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Industrial Hydraulic Valves

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

Catalog MSG14-2500/US

April 2019



ENGINEERING YOUR SUCCESS.

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Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Directional Control Valves**A****Sandwich Valves****B****Subplates and Manifolds****C****Pressure Control Valves****D****Flow Control and Check Valves****E**

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

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

When you are ready to order, call your local Parker Hydraulic distributor for fast delivery and service. Contact Parker Hannifin, Hydraulic Valve Division for the location of the distributor serving your area (see the back cover for contact information).

Alphanumeric Index

Series	Page	Series	Page
2F1C.....	Flow Control.....E2	D3DW	Subplates & ManifoldsC7
C4V.....	Direct Operated CheckE8	D3DWR	Direct Oper., Regen. and Hybrid.....A84
C4V.....	Pilot Operated Check.....E11	D3L.....	Lever OperatedA93
C5P.....	Pilot Operated Check.....E14	D3L.....	Subplates & ManifoldsC7
C5V.....	Direct Operated CheckE17	D3P.....	Subplates & ManifoldsC9
CB.....	CounterbalanceB104	D3W.....	Solenoid OperatedA63
CH	Check.....B14	D3W.....	Subplates & ManifoldsC7
CM.....	Check.....B6	D41	Installation.....A166
CP.....	Pilot Operated, Check.....B25	D41VW	IntroductionA144
CPOM.....	Dbl. Pilot Operated, Check.....B20	D41VW	Pilot Oper., Solenoid Controlled.....A145
D101.....	IntroductionA224	D41VWR.....	Regenerative and HybridA154
D101V, D10P	Installation.....A243	D41VWZ.....	Regenerative and HybridA154
D101VA	Air Pilot OperatedA236	D4L.....	Lever OperatedA158
D101VHW.....	Pilot Oper., Solenoid Controlled.....A225	D4P.....	Oil Pilot OperatedA162
D101VL.....	Lever OperatedA238	D4S.....	Directional Seat ValveA263
D101VW	Pilot Oper., Solenoid Controlled.....A225	D4S	Inline MountedA273
D10P.....	Oil Pilot OperatedA240	D5S.....	Directional Seat ValveA283
D111VW	Installation.....A256	D6.....	Subplates & ManifoldsC14
D111VW	Pilot Oper., Solenoid Controlled.....A247	D61	IntroductionA170
D111VWR.....	Regenerative and HybridA259	D61V, D6P	Installation.....A188
D111VWZ.....	Regenerative and HybridA269	D61VA	Air Pilot OperatedA182
D1SE	Solenoid Operated.....A51	D61VHW.....	Pilot Oper., Solenoid Controlled.....A171
D1V.....	Introduction & Technical Info.....A3	D61VL.....	Lever OperatedA184
D1V.....	Subplates & ManifoldsC2	D61VW	Pilot Oper., Solenoid Controlled.....A171
D1VA	Air and Oil Pilot OperatedA41	D6P.....	Oil Pilot OperatedA186
D1VC.....	Cam, Cam Lever OperatedA46	D8.....	Subplates & ManifoldsC14
D1VD	Cam, Cam Lever OperatedA46	D81	IntroductionA192
D1VG	Cam, Cam Lever OperatedA46	D81V, D8P.....	Installation.....A211
D1VHW.....	Solenoid Operated.....A17	D81VA	Air Pilot OperatedA204
D1VL.....	Lever OperatedA47	D81VHW.....	Pilot Oper., Solenoid Controlled.....A193
D1VP	Air and Oil Pilot OperatedA41	D81VL.....	Lever OperatedA206
D1VW	Solenoid Operated.....A17	D81VW	Pilot Oper., Solenoid Controlled.....A193
D1VW	Inductive Position ControlA31	D8P.....	Oil Pilot OperatedA208
D3.....	Installation.....A95	D91VWR.....	Regenerative and HybridA215
D3.....	Introduction & Technical Info.....A54	D91VWZ.....	Regenerative and HybridA215
D3*P.....	Oil Pilot OperatedA136	D9L.....	Lever OperatedA219
D31	IntroductionA98	FC.....	Throttle CheckB40
D31	Subplates & ManifoldsC9	FD.....	Throttle CheckB40
D31, D3*P.....	Installation.....A138	FM	Dbl. Sandwich, Flow ControlB33
D31*A	Air Pilot OperatedA132	Plates for Regenerative and Hybrid Circuits..... A87, A126	
D31*HW.....	Pilot Oper., Solenoid Controlled.....A99	PR.....	Pilot Oper., Reducing/RelievingB52
D31*L.....	Lever OperatedA134	PR*M	See R4RD40
D31*W	Pilot Oper., Solenoid Controlled.....A99	PRDM	Direct Oper., Pressure ReducingB47
D31NW	Pilot Oper., Solenoid Controlled.....A113	PRM.....	Pressure ReducingB62
D31NWR	Regenerative and HybridA122	PSB	EH Pressure Switch.....C34
D3A.....	Air OperatedA79	R*R, R*M	See R4V*5, R6V*5.....D3
D3A.....	Subplates & ManifoldsC7	R1E02.....	Pressure ReducingD88
D3C	Cam OperatedA82	R4R	Pressure ReducingD40
D3D	Cam OperatedA82	R4S.....	Pilot Operated Sequence.....D50
D3DW	Solenoid Operated.....A75	R4U	Pressure Reducing, UnloadingD33

Continued on next page

Alphanumeric Index

Series	Page
R4V..... Pressure Relief, Pilot Operated	D82
R4V (TÜV)..... Pilot Operated, Pressure Relief	D17
R4V*5..... Pressure Relief, Vent	D3
R5R..... phase Out Pressure Relief, Pilot Operated	D69
R5S..... phase Out Sequence, Pilot Operated.....	D79
R5U..... phase Out Unloading, Pilot Operated.....	D74
R5V..... phase Out Pressure Relief, Pilot Operated	D63
R6V (TÜV)..... Pilot Operated, Pressure Relief	D17
R6V*5..... Pressure Relief, Vent	D3
RDM..... Direct Operated, Pressure Relief.....	B69
RG..... Regenerative	B116
RM..... Relief.....	B74
RS*R, RS*M..... See R4V*5, R6V*5.....	D3
RV..... Direct Acting, Pressure Relief.....	B80
S*M..... See R4S	D50
Safety Guide.....	E23
Sandwich Valves Introduction.....	B3
Subplate & Manifold Accessories	C19
Subplate & Manifold Installation	C31
Terms of Sale and Warranty Limitations	E21
UR*M..... See R4U	D33
US*M..... See R4U	D33
VB..... Direct Operated Sequence	D54
VBV..... Pilot Operated Sequence.....	D58
VM..... D. O. Pressure Reducing.....	D44
VS..... Pressure Relief	D30
ZDR..... Pilot Operated Pressure Reducing	B93
ZDV..... Relief.....	B96
ZNS..... Counterbalance	B100
ZRD..... Dbl. Flow Control.....	B121
ZRE..... Dbl. Pilot Operated Check.....	B125
ZRV..... Check.....	B129

**The Valve Function / Series Index
appears on the following page.**

Valve Function / Series Index

Function/Series	Page
Directional Control Valves	
D1SE Solenoid Operated.....	A51
D1VA Air and Oil Pilot Operated	A41
D1VC Cam, Cam Lever Operated	A46
D1VD Cam, Cam Lever Operated	A46
D1VG Cam, Cam Lever Operated	A46
D1VHW Solenoid Operated.....	A17
D1VL Lever Operated	A47
D1VP Air and Oil Pilot Operated	A41
D1VW Solenoid Operated.....	A17
D1VW Inductive Position Control	A31
D10P Oil Pilot Operated	A240
D101VA Air Pilot Operated	A236
D101VL Lever Operated	A238
D101VHW Pilot Oper., Solenoid Controlled.....	A225
D101VW Pilot Oper., Solenoid Controlled.....	A225
D111VW Installation.....	A256
D111VWR Regenerative and Hybrid	A259
D111VWZ Regenerative and Hybrid	A269
D3A Air Operated	A79
D3C Cam Operated	A82
D3D Cam Operated	A82
D3DW Solenoid Operated.....	A75
D3DWR Direct Oper., Regen. & Hybrid	A84
D3L Lever Operated	A93
D31NWR Regenerative and Hybrid	A122
D3*P Oil Pilot Operated	A136
D3W Solenoid Operated.....	A63
D31*A Air Pilot Operated	A132
D31*HW Pilot Oper., Solenoid Controlled.....	A99
D31*L Lever Operated	A134
D31*W Pilot Oper., Solenoid Controlled.....	A99
D31NW Pilot Oper., Solenoid Controlled.....	A113
D41VW Introduction	A144
D41VWR Regenerative and Hybrid	A154
D41VWZ Regenerative and Hybrid	A154
D4L Lever Operated	A158
D4P Oil Pilot Operated	A162
D4S Directional Seat Valve.....	A263
D4S Inline Mounted	A273
D5S <i>phase Out</i> Directional Seat Valve.....	A283
D6P Oil Pilot Operated	A186
D61VA Air Pilot Operated	A182
D61VL Lever Operated	A184
D61VHW Pilot Oper., Solenoid Controlled.....	A171
D61VW Pilot Oper., Solenoid Controlled.....	A171
D8P Oil Pilot Operated	A208
D81VA Air Pilot Operated	A204
D81VL Lever Operated	A206
D81VHW Pilot Oper., Solenoid Controlled.....	A193
D81VW Pilot Oper., Solenoid Controlled.....	A193
D9L Lever Operated	A219
D91VWR Regenerative and Hybrid	A215
D91VWZ Regenerative and Hybrid	A215

Function/Series	Page
Sandwich Valve	
CB..... Counterbalance	B104
CH Check.....	B14
CM Check.....	B6
CP..... Pilot Operated, Check.....	B25
CPOM..... Dbl. Pilot Operated, Check.....	B20
FC..... Throttle Check	B40
FD..... Throttle Check	B40
FM Dbl. Sandwich, Flow Control	B33
PR..... Pilot Oper., Reducing/Relieving	B52
PRDM Direct Oper., Pressure Reducing	B47
PRM..... Pressure Reducing	B62
RDM Direct Operated, Pressure Relief.....	B69
RG Regenerative	B116
RM Relief.....	B74
RV Direct Acting, Pressure Relief.....	B80
ZDR Pilot Operated Pressure Reducing	B93
ZDV Relief.....	B96
ZNS Counterbalance	B100
ZRD Dbl. Flow Control.....	B121
ZRE Dbl. Pilot Operated Check.....	B125
ZRV..... Check.....	B129

Pressure Control Valves

PR*M See R4R	D40
PSB EH Pressure Switch.....	C34
R*R, R*M See R4V*5, R6V*5.....	D3
R1E02 Pressure Reducing	D88
R4R Pressure Reducing	D40
R4S..... Pilot Operated Sequence.....	D50
R4U Pressure Reducing, Unloading	D33
R4V..... Pressure Relief, Pilot Operated	D82
R4V (TÜV) Pilot Operated, Pressure Relief	D17
R4V*5 Pressure Relief, Vent	D3
R5R <i>phase Out</i> Pressure Relief, Pilot Operated	D69
R5S <i>phase Out</i> Sequence, Pilot Operated.....	D79
R5U Unloading, Pilot Operated.....	D74
R5V <i>phase Out</i> Pressure Relief, Pilot Operated	D63
R6V (TÜV) Pilot Operated, Pressure Relief	D17
R6V*5 Pressure Relief, Vent	D3
RS*R, RS*M See R4V*5, R6V*5.....	D3
S*M See R4S	D50
UR*M See R4U	D33
US*M See R4U	D33
VB..... Direct Operated Sequence	D54
VBY Pilot Operated Sequence.....	D58
VM D. O. Pressure Reducing.....	D44
VS..... Pressure Relief	D30

Flow Control and Check Valves

2F1C..... Flow Control.....	E2
C4V..... Direct Operated Check	E8
C4V..... Direct Operated Check	E8
C5P <i>phase Out</i> Pilot Operated Check.....	E14
C5V..... Direct Operated Check	E17

Terms of Sale and Warranty Limitations	E21
Safety Guide.....	E23

Series D1V (NFPA D03/CETOP 3, NG6 Mounting)

Introduction and Technical Information	A3 - A16
Series D1VW Solenoid Operated	A17 - A27
Accessories	A28 - A29
Series D1VW Inductive Position Control	A31 - A38
Machine Directive – Position Papers	A39 - A40
Series D1VA and D1VP	Air and Oil Pilot Operated A41 - A44
Series D1VC, D1VD and D1VG	Cam and Cam Lever Operated A45 - A46
Series D1VL	Lever Operated A47 - A48
Installation	Series D1V A49 - A50

Series D1SE (NFPA D03/CETOP 3, NG6 Mounting)

Series D1SE	Solenoid Operated A51 - A53
-------------------	-----------------------------------

Series D3 (NFPA D05/CETOP 5, NG10 Mounting)

Introduction and Technical Information	A54 - A61
Series D3W Solenoid Operated	A63 - A72
Accessories	A73
Series D3DW Solenoid Operated	A75 - A78
Series D3A	Air Operated A79 - A81
Series D3C and D3D	Cam Operated A82 - A83
Series D3DWR	Direct Operated, Regenerative and Hybrid A84 - A86
Plates for Regenerative and Hybrid Circuits	A87 - A92
Series D3L	Lever Operated A93 - A94
Installation	Series D3 A95 - A96

Series D31 (NFPA D05H/CETOP 5H, NG10 Mounting)

Introduction and Technical Information	A98
Series D31	Pilot Operated, Solenoid Controlled A99 - A111
Accessories	A112
Series D31NW	Pilot Operated, Solenoid Controlled A113 - A120
Accessories	A121
Series D31NWR	Regenerative and Hybrid A122 - A125
Plates for Regenerative and Hybrid Circuits	A126 - A131
Series D31*A	Air Pilot Operated A132 - A133
Series D31*L	Lever Operated A134 - A135
Series D3P	Oil Pilot Operated A136 - A137
Installation	Series D31, D3P A138 - A142

Series D41 (NFPA D07/CETOP 7, NG16 Mounting)

Introduction and Technical Information	A144
Series D41VW	Pilot Operated, Solenoid Controlled A145 - A152
Accessories	A153
Series D41VWR and D41VWZ	Regenerative and Hybrid A154 - A157
Series D4L	Lever Operated A158 - A161
Series D4P	Oil Pilot Operated A162 - A165
Installation	Series D4 A166 - A169

Series D61 (NFPA D08/CETOP 8, NG25 Mounting)

Introduction and Technical Information	A170
Series D61V	Pilot Operated, Solenoid Controlled A171 - A180
Accessories	A181
Series D61VA	Air Pilot Operated A182 - A183
Series D61VL	Lever Operated A184 - A185
Series D6P	Oil Pilot Operated A186 - A187
Installation	Series D61, D6P A188 - A191

Continued on next page

A**Series D81 (NFPA D08/CETOP 8, NG25 Mounting)**

Introduction and Technical Information	A192
Series D81V Pilot Operated, Solenoid Controlled	A193 - A202
Accessories	A203
Series D81VA Air Pilot Operated	A204 - A205
Series D81VL Lever Operated	A206 - A207
Series D8P Oil Pilot Operated	A208 - A210
Installation Series D81, D8P	A211 - A214
Series D91VWR and D91VWZ..... Regenerative and Hybrid	A215 - A218
Series D9L..... Lever Operated	A219 - A222

Series D101 (NFPA D10/CETOP 10, NG32 Mounting)

Introduction and Technical Information	A224
Series D101V Pilot Operated, Solenoid Controlled	A225 - A234
Accessories	A235
Series D101VA Air Pilot Operated	A236 - A237
Series D101VL Lever Operated	A238 - A239
Series D10P Oil Pilot Operated	A240 - A242
Installation Series D101, D10P.....	A243 - A246

Series D111 (NFPA D10/CETOP 10, NG32 Mounting)

Series D111VW..... Pilot Operated, Solenoid Controlled	A247 - A254
Accessories	A255
Installation	A256 - A258
Series D111VWR and D111VWZ.....	A259 - A262

Series D4S (NG10, NG25, NG32)

Series D4S Directional Seat Valve.....	A263 - A272
Series D4S Inline Mounted.....	A273 - A281

Series D5S (SAE Flange)

Series D5S Directional Seat Valve, SAE Flange.....	A283 - A297
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Phase Out

Application

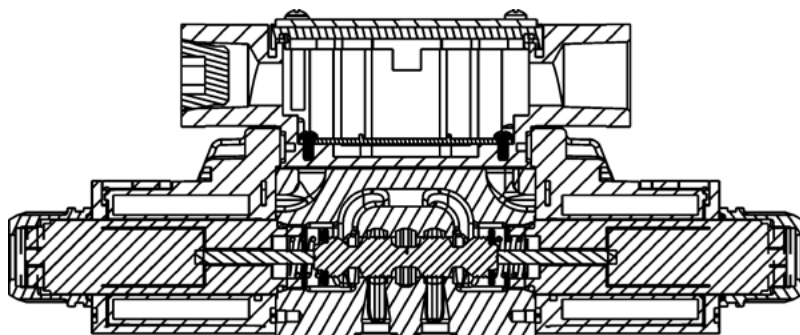
Series D1V hydraulic directional control valves are high performance, direct operated 4-way valves. They are available in 2 or 3-position styles. They are manifold mounted valves, which conform to NFPA's D03, CETOP 3 mounting pattern. These valves were designed for industrial and mobile hydraulic applications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

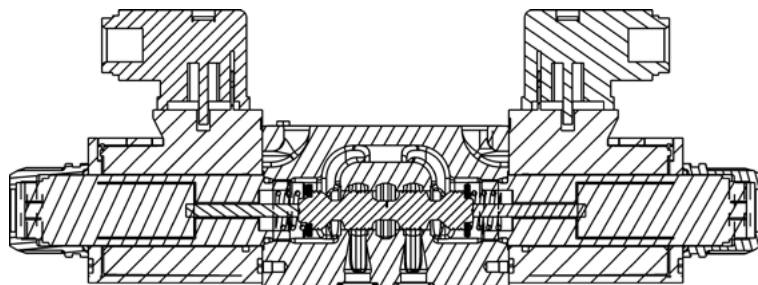
A

D1VW Solenoid Operated Plug-In Conduit Box Style



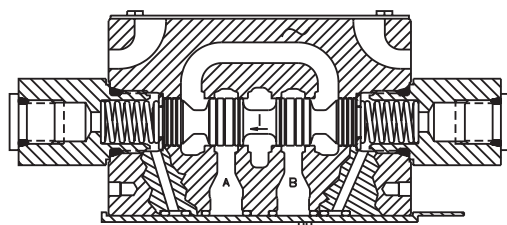
- Easy access mounting bolts.
- Waterproof NEMA 4, IP67.
- No tools required for coil removal.
- 19 standard spool styles available.
- Four electrical connection options.
- Lights included (CSA approval for DC solenoids and lights).
- Easy coil replacement.
- Plug-In design offered with lights & other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

D1VW Solenoid Operated Hirschmann (DIN) Style



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

D1VP Oil Pilot Operated



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

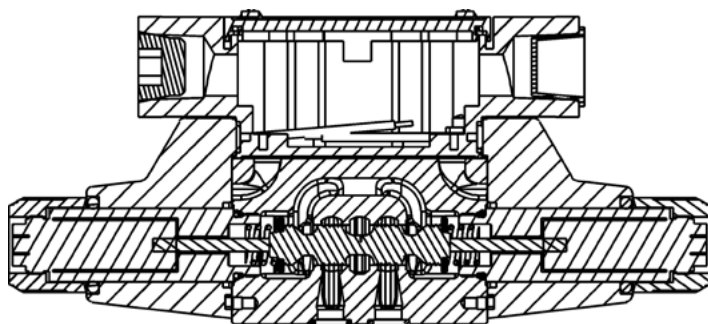
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information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

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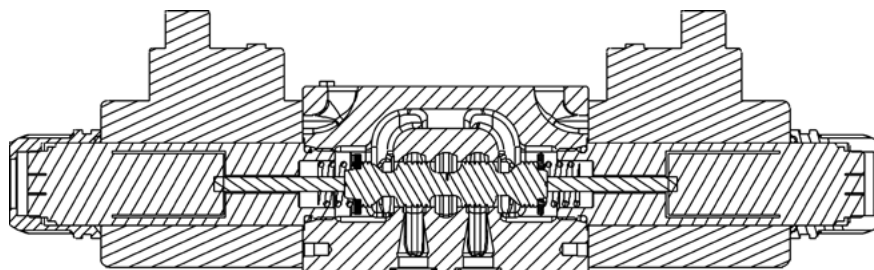
A**Electrical Connections**

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

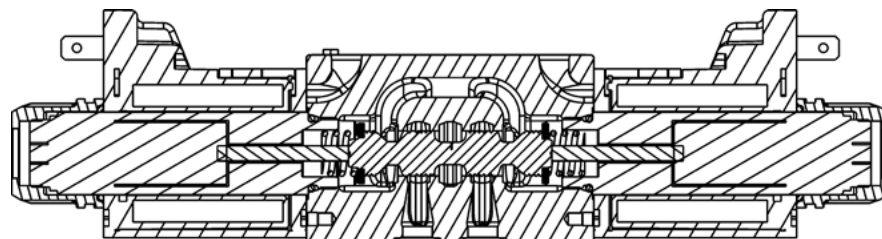
Plug-in Conduit Box	Explosion Proof	Dual Spade (DC only)
DESINA (DC only)	Hirschmann (DIN)	Wire Lead Conduit Box
Deutsch (DC only)	Metri-Pack (DC only)	

D1VW Solenoid Operated Wire Lead Conduit Box Style

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

D1VW Solenoid Operated DESINA Style

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

D1VW Solenoid Operated Dual Spade Style

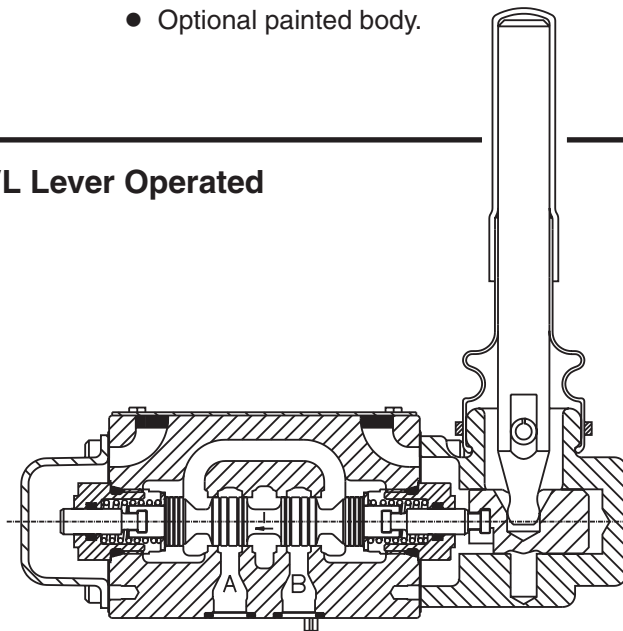
- Dual spade connection (SAE Style 1B).
- Easy coil replacement.
- Surge suppression available.
- 19 standard spool styles available.

Features

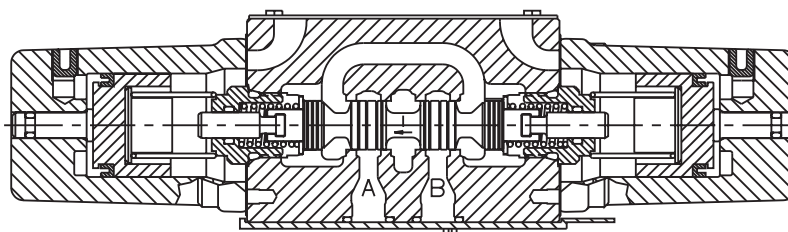
- Easy access mounting bolts.
- 345 Bar (5000 PSI) pressure rating.
- Flows to 22 GPM depending on spool.
- Choice of five operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finished body.
- CSA approved and U.L. recognized available.
- Optional proportional spool available.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

A**D1VL Lever Operated**

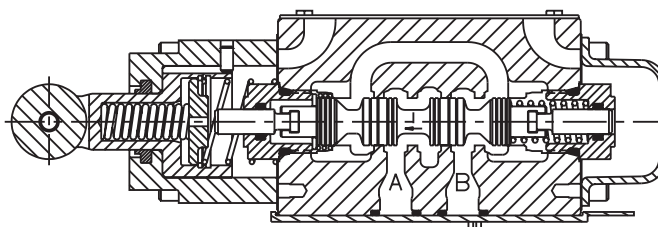
- Spring return or detent styles available.
- Heavy duty handle design.

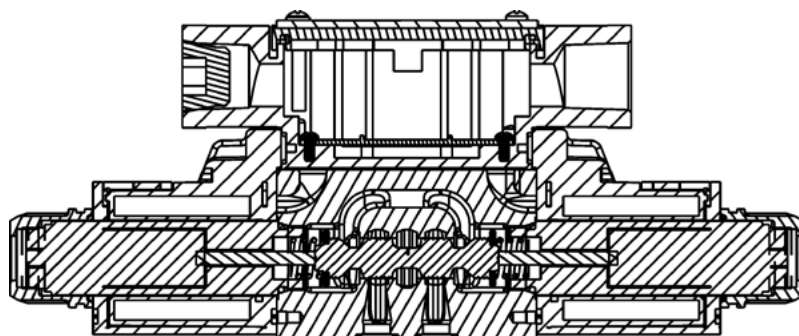
**D1VA Air Operated**

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

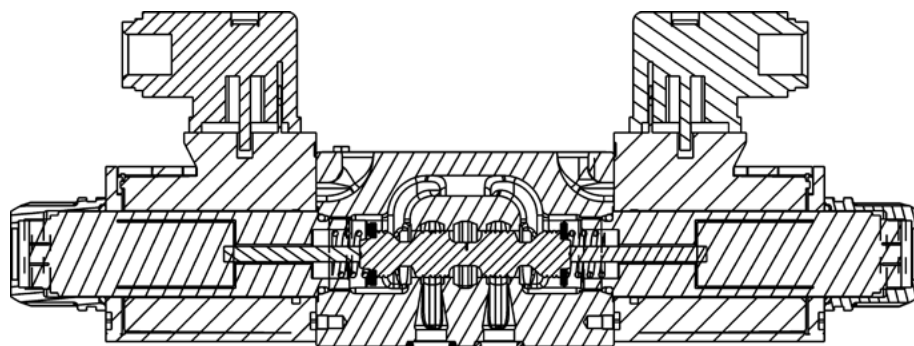
**D1VC Cam Operated**

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



A**D1VW AC Solenoid Operated Soft Shift**

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

D1VW DC Solenoid Operated Soft Shift

Standard Spool Reference Data

Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction		
		High Watt DC	Low Watt AC	Low Watt DC
D1V*001		78 (20)	49 (13)	37 (10)
D1V*002		78 (20)	45 (12)	68 (18)
D1V*003		70 (18)	30 (8)	34 (9)
D1V*004		37 (10)	30 (8)	68 (18)
D1V*006		79 (21)	49 (13)	52 (14)
D1V*007		45 (12)	18 (5)	18 (5)
D1V*008		49 (13)	45 (12)	37 (10)
D1V*009		58 (15)	45 (12)	45 (12)
D1V*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)

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

A

D1VA, D1VP, D1VC, D1VL Reference Data

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

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

Manaplug – Electrical Mini Plug

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

Desina – 12 mm Connector

5004109

Monitor Switch Connector

1301903-N

Manaplug – Electrical Micro Plug

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

Electrical Cords – Mini Plug

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

Hirschmann – Female Connector

692915	Gray (Solenoid A)
692914	Black (Solenoid B)

Hirschmann – Female Connector-Rectified (48-240 VAC)

1301053	Gray (Solenoid A)
1301054	Black (Solenoid B)

Hirschmann – Female Connector-Rectified w/Lights (100-240 VAC)

1300712

Hirschmann – Female Connector w/Lights (Note Voltages)

694935	6-48 VAC or VDC
694936	48-120 VDC, 100-240 VAC

Quantity Required		
A,C,D	B,E,F	H,K,M

1	–	1
1	1	–

1	–	1
1	1	–

2	1	1
---	---	---

2	1	1
2	1	1

Solenoid Ratings

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

Explosion Proof Solenoid Ratings*

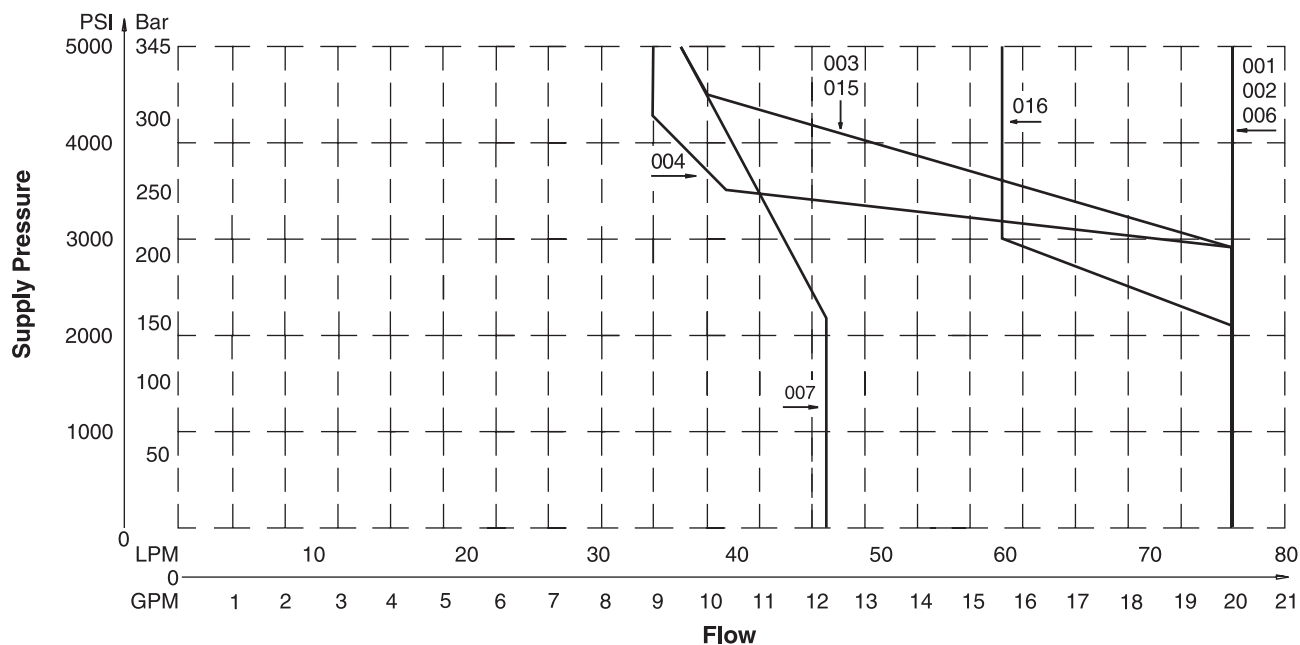
U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013; 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 $\pm 10\%$.

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
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
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
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
"ET" Explosion Proof Solenoids							
J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 ohms
Y		120/60 AC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

D1V Shift Limits, DC & AC Rectified 30 Watt

A



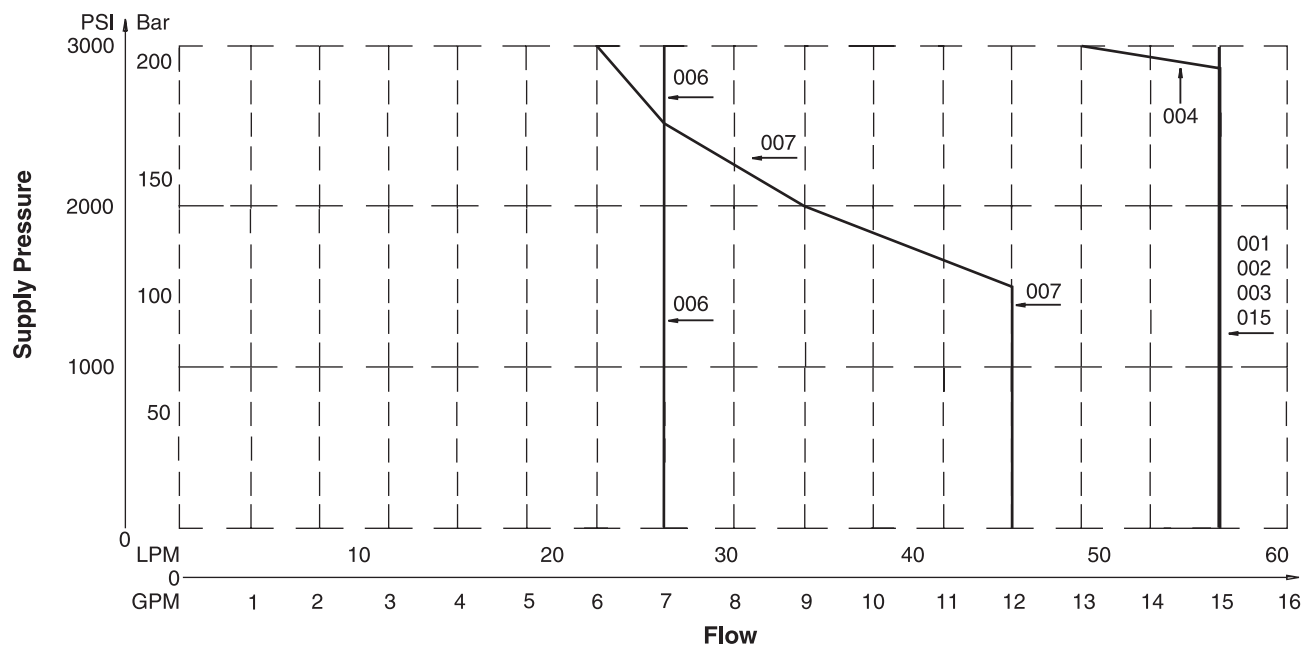
Example:

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

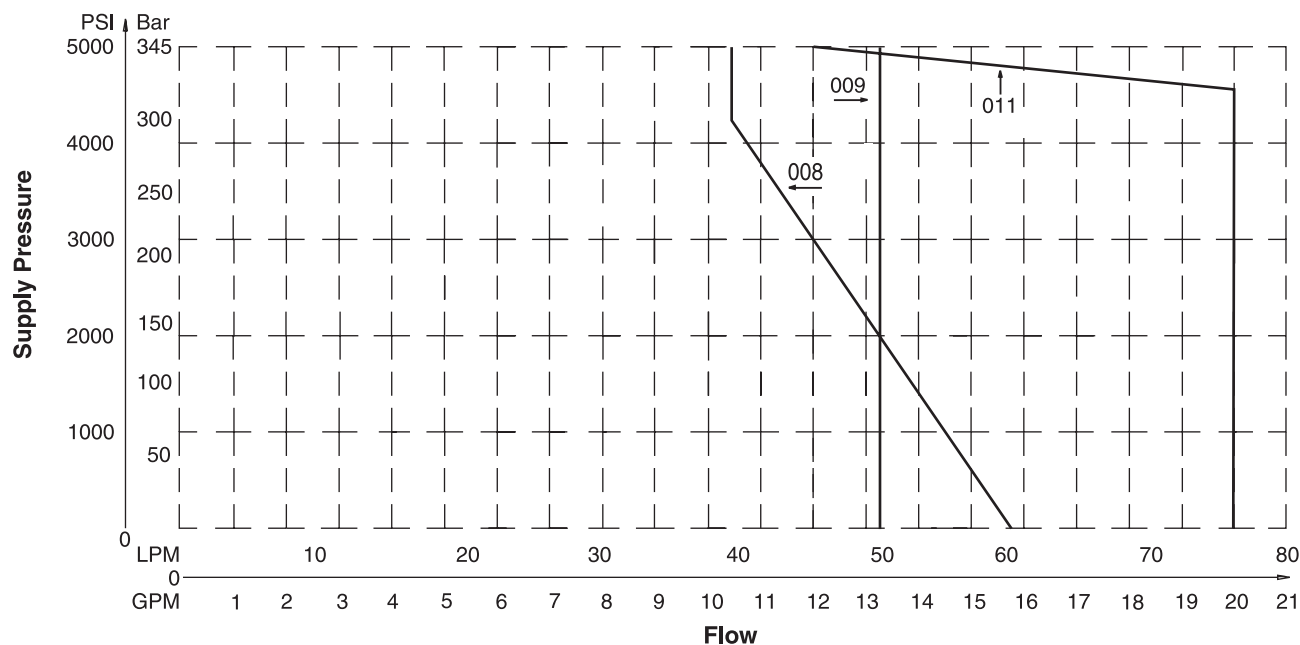
Important Notes for Switching Limit Charts

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

D1VW*****L Shift Limits



D1V Shift Limits, DC & AC Rectified 30 Watt



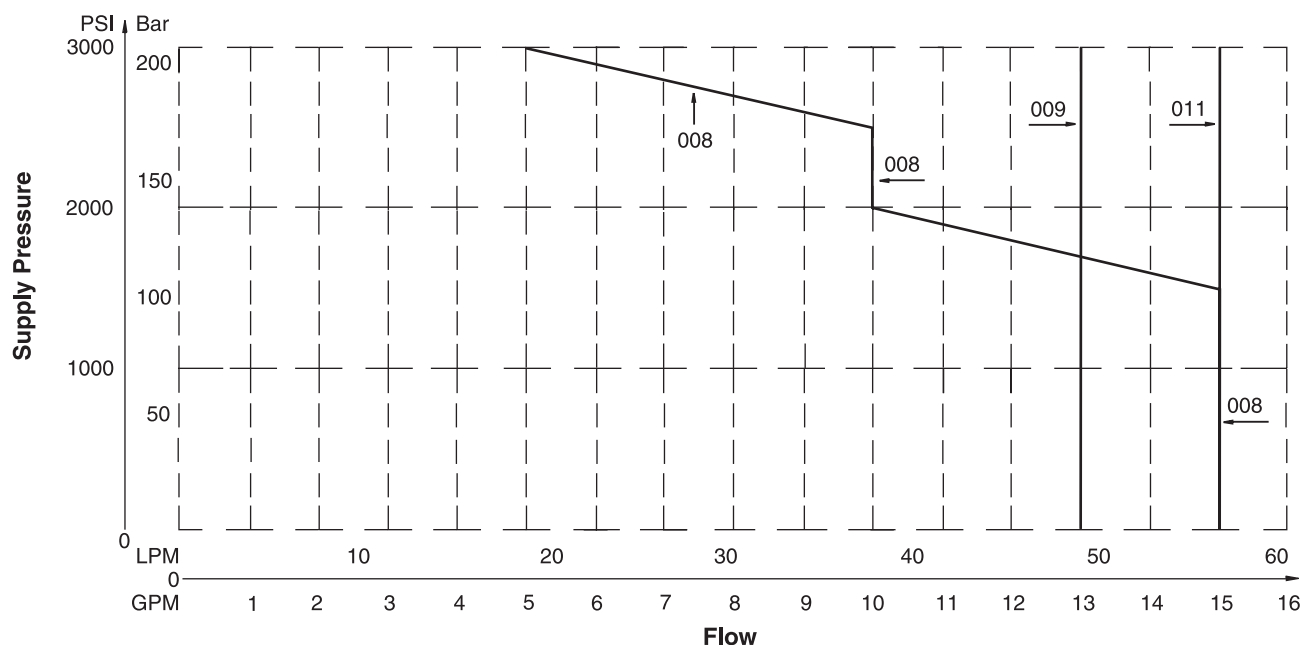
Example:

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

Important Notes for Switching Limit Charts

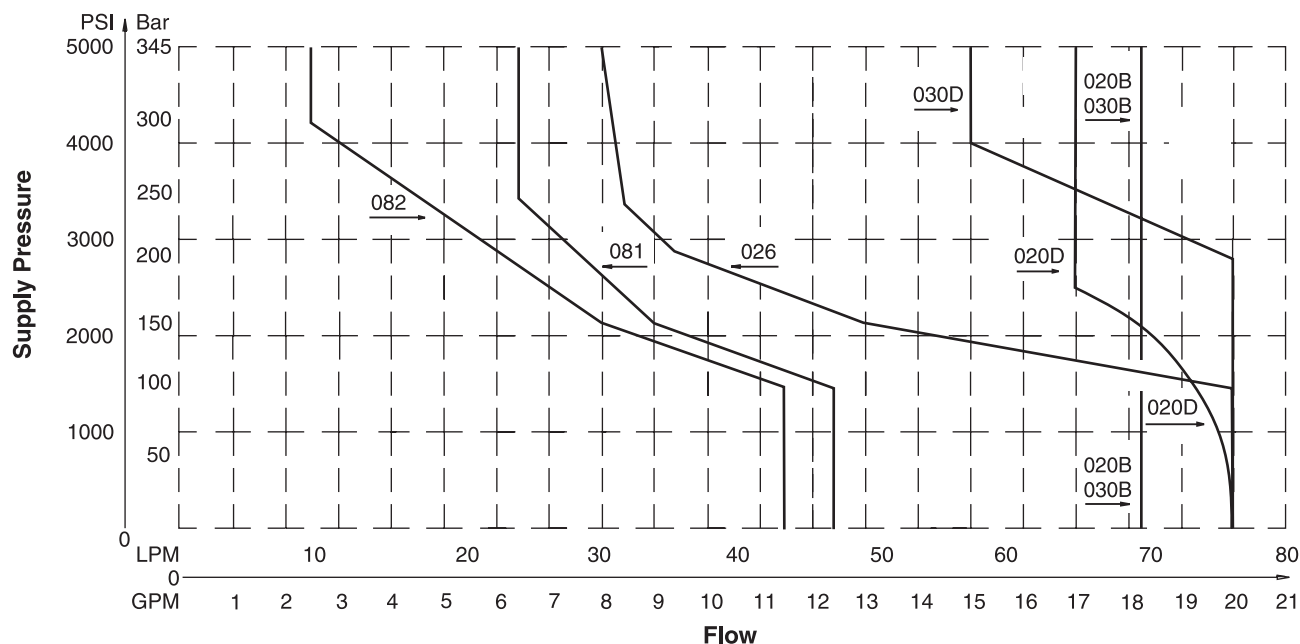
1. For F & M style valves, reduce flow to 70% of that shown.
2. Shift limits charted for equal flow A and B ports. Unequal A and B port flows may reduce shift limits.
3. These charts do not show explosion proof performance. Consult factory for explosion proof duty.
4. Blocking A or B ports will reduce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

D1VW*****L Shift Limits



D1V Shift Limits, DC & AC Rectified 30 Watt

A



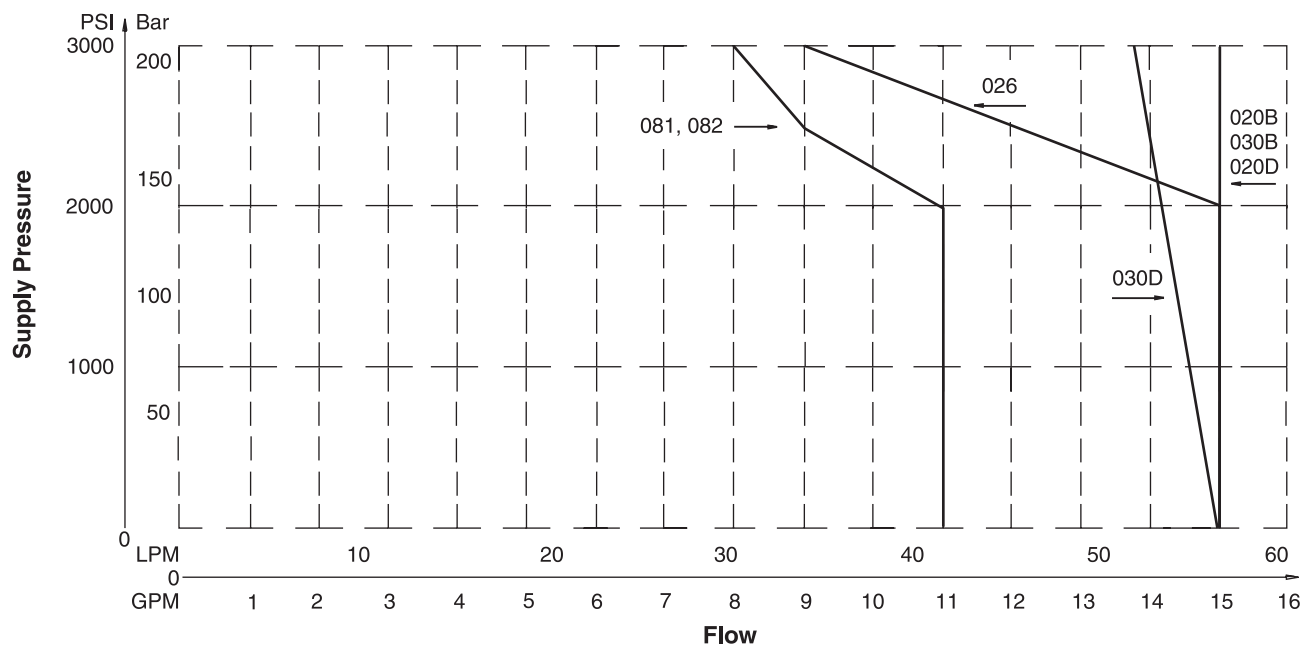
Example:

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

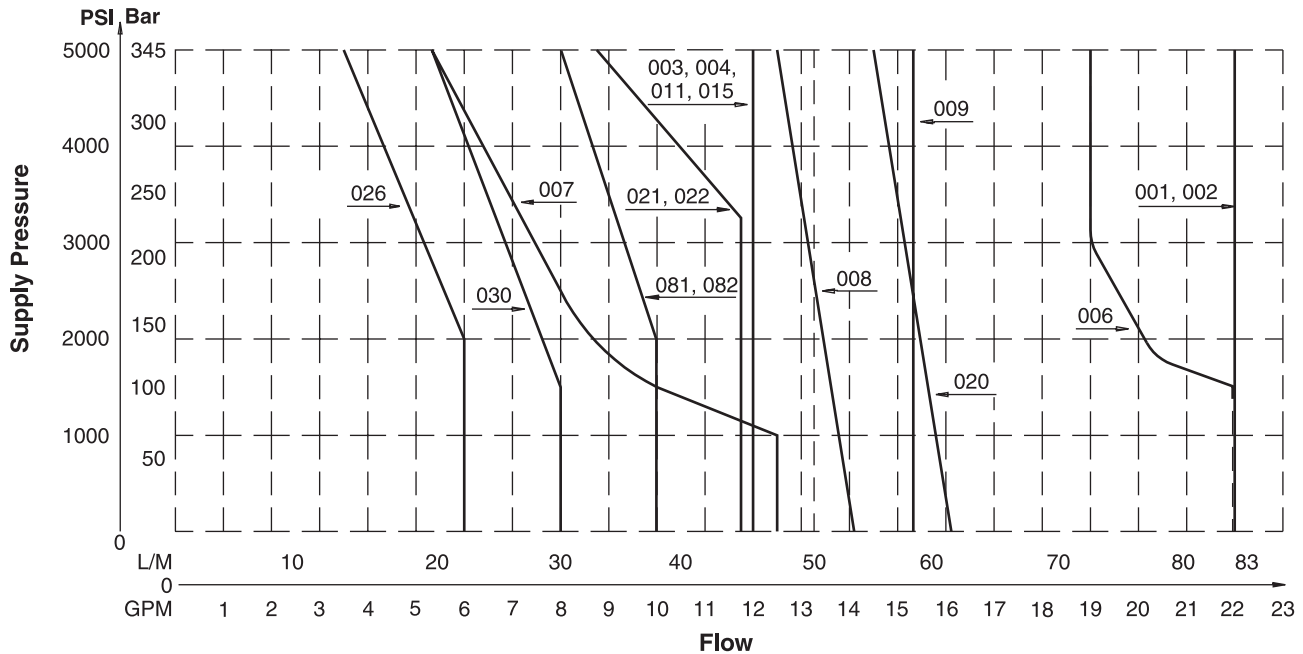
Important Notes for Switching Limit Charts

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

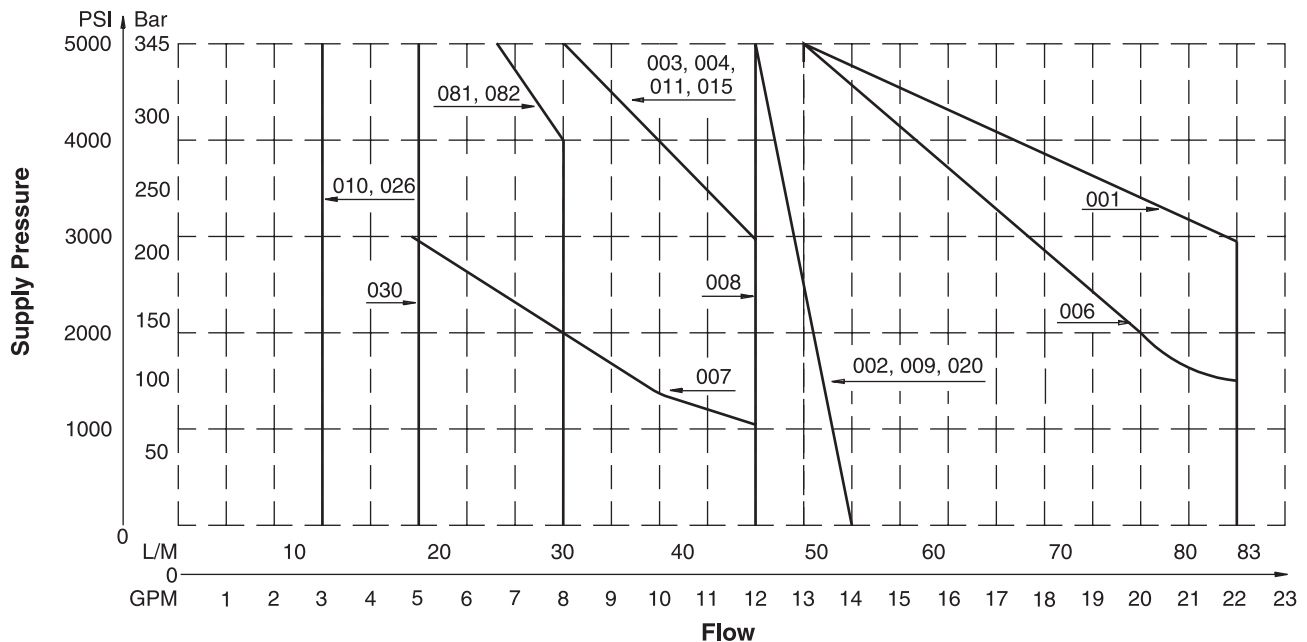
D1VW*****L Shift Limits



D1V Shift Limits, AC 30 Watt



D1VW****F Shift Limits, AC



Example:

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

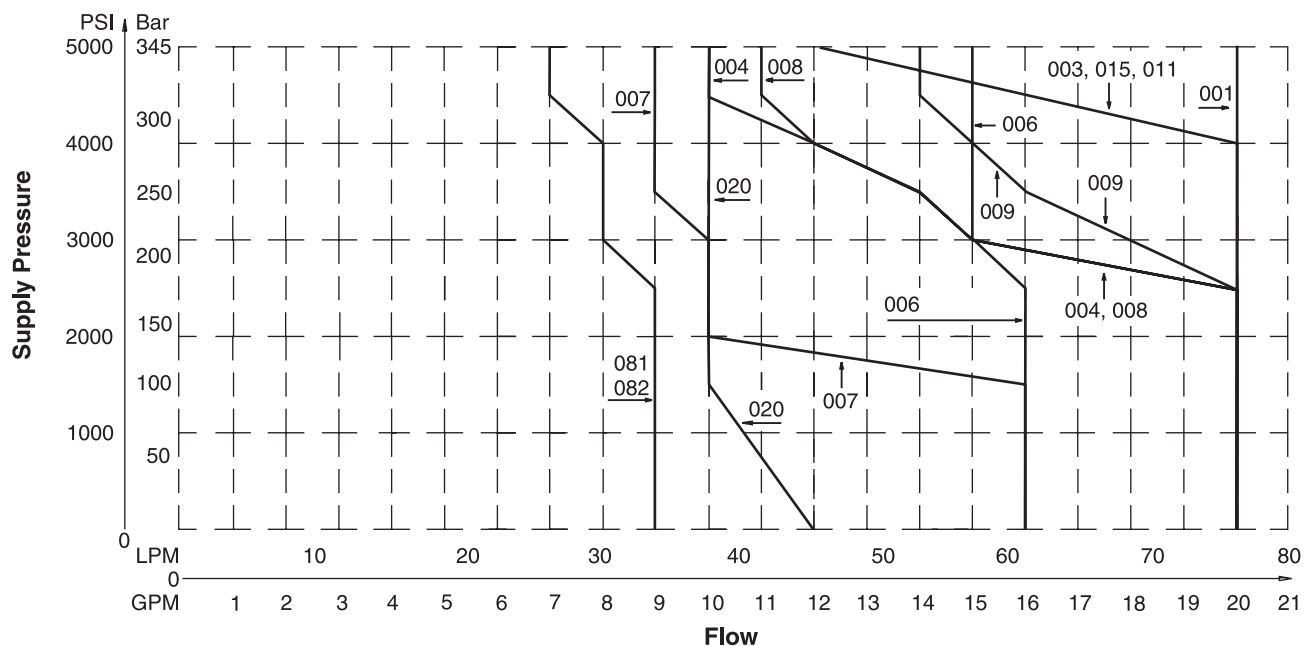
Important Notes for Switching Limit Charts

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

Soft Shift Limit Curves

A

DC Power Supply



Pressure Drop vs. Flow, High Watt

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

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

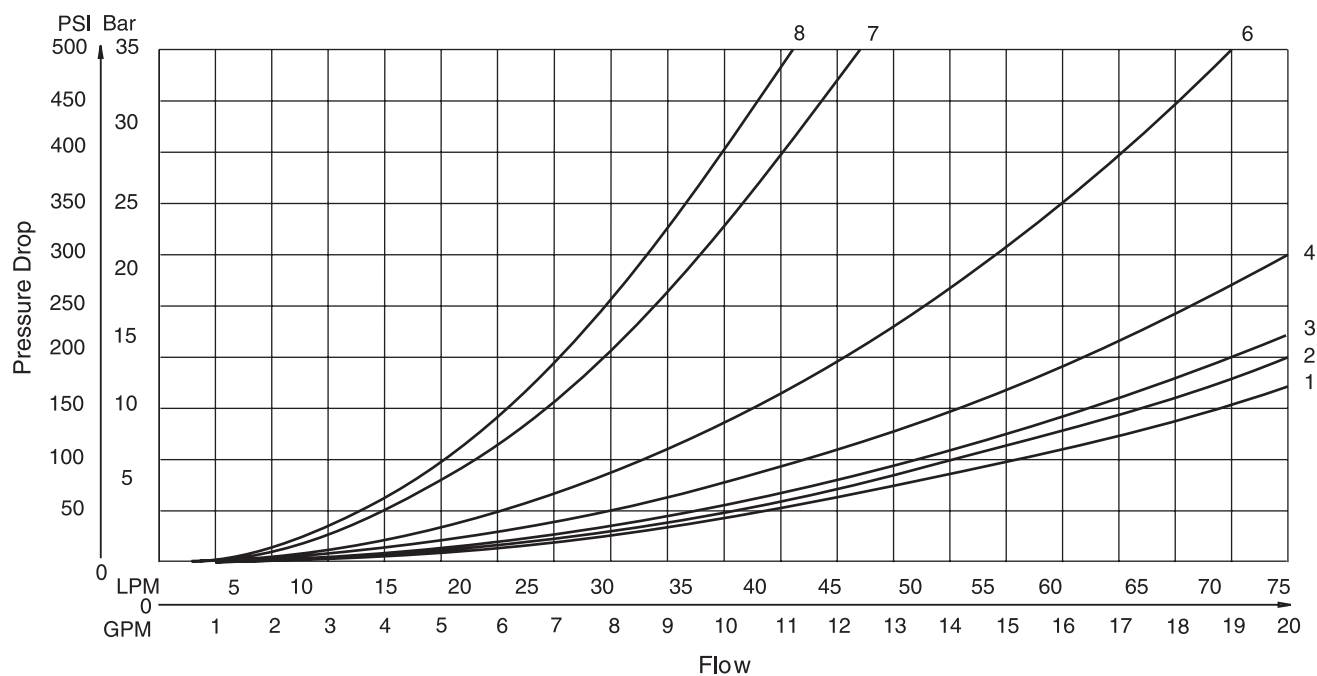
D1VW Pressure Drop Reference Chart – 30 Watt Coil

Spool No.	Curve Number										
	Shifted				Center Condition						
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	2	—	—	—	—	—	—	—
002	2	2	1	1	2	1	1	1	1	1	1
003	2	2	1	1	—	—	—	—	—	1	—
004	2	2	1	1	—	—	—	—	—	2	2
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	—	—	—	—	—	—	—

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. Pressure drops charted for equal flow A and B ports. Unequal A and B port flows may decrease shift limits.
% of ΔP (Approx.)	93	111	119	126	132	137	141	

Performance Curves – 30 Watt Coil



Pressure Drop vs. Flow, Low Watt

A

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

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

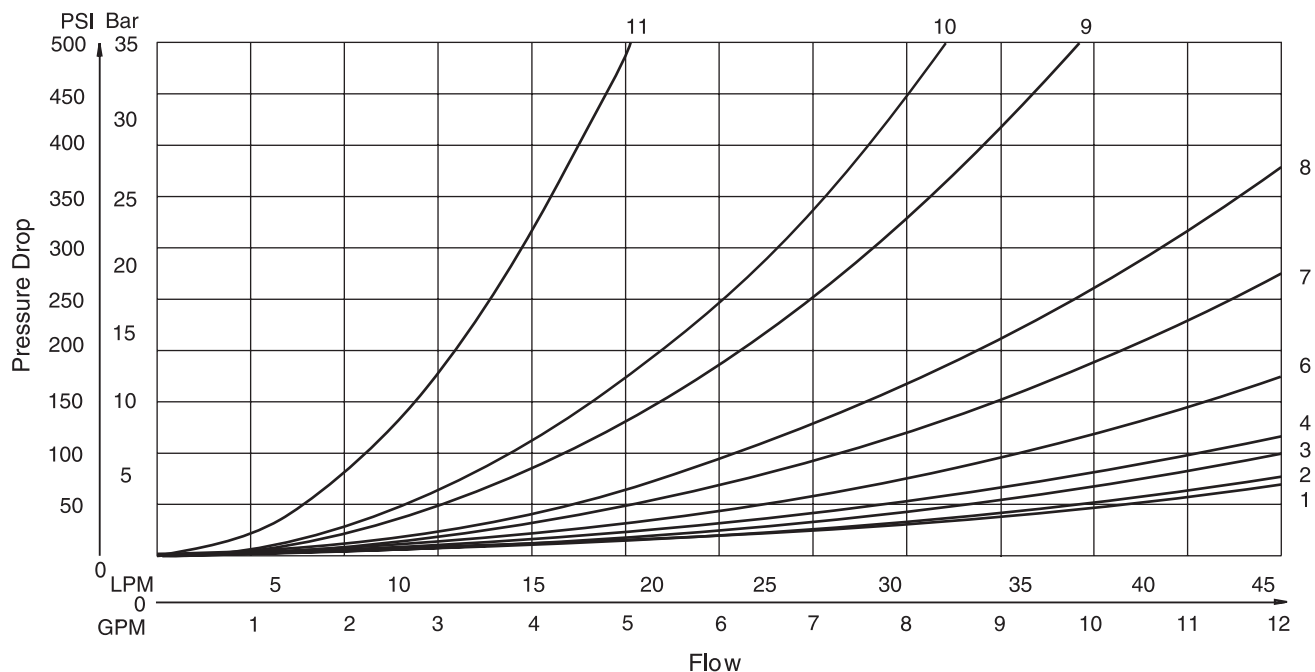
D1VW Pressure Drop Reference Chart – 10 Watt Coil

Spool No.	Curve Number										
	Shifted				Center Condition						
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	2	—	—	—	—	—	—	—
002	2	2	1	1	2	2	2	2	2	1	1
003	3	3	2	1	—	—	—	—	—	4	—
004	3	3	1	1	—	—	—	—	—	6	6
006	3	3	1	1	—	8	8	7	7	—	—
007	3	3	1	1	5	—	4	—	—	—	1
008	5	5	6	6	7	—	—	—	—	—	—
009	6	6	6	6	5	—	—	—	—	—	—
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	—	—	—	—	—	—	—

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 – 10 Watt Coil

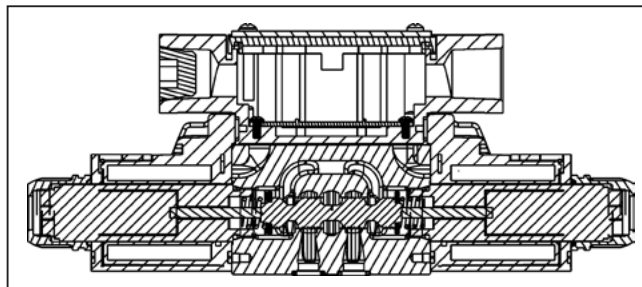
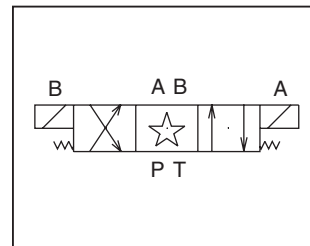
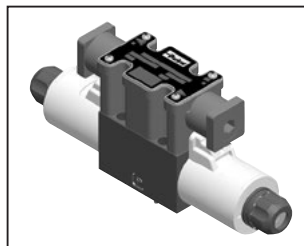


General Description

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

Features

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



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

Specifications

Mounting Pattern	NFPA D03, CETOP 3, NG 6	Leakage Rates*	Maximum Allowable:
Mounting Interface	DIN 24340-A6 ISO 4401-AB-03-4-A CETOP R35H 4.2-4-03, NFPA D03	100 SSU @ 49°C (120°F)	19.7 cc (1.2 Cu. in.) per Minute/Land @ 69 Bar (1000 PSI)*
Maximum Pressure	P, A, B 345 Bar (5000 PSI) Standard 207 Bar (3000 PSI) 10 Watt CSA 276 Bar (3750 PSI) Tank: 103 Bar (1500 PSI) AC only 207 Bar (3000 PSI) DC/AC Rectified Standard 207 Bar (3000 PSI) AC Optional CSA 103 Bar (1500 PSI)	*#008 and #009 Spools may exceed these rates. Consult Factory	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)

Response Time

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

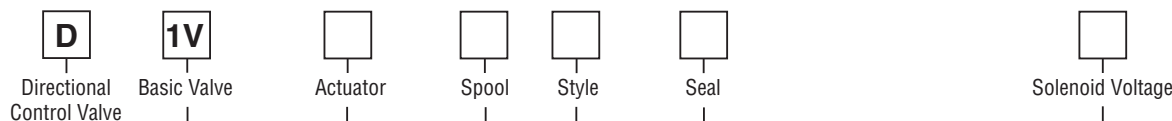
Solenoid Type	Pull-In	Drop-Out
AC	13	20
DC 10 Watt	61	22
DC 30 Watt	51	21

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.

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A



NFPA D03
 CETOP 3
 DIN NG6

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

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

Code Description
D†# **120 VDC**
E* **24 VAC/60 Hz**
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**

* 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***.

High watt only.
 * Leadwire, low watt only.
 ** DIN, Plug-In & Leadwire (all high watt only).
 ^ If leadwire, low watt not available.
 ^^ TC/TW, high watt only. TG no plugin high watt available.
 † DIN & Leadwire only. Not available with CSA.
 †† DIN only. Not available with CSA.

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

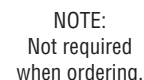
* 008, 020 & 026 spools have closed crossover.
 ** 009 & 030 spools have open crossover.
 † Only DC or AC rectified.

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.
 ‡ High Watt only.

Bold: Designates Tier I products and options.

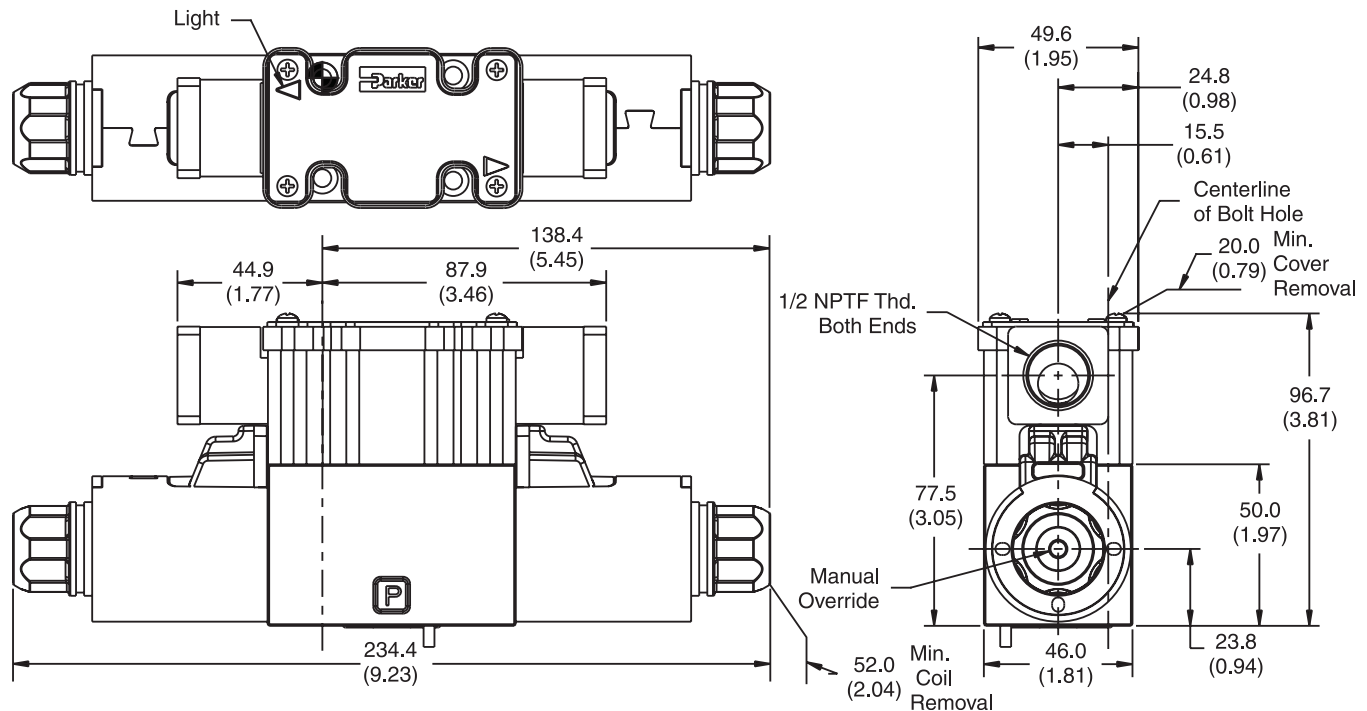
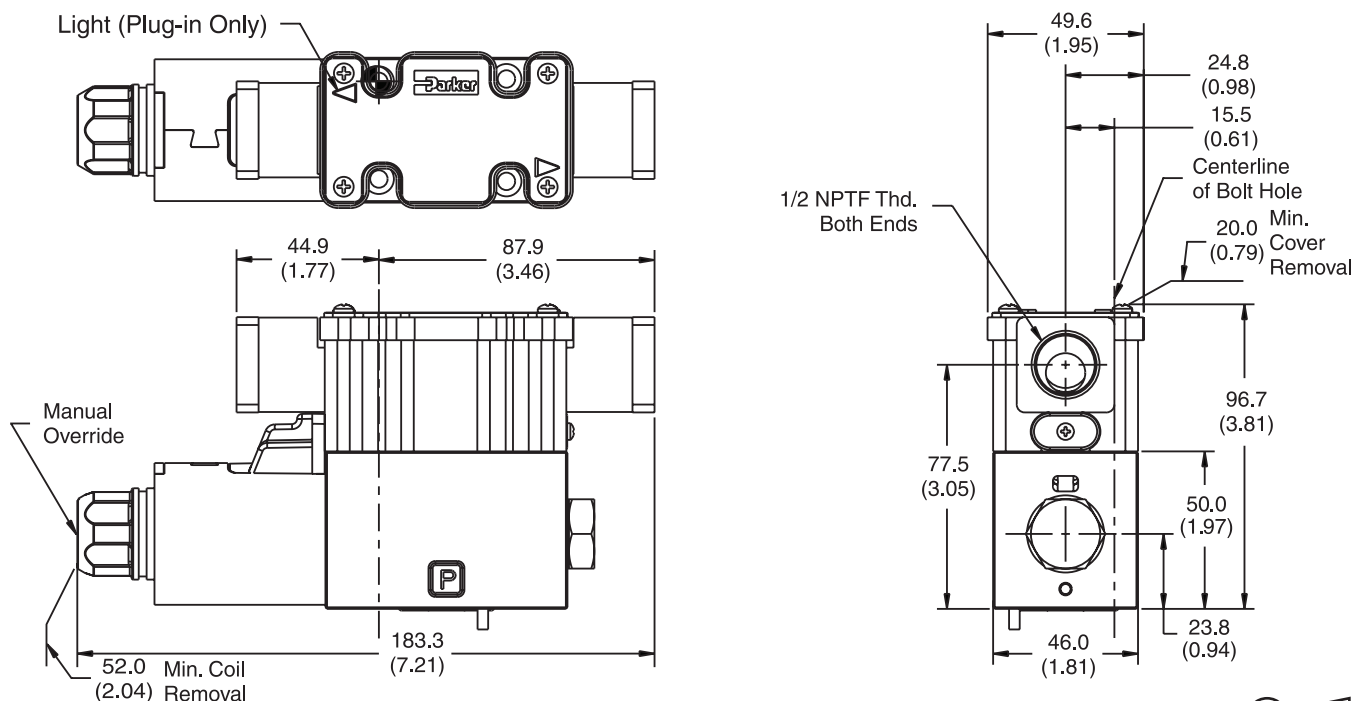
Non-Bold: Designates Tier II products and options. These products will have longer lead times.



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

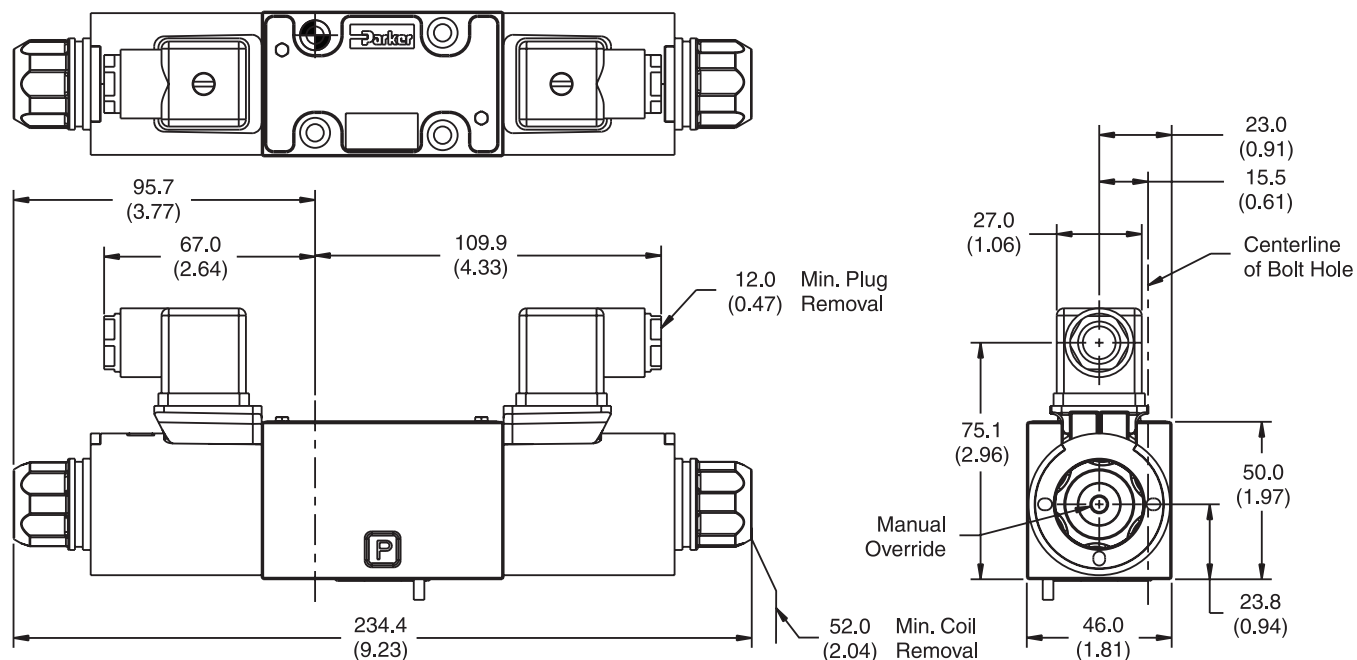


Inch equivalents for millimeter dimensions are shown in (**)

A**DC Plug-In Conduit Box Connector, with Lights, Double Solenoid****Note:** 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.**DC Plug-In or Leadwire Conduit Box Connector, with or without Lights, Single Solenoid****Note:** 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

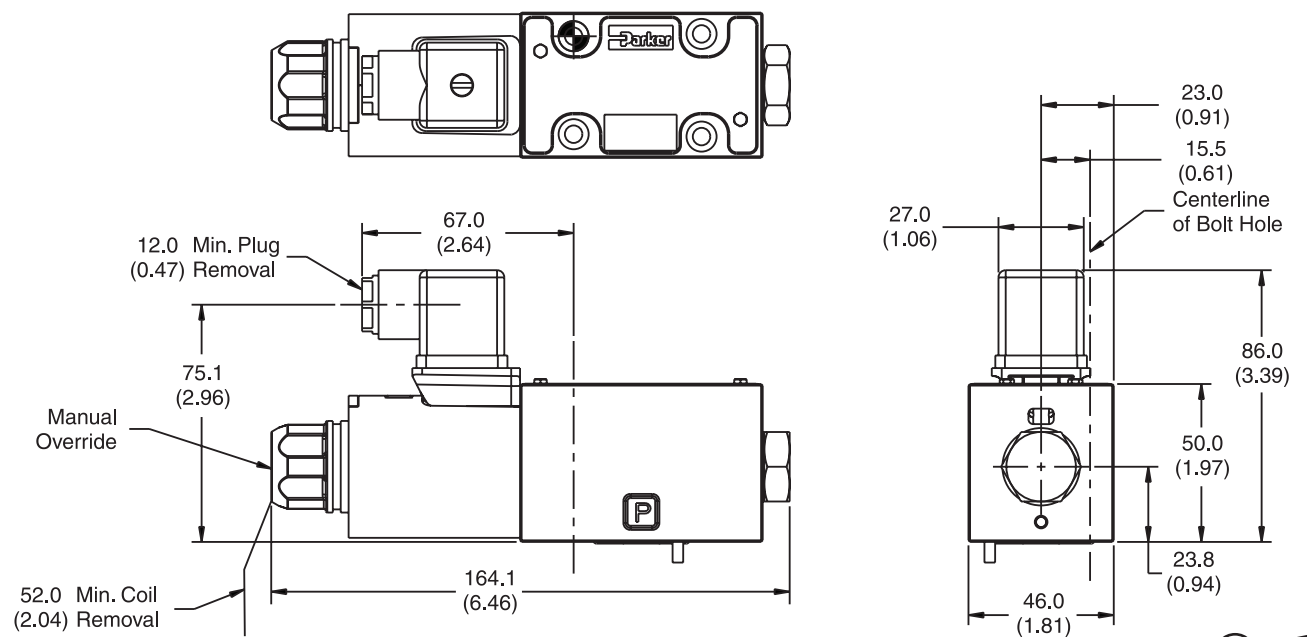
Inch equivalents for millimeter dimensions are shown in (**)

DC DIN with Plug Connector, Double Solenoid “P” Option Shown

A


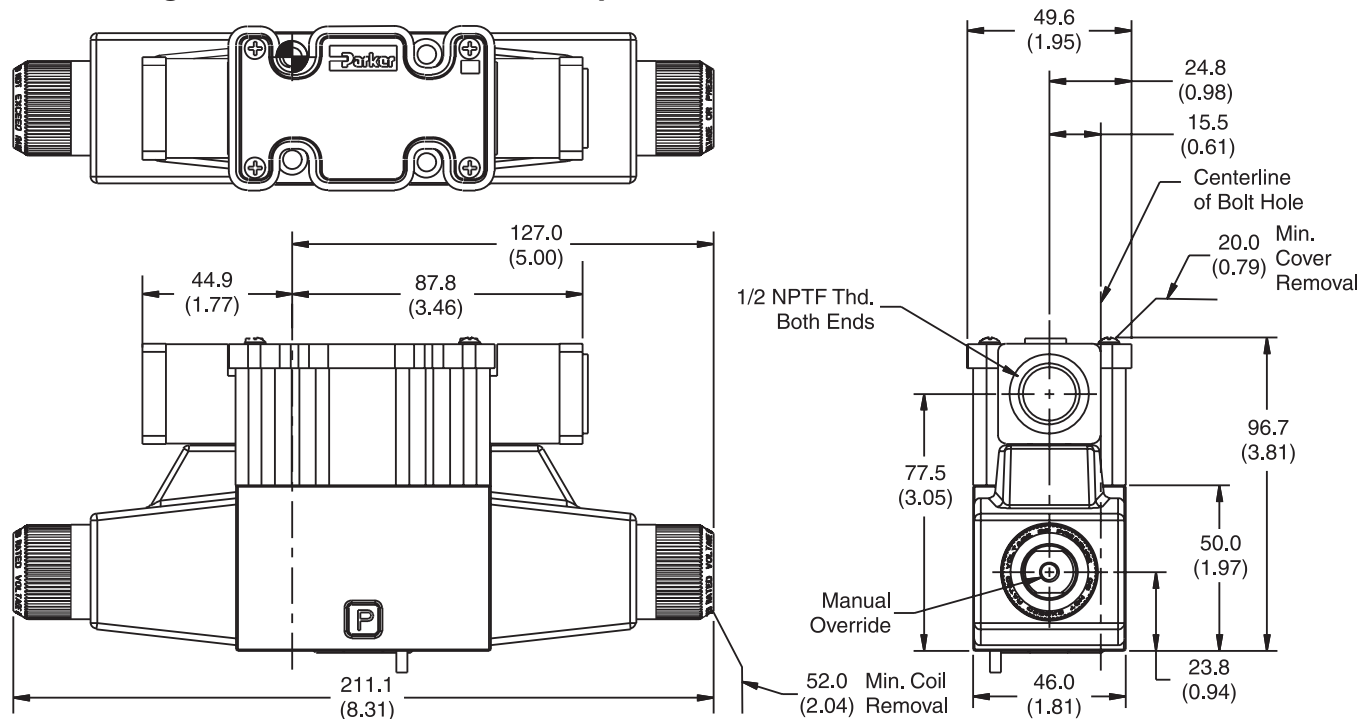
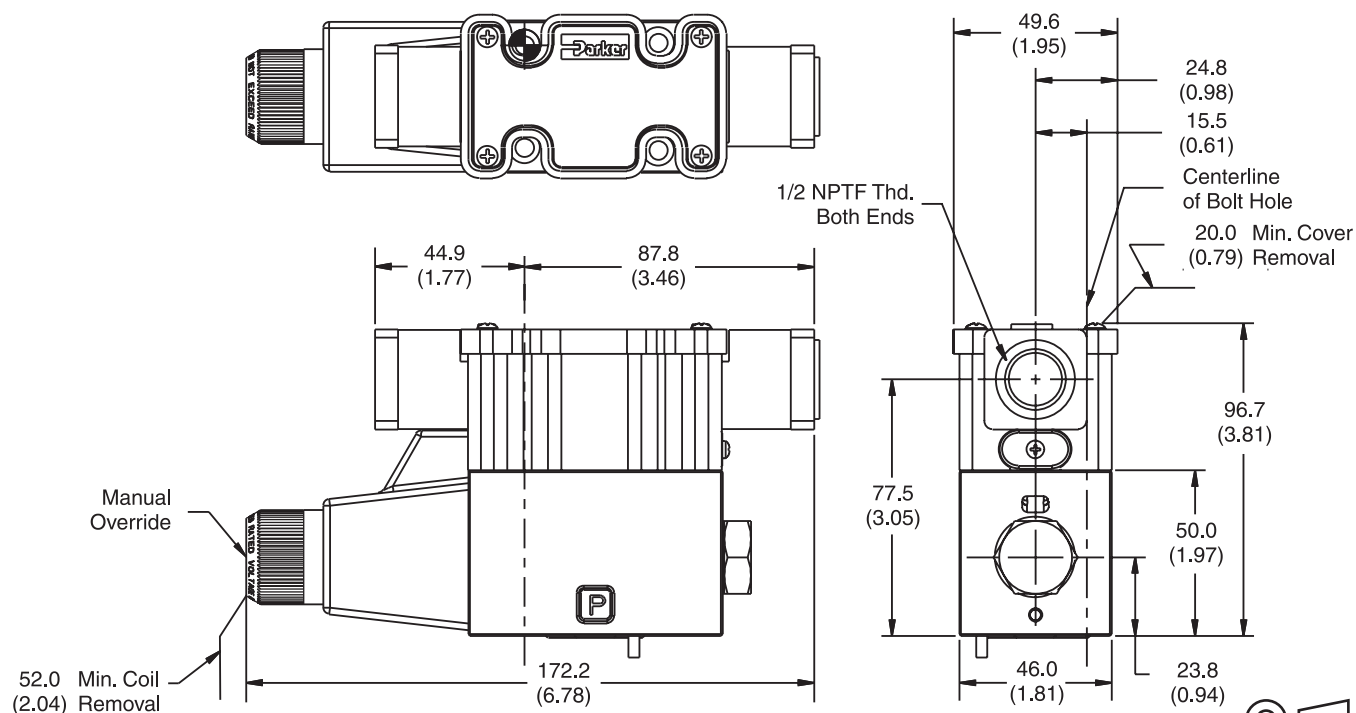
Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

DC DIN Connector, Single Solenoid “P” Option Shown



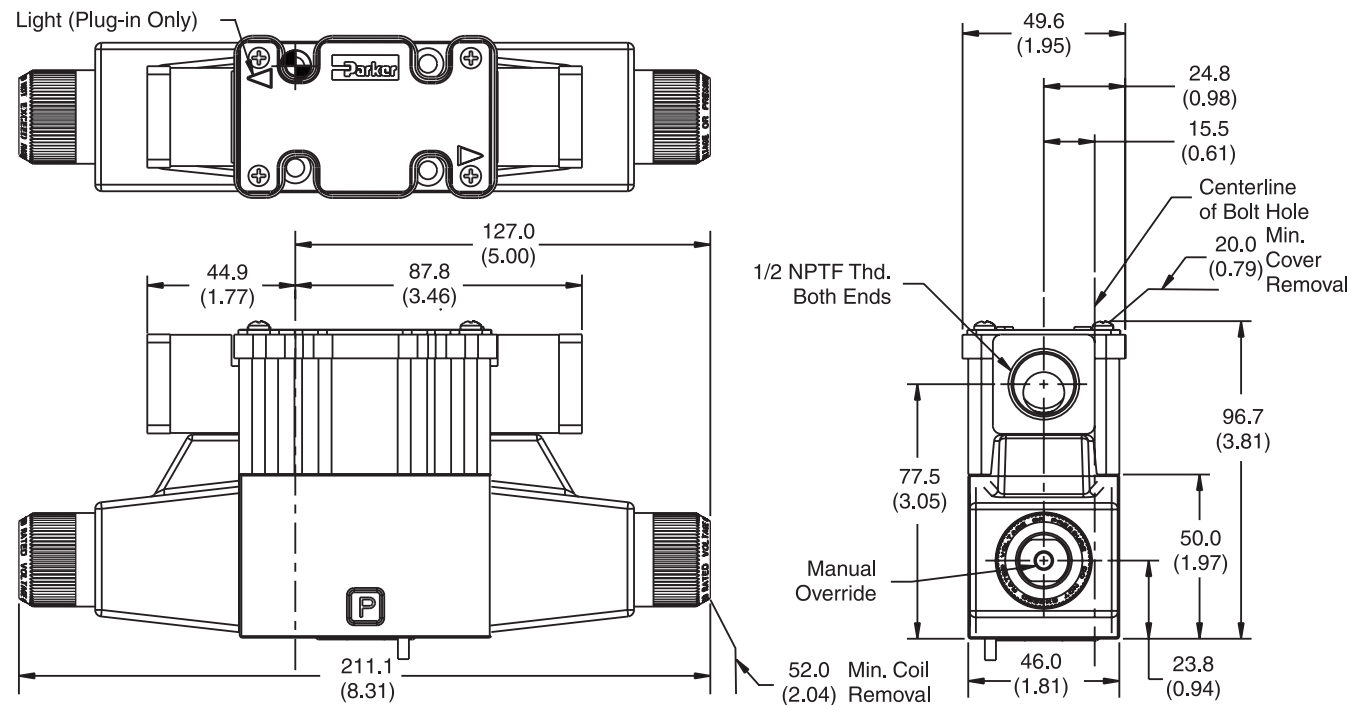
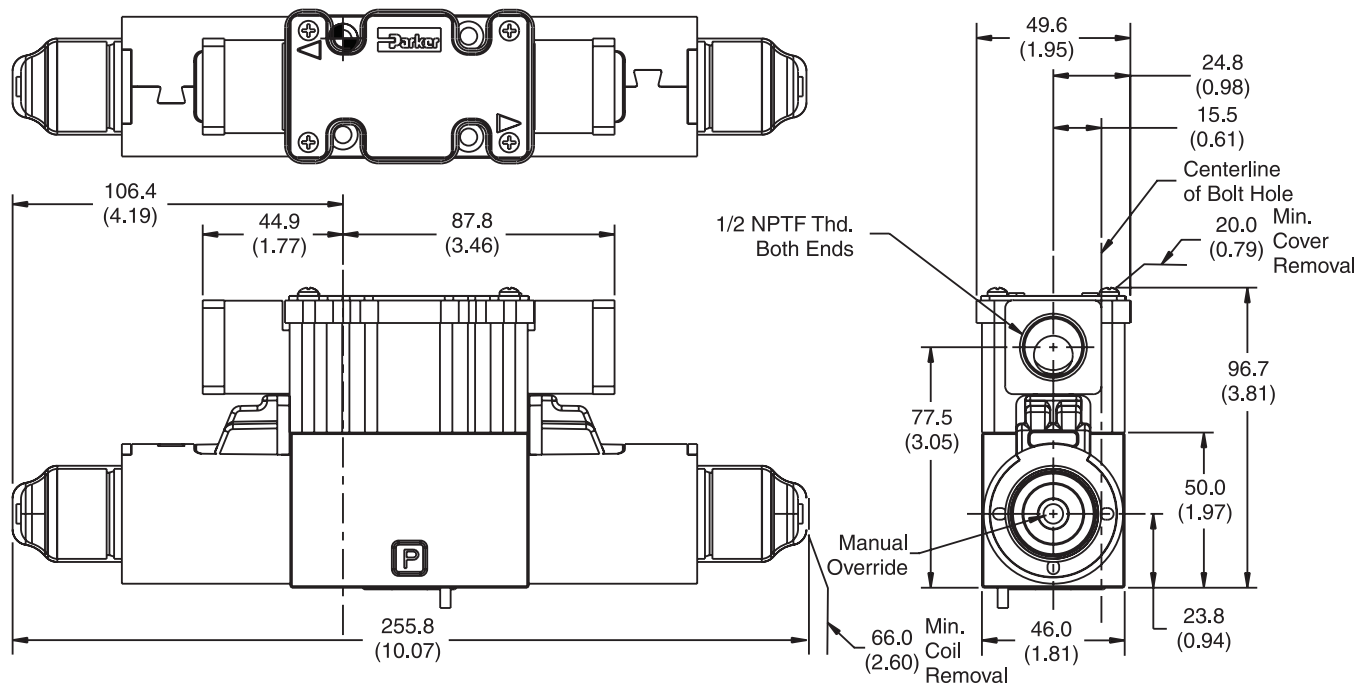
Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

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

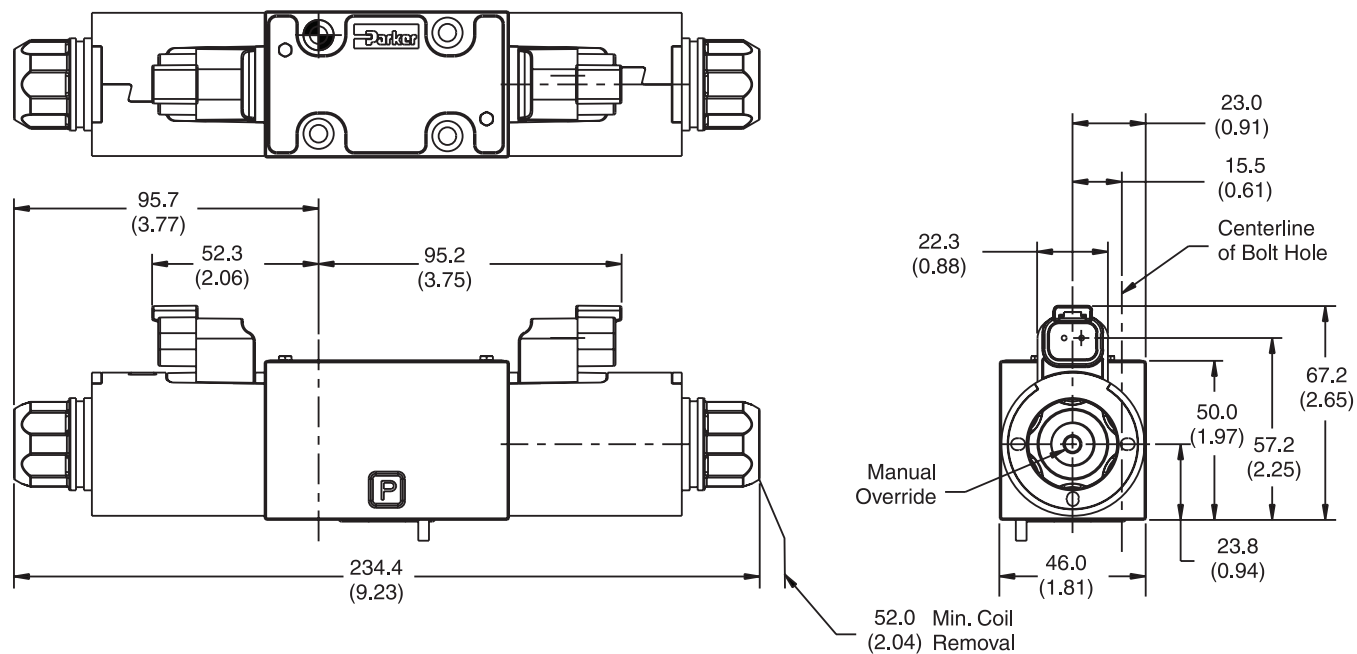
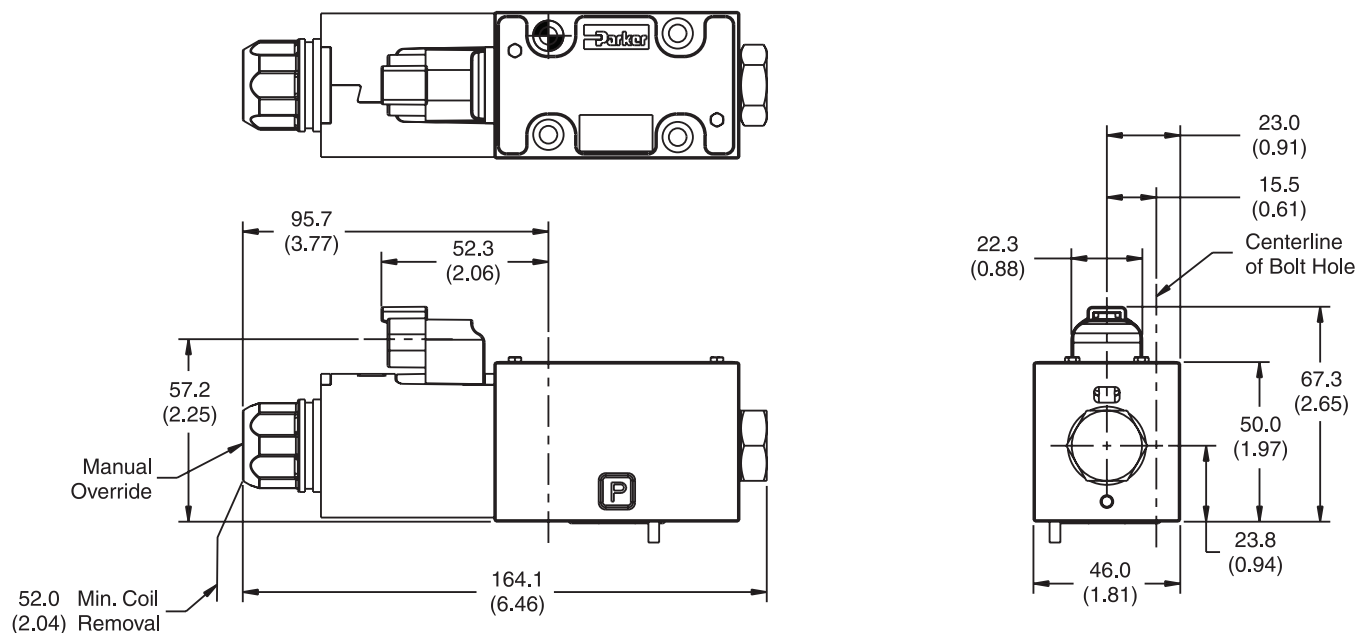
A**AC Leadwire Conduit Box Connector, without Lights, Double Solenoid, "C" Option****Note:** 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.**AC Leadwire Conduit Box Connector, without Lights, Single Solenoid, "C" Option****Note:** 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

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

AC Plug-in Conduit Box Connector, with Lights, Double Solenoid, "G" Option**Note:** 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.**DC Plug-in or Leadwire Conduit Box Connector, with or without Lights and Extended Override Tubes, Double Solenoid****Note:** 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

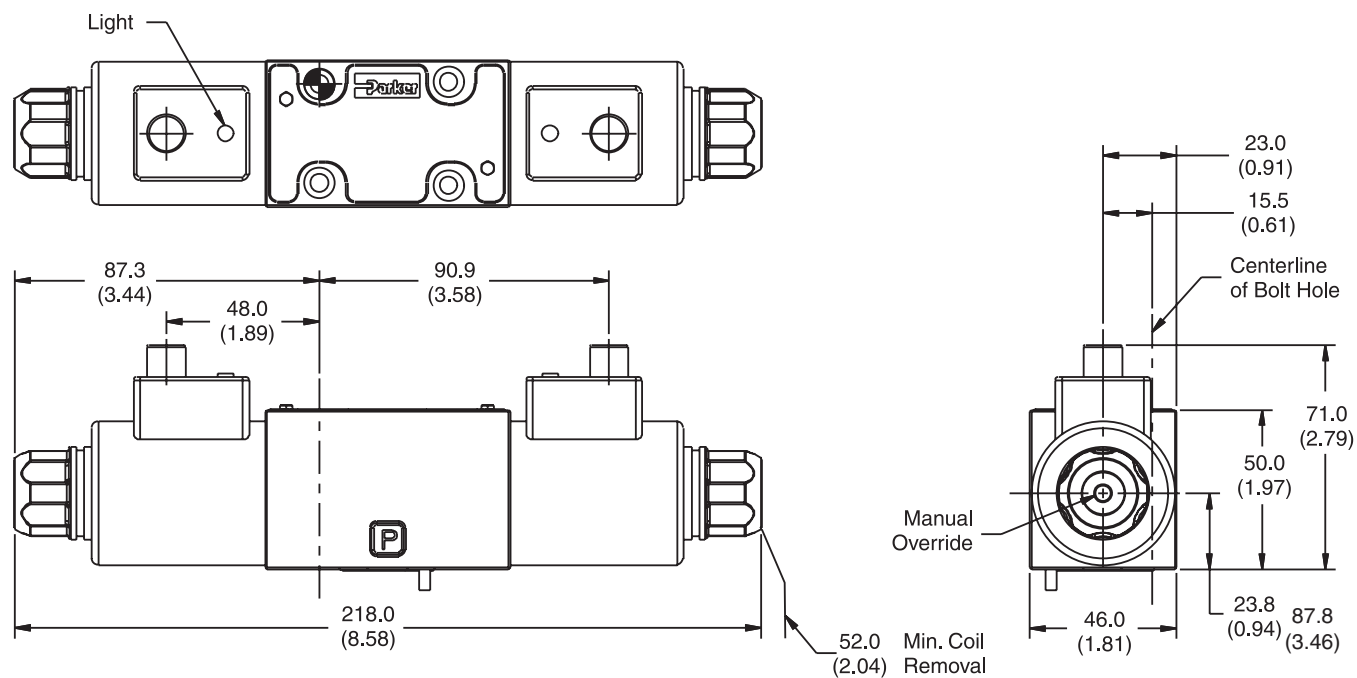
Inch equivalents for millimeter dimensions are shown in (**)

A**DC Deutsch Connector, Double Solenoid****Note:** 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.**DC Deutsch Connector, Single Solenoid****Note:** 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

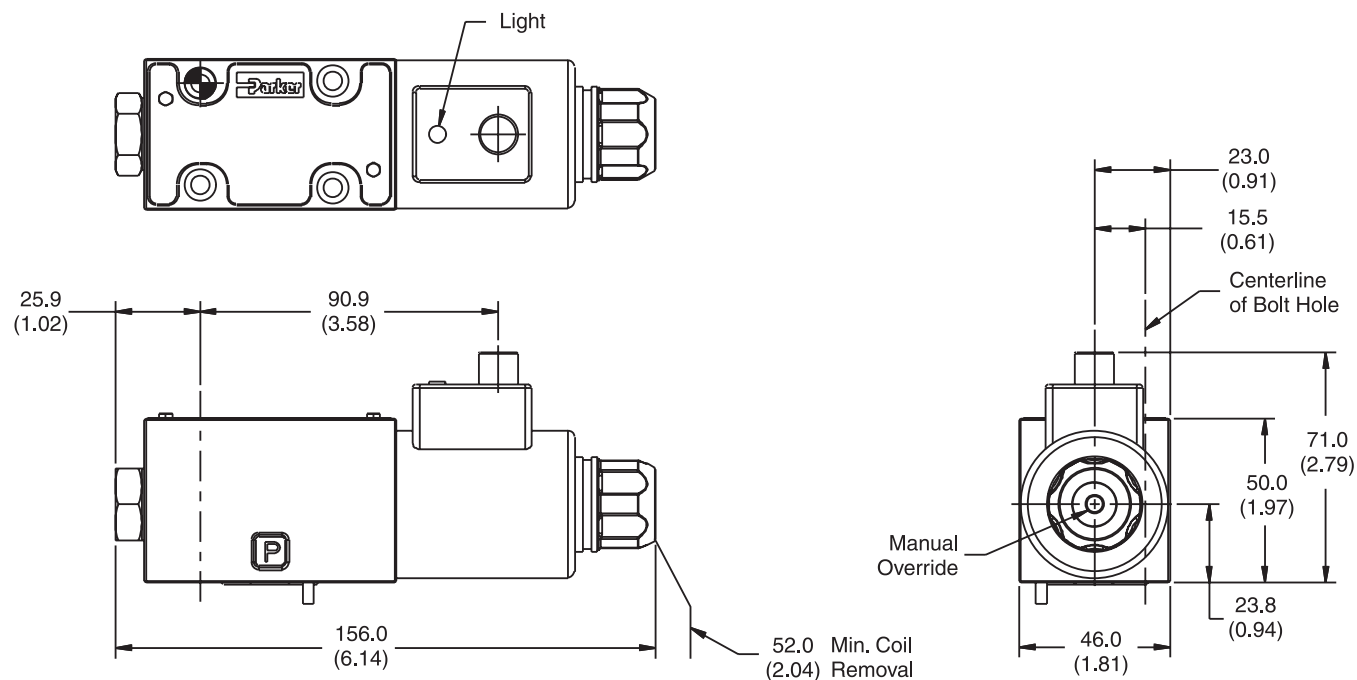
Inch equivalents for millimeter dimensions are shown in (**)

DC Desina Connector, Double Solenoid

A

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

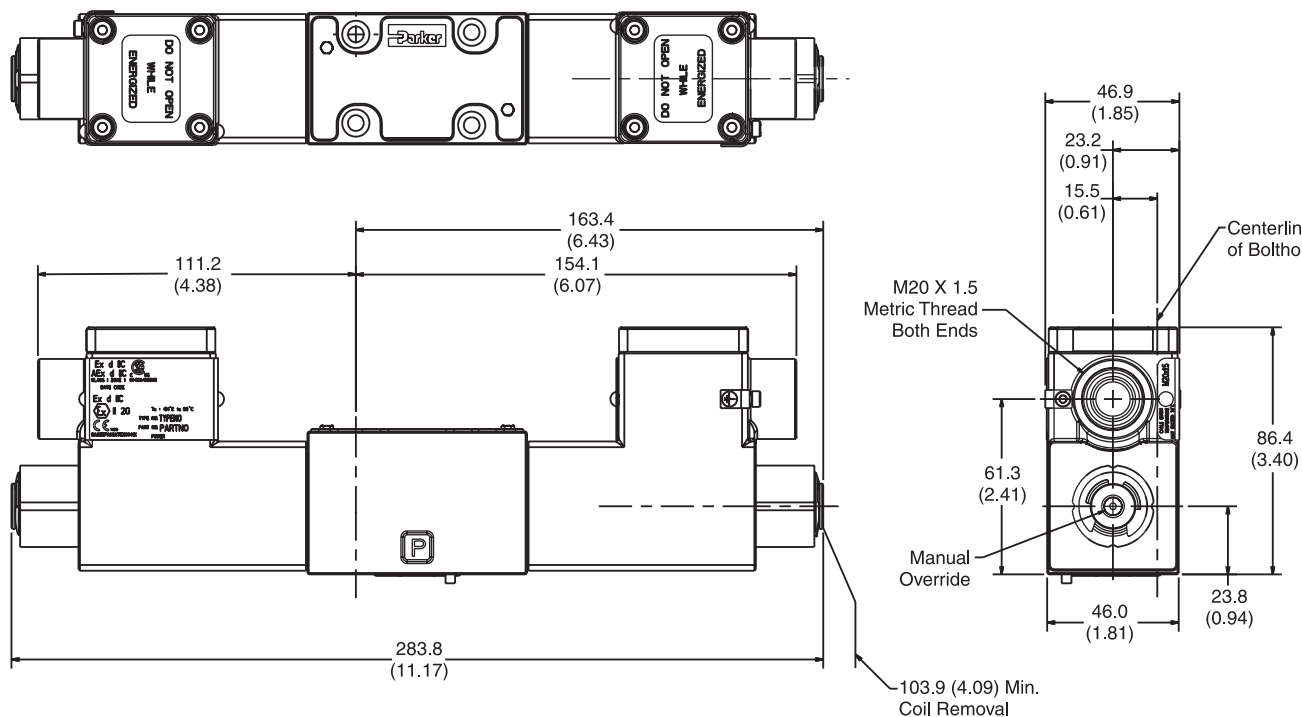
DC Desina Connector, Single Solenoid

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

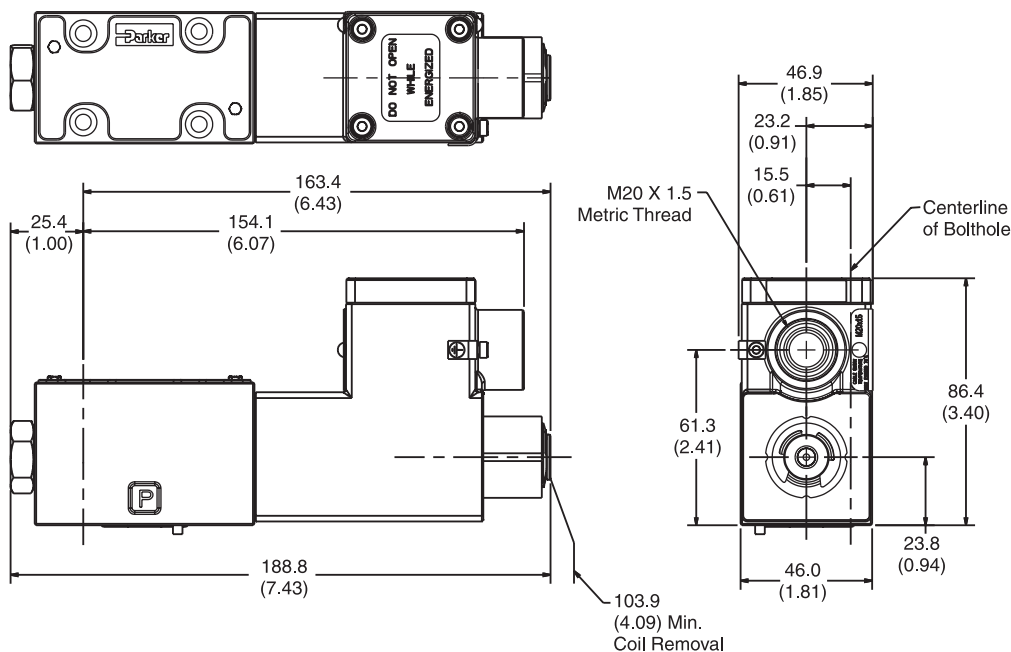
Inch equivalents for millimeter dimensions are shown in (**)

A

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

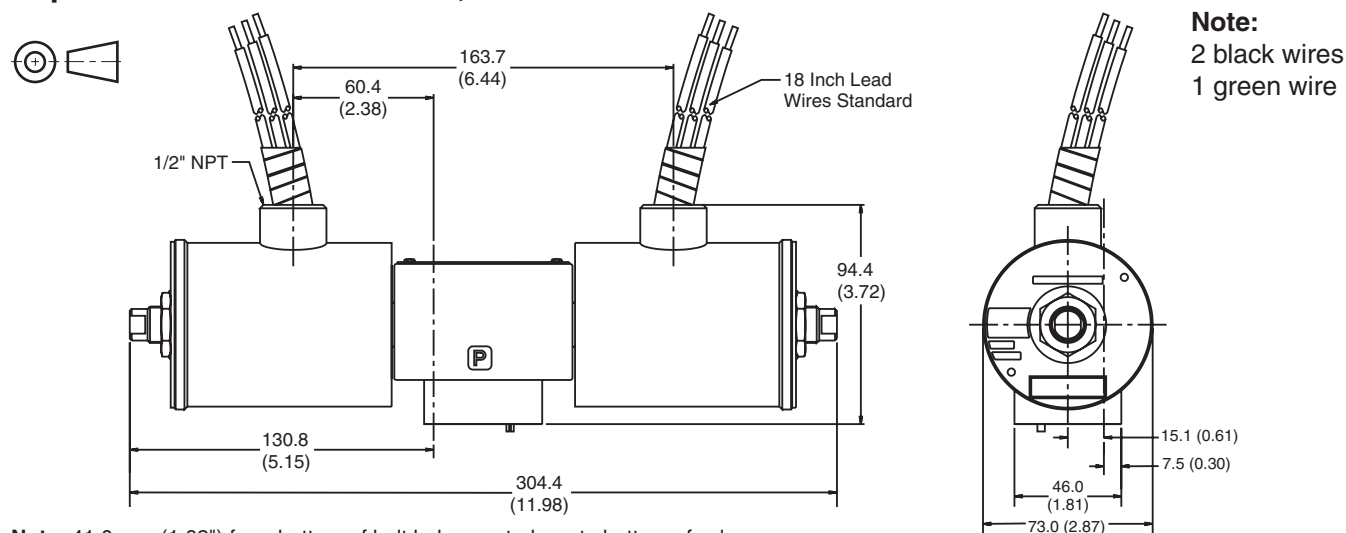


Explosion Proof, Ex d IIC ATEX/CSA/IECEX, Single Solenoid

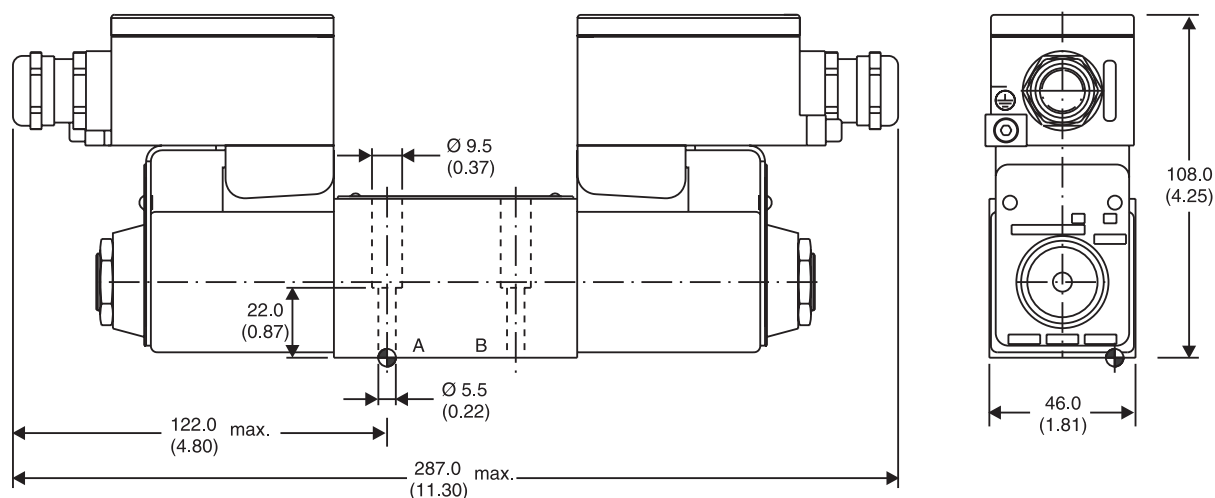


Inch equivalents for millimeter dimensions are shown in (**)

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

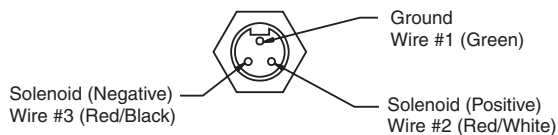


Explosion Proof, EExd ATEX, Double Solenoid

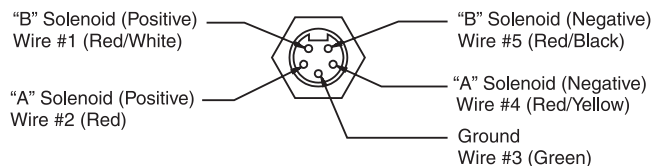


A**Manaplug (Options 56 & 1C)**

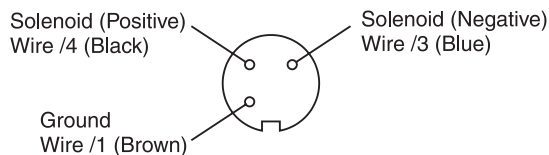
- Interface – Brad Harrison Plug
- 3-Pin for Single Solenoid
 - 5-Pin for Double Solenoid

**3-Pin Manaplug (Mini) with Lights**

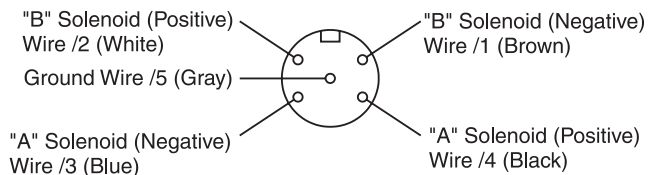
Single Solenoid Valves – Installed Opposite Side of Solenoid

**5-Pin Manaplug (Mini) with Lights**

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

Micro Connector Options (7B & 1D)**3-Pin Manaplug (Micro) with Lights**

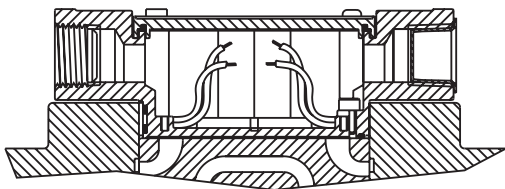
Single Solenoid Valves – Installed Opposite Side of Solenoid

**5-Pin Manaplug (Micro) with Lights**

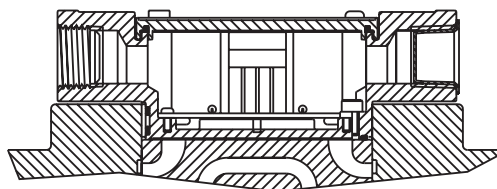
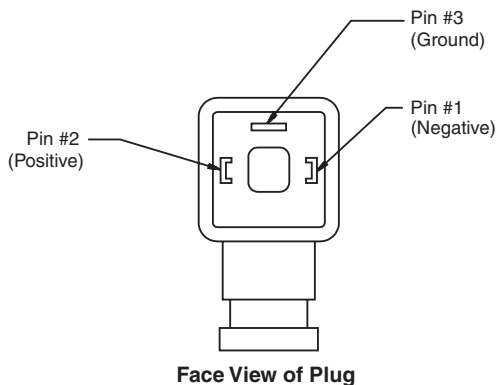
Single Solenoid Valves – Installed Opposite Side of Solenoid
 Double Solenoid Valves – Installed Over "A" Solenoid
 ("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)**Conduit Box Option C**

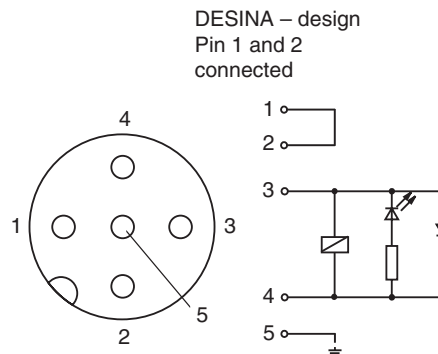
- No Wiring Options Available

**Signal Lights (Option 5) — Plug-in Only**

- LED Interface
- Meets Nema 4/IP67

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



Mounting Bolt Kits

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

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

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

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

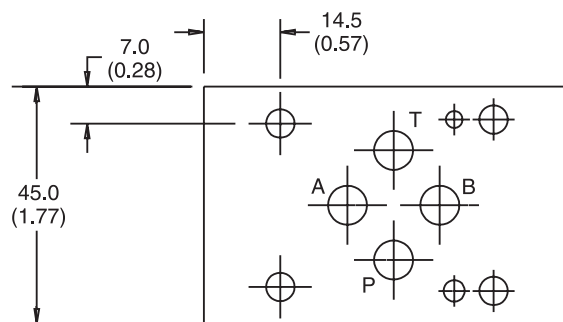
Number of Sandwich Valves at 44.5 mm (1.75") Thickness	Number of Sandwich Valves @ 40 mm (1.58") thickness				
	0	1	2	3	4
0	BK50 2.00 in.	BK211 3.63 in.	BK101 5.12 in.	BK102 6.75 in.	BK103 8.25 in.
	BKM50 50 mm	—	BKM101 130 mm	BKM102 170 mm	BKM103 210 mm
1	BK51 3.75 in.	BK212 5.37 in.	BK105 6.87 in.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

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

Sandwich Valve Dimensional Data

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

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



A

This image shows a full page of blank graph paper. The grid consists of thin, light gray horizontal and vertical lines that intersect to form a uniform pattern of small squares across the entire surface. There are no margins, text, or other markings on the paper.

General Description

Series D1VW 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.

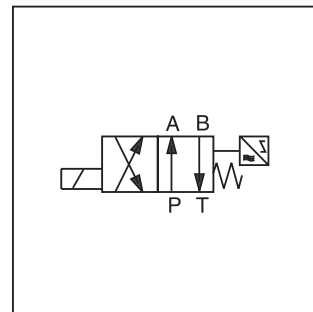
The fail-safe position of the directional valve during power failure is the spring offset or center position.

Please find detailed information on the machine directive in the position paper (see pages A39 and A40).

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



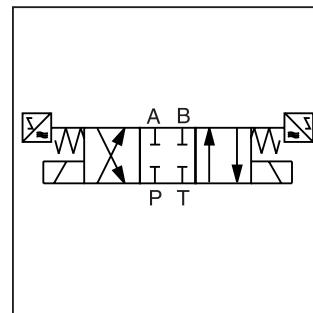
D1VW*B



D1VW*B

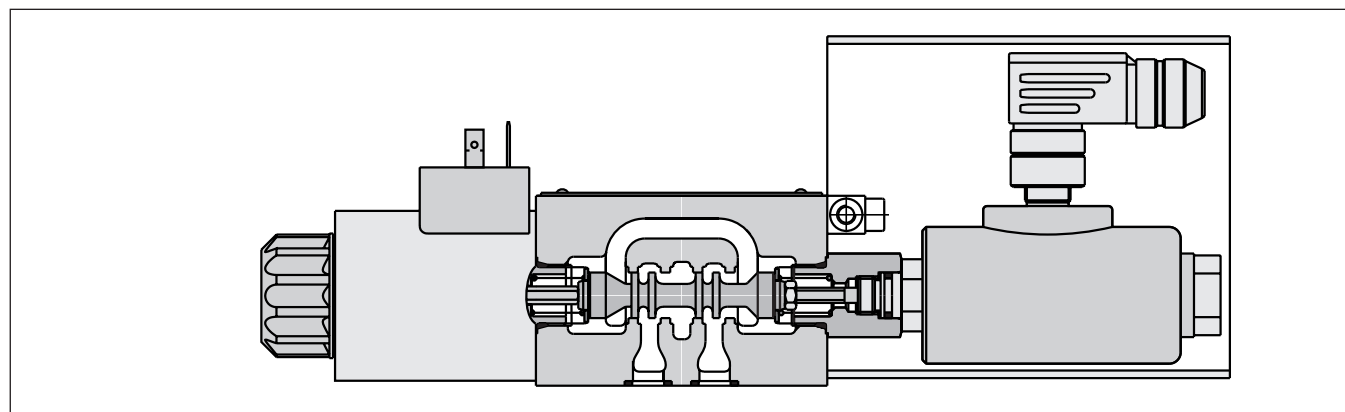


D1VW*C

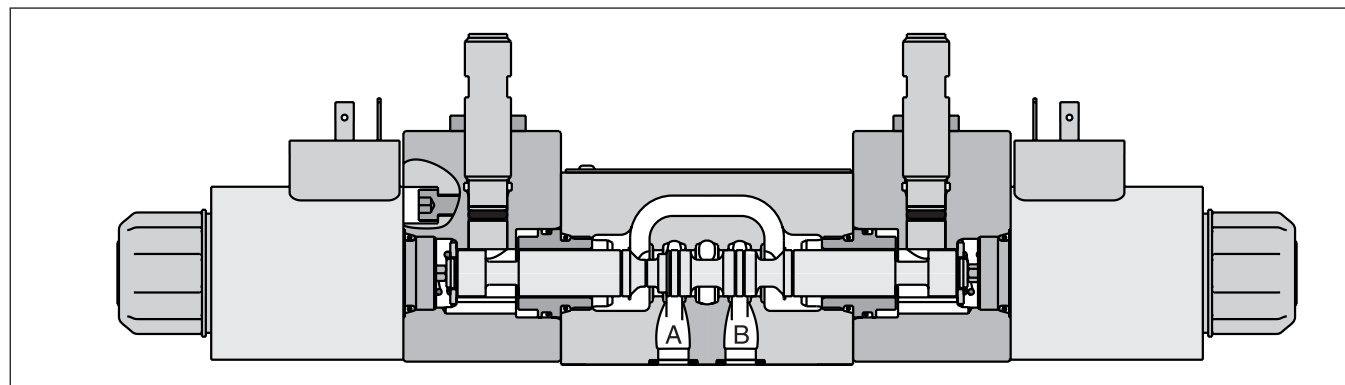


D1VW*C

D1VW*B



D1VW*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.

A01_Cat2500.indd, ddp, 04/19

A

D

Directional Control Valve

1

Basic Valve

V

3 Chamber Valve

W

Actuator Solenoid Wet Pin

Spool

Spool

Style

Style

Seal

Seal

NFPA D03
 CETOP 03
 DIN NG6

Code	Description
N	Nitrile
V	Fluorocarbon

3-Position Spools	
Code	Spool Type
	a 0 b
001	
002	
003 ¹⁾²⁾	
004	
005 ¹⁾	
015 ¹⁾³⁾	
016 ¹⁾	
076 ¹⁾	
078 ¹⁾	

2-Position Spools	
Code	Spool Type
	a b
020	
026 ⁴⁾	
030 ⁴⁾	

- ¹⁾ Spool types on request for spool position "C".
²⁾ Only available for spool position "E" and "F".
³⁾ Only available for spool position "K" and "M".
⁴⁾ Only available for spool position "B" and "H".

3-Position Spools	
Code	Spool Position
C	 3 positions. Spring offset in position "0". Operated in position "a" or "b".
E	 2 positions. Spring offset in position "0". Operated in position "a".
F	 2 positions. Spring offset in position "0". Operated in position "b".
K	 2 positions. Spring offset in position "0". Operated in position "b".
M	 2 positions. Spring offset in position "0". Operated in position "a".

2-Position Spools	
Code	Spool Position
B	 2 positions. Spring offset in position "b". Operated in position "a".
D ⁵⁾	 2 positions. Spring offset in position "a". Operated in position "b".
H	 2 positions. Spring offset in position "a". Operated in position "b".

⁵⁾ Only for position control (code I3N).

Weight:

Single Solenoid: 1.8 kg (4.0 lbs.)
 Double Solenoid: 3.8 kg (8.4 lbs.)

Bold: Designates Tier I products and options.

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



Solenoid
Voltage



Connector as per
EN 175301-803,
without plug
(Please order
plug separately.)*



Manual
Override



Position
Control



Design
Series

NOTE:
Not required
when ordering.



Code	Description
K	12 VDC
J	24 VDC
U ⁶⁾	98 VDC
G ⁶⁾	205 VDC

⁶⁾ 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 ⁷⁾	No Override

⁷⁾ For hydraulic presses according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessories "I4N", "I5N" or "I6N" (start position monitored) are required.

Code	Description	Spool Position
I2N	End position monitored side B	E, F, B (Solenoid on a-side)
I5N ⁷⁾	Start position monitored side B	
I1N	End position monitored side A	K, M, H (Solenoid on b-side)
I4N ⁷⁾	Start position monitored side A	
I3N	End positions	C, D
I6N ⁷⁾	Start positions	C

Bold: Designates Tier I products and options.

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

A

General					
Design		Directional Spool Valve			
Actuation		Solenoid			
Size		NG6 / CETOP 03 / NFPA D03			
Mounting Interface		DIN 24340 A6 / ISO 4401 / NFPA D03 / CETOP RP 121-H			
Mounting Position		Unrestricted, preferably horizontal			
Ambient Temperature		[°C]	0...+50; (+32°F...+122°F)		
MTTF _D Value		[years]	75		
Hydraulic					
Maximum Operating Pressure		P, A, B: 350 Bar (5045 PSI); T: 210 Bar (3045 PSI)			
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525			
Fluid Temperature		[°C]	-25 ... +70 (-13°F...+158°F)		
Viscosity Permitted		[cSt]/[mm²/s]	2.8...400 (13...1854 SSU)		
Recommended		[cSt]/[mm²/s]	30...80 (139...371 SSU)		
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)			
Flow Maximum		80 LPM (21 GPM) See shift limits			
Leakage at 50 Bar (725 PSI) (per flow path)		[ml/min]	Up to 10 (0.003 GPM) (depending on spool)		
Static / Dynamic					
Step Response at 95%		[ms]	Energized: 32; De-energized: 40		
Electrical					
Duty Ratio		100% ED; CAUTION: coil temperature up to 150°C (302°F) possible			
Max. Switching Frequency		15000 switchings per hour			
Protection Class		IP 65 in accordance with EN 60529 (plugged and mounted)			
	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	0.15
Power Consumption	[W]	32.7	31	31.9	30.2
Solenoid Connection		Connector as per EN 175301-803, solenoid identification as per ISO 9461.			
Wiring Minimum		[mm²]	3 x 1.5 recommended		
Wiring Length Maximum		[m]	50 (164 ft.) recommended		

With electrical connections the protective conductor (PE \perp) must be connected according to the relevant regulations.

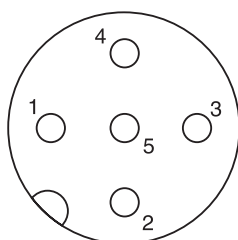
Single Solenoid Valves

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

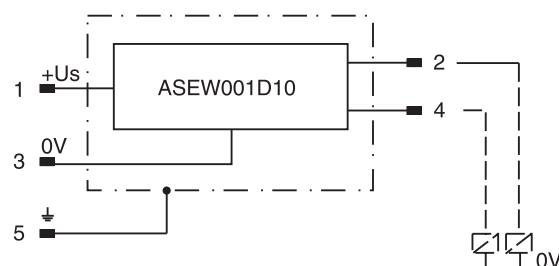
Protection Class		IP 65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature	[°C]	0...+50; (+32°F...122°F)
Supply Voltage U_s / Ripple	[V]	18...42 \pm 10%
Current Consumption without Load	[mA]	\leq 30
Max. Output Current per Channel, Ohmic	[mA]	400
Min. Output Load per Channel, Ohmic	[kOhm]	100
Max. Output Drop at 0.2A	[V]	\leq 1.1
Max. Output Drop at 0.4A	[V]	\leq 1.6
EMC		EN50081-1 / EN50082-2
Max. Tolerance Ambient Field Strength	[A/m]	<1200
Min. Distance to Next AC Solenoid	[m]	>0.1 (0.33 ft.)
Interface		M12x1
Wiring Minimum	[mm ²]	5 x 0.25 brad shield recommended
Wiring Length Maximum	[m]	50 (164 ft.) recommended

A

M12 Pin Assignment



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



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

End position monitored:

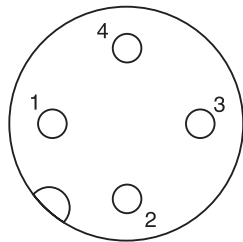
The inductive switch gives a signal before the end position is reached. (above 85% spool stroke).

Double Solenoid Valves

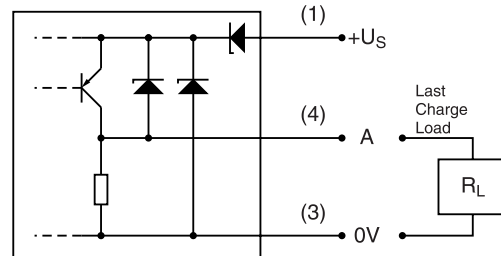
Electrical Specifications of Position Control as per IEC 61076-2-101 (M12x1)

Protection Class		IP 65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature	[°C]	0...+50; (+32°F...122°F)
Supply Voltage / Ripple	[V]	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		EN61000-6-4 / EN61000-6-2
Min. Distance to Next AC Solenoid	[m]	>0.1 (0.33 ft.)
Interface		M12x1
Wiring Minimum	[mm²]	3 x 0.14 braided shield recommended
Wiring Length Maximum	[m]	50 (164 ft.) recommended

M12 Pin Assignment



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

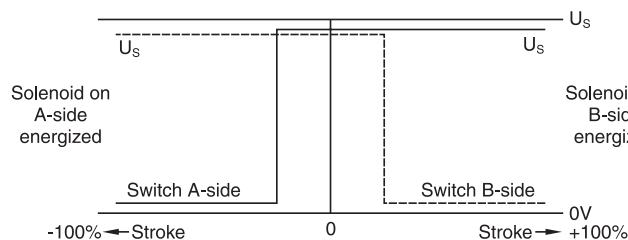


Definitions

Start position monitored:

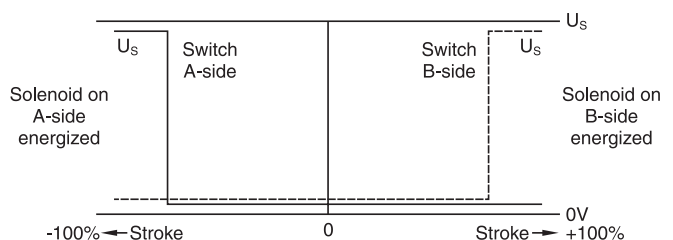
The valve is de-energized. The inductive switch gives a signal at the moment the spool leaves the center position (below 15% spool stroke).

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:

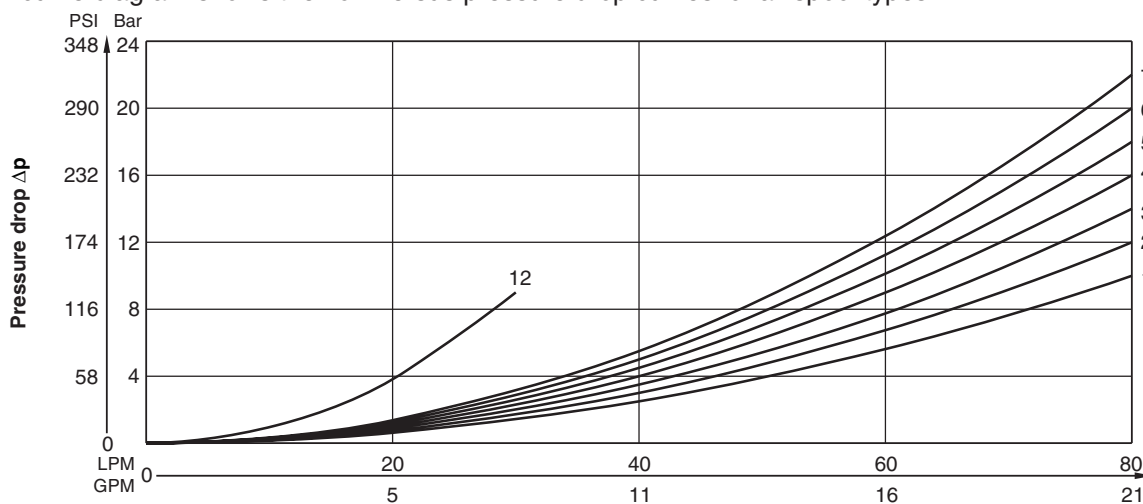
The inductive switch gives a signal before the end position is reached (above 85% spool stroke).



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

Performance Curves

The flow curve diagram shows the flow versus pressure drop curves for all spool types.



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

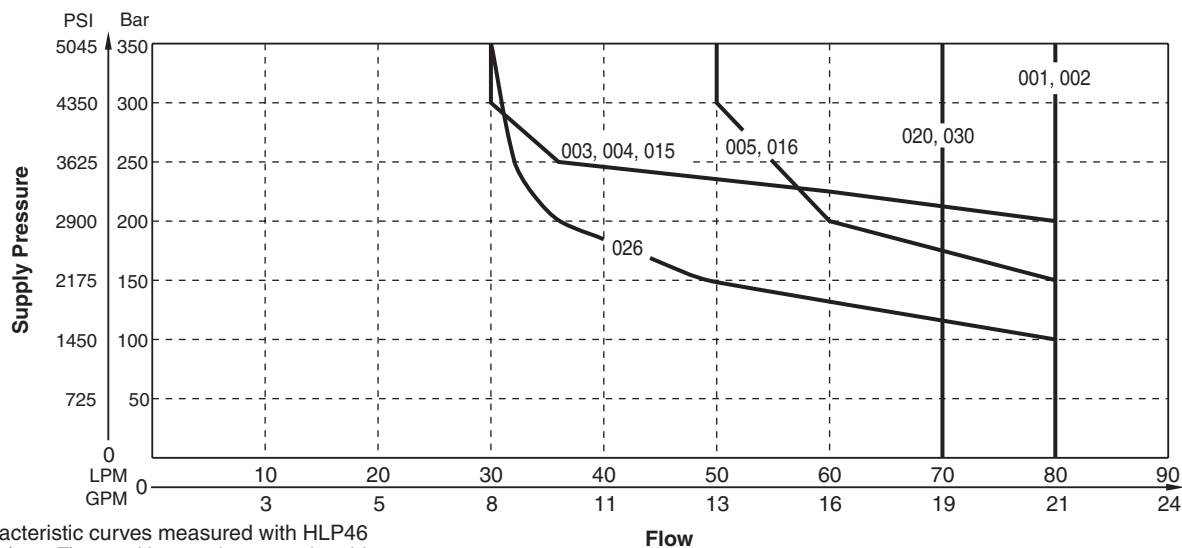
Flow Q

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

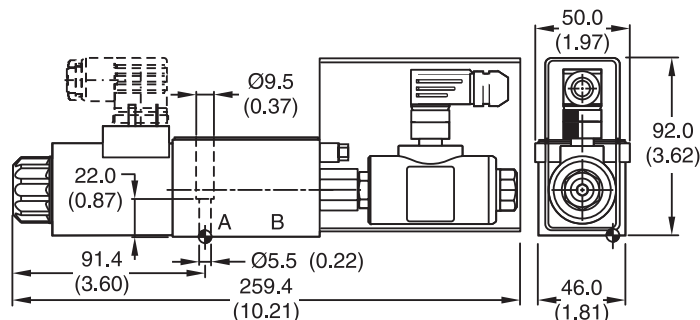
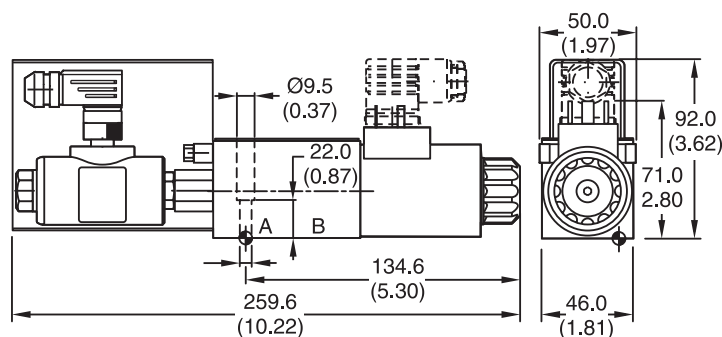
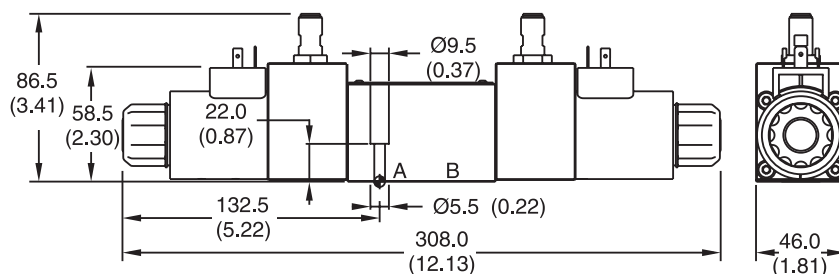
The diagram below specifies the shift limits. Valves with spool position "F" or "M" can only be operated up to 70% of the limits. The specifications apply to balanced flow conditions. The shift limits can be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, 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.

A01_Cat2500.indd, ddp, 04/19

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

A**Interface EN 175301-803, DC solenoid, with plug M12x1¹⁾****Style B, E, F****Style H, K, M**¹⁾ Delivery includes plug M12x1. (part no.: 5004109).**Interface EN 175301-803, DC solenoid, without plug M12x1²⁾****Style C**²⁾ Please order plug M12 x 1 separately. Straight plug recommended – no defined position possible for angled plug.

Surface Finish	Kit			Seal Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK375 BK209	4x M5x30 4x 10-24x1.25 DIN 912 12.9	7.6 Nm (0.6 lb.-ft.)	Nitrile: SKD1VWN91 Fluorocarbon: SKD1VWV91

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 (0.37 lb.-ft.) to 0.6 Nm (0.44 lb.-ft.).

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

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

A

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. 29.07.2009).

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 13849-2:2008-09, C.2 and C.3, 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 proven 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.

A

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 201:1997

2-way-slip in cartridges

Direct operated directional control valves NG6
Direct operated directional control valves NG10
Pilot operated directional control valves NG10
Pilot operated directional control valves NG16
Pilot operated directional control valves NG25

Type C10-DEC 101-SC
Type C13-DEC 107-SC, C18-DEC 107-SC
Type D1VW*-SC, D1DW*-SC;
Type D3W*-SC, D3DW*-SC
Type D31DW*-SC
Type D41VW*-SC
Type D81VW*-SC, D91VW*-SC

Intended usage:

For hydraulically operated clamping units of injection molding machines according to the manufacturer's declaration of incorporation.

Press controls according to DIN EN 693:2009

Press control NG06
Press control NG10
Press control NG16
Press control NG25
Press control NG50

Type PADZ2780.3xx
Type PADZ2781.3xx
Type PADZ2782.3xx
Type PADZ2783.3xx
Type PADZ2784.3xx

Intended usage:

To be incorporated into hydraulic presses according to DIN EN 693:2009.

Declaration of 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.

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.

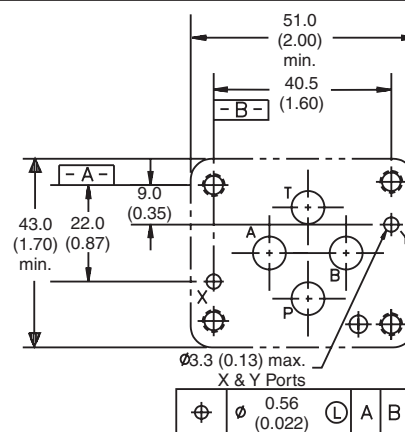
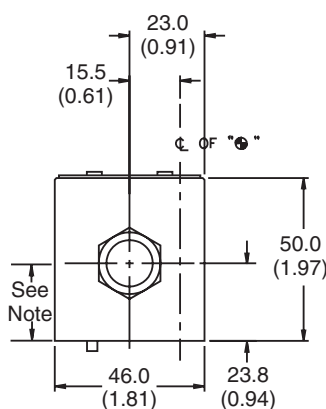
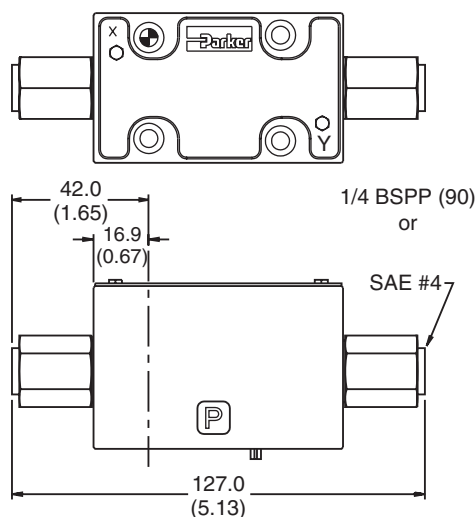
Pilot Piston. The hydraulic piston area is 198 mm² (.307 in.²). Pilot piston stroke is 3.4mm (.135 in.).

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

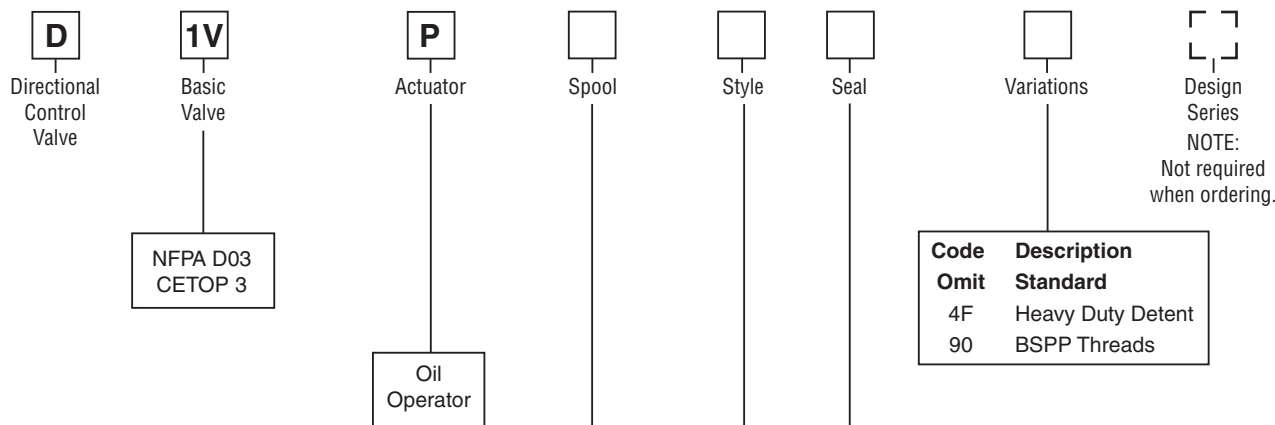


Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

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.

A01_Cat2500.indd, ddp, 04/19

A



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.	

D available with 020 and 030 spools only.
 B & H available with 020 and 030 spools only.
 E & K not available with 020 and 030 spools.

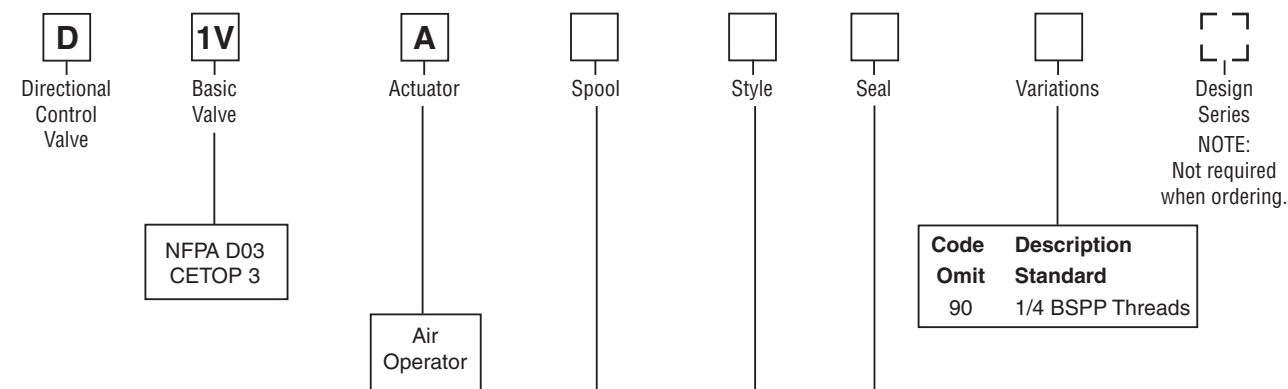
This condition varies with spool code.

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

Valve Weight: 1.90 kg (4.2 lbs.)
Standard Bolt Kit: BK209 10–24x1.25
Metric Bolt Kit: BKM209 M5–0.8x30 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.



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

* 008 spool has closed crossover.

** 009 spool has open crossover.

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

Code	Description
N	Nitrile
V	Fluorocarbon

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.	



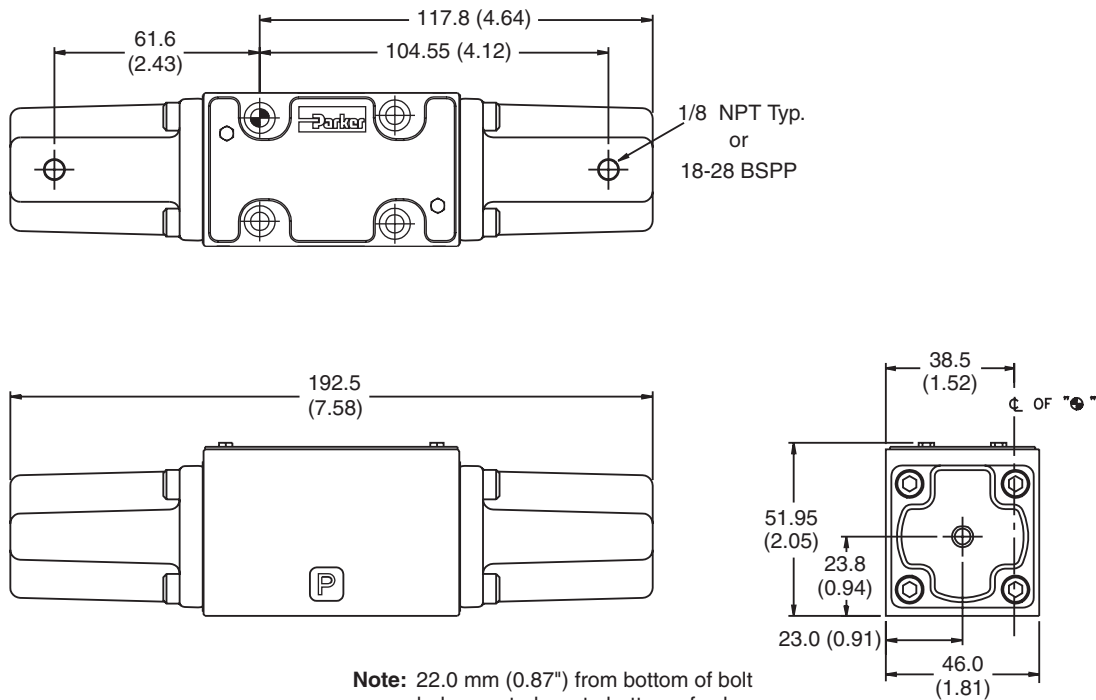
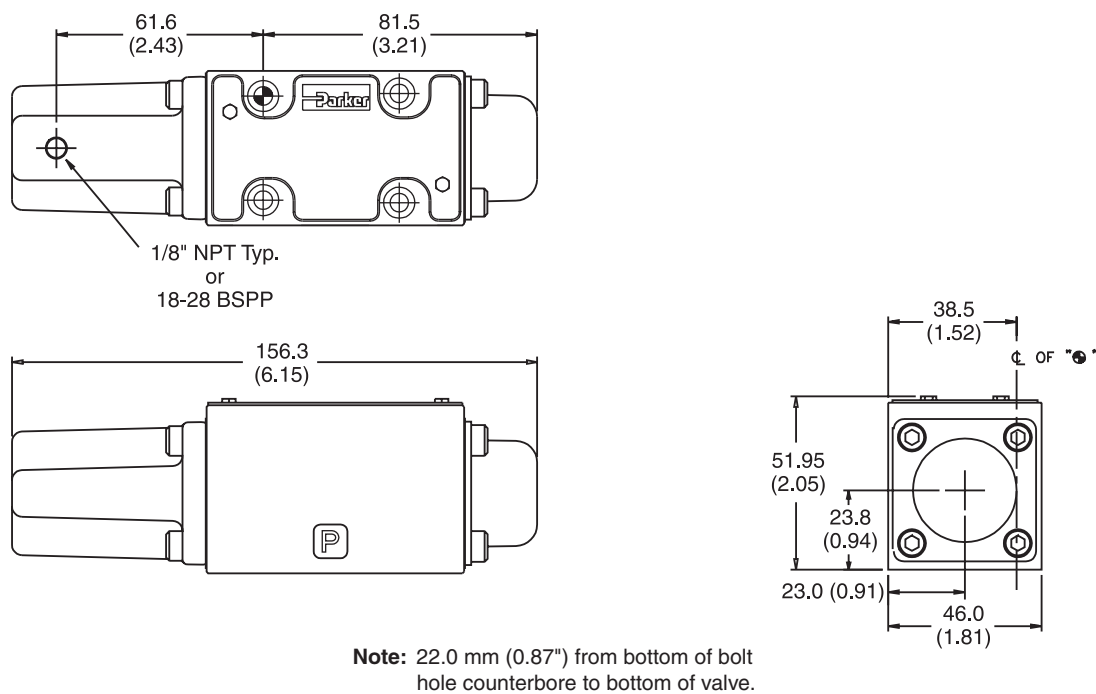
This condition varies with spool code.

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.

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

A**Air Operated D1VA, Double Pilot****Air Operated D1VA, Single Pilot**

General Description

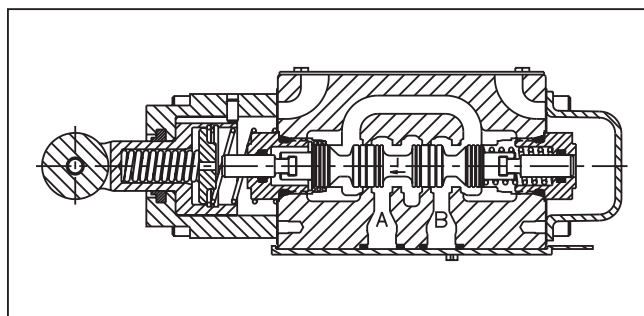
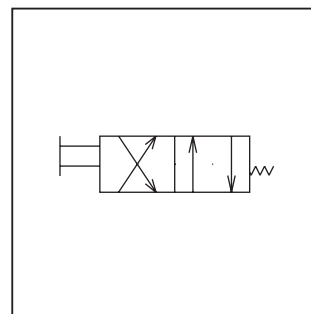
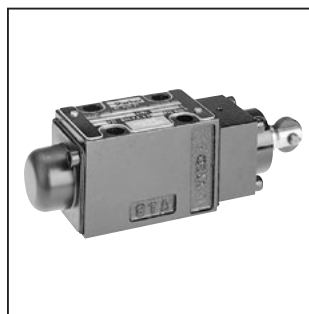
Series D1VC, D1VD and D1VG directional control valves are high performance, 4-chamber, direct operated, cam controlled, 4-way valves. They are available in 2-position and conform to NFPA's D03, CETOP 3 mounting patterns.

Features

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

Specifications

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



Ordering Information

D

Directional Control Valve

1V

Basic Valve

NFPA D03
CETOP 3

Actuator

Spool

Style

Seal

Variations

Design Series

NOTE:
Not required when ordering.

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

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 energized. Note flow paths reverse sides for #008 and #009 spools.

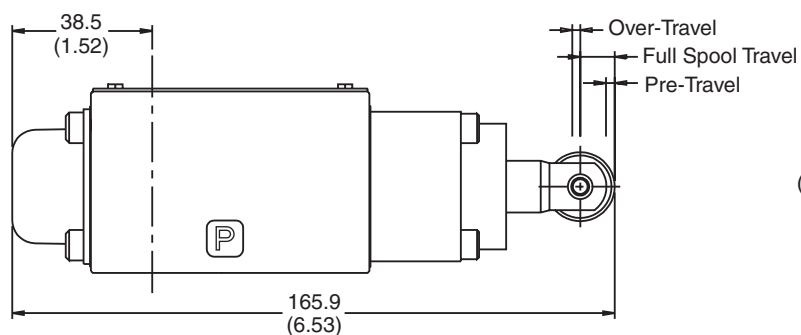
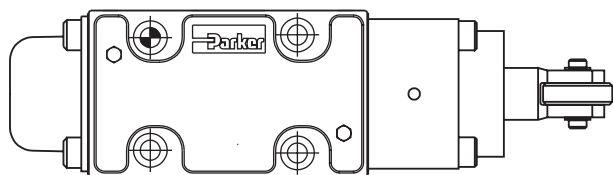
Bold: Designates Tier I products and options.

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.

A01_Cat2500.indd, ddp, 04/19

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

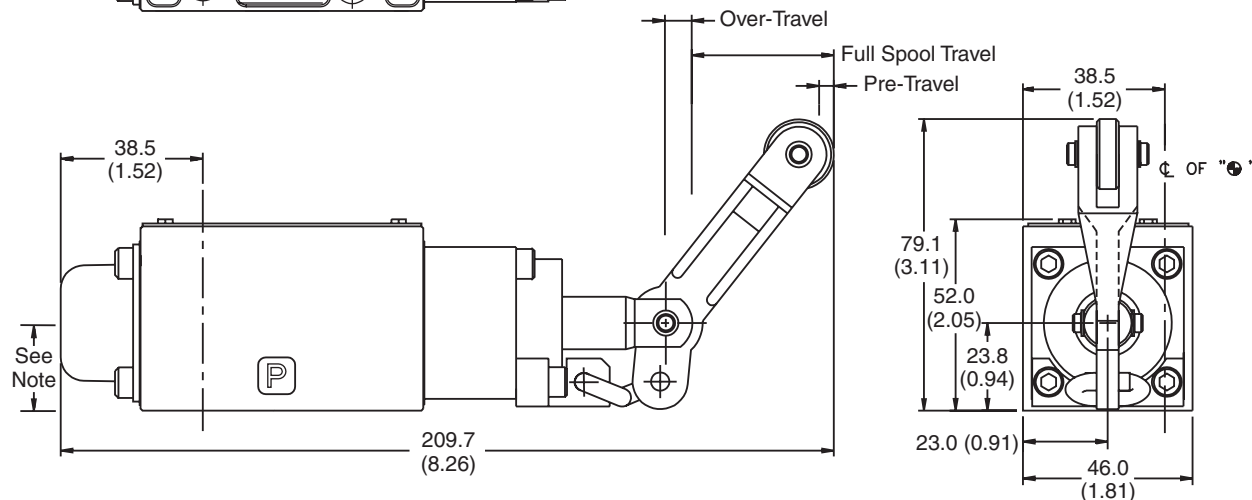
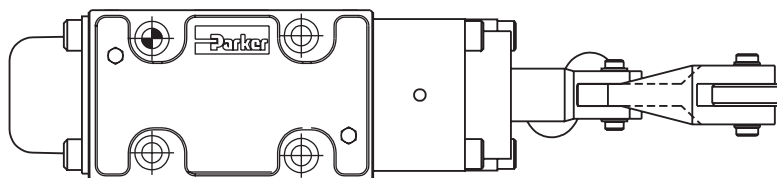
A**Cam Operated D1VC and D1VD**

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

Note: For D1VD, Cam Rotated 90°



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

Cam Lever Operated D1VG

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

General Description

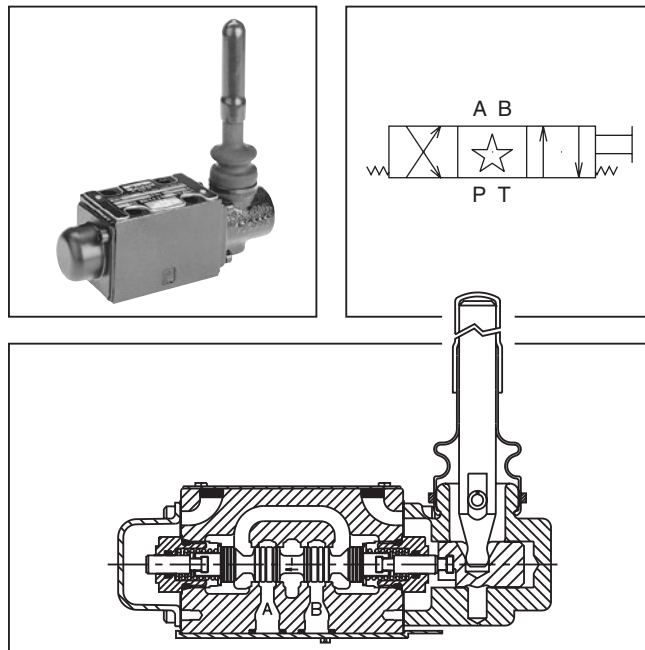
Series D1VL directional control valves are high-performance, 4-chamber, direct operated, lever controlled, 4-way valves. They are available in 2 or 3-position and conform to NFPA's D03, CETOP 3 mounting patterns.

Features

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

Specifications

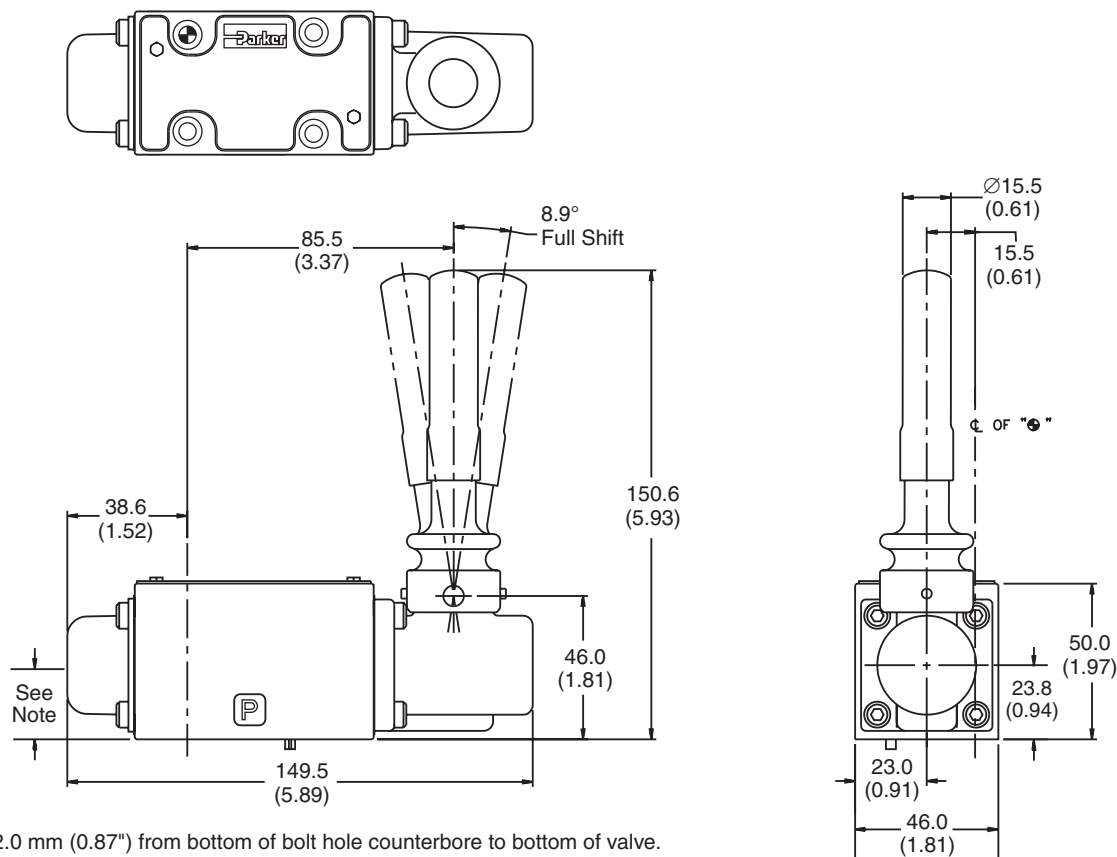
Mounting Pattern	NFPA D03, CETOP 3, NG 6
Maximum Pressure	Operating: 345 Bar (5000 PSI) Tank Line: 34 Bar (500 PSI)
Maximum Flow	See Reference Data
Force Required to Shift Lever Operator	25 N (5.6 lbs)



Dimensions

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

Lever Operated D1VL

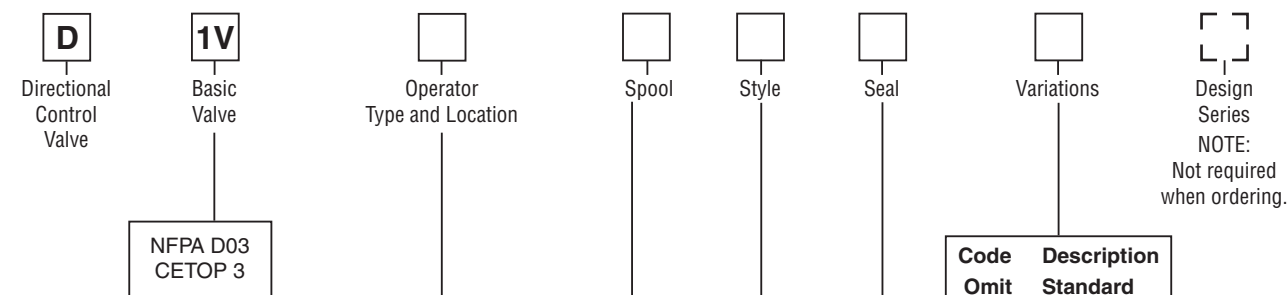


Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

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.

A01_Cat2500.indd, ddp, 04/19

A



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

Code	Description
N	Nitrile
V	Fluorocarbon

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

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

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

This condition varies with spool code.

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

Valve Weight: 1.60 kg (3.5 lbs.)
Standard Bolt Kit: BK209 10–24x1.25
Metric Bolt Kit: BKM209 M5–0.8x30 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.

Fluid Recommendations

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

Fluids and Seals

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

Temperature Recommendation

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

Ambient temperature:

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

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

Filtration

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

Tank Line Surges

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

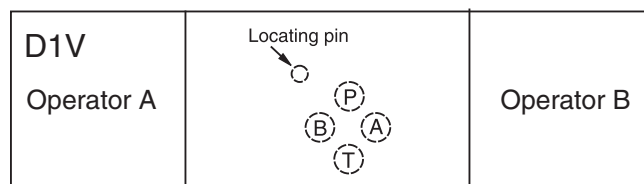
Recommended Mounting Position

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

Silting

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

Flow Path Data



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

Single Pass Operation

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

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

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

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

Electrical Failure

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

Torque Specifications

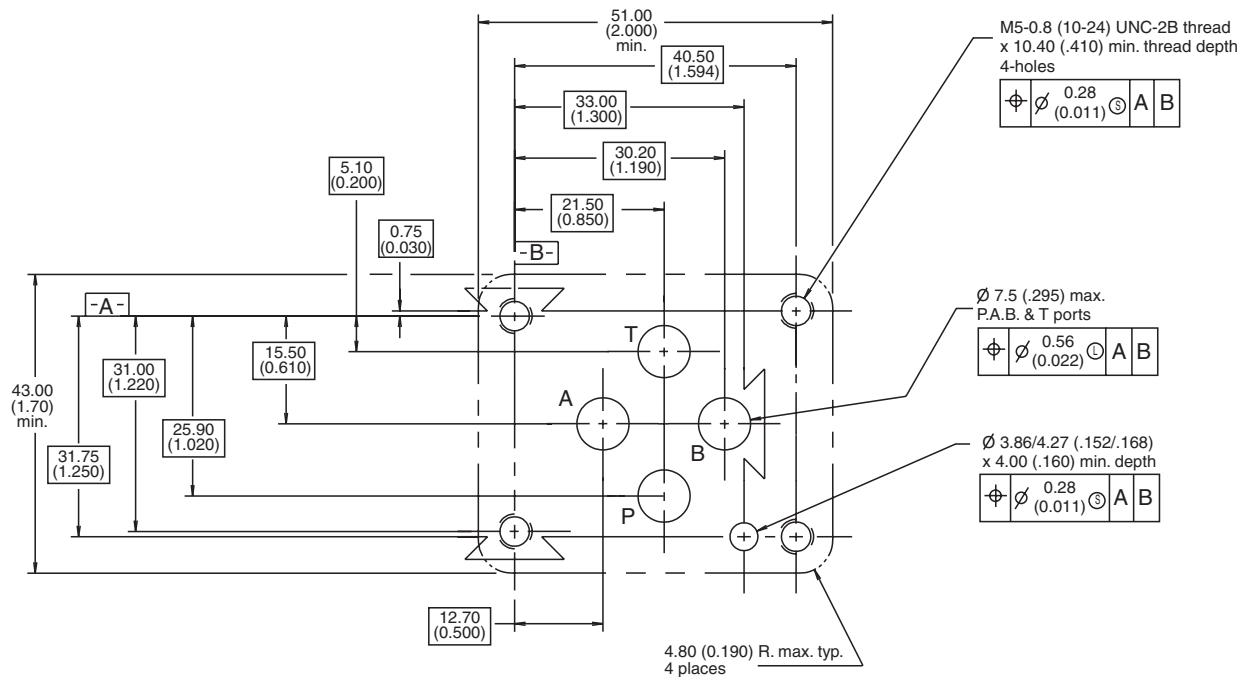
Torque values recommended for the bolts which mount the valve to the manifold or subplate are as follows:

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

Mounting Pattern — NFPA D03, CETOP 3, NG 6

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

A

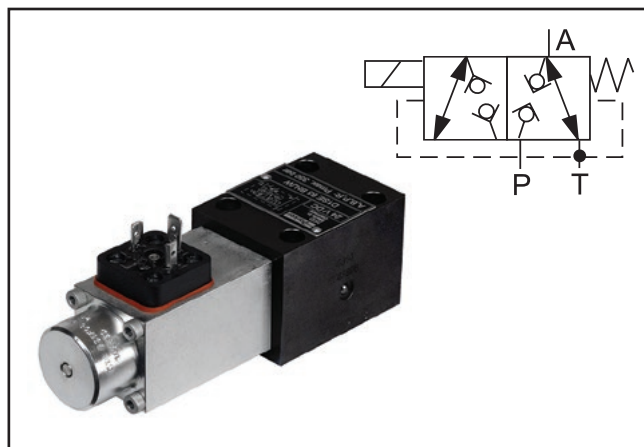


General Description

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.

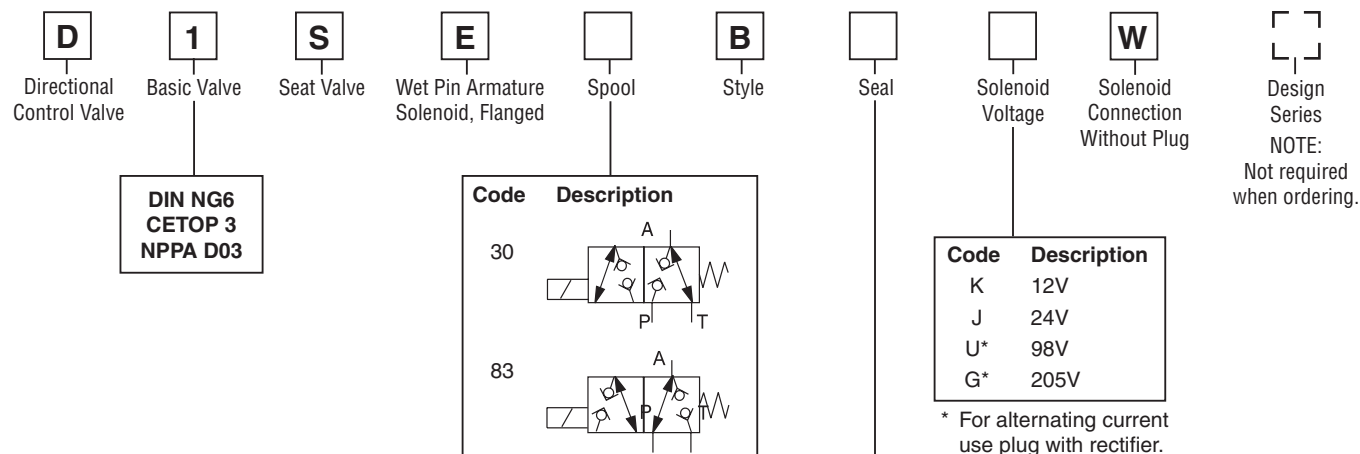


A

Features

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

Ordering Information



Coils for repair

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

Code	Description
N	Nitrile
V	Fluorocarbon

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.

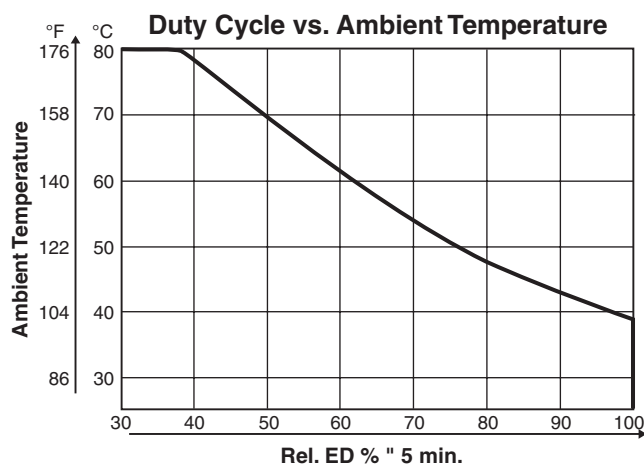
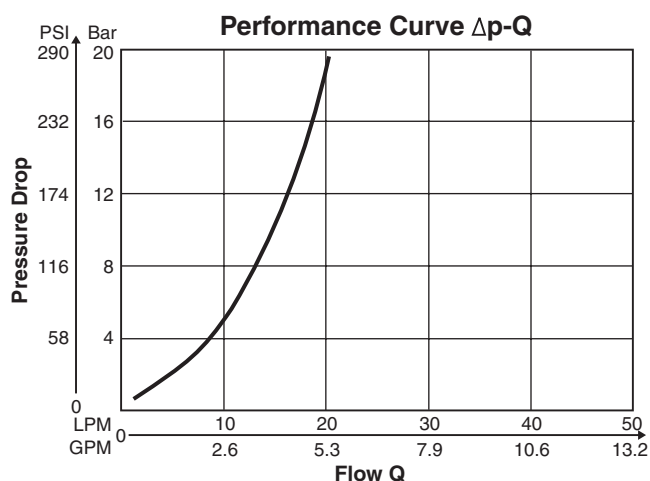
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.
A01_Cat2500.indd, ddp, 04/19

A

General		Static / Dynamic				
Design	Directional poppet valve	Step Response	Energized: approx. 50 ms			
Actuation	Solenoid		De-energized: approx. 60 ms			
Size	DIN NG6 / CETOP 3 / NFPA D03	Electrical Characteristics				
Mounting Interface	DIN 24340 A6 / ISO 4401 / CETOP RP 121-H / NFPA D03	Duty Ratio	See Diagram			
Mounting Position	Unrestricted	Max. Switching Frequency	2000 1/h			
Ambient Temperature	-25°C to +50°C (-13°F to +122°F), observe permissible duty cycle	Protection Class	IP 65 in accordance with DIN 40050 (plugged and mounted)			
Hydraulic		Code	K	J	U*	G*
Max. Operating Pressure	350 Bar (5075 PSI) (P, A, and T)	Supply Voltage	12 VDC	24 VDC	98 VDC	205 VDC
Fluid	Hydraulic oil in accordance with DIN 51524 / 51525	Tolerance Supply Voltage	±10%	±10%	±10%	±10%
Fluid Temperature	-25°C to +70°C (-13°F to +158°F)	Current Consumption	1.95A	1.1A	0.25A	0.13A
Viscosity Permitted Recommended	10...500 cSt / mm²/s (46...2318 SSU) 30...80 cSt / mm²/s (139...371 SSU)	Power Consumption	23.4 W	26.4 W	24.3 W	26.6 W
Filtration	ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)	Solenoid Connection	Connector as per EN 175301-803			
Internal Leakage	3-5 DPM per seat	Min. Wiring	3 x 1.5 mm² recommended			
Maximum Flow	20 LPM (5.28 GPM) (at Δp = 10 bar)	Max. Wiring Length	50m (164') recommended			

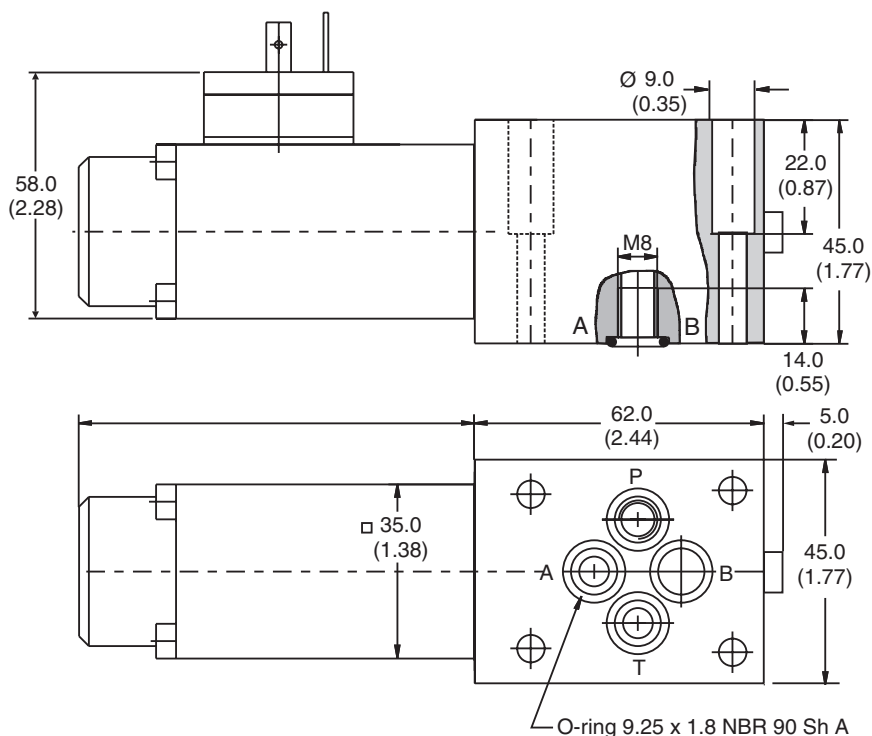
* For a silicon bridge rectifier, set up apart from unit for connecting to a 50 or 60 Hz power supply, 110 V~(98=) or 230V~ (205V=).
With electrical connections the protective conductor (PE ⚡) must be connected according to the relevant regulations.

Performance Curves



Dimensions

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



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

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 Nm (0.37 lb.-ft.) to 0.6 Nm (0.44 lb.-ft.).

A

Application

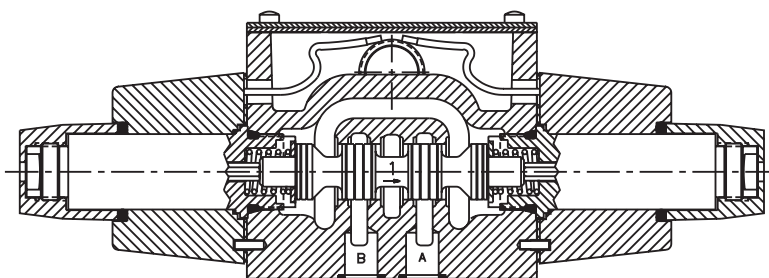
Series D3 hydraulic directional control valves are high performance, direct operated 4-way valves, available in 2 or 3-position. They are manifold mounted which conform to NFPA's D05, CETOP 5, ISO NG10 mounting patterns. These valves were designed for industrial and mobile hydraulic applications which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

Operation

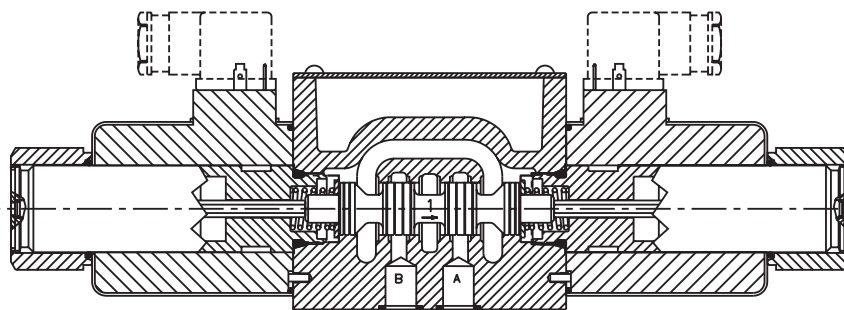
Series D3 directional control valves consist of a 4-chamber style body, and a case hardened sliding spool. The spool is directly shifted by a variety of operators including: solenoid, lever, cam, or air pilot.

Features

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

D3W Solenoid Operated Conduit Cavity Style

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

D3W Solenoid Operated Hirschmann (DIN) Style

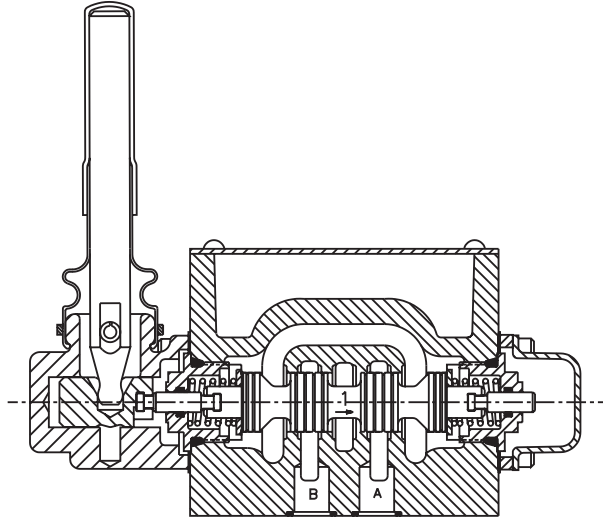
- DIN Style (43650) Hirschmann.
- 22 spool styles available.
- No tools required for coil removal.
- Easy coil replacement.
- AC and DC lights available.
- CSA approved.
- Available in low-watt DC version.

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.

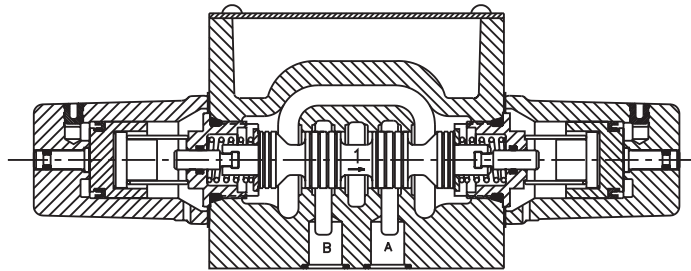
A01_Cat2500.indd, ddp, 04/19

D3L Lever Operated

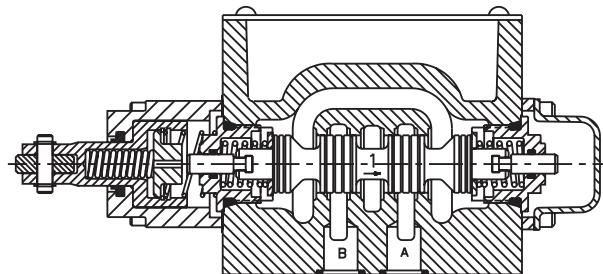
- Spring return or detent styles available.
- Heavy duty handle design.
- High flow, low pressure drop design.

**D3A Air Operated**

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

**D3C Cam Operated**

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

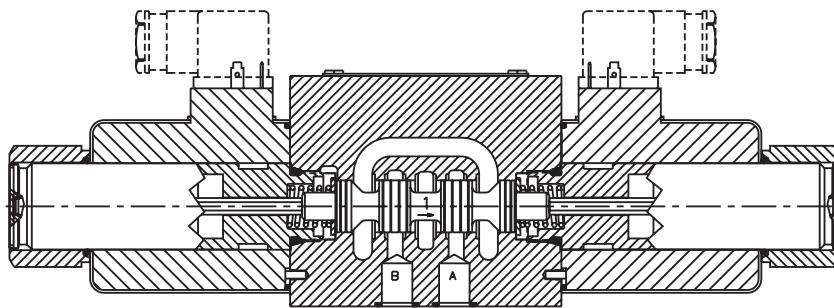


Application**A**

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

Operation

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

D3DW Solenoid Operated Hirschmann (DIN) Style

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

D3 Spool Reference Data

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

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

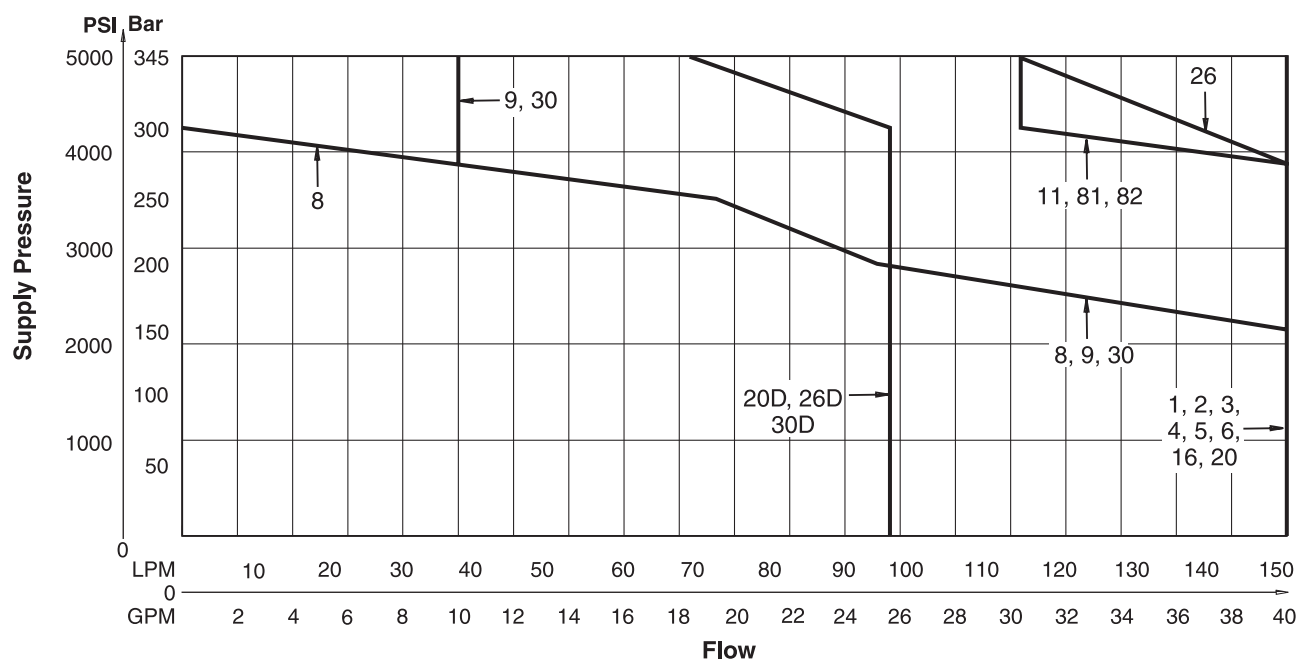
D3A, D3C, D3L Spool Reference Data (Four Chamber Body Only)

Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction	Model	Spool Symbol	Maximum Flow, LPM (GPM) 350 Bar (5000 PSI) w/o Malfunction
		D3W			D3W
D3*1		150 (40)	D3*20		150 (40)
D3*2		150 (40)	D3*30		39 (10)
D3*4		150 (40)	D3*81		115 (30)
D3*8		50 (13)	D3*82		115 (30)
D3*9		39 (10)			

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

D3W-30/32 DC and AC Rectified Shift Limits

A



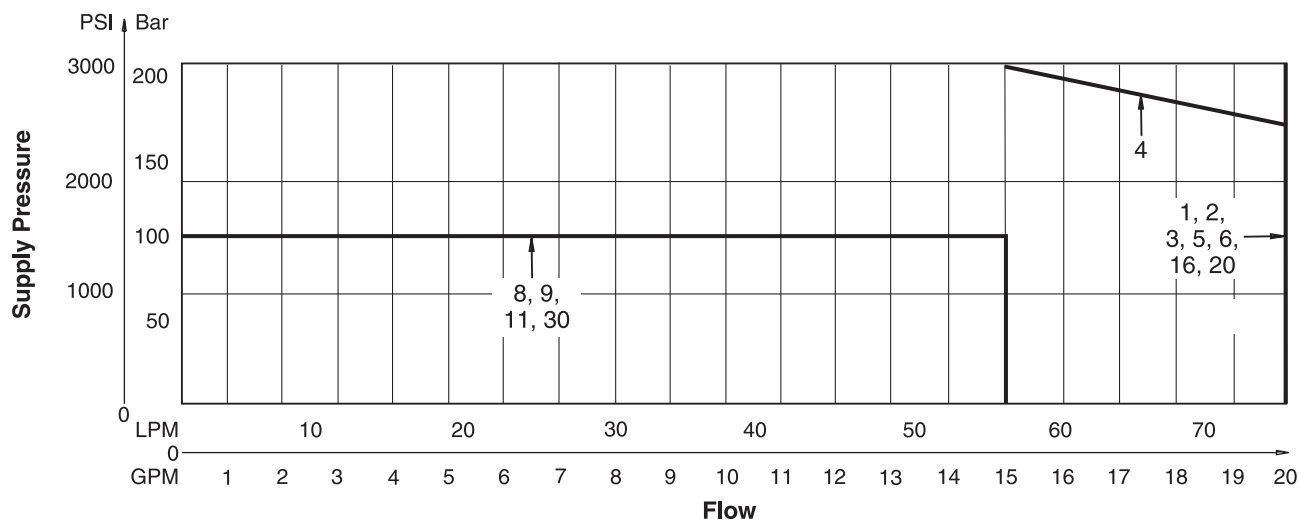
Example:

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).

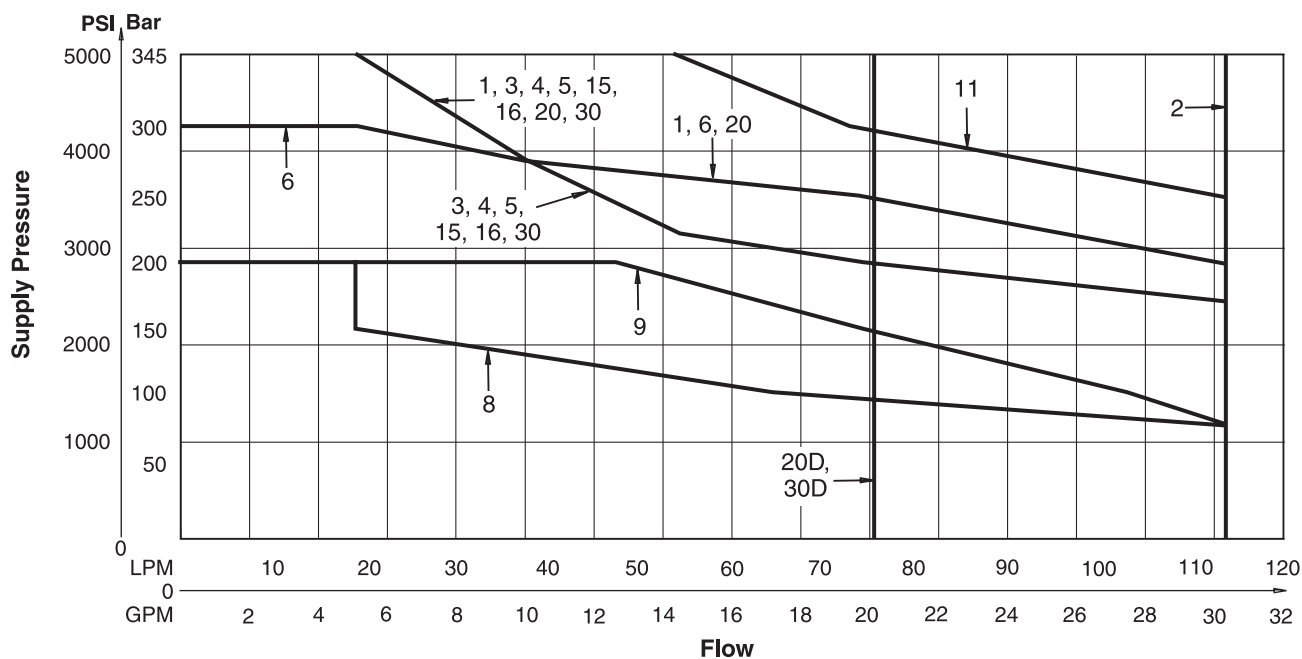
Important Notes for Switching Limit Charts

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.

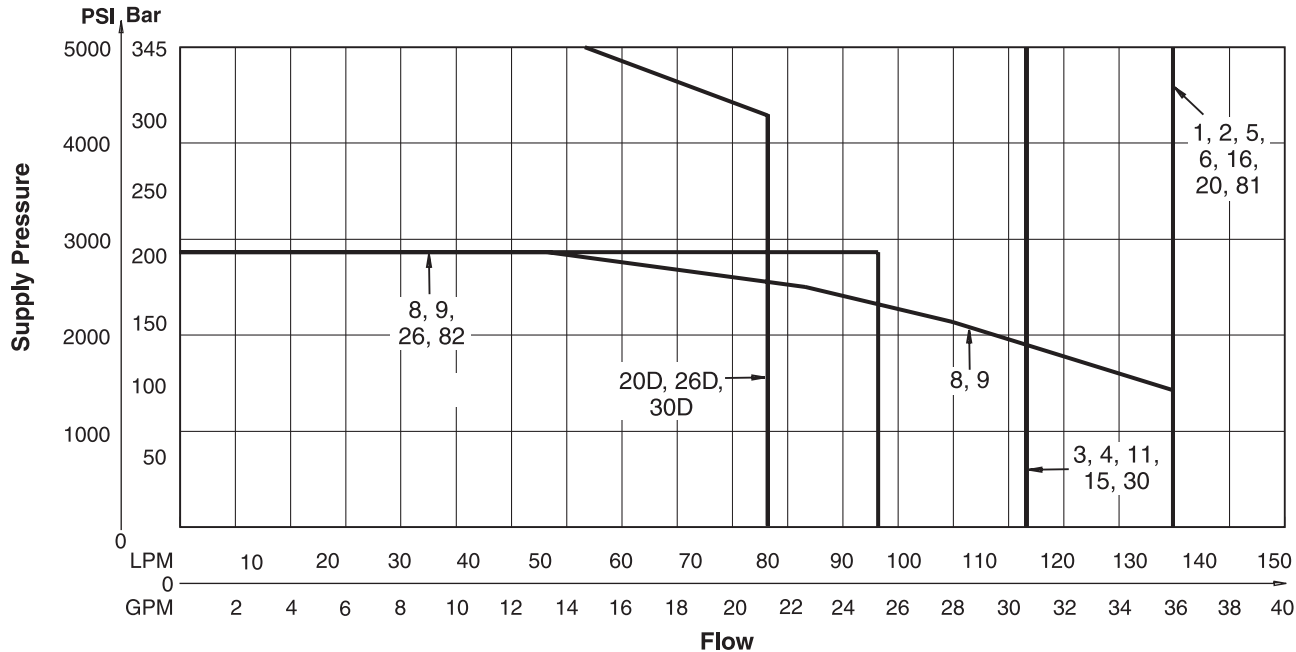
D3W-30/32 Low Watt DC and AC Rectified Shift Limits



D3W-30/32 AC Shift Limits



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

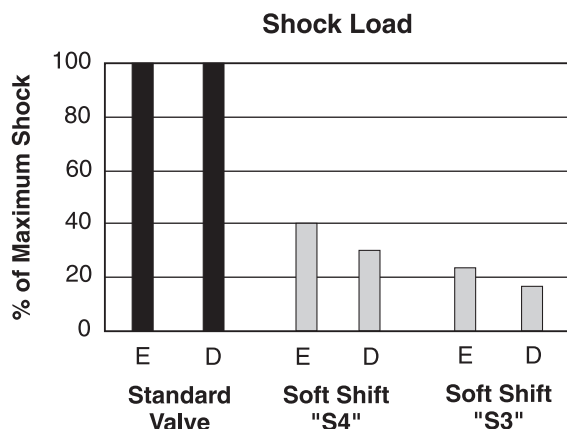


Important Notes for Switching Limit Charts

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

D3W-30/32 Soft Shift Response

A



E = Energize
D = De-energize

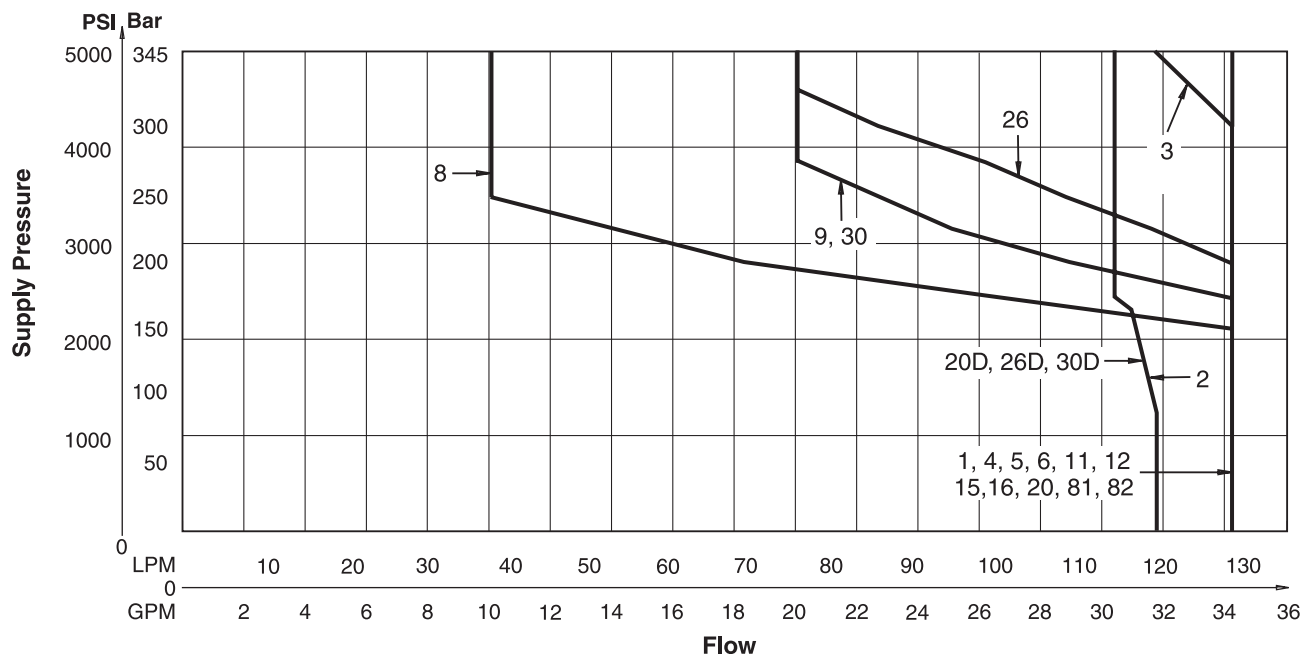
Response Time*

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

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

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

D3DW-40/41 Shift Limits



Important Notes for Switching Limit Charts

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

Pressure Drop vs. Flow

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

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

D3W and D3DW Pressure Drop Reference Chart

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

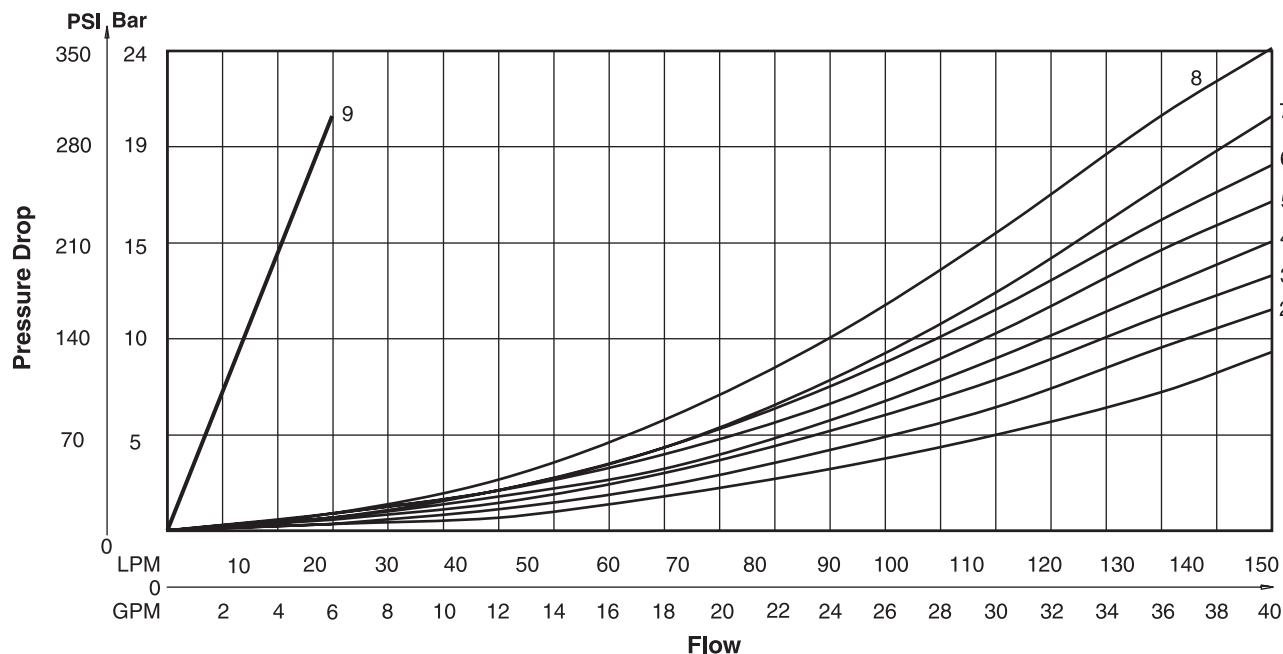
Note:
 For 81 and 82 spools, consult factory.

Viscosity Correction Factor

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

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

Performance Curves



A

This image shows a full page of blank graph paper. The grid consists of thin, light gray horizontal and vertical lines that intersect to form a uniform pattern of small squares across the entire surface. There are no margins, text, or other markings on the paper.

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.

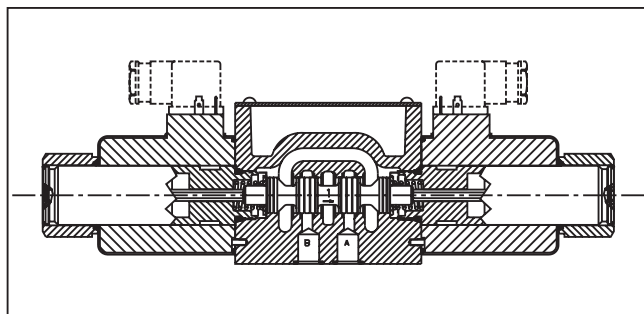
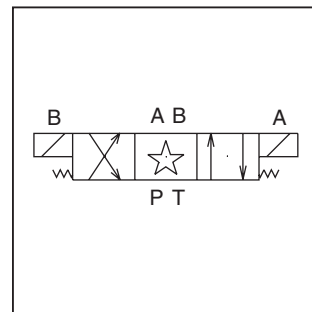
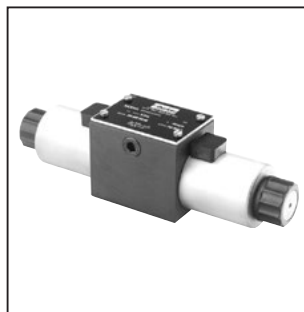
Features

- 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 & DC lights available.
- Easy access mounting bolts.
- Explosion proof availability.
- CSA approved.
- No tools required for coil removal.
- Rectified coils available for high flow AC applications.



Response Time (ms)

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

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



Specifications

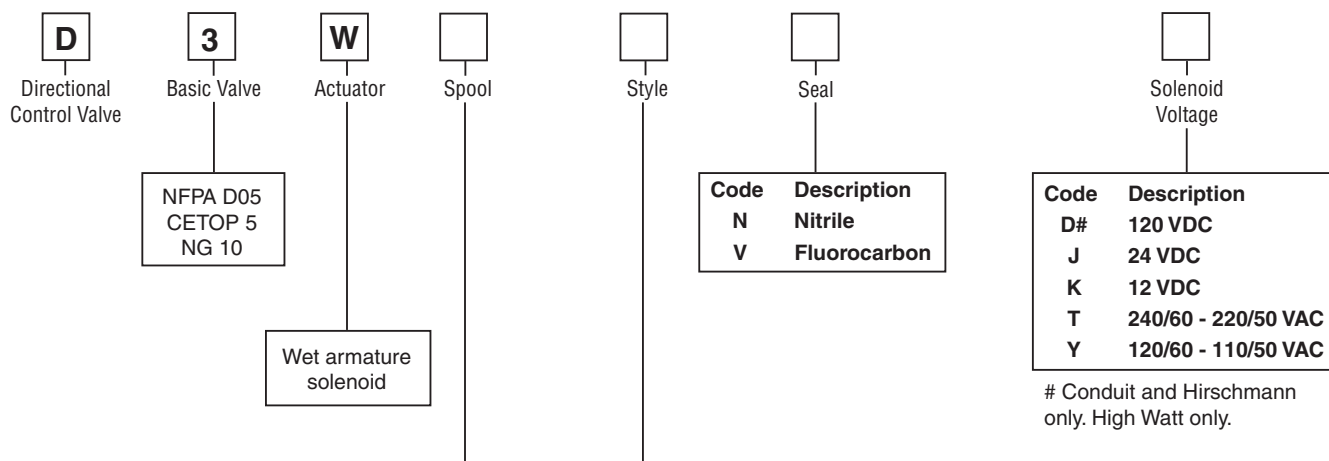
Interface	NFPA D05, CETOP 5, NG 10
Max. Operating Pressure	<p>P, A, B: 345 Bar (5000 PSI) Standard CSA  207 Bar (3000 PSI)</p> <p>Tank: 103 Bar (1500 PSI) AC Standard 207 Bar (3000 PSI) AC Optional DC/AC Rectified Standard CSA  103 Bar (1500 PSI)</p>
CSA File Number	LR060407
Leakage Rates 100 SSU @ 49°C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

* #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.
A01_Cat2500.indd, ddp, 04/19

D3W without Position Control

A



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

* 8, 20, & 26 spools have closed crossover.

** 9 & 30 spool have open crossover.

† Available only with high-watt rectified AC coils or high-watt DC coils.

†† Styles C, E, F, K & M only. Not available with explosion proof coils.

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

* Only spools 20 & 30.

** High Watt only.


† Only spools 20 & 30.

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 #8 and #9 spools. See installation information for details.


Bold: Designates Tier I products and options.

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


Solenoid Connection


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


* Lights not available.
** No variations (See "K").
24 VDC voltage only. High Watt only.



Solenoid/Tube Options

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".



Manual Override Options


Electrical Options


Shift Response


Code	Description
Omit	Standard Valve
S3*	Soft Shift, 0.030" Orifice
S4*	Soft Shift, 0.040" Orifice


* High watt coil only. Not compatible with D Style.


Approvals

Code	Description
Omit	Standard
4*	CSA Approved

* Consult Factory for available options.


Variations


Design Series

NOTE:
Not required when ordering.

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

* Availability varies based on Solenoid Voltage:
Available with J Hirschmann style only. Available with J and Y (Rectified) & T (Rectified) Leadwire style only.
Not available with soft shift or with F and M style valves.
† DED only DC available.
** YEU only AC available.
X DEU & JEU only DC available.
† Explosion proof coils are 60 Hz only.

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

24 VDC voltage only with Leadwire C & K options.
^x 120 VAC and 240 VAC Hirschmann only, high-watt only. Not available with Explosion Proof.

Mounting Bolt Kits

UNC Bolt Kits for use with D3W Directional Control Valves & Sandwich Valves					
		Number of Sandwich Valves @ 2.00" (50 mm) thickness			
		0	1	2	3
D3W	Standard:	BK98 1.62"	BK141 3.50"	BK142 5.50"	BK143 7.50"
	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 ft-lbs)

Bold: Designates Tier I products and options.

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

Valve Weight:

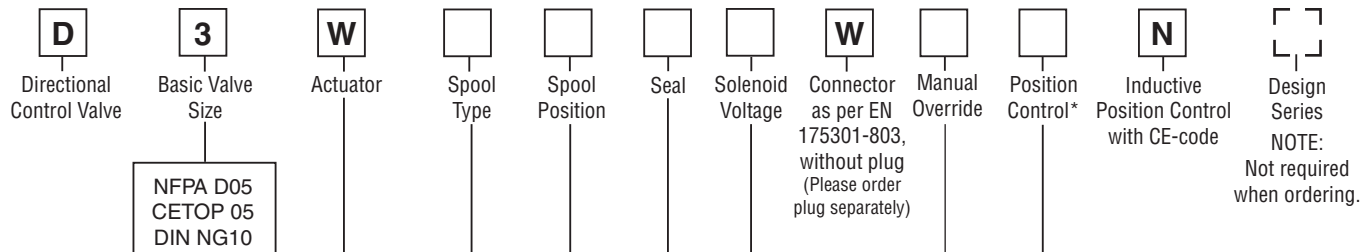
Single Solenoid:	
AC	4.3 kg (9.5 lbs.)
DC	5.3 kg (11.6 lbs.)
Double Solenoid:	
AC	5.0 kg (11.0 lbs.)
DC	7.3 kg (16.0 lbs.)

Seal Kit:

Nitrile	SKD3W
Fluorocarbon	SKD3WV

D3W with Position Control, Single Solenoid Valve

A



Code	Symbol
3 Position Spools	
001	
002	
003*	
004	
005**	
015**	
016*	
021*	
022**	
2 Position Spools	
020	
026	
030	

* Only available for spools K & M.

** Only available for spools E & F only.

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	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	Symbol
3 Position Spools		
E	2 positions. Spring offset in position 0. Operated in position a.	
F	2 positions. Spring offset in position 0. Operated in position b.	
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		
B	2 positions. Spring offset in position b. Operated in position a.	
H	2 positions. Spring offset in position a. Operated in position b.	

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

* For hydraulic presses according to the safety regulations EN 69 3, solenoid option T (without manual override) and accessories I4 or I5 (start position monitored) are required.

Standard Bolt Kit: BK98

Metric Bolt Kit: BKM98

Seal Kit:

Nitrile

Fluorocarbon

SKD3W

SKD3WV

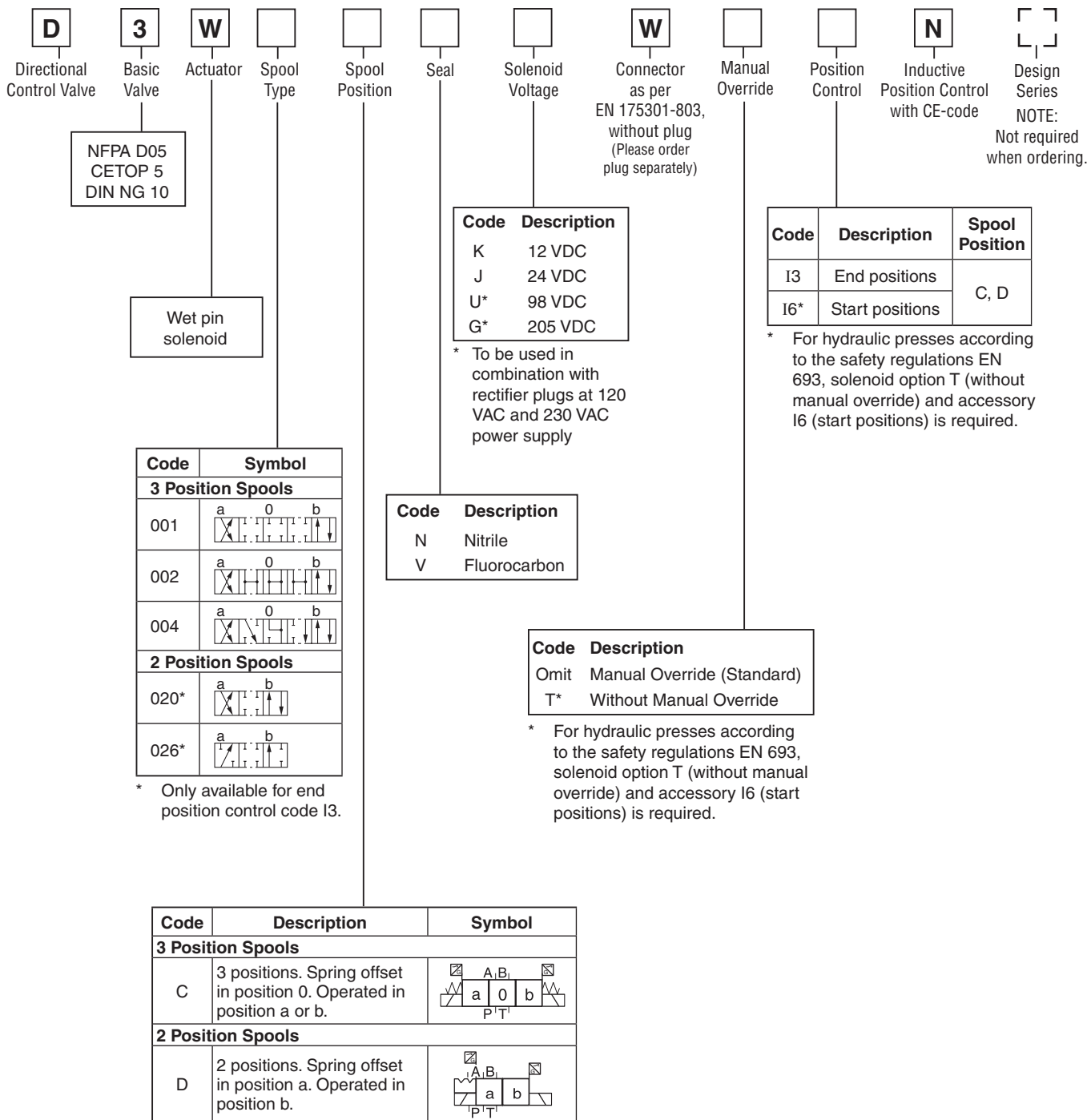
Valve Weight:

Single Solenoid:

AC 4.3 kg (9.5 lbs.)

DC 5.3 kg (11.6 lbs.)

D3W with Position Control, Double Solenoid Valve



Standard Bolt Kit: BK98
Metric Bolt Kit: BKM98
Seal Kit:
 Nitrile SKD3W
 Fluorocarbon SKD3WV

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

Solenoid Ratings**

A

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

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

D3W****F Solenoid Electrical Characteristics†

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

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

D3W Solenoid Electrical Characteristics†

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

† DC holding amps.

D3W Rectified AC Solenoid Electrical Characteristics†

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

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

Explosion Proof Solenoids

Explosion Proof Solenoid Ratings

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

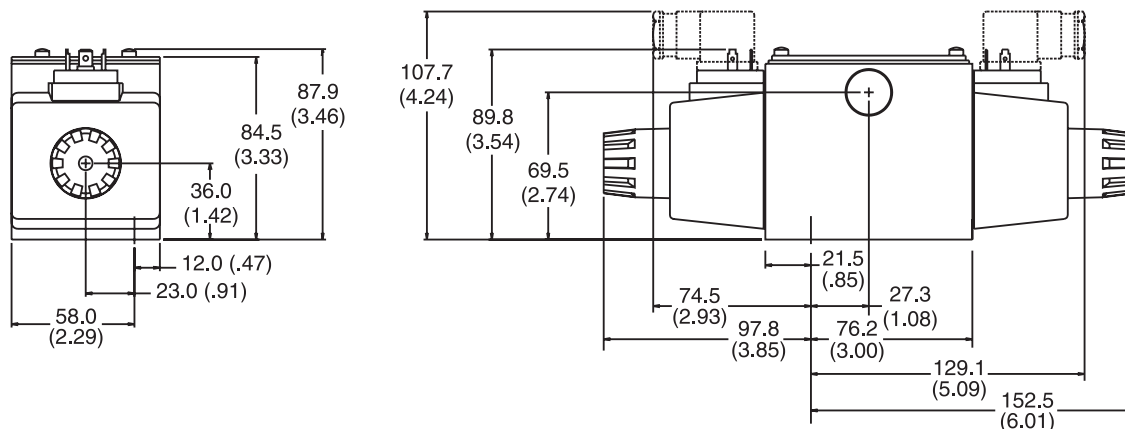
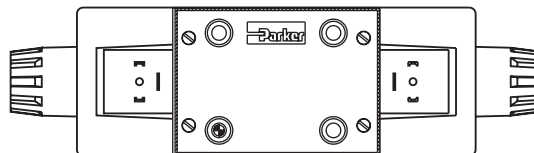
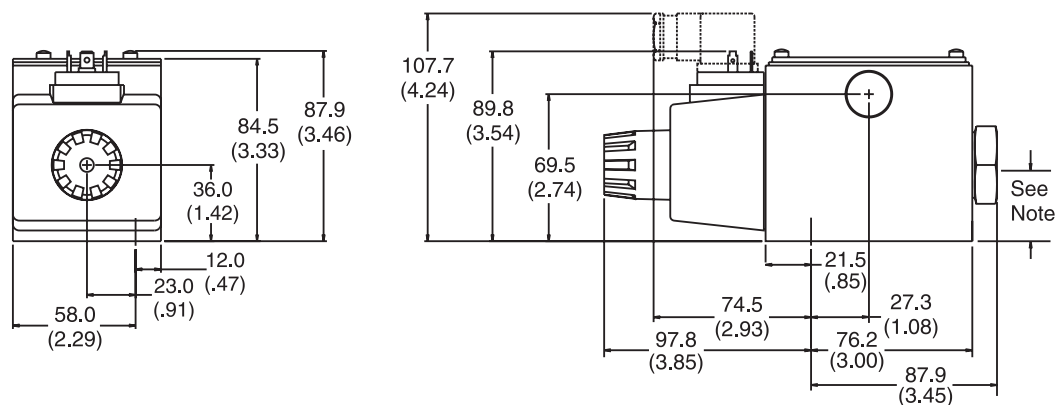
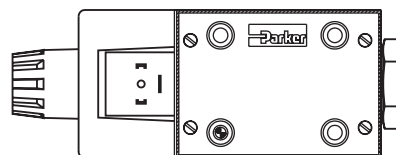
Electrical Characteristics* ED and EU†

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

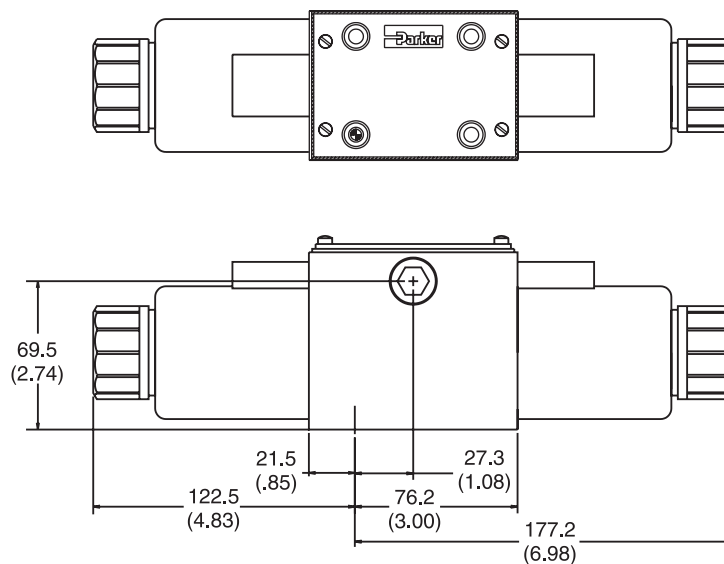
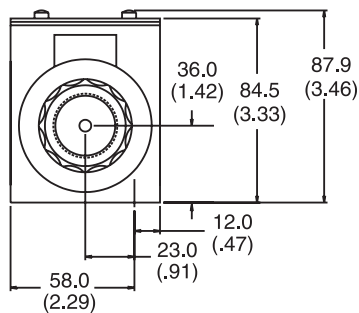
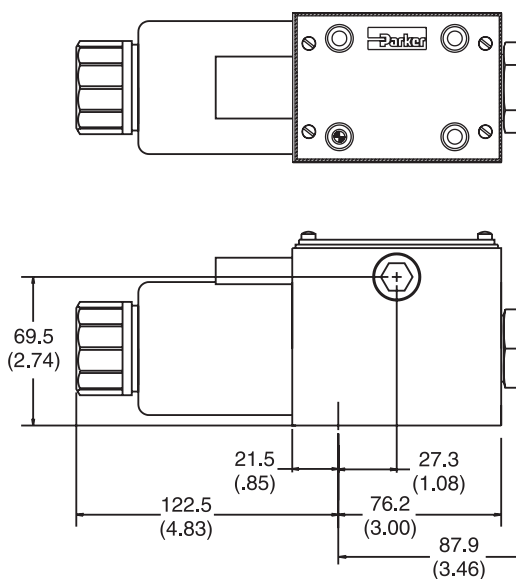
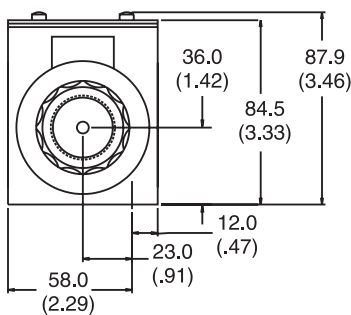
* Dual frequency not available on explosion proof coils.

† DC holding amps.

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

Hirschmann, Double AC Solenoid**A****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.

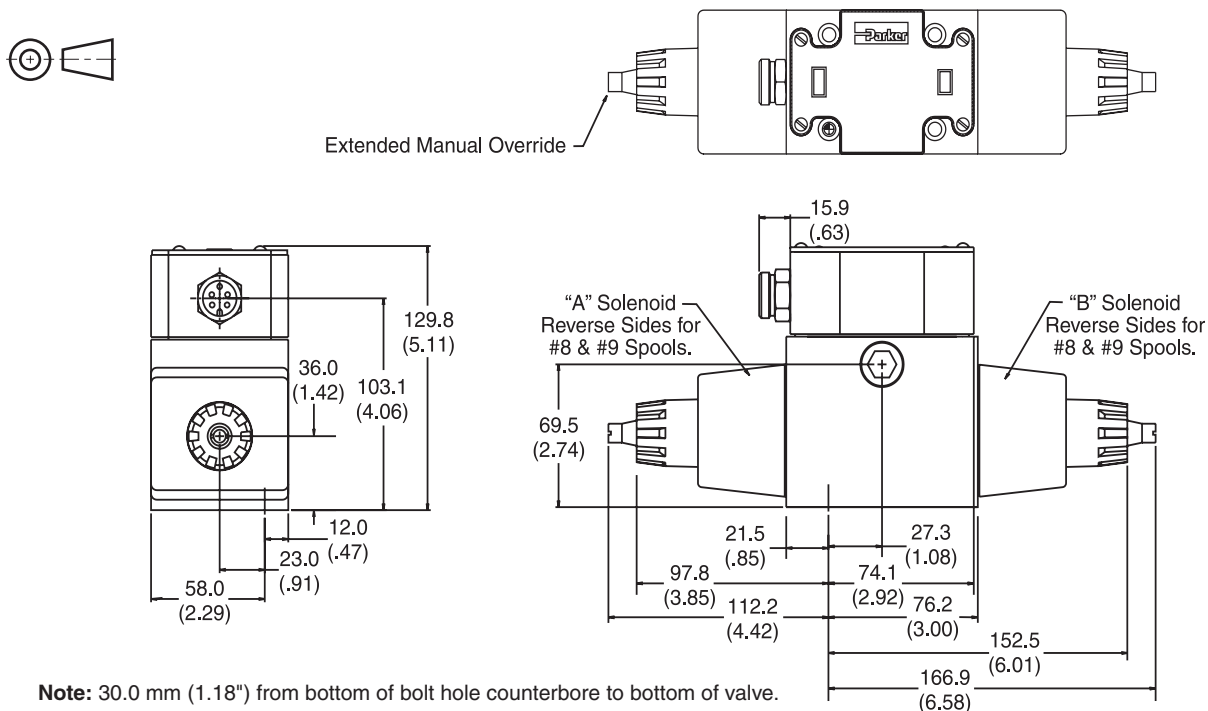
Inch equivalents for millimeter dimensions are shown in (**)

A**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.

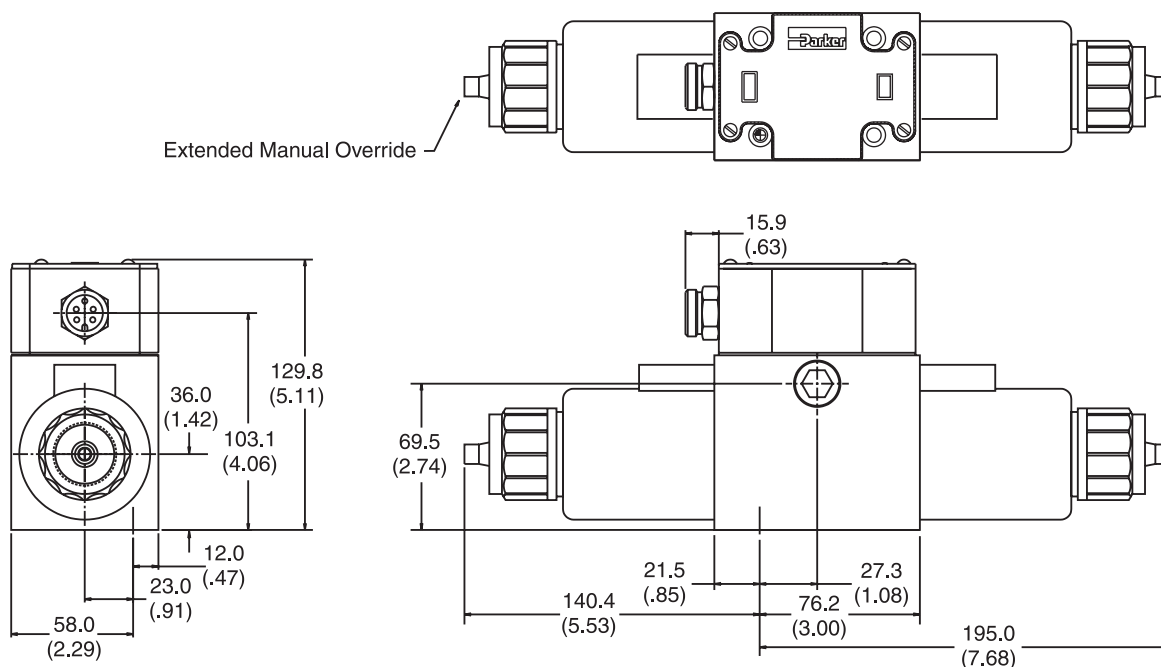
Inch equivalents for millimeter dimensions are shown in (**)

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

A



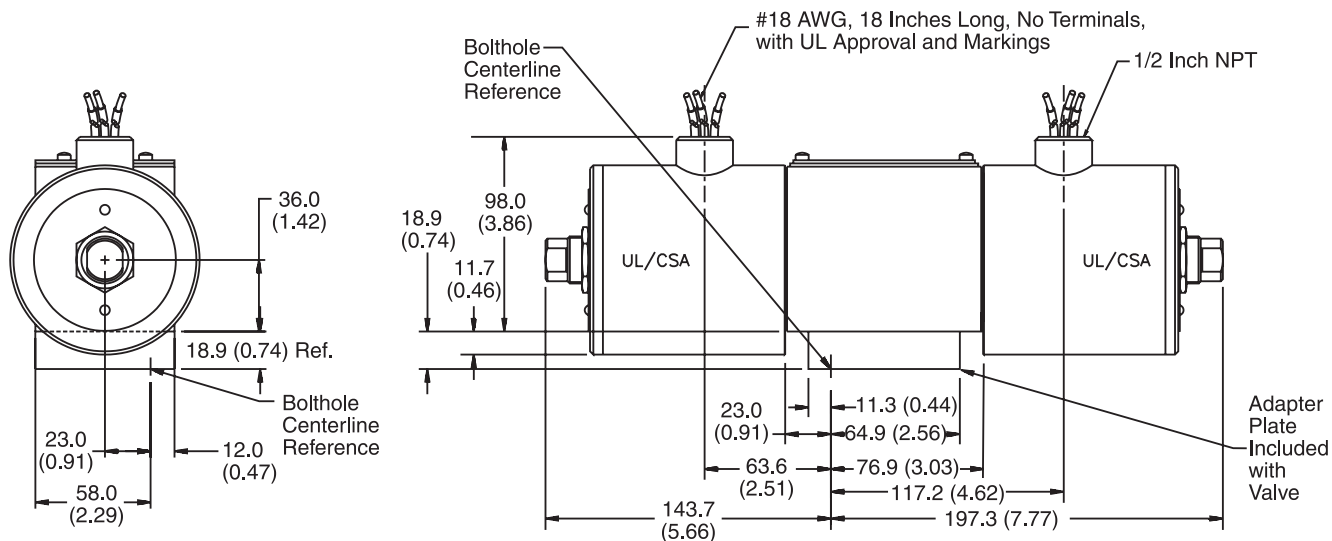
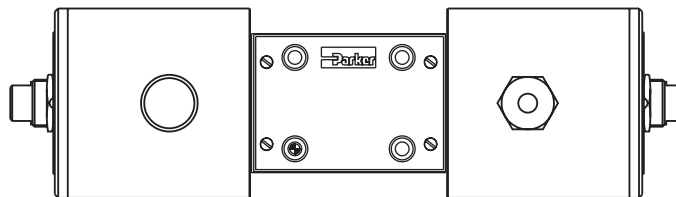
Conduit Box, Double DC Solenoid with Variation 6 (Manaplug) & Variation P (Extended Manual Override)



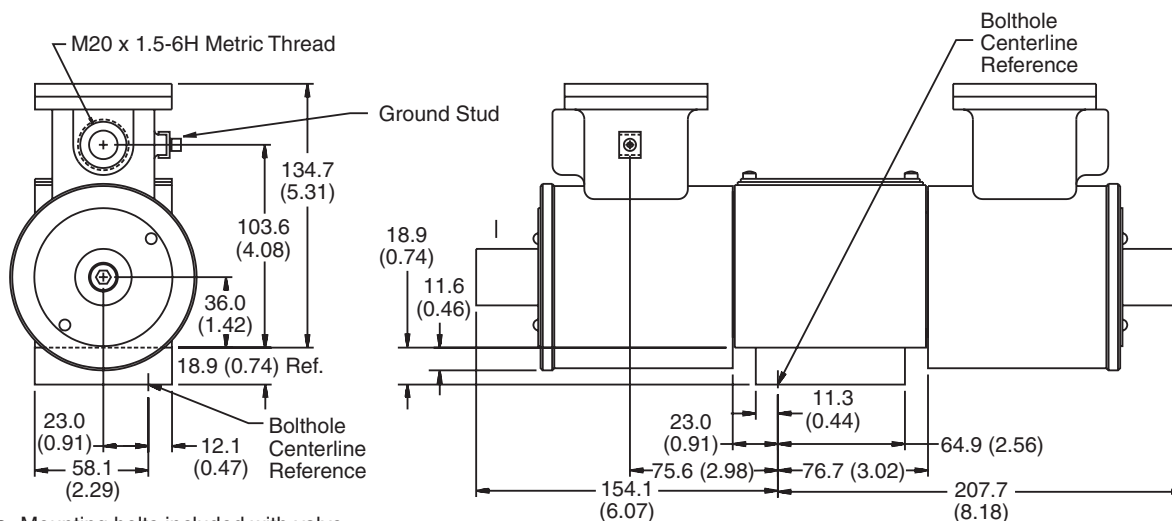
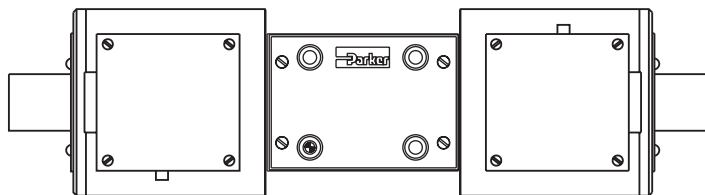
Inch equivalents for millimeter dimensions are shown in (**)

A**Explosion Proof U.L. & CSA, Double Solenoid**

Note:
2 Black Wires
1 Green Wire



Note: Mounting bolts included with valve.

Explosion Proof ATEX, Double Solenoid

Note: Mounting bolts included with valve.

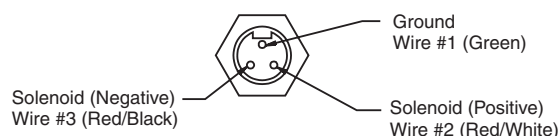
A01_Cat2500.indd, ddp, 04/19

Conduit Box**(connection option K)**

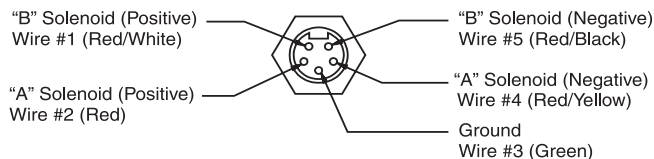
- Interface – 152.4 cm (6.0 inch) lead wires, 18 awg.
- Meets NEMA 4 and IP65

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

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

**3-Pin Manaplug (Mini) with Lights**

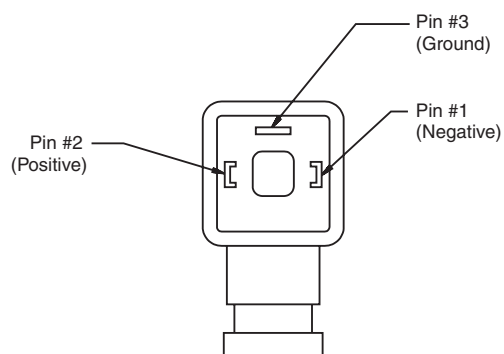
Single Solenoid Valves – Installed Opposite Side of Solenoid

**5-Pin Manaplug (Mini) with Lights**

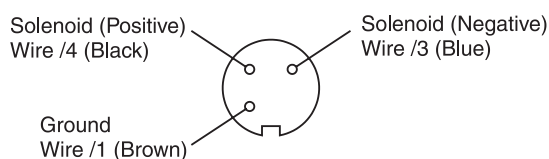
Single Solenoid Valves – Installed Opposite Side of Solenoid

Double Solenoid Valves – Installed Over "A" Solenoid

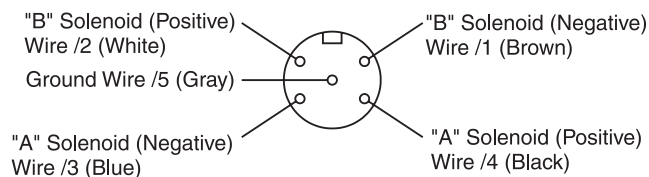
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)**Hirschmann Plug with Lights (P5)****Face View of Plug**

Conforms to DIN43650, ISO4400, Form A 3-Pin

Manaplug - Micro Connector**(valve variations 7, 57, 1B, 1D)****3-Pin Manaplug (Micro) with Lights**

Single Solenoid Valves – Installed Opposite Side of Solenoid

**5-Pin Manaplug (Micro) with Lights**

Single Solenoid Valves – Installed Opposite Side of Solenoid

Double Solenoid Valves – Installed Over "A" Solenoid

("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)

A

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin gray lines. There are 20 columns and 20 rows of squares, creating a total of 400 square units. The background is white, and the grid lines are light gray. There are no margins, text, or other markings on the page.

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)

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

Solenoid Type	Pull-In	Drop-Out
DC	110	85

Solenoid Ratings**

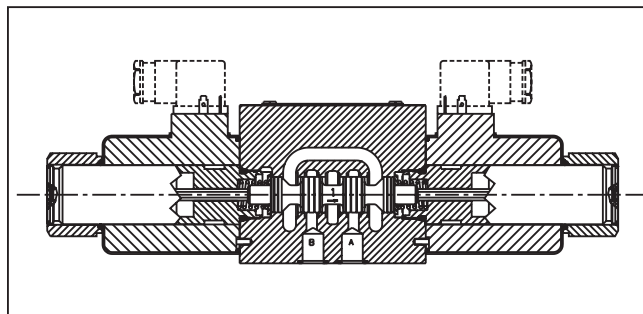
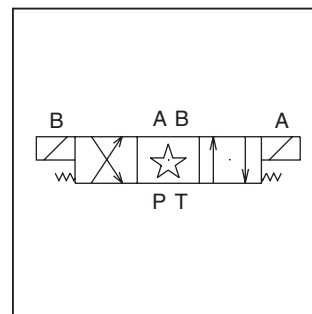
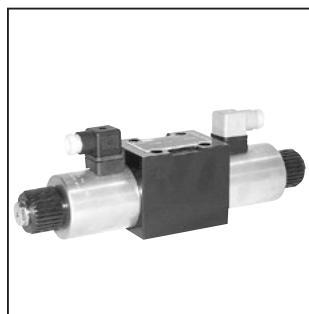
Insulation	Class H
Allowable Deviation from rated voltage	DC only -10% to +15%
Armature	Wet pin type

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

D3DW Solenoid Electrical Characteristics

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

* AC input rectified to DC



Specifications

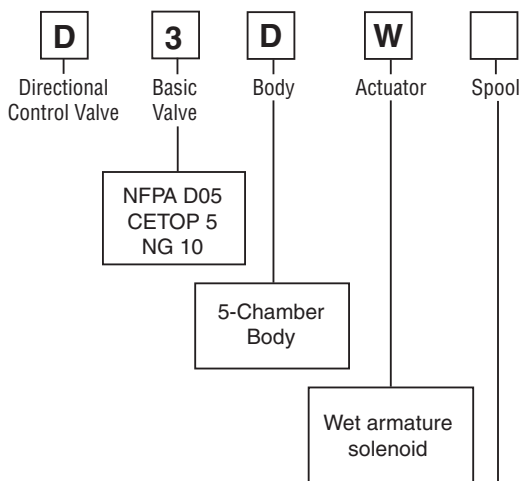
Interface	NFPA D05, CETOP 5, NG 10
Max. Operating Pressure	P, A, B: 345 Bar (5000 PSI) Standard CSA 207 Bar (3000 PSI) Tank: 207 Bar (3000 PSI) Standard CSA 103 Bar (1500 PSI)
Maximum Flow	See Spool Reference Chart
Leakage Rates 100 SSU @ 49°C (120°F)	Maximum Allowable: 19.7 cc (1.2 Cu. in.) per Minute/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

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

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.

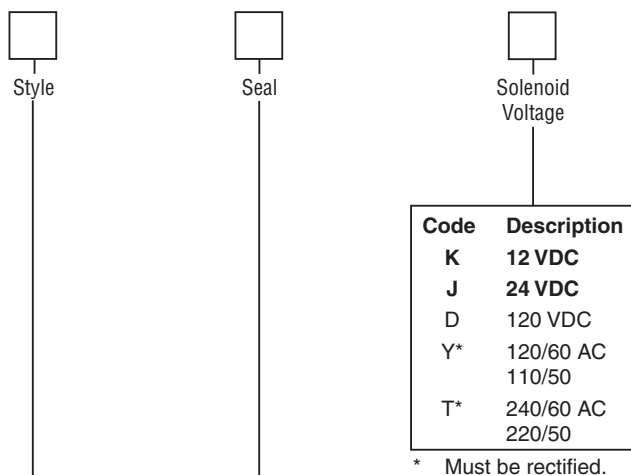
A01_Cat2500.indd, ddp, 04/19

A



Code	Symbol	Code	Symbol
001		012	
002		014	
003		015	
004		016	
005		020*	
006		021	
007		022	
008*, 009**		030**	
010		081†	
011		082†	

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



Code	Description
N	Nitrile
V	Fluorocarbon

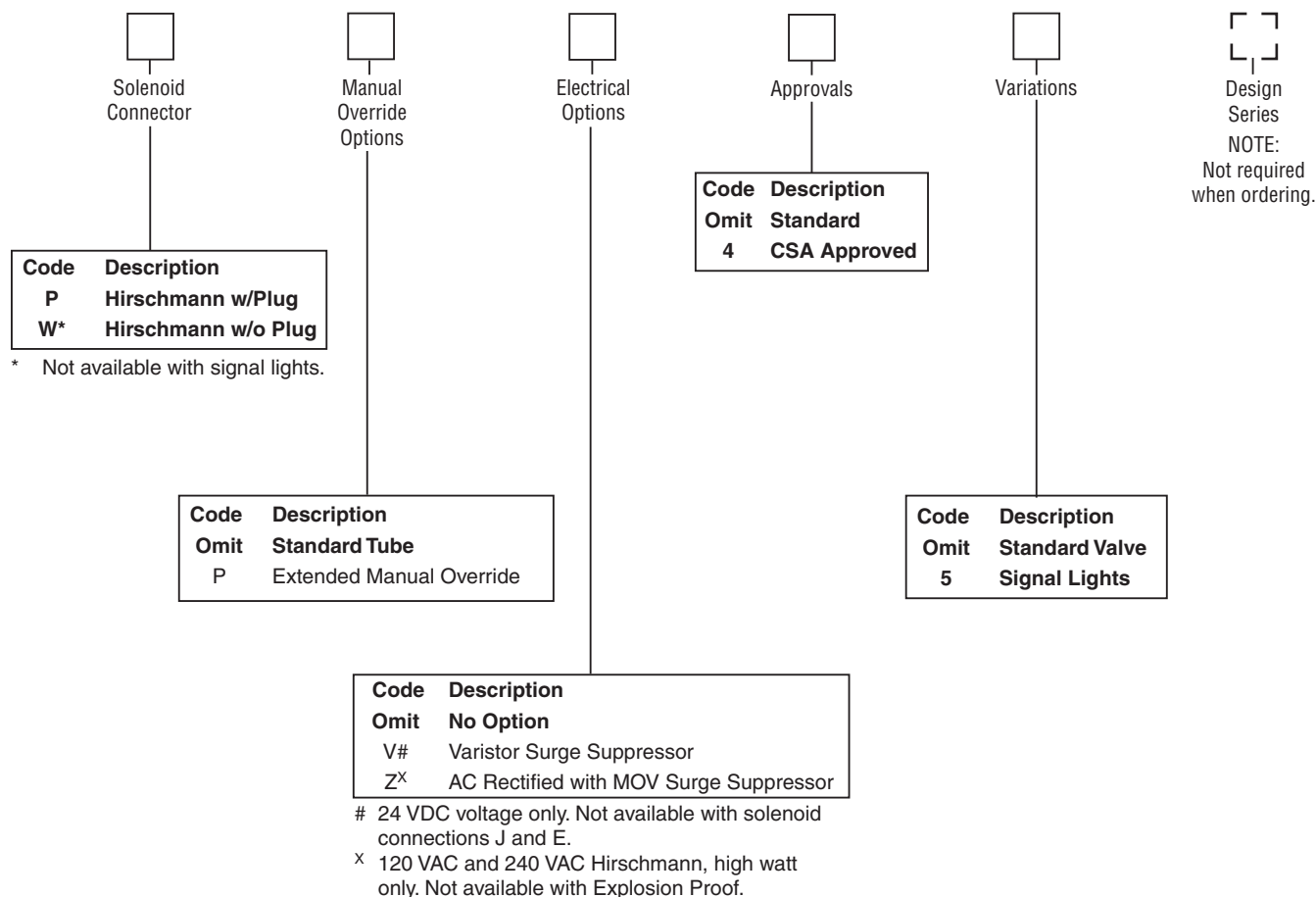
Code	Description	Symbol
B*	Single solenoid, 2 position, spring offset. P to A and B to T in offset position.	
C	Double solenoid, 3 position, spring centered.	
D*	Double solenoid, 2 position, detent.	
E	Single solenoid, 2 position, spring centered. P to B and A to T when energized.	
F**	Single solenoid,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

* Only spools 20 & 30.

This condition varies with spool code.

Bold: Designates Tier I products and options.

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



Mounting Bolt Kits

UNC Bolt Kits for use with D3DW Directional Control Valves & Sandwich Valves					
		Number of Sandwich Valves @ 2.00" (50 mm) thickness			
		0	1	2	3
D3DW	Standard:	BK98 1.62"	BK141 3.50"	BK142 5.50"	BK143 7.50"
	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 ft-lbs).

Valve Weight:

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

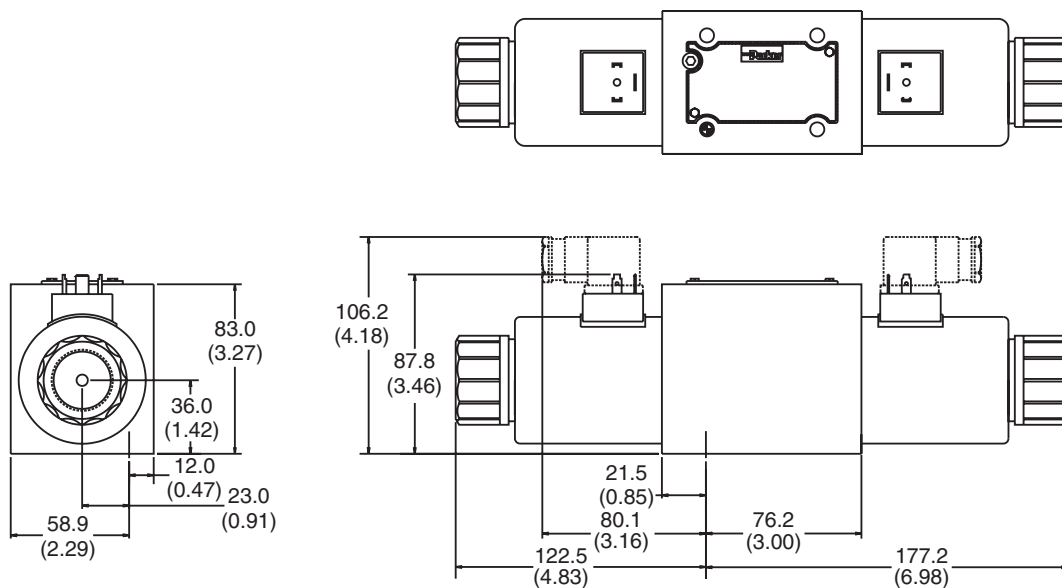
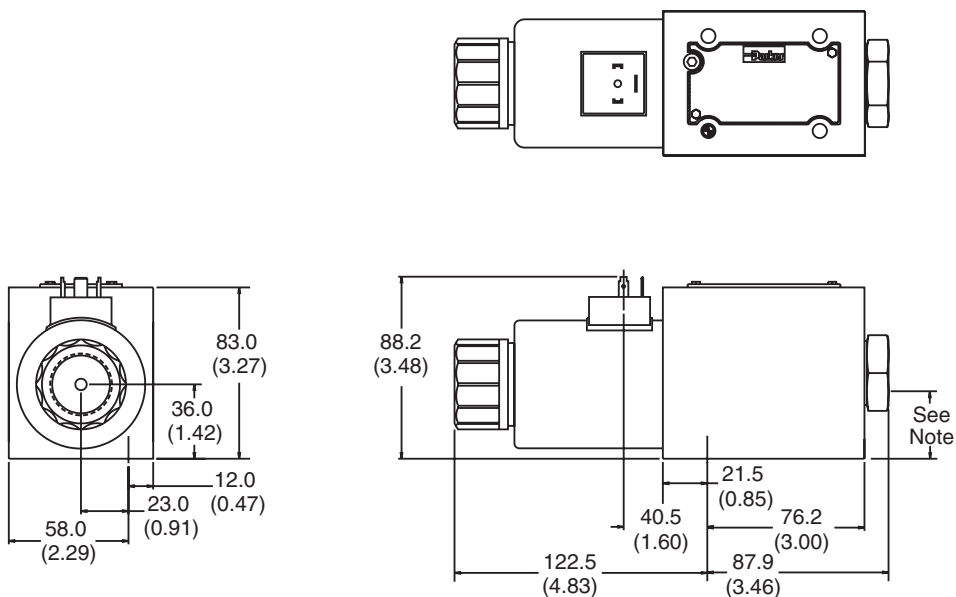
Seal Kit:

Nitrile	SKD3DW
Fluorocarbon	SKD3DWV

Bold: Designates Tier I products and options.

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

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

A**Hirschmann, Double DC Solenoid****Note:** 30.0 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.

General Description

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

Features

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

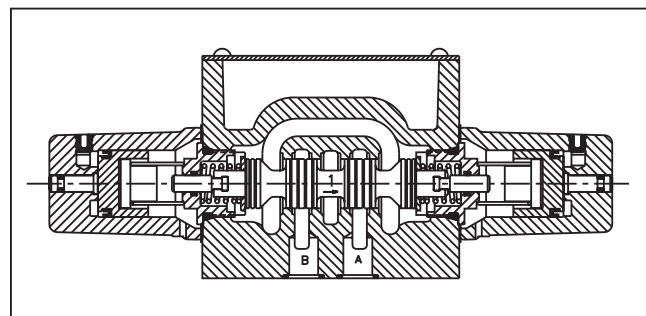
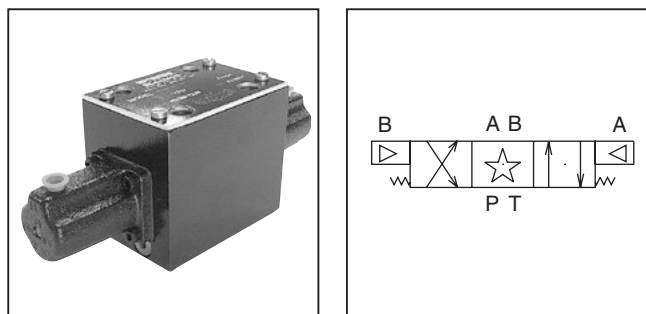
Specifications

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

Air Operated

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

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



Response Time* (ms)

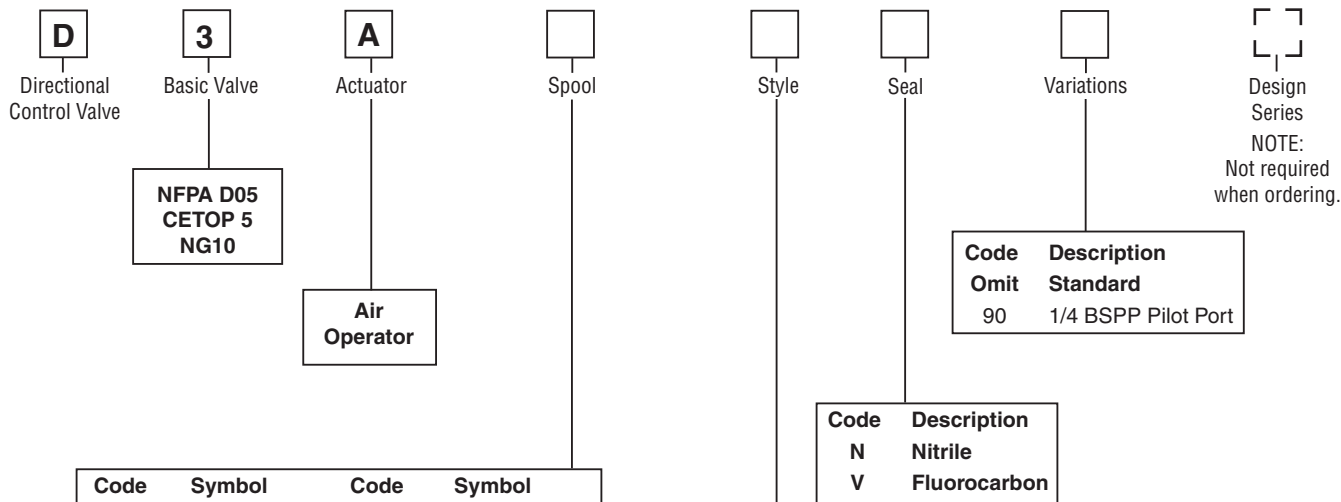
Signal to 95% spool stroke measured at 172 Bar (2500 PSI) and 75 LPM (20 GPM)

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

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

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.
A01_Cat2500.indd, ddp, 04/19

A



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

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

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

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

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



Indicates air pilot.



This condition varies with spool code.

Mounting Bolt Kits

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

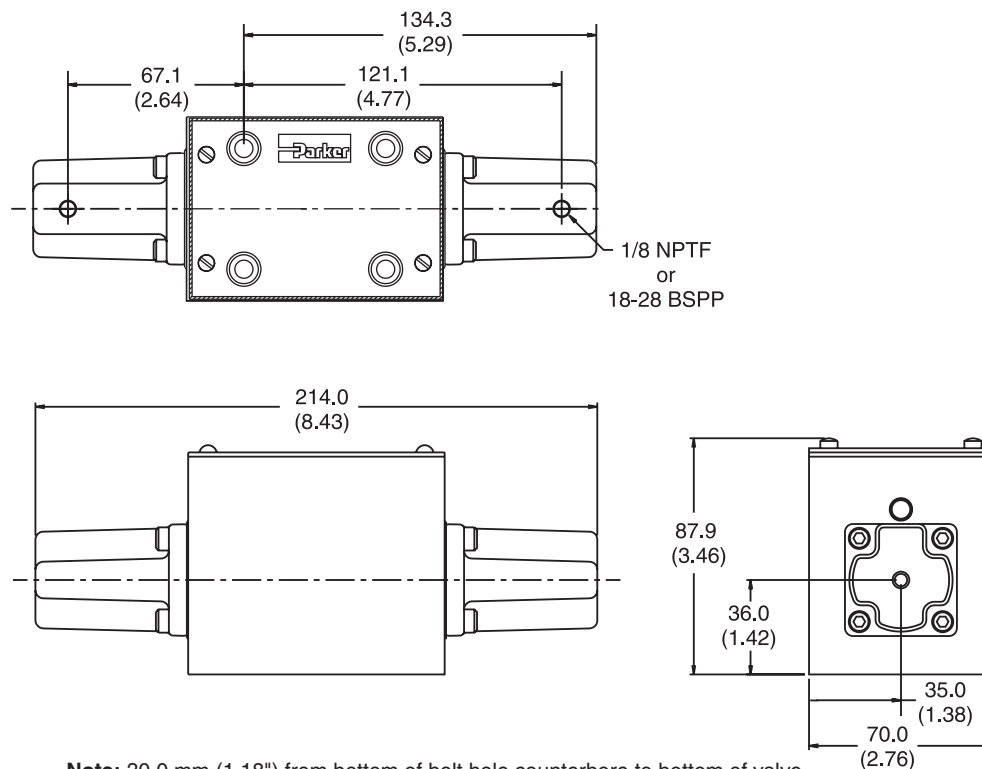
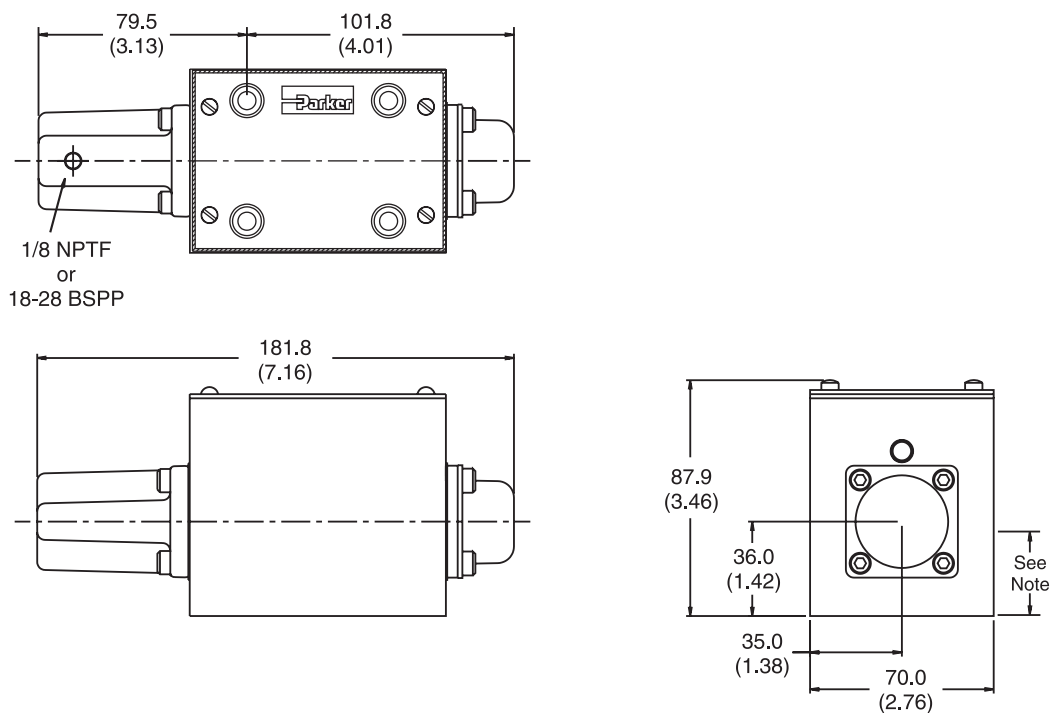
NOTE:All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 Nm (12 ft-lbs).

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

Bold: Designates Tier I products and options.

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

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

Air Operated, Double Pilot**A****Note:** 30.0 mm (1.18") from bottom of bolt hole counterbore to bottom of valve.**Air Operated, Single Pilot****Note:** 30.0 mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

General Description

A

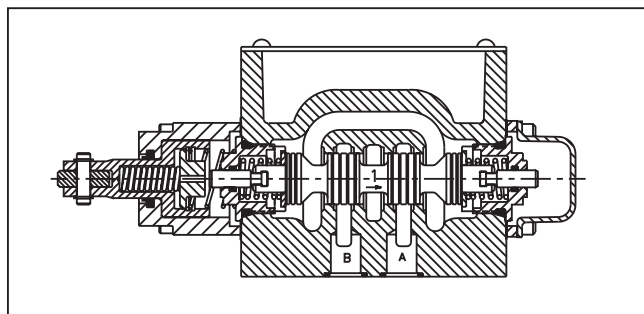
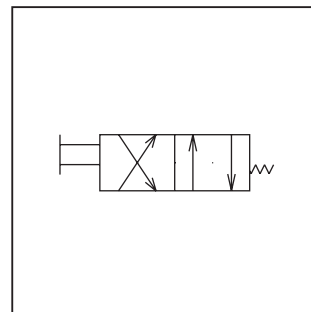
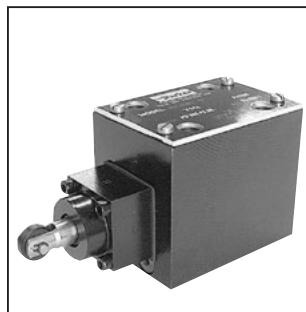
Series D3C and D3D directional control valves are high performance, 4-chamber, direct operated, cam controlled, 3 or 4-way valves. They are available in 2-position and conform to NFPA's D05, CETOP 5 mounting patterns.

Features

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

Specifications

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



Ordering Information

<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">D</div> <p>Directional Control Valve</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">3</div> <p>Basic Valve</p> <div style="border: 1px solid black; padding: 5px; margin: 5px auto; width: 100px;"> NFPA D05 CETOP 5 NG10 </div>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> <p>Actuator</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> <p>Spool</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> <p>Style</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> <p>Seal</p> <table border="1" style="margin: 5px auto; width: 150px;"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>N</td> <td>Nitrile</td> </tr> <tr> <td>V</td> <td>Fluorocarbon</td> </tr> </tbody> </table>	Code	Description	N	Nitrile	V	Fluorocarbon	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> <p>Variations</p> <table border="1" style="margin: 5px auto; width: 150px;"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Omit</td> <td>Standard</td> </tr> <tr> <td>B5</td> <td>Short Stroke</td> </tr> </tbody> </table>	Code	Description	Omit	Standard	B5	Short Stroke	<div style="border: 1px dashed black; padding: 2px; width: 30px; margin: 0 auto;"></div> <p>Design Series</p> <p>NOTE: Not required when ordering.</p>
Code	Description																		
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<table border="1" style="width: 100%;"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>Cam (90° to mounting surface)</td> </tr> <tr> <td>D</td> <td>Cam parallel to mounting surface</td> </tr> </tbody> </table>	Code	Description	C	Cam (90° to mounting surface)	D	Cam parallel to mounting surface	<table border="1" style="width: 100%;"> <thead> <tr> <th>Code</th> <th>Symbol</th> </tr> </thead> <tbody> <tr> <td>020*</td> <td></td> </tr> <tr> <td>030†</td> <td></td> </tr> </tbody> </table> <p>* 20 spool has closed crossover. † 30 spool has open crossover.</p>	Code	Symbol	020*		030†		<table border="1" style="width: 100%;"> <thead> <tr> <th>Code</th> <th>Description</th> <th>Symbol</th> </tr> </thead> <tbody> <tr> <td>B</td> <td>Two position, spring offset operator at "A" port end.</td> <td></td> </tr> <tr> <td>H</td> <td>Two position, spring offset operator at "B" port end.</td> <td></td> </tr> </tbody> </table> <p>Valve schematic symbols are per NFPA/ANSI standards. See installation information for details.</p>	Code	Description	Symbol	B	Two position, spring offset operator at "A" port end.		H	Two position, spring offset operator at "B" port end.	
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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.

A01_Cat2500.indd, ddp, 04/19



Mounting Bolt Kits

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

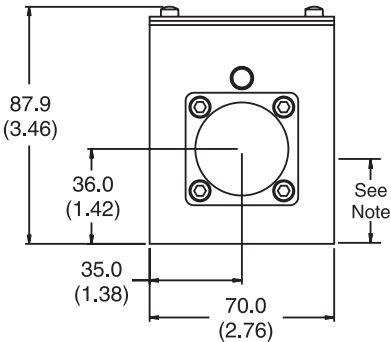
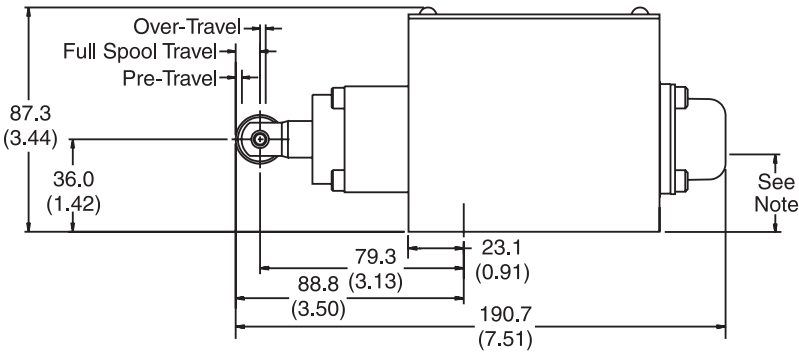
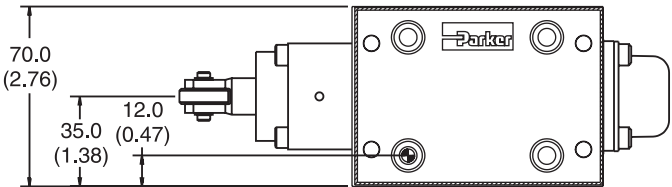
NOTE:All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 Nm (12 ft-lbs)

Dimensions

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

Cam Operated

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



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



A

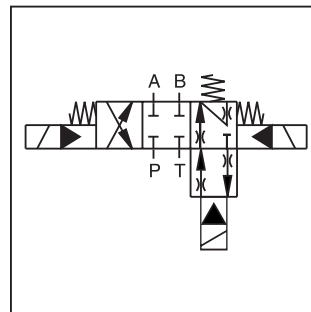
General Description

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

Specifications



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

General		
Design	Directional Spool Valve	
Actuation	Solenoid	
Size	NG10	
Mounting Interface	DIN 24340 A10 / ISO 4401 / NFPA D05	
Mounting Position	Unrestricted, preferably horizontal	
Ambient Temperature	[°C]	-25...+60; (-13°F...+140°F)
MTTF _D Value	[years]	150
Hydraulic		
Maximum Operating Pressure	Pilot drain internal: P, A, B 350 Bar (5076 PSI); T 210 Bar (3045 PSI) Option 9 ¹⁾ : P, A, B, T 350 Bar (5076 PSI); X, Y 210 Bar (3045 PSI)	
Fluid	Hydraulic oil in accordance with DIN 51524	
Fluid Temperature	[°C]	-20 ... +70 (-4°F...+158°F); Nitrile: -25...+70; (-13°F...+158°F)
Viscosity Permitted	[cSt]/[mm²/s]	2.8...400 (13...1854 SSU)
Recommended	[cSt]/[mm²/s]	30...80 (139...371 SSU)
Filtration	ISO 4406 (1999); 18/16/13	
Flow Maximum	150 LPM (40 GPM)	
Leakage at 50 Bar (725 PSI) (per flow path)	[ml/min]	0...20 (0...0.01 GPM) (depending on spool)
Static / Dynamic		
Step Response at 95% DC Solenoids @ 65 LPM (17 GPM) Pilot Pressure 175 Bar (2538 PSI)	[ms]	<div>Energized</div> <div>105</div> <div>De-energized</div> <div>85</div>
Electrical		
Duty Ratio	100% ED; CAUTION: coil temperature up to 150°C (302°F) possible	
Protection Class	IP 65 in accordance with EN 60529 (plugged and mounted)	
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]	3 x 1.5 recommended
Wiring Length Minimum	[m]	50 (164 ft.) recommended

With electrical connections, the protective conductor (PE ) must be connected according to the relevant regulations.

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.

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.

A01_Cat2500.indd, ddp, 04/19

Ordering Information

D

Directional Control Valve

3D

Basic Valve

DIN NG10

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

A

Design Series

NOTE: Not required when ordering.

Regenerative Function ¹⁾	
Code	Symbol
R01	
R04	
R81	
R82	

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

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 port

Code	Description
Omit	Standard
T	No override

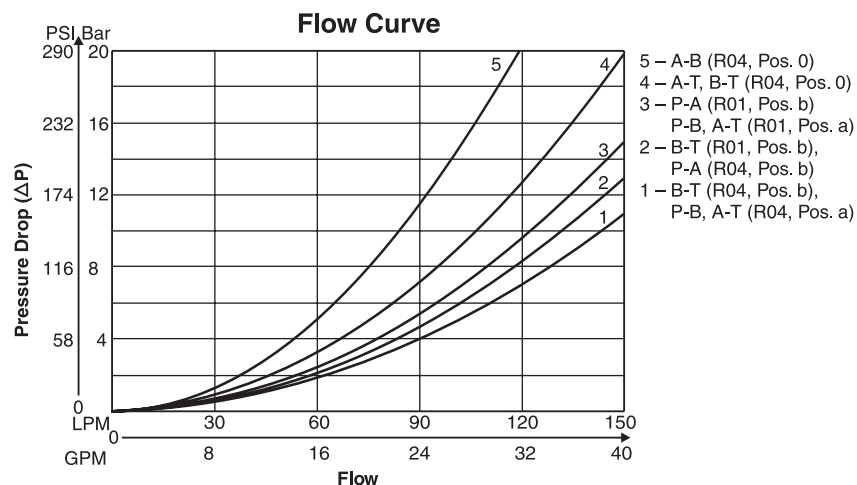
Code	Description
C	 3 positions. Spring offset in position "0". Operated in position "a" or "b".

Weight: 6.3 kg (13.9 lbs.)

Bolt Kit: BK385

Seal Kit: Nitrile – SK-D3W-30
 Fluorocarbon – SK-D3W-V-30

Performance Curves

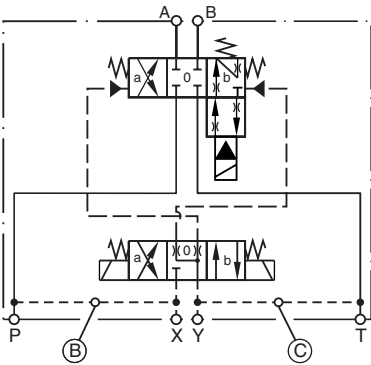
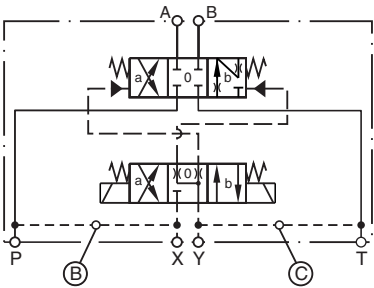


Pilot Oil Inlet (Supply) and Outlet (Drain)

A

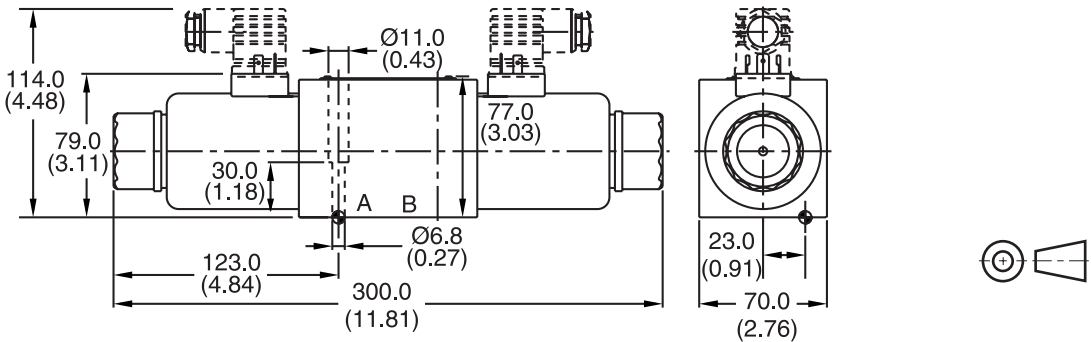
○ open, ● closed

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	Kit	Kit	Seal Kit
	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm ± 15%	Nitrile: SK-D3W-30 Fluorocarbon: SK-D3W-V-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 Nm (0.37 lb.-ft.) to 0.6 Nm (0.44 lb.-ft.).

General Description

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

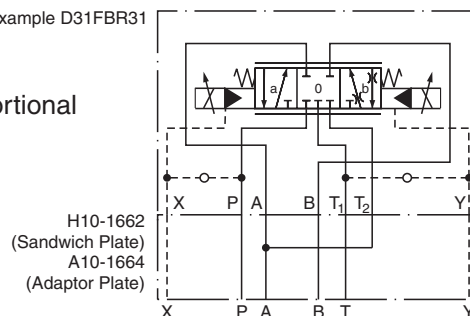
Features

- 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

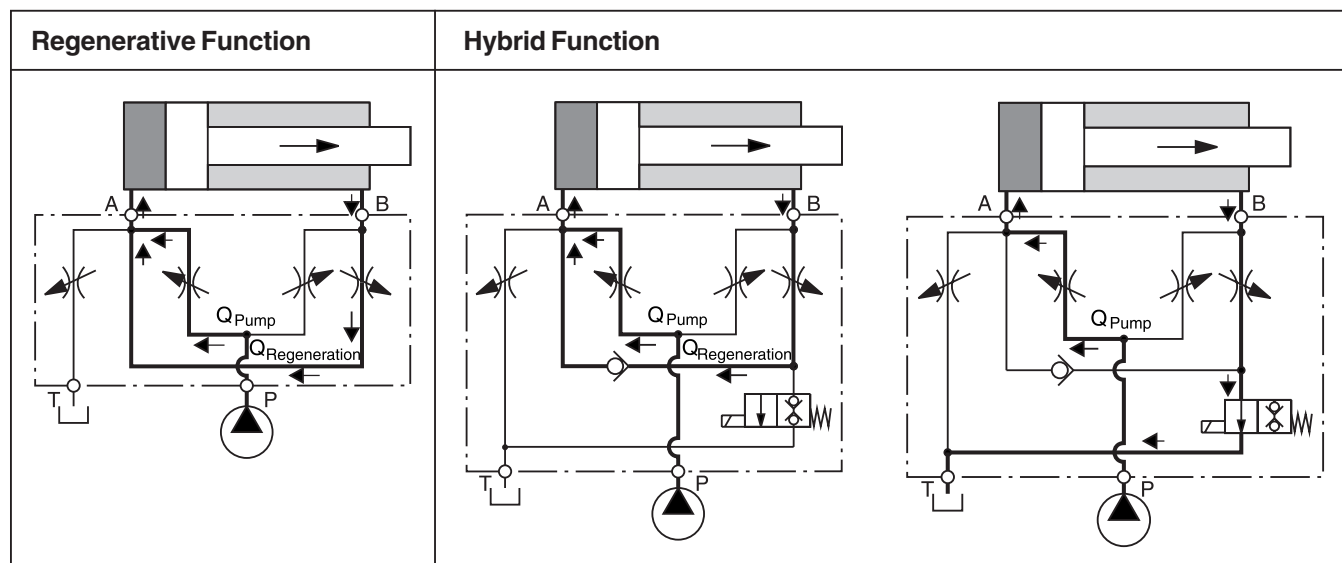
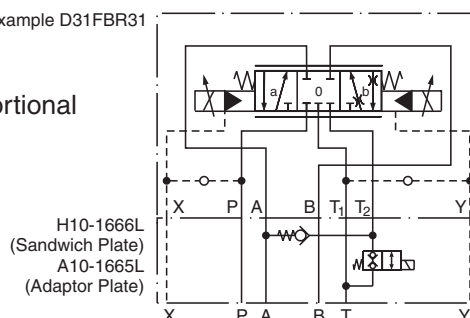
Note:
Proportional



Hybrid Function

Example D31FBR31

Note:
Proportional



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.
A01_Cat2500.indd, ddp, 04/19

A

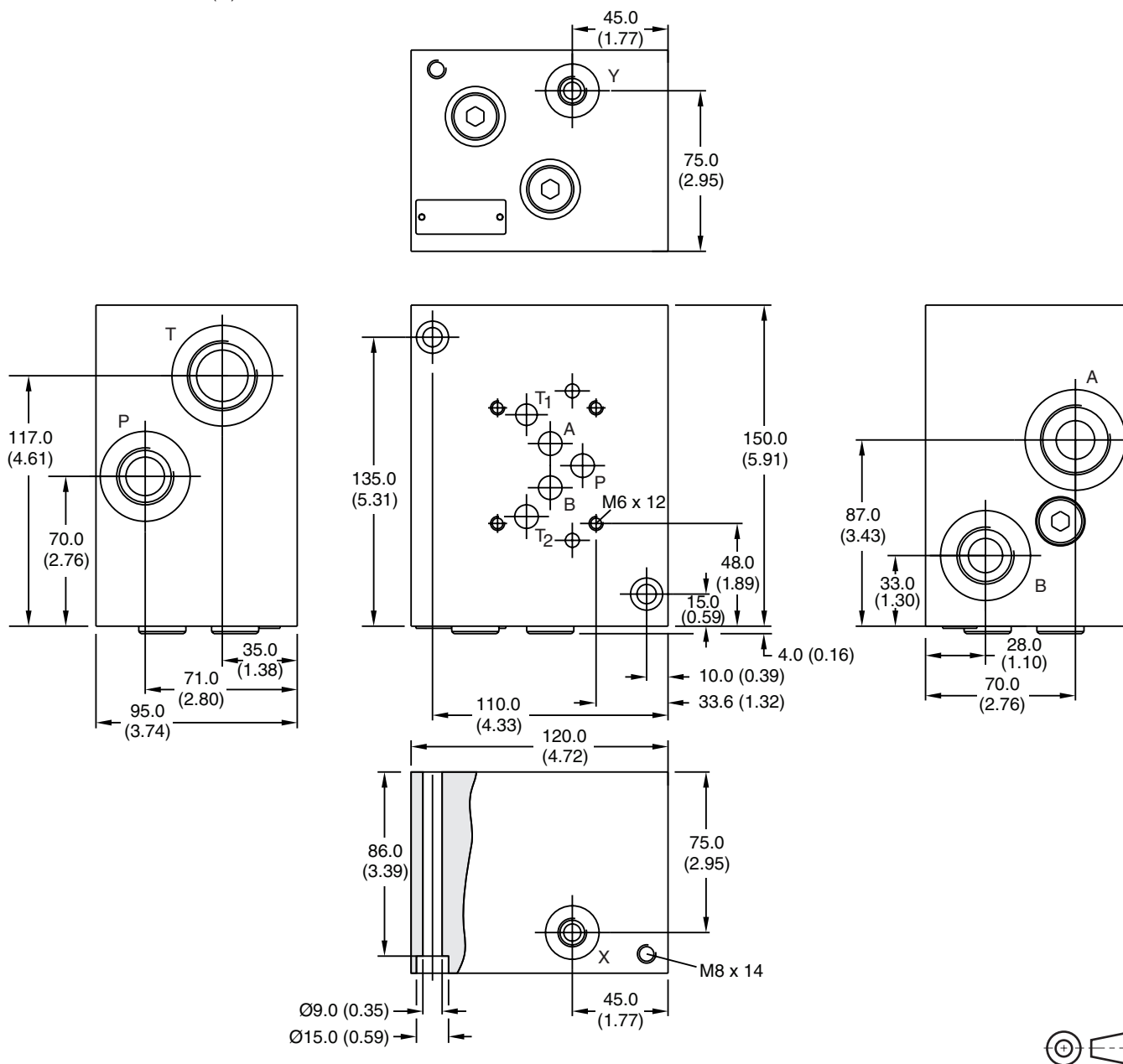
General				
Actuation		Solenoid – A10-1665L and H10-1666L		
Size		DIN NG10 / CETOP 5H		
Mounting interface		DIN 24340 A10 / ISO 4401 / CETOP RP 121-H / NFPA D05		
Mounting Position		Unrestricted		
Ambient Temperature		[°C]	-25...+50 (-13°F...+122°F)	
MTTF _D Value		[years]	150	
		A10-1664	A10-1665L	H10-1662
Weight		11.9 kg (26.5 lbs.)	14.4 kg (31.8 lbs.)	2.8 kg (6.2 lbs.)
				4.9 kg (10.8 lbs.)
Hydraulic				
Maximum Operating pressure		[Bar]	350 (5045 GPM)	
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525		
Fluid temperature		[°C]	-25...+70 (-13°F...+158°F)	
Viscosity	Permitted	[cSt] / [mm²/s]	2.8...400 (13...1854 SSU)	
	Recommended	[cSt] / [mm²/s]	30...80 (139...371 SSU)	
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)		
Maximum Flow		A10: 150 LPM (39.7 GPM); H10: 250 (66.1 GPM)		
Regeneration B-A		95 LPM (25.1 GPM)		
Regeneration B-T		A10: 75 LPM (19.8 GPM)		
Electrical				
Duty Ratio		100%		
Protection Class		IP 65 in accordance with EN 60529 (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]	3 x 1.5 recommended	
Wiring Length Maximum		[m]	50 (164 ft.) recommended	

With electrical connections the protective conductor (PE ↓) must be connected according to the relevant regulations.

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

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

A

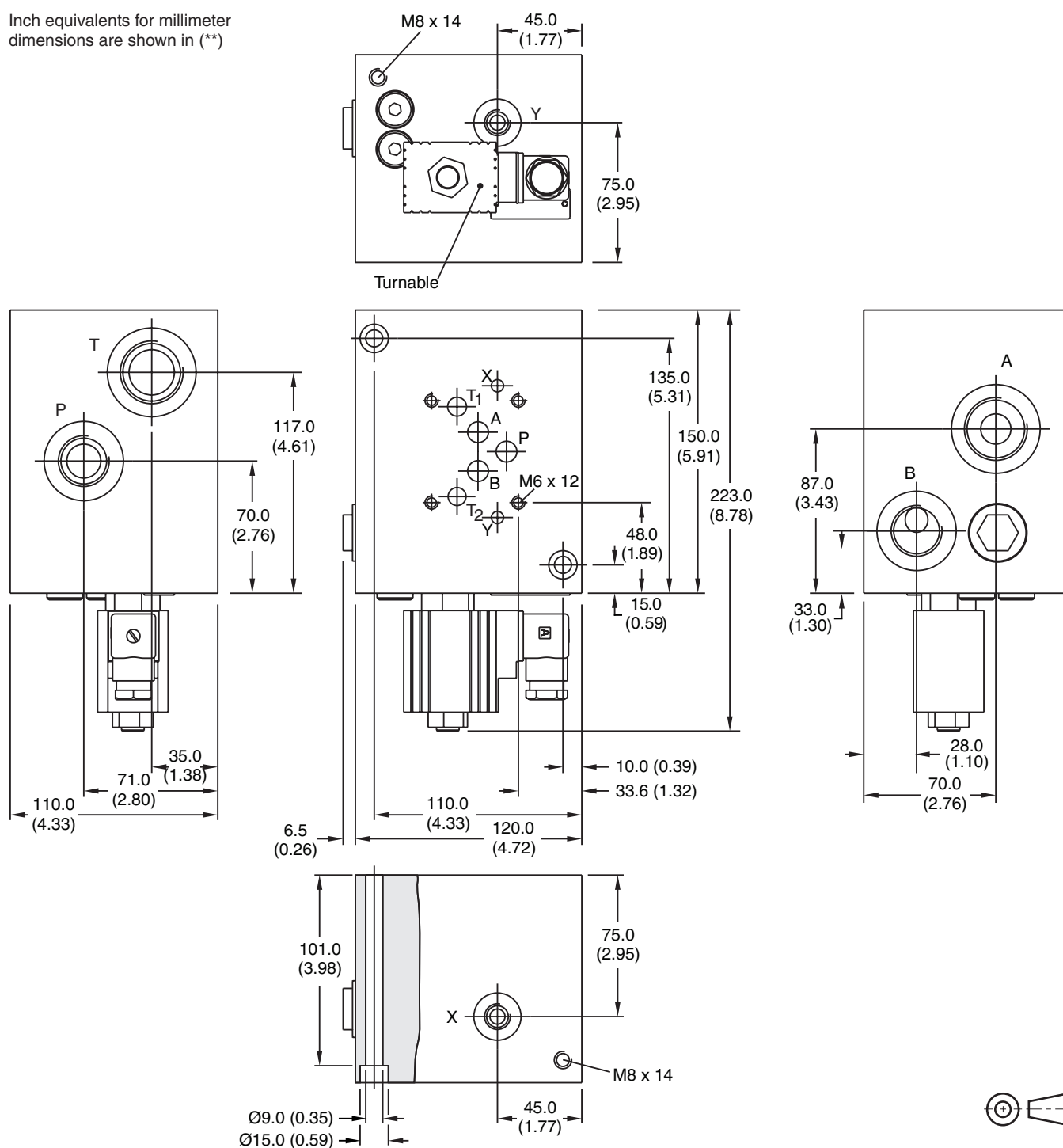



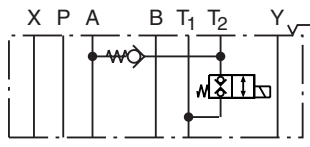
Symbol	Ordering Code	Port
	A10-1664	A, T = G1 B, P = G3/4 X, Y = G1/4

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

A

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



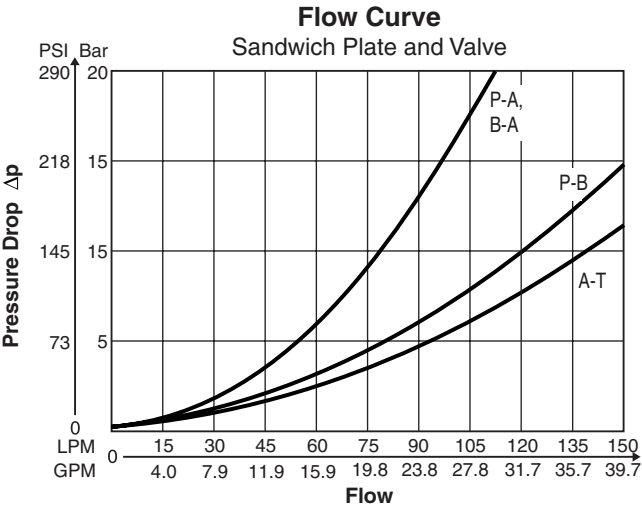
Symbol	Ordering Code	Port	Seal  Kit
	A10-1665L	A, T = G1 B, P = G3/4 X, Y = G1/4	Nitrile: SK-A10-1665

A01_Cat2500.indd, ddp, 04/19

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

Performance Curves

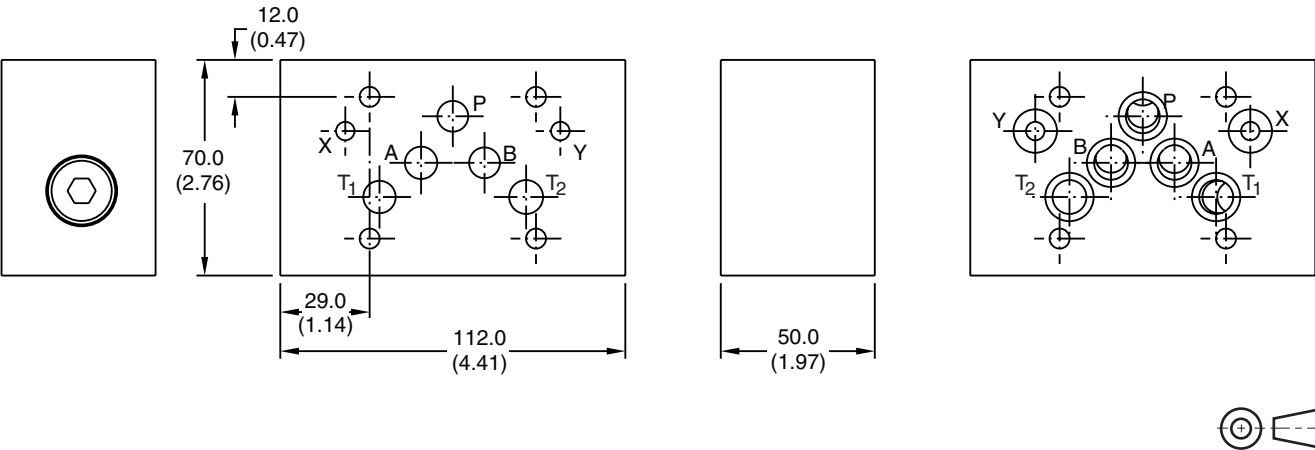
D31FP/FE/FB/VW*



Measured with Spool Z31 at command signal 100%.

Dimensions

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



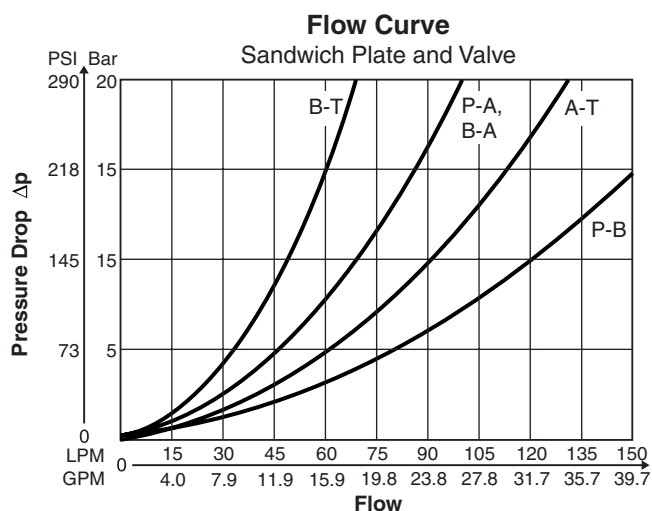
Symbol	Ordering Code	Kit	Kit	Kit	Seal Kit
 X P A B T ₁ T ₂ Y Valve Side X P A B T ₁ Y Manifold Side	H10-1662 (O-rings included in delivery)	BK412	4x M6x90 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.) ±15%	Nitrile: SK-H10-1662

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

A

Performance Curves

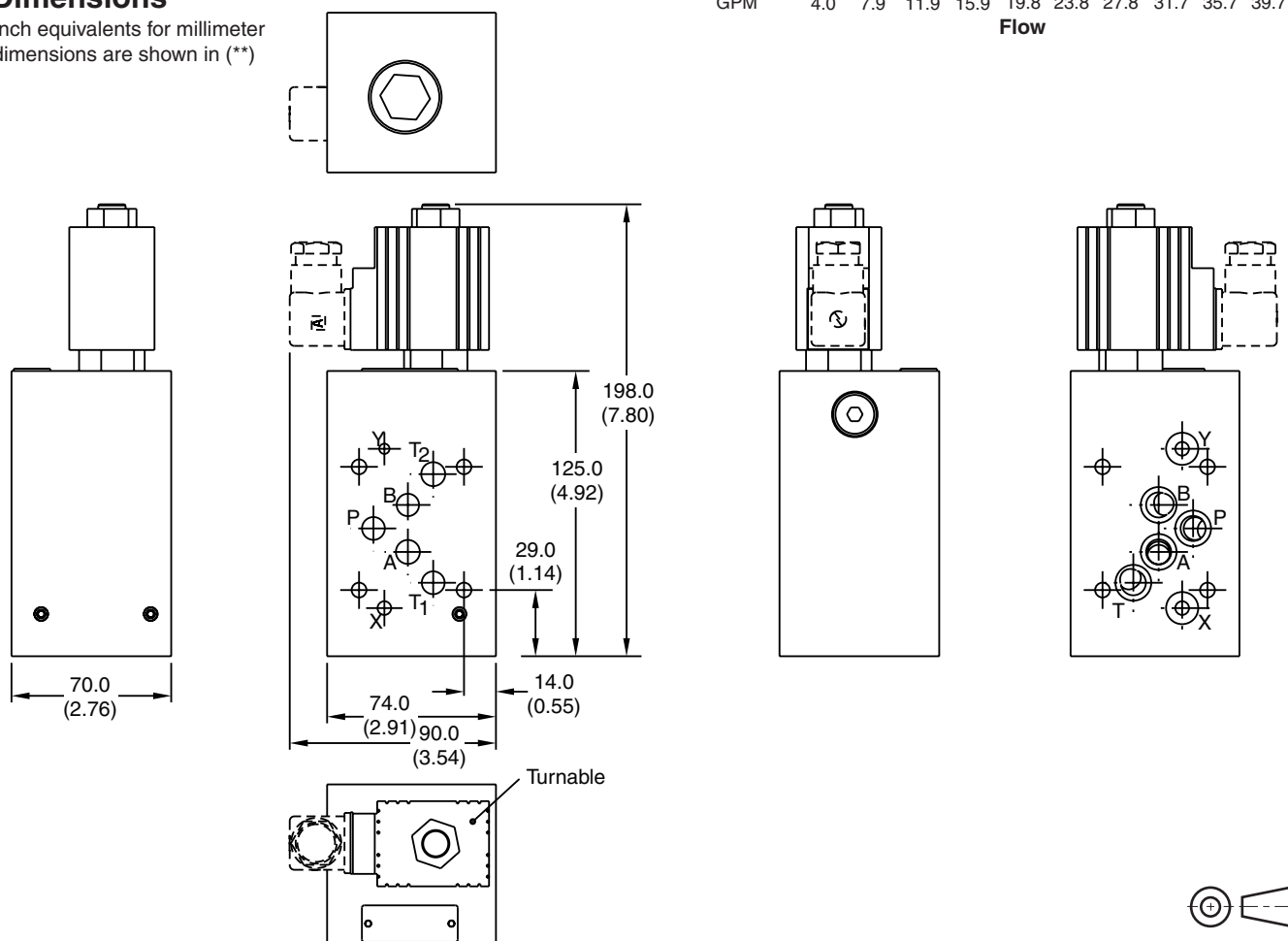
D31FP/FE/FB/VW*



Measured with Spool Z31
at command signal 100%.

Dimensions

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



Symbol	Ordering Code	Kit	4x M6x110 DIN 912 12.9	Seal Kit
	H10-1666L (O-rings included in delivery)	BK528	13.2 Nm (9.7 lb.-ft.) ±15%	Nitrile: SK-H10-1666

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General Description

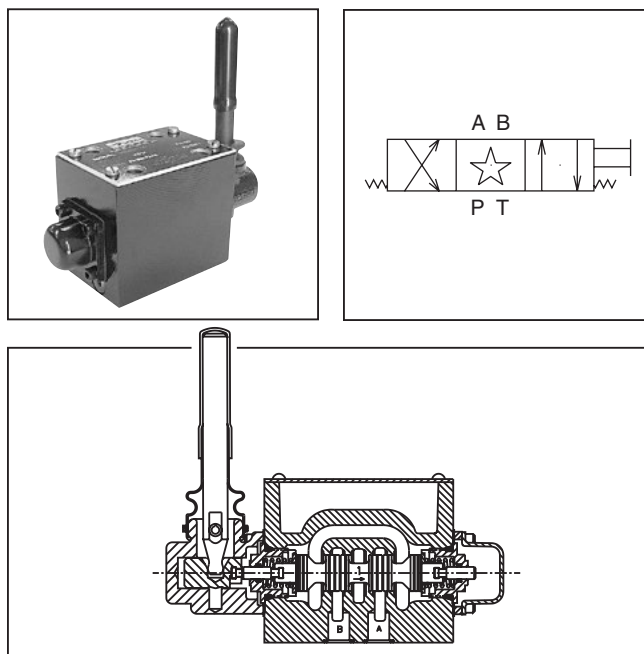
Series D3L directional control valves are high performance, 4-chamber, direct operated, lever controlled, 4-way valves. They are available in 2 or 3-position and conform to NFPA's D05, CETOP 5 mounting patterns.

Features

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

Specifications

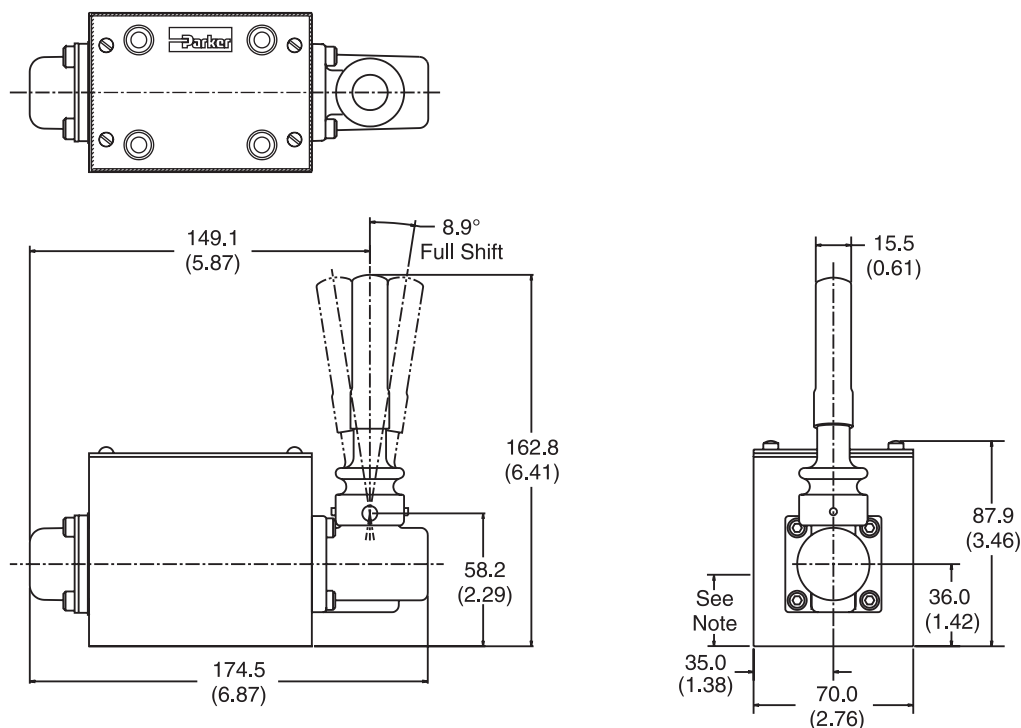
Mounting Pattern	NFPA D05, CETOP 5, NG 10
Maximum Pressure	Operating: 345 Bar (5000 PSI) Tank Line: 34 Bar (500 PSI)
Maximum Flow	See Spool Reference Chart
Force Required to Shift Lever Operator	173 N (39 lbs.)



Dimensions

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

Lever Operated D3L



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.

A01_Cat2500.indd, ddp, 04/19

A

D Directional Control Valve	3 Basic Valve	 Operator Type & Location	 Spool	 Style	 Seal	 Design Series
NFPA D05 CETOP 5 NG10						
NOTE: Not required when ordering.						

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

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Symbol	Code	Symbol
001		20*	
002		30†	
004		81	
008*		82	
009†			

* 8 and 20 spools have closed crossover.

† 9 and 30 are open crossover.

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

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

* 20 and 30 spools only.

This condition varies with spool code.

Mounting Bolt Kits

UNC Bolt Kits for use with D3L Directional Control Valves & Sandwich Valves					
		Number of Sandwich Valves @ 2.00" (50 mm) thickness			
		0	1	2	3
D3L	Standard:	BK98 1.62"	BK141 3.50"	BK142 5.50"	BK143 7.50"
	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 ft-lbs).

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

Bold: Designates Tier I products and options.

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

Fluid Recommendations

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

Fluids and Seals

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

Temperature Recommendation

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

Filtration

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

Tank Line Surges

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

Recommended Mounting Position

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

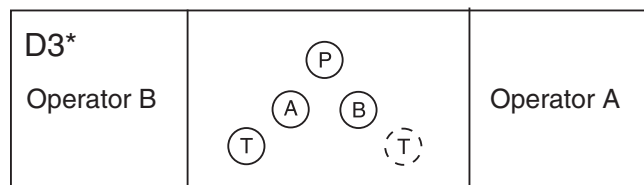
Silting

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

Single Pass Operation

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

Flow Path Data



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

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

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

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

Lever Operated (on B end)

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

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

Electrical Failure

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

Loss of Pilot Pressure (D3A)

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

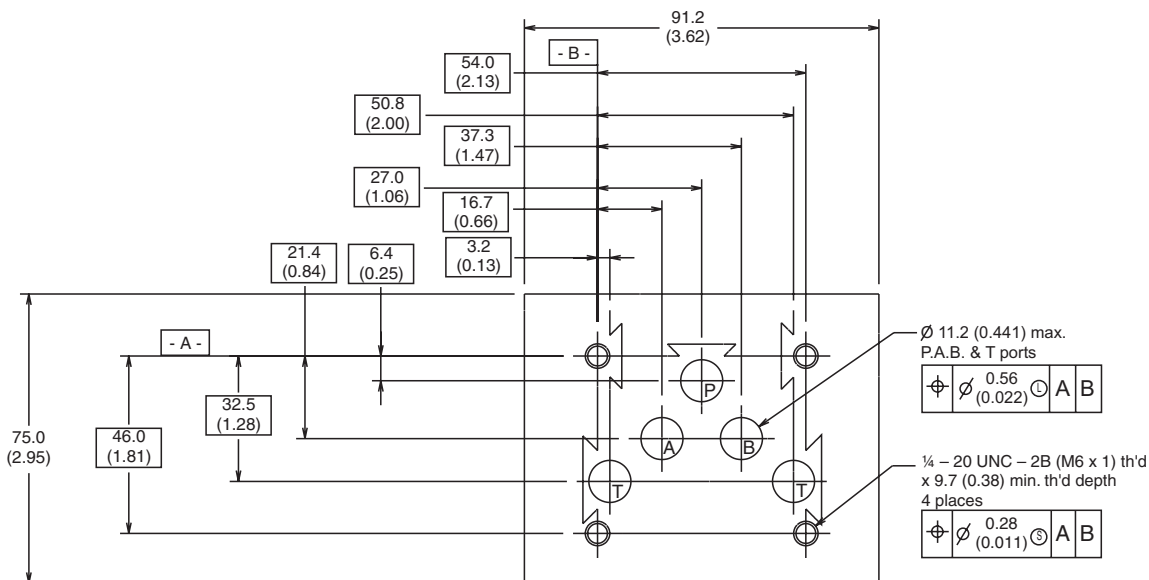
Torque Specifications

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

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

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

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



A

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin gray lines. There are 20 columns and 20 rows of squares, creating a total of 400 square units. The background is white, and the grid lines are light gray.

A

Application

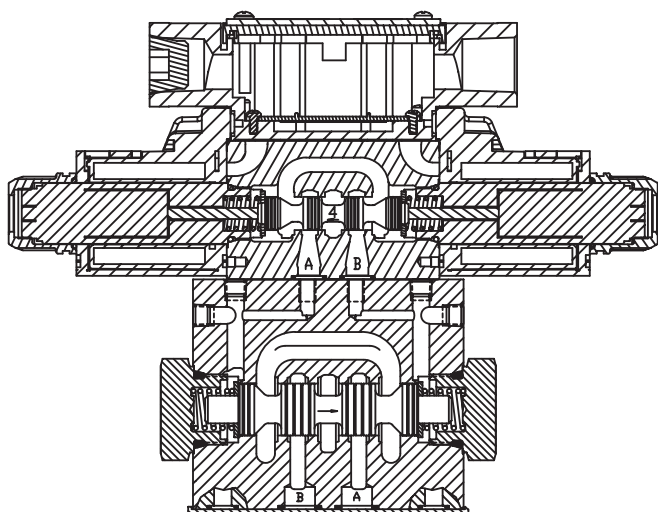
Series D31 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles and are manifold mounted. These valves conform to NFPA's D05H, CETOP 5 and can also be manufactured to an NFPA D05HE, CETOP 5H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

Operation

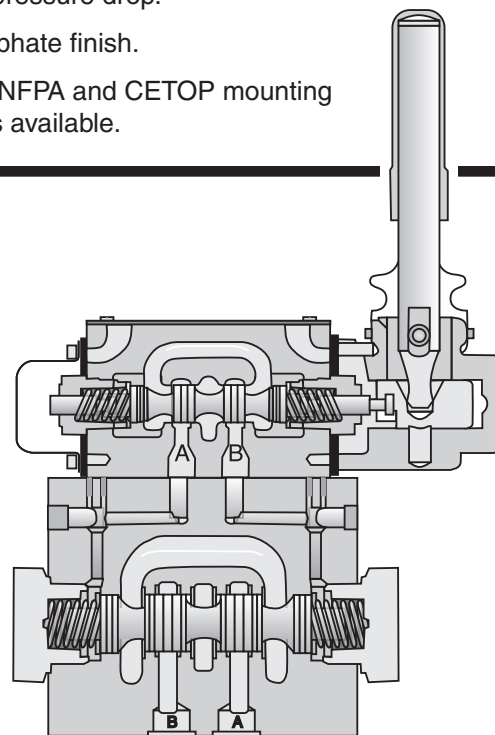
Series D31 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or pilot operators (hydraulic or pneumatic).

Features

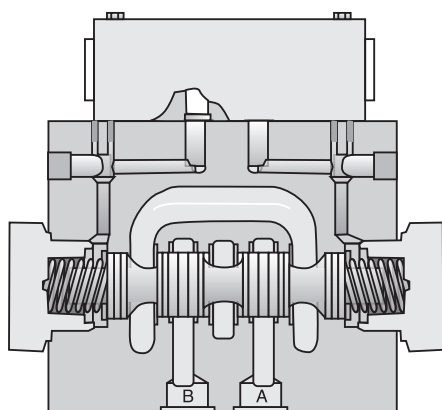
- Easy access mounting bolts.
- 345 Bar (5000 PSI) pressure rating.
- Flows to 175 LPM (45 GPM) depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.
- Both NFPA and CETOP mounting styles available.



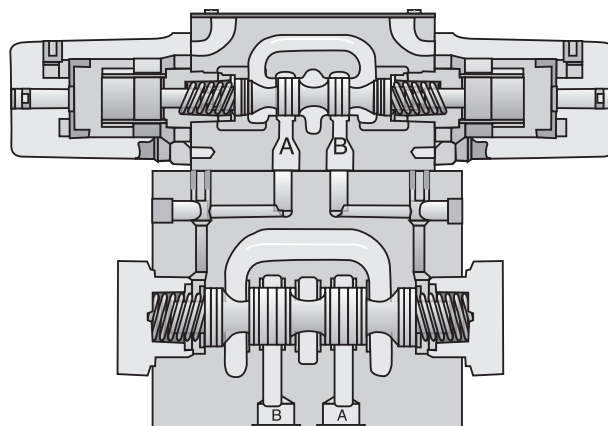
D31*W Solenoid Operated Plug-In Conduit Box



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.

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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.

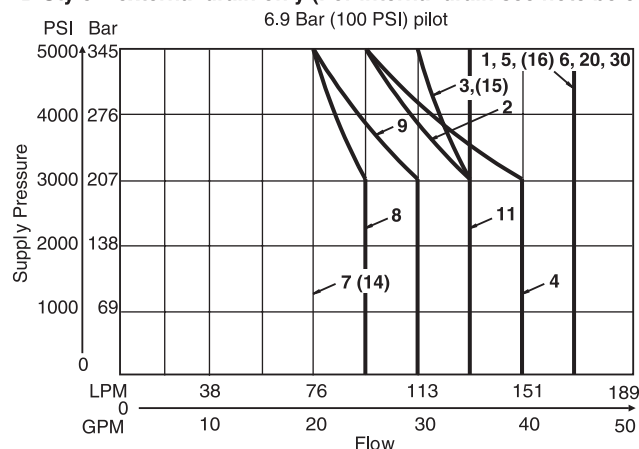
Specifications

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

Switching Limit Charts

For Styles B, C, E, H and K

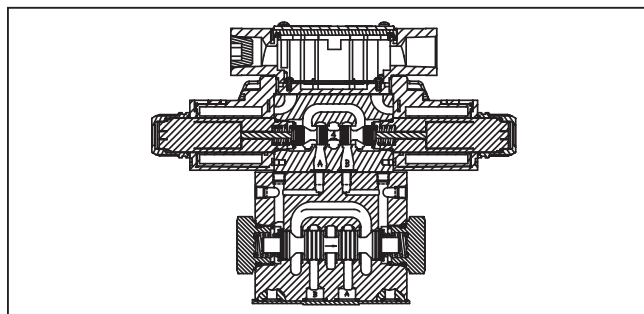
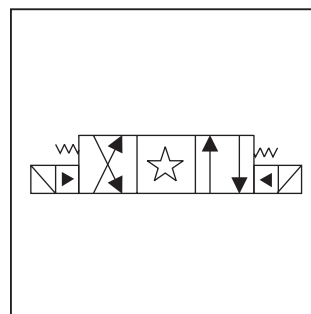
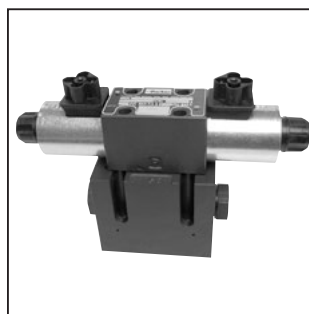
D Style – external drain only (For internal drain see note below)



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

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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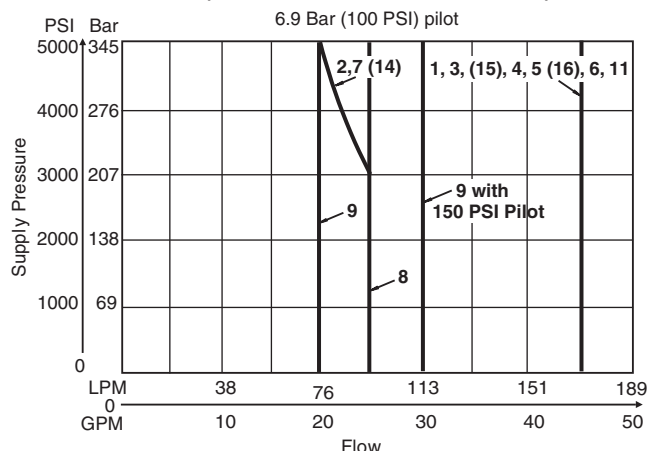


Response Time

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

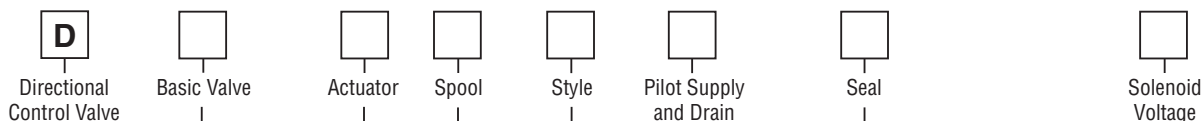
Solenoid Type	Pilot Pressure	Pull-In	Drop-Out
DC	500	40	50
	1000	36	50
	2000	34	50
AC	500	20	33
	1000	18	33
	2000	13	33

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.

A



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.

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

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

Code	Description
D†#	120 VDC
E**	24 VAC/60 Hz
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

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***.

* F and M style available only with external drain.

Not available with 002, 008, 009 or 014 spools.

High Watt only.

† DIN only. Not available with CSA.

†† DIN & Leadwire only. Not available with CSA.

* DIN & Plug-In only.

** Leadwire, Low Watt only.

Code	Symbol	Code	Symbol	Code	Description	Symbol
001		012		B*	Single solenoid, 2 position, spring offset. P to A and B to T in offset position.	
002		015		C	Double solenoid, 3 position, spring centered.	
003		020*		D*	Double solenoid, 2 position, detent.	
004		030**		E	Single solenoid, 2 position, spring centered. P to B and A to T when energized.	
006		081		F†	Single solenoid, 2 position. Spring offset, energized to center. Spacer on A side. P to A and B to T in spring offset position.	
008*, 009**		082		H*	Single solenoid, 2 position, spring offset. P to B and A to T in offset position.	
011				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. Spacer on B side. P to B and A to T in spring offset position.	

* 008 & 020 spools have closed crossover.

** 009 & 030 spools have open crossover.

* 020 and 030 spools only.

† High watt 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.



Solenoid Connection

Coil Options

Tube Options

Manual Override Options

Electrical Options

Shift Response and Indication

Approvals

Valve Variations

Design Series
 NOTE:
 Not required when ordering.

Code	Description
C*	Leadwire Conduit Box
D**	M12X1, DESINA
E†	Explosion Proof
F ^x	Flying Leadwire
G††	Plug-In Conduit Box
J#	Deutsch (DT06-25)
P	DIN with Plug
S‡	Double Spade
W†	DIN w/o Plug

* No variations – See Plug-in. 98 VDC not available.

** DC 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 volt DC only, no lights, not CSA approved.

‡ 12 VDC Hi Watt, not CSA approved.

x 12 VDC & 24 VDC only. Not CSA approved.

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

* DC only. DIN coil must include plug with lights.

† DC tube standard, plug-in only. Polarity sensitive coil is stamped (±).

24 VDC “ET” available. Also adds dust rating. Not polarity sensitive [IIC, D].

Code	Description
Omit	Standard
P	Extended with Boot
T*	Covered Manual Override

* Only available with monitor switch option.

Manual Override options not available with Explosion Proof.

Code	Description
Omit*	High Watt
D**	Explosion Proof, EExd ATEX
E**	Explosion Proof, EExme ATEX IECEx, from Germany & CSA
F†	Low Watt
L††	10 Watt
T#	Explosion Proof, Ex d IIC ATEX/CSA
U#	Explosion Proof, UL/CSA

* AC ambient temperature must not exceed 60°C (140°F).

** J voltage only, no variations available.

† AC only.

†† DC and AC rectified only.

J and Y voltages only. Dual frequency on AC, no options.

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

* Not available with CSA or Explosion Proof.

Code	Description
Omit	Standard Valve
4* †#	CSA Canada CSA22.2 No. 139-10

* Not available with AC high pressure tube.

† E, J, K, Y, U, T: Voltages only. C, G, W: Solenoid connections. E & T voltages only available with C Solenoid Connection, Low Watt only. Conforms to UL429.

Valve is derated.

See next page for Valve Variations

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 Coils only. Not available on D31VW.

Mounting Bolt Kits

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

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

Bold: Designates Tier I products and options.

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

A

Valve Variations

Code	Description
5*	Signal Lights – Standard
	Signal Lights – Hirsch. (DIN with Plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with Lights
56**	Manaplug (Mini) with Lights
20	Fast Response
1C**	Manaplug (Mini) Single Sol. 5-pin, with Lights
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1G**	Manaplug (Mini) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1H**	Manaplug (Micro) Single Sol. 5-pin, with Stroke Adjust 'A' & 'B' End and Lights
1M**	Manaplug Opposite Normal
1P	Painted Body
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	Pilot Choke Meter Out
3B	Pilot Choke Meter In
3C	Pilot Pressure Reducer
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	Pilot Choke Meter Out with Lights
3H*	Pilot Choke Meter In with Lights
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights, Mini Manaplug, Pilot Choke Meter Out
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights
XB990†	CE Marking

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

** Must have plug-in style conduit box.

† Above 50 VAC or 75 VDC must have "4" CSA approved coils.

D31 Series

Pressure Drop vs. Flow

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

Example:

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

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

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

D31 Pressure Drop Reference Chart

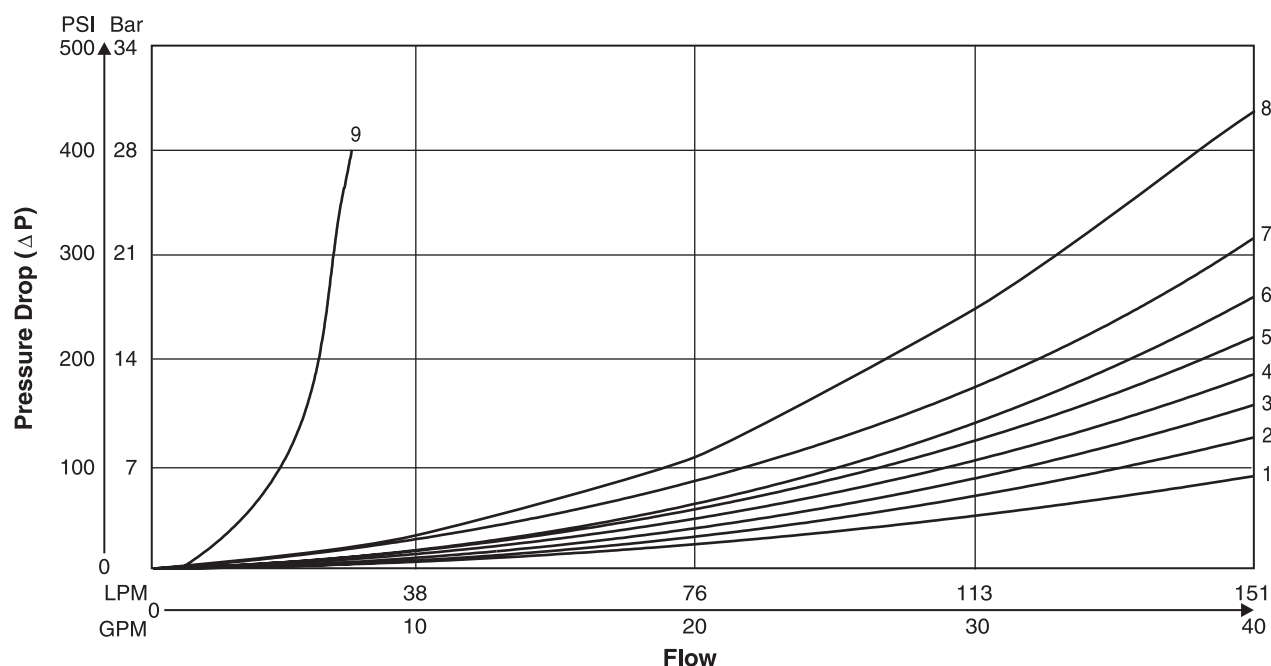
Spool No.	Curve Number										
	Shifted				Center Condition						
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	1	—	—	—	—	—	—	—
002	3	3	1	1	3	3	3	4	4	1	1
003	3	3	1	1	—	—	—	—	—	3	—
004	3	3	1	1	—	—	—	—	—	1	1
006	3	3	1	1	—	5	7	6	5	—	—
008	3	3	1	1	7	—	—	—	—	—	—
009	9	9	6	7	5	—	—	—	—	—	—
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



A

Solenoid Ratings

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

Explosion Proof Solenoid Ratings*

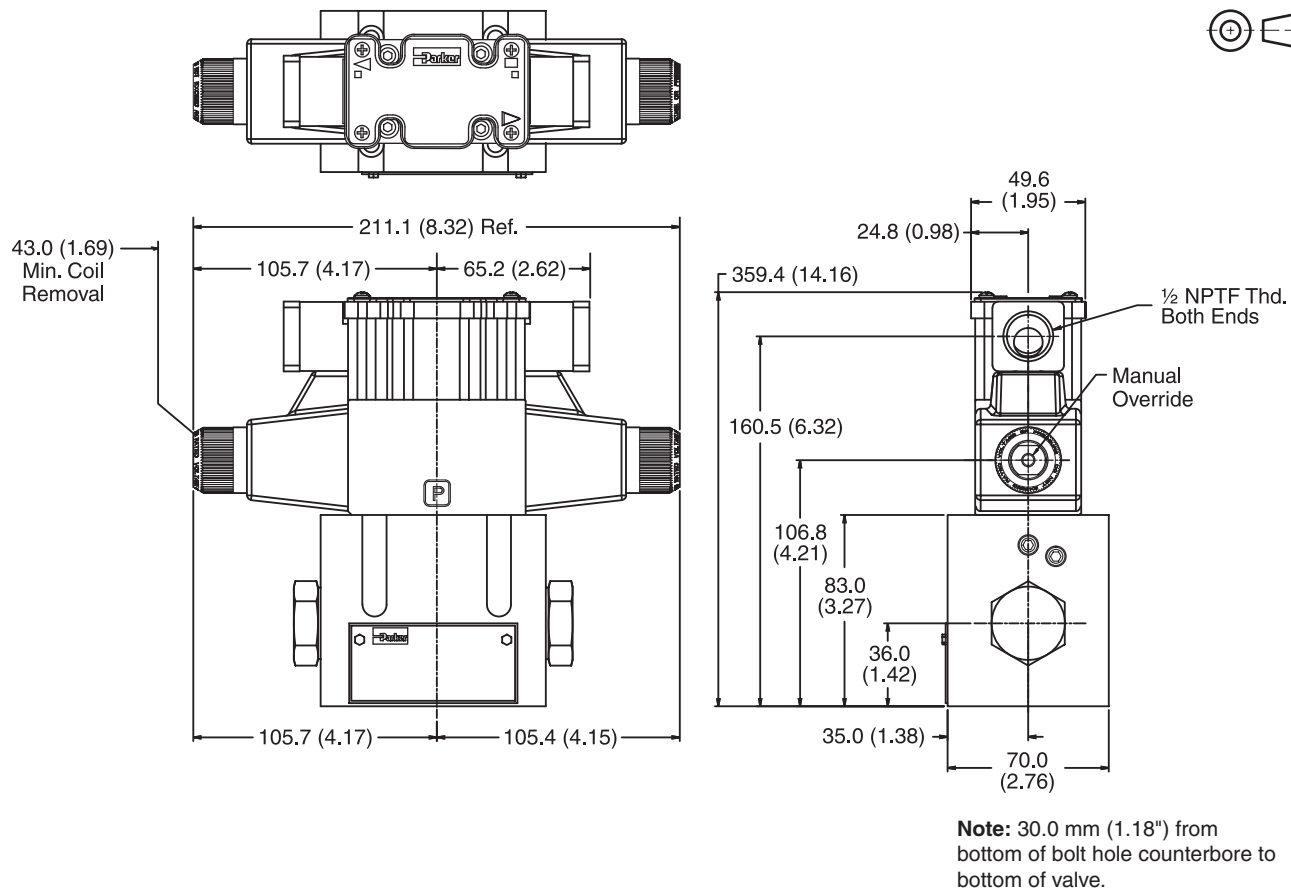
U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D; Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013; 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 $\pm 10\%$.
 Note that Explosion Proof AC coils are single frequency only.

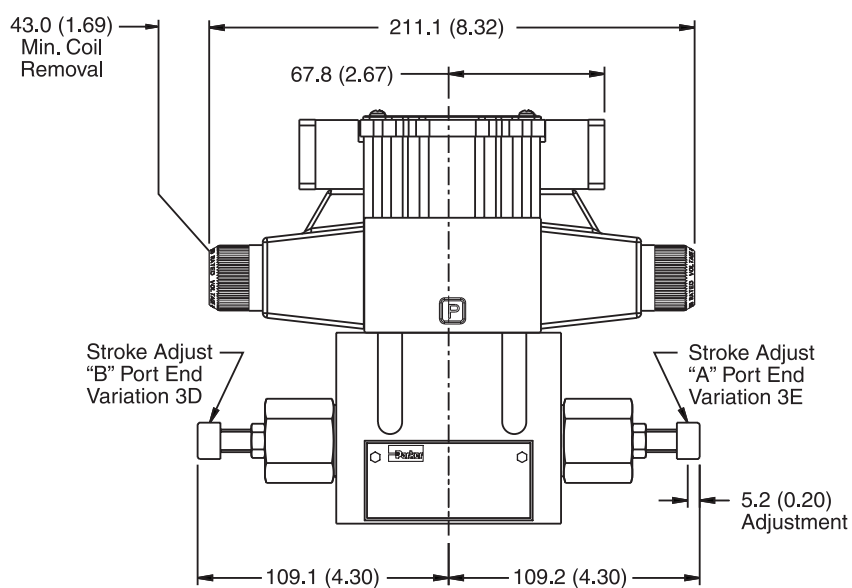
Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3 mm	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 ohms
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	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.20 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.20 ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
Z	Omit	250 VDC	N/A	N/A	0.13 Amps	30 W	1889.64 ohms
Explosion Proof Solenoids							
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
"ET" Explosion Proof Solenoids							
K		12 VDC	N/A	N/A	1.00 Amps	12 W	12.00 ohms
J		24 VDC	N/A	N/A	1.00 Amps	13 W	44.30 ohms
Y		120/60 AC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

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

Conduit Box, Double AC Solenoid

A


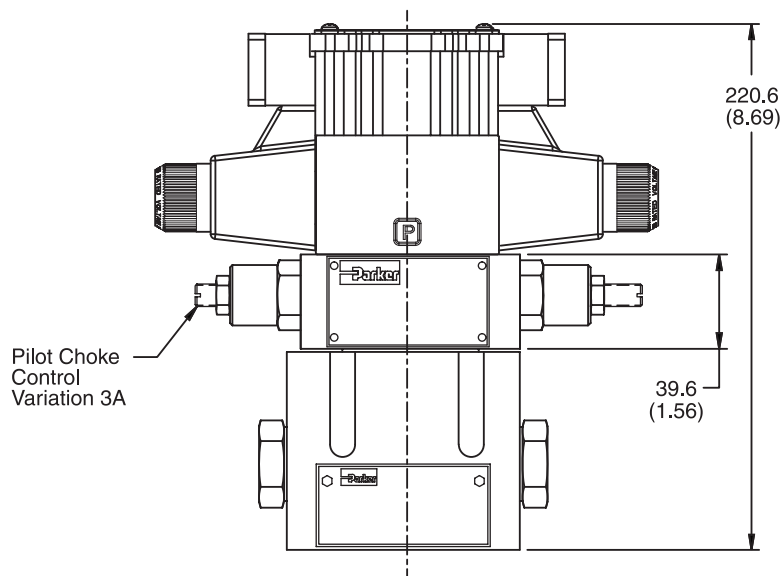
Conduit Box and Stroke Adjust, Double AC Solenoid



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

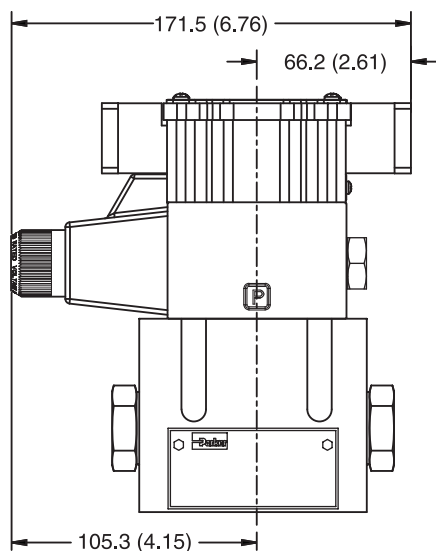
A

Conduit Box and Pilot Choke Control, Double AC Solenoid



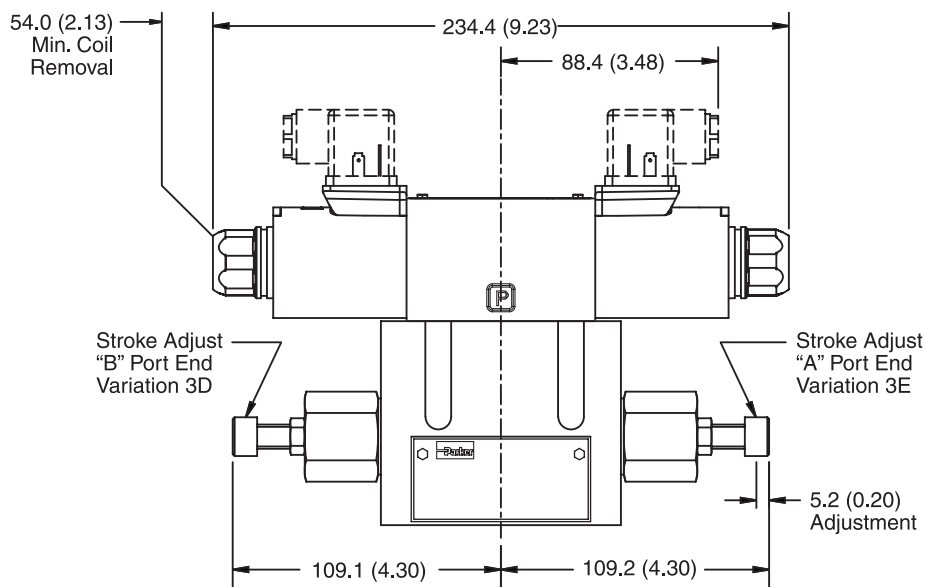
Note: 30.0 mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

Conduit Box, Single AC Solenoid

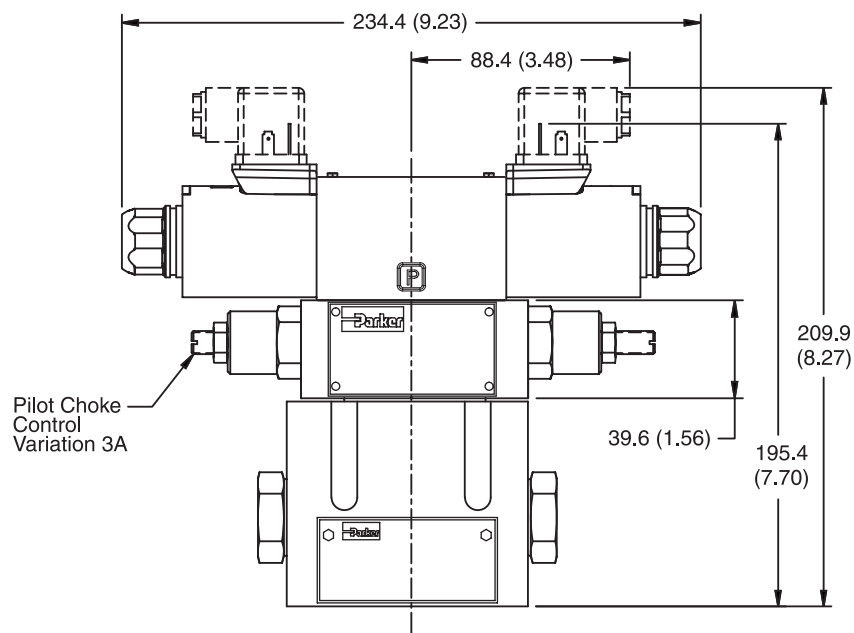


Note: 30.0 mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

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

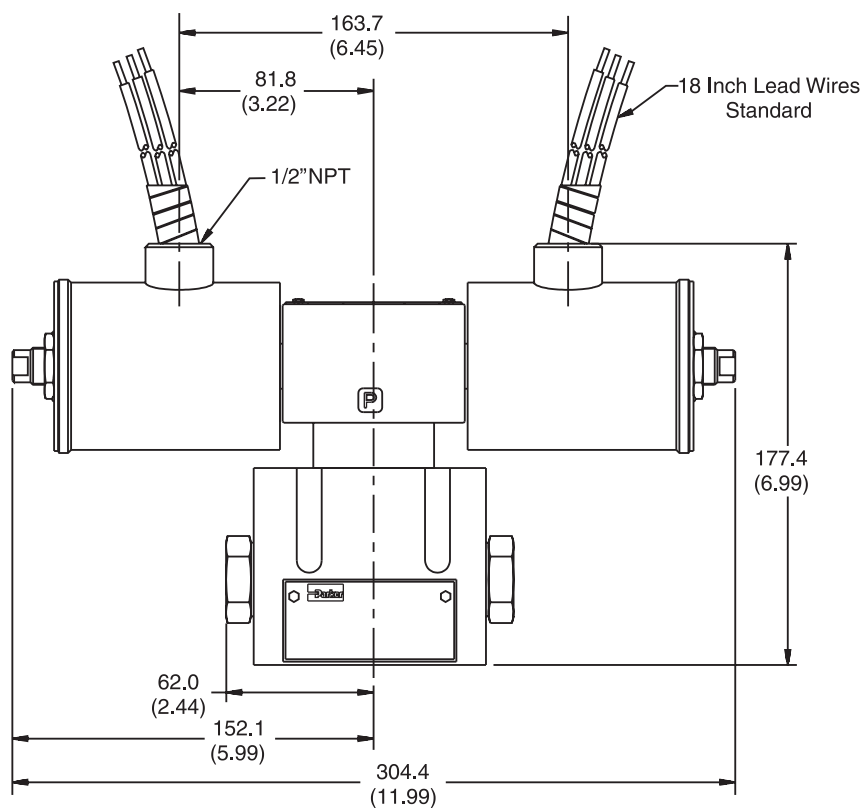
Hirschmann and Stroke Adjust, Double DC Solenoid**A**

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

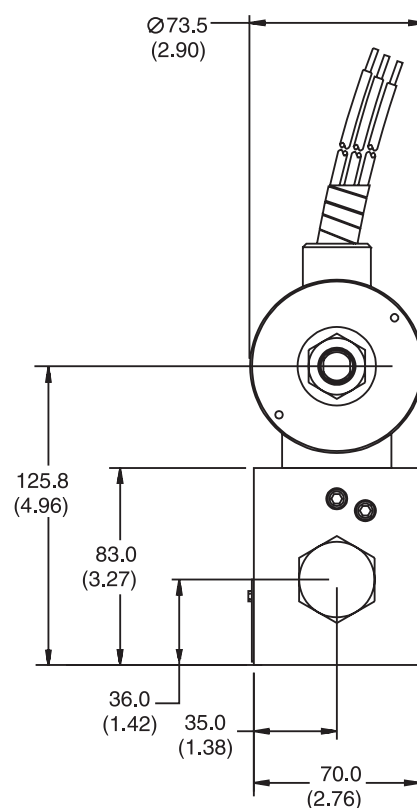
Hirschmann and Pilot Choke Control, Double DC Solenoid

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

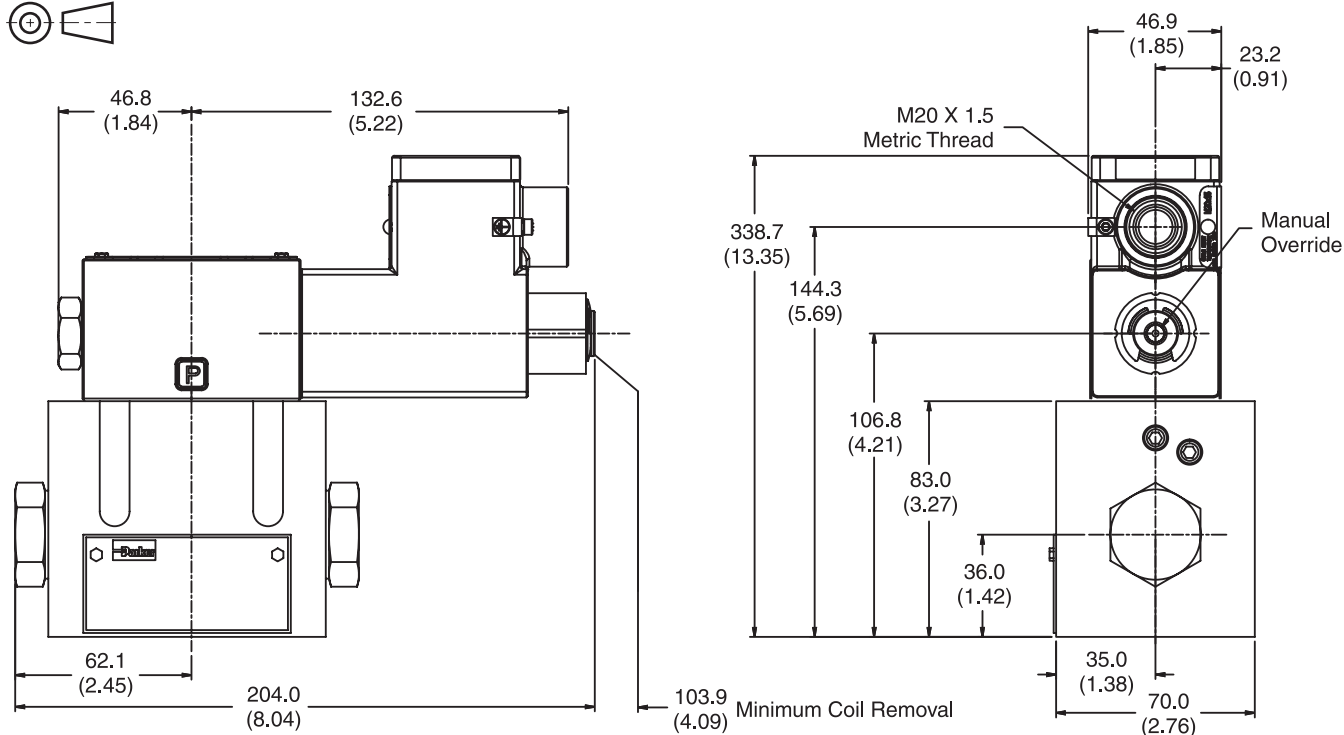
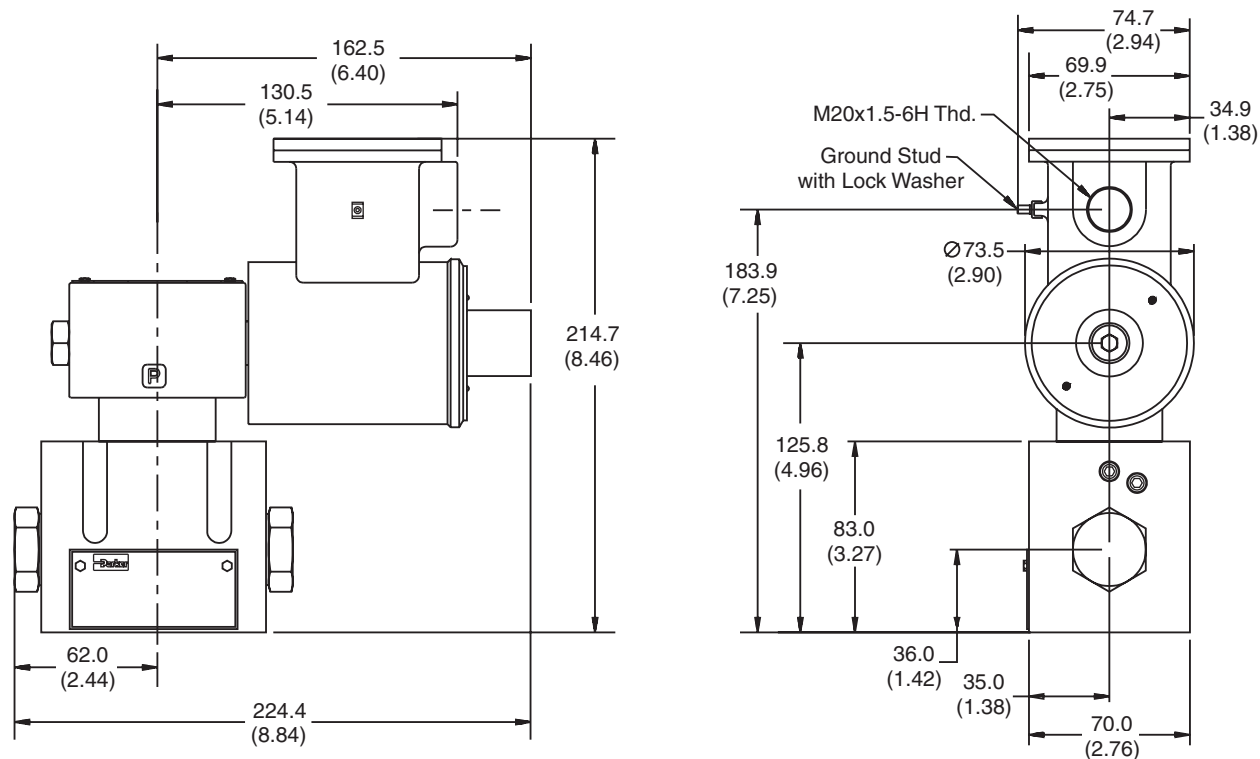
Inch equivalents for millimeter dimensions are shown in (**)

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

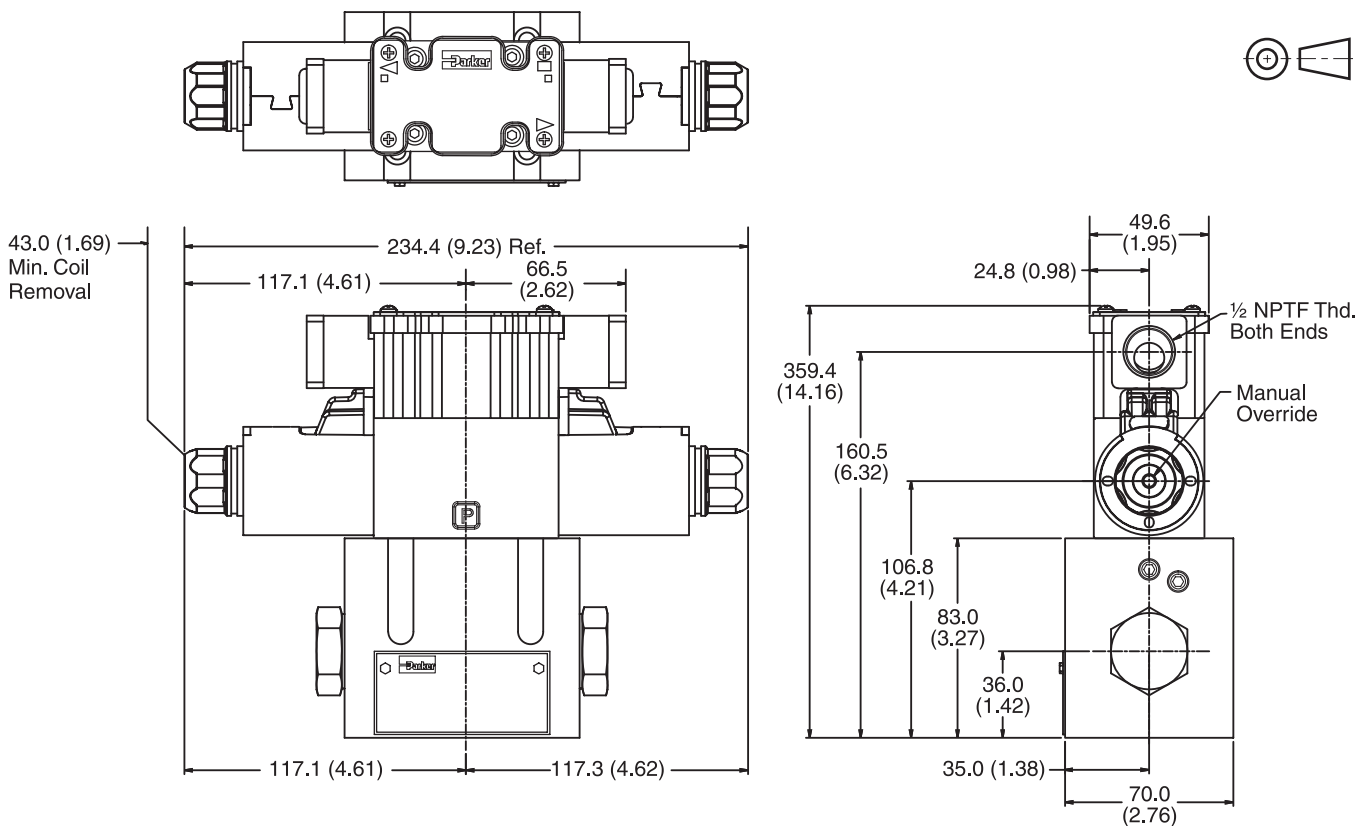
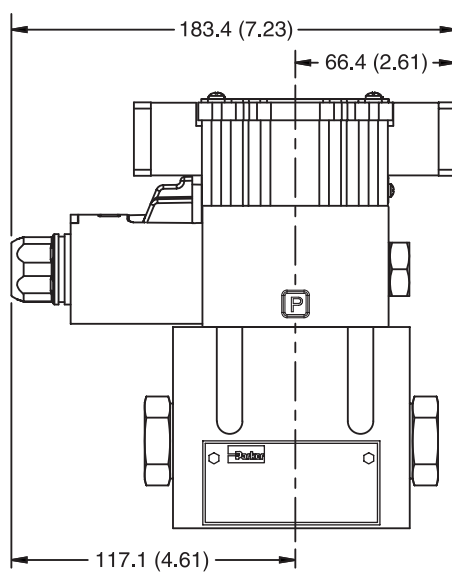
Note:
2 Black Wires
1 Green Wire



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

Explosion Proof, EX d IIC ATEX/CSA Single Solenoid**Explosion Proof, EExd ATEX, Single Solenoid**

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

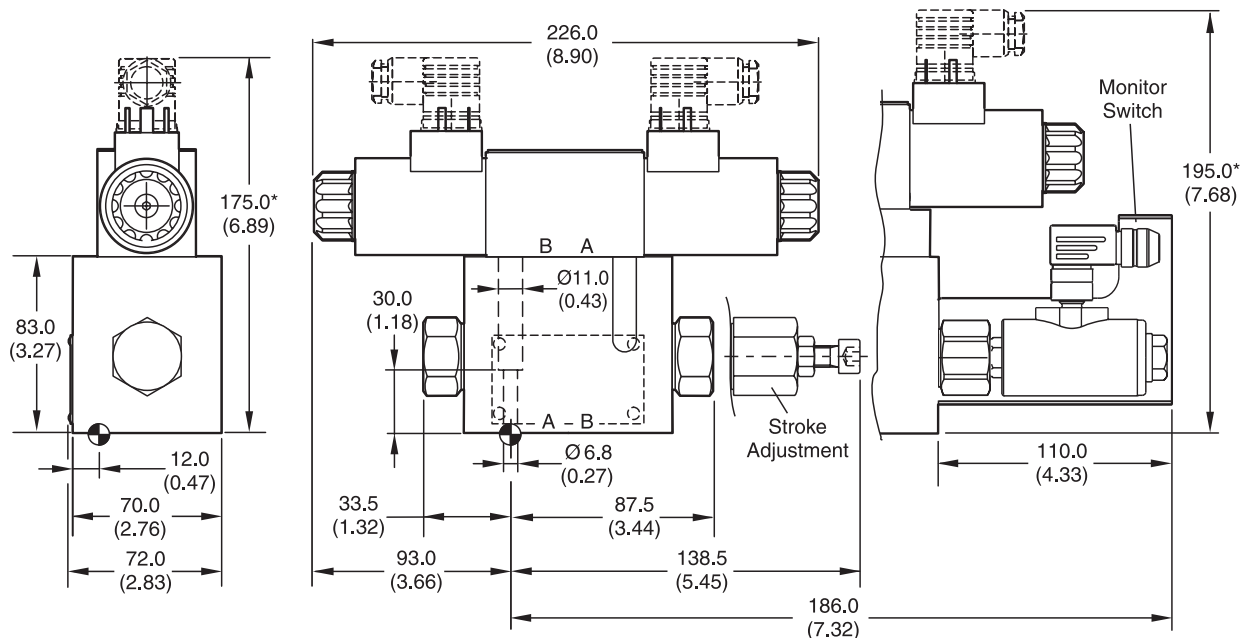
A**Plug-in Conduit Box, Double DC Solenoid****Plug-in Conduit Box, Single DC Solenoid**

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

Plug-in Conduit Box, Double DC Solenoid with Variation I3N (Monitor Switch)



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



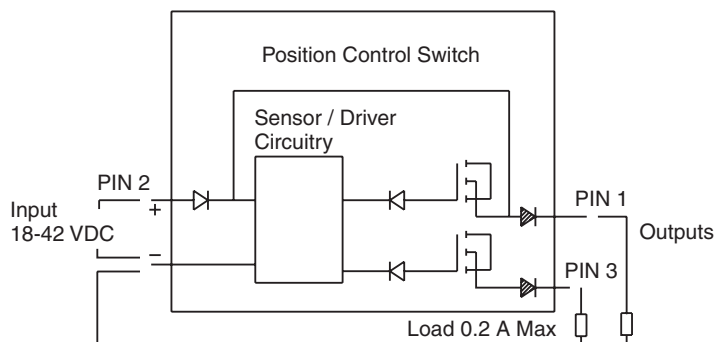
Monitor Switch

(Variation I3N and I6N)

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

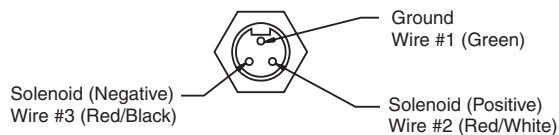
Switch Data

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

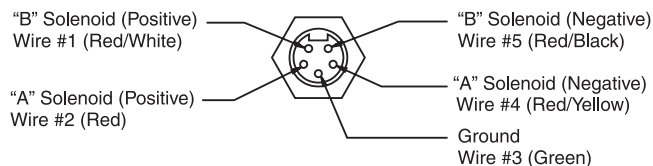


A**Manaplug (Options 6, 56, 1A & 1C)**

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

**3-Pin Manaplug (Mini) with Lights**

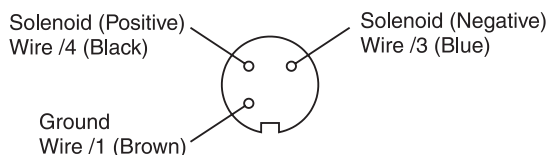
Single Solenoid Valves – Installed Opposite Side of Solenoid

**5-Pin Manaplug (Mini) with Lights**

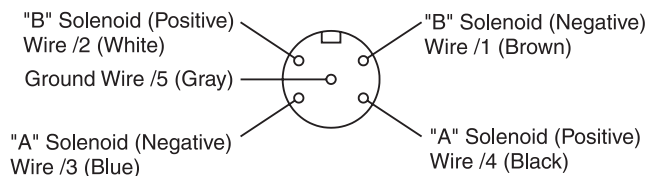
Single Solenoid Valves – Installed Opposite Side of Solenoid

Double Solenoid Valves – Installed Over "A" Solenoid

("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7A, 7B, 1B & 1D)**3-Pin Manaplug (Micro) with Lights**

Single Solenoid Valves – Installed Opposite Side of Solenoid

**5-Pin Manaplug (Micro) with Lights**

Single Solenoid Valves – Installed Opposite Side of Solenoid

Double Solenoid Valves – Installed Over "A" Solenoid

("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)**Manaplug – Electrical Mini Plug**

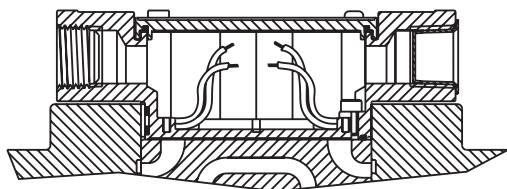
- EP336-30 3 Pin Plug
EP316-30 5 Pin Plug (Double Solenoid)
EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

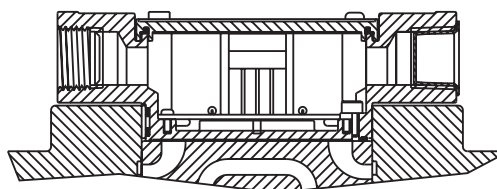
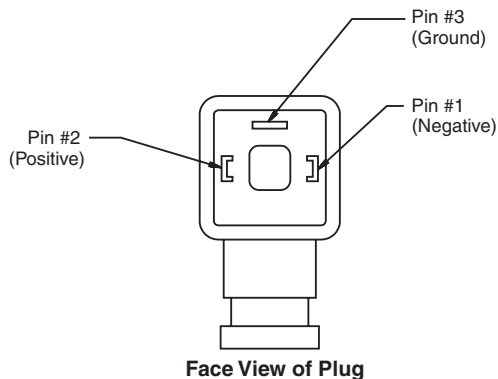
- EP337-30 3 Pin Plug
EP317-30 5 Pin Plug (Double Solenoid)
EP31B-30 5 Pin Plug (Single Solenoid)

Conduit Box Option C

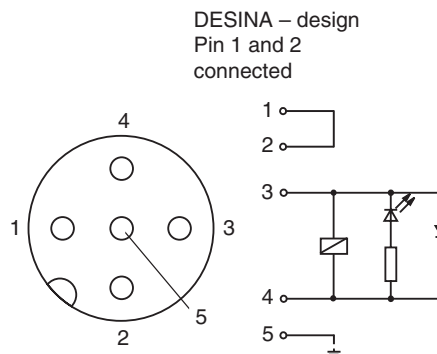
- No Wiring Options Available

**Signal Lights (Option 5) — Plug-in Only**

- LED Interface
- Meets Nema 4/IP67

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



General Description

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

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

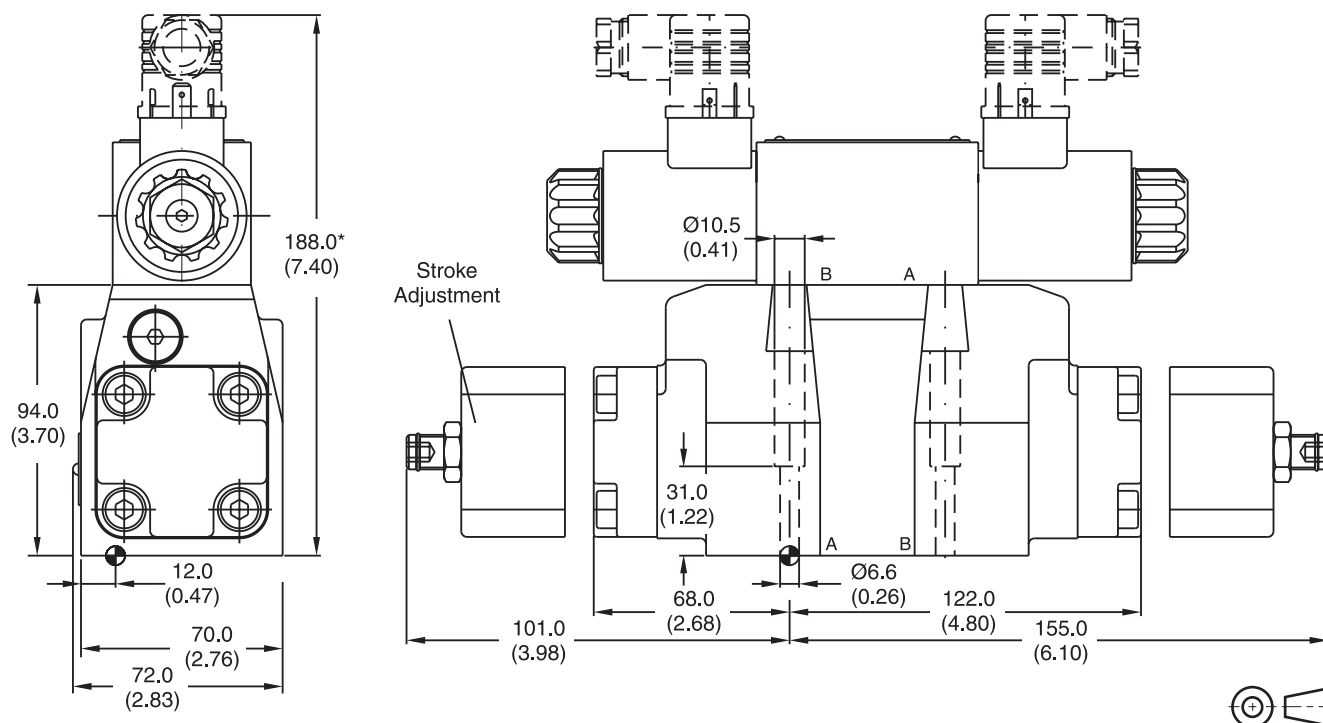
Additionally spools with a P to T connection in the de-energized position need an external pressure supply (external inlet) or an integral check valve.

Features

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

Dimensions

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



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

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

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

A01_Cat2500.indd, ddp, 04/19

A

D
 Directional Control Valve

31N
 Basic Valve

W
 Actuator Solenoid Wet Pin

Spool

Style

Pilot Supply and Drain

Seal

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

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

* Not available with 002, 009 and 030 spools.

Code	Description
N	Nitrile
V	Fluorocarbon

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 & 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". 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 & 030 spools 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.

<div><div></div><div>Solenoid Voltage</div></div>	<div><div></div><div>Solenoid Connection</div></div>	<div><div></div><div>Coil Options</div></div>	<div><div></div><div>Tube Options</div></div>	<div><div></div><div>Manual Override Options</div></div>	<div><div></div><div>Electrical Options</div></div>	<div><div></div><div>Shift Response and Indication</div></div>	<div><div></div><div>Approvals</div></div>	<div><div></div><div>Valve Variations</div></div>	<div><div></div><div>Design Series</div></div> <div>NOTE: Not required when ordering.</div>	<div><div></div><div>Monitor Switch Cover</div></div>																																																								
<div><table><tr><th>Code</th><th>Description</th></tr><tr><td>D††#</td><td>120 VDC</td></tr><tr><td>E**</td><td>24 VAC/60 Hz</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><div># High Watt only.</div><div>† DIN only. Not available with CSA.</div><div>†† DIN & Leadwire only. Not available with CSA.</div><div>* DIN & Plug-In only.</div><div>** Leadwire, Low Watt only.</div></div>	Code	Description	D††#	120 VDC	E**	24 VAC/60 Hz	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			<div><table><tr><th>Code</th><th>Description</th></tr><tr><td>Omit</td><td>Standard</td></tr><tr><td>P</td><td>Extended with Boot</td></tr><tr><td>T*</td><td>None</td></tr></table><div>* Only available with monitor switch option.</div><div>Manual Override options not available with Explosion Proof.</div><div><table><tr><th>Code</th><th>Description</th></tr><tr><td>Omit</td><td>No Options</td></tr><tr><td>Z†</td><td>Rectified Coil</td></tr></table><div>* DC only. DIN coil must include plug with lights.</div><div># 24 VDC “ET” available. Also adds dust rating. Not polarity sensitive [IIIC, D].</div><div>† DC tube standard, plug-in only. Polarity sensitive coil is stamped (+ -).</div></div></div>	Code	Description	Omit	Standard	P	Extended with Boot	T*	None	Code	Description	Omit	No Options	Z†	Rectified Coil		<div><table><tr><th>Code</th><th>Description</th></tr><tr><td>Omit</td><td>Standard Valve</td></tr><tr><td>4* †#</td><td>CSA Canada CSA22.2 No. 139-10</td></tr></table><div>* Not available with AC high pressure tube.</div><div>† E, J, K, Y, U, T: Voltages only. C, G, W: Solenoid connections. E & T voltages only available with C Solenoid Connection, Low Watt only. Conforms to UL429.</div><div># Valve is derated.</div></div>	Code	Description	Omit	Standard Valve	4* †#	CSA Canada CSA22.2 No. 139-10	<div><table><tr><th>Code</th><th>Description</th></tr><tr><td>Omit</td><td>No Variation</td></tr><tr><td>4B</td><td>Monitor Switch Cover</td></tr></table></div>	Code	Description	Omit	No Variation	4B	Monitor Switch Cover														
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Non-Bold: Designates Tier II products and options. These products will have longer lead times.



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Valve Variations

Code	Description
5*	Signal Lights – Standard Signal Lights – Hirsch. (DIN with Plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with Lights
56**	Manaplug (Mini) with Lights
1C**	Manaplug (Mini) Single Sol. 5-pin, with Lights
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1M**	Manaplug Opposite Normal
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	Pilot Choke Meter Out
3B	Pilot Choke Meter In
3C	Pilot Pressure Reducer
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	Pilot Choke Meter Out with Lights
3H*	Pilot Choke Meter In with Lights
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights, Mini Manaplug, Pilot Choke Meter Out
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights
XB990†	CE Marking

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

** Must have plug-in style conduit box.

† Above 50 VAC or 75 VDC must have "4" CSA approved coils.

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Solenoid Ratings

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

Explosion Proof Solenoid Ratings*

U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D; Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (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 $\pm 10\%$.

Note that Explosion Proof AC coils are single frequency only.

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3 mm	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
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	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.20 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.20 ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
Z	Omit	250 VDC	N/A	N/A	0.13 Amps	30 W	1889.64 ohms
Explosion Proof Solenoids							
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
"ET" Explosion Proof Solenoids							
K		12 VDC	N/A	N/A	1.00 Amps	12 W	12.00 ohms
J		24 VDC	N/A	N/A	1.00 Amps	13 W	44.30 ohms
Y		120/60 AC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

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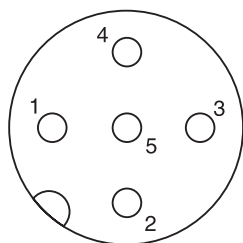
General			
Design		Directional Spool Valve	
Actuation		Solenoid	
Size		NG10	
Mounting Interface		DIN 24340 A10 / ISO 4401 / NFPA D05 / CETOP RP 121-H	
Mounting Position		Unrestricted, preferably horizontal	
Ambient Temperature		[°C]	-25...+50; (-13°F...+122°F) (without inductive position control)
		[°C]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

Position Control M12x1

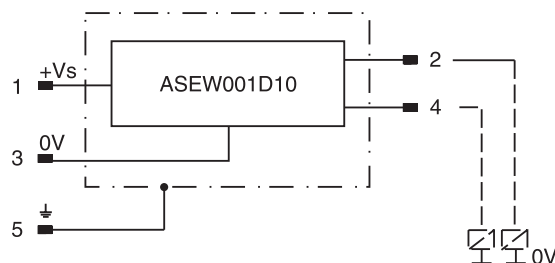
Protection Class	IP 65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature [°C]	0...+50; (+32°F...122°F)
Supply Voltage / Ripple [V]	18...42 ±10%
Current Consumption without Load [mA]	≤ 30
Max. Output Current per Channel, Ohmic [mA]	400
Min. Output Load per Channel, Ohmic [kOhm]	100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

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M12 Pin Assignment



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



Definitions

Start position monitored:

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

End position monitored:

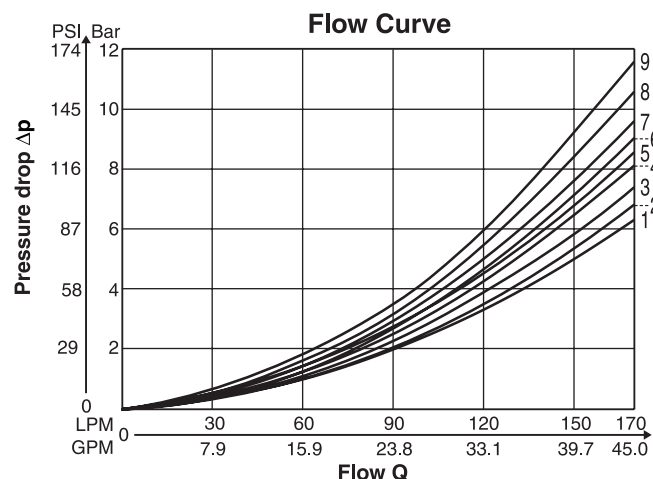
The inductive switch gives a signal before the end position is reached. (above 85% spool stroke).

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

Performance Curves

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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.

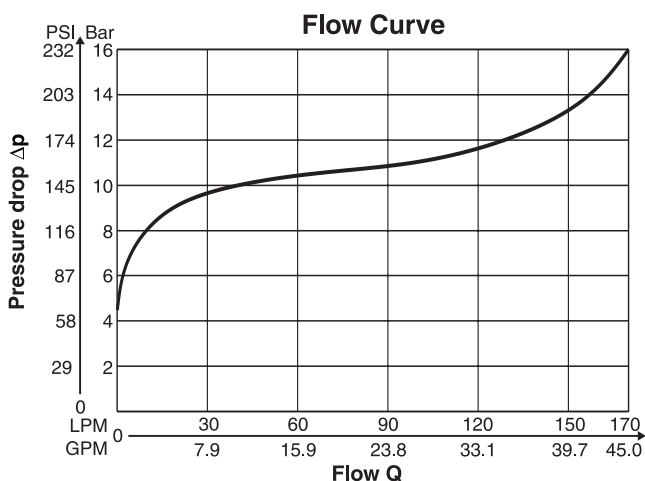


Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
001	3	3	—	2	5
002	3	3	7	4	3
003	2	3	—	4	4
004	2	3	—	4	4
005	2	4	—	1	4
006	8	9	—	7	9
009	8	9	—	7	9
011	3	3	—	2	4
015	2	2	—	1	4
016	4	3	—	2	4
020	6	4	—	3	6
021	—	7	—	8	—
022	4	—	—	9	—
030	5	3	—	2	5

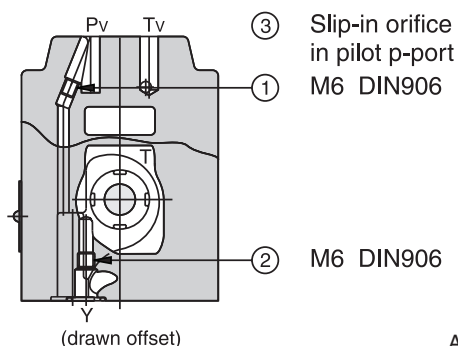
All characteristic curves measured with HLP46 at 50°C (122°F).

Integral Check Valve in the P port

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

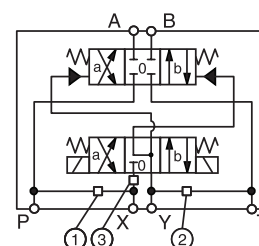


Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

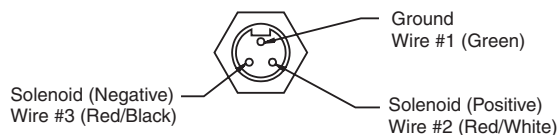
Pilot Oil Inlet	Outlet	1	2	3
internal	external	○	●	Orifice Ø1.0
external	external	●	●	Orifice Ø1.0
internal	internal	○	○	Orifice Ø1.0
external	internal	●	○	Orifice Ø1.0



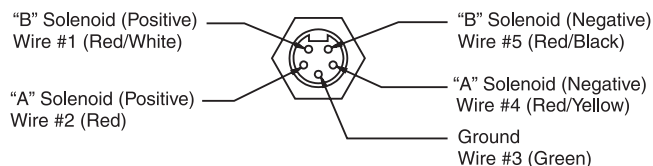
All orifice sizes for standard valves

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

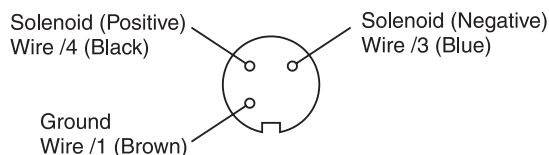
- Interface – Brad Harrison Plug
- 3-Pin for Single Solenoid
 - 5-Pin for Double Solenoid

**3-Pin Manaplug (Mini) with Lights**

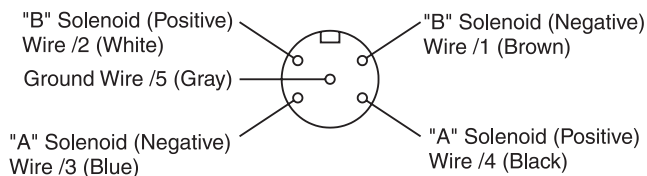
Single Solenoid Valves – Installed Opposite Side of Solenoid

**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**

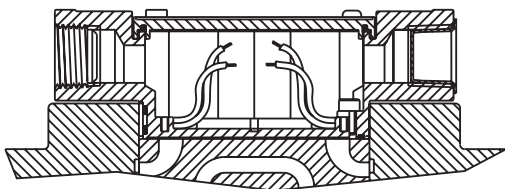
- EP336-30** 3 Pin Plug
EP316-30 5 Pin Plug (Double Solenoid)
EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

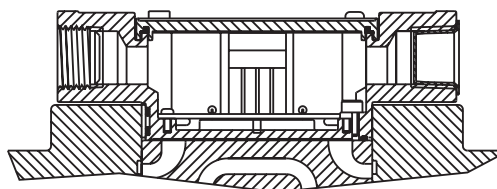
- EP337-30** 3 Pin Plug
EP317-30 5 Pin Plug (Double Solenoid)
EP31B-30 5 Pin Plug (Single Solenoid)

Conduit Box Option C

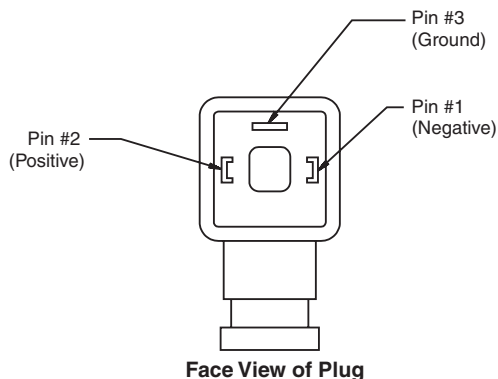
- No Wiring Options Available

**Signal Lights (Option 5) — Plug-in Only**

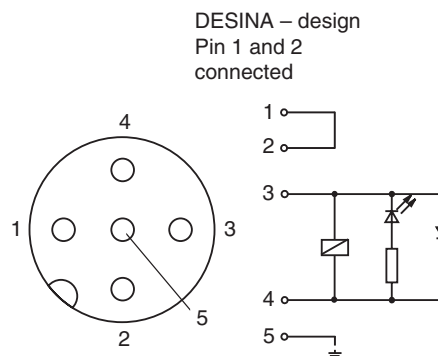
- LED Interface
- Meets Nema 4/IP67

**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



General Description

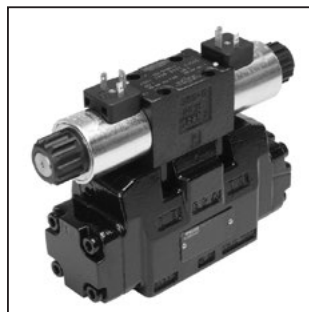
A

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.

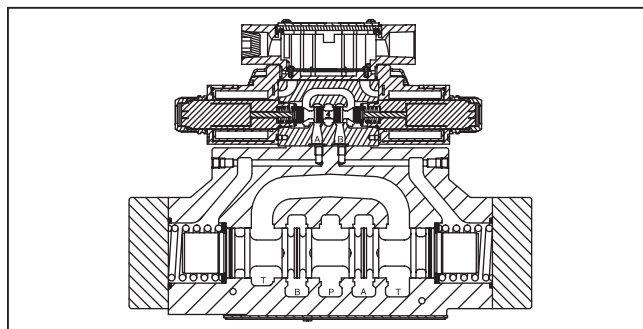
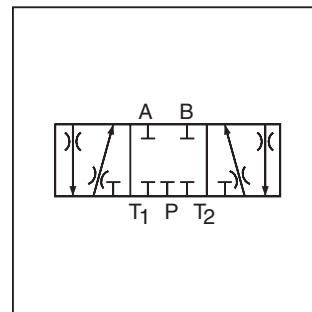
Features

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

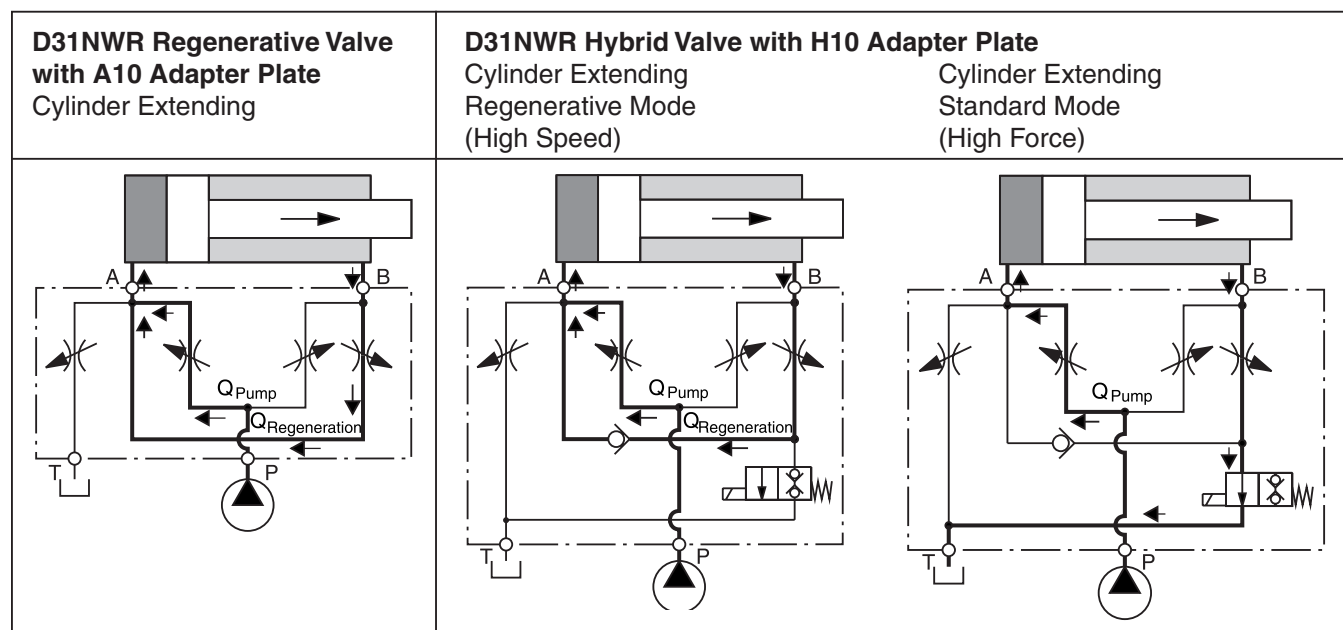
Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



D31NWR shown



D31NWR 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.
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Ordering Information

D
Directional Control Valve

31N
Basic Valve

W
Actuator Solenoid Wet Pin

R
Regenerative Spool

C
Style

01
NFPA D05HE
CETOP 5H
DIN NG10
D03 Pilot, High flow

Code	Symbol
01	
04	
81	
82	

For D31NWR regenerative and hybrid function, you must have adapter plates (A10-1664/A10-1665L)

Pilot Supply and Drain

Seal

Solenoid Voltage 24VDC

J
Connector as per EN 175301-803, without connector (please order plug separately)

W
Manual Override Options

Valve Variations

Design Series
NOTE: Not required when ordering.

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
Omit	Standard
T	No override

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

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' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
1T	Pilot Choke Meter In & Pilot Pressure Reducer

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

Weight:
8.1 kg (17.9 lbs.)

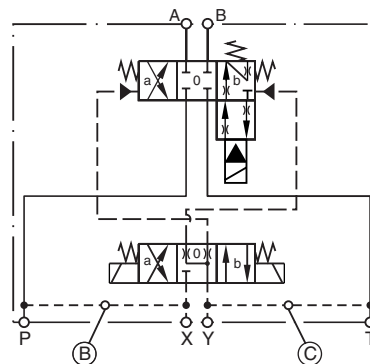
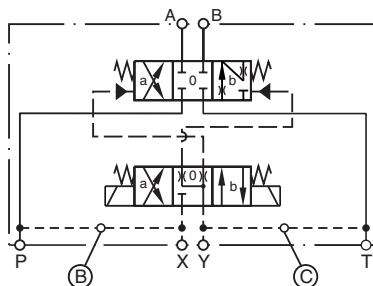
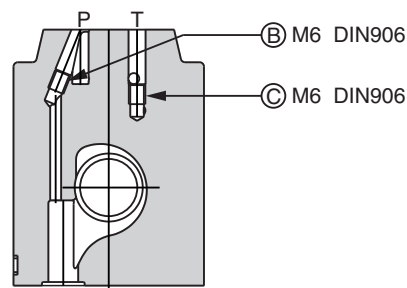
Bold: Designates Tier I products and options.

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	●	○



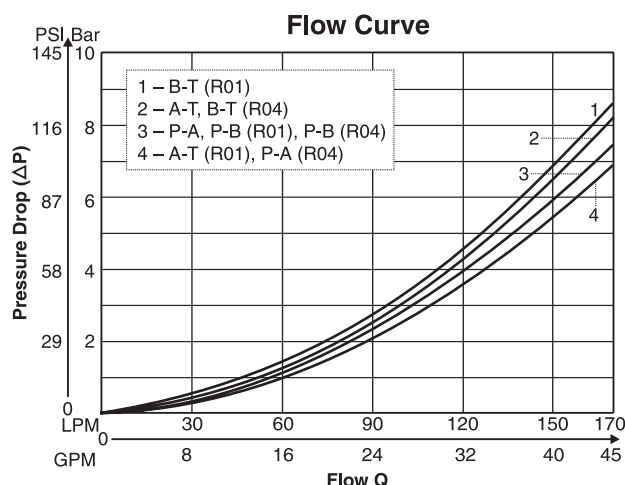
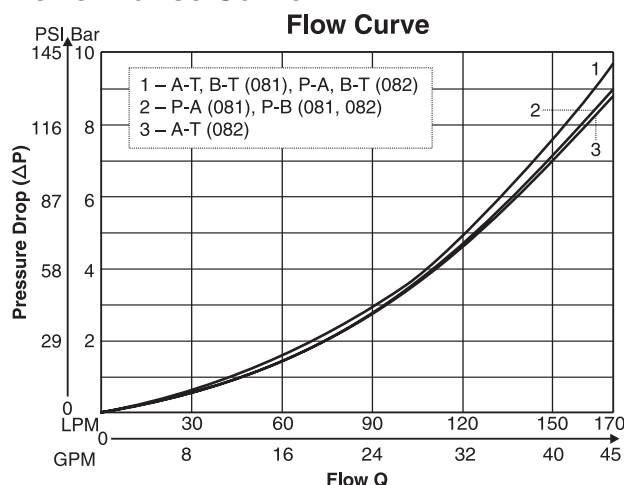
Specifications

A

General			
Design		Directional Spool Valve	
Actuation		Solenoid	
Size		NG10	
Mounting Interface		DIN 24340 A10 / ISO 4401 / NFPA D05 / CETOP RP 121-H	
Mounting Position		Unrestricted, preferably horizontal	
Ambient Temperature		[°C]	-25...+50; (-13°F...+122°F)
MTTF _D Value		[years]	75
Hydraulic			
Maximum Operating Pressure		Pilot drain internal: P, A, B, X 315 Bar (4568 PSI); T, Y 140 Bar (2030 PSI) Pilot drain external: P, A, B, T, X 315 Bar (4568 PSI); Y 140 Bar (2030 PSI)	
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature		[°C]	-25 ... +70 (-13°F...+158°F)
Viscosity Permitted		[cSt]/[mm²/s]	2.8...400 (13...1854 SSU)
Recommended		[cSt]/[mm²/s]	30...80 (139...371 SSU)
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)	
Flow Maximum		170 LPM (45 GPM)	
Leakage at 350 Bar (5075 PSI) (per flow path)		[ml/min]	72...422 (0.2...0.11 GPM) (depending on spool)
Minimum Pilot Supply Pressure		7 Bar (102 PSI)	
Static / Dynamic			
Step Response at 95%		Energized	De-energized
DC Solenoids			
Pilot Pressure			
50 & 100 Bar (725 & 1450 PSI)		50	60
250 & 350 Bar (3625 & 5075 PSI)		50	50
		[ms]	[ms]
Electrical			
Duty Ratio		100% ED; CAUTION: coil temperature up to 150°C (302°F) possible	
Protection Class		IP 65 in accordance with EN 60529 (plugged and mounted)	
Supply Voltage / Ripple		[V]	24
Tolerance Supply Voltage		[%]	±10
Current Consumption	Hold	[A]	1.29
Current Consumption	In Rush	[A]	1.29
Power Consumption	Hold	[W]	31
Power Consumption	In Rush	[W]	31
Solenoid Connection		Connector as per EN 175301-803, solenoid identification as per ISO 9461	
Wiring Minimum		[mm²]	3 x 1.5 recommended
Wiring Length Minimum		[m]	50 (164 ft.) recommended

With electrical connections the protective conductor (PE ⊥) must be connected according to the relevant regulations.

Performance Curve

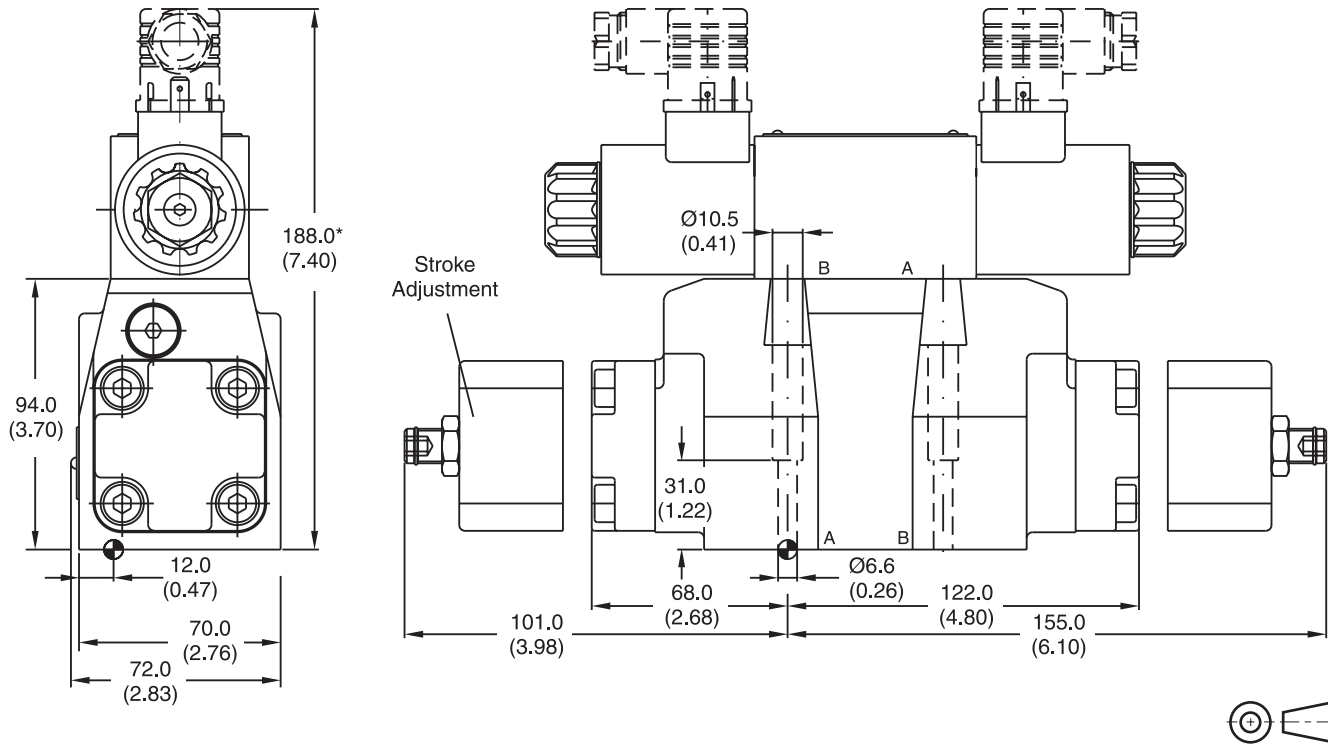


A01_Cat2500.indd, ddp, 04/19

Regenerative and Hybrid Functon with Additional Plate
H10-1666L / H10-1662 / A10-1664 / A10-1666L

A

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).

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

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

A

General Description

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

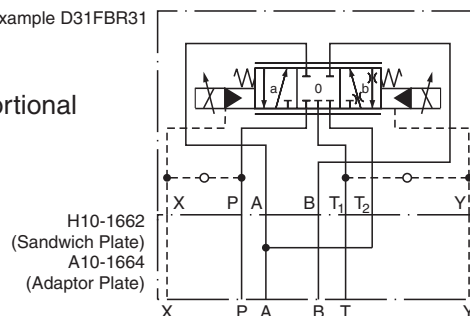
Features

- The valve comes without tank bridge and is shown in Series D31NWR section.
- 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

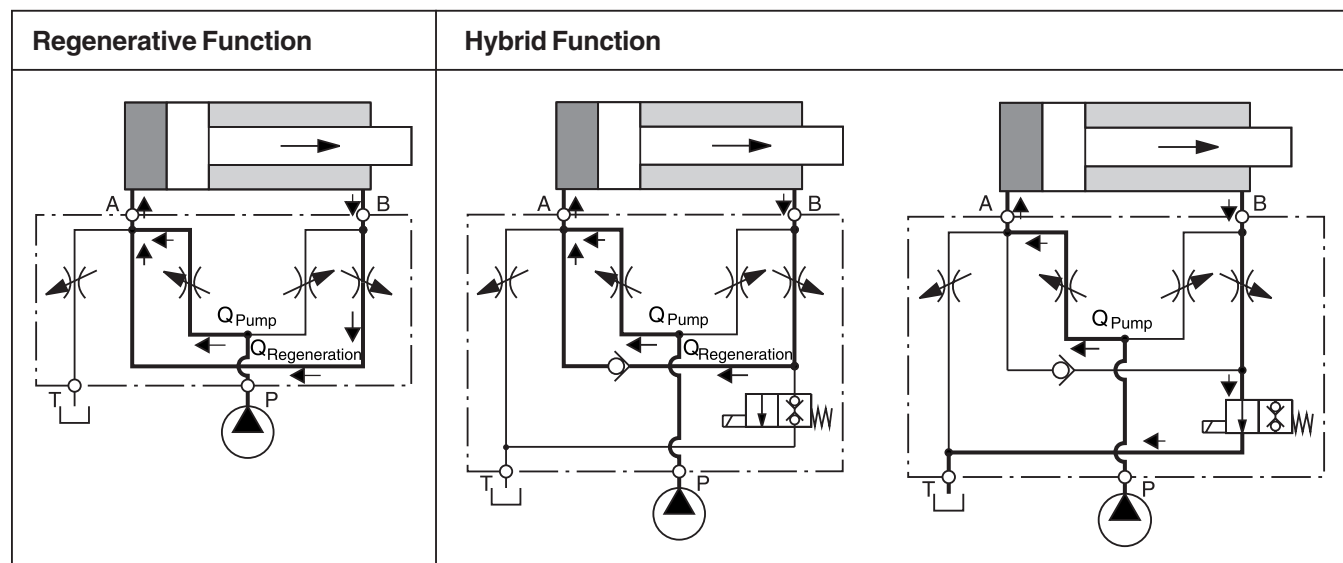
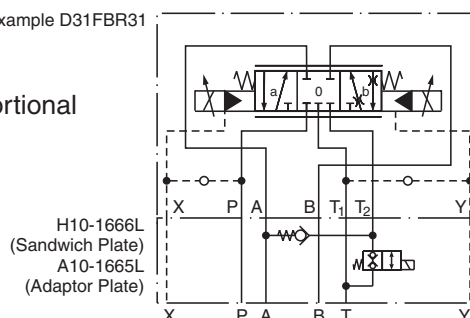
Note:
Proportional



Hybrid Function

Example D31FBR31

Note:
Proportional



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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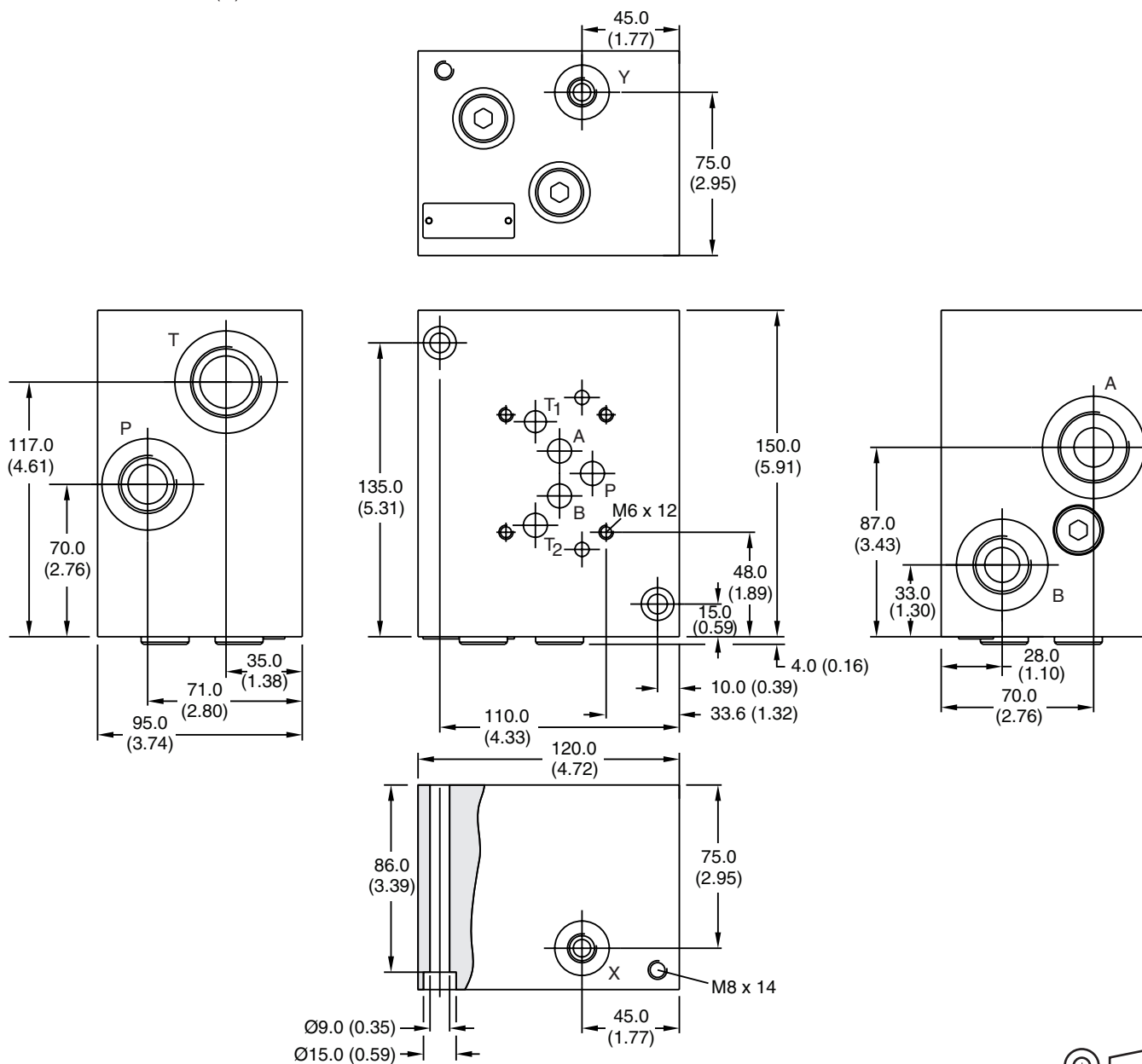
General				
Actuation		Solenoid – A10-1665L and H10-1666L		
Size		DIN NG10 / CETOP 5H		
Mounting interface		DIN 24340 A10 / ISO 4401 / CETOP RP 121-H / NFPA D05		
Mounting Position		Unrestricted		
Ambient Temperature		[°C]	-25...+50 (-13°F...+122°F)	
MTTF _D Value		[years]	150	
		A10-1664	A10-1665L	H10-1662
Weight		11.9 kg (26.5 lbs.)	14.4 kg (31.8 lbs.)	2.8 kg (6.2 lbs.)
				4.9 kg (10.8 lbs.)
Hydraulic				
Maximum Operating pressure		[Bar]	350 (5045 GPM)	
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525		
Fluid temperature		[°C]	-25...+70 (-13°F...+158°F)	
Viscosity	Permitted	[cSt] / [mm²/s]	2.8...400 (13...1854 SSU)	
	Recommended	[cSt] / [mm²/s]	30...80 (139...371 SSU)	
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)		
Maximum Flow		A10: 150 LPM (39.7 GPM); H10: 250 (66.1 GPM)		
Regeneration B-A		95 LPM (25.1 GPM)		
Regeneration B-T		A10: 75 LPM (19.8 GPM)		
Electrical				
Duty Ratio		100%		
Protection Class		IP 65 in accordance with EN 60529 (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]	3 x 1.5 recommended	
Wiring Length Maximum		[m]	50 (164 ft.) recommended	

With electrical connections the protective conductor (PE ↓) must be connected according to the relevant regulations.

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

A

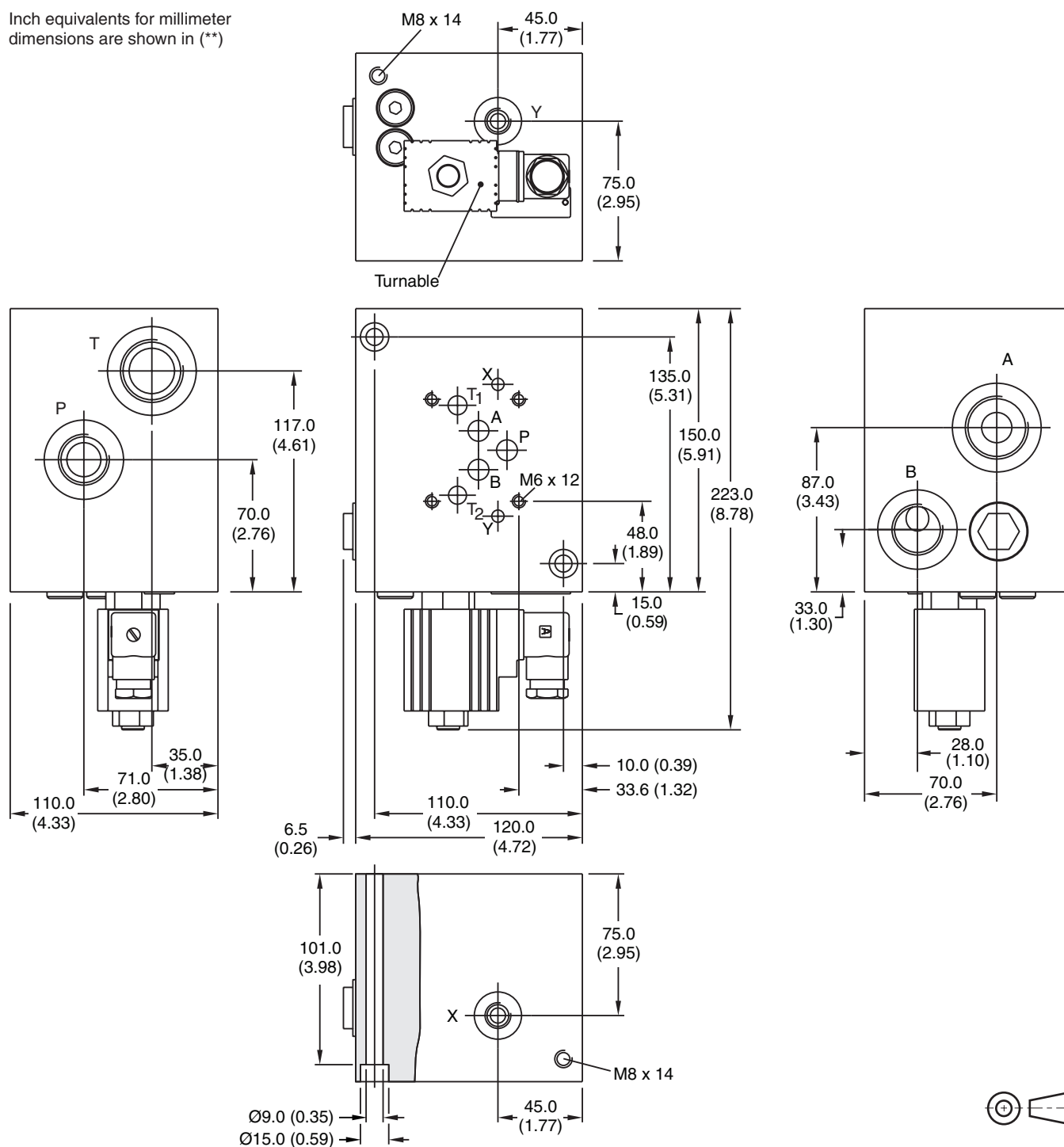
Inch equivalents for millimeter dimensions are shown in (**)


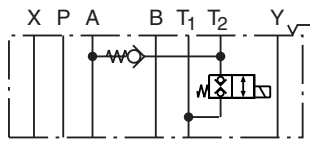


Symbol	Ordering Code	Port
	A10-1664	A, T = G1 B, P = G3/4 X, Y = G1/4

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

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



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

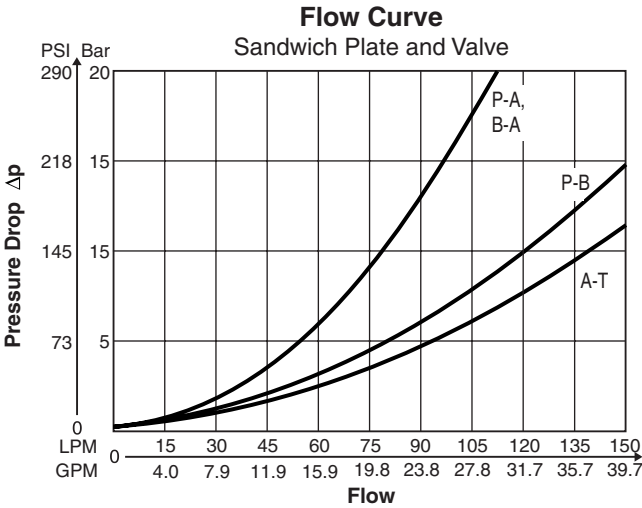
A01_Cat2500.indd, ddp, 04/19

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

A

Performance Curves

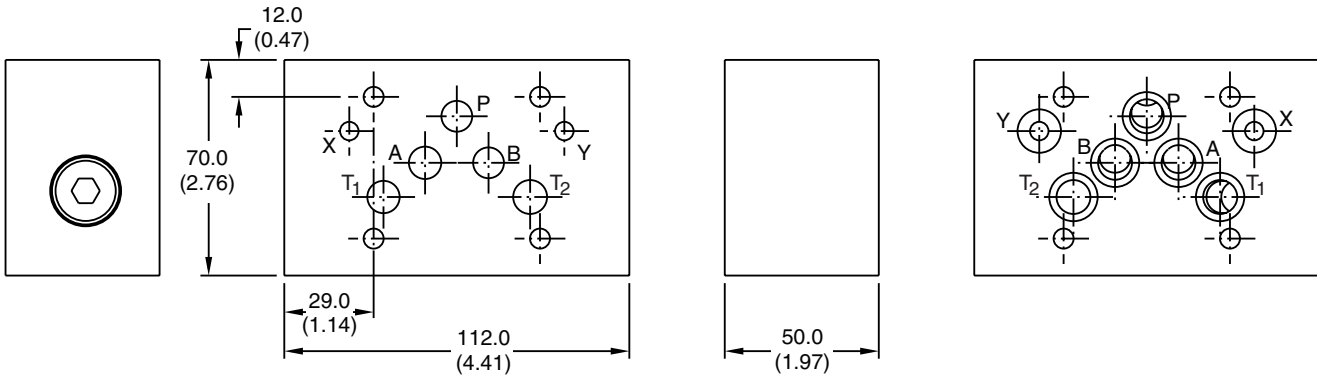
D31FP/FE/FB*





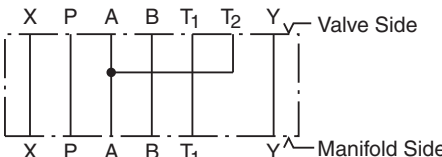


Measured with Spool Z31 at command signal 100%.

Dimensions

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

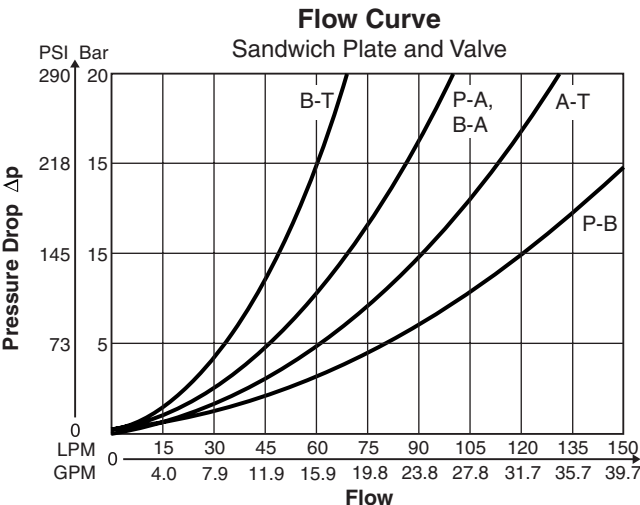


Symbol	Ordering Code	 Kit	 	 Seal Kit
	H10-1662 (O-rings included in delivery)	BK412	4x M6x90 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.) ±15%
				Nitrile: SK-H10-1662

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

Performance Curves

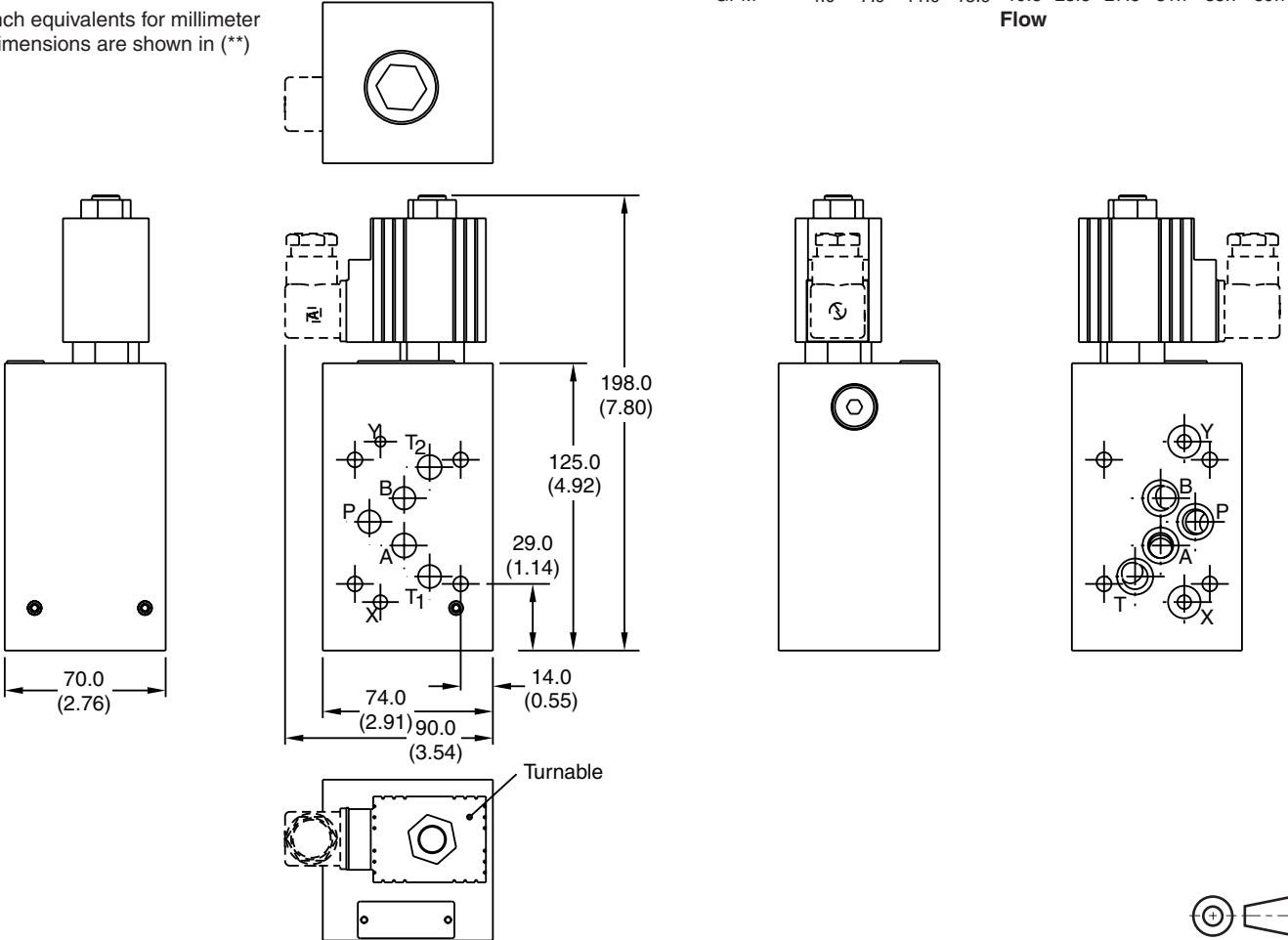
D31FP/FE/FB*



Measured with Spool Z31
at command signal 100%.

Dimensions

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



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

General Description

A

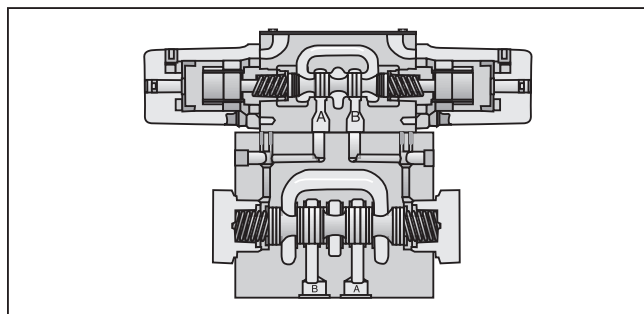
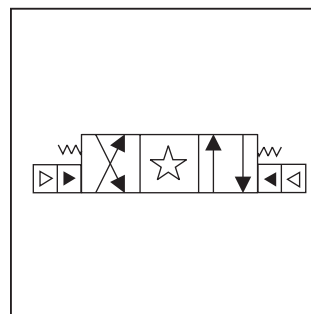
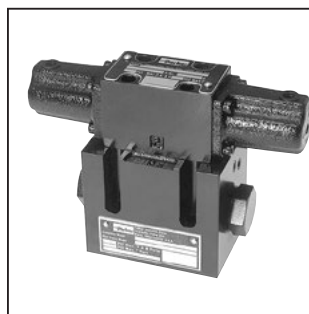
Series D31*A directional control valves are 5-chamber, air pilot operated valves. The valves are suitable for manifold or subplate mounting.

Features

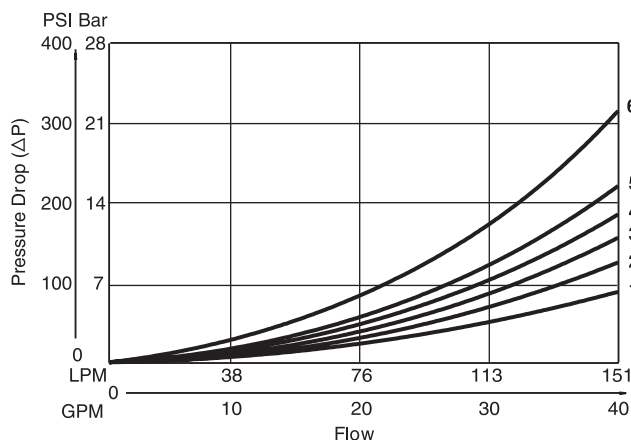
- **World design** – Available worldwide.
- **Mounting bolts below center line of spool** – Minimizes spool binding.
- **Five chamber style** – Eliminates pressure spikes in tubes, increasing valve life.
- **High pressure and flow ratings** – Increased performance options in a compact valve.

Specifications

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



Pressure Drop Chart



VISCOSITY CORRECTION FACTOR

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

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

D31VA Pressure Drop Reference Chart – Curve Number

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

D31VA Pressure Drop vs. Flow

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

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

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

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.

A01_Cat2500.indd, ddp, 04/19

Ordering Information

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

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

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

Standard Bolt Kit:
BK98

Metric Bolt Kit:
BKM98

Code	Description
N	Nitrile
V	Fluorocarbon

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

Not available with 002, 008 & 009 spools.

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

† Only spools 020 and 030.

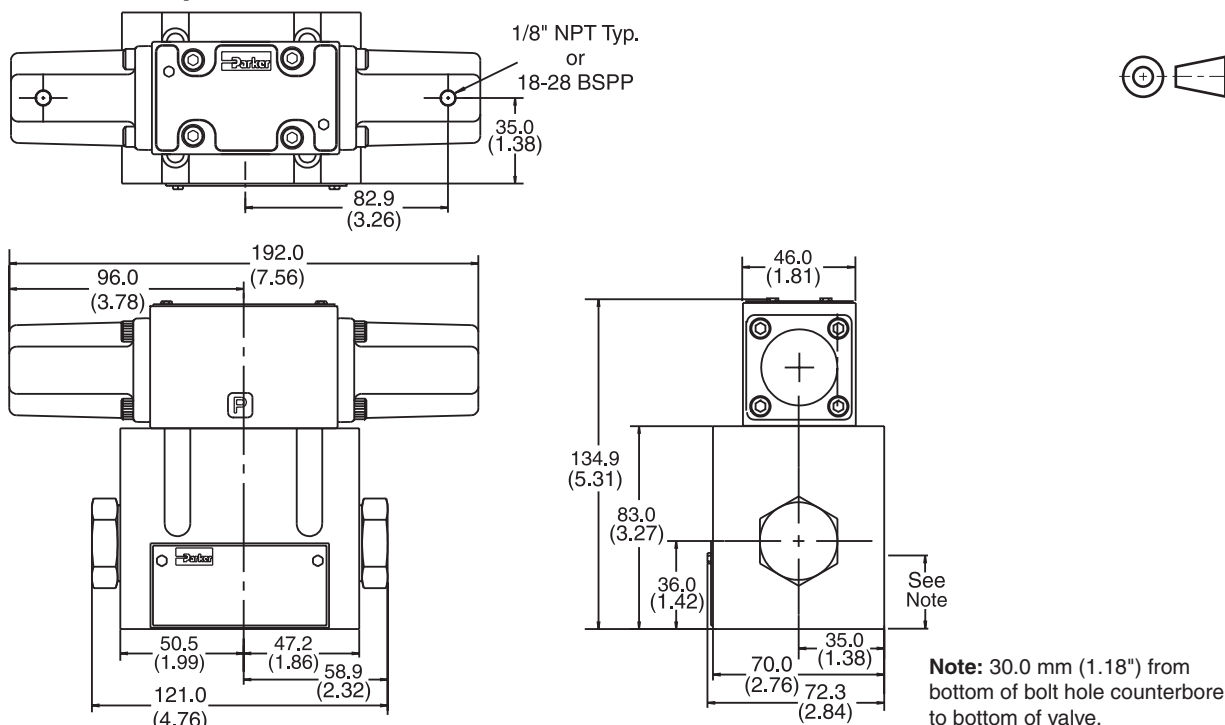
This condition varies with spool code.

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 (**)



General Description

A

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

Features

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

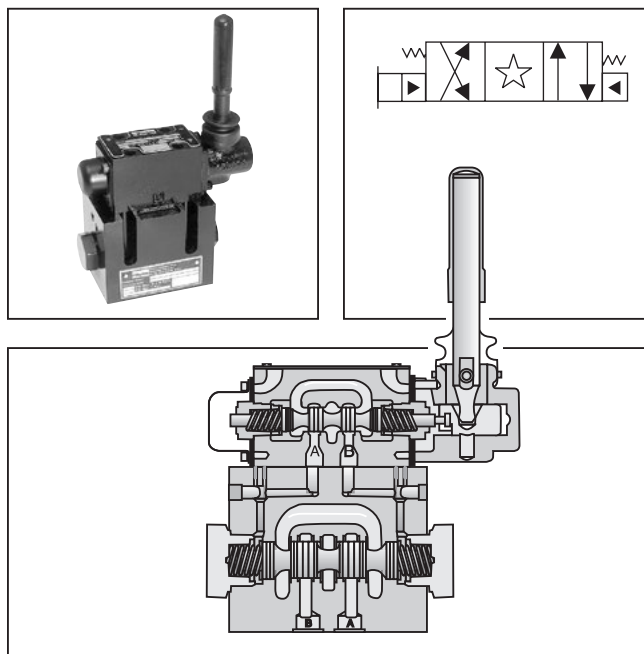
Specifications

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

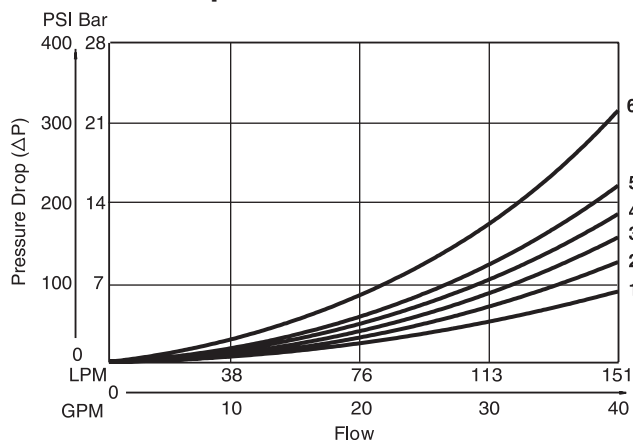
D31VL Pressure Drop Reference Chart – Curve Number												
Spool No.	Shifted				Center Condition							
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)	
001	3	3	2	1	—	—	—	—	—	—	—	
002	3	3	1	1	3	3	3	4	4	1	1	
004	3	3	1	1	—	—	—	—	—	1	1	
009	3	3	1	1	6	—	—	—	—	—	—	
020	5	4	2	2	—	—	—	—	—	—	—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

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.

A01_Cat2500.indd, ddp, 04/19



Pressure Drop Chart



VISCOSITY CORRECTION FACTOR

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

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

D31VL Pressure Drop vs. Flow

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

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

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

Ordering Information

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

NOTE: Not required when ordering.

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

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

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

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

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

Not available with 002, 008 & 009 spools.

Code	Description
N	Nitrile
V	Fluorocarbon

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

† Only spools 020 and 030.
 This condition varies with spool code.

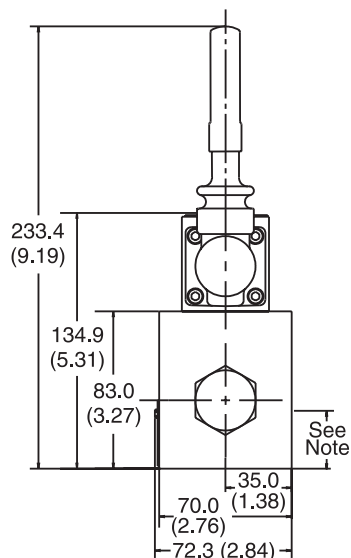
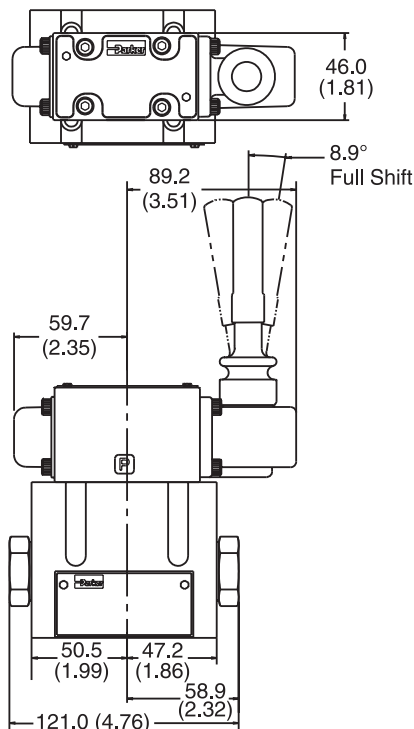
Valve Weight: 5.4 kg (12.0 lbs.)
Standard Bolt Kit: BK98
Metric Bolt Kit: BKM98

Bold: Designates Tier I products and options.

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

Dimensions – Lever Operated

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



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

General Description

A

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

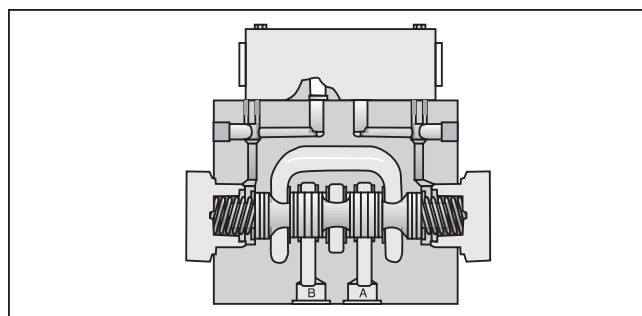
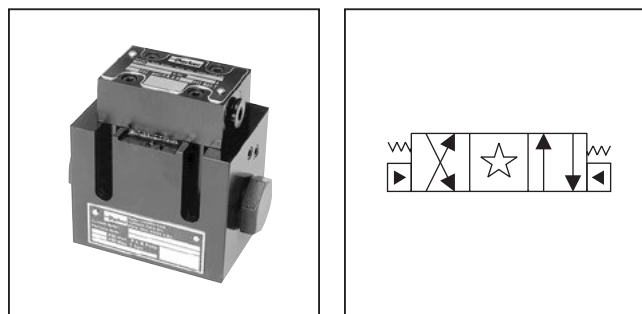
Features

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

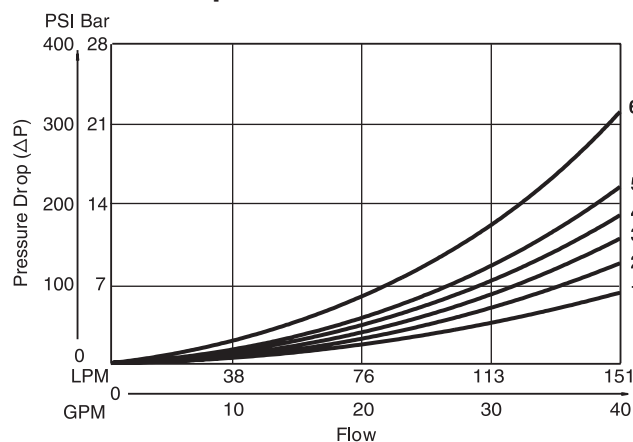
Specifications

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

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



Pressure Drop Chart



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

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

D3P Pressure Drop vs. Flow

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

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

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

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.
A01_Cat2500.indd, ddp, 04/19

Ordering Information

Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
D	Directional Control Valve		Basic Valve	P	Hydraulic Pilot		Spool		Style
3D	NFPA D05HE, CETOP 5H	1			Pilot Supply and Drain	N	Nitrile		Pilot Supply and Drain
3	NFPA D05H, CETOP 5	2			Seal	V	Fluorocarbon		Seal
		4			Valve Variations				Valve Variations
		8**			Design Series				Design Series
		9*			NOTE:				NOTE:
		20**			Not required when ordering.				Not required when ordering.
		30*							

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

Code	Description	Code	Description
2	Ext. pilot/Ext. drain	7	Pilot Choke – Meter Out
5#	Ext. pilot/Int. drain	8	Stroke Adj. 'B' End
	# Available on "B" style only.	9	Stroke Adj. 'A' End
		60	Pilot Choke – Meter In
		89	Stroke Adj. 'A' & 'B' Ends

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

† Only spools 20 and 30.

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

Valve Weight:

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

Standard Bolt Kit: BK98

Metric Bolt Kit: BKM98

Seal Kit:

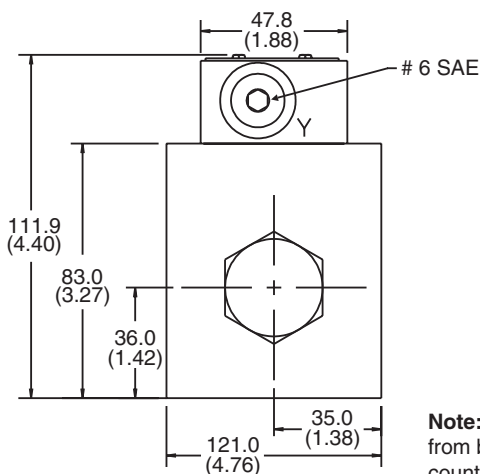
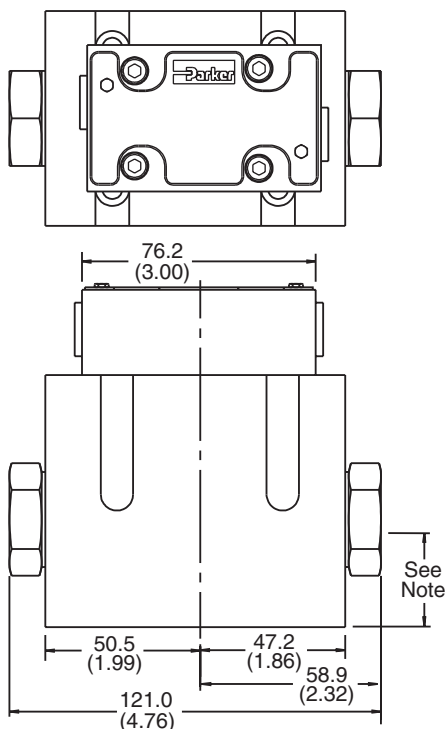
Nitrile SKD3P
 Fluorocarbon SKD3PV

Bold: Designates Tier I products and options.

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

Dimensions – Oil Operated

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



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

A

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

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

Mounting Position

Detent – Horizontal

Spring Offset – Unrestricted

Spring Centered – Unrestricted

Fluid Recommendations

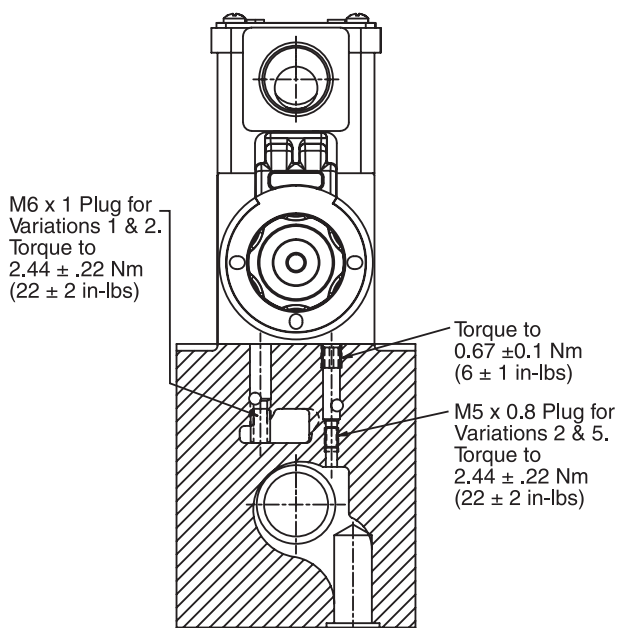
Premium quality hydraulic oil with a viscosity range between 32-54 cst. (150-250 SSU) At 38°C (100°F) is recommended. The absolute operating viscosity range is from 16-220 cst. (80-1000 SSU). Oil should have maximum anti-wear properties and rust and oxidation treatment.

Fluids and Seals

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

Filtration

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



Silting

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

Special Installations

Consult your Parker representative for any application requiring the following:

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

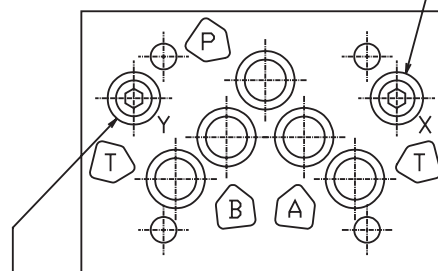
Mounting Patterns

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

Torque Specifications

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

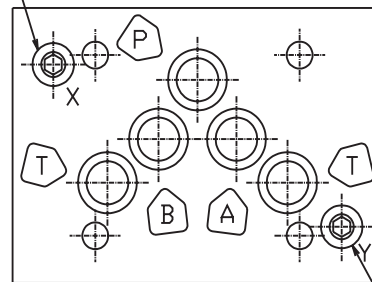
1/16 Pipe Plug for Variations 1 & 4
Torque to: 11.67 ± 1.67 Nm (105 ± 15 in-lbs)



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

**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	—	Centered
H	Spring Offset	P→B and A→T	P→A and B→T	—
K	Spring Centered	Centered	P→A and B→T	—
M†	Spring Offset, Shift to Center	P→B and A→T	Centered	—

† D31*W only.
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A

SERIES D3P, D3DP PILOT OPERATED DIRECTIONAL CONTROL VALVES

Tank and Drain Line Surges

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

Loss of Pilot Pressure

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

Mounting Pattern

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

Pilot Drain Characteristics

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

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

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

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

D3P Flow Path/Pilot Pressure

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

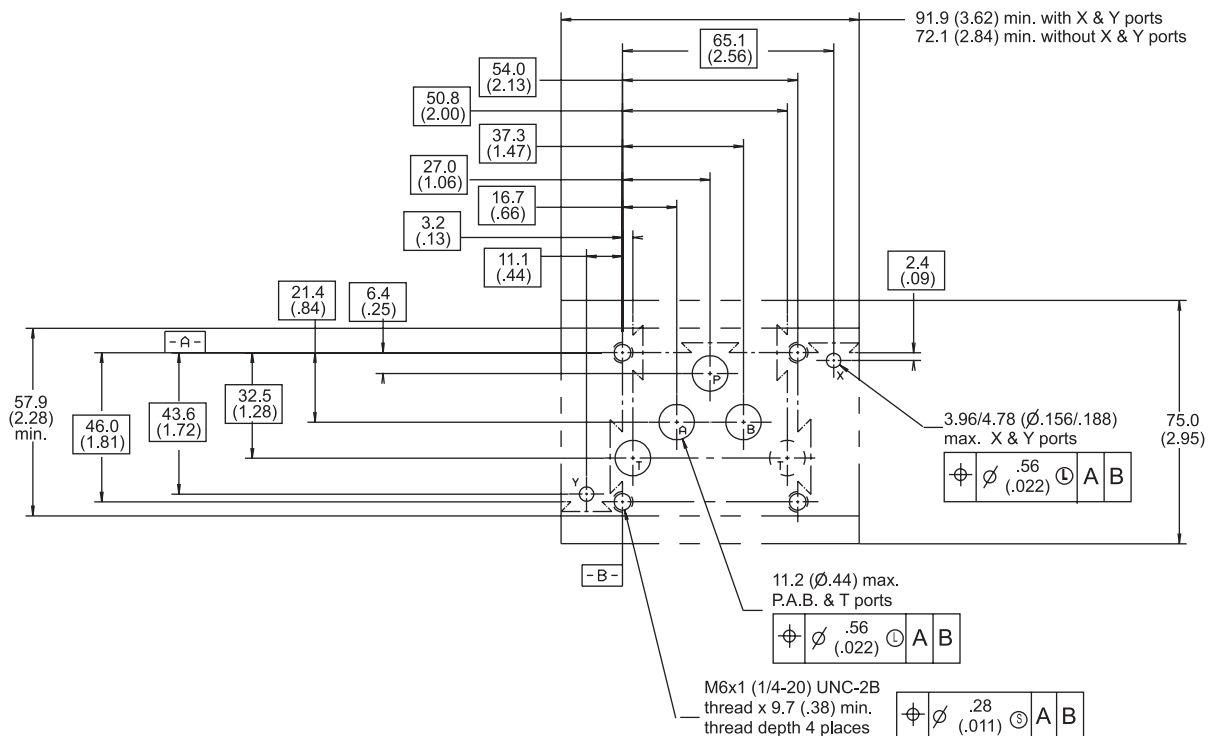
A

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.***

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

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



A

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

Recommended Mounting Surface

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

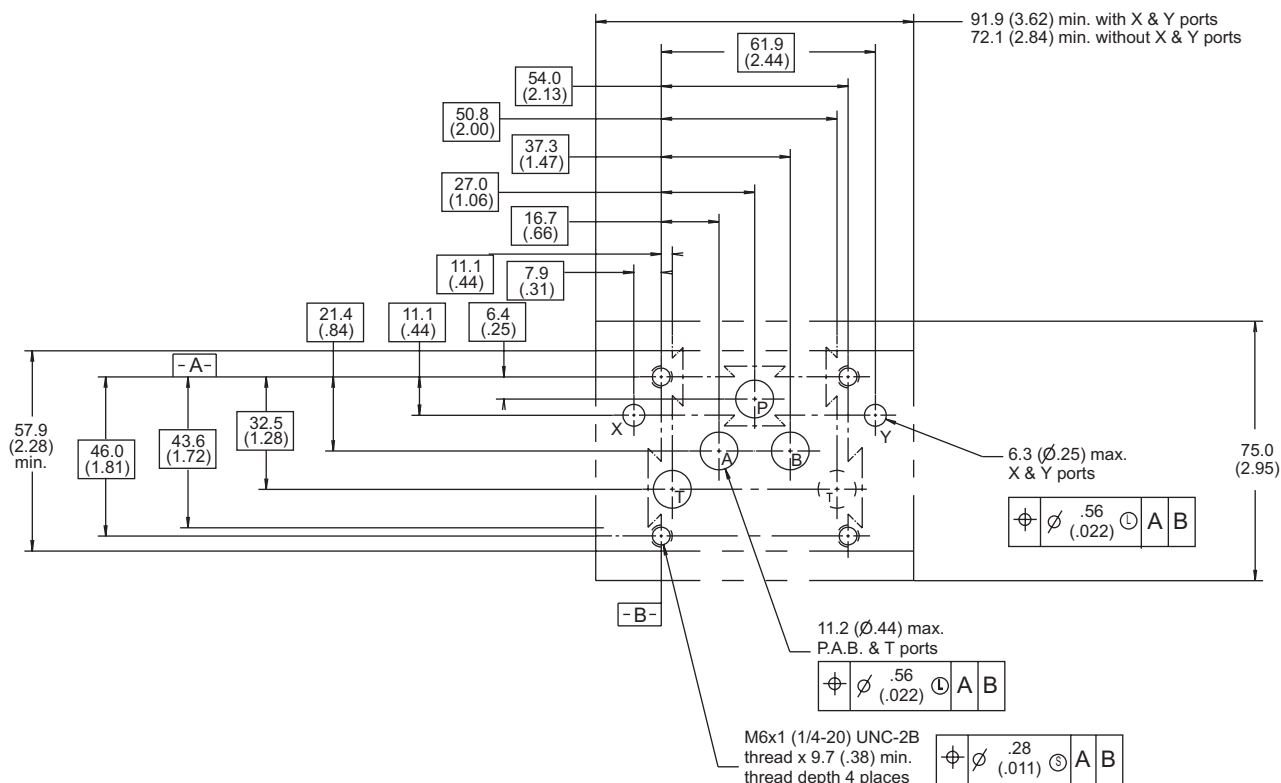
Mounting Position

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

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

Mounting Pattern — NFPA D05HE, CETOP 5H

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



A

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin, light gray lines. There are 20 columns and 20 rows of squares, creating a total of 400 square units. The background is white, and the lines are evenly spaced across the entire area.

A**Application**

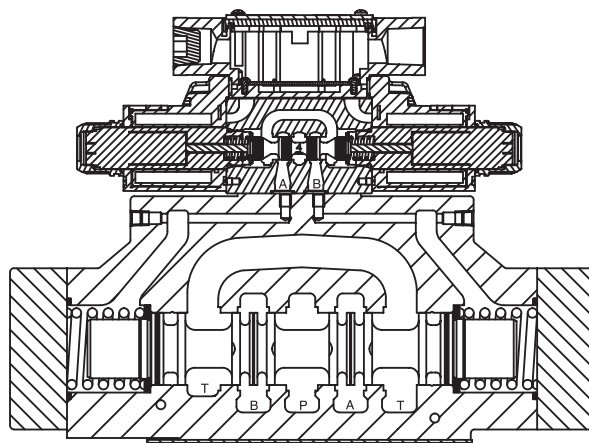
Series D41 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3 position styles and are manifold mounted. These valves conform to NFPA's D07, CETOP 7 mounting patterns.

Operation

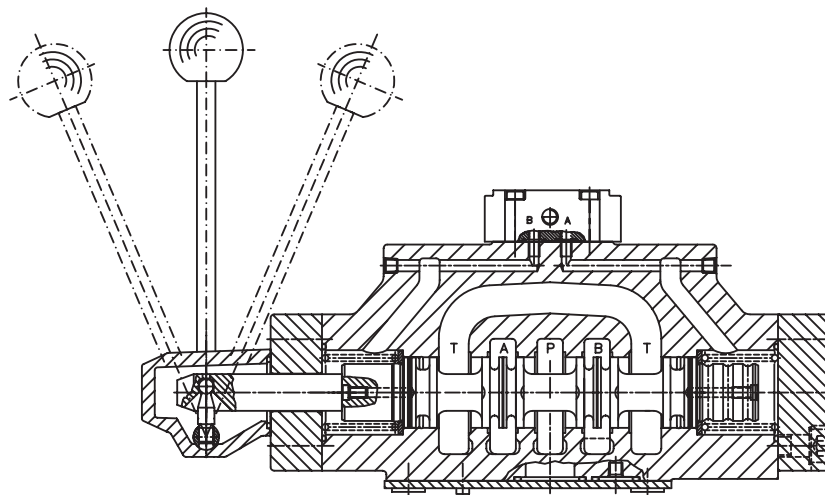
Series D41 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or oil pilot operator.

Features

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



D41VW Solenoid Operated Plug-In Conduit Box



D4L Lever Operated

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.

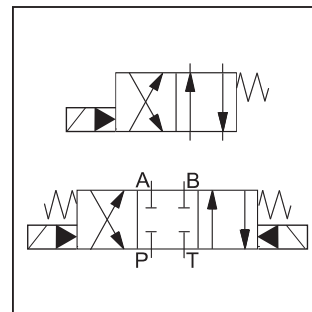
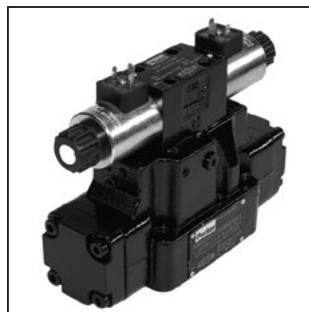
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General Description

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.



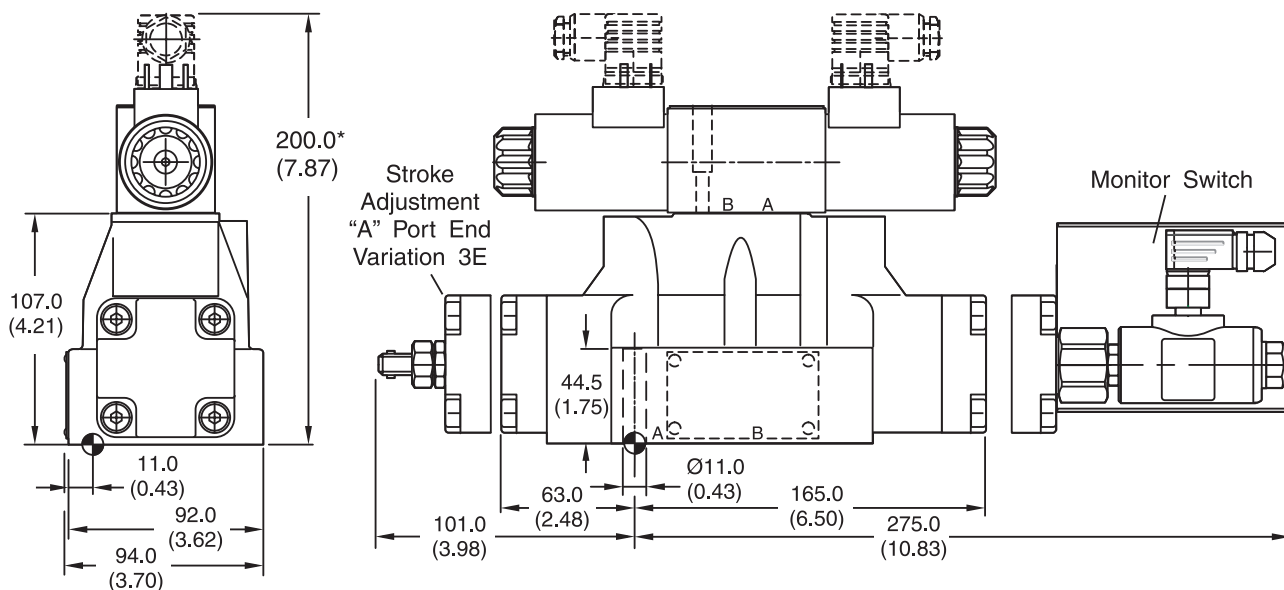
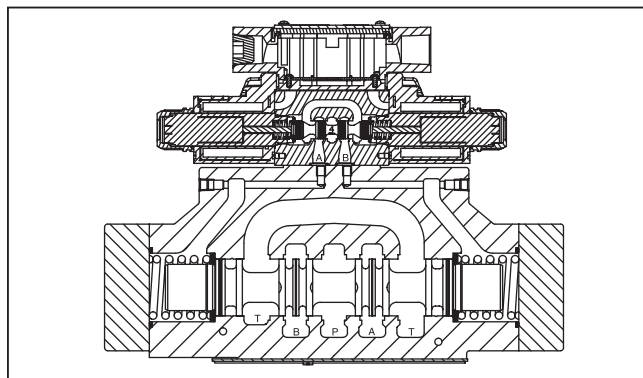
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Features

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

Dimensions

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



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



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

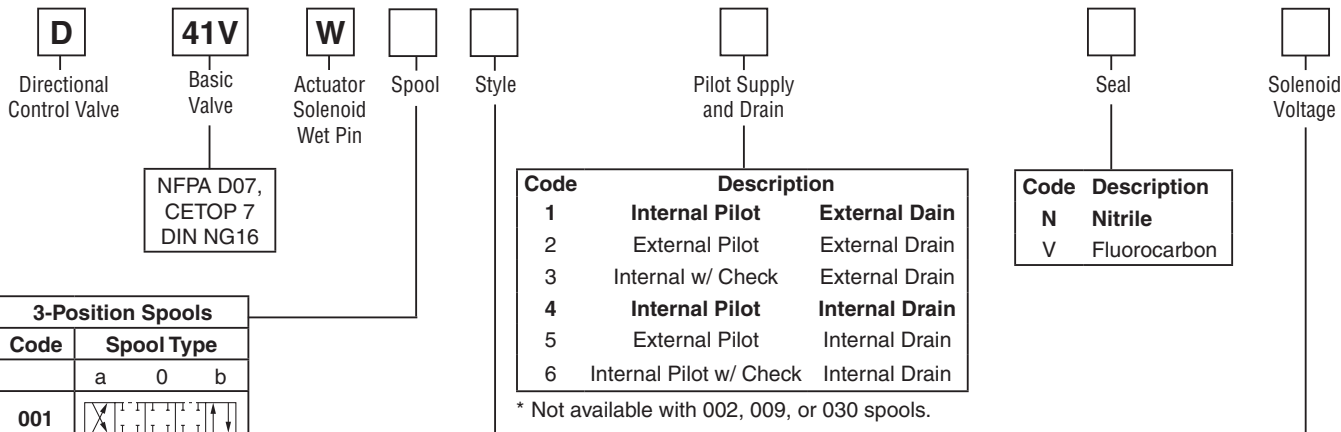
The space necessary to remove the plug per DIN 43650, design type AF is at least 15 mm (0.59").

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

A01_Cat2500.indd, ddp, 04/19

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3-Position Spools	
Code	Spool Type
	a 0 b
001	
002	
003	
004	
006†	
009**	
011	
015	
021	
022	

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

- † Not available with Monitor Switch.
- * 020 spool has closed crossover.
- ** 090 & 030 spools have an 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		2 positions. Spring offset in position "0". Operated in position "a".
F		2 positions. Spring offset in position "0". Operated in position "b".
K		2 positions. Spring offset in position "0". Operated in position "a".
M		2 positions. Spring offset in position "0". Operated in position "b".
R		2 positions, detent. No center in offset position. Operated in position "0" or "b".
S		2 positions, detent. No center in offset position. 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 & 030 spools only.

Code	Description
D††#	120 VDC
E**	24 VAC/60 Hz
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.
- † DIN only. Not available with CSA.
- †† DIN & Leadwire only. Not available with CSA.
- * DIN & Plug-In only.
- ** Leadwire, Low Watt 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.


 Solenoid Connection

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

* No variations – See Plug-in. 98 VDC not available.
** DC 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 volt DC only, no lights, not CSA approved.
‡ 12 VDC Hi Watt, not CSA approved.


Code	Description
Omit*	High Watt
D**	Explosion Proof, EExd ATEX
E**	Explosion Proof EExme ATEX, IECEX, from Germany & CSA
F†	Low Watt
L††	10 Watt
T#	Explosion Proof, Ex d IIC ATEX/CSA
U#	Explosion Proof, UL/CSA

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

 Coil Options


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


* DC only. DIN coil must include plug with lights. 24 VDC "ET" available. Also adds dust rating. Not polarity sensitive [IIC, D].
† DC tube standard, plug-in only. Polarity sensitive coil is stamped (+ -).


 Tube Options


Code	Description
Omit	Standard
P	Extended with Boot
T*	Covered Manual Override


* Only available with monitor switch option.
Manual Override options not available with Explosion Proof.

 Manual Override Options


 Electrical Options

 Shift Response and Indication


 Approvals

 Valve Variations

See next page

 Design Series

NOTE: Not required when ordering.

 Monitor Switch Cover

Code	Description
Omit	No Variation
4B	Monitor Switch Cover

Code	Description
Omit	Standard Valve
4* †#	CSA Canada CSA22.2 No. 139-10

* Not available with AC high pressure tube.
† E, J, K, Y, U, T: Voltages only. C, G, W: Solenoid connections. E & T voltages only available with C Solenoid Connection, Low Watt only. Conforms to UL429.
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 Coils only.

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

* Not available with CSA or Explosion Proof.

A

Bold: Designates Tier I products and options.

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

A

Code	Description
5*	Signal Lights – Standard
	Signal Lights – Hirsch. (DIN with Plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with Lights
56**	Manaplug (Mini) with Lights
1C**	Manaplug (Mini) Single Sol. 5-pin, with Lights
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1M**	Manaplug Opposite Normal
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	Pilot Choke Meter Out
3B	Pilot Choke Meter In
3C	Pilot Pressure Reducer
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	Pilot Choke Meter Out with Lights
3H*	Pilot Choke Meter In with Lights
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights, Mini Manaplug, Pilot Choke Meter Out
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights
XB990†	CE Marking

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

** Must have plug-in style conduit box.

† Above 50 VAC or 75 VDC must have "4" CSA approved coils.

Bold: Designates Tier I products and options.

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



Solenoid Ratings

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

Explosion Proof Solenoid Ratings*

U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D; Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (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 $\pm 10\%$.

Note that Explosion Proof AC coils are single frequency only.

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
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	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.20 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.20 ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
Z	Omit	250 VDC	N/A	N/A	0.13 Amps	30 W	1889.64 ohms
Explosion Proof Solenoids							
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
"ET" Explosion Proof Solenoids							
K		12 VDC	N/A	N/A	1.00 Amps	12 W	12.00 ohms
J		24 VDC	N/A	N/A	1.00 Amps	13 W	44.30 ohms
Y		120/60 AC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

A

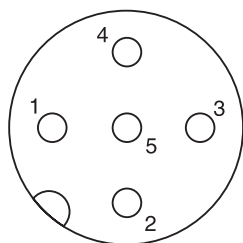
General			
Design		Directional Spool Valve	
Actuation		Solenoid	
Size		NG16	
Mounting Interface		DIN 24340 A16 / ISO 4401 / NFPA D07 / CETOP RP 121-H	
Mounting Position		Unrestricted, preferably horizontal	
Ambient Temperature		[°C]	-25...+50; (-13°F...+122°F) (without inductive position control)
		[°C]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

Position Control M12x1

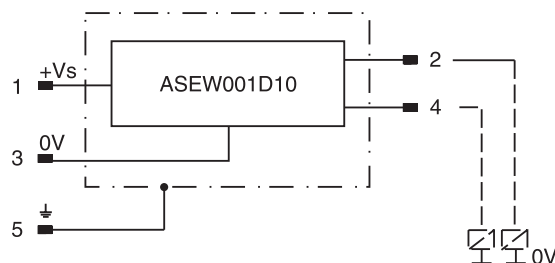
Protection Class	IP 65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature [°C]	0...+50; (+32°F...122°F)
Supply Voltage / Ripple [V]	18...42 ±10%
Current Consumption without Load [mA]	≤ 30
Max. Output Current per Channel, Ohmic [mA]	400
Min. Output Load per Channel, Ohmic [kOhm]	100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

A

M12 Pin Assignment



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



Definitions

Start position monitored:

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

End position monitored:

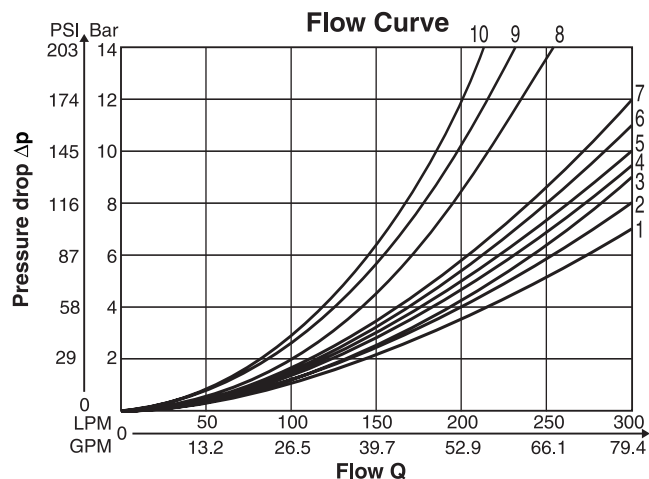
The inductive switch gives a signal before the end position is reached. (above 85% spool stroke).

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

Performance Curves

A

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

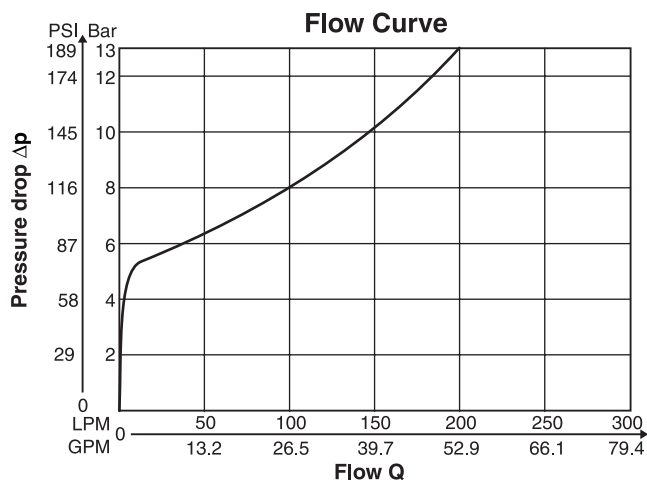


Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
001	1	1	—	4	5
002	1	2	6	4	6
003	1	2	—	5	6
004	1	1	—	5	5
006	1	2	—	3	6
009	2	9	8	7	10
011	1	1	—	4	5
015	1	2	—	4	6
020	3	5	—	3	5
021	2	8	—	2	—
022	8	2	—	—	3
030	2	3	—	6	7

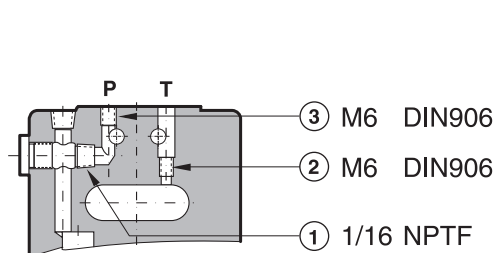
All characteristic curves measured with HLP46 at 50°C.

Integral Check Valve in the P port

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

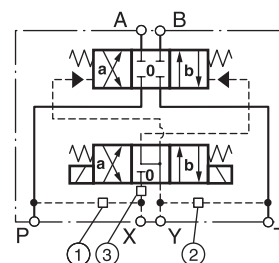


Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

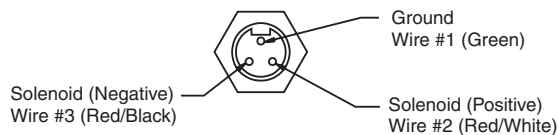
Pilot Oil Inlet	Pilot Oil Outlet	1	2	3
internal	external	○	●	Orifice Ø1.5
external	external	●	●	Orifice Ø1.5
internal	internal	○	○	Orifice Ø1.5
external	internal	●	○	Orifice Ø1.5



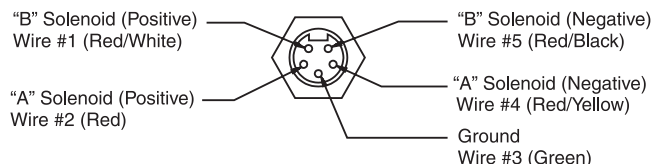
All orifice sizes for standard valves

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

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

**3-Pin Manaplug (Mini) with Lights**

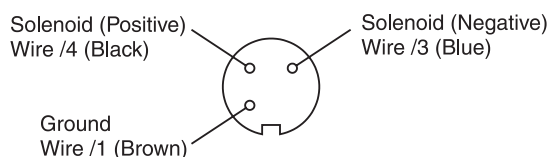
Single Solenoid Valves – Installed Opposite Side of Solenoid

**5-Pin Manaplug (Mini) with Lights**

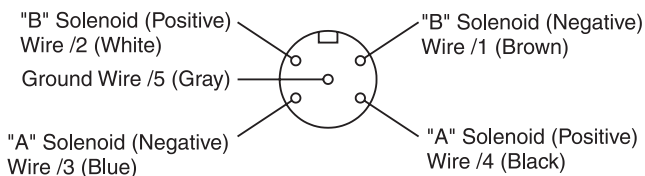
Single Solenoid Valves – Installed Opposite Side of Solenoid

Double Solenoid Valves – Installed Over "A" Solenoid

("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7A, 7B, 1B & 1D)**3-Pin Manaplug (Micro) with Lights**

Single Solenoid Valves – Installed Opposite Side of Solenoid

**5-Pin Manaplug (Micro) with Lights**

Single Solenoid Valves – Installed Opposite Side of Solenoid

Double Solenoid Valves – Installed Over "A" Solenoid

("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)**Manaplug – Electrical Mini Plug**

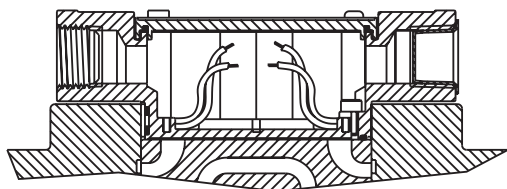
- EP336-30 3 Pin Plug
EP316-30 5 Pin Plug (Double Solenoid)
EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

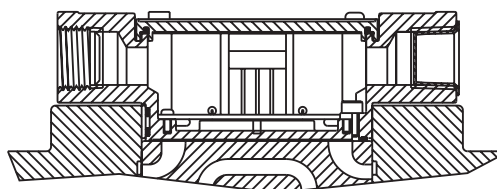
- EP337-30 3 Pin Plug
EP317-30 5 Pin Plug (Double Solenoid)
EP31B-30 5 Pin Plug (Single Solenoid)

Conduit Box Option C

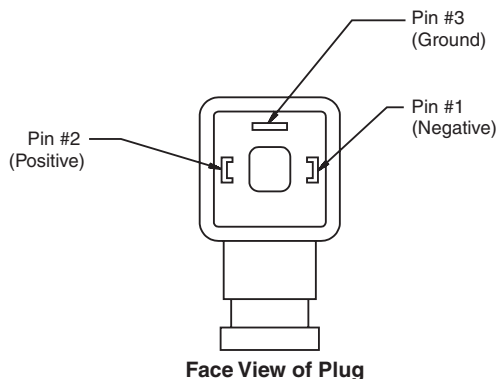
- No Wiring Options Available

**Signal Lights (Option 5) — Plug-in Only**

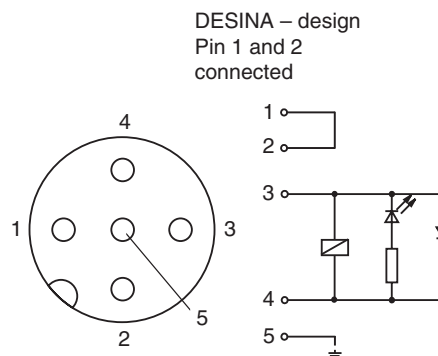
- LED Interface
- Meets Nema 4/IP67

**Hirschmann Plug with Lights (Option P5)**

ISO 4400/DIN 43650 Form "A"

**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



General Description

A

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.

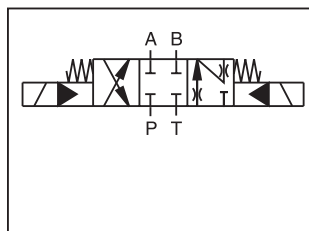
Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



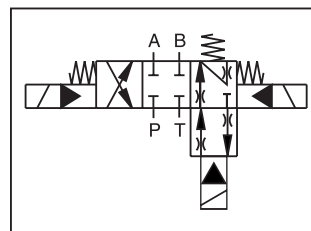
D41VWR



D41VWZ

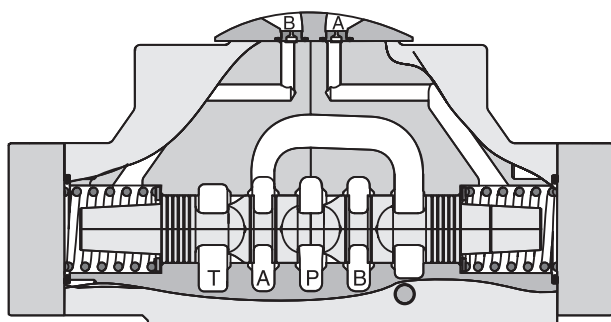


Regenerative D41VWR

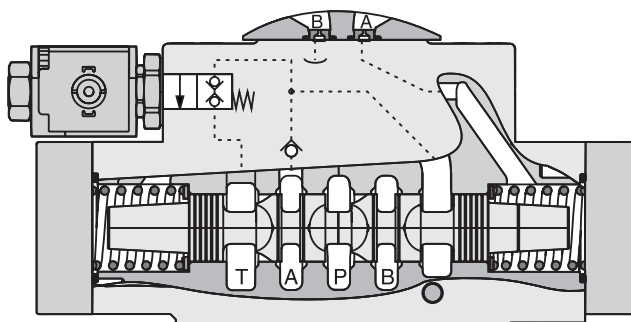


Hybrid D41VWZ

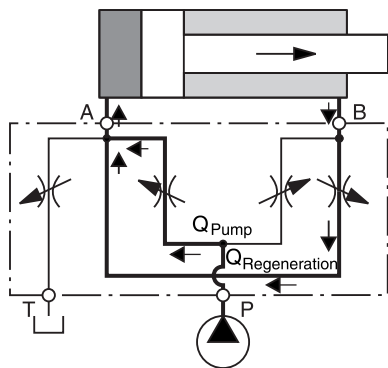
Regenerative Valve D41VWR



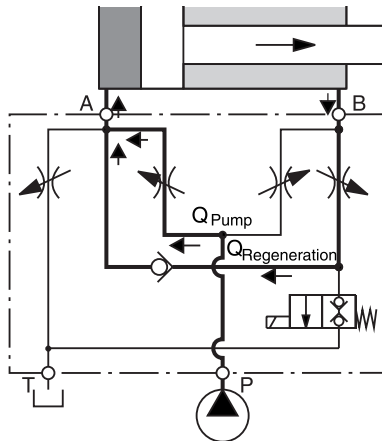
Hybrid Valve D41VWZ



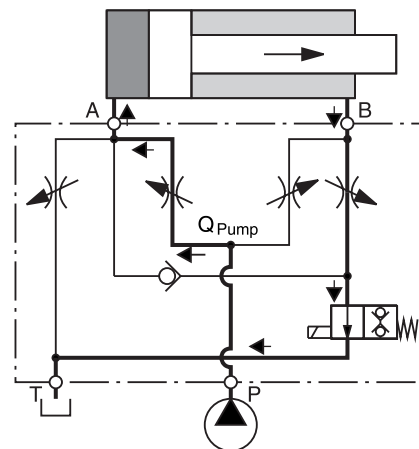
D41VWR Regenerative Valve Cylinder Extending



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.

A01_Cat2500.indd, ddp, 04/19

Ordering Information

D41VW

Series

NFPA D07,
CETOP7,
DIN NG16

C

Style

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

J

Solenoid Voltage 24VDC

Code	Description
N	Nitrile
V	Fluorocarbon

W

Connector as per EN 175301-803, without connector (Please order plug separately)

Code	Description
Omit	Standard
T	No override

Manual Override

Code	Description
Omit	No override

Valve Variations

Code	Description
Omit	No Variations
3A	Pilot Choke, Meter-Out
3B	Pilot Choke, Meter-In
3C	Pilot Pressure Reducer
3D	Stroke Adjustment "B" End
3E	Stroke Adjustment "A" End
3F	Stroke Adjustment "A" & "B" End
3R	Pilot Choke Meter-Out & Pressure Reducer
1T	Pilot Choke Meter-In & 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		

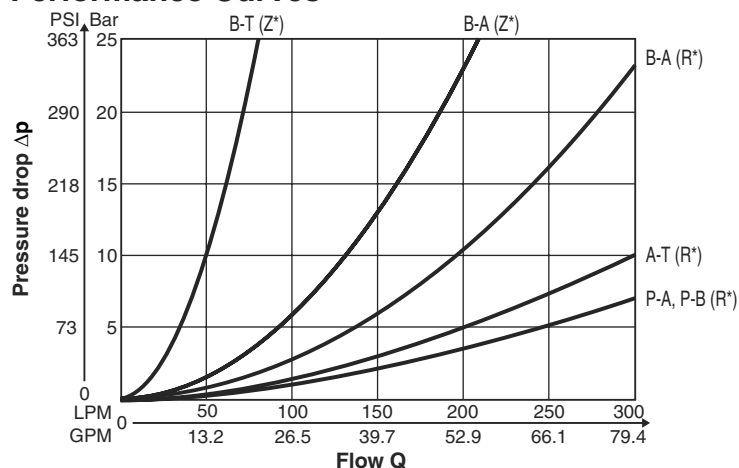
Weight:

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

A

General			
Design		Directional Spool Valve	
Actuation		Solenoid	
Size		NG16 / CETOP7 / D07	
Mounting Interface		DIN 24340 A16 / ISO 4401 / NFPA D07 / CETOP RP 121-H	
Mounting Position		Unrestricted, preferably horizontal	
Ambient Temperature		[°C]	-25...+50; (-13°F...+122°F)
MTTF _D Value		[years]	75
Hydraulic			
Maximum Operating Pressure		Pilot drain internal: P, A, B, X 350 Bar (5075 PSI); T, Y 105 Bar (1523 PSI) Pilot drain external: P, A, B, T, X 350 Bar (5075 PSI); Y 105 Bar (1523 PSI)	
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature		[°C]	-25 ... +70 (-13°F...+158°F)
Viscosity Permitted		[cSt]/[mm²/s]	2.8...400 (13...1854 SSU)
Recommended		[cSt]/[mm²/s]	30...80 (139...371 SSU)
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)	
Flow Maximum		300 LPM (79.4 GPM)	
Leakage at 350 Bar (5075 PSI) (per flow path)		[ml/min]	Up to 200 (0.05 GPM) (depending on spool)
Minimum Pilot Supply Pressure		5 Bar (73 PSI)	
Static / Dynamic			
Step Response at 95%		Energized	
DC Solenoids		De-energized	
Pilot Pressure			
50 Bar (725 PSI)		[ms]	95
100 Bar (1450 PSI)		[ms]	75
250 & 350 Bar (3625 & 5075 PSI)		[ms]	60
			65
			65
			65
Electrical			
Duty Ratio		100% ED; CAUTION: coil temperature up to 150°C (302°F) possible	
Protection Class		IP 65 in accordance with EN 60529 (plugged and mounted)	
Supply Voltage / Ripple		[V]	24
Tolerance Supply Voltage		[%]	±10
Current Consumption	Hold	[A]	1.29
Current Consumption	In Rush	[A]	1.29
Power Consumption	Hold	[W]	31
Power Consumption	In Rush	[W]	31
Solenoid Connection		Connector as per EN 175301-803, solenoid identification as per ISO 9461	
Wiring Minimum		[mm²]	3 x 1.5 recommended
Wiring Length Minimum		[m]	50 (164 ft.) recommended

With electrical connections the protective conductor (PE ≡) must be connected according to the relevant regulations.

Electrical Specifications Hybrid Option

Duty Ratio		100%
Protection Class		IP 65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage	[V]	24
Tolerance Supply Voltage	[%]	±10
Current Consumption	[A]	1.21
Power Consumption	[W]	29
Solenoid Connection		Connector as per EN 175301-803
Wiring Minimum	[mm²]	3 x 1.5 recommended
Wiring Length Maximum	[m]	50 (164 ft.) recommended

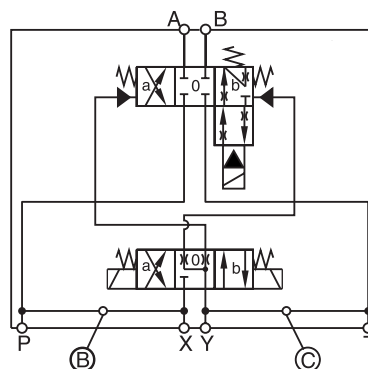
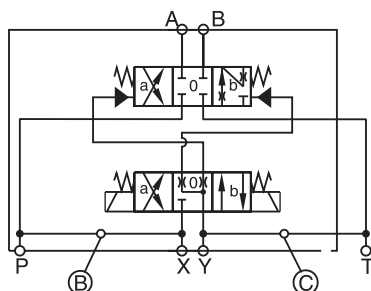
With electrical connections the protective conductor (PE ≡) must be connected according to the relevant regulations.

Pilot Flow

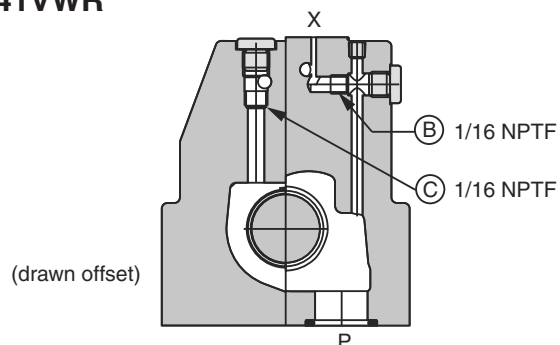
Pilot Oil Inlet (Supply) and Outlet (Drain)

○ open, ● closed

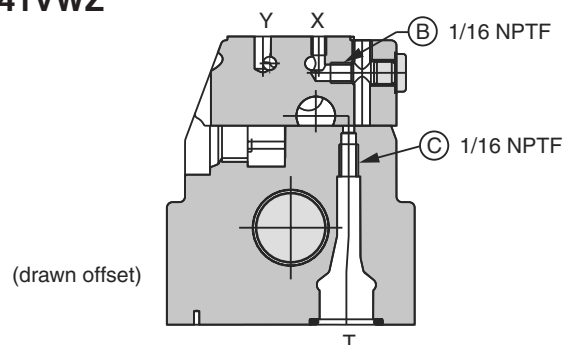
Pilot Oil Inlet	Pilot Oil Outlet	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



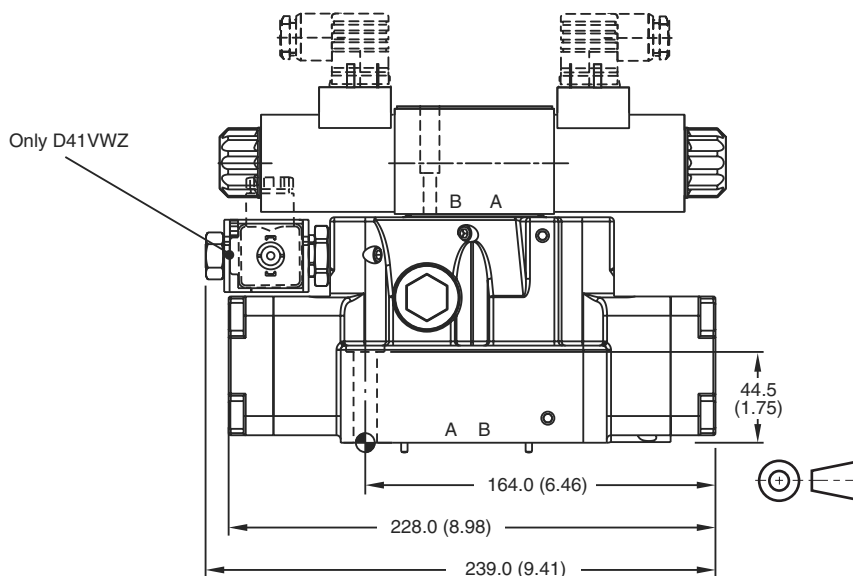
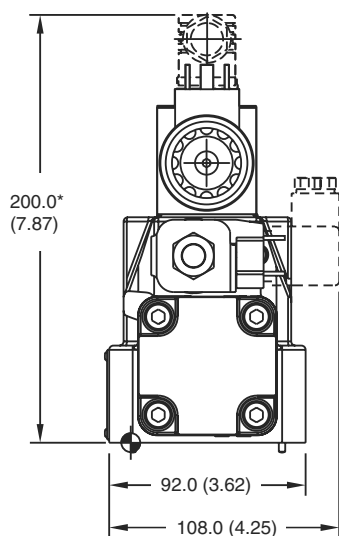
D41VWR



D41VWZ



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
	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 15mm (0.59").

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

A01_Cat2500.indd, ddp, 04/19

A

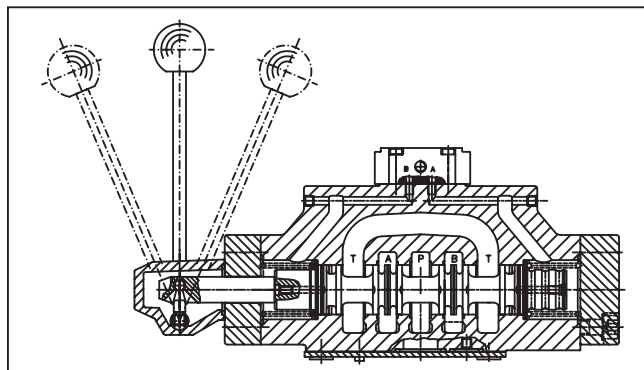
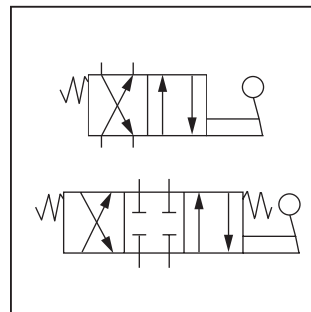
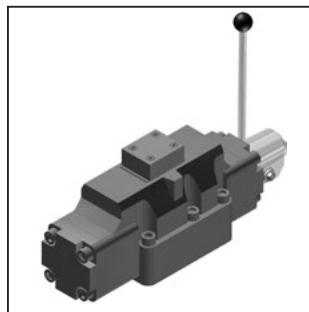
General Description

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

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

Features

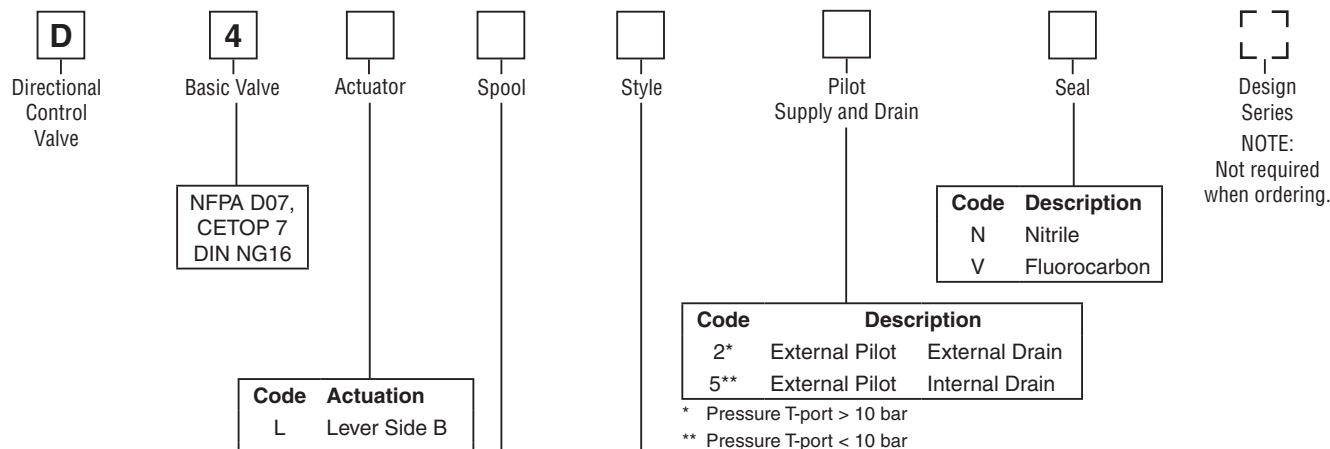
- Low force required to shift spool.
- Hardened spools provide long life.
- Low pressure drop design.



Specifications

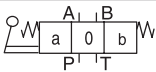
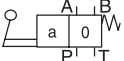
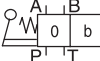
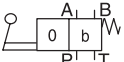
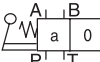
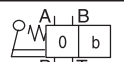
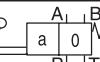
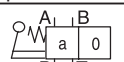
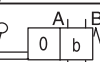
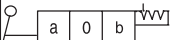
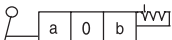
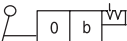
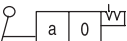
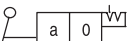
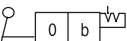
General			
Design		Directional spool valve	
Actuation		Lever	
Size		NG16	
Mounting interface		DIN 24340 A16, ISO 4401, NFPA D07, CETOP RP 121-H	
Mounting Position		Unrestricted, preferably horizontal	
Ambient Temperature		[°C]	-25...+50; (-13°F...+122°F)
Hydraulic			
Maximum Operating Pressure		External Drain: P, A B, T 350 Bar (5075 PSI); X, Y 10 Bar (145 PSI) Internal Drain: P, A B 350 Bar (5075 PSI); T, X, Y 10 Bar (145 PSI)	
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature		[°C]	-25 ... +70; (-13°F...+158°F)
Viscosity Permitted		[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		300 LPM (79.4 GPM)	
Leakage at 350 Bar (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.
A01_Cat2500.indd, ddp, 04/19



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	 Operated in position "a".	 Operated in position "b".	2 positions. Spring offset in position "0".
F	 Operated in position "0".	 Operated in position "0".	2 positions. Spring offset in position "b".
K	 Operated in position "b".	 Operated in position "a".	2 positions. Spring offset in position "0".
M	 Operated in position "0".	 Operated in position "0".	2 positions. Spring offset in position "a".
N	 No center in offset position.	 No center in offset position.	3 positions, detent. Operated in position "a", "0" or "b".
R	 No center in offset position.	 No center in offset position.	2 positions, detent. Operated in position "0" or "b".
S	 No center in offset position.	 No center in offset position.	2 positions, detent. Operated in position "0" or "a". No center in offset position.

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

Weight: 9.0 kg (19.8 lbs.)

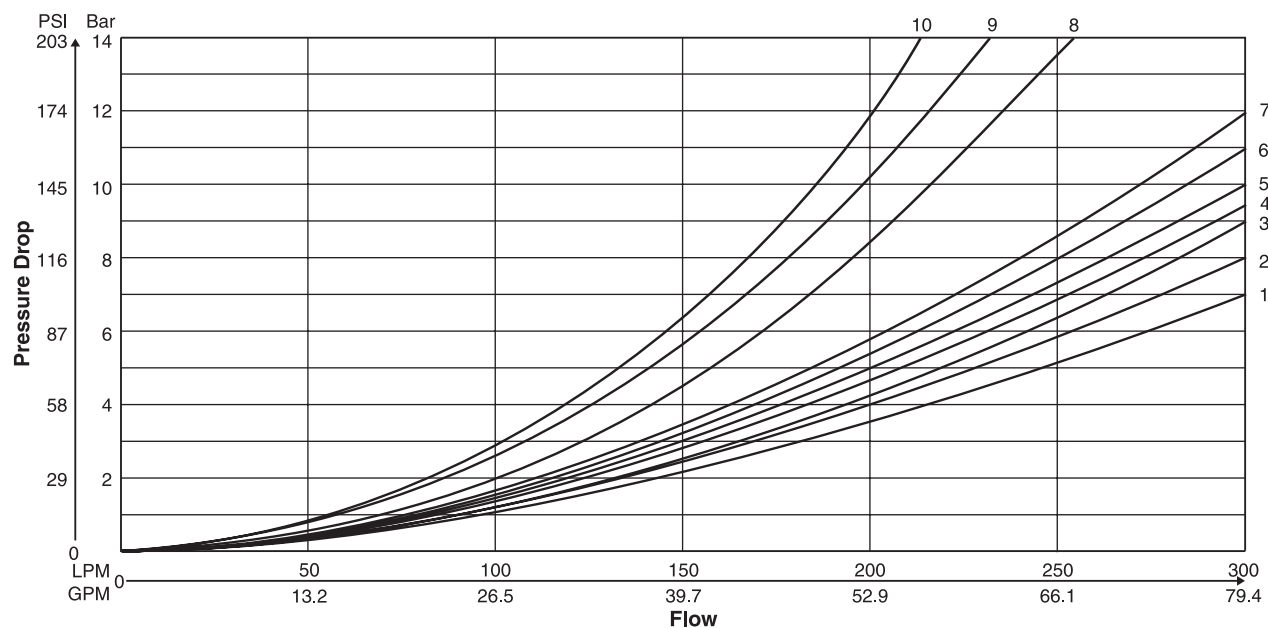
Further spool types on request.

A

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

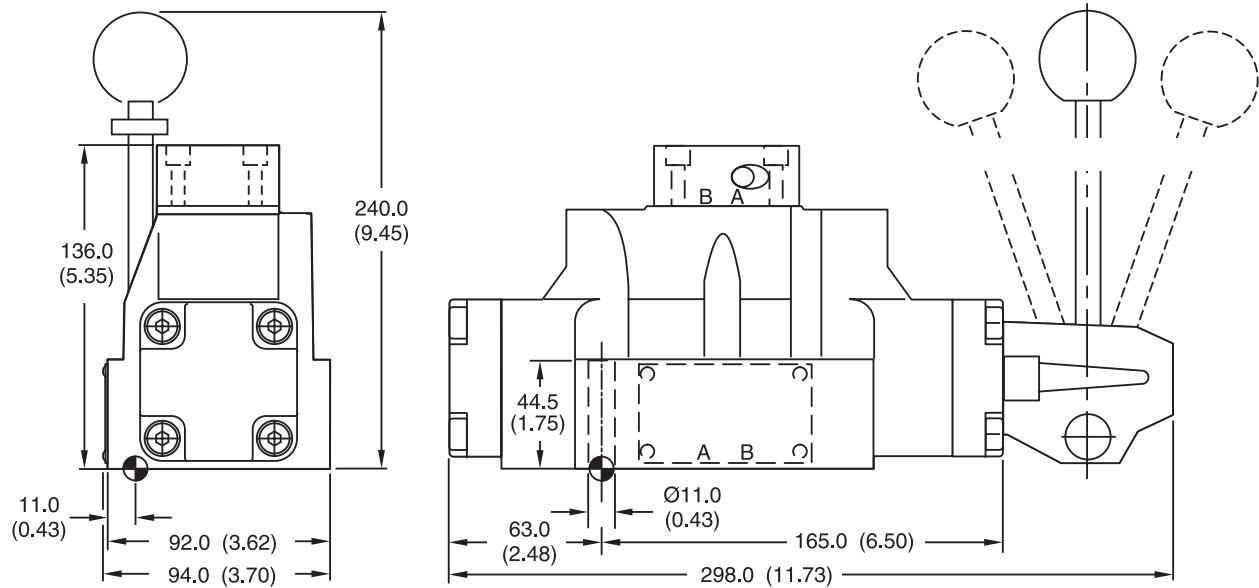
Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
001	1	1	—	4	5
002	1	2	6	4	6
003	1	2	—	5	6
004	1	1	—	5	5
006	1	2	—	3	6
007	1	1	6	4	5
009	2	9	8	7	10
011	1	1	—	4	5
014	1	1	6	5	4
015	2	1	—	6	5
020	3	5	—	3	5
030	2	3	—	6	7

All characteristic curves measured with HLP46 at 50°C.

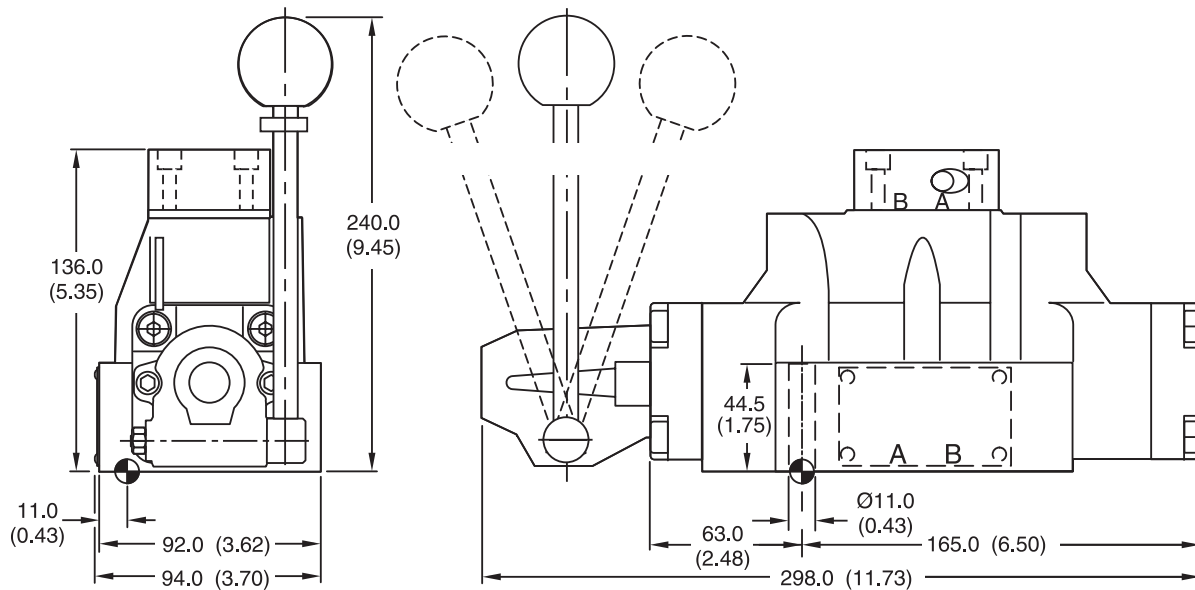






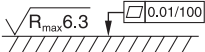
Inch equivalents for millimeter dimensions are shown in (**)

D4L



D4LB



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-D4LN60 Fluorocarbon: SK-D4LV60

A01_Cat2500.indd, ddp, 04/19

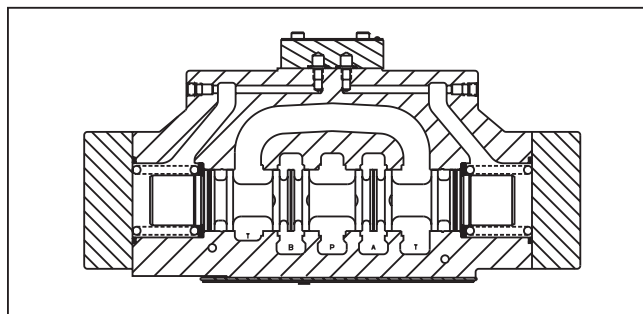
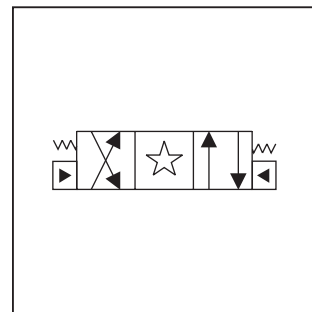
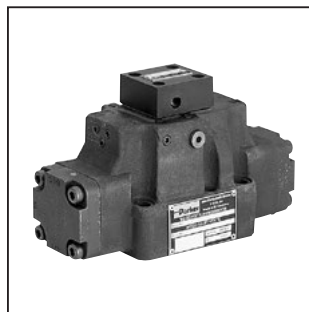
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General Description

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

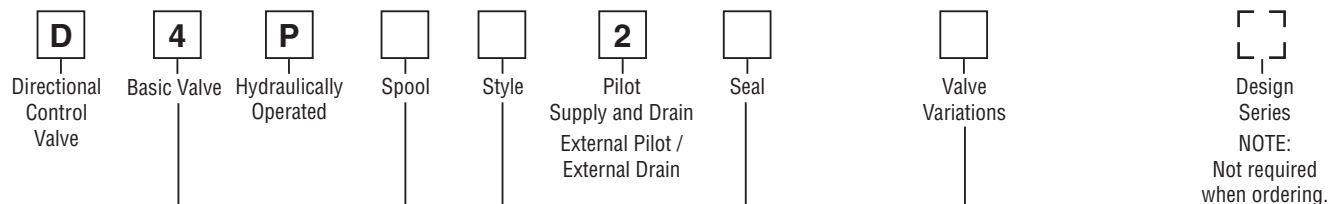
- Low pressure drop design.
- Hardened spools for long life.



Specifications

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

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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NFPA D07,
CETOP 7
DIN NG16

Code	Description
N	Nitrile
V	Fluorocarbon

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

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

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

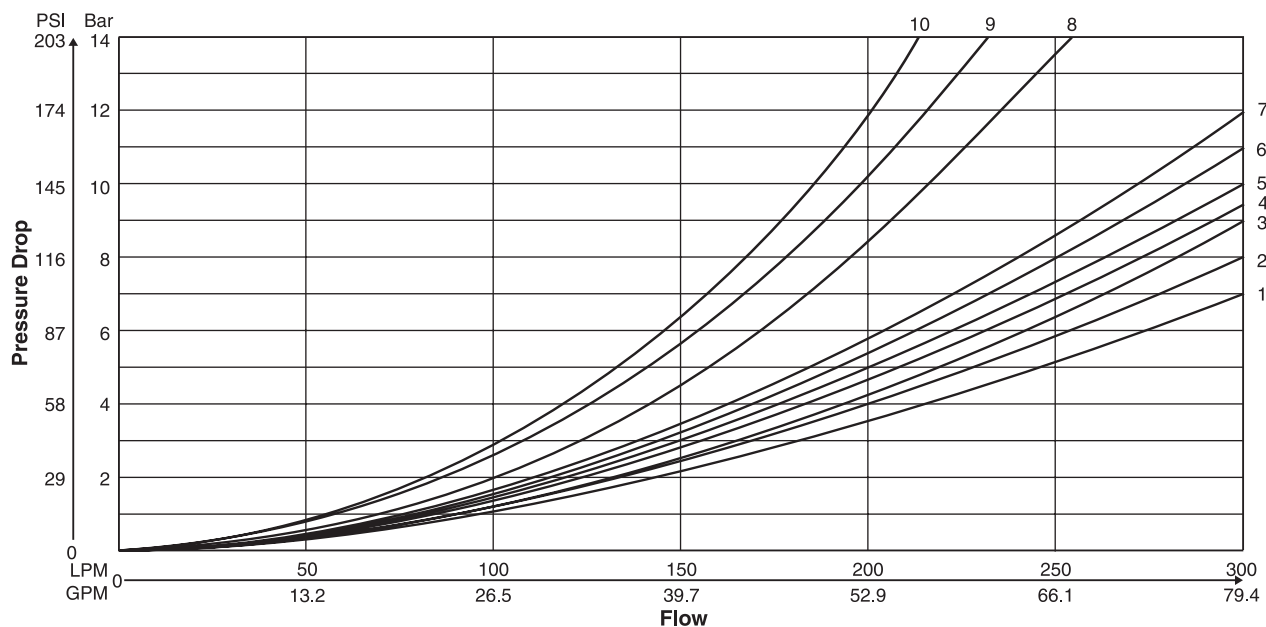
Weight: 9.0 kg (19.8 lbs.)

Further spool types and position control on request.

A

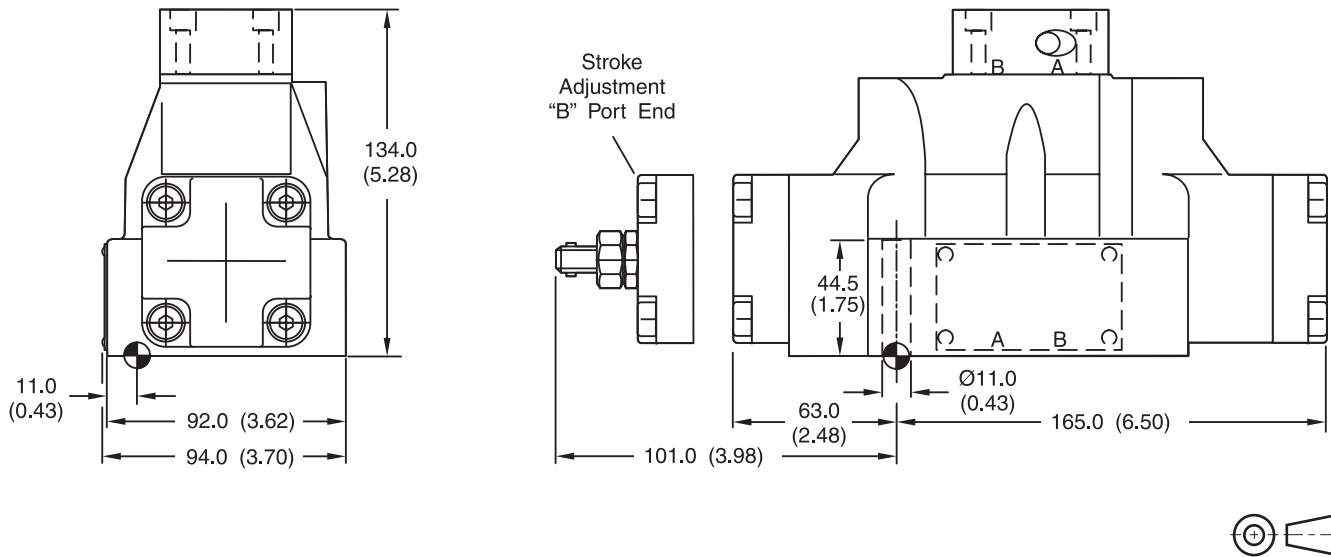
The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.





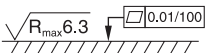
Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
001	1	1	—	4	5
002	1	2	6	4	6
003	1	2	—	5	6
004	1	1	—	5	5
005	2	2	—	3	5
006	1	2	—	3	6
007	1	1	6	4	5
009	2	9	8	7	10
011	1	1	—	4	5
014	1	1	6	4	5
015	1	2	—	4	6
016	2	2	—	3	5
020	3	5	—	3	5
021	2	8	—	2	—
022	8	2	—	—	3
026	3	5	—	—	—
030	2	3	—	6	7
054	2	3	—	6	7



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

A



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

A

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

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

Mounting Position

Detent – Horizontal

Spring Offset – Unrestricted

Spring Centered – Unrestricted

Fluid Recommendations

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

Fluids and Seals

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

Filtration

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

Silting

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

Special Installations

Consult your Parker representative for any application requiring the following:

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

Mounting Patterns

Series	NFPA	CETOP
D41V	D07	7

Torque Specifications

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

63 Nm (46.5 ft-lbs) M10

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

Tank and Drain Line Surges

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

Electrical Characteristics (Detented Spool)

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

Electrical Failure or Loss of Pilot Pressure

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

Pilot/Drain Characteristics

Pilot Pressure:

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

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

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

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

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

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

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

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

D41V* Flow Paths

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

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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 to 350 Bar (73 to 5000 PSI)

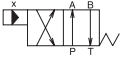

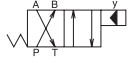
6.9 Bar (100 PSI) for spool configurations 2, 7, 9 & 14

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

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

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

Flow Path/Pilot Pressure

Style Code	Description	“X” & “Y” De-Pressurized	“X” Port Pressurized	“Y” Port Pressurized	Special Notes	Recommended Control Valve For Pilot Oil
B	Two Position Spring Offset	P→A, B→T	P→A, B→T	P→B, A→T	“X” Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position Spring Centered	Center	P→A, B→T	P→B, A→T	Flow paths will be reversed on valves with tandem center (9) spool	
H	Two-Position Spring Offset	P→B, A→T	P→A, B→T	P→B, A→T	“Y” Port may be pressurized to assist spring in returning spool to offset position	

Subplate Mounting

NFPA D07, CETOP 7 & NG16

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 135.6 Nm (100 ft-lbs).

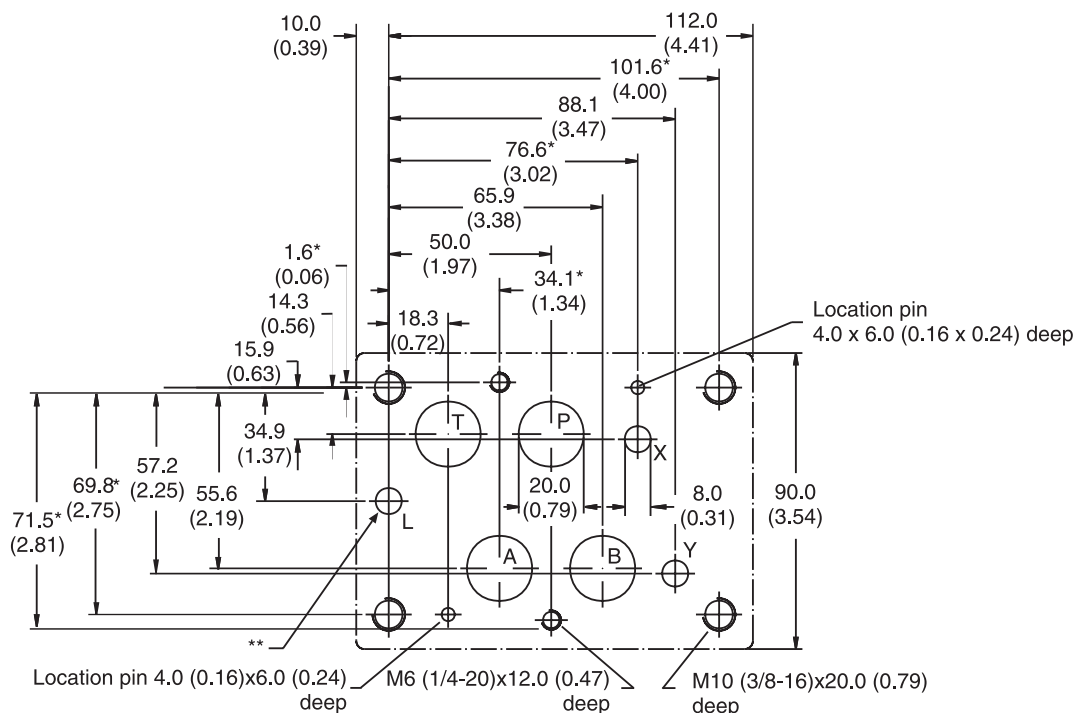
Mounting Position

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

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

Mounting Pattern — NFPA D07, CETOP 7 & NG16

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



Note: With * marked dimensions ± 0.1 mm. All other dimensions ± 0.2 mm.

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Application

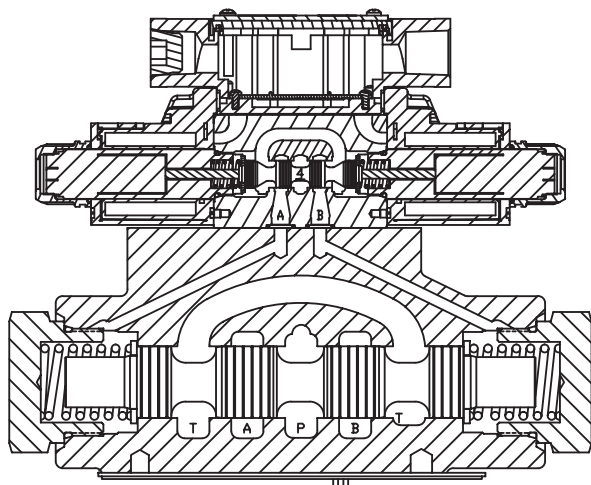
Series D6 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles. These valves are manifold mounted, and conform to NFPA's D08, CETOP 8 mounting patterns.

Operation

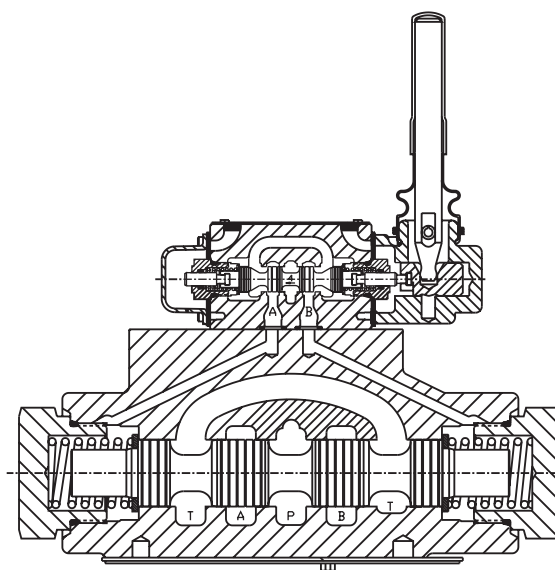
Series D61 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or pilot operators (hydraulic or pneumatic).

Features

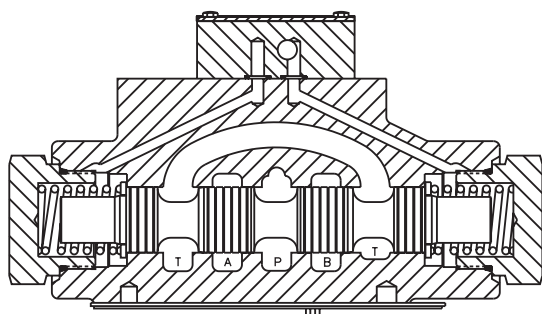
- Easy access mounting bolts.
- 210 Bar (3000 PSI) pressure rating.
- Flows to 380 LPM (100 GPM) depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.



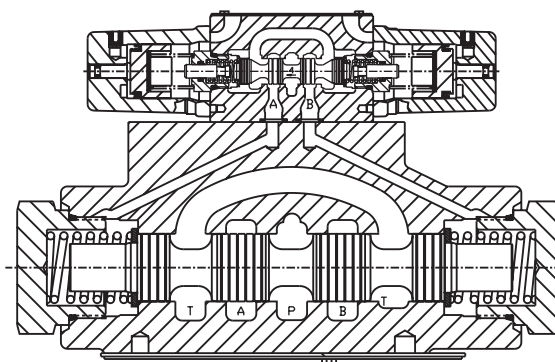
D61*W Solenoid Operated Plug-in Conduit Box



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.

A01_Cat2500.indd, ddp, 04/19

General Description

Series D61VW directional control valves are 5-chamber, pilot operated, solenoid controlled valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting patterns.





Operation

Series D61VW pilot operated valves are standard with low shock spools and pilot orifice. The orifice can be removed if a faster shift is required. It is recommended, however, that all systems operating above 138 Bar (2000 PSI) use the standard valve to avoid severe shock.

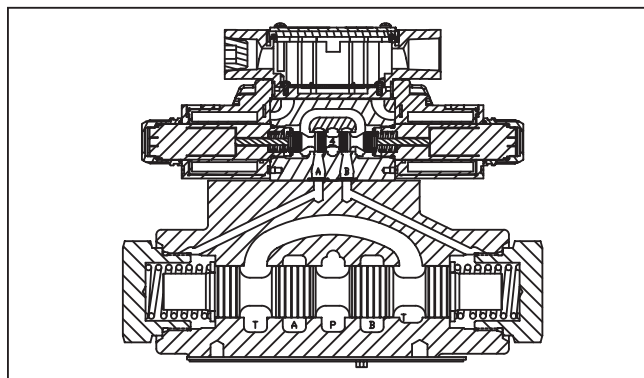
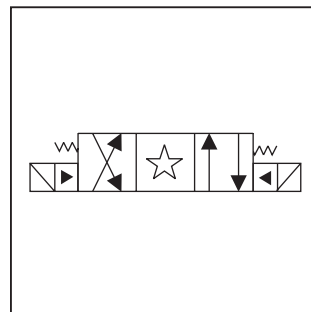
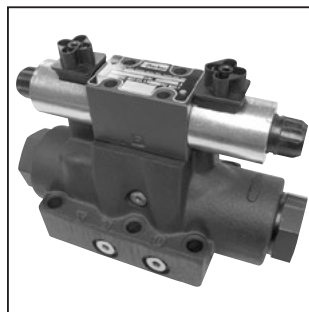
Features

- Low pressure drop design.
- Hardened spools provide long life.
- Fast response option available.
- Explosion proof availability.
- Wide variety of voltages and electrical connection options.
- No tools required for coil removal.

Specifications

Mounting Pattern	NFPA D08 CETOP 8, NG25
Maximum Operating Pressure	205 Bar (3000 PSI) Standard CSA  205 Bar (3000 PSI)
Maximum Tank Line Pressure	Internal Drain Model: 102 Bar (1500 PSI) AC Only 205 Bar (3000 PSI) DC Std./ AC Optional External Drain Model: 205 Bar (3000 PSI) CSA  102 Bar (1500 PSI)
Maximum Drain Pressure	102 Bar (1500 PSI) AC Standard 205 Bar (3000 PSI) DC Standard/ AC Optional CSA  102 Bar (1500 PSI)
Minimum Pilot Pressure	5.1 Bar* (75 PSI)
Maximum Pilot Pressure	205 Bar (3000 PSI) Standard CSA  205 Bar (3000 PSI)
Nominal Flow	189 LPM (50 GPM)
Maximum Flow	See Reference Data Chart

* 6.9 Bar (100 PSI) for spool configurations 008 & 009.



Response Time

Response times (milliseconds) are measured at 205 Bar (3000 PSI) and 195 LPM (50 GPM) with various pilot pressures as indicated.

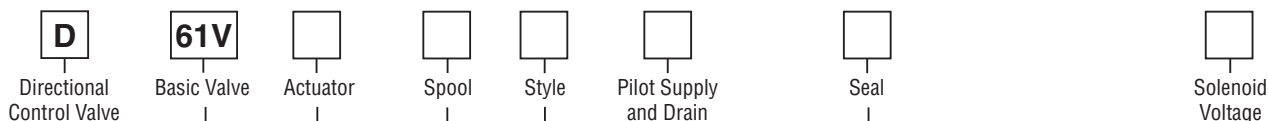
Solenoid Type	Pilot Pressure	Pull-In		Drop-Out	
		Std	Fast	Std	Fast
DC	500	130	100	80	80
	1000	90	90	80	80
	2000	80	80	80	80
AC	500	80	40	72	72
	1000	40	40	72	72
	2000	30	30	72	72

Because of the high drain line pressure transients generated during shifting, use of the fast response option is not recommended for pilot pressures exceeding 138 Bar (2000 PSI).

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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**NFPA D08, CETOP 8,
DIN NG25
Low Flow, D03 Pilot**

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

* Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing solenoid A. Note operators reverse sides for #008 and #009 spools. See installation information for details. To configure per DIN standards (A coil over A port, B coil over B port) code valves as D61VHW***.

Code	Description
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 008 & 009 spools.
** #3 and #6 bodies cannot be converted to other styles. Other pilot versions cannot be converted to styles 3 and 6.

Code	Description
D††#	120 VDC
E**	24 VAC/60 Hz
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.
† DIN only. Not available with CSA.
†† DIN & Leadwire only. Not available with CSA.
* DIN & Plug-In only.
** Leadwire, Low Watt only.

Code	Symbol	Code	Symbol
001		011	
003		012	
004		015	
005		016	
006		021	
008*			
009**			

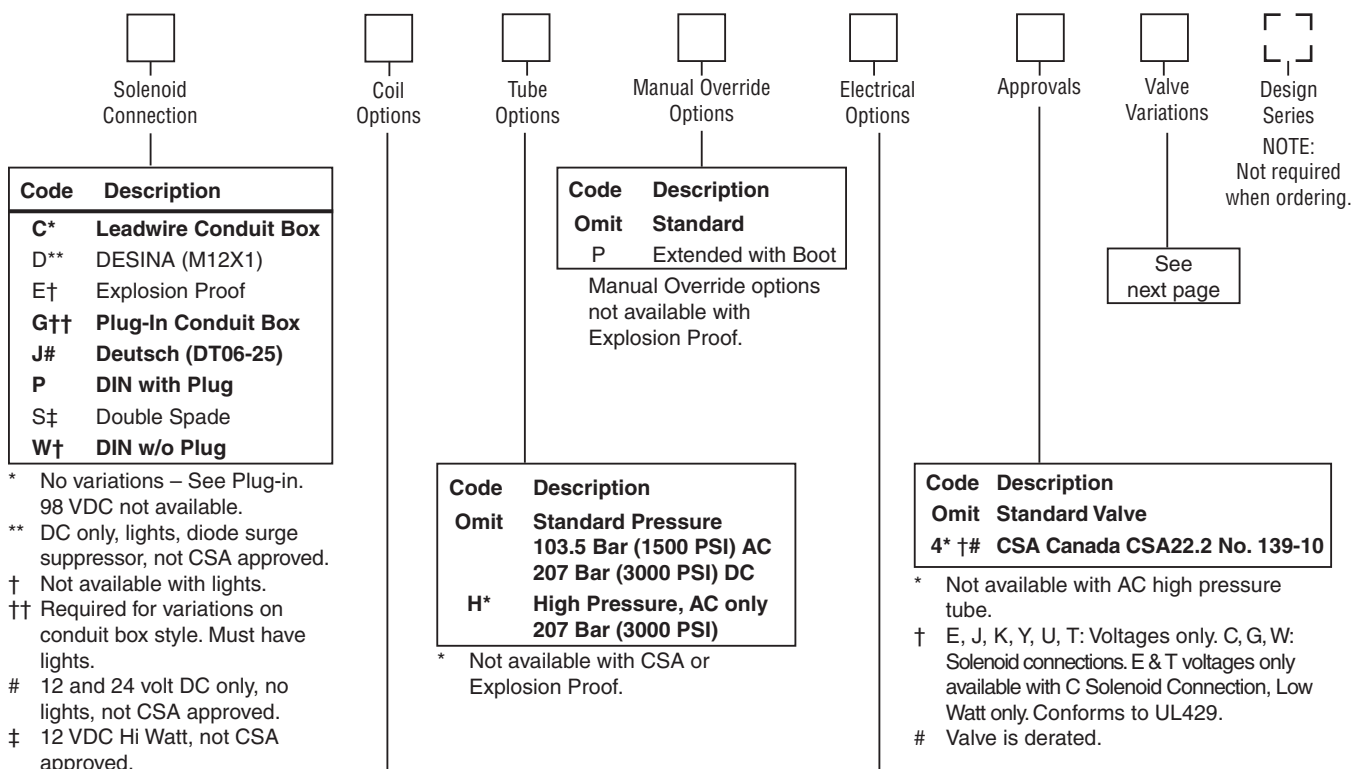
* 008 spool has closed crossover.
** 009 spool has open crossover.

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

* Available with 001, 004, 011 and 012 spools only.
** High watt coil only.

Bold: Designates Tier I products and options.

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



Code	Description
Omit*	High Watt
D**	Explosion Proof, EExd ATEX
E**	Explosion Proof EExme ATEX, IECEx, from Germany
F†	Low Watt
L††	10 Watt
T#	Explosion Proof, Ex d IIC ATEX/CSA
U#	Explosion Proof, UL/CSA

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

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

* DC only. DIN coil must include plug with lights.
 † DC tube standard, plug-in only. Polarity sensitive coil is stamped (+ -).
 # 24 VDC "ET" available. Also adds dust rating. Not polarity sensitive [IIIC, D].

Valve Weight:

Double Solenoid 12.1 kg (26.6 lbs.)

Seal Kit:

Nitrile SKD61VWN91
 Fluorocarbon SKD61VWV91

Mounting Bolt Kits

UNC Bolt Kits for use with D6 and D8 Directional Control Valves & Sandwich Valves				
	Number of Sandwich Valves @ 2.75" (70mm) thickness			
	0	1	2	3
D6	BK227 2.50"	BK121 5.25"	BK122 8.00"	BK123 10.75"
D6 plus tapping plate	BK161 3.50"	BK170 6.25"	BK171 9.00"	BK172 11.75"
D8	BK228 3.00"	BK131 5.75"	BK132 8.50"	BK133 11.25"
D8 plus tapping plate	BK173 4.00"	BK174 6.75"	BK175 9.50"	BK114 12.125"

Note: All bolts are SAE grade 8, 1/2-13 UNC-3A thread, torque to 133 N.m. (100 ft.-lbs.)

Bold: Designates Tier I products and options.

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

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Valve Variations

Code	Description
5*	Signal Lights – Standard
	Signal Lights – Hirsch. (DIN with plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with lights
56**	Manaplug (Mini) with Lights
20	Fast Response
1C**	Manaplug (Mini) Single Sol. 5-pin, with Lights
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1M**	Manaplug Opposite Normal
1P	Painted Body
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	Pilot Choke Meter Out
3B	Pilot Choke Meter In
3C	Pilot Pressure Reducer
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	Pilot Choke Meter Out with Lights
3H*	Pilot Choke Meter In with Lights
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights, Mini Manaplug, Pilot Choke Meter Out
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights
XB990†	CE Marking

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

** Must have plug-in style conduit box.

† Above 50 VAC or 75 VDC must have "4" CSA approved coils.

Reference Data

Model	Spool Symbol	Maximum Flow, LPM (GPM) 207 Bar (3000 PSI) w/o Malfunction	Model	Spool Symbol	Maximum Flow, LPM (GPM) 207 Bar (3000 PSI) w/o Malfunction
D61V*001		390 (100)	D61V*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)			

D61V* Series Pressure Drop Chart

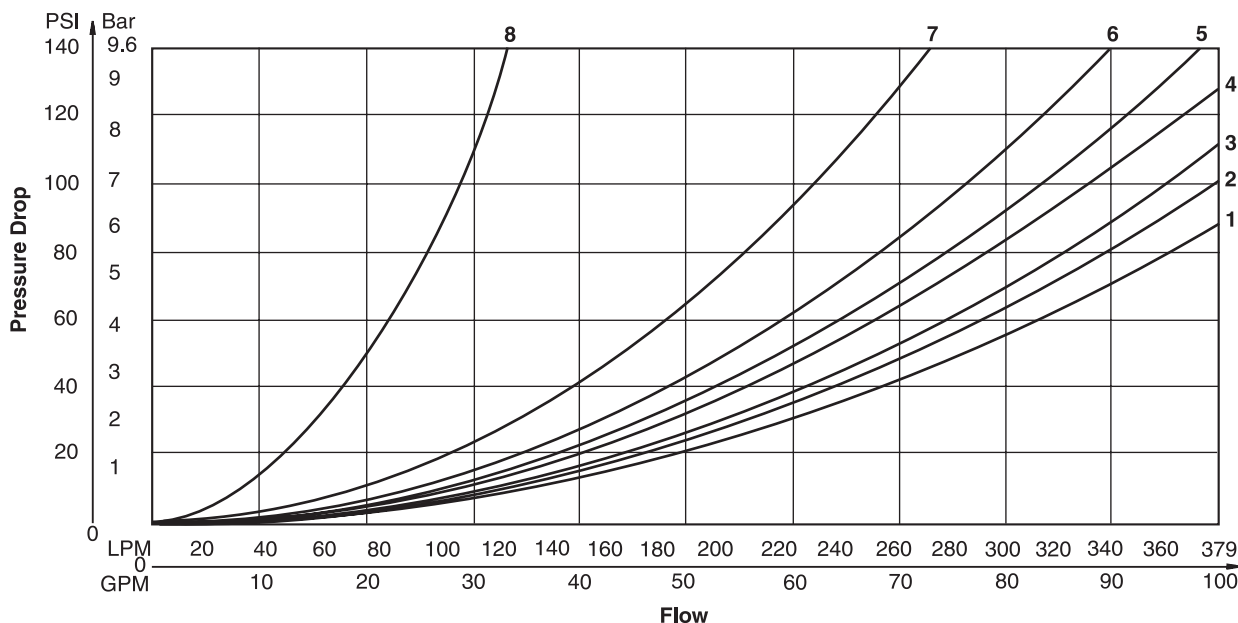
The following chart provides the flow vs. pressure drop curve reference for the Series D61V valves by spool type.

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

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

D61VW Pressure Drop Reference Chart -- Curve Number					
Spool No.	P-A	P-B	P-T	A-T	B-T
001	3	3	—	1	2
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



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Solenoid Ratings

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

Explosion Proof Solenoid Ratings*

U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D; Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (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 $\pm 10\%$.

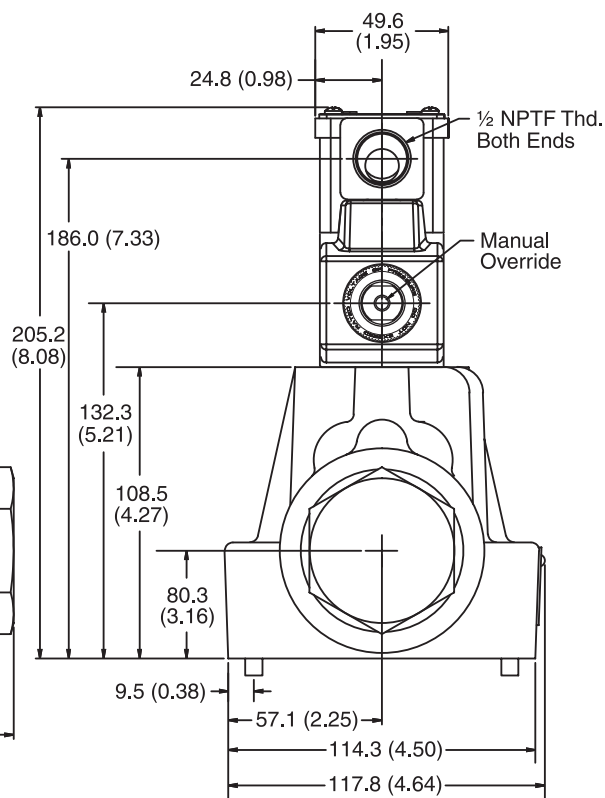
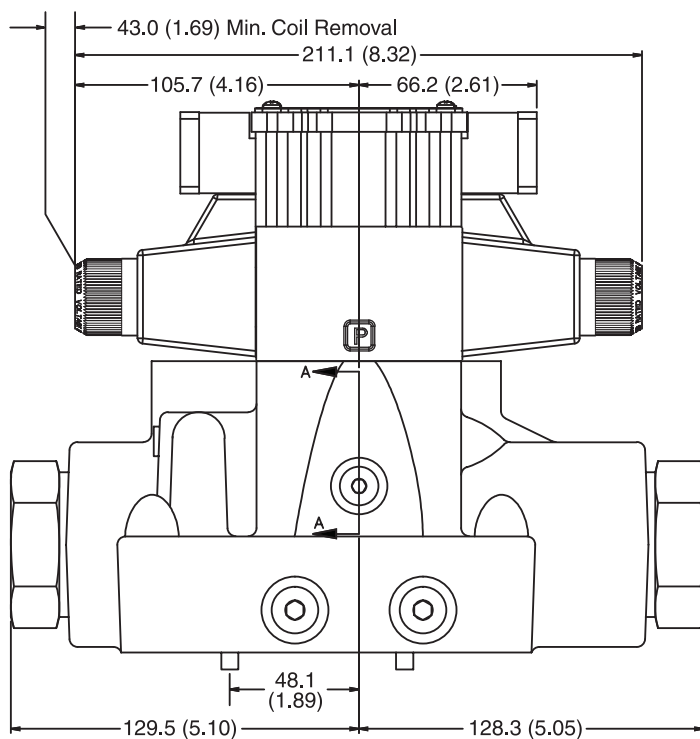
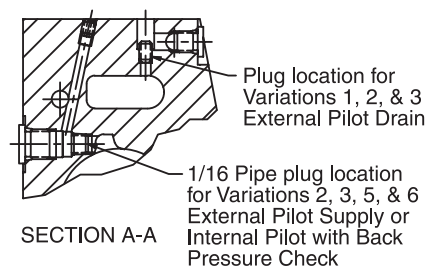
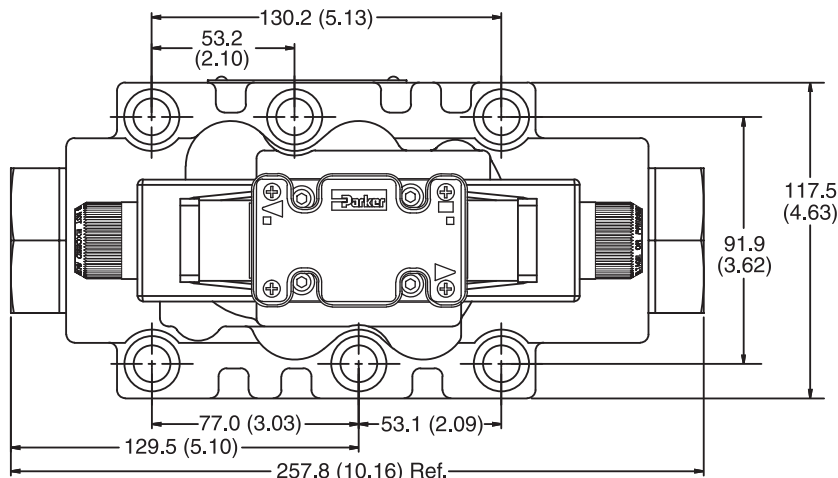
Note that Explosion Proof AC coils are single frequency only.

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
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	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.20 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.20 ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
Z	Omit	250 VDC	N/A	N/A	0.13 Amps	30 W	1889.64 ohms
Explosion Proof Solenoids							
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
"ET" Explosion Proof Solenoids							
K		12 VDC	N/A	N/A	1.00 Amps	12 W	12.00 ohms
J		24 VDC	N/A	N/A	1.00 Amps	13 W	44.30 ohms
Y		120/60 AC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

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

Plug-in Conduit Box, Double AC Solenoid

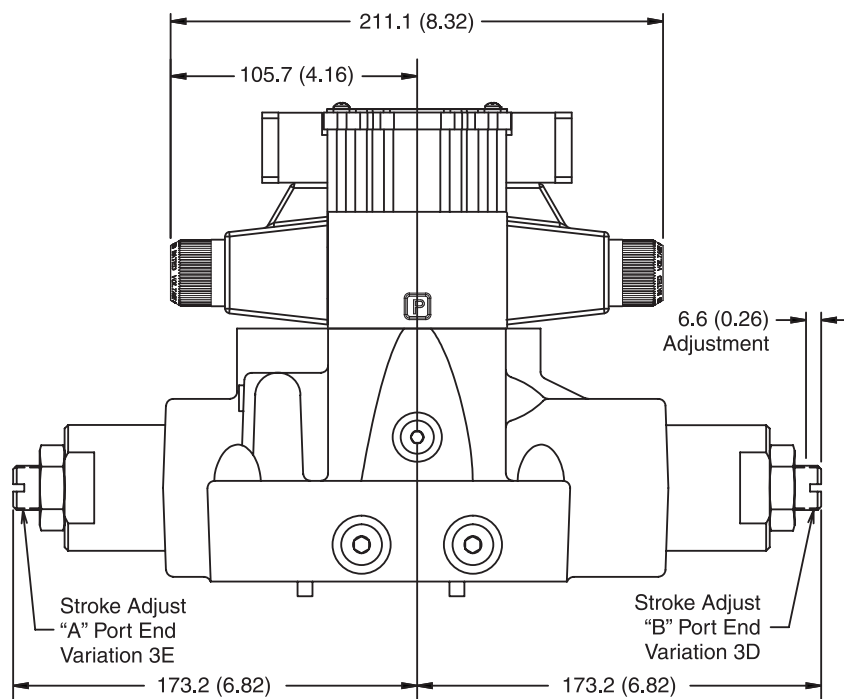
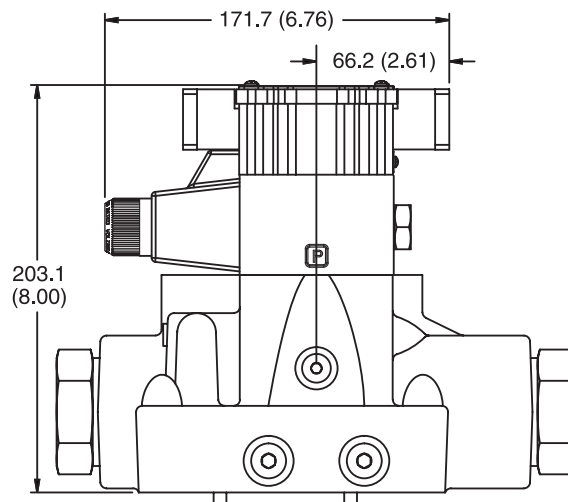
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Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.



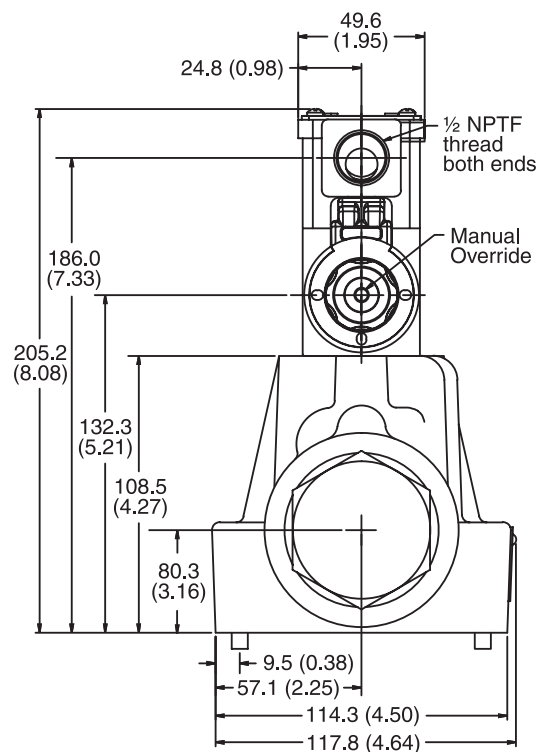
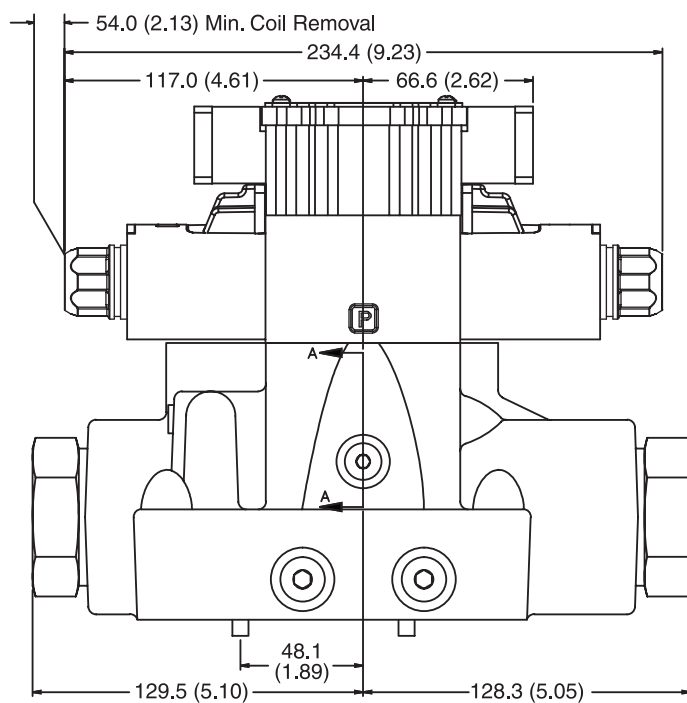
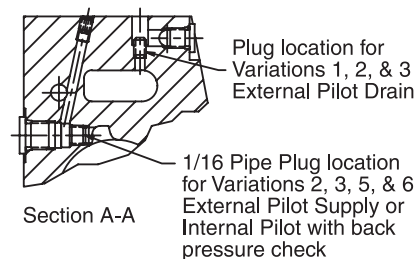
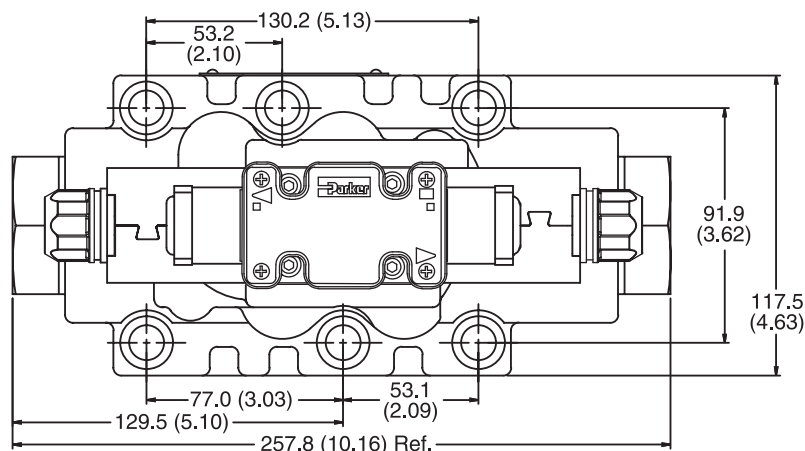
Inch equivalents for millimeter dimensions are shown in (**)

A**Plug-in Conduit Box and Stroke Adjust, Double AC Solenoid****Note:** 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.**Plug-in Conduit Box, Single AC Solenoid****Note:** 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

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

Plug-in Conduit Box, Double DC Solenoid

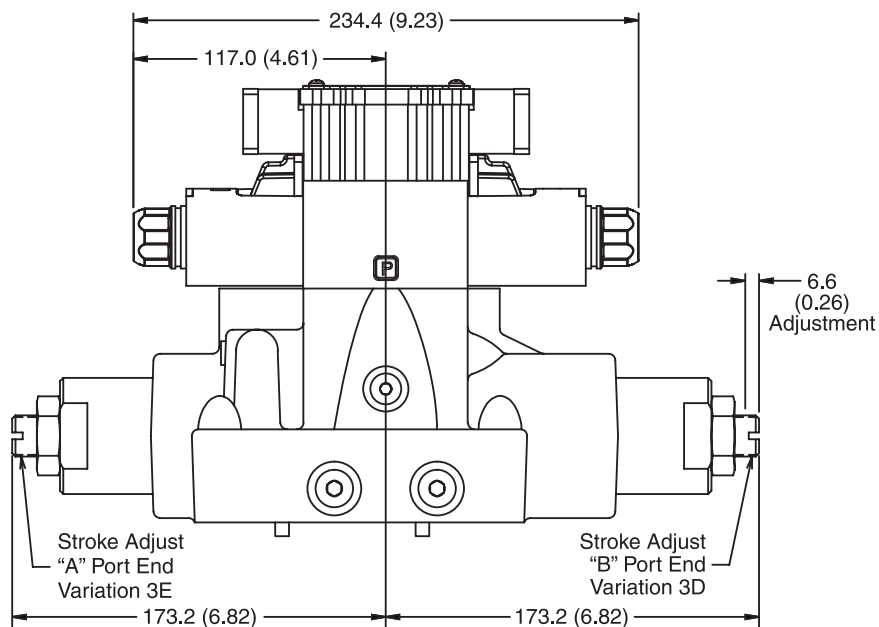
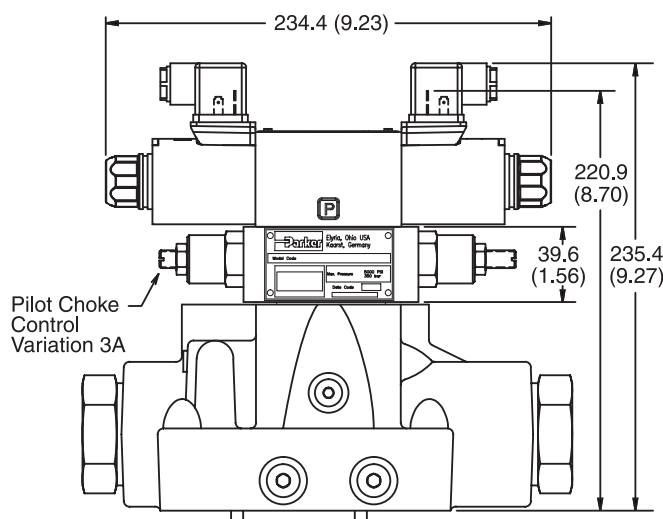
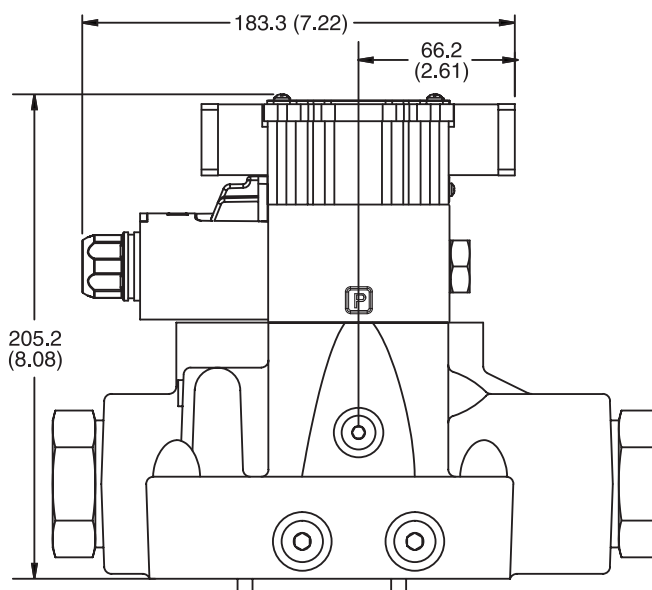
A



Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

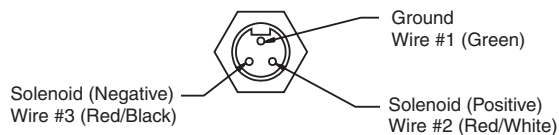


Inch equivalents for millimeter dimensions are shown in (**)

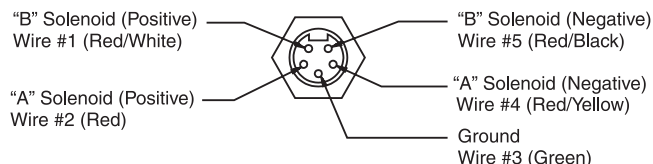
A**Plug-in Conduit Box and Stroke Adjust, Double DC Solenoid****Note:** 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.**Hirschmann and Pilot Choke Control, Double DC Solenoid****Plug-in Conduit Box, Single DC Solenoid**

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

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

**3-Pin Manaplug (Mini) with Lights**

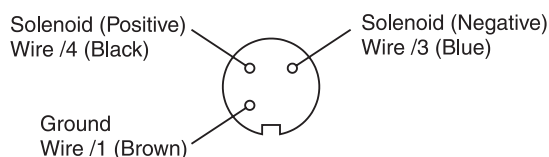
Single Solenoid Valves – Installed Opposite Side of Solenoid

**5-Pin Manaplug (Mini) with Lights**

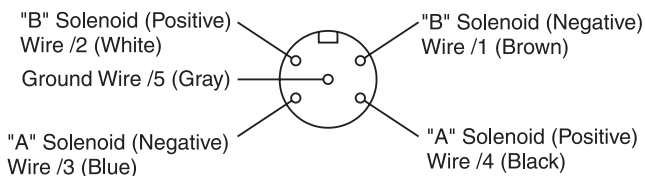
Single Solenoid Valves – Installed Opposite Side of Solenoid

Double Solenoid Valves – Installed Over "A" Solenoid

("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Micro Connector Options (7A, 7B, 1B & 1D)**3-Pin Manaplug (Micro) with Lights**

Single Solenoid Valves – Installed Opposite Side of Solenoid

**5-Pin Manaplug (Micro) with Lights**

Single Solenoid Valves – Installed Opposite Side of Solenoid

Double Solenoid Valves – Installed Over "A" Solenoid

("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)**Manaplug – Electrical Mini Plug**

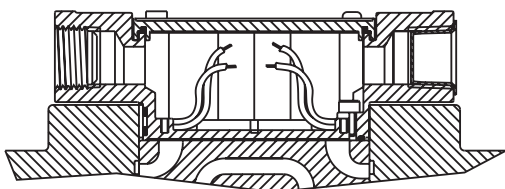
- EP336-30 3 Pin Plug
 EP316-30 5 Pin Plug (Double Solenoid)
 EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

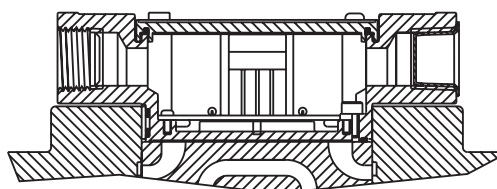
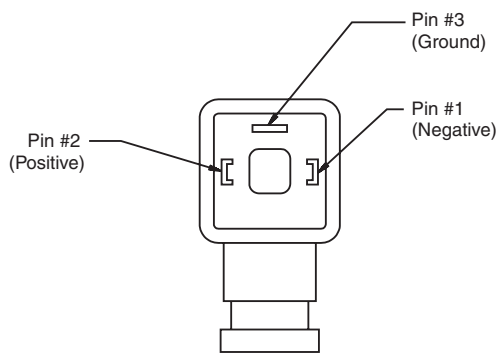
- EP337-30 3 Pin Plug
 EP317-30 5 Pin Plug (Double Solenoid)
 EP31B-30 5 Pin Plug (Single Solenoid)

Conduit Box Option C

- No Wiring Options Available

**Signal Lights (Option 5) — Plug-in Only**

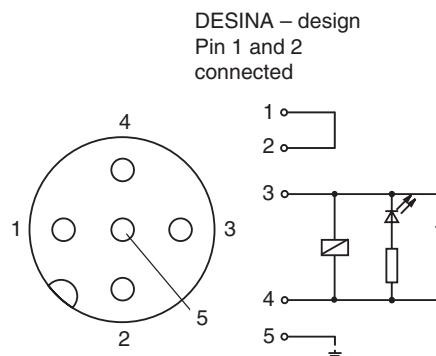
- LED Interface
 – Meets Nema 4/IP67

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

Face View of Plug

DESINA Connector (Option D)**M12 pin assignment
Standard**

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

DESINA – design
Pin 1 and 2
connected**Pins are as seen on valve (male pin connectors)**

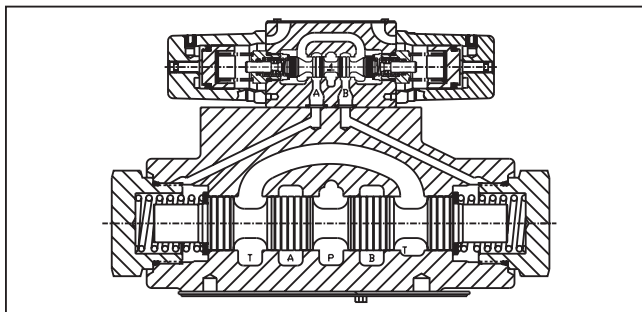
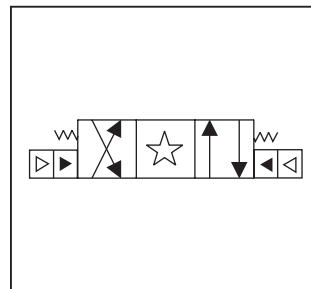
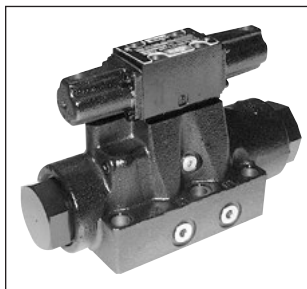
General Description

A

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 sub-plate mounted, and conform to NFPA's D08, CETOP 8 mounting patterns.

Specifications

Mounting Pattern	NFPA D08, CETOP 8, NG25
Max. Oper. Pressure	207 Bar (3000 PSI)
Max. Tank Pressure	Internal Drain Model: 34 Bar (500 PSI) External Drain Model: 207 Bar (3000 PSI)
Max. Drain Pressure	34 Bar (500 PSI)
Maximum Flow	See Reference Data
Pilot Pressure	Air Min. 3.4 Bar (50 PSI) Air Max. 10.2 Bar (150 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)



Features

- Low pressure drop.
- Fast response option available.
- Hardened spools provide long life.

Ordering Information

D

Directional Control Valve

61V

Basic Valve

A

Air Operated Pilot

Spool

Style

Pilot Supply and Drain

Seal

Valve Variations

Design Series

**NFPA D08
CETOP 8**

Code	Symbol	Code	Symbol
001		011	
004		012	
008*			
009**			

* 008 spool has closed crossover.

** 009 spool has open crossover.

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

Valve Weight: 12.4 kg (27.3 lbs.)

Standard Bolt Kit: BK227

Metric Bolt Kit: BKM227

Seal Kit: Nitrile SKD61VA
Fluorocarbon SKD61VAV

Code	Description
N	Nitrile
V	Fluorocarbon

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

Not available with 008 & 009 spools.

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

NOTE:
Not required when ordering.

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

This condition varies with spool code.

* Not available on 008 and 009 spools.

Bold: Designates Tier I products and options.

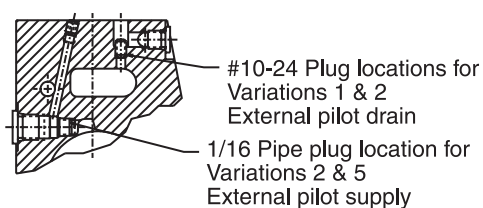
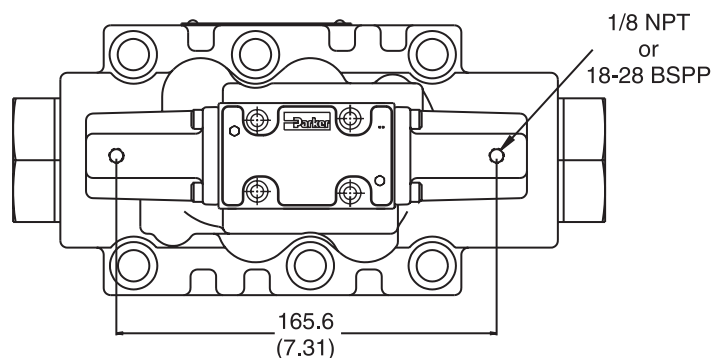
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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.

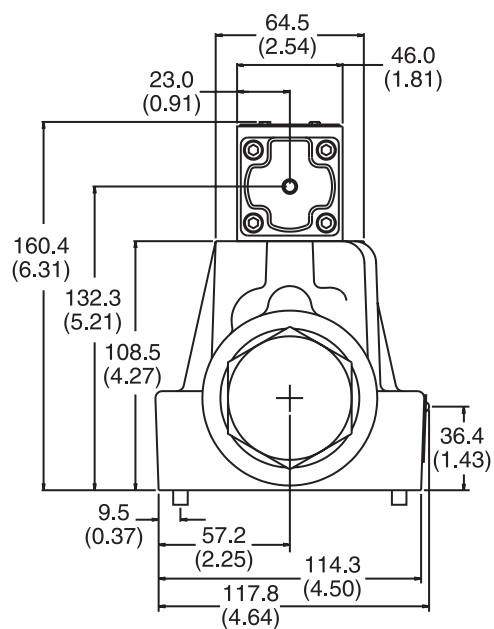
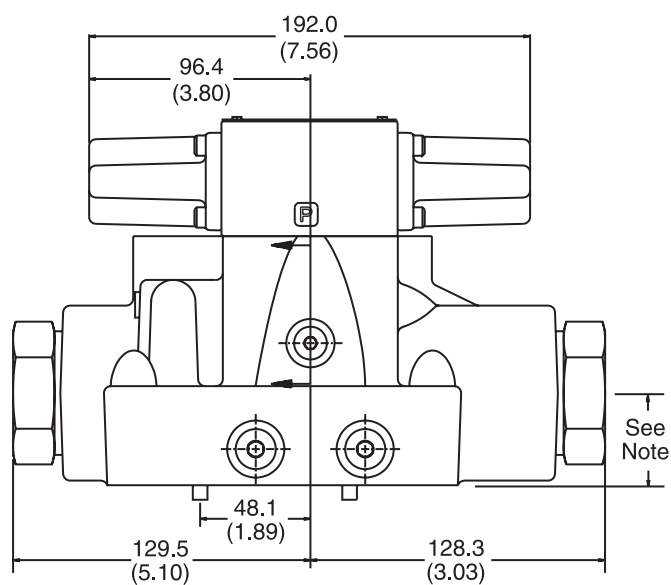
A01_Cat2500.indd, ddp, 04/19

Dimensions**Directional Control Valves****Series D61VA**

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



SECTION A-A

**Note:** 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.







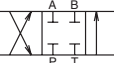



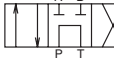
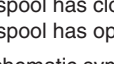
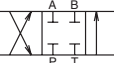



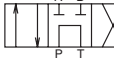
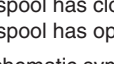
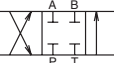



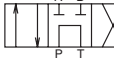
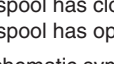
General Description

Series D61VL directional control valves are 5-chamber, lever operated valves. They are available in 2 and 3-position styles. They are manifold or sub-plate mounted valves, which conform to NFPA's D08, CETOP 8 mounting patterns.

Specifications

Mounting Pattern	NFPA D08, CETOP 8, NG25
Max. Oper. Pressure	207 Bar (3000 PSI)
Max. Tank Pressure	Internal Drain Model: 34 Bar (500 PSI) External Drain Model: 207 Bar (3000 PSI)
Max. Drain Pressure	34 Bar (500 PSI)
Maximum Flow	See Reference Data
Pilot Pressure	Oil Min. 6.9 Bar (100 PSI) Oil Max. 207 Bar (3000 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)

Ordering Information

D Directional Control Valve	61V Basic Valve	L Lever Operated Pilot	 Spool	 Style	 Pilot Supply and Drain	 Seal	 Valve Variations	 Design Series																																																		
NFPA D08 CETOP 8																																																										
<table border="1"> <thead> <tr> <th>Code</th> <th>Symbol</th> <th>Code</th> <th>Symbol</th> </tr> </thead> <tbody> <tr> <td>001</td> <td></td> <td>011</td> <td></td> </tr> <tr> <td>004</td> <td></td> <td>012</td> <td></td> </tr> <tr> <td>008*</td> <td></td> <td></td> <td></td> </tr> <tr> <td>009**</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Code	Symbol	Code	Symbol	001		011		004		012		008*				009**				<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Int. pilot/Ext. drain</td> </tr> <tr> <td>2</td> <td>Ext. pilot/Ext. drain</td> </tr> <tr> <td>4#</td> <td>Int. pilot/Int. drain</td> </tr> <tr> <td>5</td> <td>Ext. pilot/Int. drain</td> </tr> </tbody> </table> <p># Not available with 008 & 009 spools.</p>		Code	Description	1	Int. pilot/Ext. drain	2	Ext. pilot/Ext. drain	4#	Int. pilot/Int. drain	5	Ext. pilot/Int. drain	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>N</td> <td>Nitrile</td> </tr> <tr> <td>V</td> <td>Fluorocarbon</td> </tr> </tbody> </table>		Code	Description	N	Nitrile	V	Fluorocarbon	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>7</td> <td>Pilot Choke – Meter Out</td> </tr> <tr> <td>8</td> <td>Stroke Adj. 'B' End</td> </tr> <tr> <td>9</td> <td>Stroke Adj. 'A' End</td> </tr> <tr> <td>60</td> <td>Pilot Choke – Meter In</td> </tr> <tr> <td>89</td> <td>Stroke Adj. 'A' & 'B' Ends</td> </tr> <tr> <td>90</td> <td>1/4 BSPP Threads</td> </tr> </tbody> </table>		Code	Description	7	Pilot Choke – Meter Out	8	Stroke Adj. 'B' End	9	Stroke Adj. 'A' End	60	Pilot Choke – Meter In	89	Stroke Adj. 'A' & 'B' Ends	90	1/4 BSPP Threads	<p>NOTE: Not required when ordering.</p>
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* 008 spool has closed crossover.

** 009 spool has open crossover.

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator A. See installation information for details.

Valve Weight: 12.1 kg (26.7 lbs.)

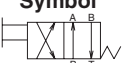

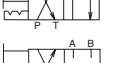



Standard Bolt Kit: BK227

Metric Bolt Kit: BKM227

Seal Kit:

Nitrile SKD61VL

Fluorocarbon SKD61VLV

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

*Available with 001, 004, 011 & 012.

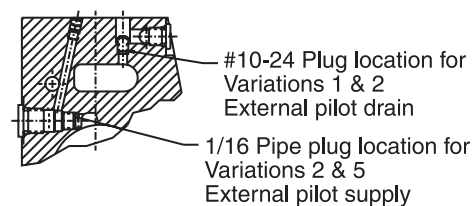
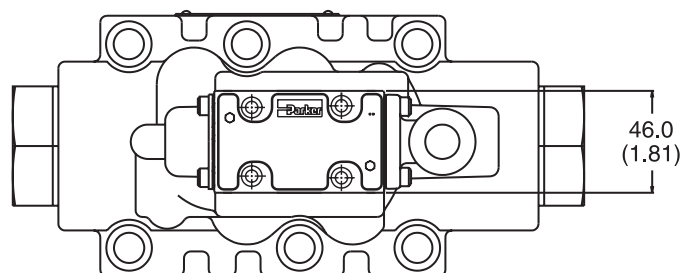
Bold: Designates Tier I products and options.

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

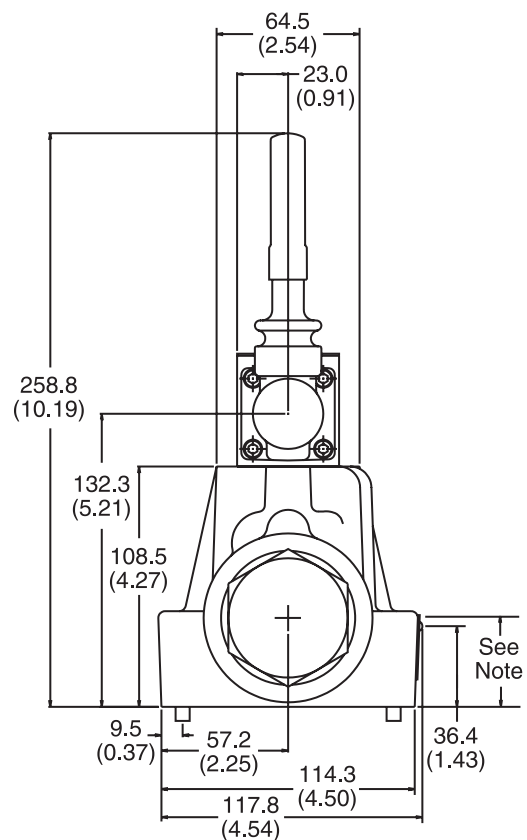
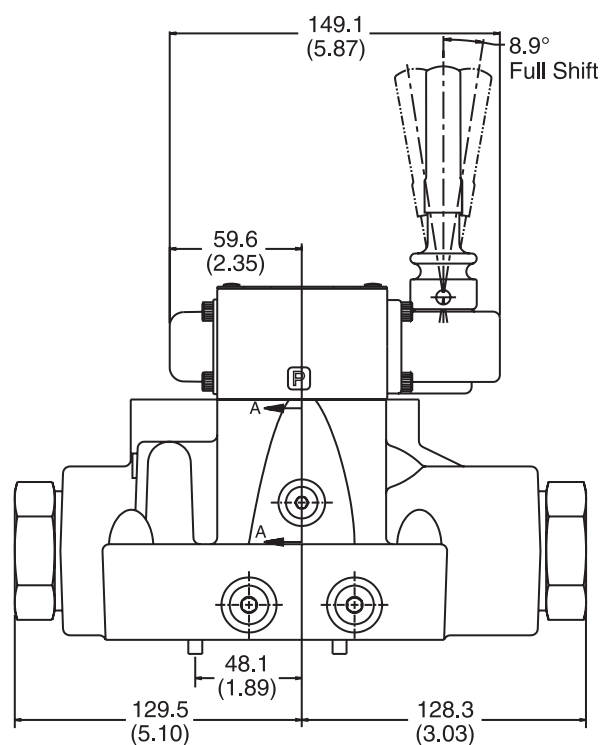
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information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

A01_Cat2500.indd, ddp, 04/19

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



SECTION A-A



Note: 41.9mm (1.65") from bottom of bolt counterbore.



A

General Description

Series D6P directional control valves are 5-chamber, pilot operated valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting patterns.

Features

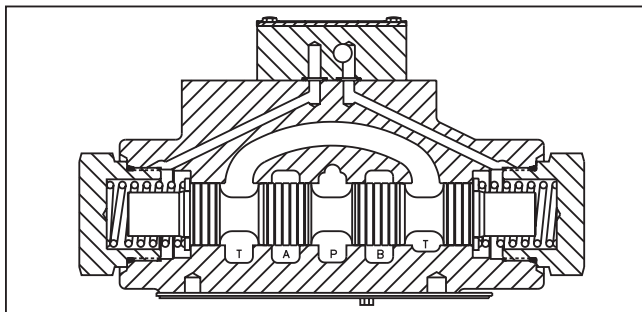
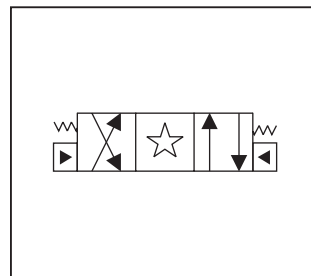
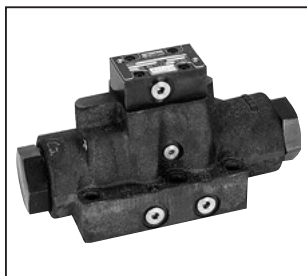
- Low pressure drop design.
- Hardened spools provide long life.
- Fast response option available.

Specifications

Mounting Pattern	NFPA D08, CETOP 8, NG25
Max. Operating Press.	207 Bar (3000 PSI)
Max. Tank Line Press.	207 Bar (3000 PSI)
Max. Drain Pressure	207 Bar (3000 PSI)
Min. Pilot Pressure	5.1 Bar* (75 PSI)
Max. Pilot Pressure	207 Bar (3000 PSI)
Nominal Flow	189 Liters/Min (50 GPM)
Maximum Flow	See Reference Chart

* 6.9 Bar (100 PSI) for 2, 8, 9 & 12 spools

For flow path, pilot drain and pilot pressure details, see Installation Information.



Response Time

Response time will vary with pilot line size, pilot line length, pilot pressure shift time and flow capacity of the control valve.

Shift Volume

The pilot chamber requires a volume of 0.54 in³ for center to end and 1.08 in³ for end to end.

Ordering Information

<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">D</div> Directional Control Valve	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">6</div> Basic Valve	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">P</div> Hydraulic Pilot	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Spool	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Style	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Pilot Supply and Drain	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Seal	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Valve Variations	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Design Series																																														
<div style="border: 1px solid black; padding: 2px; width: 100px; margin: 0 auto;">NFPA D08 CETOP 8</div>																																																						
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* 008 spool has closed crossover.

** 009 spool has open crossover.

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

Valve Weight: 11.0 kg (24.2 lbs.)

Standard Bolt Kit: BK227

Metric Bolt Kit: BKM227

Bold: Designates Tier I products and options.

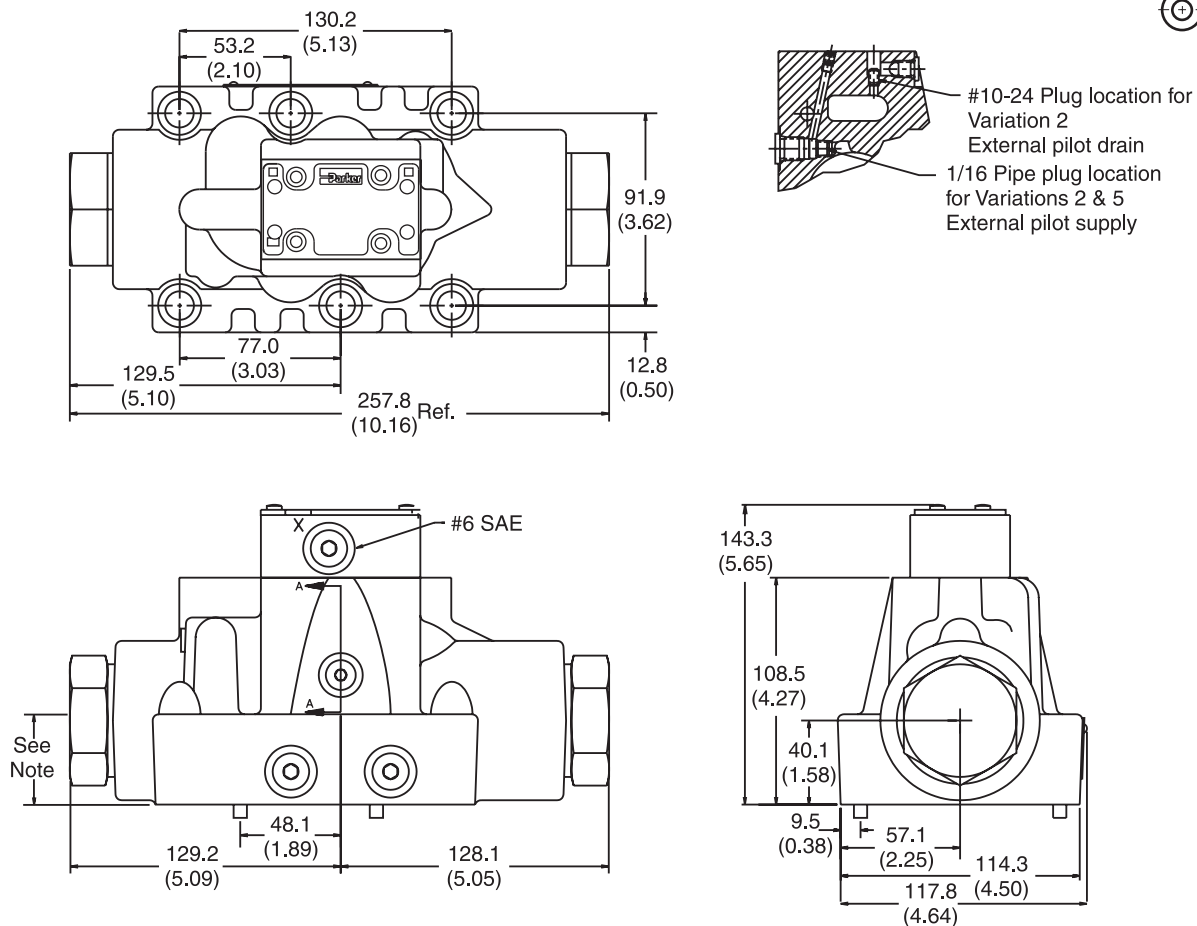
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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.

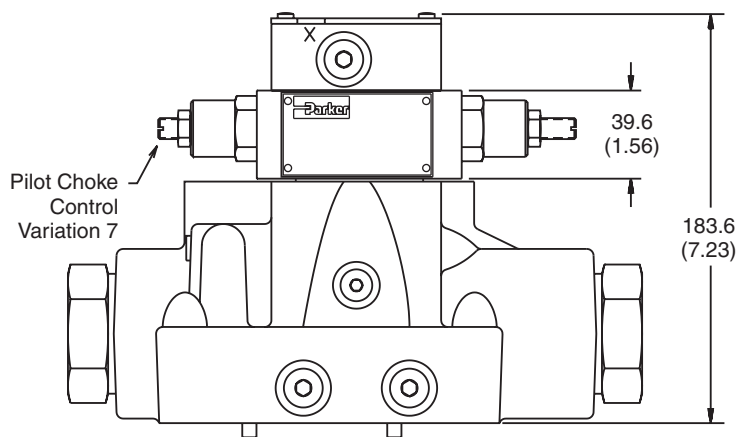
A01_Cat2500.indd, ddp, 04/19

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

Standard Pilot Operated

**A****Note:** 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

Pilot Operated with Pilot Choke Control

**Note:** 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

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

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

Mounting Position

Detent – Horizontal

Spring Offset – Unrestricted

Spring Centered – Unrestricted

Fluid Recommendations

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

Fluids and Seals

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

Filtration

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

Silting

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

Special Installations

Consult your Parker representative for any application requiring the following:

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

Mounting Patterns

Series	NFPA	Size
D61V*, D6P	D08, CETOP 8	3/4"

Torque Specifications

The recommended torque values for the bolts which mount the valve to the manifold or subplate are as follows: 135.6 Nm (100 ft-lbs).

Series D61VW, D61VA, D61VL**Tank and Drain Line Surges**

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

Electrical Characteristics (Detented Spool)

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

Electrical Failure or Loss of Pilot Pressure (D61VA)

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

Pilot/Drain Characteristics**Pilot Pressure:**

5.1 to 207 Bar (75 to 3000 PSI)

6.9 Bar (100 PSI) for spools 008 & 009

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

Internal: Flow is internally ported from the pressure port of the main valve body to the “P” port of the pilot valve. The pressure developed at the “P” port of the pilot valve must be 5.1 Bar (75 PSI) minimum at all times or 6.9 Bar (100 PSI) for spools 002, 007, 008, 009 & 014.

Integral Check: Valves using internal pilot and internal drain with an open center spool (spools 008 & 009) can be ordered with an integral check valve in the pressure port of the main valve codes 3 & 6. Pilot oil will be internally ported from the upstream side of this check to the “P” port of the pilot valve, ensuring sufficient pilot pressure. A 1/16" pipe plug will be present in the main body. The “X” port in the subplate must be plugged when using the integral check.

Pilot Valve Drain:

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

External: When using an external drain, a 10 x 24 x 0.31 long set screw must be present in the main body drain passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with drain code 1, 2 or 3.

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

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

D61V* Flow Paths

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

† D61VW only.

A01_Cat2500.indd, ddp, 04/19

Series D6P

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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:

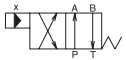
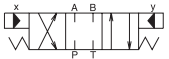
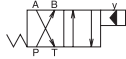
5.1 to 207 Bar (75 to 3000 PSI)
 6.9 Bar (100 PSI) for spools 8, 9 & 12

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

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

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

Flow Path/Pilot Pressure

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

Subplate Mounting

NFPA D08, CETOP 8 & NG 25

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 135.6 Nm (100 ft-lbs).

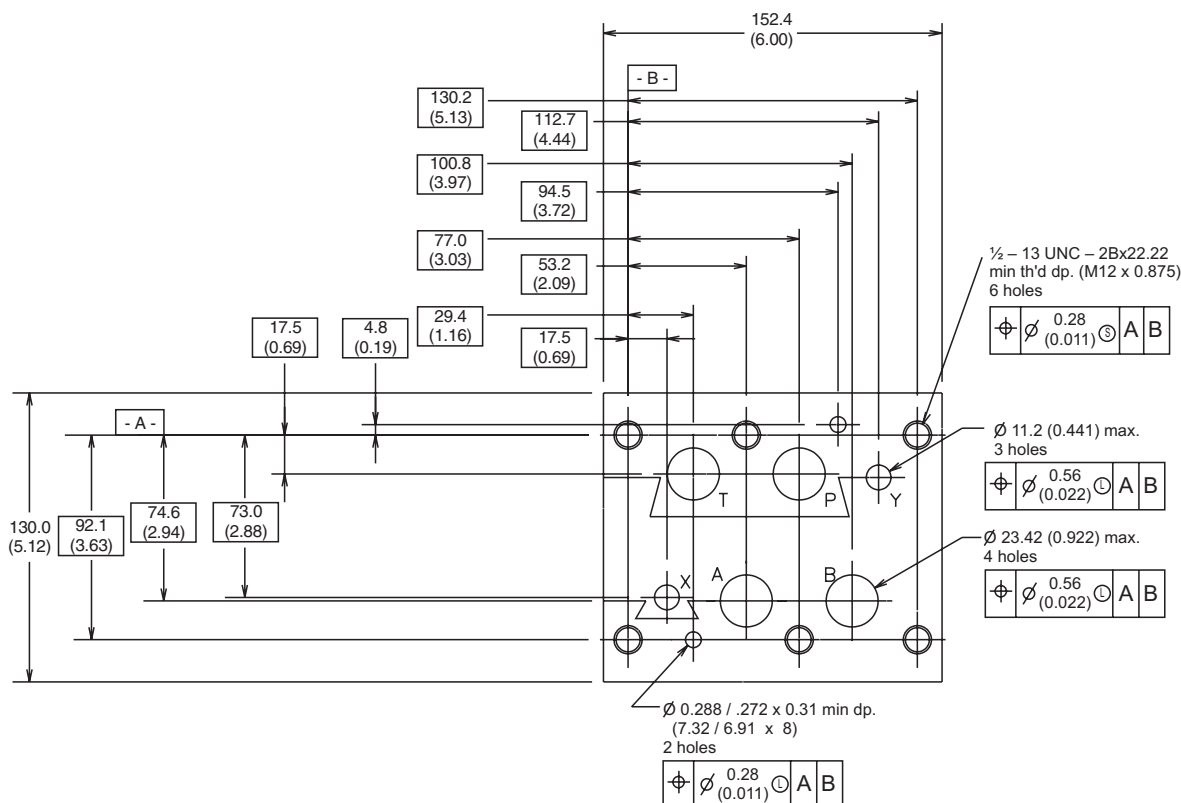
Mounting Position

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

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

Mounting Pattern — NFPA D08, CETOP 8 & NG 25

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



A**Application**

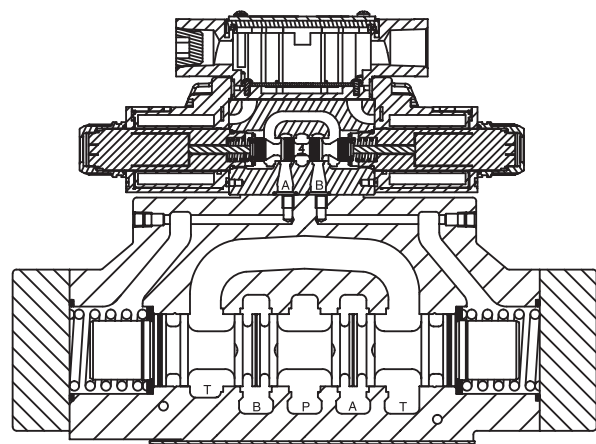
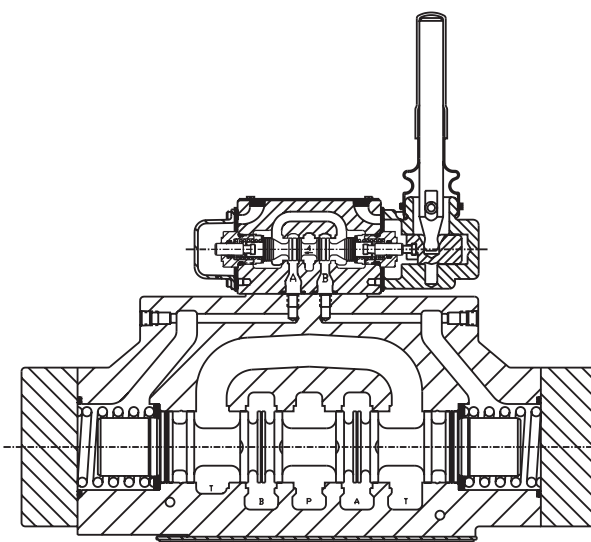
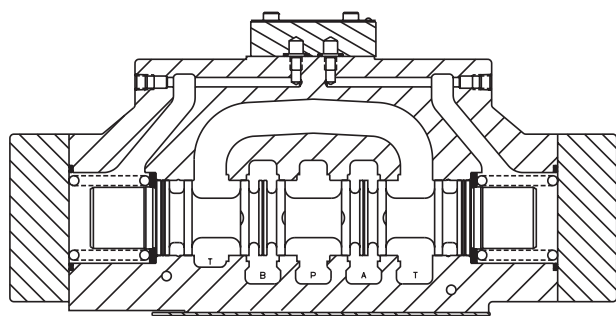
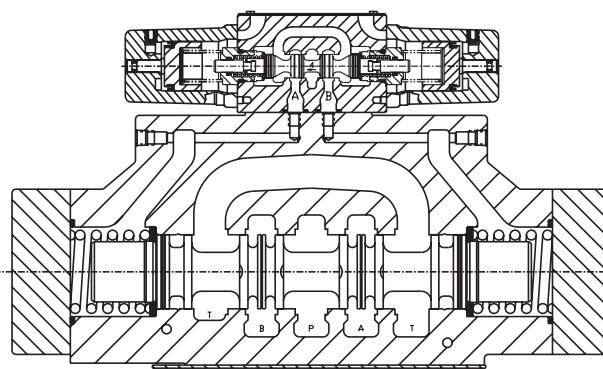
Series D81 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles and are manifold mounted. These valves conform to NFPA's D08, CETOP 8 mounting pattern.

Operation

Series D81 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or pilot operators (hydraulic or pneumatic).

Features

- Easy access mounting bolts.
- 345 Bar (5000 PSI) pressure rating.
- Flows to 622 LPM (160 GPM) depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.

**D81VW Solenoid Operated Plug-in Conduit Box****D81VL Lever Operated****D8P Oil Pilot Operated****D81VA Air Pilot Operated**

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.

A01_Cat2500.indd, ddp, 04/19

General Description

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





Operation

Series D81VW pilot operated valves are standard with low shock spools and pilot orifice. The orifice can be removed if a faster shift is required. It is recommended, however, that all systems operating above 138 Bar (2000 PSI) use the standard valve to avoid severe shock.

Features

- Low pressure drop design.
- Hardened spools provide long life.
- Fast response option available.
- Wide variety of voltages and electrical connection options.
- Explosion proof availability.
- No tools required for coil removal.

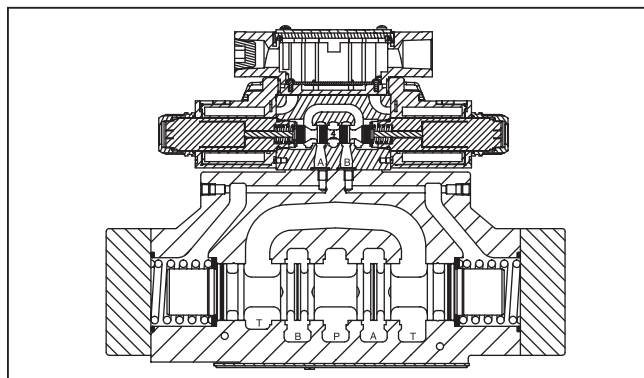
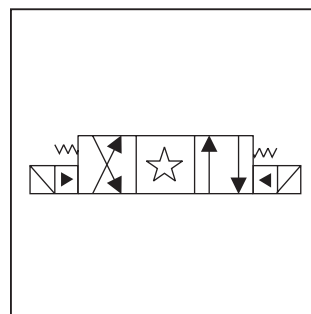
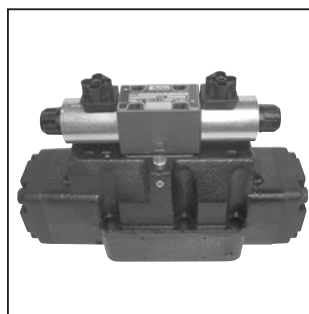
Specifications

Mounting Pattern	NFPA D08, CETOP 8, NG25
Maximum Operating Pressure	345 Bar (5000 PSI) Standard 207 Bar (3000 PSI) 10 Watt CSA  207 Bar (3000 PSI)
Maximum Tank Line Pressure	Internal Drain Model: 103 Bar (1500 PSI) AC Only 207 Bar (3000 PSI) DC Std., AC Optional External Drain Model: 345 Bar (5000 PSI) CSA  103 Bar (1500 PSI)
Maximum Drain Pressure	103 Bar (1500 PSI) AC Only 207 Bar (3000 PSI) DC Std., AC Optional CSA  103 Bar (1500 PSI)
Minimum Pilot Pressure	5.1 Bar* (75 PSI)
Maximum Pilot Pressure	345 Bar (5000 PSI) Standard CSA  207 Bar (3000 PSI)
Nominal Flow	302 LPM (80 GPM)

* 6.9 Bar (100 PSI) for spool configurations 002, 007, 008, 009 & 014.

 **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.

A01_Cat2500.indd, ddp, 04/19



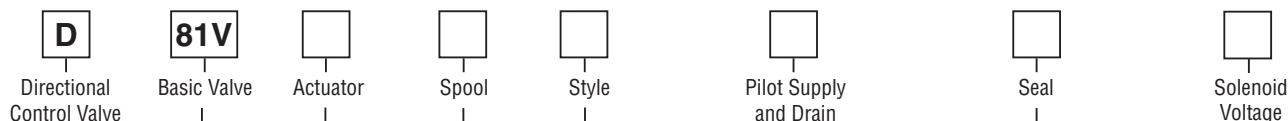
Response Time

Response times (milliseconds) are measured at 345 Bar (5000 PSI) and 300 LPM (80 GPM) with various pilot pressures as indicated.

Solenoid Type	Pilot Pressure	Pull-In		Drop-Out	
		Std	Fast	Std	Fast
DC	500	140	100	70	70
	1000	125	90	76	76
	2000	100	70	70	70
AC	500	100	60	60	60
	1000	85	50	60	60
	2000	60	30	60	60

Because of the high drain line pressure transients generated during shifting, use of the fast response option is not recommended for pilot pressures exceeding 138 Bar (2000 PSI).

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NFPA D08
 CETOP 8
 DIN NG25
 High Flow, D03 Pilot

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

* Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing solenoid A. Note operators reverse sides for #008 and #009 spools. See installation information for details. To configure per DIN standards (A coil over A port, B coil over B port) code valves as D81VHW***.

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

* Not available with 002, 008, 009 & 030 spools.

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
D††#	120 VDC
E**	24 VAC/60 Hz
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.

† DIN only. Not available with CSA.

†† DIN & Leadwire only. Not available with CSA.

* DIN & Plug-In only.

** Leadwire, Low Watt only.

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

* 008, 020 & 026 spools have closed crossover.

** 009 & 030 spools have open crossover.

† DC or AC rectified only.

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

* Available with 020 and 030 spools only.


** High watt coil only.

Bold: Designates Tier I products and options.


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

A01_Cat2500.indd, ddp, 04/19







Solenoid Connection




Coil Options




Tube Options




Manual Override Options*




Electrical Options




Shift Response and Indication




Approvals



Valve Variations



Design Series
NOTE: Not required when ordering.



Monitor Switch Cover

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

* No variations – See Plug-in.
** DC only, lights, diode surge suppressor, not CSA approved.
† Not available with lights or AC rectified.
†† Required for variations on conduit box style. Must have lights.
12 and 24 volt DC only, no lights, not CSA approved.
‡ 12 VDC Hi Watt, not CSA approved

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

* DC only. DIN coil must have plug with lights.
24 VDC “ET” available. Also adds dust rating. Not polarity sensitive [IIC, D].
† DC tube standard, plug-in only. Polarity sensitive coil is stamped (±)

Code	Description
Omit	Standard
P	Extended with Boot
T#	Covered Manual Overdrive

* Manual override not available with Explosion Proof.
Only available with monitor switch option.

Code	Description
Omit*	High Watt
D**	Explosion Proof, EExd ATEX
E**	Explosion Proof EExme ATEX, IECEx, from Germany
F†	Low Watt
L††	10 Watt
T#	Explosion Proof, Ex d IIC ATEX/CSA
U#	Explosion Proof, UL/CSA

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

Code	Description
Omit	Standard Pressure 103 Bar (1500 PSI) AC 207 Bar (3000 PSI) DC
H*	High Pressure, AC only 207 Bar (3000 PSI)

* Not available with CSA or Explosion Proof.

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

* DC only. DIN coil must have plug with lights.
24 VDC “ET” available. Also adds dust rating. Not polarity sensitive [IIC, D].
† DC tube standard, plug-in only. Polarity sensitive coil is stamped (±)

Code	Description
Omit	Standard Valve
4* †#	CSA Canada CSA22.2 No. 139-10

* Not available with AC high pressure tube.
† E, J, K, Y, U, T: Voltages only. C, G, W: Solenoid connections. E & T voltages only available with C Solenoid Connection, Low Watt only. Conforms to UL429.
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 Coils only.

Mounting Bolt Kits

UNC Bolt Kits for use with D6 and D8 Directional Control Valves & Sandwich Valves				
	Number of Sandwich Valves @ 2.75" (70mm) thickness			
	0	1	2	3
D6	BK227 2.50"	BK121 5.25"	BK122 8.00"	BK123 10.75"
D6 plus tapping plate	BK161 3.50"	BK170 6.25"	BK171 9.00"	BK172 11.75"
D8	BK228 3.00"	BK131 5.75"	BK132 8.50"	BK133 11.25"
D8 plus tapping plate	BK173 4.00"	BK174 6.75"	BK175 9.50"	BK114 12.125"

Note: All bolts are SAE grade 8, 1/2-13 UNC-3A thread, torque to 133 N.m. (100 ft.-lbs.)

Valve Weight:

Double Solenoid 19.6 kg (43.2 lbs.)

Seal Kit:

Nitrile SKD81VWN91
Fluorocarbon SKD81VWV91

Bold: Designates Tier I products and options.

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

A

Valve Variations

Code	Description
5*	Signal Lights – Standard
	Signal Lights – Hirsch. (DIN with Plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with Lights
56**	Manaplug (Mini) with Lights
20	Fast Response
1C**	Manaplug (Mini) Single Sol. 5-pin, with Lights
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1M**	Manaplug Opposite Normal
1P	Painted Body
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	Pilot Choke Meter Out
3B	Pilot Choke Meter In
3C	Pilot Pressure Reducer
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	Pilot Choke Meter Out with Lights
3H*	Pilot Choke Meter In with Lights
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights, Mini Manaplug, Pilot Choke Meter Out
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights
XB990†	CE Marking

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

** Must have plug-in style conduit box.

† Above 50 VAC or 75 VDC must have "4" CSA approved coils.

Reference Data

Model	Spool Symbol	Maximum Flow, LPM (GPM) 345 Bar (5000 PSI) w/o Malfunction	Model	Spool Symbol	Maximum Flow, LPM (GPM) 345 Bar (5000 PSI) w/o Malfunction
D81V*001		624 (160)	D81V*011		624 (160)
D81V*002		624 (160)	D81V*012		312 (80)
D81V*003		624 (160)	D81V*015		624 (160)
D81V*004		624 (160)	D81V*016		624 (160)
D81V*006		624 (160)	D81V*020 D81V*030		624 (160)
D81V*008 D61V*009		312 (80)			



D81V* Series Pressure Drop Chart

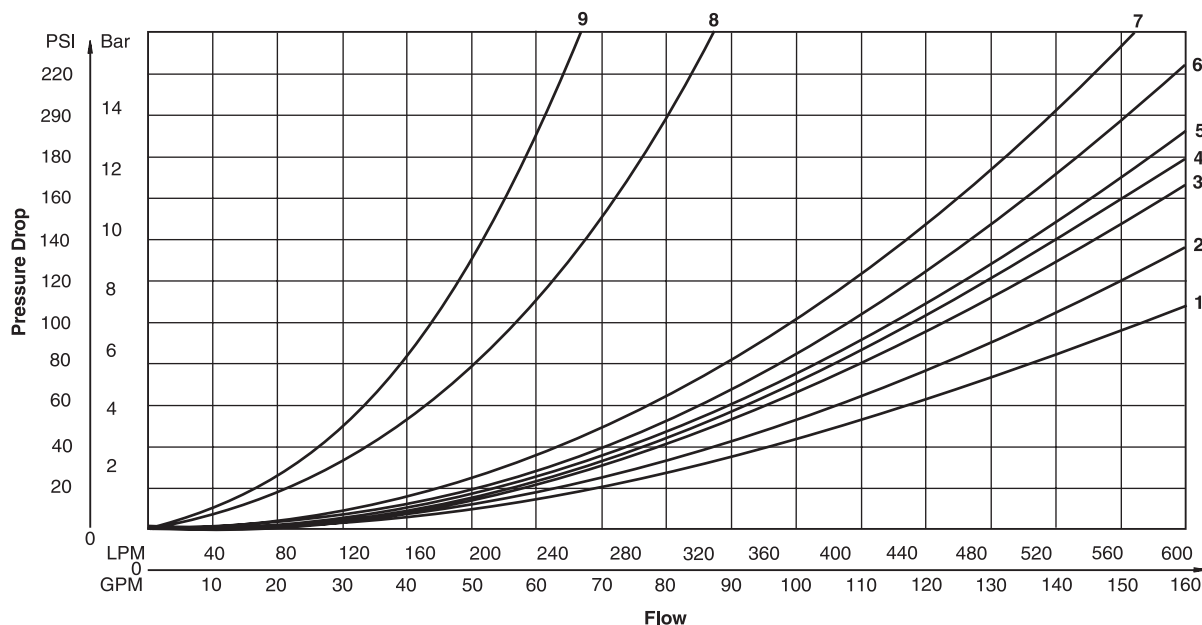
The following chart provides the flow vs. pressure drop curve reference for the Series D81V* valve by spool type.

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

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

D81VW Pressure Drop Reference Chart – Curve Number					
Spool No.	P-A	P-B	P-T	A-T	B-T
001	1	1	—	3	4
002	2	2	5	4	6
003	1	1	—	4	4
004	1	1	—	4	6
006	2	2	—	3	4
009	2	2	7	3	4
011	1	1	—	3	4
012	1	1	9	3	4
015	2	2	—	5	5
016	2	2	—	4	3
020/030	2	2	—	3	4

Performance Curves



A01_Cat2500.indd, ddp, 04/19

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Solenoid Ratings

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

Explosion Proof Solenoid Ratings*

U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D; Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (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

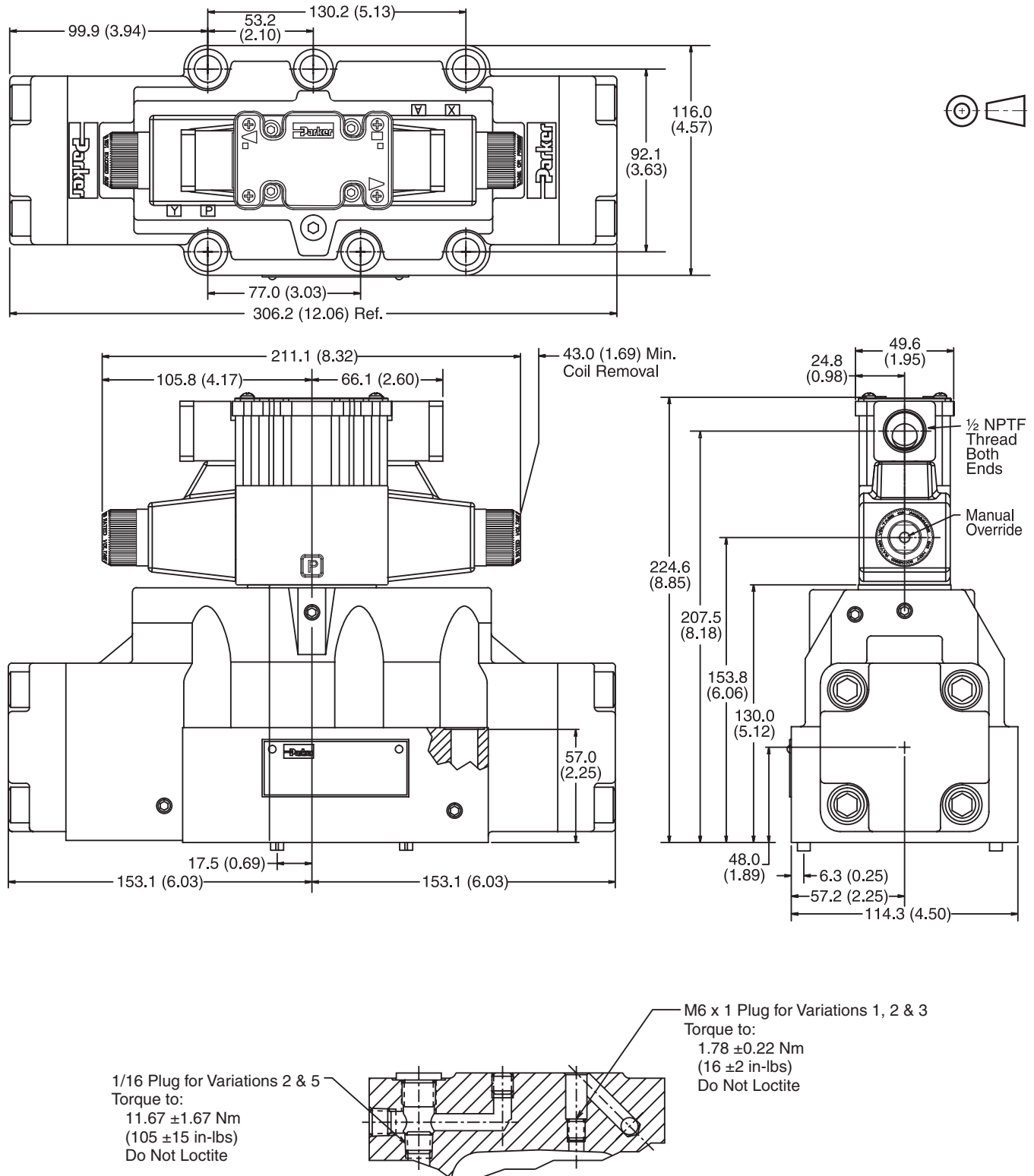
* Allowable Voltage Deviation $\pm 10\%$.

Note that Explosion Proof AC coils are single frequency only.

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
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	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.20 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.20 ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U	L	98 VDC	N/A	N/A	0.10 Amps	10 W	960.00 ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
Z	Omit	250 VDC	N/A	N/A	0.13 Amps	30 W	1889.64 ohms
Explosion Proof Solenoids							
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
"ET" Explosion Proof Solenoids							
K		12 VDC	N/A	N/A	1.00 Amps	12 W	12.00 ohms
J		24 VDC	N/A	N/A	1.00 Amps	13 W	44.30 ohms
Y		120/60-50 VAC	N/A	N/A	0.16 Amps	17 W	667.00 ohms

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

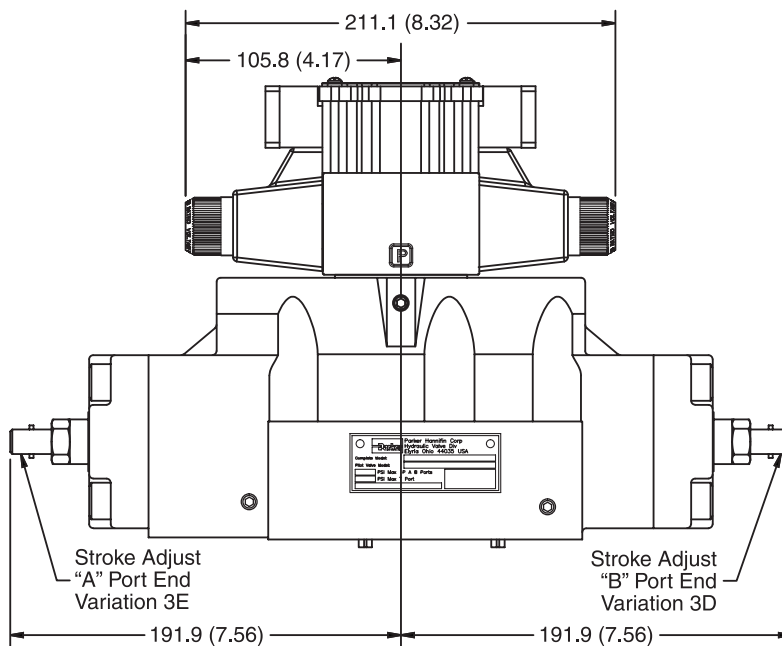
Plug-in Conduit Box, Double AC Solenoid

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

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

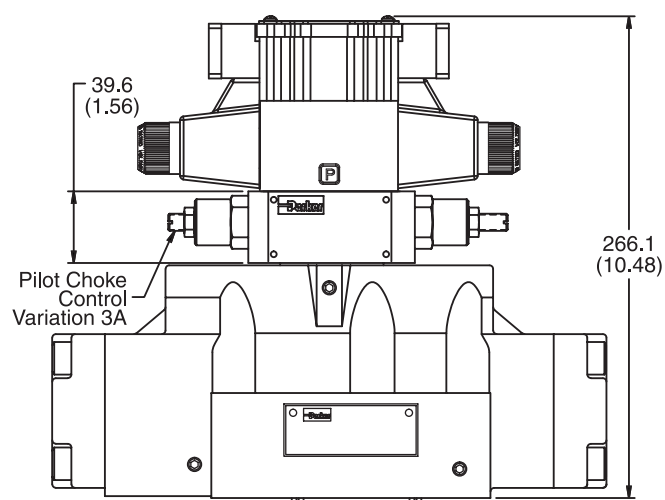
A

Conduit Box and Stroke Adjust, Double AC Solenoid

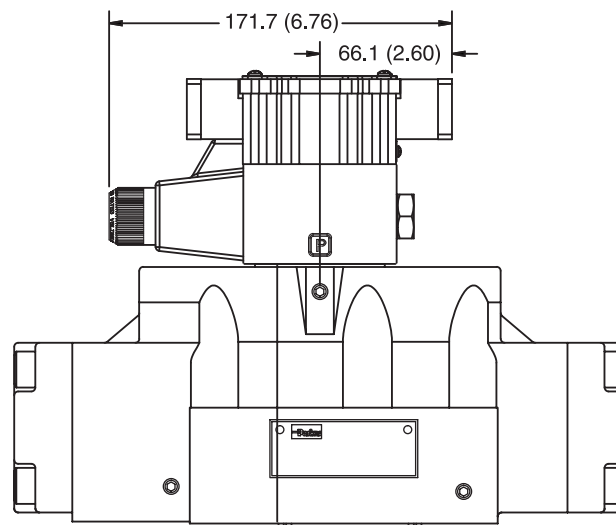


Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

Conduit Box and Pilot Choke Control, Double AC Solenoid

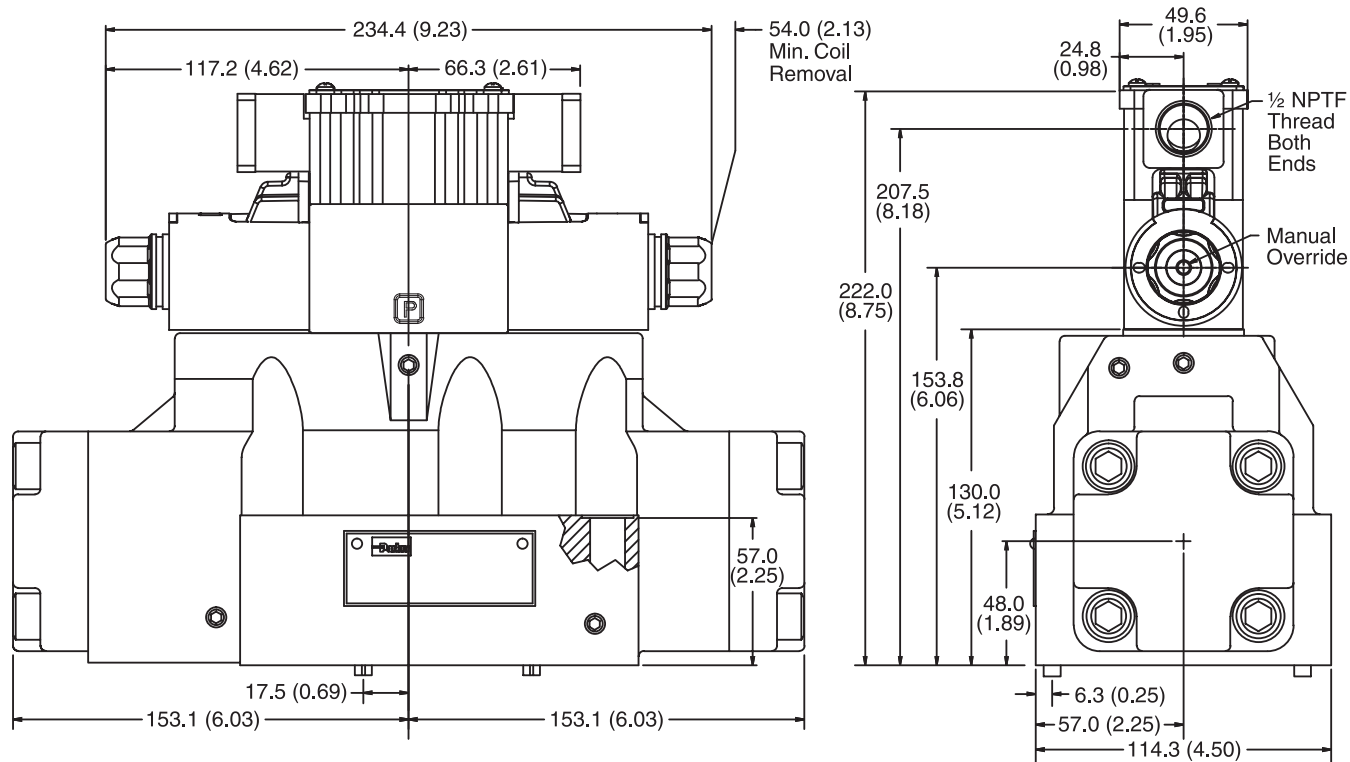
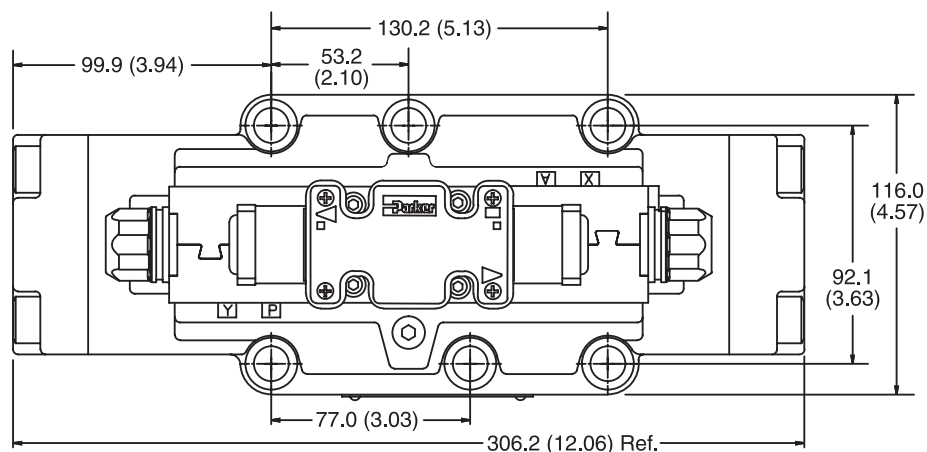


Conduit Box, Single AC Solenoid



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

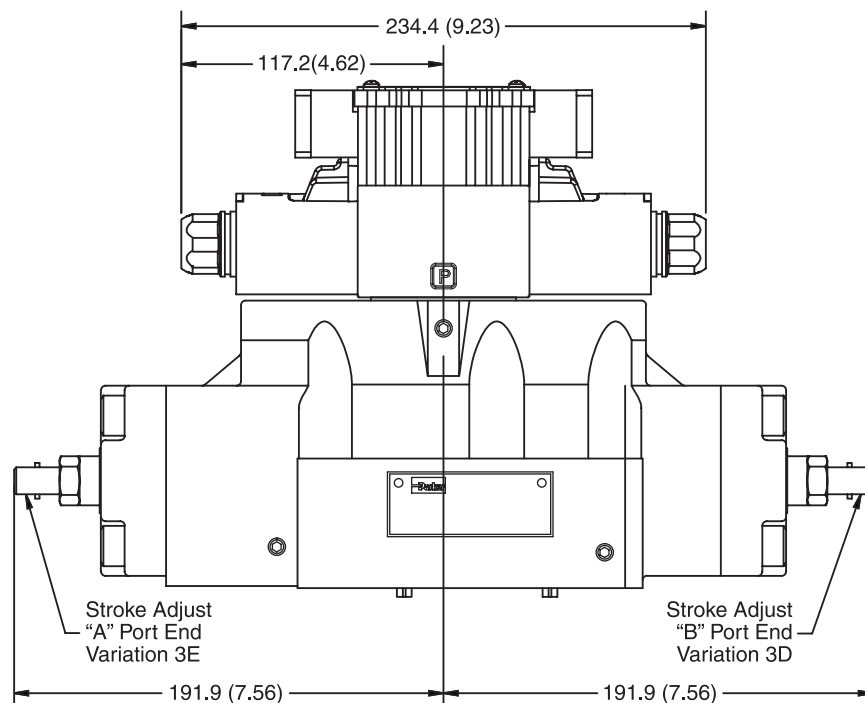
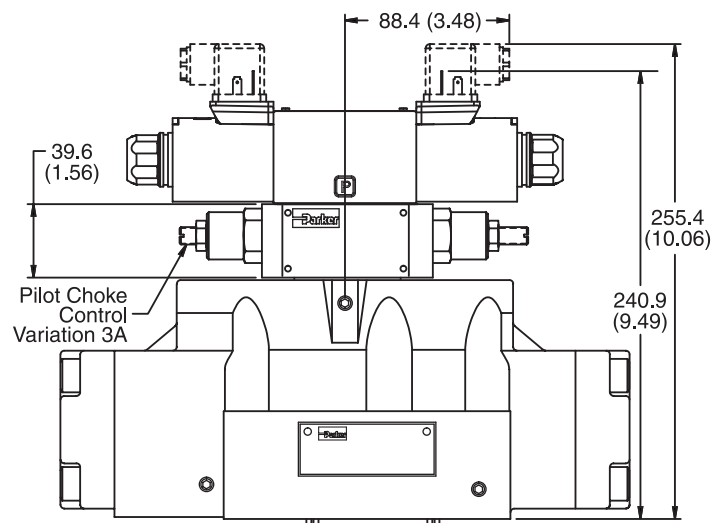
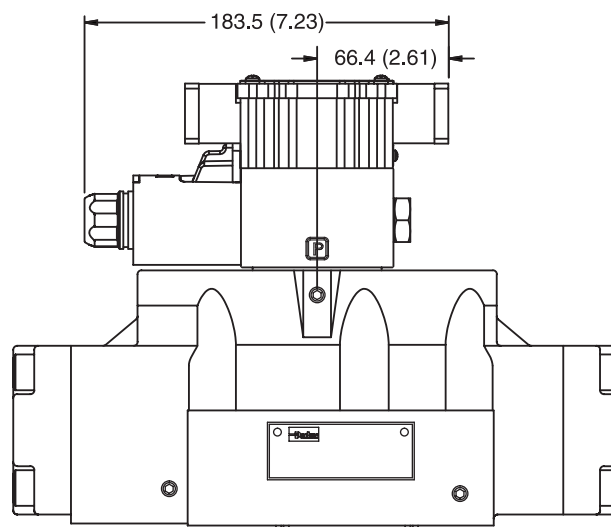
Plug-In Conduit Box, Double DC Solenoid

A


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

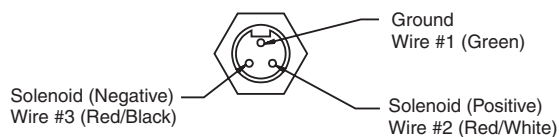


Inch equivalents for millimeter dimensions are shown in (**)

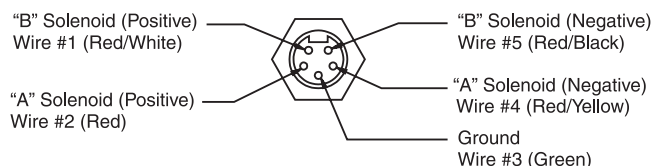
A**Plug-In Conduit Box and Stroke Adjust, Double DC Solenoid****Note:** 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.**Hirschmann and Pilot Choke Control, Double DC Solenoid****Plug-In Conduit Box, Single DC Solenoid**

Manaplug (Options 56 & 1C)

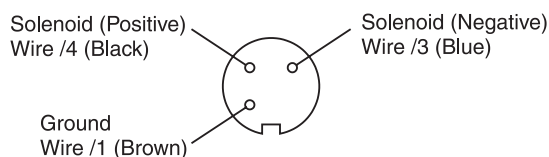
- Interface – Brad Harrison Plug
- 3-Pin for Single Solenoid
 - 5-Pin for Double Solenoid

**3-Pin Manaplug (Mini) with Lights**

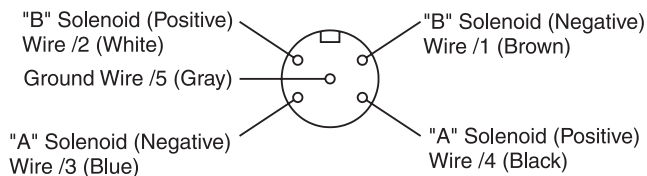
Single Solenoid Valves – Installed Opposite Side of Solenoid

**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**

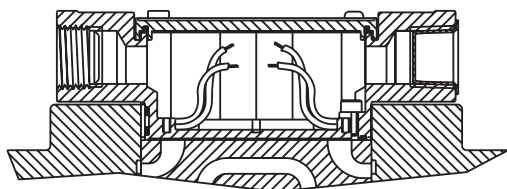
Single Solenoid Valves – Installed Opposite Side of Solenoid

**5-Pin Manaplug (Micro) with Lights**

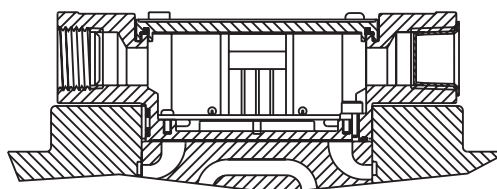
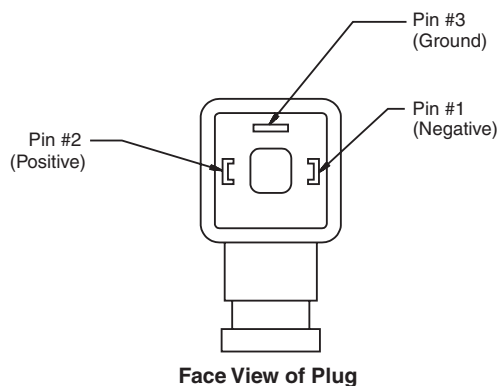
Single Solenoid Valves – Installed Opposite Side of Solenoid
 Double Solenoid Valves – Installed Over "A" Solenoid
 ("A" and "B" Solenoids Reversed for #8 and #9 Spools)

Pins are as seen on valve (male pin connectors)**Conduit Box Option C**

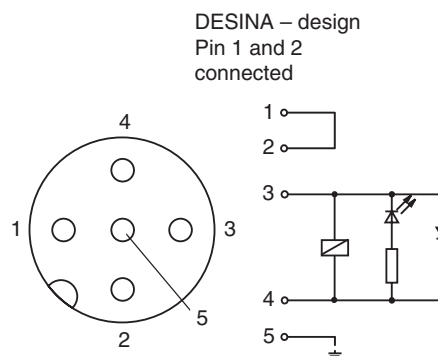
- No Wiring Options Available

**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"****DESINA Connector (Option D)****M12 pin assignment Standard**

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

**Pins are as seen on valve (male pin connectors)**

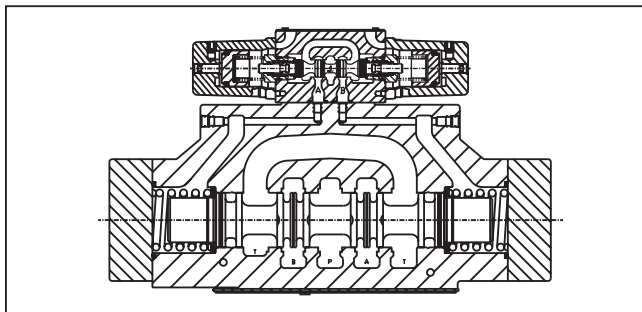
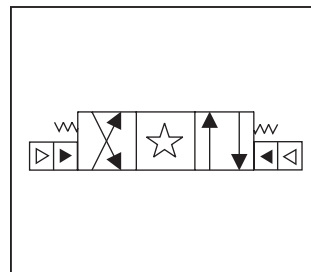
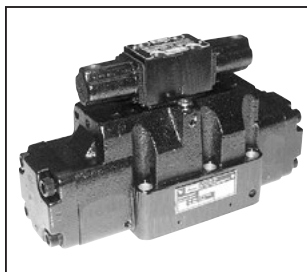
General Description

A

Series D81VA directional control valves are 5-chamber, air pilot operated valves. They are available in 2 or 3-position styles. These valves are manifold or sub-plate mounted, and conform to NFPA's D08, CETOP 8 mounting pattern.

Specifications

Mounting Pattern	NFPA D08 , CETOP 8, NG25
Max. Operating Press.	345 Bar (5000 PSI)
Max. Tank Line Pressure	Internal Drain Model: 34 Bar (500 PSI) External Drain Model: 207 Bar (3000 PSI)
Max. Drain Pressure	34 Bar (500 PSI)
Maximum Flow	See Switching Limit Charts
Pilot Pressure	Air Min 3.4 Bar (50 PSI) Air Max 10.2 Bar (150 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)



Features

- Low pressure drop design.
- Fast response option available.
- Hardened spools provide long life.

Ordering Information

<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">D</div> Directional Control Valve	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">81V</div> Basic Valve <div style="border: 1px solid black; padding: 2px; width: 80px; margin: 0 auto;">NFPA D08 CETOP 8 DIN NG25</div>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">A</div> Air Operated Pilot	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Spool	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Style	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Pilot Supply and Drain	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Seal	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Valve Variations	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Design Series NOTE: Not required when ordering.
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<table border="1"> <thead> <tr> <th>Code</th><th>Symbol</th><th>Code</th><th>Symbol</th></tr> </thead> <tbody> <tr> <td>001</td><td></td><td>011</td><td></td></tr> <tr> <td>002</td><td></td><td>012</td><td></td></tr> <tr> <td>004</td><td></td><td>020*</td><td></td></tr> <tr> <td>009**</td><td></td><td>030**</td><td></td></tr> </tbody> </table> <p>* 020 spool has closed crossover. ** 009 & 030 spools have open crossover.</p>	Code	Symbol	Code	Symbol	001		011		002		012		004		020*		009**		030**		<table border="1"> <thead> <tr> <th>Code</th><th>Description</th></tr> </thead> <tbody> <tr> <td>1</td><td>Int. pilot/Ext. drain</td></tr> <tr> <td>2</td><td>Ext. pilot/Ext. drain</td></tr> <tr> <td>4#</td><td>Int. pilot/Int. drain</td></tr> <tr> <td>5</td><td>Ext. pilot/Int. drain</td></tr> </tbody> </table> <p># Not available with 002, 008, 009 & 030 spools.</p>	Code	Description	1	Int. pilot/Ext. drain	2	Ext. pilot/Ext. drain	4#	Int. pilot/Int. drain	5	Ext. pilot/Int. drain	<table border="1"> <thead> <tr> <th>Code</th><th>Description</th></tr> </thead> <tbody> <tr> <td>7</td><td>Pilot Choke – Meter Out</td></tr> <tr> <td>8</td><td>Stroke Adj. 'B' End</td></tr> <tr> <td>9</td><td>Stroke Adj. 'A' End</td></tr> <tr> <td>60</td><td>Pilot Choke – Meter In</td></tr> <tr> <td>89</td><td>Stroke Adj. 'A' & 'B' Ends</td></tr> <tr> <td>90</td><td>1/4 BSPP Threads</td></tr> </tbody> </table>	Code	Description	7	Pilot Choke – Meter Out	8	Stroke Adj. 'B' End	9	Stroke Adj. 'A' End	60	Pilot Choke – Meter In	89	Stroke Adj. 'A' & 'B' Ends	90	1/4 BSPP Threads
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Code	Description	Symbol
B†	Sgl. operator, 2 position, spring offset. P to A and B to T in offset position.	
C	Dbl. operator, 3 position, spring centered.	
D†	Dbl. operator, 2 position, detent.	
E	Sgl. operator, 2 position, spring centered. P to B and A to T in shifted position.	
H†	Sgl. operator, 2 position, spring offset. P to B and A to T in offset position.	
K	Sgl. operator, 2 position. Spring centered. P to A and B to T in shifted position.	

This condition varies with spool code.
 † Available with 020 & 030 spools only.

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

Valve Weight: Single Operated
19.9 kg (43.9 lbs.)

Standard Bolt Kit: BK228

Metric Bolt Kit: BKM228

Bold: Designates Tier I products and options.

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

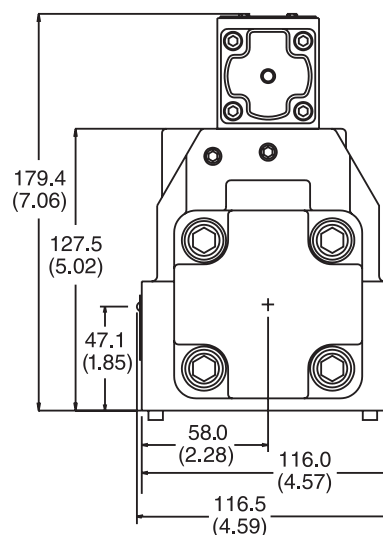
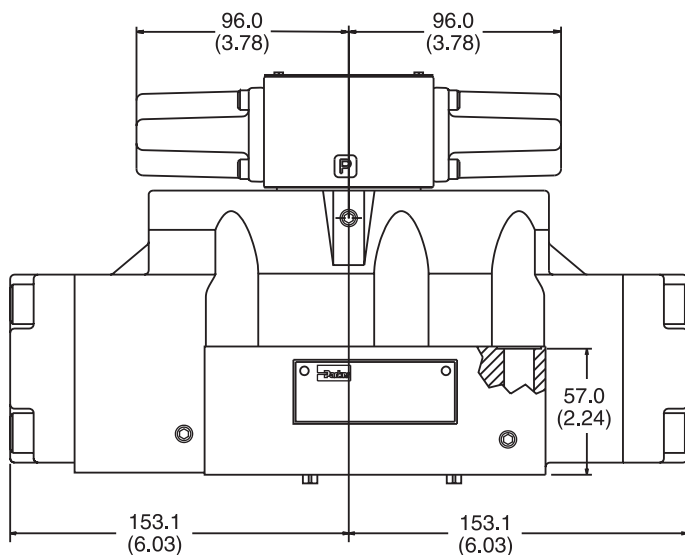
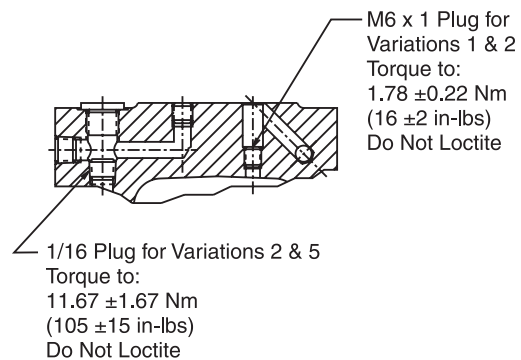
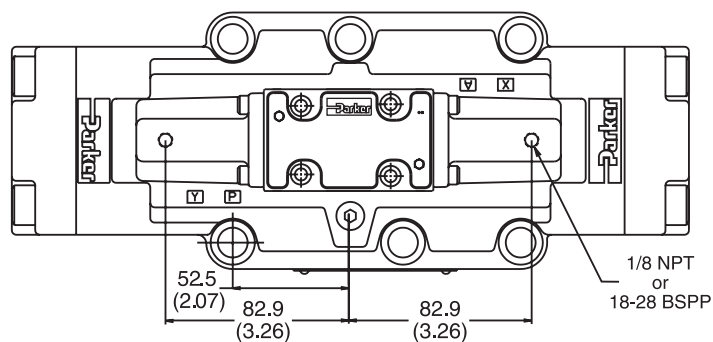
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information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

A01_Cat2500.indd, ddp, 04/19

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

Air Operated

A



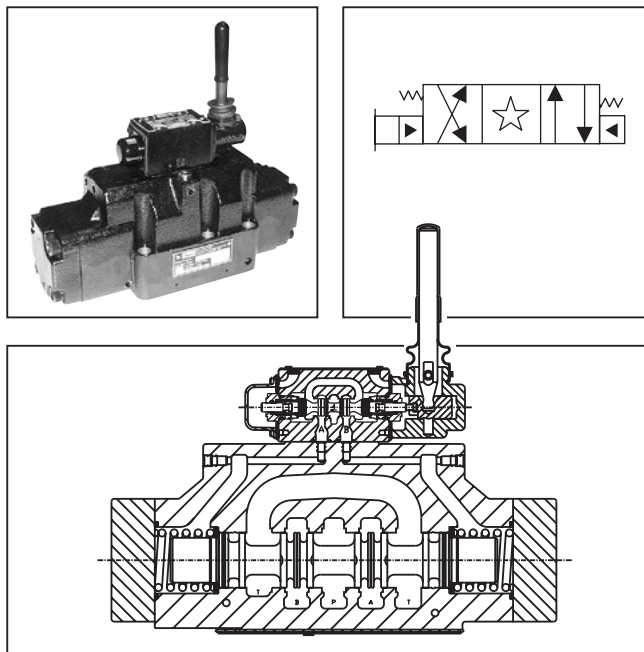
Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

General Description

Series D81VL directional control valves are 5-chamber, lever operated valves. They are available in 2 or 3-position styles. These valves are manifold or sub-plate mounted, and conform to NFPA's D08, CETOP 8 mounting pattern.

Specifications

Mounting Pattern	NFPA D08, CETOP 8, NG25
Max. Oper. Press.	350 Bar (5000 PSI)
Max. Tank Line Pressure	Internal Drain Model 34 Bar (500 PSI) External Drain Model 350 Bar (5000 PSI)
Max. Drain Press.	34 Bar (500 PSI)
Max. Flow	See Reference Data Charts
Pilot Pressure	Oil Min 6.9 Bar (100 PSI) Oil Max 350 Bar (5000 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)



Ordering Information

<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">D</div> Directional Control Valve	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">81V</div> Basic Valve <div style="border: 1px solid black; padding: 2px; width: 60px; margin: 0 auto; text-align: center;">NFPA D08 CETOP 8</div>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">L</div> Lever Operated Pilot	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Spool	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Style	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Pilot Supply and Drain	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Seal	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Valve Variations	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Design Series NOTE: Not required when ordering.
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<table border="1"> <thead> <tr> <th>Code</th><th>Symbol</th><th>Code</th><th>Symbol</th></tr> </thead> <tbody> <tr> <td>001</td><td></td><td>011</td><td></td></tr> <tr> <td>002</td><td></td><td>012</td><td></td></tr> <tr> <td>004</td><td></td><td>020*</td><td></td></tr> <tr> <td>008*</td><td></td><td>030**</td><td></td></tr> <tr> <td>009**</td><td></td><td></td><td></td></tr> </tbody> </table> <p>* 008 & 020 spools have closed crossover. ** 009 & 030 spools have open crossover.</p>	Code	Symbol	Code	Symbol	001		011		002		012		004		020*		008*		030**		009**				<table border="1"> <thead> <tr> <th>Code</th><th>Description</th></tr> </thead> <tbody> <tr> <td>1</td><td>Int. pilot/Ext. drain</td></tr> <tr> <td>2</td><td>Ext. pilot/Ext. drain</td></tr> <tr> <td>4#</td><td>Int. pilot/Int. drain</td></tr> <tr> <td>5</td><td>Ext. pilot/Int. drain</td></tr> </tbody> </table> <p># Not available with 002, 008, 009 & 030 spools.</p>	Code	Description	1	Int. pilot/Ext. drain	2	Ext. pilot/Ext. drain	4#	Int. pilot/Int. drain	5	Ext. pilot/Int. drain	<table border="1"> <thead> <tr> <th>Code</th><th>Description</th></tr> </thead> <tbody> <tr> <td>N</td><td>Nitrile</td></tr> <tr> <td>V</td><td>Fluorocarbon</td></tr> </tbody> </table>	Code	Description	N	Nitrile	V	Fluorocarbon	<table border="1"> <thead> <tr> <th>Code</th><th>Description</th></tr> </thead> <tbody> <tr> <td>7</td><td>Pilot Choke – Meter Out</td></tr> <tr> <td>8</td><td>Stroke Adj. 'B'</td></tr> <tr> <td>9</td><td>Stroke Adj. 'A'</td></tr> <tr> <td>60</td><td>Pilot Choke – Meter In</td></tr> <tr> <td>89</td><td>Stroke Adj. 'A' & 'B'</td></tr> </tbody> </table>	Code	Description	7	Pilot Choke – Meter Out	8	Stroke Adj. 'B'	9	Stroke Adj. 'A'	60	Pilot Choke – Meter In	89	Stroke Adj. 'A' & 'B'
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Code	Description	Symbol
B†	Sgl. operator, 2 position, spring offset. P to A and B to T in offset position.	
C	Dbl. operator, 3 position, spring centered.	
D†	Dbl. operator, 2 position, detent.	
E	Sgl. operator, 2 position, spring centered. P to B and A to T in shifted position.	
H†	Sgl. operator, 2 position, spring offset. P to B and A to T in offset position.	
K	Sgl. operator, 2 position. Spring centered. P to A and B to T in shifted position.	

† Available with 020 & 030 spools only.

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

Valve Weight: 19.6 kg (43.2 lbs.)

Standard Bolt Kit: BK228

Metric Bolt Kit: BKM228

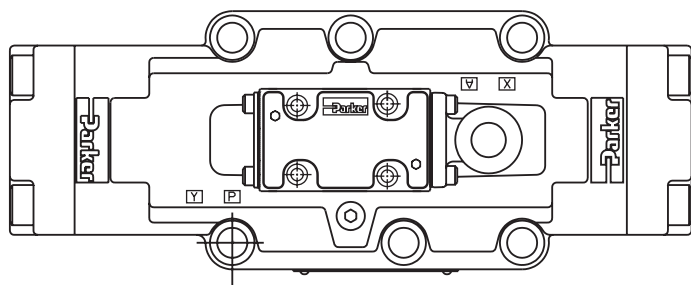
Bold: Designates Tier I products and options.

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

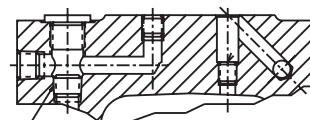
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information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

A01_Cat2500.indd, ddp, 04/19

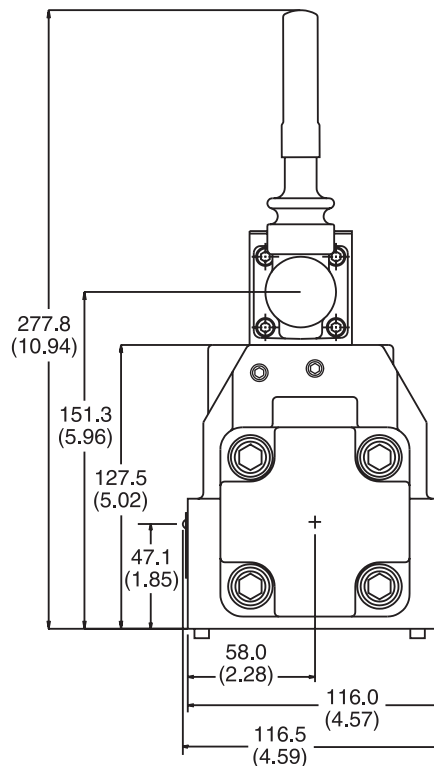
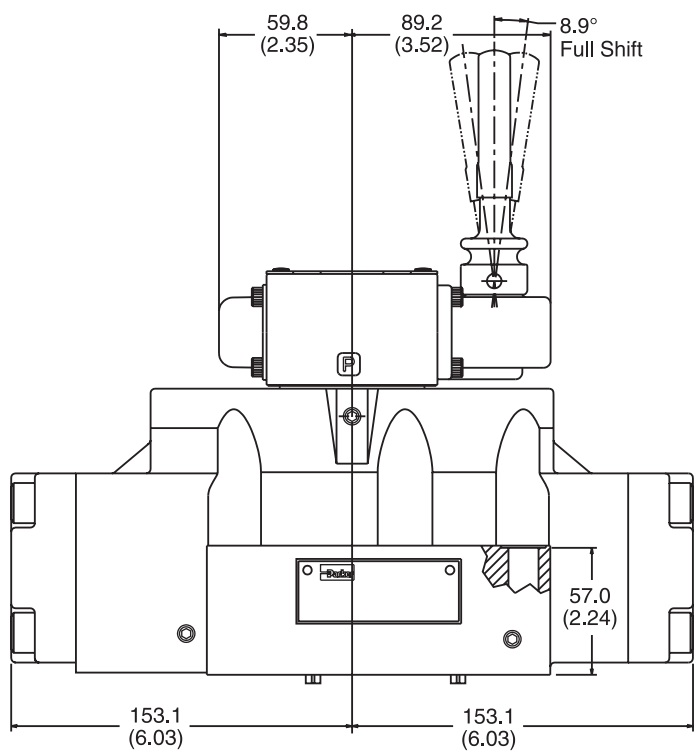
Inch equivalents for millimeter dimensions are shown in (**)

Lever Operated**A**

M6 x 1 Plug for
Variations 1 & 2
Torque to:
 1.78 ± 0.22 Nm
(16 ± 2 in-lbs)
Do Not Loctite



1/16 Plug for Variations 2 & 5
Torque to:
 11.67 ± 1.67 Nm
(105 ± 15 in-lbs)
Do Not Loctite



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

A

General Description

Series D8P directional control valves are 5-chamber, pilot operated valves. They are available in 2 or 3-position styles. These valves are manifold or sub-plate mounted, and conform to NFPA's D08, CETOP 8 mounting pattern.

Features

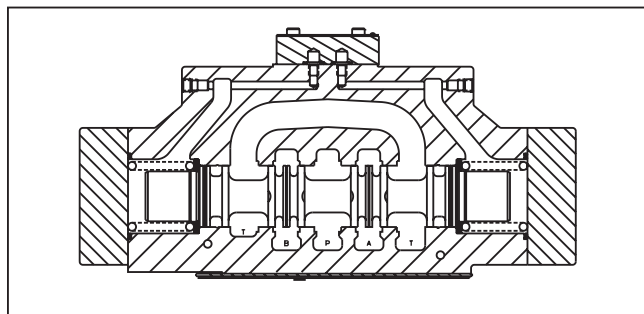
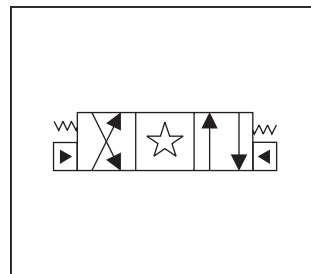
- Low pressure drop design.
- Hardened spools provide long life.

Specifications

Mounting Pattern	NFPA D08, CETOP 8, NG25
Max. Operating Pressure	345 Bar (5000 PSI)
Max. Tank Line Pressure	345 Bar (5000 PSI)
Max. Drain Pressure	345 Bar (5000 PSI)
Min. Pilot Pressure	5.1 Bar* (75 PSI)
Max. Pilot Pressure	345 Bar (5000 PSI)
Nominal Flow	302 LPM (80 GPM)
Max. Flow	See Reference Data Chart

* 6.9 Bar (100 PSI) for 2, 8, 9 & 12 spools

For flow path, pilot drain and pilot pressure details, see Installation Information.



Response Time

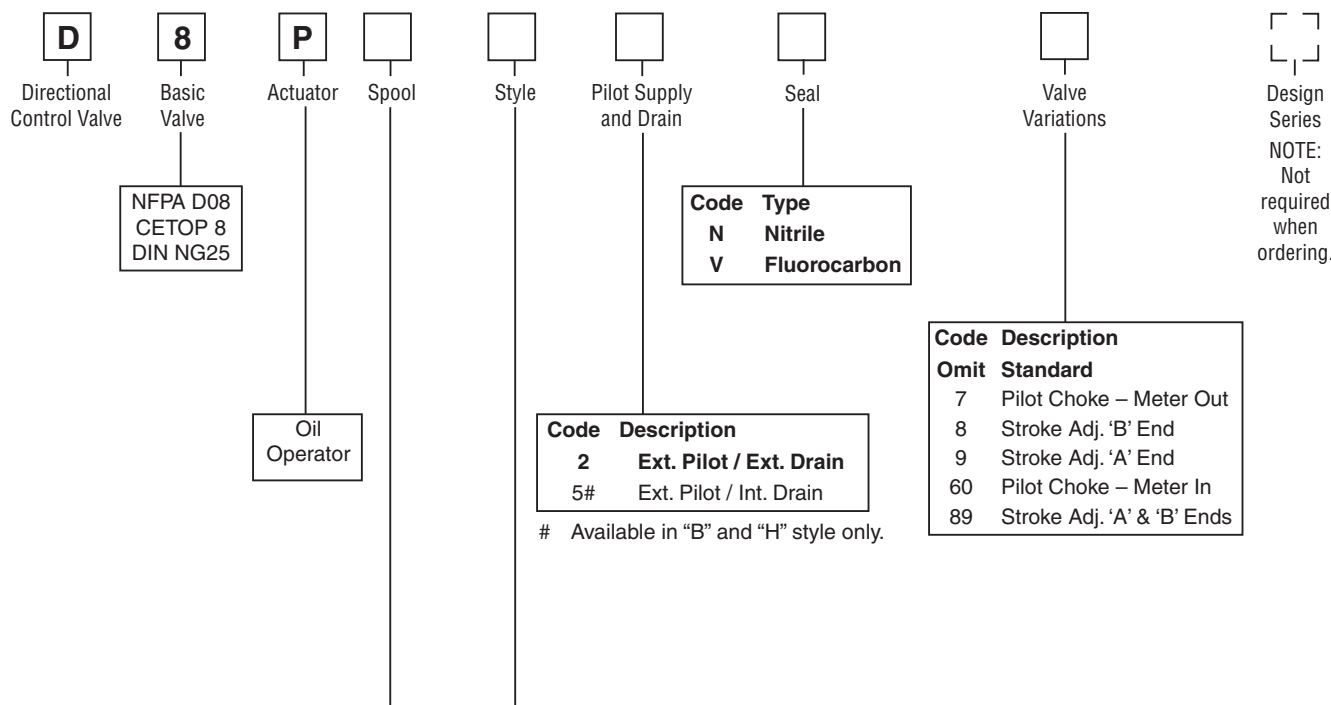
Response time will vary with pilot line size, pilot line length, pilot pressure shift time and flow capacity of the control valve.

Shift Volume

The pilot chamber requires a volume of 1.35 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.

A01_Cat2500.indd, ddp, 04/19



Code	Symbol	Code	Symbol
001		011	
002		012	
004		020*	
007		030**	
009**			

* 20 spool has closed crossover.
 ** 9 & 30 spools have open crossover.

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

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

† Available with 20 & 30 spools only.

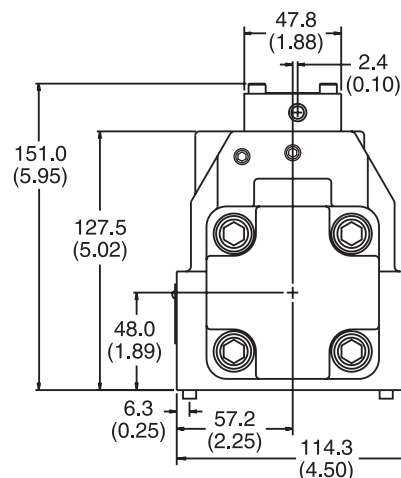
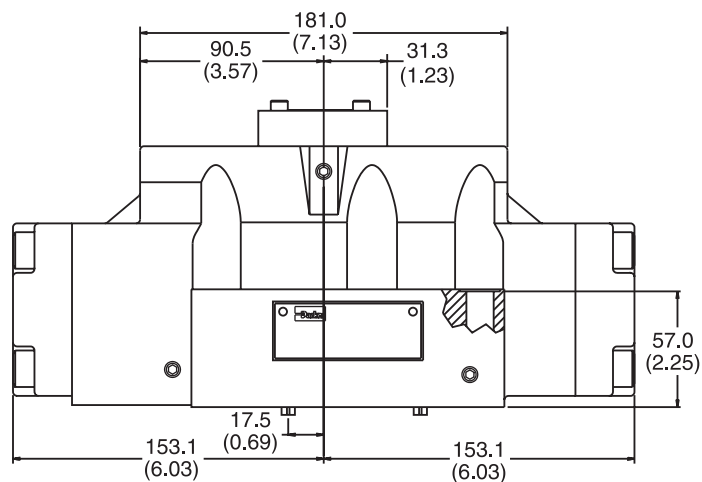
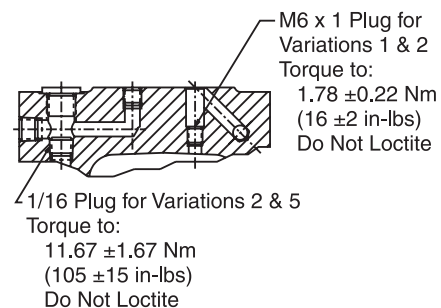
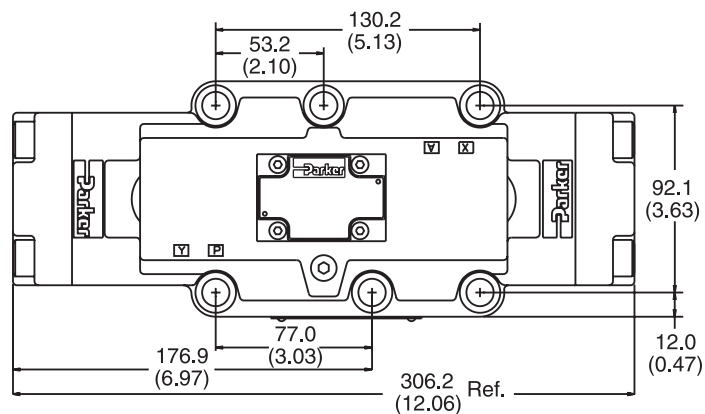
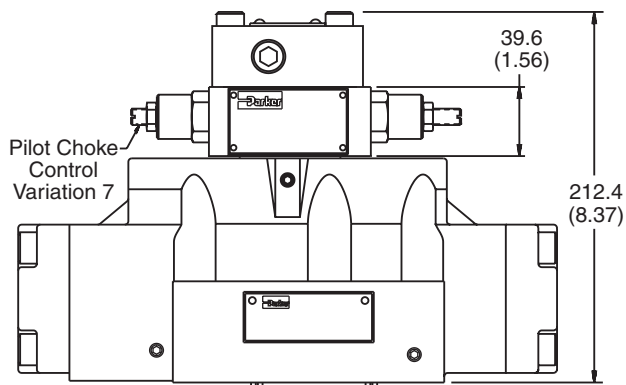
This condition varies with spool code.

Valve Weight: 18.9 kg (41.7 lbs.)
Standard Bolt Kit: BK228
Metric Bolt Kit: BKM228

Bold: Designates Tier I products and options.

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

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

A**Standard Pilot Operated****Pilot Operated with Pilot Choke Control****Note:** 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

Installation Information

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

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

Mounting Position

Detent – Horizontal
Spring Offset – Unrestricted
Spring Centered – Unrestricted

Fluid Recommendations

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

Fluids and Seals

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

Filtration

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

Silting

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

Special Installations

Consult your Parker representative for any application requiring the following:

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

Mounting Patterns

Series	NFPA	CETOP
D81V*, D8P	D08	3/4"

Torque Specifications

The recommended torque values for the bolts which mount the valve to the manifold or subplate are as follows: 135.6 Nm (100 ft-lbs).



A

Series D81VW, D81VA, D81VL**Tank and Drain Line Surges**

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

Electrical Characteristics (Detented Spool)

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

Electrical Failure or Loss of Pilot Pressure (D81V or D81VA)

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

Pilot/Drain Characteristics**Pilot Pressure:**

5.1 to 345 Bar (75 to 5000 PSI)

6.9 Bar (100 PSI) for spools 002, 007, 008, 009 & 014

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

Internal: Flow is internally ported from the pressure port of the main valve body to the “P” port of the pilot valve. The pressure developed at the “P” port of the pilot valve must be 5.1 Bar (75 PSI) minimum at all times or 6.9 Bar (100 PSI) for spools 002, 007, 008, 009 & 014.

Integral Check: Valves using internal pilot and internal drain with an open center spool (spools 2, 7, 8 & 9) can be ordered with an integral check valve in the pressure port of the main valve codes 3 & 6. Pilot oil will be internally ported from the upstream side of this check to the “P” port of the pilot valve, ensuring sufficient pilot pressure. A 1/16" pipe plug will be present in the main body. The “X” port in the subplate must be plugged when using the integral check.

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

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

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

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

D81V* Flow Paths

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

† D81VW only.

A01_Cat2500.indd, ddp, 04/19

Series D8P

Tank and Drain Line Surges

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

Loss of Pilot Pressure

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

Pilot Drain Characteristics

Pilot Pressure:

5.1 to 350 Bar (75 to 5000 PSI)
 6.9 Bar (100 PSI) for spools 2, 7, 8, 9 & 14

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

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

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

Flow Path/Pilot Pressure

Style Code	Description	“X” & “Y” De-Pressurized	“X” Port Pressurized	“Y” Port Pressurized	Special Notes	Recommended Control Valve For Pilot Oil
B	Two Position Spring Offset	P→A, B→T	P→A, B→T	P→B, A→T	“X” Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position Spring Centered	Center	P→A, B→T	P→B, A→T	Flow paths will be reversed on valves with tandem center (9) spools	
H	Two-Position Spring Offset	P→B, A→T	P→A, B→T	P→B, A→T	“Y” Port may be pressurized to assist spring in returning spool to offset position	

A

Subplate Mounting NFPA D08, CETOP 8 & NG25

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 135.6 Nm (100 ft-lbs).

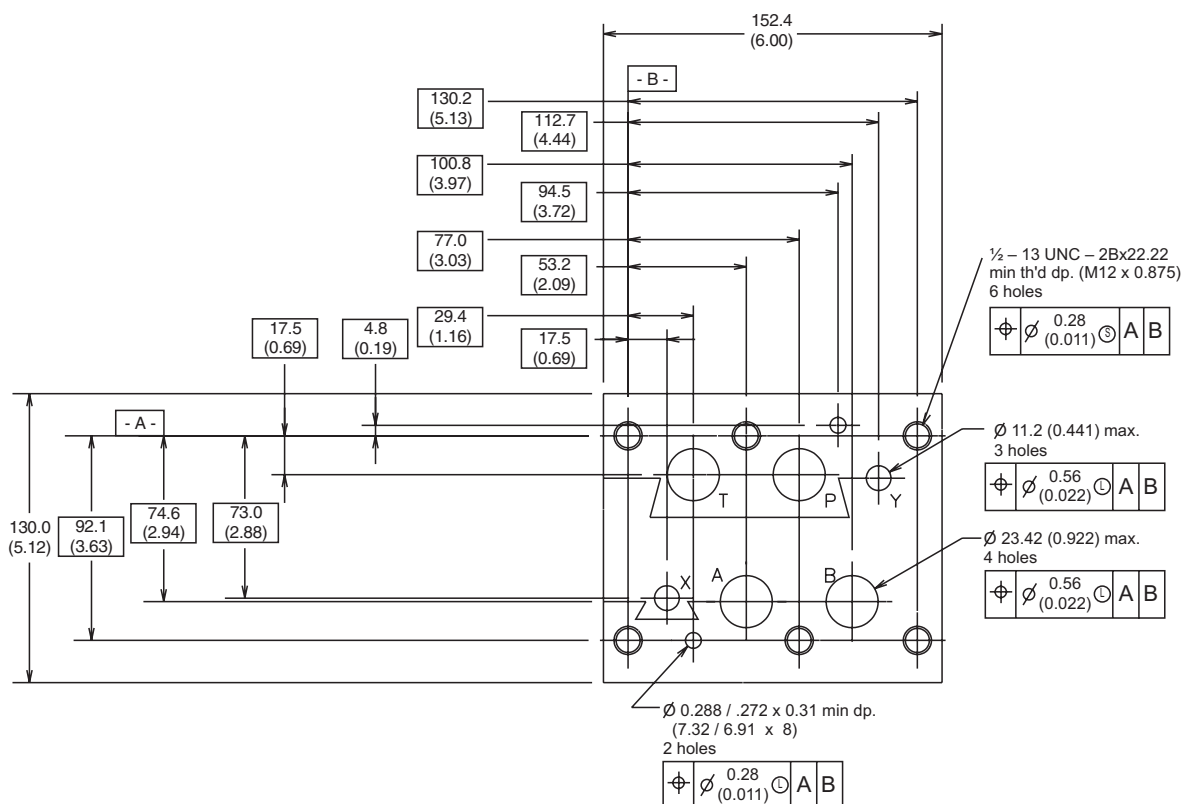
Mounting Position

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

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

Mounting Pattern — NFPA D08, CETOP 8 & NG25

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



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.

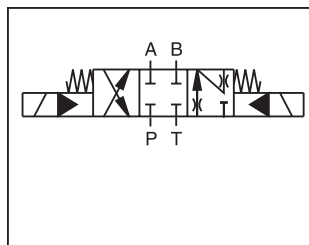
Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



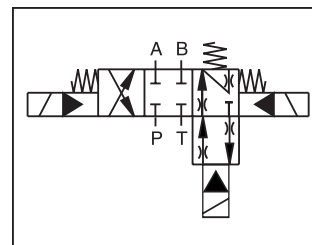
D41VWR (shown)



D41VWZ (shown)

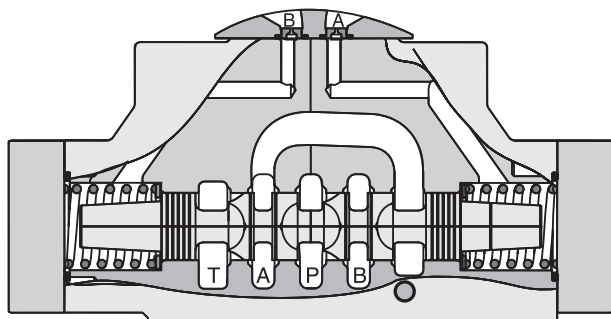


Regenerative D91VWR

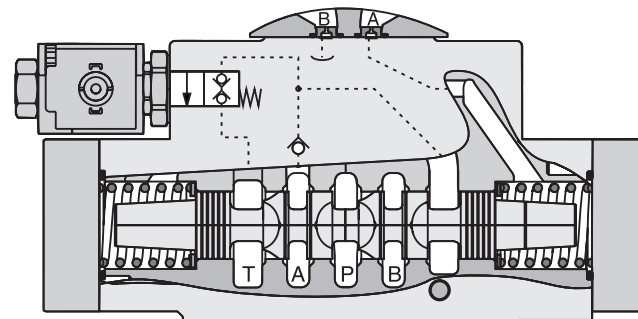


Hybrid D91VWZ

Regenerative Valve D91VWR

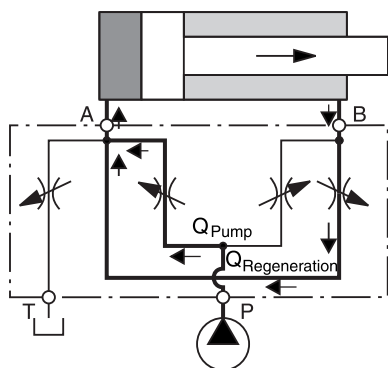


Hybrid Valve D91VWZ



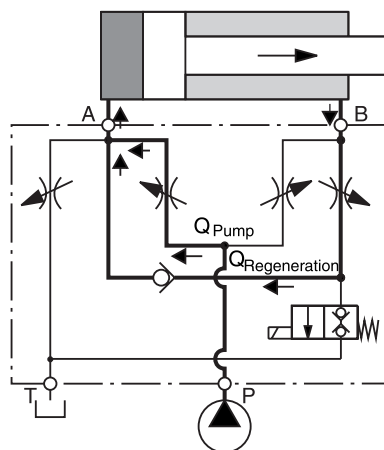
D91VWR Regenerative Valve

Cylinder Extending

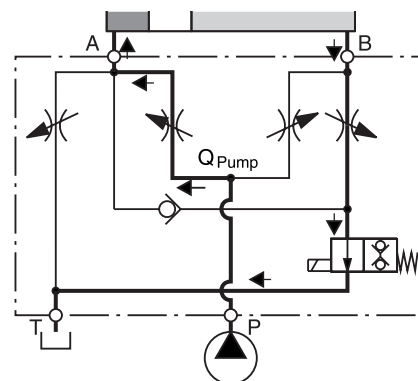


D91VWZ Hybrid Valve

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.

A01_Cat2500.indd, ddp, 04/19

Ordering Information

A

D91VW Series: NFPA D08, CETOP 8, DIN NG25, 32mm

C Style: 3 positions. Spring offset 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

Seal: Code N Nitrile, Code V Fluorocarbon

Manual Override: Code T No manual override

Valve Variations: Code 3A Pilot Choke, Meter-Out; 3B Pilot Choke, Meter-In; 3C Pilot Pressure Reducer; 3D Stroke Adjustment "B" End; 3E Stroke Adjustment "A" End; 3F Stroke Adjustment "A" & "B" End; 3R Pilot Choke Meter-Out & Pressure Reducer; 1T Pilot Choke Meter-In & 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		

Code Description

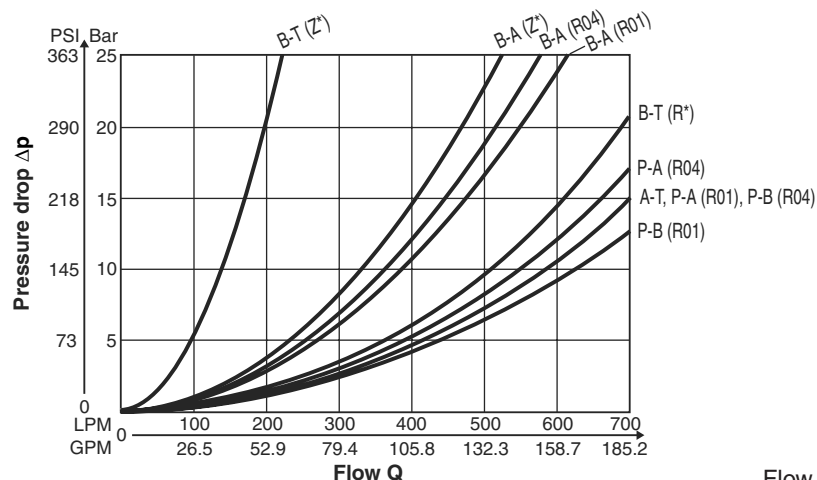
Code	Description
1	Internal Pilot External Drain
2	External Pilot External Drain
4	Internal Pilot Internal Drain
5	External Pilot Internal Drain

Weight:
D91VWR, D91DWZ 18.6 kg (41.0 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

General			
Design		Directional Spool Valve	
Actuation		Solenoid	
Size		NG25 / CETOP8 / D08	
Mounting Interface		DIN 24340 A25 / ISO 4401 / NFPA D08 / CETOP RP 121-H	
Mounting Position		Unrestricted, preferably horizontal	
Ambient Temperature		[°C]	-25° ...+50° (-13°F...+122°F)
MTTF _D Value		[years]	75
Hydraulic			
Maximum Operating Pressure		Pilot drain internal: P, A, B, X 350 Bar (5075 PSI); T, Y 105 Bar (1523 PSI) Pilot drain external: P, A, B, T, X 350 Bar (5075 PSI); Y 105 Bar (1523 PSI)	
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature		[°C]	-25° ... +70° (-13°F...+158°F)
Viscosity Permitted		[cSt]/[mm²/s]	2.8...400 (13...1854 SSU)
Recommended		[cSt]/[mm²/s]	30...80 (139...371 SSU)
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)	
Flow Maximum		700 LPM (185.2 GPM)	
Leakage at 350 Bar (5075 PSI) (per flow path)		[ml/min]	up to 800 (0.21 GPM) (depending on spool)
Minimum Pilot Supply Pressure		5 Bar (73 PSI)	
Static / Dynamic			
Step Response at 95% DC Solenoids		Energized	De-energized
Pilot Pressure			
50 Bar (725 PSI)		[ms]	150
100 Bar (1425 PSI)		[ms]	110
250 Bar (3625 PSI)		[ms]	90
350 Bar (5075 PSI)		[ms]	85
			170
			170
			170
			170
Electrical			
Duty Ratio		100% ED; CAUTION: coil temperature up to 150°C (302°F) possible	
Protection Class		IP 65 in accordance with EN 60529 (plugged and mounted)	
Supply Voltage / Ripple		[V]	24
Tolerance Supply Voltage		[%]	±10
Current Consumption Hold		[A]	1.29
Current Consumption In Rush		[A]	1.29
Power Consumption Hold		[W]	31
Power Consumption In Rush		[W]	31
Solenoid Connection		Connector as per EN 175301-803, solenid Identification as per ISO 9461	
Wiring Minimum		[mm²]	3 x 1.5 recommended
Wiring Length Minimum		[m]	50 (164 ft.) recommended

With electrical connections the protective conductor (PE ≡) must be connected according to the relevant regulations.

Electrical Specifications Hybrid Option

Duty Ratio	100%
Protection Class	IP 65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage [V]	24
Tolerance Supply Voltage [%]	±10
Current Consumption [A]	0.96
Power Consumption [W]	23
Solenoid Connection	Connector as per EN 175301-803
Wiring Minimum [mm²]	3 x 1.5 recommended
Wiring Length Maximum [m]	50 (164 ft.) recommended

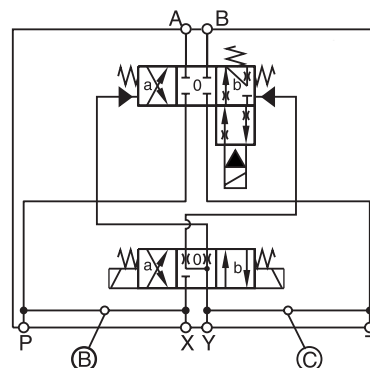
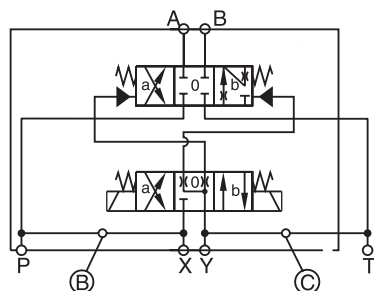
With electrical connections the protective conductor (PE ≡) must be connected according to the relevant regulations.

Pilot Flow

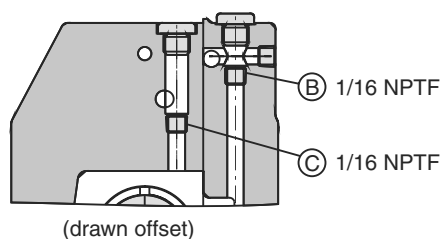
Pilot Oil Inlet (Supply) and Outlet (Drain)

○ open, ● closed

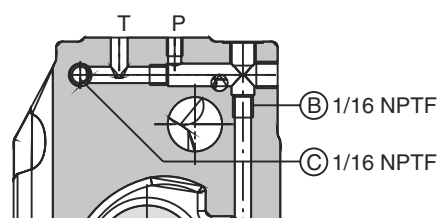
Pilot Oil Inlet	Pilot Oil Outlet	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



D91VWR

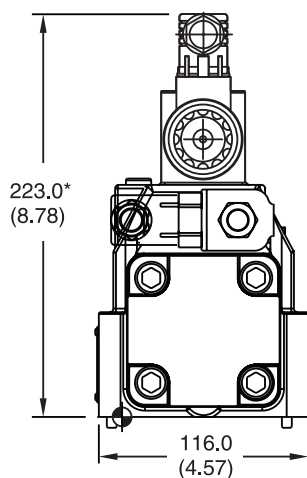


D91VWZ

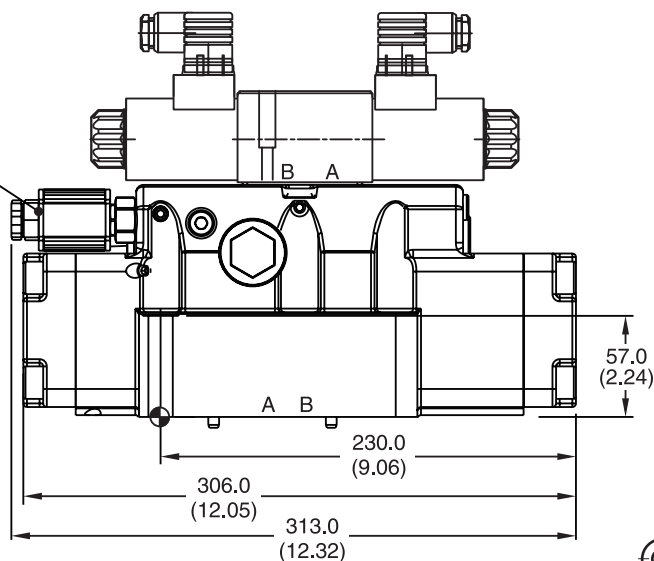


Dimensions

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



Only D91VWZ



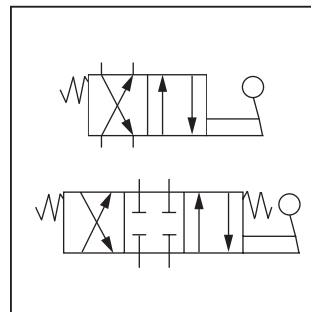
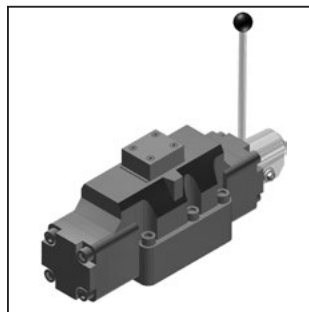
* Please add for each sandwich plate +40mm (1.58") (pressure reducing valve, pilot choke valve meter-in/-out).

Surface Finish	Kit	Kit	Seal Kit
	BK360	4x M10x60 2x M6x55 DIN 912 12.9	63 Nm (46.5 lb.-ft.) 13.2 Nm (9.7 lb.-ft.) ±15%
			Nitrile: SK-D91VW-N-91 Fluorocarbon: SK-D91VW-V-91

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

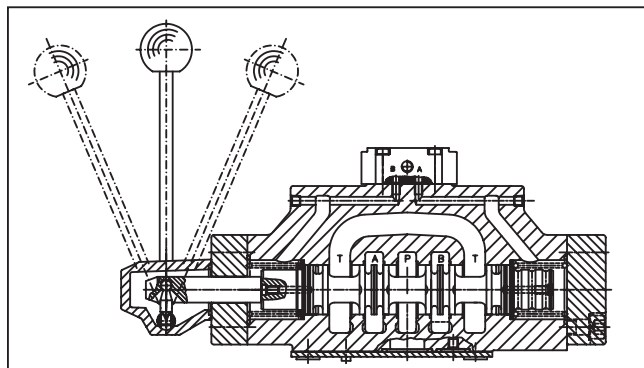
General Description

Series D9L directional control valves are 5-chamber, 4 way, 2 or 3-position valves. They are operated by a hand lever which is directly connected to the spool. The hand lever can be located either on the A or B side. Spring offset and detent designs are available.



Features

- Streamlined internal channels ensure minimum pressure drop at maximum flow.
- Hardened spools provide long life.



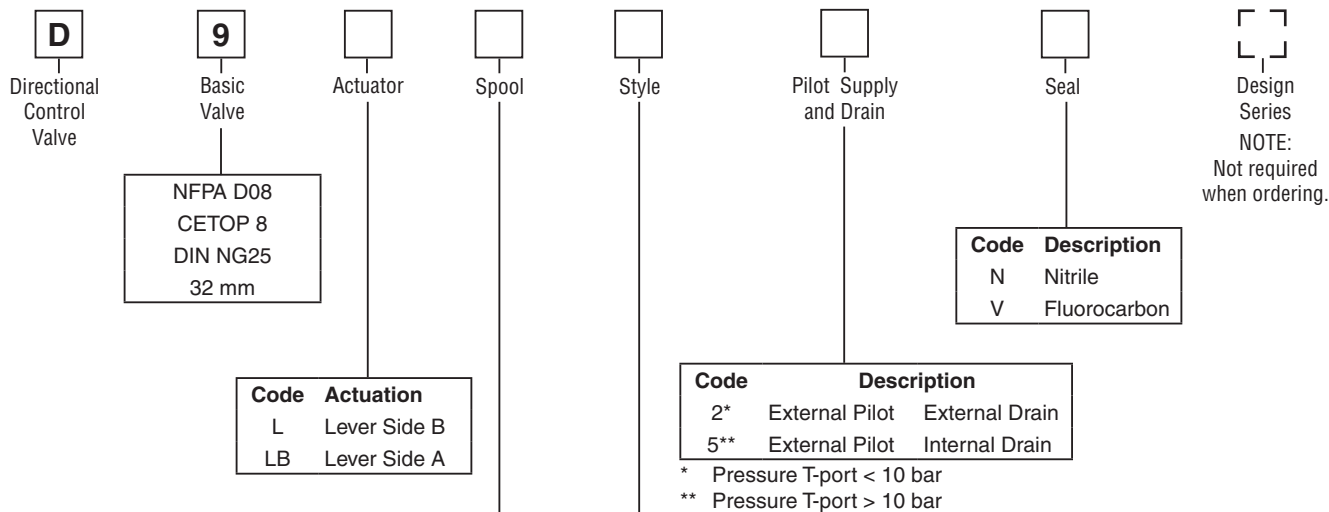
Specifications

General		Hydraulic (cont.)	
Actuation	Lever	Fluid	Hydraulic oil in accordance with DIN 51524 / 51525
Size	NG25	Fluid Temperature	-25°C to +70°C (-13°F to +158°F)
Mounting Interface	DIN 24340 A25 ISO 4401 NFPA D08 CETOP RP 121-H	Viscosity Permitted	2.8 to 400 cSt / mm ² /s (13 to 1854 SSU)
Mounting Position	Unrestricted, preferably horizontal	Viscosity Recommended	30 to 80 cSt / mm ² /s (139 to 371 SSU)
Ambient Temperature	-25°C to +50°C (-13°F to +122°F)	Filtration	ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)
Hydraulic		Maximum Flow	700 LPM (185.2 GPM)
Maximum Operating Pressure	External Drain P, A, B, T 350 Bar (5075 PSI) X, Y 10 Bar (145 PSI)	Leakage at 350 Bar (5075 PSI)	up to 800 ml per minute (per flow path) (depending on spool)
	Internal Drain P, A, B 350 Bar (5075 PSI) T, X, Y 10 Bar (145 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.

A01_Cat2500.indd, ddp, 04/19

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Code	Symbol	Code	Symbol
001		009	
002		014	
003		015	
004		020	
007		030	

Code	Description	Symbol
B*	Single operator, 2 position, spring offset.	
C	Double operator, 3 position, spring centered.	
D*	Double operator, 2 position, detent.	
E	Single operator, 2 position, spring centered.	
H*	Single operator, 2 position, spring offset.	
K	Single operator, 2 position, spring centered.	
N	Double operator, 3 position, detent.	

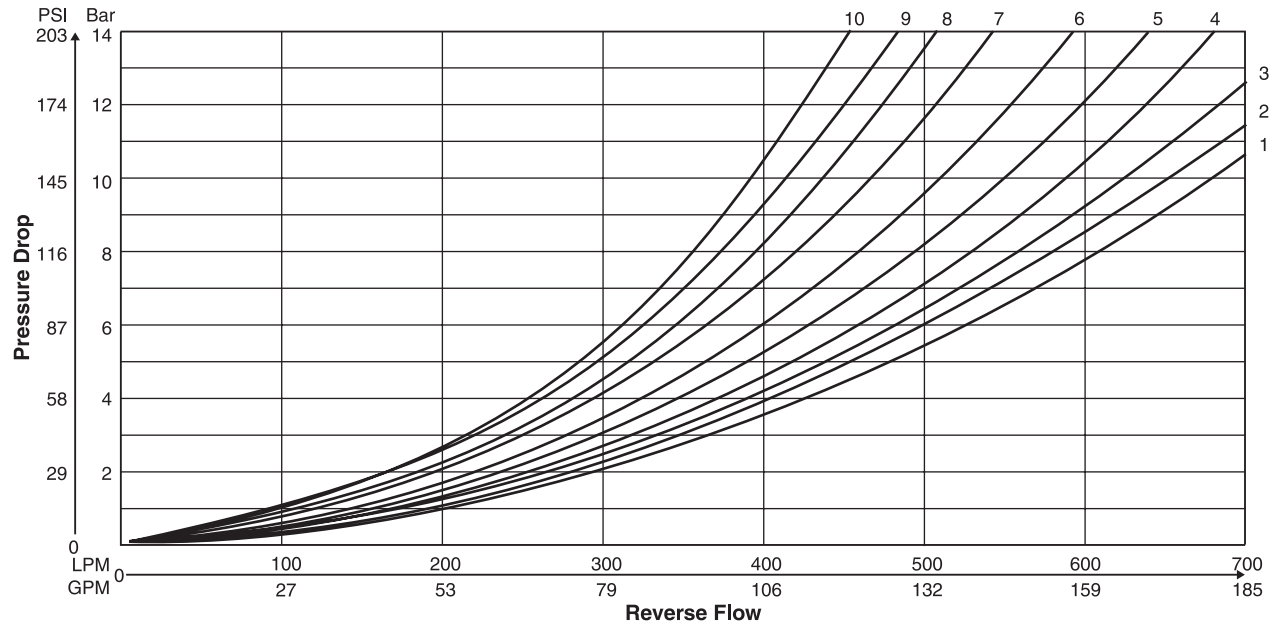
* Only available with 020 and 030 spools

Weight: 17.0 kg (37.5 lbs.)

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

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Spool Code	Curve Number				
	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
007	3	1	7	3	5
009	4	8	9	4	10
014	1	3	7	5	3
015	2	4	—	5	3
020	6	5	—	6	8
030	3	2	—	3	5

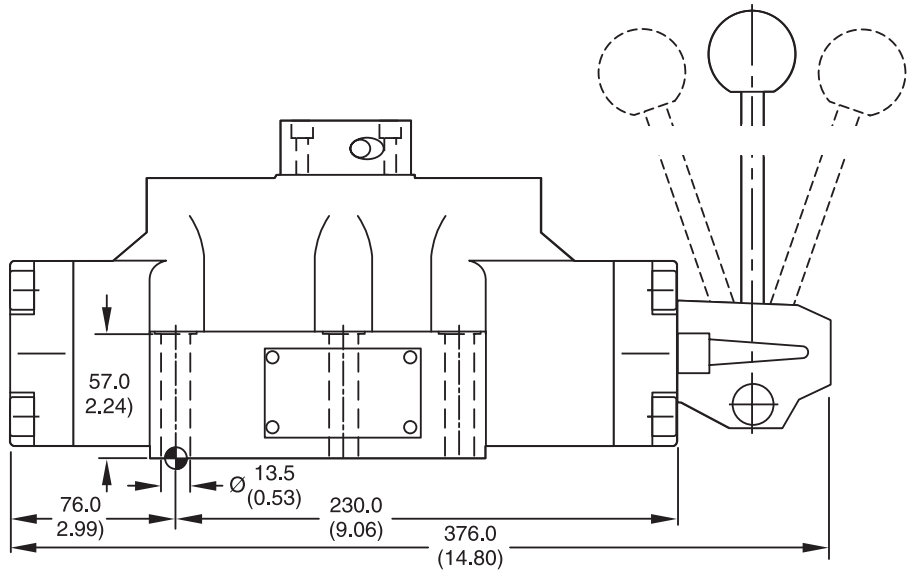
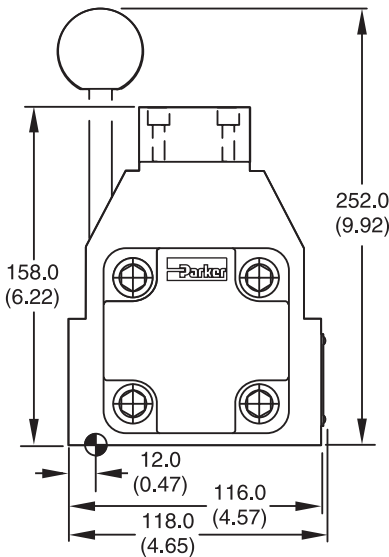


Inch equivalents for millimeter dimensions are shown in (**)

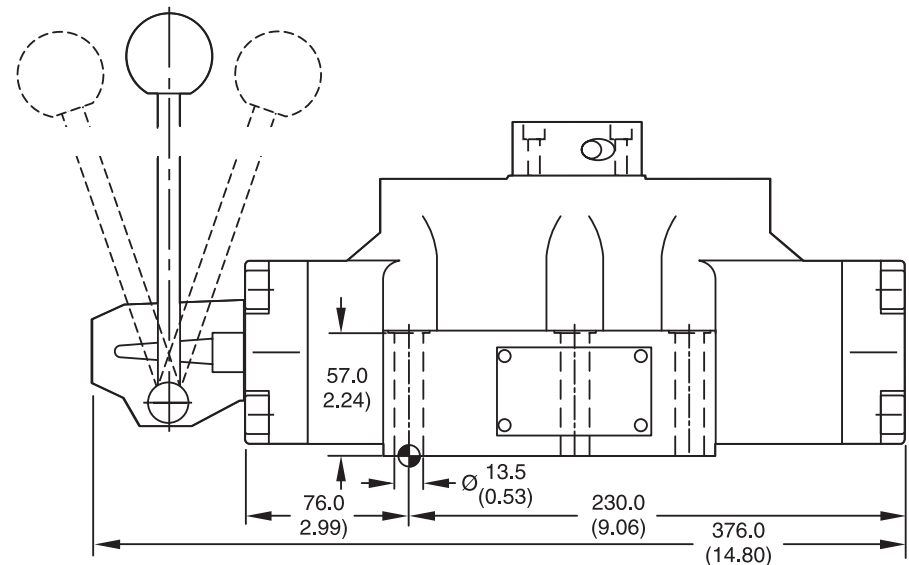
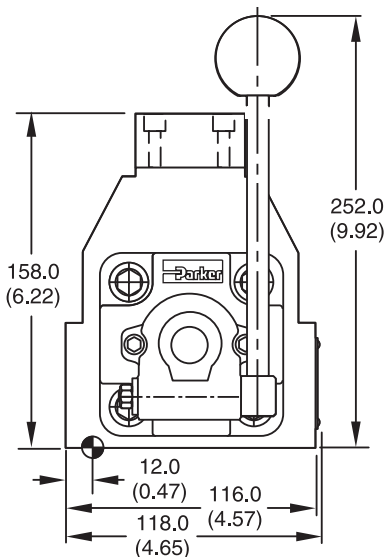


A

D9L



D9LB



Surface Finish	Kit	Kit	Kit	Seal Kit
$\sqrt{R_{max} 6.3}$ $\square 0.01/100$	BK360	6x M5x75 DIN 912 12.9	108 Nm ±15%	Nitrile: SK-D9LN Fluorocarbon: SK-D9LV

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin, light gray lines. There are 20 columns and 20 rows of squares, creating a total of 400 square units. The background is white, and the lines are evenly spaced both horizontally and vertically.

A**Application**

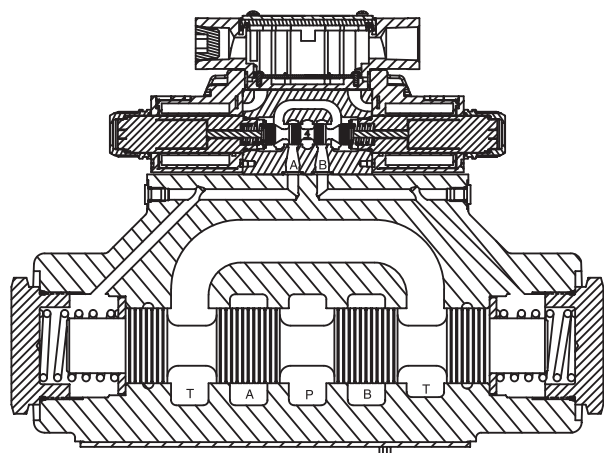
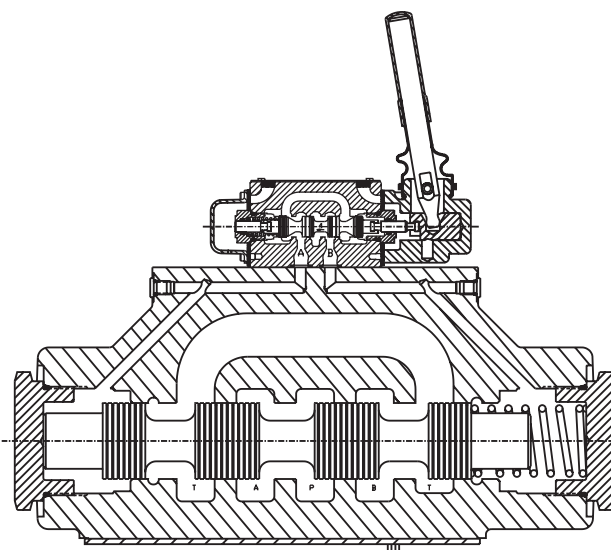
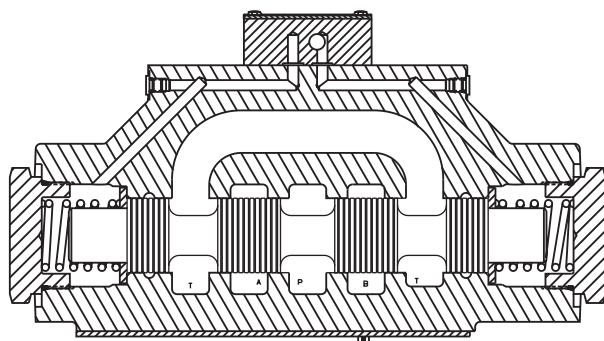
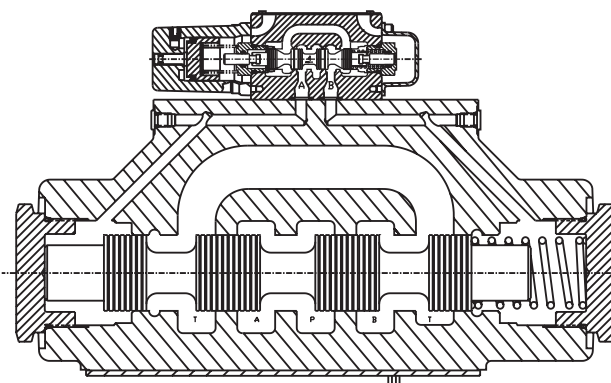
Series D101 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles and are manifold mounted. These valves conform to NFPA's D10, CETOP 10 mounting pattern.

Operation

Series D101 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or pilot operators (hydraulic or pneumatic).

Features

- Easy access mounting bolts.
- 210 Bar (3000 PSI) pressure rating.
- Flows to 950 LPM (250 GPM) depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.

**D101VW Solenoid Operated Plug-in Conduit Box****D101VL Lever Operated****D101P 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.

A01_Cat2500.indd, ddp, 04/19

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

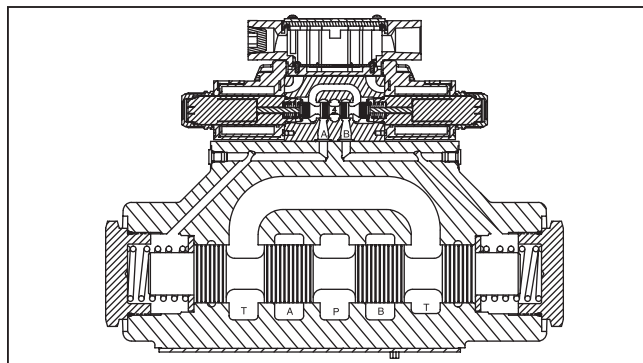
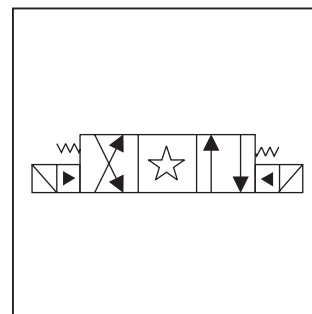
Series D101V pilot operated valves are standard with low shock spools and pilot orifice. The orifice can be removed if a faster shift is required. However, it is recommended that all systems operating above 138 Bar (2000 PSI) use the standard valve to avoid severe shock.

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.

Specifications

Mounting Pattern	NFPA D10, CETOP 10, NG32
Maximum Operating Pressure	207 Bar (3000 PSI) Standard CSA  207 Bar (3000 PSI)
Maximum Tank Line Pressure	Internal Drain Model: 102 Bar (1500 PSI) AC Only 207 Bar (3000 PSI) DC Standard/AC Optional External Drain Model: 207 Bar (3000 PSI) CSA  102 Bar (1500 PSI)
Maximum Drain Pressure	102 Bar (1500 PSI) AC Only 207 Bar (3000 PSI) DC Standard/AC Optional CSA  102 Bar (1500 PSI)
Minimum Pilot Pressure	4.4 Bar (65 PSI)
Maximum Pilot Pressure	207 Bar (3000 PSI) Standard CSA  207 Bar (3000 PSI)
Nominal Flow	378 LPM (100 GPM)
Maximum Flow	See Reference Chart



Response Time

Response times (milliseconds) are measured at 205 Bar (3000 PSI) and 416 LPM (110 GPM) with various pilot pressures as indicated.

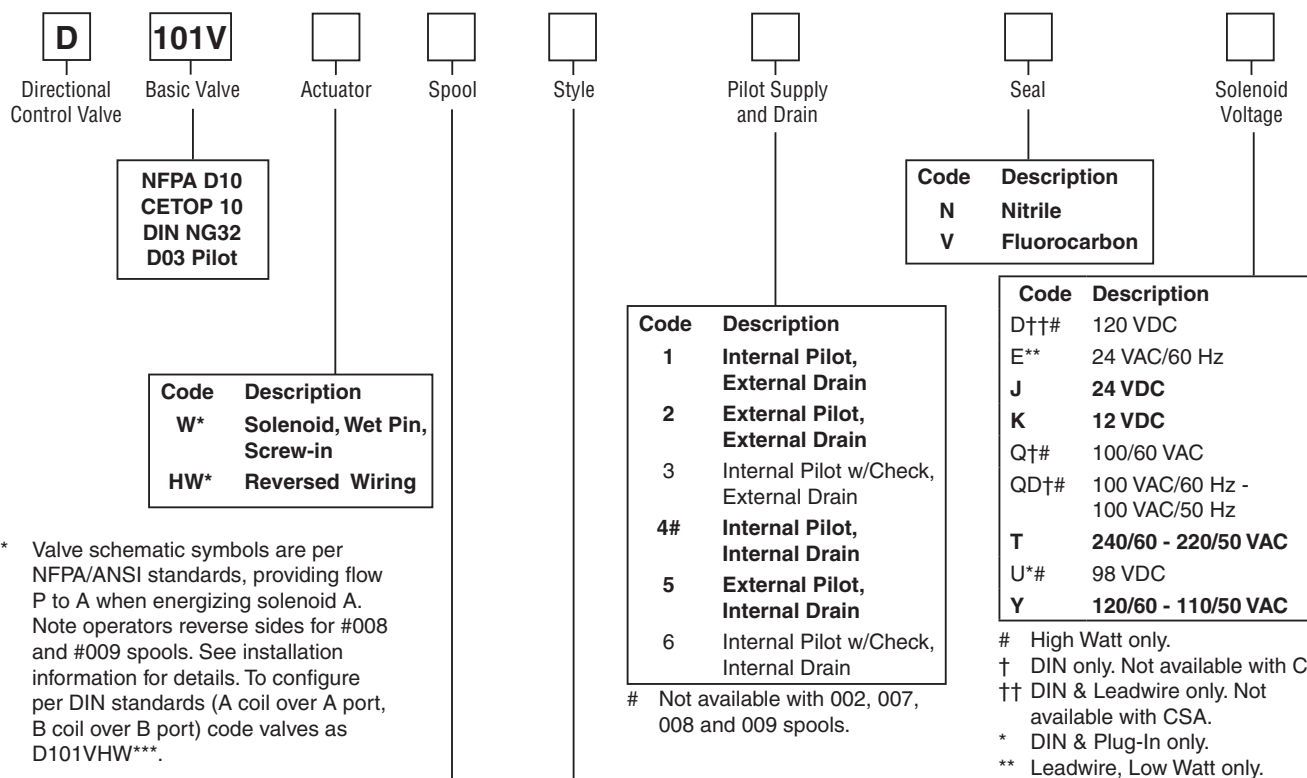
Solenoid Type	Pilot Pressure	Pull-In		Drop-Out	
		Std	Fast	Std	Fast
DC	500	180	170	195	195
	1000	130	125	195	195
	2000	100	95	195	195
AC	500	140	130	185	185
	1000	90	85	185	185
	2000	60	55	185	185

Because of the high drain line pressure transients generated during shifting, use of the fast response option is not recommended for pilot pressures exceeding 205 Bar (2000 PSI).

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.

A01_Cat2500.indd, ddp, 04/19

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* Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing solenoid A. Note operators reverse sides for #008 and #009 spools. See installation information for details. To configure per DIN standards (A coil over A port, B coil over B port) code valves as D101VHW***.

Code	Symbol	Code	Symbol
001		005	
002		006	
003		008*	
004		009**	
		011	

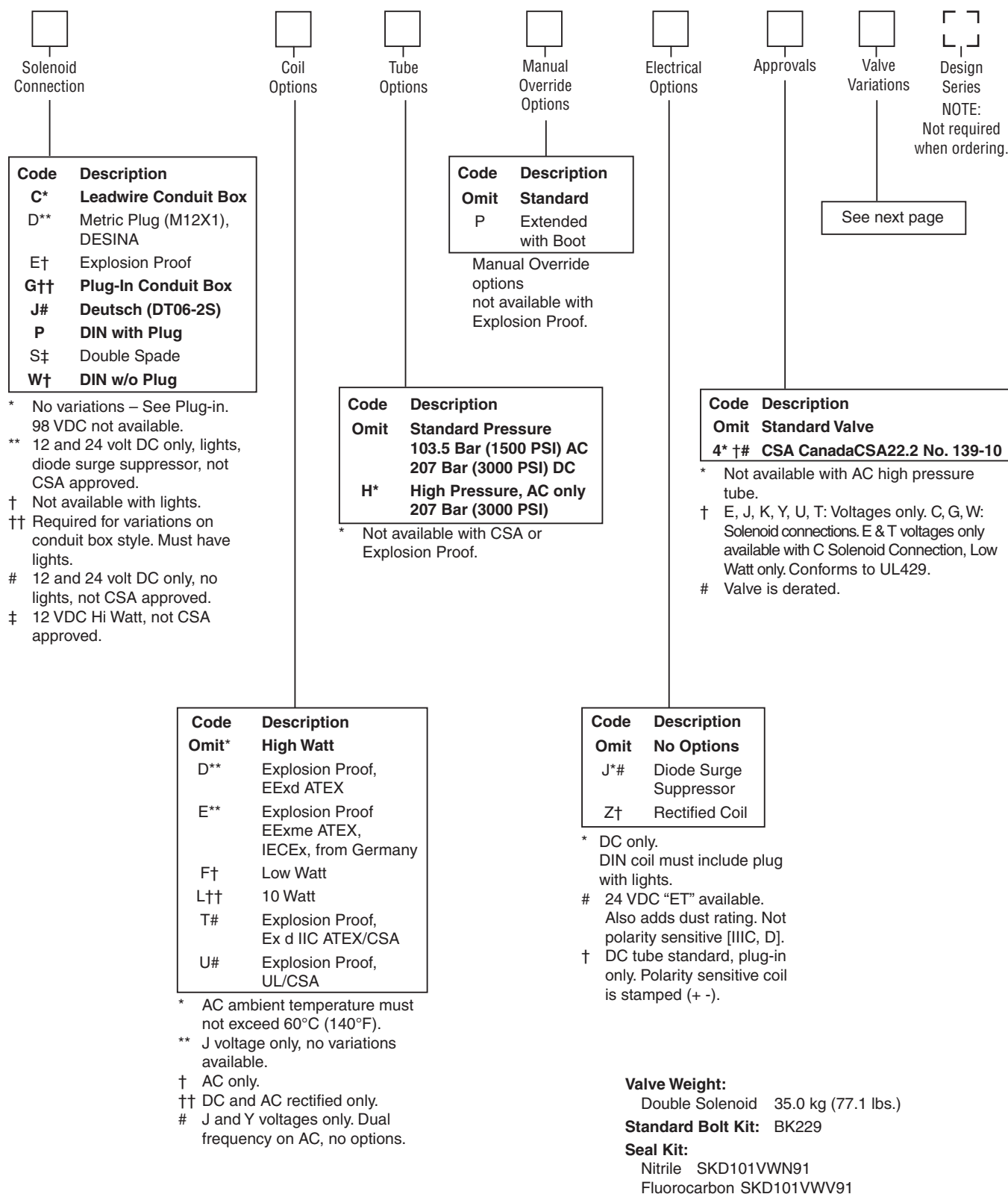
* 008 spool has closed crossover.
** 009 spool has open crossover.

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.



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

Code	Description
5*	Signal Lights – Standard
	Signal Lights – Hirsch. (DIN with Plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with Lights
56**	Manaplug (Mini) with Lights
20	Fast Response
1C**	Manaplug (Mini) Single Sol. 5-pin, with Lights
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1M**	Manaplug Opposite Normal
1P	Painted Body
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	Pilot Choke Meter Out
3B	Pilot Choke Meter In
3C	Pilot Pressure Reducer
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	Pilot Choke Meter Out with Lights
3H*	Pilot Choke Meter In with Lights
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights, Mini Manaplug, Pilot Choke Meter Out
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights
XB990†	CE Marking

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

** Must have plug-in style conduit box.

† Above 50 VAC or 75 VDC must have "4" CSA approved coils.

Bold: Designates Tier I products and options.

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

Reference Data

Model	Spool Symbol	Maximum Flow, LPM (GPM) 205 Bar (3000 PSI) w/o Malfunction	Model	Spool Symbol	Maximum Flow, LPM (GPM) 205 Bar (3000 PSI) w/o Malfunction
D101V*001		946 (250)	D101V*006		946 (250)
D101V*002		946 (250)	D101V*007		303 (80)
D101V*003		946 (250)	D101V*008 D101V*009		492 (130)
D101V*004		946 (250)	D101V*011		946 (250)
D101V*005		946 (250)			

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D101VW Series Pressure Drop Chart

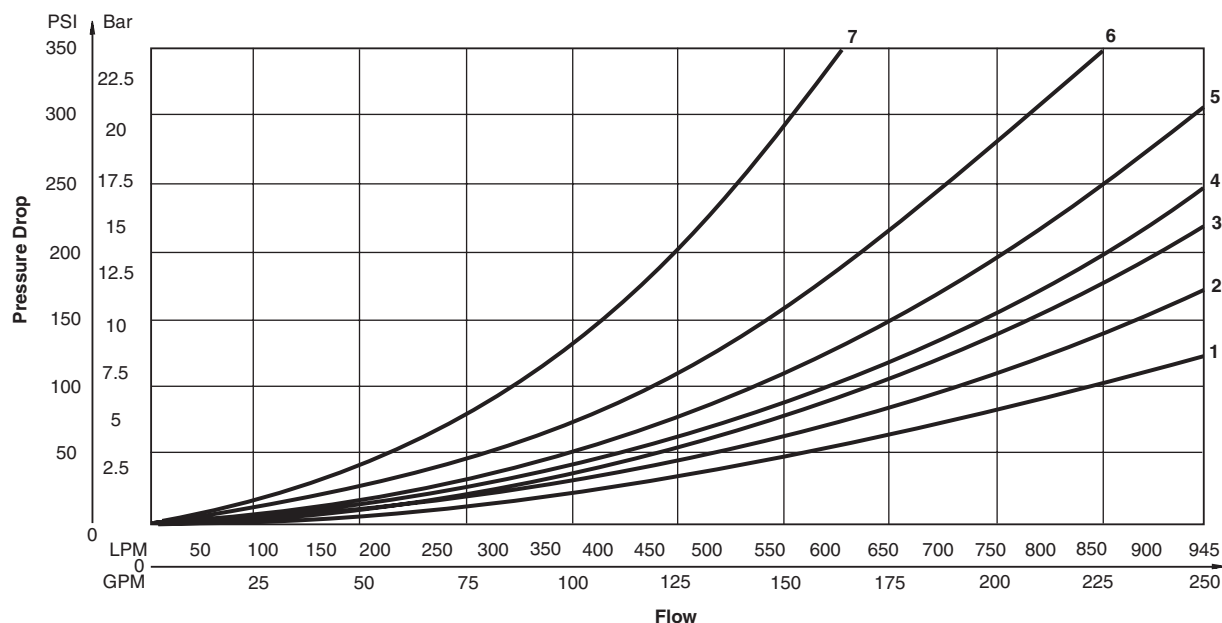
The following chart provides the flow vs. pressure drop curve reference for the Series D101VW valve by spool type.

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

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

D101VW Pressure Drop Reference Chart -- Curve Number					
Spool No.	P-A	P-B	P-T	A-T	B-T
001	4	4	—	2	3
002	3	3	3	1	2
003	4	4	—	1	3
004	4	4	—	1	2
005	3	4	—	2	3
006	3	3	—	2	3
007	4	3	7	2	2
008/009	5	5	6	2	3
011	4	4	—	2	3

Performance Curves



A01_Cat2500.indd, ddp, 04/19

A

Solenoid Ratings

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

Explosion Proof Solenoid Ratings*

U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D; Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (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

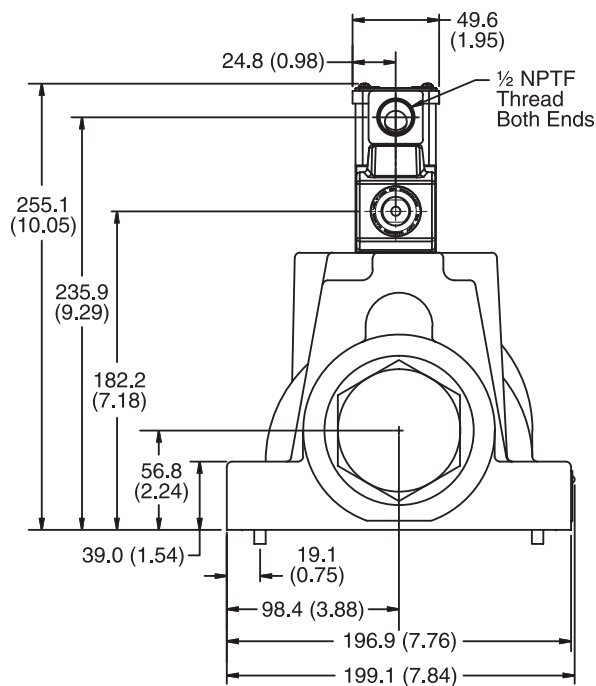
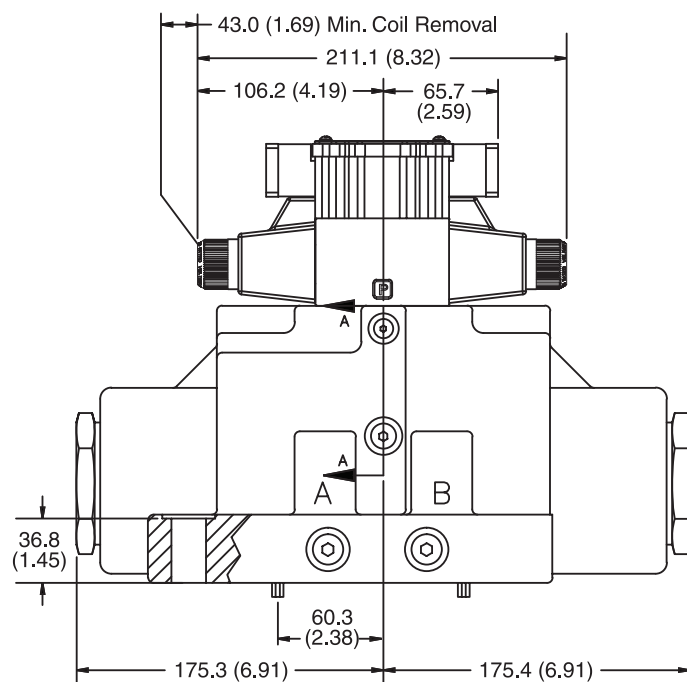
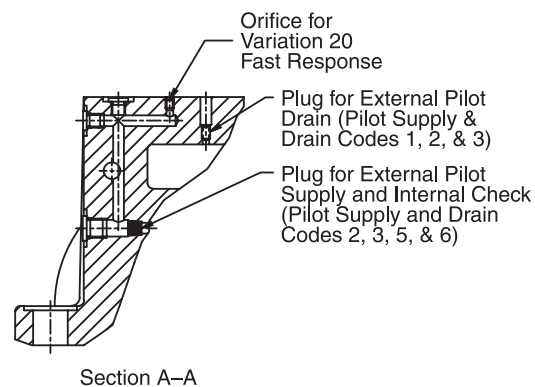
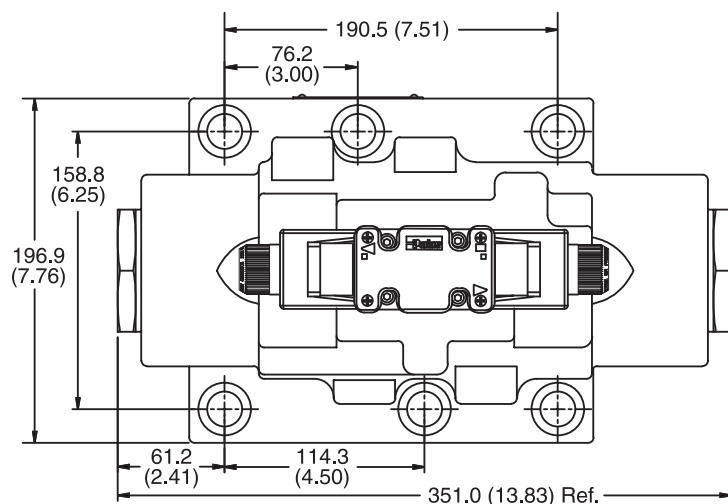
* Allowable Voltage Deviation $\pm 10\%$.

Note that Explosion Proof AC coils are single frequency only.

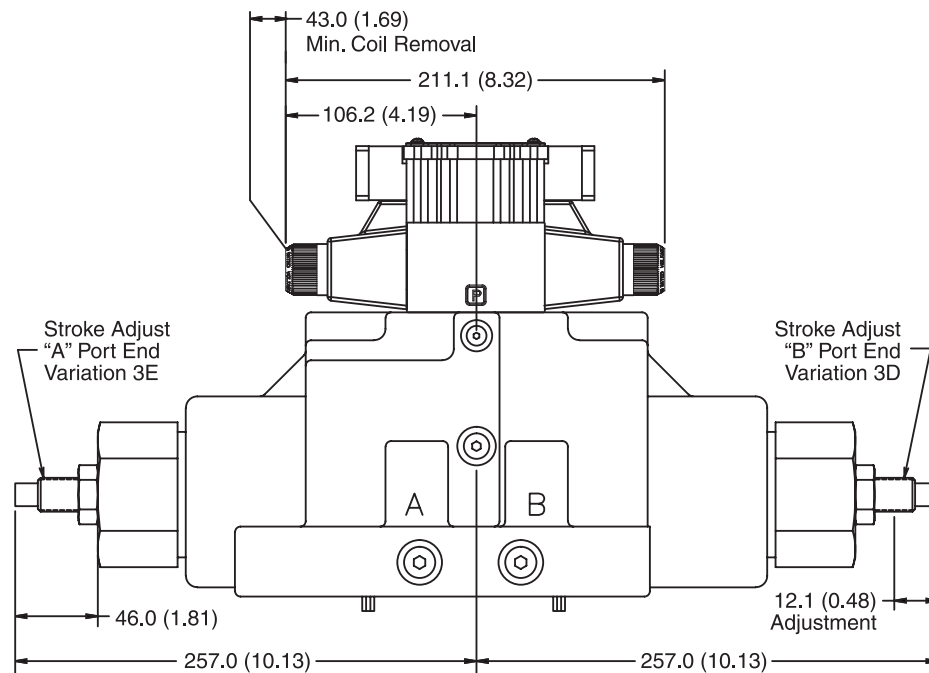
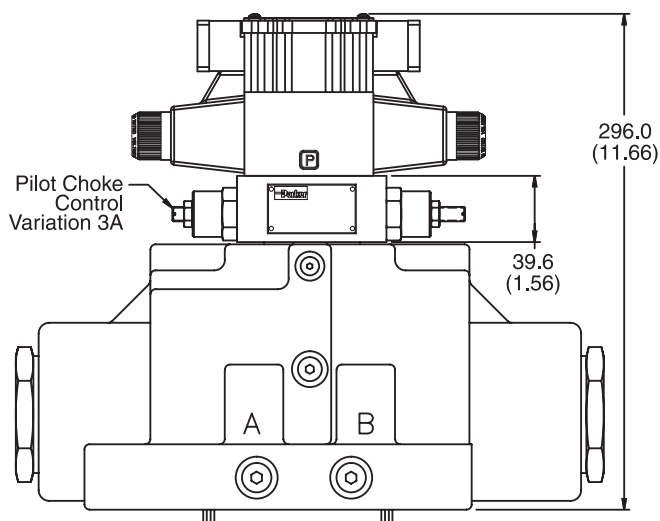
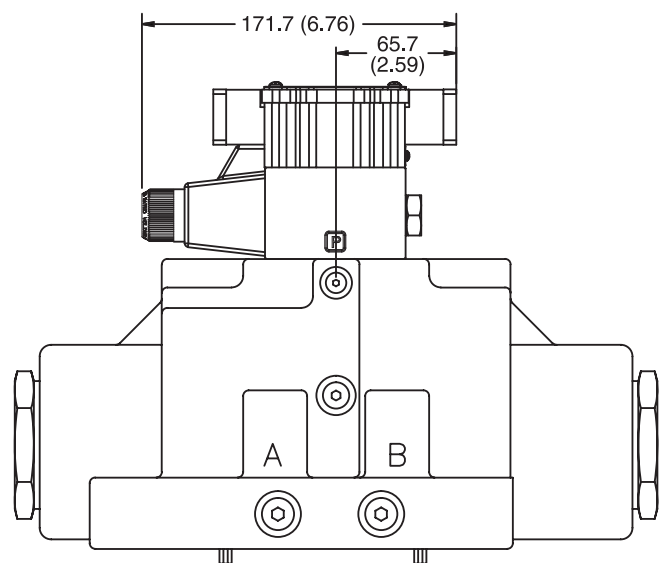
Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3MM	Watts	Resistance
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 ohms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

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

Plug-in Conduit Box, Double AC Solenoid

**A****Note:** 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

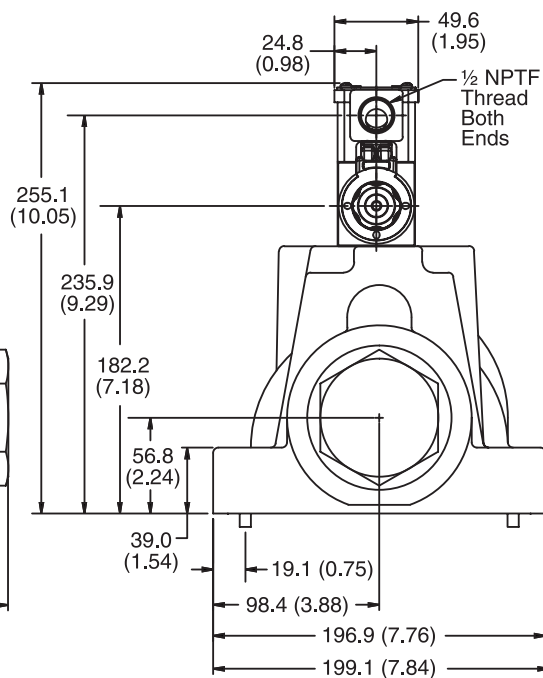
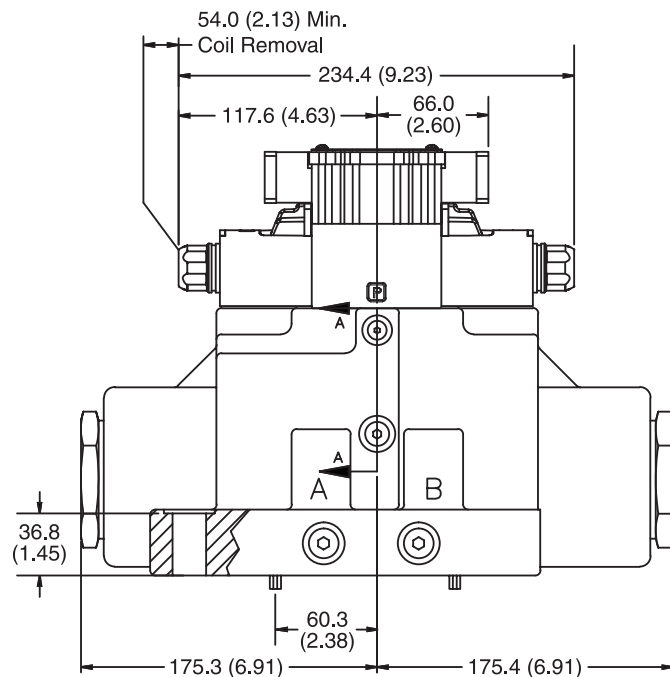
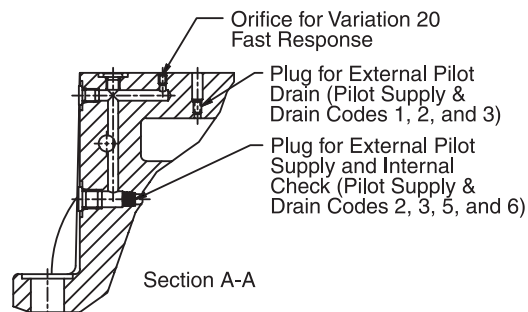
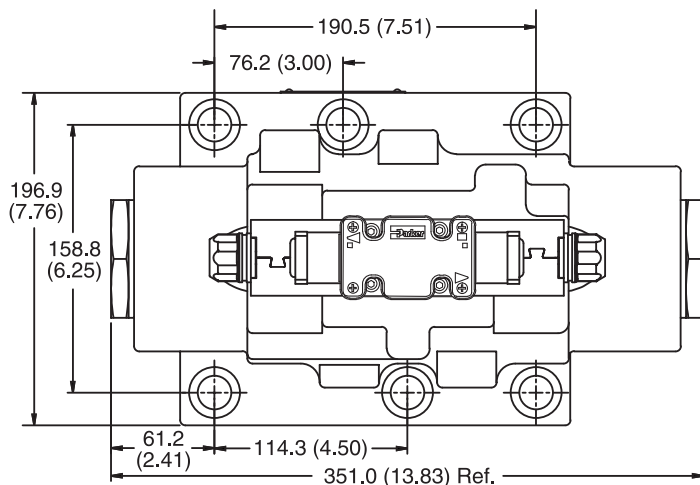
Inch equivalents for millimeter dimensions are shown in (**)

A**Conduit Box and Stroke Adjust, Double AC Solenoid****Note:** 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.**Conduit Box and Pilot Choke Control, Double AC Solenoid****Note:** 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.**Conduit Box, Single AC Solenoid**

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

Plug-in Conduit Box, Double DC Solenoid

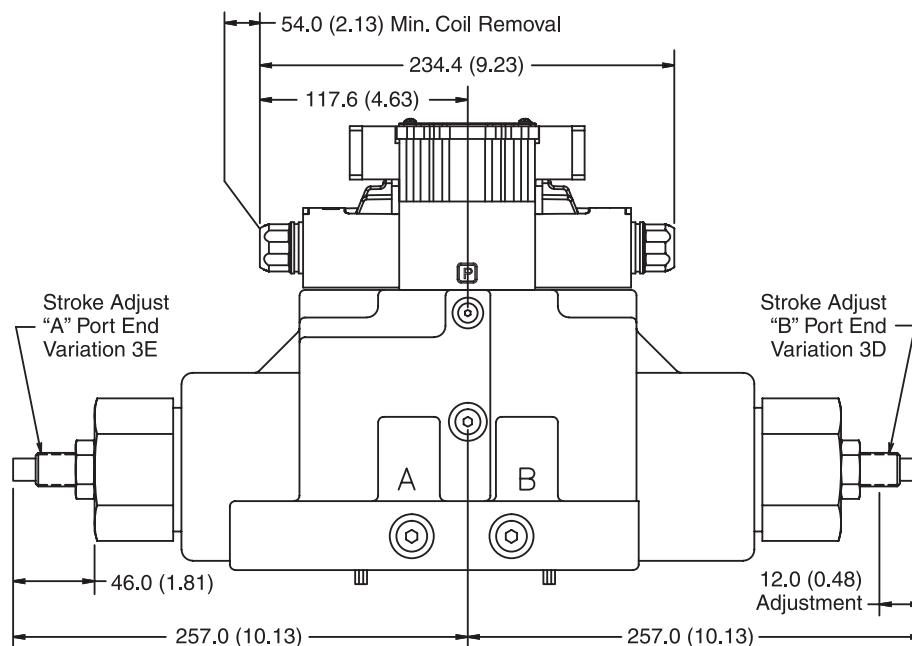
A

**Note:** 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

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

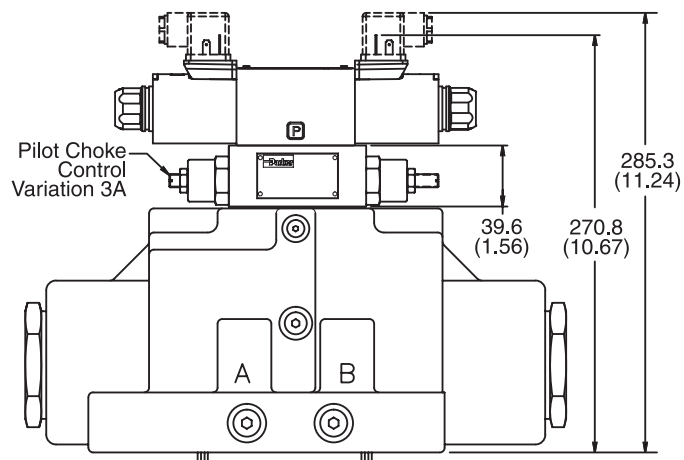
A

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



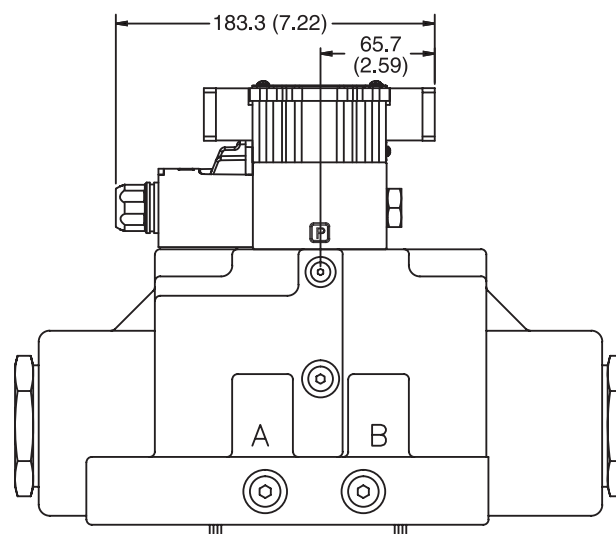
Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

Hirschmann and Pilot Choke Control, Double DC Solenoid



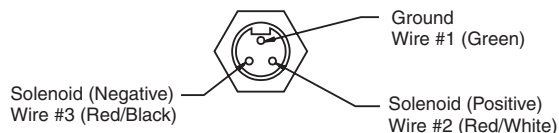
Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

Plug-in Conduit Box, Single DC Solenoid

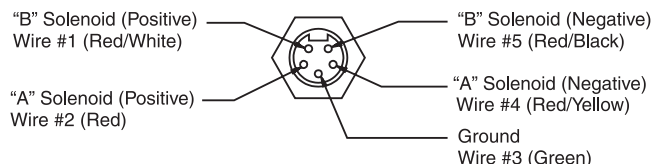


Manaplug (Options 6, 56, 1A & 1C)

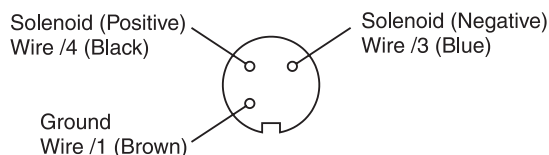
- Interface – Brad Harrison Plug
- 3-Pin for Single Solenoid
 - 5-Pin for Double Solenoid

**3-Pin Manaplug (Mini) with Lights**

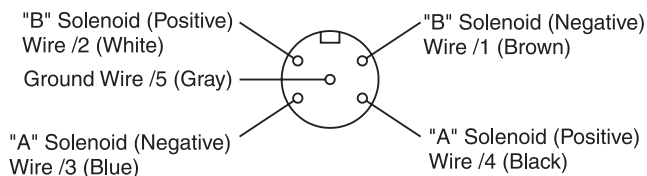
Single Solenoid Valves – Installed Opposite Side of Solenoid

**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**

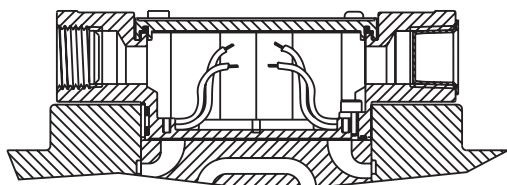
- EP336-30** 3 Pin Plug
EP316-30 5 Pin Plug (Double Solenoid)
EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

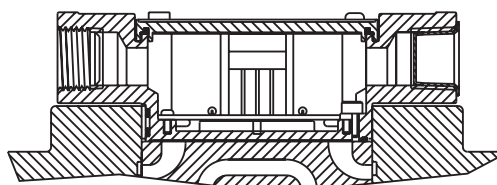
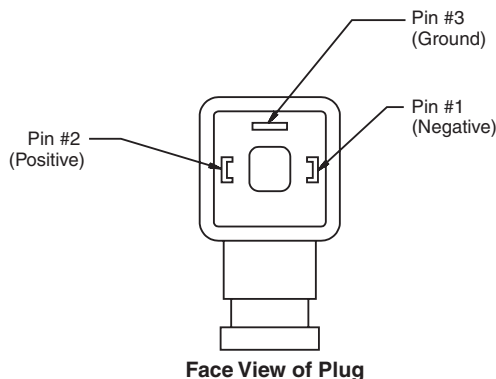
- EP337-30** 3 Pin Plug
EP317-30 5 Pin Plug (Double Solenoid)
EP31B-30 5 Pin Plug (Single Solenoid)

Conduit Box Option C

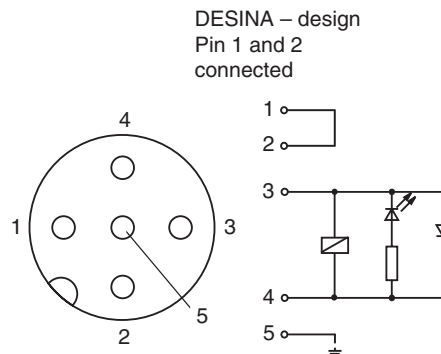
- No Wiring Options Available

**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



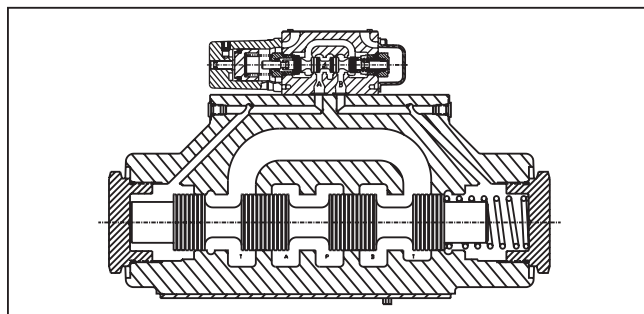
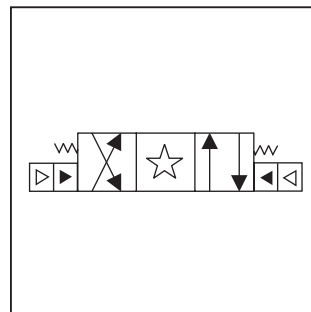
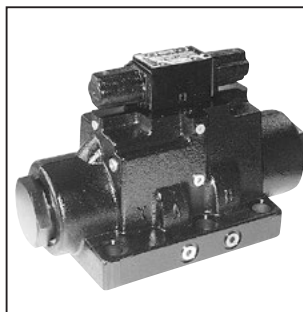
General Description

A

Series D101VA directional control valves are 5-chamber, air pilot operated valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D10, CETOP 10 mounting pattern.

Specifications

Mounting Pattern	NFPA D10, CETOP 10, NG32
Max. Operating Pressure	207 Bar (3000 PSI)
Max. Tank Pressure	Internal Drain Model: 34 Bar (500 PSI) External Drain Model: 207 Bar (3000 PSI)
Max. Drain Pressure	34 Bar (500 PSI)
Maximum Flow	See Reference Chart
Pilot Pressure	Air Min 3.4 Bar (50 PSI) Air Max 10.2 Bar (150 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)



Features

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

Ordering Information

D Directional Control Valve

101V Basic Valve

NFPA D10
CETOP 10

A Air Operated Pilot

Spool

Style

Pilot Supply and Drain

Seal

Valve Variations

Design Series

NOTE:
Not required when ordering.

Code	Symbol
001	
002	
004	
008*	
009**	
011	

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

Code	Type
N	Nitrile
V	Fluorocarbon

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

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

Not available with 2, 8 & 9 spools.

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

† Available with 001, 002, 004 & 011 spools only.

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

Valve Weight: 35.3 kg (77.8 lbs.)

Standard Bolt Kit: BK229

Metric Bolt Kit: BKM229

Bold: Designates Tier I products and options.

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

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.

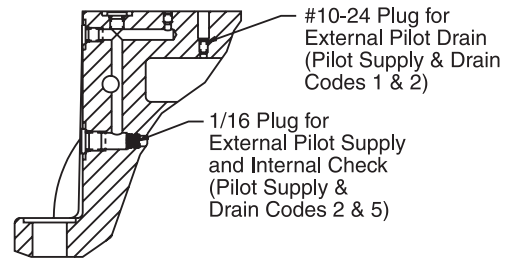
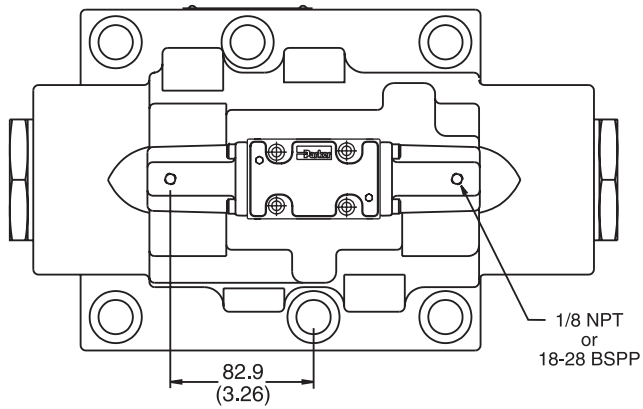
A01_Cat2500.indd, ddp, 04/19

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

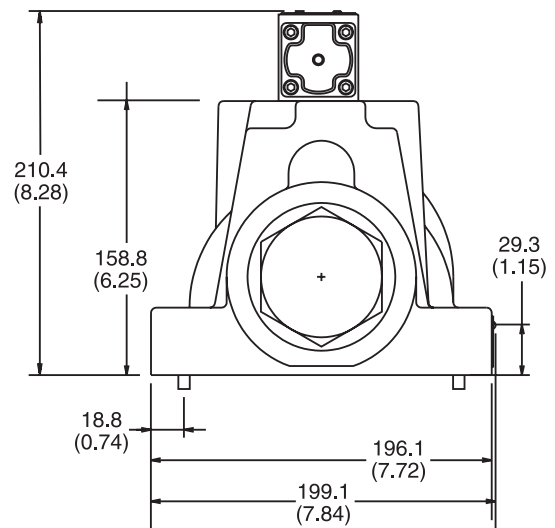
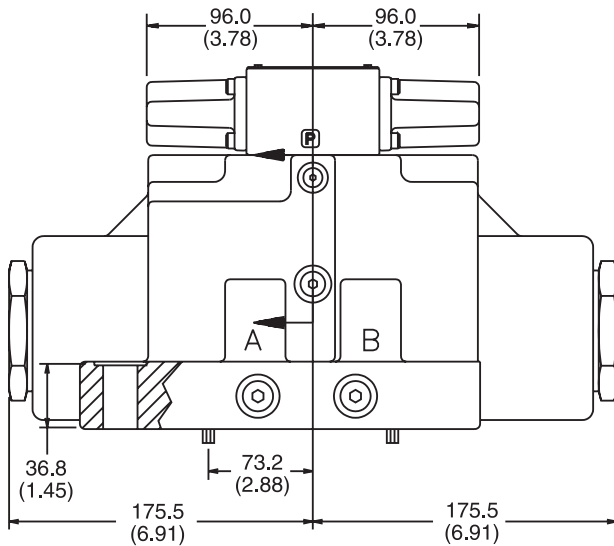
Air Operated



A



Section A-A



Note: 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

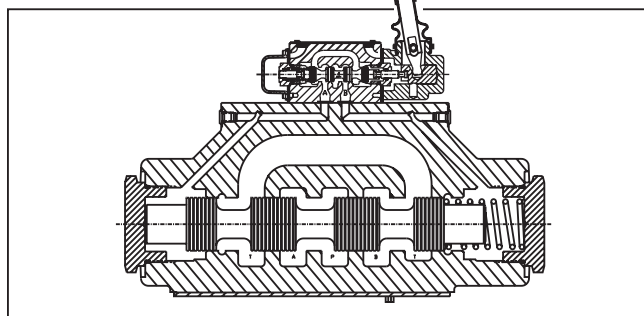
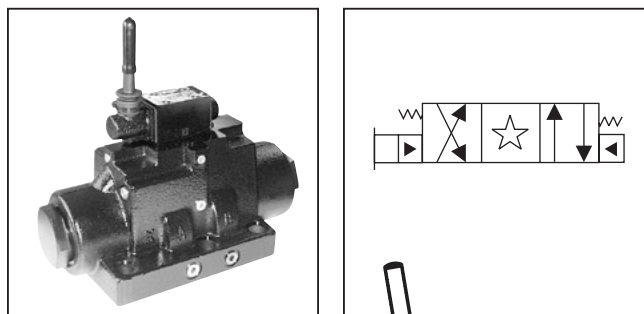
General Description

A

Series D101VL 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 D10, CETOP 10 mounting pattern.

Specifications

Mounting Pattern	NFPA D10, CETOP 10, NG32
Max. Operating Pressure	207 Bar (3000 PSI)
Max. Tank Pressure	Internal Drain Model: 34 Bar (500 PSI) External Drain Model: 207 Bar (3000 PSI)
Max. Drain Pressure	34 Bar (500 PSI)
Maximum Flow	See Reference Chart
Pilot Pressure	Oil Min 6.9 Bar (100 PSI) Oil Max 207 Bar (3000 PSI)
Response Time	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)



Features

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

Ordering Information

<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">D</div> Directional Control Valve	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">101V</div> Basic Valve	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">L</div> Lever Operated Pilot	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Spool	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Style	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Pilot Supply and Drain	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Seal	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Valve Variations	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Design Series																														
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">NFPA D10 CETOP 10</div>		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th><th>Symbol</th></tr> </thead> <tbody> <tr> <td>001</td><td></td></tr> <tr> <td>002</td><td></td></tr> <tr> <td>004</td><td></td></tr> <tr> <td>008*</td><td></td></tr> <tr> <td>009**</td><td></td></tr> <tr> <td>011</td><td></td></tr> </tbody> </table> <p>* 008 spool has closed crossover. ** 009 spool has open crossover.</p>		Code	Symbol	001		002		004		008*		009**		011		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th><th>Type</th></tr> </thead> <tbody> <tr> <td>N</td><td>Nitrile</td></tr> <tr> <td>V</td><td>Fluorocarbon</td></tr> </tbody> </table>	Code	Type	N	Nitrile	V	Fluorocarbon	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th><th>Description</th></tr> </thead> <tbody> <tr> <td>7</td><td>Pilot Choke – Meter Out</td></tr> <tr> <td>8</td><td>Stroke Adj. 'B' End</td></tr> <tr> <td>9</td><td>Stroke Adj. 'A' End</td></tr> <tr> <td>60</td><td>Pilot Choke – Meter In</td></tr> <tr> <td>89</td><td>Stroke Adj. 'A' & 'B' Ends</td></tr> </tbody> </table>	Code	Description	7	Pilot Choke – Meter Out	8	Stroke Adj. 'B' End	9	Stroke Adj. 'A' End	60	Pilot Choke – Meter In	89	Stroke Adj. 'A' & 'B' Ends	NOTE: Not required when ordering.
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Valve Weight: 35.0 kg (77.2 lbs.)
Standard Bolt Kit: BK229
Metric Bolt Kit: BKM229

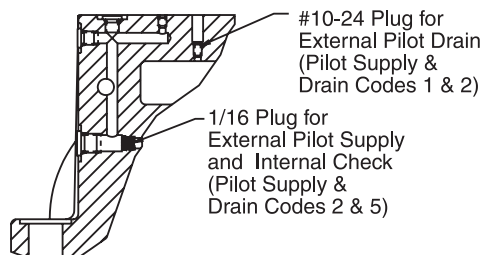
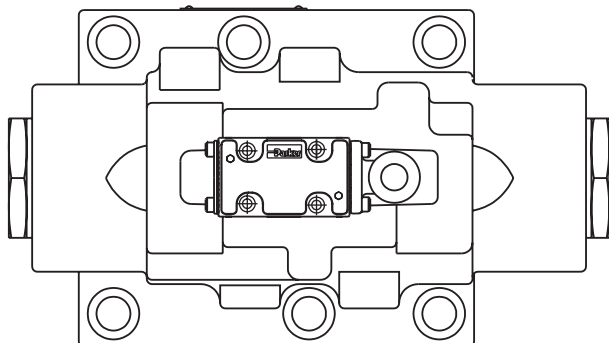
Bold: Designates Tier I products and options.

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

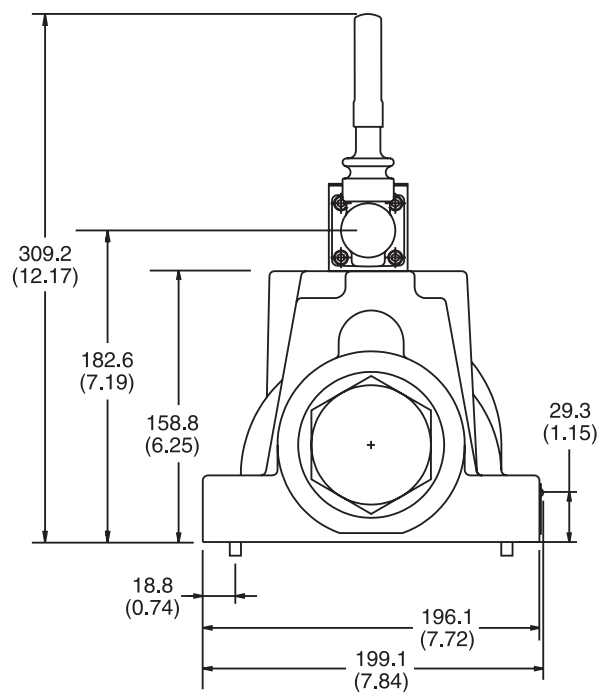
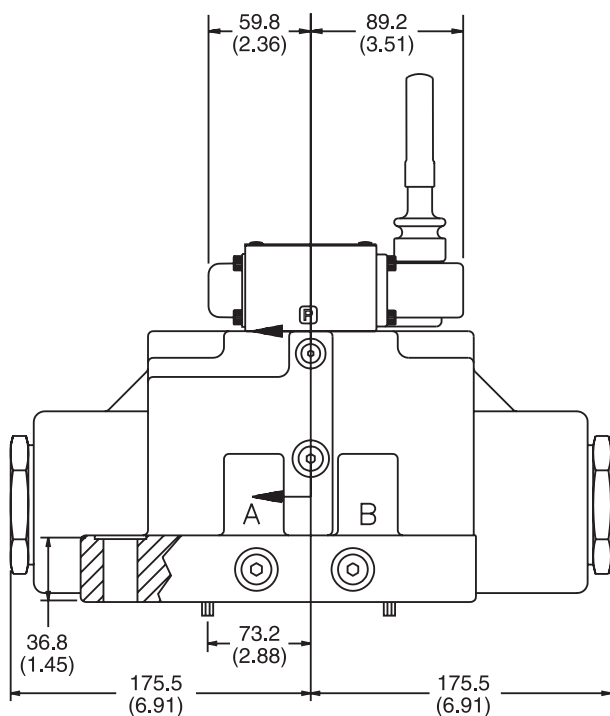
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information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

A01_Cat2500.indd, ddp, 04/19

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

Lever Operated**A**

Section A-A

**Note:** 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

A

General Description

Series D10P directional control valves are 5-chamber, pilot operated valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D10, CETOP 10 mounting pattern.

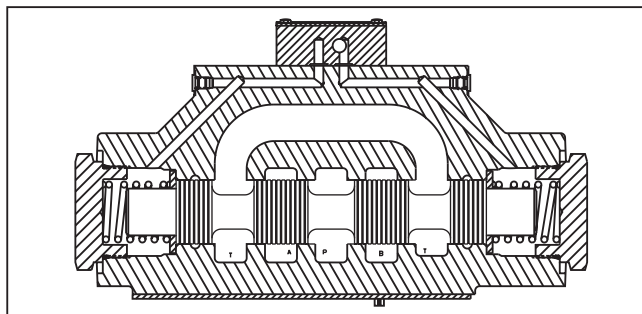
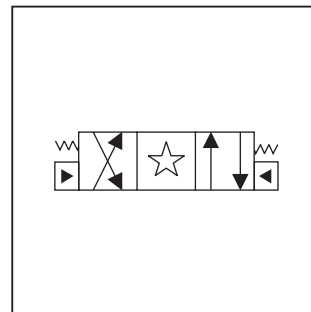
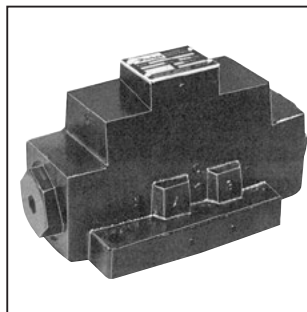
Features

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

Specifications

Mounting Pattern	NFPA D10, CETOP 10, NG32
Max. Operating Pressure	207 Bar (3000 PSI)
Max. Tank Line Pressure	207 Bar (3000 PSI)
Max. Drain Pressure	207 Bar (3000 PSI)
Min. Pilot Pressure	4.4 Bar (65 PSI)
Max. Pilot Pressure	207 Bar (3000 PSI)
Nominal Flow	378 LPM (100 GPM)
Maximum Flow	See Reference Chart

For flow path, pilot drain and pilot pressure details, see Installation Information.









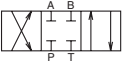
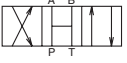
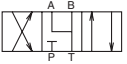

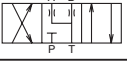
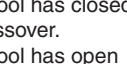
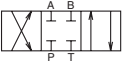
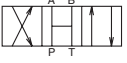
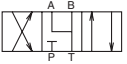

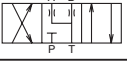
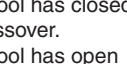
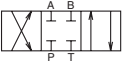
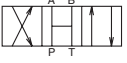
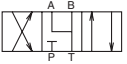

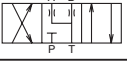
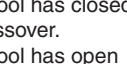
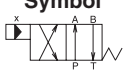

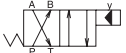
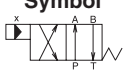

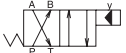

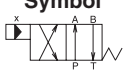

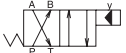
Response Time

Response time will vary with pilot line size, pilot line length, pilot pressure shift time and flow capacity of the control valve.

Shift Volume

The pilot chamber requires a volume of 1.51 in³ (24.75 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.
A01_Cat2500.indd, ddp, 04/19

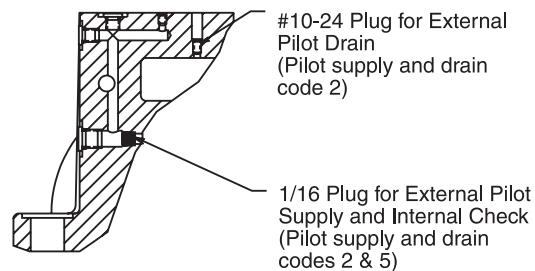
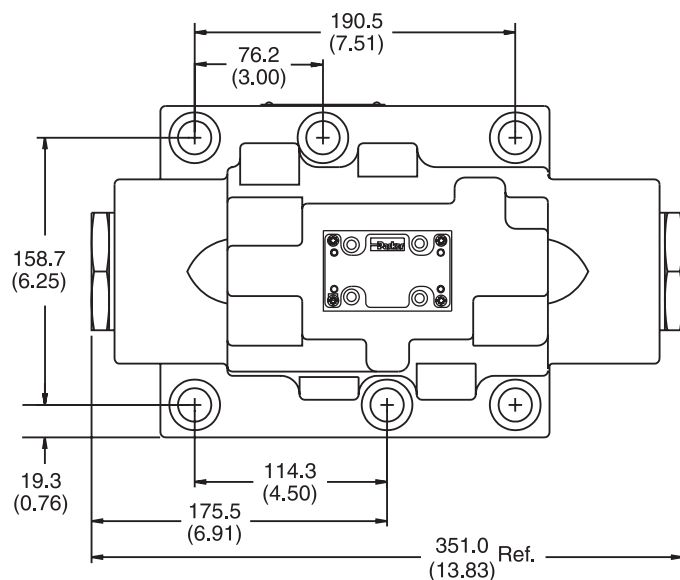
D Directional Control Valve	10 Basic Valve	P Actuator	 Spool	 Style	 Pilot Supply and Drain	 Seal	 Valve Variations	 Design Series																			
	NFPA D10 CETOP 10	Oil Operator	<table border="1"> <thead> <tr> <th>Code</th> <th>Symbol</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> </tr> <tr> <td>2</td> <td></td> </tr> <tr> <td>4</td> <td></td> </tr> <tr> <td>8*</td> <td></td> </tr> <tr> <td>9**</td> <td></td> </tr> <tr> <td>11</td> <td></td> </tr> </tbody> </table> <p>* 8 spool has closed crossover. ** 9 spool has open crossover.</p>	Code	Symbol	1		2		4		8*		9**		11			<table border="1"> <thead> <tr> <th>Code</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>N</td> <td>Nitrile</td> </tr> <tr> <td>V</td> <td>Fluorocarbon</td> </tr> </tbody> </table>	Code	Type	N	Nitrile	V	Fluorocarbon		
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<p>Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator X. Note operators reverse sides on #8 and #9 spools. See installation information for details.</p>			<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> <th>Symbol</th> </tr> </thead> <tbody> <tr> <td>B†</td> <td>Sgl. operator, 2 position, spring offset. P to A and B to T in offset position.</td> <td></td> </tr> <tr> <td>C</td> <td>DbL. operator, 3 position, spring centered.</td> <td></td> </tr> <tr> <td>H†</td> <td>Sgl. operator, 2 position, spring offset. P to B and A to T in offset position.</td> <td></td> </tr> </tbody> </table> <p>† Available with 1, 2, 4 & 11 spools only.</p>			Code	Description	Symbol	B†	Sgl. operator, 2 position, spring offset. P to A and B to T in offset position.		C	DbL. operator, 3 position, spring centered.		H†	Sgl. operator, 2 position, spring offset. P to B and A to T in offset position.		 This condition varies with spool code.									
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Valve Weight: 34.3 kg (75.7 lbs.)
Standard Bolt Kit: BK229
Metric Bolt Kit: BKM229

Bold: Designates Tier I products and options.

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

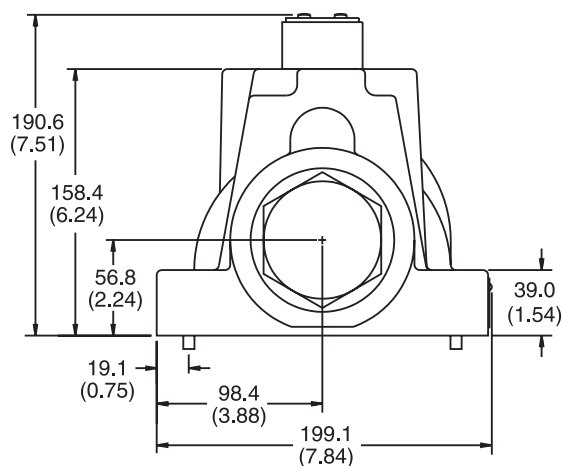
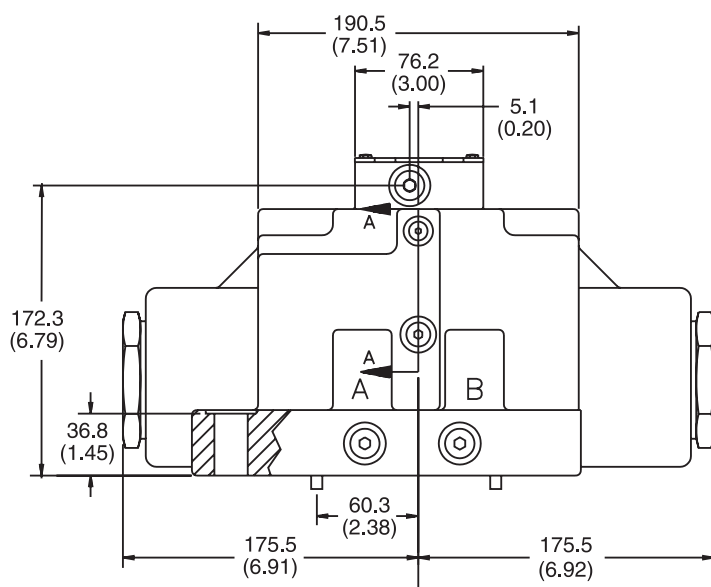
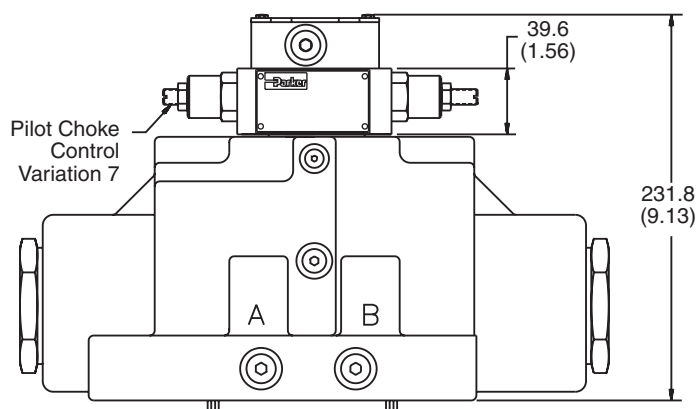
Inch equivalents for millimeter dimensions are shown in (**)

A**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.

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

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

Mounting Position

Detent – Horizontal
Spring Offset – Unrestricted
Spring Centered – Unrestricted

Fluid Recommendations

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

Fluids and Seals

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

Filtration

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

Silting

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

Special Installations

Consult your Parker representative for any application requiring the following:

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

Mounting Patterns

Series	NFPA	Size
D101V*, D10P	D10	1-1/4"

Torque Specifications

The recommended torque values for the bolts which mount the valve to the manifold or subplate are as follows: 406.8 Nm (300 ft-lbs).

A

A

Series D101VW, D101VA, D101VL**Tank and Drain Line Surges**

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

Electrical Characteristics (Detented Spool)

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

Electrical Failure or Loss of Pilot Pressure (D101VA)

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

Pilot/Drain Characteristics

Pilot Pressure: 4.4 to 207 Bar (65 to 3000 PSI)

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

Internal: Flow is internally ported from the pressure port of the main valve body to the “P” port of the pilot valve. The pressure developed at the “P” port of the pilot valve must be 4.4 Bar (65 PSI) minimum at all times.

Integral Check: Valves using internal pilot and internal drain with an open center spool (spools 2, 7, 8 & 9) can be ordered with an integral check valve in the pressure port of the main valve codes 3 & 6. Pilot oil will be internally ported from the upstream side of this check to the “P” port of the pilot valve, ensuring sufficient pilot pressure. A 1/16" pipe plug will be present in the main body. The “X” port in the subplate must be plugged when using the integral check.

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

External: When using an external drain, a 10 x 24 x 0.31 long set screw must be present in the main body drain passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with drain code 1, 2 or 3.

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

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

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

† D101VW only.



Tank and Drain Line Surges

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

Loss of Pilot Pressure

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

Pilot Drain Characteristics

Pilot Pressure:

4.4 to 207 Bar (65 to 3000 PSI)

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

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

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

Flow Path/Pilot Pressure

Style Code	Description	“X” & “Y” De-Pressurized	“X” Port Pressurized	“Y” Port Pressurized	Special Notes	Recommended Control Valve For Pilot Oil
B	Two Position Spring Offset	P→A, B→T	P→A, B→T	P→B, A→T	“X” Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position Spring Centered	Center	P→A, B→T	P→B, A→T	Flow paths will be reversed on valves with tandem center (8 & 9) spools	
H	Two-Position Spring Offset	P→B, A→T	P→A, B→T	P→B, A→T	“Y” Port may be pressurized to assist spring in returning spool to offset position	

A

Subplate Mounting

NFPA D10, CETOP 10 & NG 32

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 406.8 Nm (300 ft-lbs).

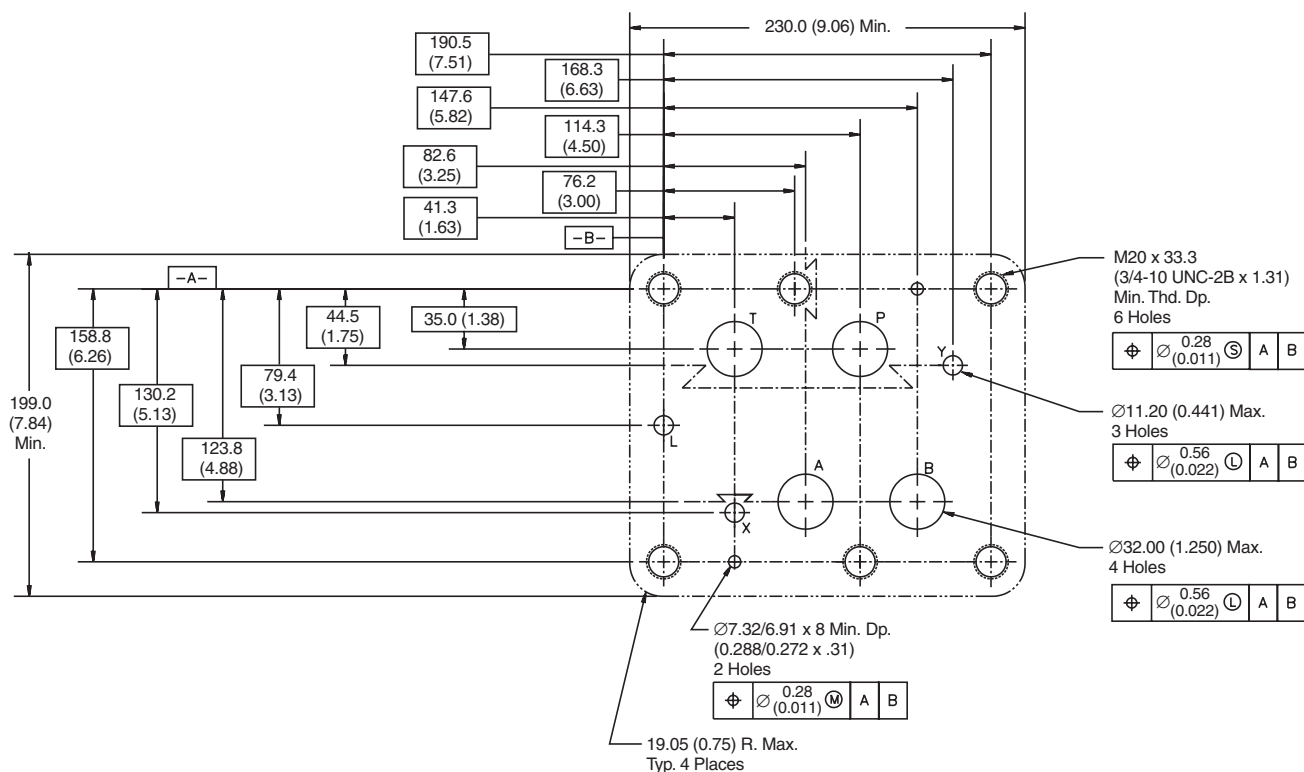
Mounting Position

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

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

Mounting Pattern — NFPA D10, CETOP 10 & NG32

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



General Description

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

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

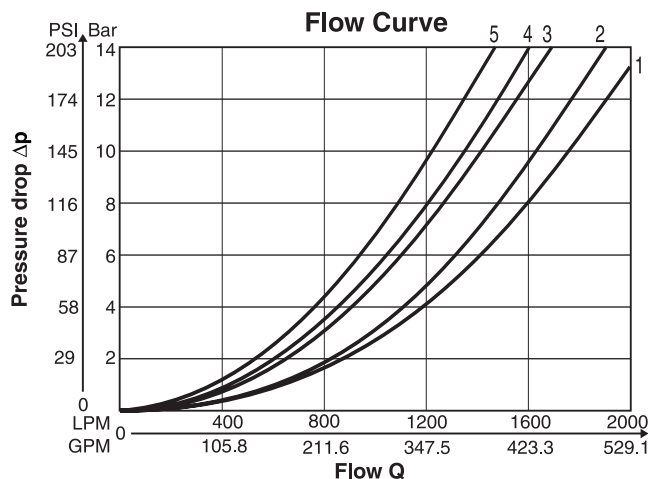
Additionally spools with a P to T connection in the de-energized position need an external pressure supply (external inlet).

Features

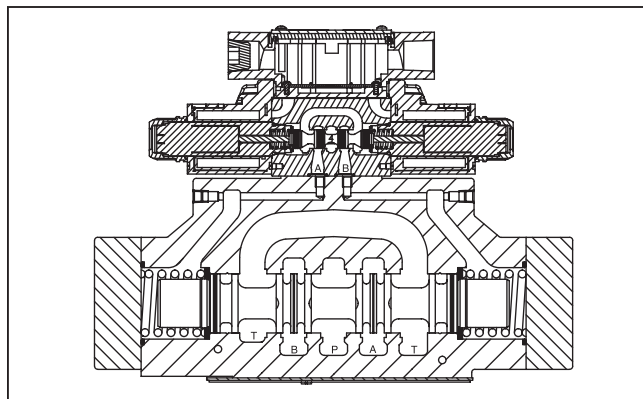
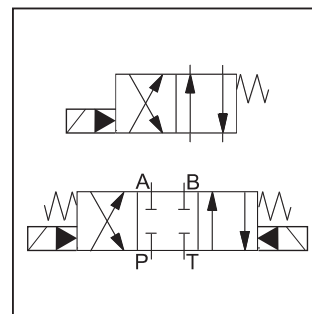
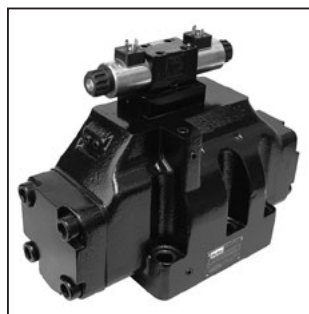
- Low pressure drop design.
- Hardened spools provide long life.
- Wide variety of voltages and electrical connection options.
- Explosion proof availability.
- No tools required for coil removal.

Performance Curves

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



All characteristic curves measured with HLP46 at 50°C.



Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
001	5	5	—	4	1
002	5	5	5	4	1
004	5	5	-	4	1
009	3	3	2	3	1
020	5	5	—	3	1
030	5	5	—	4	1
054	5	5	—	4	1

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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D	111V	W																								
Directional Control Valve	Basic Valve	Actuator	Spool	Style	Pilot Supply and Drain	Seal	Solenoid Voltage																			
	NFPA 10 CETOP 10 DIN NG32 50 mm	Solenoid Wet Pin																								
				<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															
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Code	Description																									
D††#	120 VDC																									
E**	24 VAC/60 Hz																									
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																									

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 open crossover.
**009 & 030 spools have closed crossovers.

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".

2-Position Spools		
Code	Spool Position	
B*		Spring offset in position "b". Operated in position "a".
H*		Spring offset in position "a". Operated in position "b".

* 020 & 030 spools only.

Weight:

Single Solenoid: 67.4 kg (148.6 lbs.)

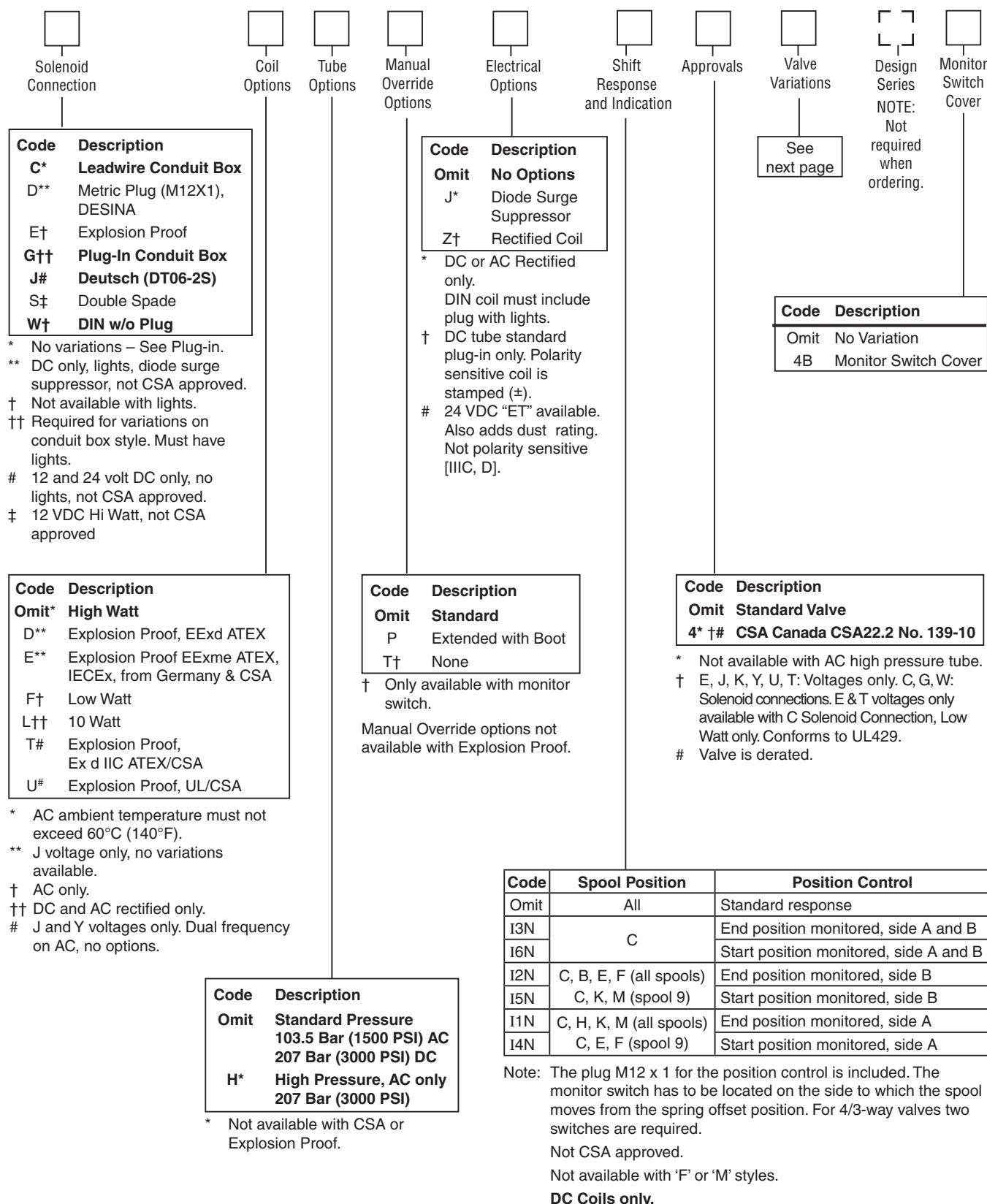
Double Solenoid: 68.0 kg (149.9 lbs.)

Bold: Designates Tier I products and options.

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

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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

Code	Description
5*	Signal Lights – Standard
	Signal Lights – Hirsch. (DIN with Plug)
7B**	Manaplug – Brad Harrison (12x1) Micro with Lights
56**	Manaplug (Mini) with Lights
1C**	Manaplug (Mini) Single Sol. 5-pin, with Lights
1D**	Manaplug (Micro) Single Sol. 5-pin, with Lights
1M**	Manaplug Opposite Normal
1R	Stroke Adjust 'A' & 'B' End with Pilot Choke Meter In
3A	Pilot Choke Meter Out
3B	Pilot Choke Meter In
3C	Pilot Pressure Reducer
3D	Stroke Adjust 'B' End
3E	Stroke Adjust 'A' End
3F	Stroke Adjust 'A' & 'B' End
3G*	Pilot Choke Meter Out with Lights
3H*	Pilot Choke Meter In with Lights
3J*	Pilot Pressure Reducer with Lights
3K	Pilot Choke Meter Out with Stroke Adjust 'A' & 'B' End
3L**	Pilot Choke Meter Out, Stroke Adjust 'A' & 'B' End with Lights and Manaplug — Brad Harrison Mini
3M	Pilot Choke Meter Out, Pilot Pressure Reducer, Stroke Adjust 'A' & 'B' End
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
3S**	Lights, Mini Manaplug, Pilot Choke Meter Out
7Y**	M12x1 Manaplug (4-pin), Special Wiring, and Lights
XB990†	CE Marking

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

** Must have plug-in style conduit box.

† Above 50 VAC or 75 VDC must have "4" CSA approved coils.

Solenoid Ratings

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

Explosion Proof Solenoid Ratings*

U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D; Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (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 $\pm 10\%$.

Note that Explosion Proof AC coils are single frequency only.

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

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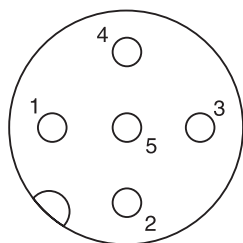
General				
Design		Directional Spool Valve		
Actuation		Solenoid		
Size		NG32		
Mounting Interface		DIN 24340 A32 / ISO 4401 / NFPA D10 / CETOP RP 121-H		
Mounting Position		Unrestricted, preferably horizontal		
Ambient Temperature		[°C]	-25...+50; (-13°F...+122°F) (without inductive position control)	
		[°C]	0...+50; (+32°F...+122°F) (with inductive position control)	
MTTF _D Value		[years]	75	
Hydraulic				
Maximum Operating Pressure		Pilot drain internal: P, A, B, X 350 Bar (5075 PSI)		
		T, Y 102 Bar (1500 PSI) AC only, 207 Bar (3000 PSI) DC/AC optional		
		Pilot drain external: P, A, B, T, X 350 Bar (5075 PSI)		
		Y 102 Bar (1500 PSI) AC only, 207 Bar (3000 PSI) DC/AC optional		
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525		
Fluid Temperature		[°C]	-25 ... +70; (-13°F...+158°F)	
Viscosity Permitted Recommended		[cSt]/[mm²/s]	2.8...400 (13...1854 SSU)	
		[cSt]/[mm²/s]	30...80 (139...371 SSU)	
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)		
Flow Maximum		2000 LPM (529.1 GPM)		
Leakage at 350 Bar (per flow path)		[ml/min]	up to 5000 (1.32 GPM) depending on spool	
Minimum Pilot Supply Pressure		5 Bar (73 PSI)		
Static / Dynamic				
Step Response at 95%		Energized	De-energized	
DC Solenoids	Pilot Pressure			
	50 Bar	[ms]	470	390
	100 Bar	[ms]	320	390
	250 Bar	[ms]	210	390
	350 Bar	[ms]	200	390
AC Solenoids	Pilot Pressure	[ms]		
	50 Bar	[ms]	450	375
	100 Bar	[ms]	300	375
	250 Bar	[ms]	190	375
	350 Bar	[ms]	180	375

Position Control M12x1

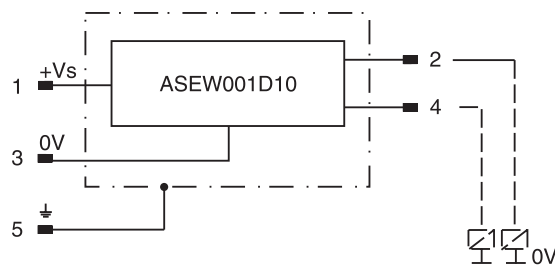
Protection Class	IP 65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature [°C]	0...+50; (+32°F...122°F)
Supply Voltage / Ripple [V]	18...42 ±10%
Current Consumption without Load [mA]	≤ 30
Max. Output Current per Channel, Ohmic [mA]	400
Min. Output Load per Channel, Ohmic [kOhm]	100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

A

M12 Pin Assignment



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



Definitions

Start position monitored:

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

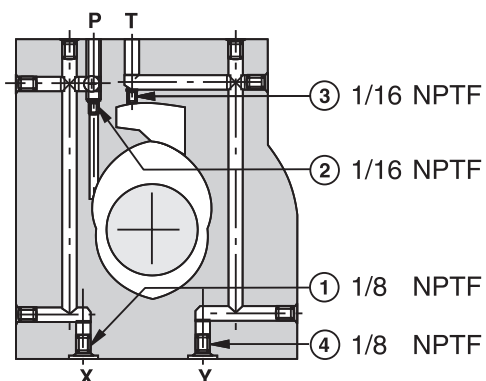
End position monitored:

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

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

Pilot Oil Inlet (Supply) and Outlet (Drain)

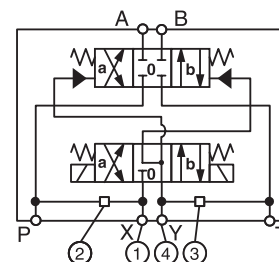
A



○ open, ● closed

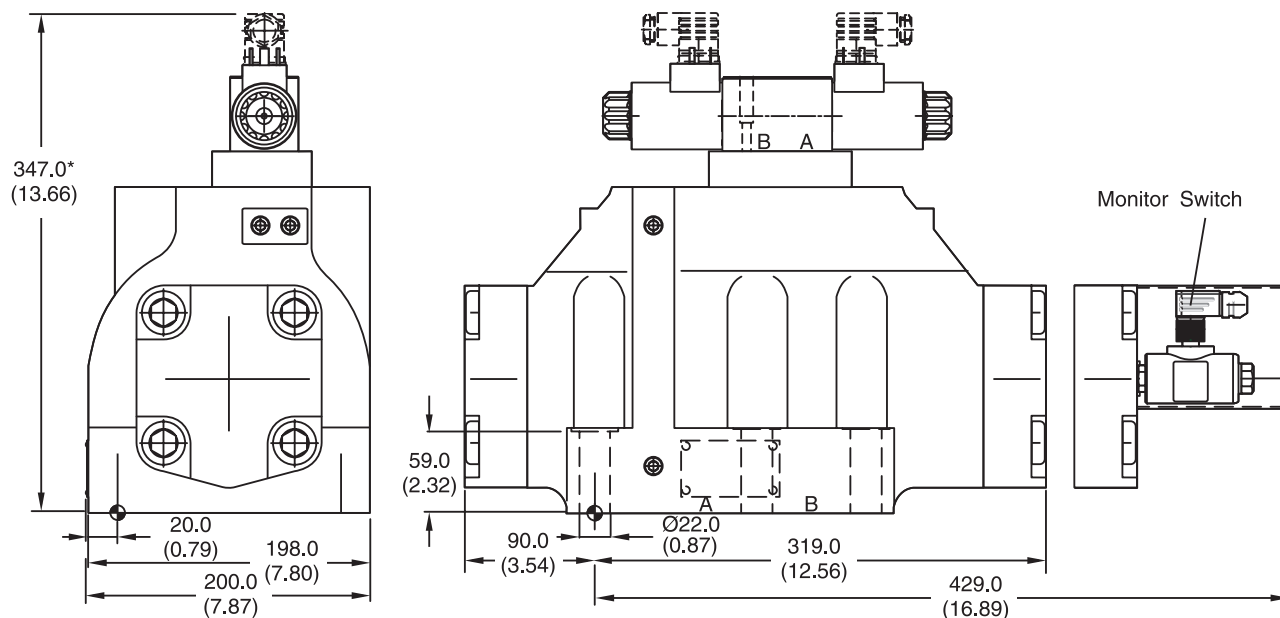
Pilot Oil		1	2	3	4
Inlet	Outlet				
internal	external	●	Orifice Ø1.5	●	○
external	external	Orifice Ø1.5	●	●	○
internal	internal	●	Orifice Ø1.5	○	●
external	internal	Orifice Ø1.5	●	○	●

All orifice sizes for standard valves



Dimensions

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



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

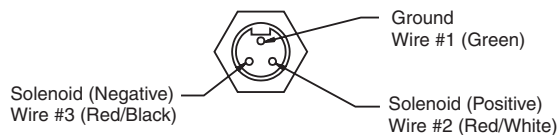
Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}6.3}$ $\sqrt{0.01/100}$	BK386	6x M20x90 DIN 912 12.9	517 Nm (381.3 lb.-ft.)	Nitrile: SK-D111VW-N-91 Fluorocarbon: SK-D111VW-V-91

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

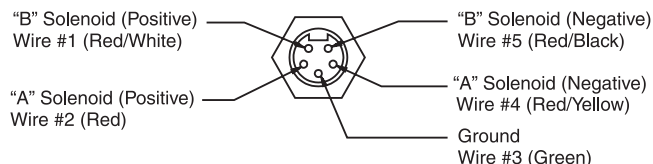
The torque for the screw M3 of the plug has to be 0.5 Nm (3.7 lb.-ft.) to 0.6 Nm (4.4 lb.-ft.).

Manaplug (Options 56 & 1C)

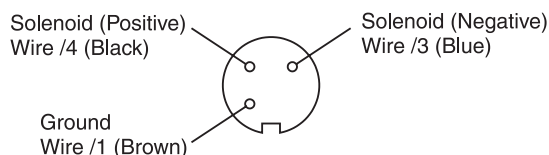
- Interface — Brad Harrison Plug
- 3-Pin for Single Solenoid
 - 5-Pin for Double Solenoid

**3-Pin Manaplug (Mini) with Lights**

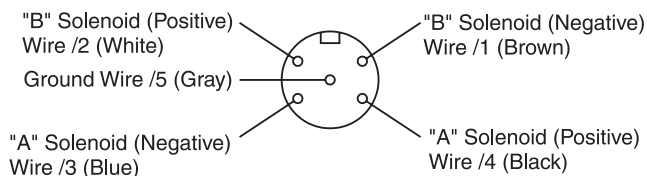
Single Solenoid Valves — Installed Opposite Side of Solenoid

**5-Pin Manaplug (Mini) with Lights**

Single Solenoid Valves — Installed Opposite Side of Solenoid

Double Solenoid Valves — Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)**Micro Connector Options (7B & 1D)****3-Pin Manaplug (Micro) with Lights**

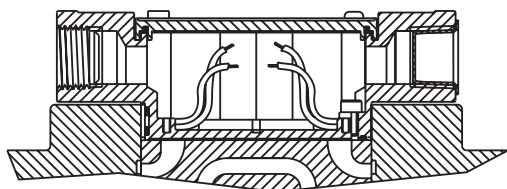
Single Solenoid Valves — Installed Opposite Side of Solenoid

**5-Pin Manaplug (Micro) with Lights**

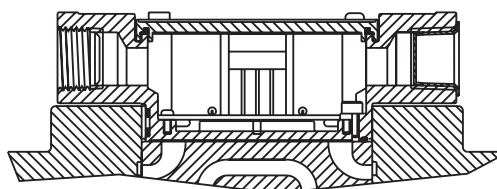
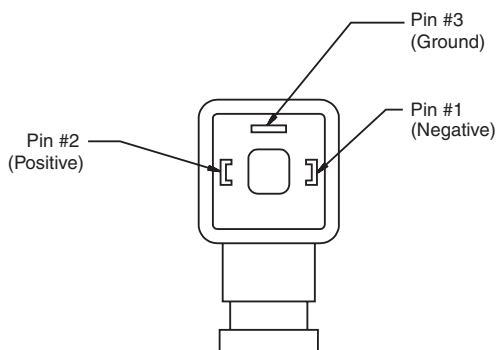
Single Solenoid Valves — Installed Opposite Side of Solenoid

Double Solenoid Valves — Installed Over "A" Solenoid
("A" and "B" Solenoids Reversed for #8 and #9 Spools)**Pins are as seen on valve (male pin connectors)****Conduit Box Option C**

- No Wiring Options Available

**Signal Lights (Option 5) — Plug-in Only**

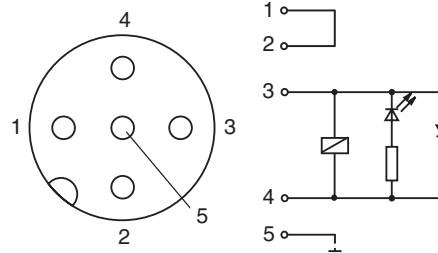
- LED Interface
- Meets Nema 4/IP67

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

Face View of Plug

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

DESINA — design
Pin 1 and 2
connected

A

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

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

Mounting Position

Detent – Horizontal

Spring Offset – Unrestricted

Spring Centered – Unrestricted

Fluid Recommendations

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

Fluids and Seals

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

Filtration

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

Silting

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

Special Installations

Consult your Parker representative for any application requiring the following:

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

Mounting Patterns

Series	NFPA	Size
D111V*, D10P	D10	1-1/4"

Torque Specifications

The recommended torque values for the bolts which mount the valve to the manifold or subplate are as follows: 406.8 Nm (300 ft-lbs).

Tank and Drain Line Surges

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

Electrical Characteristics (Detented Spool)

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

Electrical Failure or Loss of Pilot Pressure

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

Pilot/Drain Characteristics

Pilot Pressure: 5 to 345 Bar (73 to 5000 PSI)

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

Internal: Flow is internally ported from the pressure port of the main valve body to the "P" port of the pilot valve. The pressure developed at the "P" port of the pilot valve must be 5 Bar (73 PSI) minimum at all times.

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

External: When using an external drain, a 10 x 24 x 0.31 long set screw must be present in the main body drain passage. (For details see Technical pages.) This plug will be furnished in valves ordered with drain code 1 or 2.

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

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

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

Subplate Mounting

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NFPA D10, CETOP 10 & NG 32

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 406.8 Nm (300 ft-lbs).

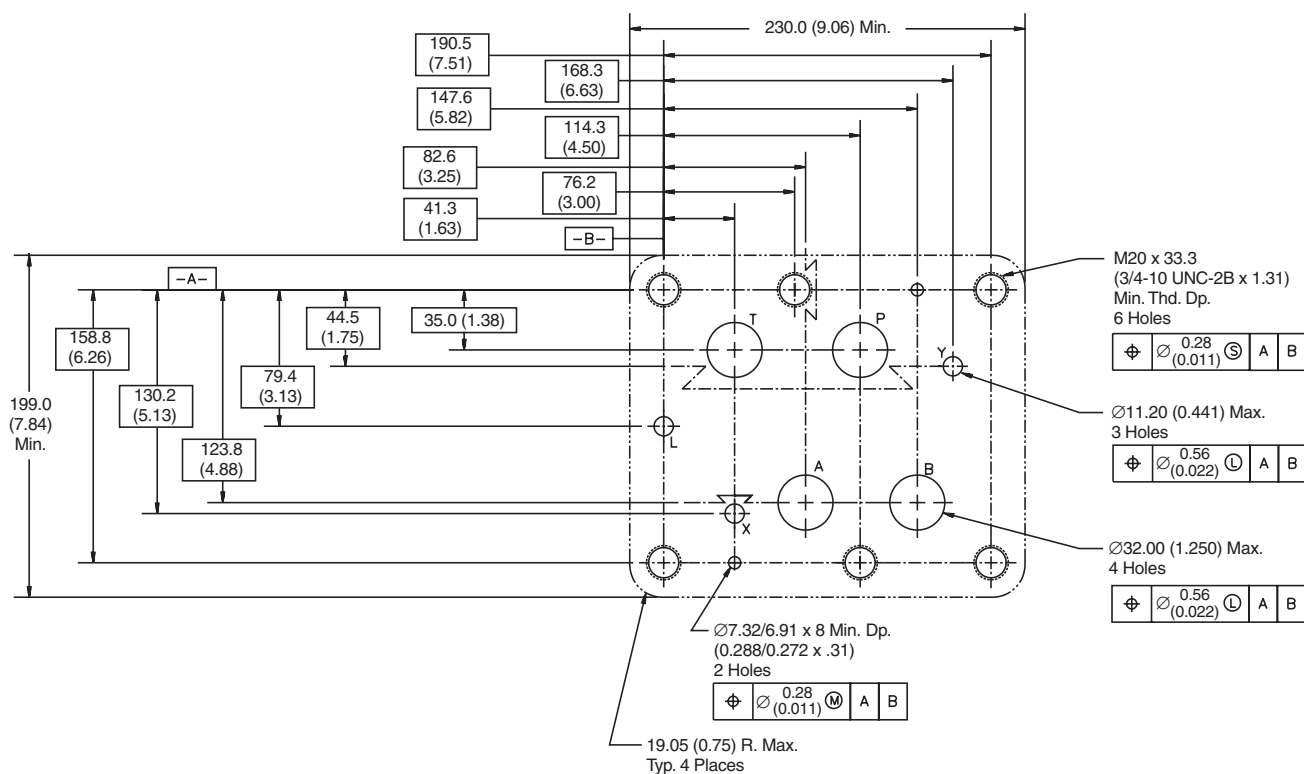
Mounting Position

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

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

Mounting Pattern — NFPA D10, CETOP 10 & NG32

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



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.

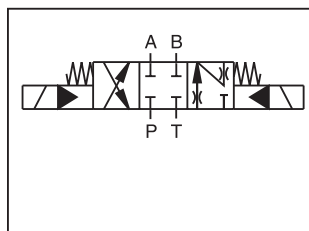
Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



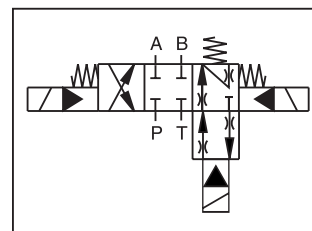
D41VWR (shown)



D41VWZ (shown)

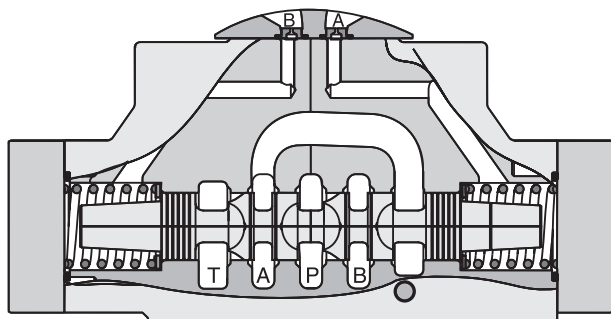


Regenerative D111VWR

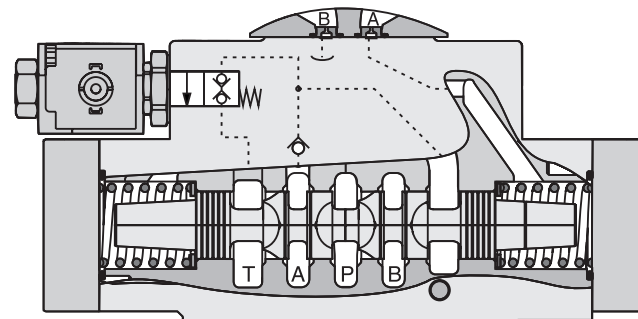


Hybrid D111VWZ

Regenerative Valve D111VWR

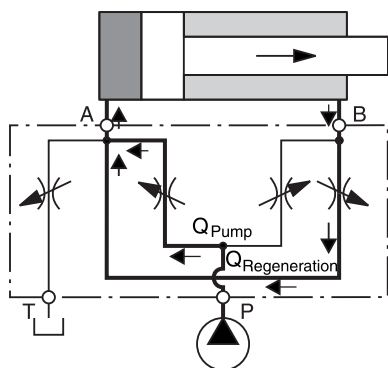


Hybrid Valve D111VWZ



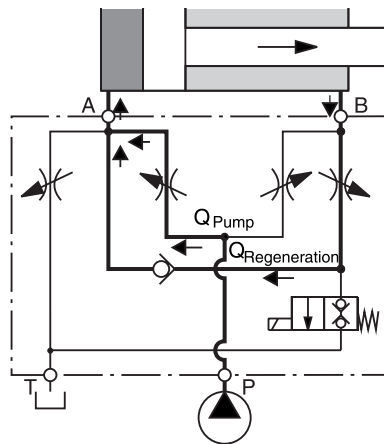
D111VWR Regenerative Valve

Cylinder Extending

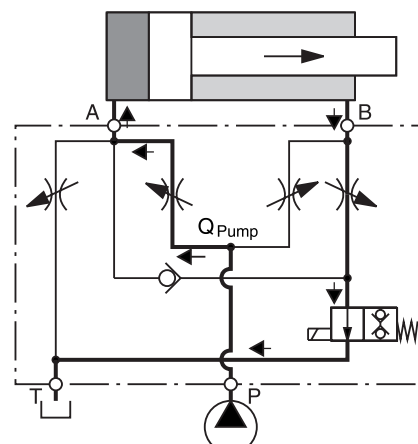


D111VWZ Hybrid Valve

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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Ordering Information

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D111VW		C			J	W																									
Series	Spool	Style	Pilot Supply and Drain	Seal	Solenoid Voltage 24VDC	Connector as per EN 175301-803, without connector (Please order plug separately)	Manual Override	Valve Variations	Design Series																						
NFPA D10, CETOP10 DIN NG32 50mm		<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>3 positions. Spring offset in position "0". Operated in position "a" or "b".</td> </tr> </tbody> </table>	Code	Description	C	3 positions. Spring offset in position "0". Operated in position "a" or "b".		<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>N</td> <td>Nitrile</td> </tr> <tr> <td>V</td> <td>Fluorocarbon</td> </tr> </tbody> </table>	Code	Description	N	Nitrile	V	Fluorocarbon		<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Omit</td> <td>Standard</td> </tr> <tr> <td>T</td> <td>No override</td> </tr> </tbody> </table>	Code	Description	Omit	Standard	T	No override									
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Code	Description																														
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2	External Pilot External Drain																														
4	Internal Pilot Internal Drain																														
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Code	Description																														
Omit	No Variations																														
3A	Pilot Choke, Meter-Out																														
3B	Pilot Choke, Meter-In																														
3C	Pilot Pressure Reducer																														
3R	Pilot Choke Meter-Out & Pressure Reducer																														
1T	Pilot Choke Meter-In & 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		

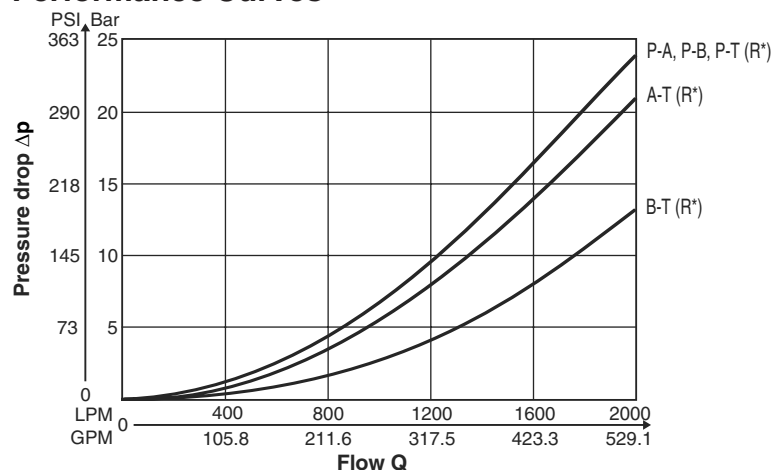
Weight:

D111VWR, D111DWZ 68.0 kg (149.9 lbs.)

Bold: Designates Tier I products and options.

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

Performance Curves



Flow curves measured with Spool R01, R04.

Spool Z* on request

General			
Design		Directional Spool Valve	
Actuation		Solenoid	
Size		NG32 / CETOP10 / D10	
Mounting Interface		DIN 24340 A32 / ISO 4401 / NFPA D10 / CETOP RP 121-H	
Mounting Position		Unrestricted, preferably horizontal	
Ambient Temperature		[°C]	-25...+50; (-13°F...+122°F)
MTTFD Value		[years]	75
Hydraulic			
Maximum Operating Pressure		Pilot drain internal: P, A, B, X 350 Bar (5075 PSI); T, Y 105 Bar (1523 PSI) Pilot drain external: P, A, B, T, X 350 Bar (5075 PSI); Y 105 Bar (1523 PSI)	
Fluid		Hydraulic oil in accordance with DIN 51524 / 51525	
Fluid Temperature		[°C]	-25 ... +70 (-13°F...+158°F)
Viscosity Permitted		/[mm²/s]	2.8...400 (13...1854 SSU)
[cSt]			30...80 (139...371 SSU)
Recommended			
[cSt]			
Filtration		ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)	
Flow Maximum		2000 LPM (529.1 GPM)	
Leakage at 350 Bar (5075 PSI) (per flow path)		[ml/min]	up to 5000 (1.32 GPM) (depending on spool)
Minimum Pilot Supply Pressure		5 Bar (73 PSI)	
Static / Dynamic			
Step Response at 95%		Energized	
DC Solenoids		De-energized	
Pilot Pressure			
50 Bar (725 PSI)		[ms]	470
100 Bar (1450 PSI)		[ms]	320
250 Bar (3625 PSI)		[ms]	210
350 Bar (5075 PSI)		[ms]	200
			390
			390
			390
			390
Electrical			
Duty Ratio		100% ED; CAUTION: coil temperature up to 150°C (302°F) possible	
Protection Class		IP 65 in accordance with EN 60529 (plugged and mounted)	
Supply Voltage / Ripple		[V]	24
Tolerance Supply Voltage		[%]	±10
Current Consumption Hold		[A]	1.29
Current Consumption In Rush		[A]	1.29
Power Consumption Hold		[W]	31
Power Consumption In Rush		[W]	31
Solenoid Connection		Connector as per EN 175301-803, Solenoid identification as per ISO 9461	
Wiring Minimum		[mm²]	3 x 1.5 recommended
Wiring Length Minimum		[m]	50 (164 ft.) recommended

With electrical connections the protective conductor (PE ≡) must be connected according to the relevant regulations.

Electrical Specifications Hybrid Option

Duty Ratio	100%		
Protection Class	IP 65 in accordance with EN 60529 (plugged and mounted)		
Supply Voltage	[V]	24	
Tolerance Supply Voltage	[%]	±10	
Current Consumption	[A]	1.29	
Power Consumption	[W]	31	
Solenoid Connection	[A/m]	Connector as per EN 175301-803	
Wiring Minimum	[mm²]	3 x 1.5 recommended	
Wiring Length Maximum	[m]	50 (164 ft.) recommended	

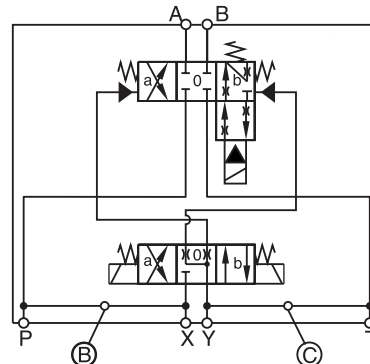
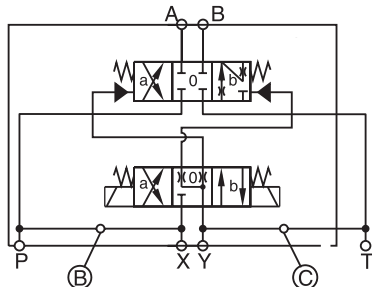
With electrical connections the protective conductor (PE ≡) must be connected according to the relevant regulations.

Pilot Flow

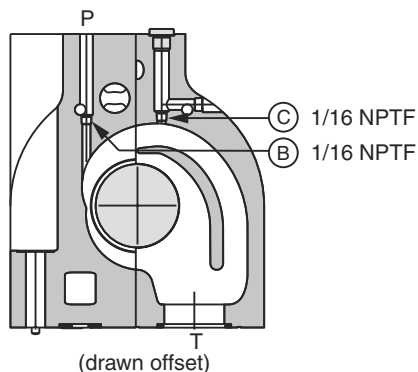
Pilot Oil Inlet (Supply) and Outlet (Drain)

○ open, ● closed

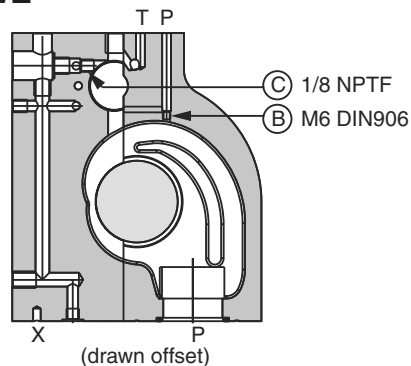
Pilot Oil Inlet	Pilot Oil Outlet	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



D111VWR

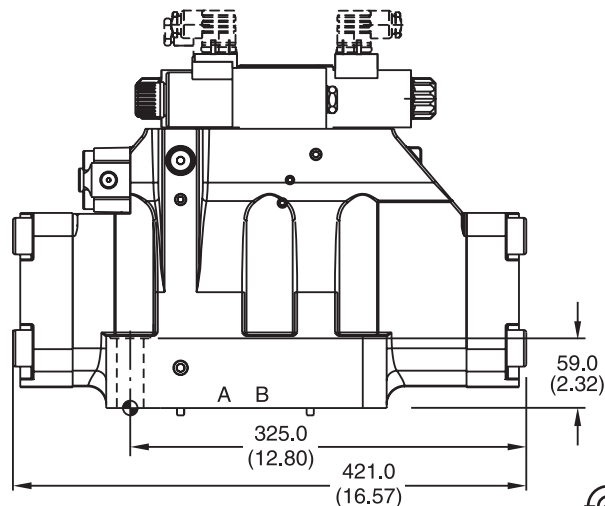
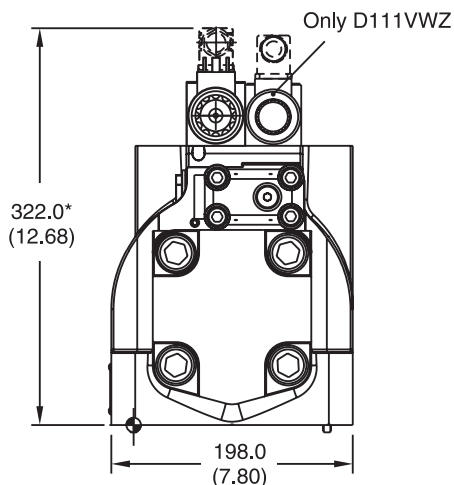


D111VWZ



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 15mm (0.59").
 The torque for the screw M3 of the plug has to be 0.5 Nm (0.37 lb.-ft.) to 0.6 Nm (0.44 lb.-ft.).

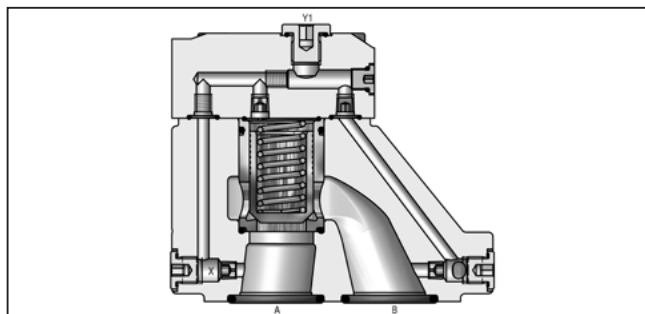
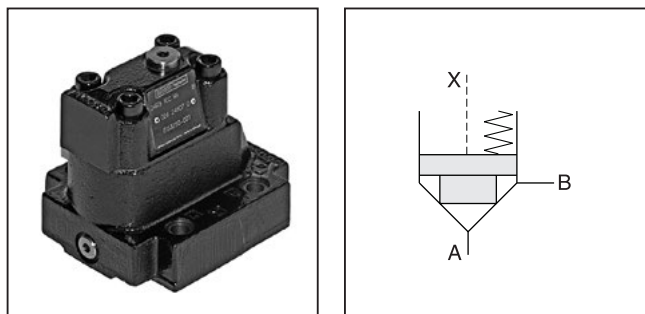
General Description

Series D4S seat valves are designed for directional control functions. A large variety of poppets, springs and covers – including shuttle valves, stroke limiters, solenoid valves (VV01) and position control – allow to design individual hydraulic solutions for nominal flow up to 600 LPM (158.7 GPM).

A complete program is offered under the Parker brand: subplate mounted valves (D4S), SAE flange valves (D5S), pipe mounted valves (D4S), slip-in cartridges (CAR - on request).

Features

- Subplate mounting acc. to ISO 5781.
- Leak-free seat valve design.
- Numerous pilot options.
- 6 poppet types.
- 3 sizes (NG10, 25, 32).



Selection of Cartridges

Sleeve 1, Poppet 1	Sleeve 1, Poppet 2	Sleeve 1, Poppet 4	Sleeve 3, Poppet 4	Sleeve 3, Poppet A	Sleeve 3, Poppet B/C
1 : 1.05 $A_A = 0.95 A_C$ $A_B = 0.05 A_C$ 15° chamfer	1 : 1.05 $A_A = 0.95 A_C$ $A_B = 0.05 A_C$ 15° chamfer orifice	1 : 1.05 $A_A = 0.95 A_C$ $A_B = 0.05 A_C$ 45° chamfer	1 : 1.67 $A_A = 0.6 A_C$ $A_B = 0.4 A_C$ 45° chamfer	1 : 1.67 $A_A = 0.6 A_C$ $A_B = 0.4 A_C$ 45° chamfer safety spool	1 : 1.67 $A_A = 0.6 A_C$ $A_B = 0.4 A_C$ 45° chamfer throttle spool

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.
A01_Cat2500.indd, ddp, 04/19

Ordering Information, Performance Curves **Series D4S****A****D4S**Seat
ValveNominal
Size**9**Subplate
Mounting
ISO 6264,
Y1 Port G1/4"Pilot
ConnectionCap
Version

Sleeve

Spool
Type

Code	Description
03	NG10
06	NG25
10	NG32

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	Description
1	AA=95%, AB=5%
3	AA=60%, AB=40%

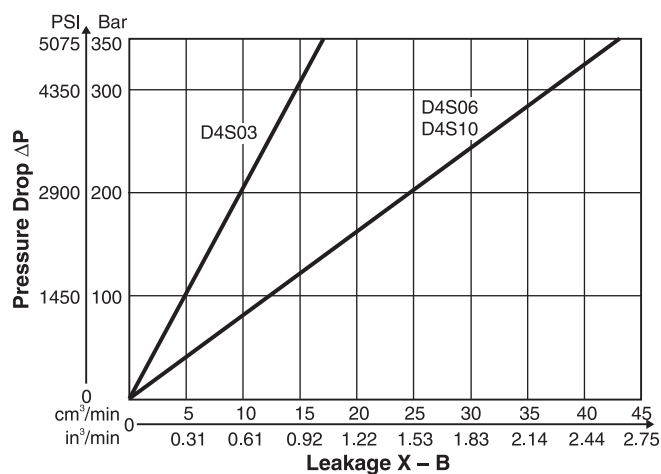
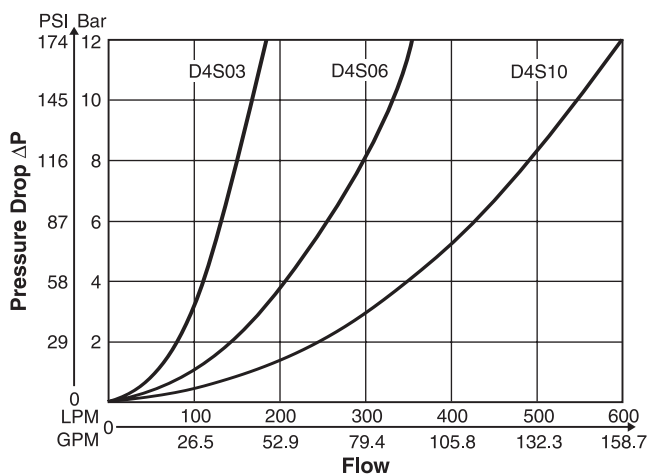
Code	Ports	X	Y	Z	X-Y	Y1	VV01
Standard							
1	Pilot Oil = Pilot Drain	○	●	●	○	●	—
C	Pilot Oil = Pilot Drain	●	○	●	○	●	—
With Solenoid Valve (VV01)							
2	External PD from cap	○	○	●	●	○	●
5	External to subplate	○	○	●	●	●	○
6	Internal pilot drain	○	○	●	●	●	○
With Stroke Limiter (not for D4S03)							
3	Pilot Oil = Pilot Drain	●	●	—	—	—	—
4	Pilot Oil = Pilot Drain	●	●	—	—	—	—

Key: ○ Open Bore ● Closed Bore ● Orifice Ø 1.2

Note: Combination examples provided on pages A227-A229.

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.

Performance Curves

All characteristic curves measured with HLP46 at 50°C.

Spring

Switching
Type

Solenoid
Voltage

B
Design
Series

Seal

Options

Code	Description
Omit	Standard w/o vent function
G0R	12V
G0Q	24V
GAR	98V
GAG	205V
W30	110V 50Hz / 120V 60Hz
W31	230V 50Hz / 240V 60Hz

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
Omit	Standard without Vent Function
09	VV01 with Manual Override
10	VV01 without Manual Override
11	VV01 with Manual Override
12	VV01 without Manual Override
CA	Shuttle Valve
DA	Shuttle Valve
CB	VV01 Code 09 and Shuttle Valve Code CA
CD	VV01 Code 11 and Shuttle Valve Code CA
DB	VV01 Code 09 and Shuttle Valve Code DA
DD	VV01 Code 11 and Shuttle Valve Code DA
BH	VV01 Code 10 and Shuttle Valve Code CA and Position Control* with Amplifier
BK	VV01 Code 12 and Shuttle Valve Code CA and Position Control* with Amplifier
BN	VV01 Code 10 and Shuttle Valve Code DA and Position Control* with Amplifier
BQ	VV01 Code 12 and Shuttle Valve Code DA and Position Control* with Amplifier
BC	VV01 Code 10 and Position Control* with Amplifier
BE	VV01 Code 12 and Position Control* with Amplifier
BA	Position Control* with Amplifier
BF	Position Control* with Amplifier and Shuttle Valve Code CA
BL	Position Control* with Amplifier and Shuttle Valve Code DA

Code	Description
Omit	Standard
013*	Cover for End Position Control

* Switching type must be B option.

Weight:

D4S03	2.7 kg (6.0 lbs)
D4S06	4.5 kg (9.9 lbs)
D4S10	6.0 kg (13.2 lbs)

* Position control for D4S06/10 only.
Spring 2 or 4. Spool A and sleeve 3.
Valve open: Proximity Switch damped.

Code	Spring — Approx. Cracking Pressure in Bar (PSI)					
	Sleeve Code 1			Sleeve Code 3		
	A -> B		A -> B		B -> A	
	D4S03	D4S06/10	D4S03	D4S06/10	D4S03	D4S06/10
1	2.8 (40.6)	3.5 (50.8)	6.5 (94.3)	6.5 (94.3)	9.5 (137.8)	11.0 (159.5)
2	0.5 (7.3)	0.5 (7.3)	1.0 (14.5)	1.0 (14.5)	1.5 (21.8)	1.7 (24.7)
3	0.3 (4.4)	0.3 (4.4)	0.6 (8.7)	0.6 (8.7)	0.9 (13.1)	1.0 (14.5)
4	2.2 (31.9)	2.2 (31.9)	4.0 (58.0)	3.5 (50.8)	5.5 (79.8)	6.0 (87.0)
5	—	9.0 (130.5)	—	16.0 (232.0)	—	28.0 (406.0)
6	1.2 (17.4)	1.2 (17.4)	2.0 (29.0)	2.2 (31.9)	3.0 (43.5)	3.8 (55.1)
7	3.0 (43.5)	—	8.0 (116.0)	—	12.0 (174.0)	—

Specifications

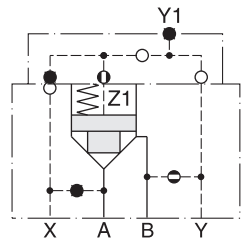
A

General							
Size	03			06		10	
Mounting	Subplate according to ISO 6264						
Mounting Position	Unrestricted						
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)						
MTTF _D	150 years						
Hydraulic							
Maximum Operating Pressure	Ports A, B	up to 350 Bar (5075 PSI)		up to 350 Bar (5075 PSI)		up to 350 Bar (5075 PSI)	
	Port Y with VV01	140 Bar (2030 PSI)		140 Bar (2030 PSI)		140 Bar (2030 PSI)	
Nominal Flow	180 LPM (47.6 GPM)		360 LPM (95.2 GPM)		600 LPM (158.7 GPM)		
Fluid	Hydraulic oil as per DIN 51524 ... 51525						
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)						
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)					
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)						
Electrical (Solenoid)							
Duty Ratio	100%						
Response Time	Energized / De-energized AC 20/18 ms, DC 46/27 ms						
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)						
	Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage		12V	24V	98V	205V	110V at 50Hz/ 120V at 60 Hz	220V at 50Hz/ 240V at 60Hz
Tolerance Supply Voltage		+5 to -10	+5 to -10	+5 to -10	+5 to -10	+5 to -10	+5 to -10
Power Consumption, Hold	[W]	31	31	31	31	78	78
Power Consumption, In Rush	[W]	31	31	31	31	264	264
Max. Switching Frequency	[1/h]	AC up to 7200; DC up to 16,000 switchings/hour					
Solenoid Connection	Connector as per EN175301-803						
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)						
Coil Insulation Class	H (180°C) (356°F)						

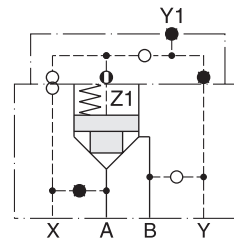
D4S Pilot Configuration

D4S Direct Operated	D4S with VV01

D4S Direct Operated Examples

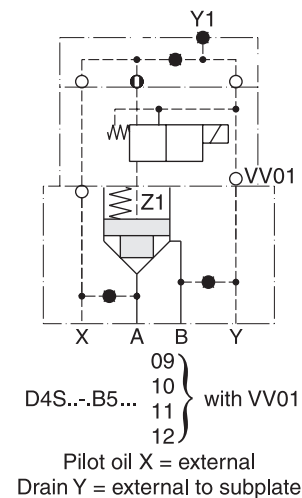
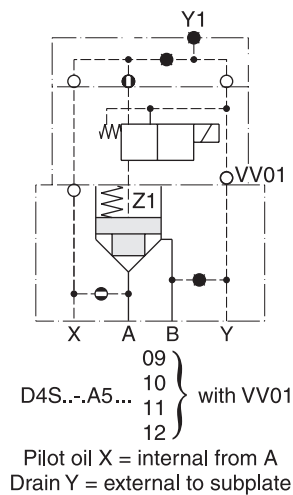
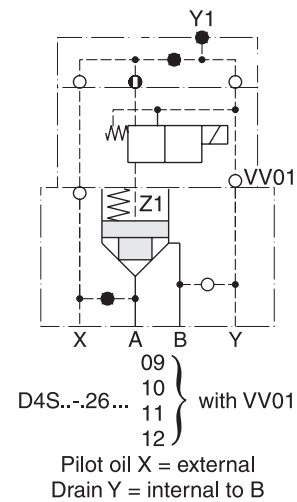
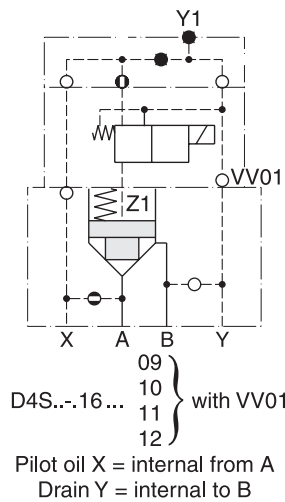


D4S...DC
Pilot oil Y = internal from B



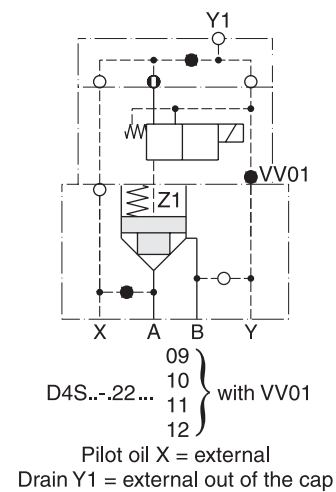
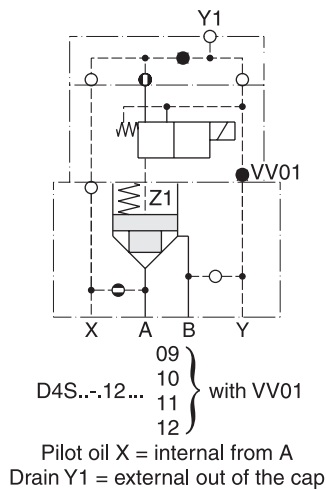
D4S...21
Pilot oil X = external

D4S with VV01 Examples

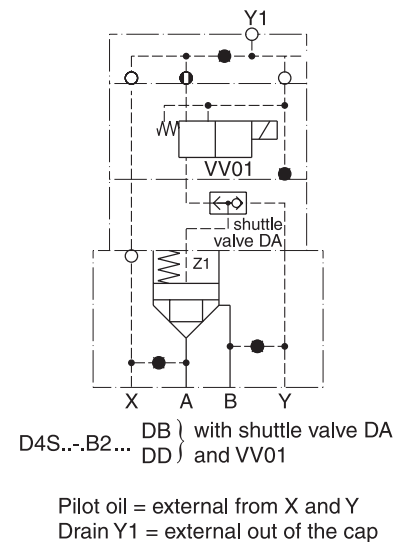
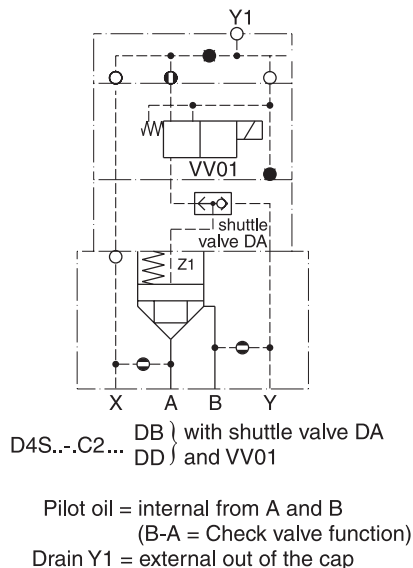
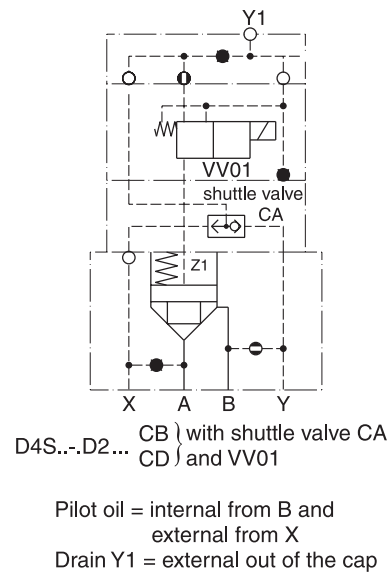
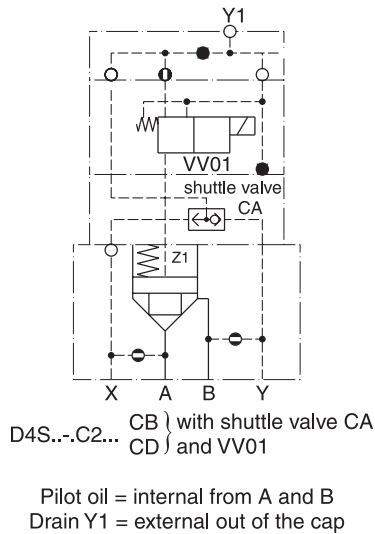


D4S with VV01 Examples

A

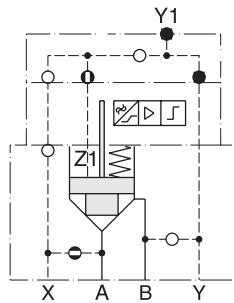


D4S with Shuttle Valve Examples



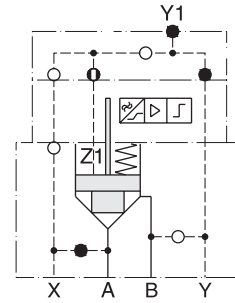
D4S with Position Control Examples

A



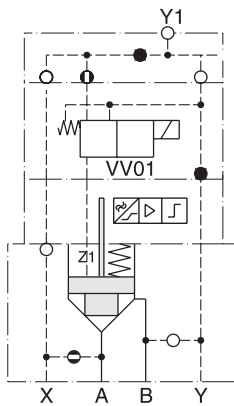
D4S..-113A.BA
 (with position control)

Pilot oil X = internal from A



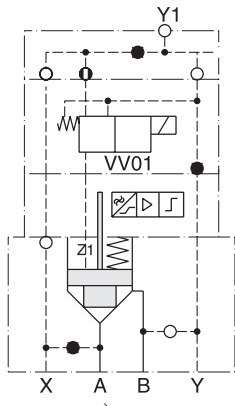
D4S..-213A.BA
 (with position control)

Pilot oil X = external



D4S..-123A. BC } with position control
 BE } and VV01

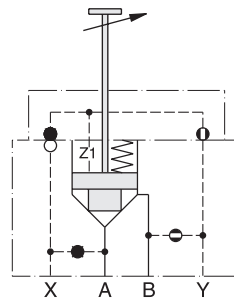
Pilot oil X = internal from A
 Drain Y1 = external out of the cap



D4S..-223A. BC } with position control
 BE } and VV01

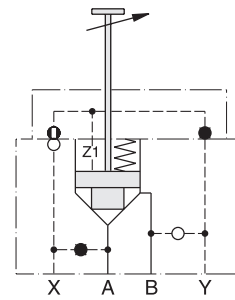
Pilot oil X = external
 Drain Y1 = external out of the cap

D4S with Stroke Limiter Examples



D4S..-D434. with stroke limiter
 Pilot oil Y = internal from B

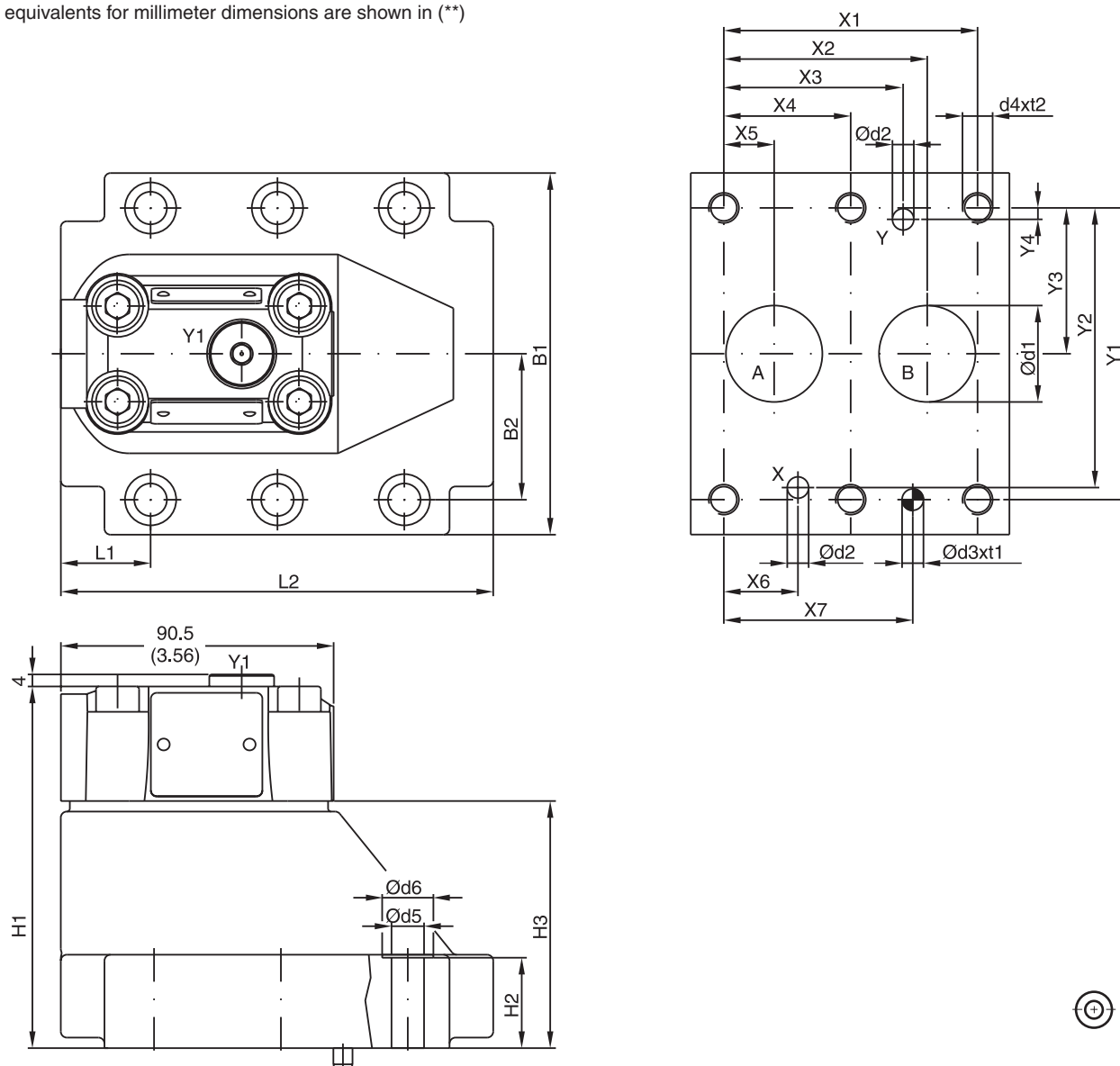
Note: for D4S06 and D4S10 only



D4S..-233B. with stroke limiter
 Pilot oil X = external



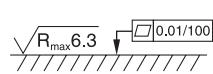
Note: for D4S06 and D4S10 only

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

A

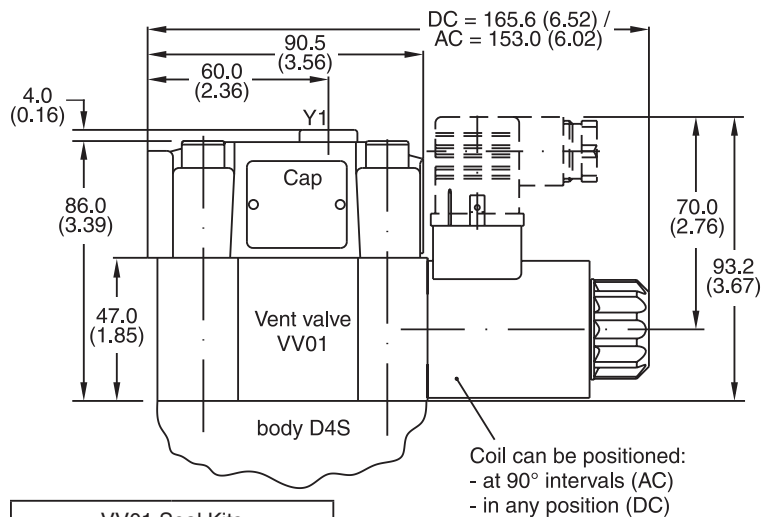
NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4
10	6264-06-09-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	—	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)
25	6264-08-13-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	—	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)
32	6264-10-17-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)

NG	ISO-code	B1	B2	H1	H2	H3	L1	L2	D1	D2	D3	t1	D4	t2	D5	D6
10	6264-06-09-*-97	87.3 (3.44)	33.35 (1.31)	83.0 (3.27)	21.0 (0.83)	45.0 (1.77)	29.0 (1.14)	94.8 (3.73)	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	6264-08-13-*-97	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	71.5 (2.81)	29.0 (1.14)	126.8 (4.99)	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	110.8 (4.37)	17.0 (0.67)
32	6264-10-17-*-97	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	82.0 (3.23)	30.6 (1.20)	144.3 (5.68)	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

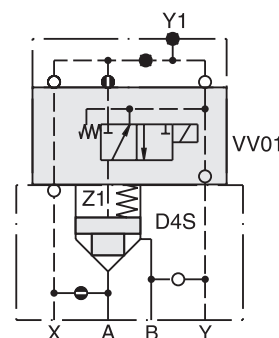
NG	ISO-code	Bolt Kit			Seal Kit	Surface Finish
10	6264-06-07-*-97	BK 505	4x M10 x 35 DIN 912 12.9	63 Nm	S26-58507-0	
25	6264-08-11-*-97	BK 485	4x M10 x 45 DIN 912 12.9	(46.5 lb.-ft.)	S26-58475-0	
32	6264-10-15-*-97	BK 506	6x M10 x 45 DIN 912 12.9	±15%	S26-58508-0	

A01_Cat2500.indd, ddp, 04/19

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

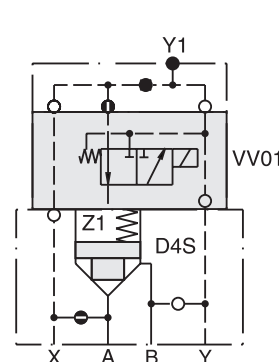
D4S with VV01

VV01 Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5



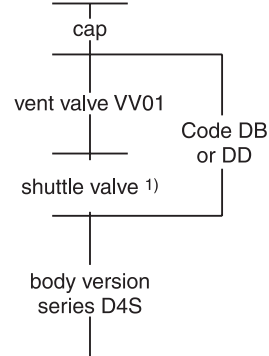
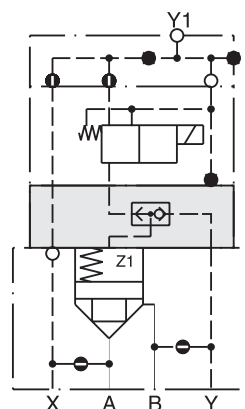
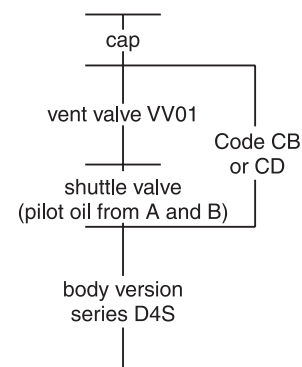
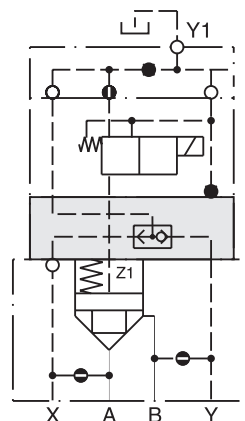
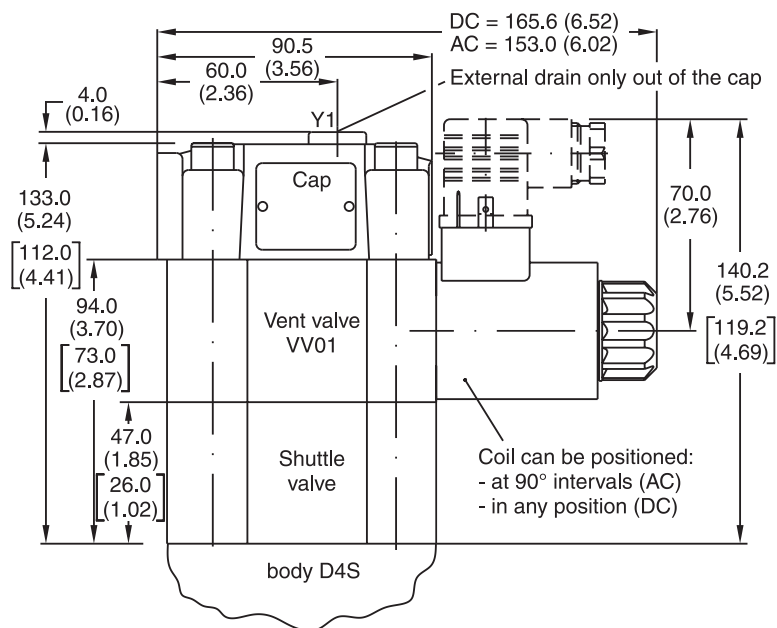
with manual override without manual override

D4S... 09/10
Solenoid energized:
D4S blocked
Solenoid de-energized:
Flow from A-B or B-A



with manual override without manual override

D4S... 11/12
Solenoid energized:
Flow from A-B or B-A
Solenoid de-energized:
D4S Blocked

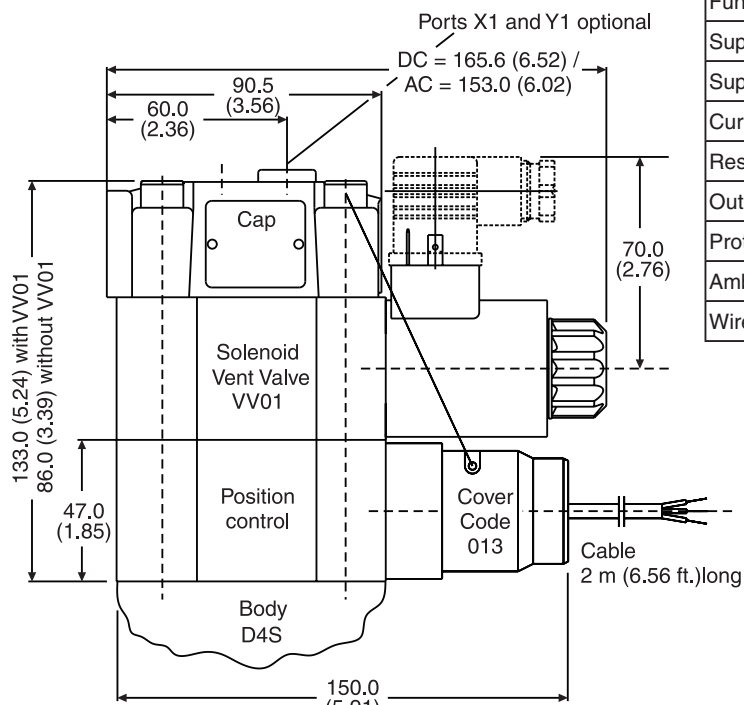
D4S with Shuttle Valve

Dimensions in brackets [] are for version VV01 with shuttle valve code DB or DD.

Note: Shuttle valves only use in connection with vent valve VV01.

1) pilot oil from A and B,
from B to A check valve function

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

A**Dimensions D4S Position Control****Position Control by Proximity Switch (incl. Amplifier)**

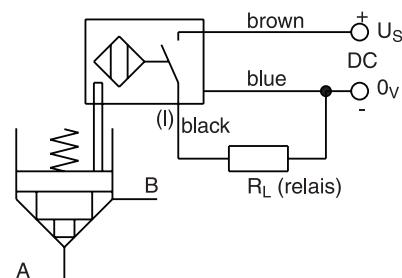
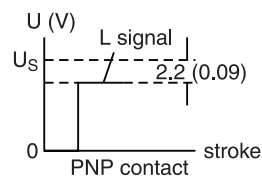
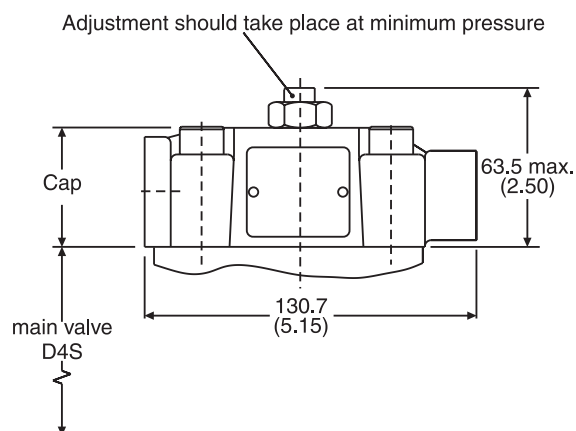
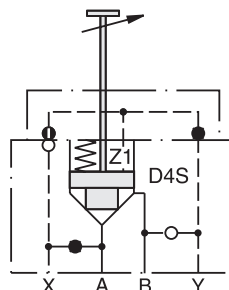
Valve open: proximity switch activated.

This proximity switch is pressure proof and has no wearing parts.

Note: Position control for D4S06 and D4S10 only.

Technical Information (proximity switch)

Function	PNP, contact
Supply voltage (Us)	[VDC] 10...30
Supply voltage ripple	[%] ≤ 10
Current consumption	[mA] max. 8
Residual voltage L-signal	[V] Us - 2.2 at I _{max}
Output current (I)	[mA] ≤ 200
Protection class	IP67
Ambient temperature	[°C] -25...+70; (-13°F...+158°F)
Wire cross section	[mm ²] 3 x 0.5

**Dimensions D4S Stroke Limiter**Example: D4S₁₀⁰⁶-.23-3B.**Note:** Stroke limiter not for use with D4S03, vent valve VV01, shuttle valve and position control.

General Description

Series D4S seat valves are designed for directional control functions. A large variety of poppets, springs and covers – including shuttle valves, stroke limiters, solenoid valves (VV01) and position control – allow to design individual hydraulic solutions for nominal flow up to 600 LPM (158.7 GPM).

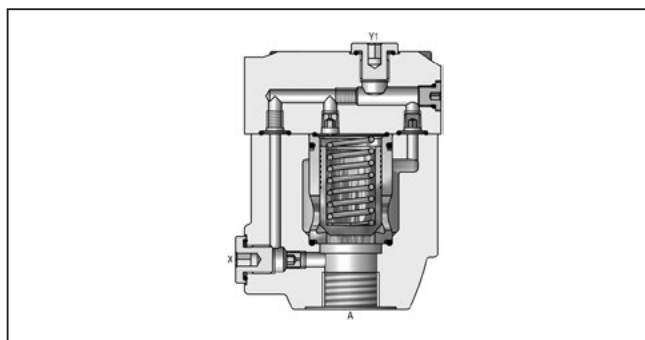
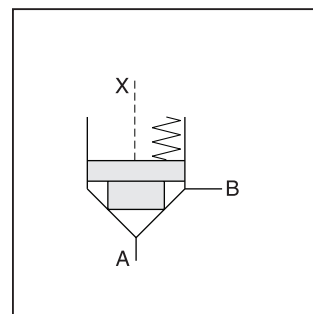
A complete program is offered under the Parker brand: subplate mounted valves (D4S), SAE flange valves (D5S), pipe mounted valves (D4S), slip-in cartridges (CAR – on request).

Features

- Leak-free seat valve design.
- 2 body designs
 - L-body (2-port); T-body (3-port)
- Numerous pilot options.
- 6 poppet types.
- 4 port sizes
 - G 1/2", G 1" for T-body; G 3/4", G 1 1/2" for L-body .



D4S10 L-Body

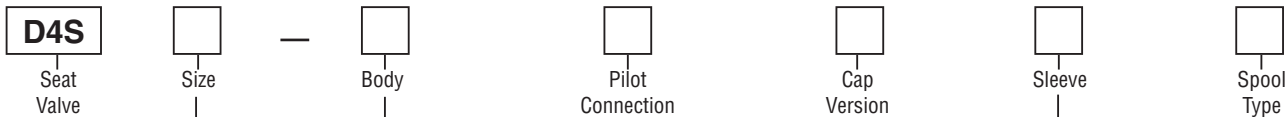


D4S06 L-Body

Selection of Cartridges

Sleeve 1, Poppet 1	Sleeve 1, Poppet 2	Sleeve 1, Poppet 4	Sleeve 3, Poppet 4	Sleeve 3, Poppet A	Sleeve 3, Poppet B/C
$1 : 1.05$ $A_A = 0.95 A_C$ $A_B = 0.05 A_C$ 15° chamfer	$1 : 1.05$ $A_A = 0.95 A_C$ $A_B = 0.05 A_C$ 15° chamfer orifice	$1 : 1.05$ $A_A = 0.95 A_C$ $A_B = 0.05 A_C$ 45° chamfer	$1 : 1.67$ $A_A = 0.6 A_C$ $A_B = 0.4 A_C$ 45° chamfer	$1 : 1.67$ $A_A = 0.6 A_C$ $A_B = 0.4 A_C$ 45° chamfer safety spool	$1 : 1.67$ $A_A = 0.6 A_C$ $A_B = 0.4 A_C$ 45° chamfer throttle spool

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.
 A01_Cat2500.indd, ddp, 04/19

A

Code	Description
03	NG10 (CAR4 build-in)
06	NG25 (CAR2 build-in)
10	NG32 (CAR2 build-in)

Code	Pilot Oil Line in Body	A-X	B-Y
1	Internal from A	●	○
2	External from X	●	○

Code	Description
1	AA=95%, AB=5%
3	AA=60%, AB=40%

Code	Body	Ports
6	D4S03 T-body D4S06 T-body	A,B = G1/2"; X,Y1 = G1/4" A,B = G1"; X,Y1 = G1/4"
D	D4S06 L-body D4S10 L-body	A,B = G3/4"; X,Y1 = G1/4" A,B = G1 1/4"; X,Y1 = G1/4"

Code	Ports	X	Y	Z	X-Y	Y1	VV01
Standard							
1	Pilot Oil = Pilot Drain	○	●	●	○	●	—
C	Pilot Oil = Pilot Drain	●	○	○	○	●	—
With Solenoid Valve (VV01)							
2	External PD from cap	○	○	○	●	○	●
6	Internal pilot drain	○	○	○	●	●	○
With Stroke Limiter (not for D4S03)							
3	Pilot Oil = Pilot Drain	●	●	—	—	—	—
4	Pilot Oil = Pilot Drain	●	●	—	—	—	—

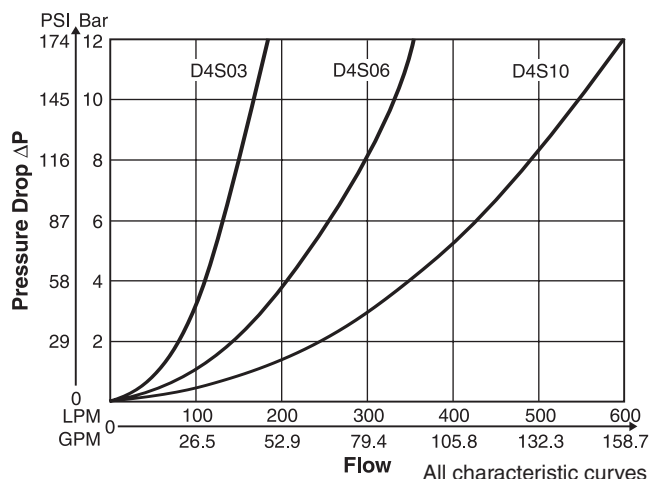
Key: ○ Open Bore ● Closed Bore ● Orifice Ø 1.2

Note: Combination examples provided on pages A227-A229.

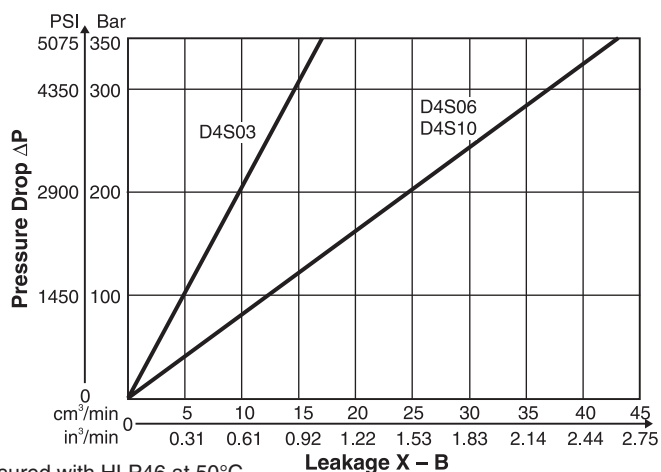
Code	Size	Poppet Type	Sleeve
1	03, 06, 10	With closed bottom and 15° chamfer (pZ max. = pA +20 Bar (290 PSI))	1
2	03	With 0.8 dia. orifice at the bottom and 15° chamfer	1
	06, 10	With 1.2 dia. orifice at the bottom and 15° chamfer	1
4	03, 06, 10	With closed bottom and 45° chamfer	1, 3
A*	06, 10	Safety 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.

Performance Curves



All characteristic curves measured with HLP46 at 50°C.



A

Spring

Switching
Type

Solenoid
Voltage

B
Design
Series

Seal

Options

Code	Description
Omit	Standard w/o vent function
G0R	12V
G0Q	24V
GAR*	98V
GAG*	205V
W30	110V 50Hz / 120V 60Hz
W31	230V 50Hz / 240V 60Hz

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

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
Omit	Standard
013	Cover for End Position Control

Code	Description
Omit	Standard without Vent Function
09	VV01 with Manual Override
10	VV01 without Manual Override
11	VV01 with Manual Override
12	VV01 without Manual Override
CA	Shuttle Valve
DA	Shuttle Valve
CB	VV01 Code 09 and Shuttle Valve Code CA
CD	VV01 Code 11 and Shuttle Valve Code CA
DB	VV01 Code 09 and Shuttle Valve Code DA
DD	VV01 Code 11 and Shuttle Valve Code DA
BH*	VV01 Code 10 and Shuttle Valve Code CA and Position Control with Amplifier
BK*	VV01 Code 12 and Shuttle Valve Code CA and Position Control with Amplifier
BN*	VV01 Code 10 and Shuttle Valve Code DA and Position Control with Amplifier
BQ*	VV01 Code 12 and Shuttle Valve Code DA and Position Control with Amplifier
BC*	VV01 Code 10 and Position Control with Amplifier
BE*	VV01 Code 12 and Position Control with Amplifier
BA*	Position Control with Amplifier
BF*	Position Control with Amplifier and Shuttle Valve Code CA
BL*	Position Control with Amplifier and Shuttle Valve Code DA

* Position control for D4S06/10 only.
Spring 2 or 4. Spool A and sleeve 3.
Valve open: Proximity Switch damped.

Weight:

D4S03 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)

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)	—

A01_Cat2500.indd, ddp, 04/19

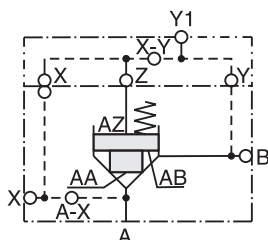
Specifications

A

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 Range		[°C]	-20 to +50 (-4°F to +122°F)					
MTTF _D		[years]	150					
Hydraulic								
Maximum Operating Pressure		Ports A, B	up to 350 Bar (5075 PSI)					
		Port Y	140 Bar (2030 PSI) with VV01					
Nominal Flow		180 LPM (47.6 GPM)		360 LPM (95.2 GPM)		360 LPM (95.2 GPM)	600 LPM (158.7 GPM)	
Fluid		Hydraulic oil as per DIN 51524 ... 51525						
Fluid Temperature		[°C]	-20 to +80 (-4°F to +176°F)					
Viscosity Permitted Recommended		cSt / mm²/s	10 to 650 (46 to 3013 SSU)					
		cSt / mm²/s	30 to 80 (139 to 371 SSU)					
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)						
Electrical (Solenoid)								
Duty Ratio		100%						
Response Time		Energized / De-energized AC 20/18 ms, DC 46/27 ms						
		Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage		[V]	12	24	98	205	110 at 50Hz/ 120 at 60 Hz	220 at 50Hz/ 240 at 60Hz
Tolerance Supply Voltage		[%]	+5 to -10	+5 to -10	+5 to -10	+5 to -10	+5 to -10	+5 to -10
Power Consumption, Hold		[W]	31	31	31	31	78	78
Power Consumption, In Rush		[W]	31	31	31	31	264	264
Max. Switching Frequency		[1/h]	AC up to 7200; DC up to 16,000 switchings/hour					
Solenoid Connection		Connector as per EN175301-803						
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)						
Coil Insulation Class		H (180°C) (356°F)						

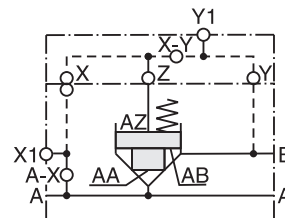
D4S Pilot Configuration

L-body (2-port)

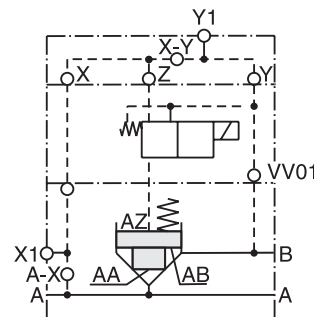
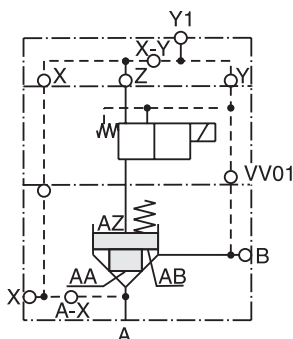


Standard

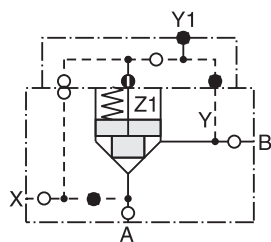
T-body (3-port)



With Vent Valve VV01

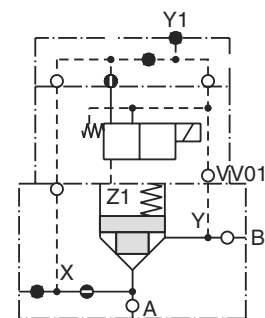


D4S Direct Operated Example



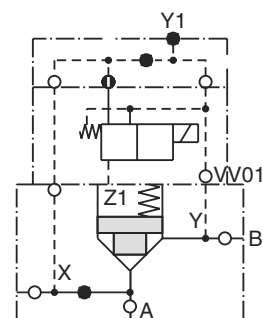
D4S...-21
Pilot Oil X = External

D4S with Solenoid Valve VV01 Examples



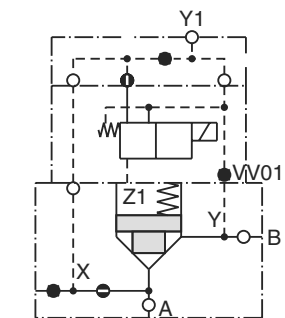
D4S...-16...
09 } with VV01
10
11
12

Pilot Oil X = Internal from A
Drain Y = Internal to B



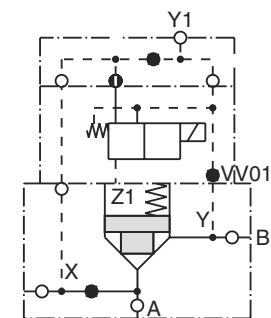
D4S...-26...
09 } with VV01
10
11
12

Pilot Oil X = Internal from A
Drain Y = Internal to B



D4S...-12...
09 } with VV01
10
11
12

Pilot Oil X = Internal from A
Drain Y1 = External out of cap

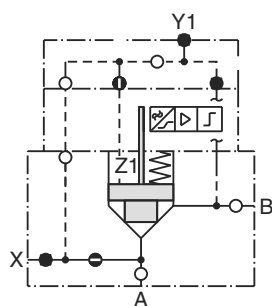


D4S...-22...
09 } with VV01
10
11
12

Pilot Oil X = External
Drain Y1 = External out of cap

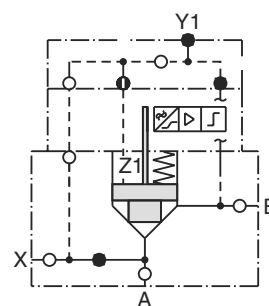
D4S with Position Control Examples

A



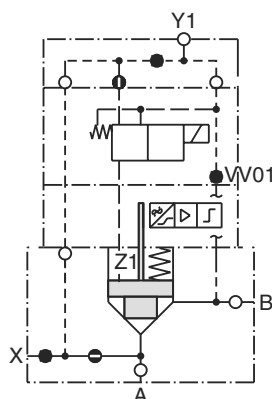
D4S...113A.BA
 (with Position Control)

Pilot Oil X = Internal from A



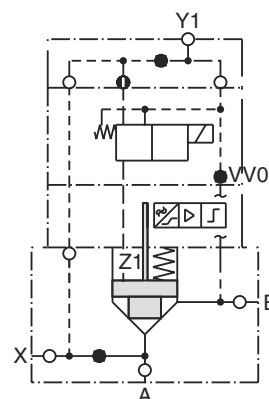
D4S...213A.BA
 (with Position Control)

Pilot Oil X = External



D4S...123A. BC } with Position Control
 BE } and VV01

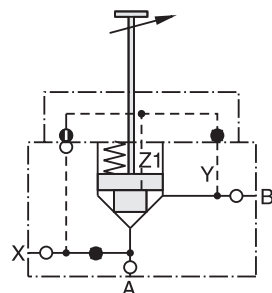
Pilot Oil X = Internal from A
 Drain Y1 = External out of Cap



D4S...223A. BC } with Position Control
 BE } and VV01

Pilot Oil X = External
 Drain Y1 = External out of Cap

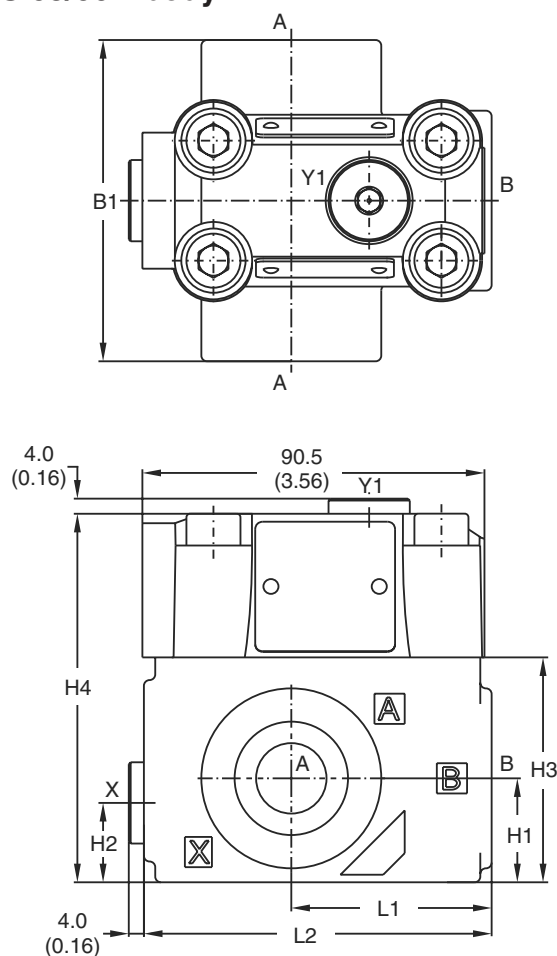
D4S with Stroke Limiter Example



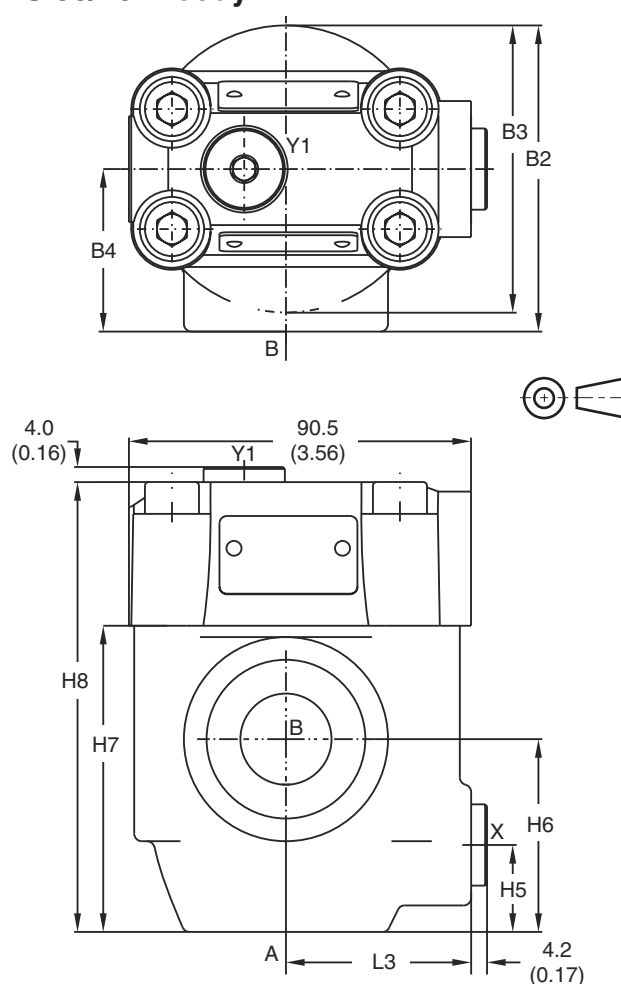
D4S...233B. with Stroke Limiter
 Pilot Oil X = External
 (Note: for D4S06 and D4S10 only)

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)

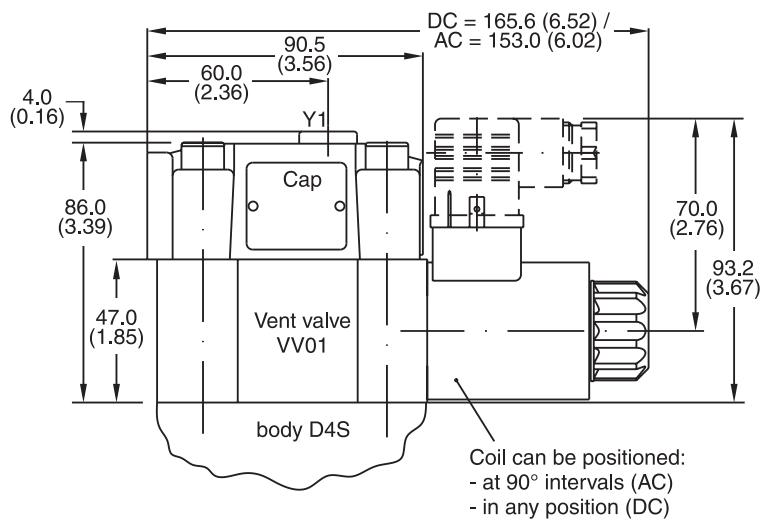
Size	L3	B2	B3	B4	H5	H6	H7	H8
06 (L-body)	49.0 (1.93)	81.0 (3.19)	76.0 (2.99)	43.0 (1.69)	23.0 (0.91)	51.0 (2.01)	81.0 (3.19)	119.0 (4.69)
10 (L-body)	49.8 (1.96)	120.7 (4.75)	85.6 (3.37)	77.8 (3.06)	38.1 (1.50)	50.8 (2.00)	96.0 (3.78)	134.0 (5.28)

Ports	Function	Port Size			
		D4S03 T-body	D4S06 T-body	D4S06 L-body	D4S10 L-body
A	Inlet or Outlet	G1/2"	G1"	G3/4"	G1 1/4"
B	Outlet or Inlet	G1/2"	G1"	G3/4"	G1 1/4"
X1	External Pilot Port	G1/4"			
Y1	External Drain*	G1/4"			

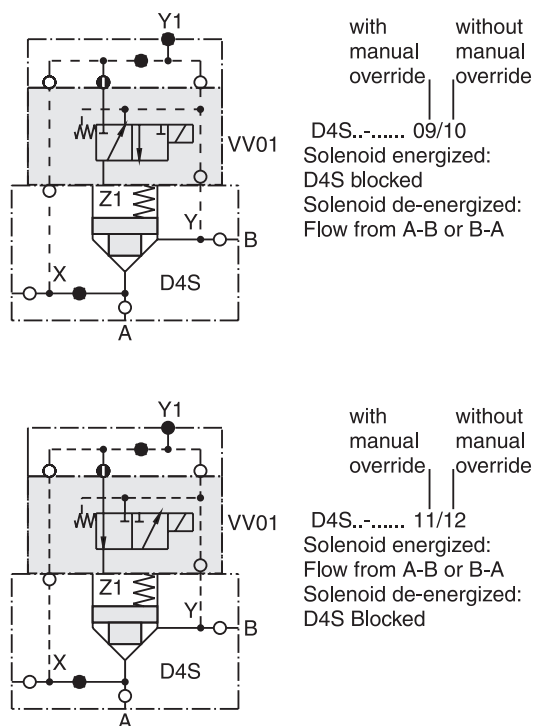
* With VV01 only.

Seal Kits		
Size	Nitrile	Fluorocarbon
03	S26-58507-0	S26-58507-5
06	S26-58475-0	S26-58475-5
10	S26-38508-0	S26-38508-5

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

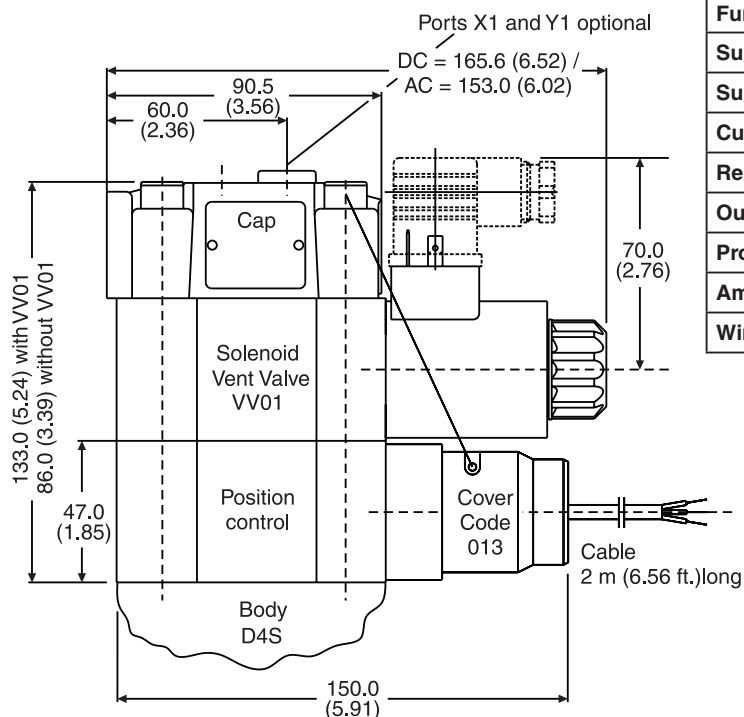
D4S with VV01

VV01 Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5



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

D4S Position Control



Position Control by Proximity Switch (incl. Amplifier)

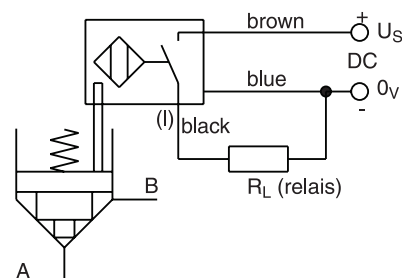
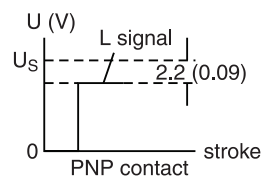
Valve open: proximity switch activated.

This proximity switch is pressure proof and has no wearing parts.

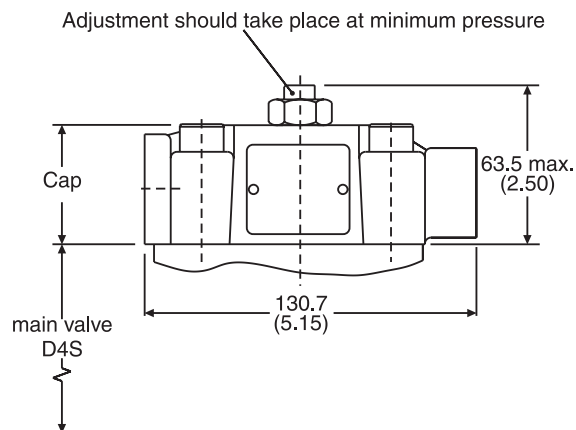
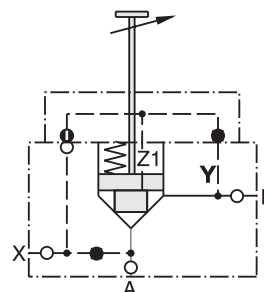
Note: Position control for D4S06 and D4S10 only.

Technical Information (proximity switch)

Function	PNP, contact
Supply voltage (Us)	[VDC] 10...30
Supply voltage ripple	[%] ≤ 10
Current consumption	[mA] max. 8
Residual voltage L-signal	[V] $U_s - 2.2$ at I_{max}
Output current (I)	[mA] ≤ 200
Protection class	IP67
Ambient temperature	[C°] -25...+70; (-13°F...+158° F)
Wire cross section	[mm²] 3 x 0.5



D4S Stroke Limiter

Example: D4S₁₀⁰⁶-.233B.**Note:** Stroke limiter not for use with D4S03, vent valve VV01, shuttle valve and position control.

A

This image shows a full page of blank graph paper. The grid consists of thin, light gray horizontal and vertical lines that intersect to form a uniform pattern of small squares across the entire surface. There are no margins, text, or other markings on the paper.

General Description

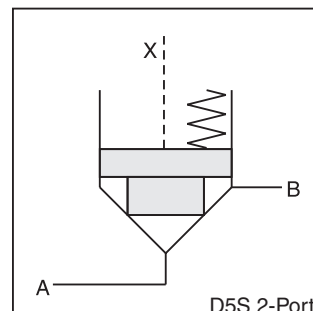
Series D5S seat valves are designed for directional control functions. They enable individual hydraulic solutions for nominal flow up to 800 LPM (211.6 GPM) due to a large variety of poppets, springs and covers, including shuttle valves, stroke limiters, solenoid valves (VV01) and position control.

Features

- Leak-free seat valve design.
- 2- and 3-port bodies.
- SAE61 flange.
- Numerous pilot options.
- 6 poppet types.
- 4 sizes (SAE 3/4", 1", 1 1/4", 1 1/2").



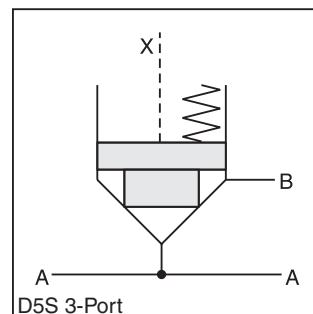
D5S 2-Port



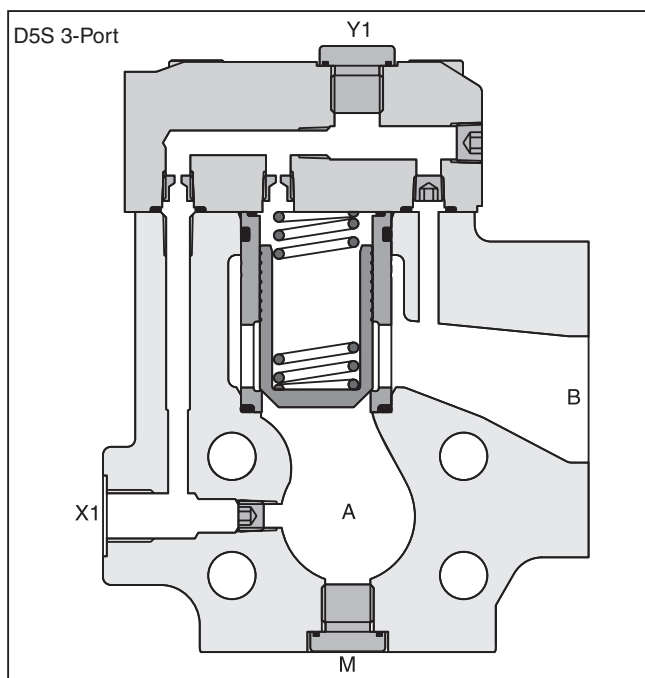
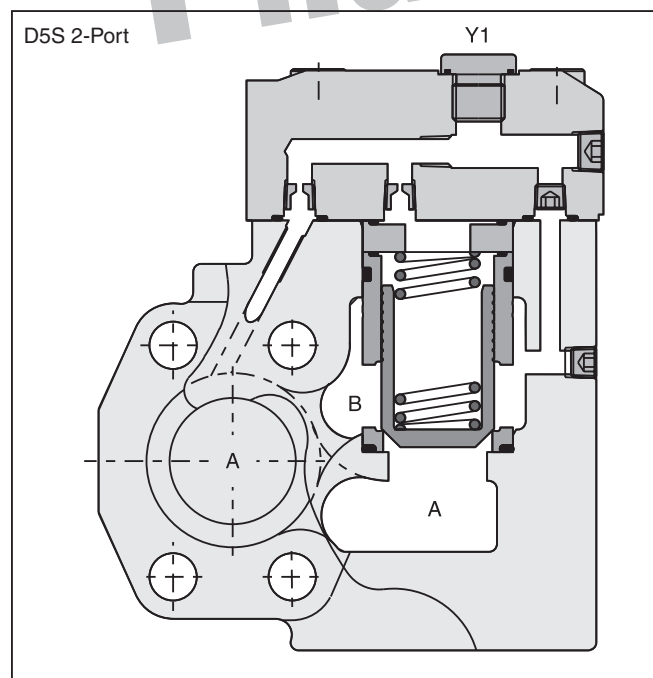
D5S 2-Port



D5S 3-Port



D5S 3-Port



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.
A01_Cat2500.indd, ddp, 04/19

A

D5S
 Seat
 Valve

Size

Body

Pilot Body
 Configuration

Pilot
 Cap

Sleeve

Spool
 Type

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"
12*	SAE 1-1/2"

* D5S 3-Port only

Code	Body	Ports
9	3-Port	Seat entry, A; X1, Y1, M = SAE 4
1	2-Port	Seat entry, A; X1, Y1, M = SAE 4
2	2-Port	Annular entry, B; X1, Y1, M = SAE 4

Code	Pilot Oil Line in Body
1	Internal from A
2	Internal from B
3	Internal from A and B
4	External from X1
5	Internal from B, External from X1

Code	Body	Ports	X	Y	Z	X-Y	X1	Y1	VV01
Standard									
1	2 and 3-Port	Pilot Oil = Pilot Drain	●	●	●	○	—	●	—
2	2 and 3-Port	Pilot Oil = Pilot Drain	●	●	●	○	—	●	—
3	2-Port	Pilot Oil = Pilot Drain	●	●	●	○	○	●	—
With Solenoid Valve (VV01)									
4	2 and 3-Port	Internal to B	●	○	●	●	—	●	○
5	2-Port	Internal to B	●	○	●	●	○	●	○
6	2 and 3-Port	External Out of Cap	●	○	●	●	—	○	●
7	2-Port	External Out of Cap	●	○	●	●	○	○	●
With Stroke Limiter (not for D5S06)									
A	2 and 3-Port	Pilot Oil = Pilot Drain	●	●	●	—	●	—	—
B	2 and 3-Port	Pilot Oil = Pilot Drain	●	●	—	—	●	—	—
C	2-Port	Pilot Oil = Pilot Drain	●	●	●	—	○	—	—

Key: ○ Open Bore ● Closed Bore ● Orifice Ø 1.2

Note: Combination examples provided on pages A238-A242.

Code	Size	Poppet Type	Sleeve
1	06, 08, 10, 12	With closed bottom and 15° chamfer (pZ max. = pA +20 Bar (290 PSI))	1
2	06	With 0.8 dia. orifice at the bottom and 15° chamfer	1
	08, 10	With 1.2 dia. orifice at the bottom and 15° chamfer	1
4	06, 08, 10, 12	With closed bottom and 45° chamfer	1, 3
A*	08, 10, 12	Safety spool (for end position control only)	3
B*	08, 10, 12	Throttle spool, 10° chamfer	3
C*	08, 10, 12	Throttle spool, 3° chamfer	3

* Springs 2, 3 and 6 only.

Spring

Switching
Type

Solenoid
Voltage

B
Design
Series

Seal

Options

Code	Description
Omit	Standard w/o vent function
G0R	12V
G0Q	24V
GAR	98V
GAG	205V
W30	110V 50Hz / 120V 60Hz
W31	220V 50Hz / 240V 60Hz

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
Omit	Standard
013	Position Control with Protection

Code	Description
omit	Standard without Vent Function
09	VV01 with Manual Override
10	VV01 without Manual Override
11	VV01 with Manual Override
12	VV01 without Manual Override
CA	Shuttle Valve
DA	Shuttle Valve
CB	VV01 Code 09 and Shuttle Valve Code CA
CD	VV01 Code 11 and Shuttle Valve Code CA
DB	VV01 Code 09 and Shuttle Valve Code DA
DD	VV01 Code 11 and Shuttle Valve Code DA
BH	VV01 Code 10 and Shuttle Valve Code CA and Position Control* with Amplifier
BK	VV01 Code 12 and Shuttle Valve Code CA and Position Control* with Amplifier
BN	VV01 Code 10 and Shuttle Valve Code DA and Position Control* with Amplifier
BQ	VV01 Code 12 and Shuttle Valve Code DA and Position Control* with Amplifier
BC	VV01 Code 10 and Position Control* with Amplifier
BE	VV01 Code 12 and Position Control* with Amplifier
BA	Position Control* with Amplifier
BF	Position Control* with Amplifier and Shuttle Valve Code CA
BL	Position Control* with Amplifier and Shuttle Valve Code DA

* Position control for D5S08/10 only.
Spring 2 or 4. Spool A and sleeve 3.

Weight: D5S 2-Port

D5S06	3.6 kg (7.9 lbs)
D5S08	4.1 kg (9.0 lbs)
D5S10	5.4 kg (11.9 lbs)
D5S12	—

D5S 3-Port

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)

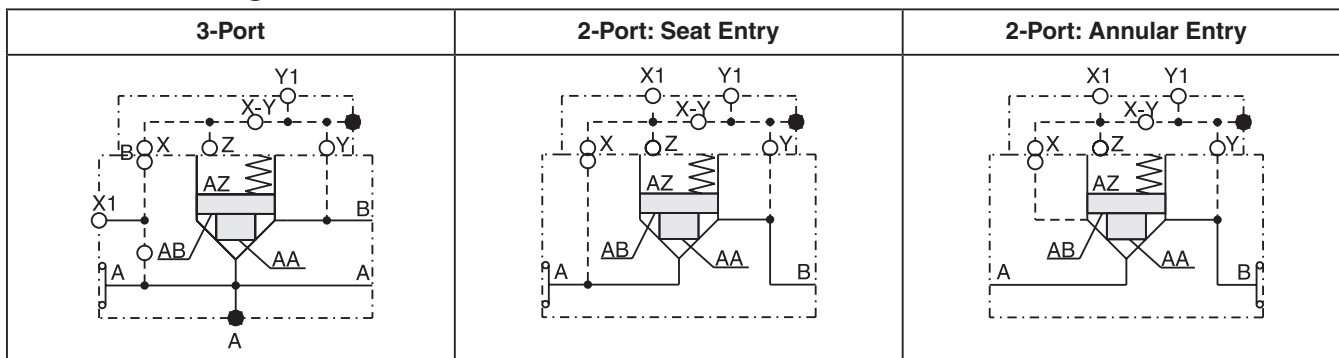
Code	Spring — Approx. Cracking Pressure in Bar (PSI)					
	Sleeve Code 1			Sleeve Code 3		
	A -> B		A -> B		B -> A	
	D5S06	D5S08/12	D5S06	D5S08/12	D5S06	D5S08/12
1	2.8 (40.6)	3.5 (50.8)	6.5 (94.3)	6.5 (94.3)	9.5 (137.8)	11.0 (159.5)
2	0.5 (7.3)	0.5 (7.3)	1.0 (14.5)	1.0 (14.5)	1.5 (21.8)	1.7 (24.7)
3	0.3 (4.4)	0.3 (4.4)	0.6 (8.7)	0.6 (8.7)	0.9 (13.1)	1.0 (14.5)
4	2.2 (31.9)	2.2 (31.9)	4.0 (58.0)	3.5 (50.8)	5.5 (79.8)	6.0 (87.0)
5	—	9.0 (130.5)	—	16.0 (232.0)	—	28.0 (406.0)
6	1.2 (17.4)	1.2 (17.4)	2.0 (29.0)	2.2 (31.9)	3.0 (43.5)	3.8 (55.1)
7	3.0 (43.5)	—	8.0 (116.0)	—	12.0 (174.0)	—

Specifications

A

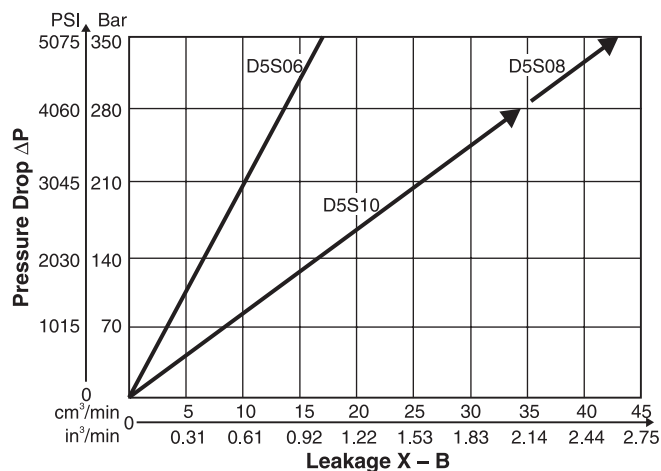
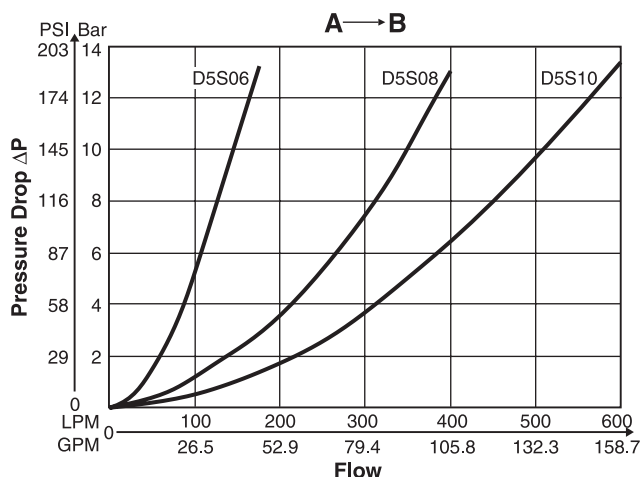
General							
Size	06		08		10		12
Mounting	Flanged according to SAE 61						
Mounting Position	Unrestricted						
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)						
Hydraulic							
Maximum Operating Pressure	SAE 61 Ports A, B	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)	210 Bar (3045 PSI)		
	Port Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)		
Nominal Flow		180 LPM (47.6 GPM)	360 LPM (95.2 GPM)	600 LPM (158.7 GPM)	800 LPM (211.6 GPM)		
Fluid	Hydraulic oil as per DIN 51524 ... 51525						
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)						
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)					
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)						
Electrical (Solenoid)							
Duty Ratio	100%						
Response Time	Energized / De-energized AC 20/18ms, DC 46/27 ms						
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)						
	Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage		12V	24V	98V	205V	110V at 50Hz 120V at 60 Hz	220V at 50Hz/ 240V at 60Hz
Tolerance Supply Voltage		+5 to -10	+5 to -10	+5 to -10	+5 to -10	±5 to -10	±5 to -10
Power Consumption	Hold	31W	31W	31W	31W	78W	78W
	In Rush	31W	31W	31W	31W	264W	264W
Maximum Switching Frequency	AC up to 7200; DC up to 16,000 switchings/hour						
Solenoid Connection	Connector as per EN175301-803						
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)						
Coil Insulation Class	H (180°C) (356°F)						

D5S Pilot Configuration

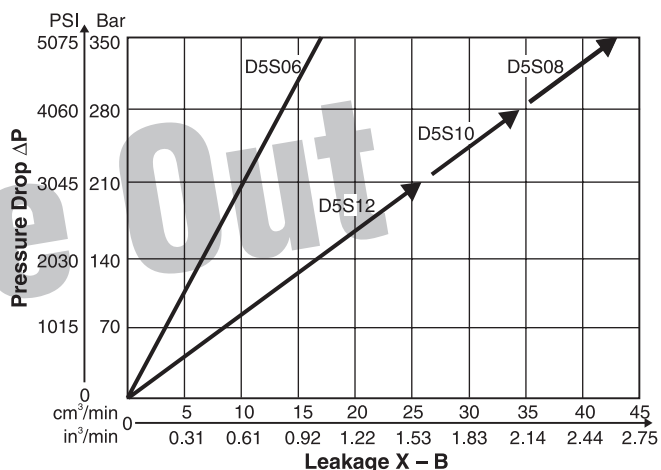
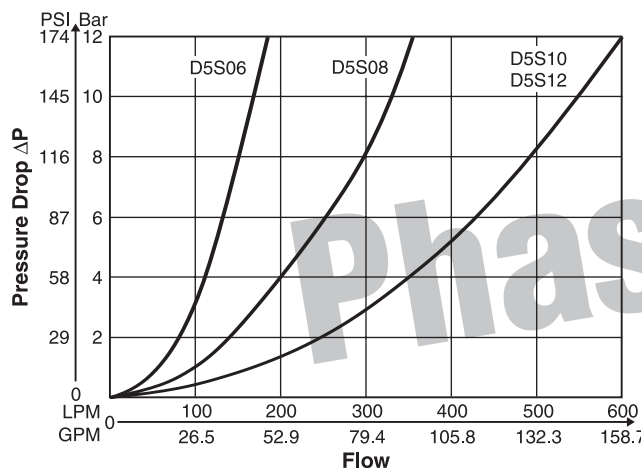


Performance Curves

D5S 2-Port*



D5S 3-Port*



*Fluid viscosity 38cSt at 50°C (122°F)

Selection of Cartridges

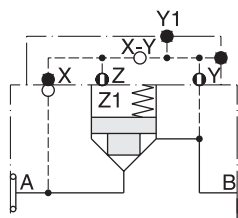
Sleeve 1, Poppet 1	Sleeve 1, Poppet 2	Sleeve 1, Poppet 4	Sleeve 3, Poppet 4	Sleeve 3, Poppet A	Sleeve 3, Poppet B/C
1 : 1.05 $A_A = 0.95 A_C$ $A_B = 0.95 A_C$ 15° chamfer	1 : 1.05 $A_A = 0.95 A_C$ $A_B = 0.95 A_C$ 15° chamfer orifice	1 : 1.05 $A_A = 0.95 A_C$ $A_B = 0.95 A_C$ 45° chamfer	1 : 1.67 $A_A = 0.6 A_C$ $A_B = 0.4 A_C$ 45° chamfer	1 : 1.67 $A_A = 0.6 A_C$ $A_B = 0.4 A_C$ 45° chamfer safety spool	1 : 1.67 $A_A = 0.6 A_C$ $A_B = 0.4 A_C$ 45° chamfer throttle spool

A01_Cat2500.indd, ddp, 04/19

D5S 2-Port Examples

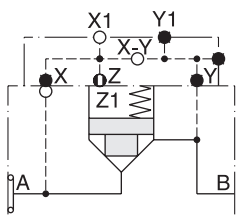
A

Seat Entry



D5S..-722

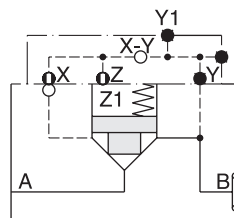
Pilot oil: internal from B



D5S..-743

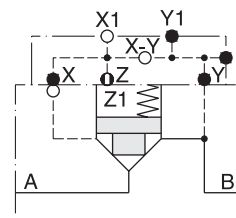
Pilot oil: external from X1

Annular Entry



D5S..-821

Pilot oil: internal from B

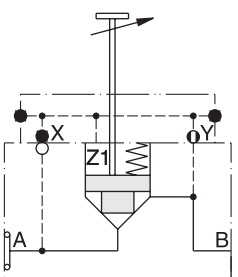


D5S..-843

Pilot oil: external from X1

Stroke Limiter D5S 2-Port Examples

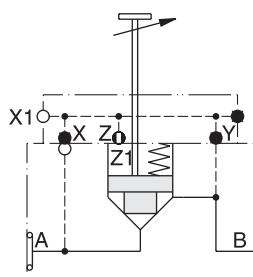
Seat Entry



D5S08-72B

10

Pilot oil: internal from B

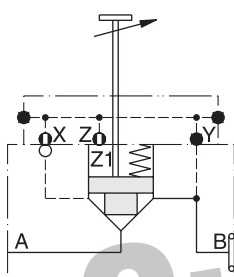


D5S08-74C

10

Pilot oil: external from X1

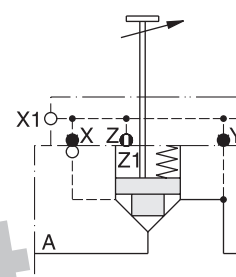
Annular Entry



D5S08-82A

10

Pilot oil: internal from B

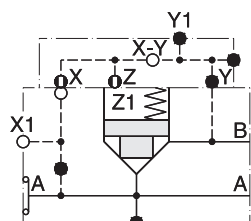


D5S08-84C

10

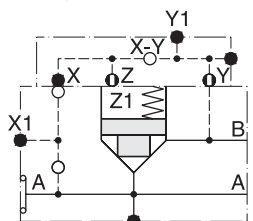
Pilot oil: external from X1

D5S 3-Port Examples



D5S ..-541

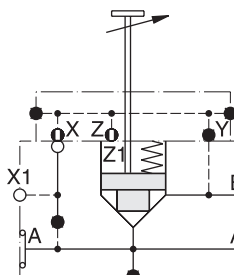
Pilot oil: external from X1



D5S ..-522

Pilot oil: internal from B

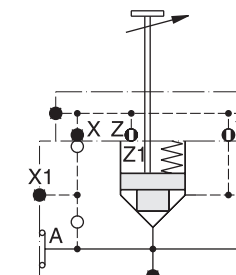
Stroke Limiter D5S 3-Port Examples



D5S08-54A

10

Pilot oil: external from X1



D5S08-52B

10

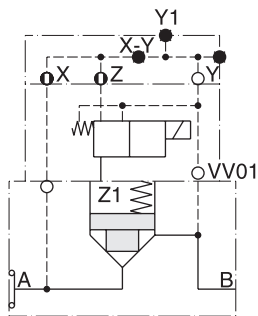
Pilot oil: internal from B

D5S 2-Port with Solenoid Valve VV01 Examples

Seat Entry

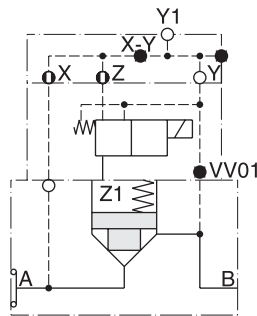
Annular Entry

A



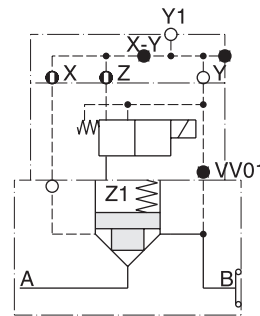
D5S...-714...09
 10
 11
 12

Pilot oil: internal from A
 Pilot drain: internal to B



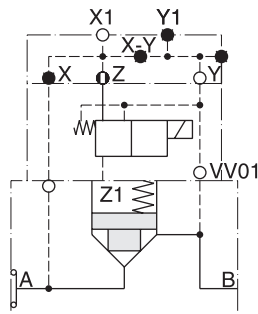
D5S...-716...09
 10
 11
 12

Pilot oil: internal from A
 Pilot drain: external out of Y1



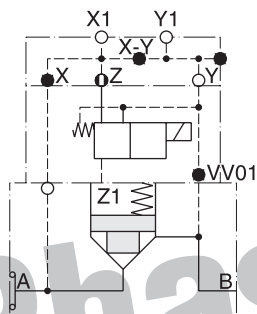
D5S...-826...09
 10
 11
 12

Pilot oil: internal from B
 Pilot drain: external out of Y1



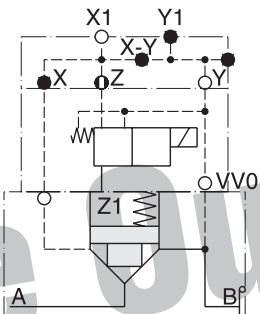
D5S...-745...09
 10
 11
 12

Pilot oil: internal from X1
 Pilot drain: internal to B



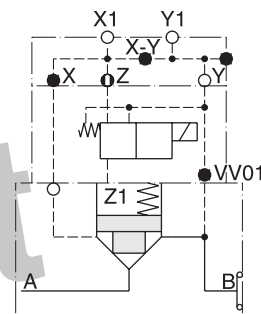
D5S...-747...09
 10
 11
 12

Pilot oil: internal from X1
 Pilot drain: external out of Y1



D5S...-845...09
 10
 11
 12

Pilot oil: internal from X1



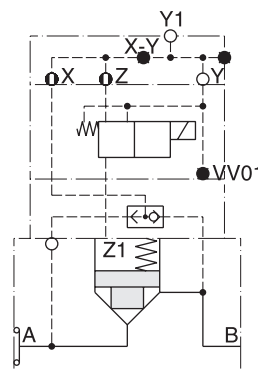
D5S...-847...09
 10
 11
 12

Pilot oil: internal from X1
 Pilot drain: external out of Y1

D5S 2-Port with Solenoid Valve VV01 and Shuttle Valve Examples

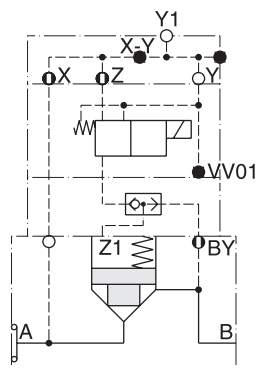
Seat Entry

Annular Entry



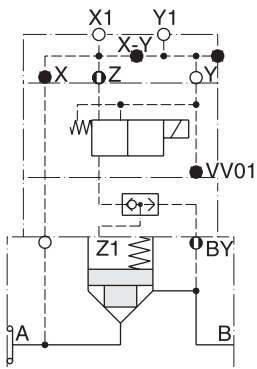
D5S...-736...CB
 CD

Pilot oil: internal from A +
 internal from B
 Pilot drain: external out of Y1



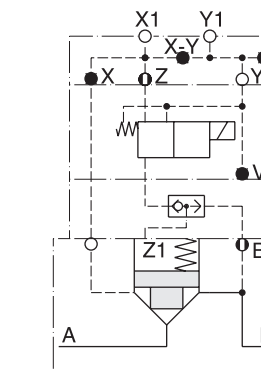
D5S...-736...DB
 DD

Pilot oil: internal from A +
 internal from B
 Pilot drain: external out of Y1



D5S...-757...DB
 DD

Pilot oil: external from X1 +
 internal from B
 Pilot drain: external out of Y1

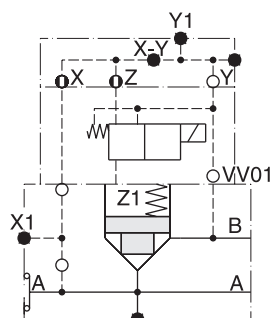


D5S...-857...DB
 DD

Pilot oil: external from X1 +
 internal from B
 Pilot drain: external out of Y1

D5S 3-Port with Solenoid Valve VV01 Examples

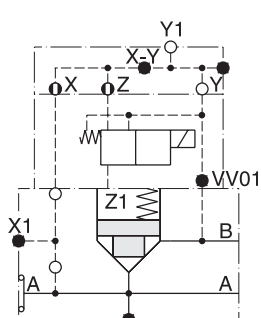
A



D5S ..-514...09

10
11
12

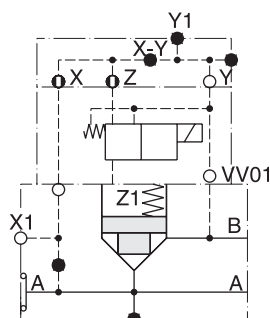
Pilot oil: internal from A
Pilot drain: internal to B



D5S ..-516...09

10
11
12

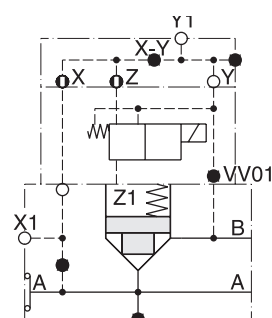
Pilot oil: internal from A
Pilot drain: external out of Y1



D5S ..-544...09

10
11
12

Pilot oil: external from X1
Pilot drain: internal to B

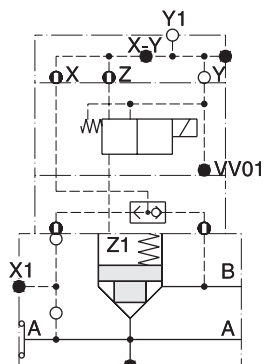


D5S ..-546...09

10
11
12

Pilot oil: external from X1
Pilot drain: external out of Y1

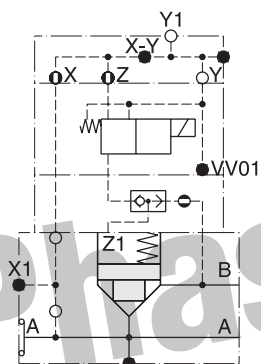
D5S 3-Port with Solenoid Valve VV01 and Shuttle Valve Examples



D5S ..-536...CB

CD

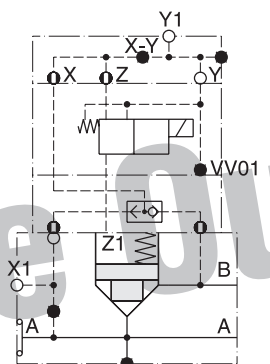
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1



D5S ..-536...DB

DD

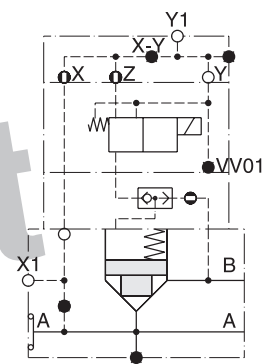
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1



D5S ..-556...CB

CD

Pilot oil: internal from X1 +
internal from B
Pilot drain: external out of Y1



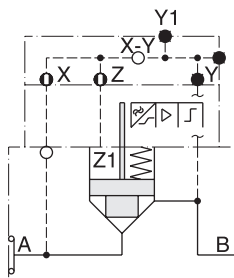
D5S ..-556...DB

DD

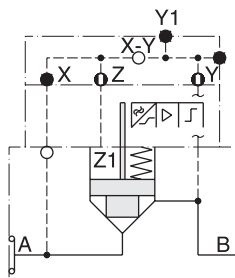
Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1

D5S 2-Port Position Control Examples

Seat Entry

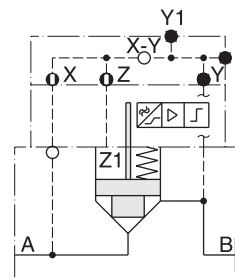


D5S08-7113A.BA
D5S10
Pilot oil: internal from A

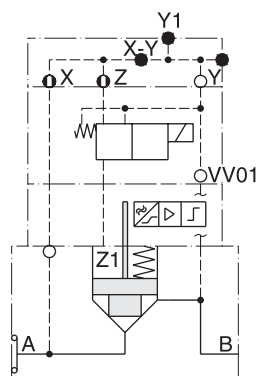


D5S08-7223A.BA
D5S10
Pilot oil: internal from B

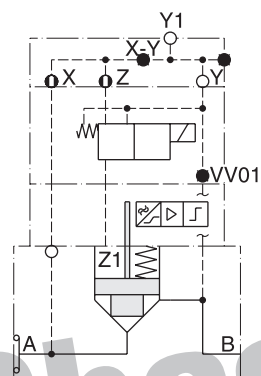
Annular Entry



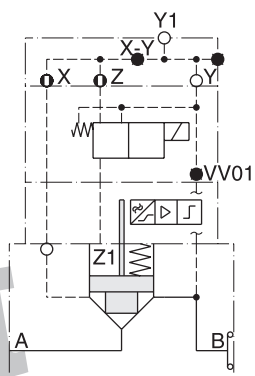
D5S08-8213A.BA
D5S10
Pilot oil: internal from B



D5S08-7143A.BC
D5S10 BE
Pilot oil: internal from A
Pilot drain: internal to B

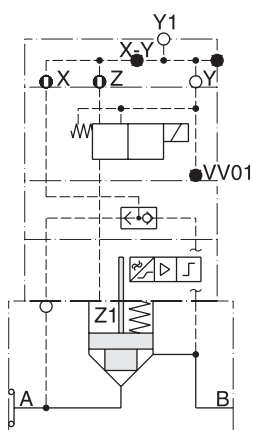


D5S08-7163A.BC
D5S10 BE
Pilot oil: internal from A
Pilot drain: external out of Y1

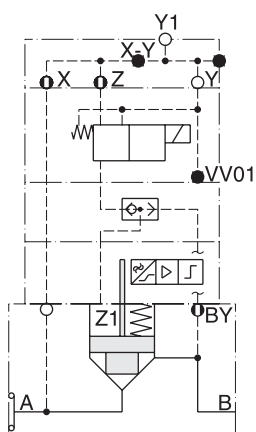


D5S08-8263A.BC
D5S10 BE
Pilot oil: internal from B
Pilot drain: external out of Y1

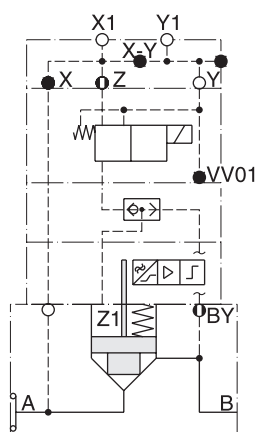
Seat Entry



D5S ..-736...BH
BK
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1

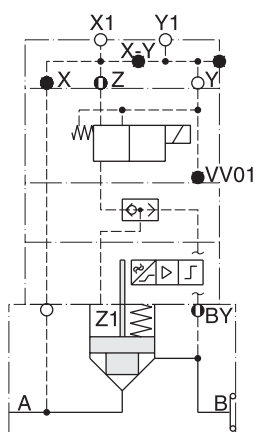


D5S ..-736...BN
BQ
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1



D5S ..-757...BN
BQ
Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1

Annular Entry

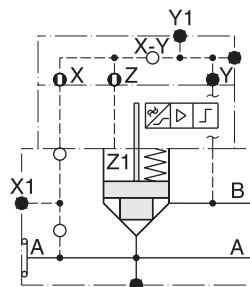


D5S ..-857...BN
BQ
Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1

D5S 3-Port Position Control Examples

A

Seat Entry

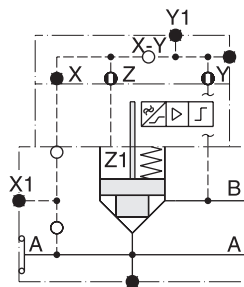


D5S08-5113A.BA

10

12

Pilot oil: internal from A



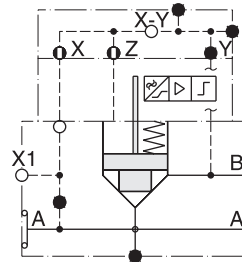
D5S08-5223A.BA

10

12

Pilot oil: internal from B

Annular Entry

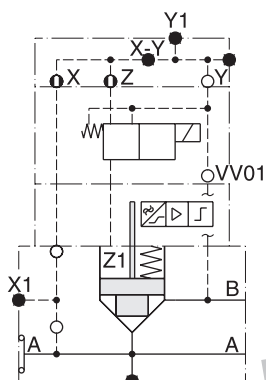


D5S08-5213A.BA

10

12

Pilot oil: external from X1

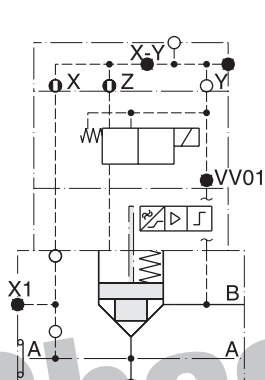


D5S08-5143A.BC

10

12

Pilot oil: internal from A
Pilot drain: internal to B

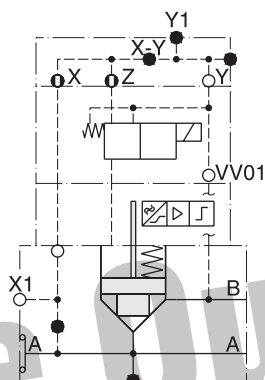


D5S08-5163A.BC

10

12

Pilot oil: internal from A
Pilot drain: external out of Y1

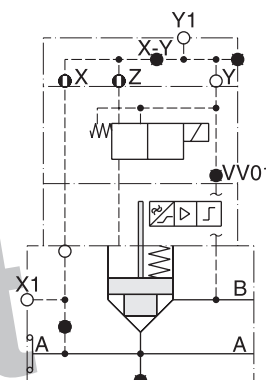


D5S08-5443A.BC

10

12

Pilot oil: external from X1
Pilot drain: internal to B



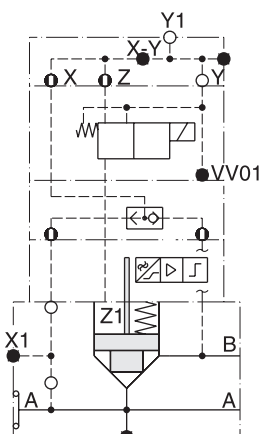
D5S08-5463A.BC

10

12

Pilot oil: external from X1
Pilot drain: external out of Y1

Seat Entry

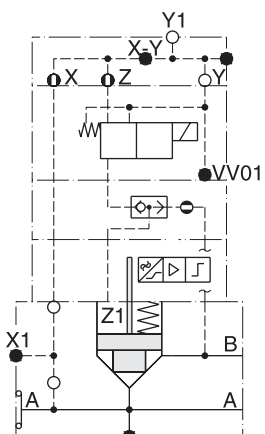


D5S08-5363A.BH

10

12

Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1



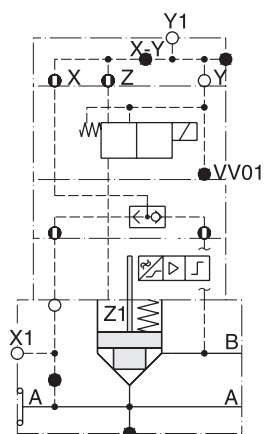
D5S08-5363A.BN

10

12

Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1

Annular Entry

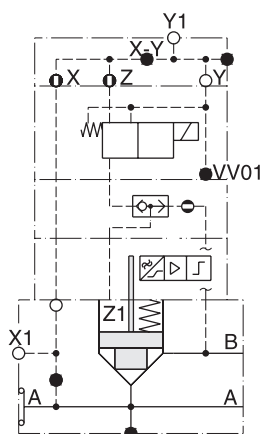


D5S08-5563A.BH

10

12

Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1



D5S08-5563A.BN

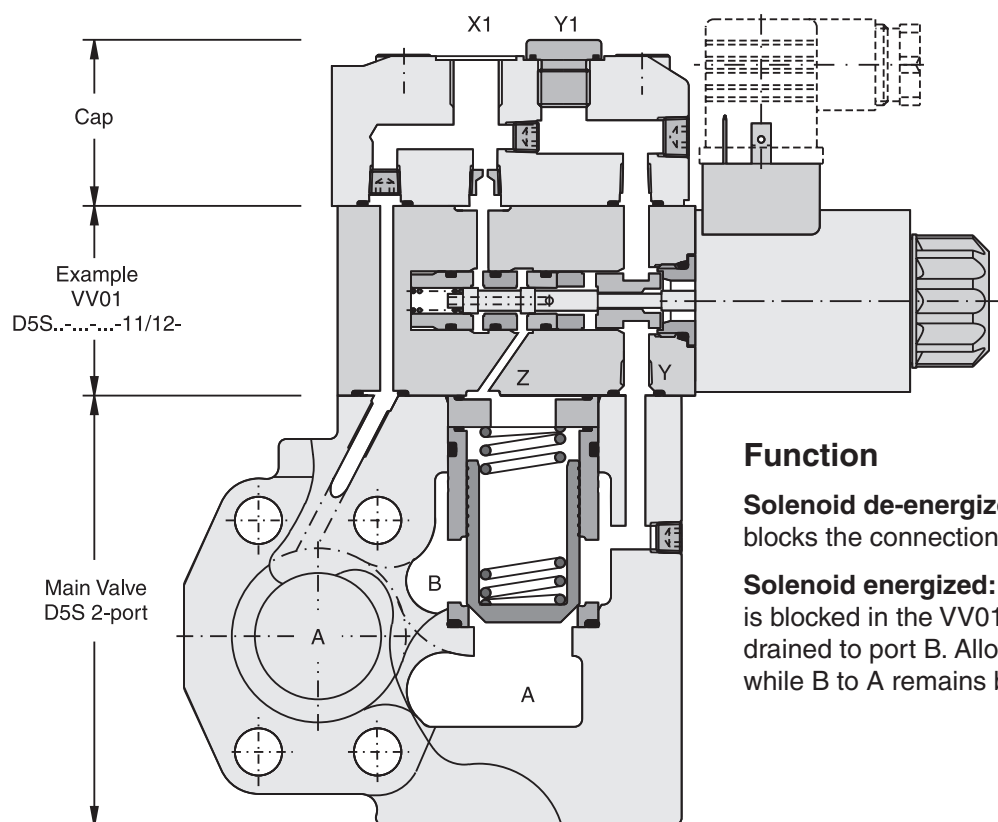
10

12

Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1

Example Pilot Oil External from X1, Pilot Drain Internal Out of B with Vent Valve

A



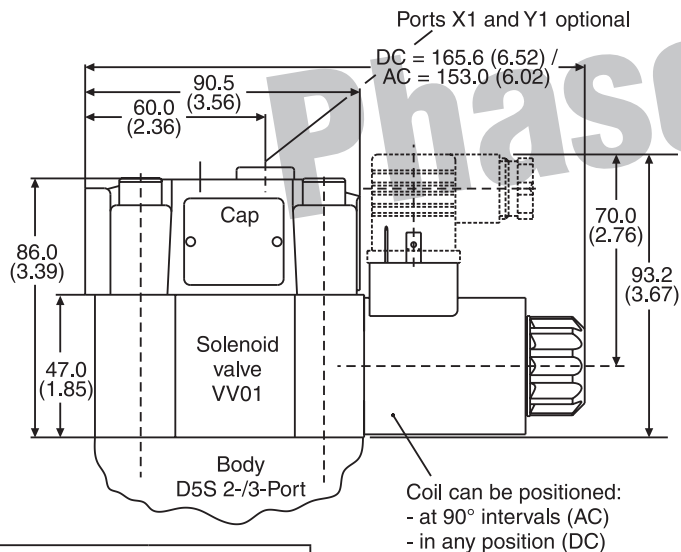
Function

Solenoid de-energized: Pilot oil from X1 to Z blocks the connection from A to B or B to A.

Solenoid energized: Pilot pressure from X1 is blocked in the VV01. The oil in Z is internally drained to port B. Allowing flow from A to B, while B to A remains blocked.

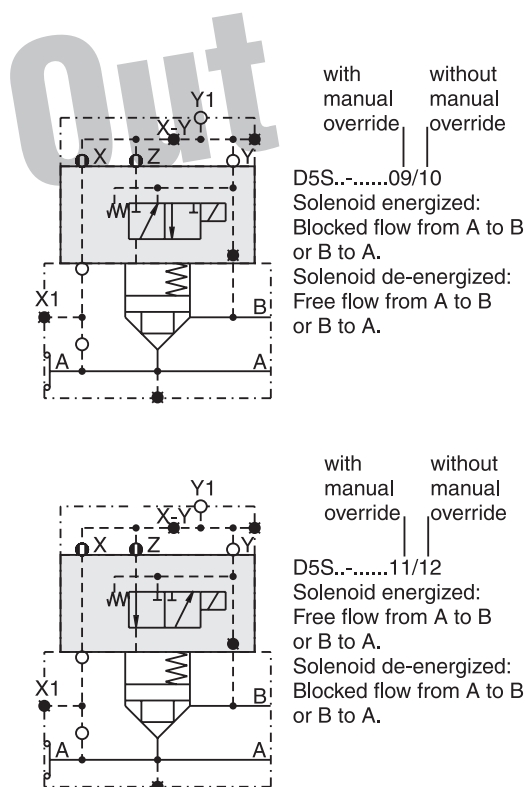
Dimensions — D5S with VV01

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



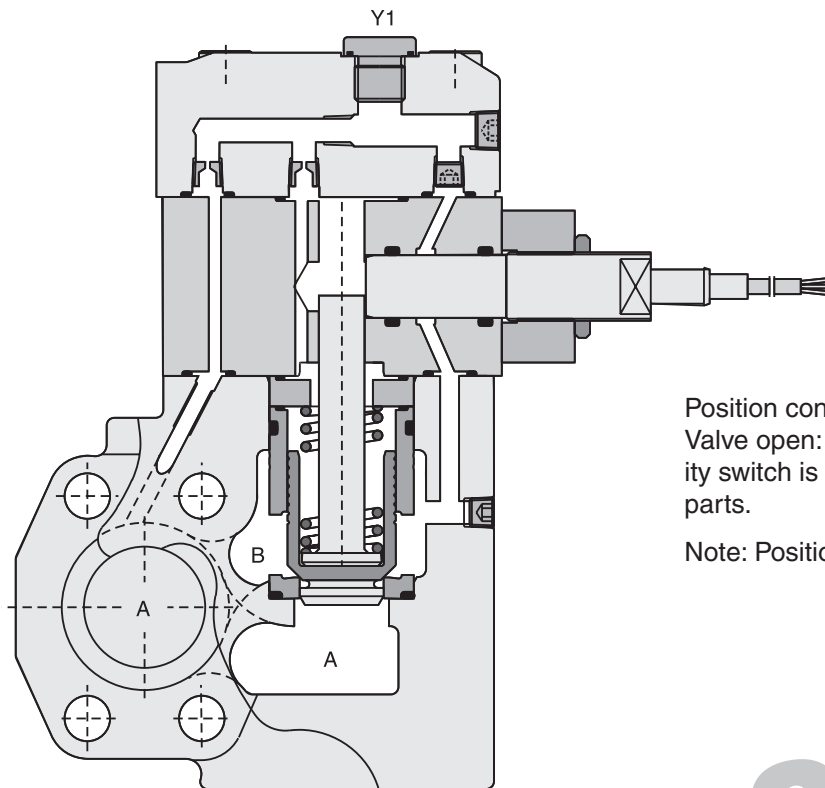
VV01 Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5

Coil can be positioned:
 - at 90° intervals (AC)
 - in any position (DC)



Example Pilot Oil External from X1, Pilot Drain Internal Out of B with Position Control

A

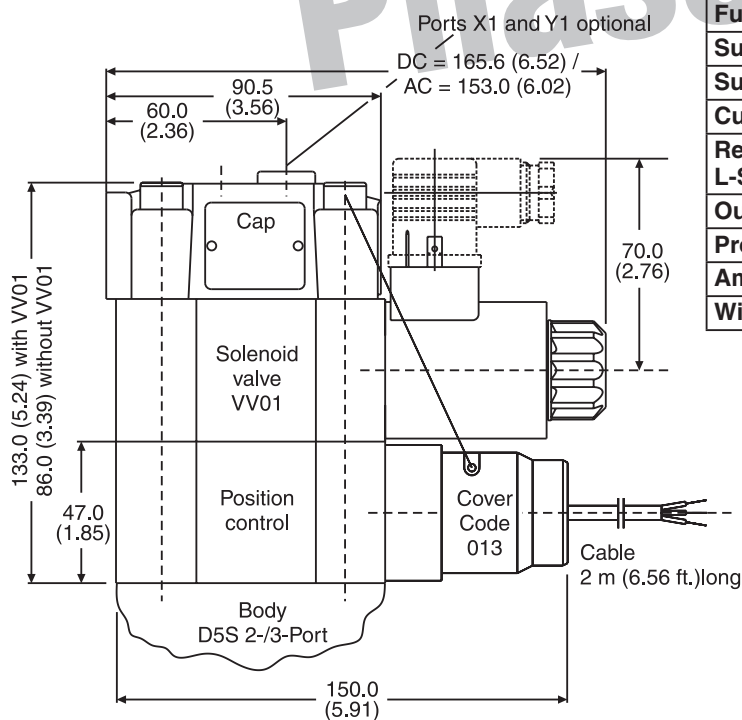


Position control by proximity switch (incl. amplifier).
 Valve open: proximity switch activated. This proximity switch is pressure proof and has no wearing parts.

Note: Position control for D5S08 and D5S10 only.

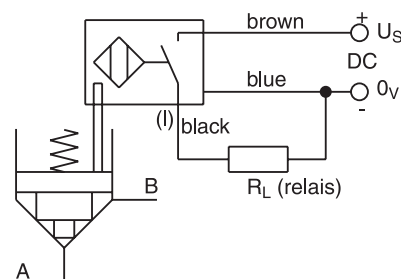
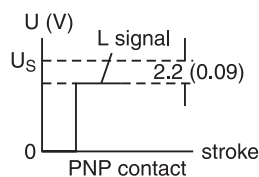
Dimensions — D5S with Position Control

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



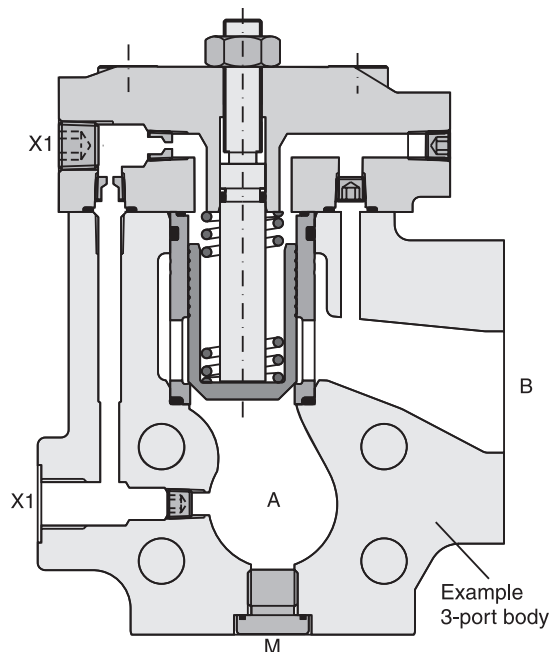
Technical Data (Proximity Switch)

Function	PNP, contact
Supply Voltage	10 - 30VDC
Supply Voltage Ripple	≤10%
Current Consumption	8mA Maximum
Residual Voltage L-Signal	U _s - 2.2V at I _{max}
Output Current	≤200 mA
Protection Class	IP67
Ambient Temperature	-25°C to +70°C (-13°F to +158°F)
Wire Cross Section	3 x 0.5 mm ²



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

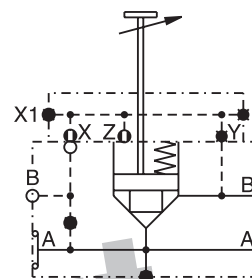
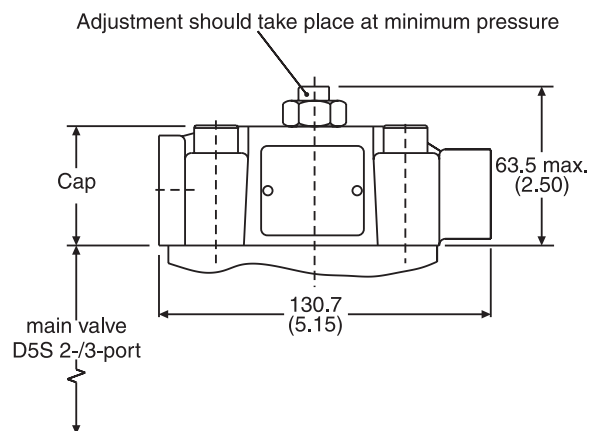
D5S Stroke Limiter



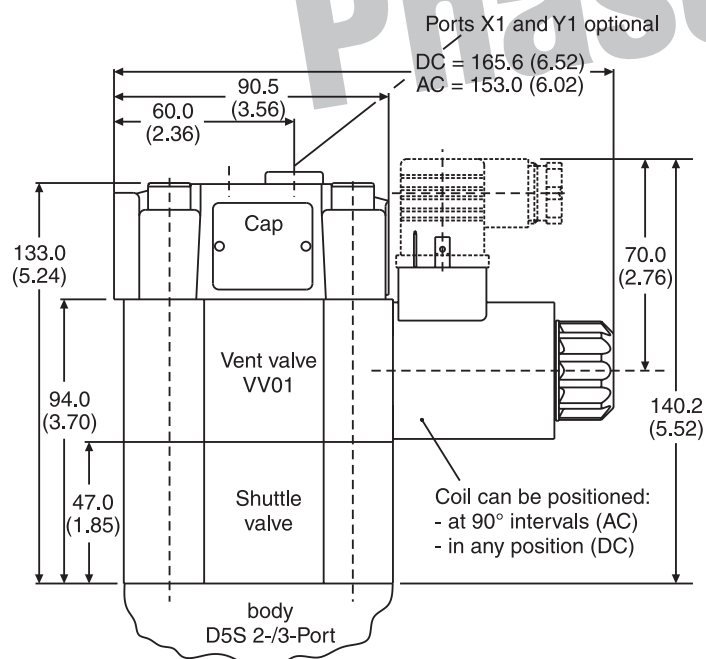
X1 = external pilot-oil (optional)

Note: Stroke limiter not for use with D5S06, solenoid valve VV01, shuttle valve and position control.

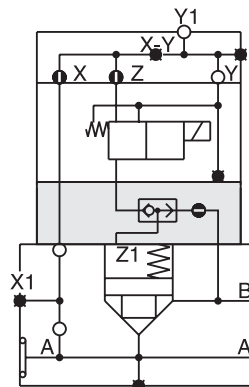
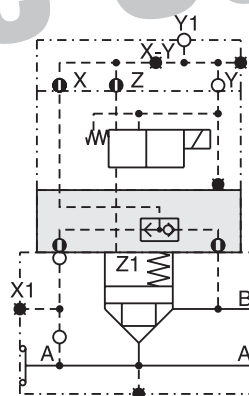
D5S Stroke Limiter Dimensions



D5S with Shuttle Valve Dimensions

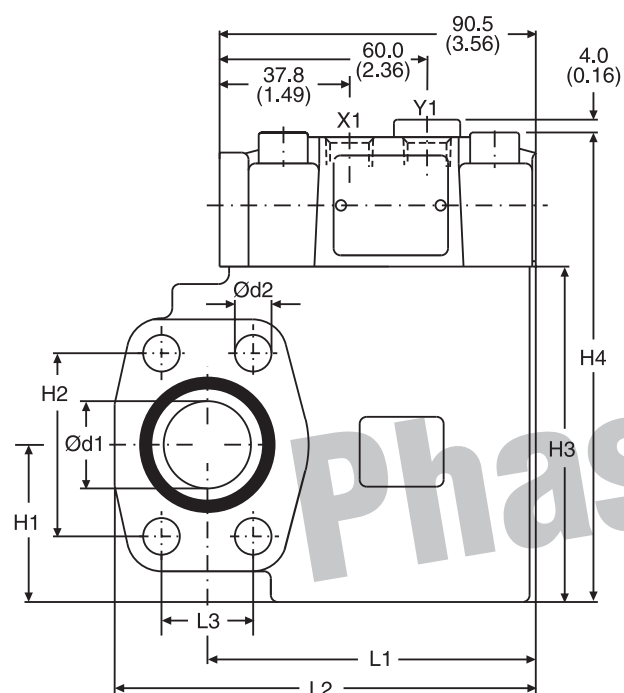
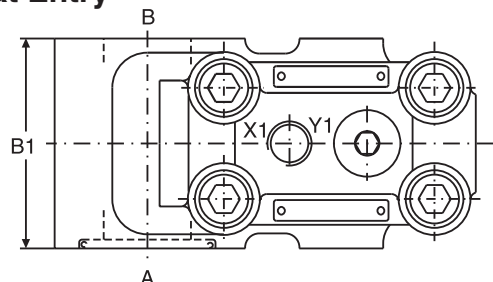
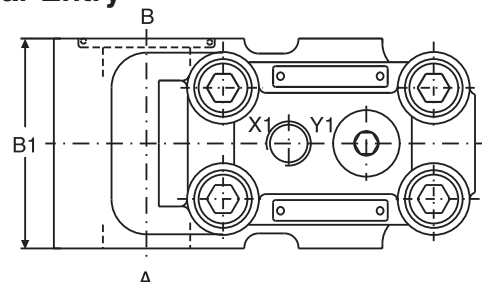


Shuttle valve only in connection with vent valve VV01.

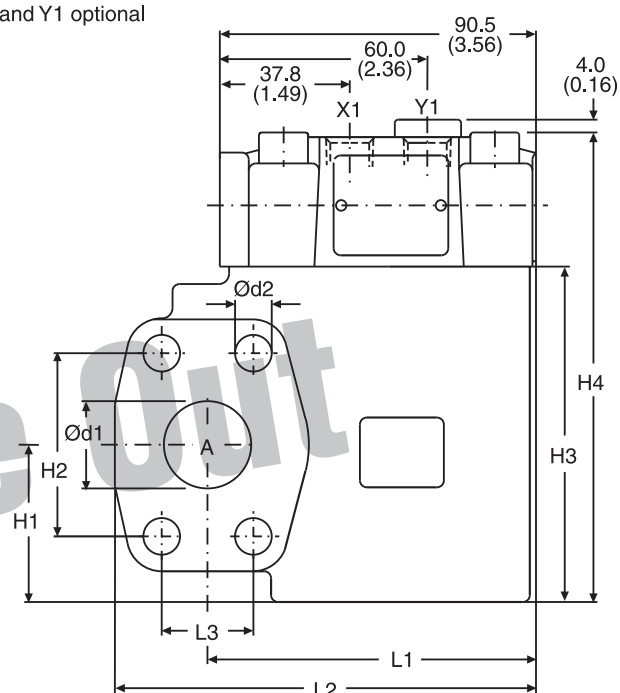


1) pilot oil from A and B, from B to A check valve function

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

A**2-Port****Seat Entry****Annular Entry**

Ports X1 and Y1 optional



Seal Kits		
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5

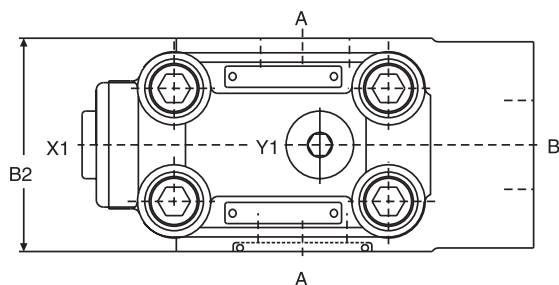
Size	I1	I2	I3	b1	h1	h2	h3	h4	d1	d2
06	77.0 (3.03)	101.0 (3.98)	22.2 (0.87)	60.0 (2.36)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	127.6 (5.02)	19.0 (0.75)	10.5 (0.41)
08	94.0 (3.70)	120.5 (4.74)	26.2 (1.03)	60.0 (2.36)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	133.6 (5.26)	25.0 (0.98)	10.5 (0.41)
10	94.0 (3.70)	128.0 (5.04)	30.2 (1.19)	75.0 (2.95)	48.0 (1.89)	58.7 (2.31)	109.0 (4.29)	146.6 (5.77)	32.0 (1.26)	12.5 (0.49)

Ports	Function	Port size		
		D5S06	D5S08	D5S10
A	Inlet or outlet	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
B	Outlet or inlet	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
X1	External pilot port	SAE 4		
Y1	External pilot drain			

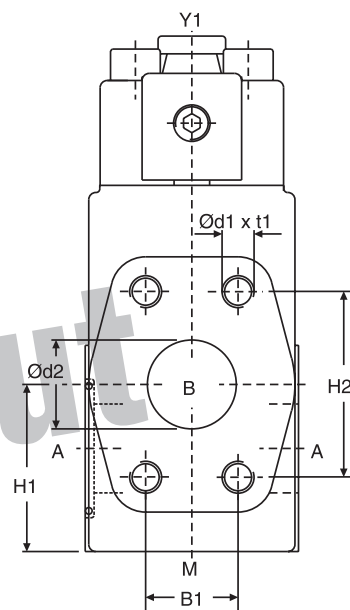
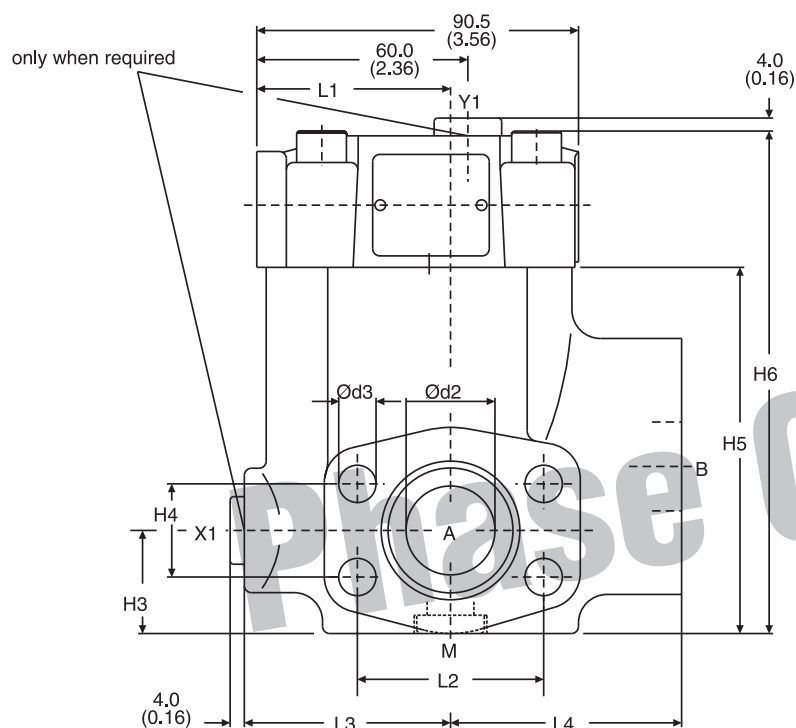
A01_Cat2500.indd, ddp, 04/19

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

3-Port



Seal Kits		
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
12	S26-27421-0	S26-27421-5



Size	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)	28.0 (1.10)	22.2 (0.87)	82.0 (3.23)	119.0 (4.69)	3/8" UNC	20.0 (0.79)	19.0 (0.75)	10.5 (0.41)
08	55.0 (2.17)	52.4 (2.06)	58.0 (2.28)	65.0 (2.56)	26.2 (1.03)	60.0 (2.36)	47.0 (1.85)	52.4 (2.06)	29.0 (1.14)	26.2 (1.03)	103.0 (4.06)	141.0 (5.55)	3/8" UNC	23.0 (0.91)	25.0 (0.98)	10.5 (0.41)
10	57.0 (2.24)	58.7 (2.31)	64.0 (2.52)	61.0 (2.40)	30.2 (1.19)	75.0 (2.95)	65.0 (2.56)	58.7 (2.31)	36.0 (1.42)	30.2 (1.19)	113.0 (4.45)	150.0 (5.91)	7/16" UNC	22.0 (0.87)	32.0 (1.26)	12.5 (0.49)
12	37.0 (1.46)	69.8 (2.75)	55.0 (2.17)	93.0 (3.66)	35.7 (1.41)	80.0 (3.15)	73.0 (2.87)	69.8 (2.75)	72.0 (2.83)	35.7 (1.41)	140.0 (5.51)	178.0 (7.01)	1/2" UNC	27.0 (1.06)	38.0 (1.50)	13.5 (0.53)

Ports	Function	Port size			
		D5S06	D5S08	D5S10	D5S12
A (2x)	Inlet or outlet	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	SAE 4			
Y1	External pilot drain				
M	Pressure gauge				

* closed when supplied.

A01_Cat2500.indd, ddp, 04/19

This image shows a full page of blank graph paper. The grid consists of thin, light gray horizontal and vertical lines that intersect to form a uniform pattern of small squares across the entire surface. There are no margins, text, or other markings on the paper.

Contents

Introduction	B3 - B5
Series CM, CH, ZRV	
CM	Check..... B6 - B7
CM2 Dimensions & Surface Patterns.....	D03 Mounted B8 - B9
CM3 Dimensions & Surface Patterns.....	D05 Mounted B10 - B11
CM6 Dimensions & Surface Patterns.....	D08 Mounted B12 - B13
CH	Check..... B14 - B16
CH05 Dimensions	D05 Mounted B17
CH5H Dimensions	D05HE Mounted B17
CH07 Dimensions	D07 Mounted B18
CH08.....	D08 Mounted B19
ZRV	Check..... B128 - B129
ZRV Dimensions	D03 and D05 Mounted, Check B130
Series CPOM, CP, ZRE	
CPOM.....	Double Pilot Operated, Check B20 - B22
CPOM2 Dimensions	D03 Mounted B23
CPOM3 Dimensions	D05 Mounted B23
CPOM4 Dimensions	D07 Mounted B24
CPOM6 Dimensions	D08 Mounted B24
CP	Pilot Operated, Check..... B25 - B27
CP05 Dimensions	D05 Mounted B28
CP5H Dimensions.....	D05HE Mounted B29
CP07 Dimensions	D07 Mounted B30 - B31
CP08 Dimensions	D08 Mounted B31 - B32
ZRE	Double Pilot Operated Check B125 - B126
ZRE Dimensions	D03 and D05 Mounted B127
Series FM, FD, FC ZRD	
FM	Double Manapak, Flow Control..... B33 - B36
FM2 Dimensions.....	D03 Mounted B37
FM3 Dimensions	D05 Mounted B38
FM6 Dimensions.....	D08 Mounted B39
FC, FD	Throttle Check Valves B40 - B42
FC05DD	D05 Mounted B43
FC5HDD	D05HE Mounted B43
FC07DD	D07 Mounted B44
FC08DD	D08 Mounted B44
FD05DD	D05 Mounted B45
FD5HDD	D05HE Mounted B45
FD07DD	D07 Mounted B46
FD08DD	D08 Mounted B46
ZRD	Double Flow Control B121 - B123
ZRD Dimensions.....	D03 and D05 Mounted B124

Continued on next page

Contents**Series PRDM, PR**

PRDM	Direct Operated, Pressure Reducing	B47 - B50
PRDM2 Dimensions	D03 Mounted	B51
PRDM3 Dimensions	D05 Mounted	B51
PR	Pilot Operated, Pressure Reducing/Relieving	B52 - B55
PR05 Dimensions	D05 Mounted	B56 - B57
PR05H Dimensions	D05HE Mounted	B57 - B58
PR07 Dimensions	D07 Mounted	B59 - B60
PR08 Dimensions	D08 Mounted	B60 - B61

Series PRM , ZDR

PRM	Pressure Reducing	B62 - B64
PRM3 Dimensions	D05 Mounted	B65 - B67
PRM6 Dimensions	D08 Mounted	B68
ZDR	Pilot Operated, Pressure Reducing	B93 - B94
ZDR Dimensions	D03 and D05 Mounted	B95

Series RDM, RM, ZDV

RDM	Relief	B69 - B72
RDM2 Dimensions	D03 Mounted	B73
RDM3 Dimensions	D05 Mounted	B73
RM	Relief	B74 - B76
RM2 Dimensions	D03 Mounted	B77
RM3 Dimensions	D05 Mounted	B78
RM6 Dimensions	D08 Mounted	B79
RV	Relief	B80 - B83
RV05 Dimensions	D05 Mounted	B83 - B85
RV05H Dimensions	D05HE Mounted	B85 - B87
RV07 Dimensions	D07 Mounted	B88 - B90
RV08 Dimensions	D08 Mounted	B90 - B92
ZDV	Relief	B96 - B98
ZDV Dimensions	D03 and D05 Mounted	B99

Series ZNS

ZNS	Counterbalance Valve	B100 - B102
ZNS Dimensions	D03 and D05 Mounted	B103
CB	Counterbalance Valve	B104 - B107
CB03 Dimensions	D03 Mounted	B108 - B109
CB05 Dimensions	D05 Mounted	B109 - B110
CB5H Dimensions	D05HE Mounted	B111 - B112
CB07 Dimensions	D07 Mounted	B112 - B113
CB08 Dimensions	D08 Mounted	B114 - B115
RG	Double-Active, Regenerative Valve Assembly	B116 - B118
RG03 Dimensions	D03 Mounted	B119
RG05 Dimensions	D05 Mounted	B119
RG07	D07 Mounted	B120
RG08	D08 Mounted	B120

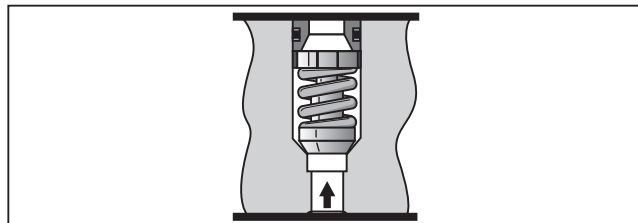
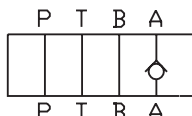
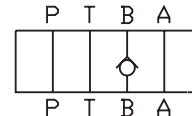
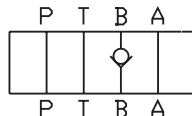
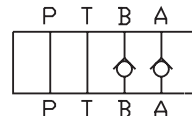
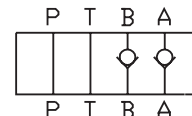
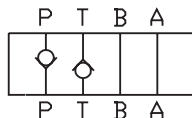
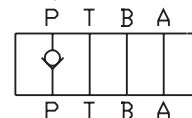
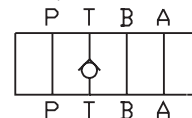
Installation Information	B131
Mounting Pattern Dimensions	B132 - B133

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.

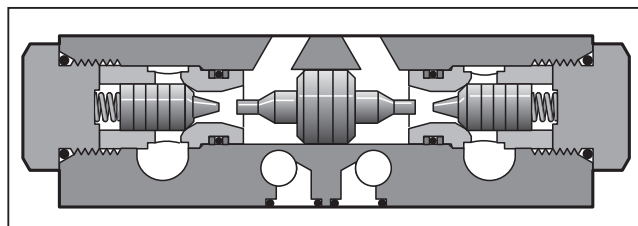
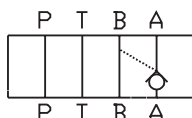
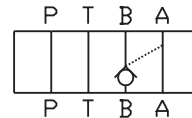
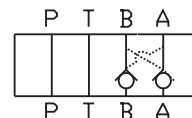
The NFPA D03 Sandwich valves may also be used in conjunction with Parker's Cartpak Series of sandwich valves which offer a wide variety of additional functions including relief, pressure reducing/relieving, load check, back pressure check, needle, flow control, pressure compensated flow control, crossover, 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.

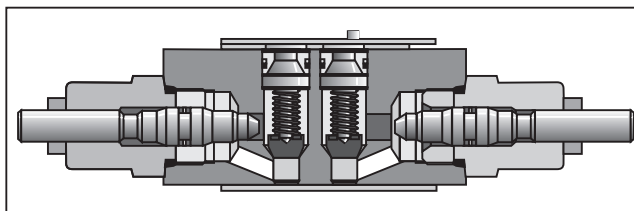
Flow Control Valves

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).



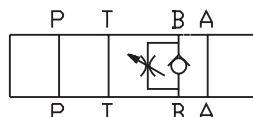
FM*AA, ZRD-AA

(Meter Out)



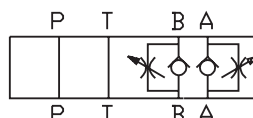
FM*BB, ZRD-BA

(Meter Out)



FM*DD, ZRD-ABA

(Meter Out)



FM*PP

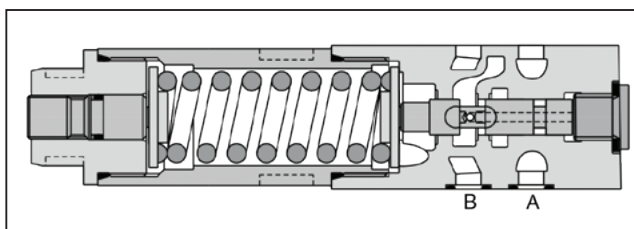
(Meter Out)



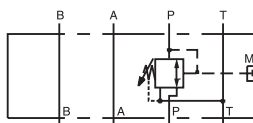
Pressure Reducing Valves

Series PRDM

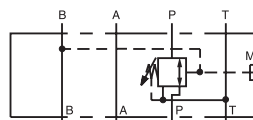
- PRDM sandwich valves have three-way design for pressure relieving of the secondary side.
- The direct operated, cushioned piston design results in fast response, low leakage and minimal hysteresis.
- PRDM sandwich valves may be selected to reduce pressure in the 'P' port, 'A' port or 'B' port.
- Up 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.



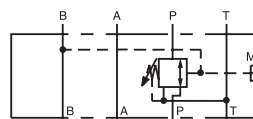
PRDM*PP



PRDM*AA



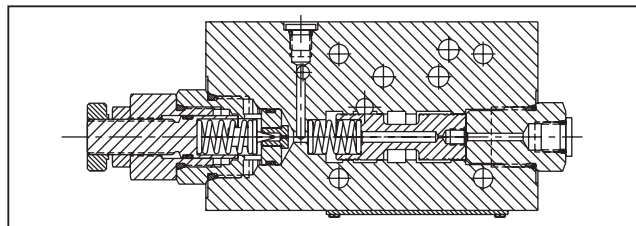
PRDM*BB



Pressure Reducing Valves

Series PRM, ZDR

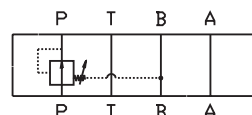
- Parker PRM, ZDR sandwich style pressure reducing valves can be used to reduce pressure on the 'P' port, the 'A' port, or the 'B' port.
- Three pressure adjustment options available: slotted screw, knob and locking knob.
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.



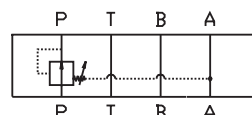
PRM*AA, ZDR-A



PRM*BB, ZDR-B



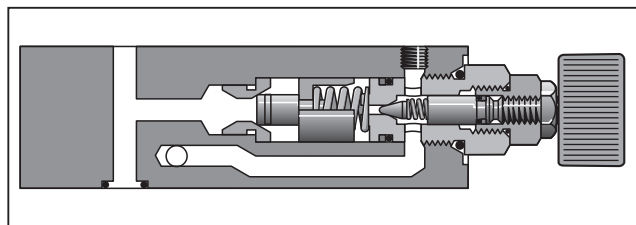
PRM*PP, ZDR-P



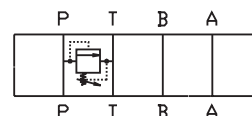
Pressure Relief Valves

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.

B

Features

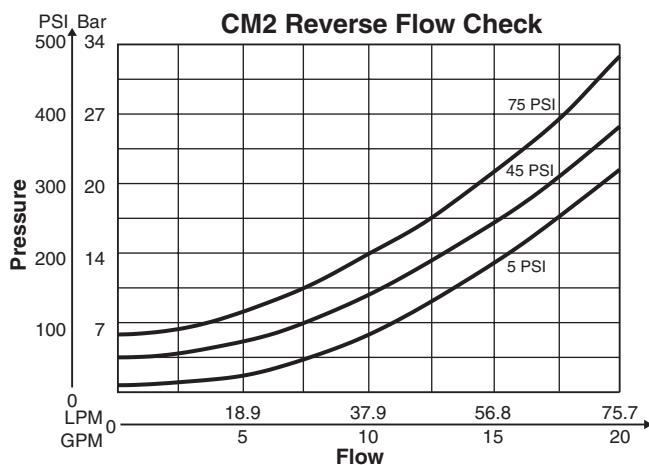
- Valve bodies are manufactured from steel which provides extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Positive shut-off is provided by a fully guided poppet and allows full flow in the unchecked position.
- Parker CM sandwich style check valves can be used either on the 'P', 'A', 'B', 'T' ports, or combinations.
- Large internal flow paths allow high flow at low pressure drop.

Specifications

	CM2	CM3	CM6
Mounting Pattern	NFPA D03, CETOP 3, NG6	NFPA D05, CETOP 5, NG10	NFPA D08, CETOP 8, NG25
Maximum Pressure	345 Bar (5000 PSI)	345 Bar (5000 PSI)	345 Bar (5000 PSI)
Maximum Flow	76 LPM (20 GPM)	113 LPM (30 GPM)	340 LPM (90 GPM)
Cracking Pressure	0.3 Bar (5 PSI), 3 Bar* (45 PSI), 5 Bar* (75 PSI)	0.3 Bar (5 PSI), 3 Bar* (45 PSI), 5 Bar* (75 PSI)	0.3 Bar (5 PSI)

* Optional

Performance Curves

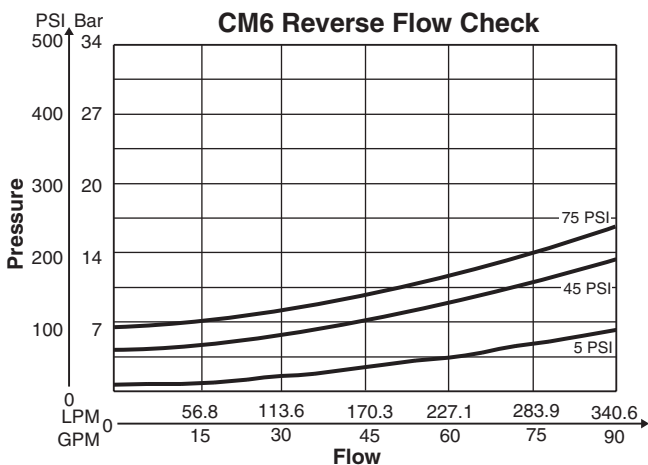
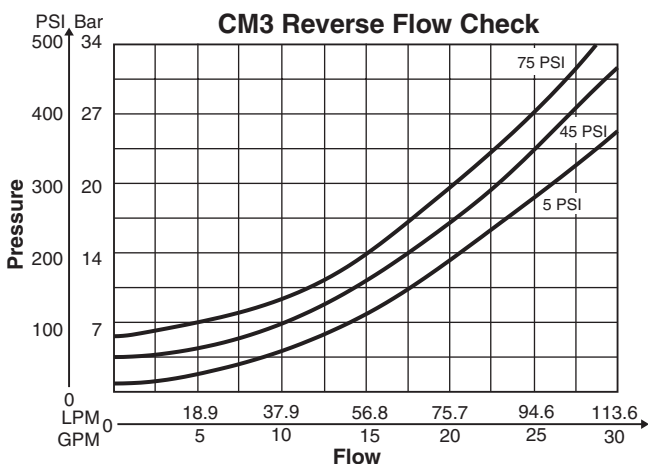
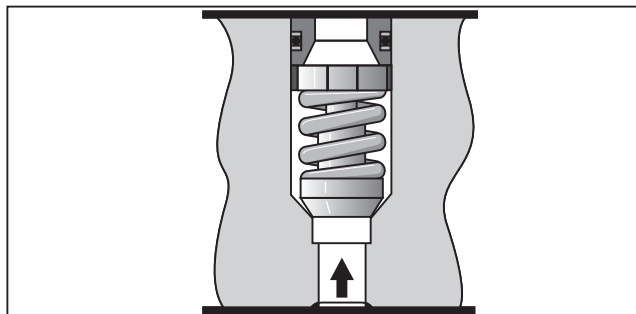
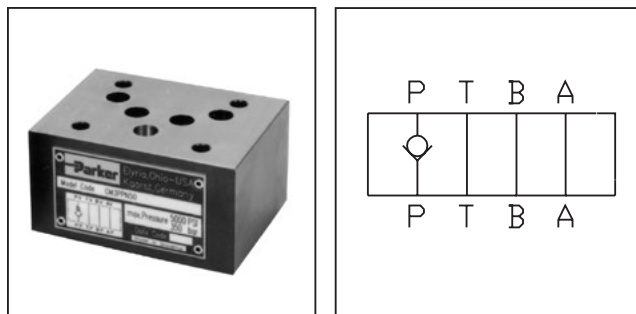


VISCOSITY CORRECTION FACTOR							
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141

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

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.

B01_Cat2500.indd, ddp, 04/19



<div style="border: 1px solid black; padding: 2px; width: 40px; margin: 0 auto;">CM</div> <div style="text-align: center;">Check Valve</div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> <div style="text-align: center;">Size</div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> <div style="text-align: center;">Port</div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> <div style="text-align: center;">Cracking Pressure</div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> <div style="text-align: center;">Seal</div>	<div style="border: 1px solid black; padding: 2px; width: 40px; margin: 0 auto;">*</div> <div style="text-align: center;">Design Series</div> <div style="text-align: center;">NOTE: Not required when ordering.</div>																																									
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* Not available on 6 size.

Bold: Designates Tier I products and options.

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

Manapak Bolt Kits

Size "2"				Size "3"			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)	No. of Sandwich	Sandwich & Valve Combination	D3W-30 D3DW & D31*W*	Bolt Length mm (in)
1	Sandwich & D1	BK243	73.2 (2.88)	1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D1	BK225	111.3 (4.38)	2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D1	BK244	152.4 (6.00)	3	Sandwich & D3	BK143	190.5 (7.50)
4	Sandwich & D1	BK245	190.5 (7.50)				

Bolt Kits must be ordered separately. *D31VW with internal pilot and internal drain only.

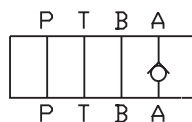
Size "6"				
Sandwich & Valve Combination	Bolt Kit	Description	Qty/Kit	Torque IN-LBS
1 Sandwich & D6*VW Valve	BK121	1/2 - 13 x 5.25	6	80
2 Sandwich & D6*VW Valve	BK122	1/2 - 13 x 8.00	6	80
3 Sandwich & D6*VW Valve	BK123	1/2 - 13 x 10.75	6	80
4 Sandwich & D6*VW Valve	BK124	1/2 - 13 x 13.50	6	80

Note: Bolt Kits must be ordered separately.

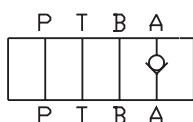
Unit Weight:

CM2 0.8 kg (1.7 lbs.)
 CM3 1.8 kg (3.9 lbs.)
 CM6 7.7 kg (17 lbs.)

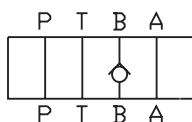
Schematics



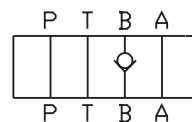
AA Option



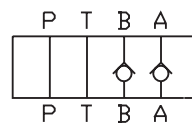
AAF Option



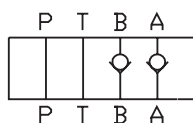
BB Option



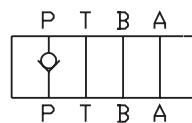
BBF Option



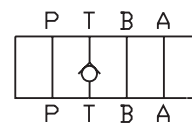
DD Option



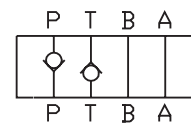
DDF Option



PP Option

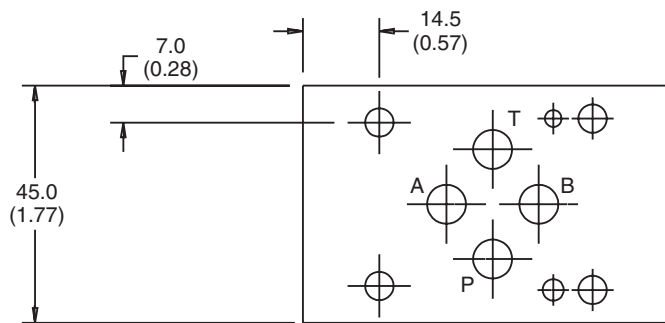
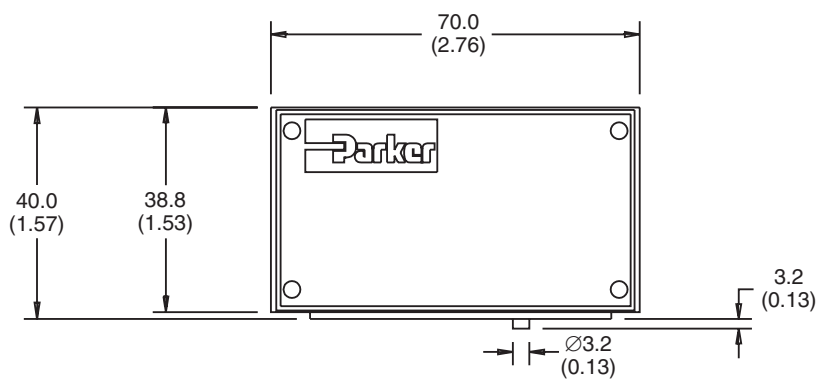
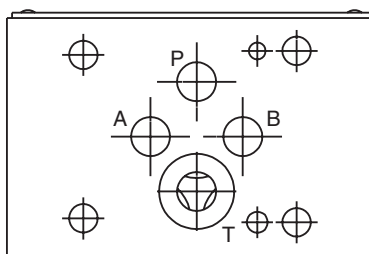


TT Option



PT Option

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

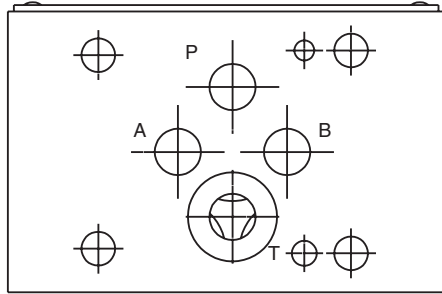
**Top View****Face View**

SHOWN WITHOUT O-RING PLATE

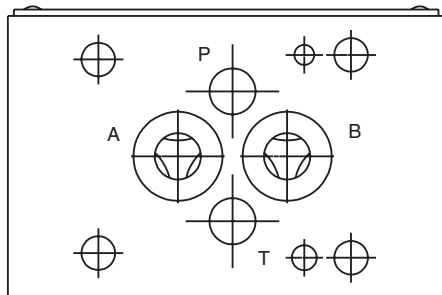
Bottom View

Note: Transfer the locating pin to the hole on the opposite side of the valve body for 'T' port option.
(Invert body 180°)

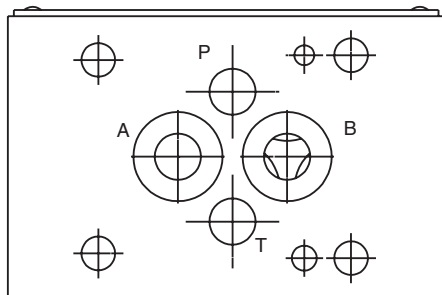
Bottom Views



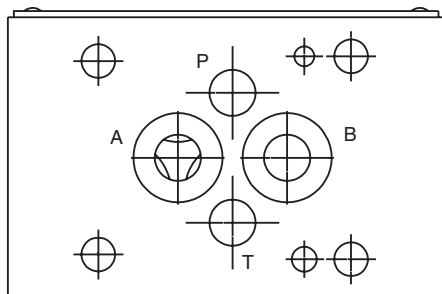
TT



DD

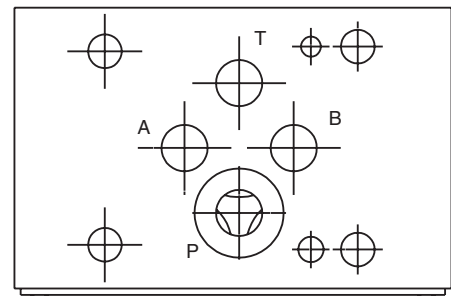


BB

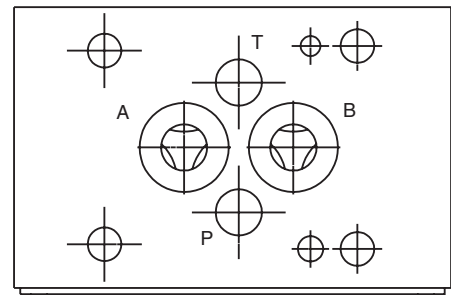


AA

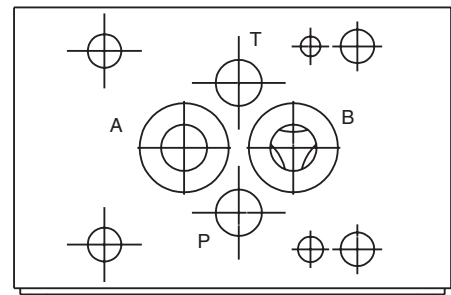
Top Views



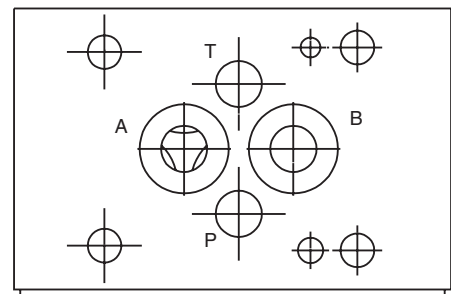
PP/PT



DDF



BBF

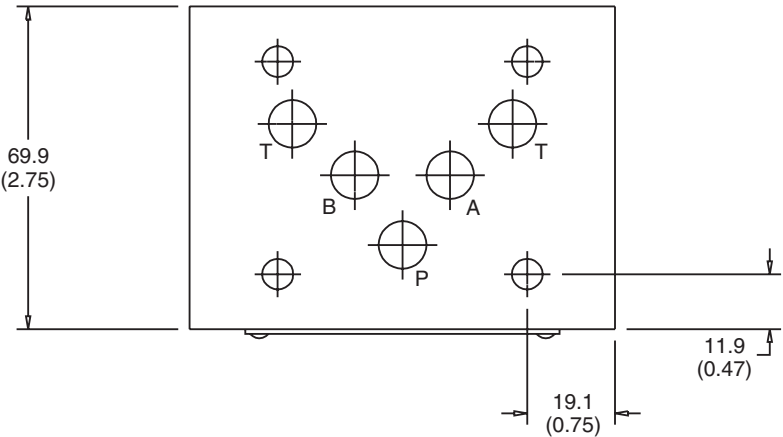


AAF

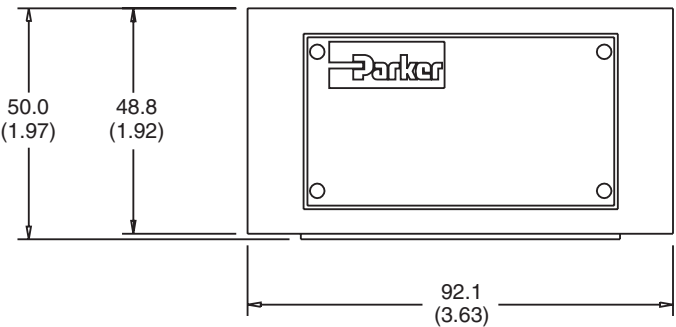
B

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

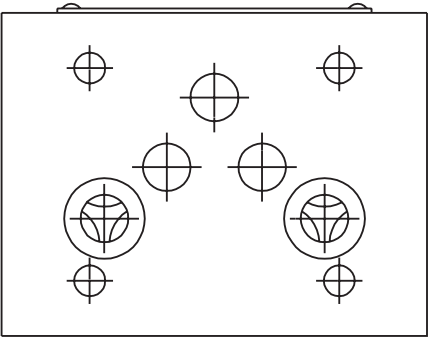
B



Top View

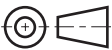


Face View

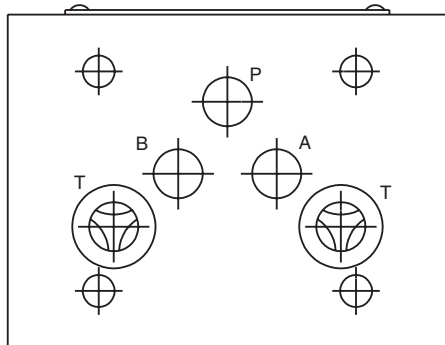


SHOWN WITHOUT O-RING PLATE

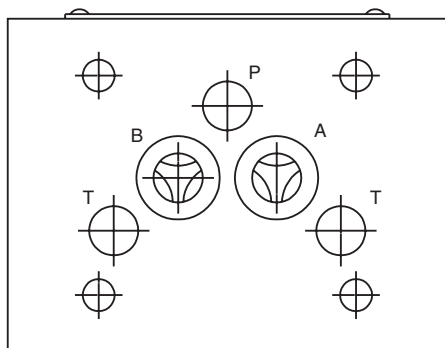
Bottom View



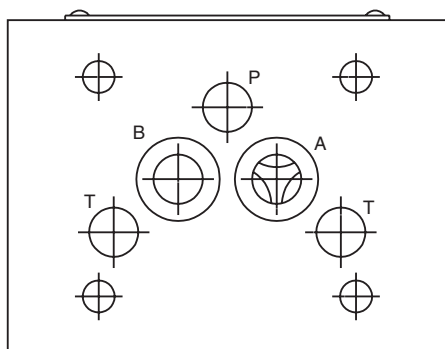
Bottom Views



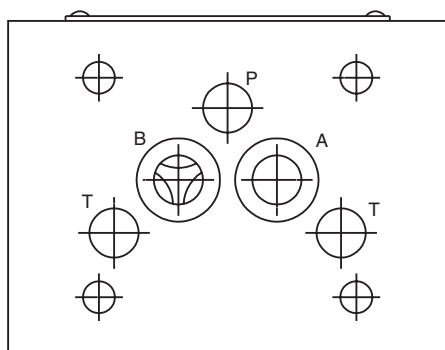
TT



DD

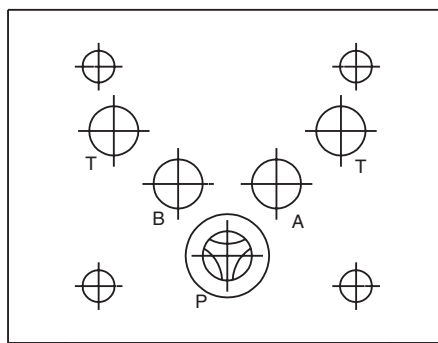


AA

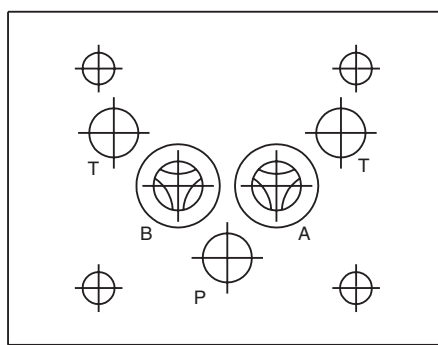


BB

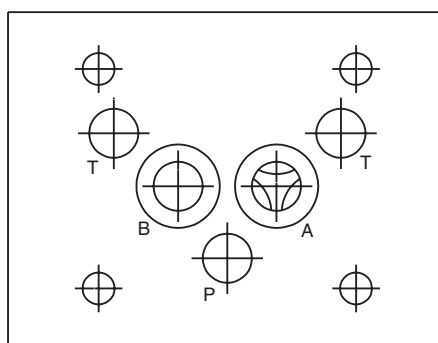
Top Views



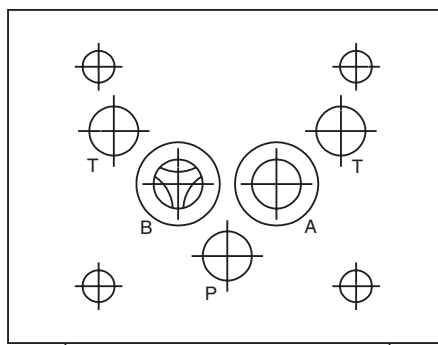
PP/PT



DDF



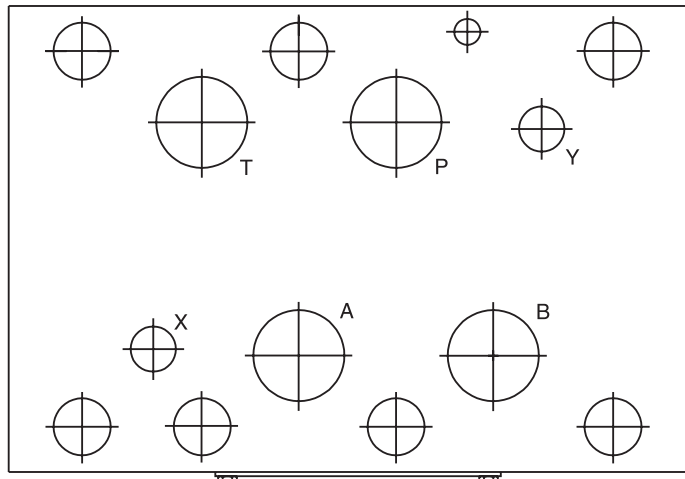
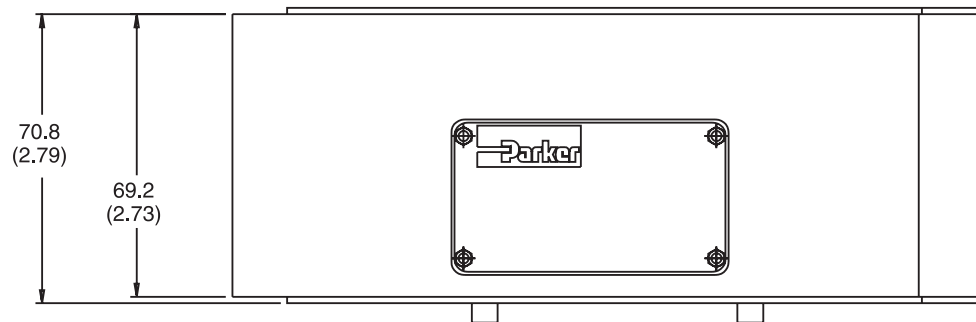
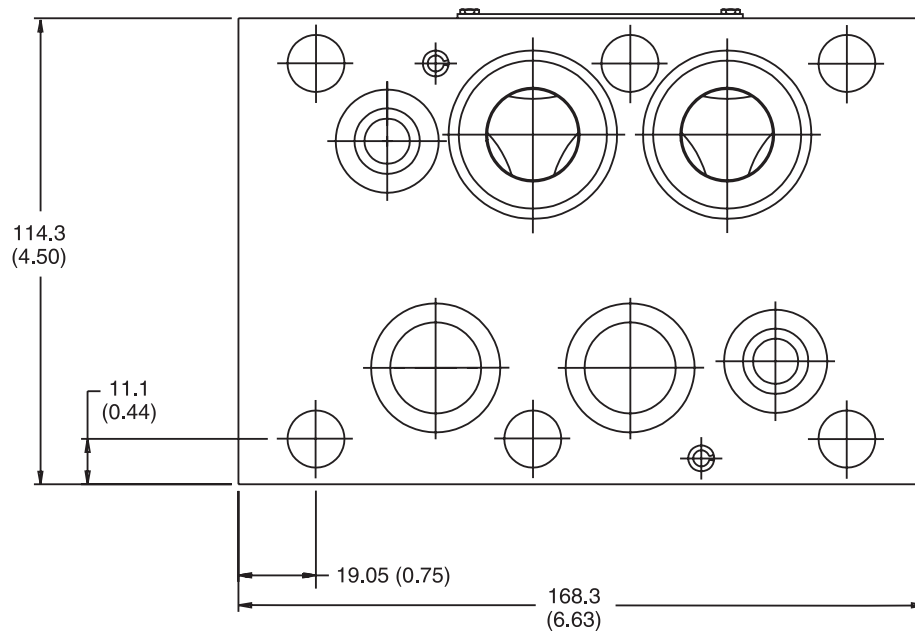
AAF



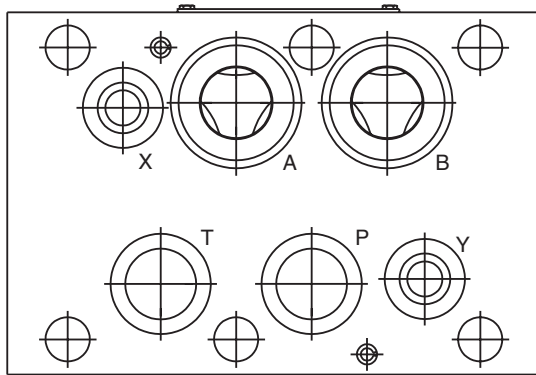
BBF

B

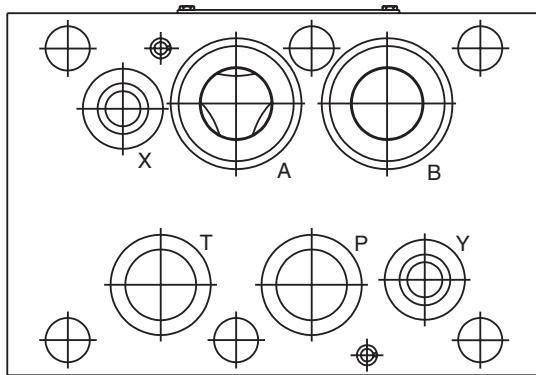
Inch equivalents for millimeter dimensions are shown in (**)

**Top View****Face View****Bottom View**

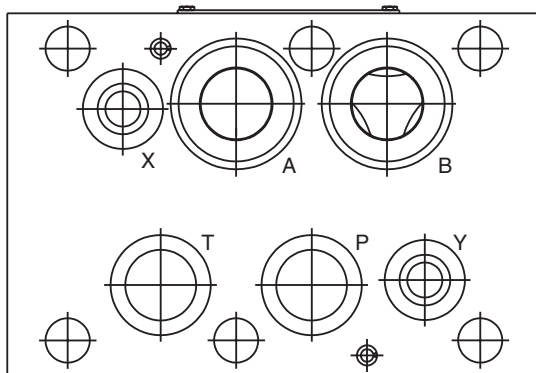
Bottom Views



DD

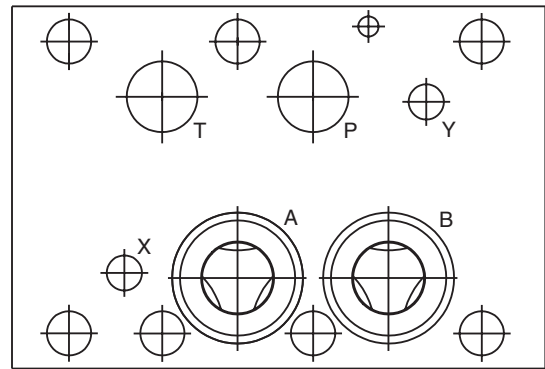


AA

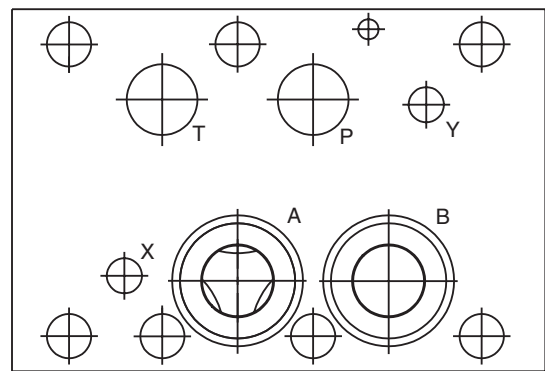


BB

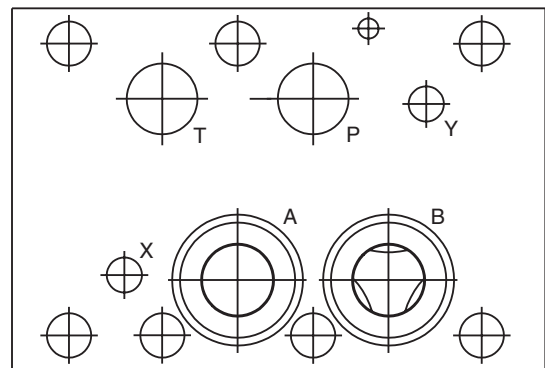
Top Views



DDF



AAF



BBF

B

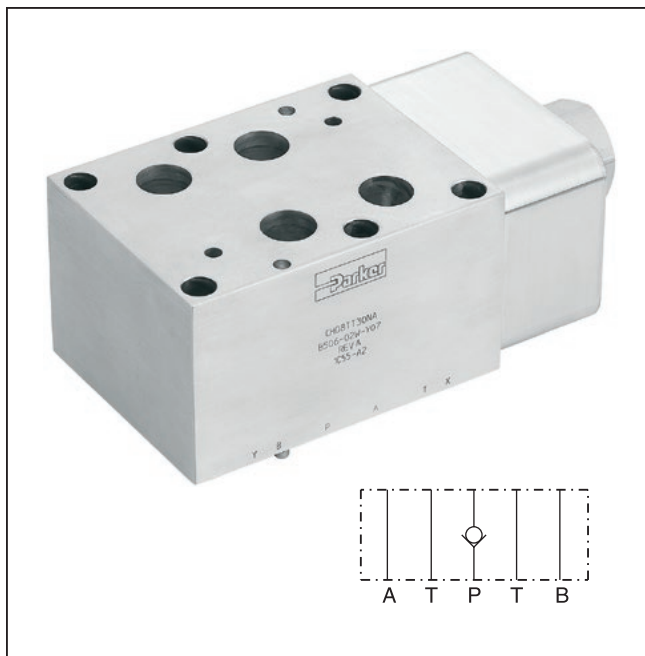
General Description

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.

B

Features

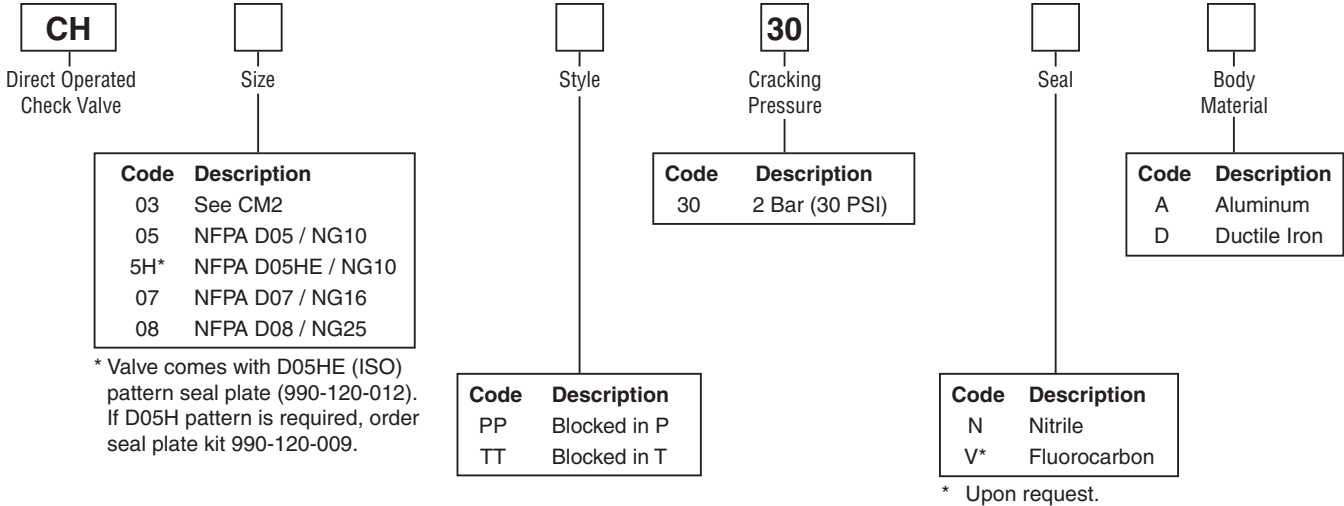
- Cracking pressure 2.0 Bar (30 PSI).
- Sizes:
 - CH05 – NFPA D05 / NG10 / CETOP 5
 - CH5H – NFPA D05HE / NG10 / CETOP 5H
 - CH07 – NFPA D07 / NG16 / CETOP 7
 - CH08 – NFPA D08 / NG25 / CETOP 8



Specifications

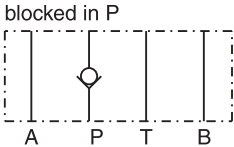
General				
Size	D05 / NG10	D05HE / NG10	D07 / NG16	D08 / NG25
Mounting Position	Unrestricted			
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure	Aluminum Body – up to 207 Bar (3000 PSI); Ductile Iron Body – up to 345 Bar (5000 PSI)			
Nominal Flow	151 LPM (40 GPM)	151 LPM (40 GPM)	303 LPM (80 GPM)	606 LPM (160 GPM)
Leakage	< 1 DPM	< 1 DPM	< 1 DPM	< 1 DPM
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)		
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			

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.
 B01_Cat2500.indd, ddp, 04/19

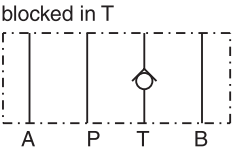


B

CH**PP



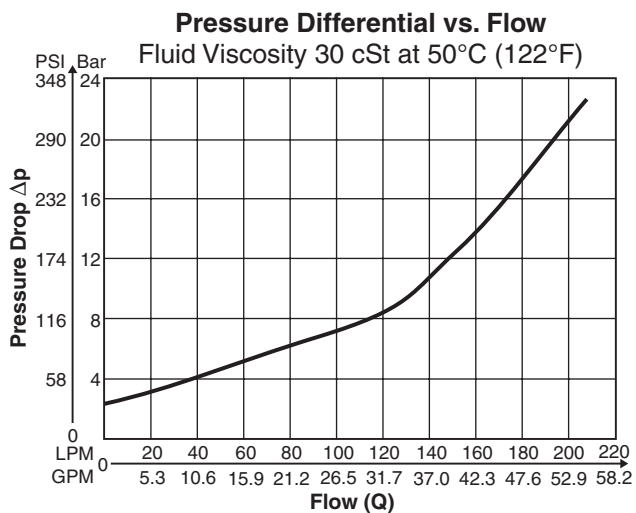
CH**TT



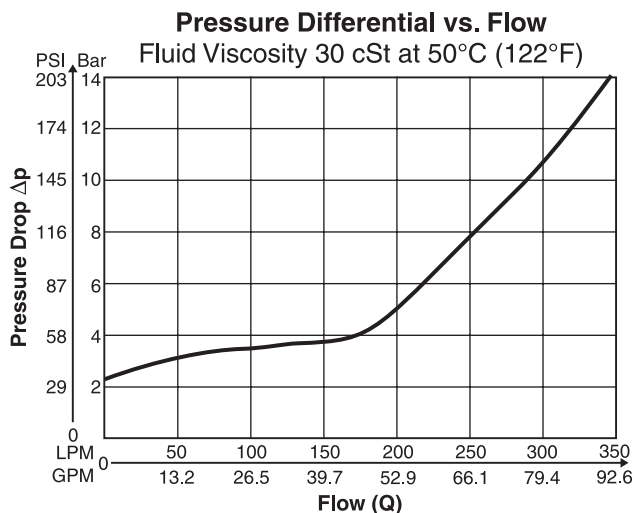
Weight:

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.)

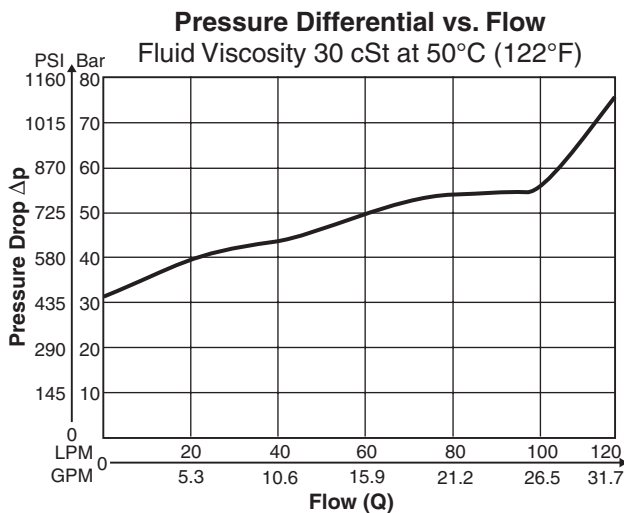
CH05/CH5H



CH07

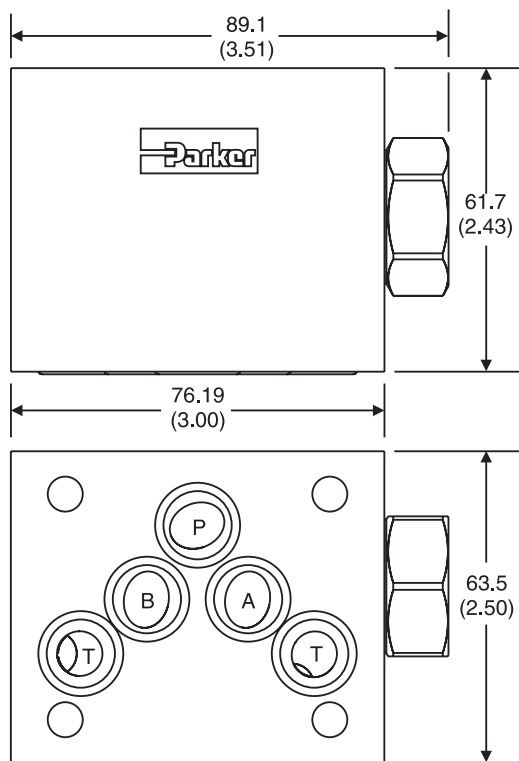


CH08

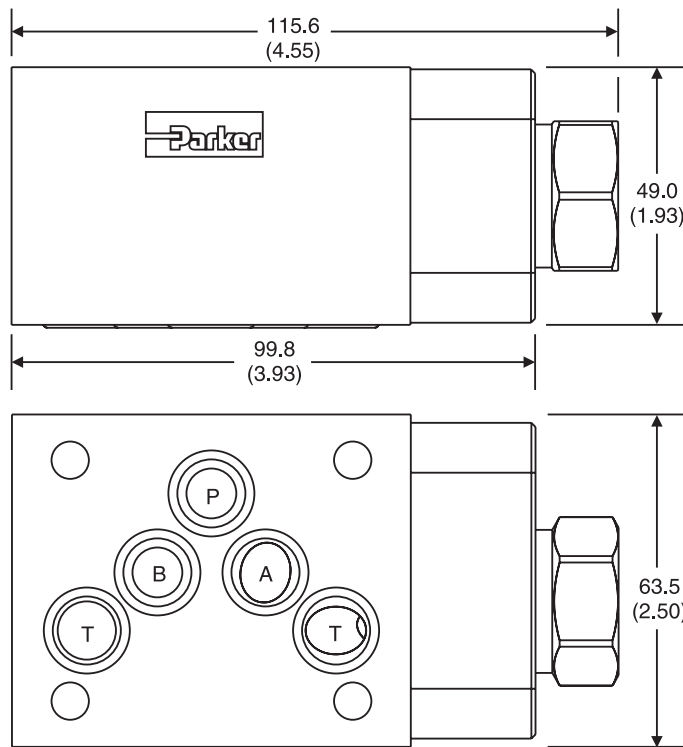


Dimensions**Sandwich Valves
Series CH05, CH5H****CH05PP**

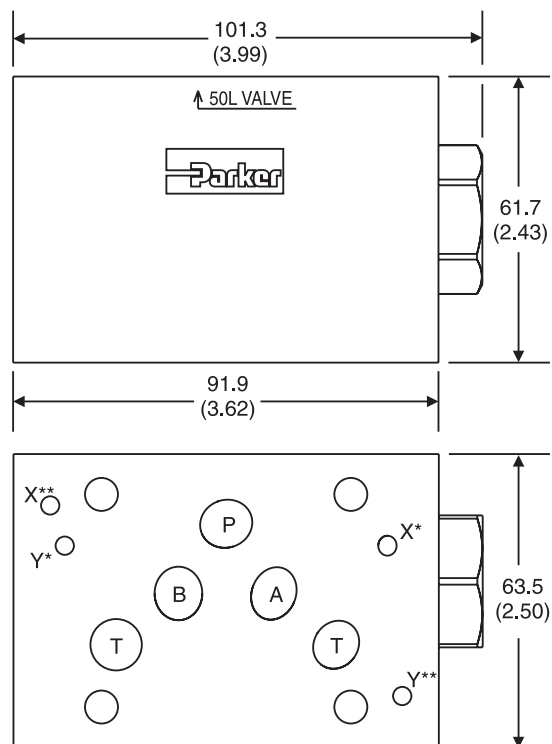
Inch equivalents for millimeter dimensions are shown in (**)

**CH05TT**

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

**CH5HPP**

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



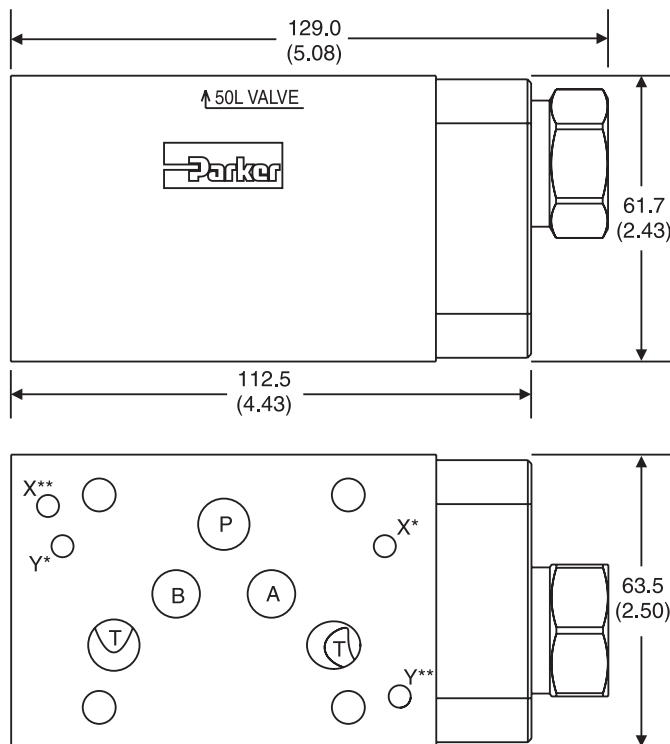
* D05HE (Standard)

** D05H

Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.

CH5HTT

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

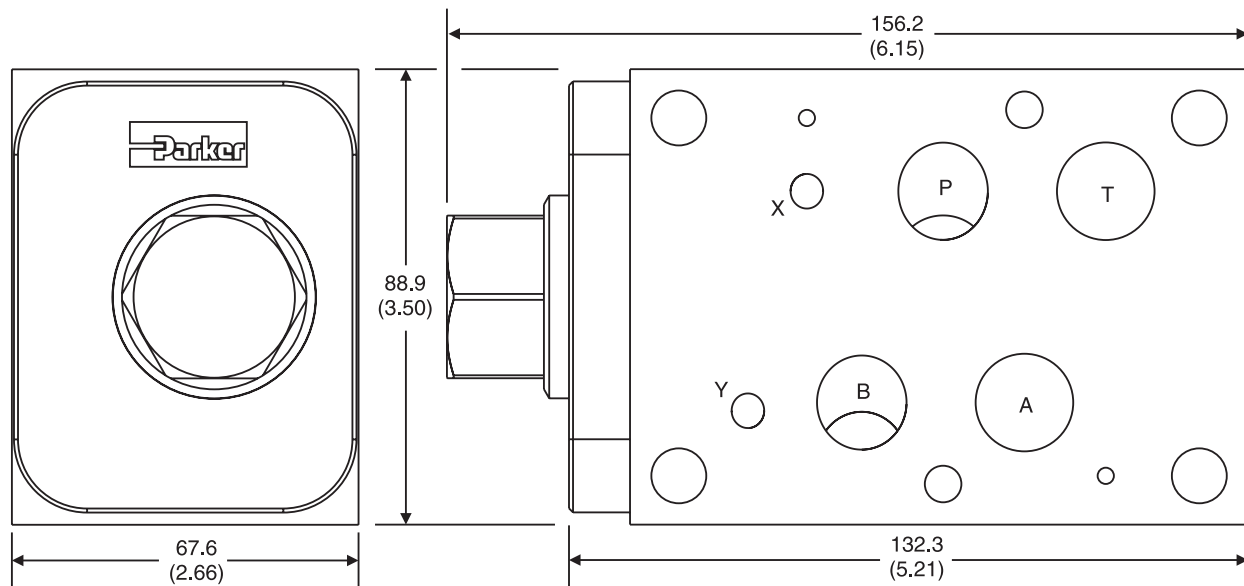


* D05HE (Standard)

** D05H

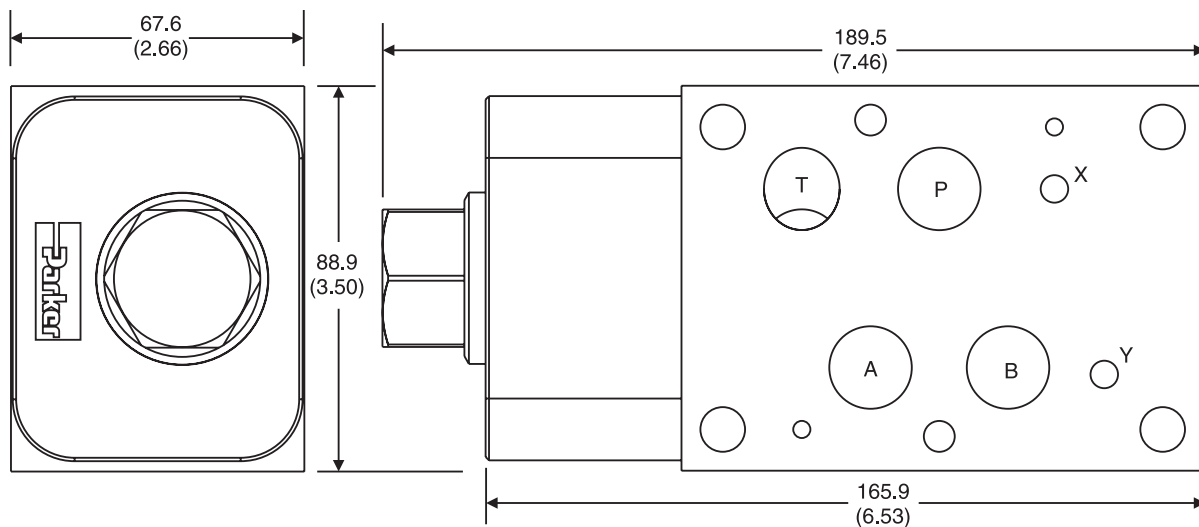
Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.

CH07PP — Inch equivalents for millimeter dimensions are shown in (**)

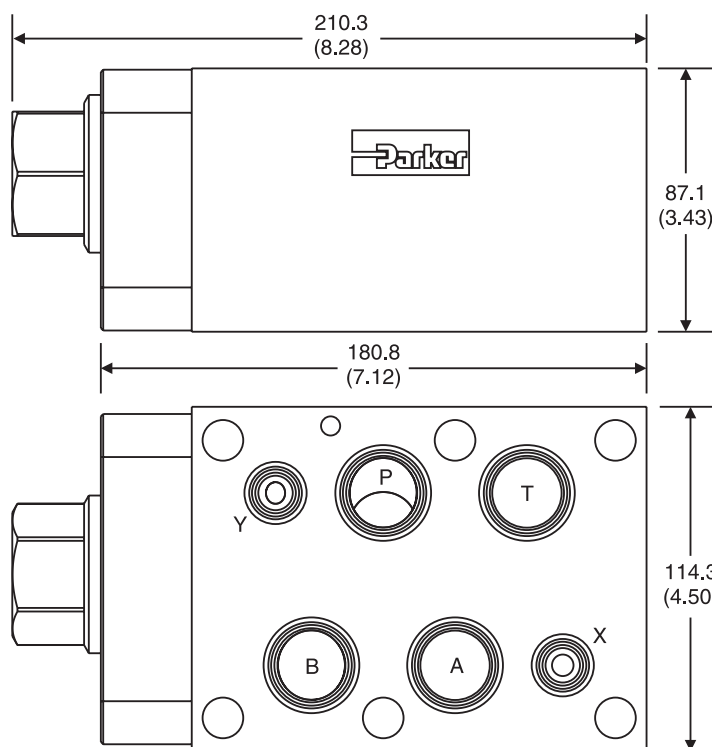


CH07TT — Inch equivalents for millimeter dimensions are shown in (**)

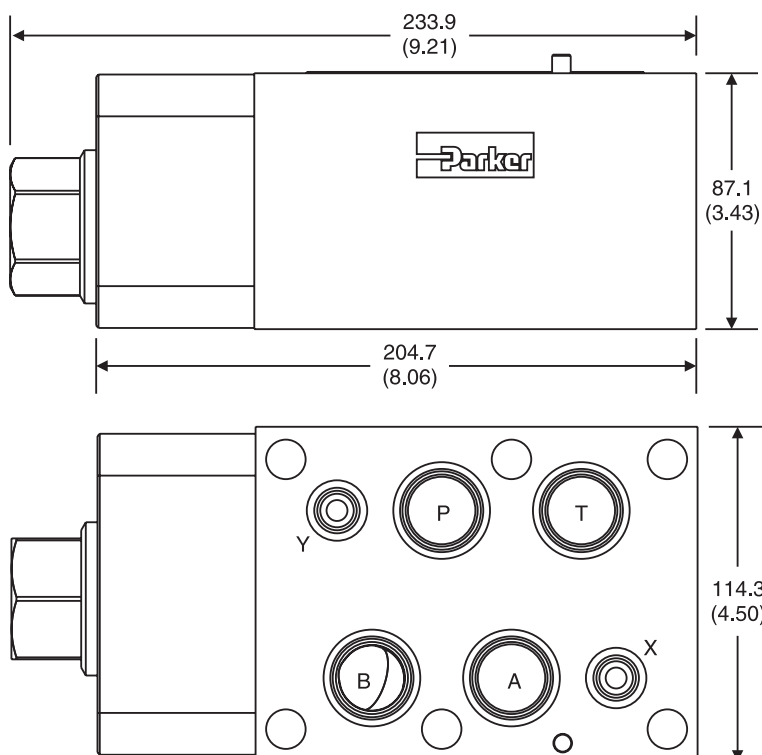
Note: This is a top view.



CH08PP — Inch equivalents for millimeter dimensions are shown in (**)



CH08TT — Inch equivalents for millimeter dimensions are shown in (**)



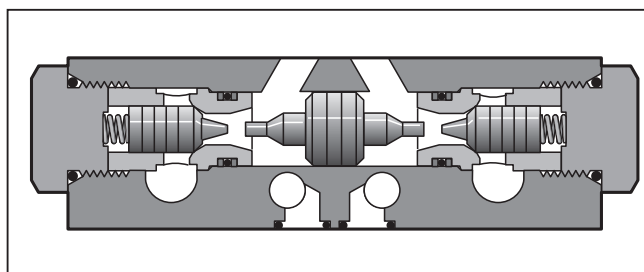
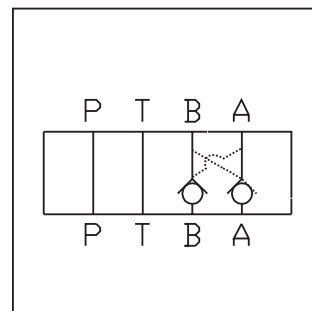
General Description

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

<div>CPOM</div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>																														
Pilot Operated Check Valve	Size	Poppet Style	Cracking Pressure	Seal	Design Series NOTE: Not required when ordering.																														
<table><tr><th>Code</th><th>Description</th></tr><tr><td>2</td><td>NFPA D03, CETOP3, NG6 Subplate Mounting</td></tr><tr><td>3</td><td>NFPA D05, CETOP5, NG10 Subplate Mounting</td></tr><tr><td>6</td><td>NFPA D08, CETOP8, NG25 Subplate Mounting</td></tr></table>	Code	Description	2	NFPA D03, CETOP3, NG6 Subplate Mounting	3	NFPA D05, CETOP5, NG10 Subplate Mounting	6	NFPA D08, CETOP8, NG25 Subplate Mounting		<table><tr><th>Code</th><th>Description</th></tr><tr><td>DD</td><td>Double Poppet A and B Ports</td></tr><tr><td>AA</td><td>A Port Only</td></tr><tr><td>BB</td><td>B Port Only</td></tr></table>	Code	Description	DD	Double Poppet A and B Ports	AA	A Port Only	BB	B Port Only	<table><tr><th>Code</th><th>Description</th></tr><tr><td>Omit**</td><td>5 PSI</td></tr><tr><td>Y*</td><td>45 PSI</td></tr><tr><td>Z*</td><td>75 PSI</td></tr></table> <p>* Size 2 only.</p>	Code	Description	Omit**	5 PSI	Y*	45 PSI	Z*	75 PSI	<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	
Code	Description																																		
2	NFPA D03, CETOP3, NG6 Subplate Mounting																																		
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Z*	75 PSI																																		
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V	Fluorocarbon																																		

CPOM	4		HT	V									
Pilot Operated Check Valve	Size NFPA D07 CETOP7 NG16	Poppet Style	Pilot Ratio 13:1	Seal Fluorocarbon	Design Series								
					NOTE: Not required when ordering.								
		<table><tr><th>Code</th><th>Description</th></tr><tr><td>AA</td><td>A Port Only</td></tr><tr><td>BB</td><td>B Port Only</td></tr><tr><td>DD</td><td>A and B Ports</td></tr></table>	Code	Description	AA	A Port Only	BB	B Port Only	DD	A and B Ports			Weight: CPOM2 0.8 CPOM3 4.4 CPOM4 7.7 CPOM6 9.5
Code	Description												
AA	A Port Only												
BB	B Port Only												
DD	A and B Ports												

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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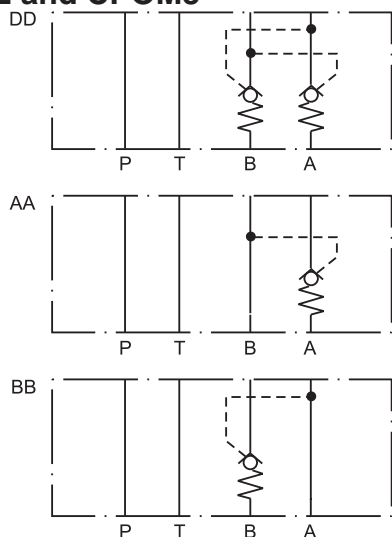
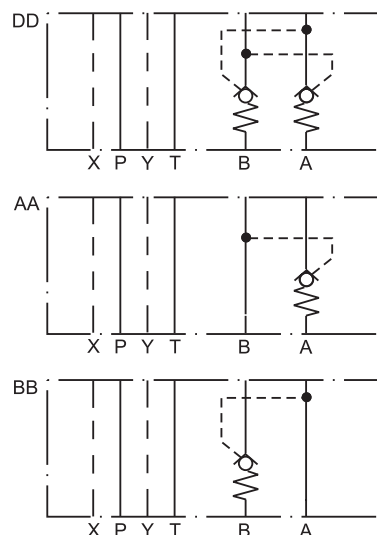
Specifications

	CPOM2	CPOM3	CPOM4	CPOM6
Mounting Pattern	NFPA D03, CETOP 3, NG6	NFPA D05, CETOP 5, NG10	NFPA D07, CETOP 7, NG16	NFPA D08, CETOP 8, NG25
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

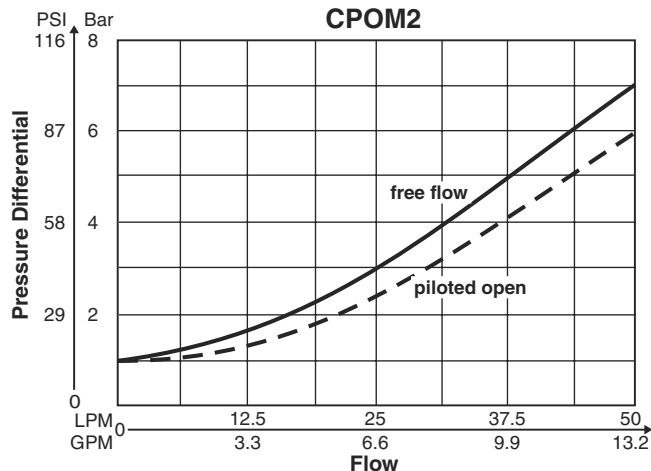
Size 2				Size 3			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)	No. of Sandwich	Sandwich & Valve Combination	D3W-30 D3DW & D31*W* Bolt Length mm (in)	
1	Sandwich & D1	BK243	73.2 (2.88)	1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D1	BK225	111.3 (4.38)	2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D1	BK244	152.4 (6.00)	3	Sandwich & D3	BK143	190.5 (7.50)
4	Sandwich & D1	BK245	190.5 (7.50)	* D31VW with internal pilot and internal drain only.			
Size 4				Size 6			
No. of Sandwich	Sandwich & Valve Combination	Bolt Length mm		No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D4	4x M10 x 140		1	Sandwich & D6	BK121	133.4 (5.25)
		2x M6 x 135		2	Sandwich & D6	BK122	203.2 (8.00)
2	Sandwich & D4	4x M10 x 220		3	Sandwich & D6	BK123	273.1 (10.75)
		2x M6 x 215		4	Sandwich & D6	BK124	342.9 (13.5)
3	Sandwich & D4	4x M10 x 300					
		2x M10 x 295					

Bolt Kits must be ordered separately.

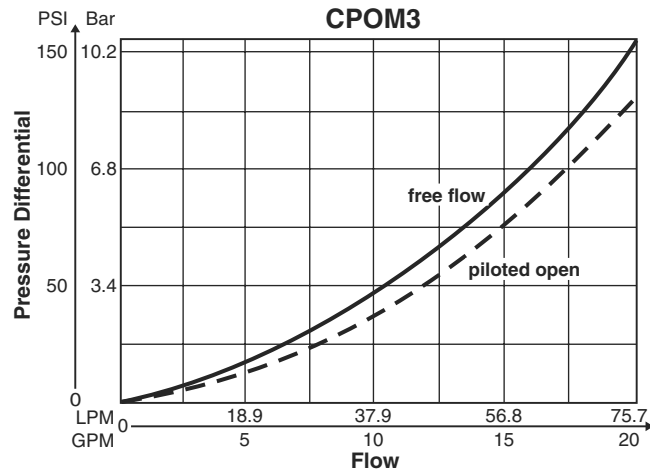
Schematics
CPOM2 and CPOM3Schematics
CPOM4 and CPOM6

B01_Cat2500.indd, ddp, 04/19

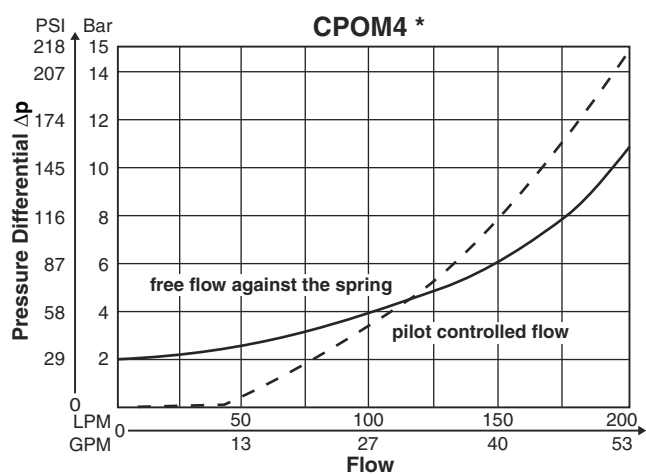
CPOM2



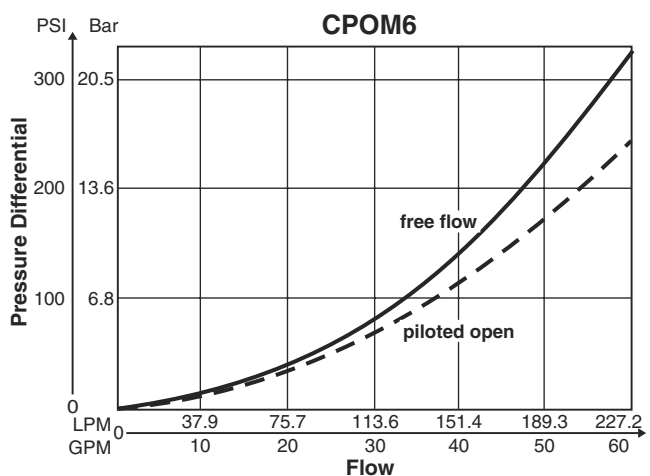
CPOM3



CPOM4



CPOM6



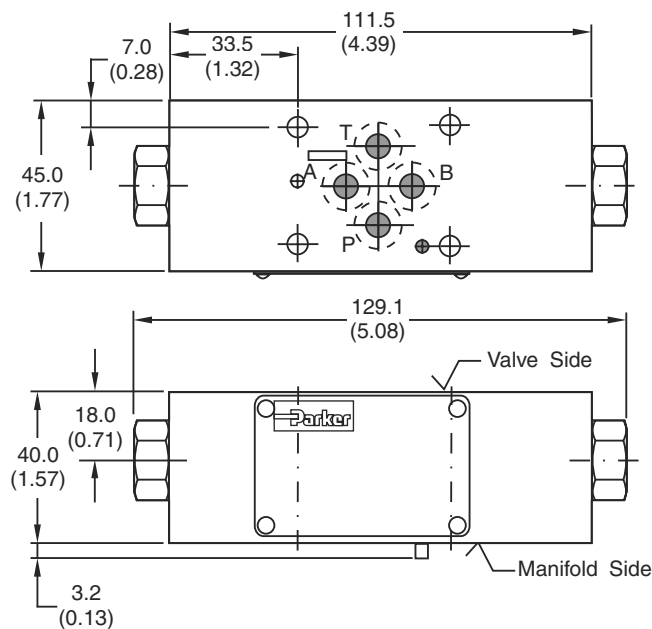
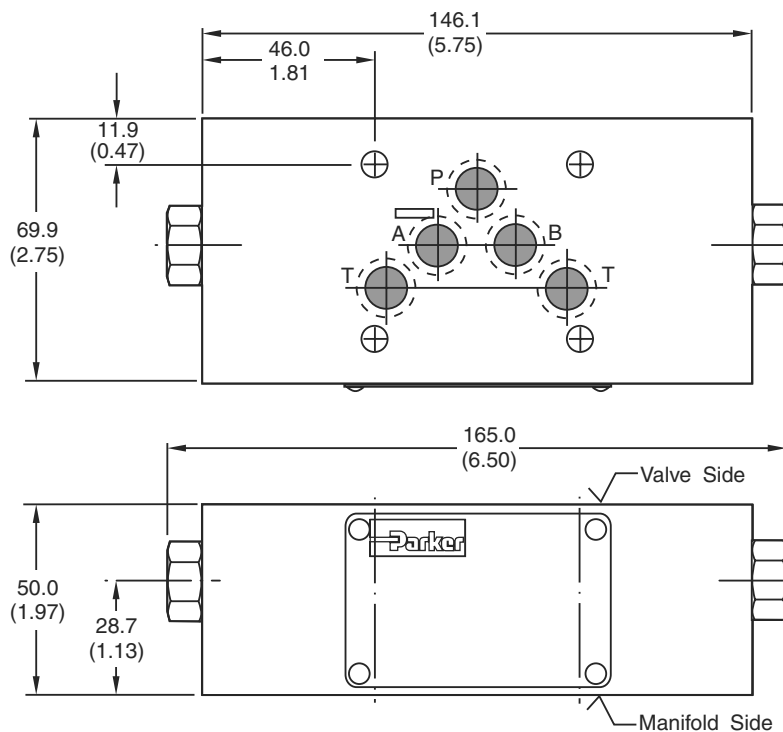
* Curves measured with ISO 46 fluid at 50°C (122°F).

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

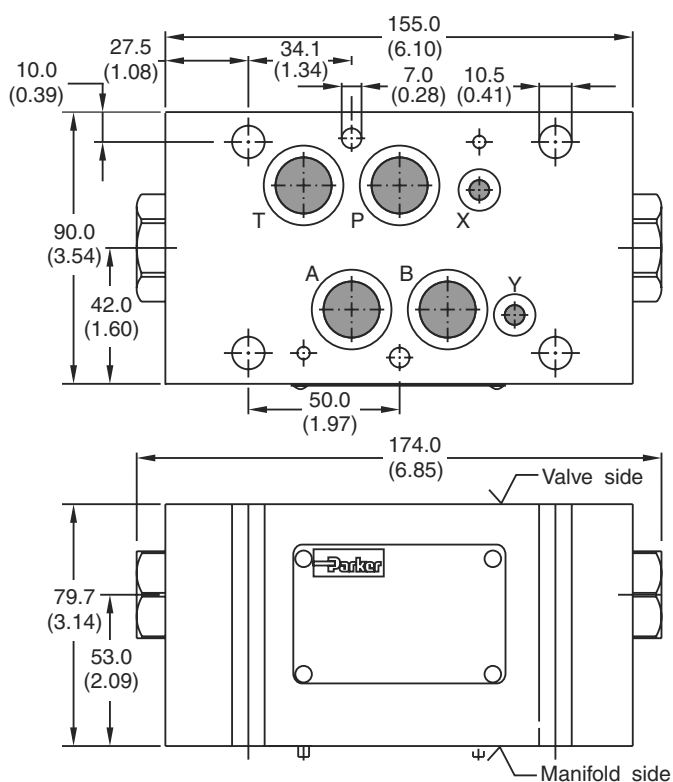
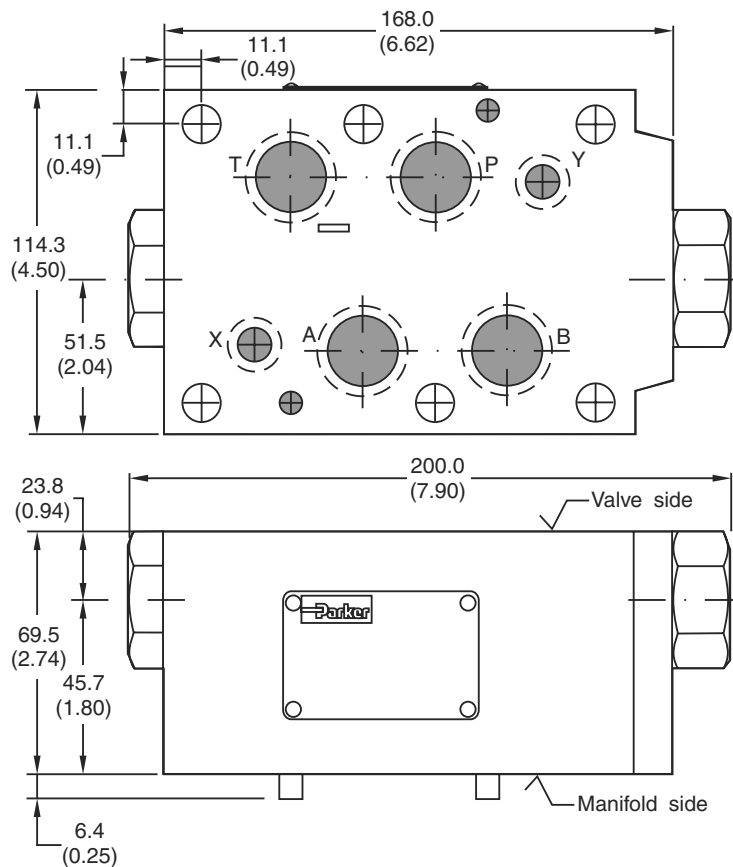
Viscosity Correction Factor

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

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

CPOM2**CPOM3**

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

CPOM4**CPOM6**

General Description.

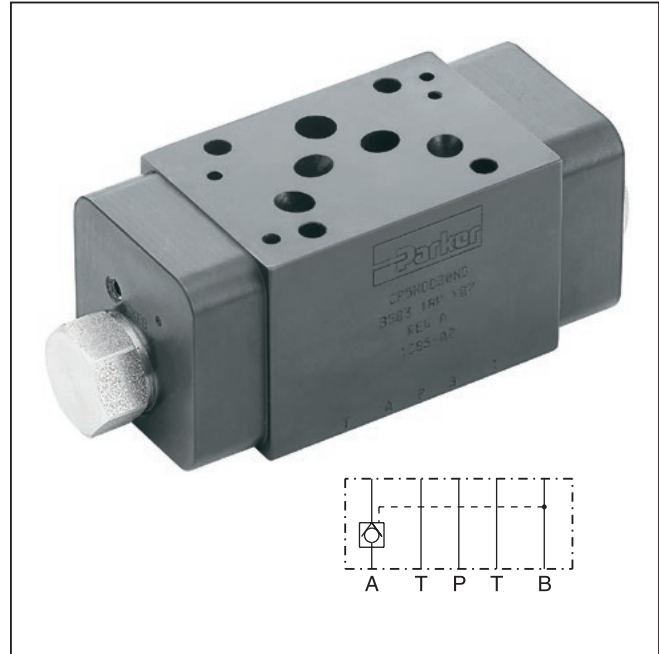
Series CP pilot operated check valves are designed for maximum flow rates.

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



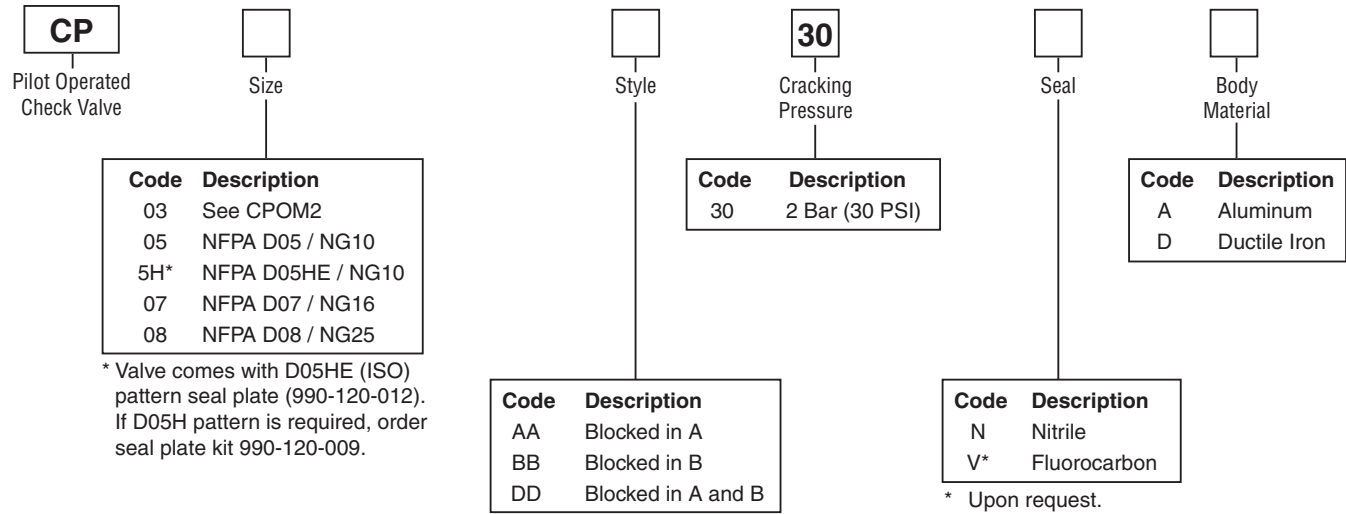
B

Specifications

General				
Size	D05 / NG10	D05HE / NG10	D07 / NG16	D08 / NG25
Mounting Position	Unrestricted			
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure	Aluminum Body – up to 207 Bar (3000 PSI); Ductile Iron Body – up to 345 Bar (5000 PSI)			
Nominal Flow	114 LPM (30 GPM)	114 LPM (30 GPM)	227 LPM (60 GPM)	454 LPM (120 GPM)
Leakage	1 DPM	1 DPM	1 DPM	1 DPM
Cracking Pressure	30 ± 0.2 Bar (3 PSI)			
Pilot Ratio	3:1	3:1	3:1	3:1
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)		
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			

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.
 B01_Cat2500.indd, ddp, 04/19

B



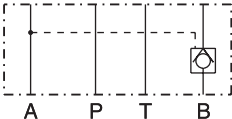
CPAA**

blocked in A



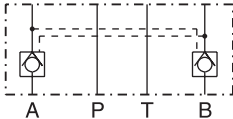
CPBB**

blocked in B



CPDD**

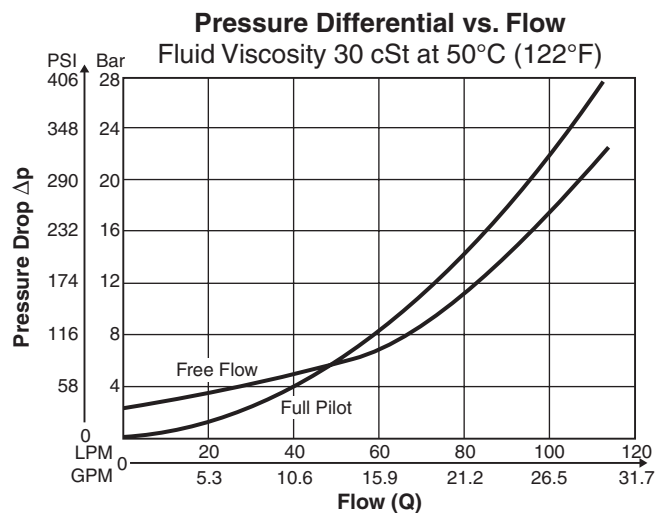
blocked in A and B



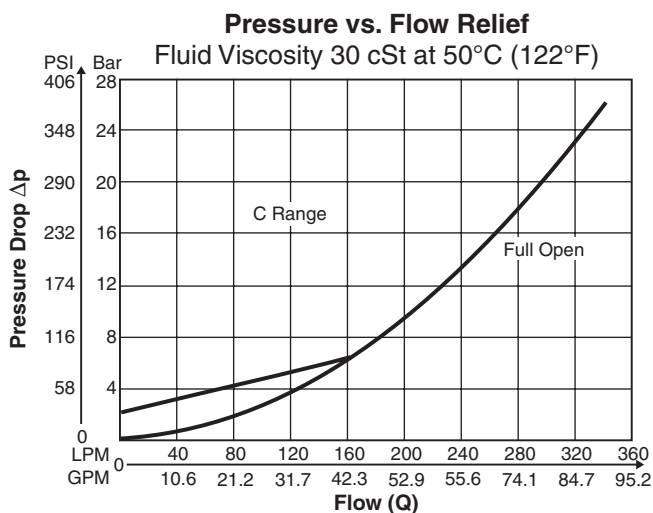
Weight:

Size	CP**AA30NA	CP**AA30ND	CP**BB30NA	CP**BB30ND	CP**DD30NA	CP**DD30ND
CP05, CP5H	0.8 kg (1.8 lbs.)	1.7 kg (3.8 lbs.)	0.8 kg (1.8 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 (5.3 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.)

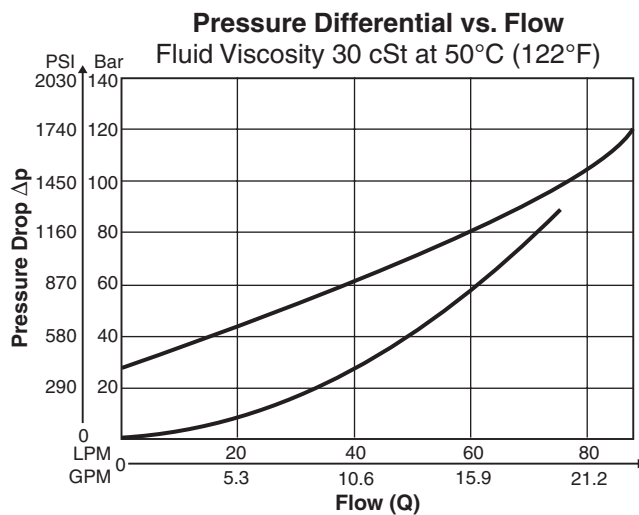
CP05/CP5H



CP07

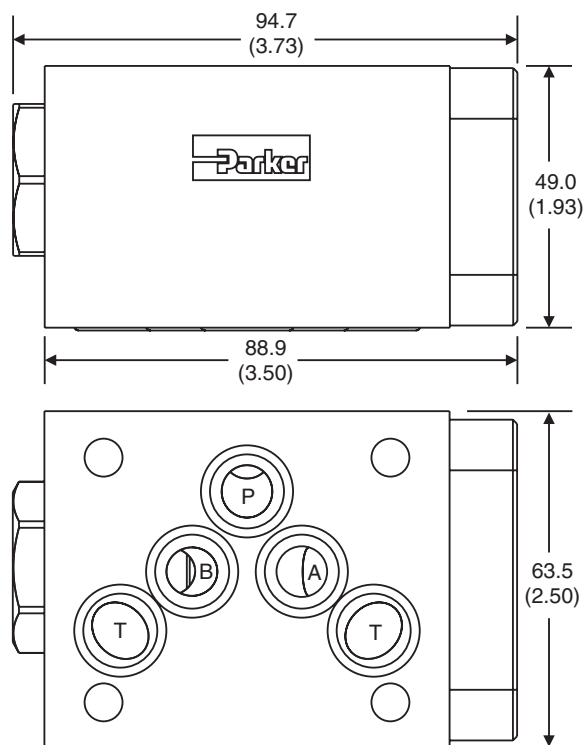


CP08

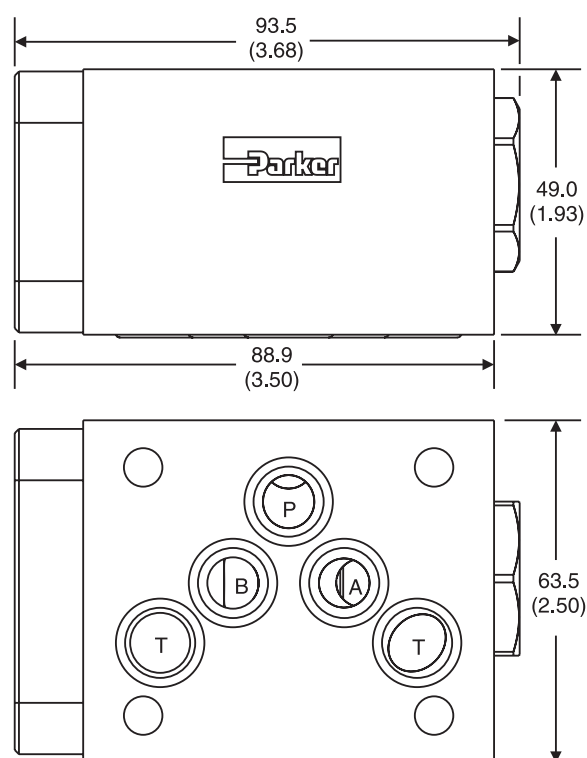
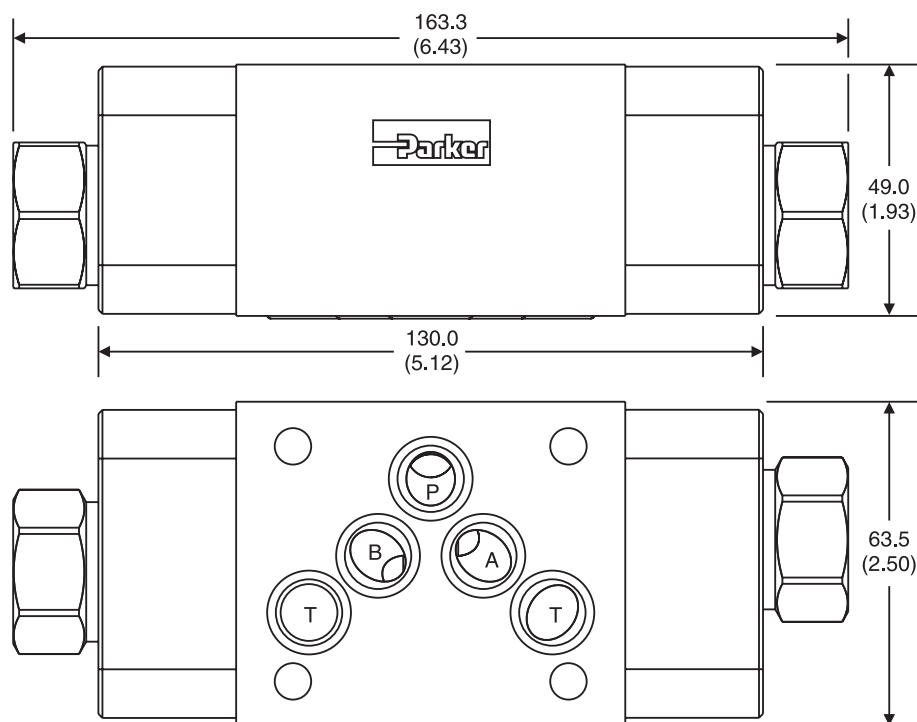


CP05AA

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

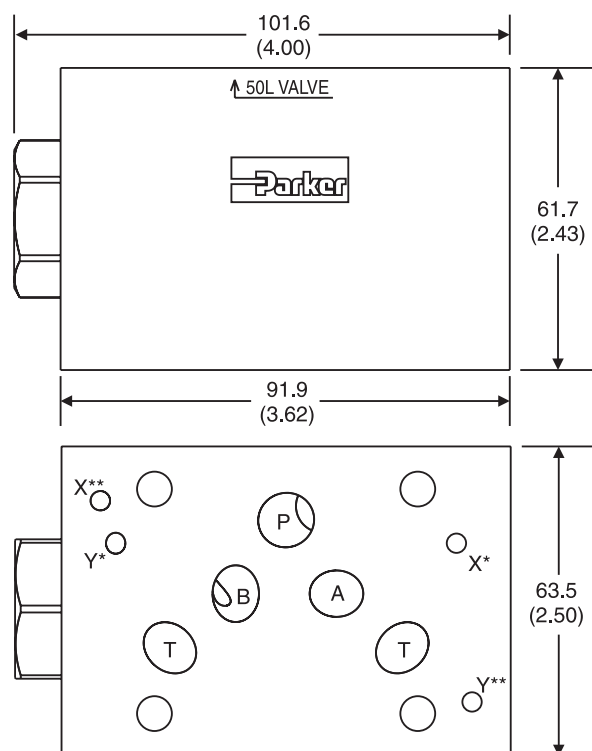
**CP05BB**

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

**CP05DD** — Inch equivalents for millimeter dimensions are shown in (**)

CP5HAA

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

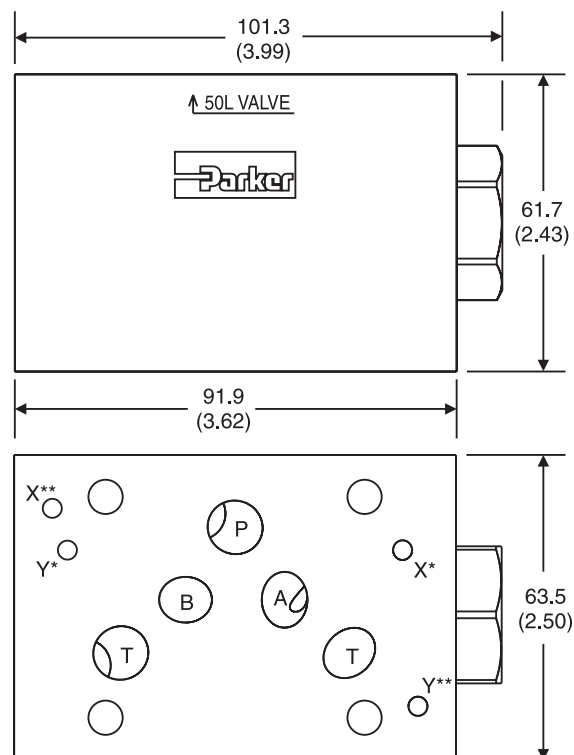


* D05HE (Standard)

** D05H

CP5HBB

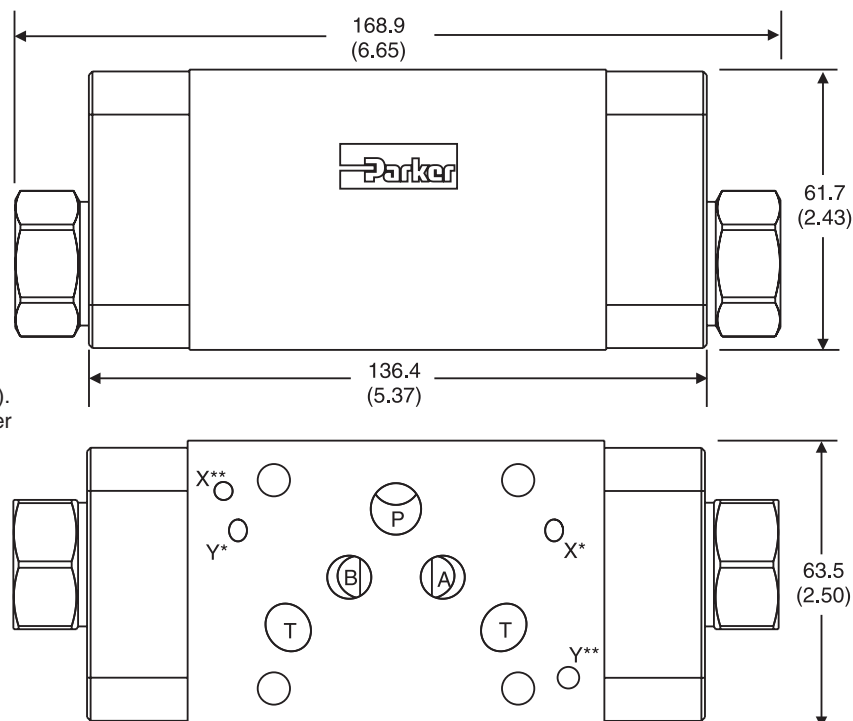
Inch equivalents for millimeter dimensions are shown in (**)



* 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.

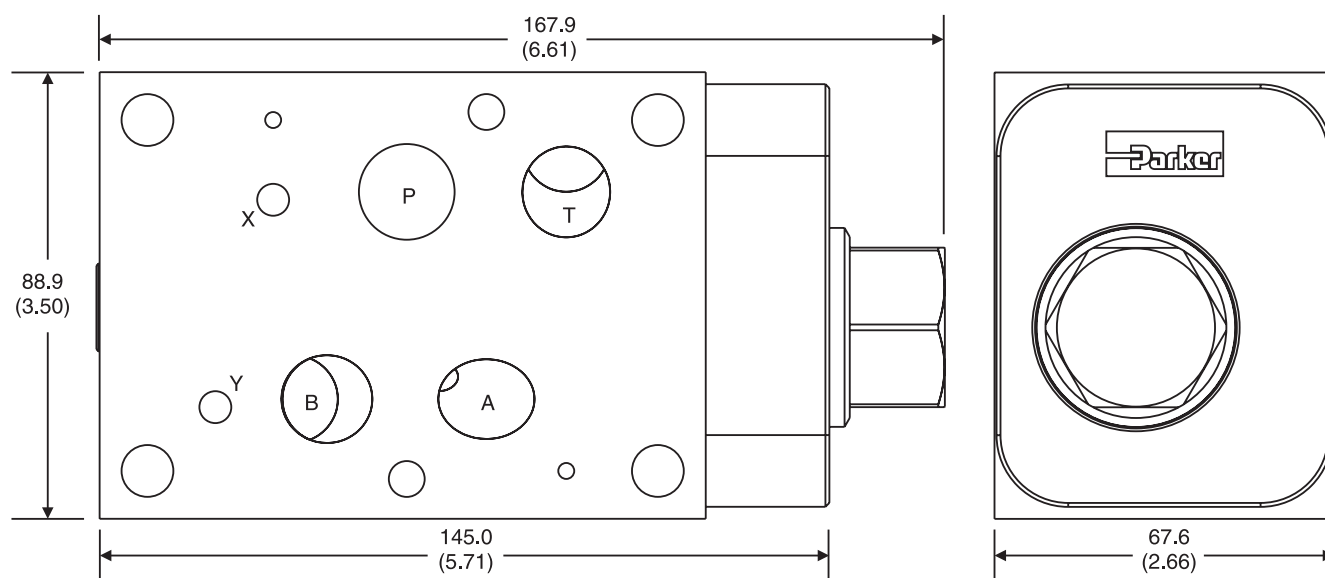
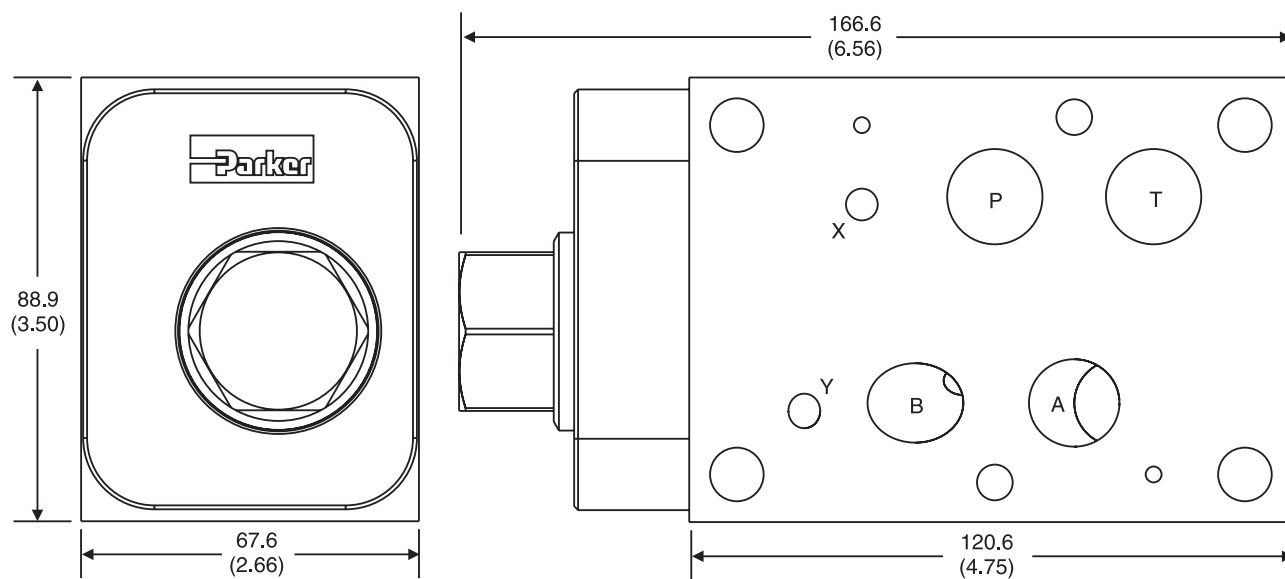
CP5HDD — Inch equivalents for millimeter dimensions are shown in (**)

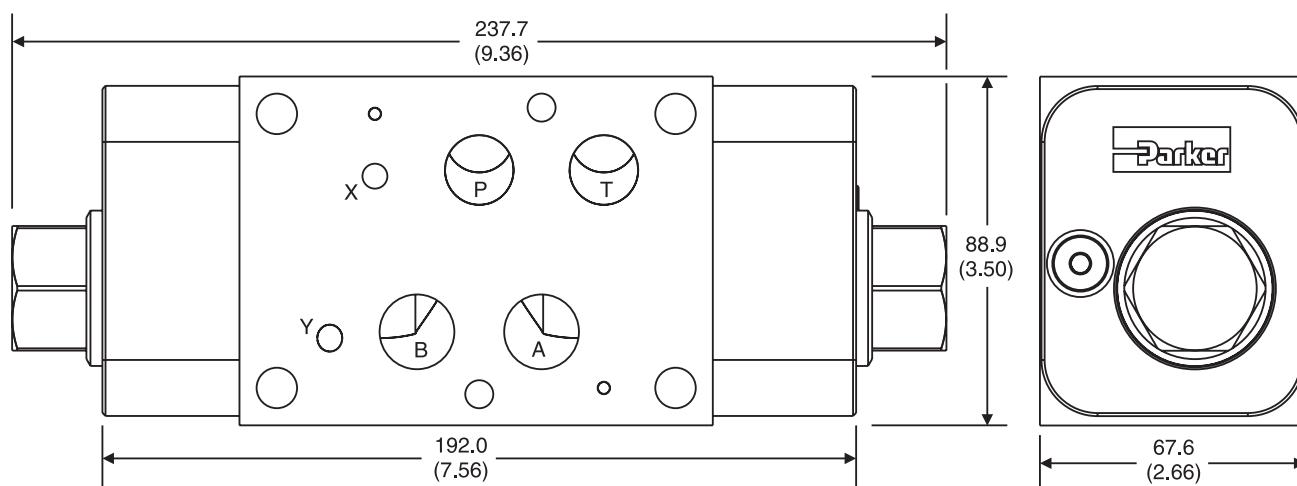
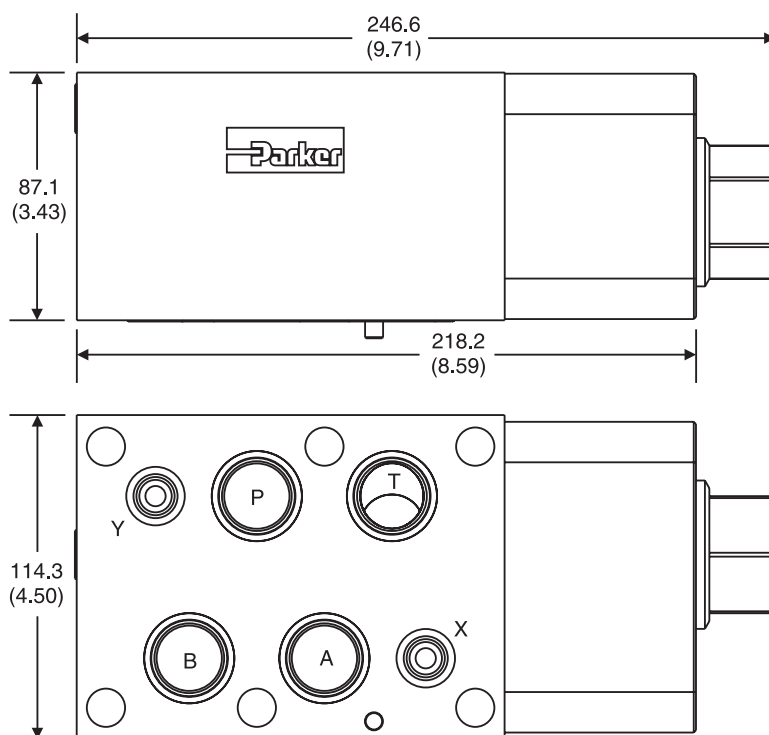
Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.

* D05HE (Standard)

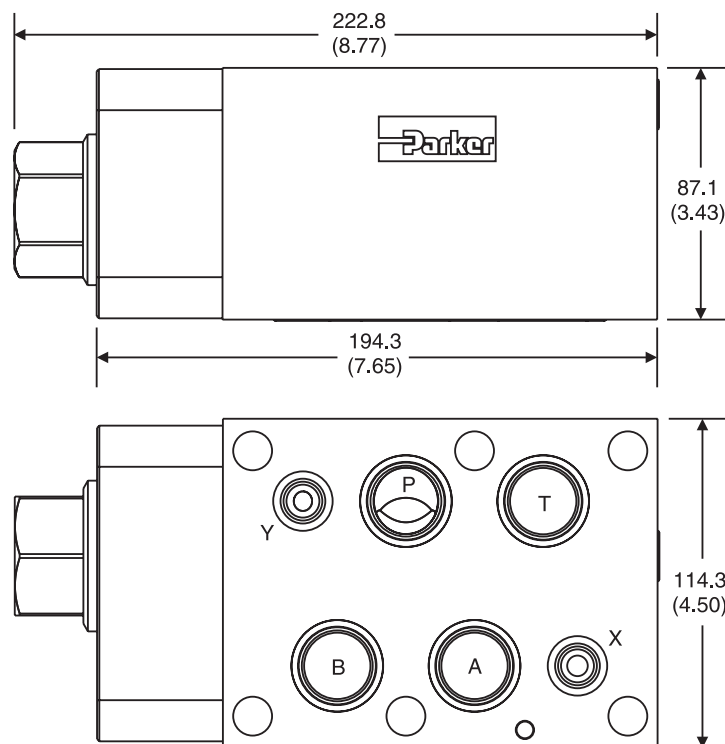
** D05H



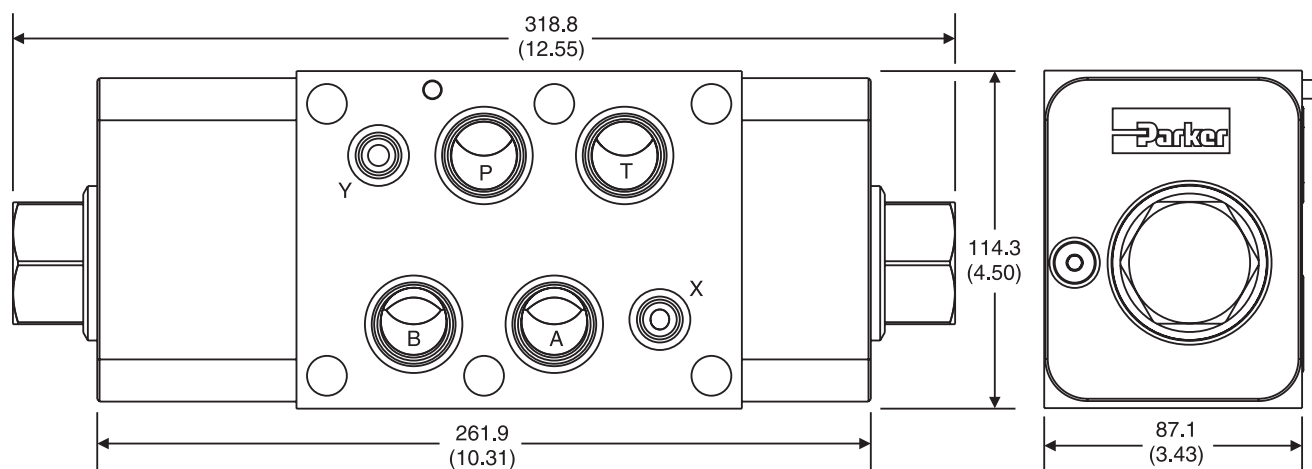
CP07AA – Inch equivalents for millimeter dimensions are shown in (**)**CP07BB** – Inch equivalents for millimeter dimensions are shown in (**)

CP07DD — Inch equivalents for millimeter dimensions are shown in (**)**B****CP08AA** — Inch equivalents for millimeter dimensions are shown in (**)

CP08BB — Inch equivalents for millimeter dimensions are shown in (**)



CP08DD — Inch equivalents for millimeter dimensions are shown in (**)



General Description

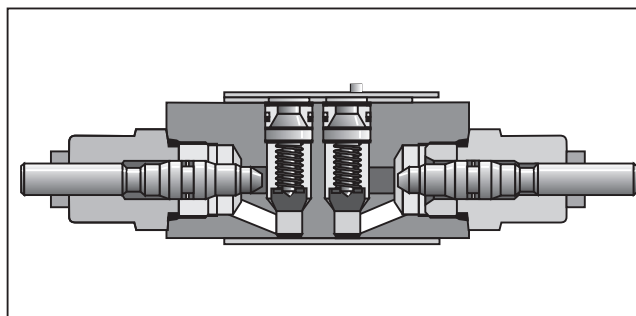
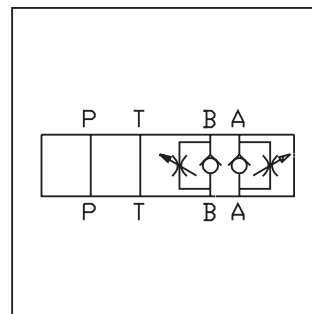
Series FM double flow control valves permit free flow from the directional valve to the actuator and adjustable independent flow regulation in each return line from the actuator (meter-out). The FM2 and FM3 have a seal plate and can be inverted for meter-in applications (see installation drawing for 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

	FM2	FM3	FM6
Mounting Pattern	NFPA D03, CETOP 3, NG 6	NFPA D05, CETOP 5, NG 10	NFPA D08, CETOP 8, NG 25
Maximum Pressure	345 Bar (5000 PSI)	345 Bar (5000 PSI)	205 Bar (3000 PSI)
Maximum Flow	76 LPM (20 GPM)	113 LPM (30 GPM)	341 LPM (90 GPM)
Cracking Pressure	0.3 Bar (5 PSI)	0.3 Bar (5 PSI)	0.3 Bar (5 PSI)



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.
 B01_Cat2500.indd, ddp, 04/19

B

<div style="border: 1px solid black; padding: 2px; width: 40px; margin: 0 auto;">FM</div> Flow Valve Control	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Size	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Meter Option	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Needles	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Adjustment	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Seal	<div style="border: 1px solid black; padding: 5px; width: 60px; margin: 0 auto;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">*</div> <div style="margin-left: 5px;"> Design Series NOTE: Not required when ordering. </div> </div>
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<table border="1" style="width: 180px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>NFPA D03 Subplate Mounting</td> </tr> <tr> <td>3</td> <td>NFPA D05 Subplate Mounting</td> </tr> <tr> <td>*6</td> <td>NFPA D08 Subplate Mounting</td> </tr> </tbody> </table> <p>* FM6 - Meter out only</p>	Code	Description	2	NFPA D03 Subplate Mounting	3	NFPA D05 Subplate Mounting	*6	NFPA D08 Subplate Mounting	<table border="1" style="width: 180px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr> <td>AA</td> <td>Single Function A Port Only</td> </tr> <tr> <td>BB</td> <td>Single Function B Port Only</td> </tr> <tr> <td>DD</td> <td>A and B Ports Dual Function</td> </tr> <tr> <td>PP**</td> <td>Single Function P Port</td> </tr> </tbody> </table> <p>** Not available on size 6.</p>	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	<table border="1" style="width: 140px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr> <td>Omit</td> <td>Standard</td> </tr> <tr> <td>D*</td> <td>Fine Meter</td> </tr> </tbody> </table> <p>* D needle is the standard needle in valves used as pilot chokes. Not available on size 6.</p>	Code	Description	Omit	Standard	D*	Fine Meter	<table border="1" style="width: 120px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Type</th> </tr> </thead> <tbody> <tr> <td>S</td> <td>Allen Hex</td> </tr> <tr> <td>K</td> <td>Knob</td> </tr> </tbody> </table>	Code	Type	S	Allen Hex	K	Knob	<table border="1" style="width: 140px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Type</th> </tr> </thead> <tbody> <tr> <td>N</td> <td>Nitrile</td> </tr> <tr> <td>V</td> <td>Fluorocarbon</td> </tr> </tbody> </table>	Code	Type	N	Nitrile	V	Fluorocarbon
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Bold: Designates Tier I products and options.

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

Bolt Kits

Size "2"				Size "3"			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)	No. of Sandwich	Sandwich & Valve Combination	D3W-30 D3DW & D31*W*	Bolt Length mm (in)
1	Sandwich & D1	BK243	73.2 (2.88)	1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D1	BK225	111.3 (4.38)	2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D1	BK244	152.4 (6.00)	3	Sandwich & D3	BK143	190.5 (7.50)
4	Sandwich & D1	BK245	190.5 (7.50)				

* D31VW with internal pilot and internal drain only.

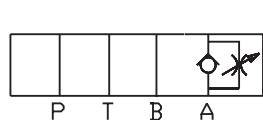
Size "6"			
No. of Sandwich	Sadnwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D6	BK121	133.4 (5.25)
2	Sandwich & D6	BK122	203.2 (8.00)
3	Sandwich & D6	BK123	273.1 (10.75)
4	Sandwich & D6	BK124	342.9 (13.5)

Unit Weight:

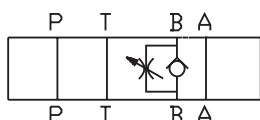
FM2 1.7 kg (3.8 lbs.)
 FM3 2.4 kg (5.2 lbs.)
 FM6 7.9 kg (17.5 lbs.)

Bolt Kits must be ordered separately.

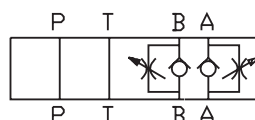
Schematics



AA Option



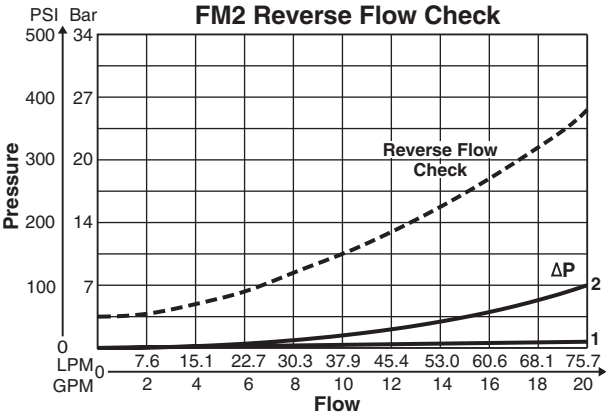
BB Option



DD Option



PP Option

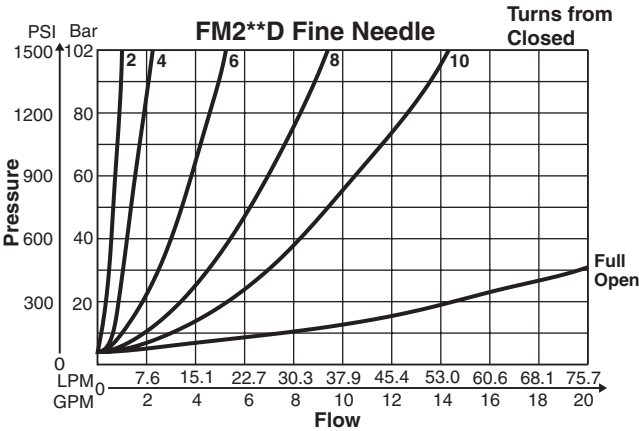
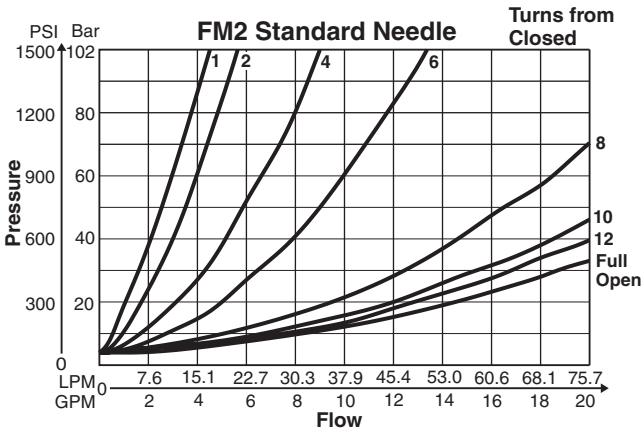


Pressure Drop
Reference
Chart

	P	A	B	T
PP	*	2	2	1
DD	1	*	*	1
AA	1	*	1	1
BB	1	1	*	1

* See specific
flow vs. turns

B

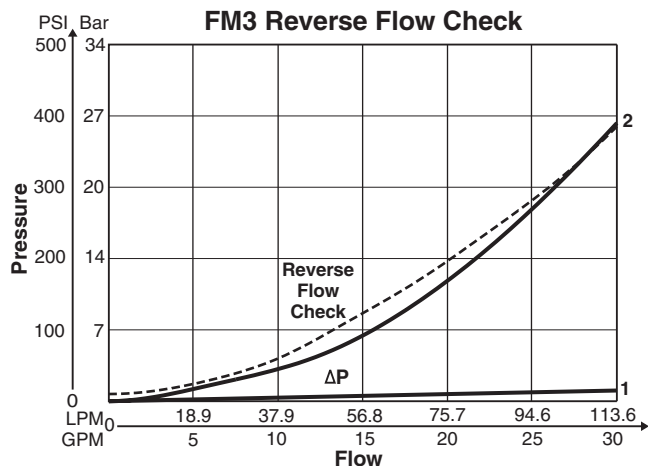


Curves were generated using 100 SSU hydraulic oil @49°C (120°F). For any other viscosity, pressure drop will change as per chart.

Viscosity Correction Factor

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

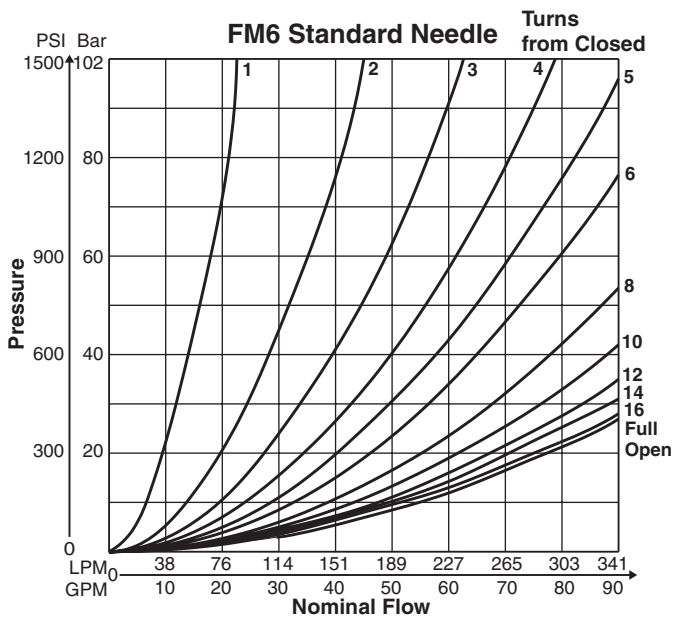
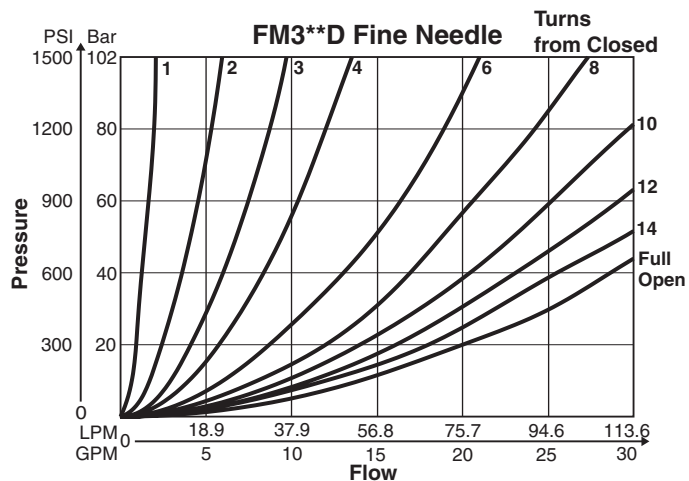
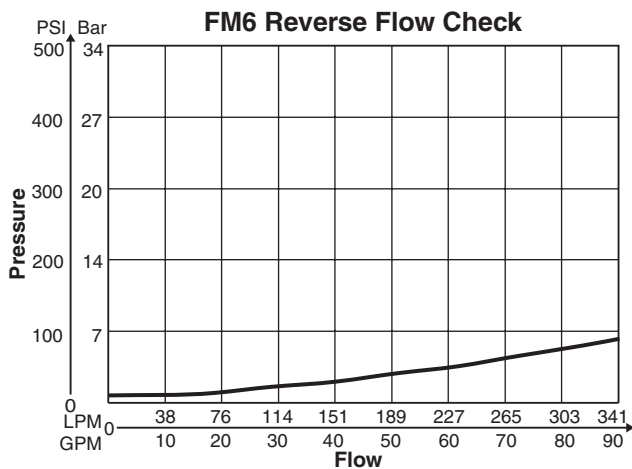
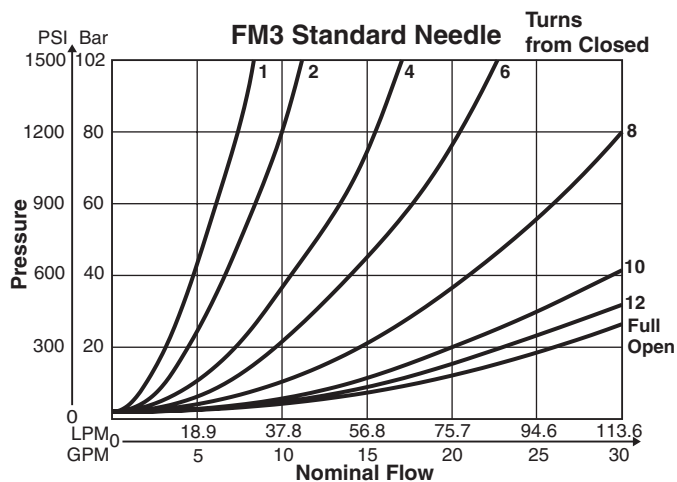
B



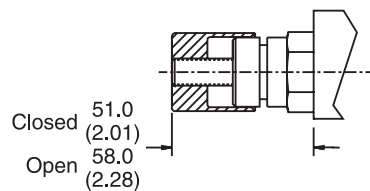
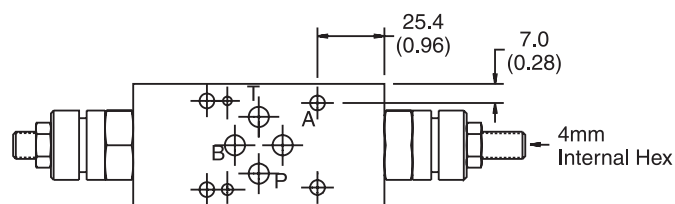
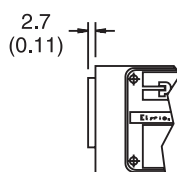
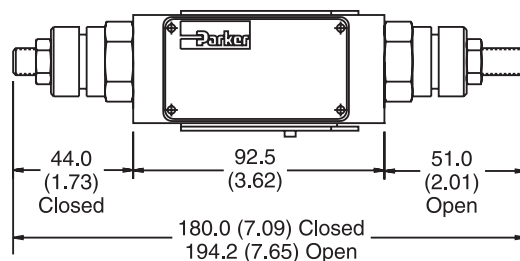
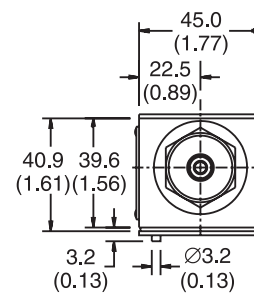
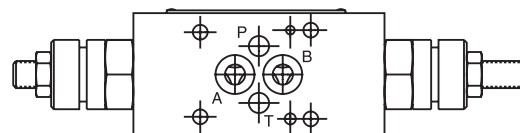
Pressure Drop Reference Chart

	P	A	B	T
PP	*	2	2	1
DD	1	*	*	1
AA	1	*	1	1
BB	1	1	*	1

* See specific flow vs. turns chart



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

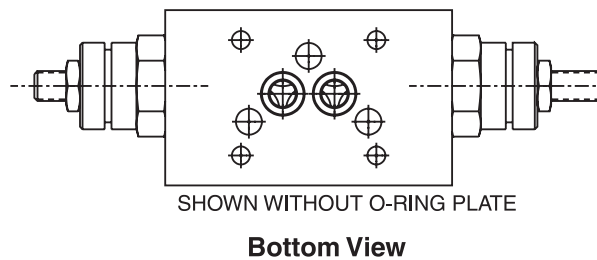
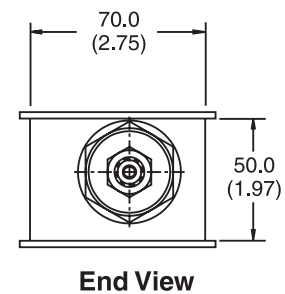
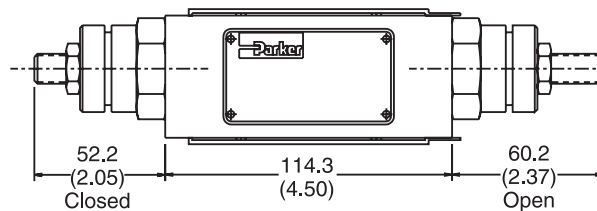
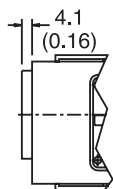
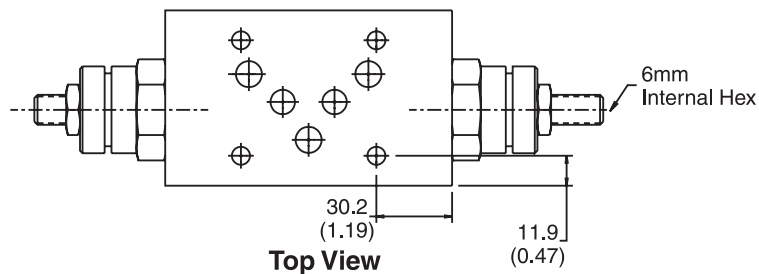
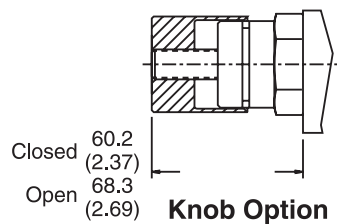
**Knob Option****Top View****BB Option****Face View****End View**

SHOWN WITHOUT O-RING PLATE

Bottom View

Note: For meter-in option, invert body 180°.

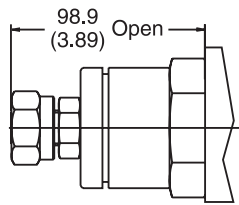
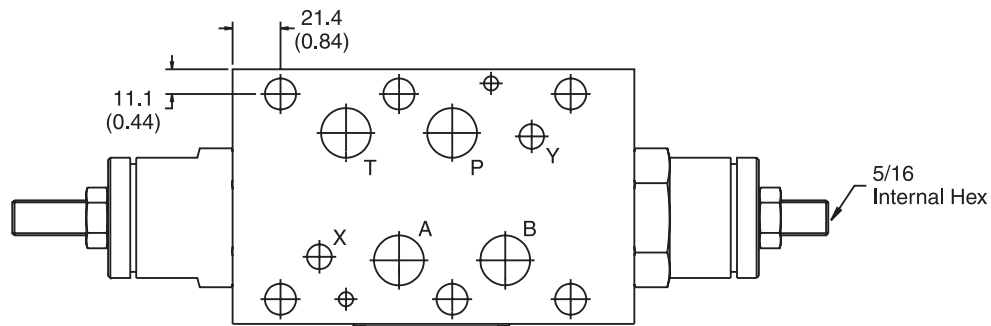
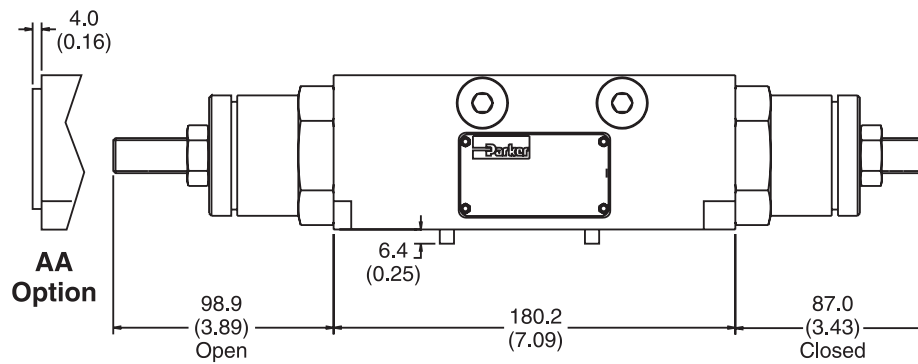
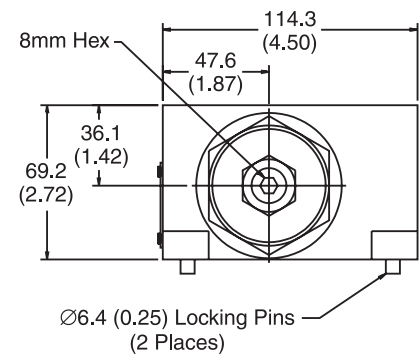
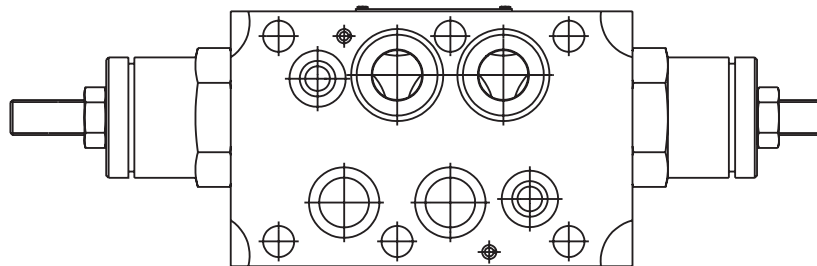
Inch equivalents for millimeter dimensions are shown in (**)



Note: For meter-in option, invert body 180°.

B01_Cat2500.indd, ddp, 04/19

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

**Knob Option****Top View****Face View****End View****Bottom View**

General Description

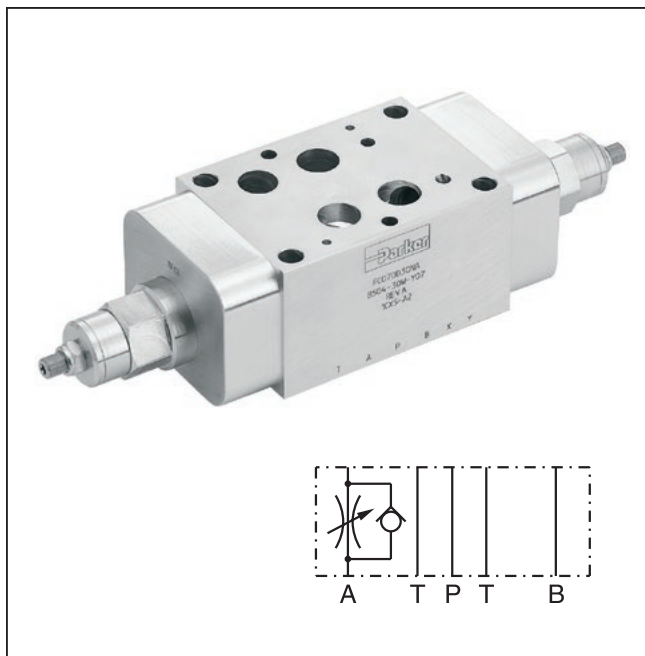
Series FC, FD throttle check valves are designed for maximum flow rates.

The throttle check function is located in ports A and B. Meter-in or meter-out functionality can be selected by model code.

B

Features

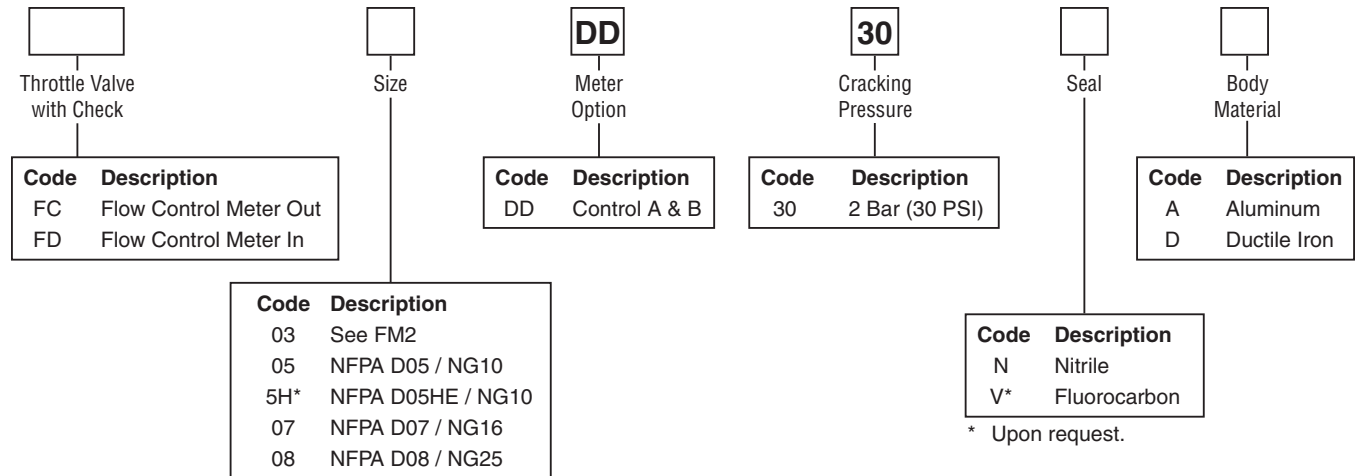
- High flow capacity.
- Various functional arrangements.
- Sizes:
 - FC05, FD05 – NFPA D05 / NG10 / CETOP 5
 - FC05H, FD5H – NFPA D05HE / NG10 / CETOP 5H
 - FC07, FD07 – NFPA D07 / NG16 / CETOP 7
 - FC08, FD08 – NFPA D08 / NG25 / CETOP 8



Specifications

General				
Size	D05 / NG10	D05HE / NG10	D07 / NG16	D08 / NG25
Mounting Position	Unrestricted			
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure	Aluminum Body – up to 207 Bar (3000 PSI); Ductile Iron Body – up to 345 Bar (5000 PSI)			
Nominal Flow	95 LPM (25 GPM)	95 LPM (25 GPM)	227 LPM (60 GPM)	454 LPM (120 GPM)
Leakage	< 5 DPM	< 5 DPM	< 5 DPM	< 5 DPM
Cracking Pressure	30 ± 0.2 Bar (3 PSI)			
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)		
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			

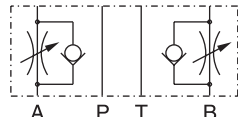
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.
 B01_Cat2500.indd, ddp, 04/19



* Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.

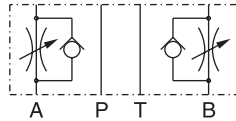
FC

Meter-in control in A and B



FD

Meter-out control in A and B

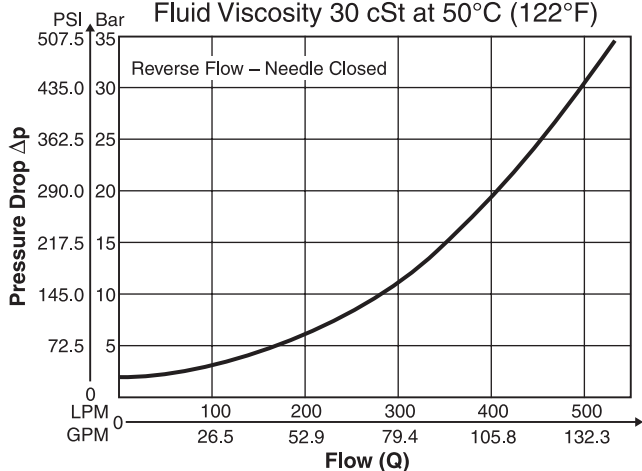


Weight:

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.)

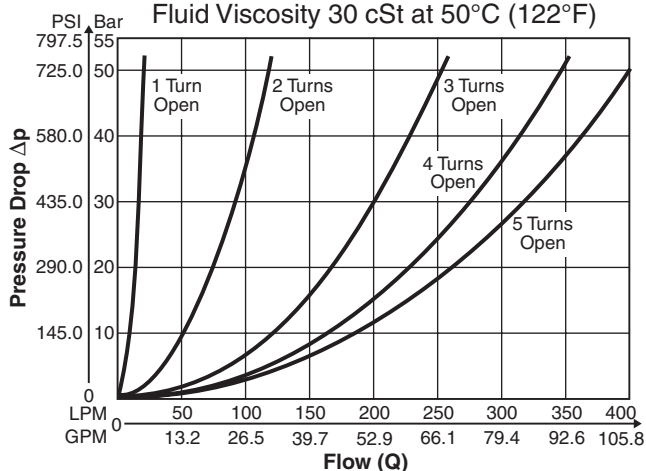
FC05/FC5H, FD05/FD5H

Pressure Differential vs. Free Flow
Fluid Viscosity 30 cSt at 50°C (122°F)



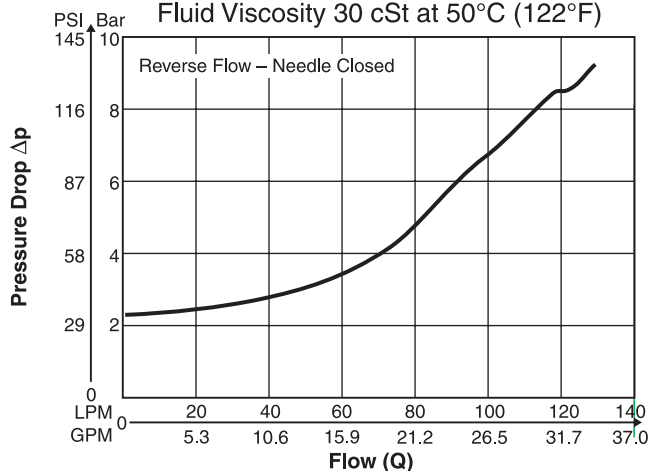
FC05/FC5H, FD05/FD5H

Pressure Differential vs. Metered Flow
Fluid Viscosity 30 cSt at 50°C (122°F)



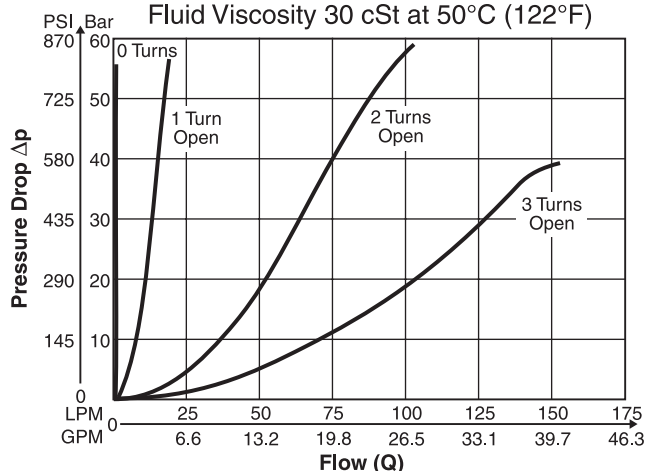
FC07, FD07

Pressure Differential vs. Free Flow
Fluid Viscosity 30 cSt at 50°C (122°F)



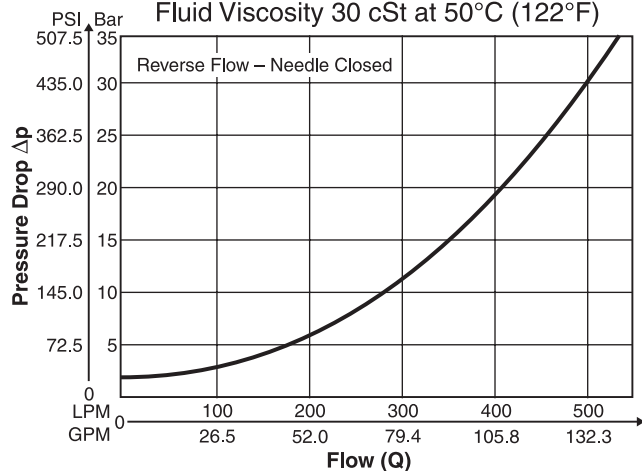
FC07, FD07

Pressure Differential vs. Metered Flow
Fluid Viscosity 30 cSt at 50°C (122°F)



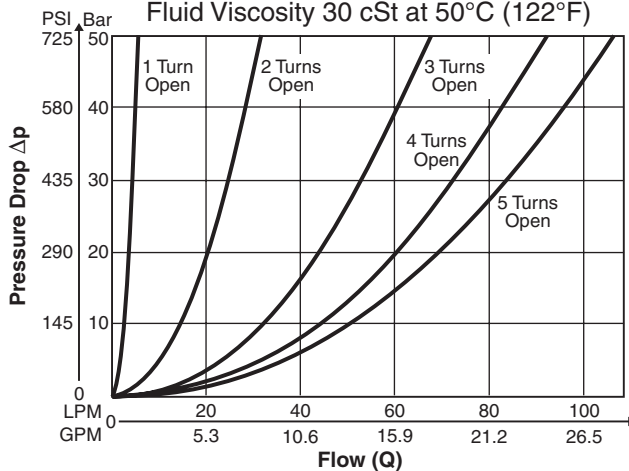
FC08, FD08

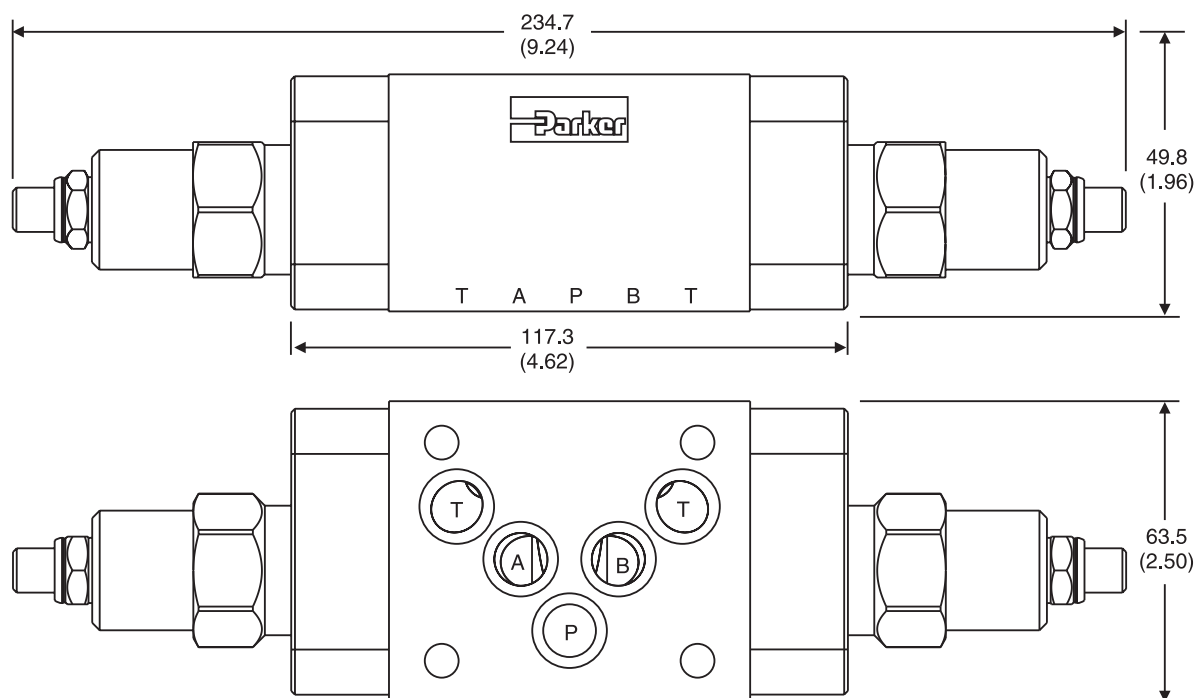
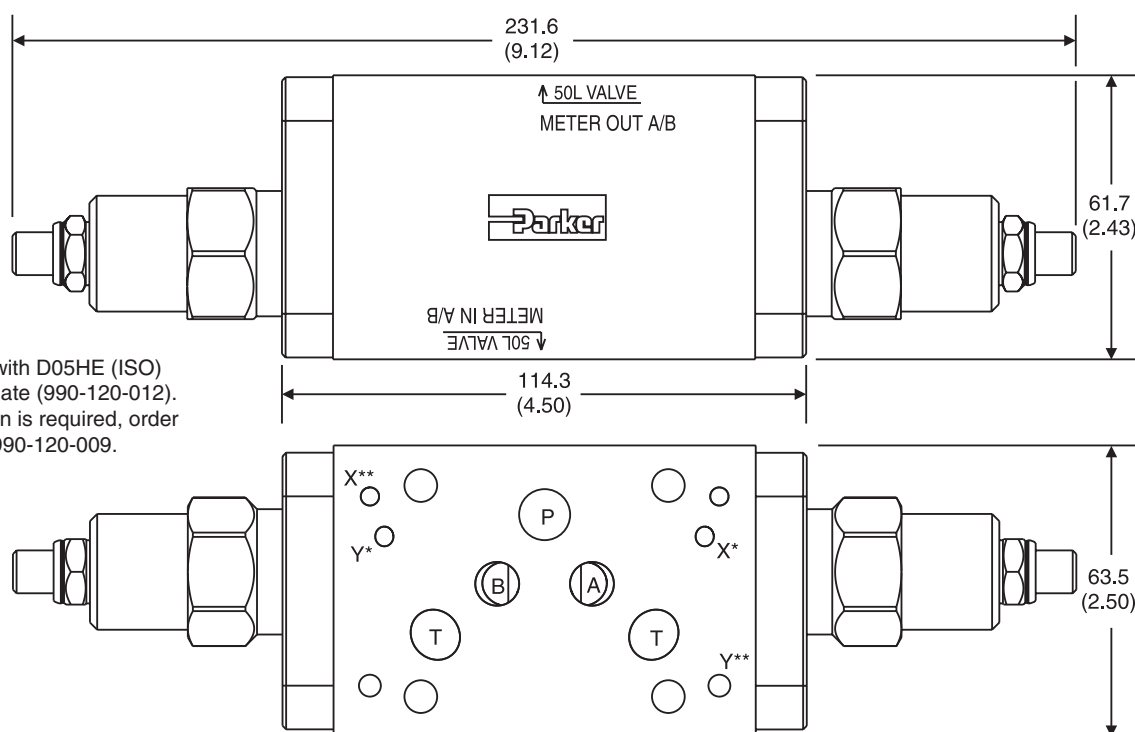
Pressure Differential vs. Free Flow
Fluid Viscosity 30 cSt at 50°C (122°F)



FC08, FD08

Pressure Differential vs. Metered Flow
Fluid Viscosity 30 cSt at 50°C (122°F)



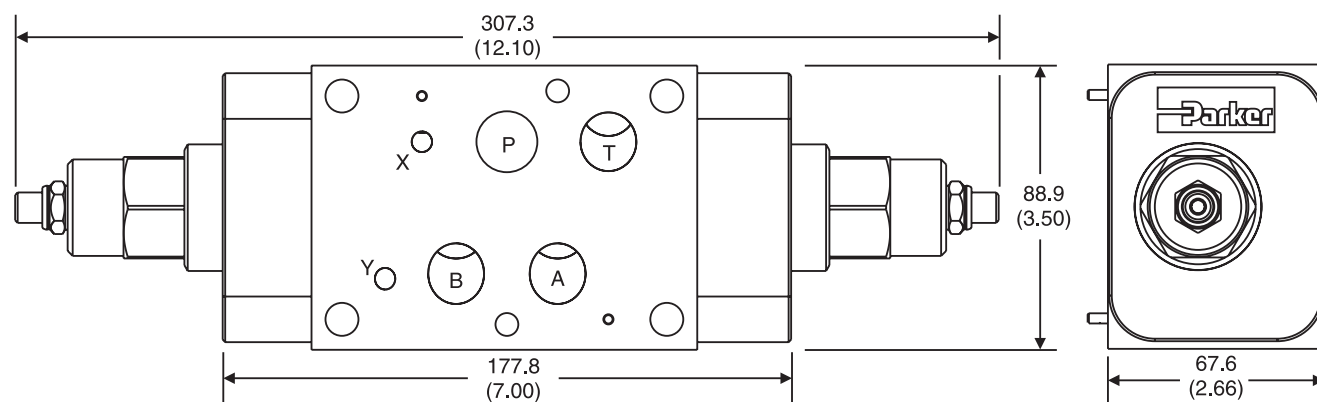
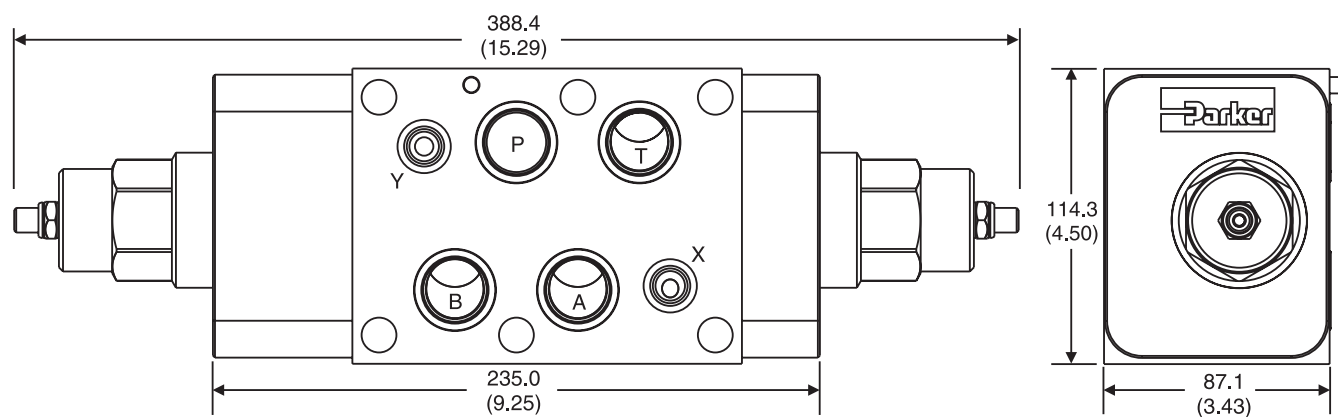
FC05DD — Inch equivalents for millimeter dimensions are shown in (**)**FC5HDD** — Inch equivalents for millimeter dimensions are shown in (**)

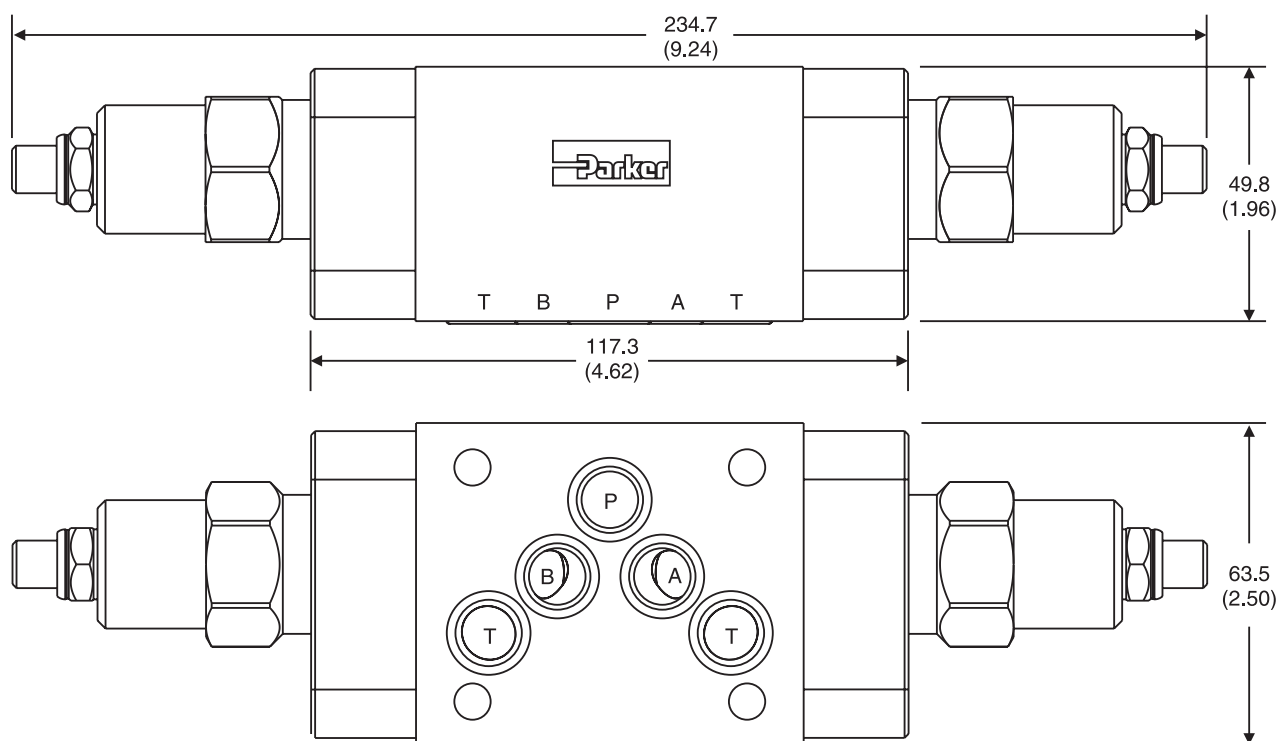
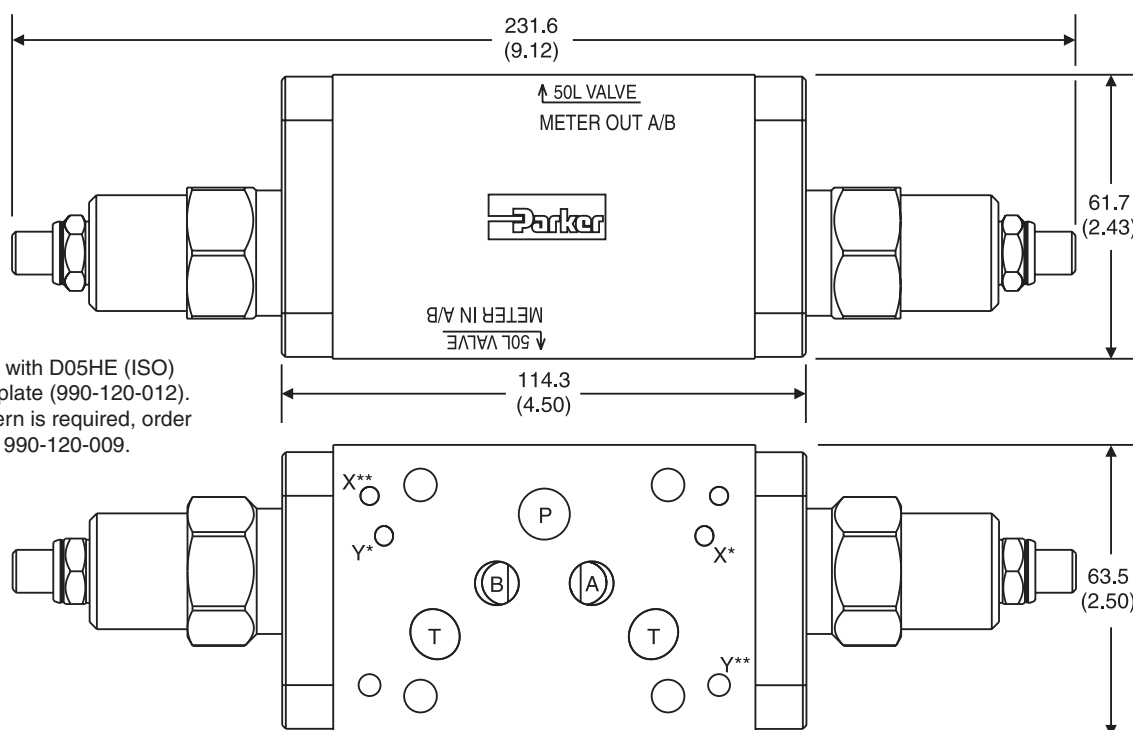
Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.

* D05HE (Standard)

** D05H



FC07DD — Inch equivalents for millimeter dimensions are shown in (**)**FC08DD** — Inch equivalents for millimeter dimensions are shown in (**)

FD05DD — Inch equivalents for millimeter dimensions are shown in (**)**B****FD5HDD** — Inch equivalents for millimeter dimensions are shown in (**)

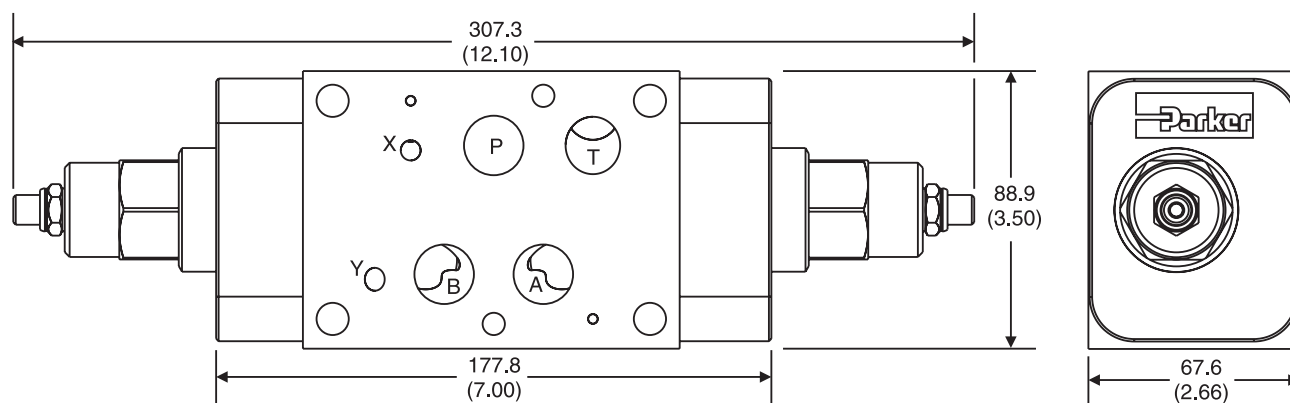
Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.

* D05HE (Standard)

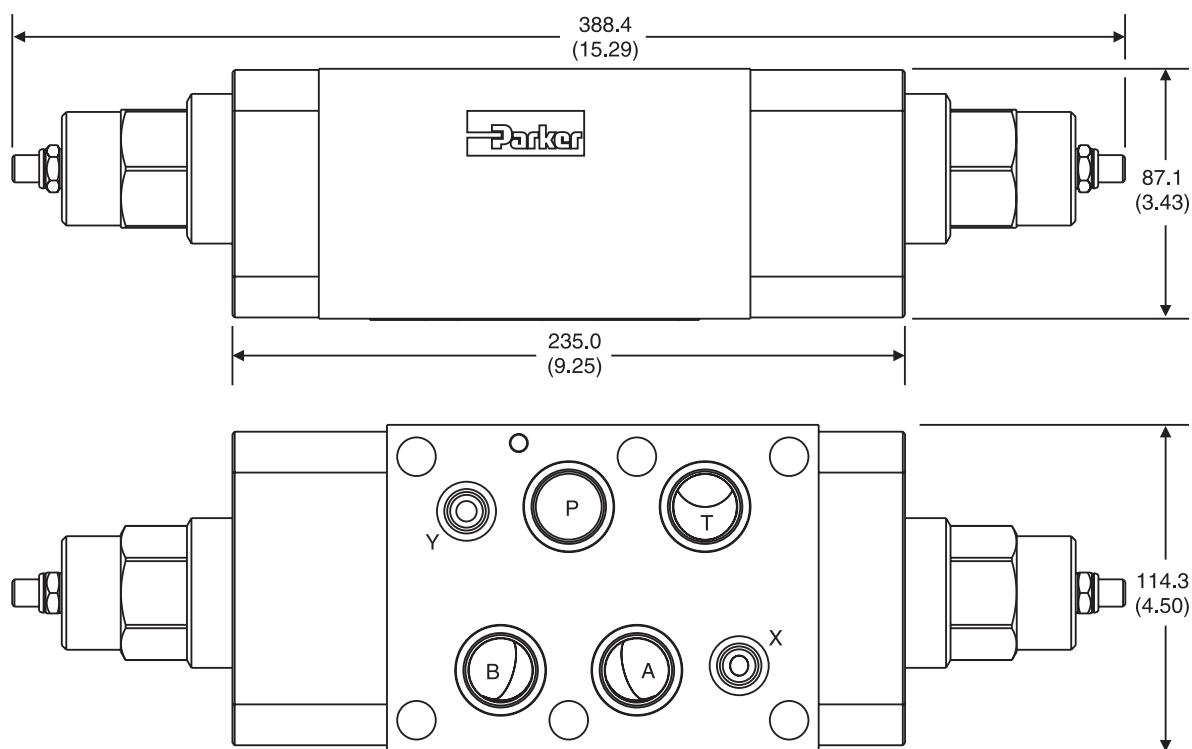
** D05H



FD07DD — Inch equivalents for millimeter dimensions are shown in (**)



FD08DD — Inch equivalents for millimeter dimensions are shown in (**)



General Description

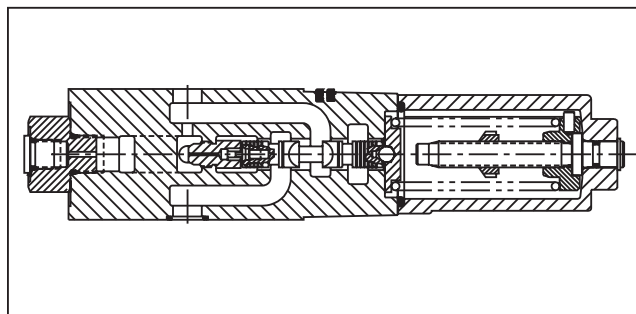
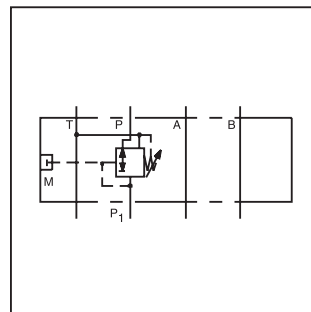
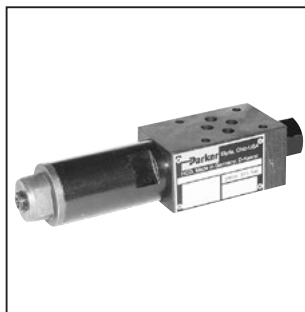
Series PRDM are direct operated pressure reducing valves that are used to regulate pressure in one area of a hydraulic circuit at a predetermined level below normal system pressure. Additionally, an integral pressure relieving function for the secondary reduced pressure circuit is incorporated into the design.

Operation

These valves are “normally open” devices that allow fluid to flow through the controlled port during their non-actuated or “at rest” condition. When downstream pressure exceeds the value set by the spring force, the control piston moves off its seat, closing off the flow path and thus reducing the fluid passing through from the main system. The cushioned piston modulates to maintain the preset pressure in this branch of the hydraulic circuit. If, due to external forces, the pressure continues to rise in this branch circuit, the piston will keep moving against the spring force allowing fluid to be drained to tank, thereby limiting maximum pressure to the valve’s setting.

Features

- PRDM sandwich valves may be selected to reduce pressure in the 'P' port, 'A' port or 'B' port.
- The direct operated, cushioned piston design results in fast response, low leakage and minimal hysteresis.
- Up to nine pressure adjustment ranges are available with maximum pressure settings.
- Adjustment options include: internal hex screw, hand knob or internal hex with keylock.
- Fluorocarbon seals are available.
- Available gage port connections include SAE, NPT, Metric and BSPP.



Specifications

	PRDM2	PRDM3																				
Mounting Pattern	NFPA D03, CETOP 3, NG6	NFPA D05, CETOP 5, NG10																				
Maximum Operating Pressure P, A, B	350 Bar (5000 PSI)	315 Bar (4560 PSI)																				
T	10 Bar (145 PSI)	10 Bar (145 PSI)																				
Max. Flow	40 LPM (10.5 GPM)	80 LPM (21 GPM)																				
Maximum Leakage P-A	15 ml/min (1.0 cu. in.)																					
Pressure Range	<table><tr><th>Code</th><th>Range</th></tr><tr><td>01</td><td>1.0 to 14 Bar (15 to 200 PSI)</td></tr><tr><td>02*</td><td>1.5 to 25 Bar (22 to 363 PSI)</td></tr><tr><td>05**</td><td>2 to 50 Bar (29 to 725 PSI)</td></tr><tr><td>06*</td><td>1.5 to 64 Bar (22 to 928 PSI)</td></tr><tr><td>10**</td><td>4 to 100 Bar (58 to 1450 PSI)</td></tr><tr><td>15**</td><td>6 to 150 Bar (87 to 2175 PSI)</td></tr><tr><td>16*</td><td>3 to 160 Bar (44 to 2320 PSI)</td></tr><tr><td>21</td><td>8 to 210 Bar (116 to 3045 PSI)</td></tr><tr><td>35*</td><td>10 to 315 Bar (147 to 4560 PSI)</td></tr></table>		Code	Range	01	1.0 to 14 Bar (15 to 200 PSI)	02*	1.5 to 25 Bar (22 to 363 PSI)	05**	2 to 50 Bar (29 to 725 PSI)	06*	1.5 to 64 Bar (22 to 928 PSI)	10**	4 to 100 Bar (58 to 1450 PSI)	15**	6 to 150 Bar (87 to 2175 PSI)	16*	3 to 160 Bar (44 to 2320 PSI)	21	8 to 210 Bar (116 to 3045 PSI)	35*	10 to 315 Bar (147 to 4560 PSI)
Code	Range																					
01	1.0 to 14 Bar (15 to 200 PSI)																					
02*	1.5 to 25 Bar (22 to 363 PSI)																					
05**	2 to 50 Bar (29 to 725 PSI)																					
06*	1.5 to 64 Bar (22 to 928 PSI)																					
10**	4 to 100 Bar (58 to 1450 PSI)																					
15**	6 to 150 Bar (87 to 2175 PSI)																					
16*	3 to 160 Bar (44 to 2320 PSI)																					
21	8 to 210 Bar (116 to 3045 PSI)																					
35*	10 to 315 Bar (147 to 4560 PSI)																					
Viscosity Range	12 to 230 cSt / mm ² /s (56 to 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.
 B01_Cat2500.indd, ddp, 04/19

B

PRDM Pressure Reducing/Relieving	<input type="checkbox"/> Size	<input type="checkbox"/> Port Reduction	<input type="checkbox"/> Pressure Range	<input type="checkbox"/> Adjustment	<input type="checkbox"/> Seal	<input type="checkbox"/> Gage Port	<input type="checkbox"/> Design Series NOTE: Not required when ordering.
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Code	Description
2	NFPA D03 Subplate Mounting
3	NFPA D05 Subplate Mounting

Code	Description
PP	P Port Only
AA	A Port Only
BB	B Port Only

Code	Type
N	Nitrile
V	Fluorocarbon

Code	Type
L	Hex w/Key Lock
S	Internal Hex Screw Adj.
K	Knob

Code	Description
01	1 to 14 Bar (15 to 200 PSI)
02*	1.5 to 25 Bar (22 to 363 PSI)
05**	2 to 50 Bar (29 to 725 PSI)
06*	1.5 to 64 Bar (22 to 928 PSI)
10**	4 to 100 Bar (58 to 1450 PSI)
15**	6 to 150 Bar (87 to 2175 PSI)
16*	3 to 160 Bar (44 to 2320 PSI)
21	8 to 210 Bar (116 to 3045 PSI)
35*	10 to 315 Bar (147 to 4560 PSI)

Code	Type
N	1/4" NPT
S	SAE #4 (UNF-2B 7/16-20) Adapter in PRDM3
M	Metric
G	1/4" BSPP

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

* PRDM2 only.
 ** PRDM3 only.

Bolt Kits

Size "2"				Size "3"			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)	No. of Sandwich	Sandwich & Valve Combination	D3W-30 D3DW & D31*W*	Bolt Length mm (in)
1	Sandwich & D1	BK243	73.2 (2.88)	1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D1	BK225	111.3 (4.38)	2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D1	BK244	152.4 (6.00)	3	Sandwich & D3	BK143	190.5 (7.50)
4	Sandwich & D1	BK245	190.5 (7.50)	* D31VW with internal pilot and internal drain only.			

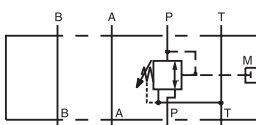
Bolt Kits must be ordered separately.

Weights:

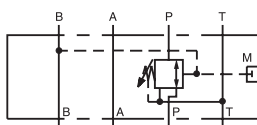
PRDM2 1.3 kg (2.9 lbs.)

PRDM3 2.6 kg (5.8 lbs.)

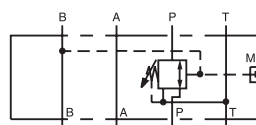
Schematics



PP Option

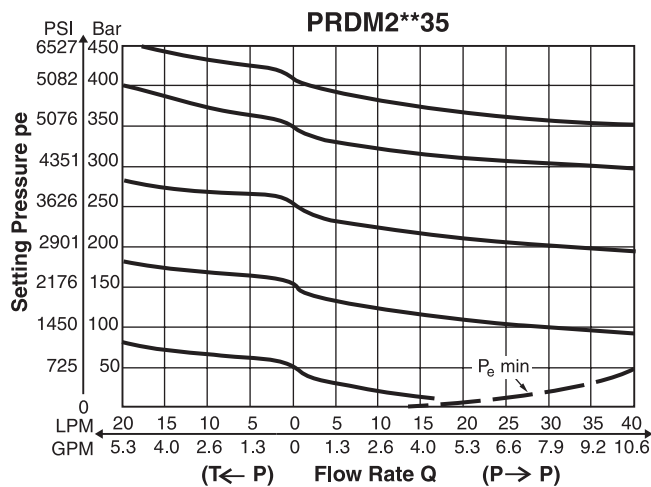
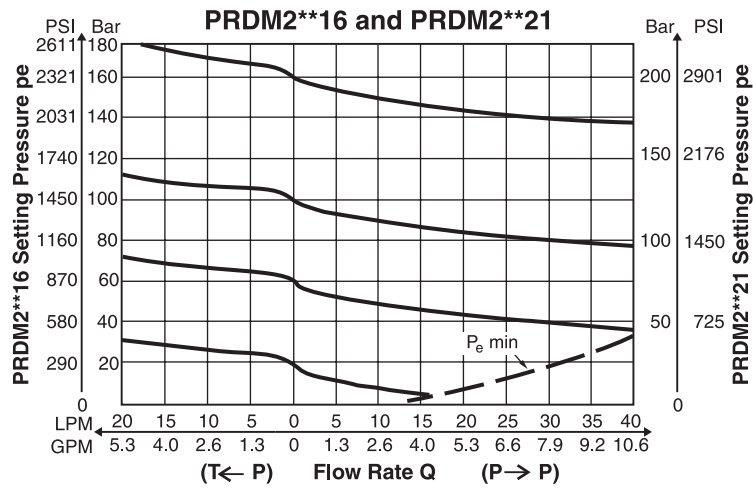
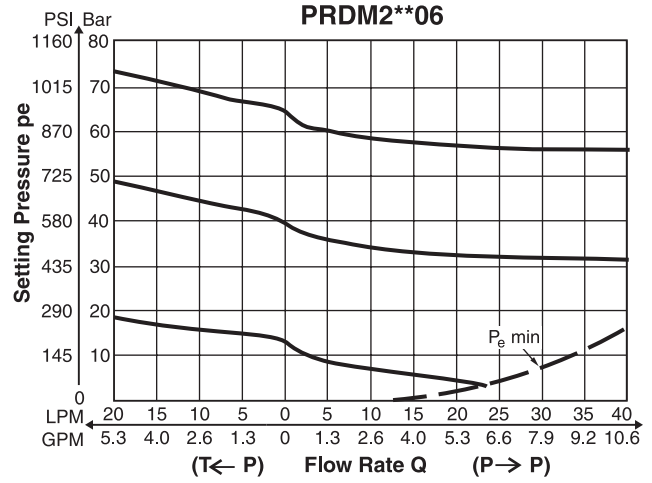
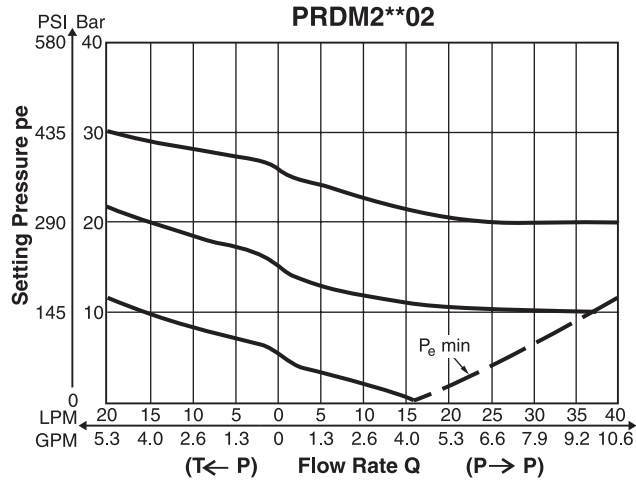


AA Option



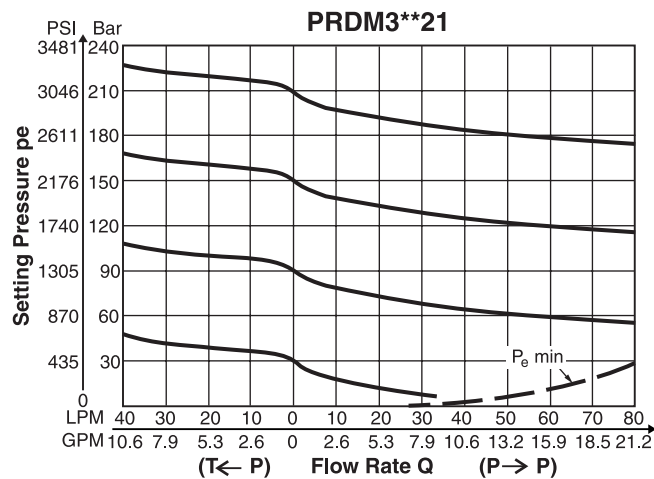
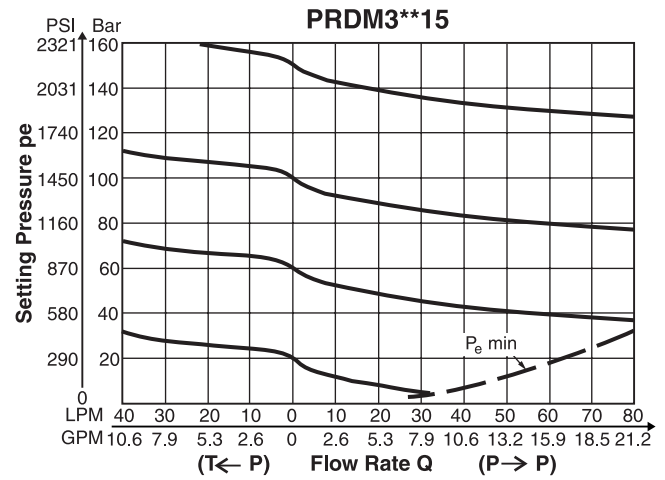
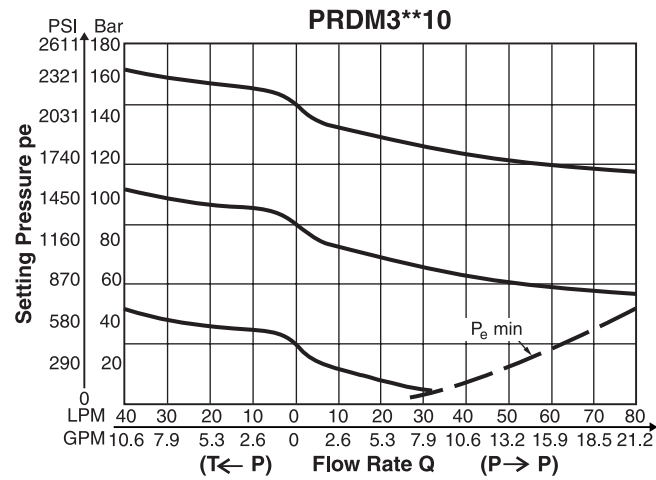
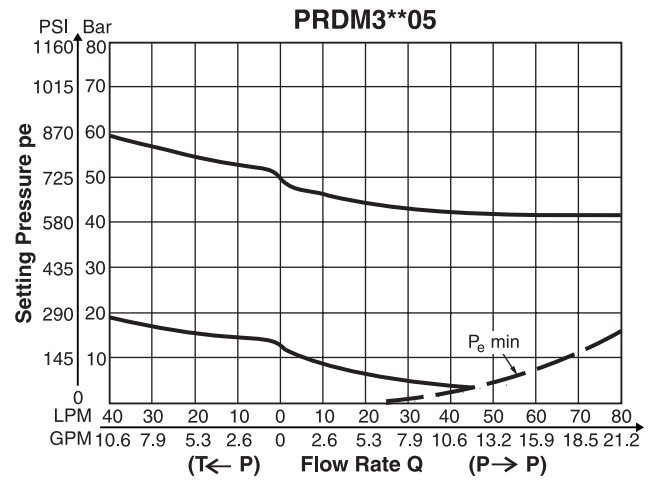
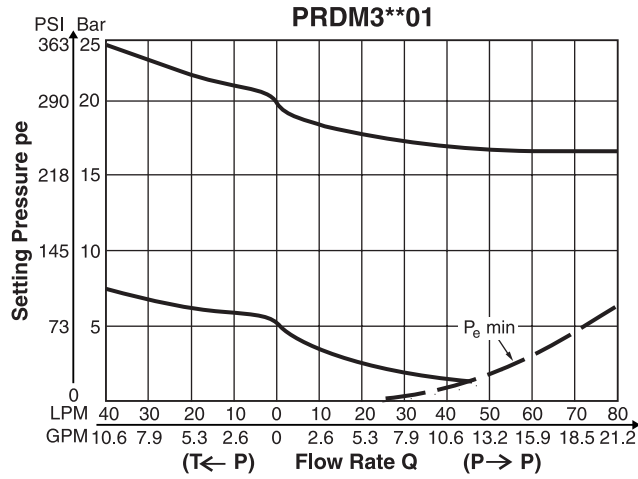
BB Option

B01_Cat2500.indd, ddp, 04/19



NOTE: Lowest pressure setting dependent upon system resistance.

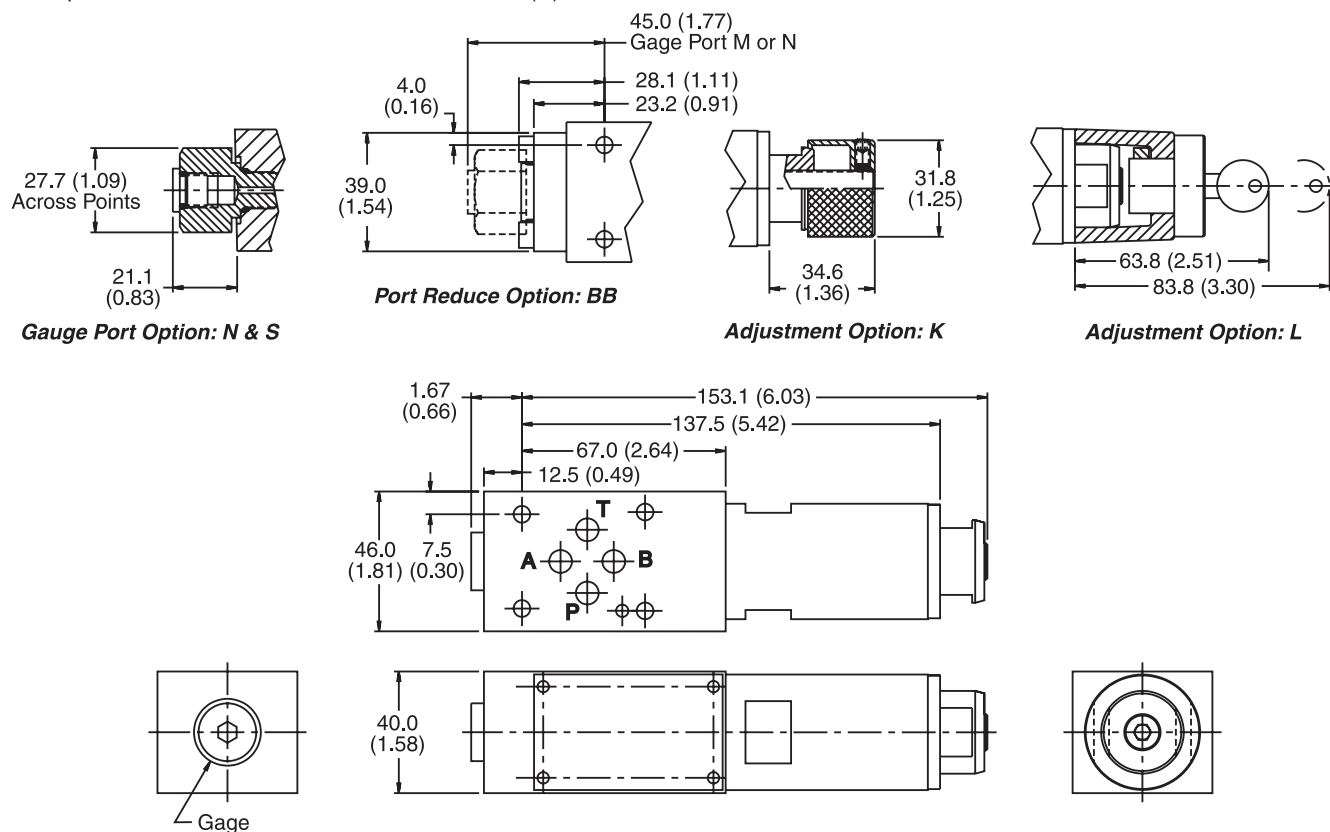
B



NOTE: Lowest pressure setting dependent upon system resistance.

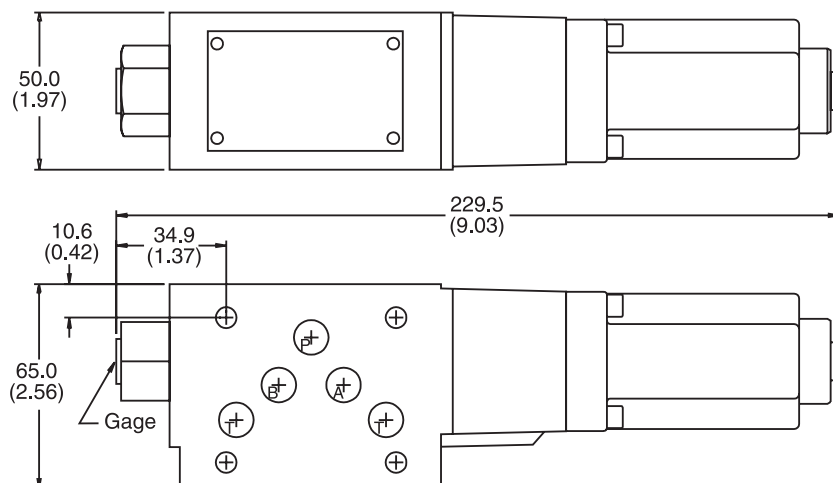
PRDM2

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



PRDM3

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

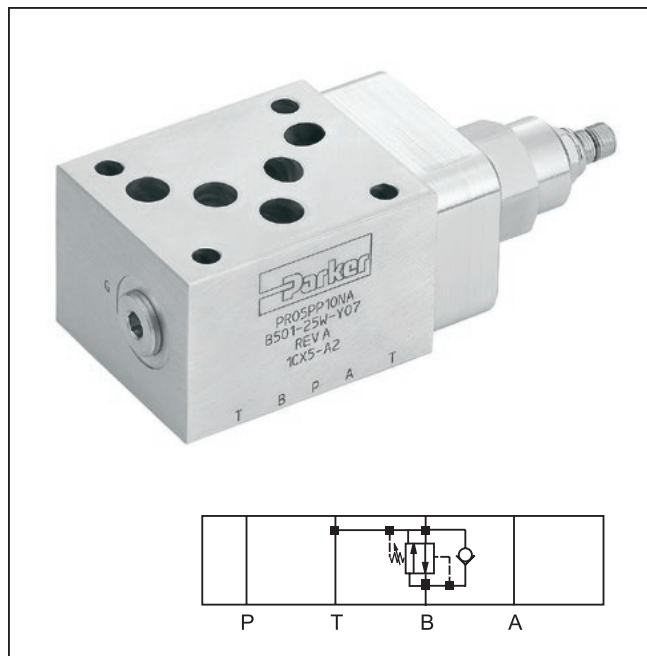


General Description

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 / NG10	D05HE / NG10	D07 / NG16	D08 / NG25
Mounting Position	Unrestricted			
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure	Aluminum Body – up to 207 Bar (3000 PSI); Ductile Iron Body – up to 345 Bar (5000 PSI)			
Nominal Flow	76 LPM (20 GPM)	76 LPM (20 GPM)	303 LPM (80 GPM)	303 LPM (80 GPM)
Adjustment Screw Hex Size	5/32	5/32	5/32	5/32
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)		
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			

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.
 B01_Cat2500.indd, ddp, 04/19

PR

Pressure Reducing/Relieving Valve

Size

Style

Pressure Range

Seal

Body Material

Code	Description
03	See PRDM2
05	NFPA D05 / NG10
5H*	NFPA D05HE / NG10
07	NFPA D07 / NG16
08	NFPA D08 / NG25

* 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
10	13.8 Bar (200 PSI)**
	6.9 to 207 Bar (100 to 3000 PSI)
20*	13.8 Bar (200 PSI)**
	10.4 to 310 Bar (150 to 4500 PSI)

* Ductile iron body only.
** Standard setting.

Code	Description
A	Aluminum
D	Ductile Iron

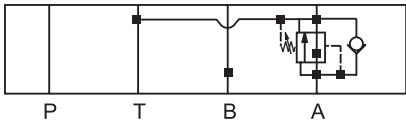
Code	Description
AA	Pressure reducing in A with check valve
BB	Pressure reducing in B with check valve
PP	Pressure reducing in P

Code	Description
N	Nitrile
V*	Fluorocarbon

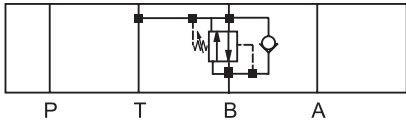
* Upon request.



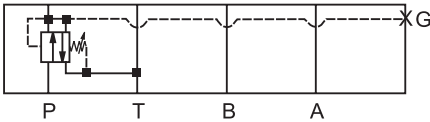
PR**AA



PR**BB



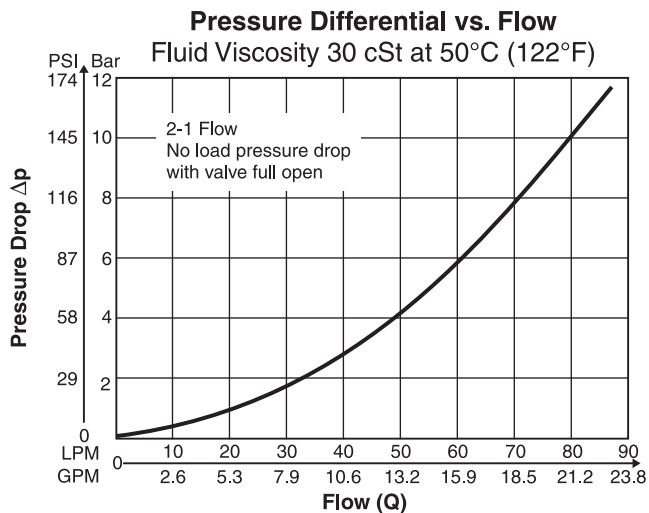
PR**PP



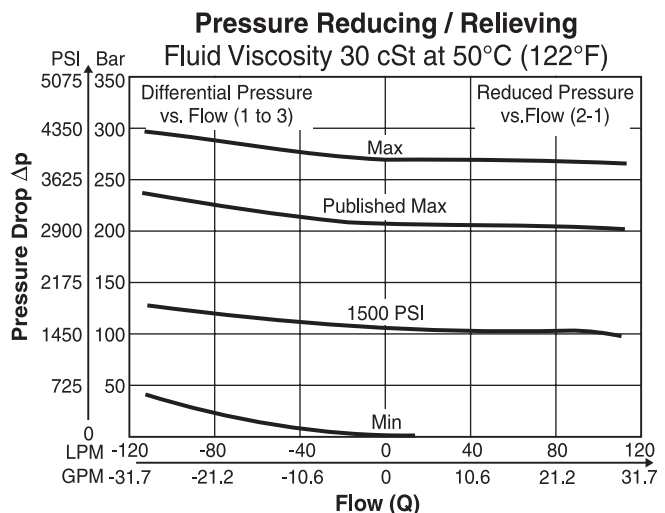
Weight:

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 (10.8 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.)

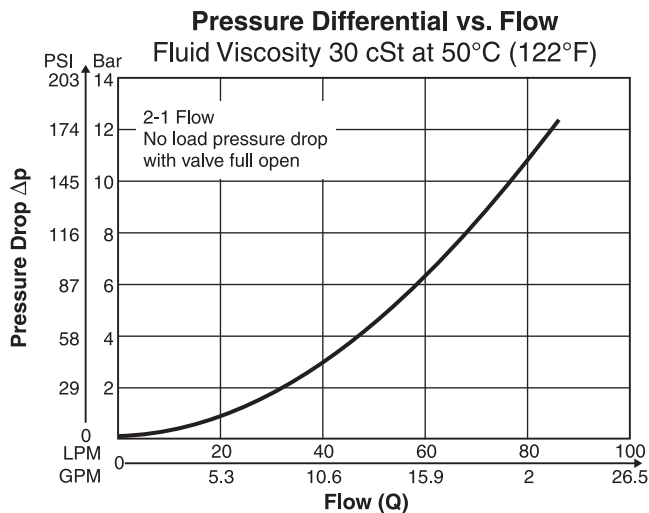
PR05*10*A and PR5H*10*A



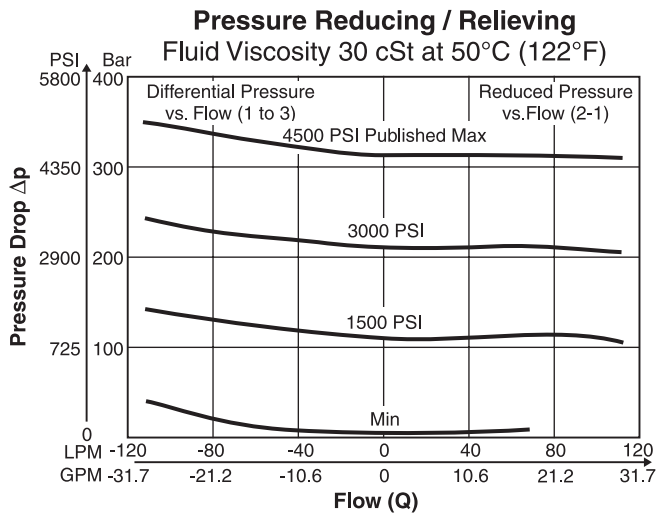
PR05*10*A and PR5H*10A



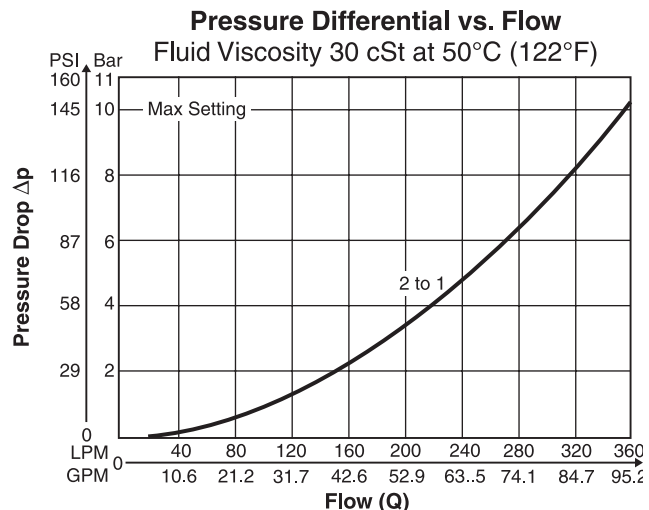
PR05*20*D and PR5H*20*D



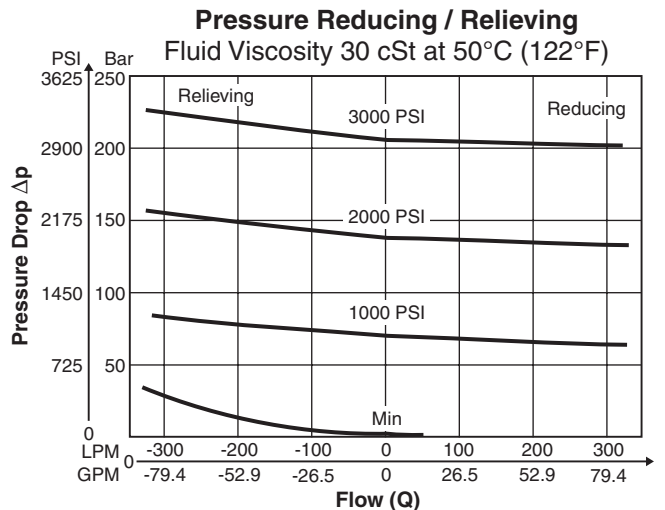
PR05*20*D and PR5H*20*D



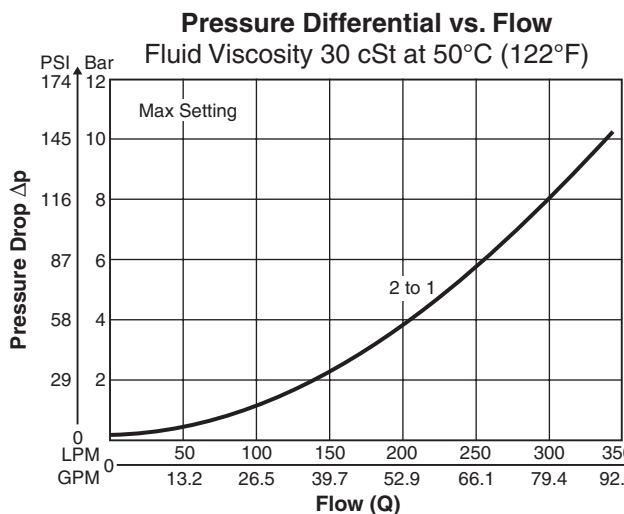
PR07*10*A



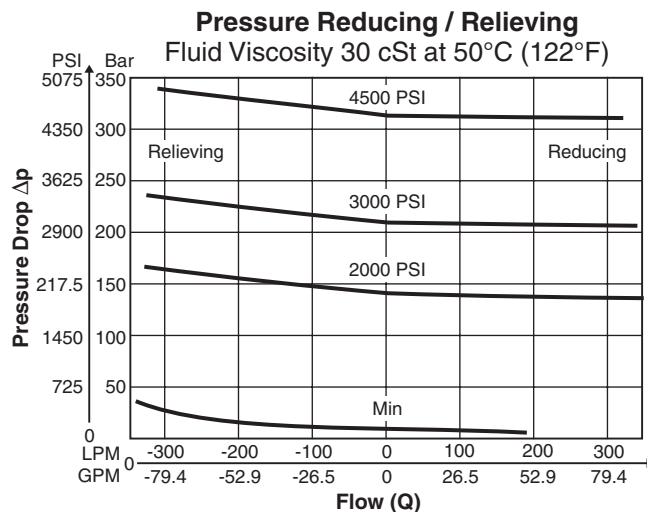
PR07*10*A



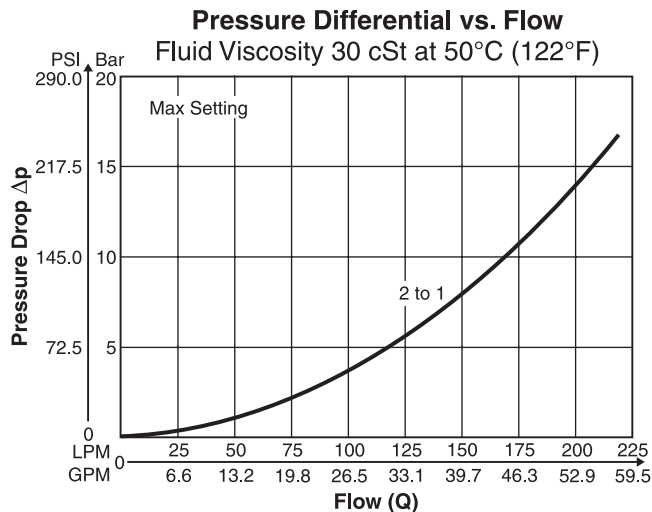
PR07*20*D



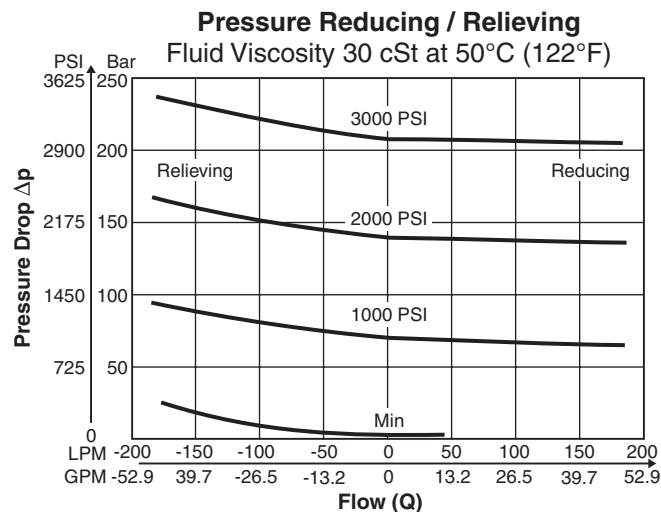
PR07*20*D



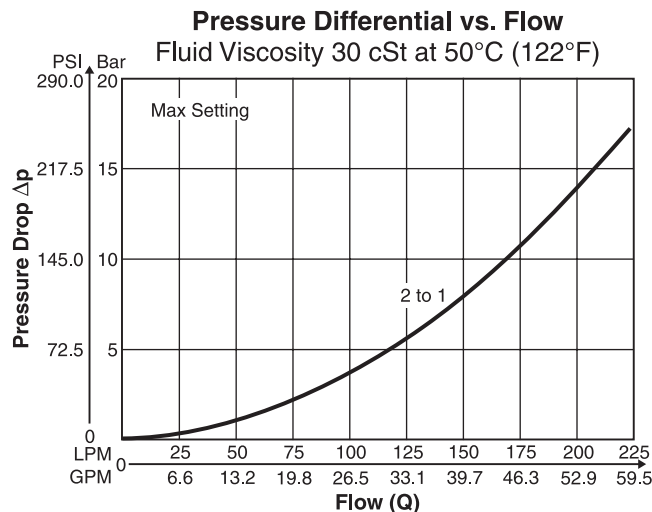
PR08*10*A



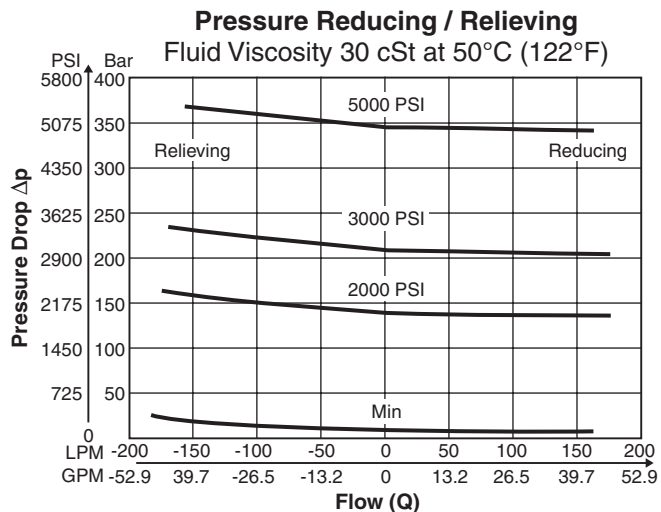
PR08*10*A



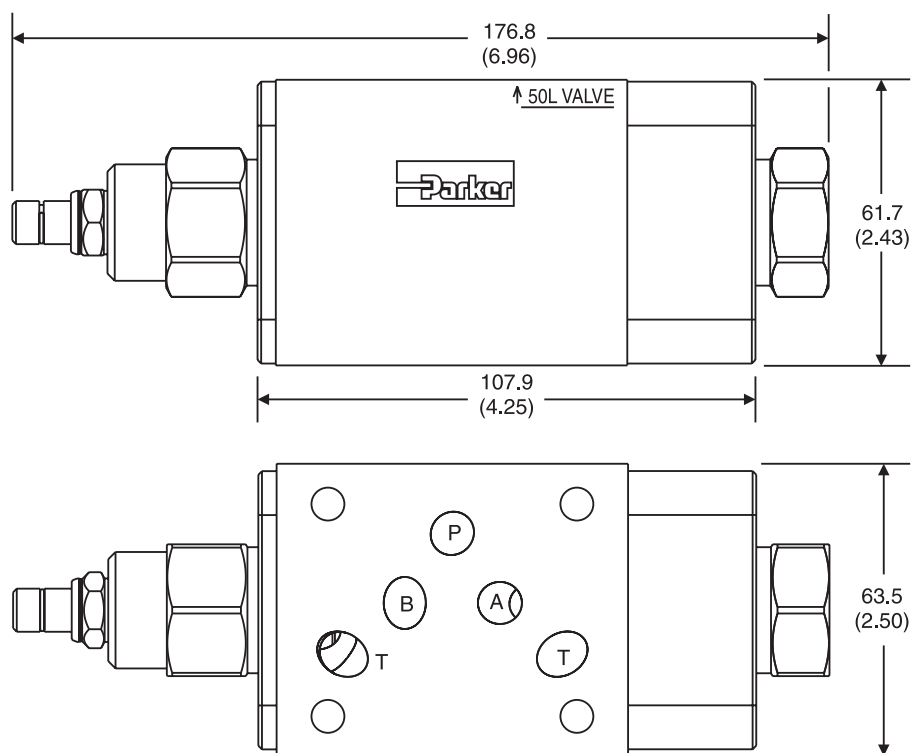
PR08*20*D



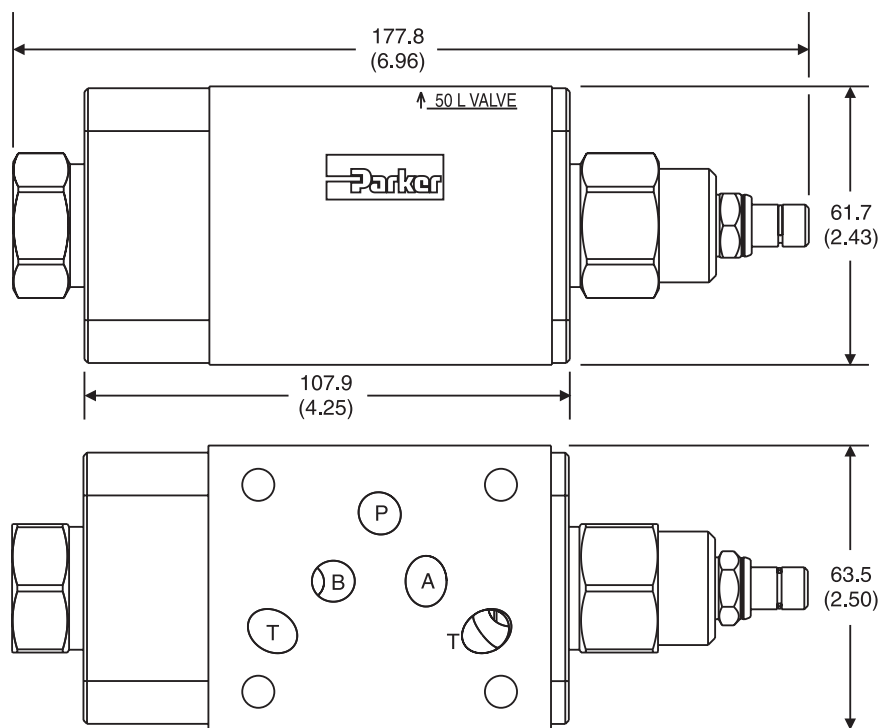
PR08*20*D

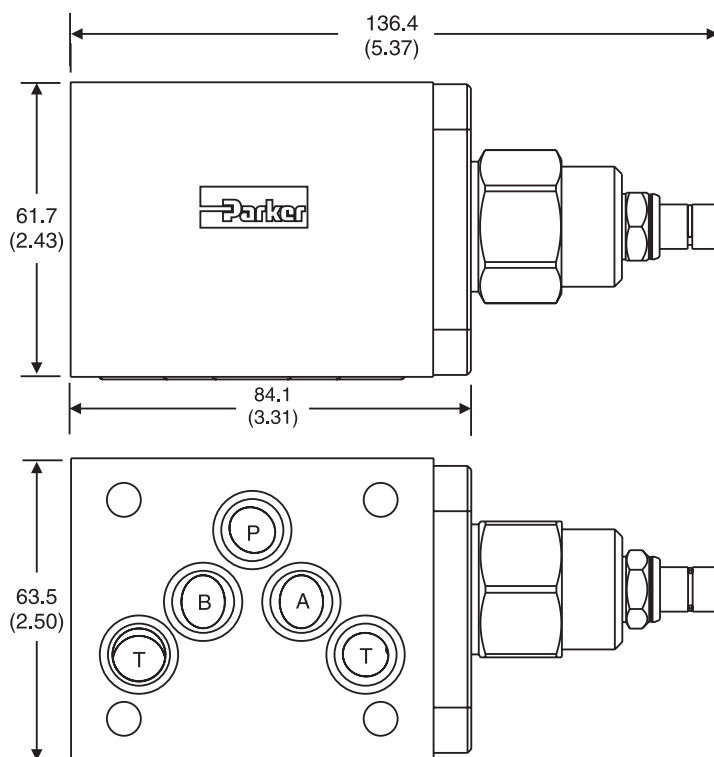
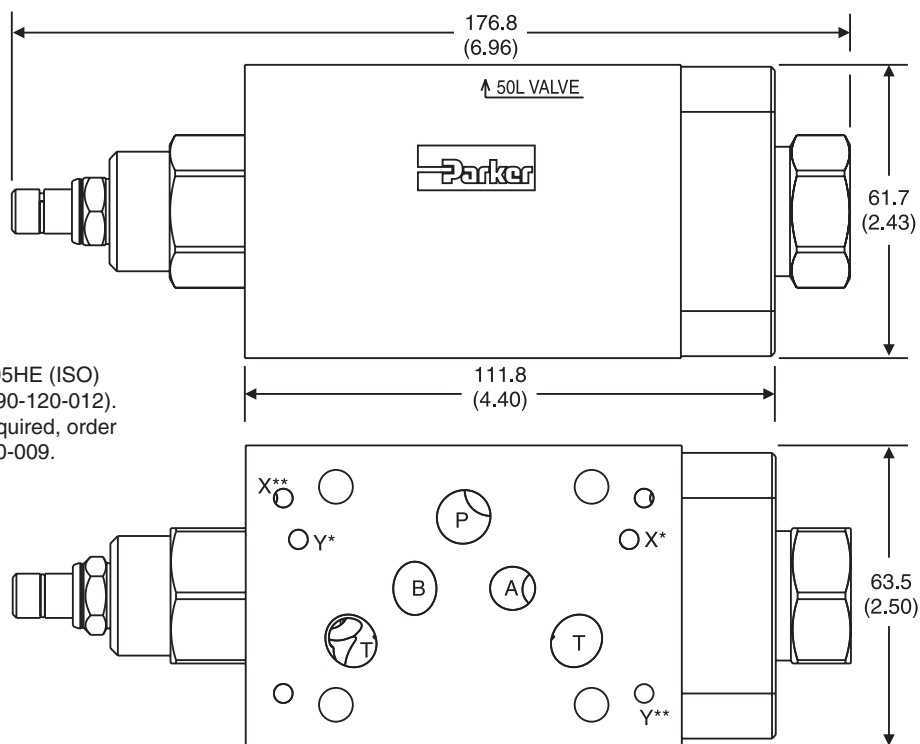


PR05AA — Inch equivalents for millimeter dimensions are shown in (**)



PR05BB — Inch equivalents for millimeter dimensions are shown in (**)



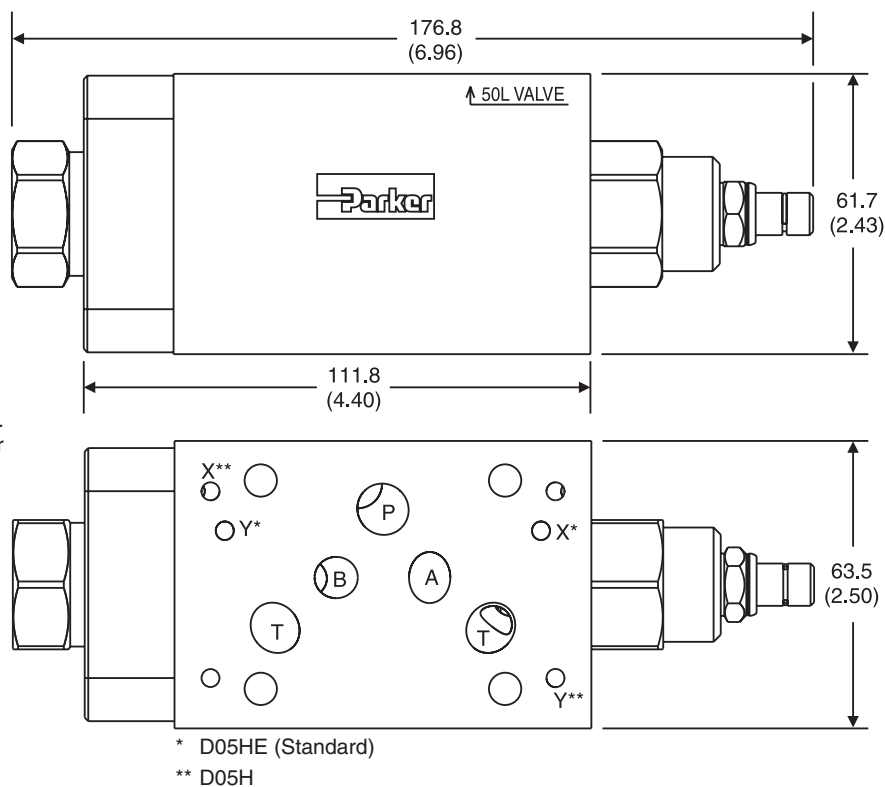
PR05PP — Inch equivalents for millimeter dimensions are shown in (**)**PR5HAA** — Inch equivalents for millimeter dimensions are shown in (**)

Valve comes with D05HE (ISO)
Pattern seal plate (990-120-012).
If D05H pattern is required, order
seal plate kit 990-120-009.

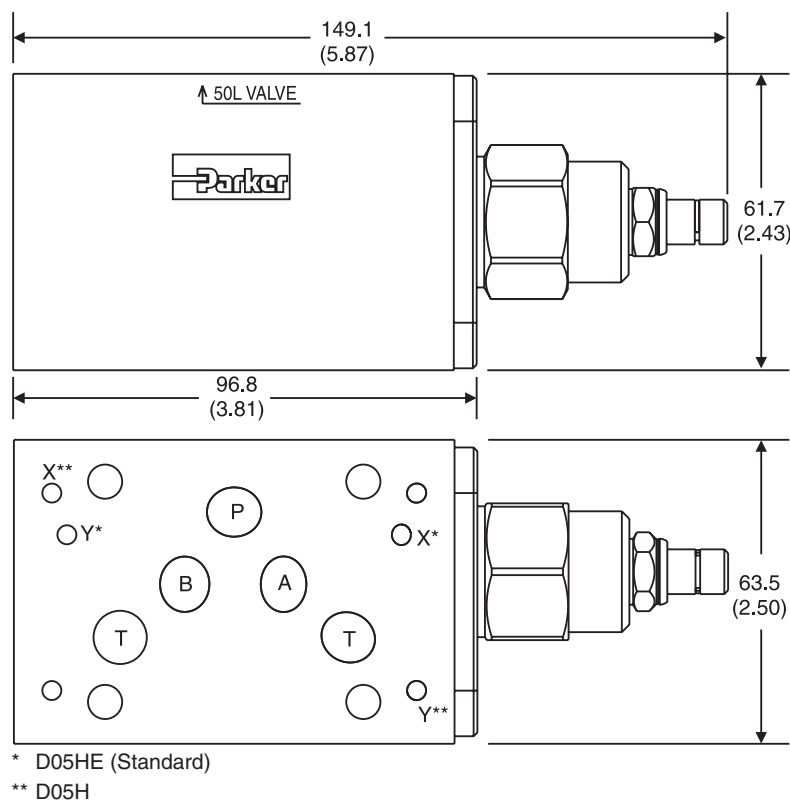
* D05HE (Standard)

** D05H



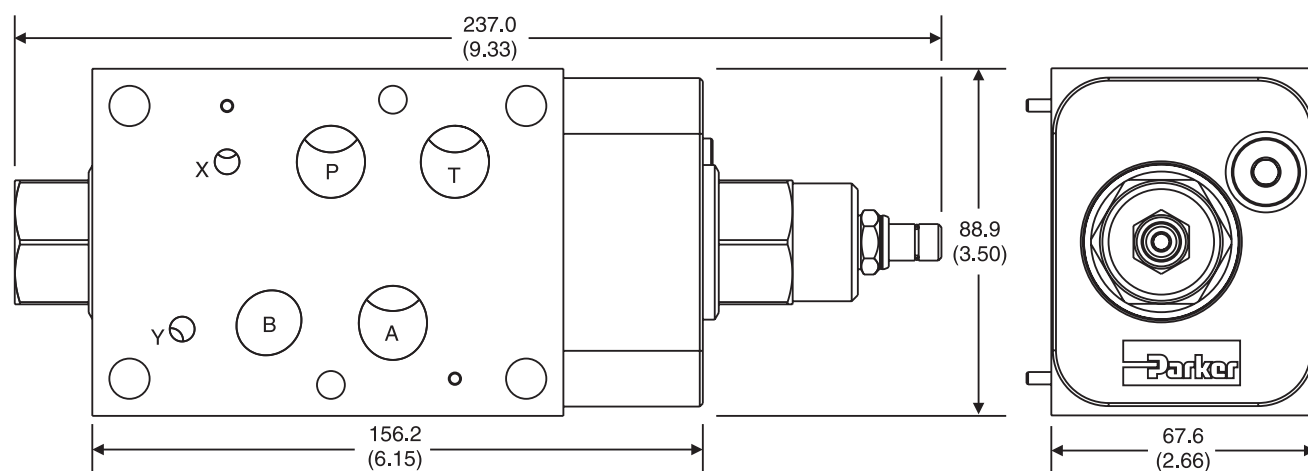
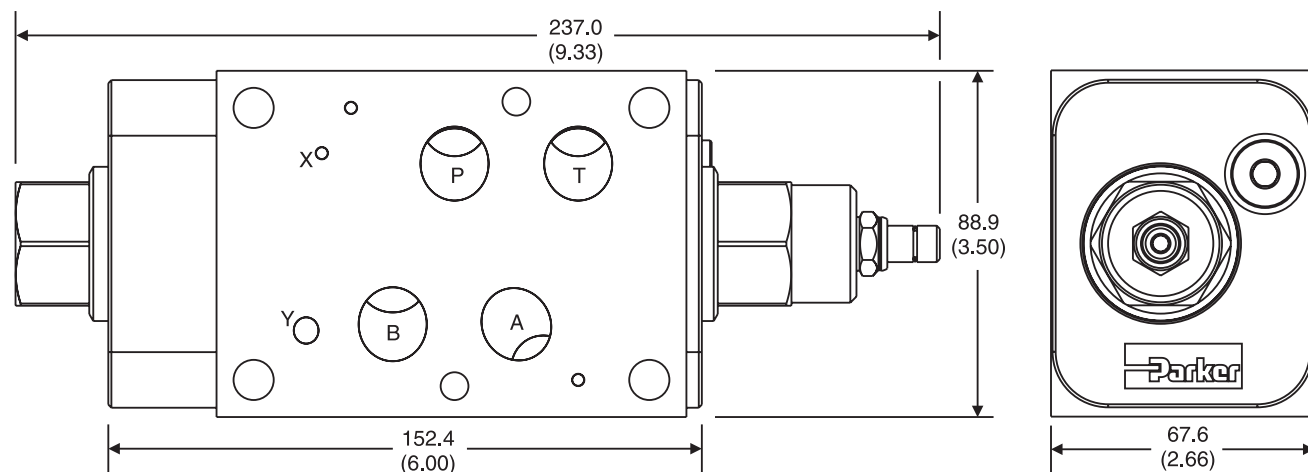
PR5HBB — Inch equivalents for millimeter dimensions are shown in (**)

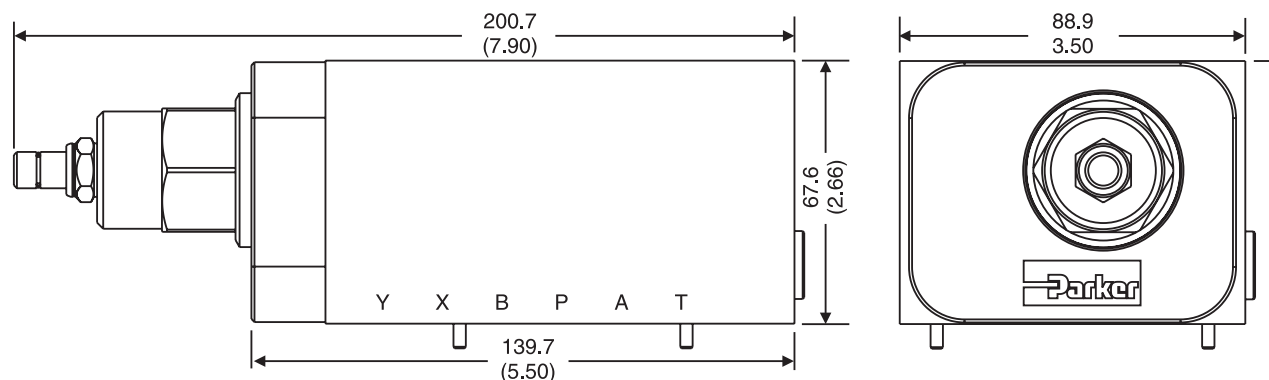
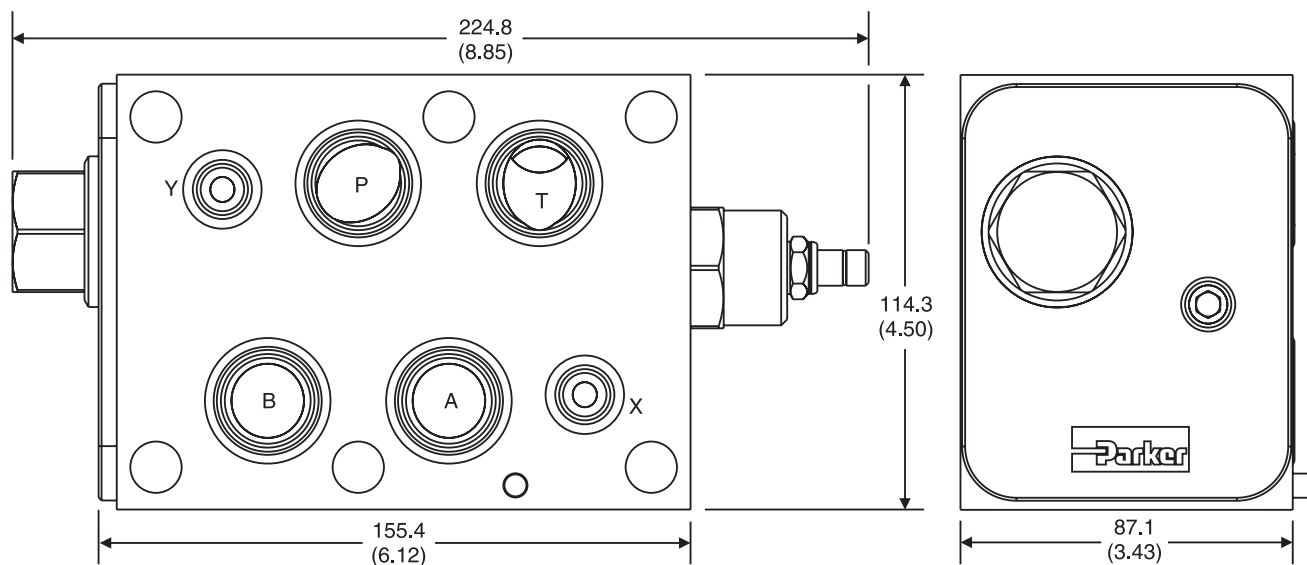
Valve comes with D05HE (ISO)
Pattern seal plate (990-120-012).
If D05H pattern is required, order
seal plate kit 990-120-009.

PR5HPP — Inch equivalents for millimeter dimensions are shown in (**)

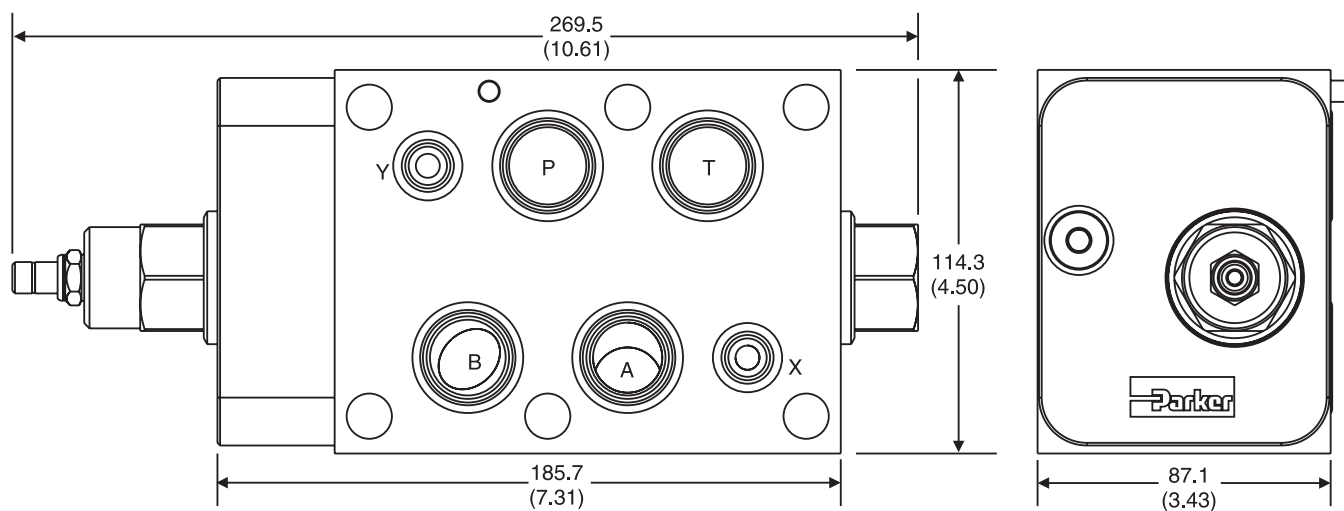
Valve comes with D05HE (ISO)
Pattern seal plate (990-120-012).
If D05H pattern is required, order
seal plate kit 990-120-009.



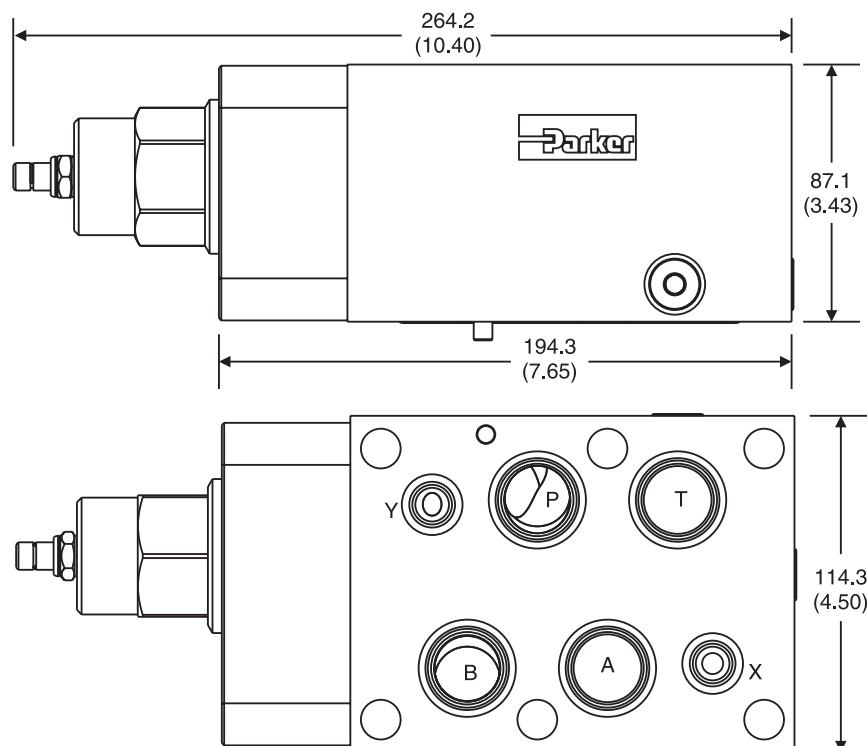
PR07AA – Inch equivalents for millimeter dimensions are shown in (**)**B****PR07BB** – Inch equivalents for millimeter dimensions are shown in (**)

PR07PP — Inch equivalents for millimeter dimensions are shown in (**)**PR08AA** — Inch equivalents for millimeter dimensions are shown in (**)

PR08BB — Inch equivalents for millimeter dimensions are shown in (**)



PR08PP — Inch equivalents for millimeter dimensions are shown in (**)



General Description

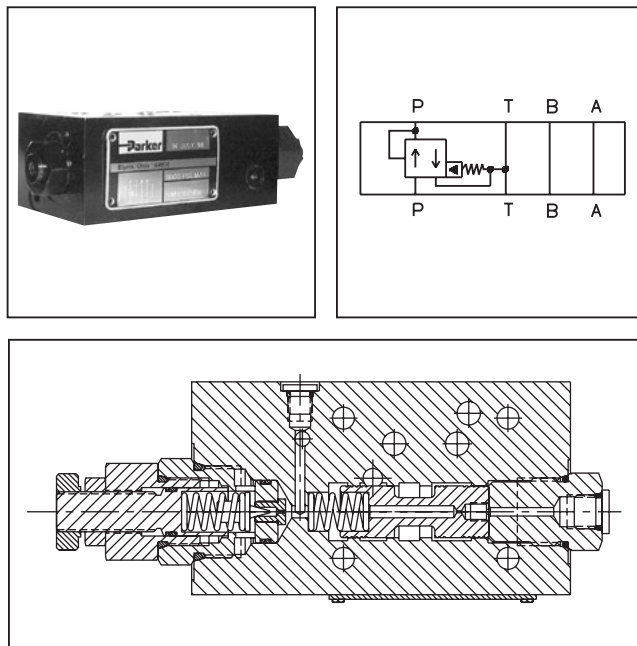
Series PRM reducing valves are used to regulate pressure, in one area of a circuit, below normal system pressure. This style valve is well suited to perform this function as it mounts directly below the directional control valve.

Operation

These are "normally open" valves that allow fluid to pass through the controlled port during typical operation. When downstream pressure rises above the value set by an adjustable spring force, the control pilot opens and allows the main spool to move from a full open position. The main spool modulates to maintain the desired "reduced pressure" downstream of the valve. The PRM3 also has a relieving mode.

Features

- PRM sandwich style pressure reducing valves can be used to reduce pressure on the 'P' port, the 'A' port, or the 'B' port.
- Three pressure adjustment options are available: slotted screw, knob and locking knob. (PRM6 only)
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.



Specifications

	PRM3	PRM6		PRM3/PRM6										
Mounting Pattern	NFPA D05, CETOP 5, NG 10	NFPA D08, CETOP 8, NG 25	Filtration	ISO 4406 (1999); 18/16/13 (meet NAS 1638:7)										
Minimum Pressure	10 Bar (150 PSI) with rated flow, 150 SSU oil, and fluid temperature of 38°C (100°F). ¹		Venting	Connecting the vent port to tank allows the reducing valve to divert flow at minimum pressure.										
Maximum Pressure	345 Bar (5000 PSI)	345 Bar (5000 PSI)												
Min. Flow	3.78 LPM (1 GPM)	3.78 LPM (1 GPM)	Remote Control	Remote control valve connected to the vent port can be used to control the pressure. ²										
Maximum Flow	64 LPM (17 GPM)	189 LPM (50 GPM)	Drain Line	Drain line from pilot valve is internally connected to the tank port. Tank line pressure is thus added to the valve setting. ³										
Pressure Range	<table><tr><td>Code</td><td>Pressure Range</td></tr><tr><td>07</td><td>10 to 70 Bar (150 - 1000 PSI)</td></tr><tr><td>17</td><td>10 to 175 Bar (150 - 2500 PSI)</td></tr><tr><td>25</td><td>10 to 250 Bar (150 - 3500 PSI)</td></tr><tr><td>35</td><td>10 to 350 Bar (150 - 5000 PSI)</td></tr></table>		Code	Pressure Range	07	10 to 70 Bar (150 - 1000 PSI)	17	10 to 175 Bar (150 - 2500 PSI)	25	10 to 250 Bar (150 - 3500 PSI)	35	10 to 350 Bar (150 - 5000 PSI)	<p>¹ Change in flow, temperature or fluid (SSU) rating will affect valve minimum pressure.</p> <p>² Set main valve pressure 10 Bar (150 PSI) higher than remote pilot.</p> <p>³ It is important that the drain line connection be taken into consideration when determining the minimum valve setting.</p>	
Code	Pressure Range													
07	10 to 70 Bar (150 - 1000 PSI)													
17	10 to 175 Bar (150 - 2500 PSI)													
25	10 to 250 Bar (150 - 3500 PSI)													
35	10 to 350 Bar (150 - 5000 PSI)													

¹ Change in flow, temperature or fluid (SSU) rating will affect valve minimum pressure.

² Set main valve pressure 10 Bar (150 PSI) higher than remote pilot.

³ It is important that the drain line connection be taken into consideration when determining the minimum valve setting.

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.

B01_Cat2500.indd, ddp, 04/19

PRM
Pressure Reducing Valve

Size

Port Reduction

Pressure Range

Adjustment

Seal

Gauge Port

Drain

Design Series
NOTE: Not required when ordering.

Code	Description
3	NFPA D05 Subplate Mounting
6	NFPA D08 Subplate Mounting

Code	Description	Available Models
		PRM3 PRM6
PP	P Port Only	✓
AA	A Port Only	✓
BB	B Port Only	✓ ✓
PA	P Port Reduced/Convertible to A Port Reduced	✓
AP	A Port Reduced/Convertible to P Port Reduced	✓

Code	Description
07	10 to 70 Bar (150 to 1000 PSI)
17	10 to 175 Bar (150 to 2500 PSI)
25	10 to 250 Bar (150 to 3500 PSI)
35	10 to 345 Bar (150 to 5000 PSI)

Code	Type
N	Nitrile
V	Fluorocarbon

* PRM6 only.

Code	Type
K	Knob
L*	Locking Knob
S	Screw Adj.

* PRM6 only.

Code	Type
Omit*	SAE
S†	SAE
N†	NPT
M†	Metric
G	1/4 BSPP

* PRM6 only.
† PRM3 only.

Code	Type
Omit	Internal
Y	External

Unit Weight:
PRM3 3.0 kg (6.6 lbs.)
PRM6 5.6 kg (12.5 lbs.)

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

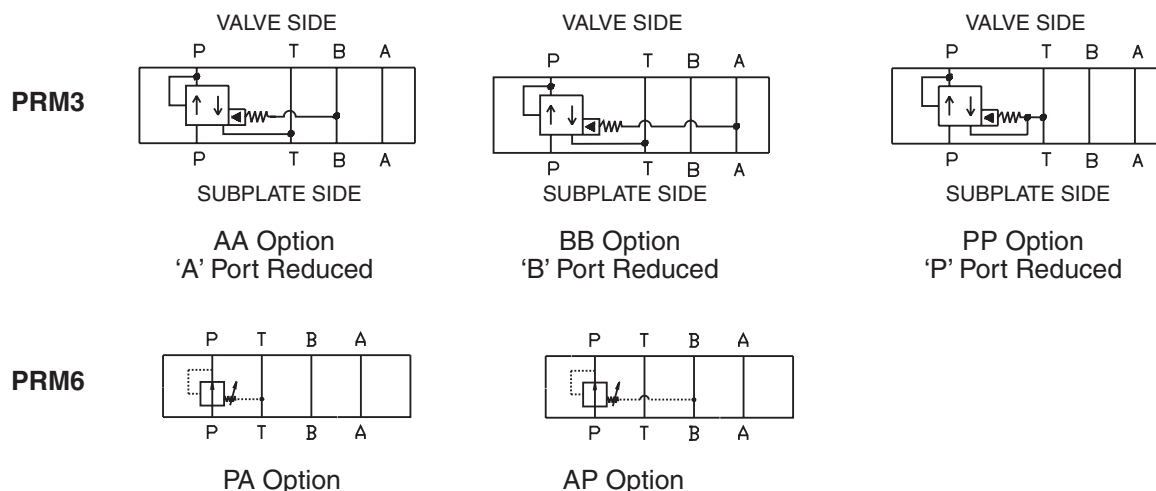
Bolt Kits

Size "3"				Size "6"			
No. of Sandwich	Sandwich & Valve Combination	D3W-30 D3DW & D31*W*	Bolt Length mm (in)	No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)
1	Sandwich & D3	BK141	88.9 (3.50)	1	Sandwich & D6	BK121	133.4 (5.25)
2	Sandwich & D3	BK142	139.7 (5.50)	2	Sandwich & D6	BK122	203.2 (8.00)
3	Sandwich & D3	BK143	190.5 (7.50)	3	Sandwich & D6	BK123	273.1 (10.75)
				4	Sandwich & D6	BK124	342.9 (13.5)

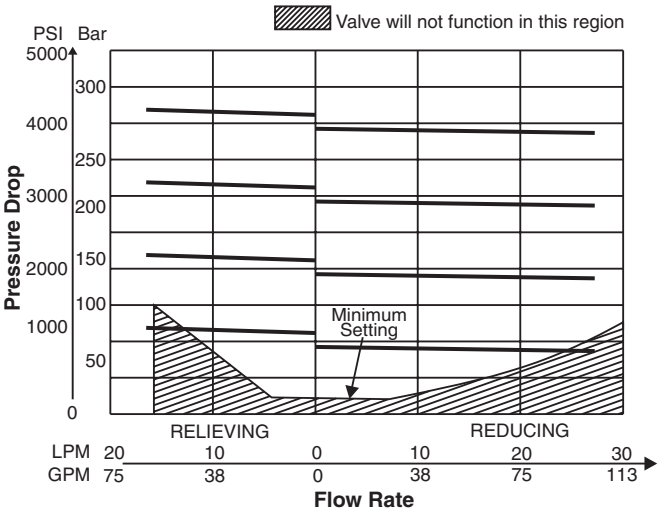
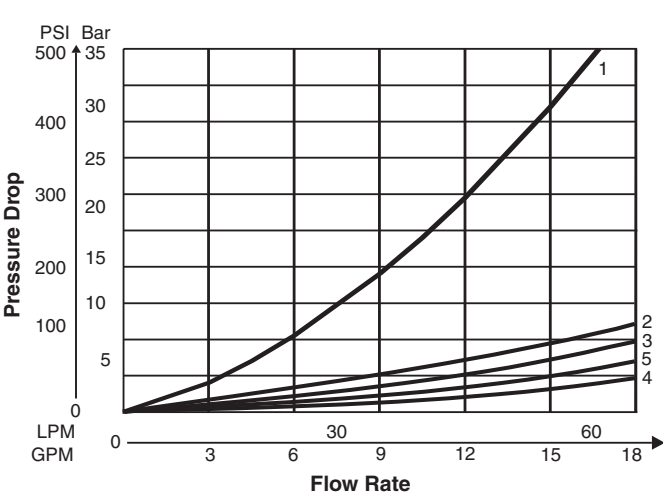
* D31VW with internal pilot and internal drain only.

Bolt Kits must be ordered separately.

Schematics



Performance Curves



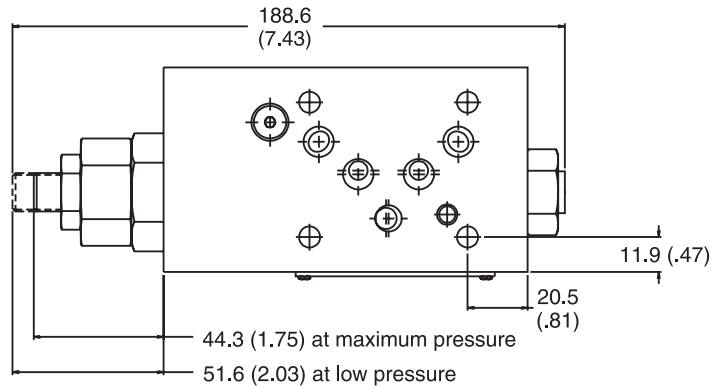
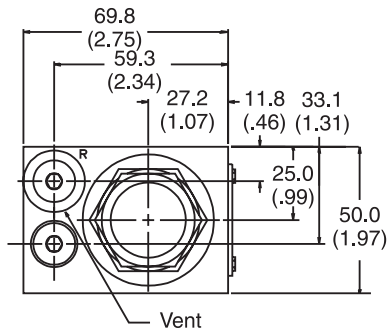
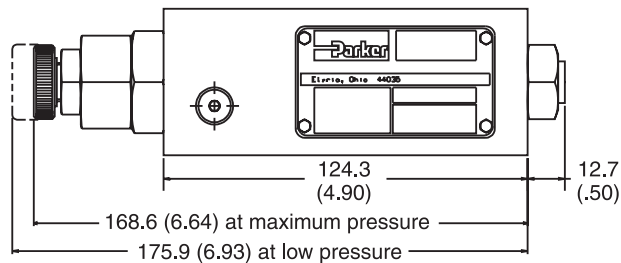
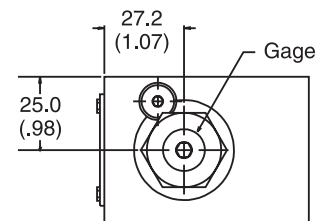
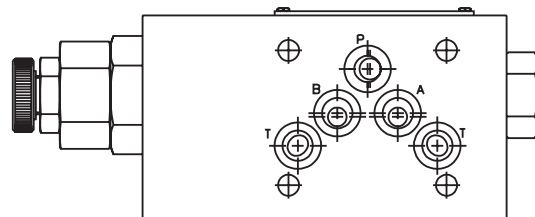
Mode	Flow Path			
	P → P	A → A	B → B	T → T
PP	1	2	3	4
AA	1	2	3	5
BB	1	2	3	5

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

NOTE: Lowest pressure setting dependent upon system resistance.

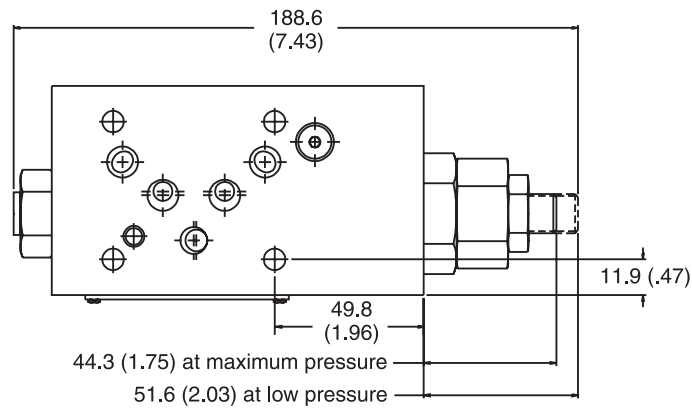
PRM3AA

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

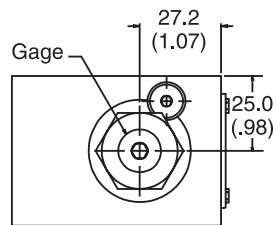
**Top View****End View****Face View****End View****Bottom View**

PRM3BB

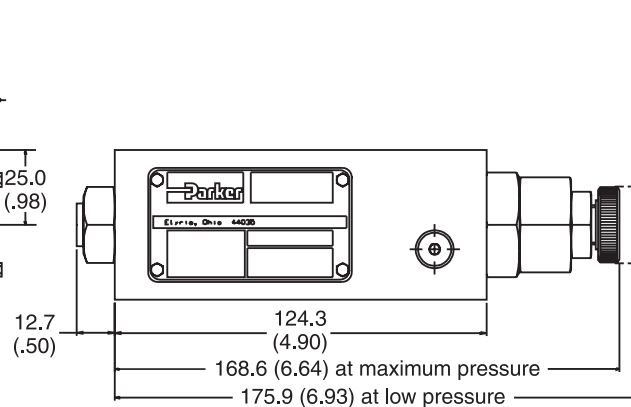
Inch equivalents for millimeter dimensions are shown in (**)

B

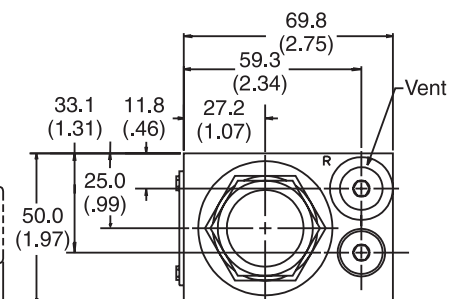
Top View



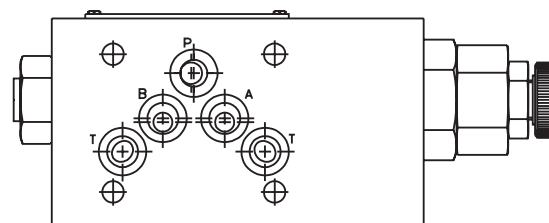
End View



Face View



End View

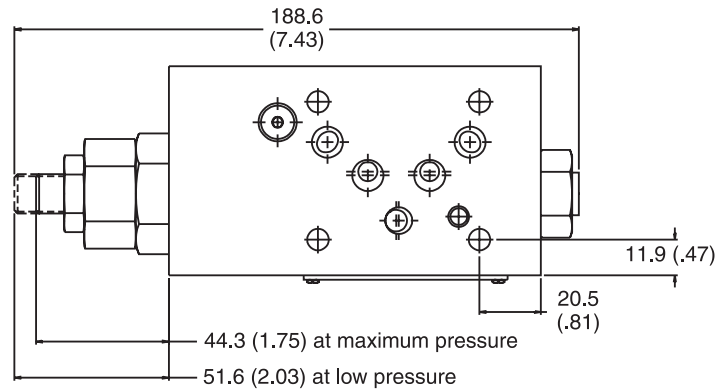


Bottom View

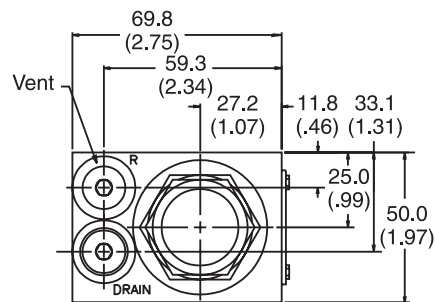


PRM3PP

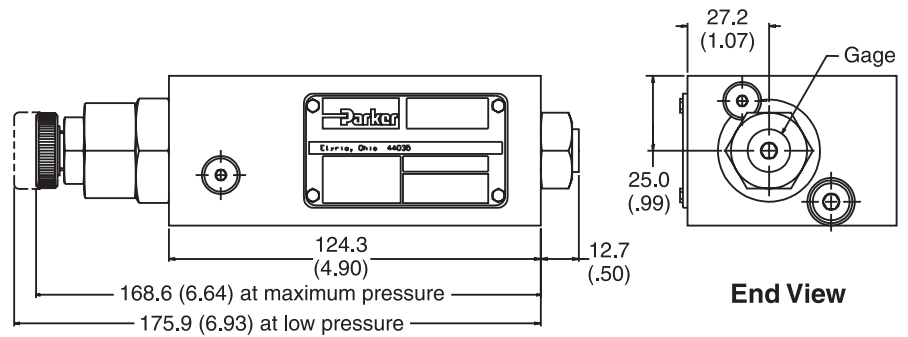
Inch equivalents for millimeter dimensions are shown in (**)



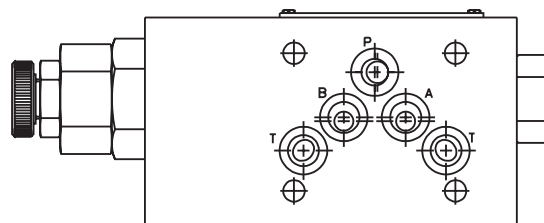
Top View



End View



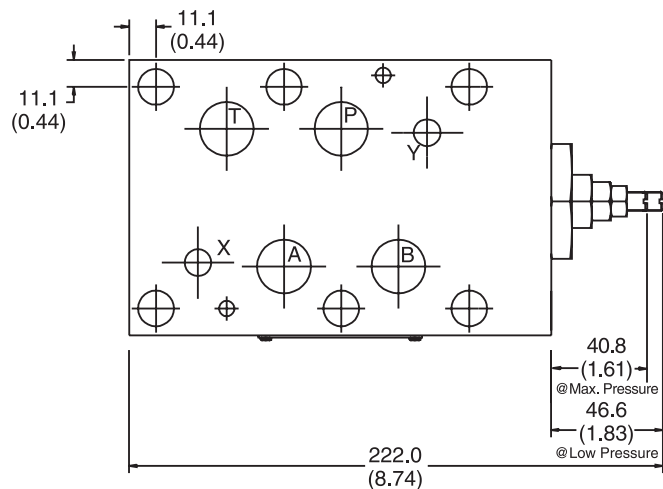
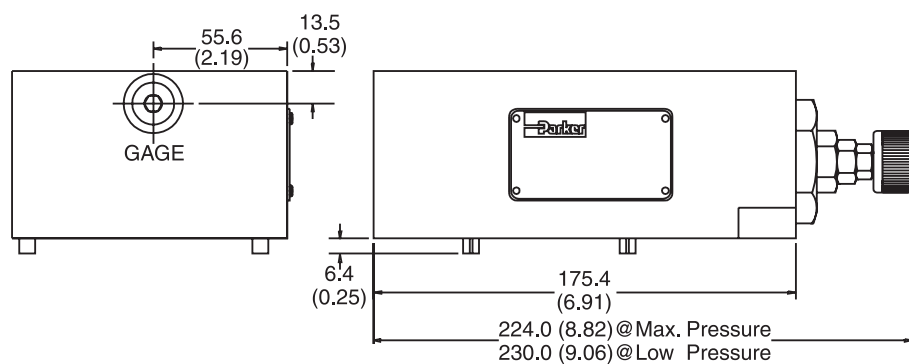
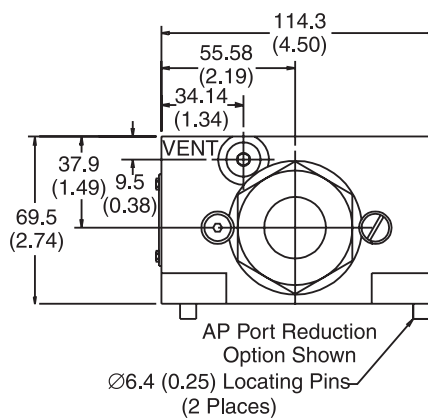
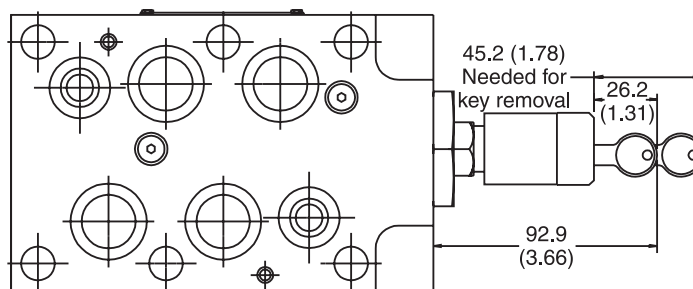
Face View



Bottom View



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

B**Top View****Face View****End View****Bottom View**

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.

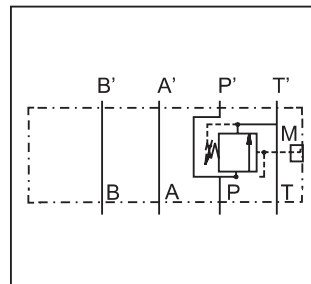
For TT, pressure is relieved from T to T at the adjusted pressure.

Features

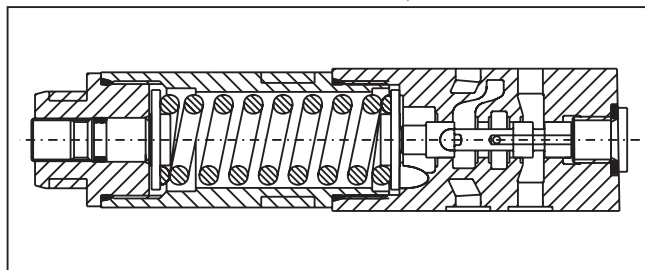
- The direct operated, cushioned piston design results in fast response, low leakage and minimal hysteresis.
- Up to 5 pressure adjustment ranges are available with maximum pressure settings of:
 - For RDM2 – 25, 64, 160, 210, 350 Bar (363, 928, 2320, 3045, 5075 PSI)
 - For RDM3 – 19, 50, 100, 150, 210 Bar (276, 725, 1450, 2175, 3045 PSI)
- Adjustment modes:
 - Slotted head with lock nut
 - Key lock
 - Knob
- RDM2 – NG06 (CETOP3)
- RDM3 – NG10 (CETOP5)



RDM2



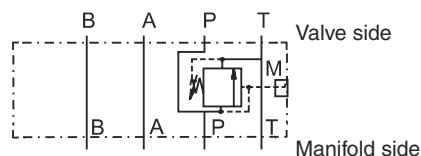
Example PT



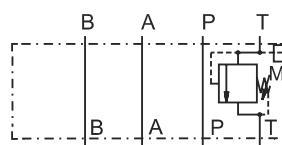
RDM2

Schematics

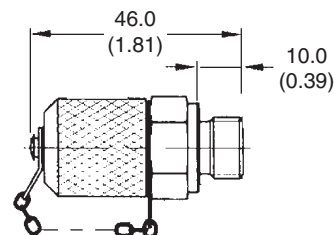
RDM*PT



RDM*TT



Gauge Port Option C



Specifications

General		
Series	RDM2	RDM3
Size	D03, CETOP3, NG6	D05, CETOP5, NG10
Mounting	NFFA, CETOP RP121, DIN 24340, ISO 4401	
MTTF _d Value	150 years	
Ambient Temperature	-20°C ... +50°C (-4°F...+122°F)	
Hydraulic		
Maximum Operating Pressure	Port P, A, B: 350 Bar (5075 PSI) Port T: 50 Bar (725 PSI)	Port P, A, B: 315 Bar (4495 PSI) Port T: 10 Bar (145 PSI)
Fluid	Hydraulic oil according to DIN 51524...525	
Fluid Temperature	-20°C ... +80°C (-4°F...+176°F)	
Viscosity Range	12...230 cSt / mm²/s (13...1854 SSU)	
Filtration	ISO 4406 (1999); 18/16/13 (meet NAS 1638: 7)	
Max. Flow – Maximum Leakage P - A 5ml/min (0.001 GPM)	40 LPM (11 GPM)	80 LPM (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.

B01_Cat2500.indd, ddp, 04/19

B

RDM

Direct
Operated
Relief
Valve

Size

Code	Description
2	NFPA D03, CETOP3, NG6
3	NFPA D05, CETOP5, NG10

Pressure
Relief

Code	Description
PT	P to T
TT *	T to T

* RDM2 only, maximum
160 Bar (2320 PSI)

Pressure
Range

Code	Description – RDM2	Code	Description – RDM3
02	1.5 to 25 Bar (22 to 363 PSI)	01	1.5 to 19 Bar (22 to 276 PSI)
06	1.5 to 64 Bar (22 to 928 PSI)	05	1.5 to 50 Bar (22 to 725 PSI)
16	3 to 160 Bar (44 to 2320 PSI)	10	3 to 100 Bar (44 to 1450 PSI)
21	3 to 210 Bar (44 to 3045 PSI)	15	3 to 150 Bar (44 to 2175 PSI)
35	5 to 350 Bar (73 to 5075 PSI)	21	3 to 210 Bar (44 to 3045 PSI)

Adjustment

Code	Description
S	Hexagon Socket
L	Key Lock
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.

Weight:

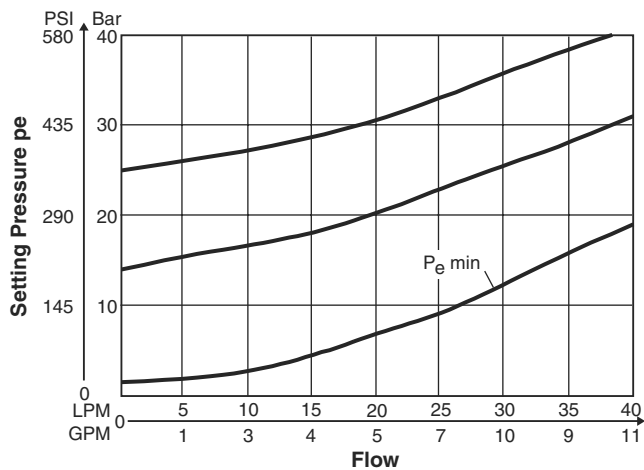
RDM2 1.3 kg (2.9 lbs.)

RDM3 2.6 kg (5.8 lbs.)

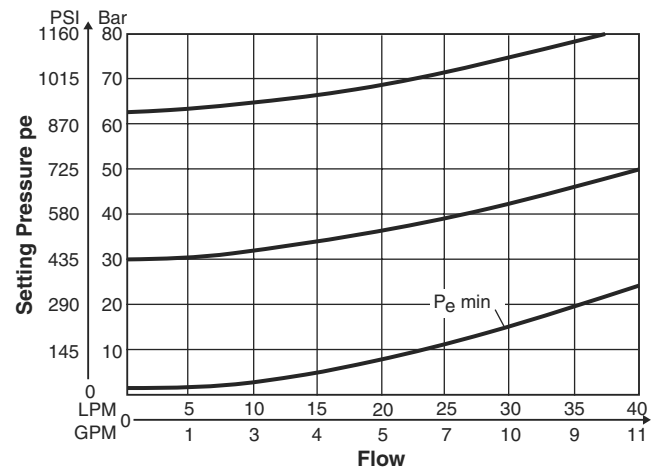
Bold: Designates Tier I products and options.

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

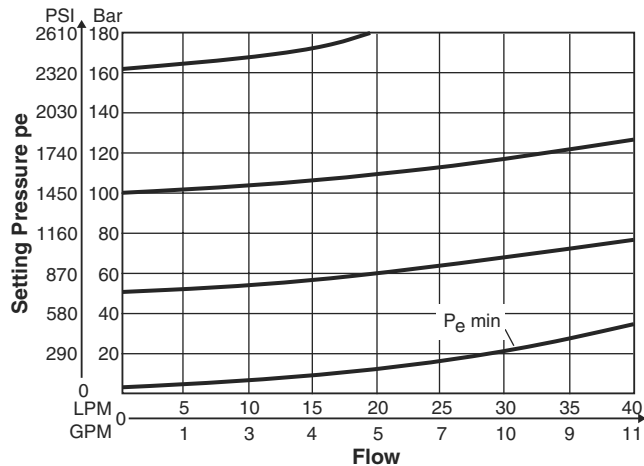
RDM2 02



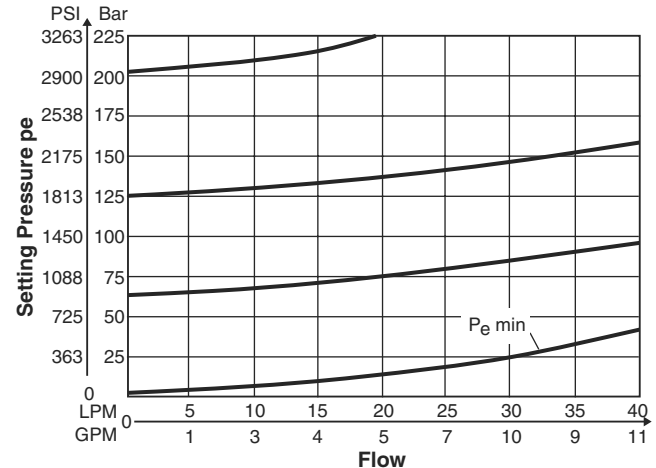
RDM2 06



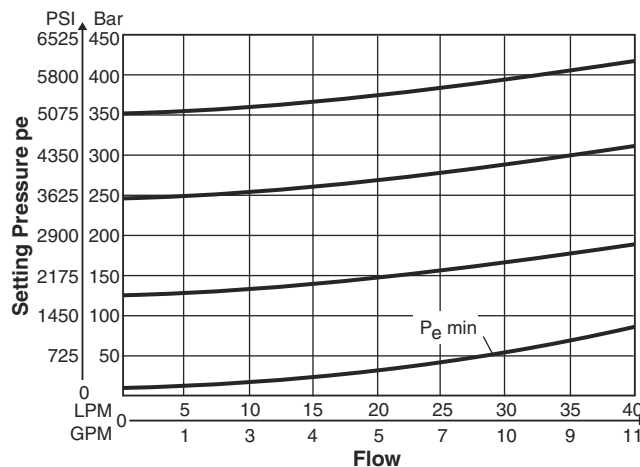
RDM2 16



RDM2 21

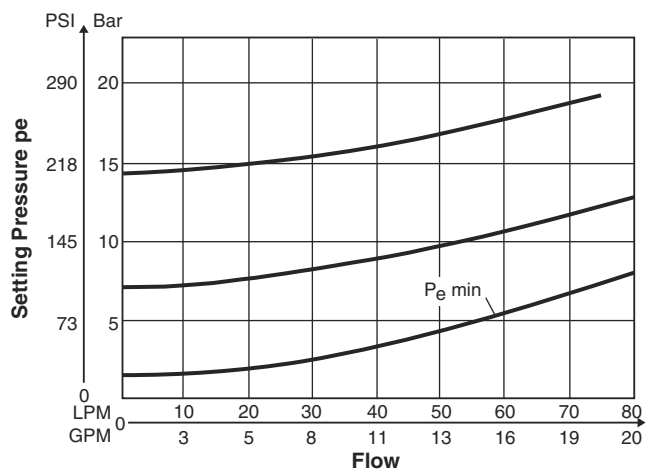


RDM2 35

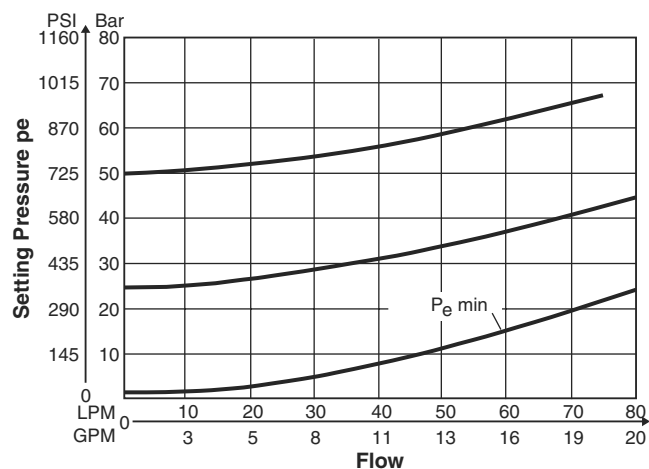


All performance curves measured with HLP46 at 50°C (122°F).

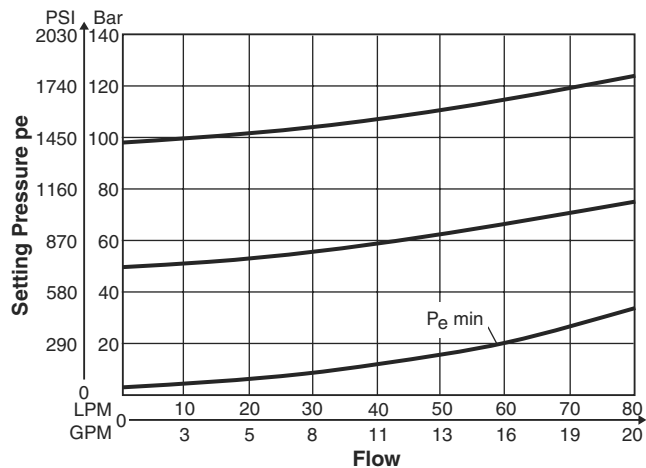
RDM3 01



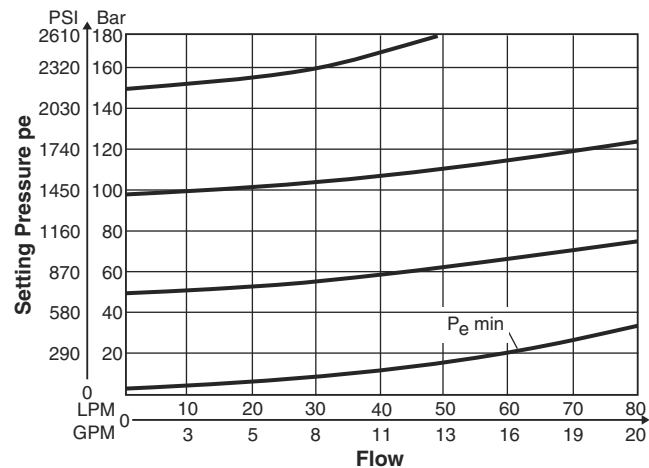
RDM3 05



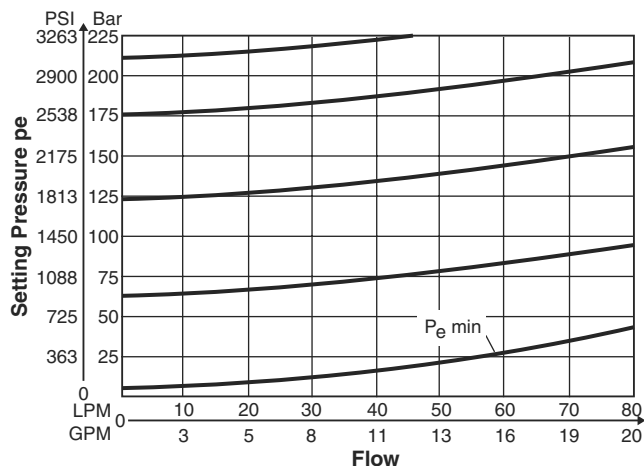
RDM3 10



RDM3 15

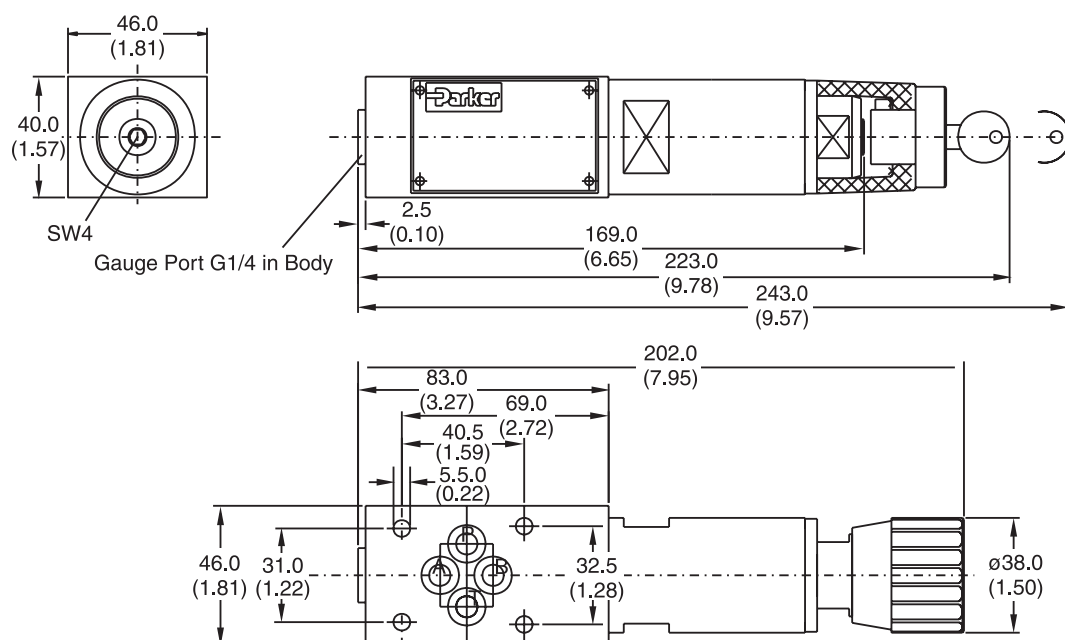
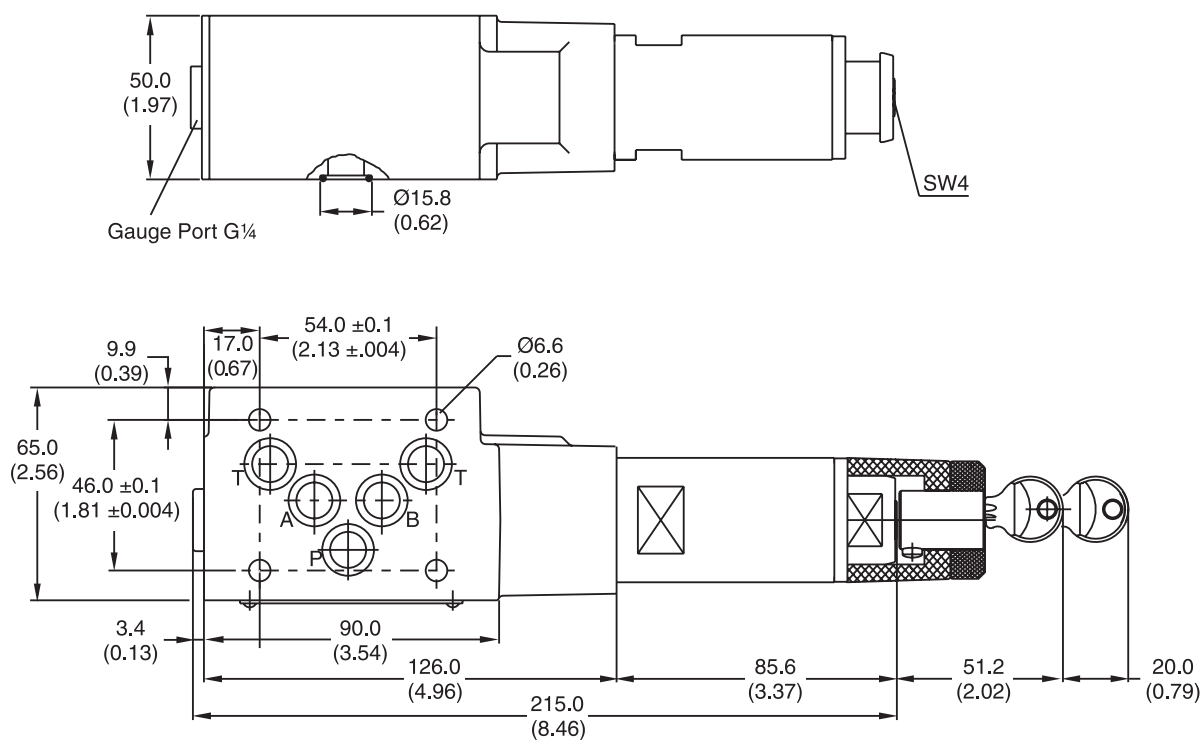


RDM3 21



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

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.

B

Features

- RM sandwich style relief valves can be used to limit pressure in the 'P' port, 'A' port, or 'B' port.
- Valve bodies are manufactured from steel which provide extra strength and durability for longer life. Internal hardened steel components also provide longer life.
- Three pressure adjustment options are available: slotted screw, knob and locking knob.
- SAE Gage Port

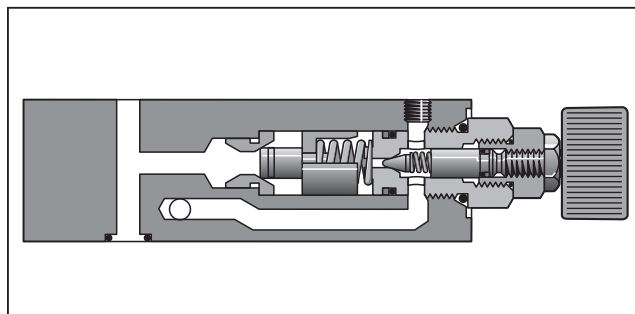
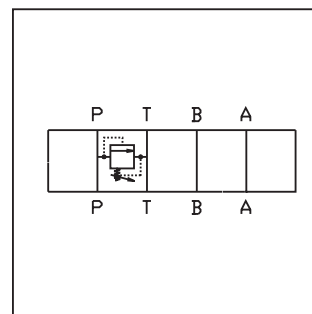
Specifications

	RM2	RM3	RM6
Mounting Pattern	NFPA D03, CETOP 3, NG 6	NFPA D05, CETOP 5, NG 10	NFPA D08, CETOP 8, NG 25
Minimum Pressure	10 Bar (150 PSI) with rated flow, 150 SSU oil, and fluid temperature of 38°C (100°F). ¹		
Maximum Pressure	350 Bar (5000 PSI)	350 Bar (5000 PSI)	350 Bar (5000 PSI)
Minimum Flow	3.78 LPM (1 GPM)	3.78 LPM (1 GPM)	3.78 LPM (1 GPM)
Maximum Flow	53 LPM (14 GPM)	76 LPM (20 GPM)	341 LPM (90 GPM)
Pressure Range	Code Pressure Range 07 10 to 70 Bar (150 - 1000 PSI) 17 10 to 175 Bar (150 - 2500 PSI) 25 10 to 250 Bar (150 - 3500 PSI) 35 10 to 350 Bar (150 - 5000 PSI)		
Filtration	ISO 4406 (1999); 18/16/13 (meet NAS 1638:7)		
Venting	Connecting the vent port to tank allows the relief valve to divert flow at minimum pressure. ²		
Remote Control	Remote control valve connected to the vent port can be used to control the pressure. ³		

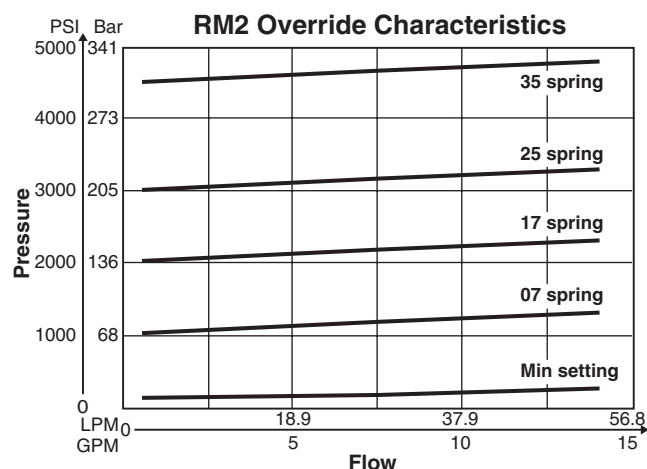
¹ Change in flow, temperature or fluid (SSU) rating will affect valve minimum pressure.

² Not available on Model RM2.

³ Set main valve pressure 10 Bar (150 PSI) higher than remote pilot.



Performance Curves



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

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

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.

B01_Cat2500.indd, ddp, 04/19

RM

Relief Valve

Size

Port Option

Pressure Range

Adjustment

Seal

*

Design Series

NOTE:
Not required when ordering.

Code	Description
2	NFPA D03 Subplate Mounting
3	NFPA D05 Subplate Mounting
6	NFPA D08 Subplate Mounting

Code	Type
N	Nitrile
V	Fluorocarbon

Code	Description
PT	Relief P to T
AT*	Relief A to T
BT*	Relief B to T

* RM2 only.

Code	Description
07	10 to 70 Bar (150 to 1000 PSI)
17	10 to 175 Bar (150 to 2500 PSI)
25	10 to 250 Bar (150 to 3500 PSI)
35	10 to 350 Bar (150 to 5000 PSI)

Code	Type
K	Knob
L	Locking Knob
S	Slotted Screw with Jam Nut

Unit Weight:

RM2 .95 kg (2.1 lbs.)

RM3 3.0 kg (6.6 lbs.)

RM6 5.9 kg (13.0 lbs.)

Bold: Designates Tier I products and options.

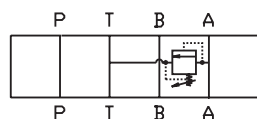
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

Bolt Kits

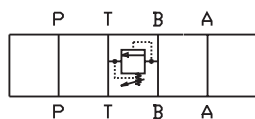
Size "2"				Size "3"			
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)	No. of Sandwich	Sandwich & Valve Combination	D3W-30 D3DW & D31*W*	Bolt Length mm (in)
1	Sandwich & D1	BK243	73.2 (2.88)	1	Sandwich & D3	BK141	88.9 (3.50)
2	Sandwich & D1	BK225	111.3 (4.38)	2	Sandwich & D3	BK142	139.7 (5.50)
3	Sandwich & D1	BK244	152.4 (6.00)	3	Sandwich & D3	BK143	190.5 (7.50)
4	Sandwich & D1	BK245	190.5 (7.50)	* D31VW with internal pilot and internal drain only.			
Size "6"							
No. of Sandwich	Sandwich & Valve Combination	Bolt Kit	Bolt Length mm (in)				
1	Sandwich & D6	BK121	133.4 (5.25)				
2	Sandwich & D6	BK122	203.2 (8.00)				
3	Sandwich & D6	BK123	273.1 (10.75)				
4	Sandwich & D6	BK124	342.9 (13.5)				

Bolt Kits must be ordered separately.

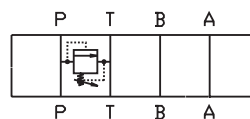
Schematics



AT Option

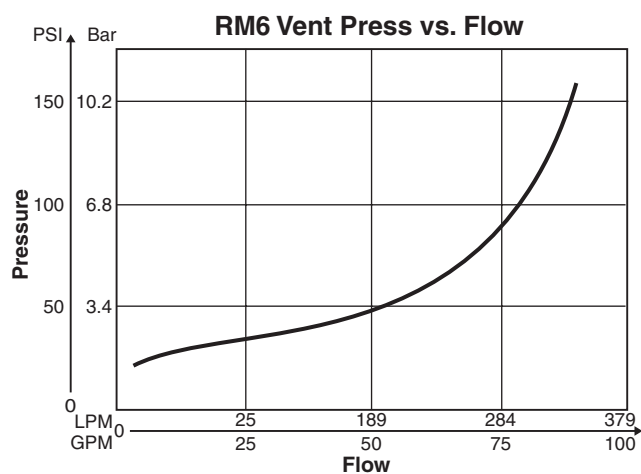
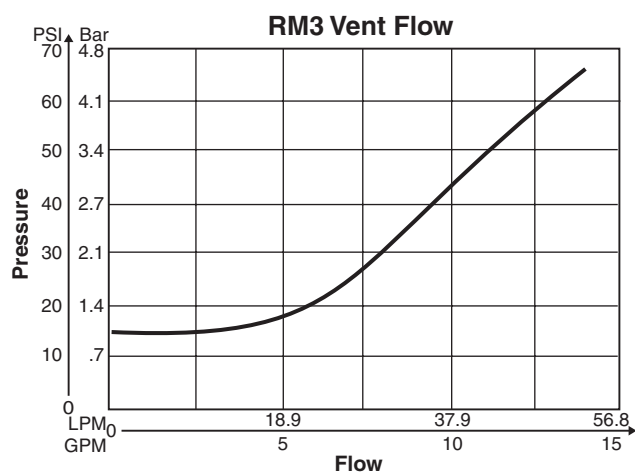
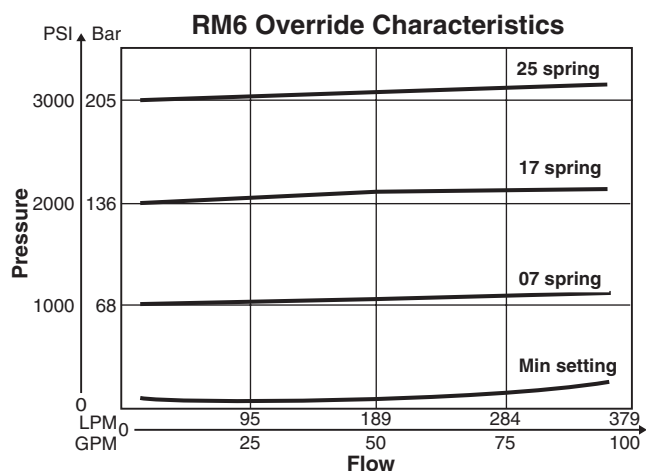
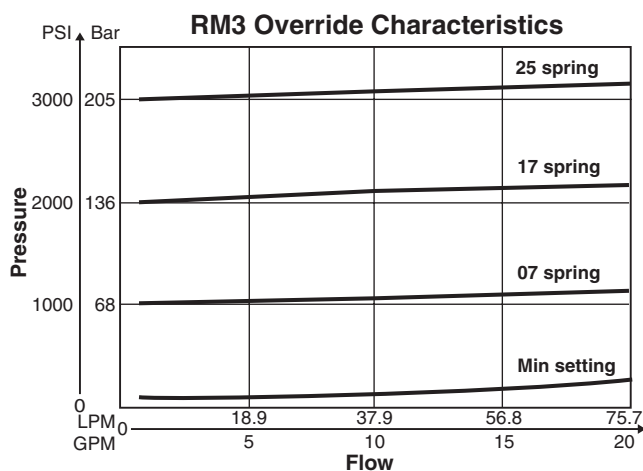


BT Option



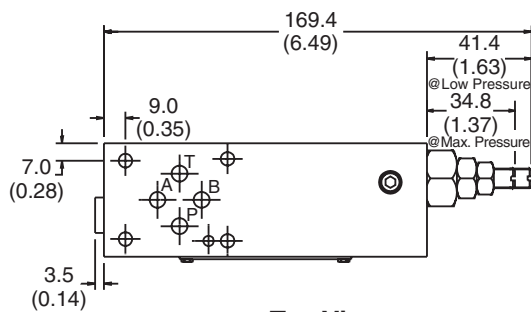
PT Option

B

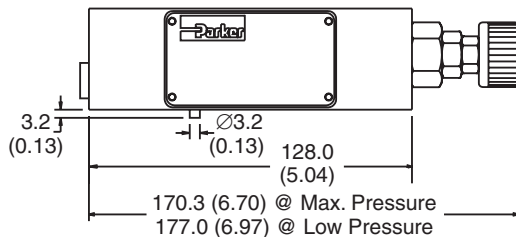
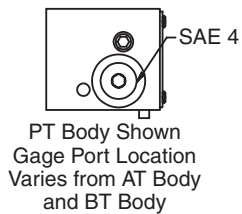


VISCOSITY CORRECTION FACTOR							
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141
Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change per chart.							

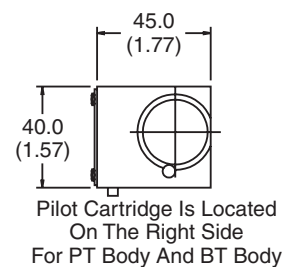
Inch equivalents for millimeter dimensions are shown in (**)

B

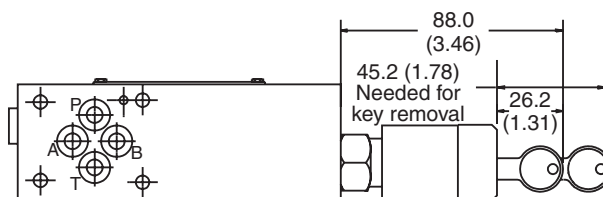
Top View



Face View



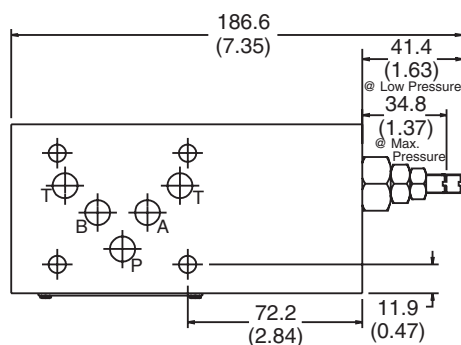
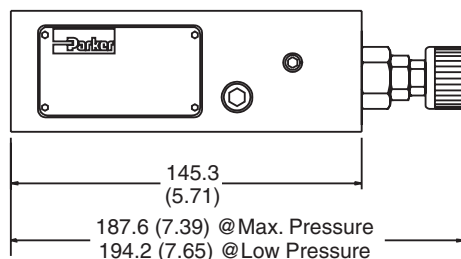
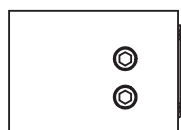
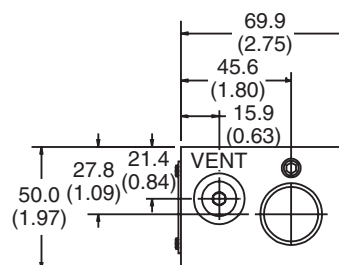
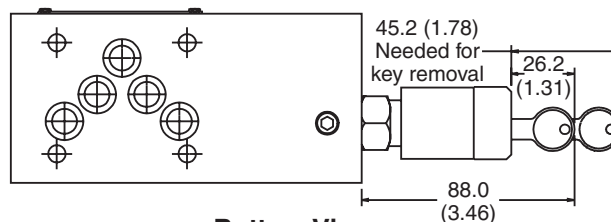
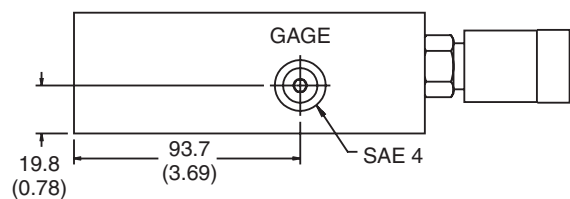
End View



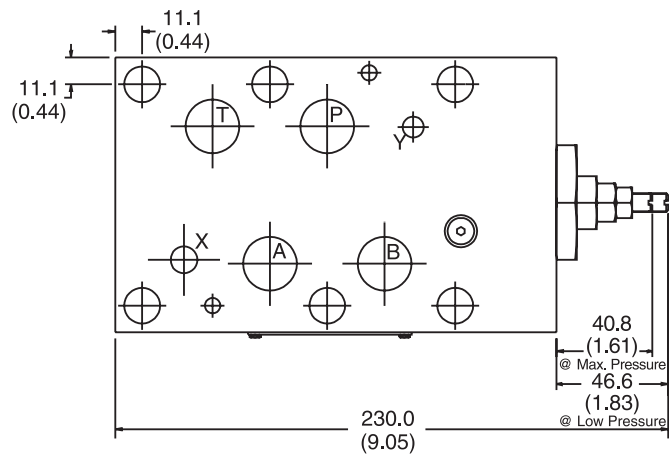
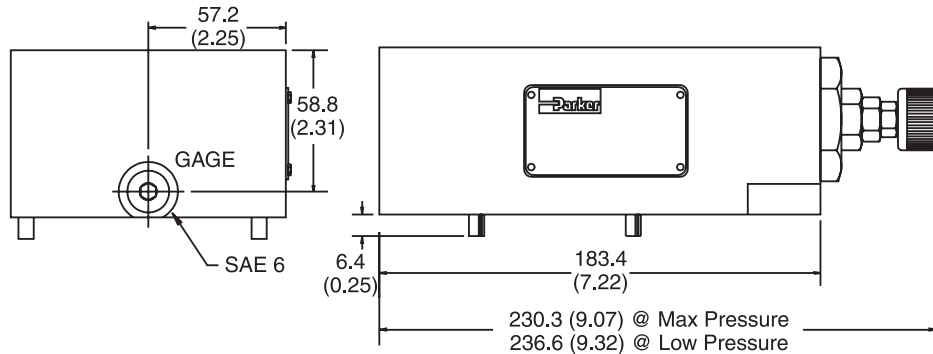
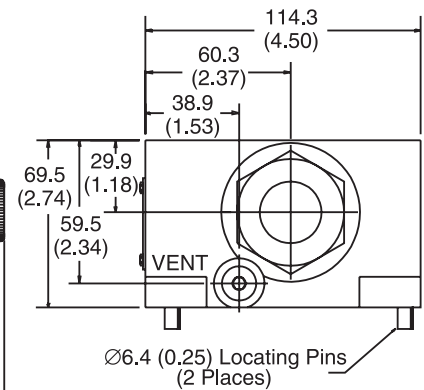
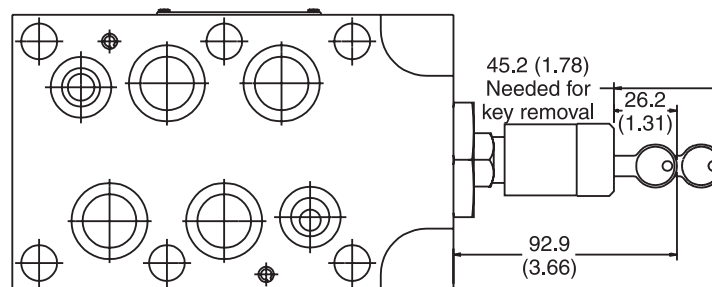
Bottom View



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

**Top View****Face View****End View****Bottom View****Back View**

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

**Top View****Face View****End View****Bottom View**

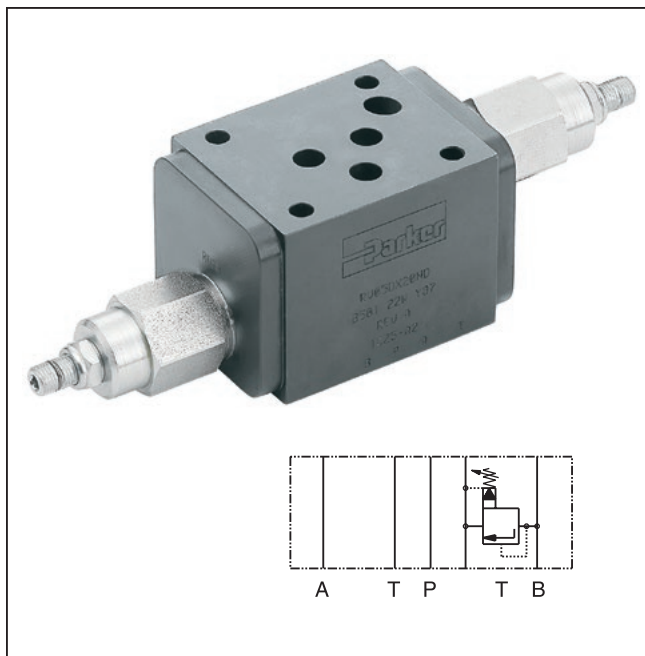
General Description

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.

B

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



Specifications

General				
Size	D05 / NG10	D05HE / NG10	D07 / NG16	D08 / NG25
Mounting Position	Unrestricted			
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure	Aluminum Body – up to 207 Bar (3000 PSI); Ductile Iron Body – up to 345 Bar (5000 PSI)			
Nominal Flow	189 LPM (50 GPM)	189 LPM (50 GPM)	189 LPM (50 GPM)	378 LPM (100 GPM)
Leakage	10 DPM	10 DPM	10 DPM	10 DPM
Reseat Pressure	> 90% Setting			
Adjustment Screw Hex Size	5/32	5/32	5/32	5/32
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)		
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			

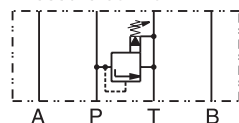
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.
 B01_Cat2500.indd, ddp, 04/19

RV Pressure Relief Valve	Size	Style	Pressure Range	Seal	Body Material																																		
<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>03</td> <td>See RM2</td> </tr> <tr> <td>05</td> <td>NFPA D05 / NG10</td> </tr> <tr> <td>5H*</td> <td>NFPA D05HE / NG10</td> </tr> <tr> <td>07</td> <td>NFPA D07 / NG16</td> </tr> <tr> <td>08</td> <td>NFPA D08 / NG25</td> </tr> </tbody> </table> <p>* Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.</p>	Code	Description	03	See RM2	05	NFPA D05 / NG10	5H*	NFPA D05HE / NG10	07	NFPA D07 / NG16	08	NFPA D08 / NG25		<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>69 Bar (1000 PSI)**</td> </tr> <tr> <td></td> <td>34.5 to 207 Bar (500 to 3000 PSI)</td> </tr> <tr> <td>20*</td> <td>69 Bar (1000 PSI)**</td> </tr> <tr> <td></td> <td>69 to 414 Bar (1000 to 6000 PSI)</td> </tr> </tbody> </table> <p>* Ductile iron body only. ** Standard setting.</p>	Code	Description	10	69 Bar (1000 PSI)**		34.5 to 207 Bar (500 to 3000 PSI)	20*	69 Bar (1000 PSI)**		69 to 414 Bar (1000 to 6000 PSI)		<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>N</td> <td>Nitrile</td> </tr> <tr> <td>V*</td> <td>Fluorocarbon</td> </tr> </tbody> </table> <p>* Upon request.</p>	Code	Description	N	Nitrile	V*	Fluorocarbon	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Aluminum</td> </tr> <tr> <td>D</td> <td>Ductile Iron</td> </tr> </tbody> </table>	Code	Description	A	Aluminum	D	Ductile Iron
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B

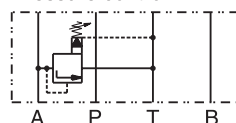
RVPT**

Pressure control P-T



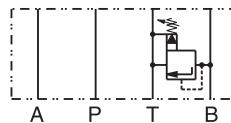
RVAT**

Pressure control A-T



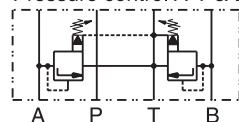
RVBT**

Pressure control B-T



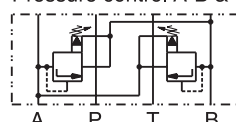
RVDT**

Pressure control A-T & B-T



RVDX**

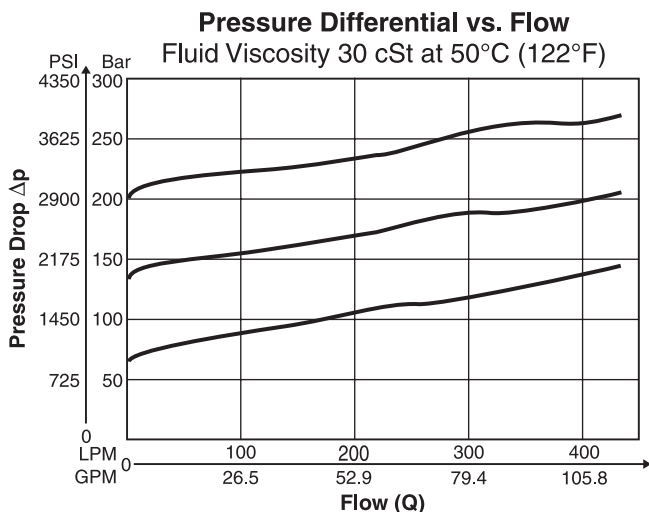
Pressure control A-B & B-A



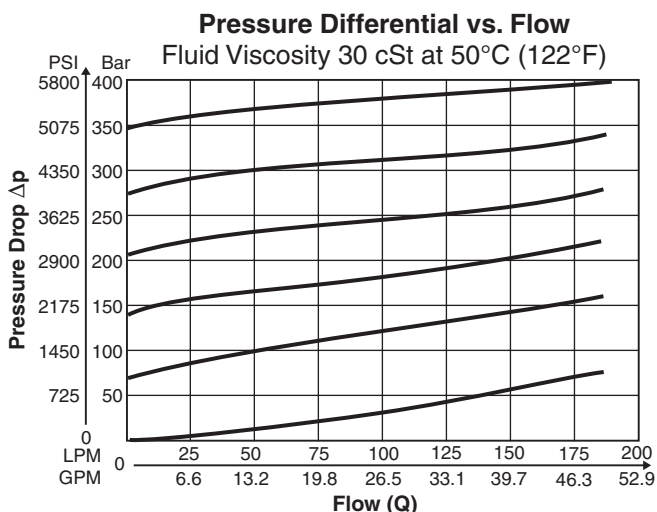
Weight:

Size	RV**AT30NA	RV**AT30ND	RV**BT30NA	RV**BT30ND	RV**DT30NA	RV**DT30ND	RV**DX30NA	RV**DX30ND	RV**PT30NA	RV**PT30ND
RV05, RV5H	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 lbs.)	2.6 kg (5.7 lbs.)	1.0 kg (2.2 lbs.)	2.2 kg (4.8 lbs.)
RV07	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.)
RV08	3.9 kg (8.6 lbs.)	9.1 kg (20 lbs.)	3.8 kg (8.5 lbs.)	9 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 lbs.)

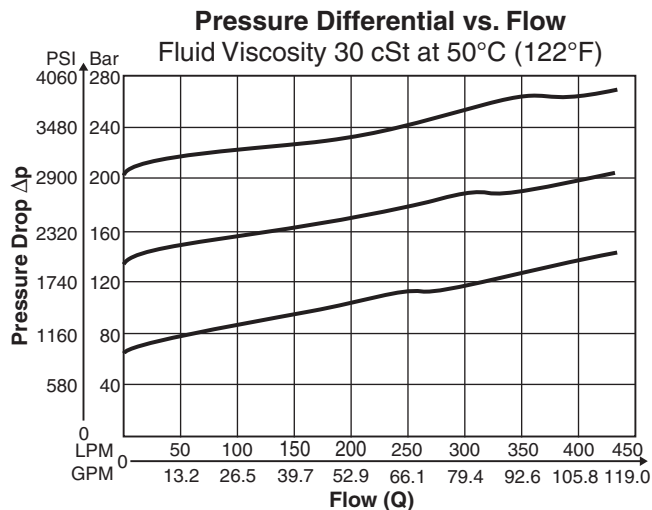
RV05*10*A, RV5H*10*A, RV07*10*A



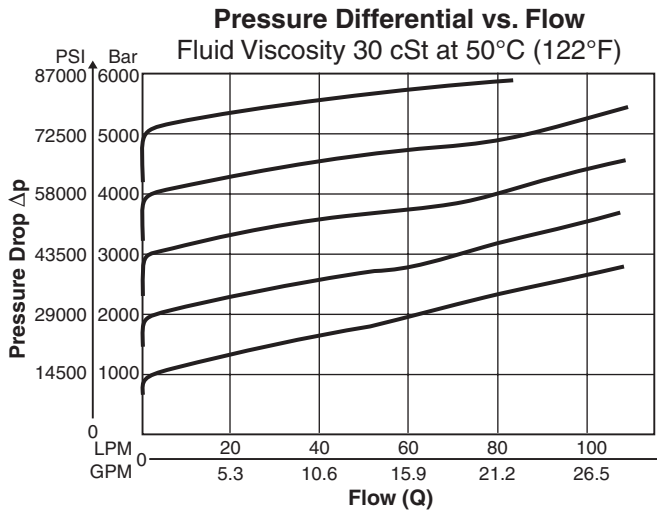
RV05*20*D, RV5H*20*D, RV07*20*D



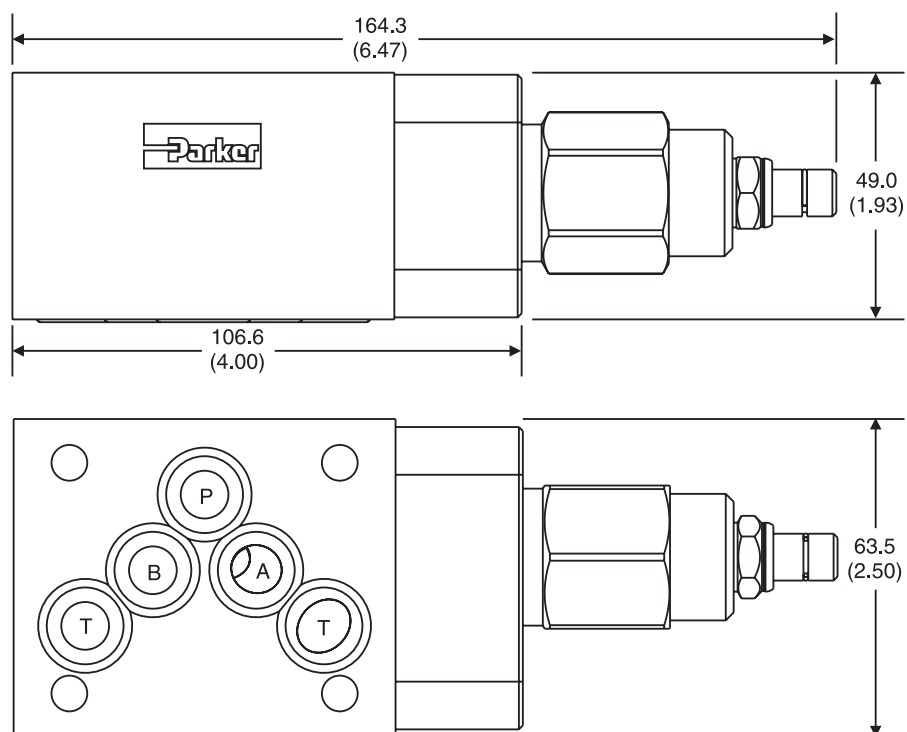
RV08*10*A



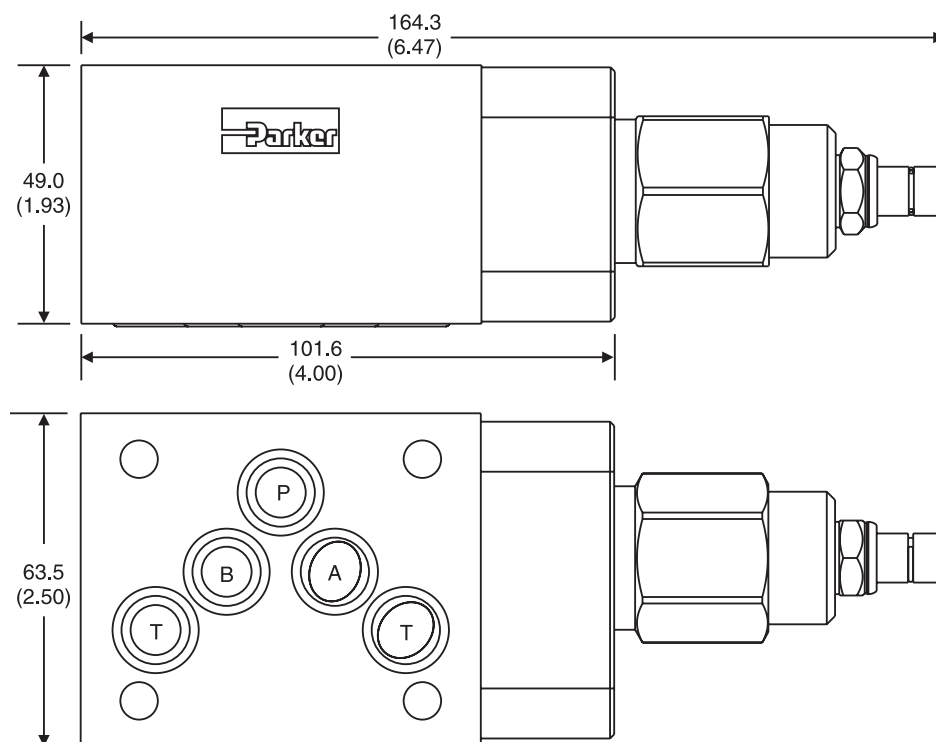
RV08*20*D

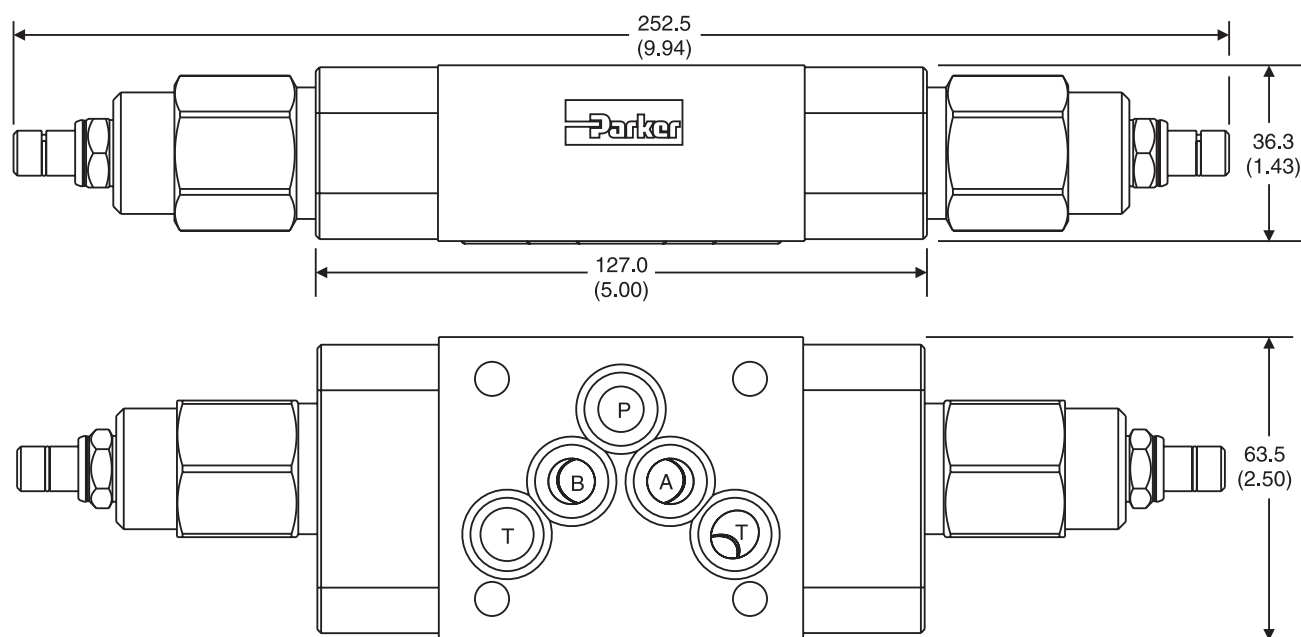
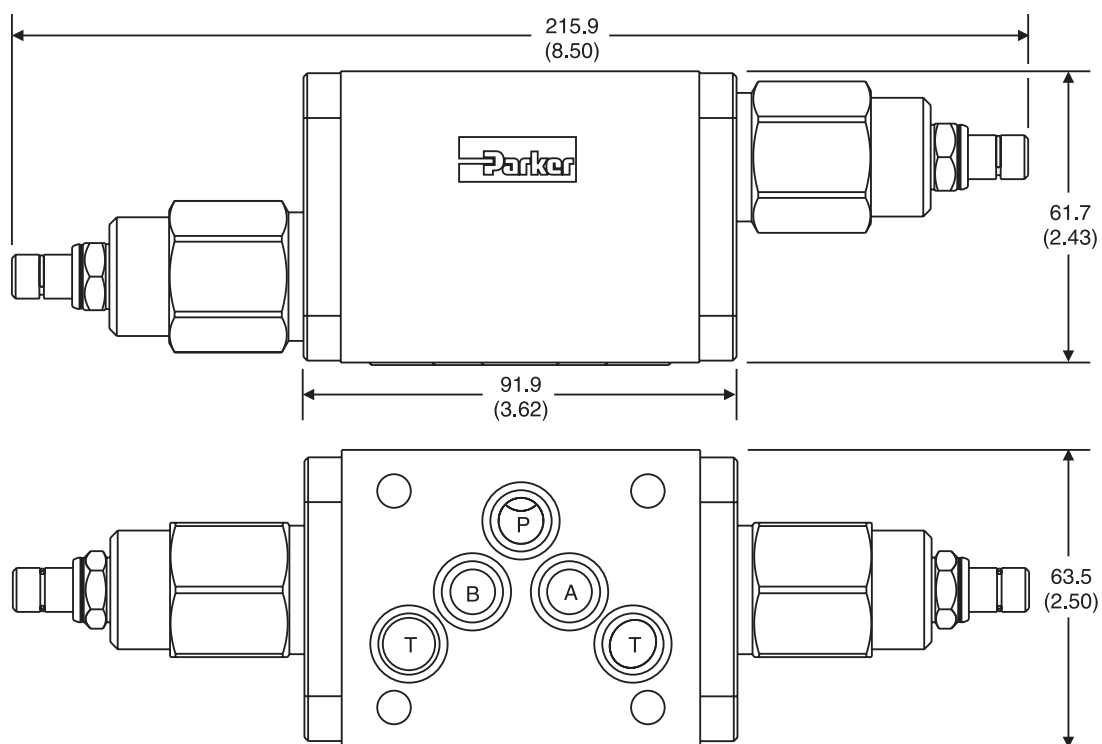


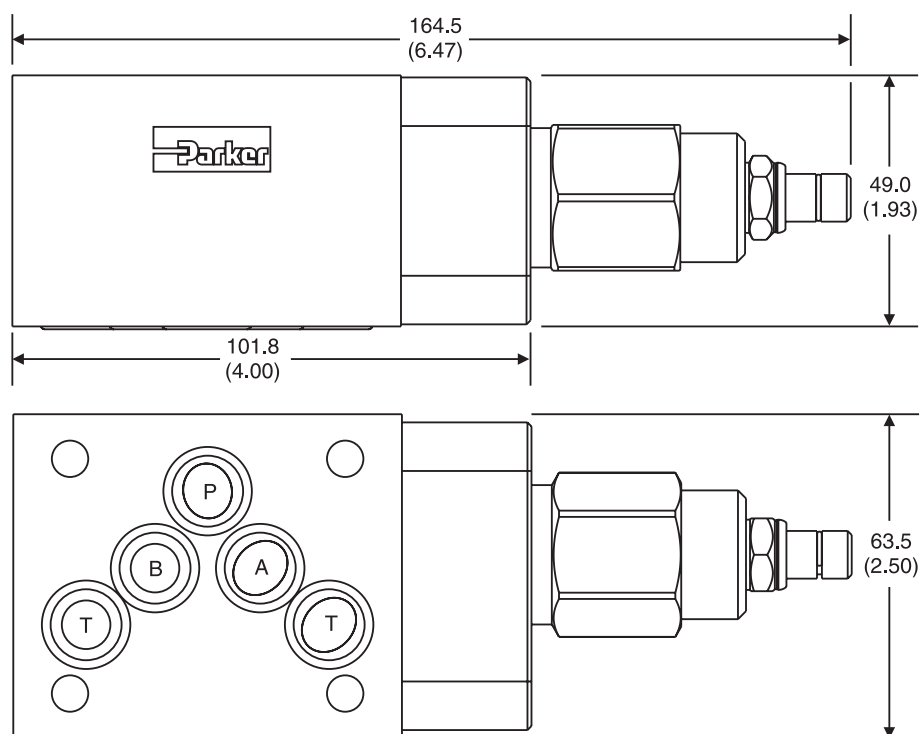
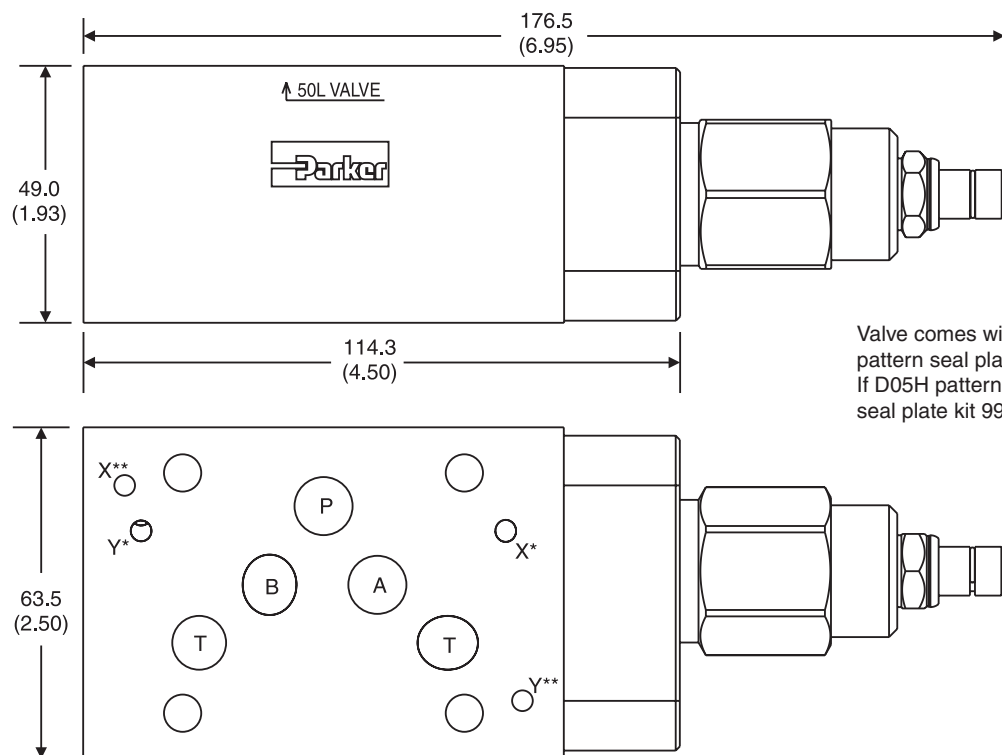
RV05AT — Inch equivalents for millimeter dimensions are shown in (**)



RV05BT — Inch equivalents for millimeter dimensions are shown in (**)



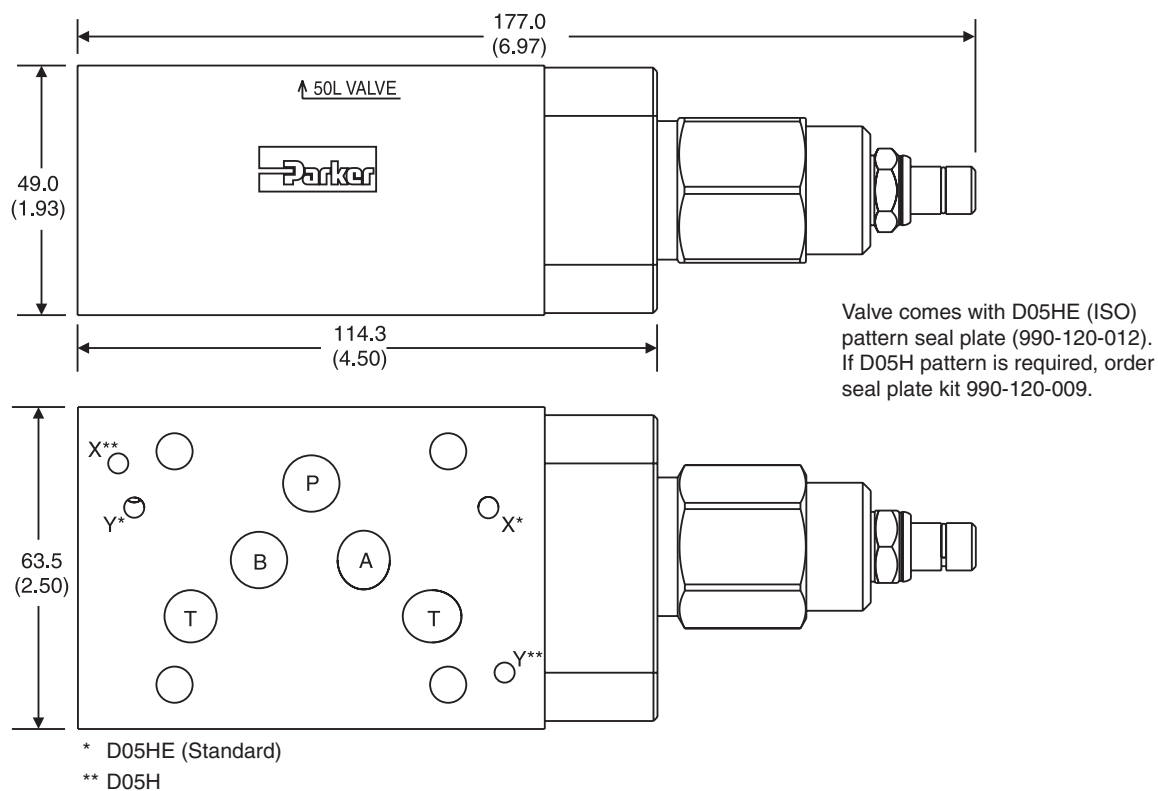
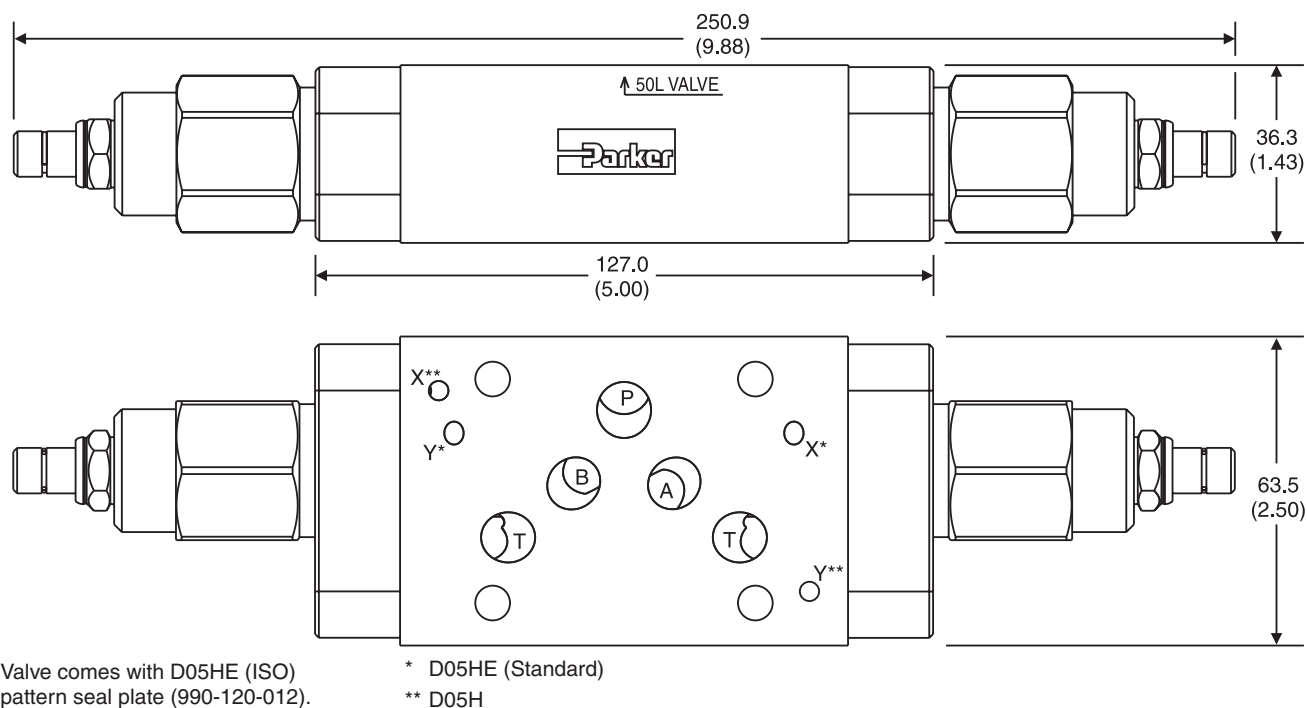
RV05DT — Inch equivalents for millimeter dimensions are shown in (**)**RV05DX** — Inch equivalents for millimeter dimensions are shown in (**)

RV05PT — Inch equivalents for millimeter dimensions are shown in (**)**RV5HAT** — Inch equivalents for millimeter dimensions are shown in (**)

Valve comes with D05HE (ISO) pattern seal plate (990-120-012). If D05H pattern is required, order seal plate kit 990-120-009.

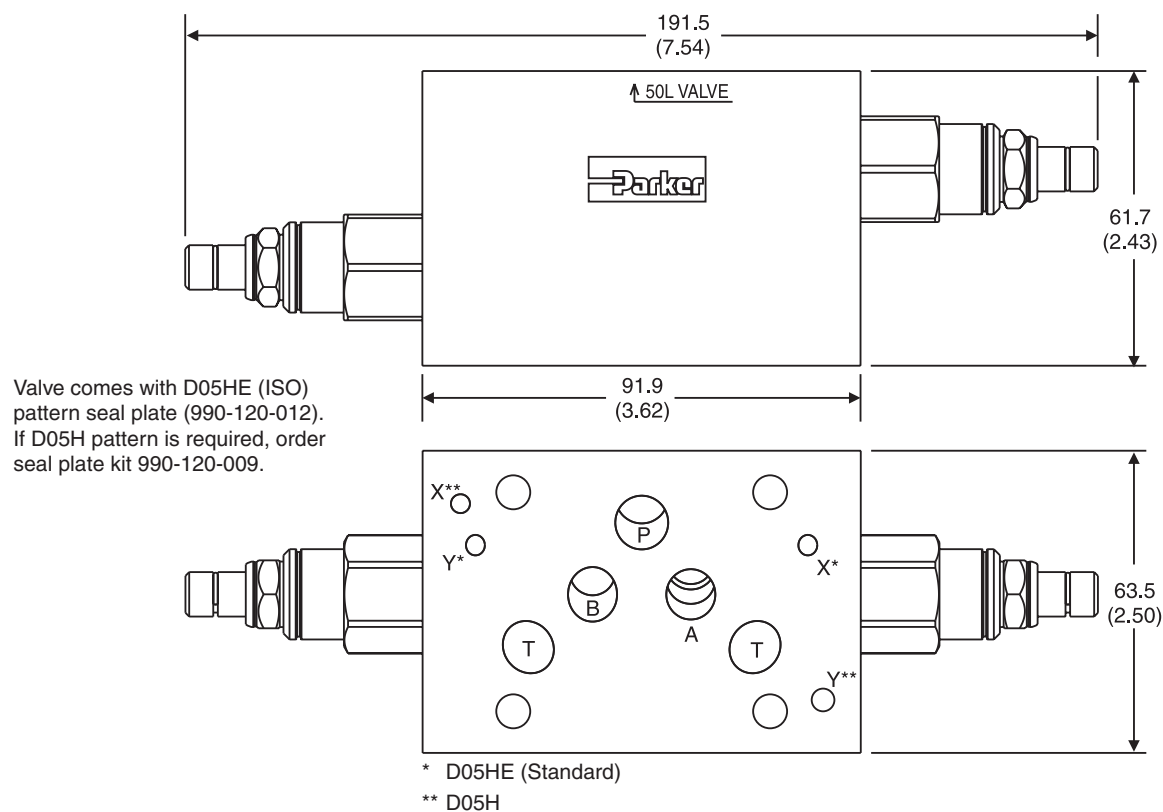
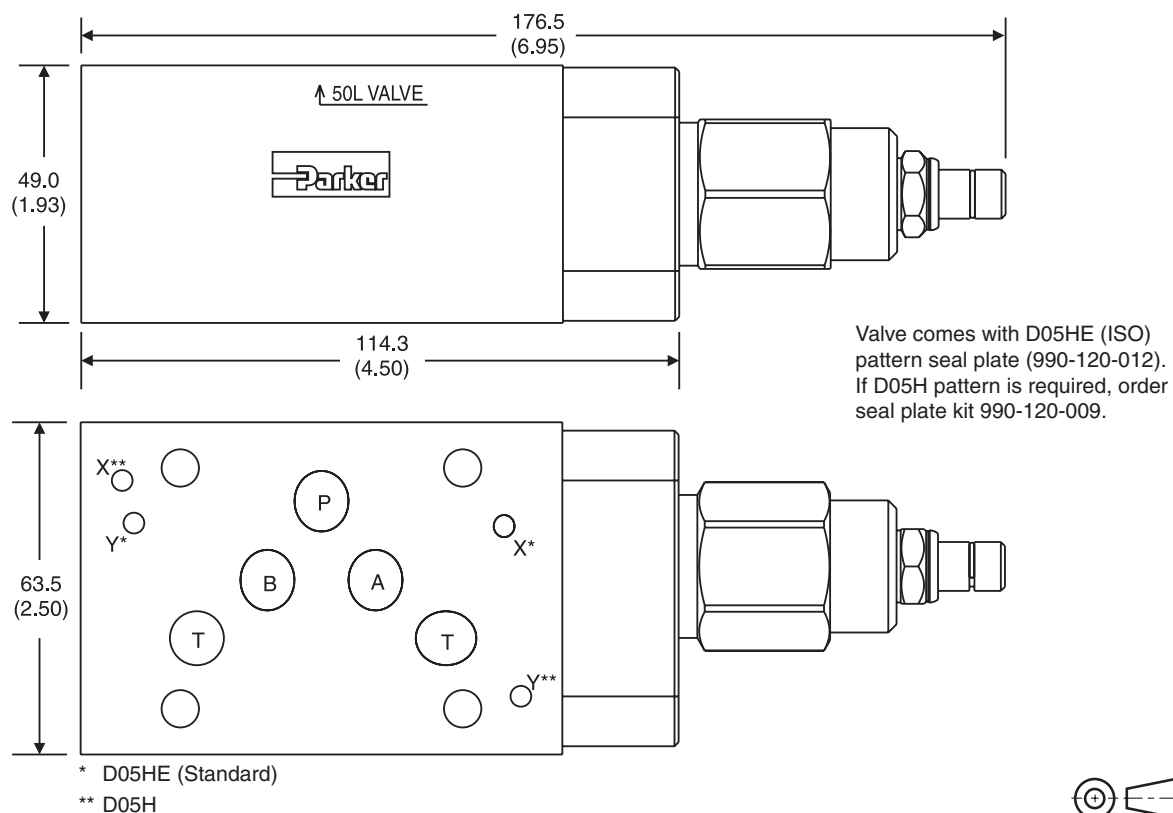
* D05HE (Standard)
** D05H



RV5HBT — Inch equivalents for millimeter dimensions are shown in (**)**RV5HDT** — Inch equivalents for millimeter dimensions are shown in (**)

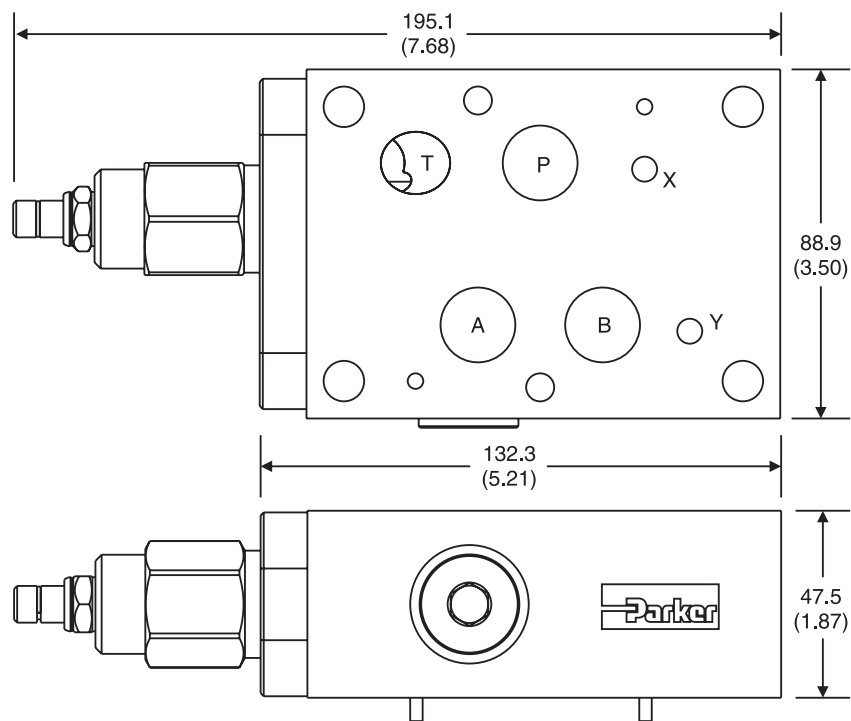
Valve comes with D05HE (ISO)
pattern seal plate (990-120-012).
If D05H pattern is required, order
seal plate kit 990-120-009.



RV5HDX — Inch equivalents for millimeter dimensions are shown in (**)**RV5HPT** — Inch equivalents for millimeter dimensions are shown in (**)

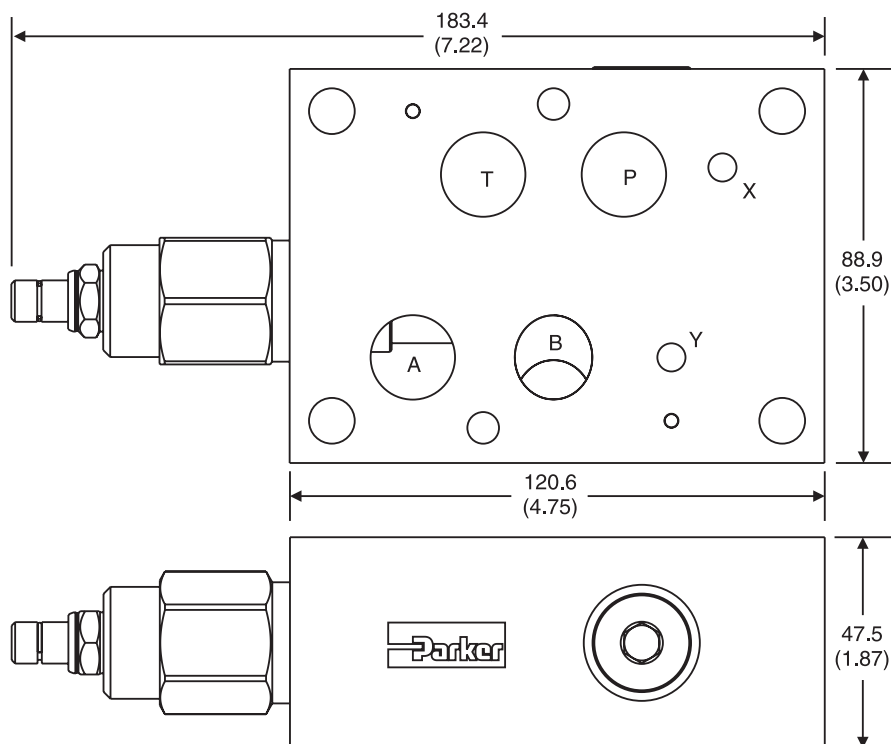
RV07AT — Inch equivalents for millimeter dimensions are shown in (**)

Note: This is a top view.



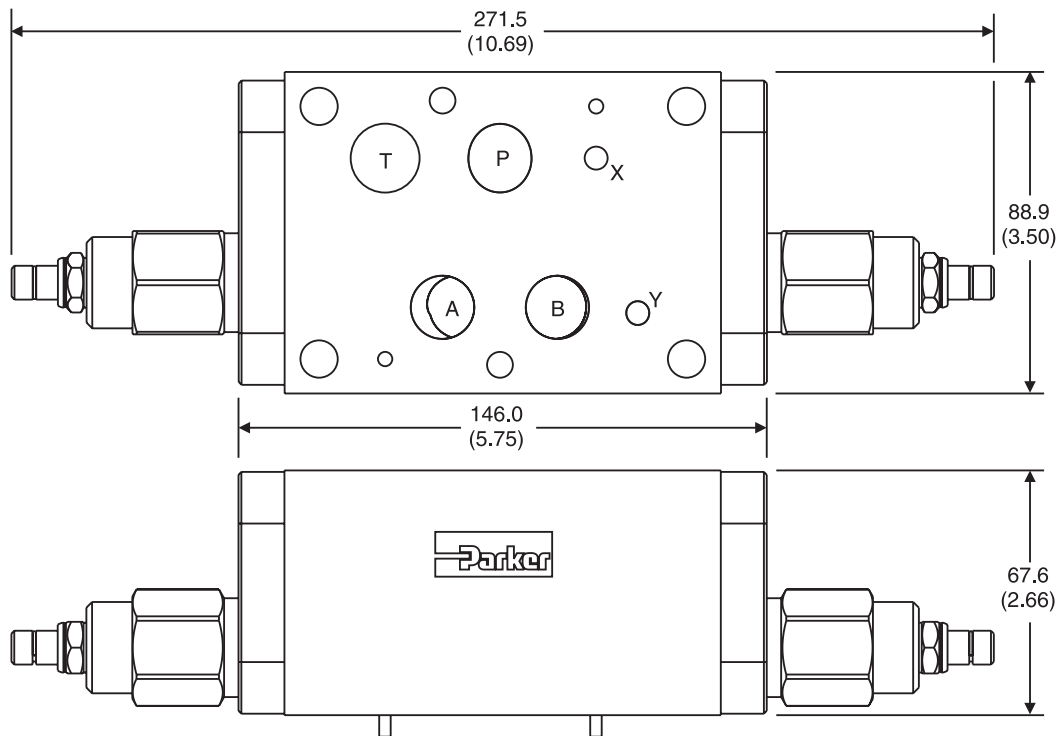
RV07BT — Inch equivalents for millimeter dimensions are shown in (**)

Note: This is a top view.

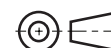
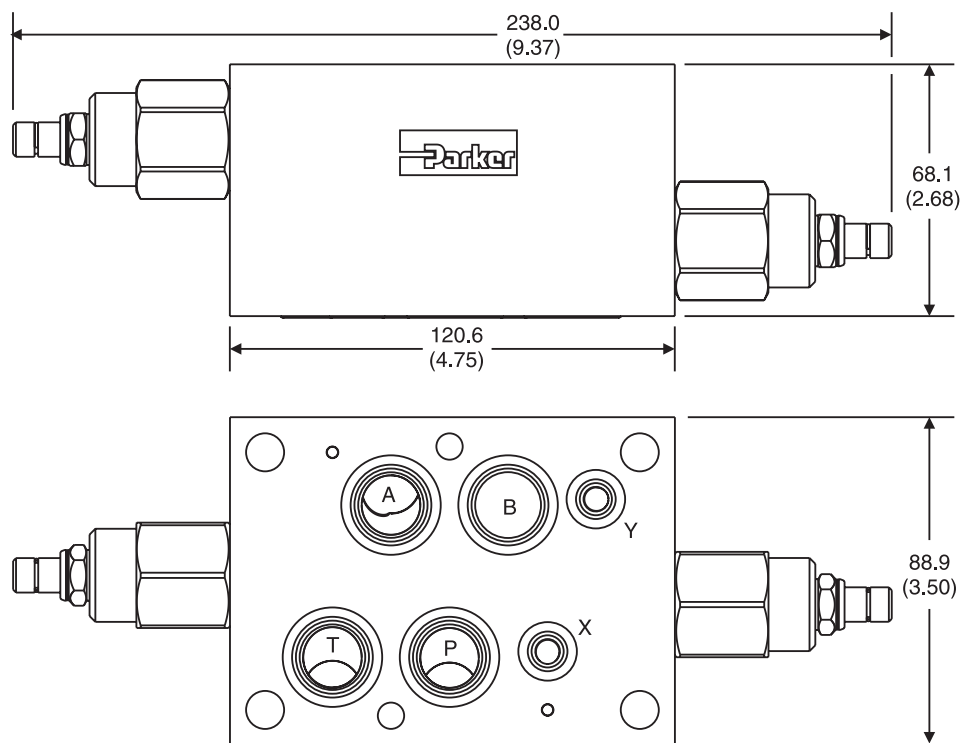


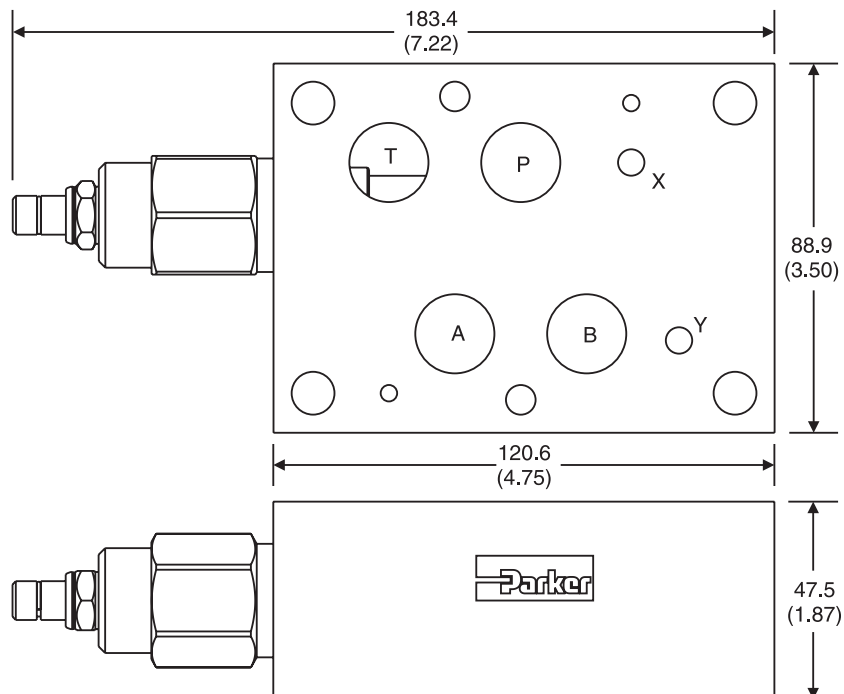
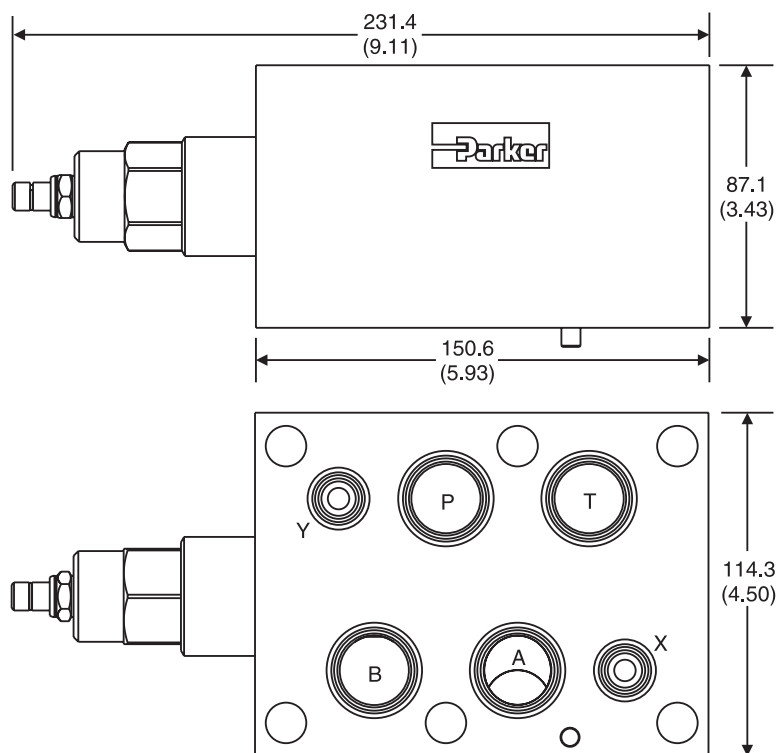
RV07DT — Inch equivalents for millimeter dimensions are shown in (**)

Note: This is a top view.

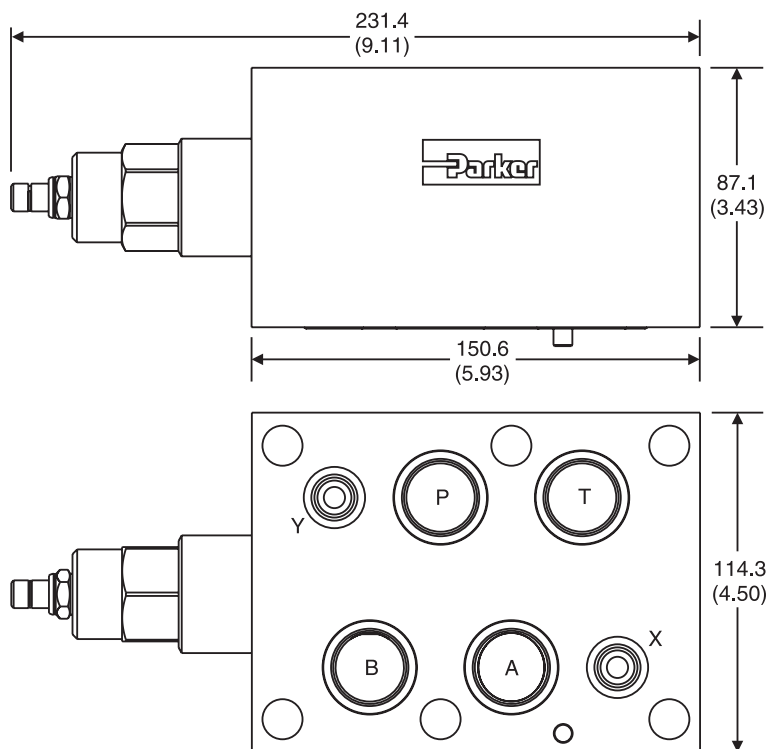


RV07DX — Inch equivalents for millimeter dimensions are shown in (**)



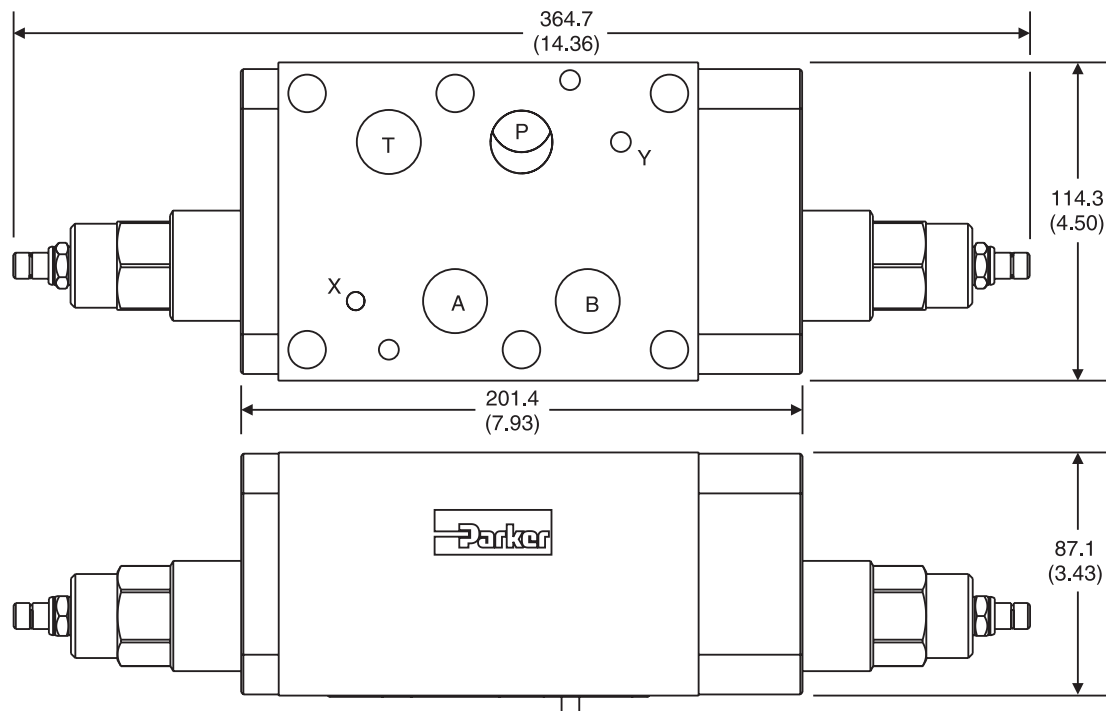
RV07PT — Inch equivalents for millimeter dimensions are shown in (**)**Note:** This is a top view.**RV08AT** — Inch equivalents for millimeter dimensions are shown in (**)

RV08BT — Inch equivalents for millimeter dimensions are shown in (**)

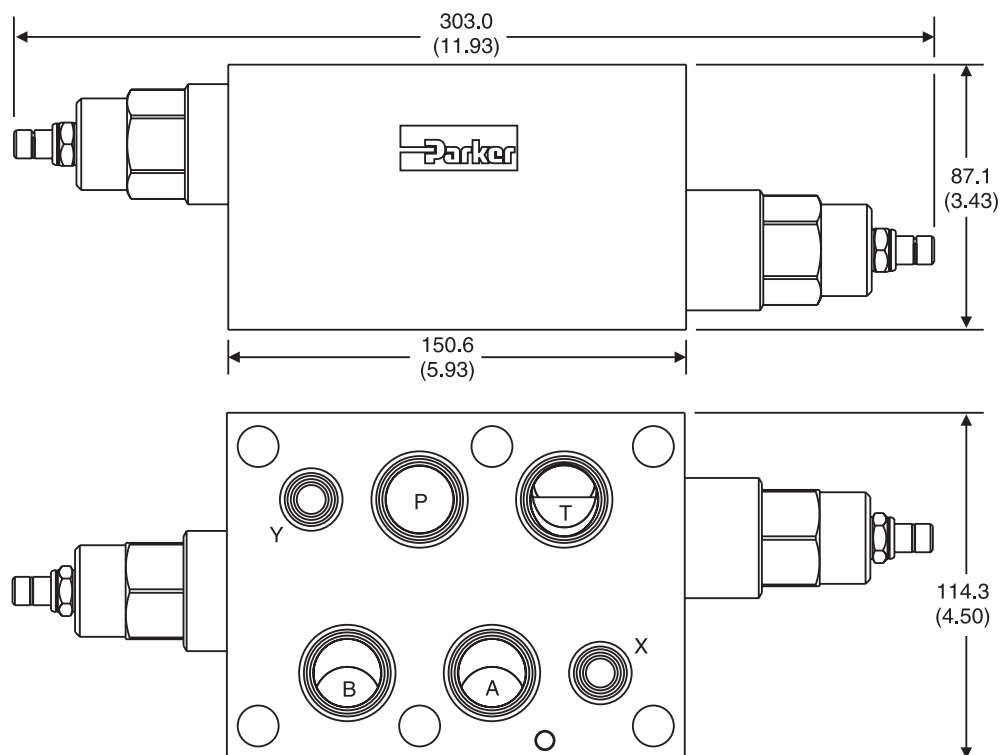


RV08DT — Inch equivalents for millimeter dimensions are shown in (**)

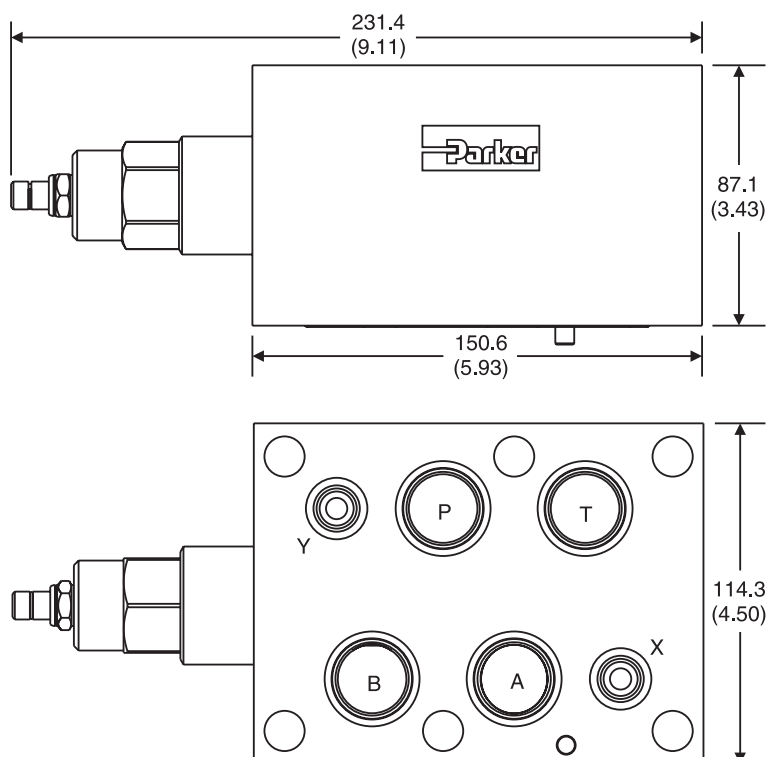
Note: This is a top view.



RV08DX — Inch equivalents for millimeter dimensions are shown in (**)



RV08PT — Inch equivalents for millimeter dimensions are shown in (**)



General Description

Series ZDR pilot operated pressure reducing valves are designed for maximum flow rates.

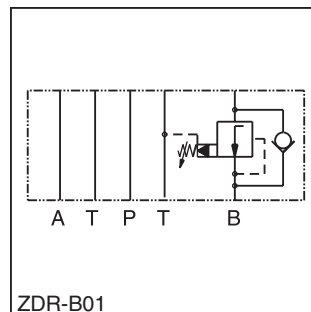
The reducing function can be located in the ports P, A or B. The sizes NG06 and NG10 are equipped with an integral return flow check valve (reducing function in A or B).

Features

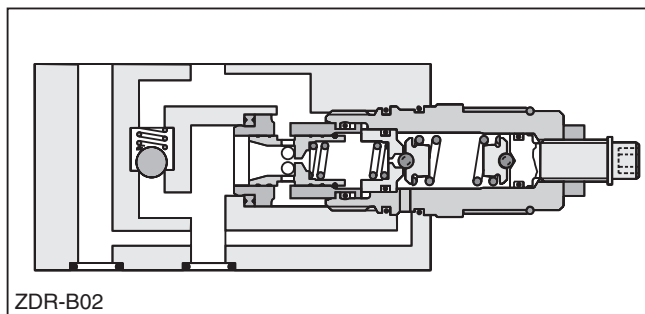
- High flow capacity.
- Sizes::
 - ZDR01 – NFPA D03 / NG6 / CETOP 3
 - ZDR02 – NFPA D05 / NG10 / CETOP 5
- With integral return flow check valve.



ZDR-P01



ZDR-B01



ZDR-B02

Specifications

General		
Size	NG6	NG10
Mounting Interface	DIN 24340 A6 ISO 4401 NFPA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFPA D05 CETOP RP 121
Mounting Position	Unrestricted	
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)	
Hydraulic		
Maximum Operating Pressure	up to 350 Bar (5075 PSI); ZDR-AR / BR up to 315 Bar (4568 PSI)	
Nominal Flow	80 LPM (21.2 GPM)	120 LPM (31.7 GPM)
Pilot Oil	0.2 LPM (0.1 GPM)	0.3 LPM (0.1 GPM)
Fluid	Hydraulic oil as per DIN 51524 ... 51525	
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)	
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. 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.
B01_Cat2500.indd, ddp, 04/19

Ordering Information

ZDR

Pressure Reducing Valve

Port Option

Size

Pressure Range

S0

Hexagon Screw with Lock Nut

D

Design Series

Seal

Code	Description
01	NFPA D03 / NG6
02	NFPA D05 / NG10

Code	Description
1	up to 100 Bar (1450 PSI)
5*	up to 350 Bar (5075 PSI)

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Size	Description
P	01/02	Pressure reducing in P with pressure gauge port M
AR	01/02	Pressure reducing in A with check valve
BR	01/02	Pressure reducing in B with check valve

* AR/BR 325 Bar (4568 PSI)

Weight: ZDR-P

ZDR*01 1.6 kg (3.5 lbs.)

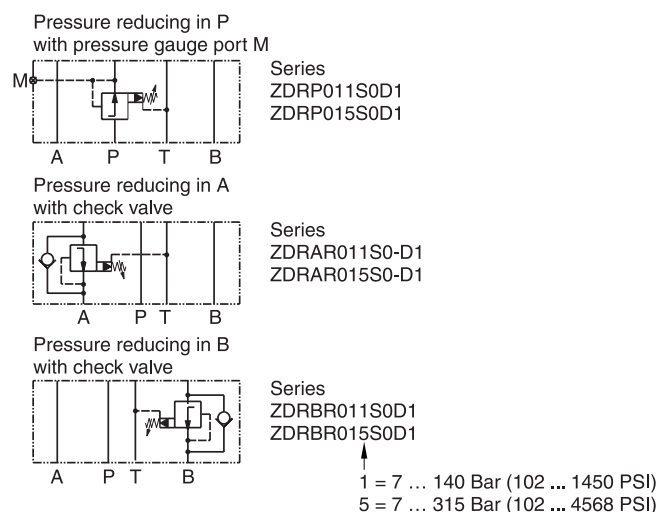
ZDR*02 2.9 kg (6.4 lbs.)

Weight: ZDR-AR/BR

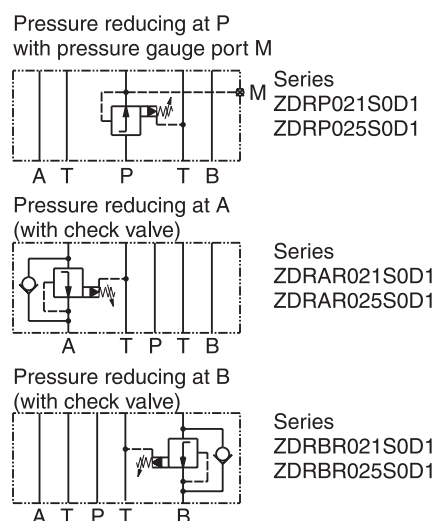
1.8 kg (4.0 lbs.)

3.0 kg (6.6 lbs.)

ZDR01

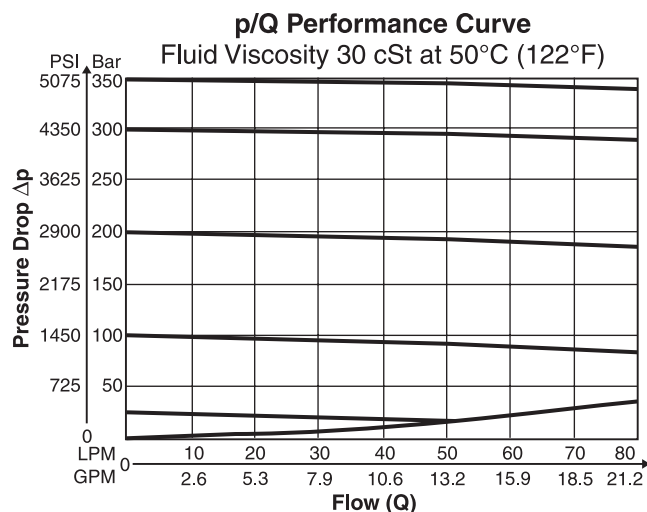


ZDR02

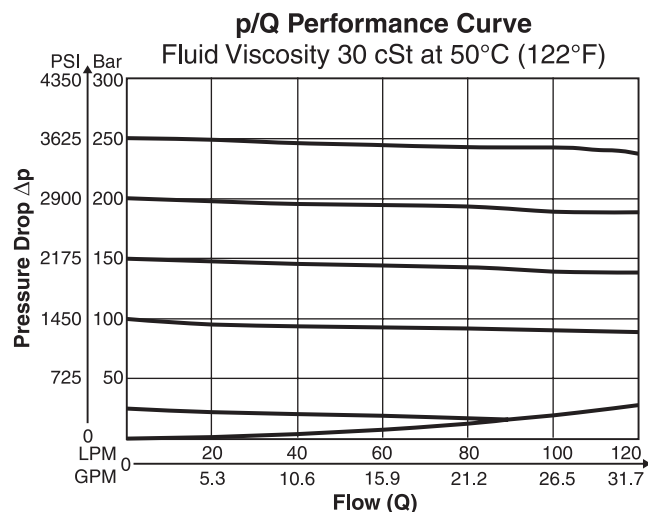


Performance Curves

ZDR-P/AR/BR01

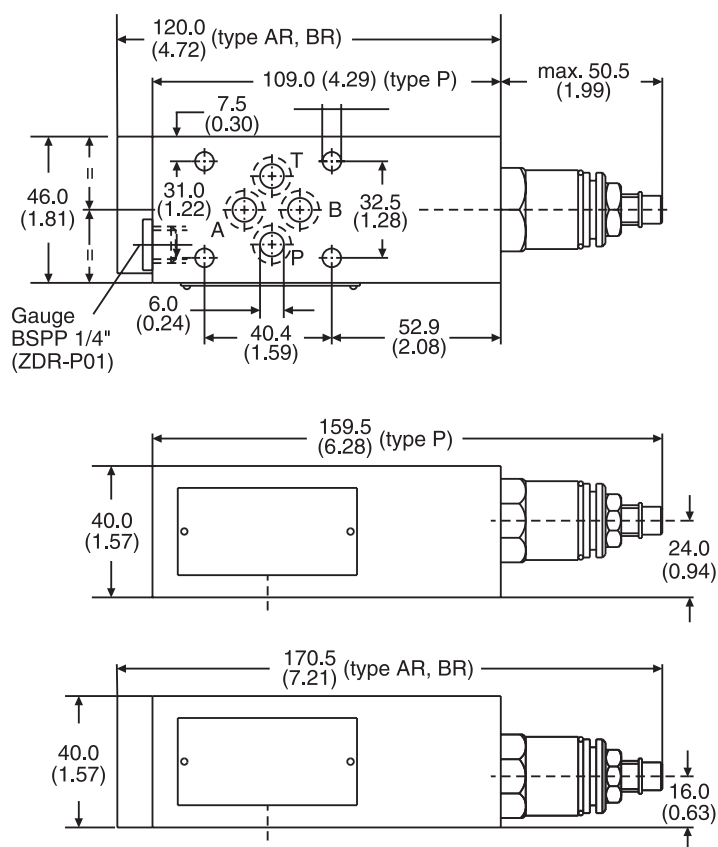


ZDR-P/AR/BR02



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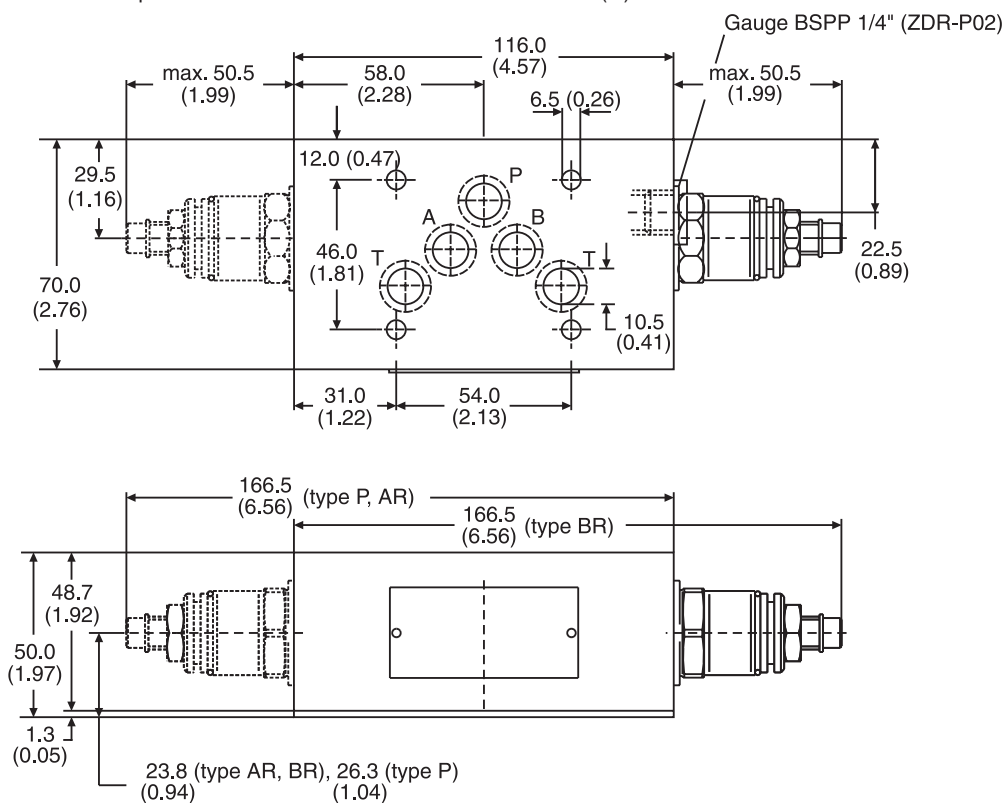
ZDR01 — Inch equivalents for millimeter dimensions are shown in (**)



B

Seal Kit	
Seal	Order Code
1	098-91184-0
5	098-91185-0
Complete Cartridge	
Seal	Order Code
1	098-91102-0
5	098-91103-0

ZDR02 — Inch equivalents for millimeter dimensions are shown in (**)



Seal Kit	
Seal	Order Code
1	098-91182-0
5	098-91183-0
Complete Cartridge	
Seal	Order Code
1	098-91102-0
5	098-91103-0

General Description

Series ZDV pilot operated pressure relief valves are designed for maximum flow rates.

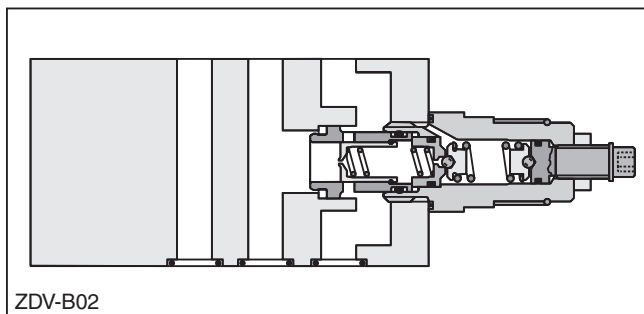
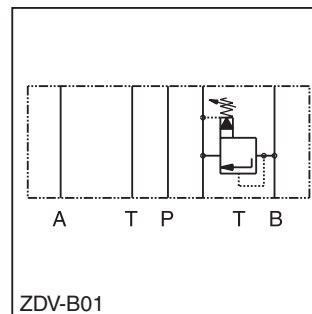
The relief function can be located between P and T, A and T, B and T or A and T + B and T for typical pressure relief functions.

For a pre-charge function the ZDV can be ordered with pressure function between A and B + B and A.

B

Features

- High flow capacity.
- Pressure function in P, A, B or A + B.
- Sizes:
 - ZDV01 – NFPA D03 / NG6 / CETOP 3
 - ZDV02 – NFPA D05 / NG10 / CETOP 5



Ordering Information

ZDV

Pressure Relief Valve

Port Option

Size

Pressure Range

S0

Hexagon Screw with Lock Nut

D

Design Series

Seal

Code	Description
01	NFPA D03 / NG6
02	NFPA D05 / NG10

Code	Description
1	up to 70 Bar (1015 PSI)
5*	up to 350 Bar (5075 PSI)

* ABS 315 Bar (4568 PSI)

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Size	Description
P	01/02	P – T
A	01/02	A – T
B	01/02	B – T
AB	01/02	A – T & B – T
ABS	01/02	A – B & B – A

Weight: One Cartridge

ZDV*01 1.6 kg (3.5 lbs.)

ZDV*02 3.0 kg (6.6 lbs.)

Two Cartridges

2.5 kg (5.5 lbs.)

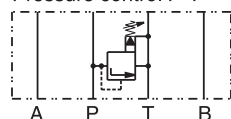
3.7 kg (8.2 lbs.)

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.
 B01_Cat2500.indd, ddp, 04/19

Ordering Information

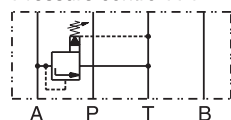
ZDV01

Pressure control P-T



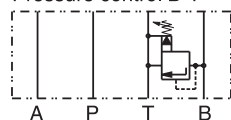
Series
 ZDVP011S0D1
 ZDVP015S0D1

Pressure control A-T



Series
 ZDVA011S0D1
 ZDVA015S0D1

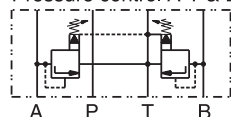
Pressure control B-T



Series
 ZDVB011S0D1
 ZDVB015S0D1

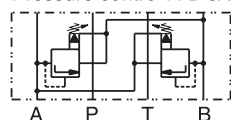
1 = 7 ... 70 Bar (102 ... 1015 PSI)
 5 = 7 ... 350 Bar (102 ... 5075 PSI)

Pressure control A-T & B-T



Series
 ZDVAB011S0D1
 ZDVAB015S0D1

Pressure control A-B & B-A

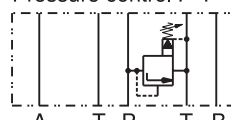


Series
 ZDVABS011S0D1
 ZDVABS015S0D1

1 = 7 ... 70 Bar (102 ... 1015 PSI)
 5 = 7 ... 315 Bar (102 ... 4568 PSI)

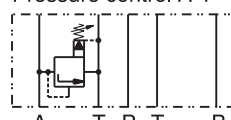
ZDV02

Pressure control P-T



Series
 ZDVP021S0D1
 ZDVP025S0D1

Pressure control A-T



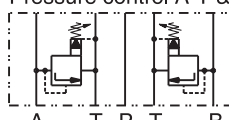
Series
 ZDVA021S0D1
 ZDVA025S0D1

Pressure control B-T



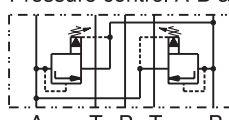
Series
 ZDVB021S0D1
 ZDVB025S0D1

Pressure control A-T & B-T



Series
 ZDVAB021S0D1
 ZDVAB025S0D1

Pressure control A-B & B-A



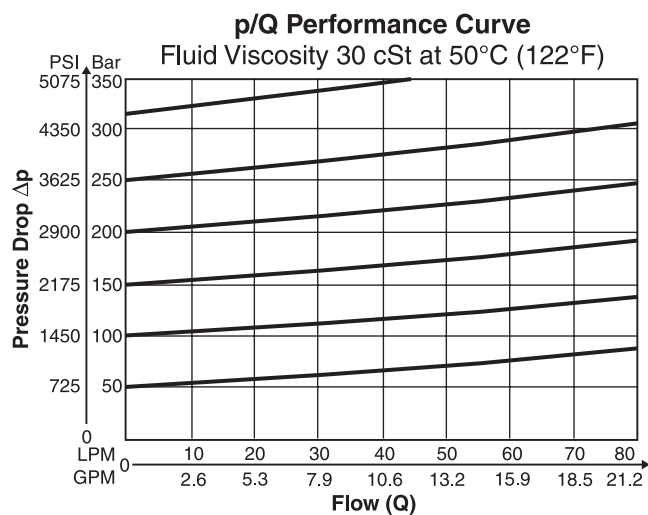
Series
 ZDVABS021S0D1
 ZDVABS025S0D1

Specifications

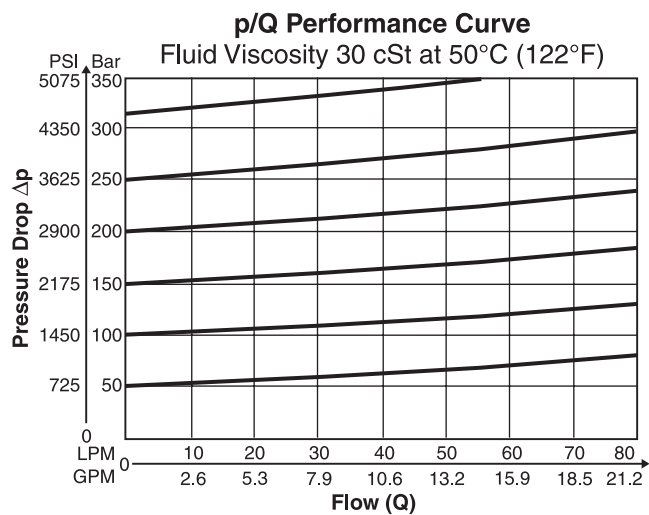
General		
Size	NG6	NG10
Mounting	DIN 24340 A6 ISO 4401 NFFA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFFA D05 CETOP RP 121
Mounting Position	Unrestricted	
Ambient Temperature Range	-20° to +50°C (-4°F to +122°F)	
Hydraulic		
Maximum Operating Pressure	up to 350 Bar (5075 PSI); ZDV*ABS up to 315 Bar (4568 PSI)	
Nominal Flow	80 LPM (21.2 GPM)	140 LPM (37.0 GPM)
Fluid	Hydraulic oil as per DIN 51524 ... 51525	
Fluid Temperature	-20° to +80°C (-4°F to +176°F)	
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	

B01_Cat2500.indd, ddp, 04/19

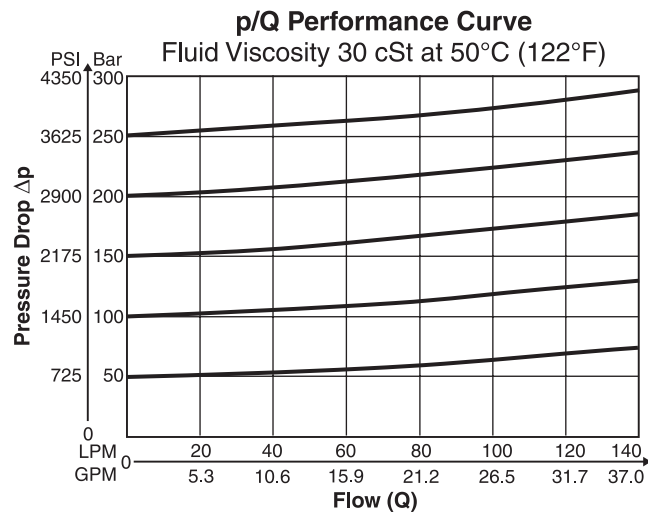
ZDV-P/A/B/ABS01



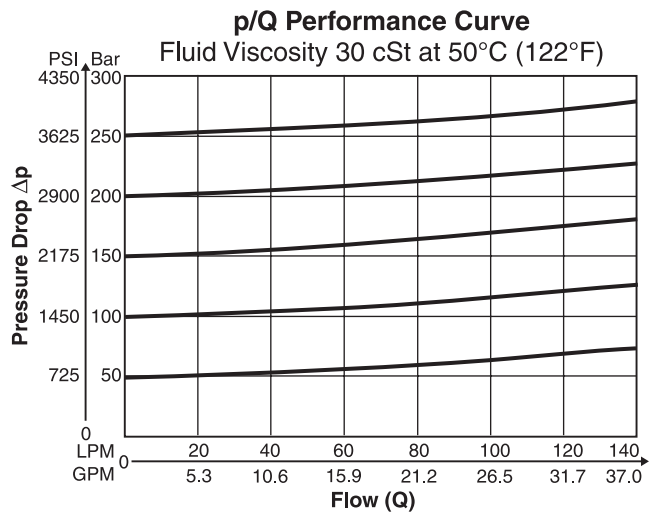
ZDV-AB01



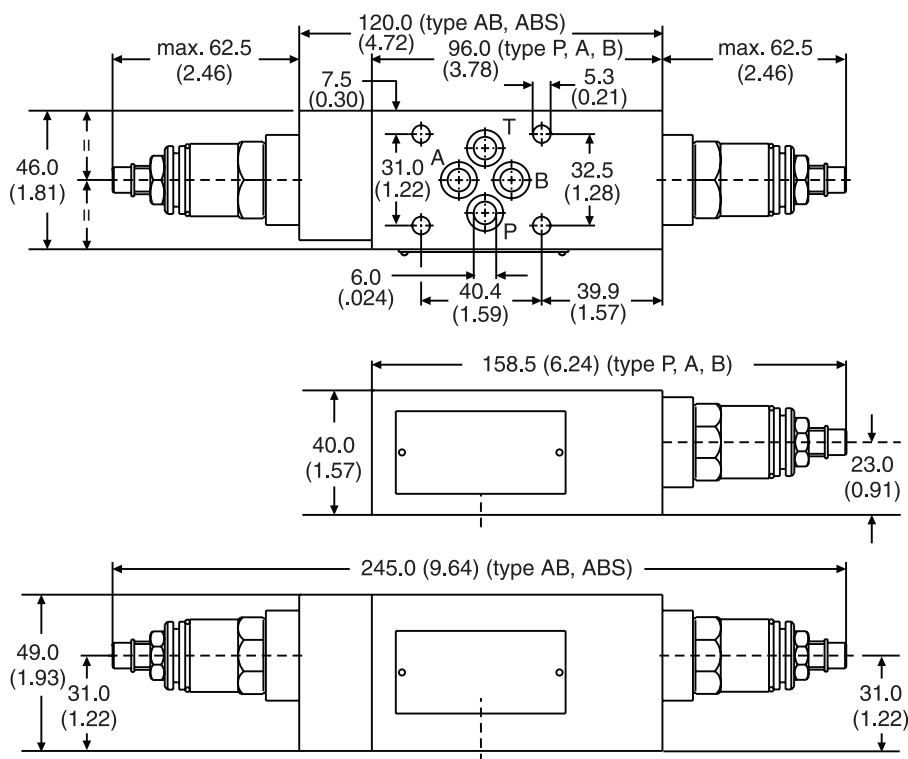
ZDV-P/A/B/AB02



ZDV-ASB02



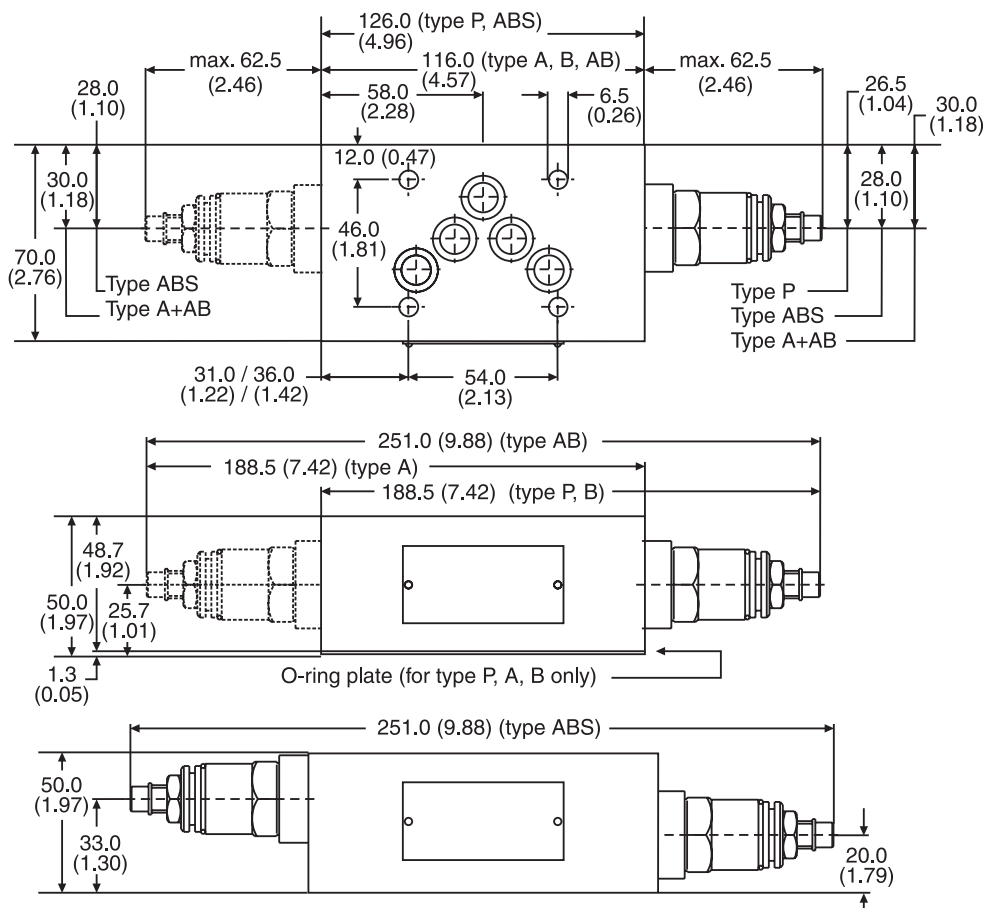
ZDV01 – Inch equivalents for millimeter dimensions are shown in (**)



B

Seal Kit	
Seal	Order Code
1	098-91182-0
5	098-91183-0
Complete Cartridge	
Seal	Order Code
1	098-91116-0
5	098-91117-0

ZDV02 – Inch equivalents for millimeter dimensions are shown in (**)



Seal Kit	
Seal	Order Code
1	098-91076-0
5	098-91077-0

Complete Cartridge	
Seal	Order Code
1	098-91116-0
5	098-91117-0

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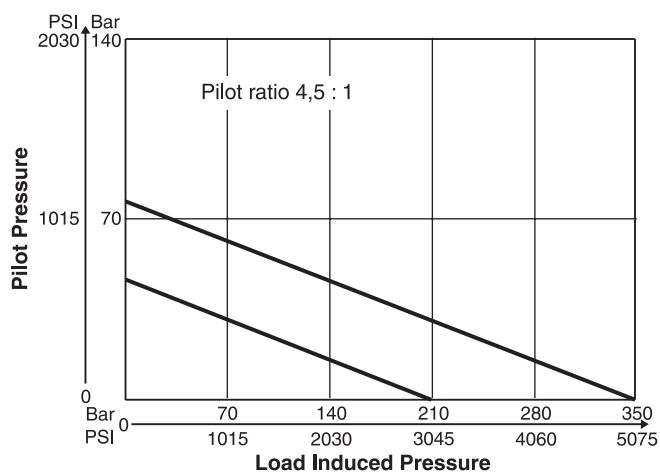
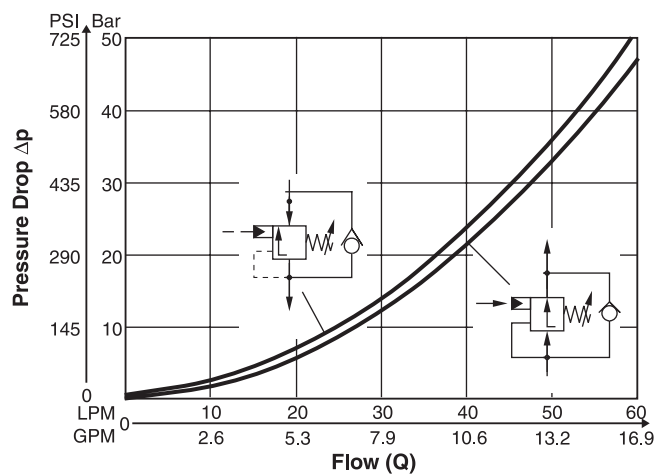


Specifications

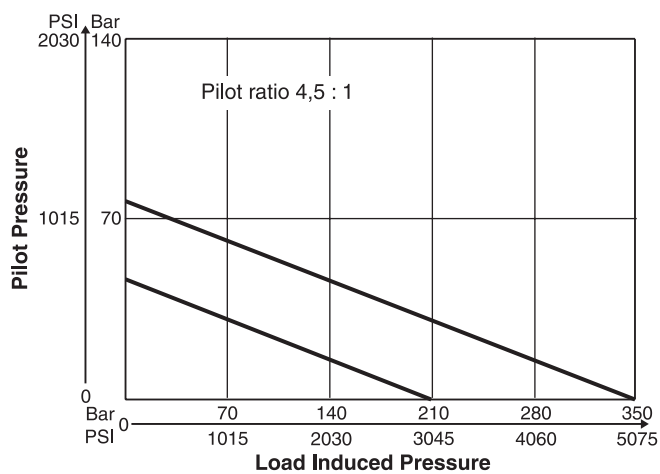
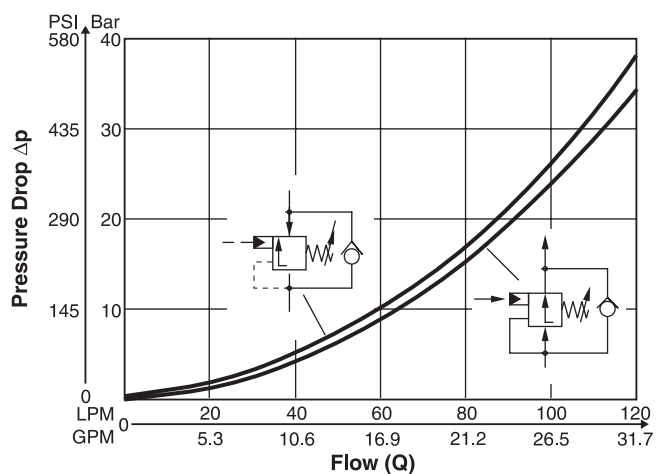
General		
Size	NG6	NG10
Mounting Interface	DIN 24340 A6 ISO 4401 NFPA D03	DIN 24340 A10 ISO 4401 NFPA D05
Mounting Position	Unrestricted	
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)	
Hydraulic		
Maximum Operating Pressure	350 Bar (5075 PSI)	315 Bar (4568 PSI)
Pressure Range	175 Bar (2538 PSI), 350 Bar (5075 PSI)	
Pilot Ratio	4.5 : 1	
Leakage	On request	
Nominal Flow	60 LPM (15.9 GPM)	120 LPM (31.7 GPM)
Opening Pressure	0.3 LPM (0.1 GPM)	0.3 LPM (0.1 GPM)
Fluid	Hydraulic oil as per DIN 51524 ... 51525	
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)	
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	

B

ZNS01

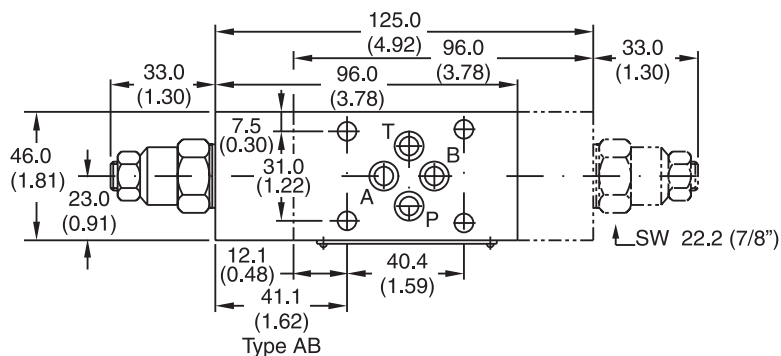
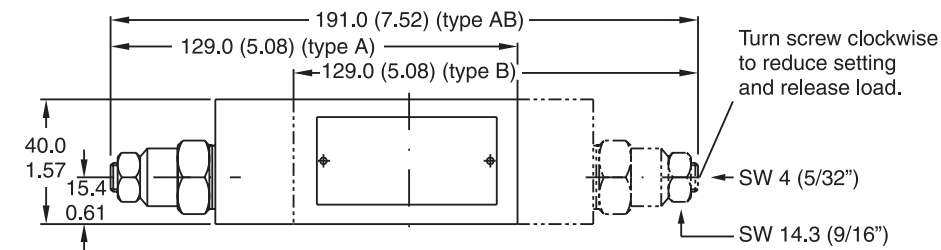


ZNS02



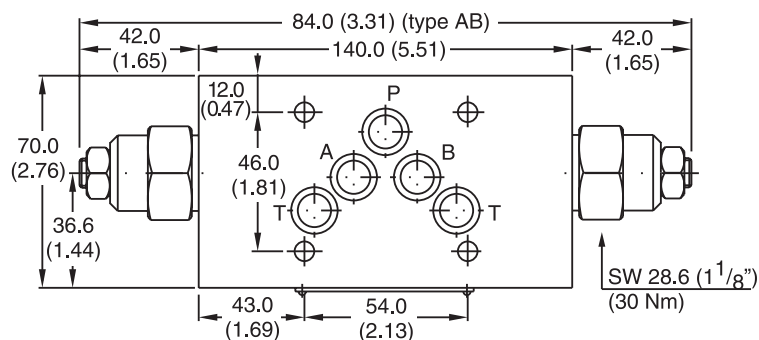
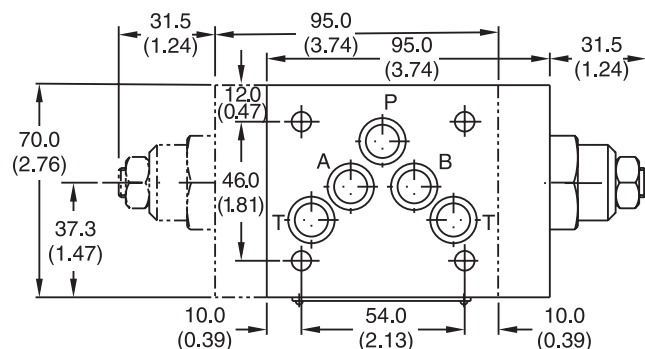
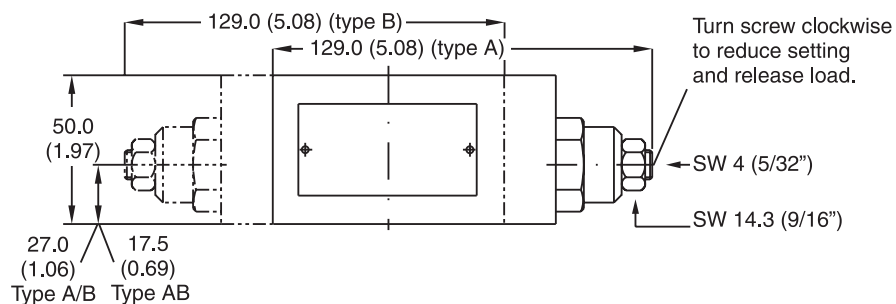
All characteristic curves measured with HLP46 at 50°C (122°F).

ZNS01 — Inch equivalents for millimeter dimensions are shown in (**)



Seal Kit	
Seal	Order Code
1	098-91153-0
5	098-91154-0
Complete Cartridge	
Seal	Order Code
1	517-01017-2
5	517-00448-8

ZNS02 — Inch equivalents for millimeter dimensions are shown in (**)



Seal Kit	
Seal	Order Code
1	098-91155-0
5	098-91183-0
Complete Cartridge	
Seal	Order Code
1	517-00449-8
5	517-00450-8

General Description

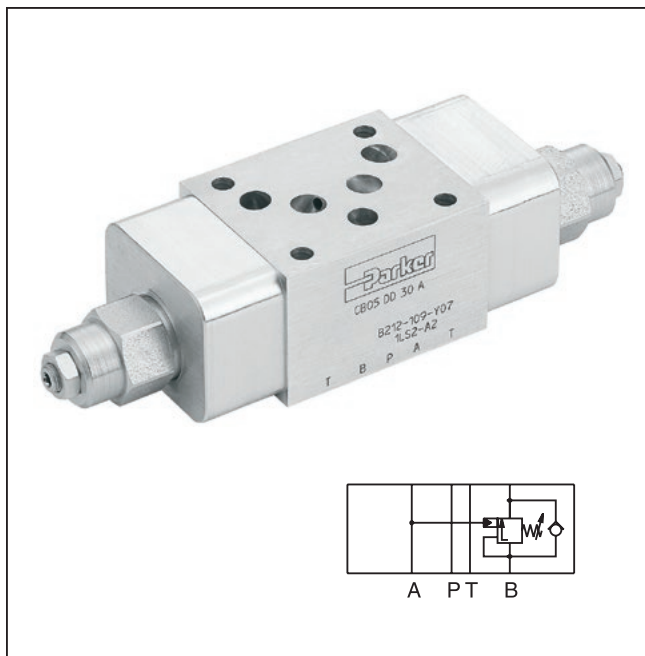
Series CB counterbalance valve controls the actuator movement with overrunning loads.

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

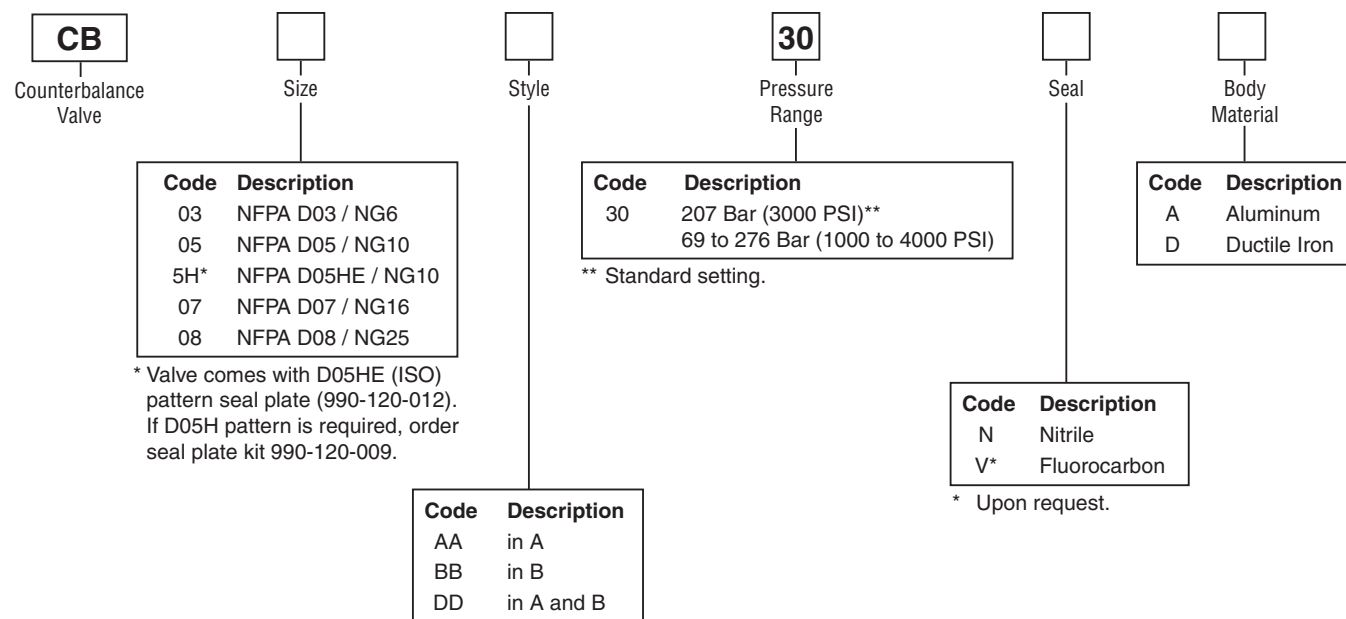


Specifications

General					
Size	D03 / NG6	D05 / NG10	D05HE / NG10	D07 / NG16	D08 / NG25
Mounting Position	Unrestricted				
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)				
Hydraulic					
Maximum Operating Pressure*	Aluminum Body – up to 207 Bar (3000 PSI); Ductile Iron Body – up to 345 Bar (5000 PSI)				
Nominal Flow	57 LPM (15 GPM)	114 LPM (30 GPM)	114 LPM (30 GPM)	227 LPM (60 GPM)	454 LPM (120 GPM)
Leakage	5 DPM	5 DPM	5 DPM	5 DPM	5 DPM
Reseat 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	-20°C to +80°C (-4°F to +176°F)				
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)			
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)				

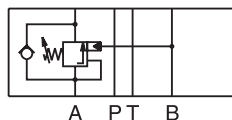
* Counterbalance valves should be set at least 1.3 times the maximum load induced pressure.

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.
 B01_Cat2500.indd, ddp, 04/19



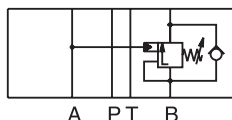
CBAA**

Counterbalance in A



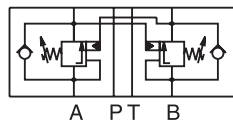
CBBB**

Counterbalance in B



CBDD**

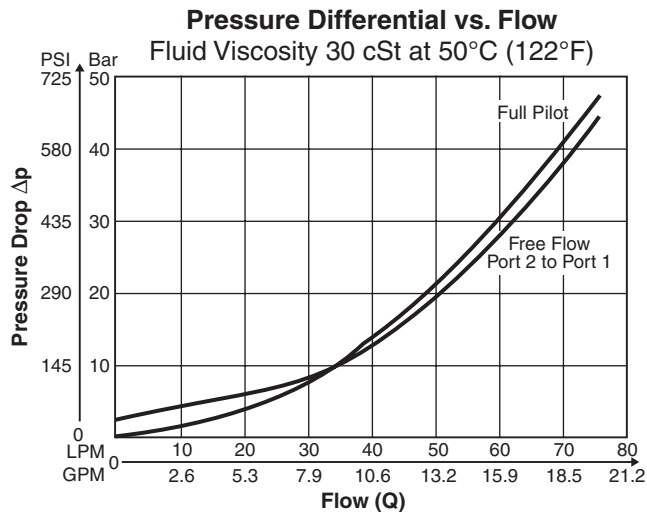
Counterbalance in A and B



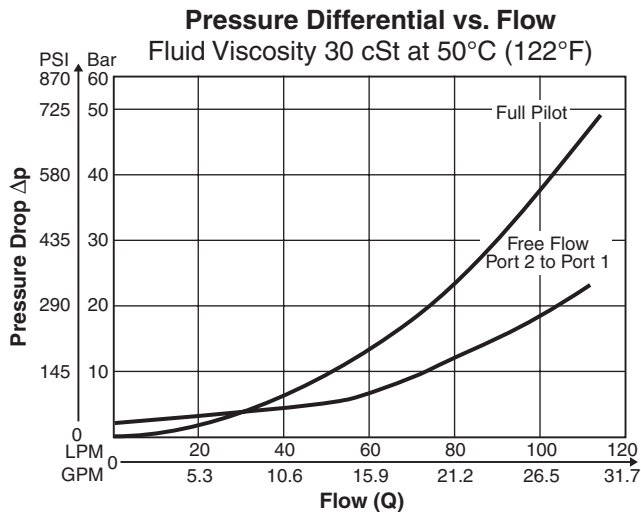
Weight:

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 (5.5 lbs.)	5.3 kg (11.8 lbs.)	3.6 kg (8 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.)

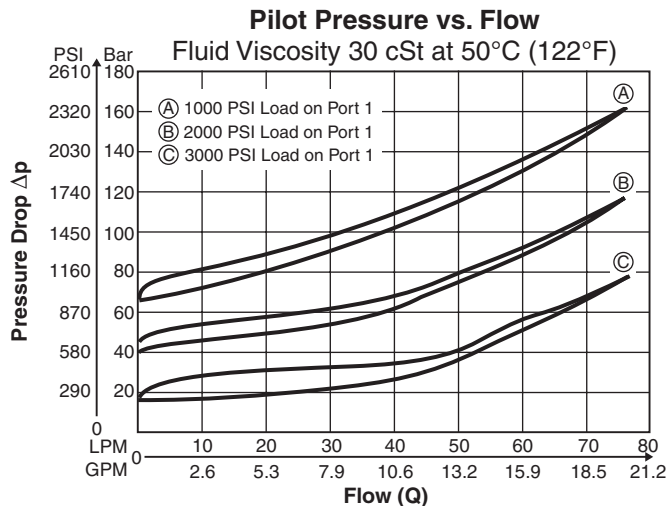
CB03*



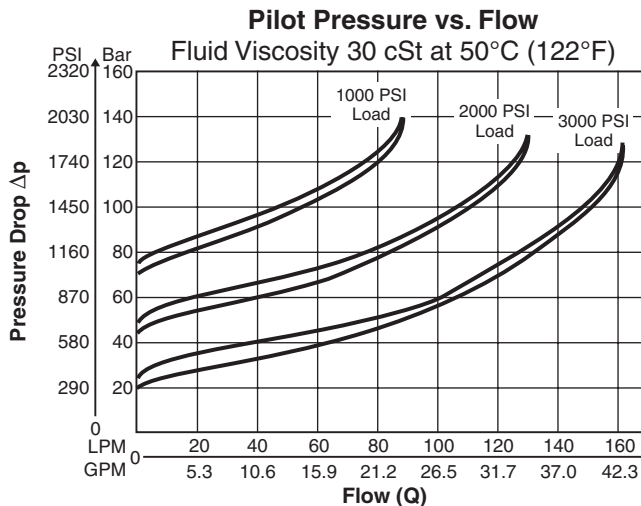
CB05/CB5H



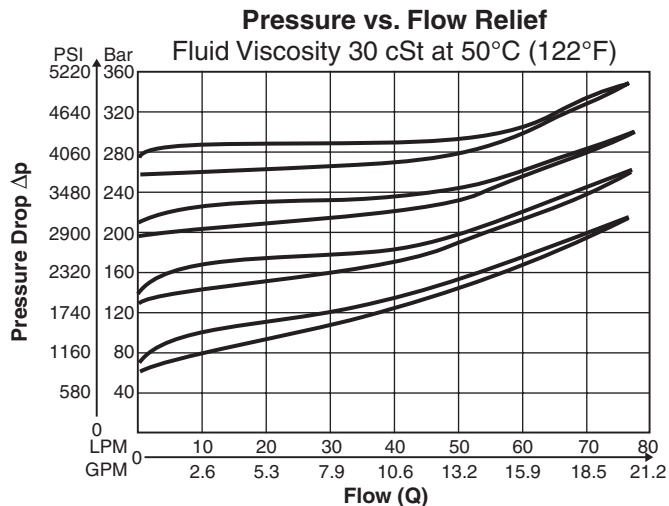
CB03*



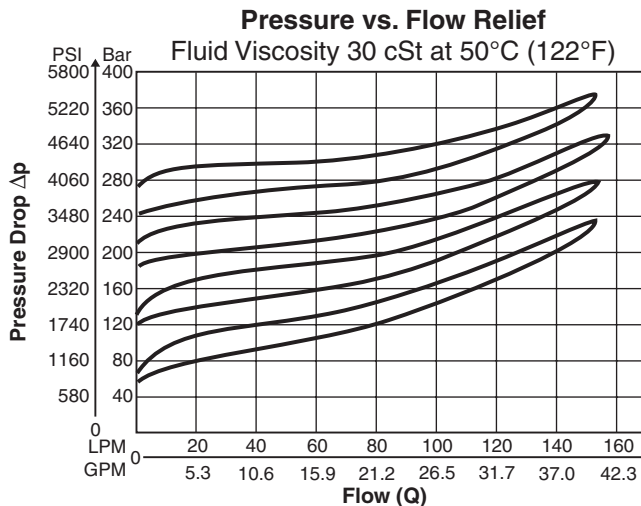
CB05/CB5H



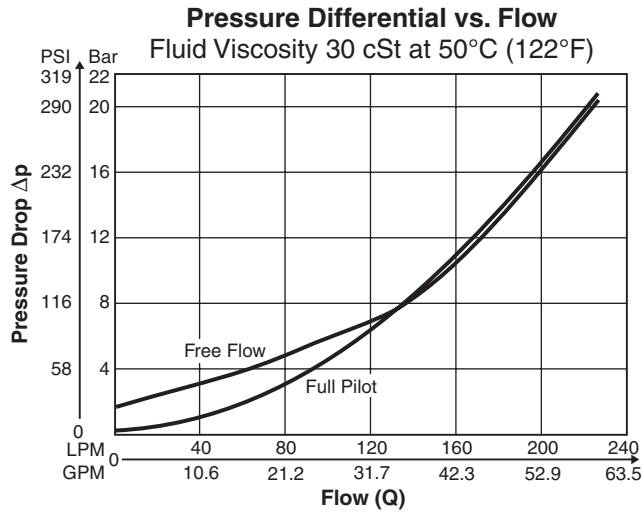
CB03*



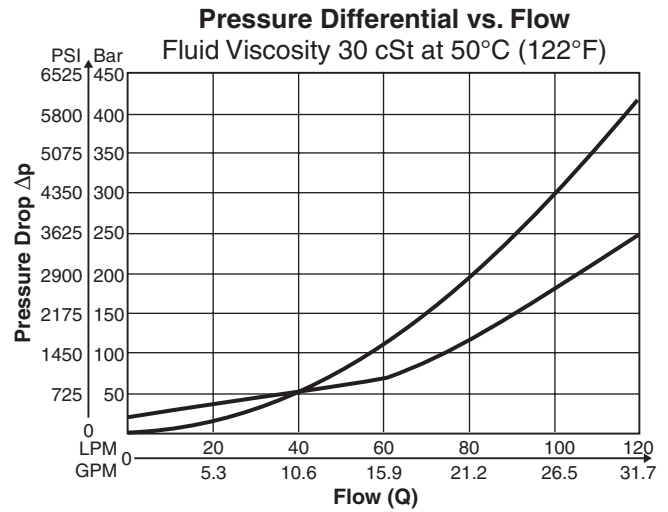
CB05/CB5H



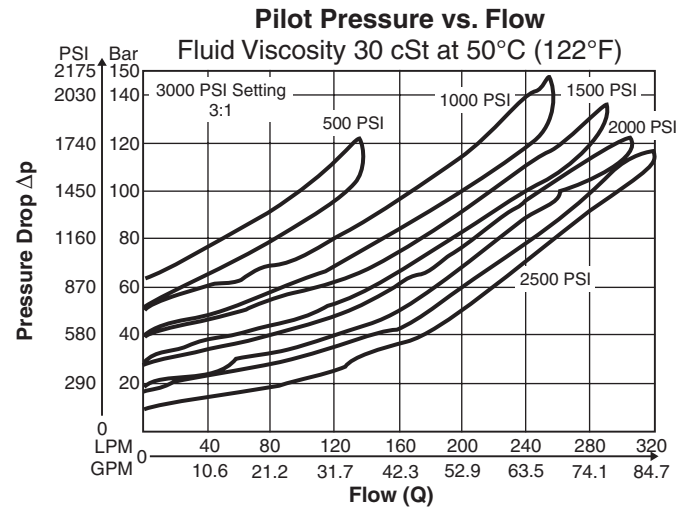
CB07*



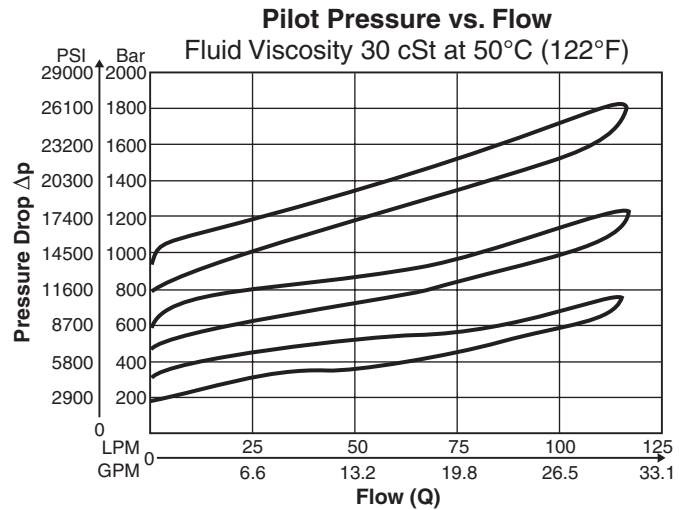
CB08*



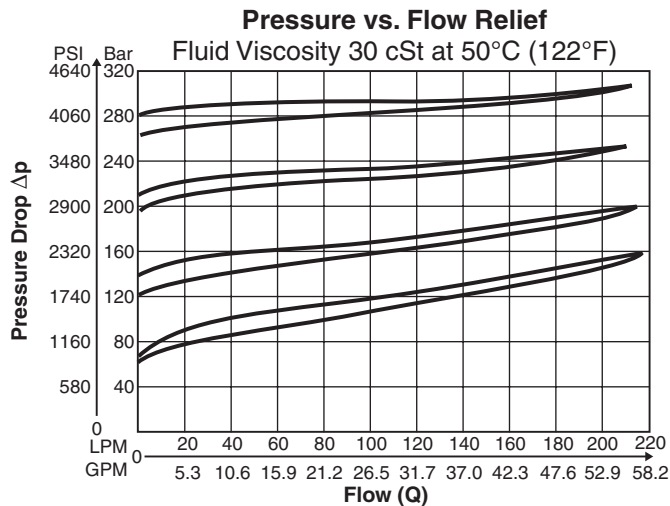
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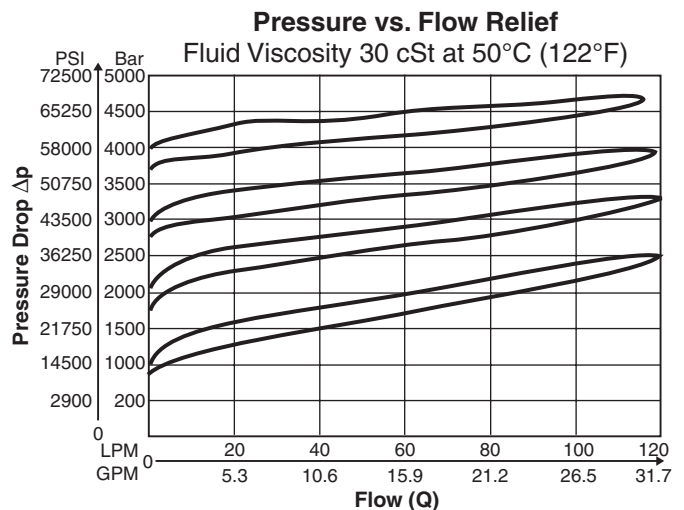
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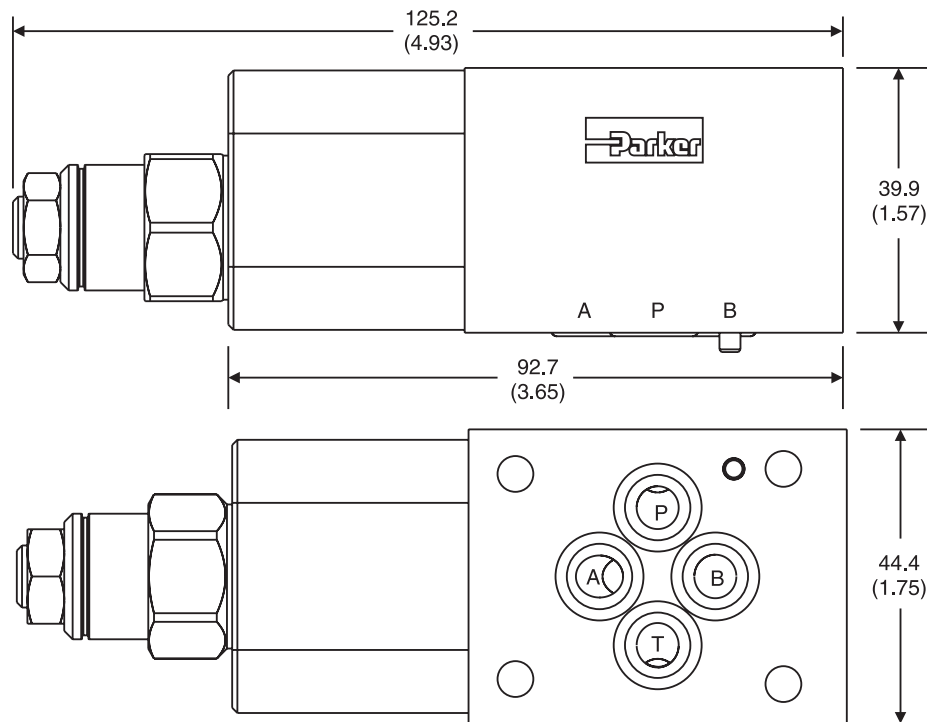
CB07*



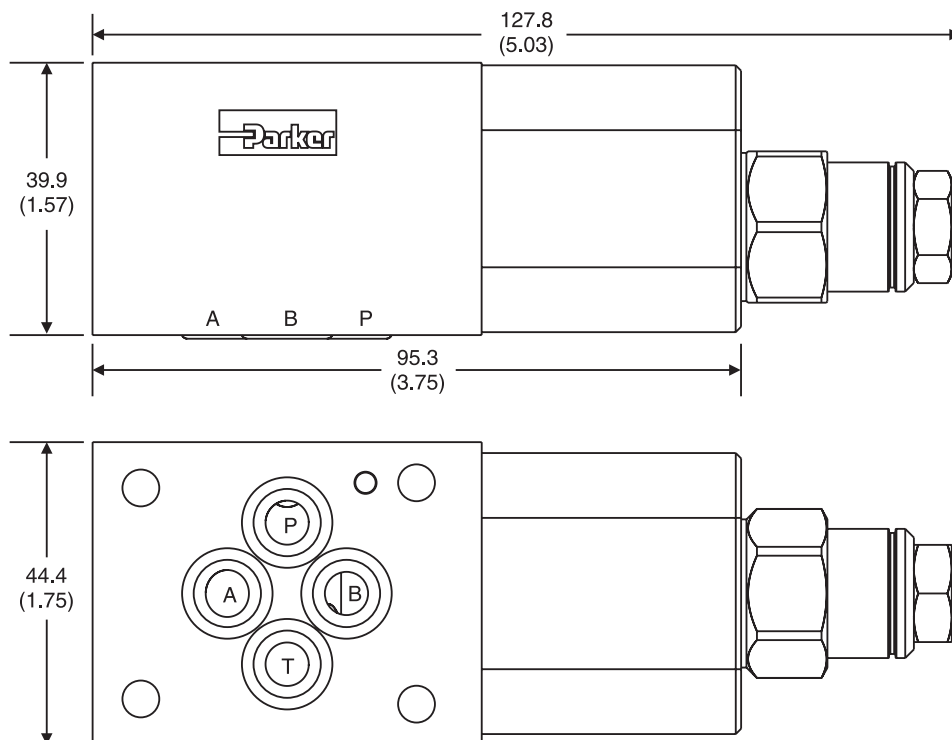
CB08*

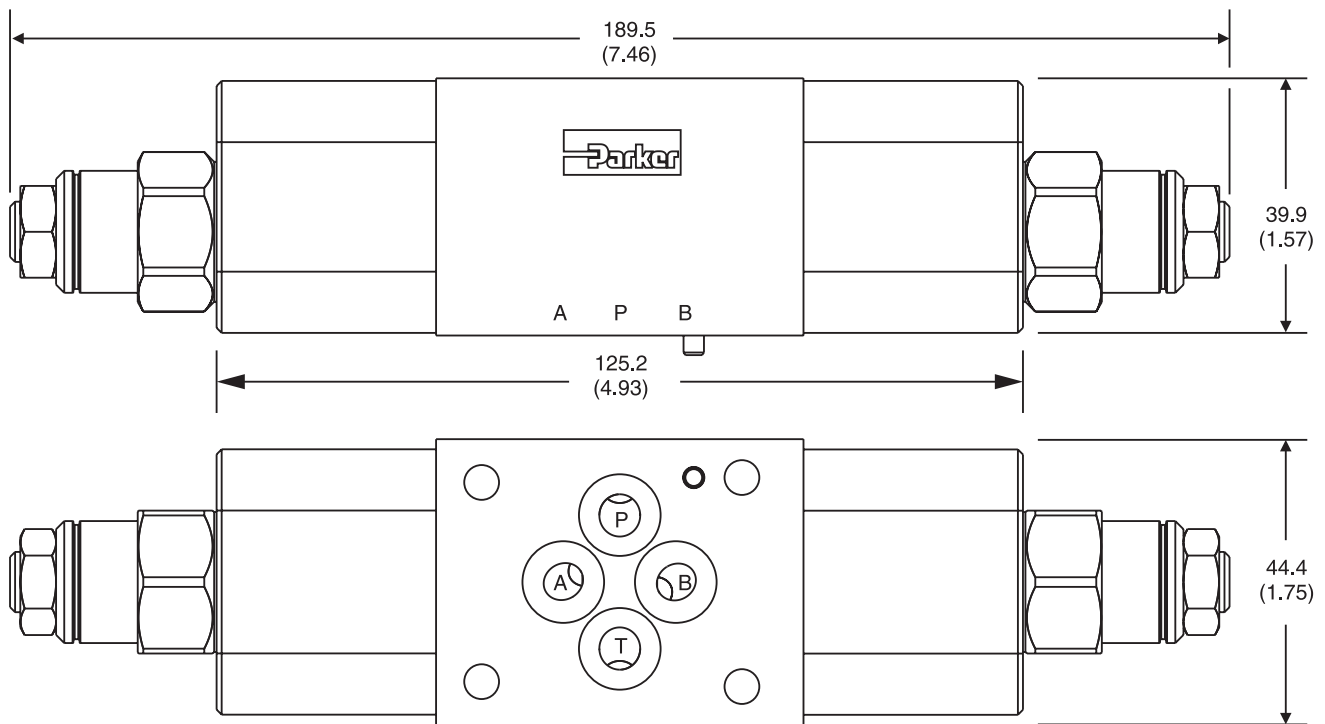
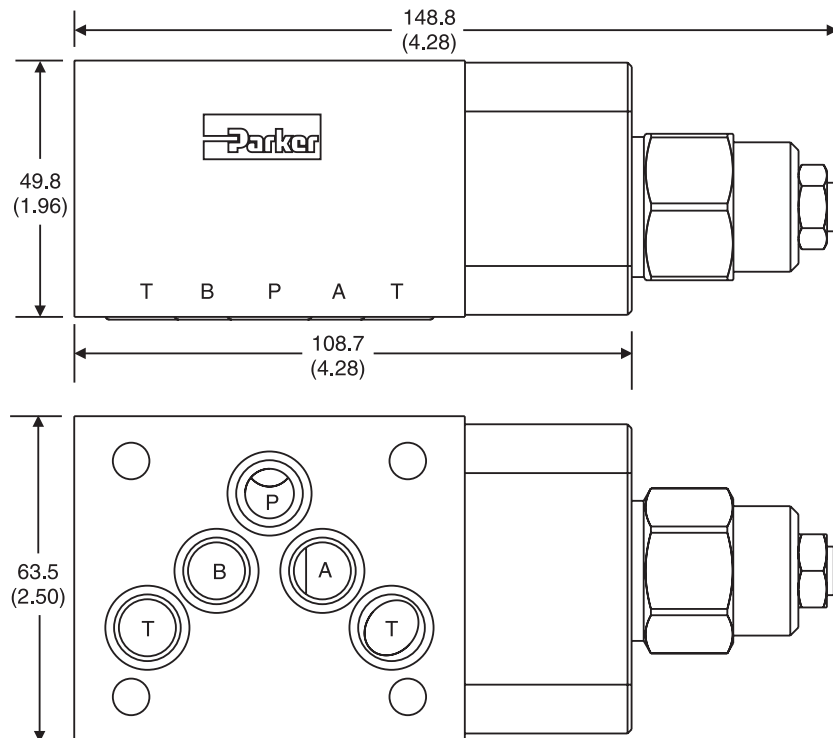


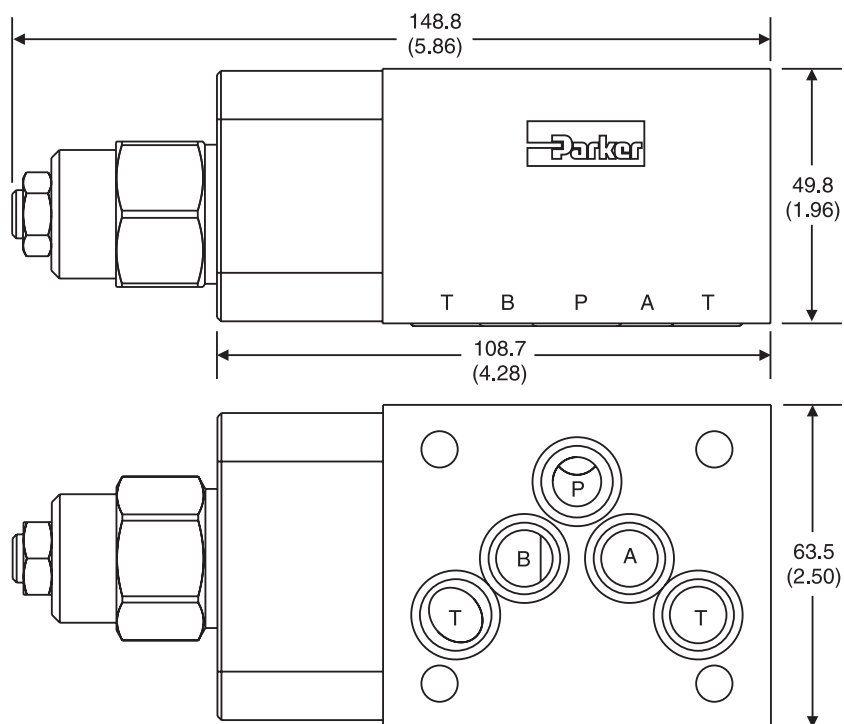
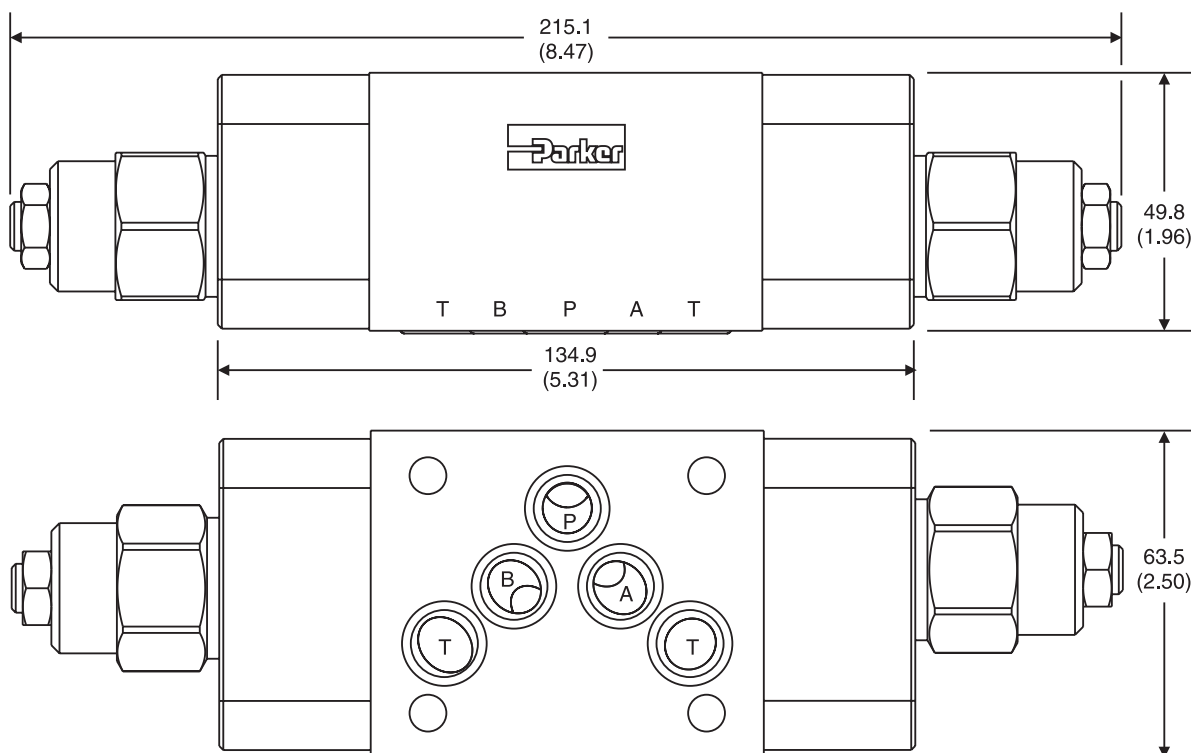
CB03AA — Inch equivalents for millimeter dimensions are shown in (**)



CB03BB — Inch equivalents for millimeter dimensions are shown in (**)

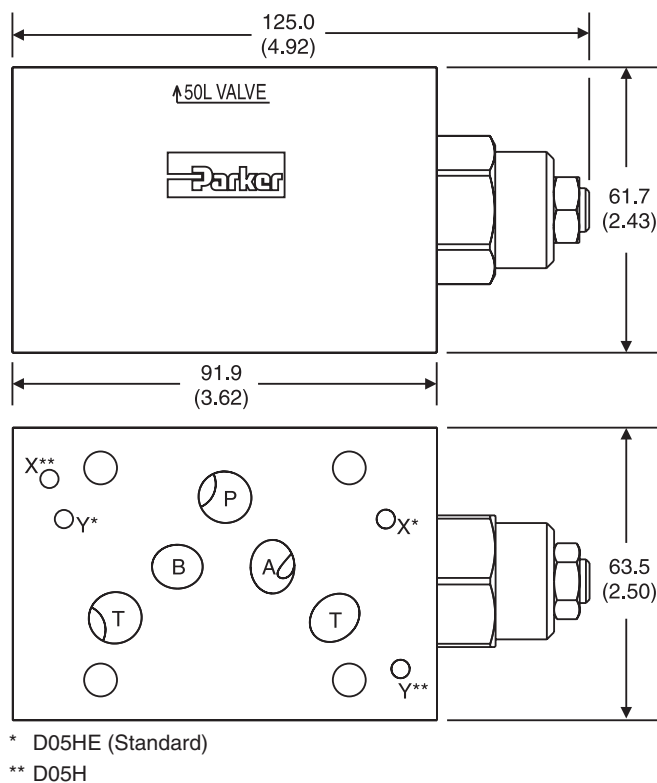


CB03DD – Inch equivalents for millimeter dimensions are shown in (**)**B****CB05AA** – Inch equivalents for millimeter dimensions are shown in (**)

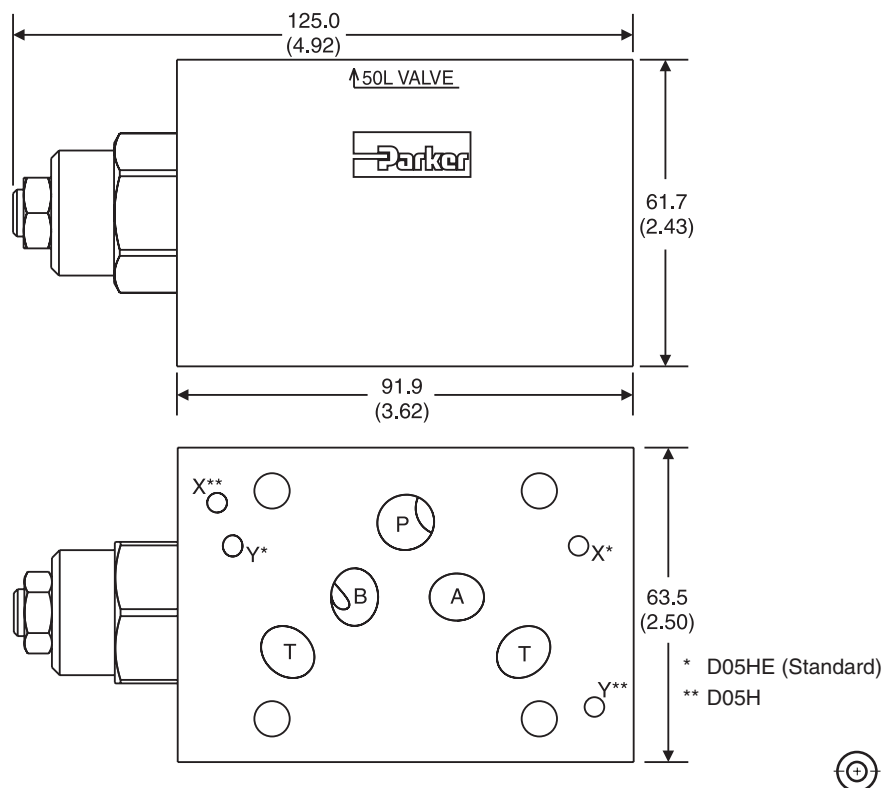
CB05BB – Inch equivalents for millimeter dimensions are shown in (**)**CB05DD** – Inch equivalents for millimeter dimensions are shown in (**)

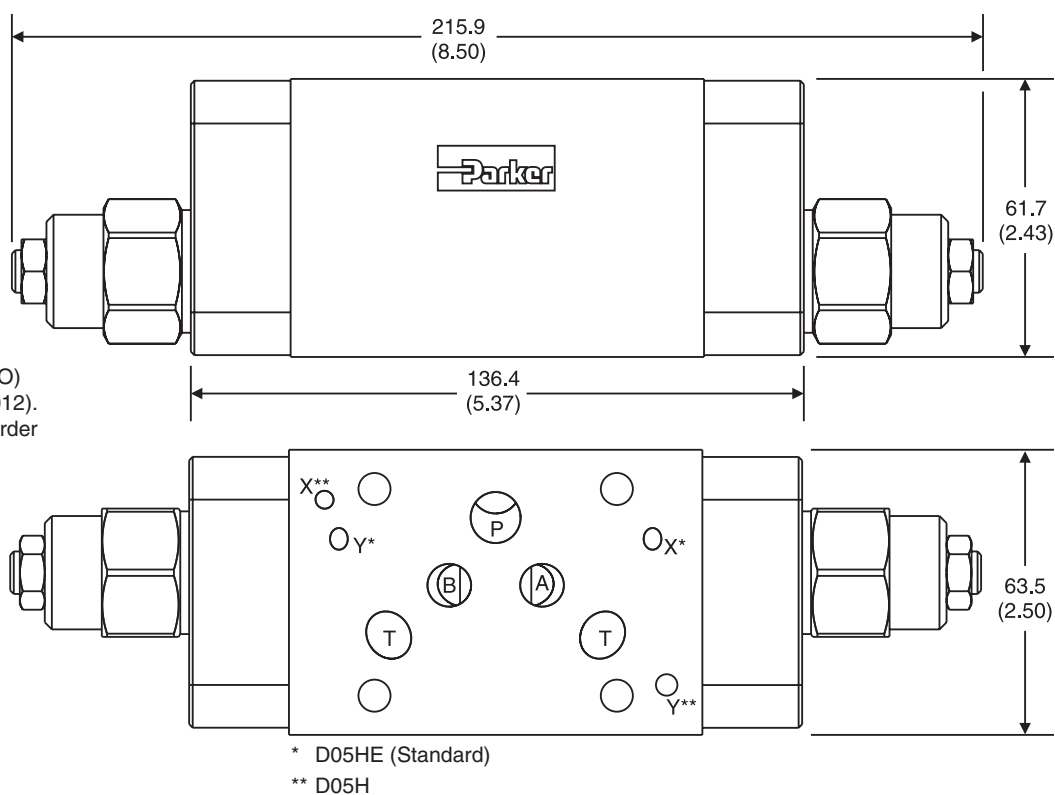
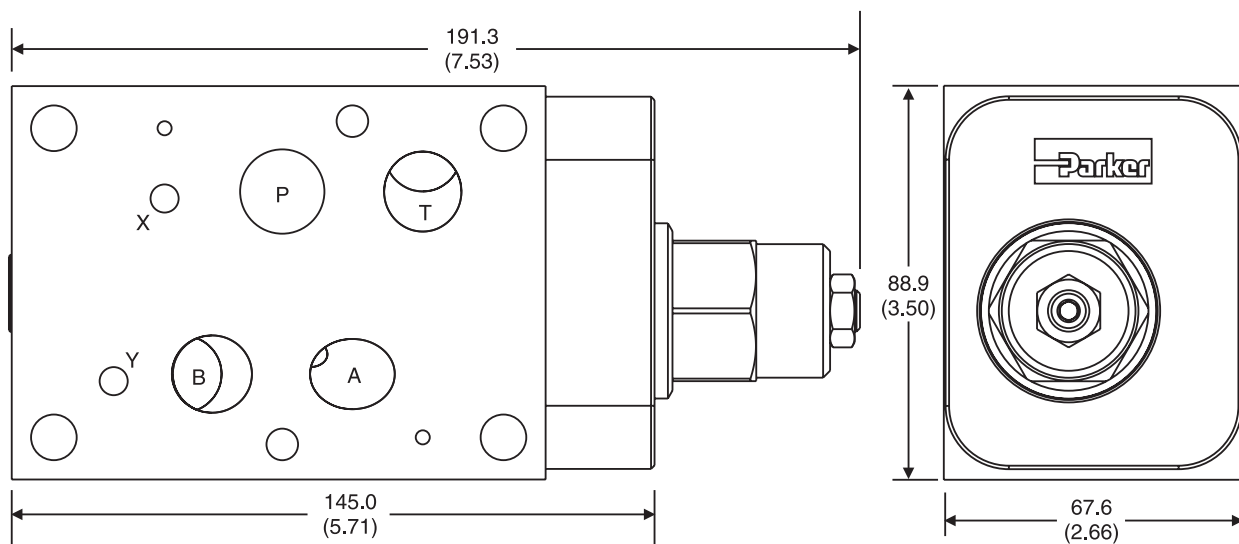
CB5HAA — Inch equivalents for millimeter dimensions are shown in (**)

Valve comes with D05HE (ISO)
Pattern seal plate (990-120-012).
If D05H pattern is required, order
seal plate kit 990-120-009.

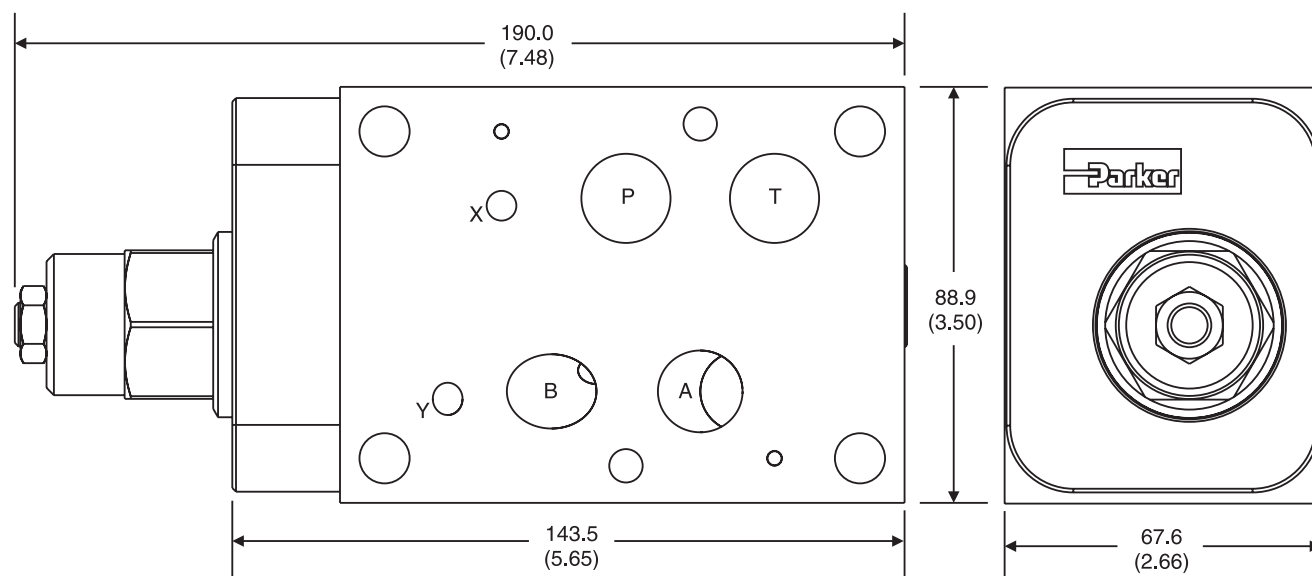
**CB5HBB** — Inch equivalents for millimeter dimensions are shown in (**)

Valve comes with D05HE (ISO)
Pattern seal plate (990-120-012).
If D05H pattern is required, order
seal plate kit 990-120-009.



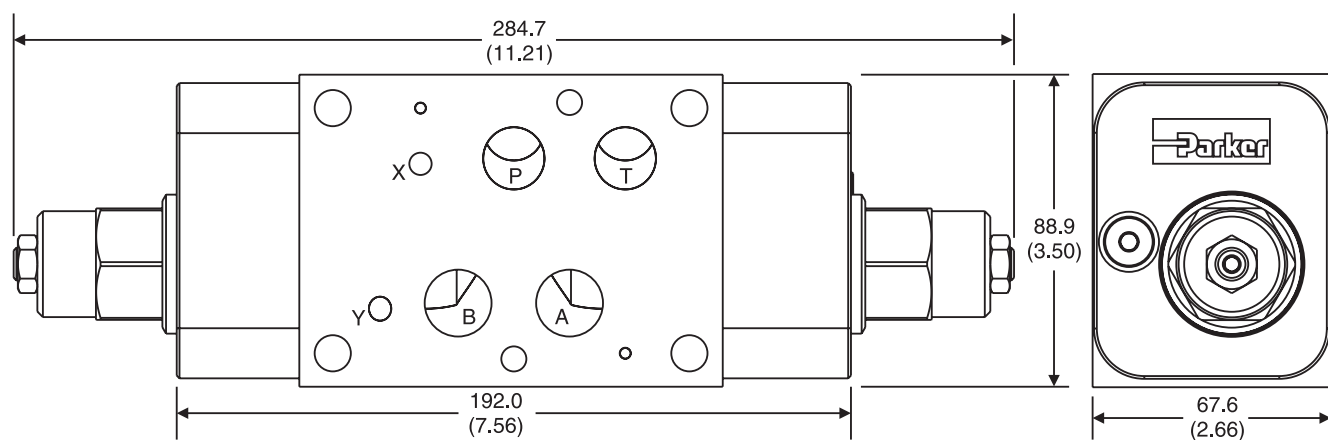
CB5HDD — Inch equivalents for millimeter dimensions are shown in (**)**CB07AA** — Inch equivalents for millimeter dimensions are shown in (**)

CB07BB – Inch equivalents for millimeter dimensions are shown in (**)

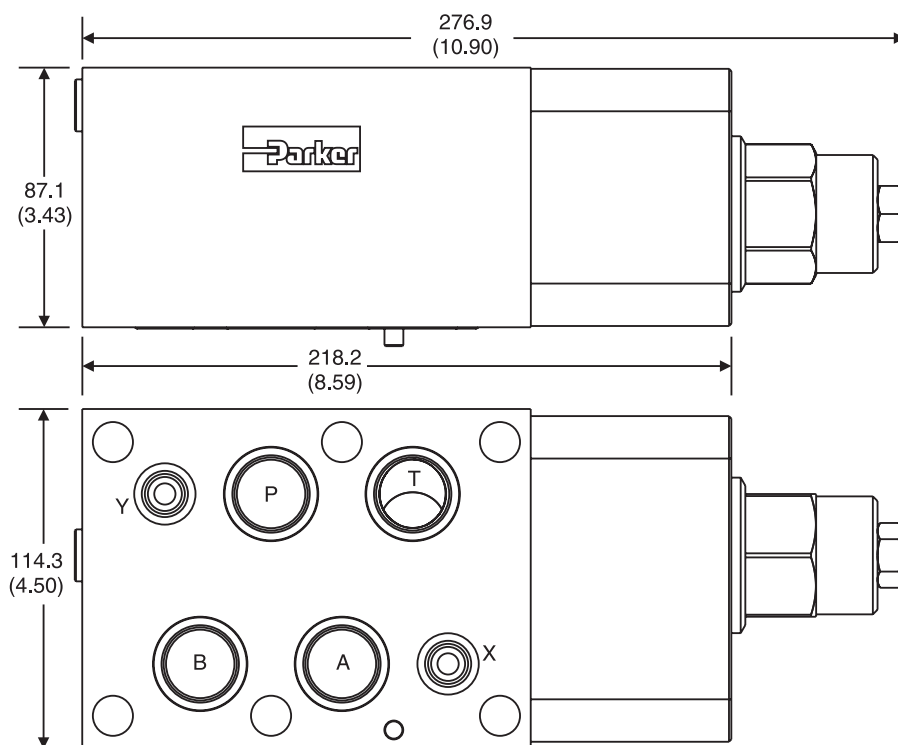


B

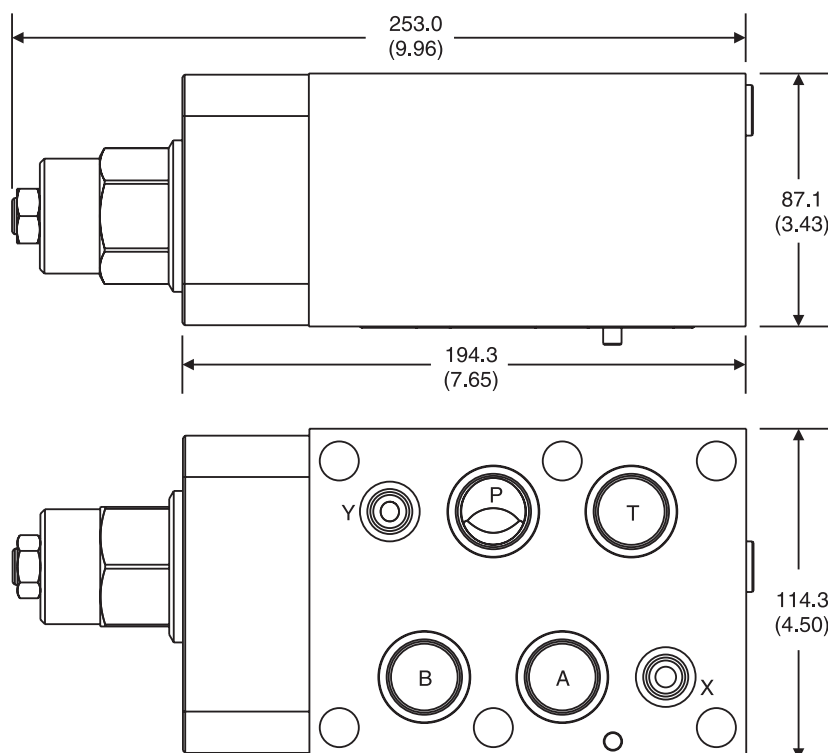
CB07DD – Inch equivalents for millimeter dimensions are shown in (**)

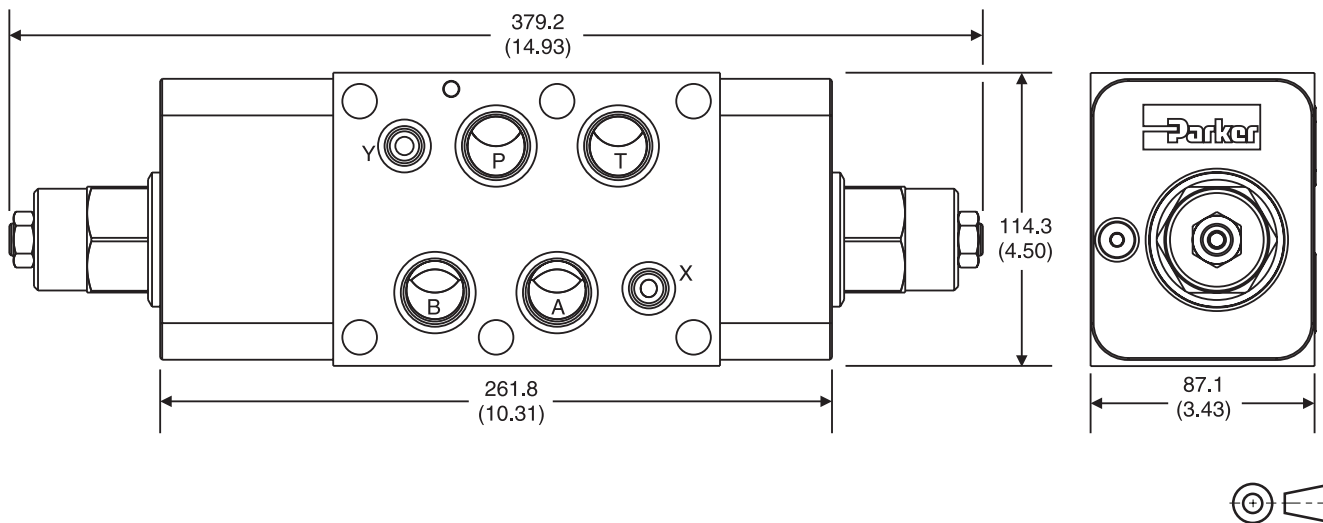


CB08AA — Inch equivalents for millimeter dimensions are shown in (**)



CB08BB — Inch equivalents for millimeter dimensions are shown in (**)



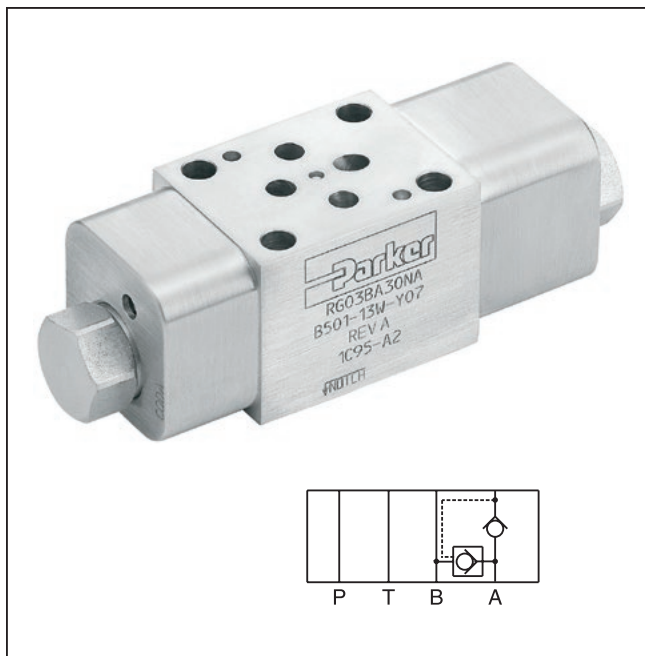
CB08DD — Inch equivalents for millimeter dimensions are shown in (**)**B**

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



Specifications

General				
Size	D03 / NG6	D05 / NG10	D07 / NG16	D08 / NG25
Mounting Position	Unrestricted			
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure	Aluminum Body – up to 207 Bar (3000 PSI); Ductile Iron Body – up to 345 Bar (5000 PSI)			
Nominal Flow*	38 LPM (10 GPM)	95 LPM (25 GPM)	189 LPM (50 GPM)	303 LPM (80 GPM)
Leakage	< 1 DPM	< 1 DPM	< 1 DPM	< 1 DPM
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)		
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			

* Nominal flow value refers to pump flow or regeneration flow from rod side, whichever is larger.

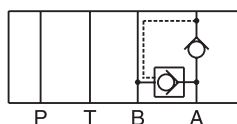
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.
B01_Cat2500.indd, ddp, 04/19

Ordering Information

RG Full Time Regeneration Valve	Size	BA Style	30 Cracking Pressure	Seal	Body Material																				
<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>03</td> <td>NFPA D03 / NG6</td> </tr> <tr> <td>05*</td> <td>NFPA D05 / NG10</td> </tr> <tr> <td>07</td> <td>NFPA D07 / NG16</td> </tr> <tr> <td>08</td> <td>NFPA D08 / NG25</td> </tr> </tbody> </table> <p>* D05HE (ISO) pattern is not available.</p>		Code	Description	03	NFPA D03 / NG6	05*	NFPA D05 / NG10	07	NFPA D07 / NG16	08	NFPA D08 / NG25	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>30</td> <td>2 Bar (30 PSI)</td> </tr> </tbody> </table>		Code	Description	30	2 Bar (30 PSI)	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Aluminum</td> </tr> <tr> <td>D</td> <td>Ductile Iron</td> </tr> </tbody> </table>		Code	Description	A	Aluminum	D	Ductile Iron
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		<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>BA</td> <td>Regeneration flow from B to A</td> </tr> </tbody> </table>		Code	Description	BA	Regeneration flow from B to A	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>N</td> <td>Nitrile</td> </tr> <tr> <td>V*</td> <td>Fluorocarbon</td> </tr> </tbody> </table> <p>* Upon request.</p>		Code	Description	N	Nitrile	V*	Fluorocarbon										
Code	Description																								
BA	Regeneration flow from B to A																								
Code	Description																								
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V*	Fluorocarbon																								

B

RG**BA

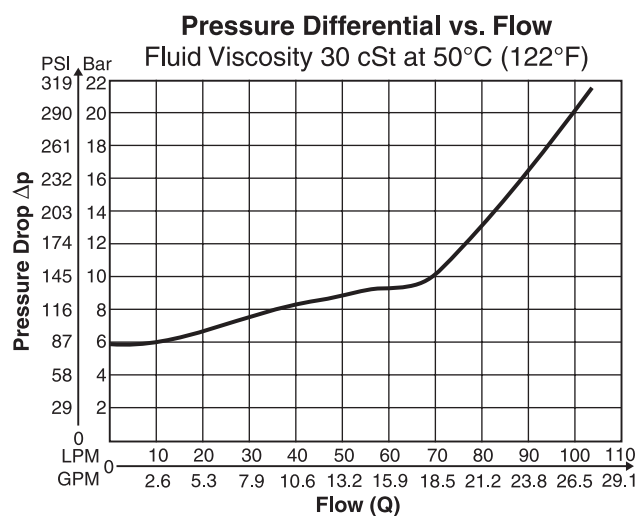


Weight:

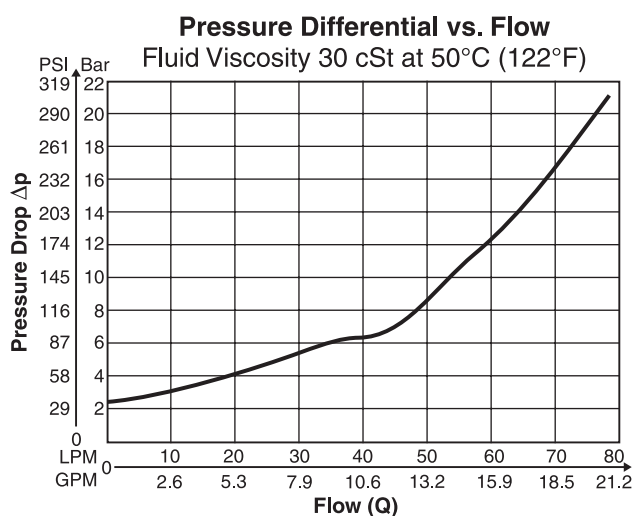
Size	RG*****NA	RG*****ND
RG03	0.8 kg (1.7 lbs)	1.6 kg (3.5 lbs)
RG05, RG5H	1.5 kg (3.3 lbs)	3.1 kg (6.9 lbs)
RG07	2.9 kg (6.5 lbs)	5.9 kg (13.1 lbs)
RG08	6.4 kg (14.1 lbs)	13.1 kg (28.8 lbs)

Performance Curves

RG03*30*A



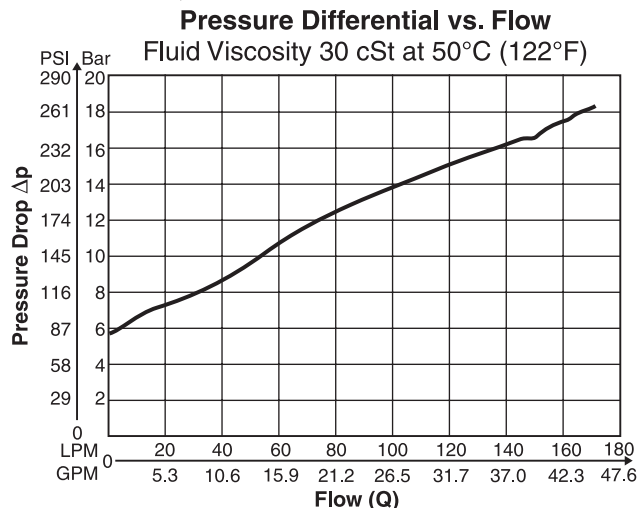
RG03*30*D



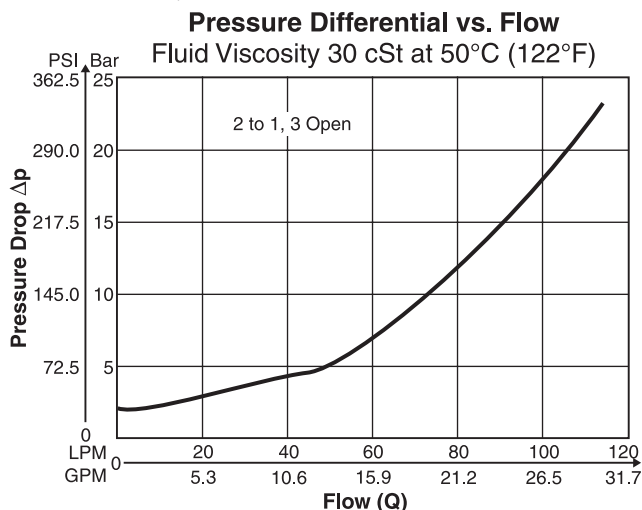
(Continued on next page.)

(Continued from previous page.)

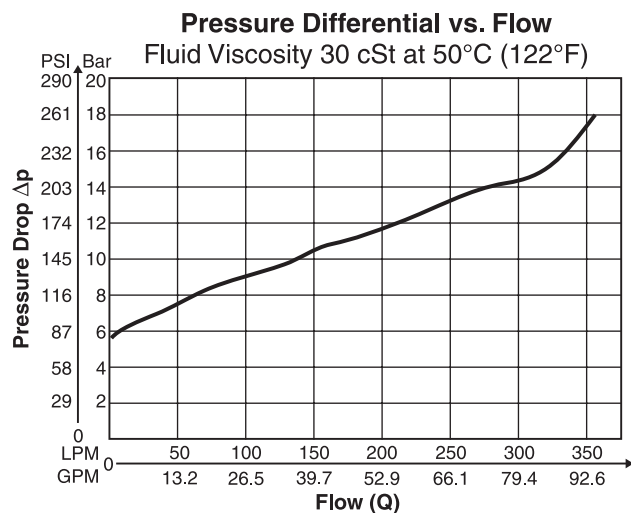
RG05*30*A, RG5H*30*A



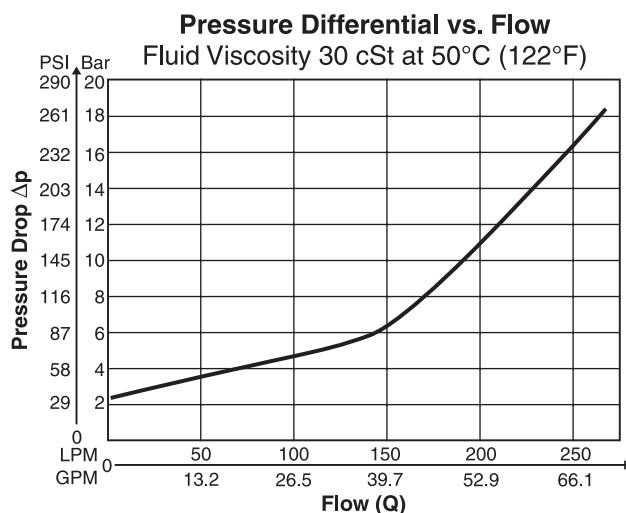
RG05*30*D, RG5H*30*D



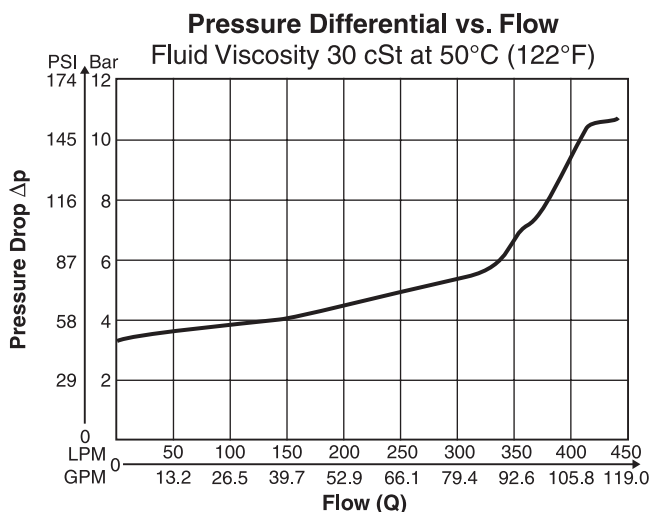
RG07*30*A



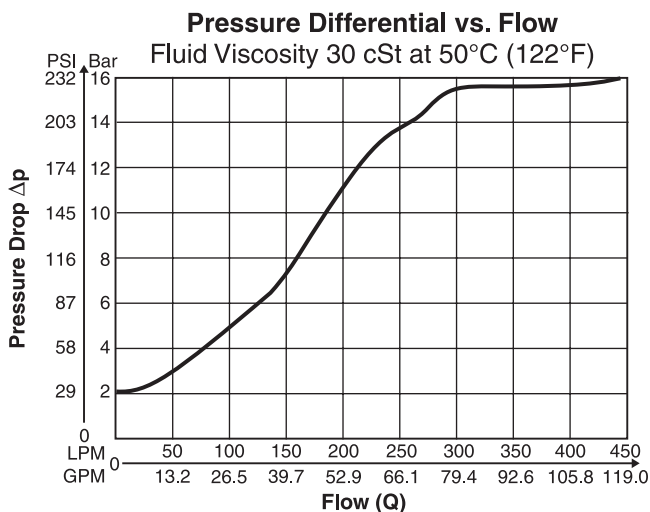
RG07*30*D

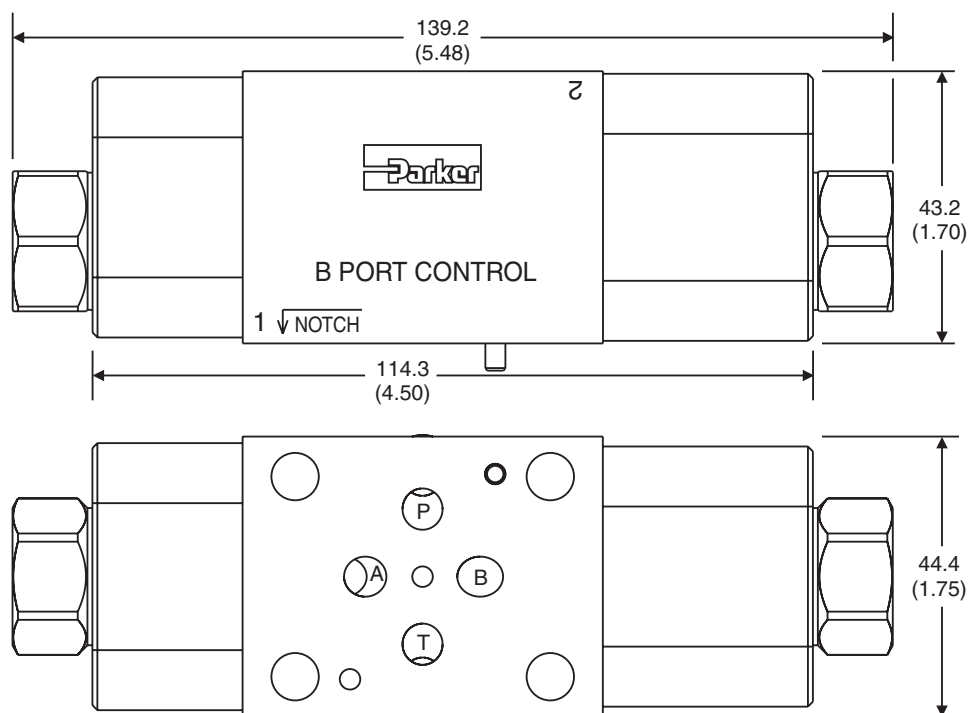
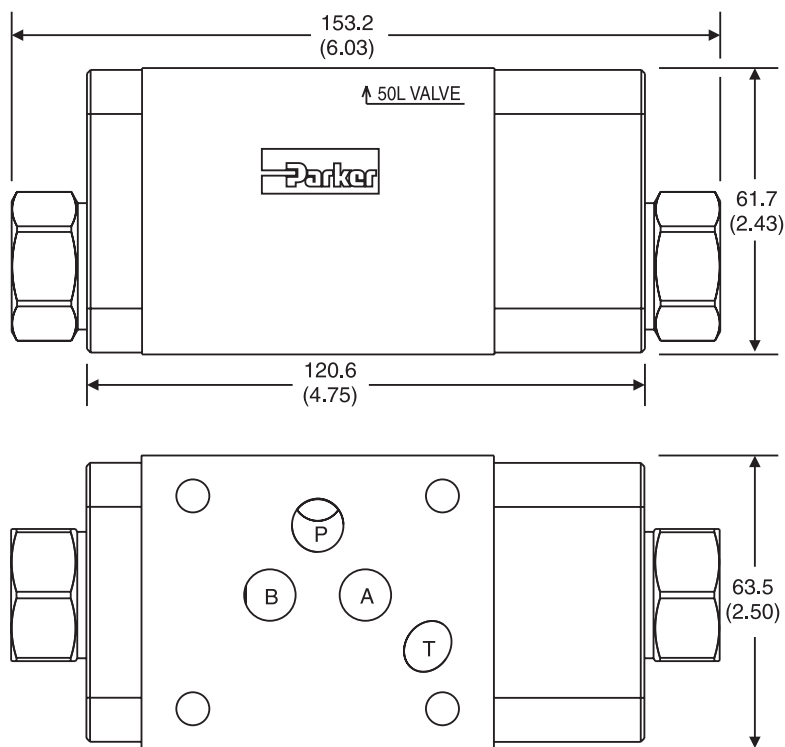


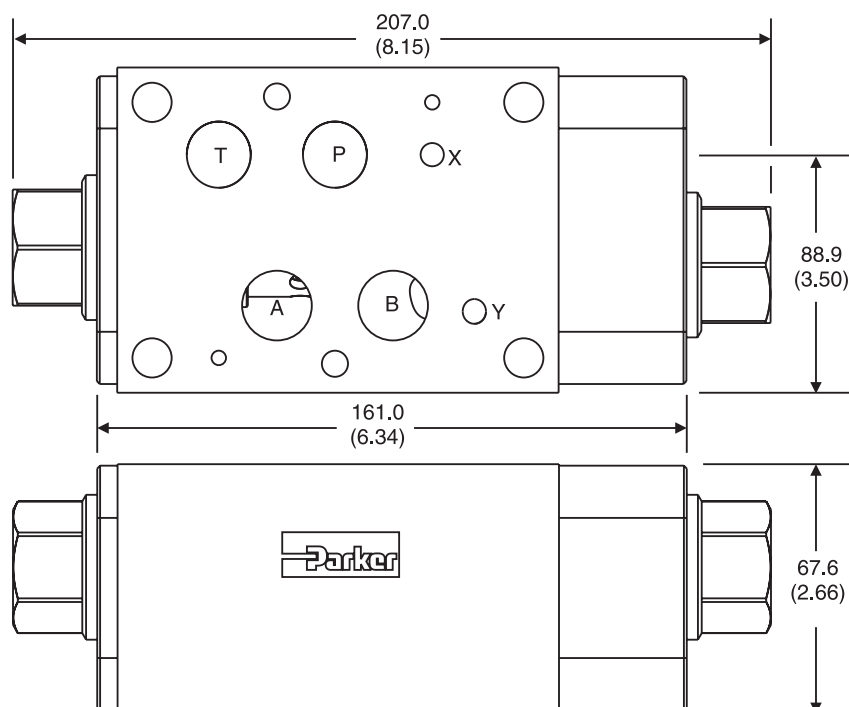
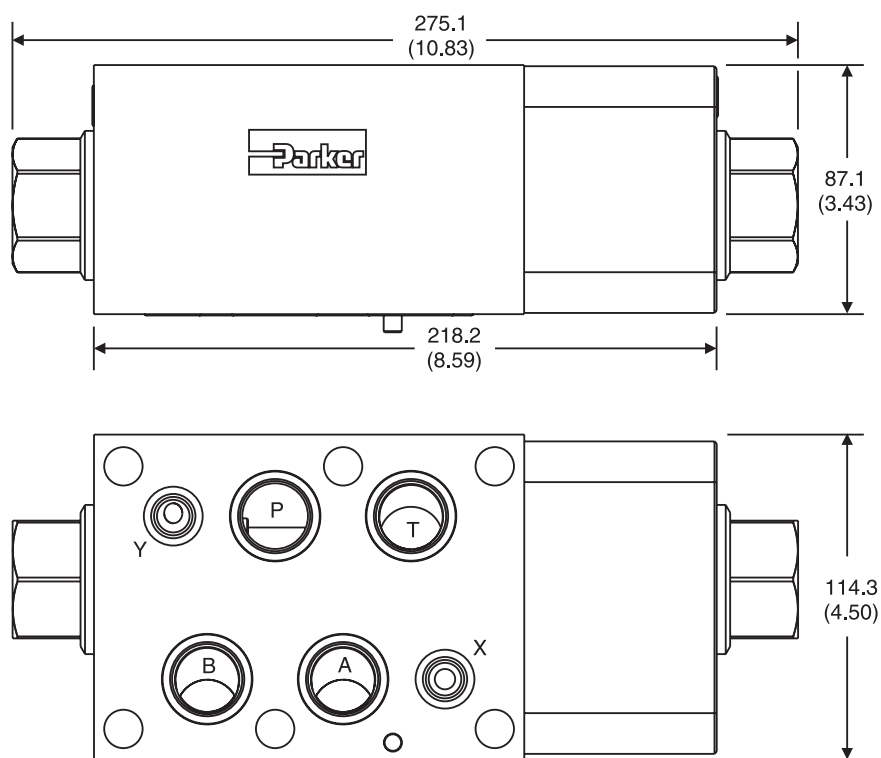
RG08*30*A



RG08*30*D



RG03BA – Inch equivalents for millimeter dimensions are shown in (**)**RG05BA** – Inch equivalents for millimeter dimensions are shown in (**)

RG07BA – Inch equivalents for millimeter dimensions are shown in (**)**Note:** This is a top view.**RG08BA** – Inch equivalents for millimeter dimensions are shown in (**)

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.

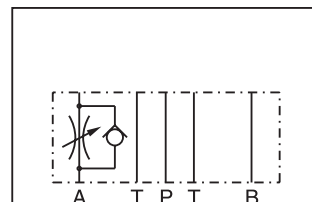
A low flow / high resolution version in NFPA 03 / NG6 for sensitive shifting time adjustment of pilot operated directional control valves is available on request.

Features

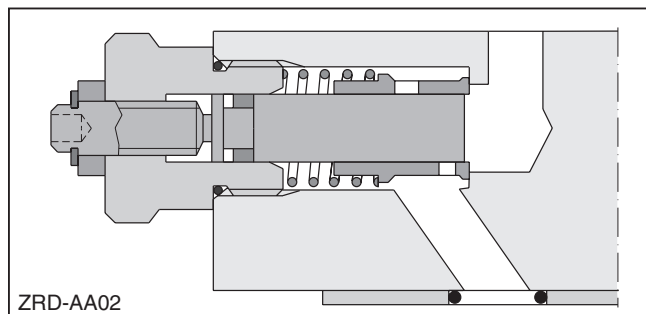
- High flow capacity.
- Various functional arrangements.
- Sizes:
 - ZRD01 – NFPA D03 / NG6 / CETOP 3
 - ZRD02 – NFPA D05 / NG10 / CETOP 5



ZRD-ABZ01



ZRD-AA02



ZRD-AA02

Specifications

General		
Size	NG6	NG10
Mounting	DIN 24340 A6 ISO 4401 NFPA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFPA D05 CETOP RP 121 5
Mounting Position	Unrestricted	
Ambient Temperature	-20°C to +50°C (-4°F to +122°F)	
Hydraulic		
Max. Operating Pressure	350 Bar (5075 PSI)	
Nominal Flow	80 LPM (21.2 GPM)	160 LPM (42.3 GPM)
Leakage	—	—
Cracking Pressure	—	—
Fluid	Hydraulic oil as per DIN 51524 ... 51525	
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)	
Viscosity Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	

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.
 B01_Cat2500.indd, ddp, 04/19

B

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 / NG6
02	NFPA D05 / NG10

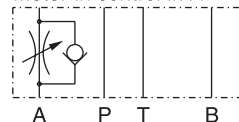
Code	Description
1	Nitrile
5	Fluorocarbon

Weight: 1 Cartridge
 ZRD*01 1.2 kg (2.6 lbs)
 ZRD*02 2.8 kg (6.2 lbs.)

2 Cartridges
 1.3 kg (2.9 lbs)
 2.9 kg (6.4 lbs.)

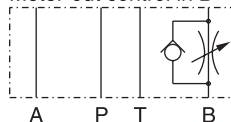
ZRD01

Meter-in control in A



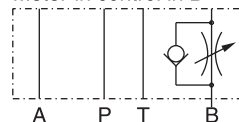
Series
 ZRDAZ01S0D1

Meter-out control in B



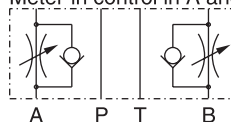
Series
 ZRDBA01S0D1

Meter-in control in B



Series
 ZRDBZ01S0D1

Meter-in control in A and B



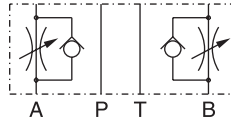
Series
 ZRDABZ01S0D1

Meter-out control in A



Series
 ZRDAA01S0D1

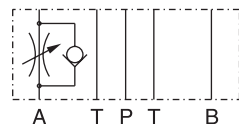
Meter-out control in A and B



Series
 ZRDABA01S0D1

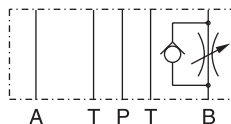
ZRD02

Meter-in control in A



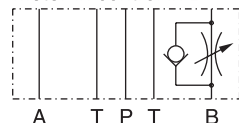
Series
 ZRDAZ02S0D1

Meter-out control in B



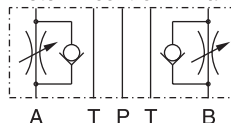
Series
 ZRDBA02S0D1

Meter-in control in B



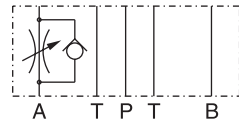
Series
 ZRDBZ02S0D1

Meter-in control in A and B



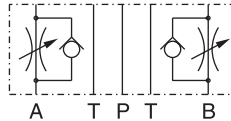
Series
 ZRDABZ02S0D1

Meter-out control in A



Series
 ZRDAA02S0D1

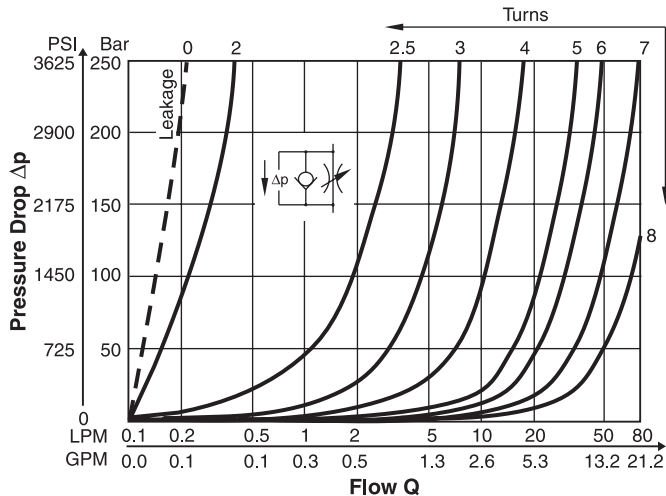
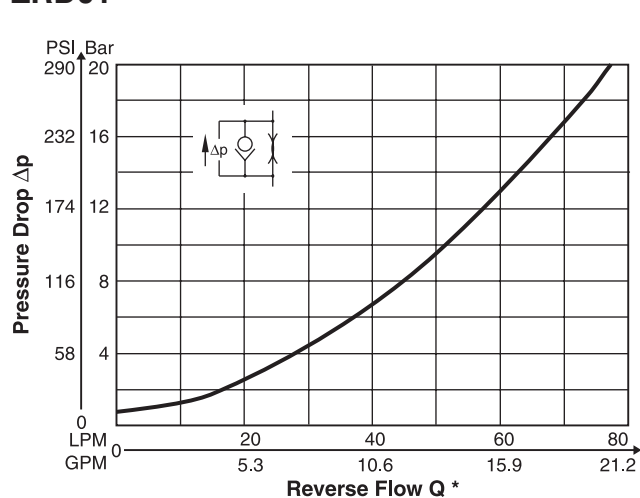
Meter-out control in A and B



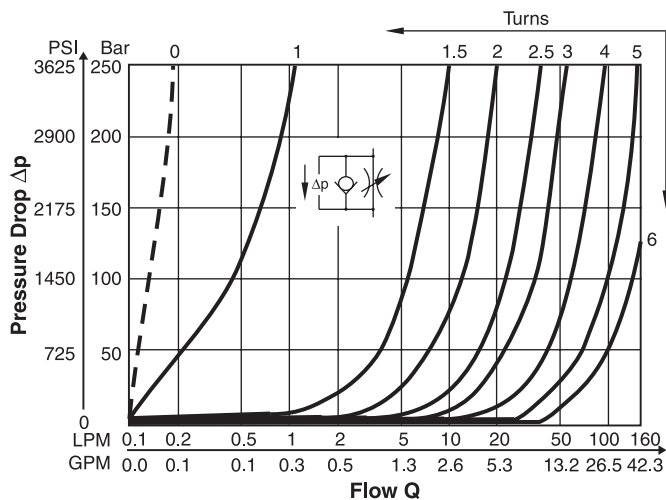
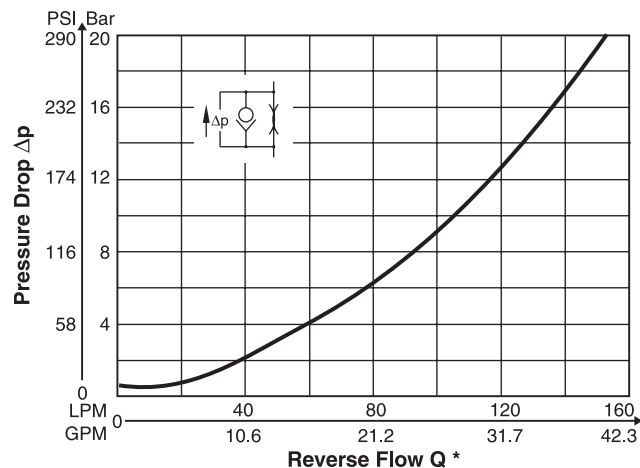
Series
 ZRDABA02S0D1

p/Q Performance Curves

ZRD01



ZRD02

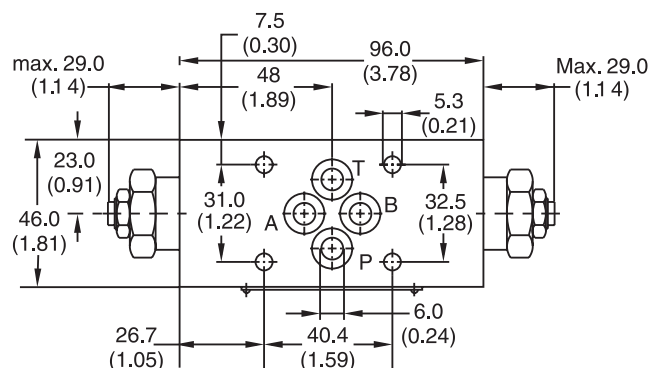


* Throttle closed

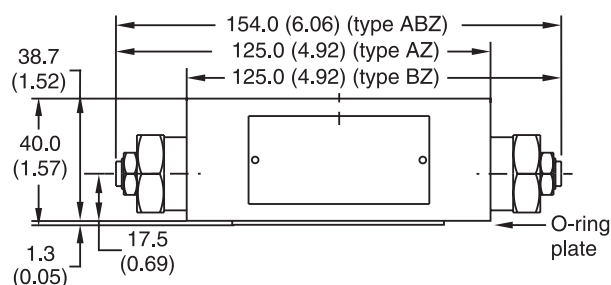
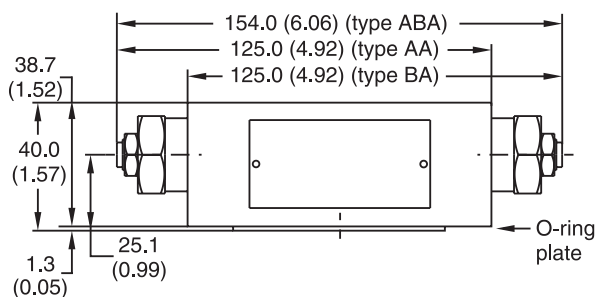
Fluid Viscosity 30 cSt @ 50°C (122°F)

ZRD01

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

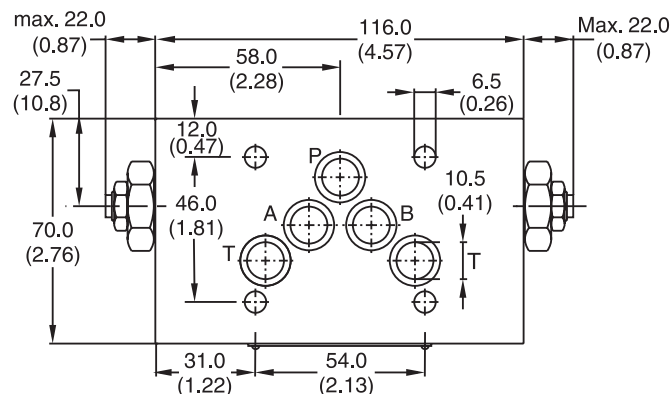


Seal Kit	
Seal	Order Code
1	098-91096-0
5	098-91097-0
Complete Cartridge	
Order Code	
098-91119-0	
O-ring Plate	
Order Code	
S26-27553-0	

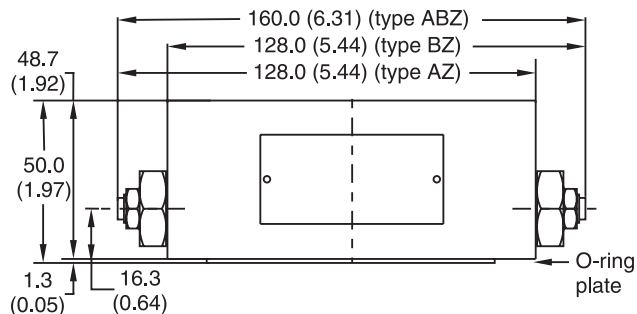
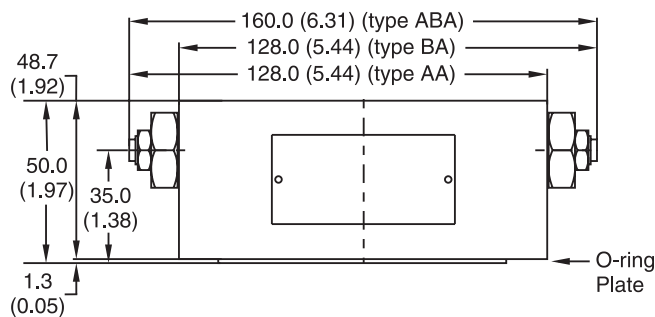


ZRD02

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



Seal Kit	
Seal	Order Code
1	098-91098-0
5	098-91099-0
Complete Cartridge	
Order Code	
098-91120-0	
O-ring Plate	
Order Code	
S16-85742-0	



General Description.

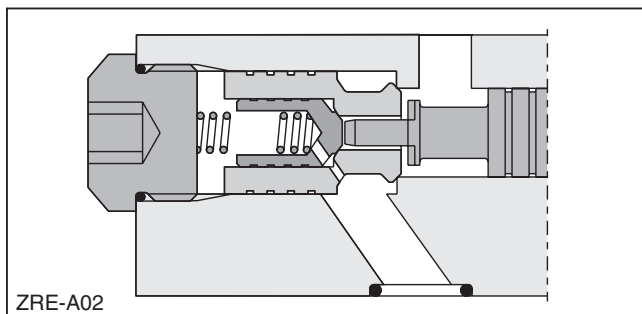
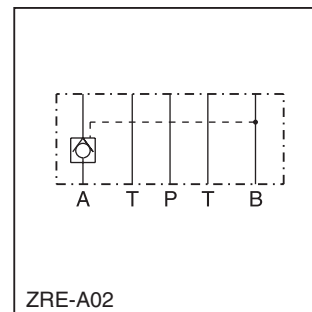
Series ZRE pilot operated check valves are designed for maximum flow rates and long life time.

The valves are typically used in combination with spool type directional control valves to ensure leak free positioning of the actuator.

The inlet flow is free while the outlet flow is blocked. Pressure in the inlet line opens the check valve and allows free outlet flow.

Features

- High life time.
- Check function in A, B or A + B.
- Sizes:
 - ZRE01 – NFPA D03 / NG6 / CETOP 3
 - ZRE02 – NFPA D05 / NG10 / CETOP 5



Ordering Information

ZRE
 Pilot Operated
 Check Valve

Port
 Option

Size

Design
 Series

Seal

Code	Description
A	Blocked in A
B	Blocked in B
AB	Blocked in A and B

Code	Description
01	NFPA D03 / NG6
02	NFPA D05 / NG10

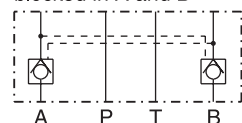
Code	Description
D	Size 01
E	Size 02

Code	Description
1	Nitrile
5	Fluorocarbon

Weight:
 ZRE*01 1.2 kg (2.6 lbs)
 ZRE*02 3.1 kg (6.8 lbs.)

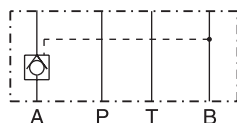
ZRE01

blocked in A and B



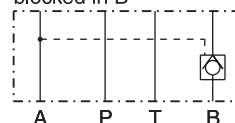
Series
 ZREAB01D1

blocked in A



Series
 ZREA01D1

blocked in B



Series
 ZREB01D1

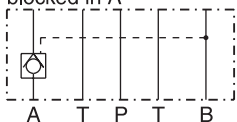
ZRE02

blocked in A and B



Series
 ZREAB02E1

blocked in A



Series
 ZREA02E1

blocked in B



Series
 ZREB02E1

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.

B01_Cat2500.indd, ddp, 04/19

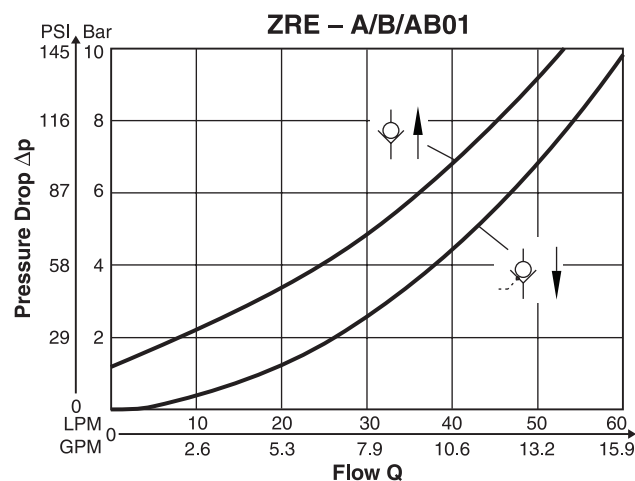
Specifications

General		
Size	NG6	NG10
Mounting Interface	DIN 24340 A6 ISO 4401 NFFA D03 CETOP RP 121	DIN 24340 A10 ISO 4401 NFFA D05 CETOP RP 121 5
Mounting Position	Unrestricted	
Ambient Temperature	-20°C to +50°C (-4°F to +122°F)	
Hydraulic		
Max. Operating Pressure	350 Bar (5075 PSI)	
Nominal Flow	60 LPM (15.9 GPM)	120 LPM (31.7 GPM)
Opening Ratio (Pilot Cone/Main Cone)	1:6	1:6
Cracking Pressure	1.2 Bar (17.4 PSI)	2.0 Bar (29.0 PSI)
Fluid	Hydraulic oil in accordance with DIN 51524 ... 51525	
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)	
Viscosity Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	

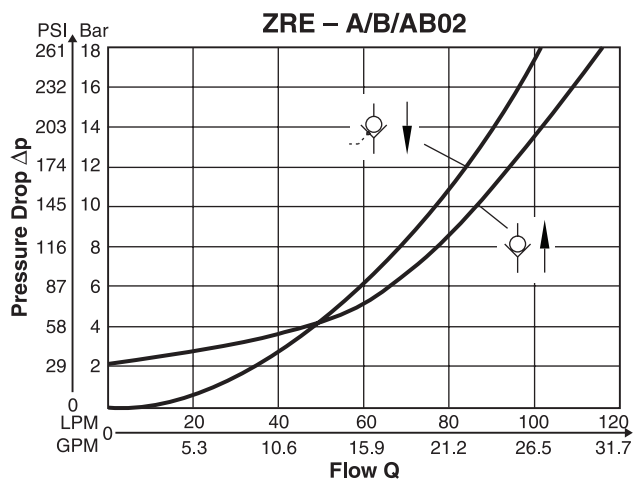
Performance Curves

p/Q

ZRE01



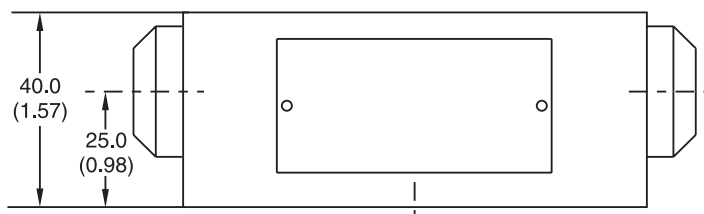
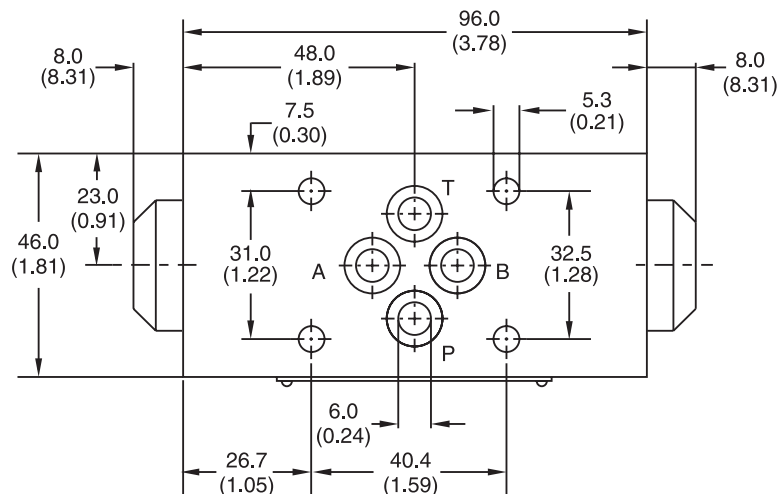
ZRE02



Fluid Viscosity 30 cSt at 50°C (122°F).

ZRE01

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

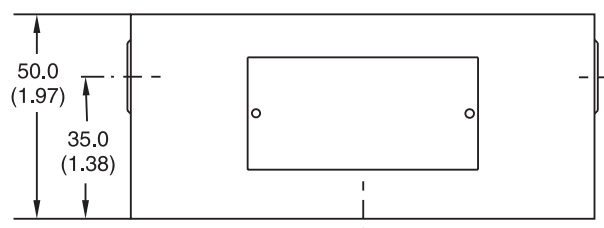
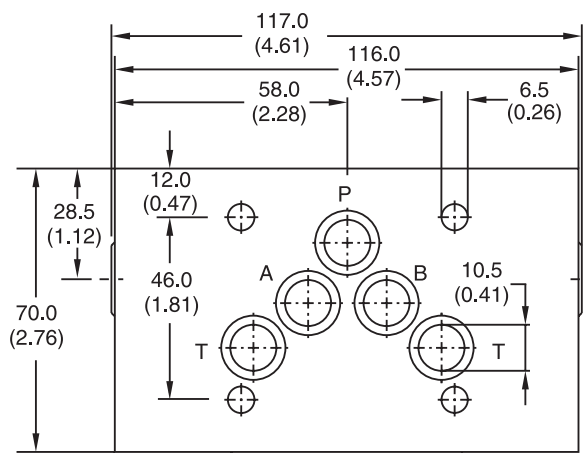


Seal Kit	
Seal	Order Code
1	098-91088-0
5	098-91089-0

B

ZRE02

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



Seal Kit	
Seal	Order Code
1	098-91090-0
5	098-91091-0



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.

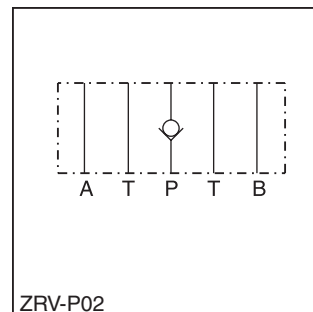
B

Features

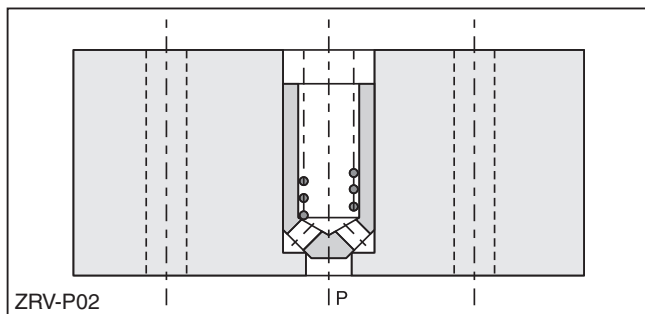
- Leakage-free seat.
- High life time.
- Cracking pressure 0.5 Bar (7.25 PSI).
- Sizes:
 - ZRV01 – NFPA D03 / NG6 / CETOP 3
 - ZRV02 – NFPA D05 / NG10 / CETOP 5



ZRV-P02



ZRV-P02



ZRV-P02

Ordering Information

ZRV
 Direct Operated
 Check Valve

Port
 Option

Size

Code	Description
P	Blocked in P
T	Blocked in T

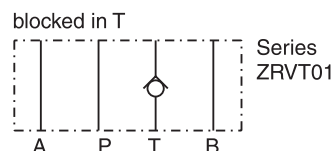
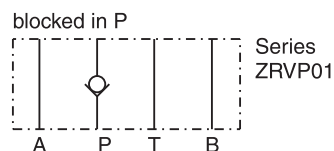
Code	Description
01	NFPA D03 / NG6
02	NFPA D05 / NG10

Weight:

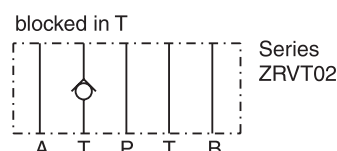
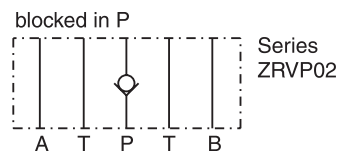
ZRV*01 0.7 kg (1.5 lbs)

ZRV*02 2.0 kg (4.4 lbs.)

ZRV01



ZRV02



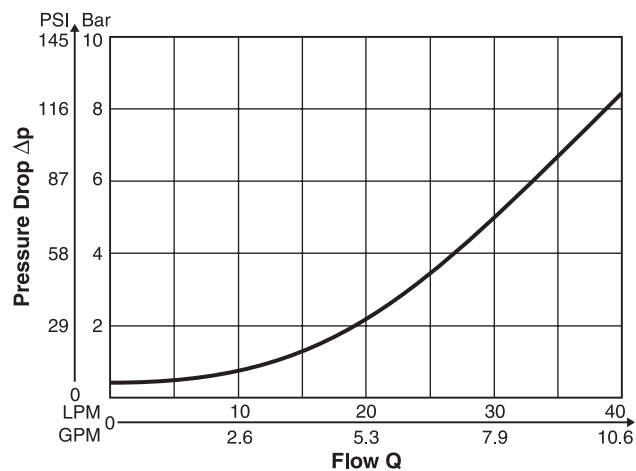
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.
 B01_Cat2500.indd, ddp, 04/19

Specifications

General		
Size	NG6	NG10
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 Temprature	-20°C to +50°C (-4°F to +122°F)	
Hydraulic		
Max. Operating Pressure	350 Bar (5075 PSI)	
Nominal Flow	40 LPM (10.6 GPM)	100 LPM (26.5 GPM)
Cracking Pressure	0.5 Bar (7.25 PSI)	0.5 Bar (7.25 PSI)
Fluid	Hydraulic oil as per DIN 51524 ... 51525	
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)	
Viscosity Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	

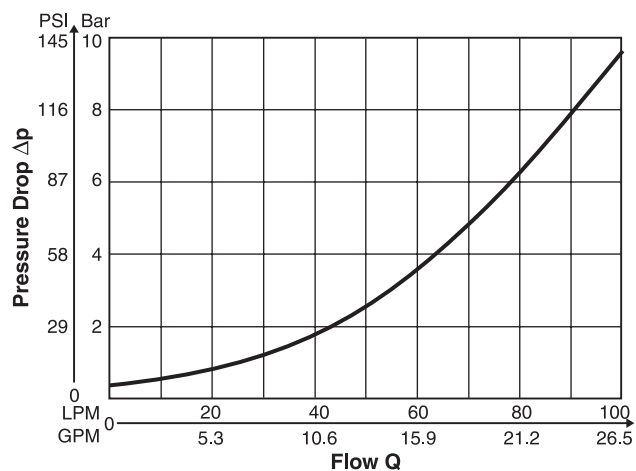
p/Q Performance Curves

ZRV P/T01



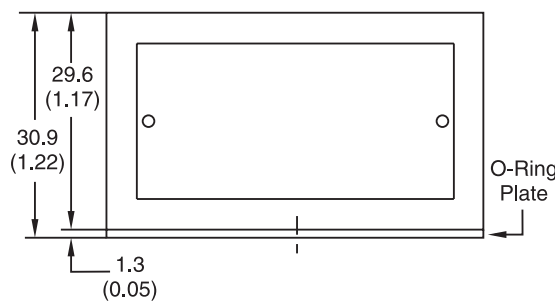
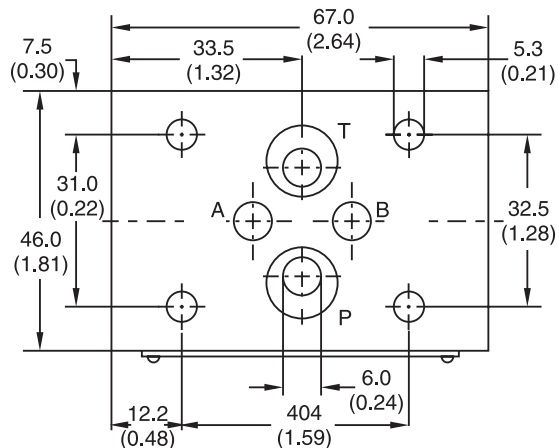
Fluid Viscosity 30 cSt at 50°C (122°F)

ZRV P/T02

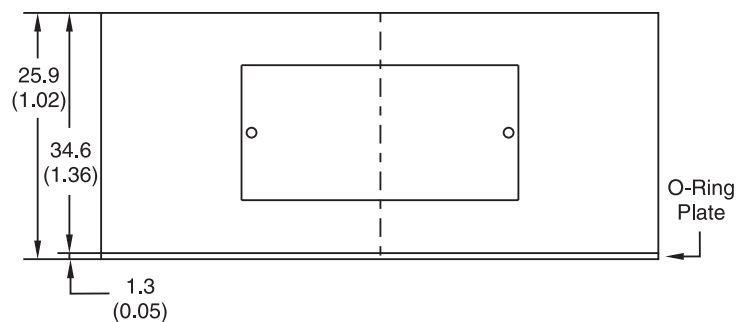
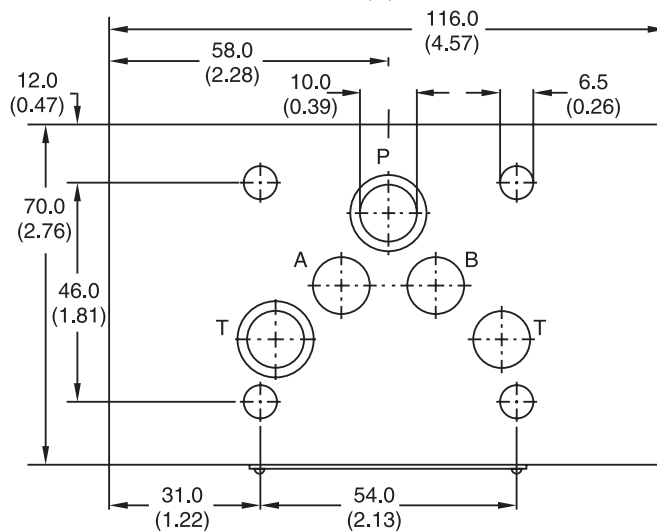


Fluid Viscosity 30 cSt at 50°C (122°F)

ZRV01 – Inch equivalents for millimeter dimensions are shown in (**)

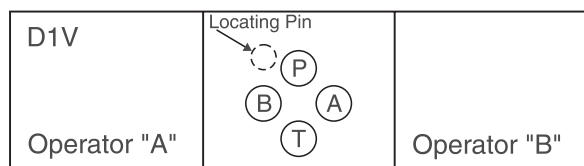


ZRV02 – Inch equivalents for millimeter dimensions are shown in (**)



CAUTION: **Sandwich Installation**

Prior to installation of Sandwich valves, please review flow paths. Due to the reversibility of the DO3 size, incorrect installation will alter the hydraulic circuit. Care must be taken during installation to insure that the Sandwich is installed in compliance with the hydraulic schematic. Please consult with your Parker representative with any questions that may arise.



Pressure Ratings

Unless otherwise specified, all Parker Sandwich valves have continuous duty pressure rating as shown in this catalog.

Special Requirements

Consult your Parker representative for factory recommendations on such situations as:

- Installations that will operate at pressures higher than published catalog ratings.
- Use of hydraulic fluids which do not meet our recommended specifications.
- Operations where fluid temperature will exceed 121°C (250°F).

Recommended Mounting Surface

Surface must be flat within .0004 inch T.I.R. and smooth with 32 micro-inch.

System Cleanliness

Any hydraulic system that includes Parker valves should be carefully protected against dirt and fluid contamination. Life of the valves, as well as of all other components, will be greatly lengthened. Operation will be smoother and more precise. Maintenance and repairs will be reduced. Lost production because of low pressure and flow will be minimized. Fluid contamination should be maintained to less than 500 particles larger than 10 micrometers per milliliter of fluid (SAE class 4 or better/ISO Code 16/13).

Hydraulic Fluids

Parker recommends using top-quality hydraulic fluids having a viscosity range of 32 to 54 cSt (150 to 250 SSU) at 38°C (100°F). The absolute viscosity range should be 16 to 220 cSt (80 to 1000 SSU). Fluids should have highest anti-wear characteristics and be treated to avoid rust and oxidation.

Seals

When used with water-glycol, water/oil emulsions, and high-grade petroleum base hydraulic fluids, Parker standard nitrile seals are suitable.

When using phosphate ester fluids or their blends, specify Parker optional seals made of fluorocarbon. Synthetic fire-resistant fluids require special seal materials which your Parker representative can recommend.

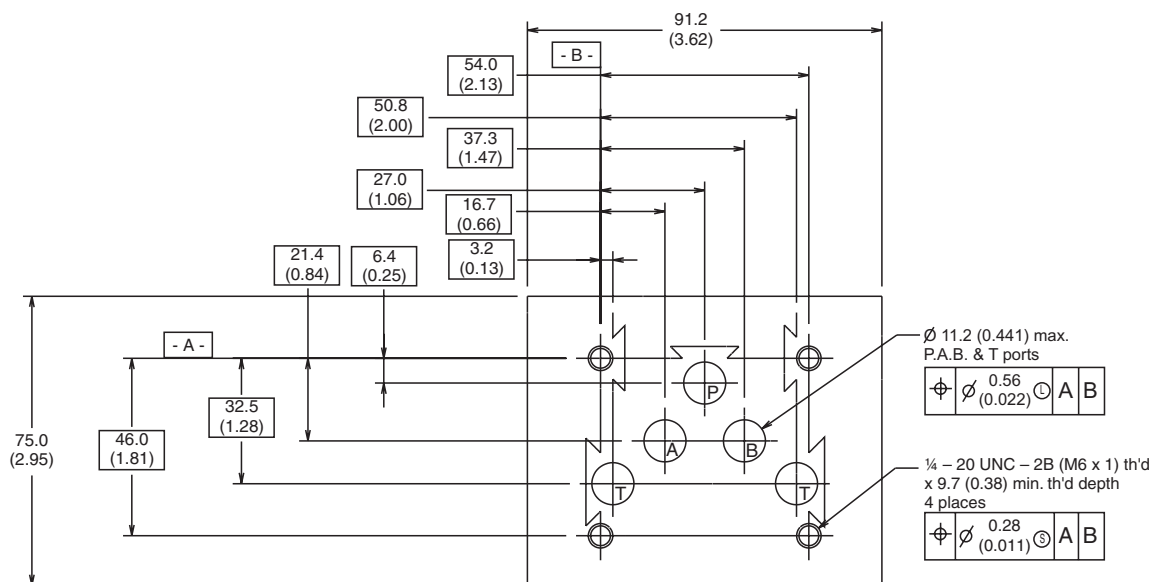
Torque Specifications

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

Size	Torque Valve
D03	5.7 N.m. (50 in.-lbs.)
D05	16.3 N.m. (12 ft.-lbs.)
D07	63.0 N.m. (46.5 ft.-lbs.)
D08	108.5 N.m. (80 ft.-lbs.)

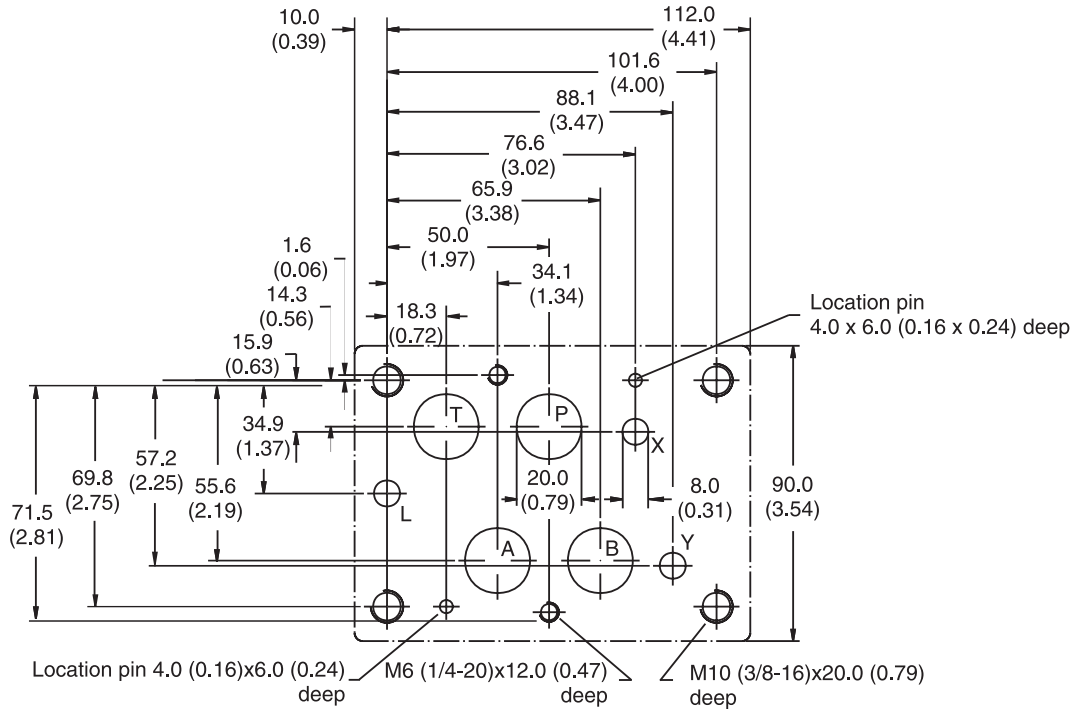
[illegible]

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



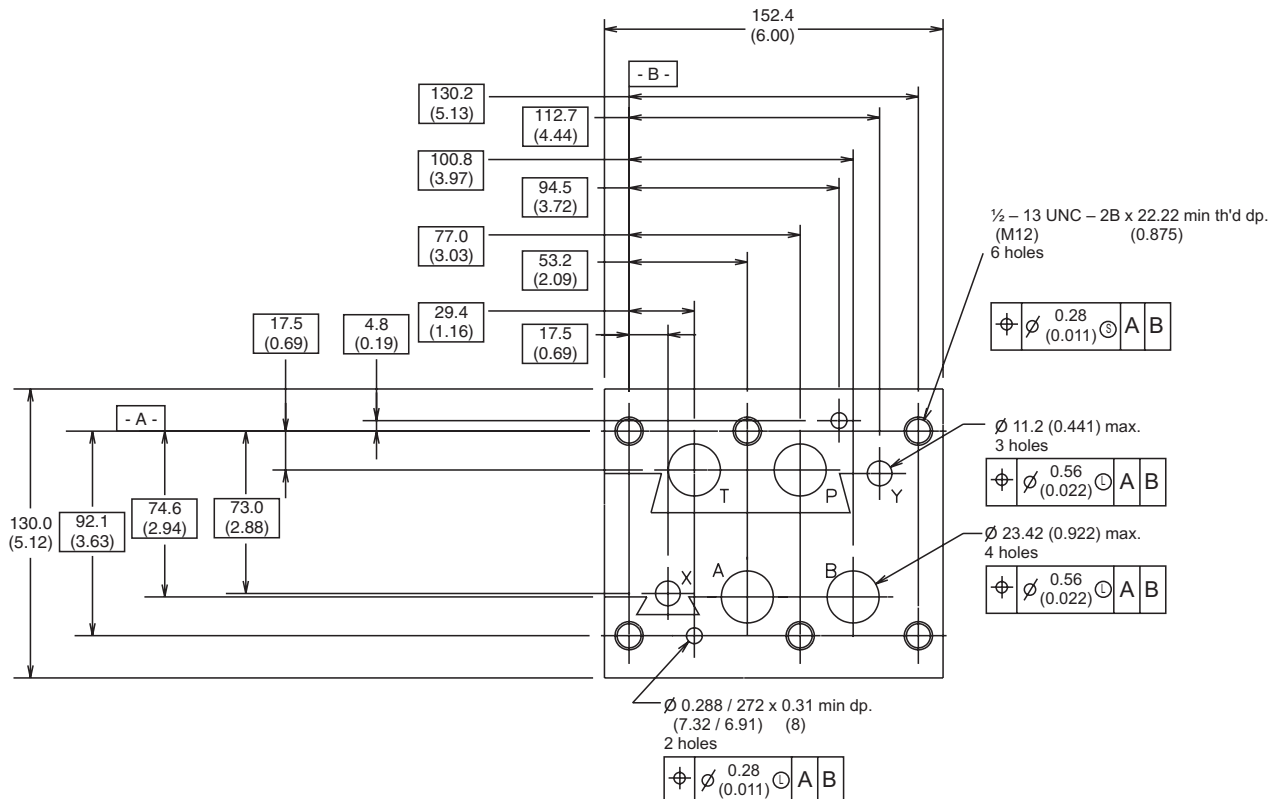
Mounting Pattern – NFPA D07, CETOP 7 & NG16

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



Mounting Pattern – NFPA D08, CETOP 8 & NG25

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



Contents**Series D1V**

General Description, Features, Operation	C2
Dimensions	
Side Ported Subplate – NFPA D03	C2
Bottom Ported Subplate – NFPA D03	C3
Manifold – NFPA D03	C4
Ordering Information	
Subplates	C5
Manifolds	C6

Series D3A, D3DW, D3L and D3W

Features	C7
Dimensions	
Side Ported Subplate – NFPA D05	C7
Bottom Ported Subplate – NFPA D05	C7
Manifold – NFPA D05	C8

Series D31, D3P and High Flow

Features	C9
Dimensions	
Side Ported Subplate – NFPA D05H (E)	C10
Bottom Ported Subplate – NFPA D05H (E)	C10
Manifold – NFPA D05H (E)	C11
Ordering Information	
D3 and D31 Subplates	C9
D3 Manifolds	C12
D3P and D31 High Flow Manifolds	C13

Series D6 and D8

Features	C14
Dimensions	
Side Ported Subplate – NFPA D08	C14
Bottom Ported Subplate – NFPA D08	C15
Manifold – NFPA D08	C16
Ordering Information	
Subplates	C17
Manifolds	C18

Accessories

Dimensions	
Cover and Crossover Plates – NFPA D03, D05, D05H and D08	C19 - C22
Tapping Plates – NFPA D03, D05, D05H and D08	C23 - C26
Ordering Information	
Tapping and Cover Plates – D1V, D3, D31, D6 and D8	C27 - C30

Installation Information

Mounting Patterns – NFPA D03, D05, D05H, D05HE and D08	C31 - C33
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Series PSB

General Description, Operation, Features, Specifications	C34
Ordering Information	C35
Mounting Pattern	C35
Performance Curves	C36
Electrical Connection	C36
Dimensions	C37 - C39

General Description

Series D1V directional control valve subplates provide easy transition from NFPA and CETOP mounting patterns to common plumbing connections. Five different thread types are available for use in any application.

Manifolds provide a single location to mount several valves in a compact and manageable array for operating multiple machines or functions.

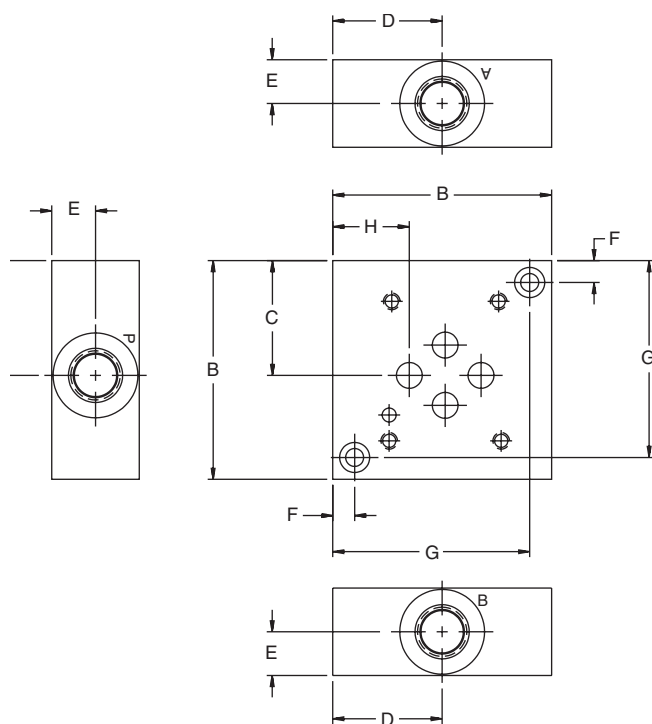
C

Features

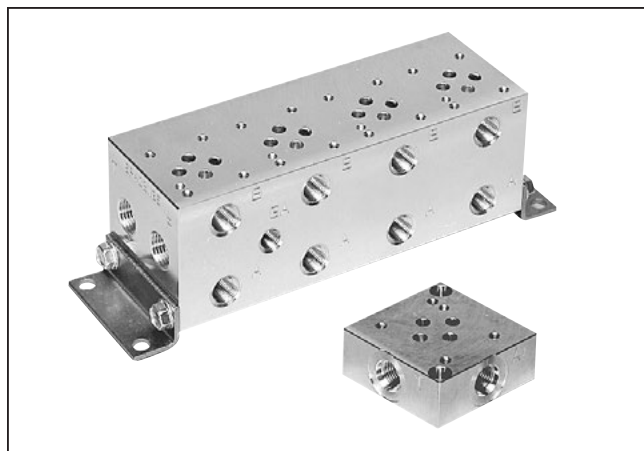
- **Aluminum or steel available** — Flexibility for applying to different system pressures
- **NPT and SAE thread options available** — Flexibility to plumb into existing systems
- **Multiple port sizes available** — Eliminates need for reducers and expanders at subplate connection

Side Ported Subplate — NFPA D03

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



See Mounting Bolt Kits for bolt information.



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.



Port Size	A	B	C	D	E	F	G	H
2*	25.4 (1.00)	63.5 (2.50)	33.3 (1.31)	31.8 (1.25)	12.7 (.50)	6.4 (.25)	57.2 (2.25)	22.4 (.88)
3*	25.4 (1.00)	63.5 (2.50)	33.3 (1.31)	31.8 (1.25)	12.7 (.50)	6.4 (.25)	57.2 (2.25)	22.4 (.88)
4*	38 (1.50)	88.9 (3.50)	46.0 (1.81)	45.2 (1.78)	19.1 (.75)	6.4 (.25)	82.5 (3.25)	35.1 (1.38)
6*	44.5 (1.75)	101.6 (4.00)	52.3 (2.06)	51.6 (2.03)	22.4 (.88)	9.7 (.38)	92.2 (3.63)	41.4 (1.63)

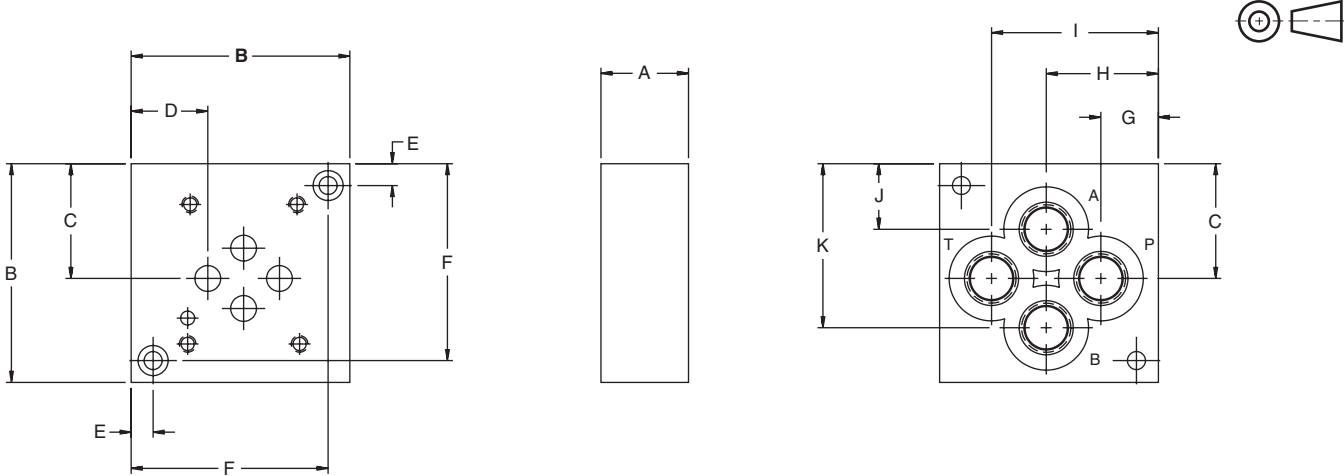
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information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

C01_Cat2500.indd, ddp, 04/19

Series D1V

Bottom Ported Subplate — NFPA D03

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



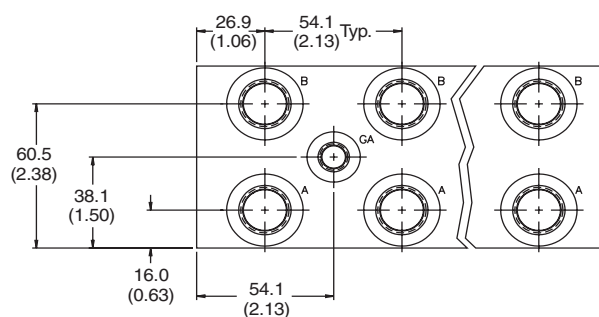
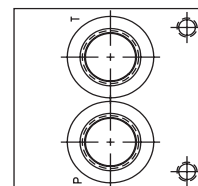
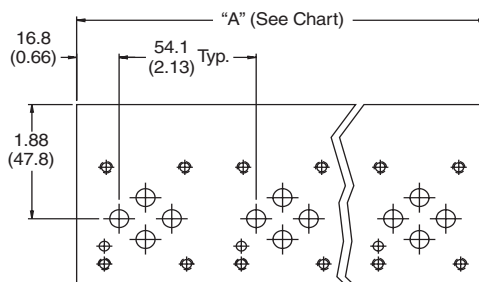
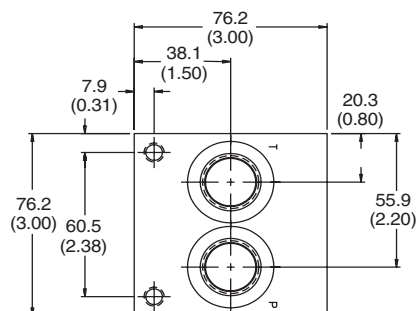
Port Size	A	B	C	D	E	F	G	H	I	J	K
2*	25.4 (1.00)	63.5 (2.50)	33.3 (1.31)	22.4 (.88)	6.4 (.25)	57.2 (2.25)	16.8 (.66)	32.5 (1.28)	48.5 (1.91)	19.1 (.75)	47.8 (1.88)
3*	25.4 (1.00)	63.5 (2.50)	33.3 (1.31)	22.4 (.88)	6.4 (.25)	57.2 (2.25)	15.0 (.59)	32.5 (1.28)	50.0 (1.97)	17.5 (.69)	49.3 (1.94)
4*	38.1 (1.50)	88.9 (3.50)	46.0 (1.81)	35.1 (1.38)	6.4 (.25)	82.6 (3.25)	17.5 (.69)	45.2 (1.78)	71.4 (2.81)	19.1 (.75)	71.4 (2.81)
6*	38.1 (1.50)	114.3 (4.50)	58.7 (2.31)	47.8 (1.88)	9.7 (.38)	104.9 (4.13)	23.9 (.94)	57.9 (2.28)	90.4 (3.56)	23.9 (.94)	90.4 (3.56)

See Mounting Bolt Kits for bolt information.

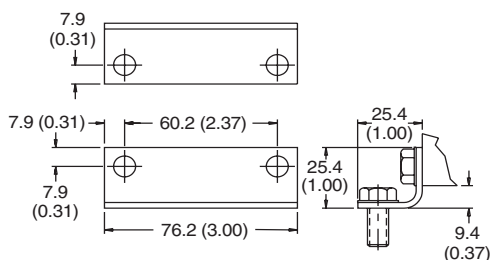
Series D1V

Manifold — NFPA D03

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



Note: Gage port not available on single station manifold.

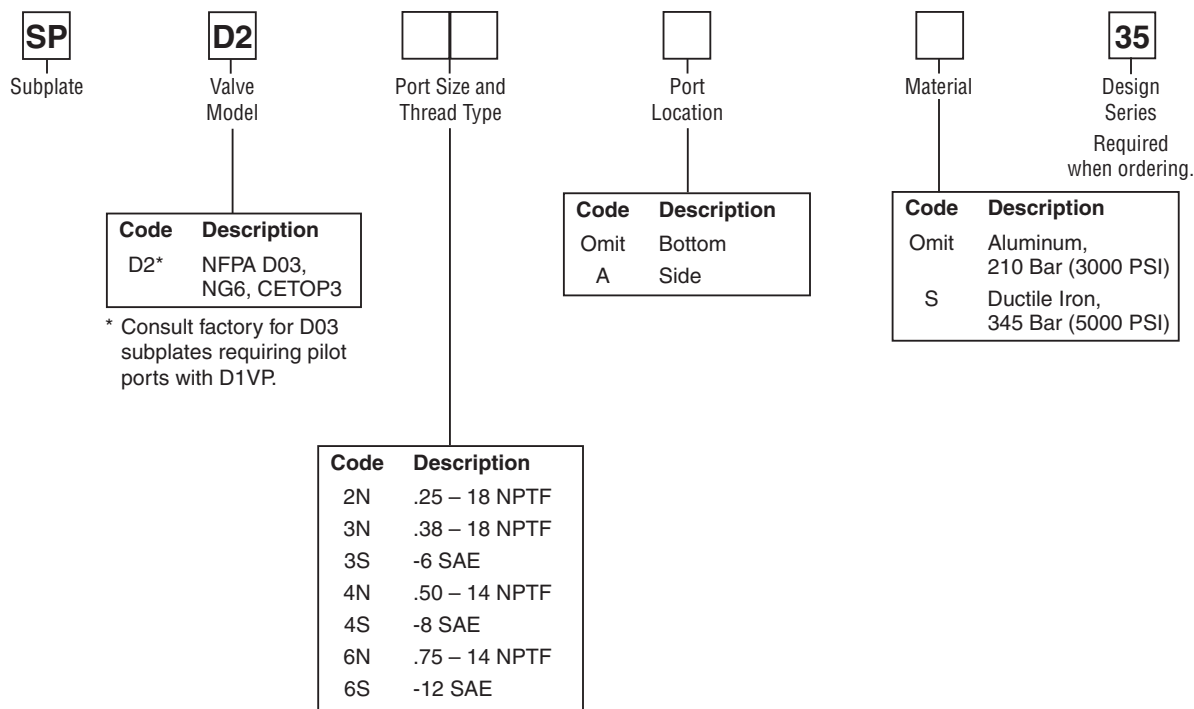


Mounting Hardware
(See Ordering Information for Mounting Hardware details)

No. Stations	1	2	3	4	5	6	7	8
"A" Length mm (inch)	54.1 (2.13)	108.0 (4.25)	162.1 (6.38)	215.9 (8.50)	270.0 (10.63)	323.9 (12.75)	378.0 (14.88)	431.8 (17.00)
Wgt., Alum, kg (lbs.)	1.4 (3)	1.8 (4)	2.7 (6)	3.6 (8)	4.1 (9)	5.0 (11)	5.4 (12)	6.4 (14)
Wgt., Iron, kg (lbs.)	2.3 (5)	4.1 (9)	5.9 (13)	7.7 (17)	9.5 (21)	11.8 (26)	13.6 (30)	15.4 (34)

See Mounting Bolt Kits for bolt information.

Series D1V Subplates



Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

Mounting Bolt Kits

UNC Bolt Kits for use with D1V Directional Control Valves & Sandwich Valves (D1V*-91 Design, Solenoid Operated)					
	Number of Sandwich Valves @ 1.58" (40mm) thickness				
	0	1	2	3	4
	BK209 1.25"	BK243 2.88"	BK225 4.38"	BK244 6.00"	BK245 7.50"
D1V-91					
D1V-91 Plus Tapping Plate	BK176 2.25"	BK56 3.81"	BK212 5.38"	BK107 7.00"	BK106 8.50"

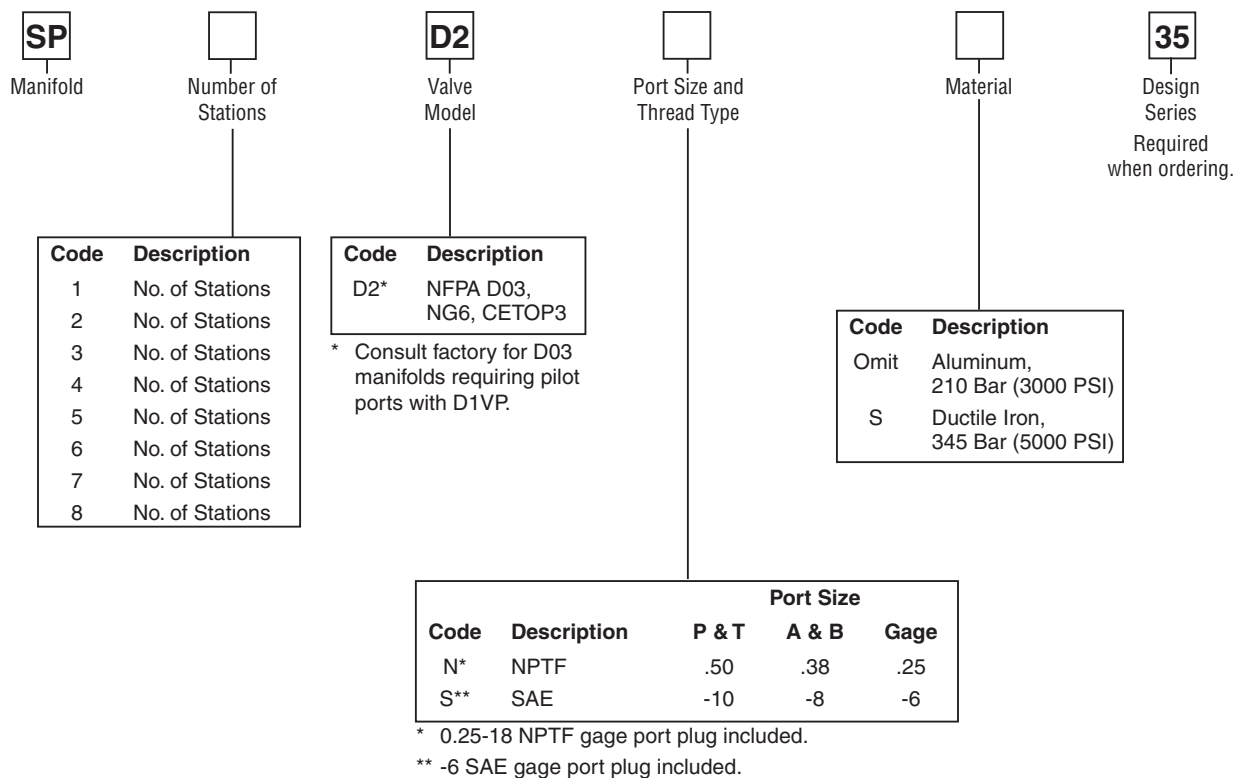
Note: All bolts are SAE grade 8, 10-24 UNC-2A thread, torque to 5.6 N.m. (50 in.-lbs.)

Mounting Hardware supplied with subplate includes:

Subplates	Mounting Hardware	Qty.
SPD22N**	.25-20 UNC x	2
SPD23N**	.88 LG. SHCS	
SPD23S**		
SPD24N**	.25-20 UNC x	2
SPD24S**	1.5 LG. SHCS	
SPD26N*	.38-16 UNC x	2
SPD26S*	1.50 LG. SHCS	
SPD26NA*	.38-16 UNC x	2
SPD26SA*	1.75 LG. SHCS	

Valve mounting threads:
 #10-24 UNC x 0.63 DP.
 Used for SAE and NPTF ports.
 Metric M5-0.8mm ISO 6H x 16 DP.
 Used for BSPP, BSPT and ISO ports.

Series D1V Manifolds



Note: 35 Design Series manifolds conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

Mounting Bolt Kits

UNC Bolt Kits for use with D1V Directional Control Valves & Sandwich (D1V*-91 Design, Solenoid Operated)					
	Number of Sandwich @ 1.58" (40mm) thickness				
	0	1	2	3	4
D1V-91	BK209 1.25"	BK243 2.88"	BK225 4.38"	BK244 6.00"	BK245 7.50"
D1V-91 Plus Tapping Plate	BK176 2.25"	BK56 3.81"	BK212 5.38"	BK107 7.00"	BK106 8.50"

Note: All bolts are SAE grade 8, 10-24 UNC-2A thread, torque to 5.6 N.m. (50 in.-lbs.)

Mounting hardware supplied with manifold includes:

(2) steel brackets

For SAE and NPTF ports: (8) 5/16-18 UNC x .63 hex washer cap screws.

Valve mounting threads:

#10-24 UNC x 0.63 DP. Used for SAE and NPTF ports.

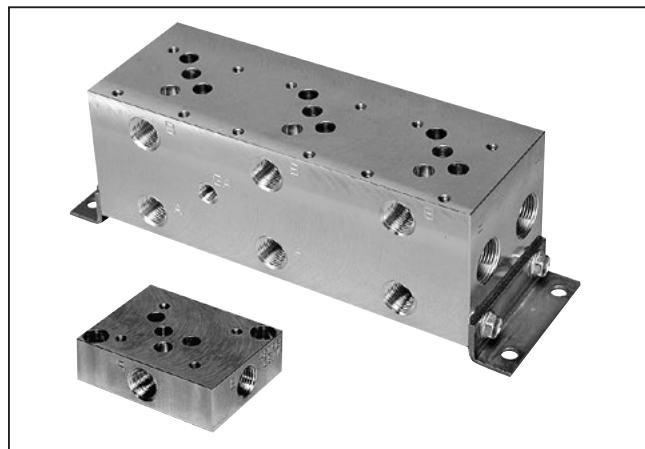
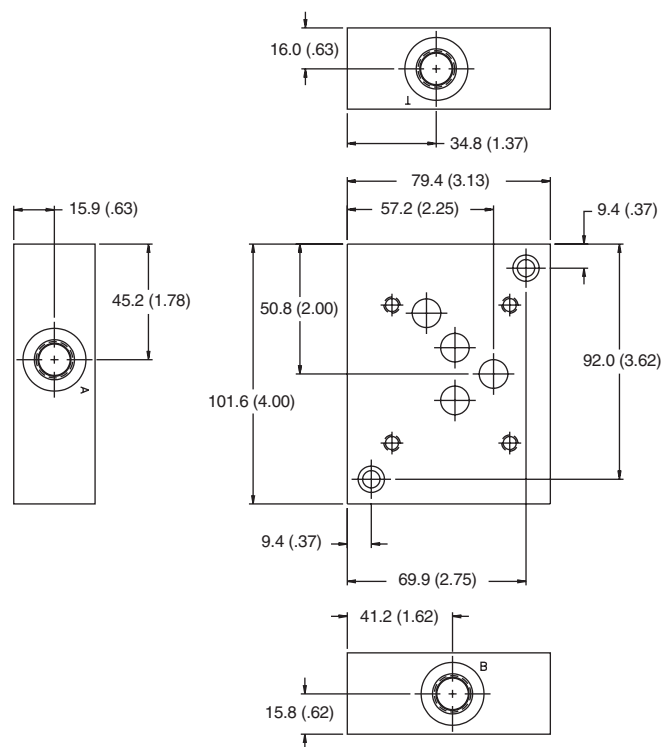
No. Stations	1	2	3	4	5	6	7	8
Wgt., Alum, kg (lbs.)	1.4 (3)	1.8 (4)	2.7 (6)	3.6 (8)	4.1 (9)	5.0 (11)	5.4 (12)	6.4 (14)
Wgt., Iron, kg (lbs.)	2.3 (5)	4.1 (9)	5.9 (13)	7.7 (17)	9.5 (21)	11.8 (26)	13.6 (30)	15.4 (34)

Features

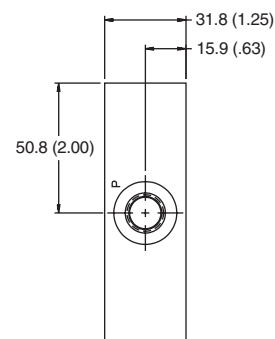
- **Aluminum or steel available** — Flexibility for applying to different system pressures
- **NPT and SAE thread options available** — Flexibility to plumb into existing systems
- **Multiple port sizes available** — Eliminates need for reducers and expander at subplate connection

Side Ported Subplate — NFPA D05

Inch equivalents for millimeter dimensions are shown in (**)



C

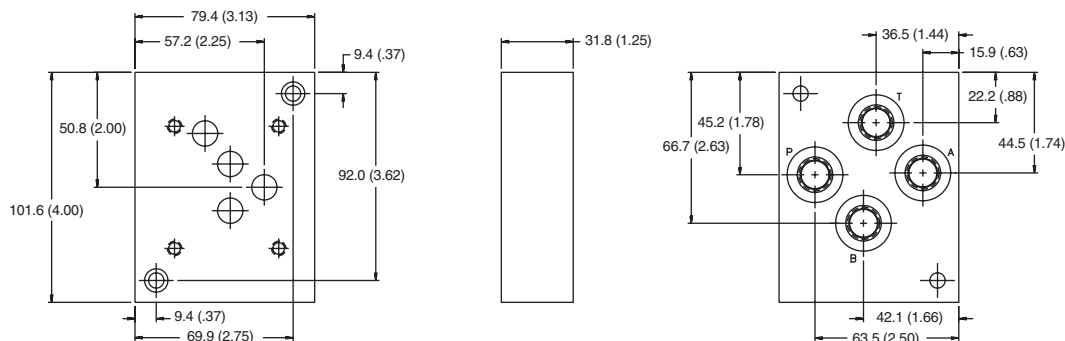


See Mounting Bolt Kits for bolt information.



Bottom Ported Subplate — NFPA D05

Inch equivalents for millimeter dimensions are shown in (**)

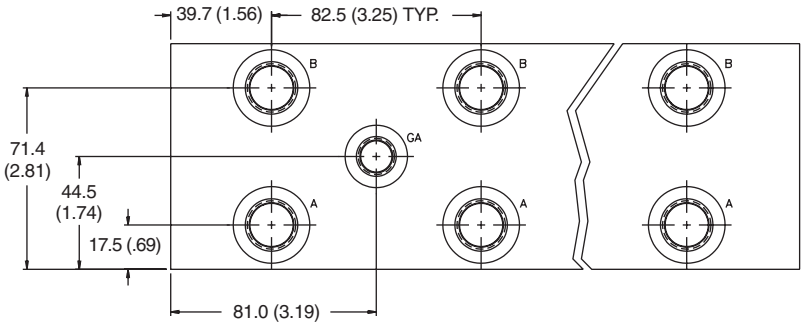
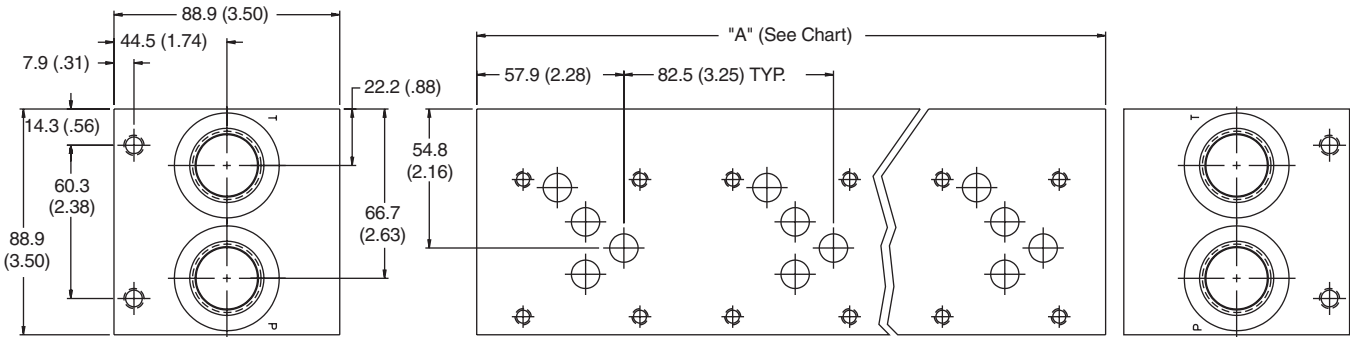


See Mounting Bolt Kits for bolt information.

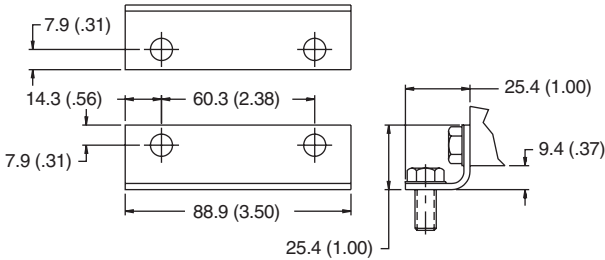
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.
C01_Cat2500.indd, ddp, 04/19

Series D3A, D3DW, D3L and D3W
Manifold — NFPA D05

Inch equivalents for millimeter dimensions are shown in (**)



Note: Gage port not available on single station manifold.



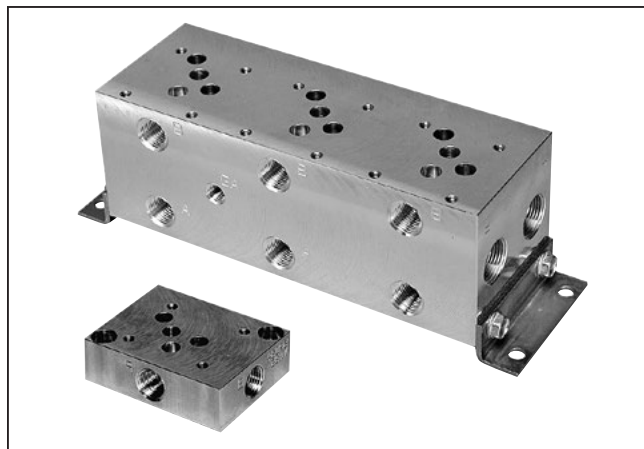
Mounting Hardware
(See Ordering Information for Mounting Hardware details)

No. Stations	1	2	3	4	5	6
"A" Length, mm (in)	82.6 (3.25)	165.1 (6.50)	247.7 (9.75)	330.2 (13.00)	412.8 (16.25)	495.3 (19.50)
Weight, Alum. kg (lbs.)	1.8 (4)	3.6 (8)	5.0 (11)	6.4 (14)	7.9 (17)	9.6 (21)
Weight, Iron kg (lbs.)	4.1 (9)	7.7 (17)	11.8 (26)	15.4 (34)	20.1 (43)	23.3 (51)

See Mounting Bolt Kits for bolt information.

Features

- **Aluminum or steel available** — Flexibility for applying to different system pressures
- **NPT and SAE thread options available** — Flexibility to plumb into existing systems
- **Multiple port sizes available** — Eliminates need for reducers and expander at subplate connection
- **Parallel or series circuit applications** — Flexibility for different circuits



C

Series D3 and D31 Subplates

Subplate		Valve Model		Port Size and Thread Type		Port Location		Material		Design Series Required when ordering.	
Code	Description	Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
D3	NFPA D05, CETOP5			# 3N	.38 – 18 NPTF	Omit	Bottom	Omit	Aluminum, 210 Bar (3000 PSI)		
D31V	NFPA D05H			# 4N	.50 – 14 NPTF	A	Side	S	Ductile Iron, 345 Bar (5000 PSI)		
D31D	NFPA D05HE, NG10, CETPOP5H			# 4S	-8 SAE						
				* 6N	.75 – 14 NPTF						
				* 6S	-12 SAE						

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.

Sizes 3* and 4* ports available on SPD3 (NFPA D05) only.

* Size 6* port available on SPD31 (NFPA D05H and D05HE) only.

Mounting Hardware supplied with subplate includes:

Subplates	Mounting Hardware	Qty.
SPD33N**	.38-16 UNC x	2
SPD34N**	1.25 LG. SHCS	
SPD34S**		
SPD31*6N**	.38-16 UNC x	2
SPD31*6S**	1.75 LG. SHCS	
SPD3H6N**		
SPD3H6S**		

Valve mounting threads:
 0.25-20 UNC x 0.75 DP.
 Used for SAE and NPTF ports.

Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

Mounting Bolt Kits

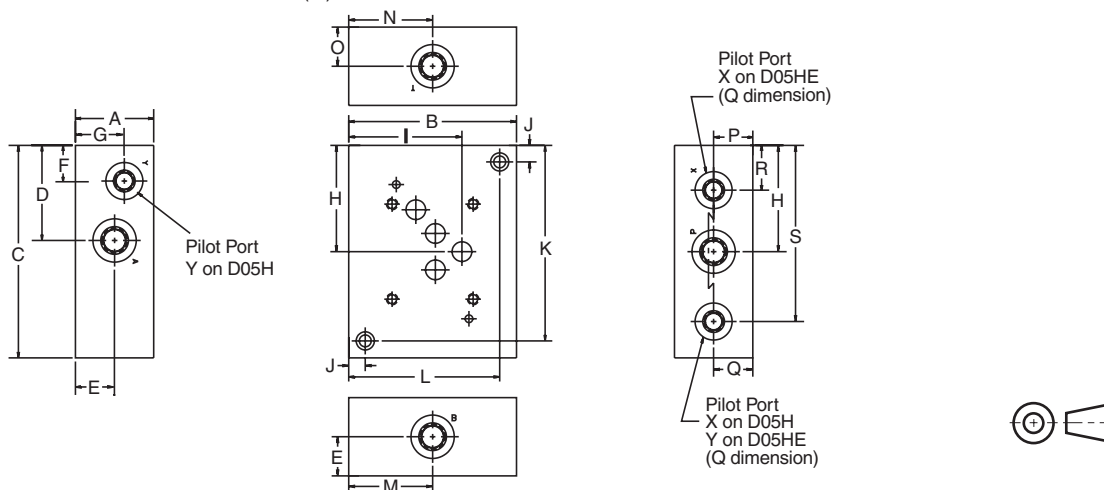
UNC Bolt Kits for use with D3W, D3, D31VW, D31DW Directional Control Valves & Sandwich Valves				
	Number of Sandwich Valves @2.00" (50mm) thickness			
	0	1	2	3
D3-32, D31VW-91, D31DW-91, D3P	BK98 1.625"	BK141 3.50"	BK142 5.50"	BK143 7.50"
D3-32, D31VW-91, D31DW-91, D3P plus tapping plate	BK166 2.50"	BK167 4.50"	BK168 6.50"	BK169 8.50"

Note: All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 N.m. (12 ft.-lbs.)

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.
 C01_Cat2500.indd, ddp, 04/19

Side Ported Subplate — NFPA D05, D05H and D05HE

Inch equivalents for millimeter dimensions are shown in (**)



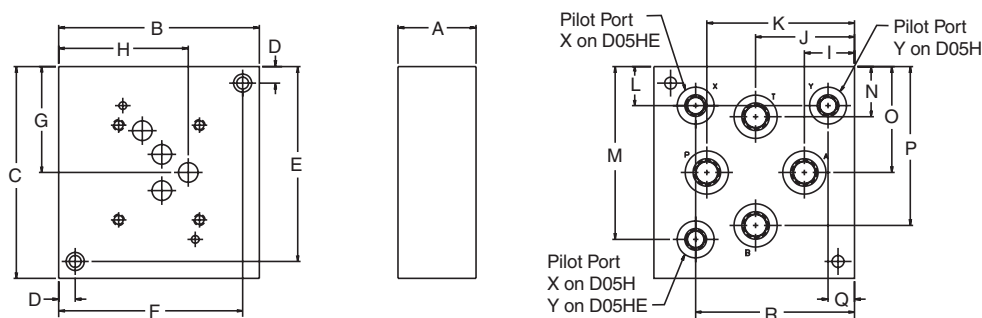
Dimensions	A	B	C	D	E	F*	G*	H	I	J	K	L	M	N	O	P	Q*	R*	S*
SPD31V**A*	44.5 (1.75)	95.3 (3.75)	120.7 (4.75)	54.1 (2.13)	22.4 (0.88)	20.6 (0.81)	22.4 (0.88)	60.2 (2.37)	64.3 (2.53)	9.7 (0.38)	111.0 (4.37)	85.9 (3.38)	47.8 (1.88)	47.8 (1.88)	22.4 (0.88)	22.4 (0.88)	22.4 (0.88)	—	100.1 (3.94)
SPD31D**A*	44.5 (1.75)	95.3 (3.75)	120.7 (4.75)	54.1 (2.13)	22.4 (0.88)	—	—	60.2 (2.37)	64.3 (2.53)	9.7 (0.38)	111.0 (4.37)	85.9 (3.38)	47.8 (1.88)	47.8 (1.88)	22.4 (0.88)	22.4 (0.88)	11.2 (0.44)	25.4 (1.00)	100.1 (3.94)

See Mounting Bolt Kits for bolt information.

* Not available with high flow option.

Bottom Ported Subplate — NFPA D05, D05H and D05HE

Inch equivalents for millimeter dimensions are shown in (**)



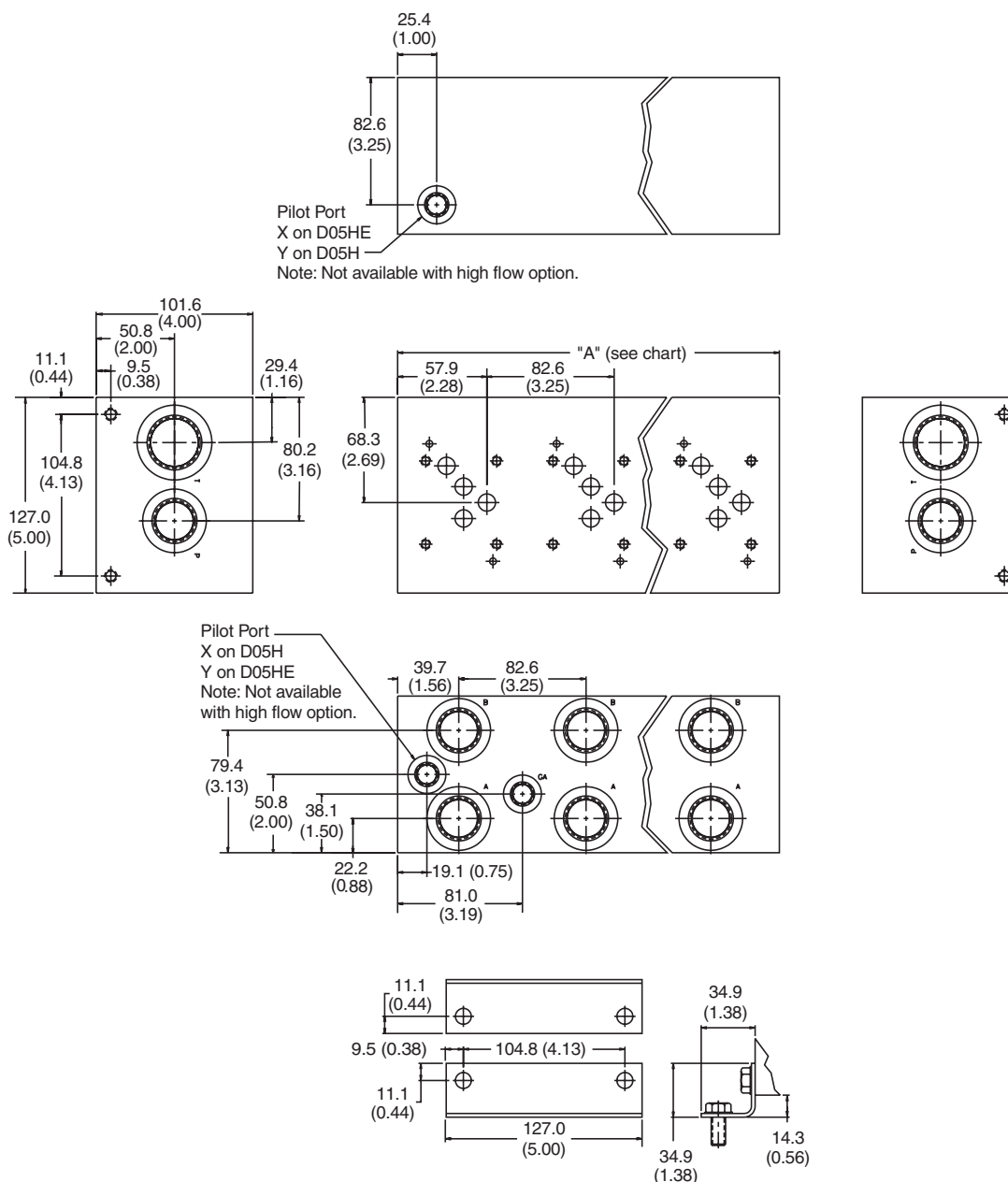
Dimension	A	B	C	D	E	F	G	H	I	J	K	L*	M*	N	O	P	Q*	R*
SPD31V***	44.5 (1.75)	114.3 (4.50)	120.7 (4.75)	9.7 (0.38)	111.3 (4.38)	104.9 (4.13)	60.2 (2.37)	73.9 (2.91)	28.4 (1.12)	56.4 (2.22)	84.1 (3.31)	22.4 (0.88)	98.6 (3.88)	28.7 (1.13)	60.5 (2.38)	90.4 (3.56)	15.0 (0.59)	90.4 (3.56)
SPD31D***	44.5 (1.75)	114.3 (4.50)	120.7 (4.75)	9.7 (0.38)	111.3 (4.38)	104.9 (4.13)	60.2 (2.37)	73.9 (2.91)	28.4 (1.12)	56.4 (2.22)	84.1 (3.31)	20.6 (0.81)	100.1 (3.94)	28.7 (1.13)	60.5 (2.38)	90.4 (3.56)	—	88.9 (3.50)

See Mounting Bolt Kits for bolt information.

* Not available with high flow option.

Series D3P and High Flow
Manifold — NFPA D05, D05H and D05HE

Inch equivalents for millimeter dimensions are shown in (**)

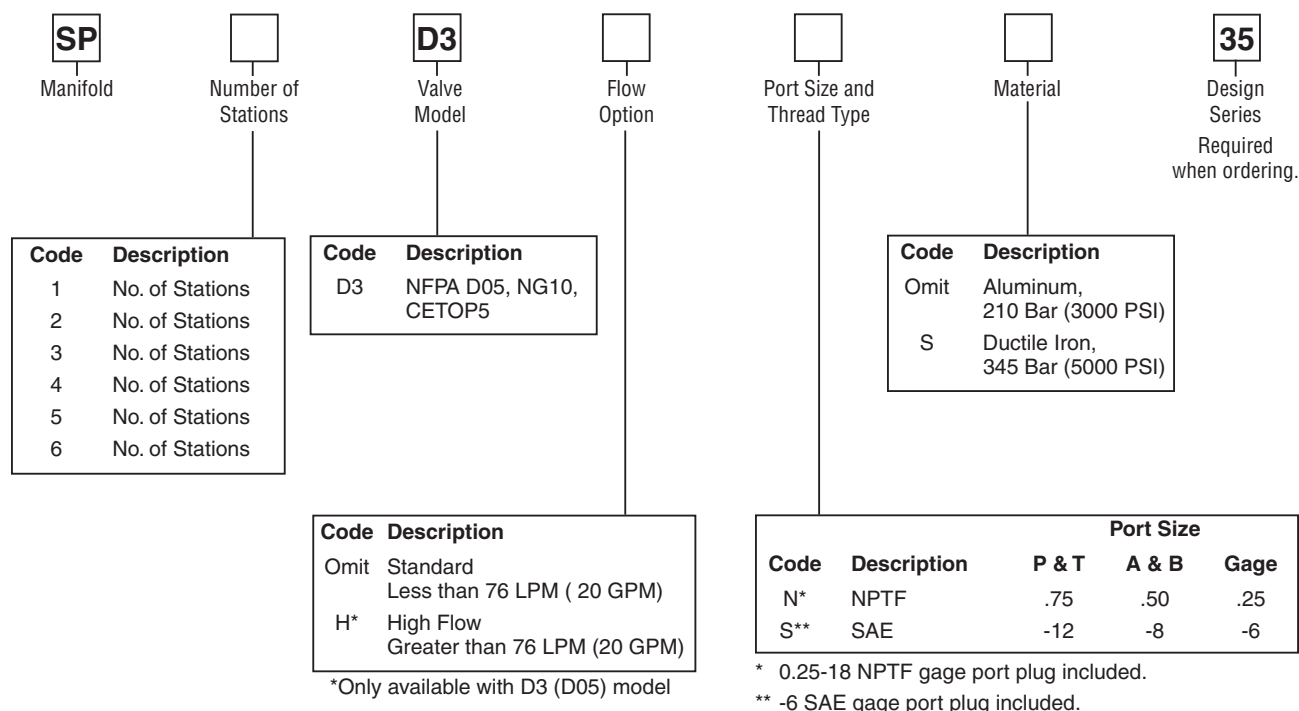


Mounting Hardware
 (See Ordering Information for Mounting Hardware details)

No. of Stations	1	2	3	4	5	6
"A" Length mm (inch)	82.6 (3.25)	165.1 (6.50)	247.7 (9.75)	330.2 (13.00)	412.8 (16.25)	495.3 (19.50)
Weight Alum. kg (lbs.)	15.4 (7.00)	26.5 (12.00)	37.5 (17.00)	48.5 (22.00)	59.5 (27.00)	72.8 (33.00)
Weight Iron kg (lbs.)	41.9 (19.00)	83.8 (38.00)	125.7 (57.00)	165.4 (75.00)	187.4 (85.00)	249.2 (113.00)

See Mounting Bolt Kits for bolt information.

Series D3 Manifolds



Mounting hardware supplied with manifold includes:

- (2) steel brackets
- For SAE and NPTF ports:
- (8) 5/16-18 UNC x .63 hex washer cap screws

Valve mounting threads:

- 0.25-20 UNC x 0.75 DP.
- Used for SAE and NPTF ports.

Note: 35 Design Series manifolds conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

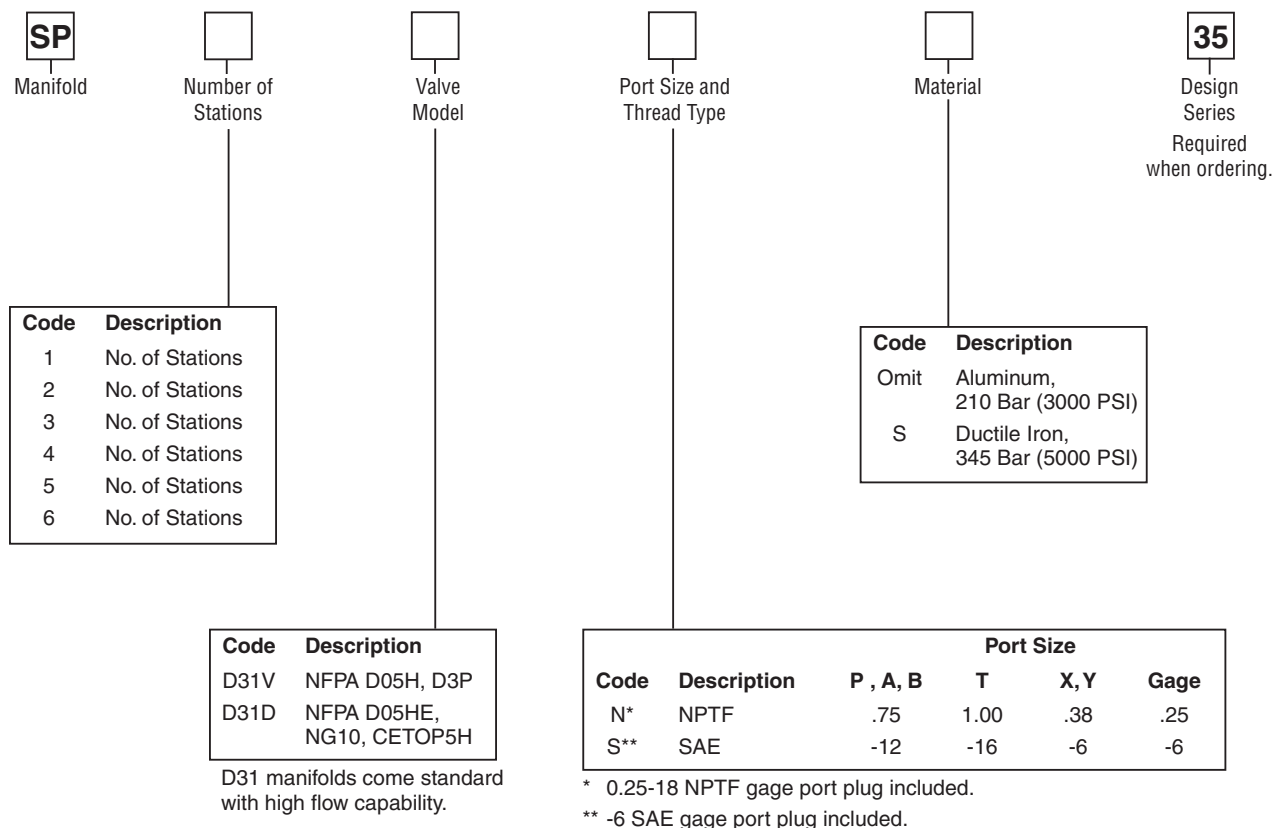
No. Stations	1	2	3	4	5	6
Wgt., Alum, kg (lbs.)	1.8 (4)	3.7 (8)	5.0 (11)	6.4 (14)	7.8 (17)	9.6 (21)
Wgt., Iron, kg (lbs.)	4.1 (9)	7.8 (17)	11.9 (26)	15.6 (34)	19.7 (43)	23.3 (51)

Mounting Bolt Kits

UNC Bolt Kits for use with D3W and D3 Directional Control Valves & Sandwich Valves				
	Number of Sandwich Valves @2.00" (50mm) thickness			
	0	1	2	3
D3-32	BK98 1.625"	BK141 3.50"	BK142 5.50"	BK143 7.50"
D3-32 plus tapping plate	BK166 2.50"	BK167 4.50"	BK168 6.50"	BK169 8.50"

Note: All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 N.m. (12 ft.-lbs.)

Series D31 and D3P Manifolds



Mounting hardware supplied with manifold includes:

- (2) steel brackets
- For SAE and NPTF ports:
- (8) 3/8-16 UNC x .88 HHCS
- and (8) .38 SAE N series washers

Valve mounting threads:

- 0.25-20 UNC x 0.75 DP.
- Used for SAE and NPTF ports.

Note: 35 Design Series manifolds conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

No. Stations	1	2	3	4	5	6
Wgt., Alum, kg (lbs.)	3.2 (7)	5.5 (12)	7.8 (17)	10.1 (22)	12.3 (27)	15.1 (33)
Wgt., Iron, kg (lbs.)	8.7 (19)	17.4 (38)	26.1 (57)	34.3 (75)	38.9 (85)	51.7 (113)

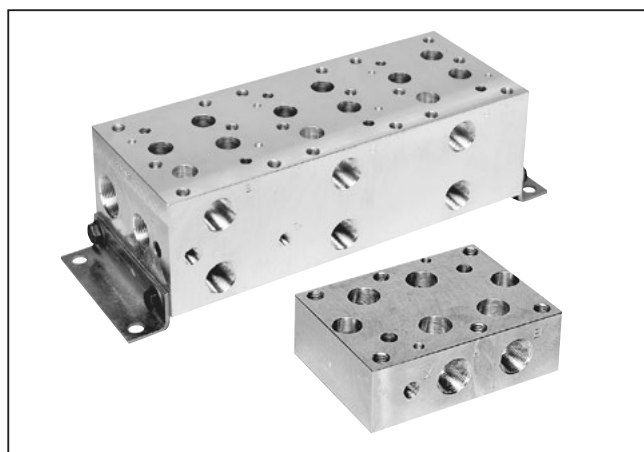
Mounting Bolt Kits

UNC Bolt Kits for use with D3P, D31VW and D31DW Directional Control Valves & Sandwich Valves (D31V*-91 Design, Solenoid Operated)				
	Number of Sandwich Valves @ 2.00" (50mm) thickness			
	0	1	2	3
D31VW-91, D3P D31DW-91	BK98 1.625"	BK141 3.50"	BK142 5.50"	BK143 7.50"
D31VW-91, D3P D31DW-91 plus tapping plate	BK166 2.50"	BK167 4.50"	BK168 6.50"	BK169 8.50"

Note: All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 N.m. (12 ft.-lbs.)

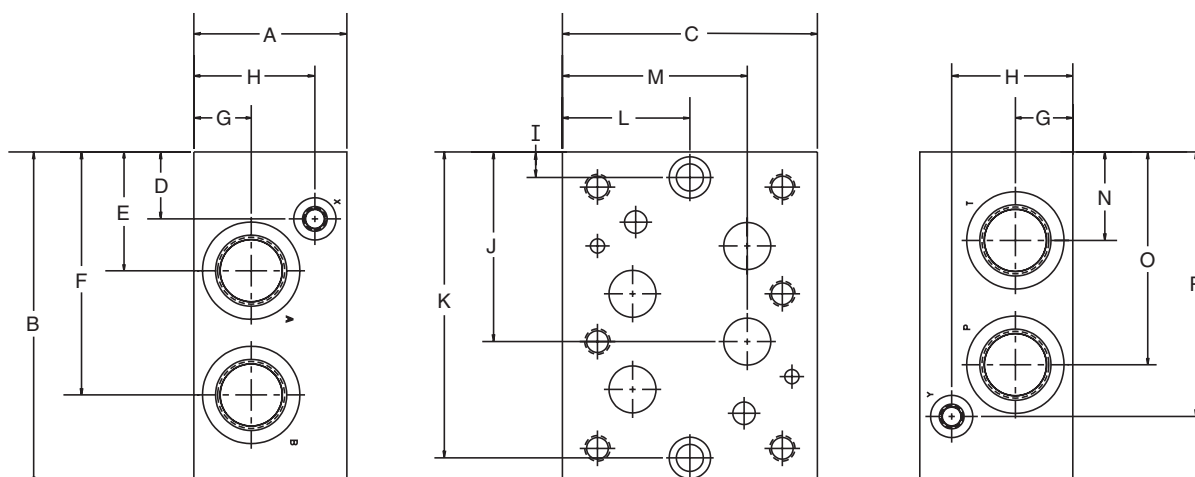
Features

- **Aluminum or steel available** — Flexibility for applying to different system pressures
- **NPT and SAE thread options available** — Flexibility to plumb into existing systems
- **Multiple port sizes available** — Eliminates need for reducers and expander at subplate connection



Side Ported Subplate — NFPA D08

Inch equivalents for millimeter dimensions are shown in (**)

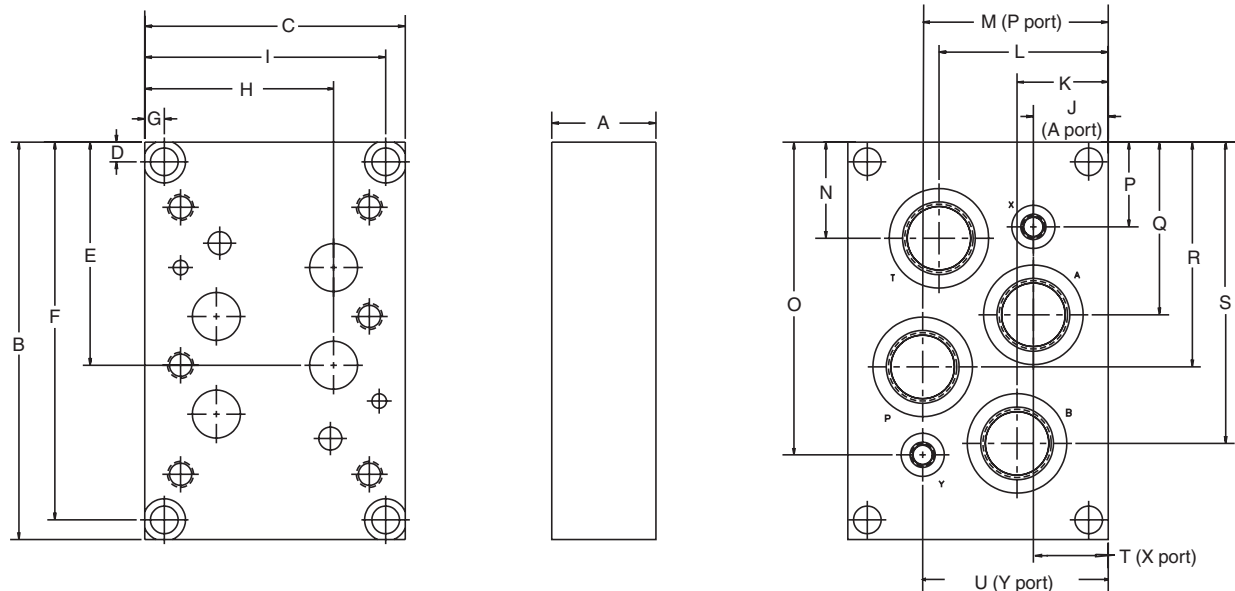


Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
SPD68*A*	50.8	155.7	114.3	30.2	64.3	115.1	25.4	25.4	12.7	89.7	142.7	57.2	85.9	40.4	91.2	125.5
SPD66NA*	(2.00)	(6.13)	(4.50)	(1.19)	(2.53)	(4.53)	(1.00)	(1.00)	(0.50)	(3.53)	(5.62)	(2.25)	(3.38)	(1.59)	(3.59)	(4.94)
SPD610*A*	76.2	165.1	127.0	33.3	59.2	121.2	28.7	60.5	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)

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.
C01_Cat2500.indd, ddp, 04/19

Series D6 and D8
Bottom Ported Subplate — NFPA D08
Inch equivalents for millimeter dimensions are shown in (**)



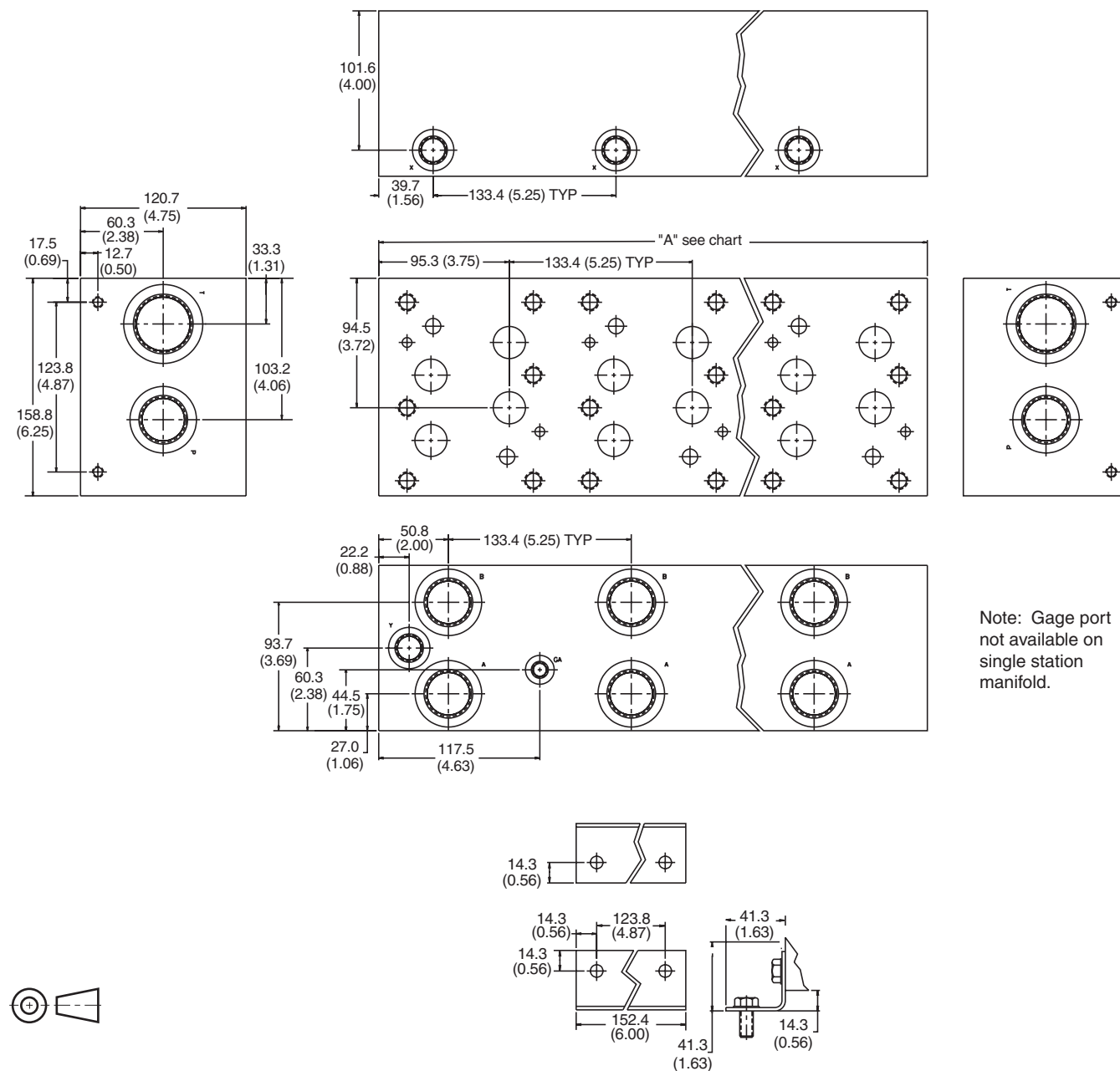
Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SPD68**	38.1	155.7	117.6	12.7	89.7	142.7	58.7	87.4	—	30.2	30.2	87.4	87.4	42.2	125.5	30.2	65.8	89.7	113.5	31.8	85.9
SPD66N*	(1.50)	(6.13)	(4.63)	(0.50)	(3.53)	(5.62)	(2.31)	(3.44)	—	(1.19)	(1.19)	(3.44)	(3.44)	(1.66)	(4.94)	(1.19)	(2.59)	(3.53)	(4.47)	(1.25)	(3.38)
SPD610**	50.8	193.8	127.0	9.7	108.7	184.2	9.7	92.2	117.6	36.6	44.5	82.6	90.4	46.7	152.4	41.4	84.1	109.5	146.8	36.6	90.4
	(2.00)	(7.63)	(5.00)	(0.38)	(4.28)	(7.25)	(0.38)	(3.63)	(4.63)	(1.44)	(1.75)	(3.25)	(3.56)	(1.84)	(6.00)	(1.63)	(3.31)	(4.31)	(5.78)	(1.44)	(3.56)

See Mounting Bolt Kits for bolt information.

Series D6 and D8

Manifold — NFPA D08

Inch equivalents for millimeter dimensions are shown in (**)



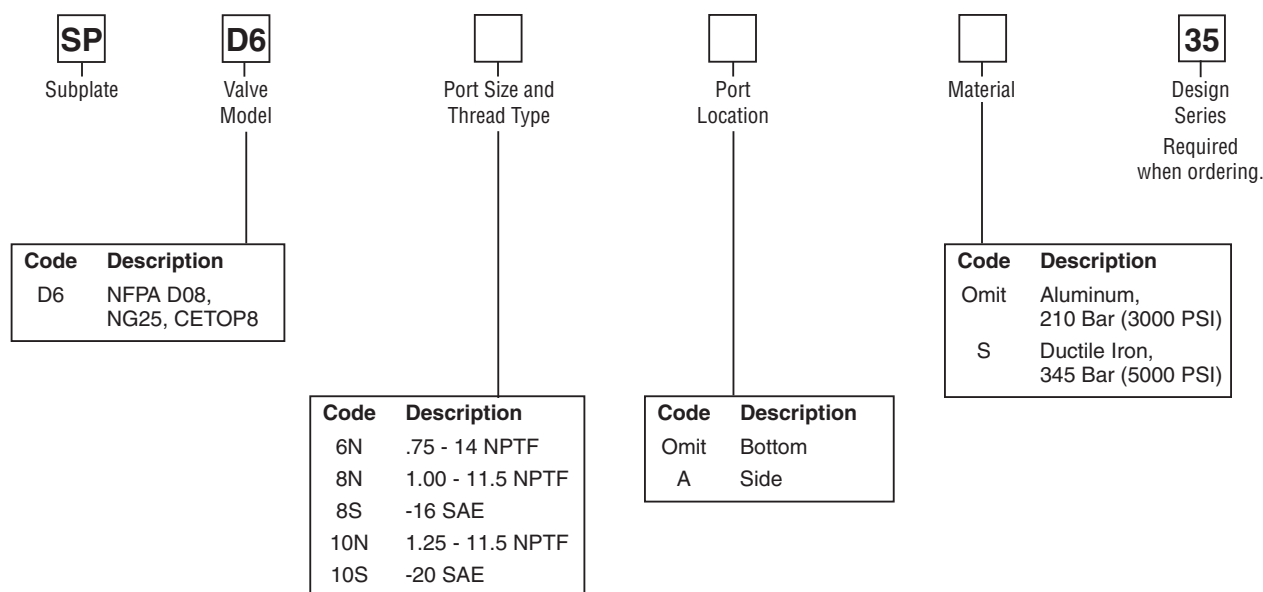
Note: Gage port
not available on
single station
manifold.

Mounting Hardware
(See Ordering Information for Mounting Hardware details)

No. of Stations	1	2	3	4	5
"A" Length mm (inch)	133.35 (5.25)	266.7 (10.50)	400.05 (15.75)	533.4 (21.00)	666.75 (26.25)
Weight Alum. kg (lbs.)	5 (12)	11 (24)	16 (35)	22 (49)	28 (61)
Weight Iron kg (lbs.)	20 (45)	41 (90)	62 (136)	82 (181)	103 (226)

See Mounting Bolt Kits for bolt information.

Series D6 and D8 Subplates



Mounting Hardware supplied with subplate includes:

Subplates	Mounting Hardware	Qty.
SPD66NA*	.50-13 UNC x	2
SPD68NA*	1.75 LG. SHCS	
SPD68SA*		
SPD610NA*	.50-13 UNC x	2
SPD610SA*	3.00 LG. SHCS	
SPD66N*	.50-13 UNC x	2
SPD68N*	1.50 LG. SHCS	
SPD68S*		
SPD610N*	.38-16 UNC x	4
SPD610S*	2.00 LG. SHCS	

Valve mounting threads:
0.50-13 UNC x 1.19 DP.
Used for SAE and NPTF ports.

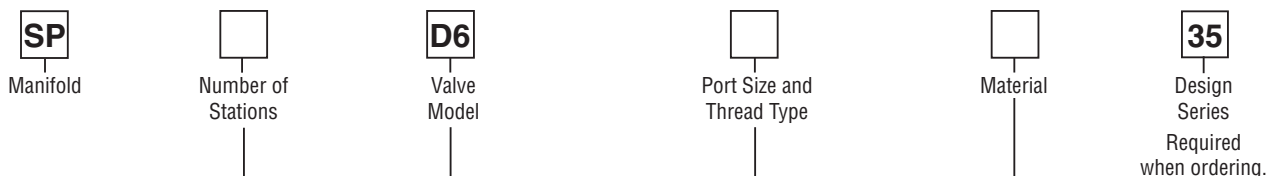
Note: 35 Design Series subplates conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

Mounting Bolt Kits

UNC Bolt Kits for use with D6 and D8 Directional Control Valves & Sandwich Valves				
	Number of Sandwich Valves @ 2.75" (70mm) thickness			
	0	1	2	3
D6	BK227 2.50"	BK121 5.25"	BK122 8.00"	BK123 10.75"
D6 plus tapping plate	BK161 3.50"	BK170 6.25"	BK171 9.00"	BK172 11.75"
D8	BK228 3.00"	BK131 5.75"	BK132 8.50"	BK133 11.25"
D8 plus tapping plate	BK173 4.00"	BK174 6.75"	BK175 9.50"	BK114 12.125"

Note: All bolts are SAE grade 8, 1/2-13 UNC-3A thread, torque to 133 N.m. (100 ft.-lbs.)

Series D6 and D8 Manifolds



Code	Description
1	No. of Stations
2	No. of Stations
3	No. of Stations
4	No. of Stations
5	No. of Stations

Code	Description
D6	NFPA D08, NG25, CETOP8

Code	Description
Omit	Aluminum, 210 Bar (3000 PSI)
S	Ductile Iron, 345 Bar (5000 PSI)

Port Size						
Code	Description	P, A, B	T	Y	X (opt.)	Gage
N*	NPTF	1.00	1.25	.38	.25	.25
S**	SAE	-16	-20	-8	-4	-6

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.

* 0.25-18 NPT gage port plug included.
 ** -6 SAE gage port plug included.

Note: 35 Design Series manifolds conform to NFPA mounting pattern specifications, but may be dimensionally different from previous design series.

No. Stations	1	2	3	4	5
Wgt., Alum, kg (lbs.)	5.5 (12)	11.0 (24)	16.0 (35)	22.4 (49)	27.9 (61)
Wgt., Iron, kg (lbs.)	20.6 (45)	41.1 (90)	62.2 (136)	82.7 (181)	103.3 (226)

Mounting Bolt Kits

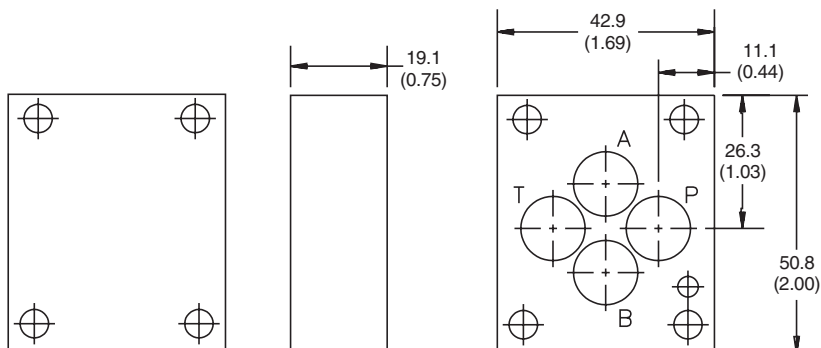
UNC Bolt Kits for use with D6 and D8 Directional Control Valves & Sandwich				
	Number of Sandwich @ 2.75" (70mm) thickness			
	0	1	2	3
D6	BK227 2.50"	BK121 5.25"	BK122 8.00"	BK123 10.75"
D6 plus tapping plate	BK161 3.50"	BK170 6.25"	BK171 9.00"	BK172 11.75"
D8	BK228 3.00"	BK131 5.75"	BK132 8.50"	BK133 11.25"
D8 plus tapping plate	BK173 4.00"	BK174 6.75"	BK175 9.50"	BK114 12.125"

Note: All bolts are SAE grade 8, 1/2-13 UNC-3A thread, torque to 133 N.m. (100 ft.-lbs.)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

Cover Plate — NFPA D03



Note:

Mounting hardware supplied with cover plate.

Includes:

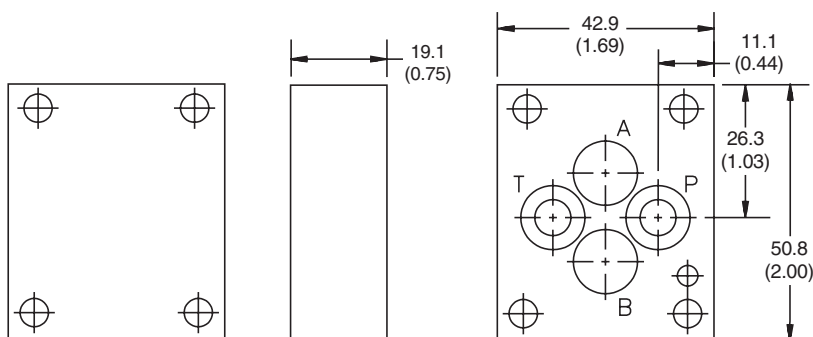
2-012V-7 O-ring, Qty. 4

Ø0.12 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:

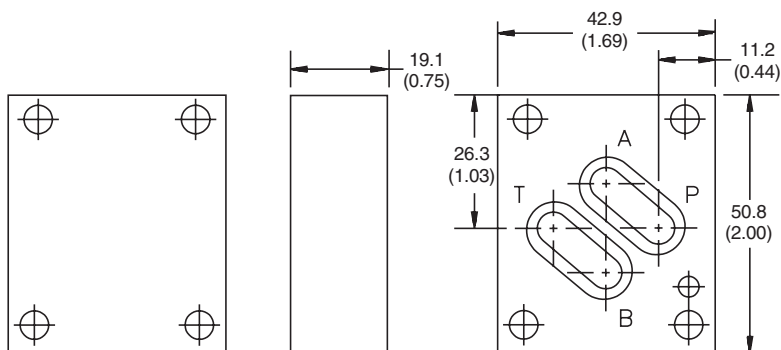
2-012V-7 O-ring, Qty. 4

Ø0.12 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

Ø0.12 x .25 long locating pin, Qty. 1

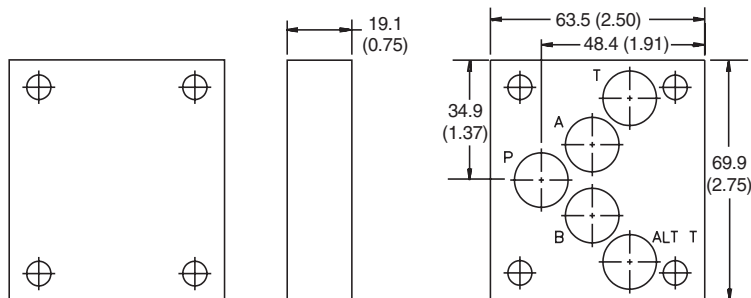
10-24 UNC x 1.00 long SHCS, Qty. 4 (SPD2A1EN) or

M5-0.8 x 25 mm long SHCS, Qty. 4 (SPD2A1MN)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

Cover Plate — NFPA D05



Note:

Mounting hardware supplied with cover plate.

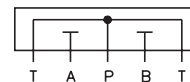
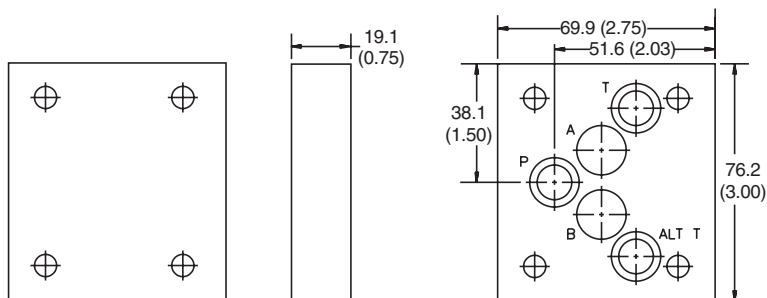
Includes:

2-014V-7 O-ring, Qty. 5

0.25-20 UNC x 1.25 long SHCS, Qty. 4 (SPD3C1EN) or

M6-1.0 x 30 mm long SHCS, Qty. 4 (SPD3C1MN)

Crossover Plate, P→T ports — NFPA D05



Note:

Mounting hardware supplied with crossover plate.

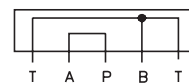
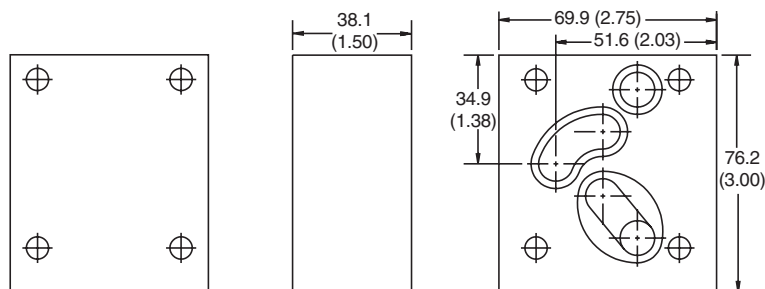
Includes:

2-014V-7 O-ring, Qty. 5

0.25-20 UNC x 1.25 long SHCS, Qty. 4 (SPD3D1EN) or

M6-1.0 x 30 mm long SHCS, Qty. 4 (SPD3D1MN)

Crossover Plate, P→A and B→T ports — NFPA D05



Note:

Mounting hardware supplied with crossover plate.

Includes:

2-014V-7 O-ring, Qty. 1

2-022V-7 +O-ring, Qty. 2

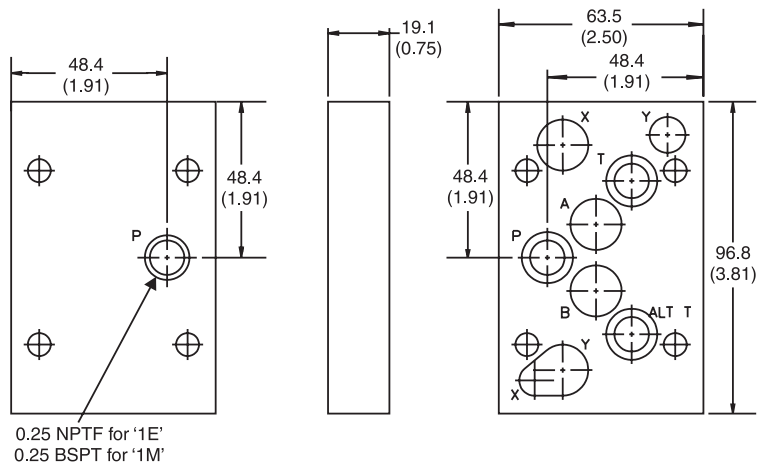
0.25-20 UNC x 2.00 long SHCS, Qty. 4 (SPD3A1EN) or

M6-1.0 x 50 mm long SHCS, Qty. 4 (SPD3A1MN)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

Cover Plate — NFPA D05H



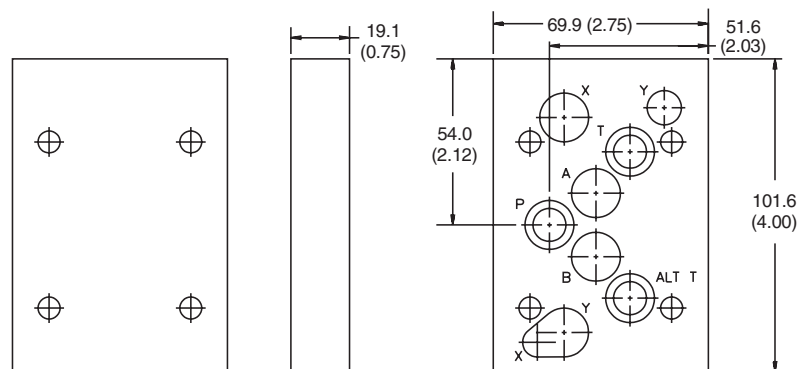
Note:

Mounting hardware supplied with cover plate.

Includes:

- 2-011V-7 O-ring, Qty. 1
- 2-014V-7 O-ring, Qty. 6
- 2-016V-7 O-ring, Qty. 1
- 0.25-18 NPTF plug, Qty. 1 (SPD31VC1EN only)
- 0.25-20 UNC x 1.25 long SHCS, Qty. 4 (SPD31VC1EN) or
- M6-1.0 x 30 mm long SHCS, Qty. 4 (SPD31VC1MN)

Crossover Plate, P→T ports — NFPA D05H



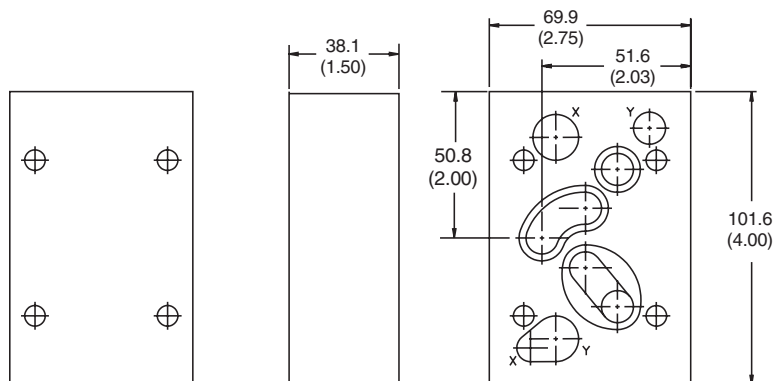
Note:

Mounting hardware supplied with crossover plate.

Includes:

- 2-011V-7 O-ring, Qty. 1
- 2-014V-7 O-ring, Qty. 6
- 2-016V-7 O-ring, Qty. 1
- 0.25-20 UNC x 1.25 long SHCS, Qty. 4 (SPD31VD1EN) or
- M6-1.0 x 30 mm long SHCS, Qty. 4 (SPD31VD1MN)

Crossover Plate, P→A and B→T ports — NFPA D05H



Note:

Mounting hardware supplied with crossover plate.

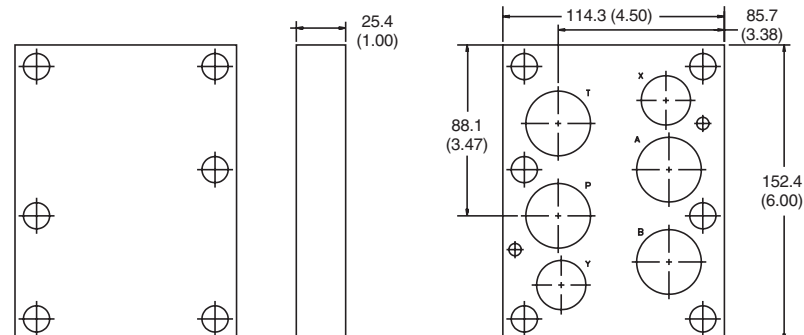
Includes:

- 2-011V-7 O-ring, Qty. 1
- 2-014V-7 O-ring, Qty. 2
- 2-016V-7 O-ring, Qty. 1
- 2-022V-7 O-ring, Qty. 2
- 0.25-20 UNC x 2.00 long SHCS, Qty. 4 (SPD31VA1EN) or
- M6-1.0 x 50 mm long SHCS, Qty. 4 (SPD31VA1MN)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

Cover Plate — NFPA D08



Note:

Mounting hardware supplied with cover plate.

Includes:

2-210V-7 O-ring, Qty. 2

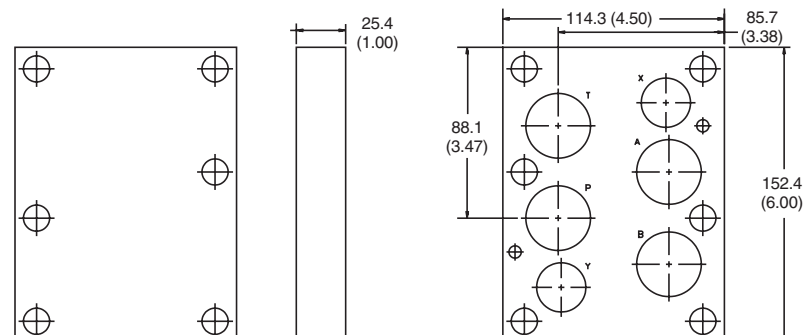
2-215V-7 O-ring, Qty. 4

0.50-13 UNC x 1.75 long SHCS, Qty. 6 (SPD6C1EN) or

M12-1.75 x 45 mm long SHCS, Qty. 6 (SPD6C1MN)

0.25 x 0.50 long locating pins, Qty. 2

Crossover Plate, P→T ports — NFPA D08



Note:

Mounting hardware supplied with cover plate.

Includes:

2-210V-7 O-ring, Qty. 2

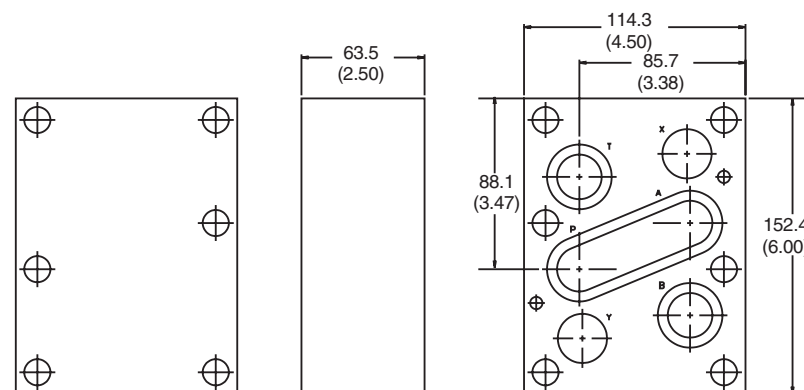
2-215V-7 O-ring, Qty. 4

0.50-13 UNC x 1.75 long SHCS, Qty. 6 (SPD6C1EN) or

M12-1.75 x 45 mm long SHCS, Qty. 6 (SPD6C1MN)

0.25 x 0.50 long locating pins, Qty. 2

Crossover Plate, P→A and B→T ports — NFPA D08



Note:

Mounting hardware supplied with crossover plate.

Includes:

2-210V-7 O-ring, Qty. 2

2-215V-7 O-ring, Qty. 2

2-231V-7 O-ring, Qty. 1

0.50-13 UNC x 3.50 long SHCS, Qty. 6 (SPD6A1EN) or

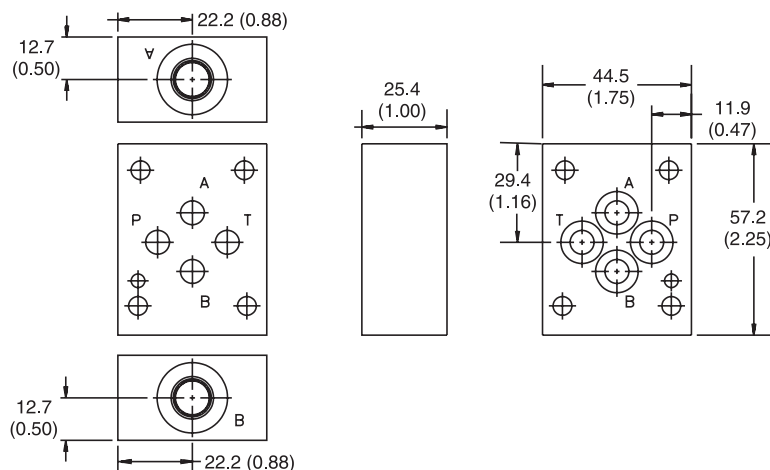
M12-1.75 x 90 mm long SHCS, Qty. 6 (SPD6A1MN)

0.25 x 0.50 long locating pins, Qty. 2

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

Tapping Plate, A and B ports — NFPA D03



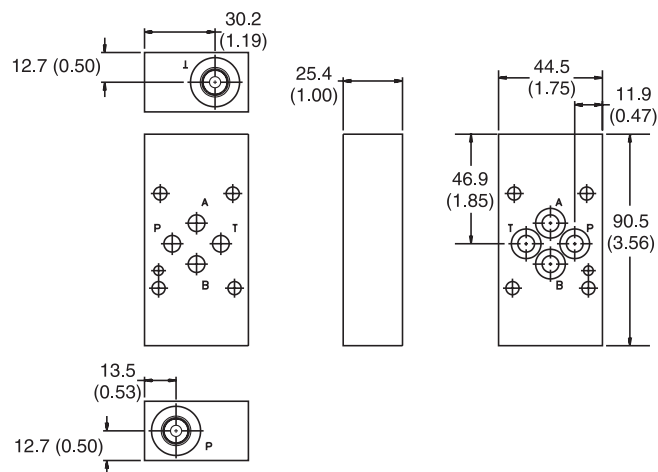
Note:

Interface seal kit provided with tapping plate.

Includes:

- 2-012V-7 O-ring, Qty. 4
- Ø0.12 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



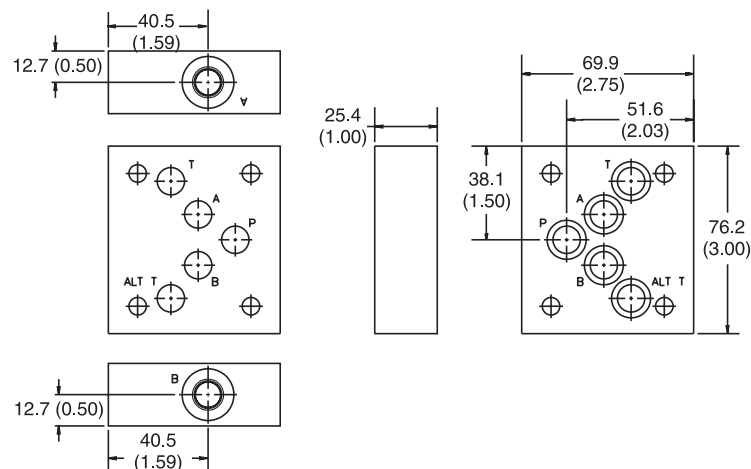
Note:

Interface seal kit provided with tapping plate.

Includes:

- 2-012V-7 O-ring, Qty. 4
- Ø0.12 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.

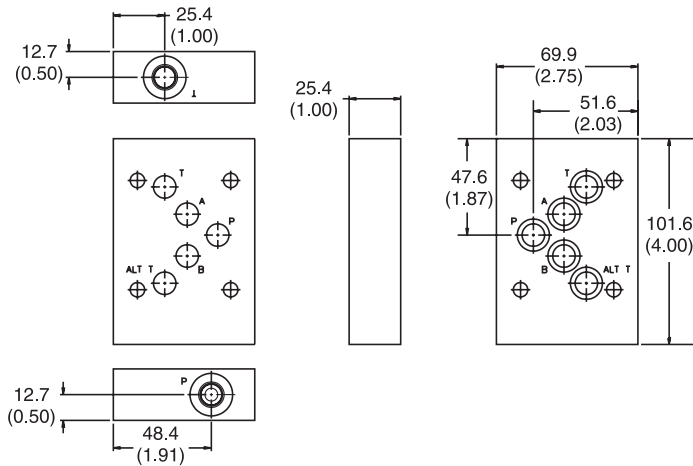
Includes:

- 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)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

Tapping Plate, P and T ports — NFPA D05

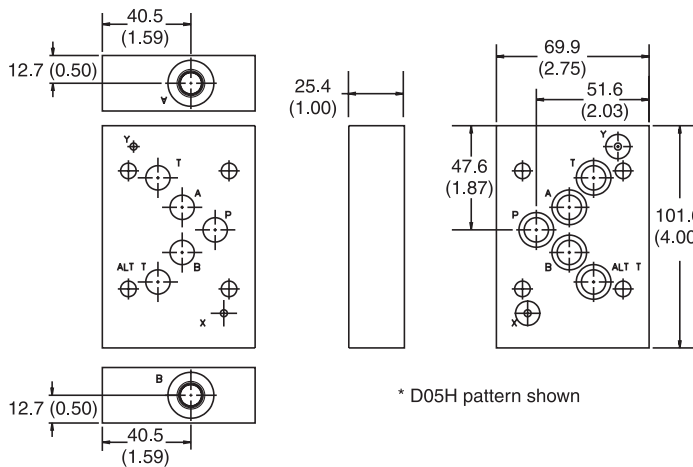
**Note:**

Interface seal kit provided with tapping plate.

Includes:

- 2-014V-7 O-ring, Qty. 5
- 0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

Tapping Plate, A and B ports — NFPA D05H and D05HE (E)



* D05H pattern shown

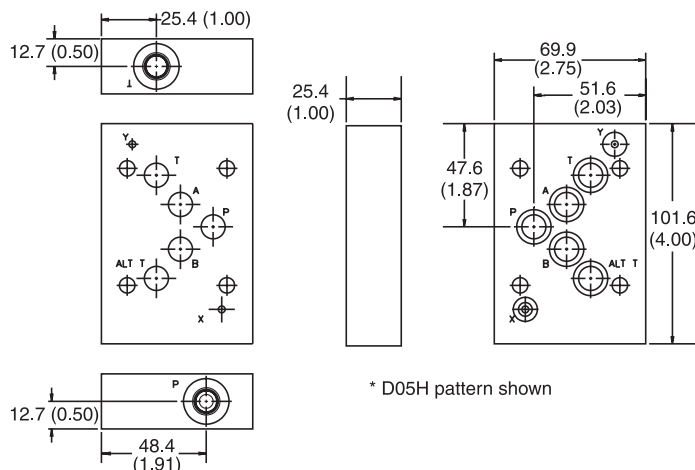
Note:

Interface seal kit provided with tapping plate.

Includes:

- SPD31VT2*W* :
 - 2-011V-7 O-ring, Qty. 2
 - 2-014V-7 O-ring, Qty. 5
- SPD31DT2*W*:
 - 2-014V-7 O-ring, Qty. 7
- 0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

Tapping Plate, P and T ports — NFPA D05H and D05HE



* D05H pattern shown

Note:

Interface seal kit provided with tapping plate.

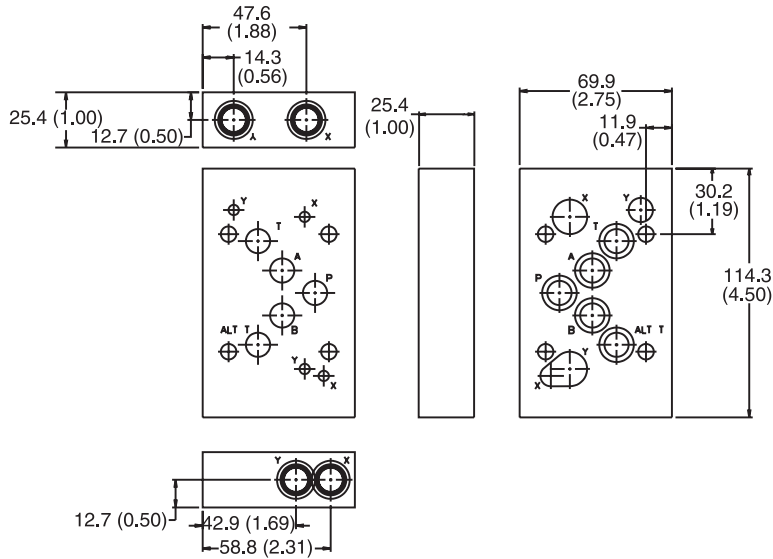
Includes:

- SPD31VT2*P*:
 - 2-011V-7 O-ring, Qty. 2
 - 2-014V-7 O-ring, Qty. 5
- SPD31DT2*P*:
 - 2-014V-7 O-ring, Qty. 7
- 0.25-18 NPTF Plug, Qty. 1 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty., 1 (SAE port only)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

Tapping Plate, X and Y ports — NFPA D05H and D05HE

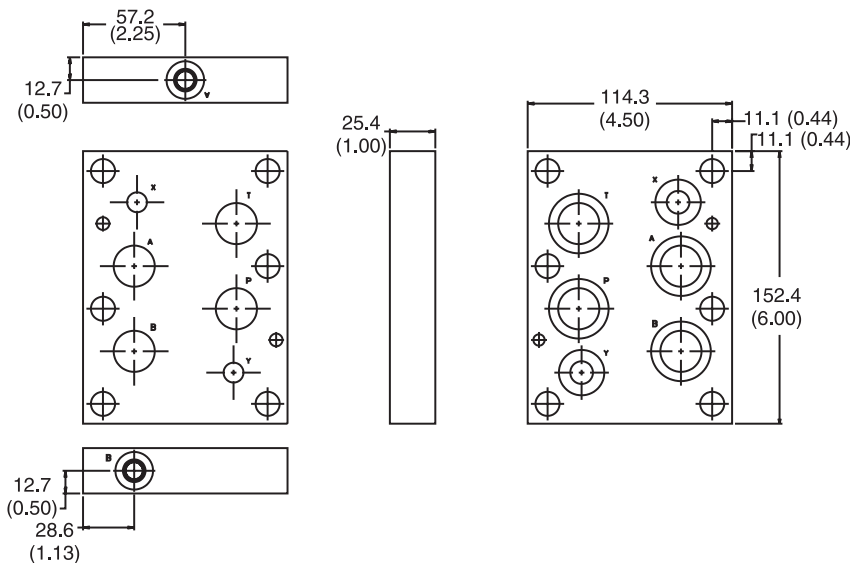
**Note:**

Interface seal kit provided with tapping plate.

Includes:

- 2-011V-7 O-ring, Qty. 1
- 2-014V-7 O-ring, Qty. 6
- 2-016V-7 O-ring, Qty. 1
- 0.25-18 NPTF Plug, Qty. 3 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty. 3 (SAE port only)

Tapping Plate, A and B ports — NFPA D08

**Note:**

Interface seal kit provided with tapping plate.

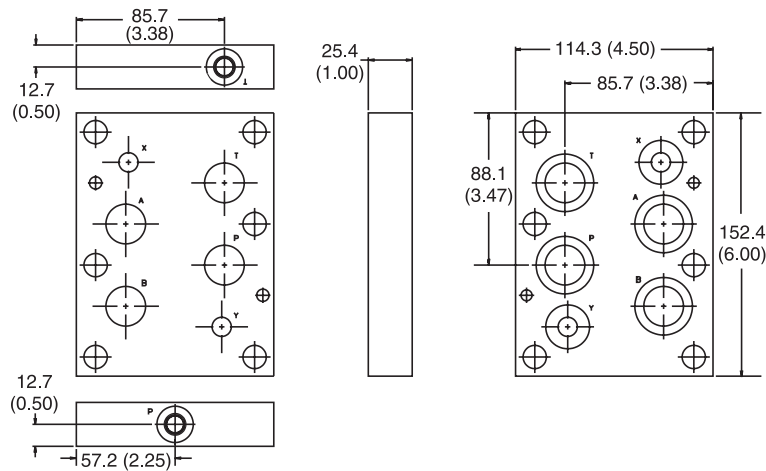
Includes:

- 2-210V-7 O-ring, Qty. 2
- 2-215V-7 O-ring, Qty. 4
- Ø.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)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

Tapping Plate, P and T ports — NFPA D08



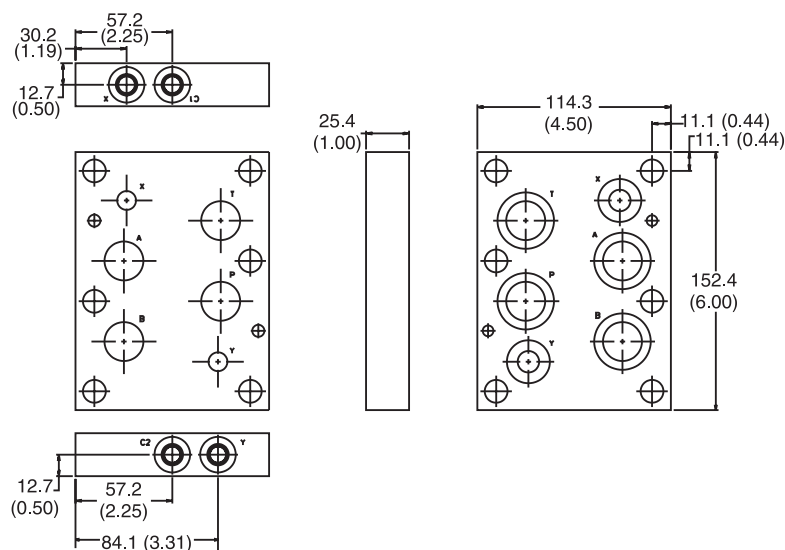
Note:

Interface seal kit provided with tapping plate.

Includes:

- 2-210V-7 O-ring, Qty. 2
- 2-215V-7 O-ring, Qty. 4
- Ø.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



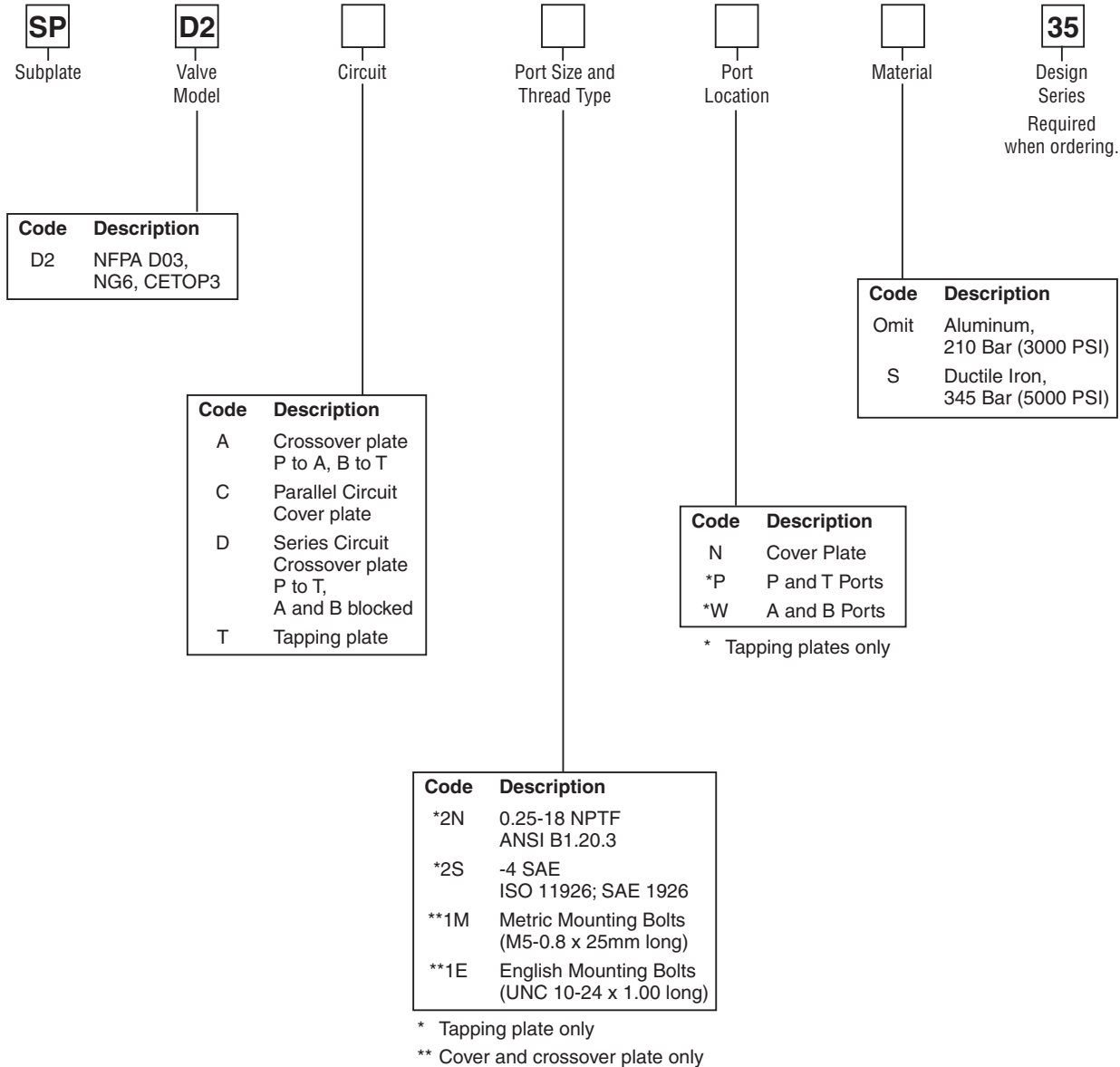
Note:

Interface seal kit provided with tapping plate.

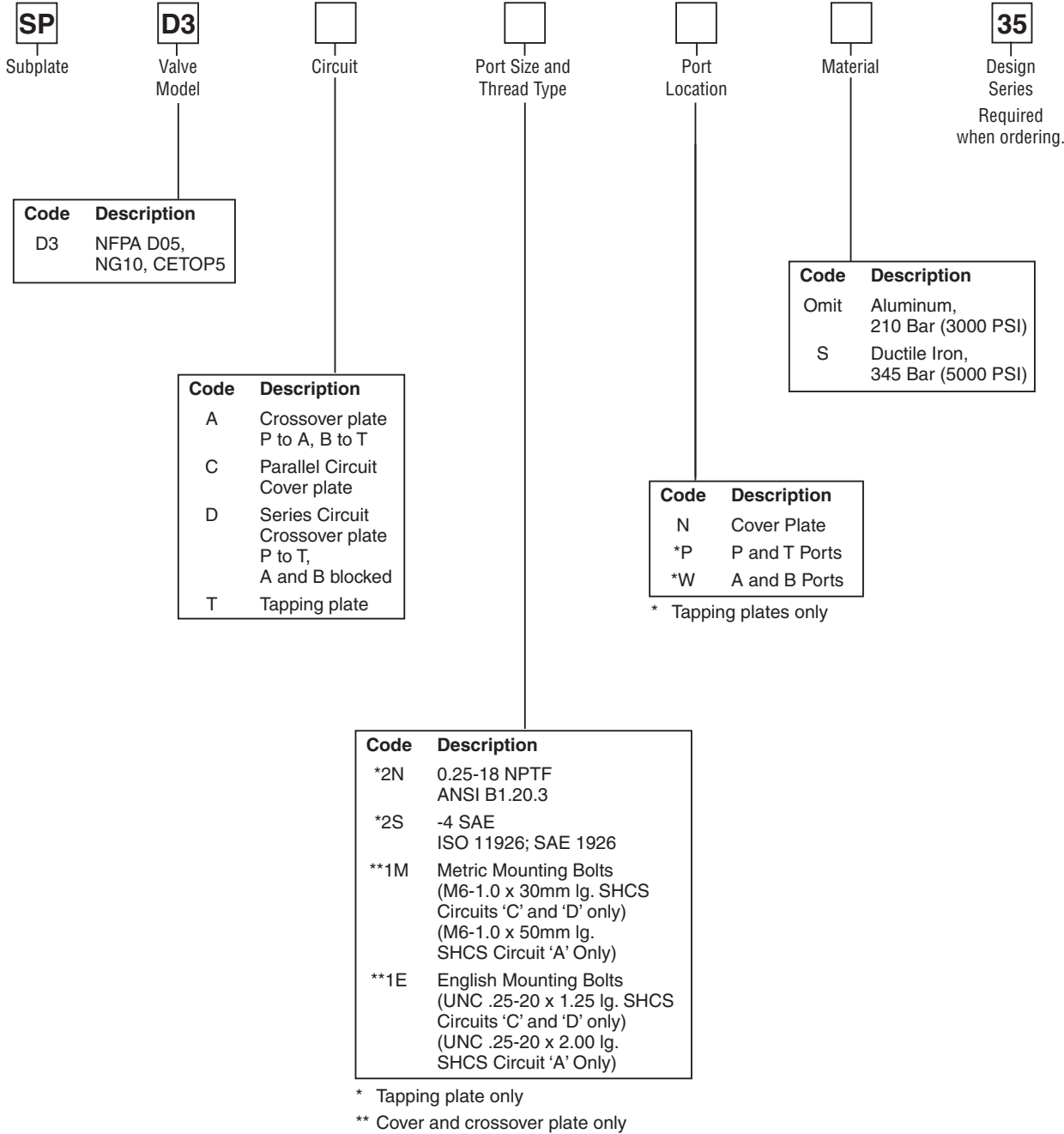
Includes:

- 2-210V-7 O-ring, Qty. 2
- 2-215V-7 O-ring, Qty. 4
- Ø.25 x .50 long locating pin, Qty. 2
- 0.25-18 NPTF Plug, Qty. 3 (NPTF port only)
- 4 SAE Hex Socket Plug, Qty. 3 (SAE port only)

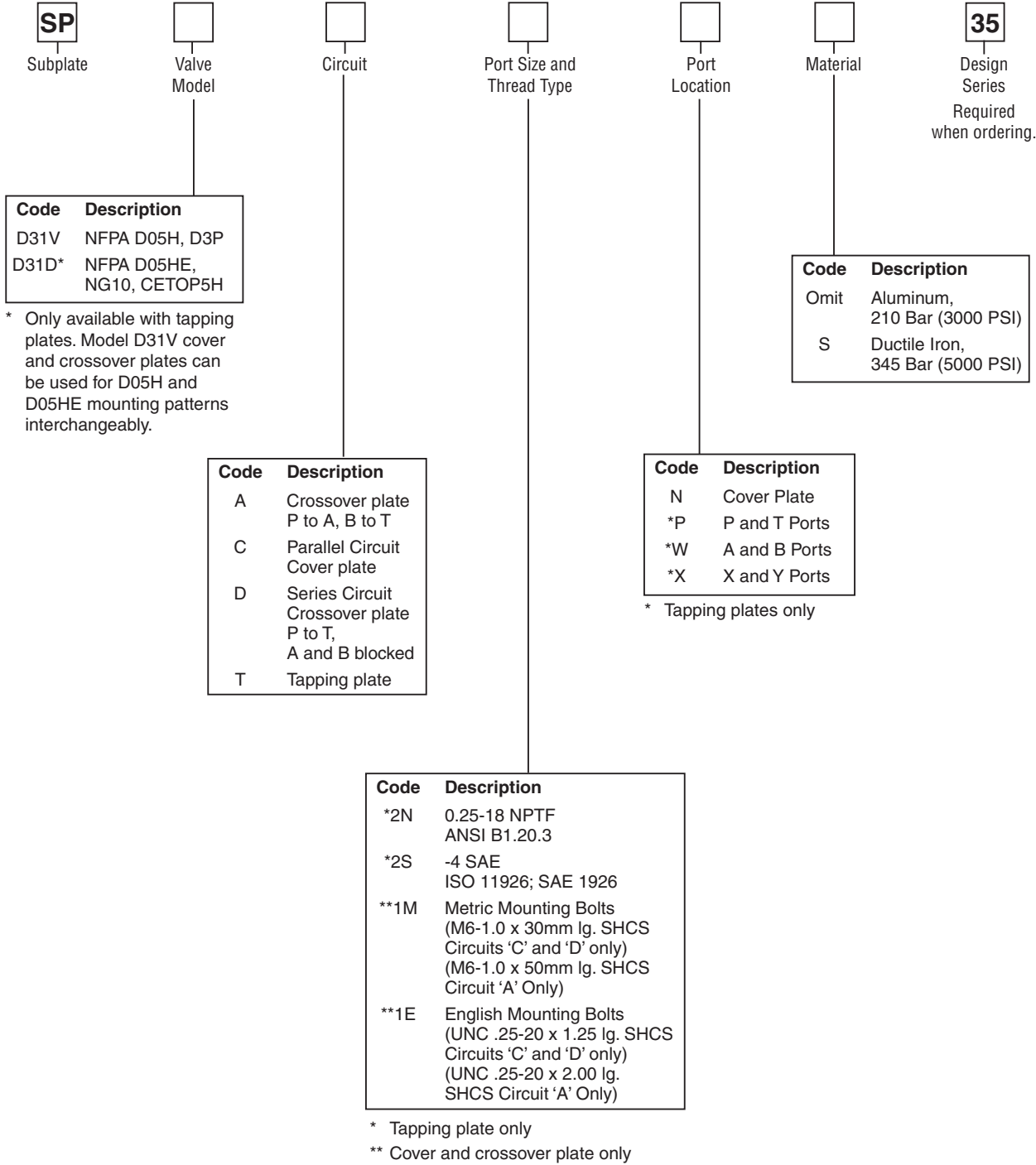
Ordering Information
Series D1V Tapping and Cover Plates



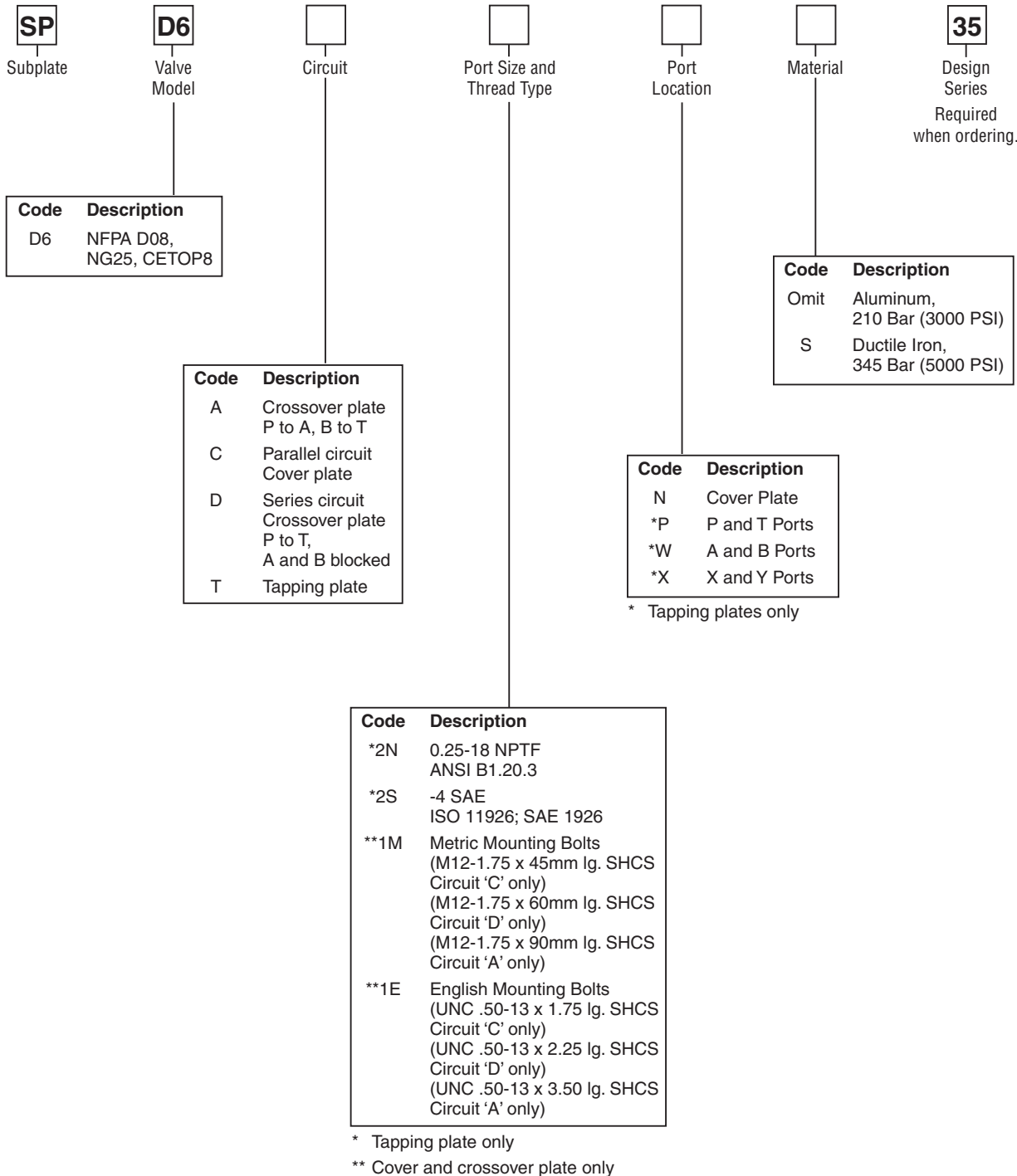
Ordering Information
Series D3 Tapping and Cover Plates



Ordering Information
Series D31 Tapping and Cover Plates

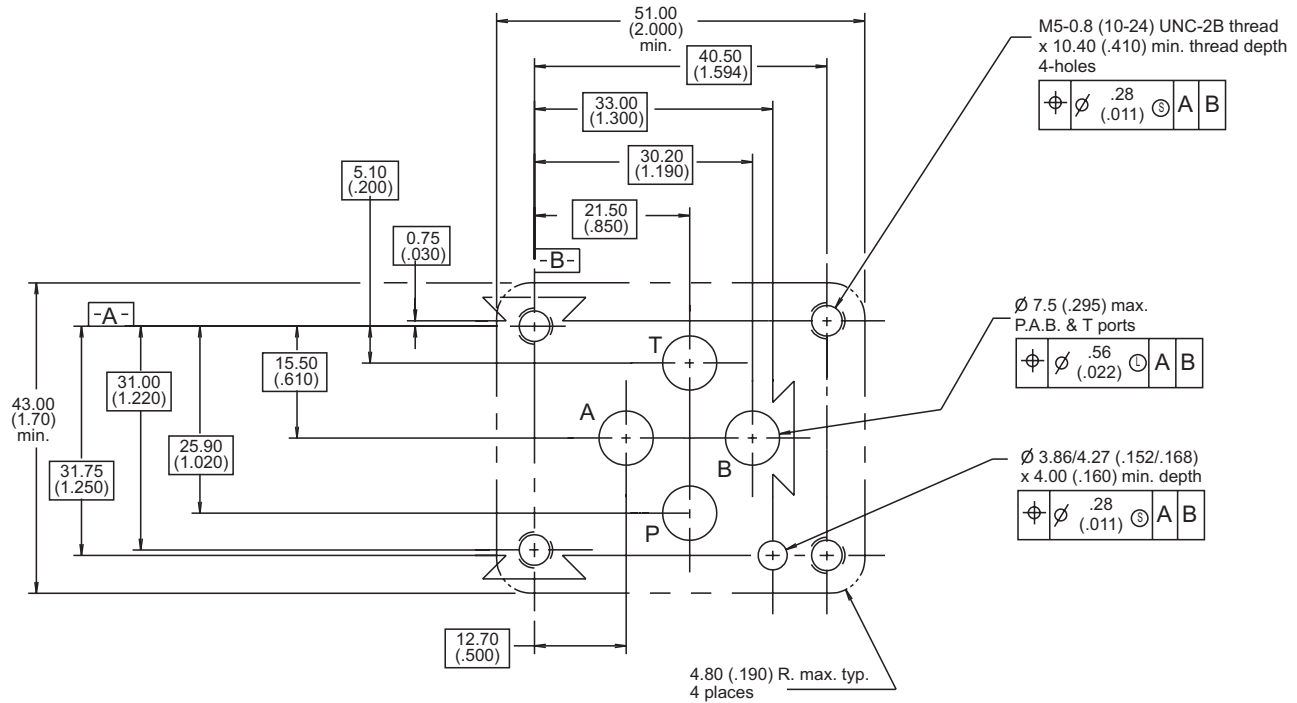


Ordering Information
Series D6 and D8 Tapping and Cover Plates



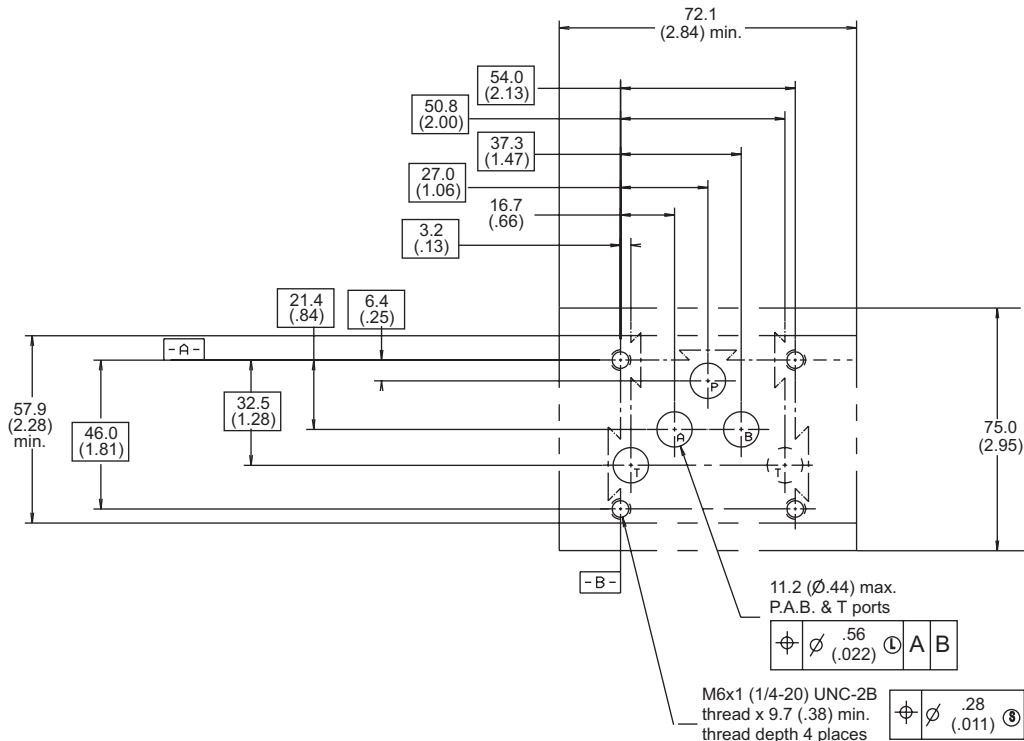
Mounting Pattern — NFPA D03, NG6, CETOP 3

Inch equivalents for millimeter dimensions are shown in (**)



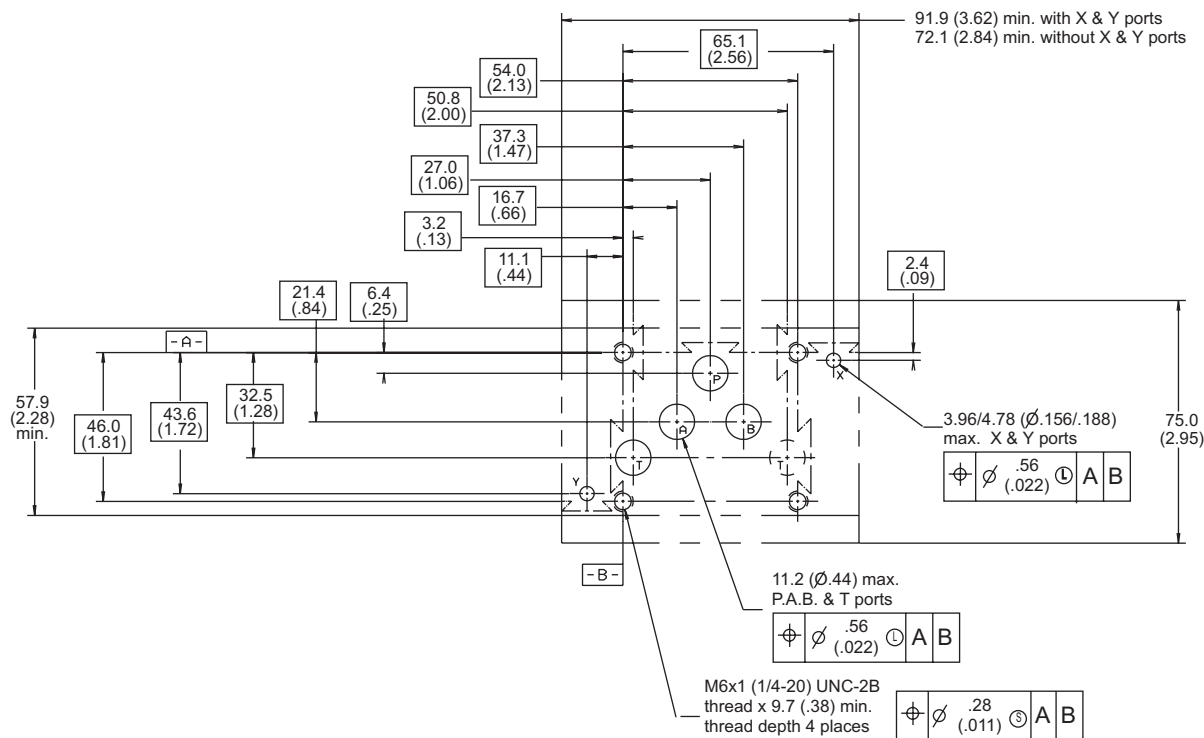
Mounting Pattern — NFPA D05, NG5, CETOP 5

Inch equivalents for millimeter dimensions are shown in (**)



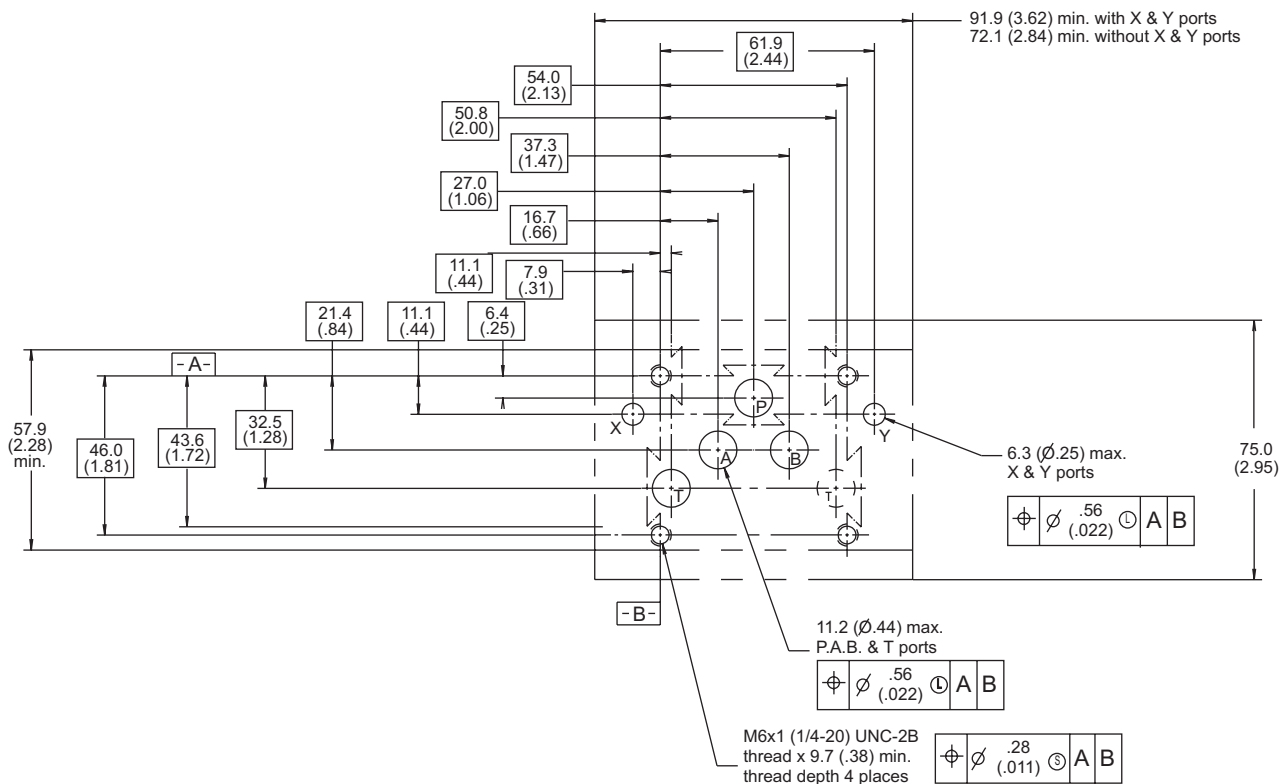
Mounting Pattern — NFPA D05H, NG10, CETOP 5H

Inch equivalents for millimeter dimensions are shown in (**)



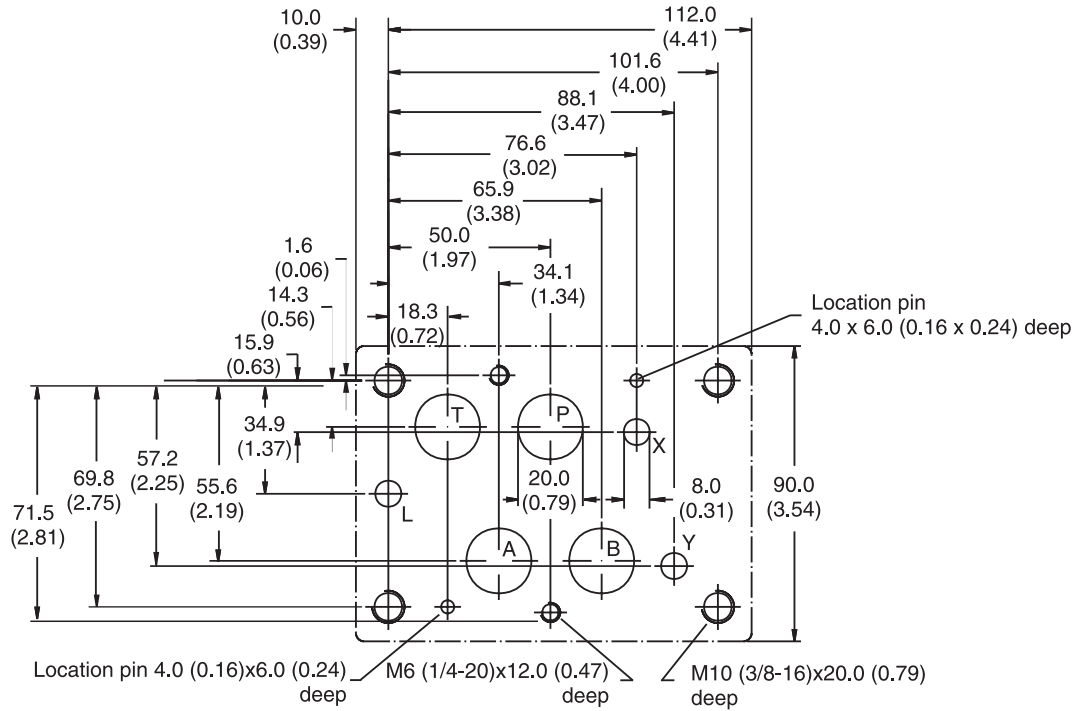
Mounting Pattern — NFPA D05HE, NG10, CETOP 5H

Inch equivalents for millimeter dimensions are shown in (**)



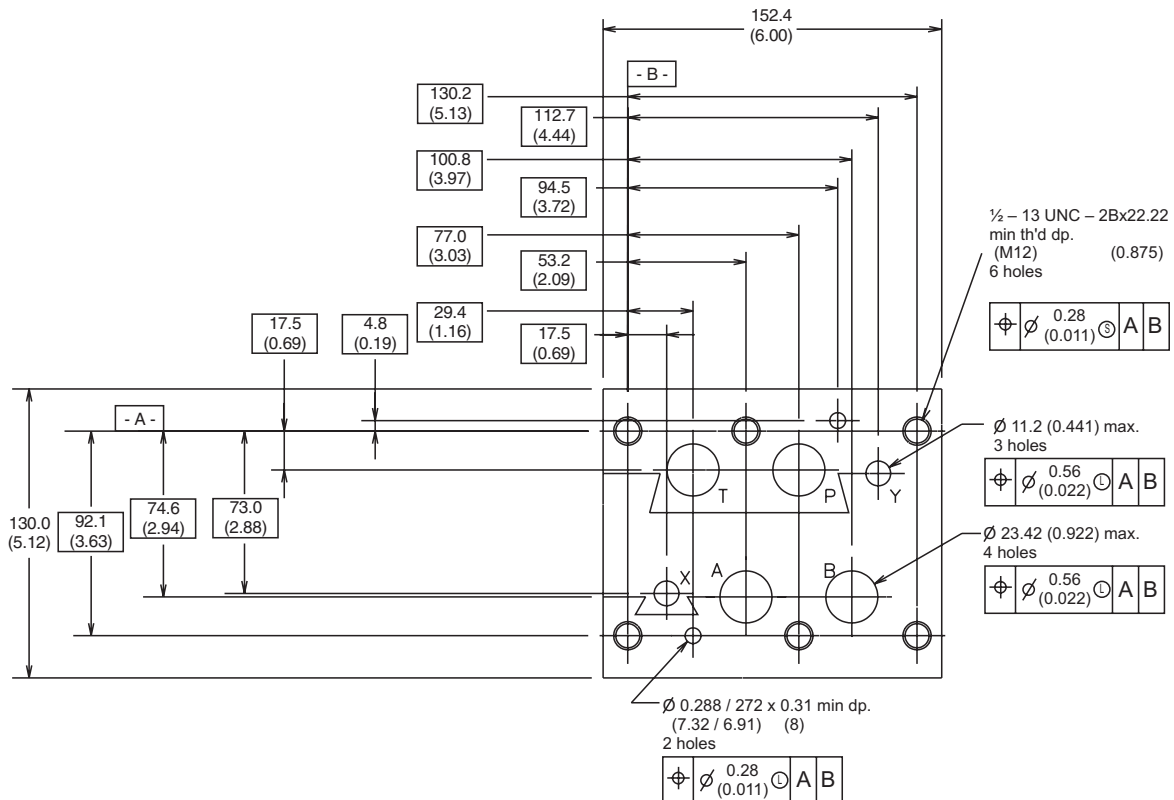
Mounting Pattern — NFPA D07, NG16, CETOP 7

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

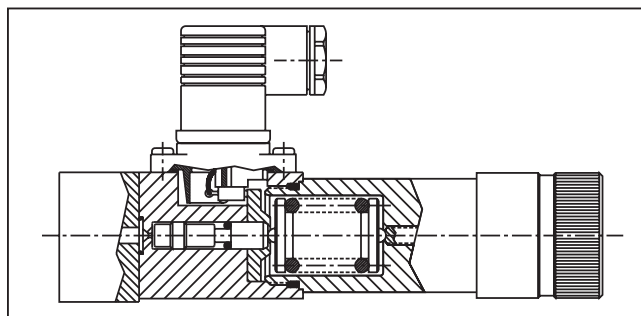
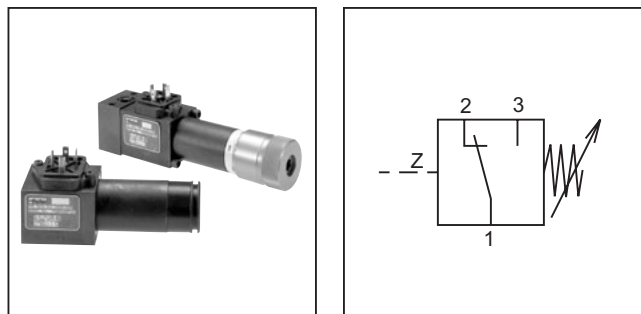
Series PSB electrohydraulic pressure switches are high performance devices that provide an electrical signal when sensed pressure rises above or falls below the selected setting. Maximum operating pressure is 315 Bar (4560 PSI) for all models.

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 "change-over" 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.

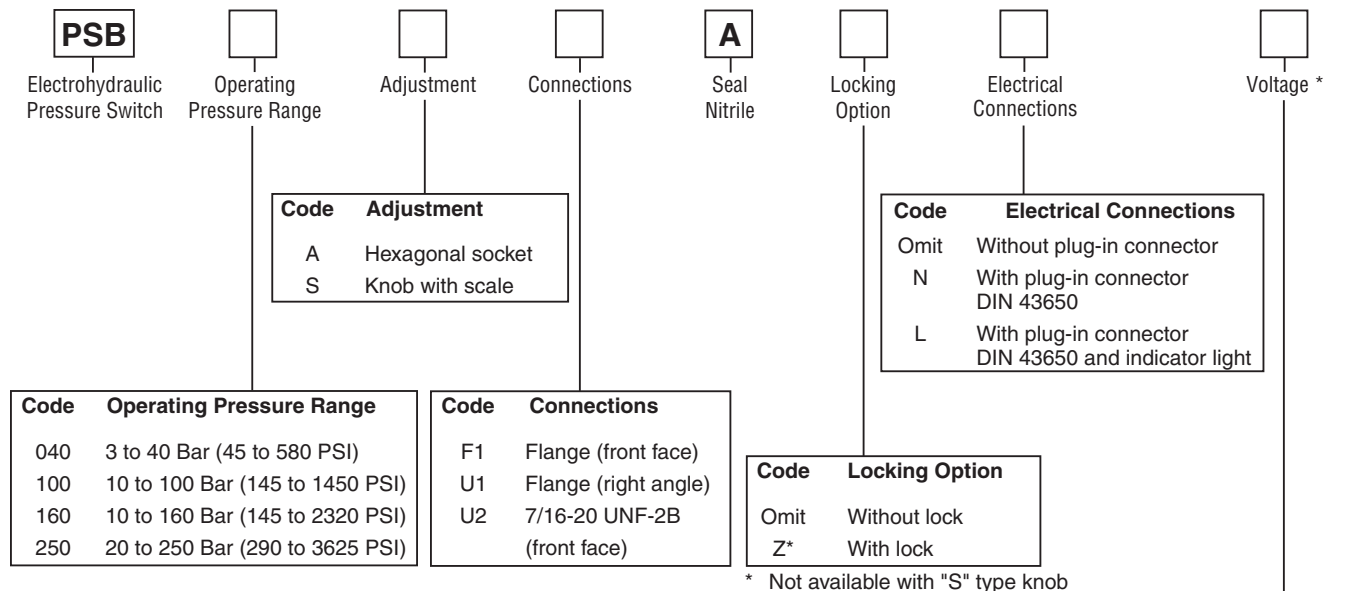


Specifications

Type	Plunger type switch
Mounting	Flange mounting or fitted to a level face
Mounting Position	No restrictions
Operating Pressure	Maximum 315 Bar (4560 PSI)
Actuating Pressure Differential	See performance curves
Duty Cycle	Maximum 1/s
Operating Temp. Range (Ambient)	0 to 80° C (32 to 176° F)
Viscosity Range	12 to 400 cSt / mm ² /s (56 to 1854 SSU)
Filtration	Recommend ISO 4406 Code, 18/16/13 or better
Electrical Connection	Plug-in connector to DIN 43650
Insulation	IP 65 (Nema 4)
Contact Load Carrying Capacity	5 A at 250 VAC; 1 A at 50 VDC; .02 A at 250 VDC

Note: For inductive DC loads a diode should be used to increase service life.

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.
C01_Cat2500.indd, ddp, 04/19



Weight: 1.0 kg (2.2 lbs.)

Mounting Bolts (2 each required)

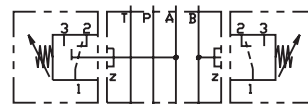
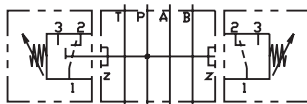
	F1	U1/U2
Inch	10 x 353 (10-24 x 2.50)	10 x 218 (10-24 x 2.00)
Metric	M5 x 60	M5 x 50

Code	Voltage
G024	Plug-in connector w/light, 24VDC
W115	Plug-in connector w/light, 115VAC
W230	Plug-in connector w/light, 230VAC

* Only for the Code "L" Models.

Sandwich Plate to NG6, NFPA D03 Pattern

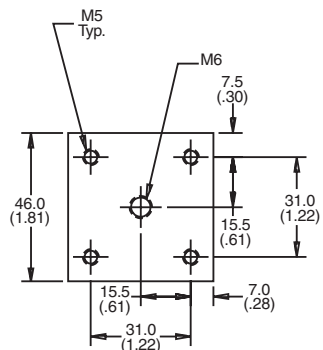
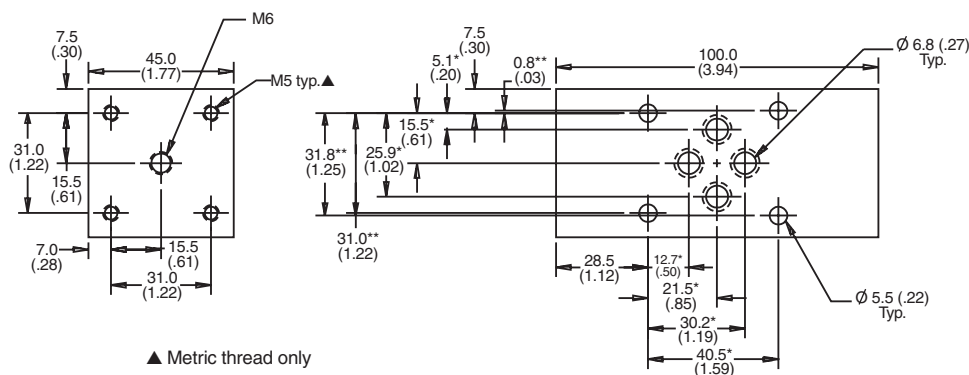
Allows PSB switches to be used in stacking assemblies with Sandwich style valves.



H06PSB-993 -- Pressure switch to P connection

H06PSB-994 -- Pressure switch to A or B or A and B connection

Inch equivalents for millimeter dimensions are shown in (**)

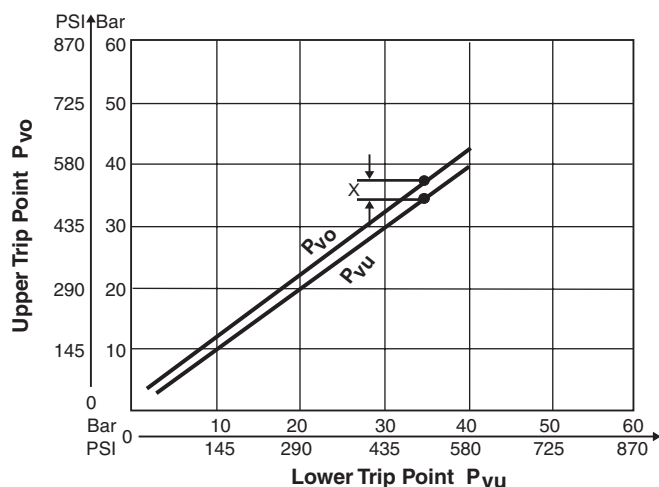


Note:
 * Tolerance on these dimensions +/- 0.2
 ** Tolerance on these dimensions +/- 0.1

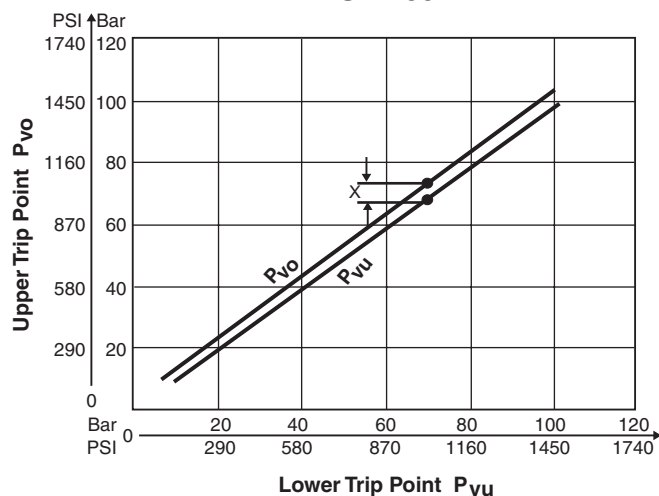


Performance Curves

PSB 040

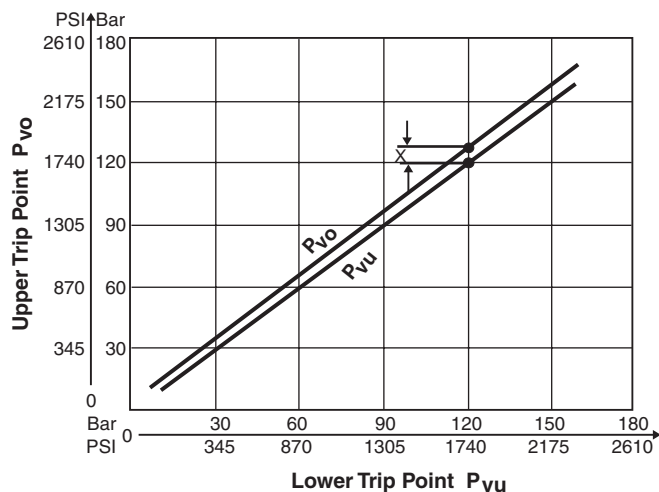


PSB 100

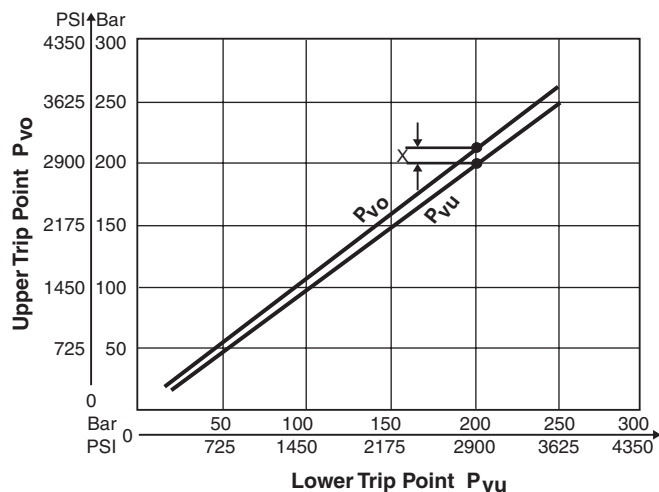


X = Switching Pressure Difference

PSB 160

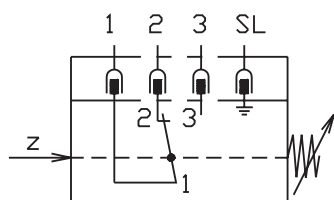


PSB 250

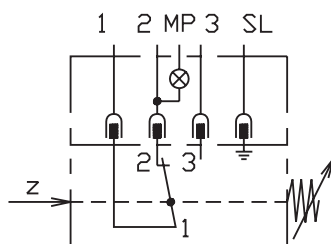


X = Switching Pressure Difference

Electrical Connections



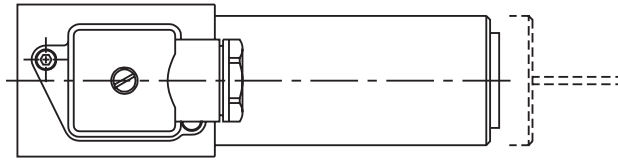
Connection 'N'



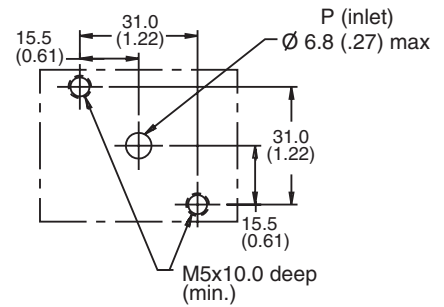
Connection 'L'

Inch equivalents for millimeter dimensions are shown in (**)

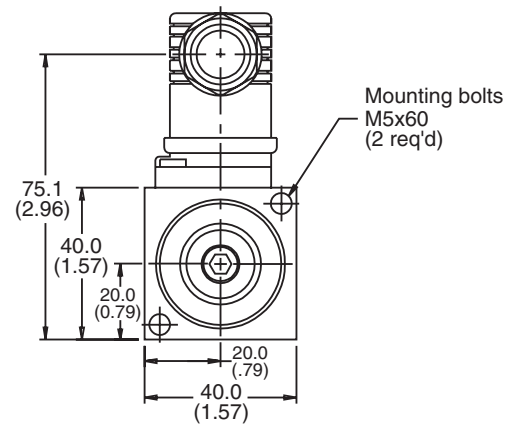
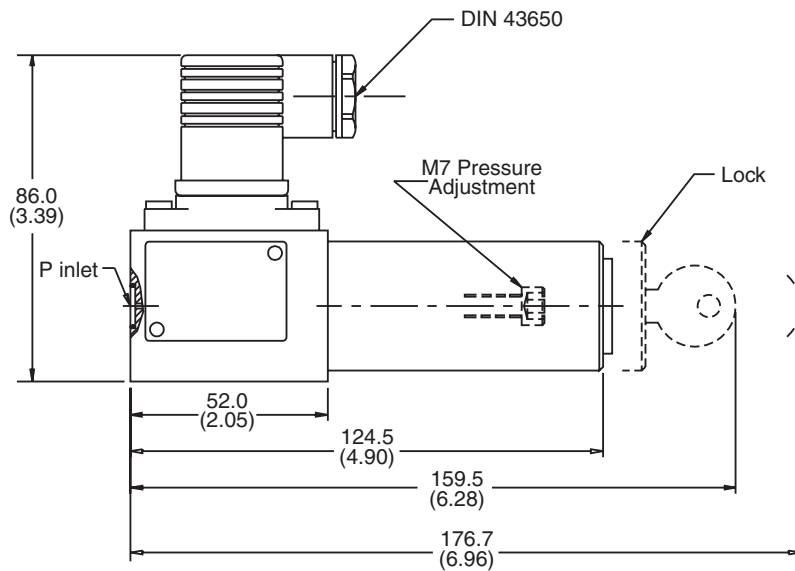
F1



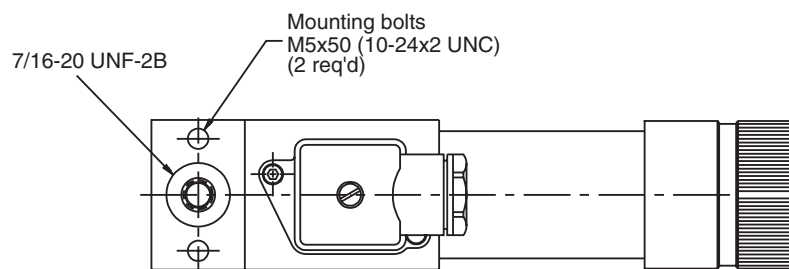
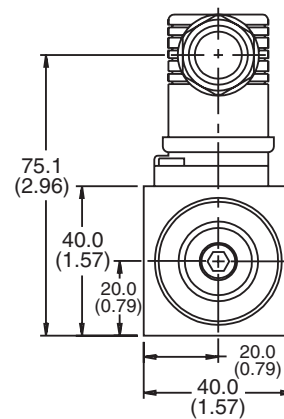
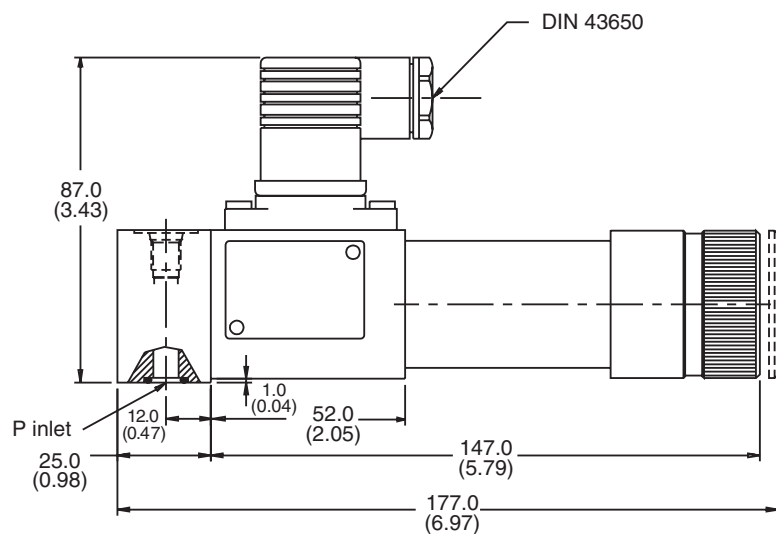
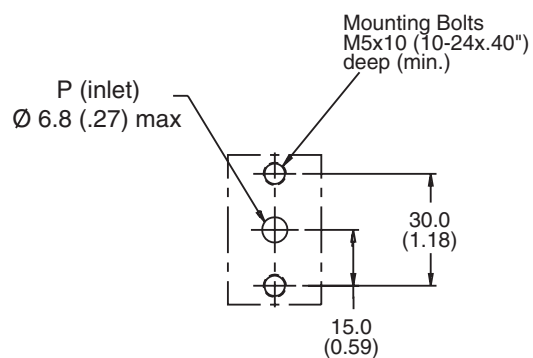
Mounting Pattern



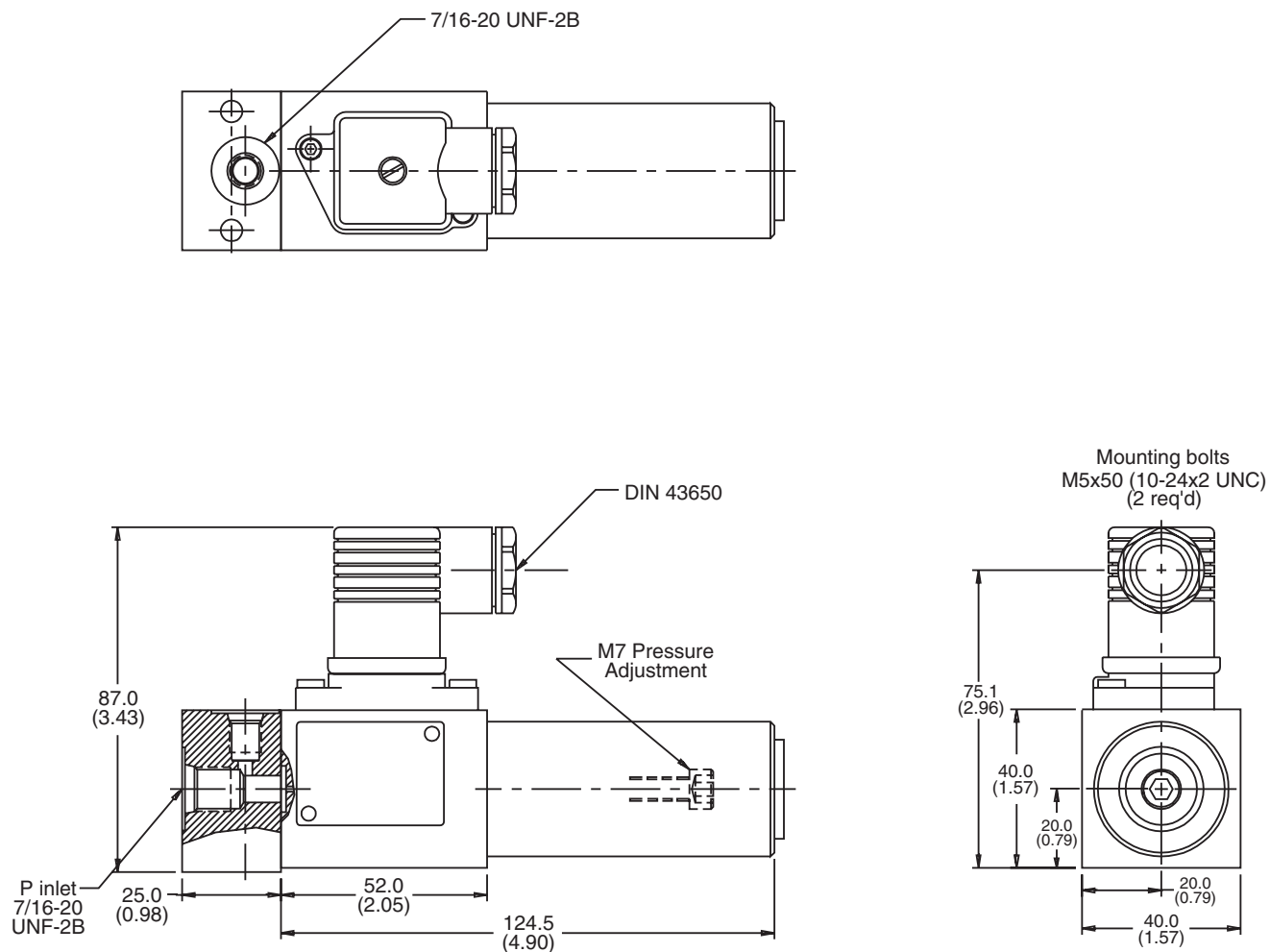
C



Inch equivalents for millimeter dimensions are shown in (**)

U1**Mounting Pattern**

Inch equivalents for millimeter dimensions are shown in (**)

U2**C**

C

Contents

Series R4V*5, R6V*5	Pressure Relief with Vent Function, Subplate Mounted	D3
	Replaces Series R*R, R*M	PHASE OUT
	Replaces Series RS*R, RS*M	PHASE OUT
General Description, Features, Function		D3
Ordering Information		D4 - D5
Specifications		D6
Performance Curves		D7
Dimensions		D8 - D15
Series R4V/R6V (TÜV)	Pilot Operated Pressure Relief Valve	D17
General Description, Features, Name Plate Data		D17
Ordering Information		D18
Specifications		D19
Performance Curves		D20 - D23
Dimensions		D24 - D29
Series VS	Pressure Relief, Direct Operated, Subplate Mounted	D30
General Description, Features, Specifications, Ordering Information		D30
Performance Curves		D31
Dimensions		D32
Series R4U	Pressure Relief, Subplate Mounted, with Unloading Valve	D33
	Replaces Series UR*M	PHASE OUT
	Replaces Series US*M	PHASE OUT
General Description, Features, Performance Curves		D33
Ordering Information		D34
Specifications		D35
Dimensions		D36 - D39
Series R4R	Pressure Reducing	D40
	Replaces Series PR*M	PHASE OUT
General Description, Features, Specifications, Ordering Information		D40
Performance Curves		D41
Dimensions		D42 - D43
Series VM	Pressure Reducing, Direct Operated, Subplate Mounted	D44
General Description, Features, Ordering Information		D44
Specifications		D45
Performance Curves		D46
Dimensions		D47 - D48
Series R4S	Sequence, Pilot Operated, Subplate Mounted	D50
	Replaces Series S*M	PHASE OUT
General Description, Features, Ordering Information		D50
Specifications, Performance Curves		D51
Dimensions		D52 - D53
Series VB	Sequence, Direct Operated, Subplate Mounted	D54
General Description, Features, Specifications, Ordering Information		D54
Performance Curves		D55
Dimensions		D56 - D57
Series VBY	Sequence, Pilot Operated, Subplate Mounted	D58
General Description, Features, Specifications, Ordering Information		D58
Performance Curves		D59 - D60
Dimensions		D61 - D62

Continued on next page

Contents

Series R5V	Pressure Relief, Pilot Operated, SAE Flange.....	D63
General Description, Operation, Features.....		D63
Ordering Information		D64
Specifications, Performance Curves.....		D65
Dimensions.....		D66 - D68
Series R5R	Pressure Relief, Pilot Operated, SAE Flange.....	D69
General Description, Features, Ordering Information.....		D69
Specifications		D70
Performance Curves.....		D71
Dimensions.....		D72 - D73
Series R5U	Unloading, Pilot Operated, SAE Flange.....	D74
General Description, Features.....		D74
Ordering Information, Performance Curves.....		D75
Specifications		D76
Dimensions.....		D77 - D78
Series R5S	Sequence, Pilot Operated, SAE Flange.....	D79
General Description, Features, Ordering Information.....		D79
Specifications, Performance Curves.....		D80
Dimensions.....		D81
Series R4V	Pressure Relief, Pilot Operated, In-line Pipe Mounted.....	D82
General Description, Operation, Features.....		D82
Ordering Information, Performance Curves.....		D83
Specifications		D84
Dimensions.....		D85 - D87
Series R1E02	Remote Control Pressure Relief	D88
General Description, Features.....		D88
Ordering Information, Specifications, Performance Curves		D89
Dimensions.....		D90

D

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

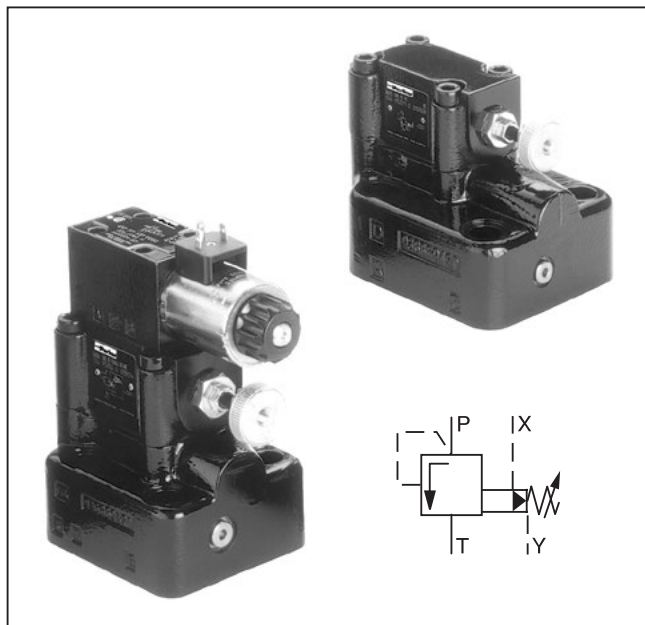
Function

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.

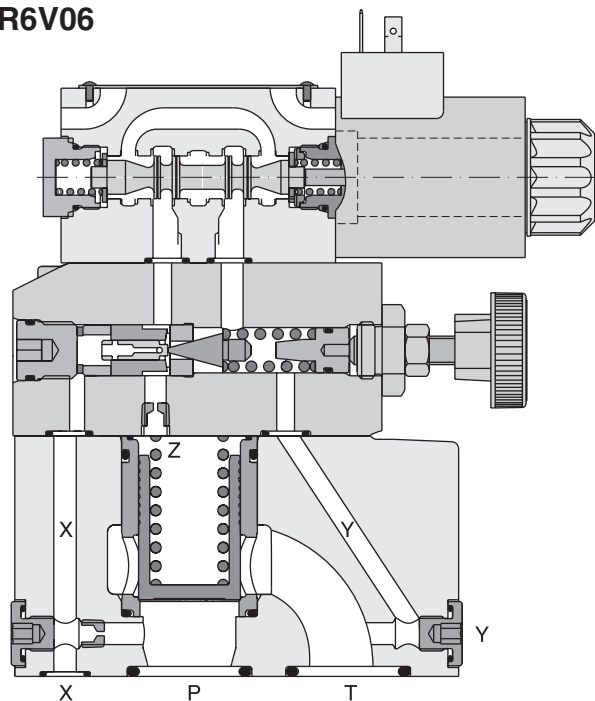
If the pilot pressure exceeds the setting pressure the pilot cone opens and thus limits the pilot pressure.

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.

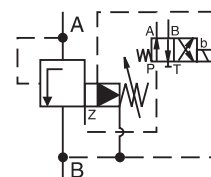
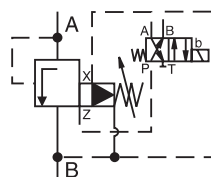


R6V06



Code 1

Code 9



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.
 D01_Cat2500.indd, ddp, 04/19

R

Pressure Relief Valve

Interface

V

Relief Function

Size

5

Maximum Pressure
350 Bar
(5075 PSI)

Drain Port

Pressure Range

Adjustment

Pilot Oil Drain Line

Vent Valve Function

Solenoid Voltage

Design Series

Seal

Modifications

Code	Description
03	NG10
06	NG25
10	NG32

Code	Interface	Drain	Aux Port
3	R4V	Y-port	NPT
7	R4V	Y-port	SAE
9	R4V	Y-port	BSP
9	R6V	Y-port	BSP

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

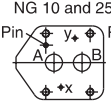

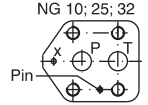
Code	Description
1	Hand Knob (Standard)
3	Acorn Nut with Lead Seal
4	Key Lock

Code	Description
G0R	12V
G0Q	24V
GAR	98V
GAG	205V
W30	110V / 50 Hz 120V / 60 Hz
W31	230V / 50 Hz 240V / 60 Hz

Code	Description
09	Solenoid not activated unpress. circulation
11	Solenoid activated unpress. circulation

Code	Description
0 ¹⁾	Internal
1 ¹⁾	External from Subplate
2	External from Valve Body (Y-port)

1) Only with drain port 3

Code	Description	
4	Subplate Mounting ISO 6264	
6		
		

Code	Description
031 ²⁾	Vent Function w/ Slow Unloading
VFM ³⁾	Vent Function w/ Slow Unloading

2) R4V only
3) R6V only

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
A	R4V
B	R6V

Weight:

R4V03	4.4 kg (9.7 lbs.)
R4V06	6.2 kg 13.7 (lbs.)
R4V10	7.7 kg (17.0 lbs.)
R6V03	5.9 kg (13.0 lbs.)
R6V06	7.2 kg (15.9 lbs.)
R6V10	9.2 kg (20.3 lbs.)

<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">R</div> Pressure Relief Valve	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Interface	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">V</div> Relief Function	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Size	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">5</div> Maximum Pressure 350 Bar (5075 PSI)	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Drain Port	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Pressure Range	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Adjustment	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Pilot Oil Drain Line	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Design Series	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Seal	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Options Check with Factory
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Code	Description
03	NG10
06	NG25
10	NG32

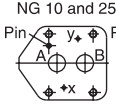

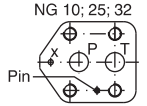
Code	Interface	Drain	Aux Port
3	R4V	Y-port	NPT
7	R4V	Y-port	SAE
9	R4V	Y-port	BSP
9	R6V	Y-port	BSP

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
1	Hand Knob 32mm dia. (Standard)
3	Acorn Nut with Lead Seal
4	Key Lock

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
A	R4V
B	R6V

Code	Description
4	Subplate Mounting  
6	ISO 6264 

Code	Description
0 ¹⁾	Internal
1 ¹⁾	External from Subplate
2	External from Valve Body (Y-port)

1) Only with drain port 3

D

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.)

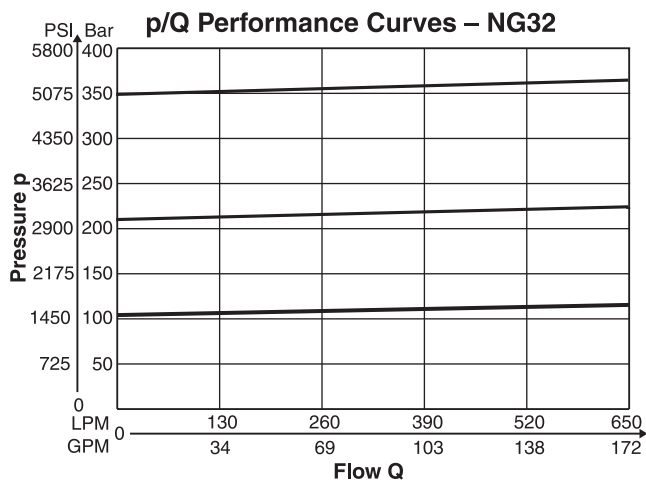
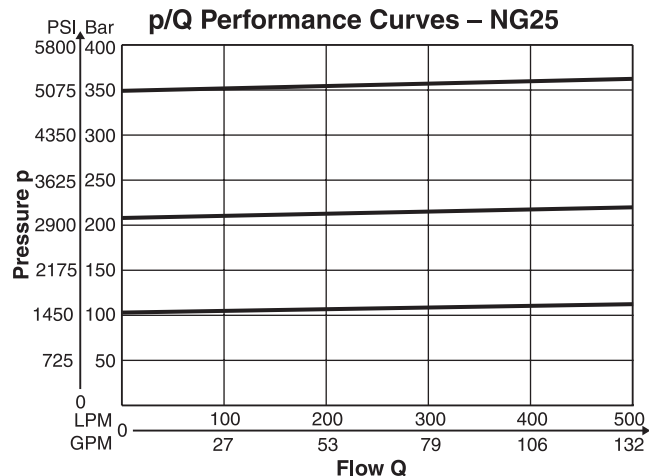
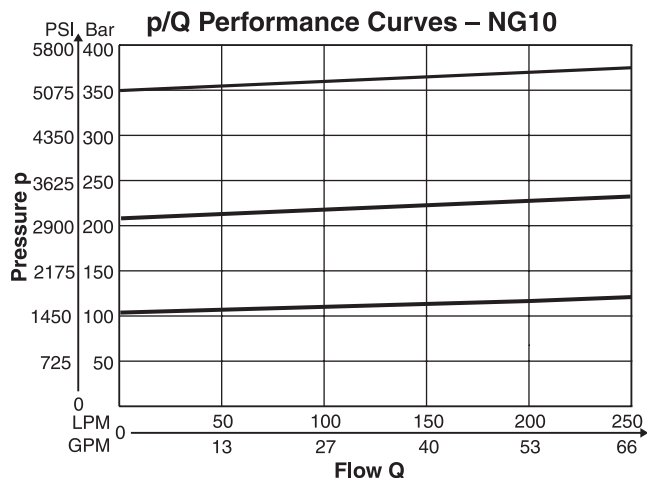
R4V and R6V

General				
Size		NG10	NG25	NG32
Interface		Subplate mounting acc. ISO 6264 (DIN 24340)		
Mounting Position		As desired, horizontal mounting preferred		
Ambient Temperature		-20°C to +80°C (-4°F to +176°F)		
Hydraulic				
Operating Pressure		Ports P or A and X up to 350 Bar (5075 PSI), Port T or B and Y depressurized		
Pressure Range		105, 210, 350 Bar (1523, 3045, 5075 PSI)		
Nominal Flow	Series R4V	150 LPM (39.7 GPM)	350 LPM (92.6 GPM)	650 LPM (172.0 GPM)
	Series R6V	250 LPM (66.1 GPM)	500 LPM (132.3 GPM)	650 LPM (172.0 GPM)
Fluid		Hydraulic oil according to DIN 51524 ... 51525		
Viscosity	Recommended Permitted	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)		
Fluid Temperature		+30°C to +50°C (+86°F to +122°F) -20°C to +70° (-4°F to +158°F)		
Recommended Maximum				
Filtration		ISO 4406 (1999), 18/16/13		

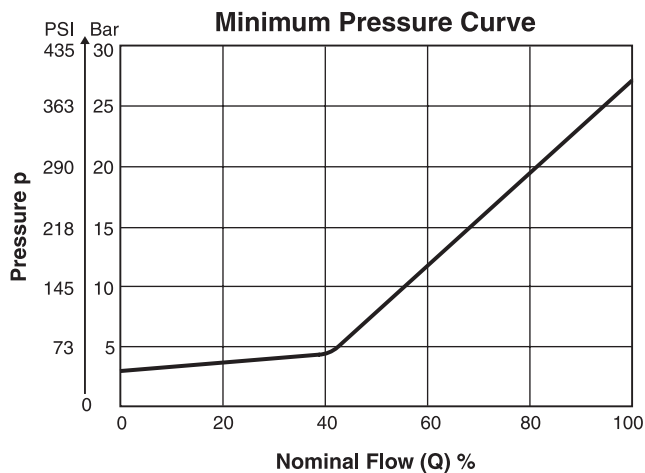
R4V and R6V with Vent Function

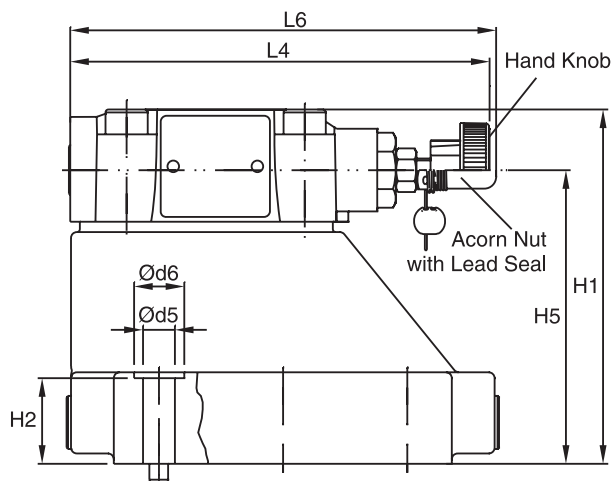
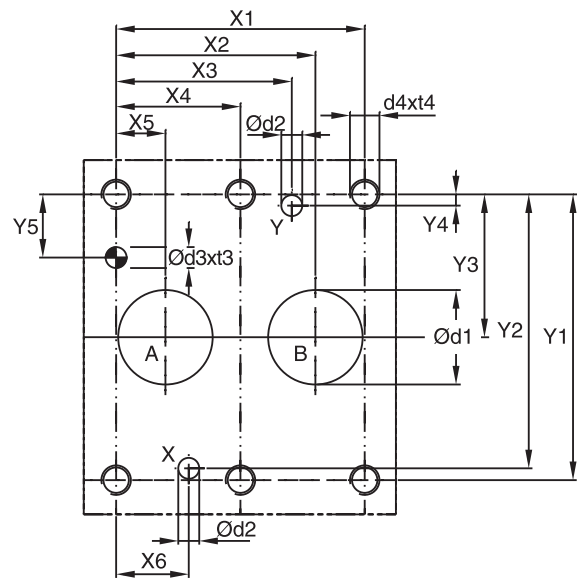
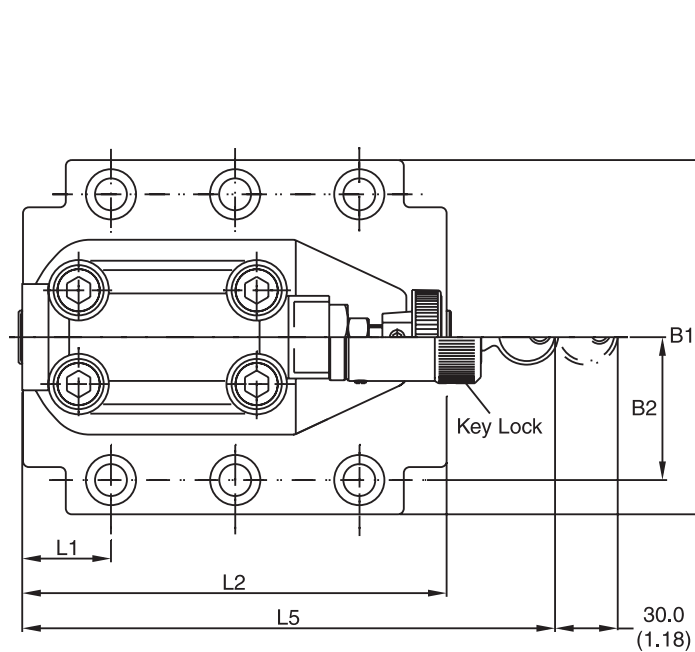
General							
Size		NG10		NG25		NG32	
Interface		Subplate mounting acc. ISO 6264 (DIN 24340)					
Mounting Position		As desired, horizontal mounting preferred					
Ambient Temperature		-20°C to +80°C (-4°F to +176°F)					
Hydraulic							
Operating Pressure		Ports P or A and X up to 350 Bar (5075 PSI), Port T or B and Y depressurized					
Pressure Range		105, 210, 350 Bar (1523, 3045, 5075 PSI)					
Nominal Flow	Series R4V	150 LPM (39.7 GPM)	350 LPM (92.6 GPM)		650 LPM (172.0 GPM)		
	Series R6V	250 LPM (66.1 GPM)	500 LPM (132.3 GPM)		650 LPM (172.0 GPM)		
Fluid		Hydraulic oil according to DIN 51524 ... 51525					
Viscosity	Recommended Permitted	30 to 50 cSt /mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)					
Fluid Temperature		-20°C to +70° (-4°F to +158°F)					
Filtration		ISO 4406 (1999), 18/16/13					
Electrical (solenoid)							
Duty Cycle		100% ED CAUTION: Coil temperature up to 180°C (356°F)					
Solenoid Connector		Connector acc. to EN 175301-803					
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)					
	Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage		12V	24V	98V	205V	110 at 50Hz 120 at 60Hz	230 at 50Hz 240 at 60Hz
Supply Tolerance		+5...-10	+5...-10	+5...-10	+5...-10	+5...-10	+5...-10
Power Consumption	Hold	31W	31W	31W	31W	78W	78W
	In Rush	31W	31W	31W	31W	264W	264W
Switching Frequency		16,000 (DC), 7200 (AC) switchings/hour maximum					
Wiring Minimum		3 x 1.5 mm² Recommended					
Wiring Length Maximum		50 m (164 ft.) Recommended					

D01_Cat2500.indd, ddp, 04/19



The performance curves are measured with external drain.
 For internal drain the tank pressure has to be added to curve.



D

Dimensions

Pressure Control Valves
Series R4V (Pilot Operated)



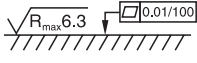
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-07-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	—	7.2 (0.28)	21.5 (0.85)	0.0 (0.00)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	14.3 (0.56)	—
25	6264-08-11-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	—	11.1 (0.44)	20.6 (0.81)	0.0 (0.00)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	15.9 (0.63)	—
32	6264-10-15-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	0.0 (0.00)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	21.4 (0.84)	—

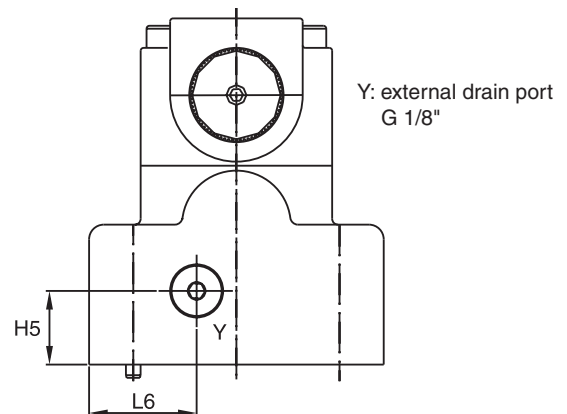
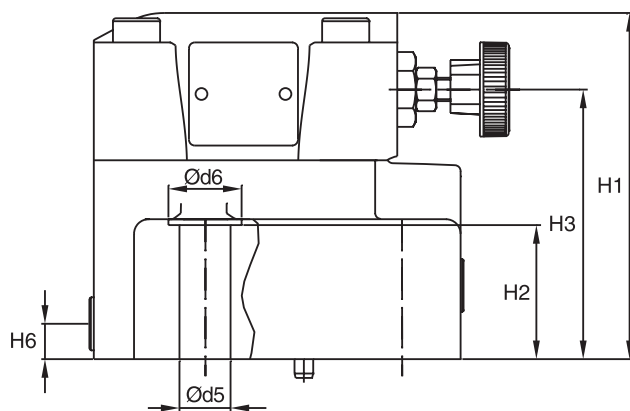
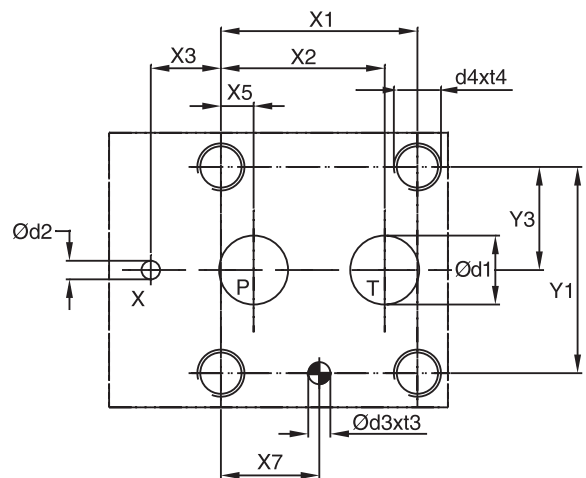
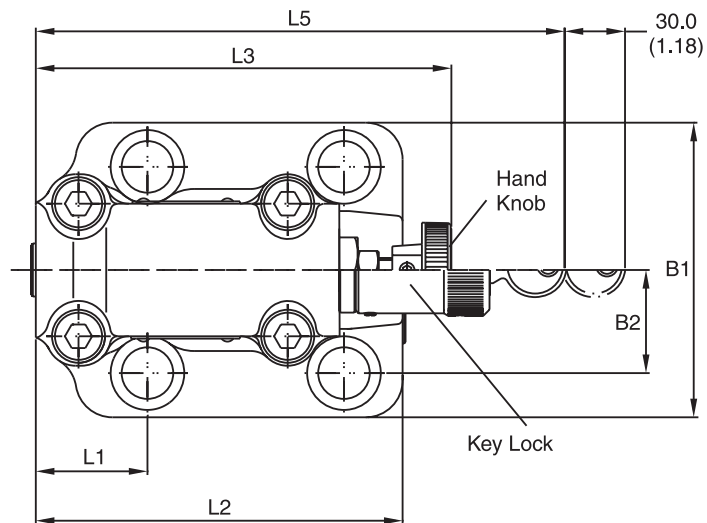
Tolerance at X and Y pin holes and screw holes ± 0.1 , at port holes ± 0.2 .

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-07-*-97	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	—	—	62.5 (2.46)	—	29.0 (1.14)	94.8 (3.73)	—	143.0 (5.63)	181.0 (7.13)	144.8 (5.76)
25	6264-08-11-*-97	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	—	—	89.0 (3.50)	—	34.7 (1.37)	126.8 (4.99)	—	143.0 (5.63)	181.0 (7.13)	144.8 (5.76)
32	6264-10-15-*-97	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	—	—	99.5 (3.92)	—	30.6 (1.20)	144.3 (5.68)	—	143.0 (5.63)	181.0 (7.13)	144.8 (5.76)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	6264-06-07-*-97	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	6264-08-11-*-97	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	6264-10-15-*-97	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal Nitrile	Kit Fluorocarbon	Surface Finish
10	6264-06-07-*-97	BK505	4xM10 x 35-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58507-0	S26-58507-5	
25	6264-08-11-*-97	BK485	4xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58475-0	S26-58475-5	
32	6264-10-15-*-97	BK506	6xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	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

D

Dimensions

Pressure Control Valves
Series R6V (Pilot Operated)



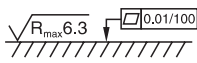
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.00)	— —	22.1 (0.87)	— —	22.1 (0.87)	53.8 (2.12)	— —	26.9 (1.06)	— —	— —	—
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.94)	— —	11.1 (0.44)	— —	33.4 (1.31)	70.0 (2.76)	— —	35.0 (1.38)	— —	— —	—
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	— —	12.7 (0.50)	— —	44.5 (1.75)	82.6 (3.25)	— —	41.3 (1.63)	— —	— —	—

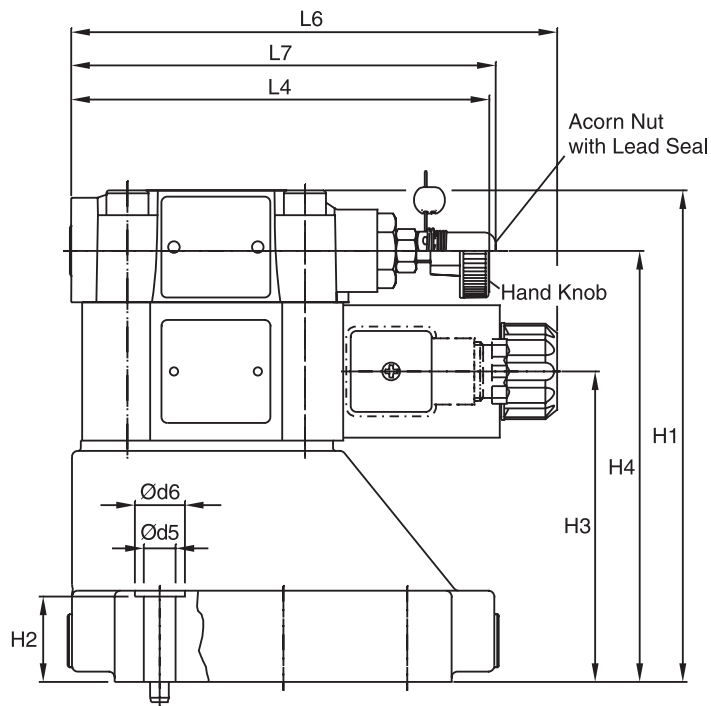
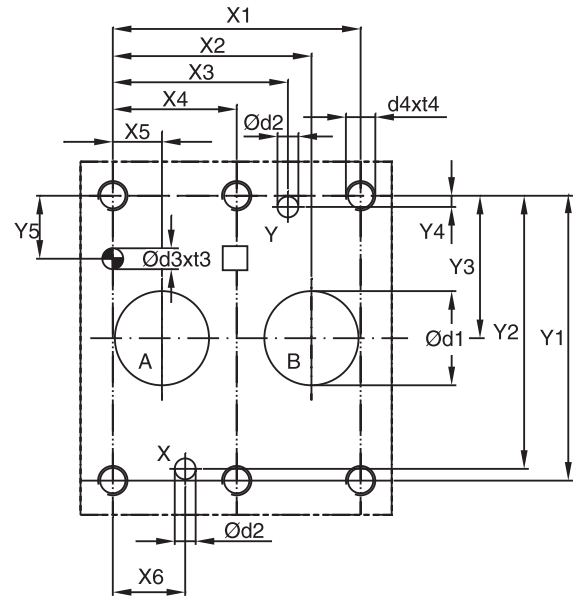
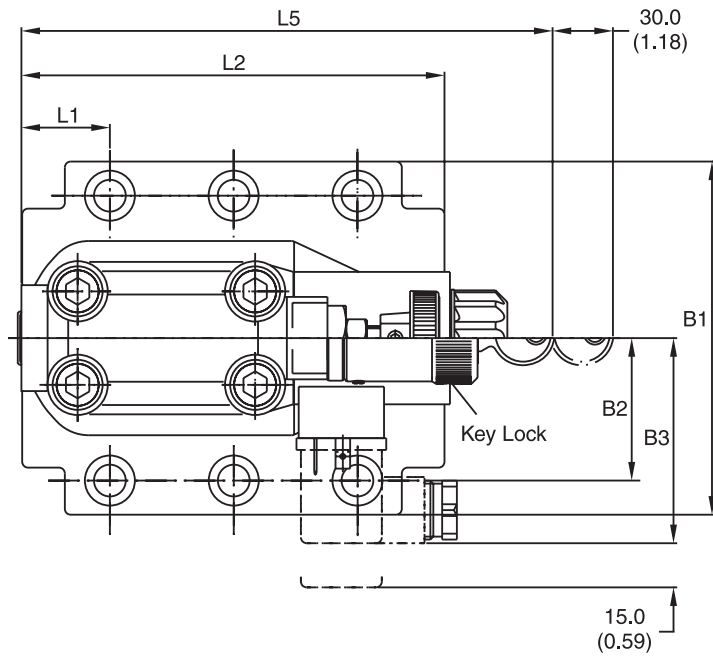
Tolerance at X and Y pin holes and screw holes ± 0.1 , at port holes ± 0.2 .

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-09-*-97	80.0 (3.15)	26.9 (1.06)	114.0 (4.49)	27.0 (1.06)	88.0 (3.46)	— —	25.0 (0.98)	25.0 (0.98)	52.5 (2.07)	118.5 (4.67)	141.0 (5.55)	— —	180.0 (7.09)	29.5 (1.16)
25	6264-08-13-*-97	100.0 (3.94)	35.0 (1.38)	117.5 (4.63)	45.5 (1.79)	91.5 (3.60)	— —	25.0 (0.98)	12.0 (0.47)	37.9 (1.49)	124.5 (4.90)	141.0 (5.55)	— —	180.0 (7.09)	36.5 (1.44)
32	6264-10-17-*-97	120.0 (4.72)	41.3 (1.63)	123.0 (4.83)	52.0 (2.05)	97.0 (3.82)	— —	25.0 (0.98)	13.5 (0.53)	45.0 (1.77)	153.0 (6.02)	141.0 (5.55)	— —	180.0 (7.09)	36.5 (1.83)

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 Nitrile	Kit Fluorocarbon	Surface Finish
10	6264-06-09-*-97	BK494	4xM12 x 45-DIN 912 12.9	108 Nm (79.6 lb.-ft.) $\pm 15\%$	S26-96396-0	S26-96396-5	
25	6264-08-13-*-97	BK366	4xM16 x 70-DIN 912 12.9	264 Nm (194.7 lb.-ft.) $\pm 15\%$	S26-96589-0	S26-96589-5	
32	6264-10-17-*-97	BK507	4xM18 x 75-DIN 912 12.9	398 Nm (293.5 lb.-ft.) $\pm 15\%$	S26-96392-0	S26-96392-5	

NG	ISO-code	Subplate	Size
10	6264-06-09-*-97	SPP3R6B910	P, T = 3/4" BSPP x = 1/4" BSPP
25	6264-08-13-*-97	SPP6R8B910	P, T = 1 1/4" BSPP x = 1/4" BSPP
32	6264-10-17-*-97	SPP10R12B910	P, T = 1 1/2" BSPP x, y = 1/4" BSPP

D

Dimensions

Pressure Control Valves
Series R4V with Vent Function



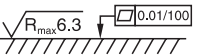
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-07-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	— —	7.2 (0.28)	21.5 (0.85)	0.0 (0.00)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	14.3 (0.56)	— —
25	6264-08-11-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	— —	11.1 (0.44)	20.6 (0.81)	0.0 (0.00)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	15.9 (0.63)	— —
32	6264-10-15-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	0.0 (0.00)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	21.4 (0.84)	— —

Tolerance at X and Y pin holes and screw holes ± 0.1 , at port holes ± 0.2 .

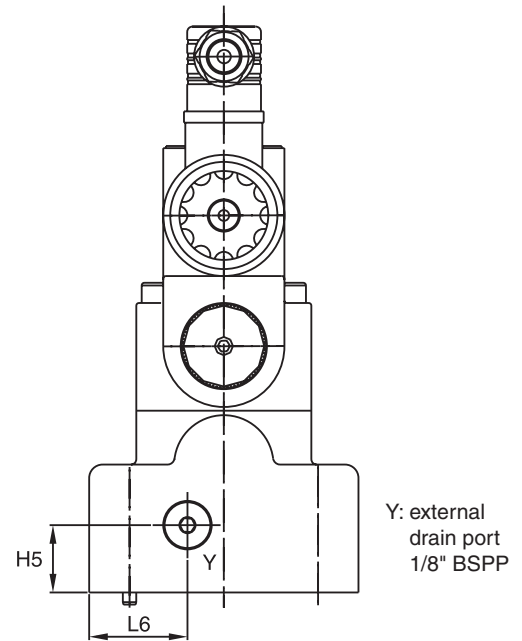
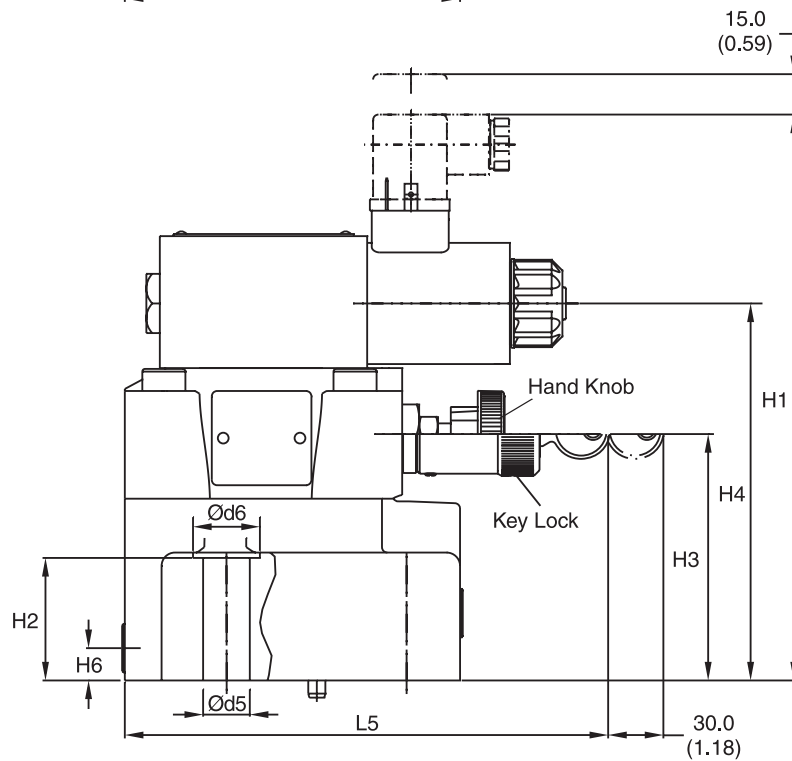
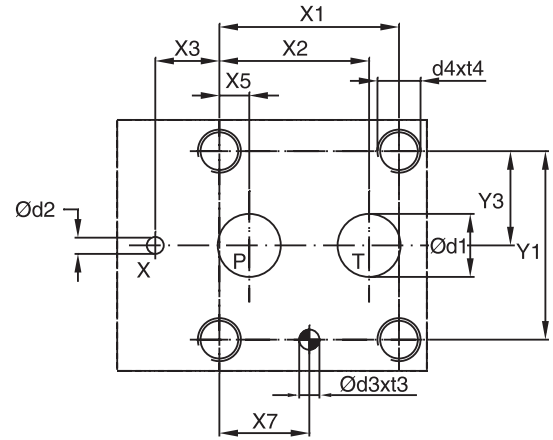
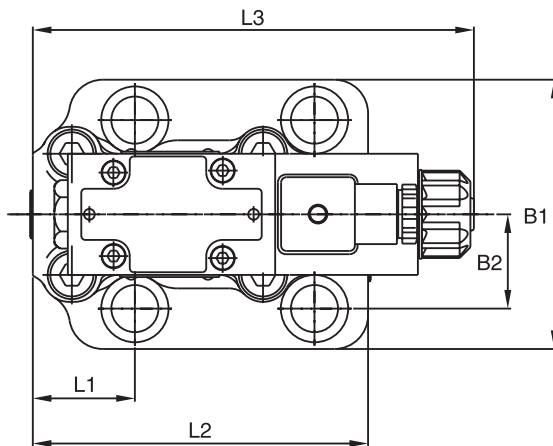
NG	ISO-code	B1	B2	B3	H1	H2	H3	H4	L1	L2	L3	L4	L5	L6	L7
10	6264-06-07-*-97	87.3 (3.44)	33.4 (1.31)	70.0 (2.76)	130.0 (5.12)	21.0 (0.83)	68.5 (2.70)	109.5 (4.31)	29.0 (1.14)	94.8 (3.73)	— —	143.0 (5.63)	181.0 (7.13)	165.6 (6.52)	144.8 (5.70)
25	6264-08-11-*-97	105.0 (4.13)	39.7 (1.59)	70.0 (2.76)	156.5 (6.16)	29.0 (1.14)	95.0 (3.74)	136.0 (5.35)	34.7 (1.37)	126.8 (4.99)	— —	143.0 (5.63)	181.0 (7.13)	165.6 (6.52)	144.8 (5.70)
32	6264-10-15-*-97	120.0 (4.72)	48.4 (1.91)	70.0 (2.76)	167.0 (6.57)	29.0 (1.14)	105.5 (4.15)	146.5 (5.77)	30.6 (1.20)	144.3 (5.68)	— —	143.0 (5.63)	181.0 (7.13)	165.6 (6.52)	144.8 (5.70)

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 Nitrile	Kit Fluorocarbon	Surface Finish
10	6264-06-07-*-97	BK505	4xM10 x 35-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58507-0	S26-58507-5	
25	6264-08-11-*-97	BK485	4xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58475-0	S26-58475-5	
32	6264-10-15-*-97	BK506	6xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58508-0	S26-58508-5	
VV01*					S56-40609-0	S56-40609-5	

* Please combine seal kit of one size with seal kit of VV01 solenoid for complete seal kit.

NG	ISO-code	Subplate	Size
10	6264-06-07-*-97	SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP
25	6264-08-11-*-97	SPP6M8B910	A, B = 1" BSPP x, y = 1/4" BSPP
32	6264-10-15-*-97	SPP10M12B910	A, B = 1 1/2" BSPP x, y = 1/4" BSPP

D

Y: external
drain port
1/8" BSPP



Dimensions

Pressure Control Valves
Series R6V with Vent Function



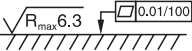
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.00)	— —	22.1 (0.87)	— —	22.1 (0.87)	53.8 (2.12)	— —	26.9 (1.06)	— —	— —	—
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.91)	— —	11.1 (0.44)	— —	33.4 (1.31)	70.0 (2.76)	— —	35.0 (1.38)	— —	— —	—
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	— —	12.7 (0.50)	— —	44.5 (1.75)	82.6 (3.25)	— —	41.3 (1.63)	— —	— —	—

Tolerance at X and Y pin holes and screw holes ± 0.1 , at port holes ± 0.2 .

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-09-*-97	80.0 (3.15)	26.9 (1.06)	206.0 (8.11)	27.0 (1.06)	88.0 (3.46)	136.5 (5.37)	25.0 (0.98)	12.0 (0.47)	52.5 (2.07)	118.5 (4.67)	163.8 (6.45)	— —	180.0 (7.09)	36.5 (1.44)
25	6264-08-13-*-97	100.0 (3.94)	35.0 (1.38)	210.0 (8.27)	45.5 (1.79)	91.5 (3.60)	140.0 (5.51)	25.0 (0.98)	12.0 (0.47)	37.9 (1.49)	124.5 (4.90)	163.8 (6.45)	— —	180.0 (7.09)	36.5 (1.44)
32	6264-10-17-*-97	120.0 (4.72)	41.3 (1.63)	215.5 (8.48)	52.0 (2.05)	97.0 (3.82)	145.5 (5.73)	25.0 (0.98)	12.0 (0.47)	45.0 (1.77)	153 (6.02)	163.8 (6.45)	— —	180.0 (7.09)	36.5 (1.44)

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 Nitrile	Kit Fluorocarbon	Surface Finish
10	6264-06-09-*-97	BK494	4xM12 x 45-DIN 912 12.9	108 Nm (79.6 lb.-ft.) $\pm 15\%$	S26-96395-0	S26-96395-5	
25	6264-08-13-*-97	BK366	4xM16 x 70-DIN 912 12.9	264 Nm (194.7 lb.-ft.) $\pm 15\%$	S26-96589-0	S26-96589-5	
32	6264-10-17-*-97	BK507	4xM18 x 75-DIN 912 12.9	398 Nm (293.5 lb.-ft.) $\pm 15\%$	S26-96392-0	S26-96392-5	

NG	ISO-code	Subplate	Size
10	6264-06-09-*-97	SPP3R6B910	P, T = 3/4" BSPP x = 1/4" BSPP
25	6264-08-13-*-97	SPP6R8B910	P, T = 1 1/4" BSPP x = 1/4" BSPP
32	6264-10-17-*-97	SPP10R12B910	P, T = 1 1/2" BSPP x, y = 1/4" BSPP

D

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

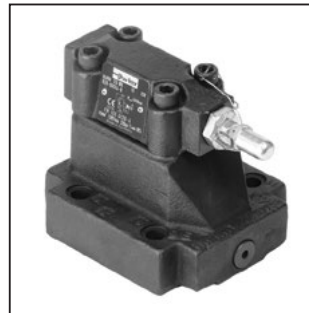
- TÜV certificate
- Pilot operated with manual adjustment
- 2 interfaces:
 - Subplate, ISO 6264 (DIN 24340 Form D) with VV01 vent valve (R4V)
 - Subplate, ISO 6264 (DIN 24340 Form E) with CETOP 03 vent valve (R6V)
- Adjustment leaded (code W)
- Adjustment leaded to maximum pressure, lower pressure possible (code V)



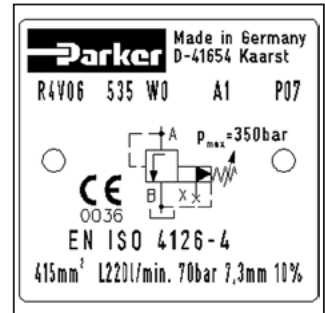
R6V06



R6V06 with Vent Valve

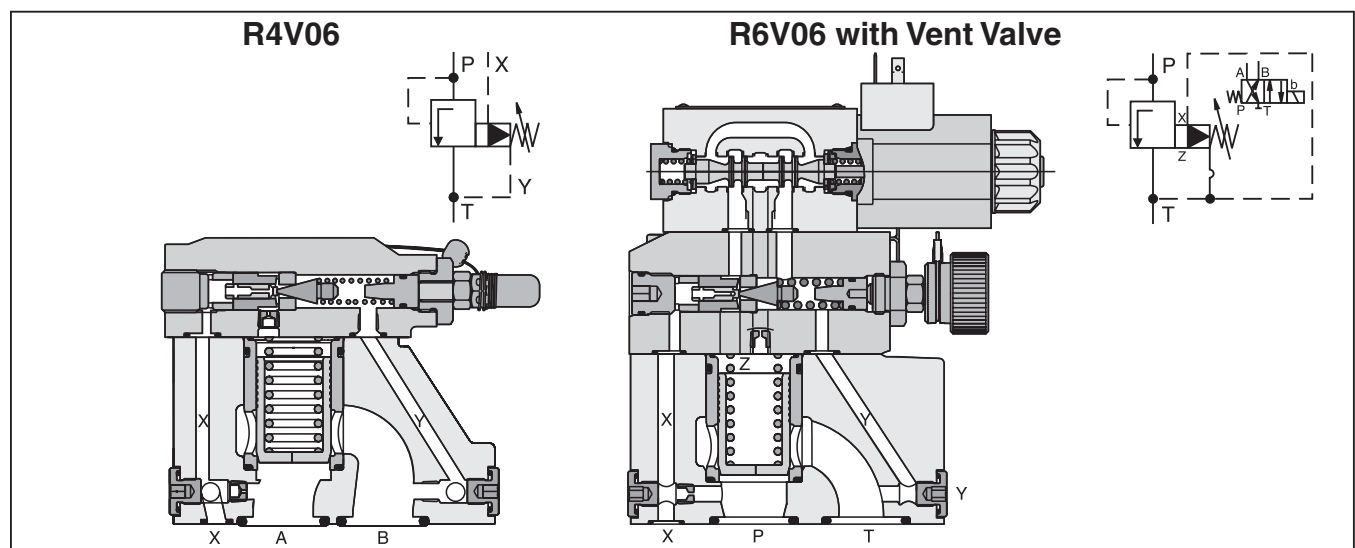


R4V06



Name Plate Data R4V06

415 mm²:	minimum opening width
L220 LPM:	maximum flow
70 Bar:	set pressure (compare p/Q curves)
7.3 mm:	cartridge stroke
10%:	permitted pressure increase of the flow range



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.
 D01_Cat2500.indd, ddp, 04/19

R4V and R6V

R Pressure Relief Valve

V Relief Function

5 Maximum Pressure 350 Bar (5075 PSI)

5 Pressure Setting up to 350 Bar (5075 PSI) Maximum

0 Pilot Oil Internal

0 Design Series

0 Seal

0 Pressure Range*

5 Body

5 Adjustment Leaded (TUV)

0 Pilot Oil Internal

0 Design Series

0 Seal

0 Pressure Range*

Code	Description
03	NG10
06	NG25
10	NG32

Code	Description
3	R4V
9	R6V

Code	Description
A	R4V
B	R6V

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
V	Hand Knob Leaded (lower pressure adjustment possible)
W	Acorn Nut Leaded

Code	Description
P10	100 Bar (1450 PSI)
P20	200 Bar (2900 PSI)
P30	300 Bar (4350 PSI)
P35	350 Bar (5075 PSI)

* Further pressure ranges on request in 10 Bar (145 PSI) steps

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.)

R6V with Vent Valve

R Pressure Relief Valve

6 Interface

V Relief Function

5 Maximum Pressure 350 Bar (5075 PSI)

9 Body Y Port = G 1/8"

5 Pressure Setting up to 350 Bar (5075 PSI) Maximum

V Adjustment Leaded (TUV)

0 Pilot Oil Internal

09 Vent Valve Function

0 Solenoid Voltage

B Design Series

0 Seal

0 Pressure Range*

5 Body

5 Adjustment Leaded (TUV)

09 Vent Valve Function

0 Solenoid Voltage

B Design Series

0 Seal

0 Pressure Range*

Code	Description
03	NG10
06	NG25
10	NG32

Code	Description
V	Hand Knob Leaded (lower pressure adjustment possible)

Code	Description
09	Solenoid not activated, unpressured circulation

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
P10	100 Bar (1450 PSI)
P20	200 Bar (2900 PSI)
P30	300 Bar (4350 PSI)
P35	350 Bar (5075 PSI)

* Further pressure ranges on request in 10 Bar (145 PSI) steps

Weight:

R6V03	5.9 kg (13.0 lbs.)
R6V06	7.2 kg (15.9 lbs.)
R6V10	9.2 kg (20.3 lbs.)

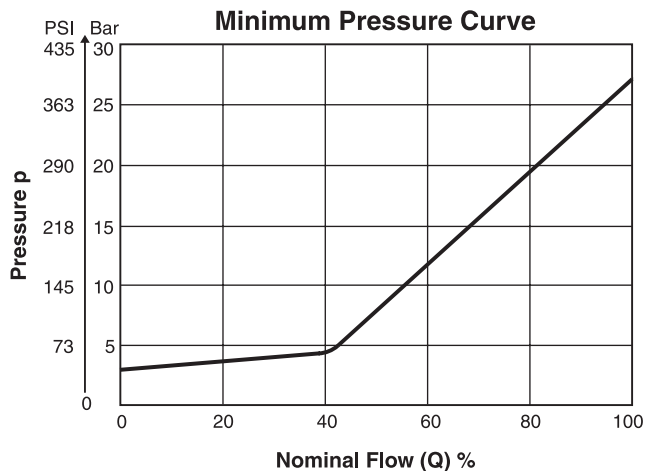
R4V and R6V

General				
Size	NG10		NG25	NG32
Interface	Subplate mounting acc. ISO 6264 (DIN 24340)			
Mounting Position	As desired, horizontal mounting preferred			
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)			
MTTF _D Value	75 years			
Hydraulic				
Operating Pressure	Ports P or A up to 350 Bar (5075 PSI), Port T or B 30 Bar (435 PSI)			
Pressure Range	100, 200, 300, 350 Bar (1450, 2900, 4350, 5075 PSI)			
Nominal Flow	Series R4V	110 LPM (29.1 GPM)	450 LPM (119.0 GPM)	500 LPM (132.3 GPM)
	Series R6V	250 LPM (66.1 GPM)	500 LPM (132.3 GPM)	500 LPM (132.3 GPM)
Fluid	Hydraulic oil according to DIN 51524 ... 51525			
Viscosity	Recommended Permitted	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)		
Fluid Temperature	-20°C to +70° (-4°F to +158°F)			
Filtration	ISO 4406 (1999), 18/16/13			

R6V with Vent Function

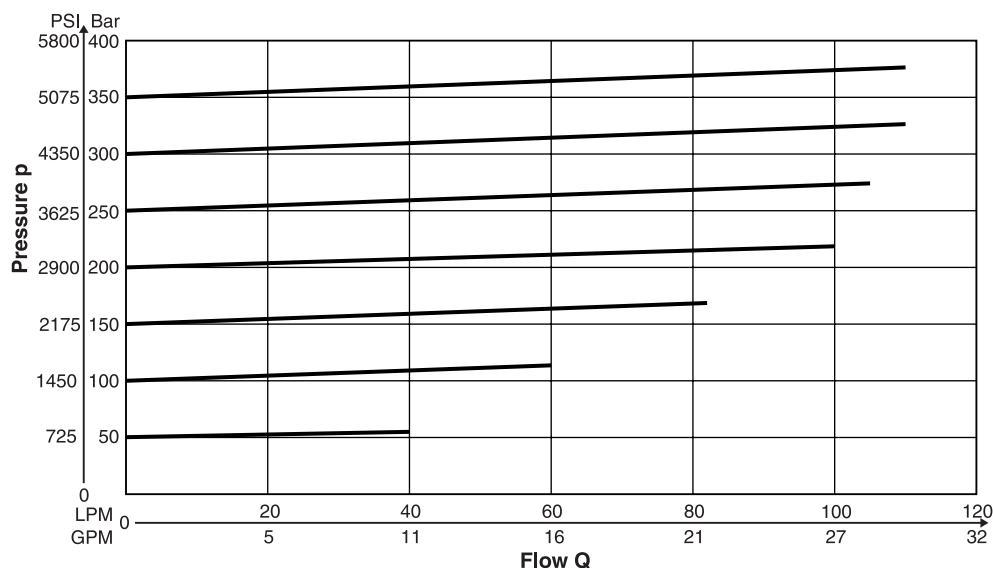
General				
Size	NG10		NG25	NG32
Interface	Subplate mounting acc. ISO 6264 (DIN 24340)			
Mounting Position	As desired, horizontal mounting preferred			
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)			
MTTF _D Value	75 years			
Hydraulic				
Operating Pressure	Ports P or A up to 350 Bar (5075 PSI), Port T or B 30 Bar (435 PSI)			
Pressure Range	100, 200, 300, 350 Bar (1450, 2900, 4350, 5075 PSI)			
Nominal Flow	250 LPM (66.1 GPM)	500 LPM (132.3 GPM)	650 LPM (172.0 GPM)	
Fluid	Hydraulic oil according to DIN 51524 ... 51525			
Viscosity	Recommended Permitted	30 to 50 cSt /mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)		
Fluid Temperature	-20°C to +70° (-4°F to +158°F)			
Filtration	ISO 4406 (1999), 18/16/13 according to NAS 1638:7)			
Electrical (Solenoid)				
Duty Ratio	100% ED; CAUTION: Coil temperature up to 180°C (356°F)			
Solenoid Connector	Connector acc. to EN 175301-803			
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)			
Code	G0R	G0Q		
Supply Voltage	12V	24V		
Supply Tolerance	+5...-10	+5...-10		
Power Consumption	Hold	31W	31W	
	In Rush	31W	31W	
Switching Frequency	16,000 (DC), 7200 (AC) switchings/hour maximum			
Wiring Minimum	3 x 1.5 mm² Recommended			
Wiring Length Maximum	50 m (164 ft.) Recommended			

Minimum Pressure Curve R4V and R6V



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).

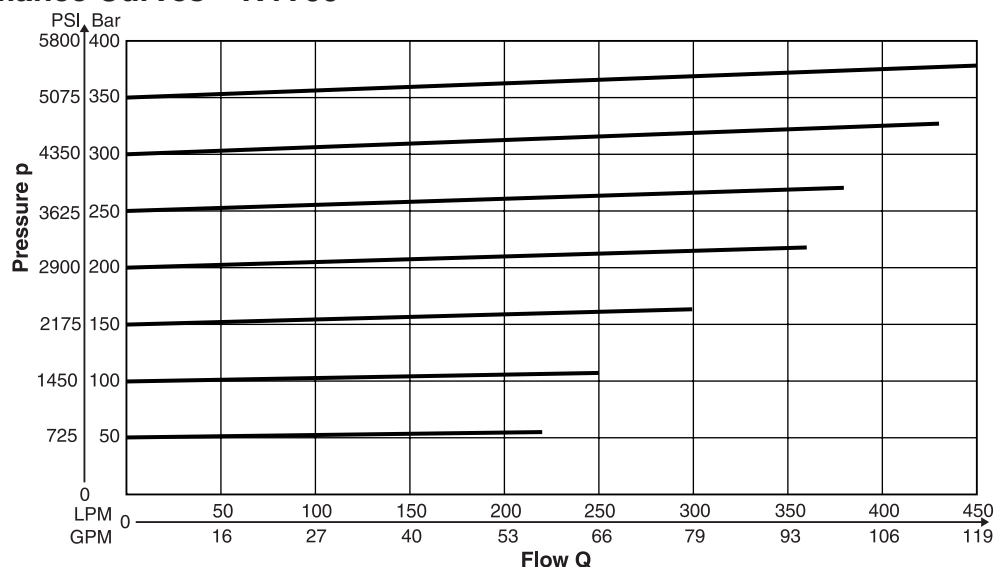
p/Q Performance Curves – R4V03



R4V03

Pressure Range	Q _{max}	Minimum Opening Width	Cartridge Stroke	Permitted Pressure Increase
50 - 70 Bar (725 - 1015 PSI)	40 LPM (11 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%
80 - 120 Bar (1160 - 1740 PSI)	60 LPM (16 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%
130 - 170 Bar (1885 - 2465 PSI)	82 LPM (22 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%
180 - 200 Bar (2610 - 2900 PSI)	100 LPM (27 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%
210 - 250 Bar (3015 - 3625 PSI)	105 LPM (28 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%
260 - 300 Bar (3770 - 4350 PSI)	110 LPM (29 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%
310 - 350 Bar (4495 - 5075 PSI)	110 LPM (29 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%

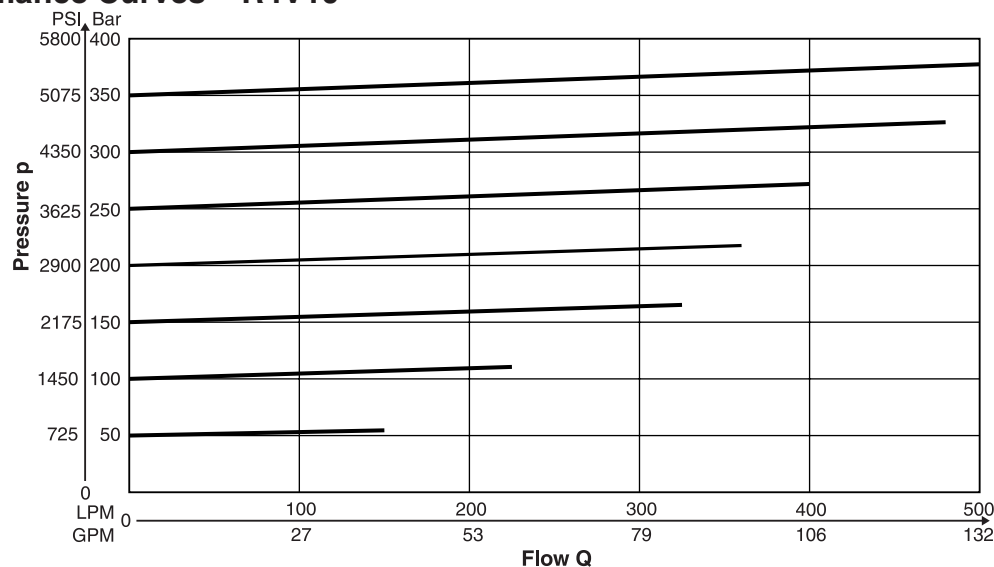
p/Q Performance Curves – R4V06



R4V06

Pressure Range	Q _{max}	Minimum Opening Width	Cartridge Stroke	Permitted Pressure Increase
50 - 70 Bar (725 - 1015 PSI)	220 LPM (58 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%
80 - 120 Bar (1160 - 1740 PSI)	250 LPM (66 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%
130 - 170 Bar (1885 - 2465 PSI)	300 LPM (79 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%
180 - 200 Bar (2610 - 2900 PSI)	360 LPM (95 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%
210 - 250 Bar (3015 - 3625 PSI)	380 LPM (101 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%
260 - 300 Bar (3770 - 4350 PSI)	430 LPM (114 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%
310 - 350 Bar (4495 - 5075 PSI)	450 LPM (120 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%

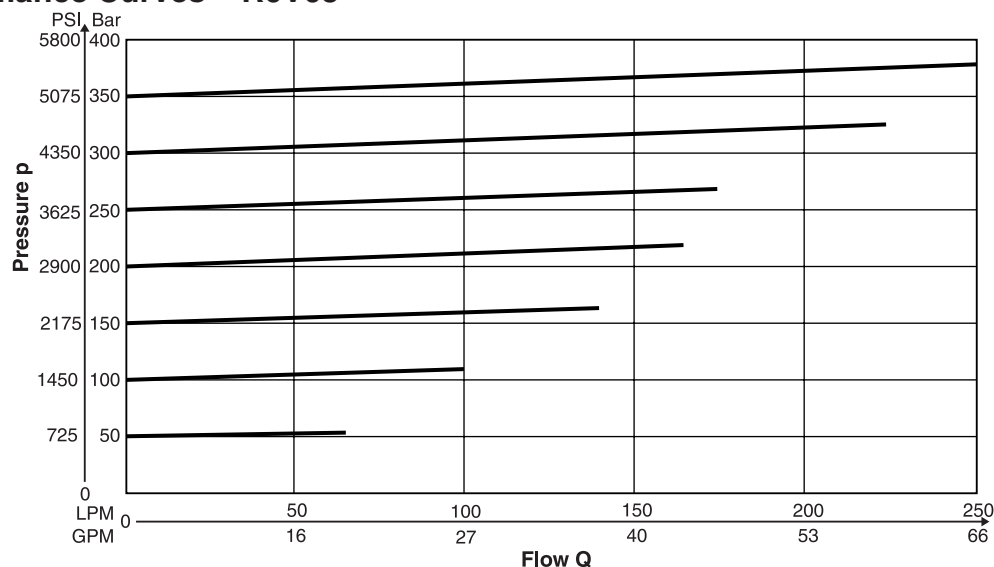
p/Q Performance Curves – R4V10



R4V10

Pressure Range	Q _{max}	Minimum Opening Width	Cartridge Stroke	Permitted Pressure Increase
50 - 70 Bar (725 - 1015 PSI)	150 LPM (40 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%
80 - 120 Bar (1160 - 1740 PSI)	225 LPM (60 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%
130 - 170 Bar (1885 - 2465 PSI)	325 LPM (86 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%
180 - 200 Bar (2610 - 2900 PSI)	360 LPM (95 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%
210 - 250 Bar (3015 - 3625 PSI)	400 LPM (106 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%
260 - 300 Bar (3770 - 4350 PSI)	480 LPM (127 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%
310 - 350 Bar (4495 - 5075 PSI)	500 LPM (132 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%

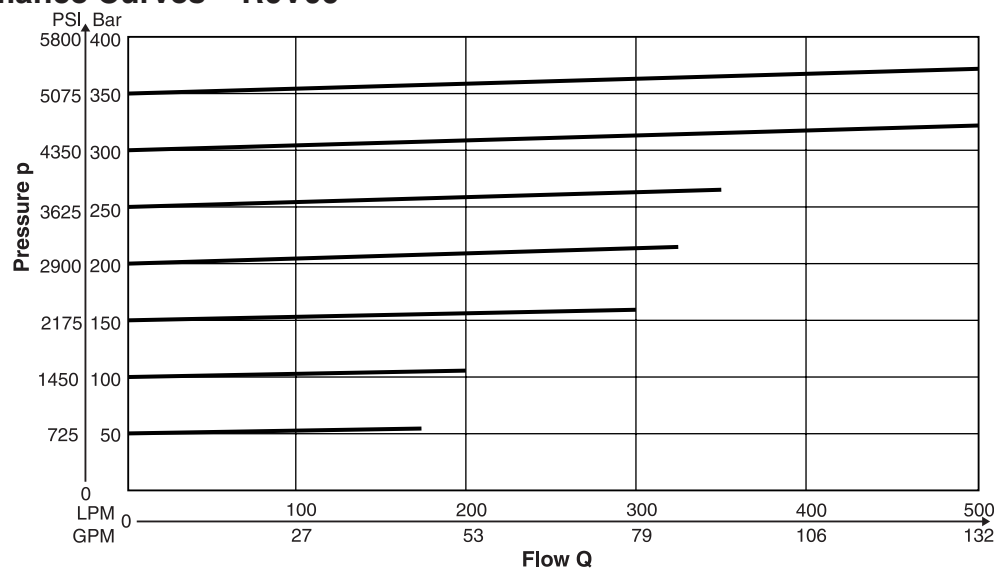
p/Q Performance Curves – R6V03



R6V03

Pressure Range	Q _{max}	Minimum Opening Width	Cartridge Stroke	Permitted Pressure Increase
50 - 70 Bar (725 - 1015 PSI)	65 LPM (17 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%
80 - 120 Bar (1160 - 1740 PSI)	100 LPM (27 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%
130 - 170 Bar (1885 - 2465 PSI)	140 LPM (37 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%
180 - 200 Bar (2610 - 2900 PSI)	165 LPM (44 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%
210 - 250 Bar (3015 - 3625 PSI)	170 LPM (46 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%
260 - 300 Bar (3770 - 4350 PSI)	225 LPM (60 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%
310 - 350 Bar (4495 - 5075 PSI)	250 LPM (66 GPM)	154mm ² (0.24 in. ²)	4.4mm (0.17")	10%

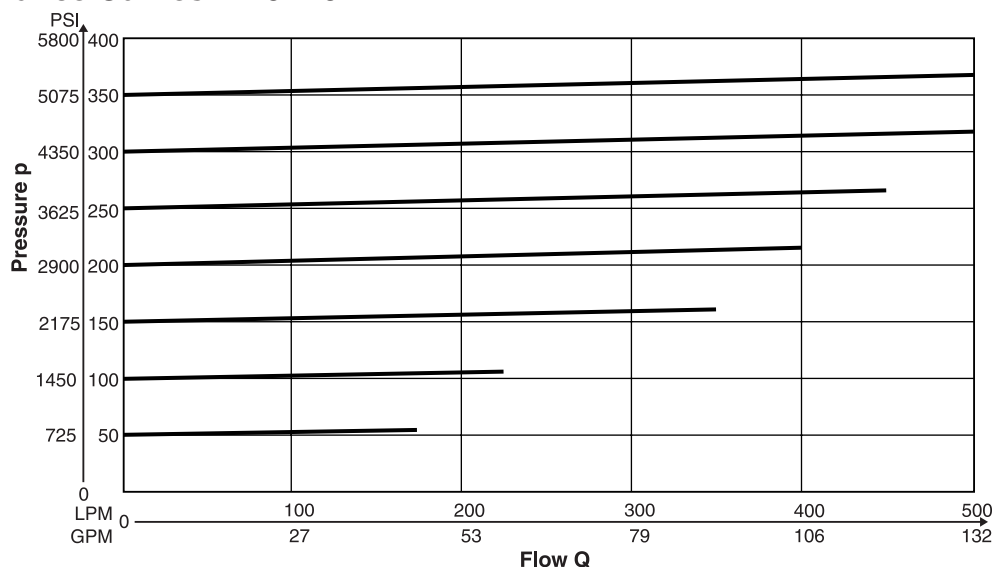
p/Q Performance Curves – R6V06



R6V06

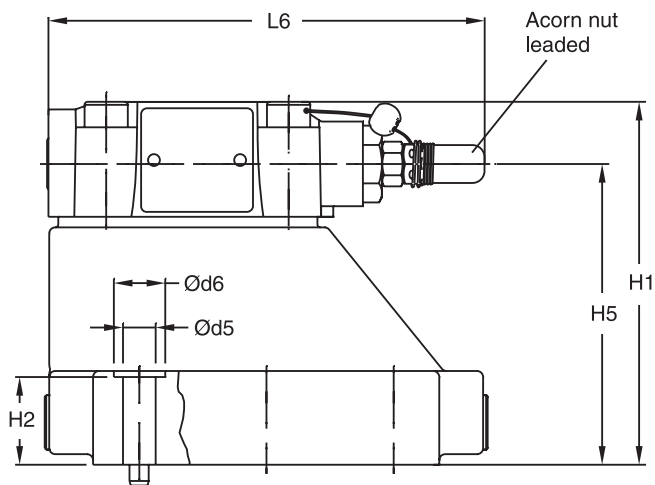
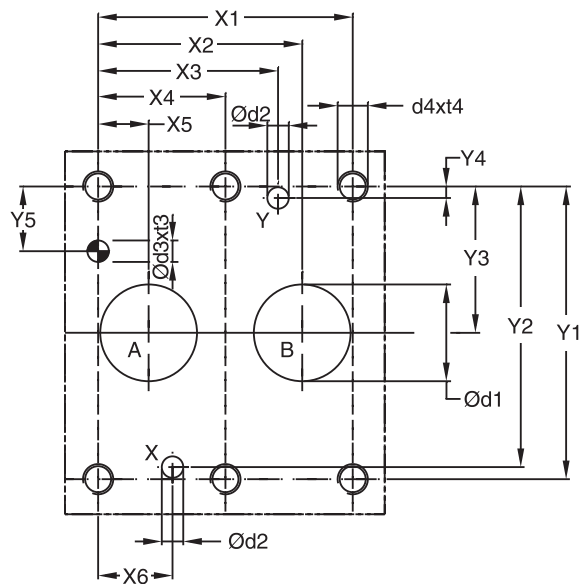
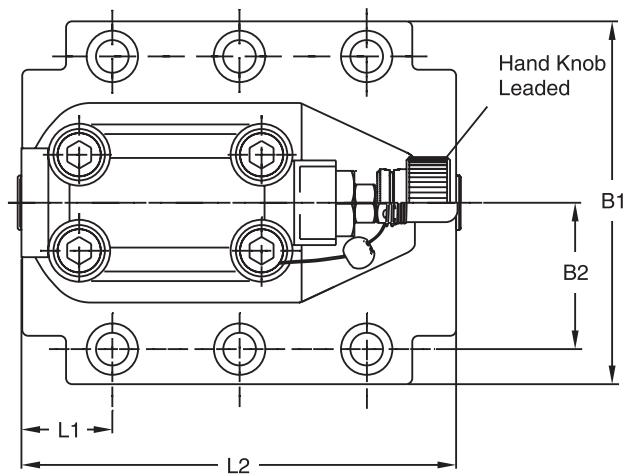
Pressure Range	Q _{max}	Minimum Opening Width	Cartridge Stroke	Permitted Pressure Increase
50 - 70 Bar (725 - 1015 PSI)	170 LPM (45 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%
80 - 120 Bar (1160 - 1740 PSI)	200 LPM (53 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%
130 - 170 Bar (1885 - 2465 PSI)	300 LPM (80 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%
180 - 200 Bar (2610 - 2900 PSI)	325 LPM (86 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%
210 - 250 Bar (3015 - 3625 PSI)	350 LPM (93 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%
260 - 300 Bar (3770 - 4350 PSI)	500 LPM (132 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%
310 - 350 Bar (4495 - 5075 PSI)	500 LPM (132 GPM)	415mm ² (0.64 in. ²)	7.3mm (0.29")	10%

p/Q Performance Curves – R6V10



R6V10

Pressure Range	Q _{max}	Minimum Opening Width	Cartridge Stroke	Permitted Pressure Increase
50 - 70 Bar (725 - 1015 PSI)	170 LPM (45 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%
80 - 120 Bar (1160 - 1740 PSI)	200 LPM (53 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%
130 - 170 Bar (1885 - 2465 PSI)	300 LPM (80 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%
180 - 200 Bar (2610 - 2900 PSI)	325 LPM (86 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%
210 - 250 Bar (3015 - 3625 PSI)	350 LPM (93 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%
260 - 300 Bar (3770 - 4350 PSI)	500 LPM (132 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%
310 - 350 Bar (4495 - 5075 PSI)	500 LPM (132 GPM)	607mm ² (0.94 in. ²)	7.3mm (0.29")	10%

D

Dimensions**Pilot Operated Pressure Relief Valves
Series R4V (TÜV)**

Inch equivalents for millimeter dimensions are shown in (**)



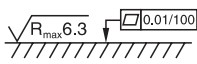
Size	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-07-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	— —	7.2 (0.28)	21.5 (0.85)	0.0 (0.00)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	14.3 (0.56)	— —
25	6264-08-11-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	— —	11.1 (0.44)	20.6 (0.81)	0.0 (0.00)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	15.9 (0.63)	— —
32	6264-10-15-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	0.0 (0.00)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	21.4 (0.84)	— —

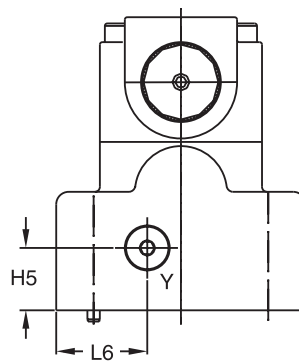
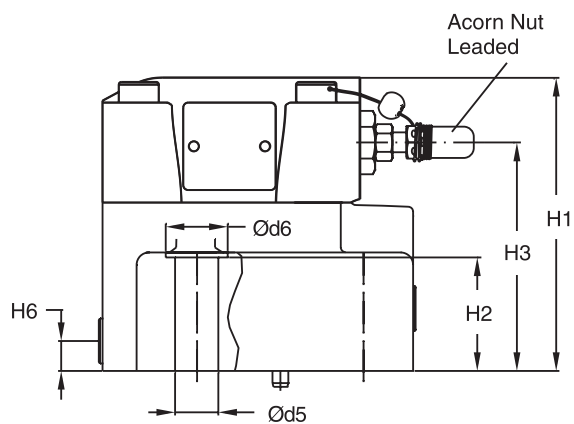
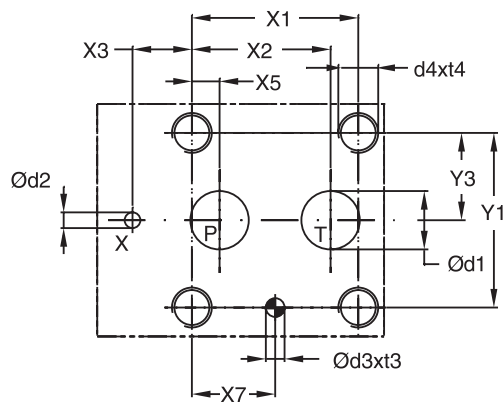
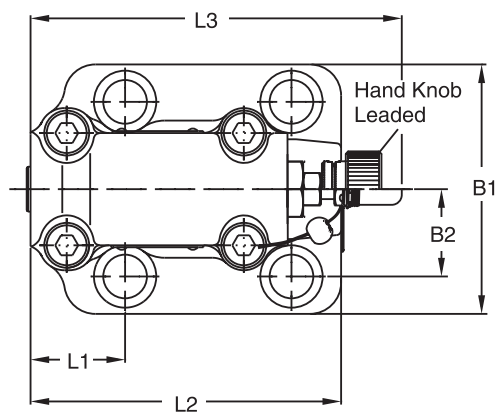
Tolerance at X and Y pin holes and screw holes ± 0.1 , at port holes ± 0.2 .

Size	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 (5.76)
25	6264-08-11-*-97	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	— —	— —	89.0 (3.50)	— —	34.7 (1.37)	126.8 (4.99)	— —	144.8 (5.76)
32	6264-10-15-*-97	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	— —	— —	99.5 (3.92)	— —	30.6 (1.20)	144.3 (5.68)	— —	144.8 (5.76)

Size	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)

Size	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

Size	ISO-code	Bolt Kit			Seal Nitrile	Kit Fluorocarbon	Surface Finish
10	6264-06-07-*-97	BK505	4xM10 x 35-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58507-0	S26-58507-5	
25	6264-08-11-*-97	BK485	4xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58475-0	S26-58475-5	
32	6264-10-15-*-97	BK506	6xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58508-0	S26-58508-5	

D

Y: external drain port G 1/8"



Dimensions**Pilot Operated Pressure Relief Valves
Series R6V (TÜV)**

Inch equivalents for millimeter dimensions are shown in (**)



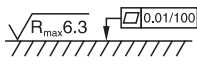
Size	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.00)	— —	22.1 (0.87)	— —	22.1 (0.87)	53.8 (2.12)	— —	26.9 (1.06)	— —	— —	— —
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.94)	— —	11.1 (0.44)	— —	33.4 (1.31)	70.0 (2.76)	— —	35.0 (1.38)	— —	— —	— —
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	— —	12.7 (0.50)	— —	44.5 (1.75)	82.6 (3.25)	— —	41.3 (1.63)	— —	— —	— —

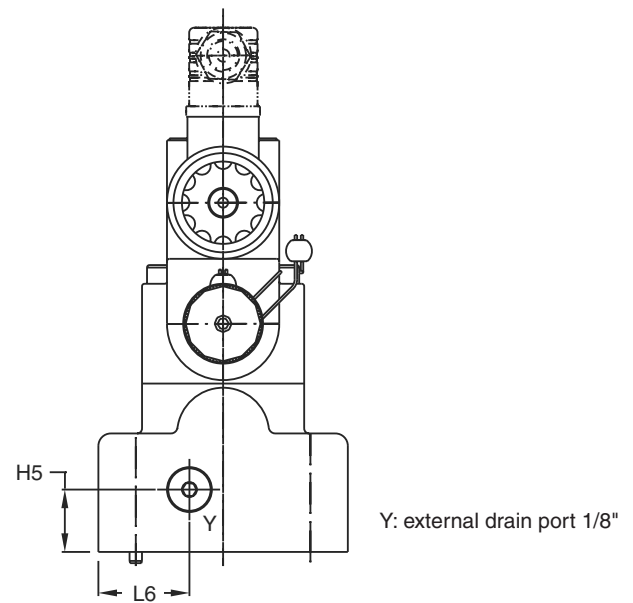
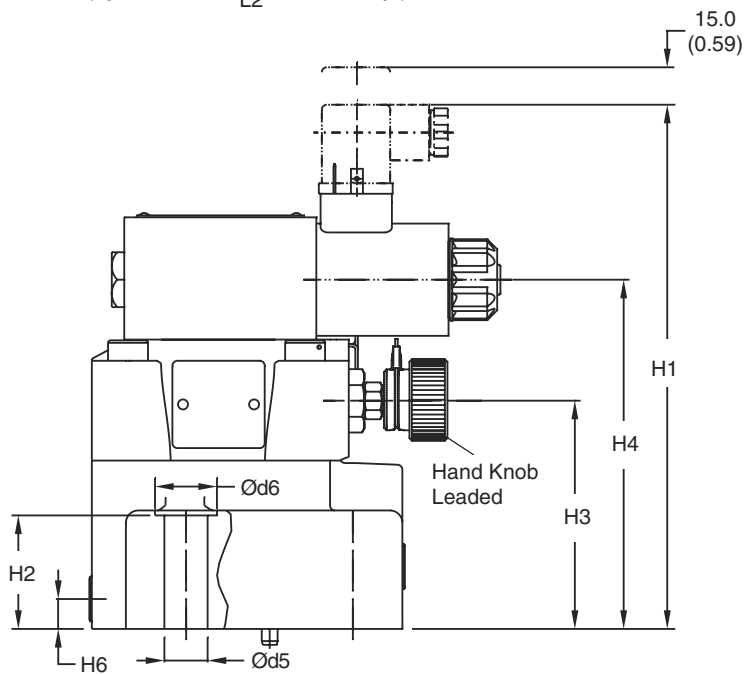
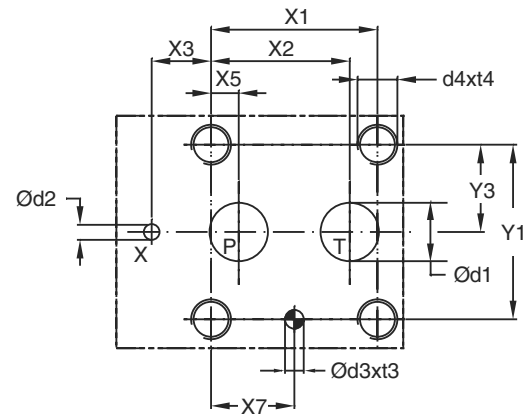
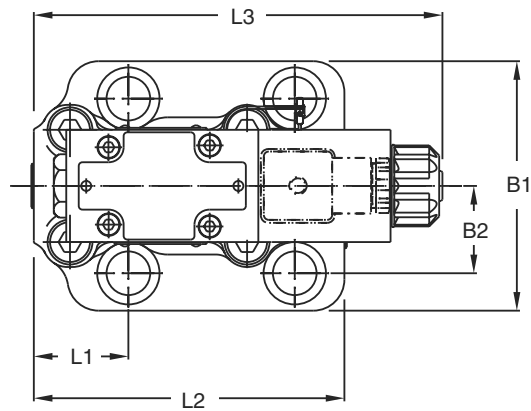
Tolerance at X and Y pin holes and screw holes ± 0.1 , at port holes ± 0.2 .

Size	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)

Size	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)

Size	ISO-code	Subplate	Size
10	6264-06-09-*-97	SPP3R6B910	P, T = 3/4" BSPP x = 1/4" BSPP
25	6264-08-13-*-97	SPP6R8B910	P, T = 1 1/4" BSPP x = 1/4" BSPP
32	6264-10-17-*-97	SPP10R12B910	P, T = 1 1/2" BSPP x,y = 1/4" BSPP

Size	ISO-code	Bolt Kit			Seal Nitrile	Kit Fluorocarbon	Surface Finish
10	6264-06-09-*-97	BK494	4xM12 x 45-DIN 912 12.9	108 Nm (79.6 lb.-ft.) $\pm 15\%$	S26-96396-0	S26-96396-5	
25	6264-08-13-*-97	BK366	4xM16 x 70-DIN 912 12.9	264 Nm (194.7 lb.-ft.) $\pm 15\%$	S26-96589-0	S26-96589-5	
32	6264-10-17-*-97	BK507	4xM18 x 75-DIN 912 12.9	398 Nm (293.5 lb.-ft.) $\pm 15\%$	S26-96392-0	S26-96392-5	



Dimensions**Pilot Operated Pressure Relief Valves
Series R6V (TÜV) with Vent Function**

Inch equivalents for millimeter dimensions are shown in (**)



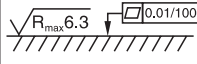
Size	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.00)	— —	22.1 (0.87)	— —	22.1 (0.87)	53.8 (2.12)	— —	26.9 (1.06)	— —	— —	— —
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.91)	— —	11.1 (0.44)	— —	33.4 (1.31)	70.0 (2.76)	— —	35.0 (1.38)	— —	— —	— —
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	— —	12.7 (0.50)	— —	44.5 (1.75)	82.6 (3.25)	— —	41.3 (1.63)	— —	— —	— —

Tolerance at X and Y pin holes and screw holes ± 0.1 , at port holes ± 0.2 .

Size	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 (6.02)	163.8 (6.45)	— —	36.5 (1.44)

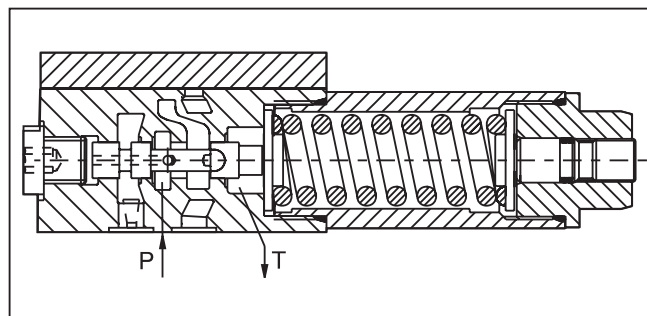
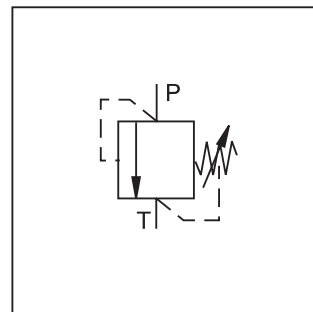
Size	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	6264-06-09-*-97	14.7 (0.58)	4.8 (0.19)	7.5 (0.30)	10.0 (0.39)	M12	20.0 (0.79)	13.5 (0.53)	20.0 (0.79)
25	6264-08-13-*-97	23.4 (0.92)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M16	27.0 (1.06)	17.5 (0.69)	25.0 (0.98)
32	6264-10-17-*-97	32.0 (1.26)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M18	28.0 (1.10)	20.0 (0.79)	30.0 (1.18)

Size	ISO-code	Subplate	Size
10	6264-06-09-*-97	SPP3R6B910	P, T = 3/4" BSPP x = 1/4" BSPP
25	6264-08-13-*-97	SPP6R8B910	P, T = 1 1/4" BSPP x = 1/4" BSPP
32	6264-10-17-*-97	SPP10R12B910	P, T = 1 1/2" BSPP x,y = 1/4" BSPP

Size	ISO-code	Bolt Kit			Seal Nitrile	Kit Fluorocarbon	Surface Finish
10	6264-06-09-*-97	BK494	4xM12 x 45-DIN 912 12.9	108 Nm (79.6 lb.-ft.) $\pm 15\%$	S26-96395-0	S26-96395-5	
25	6264-08-13-*-97	BK366	4xM16 x 70-DIN 912 12.9	264 Nm (194.7 lb.-ft.) $\pm 15\%$	S26-96589-0	S26-96589-5	
32	6264-10-17-*-97	BK507	4xM18 x 75-DIN 912 12.9	398 Nm (293.5 lb.-ft.) $\pm 15\%$	S26-96392-0	S26-96392-5	

Series VS pressure relief valve is a direct operated spool valve for subplate mounting with internal drain to port T. The connection and function is according to ISO 6264.

Size	NFPA D03 / NG6
Mounting Interface	ISO 6264
Mounting Position	Unrestricted
Ambient Temperature Range	-20°C to +70°C (-4°F to +158°F)
Working Pressure	Port P: 350 Bar (5075 PSI) Port T: depressurized
Pressure Range	25 Bar (363 PSI) 64 Bar (928 PSI) 160 Bar (2320 PSI) 210 Bar (3045 PSI) 350 Bar (5075 PSI)
Nominal Flow	25 LPM (6.6 GPM)
Pressure Fluid	Hydraulic oil as per DIN 51524 ... 525
Fluid Temperature Recommended Permitted	+30°C to +50°C (+86°F to +122°F) -20°C to +70°C (-4°F to +158°F)
Viscosity Recommended Permitted	30 to 50 cSt/mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)
Filtration	ISO 4406 (1999), 18/16/13



- Spool type valve
- Manifold mounting
- 5 pressure ranges
- 2 adjustment modes

1/2" NPT x 1/2" NPT 316 Stainless Steel Ball Valve

VS Pressure Relief Valve

Pressure Range

A Adjustment Screw with Hexagon Socket

06 Size

V Seal Fluorcarbon

Gage Port

Lock


Design Series
NOTE:
Not required when ordering.

Code	Description
025	25 Bar (363 PSI)
064	64 Bar (928 PSI)
160	160 Bar (2320 PSI)
210	210 Bar (3045 PSI)
350	350 Bar (5075 PSI)

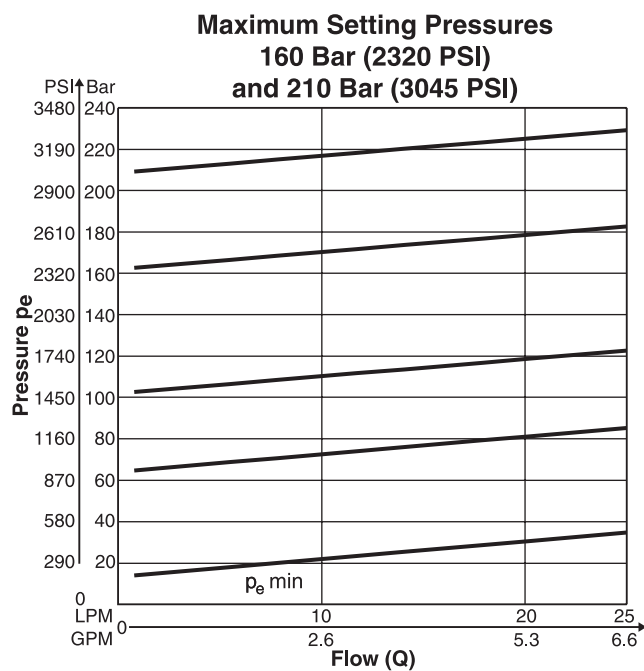
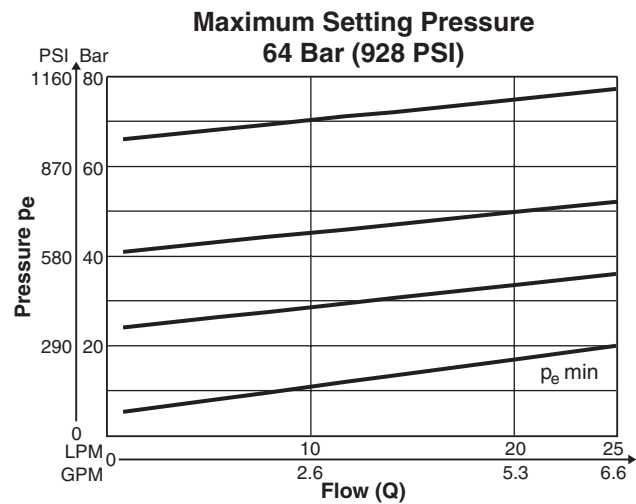
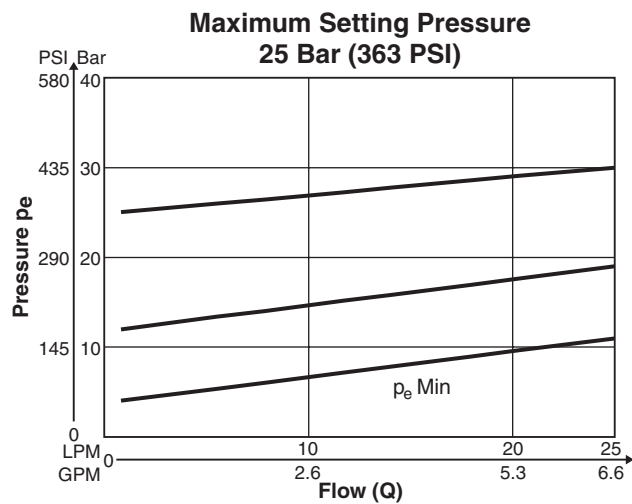
Code	Description
06	NFPA D03 / NG6

Code	Description
G	BSPP 1/4"
M	M 12x1.5

Code	Description
Omit	Normal
Z	Cylinder Lock

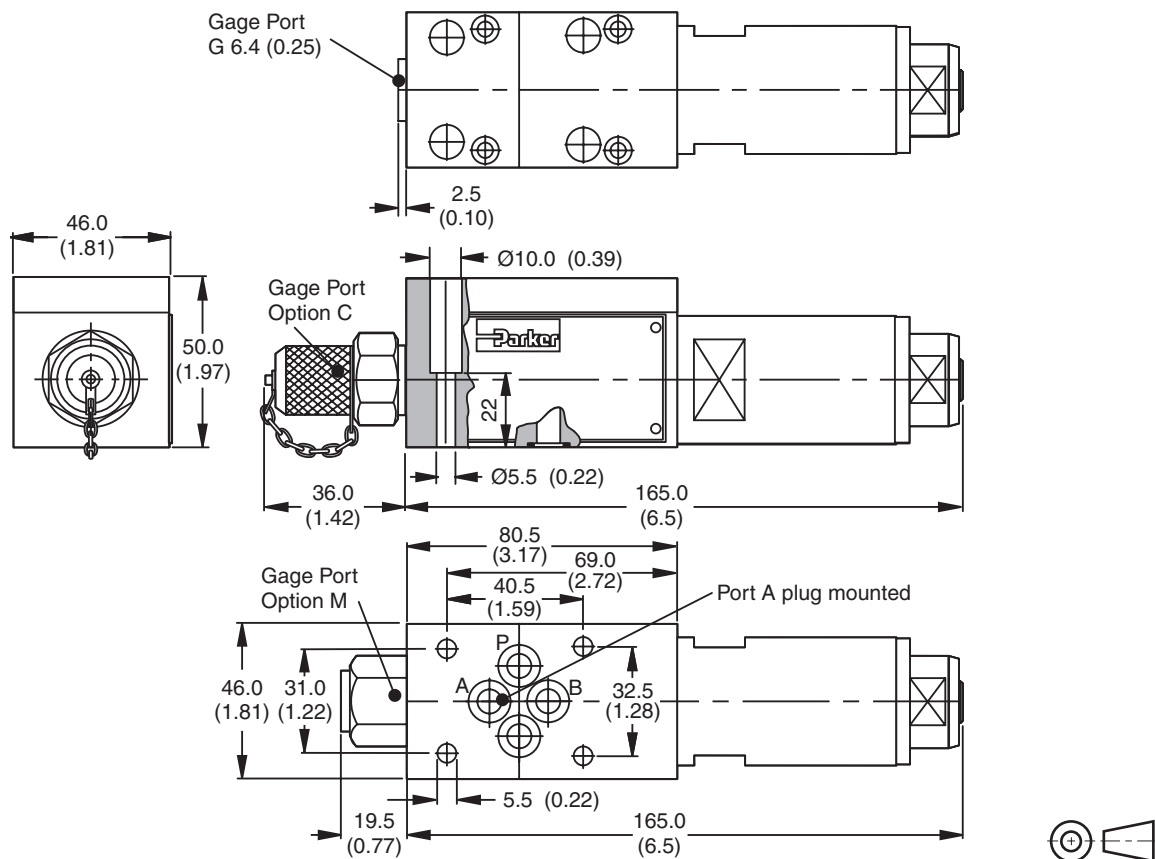
 **WARNING:** This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.




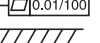
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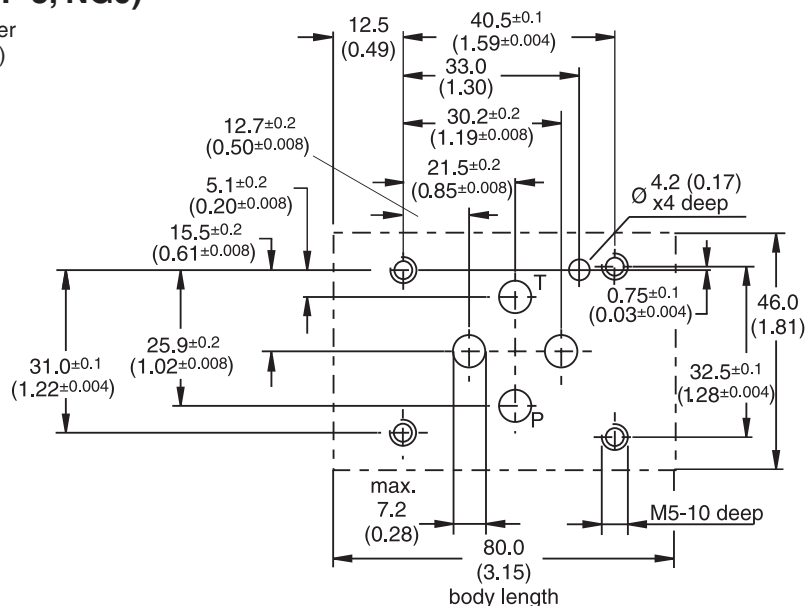
Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Bolt kit  DIN912 12.9		Seal  Kit Fluorocarbon
$\sqrt{R_{max} 6.3}$ 	M5x30-4pcs	8.1Nm (6.0 lb.-ft.)	SK-VB/VM/VS V

Mounting Pattern ISO 6264-03-04-*-97 (NFP A D03, CETOP 3, NG6)

Inch equivalents for millimeter dimensions are shown in (**)



General Description

Series R4U subplate mounted unloading valves are used to unload a circuit at low pressure. The mechanically adjustable pressure signal to unload the main stage has to be applied to port X. The pressure differential between opening and closing is nominal 15% or 28% of the setting pressure:

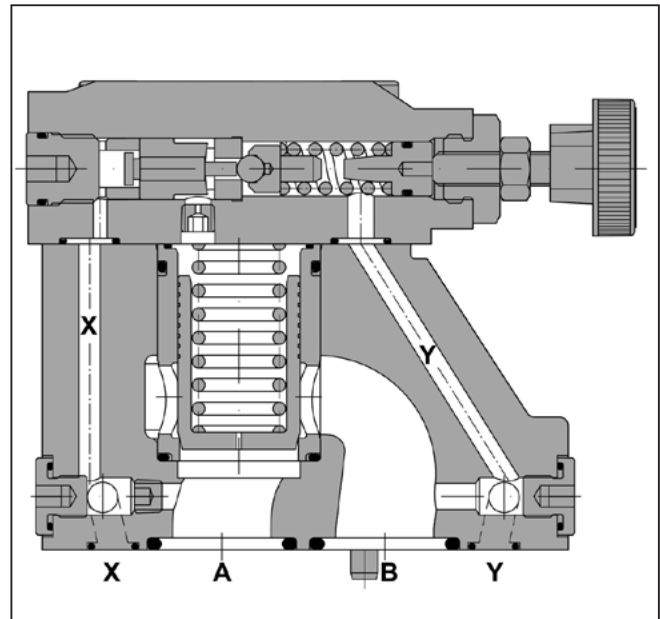
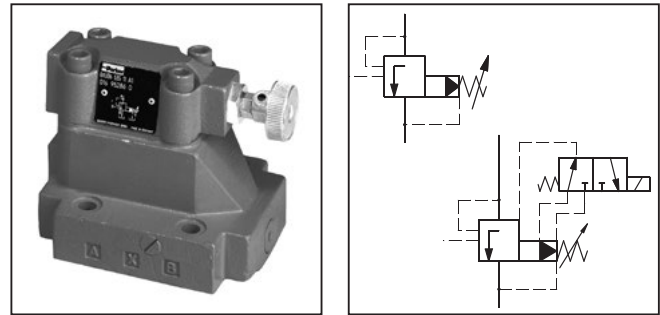
- 15% for pressure ranges 350 Bar (5075 PSI) and 28% for 105 Bar (1523 PSI) and 210 Bar (3045 PSI).

Typical applications are to unload the pumps in an accumulator circuit and to unload the low pressure stage of a double pump.

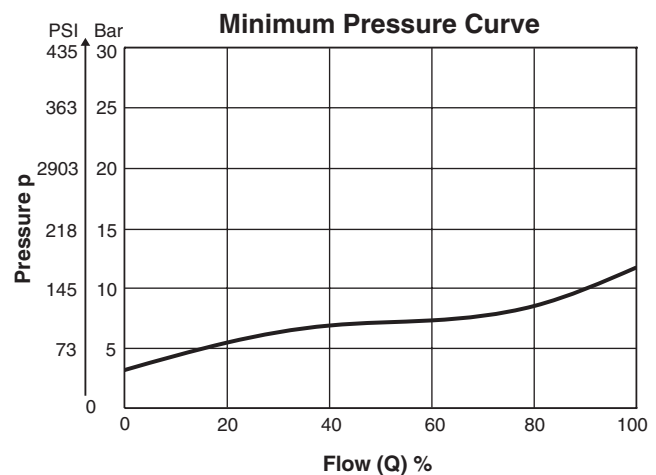
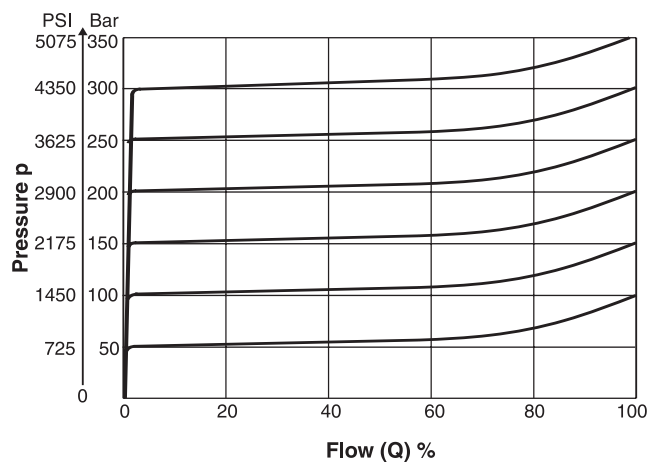
In addition, Series R4U with vent function is vented by electrical operation.

Features

- Pilot operated unloading valve
- 3 pressure ranges
- 2 switching types (series R4U with vent function)
- 3 adjustment modes:
 - Hand knob
 - Screw with locknut
 - Key lock



Performance Curves



The performance curves are measured with external drain.
 For internal drain the tank pressure has to be added to curve.

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.
 D01_Cat2500.indd, ddp, 04/19

R	4	U		5	3						A		
Pressure Valve	Interface	Unloading Function	Valve Size	Maximum Pressure 350 Bar (5075 PSI)	Body Mounting	Pressure Range	Adjustment	Pilot Oil Drain Line	Vent Valve Function	Solenoid Voltage	Design Series	Seal	Options Check with Factory

Code	Description
03	NG10
06	NG25
10	NG32

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
1	Hand Knob 32mm dia. Std.
3	Acorn Nut with Lead Seal
4	Key Lock

Code	Description
0	Internal
1	External from Subplate

Code	Description
Omit	Standard without Vent Option
09	Solenoid not active unpress. circulation
11	Solenoid activated unpress. circulation

Code	Description
Omit	Standard without Vent Option
G0R	12 VDC
G0Q	24 VDC
GAR	98 VDC
GAG	205 VDC
W30	110V 50Hz/ 120V 60Hz
W31	230V 50Hz/ 240V 60Hz

Code	Description
Omit	Standard without Vent Option
09	Solenoid not active unpress. circulation
11	Solenoid activated unpress. circulation

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
4	Interface Subplate Mounting ISO 5781

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

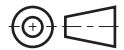
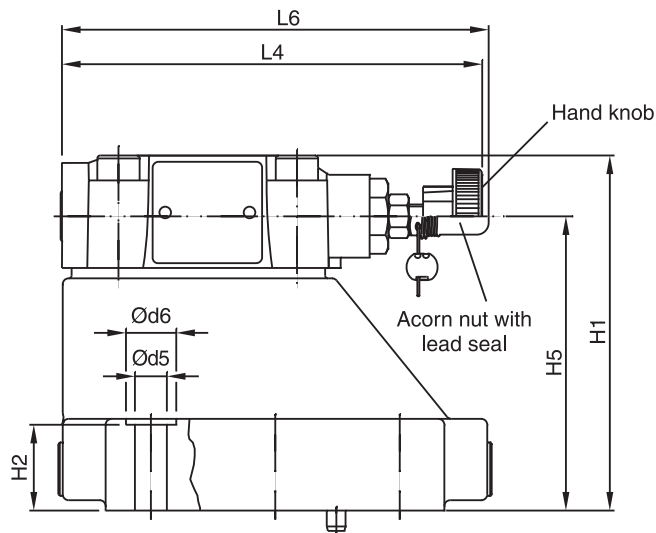
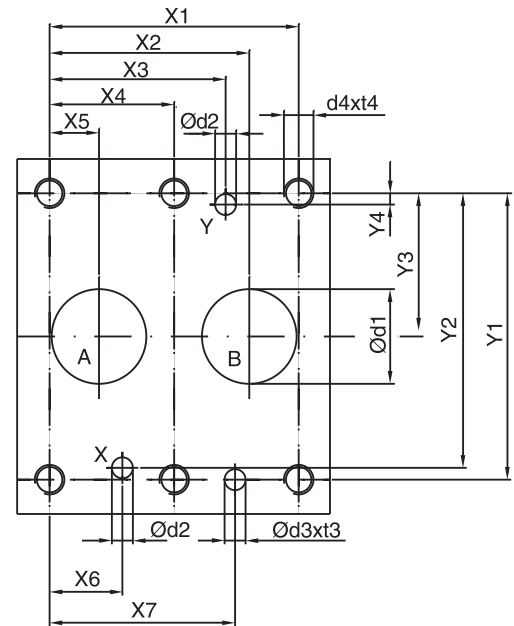
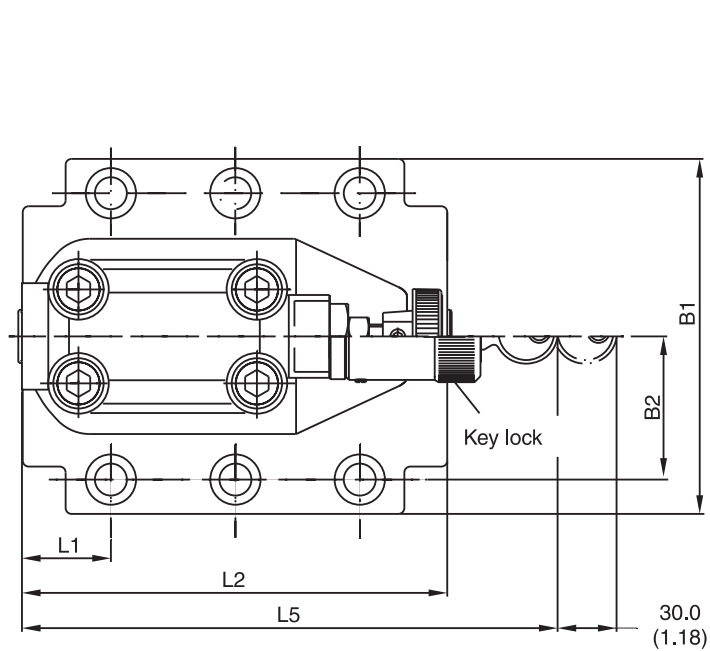
R4U03:	4.4 kg (9.7 lbs.)
R4U06:	6.2 kg (13.7 lbs.)
R4U10:	7.7 kg (17.0 lbs.)

General				
Size	NG10		NG25	NG32
Interface	Subplate mounting acc. ISO 5781			
Mounting Position	As desired, horizontal mounting preferred			
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)			
Hydraulic				
Operating Pressure	Ports A and X up to 350 Bar (5075 PSI), Ports B and Y depressurized			
Pressure Range	105, 210, 350 Bar (1523, 3045, 5075 PSI)			
Pressure Differential	15% for pressure range 350 Bar (2538 PSI) 28% for pressure ranges 105 Bar (1523 PSI) and 250 Bar (3625 PSI)			
Nominal Flow	150 LPM (39.7 GPM)	350 LPM (92.6 GPM)	650 LPM (172.0 GPM)	
Pressure Fluid	Hydraulic oil according to DIN 51524 ... 525			
Viscosity Recommended Maximum	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)			
Pressure Fluid Temperature Recommended Maximum	+30°C to +50°C (+86°F to +122°F) -20°C to +70°C (-4°F to +158°F)			
Filtration	ISO 4406 (1999), 18/16/13			

With Vent Function

General						
Size	NG10		NG25		NG32	
Interface	Subplate mounting acc. ISO 5781					
Mounting Position	As desired, horizontal mounting preferred					
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)					
Hydraulic						
Operating Pressure	Ports A and X up to 350 Bar (5075 PSI), Ports B and Y depressurized					
Pressure Range	105, 210, 350 Bar (1523, 3045, 5075 PSI)					
Pressure Differential	15% for pressure range 350 Bar (5075 PSI) 28% for pressure ranges 105 Bar (1523 PSI) and 250 Bar (3625 PSI)					
Nominal Flow	150 LPM (39.7 GPM)		350 LPM (92.6 GPM)		650 LPM (172.0 GPM)	
Pressure Fluid	Hydraulic oil according to DIN 51524 ... 525					
Viscosity Recommended Maximum	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)					
Pressure Fluid Temperature Recommended Maximum	+30°C to +50°C (+86°F to +122°F) -20°C to +70°C (-4°F to +158°F)					
Filtration	ISO 4406 (1999), 18/16/13					
Electrical (solenoid)						
Duty Cycle	100% ED CAUTION: Coil temperature up to 180°C (356°F) possible					
Max. Switching Frequency	16,000 (DC), 7200 (AC)					
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)					
Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage	12V	24V	98V	205V	110 at 50Hz 120 at 60Hz	230 at 50Hz 240 at 60Hz
Supply Tolerance	+5...-10	+5...-10	+5...-10	+5...-10	+5...-10	+5...-10
Power Consumption Hold	31W	31W	31W	31W	78W	78W
In Rush	31W	31W	31W	31W	264W	264W
Solenoid Connection	Connector as per EN 175301-803					
Wiring Minimum	3 x 1.5 mm² recommended					
Wiring Length Maximum	50 m (164 ft.) recommended					

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Dimensions

Pressure Unloading Valves
Series R4U



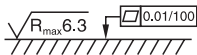
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	—	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	—	—
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	—	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	—	—
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	—	—

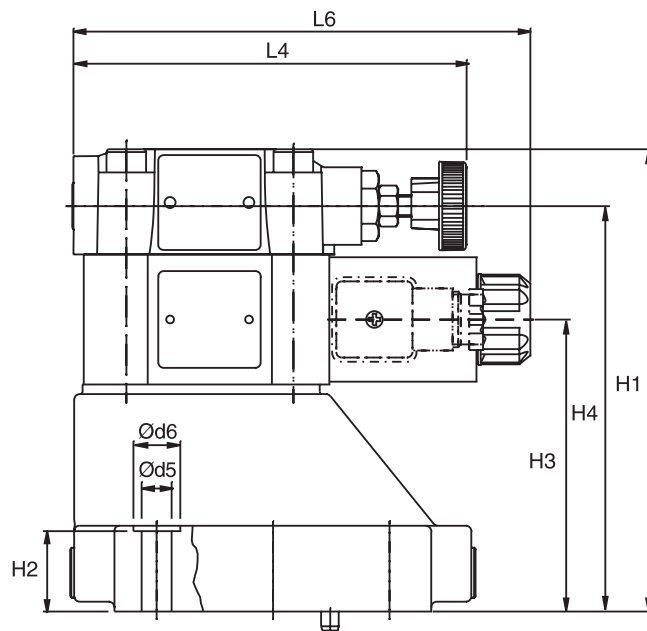
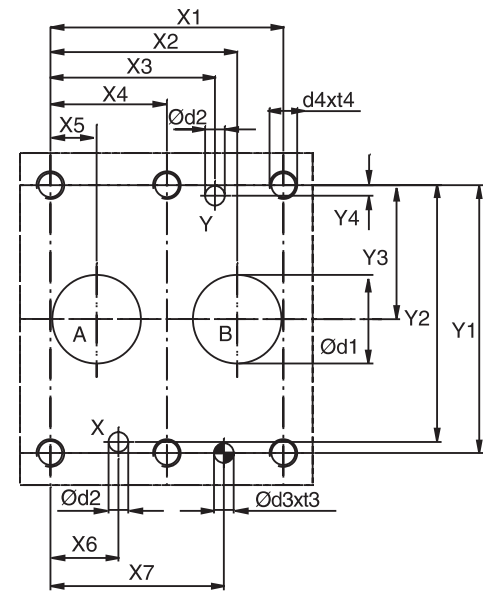
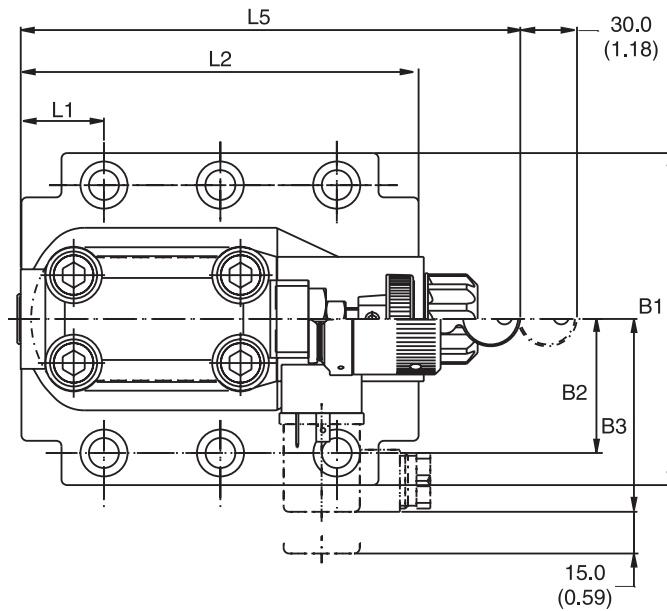
Tolerance at X and Y pin holes and screw holes ± 0.1 , at port holes ± 0.2 .

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	62.5 (2.46)	—	—	—	29.0 (1.14)	94.8 (3.73)	—	141.0 (5.55)	181.0 (7.13)	—
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	89.0 (3.50)	—	—	—	34.7 (1.37)	126.8 (4.99)	—	141.0 (5.55)	181.0 (7.13)	—
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	99.5 (3.92)	—	—	—	30.6 (1.20)	144.3 (5.68)	—	141.0 (5.55)	181.0 (7.13)	—

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 Nitrile	Kit Fluorocarbon	Surface Finish
10	5781-06-07-0-00	BK505	4xM10 x 35-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58507-0	S26-58507-5	
25	5781-08-10-0-00	BK485	4xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58475-0	S26-58475-5	
32	5781-10-13-0-00	BK506	6xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	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

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Dimensions

Pressure Unloading Valves
Series R4U with Vent Function




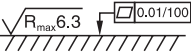
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	—	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	—	—
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	—	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	—	—
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	—	—

Tolerance at X and Y pin holes and screw holes ± 0.1 , at port holes ± 0.2 .

NG	ISO-code	B1	B2	B3	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	70.0 (2.76)	130.0 (5.12)	21.0 (0.83)	68.5 (2.70)	109.5 (4.13)	—	—	29.0 (1.14)	94.8 (3.73)	—	141.0 (5.55)	181.0 (7.13)	165.6 (6.52)
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	70.0 (2.76)	156.5 (6.16)	29.0 (1.14)	95.0 (3.74)	136.0 (5.35)	—	—	34.7 (1.37)	126.8 (4.99)	—	141.0 (5.55)	181.0 (7.13)	165.6 (6.52)
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	70.0 (2.76)	167.0 (6.57)	29.0 (1.14)	105.5 (4.15)	146.5 (5.77)	—	—	30.6 (1.20)	144.3 (5.68)	—	141.0 (5.55)	181.0 (7.13)	165.6 (6.52)

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 Nitrile	 Ki Fluorocarbon	Surface Finish
10	5781-06-07-0-00	BK505	4xM10 x 35-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58507-0*	S26-58507-5*	
25	5781-08-10-0-00	BK485	4xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58475-0*	S26-58475-5*	
32	5781-10-13-0-00	BK506	6xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58508-0*	S26-58508-5*	
VV01					S56-40609-0	S56-40609-5	

*Please combine seal kit of one size with seal kit of VV01 DC / AC solenoid for complete seal kit.

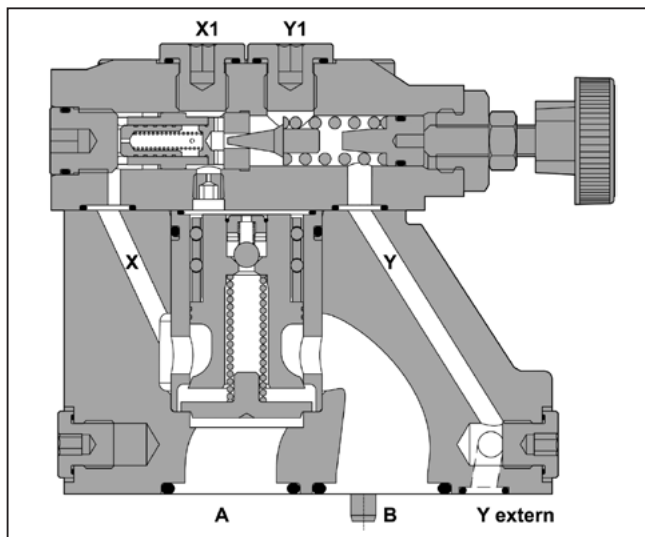
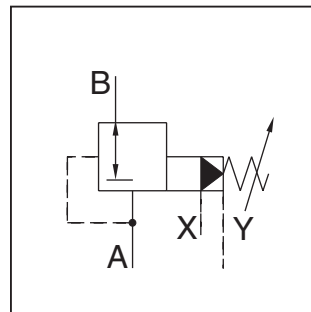
NG	ISO-code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP x, y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1 1/2" BSPP x, y = 1/4" BSPP

General Description

Series R4R pressure reducing valves are used to control the pressure in the secondary part of the hydraulic system. Independent of the primary pressure the secondary pressure is reduced to the pressure setting. In order to avoid undesired motion the valves are normally closed.

Specifications

Size	NG10, NG25, NG32
Interface	Subplate mounting acc. ISO 5781
Mounting Pos.	As desired, horizontal mounting preferred
Ambient Temp.	-20°C to +80°C (-4°F to +176°F)
Max. Oper. Pressure	Ports A, B and X: 350 Bar (5075 PSI), Port Y: depressurized
Pressure Range	up to 105, 210, 350 Bar (1523, 3045, 5075 PSI)
Nominal Flow	Size NG10: 150 LPM (39.7 GPM) Size NG25: 350 LPM (92.6 GPM) Size NG32: 500 LPM (132.3 GPM)
Pressure Fluid	Hydraulic oil according to DIN 51524... 51525
Pressure Fluid Temperature	Recommended: +30°C to +50°C (86°F to +122°F) Maximum: -20°C to +70°C (-4°F to +158°F)
Viscosity	Recommended: 30 to 50 cSt (mm²/s) Maximum: 20 to 380 cSt (mm²/s)
Filtration	ISO 4406 (1999), 18/16/13



Features

- Subplate mounting acc. to ISO 5781
- Normally closed to avoid unintended motion
- 3 pressure ranges
- Three adjustment modes: Hand knob, acorn nut with lead seal, or key lock

Ordering Information

R	4	R	—	5				B		
Pressure Reducing Valve	Interface	Reducing Function	Size	Max. Pressure 350 Bar (5075 PSI)	Body Mounting	Pressure Range	Adjustment	Pilot Oil	Design Series	Seal
										Options Check with Factory

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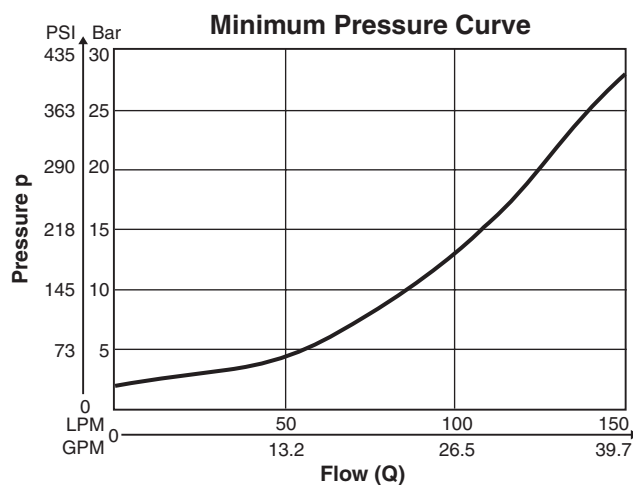
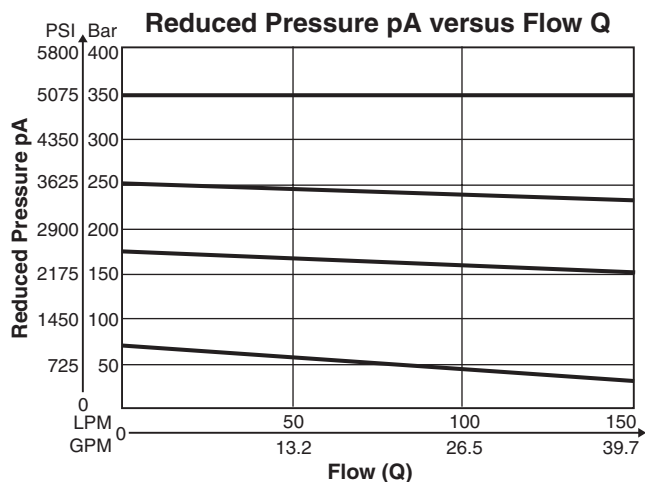
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Weight: R4R03: 4.8 kg (10.6 lbs.) R4R06: 7.2 kg (15.9 lbs.) R4R10: 13.5 kg (29.8 lbs.)	
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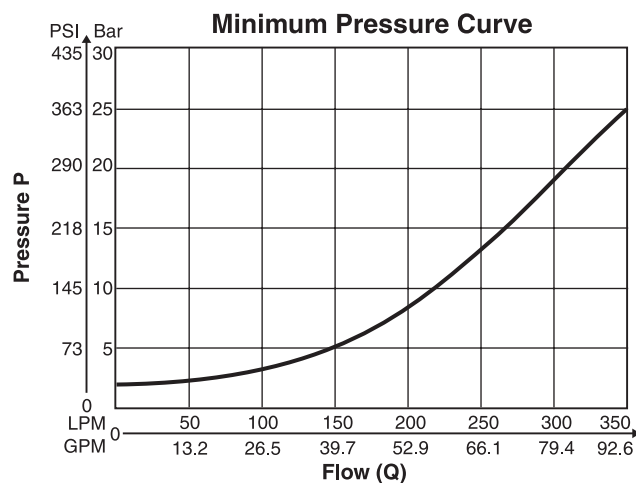
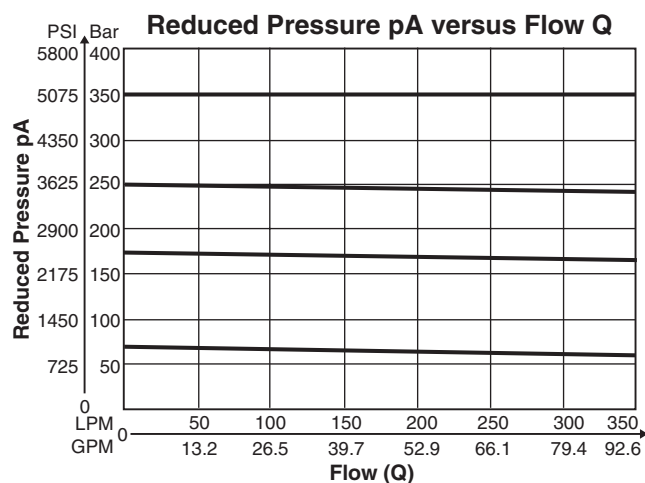
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

D01_Cat2500.indd, ddp, 04/19

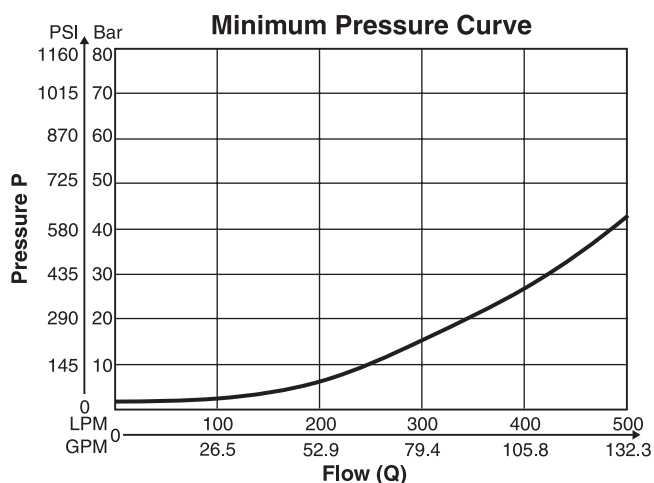
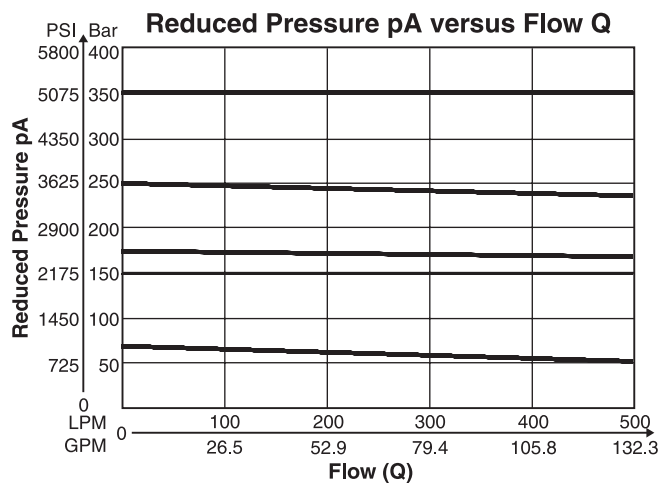
R4R03 ¹⁾



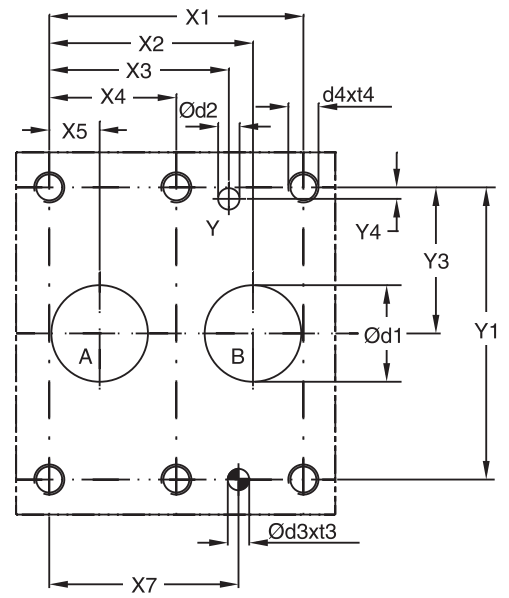
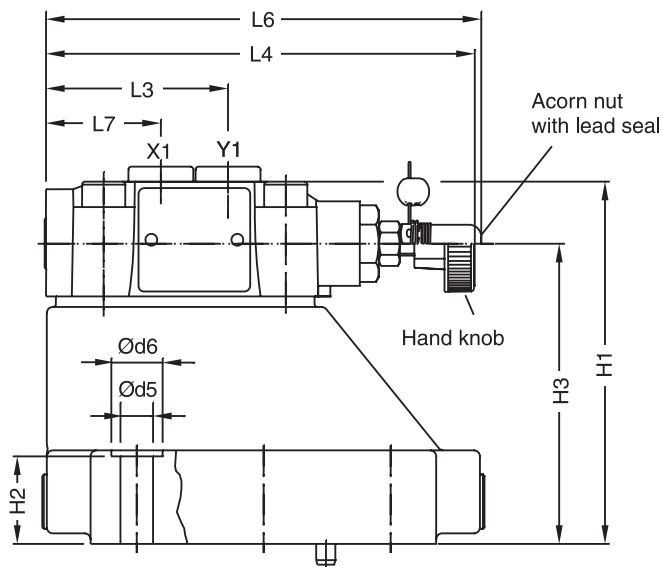
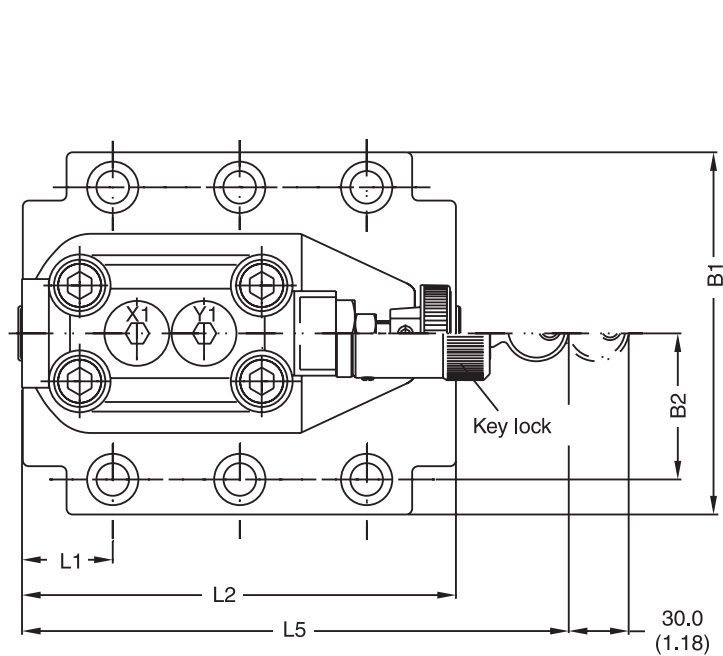
R4R06 ¹⁾



R4R10 ¹⁾



¹⁾ Measured at 350 Bar (5075 PSI) primary pressure pB.

D

Dimensions

Pressure Reducing Valves
Series R4R



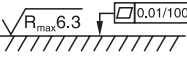
Inch equivalents for millimeter dimensions are shown in (**)

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)	— (0.28)	7.2 (0.28)	— (0.28)	31.8 (1.25)	66.7 (2.63)	— (0.31)	33.4 (1.31)	7.9 (0.31)	— (0.31)	— (0.31)
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	— (0.44)	11.1 (0.44)	— (0.44)	44.5 (1.75)	79.4 (3.13)	— (1.56)	39.7 (1.56)	6.4 (0.25)	— (0.25)	— (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)	— (0.66)	62.7 (2.47)	96.8 (3.81)	— (1.92)	48.4 (1.92)	3.8 (0.15)	— (0.15)	— (0.15)

Tolerance for all dimensions ± 0.2

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L7
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	62.5 (2.46)	— (0.28)	— (0.28)	— (0.28)	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)	— (0.28)	— (0.28)	— (0.28)	34.7 (1.37)	126.8 (4.99)	60.8 (2.39)	141.0 (5.55)	181.0 (7.13)	38.6 (1.52)
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	99.5 (3.92)	— (0.28)	— (0.28)	— (0.28)	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)

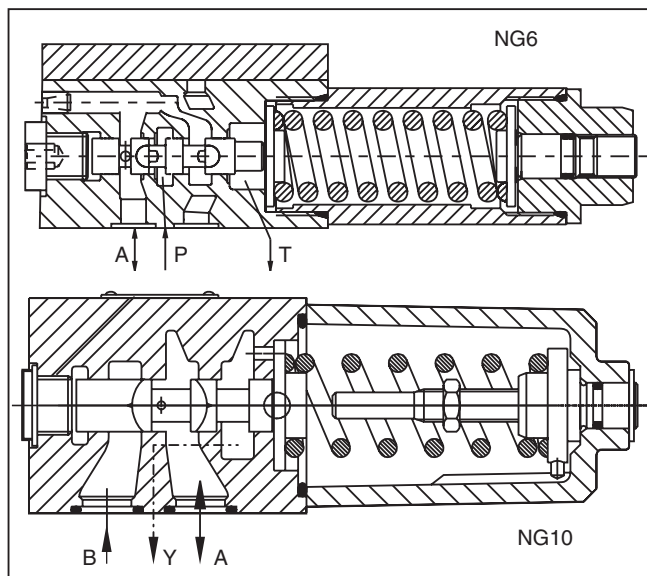
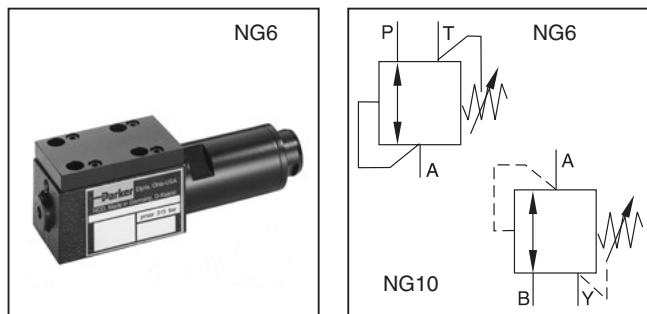
NG	ISO-code	Bolt Kit			Seal Nitrile	Kit Fluorocarbon	Surface Finish
10	5781-06-07-0-00	BK505	4xM10 x 35-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58507-0	S26-58507-5	
25	5781-08-10-0-00	BK485	4xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58475-0	S26-58475-5	
32	5781-10-13-0-00	BK506	6xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58508-0	S26-58508-5	

NG	ISO-code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP x, y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1 1/2" BSPP x, y = 1/4" BSPP

General Description

Series VM direct operated, pressure reducing valve with manual adjustment. Series VM is a direct-controlled, spring loaded 3-way pressure reducing valve, that is open in neutral position. The valve closes the connection from P to A (NG6) or B to A (NG10) when the pre-set pressure is exceeded.

If the pressure increases due to an external influence in connection A, the spool moves and opens the connection from A to T (NG6) or A to Y (NG10) until the pre-set pressure is reached.



D

Features

- Spool type valve
- Manifold mounting acc. to ISO 5871
- 5 pressure ranges at NG6
- 3 pressure ranges at NG10
- 2 adjustment modes

Ordering Information

V

Pressure Reducing Valve

Code	Description
025 ¹⁾	25 Bar (363 PSI)
064	64 Bar (928 PSI)
125 ²⁾	125 Bar (1813 PSI)
160 ¹⁾	160 Bar (2320 PSI)
210	210 Bar (3045 PSI)
350 ¹⁾	350 Bar (5075 PSI)

M

Maximum Pressure Setting

A

Adjustment Screw with Hexagon Socket

Size

Code	Description
06	NG6
10	NG10

V

Seal Fluorocarbon

Code	Description
G ¹⁾	1/4" BSPP
M	M18x1.5 ²⁾
	M12x1.5 ¹⁾

¹⁾ NG6 only
²⁾ NG10 only

Gage Port

Lock

Code	Description
Omit	No Lock
Z	Cylinder Lock

Design Series

NOTE: Not required when ordering.

¹⁾ NG6 only

²⁾ NG10 only

¹⁾ NG6 only

²⁾ NG10 only

Weight:

VM*A06 1.3 kg (2.9 lbs.)

VM*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.

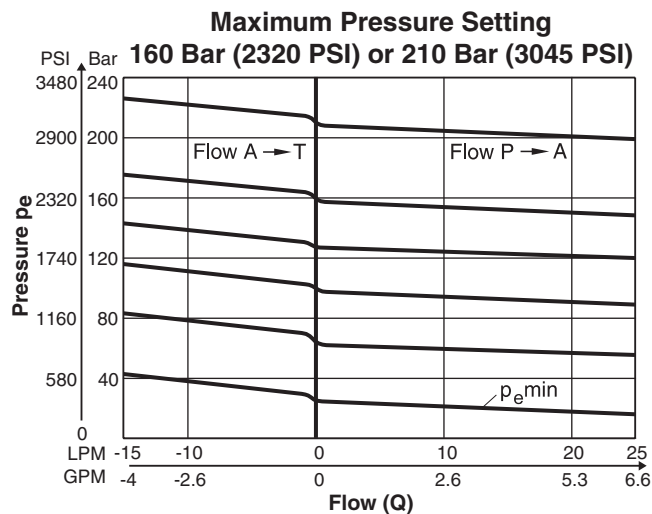
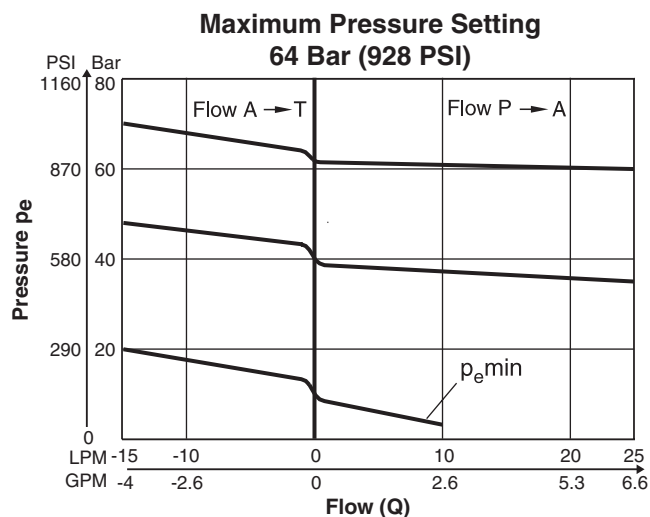
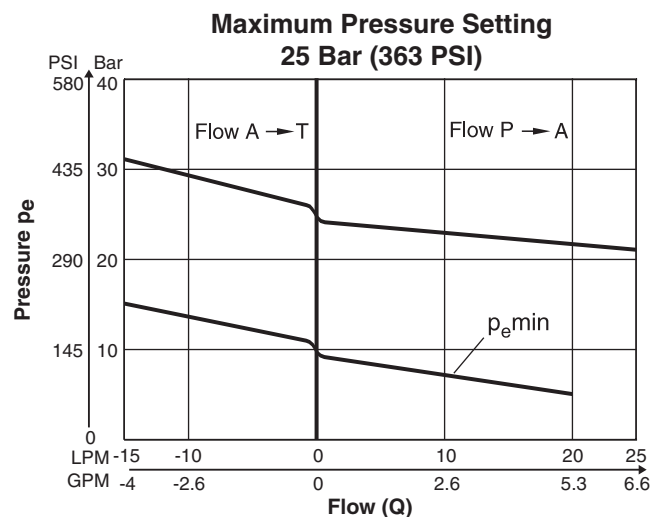
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Specifications**Pressure Reducing Valves****Series VM**

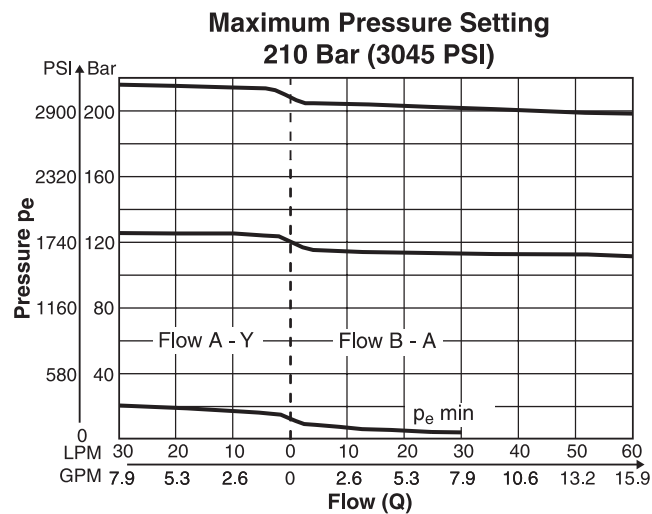
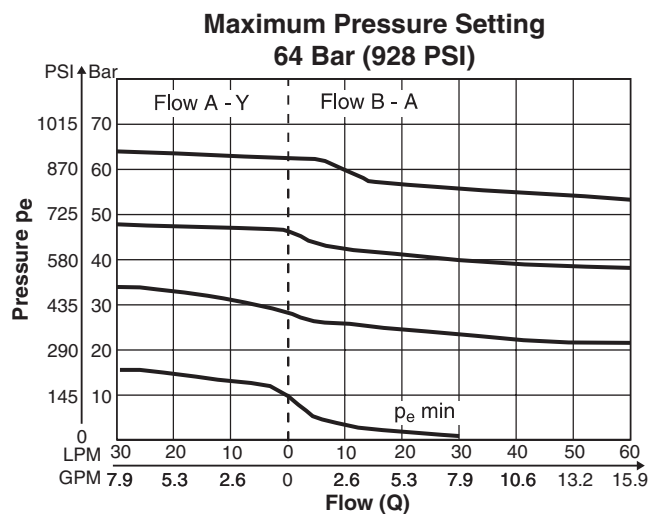
General		
Size	NG6	NG10
Interface	Subplate mounting acc. ISO 5781	
Mounting Position	Unrestricted	
Ambient Temperature	-20°C to +70° (-4°F to +158°F)	
Hydraulic		
Working Pressure	Ports P and A 350 Bar (5075 PSI) Port T depressurized	Ports A and B 210 Bar (3045 PSI) Port Y depressurized
Pressure Range	25, 64, 160, 210, 350 Bar (363, 928, 2320, 3045, 5075 PSI)	64, 125, 210 Bar (928, 1813, 3045 PSI)
Nominal Flow	25 LPM (6.6 GPM)	60 LPM (15.9 GPM)
Pressure Fluid	Hydraulic oil according to DIN 51524 ... 525	
Viscosity	Recommended Maximum	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)
Pressure Fluid Temperature	Recommended Permitted	+30°C to +50°C (+86°F to +122°F) -20°C to +70° (-4°F to +158°F)
Filtration	ISO 4406 (1999), 18/16/13	

D

VM*06

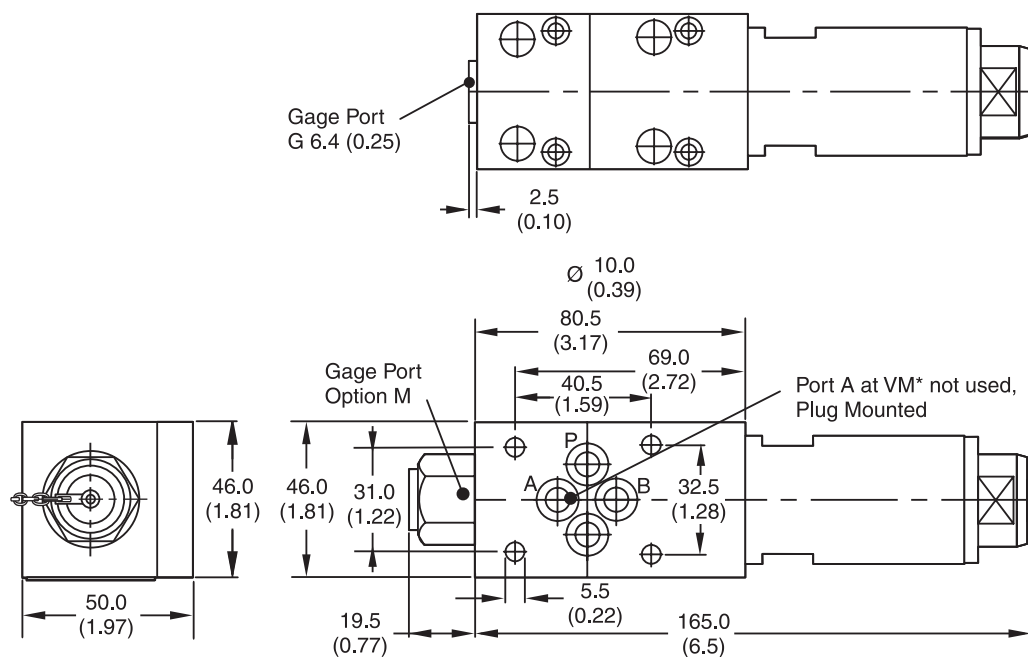





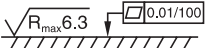
VM*10



VM*06

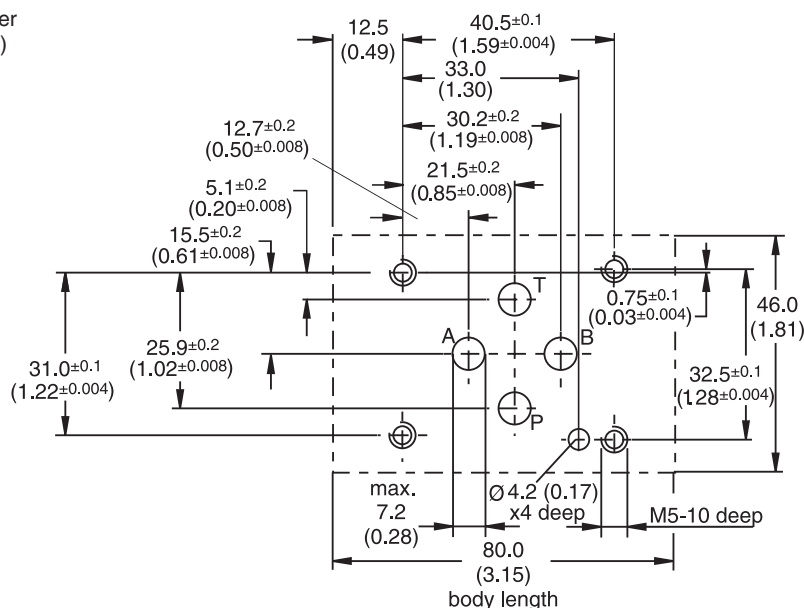
Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Bolt Kit  DIN912 12.9		Seal  Kit Fluorocarbon
	BK375 4x M5x30	8.1 Nm (6.0 lb.-ft.)	SK-VB/VM/VS-V

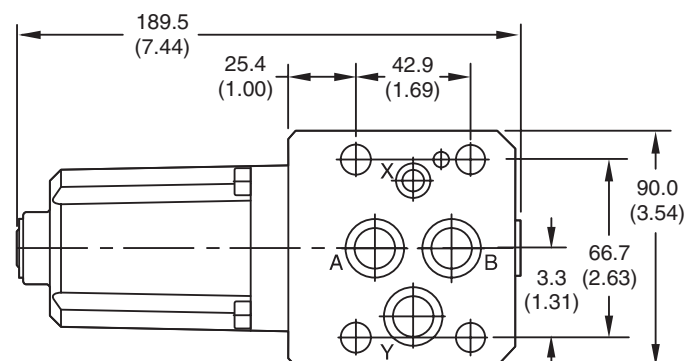
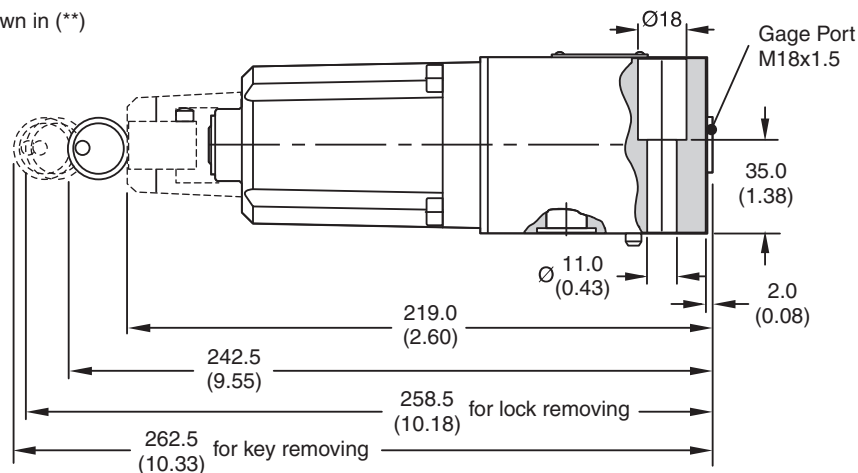
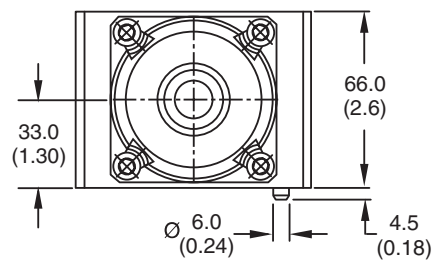
Mounting Pattern ISO 5871-03-04-0-00
(NFFA D03, CETOP 3, NG6)




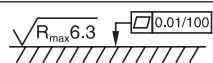
Inch equivalents for millimeter dimensions are shown in (**)



VM*10

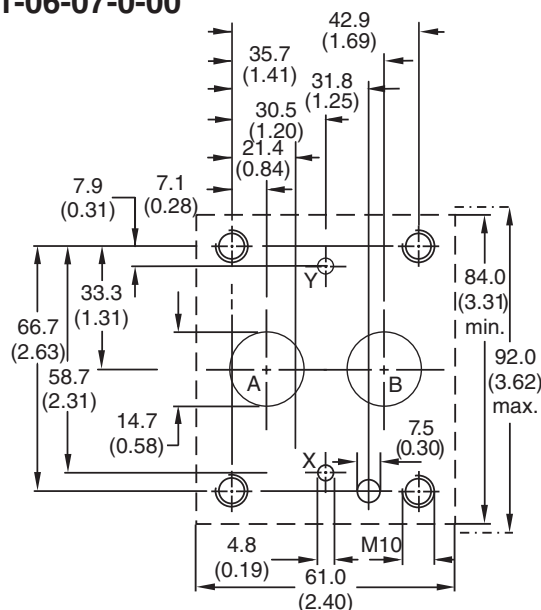
Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Bolt Kit  DIN912 12.9		Seal  Kit Fluorocarbon
$\sqrt{R_{max} 6.3}$ 	BK389 4x M10x50	65 Nm (47.9 lb.-ft.)	SK-VB/VM-A10V

Mounting Pattern ISO 5871-06-07-0-00

Inch equivalents for millimeter dimensions are shown in (**)



Subplate	Size
SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP

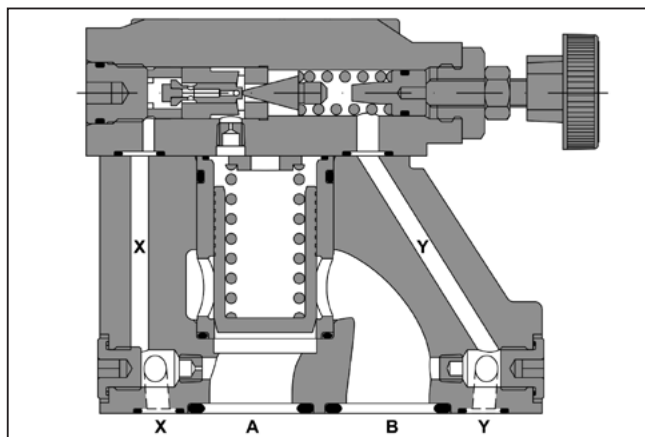
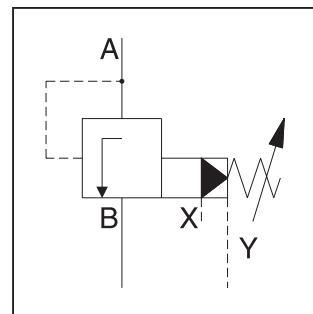
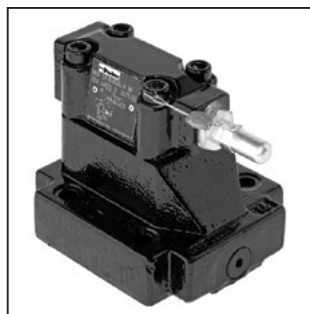
This image shows a full page of blank graph paper. The grid consists of thin, light gray horizontal and vertical lines that intersect to form a uniform pattern of small squares across the entire surface. There are no margins, text, or other markings present.

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

<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">R</div> Pressure Valve	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">4</div> Interface	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">S</div> Relief Function	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Size	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">5</div> Maximum Pressure 350 Bar (5075 PSI)	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">7</div> Body Mounting	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Pressure Range	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Adjustment	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">1</div> External Drain from Subplate	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">A</div> Design Series	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"></div> Seal																	
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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.
 D01_Cat2500.indd, ddp, 04/19

Specifications

General				
Size	NG10		NG25	NG32
Interface	Subplate mounting acc. ISO 5781			
Mounting Position	As desired, horizontal mounting preferred			
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)			
Hydraulic				
Operating Pressure	Ports A, B and X up to 350 Bar (5075 PSI), Port Y: depressurized			
Pressure Range	up to 105, 210, 350 Bar (1523, 3045, 5075 PSI)			
Nominal Flow	150 LPM (39.7 GPM)	350 LPM (92.6 GPM)	650 LPM (172.0 GPM)	
Pressure Fluid	Hydraulic oil according to DIN 51524 ... 51525			
Viscosity	Recommended Maximum			30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)
Pressure Fluid Temperature	Recommended Maximum			+30°C to +50°C (+86°F to +122°F) -20°C to +70° (-4°F to +158°F)
Filtration	ISO 4406 (1999), 18/16/13			

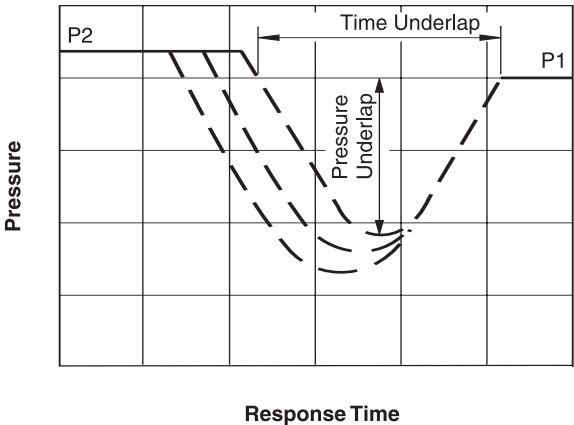
D

Performance Curves

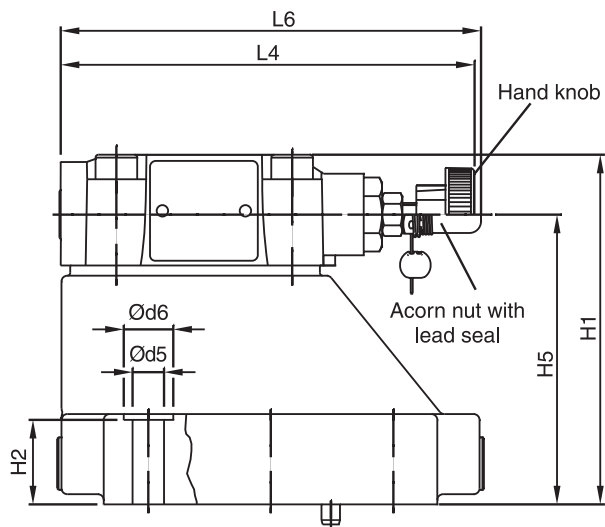
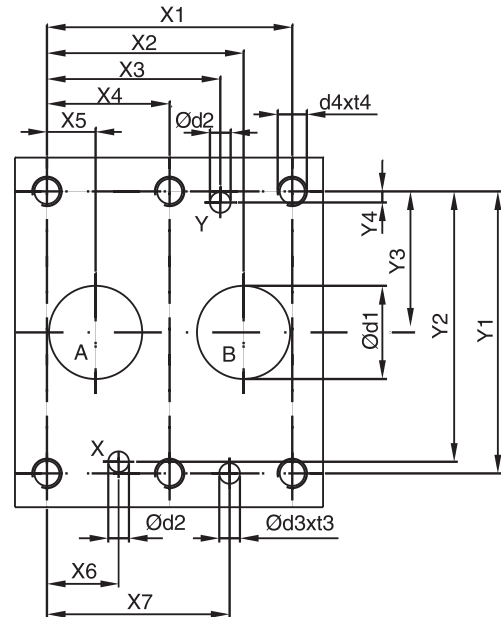
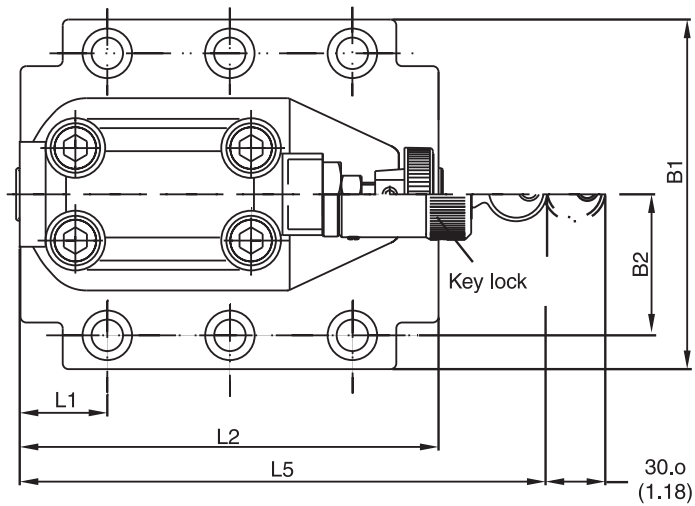
Typical pressure curves at closing point

P1 = setting pressure

P2 = operating pressure



Note:
Time and pressure underlap
depend on the characteristics
of a specific system.

D

Dimensions

Sequence Valves

Series R4S

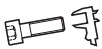

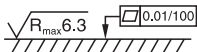
Inch equivalents for millimeter dimensions are shown in (**)

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	—	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	—	—
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	—	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	6.4 (0.25)	—	—
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	—	—

Tolerance at X and Y pin holes and screw holes ± 0.1 , at port holes ± 0.2 .

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	62.5 (2.46)	—	—	—	29.0 (1.14)	94.8 (3.73)	—	141.0 (5.55)	181.0 (7.13)	—
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	89.0 (3.50)	—	—	—	34.7 (1.37)	126.8 (4.99)	—	141.0 (5.55)	181.0 (7.13)	—
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	99.5 (3.92)	—	—	—	30.6 (1.20)	144.3 (5.68)	—	141.0 (5.55)	181.0 (7.13)	—

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 Nitrile	Kit Fluorocarbon	Surface Finish
10	5781-06-07-0-00	BK505	4xM10 x 35-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58507-0	S26-58507-5	
25	5781-08-10-0-00	BK485	4xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58475-0	S26-58475-5	
32	5781-10-13-0-00	BK506	6xM10 x 45-DIN 912 12.9	63 Nm (46.5 lb.-ft.) $\pm 15\%$	S26-58508-0	S26-58508-5	

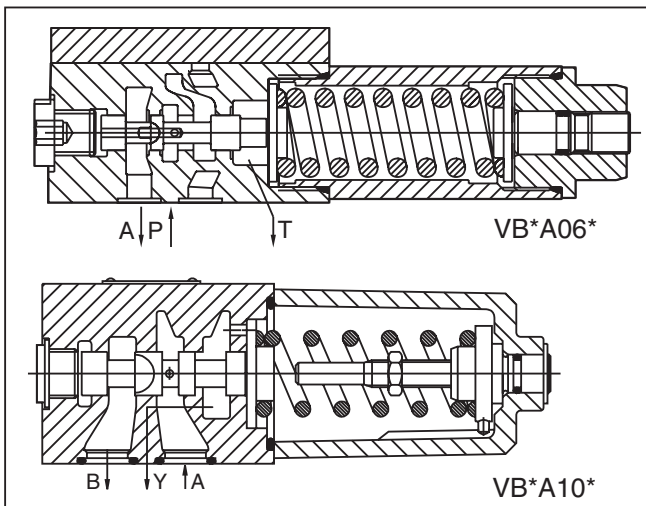
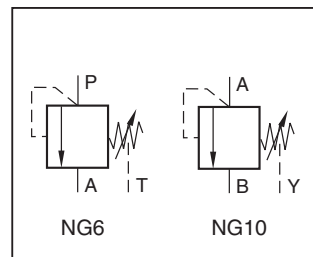
NG	ISO-code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP x, y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1 1/2" BSPP x, y = 1/4" BSPP

General Description

Series VB are direct operated pressure relief valves with manual adjustment. Series VB valves can also be used as pressure sequence valves because of the high pressure capability in the outlet port and the external drain port.

Specifications

Size	NG6, NG10
Interface	ISO 5791
Mounting Pos.	Unrestricted
Ambient Temp.	-20°C to +80°C (-4°F to +176°F)
Max. Operating Pressure	Size 6: Ports P and A 350 Bar (5075 PSI), Port T depressurized Size 10: Ports A and B 315 Bar (4568 PSI), Port Y depressurized
Pressure Range	Size 6: 25, 64, 160, 210, 350 Bar (363, 928, 2320, 3045, 5075 PSI) Size 10: 64, 125, 210 Bar (928, 1813, 3045 PSI)
Nominal Flow	Size 6: 25 LPM (6.6 GPM) Size 10: 60 LPM (15.9 GPM)
Pressure Fluid	Hydraulic oil according to DIN 51524 ... 525
Pressure Fluid Temperature	Recommended: +30°C to +50°C (+86°F to +122°F) Permitted: -20°C to +70°C (-4°F to +158°F)
Viscosity	Recommended: 30 to 50 cSt (mm²/s) Permitted: 20 to 380 cSt (mm²/s)
Filtration	ISO 4406 (1999), 18/16/13



Features

- Spool valve
- Manifold mounting
- Five pressure ranges at NG6
- Three pressure ranges at NG10
- Two adjustment modes

Ordering Information

VB Sequence Valve	A Adjustment Screw with Hexagon Socket	V Seal Fluorocarbon	Lock
Code Description	Code Description	Code Description	Code Description
025 ¹⁾ 25 Bar (363 PSI)	06 NG6	G ¹⁾ G 1/4"	Omit No Lock
064 64 Bar (938 PSI)	10 NG10	M M12x1.5	Z Cylinder Lock
125 ²⁾ 125 Bar (1813 PSI)			
160 ¹⁾ 160 Bar (2320 PSI)			
210 210 Bar (3045 PSI)			
350 ¹⁾ 350 Bar (5075 PSI)			

¹⁾ only NG6
²⁾ only NG10

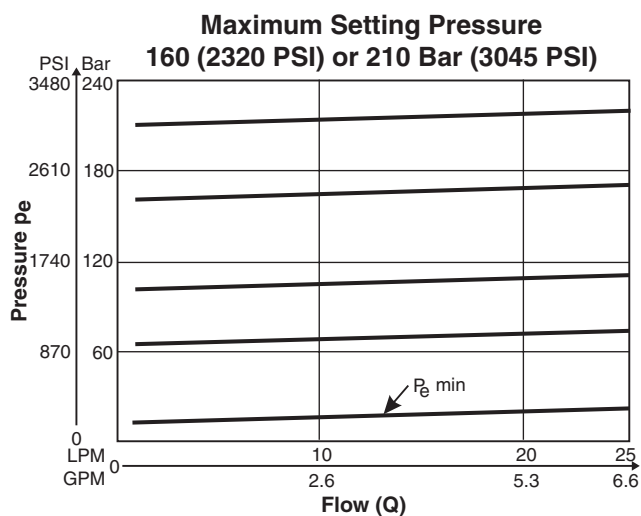
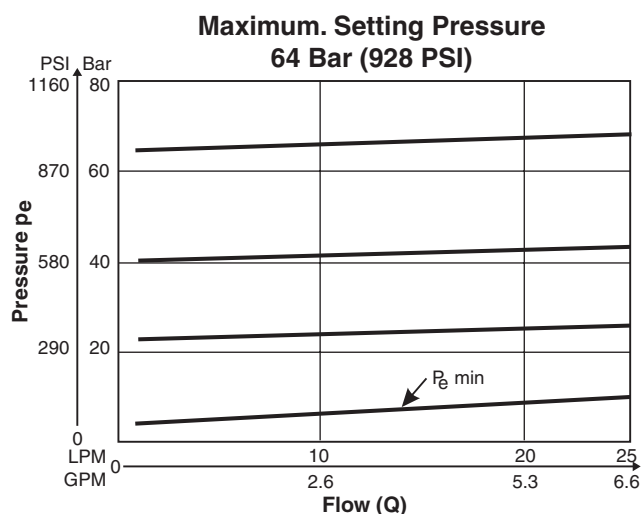
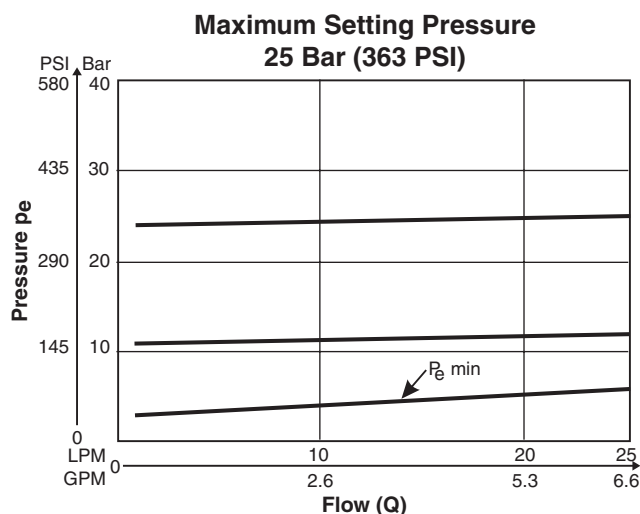
Weight:
 VB*A06 1.3 kg (2.9 lbs.)
 VB*A10 3.7 kg (8.2 lbs.)

Design Series
 NOTE: Not required when ordering.

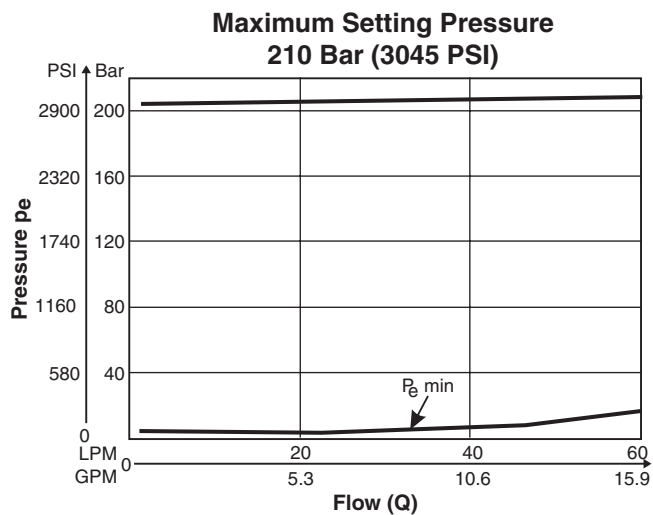
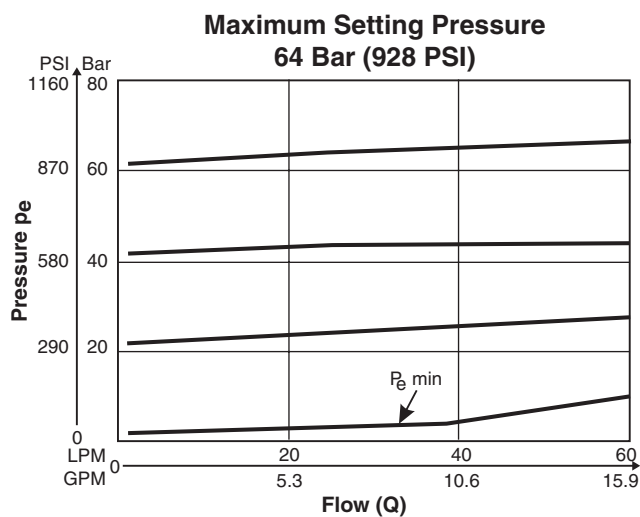
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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VB*06



VB*10

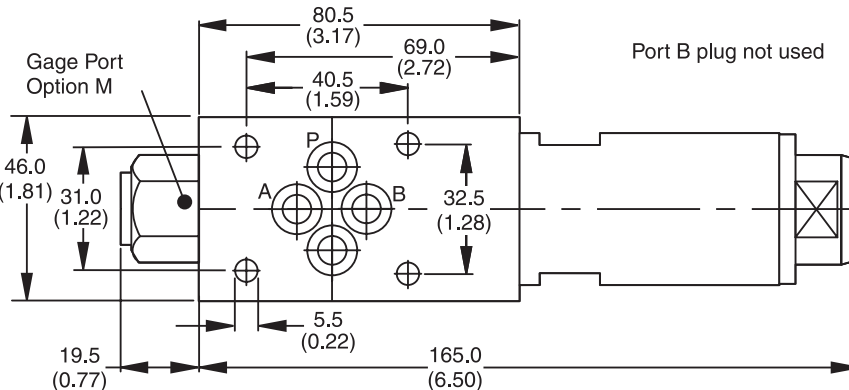
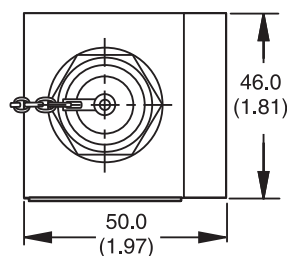


VB*06

Inch equivalents for millimeter dimensions are shown in (**)

Gage Port
G 6.4 (0.25)2.5
(.10)Gage Port
Option M

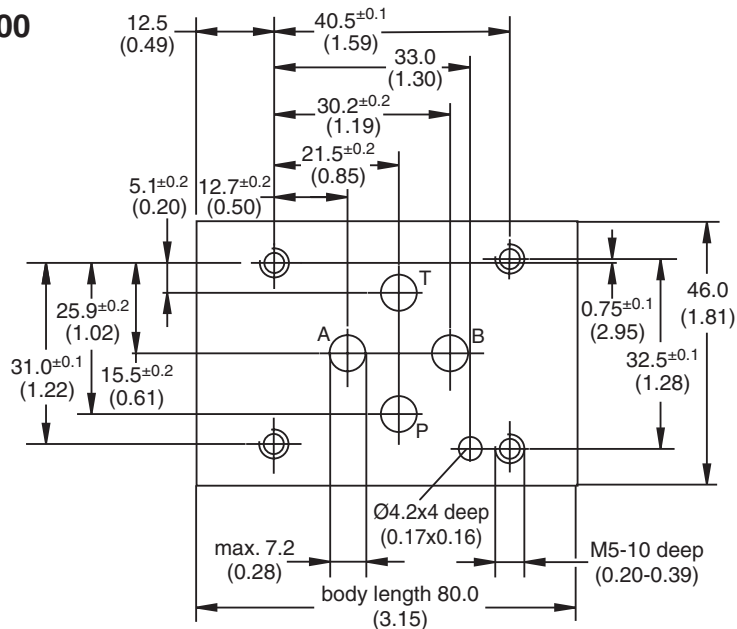
Port B plug not used



Surface Finish	$\sqrt{R_{\max} 6.3}$ [0.01/100]
Bolt Kit DIN912 12.9	BK375 4x M5x30
 7.6 Nm (5.6 lb.-ft.) ±15%	
Seal Kit Fluorocarbon	SK-VB/VM/VS V

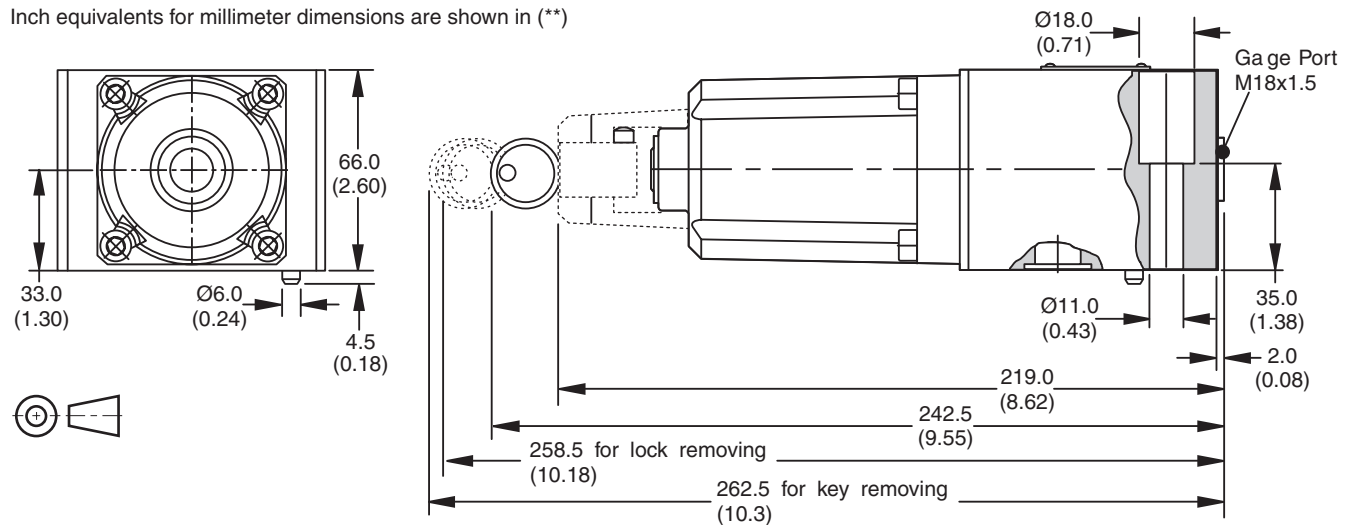
Mounting Pattern ISO 5781-03-04-0-00 (NFPA D03, CETOP 3, NG6)

Inch equivalents for millimeter dimensions are shown in (**)

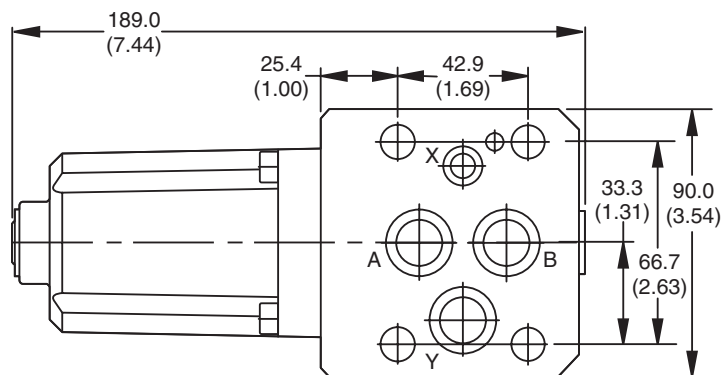


VB*10

Inch equivalents for millimeter dimensions are shown in (**)

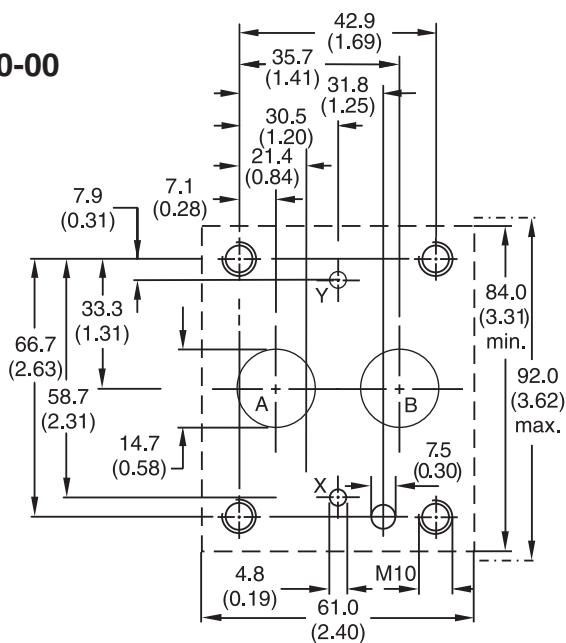


Surface Finish	$\sqrt{R_{\max} 6.3}$ $\square 0.01/100$
Bolt Kit DIN912 12.9	BK389 4x M10x50
	65 Nm (48 lb.-ft.) ±15%
Seal Kit Fluorocarbon	SK-VB/VM-A10V
Subplate	Size
SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP



Mounting Pattern ISO 5781-06-07-0-00

Inch equivalents for millimeter dimensions are shown in (**)



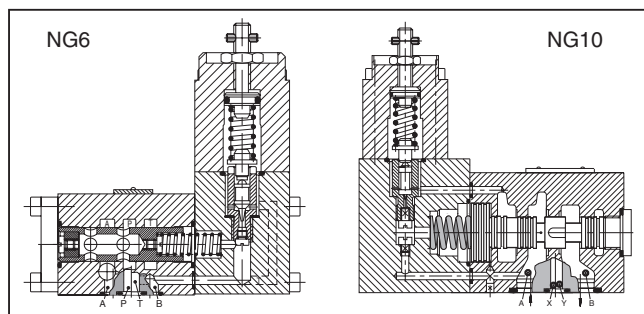
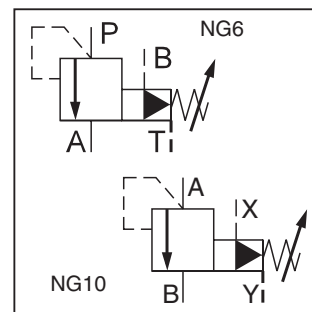
General Description

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



Specifications

Size	NG6	NG10
Mounting Pattern	ISO 5781	
Mounting Position	As desired	
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)	
Operating Pressure, Ports External Drain Port Pressure	P, A, B up to 315 Bar (4568 PSI) T up to 100 Bar (1450 PSI)	A, B, X up to 315 Bar (4568 PSI) Y up to 100 Bar (1450 PSI)
Pressure Range	64, 160, 210, 315 Bar (928, 2320, 3045, 4568 PSI)	
Pressure Fluid Temperature	-20°C to +70°C (-4°F to +158°F)	
Viscosity Range Recommended Permitted	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)	
Filtration	ISO 4406 (1999), 18/16/13	
Pilot Oil Flow	approx. 500 cm³/min	approx. 1000 cm³/min

Ordering Information

VBY

Pressure Relief
Valve

Pressure
Range

Adjustment

Size

Seal

Design
Series

NOTE:

Not required
when ordering.

Code	Description
064	64 Bar (928 PSI)
160	160 Bar (2320 PSI)
210	210 Bar (3045 PSI)
315	315 Bar (4568 PSI)

Code	Description
A	Adjustment Screw with Hexagon Socket
H	Turning Knob with Cylinder Lock

Code	Description
06	NG6
10	NG10

Code	Description
N	Nitrile
V	Fluorocarbon

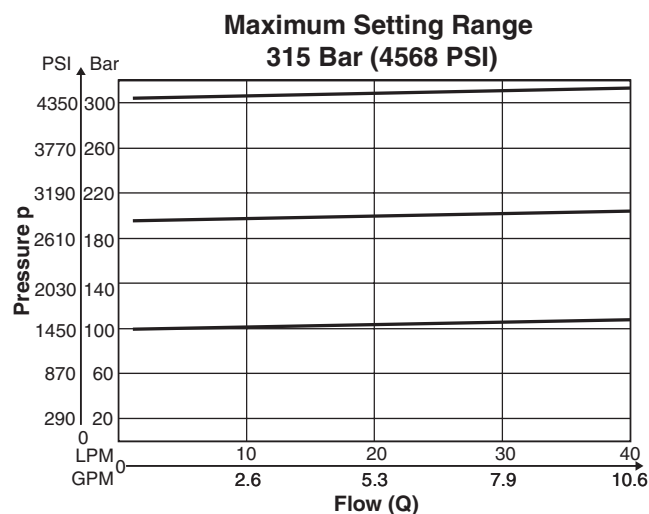
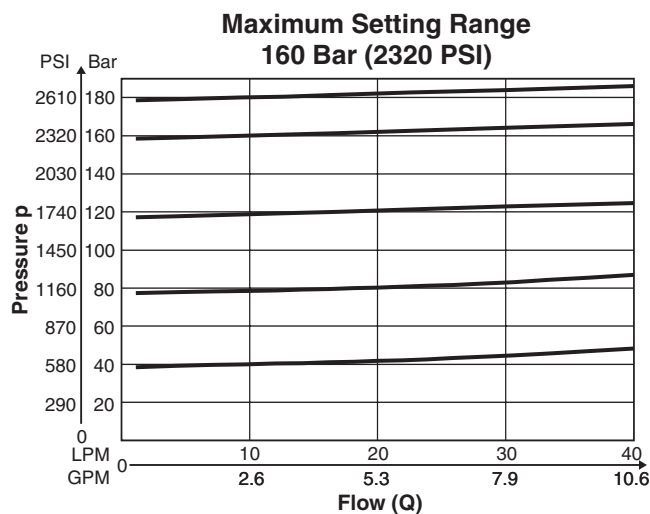
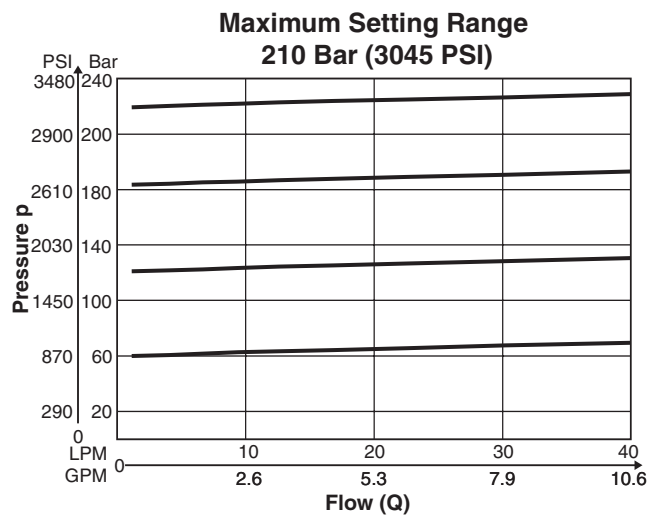
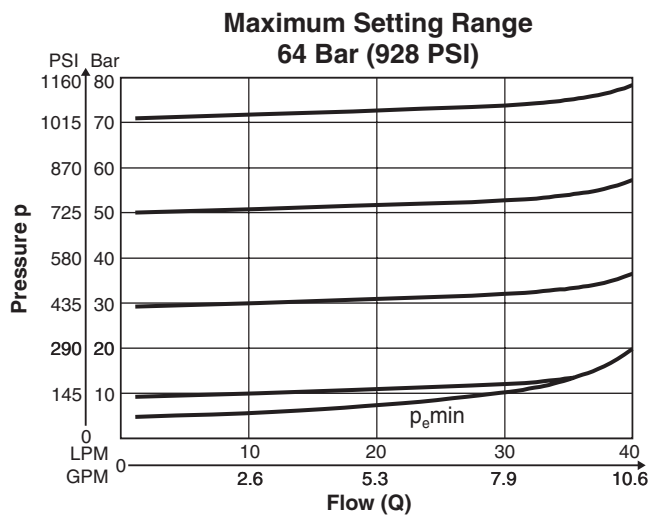
Weight:

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*06

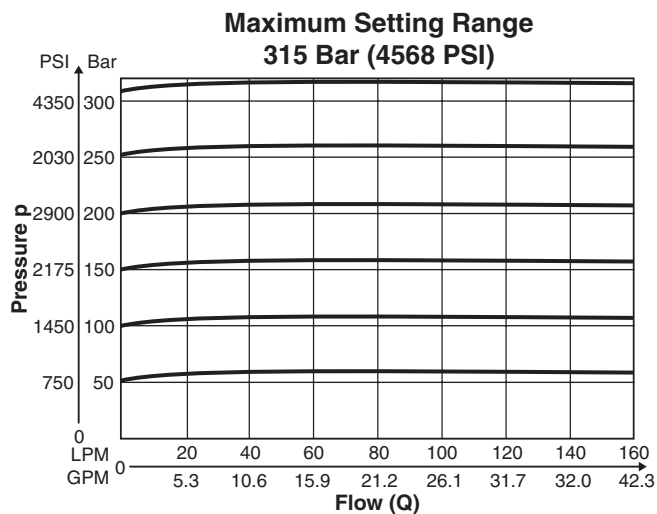
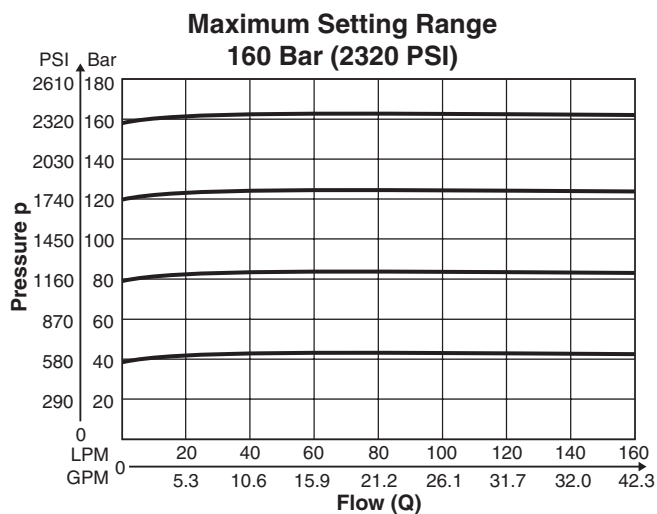
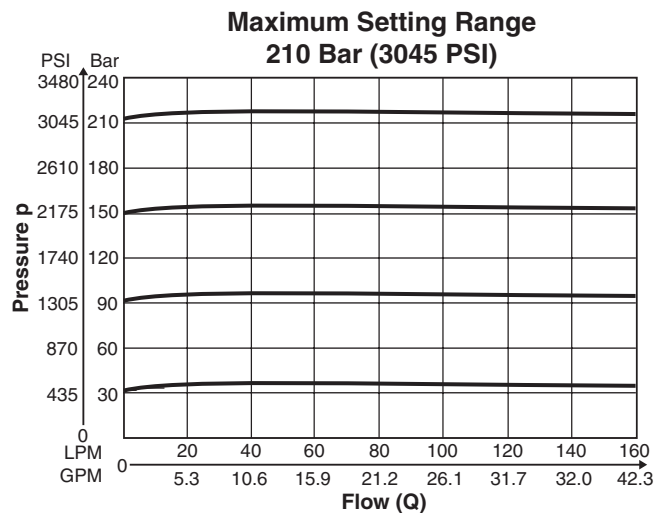
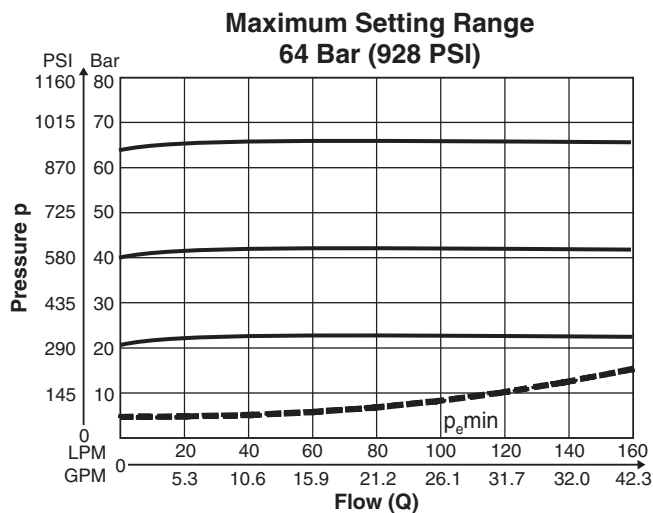
p/Q measured at $t = 50^{\circ}\text{C}$ (122°F) and $v = 36\text{mm}^2/\text{s}$



VBY*10

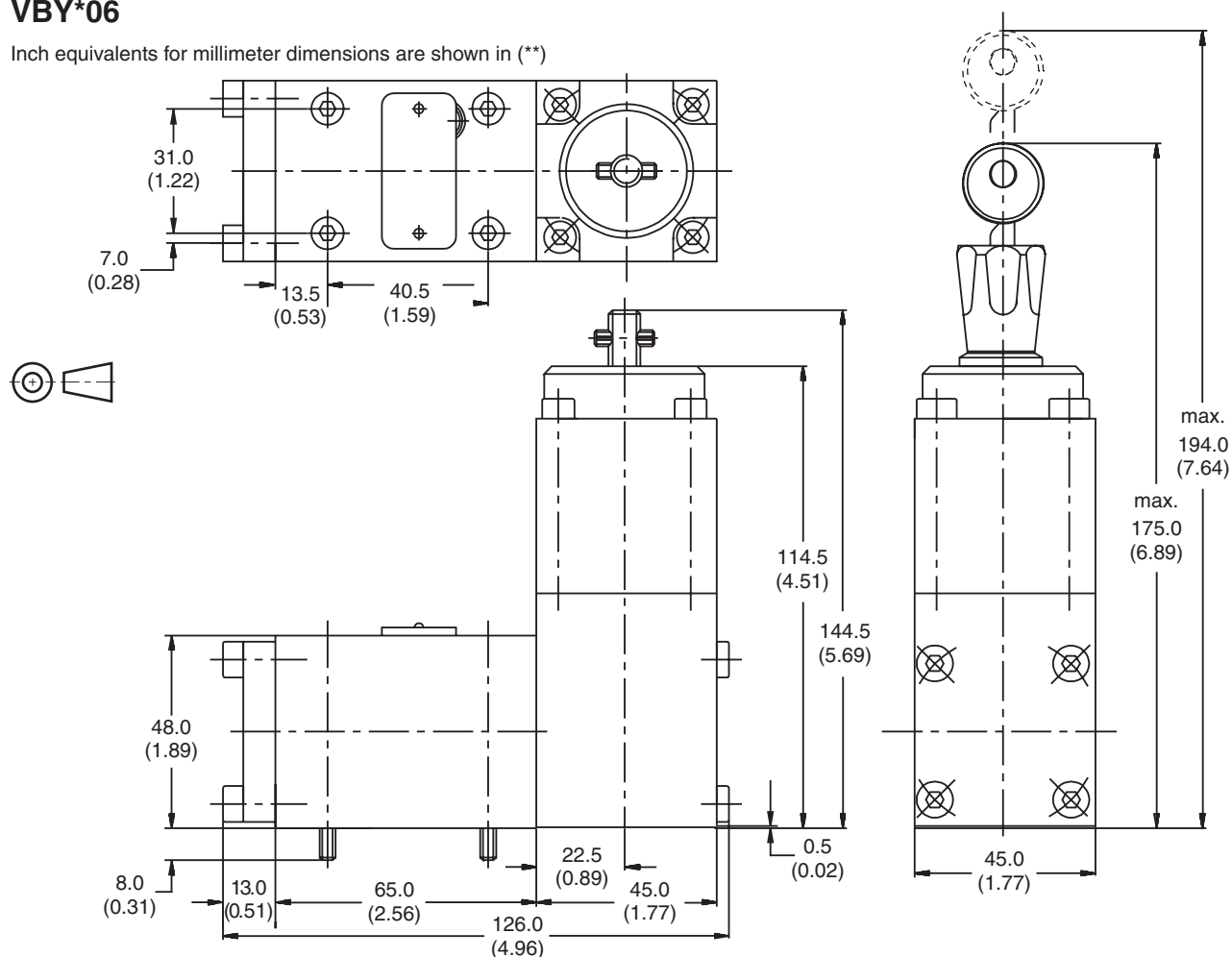
p/Q measured at $t = 50^{\circ}\text{C}$ (122°F) and $v = 36\text{mm}^2/\text{s}$




D



VBY*06

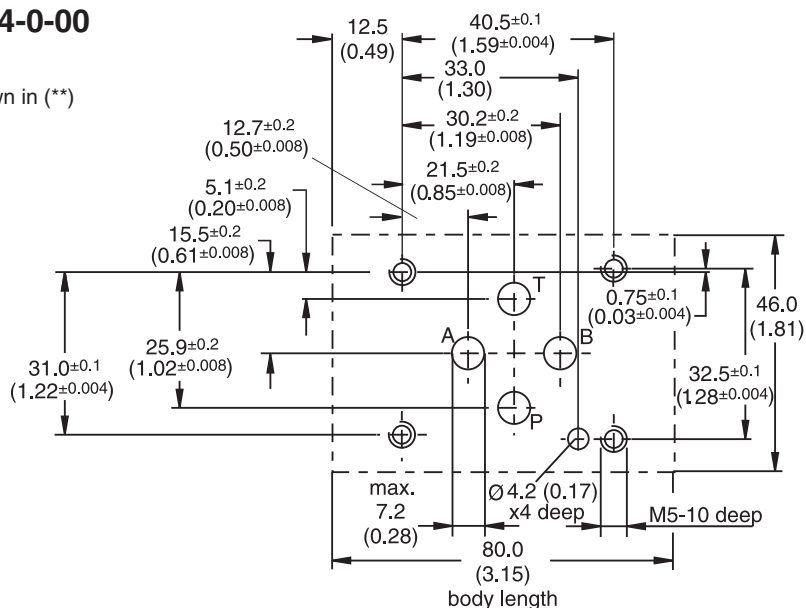
Inch equivalents for millimeter dimensions are shown in (**)



Surface Finish	Bolt Kit  DIN912 12.9		Seal  Kit
	BK375 4x M5x30	7.5 Nm (5.5 lb.-ft.)	Nitrile: SK-VB/VM/VS Fluorocarbon: SK-VB/VM/VS V

**Mounting Pattern ISO 5781-03-04-0-00
(NFPA D03, CETOP 3, NG6)**

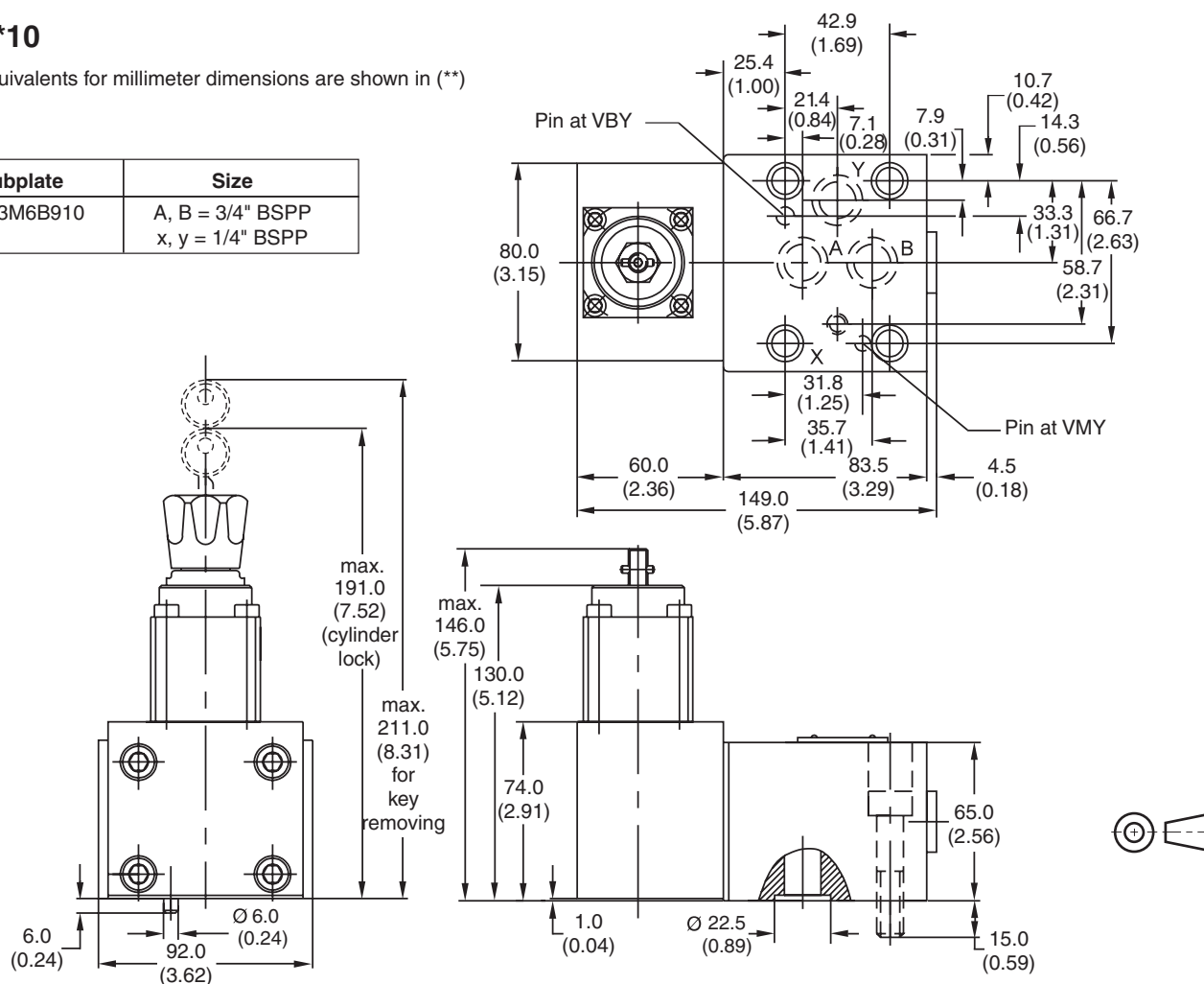
Inch equivalents for millimeter dimensions are shown in (**)




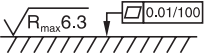


VBY*10

Inch equivalents for millimeter dimensions are shown in (**)

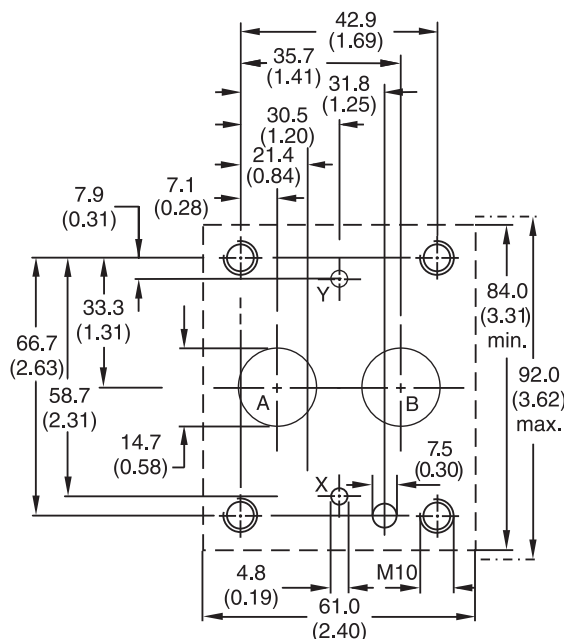
Subplate	Size
SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP



Surface Finish	Bolt Kit  DIN912 12.9		Seal  Kit
	BK389 4x M10x50	65 Nm (47.9 lb.-ft.)	Nitrile: SK-VB/VM-A10 Fluorocarbon: SK-VB/VM-A10V

Mounting Pattern ISO 5781-06-07-0-00

Inch equivalents for millimeter dimensions are shown in (**)



General Description

Series R5V pilot operated pressure relief valves have a similar design to the subplate mounted R4V series. The SAE flanges allow to mount the valves directly on the outlet flanges of pumps or inlet flanges of actuators to achieve a very compact design.

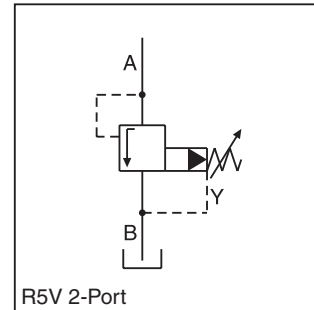
Valves with SAE flanges can also be bolted together to combine functions without the need of a manifold block.

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.



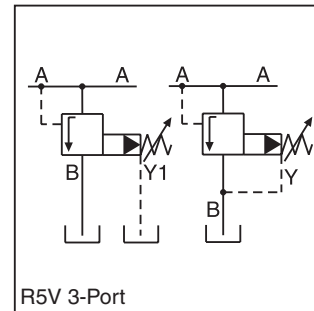
R5V 2-Port



R5V 2-Port



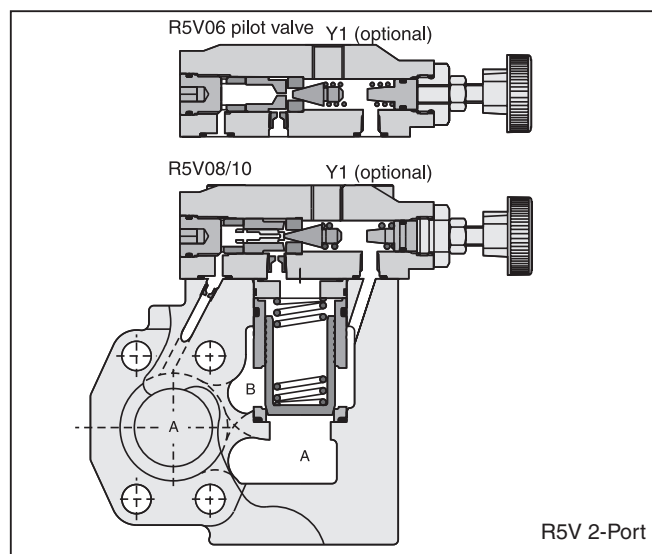
R5V 3-Port



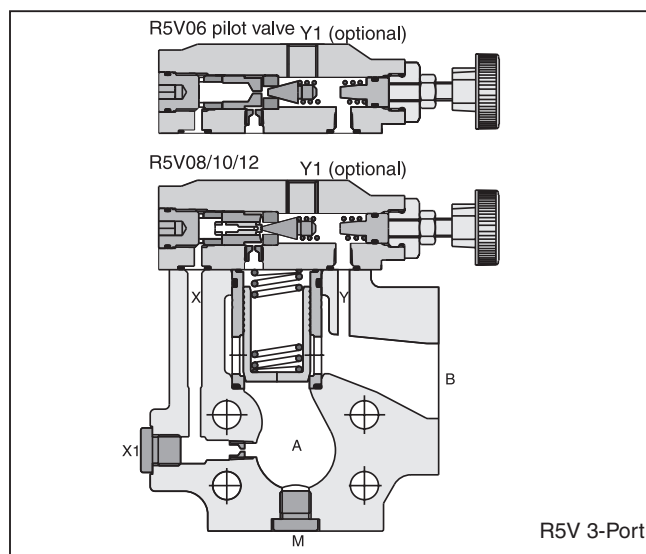
R5V 3-Port

Features

- Pilot operated with manual adjustment
- R5V with 2-port body:
 - 3 sizes (SAE 3/4", 1", 1-1/4")
 - SAE 61 flange
- R5V with 3-port body:
 - 4 sizes (SAE 3/4", 1", 1-1/4", 1-1/2")
 - SAE 61 and SAE 62 flange
- 3 pressure stages
- 3 adjustment modes: Hand knob, acorn nut with lead seal, or key lock
- With optional vent function



R5V 2-Port



R5V 3-Port

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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R5V

Pressure
Relief
Valve

Size

SAE
Interface

Pilot Ports

Pressure Range

Adjustment

Pilot Oi

Switchi
Type

Solenoid
Voltage

Design Series

Seal

Option

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"
12*	SAE 1-1/2"

* R5V 3-Port only

SAE 61		
Code	Size	Maximum Pressure
3	12	210 Bar (3045 PSI)
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

SAE 62		
Code	Size	Maximum Pressure
6*	06/08/ 10/12	350 Bar (5075 PSI)

* R5V 3-Port only.

2-Port Body	
Code	Description
7	Y1 = G1/4

Code	Description
9	Y1*, X1, M = G 1/4

* 3-Port: Y1 only
available at external
drain (pilot oil code 6).

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 Bar)

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal
4	Key Lock

Code	Description
Omit	Standard w/o vent function
G0R	12V
G0Q	24V
GAR	98V
GAG	205V
W30	110V 50Hz/ 120V 60Hz
W31	220V 50Hz/ 240V 60Hz

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
Omit	Standard w/o vent function
09*	Solenoid not activ. unpress. circulation
11**	Solenoid activated unpress. circulation

* Sol. de-energized: open to tank
Sol. energized: vent line blocked.

** Sol. de-energized: vent line blocked
Sol energized: open to tank.

Code	Drain Line
2	Internal
6	External from Y1-Port
F	Internal for 2-Port with X plugged

Code	Description
Omit	Standard
008	Vent function with slow unloading

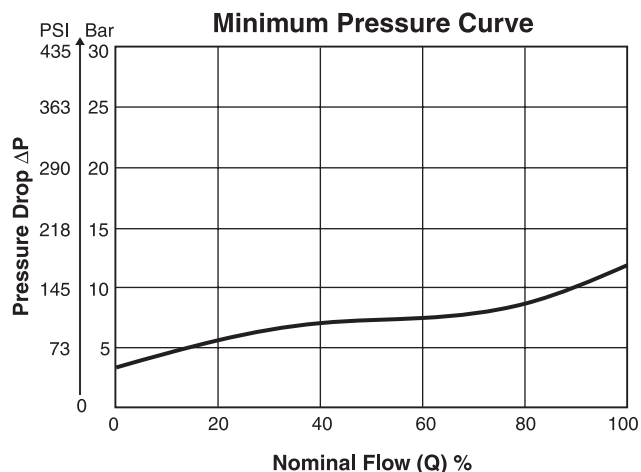
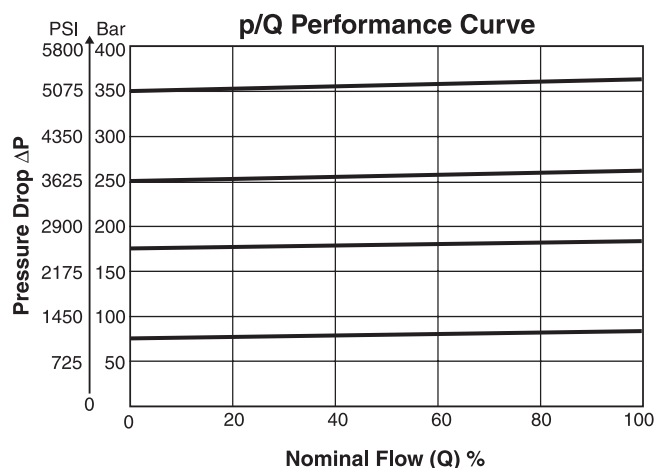
Weight:

Weight:	2-Port	3-Port
R5V06	4.0 kg (8.8 lbs.)	3.6 kg (7.9 lbs.)
R5V08	4.6 kg (10.1 lbs.)	4.6 kg (10.1 lbs.)
R4V10	5.9 kg (13.0 lbs.)	5.2 kg (11.5 lbs.)
R5V12	–	8.0 kg (17.6 lbs.)

Specifications

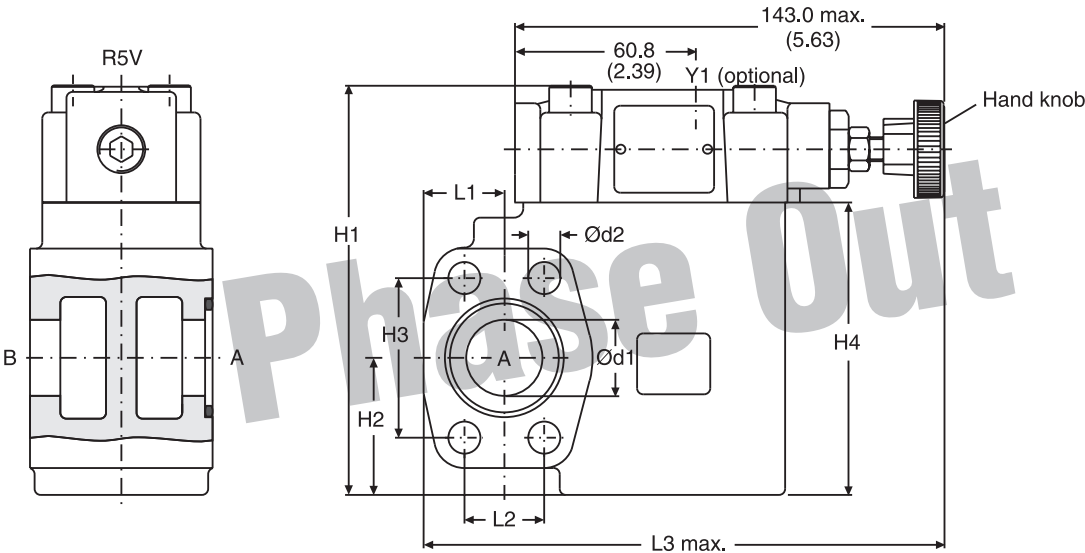
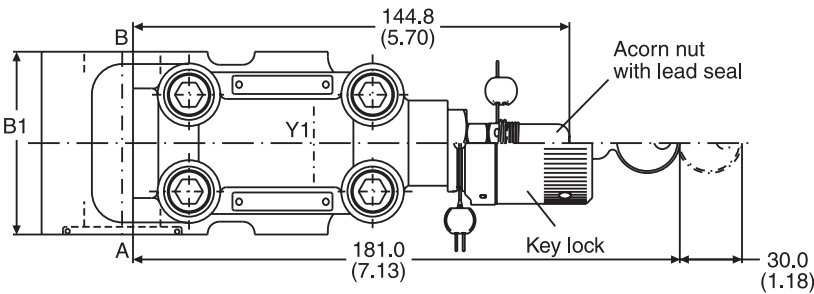
General									
Size		06		08		10		12	
Mounting		Flanged according to SAE 61 / SAE 62							
Mounting Position		Unrestricted							
Ambient Temperature Range		-20°C to +50°C (-4°F to +122°F)							
Hydraulic									
Maximum Operating Pressure		SAE 61 Ports A, B	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)	210 Bar (3045 PSI)			
		SAE 61 Port Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)			
		SAE 62 Ports A, B	350 Bar (5075 PSI)	350 Bar (5075 PSI)	350 Bar (5075 PSI)	350 Bar (5075 PSI)			
		SAE 62 Port Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)			
Pressure Ranges		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)							
Nominal Flow		90 LPM (23.8 GPM)		300 LPM (79.4 GPM)		600 LPM (158.7 GPM)		600 LPM (158.7 GPM)	
Fluid		Hydraulic oil as per DIN 51524 to 51525							
Fluid Temperature		-20°C to +80°C (-4°F to +176°F)							
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)							
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)							
Electrical (Solenoid)									
Duty Ratio		100%							
Solenoid Connection		Connector as per EN175301-803							
Protection Class		IP65 in accordance with EN60529 (plugged and mounted)							
	Code	G0R	G0Q	GAR	GAG	W30	W31		
Supply Voltage		12V	24V	98V	205V	110V at 50Hz/ 120V at 60Hz	220V at 50Hz/ 240V at 60Hz		
Tolerance Supply Voltage		+5 to -10	+5 to -10	+5 to -10	+5 to -10	±5	±5		
Power Consumption		Hold	31W	31W	31W	31W	78W	78W	
		In Rush	31W	31W	31W	31W	264W	264W	
Response Time		Energized / De-energized AC 20/18ms, DC 46/27 ms							
Maximum Switching Frequency		AC up to 7200 switchings/hour; DC up to 16,000 switchings/hour							
Coil Insulation Class		H (180°C) (356°F)							

Performance Curves



Inch equivalents for millimeter dimensions are shown in (**)

2-Port



Seal Kits		
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5

SAE 61

Size	B1	H1	H2	H3	H4	L1	L2	L3	d1	d2
06	60.0 (2.36)	131.6 (5.18)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	24.6 (0.97)	22.2 (0.89)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)
08	60.0 (2.36)	137.6 (5.42)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	26.5 (1.04)	26.2 (1.03)	171.0 (6.73)	25.0 (0.98)	10.5 (0.41)
10	75.0 (2.95)	150.6 (5.93)	48.0 (1.89)	58.7 (2.31)	109.0 (4.29)	34.0 (1.34)	30.2 (1.19)	179.0 (7.05)	32.0 (1.26)	12.5 (0.49)

Port	Function	Port Size		
		R5V06	R5V08	R5V10
A	Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
B	Tank	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
Y1	External Drain	SAE 4		

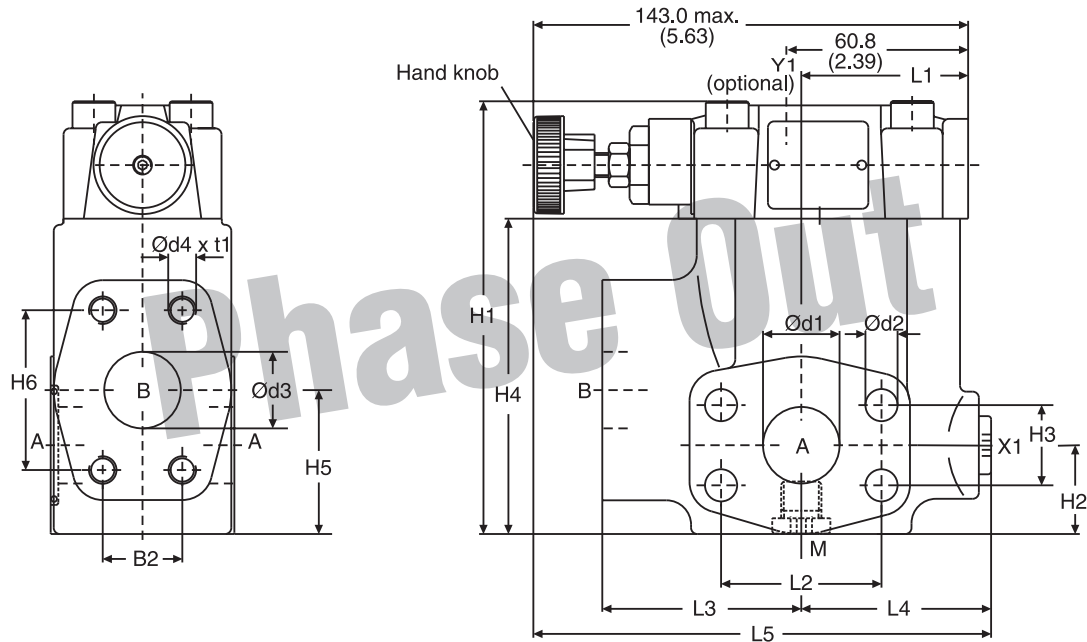
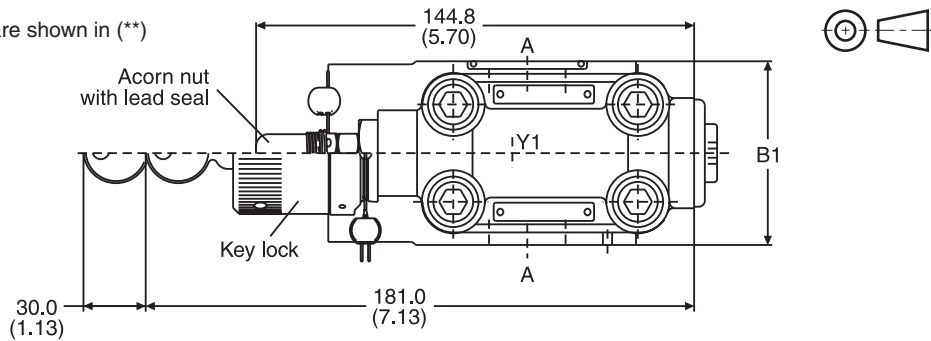
Dimensions

Pressure Relief Valves
Series R5V

Inch equivalents for millimeter dimensions are shown in (**)

3-Port

Seal Kits		
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
12	S26-27421-0	S26-27421-5



SAE 61

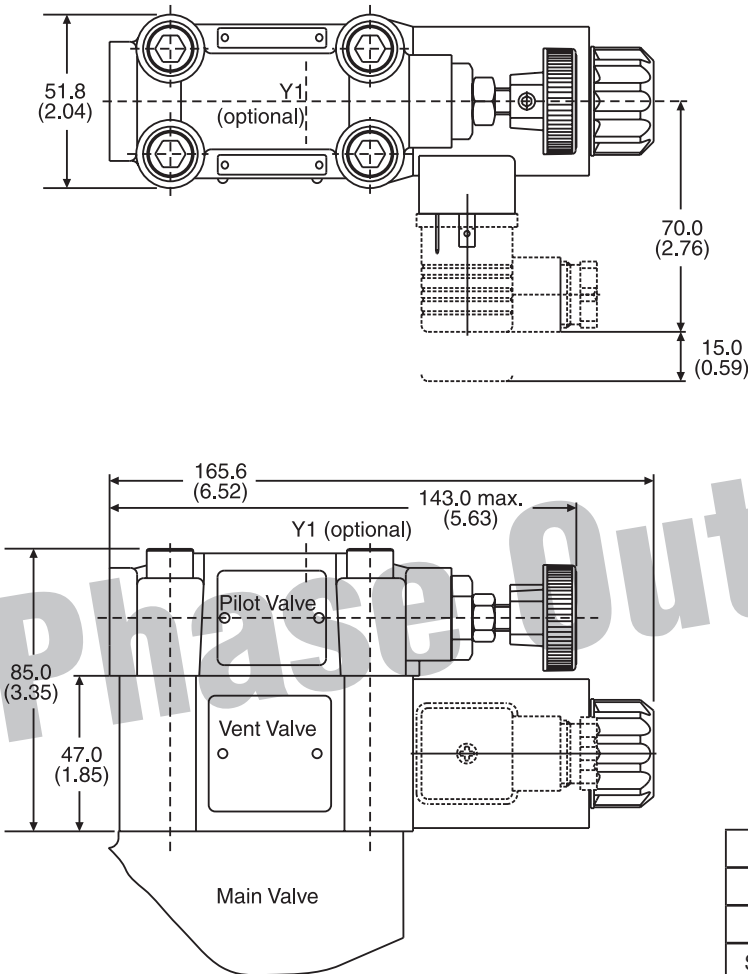
Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	t1
06	60.0 (2.36)	22.2 (0.87)	119.0 (4.69)	28.0 (1.10)	22.2 (0.87)	81.0 (3.19)	41.6 (1.64)	47.6 (1.87)	50.3 (1.98)	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	20.0 (0.79)
08	60.0 (2.36)	26.2 (1.03)	141.0 (5.55)	29.0 (1.14)	26.2 (1.03)	103.0 (4.06)	47.0 (1.85)	52.4 (2.06)	55.8 (2.20)	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.98)	10.5 (0.41)	25.0 (0.98)	23.0 (0.91)
10	75.0 (2.95)	30.2 (1.19)	151.0 (5.94)	34.5 (1.36)	30.2 (1.19)	113.0 (4.45)	64.0 (2.52)	58.7 (2.31)	57.8 (2.28)	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	12.5 (0.49)	32.0 (1.26)	22.0 (0.87)
12	80.0 (3.15)	35.7 (1.41)	178.0 (7.01)	34.0 (1.34)	35.7 (1.41)	140.0 (5.51)	73.0 (2.87)	69.8 (2.75)	37.3 (1.47)	69.8 (2.75)	92.5 (3.64)	55.2 (2.17)	171.2 (6.74)	38.0 (1.50)	13.5 (0.53)	38.0 (1.50)	27.0 (1.06)

SAE 62

Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	t1
06	60.0 (2.36)	23.8 (0.94)	119.0 (4.69)	28.0 (1.10)	23.8 (0.94)	81.0 (3.19)	41.6 (1.64)	50.8 (2.00)	50.3 (1.98)	50.8 (2.00)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	20.0 (0.79)
08	60.0 (2.36)	27.8 (1.09)	141.0 (5.55)	29.0 (1.14)	27.8 (1.09)	103.0 (4.06)	47.0 (1.85)	57.2 (2.25)	55.8 (2.20)	57.2 (2.25)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.98)	12.5 (0.49)	25.0 (0.98)	22.0 (0.87)
10	75.0 (2.95)	31.8 (1.25)	151.0 (5.94)	34.5 (1.36)	31.8 (1.25)	113.0 (4.45)	64.0 (2.52)	66.7 (2.63)	57.8 (2.28)	66.7 (2.63)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	13.5 (0.53)	32.0 (1.26)	24.0 (0.94)
12	80.0 (3.15)	36.5 (1.44)	178.0 (7.01)	34.0 (1.34)	36.5 (1.44)	140.0 (5.51)	73.0 (2.87)	79.4 (3.13)	37.3 (1.47)	79.4 (3.13)	92.5 (3.64)	55.2 (2.17)	171.2 (6.74)	38.0 (1.50)	17.0 (0.67)	38.0 (1.50)	33.0 (1.30)

Port	Function	Port size			
		R5V06	R5V08	R5V10	R5V12
A (2)	Pressure	3/4" SAE 61/62	1" SAE 61/62	1-1/4" SAE 61/62	1-1/2" SAE 61/62
B	Tank	3/4" SAE 61/62	1" SAE 61/62	1-1/4" SAE 61/62	1-1/2" SAE 61/62
X1	External pilot port *	SAE 4			
Y1	External drain	SAE 4			
M	Pressure gauge	SAE 4			

Inch equivalents for millimeter dimensions are shown in (**)
with Vent Function

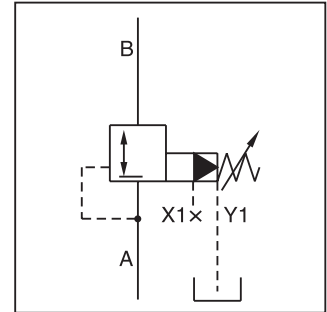
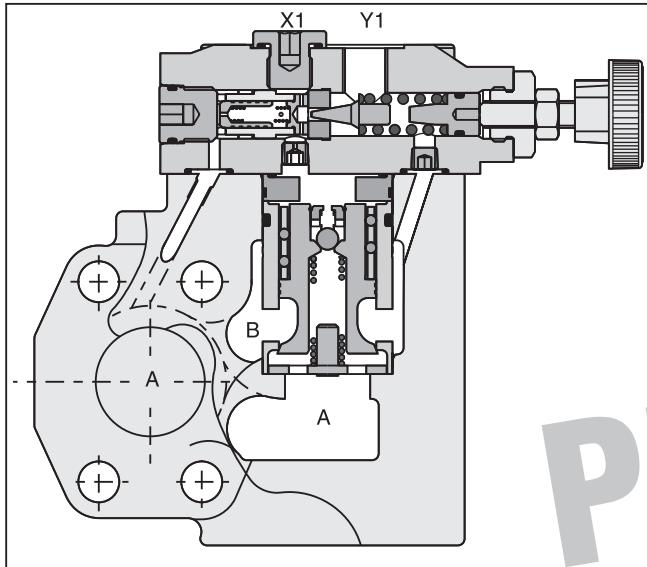


Vent Valve Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5

Code	R5V 2-Port		R5V 3-Port	
	Internal Drain	External Drain	Internal Drain	External Drain
11				
09				

General Description

Series R5R pilot operated pressure reducing valves have a similar design as the subplate mounted R4R series. The SAE flanges allow to mount the valves directly on the inlet flanges of actuators to achieve a very compact design.



Features

- Pilot operated with manual adjustment
- Normally closed to avoid unintended motion
- 2-port body with SAE61 flange
- 3 sizes (SAE 3/4", 1", 1-1/4")
- 3 pressure stages
- 3 adjustment modes:
 - Hand knob
 - Acorn nut with lead seal
 - Key lock
- With optional vent function
- Flow direction B → A

Ordering Information

R5R		—	2			6			A																																												
Pressure Reducing Valve	Size	SAE 61 Interface	2-Port Body X1, Y1 = SAE 4	Pressure Range	Adjustment	External Drain from Y1 Port	Switching Type	Solenoid Voltage	Design Series	Seal	Options Check with Factory																																										
<table><tr><th>Code</th><th>Description</th></tr><tr><td>06</td><td>SAE 3/4"</td></tr><tr><td>08</td><td>SAE 1"</td></tr><tr><td>10</td><td>SAE 1-1/4"</td></tr></table>	Code	Description	06	SAE 3/4"	08	SAE 1"	10	SAE 1-1/4"	<table><tr><th>Code</th><th>Size</th><th>Max. Pressure</th></tr><tr><td>4</td><td>10</td><td>280 Bar (4060 PSI)</td></tr><tr><td>5</td><td>06/08</td><td>350 Bar (5075 PSI)</td></tr></table>	Code	Size	Max. Pressure	4	10	280 Bar (4060 PSI)	5	06/08	350 Bar (5075 PSI)		<table><tr><th>Code</th><th>Description</th></tr><tr><td>1</td><td>Hand Knob</td></tr><tr><td>3</td><td>Acorn Nut with Lead Seal</td></tr><tr><td>4</td><td>Key Lock</td></tr></table>	Code	Description	1	Hand Knob	3	Acorn Nut with Lead Seal	4	Key Lock		<table><tr><th>Code</th><th>Description</th></tr><tr><td>Omit</td><td>Standard w/o vent function</td></tr><tr><td>G0R</td><td>12V</td></tr><tr><td>G0Q</td><td>24V</td></tr><tr><td>GAR</td><td>98V</td></tr><tr><td>GAG</td><td>205V</td></tr><tr><td>W30</td><td>110V 50Hz/ 120V 60Hz</td></tr><tr><td>W31</td><td>220V 50Hz/ 240V 60Hz</td></tr></table>	Code	Description	Omit	Standard w/o vent function	G0R	12V	G0Q	24V	GAR	98V	GAG	205V	W30	110V 50Hz/ 120V 60Hz	W31	220V 50Hz/ 240V 60Hz	<table><tr><th>Code</th><th>Description</th></tr><tr><td>1</td><td>Nitrile</td></tr><tr><td>5</td><td>Fluorocarbon</td></tr></table>	Code	Description	1	Nitrile	5	Fluorocarbon
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1	Nitrile																																																				
5	Fluorocarbon																																																				
Further options on request.																																																					
Weight:																																																					
R5R06	4.0 kg (8.8 lbs.)																																																				
R5R08	4.6 kg (10.1 lbs.)																																																				
R5R10	5.9 kg (13.0 lbs.)																																																				
		<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 Bar)</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 Bar)		<table><tr><th>Code</th><th>Description</th></tr><tr><td>Omit</td><td>Standard w/o vent function</td></tr><tr><td>09*</td><td>Solenoid not activ. unpress. circulation</td></tr><tr><td>11**</td><td>Solenoid activated unpress. circulation</td></tr></table>	Code	Description	Omit	Standard w/o vent function	09*	Solenoid not activ. unpress. circulation	11**	Solenoid activated unpress. circulation																																	
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* Sol. de-energized: open to tank
 Sol. energized: vent line blocked

** Sol. de-energized: vent line blocked
 Sol energized: open to tank

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.

D01_Cat2500.indd, ddp, 04/19

Specifications

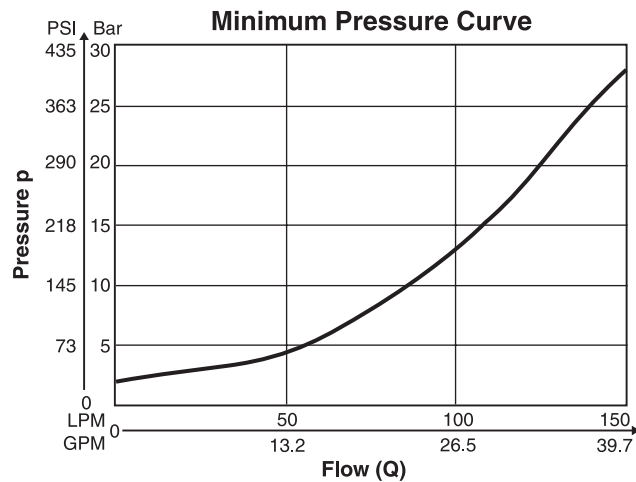
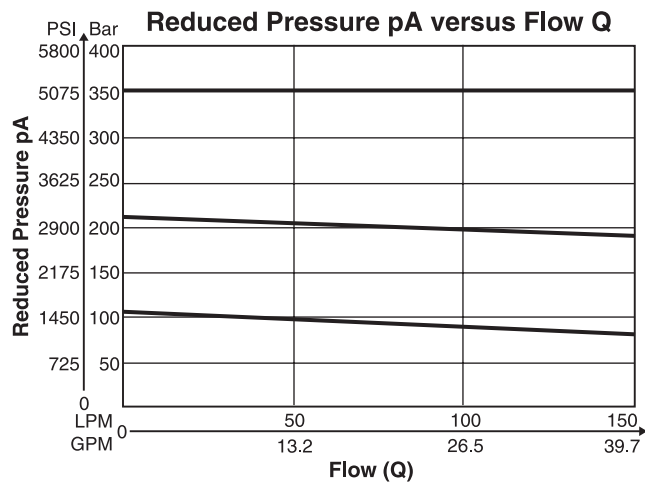
Pressure Relief Valves

Series R5R

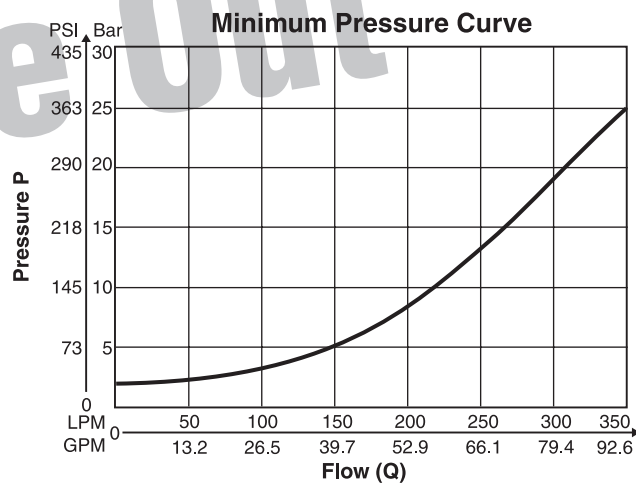
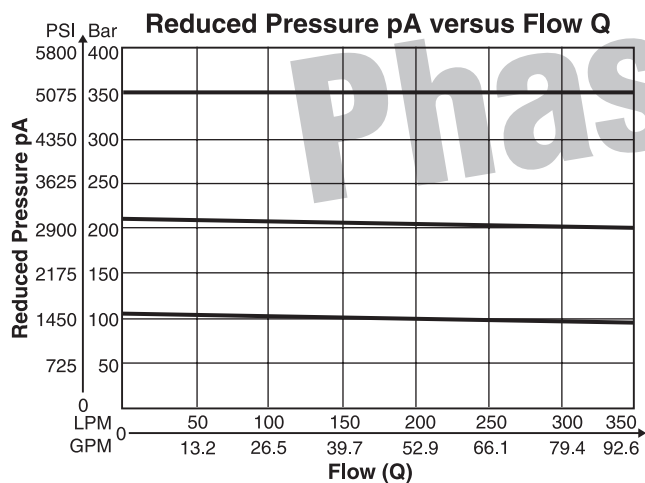
General							
Size		06		08		10	
Mounting		Flanged according to SAE 61					
Mounting Position		Unrestricted					
Ambient Temperature Range		-20°C to +50°C (-4°F to +122°F)					
Hydraulic							
Max. Operating Pressure	Ports A,B, X1	350 Bar (5075 PSI)		350 Bar (5075 PSI)		280 Bar (4060 PSI)	
	Port Y1	30 Bar (435 PSI)		30 Bar (435 PSI)		30 Bar (435 PSI)	
Pressure Ranges		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)					
Nominal Flow		90 LPM (23.8 GPM)		300 LPM (79.4 GPM)		500 LPM (132.3 GPM)	
Fluid		Hydraulic oil as per DIN 51524 ... 51525					
Fluid Temperature		-20°C to +80°C (-4°F to +176°F)					
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)					
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)					
Electrical (Solenoid)							
Duty Ratio		100%					
Solenoid Connection		Connector as per EN175301-803					
Protection Class		IP65 in accordance with EN60529 (plugged and mounted)					
	Code	G0R	G0Q	GAR	GAG	W30	W31
Supply Voltage		12V	24V	98V	205V	110V at 50Hz 120V at 60Hz	2200V at 50Hz 240V at 60Hz
Tolerance Supply Voltage		+5 to -10	+5 to -10	+5 to -10	+5 to -10	±5	±5
Power Consumption	Hold	31W	31W	31W	31W	78W	78W
	In Rush	31W	31W	31W	31W	264W	264W
Response Time		Energized / De-energized AC 20/18ms, DC 46/27 ms					
Max. Switching Frequency		AC up to 7200, DC 70 to 16,000 switchings/hour					
Coil Insulation Class		H (180°C) (356°F)					

D

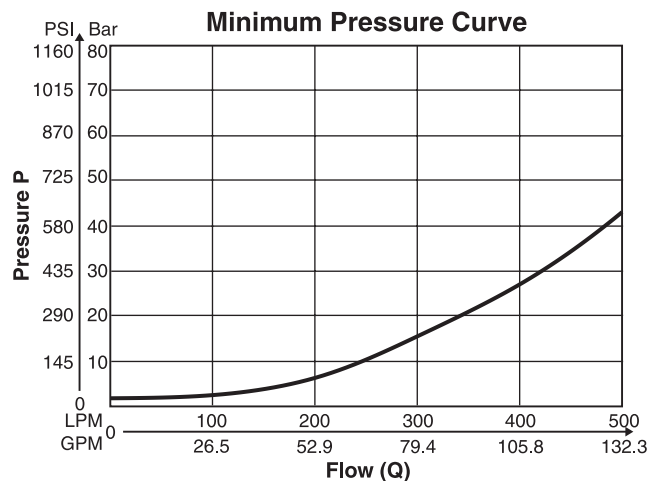
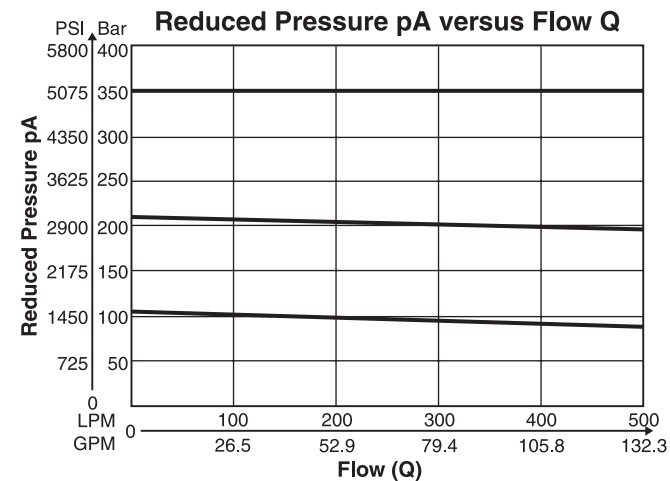
R5R06*



R5R08*

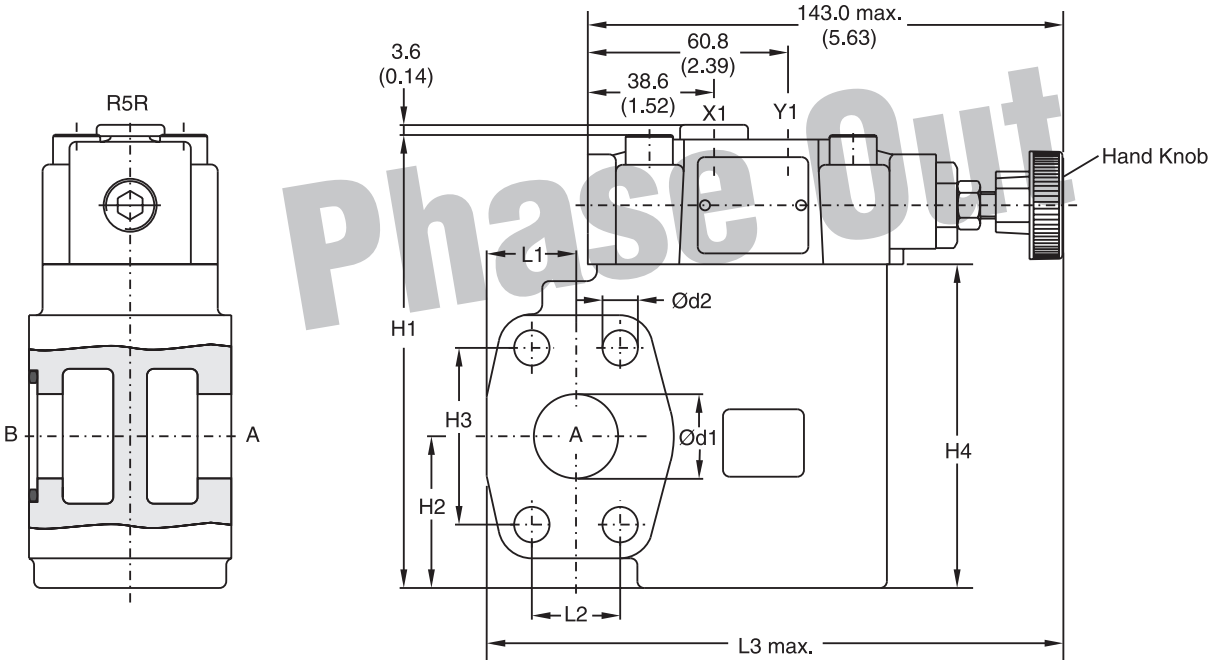
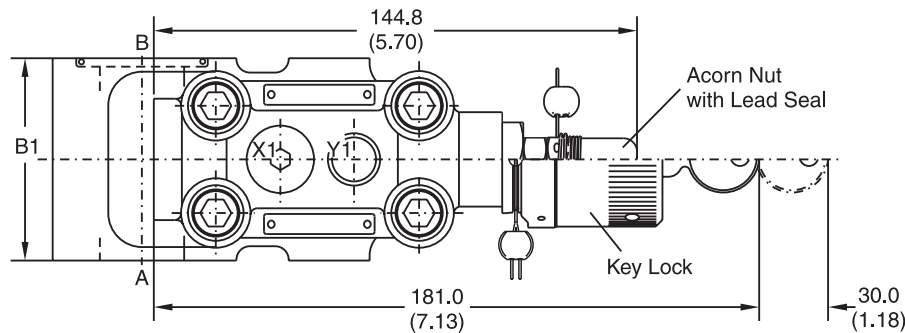


R5R10*



*Measured at 350 Bar (5075 PSI) primary pressure pB.

Inch equivalents for millimeter dimensions are shown in (**)

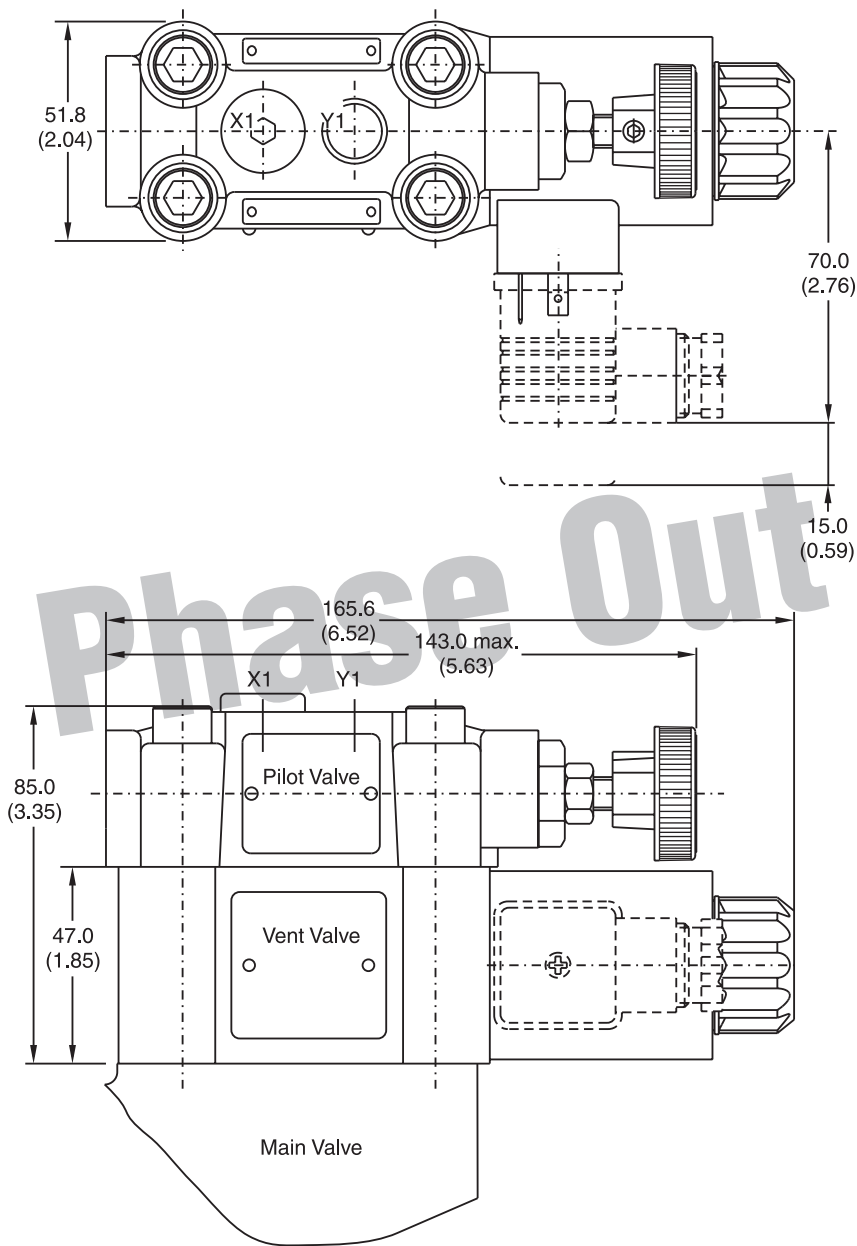


Seal Kits		
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5

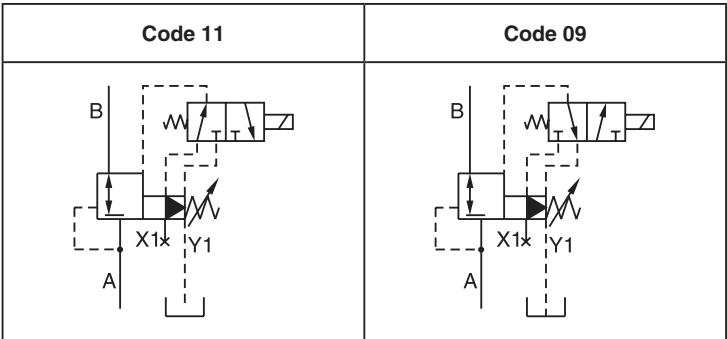
Size	B1	H1	H2	H3	H4	L1	L2	L3	d1	d2
06	60.0 (2.36)	131.6 (5.18)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	24.6 (0.97)	22.2 (0.87)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)
08	60.0 (2.36)	137.6 (5.42)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	26.5 (1.04)	26.2 (1.03)	171.0 (6.73)	25.0 (0.98)	10.5 (0.41)
10	75.0 (2.95)	150.6 (5.93)	48.0 (1.89)	58.7 (2.31)	109.0 (4.29)	34.0 (1.34)	30.2 (1.19)	179.0 (7.05)	32.0 (1.26)	12.5 (0.49)

Port	Function	Port Size		
		R5R06	R5R08	R5R10
B	Inlet Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
A	Reduced Outlet Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
Y1	External Drain	SAE 4		
X1	Pressure Gauge	SAE 4		

Inch equivalents for millimeter dimensions are shown in (**)



External Drain



Vent Valve Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5

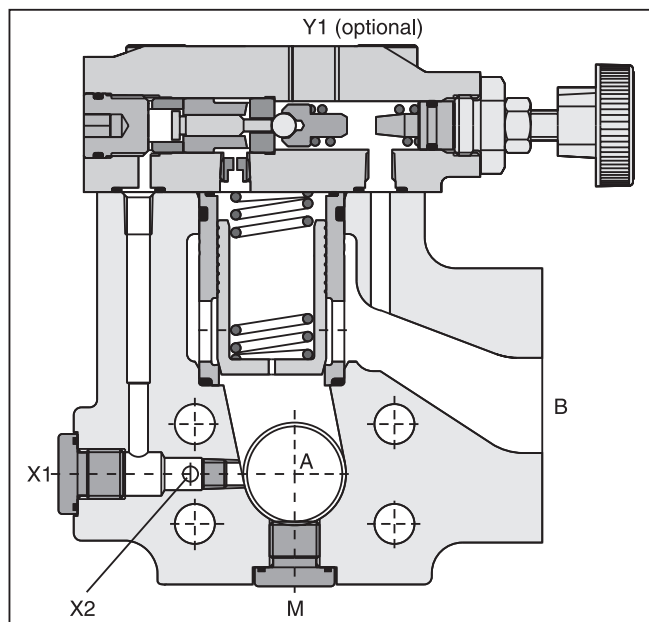
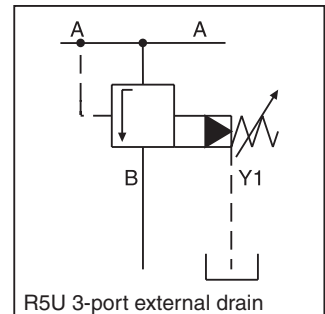
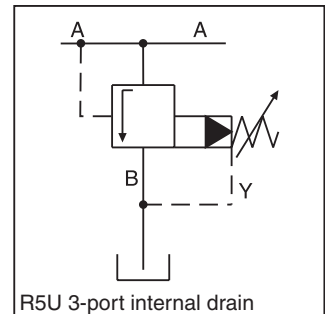
General Description

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.

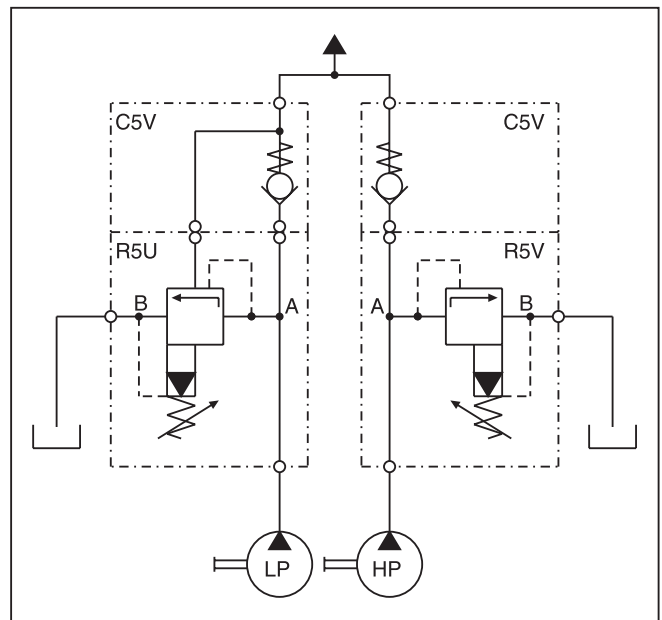
A typical application is the unloading of a pump in an accumulator circuit. The combination of an R5U, C5V and R5V on a double pump generates a high pressure / low pressure pump system without the need of a manifold block or piping between the valves.

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



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.
 D01_Cat2500.indd, ddp, 04/19

Ordering Information

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"
12	SAE 1-1/2"

Code	Size	Max. Pressure
3	12	210 Bar (3045 PSI)
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal
4	Key Lock

Code	Pilot	Drain
4	External via port X1 or X2	External
5	External via port X1 or X2	Internal

Code	Description
Omit	Standard w/o vent function
G0R	12V
G0Q	24V
GAR	98V
GAG	205V
W30	110V 50Hz/ 120V 60Hz
W31	220V 50Hz/ 240V 60Hz

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
Omit	Standard w/o vent function
09*	Solenoid not activ. unpress. circulation
11**	Solenoid activated unpress. circulation

* Sol. de-energized: open to tank
Sol. energized: vent line blocked

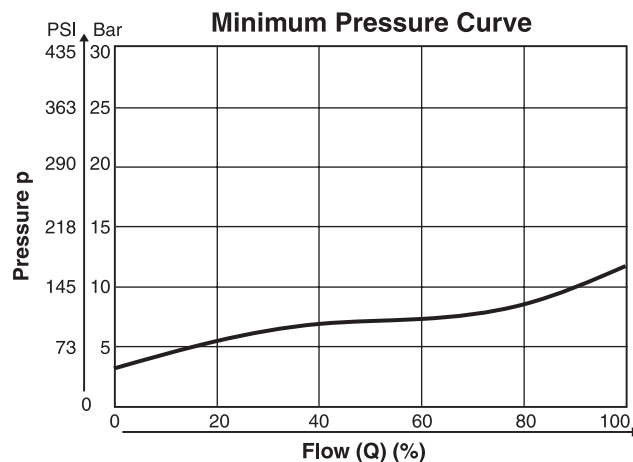
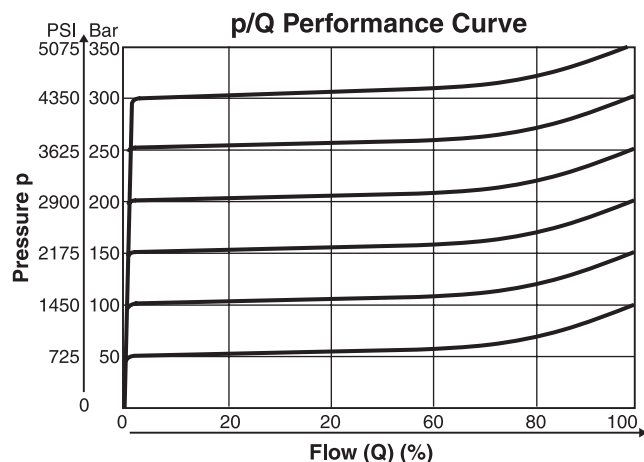
** Sol. de-energized: vent line blocked
Sol energized: open to tank

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.

D01_Cat2500.indd, ddp, 04/19

Specifications

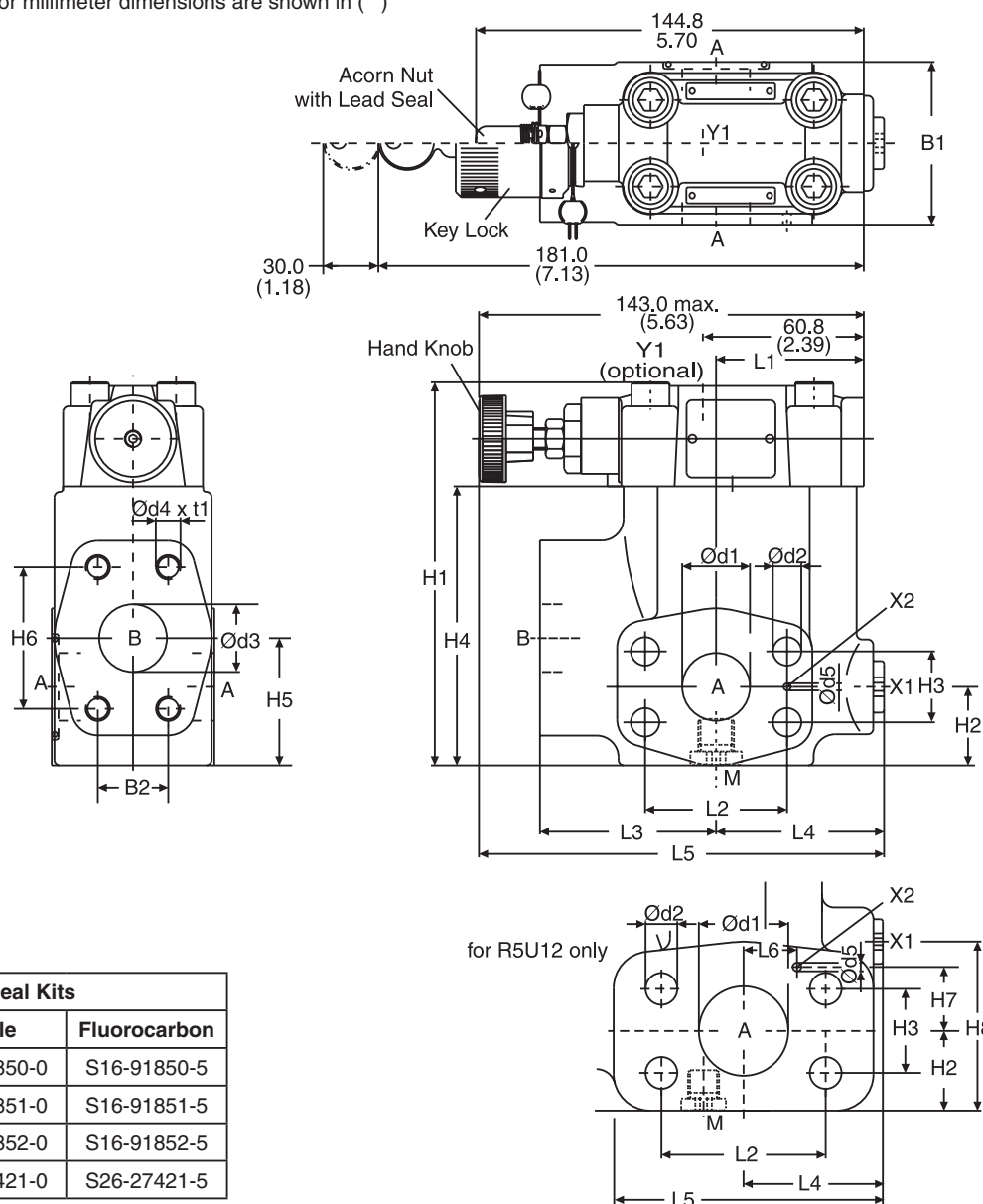
Unloading Valves

Series R5U

General							
Size		06	08	10	12		
Mounting	Flanged according to SAE 61						
Mounting Position	Unrestricted						
Ambient Temperature	-20°C to +50°C (-4°F to +122°F)						
Hydraulic							
Maximum Operating Pressure	Ports A,B, X	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)	210 Bar (3045 PSI)		
	Ports Y, Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)		
Pressure Ranges	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)						
Nominal Flow	90 LPM (23.8 GPM)		300 LPM (79.4 GPM)	600 LPM (158.7 GPM)	600 LPM (158.7 GPM)		
Fluid	Hydraulic oil as per DIN 51524 ... 51525						
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)						
Viscosity Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)						
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)						
Electrical							
Duty Ratio	100%						
Solenoid Connection	Connector as per EN175301-803						
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)						
Supply Voltage	Code	G0R	G0Q	GAR	GAG	W30	W31
		12V	24V	98V	205V	110V at 50Hz 120V at 60Hz	220V at 50Hz 240V at 60Hz
Tolerance Supply Voltage		+5 to -10	+5 to -10	+5 to -10	+5 to -10	±5	±5
Power Consumption	Hold	31W	31W	31W	31W	78W	78W
	In Rush	31W	31W	31W	31W	264W	264W
Response Time	Energized / De-energized AC 20/18ms, DC 46/27 ms						
Maximum Switching Frequency	AC up to 7200 switchings/hour DC up to 16,000 switchings/hour						
Coil Insulation Class	H (180°C) (356°F)						

Dimensions**Unloading Valves
Series R5U**

Inch equivalents for millimeter dimensions are shown in (**)



Seal Kits		
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
12	S26-27421-0	S26-27421-5

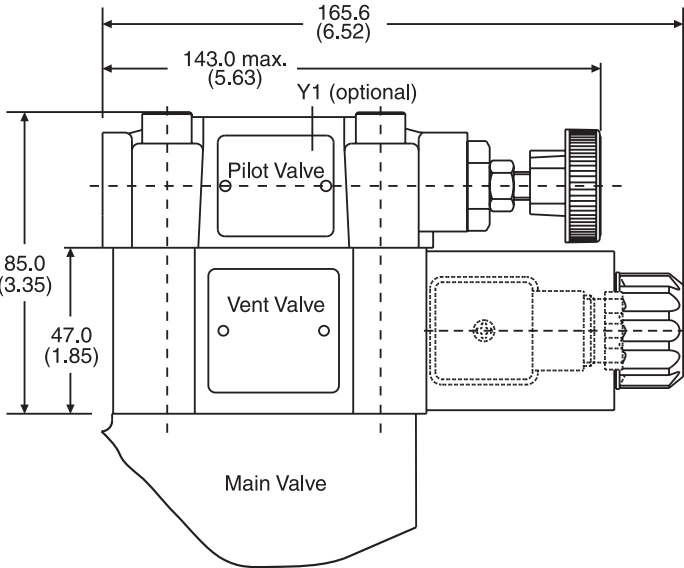
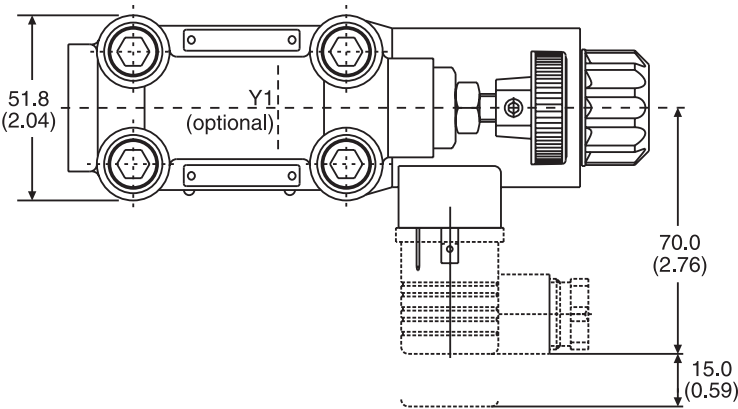
Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	d4	t1	d5	L6	H7	H8
06	60.0 (2.36)	22.2 (0.87)	119.0 (4.69)	28.0 (1.10)	22.2 (0.87)	81.0 (3.19)	41.6 (1.64)	47.6 (1.87)	50.0 (1.98)	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	3/8"-16 UNC	20.0 (0.79)	3.0 (0.12)	-	-	-
08	60.0 (2.36)	26.2 (1.03)	141.0 (5.55)	29.0 (1.14)	26.2 (1.03)	103.0 (4.06)	47.0 (1.85)	52.4 (2.06)	55.8 (2.20)	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.98)	10.5 (0.41)	25.0 (0.98)	3/8"-16 UNC	23.0 (0.91)	3.0 (0.12)	-	-	-
10	75.0 (2.95)	30.2 (1.19)	151.0 (5.94)	34.5 (1.36)	30.2 (1.19)	113.0 (4.45)	64.0 (2.52)	58.7 (2.31)	57.8 (2.28)	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	12.5 (0.49)	32.0 (1.26)	7/16"-14 UNC	22.0 (0.87)	3.0 (0.12)	-	-	-
12	80.0 (3.15)	35.7 (1.41)	178.0 (7.01)	34.0 (1.34)	35.7 (1.41)	140.0 (5.51)	73.0 (2.87)	69.8 (2.75)	37.3 (1.47)	69.8 (2.75)	92.5 (3.64)	55.2 (2.17)	171.2 (6.74)	38.0 (1.50)	13.5 (0.53)	38.0 (1.50)	1/2"-13 UNC	27.0 (1.06)	3.0 (0.12)	22.4 (0.88)	27.2 (1.07)	73.0 (2.87)

Port	Function	Port Size			
		R5U06	R5U08	R5U10	R5U12
A (2)	Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61	1-1/2" SAE 61
B	Tank	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61	1-1/2" SAE 61
X1	External Pilot Port*	SAE 4			
Y1	External Drain	SAE 4			
M	Pressure Gauge	SAE 4			

* closed when supplied.

D01_Cat2500.indd, ddp, 04/19

Inch equivalents for millimeter dimensions are shown in (**)

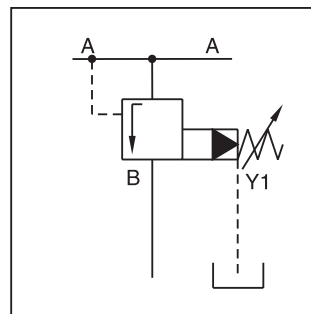


Code	Internal Drain	External Drain
11		
09		

Vent Valve Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5

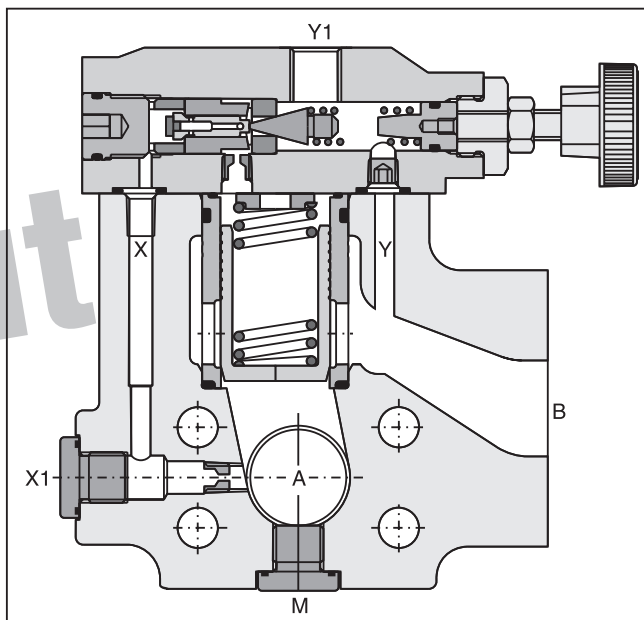
General Description

Series R5S pilot operated sequence valves have a similar design to the subplate mounted R4S series. The SAE flanges allow to mount the valve directly on the inlet flanges of actuators or outlet flanges of pumps to achieve a very compact design.



Features

- Pilot operated with manual adjustment
- 3-port body with SAE61 flange
- 3 sizes (SAE 3/4", 1", 1-1/4")
- 3 pressure stages:
- 2 adjustment modes:
 - Hand knob
 - Acorn nut with lead seal



Ordering Information

R5S

Pressure Sequence Valve

Size

SAE 61 Interface

3

3-Port Body
Y1, M = SAE 4

Pressure Range

Adjustment

6

External Drain from Y1 Port

A

Design Series

Seal

Options Check with Factory

Code

Description

06SAE 3/4"

08SAE 1"

10SAE 1-1/4"

Code

Description

1up to 105 Bar (1523 PSI)

3up to 210 Bar (3045 PSI)

5up to 350 Bar (5075 Bar)

Code

Size

Max. Pressure

410280 Bar (4060 PSI)

506/08350 Bar (5075 PSI)

Code

Description

1Hand Knob

3Acorn Nut with Lead Seal

4Key Lock

Weight:

R5S063.6 kg (7.9 lbs.)

R5S084.6 kg (10.1 lbs.)

R5S105.2 kg (11.5 lbs.)

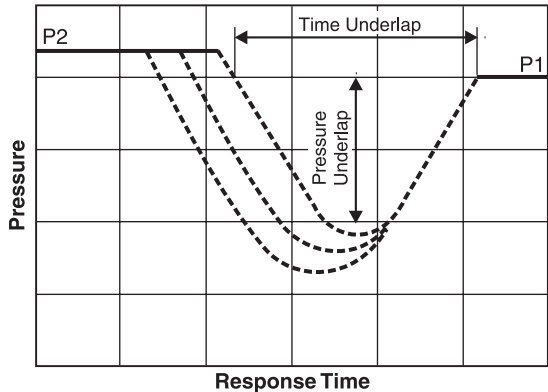
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.
 D01_Cat2500.indd, ddp, 04/19

Specifications

General				
Size		06	08	10
Mounting		Flanged according to SAE 61		
Mounting Position		Unrestricted		
Ambient Temperature Range		-20°C to +50°C (-4°F to +122°F)		
Hydraulic				
Max. Operating Pressure	Ports A,B	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)
	Ports Y, Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)
Pressure Ranges		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)		
Nominal Flow		90 LPM (23.3 GPM)	300 LPM (79.4 GPM)	600 LPM (158.7 GPM)
Fluid		Hydraulic oil as per DIN 51524 ... 51525		
Fluid Temperature		-20°C to 80°C (-4°F to 176°F)		
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)		
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		

Performance Curve

Typical Pressure Characteristics
at Closing Point

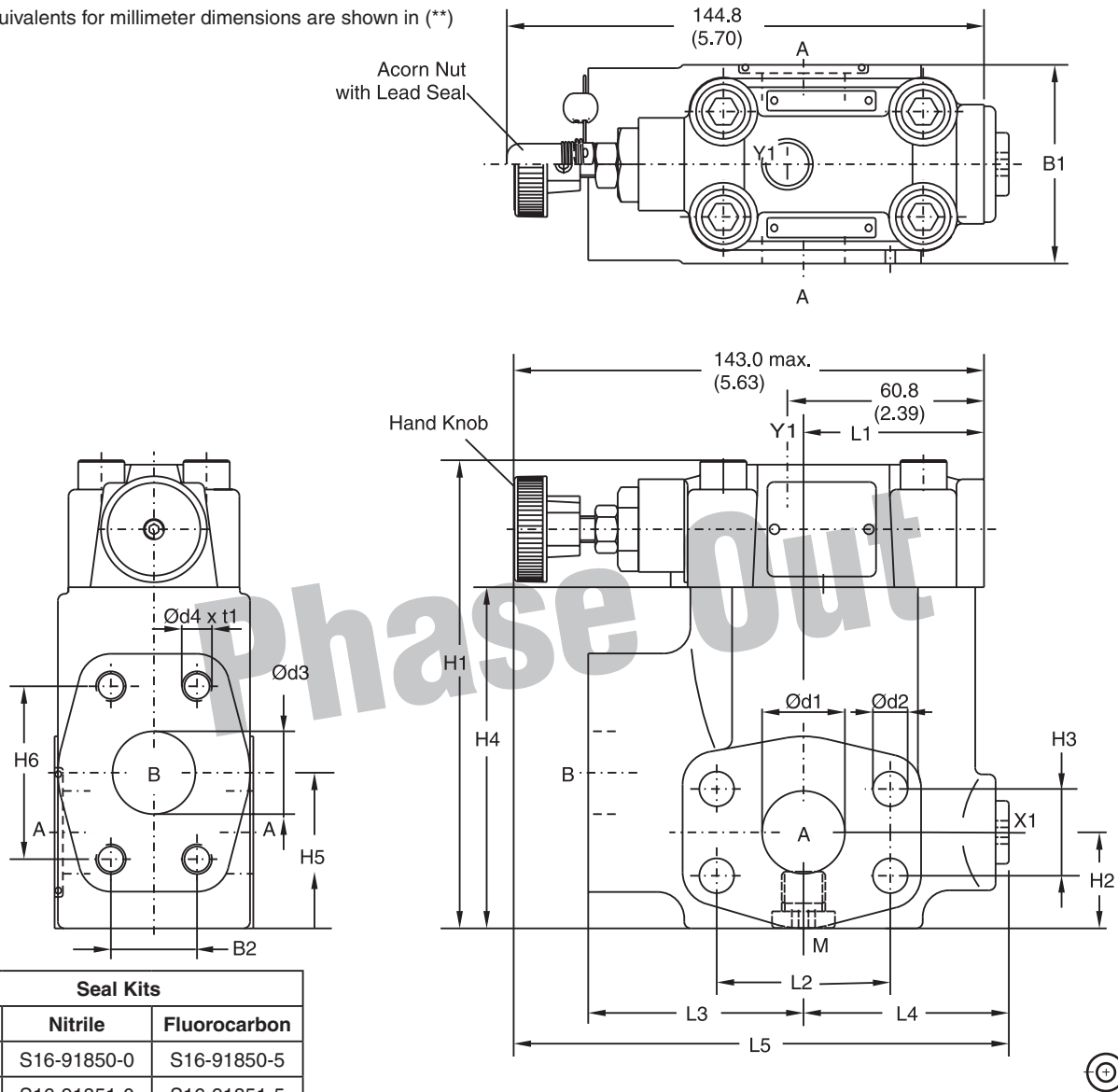


P1 = Setting Pressure
P2 = Operating Pressure

Time and pressure underlap depend on the characteristics
of the specific system.

Dimensions**Sequence Valves****Series R5S**

Inch equivalents for millimeter dimensions are shown in (**)

**SAE 61**

Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	d4 (option 152)	t1
06	60.0 (2.36)	22.2 (0.87)	119.0 (4.69)	28.0 (1.10)	22.2 (0.87)	81.0 (3.19)	41.6 (1.64)	47.6 (1.87)	50.3 (1.98)	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	3/8"-16 UNC (M10)	20.0 (0.79)
08	60.0 (2.36)	26.2 (1.03)	141.0 (5.55)	29.0 (1.14)	26.2 (1.03)	103.0 (4.06)	47.0 (1.85)	52.4 (2.06)	55.8 (2.20)	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.93)	10.5 (0.41)	25.0 (0.98)	3/8"-16 UNC (M10)	23.0 (0.91)
10	75.0 (2.95)	30.2 (1.19)	151.0 (5.94)	34.5 (1.36)	30.2 (1.19)	113.0 (4.45)	64.0 (1.52)	58.7 (2.31)	57.8 (2.28)	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	12.5 (0.49)	32.0 (1.26)	7/16"-14 UNC (M12)	22.0 (0.87)

Port	Function	Port Size		
		R5S06	R5S08	R5S10
A (2)	Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
B	Secondary Port	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
X1	External Pilot Port*	SAE 4		
Y1	External Drain	SAE 4		
M	Pressure Gauge	SAE 4		

* closed when supplied.

D01_Cat2500.indd, ddp, 04/19

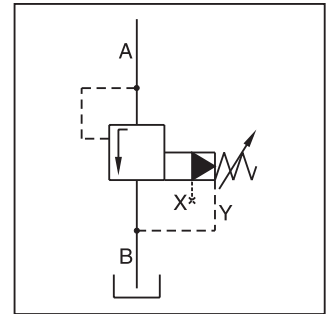
General Description

Series R4V pilot operated, pressure relief valves for in-line mounting have a similar design to the subplate mounted R4V series. For single functions where no manifold blocks are used, the valves can be directly placed in the pipework.

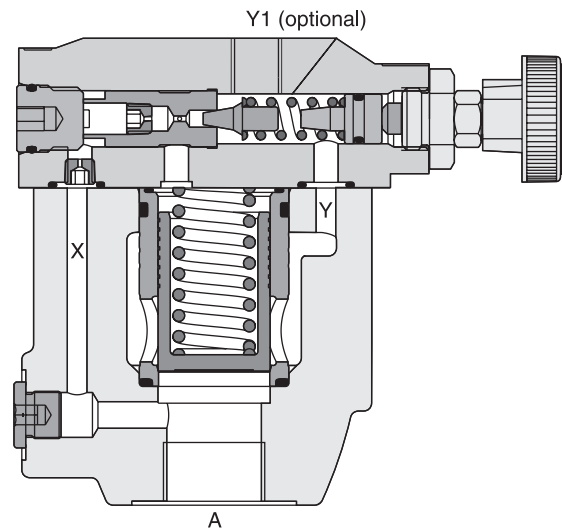
The R4V valves are available with 2 ports (L-body) for in-line relief function or with 3 ports (T-body) for relief functions in the bypass.

Operation

The system pressure in Port A is applied to the pilot valve and to the top surface of the main poppet via an orifice in X. The hydraulically balanced main poppet is held against the seat by the main spring. In this state there is no flow through the valve. The adjusted spring force acting on the pilot cone determines the relief pressure. If the pressure in Port A exceeds the set point, the pilot cone is lifted from its seat, releasing a small pilot flow to tank. The flow through the control orifice in X creates a pressure drop which limits the pressure at the top of the main poppet to the set point. The higher system pressure in Port A now lifts the main poppet off its seat and allows flow to Port B. In the resulting float position only enough flow is passed from Port A to Port B to maintain the inlet pressure in Port A at the set point. When the pressure in Port A falls below the set point, the hydraulic balance on the main poppet is restored. The main spring then forces the main poppet to close.



R4V06 L-Body



Features

- Pilot operated with manual adjustment
- 2 interfaces:
 - L-body (R4V06-SAE 12, R4V10-SAE 20)
 - T-body (R4V03-SAE 8, R4V06-SAE 16)
- 3 pressure stages
- 3 adjustment modes:
 - Hand knob
 - Acorn nut with lead seal
 - Key lock
- With optional vent function

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.
D01_Cat2500.indd, ddp, 04/19

Ordering Information

R4V Pressure Relief Valve	Size —	5 Max Pressure 350 Bar (5075 PSI)	Body	Pressure Range	Adjustment	Drain Line	Switching Type	Solenoid Voltage (Optional)	A Design Series	Seal	Options Check with Factory
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Code	Description
03	NG10 (SAE 8)
06	NG25 (SAE 16 – T-Body) (SAE 12 – L-Body)
10	NG32 (SAE 20)

Code	Description
0	Internal
2	External from Pilot Head (Y1)

Code	Description
Omit	Standard w/o vent function
G0R	12V
G0Q	24V
GAR	98V
GAG	205V
W30	110V 50Hz/ 120V 60Hz
W31	220V 50Hz/ 240V 60Hz

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
1	R4V03 T-Body NPT R4V06 T-Body NPT
4	R4V03 T-Body R4V06 T-Body
6	R4V03 T-Body BSP R4V06 T-Body BSP
A	R4V06 T-Body NPT R4V10 T-Body NPT
B	R4V06 L-Body R4V10 L-Body
D	R4V06 L-Body BSP R4V10 L-Body BSP

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal
4	Key Lock

Code	Description
Omit	Standard w/o vent function
09*	Solenoid not activ. unpress. circulation
11**	Solenoid activated unpress. circulation

* Sol. de-energized: open to tank
Sol. energized: vent line blocked

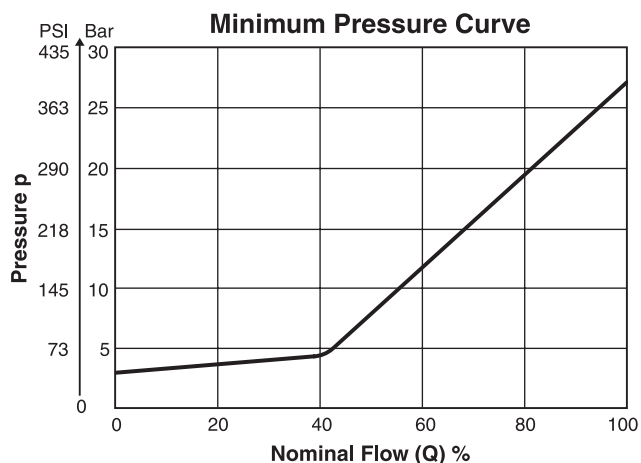
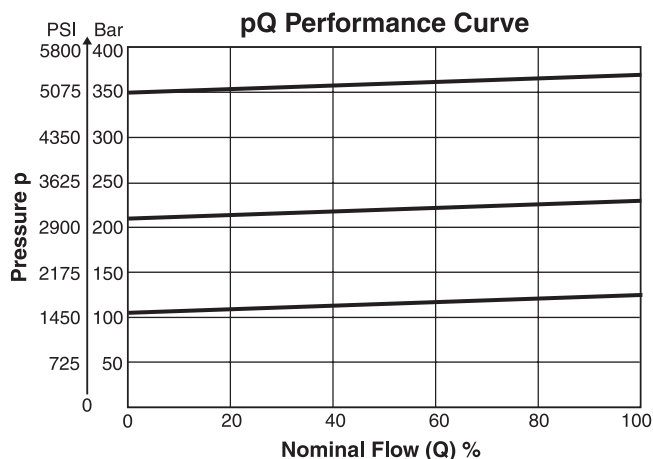
** Sol. de-energized: vent line blocked
Sol energized: open to tank

Weight:

R4V03	3.2 kg (7.1 lbs.)
R4V06*4	6.6 kg (14.6 lbs.)
R4V06*B	3.3 kg (8.2 lbs.)
R4V10	5.6 kg (12.3 lbs.)

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 Bar)

Performance Curves*



* The performance curves are measured with external drain. For internal drain, the tank pressure has to be added to the curve.

R4V

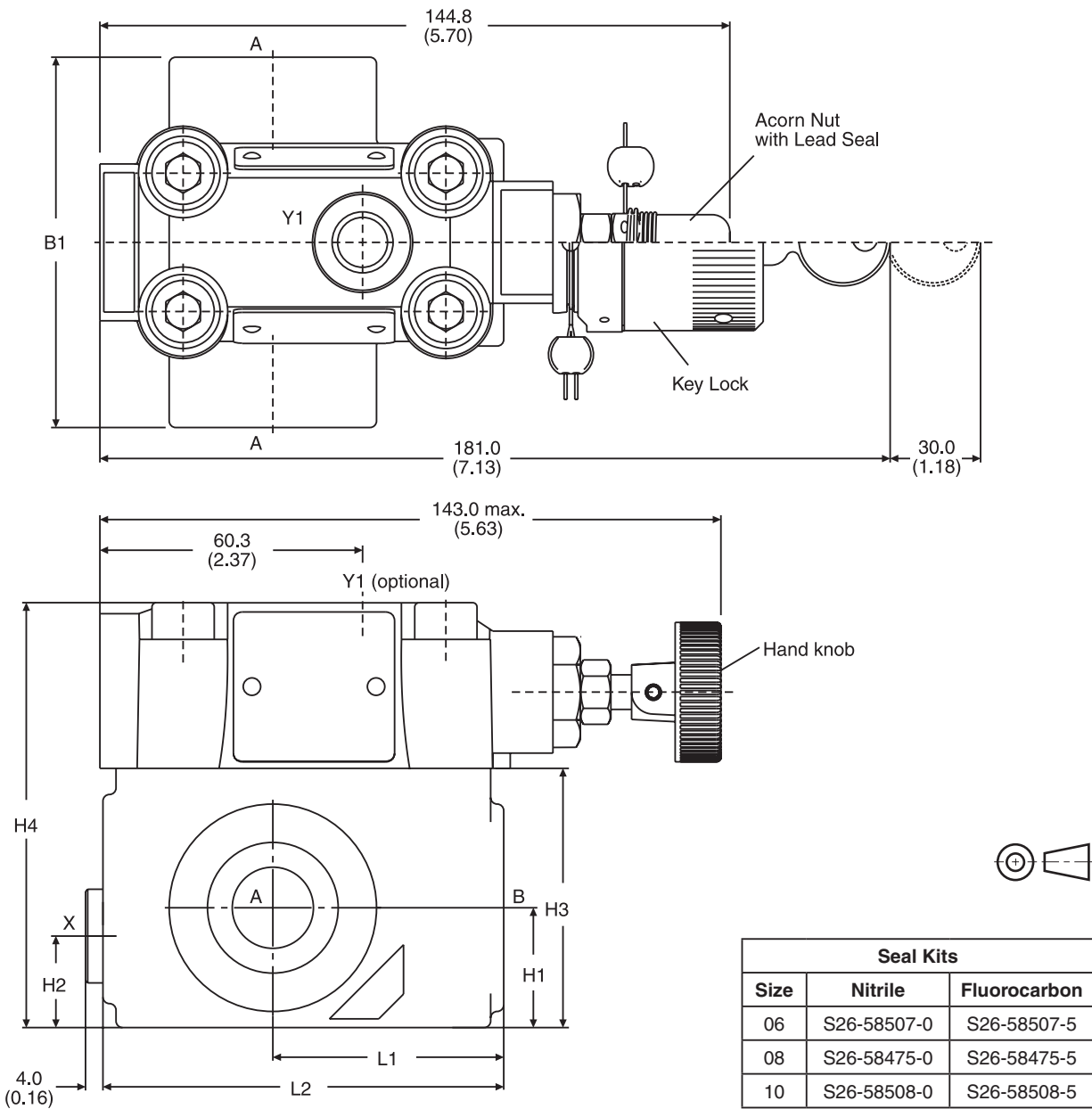
General				
Size	T-Body		L-Body	
	03 (SAE 8)	06 (SAE 16)	06 (SAE 12)	10 (SAE 20)
Mounting	Threaded Body			
Mounting Position	Unrestricted			
Ambient Temp. Range	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Max. Operating Pressure	Ports A and X up to 350 Bar (5075 PSI); Ports B and Y 30 Bar (435 PSI)			
Pressure Ranges	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)			
Nominal Flow	60 LPM (15.9 GPM)	200 LPM (52.9 GPM)	200 LPM (52.9 GPM)	450 LPM (119.0 GPM)
Fluid	Hydraulic oil as per DIN 51524 ... 51525			
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity	10 to 650 cSt / mm²/s (46 to 3013 SSU 30 cSt / mm²/s (139 SSU))			
Permitted Recommended				
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			

R4V with Vent Function

General						
Size	T-Body			L-Body		
	03 (SAE 8)	06 (SAE 16)		06 (SAE 12)	10 (SAE 20)	
Mounting	Threaded Body					
Mounting Position	Unrestricted					
Ambient Temp. Range	-20°C to +50°C (-4°F to +122°F)					
Weight	3.2 kg (7.0 lbs)	6.6 kg (14.5 lbs)		3.3 kg (7.3 lbs)	5.6 kg (12.3 lbs)	
Electrical (Solenoid)						
Duty Ratio	100%					
Response Time	Energized / De-energized AC: 20/18ms, DC: 46/27 ms					
	Code	G0R	G0Q	GAR	GAG	W30 W31
Supply Voltage		12V	24V	98V	205V	110V at 50Hz 120V at 60Hz 220V at 50Hz 240V at 60Hz
Tolerance Supply Voltage		+5 to -10	+5 to -10	+5 to -10	+5 to -10	±5 ±5
Power Consumption	Hold	31W	31W	31W	31W	78W 78W
	In Rush	31W	31W	31W	31W	264W 264W
Maximum Switching Frequency	AC up to 7,200 switchings per hour DC up to 16,000 switchings per hour					
Solenoid Connection	Connector as per EN175301-803					
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)					
Coil Insulation Class	H (180°C) (356°F)					

T-Body

Inch equivalents for millimeter dimensions are shown in (**)



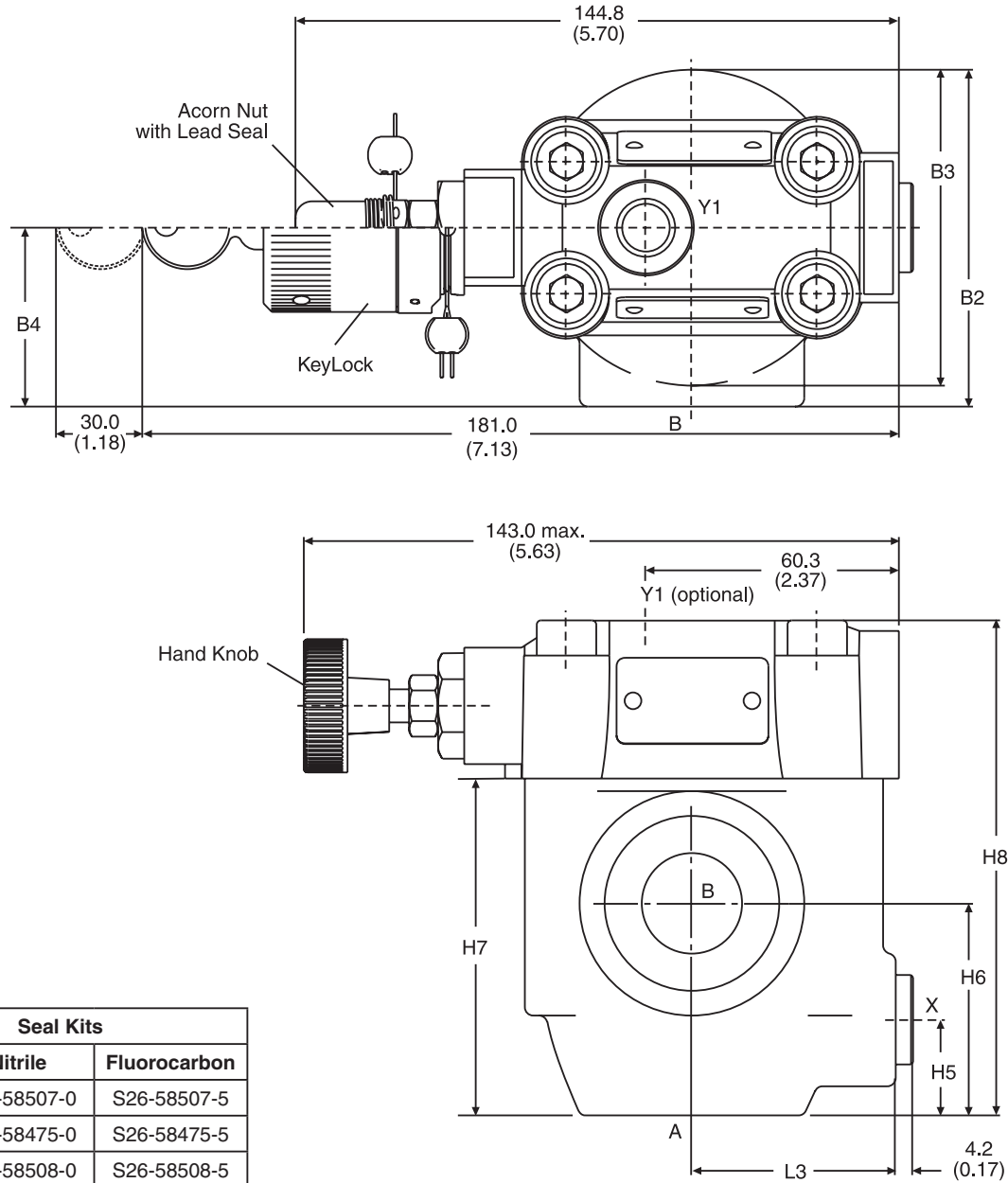
Size	Body	B1	B2	B3	B4	H1	H2	H3	H4	H5	H6	H7	H8	L1	L2	L3
03	T-body	85.0 (3.35)	–	–	–	27.5 (1.08)	21.0 (0.83)	59.5 (2.34)	97.5 (3.84)	–	–	–	–	53.0 (2.09)	92.0 (3.62)	–
06	T-body	136.0 (5.35)	–	–	–	38.0 (1.50)	28.0 (1.10)	93.0 (3.66)	131.0 (5.16)	–	–	–	–	66.5 (2.62)	117.5 (4.63)	–

Ports	Function	Port size	
		R4V03 T-body	R4V06 T-body
A	Pressure (inlet)	SAE 8	SAE 16
B	Tank (outlet)	SAE 8	SAE 16
X ¹⁾	Ext. Remote Control or Vent Connection	SAE 4	
Y1 ²⁾	External Drain		

¹⁾ closed when supplied
²⁾ port Y1 is only available at drain line (code 2) external from the pilot head

L-Body

Inch equivalents for millimeter dimensions are shown in (**)



Seal Kits		
Size	Nitrile	Fluorocarbon
06	S26-58507-0	S26-58507-5
08	S26-58475-0	S26-58475-5
10	S26-58508-0	S26-58508-5

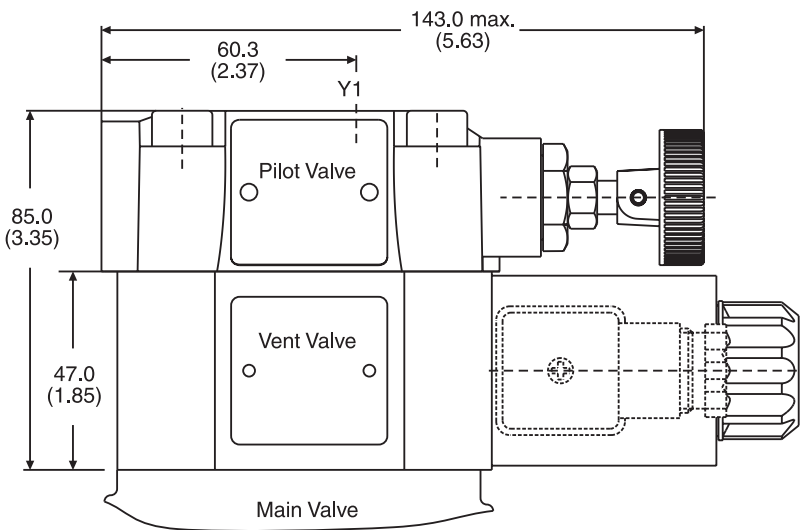
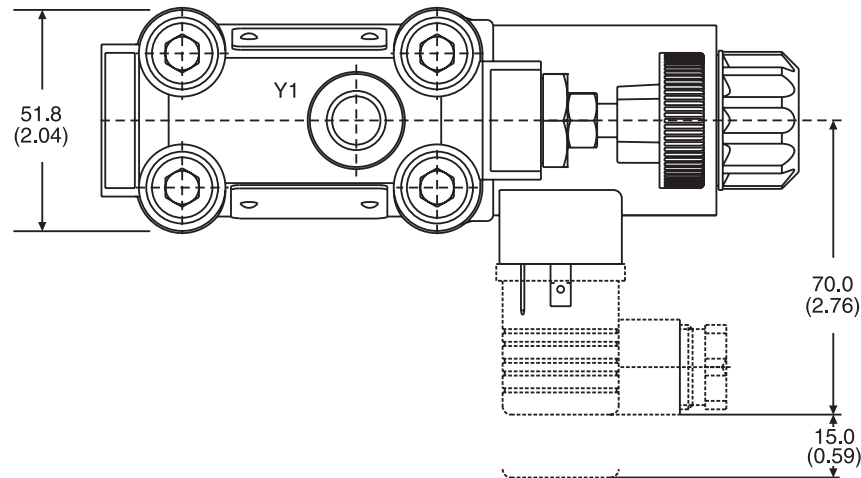
Size	Body	B1	B2	B3	B4	H1	H2	H3	H4	H5	H6	H7	H8	L1	L2	L3
06	L-body	—	81.0 (3.19)	76.0 (2.99)	43.0 (1.69)	—	—	—	—	23.0 (0.91)	51.0 (2.01)	81.0 (3.19)	119.0 (4.69)	—	—	49.0 (1.93)
10	L-body	—	120.7 (4.75)	85.8 (3.38)	77.8 (3.06)	—	—	—	—	31.8 (1.25)	50.8 (2.00)	96.0 (3.78)	134.0 (5.28)	—	—	49.8 (1.96)

Ports	Function	Port size	
		R4V06 L-body	R4V10 L-body
A	Pressure (inlet)	SAE 12	SAE 20
B	Tank (outlet)	SAE 12	SAE 20
X ¹⁾	Ext. Remote Control or Vent Connection	SAE 4	
Y1 ²⁾	External Drain		

¹⁾ closed when supplied

²⁾ port Y1 is only available at drain line (code 2) external from the pilot head

Inch equivalents for millimeter dimensions are shown in (**)



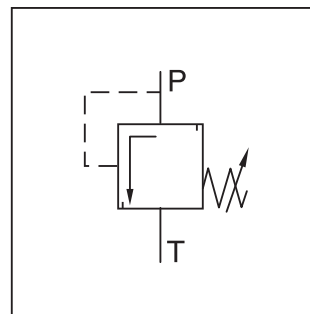
Vent Valve Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5

Code	Internal Drain	External Drain
11		
09		

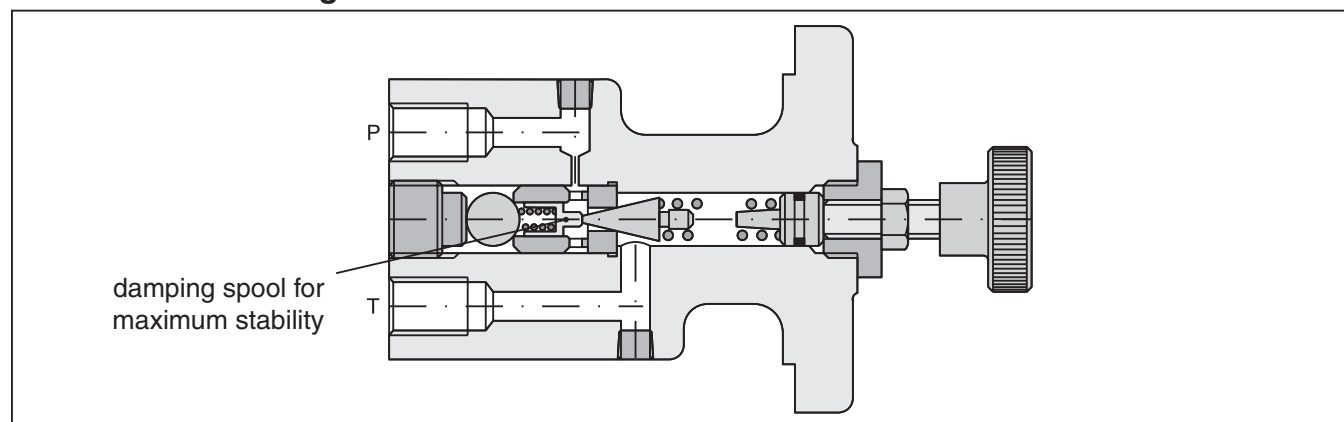
Typically pilot operated pressure valves or compensators of variable pumps are controlled.

Features

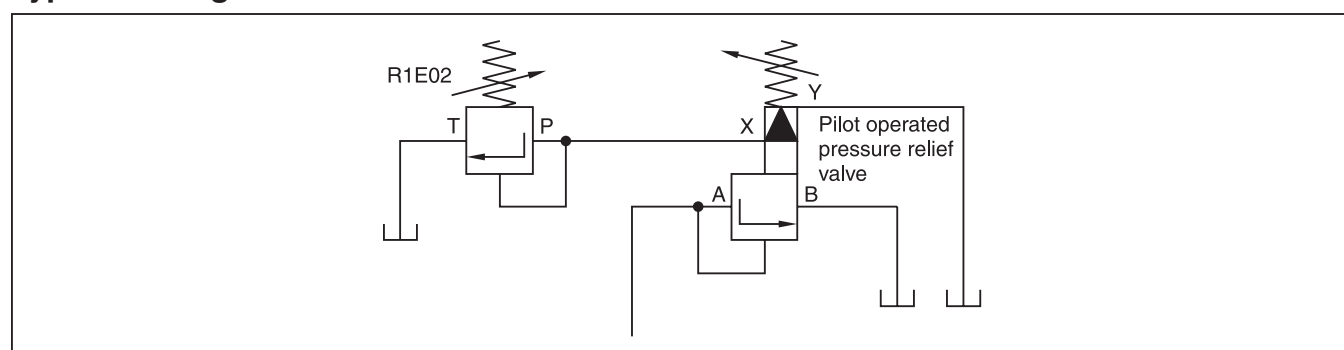
- Seated type valve
- 3 body variants:
 - foot mounting
 - front panel mounting
 - subplate mounting
- 3 pressure ranges
- 3 adjustment modes:
 - hand knobs
 - acorn nut with lead seal
 - adjusting with lock




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.

D01 Cat2500.indd, ddp, 04/19

Ordering Information

<div><div>R1E02</div><div>Pressure Relief Valve</div></div>	<div><div></div><div>Interface</div></div>	<div><div></div><div>Pressure Range</div></div>	<div><div>2</div><div>Connections G1/4"</div></div>	<div><div></div><div>Adjustment</div></div>	<div><div>A</div><div>Design Series</div></div>	<div><div>1</div><div>Seal Nitrile</div></div>	<div><div></div><div>Options Check with Factory</div></div>																								
<table><tr><th>Code</th><th>Description</th></tr><tr><td>1</td><td>Foot Mounting</td></tr><tr><td>2</td><td>Front Panel Mounting</td></tr><tr><td>3</td><td>Subplate Mounting</td></tr></table>	Code	Description	1	Foot Mounting	2	Front Panel Mounting	3	Subplate Mounting		<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)		<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 with Lead Seal</td></tr><tr><td>4 *</td><td>Adjusting Device with Lock (Key Order No. 700-70619)</td></tr></table>	Code	Description	1	Hand Knob Ø32mm	3	Acorn Nut with Lead Seal	4 *	Adjusting Device with Lock (Key Order No. 700-70619)			
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Code	Description																														
1	Hand Knob Ø32mm																														
3	Acorn Nut with Lead Seal																														
4 *	Adjusting Device with Lock (Key Order No. 700-70619)																														

Weight:

R1E021	2.1 kg (4.6 lbs.)
R1E022	2.1 kg (4.6 lbs.)
R1E023	1.0 kg (2.2 lbs.)

Seal Kit:

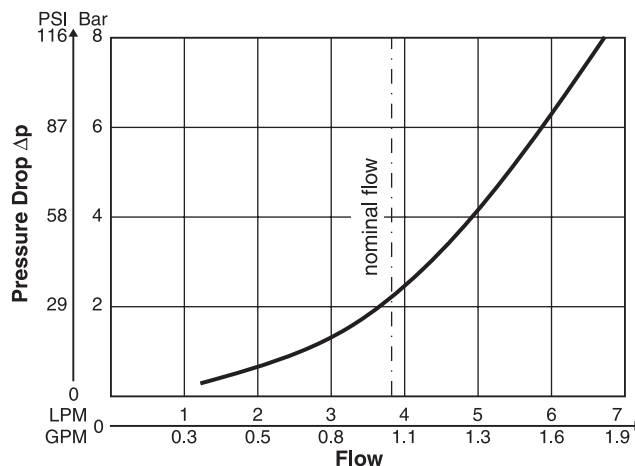
R1E021	S26-58466-0
R1E022	S26-58466-0
R1E023	S16-91963-0

* on bodies for subplate mounting use plate S16-64188.

Specifications

General		
Size	1/4"	
Interface	Foot mounting, Front panel mounting, Subplate mounting	
Mounting Position	Unrestricted	
Ambient Temperature Range	-20°C to +70°C (-4°F to +158°F)	
Hydraulic		
Maximum Operating Pressure	Port P 350 Bar (5075 PSI); Port T depressurized	
Pressure Range	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)	
Fluid	Hydraulic oil as per DIN 51524 ... 51525	
Fluid Temperature	-20°C to +70°C (-4°F to +158°F)	
Nominal Flow	3.8 LPM (1.0 GPM)	
Minimum Pressure Setting	7 Bar (102 PSI)	
Viscosity	Permitted	10 to 650 cSt / mm²/s (46 to 3013 SSU)
	Recommended	30 cSt / mm²/s (139 SSU)
Filtration	ISO Class 4406 (1999) 18/16/13	

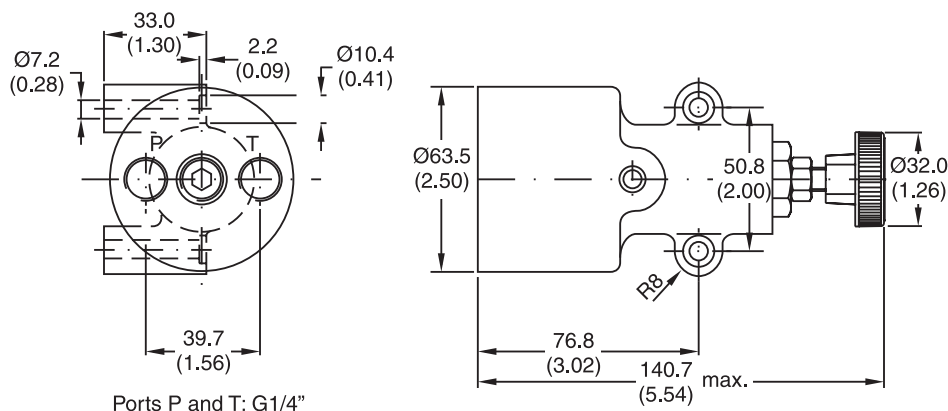
Performance Curve



Fluid viscosity 35 cSt at 50°C (122°F) \pm 5°C (41°F)

Inch equivalents for millimeter dimensions are shown in (**)

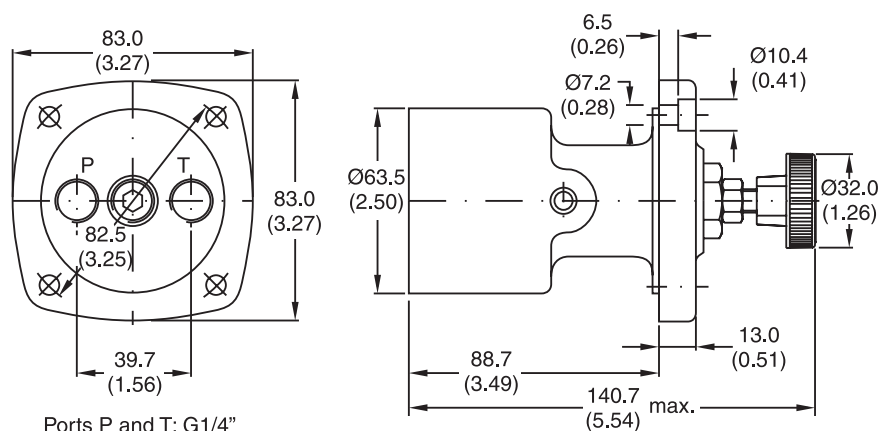
Foot Mounting



Ports P and T: G1/4"

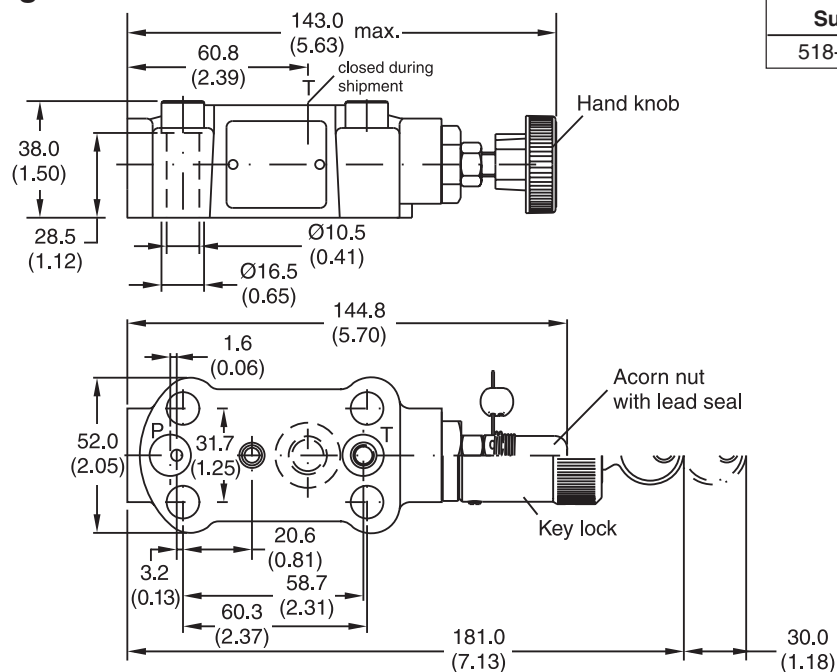
D

Front Panel Mounting



Ports P and T: G1/4"

Subplate Mounting



Subplate	Size
518-00139-0	3/8" NPT

Contents**Series 2F1C**

General Description.....	2-Way Flow Control Valves, Subplate Mounted	E2
Operation.....		E2
Features		E2
Ordering Information		E2
Specifications		E3
Performance Curves.....		E4 - E6
Dimensions.....		E7

Series C4V

General Description.....	Direct Operated Check Valves, Subplate Mounted	E8
Operation.....		E8
Features		E8
Ordering Information		E8
Specifications		E9
Performance Curves.....		E9
Dimensions.....		E10

Series C4V

General Description	Pilot Operated Check Valves, Subplate Mounted	E11
Operation.....		E11
Features		E11
Ordering Information		E11
Specifications		E12
Performance Curves.....		E12
Dimensions.....		E13

Series C5P

General Description.....	Pilot Operated Check Valves, SAE Flange	E14
Operation.....		E14
Features		E14
Ordering Information		E14
Specifications		E15
Performance Curves.....		E15
Dimensions.....		E16

Series C5V

General Description.....	Direct Operated Check Valves, SAE Flange	E17
Operation.....		E17
Features		E17
Ordering Information		E17
Specifications		E18
Performance Curves.....		E18
Dimensions.....		E19

Terms of Sale and Warranty Limitations	E21
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Safety Guide.....	E23 - E26
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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:

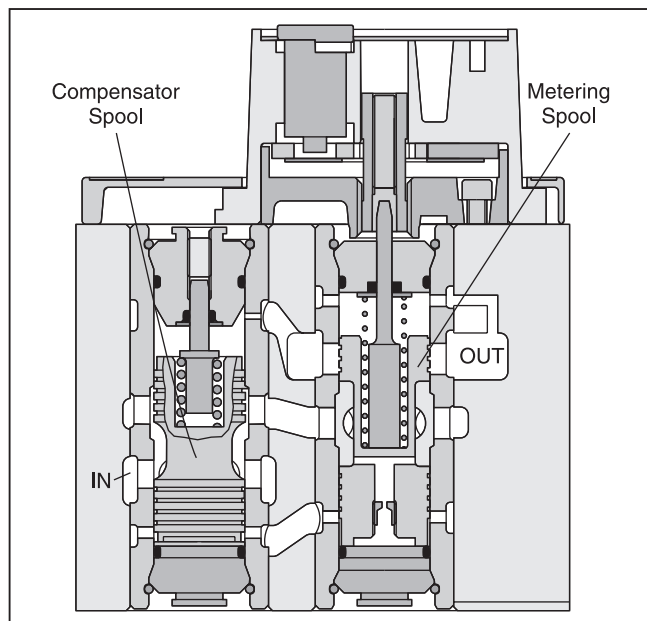
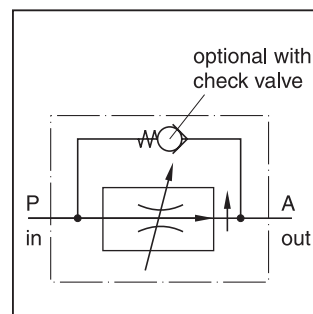
Lock: Adjustment is locked

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

Reverse Flow Check

Options Check with Factory

Options Check with Factory

Code	Description
02	NG10 (3/8")
03	NG16 (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.)

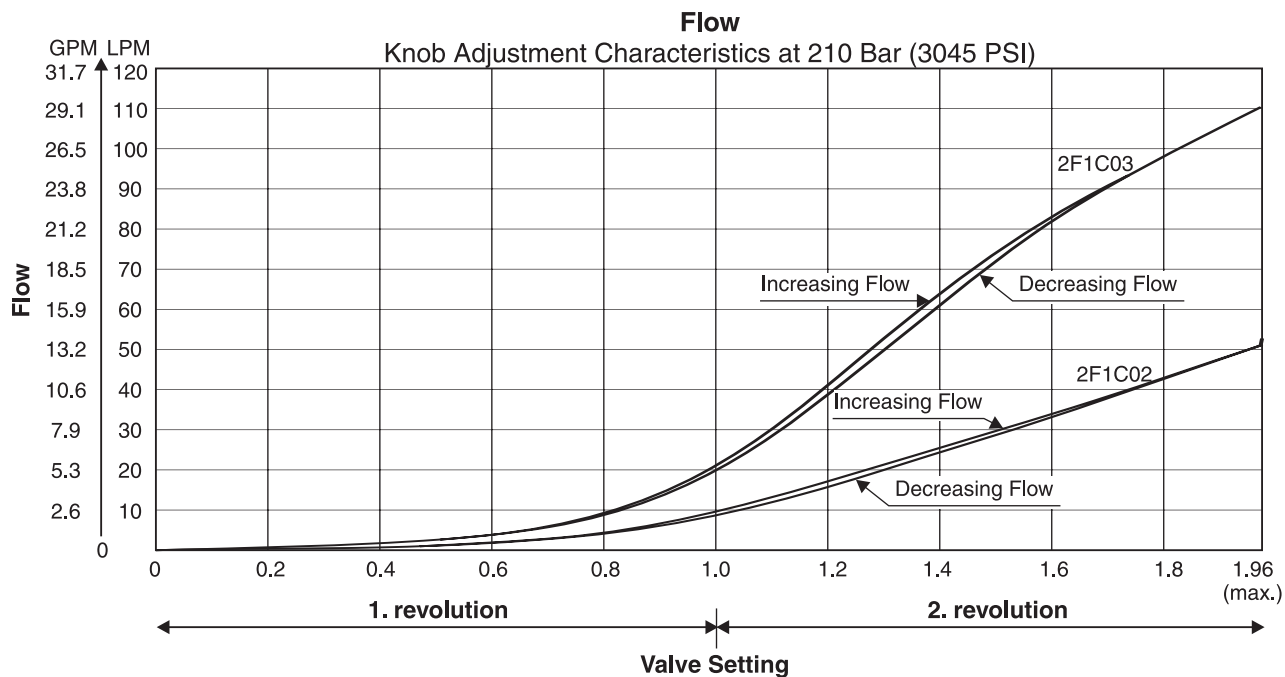
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

E01_Cat2500.indd, ddp, 04/19

Specifications**Pressure Compensated Flow Control Valves
Series 2F1C**

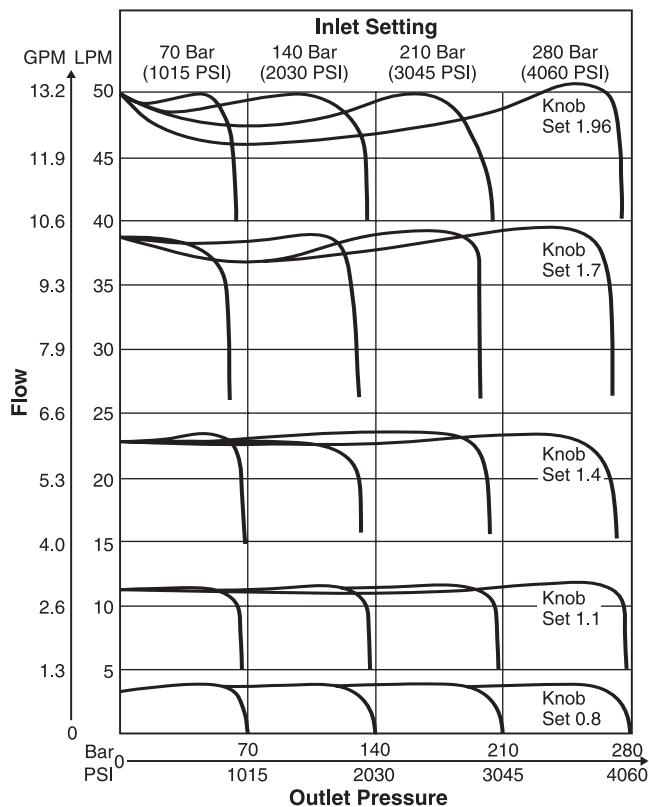
Size	NG10		NG16	
Actuator	Manual flow rate adjustment			
Mounting Type	ISO 6263			
Mounting Position	Unrestricted			
Fluid Temperature	+70°C (+158°F) Maximum			
Ambient Temperature	-25°C to +50°C (-13°F to +122°F)			
Viscosity Range	2.8 to 400 cSt / mm²/s (13 to 1854 SSU)			
Filtration	ISO 4406 (1999); 18/16/13 (meet NAS 1638:7)			
Maximum Pressure Difference	See Diagram			
Maximum Operating Pressure	Port A	2F1C02 14 - 280 Bar (203 - 4060 PSI) 0 - 270 Bar (0 - 3915 PSI)		2F1C03 14 - 350 Bar (203 - 5075 PSI) 0 - 340 Bar (0 - 4930 PSI)
	Port B			
Flow Direction	A–B	Flow control function		
	B–A	Blocked or free flow through check valve		

E



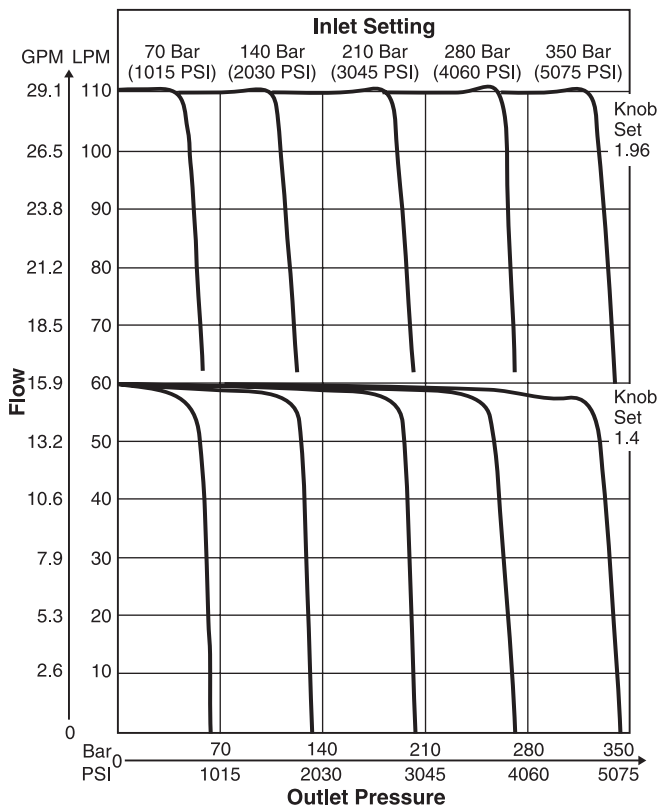
2F1C02

Flow / Pressure Drop
 Constant Inlet Pressure – Variable Outlet Pressure



2F1C03

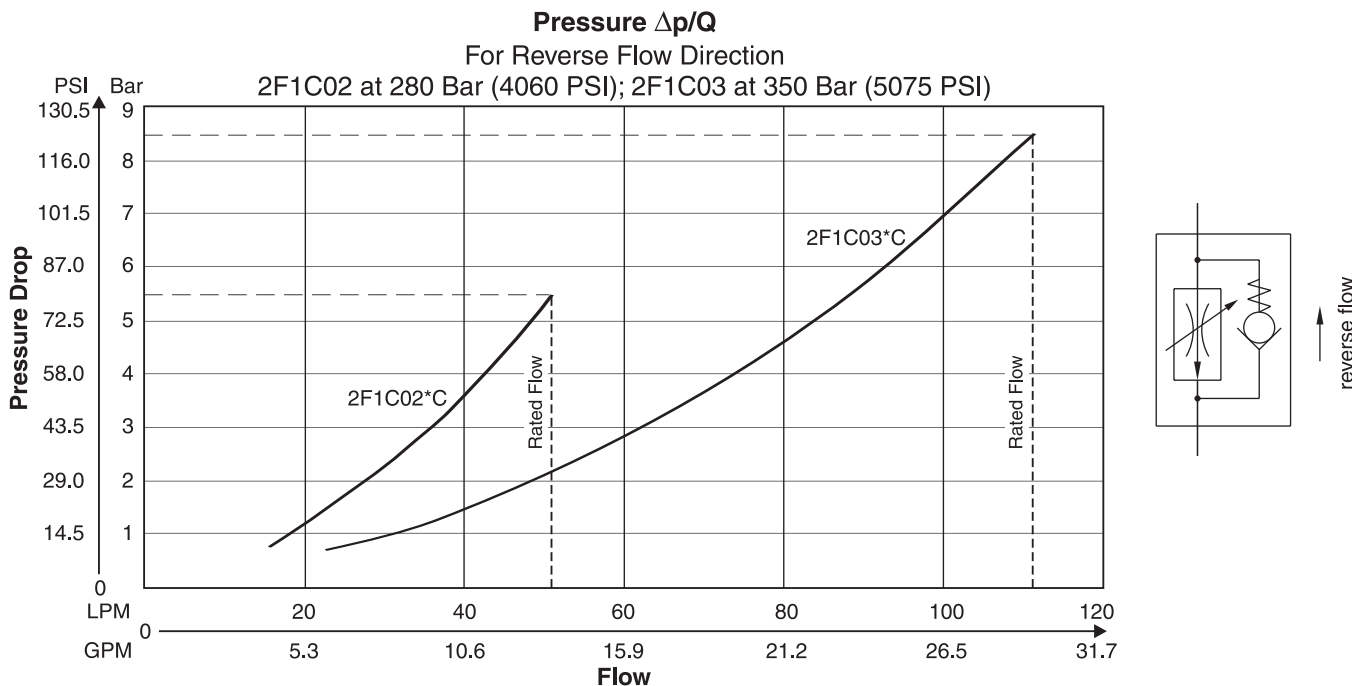
Flow / Pressure Drop
 Constant Inlet Pressure – Variable Outlet Pressure



Fluid viscosity 40 cSt at 50°C (122°F)

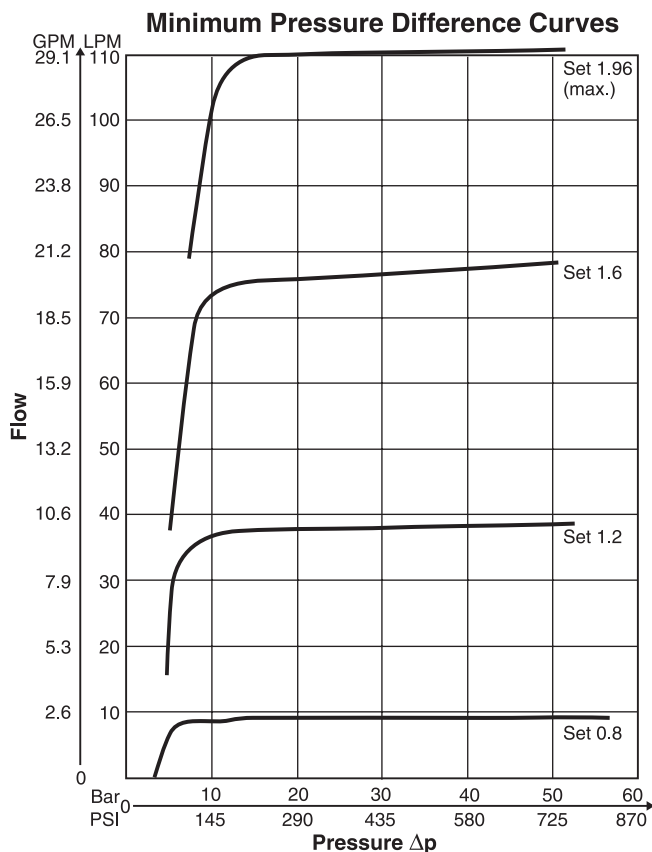
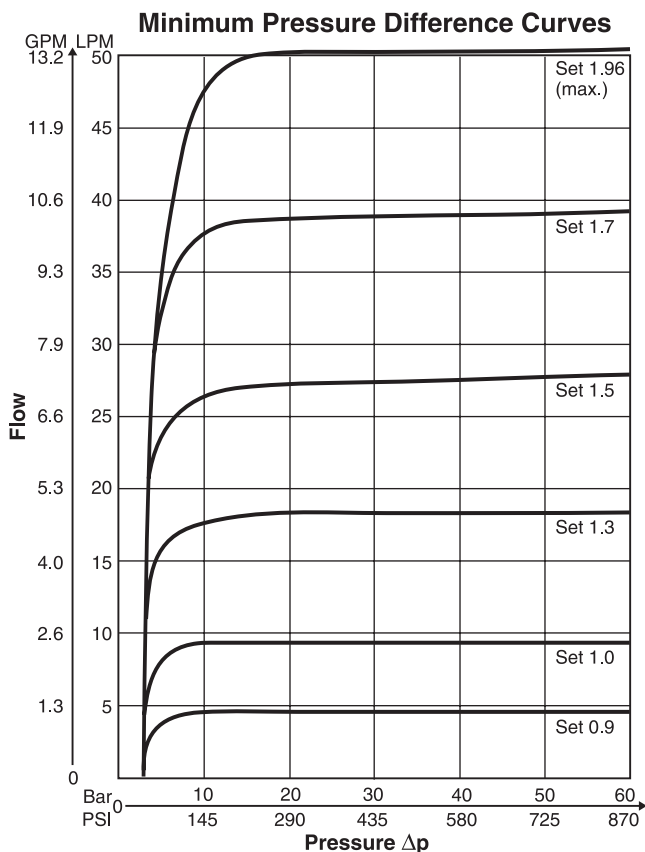
E01_Cat2500.indd, ddp, 04/19





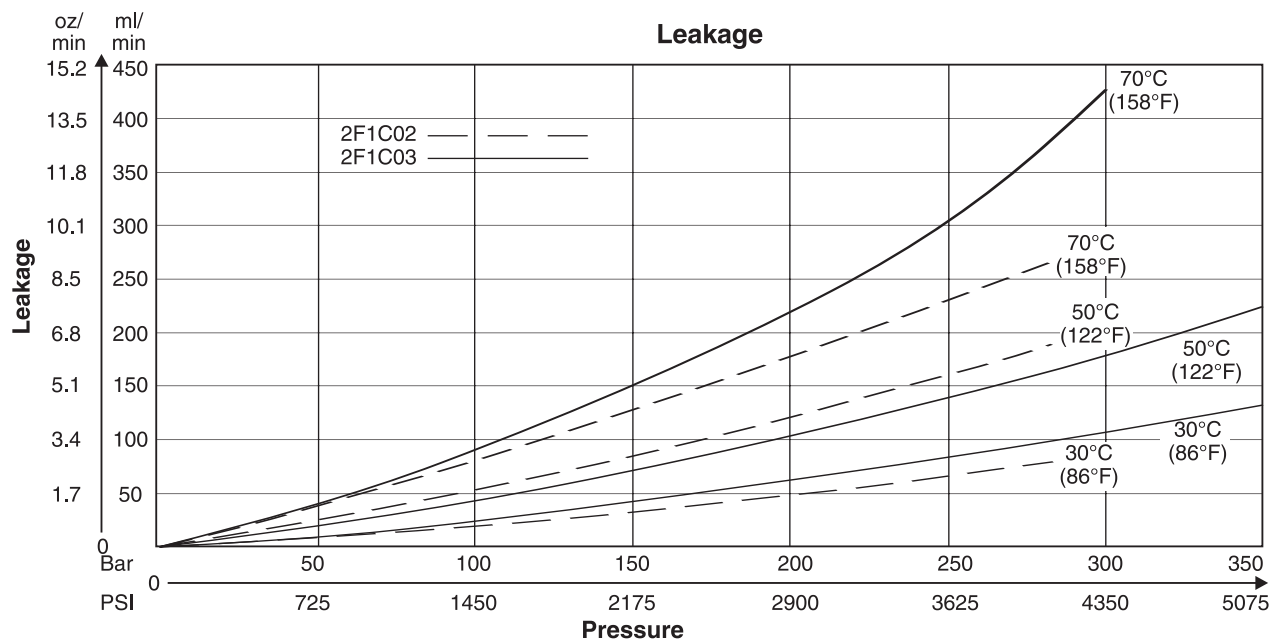
2F1C02

2F1C03



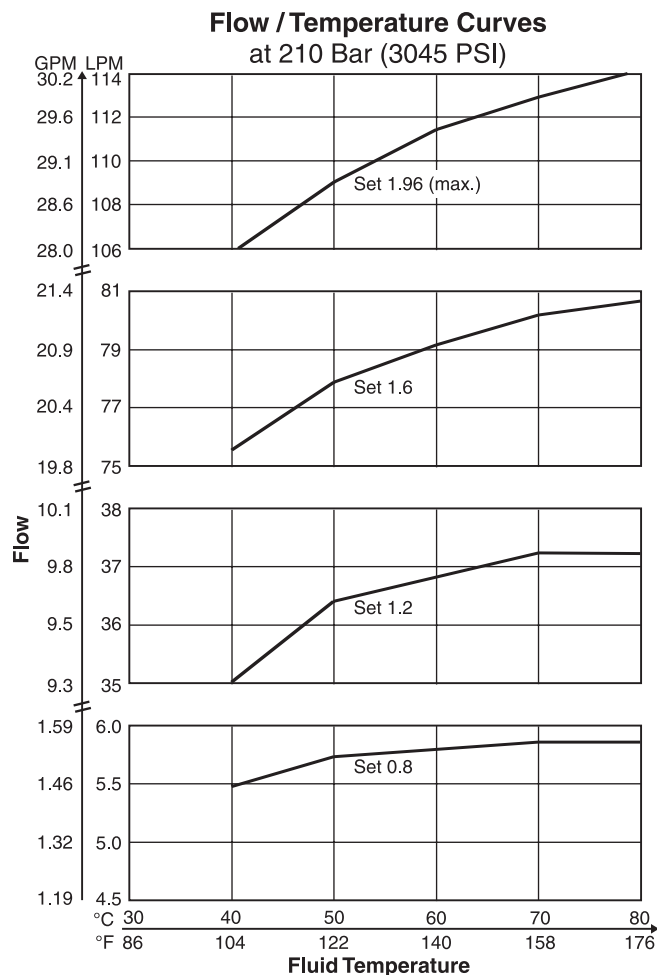
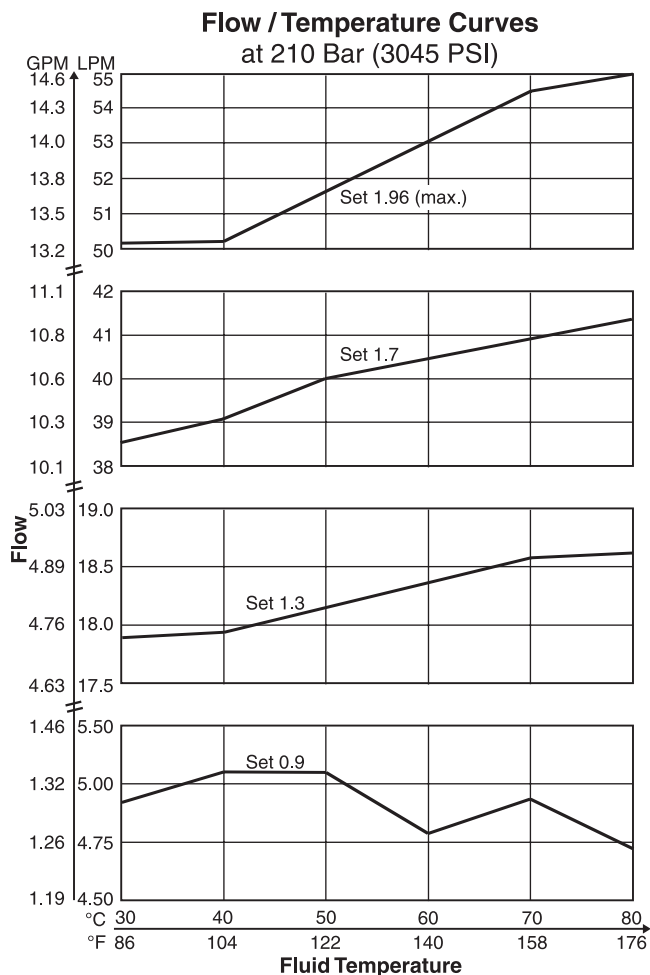
Fluid viscosity 40 cSt at 50°C (122°F)

E01_Cat2500.indd, ddp, 04/19



2F1C02

2F1C03

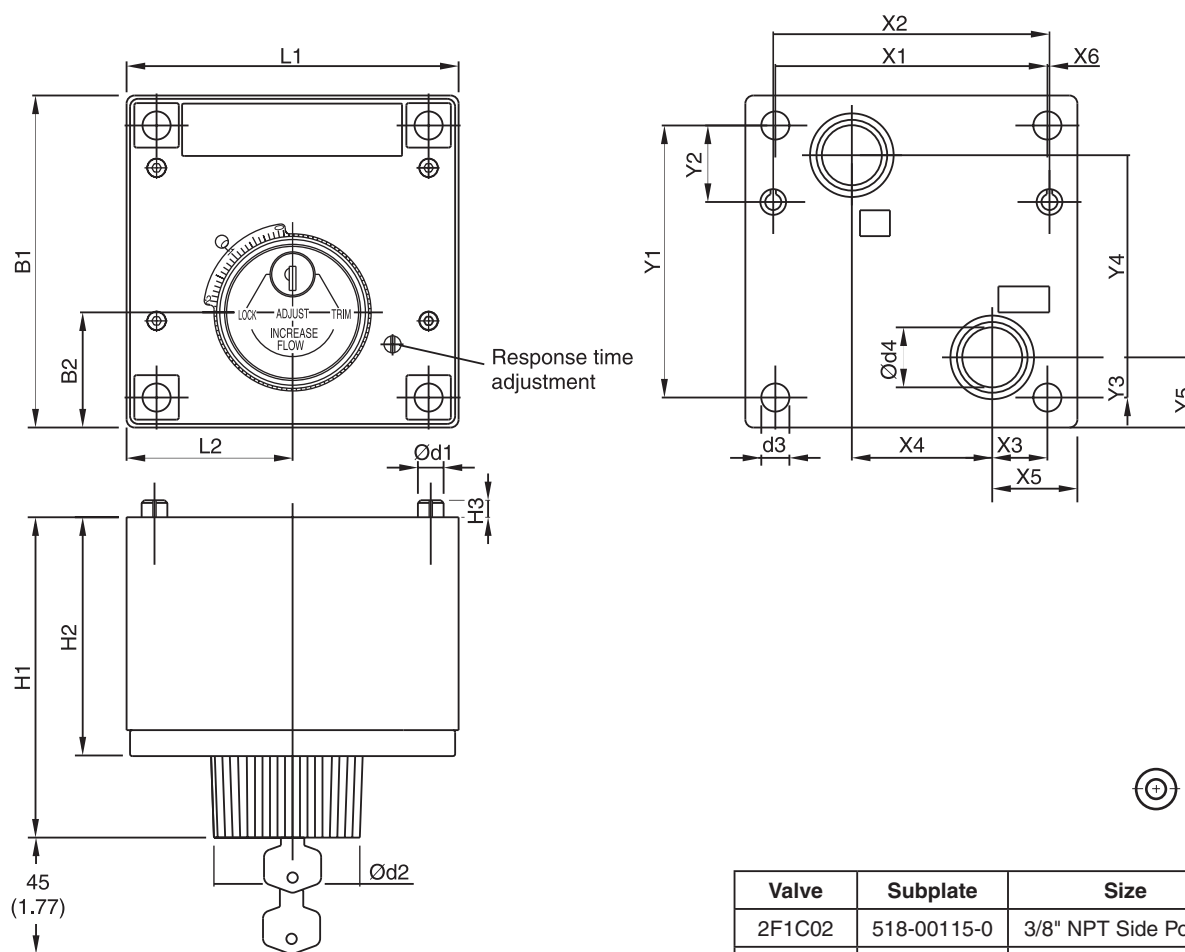


Fluid viscosity 40 cSt at 50°C (122°F)

E01_Cat2500.indd, ddp, 04/19

Dimensions**Pressure Compensated Flow Control Valves
Series 2F1C**





Inch equivalents for millimeter dimensions are shown in (**)



Valve	Subplate	Size
2F1C02	518-00115-0	3/8" NPT Side Ported
2F1C03	518-00118-0	1/2" NPT Side Ported

Size	ISO-code	x1	x2	x3	x4	x5	x6	y1	y2	y3	y4	y5
02	6263-AM-07-2-A	76.2 (3.00)	79.4 (3.13)	9.5 (0.37)	44.5 (1.75)	19.0 (0.75)	—	82.5 (3.25)	23.8 (0.94)	30.2 (1.19)	41.3 (1.63)	39.7 (1.56)
03	6263-AK-06-2-A	101.6 (4.00)	103.2 (4.06)	20.6 (0.81)	52.4 (2.06)	31.8 (1.25)	0.8 (0.03)	101.6 (4.00)	28.6 (1.13)	15.1 (0.59)	75.4 (2.97)	26.2 (1.03)

Size	ISO-code	B1	B2	H1	H2	H3	L1	L2	d1	d2	d3	d4
02	6263-AM-07-2-A	101.6 (4.00)	38.1 (1.50)	119.6 (4.71)	87.4 (3.44)	6.4 (0.25)	95.2 (3.75)	47.6 (1.87)	6.4 (0.25)	57.2 (2.25)	8.7 (0.34)	14.2 (0.56)
03	6263-AK-06-2-A	123.8 (4.87)	42.9 (1.69)	121.4 (4.78)	89.2 (3.51)	6.4 (0.25)	123.8 (4.87)	61.9 (2.44)	9.5 (0.37)	57.2 (2.25)	10.5 (0.41)	22.4 (0.88)

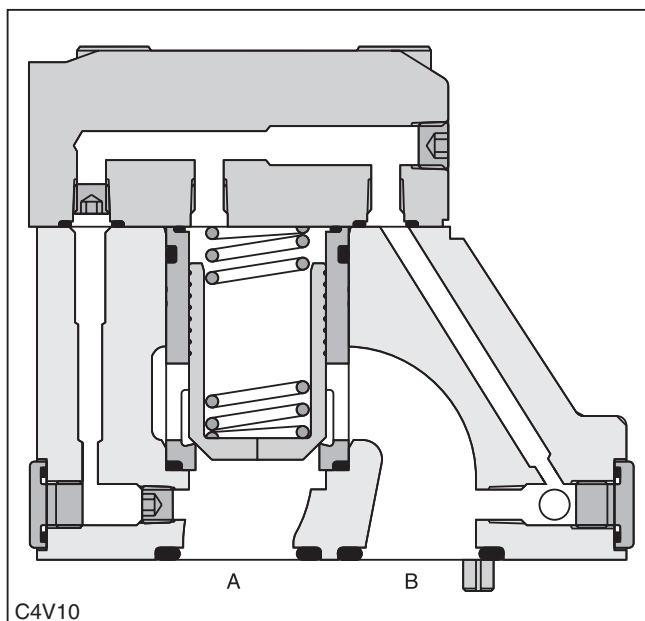
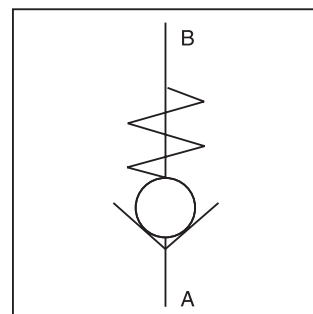
Size	ISO-Code	Bolt Kit  DIN912 12.9		Seal  Kit Fluorocarbon	Surface Finish
02	6263-AM-07-2-A	BK-700-70842-8 4xM8x100	31.8 Nm (23.5 lb.-ft.) ±15%	S26-98617-5	$\sqrt{R_{max} 6.3}$ 
03	6263-AK-06-2-A	BK395 4xM10x100	63 Nm (46.5 lb.-ft.) ±15%		

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.



E

Features

- High flow, low pressure drop design
- Minimal internal leakage
- Six crack pressure options

Ordering Information

C4V	<input type="text"/>	5	3	0	<input type="text"/>	B	<input type="text"/>	<input type="text"/>
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	NG10
06	NG25
10	NG32

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
C4V03	
1	2.8 Bar (40.6 PSI)
2	0.5 Bar (7.3 PSI)
3	0.3 Bar (4.4 PSI)
4	2.2 Bar (31.9 PSI)
5	—
6	1.2 Bar (17.4 PSI)
7	3.0 Bar (43.5 PSI)

Code	Description
C4V06 / C4V10	
	3.5 Bar (50.8 PSI)
	0.5 Bar (7.3 PSI)
	0.3 Bar (4.4 PSI)
	2.2 Bar (31.9 PSI)
	9.0 Bar (130.5 PSI)
	1.2 Bar (17.4 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.

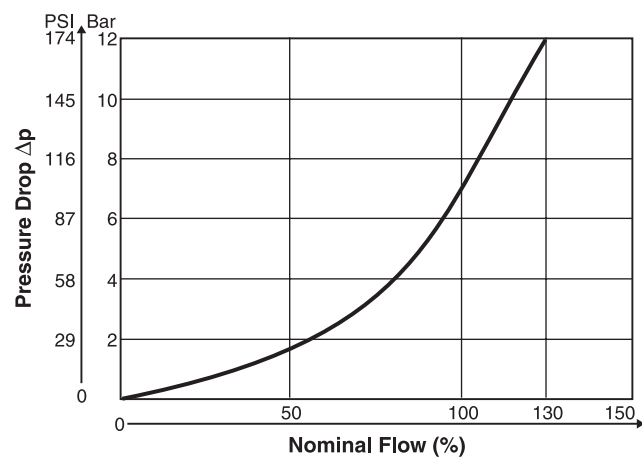
E01_Cat2500.indd, ddp, 04/19

Specifications

General				
Size	NG10		NG25	NG32
Subplate Mounting	ISO 5781			
Mounting Position	Unrestricted			
Ambient Temperature Range	-20°C to +80°C (-4°F to +176°F)			
Hydraulic				
Maximum Operating Pressure	350 Bar (5075 PSI)			
Pressure Range	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)			
Nominal Flow	150 LPM (39.7 GPM)	270 LPM (71.4 GPM)	450 LPM (119.0 GPM)	
Fluid	Hydraulic oil to DIN 51524			
Viscosity	Recommended Permitted	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)		
Fluid Temperature	Recommended Permitted	+30°C to +50°C (86°F to +122°F) -20°C to +70°C (-4°F to +158°F)		
Filtration	ISO Class 4406 (1999) 18/16/13 (meet NAS 1638:7)			

E

Performance Curve

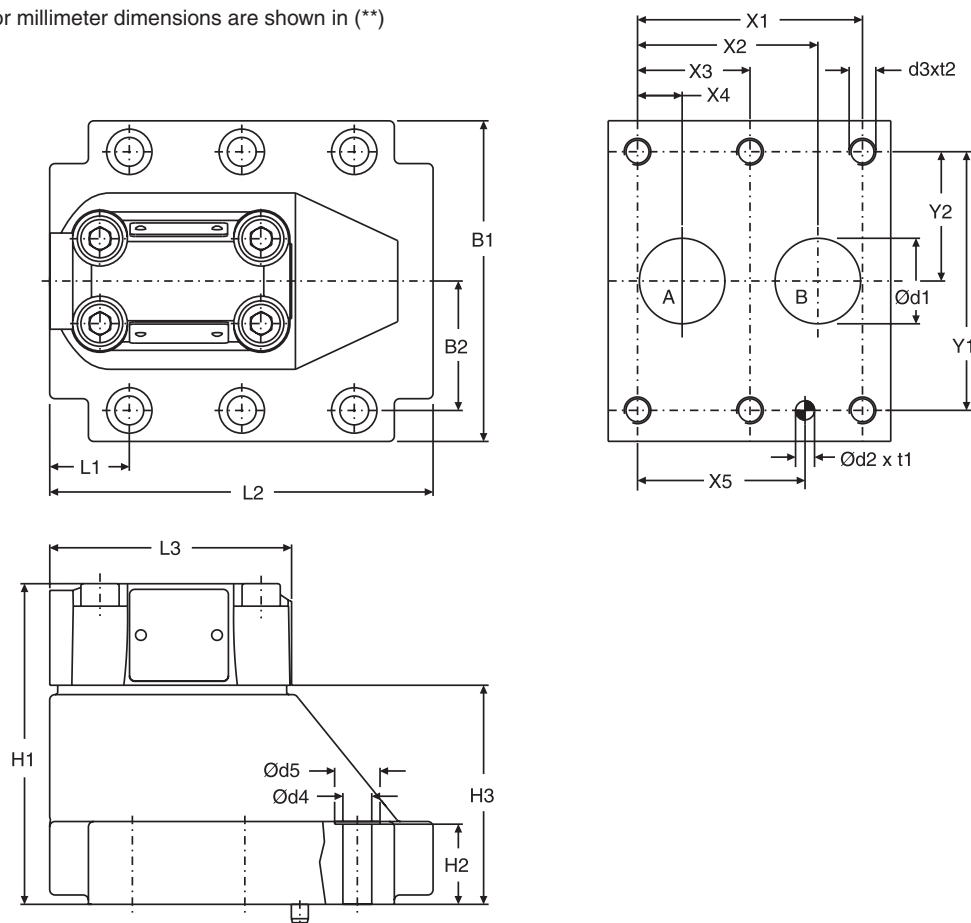


Dimensions

Check Valves

Series C4V (Direct Operated)




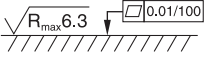
Inch equivalents for millimeter dimensions are shown in (**)



NG	ISO-code	x1	x2	x3	x4	x5	y1	y2	B1	B2	H1	H2	H3	L1	L2
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	—	7.2 (0.28)	31.8 (1.25)	66.7 (2.63)	33.4 (1.31)	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	45.0 (1.77)	29.0 (1.14)	94.8 (3.73)
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	—	11.1 (0.44)	44.5 (1.75)	79.4 (3.13)	39.7 (1.56)	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	71.5 (2.81)	34.7 (1.37)	126.8 (4.99)
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	42.1 (1.66)	16.7 (0.66)	62.7 (2.47)	96.8 (3.81)	48.4 (1.91)	120.0 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	82.0 (3.23)	30.6 (1.20)	144.3 (5.68)

Tolerance for all dimensions ± 0.2 mm (0.01 inches)

NG	ISO-code	d1max	d2	t1	d3	t2	d4	d5
10	5781-06-07-0-00	15.0 (0.59)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit			Seal  Kit		Surface finish
					Nitrile	Fluorocarbon	
10	5781-06-07-0-00	BK505	4xM10 x 35 DIN 912 12.9	68 Nm (50.2 lb-ft) $\pm 15\%$	S16-39362-0	S16-39362-5	
25	5781-08-10-0-00	BK485	4xM10 x 45 DIN 912 12.9	68 Nm (50.2 lb-ft) $\pm 15\%$	S16-39364-0	S16-39364-5	
32	5781-10-13-0-00	BK506	6xM10 x 45 DIN 912 12.9	68 Nm (50.2 lb-ft) $\pm 15\%$	S16-39366-0	S16-39366-5	

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

Size

5

Maximum
Pressure
350 Bar
(5075 PSI)

9

Y1 Port
G1/4"

**Opening
Ratio**

Opening
Ratio

**Approximate
Cracking
Pressure**

Approximate
Cracking
Pressure

B

Design
Series

Seal

Seal

**Options
Check
with
Factory**

Options
Check
with
Factory

Code Description

03	NG10
06	NG25
10	NG32

Code Description

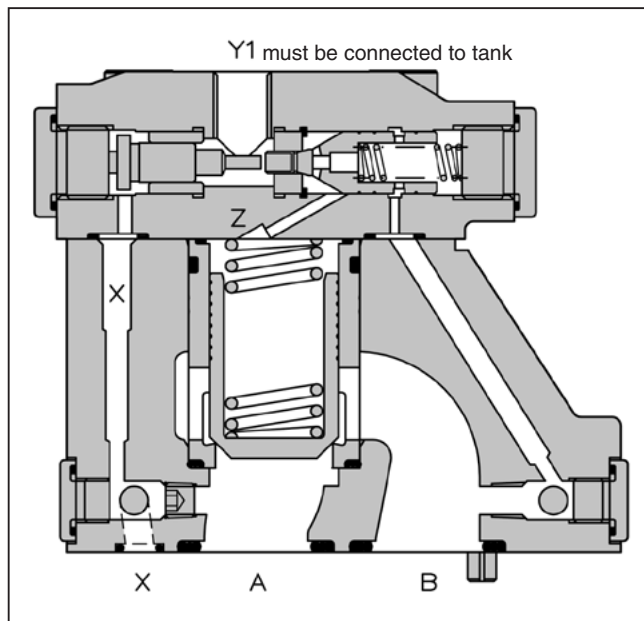
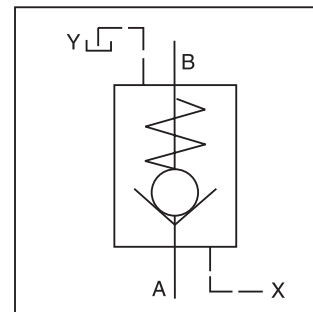
1	1:1
3	3:1
8	8:1
9	10:1

Code Description

1	Nitrile
5	Fluorocarbon

Weight:

C4V03	2.8 kg (6.2 lbs)
C4V06	4.6 kg (10.1 lbs.)
C4V10	6.1 kg (13.5 lbs.)



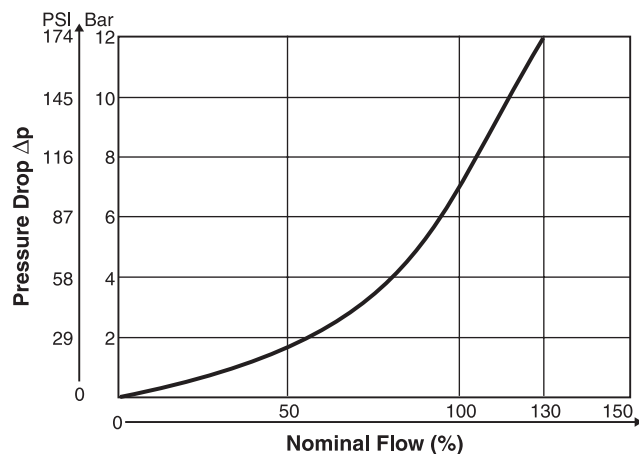
Code	Description	Flow A to B	Flow A to B
		C4V03	C4V06 / C4V10
2	1.0 Bar (14.5 PSI)	1.0 Bar (14.5 PSI)	1.0 Bar (14.5 PSI)
4	4.0 Bar (58.0 PSI)	3.5 Bar (50.8 PSI)	3.5 Bar (50.8 PSI)
6	2.0 Bar (29.0 PSI)	2.2 Bar (31.9 PSI)	2.2 Bar (31.9 PSI)
		Flow B to A	Flow B to A
		C4V03	C4V06 / C4V10
2	1.5 Bar (21.8 PSI)	1.7 Bar (24.7 PSI)	1.7 Bar (24.7 PSI)
4	5.5 Bar (79.8 PSI)	6.0 Bar (87.0 PSI)	6.0 Bar (87.0 PSI)
6	3.0 Bar (43.5 PSI)	3.8 Bar (55.1 PSI)	3.8 Bar (55.1 PSI)

Specifications

General			
Size	NG10	NG25	NG32
Subplate Mounting	ISO 5781		
Mounting Position	Unrestricted		
Ambient Temperature Range	-20°C to +80°C (-4°F to +176°F)		
Hydraulic			
Maximum Operating Pressure	350 Bar (5075 PSI)		
Nominal Flow	150 LPM (39.7 GPM)	270 LPM (71.4 GPM)	450 LPM (119.0 GPM)
Fluid	Hydraulic oil to DIN 51524		
Viscosity	Recommended Permitted	30 to 50 cSt / mm²/s (139 to 232 SSU) 20 to 380 cSt / mm²/s (93 to 1761 SSU)	
Fluid Temperature	Recommended Permitted	+30C° to +50°C (86°F to +122°F) -20°C to +70°C (-4°F to +158°F)	
Filtration	ISO Class 4406 (1999) 18/16/13 (meet NAS 1638:7)		

E

Performance Curve

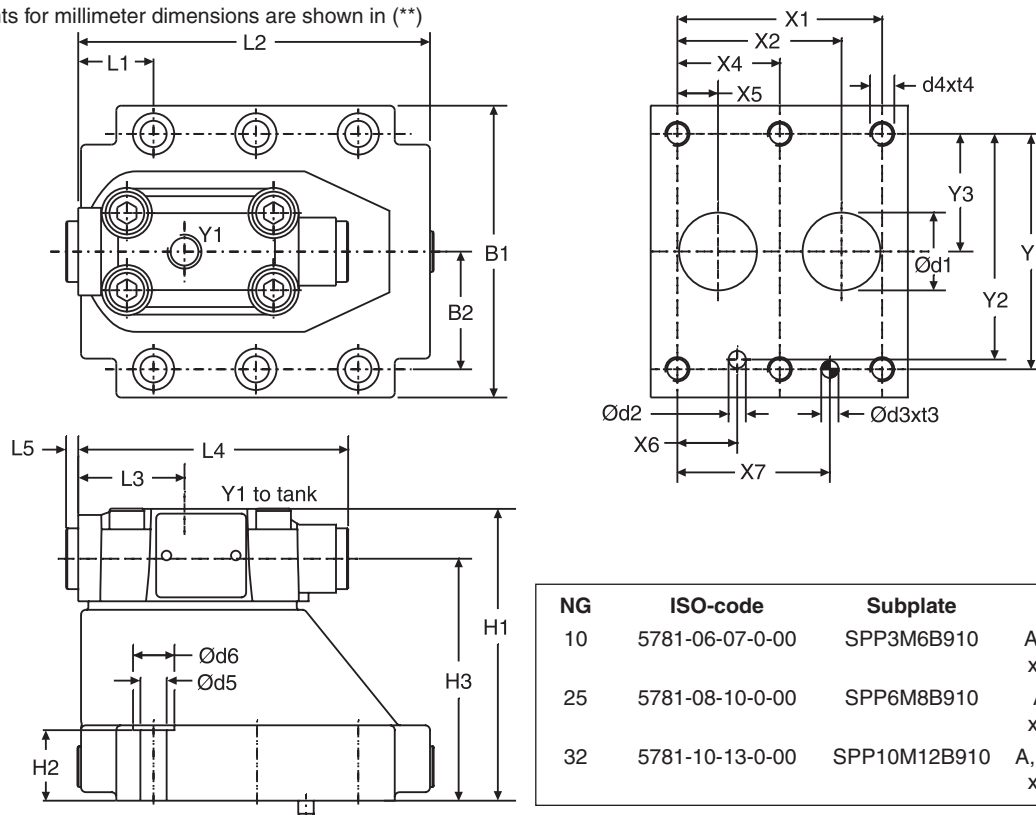


Dimensions

Check Valves

Series C4V (Pilot Operated)

Inch equivalents for millimeter dimensions are shown in (**)



NG	ISO-code	Subplate	Size
10	5781-06-07-0-00	SPP3M6B910	A, B = 3/4" BSPP x, y = 1/4" BSPP
25	5781-08-10-0-00	SPP6M8B910	A, B = 1" BSPP x, y = 1/4" BSPP
32	5781-10-13-0-00	SPP10M12B910	A, B = 1 1/2" BSPP x, y = 1/4" BSPP

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	—	—	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	—	—	—
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	—	—	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	39.7 (1.56)	—	—	—
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	—	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	62.7 (2.47)	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	—	—	—

Tolerance for all dimensions ± 0.2 mm (0.01 inches)

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	83.0 (3.27)	21.0 (0.83)	62.5 (2.46)	—	—	—	29.4 (1.16)	95.2 (3.75)	43.7 (1.72)	111.0 (4.37)	5.0 (0.20)	—
25	5781-08-10-0-00	105 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	89.0 (3.50)	—	—	—	35.1 (1.38)	127.2 (5.01)	43.7 (1.72)	111.0 (4.37)	5.0 (0.20)	—
32	5781-10-13-0-00	120 (4.72)	48.4 (1.91)	120.0 (4.72)	29.0 (1.14)	99.5 (3.92)	—	—	—	31.0 (1.22)	144.7 (5.70)	43.7 (1.72)	111.0 (4.37)	5.0 (0.20)	—

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6
10	5781-06-07-0-00	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)

NG	ISO-code	Bolt Kit	Seal Kit	Surface finish
10	5781-06-07-0-00	BK505	4xM10 x 35 DIN 912 12.9	68 Nm (50.2 lb-ft) ±15%
25	5781-08-10-0-00	BK485	4xM10 x 45 DIN 912 12.9	68 Nm (50.2 lb-ft) ±15%
32	5781-10-13-0-00	BK506	6xM10 x 45 DIN 912 12.9	68 Nm (50.2 lb-ft) ±15%

E01_Cat2500.indd, ddp, 04/19

General Description

Series C5P pilot operated check valves have a similar design to the subplate mounted C5V series. The SAE flanges allow to mount directly on the flanges of actuators to achieve a very compact design.

Operation

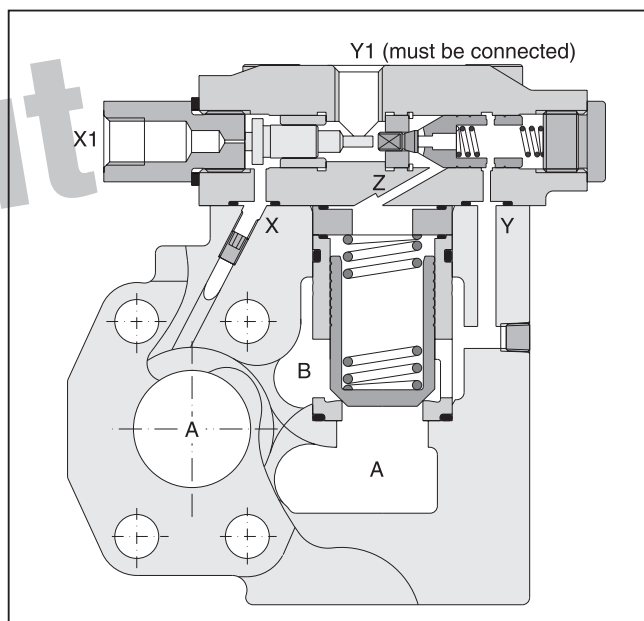
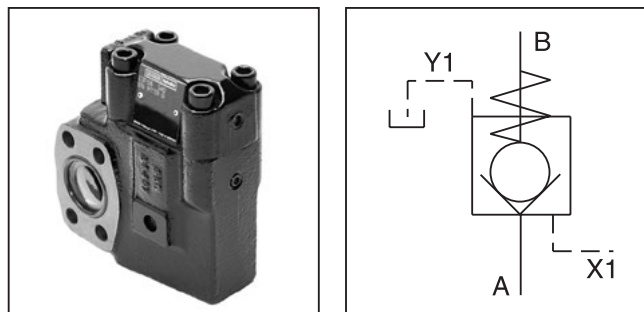
When no pressure is applied to the X-port, the flow from B to A is blocked, because the pressure in B is also in effect on top of the poppet.

Pressurizing the X port relieves the area on top of the poppet to the drain port and allows flow from B to A.

The seat design of the C5P valve series provides leak-free separation of port A and B in the closed position.

Features

- Pilot operated check valve
- 2-port body with SAE 61 flange
- 3 sizes (SAE 3/4", 1", 1 1/4")
- 4 opening ratios
- Valves with position control are available on request



Ordering Information

C5P

Pilot Operated
Check Valve

Size

**SAE 61
Interface**

2

Pilot
Ports

**Opening
Ratio**

**Cracking
Pressure**

A

Design
Series

Seal

**Options
Check
with
Factory**

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1 1/4"

X1 and Y1 = SAE 4

Code	Description
4	280 Bar (4060 PSI) Size 10 (SAE 61)
5	350 Bar (5075 PSI) Sizes 06/08 (SAE 61)

Code	Description
1	Pilot Operated 1:1 Ratio
3	Pilot Operated 3:1 Ratio
8	Pilot Operated 8:1 Ratio
9	Pilot Operated 10:1 Ratio

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Size	Flow A-B	Flow B-A
2	06	1.0 Bar (14.5 PSI)	1.5 Bar (21.8 PSI)
	08/10	1.0 Bar (14.5 PSI)	1.7 Bar (24.7 PSI)
4	06	4.0 Bar (58.0 PSI)	5.5 Bar (79.8 PSI)
	08/10	3.5 Bar (50.8 PSI)	6.0 Bar (87.0 PSI)
6	06	2.0 Bar (29.0 PSI)	3.0 Bar (43.5 PSI)
	08/10	2.2 Bar (31.9 PSI)	3.8 Bar (55.1 PSI)

Weight:

C5P06	3.9 kg (8.6 lbs.)
C5P08	4.4 kg (9.7 lbs.)
C5P10	5.7 kg (12.6 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.

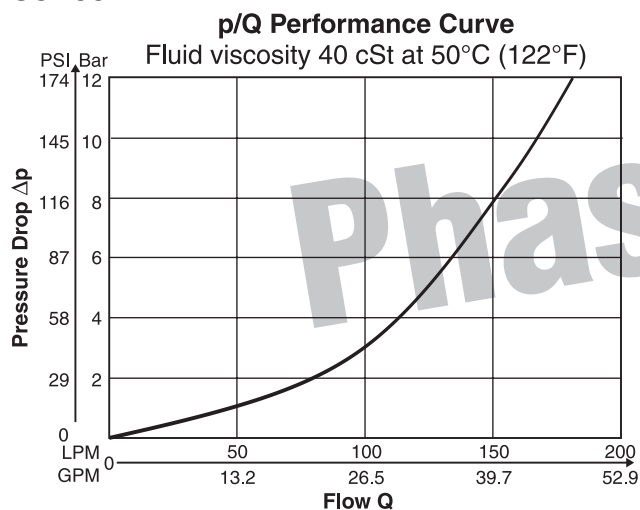
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Specifications

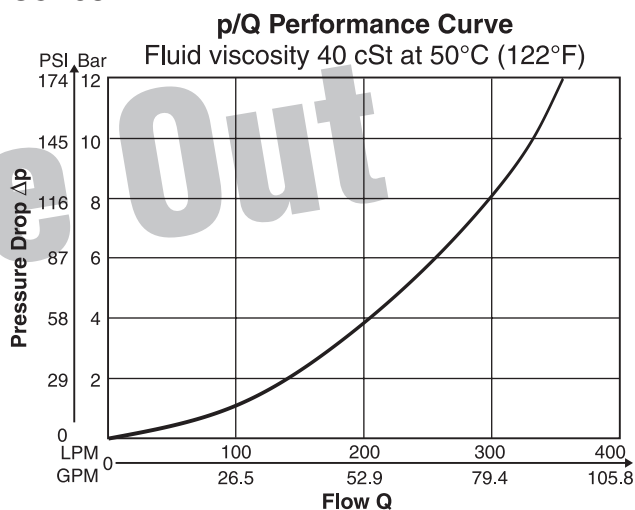
General				
Size		06 (3/4")	08 (1")	10 (1 1/4")
Mounting		2-port in-line flange SAE 61		
Mounting Position		Unrestricted		
Ambient Temperature		-20°C to +50°C (-4°F to +122°F)		
Hydraulic				
Maximum Operating Pressure	Ports A, B Port Y1	350 Bar (5075 PSI) 30 Bar (435 PSI)	350 Bar (5075 PSI) 30 Bar (435 PSI)	280 Bar (4060 PSI) 30 Bar (435 PSI)
Nominal Flow		180 LPM (47.6 GPM)	360 LPM (95.2 GPM)	600 LPM (158.7 GPM)
Fluid		Hydraulic oil in accordance with DIN 51524...51525		
Fluid Temperature		-20°C to +80°C (-4°F to +176°F)		
Viscosity	Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)		
Filtration		ISO 4406 (1999) 18/16/13 (acc. NAS 1638:7)		

Performance Curves

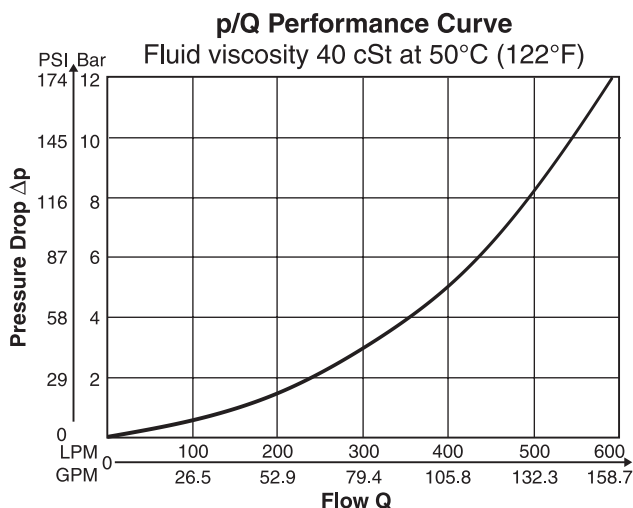
C5P06



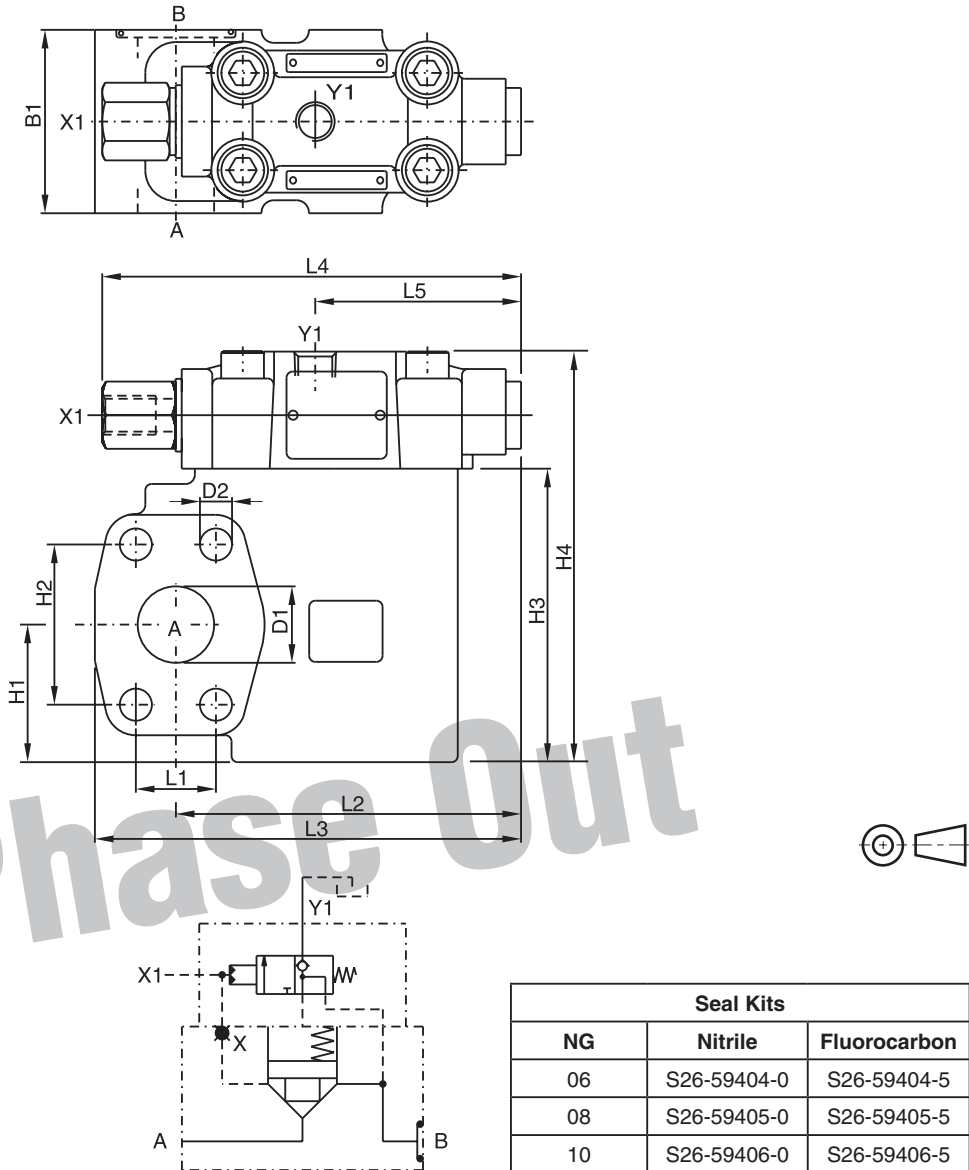
C5P08



C5P10



Inch equivalents for millimeter dimensions are shown in (**)



Dimensions

Series	L1	L2	L3	L4	L5	B1	H1	H2	H3	H4	D1	D2
C5P06	22.2 (0.87)	95.8 (3.77)	119.8 (4.72)	137.0 (5.39)	67.3 (2.65)	60.0 (2.36)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	128.0 (5.04)	19.0 (0.75)	10.5 (0.41)
C5P08	26.2 (1.03)	112.9 (4.44)	139.4 (5.49)	137.0 (5.39)	67.3 (2.65)	60.0 (2.36)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	134.0 (5.28)	25.0 (0.93)	10.5 (0.41)
C5P10	30.2 (1.19)	112.9 (4.44)	146.9 (5.78)	137.0 (5.39)	67.3 (2.65)	75.0 (2.95)	48.0 (1.39)	58.7 (2.31)	109.0 (4.29)	147.0 (5.79)	32.0 (1.26)	12.5 (0.49)

Ports

Port	Function	Port Size		
		C5P06	C5P08	C5P10
A	Inlet or Outlet	3/4" SAE 61	1" SAE 61	1 1/4" SAE 61
B	Outlet or Inlet	3/4" SAE 61	1" SAE 61	1 1/4" SAE 61
X1	External Pilot Port	SAE 4		
Y1	External Pilot Drain	SAE 4		

General Description

Series C5V direct operated check valves provide free flow in one direction and block the flow in the counter direction.

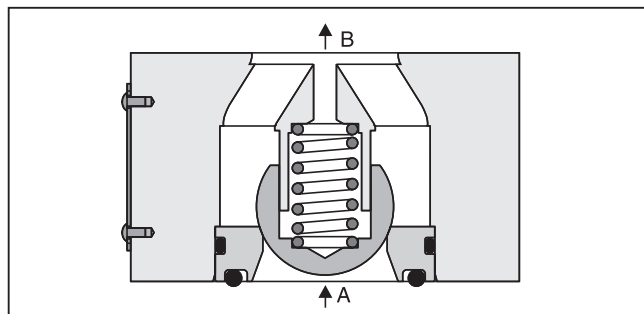
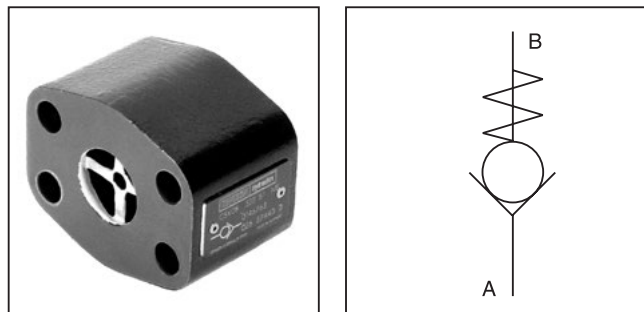
The SAE flanges allow to mount the C5V directly on the pressure port of pumps for protection against pressure shocks from the system.

Operation

The ball is held on its seat by a spring under zero pressure condition. When flow is increased to the cracking pressure, free flow is allowed from port A to port B. Blocked flow is created when operating pressure and spring on Port B exceed pressure on port A.

Features

- Direct operated check valve
- SAE 61 and SAE 62 flanges
- 4 sizes (SAE 3/4", 1", 1 1/4", 1 1/2")
- 3 springs
- 2 different seal configurations



Ordering Information

<div style="border: 1px solid black; padding: 2px; display: inline-block;">C5V</div> Direct Operated Check Valve	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> Size	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> Flange	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> Body Sealing	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> Cracking Pressure	<div style="border: 1px solid black; padding: 2px; display: inline-block;">B</div> Design Series	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> Seal	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> Options																								
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr><td>06</td><td>SAE 3/4"</td></tr> <tr><td>08</td><td>SAE 1"</td></tr> <tr><td>10</td><td>SAE 1 1/4"</td></tr> <tr><td>12</td><td>SAE 1 1/2"</td></tr> </tbody> </table>	Code	Description	06	SAE 3/4"	08	SAE 1"	10	SAE 1 1/4"	12	SAE 1 1/2"			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.5 Bar (7 PSI)</td></tr> <tr><td>1</td><td>1.0 Bar (15 PSI)</td></tr> <tr><td>2</td><td>2.0 Bar (29 PSI)</td></tr> </tbody> </table>	Code	Description	0	0.5 Bar (7 PSI)	1	1.0 Bar (15 PSI)	2	2.0 Bar (29 PSI)			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr><td>Omit</td><td>Standard</td></tr> <tr><td>019*</td><td>C5V10 for M14 Mounting Screws</td></tr> </tbody> </table> <p style="font-size: small;">* For SAE 62 only.</p>	Code	Description	Omit	Standard	019*	C5V10 for M14 Mounting Screws
Code	Description																														
06	SAE 3/4"																														
08	SAE 1"																														
10	SAE 1 1/4"																														
12	SAE 1 1/2"																														
Code	Description																														
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Code	Description																														
3	SAE 61																														
6	SAE 62																														
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1	Sealing for Port A																														
2*	Sealing for Ports A and X																														
3	Without Sealing																														
Code	Description																														
1	Nitrile																														
5	Fluorocarbon																														
						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.

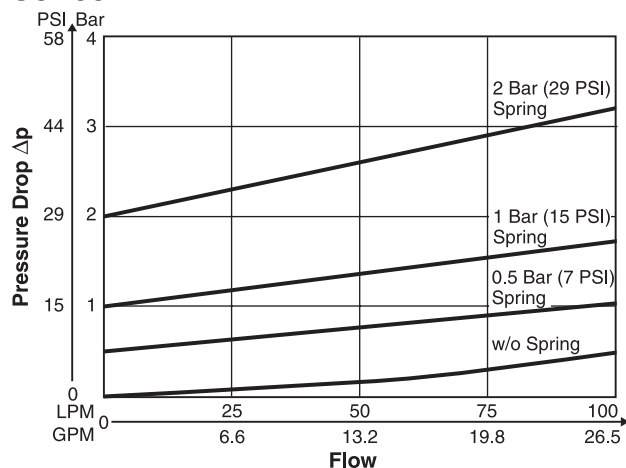
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Specifications

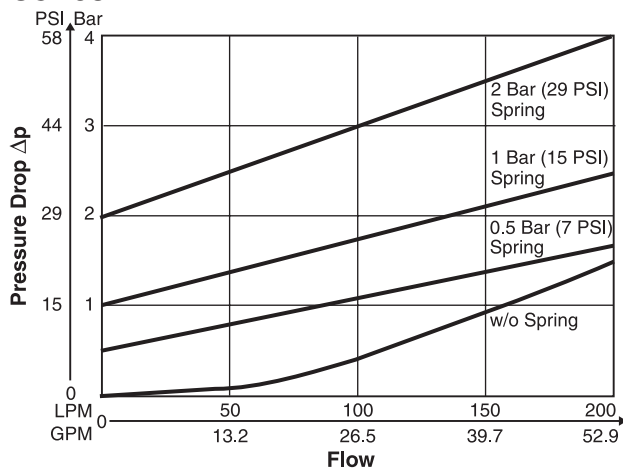
General				
Size	06 (3/4")	08 (1")	10 (1 1/4")	12 (1 1/2")
Mounting	2-port in-line flange SAE 61 and SAE 62			
Mounting Position	Unrestricted			
Ambient Temperature	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Maximum Operating Pressure				
SAE 61 SAE 62	350 Bar (5075 PSI) 420 Bar (6090 PSI)	350 Bar (5075 PSI) 420 Bar (6090 PSI)	280 Bar (4060 PSI) 420 Bar (6090 PSI)	210 Bar (3045 PSI) 420 Bar (6090 PSI)
Nominal Flow	100 LPM (26.5 GPM)	200 LPM (52.9 GPM)	400 LPM (105.8 GPM)	750 LPM (198.4 GPM)
Fluid	Hydraulic oil in accordance with DIN 51524...51525			
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity Permitted Recommended	10 to 650 cSt / mm²/s (46 to 3013 SSU) 30 cSt / mm²/s (139 SSU)			
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638:7)			

Performance Curves

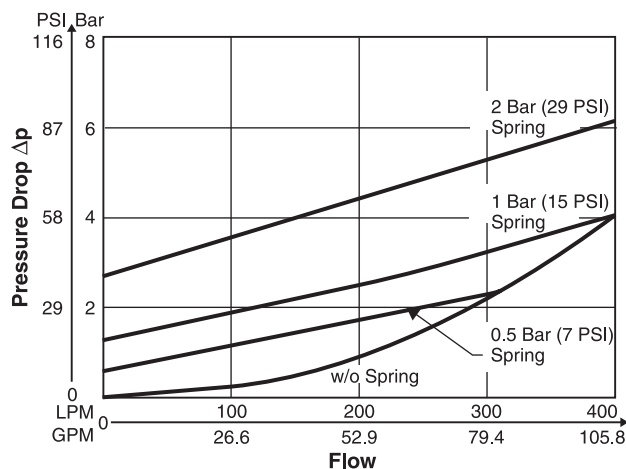
C5V06



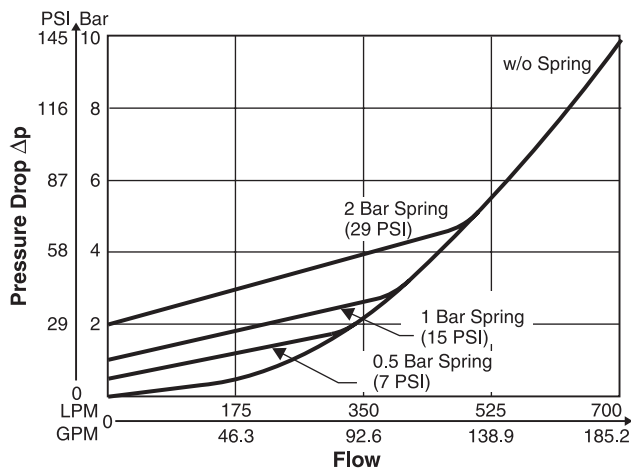
C5V08



C5V10



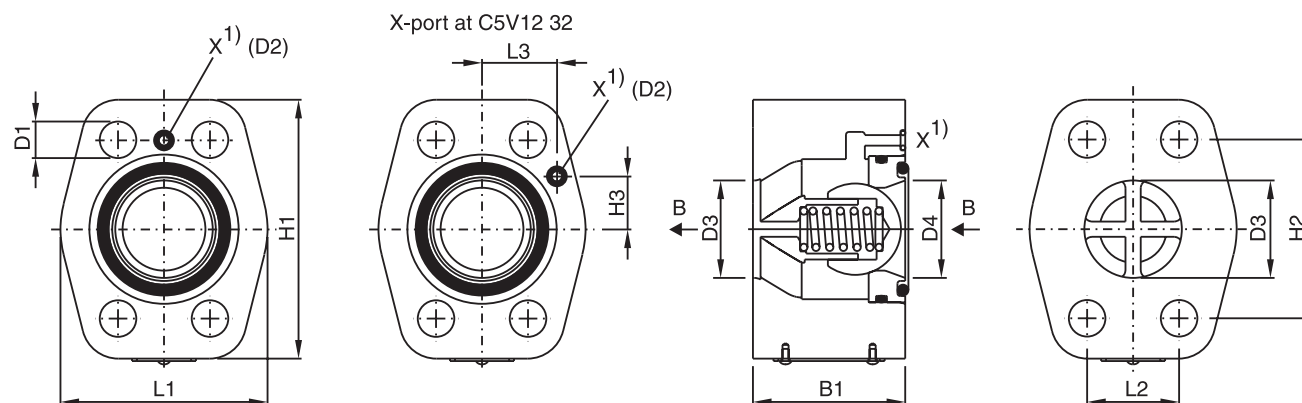
C5V12



E01_Cat2500.indd, ddp, 04/19

Dimensions**Check Valves****Series C5V (Direct Operated)**

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)
C5V08	1"	SAE 61	60.0 (2.36)	26.2 (1.03)	27.2 (1.07)	74.0 (2.91)	52.4 (2.06)	22.4 (0.88)	45.0 (1.77)	10.5 (0.41)	Ø3.0 (0.12)	25.0 (0.98)	25.0 (0.98)
		SAE 62	60.0 (2.36)	27.8 (1.09)	27.2 (1.07)	74.0 (2.91)	57.2 (2.25)	22.4 (0.88)	45.0 (1.77)	12.5 (0.49)	—	25.0 (0.98)	25.0 (0.98)
C5V10	1 1/4"	SAE 61	68.0 (2.68)	30.2 (1.19)	27.2 (1.07)	85.0 (3.35)	58.7 (2.31)	22.4 (0.88)	50.0 (1.97)	12.5 (0.49)	Ø3.0 (0.12)	32.0 (1.26)	32.0 (1.26)
		SAE 62	68.0 (2.68)	31.8 (1.25)	27.2 (1.07)	85.0 (3.35)	66.7 (2.63)	22.4 (0.88)	50.0 (1.97)	13.5* (0.53)	—	32.0 (1.26)	32.0 (1.26)
C5V12	1 1/2"	SAE 61	80.0 (3.15)	35.7 (1.41)	27.2 (1.07)	104.0 (4.09)	69.8 (2.75)	22.4 (0.88)	50.0 (1.97)	13.5 (0.53)	Ø3.0 (0.12)	42.0 (1.65)	38.0 (1.50)
		SAE 62	80.0 (3.15)	36.5 (1.44)	27.2 (1.07)	104.0 (4.09)	79.4 (3.13)	22.4 (0.88)	50.0 (1.97)	17.0 (0.67)	—	42.0 (1.65)	38.0 (1.50)

* D1 = 15 (0.59) at option code 019 for M14 mounting screws.

Seal Kits		
NG	Nitrile	Fluorocarbon
3	S26-75409-0	S26-75409-5
6	S26-75410-0	S26-75410-5
10	S26-75411-0	S26-75411-5
12	S26-75412-0	S26-75412-5

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Terms of Sale with Warranty Limitations

PARKER-HANNIFIN CORPORATION — HYDRAULIC VALVE 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, NON-INFRINGEMENT, 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

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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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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.

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Parker Safety Guide (Continued)

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

E

Parker Safety Guide (Continued)

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 (GFE PDs): 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 GFE PDs with a nominal 30 milliamper 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 tool

E

Parker Safety Guide (Continued)

ing 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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