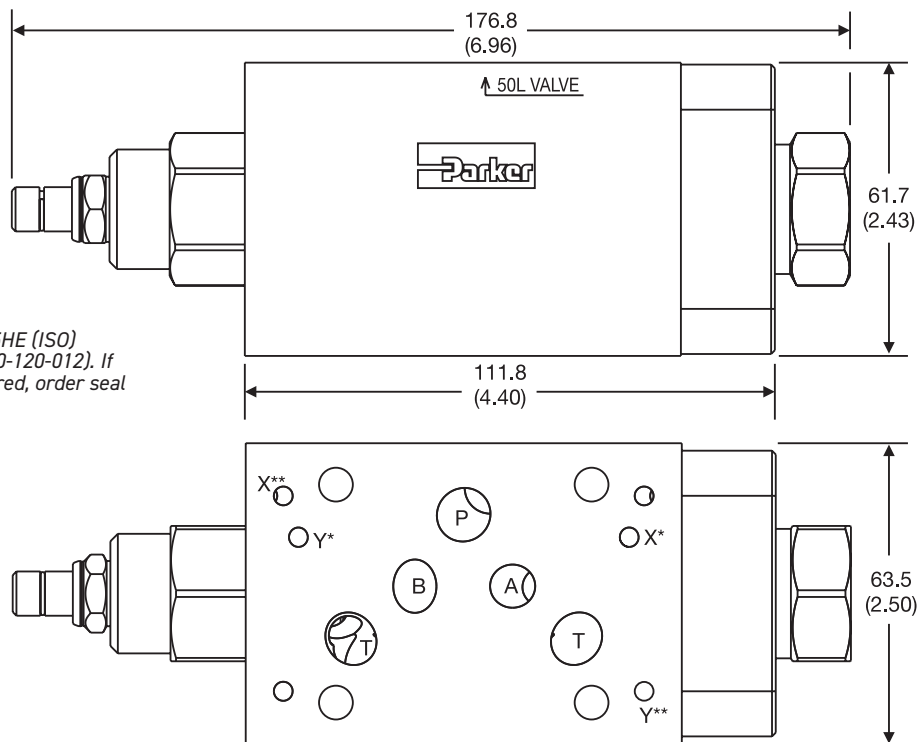
WWW.SUMY.IR

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

PR05PP



PR5HAA



Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.

* D05HE (Standard)
** D05H



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Sandwich Valves

PR5H - Dimensions

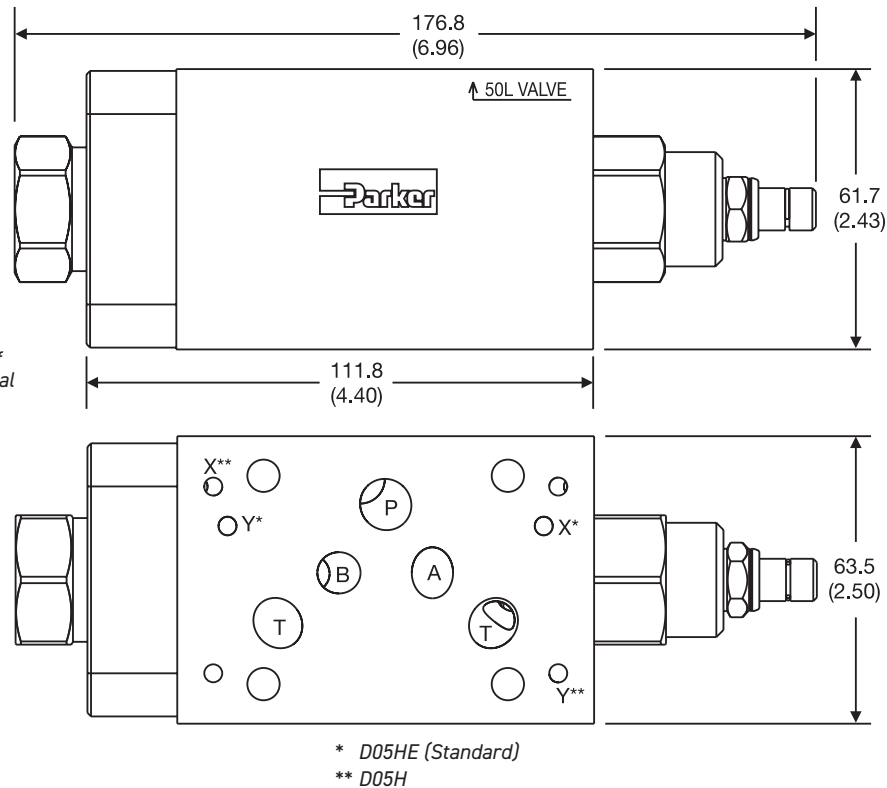
B68

WWW.SUMY.IR

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

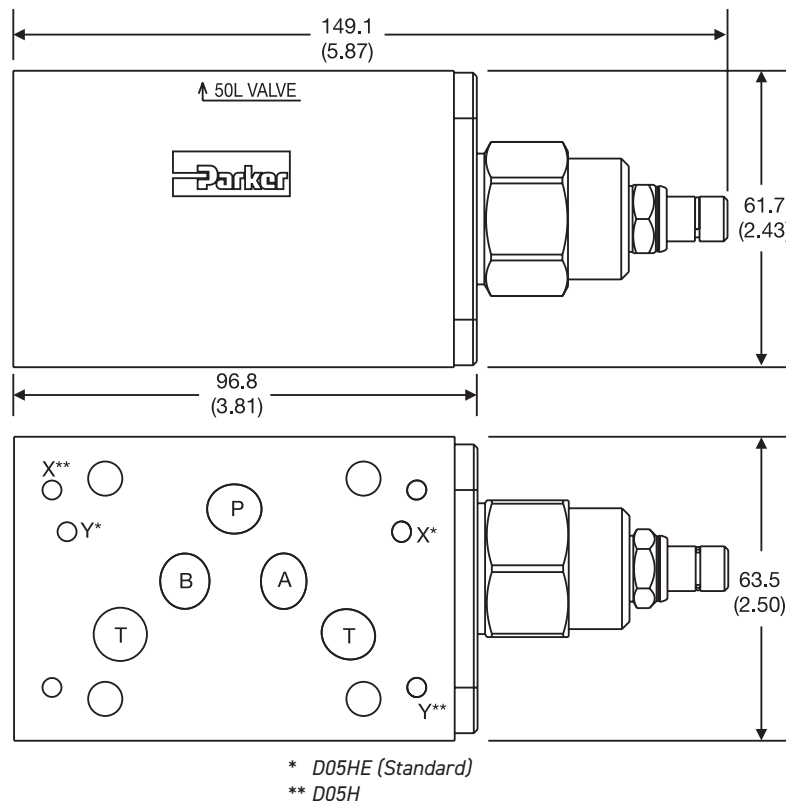
PR5HBB

Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.



PR5HPP

Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.



Sandwich Valves

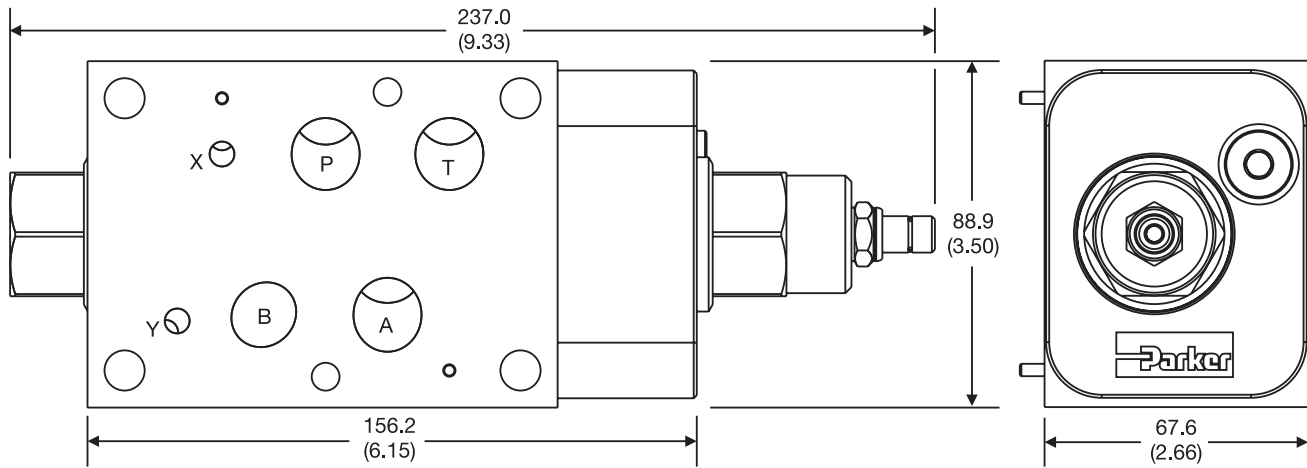
PR07 - Dimensions

B69

WWW.SUMY.IR

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

PR07AA

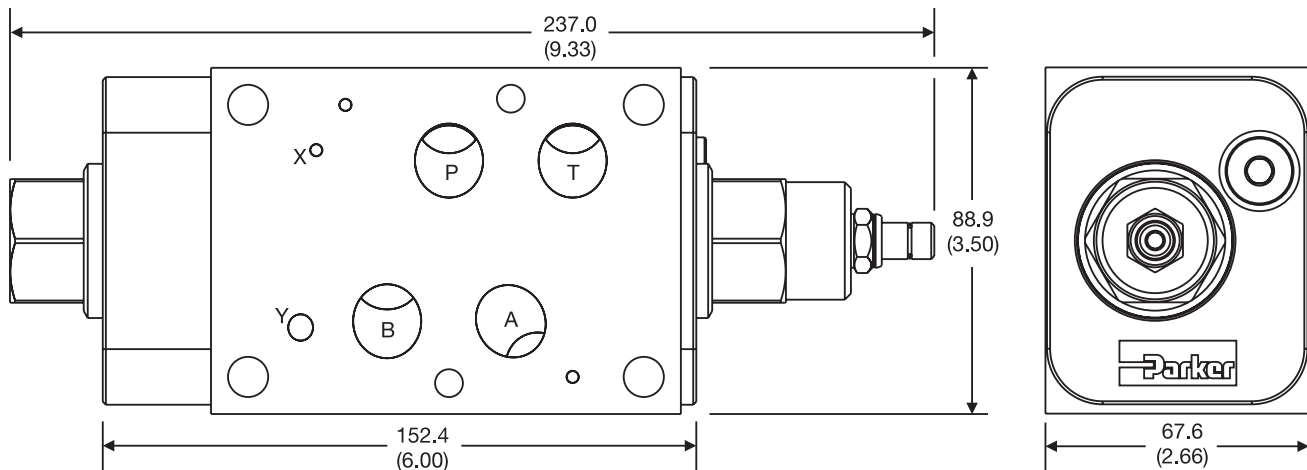


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PR07BB



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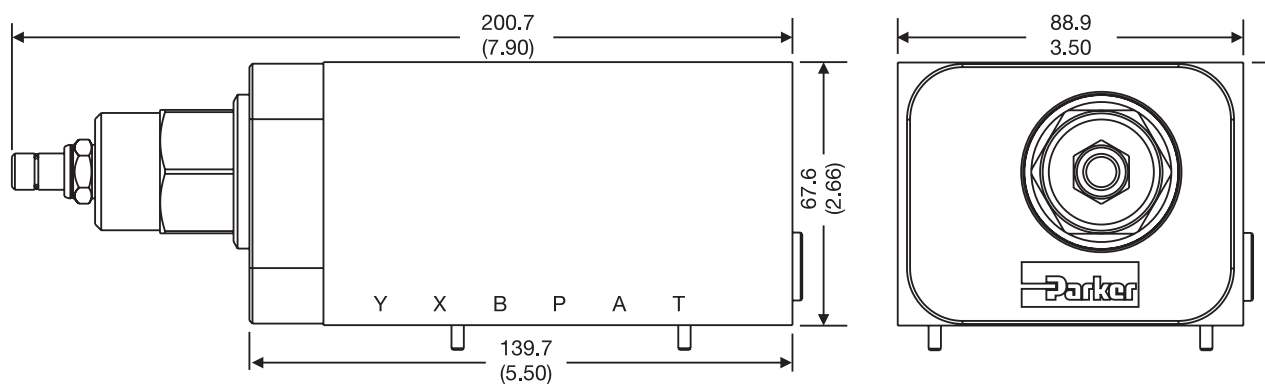
PR07, PR08 - Dimensions

B70

WWW.SUMY.IR

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

PR07PP

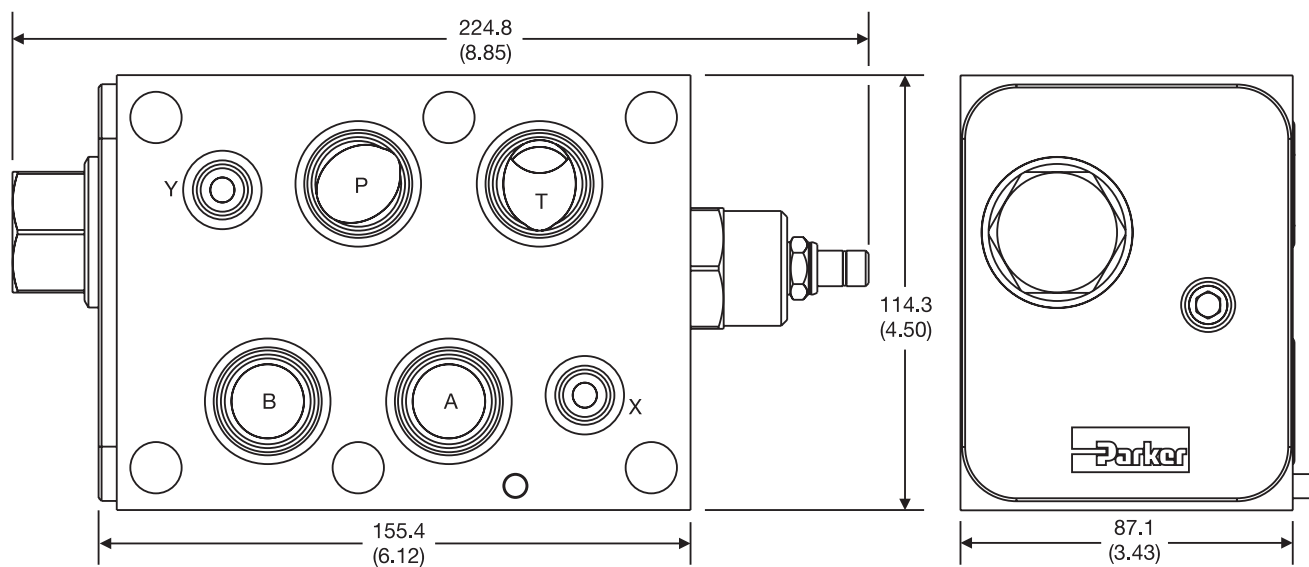


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PR08AA



Sandwich Valves

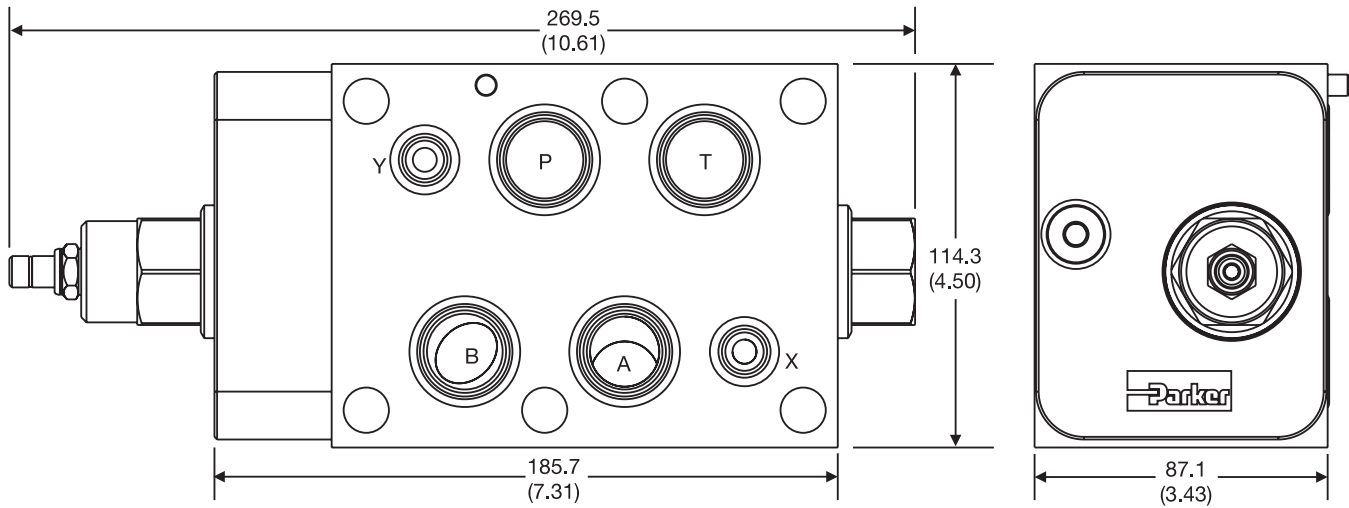
PR08 - Dimensions

B71

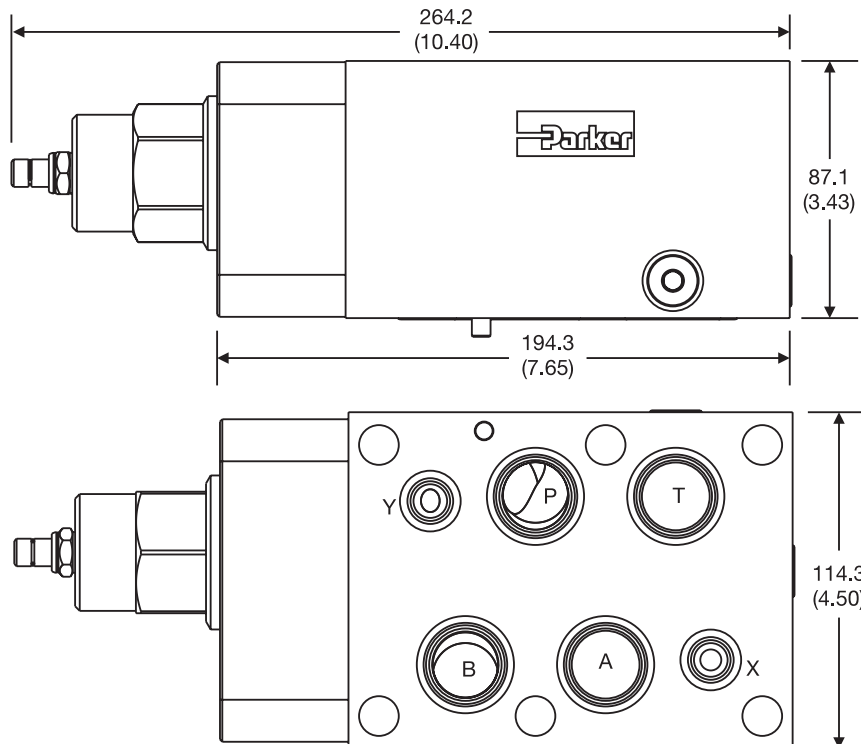
WWW.SUMY.IR

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

PR08BB



PR08PP



B

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General Description

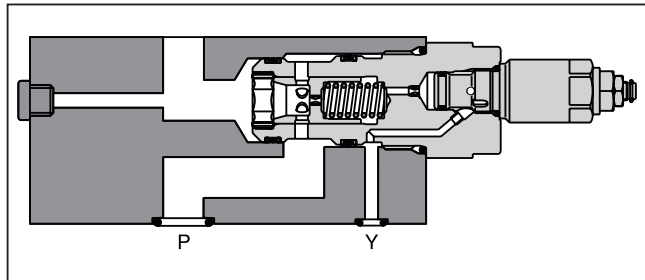
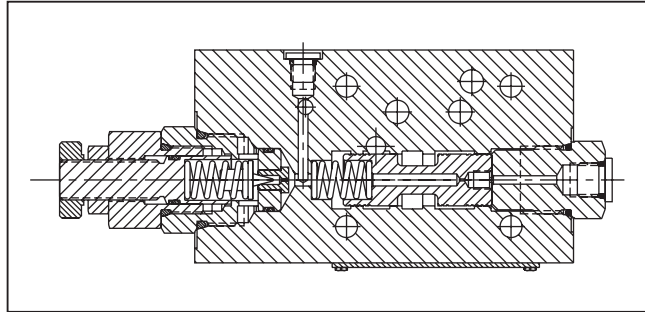
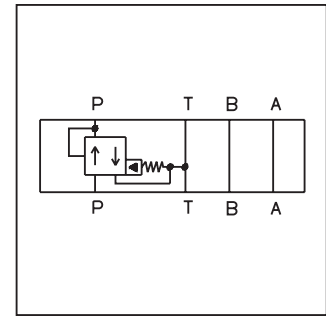
Series PRM reducing valves are used to regulate pressure in one area of a circuit below normal system pressure. This style valve is well suited to perform this function as it mounts directly below the directional control valve.

Operation

These are "normally open" valves that allow fluid to pass through the controlled port during typical operation. When downstream pressure rises above the value set by an adjustable spring force, the control pilot opens and allows the main spool to move from a full open position. The main spool modulates to maintain the desired "reduced pressure" downstream of the valve. The PRM3 also has a relieving mode.

Features

- PRM sandwich style pressure reducing valves allow for easy configuration of stack systems and can be used to reduce pressure on the 'P' port, the 'A' port, or the 'B' port.
- Four pressure adjustment options are available: slotted screw, hexagon socket screw, knob and locking knob. (PRM6 only)
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.



Specifications

	PRM3	PRM6
Size	NFPA D05, CETOP 05, NG 10	NFPA D08, CETOP 08, NG 25
Minimum Pressure (Bar) ¹⁾	10 (150 (PSI) with rated flow, 150 SSU oil, and fluid temperature of 38°C (100°F)	
Maximum Pressure (Bar)	345 (5000 PSI)	345 (5000 PSI)
Minimum Flow (LPM)	3.78 (1 GPM)	3.78 (1 GPM)
Maximum Flow (LPM)	64 (17 GPM)	189 (50 GPM)
Pressure Range Code	Range (Bar)	
07	10 - 70 (150 - 1000 PSI)	
17	10 - 175 (150 - 2500 PSI)	
25	10 - 250 (150 - 3500 PSI)	
35	10 - 345 (150 - 5000 PSI)	
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)	
Venting	Connecting the vent port to tank allows the reducing valve to divert flow at minimum pressure	
Remote Control ²⁾	Remote control valve connected to the vent port can be used to control the pressure	
Drain Line ³⁾	Drain line from pilot valve is internally connected to the tank port. Tank line pressure is thus added to the valve setting	
<i>1) Change in flow, temperature, or fluid (SSU) rating will affect minimum pressure.</i>		
<i>2) Set main valve pressure 10 Bar (150 PSI) higher than remote pilot.</i>		
<i>3) It is important that the drain line connection be taken into consideration when determining the minimum valve setting.</i>		

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

PRM - Ordering Information

B73

WWW.SUMY.IR

PRM

Pressure
Reducing
Valve

Size

Pressure
Reducing

Pressure
Range

Adjustment

Seal

Gauge Port

Drain

Design
Series

NOTE:
Not required
when ordering.

Code	Description
3	NFPA D05
6	NFPA D08

Code	Description
N*	Nitrile
V	Fluorocarbon
* PRM3 only	

Code	Type
S*	SAE
N*	NPT
M*	Metric
G	PRM3 - 1/8 BSPP
	PRM6 - 1/4 BSPP
* PRM3 only	

Code	Type
Omit	Internal
Y*	External
* PRM3 only	

Code	Description	Available Models	
		PRM3	PRM6
AA	A Port Only	✓	
AP	Connection A		✓
PA	Connection P		✓
PA	Function in P, Reduced Pressure in A		
PB	Function in P, Reduced Pressure in B		
PP	P Port Only	✓	
PP	Function in P, Reduced Pressure in P		

Code	Description
K*	Turning Knob
S**	Screw Adjust
* PRM3 and PRM6 only	
** PRM3 only	

Code	Description
07	10 - 70 Bar (150 - 1000 PSI)
17*	10 - 175 Bar (150 - 2500 PSI)
25	10 - 250 Bar (150 - 3500 PSI)
35**	10 - 345 Bar (150 - 5000 PSI)
* PRM3 and PRM6 only	
** PRM3 only	

Unit Weight:

PRM3 3.0 kg (6.6 lbs.)
PRM6 5.6 kg (12.5 lbs.)

Bold: Designates Tier I products and options.

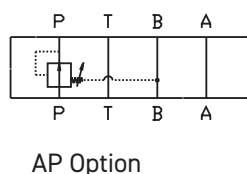
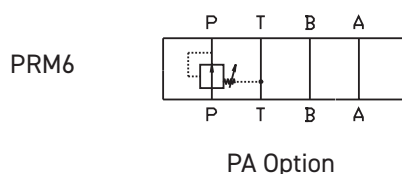
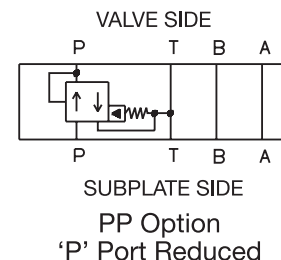
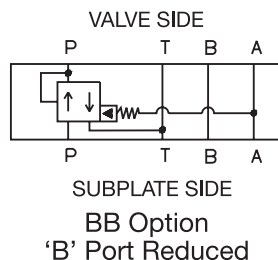
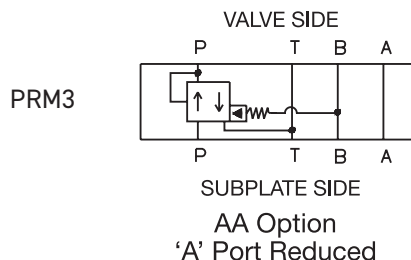
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Bolt Kits (NOTE: Bolt kits must be ordered separately)

Size "3"			
No. of Sandwich	Sandwich & Valve Combination	D3W-30, D3DW, & D31*W*	Bolt Length mm (in)
1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D3	BK143	190.2 (7.50)
* D31VW with internal pilot and internal drain only			

Size "6"			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D6	BK121	133.4 (5.25)
2	Sandwich & D6	BK122	203.2 (8.00)
3	Sandwich & D6	BK123	273.1 (10.75)
4	Sandwich & D6	BK124	342.9 (13.50)

Schematics



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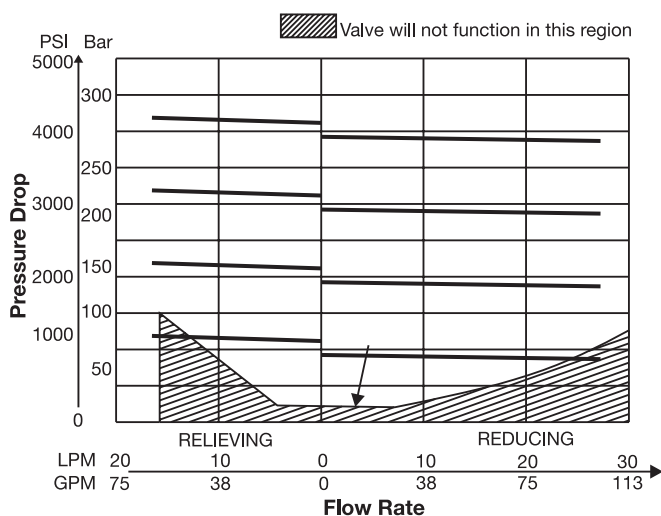
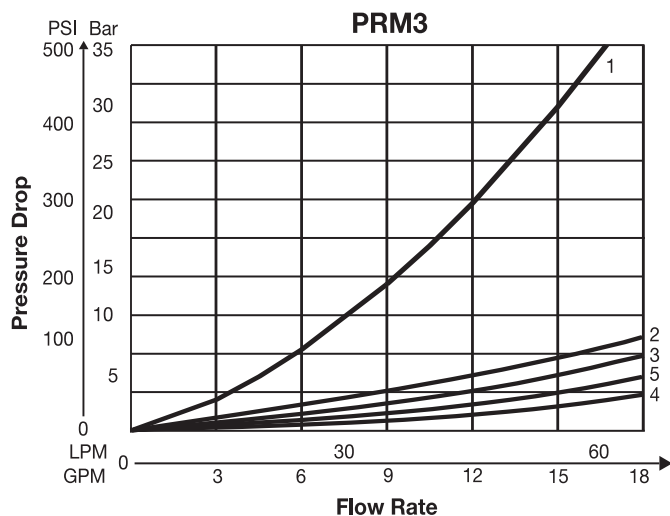
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Sandwich Valves

PRM - Performance Curves

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WWW.SUMY.IR

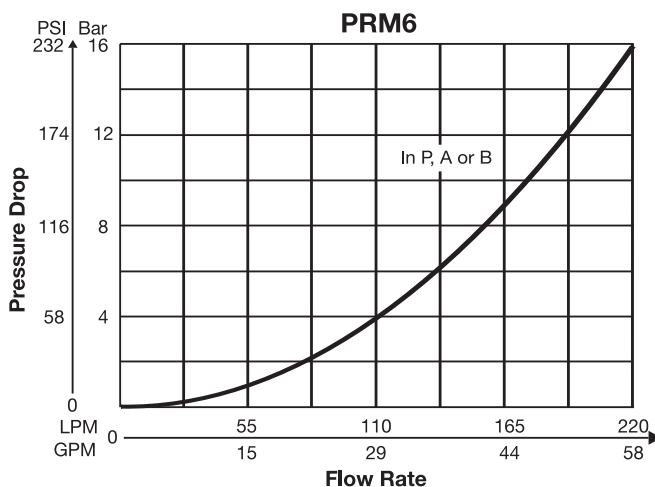


Mode	Flow Path			
	P->P	A->A	B->B	T->T
PP	1	2	3	4
AA	1	2	3	5
BB	1	2	3	5

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

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

NOTE: Lowest pressure setting dependent upon system resistance.



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

Sandwich Valves

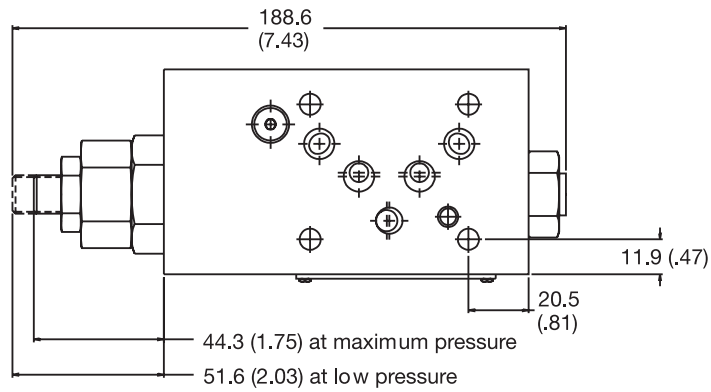
PRM3 - Dimensions

B75

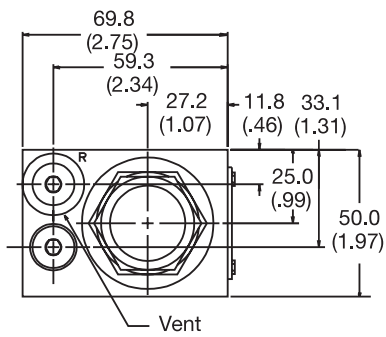
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Inch equivalents for millimeter dimensions are shown in (**)

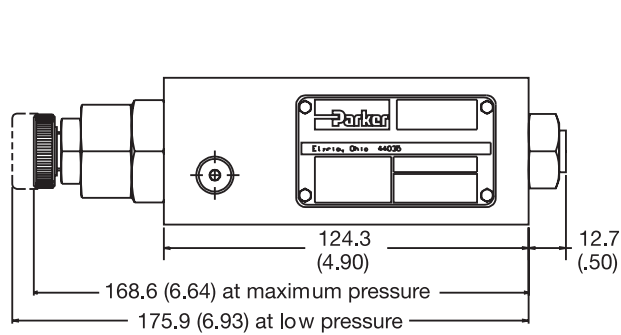
PRM3AA



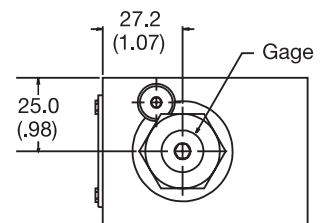
Top View



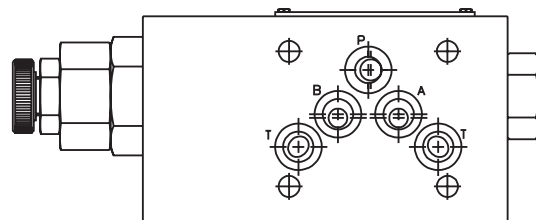
End View



Face View



End View



Bottom View



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Sandwich Valves

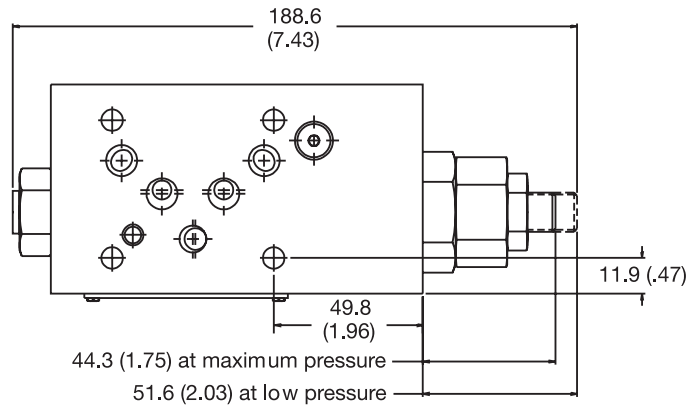
PRM3 - Dimensions

B76

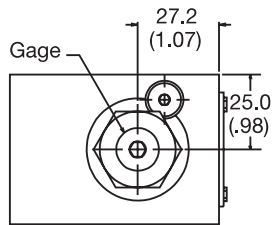
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Inch equivalents for millimeter dimensions are shown in (**)

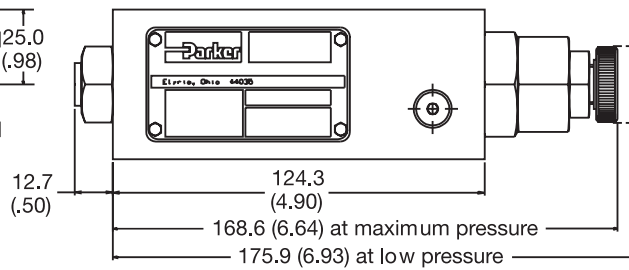
PRM3BB



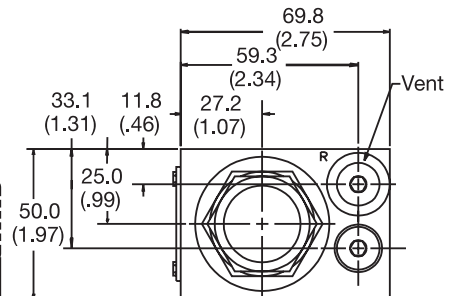
Top View



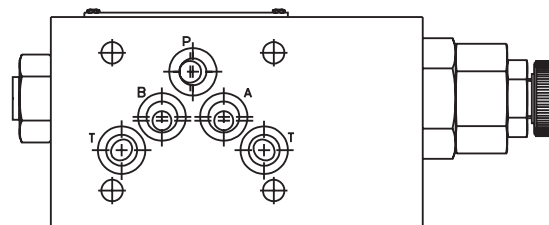
End View



Face View



End View



Bottom View



Sandwich Valves

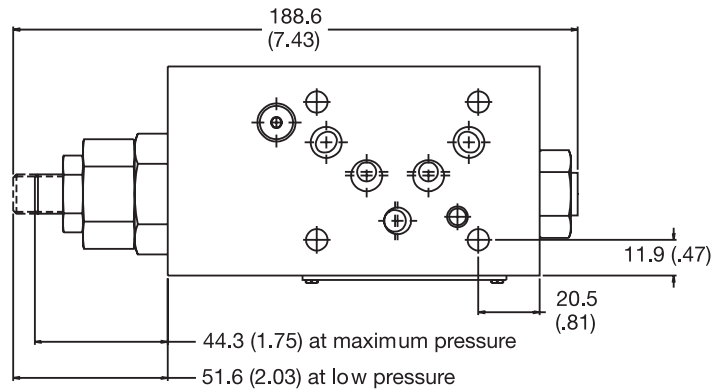
PRM3 - Dimensions

B77

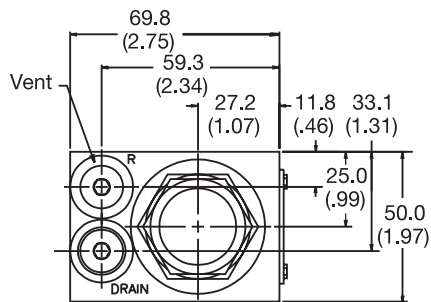
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Inch equivalents for millimeter dimensions are shown in (**)

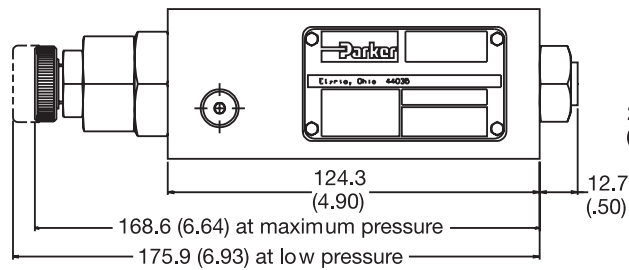
PRM3PP



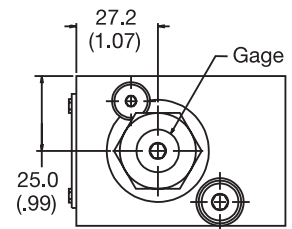
Top View



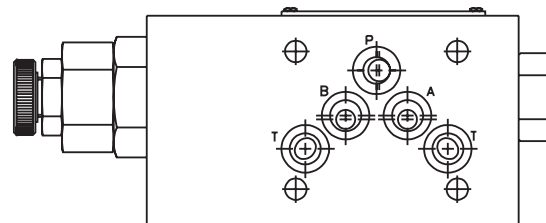
End View



Face View



End View



Bottom View



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Sandwich Valves

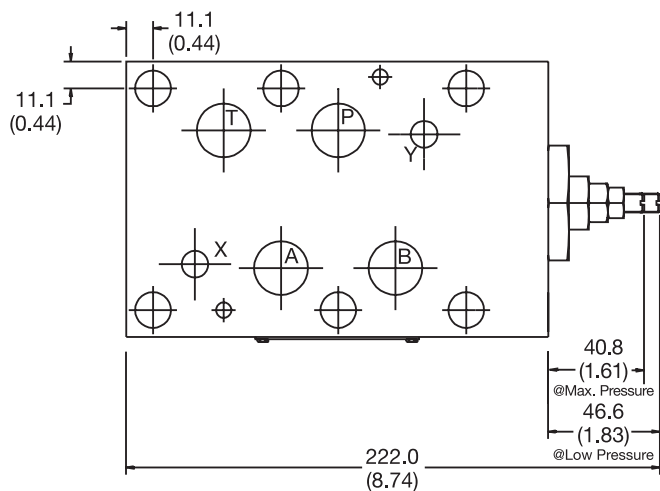
PRM6 - Dimensions

B78

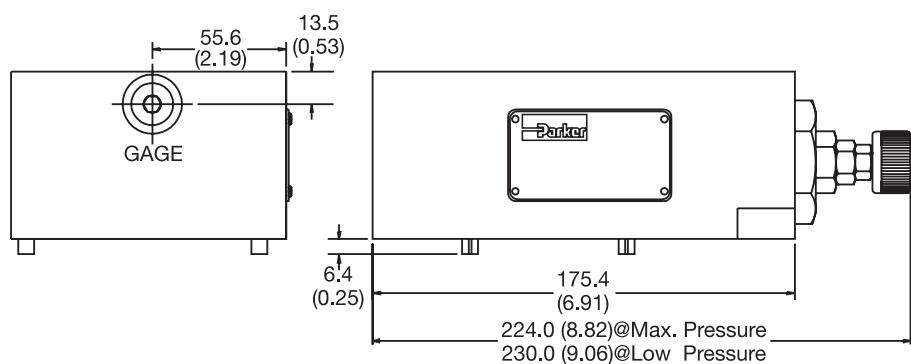
WWW.SUMY.IR

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

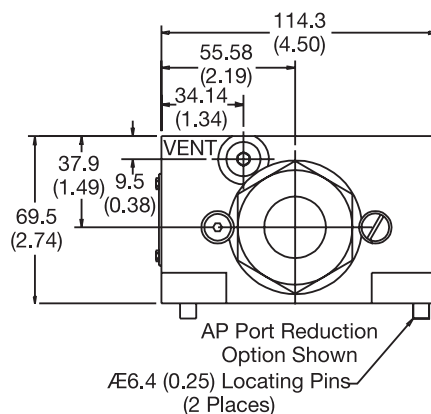
PRM6



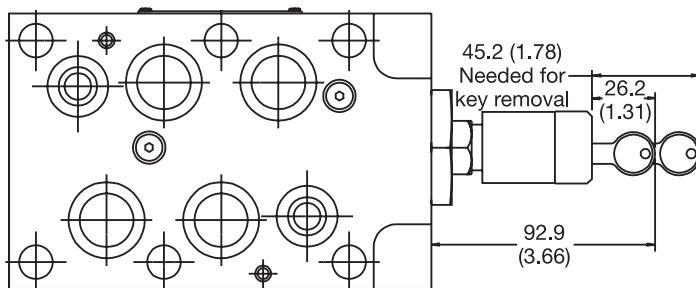
Top View



Face View



End View



Bottom View



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General Description

Series ZDR pilot operated pressure reducing valves are designed for maximum flow rates.

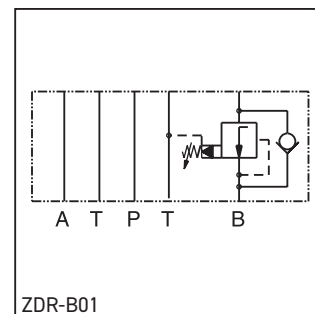
The reducing function can be located in the ports P, A or B. The sizes NG06 and NG10 are equipped with an integral return flow check valve (reducing function in A or B).

Features

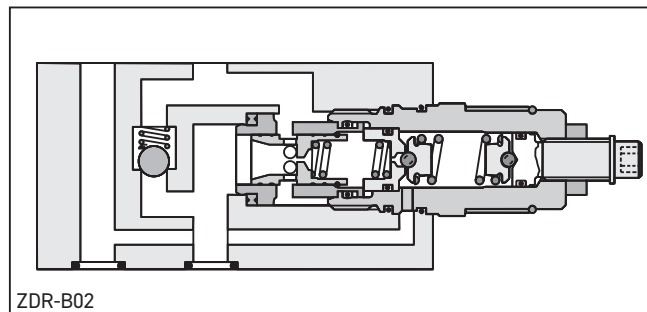
- High flow capacity.
- Sizes:
 - ZDR01 – NFPA D03 / NG6 / CETOP 3
 - ZDR02 – NFPA D05 / NG10 / CETOP 5
- With integral return flow check valve.



ZDR-P01



ZDR-B01



ZDR-B02

Specifications

General		
Size	NG 06	NG 10
Mounting Interface	DIN 24340 A6 ISO 4401 NFPA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFPA D05 CETOP RP 121 5
Mounting Position	Unrestricted	
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)	
Hydraulic		
Maximum Operating Pressure (Bar)	Up to 350 (5075 PSI); ZDR-AR / BR up to 315 (4568 PSI)	
Nominal Flow (LPM)	80 (21.2 GPM)	120 (31.7 GPM)
Pilot Oil (LPM)	0.2 (0.1 GPM)	0.3 (0.1 GPM)
Fluid	Hydraulic oil as per DIN 51524 - 51525	
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)	
Viscosity		
Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)	
Recommended (cSt / mm²/s)	30 (139 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)	

⚠ WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

General Description

Series RDM pressure relief valves are direct operated piston type valves with low hysteresis. They can be used as P-T relief or as T-T controlled counter balance valve. The valve body is equipped with a pressure gauge port.

Function

For PT, pressure is relieved from P to T at the adjusted value.

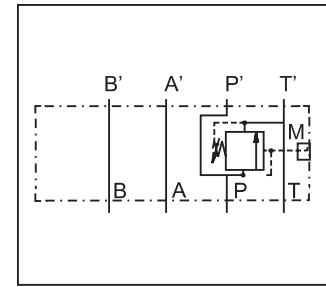
For TT, pressure is relieved from T to T at the adjusted pressure.

Features

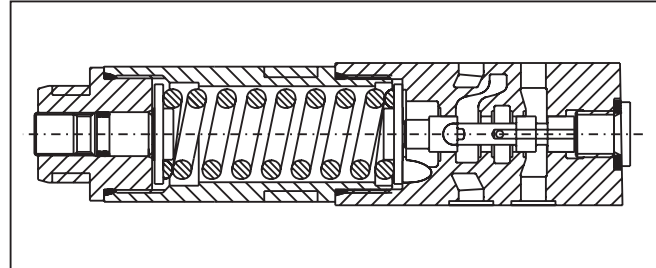
- The direct operated, cushioned piston design results in fast response, low leakage and minimal hysteresis.
- Up to 5 pressure adjustment ranges are available with maximum pressure settings of:
 - For RDM2 – 25, 64, 160, 210, 350 Bar
(363, 928, 2320, 3045, 5075 PSI)
 - For RDM3 – 19, 50, 100, 150, 210 Bar
(276, 725, 1450, 2175, 3045 PSI)
- Adjustment modes:
 - Slotted head with lock nut
 - Key lock
 - Knob
- RDM2 – NG06 (CETOP3)
- RDM3 – NG10 (CETOP5)



RDM2



Example PT



RDM2

Specifications

General		
Series	RDM2	RDM3
Size	NFPA D03, CETOP 03, NG 06	NFPA D05, CETOP 05, NG 10
Mounting	NFPA, CETOP RP121, DIN 24340, ISO 4401	
MTTF _d Value (years)	150	
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)	
Hydraulic		
Maximum Operating Pressure (Bar)	Port P, A, B: 350 (5075 PSI) Port T: 50 (725 PSI)	Port P, A, B: 315 (4495 PSI) Port T: 10 (145 PSI)
Fluid	Hydraulic oil as per DIN 51524 - 51525	
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)	
Viscosity Range (cSt / mm²/s)	12 - 230 (13 - 1854 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)	
Max Flow (LPM) - Max Leakage (ml/min) P - A 5ml/min (0.001 GPM)	40 (11 GPM)	80 (21 GPM)

⚠ WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

RDM - Ordering Information

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WWW.SUMY.IR

RDM
Direct
Operated
Relief
Valve

Size

Code	Description
2	NFPA D03, CETOP 03, NG 06
3	NFPA D03, CETOP 03, NG 10

Pressure
Relief

Code	Description
PT	P -> T
TT*	T -> T
* RDM2 only, maximum 160 Bar (2320 PSI)	

Pressure
Range

Code	Description - RDM2	Code	Description - RDM3
02	1.5 - 25 Bar (22 - 363 PSI)	01	1.5 - 19 Bar (22 - 276 PSI)
06	1.5 - 64 Bar (22 - 928 PSI)	05	1.5 - 50 Bar (22 - 725 PSI)
16	3 - 160 Bar (44 - 2320 PSI)	10	3 - 100 Bar (44 - 1450 PSI)
21	3 - 210 Bar (44 - 3045 PSI)	15	3 - 150 Bar (44 - 2175 PSI)
35	5 - 350 Bar (73 - 5075 PSI)	21	3 - 210 Bar (44 - 3045 PSI)

Adjustment

Code	Description
S	Hexagon Socket
K*	Knob
* RDM2 only	

V
Seal
Fluorocarbon

Gauge
Port

Code	Description
G*	G 1/4
C	Coupling M16
* Standard in housing	

Design
Series

NOTE:
Not required
when ordering.

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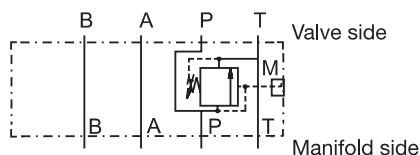
Weight:
RDM2 1.3 kg (2.9 lbs.)
RDM3 2.6 kg (5.8 lbs.)

Bold: Designates Tier I products and options.

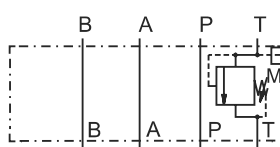
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Schematics

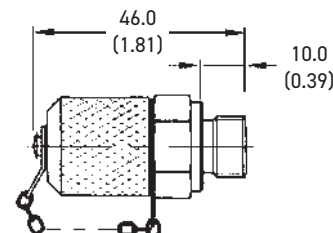
RDM*PT



RDM*TT



Gauge Port Option C



Sandwich Valves

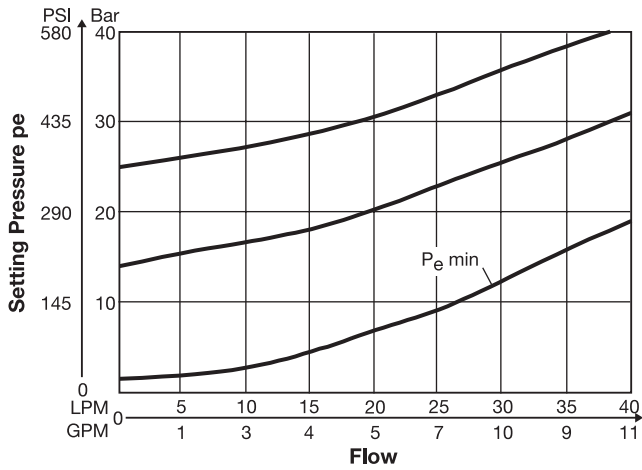
RDM - Performance Curves

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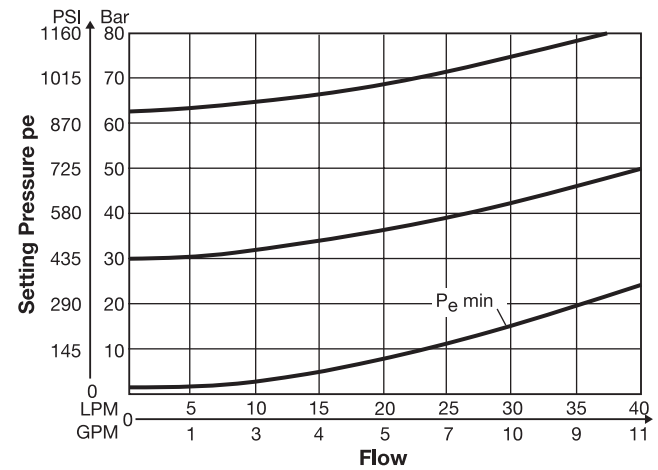
WWW.SUMY.IR

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

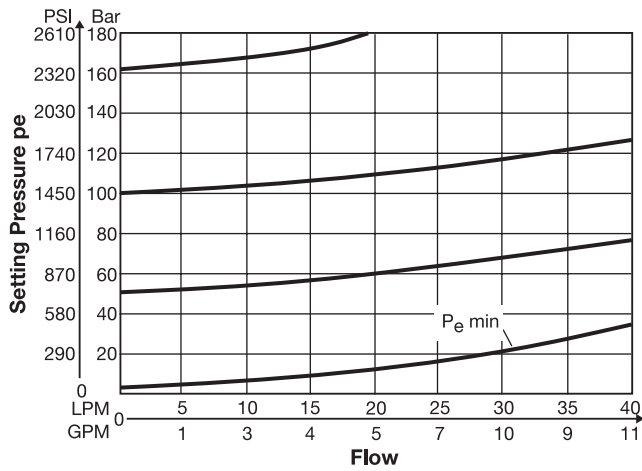
RDM2 02



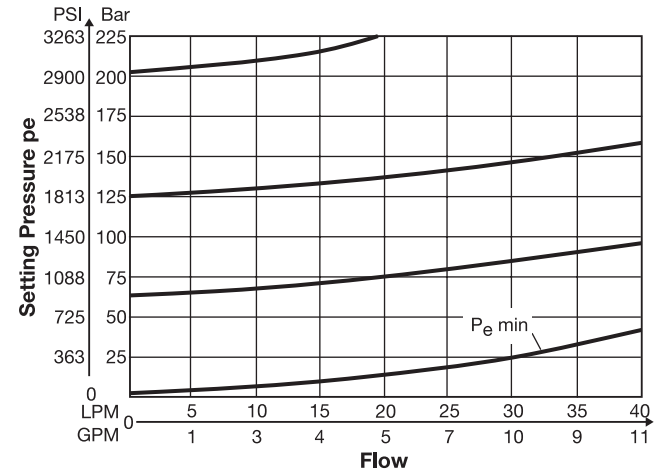
RDM2 06



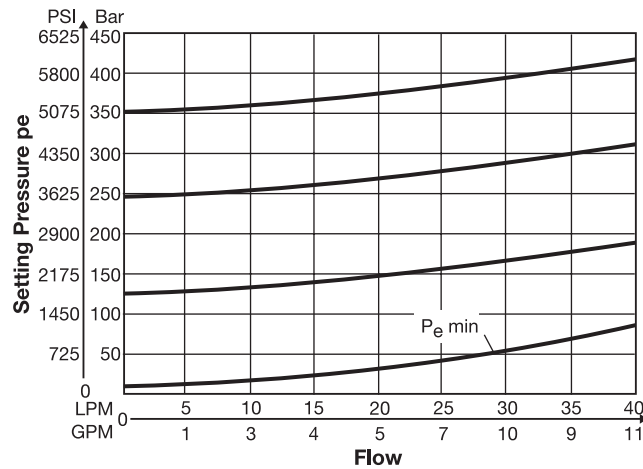
RDM2 16



RDM2 21



RDM2 35



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Sandwich Valves

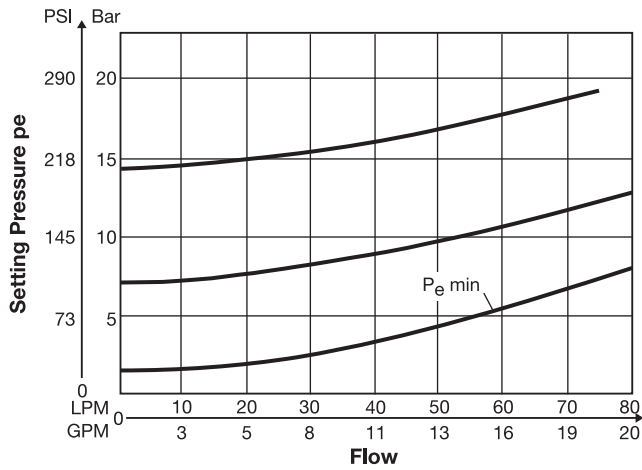
RDM - Performance Curves

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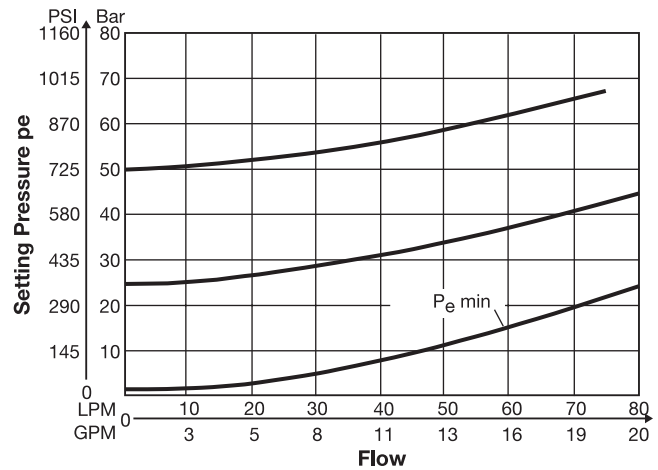
WWW.SUMY.IR

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

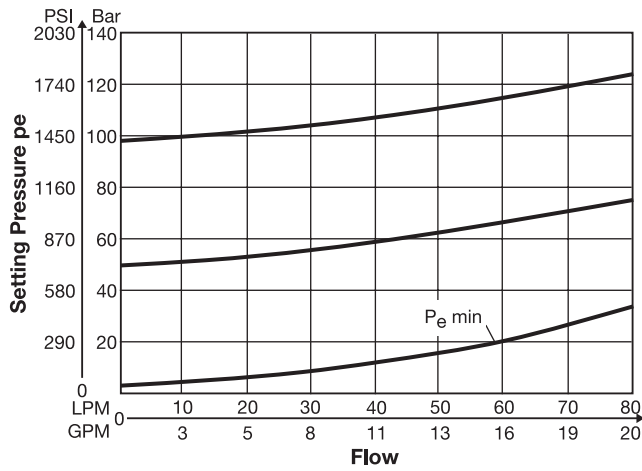
RDM3 01



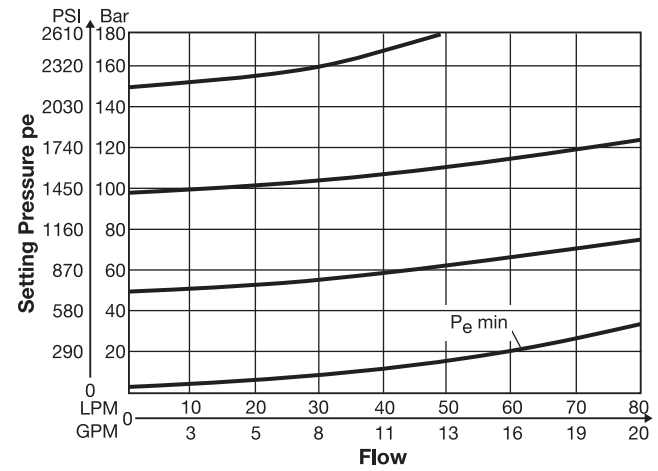
RDM3 05



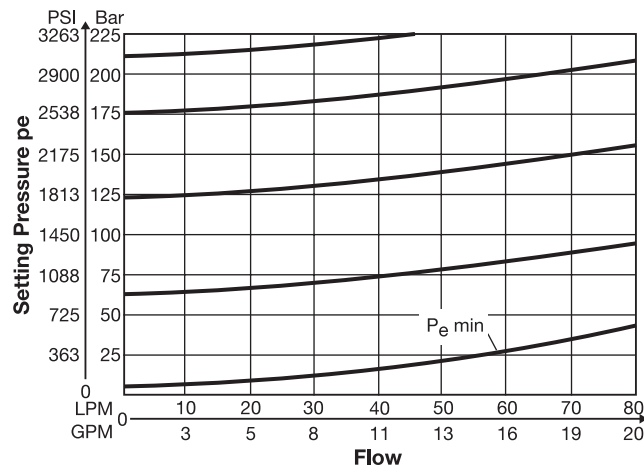
RDM3 10



RDM3 15



RDM3 21



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Sandwich Valves

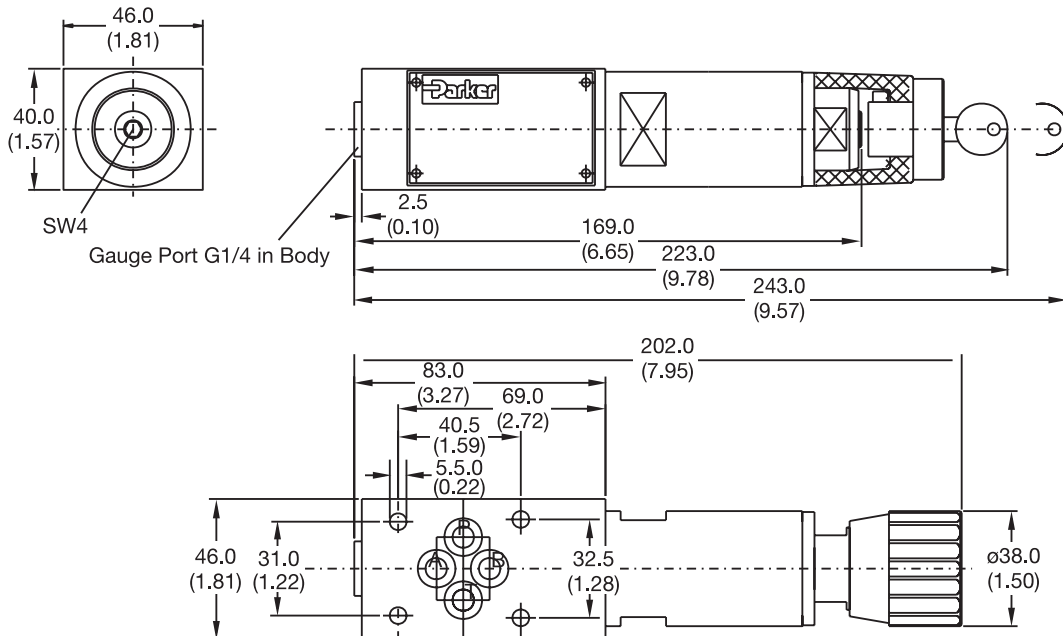
RDM - Dimensions

B86

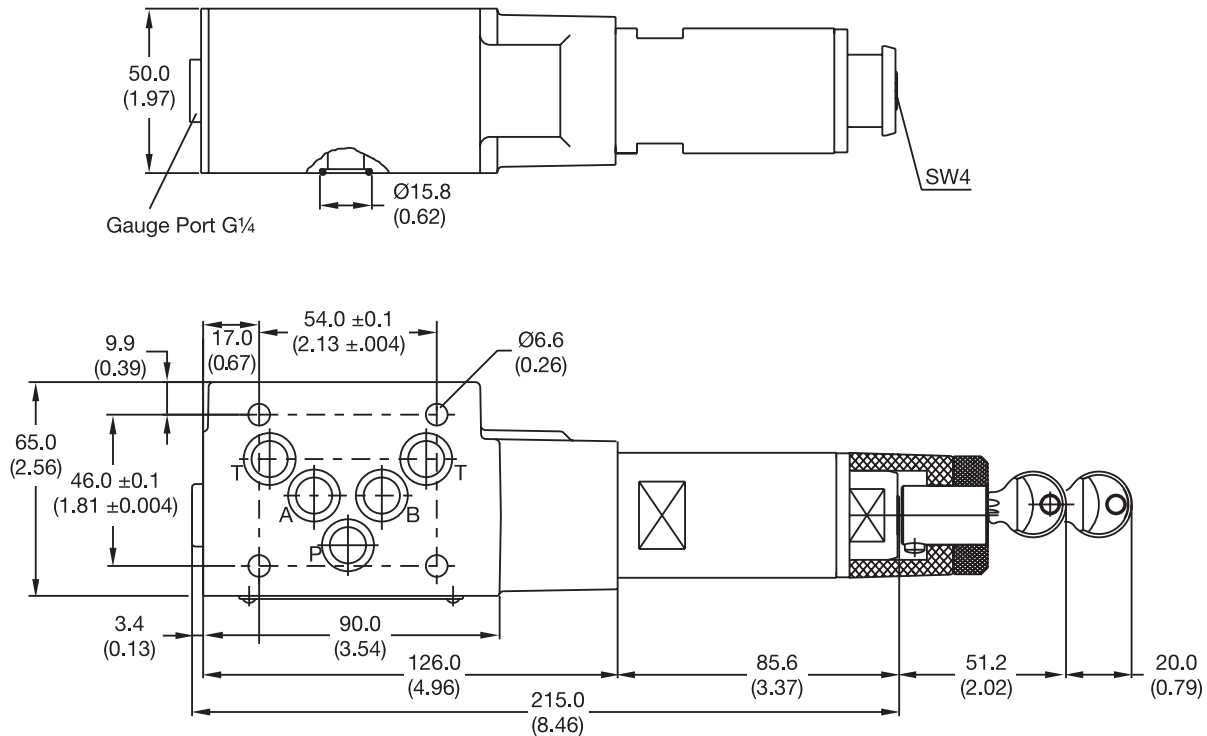
WWW.SUMY.IR

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

RDM2



RDM3



Seal Kit		
Seal	RDM2	RDM3
V	SK-RDM2-V	SK-RDM3-V

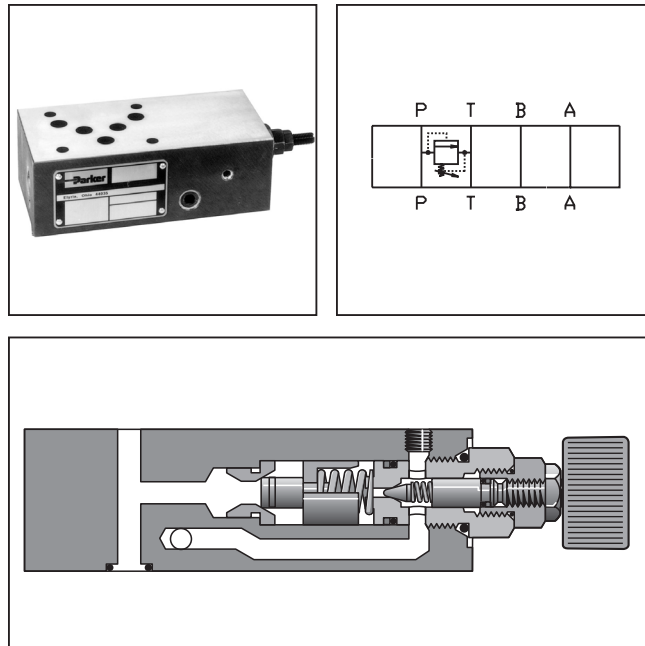


General Description

Series RM relief valves limit system pressure by opening to tank when system pressure reaches the valve setting. With D03 size, they can also be configured to limit the 'A' or 'B' work port pressures independently.

Features

- RM sandwich style relief valves can be used to limit pressure in the 'P' port, 'A' port, or 'B' port.
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Three pressure adjustment options are available: slotted screw, knob and locking knob.
- SAE Gage Port



B

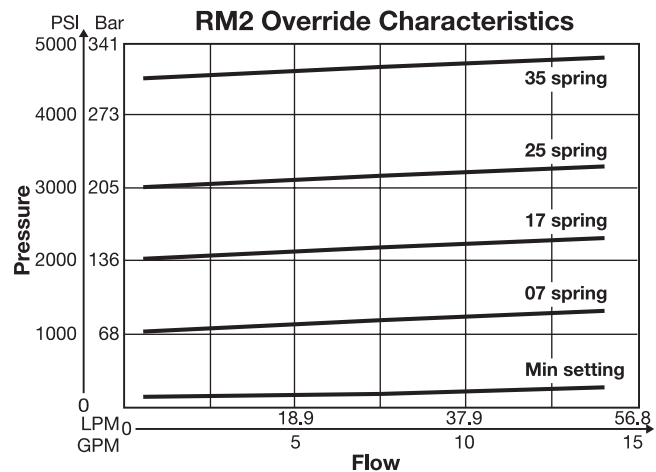
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Specifications

Size	RM2	RM3	RM6
Mounting Pattern	NFPA D03, CETOP 03, NG 06	NFPA D05, CETOP 05, NG 10	NFPA D08, CETOP 08, NG 25
Minimum Pressure ¹⁾	10 Bar (150 PSI) with rated flow, 150 SSU oil, and fluid temperature of 38°C (100°F)		
Maximum Pressure	350 Bar (5000 PSI)	350 Bar (5000 PSI)	350 Bar (5000 PSI)
Minimum Flow	3.78 LPM (1 GPM)	3.78 LPM (1 GPM)	3.78 LPM (1 GPM)
Maximum Flow	53 LPM (14 GPM)	76 LPM (20 GPM)	341 LPM (90 GPM)
Pressure Range	Code 07 17 25 35	Pressure Range 10 - 70 Bar (150 - 1000 PSI) 10 - 175 Bar (150 - 2500 PSI) 10 - 250 Bar (150 - 3500 PSI) 10 - 345 Bar (150 - 5000 PSI)	
Filtration	ISO 4406 (1999); 18/16/13 (meet NAS 1638:7)		
Venting ²⁾	Connecting the vent port to tank allows the relief valve to divert flow at minimum pressure		
Remote Control ³⁾	Remote control valve connected to the vent port can be used to control pressure		
1) Change in flow, temperature, or fluid (SSU) rating will affect valve minimum pressure			
2) Not available on RM2			
3) Set main valve pressure 10 bar (150 PSI) higher than remot pilot			

Performance Curves



Viscosity Correction Factor

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

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

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

RM - Ordering Information

B88

WWW.SUMY.IR

Code	Description
2	NFPA D03 Subplate Mounting
3	NFPA D05 Subplate Mounting
6	NFPA D08 Subplate Mounting

Code	Type
PT	Relief P -> T
AT*	Relief A -> T
BT*	Relief B -> T

* RM2 only

Code	Description
07	10 - 70 Bar (150 - 1000 PSI)
17	10 - 175 Bar (150 - 2500 PSI)
25	10 - 250 Bar (150 - 3500 PSI)
35	10 - 345 Bar (150 - 5000 PSI)

Code	Description
K	Knob
S	Slotted Screw with Jam Nut

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
Omit	SAE Body w/Plug
G	BSPP Body w/Plug

Unit Weight:

RM2 .95 kg (2.1 lbs.)

RM3 3.0 kg (6.6 lbs.)

RM6 5.9 kg (13.0 lbs.)

Bold: Designates Tier I products and options.

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

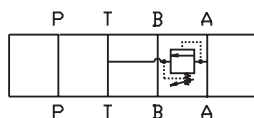
Sandwich Bolt Kits *(NOTE: Bolt kits must be ordered separately)*

Size "2"			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D1	BK243	73.2 (2.88)
2	Sandwich & D1	BK225	111.3 (4.38)
3	Sandwich & D1	BK244	152.4 (6.00)
4	Sandwich & D1	BK245	190.5 (7.50)

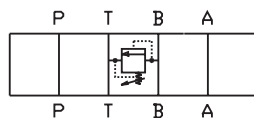
Size "3"			
No. of Sandwich	Sandwich & Valve Combination	D3W-30, D3DW, & D31 *W*	Bolt Length mm (in)
1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D3	BK143	190.2 (7.50)
* D31VW with internal pilot and internal drain only			

Size "6"			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D6	BK121	133.4 (5.25)
2	Sandwich & D6	BK122	203.2 (8.00)
3	Sandwich & D6	BK123	273.1 (10.75)
4	Sandwich & D6	BK124	342.9 (13.50)

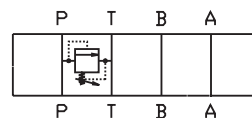
Schematics



AT Option



SUBPLATE SIDE
BT Option



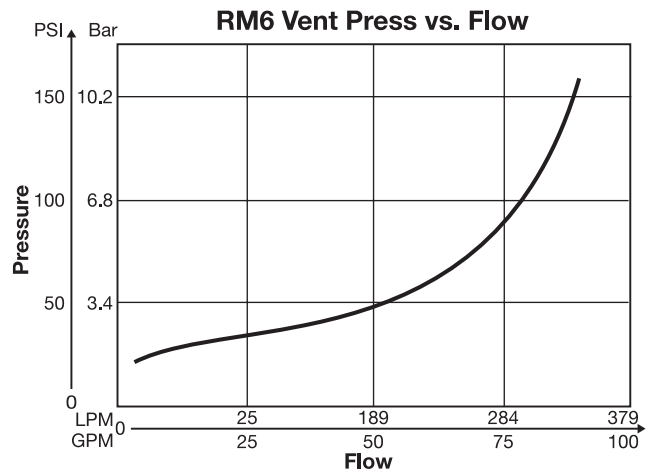
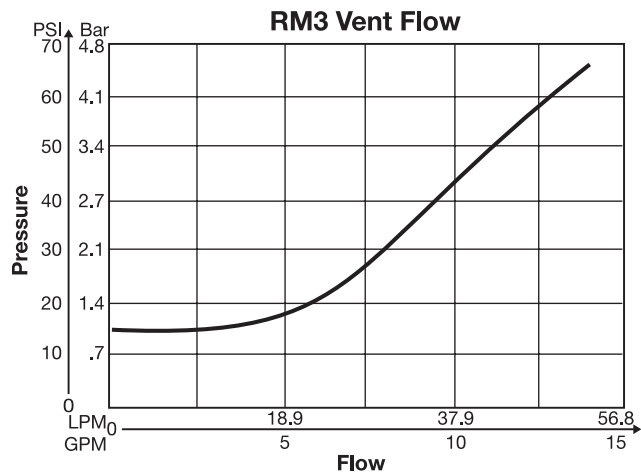
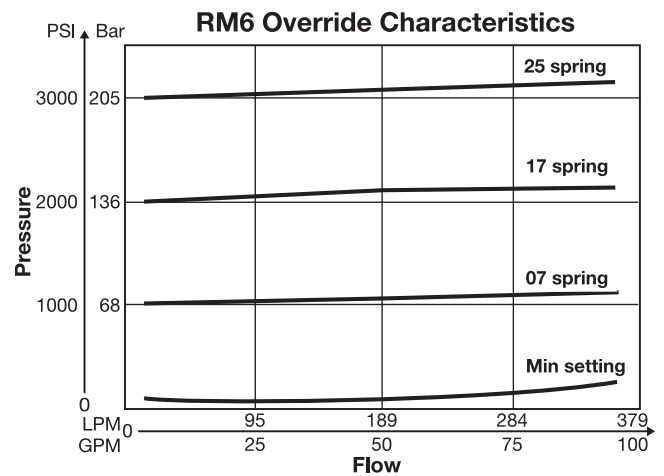
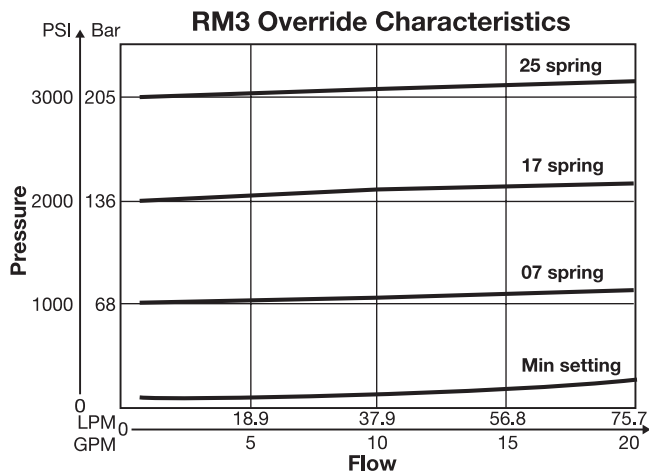
PT Option

Sandwich Valves

RM - Performance Curves

B89

WWW.SUMY.IR



Viscosity Correction Factor

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

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

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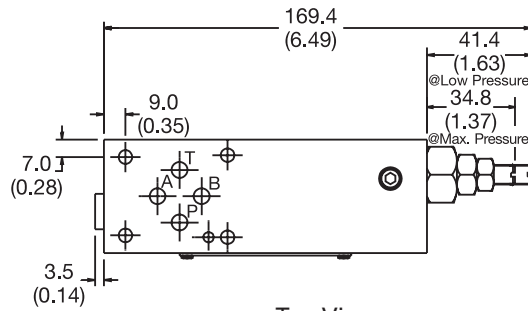
Sandwich Valves

RM2 - Dimensions

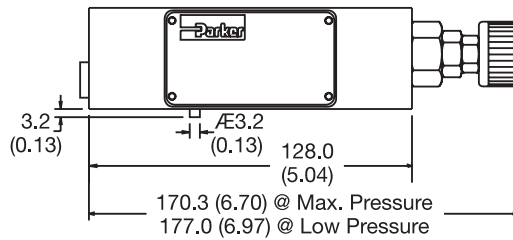
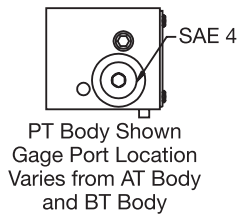
B90

WWW.SUMY.IR

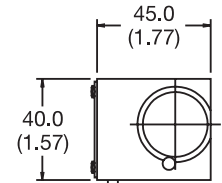
Inch equivalents for millimeter dimensions are shown in (**)



Top View

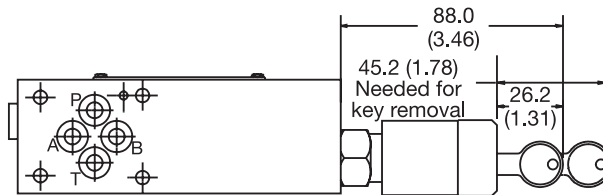


Face View



Pilot Cartridge Is Located
On The Right Side
For PT Body And BT Body

End View



Bottom View



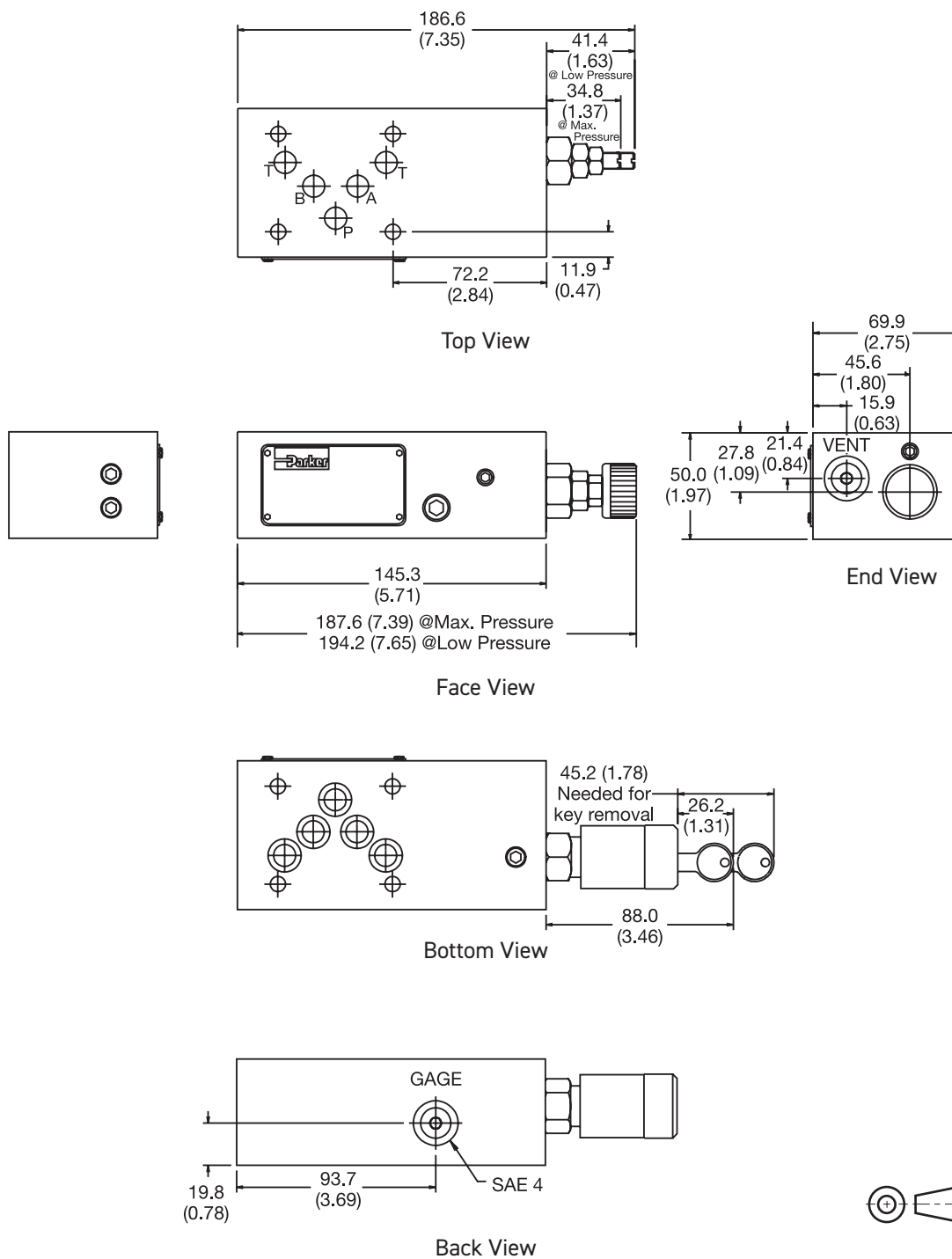
Sandwich Valves

RM3 - Dimensions

B91

WWW.SUMY.IR

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



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WWW.SUMY.IR

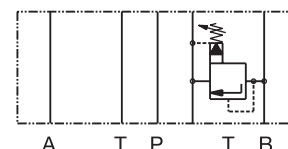
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General Description

Series RV direct acting, pressure relief valves are designed to limit pressure in various parts of a hydraulic circuit. The relief valve function options are P to T, A to T, B to T or A & B to T. Another option is for A to B & B to A crossover relief functions.

Features

- High flow capacity.
- Pressure function in P, A, B or A + B.
- Sizes:
RV05 – NFPA D05 / NG10 / CETOP 5
RV5H – NFPA D05HE / NG10 / CETOP 5H
RV07 – NFPA D07 / NG16 / CETOP 7
RV08 – NFPA D08 / NG25 / CETOP 8



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Specifications

General				
Size	D05 / NG 10	D05HE / NG 10	D07 / NG 16	D08 / NG 25
Mounting Position	Unrestricted			
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure (Bar)	Aluminum Body - up to 207 (3000 PSI); Ductile Iron Body - up to 345 (5000 PSI)			
Nominal Flow (LPM)	189 (50 GPM)	189 (50 GPM)	189 (50 GPM)	378 (100 GPM)
Leakage (DPM)	10	10	10	10
Reseat Pressure	>90% setting			
Adjustment Screw Hex Size	5/32	5/32	5/32	5/32
Viscosity				
Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)			
Recommended (cSt / mm²/s)	30 (139 SSU)			
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)			



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

RV - Ordering Information

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WWW.SUMY.IR

RV
Pressure Relief
Valve

Code	Description
03	See RM2
05	NFPA D05 / NG 10
SH*	NFPA D05HE / NG 10
07	NFPA D07 / NG 16
08	NFPA D08 / NG 25
* Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.	

Size

Style

Code	Description
PT	P -> T
AT	A -> T
BT	B -> T
DT	A -> T and B -> T
DX	A -> B and B -> A

Pressure
Range

Code	Description
10	69 Bar (1000 PSI)** 34.5 - 207 Bar (500 - 3000 PSI)
20*	69 Bar (1000 PSI)** 69 - 414 Bar (1000 - 6000 PSI)
* Ductile iron body only	
** Standard setting	

Seal

Code	Description
N	Nitrile
V*	Fluorocarbon
* Upon request	

Body
Material

Code	Description
A	Aluminum
D	Ductile Iron

B

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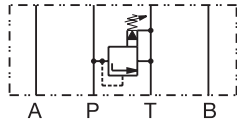
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Weight										
Size	RV**AT30NA	RV**AT30ND	RV**BT30NA	RV**BT30ND	RV**DT30NA	RV**DT30ND	RV**DX30NA	RV**DX30ND	RV**PT30NA	RV**PT30ND
PR05, PR5H	1.0 kg (2.2 lbs)	2.2 kg (4.8 lbs)	1.0 kg (2.2 lbs)	2.2 kg (4.8 lbs)	1.2 kg (2.6 lbs)	2.1 kg (4.7 lbs)	1.4 kg (3.0 lbs)	2.6 kg (5.7 lbs)	1.0 kg (2.2 lbs)	2.2 kg (4.8 lbs)
PR07	1.7 kg (3.7 lbs)	3.6 kg (7.9 lbs)	1.5 kg (3.3 lbs)	3.2 kg (7.2 lbs)	2.6 kg (5.7 lbs)	5.6 kg (12.3 lbs)	2.1 kg (4.7 lbs)	4.5 kg (10.0 lbs)	1.5 kg (3.3 lbs)	3.3 kg (7.2 lbs)
PR08	3.9 kg (8.6 lbs)	9.1 kg (20.0 lbs)	3.8 kg (8.5 lbs)	9.0 kg (19.7 lbs)	5.6 kg (12.3 lbs)	12.4 kg (27.4 lbs)	4.4 kg (9.6 lbs)	9.2 kg (20.3 lbs)	3.9 kg (8.6 lbs)	9.1 kg (20.0 lbs)

Schematics

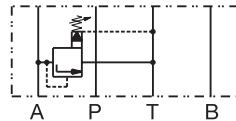
RVPT**

Pressure control P-T



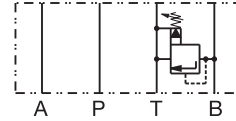
RVAT**

Pressure control A-T



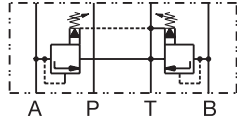
RVBT**

Pressure control B-T



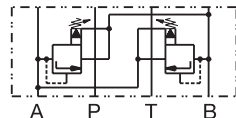
RVDT**

Pressure control A-T & B-T



RVDX**

Pressure control A-B & B-A



Sandwich Valves

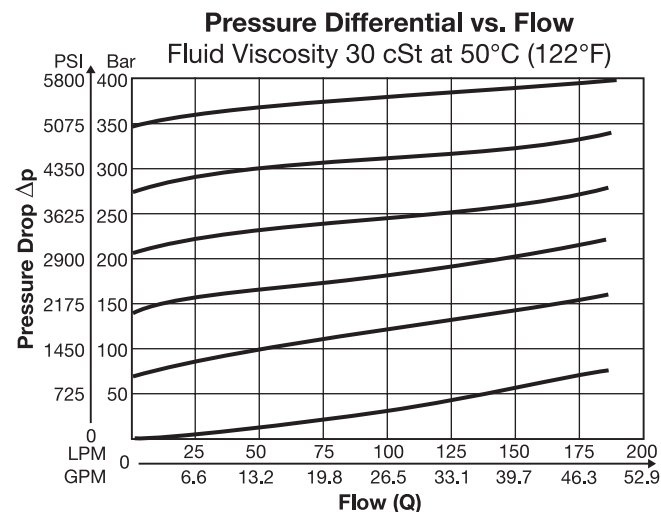
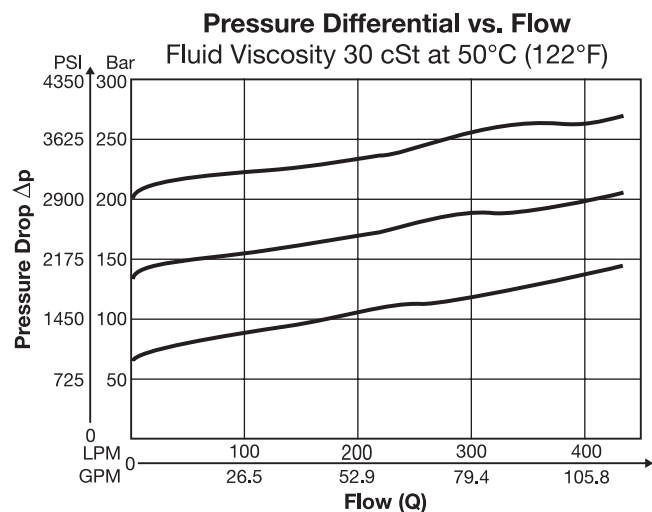
RV - Performance Curves

B95

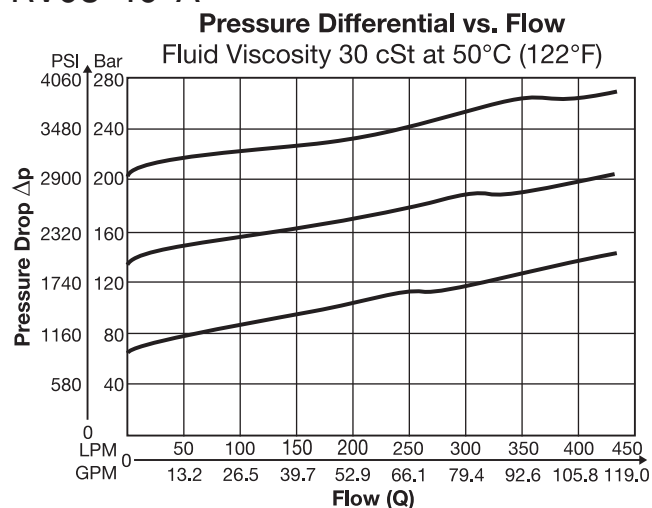
WWW.SUMY.IR

RV05*10*A, RV5H*10*A, RV07*10*A

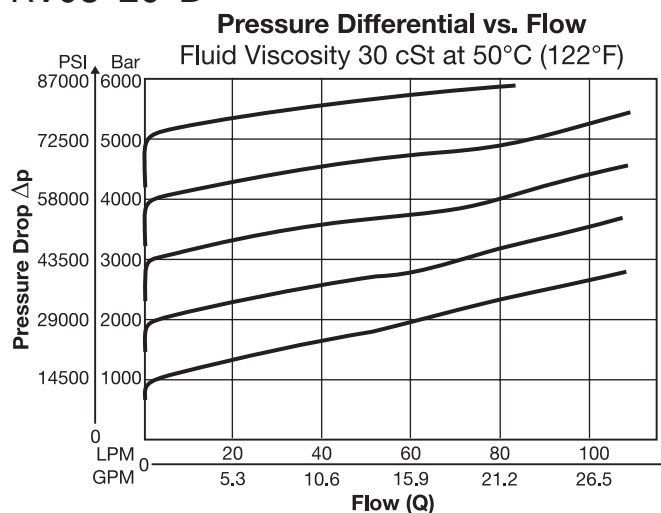
RV05*20*D, RV5H*20*D, RV07*20*D



RV08*10*A



RV08*20*D



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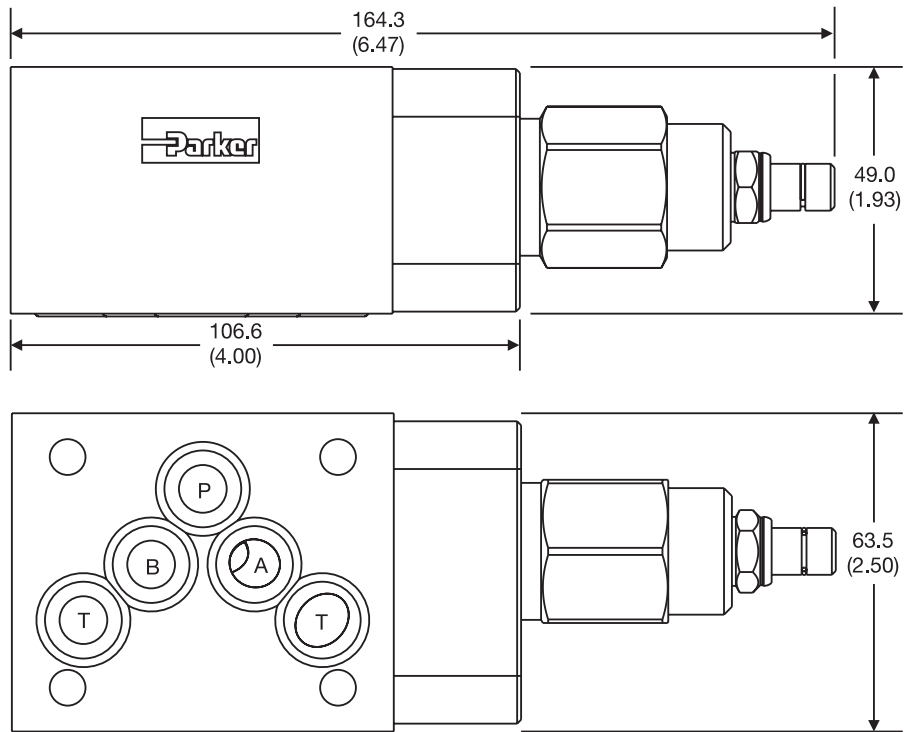
RV05 - Dimensions

B96

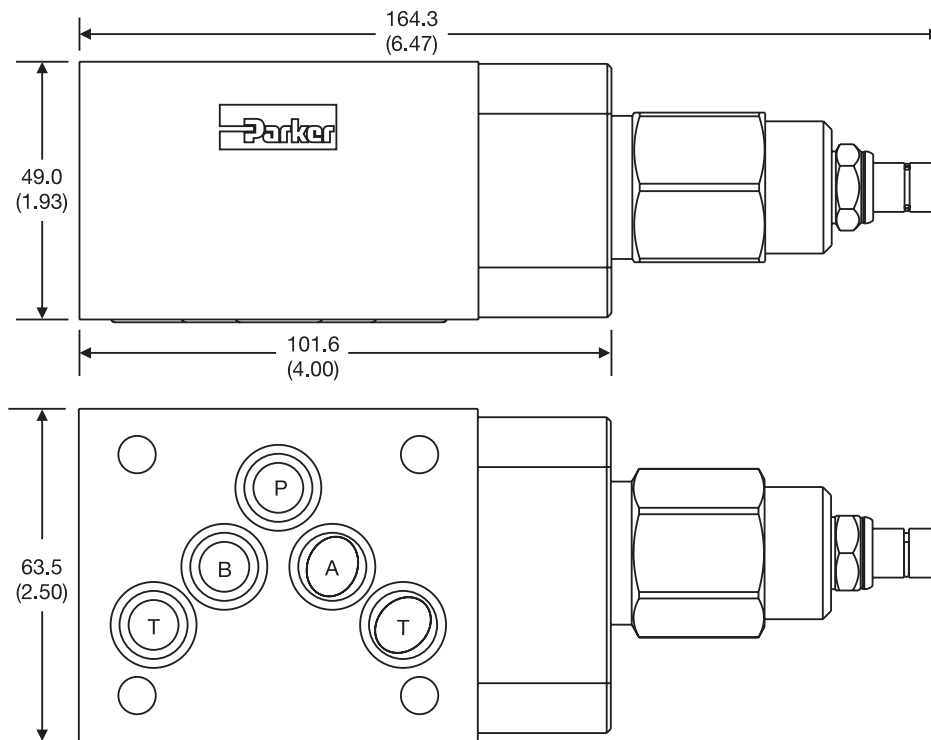
WWW.SUMY.IR

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

RV05AT



RV05BT



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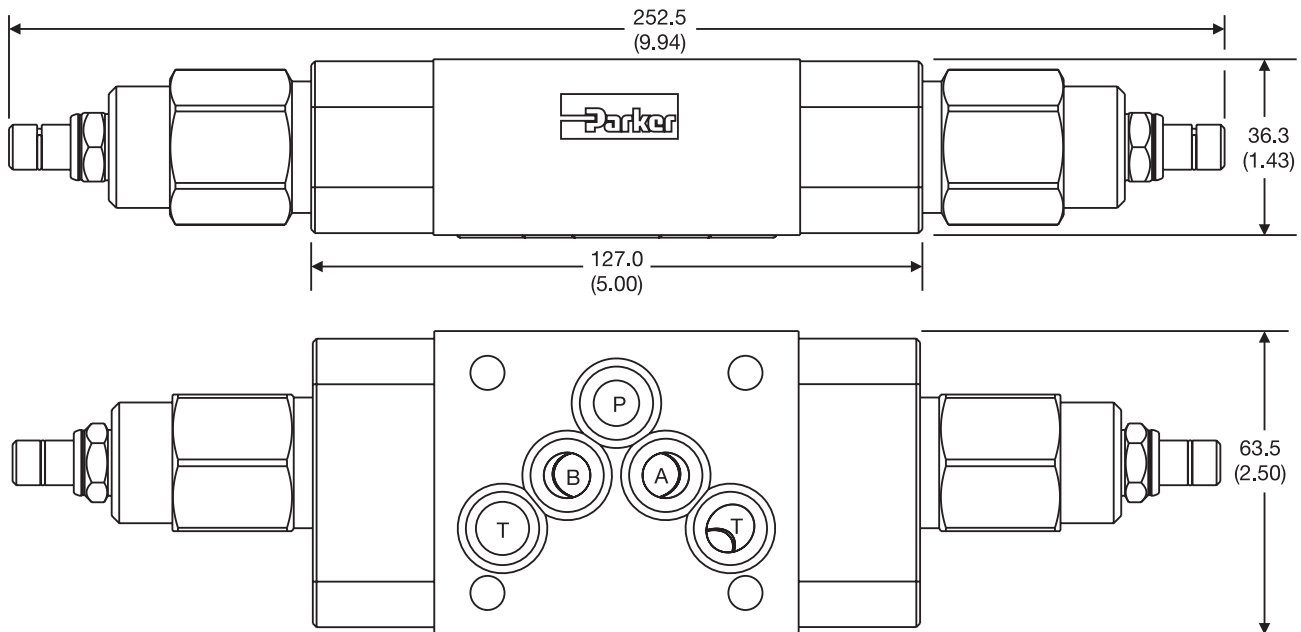
RV05 - Dimensions

B97

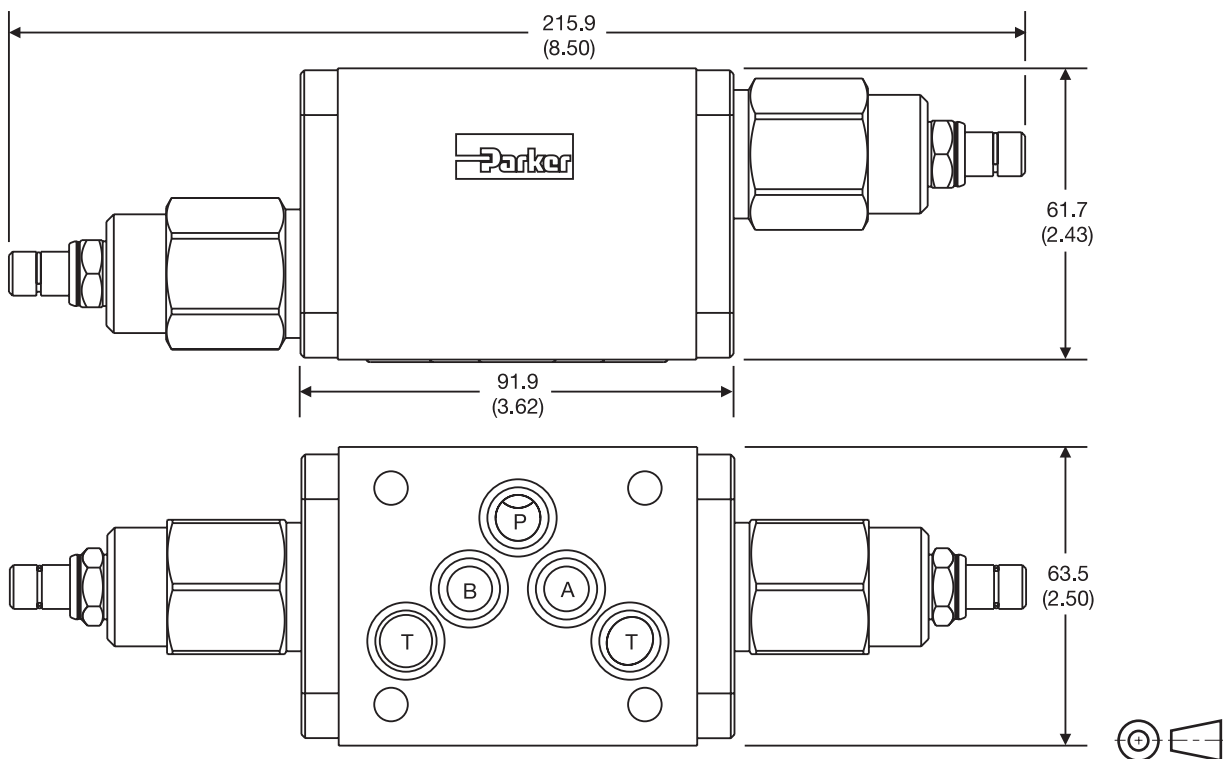
WWW.SUMY.IR

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

RV05DT



RV05DX



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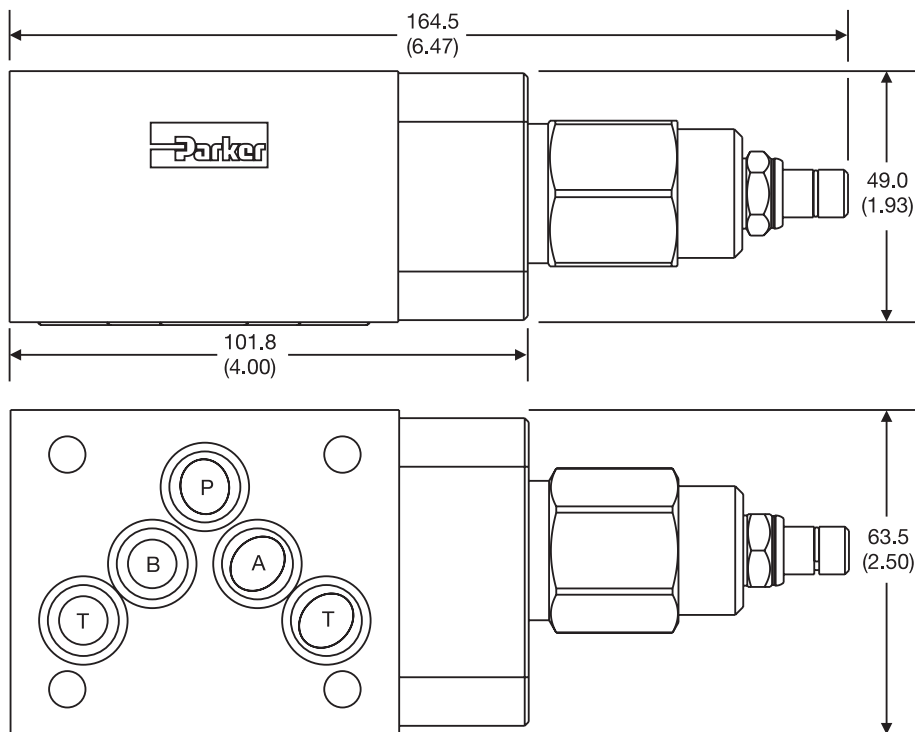
RV05, RV5H - Dimensions

B98

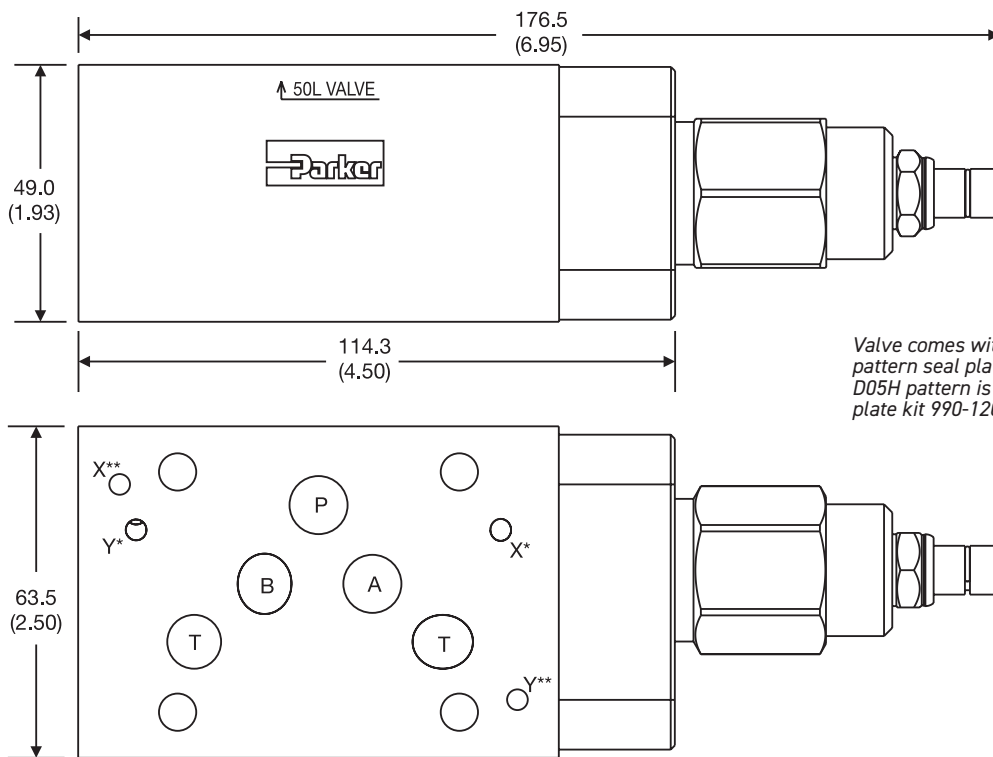
WWW.SUMY.IR

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

RV05PT



RV5HAT



Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.

* D05HE (Standard)
** D05H



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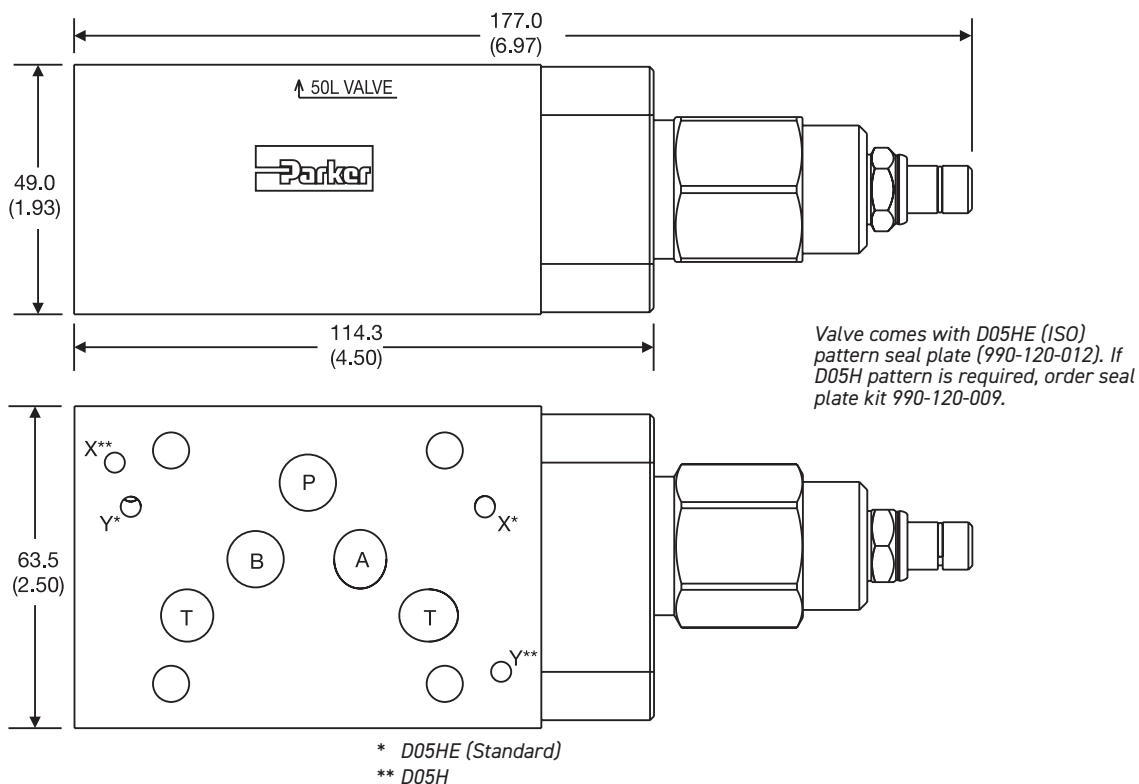
RV5H - Dimensions

B99

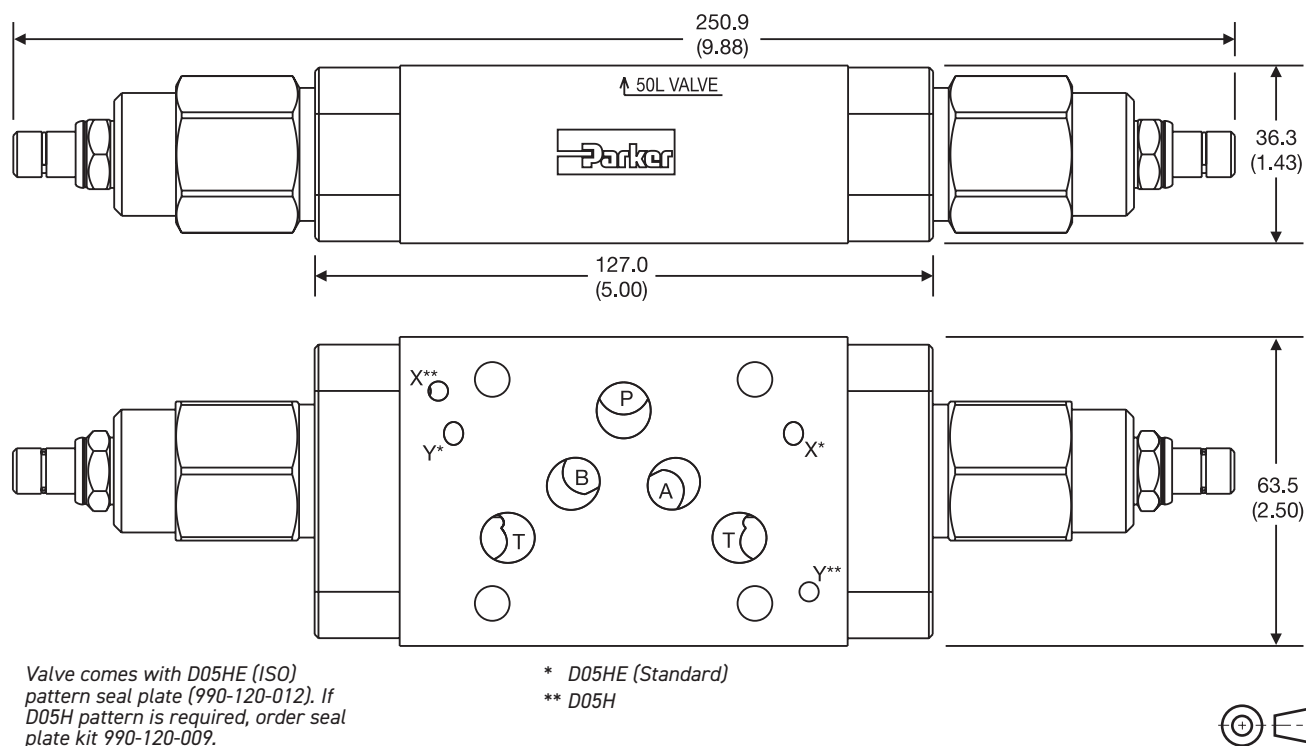
WWW.SUMY.IR

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

RV5HBT



RV5HDT



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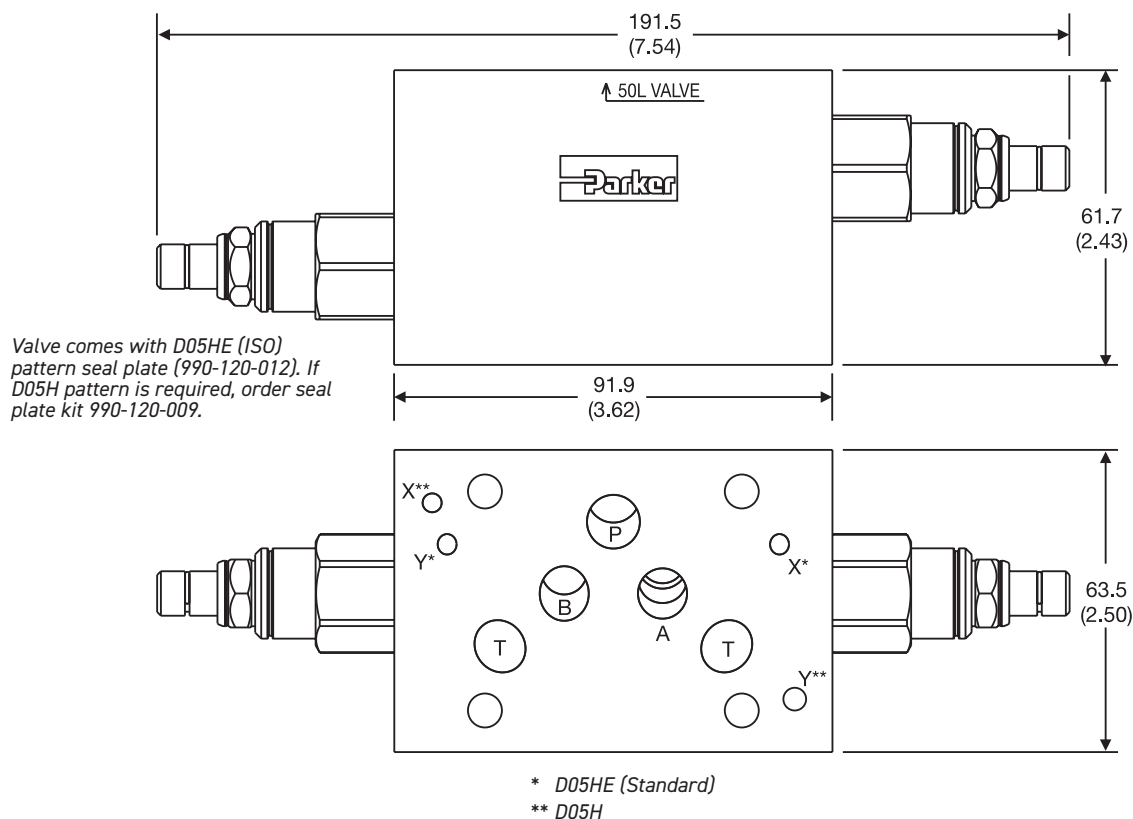
RV5H - Dimensions

B100

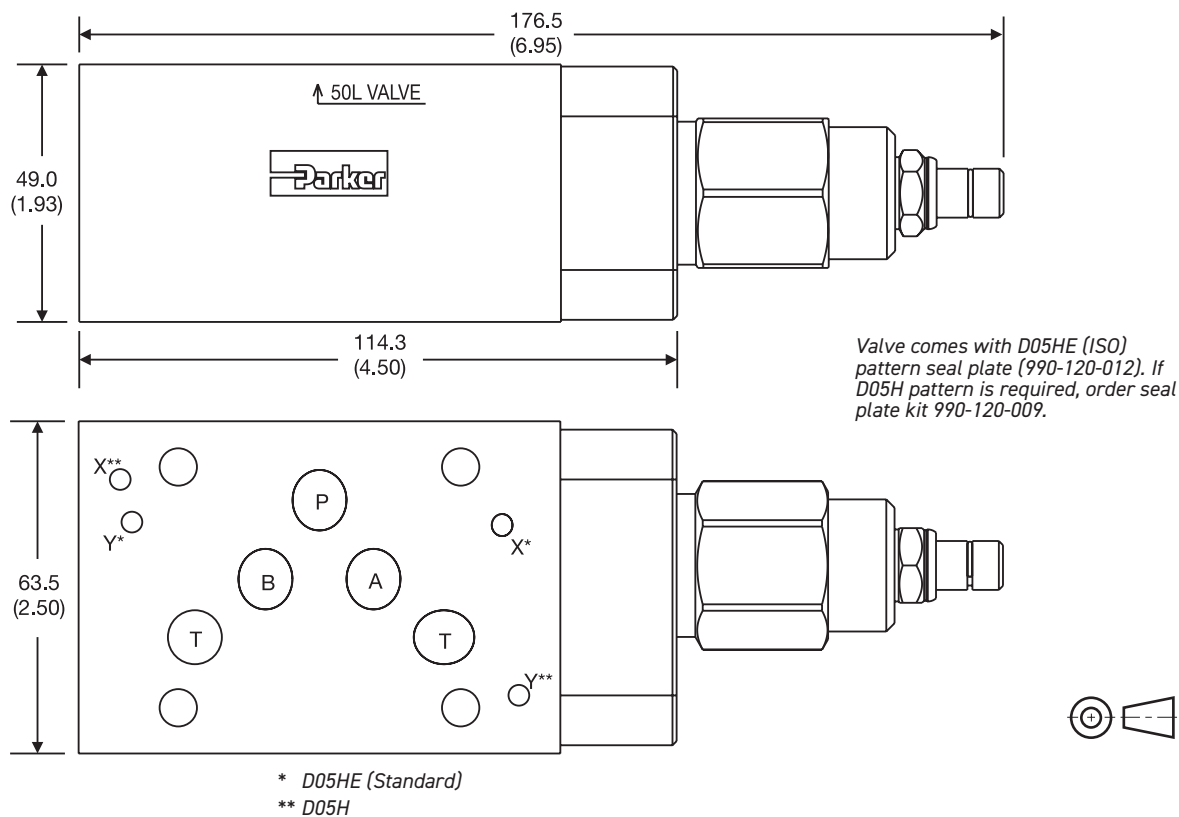
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Inch equivalents for millimeter dimensions are shown in (**)

RV5HDX



RV5HPT



Sandwich Valves

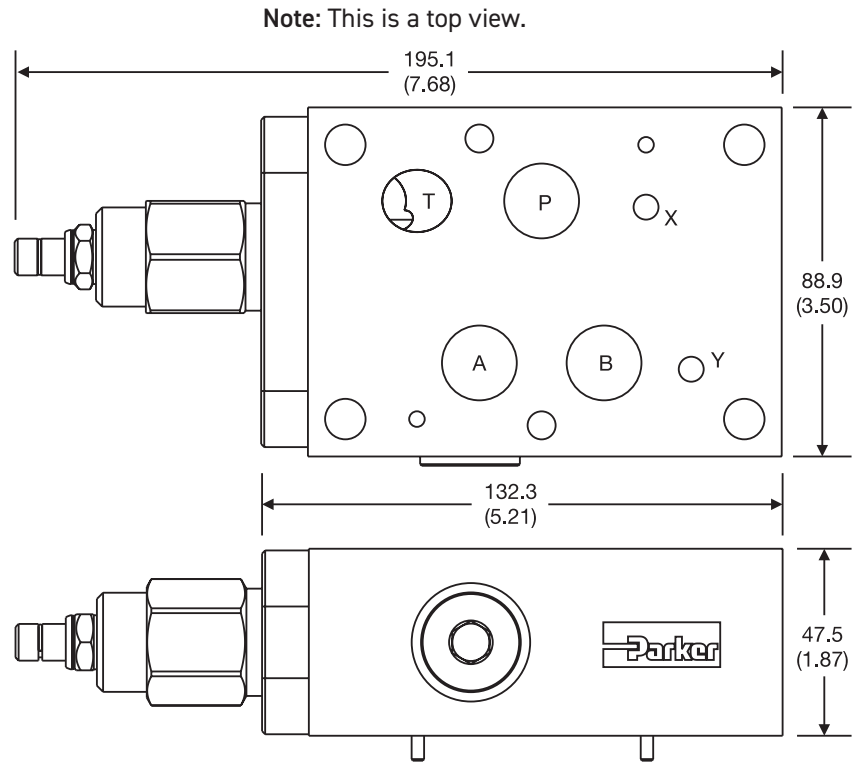
RV07 - Dimensions

B101

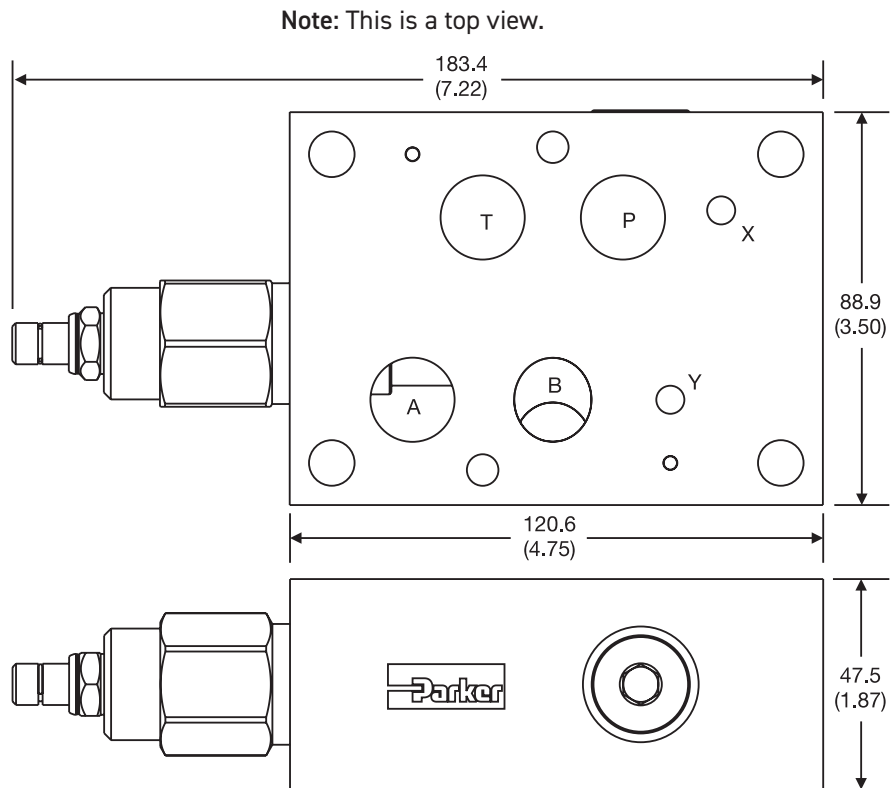
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Inch equivalents for millimeter dimensions are shown in (**)

RV07AT



RV07BT



Sandwich Valves

RV07 - Dimensions

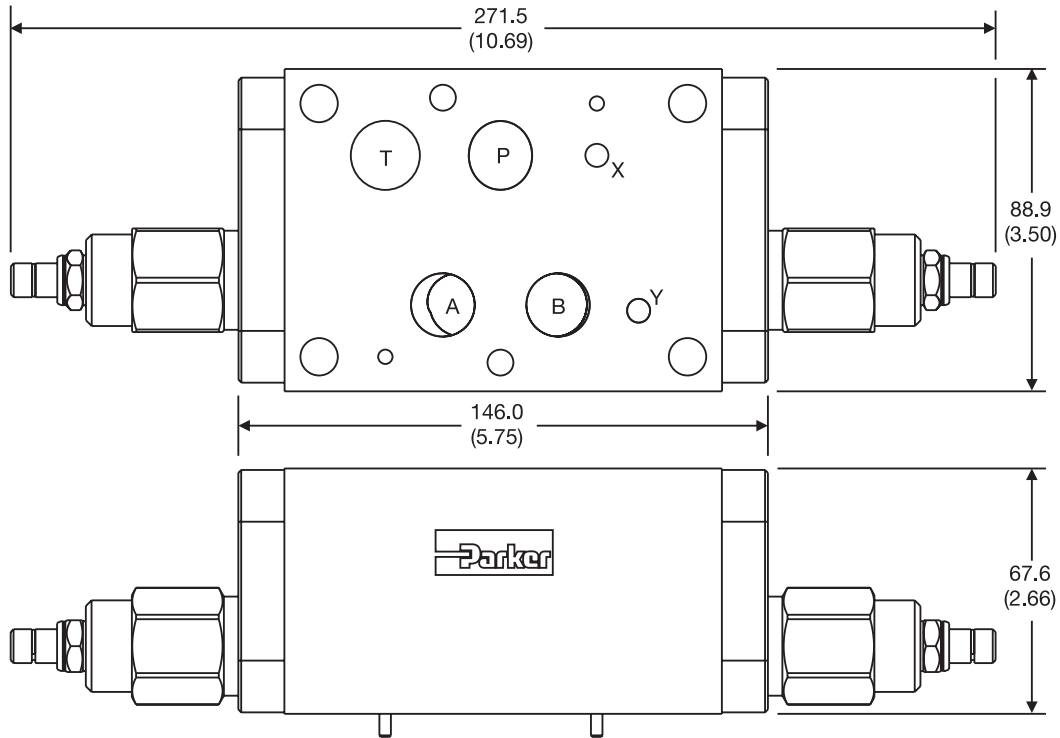
B102

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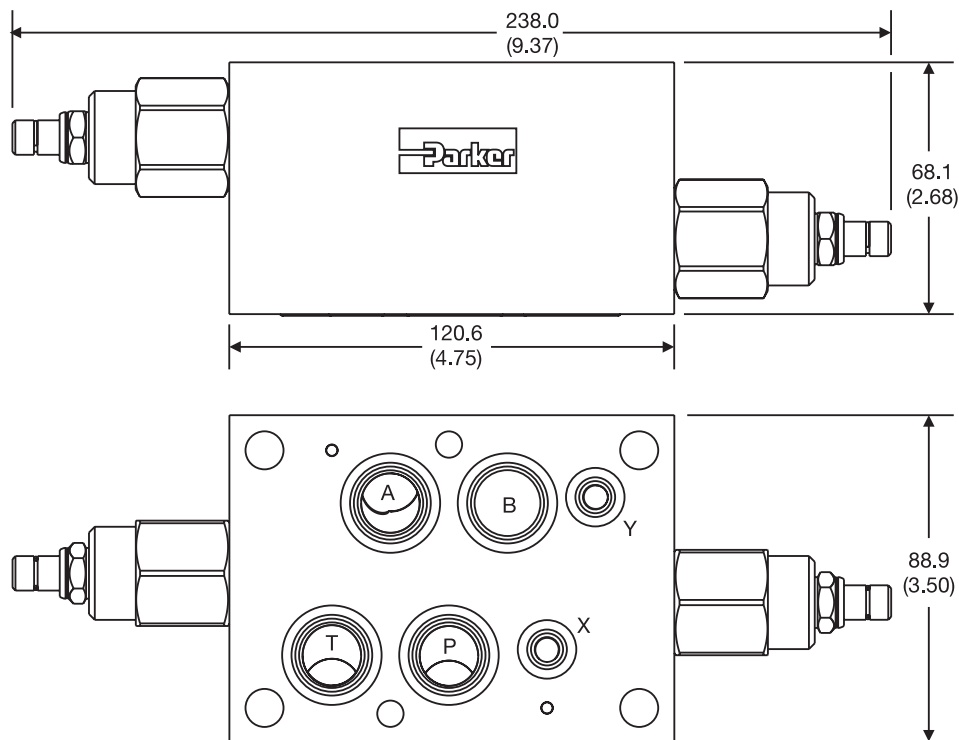
Inch equivalents for millimeter dimensions are shown in (**)

RV07DT

Note: This is a top view.



RV07DX



Sandwich Valves

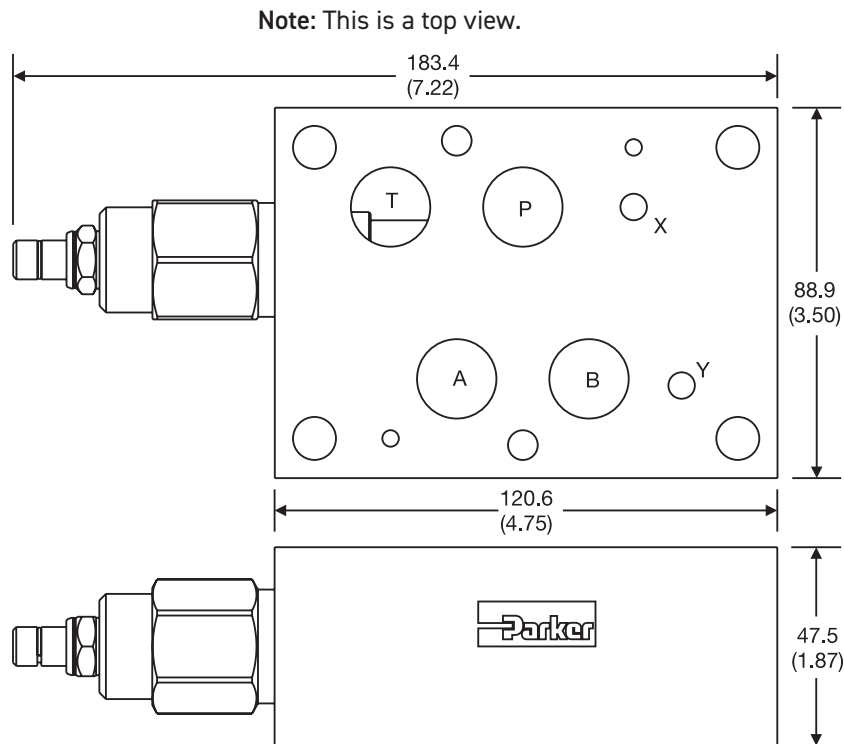
RV07, RV08 - Dimensions

B103

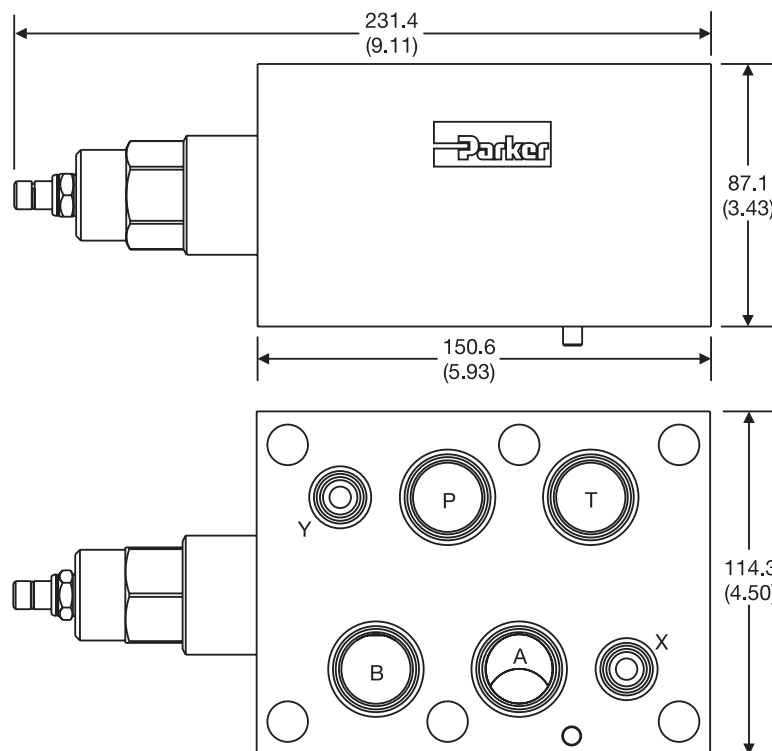
WWW.SUMY.IR

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

RV07PT



RV08AT



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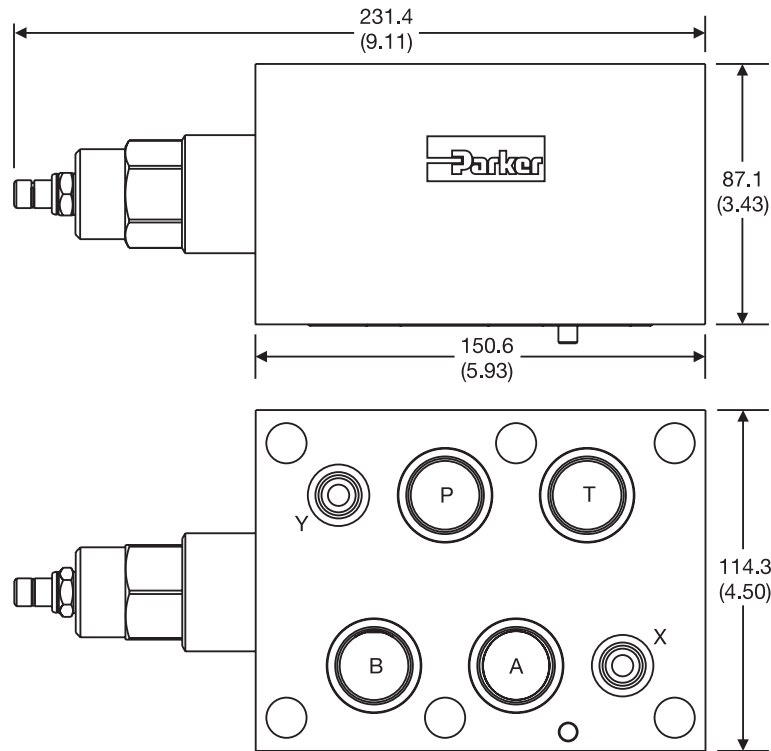
RV08 - Dimensions

B104

WWW.SUMY.IR

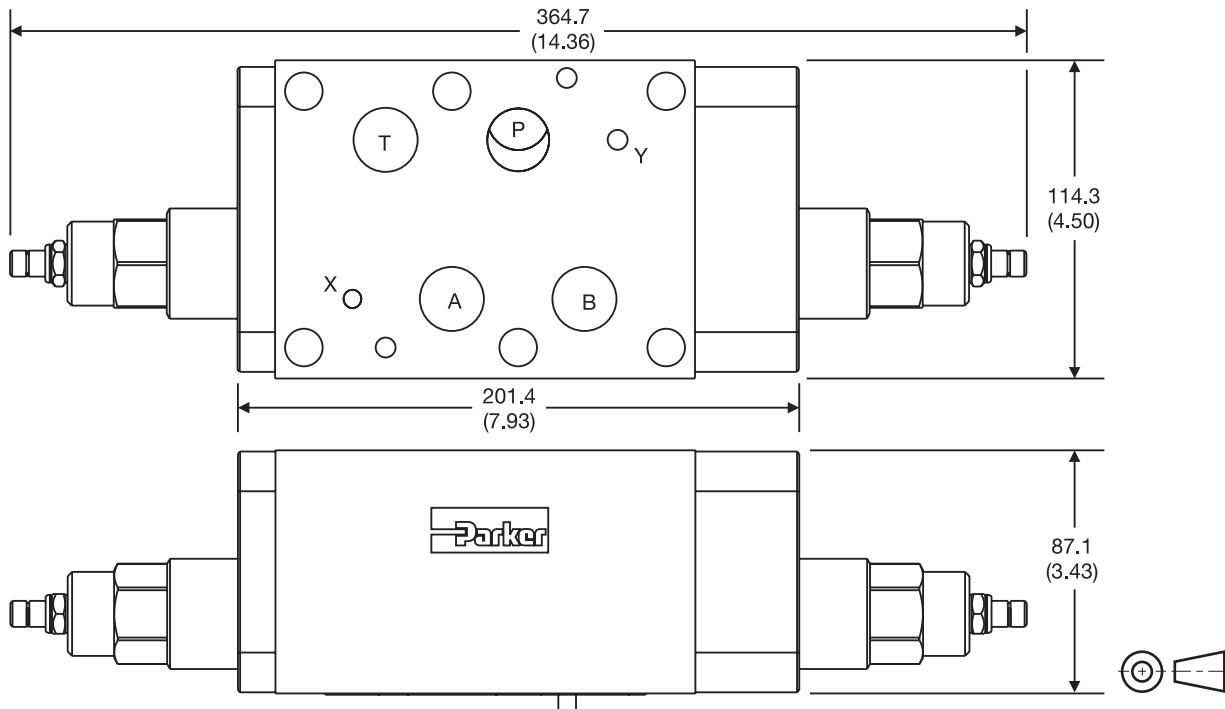
Inch equivalents for millimeter dimensions are shown in (**)

RV08BT



RV08DT

Note: This is a top view.



Sandwich Valves

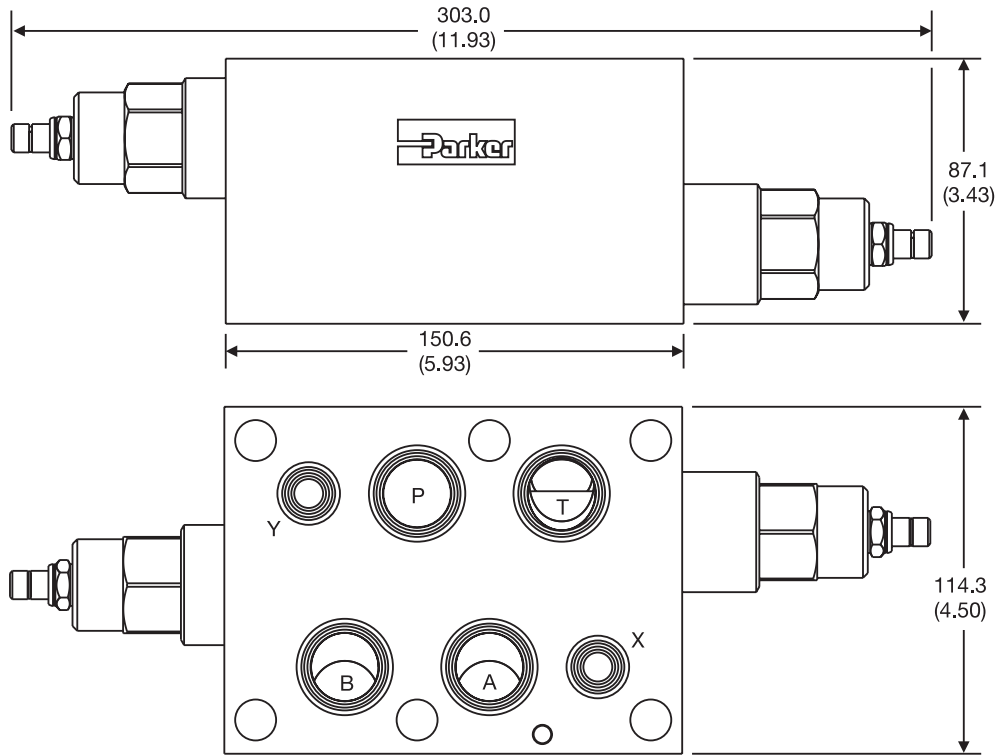
RV08 - Dimensions

B105

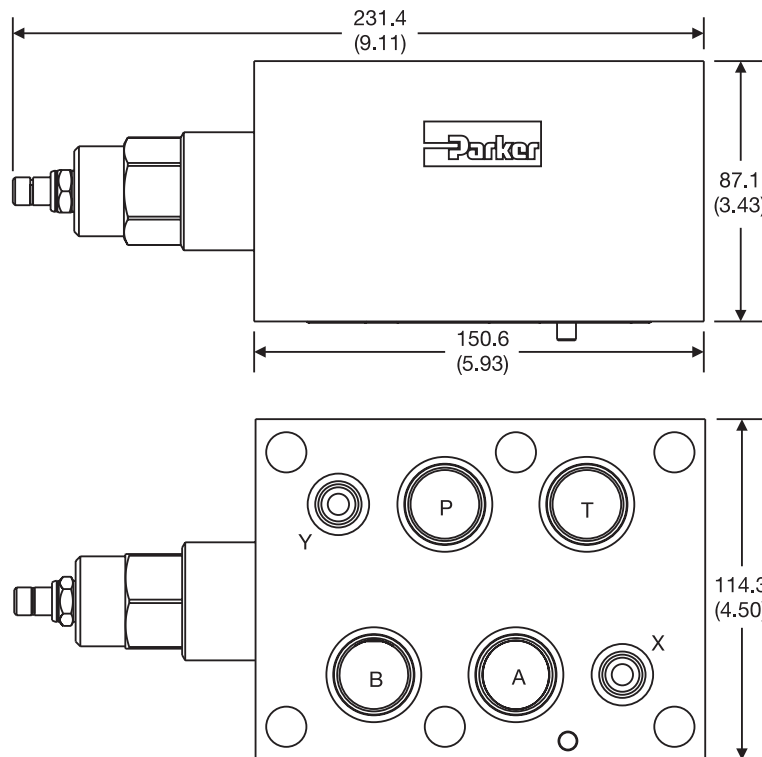
WWW.SUMY.IR

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

RV08DX



RV08PT



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General Description

Series ZDV pilot operated pressure relief valves are designed for maximum flow rates.

The relief function can be located between P and T, A and T, B and T or A and T + B and T for typical pressure relief functions.

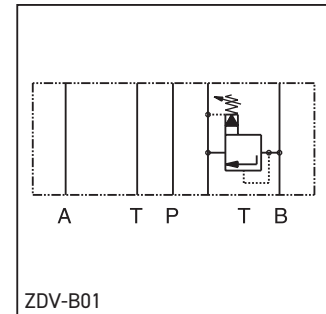
For a pre-charge function the ZDV can be ordered with pressure function between A and B + B and A.

Features

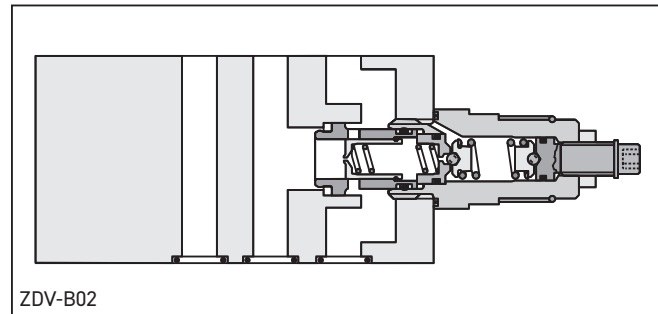
- High flow capacity.
- Pressure function in P, A, B or A + B.
- Sizes:
ZDV01 – NFPA D03 / NG6 / CETOP 3
ZDV02 – NFPA D05 / NG10 / CETOP 5



ZDV-B01



ZDV-B01



ZDV-B02

Ordering Information

ZDV

Pressure
Relief
Valve

Port
Option

Size

Code	Description
01	NFPA D03 / NG 06
02	NFPA D05 / NG 10

Code	Size	Description
P	01 / 02	P -> T
A	01 / 02	A -> T
B	01 / 02	B -> T
AB	01 / 02	A -> T and B -> T
ABS	01 / 02	A -> B and B -> A

Pressure
Range

S0

Hexagon Screw
with Lock Nut

Code	Description
1	up to 70 Bar (1015 PSI)
5*	Size Code 01: up to 350 Bar (5075 PSI) Size Code 02: up to 315 Bar (4568 PSI)

* Size Code 01, Port ABS - 315 Bar (4568 PSI)

D

Design
Series

Seal

Code	Description
1	Nitrile
5	Fluorocarbon

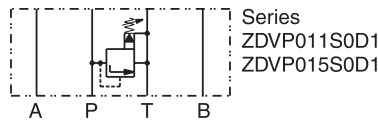
Weight:	One Cartridge	Two Cartridges
ZDV*01	1.6 kg (3.5 lbs.)	2.5 kg (5.5 lbs.)
ZDV*02	3.0 kg (6.6 lbs.)	3.7 kg (8.2 lbs.)

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

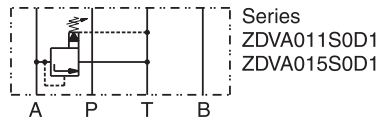
Schematics

ZDV01

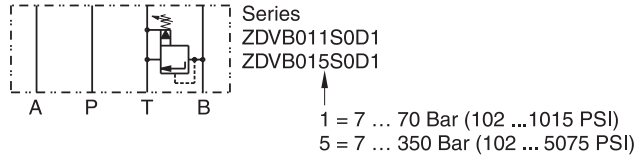
Pressure control P-T



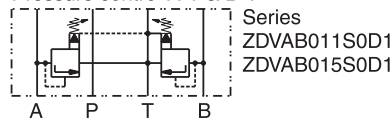
Pressure control A-T



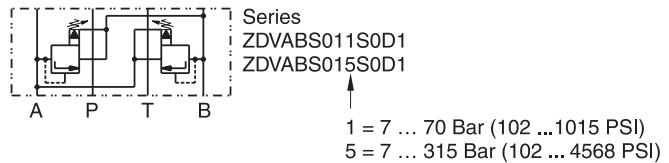
Pressure control B-T



Pressure control A-T & B-T

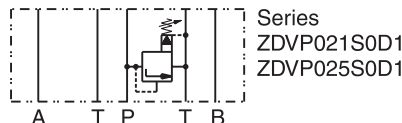


Pressure control A-B & B-A

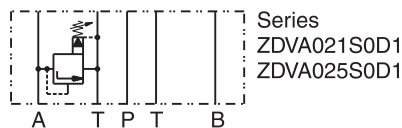


ZDV02

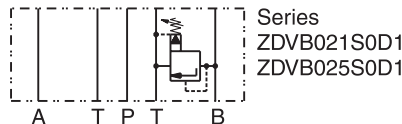
Pressure control P-T



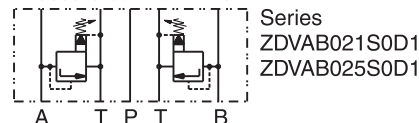
Pressure control A-T



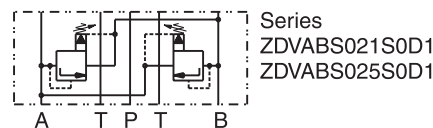
Pressure control B-T



Pressure control A-T & B-T



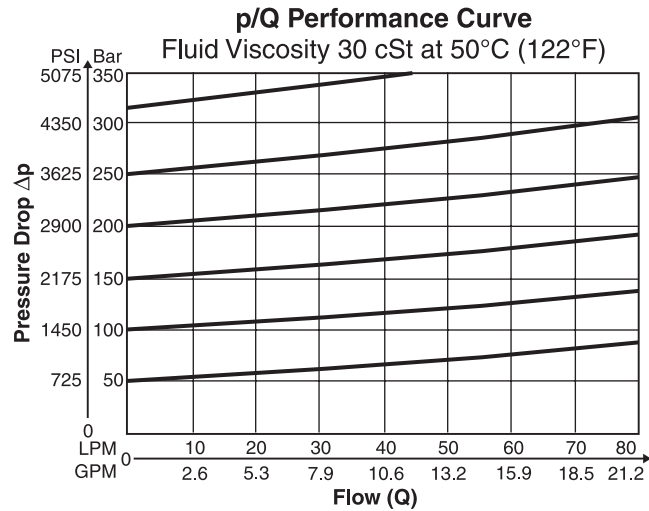
Pressure control A-B & B-A



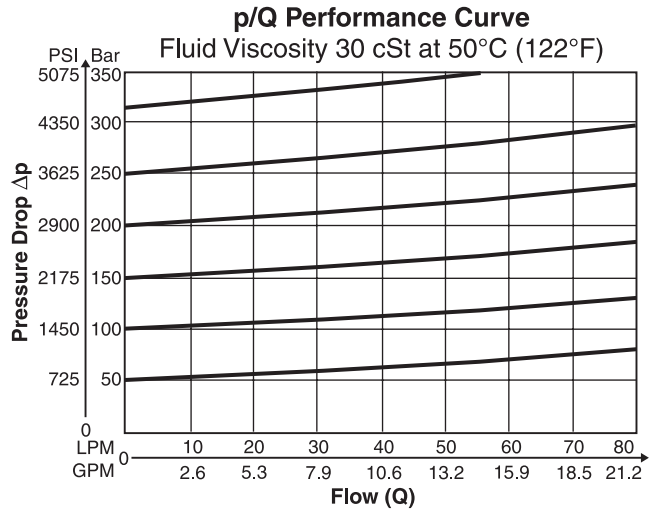
Specifications

General		
Size	NG 06	NG 10
Mounting Interface	DIN 24340 A6 ISO 4401 NFPA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFPA D05 CETOP RP 121 5
Mounting Position	Unrestricted	
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)	
Hydraulic		
Maximum Operating Pressure (Bar)	Up to 350 (5075 PSI); ZDV*ABS up to 315 (4568 PSI)	
Nominal Flow (LPM)	80 (21.2 GPM)	140 (37 GPM)
Fluid	Hydraulic oil as per DIN 51524 - 51525	
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)	
Viscosity		
Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)	
Recommended (cSt / mm²/s)	30 (139 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)	

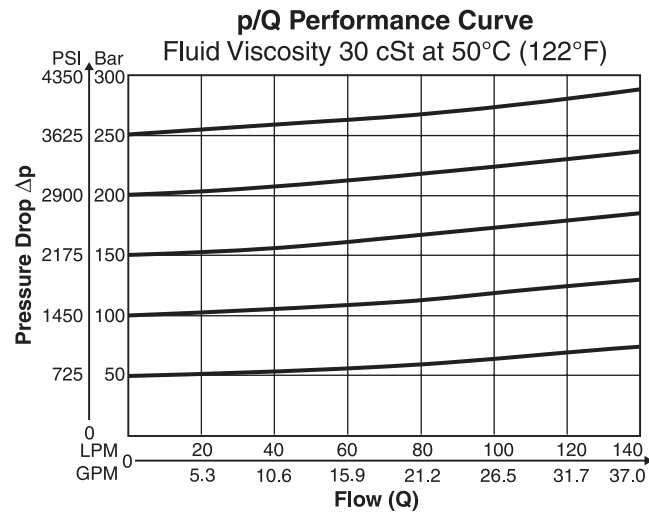
ZDV-P/A/B/ABS01



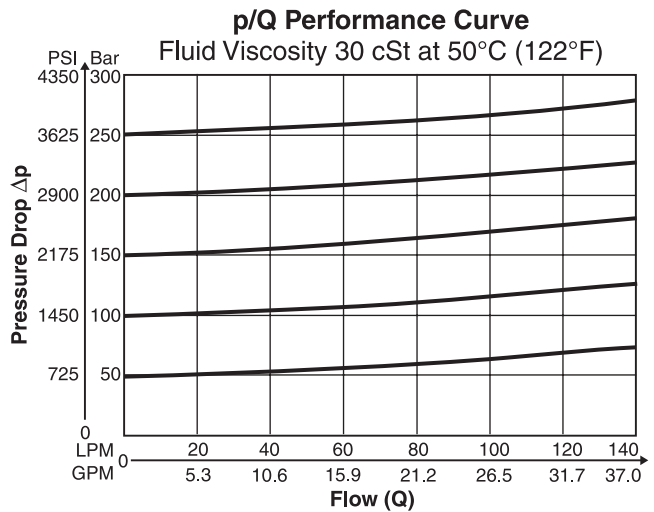
ZDV-AB01



ZDV-P/A/B/AB02



ZDV-ASB02



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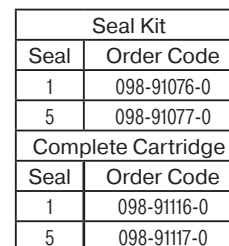
WWW.SUMY.IR

ZDV01



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ZDV02



General Description

Series ZNS counterbalance valve controls the actuator movement at overrunning loads.

The return flow from the actuator is piloted and controlled by the inlet flow to the actuator, ensuring a cavitation-free lowering of the load.

The counterbalance valve operates as a pressure relief valve. The setting pressure is lowered by the pressure in the inlet line. To ensure safe load holding the setting pressure should be approximately 30% higher than the max. load pressure.

Features

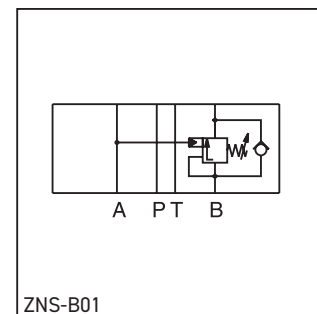
- Controlled movement loads.
- Load holding via leak-free poppet valve.
- Secondary relief protection for the actuator.
- Sizes:

ZNS*01 – NFPA D03 / NG6 / CETOP 3

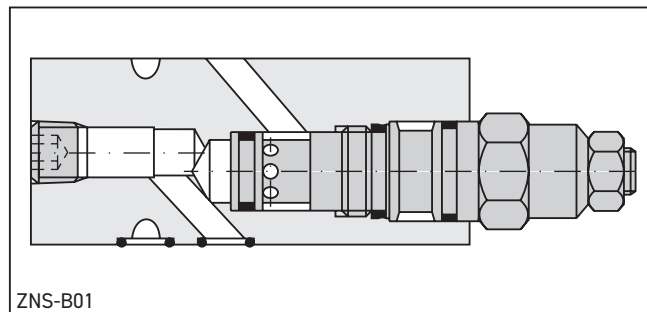
ZNS*02 – NFPA D05 / NG10 / CETOP 5



ZNS-AB01



ZNS-B01



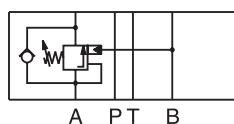
ZNS-B01

Ordering Information

ZNS					S0		D	
Counterbalance Valve		Port Option	Size	Pressure Range	Hexagon Screw with Lock Nut	Design Series	Seal	
Code	Description	Code	Description	Code	Description	Code	Description	
A	In A	01	NFPA D03 / NG 06	1	70 - 175 Bar (1015 - 2538 PSI)		1	Nitrile
B	In B	02	NFPA D05 / NG 10	5*	140 - 350 Bar (1015 - 5075 PSI)		5	Fluorocarbon
AB	In A and B			* ZNS02 to 315 Bar (4568 PSI)				
				Weight: 1 cartridge		2 cartridges		
				ZNS*01 1.3 kg (2.9 lbs.)		3.0 kg (6.6 lbs.)		
				ZNS*02 1.6 kg (3.5 lbs.)		3.9 kg (8.6 lbs.)		

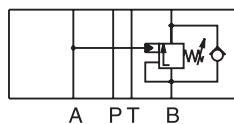
Schematics

Counterbalance in A



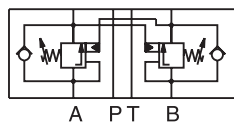
A PT B

Counterbalance in B



A PT B

Counterbalance in A and B



A PT B

ZNS01

Series
ZNSA012S0D1
ZNSA015S0D1

Series
ZNSB011S0D1
ZNSB015S0D1

Series
ZNSAB011S0D1
ZNSAB015S0D1

2 = 70 ... 175 Bar (1015 ... 2538 PSI)
5 = 140 ... 350 Bar (2030 ... 5075 PSI)

ZNS02

Series
ZNSA022S0D1
ZNSA025S0D1

Series
ZNSB021S0D1
ZNSB025S0D1

Series
ZNSAB021S0D1
ZNSAB025S0D1

2 = 70 ... 175 Bar (1015 ... 2538 PSI)
5 = 140 ... 315 Bar (2030 ... 4568 PSI)

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

ZNS - Specifications

B111

WWW.SUMY.IR

Specifications		
General		
Size	NG 06	NG 10
Mounting Interface	DIN 24340 A6 ISO 4401 NFPA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFPA D05 CETOP RP 121 5
Mounting Position	Unrestricted	
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)	
Hydraulic		
Maximum Operating Pressure (Bar)	350 (5075 PSI)	315 (4568 PSI)
Pressure Range (Bar)	175 (2538 PSI), 350 (5075 PSI)	
Pilot Ratio	4.5:1	
Leakage	On request	
Nominal Flow (LPM)	60 (15.9 GPM)	120 (31.7 GPM)
Opening Pressure Flow (LPM)	0.3 (0.1 GPM)	0.3 (0.1 GPM)
Fluid	Hydraulic oil as per DIN 51524 - 51525	
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)	
Viscosity		
Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)	
Recommended (cSt / mm²/s)	30 (139 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)	

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Sandwich Valves

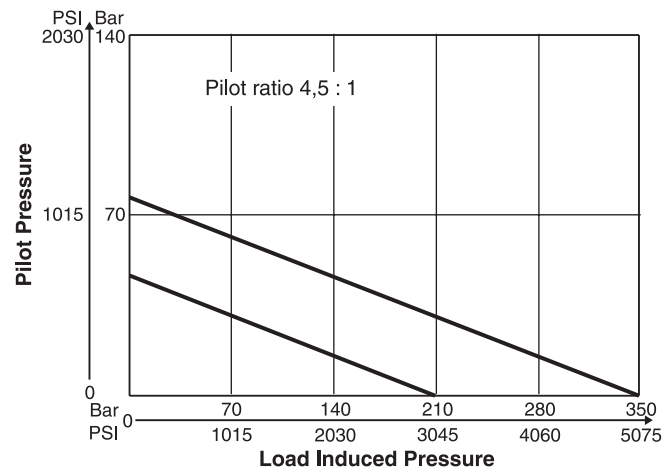
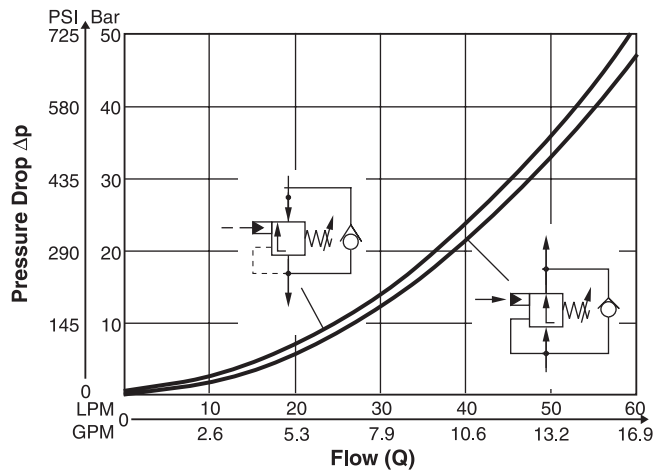
ZNS - Performance Curves

B112

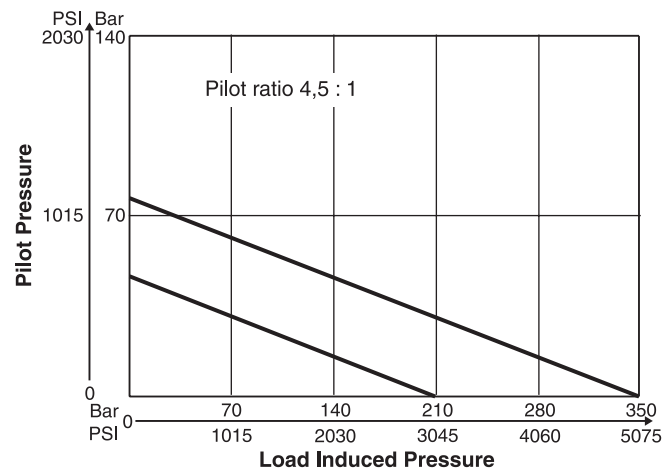
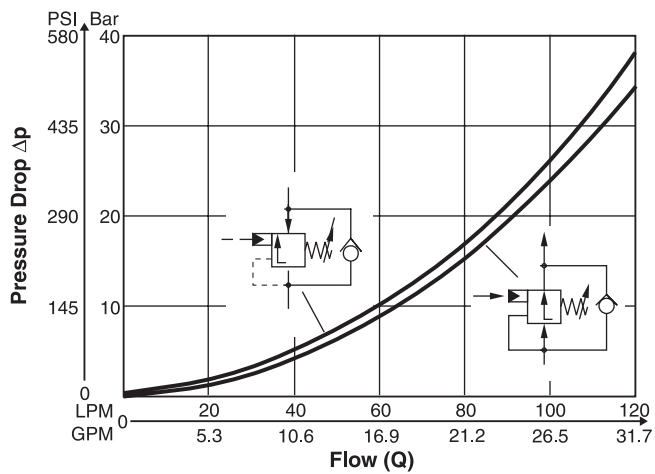
WWW.SUMY.IR

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

ZNS01



ZNS02



Sandwich Valves

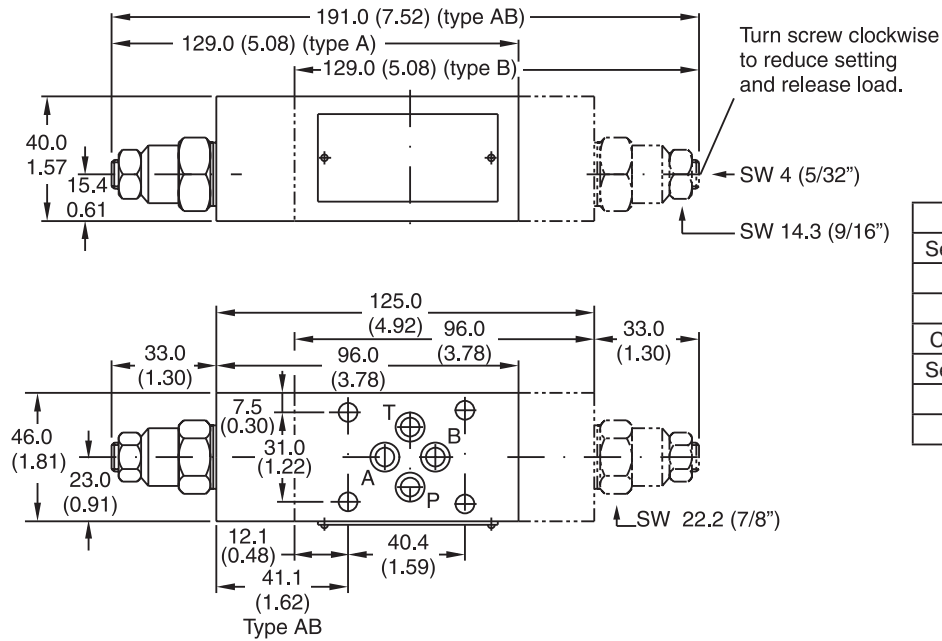
ZNS - Dimensions

B113

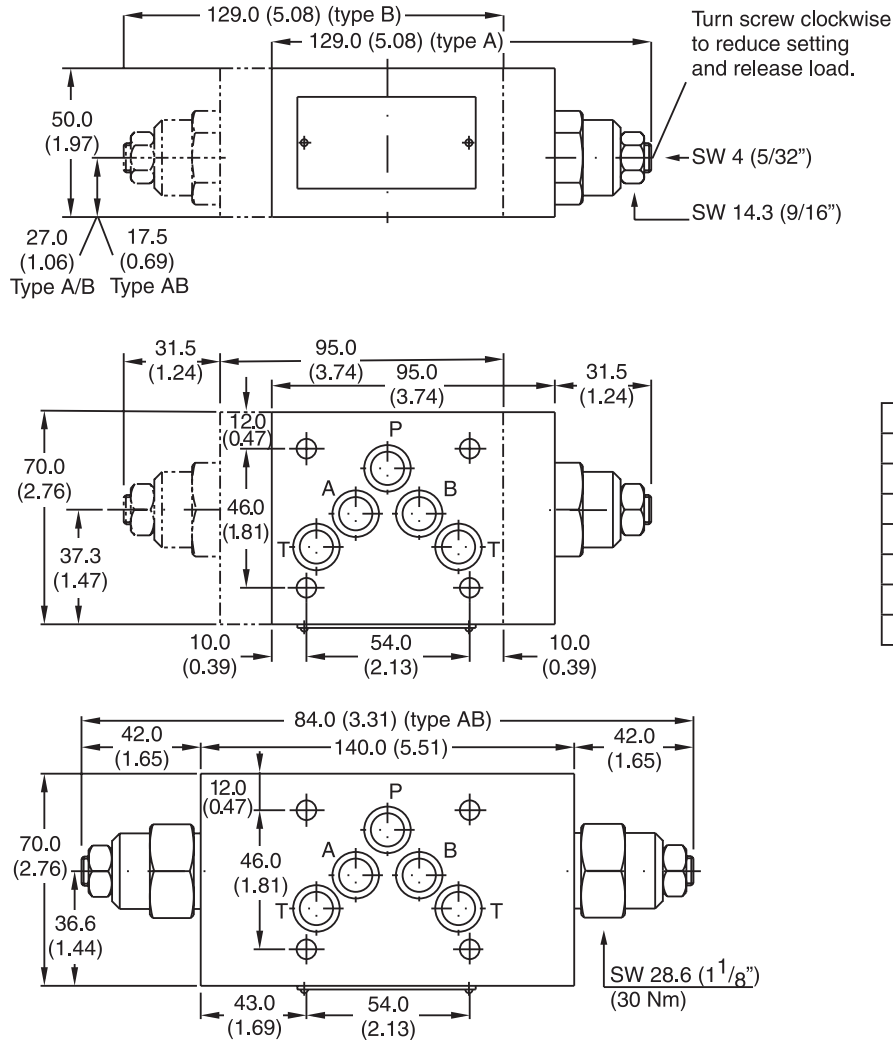
WWW.SUMY.IR

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

ZNS01



ZNS02



General Description

Series CB counterbalance valve controls the actuator movement with overrunning loads.

The return flow from the actuator is piloted and controlled by the inlet flow to the actuator, ensuring a cavitation-free lowering of the load.

The counterbalance valve operates as a pressure relief valve. The setting pressure is lowered by the pressure in the inlet line. To ensure safe load holding the setting pressure should be approximately 30% higher than the max. load pressure.

Features

- Controlled movement loads.
- Load holding via leak-free poppet valve.
- Secondary relief protection for the actuator.
- Sizes:

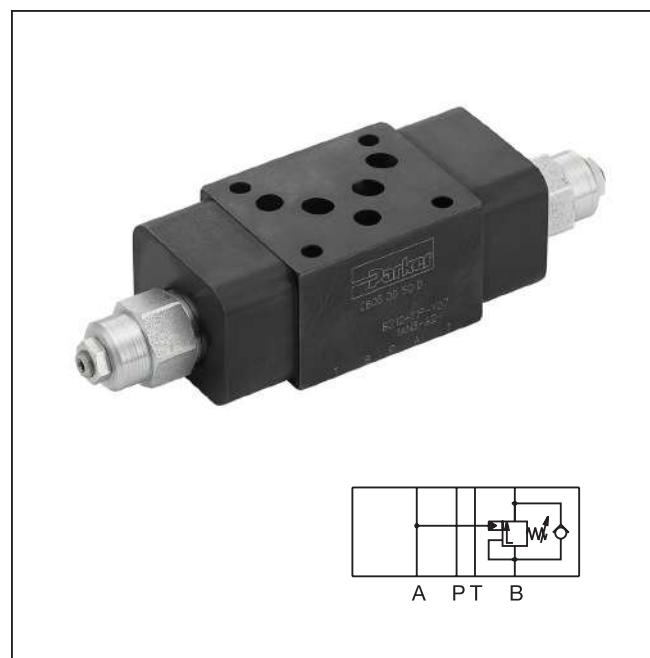
CB03 – NFPA D03 / NG6 / CETOP 3

CB05 – NFPA D05 / NG10 / CETOP 5

CB5H – NFPA D05HE / NG10 / CETOP 5H

CB07 – NFPA D07 / NG16 / CETOP 7

CB08 – NFPA D08 / NG25 / CETOP 8



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Specifications

General					
Size	D03 / NG 06	D05 / NG 10	D05HE / NG 10	D07 / NG 16	D08 / NG 25
Mounting Position	Unrestricted				
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)				
Hydraulic					
Maximum Operating Pressure* (Bar)	Aluminum Body - up to 207 (3000 PSI); Ductile Iron Body - up to 345 (5000 PSI)				
Nominal Flow (LPM)	57 (15 GPM)	114 (30 GPM)	114 (30 GPM)	227 (60 GPM)	454 (120 GPM)
Leakage (DPM)	5	5	5	5	5
Resest Pressure	85% of set pressure				
Pilot Ratio	3:1	3:1	3:1	3:1	3:1
Adjustment Screw Hex Size	5/32	5/32	5/32	5/32	5/32
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)				
Viscosity					
Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)				
Recommended (cSt / mm²/s)	30 (139 SSU)				
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)				
* Counterbalance valves should be set at least 1.3 times the maximum load induced pressure					

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

CB - Ordering Information

B115

WWW.SUMY.IR

CB

Counterbalance Valve

Size

Style

30

Pressure Range

Seal

Body Material

Code	Description
03	NFPA D03 / NG 06
05	NFPA D05 / NG 10
SH*	NFPA D05HE / NG 10
07	NFPA D07 / NG 16
08	NFPA D08 / NG 25

Code	Description
30	207 Bar (3000 PSI)* 69 - 276 Bar (1000 to 4000 PSI)

Code	Description
A	Aluminum
D	Ductile Iron

* Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.

Code	Description
AA	In A
BB	In B
DD	In A and B

Code	Description
N	Nitrile
V*	Fluorocarbon

* Upon request

B

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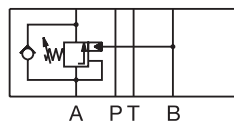
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Weight						
Size	CB**AA30NA	CB**AA30ND	CB**BB30NA	CB**BB30ND	CB**DD30NA	CB**DD30ND
CB03	0.3 kg (0.8 lbs)	1.1 kg (2.4 lbs)	0.5 kg (1.1 lbs)	1.1 kg (2.4 lbs)	0.8 kg (1.7 lbs)	1.5 kg (3.2 lbs)
CB05, CB5H	1.0 kg (2.3 lbs)	2.2 kg (4.9 lbs)	1.0 kg (2.3 lbs)	2.2 kg (4.9 lbs)	1.5 kg (3.2 lbs)	2.9 kg (6.4 lbs)
CB07	2.5 kg (5.6 lbs)	4.8 kg (10.6 lbs)	2.5 kg (5.6 lbs)	5.3 kg (11.8 lbs)	3.6 kg (8.0 lbs)	7.3 kg (16.2 lbs)
CB08	5.3 kg (11.7 lbs)	11.8 kg (25.9 lbs)	5.9 kg (13.1 lbs)	13.3 kg (29.3 lbs)	7.9 kg (17.4 lbs)	16.2 kg (35.8 lbs)

Schematics

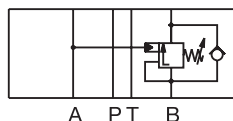
CB**AA

Counterbalance in A



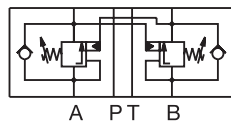
CB**BB

Counterbalance in B

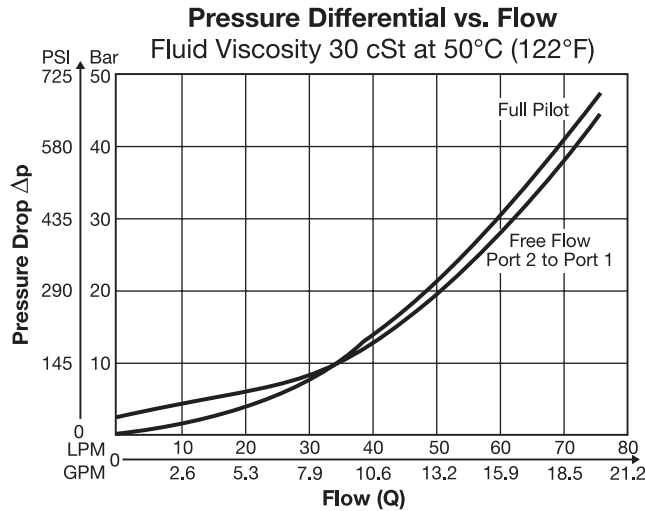


CB**DD

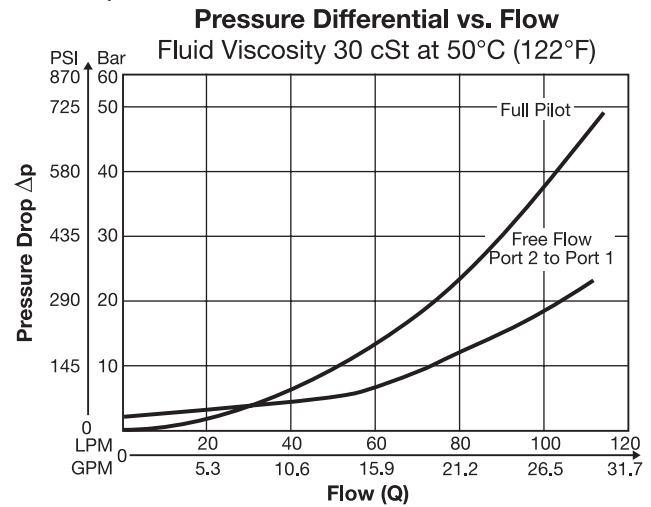
Counterbalance in A and B



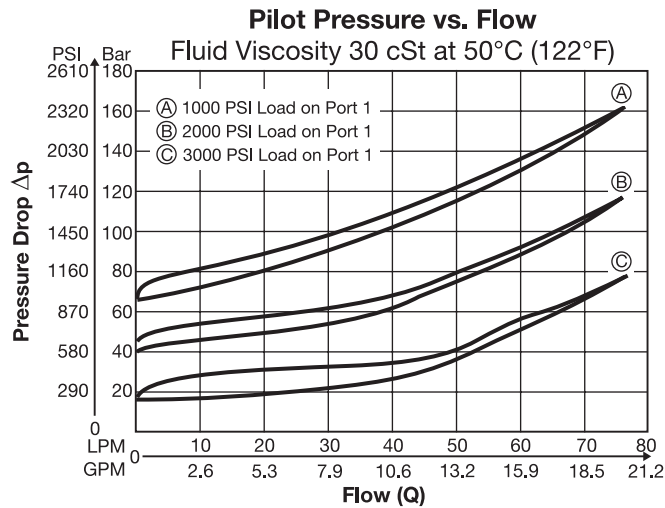
CB03*



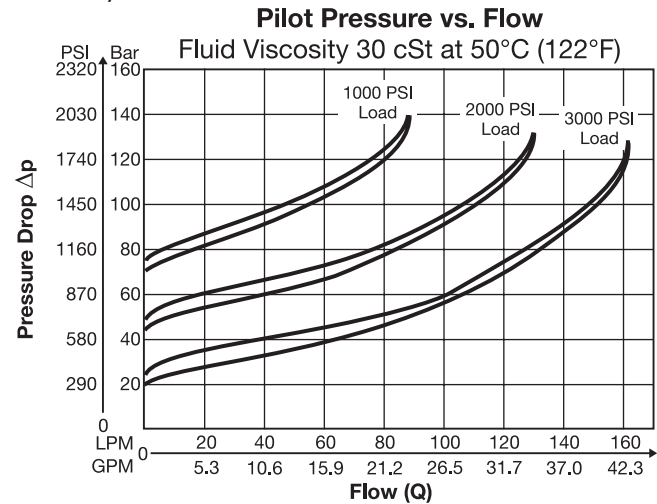
CB05/CB5H



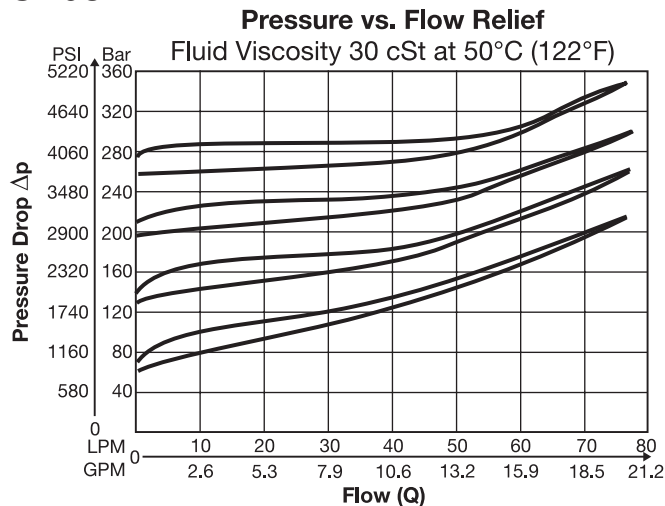
CB03*



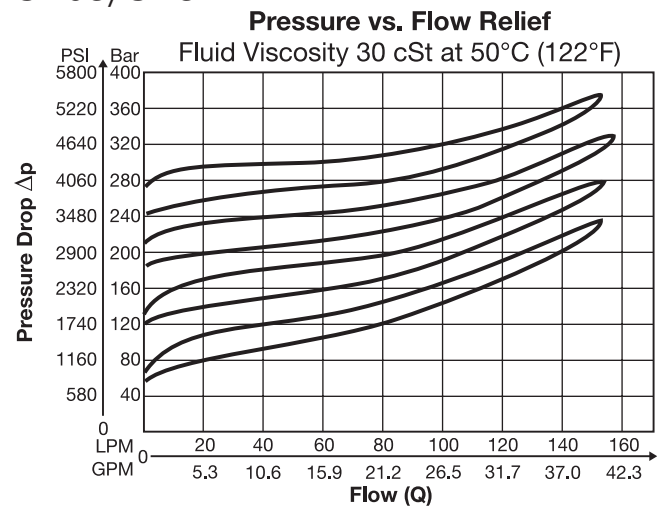
CB05/CB5H



CB03*



CB05/CB5H



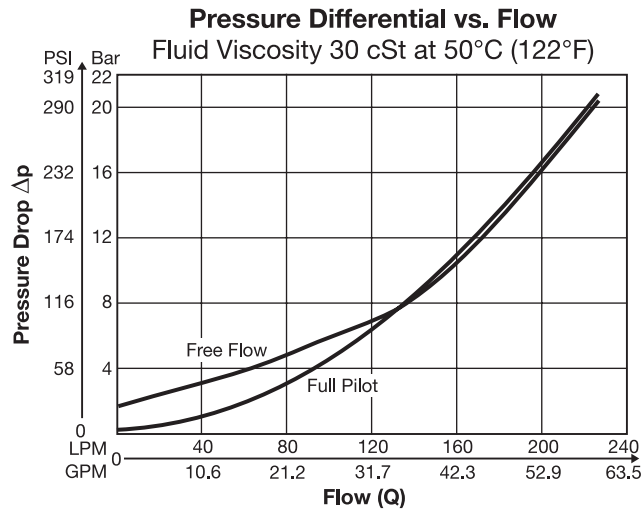
Sandwich Valves

CB - Performance Curves

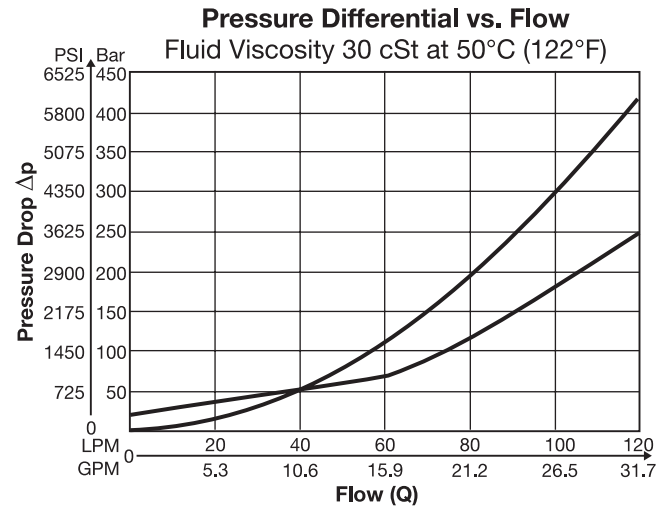
B117

WWW.SUMY.IR

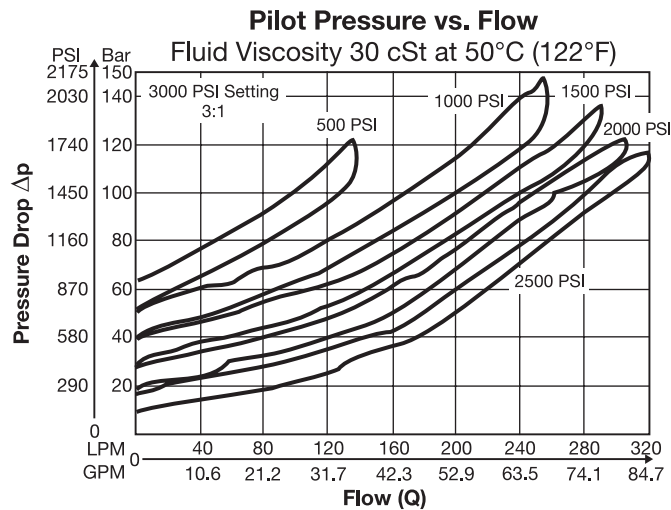
CB07*



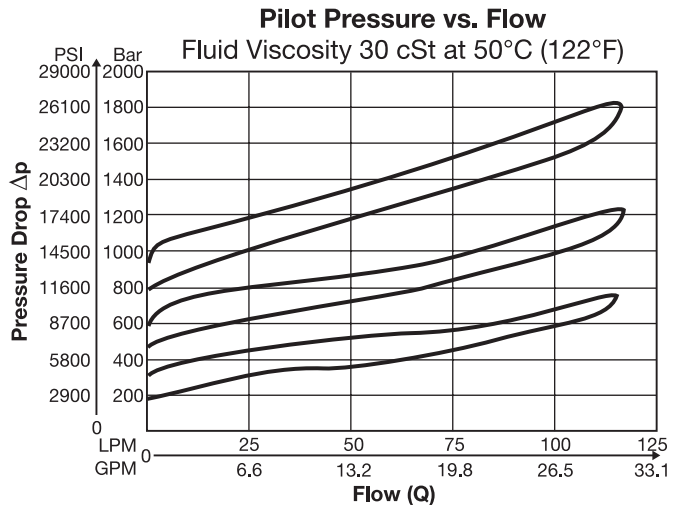
CB08*



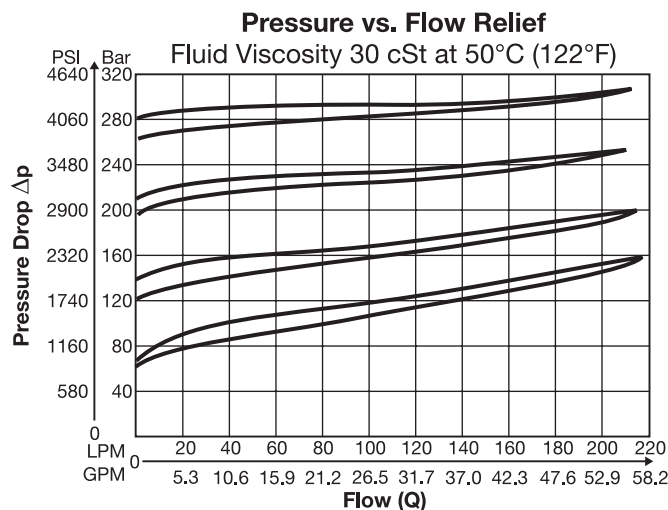
CB07*



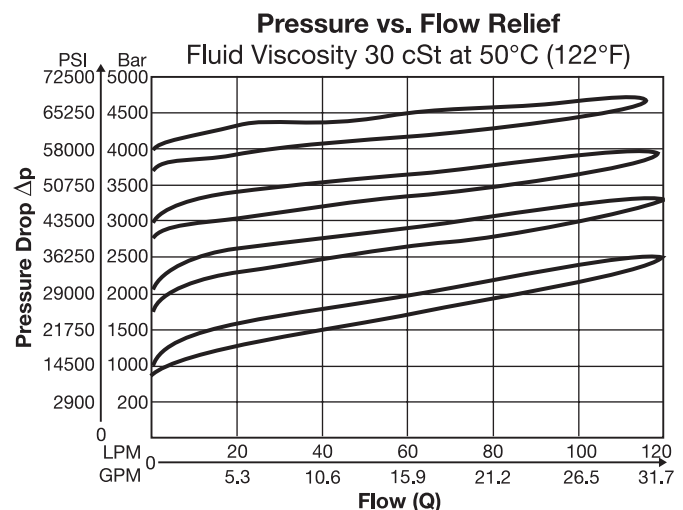
CB08*



CB07*



CB08*



Sandwich Valves

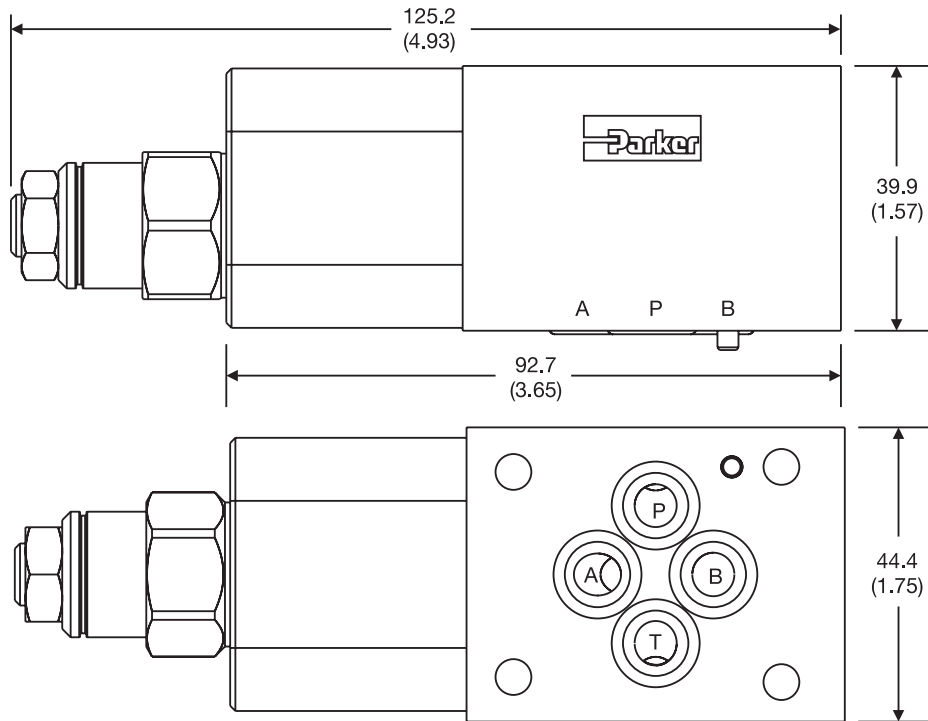
CB03 - Dimensions

B118

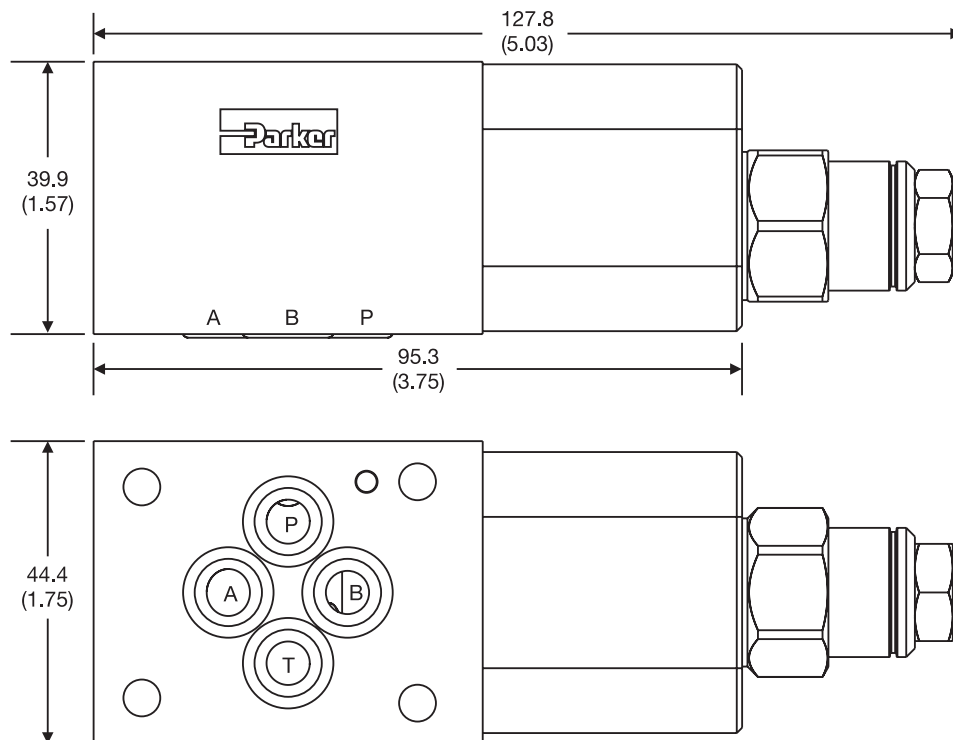
WWW.SUMY.IR

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

CB03AA



CB03BB



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Sandwich Valves

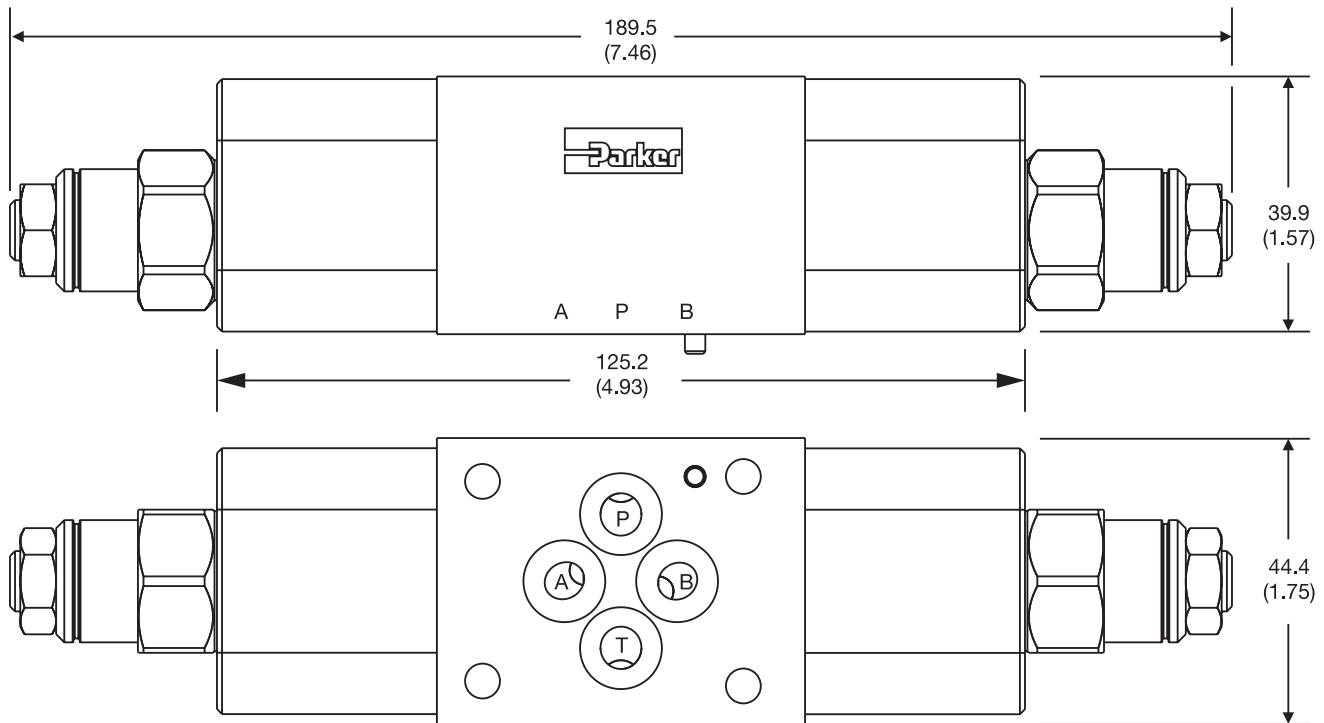
CB03, CB05 - Dimensions

B119

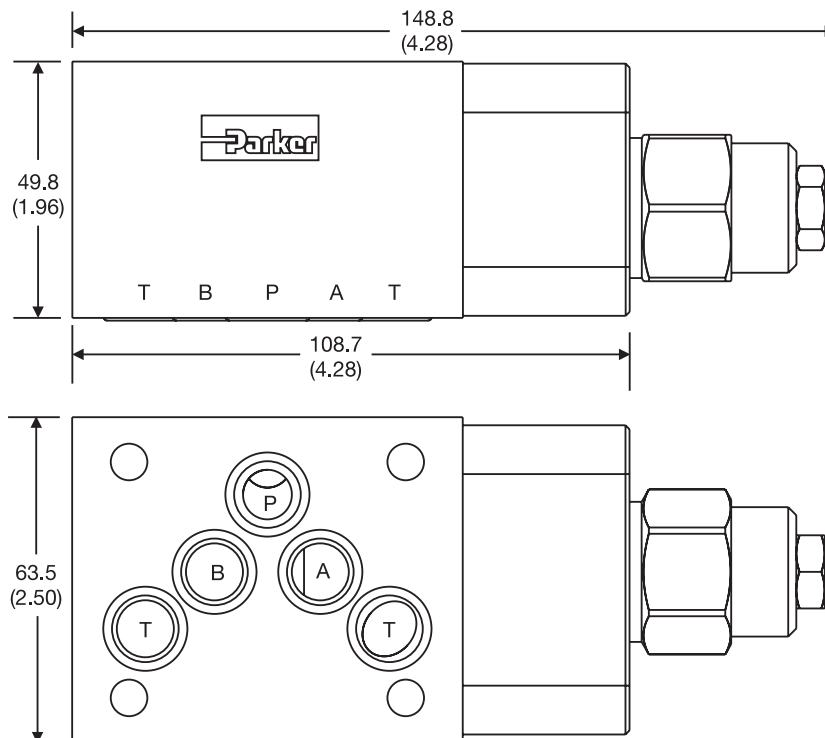
WWW.SUMY.IR

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

CB03DD



CB05AA



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Sandwich Valves

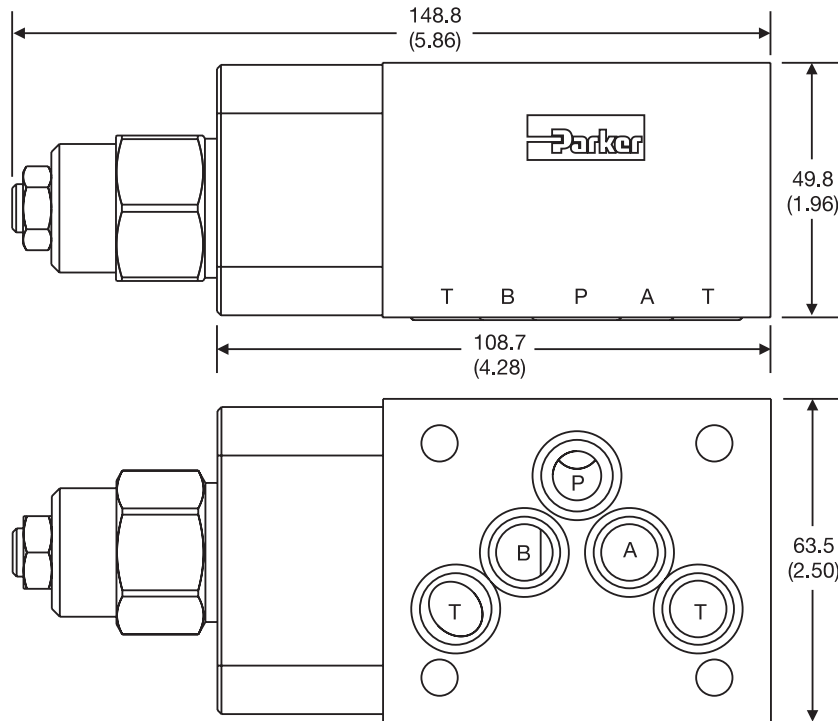
CB05 - Dimensions

B120

WWW.SUMY.IR

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

CB05BB

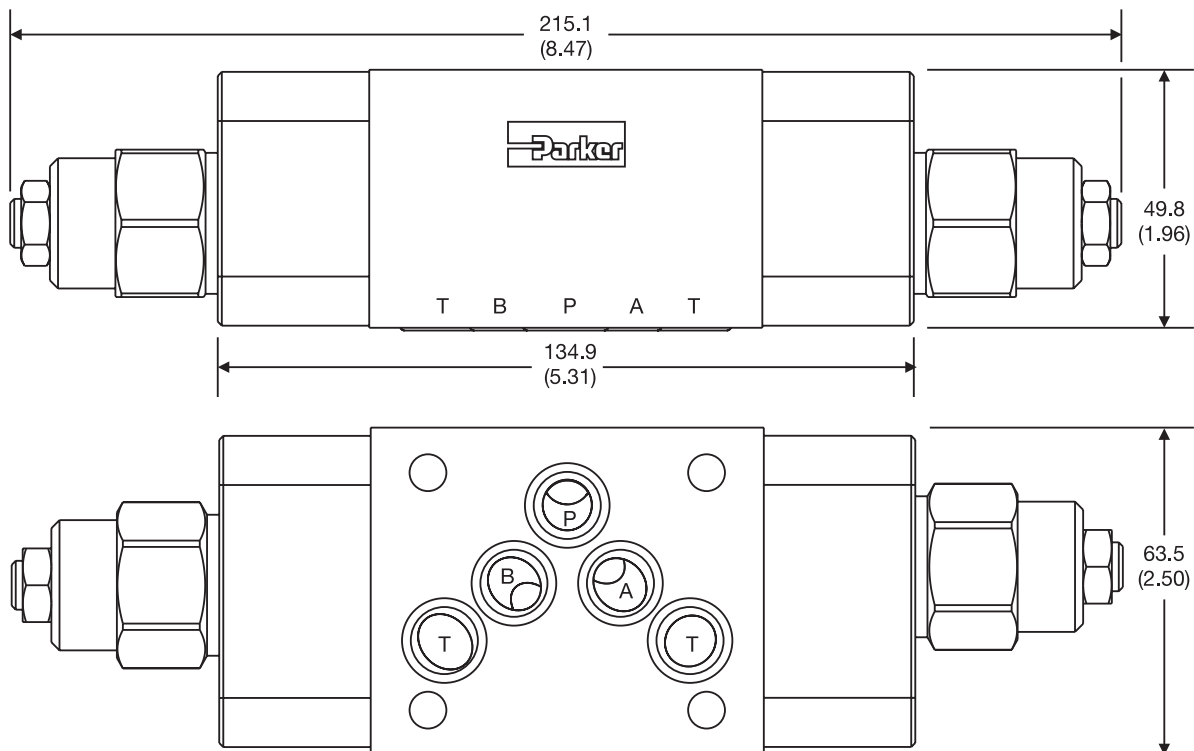


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CB05DD



Sandwich Valves

CB5H - Dimensions

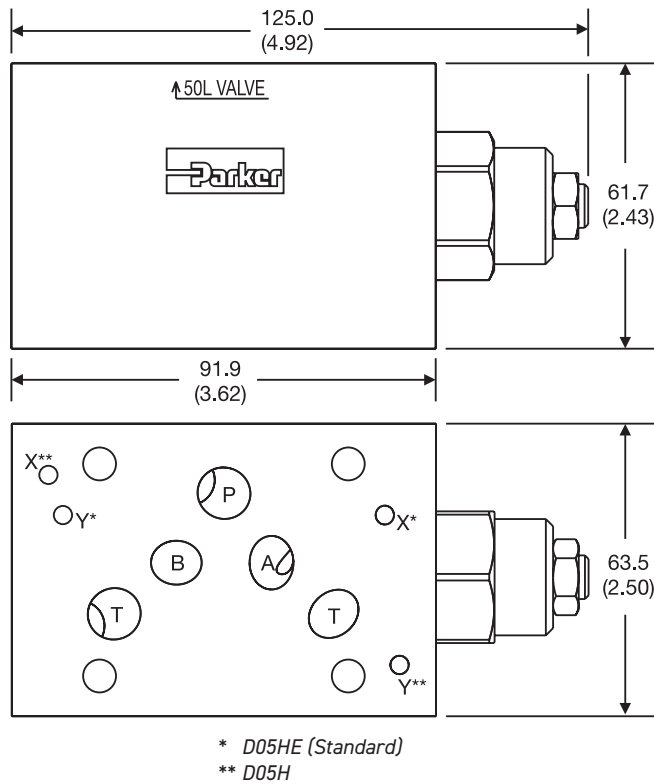
B121

WWW.SUMY.IR

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

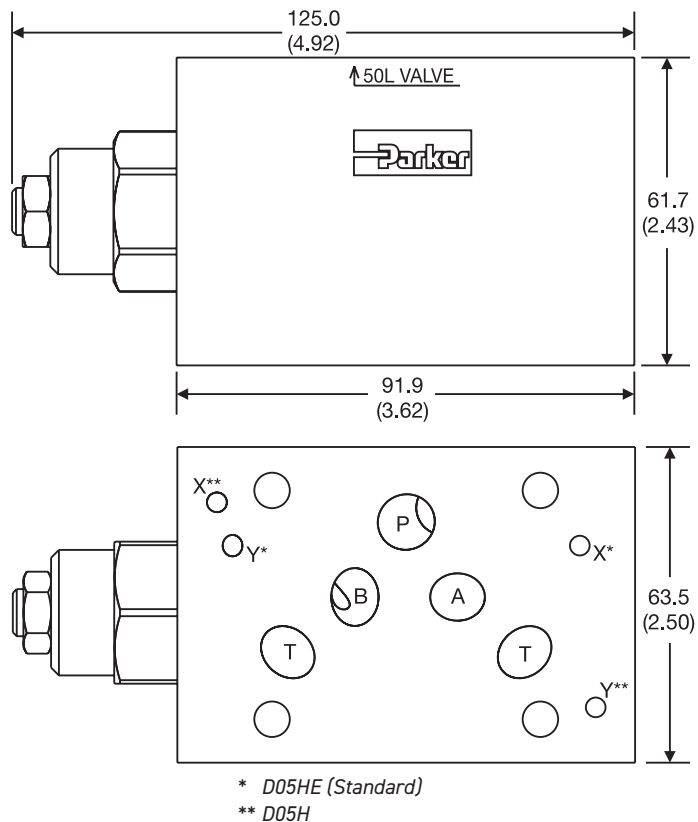
CB5HAA

Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.



CB5HBB

Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.



Sandwich Valves

CB5H, CB07 - Dimensions

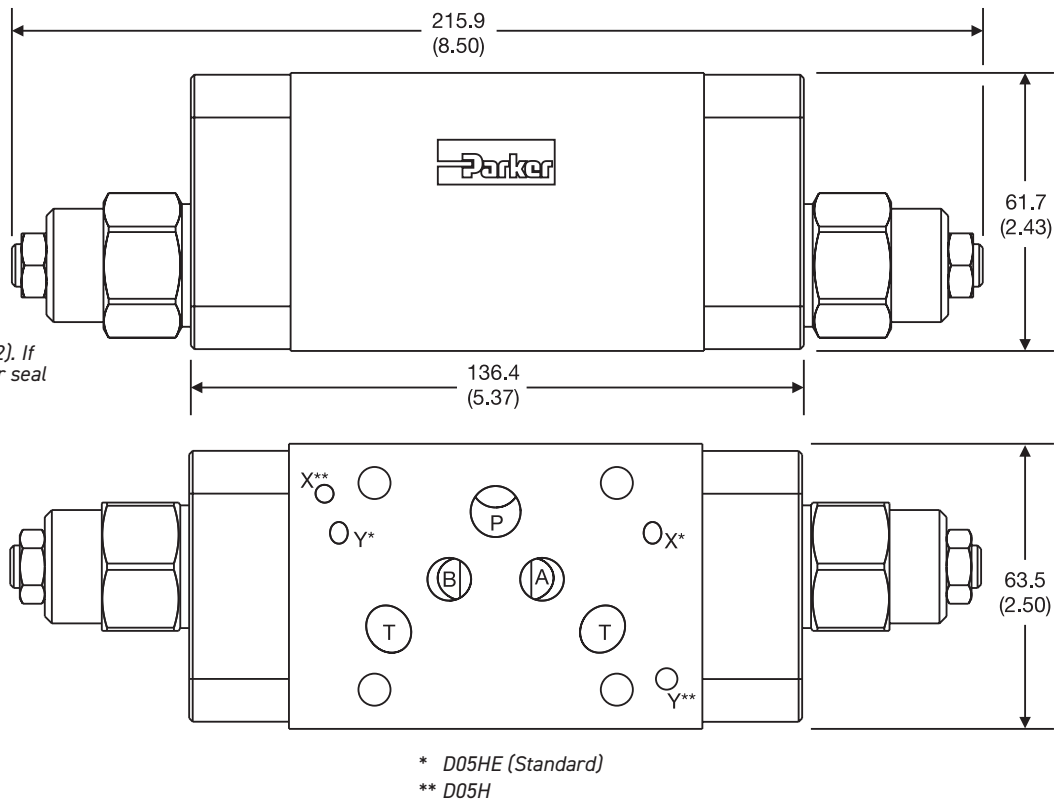
B122

WWW.SUMY.IR

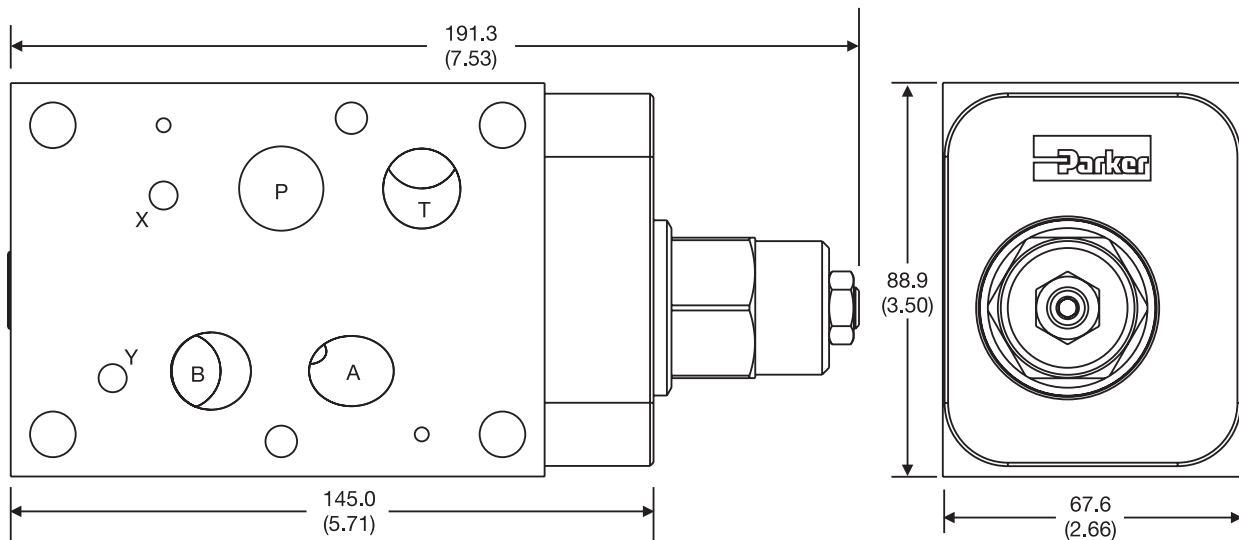
Inch equivalents for millimeter dimensions are shown in (**)

CB5HDD

Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.



CB07AA



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Sandwich Valves

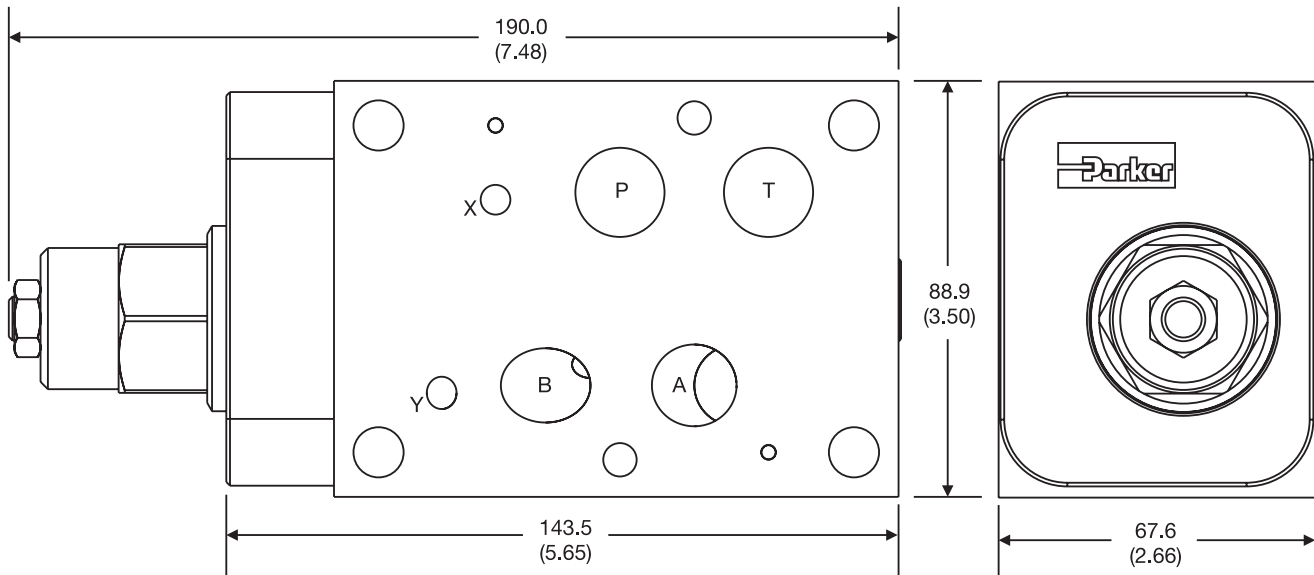
CB07 - Dimensions

B123

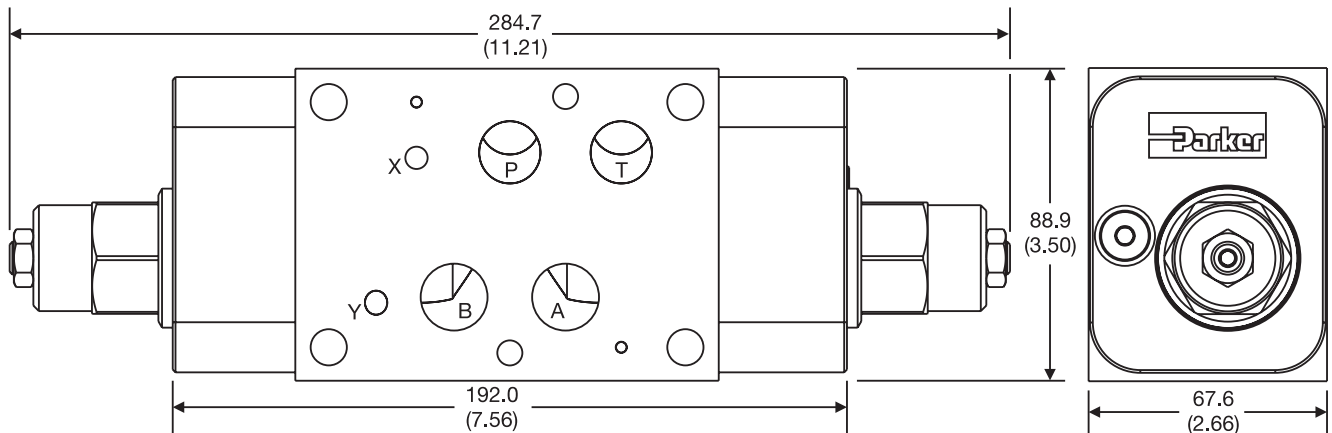
WWW.SUMY.IR

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

CB07BB



CB07DD



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Sandwich Valves

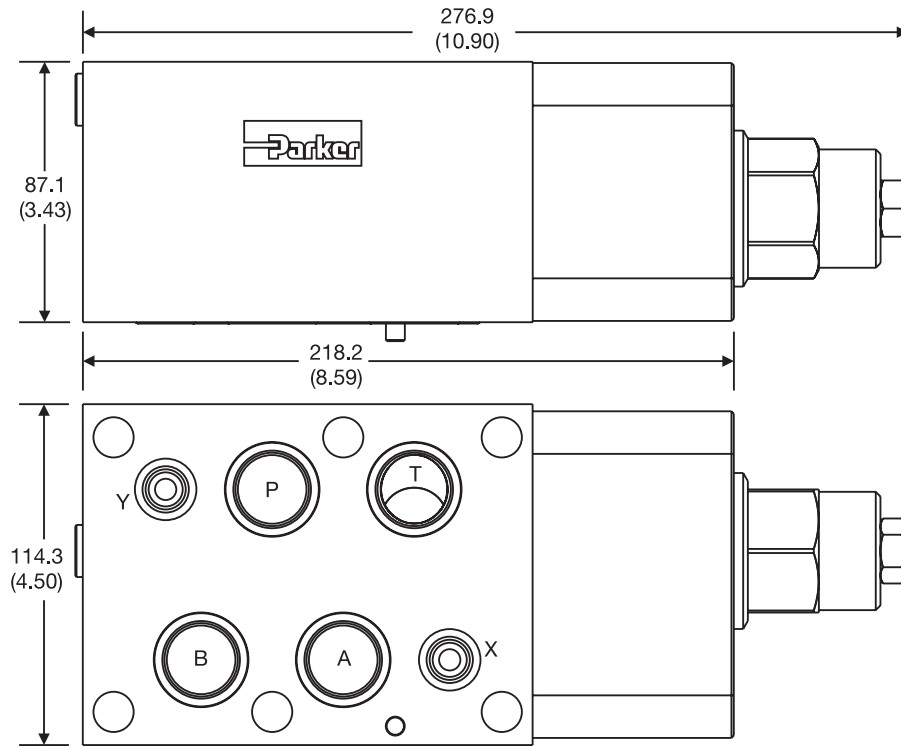
CB08 - Dimensions

B124

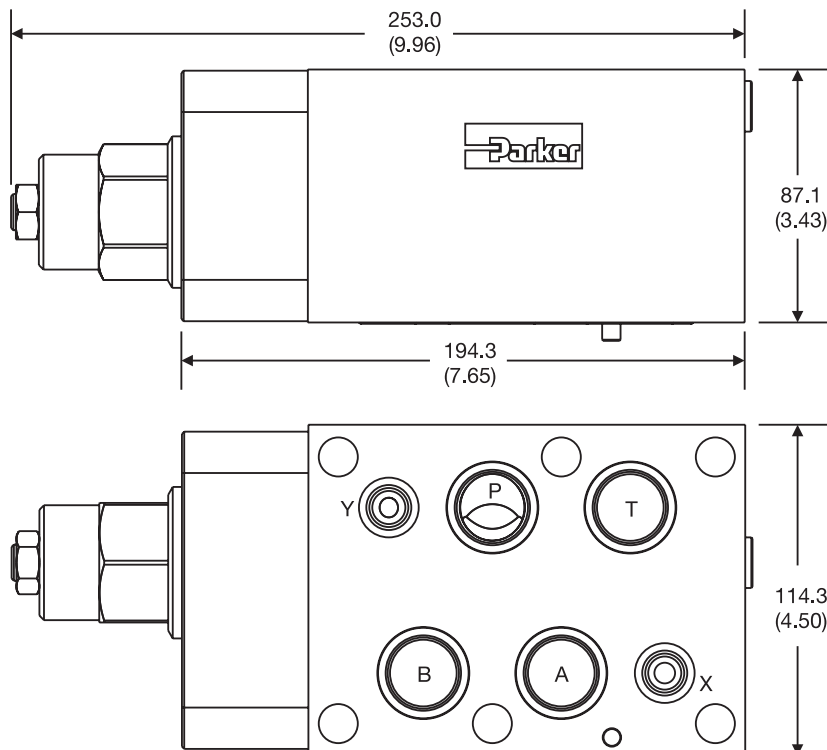
WWW.SUMY.IR

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

CB08AA



CB08BB



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Sandwich Valves

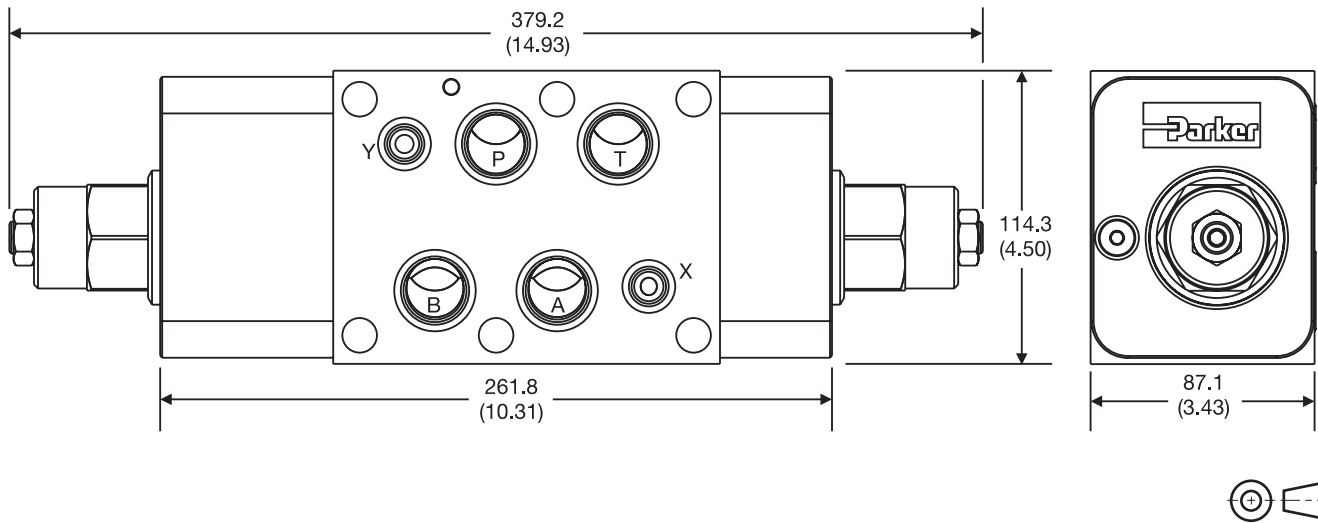
CB08 - Dimensions

B125

WWW.SUMY.IR

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

CB08DD



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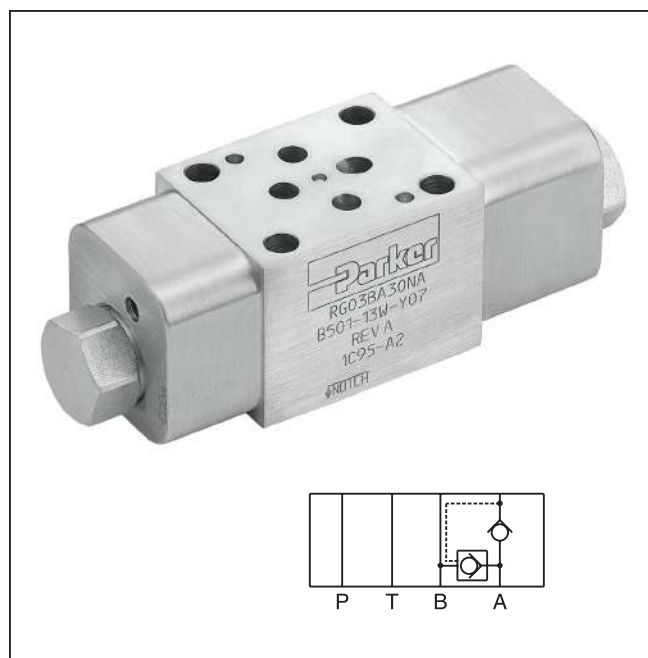
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General Description

Series RG is a full time regenerative valve assembly that allows a double-acting, single rod cylinder to be extended more rapidly using the same pump flow. To achieve this, oil from the rod end of the cylinder is added to the flow to the cap end, increasing the rate of extension.

Features

- High life time.
- Cracking pressure 2.0 Bar (30 PSI).
- Sizes:
 - RG03 – NFPA D03 / NG6 / CETOP 3
 - RG05 – NFPA D05 / NG10 / CETOP 5
 - RG07 – NFPA D07 / NG16 / CETOP 7
 - RG08 – NFPA D08 / NG25 / CETOP 8



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Specifications

General				
Size	D03 / NG 06	D05 / NG 10	D07 / NG 16	D08 / NG 25
Mounting Position	Unrestricted			
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure (Bar)	Aluminum Body - up to 207 (3000 PSI); Ductile Iron Body - up to 345 (5000 PSI)			
Nominal Flow* (LPM)	38 (10 GPM)	95 (25 GPM)	189 (50 GPM)	303 (80 GPM)
Leakage (DPM)	<1	<1	<1	<1
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)			
Viscosity				
Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)			
Recommended (cSt / mm²/s)	30 (139 SSU)			
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)			
* Nominal flow value refers to pump flow or regeneration flow from rod side, whichever is greater				



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Sandwich Valves

RG - Performance Curves

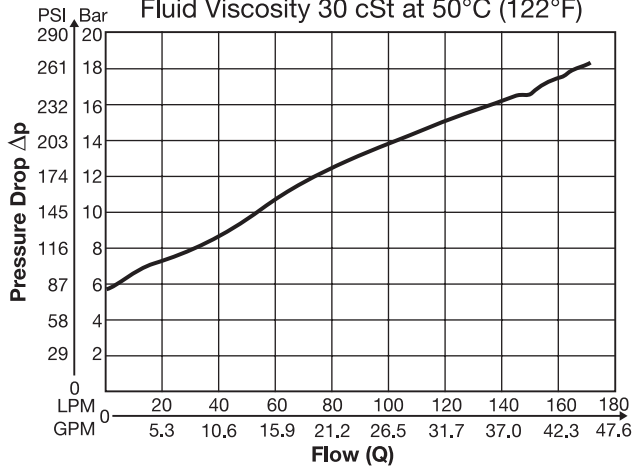
B128

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RG05*30*A, RG5H*30*A

Pressure Differential vs. Flow

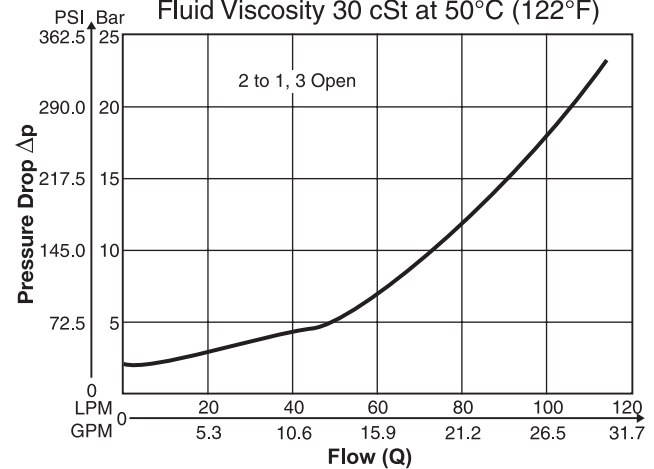
Fluid Viscosity 30 cSt at 50°C (122°F)



RG05*30*D, RG5H*30*D

Pressure Differential vs. Flow

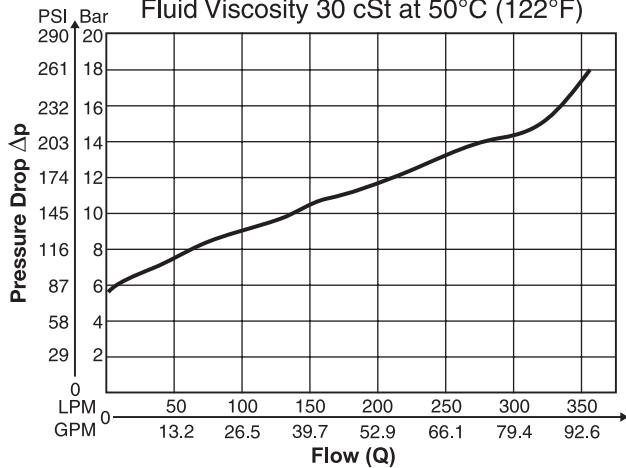
Fluid Viscosity 30 cSt at 50°C (122°F)



RG07*30*A

Pressure Differential vs. Flow

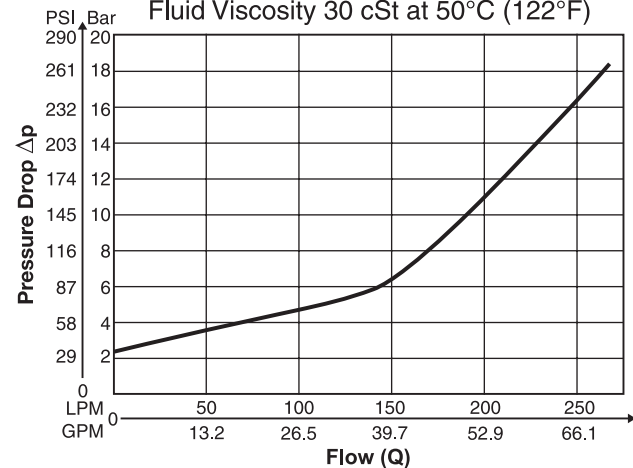
Fluid Viscosity 30 cSt at 50°C (122°F)



RG07*30*D

Pressure Differential vs. Flow

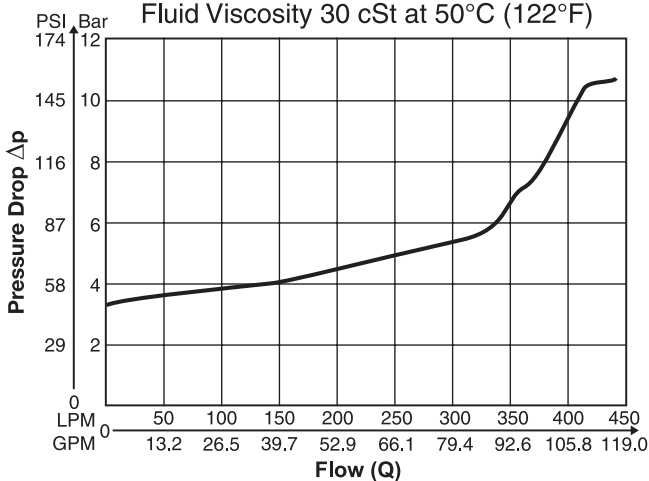
Fluid Viscosity 30 cSt at 50°C (122°F)



RG08*30*A

Pressure Differential vs. Flow

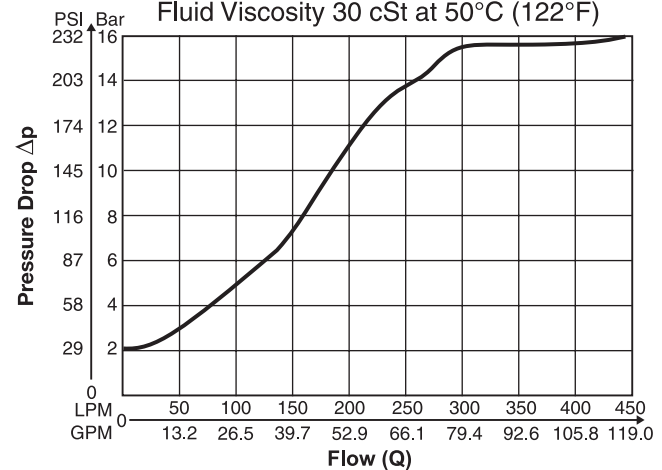
Fluid Viscosity 30 cSt at 50°C (122°F)



RG08*30*D

Pressure Differential vs. Flow

Fluid Viscosity 30 cSt at 50°C (122°F)



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Sandwich Valves

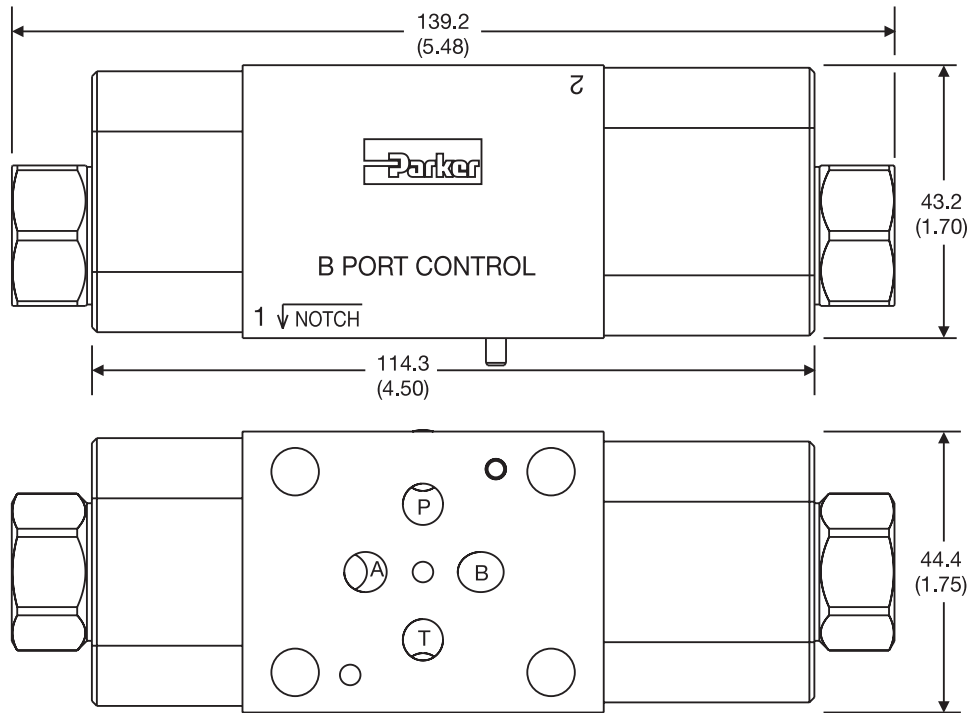
RG03, RG05 - Dimensions

B129

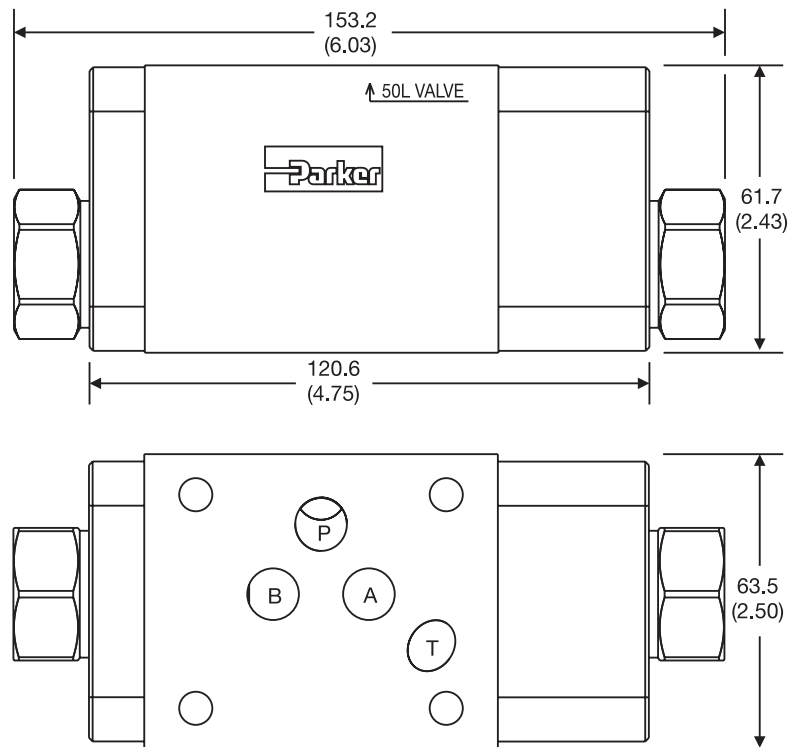
WWW.SUMY.IR

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

RG03BA



RG05BA



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Sandwich Valves

RG07, RG08 - Dimensions

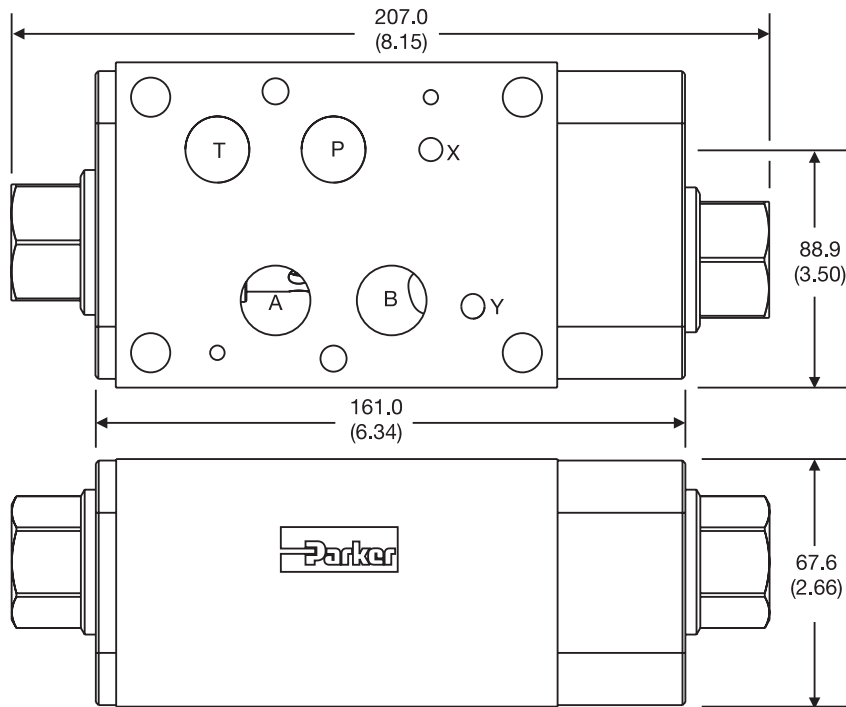
B130

WWW.SUMY.IR

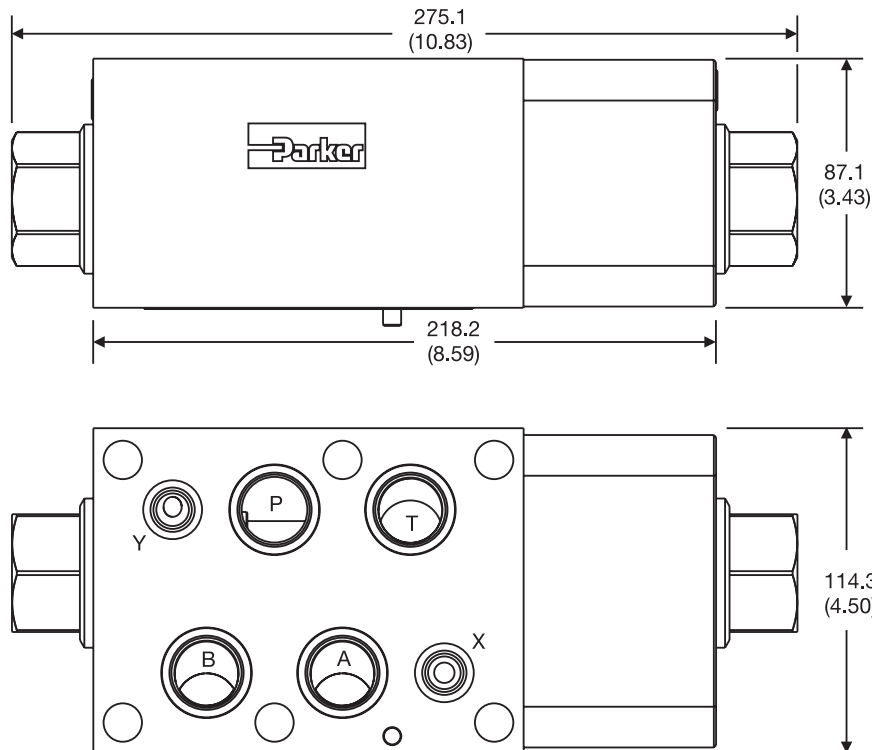
Inch equivalents for millimeter dimensions are shown in (**)

RG07BA

Note: This is a top view.

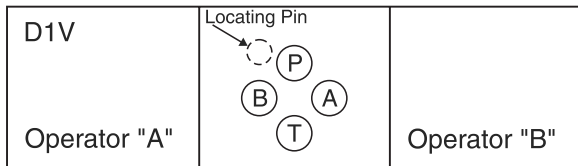


RG08BA



CAUTION: Sandwich Installation

Prior to installation of Sandwich valves, please review flow paths. Due to the reversibility of the D03 size, incorrect installation will alter the hydraulic circuit. Care must be taken during installation to insure that the Sandwich is installed in compliance with the hydraulic schematic. Please consult with your Parker representative with any questions that may arise.



Pressure Ratings

Unless otherwise specified, all Parker Sandwich valves have continuous duty pressure rating as shown in this catalog.

Special Requirements

Consult your Parker representative for factory recommendations on such situations as:

- Installations that will operate at pressures higher than published catalog ratings.
- Use of hydraulic fluids which do not meet our recommended specifications.
- Operations where fluid temperature will exceed 121°C (250°F).

Recommended Mounting Surface

Surface must be flat within .0004 inch T.I.R. and smooth with 32 micro-inch.

System Cleanliness

Any hydraulic system that includes Parker valves should be carefully protected against dirt and fluid contamination. Life of the valves, as well as of all other components, will be greatly lengthened. Operation will be smoother and more precise. Maintenance and repairs will be reduced. Lost production because of low pressure and flow will be minimized. Fluid contamination should be maintained to less than 500 particles larger than 10 micrometers per milliliter of fluid (SAE class 4 or better/ ISO Code 16/13).

Hydraulic Fluids

Parker recommends using top-quality hydraulic fluids having a viscosity range of 32 to 54 cSt (150 to 250 SSU) at 38°C (100°F). The absolute viscosity range should be 16 to 220 cSt (80 to 1000 SSU). Fluids should have highest anti-wear characteristics and be treated to avoid rust and oxidation.

Seals

When used with water-glycol, water/oil emulsions, and high-grade petroleum base hydraulic fluids, Parker standard nitrile seals are suitable.

When using phosphate ester fluids or their blends, specify Parker optional seals made of fluorocarbon. Synthetic fire-resistant fluids require special seal materials which your Parker representative can recommend.

Torque Specifications

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

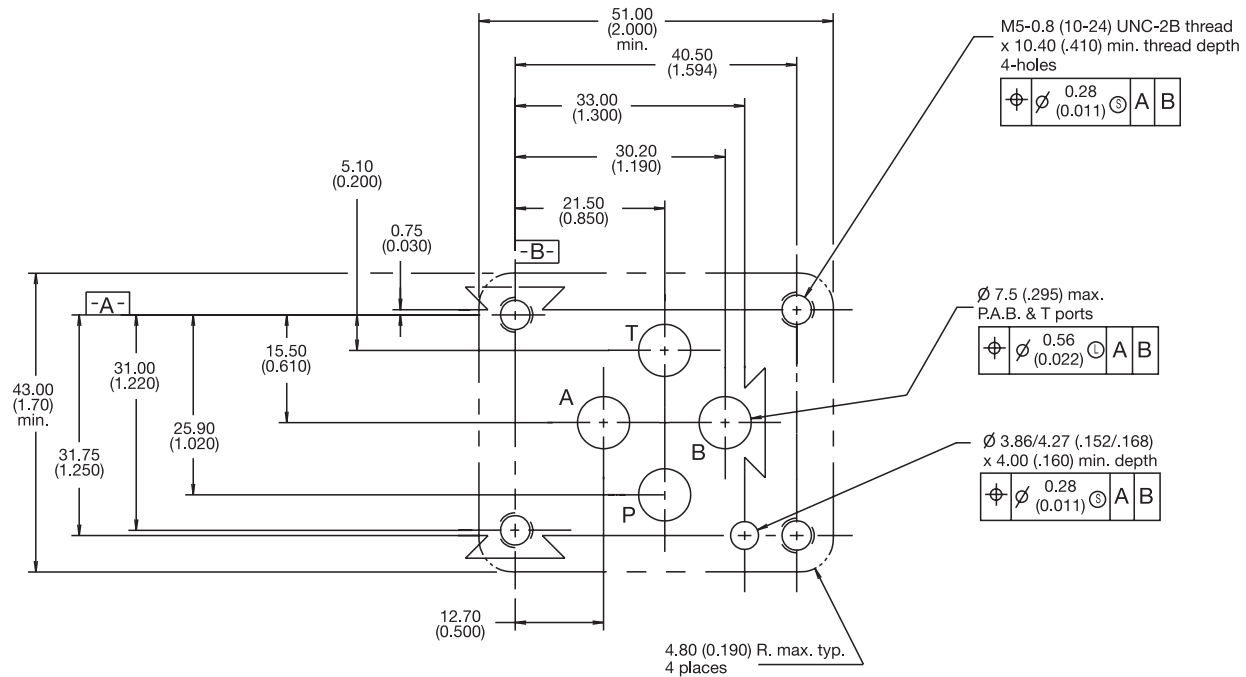
Size	Torque Value
D03	5.7 Nm (50 in-lbs)
D05	16.3 Nm (12 lbs-ft)
D07	63.0 Nm (46.5 lbs-ft)
D08	108.5 Nm (80.0 lbs-ft)

B

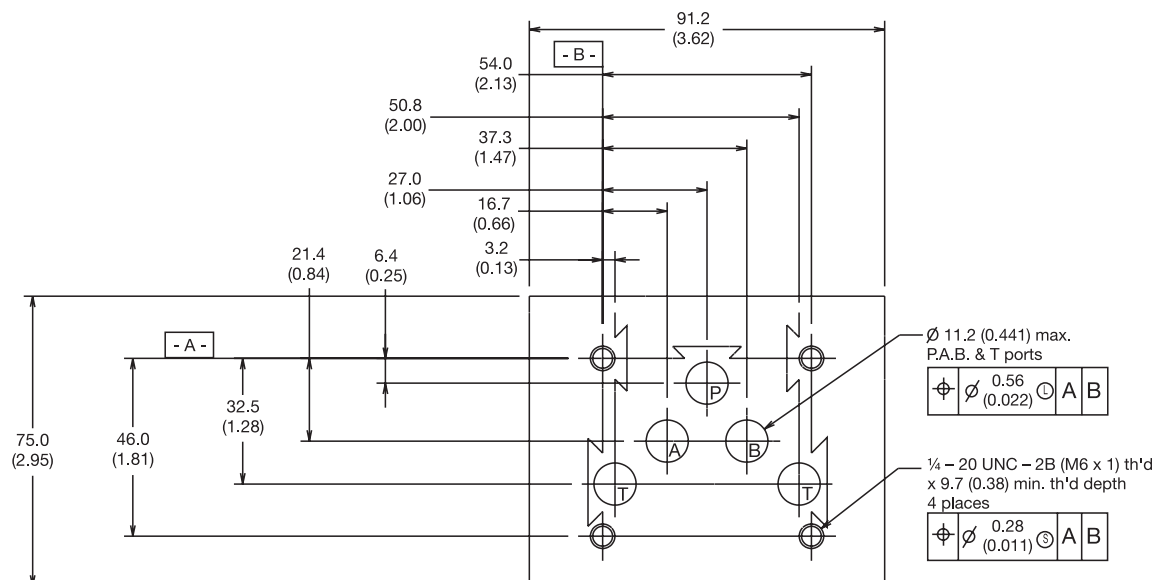
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Inch equivalents for millimeter dimensions are shown in (**)

Mounting Pattern – NFPA D03, CETOP 3 & NG6

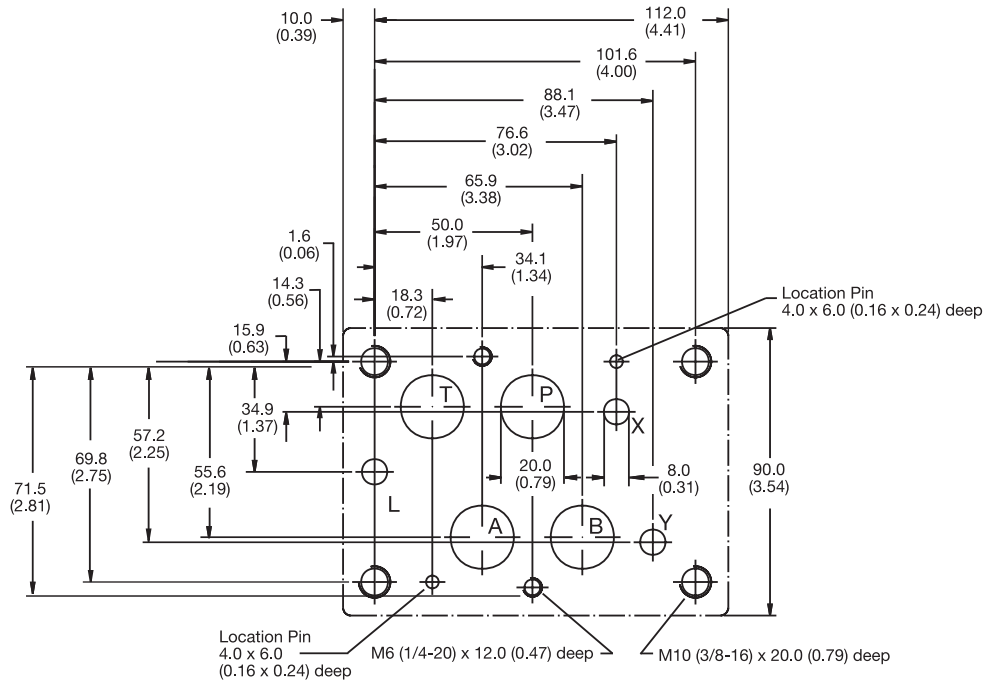


Mounting Pattern – NFPA D05, CETOP 5 & NG10

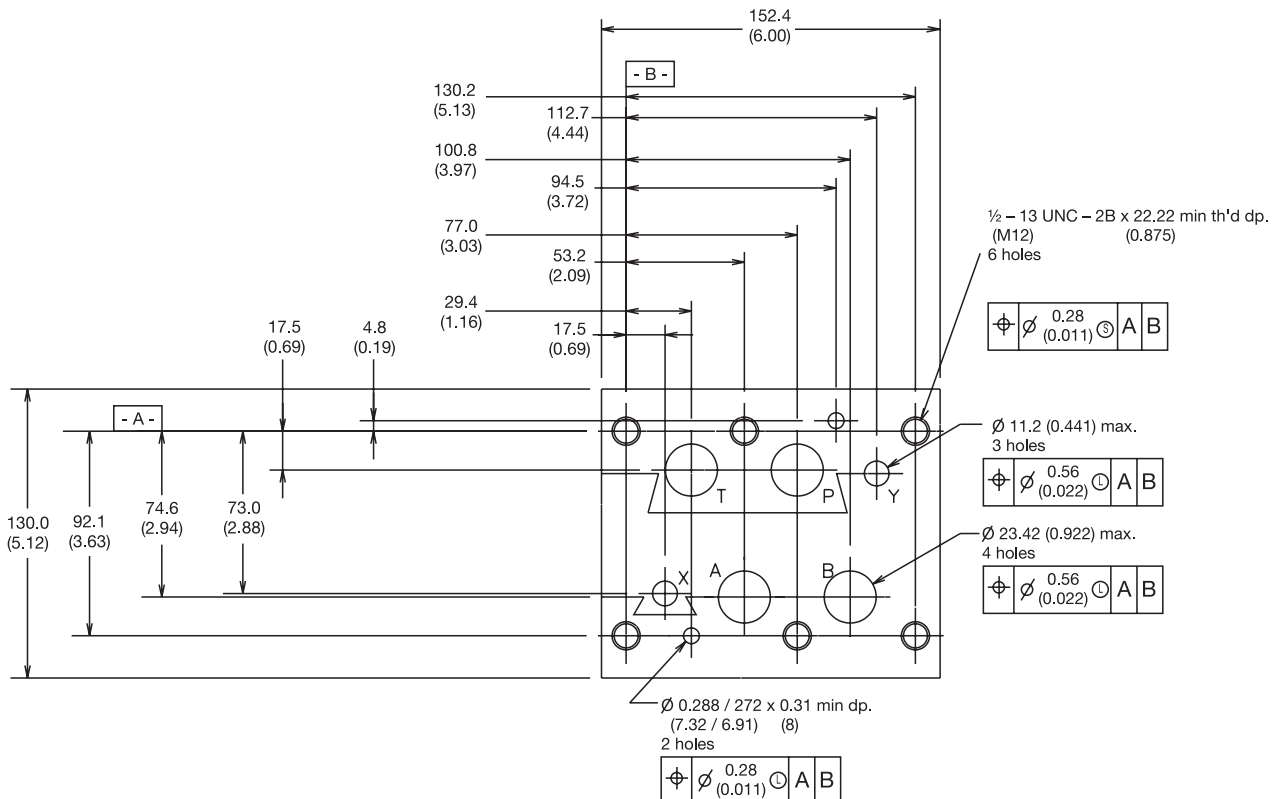


Inch equivalents for millimeter dimensions are shown in (**)

Mounting Pattern – NFPA D07, CETOP 7 & NG16



Mounting Pattern – NFPA D08, CETOP 8 & NG25



Subplates and Manifolds

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SERIES DESCRIPTION

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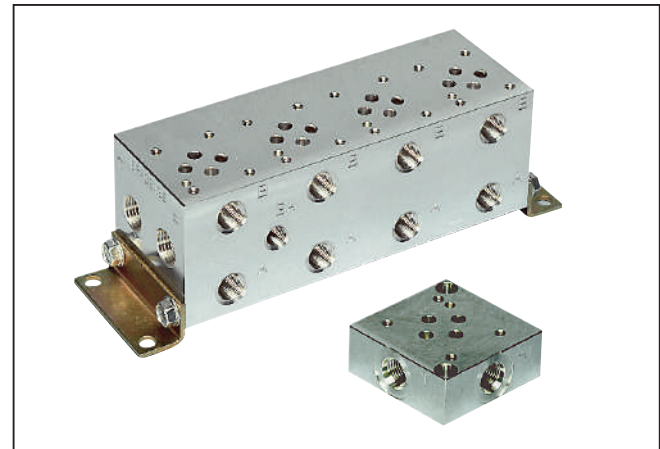
General Description

Series D1V directional control valve subplates provide easy transition from NFPA and CETOP mounting patterns to common plumbing connections. Five different thread types are available for use in any application.

Manifolds provide a single location to mount several valves in a compact and manageable array for operating multiple machines or functions.

Features

- **Aluminum or steel available** — Flexibility for applying to different system pressures
- **NPT and SAE thread options available** — Flexibility to plumb into existing systems
- **Multiple port sizes available** — Eliminates need for reducers and expanders at subplate connection

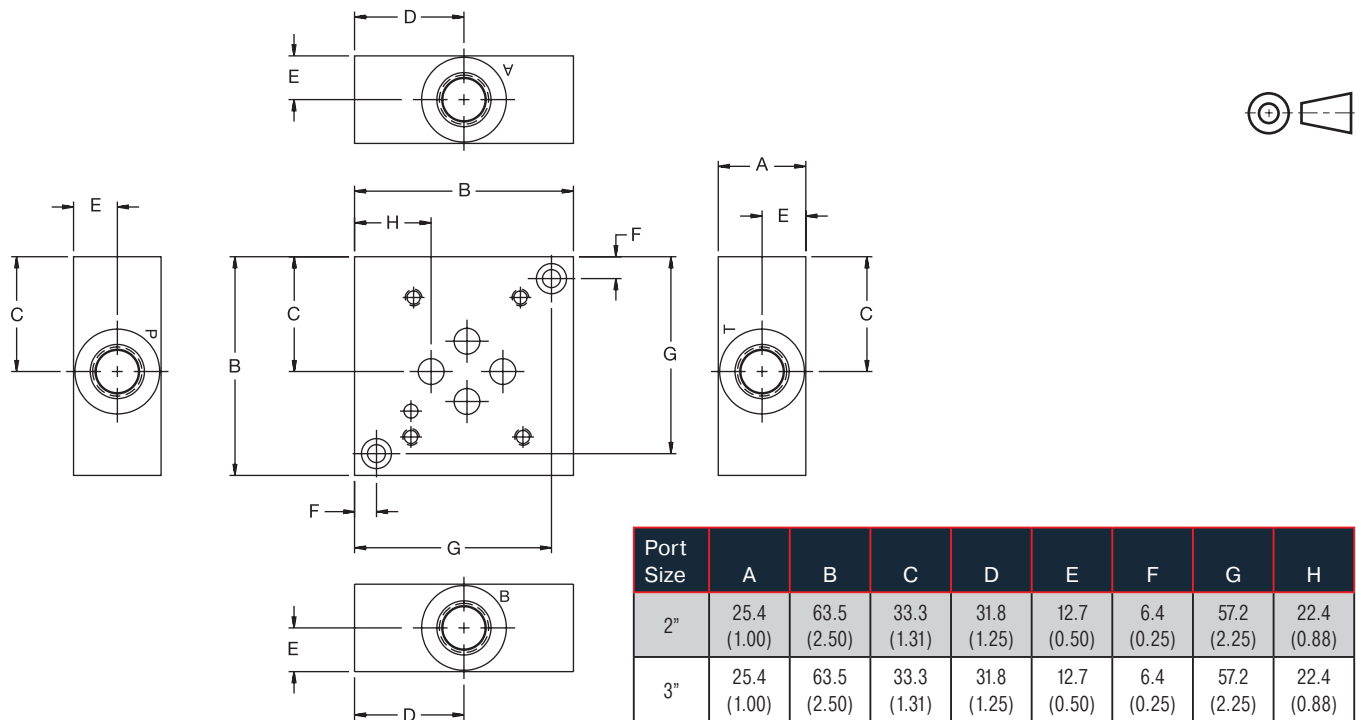


Operation

Series D1V subplates and manifolds consist of an NFPA valve mounting surface and corresponding connections for each valve port. Various port sizes and thread type are available. Cover plates, crossover and tapping plates are also available.

Dimensions — Side Ported Subplate — NFPA D03

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



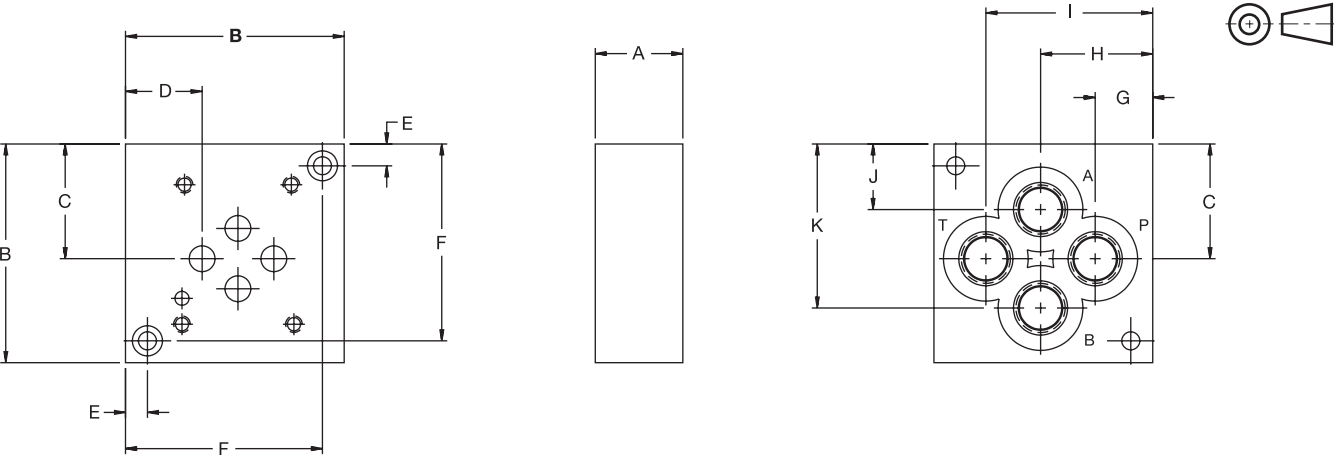
Port Size	A	B	C	D	E	F	G	H
2"	25.4 (1.00)	63.5 (2.50)	33.3 (1.31)	31.8 (1.25)	12.7 (0.50)	6.4 (0.25)	57.2 (2.25)	22.4 (0.88)
3"	25.4 (1.00)	63.5 (2.50)	33.3 (1.31)	31.8 (1.25)	12.7 (0.50)	6.4 (0.25)	57.2 (2.25)	22.4 (0.88)
4"	38.0 (1.50)	88.9 (3.50)	46.0 (1.81)	45.2 (1.78)	19.1 (0.75)	6.4 (0.25)	82.5 (3.25)	35.1 (1.38)
6"	44.5 (1.75)	101.6 (4.00)	52.3 (2.06)	51.6 (2.03)	22.4 (0.88)	9.7 (0.38)	92.2 (3.63)	41.4 (1.63)

NOTE: See Mounting Bolt Kits for bolt information

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Bottom Ported Subplate — NFPA D03

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



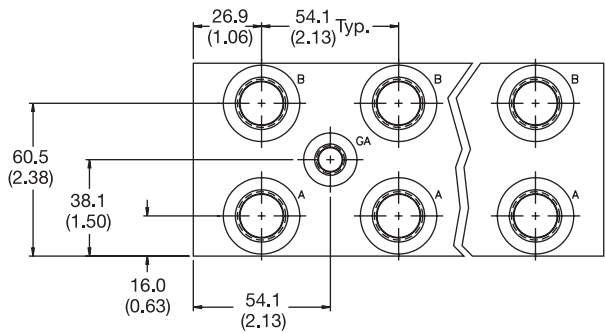
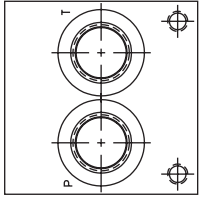
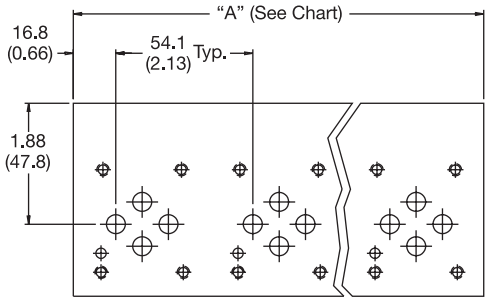
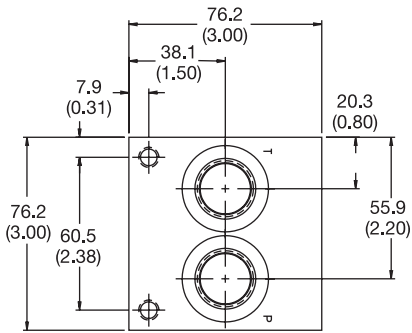
Port Size	A	B	C	D	E	F	G	H	I	J	K
2"	25.4 (1.00)	63.5 (2.50)	33.3 (1.31)	22.4 (0.88)	6.4 (0.25)	57.2 (2.25)	16.8 (0.66)	32.5 (1.28)	48.5 (1.91)	19.1 (0.75)	47.8 (1.88)
3"	25.4 (1.00)	63.5 (2.50)	33.3 (1.31)	22.4 (0.88)	6.4 (0.25)	57.2 (2.25)	15.0 (0.59)	32.5 (1.28)	50.0 (1.97)	17.5 (0.69)	49.3 (1.94)
4"	38.1 (1.50)	88.9 (3.50)	46.0 (1.81)	35.1 (1.38)	6.4 (0.25)	82.6 (3.25)	17.5 (0.69)	45.2 (1.78)	71.4 (2.81)	19.1 (0.75)	71.4 (2.81)
6"	38.1 (1.50)	114.3 (4.50)	58.7 (2.31)	47.8 (1.88)	9.7 (0.38)	104.9 (4.13)	23.9 (0.94)	57.9 (2.28)	90.4 (3.56)	23.9 (0.94)	90.4 (3.56)
NOTE: See Mounting Bolt Kits for bolt information											

Subplates and Manifolds

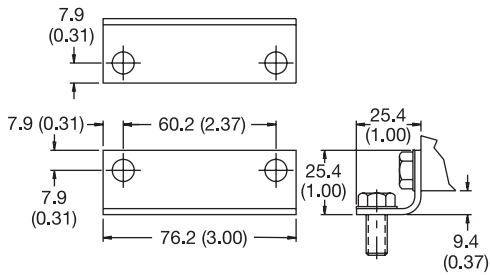
D1V Manifolds - Dimensions

Manifolds — NFPA D03

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



Note: Gage port not available on single station manifold.



Mounting Hardware

(See Ordering Information for Mounting Hardware details)

No. Stations	1	2	3	4	5	6	7	8
"A" Length mm (in)	54.1 (2.13)	108.0 (4.25)	162.1 (6.38)	215.9 (8.50)	270.0 (10.63)	323.9 (12.75)	378.0 (14.88)	431.8 (17.00)
Weight, Aluminum, Kg (lbs)	1.4 (3)	1.8 (4)	2.7 (6)	3.6 (8)	4.1 (9)	5.0 (11)	5.4 (12)	6.4 (14)
Weight, Iron, Kg (lbs)	2.3 (5)	4.1 (9)	5.9 (13)	7.7 (17)	9.5 (21)	11.8 (26)	13.6 (30)	15.4 (34)
NOTE: See Mounting Bolt Kits for bolt information								

Subplates and Manifolds

D1V Subplates - Ordering Information

C5

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Series D1V Subplates

SP

Subplate

D2

Valve Model

Port Size and Thread Type

Port Location

Material

35

Design Series
Required when ordering.

Code	Description
D2*	NFPA D03, NG 06 CETOP 03

** Consult factory for D03 subplates requiring pilot ports with D1VP*

Code	Description
Omit	Bottom
A	Side

Code	Description
2N	.25-18 NPTF
3N	.38-18 NPTF
3S	-6 SAE
4N	.50-14 NPTF
4S	-8 SAE
6N	.75-14 NPTF
6S	-12 SAE

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

Weight:

SPD23 2.3 kg (5.0 lbs.)

SPD2330 (5000 PSI) 2.3 kg (5.0 lbs.)

Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

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Mounting Bolt Kits

UNC Bolt Kits for use with D1V Directional Control Valves and Sandwich valves (D1V*-91 Design, Solenoid Operated)					
	Number of Sandwich Valves @ 1.58" (40 mm) thickness				
	0	1	2	3	4
D1V-91	BK209 1.25"	BK243 2.88"	BK225 4.38"	BK244 6.00"	BK245 7.50"
D1V-91 Plus Tapping Plate	BK176 2.25"	BK56 3.81"	BK212 5.38"	BK107 7.00"	BK106 8.50"

NOTE: All bolts are SAE grade 8, 10-24 UNC-2A thread, torque to 5.6 Nm (50 in-lbs)

Mounting Hardware supplied with subplate includes:		
Subplates	Mounting Hardware	Qty
SP22NN**	.25-20 UNC x .88 LG. SHCS	2
SP23N**		
SP23S**		
SPD24N**	.25-20 UNC x 1.5 LG. SHCS	2
SPD24S**		
SPD26N*	.38-16 UNC x 1.5 LG. SHCS	2
SPD26S*		
SPD26NA*	.38-16 UNC x 1.75 LG. SHCS	2
SPD26SA*		

Valve Mounting Threads:
#10-24 UNC x 0.63 DP.
Used for SAE and NPTF ports.
Metric M5-0.8 mm ISO 6H x 16 DP.
Used for BSPP, BSPT, and ISO ports.

Subplates and Manifolds

D1V Subplates - Ordering Information

C6

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Series D1V Manifolds

SP

Manifold

Number of Stations

D2

Valve Model

Port Size and Thread Type

Material

35

Design Series

Required when ordering.

Code	Description
1	No. of Stations
2	No. of Stations
3	No. of Stations
4	No. of Stations
5	No. of Stations
6	No. of Stations
7	No. of Stations
8	No. of Stations

Code	Description
D2*	NFPA D03, NG 06 CETOP 03
* Consult factory for D03 subplates requiring pilot ports with D1VP	

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

		Port Size		
Code	Description	P and T	A and B	Gage
N*	NPTF	.50	.38	.25
S**	SAE	-10	-8	-6

* 0.25-18 NPTF gage port plug included.

** -6 SAE gage port plug included.

Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

Mounting Bolt Kits

UNC Bolt Kits for use with D1V Directional Control Valves and Sandwich valves (D1V*-91 Design, Solenoid Operated)					
	Number of Sandwich Valves @ 1.58" (40 mm) thickness				
	0	1	2	3	4
D1V-91	BK209 1.25"	BK243 2.88"	BK225 4.38"	BK244 6.00"	BK245 7.50"
D1V-91 Plus Tapping Plate	BK176 2.25"	BK56 3.81"	BK212 5.38"	BK107 7.00"	BK106 8.50"

NOTE: All bolts are SAE grade 8, 10-24 UNC-2A thread, torque to 5.6 Nm (50 in-lbs)

Mounting hardware supplied with manifold includes:

(2) steel brackets

For SAE and NPTF ports: (8) 5/16-18 UNC x .63 hex washer cap screws.

Valve mounting threads:

#10-24 UNC x 0.63 DP. Used for SAE and NPTF ports.

No. Stations	1	2	3	4	5	6	7	8
Weight, Aluminum, Kg (lbs)	1.4 (3)	1.8 (4)	2.7 (6)	3.6 (8)	4.1 (9)	5.0 (11)	5.4 (12)	6.4 (14)
Weight, Iron, Kg (lbs)	2.3 (5)	4.1 (9)	5.9 (13)	7.7 (17)	9.5 (21)	11.8 (26)	13.6 (30)	15.4 (34)

NOTE: See Mounting Bolt Kits for bolt information

Subplates and Manifolds

D3A, D3DW, D3L, D3W - Technical Information

C7

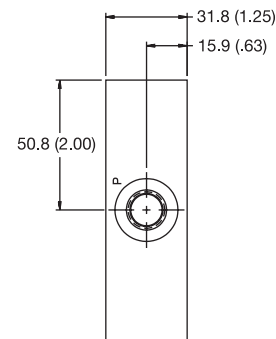
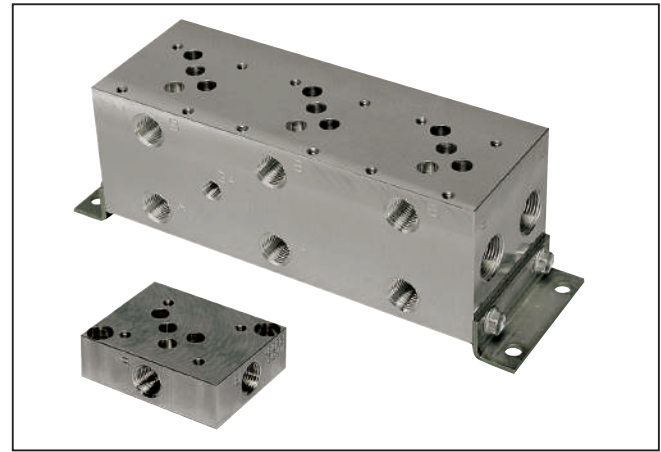
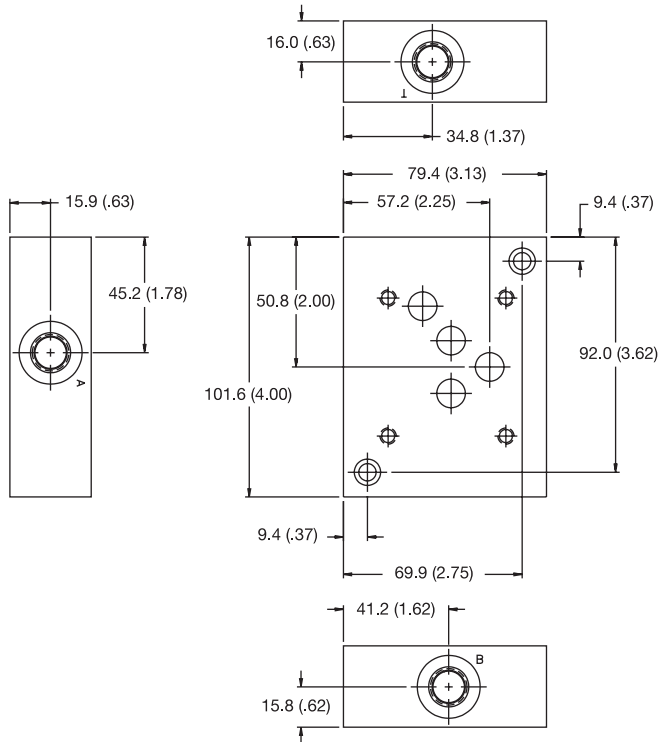
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Features

- **Aluminum or steel available** — Flexibility for applying to different system pressures
- **NPT and SAE thread options available** — Flexibility to plumb into existing systems
- **Multiple port sizes available** — Eliminates need for reducers and expander at subplate connection

Dimensions — Side Ported Subplate — NFPA D05

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

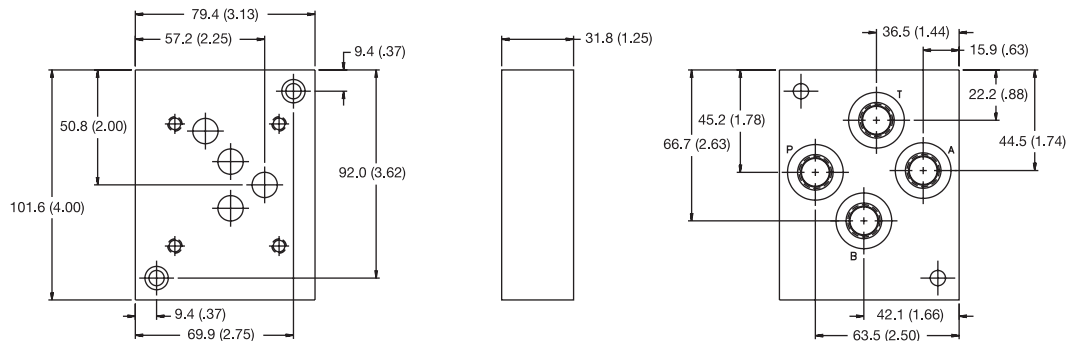


NOTE: See Mounting Bolt Kits for bolt information.



Dimensions — Bottom Ported Subplate — NFPA D05

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



NOTE: See Mounting Bolt Kits for bolt information.

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Subplates and Manifolds

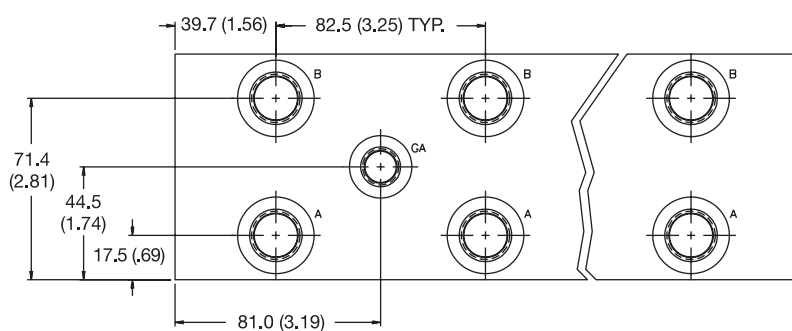
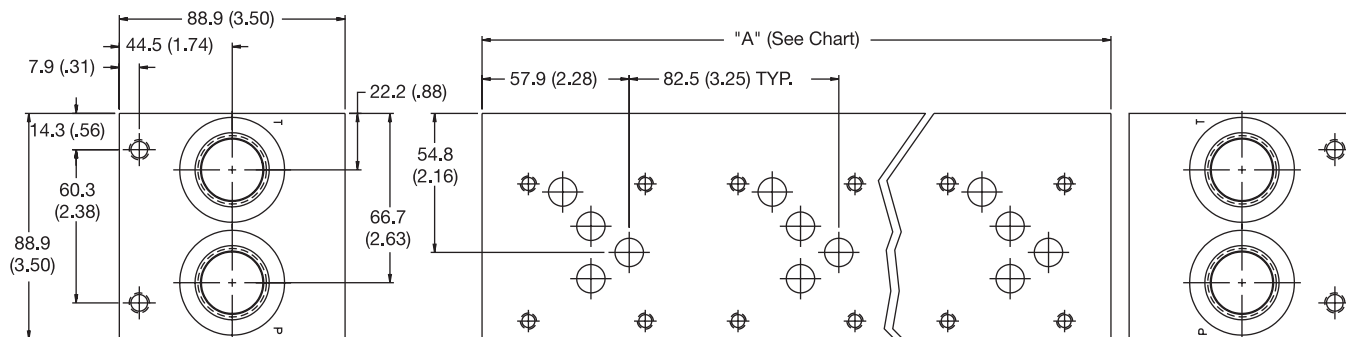
D3A, D3DW, D3L, D3W Manifolds - Dimensions

C8

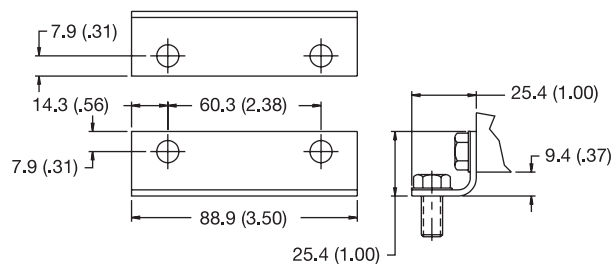
WWW.SUMY.IR

Manifolds — NFPA D05

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



Note: Gage port not available on single station manifold.



Mounting Hardware
(See Ordering Information for Mounting Hardware details)

No. Stations	1	2	3	4	5	6
"A" Length mm (in)	82.6 (3.25)	165.1 (6.50)	247.7 (9.75)	330.2 (13.00)	412.8 (16.25)	495.3 (19.50)
Weight, Aluminum, Kg (lbs)	1.8 (4)	3.6 (8)	5.0 (11)	6.4 (14)	7.9 (17)	9.6 (21)
Weight, Iron, Kg (lbs)	4.1 (9)	7.7 (17)	11.8 (26)	15.4 (34)	20.1 (43)	23.3 (51)
NOTE: See Mounting Bolt Kits for bolt information						

Subplates and Manifolds

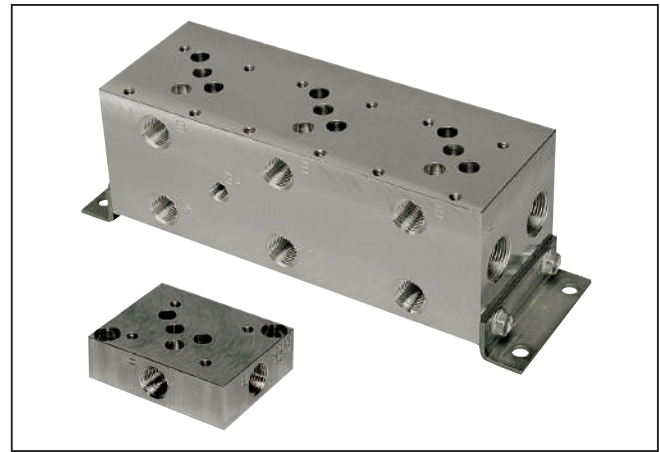
D31, D3P - Technical Information

C9

WWW.SUMY.IR

Features

- **Aluminum or steel available** — Flexibility for applying to different system pressures
- **NPT and SAE thread options available** — Flexibility to plumb into existing systems
- **Multiple port sizes available** — Eliminates need for reducers and expander at subplate connection
- **Parallel or series circuit applications** — Flexibility for different circuits



Ordering Information

Series D3 and D31 Subplates

SP

Subplate

Valve Model

Port Size and Thread Type

Port Location

Material

35

Design Series

Required when ordering.

Code	Description
D3	NFPA D05, NG 10 CETOP 03
D31V	NFPA D05H, NG 10
D31D	NFPA D05HE, NG 10, CETOP 05H

NOTE: D31 Manifolds come standard with high flow capability. For flows over 20 GPM, use D31V or D31D subplate. It will have X and Y ports.

Code	Description
3N*	.38-18 NPTF
4N*	.50-14 NPTF
4S*	-8 SAE
6N#	.75-14 NPTF
6S#	-12 SAE

* Sizes 3* and 4* ports available on SPD3 (NFPA D05) only.
Size 6* port available on SPD31 (NFPA D05H and D05HE) only.

Code	Description
Omit	Bottom
A	Side

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

Mounting Bolt Kits

UNC Bolt Kits for use with D3W, D3, D31VW, D31DW Directional Control Valves and Sandwich valves				
	Number of Sandwich Valves @ 2.00" (50 mm) thickness			
	0	1	2	3
D3-32, D31VW-91, D31DW-91, D3P	BK98 1.625"	BK141 3.50"	BK142 5.50"	BK143 7.50"
D3-32, D31VW-91, D31DW-91, D3P Plus Tapping Plate	BK166 2.50"	BK167 4.50"	BK168 6.50"	BK169 8.50"

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

Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

Mounting Hardware supplied with subplate includes:		
Subplates	Mounting Hardware	Qty
SPD33N**	.25-20 UNC x .88 LG. SHCS	2
SPD34N**		
SPD34S**		
SPD31*6N**	.25-20 UNC x 1.5 LG. SHCS	2
SPD31*6S**		
SPD3H6N**		
SPD3H6S**		

Valve Mounting Threads:
0.25-20 UNC x 0.75 DP.
Used for SAE and NPTF ports.



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Subplates and Manifolds

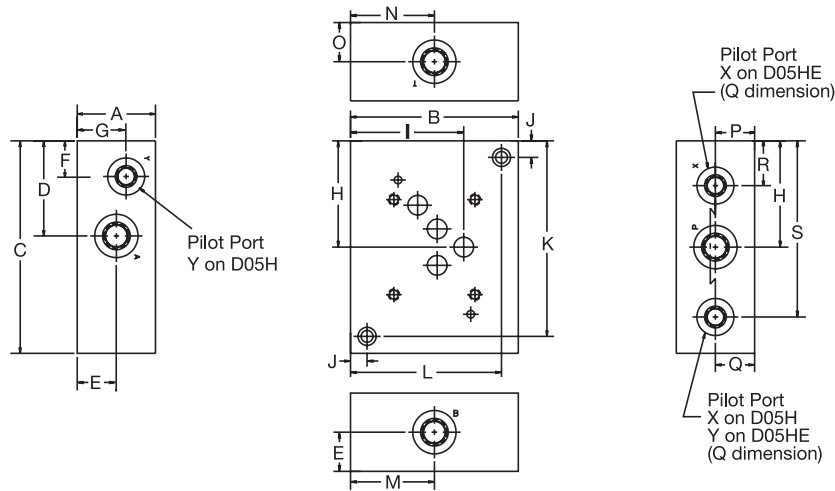
D31 Subplates - Dimensions

C10

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Side Ported Subplate — NFPA D05, D05H, and D05HE

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

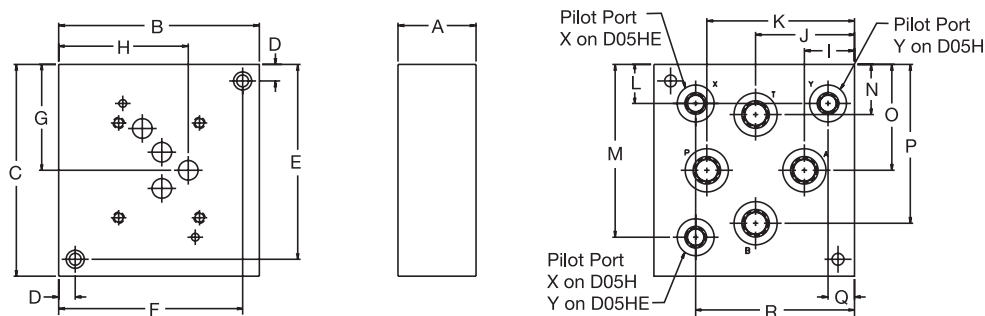


Dimensions	A	B	C	D	E	F*	G*	H	I	J	K	L	M	N	O	P	Q*	R*	S*
SPD31V**A*	44.5 (1.75)	95.3 (3.75)	120.7 (4.75)	54.1 (2.13)	22.4 (0.88)	20.6 (0.81)	22.4 (0.88)	60.2 (2.37)	64.3 (2.53)	9.7 (0.38)	111.0 (4.37)	85.9 (3.38)	47.8 (1.88)	47.8 (1.88)	22.4 (0.88)	22.4 (0.88)	22.4 (0.88)	— —	100.1 (3.94)
SPD31D**A*	44.5 (1.75)	95.3 (3.75)	120.7 (4.75)	54.1 (2.13)	22.4 (0.88)	— —	— —	60.2 (2.37)	64.3 (2.53)	9.7 (0.38)	111.0 (4.37)	85.9 (3.38)	47.8 (1.88)	47.8 (1.88)	22.4 (0.88)	22.4 (0.88)	22.4 (0.88)	25.4 (1.00)	100.1 (3.94)

* Not available with high flow option.
NOTE: See Mounting Bolt Kits for bolt information

Bottom Ported Subplate — NFPA D05, D05H, and D05HE

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



Dimensions	A	B	C	D	E	F	G	H	I	J	K	L*	M*	N	O	P	Q*	R*
SPD31V**A*	44.5 (1.75)	114.3 (4.50)	120.7 (4.75)	9.7 (0.38)	111.3 (4.38)	104.9 (4.13)	60.2 (2.37)	73.9 (2.91)	28.4 (1.12)	56.4 (2.22)	84.1 (3.91)	22.4 (0.88)	98.6 (3.88)	28.7 (1.13)	60.5 (2.38)	90.4 (3.56)	15.0 (0.59)	90.4 (3.56)
SPD31D**A*	44.5 (1.75)	114.3 (4.50)	120.7 (4.75)	9.7 (0.38)	111.3 (4.38)	104.9 (4.13)	60.2 (2.37)	73.9 (2.91)	28.4 (1.12)	56.4 (2.22)	84.1 (3.91)	20.6 (0.81)	100.1 (3.94)	28.7 (1.13)	60.5 (2.38)	90.4 (3.56)	— —	88.9 (3.80)

* Not available with high flow option.
NOTE: See Mounting Bolt Kits for bolt information

Subplates and Manifolds

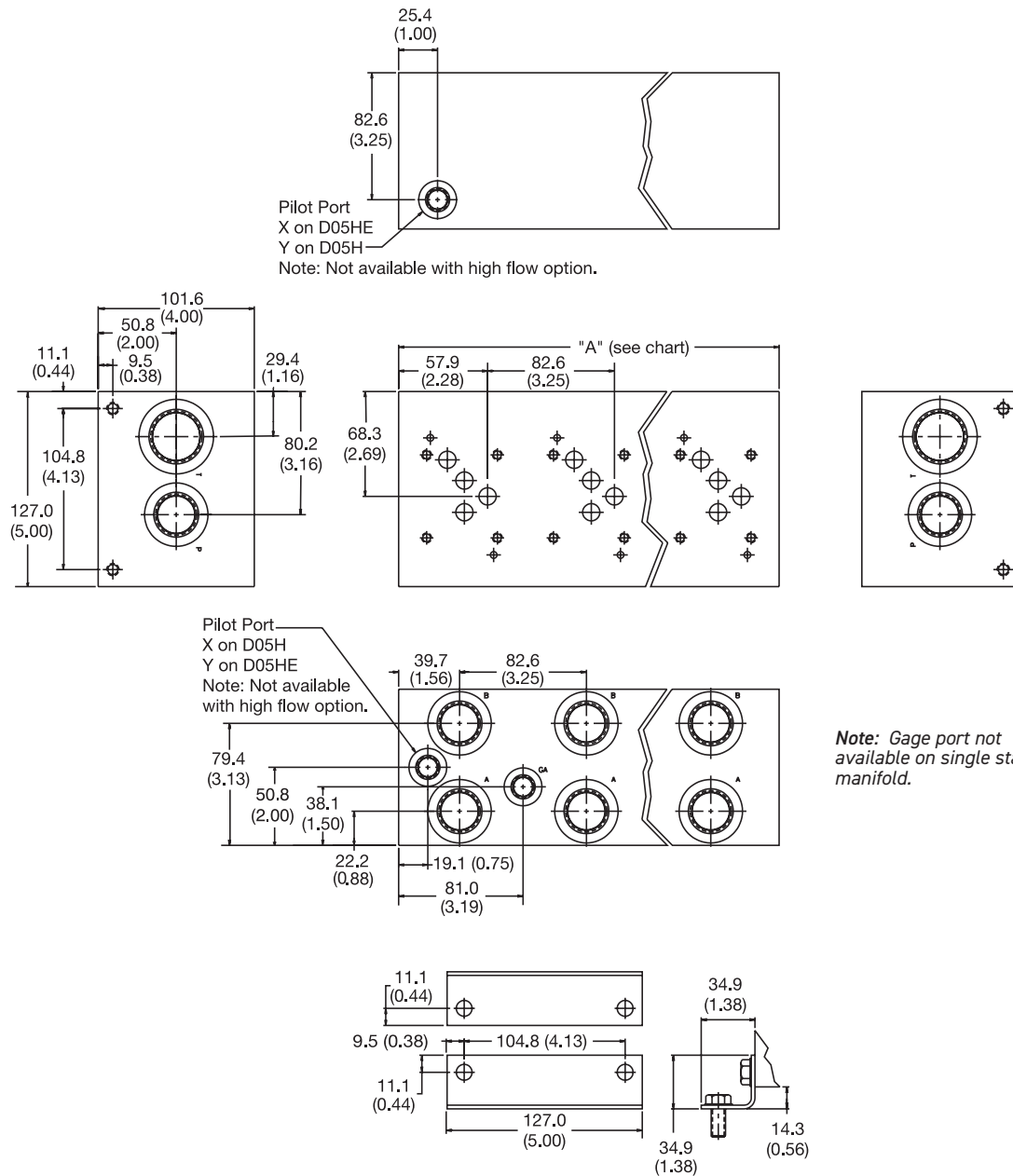
D3P and High Flow Manifolds - Dimensions

C11

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Manifolds — NFPA D05, D05H, and D05HE

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



Mounting Hardware

(See Ordering Information for Mounting Hardware details)

No. Stations	1	2	3	4	5	6
"A" Length mm (in)	82.6 (3.25)	165.1 (6.50)	247.7 (9.75)	330.2 (13.00)	412.8 (16.25)	495.3 (19.50)
Weight, Aluminum, Kg (lbs)	7 (15)	12 (26)	17 (37)	22 (48)	27 (59)	33 (73)
Weight, Iron, Kg (lbs)	19 (42)	38 (84)	57 (125)	75 (165)	85 (187)	113 (249)
NOTE: See Mounting Bolt Kits for bolt information						

Subplates and Manifolds

D3 Manifolds - Ordering Information

C12

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SP

Manifold

Number of Stations

D3

Valve Model

Flow Option

Port Size and Thread Type

Material

35

Design Series
Required when ordering.

Code	Description
1	No. of Stations
2	No. of Stations
3	No. of Stations
4	No. of Stations
5	No. of Stations
6	No. of Stations

Code	Description
D3	NFPA D05, NG 10 CETOP 05

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

Code	Description
Omit	Standard Less than 76 LPM (20 GPM)
H*	High Flow Greater than 76 LPM (20 GPM)

		Port Size		
Code	Description	P and T	A and B	Gage
N*	NPTF	.75	.50	.25
S**	SAE	-12	-8	-6

Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

*** Only available with D3 (D05) model**

*** 0.25-18 NPTF gage port plug included.**

**** -6 SAE gage port plug included.**

C

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Mounting hardware supplied with manifold includes:

(2) steel brackets

For SAE and NPTF ports: (8) 5/16-18 UNC x .63 hex washer cap screws.

Valve mounting threads:

0.25-20 UNC x 0.75 DP. Used for SAE and NPTF ports.

Mounting Bolt Kits

UNC Bolt Kits for use with D3W and D3 Directional Control Valves and Sandwich valves				
Number of Sandwich Valves @ 1.58" (40 mm) thickness				
	0	1	2	3
D3-32	BK98 1.625"	BK141 3.50"	BK142 5.50"	BK143 7.50"
D3-32 Plus Tapping Plate	BK166 2.50"	BK167 4.50"	BK168 6.50"	BK169 8.50"

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

No. Stations	1	2	3	4	5	6
Weight, Aluminum, Kg (lbs)	1.8 (4)	3.7 (8)	5.0 (11)	6.4 (14)	7.8 (17)	9.6 (21)
Weight, Iron, Kg (lbs)	4.1 (9)	7.8 (17)	11.9 (26)	15.6 (34)	19.7 (43)	23.3 (51)

Subplates and Manifolds

D31, D3P Manifolds - Ordering Information

C13

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SP
Manifold

Number of
Stations

Code	Description
1	No. of Stations
2	No. of Stations
3	No. of Stations
4	No. of Stations
5	No. of Stations
6	No. of Stations

Valve
Model

Code	Description
D31V	NFPA D05H, D3P
D31D	NFPA D05HE, NG 10, CETOP 05H
NOTE: D31 manifolds come standard with high flow capability	

Port Size and
Thread Type

		Port Size			
Code	Description	P, A, B	T	X, Y	Gage
N*	NPTF	.75	1.00	.38	.25
S**	SAE	-12	-16	-6	-6
* 0.25-18 NPTF gage port plug included.					
** -6 SAE gage port plug included.					

Material

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

35
Design
Series
Required
when ordering.

Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

Mounting hardware supplied with manifold includes:

(2) steel brackets

For SAE and NPTF ports: (8) 3/8-16 UNC x .88 HHCS and (8) .38 SAE N series washers.

Valve mounting threads:

0.25-20 UNC x 0.75 DP. Used for SAE and NPTF ports.

Mounting Bolt Kits

UNC Bolt Kits for use with D3W and D3 Directional Control Valves and Sandwich valves				
	Number of Sandwich Valves @ 1.58" (40 mm) thickness			
	0	1	2	3
D31VW-91, D3P D31DW-91	BK98 1.625"	BK141 3.50"	BK142 5.50"	BK143 7.50"
D31VW-91, D3P D31DW-91 Plus Tapping Plate	BK166 2.50"	BK167 4.50"	BK168 6.50"	BK169 8.50"
NOTE: All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 Nm (12 lbs-ft)				

No. Stations	1	2	3	4	5	6
Weight, Aluminum, Kg (lbs)	3.2 (7)	5.5 (12)	7.8 (17)	10.1 (22)	12.3 (27)	15.1 (33)
Weight, Iron, Kg (lbs)	8.7 (19)	17.4 (38)	26.1 (57)	34.3 (75)	38.9 (85)	51.7 (113)

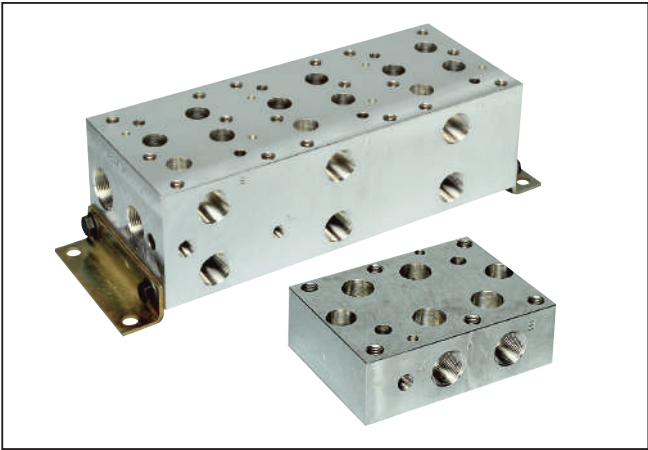
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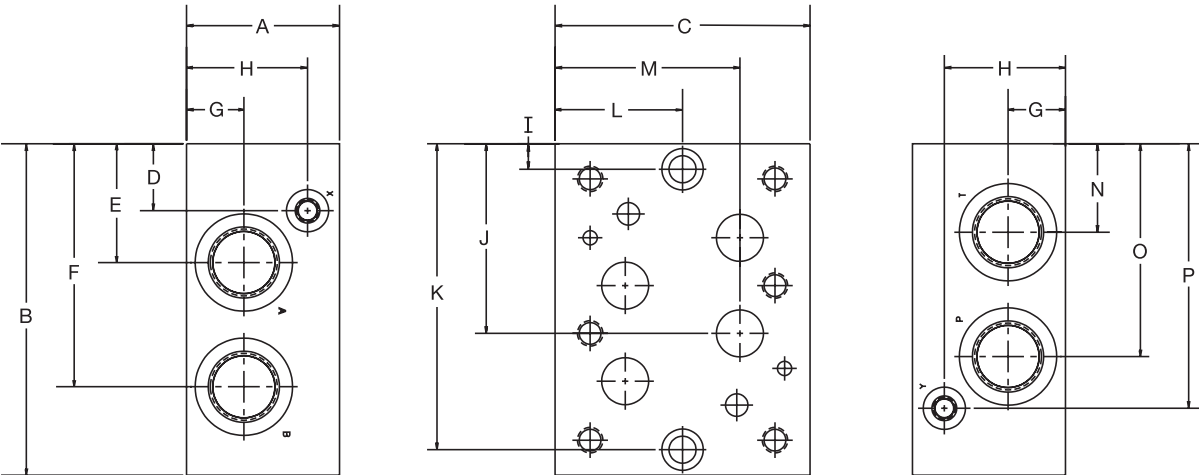
Features

- **Aluminum or steel available** — Flexibility for applying to different system pressures
- **NPT and SAE thread options available** — Flexibility to plumb into existing systems
- **Multiple port sizes available** — Eliminates need for reducers and expander at subplate connection



Dimensions — Side Ported Subplate — NFPA D08

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



Dimensions	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
SPD68*A*	50.8	155.7	114.3	30.2	64.3	115.1	25.4	25.4	12.7	89.7	142.7	57.2	85.9	40.4	91.2	125.5
SPD66NA*	(2.00)	(6.13)	(4.50)	(1.19)	(2.53)	(4.53)	(1.00)	(1.00)	(0.50)	(3.53)	(5.62)	(2.25)	(3.38)	(1.59)	(3.59)	(4.94)
SPD610*A*	76.2	165.1	127.0	33.3	59.2	121.2	28.7	60.5	12.7	94.5	152.4	63.5	92.2	43.9	105.9	131.8
	(3.00)	(6.50)	(5.00)	(1.31)	(2.33)	(4.77)	(1.13)	(2.38)	(0.50)	(3.72)	(6.00)	(2.50)	(3.63)	(1.73)	(4.17)	(5.19)
NOTE: See Mounting Bolt Kits for bolt information																

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Subplates and Manifolds

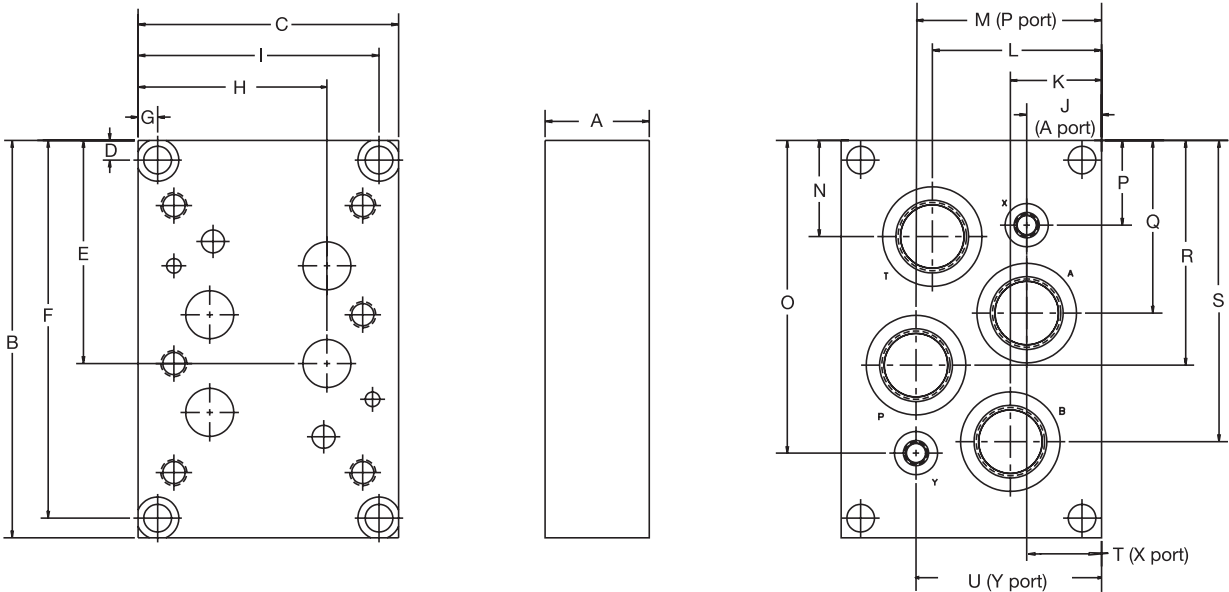
D6, D8 Subplates - Dimensions

C15

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Bottom Ported Subplate — NFPA D08

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



Dimensions	A	B	C	D	E	F	G	H	I	J	K
SPD68** SPD66N**	38.1 (1.50)	155.7 (6.13)	117.6 (4.63)	12.7 (0.50)	89.7 (3.53)	142.7 (5.62)	58.7 (2.31)	87.4 (3.44)	— —	30.2 (1.19)	30.2 (1.19)
SPD610**	50.8 (2.00)	193.8 (7.63)	127.0 (5.00)	9.7 (0.38)	108.7 (4.28)	184.2 (7.25)	9.7 (0.38)	92.2 (3.63)	117.6 (4.63)	36.6 (1.44)	44.5 (1.75)
Dimensions	L	M	N	O	P	Q	R	S	T	U	
SPD68** SPD66N**	87.4 (3.44)	87.4 (3.44)	42.2 (1.66)	125.5 (4.94)	30.2 (1.19)	65.8 (2.59)	89.7 (3.53)	113.5 (4.47)	31.8 (1.25)	85.9 (3.38)	— —
SPD610**	82.6 (3.25)	90.4 (3.56)	46.7 (1.84)	152.4 (6.00)	41.4 (1.63)	84.1 (3.31)	109.5 (4.31)	146.8 (5.78)	36.6 (1.44)	90.4 (3.56)	— —

NOTE: See Mounting Bolt Kits for bolt information

Subplates and Manifolds

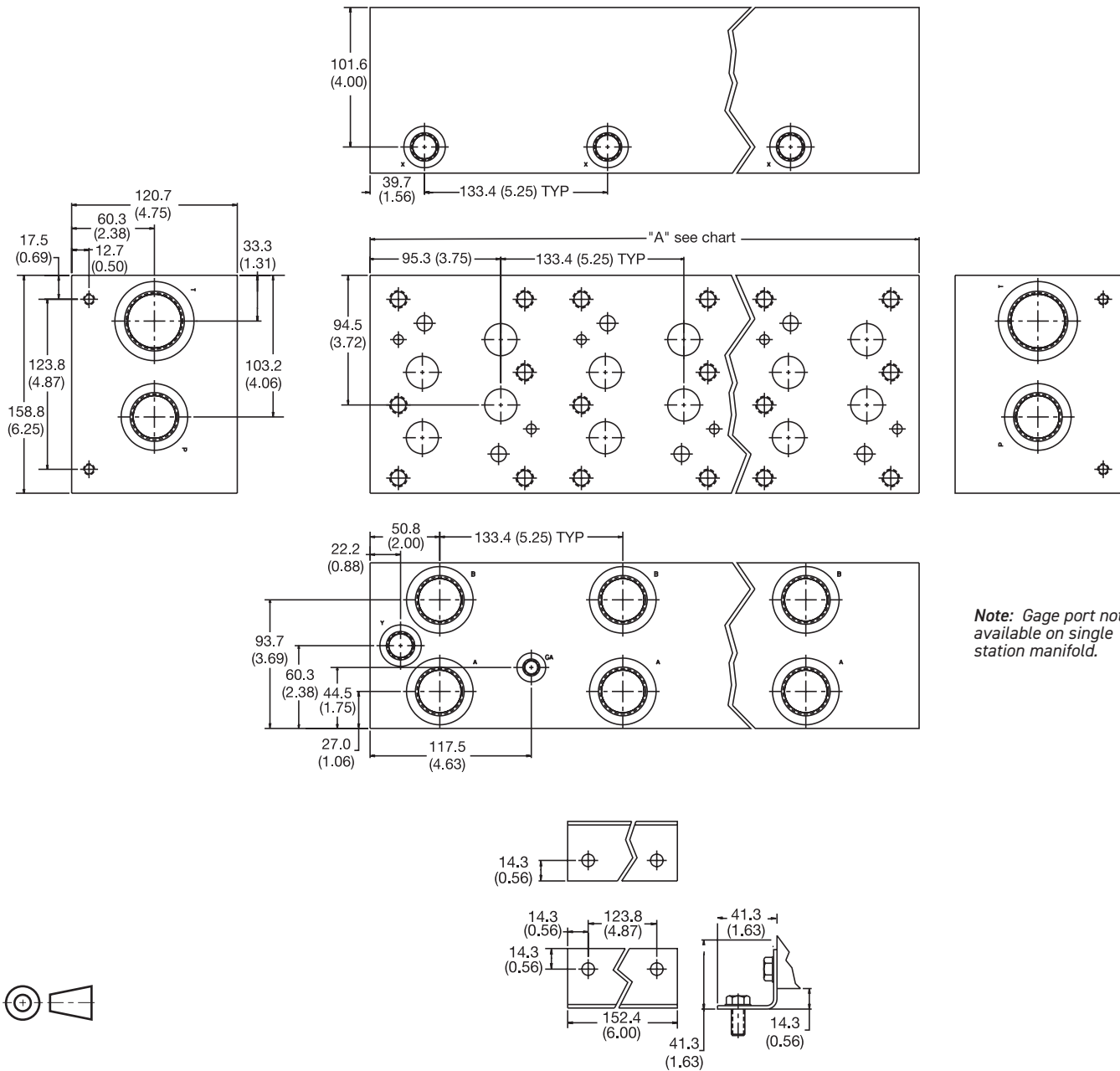
D6, D8 Manifolds - Dimensions

C16

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Manifolds — NFPA D08

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



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Mounting Hardware

(See Ordering Information for Mounting Hardware details)

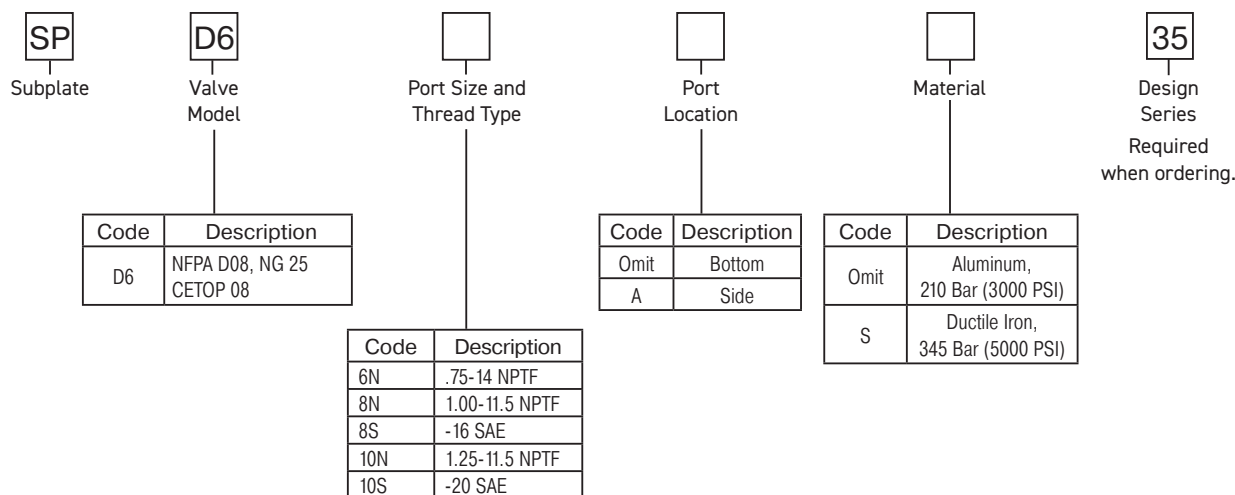
No. Stations	1	2	3	4	5
"A" Length mm (in)	133.35 (5.25)	266.7 (10.50)	400.05 (15.75)	533.4 (21.00)	666.75 (26.25)
Weight, Aluminum, Kg (lbs)	5 (12)	11 (24)	16 (35)	22 (49)	28 (61)
Weight, Iron, Kg (lbs)	20 (45)	41 (90)	62 (136)	82 (181)	103 (226)
NOTE: See Mounting Bolt Kits for bolt information					

Subplates and Manifolds

D6, D8 Subplates - Ordering Information

C17

WWW.SUMY.IR



Weight:

D6P, D61VW, D81VW, D8P

SPD66A

12 kg (26.4 lbs.)

Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

Mounting Bolt Kits

UNC Bolt Kits for use with D3W, D3, D31VW, D31DW Directional Control Valves and Sandwich valves				
	Number of Sandwich Valves @ 2.00" (50 mm) 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-2A thread, torque to 133 Nm (100 lbs-ft)

Mounting Hardware supplied with subplate includes:		
Subplates	Mounting Hardware	Qty
SPD66NA*	.50-13 UNC x 1.75 LG. SHCS	2
SPD68NA*		
SPD85A*		
SPD610NA*	.50-13 UNC x 3.00 LG. SHCS	2
SPD610SA*		
SPD66N*	.50-13 UNC x 1.5 LG. SHCS	2
SPD68N*		
SPD68S*		
SPD610N*	.38-16 UNC x 2.00 LG. SHCS	2
SPD610S*		

Valve Mounting Threads:
0.50-13 UNC x 1.19 DP.
Used for SAE and NPTF ports.

Subplates and Manifolds

D6, D8 Manifolds - Ordering Information

C18

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SP

Manifold

Number of Stations

Code	Description
1	No. of Stations
2	No. of Stations
3	No. of Stations
4	No. of Stations
5	No. of Stations

D6

Valve Model

Code	Description
D6	NFPA D08, NG 25 CETOP 08

Port Size and Thread Type

Material

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

35

Design Series
Required when ordering.

		Port Size				
Code	Description	P, A, B	T	Y	X (opt.)	Gage
N*	NPTF	1.00	1.25	.38	.25	.25
S**	SAE	-16	-20	-8	-4	-6
* 0.25-18 NPTF gage port plug included.						
** -6 SAE gage port plug included.						

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Mounting Bolt Kits

UNC Bolt Kits for use with D3W, D3, D31VW, D31DW Directional Control Valves and Sandwich valves				
	Number of Sandwich Valves @ 2.00" (50 mm) 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-2A thread, torque to 133 Nm (100 lbs-ft)				

Mounting hardware supplied with manifold includes:

- (2) steel brackets
- For SAE and NPTF ports: (8) 1/2-13 UNC x 1.00 HHCS
- (8) .50 SAE N Series washers

Valve mounting threads:

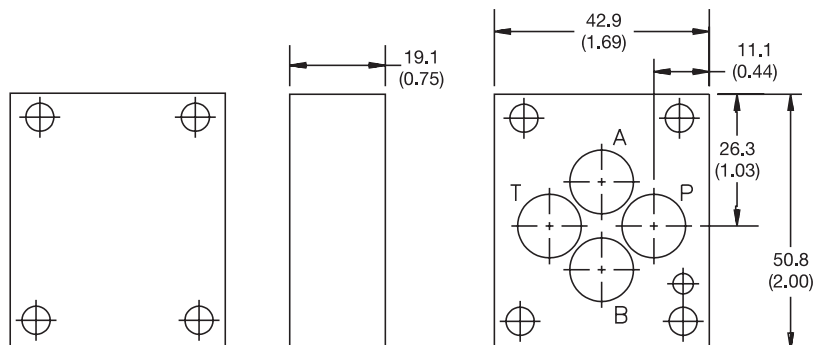
0.50-13 UNC x 1.19 DP. Used for SAE and NPTF ports.

Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

No. Stations	1	2	3	4	5
Weight, Aluminum, Kg (lbs)	5.5 (12)	11.0 (24)	16.0 (35)	22.4 (49)	27.9 (61)
Weight, Iron, Kg (lbs)	20.6 (45)	41.1 (90)	62.2 (136)	82.7 (181)	103.3 (226)

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

Cover Plate — NFPA D03



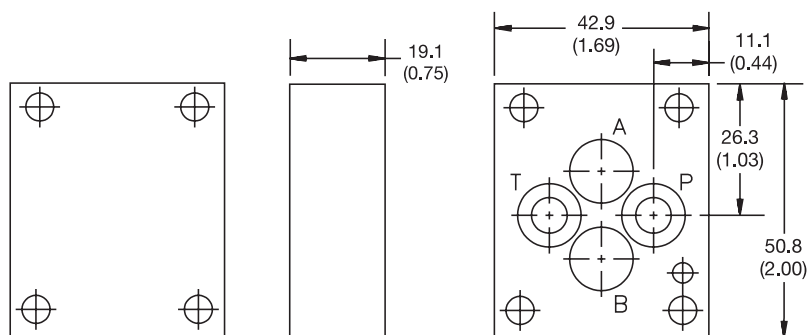
Note:

Mounting hardware supplied with cover plate.

Includes:

- 2-012V-7 O-ring, Qty. 4
- Æ0.12 x .25 long locating pin, Qty. 1
- 10-24 UNC x 1.00 long SHCS, Qty. 4 (SPD2C1EN) or
- M5-0.8 x 25 mm long SHCS, Qty. 4 (SPD2C1MN)

Crossover Plate, P → T ports — NFPA D03



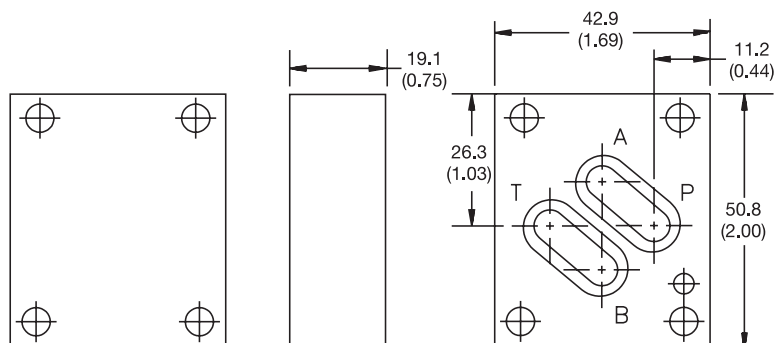
Note:

Mounting hardware supplied with crossover plate.

Includes:

- 2-012V-7 O-ring, Qty. 4
- Æ0.12 x .25 long locating pin, Qty. 1
- 10-24 UNC x 1.00 long SHCS, Qty. 4 (SPD2D1EN) or
- M5-0.8 x 25 mm long SHCS, Qty. 4 (SPD2D1MN)

Crossover Plate, P → A and B → T ports — NFPA D03



Note:

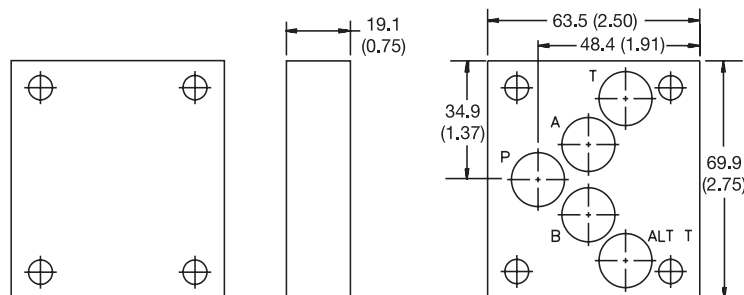
Mounting hardware supplied with cover plate.

Includes:

- 2-016V-7 O-ring, Qty. 2
- Æ0.12 x .25 long locating pin, Qty. 1
- 10-24 UNC x 1.00 long SHCS, Qty. 4 (SPD2A1EN) or
- M5-0.8 x 25 mm long SHCS, Qty. 4 (SPD2A1MN)

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

Cover Plate — NFPA D05



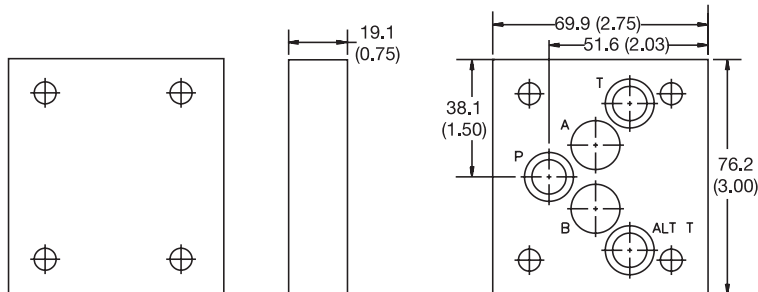
Note:

Mounting hardware supplied with cover plate.

Includes:

- 2-014V-7 O-ring, Qty. 5
- 0.25-20 UNC x 1.25 long SHCS, Qty. 4 (SPD3C1EN) or
- M6-1.0 x 30 mm long SHCS, Qty. 4 (SPD3C1MN)

Crossover Plate, P → T ports — NFPA D05



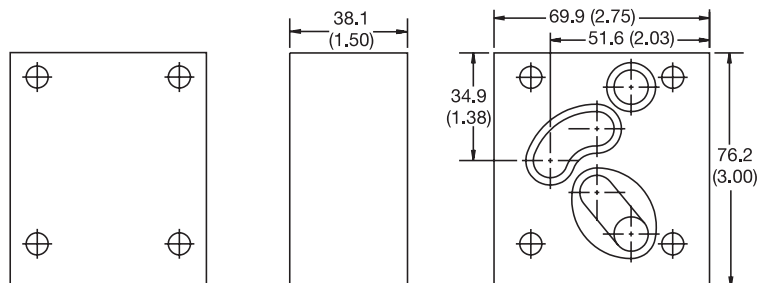
Note:

Mounting hardware supplied with crossover plate.

Includes:

- 2-014V-7 O-ring, Qty. 5
- 0.25-20 UNC x 1.25 long SHCS, Qty. 4 (SPD3D1EN) or
- M6-1.0 x 30 mm long SHCS, Qty. 4 (SPD3D1MN)

Crossover Plate, P → A and B → T ports — NFPA D05



Note:

Mounting hardware supplied with crossover plate.

Includes:

- 2-014V-7 O-ring, Qty. 1
- 2-022V-7 +O-ring, Qty. 2
- 0.25-20 UNC x 2.00 long SHCS, Qty. 4 (SPD3A1EN) or
- M6-1.0 x 50 mm long SHCS, Qty. 4 (SPD3A1MN)

Subplates and Manifolds

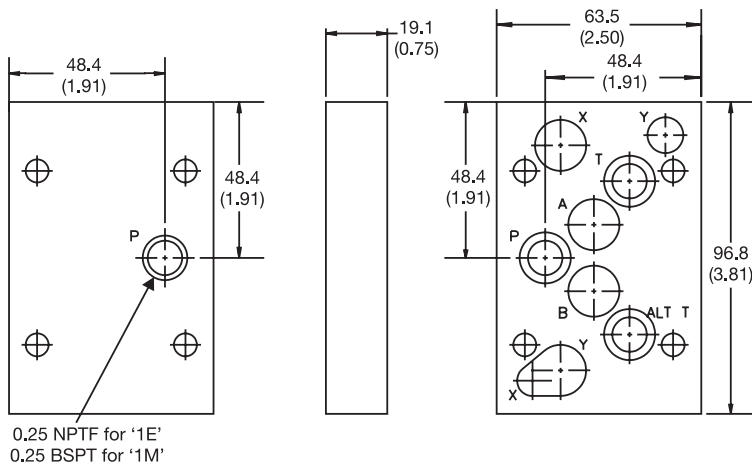
Accessories, NFPA D05H - Dimensions

C21

WWW.SUMY.IR

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

Cover Plate — NFPA D05H



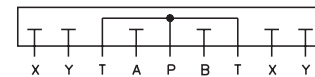
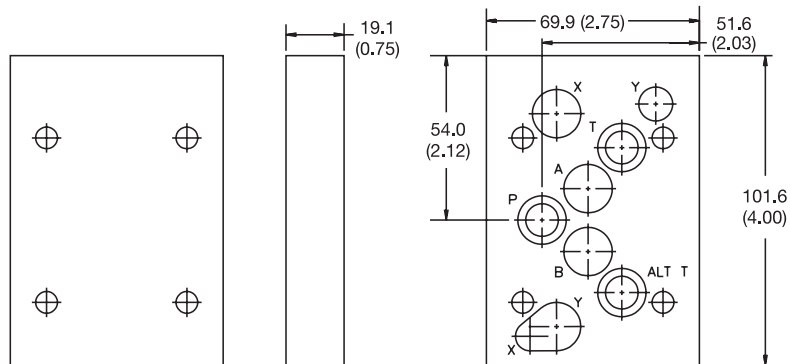
Note:

Mounting hardware supplied with cover plate.

Includes:

- 2-011V-7 O-ring, Qty. 1
- 2-014V-7 O-ring, Qty. 6
- 2-016V-7 O-ring, Qty. 1
- 0.25-18 NPTF plug, Qty. 1 (SPD31VC1EN only)
- 0.25-20 UNC x 1.25 long SHCS, Qty. 4 (SPD31VC1EN) or
- M6-1.0 x 30 mm long SHCS, Qty. 4 (SPD31VC1MN)

Crossover Plate, P → T ports — NFPA D05H



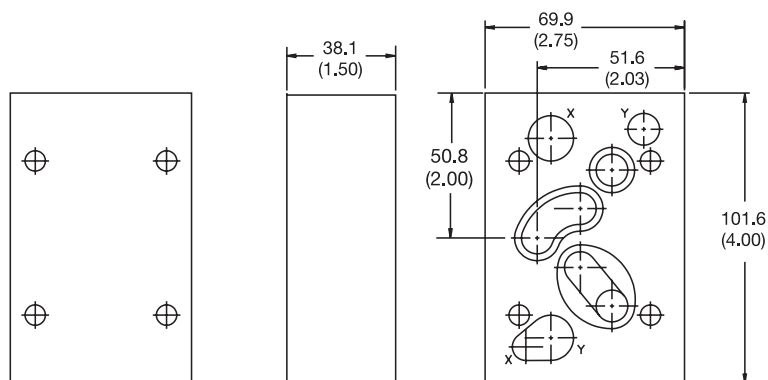
Note:

Mounting hardware supplied with crossover plate.

Includes:

- 2-011V-7 O-ring, Qty. 1
- 2-014V-7 O-ring, Qty. 6
- 2-016V-7 O-ring, Qty. 1
- 0.25-20 UNC x 1.25 long SHCS, Qty. 4 (SPD31VD1EN) or
- M6-1.0 x 30 mm long SHCS, Qty. 4 (SPD31VD1MN)

Crossover Plate, P → A and B → T ports — NFPA D05H



Note:

Mounting hardware supplied with crossover plate.

Includes:

- 2-011V-7 O-ring, Qty. 1
- 2-014V-7 O-ring, Qty. 2
- 2-016V-7 O-ring, Qty. 1
- 2-022V-7 O-ring, Qty. 2
- 0.25-20 UNC x 2.00 long SHCS, Qty. 4 (SPD31VA1EN) or
- M6-1.0 x 50 mm long SHCS, Qty. 4 (SPD31VA1MN)

Subplates and Manifolds

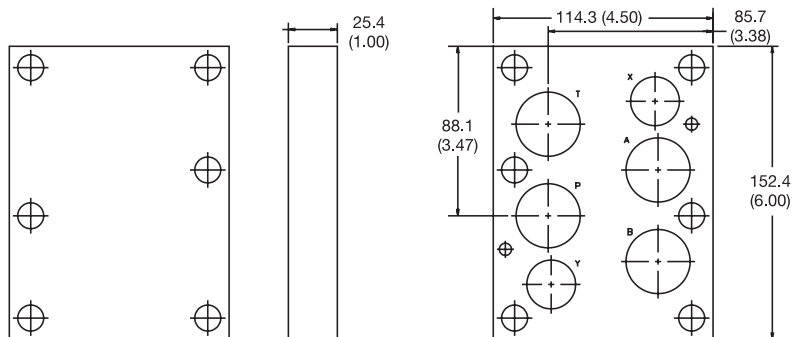
Accessories, NFPA D08 - Dimensions

C22

WWW.SUMY.IR

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

Cover Plate — NFPA D08



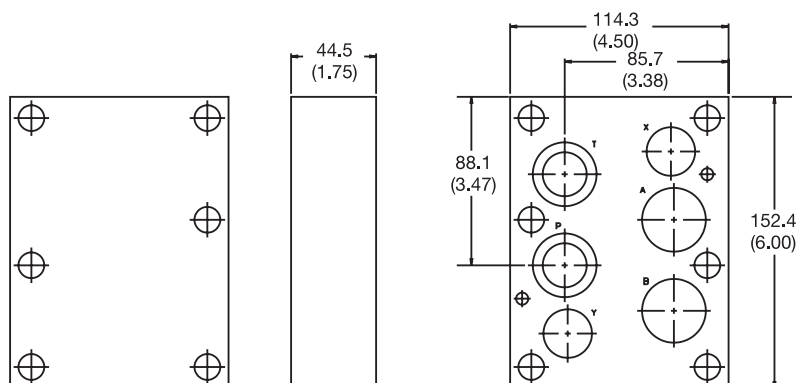
Note:

Mounting hardware supplied with cover plate.

Includes:

- 2-210V-7 O-ring, Qty. 2
- 2-215V-7 O-ring, Qty. 4
- 0.50-13 UNC x 1.75 long SHCS, Qty. 6 (SPD6C1EN) or M12-1.75 x 45 mm long SHCS, Qty. 6 (SPD6C1MN)
- 0.25 x 0.50 long locating pins, Qty. 2

Crossover Plate, P → T ports — NFPA D08



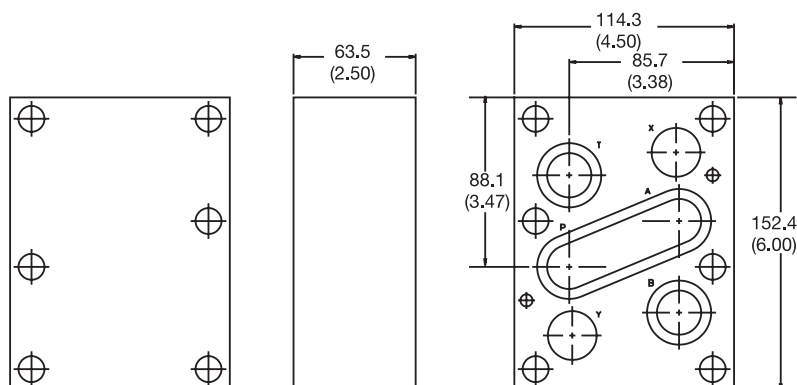
Note:

Mounting hardware supplied with crossover plate.

Includes:

- 2-210V-7 O-ring, Qty. 2
- 2-215V-7 O-ring, Qty. 4
- 0.50-13 UNC x 2.50 long SHCS, Qty. 6 (SPD6D1EN) or M12-1.75 x 65 mm long SHCS, Qty. 6 (SPD6D1MN)
- 0.25 x 0.50 long locating pins, Qty. 2

Crossover Plate, P → A and B → T ports — NFPA D08



Note:

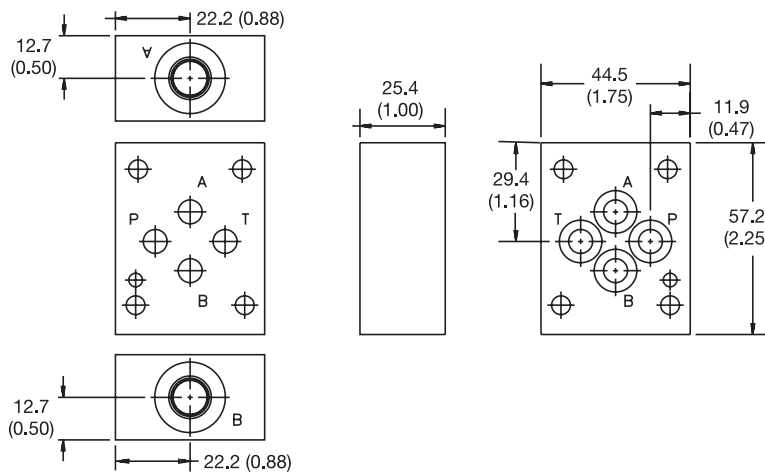
Mounting hardware supplied with crossover plate.

Includes:

- 2-210V-7 O-ring, Qty. 2
- 2-215V-7 O-ring, Qty. 2
- 2-231V-7 O-ring, Qty. 1
- 0.50-13 UNC x 3.50 long SHCS, Qty. 6 (SPD6A1EN) or M12-1.75 x 90 mm long SHCS, Qty. 6 (SPD6A1MN)
- 0.25 x 0.50 long locating pins, Qty. 2

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

Tapping Plate, A and B ports — NFPA D03



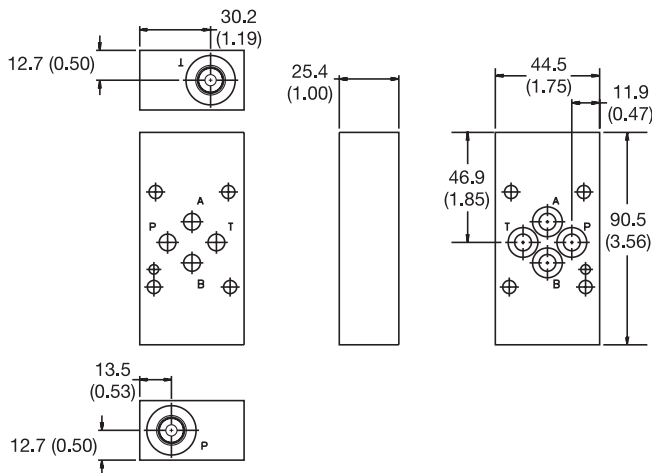
Note:

Interface seal kit provided with tapping plate.

Includes:

- 2-012V-7 O-ring, Qty. 4
- Æ0.12 x .25 long locating pin, Qty. 1
- 0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

Tapping Plate, P and T ports — NFPA D03



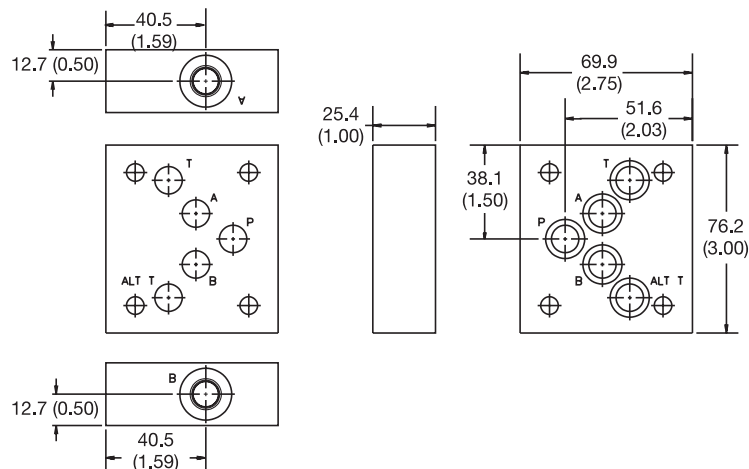
Note:

Interface seal kit provided with tapping plate.

Includes:

- 2-012V-7 O-ring, Qty. 4
- Æ0.12 x .25 long locating pin, Qty. 1
- 0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

Tapping Plate, A and B ports — NFPA D05



Note:

Interface seal kit provided with tapping plate.

Includes:

- 2-014V-7 O-ring, Qty. 5
- 0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

Subplates and Manifolds

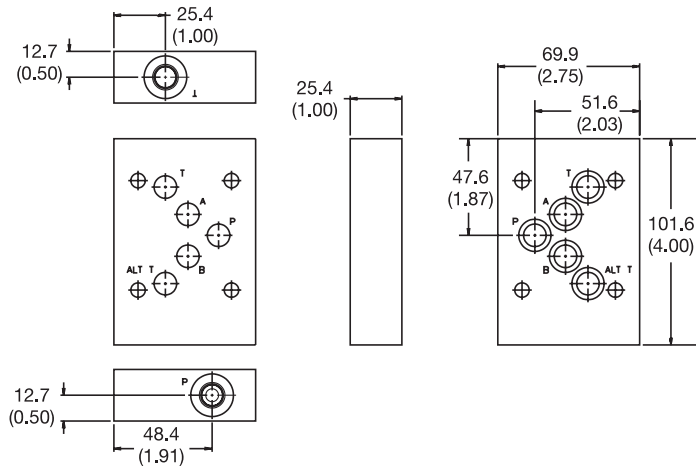
Accessories, NFPA D05, D05H, D05HE - Dimensions

C24

WWW.SUMY.IR

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

Tapping Plate, P and T ports — NFPA D05



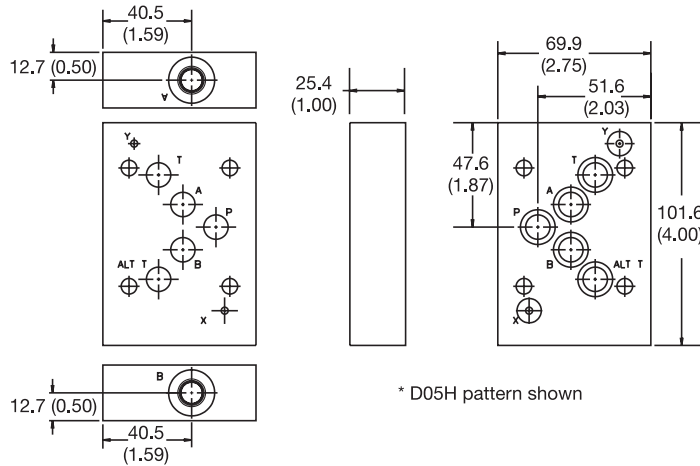
Note:

Interface seal kit provided with tapping plate.

Includes:

- 2-014V-7 O-ring, Qty. 5
- 0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

Tapping Plate, A and B ports — NFPA D05H and D05HE (E)



* D05H pattern shown

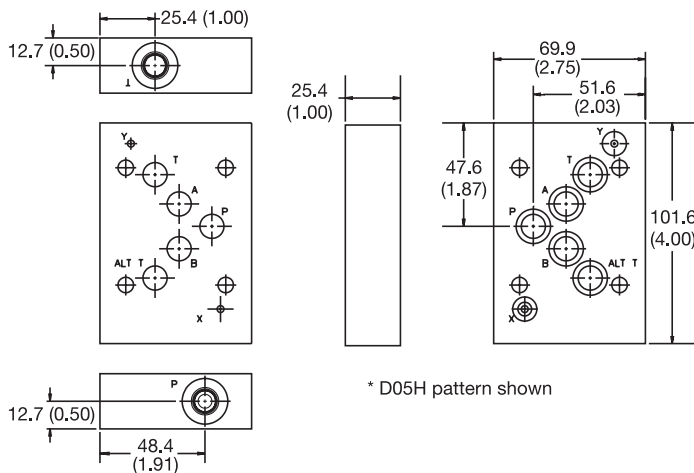
Note:

Interface seal kit provided with tapping plate.

Includes:

- SPD31VT2*W* :
2-011V-7 O-ring, Qty. 2
- 2-014V-7 O-ring, Qty. 5
- SPD31DT2*W*:
2-014V-7 O-ring, Qty. 7
- 0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

Tapping Plate, P and T ports — NFPA D05H and D05HE



* D05H pattern shown

Note:

Interface seal kit provided with tapping plate.

Includes:

- SPD31VT2*P*:
2-011V-7 O-ring, Qty. 2
- 2-014V-7 O-ring, Qty. 5
- SPD31DT2*P*:
2-014V-7 O-ring, Qty. 7
- 0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

Subplates and Manifolds

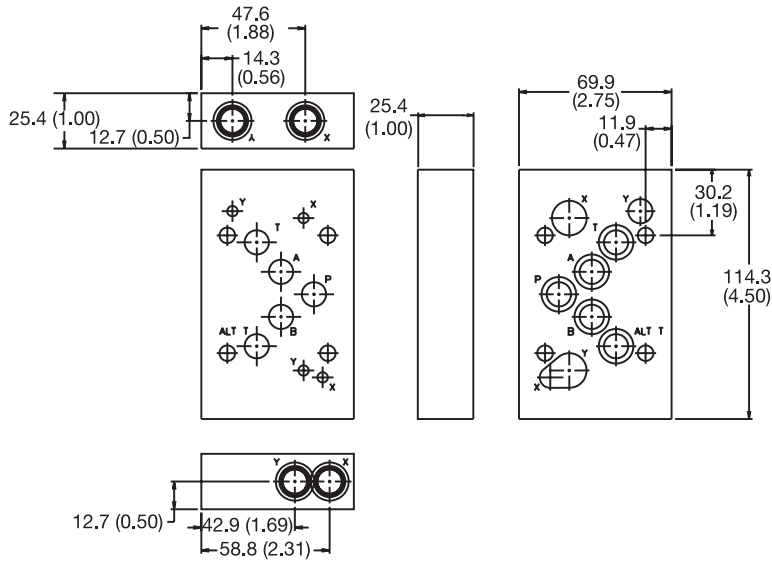
Accessories, NFPA D05H, D05HE, D08 - Dimensions

C25

WWW.SUMY.IR

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

Tapping Plate, X and Y ports — NFPA D05H and D05HE



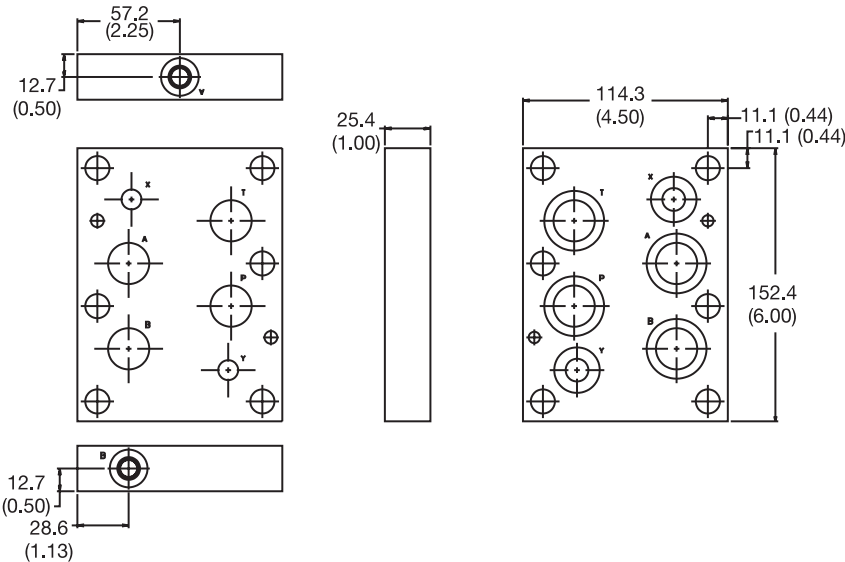
Note:

Interface seal kit provided with tapping plate.

Includes:

- 2-011V-7 O-ring, Qty. 1
- 2-014V-7 O-ring, Qty. 6
- 2-016V-7 O-ring, Qty. 1
- 0.25-18 NPTF Plug, Qty. 3 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty. 3 (SAE port only)

Tapping Plate, A and B ports — NFPA D08



Note:

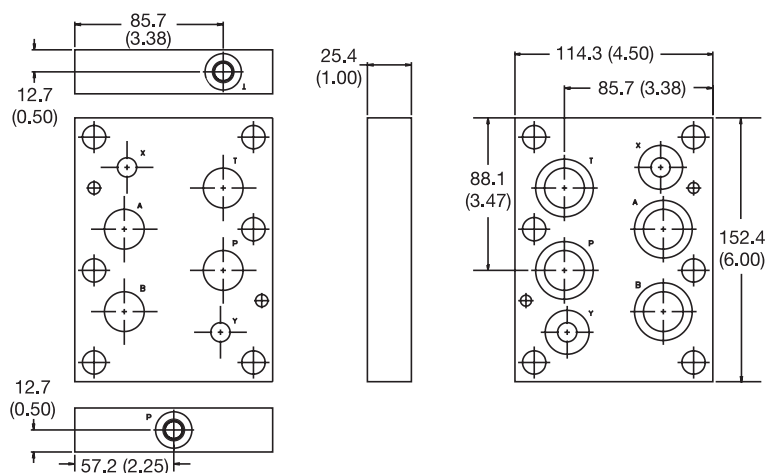
Interface seal kit provided with tapping plate.

Includes:

- 2-210V-7 O-ring, Qty. 2
- 2-215V-7 O-ring, Qty. 4
- Æ.25 x .50 long locating pin, Qty. 2
- 0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty. 1 (SAE port only)

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

Tapping Plate, P and T ports — NFPA D08



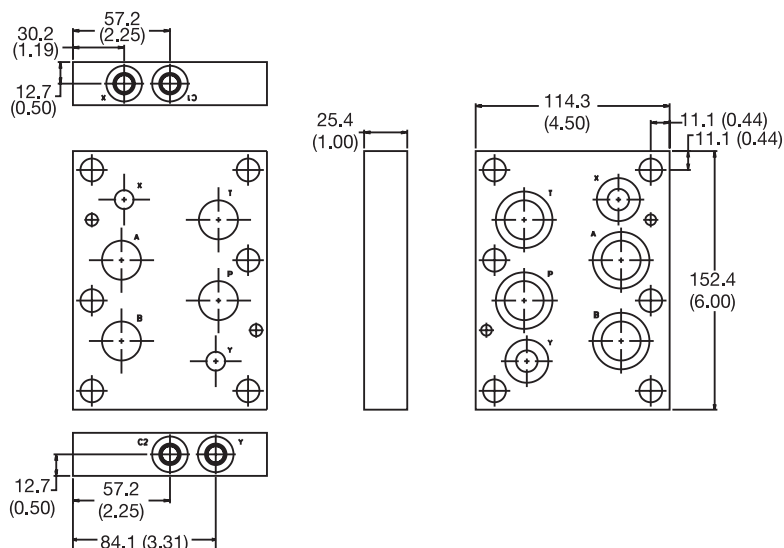
Note:

Interface seal kit provided with tapping plate.

Includes:

- 2-210V-7 O-ring, Qty. 2
- 2-215V-7 O-ring, Qty. 4
- Æ.25 x .50 long locating pin, Qty. 2
- 0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty. 1 (SAE port only)

Tapping Plate, X and Y ports — NFPA D08



Note:

Interface seal kit provided with tapping plate.

Includes:

- 2-210V-7 O-ring, Qty. 2
- 2-215V-7 O-ring, Qty. 4
- Æ.25 x .50 long locating pin, Qty. 2
- 0.25-18 NPTF Plug, Qty. 3 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty. 3 (SAE port only)

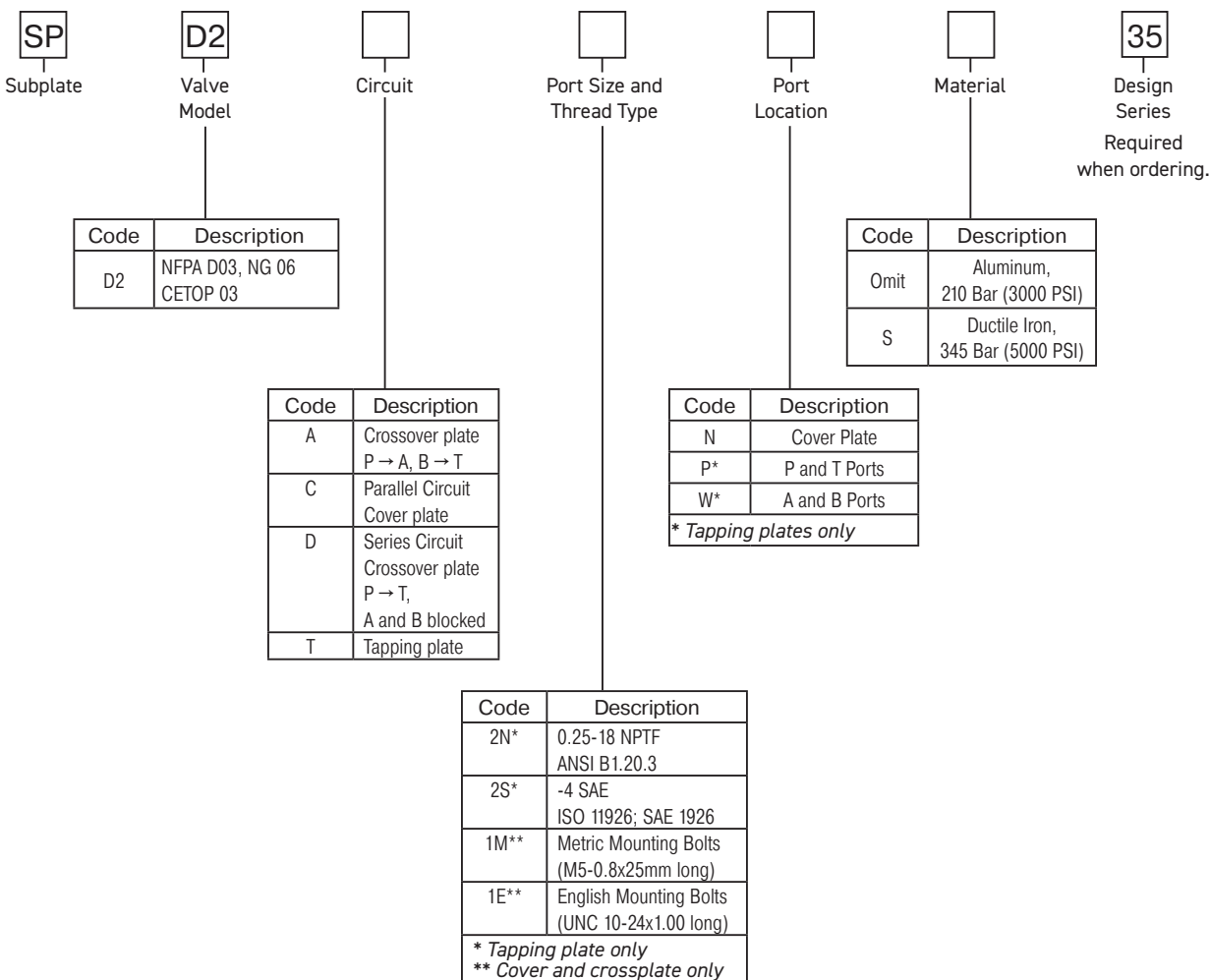
Subplates and Manifolds

Accessories, D1V - Ordering Information

C27

WWW.SUMY.IR

Tapping and Cover Plates



C

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to Alpha
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Section C
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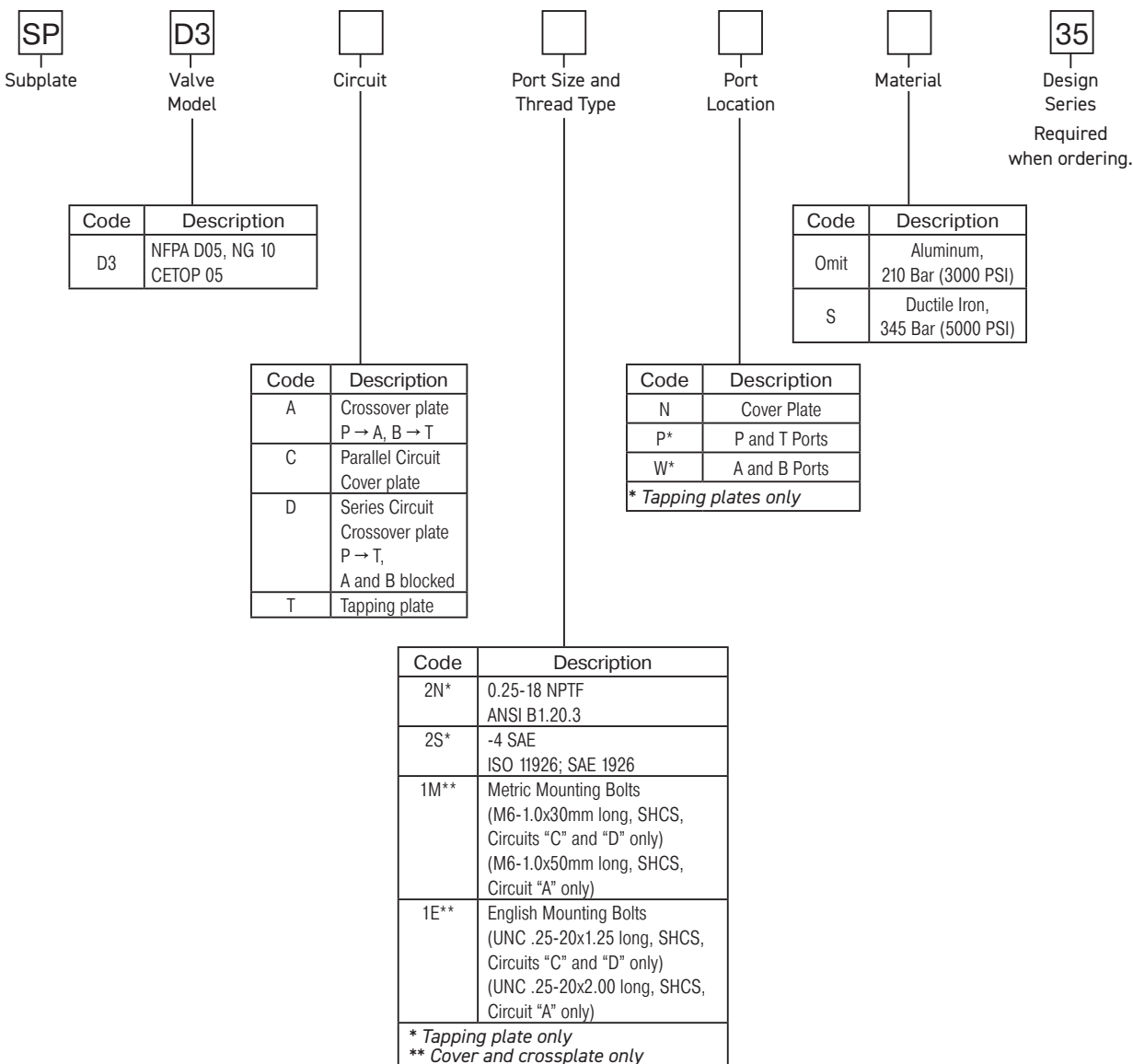
Subplates and Manifolds

Accessories, D3 - Ordering Information

C28

WWW.SUMY.IR

Tapping and Cover Plates



C

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to Alpha
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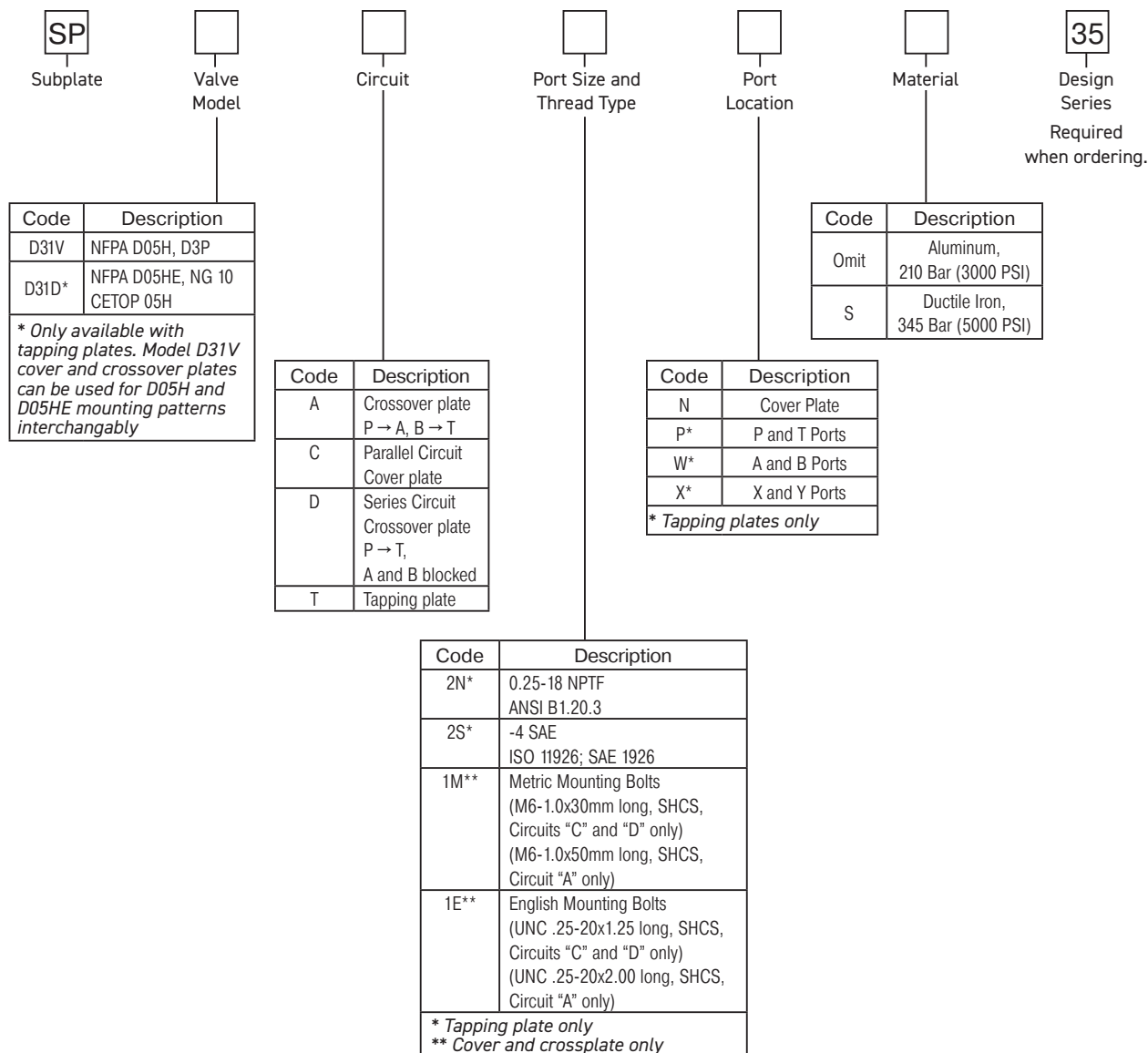
Subplates and Manifolds

Accessories, D31 - Ordering Information

C29

WWW.SUMY.IR

Tapping and Cover Plates



C

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to Alpha
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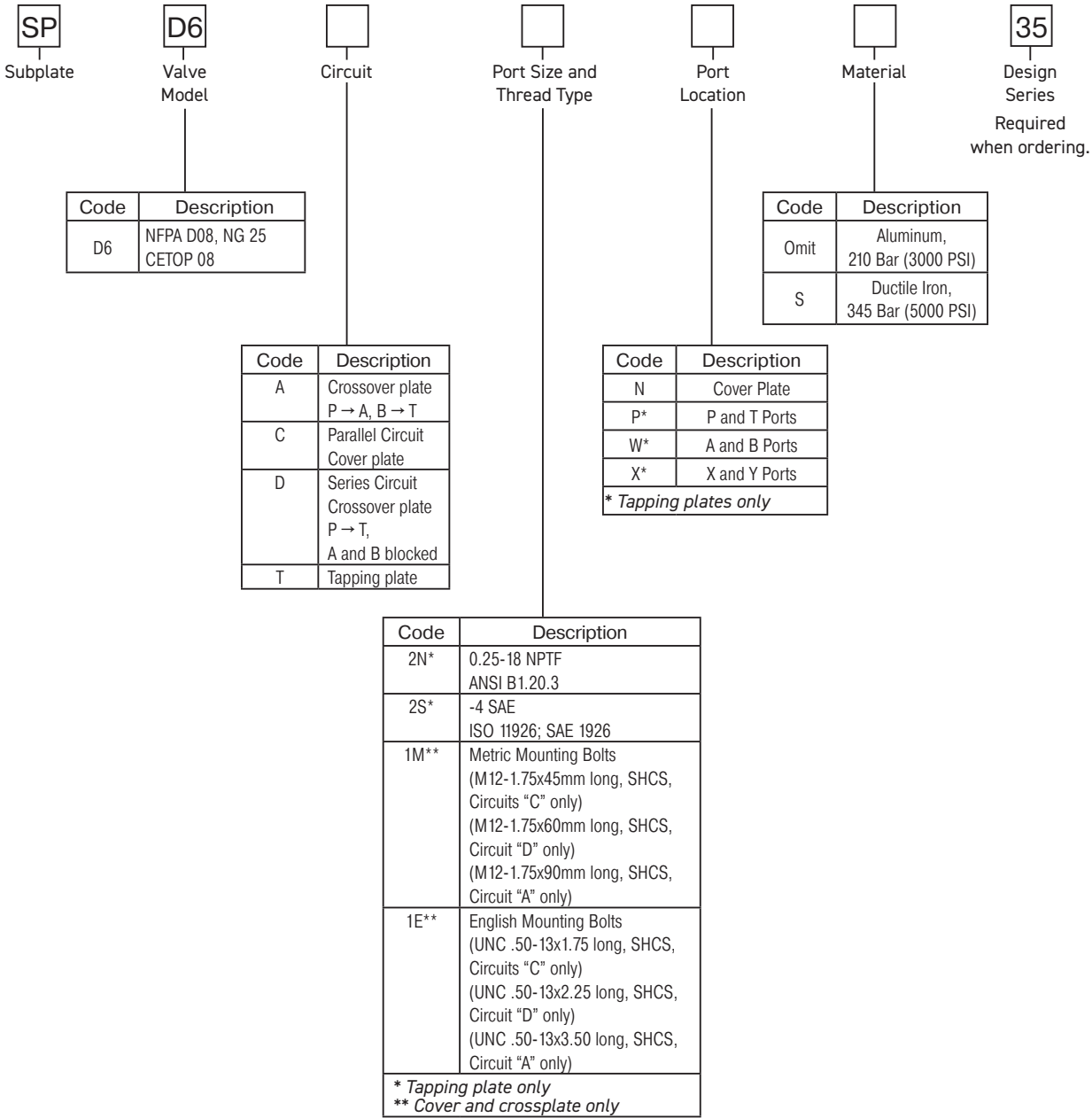
Subplates and Manifolds

Accessories, D6, D8 - Ordering Information

C30

WWW.SUMY.IR

Tapping and Cover Plates



C

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Subplates and Manifolds

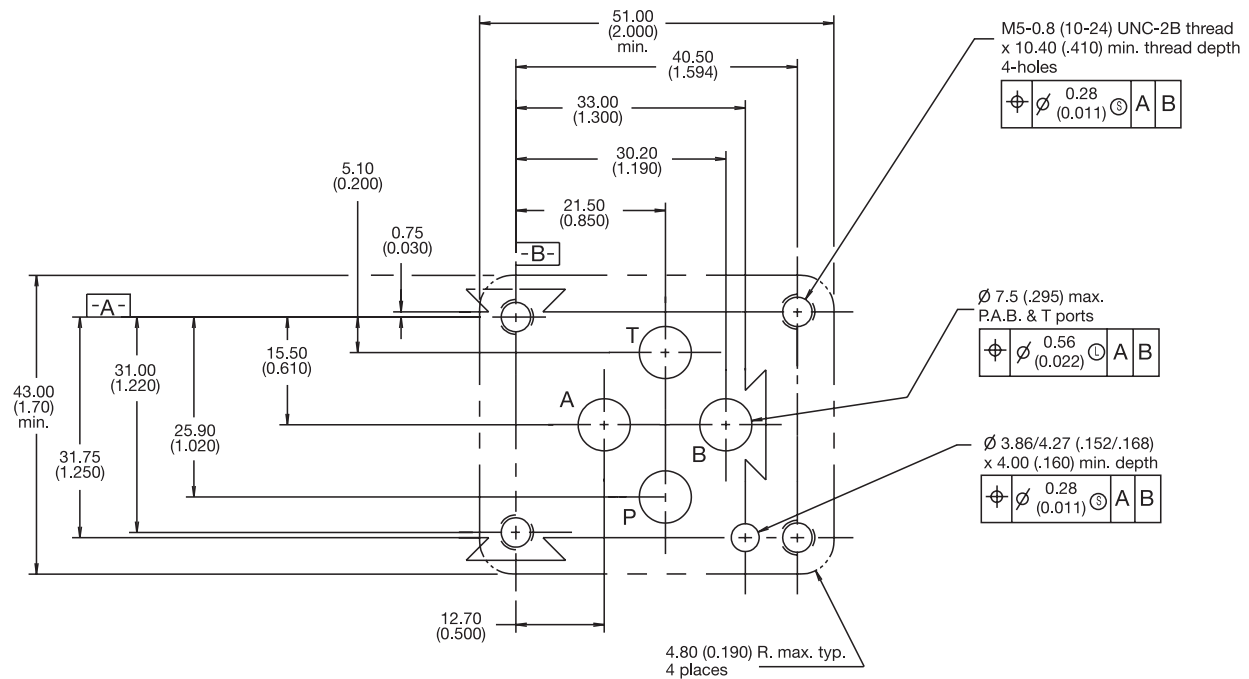
D03, D05 - Installation Information

C31

WWW.SUMY.IR

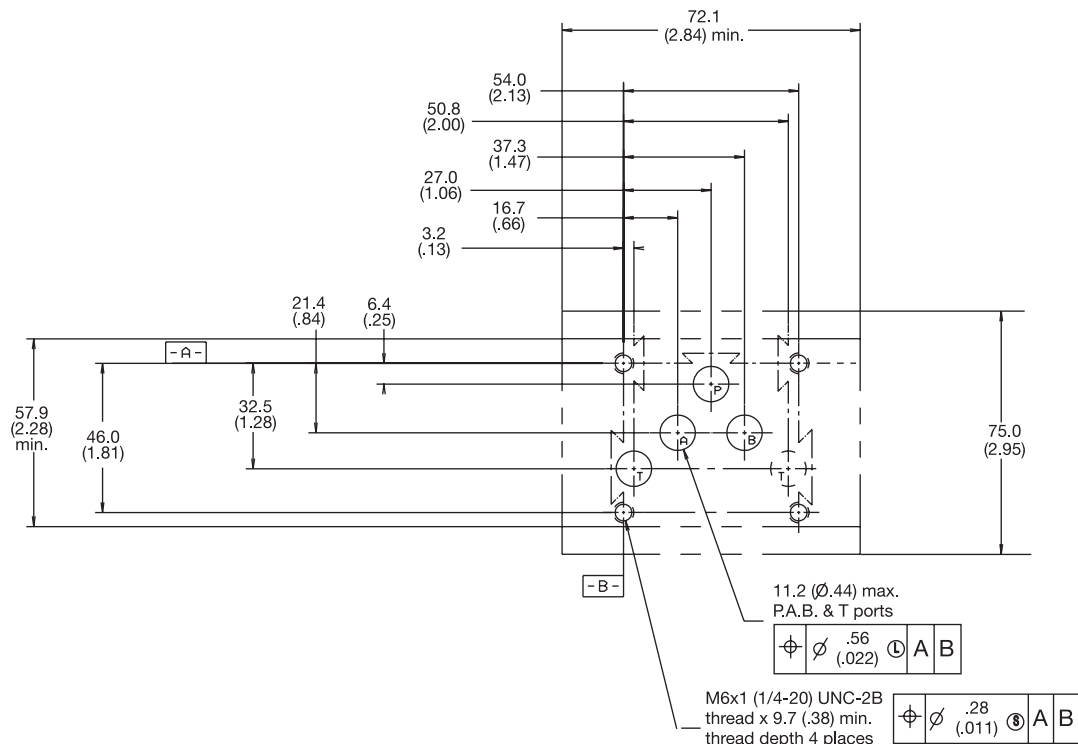
Mounting Pattern — NFPA D03, NG6, CETOP 3

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



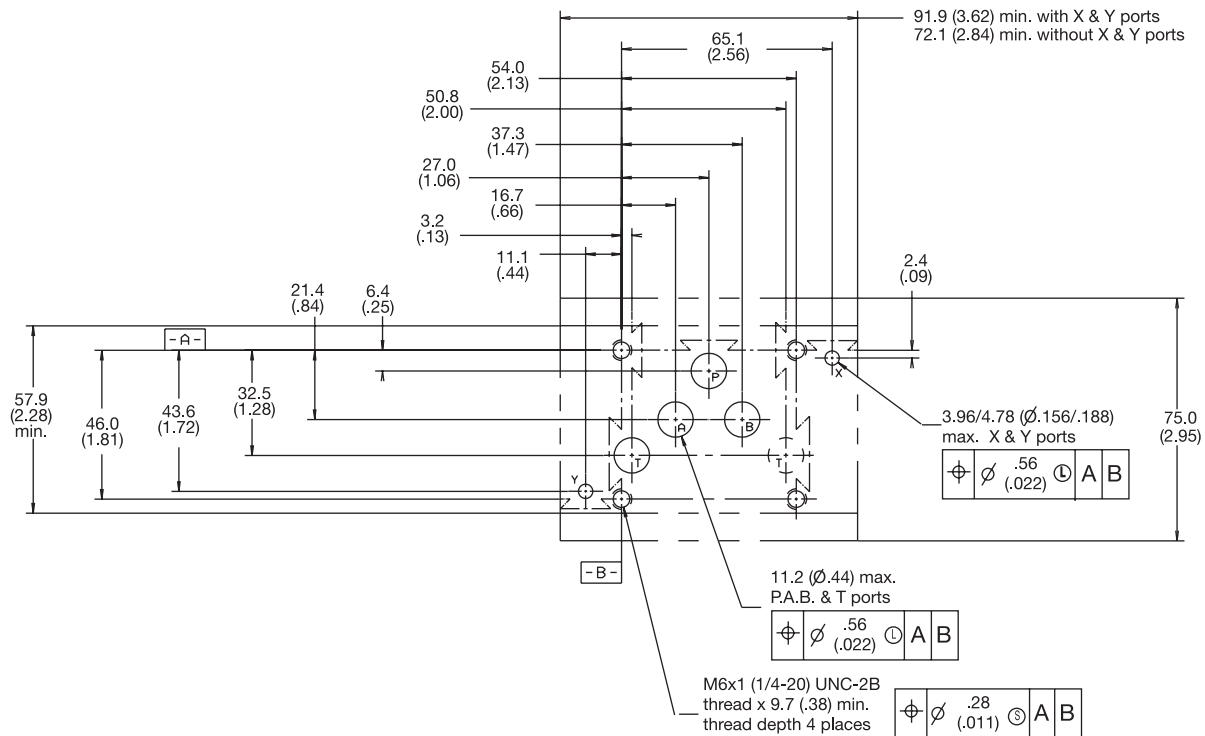
Mounting Pattern — NFPA D05, NG5, CETOP 5

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



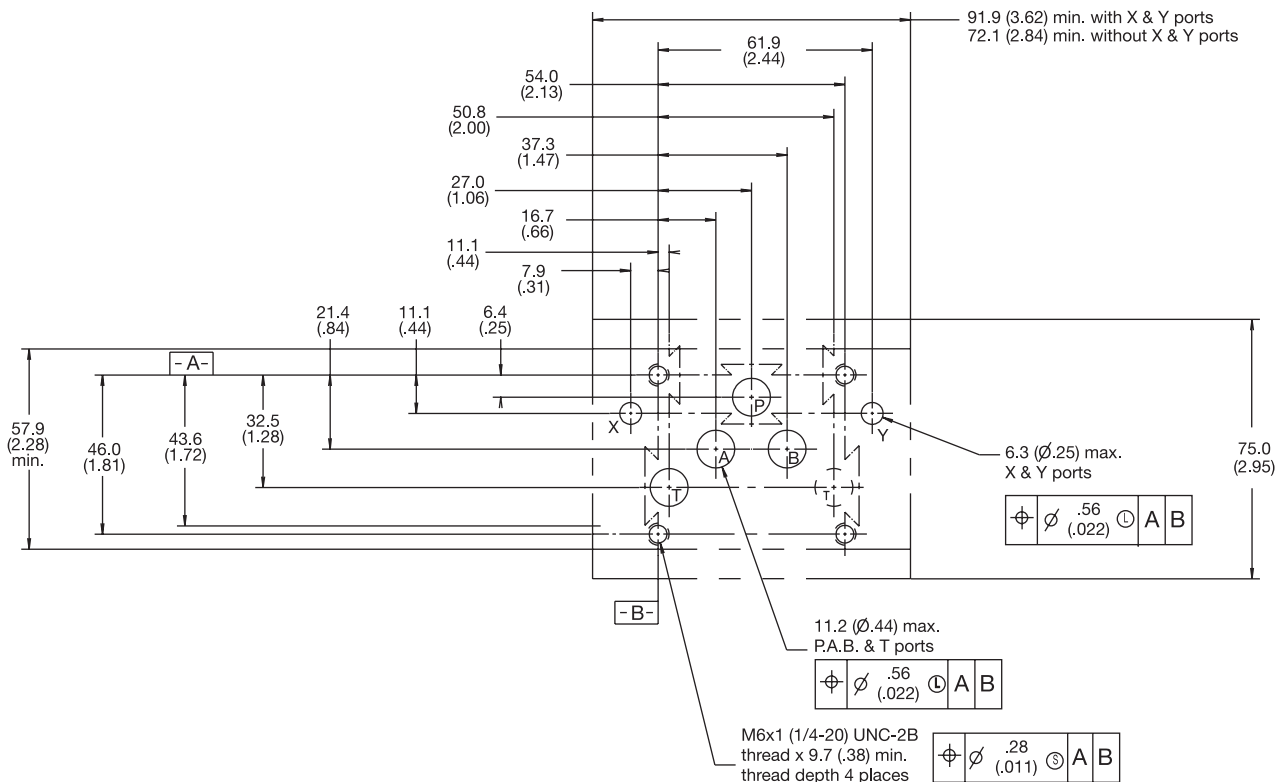
Mounting Pattern — NFPA D05H, NG10, CETOP 5H

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



Mounting Pattern — NFPA D05HE, NG10, CETOP 5H

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



Subplates and Manifolds

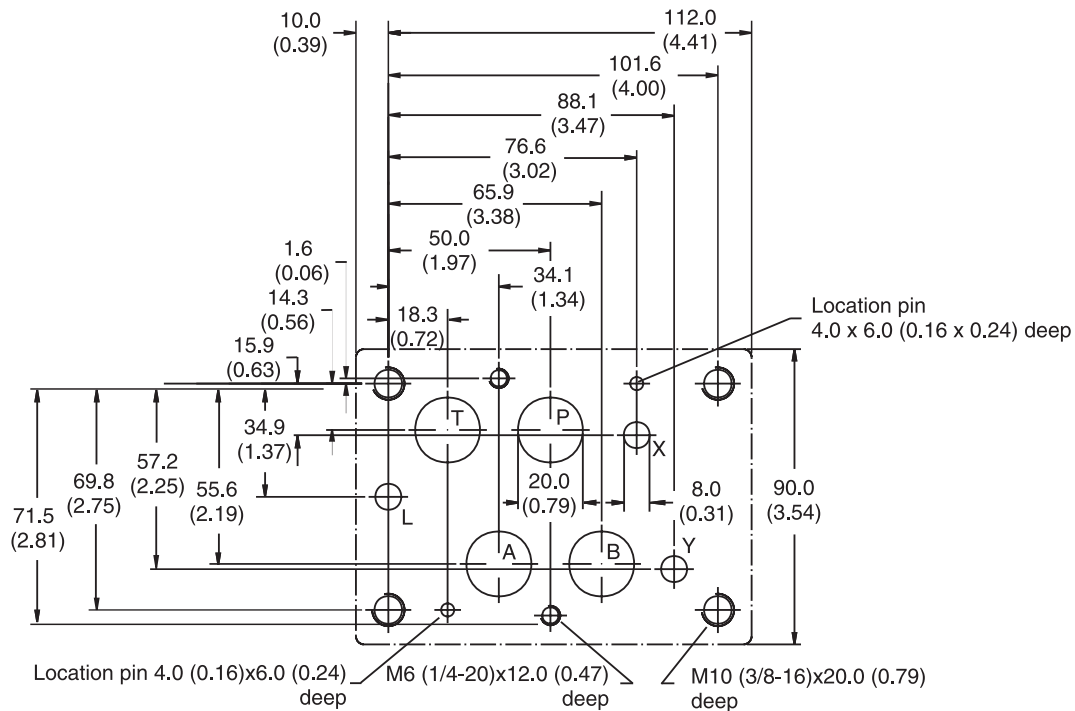
D08 - Installation Information

C33

WWW.SUMY.IR

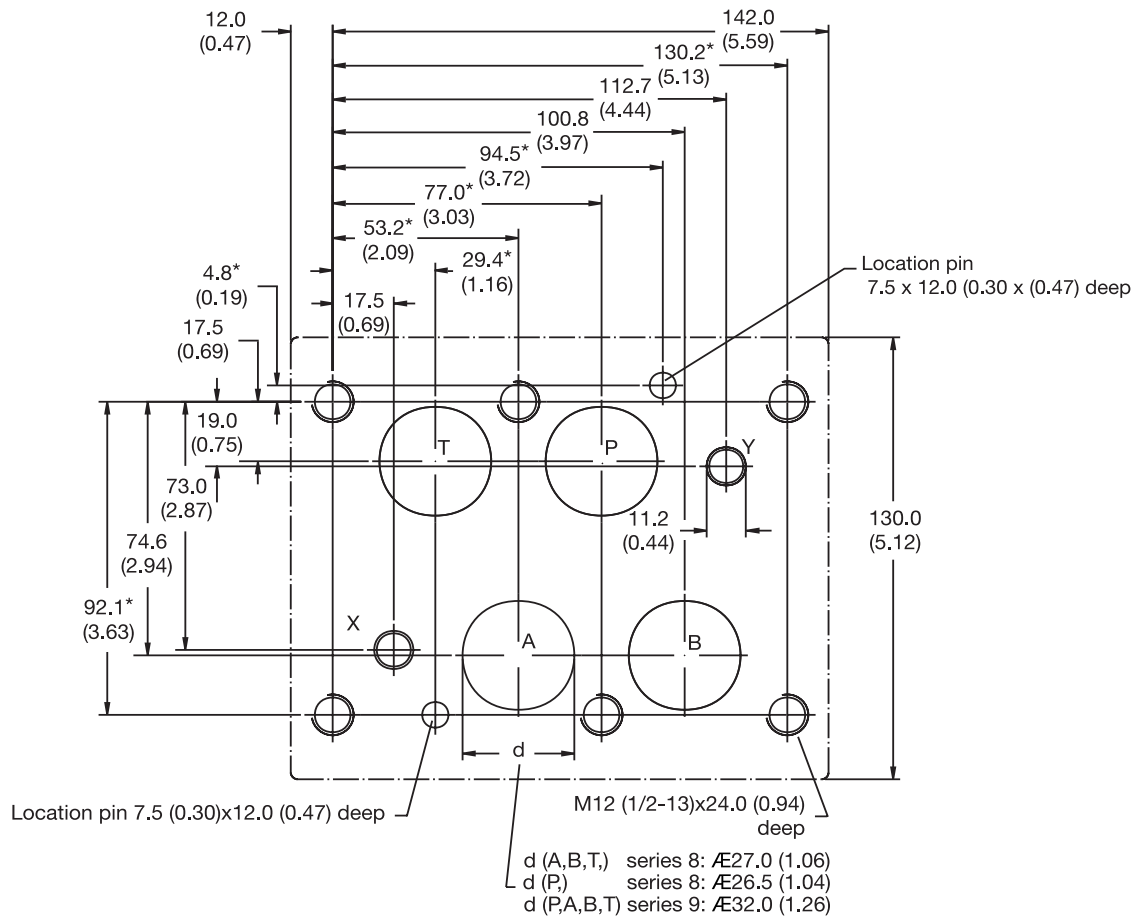
Mounting Pattern — NFPA D07, NG16, CETOP 7

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



Mounting Pattern — NFPA D08, NG25, CETOP 8

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



General Description

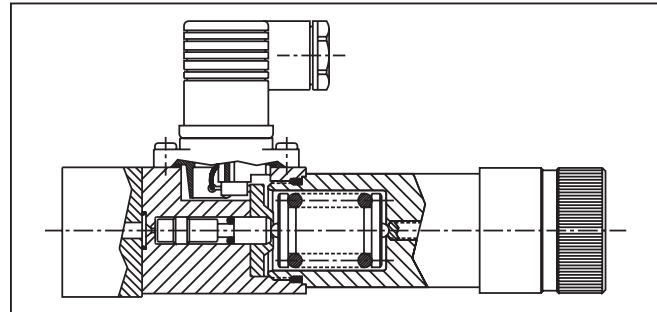
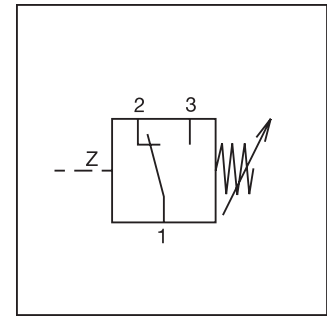
Series PSB electrohydraulic pressure switches are high performance devices that provide an electrical signal when sensed pressure rises above or falls below the selected setting. Maximum operating pressure is 315 Bar (4560 PSI) for all models.

Operation

Sensed pressure acts against a piston and spring plate assembly that is opposed by an adjustable spring force. When the pressure against the piston exceeds that of the adjustable spring, the plate moves and actuates a microswitch. The desired operating pressure is adjusted via a setscrew or hand knob. A tamper resistant keylock option is also available with the setscrew type adjuster. The electric element is a high quality micro switch with snap-action contact. Three terminals permit application as "on", "off" or "changeover" switch. The electric connection is made with a 3-pole plug-in connector to DIN 43650 with ground. The plug-in connector is also available with an indicator light.

Features

- **Four Separate Adjustable Pressure Range Options** – Enables operator to precisely select the desired pressure setting.
- **Hydraulically Dampened Piston** – Provides accurate response and extended service life.
- **Flange Type Mounting Style** – Provides great flexibility for mounting with manifolds, sandwich plates or direct line connections.
- **Optional Keylock Adjustment** – Prevents tampering or unauthorized adjustments in critical applications.
- **Robust Cast Iron Construction** – A rugged, yet compact, product designed to provide long service life in demanding applications.
- **IP 65 (Nema 4) Class Electrical Protection** – Maintains integrity against moisture in spray or splashdown situations.



Specifications

Type	Plunger type switch
Mounting	Flange mounting or fitted to a level face
Mounting Position	No restrictions
Operating Pressure (Bar)	315 (4650 PSI) maximum
Actuating Pressure Differential (Bar)	See performance curves
Duty Cycle	1/s maximum
Operating Temperature Range - Ambient (°C)	0 - 80 (32 - 176°F)
Viscosity Range (cSt / mm²/s)	12 - 400 (56 - 1854 SSU)
Filtration	Recommended ISO 4406 Code, 18/16/13 or better
Electrical Connection	Plug-in connector to DIN 43650
Insulation	IP 65 (Nema 4)
Contact Load Carrying Capacity (A)	5 @ 250 VAC 1 @ 50 VDC .02 @ 250 VDC

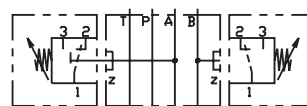
NOTE: For inductive DC loads, a diode should be used to increase service life

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

WWW.SUMY.IR

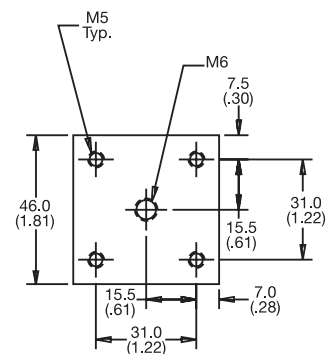


(Allows PSB switches to be used in stacking assemblies with Sandwich style valves)



H06PSB-994 -- Pressure switch to A or B or A and B connection

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

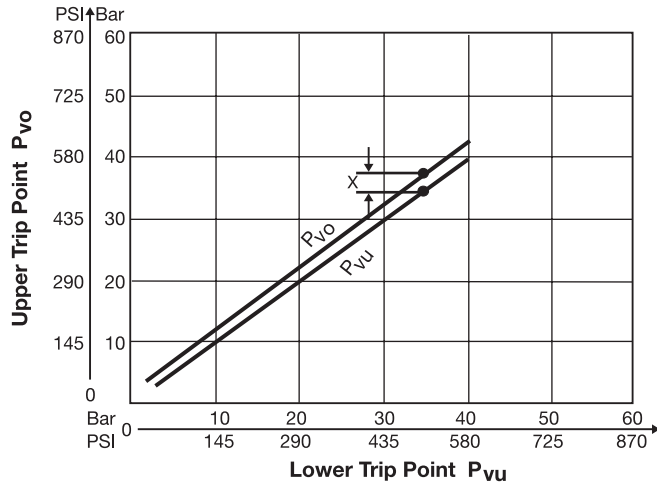


** Tolerance on these dimensions +/- 0.1

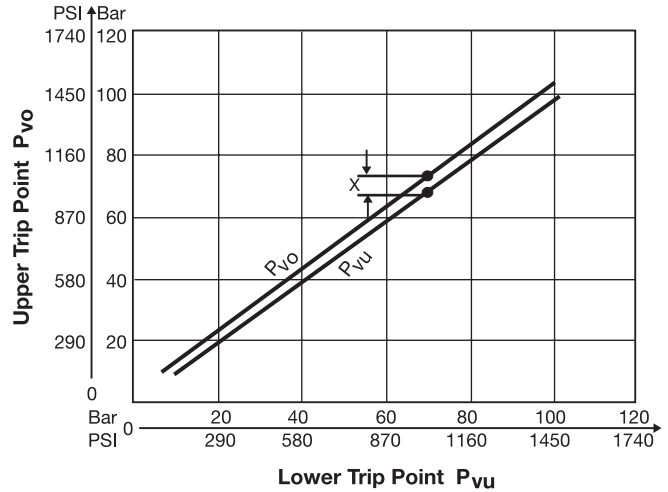


Performance Curves

PSB 040

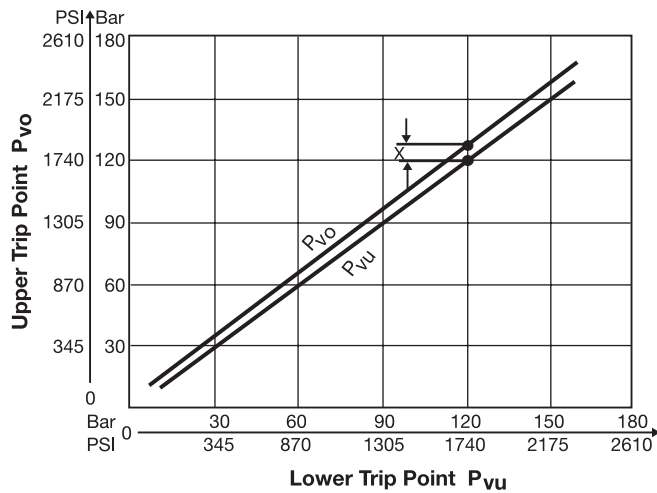


PSB 100

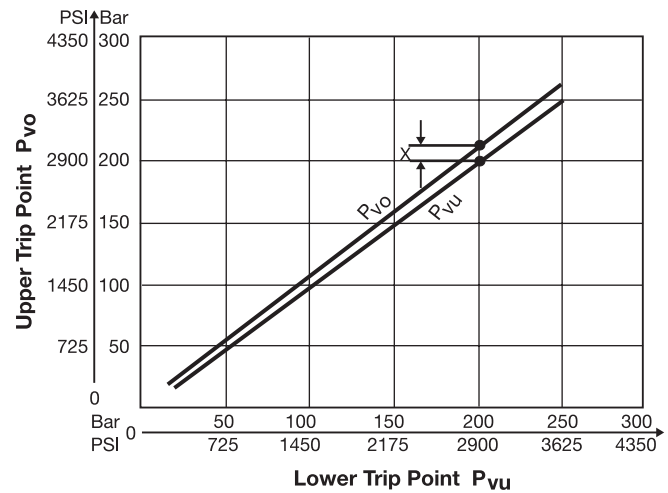


X = Switching Pressure Difference

PSB 160

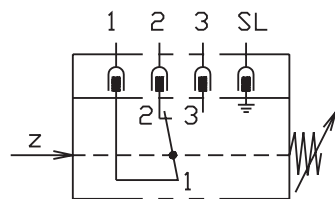


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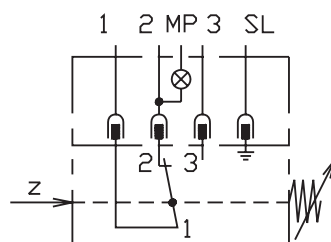


X = Switching Pressure Difference

Electrical Connections



Connection 'N'



Connection 'L'

Subplates and Manifolds

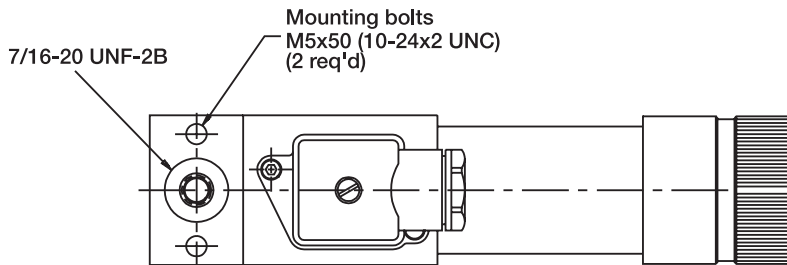
PSB- Dimensions

C38

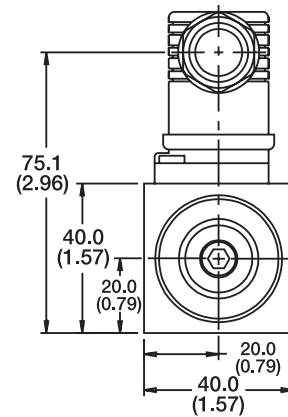
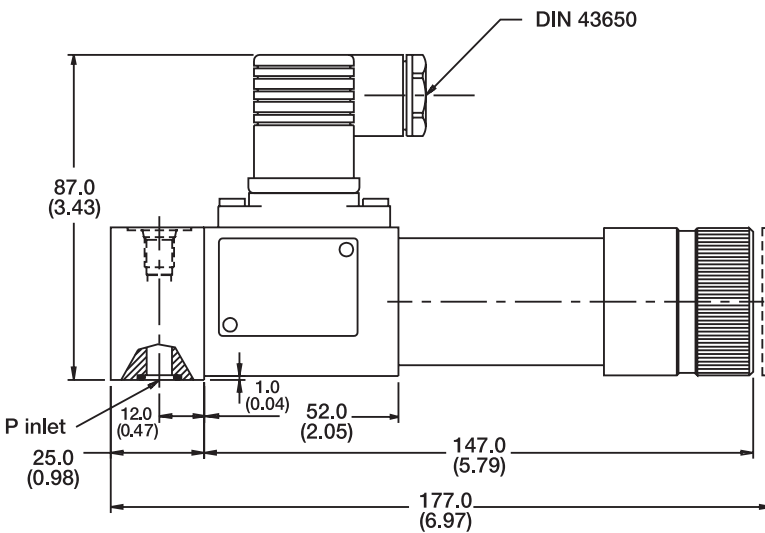
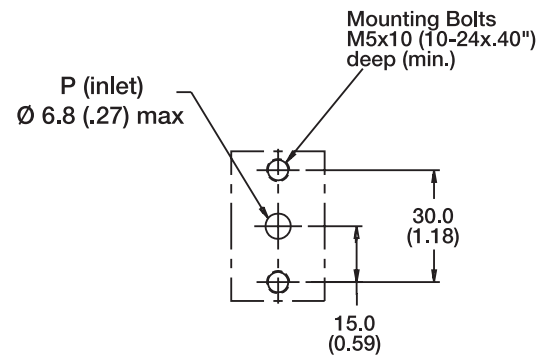
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Inch equivalents for millimeter dimensions are shown in (**)

U1



Mounting Pattern



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Subplates and Manifolds

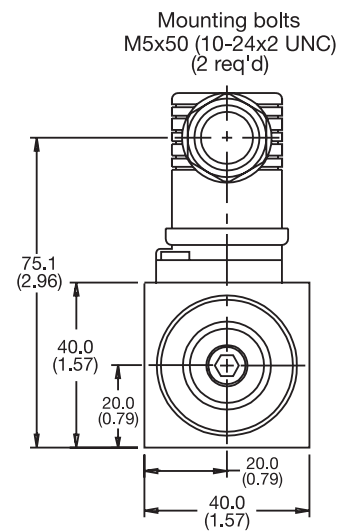
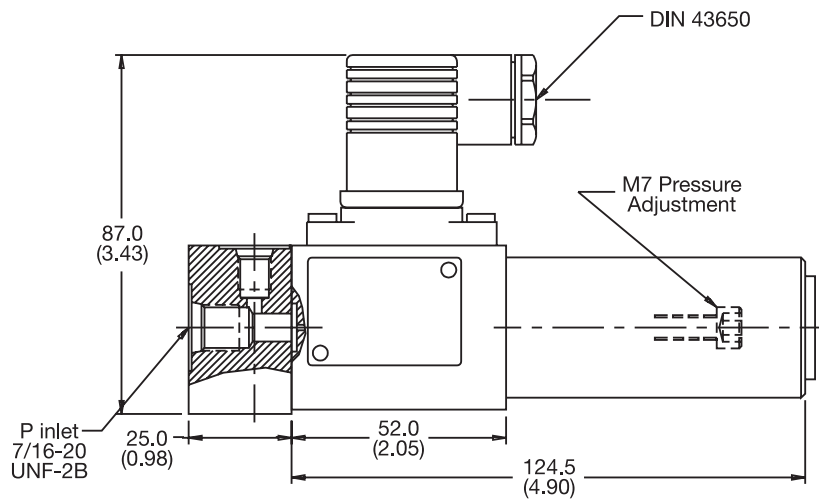
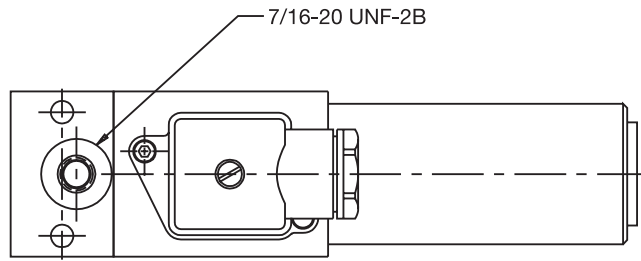
PSB- Dimensions

C39

WWW.SUMY.IR

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

U2



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Pressure Control Valves

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Pressure Control Valves

R4V*5, R6V*5 (Pilot Operated) - Technical Information

D3

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General Description

Series R4V*5 and R6V*5 pressure relief valves feature a manual adjustment pilot stage which controls a seated type main stage.

A vent function with a solenoid operated directional valve is available for circulation at minimum pressure.

Features

- Pilot operated with manual adjustment
- 2 interfaces:
 - Subplate, ISO 6264 (DIN 24340 Form D) with VV01 vent valve (R4V)
 - Subplate, ISO 6264 (DIN 24340 Form E) with CETOP 03 vent valve (R6V)
- 3 pressure ranges
- 3 adjustment modes:
 - Hand knob
 - Acorn nut with lead seal
 - Key lock
- Remote control via port X

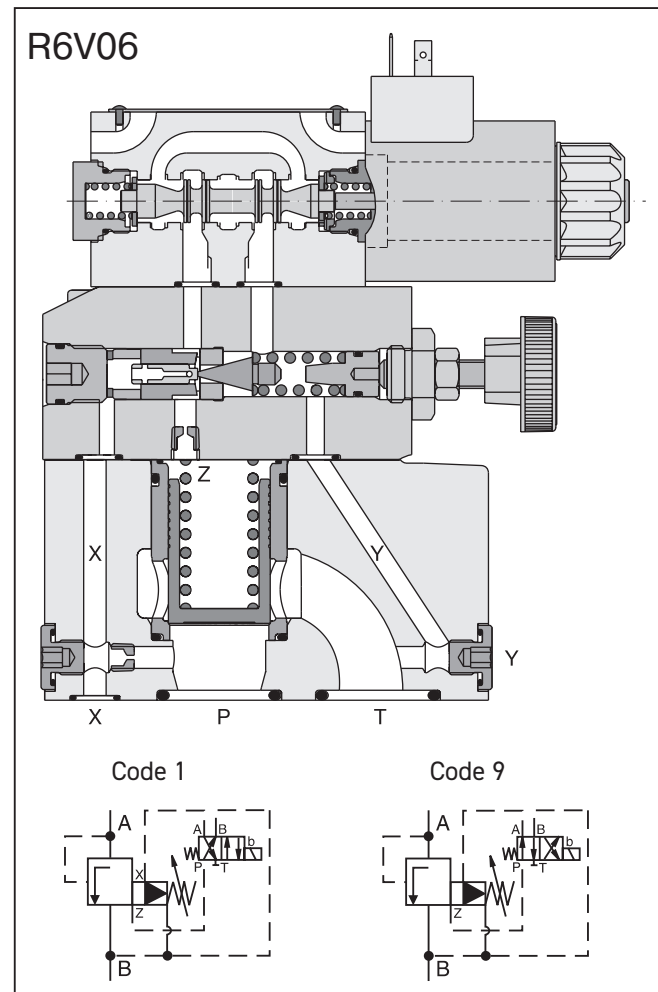
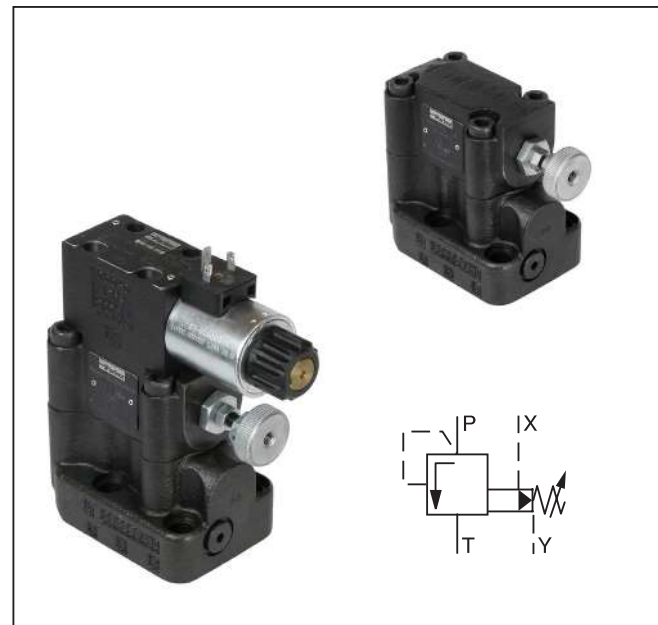
Function

System pressure in port P is applied via the X gallery to the spring loaded cone in the pilot head. The pilot head controls the pressure in the Z area on top of the main cartridge which is additionally kept close by the main spring.

If the pilot pressure exceeds the setting pressure the pilot cone opens and thus limits the pilot pressure.

When the system pressure exceeds the pilot pressure plus the spring force, the main cartridge opens to port T and limits the pressure in port P to the adjusted level.

Additionally to the relief function, a solenoid operated vent valve connects the Z area to tank. This allows oil circulation from P to T at minimum pressure drop. The vent valve can either be a standard CETOP 03 valves (mounting form E) or a sandwich unit (mounting form D). For both types the vent position can be either at the energized or de-energized solenoid.



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Pressure Control Valves

R4V*5, R6V*5 w/Vent Function - Ordering Information

Pressure Relief Valve	Interface	Relief Function	Size	Maximum Pressure 350 Bar (5075 PSI)	Drain Port	Pressure Range	Adjustment	Pilot Oil Drain Line Function	Vent Valve	Solenoid Voltage	Design Series	Seal	Modifications																																
R		V		5																																									
<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>03</td> <td>NG 10</td> </tr> <tr> <td>06</td> <td>NG 25</td> </tr> <tr> <td>10</td> <td>NG 32</td> </tr> </tbody> </table>				Code	Description	03	NG 10	06	NG 25	10	NG 32	<table border="1"> <thead> <tr> <th>Code</th> <th>Interface</th> <th>Drain</th> <th>Aux Port</th> </tr> </thead> <tbody> <tr> <td>3*</td> <td>R4V</td> <td>Y Port</td> <td>NPT</td> </tr> <tr> <td>7**</td> <td>R4V</td> <td>Y Port</td> <td>SAE</td> </tr> <tr> <td>9**</td> <td>R4V</td> <td>Y Port</td> <td>BSP</td> </tr> <tr> <td>9**</td> <td>R6V</td> <td>Y Port</td> <td>BSP</td> </tr> </tbody> </table> * For use only with Pilot options 0 and 1 ** Must be used with Pilot option 2				Code	Interface	Drain	Aux Port	3*	R4V	Y Port	NPT	7**	R4V	Y Port	SAE	9**	R4V	Y Port	BSP	9**	R6V	Y Port	BSP	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>031*</td> <td>Vent Function w/ Slow Unloading</td> </tr> <tr> <td>VFM**</td> <td>Vent Function w/ Slow Unloading</td> </tr> </tbody> </table> * R4V only ** R6V only				Code	Description	031*	Vent Function w/ Slow Unloading	VFM**	Vent Function w/ Slow Unloading
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Pressure Control Valves

R4V*5, R6V*5 (Pilot Operated) - Ordering Information

R		V		5							
Pressure Relief Valve	Interface	Relief Function	Size	Maximum Pressure 350 Bar (5075 PSI)	Drain Port	Pressure Range	Adjustment	Pilot Oil Drain Line	Design Series	Seal	Options Check with Factory

Code	Description
03	NG 10
06	NG 25
10	NG 32

Code	Interface	Drain	Aux Port
3	R4V	Y Port	NPT
7	R4V	Y Port	SAE
9	R4V	Y Port	BSP
9	R6V	Y Port	BSP

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
A	R4V
B	R6V

Code	Description
0*	Internal
1*	R4V - External from Subplate
2	R4V - External from Pilot Head (Y-port) R6V - External from Valve Body (Y-port)

* Only with drain port 3

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
1	Hand Knob 32mm dia (Standard)
3	Acorn Nut w/Lead Seal
4	Key Lock

Code	Description
4	Subplate Mounting ISO 6264
6	Subplate Mounting ISO 6264

Weight:

R4V03	2.7 kg (6.0 lbs.)
R4V06	4.5 kg (9.9 lbs.)
R4V10	6.0 kg (13.2 lbs.)
R6V03	4.5 kg (9.9 lbs.)
R6V06	5.8 kg (12.8 lbs.)
R6V10	7.8 kg (17.2 lbs.)

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Pressure Control Valves

R4V*5, R6V*5 (Pilot Operated) - Specifications

D6

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R4V and R6V

General				
Size	NG 10		NG 25	NG 32
Interface	Subplate mounting acc. ISO 6264 (DIN 24340)			
Mounting Position	Unrestricted			
Ambient Temperature Range (°C)	-20 to +80 (-4°F to +176°F)			
Hydraulic				
Operating Pressure (Bar)	Ports P or A, and X: up to 350 (5075 PSI); Port T or B, and Y depressurized			
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)			
Nominal Flow	R4V (LPM)	150 (39.7 GPM)	350 (92.6 GPM)	650 (172 GPM)
	R6V (LPM)	250 (66.1 GPM)	500 (132.3 GPM)	650 (172 GPM)
Fluid	Hydraulic oil according to DIN 51524 - 51525			
Viscosity	Permitted (cSt / mm²/s)	20 - 380 (93 - 1761 SSU)		
	Recommended (cSt / mm²/s)	30 - 50 (139 - 232 SSU)		
Fluid Temperature Recommended (°C)	+30 to +50 (+86°F to +122°F)			
	Maximum (°C)	-20 to +70 (-4°F to +158°F)		
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)			

R4V and R6V w/Vent Function

General						
Size	NG 10		NG 25		NG 32	
Interface	Subplate mounting acc. ISO 6264 (DIN 24340)					
Mounting Position	Unrestricted					
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)					
Hydraulic						
Operating Pressure (Bar)	Ports P or A, and X: up to 350 (5075 PSI); Port T or B, and Y depressurized					
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)					
Nominal Flow	R4V (LPM)	150 (39.7 GPM)	350 (92.6 GPM)		650 (172 GPM)	
	R6V (LPM)	250 (66.1 GPM)	500 (132.3 GPM)		650 (172 GPM)	
Fluid	Hydraulic oil according to DIN 51524 - 51525					
Viscosity	Permitted (cSt / mm²/s)	20 - 380 (93 - 1761 SSU)				
	Recommended (cSt / mm²/s)	30 - 50 (139 - 232 SSU)				
Fluid Temperature (°C)	-20 to +70 (-4°F to +158°F)					
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)					
Electrical						
Duty Cycle (%)	100 ED; CAUTION: Coil temperature up to 180°C (356°F) possible					
Solenoid Connector	Connector acc. to EN 175301-803					
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)					
Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage	12 VDC	24 VDC	98 VDC	205 VDC	110 VAC / 50 Hz 120 VAC / 60 Hz	230 VAC / 50 Hz 240 VAC / 60 Hz
Supply Tolerance	+5 - -10	+5 - -10	+5 - -10	+5 - -10	+5 - -10	+5 - -10
Power Consumption	Hold (W)	31	31	31	78	78
	In Rush (W)	31	31	31	264	264
Switching Frequency	16,000 (DC), 7200 (AC) switchings/hour maximum					
Wiring Minimum (mm²)	3 x 1.5 recommended					
Wiring Length Maximum (mm²)	50 (164 ft) recommended					

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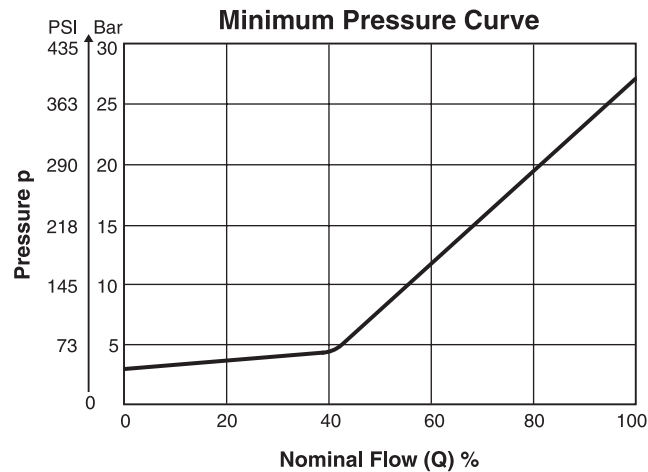
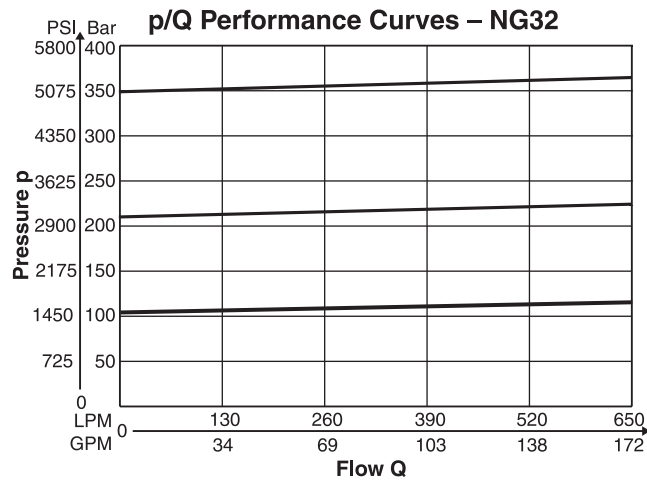
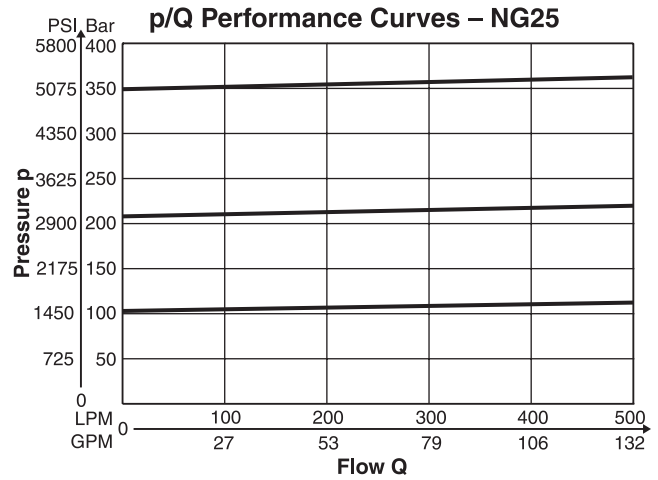
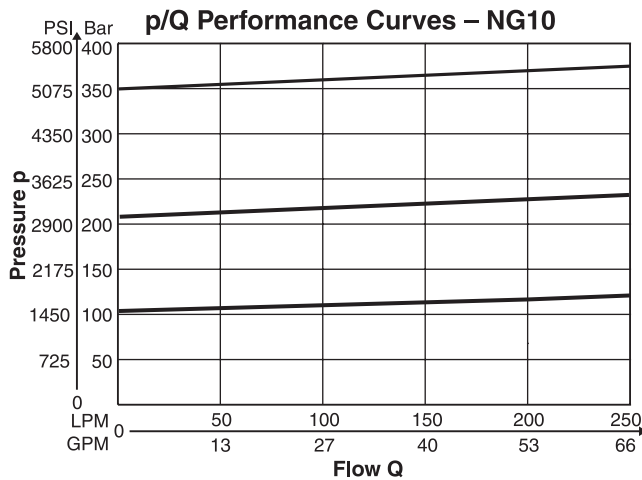
Pressure Control Valves

R4V*5, R6V*5 (Pilot Operated) - Performance Curves

D7

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The performance curves are measured with external drain.
For internal drain, the tank pressure has to be added to curve.



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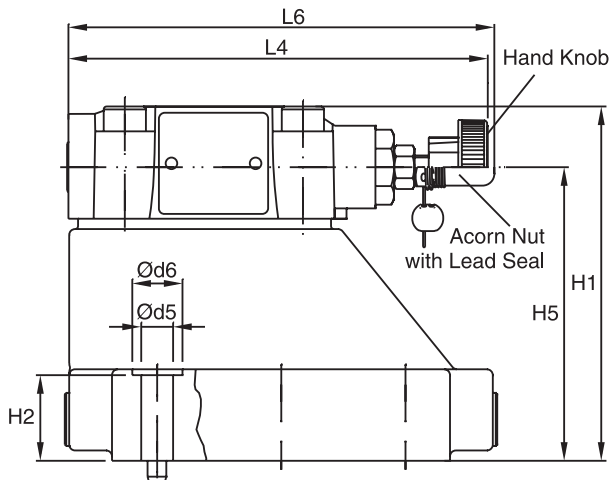
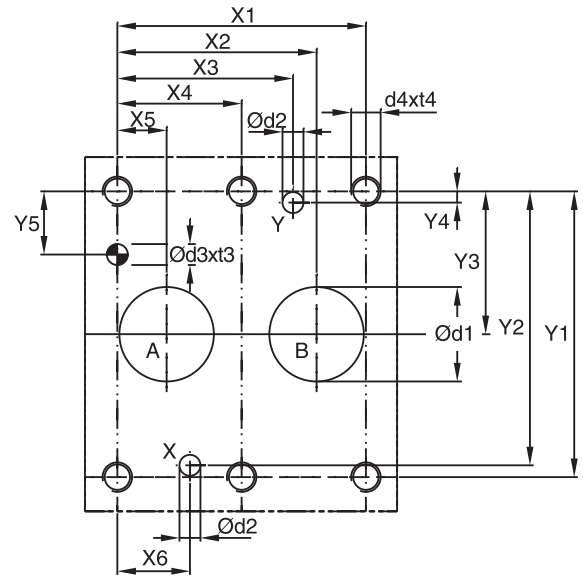
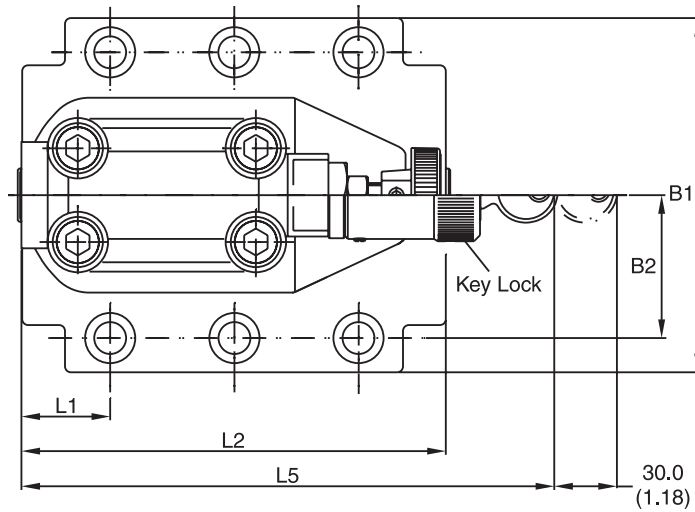
Pressure Control Valves

R4V (Pilot Operated) - Dimensions

D8

WWW.SUMY.IR

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



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Pressure Control Valves

R4V (Pilot Operated) - Dimensions

D9

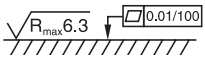
WWW.SUMY.IR

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

NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4	Y5	Y6
10	6264-06-07-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	– –	7.2 (0.28)	21.5 (0.85)	0.0 (0.0)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	14.3 (0.56)	– –
25	6264-08-11-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	– –	11.1 (0.44)	20.6 (0.81)	0.0 (0.0)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	15.9 (0.63)	– –
32	6264-10-15-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	0.0 (0.0)	96.8 (3.81)	82.8 (3.65)	48.4 (1.91)	3.8 (0.15)	21.4 (0.84)	– –
Tolerances at X and Y pin holes and screw holes: +/-0.1 (0.003); at port holes: +/-0.2 (0.007)														

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-07-*-97	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	– –	– –	62.5 (2.46)	– –	29.0 (1.14)	94.8 (3.73)	– –	143.0 (5.63)	181.0 (7.13)	144.8 (5.70)
25	6264-08-11-*-97	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	– –	– –	89.0 (3.50)	– –	34.7 (1.37)	126.8 (4.99)	– –	143.0 (5.63)	181.0 (7.13)	144.8 (5.70)
32	6264-10-15-*-97	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	– –	– –	99.5 (3.92)	– –	30.6 (1.20)	144.3 (5.68)	– –	143.0 (5.63)	181.0 (7.13)	144.8 (5.70)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	6264-06-07-*-97	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	6264-08-11-*-97	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	6264-10-15-*-97	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal 		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-07-*-97	BK505	4x M10 x 35 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58507-0	S26-58507-5	
25	6264-08-11-*-97	BK485	4x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58475-0	S26-58475-5	
32	6264-10-15-*-97	BK506	6x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58508-0	S26-58508-5	

NG	ISO-code	Subplate	Size
10	6264-06-07-*-97	SPP3M6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP
25	6264-08-11-*-97	SPP6M8B910	A, B = 1" BSPP X, Y = 1/4" BSPP
32	6264-10-15-*-97	SPP10M12B910	A, B = 1-1/2" BSPP X, Y = 1/4" BSPP

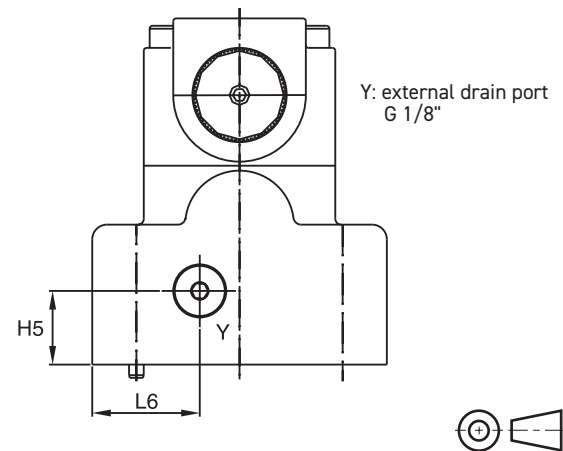
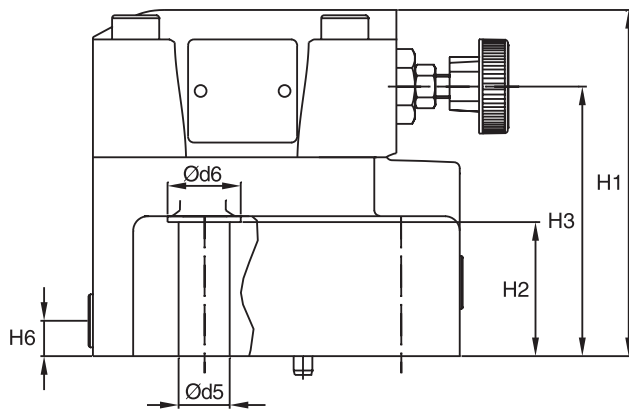
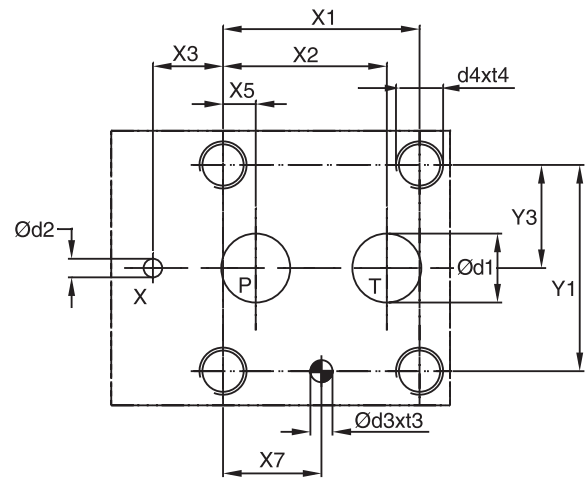
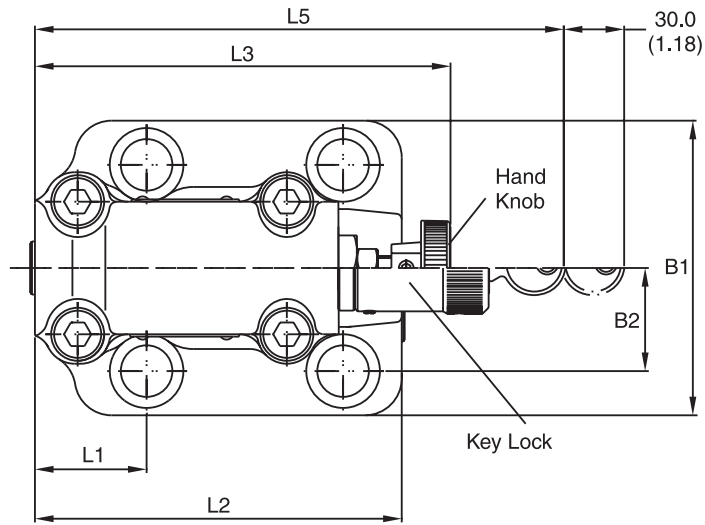
Pressure Control Valves

R6V (Pilot Operated) - Dimensions

D10

WWW.SUMY.IR

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



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Pressure Control Valves

R6V (Pilot Operated) - Dimensions

D11

WWW.SUMY.IR

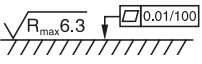
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4	Y5	Y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.0)	– –	22.1 (0.87)	– –	22.1 (0.87)	53.8 (2.12)	– –	26.9 (1.06)	– –	– –	– –
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.94)	– –	11.1 (0.44)	– –	33.4 (1.31)	70.0 (2.76)	– –	35.0 (1.38)	– –	– –	– –
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	– –	12.7 (0.50)	– –	44.5 (1.75)	82.6 (3.25)	– –	41.3 (1.63)	– –	– –	– –

Tolerances at X and Y pin holes and screw holes: ± 0.1 (0.003); at port holes: ± 0.2 (0.007)

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-09-*-97	80.0 (3.15)	26.9 (1.06)	114.0 (4.49)	27.0 (1.06)	88.0 (3.46)	– –	25.0 (0.98)	25.0 (0.98)	52.5 (2.07)	118.5 (4.67)	141.0 (5.55)	– –	180.0 (7.09)	29.5 (1.16)
25	6264-08-13-*-97	100.0 (3.94)	35.0 (1.38)	117.5 (4.63)	45.5 (1.79)	91.5 (3.60)	– –	25.0 (0.98)	12.0 (0.47)	37.9 (1.49)	124.5 (4.90)	141.0 (5.55)	– –	180.0 (7.09)	36.5 (1.44)
32	6264-10-17-*-97	120.0 (4.72)	41.3 (1.63)	123.0 (4.83)	52.0 (2.05)	97.0 (3.82)	– –	25.0 (0.98)	13.5 (0.53)	45.0 (1.77)	153.0 (6.02)	141.0 (5.55)	– –	180.0 (7.09)	36.5 (1.44)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	6264-06-09-*-97	14.7 (0.58)	4.8 (0.19)	7.5 (0.30)	10.0 (0.39)	M12	20.0 (0.79)	13.5 (0.53)	20.0 (0.79)
25	6264-08-13-*-97	23.4 (0.92)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M16	27.0 (1.06)	17.5 (0.69)	25.0 (0.98)
32	6264-10-17-*-97	32.0 (1.26)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M18	28.0 (1.10)	20.0 (0.79)	30.0 (1.18)

NG	ISO-code	Bolt Kit			Seal 		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-09-*-97	BK494	4x M12 x 45 DIN 912 12.9	108 Nm (79.6 lb-ft) +/-15%	S26-96396-0	S26-96396-5	
25	6264-08-13-*-97	BK366	4x M16 x 70 DIN 912 12.9	264 Nm (194.7 lb-ft) +/-15%	S26-96589-0	S26-96589-5	
32	6264-10-17-*-97	BK507	4x M18 x 75 DIN 912 12.9	398 Nm (293.5 lb-ft) +/-15%	S26-96392-0	S26-96392-5	

NG	ISO-code	Subplate	Size
10	6264-06-09-*-97	SPP3R6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP
25	6264-08-13-*-97	SPP6R8B910	A, B = 1-1/4" BSPP X, Y = 1/4" BSPP
32	6264-10-17-*-97	SPP10R12B910	A, B = 1-1/2" BSPP X, Y = 1/4" BSPP

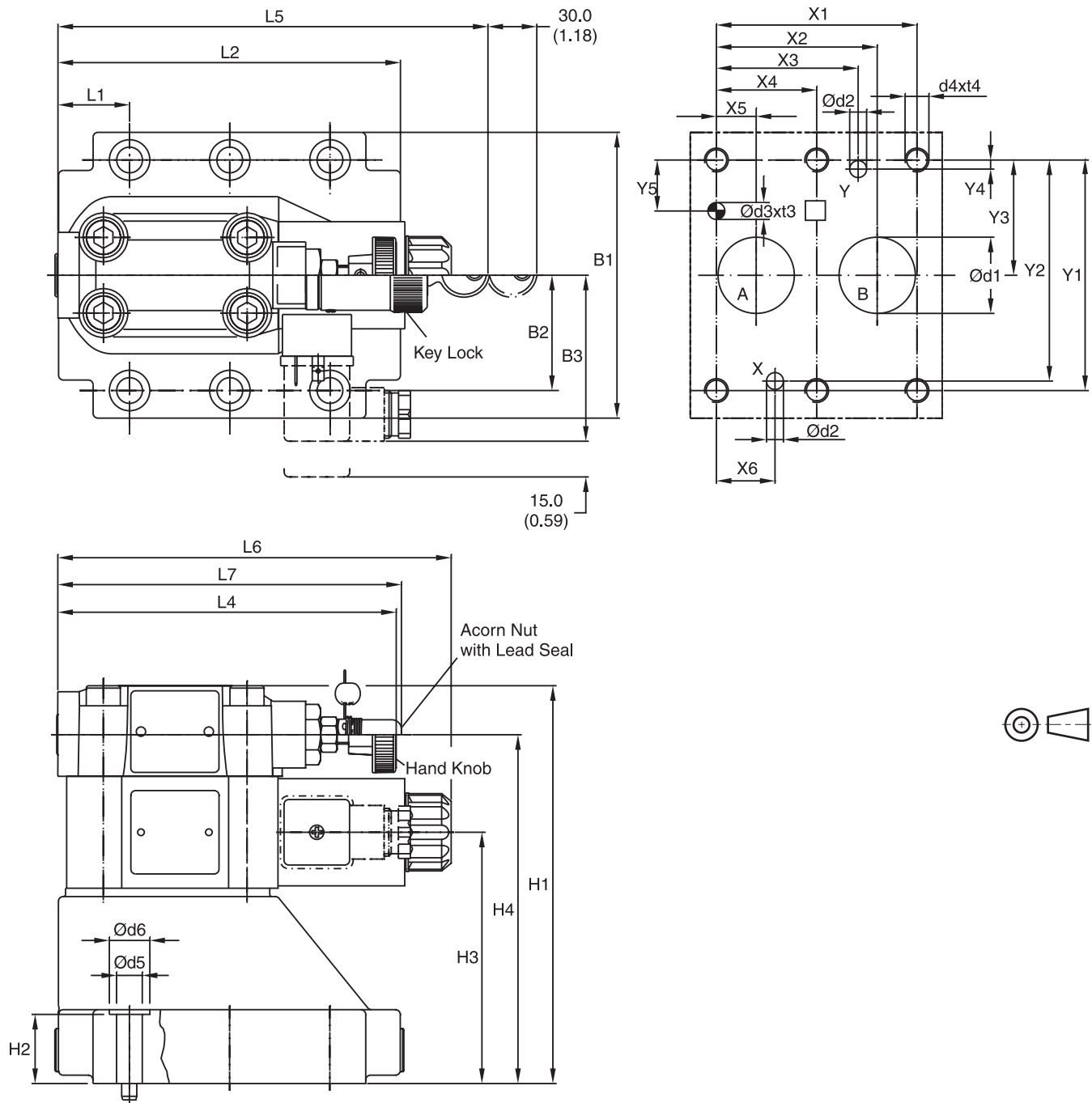
Pressure Control Valves

R4V w/Vent Function - Dimensions

D12

WWW.SUMY.IR

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



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Pressure Control Valves

R4V w/Vent Function - Dimensions

D13

WWW.SUMY.IR

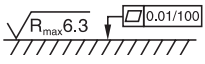
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4	Y5	Y6
10	6264-06-07-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	– –	7.2 (0.28)	21.5 (0.85)	0.0 (0.0)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	14.3 (0.56)	– –
25	6264-08-11-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	– –	11.1 (0.44)	20.6 (0.81)	0.0 (0.0)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	15.9 (0.63)	– –
32	6264-10-15-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	0.0 (0.0)	96.8 (3.81)	82.8 (3.65)	48.4 (1.91)	3.8 (0.15)	21.4 (0.84)	– –

Tolerances at X and Y pin holes and screw holes: +/-0.1 (0.003); at port holes: +/-0.2 (0.007)

NG	ISO-code	B1	B2	B3	H1	H2	H3	H4	L1	L2	L3	L4	L5	L6	L7
10	6264-06-07-*-97	87.3 (3.44)	33.4 (1.31)	70.0 (2.76)	130.0 (5.12)	21.0 (0.83)	68.5 (2.70)	109.5 (4.31)	29.0 (1.14)	94.8 (3.73)	– –	143.0 (5.63)	181.0 (7.13)	165.6 (6.52)	144.8 (5.76)
25	6264-08-11-*-97	105.0 (4.13)	39.7 (1.56)	70.0 (2.76)	156.5 (6.16)	29.0 (1.14)	95.0 (3.74)	136.0 (5.35)	34.7 (1.37)	126.8 (4.99)	– –	143.0 (5.63)	181.0 (7.13)	165.6 (6.52)	144.8 (5.70)
32	6264-10-15-*-97	120.0 (4.72)	48.4 (1.91)	70.0 (2.76)	167.0 (6.57)	29.0 (1.14)	105.5 (4.15)	146.5 (5.77)	30.6 (1.20)	144.3 (5.68)	– –	143.0 (5.63)	181.0 (7.13)	165.6 (6.52)	144.8 (5.70)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	6264-06-07-*-97	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	6264-08-11-*-97	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	6264-10-15-*-97	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal 		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-07-*-97	BK505	4x M10 x 35 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58507-0	S26-58507-5	
25	6264-08-11-*-97	BK485	4x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58475-0	S26-58475-5	
32	6264-10-15-*-97	BK506	6x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58508-0	S26-58508-5	

NG	ISO-code	Subplate	Size
10	6264-06-07-*-97	SPP3M6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP
25	6264-08-11-*-97	SPP6M8B910	A, B = 1" BSPP X, Y = 1/4" BSPP
32	6264-10-15-*-97	SPP10M12B910	A, B = 1-1/2" BSPP X, Y = 1/4" BSPP

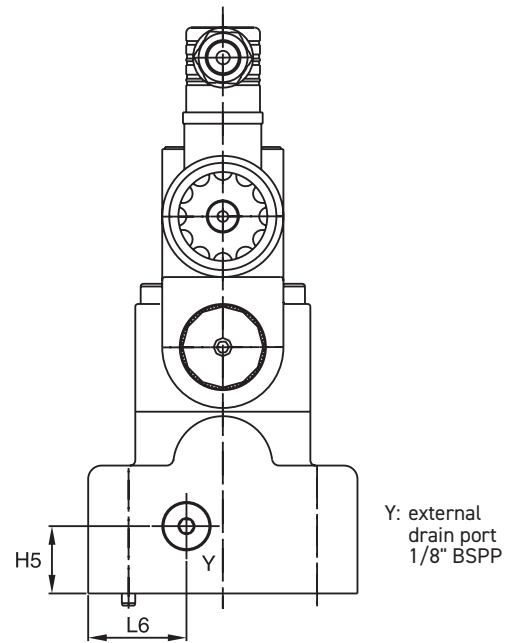
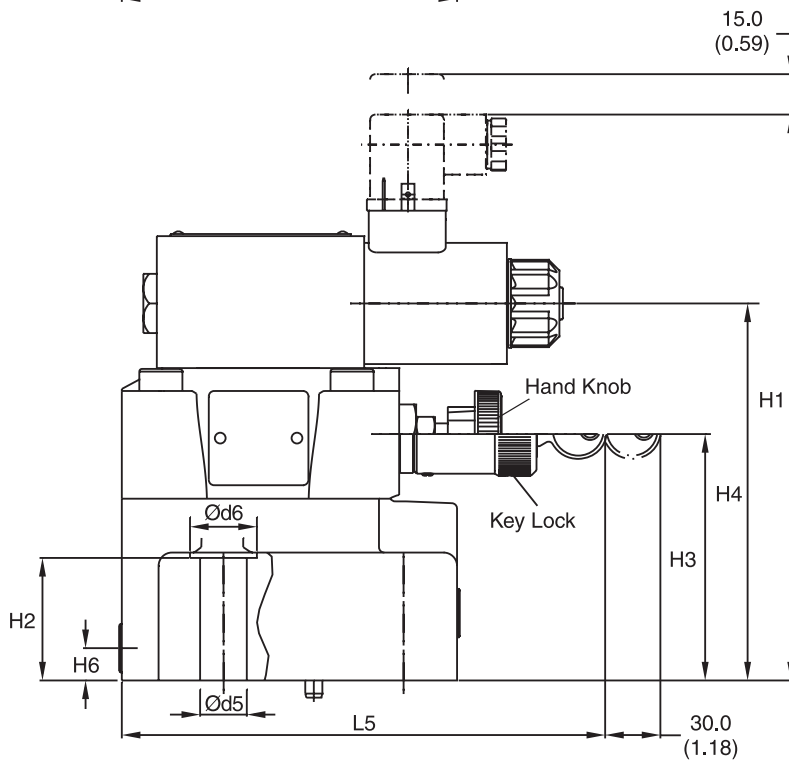
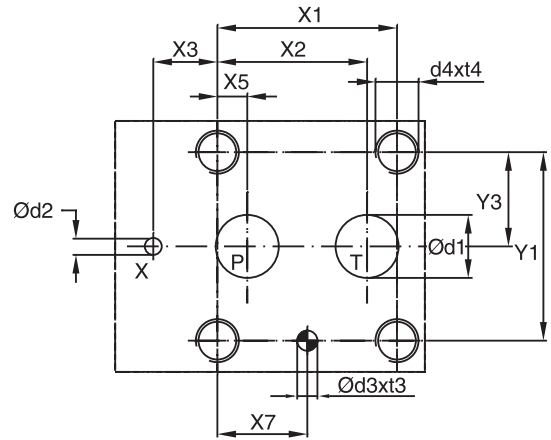
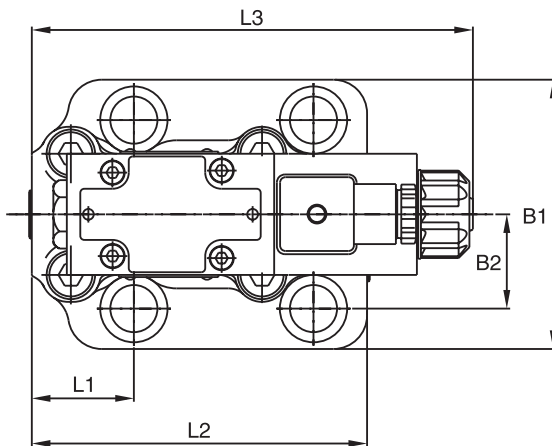
Pressure Control Valves

R6V w/Vent Function - Dimensions

D14

WWW.SUMY.IR

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



Y: external
drain port
1/8" BSPP



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Pressure Control Valves

R6V w/Vent Function - Dimensions

D15

WWW.SUMY.IR

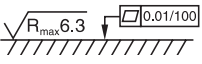
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4	Y5	Y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.0)	– –	22.1 (0.87)	– –	22.1 (0.87)	53.8 (2.12)	– –	26.9 (1.06)	– –	– –	– –
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.94)	– –	11.1 (0.44)	– –	33.4 (1.31)	70.0 (2.76)	– –	35.0 (1.38)	– –	– –	– –
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	– –	12.7 (0.50)	– –	44.5 (1.75)	82.6 (3.25)	– –	41.3 (1.63)	– –	– –	– –

Tolerance at X and Y pin holes and screw holes: ± 0.1 (0.003); at port holes: ± 0.2 (0.007)

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-09-*-97	80.0 (3.15)	26.9 (1.06)	206.0 (8.11)	27.0 (1.06)	88.0 (3.46)	136.5 (5.37)	25.0 (0.98)	12.0 (0.47)	52.5 (2.07)	118.5 (4.67)	163.8 (6.45)	– –	180.0 (7.09)	36.5 (1.44)
25	6264-08-13-*-97	100.0 (3.94)	35.0 (1.38)	210.0 (8.27)	45.5 (1.79)	91.5 (3.60)	140.0 (5.51)	25.0 (0.98)	12.0 (0.47)	37.9 (1.49)	124.5 (4.90)	163.8 (6.45)	– –	180.0 (7.09)	36.5 (1.44)
32	6264-10-17-*-97	120.0 (4.72)	41.3 (1.63)	215.5 (8.48)	52.0 (2.05)	97.0 (3.82)	145.5 (5.73)	25.0 (0.98)	12.0 (0.47)	45.0 (1.77)	153.0 (6.02)	163.8 (6.45)	– –	180.0 (7.09)	36.5 (1.44)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	6264-06-09-*-97	14.7 (0.58)	4.8 (0.19)	7.5 (0.30)	10.0 (0.39)	M12	20.0 (0.79)	13.5 (0.53)	20.0 (0.79)
25	6264-08-13-*-97	23.4 (0.92)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M16	27.0 (1.06)	17.5 (0.69)	25.0 (0.98)
32	6264-10-17-*-97	32.0 (1.26)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M18	28.0 (1.10)	20.0 (0.79)	30.0 (1.18)

NG	ISO-code	Bolt Kit			Seal 		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-09-*-97	BK494	4x M12 x 45 DIN 912 12.9	108 Nm (79.6 lb-ft) +/-15%	S26-96396-0	S26-96396-5	
25	6264-08-13-*-97	BK366	4x M16 x 70 DIN 912 12.9	264 Nm (194.7 lb-ft) +/-15%	S26-96589-0	S26-96589-5	
32	6264-10-17-*-97	BK507	4x M18 x 75 DIN 912 12.9	398 Nm (293.5 lb-ft) +/-15%	S26-96392-0	S26-96392-5	

NG	ISO-code	Subplate	Size
10	6264-06-09-*-97	SPP3R6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP
25	6264-08-13-*-97	SPP6R8B910	A, B = 1-1/4" BSPP X, Y = 1/4" BSPP
32	6264-10-17-*-97	SPP10R12B910	A, B = 1-1/2" BSPP X, Y = 1/4" BSPP

Pressure Control Valves

R4V*5, R6V*5 (TÜV) - Technical Information

D16

WWW.SUMY.IR

General Description

Series R4V (TÜV) (DIN 24340 Form D) and R6V (TÜV) (DIN 24340 Form E) pilot operated pressure relief valves include a certification according to directive 97/23/EG for safety-related applications.

The valve is set and sealed by the German technical inspection association TÜV. The valve delivery includes the TÜV certificate of conformity.

For Series R6V, a vent function with a solenoid operated directional valve is available for circulation at minimum pressure.

Features

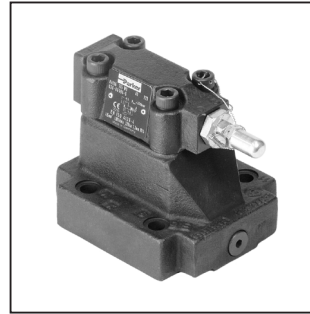
- TÜV certificate
- Pilot operated with manual adjustment
- 2 interfaces:
 - Subplate, ISO 6264 (DIN 24340 Form D) with VV01 vent valve (R4V)
 - Subplate, ISO 6264 (DIN 24340 Form E) with CETOP 03 vent valve (R6V)
- Adjustment leaved (code W)
- Adjustment leaved to maximum pressure, lower pressure possible (code V)



R6V06



R6V06 with Vent Valve



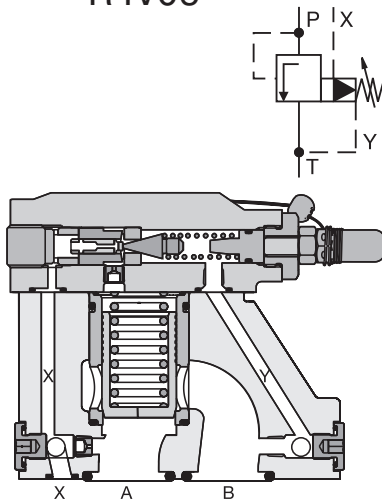
R4V06



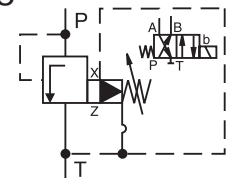
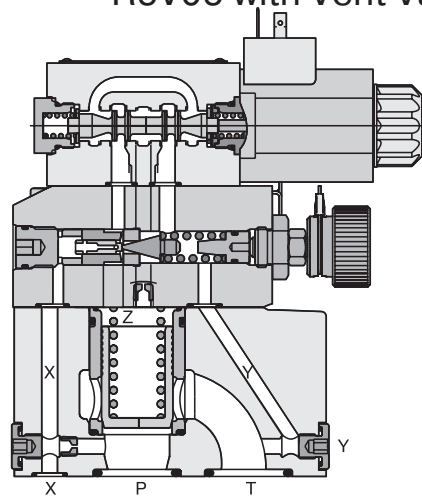
Name Plate Data R4V06

Minimum Opening Width	415 mm ² (0.64 in ²)
Maximum Flow	220 LPM (58 GPM)
Set Pressure (compare p/Q curves)	70 Bar (1015 PSI)
Cartridge Stroke	7.3 mm (0.28 in)
Permitted Pressure Increase of Flow Range	10%

R4V06



R6V06 with Vent Valve



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Pressure Control Valves

R4V*5, R6V*5 (TÜV) - Ordering Information

D17

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R4V and R6V

R	Interface	V	Size	Maximum Pressure 350 Bar (5075 PSI)	Body	Pressure Setting up to 350 Bar (5075 PSI) Maximum	Adjustment Leaded (TUV)	Pilot Oil Internal	Design Series	Seal	Pressure Range*																			
Pressure Relief Valve		Relief Function																												
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Weight:

R4V03	2.7 kg (6.0 lbs.)
R4V06	4.5 kg (9.9 lbs.)
R4V10	6.0 kg (13.2 lbs.)
R6V06	5.8 kg (12.8 lbs.)
R6V10	7.8 kg (17.2 lbs.)

R6V with Vent Valve

R	Interface	V	Size	Maximum Pressure 350 Bar (5075 PSI)	Body Y Port = G 1/8"	Pressure Setting up to 350 Bar (5075 PSI) Maximum	Adjustment Leaded (TUV)	Pilot Oil Internal	Vent Valve Function	Solenoid Voltage	Design Series	Seal	Pressure Range*																				
Pressure Relief Valve		Relief Function																															
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Weight:

R6V06	7.2 kg (15.9 lbs.)
R6V10	9.2 kg (20.3 lbs.)

Pressure Control Valves

R4V*5, R6V*5 (TÜV) - Specifications

D18

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R4V and R6V

General				
Size	NG 10		NG 25	NG 32
Interface	Subplate mounting acc. ISO 6264 (DIN 24340)			
Mounting Position	As desired, horizontal mounting preferred			
Ambient Temperature Range (°C)	-20 to +80 (-4°F to +176°F)			
MTTF _D Value (years)	75			
Hydraulic				
Operating Pressure (Bar)	Ports P or A: up to 350 (5075 PSI); Port T or B: 30 Bar (435 PSI)			
Pressure Range (Bar)	100 (1450 PSI), 200 (2900 PSI), 300 (4350 PSI), 350 Bar (5075 PSI)			
Nominal Flow	R4V (LPM)	110 (29.1 GPM)	450 (119 GPM)	500 (132.3 GPM)
	R6V (LPM)	250 (66.1 GPM)	500 (132.3 GPM)	500 (132.3 GPM)
Fluid	Hydraulic oil according to DIN 51524 - 51525			
Viscosity	Permitted (cSt / mm²/s)	20 - 380 (93 - 1761 SSU)		
	Recommended (cSt / mm²/s)	30 - 50 (139 - 232 SSU)		
Fluid Temperature (°C)	-20 to +70 (-4°F to +158°F)			
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)			

R4V and R6V w/Vent Function

General				
Size	NG 10		NG 25	NG 32
Interface	Subplate mounting acc. ISO 6264 (DIN 24340)			
Mounting Position	As desired, horizontal mounting preferred			
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)			
MTTF _n Value (years)	75			
Hydraulic				
Operating Pressure (Bar)	Ports P or A: up to 350 (5075 PSI); Port T or B: 30 Bar (435 PSI)			
Pressure Range (Bar)	100 (1450 PSI), 200 (2900 PSI), 300 (4350 PSI), 350 Bar (5075 PSI)			
Nominal Flow (LPM)	250 (66.1 GPM)	500 (132.3 GPM)	500 (132.3 GPM)	
Fluid	Hydraulic oil according to DIN 51524 - 51525			
Viscosity Permitted (cSt / mm²/s)	20 - 380 (93 - 1761 SSU)			
Recommended (cSt / mm²/s)	30 - 50 (139 - 232 SSU)			
Fluid Temperature (°C)	-20 to +70 (-4°F to +158°F)			
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)			
Electrical				
Duty Cycle (%)	100 ED; CAUTION: Coil temperature up to 180°C (356°F) possible			
Solenoid Connector	Connector acc. to EN 175301-803			
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)			
Code	G0R		G0Q	
Supply Voltage	12 VDC		24 VDC	
Supply Tolerance	+5 - -10		+5 - -10	
Power Consumption	Hold (W)	31	31	
	In Rush (W)	31	31	
Switching Frequency	16,000 (DC), 7200 (AC) switchings/hour maximum			
Wiring Minimum (mm²)	3 x 1.5 recommended			
Wiring Length Maximum (mm²)	50 (164 ft) recommended			

Pressure Control Valves

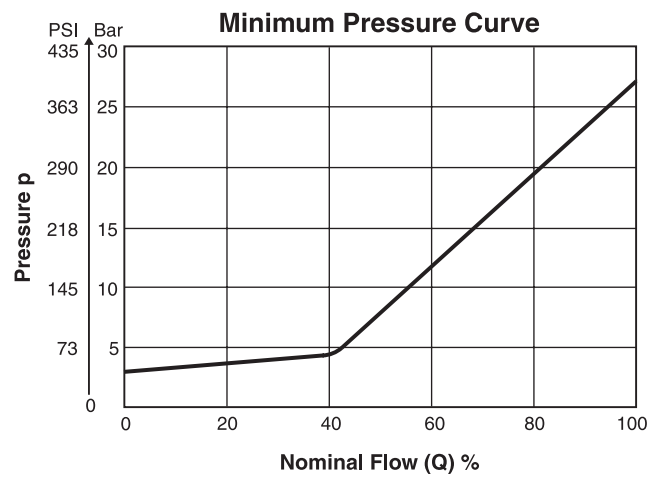
R4V*5, R6V*5 (TÜV) - Performance Curves

D19

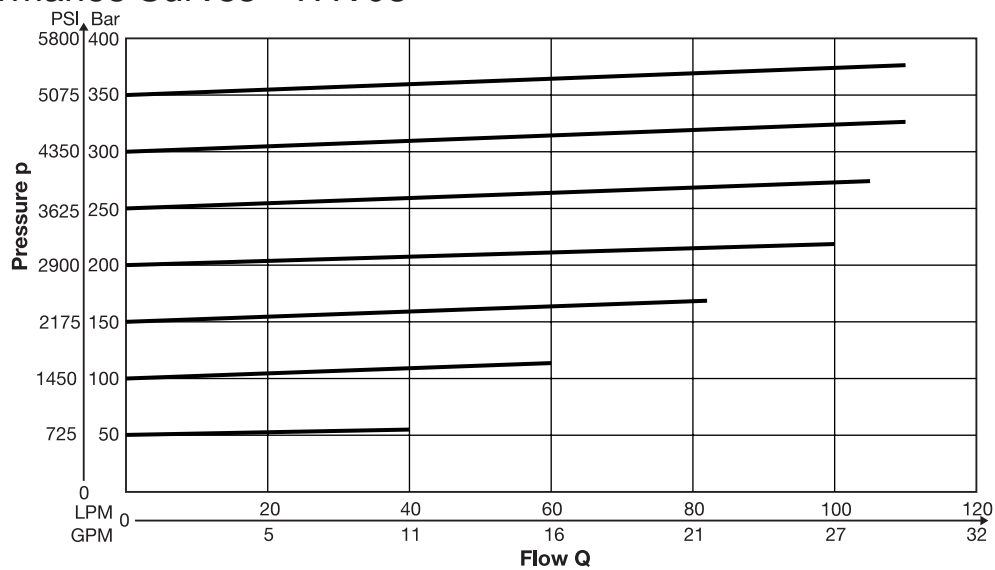
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The performance curves are measured with external drain.
For internal drain, the tank pressure has to be added to curve.
All performance curves measured with HLP46 at 50°C (122°F).

Minimum Pressure Curve R4V and R6V



p/Q Performance Curves – R4V03



R4V03				
Pressure Range	Qmax	Minimum Opening Width	Cartridge Stroke	Permitted Pressure Increase
50 - 70 Bar (725 - 1015 PSI)	40 LPM (11 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%
80 - 120 Bar (1160 - 1740 PSI)	60 LPM (16 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%
130 - 170 Bar (1885 - 2465 PSI)	82 LPM (22 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%
180 - 200 Bar (2610 - 2900 PSI)	100 LPM (27 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%
210 - 250 Bar (3015 - 3625 PSI)	105 LPM (28 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%
260 - 300 Bar (3770 - 4350 PSI)	110 LPM (29 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%
310 - 350 Bar (4495 - 5075 PSI)	110 LPM (29 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%

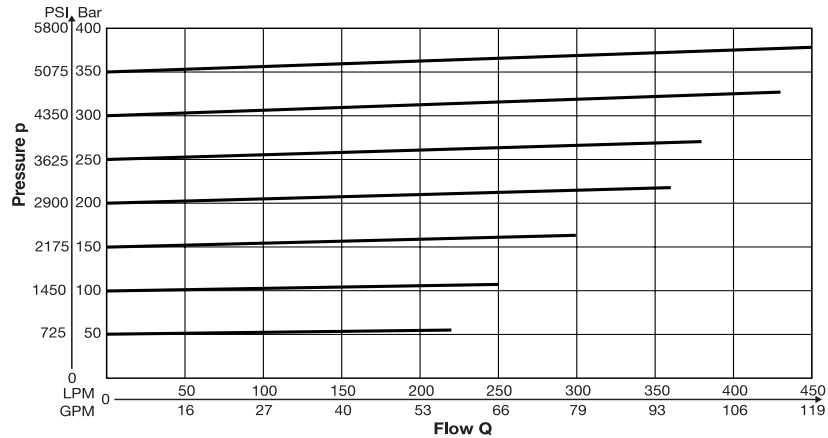
Pressure Control Valves

R4V*5, R6V*5 (TÜV) - Performance Curves

D20

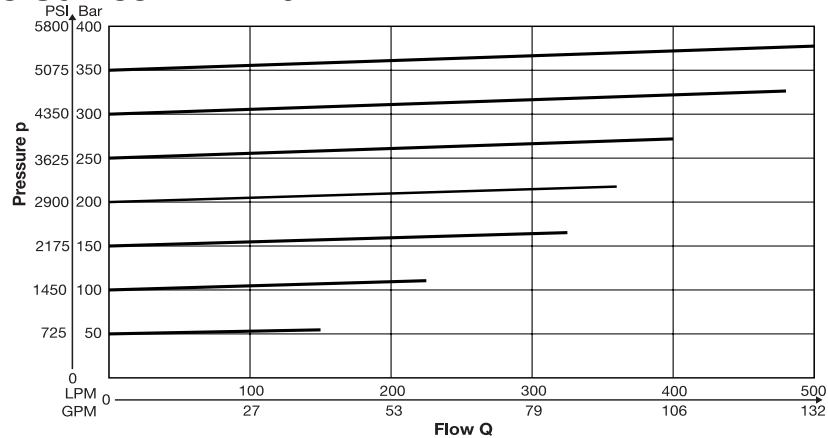
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p/Q Performance Curves – R4V06



R4V06				
Pressure Range	Qmax	Minimum Opening Width	Cartridge Stroke	Permitted Pressure Increase
50 - 70 Bar (725 - 1015 PSI)	220 LPM (58 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%
80 - 120 Bar (1160 - 1740 PSI)	250 LPM (66 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%
130 - 170 Bar (1885 - 2465 PSI)	300 LPM (79 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%
180 - 200 Bar (2610 - 2900 PSI)	360 LPM (95 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%
210 - 250 Bar (3015 - 3625 PSI)	380 LPM (101 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%
260 - 300 Bar (3770 - 4350 PSI)	430 LPM (114 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%
310 - 350 Bar (4495 - 5075 PSI)	450 LPM (120 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%

p/Q Performance Curves – R4V10



R4V10				
Pressure Range	Qmax	Minimum Opening Width	Cartridge Stroke	Permitted Pressure Increase
50 - 70 Bar (725 - 1015 PSI)	150 LPM (40 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%
80 - 120 Bar (1160 - 1740 PSI)	225 LPM (60 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%
130 - 170 Bar (1885 - 2465 PSI)	325 LPM (86 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%
180 - 200 Bar (2610 - 2900 PSI)	360 LPM (95 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%
210 - 250 Bar (3015 - 3625 PSI)	400 LPM (106 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%
260 - 300 Bar (3770 - 4350 PSI)	480 LPM (127 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%
310 - 350 Bar (4495 - 5075 PSI)	500 LPM (132 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%

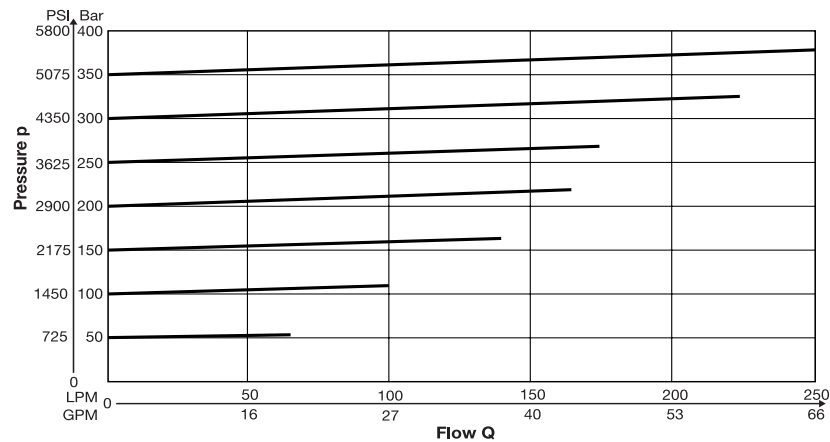
Pressure Control Valves

R4V*5, R6V*5 (TÜV) - Performance Curves

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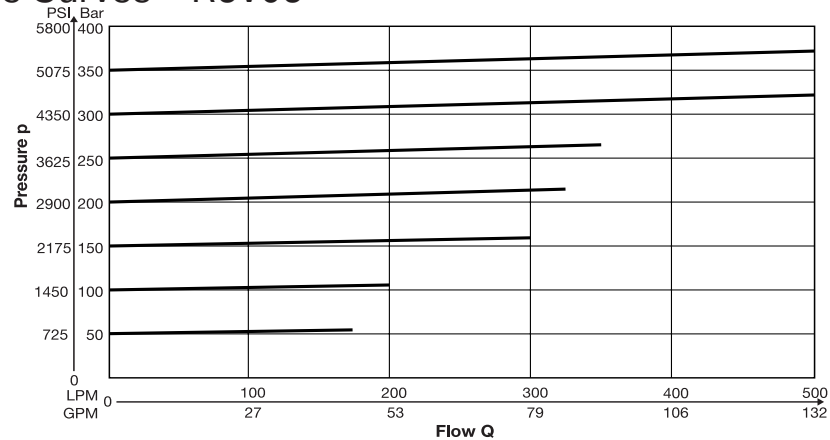
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p/Q Performance Curves – R6V03



R6V03				
Pressure Range	Qmax	Minimum Opening Width	Cartridge Stroke	Permitted Pressure Increase
50 - 70 Bar (725 - 1015 PSI)	65 LPM (17 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%
80 - 120 Bar (1160 - 1740 PSI)	100 LPM (27 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%
130 - 170 Bar (1885 - 2465 PSI)	140 LPM (37 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%
180 - 200 Bar (2610 - 2900 PSI)	165 LPM (44 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%
210 - 250 Bar (3015 - 3625 PSI)	170 LPM (46 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%
260 - 300 Bar (3770 - 4350 PSI)	225 LPM (60 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%
310 - 350 Bar (4495 - 5075 PSI)	250 LPM (66 GPM)	154 mm ² (0.24 in ²)	4.4 mm (0.17 in)	10%

p/Q Performance Curves – R6V06



R6V06				
Pressure Range	Qmax	Minimum Opening Width	Cartridge Stroke	Permitted Pressure Increase
50 - 70 Bar (725 - 1015 PSI)	170 LPM (45 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%
80 - 120 Bar (1160 - 1740 PSI)	200 LPM (53 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%
130 - 170 Bar (1885 - 2465 PSI)	300 LPM (80 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%
180 - 200 Bar (2610 - 2900 PSI)	325 LPM (86 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%
210 - 250 Bar (3015 - 3625 PSI)	350 LPM (93 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%
260 - 300 Bar (3770 - 4350 PSI)	500 LPM (132 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%
310 - 350 Bar (4495 - 5075 PSI)	500 LPM (132 GPM)	415 mm ² (0.64 in ²)	7.3 mm (0.29 in)	10%

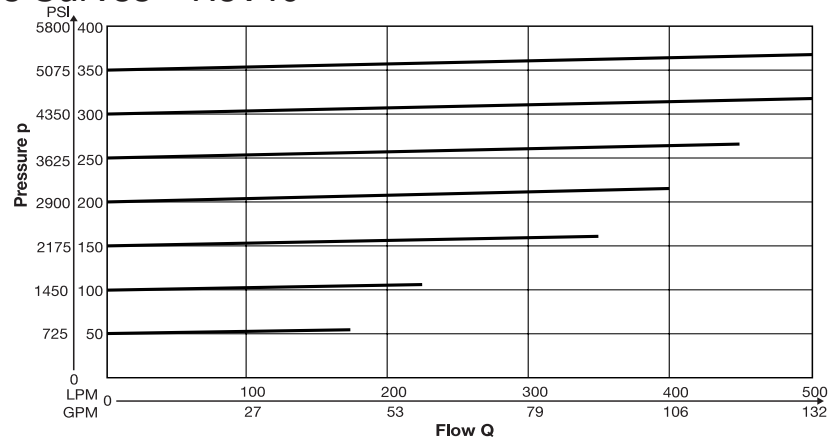
Pressure Control Valves

R4V*5, R6V*5 (TÜV) - Performance Curves

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WWW.SUMY.IR

p/Q Performance Curves – R6V10



R6V10				
Pressure Range	Qmax	Minimum Opening Width	Cartridge Stroke	Permitted Pressure Increase
50 - 70 Bar (725 - 1015 PSI)	170 LPM (45 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%
80 - 120 Bar (1160 - 1740 PSI)	200 LPM (53 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%
130 - 170 Bar (1885 - 2465 PSI)	300 LPM (80 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%
180 - 200 Bar (2610 - 2900 PSI)	325 LPM (86 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%
210 - 250 Bar (3015 - 3625 PSI)	350 LPM (93 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%
260 - 300 Bar (3770 - 4350 PSI)	500 LPM (132 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%
310 - 350 Bar (4495 - 5075 PSI)	500 LPM (132 GPM)	607 mm ² (0.94 in ²)	7.3 mm (0.29 in)	10%

D

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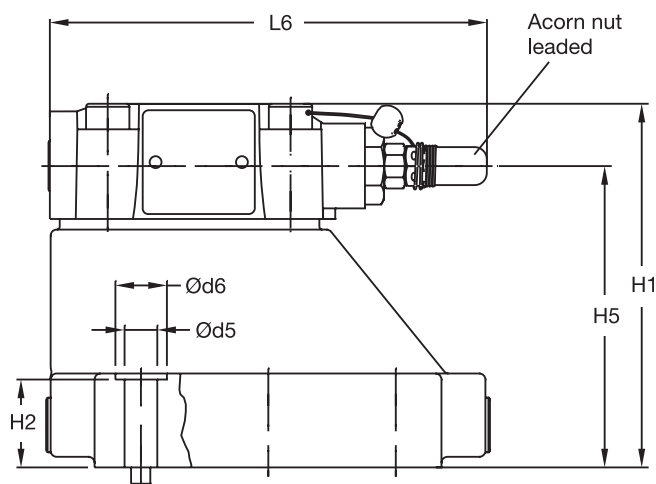
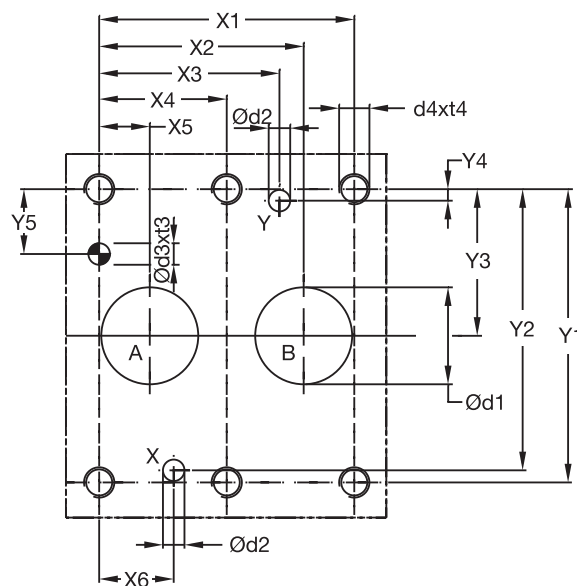
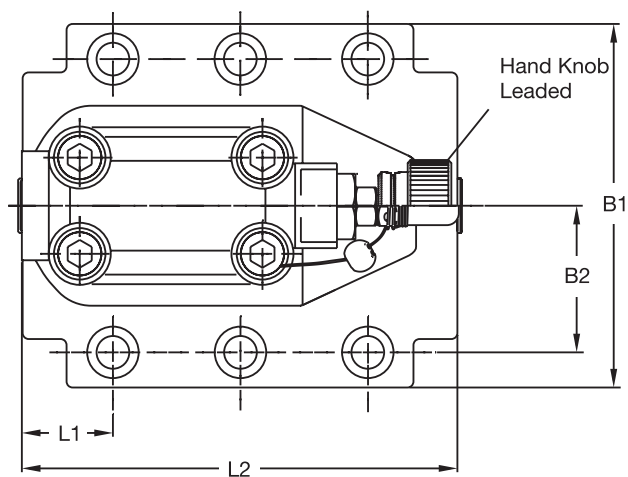
Pressure Control Valves

R4V (TÜV) - Dimensions

D23

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



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Section D
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Pressure Control Valves

R4V (TÜV) - Dimensions

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WWW.SUMY.IR

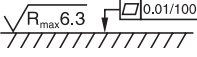
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4	Y5	Y6
10	6264-06-07-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	– –	7.2 (0.28)	21.5 (0.85)	0.0 (0.0)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	14.3 (0.56)	– –
25	6264-08-11-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	– –	11.1 (0.44)	20.6 (0.81)	0.0 (0.0)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	15.9 (0.63)	– –
32	6264-10-15-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	0.0 (0.0)	96.8 (3.81)	82.8 (3.65)	48.4 (1.91)	3.8 (0.15)	21.4 (0.84)	– –

Tolerances at X and Y pin holes and screw holes: +/-0.1 (0.003); at port holes: +/-0.2 (0.007)

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L6
10	6264-06-07-*-97	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	– –	– –	62.5 (2.46)	– –	29.0 (1.14)	94.8 (3.73)	– –	144.8 (5.70)
25	6264-08-11-*-97	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	– –	– –	89.0 (3.50)	– –	34.7 (1.37)	126.8 (4.99)	– –	144.8 (5.70)
32	6264-10-15-*-97	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	– –	– –	99.5 (3.92)	– –	30.6 (1.20)	144.3 (5.68)	– –	144.8 (5.70)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	6264-06-07-*-97	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	6264-08-11-*-97	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	6264-10-15-*-97	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal 		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-07-*-97	BK505	4x M10 x 35 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58507-0	S26-58507-5	
25	6264-08-11-*-97	BK485	4x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58475-0	S26-58475-5	
32	6264-10-15-*-97	BK506	6x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58508-0	S26-58508-5	

NG	ISO-code	Subplate	Size
10	6264-06-07-*-97	SPP3M6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP
25	6264-08-11-*-97	SPP6M8B910	A, B = 1" BSPP X, Y = 1/4" BSPP
32	6264-10-15-*-97	SPP10M12B910	A, B = 1-1/2" BSPP X, Y = 1/4" BSPP

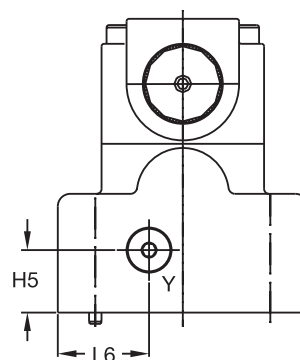
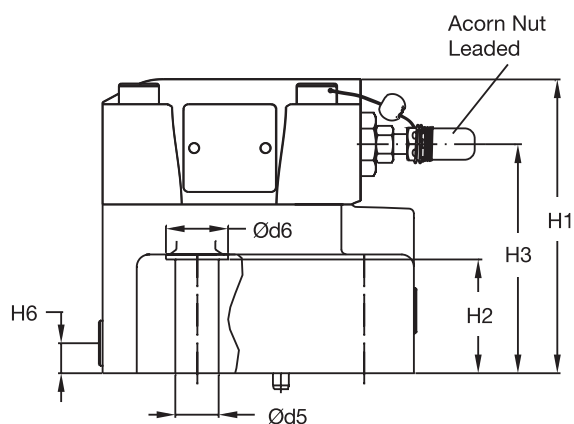
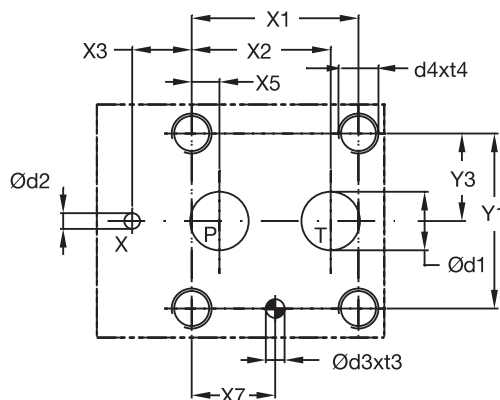
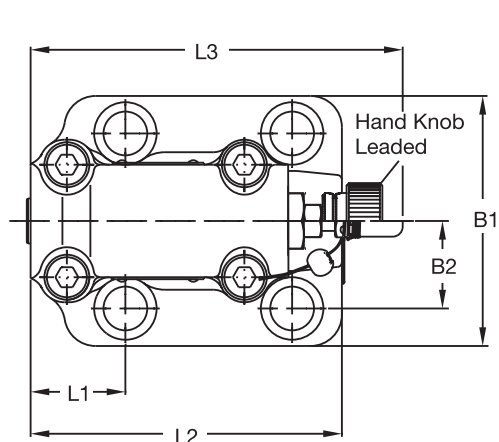
Pressure Control Valves

R6V (TÜV) - Dimensions

D25

WWW.SUMY.IR

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



Y: external drain port G 1/8"



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Pressure Control Valves

R6V (TÜV) - Dimensions

D26

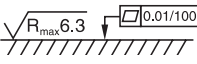
WWW.SUMY.IR

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

NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4	Y5	Y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.0)	– –	22.1 (0.87)	– –	22.1 (0.87)	53.8 (2.12)	– –	26.9 (1.06)	– –	– –	– –
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.94)	– –	11.1 (0.44)	– –	33.4 (1.31)	70.0 (2.76)	– –	35.0 (1.38)	– –	– –	– –
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	– –	12.7 (0.50)	– –	44.5 (1.75)	82.6 (3.25)	– –	41.3 (1.63)	– –	– –	– –
Tolerances at X and Y pin holes and screw holes: +/-0.1 (0.003); at port holes: +/-0.2 (0.007)														

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L6
10	6264-06-09-*-97	80.0 (3.15)	26.9 (1.06)	114.0 (4.49)	27.0 (1.06)	88.0 (3.46)	– –	20.5 (0.81)	25.0 (0.98)	52.5 (2.07)	118.5 (4.67)	148.3 (5.84)	– –	29.5 (1.16)
25	6264-08-13-*-97	100.0 (3.94)	35.0 (1.38)	117.5 (4.63)	45.5 (1.79)	91.5 (3.60)	– –	25.0 (0.98)	12.0 (0.47)	37.9 (1.49)	124.5 (4.90)	148.3 (5.84)	– –	36.5 (1.44)
32	6264-10-17-*-97	120.0 (4.72)	41.3 (1.63)	123.0 (4.83)	52.0 (2.05)	97.0 (3.82)	– –	26.5 (1.04)	13.5 (0.53)	45.0 (1.77)	153.0 (6.02)	148.3 (5.84)	– –	46.5 (1.83)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	6264-06-09-*-97	14.7 (0.58)	4.8 (0.19)	7.5 (0.30)	10.0 (0.39)	M12	20.0 (0.79)	13.5 (0.53)	20.0 (0.79)
25	6264-08-13-*-97	23.4 (0.92)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M16	27.0 (1.06)	17.5 (0.69)	25.0 (0.98)
32	6264-10-17-*-97	32.0 (1.26)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M18	28.0 (1.10)	20.0 (0.79)	30.0 (1.18)

NG	ISO-code	Bolt Kit			Seal 		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-09-*-97	BK494	4x M12 x 45 DIN 912 12.9	108 Nm (79.6 lb-ft) +/-15%	S26-96396-0	S26-96396-5	
25	6264-08-13-*-97	BK366	4x M16 x 70 DIN 912 12.9	264 Nm (194.7 lb-ft) +/-15%	S26-96589-0	S26-96589-5	
32	6264-10-17-*-97	BK507	4x M18 x 75 DIN 912 12.9	398 Nm (293.5 lb-ft) +/-15%	S26-96392-0	S26-96392-5	

NG	ISO-code	Subplate	Size
10	6264-06-09-*-97	SPP3R6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP
25	6264-08-13-*-97	SPP6R8B910	A, B = 1-1/4" BSPP X, Y = 1/4" BSPP
32	6264-10-17-*-97	SPP10R12B910	A, B = 1-1/2" BSPP X, Y = 1/4" BSPP

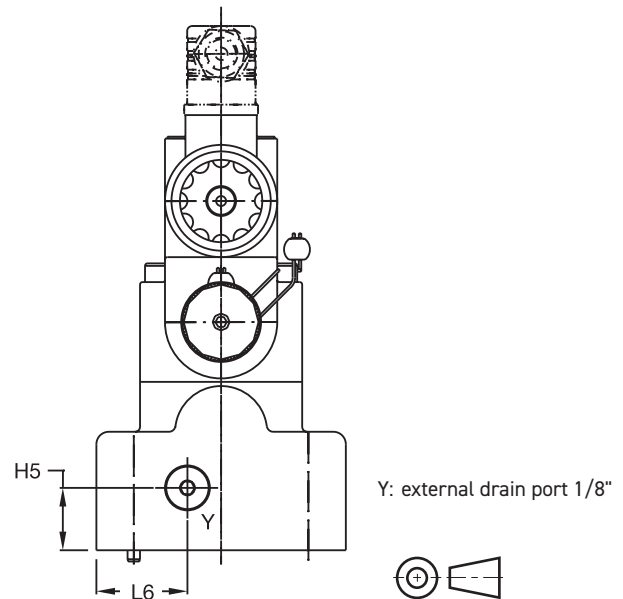
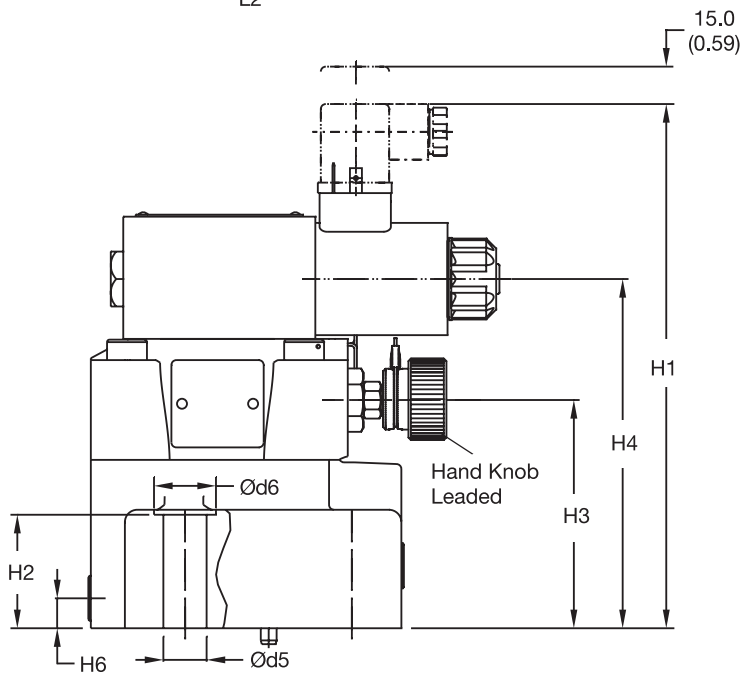
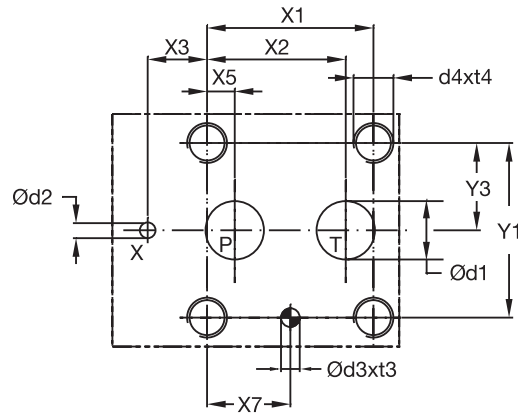
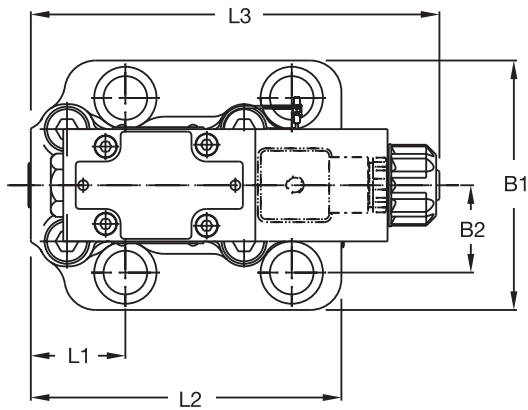
Pressure Control Valves

R6V (TÜV) w/Vent Function - Dimensions

D27

WWW.SUMY.IR

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



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Pressure Control Valves

R6V (TÜV) w/Vent Function - Dimensions

D28

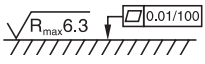
WWW.SUMY.IR

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

NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4	Y5	Y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.0)	– –	22.1 (0.87)	– –	22.1 (0.87)	53.8 (2.12)	– –	26.9 (1.06)	– –	– –	– –
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.94)	– –	11.1 (0.44)	– –	33.4 (1.31)	70.0 (2.76)	– –	35.0 (1.38)	– –	– –	– –
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	– –	12.7 (0.50)	– –	44.5 (1.75)	82.6 (3.25)	– –	41.3 (1.63)	– –	– –	– –
Tolerances at X and Y pin holes and screw holes: +/-0.1 (0.003); at port holes: +/-0.2 (0.007)														

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L6
10	6264-06-09-*-97	80.0 (3.15)	26.9 (1.06)	206.0 (8.11)	27.0 (1.06)	88.0 (3.46)	136.5 (5.37)	25.0 (0.98)	12.0 (0.47)	52.5 (2.07)	118.5 (4.67)	163.8 (6.45)	– –	36.5 (1.44)
25	6264-08-13-*-97	100.0 (3.94)	35.0 (1.38)	210.0 (8.27)	45.5 (1.79)	91.5 (3.60)	140.0 (5.51)	25.0 (0.98)	12.0 (0.47)	37.9 (1.49)	124.5 (4.90)	163.8 (6.45)	– –	36.5 (1.44)
32	6264-10-17-*-97	120.0 (4.72)	41.3 (1.63)	215.5 (8.48)	52.0 (2.05)	97.0 (3.82)	145.5 (5.73)	25.0 (0.98)	12.0 (0.47)	45.0 (1.77)	153.0 (6.02)	163.8 (6.45)	– –	36.5 (1.44)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	6264-06-09-*-97	14.7 (0.58)	4.8 (0.19)	7.5 (0.30)	10.0 (0.39)	M12	20.0 (0.79)	13.5 (0.53)	20.0 (0.79)
25	6264-08-13-*-97	23.4 (0.92)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M16	27.0 (1.06)	17.5 (0.69)	25.0 (0.98)
32	6264-10-17-*-97	32.0 (1.26)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M18	28.0 (1.10)	20.0 (0.79)	30.0 (1.18)

NG	ISO-code	Bolt Kit			Seal 		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-09-*-97	BK494	4x M12 x 45 DIN 912 12.9	108 Nm (79.6 lb-ft) +/-15%	S26-96396-0	S26-96396-5	
25	6264-08-13-*-97	BK366	4x M16 x 70 DIN 912 12.9	264 Nm (194.7 lb-ft) +/-15%	S26-96589-0	S26-96589-5	
32	6264-10-17-*-97	BK507	4x M18 x 75 DIN 912 12.9	398 Nm (293.5 lb-ft) +/-15%	S26-96392-0	S26-96392-5	

NG	ISO-code	Subplate	Size
10	6264-06-09-*-97	SPP3R6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP
25	6264-08-13-*-97	SPP6R8B910	A, B = 1-1/4" BSPP X, Y = 1/4" BSPP
32	6264-10-17-*-97	SPP10R12B910	A, B = 1-1/2" BSPP X, Y = 1/4" BSPP

A diagram of a square element under stress. A downward force P is applied to the top edge, and an upward force T is applied to the bottom edge. A dashed line indicates the original shape, and a jagged line indicates the deformed shape.

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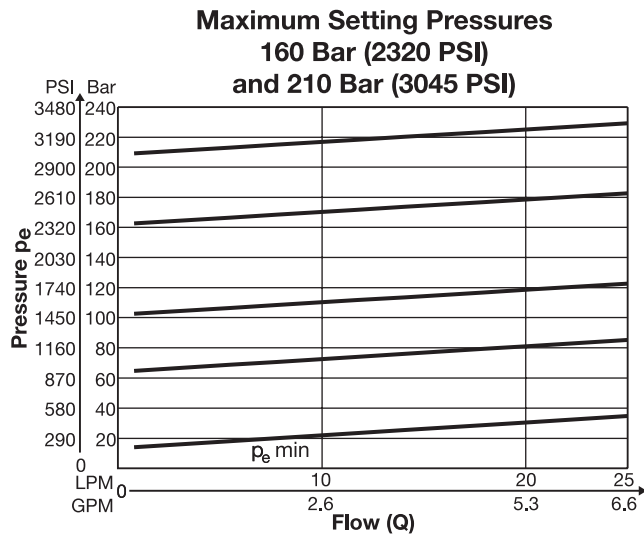
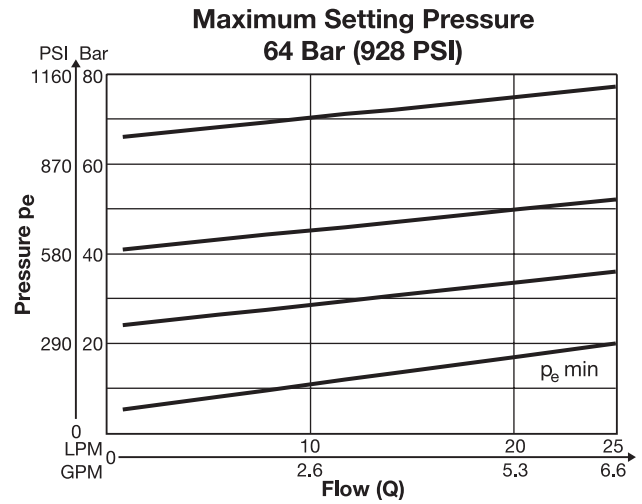
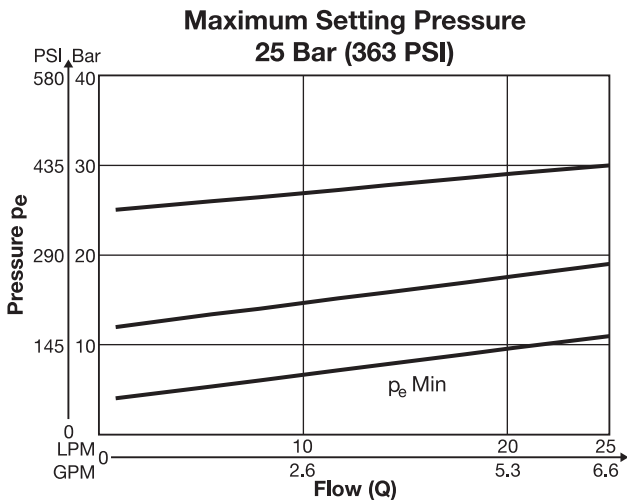
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VS - Performance Curves

D30

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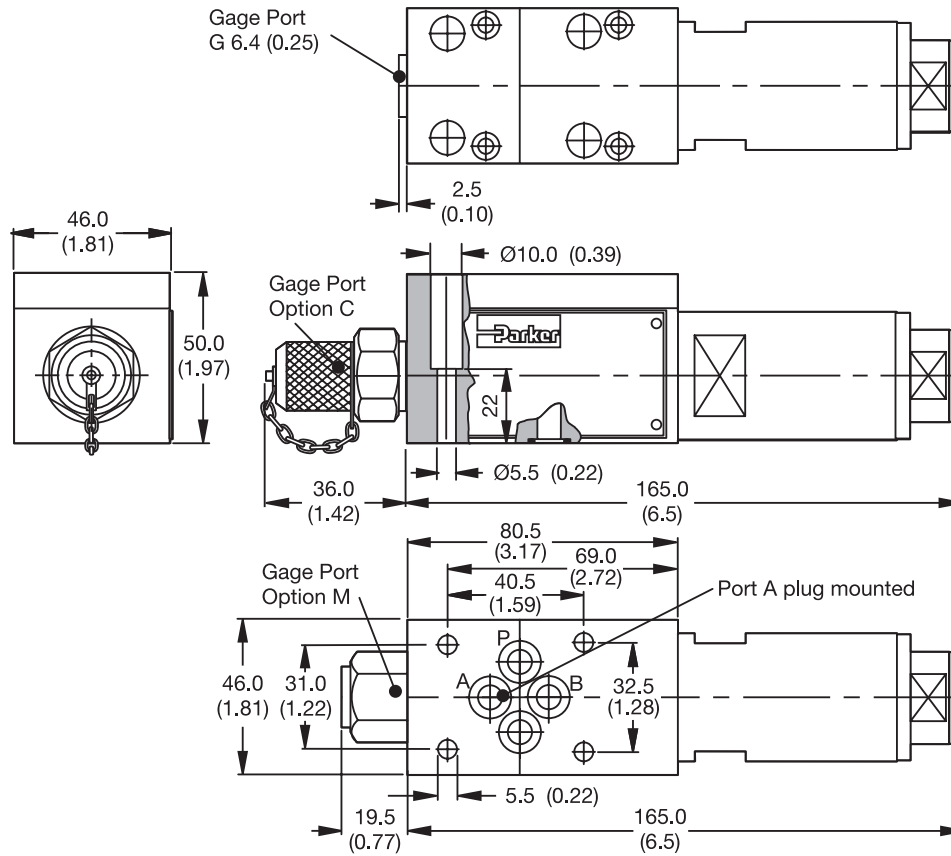
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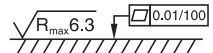
VS - Dimensions

D31

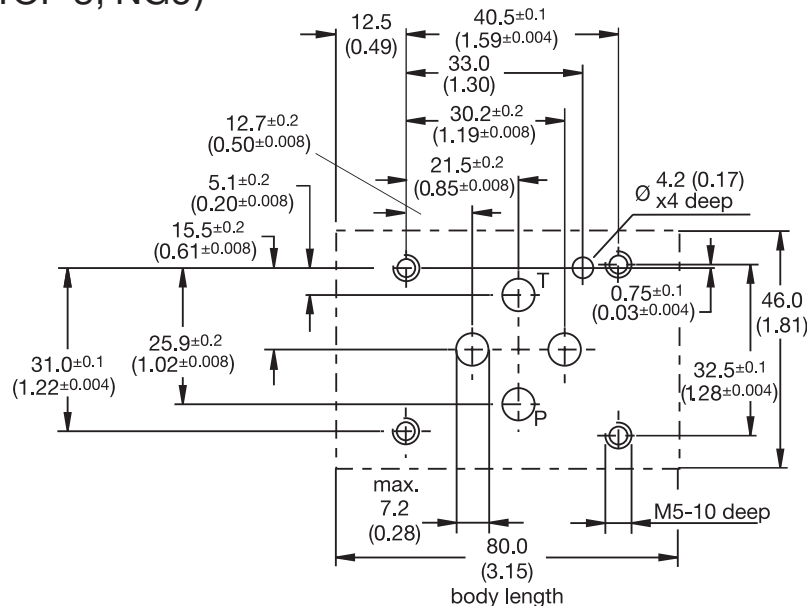
WWW.SUMY.IR

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



Surface Finish			Seal Kit 
	4x M5x30 DIN 912 12.9	8.1 Nm (6.0 lb-ft) +/- 15%	SK-VN/VM/VS V

Mounting Pattern ISO 6264-03-04-* -97 (NFPA D03, CETOP 3, NG6)



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General Description

Series R4U subplate mounted unloading valves are used to unload a circuit at low pressure. The mechanically adjustable pressure signal to unload the main stage has to be applied to port X. The pressure differential between opening and closing is nominal 15% or 28% of the setting pressure:

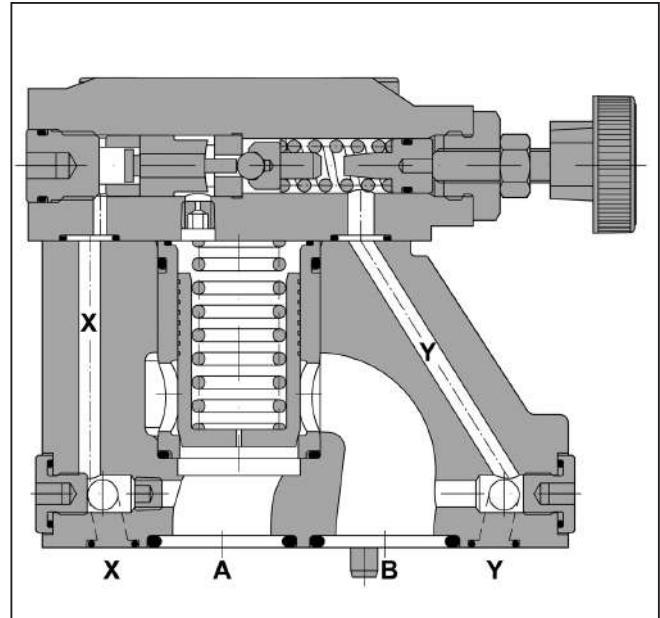
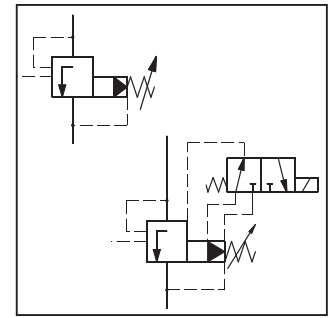
- 15% for pressure ranges 350 Bar (5075 PSI) and 28% for 105 Bar (1523 PSI) and 210 Bar (3045 PSI).

Typical applications are to unload the pumps in an accumulator circuit and to unload the low pressure stage of a double pump.

In addition, Series R4U with vent function is vented by electrical operation.

Features

- Pilot operated unloading valve
- 3 pressure ranges
- 2 switching types (series R4U with vent function)
- 3 adjustment modes:
 - Hand knob
 - Screw with locknut
 - Key lock

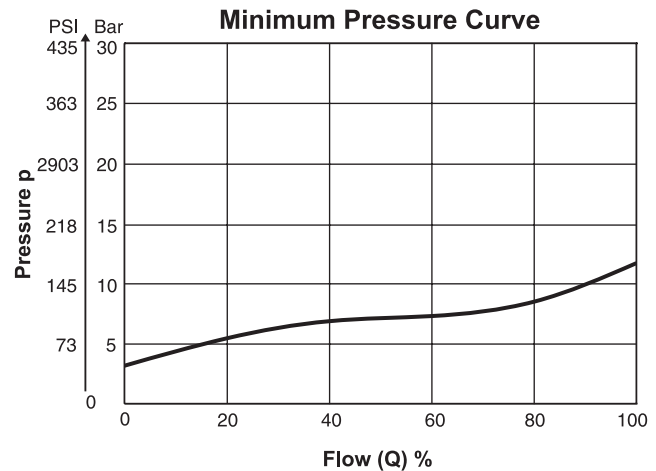
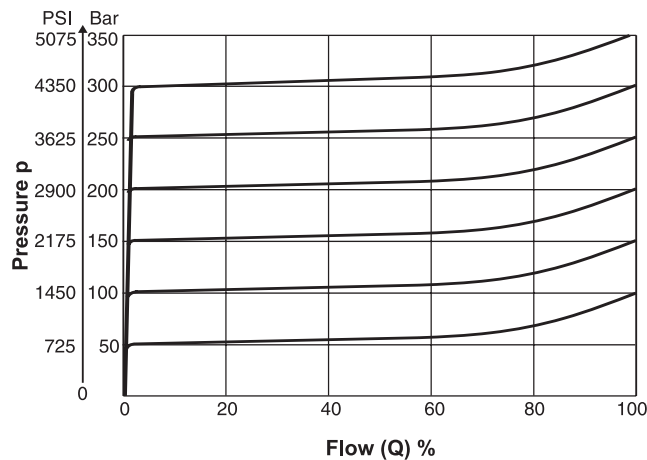


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Performance Curves



*The performance curves are measured with external drain.
For internal drain the tank pressure has to be added to curve.*

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Pressure Control Valves

R4U - Ordering Information

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R

Pressure Valve

4

Interface

U

Unloading Function

Valve Size

5

Maximum Pressure

Body Mounting

Pressure Range

Adjustment

Pilot Oil Drain Line

Vent Valve Function

Solenoid Voltage

A

Design Series

Seal

Options Check with Factory

Code	Description
03	NG 10
06	NG 25
10	NG 32

Code	Description
4	Subplate Mounting ISO 5781

Code	Description
3*	Subplate NPT
7**	Subplate SAE
9**	Subplate BSP

* For use only with Pilot options 0 and 1
** Must be used with Pilot option 2

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
1	Hand Knob 32mm dia Std
3	Acorn Nut w/Lead Seal
4	Key Lock

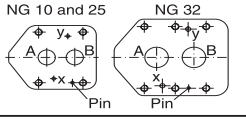
Code	Description
Omit	Standard without Vent Option
G0R	12 VDC
G0Q	24 VDC
GAR	98 VDC
GAG	205 VDC
W30	110 VAC / 50 Hz 120 VAC / 60 Hz
W31	230 VAC / 50 Hz 240 VAC / 60 Hz

Code	Description
Omit	Standard without Vent Option
09	Solenoid not activated unpress. circulation
11	Solenoid activated unpress. circulation

Code	Description
0*	Internal
1*	External from Subplate
2**	External from Valve Body (Y-port)

* Must be used with Body Mounting option 3
** Y-port. For use with Body Mounting options 7 and 9

Code	Description
03	NG 10
06	NG 25
10	NG 32



Code	Description
1	Nitrile
5	Fluorocarbon

Weight:

R4U03:	2.7 kg	(6.0 lbs.)
R4U06:	4.5 kg	(9.9 lbs.)
R4U10:	6.0 kg	(13.2 lbs.)

Weight (with Vent):

R4U03:	4.4 kg	(9.7 lbs.)
R4U06:	6.2 kg	(13.7 lbs.)
R4U10:	7.7 kg	(17.0 lbs.)

Industrial
Hydraulic Valves

MSG14-2500/US
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Pressure Control Valves

R4U - Specifications

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Without Vent Function

General			
Size	NG 10	NG 25	NG 32
Interface	Subplate mounting acc. ISO 5781		
Mounting Position	As desired, horizontal mounting preferred		
Ambient Temperature Range (°C)	-20 to +80 (-4°F to +176°F)		
Hydraulic			
Operating Pressure (Bar)	Ports A and X: up to 350 (5075 PSI); Ports B and Y depressurized		
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)		
Pressure Differential	15% for pressure range 350 Bar (5075 PSI) 28% for pressure ranges 105 Bar (1523 PSI) and 250 Bar (3625 PSI)		
Nominal Flow (LPM)	150 (39.7 GPM)	350 (92.6 GPM)	650 (172 GPM)
Fluid	Hydraulic oil according to DIN 51524 - 51525		
Viscosity Permitted (cSt / mm²/s)	20 - 380 (93 - 1761 SSU)		
Viscosity Recommended (cSt / mm²/s)	30 - 50 (139 - 232 SSU)		
Fluid Temperature Recommended (°C)	+30 to +50 (+86°F to +122°F)		
Maximum (°C)	-20 to +70 (-4°F to +158°F)		
Filtration	ISO 4406 (1999) 18/16/13		

With Vent Function

General						
Size	NG 10		NG 25		NG 32	
Interface	Subplate mounting acc. ISO 5781					
Mounting Position	Unrestricted					
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)					
Hydraulic						
Operating Pressure (Bar)	Ports A and X: up to 350 (5075 PSI); Ports B and Y depressurized					
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)					
Pressure Differential	15% for pressure range 350 Bar (5075 PSI) 28% for pressure ranges 105 Bar (1523 PSI) and 250 Bar (3625 PSI)					
Nominal Flow (LPM)	150 (39.7 GPM)		350 (92.6 GPM)		650 (172 GPM)	
Fluid	Hydraulic oil according to DIN 51524 - 51525					
Viscosity Permitted (cSt / mm²/s)	20 - 380 (93 - 1761 SSU)					
Viscosity Recommended (cSt / mm²/s)	30 - 50 (139 - 232 SSU)					
Fluid Temperature Recommended (°C)	+30 to +50 (+86°F to +122°F)					
Maximum (°C)	-20 to +70 (-4°F to +158°F)					
Filtration	ISO 4406 (1999) 18/16/13					
Electrical						
Duty Cycle (%)	100 ED; CAUTION: Coil temperature up to 180°C (356°F) possible					
Solenoid Connector	Connector acc. to EN 175301-803					
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)					
Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage	12 VDC	24 VDC	98 VDC	205 VDC	110 VAC / 50 Hz 120 VAC / 60 Hz	230 VAC / 50 Hz 240 VAC / 60 Hz
Supply Tolerance	+5 - -10	+5 - -10	+5 - -10	+5 - -10	+5 - -10	+5 - -10
Power Consumption Hold (W)	31	31	31	31	78	78
Power Consumption In Rush (W)	31	31	31	31	264	264
Max Switching Frequency	16,000 (DC), 7200 (AC) switchings/hour maximum					
Wiring Minimum (mm²)	3 x 1.5 recommended					
Wiring Length Maximum (mm²)	50 (164 ft) recommended					

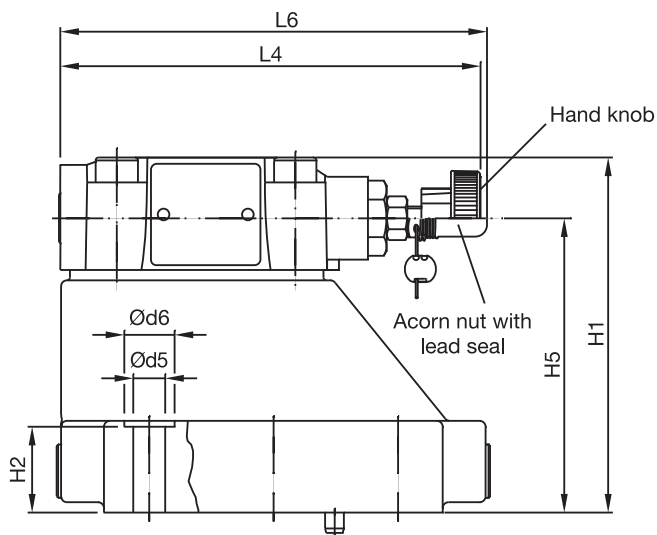
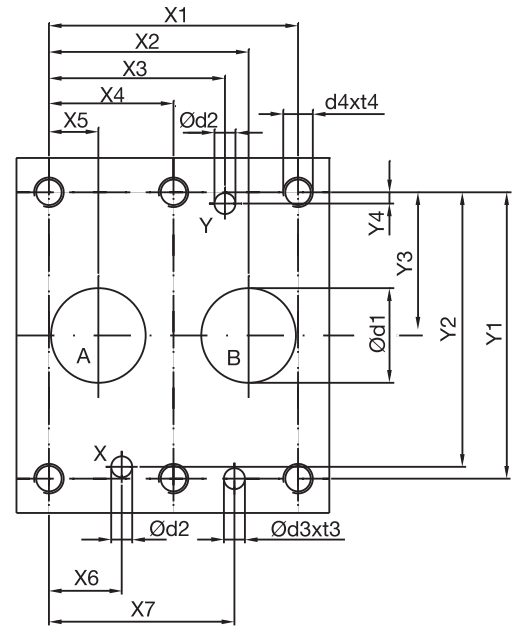
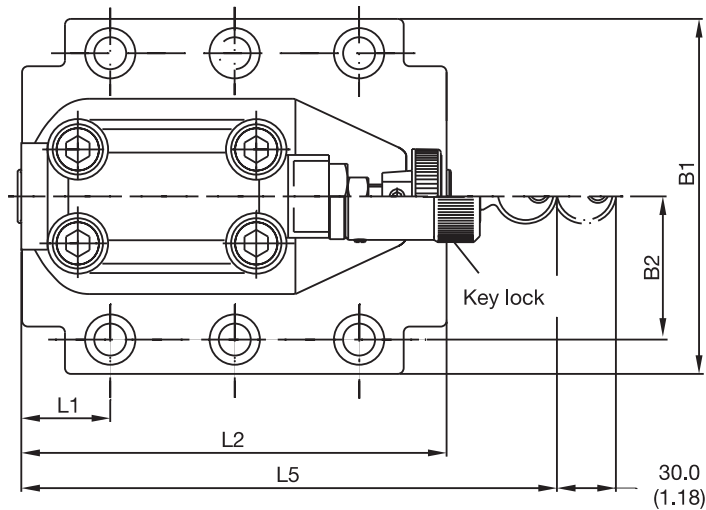
Pressure Control Valves

R4U - Dimensions

D35

WWW.SUMY.IR

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



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Pressure Control Valves

R4U - Dimensions

D36

WWW.SUMY.IR

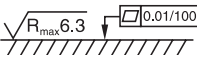
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4	Y5	Y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	– –	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	– –	– –
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	– –	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	– –	– –
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	– –	– –

Toleranace at X and Y pin holes and screw holes: +/-0.1 (0.003); at port holes: +/-0.2 (0.007)

NG	ISO-code	B1	B2	B3	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	70.0 (2.76)	130.0 (5.12)	21.0 (0.83)	68.5 (2.70)	109.5 (4.13)	– –	– –	29.0 (1.14)	94.8 (3.73)	– –	141.0 (5.55)	181.0 (7.13)	165.6 (6.52)
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	70.0 (2.76)	156.5 (6.16)	29.0 (1.14)	95.0 (3.74)	136.0 (5.35)	– –	– –	34.7 (1.37)	126.8 (4.99)	– –	141.0 (5.55)	181.0 (7.13)	165.6 (6.52)
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	70.0 (2.76)	167.0 (6.57)	29.0 (1.14)	105.5 (4.15)	146.5 (5.77)	– –	– –	30.6 (1.20)	144.3 (5.68)	– –	141.0 (5.55)	181.0 (7.13)	165.6 (6.52)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	5781-06-07-0-00	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal 		Surface Finish
					Nitrile	Fluorocarbon	
10	5781-06-07-0-00	BK505	4x M10 x 35 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58507-0	S26-58507-5	
25	5781-08-10-0-00	BK485	4x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58475-0	S26-58475-5	
32	5781-10-13-0-00	BK506	6x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58508-0	S26-58508-5	

NG	ISO-code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP X, Y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1-1/2" BSPP X, Y = 1/4" BSPP

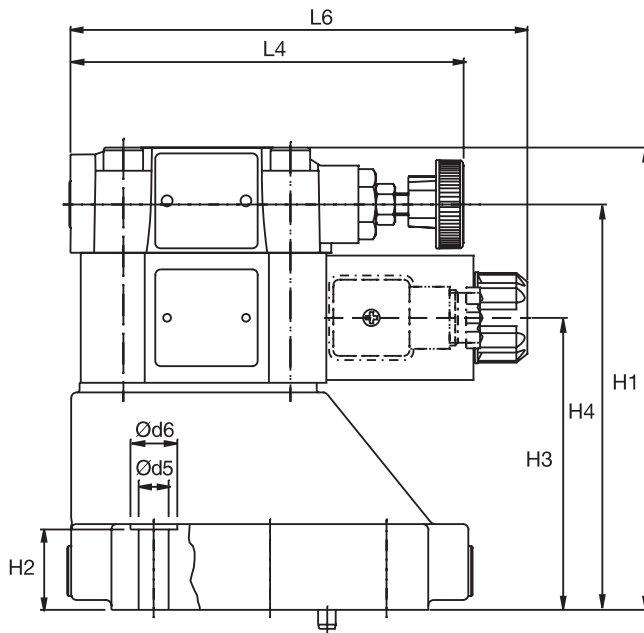
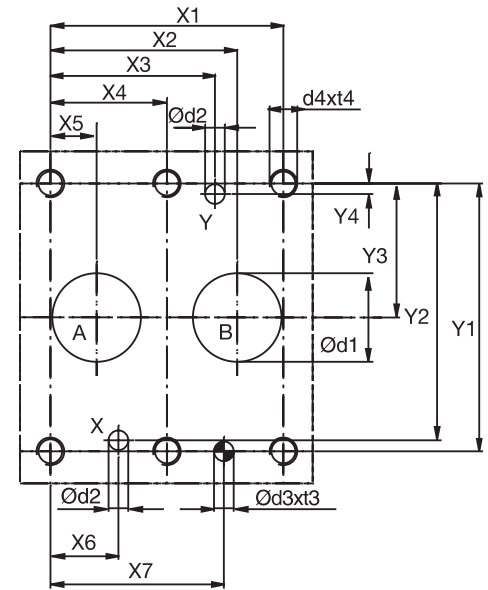
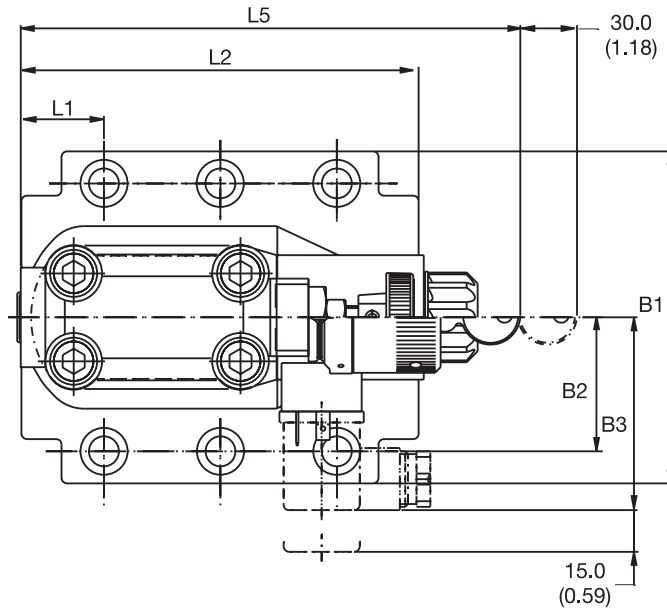
Pressure Control Valves

R4U w/Vent Function - Dimensions

D37

WWW.SUMY.IR

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



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Pressure Control Valves

R4U w/Vent Function - Dimensions

D38

WWW.SUMY.IR

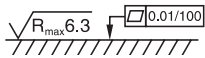
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4	Y5	Y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	– –	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	– –	– –
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	– –	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	– –	– –
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	– –	– –

Toleranace at X and Y pin holes and screw holes: +/-0.1 (0.003); at port holes: +/-0.2 (0.007)

NG	ISO-code	B1	B2	B3	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	70.0 (2.76)	130.0 (5.12)	21.0 (0.83)	68.5 (2.70)	109.5 (4.13)	– –	– –	29.0 (1.14)	94.8 (3.73)	– –	141.0 (5.55)	181.0 (7.13)	165.6 (6.52)
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	70.0 (2.76)	156.5 (6.16)	29.0 (1.14)	95.0 (3.74)	136.0 (5.35)	– –	– –	34.7 (1.37)	126.8 (4.99)	– –	141.0 (5.55)	181.0 (7.13)	165.6 (6.52)
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	70.0 (2.76)	167.0 (6.57)	29.0 (1.14)	105.5 (4.15)	146.5 (5.77)	– –	– –	30.6 (1.20)	144.3 (5.68)	– –	141.0 (5.55)	181.0 (7.13)	165.6 (6.52)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	5781-06-07-0-00	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal Kit		Surface Finish
					Nitrile	Fluorocarbon	
10	5781-06-07-0-00	BK505	4x M10 x 35 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58507-0*	S26-58507-5*	
25	5781-08-10-0-00	BK485	4x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58475-0*	S26-58475-5*	
32	5781-10-13-0-00	BK506	6x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58508-0*	S26-58508-5*	
VV01					S26-40609-0	S26-40609-5	

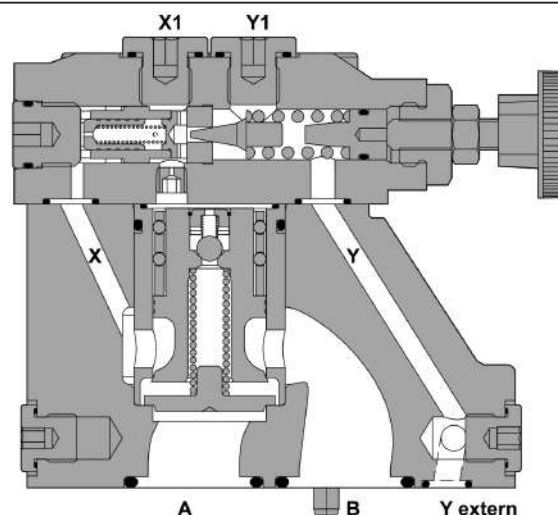
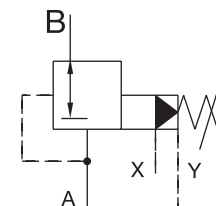
* Please combine seal kit of one size with seal kit of VV01 DC / AC solenoid for complete seal kit

NG	ISO-code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP X, Y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1-1/2" BSPP X, Y = 1/4" BSPP

Pressure Control Valves

Series R4R pressure reducing valves are used to control the pressure in the secondary part of the hydraulic system. Independent of the primary pressure the secondary pressure is reduced to the pressure setting. In order to avoid undesired motion the valves are normally closed.

Size	NG 10, NG 25, NG 32
Mounting Interface	Subplate mounting acc. ISO 5781
Mounting Position	As desired, horizontal mounting preferred
Ambient Temperature Range (°C)	-20 to +80 (-4°F to +176°F)
Max Operating Pressure (Bar)	Ports A, B, and X: 350 (5075 PSI) Port Y: depressurized
Pressure Range (Bar)	up to 105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)
Nominal Flow (LPM)	NG 10: 150 (39.7 GPM) NG 25: 350 (92.6 GPM) NG 32: 500 (132.3 GPM)
Pressure Fluid	Hydraulic oil as per DIN 51524 - 51525
Fluid Temperature Recommended (°C) Permitted (°C)	+30 to +50 (+86°F to +122°F) -20 to +70 (-4°F to +158°F)
Viscosity Maximum (cSt / mm²/s) Recommended (cSt / mm²/s)	20 - 380 (93 - 1761 SSU) 30 - 50 (139 - 232 SSU)
Filtration	ISO 4406 (1999), 18/16/13



- Subplate mounting acc. to ISO 5781
- Normally closed to avoid unintended motion
- 3 pressure ranges
- Three adjustment modes: Hand knob, acorn nut with lead seal, or key lock

Legend:

- R** Pressure Reducing Valve
- 4** Interface
- R** Reducing Function
- []** Size
- Maximum Pressure 350 Bar (5075 PSI)
- 5** Body Mounting
- []** Pressure Range
- []** Adjustment
- []** Pilot Oil
- B** Design Series
- []** Seal
- []** Options

Option Tables:

Code	Description
03	NG 10
06	NG 25
10	NG 32

Mounting: Subplate

Code	Description
7	SAE (X1, Y1)
9	BSP (X1, Y1)

Code	Description
1	Hand Knob 32mm dia Std
3	Acorn Nut w/Lead Seal
4	Key Lock

Code	Description
1	Nitrile
5	Fluorocarbon

Main Assembly Diagram:

Code | **Description**

Code	Description
4	Subplate Mounting ISO 5781

NG 10 and 25 | **NG 32**

Weight:

- R4R03: 4.8 kg (10.6 lbs.)
- R4R06: 7.2 kg (15.9 lbs.)
- R4R10: 13.5 kg (29.8 lbs.)

 **WARNING:** This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Pressure Control Valves

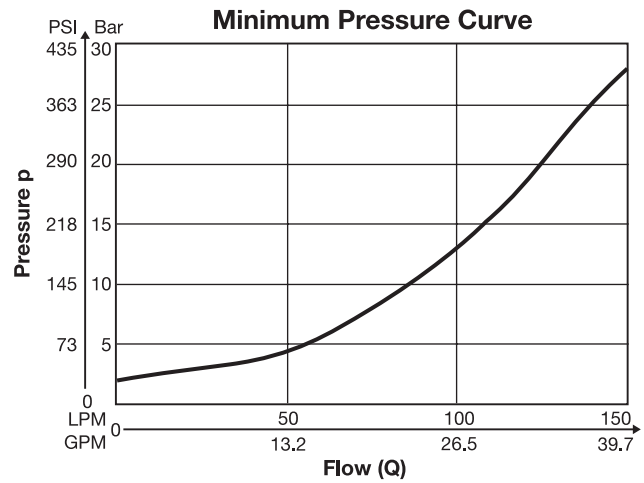
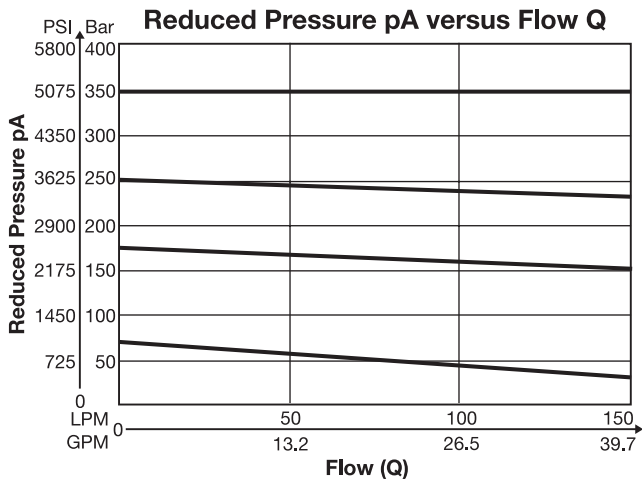
R4R (Subplate Mounted) - Performance Curves

D40

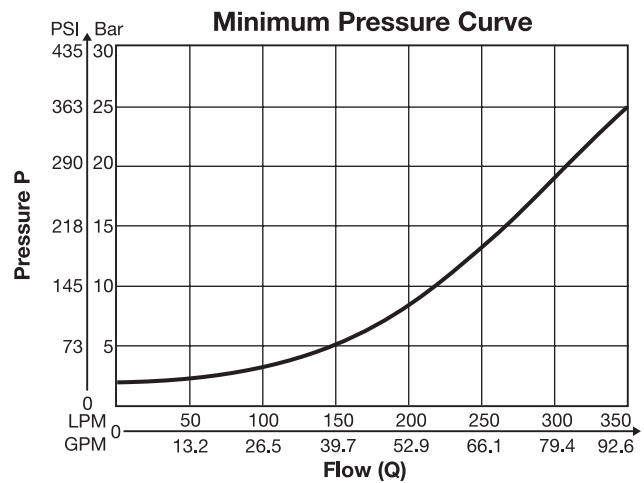
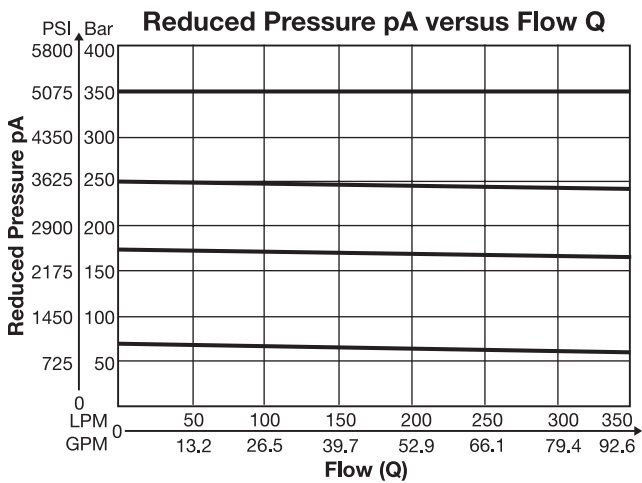
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Performance curves measured at 350 Bar (5075 PSI) primary pressure pB.

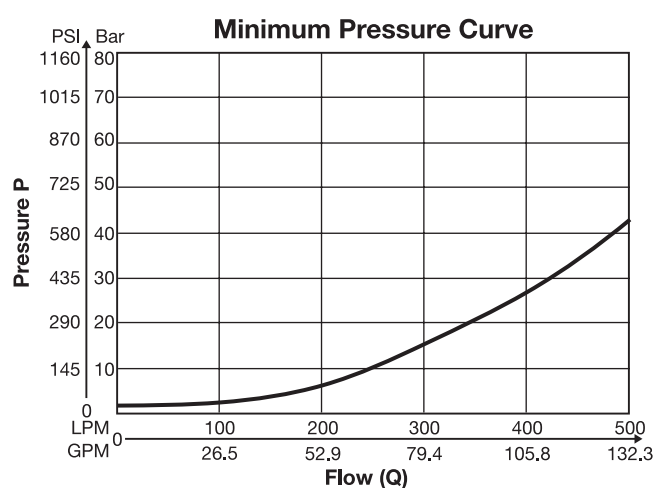
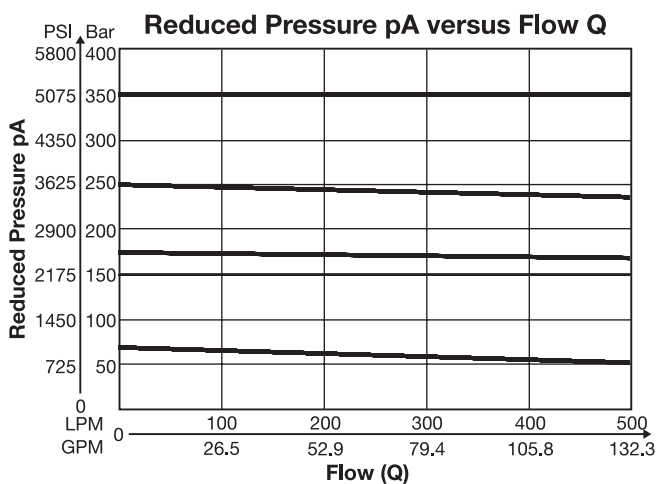
R4R03



R4R06



R4R10



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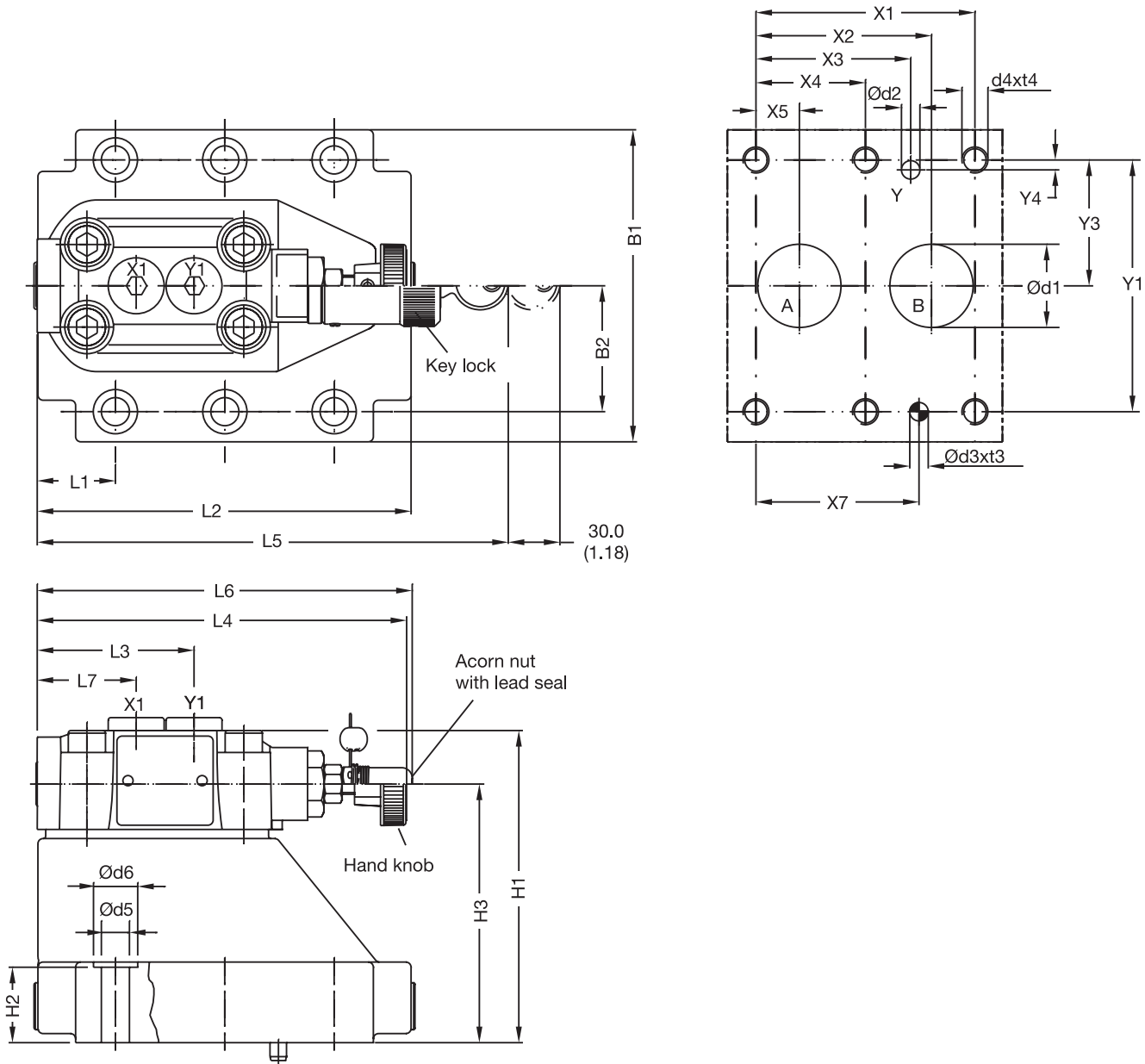
Pressure Control Valves

R4R (Subplate Mounted) - Dimensions

D41

WWW.SUMY.IR

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



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Pressure Control Valves

R4R (Subplate Mounted) - Dimensions

D42

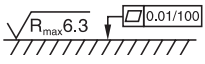
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Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4	Y5	Y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	– –	7.2 (0.28)	– –	31.8 (1.25)	66.7 (2.63)	– –	33.4 (1.31)	7.9 (0.31)	– –	– –
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	– –	11.1 (0.44)	– –	44.5 (1.75)	79.4 (3.13)	– –	39.7 (1.56)	6.4 (0.25)	– –	– –
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	– –	62.7 (2.47)	96.8 (3.81)	– –	48.4 (1.91)	3.8 (0.15)	– –	– –
Tolerances for all dimensions +/-0.2 (0.007)														

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L7
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	62.5 (2.46)	– –	– –	– –	29.0 (1.14)	94.8 (3.73)	60.8 (2.39)	141.0 (5.55)	181.0 (7.13)	38.6 (1.52)
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	89.0 (3.50)	– –	– –	– –	34.7 (1.37)	126.8 (4.99)	60.8 (2.39)	141.0 (5.55)	181.0 (7.13)	38.6 (1.52)
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	99.4 (3.92)	– –	– –	– –	30.6 (1.20)	144.3 (5.68)	60.8 (2.39)	141.0 (5.55)	181.0 (7.13)	38.6 (1.52)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	5781-06-07-0-00	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal 		Surface Finish
					Nitrile	Fluorocarbon	
10	5781-06-07-0-00	BK505	4x M10 x 35 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58507-0	S26-58507-5	
25	5781-08-10-0-00	BK485	4x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58475-0	S26-58475-5	
32	5781-10-13-0-00	BK506	6x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58508-0	S26-58508-5	

NG	ISO-code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP X, Y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1-1/2" BSPP X, Y = 1/4" BSPP

Pressure Control Valves

R4R (Inline Mounted) - Technical Information

D43

WWW.SUMY.IR

General Description

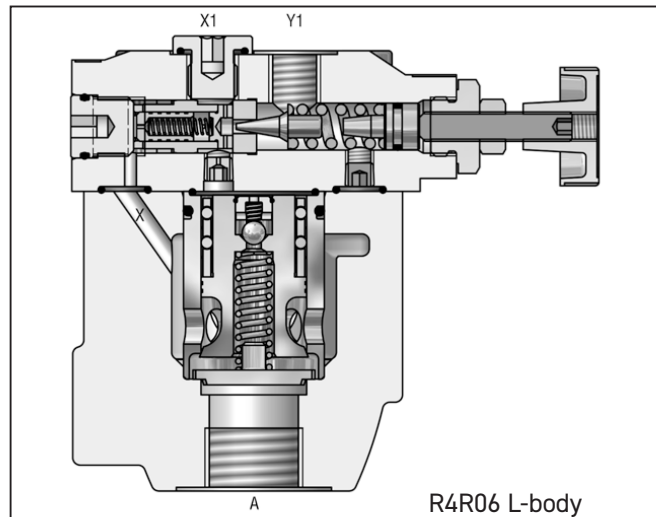
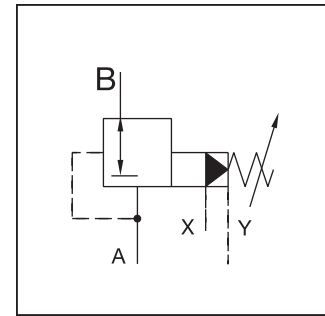
Series R4R pressure reducing valves are pilot operated and have a similar design to the subplate mounted R4R Series. For single functions (where no manifold blocks are used), the valves can be directly placed in the pipework. The valves are available with 2 ports (L-body) or with 3 ports (T-body).

Features

- Pilot operated with manual adjustment
- Normally closed to avoid unintended motion
- 2 interfaces:
 - L-body (R4R06-G3/4", R4R10-G1-1/4")
 - T-body (R4R03-G1/2", R4R06-G1")
- 3 pressure ranges
- Three adjustment modes:
 - Hand knob
 - Acorn nut with lead seal
 - Cylinder lock
- With optional vent function



R4R10 L-body



R4R06 L-body

Ordering Information

R4R		5				2			B		
Pressure Reducing Valve	Size	Max. Pressure 350 Bar (5075 PSI)	Body Mounting	Pressure Range	Adjustment	Drain Line ext. from Pilot Head (Y1)	Switching Type	Solenoid Voltage	Design Series	Seal	Options Check with Factory

Code	Description
03	NG 10 (G1/2")
06	NG 25 (G1" - T-body, G3/4" - L - body)
10	NG 32 (G1-1/4")

Mounting: Inline

Code	Description
4*	T - Body - SAE
6*	T - Body - BSP
B**	L - Body - SAE
D**	L - Body - BSP
E	Cartridge only w/Pilot SAE
G	Cartridge only w/Pilot BSP

* Size codes 03 and 06 only
** Size codes 06 and 10 only

Code	Description
1	Hand Knob 32mm dia Std
3	Acorn Nut w/Lead Seal
4	Cylinder Lock

Code	Description
Omit	Standard without Vent Option
09	Solenoid not activated unpress. circulation
11	Solenoid activated unpress. circulation

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
Omit	Standard without Vent Option
G0R	12 VDC
G0Q	24 VDC
GAR*	98 VDC
GAG*	205 VDC
W30	110 VAC / 50 Hz 120 VAC / 60 Hz
W31	230 VAC / 50 Hz 240 VAC / 60 Hz

* To be used in combination with rectifier plugs at 120 VAC / 230 VAC power supply

Code	Pressure Range
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Weight:
T-Body
033.2 kg (7.0 lbs.)
063.3 kg (7.3 lbs.)
L-Body
065.6 kg (12.3 lbs.)
106.6 kg (14.5 lbs.)

Weight (w/Vent Function)
T-Body
034.9 kg (10.8 lbs.)
065.0 kg (11.0 lbs.)
L-Body
067.3 kg (16.1 lbs.)
108.3 kg (18.3 lbs.)

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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MSG14-2500/US
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Pressure Control Valves

R4R (Inline Mounted) - Specifications

D44

WWW.SUMY.IR

Without Vent Function

General				
Design	T - Body		L - Body	
Size	03 (1/2")	06 (3/4")	06 (1")	10 (1-1/4")
Mounting	Threaded body			
Mounting Position	Unrestricted			
Ambient Temperature Range (°C)	-20 to +60 (-4°F to +140°F)			
MTTF _n Value (years)	75			
Hydraulic				
Max Operating Pressure (Bar)	Ports A, B, and X: up to 350 (5075 PSI); Port Y depressurized			
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)			
Nominal Flow (LPM)	60 (15.8 GPM)	200 (52.8 GPM)	200 (52.8 GPM)	450 (118.9 GPM)
Fluid	Hydraulic oil according to DIN 51524			
Viscosity Permitted (cSt / mm²/s)	20 - 400 (93 - 1853 SSU)			
Viscosity Recommended (cSt / mm²/s)	30 - 80 (139 - 371 SSU)			
Fluid Temperature (°C)	-20 to +70 (-4°F to +158°F); NBR: -25 - +70 (-13 - +158°F)			
Filtration	ISO 4406 (1999) 18/16/13			

With Vent Function

General							
Design	T - Body				L - Body		
Size	03 (1/2")		06 (3/4")		06 (1")	10 (1-1/4")	
Mounting	Threaded Body						
Mounting Position	Unrestricted						
Ambient Temperature Range (°C)	-20 to +60 (-4°F to +140°F)						
MTTF _n Value (years)	75						
Hydraulic							
Max Operating Pressure (Bar)	Ports A, B, and X: up to 350 (5075 PSI); Port Y depressurized						
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)						
Nominal Flow (LPM)	60 (15.8 GPM)		200 (52.8 GPM)		200 (52.8 GPM)	450 (118.9 GPM)	
Fluid	Hydraulic oil according to DIN 51524						
Viscosity Permitted (cSt / mm²/s)	20 - 400 (93 - 1853 SSU)						
Viscosity Recommended (cSt / mm²/s)	30 - 80 (139 - 371 SSU)						
Fluid Temperature (°C)	-20 to +70 (-4°F to +158°F); NBR: -25 - +70 (-13 - +158°F)						
Filtration	ISO 4406 (1999) 18/16/13						
Electrical							
Duty Cycle (%)	100 ED; CAUTION: Coil temperature up to 180°C (356°F) possible						
Solenoid Connector	Connector acc. to EN 175301-803						
Protection Class	IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)						
Code	G0R	G0Q	GAR	GAG	W30	W31	
Supply Voltage	12 VDC	24 VDC	98 VDC	205 VDC	110 VAC / 50 Hz 120 VAC / 60 Hz	230 VAC / 50 Hz 240 VAC / 60 Hz	
Tolerance Supply Voltage (%)	+/-10	+/-10	+/-10	+/-10	+/-5	+/-5	
Current Consumption	Hold (A)	2.72	1.29	0.33	0.13	0.6 / 0.55	0.3 / 0.27
	In Rush (A)	2.72	1.29	0.33	0.13	2.5 / 2.4	1.25 / 1.2
Power Consumption	Hold (W)	32.7	31	31.9	28.2	70 / 70 VA	70 / 70 VA
	In Rush (W)	32.7	31	31.9	28.2	280 / 290 VA	280 / 290 VA
Wiring Minimum (mm²)	3 x 1.5 recommended						
Wiring Length Maximum (mm²)	50 (164 ft) recommended						

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Pressure Control Valves

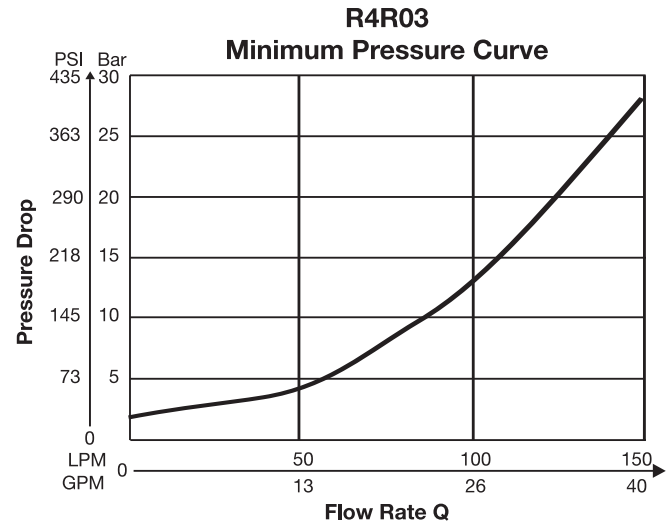
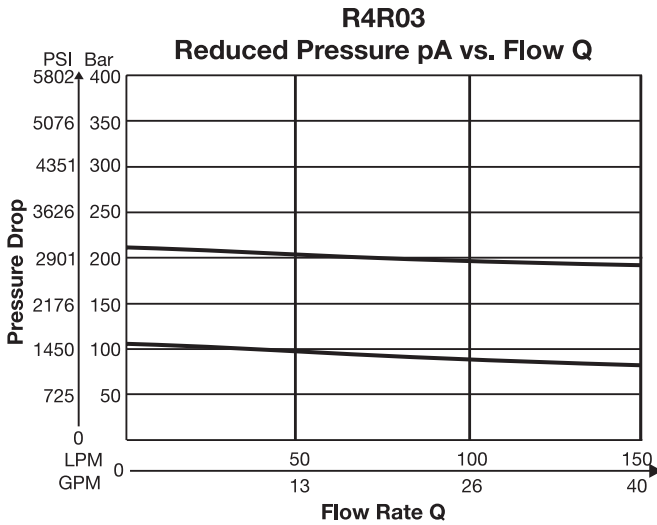
R4R (Inline Mounted) - Performance Curves

D45

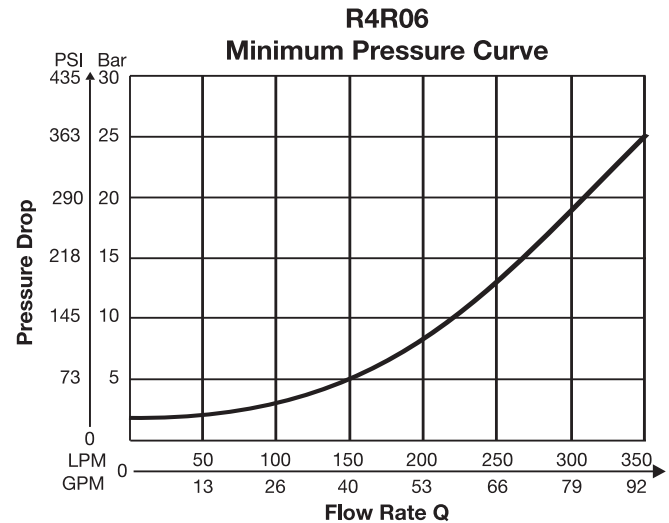
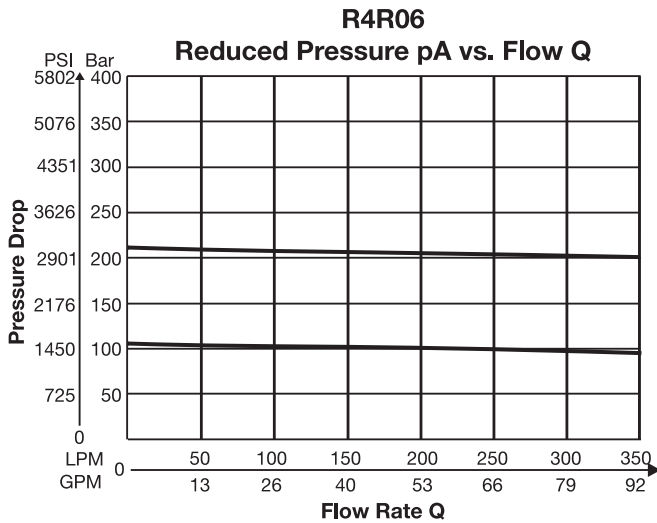
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All characteristic curves measured with HLP46 at 50°C (122°F).
Performance curves measured at 350 Bar (5075 PSI) primary pressure pB.

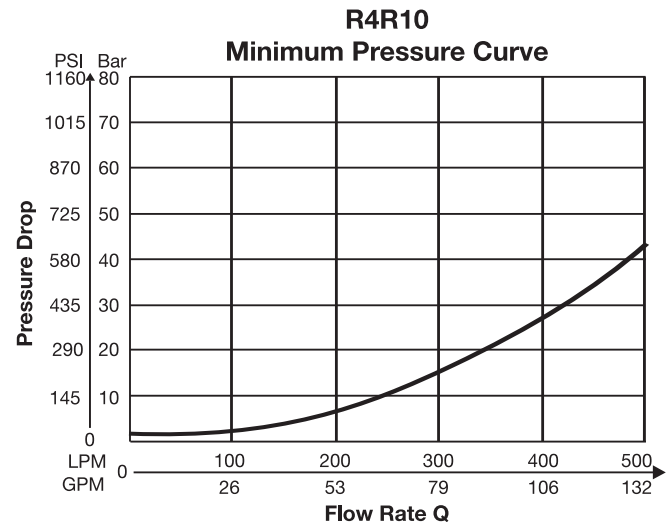
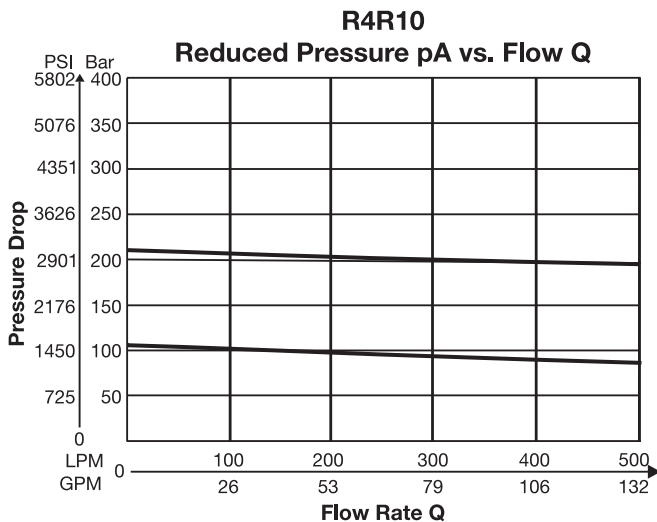
R4R03



R4R06



R4R10



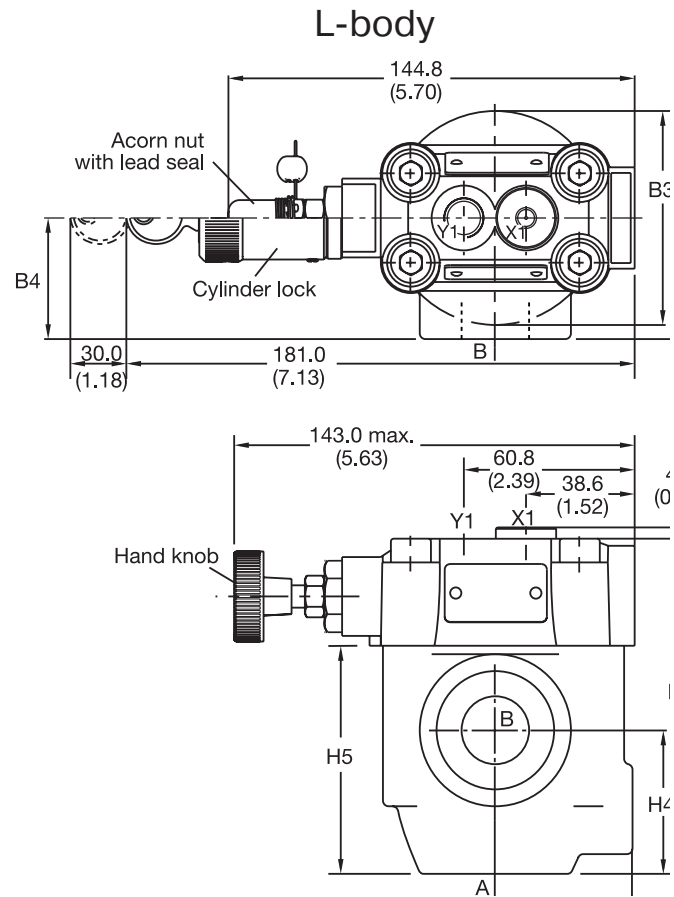
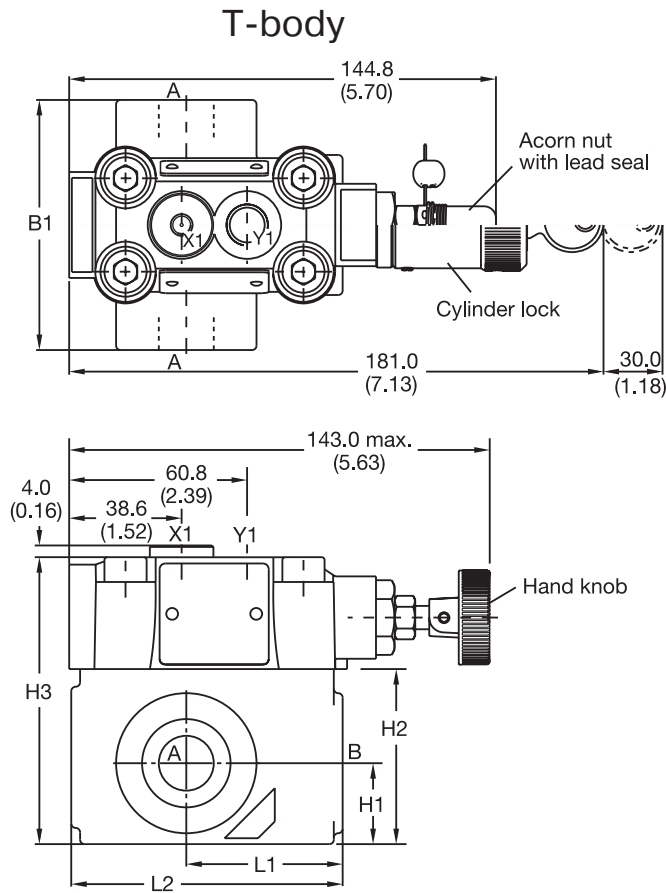
Pressure Control Valves

R4R w/o Vent Function (Inline Mounted) - Dimensions

D46

WWW.SUMY.IR

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



Seal Kits		
NG	NBR	FPM
03	S26-58507-0	S26-58507-0
06	S26-58475-0	S26-58475-0
10	S26-58508-0	S26-58508-0



NG	Body	B1	B2	B3	B4	H1	H2	H3	H4	H5	H6	L1	L2	L3
03	T - Body	85.0 (3.35)	-	-	-	27.5 (1.08)	59.5 (2.34)	97.5 (3.84)	-	-	-	53.0 (2.09)	92.0 (3.62)	-
06	T - Body	136.0 (5.35)	-	-	-	38.0 (1.50)	93.0 (3.66)	131.0 (5.16)	-	-	-	66.5 (2.62)	117.5 (4.63)	-
06	L - Body	-	81.0 (3.19)	76.0 (2.99)	43.0 (1.69)	-	-	-	51.0 (2.01)	81.0 (3.19)	119.0 (4.69)	-	-	49.0 (1.93)
10	L - Body	-	120.7 (4.75)	85.8 (3.38)	77.8 (3.06)	-	-	-	50.8 (2.00)	96.0 (3.78)	134.0 (5.28)	-	-	49.8 (1.96)

Ports	Function	Port Size*			
		RV03 T - Body	RV06 L - Body	RV06 T - Body	RV10 L - Body
B	Pressure (inlet)	G1/2" or 3/4-16 UNF	G1" or 1-5/16-12 UN	G1" or 1-1/16-12 UN	G1-1/4" or 1-5/8-12 UN
A	Pressure (outlet)	G1/2" or 3/4-16 UNF	G1" or 1-5/16-12 UN	G1" or 1-1/16-12 UN	G1-1/4" or 1-5/8-12 UN
X1	External remote control or vent connection	G1/4" or 7/16-20 UNF			
Y1	External Drain	G1/4" or 7/16-20 UNF			

* G1/2" and G1" if body 6 or D (BSP). UNF/UN if body 4 or B (SAE)

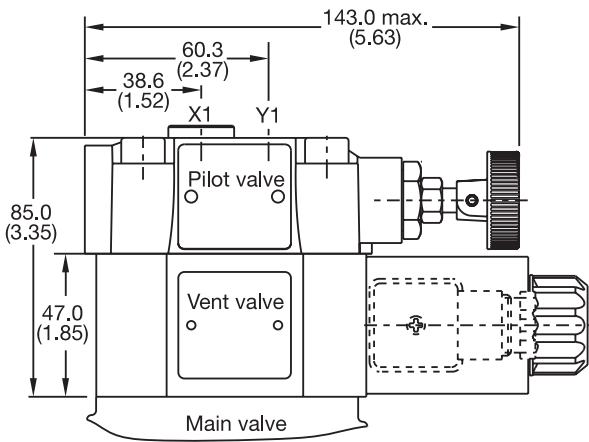
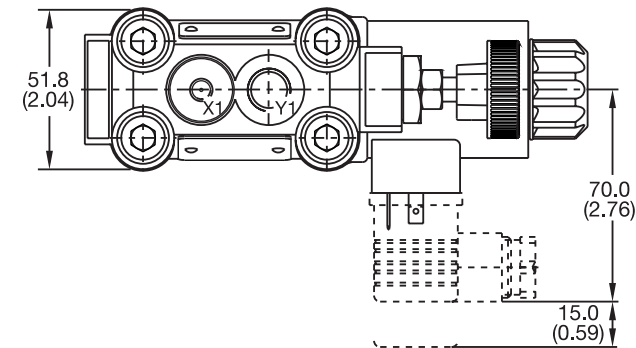
Pressure Control Valves

R4R w/Vent Function (Inline Mounted) - Dimensions

D47

WWW.SUMY.IR

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



Seal Kits	
NBR	FPM
DC Solenoid	
S56-40609-0	S56-40609-5
AC Solenoid	
S26-35237-0	S26-35237-5



Code	External Drain
11	
09	

Pressure Control Valves

VM - Technical Information

D48

WWW.SUMY.IR

General Description

Series VM direct operated, pressure reducing valve with manual adjustment. Series VM is a direct-controlled, spring loaded 3-way pressure reducing valve, that is open in neutral position. The valve closes the connection from P to A (NG6) or B to A (NG10) when the pre-set pressure is exceeded.

If the pressure increases due to an external influence in connection A, the spool moves and opens the connection from A to T (NG6) or A to Y (NG10) until the pre-set pressure is reached.

Features

- Spool type valve
- Manifold mounting acc. to ISO 5871
- 5 pressure ranges at NG6
- 3 pressure ranges at NG10
- 2 adjustment modes

Ordering Information



Pressure
Reducing
Valve

Maximum
Pressure
Setting

Adjustment
Screw
with
Hexagon
Socket

Size

Seal
Fluorocarbon

Gage Port

Lock

Design
Series
NOTE:
Not required
when
ordering.

Code	Description
025*	25 Bar (363 PSI)
064	64 Bar (928 PSI)
125**	125 Bar (1813 PSI)
160*	160 Bar (2320 PSI)
210	210 Bar (3045 PSI)
350*	350 Bar (5075 PSI)
* NG 06 only	
** NG 10 only	

Code	Description
06	NG 06
10	NG 10

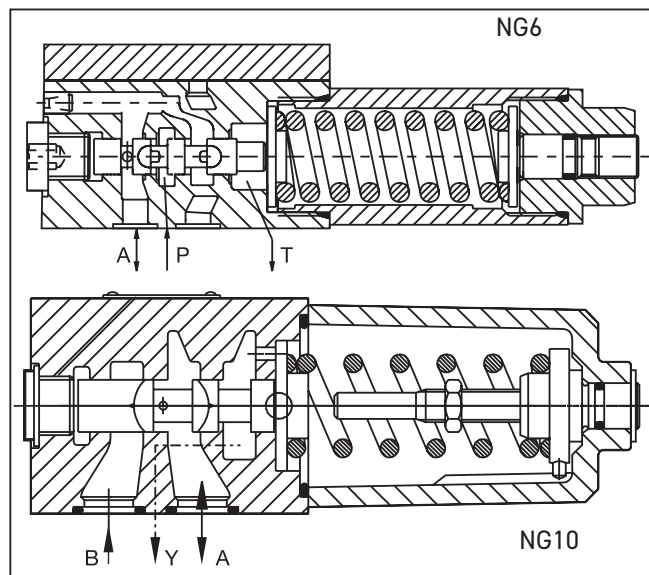
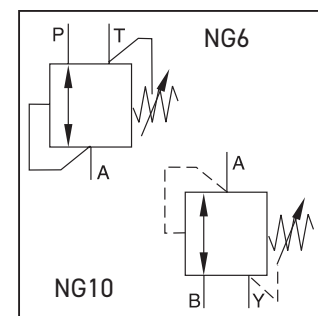
Code	Description
G*	1/4" BSPP
M	M18x1.5** M12x1.5*
* NG 06 only	
** NG 10 only	

Code	Description
Omit	No Lock
Z	Cylinder Lock

Weight:

VM*A06 1.3 kg (2.9 lbs.)

VM*A10 3.7 kg (8.2 lbs.)



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WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Pressure Control Valves

VM - Specifications

D49

WWW.SUMY.IR

General		
Size	NG 06	NG 10
Interface	Subplate mounting acc. ISO 5781	
Mounting Position	Unrestricted	
Ambient Temperature Range (°C)	-20 to +60 (-4°F to +140°F)	
Hydraulic		
Working Pressure (Bar)	Ports P and A: 350 (5075 PSI) Port T depressurized	Ports P and B: 210 (3045 PSI) Port Y depressurized
Pressure Range (Bar)	25 (363 PSI), 64 (928 PSI), 160 (2320 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)	64 (928 PSI), 125 (1813 PSI), 210 (3045 PSI)
Nominal Flow (LPM)	25 (6.6 GPM)	60 (15.9 GPM)
Fluid	Hydraulic oil according to DIN 51524 - 51525	
Viscosity Permitted (cSt / mm²/s)	20 - 380 (93 - 1761 SSU)	
Viscosity Recommended (cSt / mm²/s)	30 - 50 (139 - 232 SSU)	
Fluid Temperature Recommended (°C)	+30 to +50 (+86°F to +122°F)	
Permitted (°C)	-20 to +70 (-4°F to +158°F)	
Filtration	ISO 4406 (1999) 18/16/13	

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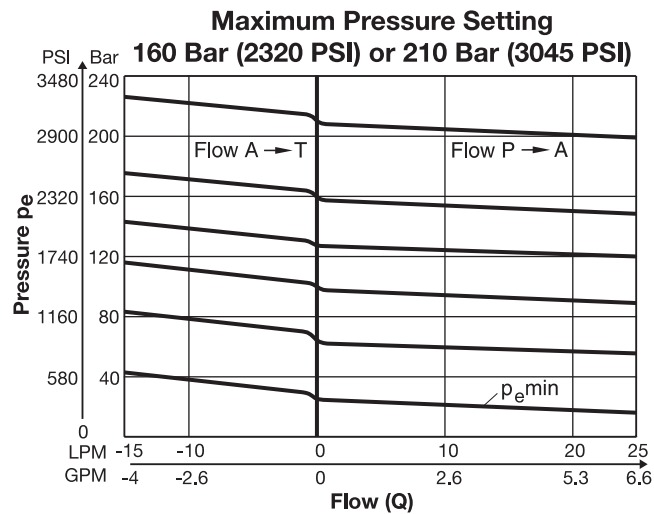
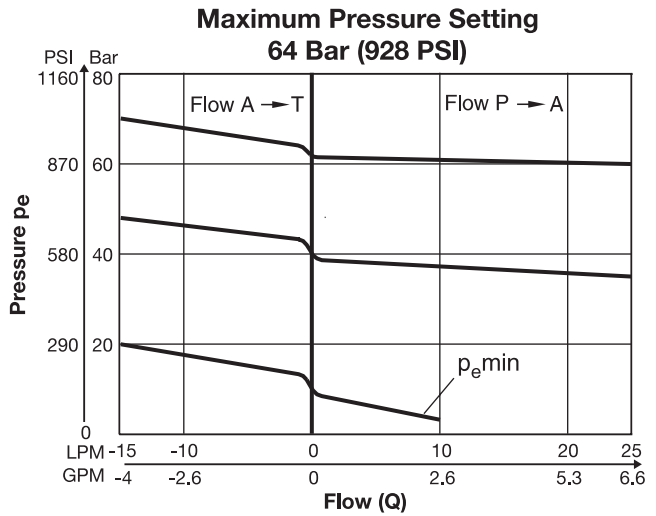
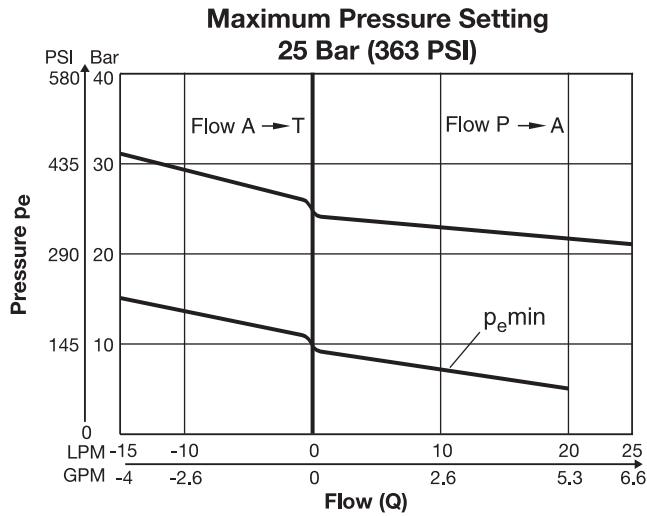
Pressure Control Valves

VM - Performance Curves

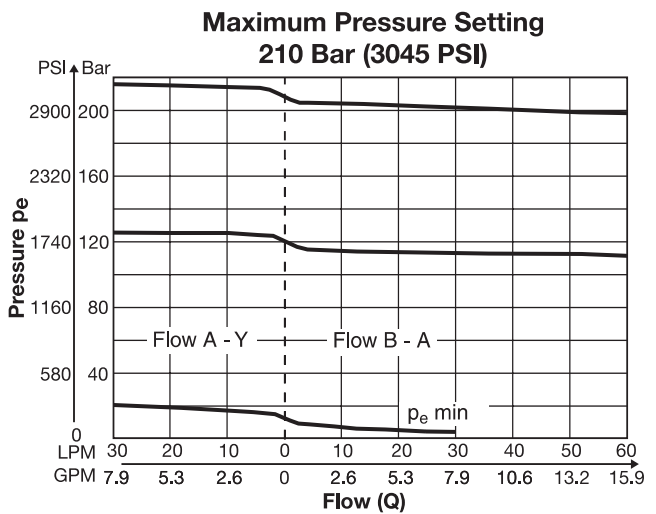
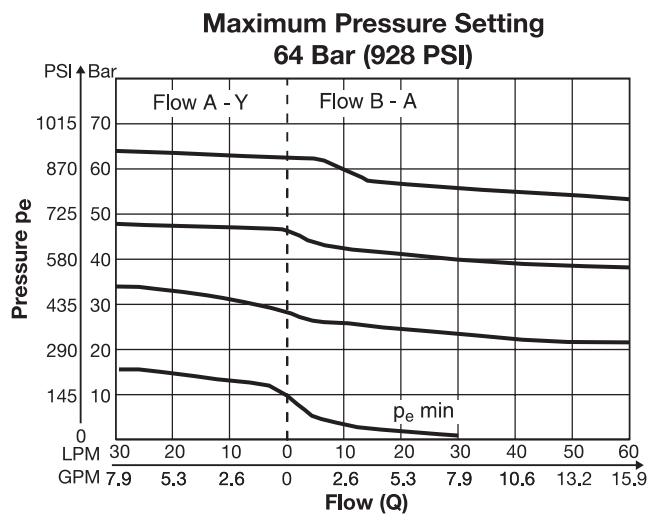
D50

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VM*06



VM*10



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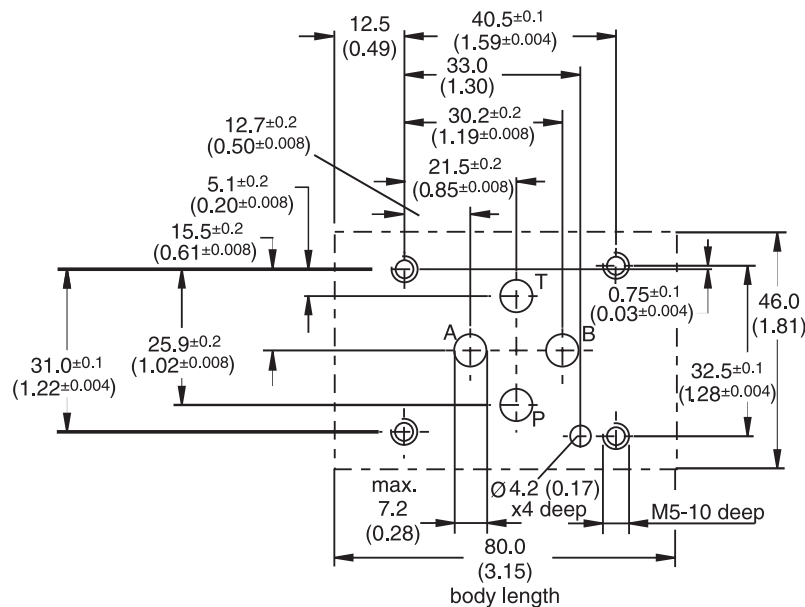
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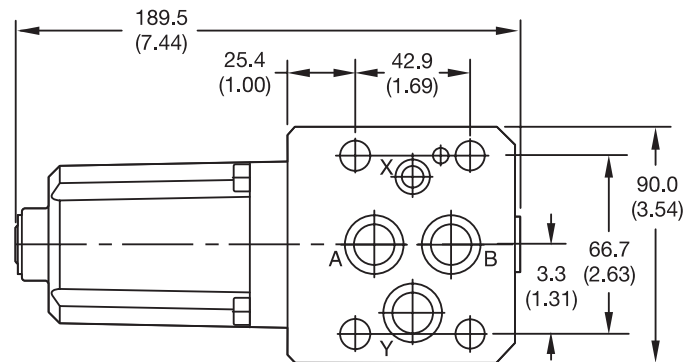
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Surface Finish	Kit 	 	 	Seal Kit 
	BK375	4x M5x30 DIN 912-12.9	8.1 Nm (6.0 lb-ft) +/- 15%	SK-VB/VM/VS-V (Fluorocarbon)



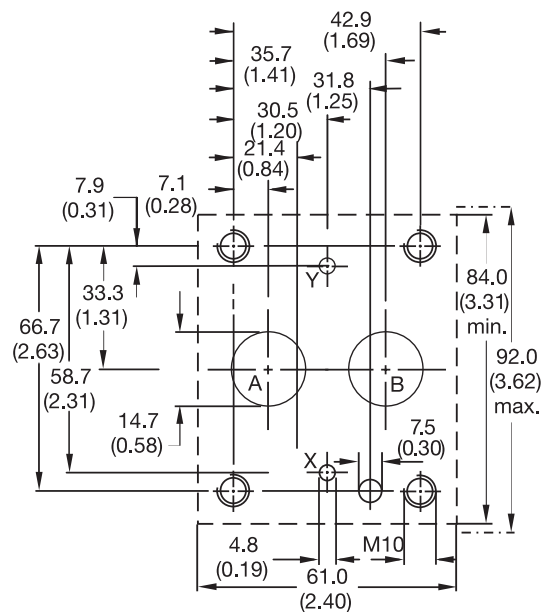
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Surface Finish	Kit 			Seal Kit 
	BK389	4x M10x50 DIN 912-12.9	65 Nm (47.9 lb-ft) +/- 15%	SK-VB/VM-A10V (Fluorocarbon)

Mounting Pattern ISO 5871-06-07-0-00

Subplate	Size
SPP3M6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP

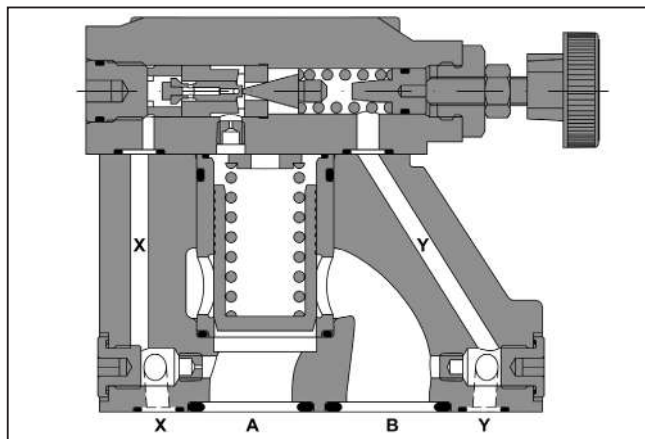
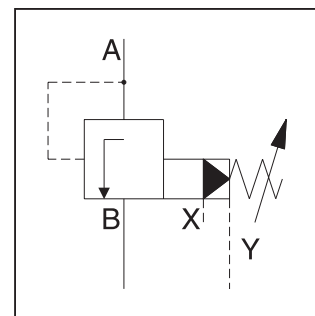


General Description

Series R4S pilot operated sequence valves enable a hydraulic system to operate in a pressure sequence. When the system pressure reaches the setting pressure the valve opens and permits flow to the secondary sub-system.

Features

- Pilot-operated sequence valve
- 3 pressure ranges
- 3 adjustment modes:
 - Hand knob
 - Acorn nut with lead seal
 - Key lock



Ordering Information

Code	Description
R	Pressure Valve
4	Interface
S	Relief Function
5	Maximum Pressure 350 Bar (5075 PSI)
A	Design Series
1	Nitrile
5	Fluorocarbon

Code	Description
03	NG 10
06	NG 25
10	NG 32

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
3*	Subplate NPT
7**	Subplate SAE
9**	Subplate BSP

* For use only with Pilot options 0 and 1
** Must be used with Pilot option 2

Code	Description
0*	Internal
1*	External from Subplate
2**	External from Valve Body (Y-port)

* Must be used with Body Mounting option 3
** Y-port. For use with Body Mounting options 7 and 9

Code	Description
1	Hand Knob 32mm dia Std
3	Acorn Nut w/Lead Seal
4	Key Lock

Code	Description
4	Subplate Mounting ISO 5781

Weight:

R4S03: 2.7 kg (6.0 lbs.)

R4S06: 4.5 kg (9.0 lbs.)

R4S10: 6.0 kg (13.2 lbs.)

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Pressure Control Valves

R4S - Technical Information

D54

WWW.SUMY.IR

Specifications

General			
Size	NG 10	NG 25	NG 32
Interface	Subplate mounting acc. ISO 5781		
Mounting Position	As desired, horizontal mounting preferred		
Ambient Temperature Range (°C)	-20 to +80 (-4°F to +176°F)		
Hydraulic			
Operating Pressure (Bar)	Ports A, B, and X: up to 350 (5075 PSI); Port Y depressurized		
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)		
Pressure Differential	15% for pressure range 350 Bar (5075 PSI) 28% for pressure ranges 105 Bar (1523 PSI) and 250 Bar (3625 PSI)		
Nominal Flow (LPM)	150 (39.7 GPM)	350 (92.6 GPM)	650 (172 GPM)
Fluid	Hydraulic oil according to DIN 51524 - 51525		
Viscosity Permitted (cSt / mm²/s)	20 - 380 (93 - 1761 SSU)		
Viscosity Recommended (cSt / mm²/s)	30 - 50 (139 - 232 SSU)		
Fluid Temperature Recommended (°C)	+30 to +50 (+86°F to +122°F)		
Maximum (°C)	-20 to +70 (-4°F to +158°F)		
Filtration	ISO 4406 (1999) 18/16/13		

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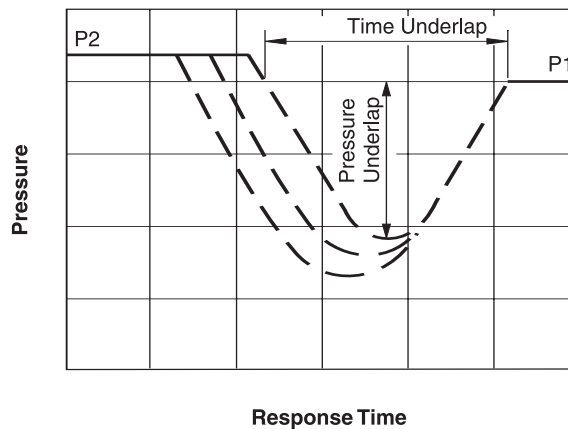
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Performance Curves

Typical pressure curves at closing point

P1 = setting pressure

P2 = operating pressure



Note: Time and pressure underlap depend on the characteristics of a specific system.

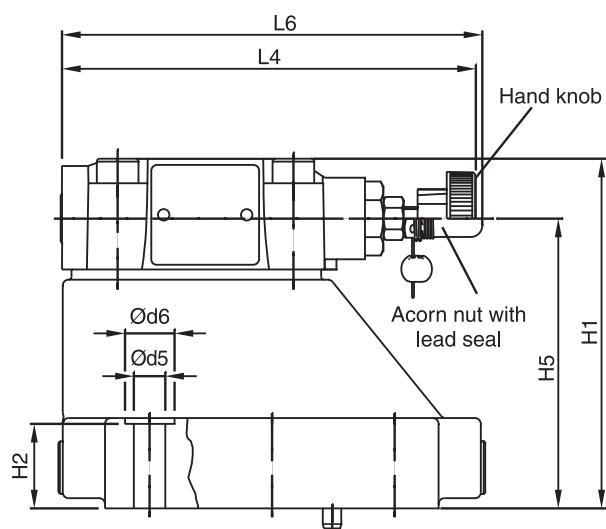
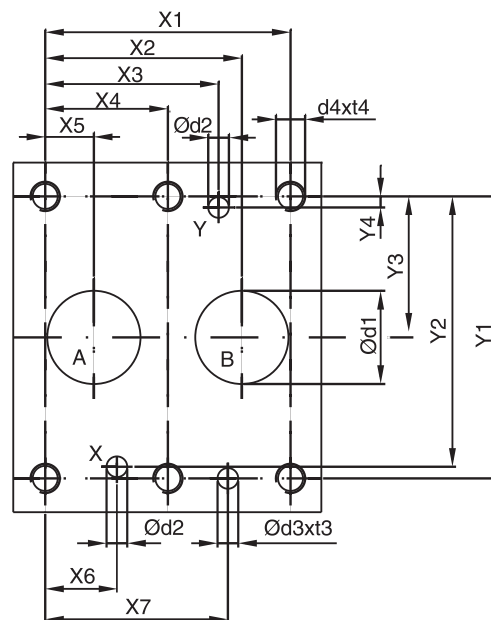
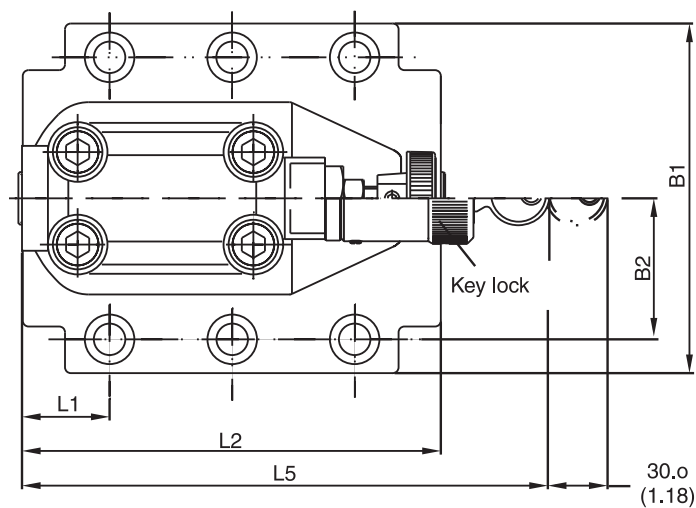
Pressure Control Valves

R4S - Dimensions

D55

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



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Pressure Control Valves

R4S - Dimensions

D56

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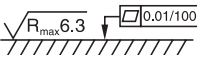
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4	Y5	Y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	– –	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	– –	– –
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	– –	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	– –	– –
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	– –	– –

Tolerances at X and Y pin holes and screw holes: ± 0.1 (0.003); at port holes: ± 0.2 (0.007)

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	62.5 (2.46)	– –	– –	– –	29.0 (1.14)	94.8 (3.73)	– –	141.0 (5.55)	181.0 (7.13)	– –
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	89.0 (3.50)	– –	– –	– –	34.7 (1.37)	126.8 (4.99)	– –	141.0 (5.55)	181.0 (7.13)	– –
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	99.5 (3.92)	– –	– –	– –	30.6 (1.20)	144.3 (5.68)	– –	141.0 (5.55)	181.0 (7.13)	– –

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	5781-06-07-0-00	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal 		Surface Finish
					Nitrile	Fluorocarbon	
10	5781-06-07-0-00	BK505	4x M10 x 35 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58507-0	S26-58507-5	
25	5781-08-10-0-00	BK485	4x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58475-0	S26-58475-5	
32	5781-10-13-0-00	BK506	6x M10 x 45 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-58508-0	S26-58508-5	

NG	ISO-code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP X, Y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1-1/2" BSPP X, Y = 1/4" BSPP

Pressure Control Valves

VB - Technical Information

D57

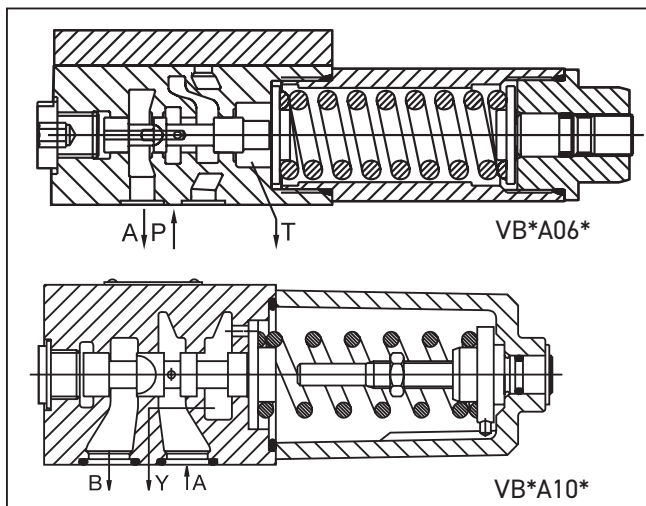
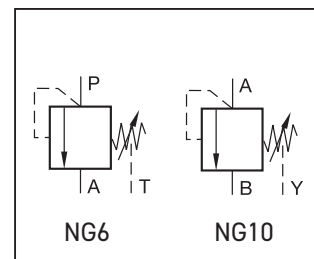
WWW.SUMY.IR

General Description

Series VB are direct operated pressure relief valves with manual adjustment. Series VB valves can also be used as pressure sequence valves because of the high pressure capability in the outlet port and the external drain port.

Specifications

Size	NG 06, NG 10
Mounting Interface	ISO 5791
Mounting Position	Unrestricted
Ambient Temperature Range (°C)	-20 to +80 (-4°F to +176°F)
Max Operating Pressure (Bar)	NG 06: Ports P and A: 350 (5075 PSI); Port T: depressurized NG 10: Ports P and A: 315 (4568 PSI); Port Y: depressurized
Pressure Range (Bar)	NG 06: 25 (363 PSI), 64 (928 PSI), 160 (2320 PSI), 210 (3045 PSI), 350 (5075 PSI) NG 10: 64 (928 PSI), 125 (1813 PSI), 210 (3045 PSI)
Nominal Flow (LPM)	NG 06: 25 (6.6 GPM) NG 10: 60 (15.9 GPM)
Pressure Fluid	Hydraulic oil as per DIN 51524 - 51525
Fluid Temperature Recommended (°C) Permitted (°C)	+30 to +50 (+86°F to +122°F) -20 to +70 (-4°F to +158°F)
Viscosity Maximum (cSt / mm²/s) Recommended (cSt / mm²/s)	20 - 380 (93 - 1761 SSU) 30 - 50 (139 - 232 SSU)
Filtration	ISO 4406 (1999), 18/16/13



Features

- Spool valve
- Manifold mounting
- Five pressure ranges at NG6
- Three pressure ranges at NG10
- Two adjustment modes

Ordering Information

VB

Sequence Valve

Maximum Pressure Setting

A

Adjustment Screw with Hexagon Socket

Size

V

Seal Fluorocarbon

Gauge Port

Lock

Design Series

NOTE: Not required when ordering.

Code	Description
025*	25 Bar (363 PSI)
064	64 Bar (928 PSI)
125**	125 Bar (1813 PSI)
160*	160 Bar (2320 PSI)
210	210 Bar (3045 PSI)
350*	350 Bar (5075 PSI)

* NG 06 only

** NG 10 only

Code	Description
06	NG 06
10	NG 10

Code	Description
G*	G1/4"
M	M12x1.5

* NG 06 only

Code	Description
Omit	No Lock
Z	Cylinder Lock

Weight:

VB*A06

1.3 kg (2.9 lbs.)

VB*A10

3.7 kg (8.2 lbs.)

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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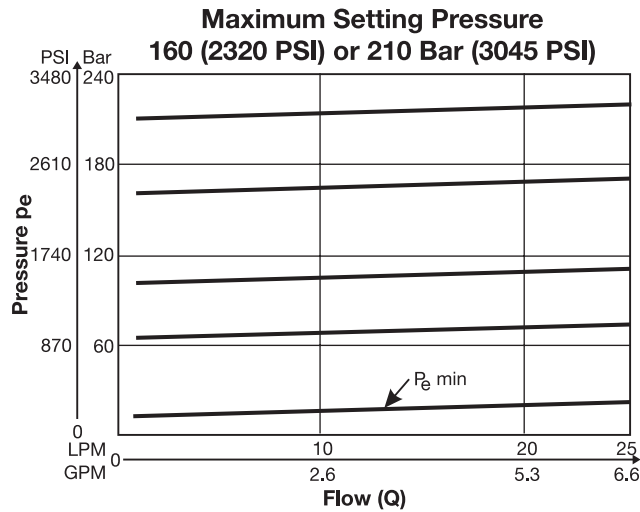
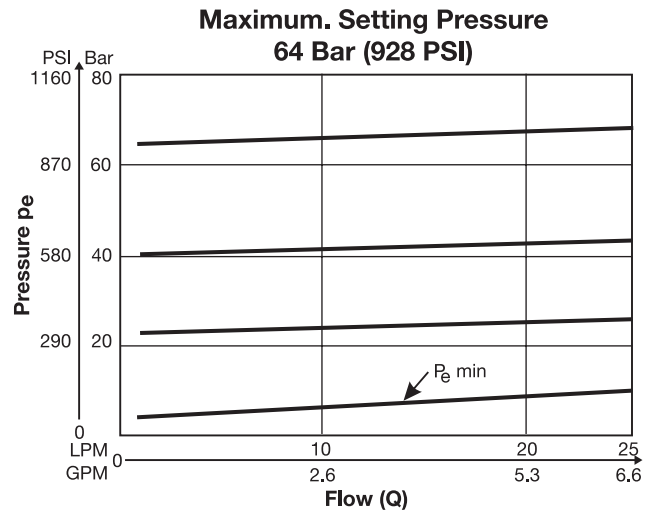
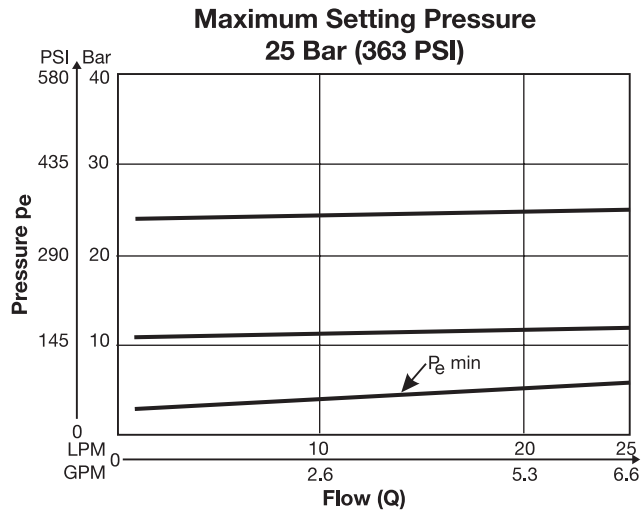
Pressure Control Valves

VB - Performance Curves

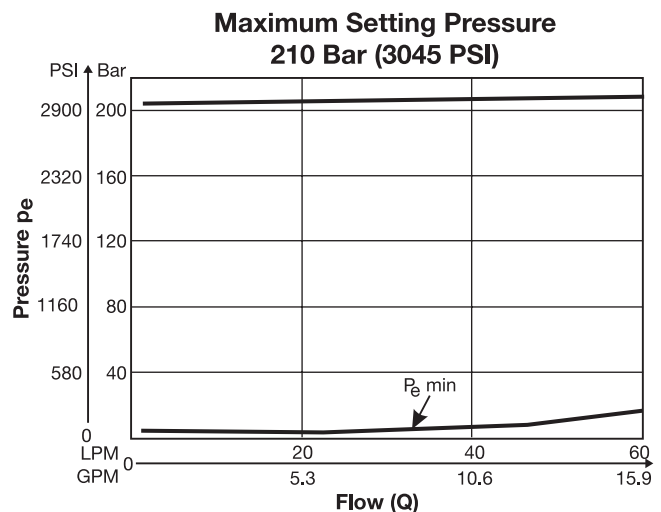
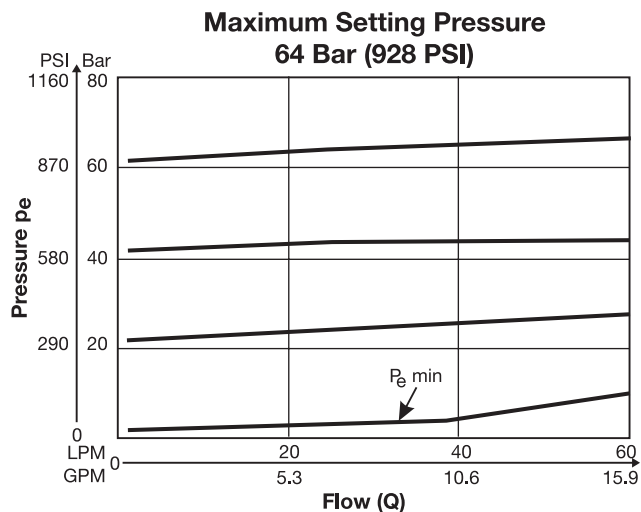
D58

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VB*06



VB*10



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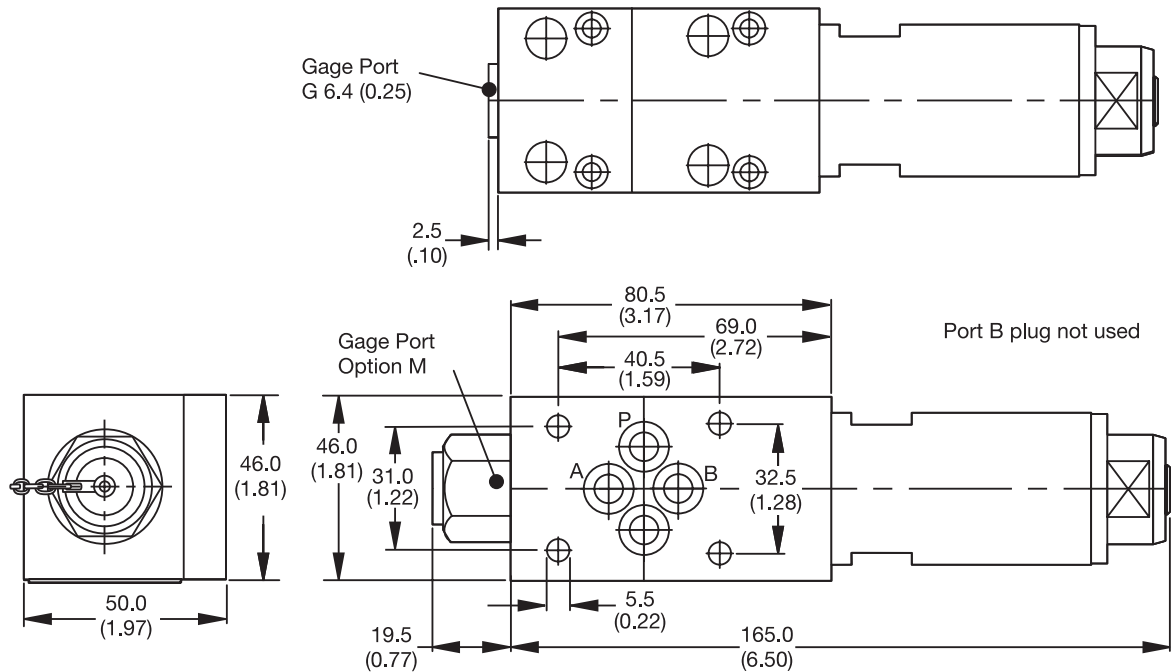
VB - Dimensions

D59

WWW.SUMY.IR

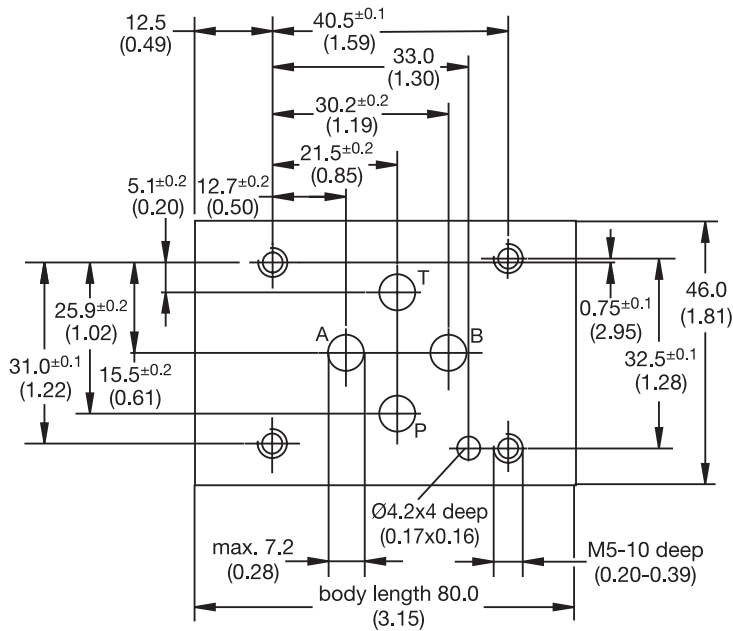
Inch equivalents for millimeter dimensions are shown in (**)

VB*06



Surface Finish	Kit			Seal Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK375	4x M5x30 DIN 912-12.9	7.6 Nm (5.6 lb-ft) +/- 15%	SK-VB/VM/VS V (Fluorocarbon)

Mounting Pattern ISO 5781-03-04-0-00
(NFPA D03, CETOP 3, NG6)



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Pressure Control Valves

VBY - Technical Information

D61

WWW.SUMY.IR

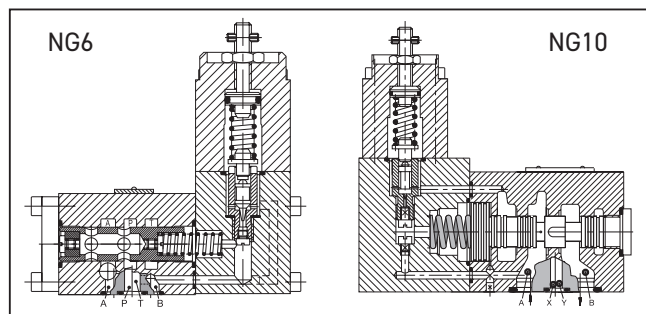
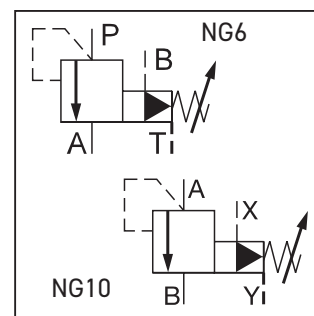
General Description

Series VBY pilot operated sequence valves consist of a pilot with manual adjustment and a main part with spool execution. The valve has an external drain.

This valve can also be used as a pressure relief valve. Please observe hydraulic connection.

Features

- Manifold mounting acc. to ISO 5781
- Type VBY with external drain
- Main stage spool type valve
- Pilot stage seated type valve
- 4 pressure ranges
- 2 adjustment modes
 - Screw with hexagon socket
 - DIN knob



General		
Size	NG 06	NG 10
Mounting Pattern	ISO 5781	
Mounting Position	Unrestricted	
Ambient Temperature Range (°C)	-20 to +80 (-4°F to +176°F)	
Operating Pressure, Ports (Bar)	Ports P, A, and B up to 315 (4568 PSI)	Ports A, B, and X up to 315 (4568 PSI)
External Drain Port Pressure (Bar)	Port T up to 100 (1450 PSI)	Port Y up to 100 (1450 PSI)
Pressure Range (Bar)	64 (928 PSI), 160 (2320 PSI), 210 Bar (3045 PSI), 315 Bar (4568 PSI)	
Pressure Fluid Temperature (°C)	-20 to +70 (-4°F to +158°F)	
Viscosity	Permitted (cSt / mm²/s) 20 - 380 (93 - 1761 SSU)	
	Recommended (cSt / mm²/s) 30 - 50 (139 - 232 SSU)	
Filtration	ISO 4406 (1999) 18/16/13	
Pilot Oil Flow	approx. 500 cm³/min	approx. 1000 cm³/min

Ordering Information

VBY

Pressure Relief Valve

Pressure Range

Code	Description
064	64 Bar (928 PSI)
160	160 Bar (2320 PSI)
210	210 Bar (3045 PSI)
350	350 Bar (5075 PSI)

Adjustment

Code	Description
A	Adjustment Screw w/ Hexagon Socket
H	Turning Knob w/ Cylinder Lock

Size

Code	Description
06	NG 06
10	NG 10

Seal

Code	Description
1	Nitrile
5	Fluorocarbon

Design Series

NOTE: Not required when ordering.

Weight:

VBY*06

2.4 kg (5.29 lbs.)

VBY*10

4.5 kg (9.92 lbs.)

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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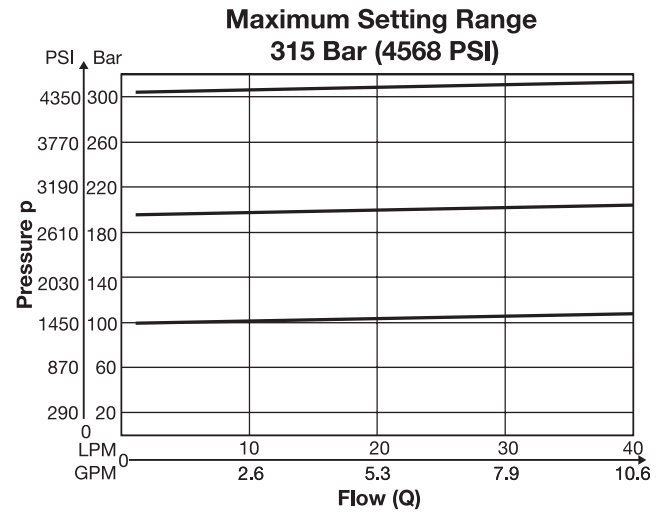
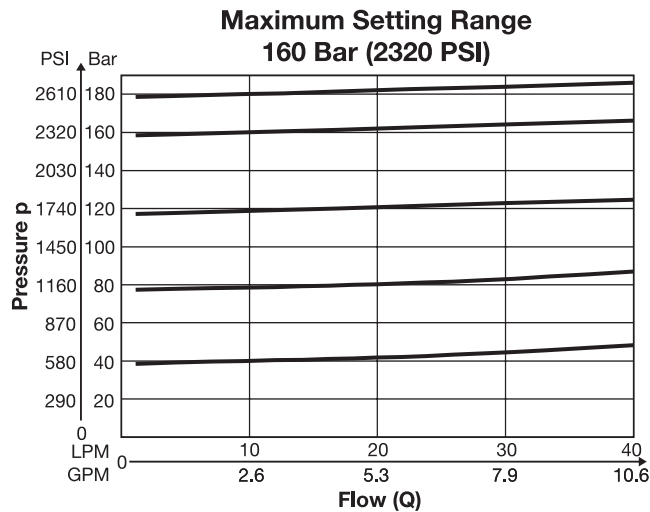
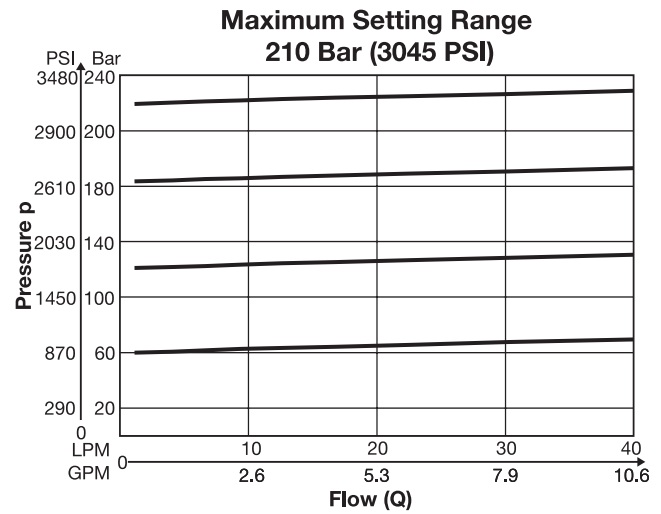
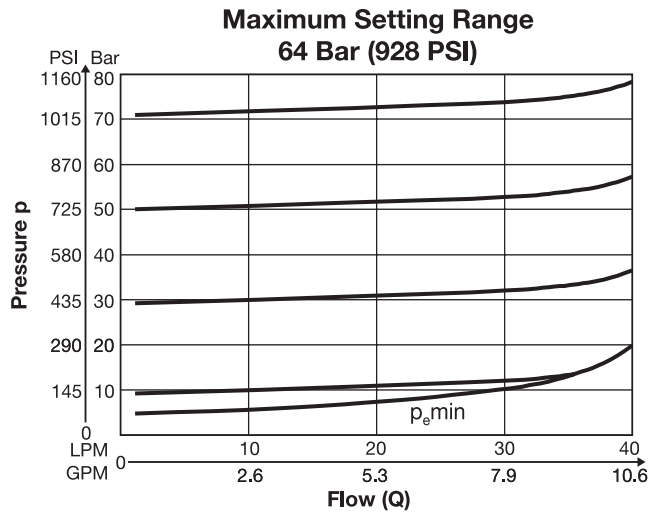
VBY - Performance Curves

D62

WWW.SUMY.IR

p/Q measured at $t = 50^{\circ}\text{C}$ (122°F) and $v = 36 \text{ mm}^2/\text{s}$

VBY*06



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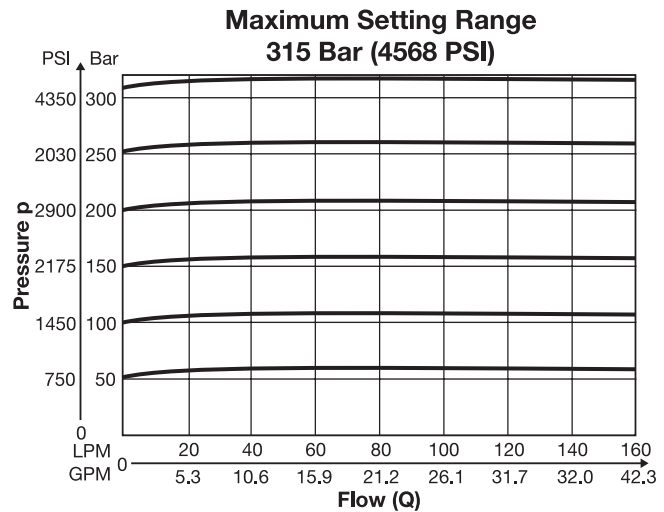
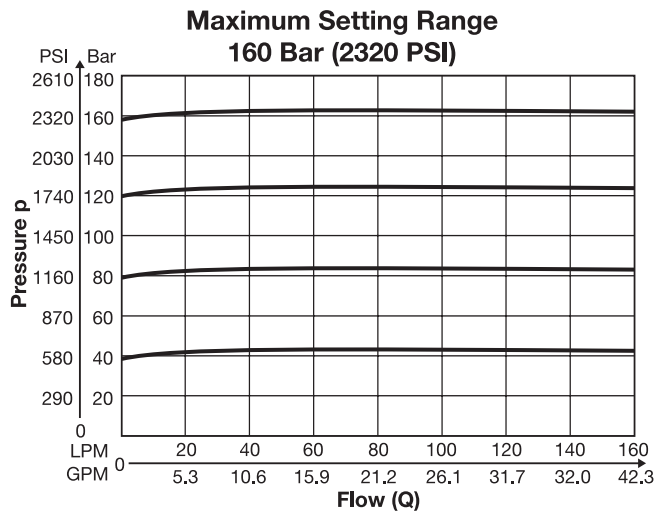
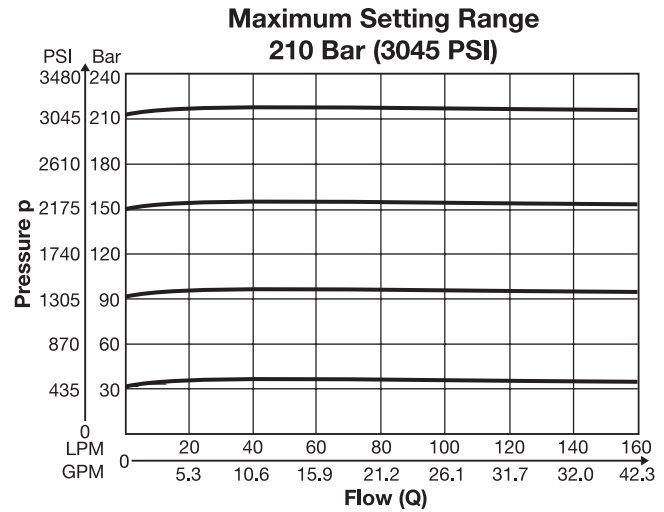
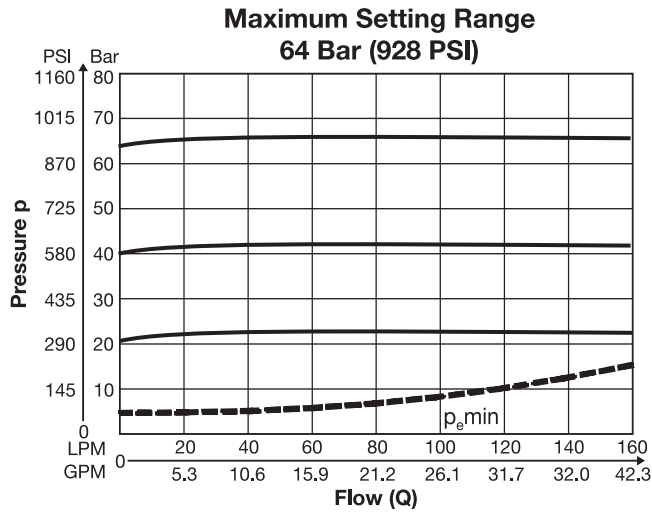
VBY - Performance Curves

D63

WWW.SUMY.IR

p/Q measured at $t = 50^{\circ}\text{C}$ (122°F) and $v = 36 \text{ mm}^2/\text{s}$

VBY* 10



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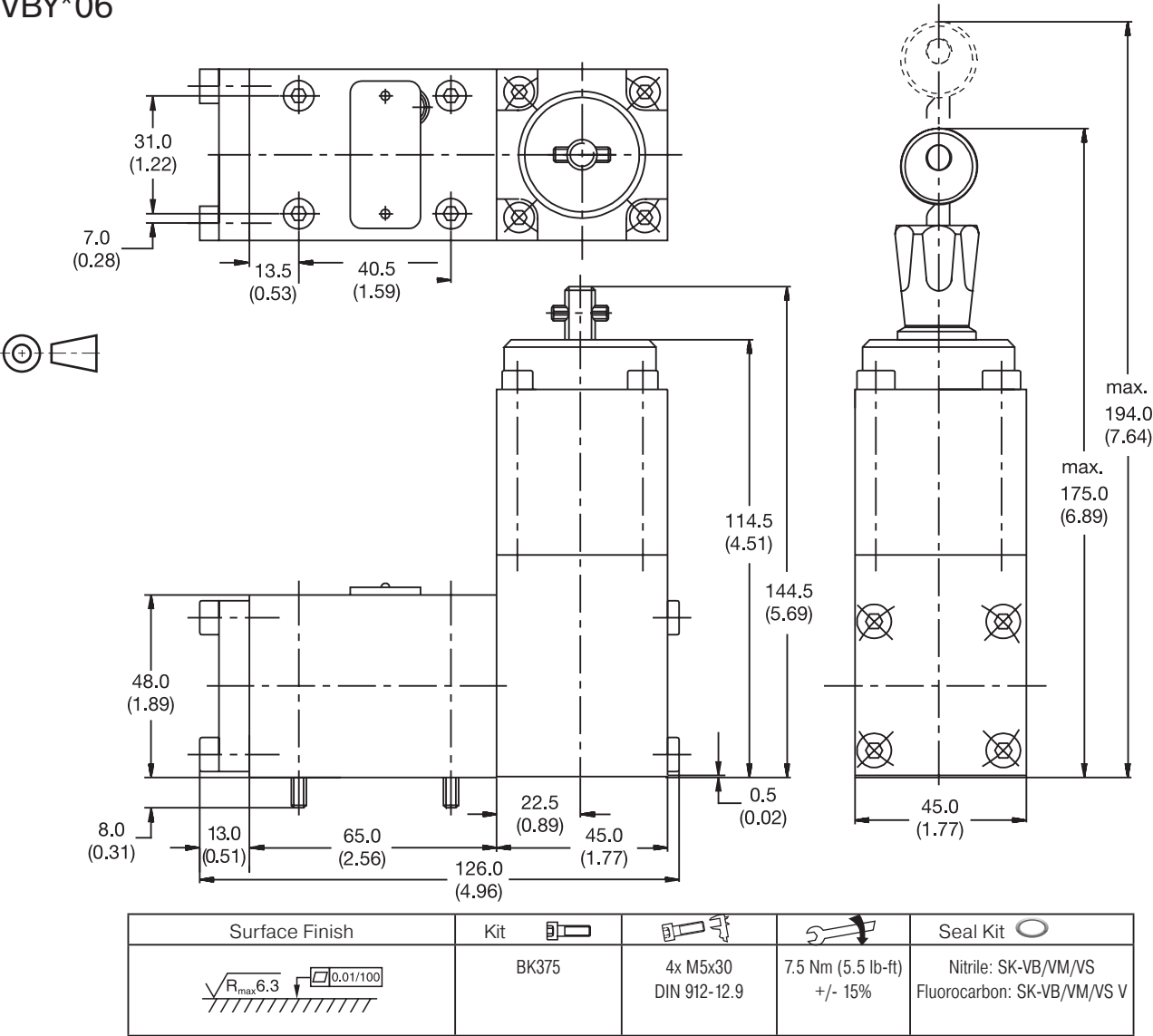
VBY - Dimensions

D64

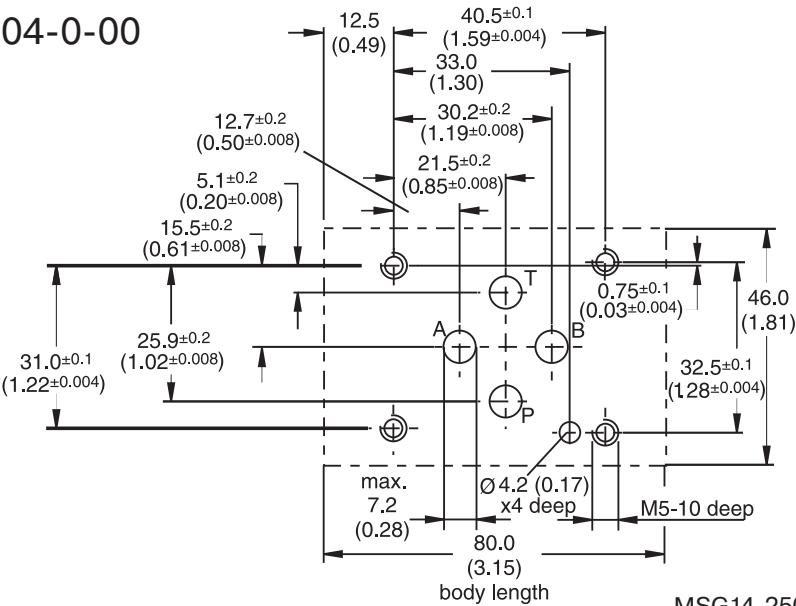
WWW.SUMY.IR

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

VBY*06



Mounting Pattern ISO 5781-03-04-0-00
(NFA D03, CETOP 3, NG6)



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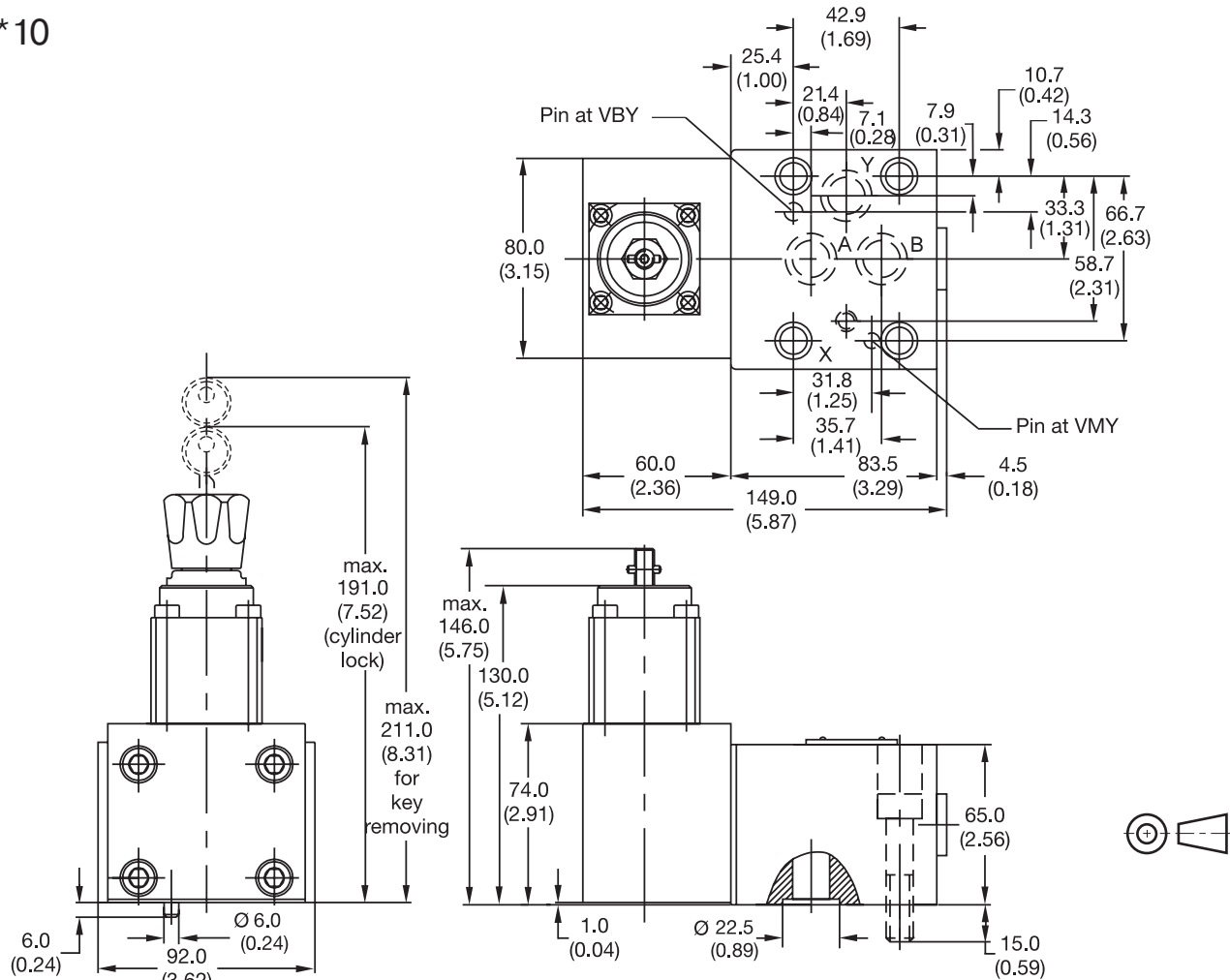
VBY - Dimensions

D65

WWW.SUMY.IR

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

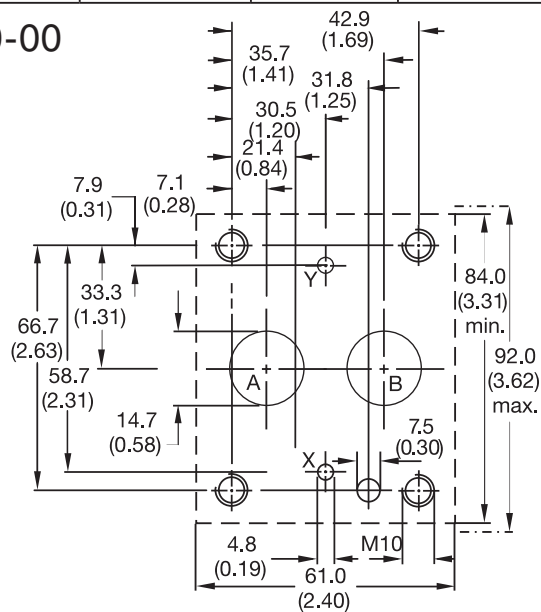
VBY* 10



Surface Finish	Kit			Seal Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK389	4x M10x50 DIN 912-12.9	65 Nm (47.9 lb-ft) +/- 15%	Nitrile: SK-VB/VM-A10 Fluorocarbon: SK-VB/VM-A10V

Mounting Pattern ISO 5781-06-07-0-00

Subplate	Size
SPP3M6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP



Pressure Control Valves

R5V - Technical Information

D66

WWW.SUMY.IR

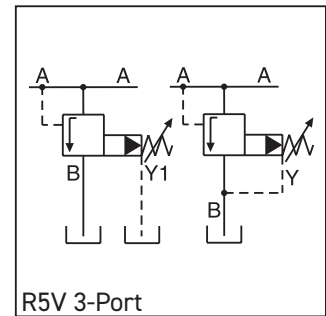
General Description

Series R5V pilot operated pressure relief valves have a similar design to the subplate mounted R4V series. The SAE flanges allow to mount the valves directly on the outlet flanges of pumps or inlet flanges of actuators to achieve a very compact design.

Valves with SAE flanges can also be bolted together to combine functions without the need of a manifold block.

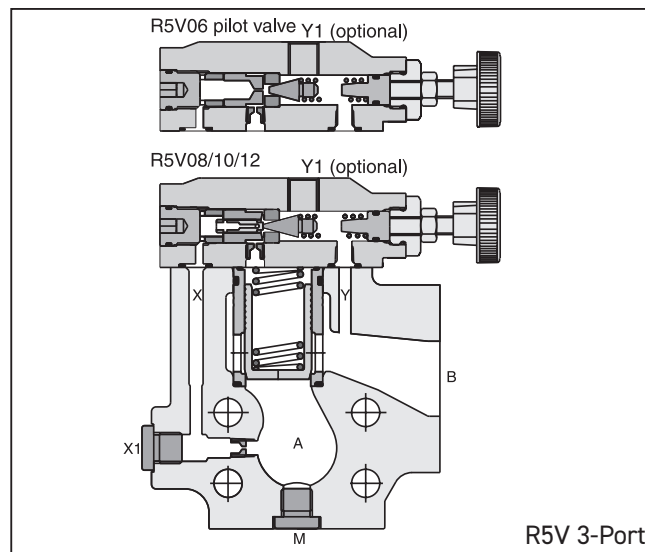
Operation

The system pressure in Port A is applied to the pilot valve and to the top surface of the main poppet via an orifice in X. The hydraulically balanced main poppet is held against the seat by the main spring. In this state there is no flow through the valve. The adjusted spring force acting on the pilot cone determines the relief pressure. If the pressure in Port A exceeds the set point, the pilot cone is lifted from its seat, releasing a small pilot flow to tank. The flow through the control orifice in X creates a pressure drop which limits the pressure at the top of the main poppet to the set point. The higher system pressure in Port A now lifts the main poppet off its seat and allows flow to Port B. In the resulting float position only enough flow is passed from Port A to Port B to maintain the inlet pressure in Port A at the set point. When the pressure in Port A falls below the set point, the hydraulic balance on the main poppet is restored. The main spring then forces the main poppet to close.



Features

- Pilot operated with manual adjustment
- R5V with 3-port body:
 - 4 sizes (SAE 3/4", 1", 1-1/4", 1-1/2")
 - SAE 61 and SAE 62 flange
- 3 pressure stages
- 3 adjustment modes: Hand knob, acorn nut with lead seal, or key lock
- With optional vent function



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Pressure Control Valves

R5V - Ordering Information

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R5V

Pressure Relief Valve

Size

SAE Interface

Pilot Ports

Pressure Range

Adjustment

Pilot Oil

Switching Type

Solenoid Voltage

A

Design Series

Seal

Options

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"
12	SAE 1-1/2"

Code	Description
Omit	Standard without Vent Option
G0R	12 VDC
G0Q	24 VDC
GAR	98 VDC
GAG	205 VDC
W30	110 VAC / 50 Hz 120 VAC / 60 Hz
W31	230 VAC / 50 Hz 240 VAC / 60 Hz

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
Omit	Standard without Vent Option
09*	Solenoid not activated unpress. circulation
11**	Solenoid activated unpress. circulation

* Solenoid de-energized: open to tank.
Solenoid energized: vent line blocked.
** Solenoid de-energized: vent line blocked.
Solenoid energized: Open to tank

Code	Pressure Range
Omit	Standard
008	Vent function w/slow unloading

Code	Description
3	SAE (Y1, X1 M = 7/16-20 UNF)
9	BSP (Y1, X1 M = G1/4")

Code	Description
2	Internal
6	External from Y1-port

Code	Description
Omit	Standard without Vent Option
09*	Solenoid not activated unpress. circulation
11**	Solenoid activated unpress. circulation

* Solenoid de-energized: open to tank.
Solenoid energized: vent line blocked.
** Solenoid de-energized: vent line blocked.
Solenoid energized: Open to tank

Code	Pressure Range
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
1	Hand Knob
3	Acorn Nut w/Lead Seal

Weight:

R5V06	3.6 kg (7.9 lbs.)
R5V08	4.6 kg (10.1 lbs.)
R4V10	5.2 kg (11.5 lbs.)
R5V12	8.0 kg (17.6 lbs.)

Pressure Control Valves

R5V - Technical Information

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Specifications

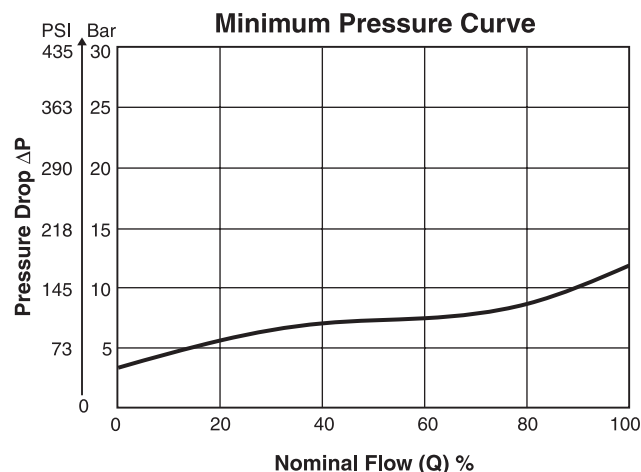
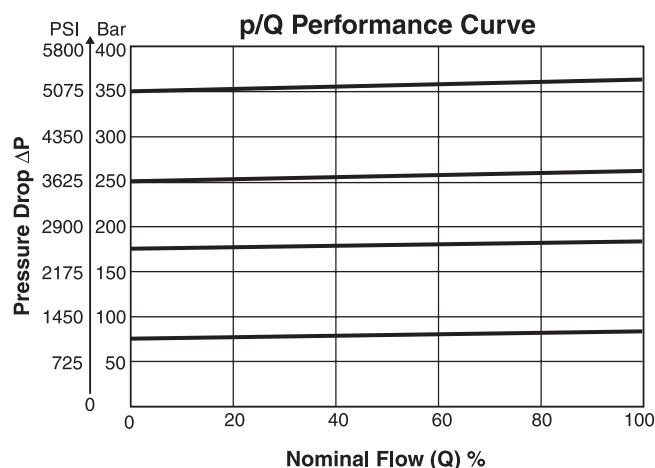
General						
Size	06		08		10	12
Mounting	Flanged according to SAE 61 / SAE 62					
Mounting Position	Unrestricted					
Ambient Temperature Range (°C)	-20 to +60 (-4°F to +140°F)					
Hydraulic						
Max Operating Pressure (Bar)						
SAE 61 Ports A, B	350 (5075 PSI)	350 (5075 PSI)		280 (4060 PSI)	280 (4060 PSI)	
SAE 61 Port Y1	30 (435 PSI)	30 (435 PSI)		30 (435 PSI)	30 (435 PSI)	
SAE 62 Ports A, B	350 (5075 PSI)	350 (5075 PSI)		350 (5075 PSI)	350 (5075 PSI)	
SAE 62 Port Y1	30 (435 PSI)	30 (435 PSI)		30 (435 PSI)	30 (435 PSI)	
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)					
Nominal Flow (LPM)	90 (23.8 GPM)	300 (79.4 GPM)		600 (158.7 GPM)	600 (158.7 GPM)	
Fluid	Hydraulic oil according to DIN 51524 - 51525					
Viscosity Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)					
Recommended (cSt / mm²/s)	30 (139 SSU)					
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)					
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638:7)					
Electrical						
Duty Cycle (%)	100					
Solenoid Connector	Connector as per EN 175301-803					
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)					
Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage	12 VDC	24 VDC	98 VDC	205 VDC	110 VAC / 50 Hz 120 VAC / 60 Hz	230 VAC / 50 Hz 240 VAC / 60 Hz
Tolerance Supply Voltage (%)	+5 - -10	+5 - -10	+5 - -10	+5 - -10	+/-5	+/-5
Power Consumption Hold (W)	31	31	31	31	78	78
In Rush (W)	31	31	31	31	264	264
Response Time	Energized / De-energized AC: 20 / 18 ms; DC: 46 / 27 ms					
Maximum Switching Frequency	AC up to 7,200 switchings/hour; DC up to 16,000 switchings/hour					
Coil Insulation Class	H (180°C (356°F))					

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R5V - Dimensions

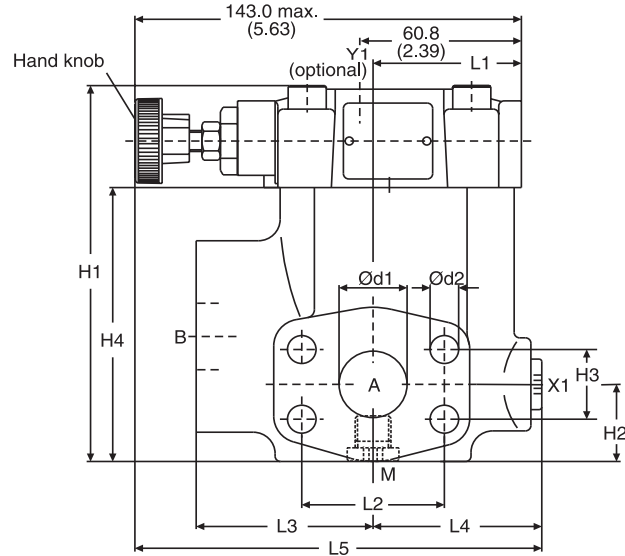
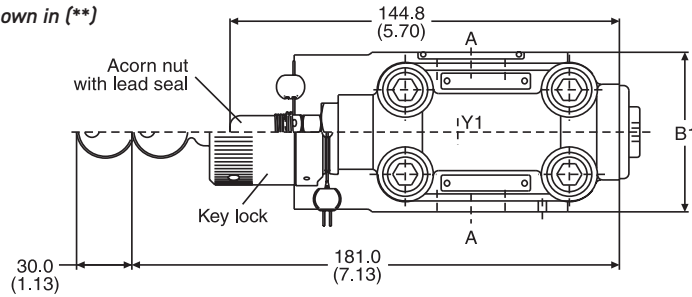
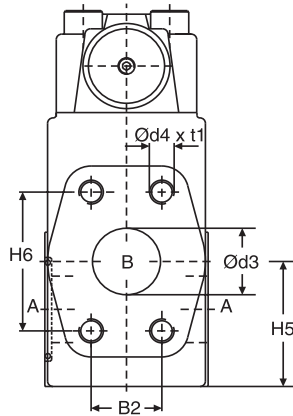
D69

WWW.SUMY.IR

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

Without Vent Function

Seal Kits		
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
12	S26-27421-0	S26-27421-0



SAE 61

Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	t1
06	60.0 (2.36)	22.2 (0.87)	119.0 (4.69)	28.0 (1.10)	22.2 (0.87)	81.0 (3.19)	41.6 (1.64)	47.6 (1.87)	50.3 (1.98)	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	20.0 (0.79)
08	60.0 (2.36)	26.2 (1.03)	141.0 (5.55)	29.0 (1.14)	26.2 (1.03)	103.0 (4.06)	47.0 (1.85)	52.4 (2.06)	55.8 (2.20)	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.98)	10.5 (0.41)	25.0 (0.98)	23.0 (0.91)
10	75.0 (2.95)	30.2 (1.19)	151.0 (5.94)	34.5 (1.36)	30.2 (1.19)	113.0 (4.45)	64.0 (2.52)	58.7 (2.31)	57.8 (2.28)	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	12.5 (0.49)	32.0 (1.26)	22.0 (0.87)
12	80.0 (3.15)	35.7 (1.41)	178.0 (7.01)	34.0 (1.34)	35.7 (1.41)	140.0 (5.51)	73.0 (2.87)	69.8 (2.75)	37.3 (1.47)	69.8 (2.75)	92.5 (3.64)	55.2 (2.17)	171.2 (6.74)	38.0 (1.50)	13.5 (0.53)	38.0 (1.50)	27.0 (1.06)

SAE 62

Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	t1
06	60.0 (2.36)	23.8 (0.94)	119.0 (4.69)	28.0 (1.10)	23.8 (0.94)	81.0 (3.19)	41.6 (1.64)	50.8 (2.00)	50.3 (1.98)	50.8 (2.00)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	20.0 (0.79)
08	60.0 (2.36)	27.8 (1.09)	141.0 (5.55)	29.0 (1.14)	27.8 (1.09)	103.0 (4.06)	47.0 (1.85)	57.2 (2.25)	55.8 (2.20)	57.2 (2.25)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.98)	12.5 (0.49)	25.0 (0.98)	22.0 (0.87)
10	75.0 (2.95)	31.8 (1.25)	151.0 (5.94)	34.5 (1.36)	31.8 (1.25)	113.0 (4.45)	64.0 (2.52)	66.7 (2.63)	57.8 (2.28)	66.7 (2.63)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	13.5 (0.53)	32.0 (1.26)	24.0 (0.94)
12	80.0 (3.15)	36.5 (1.44)	178.0 (7.01)	34.0 (1.34)	36.5 (1.44)	140.0 (5.51)	73.0 (2.87)	79.4 (3.13)	37.3 (1.47)	79.4 (3.13)	92.5 (3.64)	55.2 (2.17)	171.2 (6.74)	38.0 (1.50)	17.0 (0.67)	38.0 (1.50)	33.0 (1.30)

Ports	Function	Port Size			
		R5V06	R5V08	R5V10	R5V12
A (2)	Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61	1-1/2" SAE 61
B	Tank	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61	1-1/2" SAE 61
X1	External pilot port	G1/4" or SAE-4*			
Y1	External drain	G1/4" or SAE-4*			
M	Pressure gauge	G1/4" or SAE-4*			
* G1/4" if body 9 (BSP). SAE-4 if body is 3 (SAE)					

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Pressure Control Valves

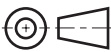
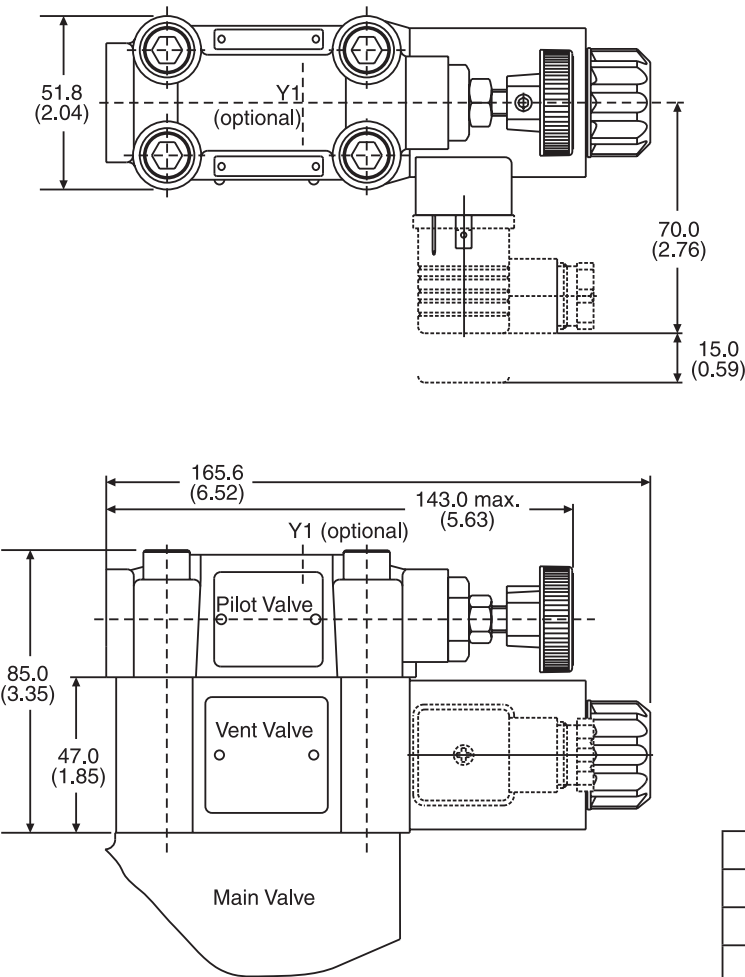
R5V - Dimensions

D70

WWW.SUMY.IR

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

with Vent Function

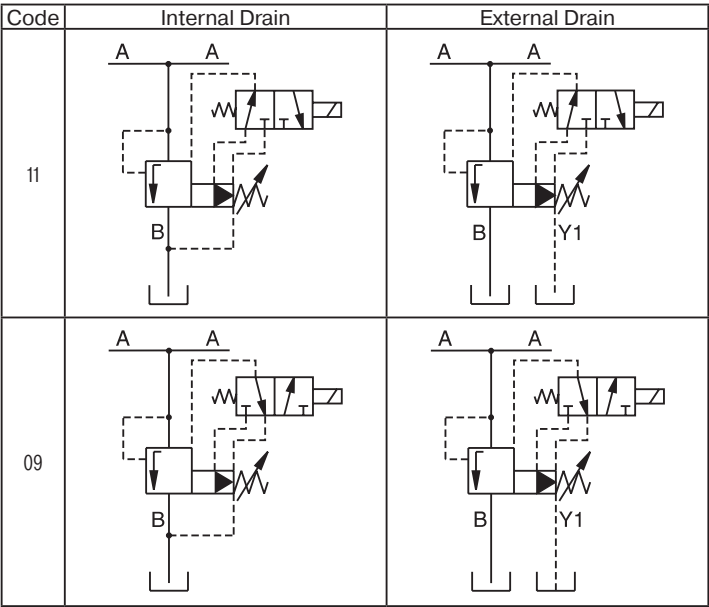


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Vent Valve Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5



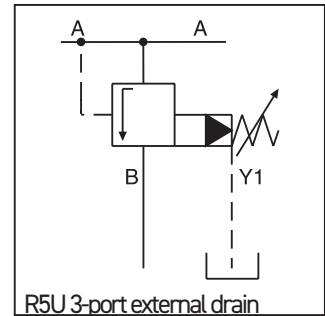
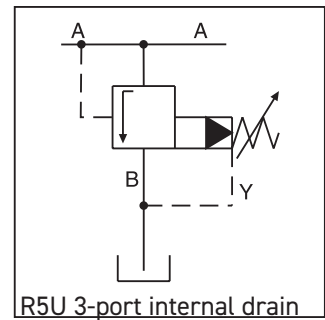
General Description

Series R5U pilot operated, pressure unloading valves have a similar design to the subplate mounted R4U series. The SAE flanges allow to mount the valve directly on the outlet flanges of pumps.

A typical application is the unloading of a pump in an accumulator circuit. The combination of an R5U, C5V and R5V on a double pump generates a high pressure / low pressure pump system without the need of a manifold block or piping between the valves.

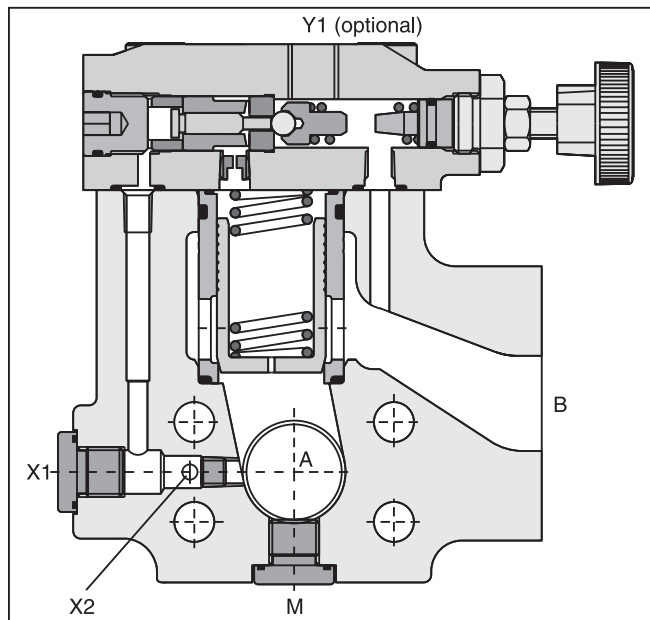
Features

- Pilot operated unloading valve
- 3-port body with SAE 61 flange
- 4 sizes (SAE 3/4", 1", 1 1/4", 1 1/2")
- 3 pressure stages
- 3 adjustment modes:
Hand knob
Acorn nut with lead seal
Key lock
- With optional vent function

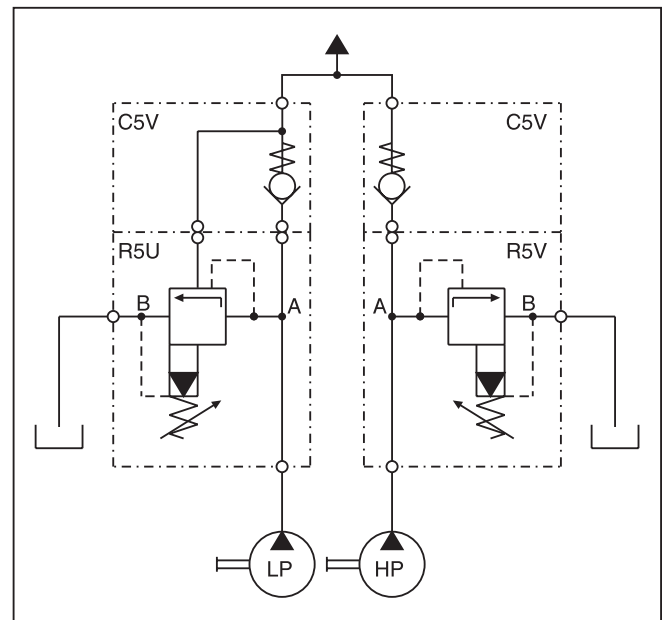


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High Pressure / Low Pressure System



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Pressure Control Valves

R5U - Technical Information

D72

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Ordering Information

R5U		—								A		
Pressure Unloading Valve	Size		SAE61 Interface	3-Port Body	Pressure Range	Adjustment	Pilot Oil	Switching Type	Solenoid Voltage	Design Series	Seal	Options Check with Factory

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"
12	SAE 1-1/2"

Code	Description
3	3-port SAE (SAE 4)
9	3-port BSP (G1/4")

Code	Description
1	Hand Knob
3	Acorn Nut w/Lead Seal
4	Key Lock

Code	Description
Omit	Standard without Vent Option
G0R	12 VDC
G0Q	24 VDC
GAR	98 VDC
GAG	205 VDC
W30	110 VAC / 50 Hz 120 VAC / 60 Hz
W31	230 VAC / 50 Hz 240 VAC / 60 Hz

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
Omit	Standard without Vent Option
09*	Solenoid not activated unpress. circulation
11**	Solenoid activated unpress. circulation

Code	Pressure Range	Pressure Differential
1	up to 105 Bar (1523 PSI)	28%
3	up to 210 Bar (3045 PSI)	28%
5	up to 350 Bar (5075 PSI)	15%

Code	Size	Maximum Pressure
3	12	210 Bar (3045 PSI)
4	10	280 Bar (4060 PSI)
5	06 / 08	350 Bar (5075 PSI)

Code	Pilot	Drain
4	External via port X1 or X2	External
5	External via port X1 or X2	Internal

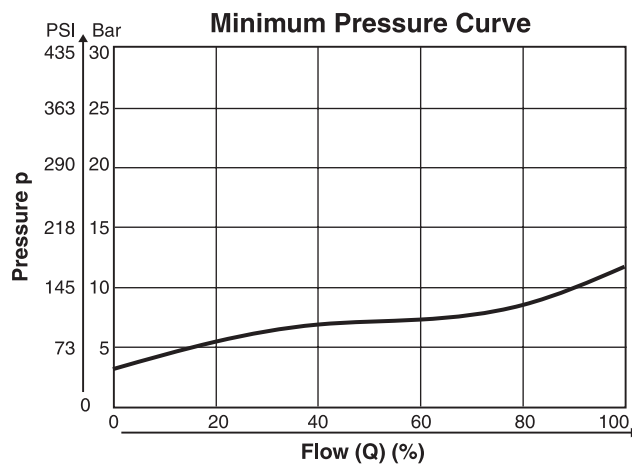
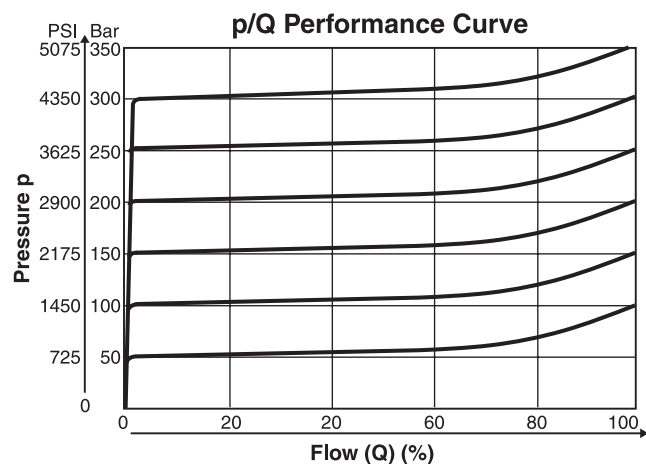
* Solenoid de-energized: open to tank.
Solenoid energized: vent line blocked.
** Solenoid de-energized: vent line blocked.
Solenoid energized: Open to tank

Weight:

R5U06	3.6 kg (7.9 lbs)
R5U08	4.6 kg (10.1 lbs.)
R5U10	5.2 kg (11.5 lbs.)
R5U12	8.0 kg (17.6 lbs.)

Further options on request.

Performance Curves



The performance curves are measured with external drain.
For internal drain the tank pressure has to be added to curve.

Pressure Control Valves

R5U - Specifications

D73

WWW.SUMY.IR

General						
Size	06		08		10	12
Mounting	Flanged according to SAE 61					
Mounting Position	Unrestricted					
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)					
Hydraulic						
Max Operating Pressure (Bar) Ports A, B, and X Port Y, and Y1	350 (5075 PSI) 30 (435 PSI)	350 (5075 PSI) 30 (435 PSI)		280 (4060 PSI) 30 (435 PSI)	280 (4060 PSI) 30 (435 PSI)	
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)					
Nominal Flow (LPM)	90 (23.8 GPM)	300 (79.4 GPM)		600 (158.7 GPM)	600 (158.7 GPM)	
Fluid	Hydraulic oil according to DIN 51524 - 51525					
Viscosity Permitted (cSt / mm²/s) Recommended (cSt / mm²/s)	10 - 650 (46 - 3013 SSU) 30 (139 SSU)					
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)					
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638:7)					
Electrical						
Duty Cycle (%)	100					
Solenoid Connector	Connector as per EN 175301-803					
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)					
Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage	12 VDC	24 VDC	98 VDC	205 VDC	110 VAC / 50 Hz 120 VAC / 60 Hz	230 VAC / 50 Hz 240 VAC / 60 Hz
Tolerance Supply Voltage (%)	+5 - -10	+5 - -10	+5 - -10	+5 - -10	+/-5	+/-5
Power Consumption Hold (W) In Rush (W)	31 31	31 31	31 31	31 31	78 264	78 264
Response Time	Energized / De-energized AC: 20 / 18 ms; DC: 46 / 27 ms					
Maximum Switching Frequency	AC up to 7,200 switchings/hour; DC up to 16,000 switchings/hour					
Coil Insulation Class	H (180°C (356°F))					

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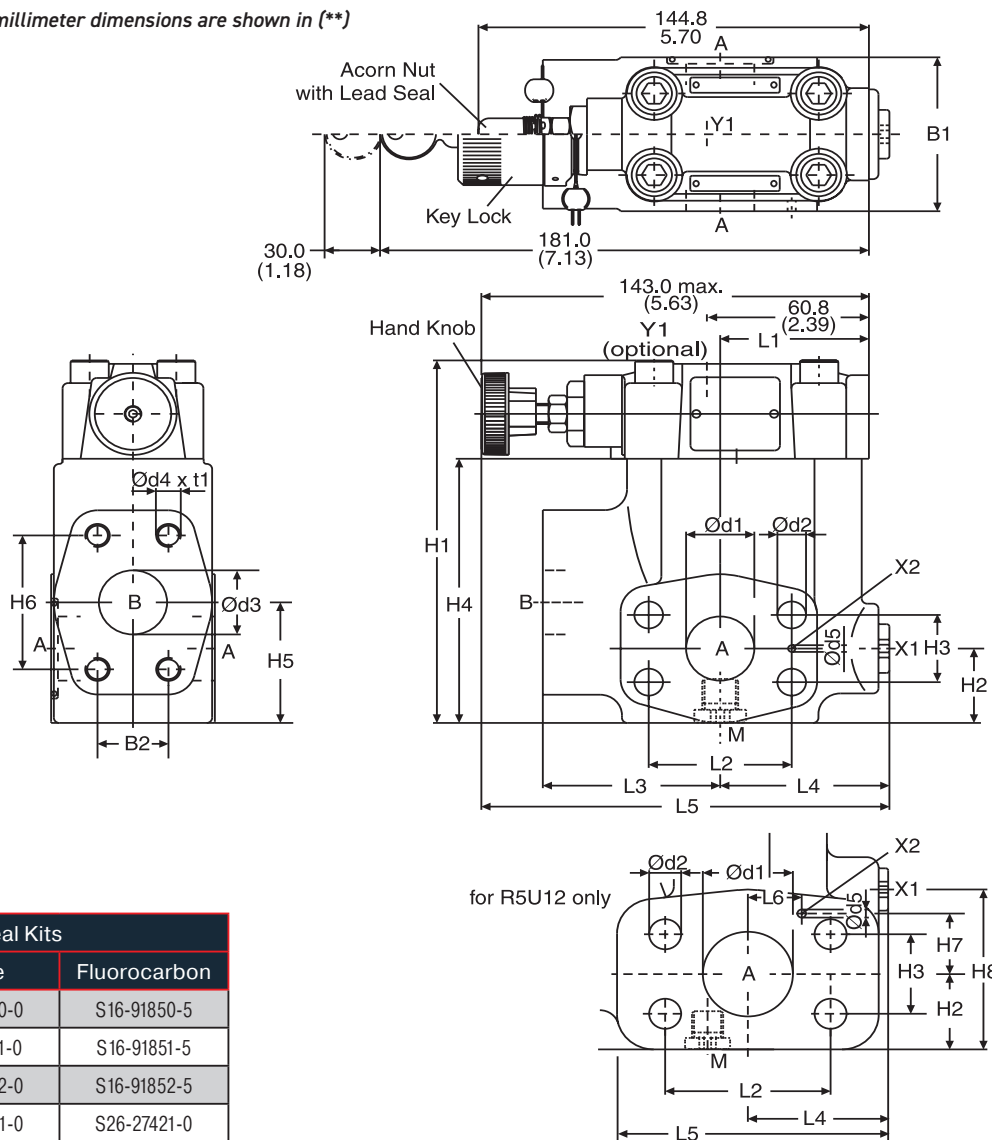
Pressure Control Valves

R5U - Dimensions

D74

WWW.SUMY.IR

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



Seal Kits		
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
12	S26-27421-0	S26-27421-0

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Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	d4	t1	d5	L6	H7	H8
06	60.0 (2.36)	22.2 (0.87)	119.0 (4.69)	28.0 (1.10)	22.2 (0.87)	81.0 (3.19)	41.6 (1.64)	47.6 (1.87)	50.0 (1.96)	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	3/8"-16UNC	20.0 (0.79)	3.0 (0.12)	-	-	-
08	60.0 (2.36)	26.2 (1.03)	141.0 (5.55)	29.0 (1.14)	26.2 (1.03)	103.0 (4.06)	47.0 (1.85)	52.4 (2.06)	55.8 (2.20)	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.98)	10.5 (0.41)	25.0 (0.98)	3/8"-16UNC	23.0 (0.91)	3.0 (0.12)	-	-	-
10	75.0 (2.95)	30.2 (1.19)	151.0 (5.94)	34.5 (1.36)	30.2 (1.19)	113.0 (4.45)	64.0 (2.52)	58.7 (2.31)	57.8 (2.28)	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	12.5 (0.49)	32.0 (1.26)	7/16"-14UNC	22.0 (0.87)	3.0 (0.12)	-	-	-
12	80.0 (3.15)	35.7 (1.41)	178.0 (7.01)	34.0 (1.34)	35.7 (1.41)	140.0 (5.51)	73.0 (2.87)	69.8 (2.75)	37.3 (1.47)	69.8 (2.75)	92.5 (3.64)	55.2 (2.17)	171.2 (6.74)	38.0 (1.50)	13.5 (0.53)	38.0 (1.50)	1/2"-13UNC	27.0 (1.06)	3.0 (0.12)	22.4 (0.88)	27.2 (1.07)	73.0 (2.87)

Ports	Function	Port Size			
		R5V06	R5V08	R5V10	R5V12
A (2)	Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61	1-1/2" SAE 61
B	Tank	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61	1-1/2" SAE 61
X1	External pilot port*	G1/4" or SAE-4**			
Y1	External drain	G1/4" or SAE-4**			
M	Pressure gauge	G1/4" or SAE-4**			
* closed when supplied					
** G1/4" if body 9 (BSP). SAE-4 if body is 3 (SAE)					

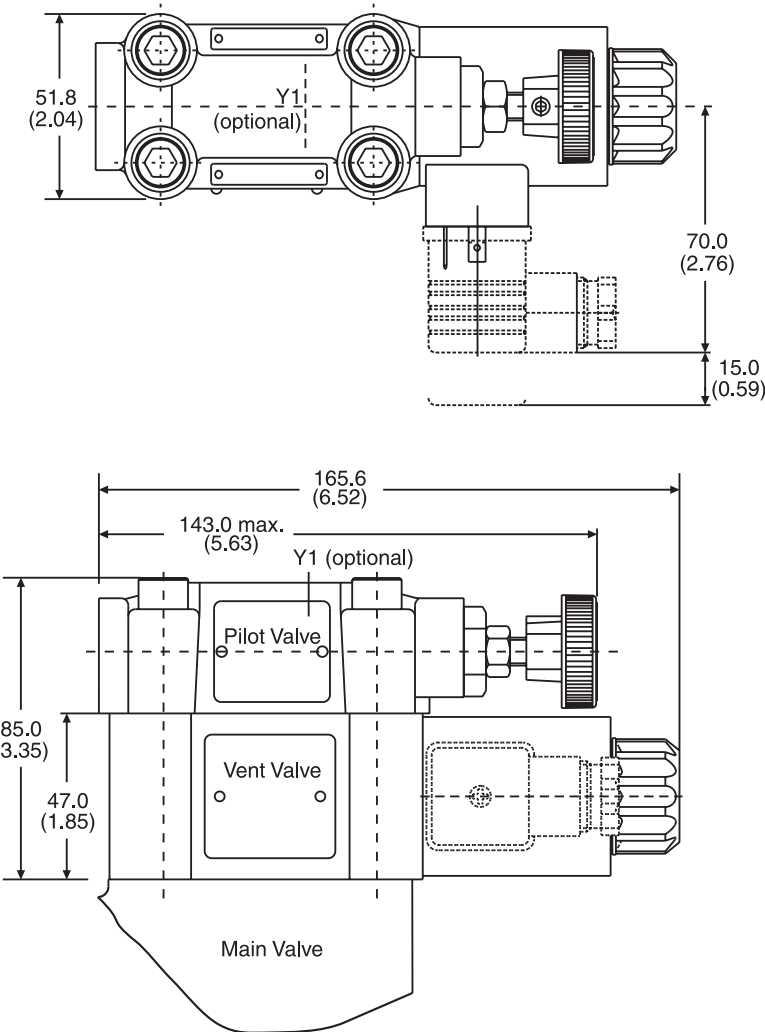
Pressure Control Valves

R5U - Dimensions

D75

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



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Code	Internal Drain	External Drain
11		
09		

Vent Valve Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5

Pressure Control Valves

R5S - Technical Information

D76

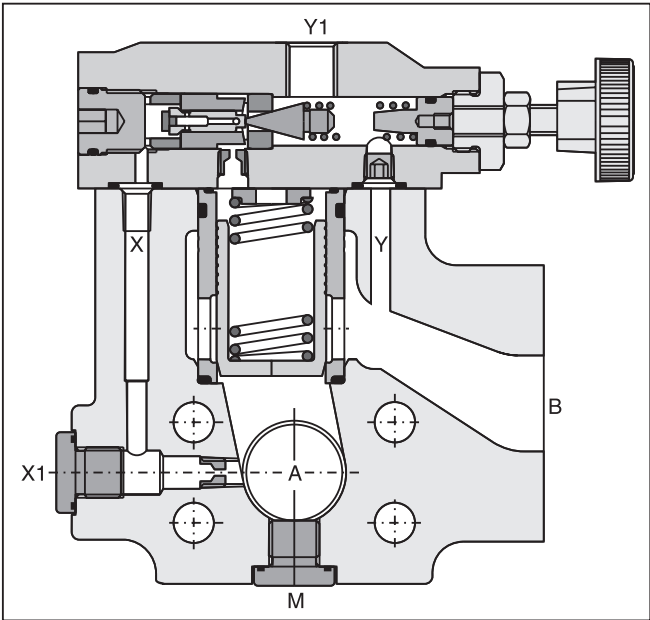
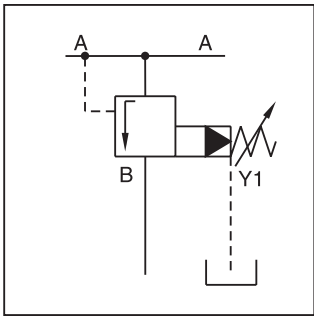
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General Description

Series R5S pilot operated sequence valves have a similar design to the subplate mounted R4S series. The SAE flanges allow to mount the valve directly on the inlet flanges of actuators or outlet flanges of pumps to achieve a very compact design.

Features

- Pilot operated with manual adjustment
- 3-port body with SAE61 flange
- 3 sizes (SAE 3/4", 1", 1-1/4")
- 3 pressure stages:
- 2 adjustment modes:
 - Hand knob
 - Acorn nut with lead seal



Ordering Information

R5S

Pressure Sequence Valve

Size

SAE 61 Interface

3-Port Body

Pressure Range

Adjustment

6

External Drain from Y1 Port

A

Design Series

Seal

Options Check with Factory

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"

Code	Description
3	3-port SAE (SAE 4)
9	3-port BSP (G1/4")

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Size	Maximum Pressure
4	10	280 Bar (4060 PSI)
5	06 / 08	350 Bar (5075 PSI)

Code	Pressure Range
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
1	Hand Knob
3	Acorn Nut w/Lead Seal
4	Key Lock

Weight:

R5S06

3.6 kg (7.9 lbs.)

R5S08

4.6 kg (10.1 lbs.)

R5S10

5.2 kg (11.5 lbs.)

⚠ WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Industrial
Hydraulic Valves

MSG14-2500/US
Pressure Control Valves

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Pressure Control Valves

R5S - Technical Information

D77

WWW.SUMY.IR

Specifications

General			
Size	06	08	10
Mounting	Flanged according to SAE 61		
Mounting Position	Unrestricted		
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)		
Hydraulic			
Max Operating Pressure (Bar) Ports A and B Ports Y and Y1	350 (5075 PSI) 30 (435 PSI)	350 (5075 PSI) 30 (435 PSI)	280 (4060 PSI) 30 (435 PSI)
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)		
Nominal Flow (LPM)	90 (23.3 GPM)	300 (79.4 GPM)	600 (158.7 GPM)
Fluid	Hydraulic oil according to DIN 51524 - 51525		
Viscosity Permitted (cSt / mm²/s) Recommended (cSt / mm²/s)	10 - 650 (46 - 3013 SSU) 30 (139 SSU)		
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)		
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638:7		

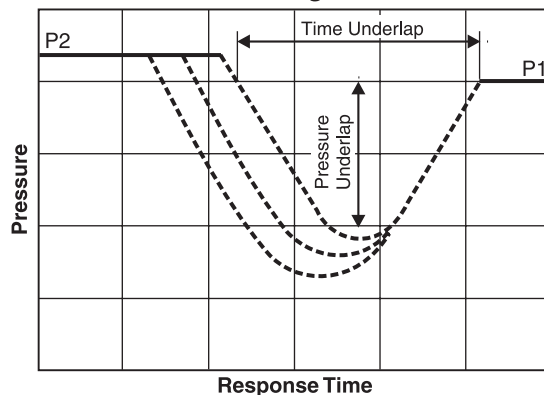
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Performance Curve

**Typical Pressure Characteristics
at Closing Point**



P1 = Setting Pressure
P2 = Operating Pressure

Time and pressure underlap depend on the characteristics of the specific system.

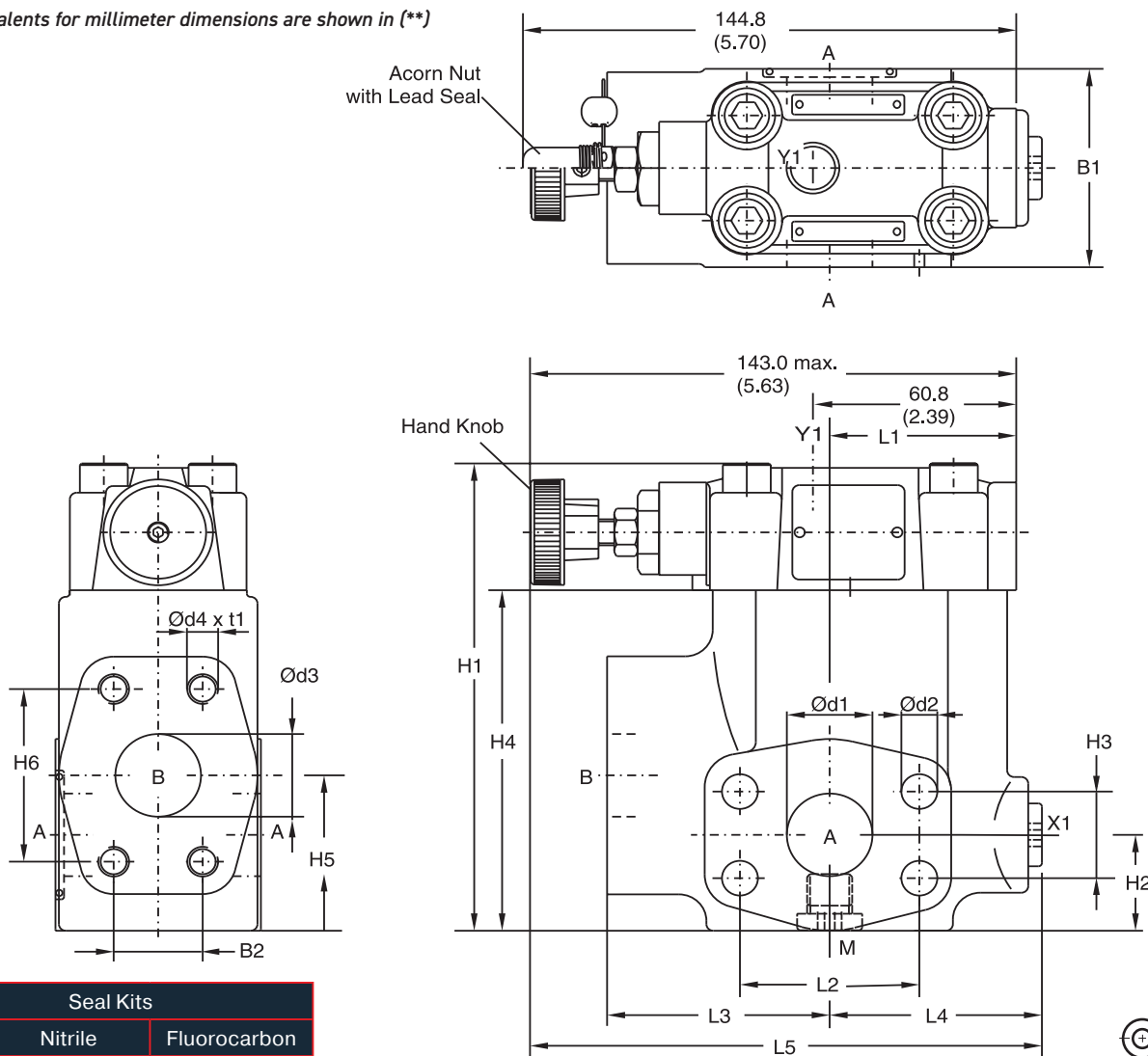
Pressure Control Valves

R5S - Dimensions

D78

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



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Seal Kits		
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5

Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	d4 (option 152)	t1
06	60.0 (2.36)	22.2 (0.87)	119.0 (4.69)	28.0 (1.10)	22.2 (0.87)	81.0 (3.19)	41.6 (1.64)	47.6 (1.87)	50.3 (1.98)	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	3/8"-16UNC (M10)	20.0 (0.79)
08	60.0 (2.36)	26.2 (1.03)	141.0 (5.55)	29.0 (1.14)	26.2 (1.03)	103.0 (4.06)	47.0 (1.85)	52.4 (2.06)	55.8 (2.20)	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.98)	10.5 (0.41)	25.0 (0.98)	3/8"-16UNC (M10)	23.0 (0.91)
10	75.0 (2.95)	30.2 (1.19)	151.0 (5.94)	34.5 (1.36)	30.2 (1.19)	113.0 (4.45)	64.0 (2.52)	58.7 (2.31)	57.8 (2.28)	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	12.5 (0.49)	32.0 (1.26)	7/16"-14UNC (M12)	22.0 (0.87)

Ports	Function	Port Size		
		R5S06	R5S08	R5S10
A (2)	Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
B	Tank	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
X1	External pilot port*	G1/4" or SAE-4**		
Y1	External drain	G1/4" or SAE-4**		
M	Pressure gauge	G1/4" or SAE-4**		
* closed when supplied				
** G1/4" if body 9 (BSP). SAE-4 if body is 3 (SAE)				

Industrial
Hydraulic Valves

MSG14-2500/US
Pressure Control Valves

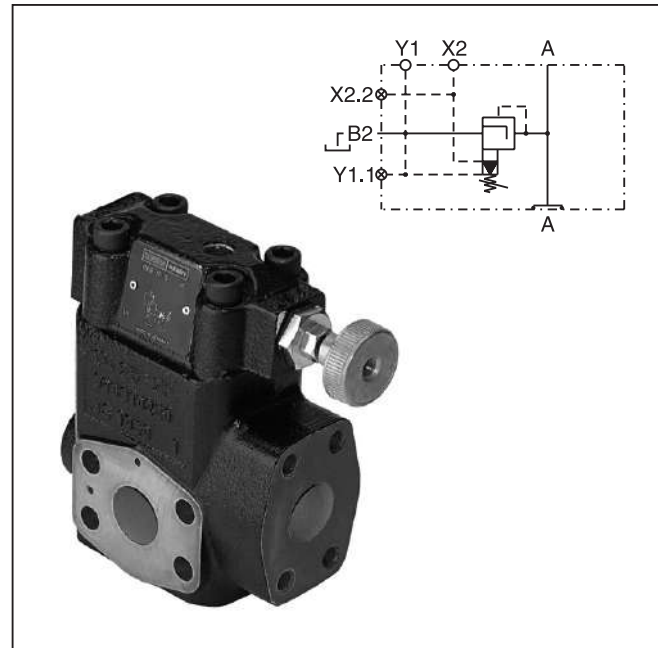
General Description

Series R5P direct operated, 3-way pressure compensators can be combined with any type of fixed or adjustable flow resistor (throttle) to provide a load compensated flow. The combination with the proportional throttle valve F5C serves as a compact 3-way flow control unit in SAE flange design. The R5P is typically used as meter-in compensator in front of the flow resistor.

The R5P is additionally equipped with a pressure relief pilot that controls the compensator cartridge and operates a system pressure relief valve. The R5P*P2 provides a proportional relief function.

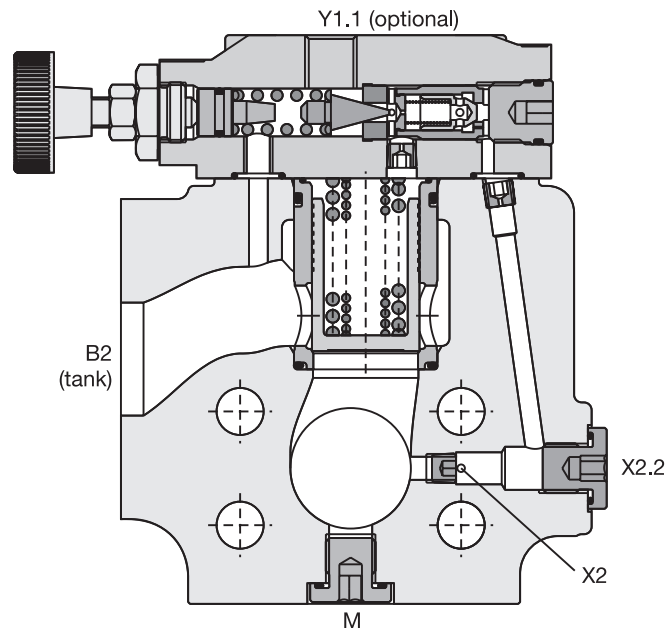
Features

- Seated type 3-way pressure compensator
- SAE 61 flange
- 8.4 Bar (121.8 PSI) control pressure
- Pressure relief function (optionally proportional)
- With optional vent function
- 3 sizes (SAE Code 61 3/4", 1", 1-1/4")
- Load compensated flow in combination with F5C



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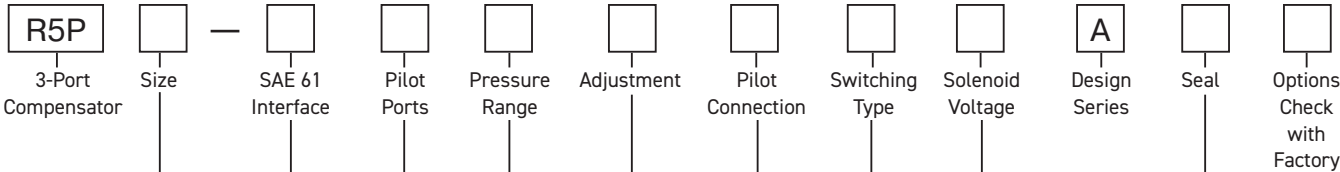
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Pressure Control Valves

R5P - Ordering Information

D80

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Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"

Code	Size	Maximum Pressure
0*	Cartridge Only	350 Bar (5075 PSI)
4	10	280 Bar (4060 PSI)
5	06 / 08	350 Bar (5075 PSI)

* Cartridge only. No housing

Code	Pilot Port	Port Y1**
0*	Cartridge NPT	Plugged
3	SAE	Plugged
9	BSP	Plugged
E*	Cartridge BSP	Plugged
P	BSP	Open
S	SAE	Open

* SAE 61 interface option only
** Y1 port is used in combination with F5C, when the F5C should be drained through the R5P (internal or external drain)

Code	Description
1	Hand Knob
3	Acorn Nut w/Lead Seal

Code	Description
2	Internal PD Internal PP*
6	External PD** Internal PP*

* PP through port X1 in outlet flange
** Through port Y1.1

Code	Description
Omit	Standard without Vent Option
G0R	12 VDC
G0Q	24 VDC
GAR	98 VDC
GAG	205 VDC
W30	110 VAC / 50 Hz 120 VAC / 60 Hz
W31	230 VAC / 50 Hz 240 VAC / 60 Hz

Code	Description
Omit	Standard without Vent Option
09*	Solenoid not activated unpress. circulation
11**	Solenoid activated unpress. circulation

* Solenoid de-energized: open to tank.
Solenoid energized: vent line blocked.
** Solenoid de-energized: vent line blocked.
Solenoid energized: Open to tank

Code	Description*
1	Nitrile
5	Fluorocarbon

* Further seals on request

Code	Pressure Range
1	7 - 105 Bar (102 - 1523 PSI)
3	7 - 210 Bar (102 - 3045 PSI)
5	7 - 350 Bar (102 - 5075 PSI)

Weight:	R5P	R5P with VV01
	R5P06	5.4 kg (11.9 lbs.)
	R5P08	6.1 kg (13.5 lbs.)
	R5P10	7.0 kg (15.4 lbs.)

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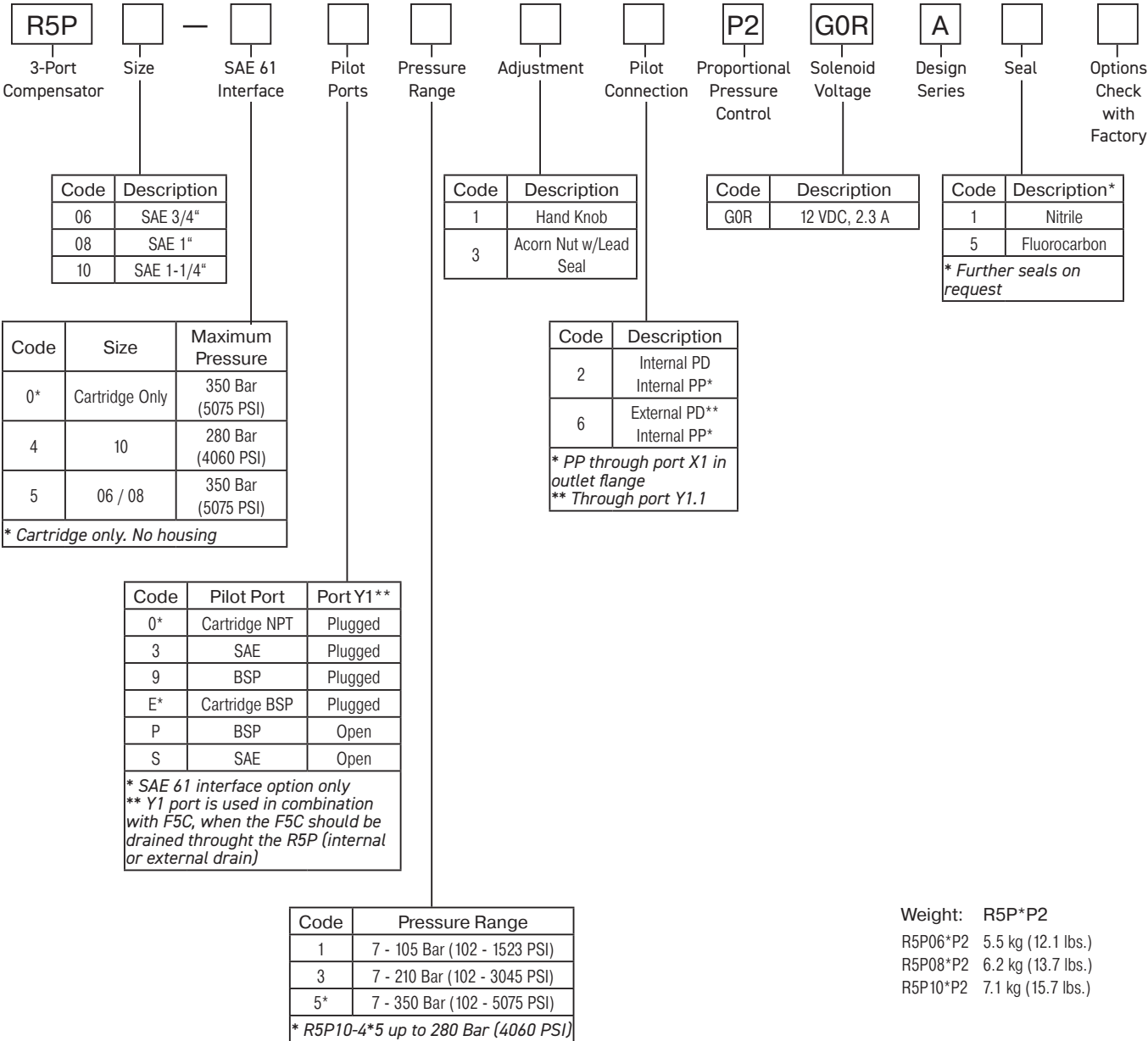
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Pressure Control Valves

R5P - Ordering Information

D81

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Pressure Control Valves

R5P - Specifications

D82

WWW.SUMY.IR

General						
Size	06 (3/4")		08 (1")		10 (1-1/4")	
Mounting	Flanged according to SAE 61					
Mounting Position	Unrestricted					
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)					
MTTF _b Value (years)	150					
Hydraulic						
Max Operating Pressure (Bar) Ports A and B	350 (5075 PSI)		350 (5075 PSI)		280 (4060 PSI)	
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)					
Nominal Flow (LPM)	90 (23.8 GPM)		300 (79.4 GPM)		600 (158.7 GPM)	
Fluid	Hydraulic oil according to DIN 51524 - 51535, other on request					
Viscosity Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)					
Viscosity Recommended (cSt / mm²/s)	30 - 80 (139 - 371 SSU)					
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)					
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638:7)					
Electrical						
Duty Ratio (%)	100 ED; CAUTION: Coil temperature up to 180°C (356°F) possible					
Solenoid Connection	Connector acc. to EN 175301-803					
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)					
Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage	12 VDC	24 VDC	98 VDC	205 VDC	110 VAC / 50 Hz 120 VAC / 60 Hz	230 VAC / 50 Hz 240 VAC / 60 Hz
Supply Tolerance (%)	+/-10	+/-10	+/-10	+/-10	+/-5	+/-5
Power Consumption Hold (W)	32.7	31	32	30	70 / 70 VA	70 / 70 VA
In Rush (W)	32.7	31	32	30	280 / 290 VA	280 / 290 VA
Response Time	Energized / De-energized AC: 20 / 18 ms, DC: 46 / 27 ms					
Max Switching Frequency	AC up to 7,200, DC 70 - 16,000 switchings/hour					
Coil Insulation Class	H (180°C (356°F))					

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Pressure Control Valves

R5P*P2 (Proportional) - Specifications

D83

WWW.SUMY.IR

General			
Size	06 (3/4")	08 (1")	10 (1-1/4")
Mounting	Flanged according to SAE 61		
Mounting Position	Unrestricted		
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)		
MTTF _b Value (years)	150		
Hydraulic			
Max Operating Pressure (Bar) Ports A and B	350 (5075 PSI)	350 (5075 PSI)	280 (4060 PSI)
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)		
Nominal Flow (LPM)	90 (23.8 GPM)	300 (79.4 GPM)	600 (158.7 GPM)
Fluid	Hydraulic oil according to DIN 51524 - 51535, other on request		
Viscosity Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)		
Viscosity Recommended (cSt / mm²/s)	30 - 80 (139 - 371 SSU)		
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)		
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638:7)		
Electrical			
Duty Cycle (%)	100 ED; CAUTION: Coil temperature up to 180°C (356°F) possible		
Solenoid Connection	Connector as per EN 175301-803. Solenoid indentification as per ISO 9461		
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)		
Nominal Voltage	12 VDC		
Maximum Current (A)	2.3		
Coil Resistance (Ohm)	4 at 20°C (68°F)		
Power Amplifier	PCD00A-400		

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Pressure Control Valves

R5P - Dimensions

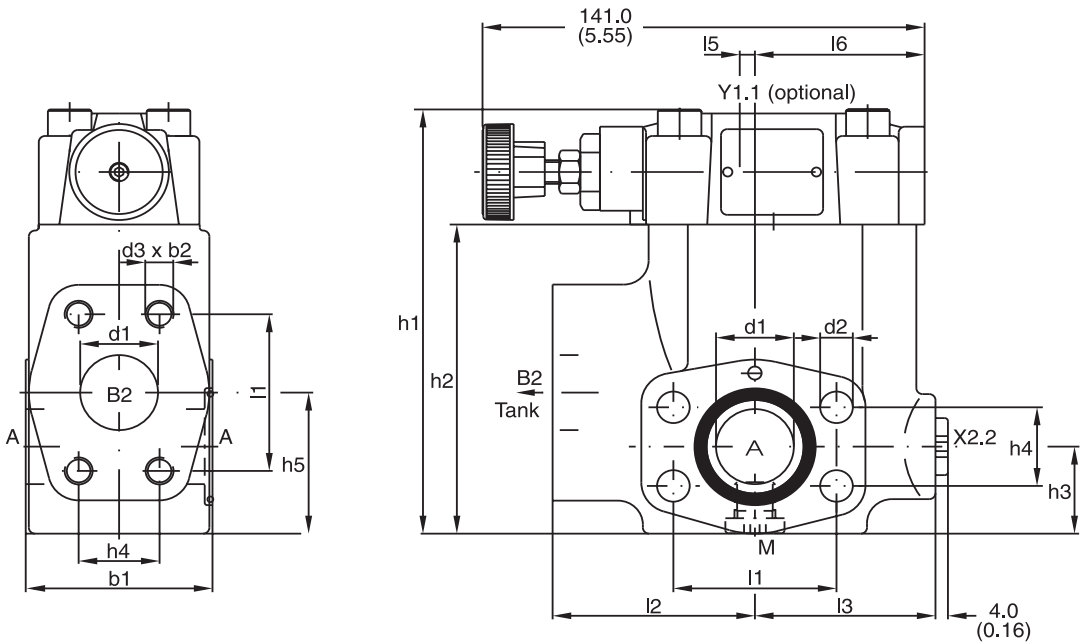
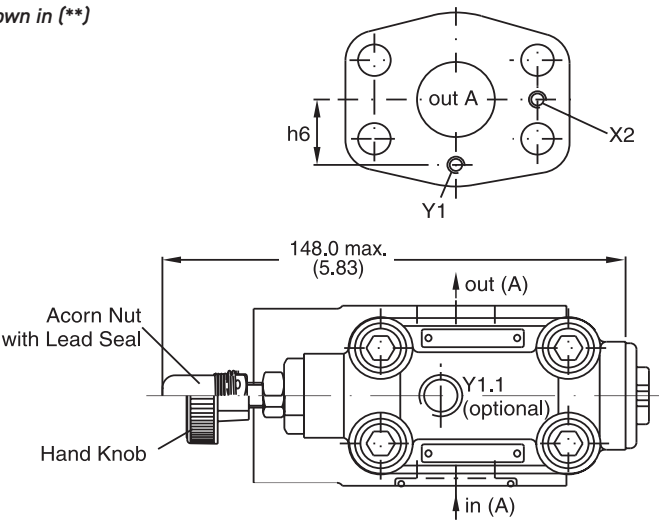
D84

WWW.SUMY.IR

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



Seal Kits*		
Size	Nitrile	Fluorocarbon
06	S16-91461-0	S16-91461-5
08	S16-91460-0	S16-91460-5
10	S16-91459-0	S16-91459-5
* Does not include P2 seal kit		



Size	I1	I2	I3	I4	I5	I6	b1	b2	h1	h2	h3	h4	h5	h6	d1	d2	d3
06	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	148.0 (5.83)	1.0 (0.04)	49.0 (1.93)	60.0 (2.36)	20.0 (0.79)	119.0 (4.69)	81.6 (3.21)	28.5 (1.13)	22.2 (0.87)	41.6 (1.64)	20.8 (0.82)	19.0 (0.75)	10.5 (0.41)	3/8"-16 UNC
08	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	144.6 (5.69)	5.0 (0.20)	54.5 (2.15)	60.0 (2.36)	23.0 (0.91)	142.0 (5.59)	103.0 (4.06)	30.5 (1.20)	26.2 (1.03)	48.6 (1.91)	24.3 (0.96)	25.0 (0.98)	10.5 (0.41)	3/8"-16 UNC
10	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	146.6 (5.77)	3.0 (0.12)	56.5 (2.22)	75.0 (2.95)	22.0 (0.87)	149.0 (5.87)	111.5 (4.39)	37.5 (1.48)	30.2 (1.19)	64.1 (2.52)	29.3 (1.15)	32.0 (1.26)	12.5 (0.49)	7/16"-14 UNC

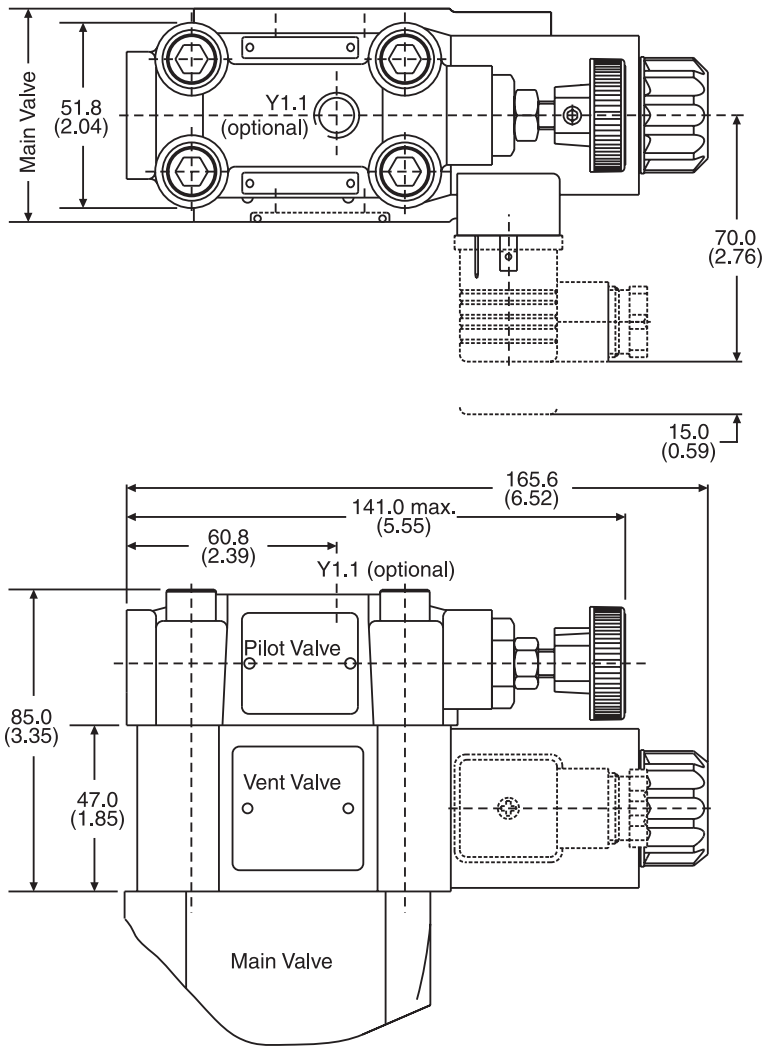
Ports	Function	Port Size		
		R5P06	R5P08	R5P10
A	Inlet / Outlet	3/4"	1"	1-1/4"
B2	Tank	3/4"	1"	1-1/4"
X2	Internal Pilot Pressure	M3		
X2.2	External Pilot Pressure	G1/4"		
Y1	Internal Pilot Drain	M3		
Y1.1	External Pilot Drain	G1/4"		
M	Pressure gauge	G1/4"		

Pressure Control Valves
R5P w/Vent Function - Dimensions

D85

WWW.SUMY.IR

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



Vent Valve Seal Kits*	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5
* For vent valve only	



Code	Internal Drain	External Drain
11		
09		

WWW.SUMY.IR

MSG14-2500/US
Pressure Control Valves

General Description

Series R4V pilot operated, pressure relief valves for in-line mounting have a similar design to the subplate mounted R4V series. For single functions where no manifold blocks are used, the valves can be directly placed in the pipework.

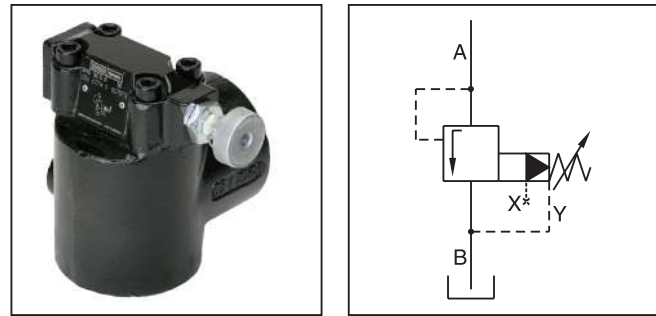
The R4V valves are available with 2 ports (L-body) for in-line relief function or with 3 ports (T-body) for relief functions in the bypass.

Operation

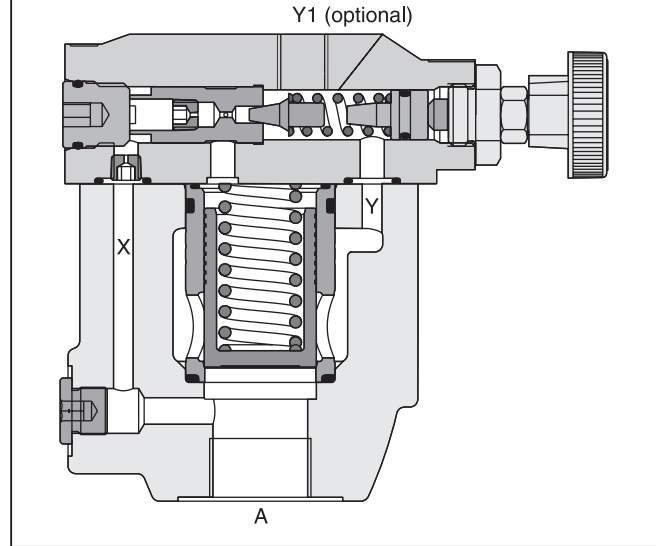
The system pressure in Port A is applied to the pilot valve and to the top surface of the main poppet via an orifice in X. The hydraulically balanced main poppet is held against the seat by the main spring. In this state there is no flow through the valve. The adjusted spring force acting on the pilot cone determines the relief pressure. If the pressure in Port A exceeds the set point, the pilot cone is lifted from its seat, releasing a small pilot flow to tank. The flow through the control orifice in X creates a pressure drop which limits the pressure at the top of the main poppet to the set point. The higher system pressure in Port A now lifts the main poppet off its seat and allows flow to Port B. In the resulting float position only enough flow is passed from Port A to Port B to maintain the inlet pressure in Port A at the set point. When the pressure in Port A falls below the set point, the hydraulic balance on the main poppet is restored. The main spring then forces the main poppet to close.

Features

- Pilot operated with manual adjustment
- 2 interfaces:
 - L-body (R4V06-SAE 12, R4V10-SAE 20)
 - T-body (R4V03-SAE 8, R4V06-SAE 16)
- 3 pressure stages
- 3 adjustment modes:
 - Hand knob
 - Acorn nut with lead seal
 - Key lock
- With optional vent function



R4V06 L-Body



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WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Pressure Control Valves

R4V - Technical Information

D88

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Ordering Information

R4V **Size** **Max Pressure** **Body** **Pressure Range** **Adjustment** **Drain Line** **Switching Type** **Solenoid Voltage (Optional)** **Design Series** **Seal** **Options Check with Factory**

Pressure Relief Valve 350 Bar (5075 PSI)

Code	Description
03	NG 10 (SAE 8)
06	NG 25 (SAE 16 - T-body) (SAE 12 - L-body)
10	NG 32 (SAE 20)

Code	Description
4*	R4V03 T-body SAE R4V06 T-body SAE
6*	R4V03 T-body BSP R4V06 T-body BSP
B**	R4V06 L-body SAE R4V10 L-body SAE
D**	R4V06 L-body BSP R4V10 L-body BSP

* Size 03/06 only
** Size 06/10 only

Code	Description
0	Internal
2	External from Pilot Head (Y1)

Code	Description
1	Hand Knob
3	Acorn Nut w/Lead Seal
4	Key Lock

Code	Description
Omit	Standard without Vent Option
G0R	12 VDC
G0Q	24 VDC
GAR	98 VDC
GAG	205 VDC
W30	110 VAC / 50 Hz 120 VAC / 60 Hz
W31	230 VAC / 50 Hz 240 VAC / 60 Hz

Code	Description
Omit	Standard without Vent Option
09*	Solenoid not activated unpress. circulation
11**	Solenoid activated unpress. circulation

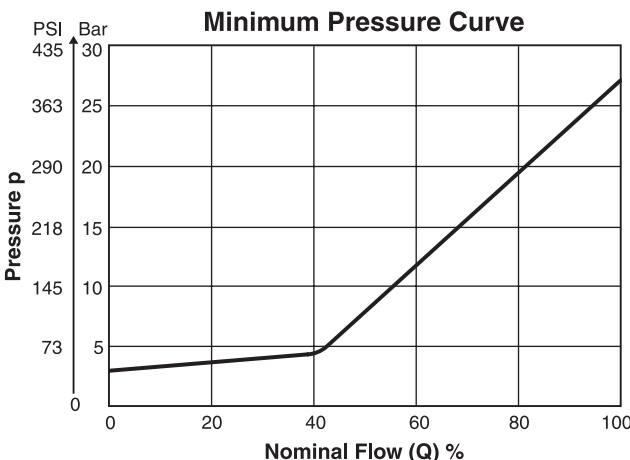
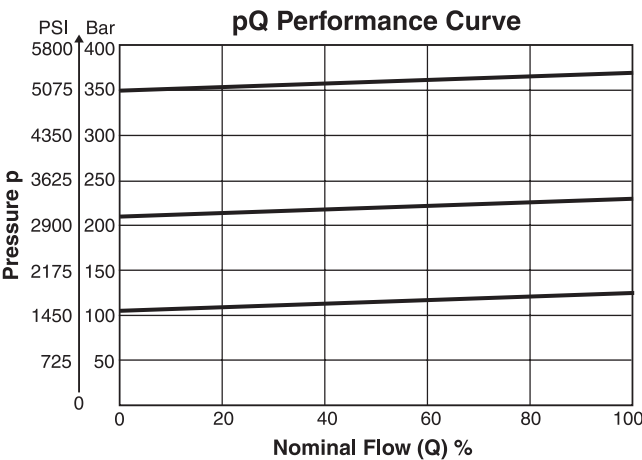
* Solenoid de-energized: open to tank.
Solenoid energized: vent line blocked.
** Solenoid de-energized: vent line blocked.
Solenoid energized: Open to tank

Code	Pressure Range
1	up to 105 Bar (102 - 1523 PSI)
3	up to 210 Bar (102 - 3045 PSI)
5	up to 350 Bar (102 - 5075 PSI)

Weight (w/o Vent Function): Weight (w/Vent Function)

R4V03	3.2 kg (7.1 lbs.)	R4V03	3.2 kg (7.1 lbs.)
R4V06*4	6.6 kg (14.6 lbs.)	R4V06*4	6.6 kg (14.6 lbs.)
R4V06*B	3.3 kg (7.3 lbs.)	R4V06*B	3.3 kg (7.3 lbs.)
R4V10	5.6 kg (12.3 lbs.)	R4V10	5.6 kg (12.3 lbs.)

Performance Curves*



* The performance curves are measured with external drain.
For internal drain, the tank pressure has to be added to the curve.

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Pressure Control Valves

R4V - Specifications

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Without Vent Function

General				
Design	T - Body		L - Body	
Size	03 (SAE 8)	06 (SAE 16)	06 (SAE 12)	10 (SAE 20)
Mounting	Threaded body			
Mounting Position	Unrestricted			
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)			
Hydraulic				
Max Operating Pressure (Bar)	Ports A and X: up to 350 (5075 PSI); Ports B and Y 30 (435 PSI)			
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)			
Nominal Flow (LPM)	60 (15.8 GPM)	200 (52.8 GPM)	200 (52.8 GPM)	450 (118.9 GPM)
Fluid	Hydraulic oil according to DIN 51524 - 51525			
Viscosity Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)			
Viscosity Recommended (cSt / mm²/s)	30 (139 SSU)			
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)			
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638:7)			

With Vent Function

General							
Design	T - Body				L - Body		
Size	03 (SAE 8)		06 (SAE 16)		06 (SAE 12)	10 (SAE 20)	
Mounting	Threaded Body						
Mounting Position	Unrestricted						
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)						
Electrical							
Duty Cycle (%)	100						
Solenoid Connection	Connector acc. to EN 175301-803						
Protection Class	IP65 in accordance with EN 60529 (with correctly mounted plug-in connector)						
Code	G0R	G0Q	GAR	GAG	W30	W31	
Supply Voltage	12 VDC	24 VDC	98 VDC	205 VDC	110 VAC / 50 Hz 120 VAC / 60 Hz	230 VAC / 50 Hz 240 VAC / 60 Hz	
Tolerance Supply Voltage (%)	+5 - -10	+5 - -10	+5 - -10	+5 - -10	+/-5	+/-5	
Power Consumption	Hold (W)	31	31	31	31	78	78
	In Rush (W)	31	31	31	31	264	264
Maximum Switching Frequency	AC: up to 7,200 switchings/hour DC: up to 16,000 switchings/hour						
Coil Insulation Class	H (180°C (356°F))						

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Pressure Control Valves

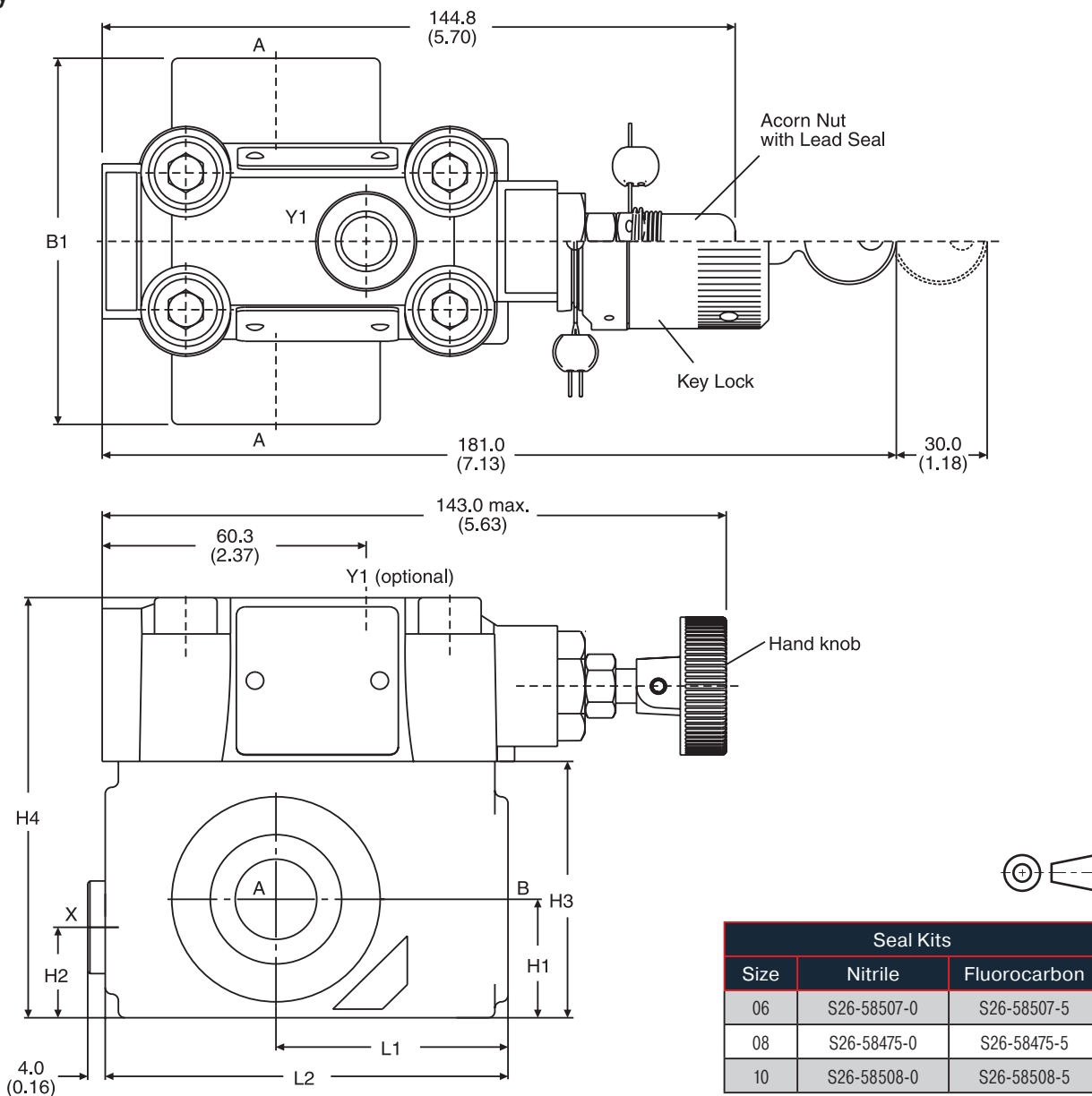
R4V (T - Body) - Dimensions

D90

WWW.SUMY.IR

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

T-Body



Seal Kits		
Size	Nitrile	Fluorocarbon
06	S26-58507-0	S26-58507-5
08	S26-58475-0	S26-58475-5
10	S26-58508-0	S26-58508-5

NG	Body	B1	B2	B3	B4	H1	H2	H3	H4	H5	H6	H7	H8	L1	L2	L3
03	T - Body	85.0 (3.35)	-	-	-	27.5 (1.08)	21.0 (0.83)	59.5 (2.34)	97.5 (3.84)	-	-	-	-	53.0 (2.09)	92.0 (3.62)	-
06	T - Body	136.0 (5.35)	-	-	-	38.0 (1.50)	28.0 (1.10)	93.0 (3.66)	131.0 (5.16)	-	-	-	-	66.5 (2.62)	117.5 (4.63)	-

Ports	Function	Port Size†	
		RV03 T - Body	RV06 T - Body
A	Pressure (inlet)	G1/2" or 3/4-16 UNF	G1" or 1-1/16-12 UN
B	Tank (outlet)	G1/2" or 3/4-16 UNF	G1" or 1-1/16-12 UN
X*	External remote control or vent connection	G1/4" or 7/16-20 UNF	
Y1**	External Drain	G1/4" or 7/16-20 UNF	

** closed when supplied*
*** port Y1 is only available at drain line (code 2) external from the pilot head*
† G1/2" and G1" if body 6 or D (BSP). UNF/UN if body 4 or B (SAE)

Pressure Control Valves

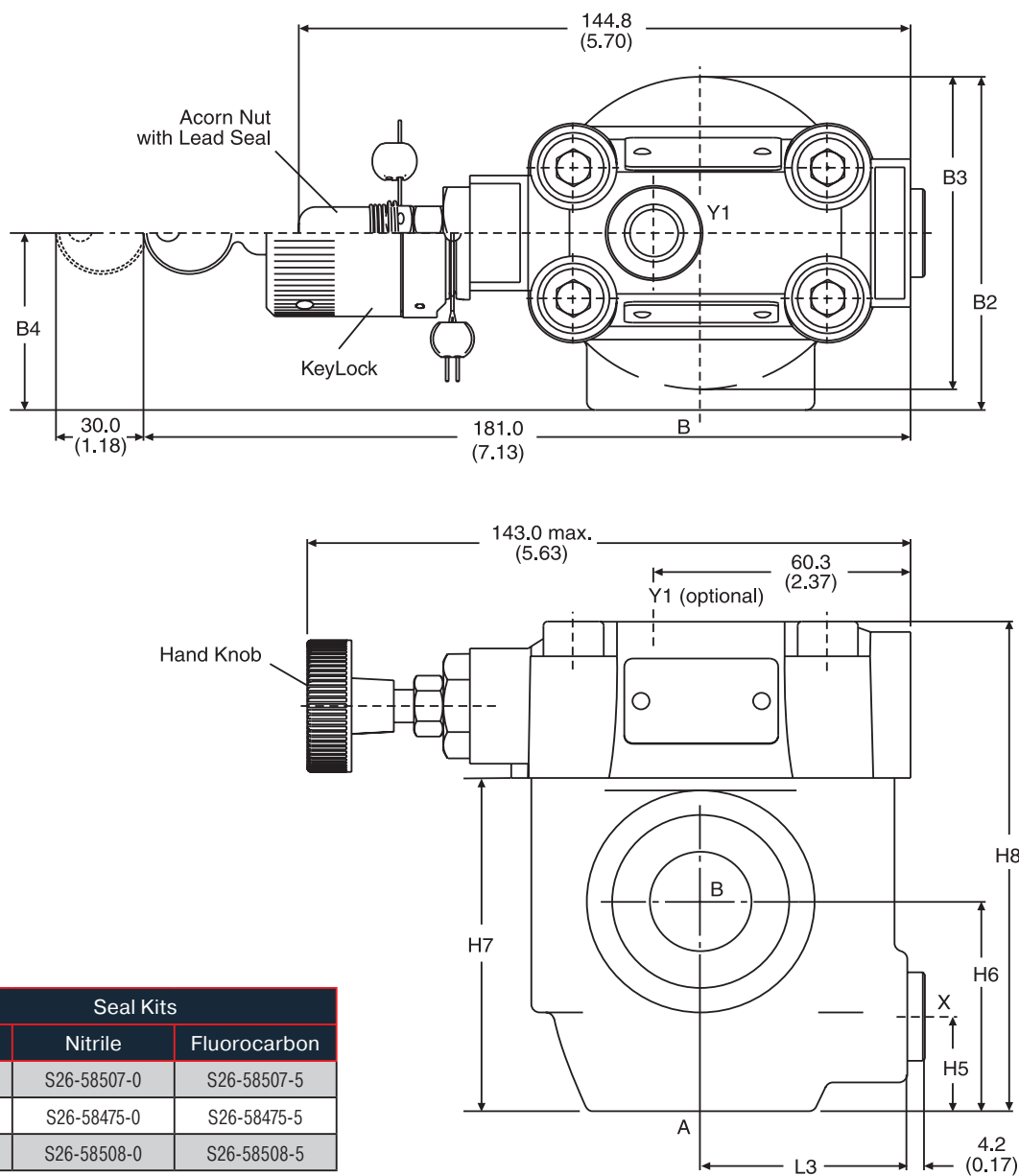
R4V (L - Body) - Dimensions

D91

WWW.SUMY.IR

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

L-Body



Seal Kits		
Size	Nitrile	Fluorocarbon
06	S26-58507-0	S26-58507-5
08	S26-58475-0	S26-58475-5
10	S26-58508-0	S26-58508-5

NG	Body	B1	B2	B3	B4	H1	H2	H3	H4	H5	H6	H7	H8	L1	L2	L3
06	L - Body	-	81.0 (3.19)	76.0 (2.99)	43.0 (1.69)	-	-	-	-	23.0 (0.91)	51.0 (2.01)	81.0 (3.19)	119.0 (4.69)	-	-	49.0 (1.93)
10	L - Body	-	120.7 (4.75)	85.8 (3.38)	77.8 (3.06)	-	-	-	-	31.8 (1.25)	50.8 (2.00)	96.0 (3.78)	134.0 (5.28)	-	-	49.8 (1.96)

Ports	Function	Port Size†	
		RV03 L - Body	RV06 L - Body
A	Pressure (inlet)	G1" or 1-5/16-12 UN	G1-1/4" or 1-5/8-12 UN
B	Tank (outlet)	G1" or 1-5/16-12 UN	G1-1/4" or 1-5/8-12 UN
X*	External remote control or vent connection	G1/4" or 7/16-20 UNF	
Y1**	External Drain	G1/4" or 7/16-20 UNF	
<i>* closed when supplied</i> <i>** port Y1 is only available at drain line (code 2) external from the pilot head</i> <i>† G1/2" and G1" if body 6 or D (BSP). UNF/UN if body 4 or B (SAE)</i>			

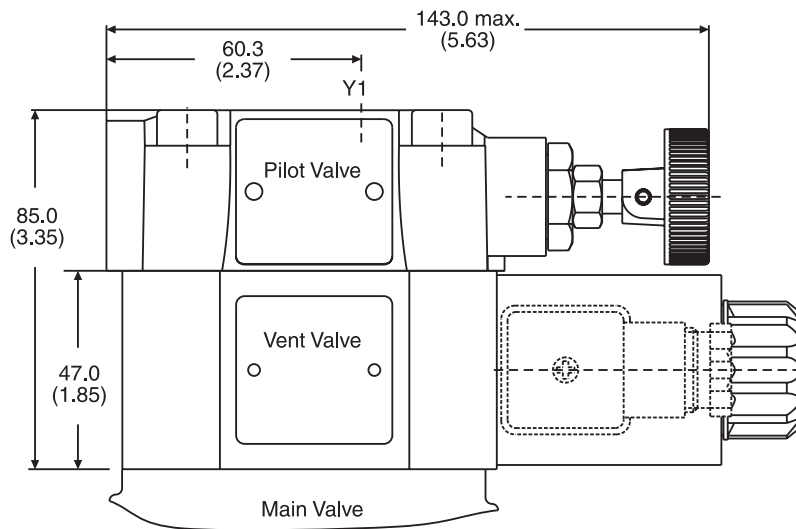
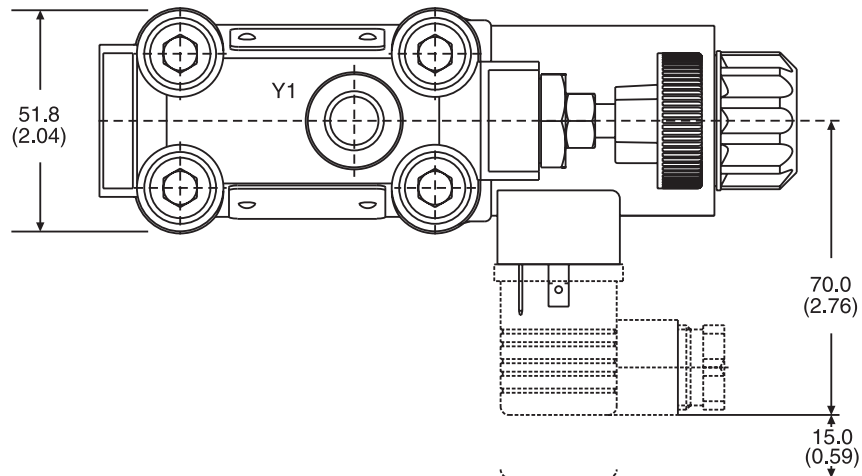
Pressure Control Valves

R4V w/Vent Function - Dimensions

D92

WWW.SUMY.IR

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



Vent Valve Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5

Code	Internal Drain	External Drain
11		
09		

Pressure Control Valves

R1E02 - Technical Information

D93

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General Description

Series R1E02 direct operated, pressure relief valves are seated type valves typically used for remote pressure controls. In applications where the reliability and simplicity of a hydraulic remote control are preferred to an electrohydraulic system, Series R1E02 is an ideal solution.

Typically pilot operated pressure valves or compensators of variable pumps are controlled.

Features

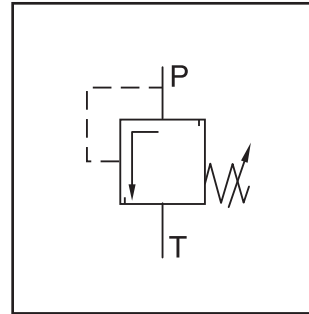
- Seated type valve
- 2 body variants:
 - front panel mounting
 - subplate mounting
- 3 pressure ranges
- 3 adjustment modes:
 - hand knobs
 - acorn nut with lead seal
 - adjusting with lock



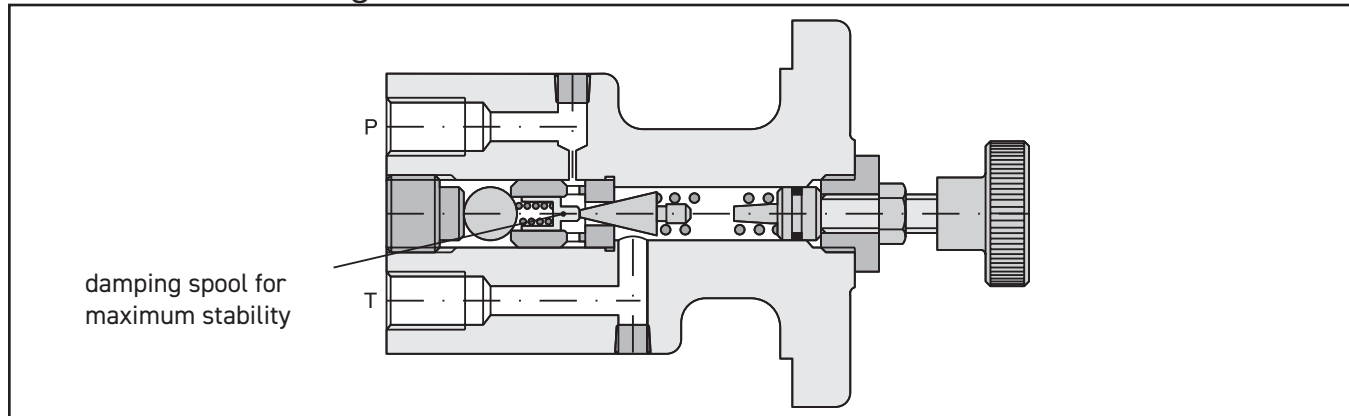
Front Panel Mounting



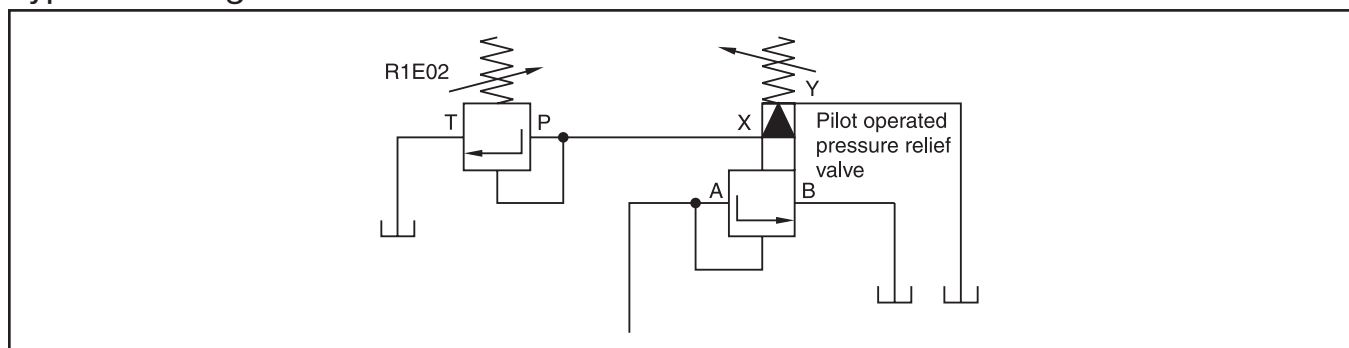
Subplate Mounting



Front Panel Mounting



Typical Configuration as Remote Pilot Valve



WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Pressure Control Valves

R1E02 - Technical Information

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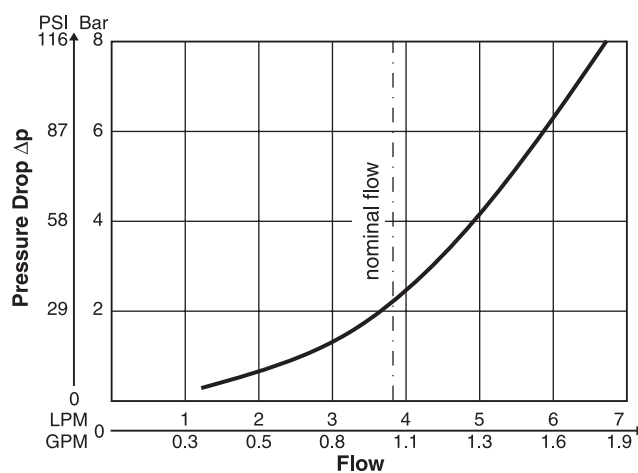
Ordering Information

R1E02					A	1																					
Pressure Relief Valve	Interface	Pressure Range	Connections	Adjustment	Design Series	Seal Nitrile	Options Check with Factory																				
<table><tr><th>Code</th><th>Description</th></tr><tr><td>2</td><td>Front Panel Mounting</td></tr><tr><td>3</td><td>Subplate Mounting</td></tr></table>	Code	Description	2	Front Panel Mounting	3	Subplate Mounting			<table><tr><th>Code</th><th>Description</th></tr><tr><td>2</td><td>G1/4"</td></tr><tr><td>3</td><td>SAE 7/16-20UNF</td></tr></table>	Code	Description	2	G1/4"	3	SAE 7/16-20UNF	<table><tr><th>Code</th><th>Description</th></tr><tr><td>1</td><td>Hand Knob Ø32mm</td></tr><tr><td>3</td><td>Acorn Nut w/Lead Seal</td></tr><tr><td>4*</td><td>Adjusting Device w/Lock (Key order no. 700-70619)</td></tr></table> * On bodies for subplate mounting, use plate S16-64188	Code	Description	1	Hand Knob Ø32mm	3	Acorn Nut w/Lead Seal	4*	Adjusting Device w/Lock (Key order no. 700-70619)		Weight: R1E022 2.1 kg (4.6 lbs.) R1E023 1.0 kg (2.2 lbs.) Seal Kit: R1E022 S26-58466-0 R1E023 S16-91963-0	
Code	Description																										
2	Front Panel Mounting																										
3	Subplate Mounting																										
Code	Description																										
2	G1/4"																										
3	SAE 7/16-20UNF																										
Code	Description																										
1	Hand Knob Ø32mm																										
3	Acorn Nut w/Lead Seal																										
4*	Adjusting Device w/Lock (Key order no. 700-70619)																										
	<table><tr><th>Code</th><th>Description</th></tr><tr><td>1</td><td>up to 105 Bar (1523 PSI)</td></tr><tr><td>3</td><td>up to 210 Bar (3045 PSI)</td></tr><tr><td>5</td><td>up to 350 Bar (5075 PSI)</td></tr></table>	Code	Description	1	up to 105 Bar (1523 PSI)	3	up to 210 Bar (3045 PSI)	5	up to 350 Bar (5075 PSI)																		
Code	Description																										
1	up to 105 Bar (1523 PSI)																										
3	up to 210 Bar (3045 PSI)																										
5	up to 350 Bar (5075 PSI)																										

Specifications

General	
Size	1/4"
Interface	Front panel mounting; Subplate mounting
Mounting Position	Unrestricted
Ambient Temperature Range (°C)	-20 to +70 (-4°F to +158°F)
Hydraulic	
Maximum Operating Pressure (Bar)	Port P: 350 (5075 PSI); Port T depressurized
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)
Fluid	Hydraulic oil according to DIN 51524 - 51525
Fluid Temperature (°C)	-20 to +70 (-4°F to +158°F)
Nominal Flow (LPM)	3.8 (1.0 GPM)
Minimum Pressure Setting (Bar)	7 (102 PSI)
Viscosity Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)
Viscosity Recommended (cSt / mm²/s)	30 (139 SSU)
Filtration	ISO 4406 (1999) 18/16/13

Performance Curve



Fluid viscosity measured at 50°C (122°F) +/- 5°C (41°F)

Pressure Control Valves

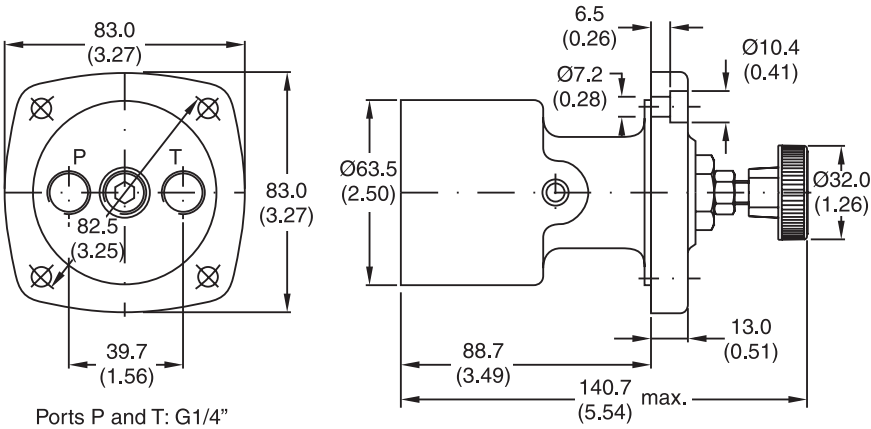
R1E02 - Dimensions

D95

WWW.SUMY.IR

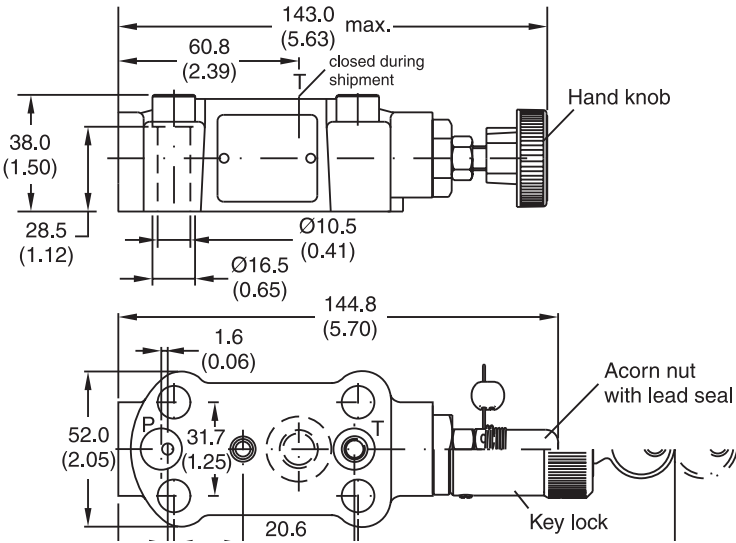
Inch equivalents for millimeter dimensions are shown in (**)

Front Panel Mounting



Subplate Mounting

Subplate	Size
518-00139-0	3/8" NPT



D

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General Description

Pressure intensifiers are used wherever a particular section of a hydraulic system has to be pressurized to a substantially higher pressure than the available primary pressure (clamping functions). With an intensification ratio of 1 : 4 (1 : 2, 1 : 6) it enables a cost-effective system solution, especially in clamping applications, with primary pressures up to 125 bar (1813 PSI). A pilot operated check valve can be flanged underneath the pressure intensifier for quick filling and decompression of the high pressure section.

Features

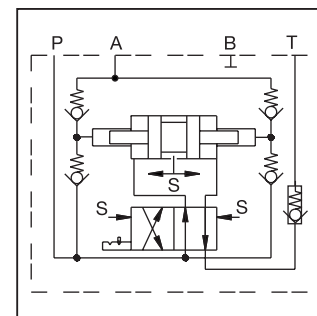
- Mounting pattern NG06, DIN 24 340 Design A, CETOP, ISO
- Check valve attachable to bottom flange
- High pressure up to 500 bar (7252 PSI)
- Volume flow formed with low pulsation
- Compact design

Design

Main functional parts of the pressure intensifier: piston, rocker mechanism, slide valve with lock, four check valves which separate the high pressure section from the low pressure section, check valve in the tank port to partition of the tank section from the primary pressure.

Function

After the high pressure section is filled with oil, (e.g., extension of a clamping cylinder), the pressure intensifier begins operation. The low pressure moves the intensifier piston because of the surface ratio and compresses the oil column in the high pressure section.



At the end of the intensifier's piston stroke, the rocker mechanism switches the directional slide valve to the crossed switching position and the intensifier piston pumps oil from the piston rod area into the high pressure section. The process repeats itself until the pressure ratio corresponding to the surface ratio has lead to a balance of force on the intensifier piston.

The pressure intensifier switches itself off and immediately on again when the high pressure (e.g., due to external leakage) begins to drop. (Pay attention to the flow characteristic.) The switching speed of the slide valve is dependent on the operating speed of the intensifier piston.

Note:

- To avoid exceeding the admissible maximum pressure, a pressure relief or pressure control valve must be fitted on the primary side (pressure setting, max. 125 bar (1813 PSI) / 1 : 4, max. 250 bar (3626 PSI) / 1 : 2 or max. 83 bar (1204 PSI) / 1 : 6).
- There must be no pressure peak on the primary side when operating in the maximum pressure range.
- It is recommended to mount a 10µm filter on the primary side to ensure damage-free operation.

Ordering Information

SD

Pressure Intensifier

500

Working Pressure
500 bar (7252 PSI)
(max. pressure)

Intensification
Ratio

Code	Intensification Ratio
A	1:4
B	1:2
C	1:6

06

Nominal Size
(pressure intensifier)
Interface DIN 24 340
Design A, CETOP, ISO

V

Seals

Code	Description
F	Fluorocarbon

Design Series

NOTE:
Not required
when
ordering.

Weight:

3.0 kg (6.61 lbs.)

Weight: 3.0 kg (6.61 lbs.)

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Pressure Control Valves

SD500 - Technical Information

D97

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Specifications

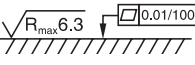
General	
Symbol	DIN 24 300
Design	Piston and poppet valve in body
Mounting Type	NG 06, DIN 24 300, Design A, CETOP, ISO
Ports	Subplate
Mounting Position	Unrestricted
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)
MTTF _D Value (years)	150
Hydraulic	
Maximum Operating Pressure (Bar)	Port A: 500 (7252 PSI); Ports P, B, and T: 125 (1813 PSI) @ ratio 1:4; 250 (3626 PSI) @ ratio 1:2
Fluid	Hydraulic oil according to DIN 51524
Fluid Temperature (°C)	+10 to +70 (+50°F to +158°F)
Viscosity Permitted (cSt / mm ² /s)	20 - 400 (98 - 1853 SSU)
Viscosity Recommended (cSt / mm ² /s)	30 - 80 (139 - 371 SSU)
Filtration	ISO 4406 (1999) 18/16/13
Flow	See performance curve
Intensification Ratio	$P_B : P_A = 1:4, 1:2, 1:6$
Flow Volume	$Q_P : Q_A = 4:1, 2:1, 6:1$
Stroke Volume (cm ³)	3 (0.18 cu. in) per double stroke
Operating	Hydraulic-mechanic automatic control

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Accessories

Type	Description	Number
SD 500*06V	Seals	—
	9.25 x 1.78	3
	10.82 x 1.78	1
	M5x75 ISO 4762-12.9	4
NOTE: Seals are included in delivery. Mounting screws are not included in delivery.		

Surface Finish	Kit			
$\sqrt{R_{max}6.3}$ 	BK401	4x M5x75 ISO 4762-12.9	9.0 Nm (6.6 lb-ft) +/- 15%	

Pressure Control Valves

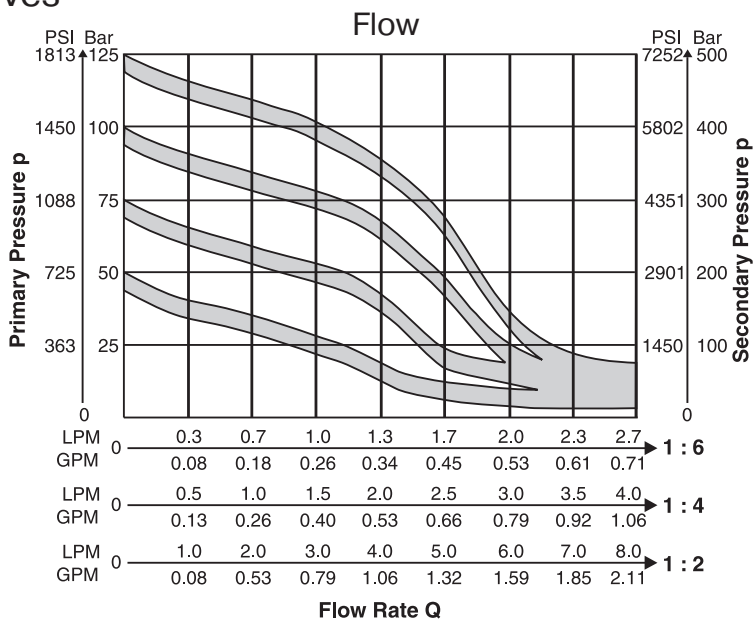
SD500 - Performance Curves / Dimensions

D98

WWW.SUMY.IR

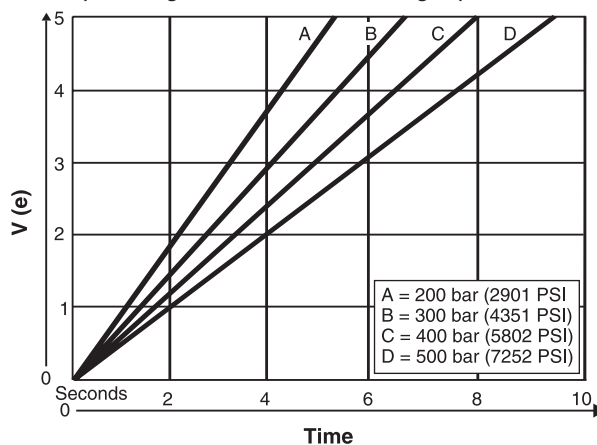
All characteristics curves measured with HLP46 at 50°C (122°F).

Performance Curves



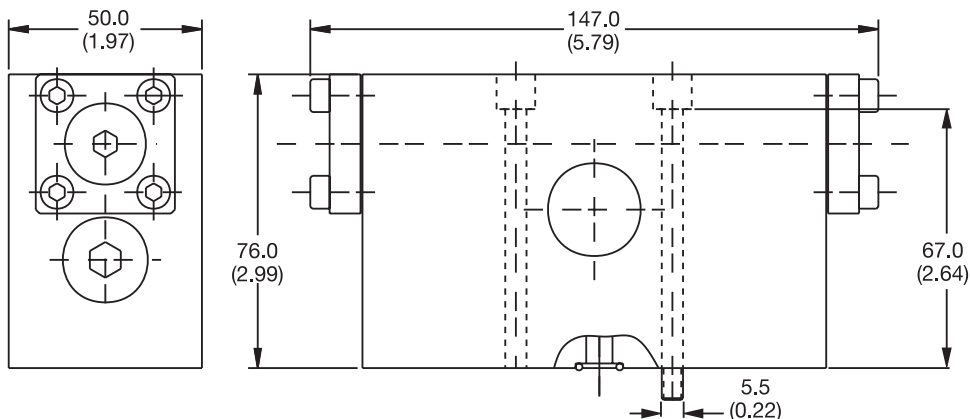
Compression

Approximate values of the compression time for compressing a filled volume to target pressure (1 : 4)



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

Dimensions



Industrial
Hydraulic Valves

MSG14-2500/US
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Pilot Operated Check Valve Plates NG06 and NG10

Description

Pilot operated check valve plates are flanged under the pressure intensifier for quick filling and decompression.

Design

The check valve plate is equipped with a hydraulic, pilot operated check valve.

Opening ratio: Main valve 2.5 : 1
Pilot ratio 10 : 1

Specifications

General	
Design	Spring loaded ball seat valve
Mounting Type	Flange
Mounting Position	Unrestricted
Ambient Temperature (°C)	-20 to +60 (-4°F to +140°F)
Hydraulic	
Max Operating Pressure (Bar)	Ports A: 500 (7252 PSI) Ports P, B, and T: 125 (1813 PSI) @ ratio 1:4; 250 (3626 PSI) @ ratio 1:2
Fluid	Hydraulic oil according to DIN 51524
Fluid Temperature	+10 to +70 (+50°F to +158°F)
Viscosity	
Maximum (cSt / mm²/s)	20 - 400 (93 - 1853 SSU)
Recommended (cSt / mm²/s)	30 - 80 (139 - 371 SSU)
Filtration	ISO 4406 (1999), 18/16/13
Flow	See performance curve
Pilot Ratio	Main Valve 2.5:1; pre-discharge 10:1
Operating Pressure (Bar)	Approx. 0.5 (7 PSI)

Accessories

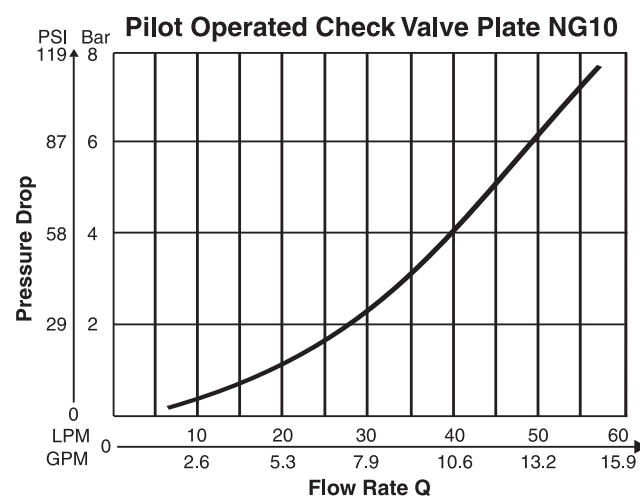
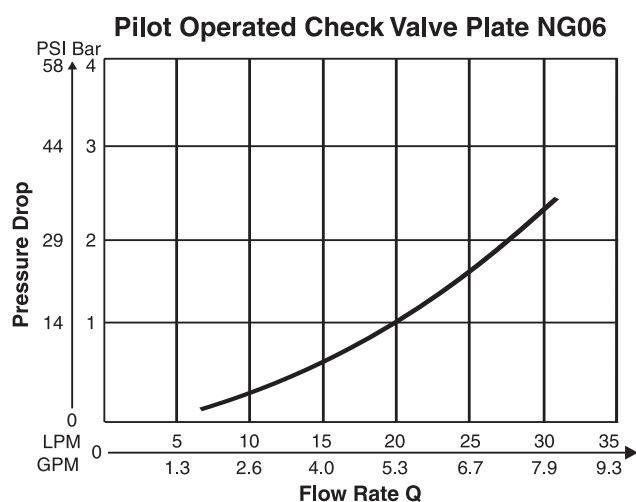
Type	Description	Number
H06SDV	Seals	—
	9.25 x 1.78	4
	M5x115 ISO 4762-12.9	4
H101SDV	Seals	—
	12.24 x 1.78	4
	M5x75 ISO 4762-12.9	4
	M6x75 ISO 4762-12.9	4
NOTE: Seals are included in delivery. Mounting screws are not included in delivery.		

Weight

NG06 1.3 kg (2.87 lbs.)
NG10 2.3 kg (5.07 lbs.)

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

Performance Curves



Ordering Information

NG06

H06 SDV

NG10

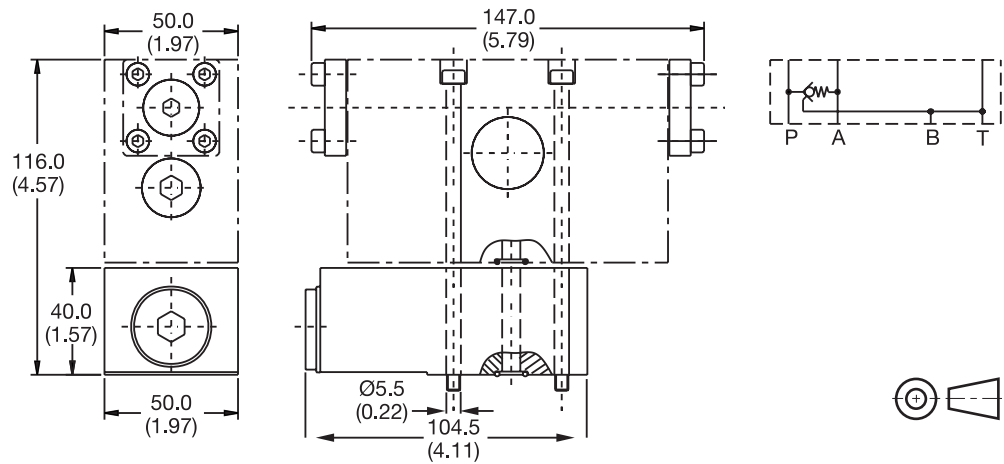
H10 SDV

Bold = Short-term availability.

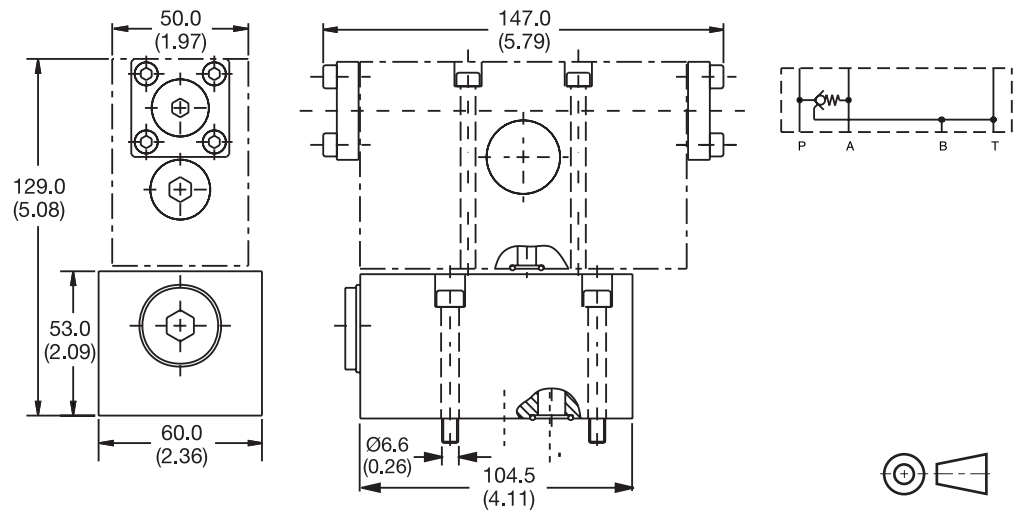
*Inch equivalents for millimeter dimensions are shown in (**)*

Dimensions

NG06



NG10



Size	Surface Finish	Kit		
NG 06	$\sqrt{R_{max} 6.3}$ [0.01/100]	BK406	4x M5x115 ISO 4762-12.9	9.0 Nm (6.6 lb-ft) +/- 15%
NG 10	$\sqrt{R_{max} 6.3}$ [0.01/100]	BK490	4x M5x75 4x M6x50 ISO 4762-12.9	9.0 Nm (6.6 lb-ft) 18.0 Nm (13.3 lb-ft) +/- 15%

Flow Controls and Check Valves

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SERIES	DESCRIPTION	PAGE NO.
Series 2F1C		
General Description	2-Way Flow Control Valves, Subplate Mounted.....	E2 - E7
Operation		E2
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Ordering Information		E2
Specifications		E3
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Series C4V		
General Description	Direct Operated Check Valves, Subplate Mounted	E8 - E10
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Ordering Information		E8
Specifications		E9
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Series C4V		
General Description	Pilot Operated Check Valves, Subplate Mounted	E11 - E13
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Series C5V		
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Flow Controls - Pressure Compensated

2F1C - Technical Information

E2

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General Description

Series 2F1C 2-way flow control valves provide pressure and viscosity compensated flow from port A to port B. The counter direction is blocked (standard) or can be open via an integral reverse flow check valve (optional).

Operation

The compensator spool is located in front of the metering spool. The metering spool is closed in the neutral position to avoid undesired initial actuator motion. The oil flow to open the metering spool has to pass a needle valve (not shown in the sectional drawing). The needle valve can be adjusted from the front panel to set the response time of the 2F1C.

The metering spool is adjusted by the main control knob. The key lock has three positions:

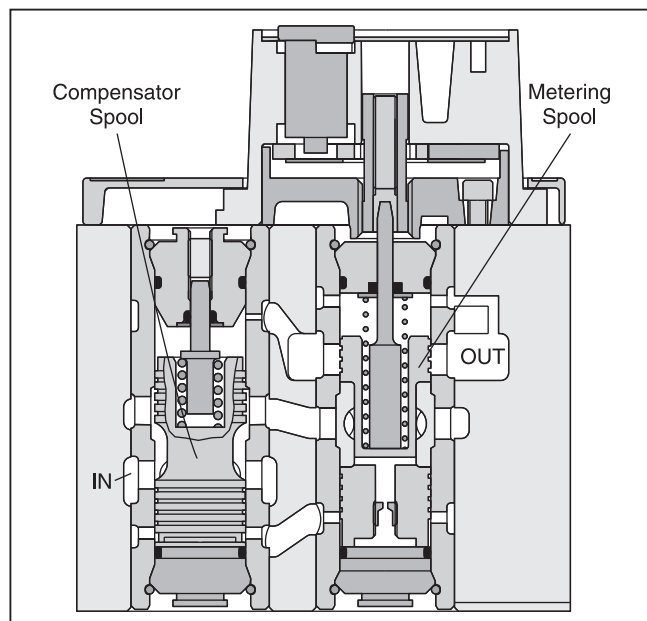
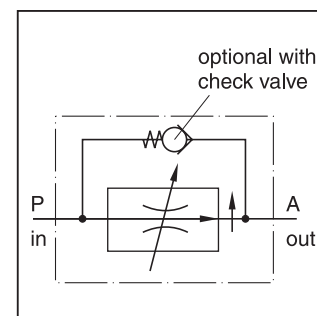
Lock: Adjustment is locked

Adjust: Full adjustment is permitted

Trim: Fine adjustment of $\pm 5\%$ is possible

Features

- 2 way flow control valve
- Subplate mounting according to ISO 6263
- Excellent fine adjustment
- Adjustable response time
- Closed in neutral position
- Optional reverse flow check valve
- 2 sizes: NG10 (3/8"), NG16 (3/4")



Ordering Information

2F1C
2-Way Flow
Control Valve

Size

01
Adjustment
Knob with
Lock

B
Design
Series

5
Seal
Fluorocarbon

**Reverse
Flow Check**

**Options
Check
with
Factory**

Code	Description
02	NG 10 (3/8")
03	NG 16 (3/4")

Code	Description
0	Without Check
C	With Check

Weight:

2F1C02 6.0 kg (13.2 lbs.)

2F1C03 9.0 kg (19.8 lbs.)

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Flow Controls - Pressure Compensated

2F1C - Specifications

E3

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Size	NG 10	NG 16
Actuator	Manual flow rate adjustment	
Mounting Type	ISO 6263	
Mounting Position	Unrestricted	
Fluid Temperature (°C)	+70 (+158°F) maximum	
Ambient Temperature Range (°C)	-25 to +50 (-13°F to +122°F)	
Viscosity Range (cSt / mm ² /s)	2.8 - 400 (13 - 1854 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)	
Maximum Pressure Difference	See Diagram	
Maximum Operating Pressure (Bar)	2F1C02	2F1C03
Port A	14 - 280 (203 - 4060 PSI)	14 - 350 (203 - 5075 PSI)
Port B	0 - 270 (0 - 3915 PSI)	0 - 340 (0 - 4930 PSI)
Flow Direction	A - B Flow control function B - A Blocked or free flow through check valve	

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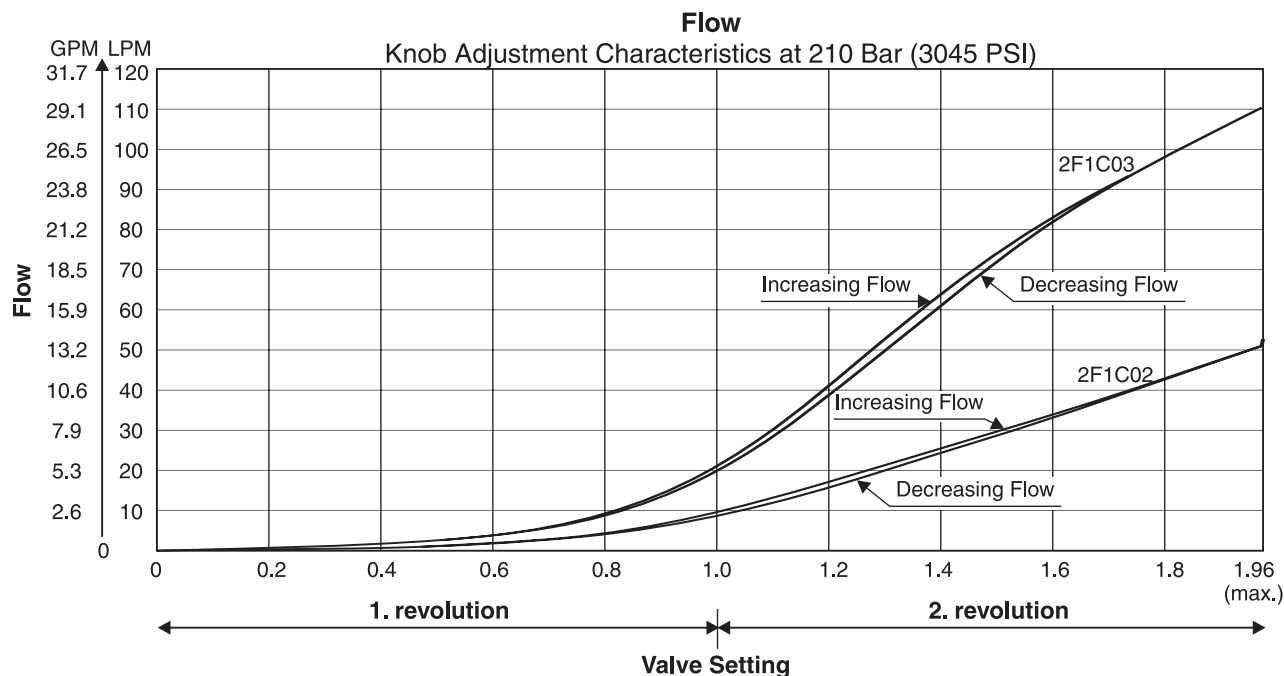
Flow Controls - Pressure Compensated

2F1C - Performance Curves

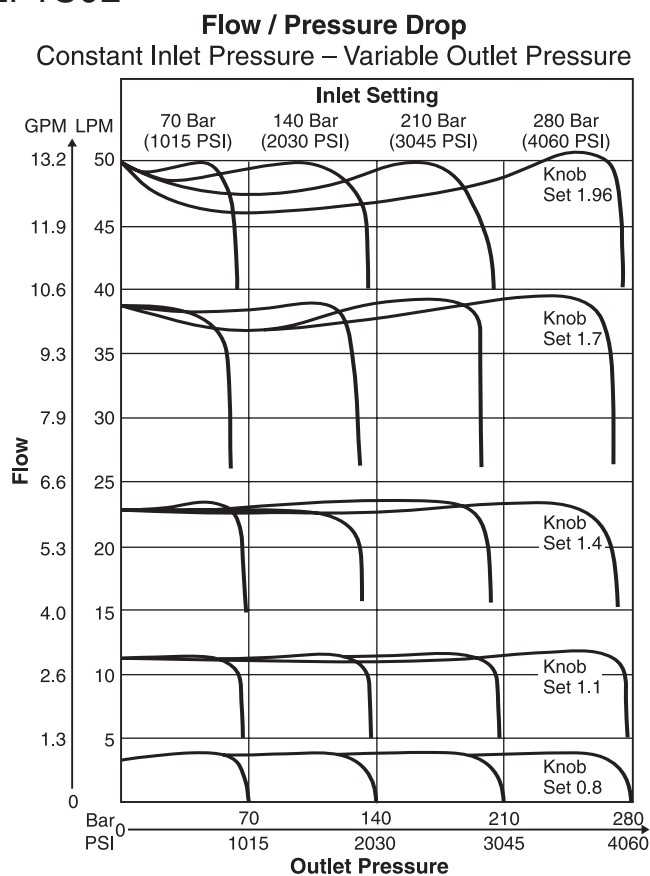
E4

WWW.SUMY.IR

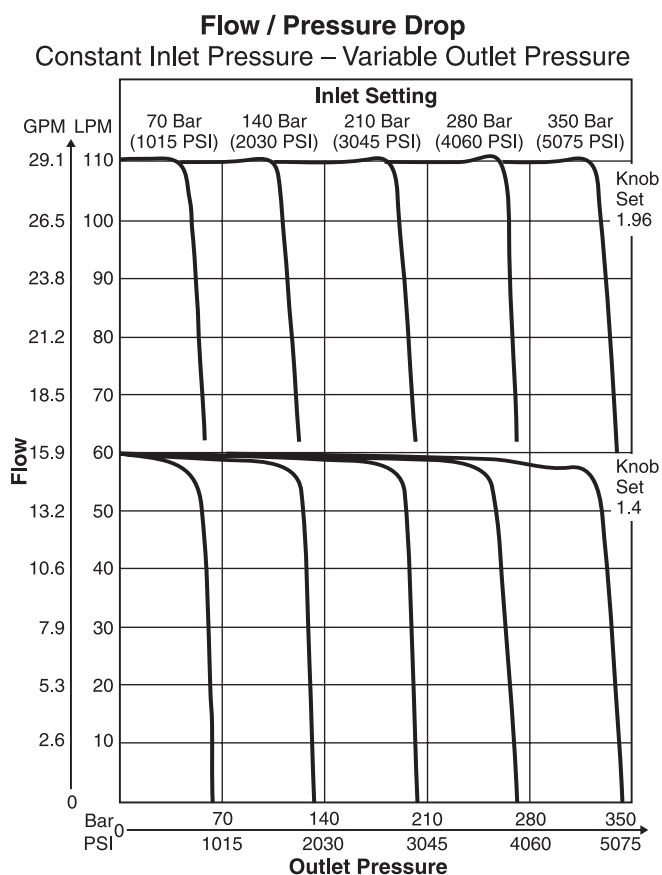
Fluid viscosity 40 cSt at 50°C (122°F).



2F1C02



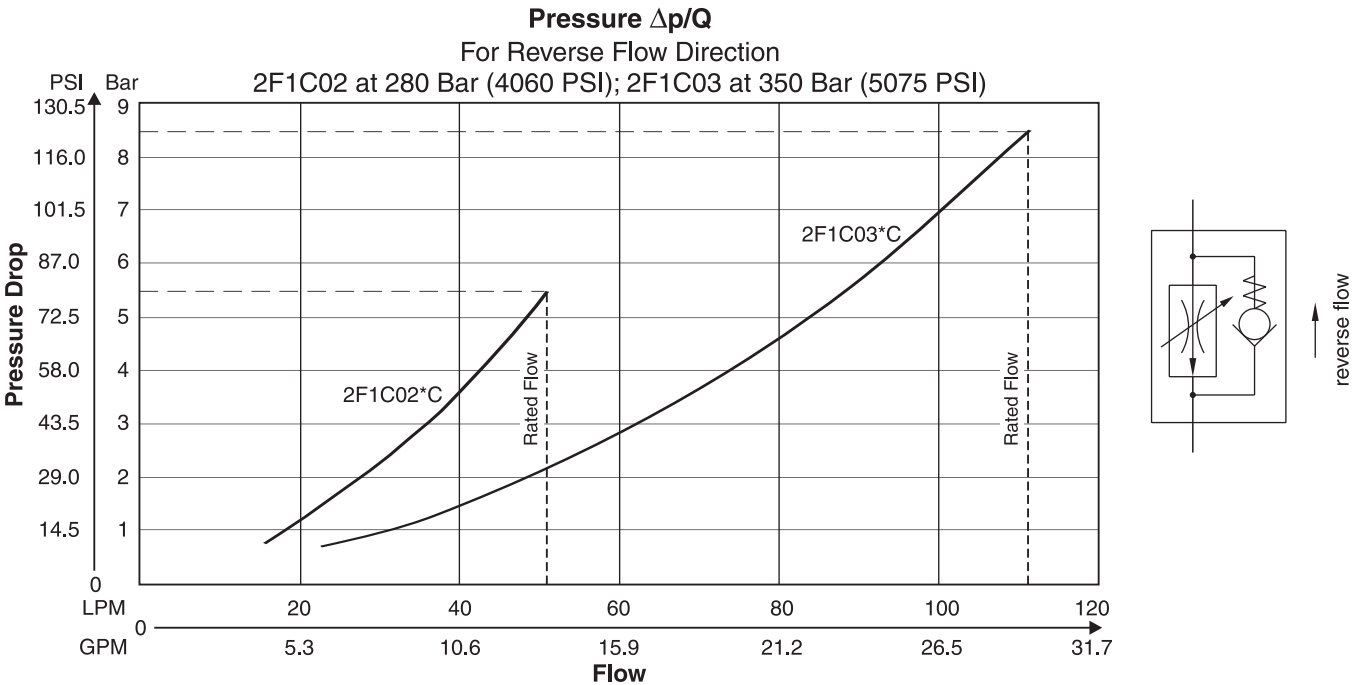
2F1C03



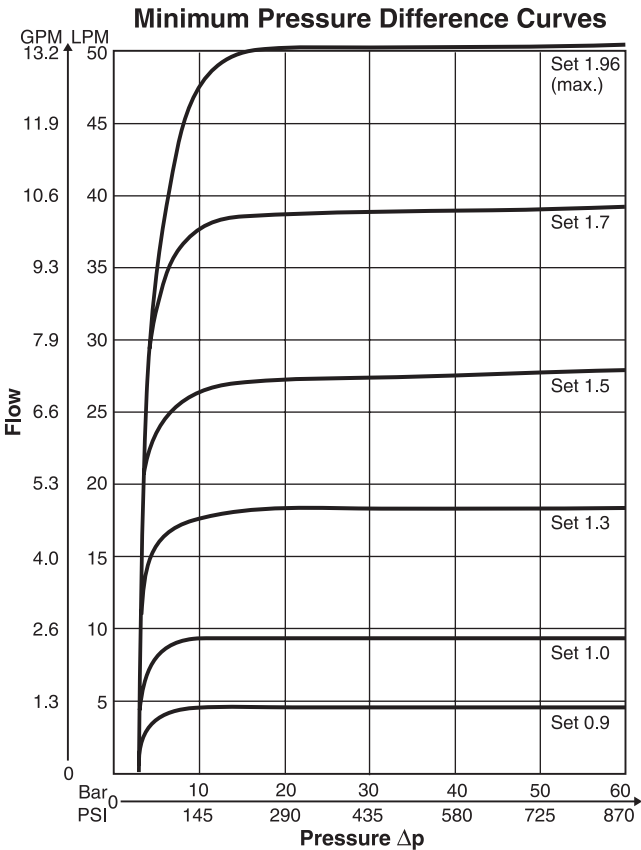
Flow Controls - Pressure Compensated

2F1C - Performance Curves

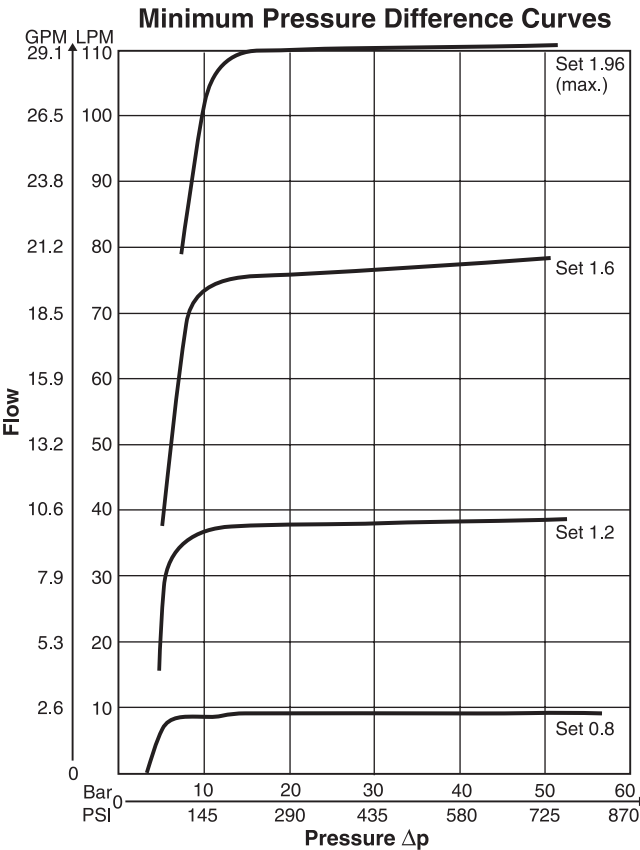
Fluid viscosity 40 cSt at 50°C (122°F).



2F1C02

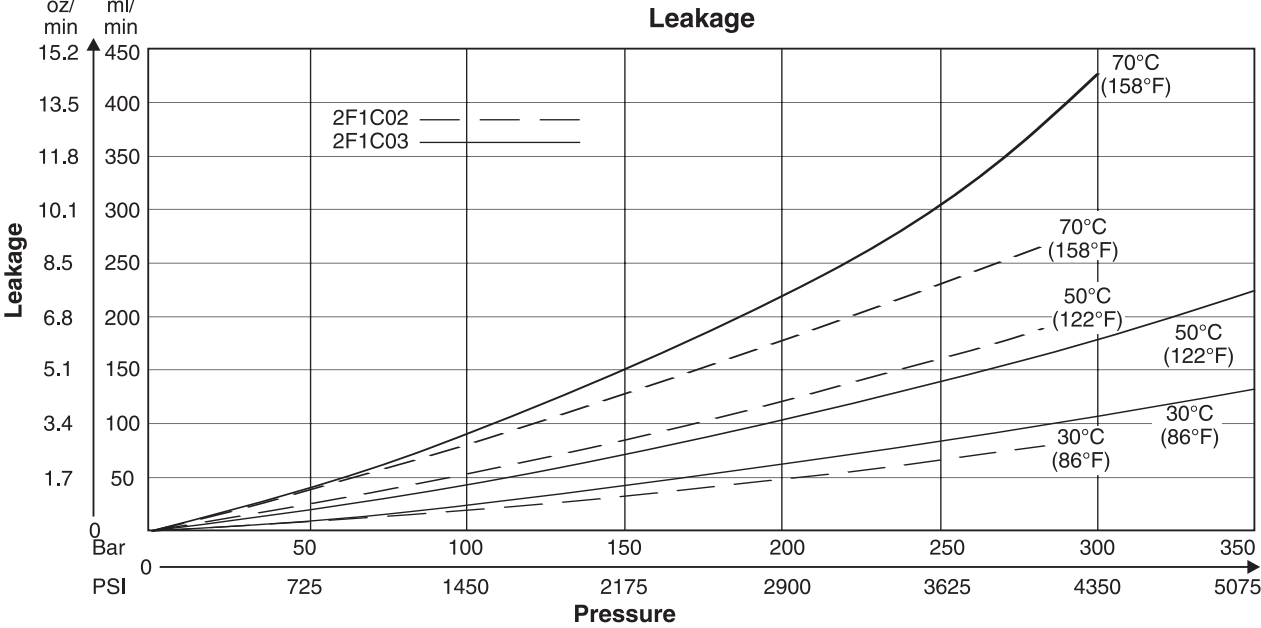


2F1C03



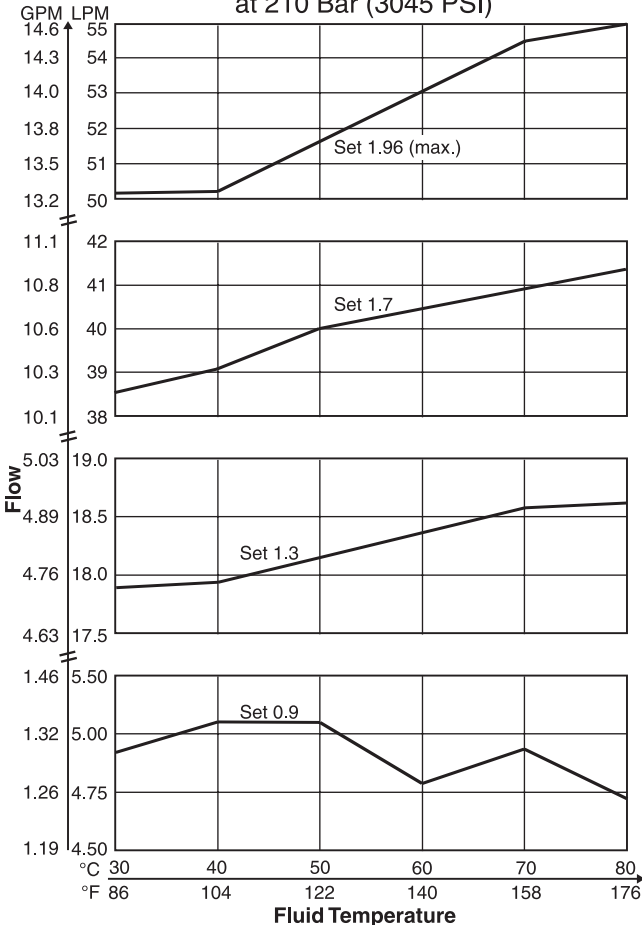
Flow Controls - Pressure Compensated
2F1C - Performance Curves

Fluid viscosity 40 cSt at 50°C (122°F).



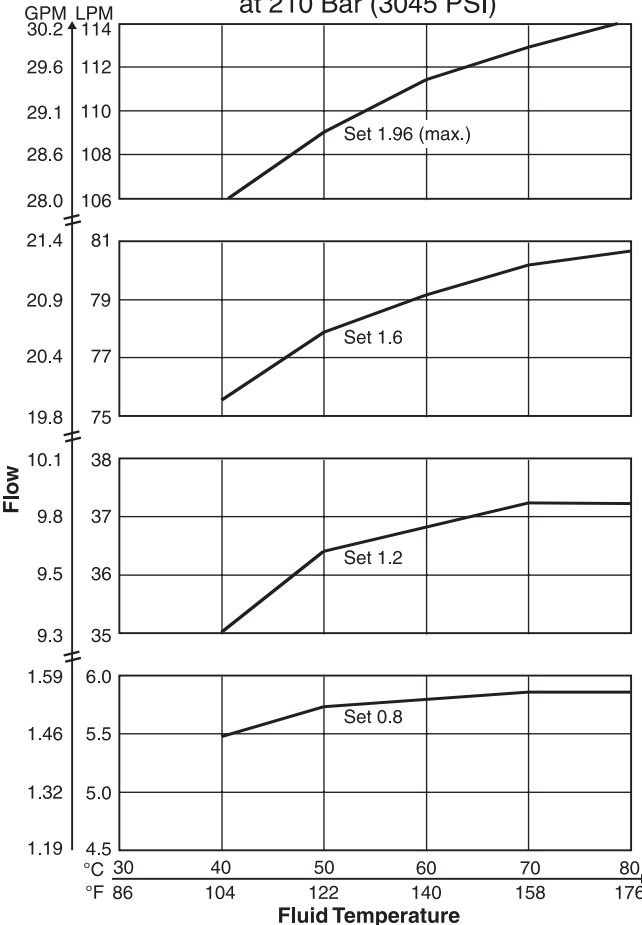
2F1C02

Flow / Temperature Curves
at 210 Bar (3045 PSI)



2F1C03

Flow / Temperature Curves
at 210 Bar (3045 PSI)



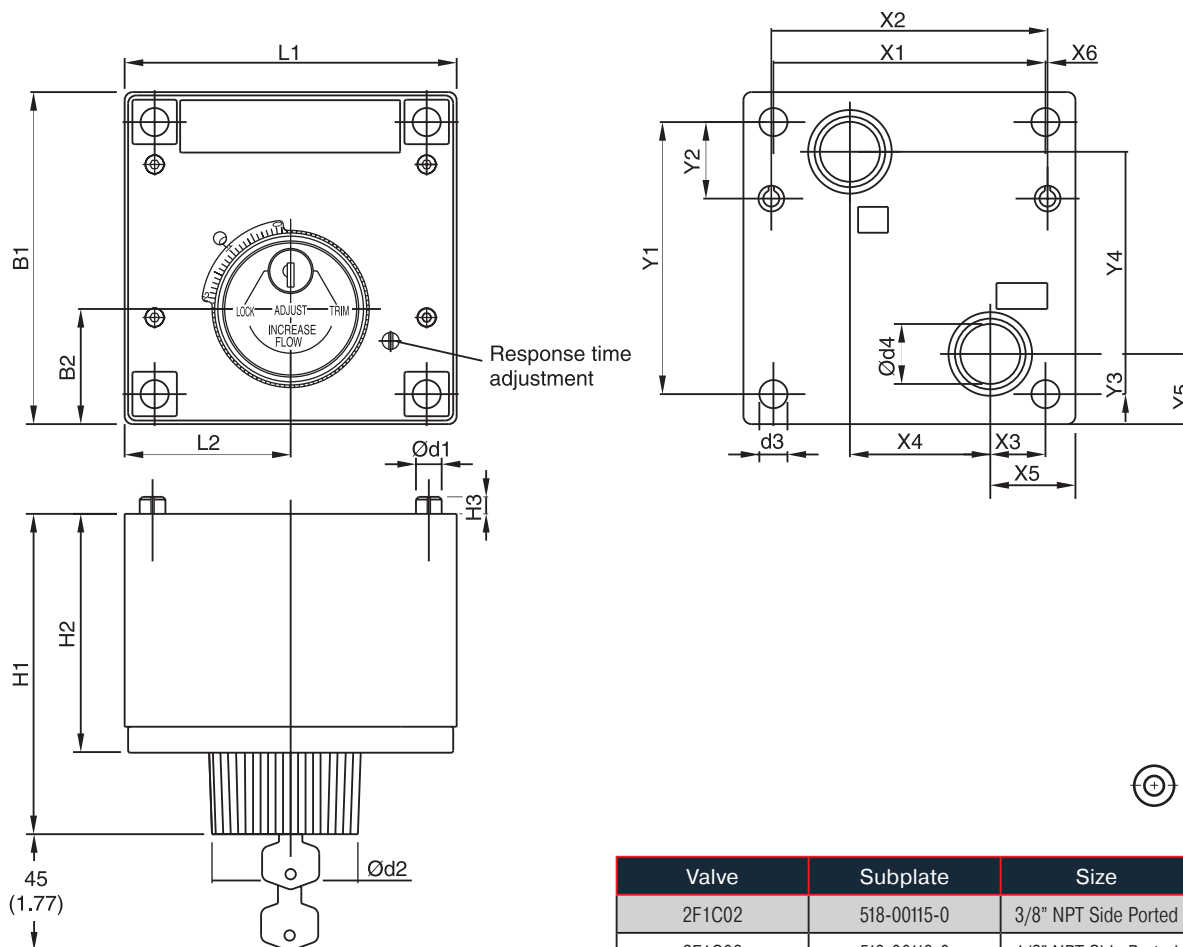
Flow Controls - Pressure Compensated

2F1C - Dimensions

E7

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



Valve	Subplate	Size
2F1C02	518-00115-0	3/8" NPT Side Ported
2F1C03	518-00118-0	1/2" NPT Side Ported

NG	ISO-code	X1	X2	X3	X4	X5	X6	Y1	Y2	Y3	Y4	Y5
02	6263-AM-07-2-A	76.2 (3.00)	79.4 (3.13)	9.5 (0.37)	44.5 (1.75)	19.0 (0.75)	- -	82.5 (3.25)	23.8 (0.94)	30.2 (1.19)	41.3 (1.63)	39.7 (1.56)
03	6263-AK-06-2-A	101.6 (4.00)	103.2 (4.06)	20.6 (0.81)	52.4 (2.06)	31.8 (1.25)	0.8 (0.03)	101.6 (4.00)	28.6 (1.13)	15.1 (0.59)	75.4 (2.97)	26.2 (1.03)

NG	ISO-code	B1	B2	H1	H2	H3	L1	L2	D1	D2	D3	D4
02	6263-AM-07-2-A	101.6 (4.00)	38.1 (1.50)	119.6 (4.71)	87.4 (3.44)	6.4 (0.25)	95.2 (3.75)	47.6 (1.87)	6.4 (0.25)	57.2 (2.25)	8.7 (0.34)	14.2 (0.56)
03	6263-AK-06-2-A	123.8 (4.87)	42.9 (1.69)	121.4 (4.78)	89.2 (3.51)	6.4 (0.25)	123.8 (4.87)	61.9 (2.44)	9.5 (0.37)	57.2 (2.25)	10.5 (0.41)	22.4 (0.88)

NG	ISO-code	Bolt Kit			Seal Kit	Surface Finish
					Fluorocarbon	
02	6263-AM-07-2-A	BK-700-70812-8	4x M8x100 DIN 912 12.9	31.8 Nm (23.5 lb-ft) +/-15%	S26-98617-5	
03	6263-AK-06-2-A	BK395	4x M10x100 DIN 912 12.9	63 Nm (46.5 lb-ft) +/-15%	S26-98617-5	

Check Valves

C4V (Direct Operated) - Technical Information

E8

WWW.SUMY.IR

General Description

Series C4V direct operated check valves allow free flow from A to B. The counter direction is blocked. Series C4V valves are equipped with a leak-free seat type cartridge.

Operation

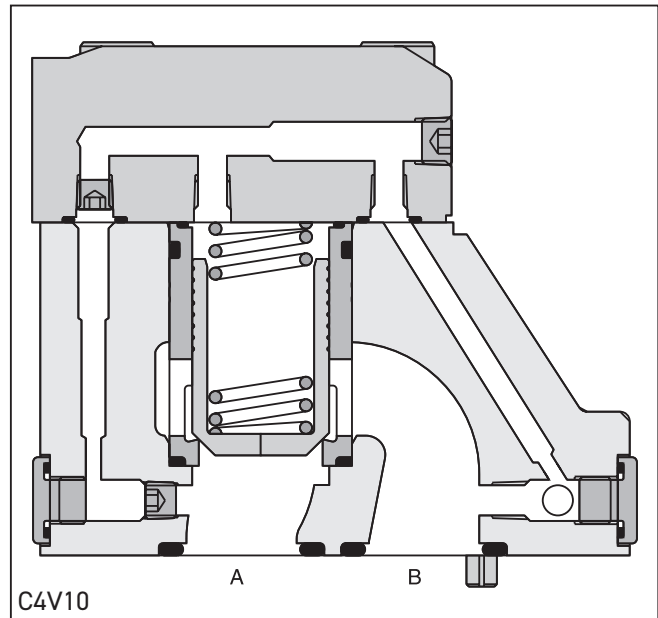
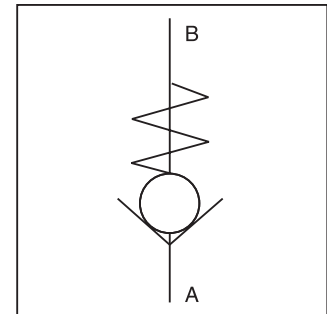
The pressure arising in port A lifts the poppet from the valve seat and releases the flow to B. In the counter direction, the spring and the pressure on top of the cartridge hold the poppet onto the seat and block the flow.

Features

- High flow, low pressure drop design
- Minimal internal leakage
- Six crack pressure options



C4V06



C4V10

Ordering Information

C4V		5	3	0		B		
Direct Operated Check Valve	Size	Maximum Pressure 350 Bar (5075 PSI)	Subplate Mounting		Approximate Cracking Pressure	Design Series	Seal	Options Check with Factory

Code	Description
03	NG 10
06	NG 25
10	NG 32

Code	Description
1	Nitrile
5	Fluorocarbon

Weight:

C4V03	2.8 kg (6.2 lbs.)
C4V06	4.6 kg (10.1 lbs.)
C4V10	6.1 kg (13.5 lbs.)

Code	Description	
	C4V03	C4V06 / C4V10
1	2.8 Bar (40.6 PSI)	3.5 Bar (50.8 PSI)
2	0.5 Bar (7.3 PSI)	0.5 Bar (7.3 PSI)
3	0.3 Bar (4.4 PSI)	0.3 Bar (4.4 PSI)
4	2.2 Bar (31.9 PSI)	2.2 Bar (31.9 PSI)
5	—	9.0 Bar (130.5 PSI)
6	1.2 Bar (17.4 PSI)	1.2 Bar (17.4 PSI)
7	3.0 Bar (43.5 PSI)	—

⚠ WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Check Valves

C4V (Direct Operated) - Technical Information

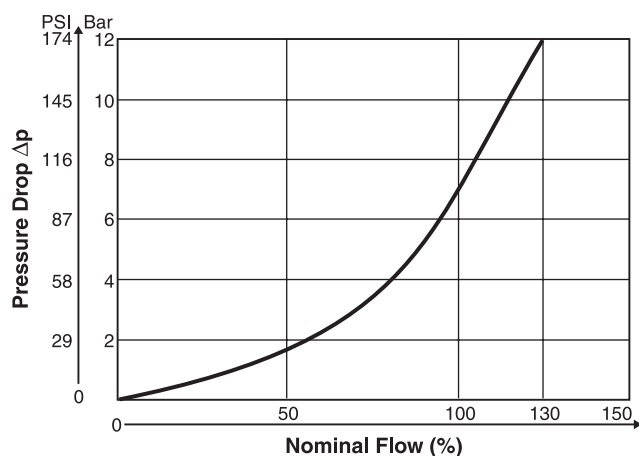
E9

WWW.SUMY.IR

Specifications

General			
Size	NG 10	NG 25	NG 32
Subplate Mounting	ISO 5781		
Mounting Position	Unrestricted		
Ambient Temperature Range (°C)	-20 to +80 (-4°F to +176°F)		
Hydraulic			
Max Operating Pressure (Bar)	350 (5075 PSI)		
Pressure Range (Bar)	105 (1523 PSI), 210 (3045 PSI), 350 (5075 PSI)		
Nominal Flow (LPM)	150 (39.7 GPM)	270 (71.4 GPM)	450 (119.0 GPM)
Fluid	Hydraulic oil according to DIN 51524		
Viscosity	Permitted (cSt / mm²/s)	20 - 380 (93 - 1761 SSU)	
	Recommended (cSt / mm²/s)	30 - 50 (139 - 232 SSU)	
Fluid Temperature Recommended (°C)	+30 to +50 (+86°F to +122°F)		
Maximum (°C)	-20 to +70 (-4°F to +158°F)		
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)		

Performance Curve



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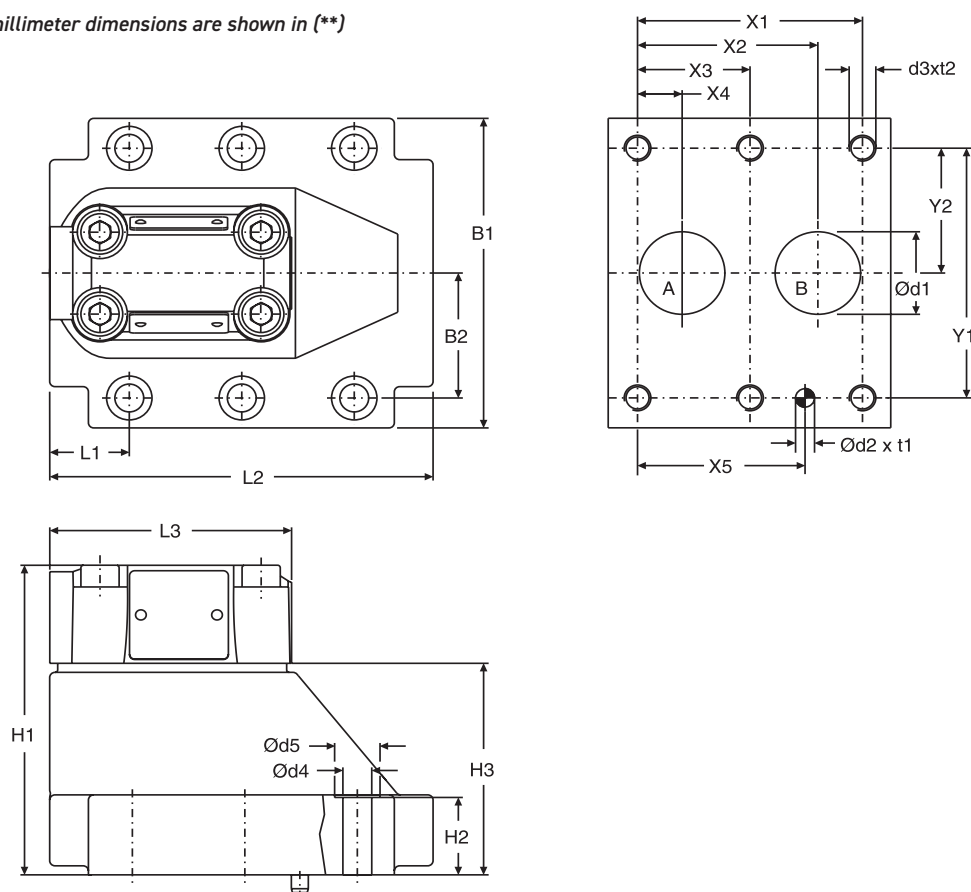
Check Valves

C4V (Direct Operated) - Dimensions

E10

WWW.SUMY.IR

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



NG	ISO-code	X1	X2	X3	X4	X5	Y1	Y2	B1	B2	H1	H2	H3	L1	L2
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	— —	7.2 (0.28)	31.8 (1.25)	66.7 (2.63)	33.4 (1.31)	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	45.0 (1.77)	29.0 (1.14)	94.8 (3.73)
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	— —	11.1 (0.44)	44.5 (1.75)	79.4 (3.13)	39.7 (1.56)	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	71.5 (2.81)	34.7 (1.37)	126.8 (4.99)
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	42.1 (1.66)	16.7 (0.66)	62.7 (2.47)	96.8 (3.81)	48.4 (1.91)	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	— —	30.6 (1.20)	144.3 (5.68)

Tolerance for all dimensions: +/-0.2 (0.007)

NG	ISO-code	d1max	d2	t1	d3	t2	d4	d5
10	5781-06-07-0-00	15.0 (0.59)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal Kit		Surface Finish
					Nitrile	Fluorocarbon	
10	5781-06-07-0-00	BK505	4x M10 x 35 DIN 912 12.9	68 Nm (50.2 lb-ft) +/-15%	S16-39362-0	S16-39362-5	
25	5781-08-10-0-00	BK485	4x M10 x 45 DIN 912 12.9	68 Nm (50.2 lb-ft) +/-15%	S16-39364-0	S16-39364-5	
32	5781-10-13-0-00	BK506	6x M10 x 45 DIN 912 12.9	68 Nm (50.2 lb-ft) +/-15%	S16-39366-0	S16-39366-5	

Check Valves

C4V (Pilot Operated) - Technical Information

E11

WWW.SUMY.IR

General Description

Series C4V hydraulically pilot operated check valves allow free flow from A to B. The counter-flow direction is blocked.

When pressure is applied to control port X, the ring chamber flow from B to A is released.

Up to four different pilot control ratios are available (see Ordering Information).

Check valves allow free flow from A to B. The counter direction is blocked. The C4V series are equipped with a leak-free seat type cartridge.

Operation

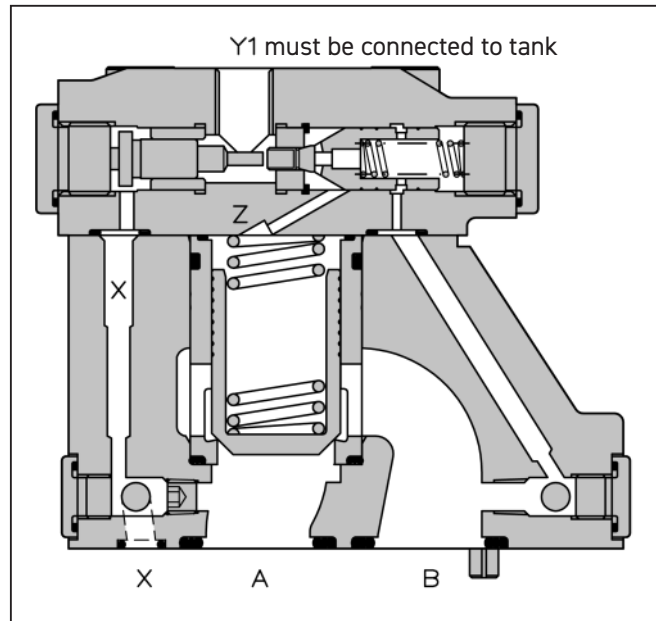
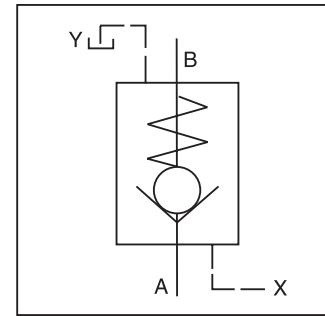
When no pressure is applied to the X-port, the flow from B to A is blocked, because the pressure in B is also in effect on top of the poppet.

Pressurizing the X port relieves the area on top of the poppet to the drain port and allows flow from B to A.

The seat design of the C4V valve series provides leak-free separation of port A and B in the closed position.

Features

- High flow, low pressure drop design
- Minimal internal leakage



Ordering Information

C4V

Pilot Operated Check Valve

Size

5

Maximum Pressure
350 Bar
(5075 PSI)

Y1 Port

Opening Ratio

Approximate Cracking Pressure

B

Design Series

Seal

Options Check with Factory

Code	Description
03	NG 10
06	NG 25
10	NG 32

Code	Description
7	SAE (Y1 port 7/16-20 UNF)
9	BSP (Y1 port G1/4")

Code	Description
1	Nitrile
5	Fluorocarbon

Weight:

C4V03

2.8 kg (6.2 lbs)

C4V06

4.6 kg (10.1 lbs.)

C4V10

6.1 kg (13.5 lbs.)

Code	Description
1	1:1
3	3:1
8	8:1
9	10:1

Code	Description	
	Flow A - B C4V03	Flow A - B C4V06 / C4V10
2	1.0 Bar (14.5 PSI)	1.0 Bar (14.5 PSI)
4	4.0 Bar (58.0 PSI)	3.5 Bar (50.8 PSI)
6	2.0 Bar (29.0 PSI)	2.2 Bar (31.9 PSI)
	Flow B - A C4V03	Flow B - A C4V06 / C4V10
2	1.5 Bar (21.8 PSI)	1.7 Bar (24.7 PSI)
4	5.5 Bar (79.8 PSI)	6.0 Bar (87.0 PSI)
6	3.0 Bar (43.5 PSI)	3.8 Bar (55.1 PSI)

Weight:

C4V03	2.8 kg (6.2 lbs)
C4V06	4.6 kg (10.1 lbs.)
C4V10	6.1 kg (13.5 lbs.)

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Industrial
Hydraulic Valves

MSG14-2500/US
Flow Control and Check Valves

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Check Valves

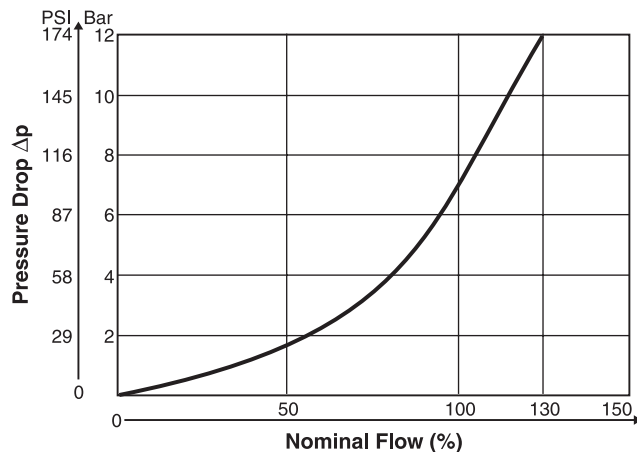
C4V (Pilot Operated) - Technical Information

E12

WWW.SUMY.IR

Specifications			
General			
Size	NG 10	NG 25	NG 32
Subplate Mounting	ISO 5781		
Mounting Position	Unrestricted		
Ambient Temperature Range (°C)	-20 to +80 (-4°F to +176°F)		
Hydraulic			
Max Operating Pressure (Bar)	350 (5075 PSI)		
Nominal Flow (LPM)	150 (39.7 GPM)	270 (71.4 GPM)	450 (119.0 GPM)
Fluid	Hydraulic oil according to DIN 51524		
Viscosity	Permitted (cSt / mm²/s)	20 - 380 (93 - 1761 SSU)	
	Recommended (cSt / mm²/s)	30 - 50 (139 - 232 SSU)	
Fluid Temperature Recommended (°C)	+30 to +50 (+86°F to +122°F)		
	Maximum (°C)	-20 to +70 (-4°F to +158°F)	
Filtration	ISO 4406 (1999) 18/16/13 (meet NAS 1638:7)		

Performance Curve



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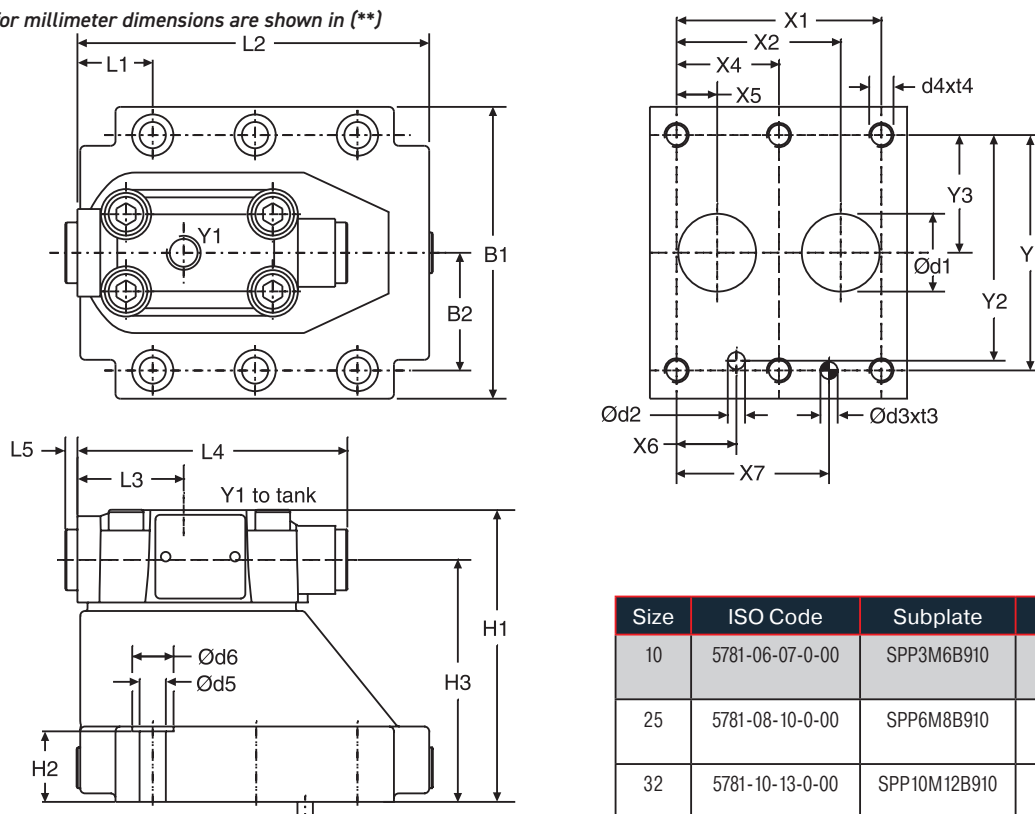
Check Valves

C4V (Pilot Operated) - Dimensions

E13

WWW.SUMY.IR

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



Size	ISO Code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP X, Y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP X, Y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1-1/2" BSPP X, Y = 1/4" BSPP

NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4	Y5	Y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	-	-	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	-	-	-
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	-	-	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	-	-	-
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	-	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	-	-	-

Tolerance for all dimensions: +/-0.2 (0.007)

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	62.5 (2.46)	-	-	-	29.4 (1.16)	95.2 (3.75)	43.7 (1.72)	111.0 (4.37)	5.0 (0.20)	-
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	89.0 (3.50)	-	-	-	35.1 (1.38)	127.2 (5.01)	43.7 (1.72)	111.0 (4.37)	5.0 (0.20)	-
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	99.5 (3.92)	-	-	-	31.0 (1.22)	144.7 (5.70)	43.7 (1.72)	111.0 (4.37)	5.0 (0.20)	-

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	5781-06-07-0-00	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal		Surface Finish
					Nitrile	Fluorocarbon	
10	5781-06-07-0-00	BK505	4x M10 x 35 DIN 912 12.9	68 Nm (50.2 lb-ft) +/-15%	S16-39362-0	S16-39362-5	
25	5781-08-10-0-00	BK485	4x M10 x 45 DIN 912 12.9	68 Nm (50.2 lb-ft) +/-15%	S16-39364-0	S16-39364-5	
32	5781-10-13-0-00	BK506	6x M10 x 45 DIN 912 12.9	68 Nm (50.2 lb-ft) +/-15%	S16-39366-0	S16-39366-5	

Check Valves

C5V (Direct Operated) - Technical Information

E14

WWW.SUMY.IR

General Description

Series C5V direct operated check valves provide free flow in one direction and block the flow in the counter direction.

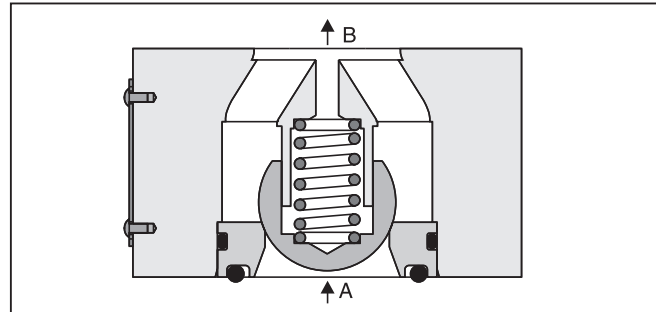
The SAE flanges allow to mount the C5V directly on the pressure port of pumps for protection against pressure shocks from the system.

Operation

The ball is held on its seat by a spring under zero pressure condition. When flow is increased to the cracking pressure, free flow is allowed from port A to port B. Blocked flow is created when operating pressure and spring on Port B exceed pressure on port A.

Features

- Direct operated check valve
- SAE 61 and SAE 62 flanges
- 4 sizes (SAE 3/4", 1", 1 1/4", 1 1/2")
- 3 springs
- 2 different seal configurations



Ordering Information

C5V

Direct Operated Check Valve

Size

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"
12	SAE 1-1/2"

Flange

Code	Description
3	SAE 61
6	SAE 62

Body Sealing

Code	Description
1	Sealing for Port A
2*	Sealing for Ports A and X
3	Without Sealing

* For combination with R5U Unloading Valve, SAE 61 only (flange option 3)

Cracking Pressure

Code	Description
0	0.5 Bar (7 PSI)
1	1.0 Bar (15 PSI)
2	2.0 Bar (29 PSI)

B

Design Series

Seal

Code	Description
1	Nitrile
5	Fluorocarbon

Options

Code	Description
Omit	Standard
019*	C5V10 for M14

* For SAE 62 only

Weight:

C5V06

0.6 kg (1.3 lbs.)

C5V08

0.9 kg (2.0 lbs.)

C5V10

1.3 kg (2.9 lbs.)

C5V12

1.8 kg (4.0 lbs.)

Weight:

C5V06	0.6 kg (1.3 lbs.)
C5V08	0.9 kg (2.0 lbs.)
C5V10	1.3 kg (2.9 lbs.)
C5V12	1.8 kg (4.0 lbs.)

WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Check Valves

C5V (Direct Operated) - Technical Information

E15

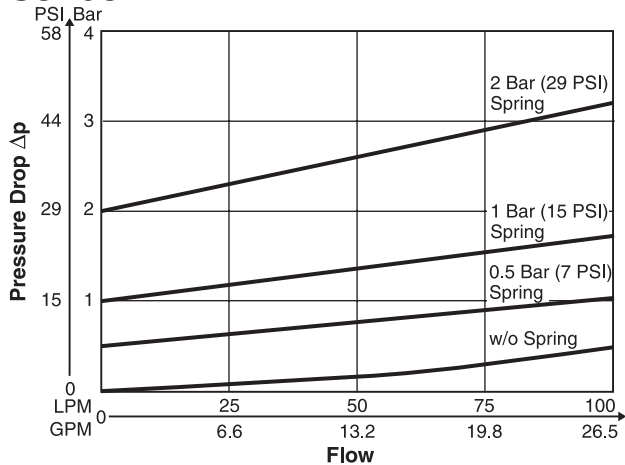
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Specifications

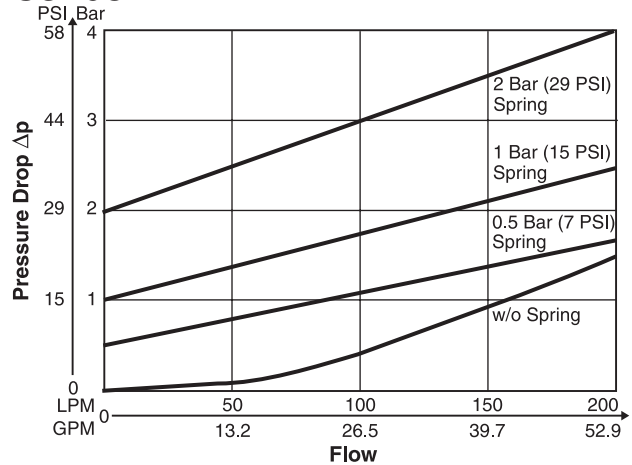
General				
Size	06 (3/4")	08 (1")	10 (1-1/4")	12 (1-1/2")
Mounting	2 port in-line flange SAE 61 and SAE 62			
Mounting Position	Unrestricted			
Ambient Temperature Range (°C)	-20 to +50 (-4°F to +122°F)			
Hydraulic				
Max Operating Pressure (Bar)	SAE 61	350 (5075 PSI)	350 (5075 PSI)	280 (4060 PSI)
	SAE 62	420 (6090 PSI)	420 (6090 PSI)	420 (6090 PSI)
Nominal Flow (LPM)	100 (26.5 GPM)	200 (52.8 GPM)	400 (105.8 GPM)	750 (198.4 GPM)
Fluid	Hydraulic oil according to DIN 51524 - 51525			
Fluid	Hydraulic oil according to DIN 51524			
Viscosity	Permitted (cSt / mm²/s)	10 - 650 (46 - 3013 SSU)		
	Recommended (cSt / mm²/s)	30 (139 SSU)		
Fluid Temperature (°C)	-20 to +80 (-4°F to +176°F)			
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638:7			

Performance Curves

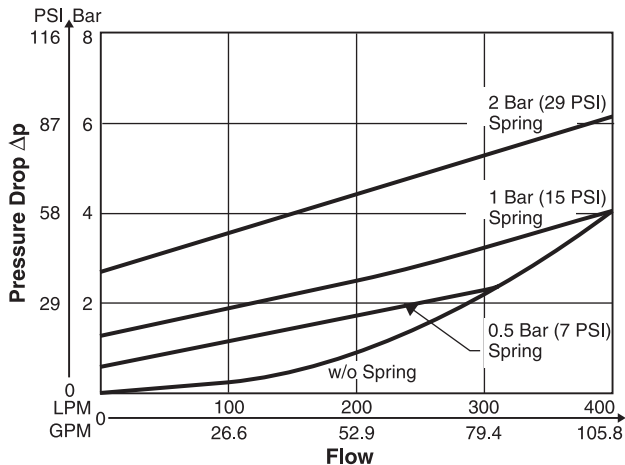
C5V06



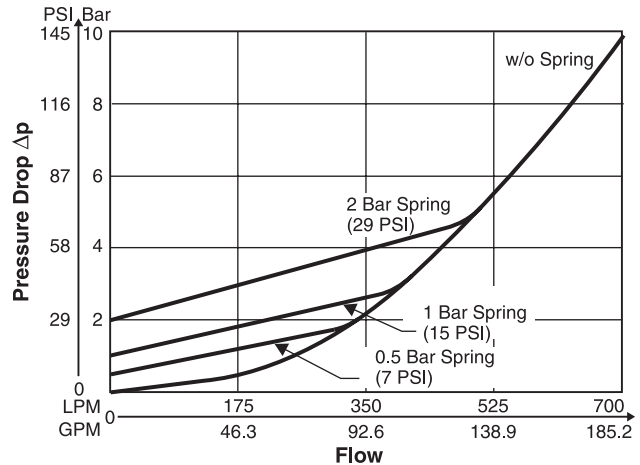
C5V08



C5V10



C5V12



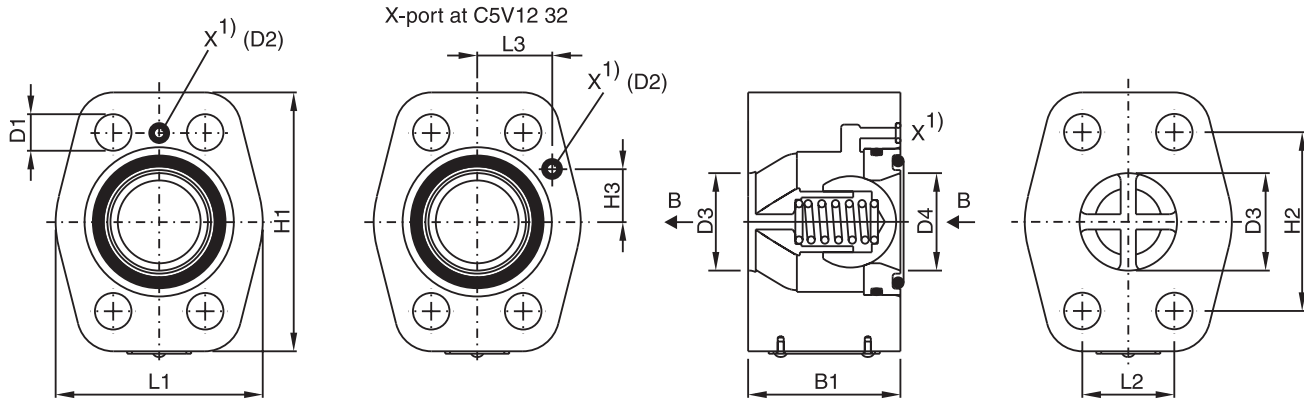
Check Valves

C5V (Direct Operated) - Dimensions

E16

WWW.SUMY.IR

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



Position of O-ring seal according to ordering information

¹⁾ X1 port for C5V*32* (for use with Unloading Valve R5U)

Series	Nominal Size		L1	L2	L3	H1	H2	H3	B1	D1	D2	D3+0.8	D4
C5V06	3/4"	SAE 61	48.0 (1.89)	22.2 (0.87)	27.2 (1.07)	64.0 (2.52)	47.6 (1.87)	22.4 (0.88)	45.0 (1.77)	10.5 (0.41)	Ø3.0 (0.12)	19.0 (0.75)	19.0 (0.75)
		SAE 62	48.0 (1.89)	23.8 (0.94)	27.2 (1.07)	64.0 (2.52)	50.8 (2.00)	22.4 (0.88)	45.0 (1.77)	10.5 (0.41)	–	19.0 (0.75)	19.0 (0.75)
C5V06	1"	SAE 61	60.0 (2.36)	26.2 (1.03)	27.2 (1.07)	74.0 (2.91)	52.4 (2.06)	22.4 (0.88)	45.0 (1.77)	10.5 (0.41)	Ø3.0 (0.12)	25.0 (0.98)	25.0 (0.98)
		SAE 62	60.0 (2.36)	27.8 (1.09)	27.2 (1.07)	74.0 (2.91)	57.2 (2.25)	22.4 (0.88)	45.0 (1.77)	12.5 (0.49)	–	25.0 (0.98)	25.0 (0.98)
C5V10	1-1/4"	SAE 61	68.0 (2.68)	30.2 (1.19)	27.2 (1.07)	85.0 (3.35)	58.7 (2.31)	22.4 (0.88)	50.0 (1.97)	12.5 (0.49)	Ø3.0 (0.12)	32.0 (1.26)	32.0 (1.26)
		SAE 62	68.0 (2.68)	31.8 (1.25)	27.2 (1.07)	85.0 (3.35)	66.7 (2.63)	22.4 (0.88)	50.0 (1.97)	13.5* (0.53)	–	32.0 (1.26)	32.0 (1.26)
C5V12	1-1/2"	SAE 61	80.0 (3.15)	35.7 (1.41)	27.2 (1.07)	104.0 (4.09)	69.8 (2.75)	22.4 (0.88)	50.0 (1.97)	13.5 (0.53)	Ø3.0 (0.12)	42.0 (1.65)	38.0 (1.50)
		SAE 62	80.0 (3.15)	36.5 (1.44)	27.2 (1.07)	104.0 (4.09)	79.4 (3.13)	22.4 (0.88)	50.0 (1.97)	17.0 (0.67)	–	42.0 (1.65)	38.0 (1.50)
* D1 = 15 (0.59) at option code 019 for M14 mounting screws.													

* D1 = 15 (0.59) at option code 019 for M14 mounting screws.

Seal Kits		
NG	Nitrile	Fluorocarbon
3	S26-75409-0	S26-75409-5
6	S26-75410-0	S26-75410-5
10	S26-75411-0	S26-75411-5
12	S26-75412-0	S26-75412-5

Accessories - Terms of Sale and Warranty Limitations

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WWW.SUMY.IR

PARKER-HANNIFIN CORPORATION — HYDRAULIC VALVE SYSTEMS DIVISION OFFER OF SALE

1. Definitions. As used herein, the following terms have the meanings indicated.

Buyer: means any customer receiving a Quote for Products from Seller.
Goods: means any tangible part, system or component to be supplied by the Seller.
Products: means the Goods, Services and/or Software as described in a Quote provided by the Seller.
Quote: means the offer or proposal made by Seller to Buyer for the supply of Products.
Seller: means Parker-Hannifin Corporation, including all divisions and businesses thereof.
Services: means any services to be supplied by the Seller.
Software: means any software related to the Products, whether embedded or separately downloaded.
Terms: means the terms and conditions of this Offer of Sale or any newer version of the same as published by Seller electronically at www.parker.com/saleterms.

2. Terms. All sales of Products by Seller are contingent upon, and will be governed by, these Terms and, these Terms are incorporated into any Quote provided by Seller to any Buyer. Buyer's order for any Products whether communicated to Seller verbally, in writing, by electronic data interface or other electronic commerce, shall constitute acceptance of these Terms. Seller objects to any contrary or additional terms or conditions of Buyer. Reference in Seller's order acknowledgement to Buyer's purchase order or purchase order number shall in no way constitute an acceptance of any of Buyer's terms of purchase. No modification to these Terms will be binding on Seller unless agreed to in writing and signed by an authorized representative of Seller.

3. Price; Payment. The Products set forth in Seller's Quote are offered for sale at the prices indicated in Seller's Quote. Unless otherwise specifically stated in Seller's Quote, prices are valid for thirty (30) days and do not include any sales, use, or other taxes or duties. Seller reserves the right to modify prices at any time to adjust for any raw material price fluctuations. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). All sales are contingent upon credit approval and payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified in the Quote). Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month or the maximum allowable rate under applicable law.

4. Shipment; Delivery; Title and Risk of Loss. All delivery dates are approximate. Seller is not responsible for damages resulting from any delay. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the shipment carrier at Seller's facility. Unless otherwise agreed, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective indicated shipping date will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.

5. Warranty. The warranty related to the Products is as follows: (i) Goods are warranted against defects in material or workmanship for a period of eighteen (18) months from the date of delivery; (ii) Services shall be performed in accordance with generally accepted practices and using the degree of care and skill that is ordinarily exercised and customary in the field to which the Services pertain and are warranted for a period of six (6) months from the completion of the Services by Seller; and (iii) Software is only warranted to perform in accordance with applicable specifications provided by Seller to Buyer for ninety (90) days from the date of delivery or, when downloaded by a Buyer or end-user, from the date of the initial download. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer:

DISCLAIMER OF WARRANTY: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE SOFTWARE IS ERROR-FREE OR FAULT-TOLERANT, OR THAT BUYER'S USE THEREOF WILL BE SECURE OR UNINTERRUPTED. BUYER AGREES AND ACKNOWLEDGES THAT UNLESS OTHERWISE AUTHORIZED IN WRITING BY SELLER THE SOFTWARE SHALL NOT BE USED IN CONNECTION WITH HAZARDOUS OR HIGH RISK ACTIVITIES OR ENVIRONMENTS. EXCEPT AS EXPRESSLY STATED HEREIN, ALL PRODUCTS ARE PROVIDED "AS IS".

6. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to the Seller within ten (10) days of delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the non-conformance is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

7. LIMITATION OF LIABILITY. IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE THE NON-CONFORMING PRODUCT, RE-PERFORM THE SERVICES, OR REFUND THE PURCHASE PRICE PAID WITHIN A REASONABLE PERIOD OF TIME. IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, NON-COMPLETION OF SERVICES, USE, LOSS OF USE OF, OR INABILITY TO USE THE PRODUCTS OR ANY PART THEREOF, LOSS OF DATA, IDENTITY, PRIVACY, OR CONFIDENTIALITY, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCTS.

8. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which are or become Buyer's property, will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the Products manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Special Tooling. Special Tooling includes but is not limited to tooling, jigs, fixtures and associated manufacturing equipment acquired or necessary to manufacture Products. A tooling charge may be imposed for any Special Tooling. Such Special Tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in Special Tooling belonging to Seller that is utilized in the manufacture of the Products, even if such Special Tooling has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any Special Tooling or other property in its sole discretion at any time.

10. Security Interest. To secure payment of all sums due, Seller retains a security interest in all Products delivered to Buyer and, Buyer's acceptance of these Terms is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.

11. User Responsibility. The Buyer through its own analysis and testing, is solely responsible for making the final selection of the Products and assuring that all performance, endurance, maintenance, safety and warning requirements of the application of the Products are met. The Buyer must analyze all aspects of the application and follow applicable industry standards, specifications, and other technical information provided with the Product. If Seller provides Product options based upon data or specifications provided by the Buyer, the Buyer is responsible for determining that such data and

specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products. In the event the Buyer is not the end-user, Buyer will ensure such end-user complies with this paragraph.

12. Use of Products. Indemnity by Buyer. Buyer shall comply with all instructions, guides and specifications provided by Seller with the Products. Unauthorized Uses. If Buyer uses or resells the Products for any uses prohibited in Seller's instructions, guides or specifications, or Buyer otherwise fails to comply with Seller's instructions, guides and specifications, Buyer acknowledges that any such use, resale, or non-compliance is at Buyer's sole risk. Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, intellectual property infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, application, design, specification or other misuse of Products provided by Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, tooling, equipment, plans, drawings, designs or specifications or other information or things furnished by Buyer; (d) damage to the Products from an external cause, repair or attempted repair by anyone other than Seller, failure to follow instructions, guides and specifications provided by Seller, use with goods not provided by Seller, or opening, modifying, deconstructing or tampering with the Products for any reason; or (e) Buyer's failure to comply with these Terms. Seller shall not indemnify Buyer under any circumstance except as otherwise provided in these Terms.

13. Cancellations and Changes. Buyer may not cancel or modify any order for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller, at any time, may change Product features, specifications, designs and availability.

14. Limitation on Assignment. Buyer may not assign its rights or obligations without the prior written consent of Seller.

15. Force Majeure. Seller does not assume the risk and is not liable for delay or failure to perform any of Seller's obligations by reason of events or circumstances beyond its reasonable control ("Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

16. Waiver and Severability. Failure to enforce any provision of these Terms will not invalidate that provision; nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of these Terms by legislation or other rule of law shall not invalidate any other provision herein and, the remaining provisions will remain in full force and effect.

17. Termination. Seller may terminate any agreement governed by or arising from these Terms for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate, in writing, if Buyer: (a) breaches any provision of these Terms (b) appoints a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or one if filed by a third party (d) makes an assignment for the benefit of creditors; or (e) dissolves its business or liquidates all or a majority of its assets.

18. Ownership of Software. Seller retains ownership of all Software supplied to Buyer hereunder. In no event shall Buyer obtain any greater right in and to the Software than a right in the nature of a license limited to the use thereof and subject to compliance with any other terms provided with the Software.

19. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights ("Intellectual Property Rights") except as provided in this Section. Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on a third party claim that one or more of the Products sold hereunder infringes the Intellectual Property Rights of a third party in the country of delivery of the Products by the Seller to the Buyer. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of any such claim, and Seller having sole control over the defense of the claim including all negotiations for settlement or compromise. If one or more Products sold hereunder is subject to such a claim, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Products, replace or modify the Products so as to render them non-infringing, or offer to accept return of the Products and refund the purchase price less a reasonable allowance for depreciation. Seller has no obligation or liability for any claim of infringement: (i) arising from information provided by Buyer; or (ii) directed to any Products provided hereunder for which the designs are specified in whole or part by Buyer; or (iii) resulting from the modification, combination or use in a system of any Products provided hereunder. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for such claims of infringement of Intellectual Property Rights.

20. Governing Law. These Terms and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to the sale and delivery of the Products.

21. Entire Agreement. These Terms, along with the terms set forth in the main body of any Quote, forms the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. In the event of a conflict between any term set forth in the main body of a Quote and these Terms, the terms set forth in the main body of the Quote shall prevail. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter shall have no effect. These Terms may not be modified unless in writing and signed by an authorized representative of Seller.

22. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards, including those of the United States of America, and the country or countries in which Buyer may operate, including without limitation the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act"), U.S. and E.U. export control and sanctions laws ("Export Laws"), the U.S. Food Drug and Cosmetic Act ("FDCA"), and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), each as currently amended. Buyer agrees to indemnify, defend, and hold harmless Seller from the consequences of any violation of such laws, regulations and standards by Buyer, its employees or agents. Buyer acknowledges that it is familiar with all applicable provisions of the FCPA, the Anti-Kickback Act, Export Laws, the FDCA and the FDA and certifies that Buyer will adhere to the requirements thereof and not take any action that would make Seller violate such requirements. Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly, to any governmental official, foreign political party or official thereof, candidate for foreign political office, or commercial entity or person, for any improper purpose, including the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller. Buyer further represents and agrees that it will not receive, use, service, transfer or ship any Product from Seller in a manner or for a purpose that violates Export Laws or would cause Seller to be in violation of Export Laws.

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Parker Safety Guide for Selecting and Using Hose, Tubing, Fittings and Related Accessories

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WARNING: Failure or improper selection or improper use of hose, tubing, fittings, assemblies, valves, connectors, conductors or related accessories ("Products") can cause death, personal injury and property damage. Possible consequences of failure or improper selection or improper use of these Products include but are not limited to:

- Fittings thrown off at high speed.
- High velocity fluid discharge.
- Explosion or burning of the conveyed fluid.
- Electrocution from high voltage electric powerlines.
- Contact with suddenly moving or falling objects that
- are controlled by the conveyed fluid.
- Injections by high-pressure fluid discharge.

- Dangerously whipping Hose.
- Tube or pipe burst.
- Weld joint fracture.
- Contact with conveyed fluids that may be hot, cold, toxic or
- otherwise injurious.
- Sparking or explosion caused by static electricity buildup or other sources of electricity.
- Sparking or explosion while spraying paint or flammable liquids.
- Injuries resulting from inhalation, ingestion or exposure to fluids.

Before selecting or using any of these Products, it is important that you read and follow the instructions below. No product from any division in Parker Fluid Connectors Group is approved for in-flight aerospace applications. For hoses and fittings used in in-flight aerospace applications, please contact Parker Aerospace Group.

1.0 GENERAL INSTRUCTIONS

1.1 Scope: This safety guide provides instructions for selecting and using (including assembling, installing, and maintaining) these Products. For convenience, all rubber and/or thermoplastic products commonly called "hose" or "tubing" are called "Hose" in this safety guide. Metallic tube or pipe are called "tube". All assemblies made with Hose are called "Hose Assemblies". All assemblies made with Tube are called "Tube Assemblies".

All products commonly called "fittings", "couplings" or "adapters" are called "Fittings". Valves are fluid system components that control the passage of fluid. Related accessories are ancillary devices that enhance or monitor performance including crimping, flaring, flanging, presetting, bending, cutting, deburring, swaging machines, sensors, tags, lockout handles, spring guards and associated tooling. This safety guide is a supplement to and is to be used with the specific Parker publications for the specific Hose, Fittings and Related Accessories that are being considered for use. Parker publications are available at www.parker.com. SAE J1273 (www.sae.org) and ISO 17165-2 (www.ansi.org) also provide recommended practices for hydraulic Hose Assemblies, and should be followed.

1.2 Fail-Safe: Hose, Hose Assemblies, Tube, Tube Assemblies and Fittings can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of the Hose, Hose Assembly, Tube, Tube Assembly or Fitting will not endanger persons or property.

1.3 Distribution: Provide a copy of this safety guide to each person responsible for selecting or using Hose, Tube and Fitting products. Do not select or use Parker Hose, Tube or Fittings without thoroughly reading and understanding this safety guide as well as the specific Parker publications for the Products.

1.4 User Responsibility: Due to the wide variety of operating conditions and applications for Hose, Tube and Fittings, Parker does not represent or warrant that any particular Hose, Tube or Fitting is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the Products.
- Assuring that the user's requirements are met and that the application presents no health or safety hazards.
- Following the safety guide for Related Accessories and being trained to operate Related Accessories.
- Providing all appropriate health and safety warnings on the equipment on which the Products are used.
- Assuring compliance with all applicable government and industry standards.

1.5 Additional Questions: Call the appropriate Parker technical service department if you have any questions or require any additional information.

See the Parker publication for the Products being considered or used, or call 1-800-CPARKER, or go to www.parker.com, for telephone numbers of the appropriate technical service department.

2.0 HOSE, TUBE & FITTINGS SELECTION INSTRUCTIONS

2.1 Electrical Conductivity: Certain applications require that the Hose be nonconductive to prevent electrical current flow. Other applications require the Hose and the Fittings and the Hose/Fitting interface to be sufficiently conductive to drain off static electricity. Extreme care must be exercised when selecting Hose, Tube and Fittings for these or any other applications in which electrical conductivity or nonconductivity is a factor.

The electrical conductivity or nonconductivity of Hose, Tube and Fittings is dependent upon many factors and may be susceptible to change. These factors include but are not limited to the various materials used to make the Hose and the Fittings, Fitting finish (some Fitting finishes are electrically conductive while others are nonconductive), manufacturing methods (including moisture control), how the Fittings contact the Hose, age and amount of deterioration or damage or other changes, moisture content of the Hose at any particular time, and other factors.

The following are considerations for electrically nonconductive and conductive Hose. For other applications consult the individual catalog pages and the appropriate industry or regulatory standards for proper selection.

2.1.1 Electrically Nonconductive Hose: Certain applications require that the Hose be nonconductive to prevent electrical current flow or to maintain electrical isolation. For applications that require Hose to be electrically nonconductive, including but not limited to applications near high voltage electric lines, only special nonconductive Hose can be used. The manufacturer of the equipment in which the nonconductive Hose is to be used must be consulted to be certain that the Hose, Tube and Fittings that are selected are proper for the application. Do not use any Parker Hose or Fittings for any such application requiring nonconductive Hose, including but not limited to applications near high voltage electric lines or dense magnetic fields, unless (i) the application is expressly approved in the Parker technical publication for the product, (ii) the Hose is marked "nonconductive", and (iii) the manufacturer of the equipment on which the Hose is to be used specifically approves the particular Parker Hose, Tube and Fittings for such use.

2.1.2 Electrically Conductive Hose: Parker manufactures special Hose for certain applications that require electrically conductive Hose. Parker manufactures special Hose for conveying paint in airless paint spraying applications. This Hose is labeled "Electrically Conductive Airless Paint Spray Hose" on its layline and packaging. This Hose must be properly connected to the appropriate Parker Fittings and properly grounded in order to dissipate dangerous static charge buildup, which occurs in all airless paint spraying applications. Do not use any other Hose for airless paint spraying, even if electrically conductive. Use of any other Hose or failure to properly connect the Hose can cause a fire or an explosion resulting in death, personal injury, and property damage. All hoses that convey fuels must be grounded.

Parker manufactures a special Hose for certain compressed natural gas ("CNG") applications where static electricity buildup may occur. Parker CNG Hose assemblies comply with the requirements of ANSI/IAS NGV 4.2; CSA 12.52, "Hoses for Natural Gas Vehicles and Dispensing Systems"

(www.ansi.org). This Hose is labeled "Electrically Conductive for CNG Use" on its layline and packaging. This Hose must be properly connected to the appropriate Parker Fittings and properly grounded in order to dissipate dangerous static charge buildup, which occurs in, for example, high velocity CNG dispensing or transfer. Do not use any other Hose for CNG applications where static charge buildup may occur, even if electrically conductive. Use of other Hoses in CNG applications or failure to properly connect or ground this Hose can cause a fire or an explosion resulting in death, personal injury, and property damage. Care must also be taken to protect against CNG permeation through the Hose wall. See section 2.6, Permeation, for more information. Parker CNG Hose is intended for dispenser and vehicle use within the specified temperature range. Parker CNG Hose should not be used in confined spaces or unventilated areas or areas exceeding the specified temperature range.

Final assemblies must be tested for leaks. CNG Hose Assemblies should be tested on a monthly basis for conductivity per ANSI/IAS NGV 4.2; CSA 12.52.

Parker manufactures special Hose for aerospace in-flight applications. Aerospace in-flight applications employing Hose to transmit fuel, lubricating fluids and hydraulic fluids require a special Hose with a conductive inner tube. This Hose for in-flight applications is available only from Parker's Stratoflex Products Division. Do not use any other Parker Hose for in-flight applications, even if electrically conductive. Use of other Hoses for in-flight applications or failure to properly connect or ground this Hose can cause a fire or an explosion resulting in death, personal injury and property damage. These Hose assemblies for in-flight applications must meet all applicable aerospace industry, aircraft engine and aircraft requirements.

2.2 Pressure: Hose, Tube and Fitting selection must be made so that the published maximum working pressure of the Hose, Tube and Fittings are equal to or greater than the maximum system pressure. The maximum working pressure of a Hose, or Tube Assembly is the lower of the respective published maximum working pressures of the Hose, Tube and the Fittings used. Surge pressures or peak transient pressures in the system must be below the published maximum working pressure for the Hose, Tube and Fitting. Surge pressures and peak pressures can usually only be determined by sensitive electrical instrumentation that measures and indicates pressures at millisecond intervals. Mechanical pressure gauges indicate only average pressures and cannot be used to determine surge pressures or peak transient pressures. Published burst pressure ratings for Hose is for manufacturing test purposes only and is no indication that the Product can be used in applications at the burst pressure or otherwise above the published maximum recommended working pressure.

2.3 Suction: Hoses used for suction applications must be selected to insure that the Hose will withstand the vacuum and pressure of the system. Improperly selected Hose may collapse in suction application.

2.4 Temperature: Be certain that fluid and ambient temperatures, both steady and transient, do not exceed the limitations of the Hose, Tube, Fitting and Seals. Temperatures below and above the recommended limit can degrade Hose, Tube, Fittings and Seals to a point where a failure may occur and release fluid. Tube and Fittings performances are normally degraded at elevated temperature. Material compatibility can also change at temperatures outside of the rated range. Properly insulate and protect the Hose Assembly when routing near hot objects (e.g. manifolds). Do not use any Hose in any application where failure of the Hose could result in the conveyed fluids (or vapors or mist from the conveyed fluids) contacting any open flame, molten metal, or other potential fire ignition source that could cause burning or explosion of the conveyed fluids or vapors.

2.5 Fluid Compatibility: Hose, and Tube Assembly selection must assure compatibility of the Hose tube, cover, reinforcement, Tube, Plating and Seals with the fluid media used. See the fluid compatibility chart in the Parker publication for the product being considered or used. This information is offered only as a guide. Actual service life can only be determined by the end user by testing under all extreme conditions and other analysis.

Hose, and Tube that is chemically compatible with a particular fluid must be assembled using Fittings and adapters containing likewise compatible seals. Flange or flare processes can change Tube material properties that may not be compatible with certain requirements such as NACE

2.6 Permeation: Permeation (that is, seepage through the Hose or Seal) will occur from inside the Hose or Fitting to outside when Hose or Fitting is used with gases, liquid and gas fuels, and refrigerants (including but not limited to such materials as helium, diesel fuel, gasoline, natural gas, or LPG). This permeation may result in high concentrations of vapors which are potentially flammable, explosive, or toxic, and in loss of fluid. Dangerous explosions, fires, and other hazards can result when using the wrong Hose for such applications. The system designer must take into account the fact that this permeation will take place and must not use Hose or Fitting if this permeation could be hazardous. The system designer must take into account all legal, government, insurance, or any other special regulations which govern the use of fuels and refrigerants. Never use a Hose or Fitting even though the fluid compatibility is acceptable without considering the potential hazardous effects that can result from permeation through the Hose or Tube Assembly. Permeation of moisture from outside the Hose or Fitting to inside the Hose or Fitting will also occur in Hose or Tube assemblies, regardless of internal pressure. If this moisture permeation would have detrimental effects (particularly, but not limited to refrigeration and air conditioning systems), incorporation of sufficient drying capacity in the system or other appropriate system safeguards should be selected and used. The sudden pressure release of highly pressurized gas could also result in Explosive Decompression failure of permeated Seals and Hoses.

2.7 Size: Transmission of power by means of pressurized fluid varies with pressure and rate of flow. The size of the components must be

adequate to keep pressure losses to a minimum and avoid damage due to heat generation or excessive fluid velocity.

2.8 Routing: Attention must be given to optimum routing to minimize inherent problems (kinking or flow restriction due to Hose collapse, twisting of the Hose, proximity to hot objects or heat sources). For additional routing recommendations see SAE J1273 and ISO 17165-2. Hose Assemblies have a finite life and should be installed in a manner that allows for ease of inspection and future replacement. Hose because of its relative short life, should not be used in residential and commercial buildings inside of inaccessible walls or floors, unless specifically allowed in the product literature. Always review all product literature for proper installation and routing instructions.

2.9 Environment: Care must be taken to insure that the Hose, Tube and Fittings are either compatible with or protected from the environment (that is, surrounding conditions) to which they are exposed. Environmental conditions including but not limited to ultraviolet radiation, sunlight, heat, ozone, moisture, water, salt water, chemicals and air pollutants can cause degradation and premature failure.

2.10 Mechanical Loads: External forces can significantly reduce Hose, Tube and Fitting life or cause failure. Mechanical loads which must be considered include excessive flexing, twist, kinking, tensile or side loads, bend radius, and vibration. Use of swivel type Fittings or adapters may be required to insure no twist is put into the Hose. Use of proper Hose or Tube clamps may also be required to reduce external mechanical loads. Unusual applications may require special testing prior to Hose selection.

2.11 Physical Damage: Care must be taken to protect Hose from wear, snagging, kinking, bending smaller than minimum bend radius and cutting, any of which can cause premature Hose failure. Any Hose that has been kinked or bent to a radius smaller than the minimum bend radius, and any Hose that has been cut or is cracked or is otherwise damaged should be removed and discarded. Fittings with damages such as scratches on sealing surfaces and deformation should be replaced.

2.12 Proper End Fitting: See instructions 3.2 through 3.5. These recommendations may be substantiated by testing to industry standards such as SAE J517 for hydraulic applications, or MIL-A-5070, AS1339, or AS3517 for Hoses from Parker's Stratoflex Products Division for aerospace applications.

2.13 Length: When determining the proper Hose or Tube length of an assembly, be aware of Hose length change due to pressure, Tube length change due to thermal expansion or contraction, and Hose or Tube and machine tolerances and movement must be considered. When routing short hose assemblies, it is recommended that the minimum free hose length is always used. Consult the hose manufacturer for their minimum free hose length recommendations. Hose assemblies should be installed in such a way that any motion or flexing occurs within the same plane.

2.14 Specifications and Standards: When selecting Hose, Tube and Fittings, government, industry, and Parker specifications and recommendations must be reviewed and followed as applicable.

2.15 Hose Cleanliness: Hose and Tube components may vary in cleanliness levels. Care must be taken to insure that the Hose and Tube Assembly selected has an adequate level of cleanliness for the application.

2.16 Fire Resistant Fluids: Some fire resistant fluids that are to be conveyed by Hose or Tube require use of the same type of Hose or Tube as used with petroleum base fluids. Some such fluids require a special Hose, Tube, Fitting and Seal, while a few fluids will not work with any Hose at all. See instructions 2.5 and 1.5. The wrong Hose, Tube, Fitting or Seal may fail after a very short service. In addition, all liquids but pure water may burn fiercely under certain conditions, and even pure water leakage may be hazardous.

2.17 Radiant Heat: Hose and Seals can be heated to destruction without contact by such nearby items as hot manifolds or molten metal. The same heat source may then initiate a fire. This can occur despite the presence of cool air around the Hose or Seal. Performance of Tube and Fitting subjected to the heat could be degraded.

2.18 Welding or Brazing: When using a torch or arc welder in close proximity to hydraulic lines, the hydraulic lines should be removed or shielded with appropriate fire resistant materials. Flame or weld spatter could burn through the Hose or Seal and possibly ignite escaping fluid resulting in a catastrophic failure. Heating of plated parts, including Hose Fittings and adapters, above 450°F (232°C) such as during welding, brazing or soldering may emit deadly gases. Any elastomer seal on fittings shall be removed prior to welding or brazing, any metallic surfaces shall be protected after brazing or welding when necessary. Welding and brazing filler material shall be compatible with the Tube and Fitting that are joined.

2.19 Atomic Radiation: Atomic radiation affects all materials used in Hose and Tube assemblies. Since the long-term effects may be unknown, do not expose Hose or Tube assemblies to atomic radiation. Nuclear applications may require special Tube and Fittings.

2.20 Aerospace Applications: The only Hose, Tube and Fittings that may be used for in-flight aerospace applications are those available from Parker's Stratoflex Products Division. Do not use any other Hose or Fittings for in-flight applications. Do not use any Hose or Fittings from Parker's Stratoflex Products Division with any other Hose or Fittings, unless expressly approved in writing by the engineering manager or chief engineer of Stratoflex Products Division and verified by the user's own testing and inspection to aerospace industry standards.

2.21 Unlocking Couplings: Ball locking couplings or other Fittings with quick disconnect ability can unintentionally disconnect if they are dragged over obstructions, or if the sleeve or other disconnect member, is bumped or moved enough to cause disconnect. Threaded Fittings should be considered where there is a potential for accidental uncoupling.

3.0 HOSE AND FITTINGS ASSEMBLY AND INSTALLATION INSTRUCTIONS

3.1 Component Inspection: Prior to assembly, a careful examination of the Hose and Fittings must be performed. All components must be checked for correct style, size, catalog number, and length. The Hose must be examined for cleanliness, obstructions, blisters, cover looseness, kinks, cracks, cuts or any other visible defects. Inspect the Fitting and sealing surfaces for burrs, nicks, corrosion or other imperfections. Do NOT use any component that displays any signs of nonconformance.

3.2 Hose and Fitting Assembly: Do not assemble a Parker Fitting on a Parker Hose that is not specifically listed by Parker for that Fitting, unless authorized in writing by the engineering manager or chief engineer of the appropriate Parker division. Do not assemble a Parker Fitting on another manufacturer's Hose or a Parker Hose on another manufacturer's Fitting unless (i) the engineering manager or chief engineer of the appropriate Parker division approves the Assembly in writing or that combination is expressly approved in the appropriate Parker literature for the specific Parker product, and (ii) the user verifies the Assembly and the application through analysis and testing. For Parker Hose that does not specify a Parker Fitting, the user is solely responsible for the selection of the proper Fitting and Hose Assembly procedures. See instruction 1.4.

To prevent the possibility of problems such as leakage at the Fitting or system contamination, it is important to completely remove all debris from the cutting operation before installation of the Fittings. The Parker published instructions must be followed for assembling the Fittings on the Hose. These instructions are provided in the Parker Fitting catalog for the specific Parker Fitting being used, or by calling 1-800-CPARKER, or at www.parker.com.

3.3 Related Accessories: Do not crimp or swage any Parker Hose or Fitting with anything but the listed swage or crimp machine and dies in accordance with Parker published instructions. Do not crimp or swage another manufacturer's Fitting with a Parker crimp or swage die unless authorized in writing by the engineering manager or chief engineer of the appropriate Parker division.

3.4 Parts: Do not use any Parker Fitting part (including but not limited to socket, shell, nipple, or insert) except with the correct Parker mating parts, in accordance with Parker published instructions, unless authorized in writing by the engineering manager or chief engineer of the appropriate Parker division.

3.5 Field Attachable/Permanent: Do not reuse any field attachable Hose Fitting that has blown or pulled off a Hose. Do not reuse a Parker permanent Hose Fitting (crimped or swaged) or any part thereof. Complete Hose Assemblies may only be reused after proper inspection under section 4.0. Do not assemble Fittings to any previously used hydraulic Hose that was in service, for use in a fluid power application.

3.6 Pre-Installation Inspection: Prior to installation, a careful examination of the Hose Assembly must be performed. Inspect the Hose Assembly for any damage or defects. DO NOT use any Hose Assembly that displays any signs of nonconformance.

3.7 Minimum Bend Radius: Installation of a Hose at less than the minimum listed bend radius may significantly reduce the Hose life. Particular attention must be given to preclude sharp bending at the Hose to Fitting juncture. Any bending during installation at less than the minimum bend radius must be avoided. If any Hose is kinked during installation, the Hose must be discarded.

3.8 Twist Angle and Orientation: Hose Assembly installation must be such that relative motion of machine components does not produce twisting.

3.9 Securement: In many applications, it may be necessary to restrain, protect, or guide the Hose to protect it from damage by unnecessary flexing, pressure surges, and contact with other mechanical components. Care must be taken to insure such restraints do not introduce additional stress or wear points.

3.10 Proper Connection of Ports: Proper physical installation of the Hose Assembly requires a correctly installed port connection insuring that no twist or torque is transferred to the Hose when the Fittings are being tightened or otherwise during use.

3.11 External Damage: Proper installation is not complete without insuring that tensile loads, side loads, kinking, flattening, potential abrasion, thread damage or damage to sealing surfaces are corrected or eliminated. See instruction 2.10.

3.12 System Checkout: All air entrapment must be eliminated and the system pressurized to the maximum system pressure (at or below the Hose maximum working pressure) and checked for proper function and freedom from leaks. Personnel must stay out of potential hazardous areas while testing and using.

3.13 Routing: The Hose Assembly should be routed in such a manner so if a failure does occur, the escaping media will not cause personal injury or property damage. In addition, if fluid media comes in contact with hot surfaces, open flame or sparks, a fire or explosion may occur. See section 2.4.

3.14 Ground Fault Equipment Protection Devices (GFEEDs): WARNING! Fire and Shock Hazard. To minimize the danger of fire if the heating cable of a Multitube bundle is damaged or improperly installed, use a Ground Fault Equipment Protection Device. Electrical fault currents may be insufficient to trip a conventional circuit breaker.

For ground fault protection, the IEEE 515: (www.ansi.org) standard for heating cables recommends the use of GFEEDs with a nominal 30 milliampere trip level for "piping systems in classified areas, those areas requiring a high degree of maintenance, or which may be exposed to physical abuse or corrosive atmospheres".

4.0 TUBE AND FITTINGS ASSEMBLY AND INSTALLATION INSTRUCTIONS

4.1 Component Inspection: Prior to assembly, a careful examination of the Tube and Fittings must be performed. All components must be checked for correct style, size, material, seal, and length. Inspect the Fitting and sealing surfaces for burrs, nicks, corrosion, missing seal or other imperfections. Do NOT use any component that displays any signs of nonconformance.

4.2 Tube and Fitting Assembly: Do not assemble a Parker Fitting with a Tube that is not specifically listed by Parker for that Fitting, unless authorized in writing by the engineering manager or chief engineer of the appropriate Parker division. The Tube must meet the requirements specified to the Fitting. The Parker published instructions must be followed for assembling the Fittings to a Tube. These instructions are provided in the Parker Fitting catalog for the specific Parker Fitting being used, or by calling 1-800-CPARKER, or at www.parker.com.

4.3 Related Accessories: Do not preset or flange Parker Fitting components using another manufacturer's equipment or procedures unless authorized in writing by the engineering manager or chief engineer of the appropriate Parker division. Tube, Fitting component and tooling must be checked for correct style, size and material. Operation and maintenance of Related Accessories must be in accordance with the operation manual for the designated Accessory.

4.4 Securement: In many applications, it may be necessary to restrain, protect, or guide the Tube to protect it from damage by unnecessary flexing, pressure surges, vibration, and contact with other mechanical components. Care must be taken to insure such restraints do not introduce additional stress or wear points.

4.5 Proper Connection of Ports: Proper physical installation of the Tube Assembly requires a correctly installed port connection insuring that no torque is transferred to the Tube when the Fittings are being tightened or otherwise during use.

4.6 External Damage: Proper installation is not complete without insuring that tensile loads, side loads, flattening, potential abrasion, thread damage or damage to sealing surfaces are corrected or eliminated. See instruction 2.10.

4.7 System Checkout: All air entrapment must be eliminated and the system pressurized to the maximum system pressure (at or below the Tube Assembly maximum working pressure) and checked for proper function and freedom from leaks. Personnel must stay out of potential hazardous areas while testing and using.

4.8 Routing: The Tube Assembly should be routed in such a manner so if a failure does occur, the escaping media will not cause personal injury or property damage. In addition, if fluid media comes in contact with hot surfaces, open flame or sparks, a fire or explosion may occur. See section 2.4.

5.0 HOSE AND FITTING MAINTENANCE AND REPLACEMENT INSTRUCTIONS

5.1 Even with proper selection and installation, Hose life may be significantly reduced without a continuing maintenance program. The severity of the application, risk potential from a possible Hose failure, and experience with any Hose failures in the application or in similar applications should determine the frequency of the inspection and the replacement for the Products so that Products are replaced before any failure occurs. Certain products require maintenance and inspection per industry requirements. Failure to adhere to these requirements may lead to premature failure. A maintenance program must be established and followed by the user and, at minimum, must include instructions 5.2 through 5.7

5.2 Visual Inspection Hose/Fitting: Any of the following conditions require immediate shut down and replacement of the Hose Assembly:

- Fitting slippage on Hose;
- Damaged, cracked, cut or abraded cover (any reinforcement exposed);
- Hard, stiff, heat cracked, or charred Hose;
- Cracked, damaged, or badly corroded Fittings;
- Leaks at Fitting or in Hose;
- Kinked, crushed, flattened or twisted Hose; and
- Blistered, soft, degraded, or loose cover.

5.3 Visual Inspection All Other: The following items must be tightened, repaired, corrected or replaced as required:

- Leaking port conditions;
- Excess dirt buildup; /
- Worn clamps, guards or shields; and
- System fluid level, fluid type, and any air entrapment.

5.4 Functional Test: Operate the system at maximum operating pressure and check for possible malfunctions and leaks. Personnel must avoid potential hazardous areas while testing and using the system. See section 2.2.

5.5 Replacement Intervals: Hose assemblies and elastomeric seals used on Hose Fittings and adapters will eventually age, harden, wear and deteriorate under thermal cycling and compression set. Hose Assemblies and elastomeric seals should be inspected and replaced at specific replacement intervals, based on previous service life, government or industry recommendations, or when failures could result in unacceptable downtime, damage, or injury risk. See section 1.2. Hose and Fittings may be subjected to internal mechanical and/or chemical wear from the conveying fluid and may fail without warning. The user must determine the product life under such circumstances by testing. Also see section 2.5.

5.6 Hose Inspection and Failure: Hydraulic power is accomplished by utilizing high pressure fluids to transfer energy and do work. Hoses, Fittings and Hose Assemblies all contribute to this by transmitting fluids at high pressures. Fluids under pressure can be dangerous and potentially lethal and, therefore, extreme caution must be exercised when working with fluids under pressure and handling the Hoses transporting the fluids. From time to time, Hose Assemblies will fail if they are not replaced at proper time intervals. Usually these failures are the result of some form of misapplication, abuse, wear or failure to perform proper maintenance. When Hoses fail, generally the high pressure fluids inside escape in a stream which may or may not be visible to the user. Under no circumstances should the user attempt to locate the leak by "feeling" with their hands or any other part of their body. High pressure fluids can and will penetrate the skin and cause severe tissue damage and possibly loss of limb. Even seemingly minor hydraulic fluid injection injuries must be treated immediately by a physician with knowledge of the tissue damaging properties of hydraulic fluid.

If a Hose failure occurs, immediately shut down the equipment and leave the area until pressure has been completely released from the Hose Assembly. Simply shutting down the hydraulic pump may or may not eliminate the pressure in the Hose Assembly. Many times check valves, etc., are employed in a system and can cause pressure to remain in a Hose Assembly even when pumps or equipment are not operating. Tiny holes in the Hose, commonly known as pinholes, can eject small, dangerously powerful but hard to see streams of hydraulic fluid. It may take several minutes or even hours for the pressure to be relieved so that the Hose Assembly may be examined safely.

Once the pressure has been reduced to zero, the Hose Assembly may be taken off the equipment and examined. It must always be replaced if a failure has occurred. Never attempt to patch or repair a Hose Assembly that has failed. Consult the nearest Parker distributor or the appropriate Parker division for Hose Assembly replacement information.

Never touch or examine a failed Hose Assembly unless it is obvious that the Hose no longer contains fluid under pressure. The high pressure fluid is extremely dangerous and can cause serious and potentially fatal injury.

5.7 Elastomeric seals: Elastomeric seals will eventually age, harden, wear and deteriorate under thermal cycling and compression set. Elastomeric seals should be inspected and replaced.

5.8 Refrigerant gases: Special care should be taken when working with refrigeration systems. Sudden escape of refrigerant gases can cause blindness if the escaping gases contact the eye and can cause freezing or other severe injuries if it contacts any other portion of the body.

5.9 Compressed natural gas (CNG): Parker CNG Hose Assemblies should be tested after installation and before use, and at least on a monthly basis per instructions provided on the Hose Assembly tag. The recommended procedure is to pressurize the Hose and check for leaks and to visually inspect the Hose for damage and to perform an electrical resistance test.

Caution: Matches, candles, open flame or other sources of ignition shall not be used for Hose inspection. Leak check solutions should be rinsed off after use.

6.0 HOSE STORAGE

6.1 Age Control: Hose and Hose Assemblies must be stored in a manner that facilitates age control and first-in and first-out usage based on manufacturing date of the Hose and Hose Assemblies. Unless otherwise specified by the manufacturer or defined by local laws and regulations:

6.1.1 The shelf life of rubber hose in bulk form or hose made from two or more materials is 28 quarters (7 years) from the date of manufacture, with an extension of 12 quarters (3 years), if stored in accordance with ISO 2230;

6.1.2 The shelf life of thermoplastic and polytetrafluoroethylene hose is considered to be unlimited;

6.1.3 Hose assemblies that pass visual inspection and proof test shall not be stored for longer than 2 years.

6.1.4 Storage: Stored Hose and Hose Assemblies must not be subjected to damage that could reduce their expected service life and must be placed in a cool, dark and dry area with the ends capped. Stored Hose and Hose Assemblies must not be exposed to temperature extremes, ozone, oils, corrosive liquids or fumes, solvents, high humidity, rodents, insects, ultraviolet light, electromagnetic fields or radioactive materials.

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