



www.Parker.com/HydraulicValve

Industrial Hydraulic Valves

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

Catalog MSG14-2500/US

July 2021



ENGINEERING YOUR SUCCESS.

**WARNING – USER RESPONSIBILITY**

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

- This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.
- The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.
- To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

OFFER OF SALE

The items described in this document are hereby offered for sale by Parker-Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated in the detailed "Offer of Sale" elsewhere in this document or available at www.parker.com/hydraulicvalve.

SAFETY GUIDE

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

© Copyright 2021 Parker Hannifin Corporation, All Rights Reserved



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	D3C	Cam OperatedA88
C4V.....	Direct Operated CheckE8	D3D	Cam OperatedA88
C4V.....	Pilot Operated Check.....E11	D3DW	Solenoid Operated.....A81
C5V.....	Direct Operated CheckE14	D3DW	Subplates & ManifoldsC7
CB.....	CounterbalanceB105	D3DWR	Direct Oper., Regen. and Hybrid.....A90
CH	Check.....B14	D3L.....	Lever OperatedA99
CM.....	Check.....B6	D3L.....	Subplates & ManifoldsC7
CP.....	Pilot Operated, Check.....B25	D3P.....	Subplates & ManifoldsC9
CPOM.....	Dbl. Pilot Operated, Check.....B20	D3W.....	Solenoid Operated.....A63
D101	IntroductionA240	D3W.....	Subplates & ManifoldsC7
D101V, D10P	Installation.....A259	D41	Installation.....A175
D101VA	Air Pilot OperatedA252	D41VW	Pilot Oper., Solenoid Controlled.....A153
D101VHW.....	Pilot Oper., Solenoid Controlled.....A241	D41VWR.....	Regenerative and HybridA162
D101VL.....	Lever Operated.....A254	D41VWZ.....	Regenerative and HybridA162
D101VW	Pilot Oper., Solenoid Controlled.....A241	D4L.....	Lever OperatedA166
D10P.....	Oil Pilot OperatedA256	D4P.....	Oil Pilot OperatedA170
D111VW	Installation.....A270	D4S.....	Directional Seat ValveA277
D111VW	Pilot Oper., Solenoid Controlled.....A263	D4S	Inline MountedA287
D111VWR.....	Regenerative and HybridA273	D5S.....	Directional Seat ValveA297
D111VWZ.....	Regenerative and HybridA273	D6.....	Subplates & ManifoldsC14
D1SE	Solenoid Operated.....A52	D61	IntroductionA178
D1V.....	Introduction & Technical InfoA5	D61V, D6P	Installation.....A196
D1V.....	Subplates & ManifoldsC2	D61VA	Air Pilot OperatedA190
D1VA	Air and Oil Pilot OperatedA42	D61VHW.....	Pilot Oper., Solenoid Controlled.....A179
D1VC	Cam, Cam Lever Operated.....A46	D61VL.....	Lever OperatedA192
D1VD	Cam, Cam Lever Operated.....A46	D61VW	Pilot Oper., Solenoid Controlled.....A179
D1VG.....	Cam, Cam Lever Operated.....A46	D6P.....	Oil Pilot OperatedA194
D1VHW.....	Solenoid Operated.....A19	D8.....	Subplates & ManifoldsC14
D1VL.....	Lever Operated.....A48	D81	IntroductionA200
D1VP	Air and Oil Pilot OperatedA42	D81V, D8P	Installation.....A221
D1VW	Solenoid Operated.....A19	D81VA	Air Pilot OperatedA214
D1VW	Inductive Position ControlA33	D81VHW.....	Pilot Oper., Solenoid Controlled.....A201
D3.....	Installation.....A101	D81VL.....	Lever OperatedA216
D3.....	Introduction & Technical InfoA55	D81VW	Pilot Oper., Solenoid Controlled.....A201
D3*P	Oil Pilot OperatedA144	D8P.....	Oil Pilot OperatedA218
D31	IntroductionA104	D91VWR.....	Regenerative and HybridA232
D31	Subplates & ManifoldsC9	D91VWZ.....	Regenerative and HybridA232
D31, D3*P.....	Installation.....A146	D9L.....	Lever OperatedA236
D31*A	Air Pilot OperatedA140	FC.....	Throttle CheckB40
D31*HW.....	Pilot Oper., Solenoid Controlled.....A105	FD.....	Throttle CheckB40
D31*L.....	Lever Operated.....A142	FM	Dbl. Sandwich, Flow ControlB33
D31*W	Pilot Oper., Solenoid Controlled.....A105	Plates for Regenerative and Hybrid Circuits.....	A93, A133
D31NW	Pilot Oper., Solenoid Controlled.....A121	PR.....	Pilot Oper., Reducing/RelievingB52
D31NWR	Regenerative and HybridA130	PR*M	See R4RD40
D3A.....	Air OperatedA85	PRDM	Direct Oper., Pressure ReducingB47
D3A.....	Subplates & ManifoldsC7	PRM.....	Pressure ReducingB62

Continued on next page

Alphanumeric Index

Series	Page
PSB	EH Pressure Switch.....C34
R*R, R*M.....	See R4V*5, R6V*5.....D3
R1E02.....	Pressure ReducingD93
R4R	Pressure ReducingD40
R4R	Pressure Reducing, Inline Mounting....D44
R4S.....	Pilot Operated Sequence.....D55
R4U	Pressure Reducing, Unloading.....D33
R4V.....	Pressure Relief, Pilot OperatedD87
R4V (TÜV).....	Pilot Operated, Pressure ReliefD17
R4V*5	Pressure Relief, VentD3
R5R	Pressure Relief, Pilot OperatedD74
R5S.....	Sequence, Pilot Operated.....D84
R5U	Unloading, Pilot Operated.....D79
R5V.....	Pressure Relief, Pilot OperatedD68
R6V (TÜV).....	Pilot Operated, Pressure ReliefD17
R6V*5	Pressure Relief, VentD3
RDM	Direct Operated, Pressure Relief.....B70
RG	RegenerativeB117
RM.....	Relief.....B75
RS*R, RS*M	See R4V*5, R6V*5.....D3
RV.....	Direct Acting, Pressure Relief.....B81
S*M.....	See R4SD55
SD500.....	Pressure Intensifier.....D96
Safety Guide.....	E19
Sandwich Valves Introduction.....	B3
Subplate & Manifold Accessories	C19
Subplate & Manifold Installation	C31
Terms of Sale and Warranty Limitations	E17
UR*M	See R4UD33
US*M	See R4UD33
VB.....	Direct Operated SequenceD59
VBV	Pilot Operated Sequence.....D63
VM	D. O. Pressure Reducing.....D50
VS.....	Pressure ReliefD30
ZDR	Pilot Operated Pressure ReducingB94
ZDV.....	Relief.....B97
ZNS	CounterbalanceB101
ZRD	Dbl. Flow Control.....B122
ZRE	Dbl. Pilot Operated Check.....B126
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.....	A52
D1VA Air and Oil Pilot Operated	A42
D1VC Cam, Cam Lever Operated	A46
D1VD Cam, Cam Lever Operated	A46
D1VG Cam, Cam Lever Operated	A46
D1VHW Solenoid Operated.....	A19
D1VL Lever Operated	A48
D1VP Air and Oil Pilot Operated	A42
D1VW Solenoid Operated.....	A19
D1VW Inductive Position Control	A33
D10P Oil Pilot Operated	A256
D101VA Air Pilot Operated	A252
D101VL Lever Operated	A254
D101VHW Pilot Oper., Solenoid Controlled.....	A241
D101VW Pilot Oper., Solenoid Controlled.....	A241
D111VW Installation.....	A271
D111VWR Regenerative and Hybrid	A273
D111VWZ Regenerative and Hybrid	A273
D3A Air Operated	A85
D3C Cam Operated	A88
D3D Cam Operated	A88
D3DW Solenoid Operated.....	A81
D3DWR Direct Oper., Regen. & Hybrid	A90
D3L Lever Operated	A99
D31NWR Regenerative and Hybrid	A130
D3*P Oil Pilot Operated	A144
D3W Solenoid Operated.....	A63
D31*A Air Pilot Operated	A140
D31*HW Pilot Oper., Solenoid Controlled.....	A105
D31*L Lever Operated	A142
D31*W Pilot Oper., Solenoid Controlled.....	A105
D31NW Pilot Oper., Solenoid Controlled.....	A121
D41VW Introduction.....	A153
D41VWR Regenerative and Hybrid	A162
D41VWZ Regenerative and Hybrid	A162
D4L Lever Operated	A166
D4P Oil Pilot Operated	A170
D4S Directional Seat Valve	A277
D4S Inline Mounted	A287
D5S Directional Seat Valve	A297
D6P Oil Pilot Operated	A194
D61VA Air Pilot Operated	A190
D61VL Lever Operated	A192
D61VHW Pilot Oper., Solenoid Controlled.....	A179
D61VW Pilot Oper., Solenoid Controlled.....	A179

Function/Series	Page
Directional Control Valves (Continued)	
D8P Oil Pilot Operated	A218
D81VA Air Pilot Operated	A214
D81VL Lever Operated	A216
D81VHW Pilot Oper., Solenoid Controlled.....	A201
D81VW Pilot Oper., Solenoid Controlled.....	A201
D9L Lever Operated	A236
D91VWR Regenerative and Hybrid	A232
D91VWZ Regenerative and Hybrid	A232
Sandwich Valve	
CB Counterbalance	B105
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.....	B70
RG Regenerative	B117
RM Relief.....	B75
RV Direct Acting, Pressure Relief.....	B81
ZDR Pilot Operated Pressure Reducing	B94
ZDV Relief.....	B97
ZNS Counterbalance	B101
ZRD Dbl. Flow Control.....	B122
ZRE Dbl. Pilot Operated Check.....	B126
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	D93
R4R Pressure Reducing	D40
R4R Pressure Reducing, Inline Mounted.....	D44
R4S Pilot Operated Sequence.....	D55
R4U Pressure Reducing, Unloading	D33
R4V Pressure Relief, Pilot Operated	D87
R4V (TÜV) Pilot Operated, Pressure Relief	D17
R4V*5 Pressure Relief, Vent	D3
R5R phase Out Pressure Relief, Pilot Operated	D74
R5S Sequence, Pilot Operated.....	D84

Continued on next page

Valve Function / Series Index

Function/Series	Page
Pressure Control Valves (Continued)	
R5U Unloading, Pilot Operated.....	D79
R5V..... Pressure Relief, Pilot Operated	D68
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	D55
SD500..... Pressure Intensifier.....	D96
UR*M See R4U	D33
US*M See R4U	D33
VB..... Direct Operated Sequence	D59
VBV Pilot Operated Sequence.....	D63
VM D. O. Pressure Reducing.....	D50
VS..... Pressure Relief	D30
Flow Control and Check Valves	
2F1C..... Flow Control.....	E2
C4V..... Direct Operated Check	E8
C4V..... Pilot Operated Check.....	E11
C5V..... Direct Operated Check	E14
Terms of Sale and Warranty Limitations	E17
Safety Guide.....	E19

This image shows a full page of blank graph paper. The grid consists of small, uniform squares formed by thin, light gray lines. There are no margins, text, or other markings on the page.

Contents

Machine Directive – Position Papers	A3 - A4
Series D1V (NFPA D03/CETOP 3, NG6 Mounting)	
Introduction and Technical Information	A5 - A18
Series D1VW Solenoid Operated	A19 - A29
Accessories	A30 - A31
Series D1VW Inductive Position Control	A33 - A41
Series D1VA and D1VP Air and Oil Pilot Operated	A42 - A45
Series D1VC, D1VD and D1VG Cam and Cam Lever Operated	A46 - A47
Series D1VL Lever Operated	A48 - A49
Installation Series D1V	A50 - A51
Series D1SE (NFPA D03/CETOP 3, NG6 Mounting)	
Series D1SE Solenoid Operated	A52 - A54
Series D3 (NFPA D05/CETOP 5, NG10 Mounting)	
Introduction and Technical Information	A55 - A62
Series D3W Solenoid Operated	A63 - A70
Accessories	A71
Series D3W Inductive Position Control	A73 - A80
Series D3DW Solenoid Operated	A81 - A84
Series D3A Air Operated	A85 - A87
Series D3C and D3D Cam Operated	A88 - A89
Series D3DWR Direct Operated, Regenerative and Hybrid	A90 - A92
Plates for Regenerative and Hybrid Circuits	A93 - A98
Series D3L Lever Operated	A99 - A100
Installation Series D3	A101 - A102
Series D31 (NFPA D05H/CETOP 5H, NG10 Mounting)	
Introduction and Technical Information	A104
Series D31 Pilot Operated, Solenoid Controlled	A105 - A119
Accessories	A120
Series D31NW Pilot Operated, Solenoid Controlled	A121 - A128
Accessories	A129
Series D31NWR Regenerative and Hybrid	A130 - A133
Plates for Regenerative and Hybrid Circuits	A134 - A139
Series D31*A Air Pilot Operated	A140 - A141
Series D31*L Lever Operated	A142 - A143
Series D3P Oil Pilot Operated	A144 - A145
Installation Series D31, D3P	A146 - A150
Series D41 (NFPA D07/CETOP 7, NG16 Mounting)	
Introduction and Technical Information	A152
Series D41VW Pilot Operated, Solenoid Controlled	A153 - A160
Accessories	A161
Series D41VWR and D41VWZ Regenerative and Hybrid	A162 - A165
Series D4L Lever Operated	A166 - A169
Series D4P Oil Pilot Operated	A170 - A173
Installation Series D4	A174 - A177
Series D61 (NFPA D08/CETOP 8, NG25 Mounting)	
Introduction and Technical Information	A178
Series D61V Pilot Operated, Solenoid Controlled	A179 - A188
Accessories	A189
Series D61VA Air Pilot Operated	A190 - A191
Series D61VL Lever Operated	A192 - A193
Series D6P Oil Pilot Operated	A194 - A195
Installation Series D61, D6P	A196 - A199

Continued on next page

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

Introduction and Technical Information	A200
Series D81V	Pilot Operated, Solenoid ControlledA201 - A211
Accessories	A213
Series D81VA	Air Pilot OperatedA214 - A215
Series D81VL	Lever OperatedA216 - A217
Series D8P	Oil Pilot OperatedA218 - A220
Installation	Series D81, D8PA221 - A224

Series D91

Series D91VW	Pilot Operated, Solenoid ControlledA225 - A231
Series D91VWR and D91VWZ	Regenerative and HybridA232 - A235
Series D9L	Lever OperatedA236 - A239

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

Introduction and Technical Information	A240
Series D101V	Pilot Operated, Solenoid ControlledA241 - A250
Accessories	A251
Series D101VA	Air Pilot OperatedA252 - A253
Series D101VL	Lever OperatedA254 - A255
Series D10P	Oil Pilot OperatedA256 - A258
Installation	Series D101, D10PA259 - A262

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

Series D111VW	Pilot Operated, Solenoid ControlledA263 - A269
Accessories	A269
Installation	A270 - A272
Series D111VWR and D111VWZ	A273 - A276

Series D4S (NG10, NG25, NG32)

Series D4S	Directional Seat ValveA277 - A286
Series D4S Inline Mounted	A287 - A295

Series D5S (SAE Flange)

Series D5S	Directional Seat Valve, SAE FlangeA297 - A311
------------------	---

**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. 23.06.2010).

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

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

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

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

Position Paper Machinery Directive 2006/42/EG “safety components”

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

Safety components are:

Pressure relief valves according to directive 97/23/EG

Type R4V*V , R4V*W
Type R6V*V, R6V*W
Type DSDU 578 P20E TÜV
Type DSDU 1078 E*E TÜV

Intended usage:

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

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

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

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

Clamping valves according to EN 201:2010

2-way-slip in cartridges

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 C10C1 E-SC, C10C3 E-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 693:2011

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

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

Press control NG10
Press control NG16
Press control NG25

Typ PPCC10*-SC
Typ PPCC16*-SC
Typ PPCC25*-SC

Intended usage:

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

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.

Application

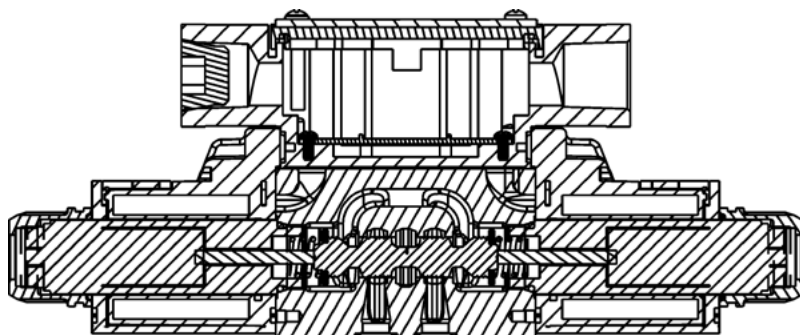
Series D1V hydraulic directional control valves are high performance, direct operated 4-way valves. They are available in 2 or 3-position styles. They are manifold mounted valves, which conform to NFPA's D03, CETOP 3 mounting pattern. These valves were designed for industrial and mobile hydraulic applications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

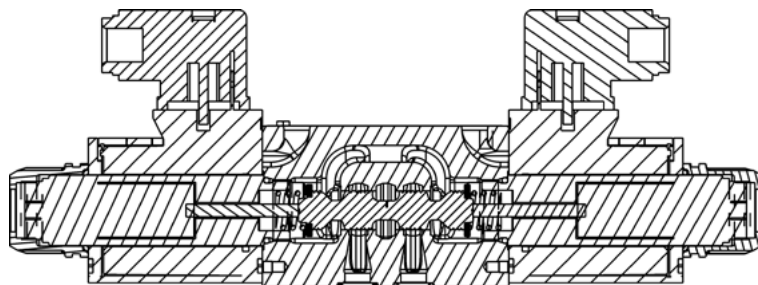
A

D1VW Solenoid Operated Plug-In Conduit Box Style



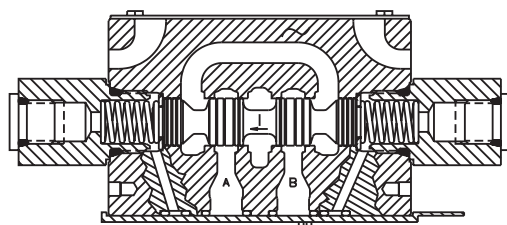
- Easy access mounting bolts.
- Waterproof NEMA 4, IP67.
- No tools required for coil removal.
- 15 standard spool styles available.
- Four electrical connection options.
- Lights included (CSA approval and CE approval).
- Easy coil replacement.
- Plug-In design offered with lights & other options.

D1VW Solenoid Operated Hirschmann (DIN) Style



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

D1VP Oil Pilot Operated



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

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

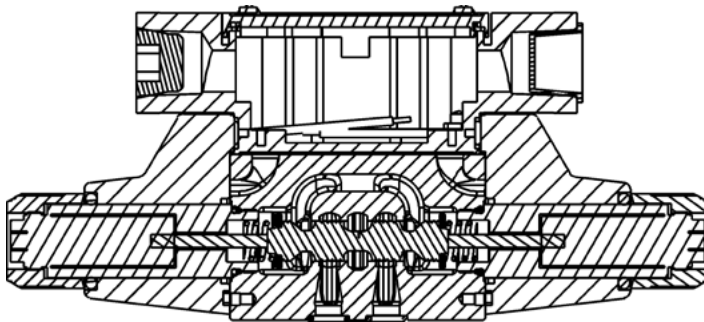
Electrical Connections

A

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

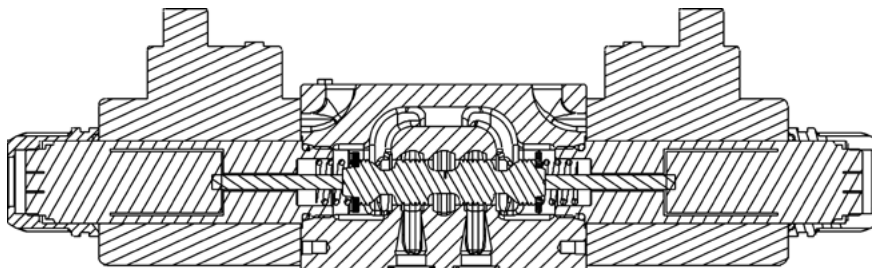
Plug-in Conduit Box	Explosion Proof	Dual Spade (DC only)
DESINA (DC only)	Hirschmann (DIN)	Wire Lead Conduit Box
Deutsch (DC only)	Metri-Pack (DC only)	

D1VW Solenoid Operated Wire Lead Conduit Box Style



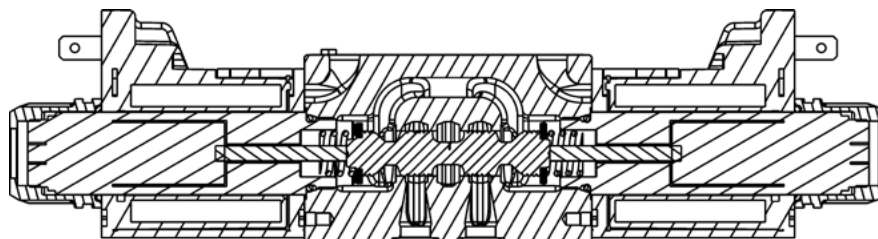
- Easy access mounting bolts.
- Waterproof NEMA 4, IP67.
- No tools required for coil removal.
- 15 spool styles available.
- No lights available

D1VW Solenoid Operated DESINA Style



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

D1VW Solenoid Operated Dual Spade Style



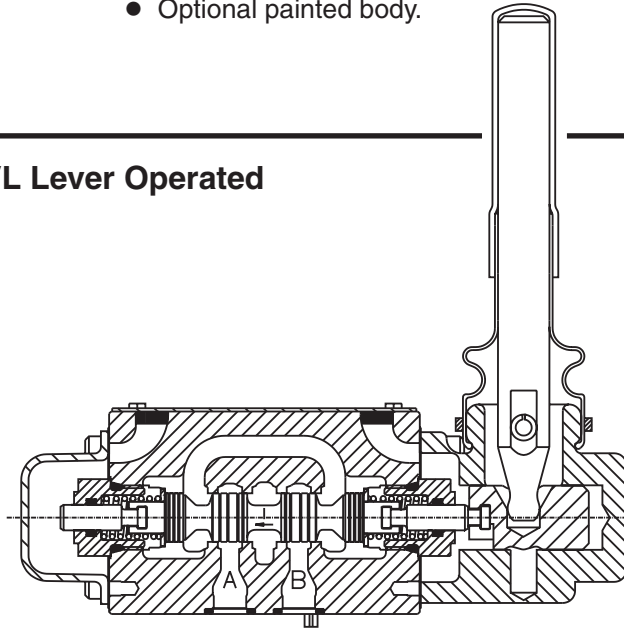
- Dual spade connection (SAE Style 1B).
- Easy coil replacement.
- 15 standard spool styles available.
- 12 VDC, 30 watt only.

Features

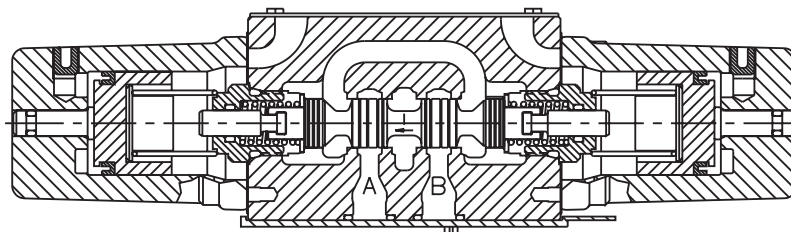
- Easy access mounting bolts.
- 345 Bar (5000 PSI) pressure rating.
- Flows to 22 GPM depending on spool.
- Choice of five operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finished body.
- Optional proportional spool available.
- Optional painted body.

A**D1VL Lever Operated**

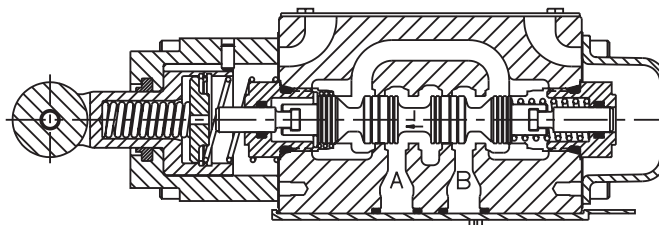
- Spring return or detent styles available.
- Heavy duty handle design.

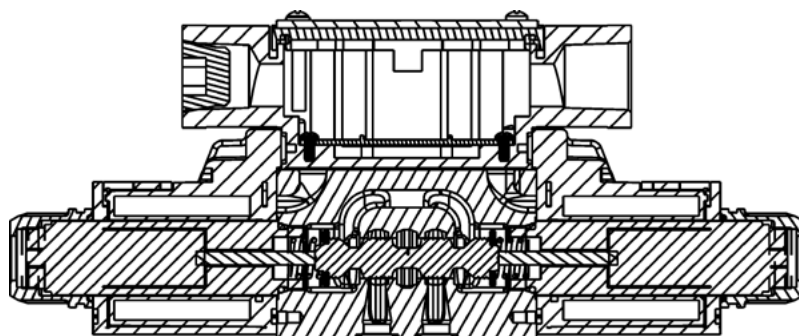
**D1VA Air Operated**

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

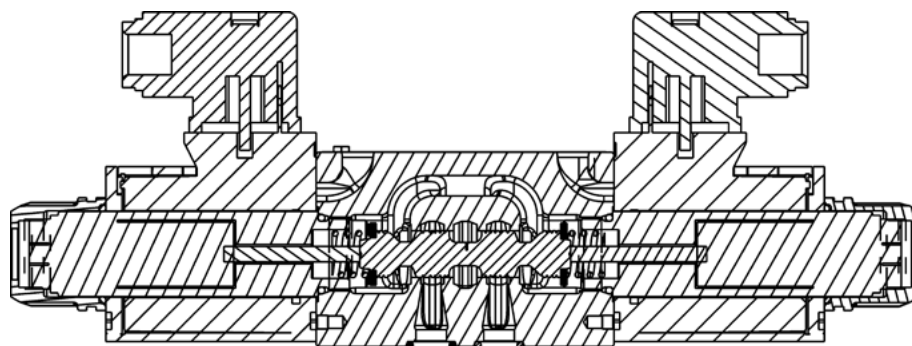
**D1VC Cam Operated**

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

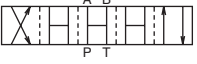
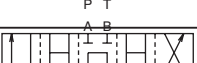
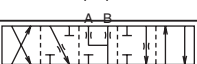
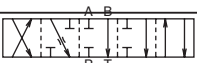
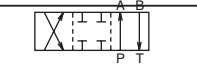
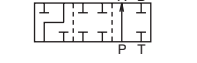
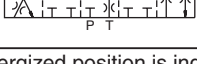


A**D1VW AC Input Solenoid Operated Soft Shift**

- 3 standard orifice sizes available.
- 15 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)	49 (13)
D1V*006		78 (20)	49 (13)	52 (14)
D1V*007		45 (12)	18 (5)	18 (5)
D1V*008		49 (13)	45 (12)	37 (10)
D1V*009		58 (15)	45 (12)	45 (12)
D1V*011		58 (16)	30 (8)	37 (10)
D1V*015		79 (21)	30 (8)	34 (9)
D1V*020		78 (20)	45 (12)	75 (20)
D1V*026		37 (10)	11 (3)	7 (2)
D1V*030		70 (18)	18 (5)	75 (20)
D1V*081		32 (9)	26 (7)	30 (8)
D1V*082		32 (9)	26 (7)	34 (9)

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

A

D1VA, D1VP, D1VC, D1VL Reference Data

A

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

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

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	-10% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact HVD for AC coil applications.

Explosion Proof Solenoid Ratings*

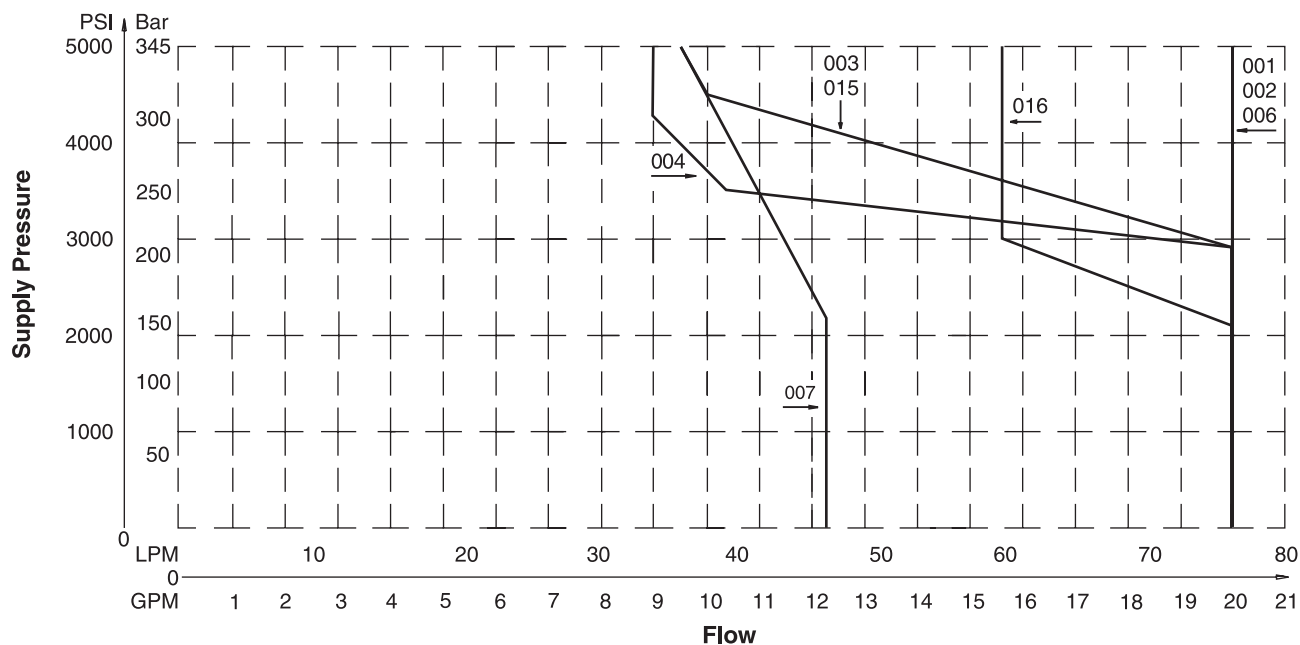
U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (ER, ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013;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

* Allowable Voltage Deviation $\pm 10\%$.

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
E	F	24 VAC	4.8 AMPS	120 VA	2.07 Amps	21 W	1.29 Ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 Ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 Ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 Ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 Ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 Ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 Ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 Ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 Ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 Ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 Ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 Ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 Ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 Ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 Ohms
Explosion Proof Solenoids							
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
ER & ET Explosion Proof Solenoids							
J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

D1V Shift Limits, DC & AC Rectified 30 Watt

A



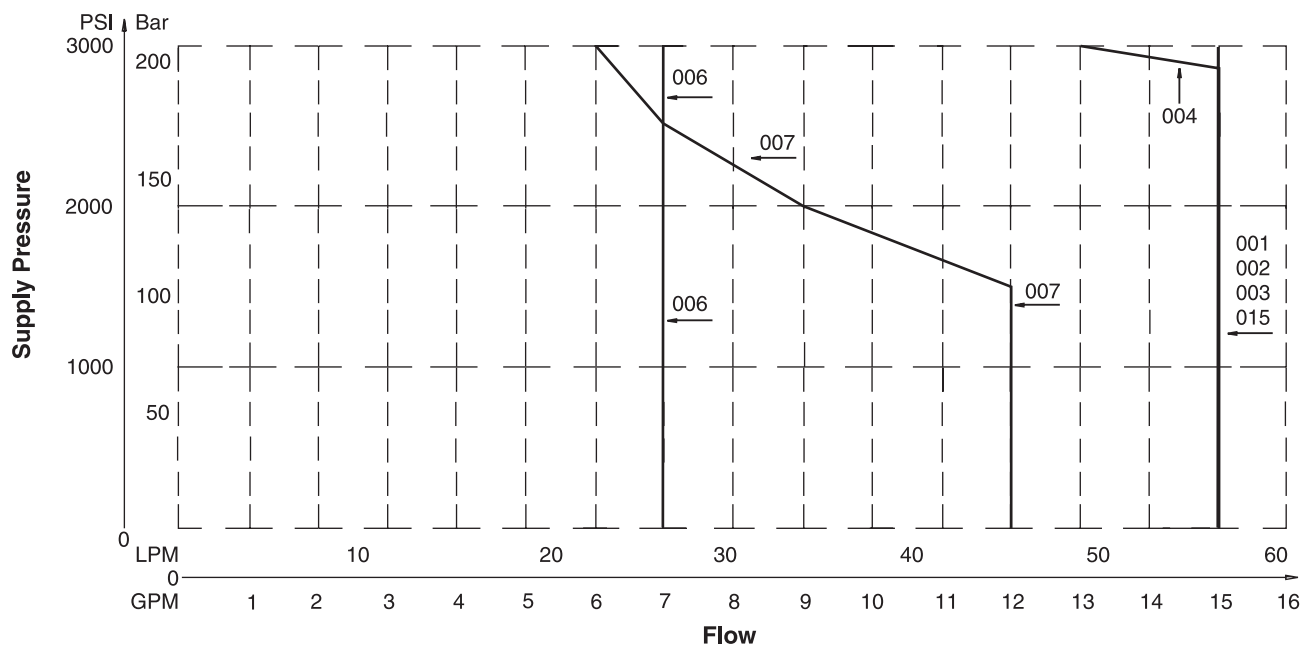
Example:

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).

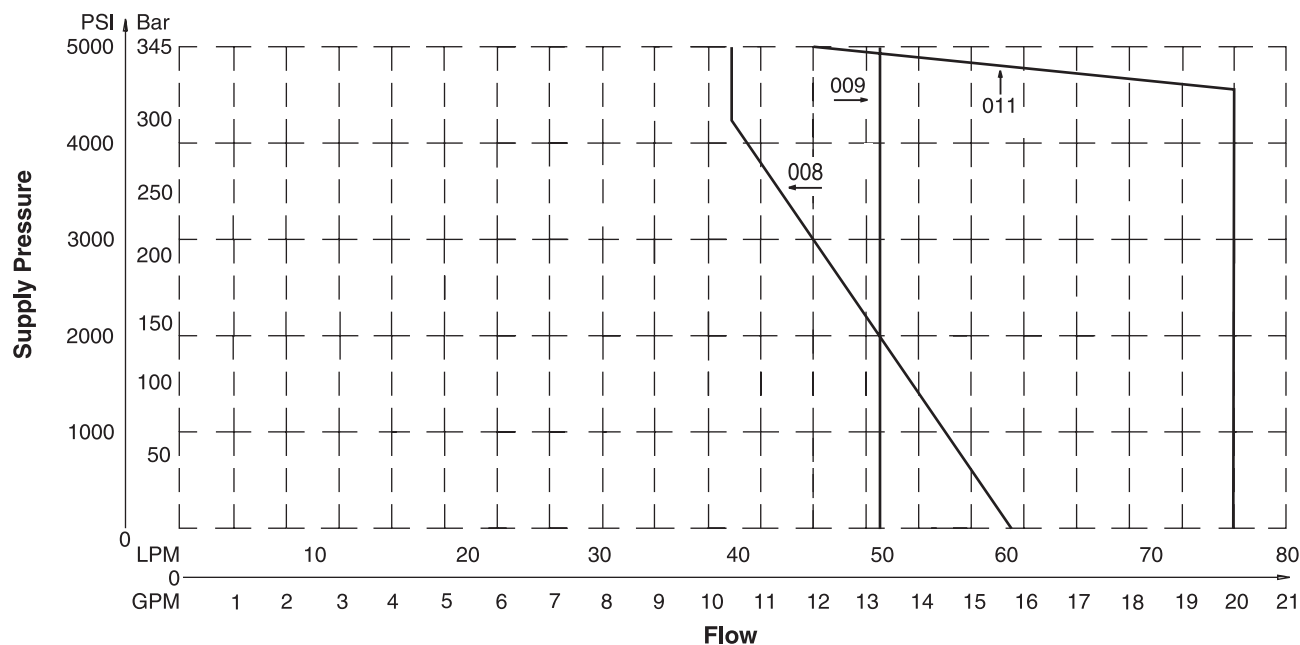
Important Notes for Switching Limit Charts

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



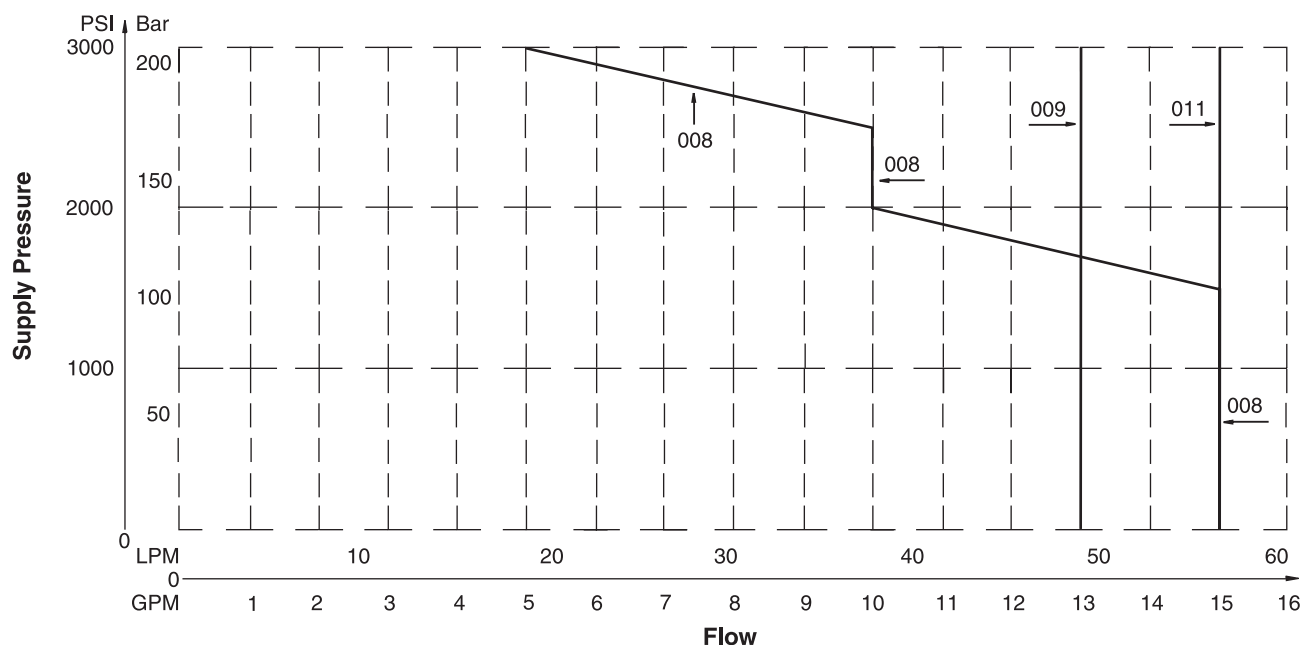
Example:

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

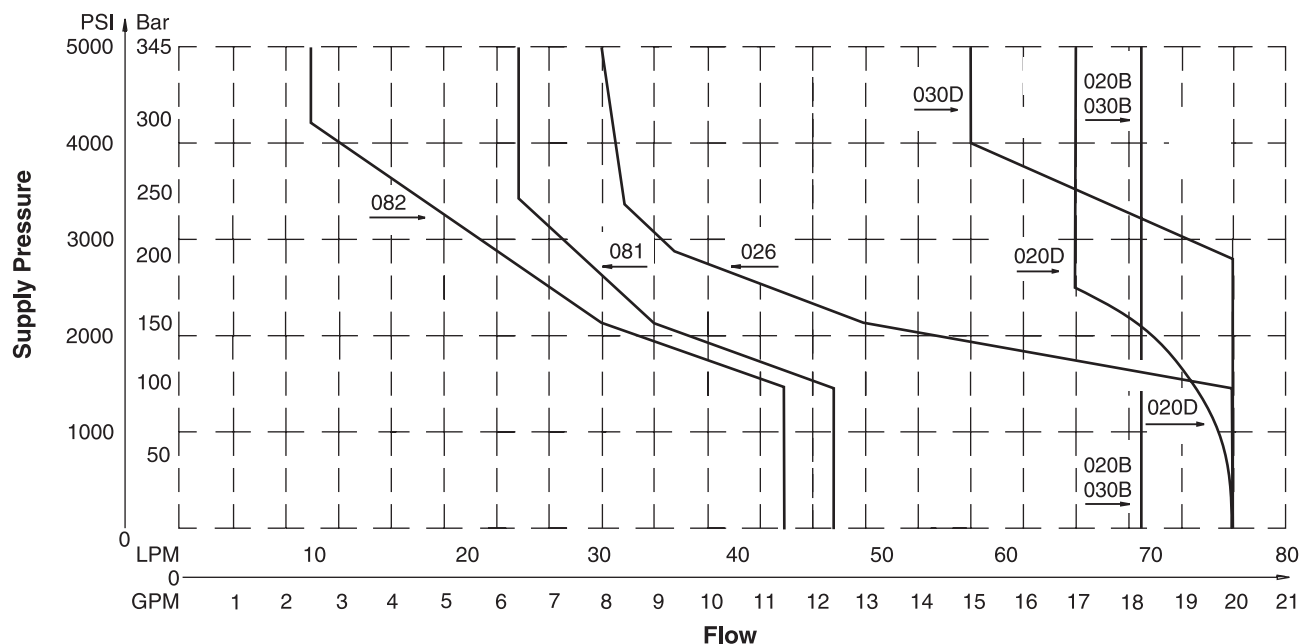
1. For F & M style valves, reduce flow to 70% of that shown.
2. Shift limits charted for equal flow A and B ports. Unequal A and B port flows may reduce shift limits.
3. These charts do not show explosion proof performance. Consult factory for explosion proof duty.
4. Blocking A or B ports will reduce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

D1VW***L Shift Limits**



D1V Shift Limits, DC & AC Rectified 30 Watt

A



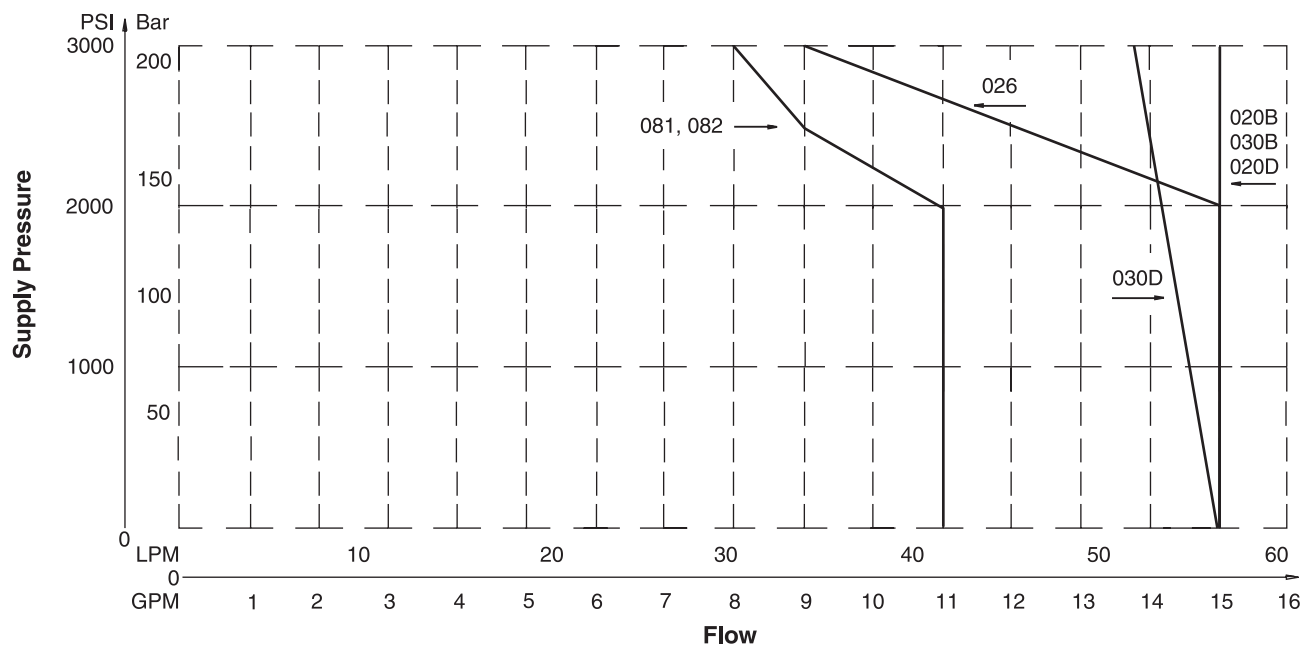
Example:

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).

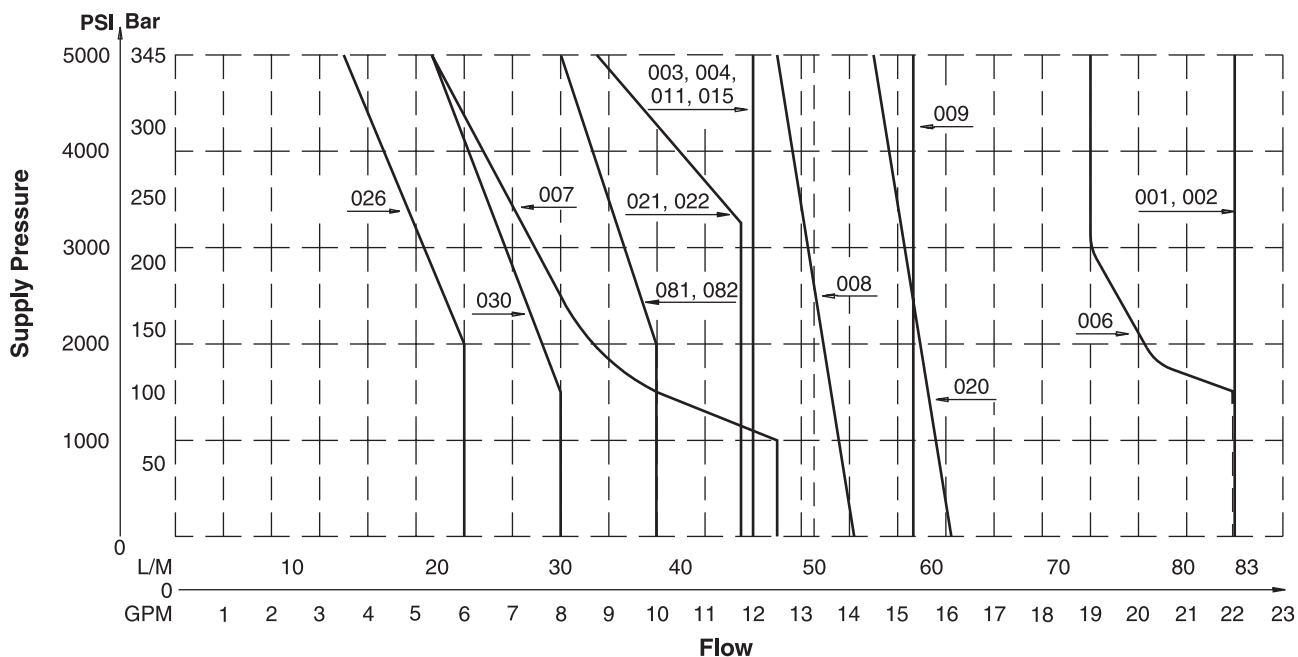
Important Notes for Switching Limit Charts

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%.

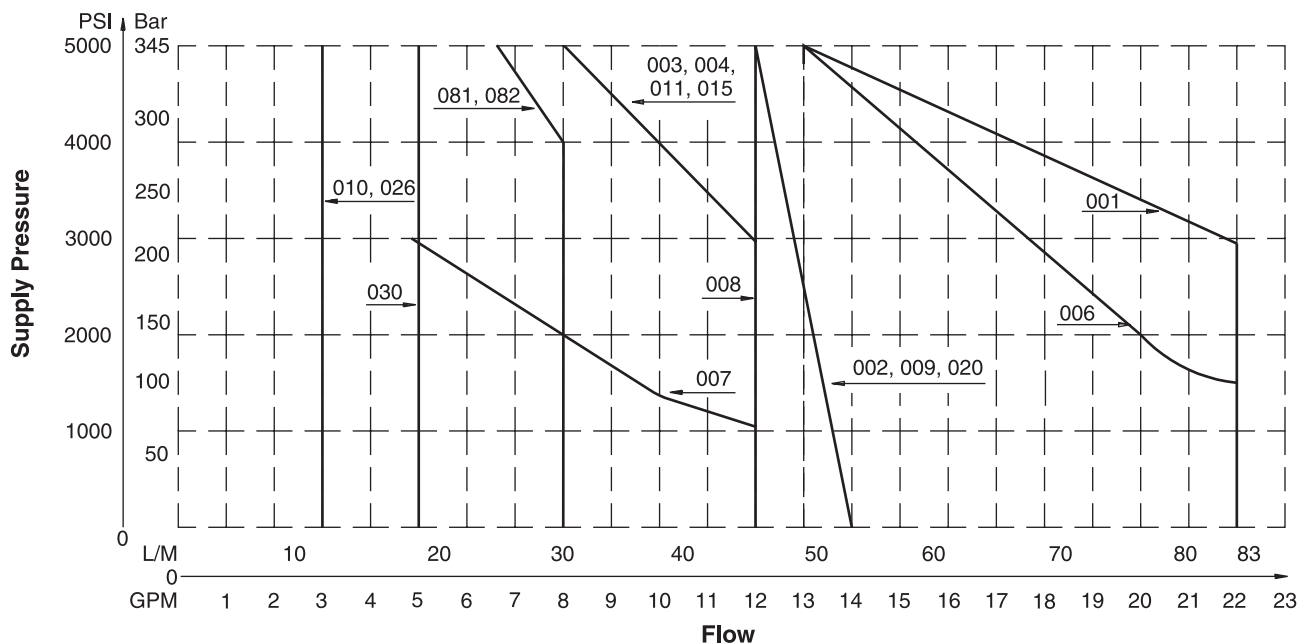
D1VW*****L Shift Limits



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).

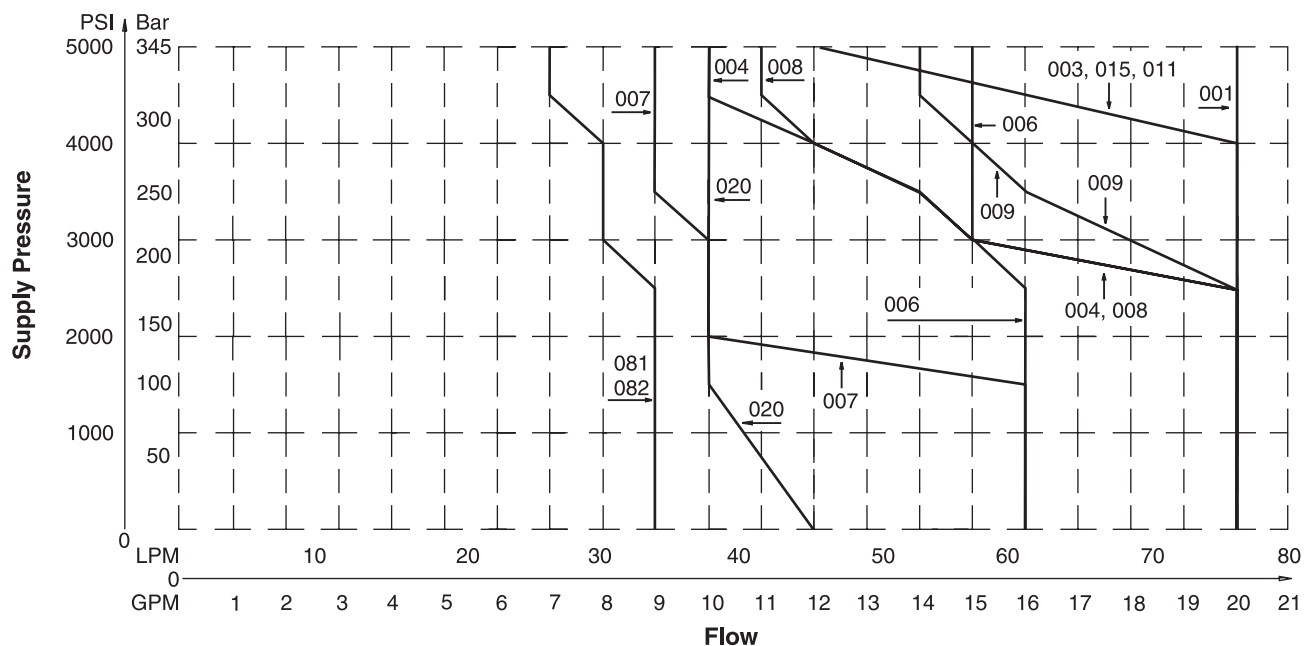
Important Notes for Switching Limit Charts

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).

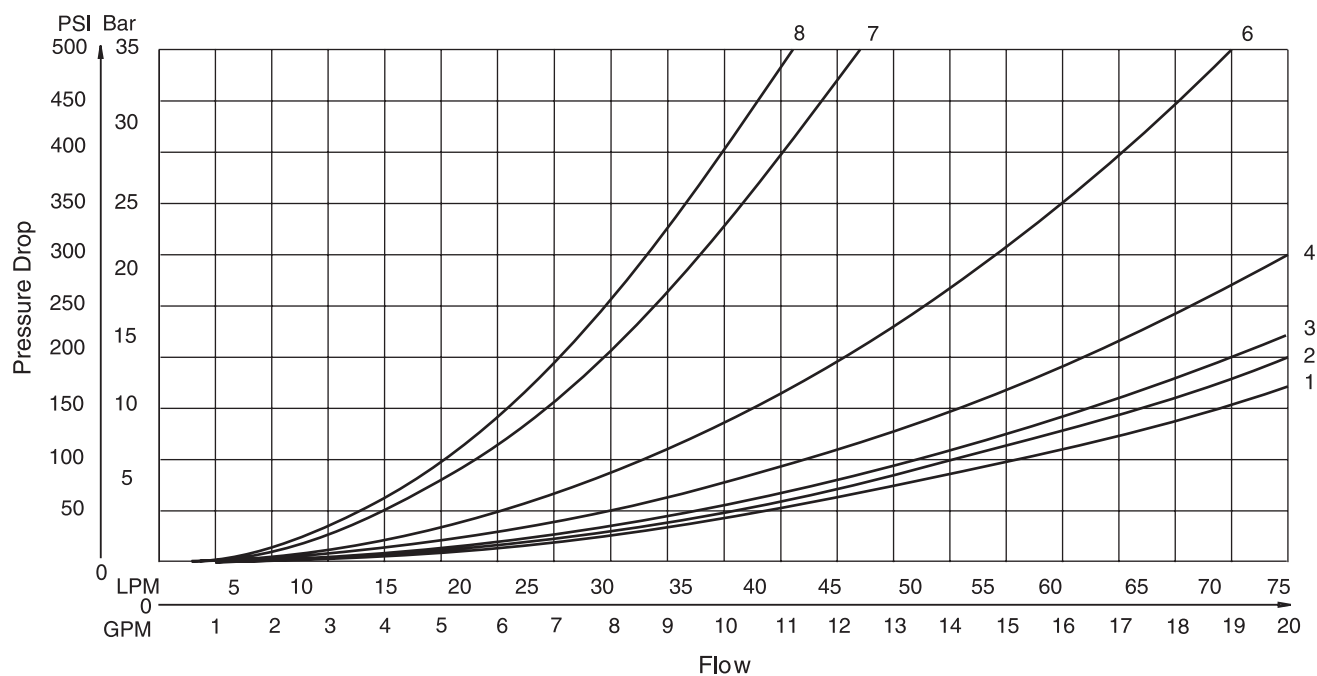
D1VW Pressure Drop Reference Chart – 30 Watt Coil

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).

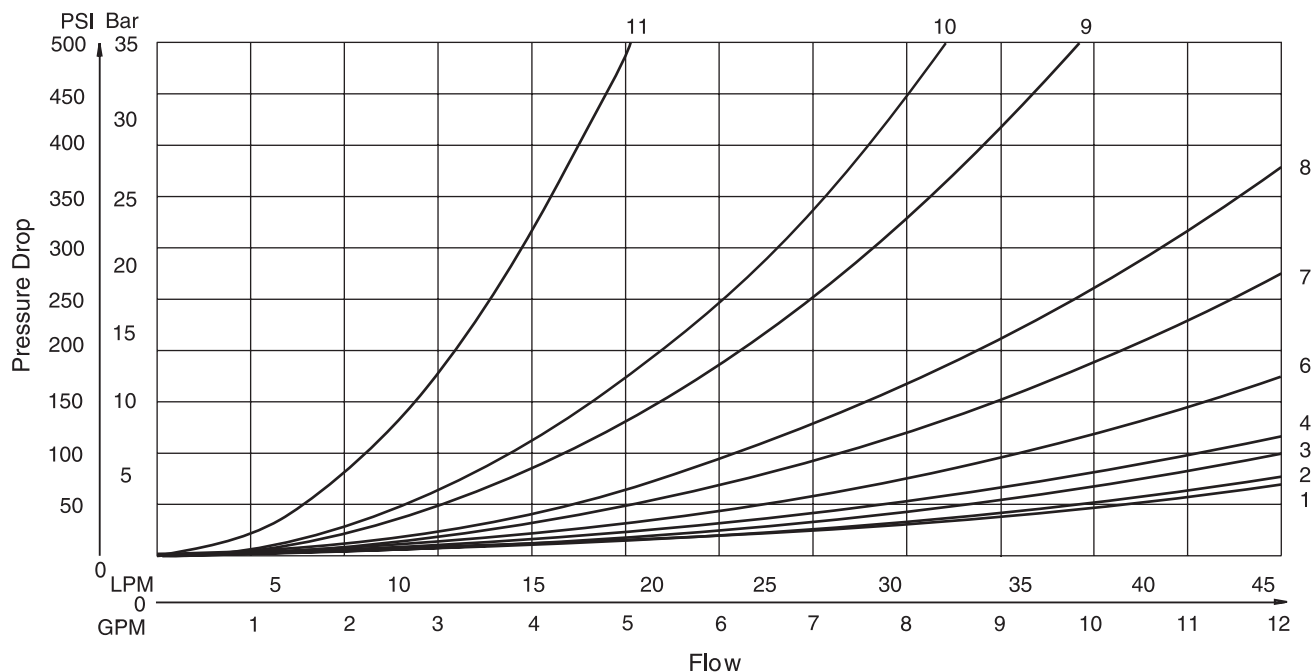
D1VW Pressure Drop Reference Chart – 10 Watt Coil

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

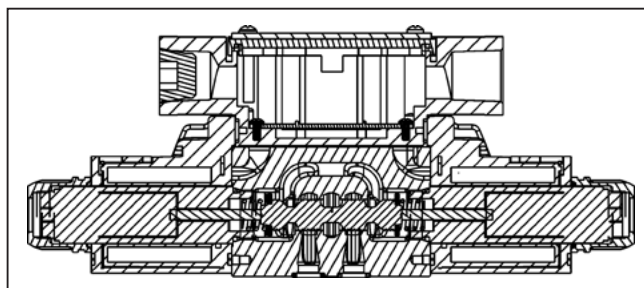
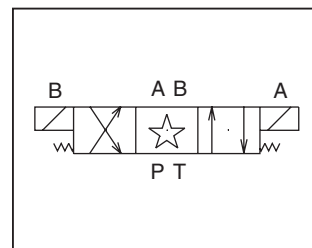
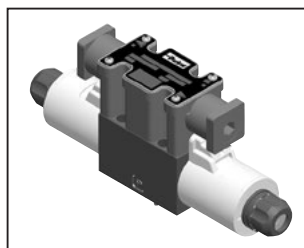
Series D1VW directional control valves are high performance, 4-chamber, direct operated, wet armature solenoid controlled, 3 or 4-way valves. They are available in 2 or 3-position and conform to NFPA's D03, CETOP 3 mounting patterns.

Features

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

Specifications

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



- U.L. recognized coils standard, expect Expl Pf.
- No tools required for coil removal.
- AC rectified coils.

Leakage Rates* 100 SSU @ 49°C (120°F)	Maximum Allowable: 19.7 cc (1.2 Cu. in.) per Minute/Land @ 69 Bar (1000 PSI)* 73.8 cc (4.5 Cu. in.) per Minute/Land @ 207 Bar (3000 PSI)* Typical: 4.9 cc (0.3 Cu. in.) per Minute/Land @ 69 Bar (1000 PSI)* 26.2 cc (1.6 Cu. in.) per Minute/Land @ 345 Bar (5000 PSI)
--	--

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

Response Time

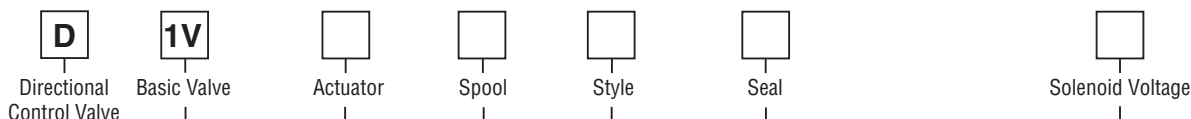
Response time
(milliseconds)
at 345 Bar (5000 PSI)
is 32 LPM (8.5 GPM).

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.

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

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

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.

Valve Weight:

Single Solenoid 1.36 kg (3.0 lbs.)
 Double Solenoid 1.6 kg (3.5 lbs.)

Standard Bolt Kit: BK209

Metric Bolt Kit: BKM209

Seal Kit:

Nitrile SKD1VWN91
 Fluorocarbon SKD1VWV91

Code	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.
 ‡ High Watt only.

Bold: Designates Tier I products and options.

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

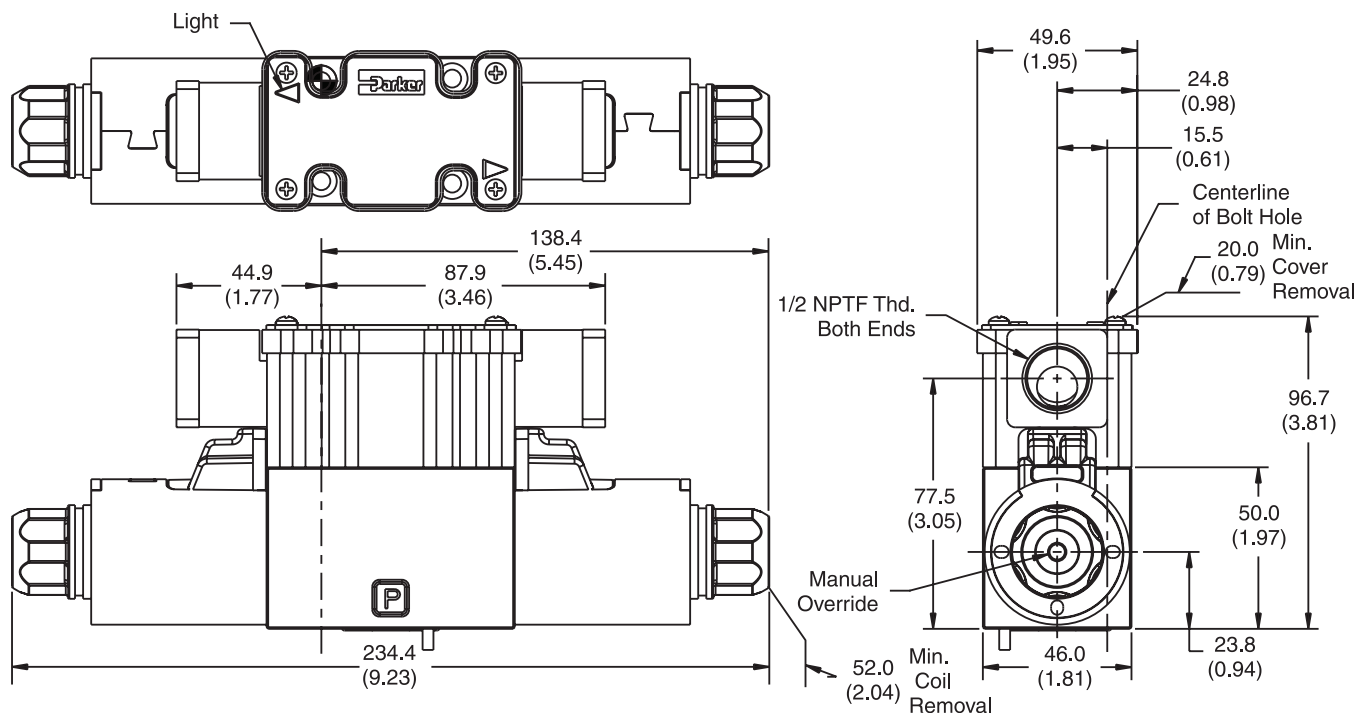
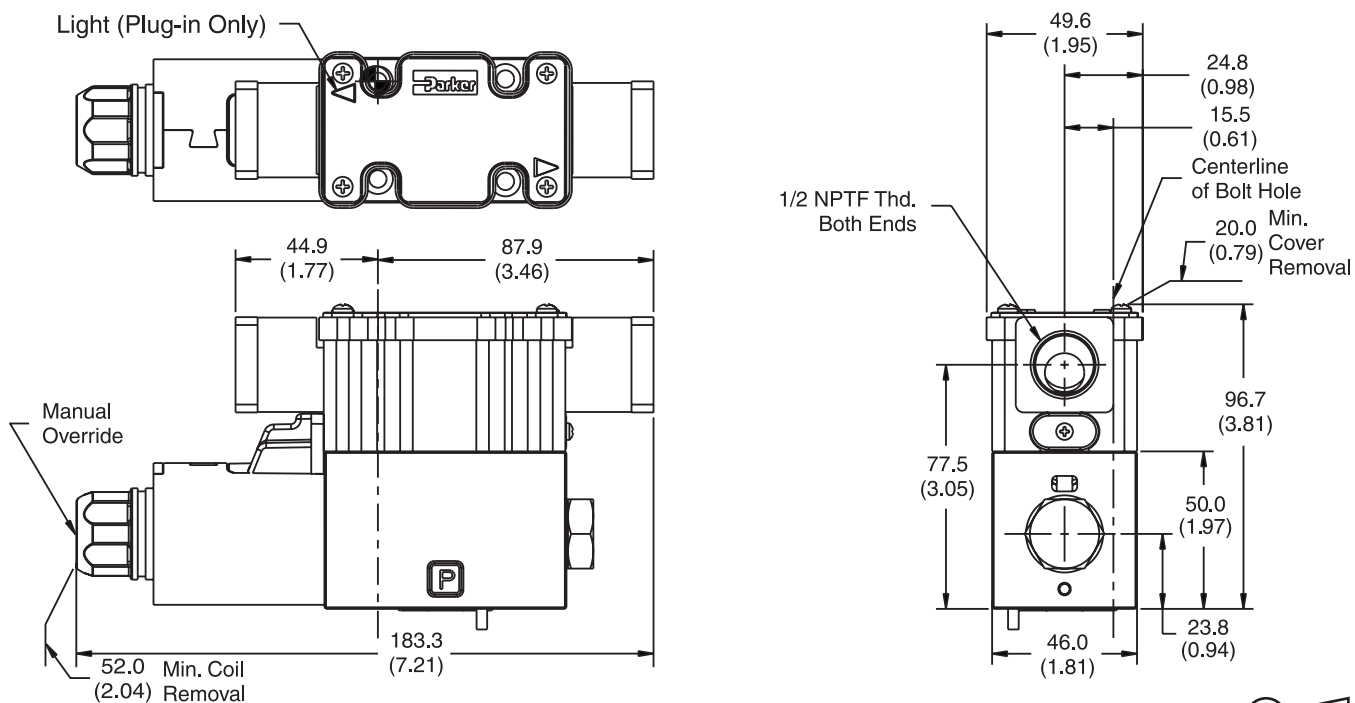
Solenoid Connection		Coil Options		Tube Options		Manual Override Options		Electrical Options		Shift Response and Indication		Approvals		Valve Variations		Design Series			
Code Description C* Leadwire Conduit Box D** Metric Plug (M12X1) DESINA E† Explosion Proof F^x Flying Leadwire G†† Plug-In Conduit Box J++ Deutsch (DT04-2P) P DIN with Plug S‡ Double Spade W† DIN w/o Plug										Code Description Omit Standard Response S2* Soft Shift, 0.020" Orifice S3* Soft Shift, 0.030" Orifice S4* Soft Shift, 0.040" Orifice * Not available with low watt, AC coil, detent or DESINA. AC DIN coil must include rectified lighted plug or be Plug-in style.						Code Description Omit Standard Valve 4†# CSA Canada CSA22.2 No. 139-13 N CE Approved Q†# CE + CSA Approved † Not available with AC high pressure tube. # Valve is derated.		NOTE: Not required when ordering.	
* No conduit box variations – See Plug-in G. ** 24 VDC only, low watt only, lights, diode surge suppressor, not CSA approved. † Not available with lights. †† Required for variations on conduit box style, must have lights. ++ 12 and 24 VDC only. ‡ Only 12 VDC high watt. x 6" leadwire only.								Code Description Omit No Options J**# Diode Surge Suppressor Z† Rectified Coil # Plug-In – 24 VDC only. DIN – DC only with Lighted Plug (5), which has integrated Surge Suppression. "J" not required here. Deutsch – as follows: • 12 VDC Hi watt only • 24 VDC Hi & Lo watt 24 VDC "JER" required. "JET" available. Adds dust rating, not polarity sensitive [IIC, D]. Leadwire – not available † DC tube standard, Plug-In conduit box only. Not polarity sensitive. Only available with Y voltage.											
Code Description Omit* High watt D** Explosion Proof, EExd ATEX E** Explosion Proof, EExme ATEX, IECEX, from Germany F† Low Watt L†† 10 Watt R# Explosion Proof, ATEX/UL/CSA/IECEX, configurable cable connections T# Explosion Proof, ATEX/UL/CSA/IECEX, fixed horizontal cable connection U## Explosion Proof, UL/CSA * AC ambient temperature must not exceed 60°C (140°F). ** J voltage only, no options. † AC only. †† DC and AC rectified only. # J and Y voltages only. Y voltage is rectified. ## J and Y voltages only. Y voltage is not rectified.						Code Description Omit Standard P* Extended Manual Override with Boot T Covered Manual Override, DC only, or AC Rectified * Manual override options not available on Explosion Proof or soft shift. Not available with high pressure AC tube H.													
						Code Description Omit Standard Pressure 103.5 Bar (1500 PSI) AC 207 Bar (3000 PSI) DC H* High Pressure, AC only 207 Bar (3000 PSI) * Not available with CSA or Explosion Proof.													
												Code Description Omit Standard – No Variations 5** Signal Lights - Standard Signal Lights - Hirsch* (DIN w/Plug) (the DC Lighted Plug has Integral Surge Suppression) 56* Manaplug (Mini) with Lights 7B* Manaplug (Micro) with Lights 1C* Manaplug (Mini) Single Sol. 5-pin, with Lights 1D* Manaplug (Micro) Single Sol. 5-pin, with Lights 1J^x Male Weather Pack (one coil) 1L^x Male to Female Weather Pack (two coils) 1M* Manaplug Opposite of Normal 1P Painted Body 2P Complete Painted Valve, 1 mil thick, spec. 4D† Twist & Lock Override (old 5426, 33 Ford Wiring) 7W* 4-pin Micro Manaplug, Special Wiring with Lights 7Y* 4-pin Micro Manaplug, Special Wiring with Lights (old B755) * Plug-in Conduit Box ** Plug-in, DIN, or DESINA only. † DC/AC Rectified only. Not available with soft shift. x Flying leadwire only.							

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

Bold: Designates Tier I products and options.

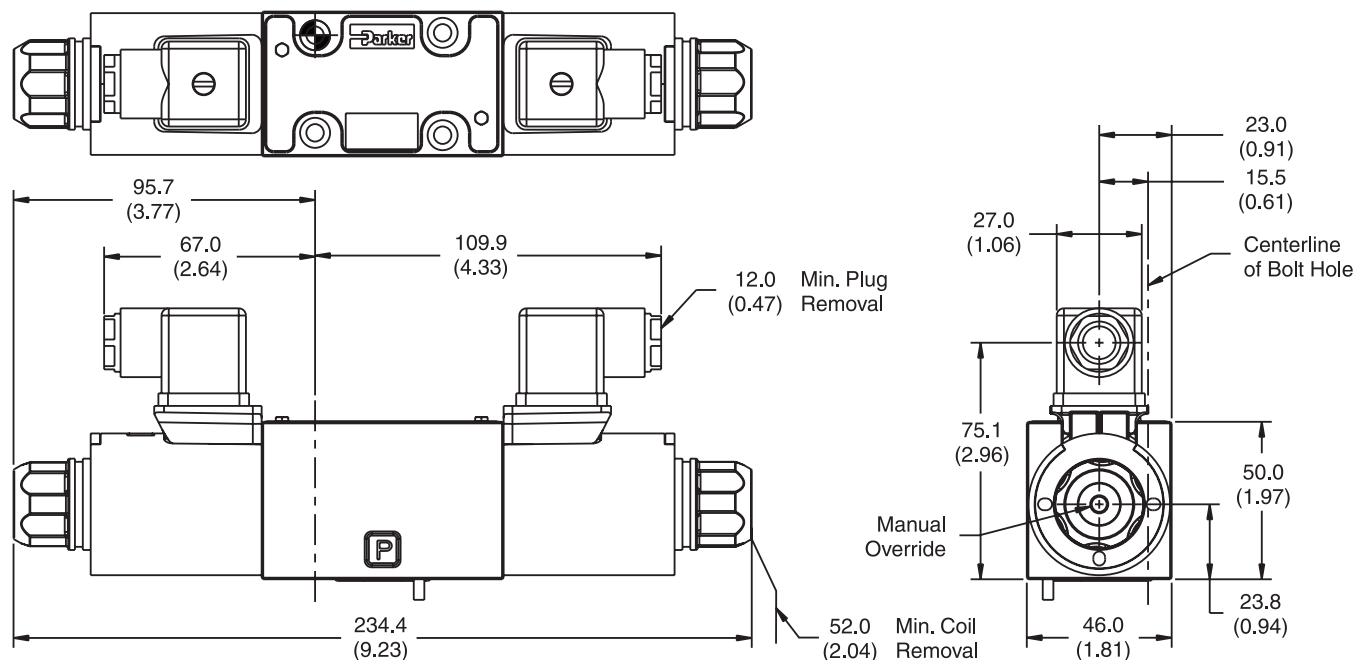
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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.

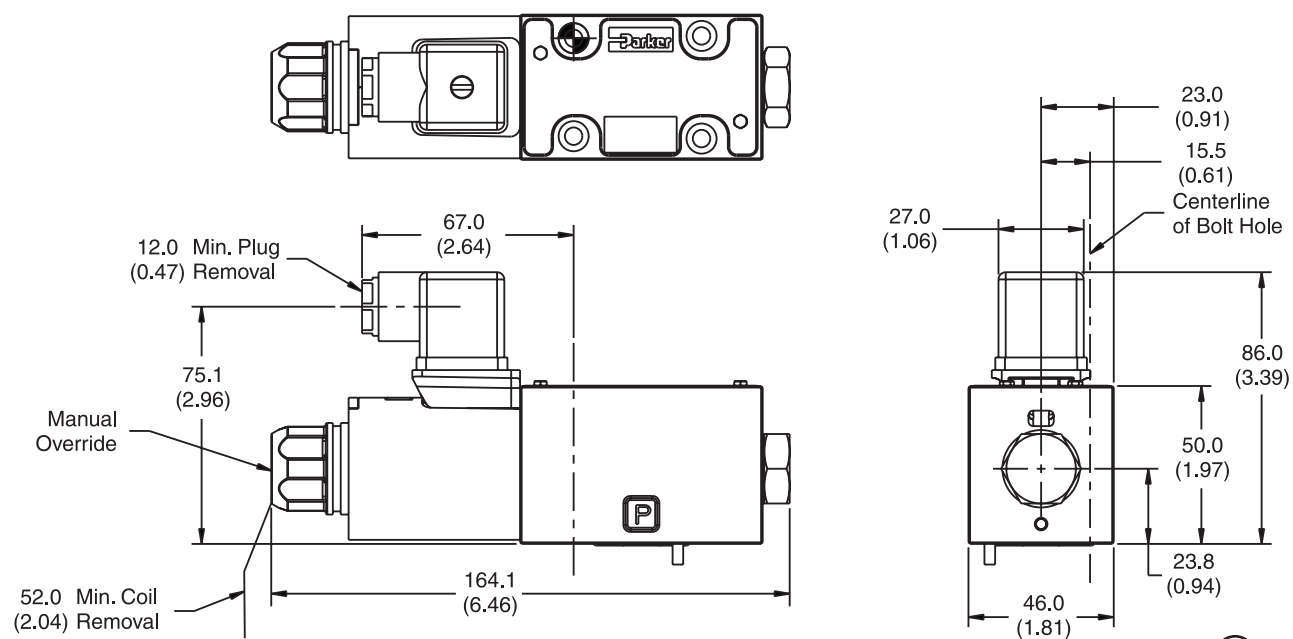
Inch equivalents for millimeter dimensions are shown in (**)

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.

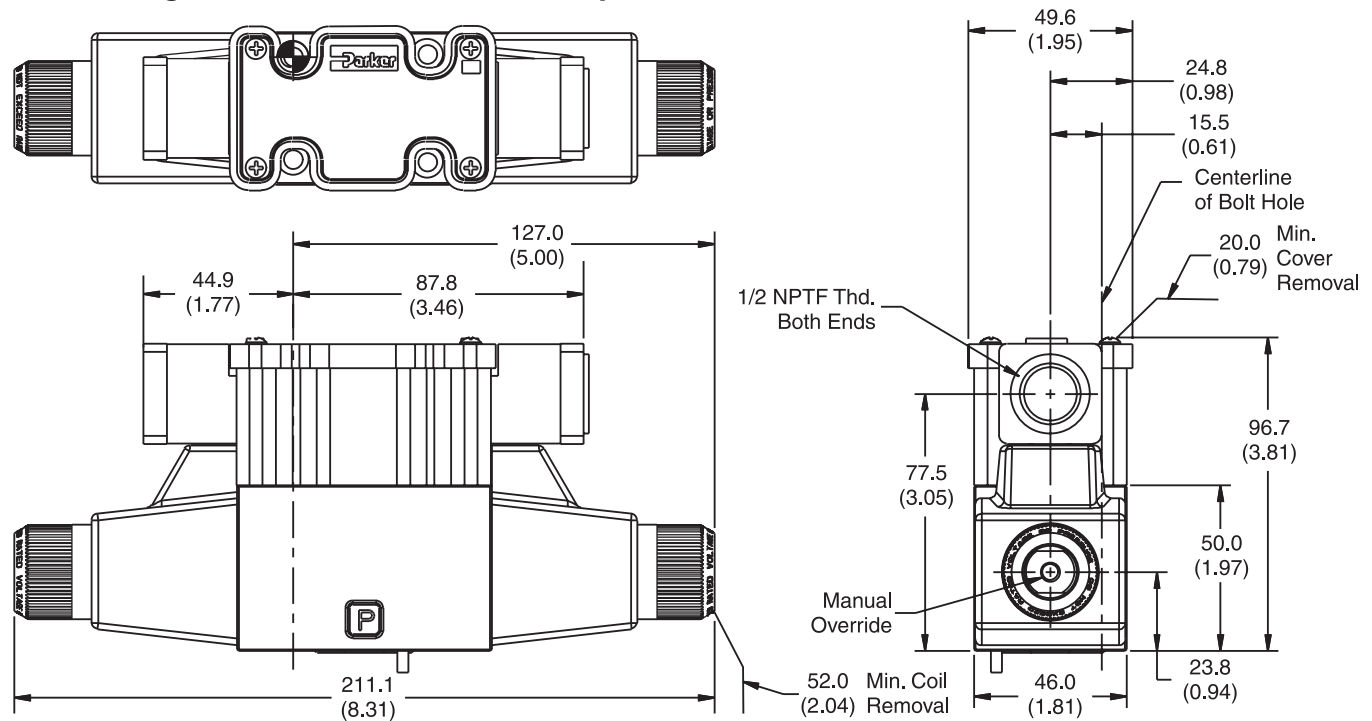
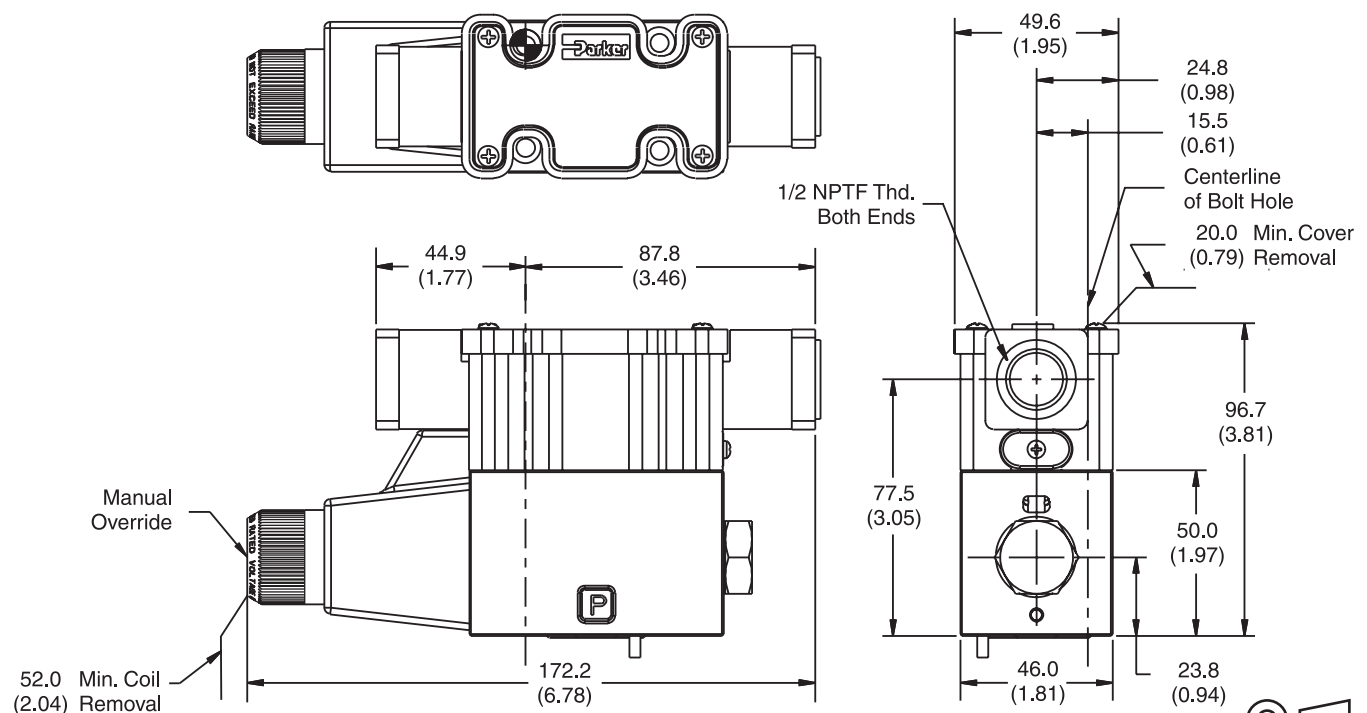
DC DIN Connector, Single Solenoid “P” Option Shown



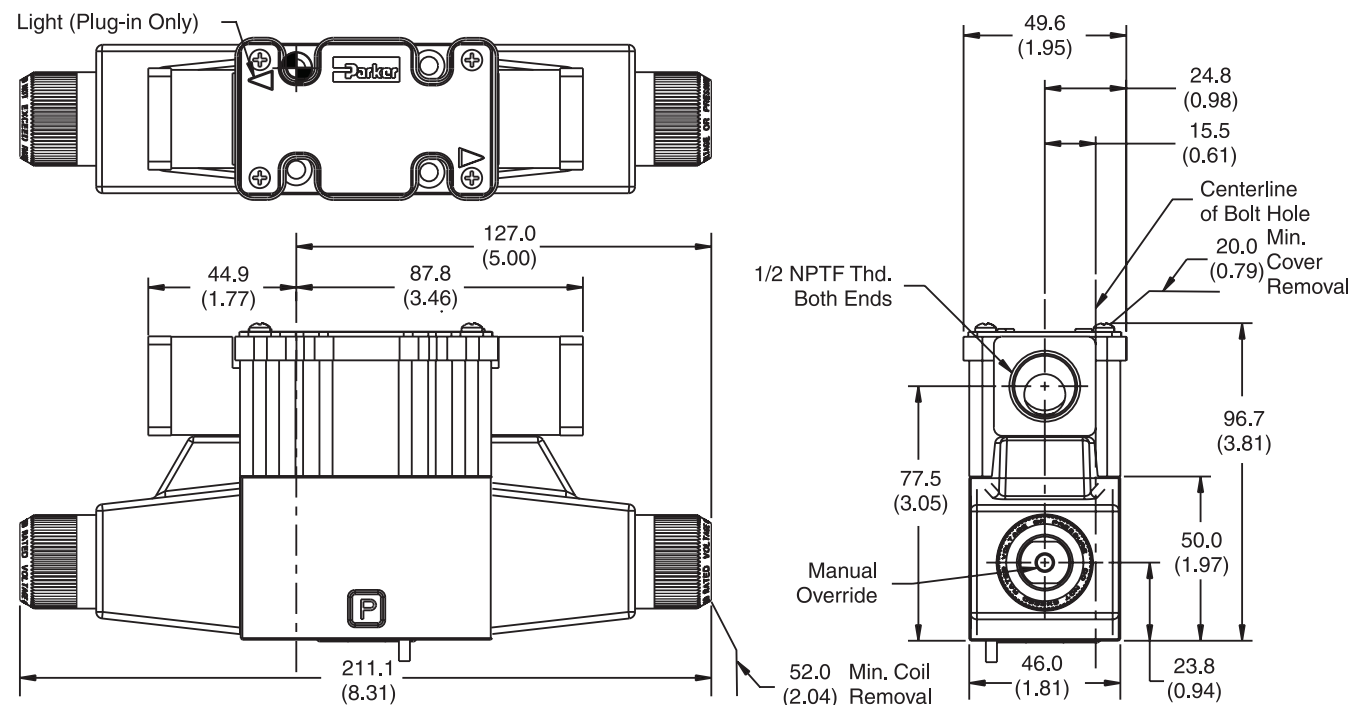
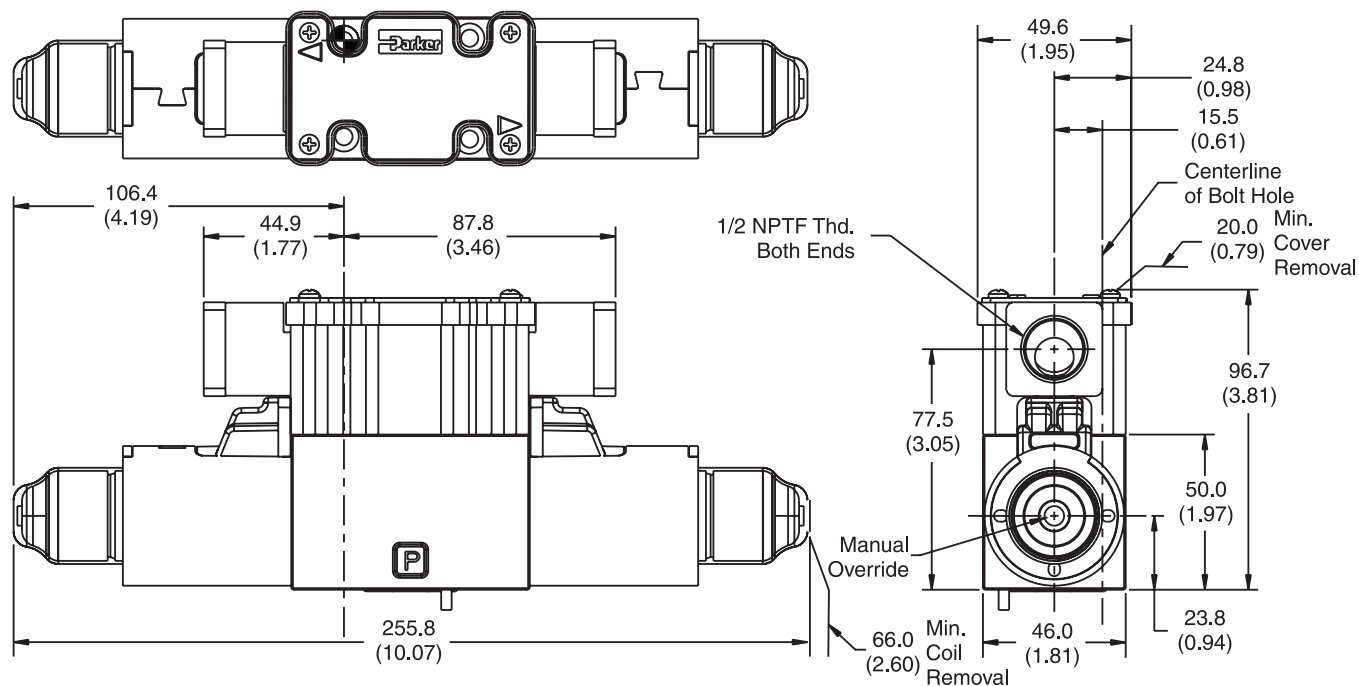
Note: 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.



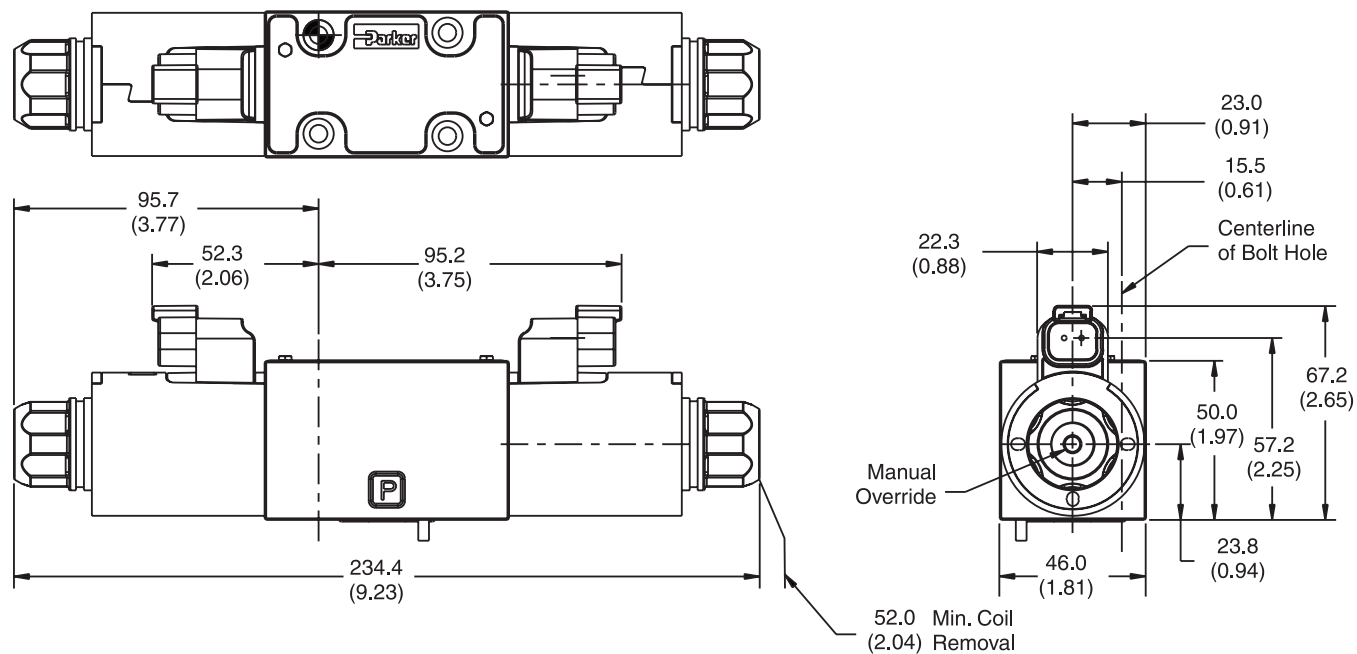
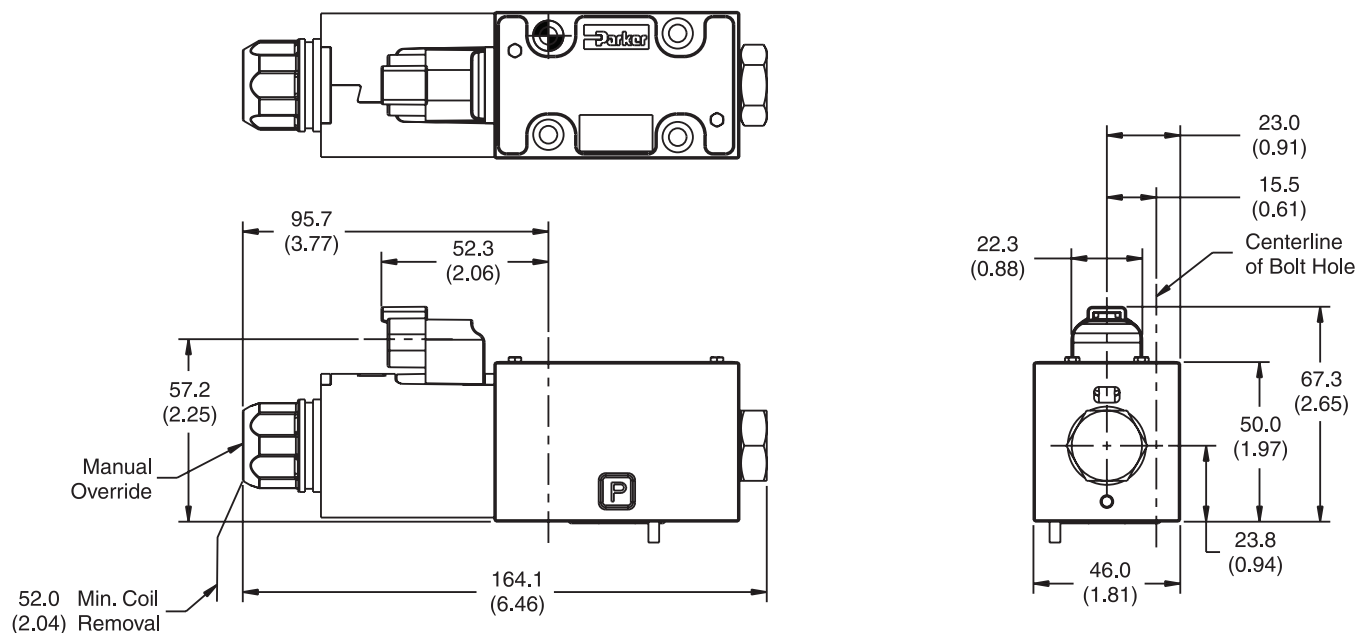
Inch equivalents for millimeter dimensions are shown in (**)

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.

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

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

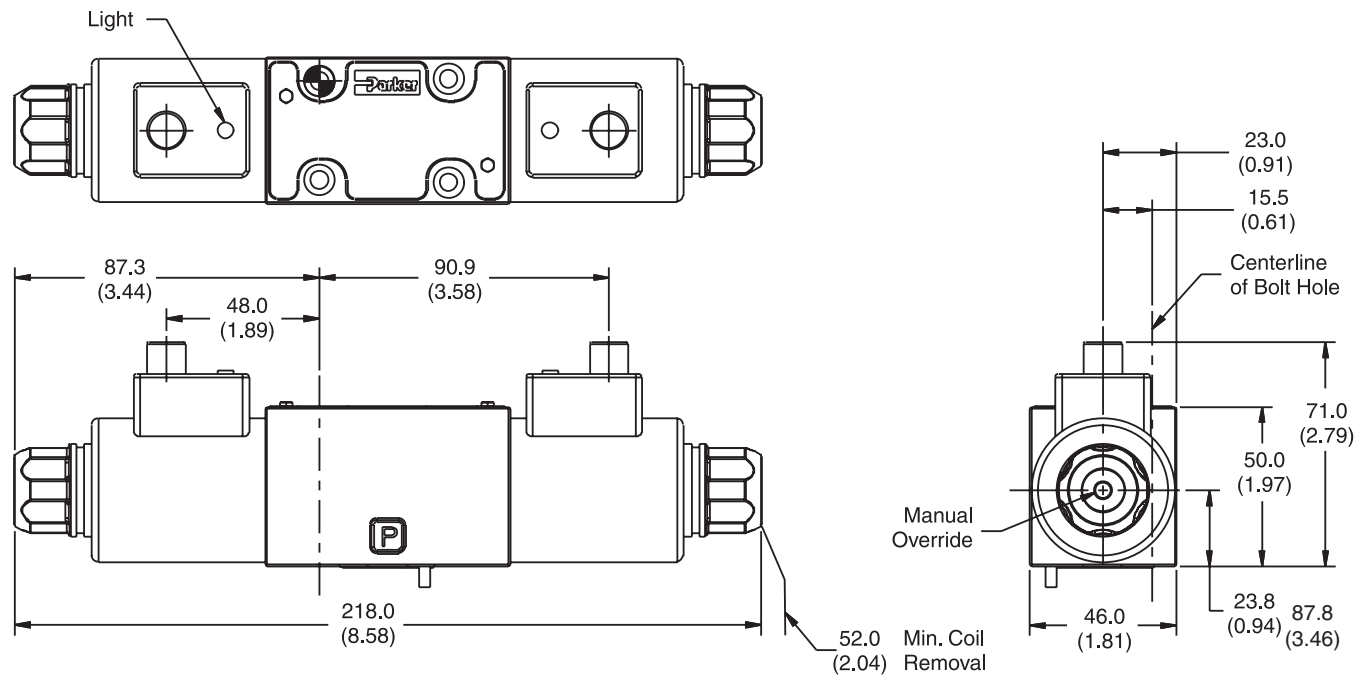
Inch equivalents for millimeter dimensions are shown in (**)

A**DC Deutsch Connector, Double Solenoid (DT04-2P)****Note:** 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.**DC Deutsch Connector, Single Solenoid****Note:** 22.0 mm (0.87") from bottom of bolt hole counterbore to bottom of valve.

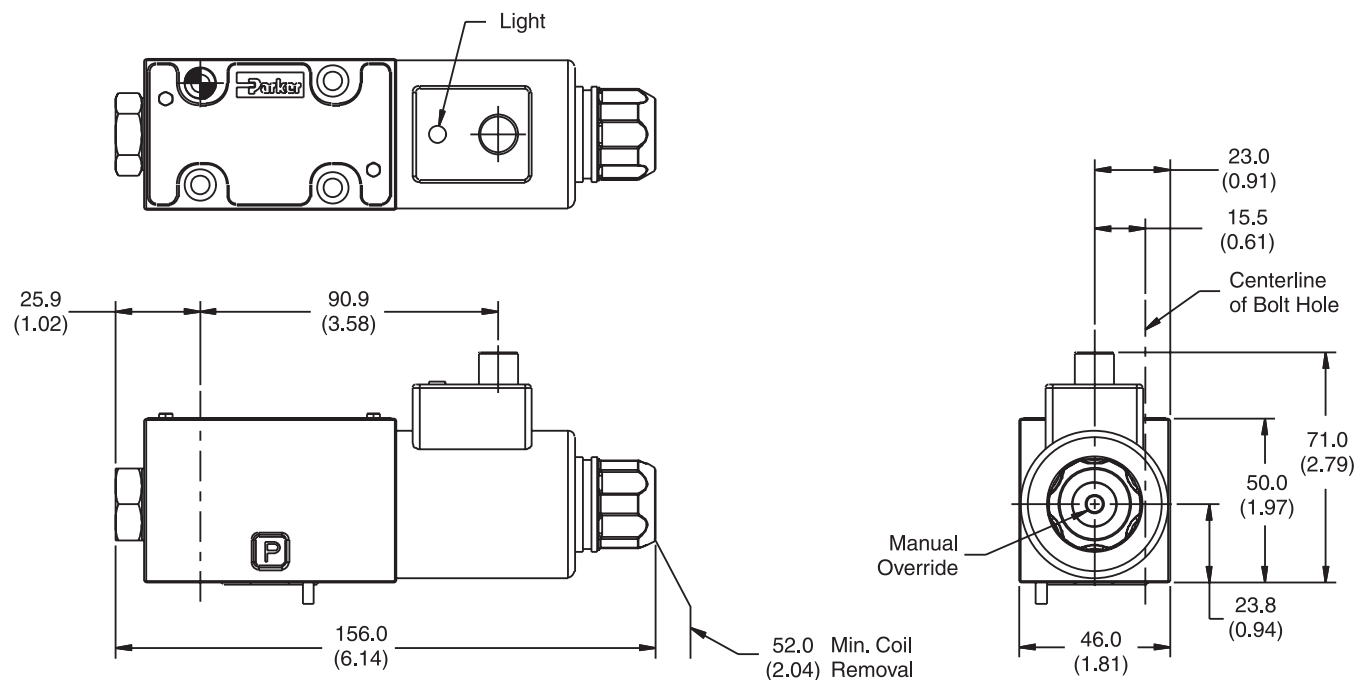
Inch equivalents for millimeter dimensions are shown in (**)

DC Desina Connector, Double Solenoid

A

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

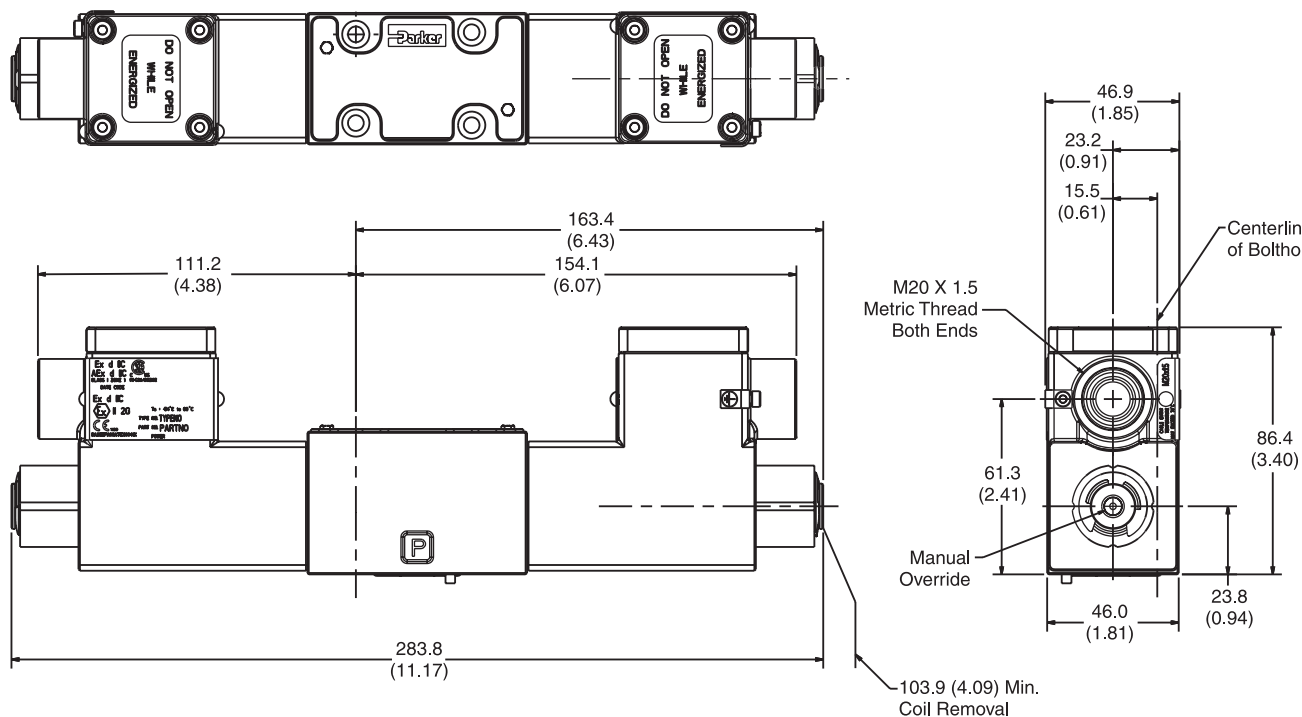
DC Desina Connector, Single Solenoid

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

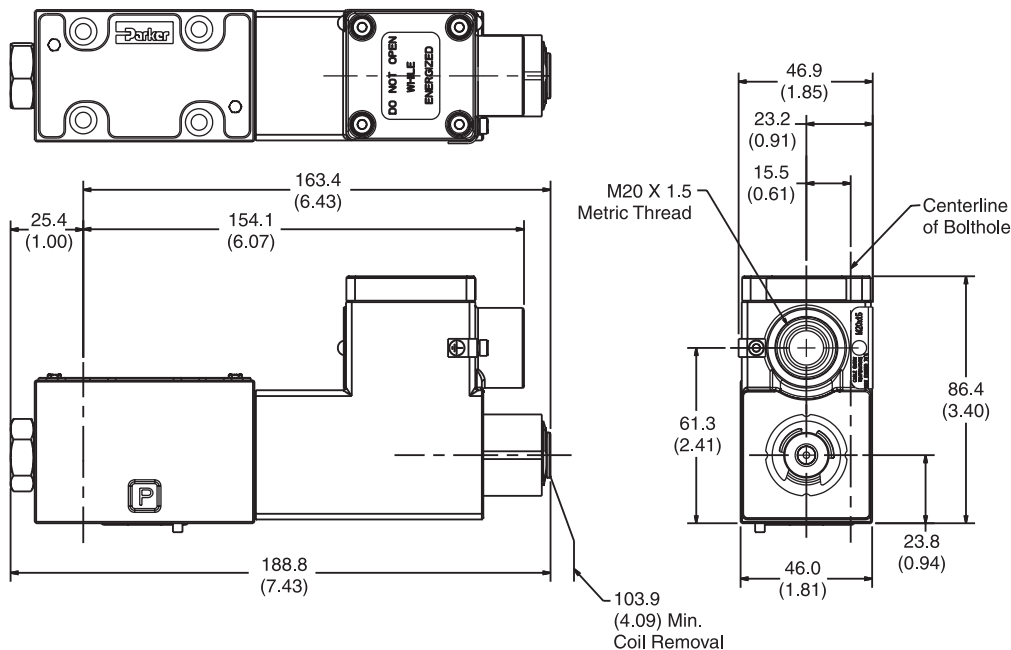
Inch equivalents for millimeter dimensions are shown in (**)

A

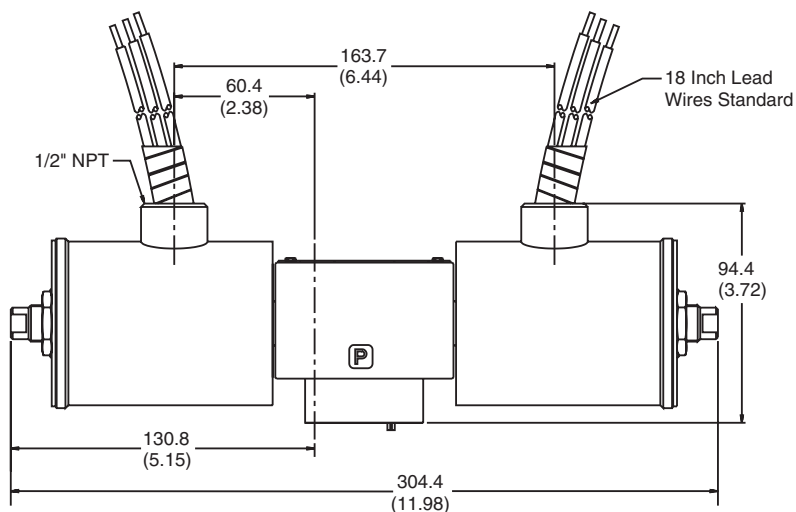
Explosion Proof, Ex d IIC ATEX/CSA/IECEX, Double Solenoid



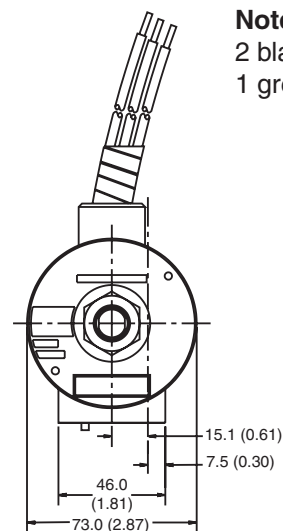
Explosion Proof, Ex d IIC ATEX/CSA/IECEX, Single Solenoid



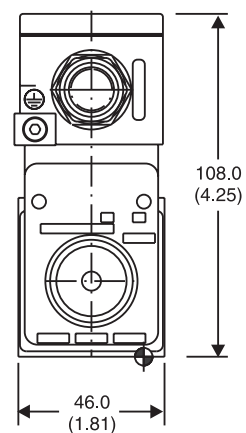
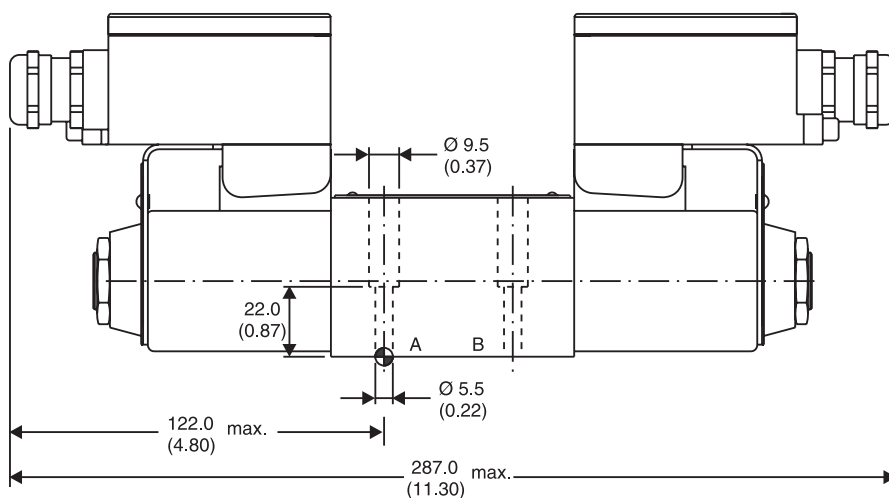
Inch equivalents for millimeter dimensions are shown in (**)

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

Note:
2 black wires
1 green wire

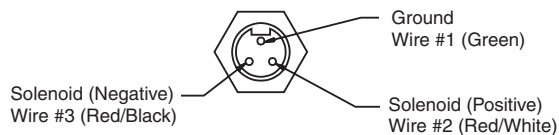


Note: 41.0 mm (1.62") from bottom of bolt hole counterbore to bottom of valve.

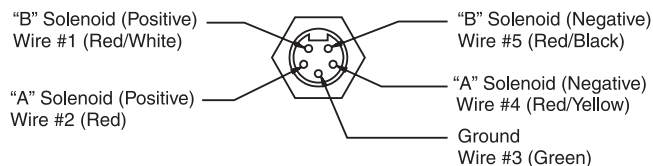
Explosion Proof, EExme ATEX, Double Solenoid, from Germany

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

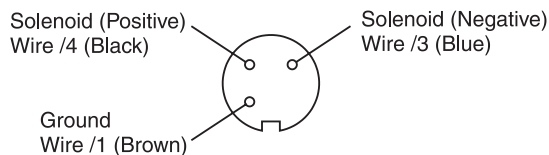
- Interface – Brad Harrison Plug
- 3-Pin for Single Solenoid
 - 5-Pin for Double Solenoid

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

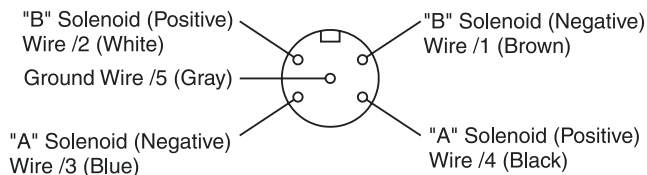
Single Solenoid Valves – Installed Opposite Side of Solenoid

**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**

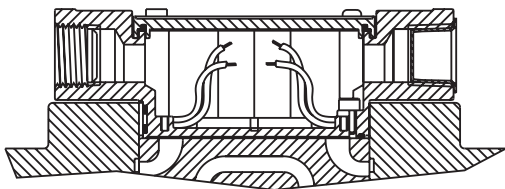
Single Solenoid Valves – Installed Opposite Side of Solenoid

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

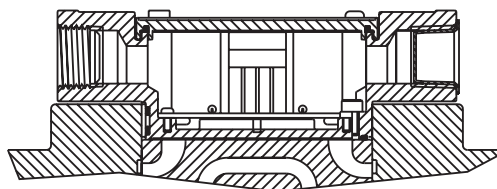
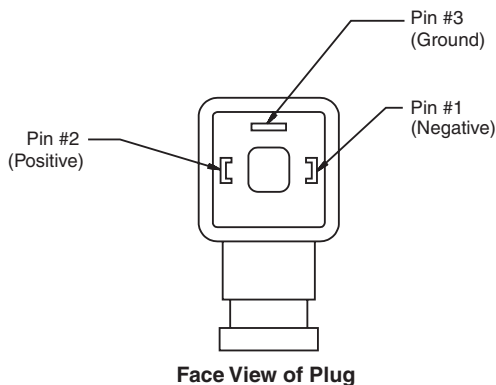
Single Solenoid Valves – Installed Opposite Side of Solenoid

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**

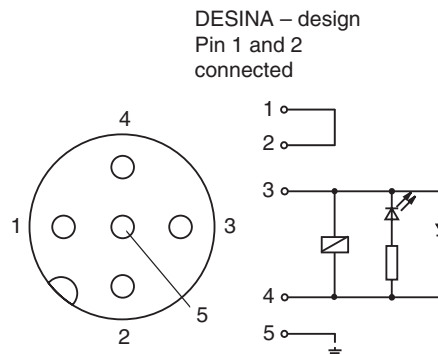
- No Wiring Options Available

**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, ER and ET Explosion Proof & Sandwich Valves (D1V*-94 Design back to 82 Design Valves)

Number of Sandwich Valves at 40.0 mm (1.57") 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).

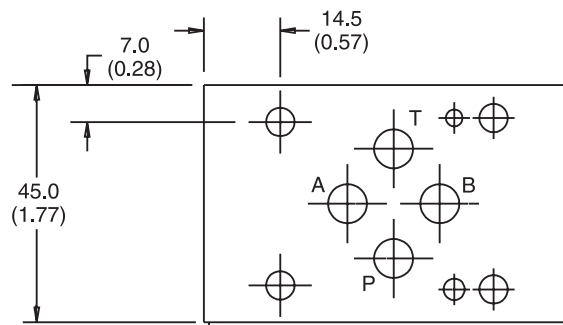
Bolt Kits for use with D1V Directional Control Valves with Explosion Proof Coils & Sandwich Valves (D1V*-94 Design back to 82 Design) Except ER and ET Coils

Number of Sandwich Valves at 40.0 mm (1.57") 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

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 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 evenly spaced across the entire area.

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.

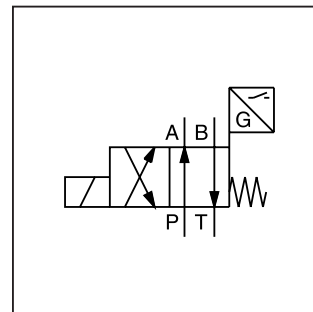
The fail-safe position of the directional valve during power failure is the spring offset or center position.

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

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



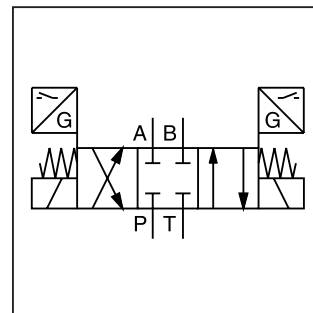
D1VW*B



D1VW*B

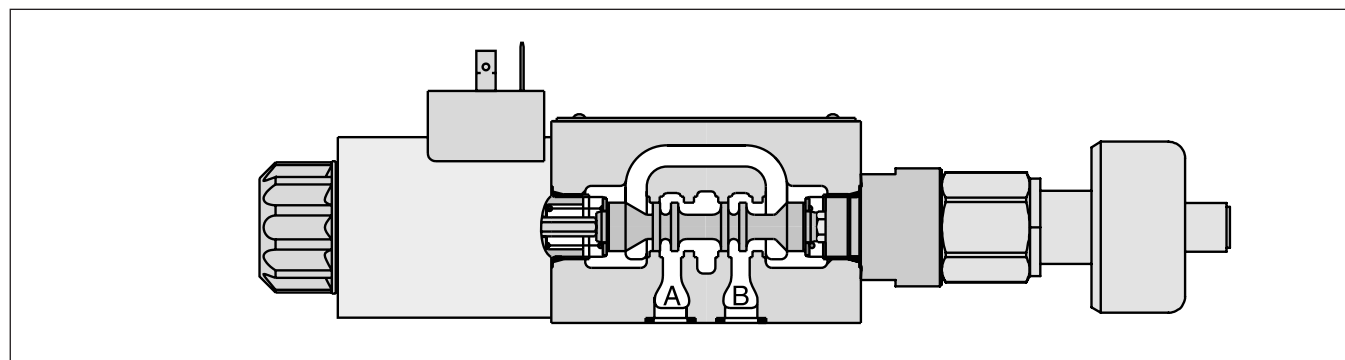


D1VW*C

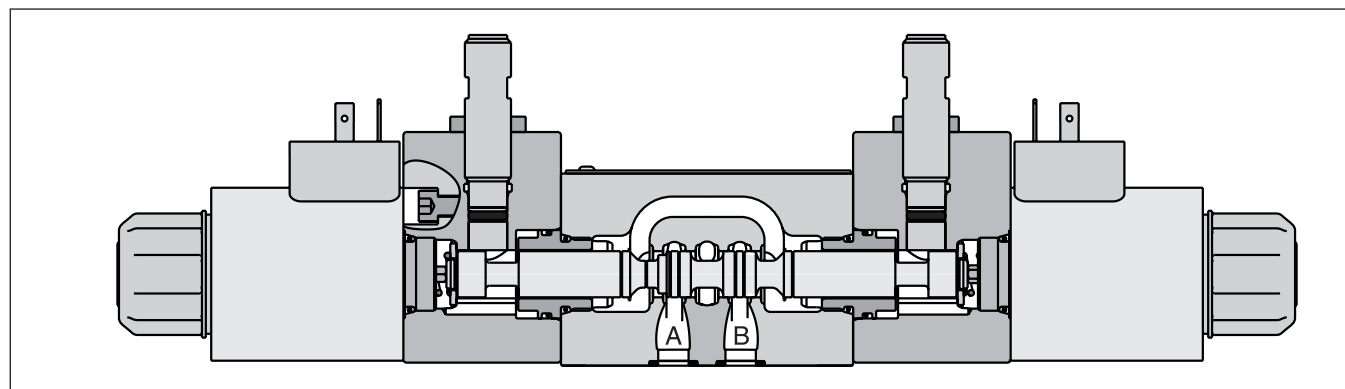


D1VW*C

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.

D1VW with Position Control, Single Solenoid Valve

A

D

Directional
Control Valve

1

Basic
Valve

V

3-Chamber
Valve

W

Wet Pin
Solenoid

Spool
Type

Spool
Position

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*	
004	
005	
015**	
016	
076	
078	

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

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

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

† Only available for spool position "B" and "H".

3-Position Spools	
Code	Spool Position
E	 Operated in position "a".
F	 Spring offset in position "b".
K	 Operated in position "b".
M	 Spring offset in position "a".

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

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

Bold: Designates Tier I products and options.

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



Solenoid
Voltage



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



Manual
Override



Position
Control*



Design
Series
NOTE:
Not required
when ordering.



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

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

Code	Description
Omit	Standard
T*	No Override

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

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

* Please order female connector M12 x 1 separately. See Accessories, Female Connector M12x1 (order no. 5004109).

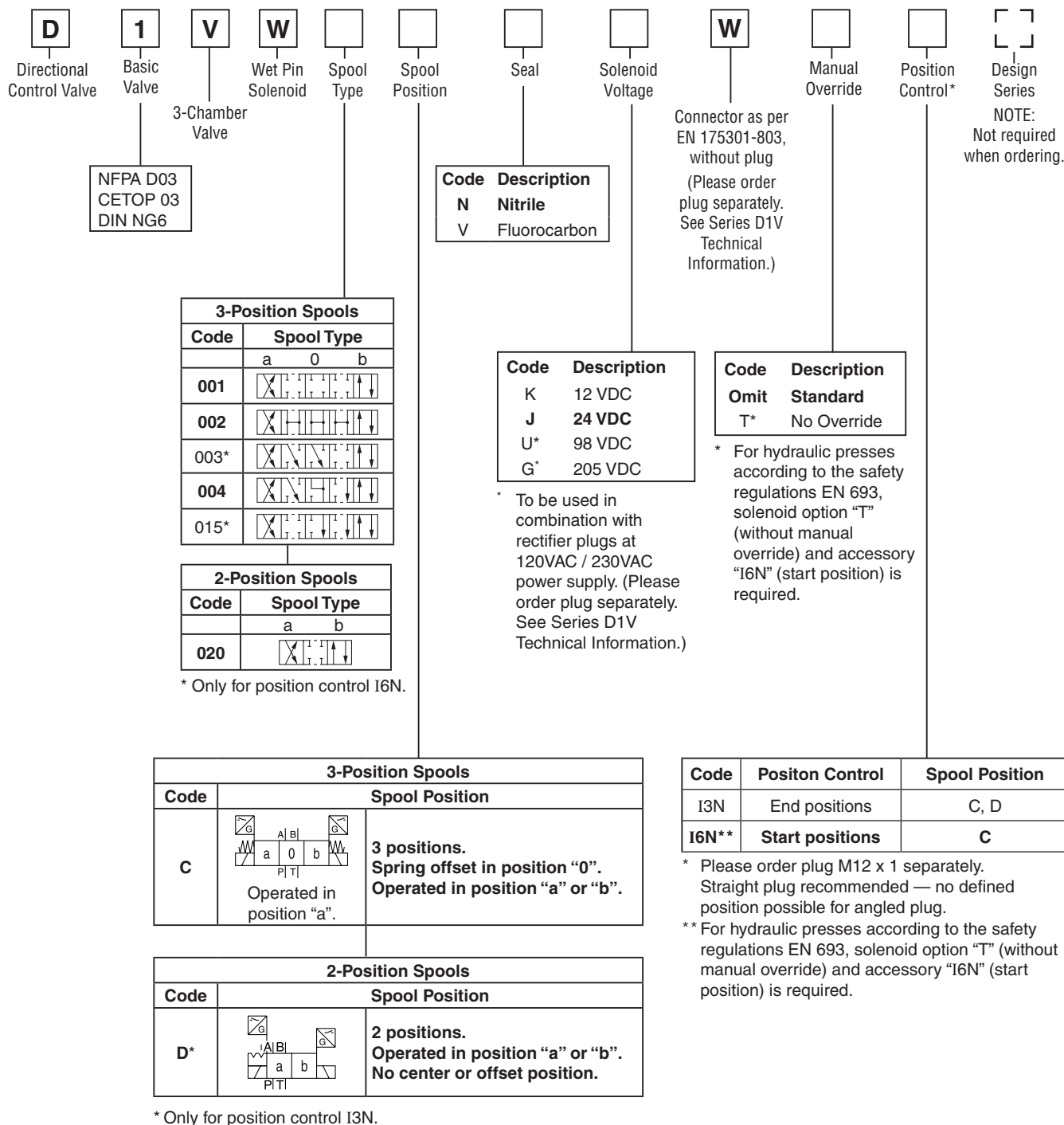
** For hydraulic presses according to the safety regulations EN 693, solenoid option "T" (without manual override) and accessories "I4N" or "I5N" (start position monitored) are required.

Bold: Designates Tier I products and options.

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

D1VW with Position Control, Double Solenoid Valve

A



Weight:

Double Solenoid: 3.8 kg (8.4 lbs.)

General					
Design		Directional Spool Valve			
Actuation		Solenoid			
Size		NG06 / 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]	-20...+60; (-4°F...+140°F)		
MTTF _D Value		[years]	150		
Hydraulic					
Maximum Operating Pressure		P, A, B: 350 Bar (5045 PSI); T: 210 Bar (3045 PSI)			
Fluid		Hydraulic oil in accordance with DIN 51524			
Fluid Temperature		[°C]	-20 ... +70 (-4°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		15,000 switchings per hour			
Protection Class		IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)			
	Code	K	J	U	G
Supply Voltage	[V]	12	24	98	205
Tolerance Supply Voltage	[%]	±10	±10	±10	±10
Current Consumption	[A]	2.72	1.29	0.33	0.13
Power Consumption	[W]	32.7	31	31.9	28.2
Solenoid Connection		Connector as per EN 175301-803, solenoid 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

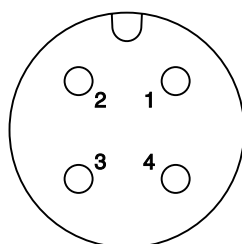
A

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

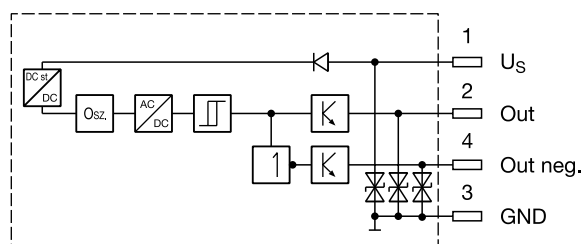
Protection Class		IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Ambient Temperature	[°C]	-20...+60; (-4°F...140°F)
Supply Voltage / Ripple	[V]	24 ≤10%
Tolerance Supply Voltage	[%]	±20
Polarity Protection	[V]	300
Current Consumption without Load	[mA]	≤ 20
Switching Hysteresis	[mm]	<0.06
Max. Output Current per Channel, Ohmic	[mA]	250
Min. Distance to Next AC Solenoid	[m]	0.1 (0.33 ft.)
Interface		M12x1 to IEC 61076-2-101
Wiring Minimum	[mm²]	5 x 0.25 brad shield recommended
Wiring Length Maximum	[m]	50 (164 ft.) recommended
CE Conform		EN 61000-4-2/EN 61000-4-4/EN 61000-4-6 ¹⁾ /ENV 50140/ENV 50240

1) Only guaranteed with screened cable and female connector.

M12 Pin Assignment



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



Outputs: Open collector

Definitions

Start position monitored:

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

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

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

End position monitored:

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

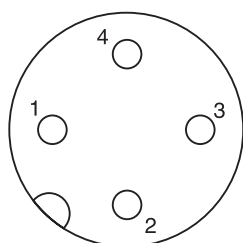
Double Solenoid Valves

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

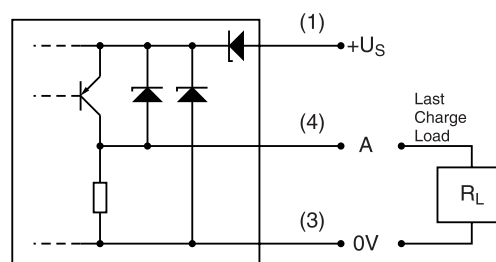
Protection Class	IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Ambient Temperature	[°C] -20...+60; (-4°F...140°F)
Supply Voltage U_s / Ripple	[V] 10...30 / $\pm 10\%$
Current Consumption without Load	[mA] ≤ 10
Max. Output Current per Channel, Ohmic	[mA] 200
Min. Output 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 acc. to IEC 61076-2-101
Wiring Minimum	[mm ²] 3 x 0.14 braid shield recommended
Wiring Length Maximum	[m] 50 (164 ft.) recommended

A

M12 Pin Assignment



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

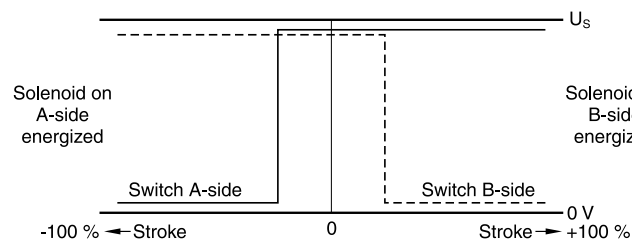


Definitions

Start position monitored:

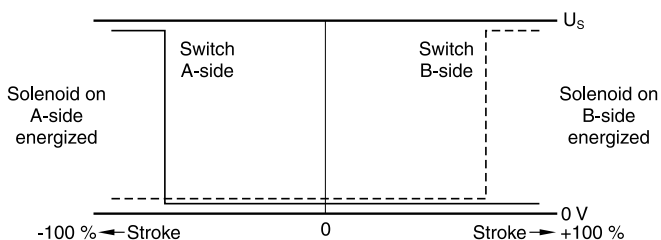
The valve is de-energized. The inductive switch gives a signal at the moment the spool leaves the center position (below 15% spool stroke).

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:

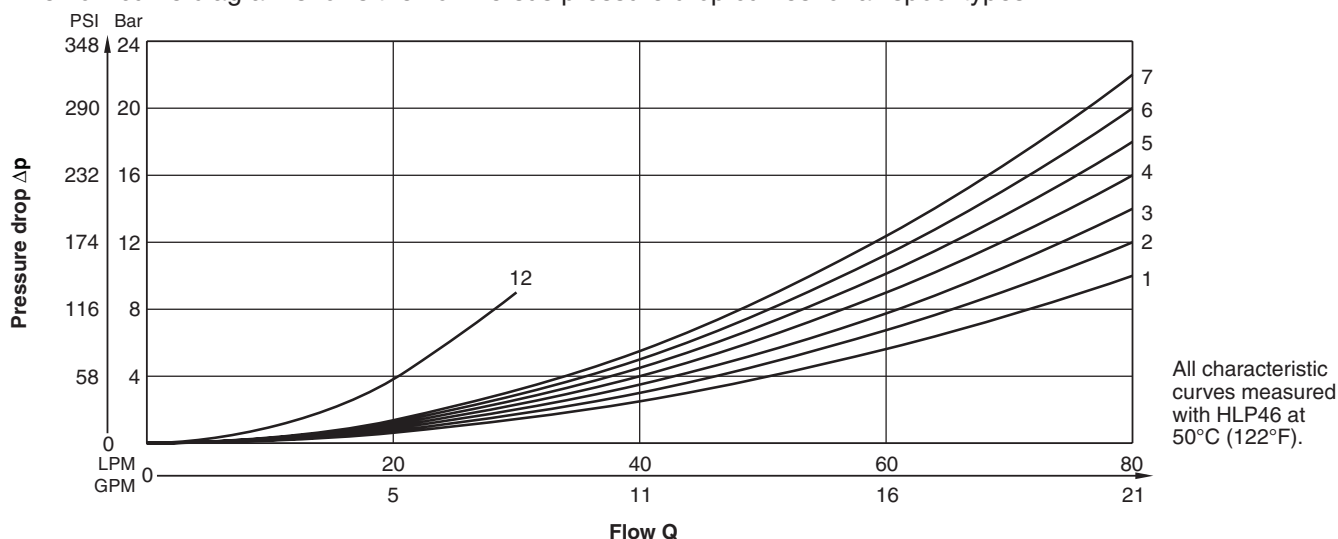
The inductive switch gives a signal before the end position is reached (above 85% spool stroke).



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.

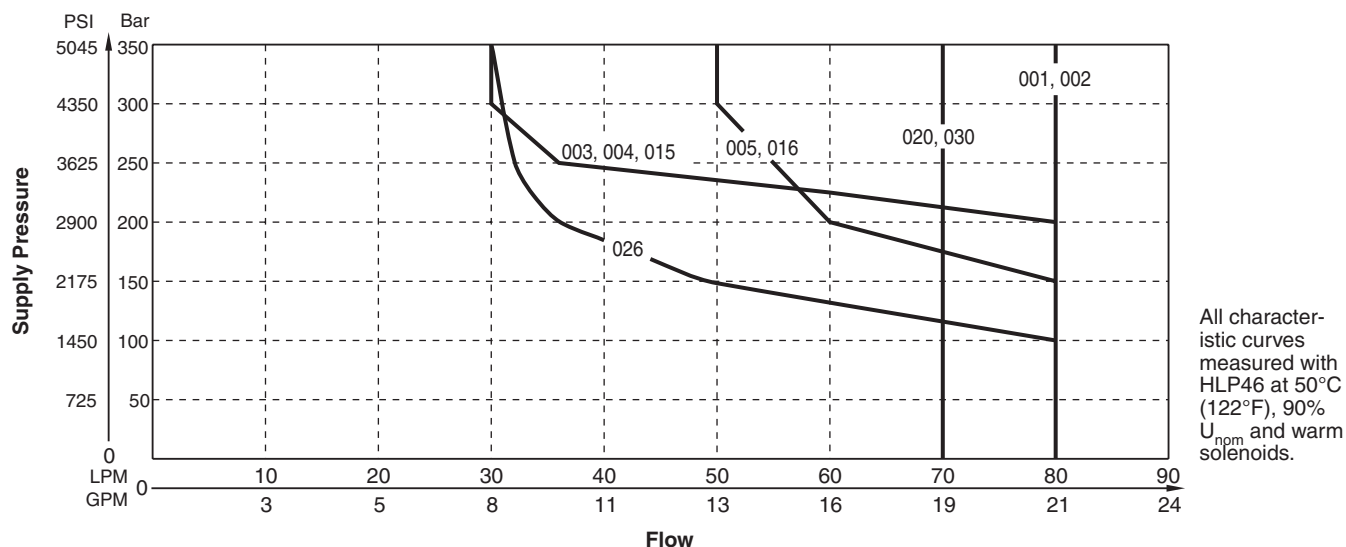


The relevant curve number for each spool type, operating position and flow direction is given in the table below.

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

Shift Limit Diagram

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

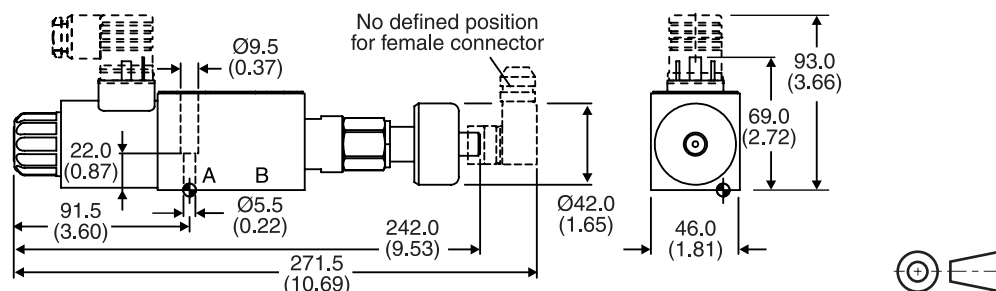


Inch equivalents for millimeter dimensions are shown in (**)

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

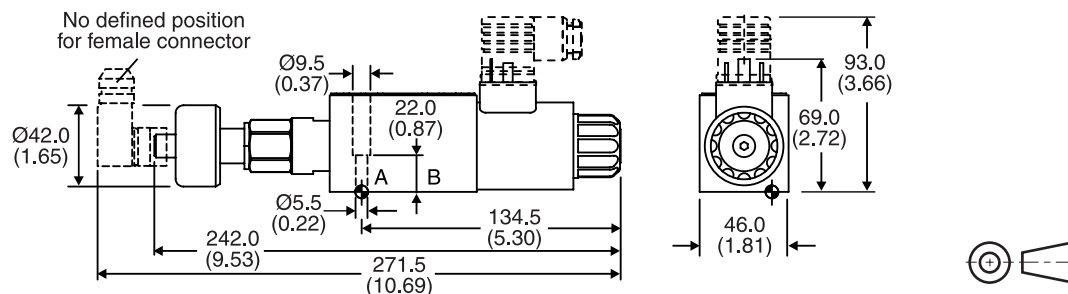
Styles B, E, F

A



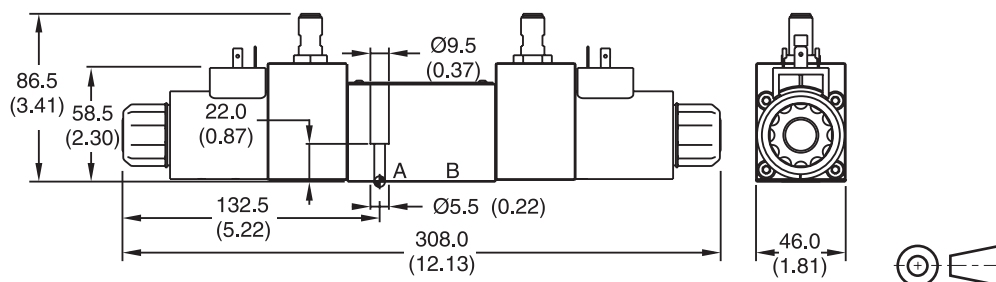
¹⁾ Please order plug M12x1 separately. See Accessories (part no.: 5004109).

Styles H, K, M



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

Styles C, D



²⁾ Please order plug M12x1 separately. Straight plug recommended – no defined position possible for angled plug.

Surface Finish	 Kit			Seal  Kit
	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm (0.6 lb.-ft.) ±15%	Nitrile: SK-D1VW-N-91 Fluorocarbon: SK-D1VW-V-91

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

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

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

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

Replacement and repairs can only be undertaken by the manufacturer.

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.

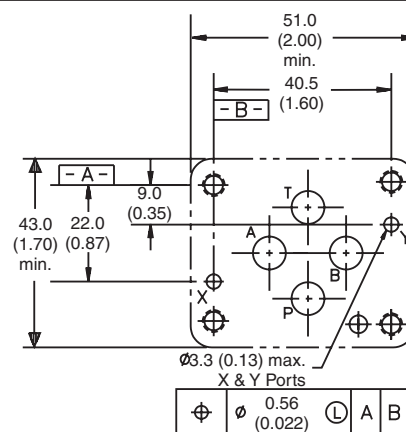
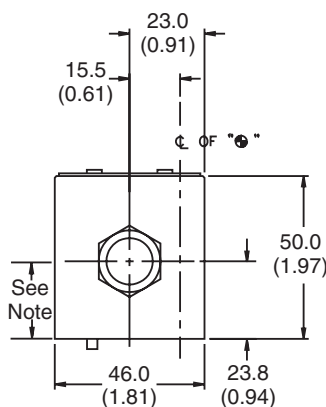
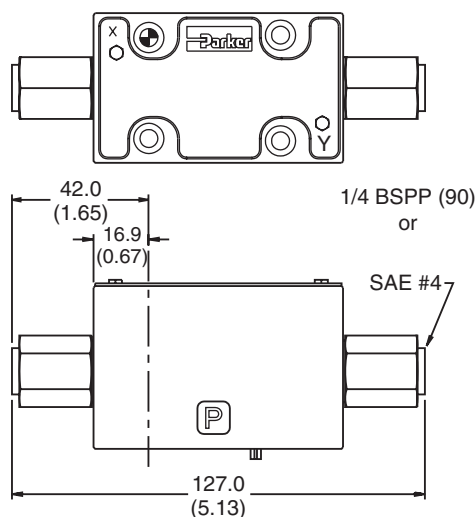
Pilot Piston. The hydraulic piston area is 198 mm² (.307 in.²). Pilot piston stroke is 3.4mm (.135 in.).

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

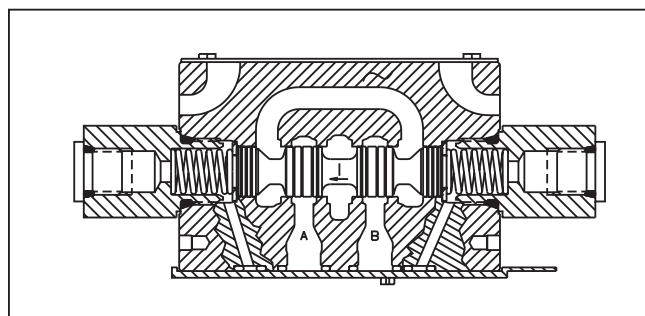
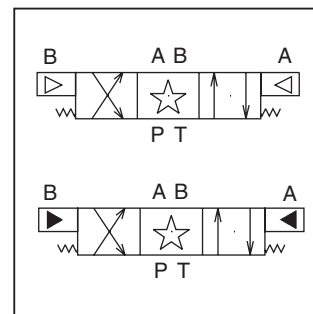
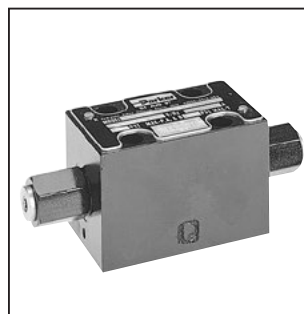
Inch equivalents for millimeter dimensions are shown in (**)

Oil Operated D1VP, Single and Double Pilot



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

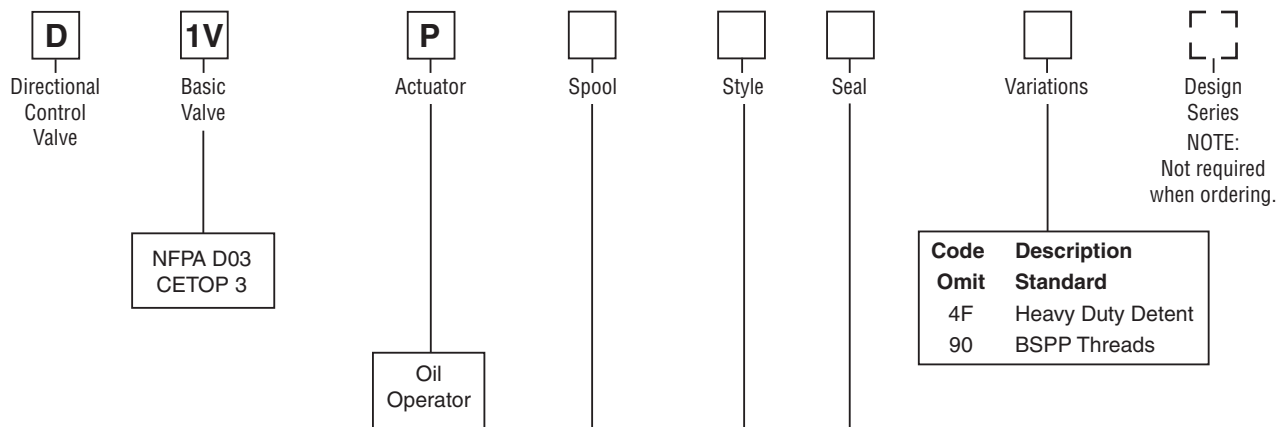
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information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



Specifications

Mounting Pattern	NFPA D03, CETOP 3, NG 6	
Maximum Pressure	Operating:	345 Bar (5000 PSI)
	Tank Line: D1VA	34 Bar (500 PSI)
	D1VP	207 Bar (3000 PSI)
Maximum Flow	See Reference Data	
Pilot Pressure	D1VA:	
	Air Minimum	4.1 Bar (60 PSI)
	Air Maximum	10.2 Bar (150 PSI)
	D1VP:	
	Oil Minimum	15.2 Bar (220 PSI)
	Oil Maximum	207 Bar (3000 PSI)

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.

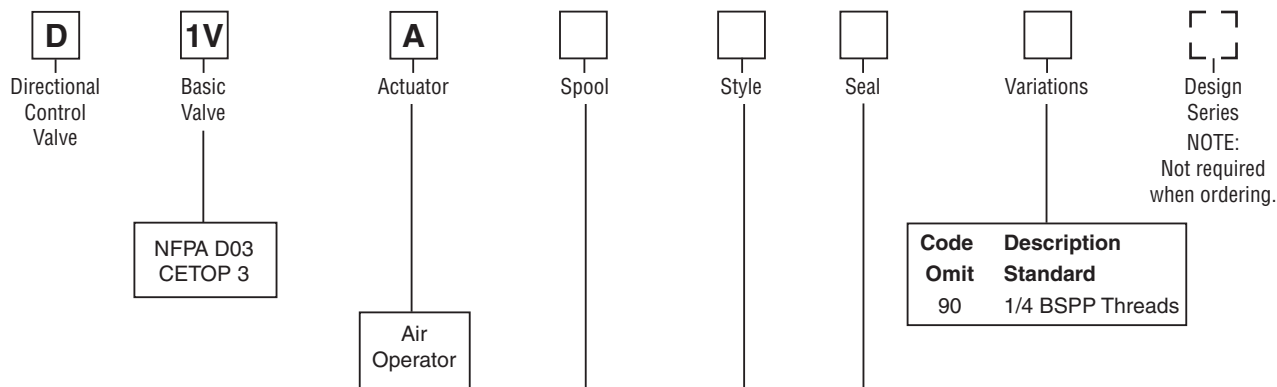
Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when actuating operator X. Note operators reverse sides for #008 and #009 spools. See installation information for details.

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.

A



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	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

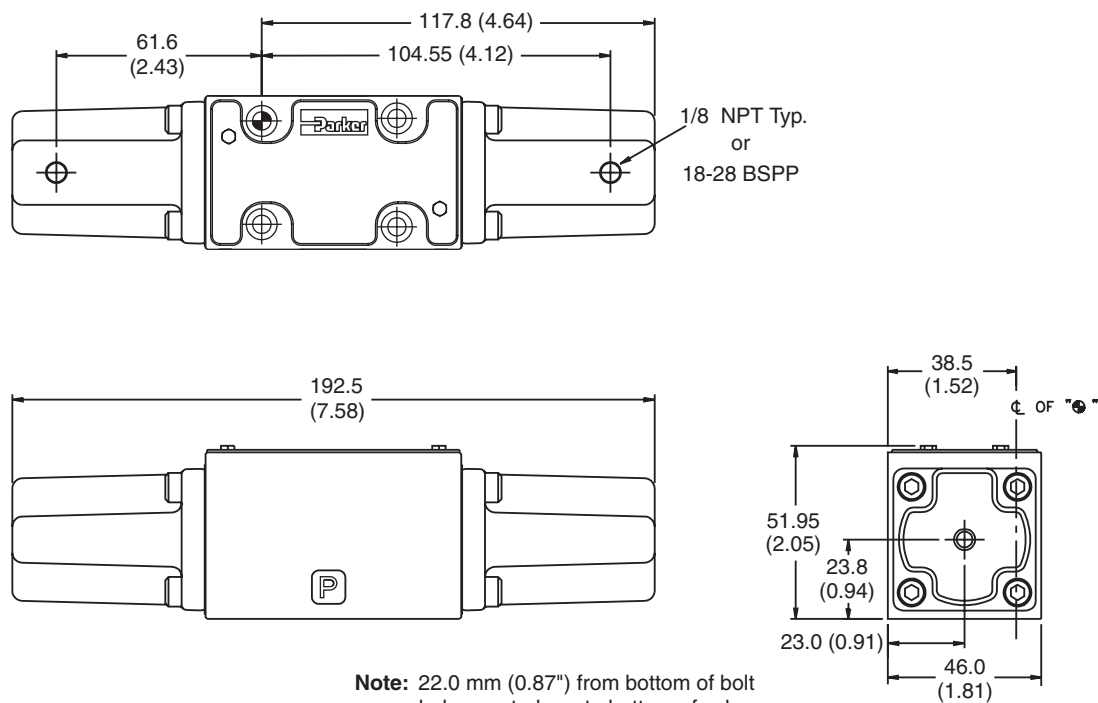
Seal Kit:
 Nitrile SKD1VA
 Fluorocarbon SKD1VAV

Bold: Designates Tier I products and options.

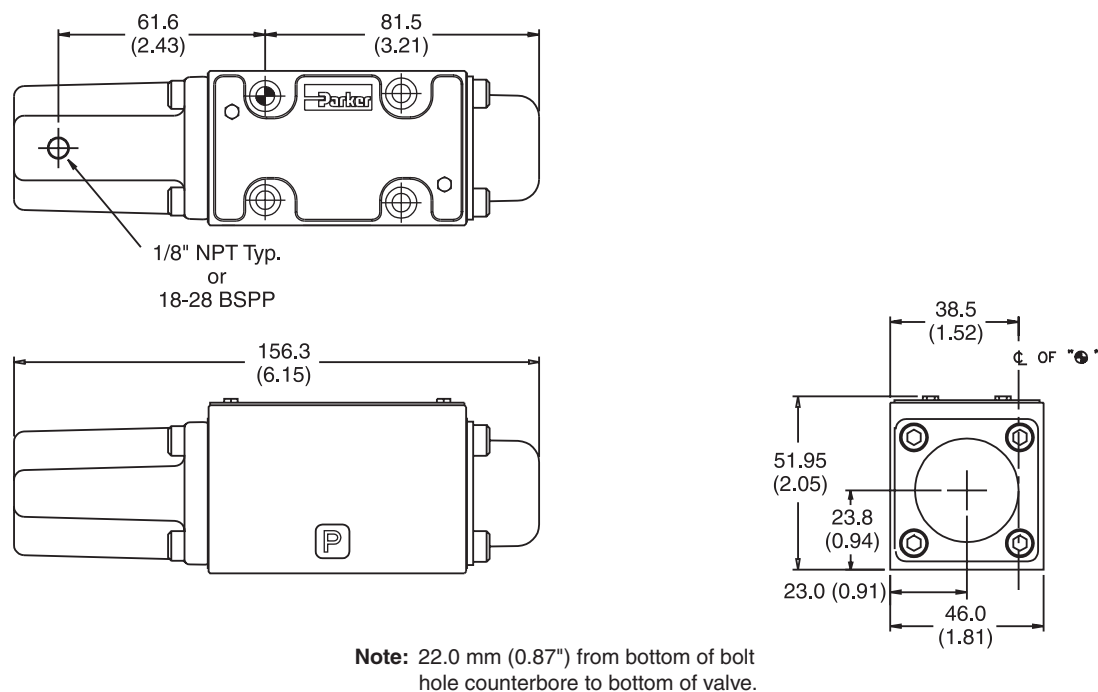
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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

Air Operated D1VA, Double Pilot

A


Air Operated D1VA, Single Pilot



A

General Description

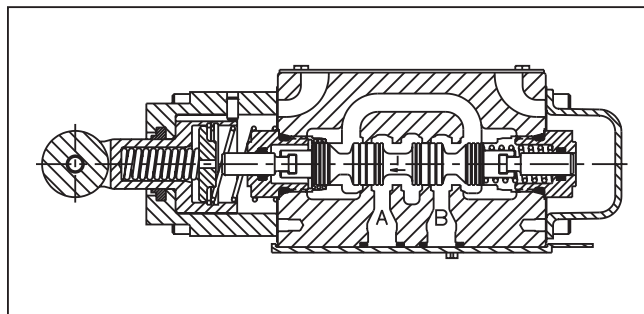
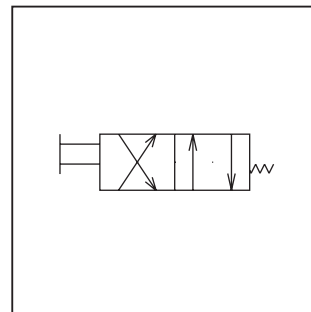
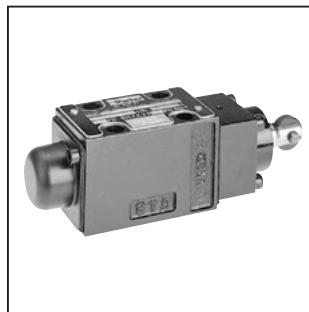
Series D1VC, D1VD and D1VG directional control valves are high performance, 4-chamber, direct operated, cam controlled, 4-way valves. They are available in 2-position and conform to NFPA's D03, CETOP 3 mounting patterns.

Features

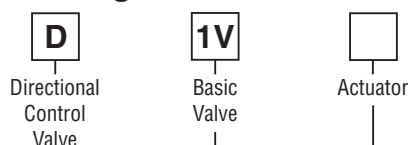
- Choice of 2 cam roller positions (D1VC and D1VD)
- Two styles available (D1VC and D1VG)
- Short stroke option

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



NFPA D03
CETOP 3

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

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

Standard Bolt Kit: BK209 1-24x1.25

Metric Bolt Kit: BKM209 M5-0.8x30 mm

Seal Kit:

Nitrile SKD1VC
Fluorocarbon SKD1VCV

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.

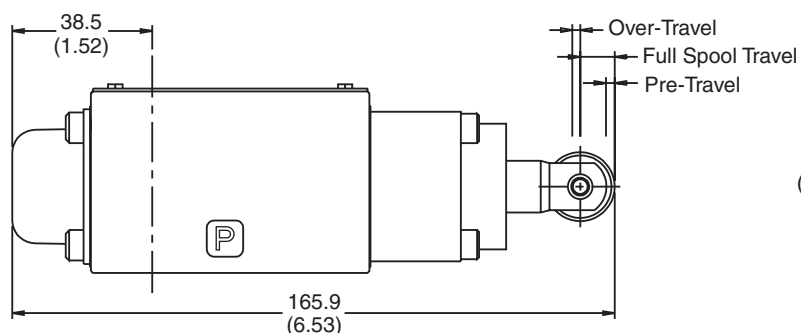
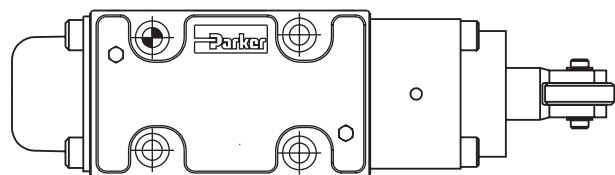
Bold: Designates Tier I products and options.

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.

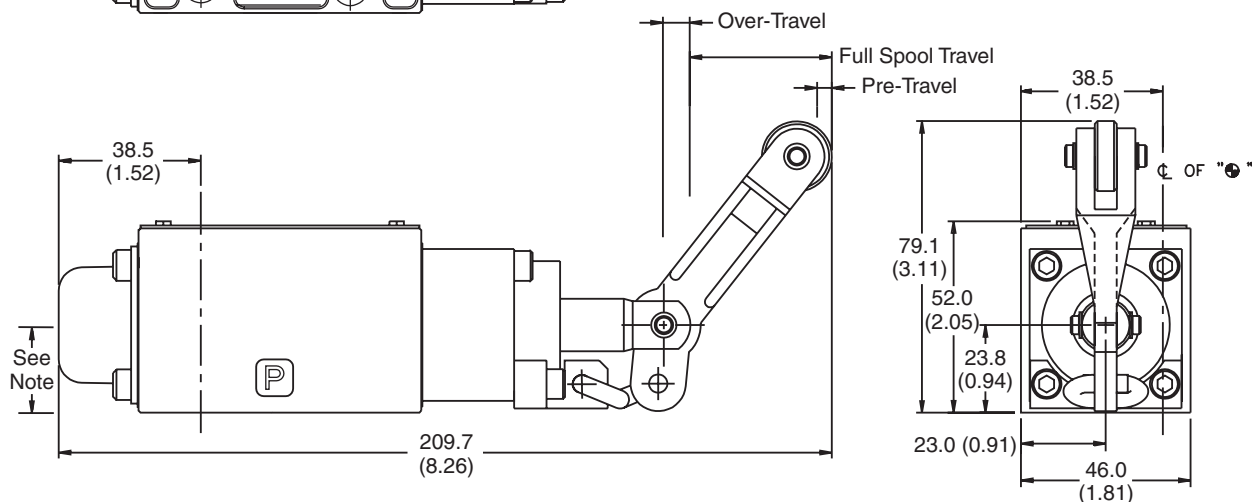
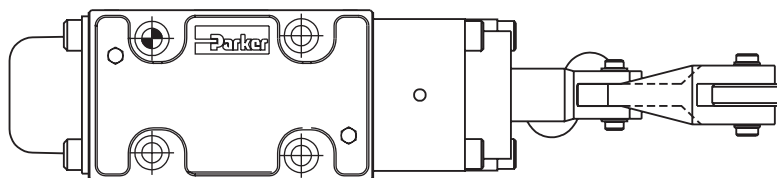
Dimensions**Directional Control Valves
Series D1VC, D1VD, D1VG**

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

Cam Operated D1VC and D1VD

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

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)

A**Cam Lever Operated D1VG**

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

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

A

General Description

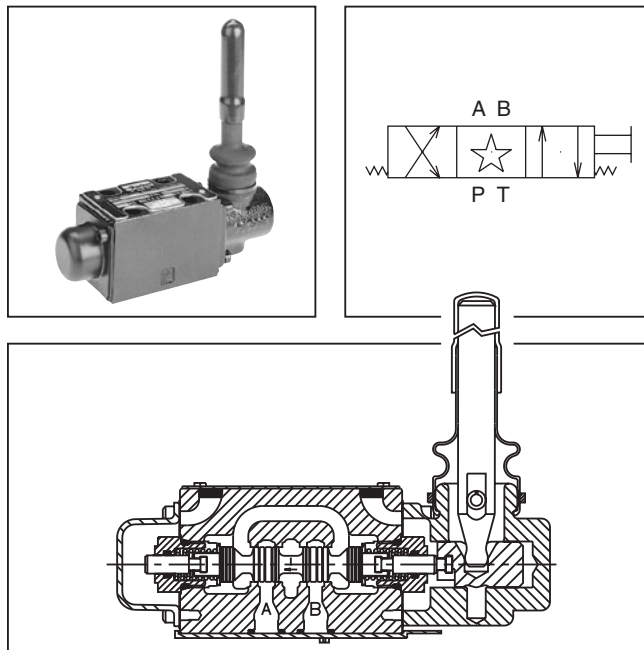
Series D1VL directional control valves are high-performance, 4-chamber, direct operated, lever controlled, 4-way valves. They are available in 2 or 3-position and conform to NFPA's D03, CETOP 3 mounting patterns.

Features

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

Specifications

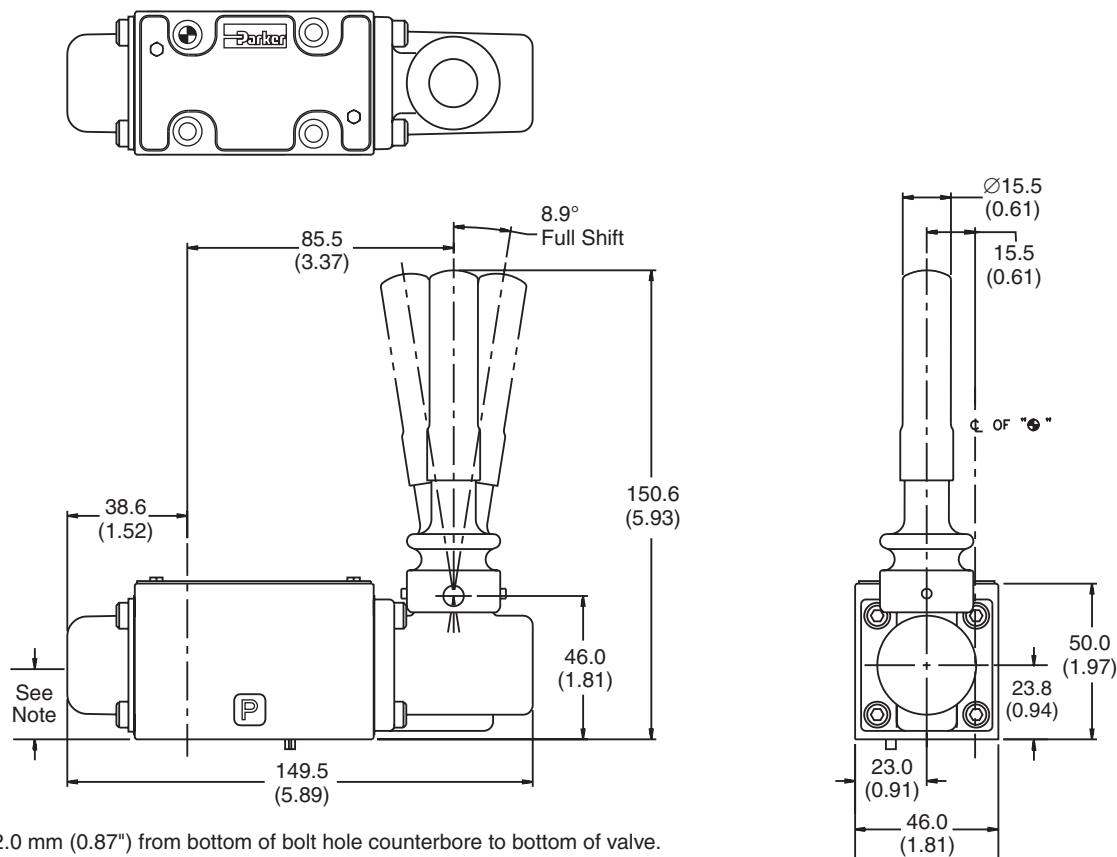
Mounting Pattern	NFPA D03, CETOP 3, NG 6
Maximum Pressure	Operating: 345 Bar (5000 PSI) Tank Line: 34 Bar (500 PSI)
Maximum Flow	See Reference Data
Force Required to Shift Lever Operator	25 N (5.6 lbs)



Dimensions

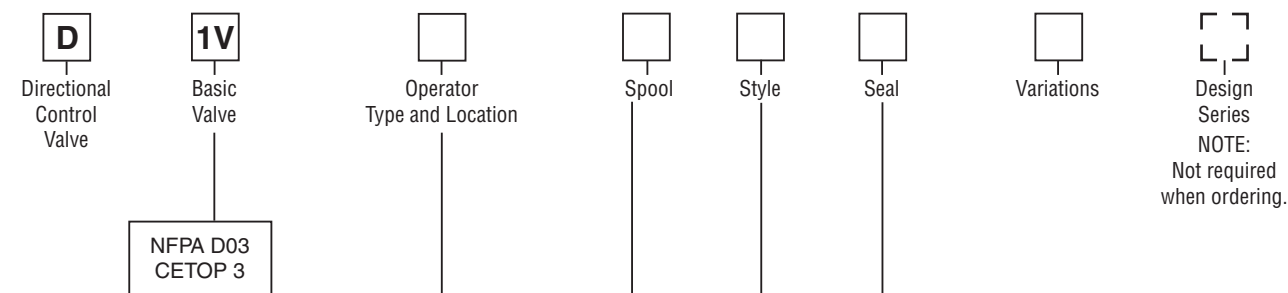
Inch equivalents for millimeter dimensions are shown in (**)

Lever Operated D1VL



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.

A



Operator Location (A or B Port End) For Valve Style		B	C	D	E	H	K	N
Code	Operator Type							
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	

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.	

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

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

A

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.

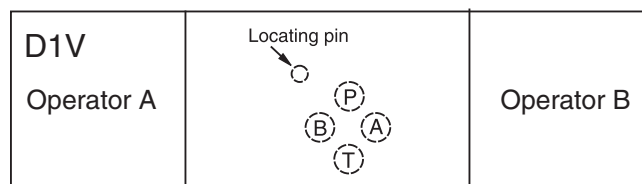
Recommended Mounting Position

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.

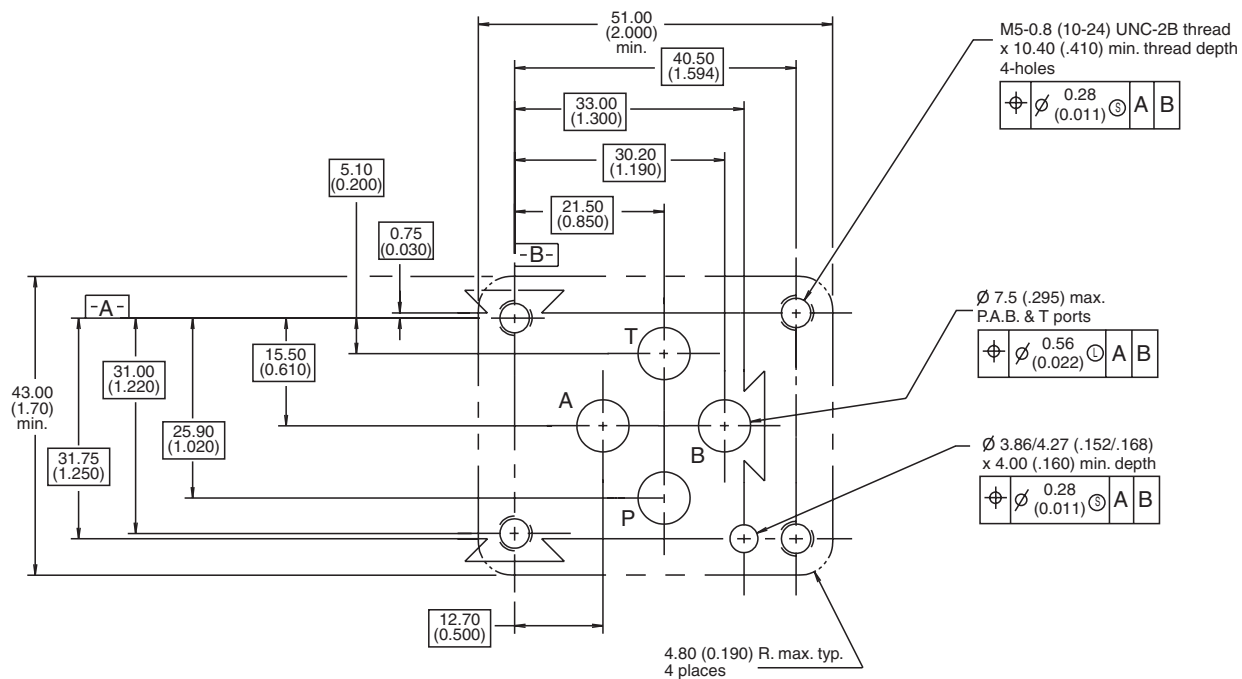
Torque Specifications

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 (**)



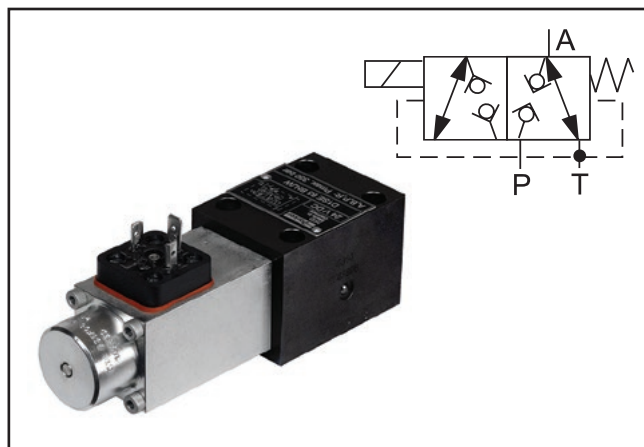
General Description

A

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

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

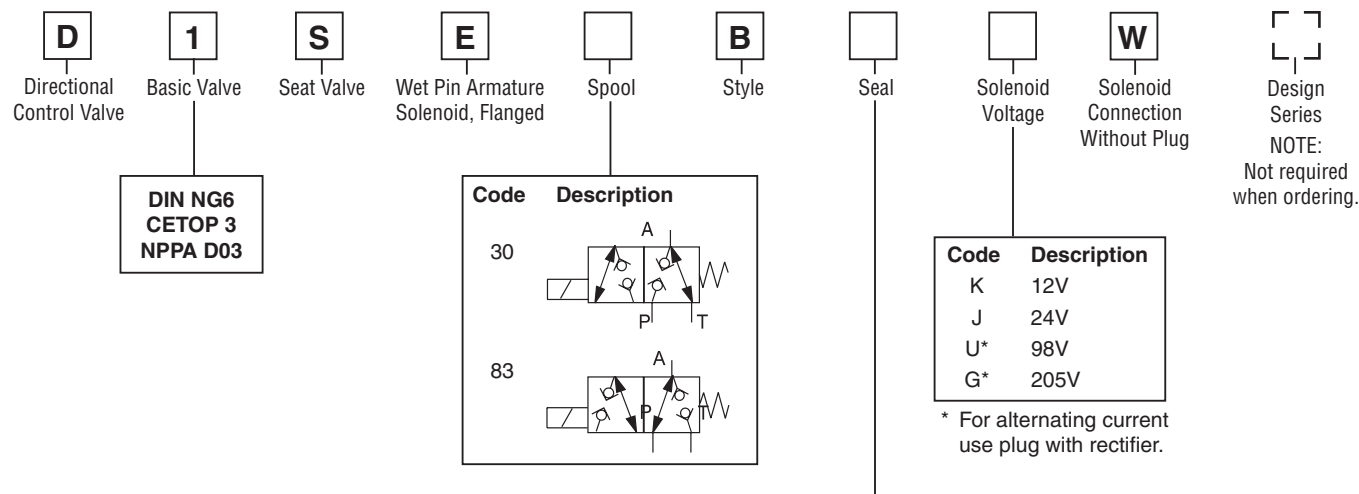
The unit has an all-steel design, the important functional inner parts are hardened, the poppet and seat are ground.



Features

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

Ordering Information



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.

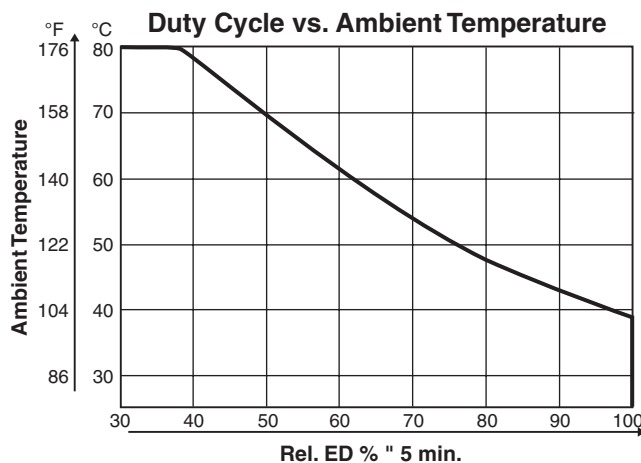
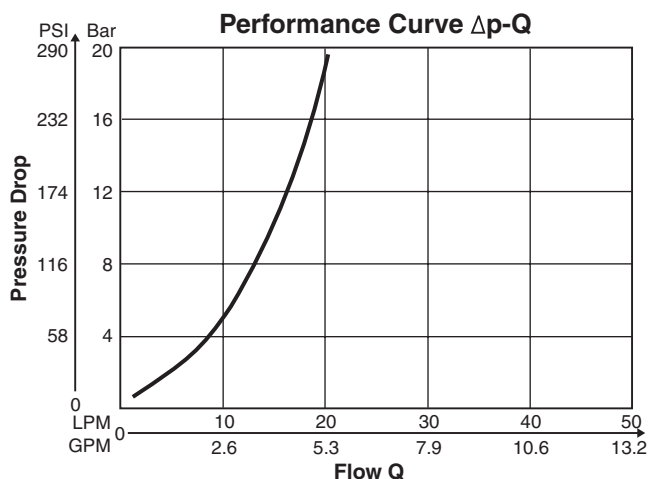
These products will have longer lead times.

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.

General		Static / Dynamic				
Design	Directional poppet valve	Step Response	Energized: approx. 50 ms De-energized: approx. 60 ms			
Actuation	Solenoid					
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			

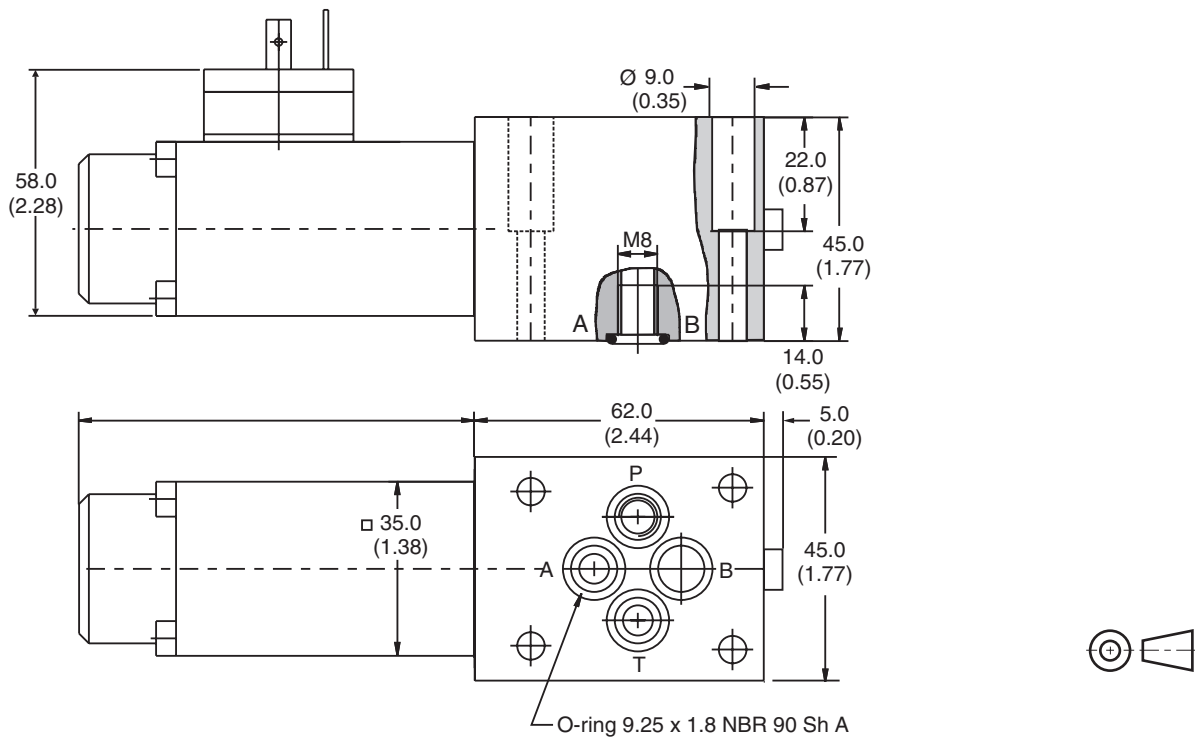
* For a silicon bridge rectifier, set up apart from unit for connecting to a 50 or 60 Hz power supply, 110 V~(98=) or 230V~ (205V=).
 With electrical connections the protective conductor (PE $\downarrow$) must be connected according to the relevant regulations.

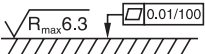
Performance Curves



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

A



Surface Finish	 Kit	 Kit	 Kit	Seal  Kit
	BK375	4x M5x30 DIN 912 12.9	6.8 Nm ± 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.).

Application

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

Operation

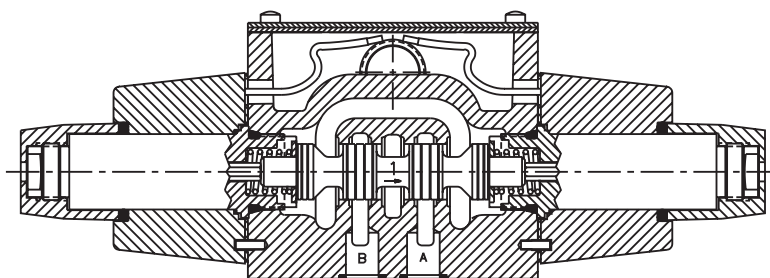
Series D3 directional control valves consist of a 4-chamber style body, and a case hardened sliding spool. The spool is directly shifted by a variety of operators including: solenoid, lever, cam, or air pilot.

Features

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

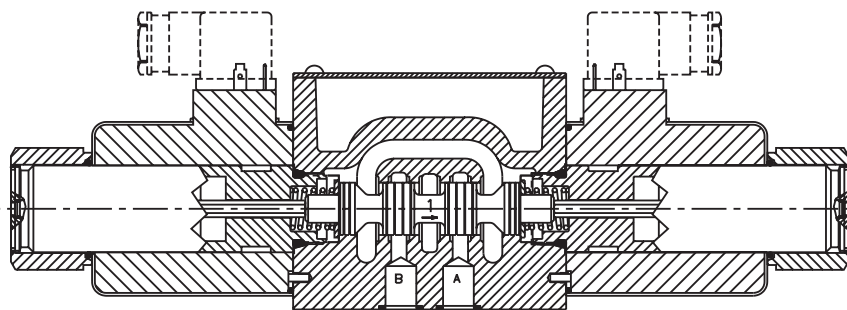
A

D3W Solenoid Operated Conduit Cavity Style



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

D3W Solenoid Operated Hirschmann (DIN) Style

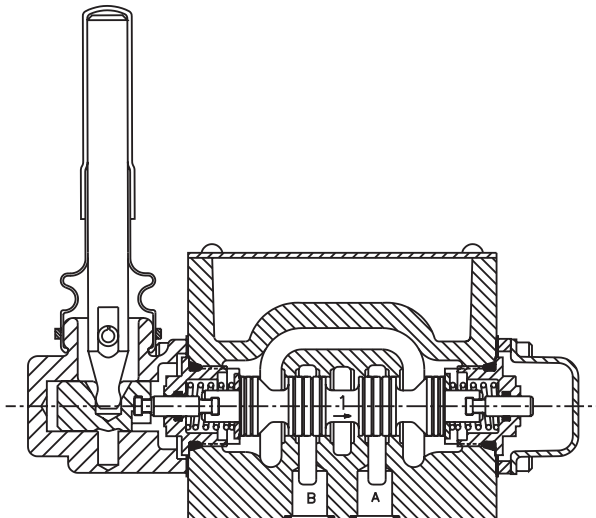


- DIN Style (43650) Hirschmann.
- 16 spool styles available.
- No tools required for coil removal.
- Easy coil replacement.
- AC and DC lights available.
- CSA approved.
- Available in low-watt DC version.

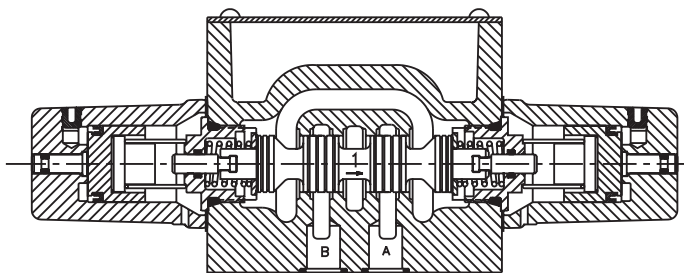
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information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

A**D3L Lever Operated**

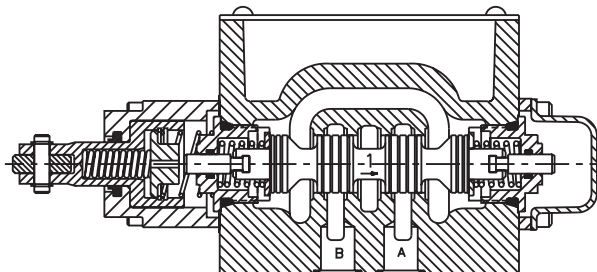
- Spring return or detent styles available.
- Heavy duty handle design.
- High flow, low pressure drop design.

**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.

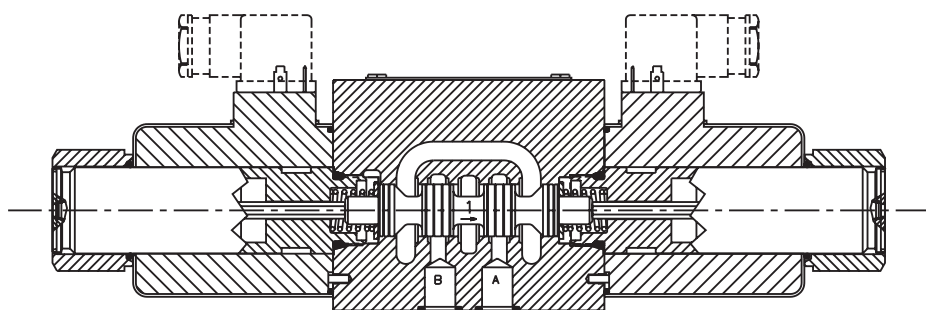


Application

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.

A**D3DW Solenoid Operated Hirschmann (DIN) Style**

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

D3 Spool Reference Data

A

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*001		150 (40)	78 (20)	130 (33)	D3*011		115 (30)	59# (15)	130 (33)
D3*002		150 (40)	78 (20)	115 (30)	D3*015		150 (40)	78 (20)	120 (31)
D3*003		150 (40)	78 (20)	120 (31)	D3*016		150 (40)	78 (20)	130 (33)
D3*004		150 (40)	59 (15)	130 (33)	D3*020		150 (40)	78 (20)	130 (33)
D3*005		150 (40)	78 (20)	130 (33)	D3*026		115 (30)	N/A	75 (19)
D3*006		150 (40)	78 (20)	130 (33)	D3*030		39 (10)	59# (15)	75 (19)
D3*008		50‡ (13)	59# (15)	39 (10)	D3*081		115† (30)	N/A	130 (33)
D3*009		39 (10)	59# (15)	75 (19)	D3*082		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.

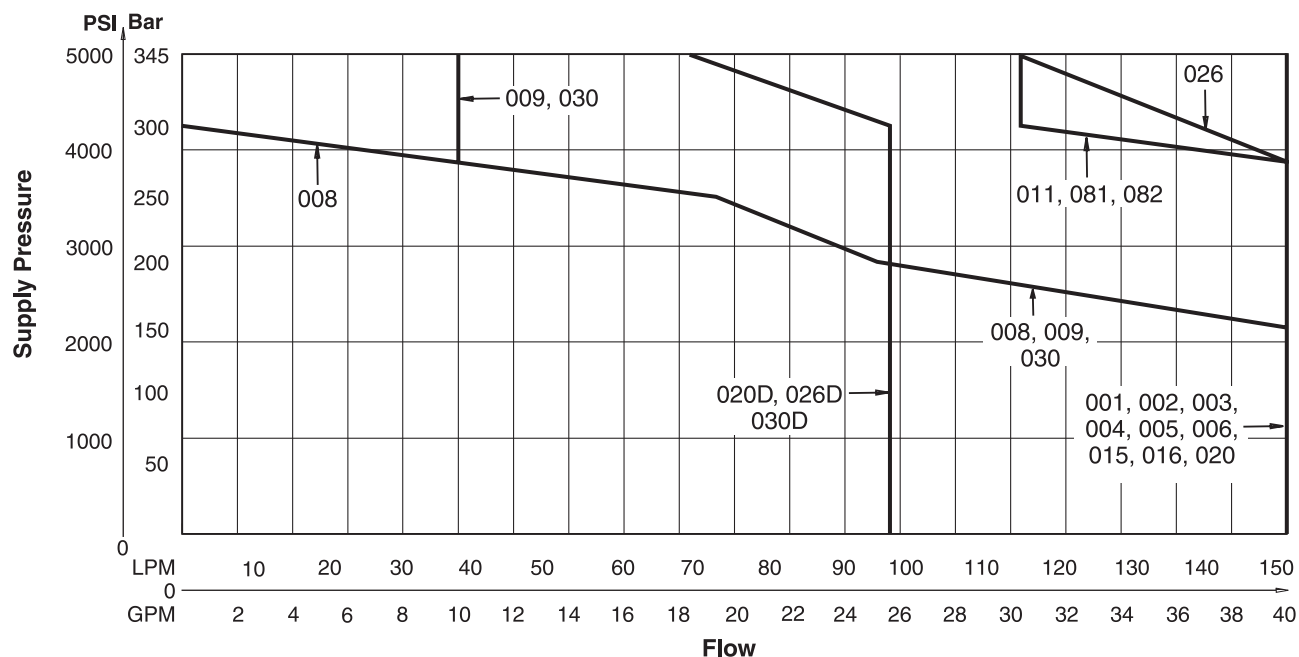
D3A, D3C, D3L Spool Reference Data (Four Chamber Body Only)

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*001		150 (40)	D3*020		150 (40)
D3*002		150 (40)	D3*030		39 (10)
D3*004		150 (40)	D3*081		115 (30)
D3*008		50 (13)	D3*082		115 (30)
D3*009		39 (10)			

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

D3W-30/32 DC and AC Rectified Shift Limits

A



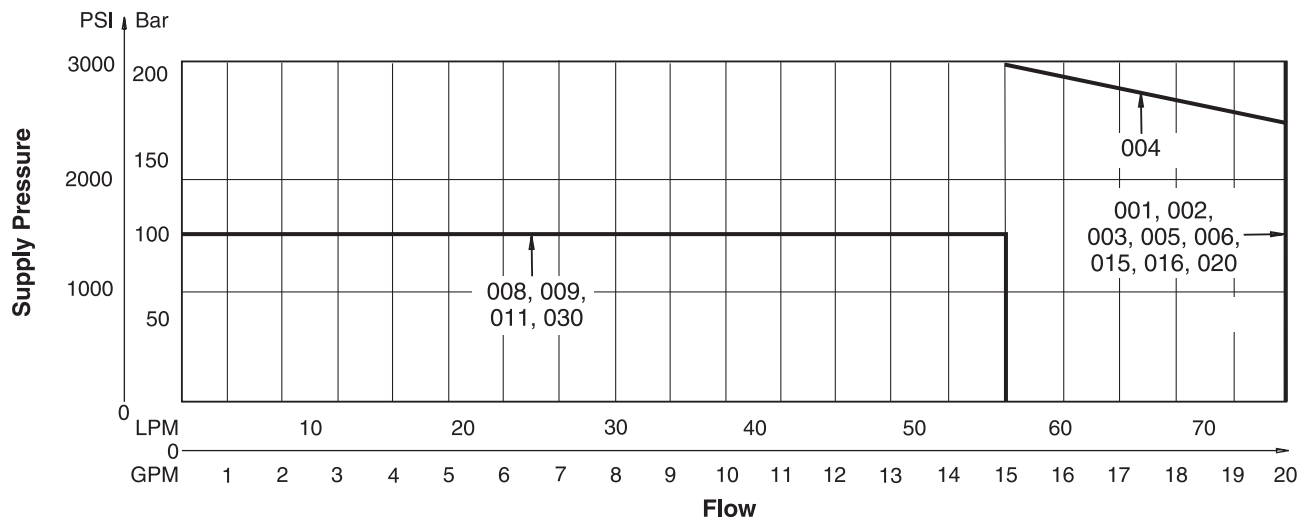
Example:

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

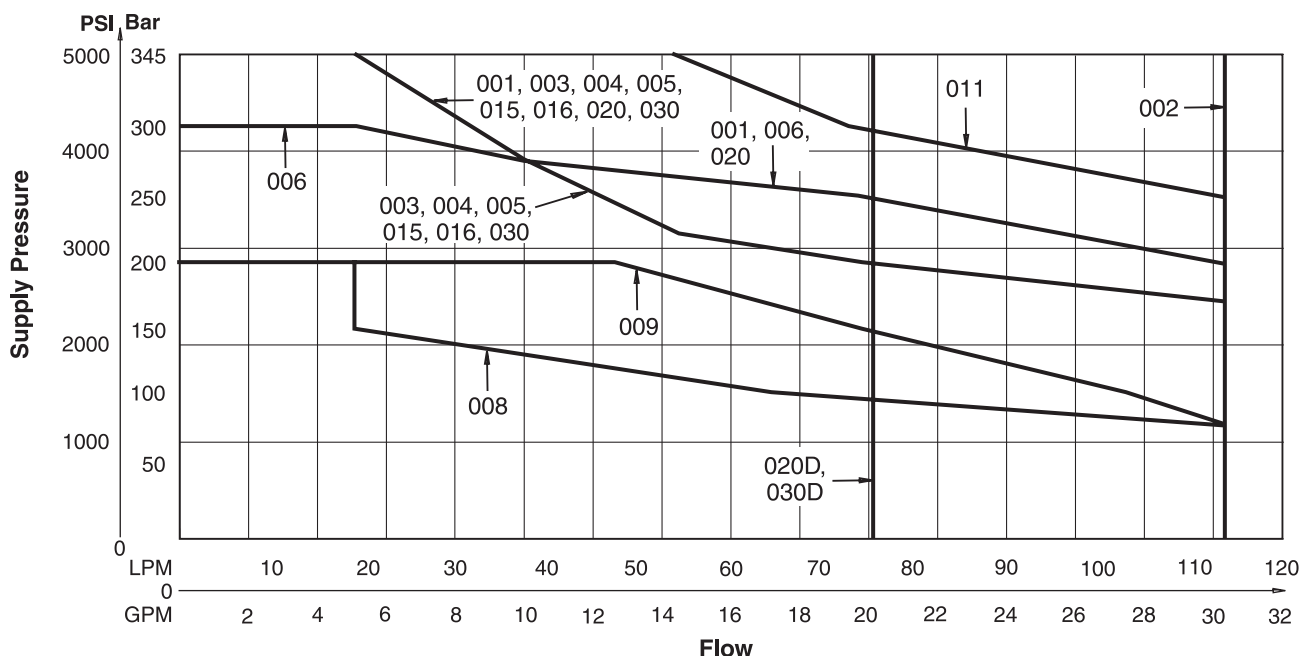
1. For F & M style valves, reduce flow to 70% of that shown.
2. Shift limits charted for equal flow A and B ports. Unequal A and B port flows may reduce shift limits.
3. These charts do not show explosion proof performance. Consult factory for explosion proof duty.
4. Blocking A and B ports will reduce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

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

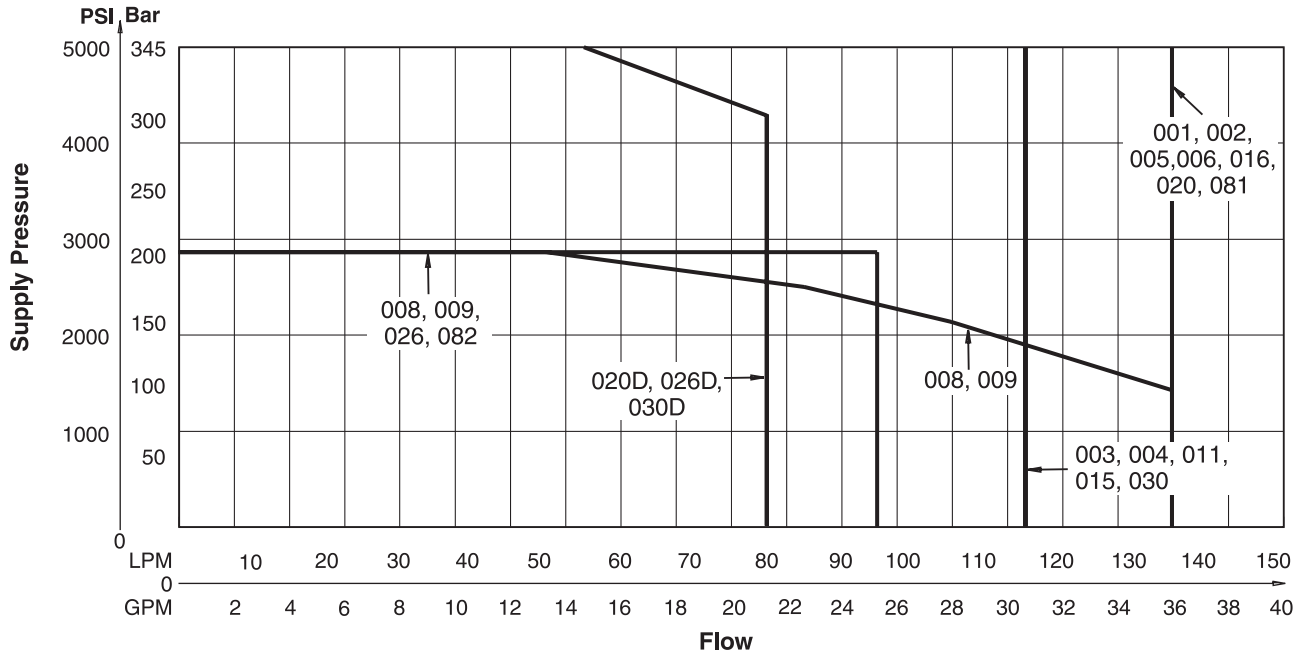


D3W-30/32 AC Shift Limits

A



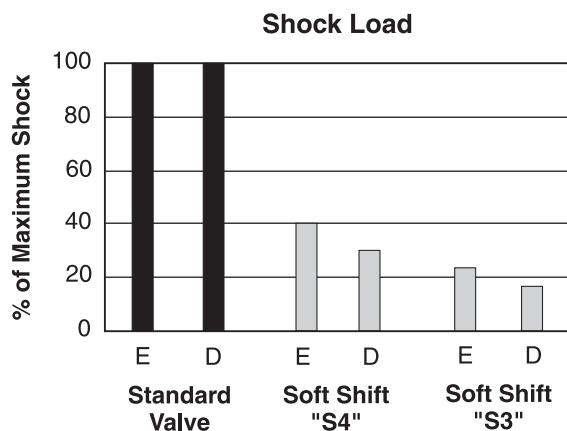
D3W-30/32 Soft Shift Limits (High Watt Coil Only)



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



E = Energize
D = De-energize

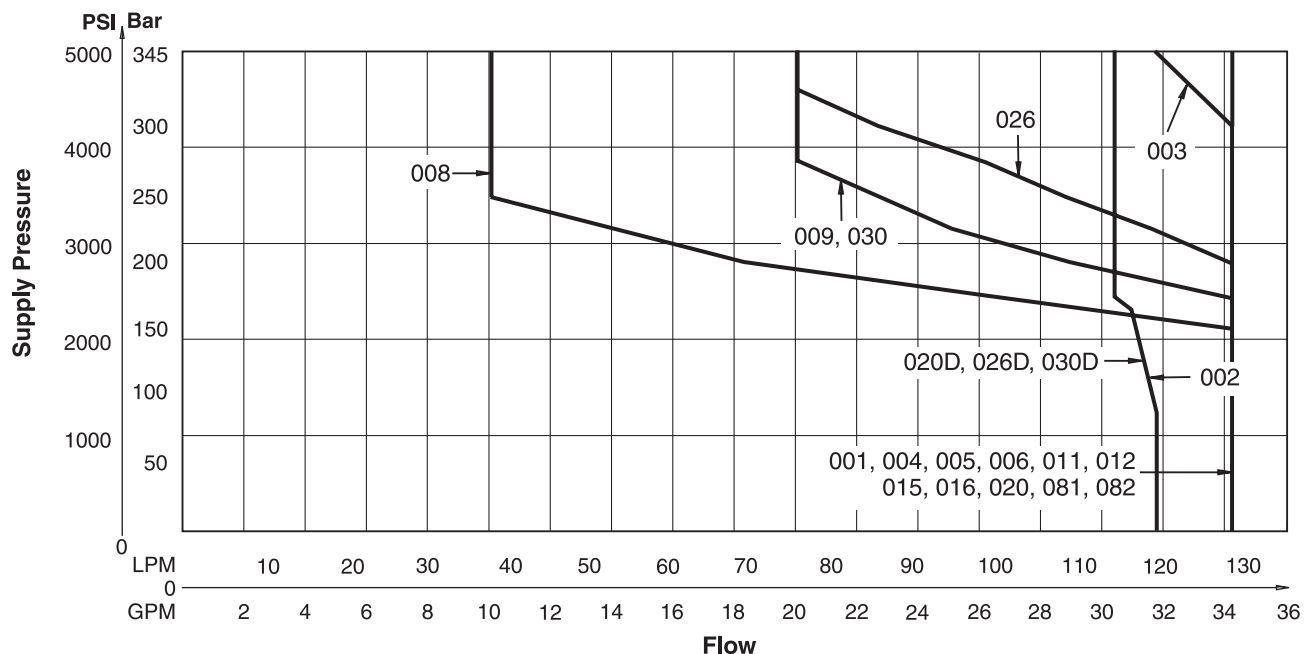
Response Time*

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

A

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)
001	5	5	2	2	—	—	—	—	—	—	—
002	4	4	1	1	2	3	3	3	3	1	1
003	5	5	2	3	—	—	—	—	—	1	—
004	4	4	3	3	—	—	—	—	—	1	1
005	6	5	2	2	—	—	—	2	—	—	—
006	6	6	2	2	—	4	4	2	2	—	—
008	8	8	7	7	6	—	—	—	—	—	—
009	5	5	4	4	7	—	—	—	—	—	—
011	5	5	2	2	—	—	—	—	—	10	10
015	5	5	3	2	—	—	—	—	—	—	1
016	5	6	2	2	—	—	—	—	2	—	—
020	5	5	2	2	—	—	—	—	—	—	—
026	5	5	—	—	—	—	—	—	—	—	—
030	5	5	2	2	—	—	—	—	—	—	—

Note:

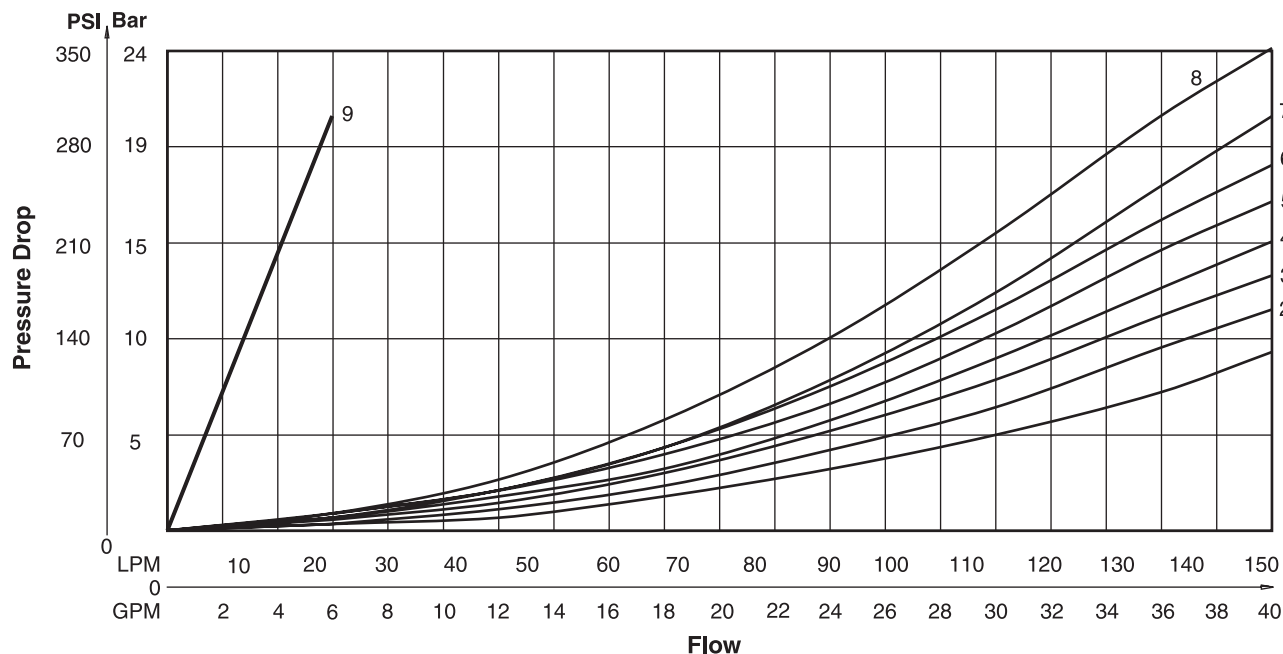
For 081 and 082 spools, consult factory.

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



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.

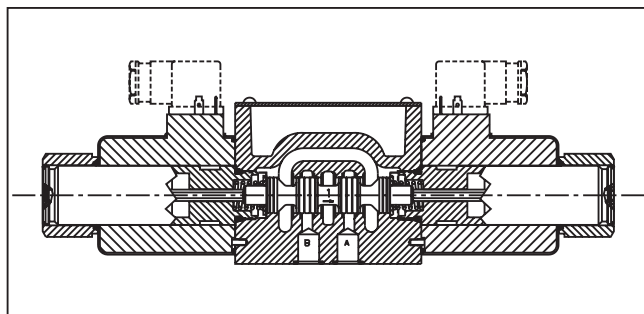
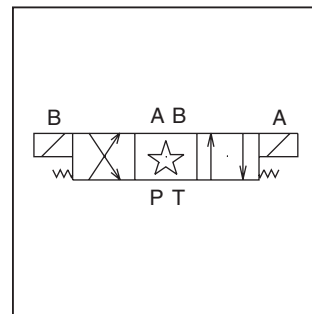
Features

- 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

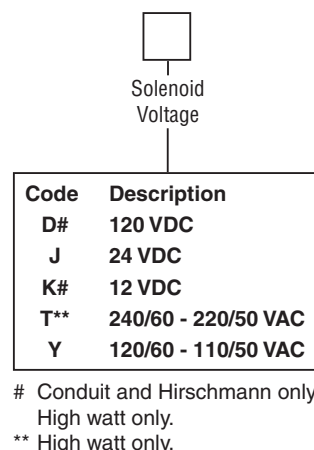
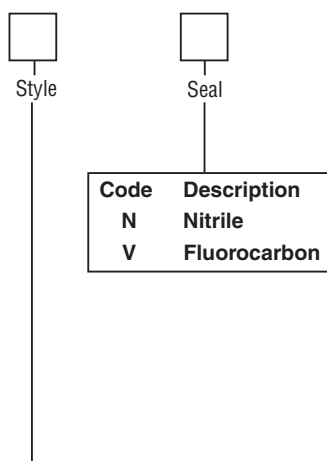
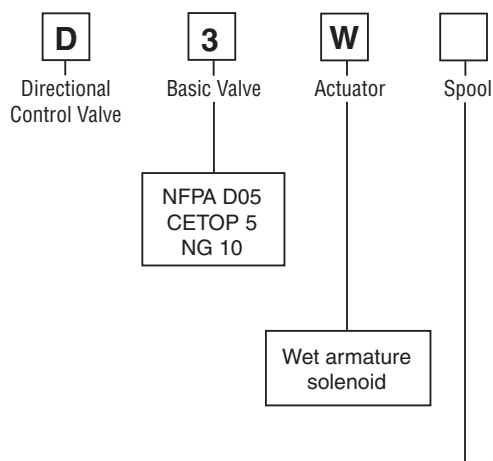
Interface	NFPA D05, CETOP 5, NG 10
Max. Operating Pressure	P, A, B: 345 Bar (5000 PSI) Standard CSA  207 Bar (3000 PSI) Tank: 103 Bar (1500 PSI) AC Standard 207 Bar (3000 PSI) AC Optional DC/AC Rectified Standard CSA  103 Bar (1500 PSI)
CSA File Number	LR060407
Leakage Rates 100 SSU @ 49°C (120°F)	Maximum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

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

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

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			

- * 008, 020, & 026 spools have closed crossover.
 ** 009 & 030 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 020, 026 & 030.
 ** High Watt only.
 † Only spools 020 & 030.
- 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 (DT04-2P)
P	Hirschmann w/Plug
W*	Hirschmann w/o Plug
E*	Explosion Proof

* Lights not available.
+ No conduit cavity variations. See K conduit box option.
† 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. Not available with Detent. DC or AC rectified.


Approvals

Code	Description
Omit	Standard
4*	CSA Approved
N*#	CE Approved

* Consult Factory for available options.
YC and TC only. Conduit box not allowed at this time.


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) 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

24 VDC voltage only with Leadwire C & K options. High and low watt available.
X 240 VAC DIN only, high-watt only. Not available with Explosion Proof. Y voltage available with leadwire, High and Low watt. Y voltage, DIN and high watt only.

Code	Description
Omit	Standard Valve
5	Signal Lights
6	Manaplug, Brad Harrison Mini
56	Manaplug (Mini) with Lights
57	Manaplug (Micro) with Lights (M12x1)
1C	Manaplug (Mini) Single Sol. 5-Pin w/Lights
1M	Manaplug Opposite Normal
1P	Painted Body
2P	Complete Painted Valve, 1 mil thick, spec. (Check factory for availability)

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)

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

Bold: Designates Tier I products and options.

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

Solenoid Ratings**

A

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

** 24VDC Solenoids leadwire coils available with TVS Diode surge suppression. Leadwire length 6" from coil face.

D3W****F Solenoid Electrical Characteristics†

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

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

D3W Solenoid Electrical Characteristics†

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

† DC holding amps.

D3W Rectified AC Solenoid Electrical Characteristics†

Solenoid Code	Nominal Volts/Hz	In Rush 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

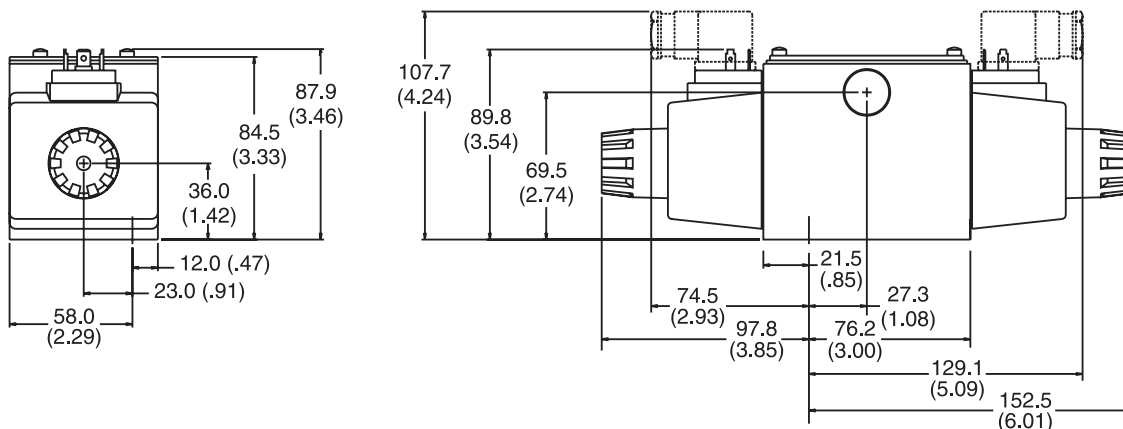
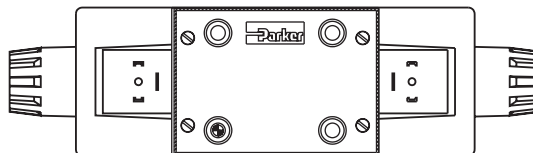
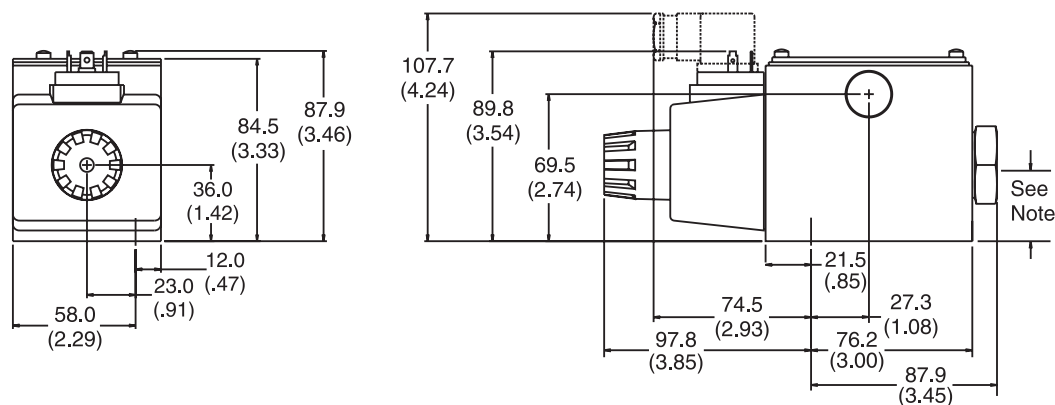
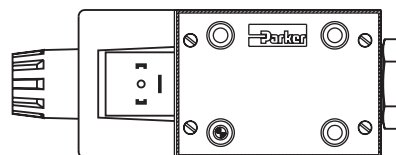
Electrical Characteristics* ED and EU†

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

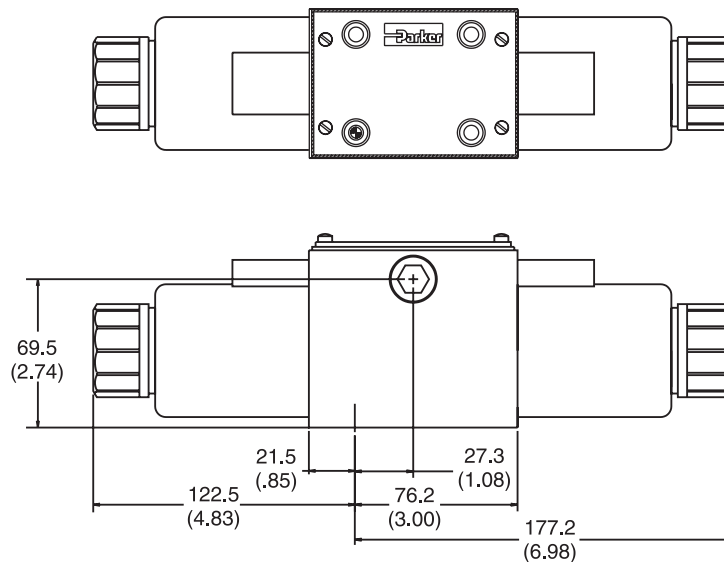
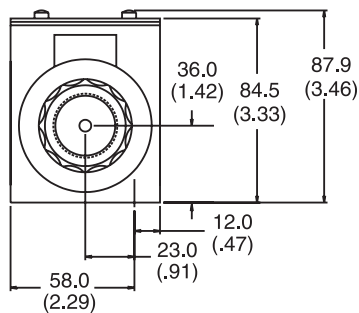
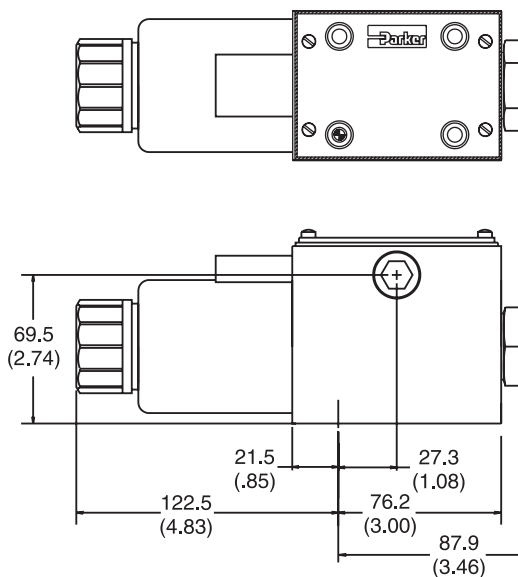
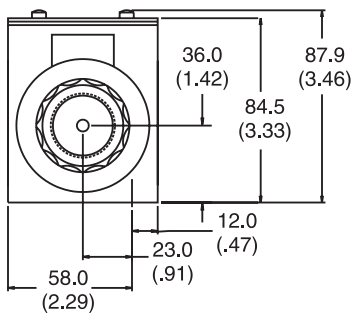
* Dual frequency not available on explosion proof coils.

† DC holding amps.

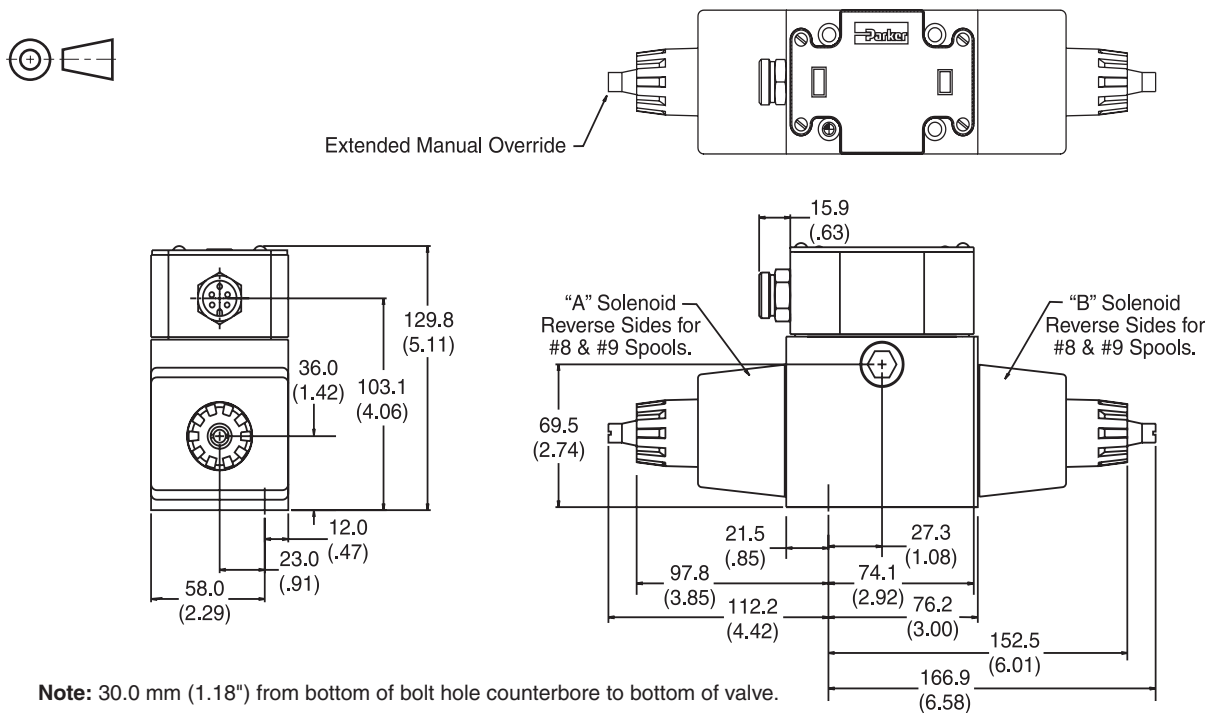
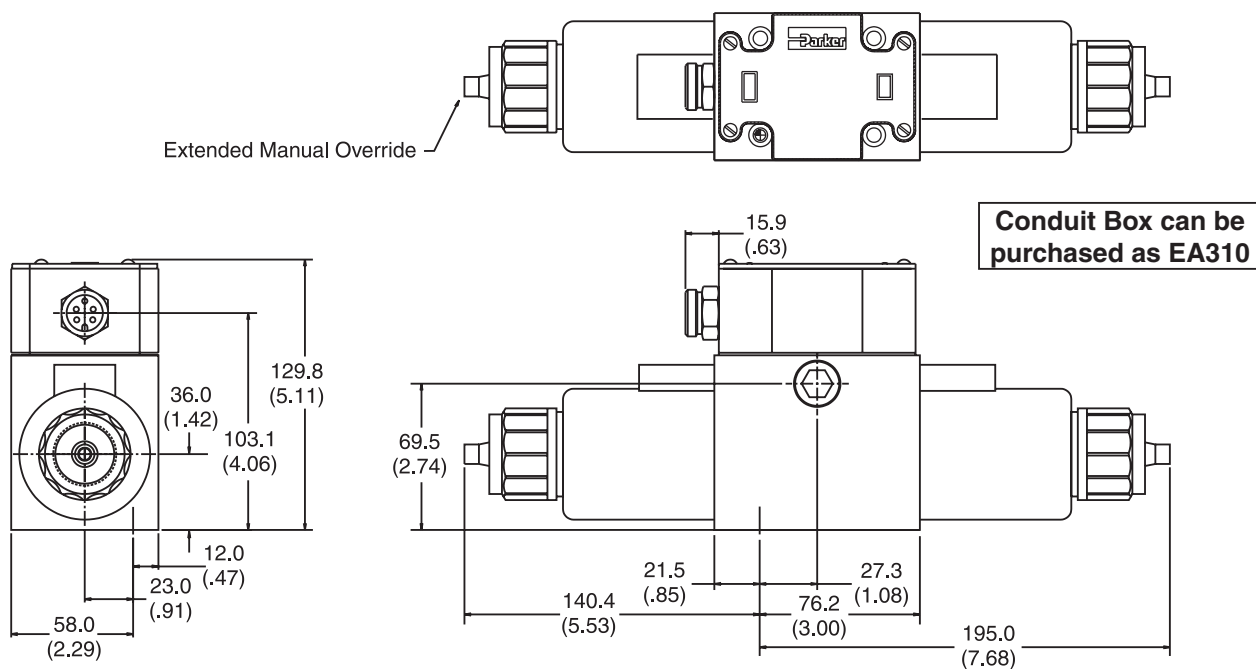
Inch equivalents for millimeter dimensions are shown in (**)

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.

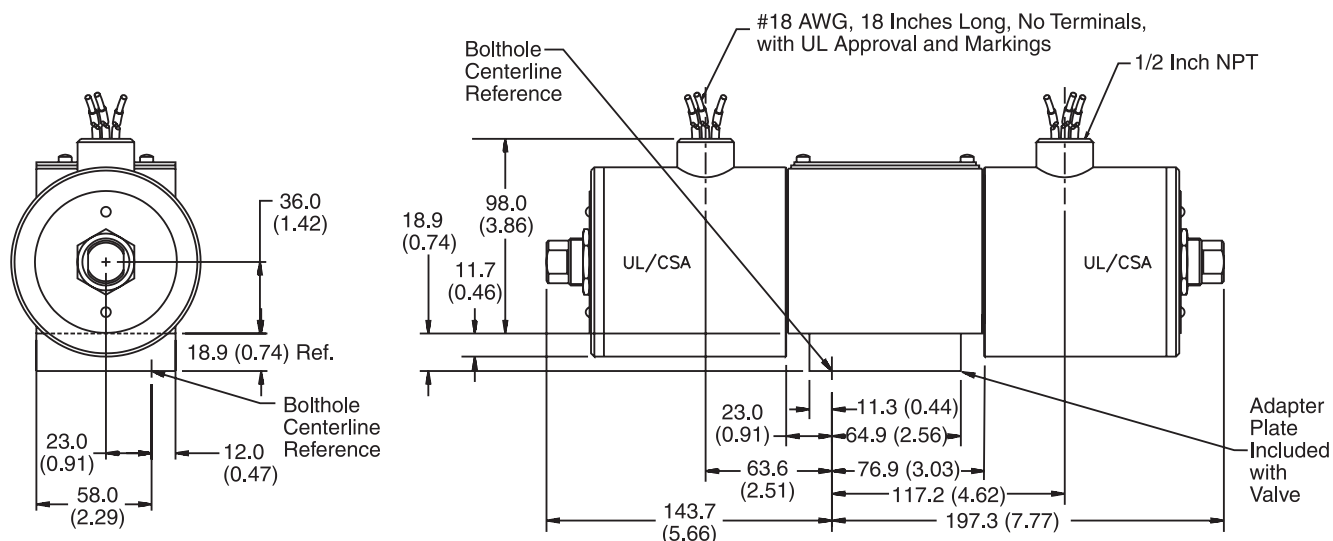
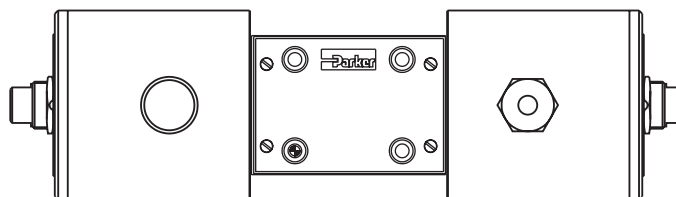
Inch equivalents for millimeter dimensions are shown in (**)

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)

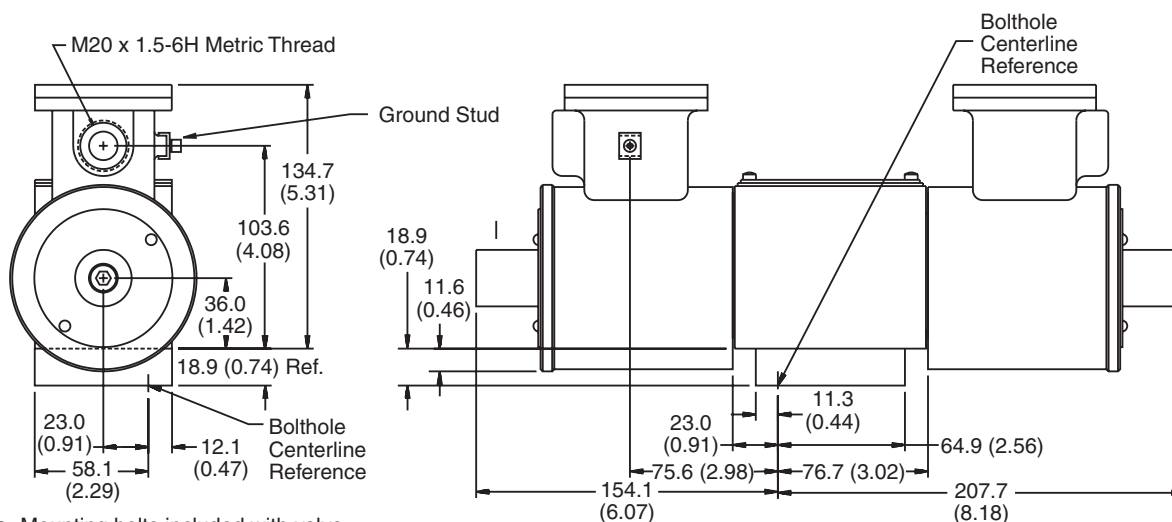
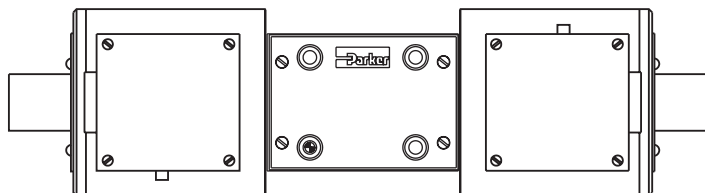
Inch equivalents for millimeter dimensions are shown in (**)

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

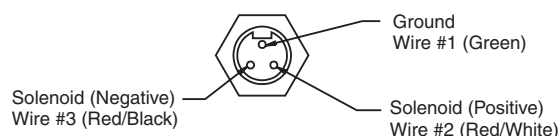
Note: Mounting bolts included with valve.

Conduit Box**(connection option K)**

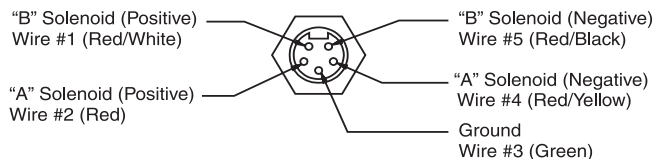
- Interface – 152.4 cm (6.0 inch) lead wires, 18 awg.
- Meets NEMA 4 and IP65

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**

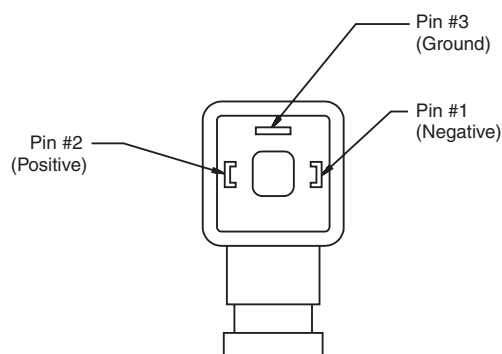
Single Solenoid Valves – Installed Opposite Side of Solenoid

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

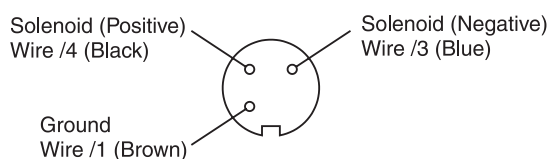
Single Solenoid Valves – Installed Opposite Side of Solenoid

Double Solenoid Valves – Installed Over "A" Solenoid

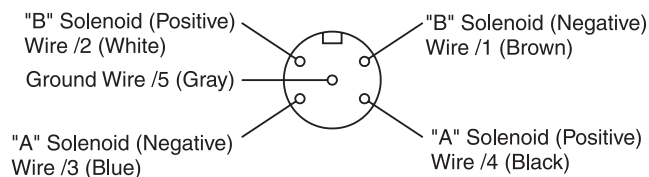
("A" and "B" Solenoids Reversed for #8 and #9 Spools)

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)

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

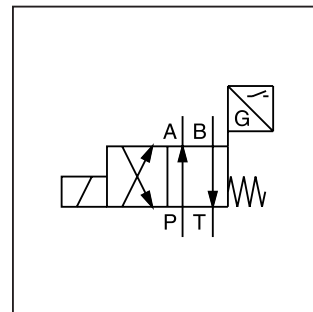
The fail-safe position of the directional valve during power failure is the spring offset position.

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

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



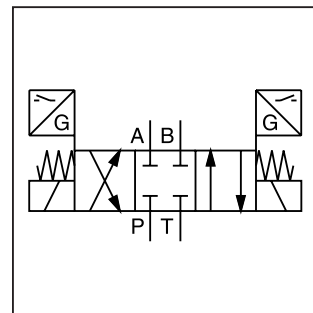
D3W*B



D3W*B

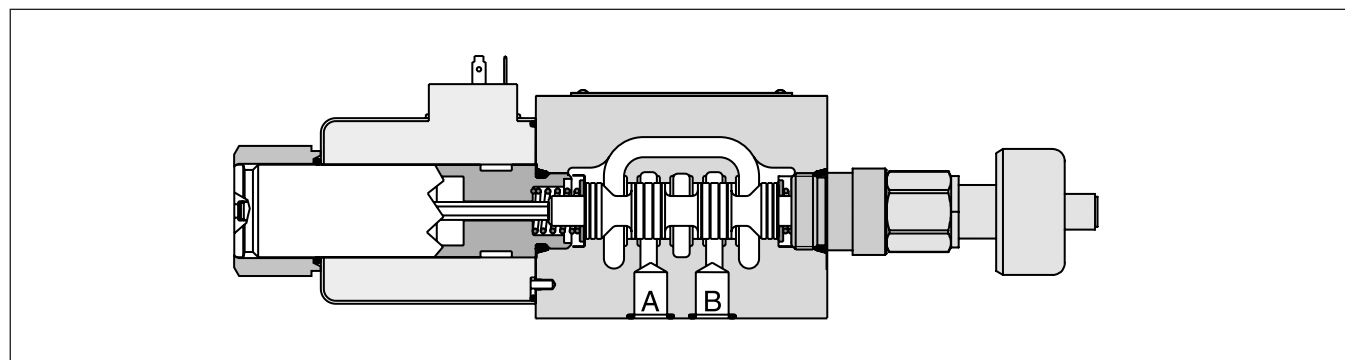


D3W*C

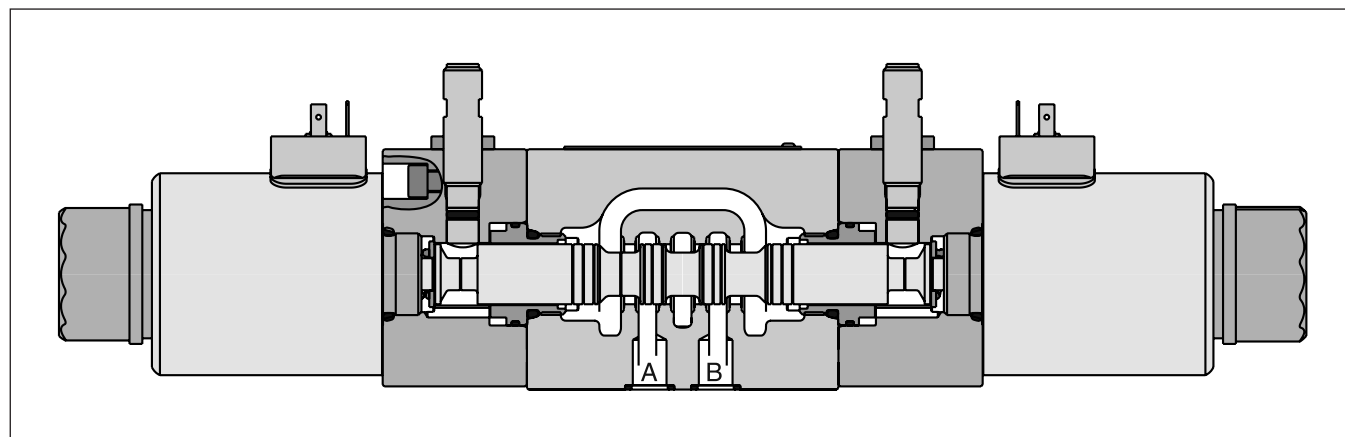


D3W*C

D3W*B



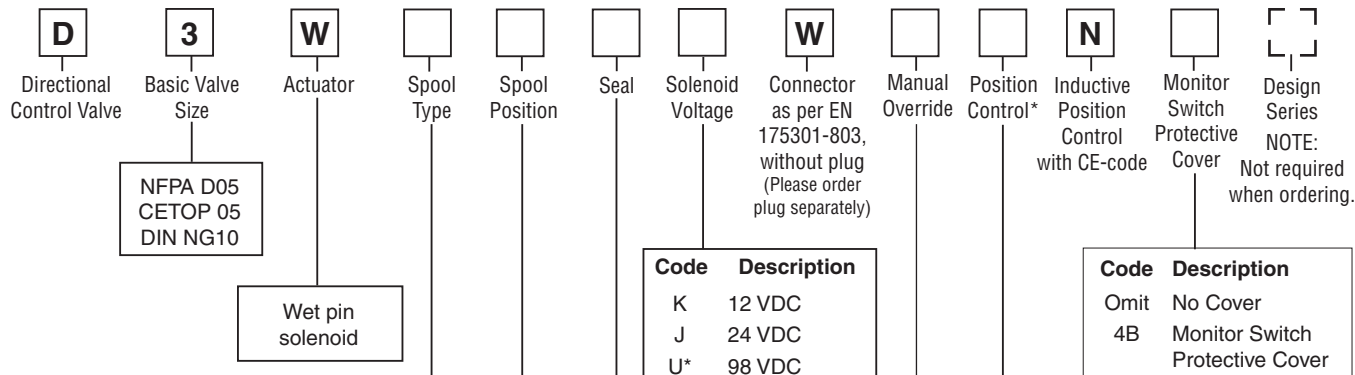
D3W*C



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

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	

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 b. Operated in position 0.	
K	2 positions. Spring offset in position 0. Operated in position b.	
M	2 positions. Spring offset in position a. Operated in position 0.	
2 Position Spools		
B	2 positions. Spring offset in position b. Operated in position a.	
H	2 positions. Spring offset in position a. Operated in position b.	

* Only available for spools K & M.

** Only available for spools E & F.

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

D	3	W					W			N																											
Directional Control Valve	Basic Valve	Actuator	Spool Type	Spool Position	Seal	Solenoid Voltage	Connector as per EN 175301-803, without plug (Please order plug separately)	Manual Override	Position Control	Inductive Position Control with CE-code	Monitor Switch Protective Cover	Design Series																									
NFFPA D05 CETOP 5 DIN NG 10		Wet pin solenoid				<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>K</td> <td>12 VDC</td> </tr> <tr> <td>J</td> <td>24 VDC</td> </tr> <tr> <td>U*</td> <td>98 VDC</td> </tr> <tr> <td>G*</td> <td>205 VDC</td> </tr> </tbody> </table> * To be used in combination with rectifier plugs at 120 VAC and 230 VAC power supply.		Code	Description	K	12 VDC	J	24 VDC	U*	98 VDC	G*	205 VDC			<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Omit</td> <td>No Cover</td> </tr> <tr> <td>4B</td> <td>Monitor Switch Protective Cover</td> </tr> </tbody> </table>		Code	Description	Omit	No Cover	4B	Monitor Switch Protective Cover	NOTE: Not required when ordering.									
Code	Description																																				
K	12 VDC																																				
J	24 VDC																																				
U*	98 VDC																																				
G*	205 VDC																																				
Code	Description																																				
Omit	No Cover																																				
4B	Monitor Switch Protective Cover																																				
		<table border="1"> <thead> <tr> <th>Code</th> <th>Symbol</th> </tr> </thead> <tbody> <tr> <td colspan="2">3 Position Spools</td> </tr> <tr> <td>001</td> <td></td> </tr> <tr> <td>002</td> <td></td> </tr> <tr> <td>004</td> <td></td> </tr> <tr> <td colspan="2">2 Position Spools</td> </tr> <tr> <td>020*</td> <td></td> </tr> <tr> <td>026*</td> <td></td> </tr> </tbody> </table> * Only available for end position control code I3.		Code	Symbol	3 Position Spools		001		002		004		2 Position Spools		020*		026*		<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> <th>Spool Position</th> </tr> </thead> <tbody> <tr> <td>I3</td> <td>End positions</td> <td rowspan="2">C, D</td> </tr> <tr> <td>I6*</td> <td>Start positions</td> </tr> </tbody> </table> * For hydraulic presses according to the safety regulations EN 693, solenoid option T (without manual override) and accessory I6 (start positions) is required.		Code	Description	Spool Position	I3	End positions	C, D	I6*	Start positions
Code	Symbol																																				
3 Position Spools																																					
001																																					
002																																					
004																																					
2 Position Spools																																					
020*																																					
026*																																					
Code	Description																																				
N	Nitrile																																				
V	Fluorocarbon																																				
Code	Description	Spool Position																																			
I3	End positions	C, D																																			
I6*	Start positions																																				
		<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Omit</td> <td>Manual Override (Standard)</td> </tr> <tr> <td>T*</td> <td>Without Manual Override</td> </tr> </tbody> </table> * For hydraulic presses according to the safety regulations EN 693, solenoid option T (without manual override) and accessory I6 (start positions) is required.		Code	Description	Omit	Manual Override (Standard)	T*	Without Manual Override																												
Code	Description																																				
Omit	Manual Override (Standard)																																				
T*	Without Manual Override																																				
		<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> <th>Symbol</th> </tr> </thead> <tbody> <tr> <td colspan="3">3 Position Spools</td> </tr> <tr> <td>C</td> <td>3 positions. Spring offset in position 0. Operated in position a or b.</td> <td></td> </tr> <tr> <td colspan="3">2 Position Spools</td> </tr> <tr> <td>D</td> <td>2 positions. Spring offset in position a. Operated in position b.</td> <td></td> </tr> </tbody> </table>		Code	Description	Symbol	3 Position Spools			C	3 positions. Spring offset in position 0. Operated in position a or b.		2 Position Spools			D	2 positions. Spring offset in position a. Operated in position b.																				
Code	Description	Symbol																																			
3 Position Spools																																					
C	3 positions. Spring offset in position 0. Operated in position a or b.																																				
2 Position Spools																																					
D	2 positions. Spring offset in position a. Operated in position b.																																				

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

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

A

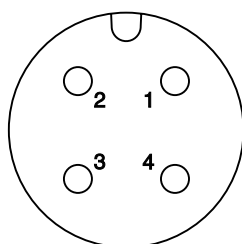
General						
Design		Directional Spool Valve				
Actuation		Solenoid				
Size		NG10 / CETOP 05 / NFPA D05				
Mounting Interface		DIN 24340 A10 / ISO 4401 / NFPA D05 / CETOP RP 121-H				
Mounting Position		Unrestricted, preferably horizontal				
Ambient Temperature		[°C]	-20...+60; (-4°F...+140°F)			
MTTF _D Value		[years]	150			
Hydraulic						
Maximum Operating Pressure		P, A, B: 350 Bar (5045 PSI); T: 210 Bar (3045 PSI)				
Fluid		Hydraulic oil in accordance with DIN 51524				
Fluid Temperature		[°C]	-20 ... +70 (-4°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) See shift limits				
Leakage at 50 Bar (725 PSI) (per flow path)		[ml/min]	Up to 20 (0.005 GPM) (depending on spool)			
Static / Dynamic						
Step Response at 95%		[ms]	Energized: 105; De-energized: 85			
Electrical						
Duty Ratio		100% ED; CAUTION: coil temperature up to 150°C (302°F) possible				
Max. Switching Frequency		10,000 switchings per hour				
Protection Class		IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)				
	Code	K	J	U	G	
Supply Voltage / Ripple		[V]	12	24	98	205
Tolerance Supply Voltage		[%]	±10	±10	±10	±10
Current Consumption		[A]	3	1.5	0.35	0.18
Power Consumption		[W]	36	36	34	36
Solenoid Connection		Connector as per EN 175301-803, solenoid 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.

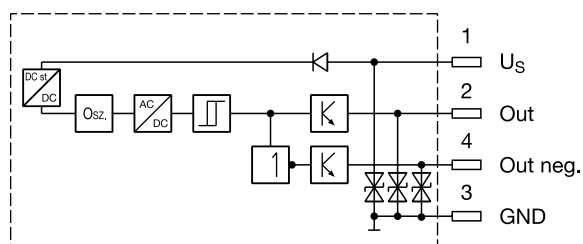
Electrical Specifications of Position Control as per IEC 61076-2-101 (M12x1)

A

M12 Pin Assignment



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



Outputs: Open collector

Start position monitored:

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

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

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

End position monitored:

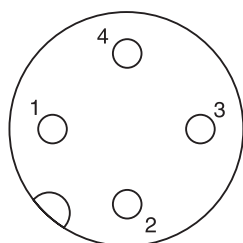
The inductive switch gives a signal before the end position is reached. (above 85% spool stroke).

Double Solenoid Valves

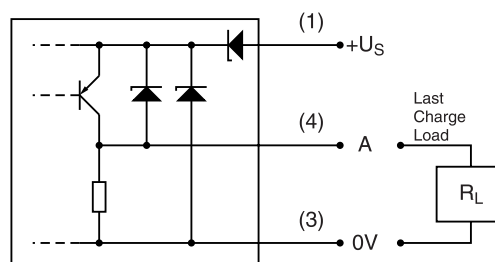
Electrical Specifications of Position Control as per IEC 61076-2-101 (M12x1)

Protection Class	IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Ambient Temperature [°C]	-20...+60; (-4°F...140°F)
Supply Voltage U_S/ Ripple [V]	10...30 / $\pm 10\%$
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 acc. to IEC 61076-2-101
Wiring Minimum [mm ²]	3 x 0.14 braided shield recommended
Wiring Length Maximum [m]	50 (164 ft.) recommended

M12 Pin Assignment



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

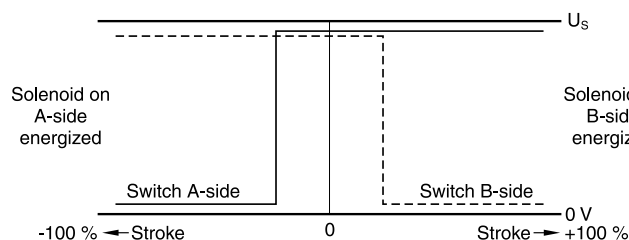


Definitions

Start position monitored:

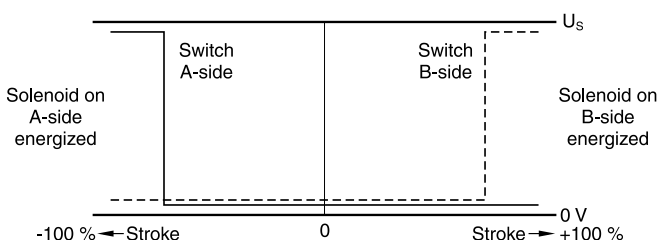
The valve is de-energized. The inductive switch gives a signal at the moment the spool leaves the center position (below 15% spool stroke).

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).

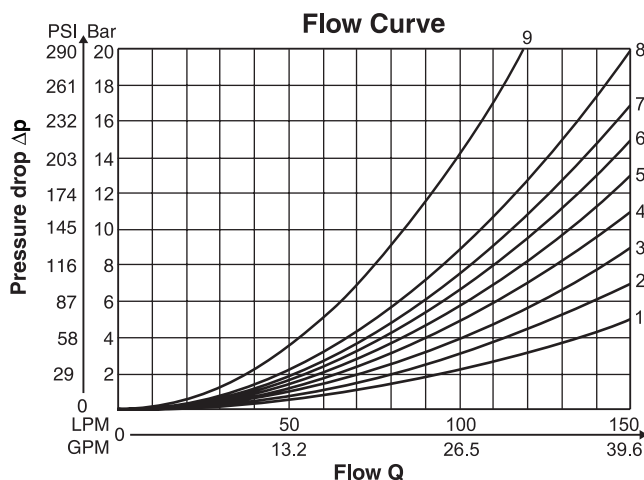


Please order plug M12x1 separately. Straight plug recommended – no defined position possible for angled plug.

Performance Curves

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

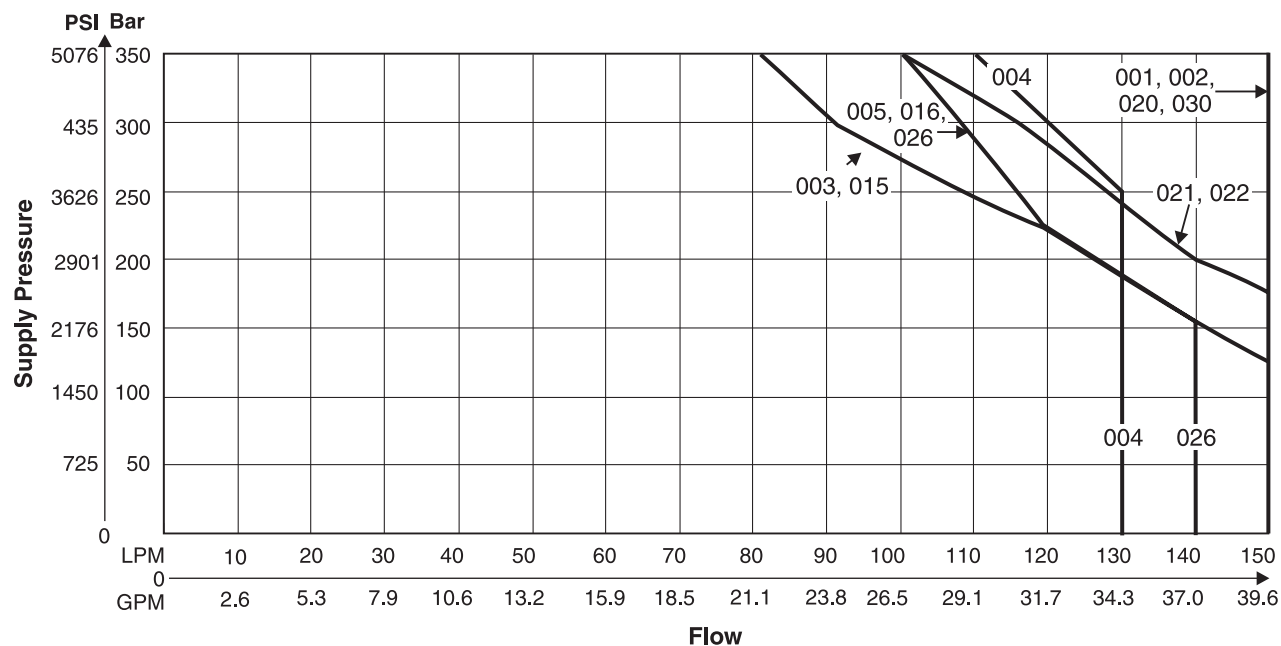
Spool	Position "b"		Position "a"		Position "0"					
	P-A	B-T	P-B	A-T	P-A	P-B	A-T	B-T	P-T	A-B
001	6	5	6	6	—	—	—	—	—	—
002	3	5	3	3	1	1	4	5	1	6
003	2	2	3	1	—	—	3	—	—	—
004	5	4	4	4	—	—	8	8	—	9
005	2	2	2	2	3	—	—	—	—	—
015	2	1	2	2	—	—	—	3	—	—
016	2	2	1	2	—	2	—	—	—	—
020	6	6	5	7	—	—	—	—	—	—
026B	5	—	5	—	—	—	—	—	—	—
030	4	5	3	5	—	—	—	—	—	—
Spool	Position "b"			Position "a"						
	P-A	P-B	A-B	P-B	A-T	—				
021	2	4	8	3	2	—				
	P-A	B-T	—	P-A	P-B	A-B				
	022	3	2	—	3	2	8			



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

Shift Limit Diagram

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



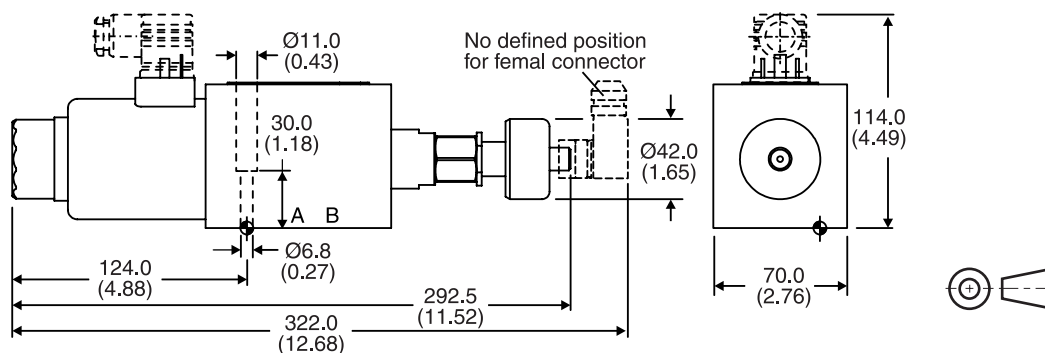
All characteristic curves measured with HLP46 at 50°C (122°F), 90% U_{nom} and warm solenoids.

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

A

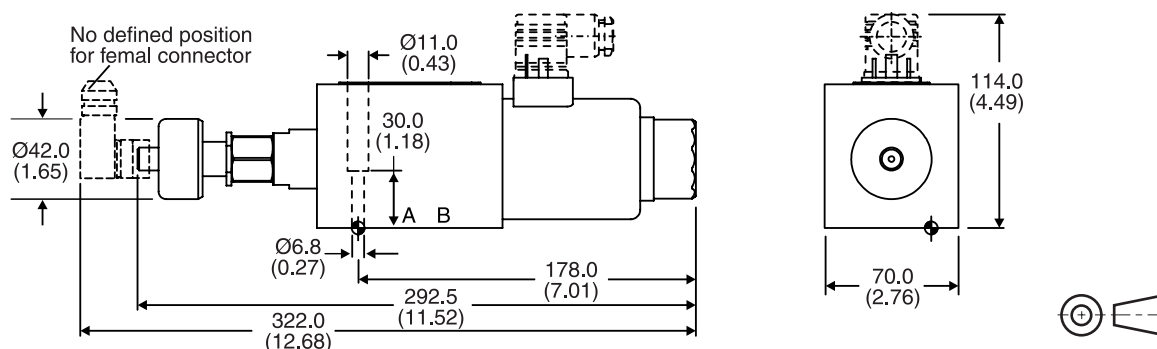
Interface EN 175301-803, DC solenoid, with plug M12x1¹⁾

Styles B, E, F



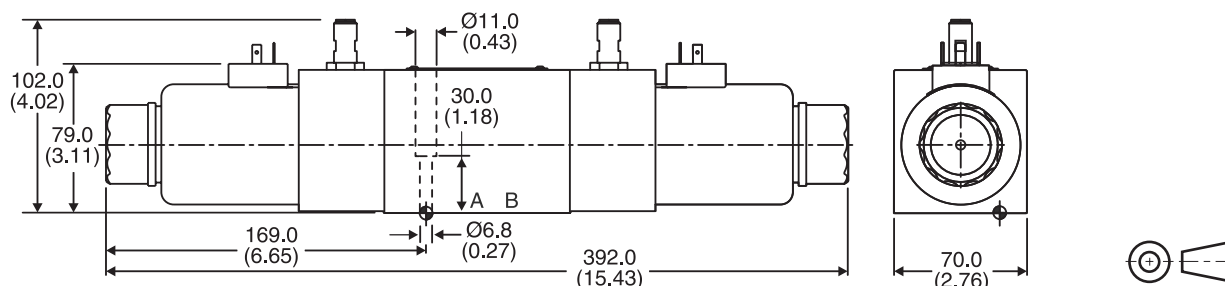
¹⁾ Please order plug M12x1 separately. See Accessories (part no.: 5004109).

Styles H, K, M



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

Styles C, D



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

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

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

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

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

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

Replacement and repairs can only be undertaken by the manufacturer.

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**

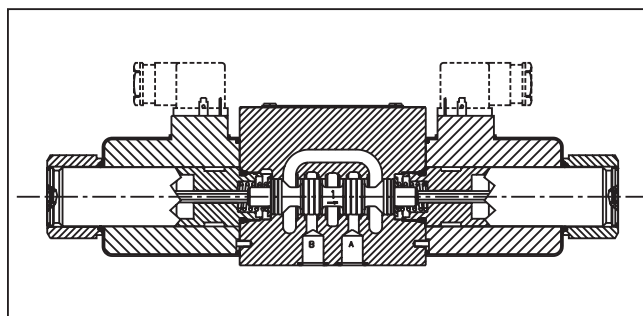
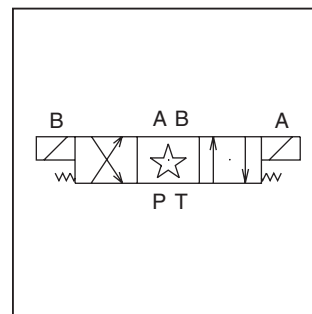
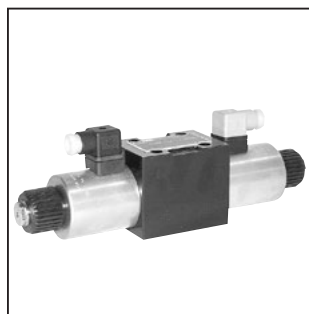
Insulation	Class H
Allowable Deviation from rated voltage	DC only -10% to +15%
Armature	Wet pin type

** 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



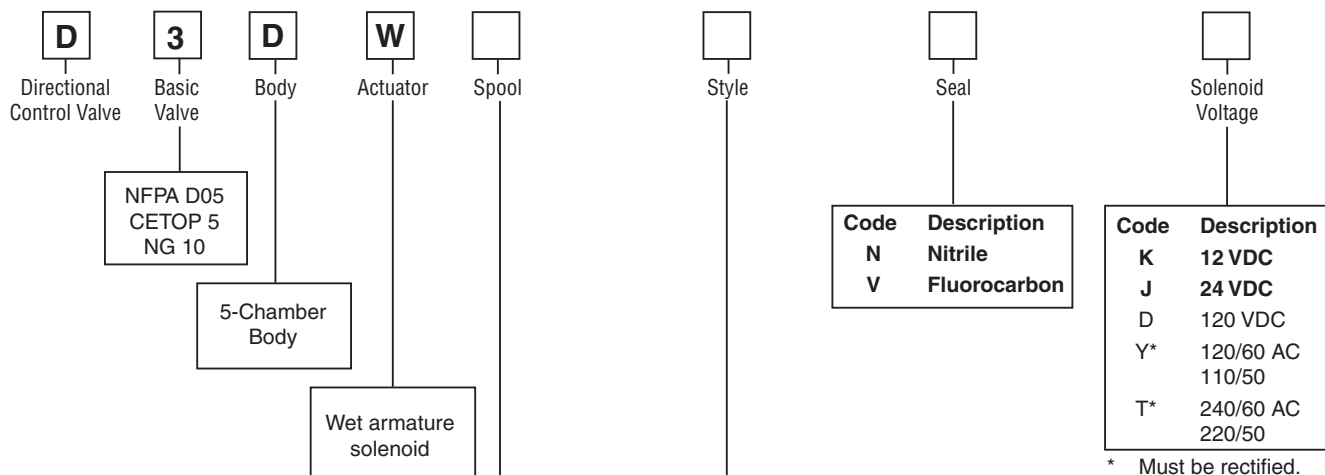
Specifications

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.

A



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

Code	Description	Symbol
B*	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 020 & 030.

This condition varies with spool code.

* 008 & 020 spools have closed crossover.

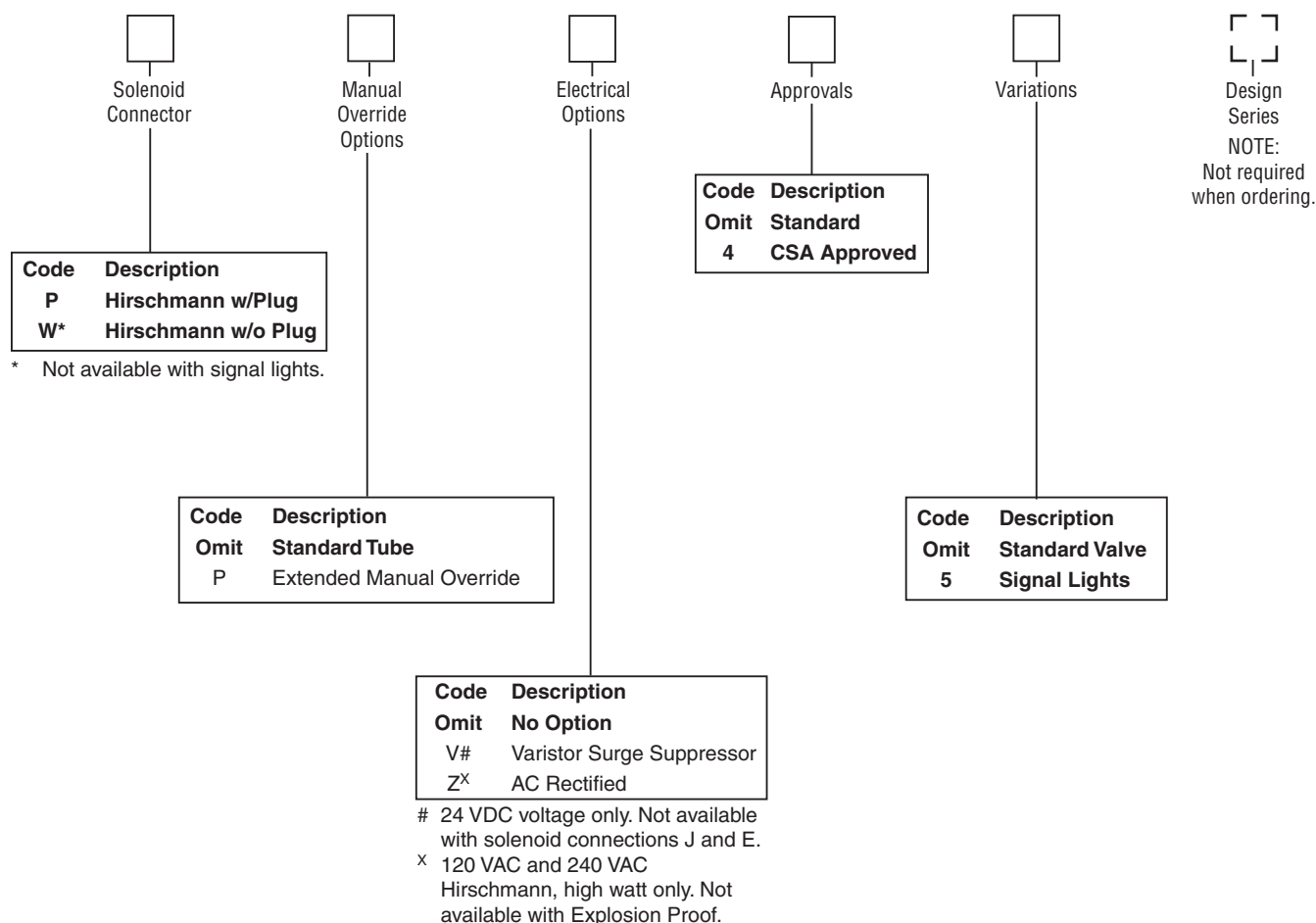
** 009 & 030 spools have open crossover.

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

†† Spring centered versions C, E, F, K & M only.

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.)

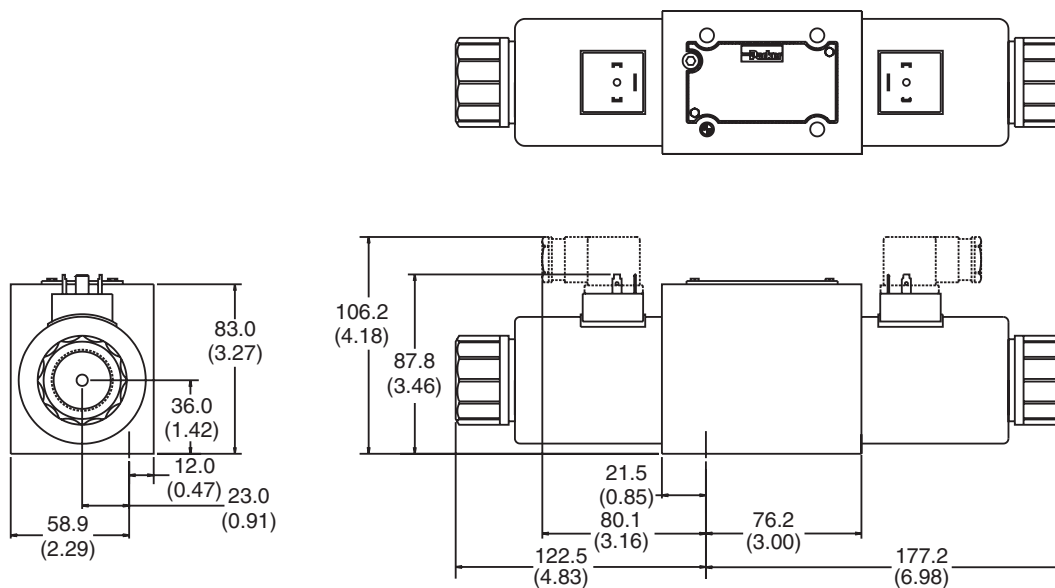
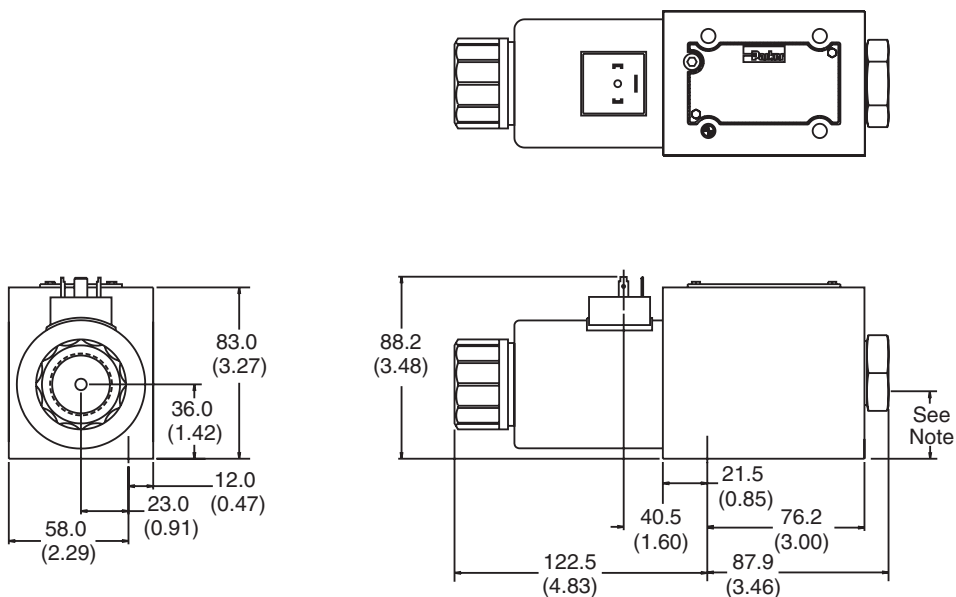
Seal Kit:

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.

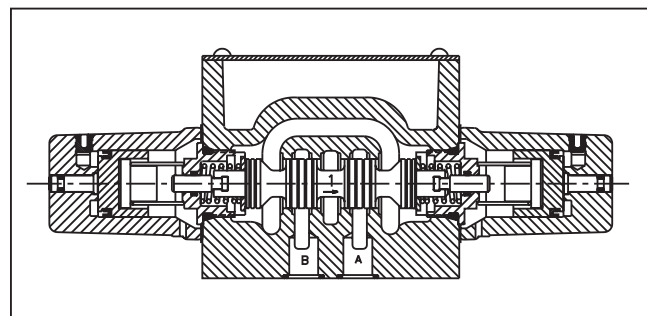
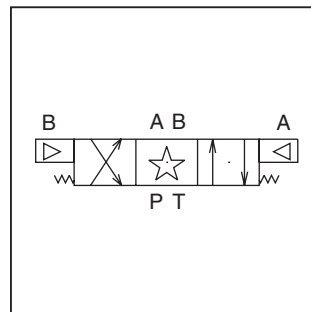
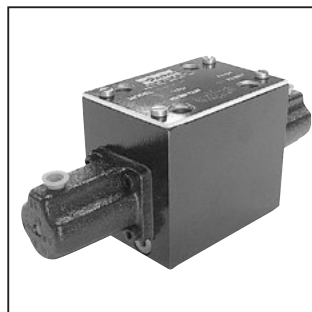
Specifications

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)

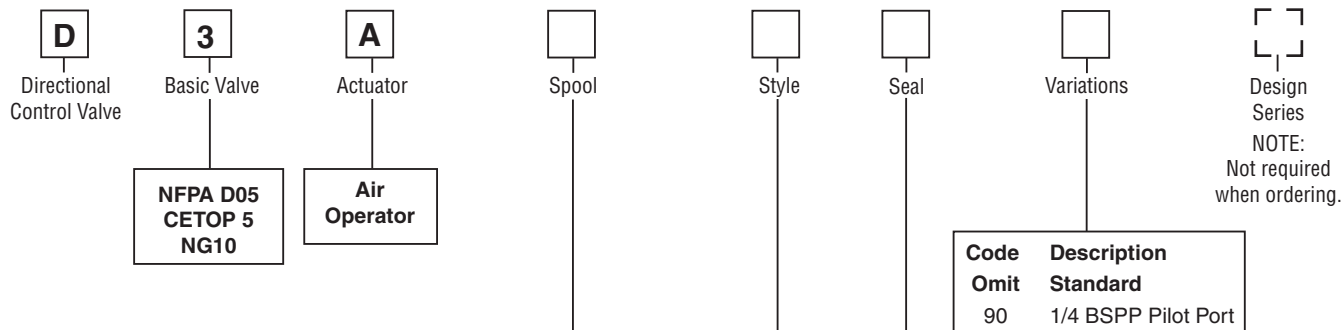
Signal to 95% spool stroke measured at
172 Bar (2500 PSI) and 75 LPM (20 GPM)

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.

A



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

* 008 and 020 spools have closed crossover.
 † 009 and 030 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 020 and 030 spools only.

Indicates air pilot.

This condition varies with spool code.

Mounting Bolt Kits

UNC Bolt Kits for use with D3A Directional Control Valves & 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.)

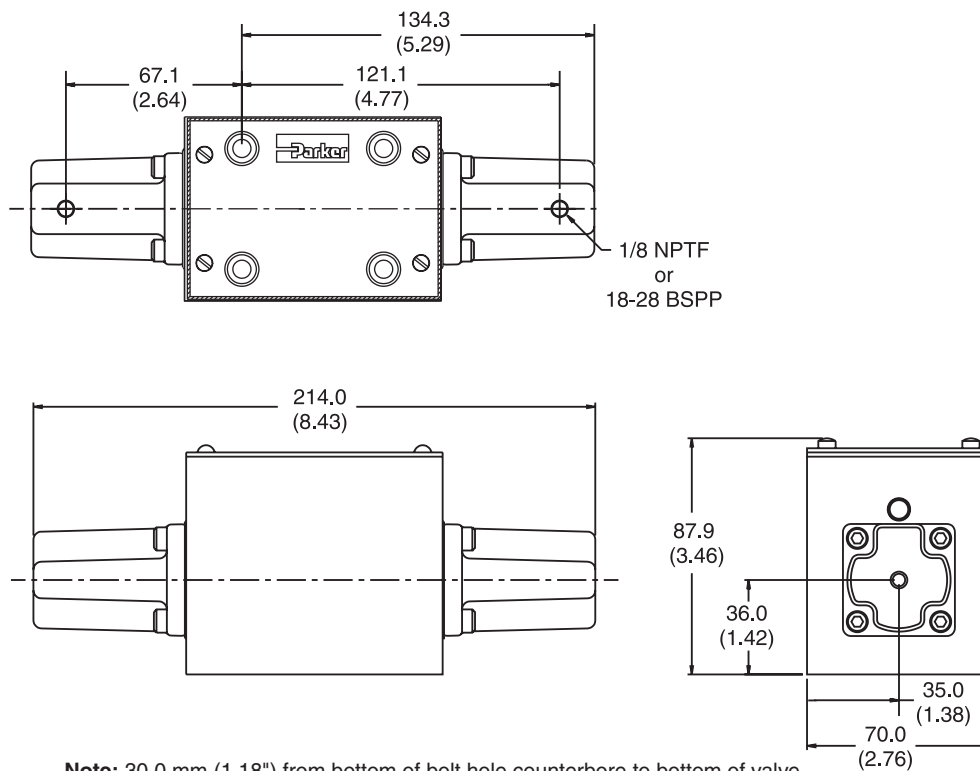
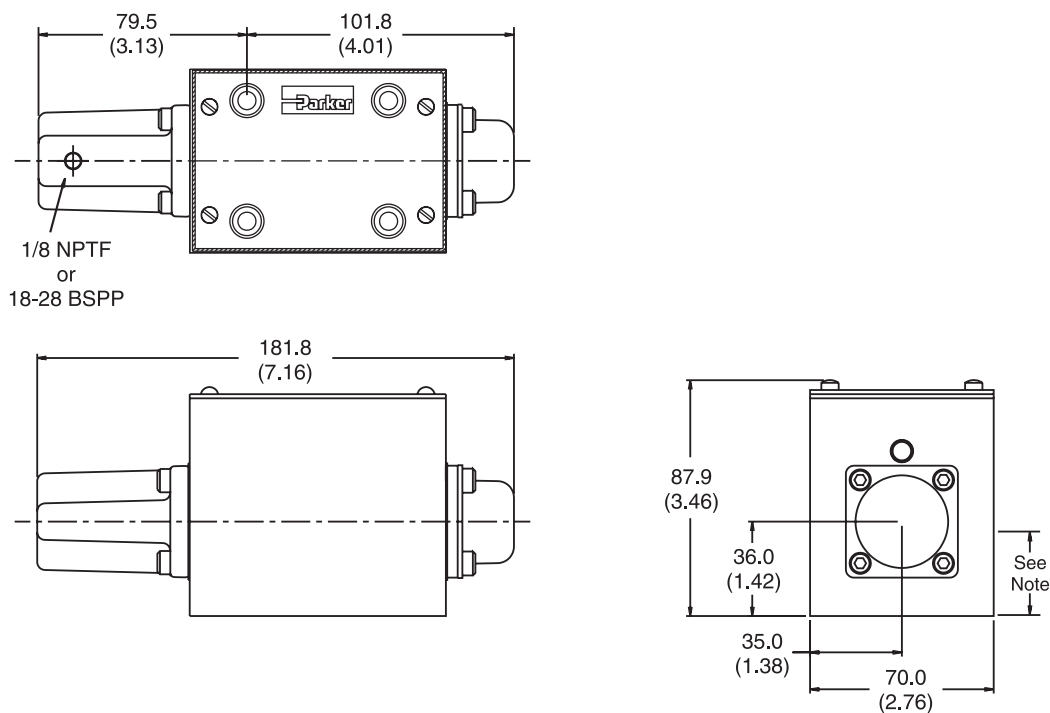
Seal Kit:

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

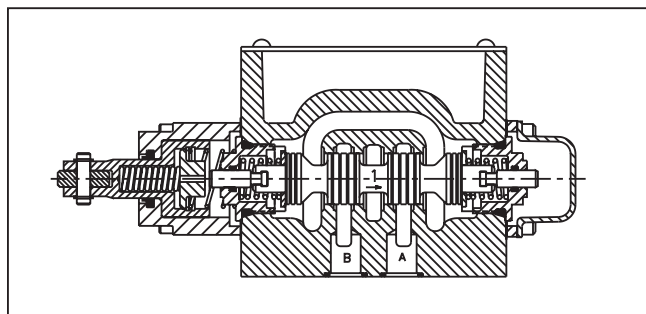
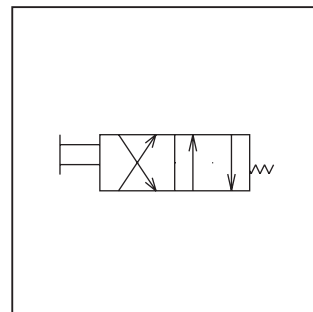
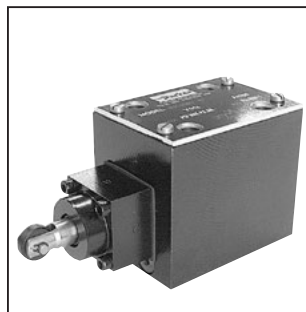
Series D3C and D3D directional control valves are high performance, 4-chamber, direct operated, cam controlled, 3 or 4-way valves. They are available in 2-position and conform to NFPA's D05, CETOP 5 mounting patterns.

Features

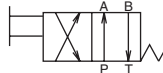
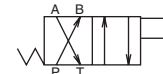
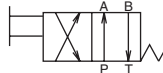
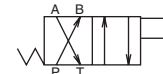
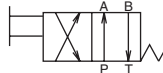
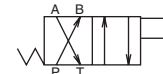
- Choice of 2 cam roller positions (D3C and D3D).
- Short stroke option.
- High flow, low pressure drop design.

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

D Directional Control Valve	3 Basic Valve NFPA D05 CETOP 5 NG10	Actuator	Spool	Style	Seal <table border="0"> <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	Variations <table border="0"> <tr> <th>Code</th> <th>Description</th> </tr> <tr> <td>Omit</td> <td>Standard</td> </tr> <tr> <td>B5</td> <td>Short Stroke</td> </tr> </table>	Code	Description	Omit	Standard	B5	Short Stroke	Design Series NOTE: Not required when ordering.			
Code	Description																					
N	Nitrile																					
V	Fluorocarbon																					
Code	Description																					
Omit	Standard																					
B5	Short Stroke																					
<table border="0"> <tr> <th>Code</th> <th>Description</th> </tr> <tr> <td>C</td> <td>Cam (90° to mounting surface)</td> </tr> <tr> <td>D</td> <td>Cam parallel to mounting surface</td> </tr> </table>				Code	Description	C	Cam (90° to mounting surface)	D	Cam parallel to mounting surface	<table border="0"> <tr> <th>Code</th> <th>Description</th> <th>Symbol</th> </tr> <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> </table> Valve schematic symbols are per NFPA/ANSI standards. See installation information for details.				Code	Description	Symbol	B	Two position, spring offset operator at "A" port end.		H	Two position, spring offset operator at "B" port end.	
Code	Description																					
C	Cam (90° to mounting surface)																					
D	Cam parallel to mounting surface																					
Code	Description	Symbol																				
B	Two position, spring offset operator at "A" port end.																					
H	Two position, spring offset operator at "B" port end.																					
<table border="0"> <tr> <th>Code</th> <th>Symbol</th> </tr> <tr> <td>020*</td> <td></td> </tr> <tr> <td>030†</td> <td></td> </tr> </table> * 020 spool has closed crossover. † 030 spool has open crossover.				Code	Symbol	020*		030†		Valve Weight: 3.6 kg (8 lbs.) Seal Kit: <table border="0"> <tr> <td>Nitrile</td> <td>SKD3C</td> </tr> <tr> <td>Fluorocarbon</td> <td>SKD3CV</td> </tr> </table>				Nitrile	SKD3C	Fluorocarbon	SKD3CV					
Code	Symbol																					
020*																						
030†																						
Nitrile	SKD3C																					
Fluorocarbon	SKD3CV																					

Bold: Designates Tier I products and options.

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

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



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

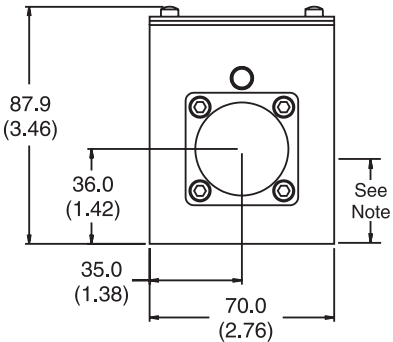
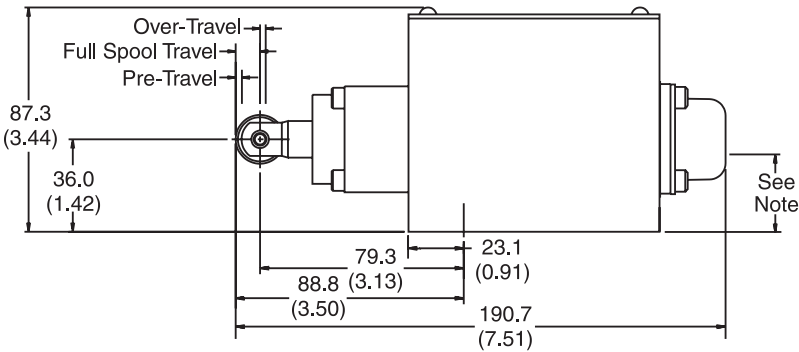
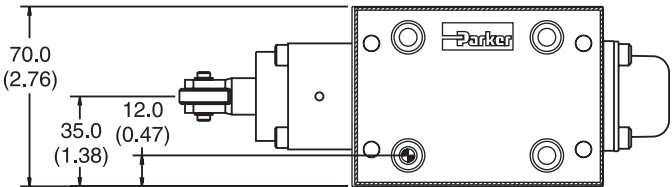
NOTE:All bolts are SAE grade 8, 1/4-20 UNC-2A thread, torque to 16 Nm (12 ft-lbs)

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

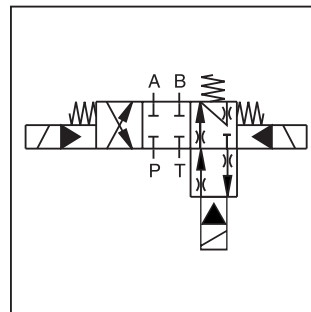
General Description

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]	Energized 105 De-energized 85
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.

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 adapter 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	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

Code	Description
C	

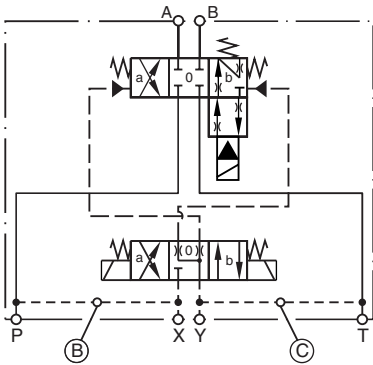
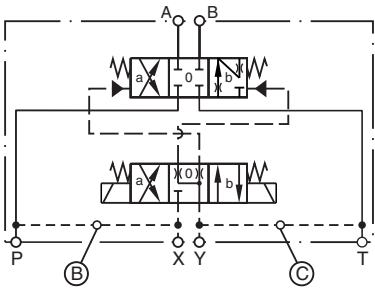
Code	Description

Pilot Oil Inlet (Supply) and Outlet (Drain)

A

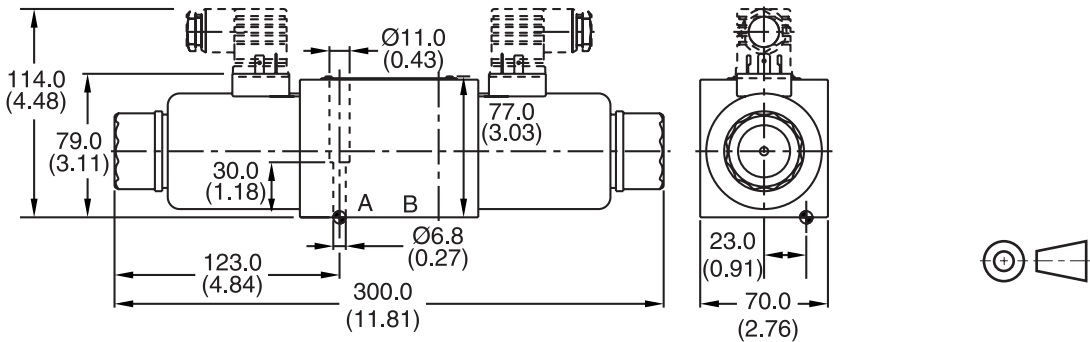
○ open, ● closed

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

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

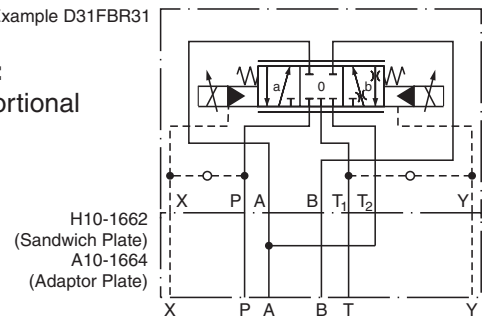
Features

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

Regenerative Function

Example D31FBR31

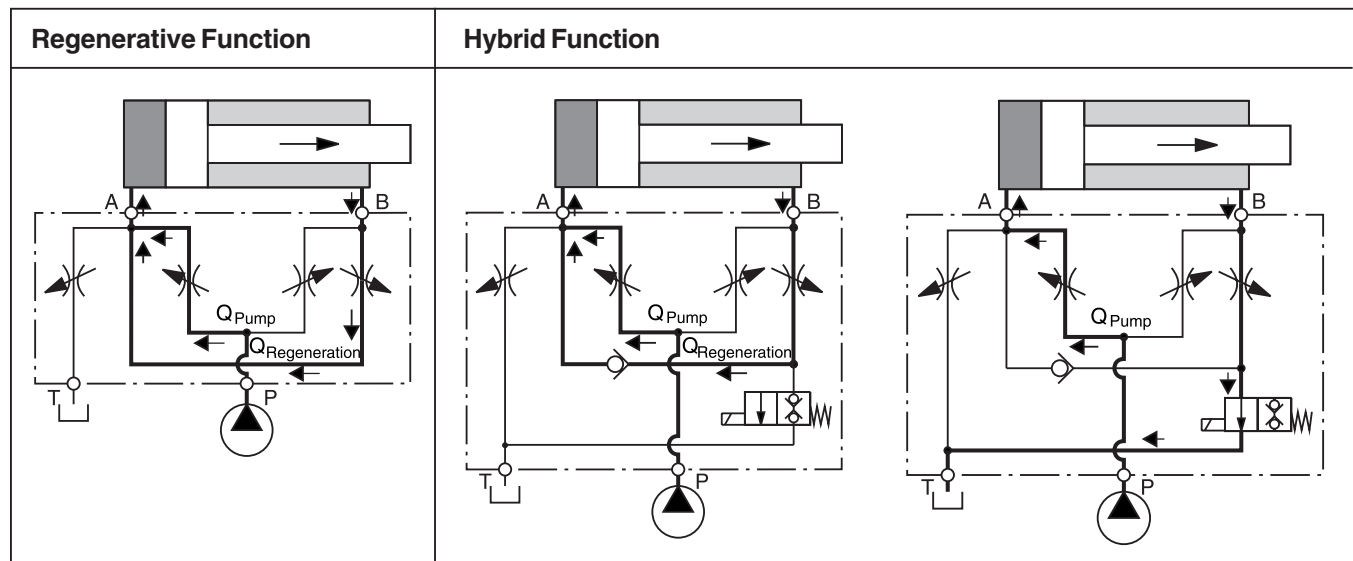
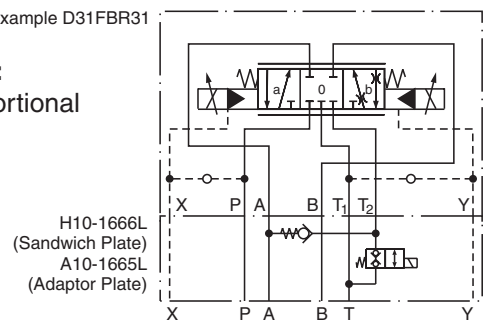
Note:
Proportional



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.

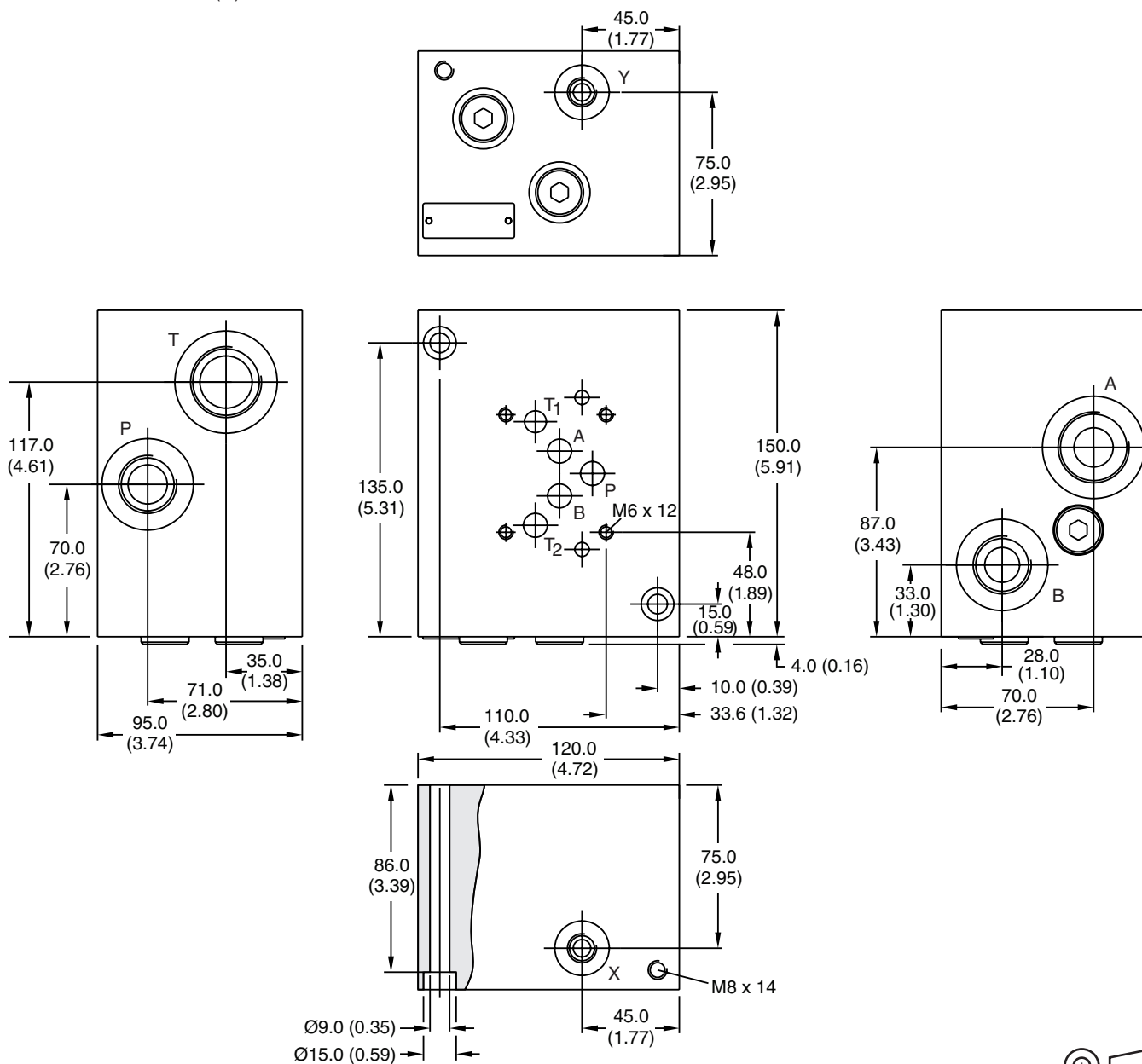
A

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
				H10-1666L
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 (**)

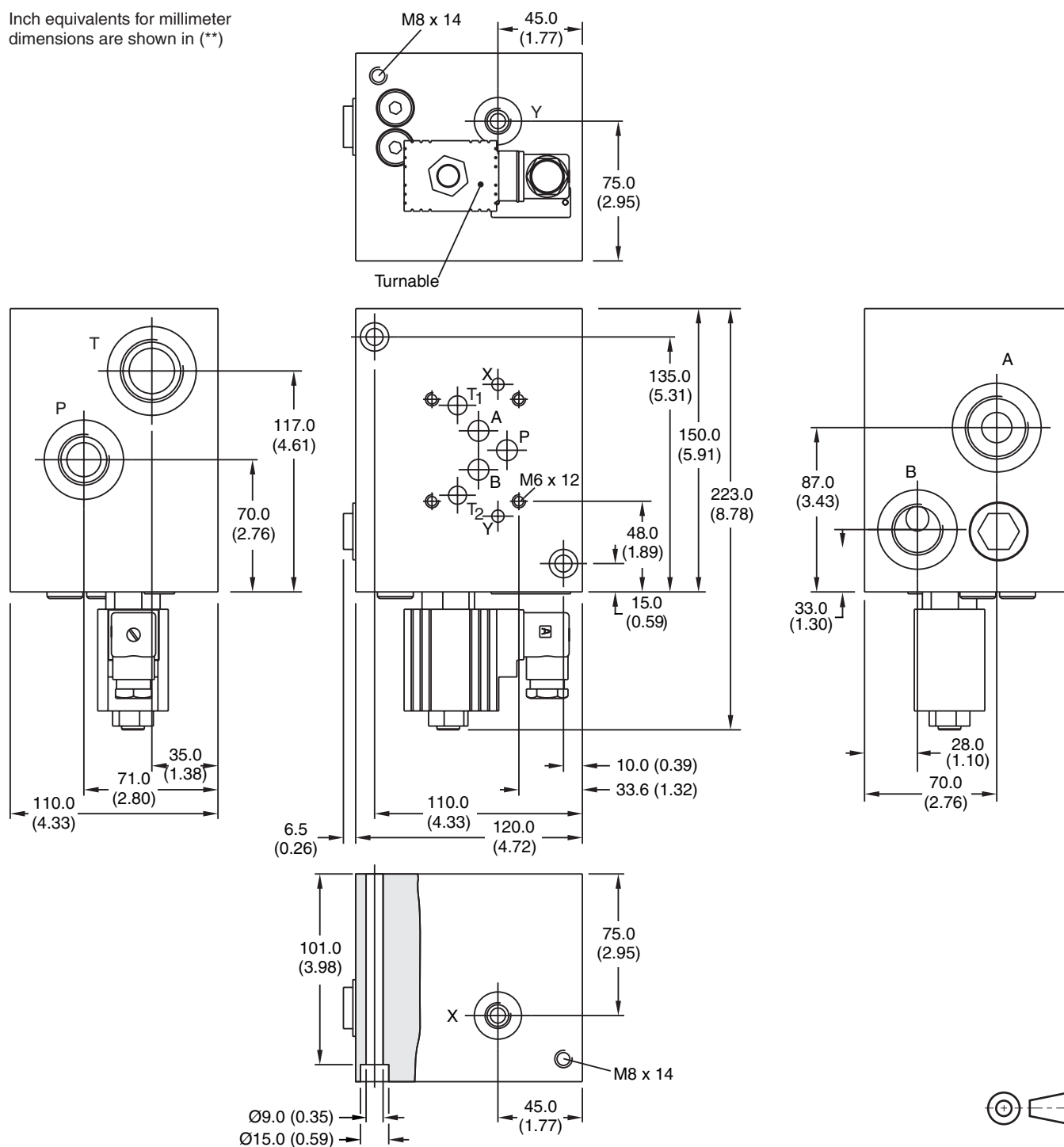
A

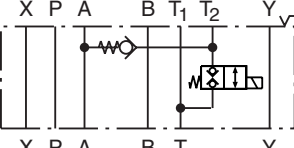
Symbol	Ordering Code	Port
	A10-1664	A, T = G1 B, P = G3/4 X, Y = G1/4

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

A

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



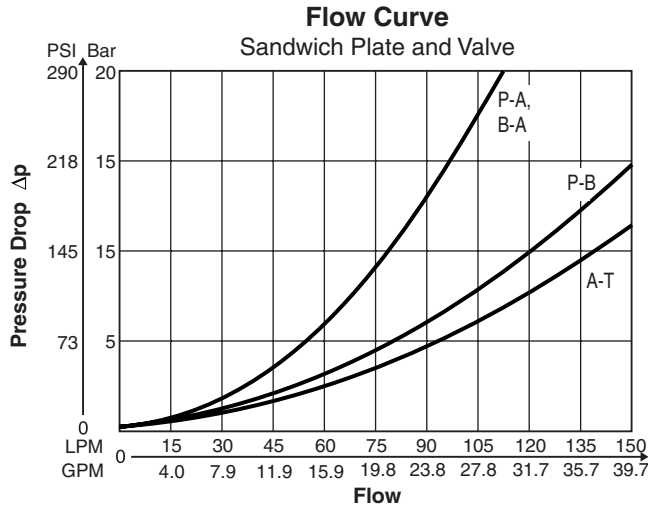
Symbol	Ordering Code	Port	Seal  Kit
	A10-1665L	A, T = G1 B, P = G3/4 X, Y = G1/4	Nitrile: SK-A10-1665

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

Performance Curves

D31FP/FE/FB/VW*

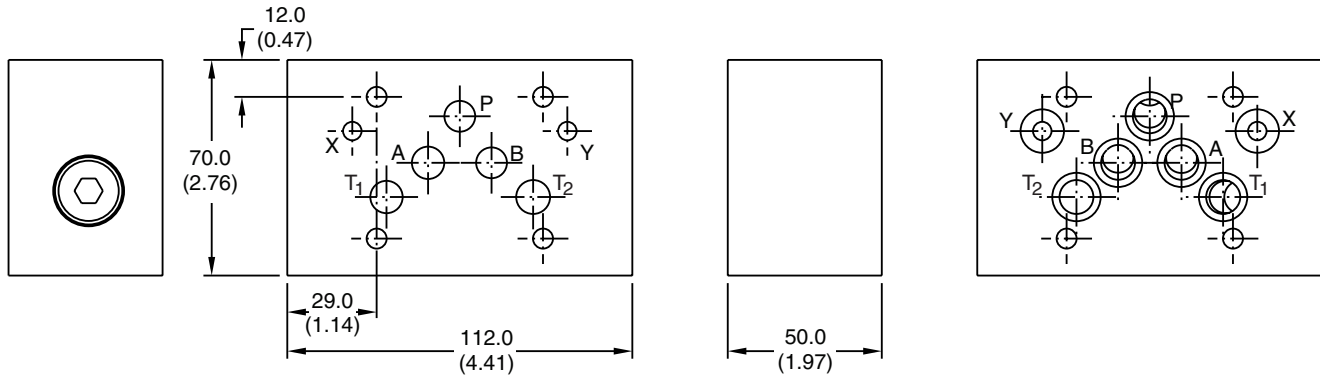
A

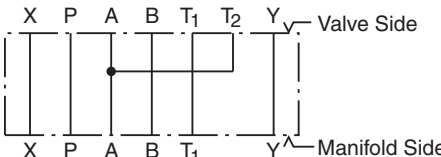


Measured with Spool Z31 at command signal 100%.

Dimensions

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



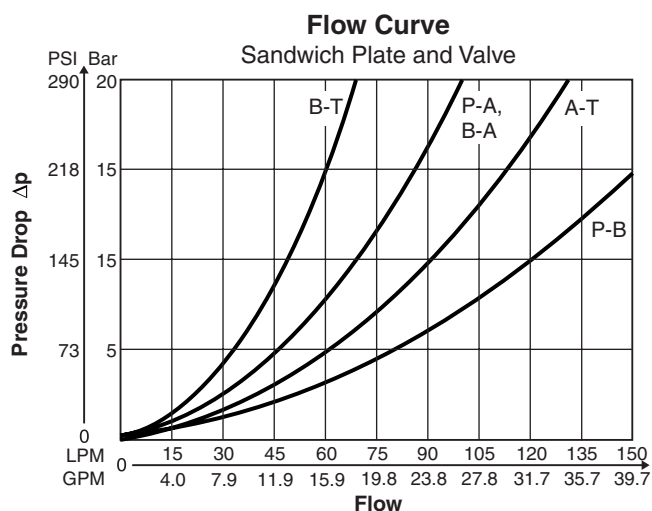
Symbol	Ordering Code	 Kit	 		Seal  Kit
	H10-1662 (O-rings included in delivery)	BK412	4x M6x90 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.) ±15%	Nitrile: SK-H10-1662

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

A

Performance Curves

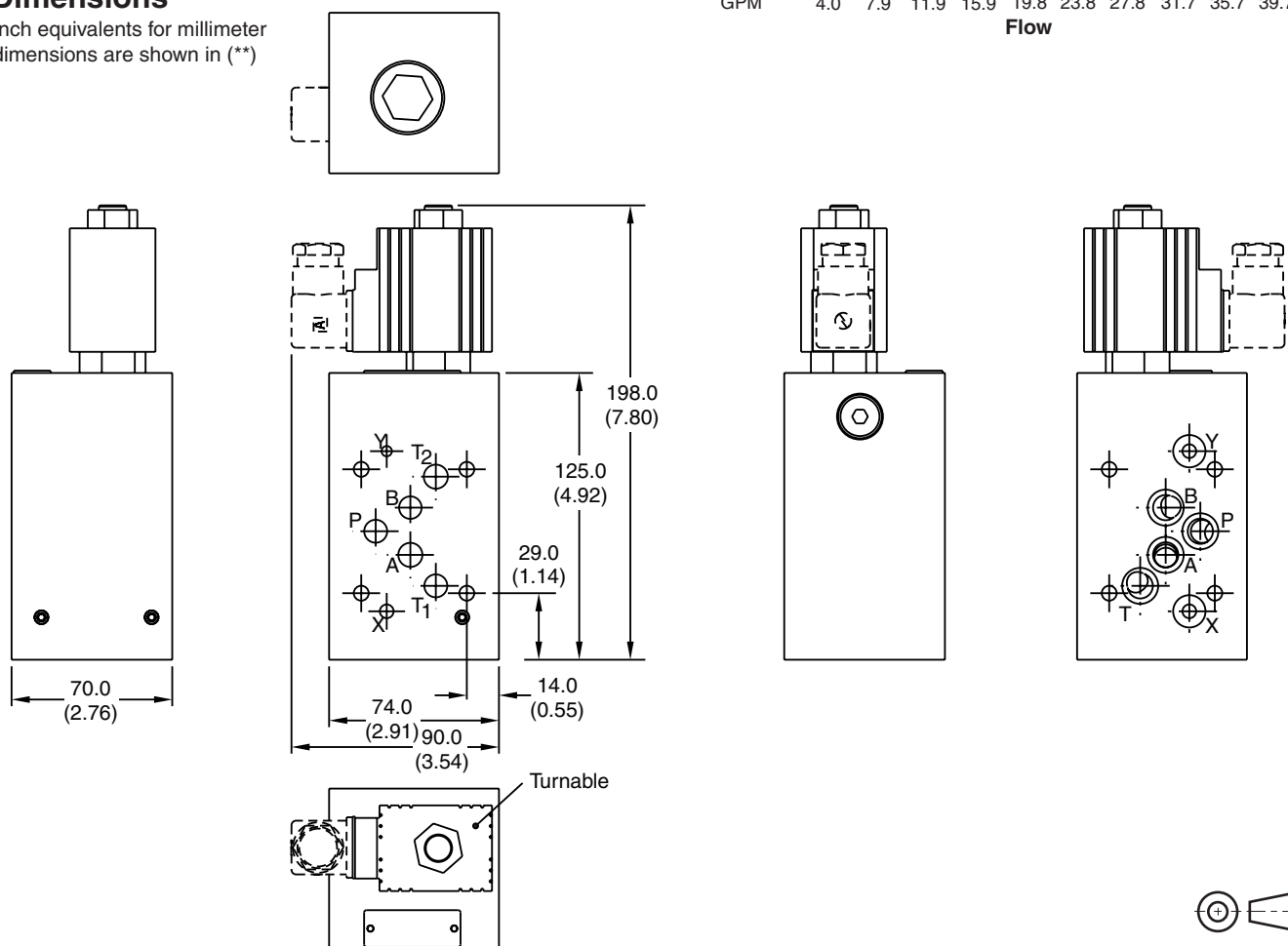
D31FP/FE/FB/VW*



Measured with Spool Z31
at command signal 100%.

Dimensions

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



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

General Description

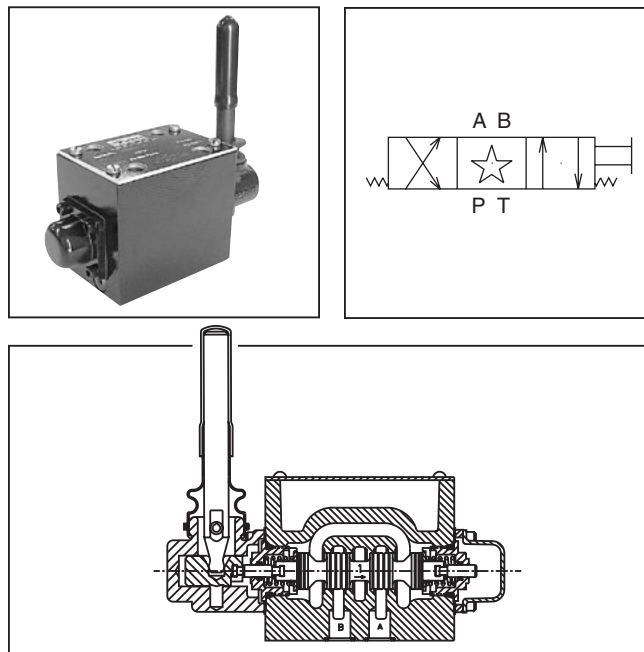
Series D3L directional control valves are high performance, 4-chamber, direct operated, lever controlled, 4-way valves. They are available in 2 or 3-position and conform to NFPA's D05, CETOP 5 mounting patterns.

Features

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

Specifications

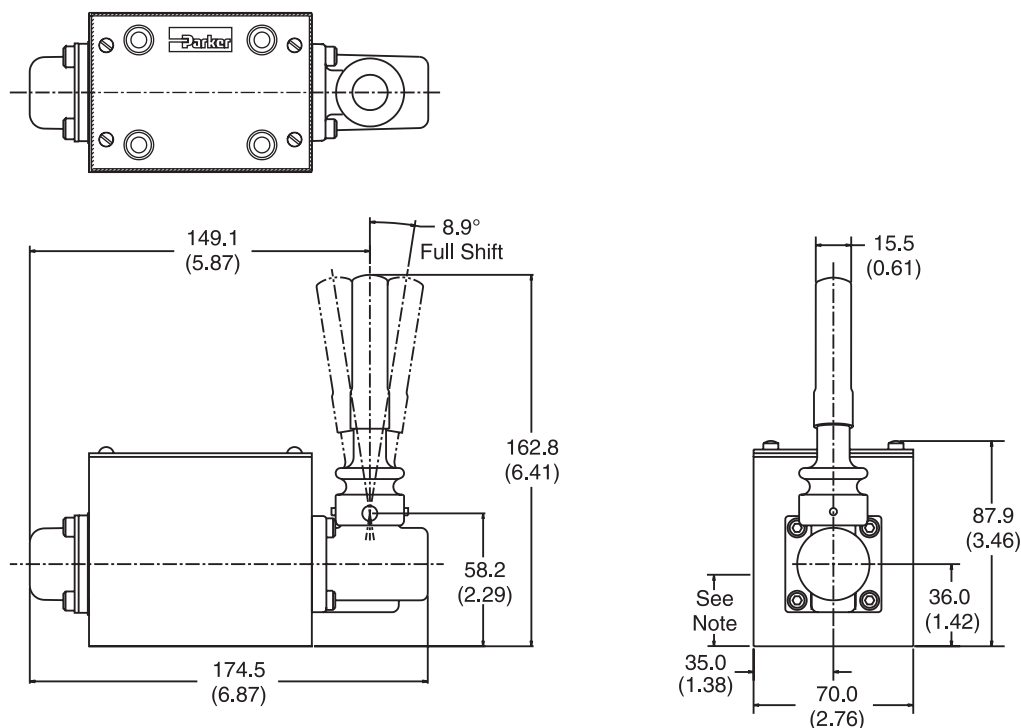
Mounting Pattern	NFPA D05, CETOP 5, NG 10
Maximum Pressure	Operating: 345 Bar (5000 PSI) Tank Line: 34 Bar (500 PSI)
Maximum Flow	See Spool Reference Chart
Force Required to Shift Lever Operator	173 N (39 lbs.)



Dimensions

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

Lever Operated D3L



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

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

A

D Directional Control Valve	3 Basic Valve	Operator Type & Location	Spool	Style	Seal	Design Series NOTE: Not required when ordering.
--	--	--	---	---	--	---

**NFPA D05
CETOP 5
NG10**

Operator Location (A or B 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	Code	Symbol
001		020*	
002		030†	
004		081	
008*		082	
009†			

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

* 020 and 030 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

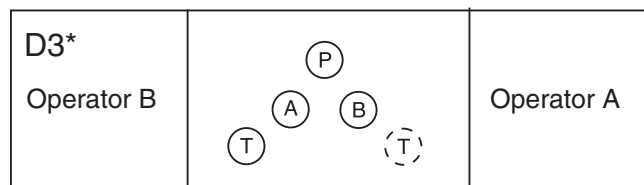
Silting

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

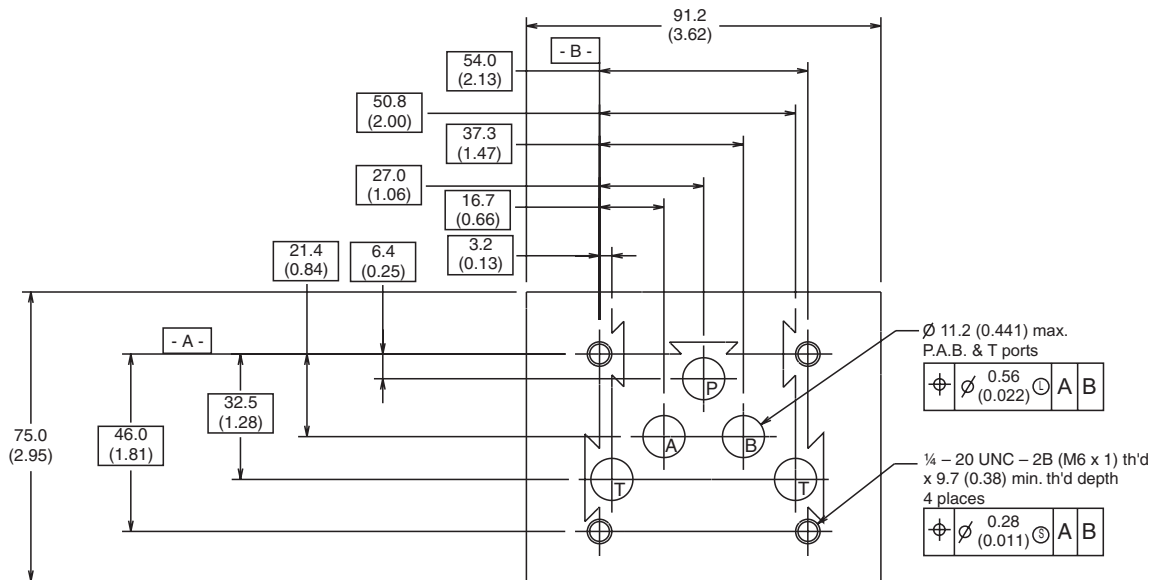
Torque values recommended for the bolts which mount the valve to the manifold or subplate are as follows:

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

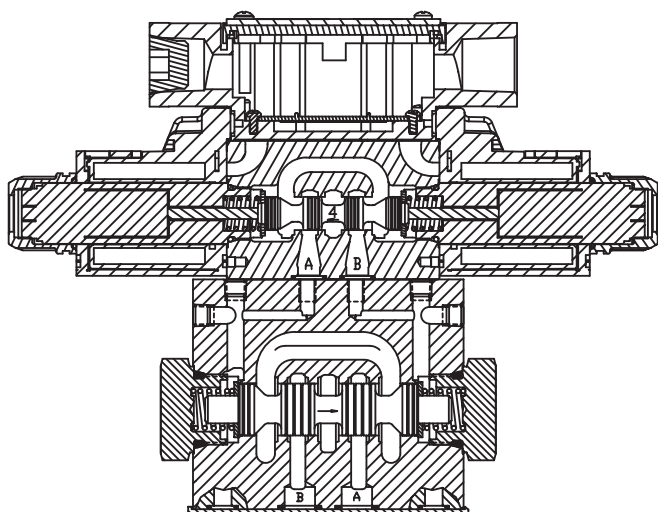
Series D31 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles and are manifold mounted. These valves conform to NFPA's D05H, CETOP 5 and can also be manufactured to an NFPA D05HE, CETOP 5H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

Operation

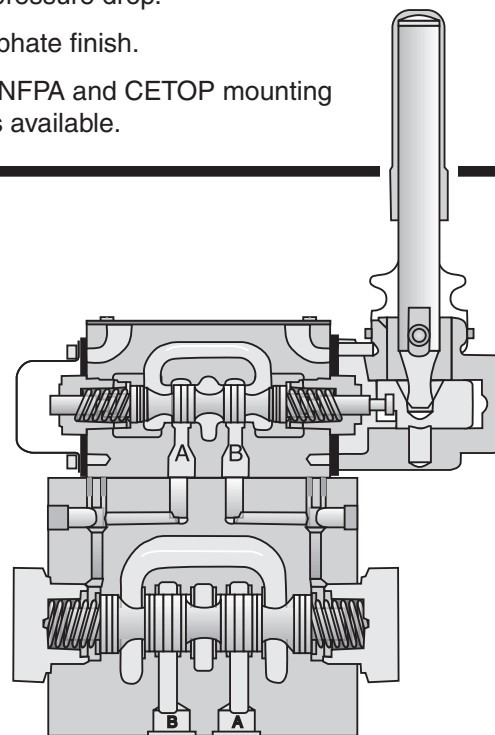
Series D31 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or pilot operators (hydraulic or pneumatic).

Features

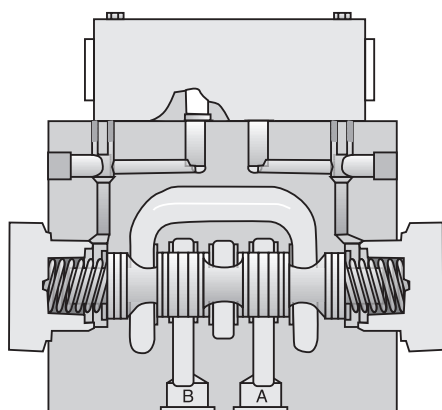
- Easy access mounting bolts.
- 345 Bar (5000 PSI) pressure rating.
- Flows to 175 LPM (45 GPM) depending on spool.
- Choice of four operator styles.
- Rugged four land spools.
- Low pressure drop.
- Phosphate finish.
- Both NFPA and CETOP mounting styles available.



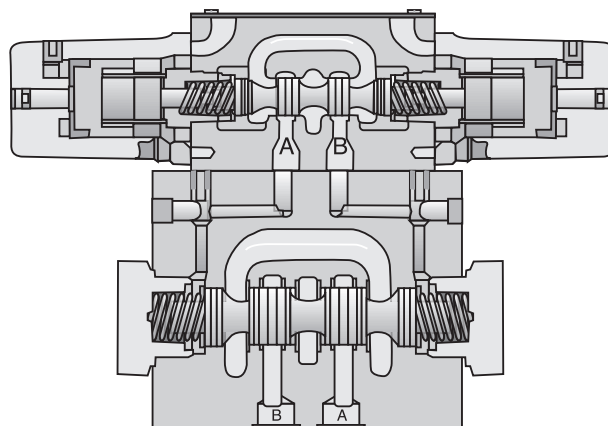
D31*W Solenoid Operated Plug-In Conduit Box



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.

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.

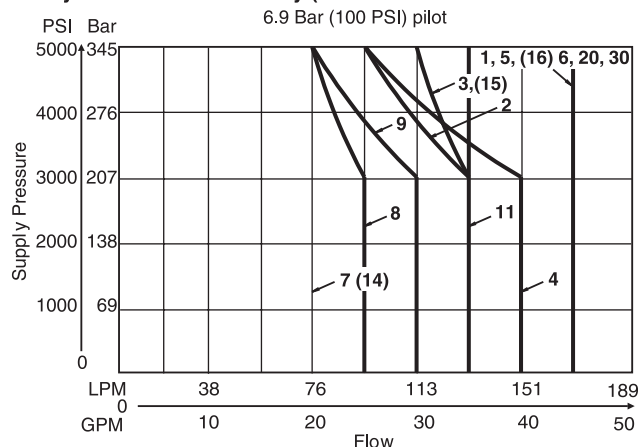
Specifications

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

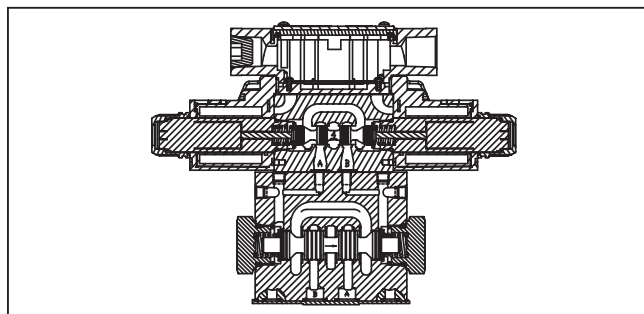
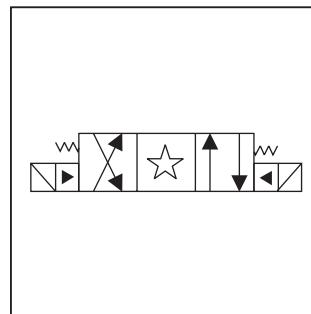
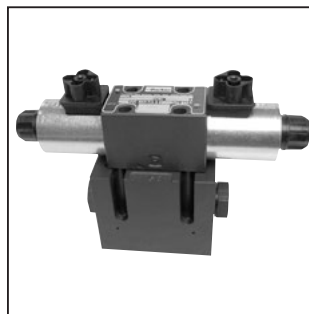
D Style – external drain only (For internal drain see note below)



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.

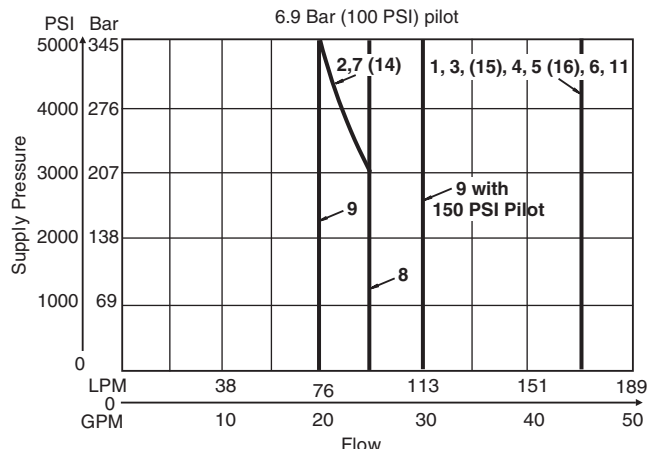


Response Time

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

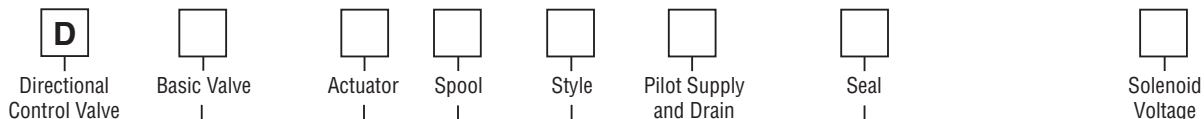
For Styles F and M – external drain only
 (For internal drain see note below)



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

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

Code	Symbol#	Code	Symbol#
001		012	
002		015	
003		020*	
004		030**	
006		081	
008*, 009**		082	
011			

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

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

* 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

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

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

Coil Options

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

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

Tube Options

Manual Override 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.

Electrical Options

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

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

Shift Indication

Approvals

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

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

Valve Variations

See next page for Valve Variations

Design Series

NOTE: Not required when ordering.

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

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

Valve Weight:
Double Solenoid 5.4 kg (12.0 lbs.)

Seal Kit:
Nitrile SKD31VWN91
Fluorocarbon SKD31VWV91

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.

Valve Variations

A **OPTIONS ARE NOT AVAILABLE ON MONITOR SWITCH VALVES.**

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

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

** Must have plug-in style conduit box.

D31 Series

Pressure Drop vs. Flow

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

Example:

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

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

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

D31 Pressure Drop Reference Chart

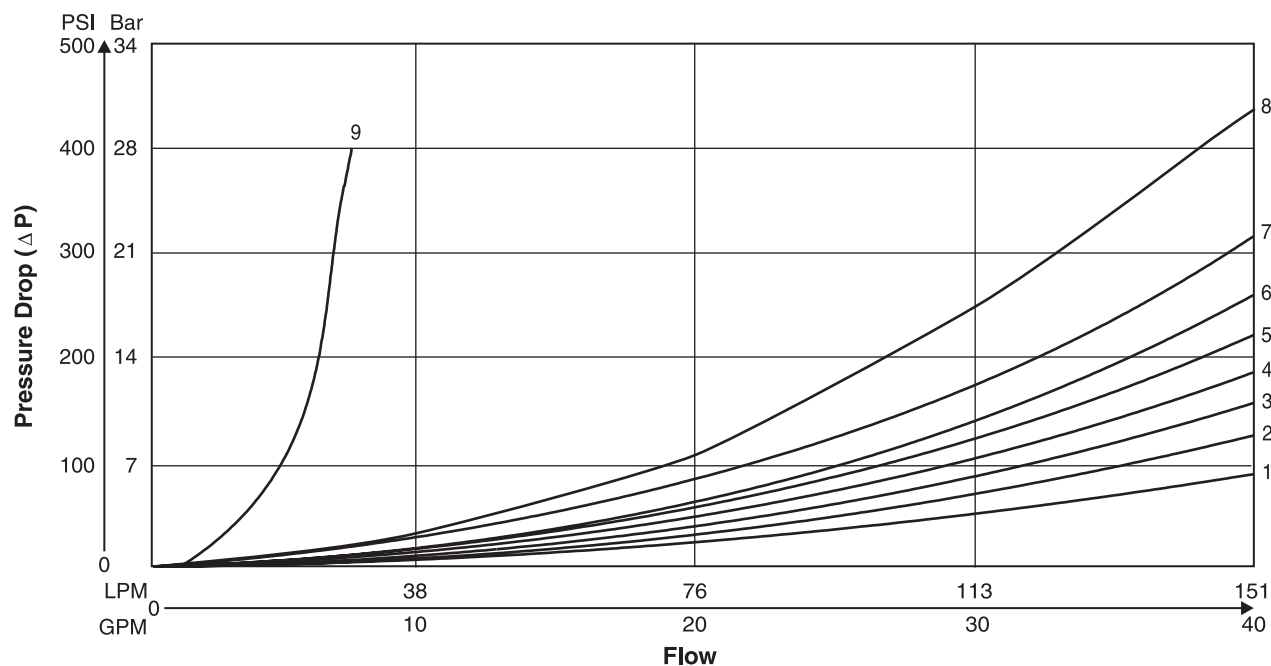
Spool No.	Curve Number										
	Shifted				Center Condition						
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)
001	3	3	2	1	—	—	—	—	—	—	—
002	3	3	1	1	3	3	3	4	4	1	1
003	3	3	1	1	—	—	—	—	—	3	—
004	3	3	1	1	—	—	—	—	—	1	1
006	3	3	1	1	—	5	7	6	5	—	—
008	3	3	1	1	7	—	—	—	—	—	—
009	9	9	6	7	5	—	—	—	—	—	—
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	-10% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact 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 (ER, ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013; Ex d IIC Gb; Ex tb IIIC Db IP66; IECEx BAS 14.0164X ATEX: EN60079-0, EN60079-1, EN60079-31; CE 1180 Ex II 2G BASEEFA08ATEX0041X CSA 22.2 No. 60079-0:07, 60079-1:07 and UL 60079-0:05, UL 60079-1:05; CSA listed to US and Canada Safety Standards. File 08-CSA-1932102 CSA Ex d IIC, AEx d IIC for Class I Zone 1; Class I Div 1 Grp. C & D; Class II Div 1 Grp. E, F & G

* Allowable Voltage Deviation $\pm 10\%$.

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
E	F	24 VAC	4.8 AMPS	120 VA	2.07 Amps	21 W	1.29 Ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 Ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 Ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 Ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 Ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 Ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 Ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 Ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 Ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 Ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 Ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 Ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 Ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 Ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 Ohms
Explosion Proof Solenoids							
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
ER & ET Explosion Proof Solenoids							
J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

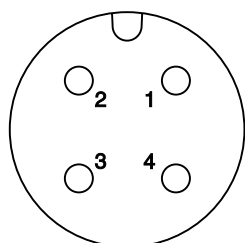
Electrical Specifications

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

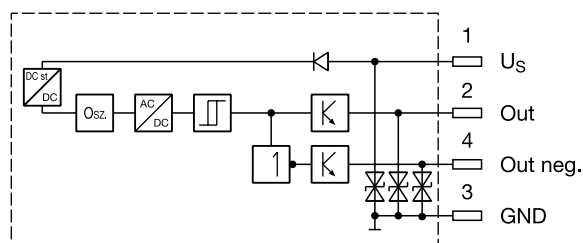
Supply Voltage	[VDC]	24
Tolerance Supply Voltage	[%]	±20
Polarity Protection	[V]	300
Current Consumption without Load	[mA]	≤ 20
Switching Hysteresis	[mm]	<0.06
Max. Output Current per Channel, Ohmic	[mA]	250
Ambient Temperature	[°C]	-20...+60 (-4°F...+140°F)
Protection Class		IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Min. Distance to Next AC Solenoid	[m]	0.1 (0.33 ft.)
Interface		M12x1 to IEC 61076-2-101
CE Conform		EN 61000-4-2 / EN 61000-4-4 / EN 61000-4-6* / ENV 50140 / ENV 50204

* Only guaranteed with screened cable and female connector.

M12 Pin Assignment



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



Outputs: Open collector

Definitions

Start position monitored:

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

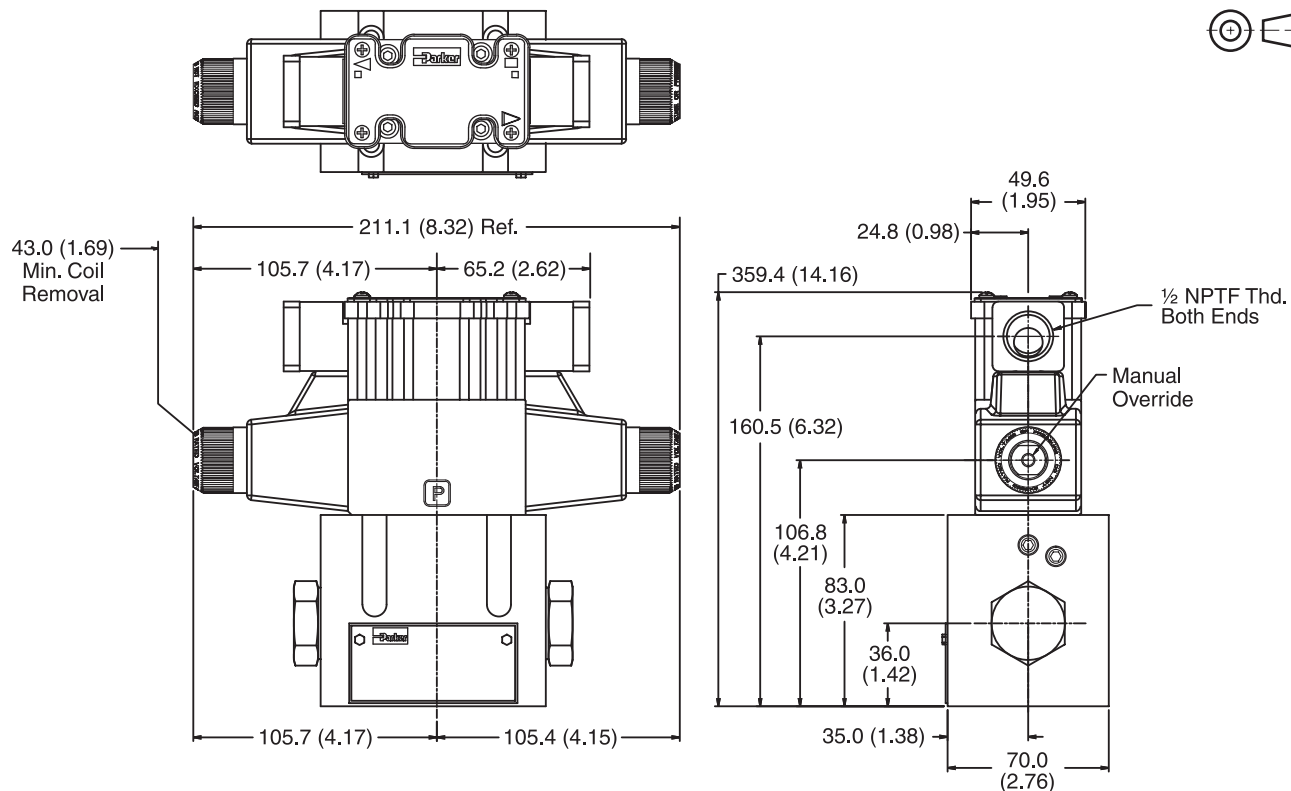
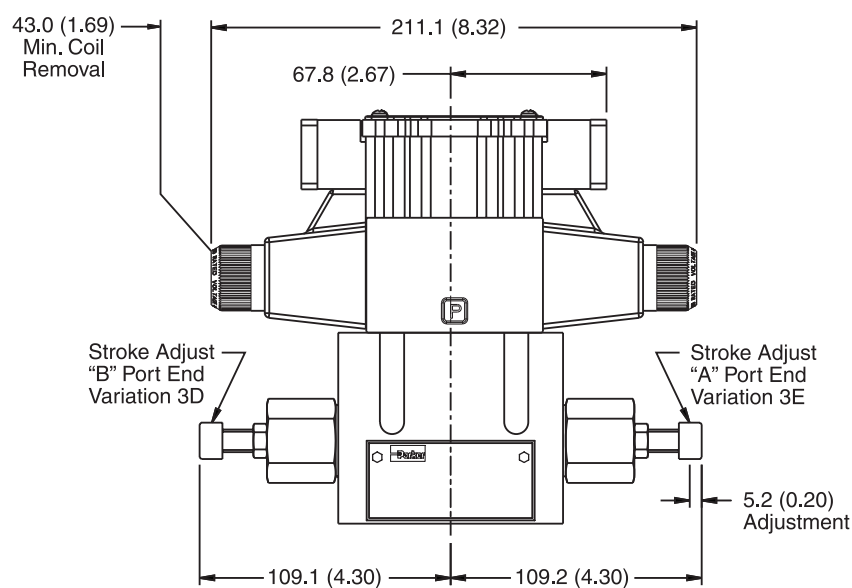
At the switching point the spool is located within the closed position. It is secured that only the flow paths of the offset position are granted.

Please order plug M12x1 separately (see accessories, plug M12x1 (part no.: 5004109)).

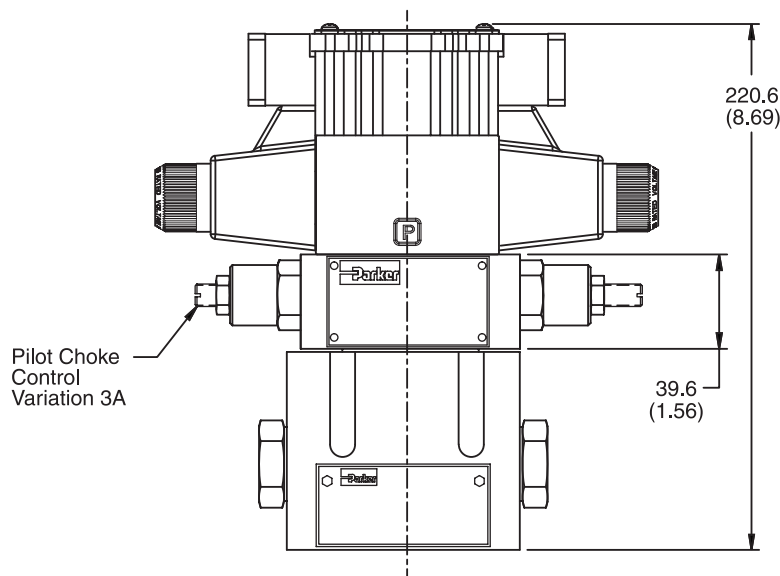
End position monitored:

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

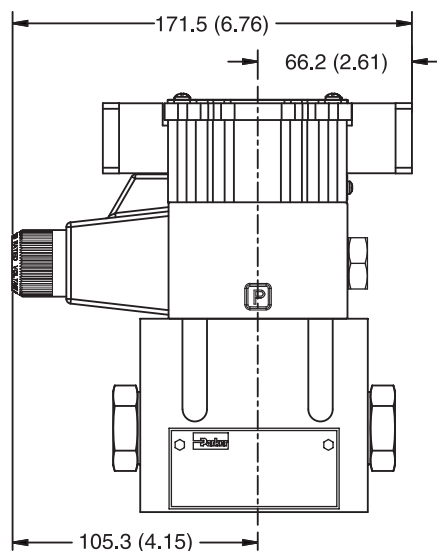
Inch equivalents for millimeter dimensions are shown in (**)

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

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

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

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

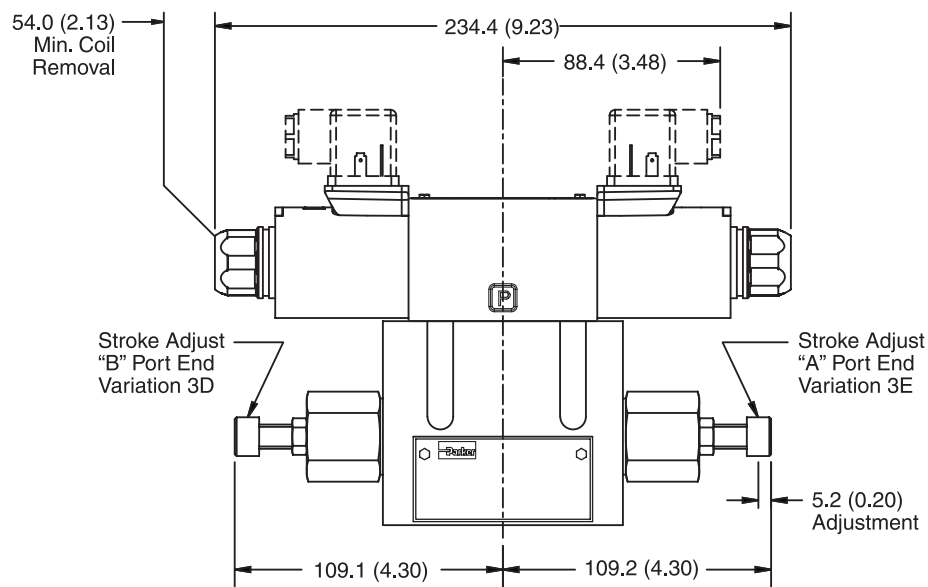
Conduit Box, Single AC Solenoid

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

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

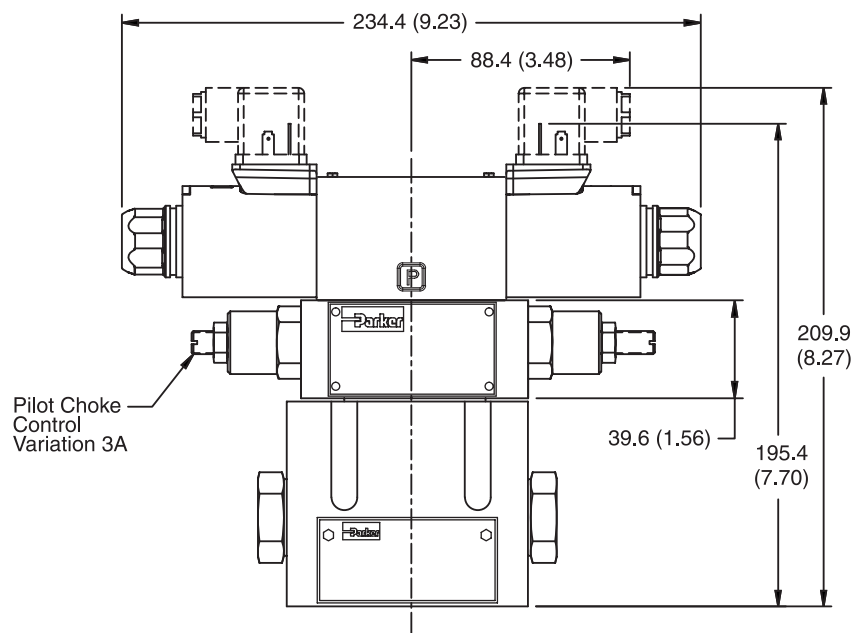
A

Hirschmann and Stroke Adjust, Double DC Solenoid



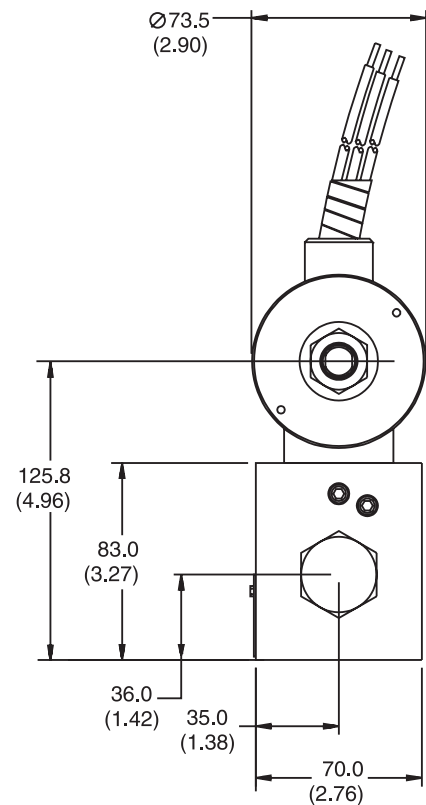
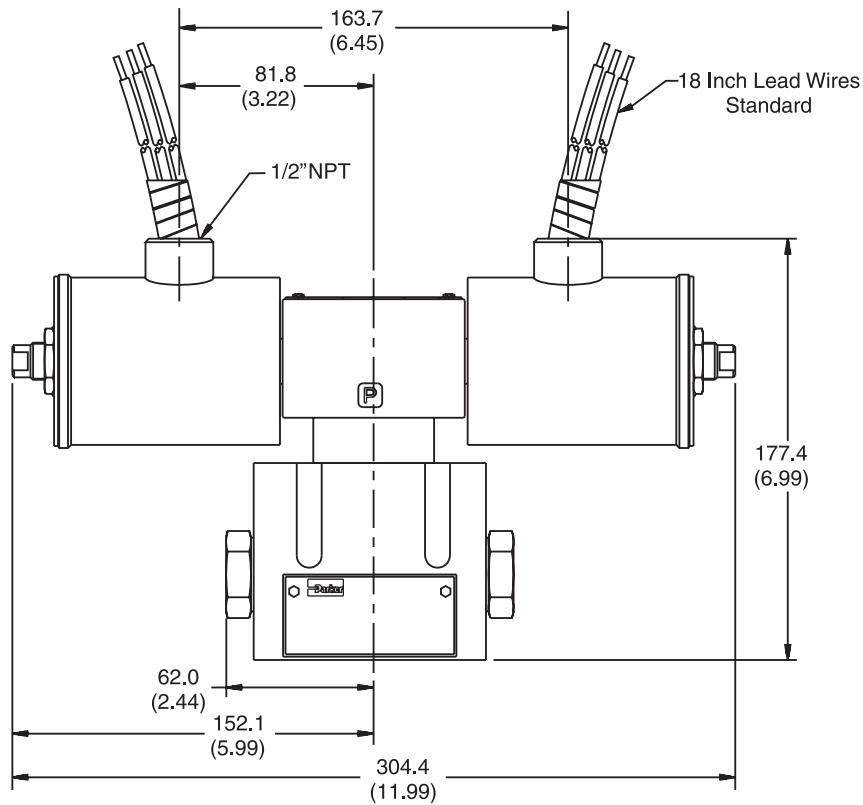
Note: 30.0 mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

Hirschmann and Pilot Choke Control, Double DC Solenoid

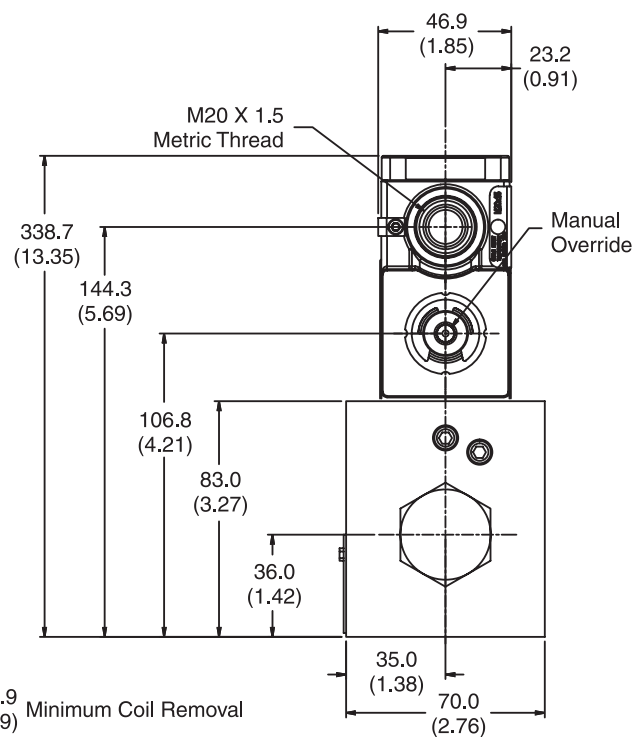
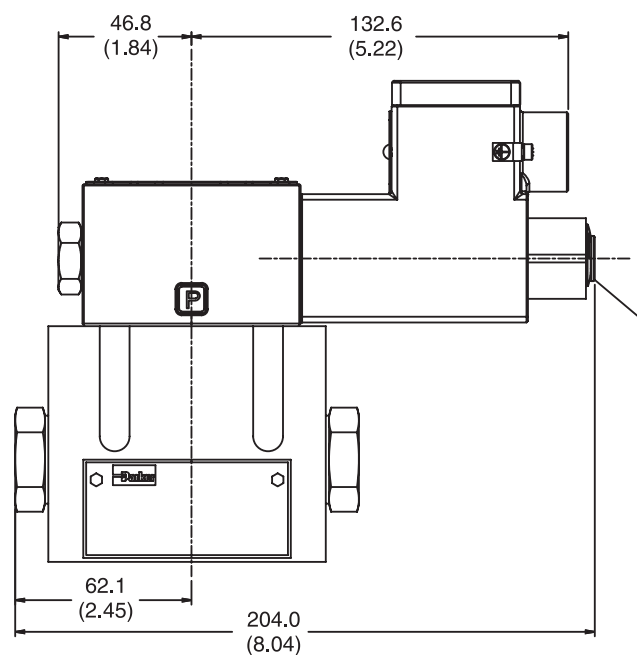
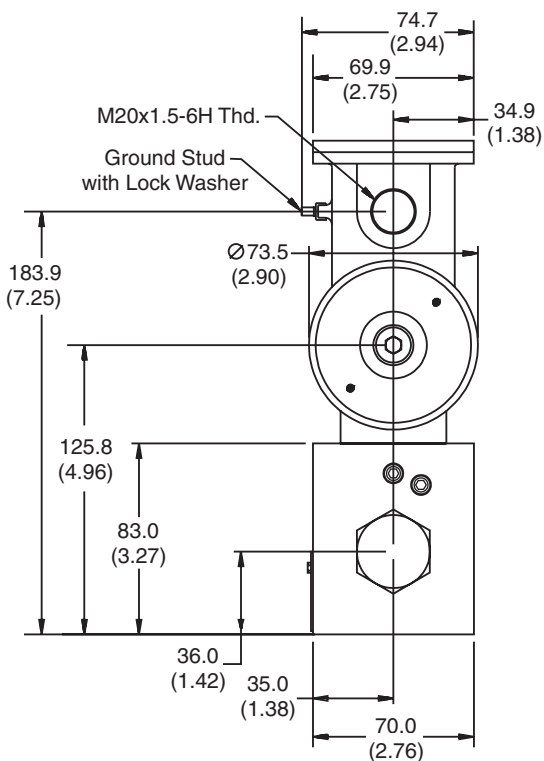
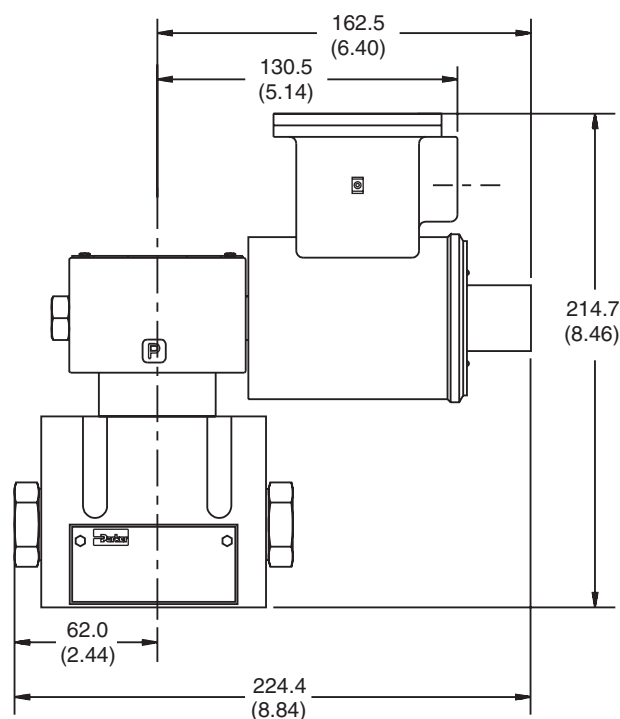


Note: 30.0 mm (1.18") from bottom of bolt hole counterbore to bottom of valve.

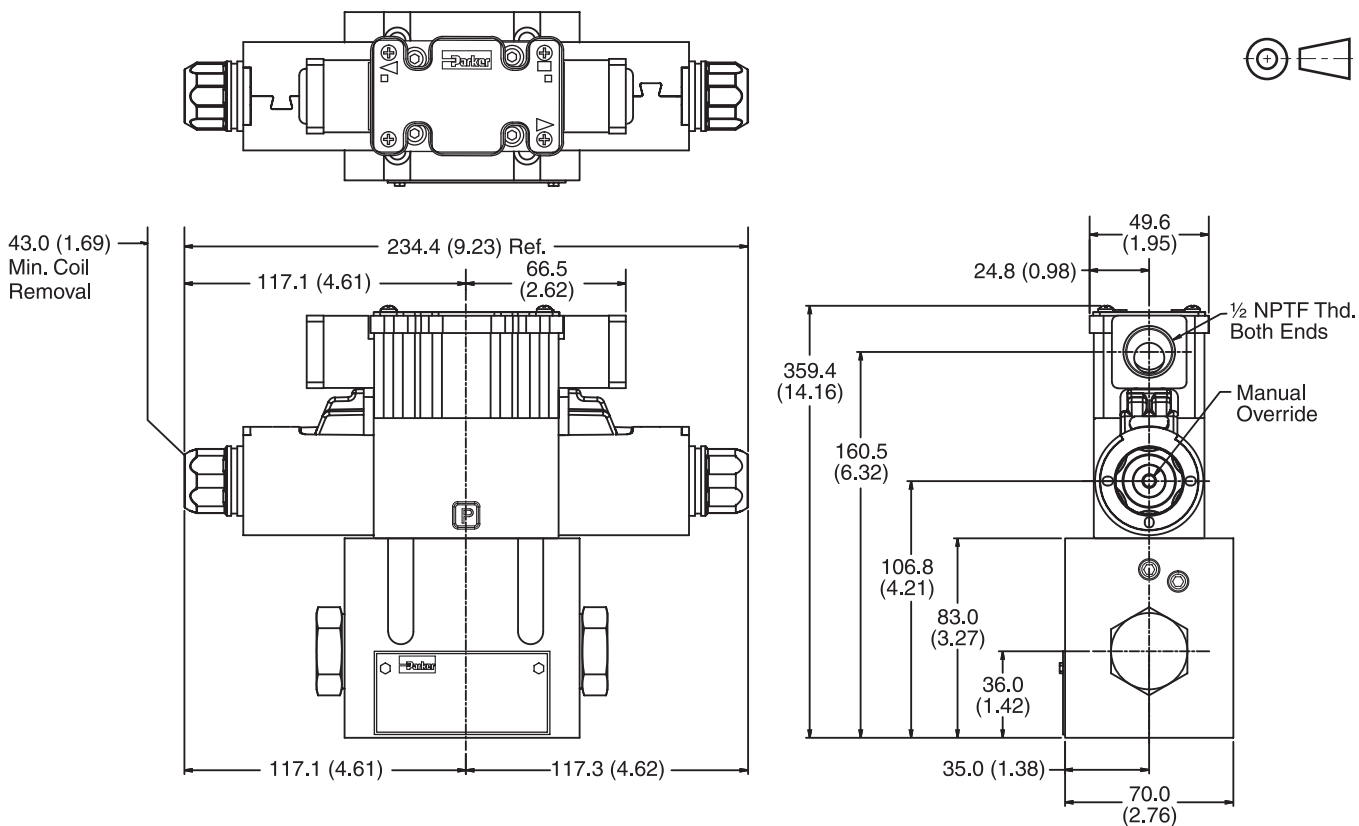
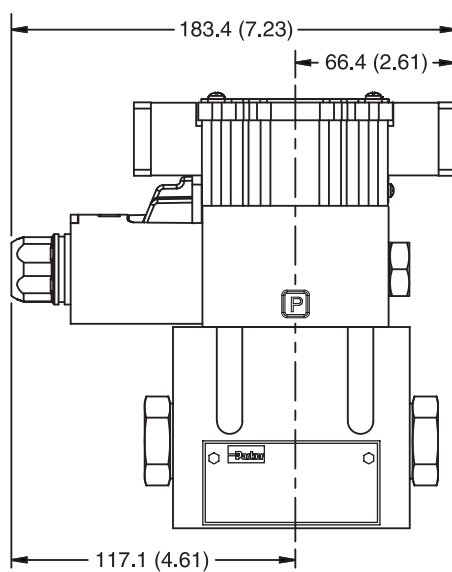
Inch equivalents for millimeter dimensions are shown in (**)

Explosion Proof U.L. and C.S.A. Approved, Double Solenoid**A**Note:
2 Black Wires
1 Green Wire

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

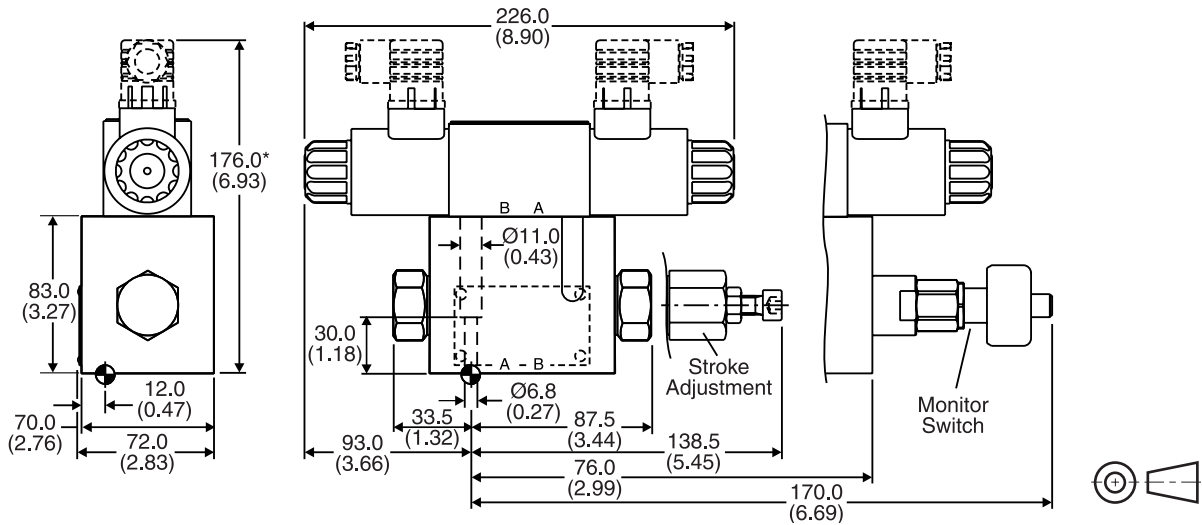
A Explosion Proof, EX d IIC ATEX/CSA/IECEX Single Solenoid**Explosion Proof, EExd ATEX, Single Solenoid**

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

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

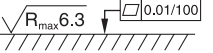
Inch equivalents for millimeter dimensions are shown in (**)

A



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

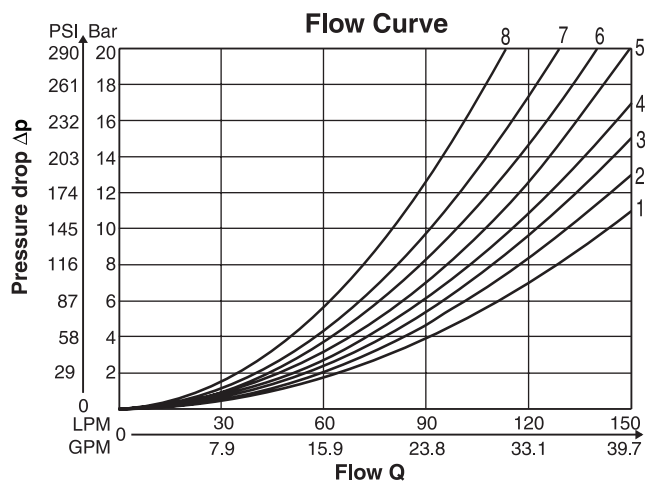
* For each sandwich plate, please add +40mm (1.58") (pressure reducing valve, choke valve meter-in/-out),

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

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

Performance Curves

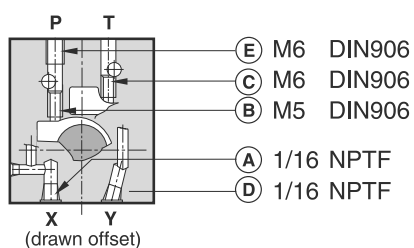
The flow curve diagrams show the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.



All characteristic curves measured with HLP46 at 50°C.

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

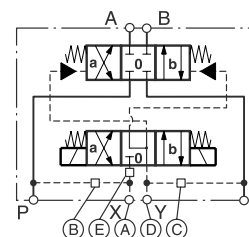
Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

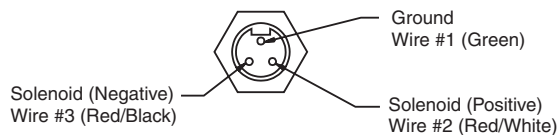
Pilot oil		A	B	C	D	E
Inlet	Outlet					
internal	external	●	○	●	○	Orifice Ø1.2
external	external	○	●	●	○	Orifice Ø1.2
internal	internal	●	○	○	●	Orifice Ø1.2
external	internal	○	●	○	●	Orifice Ø1.2

All orifice sizes for standard valves

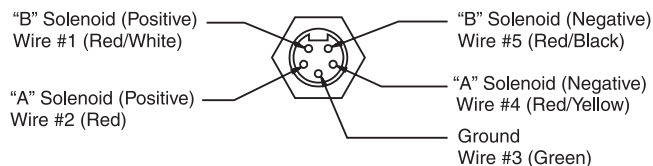


A**Manaplug (Options 6, 56, 1A & 1C)**

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

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

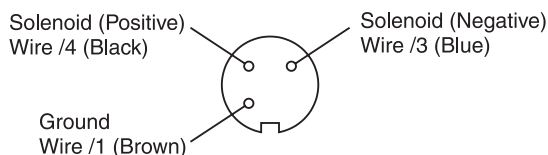
Single Solenoid Valves – Installed Opposite Side of Solenoid

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

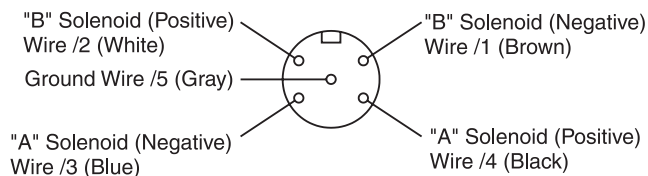
Single Solenoid Valves – Installed Opposite Side of Solenoid

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**

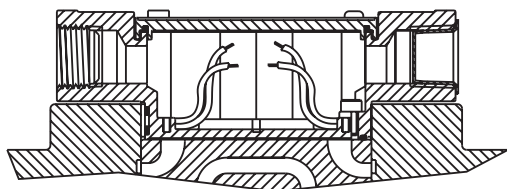
- EP336-30 3 Pin Plug
EP316-30 5 Pin Plug (Double Solenoid)
EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

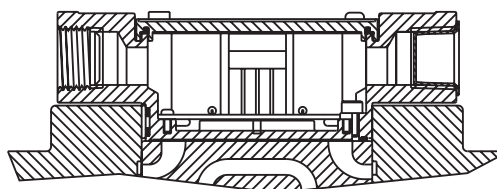
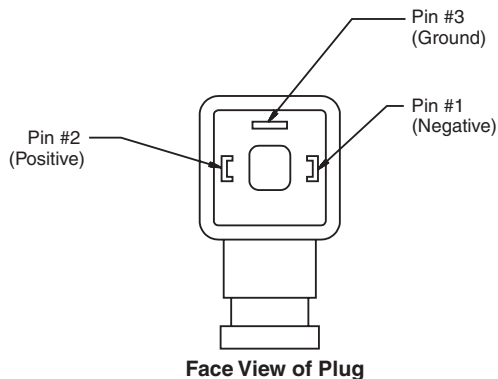
- EP337-30 3 Pin Plug
EP317-30 5 Pin Plug (Double Solenoid)
EP31B-30 5 Pin Plug (Single Solenoid)

Conduit Box Option C

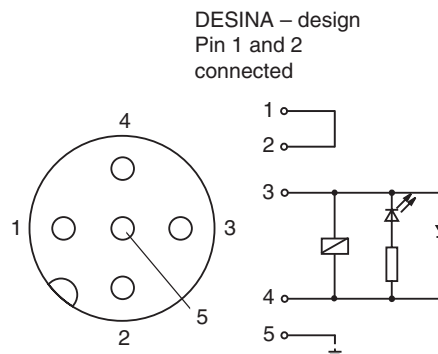
- No Wiring Options Available

**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

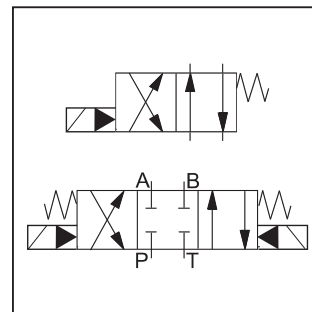
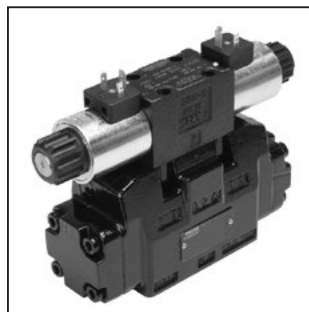


General Description

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

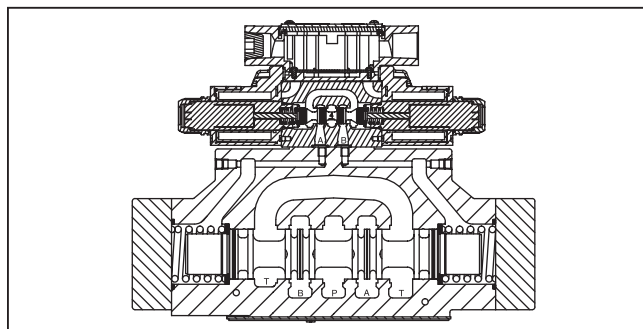
The minimum pilot pressure must be ensured for all operating conditions of the directional valve.

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.



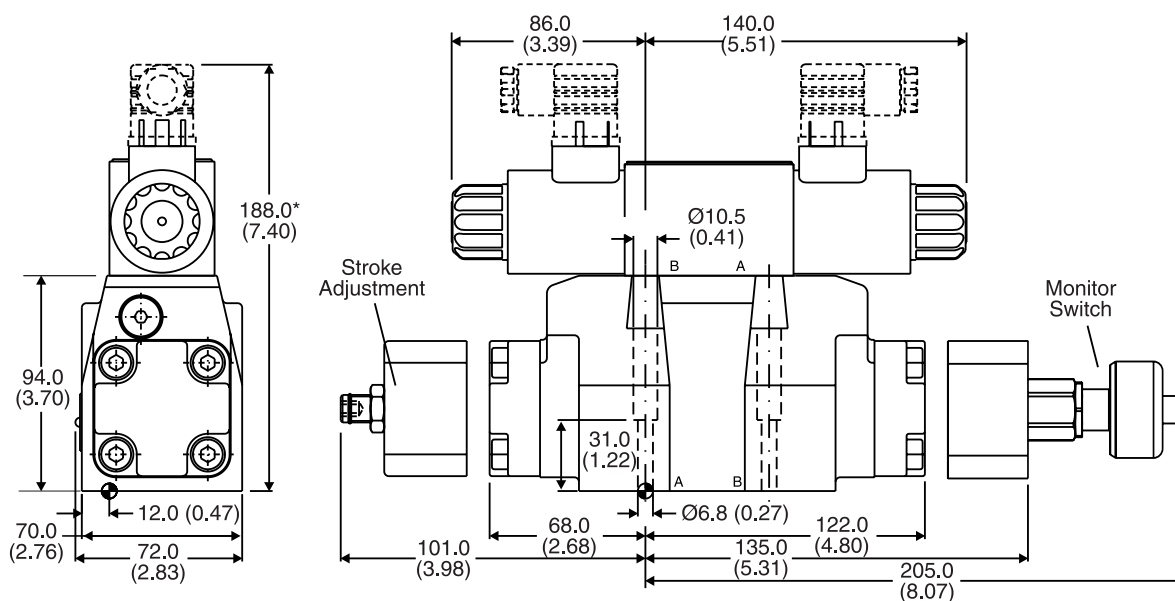
Features

- **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 (**)



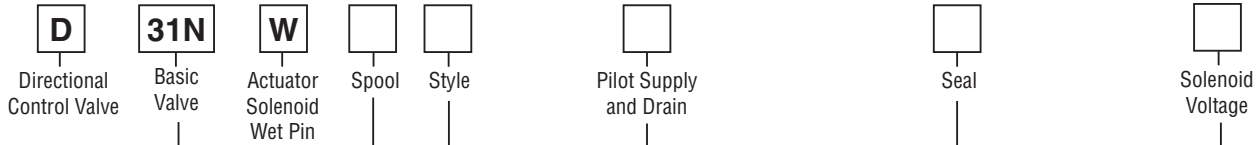
* For each sandwich plate, please add +40mm (1.58") (pressure reducing valve, choke valve meter-in/-out),

Surface Finish	Kit	Kit	Kit	Seal Kit
$\sqrt{R_{max} 6.3}$ $\downarrow$ $\square 0.01/100$	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm (9.7 lb.-ft.) ±15%	Nitrile: SK-D31NW-N-91 Fluorocarbon: SK-D31NW-V-91

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

A



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

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

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

3-Position Spools	
Code	Spool Type
	a 0 b
001	
002	
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		2 positions. Spring offset in position "0". Operated in position "a".
F		2 positions. Spring offset in position "0". Operated in position "a".
K		2 positions. Spring offset in position "0". Operated in position "a".
M		2 positions. Spring offset in position "0". Operated in position "a".
R		2 positions, detent. Operated in position "0" or "b".
S		2 positions, detent. Operated in position "0" or "a". No center in offset position.

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

* 020 & 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.


Solenoid Connection

Code Description

C* **Leadwire Conduit Box**

D** Metric Plug (M12X1) DESINA

E† Explosion Proof

F^x Flying Leadwire

G†† **Plug-In Conduit Box**

J++ **Deutsch (DT04-2P)**

P **DIN with Plug**

S‡ Double Spade

W† **DIN w/o Plug**

* No conduit box variations – See Plug-in.

** 24 VDC only, low watt only, lights, diode surge suppressor, not CSA approved.

† Not available with lights.

†† Required for variations on conduit box style, must have lights.

++ 12 and 24 VDC only.

‡ Only 12 VDC high watt.

x 6" leadwire only.


Coil Options

Code Description

Omit Standard

P* Extended Manual Override with Boot

T Covered Manual Override, DC only, or AC Rectified

* Manual override options not available on Explosion Proof or soft shift. Not available with high pressure AC tube H.


Tube Options

Code Description

Omit No Options

J** Diode Surge Suppressor

Z† Rectified Coil

Plug-In – 24 VDC only.
DIN – DC only with Lighted Plug (5), which has integrated Surge Suppression. "J" not required here.
Deutsch – as follows:
 • 12 VDC Hi watt only
 • 24 VDC Hi & Lo watt
24 VDC "JER" required. "JET" available. Adds dust rating, not polarity sensitive [III C, D].
Leadwire – not available

† DC tube standard, Plug-In conduit box only. Not polarity sensitive. Only available with Y voltage.


Manual Override 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.


Electrical Options


Shift Indication


Approvals

Code Description

Omit Standard Valve

4†# **CSA Canada CSA22.2 No. 139-13**

N **CE Approved**

Q†# **CE + CSA Approved**

† Not available with AC high pressure tube.

Valve is derated.


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* High watt

D** Explosion Proof, EExd ATEX

E** Explosion Proof, EExme ATEX, IECEx, from Germany

F† Low Watt

L†† 10 Watt

R# Explosion Proof, ATEX/UL/CSA/IECEx, configurable cable connection

T# Explosion Proof ATEX/UL/CSA/IECEx, fixed horizontal cable connection

U## Explosion Proof, UL/CSA

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

** J voltage only, no options.

† AC only.

†† DC and AC rectified only.

J and Y voltages only. Y voltage is rectified.

J and Y voltages only. Y voltage is not rectified.

A

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

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

Bold: Designates Tier I products and options.

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

Valve Variations

A OPTIONS ARE NOT AVAILABLE ON MONITOR SWITCH VALVES.

Code	Description
5*	Signal Lights – Standard
	Signal Lights – Hirsch. (DIN with Plug) (the DC Lighted Plug has Integral Surge Suppression)
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

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

** Must have plug-in style conduit box.

Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-10% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact 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 (ER, ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013; Ex d IIC Gb; Ex tb IIIC Db IP66; IECEx BAS 14.0164X ATEX: EN60079-0, EN60079-1, EN60079-31; CE 1180 Ex II 2G BASEEFA08ATEX0041X CSA 22.2 No. 60079-0:07, 60079-1:07 and UL 60079-0:05, UL 60079-1:05; CSA listed to US and Canada Safety Standards. File 08-CSA-1932102 CSA Ex d IIC, AEx d IIC for Class I Zone 1; Class I Div 1 Grp. C & D; Class II Div 1 Grp. E, F & G

* Allowable Voltage Deviation $\pm 10\%$.

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
E	F	24 VAC	4.8 AMPS	120 VA	2.07 Amps	21 W	1.29 Ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 Ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 Ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 Ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 Ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 Ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 Ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 Ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 Ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 Ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 Ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 Ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 Ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 Ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 Ohms
Explosion Proof Solenoids							
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
ER & ET Explosion Proof Solenoids							
J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

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) (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

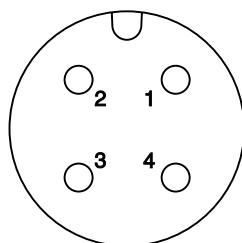
Single Solenoid Valves

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

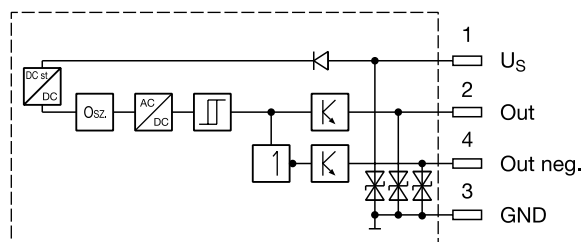
Protection Class		IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Ambient Temperature	[°C]	-20...+60; (-4°F...140°F)
Supply Voltage / Ripple	[V]	24 ≤10%
Tolerance Supply Voltage	[%]	±20
Polarity Protection	[V]	300
Current Consumption without Load	[mA]	≤ 20
Switching Hysteresis	[mm]	<0.06
Max. Output Current per Channel, Ohmic	[mA]	250
Min. Distance to Next AC Solenoid	[m]	0.1 (0.33 ft.)
Interface		M12x1 to IEC 61076-2-101
Wiring Minimum	[mm²]	5 x 0.25 brad shield recommended
Wiring Length Maximum	[m]	50 (164 ft.) recommended
CE Conform		EN 61000-4-2/EN 61000-4-4/EN 61000-4-6 ¹⁾ /ENV 50140/ENV 50240

1) Only guaranteed with screened cable and female connector.

M12 Pin Assignment



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



Outputs: Open collector

Definitions

Start position monitored:

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

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

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

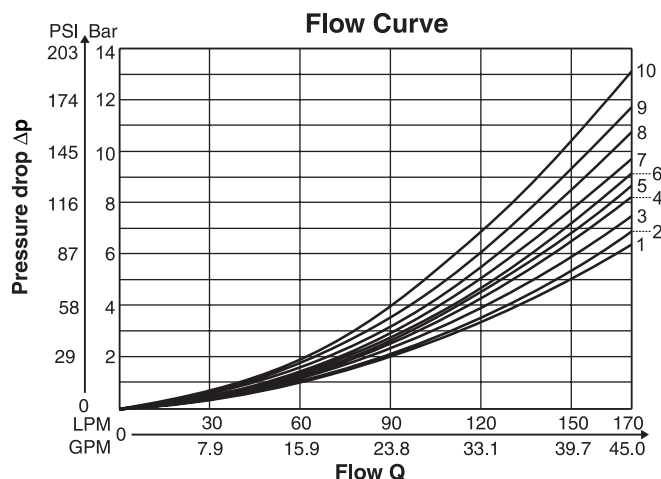
End position monitored:

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

Performance Curves

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.

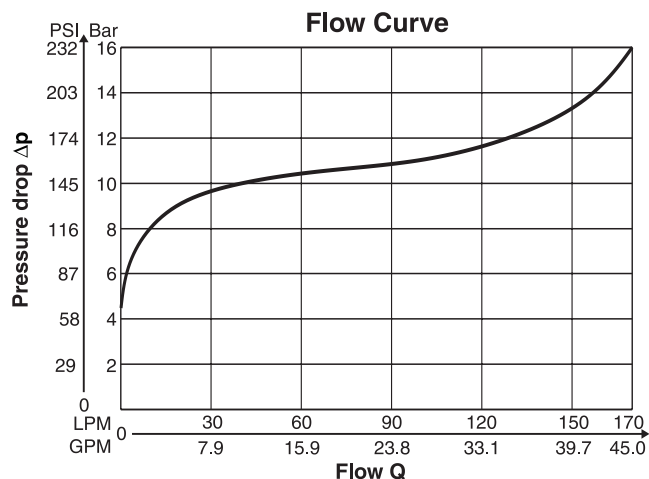


All characteristic curves measured with HLP46 at 50°C.

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
007	—	—	—	—	—
009	4	6	6	4	10
011	3	3	—	2	4
014	—	—	—	—	—
015	2	2	—	1	4
016	4	3	—	2	4
020	6	4	—	3	6
021	—	7	—	8	—
022	4	—	—	9	—
026	—	—	—	—	—
030	5	3	—	2	5
031	—	—	—	—	—
032	—	—	—	—	—
081	—	—	—	—	—
082	—	—	—	—	—

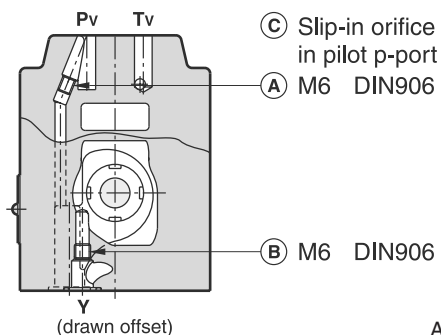
Integral Check Valve in the P port

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



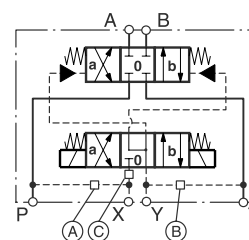
All characteristic curves measured with HLP46 at 50°C.

Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

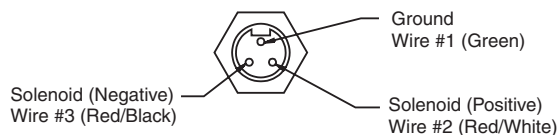
Pilot oil		A	B	C
Inlet	Outlet			
internal	external	○	●	Orifice Ø1.0
external	external	●	●	Orifice Ø1.0
internal	internal	○	○	Orifice Ø1.0
external	internal	●	○	Orifice Ø1.0



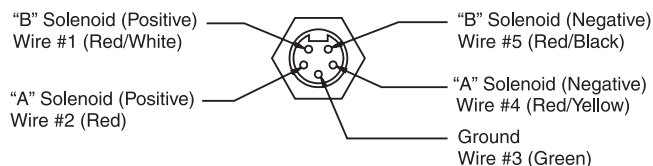
All orifice sizes for standard valves

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

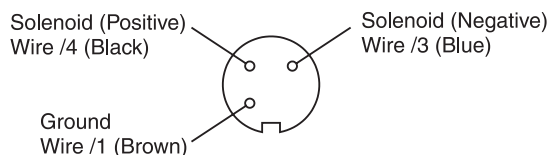
- Interface – Brad Harrison Plug
- 3-Pin for Single Solenoid
 - 5-Pin for Double Solenoid

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

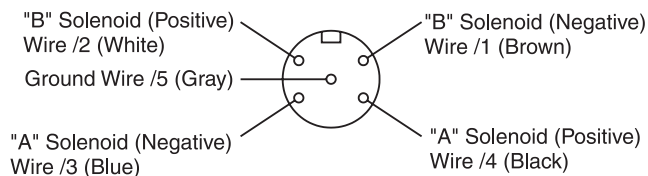
Single Solenoid Valves – Installed Opposite Side of Solenoid

**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**

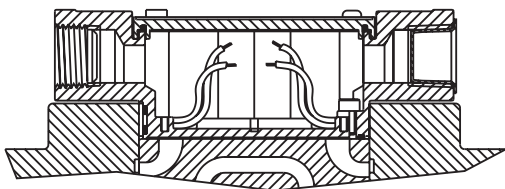
- EP336-30** 3 Pin Plug
EP316-30 5 Pin Plug (Double Solenoid)
EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

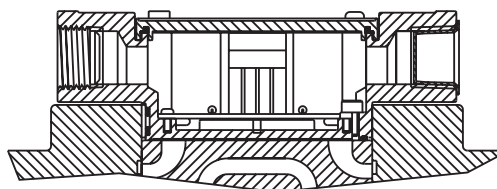
- EP337-30** 3 Pin Plug
EP317-30 5 Pin Plug (Double Solenoid)
EP31B-30 5 Pin Plug (Single Solenoid)

Conduit Box Option C

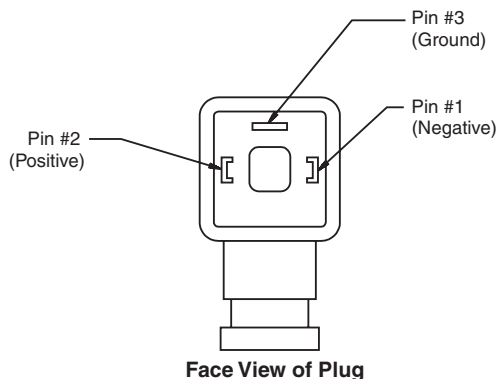
- No Wiring Options Available

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

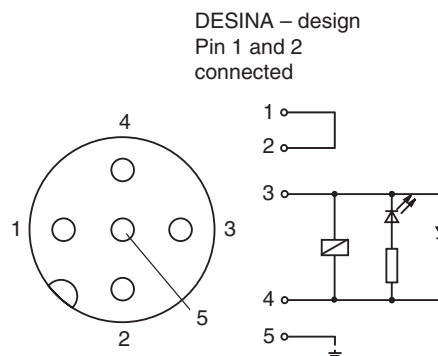
- LED Interface
- Meets Nema 4/IP67

**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

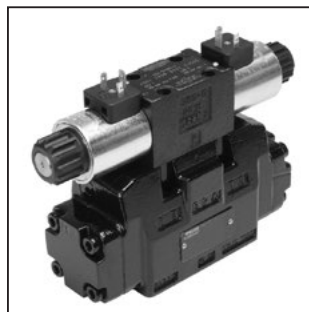
A

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.

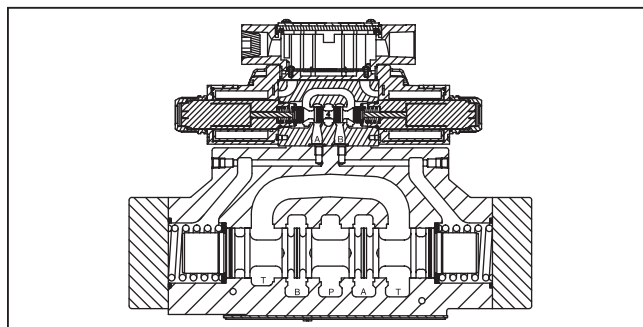
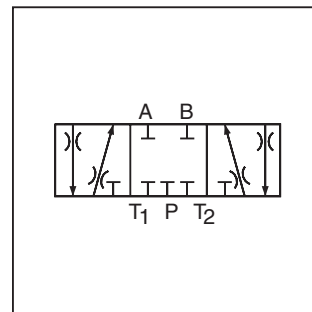
Features

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

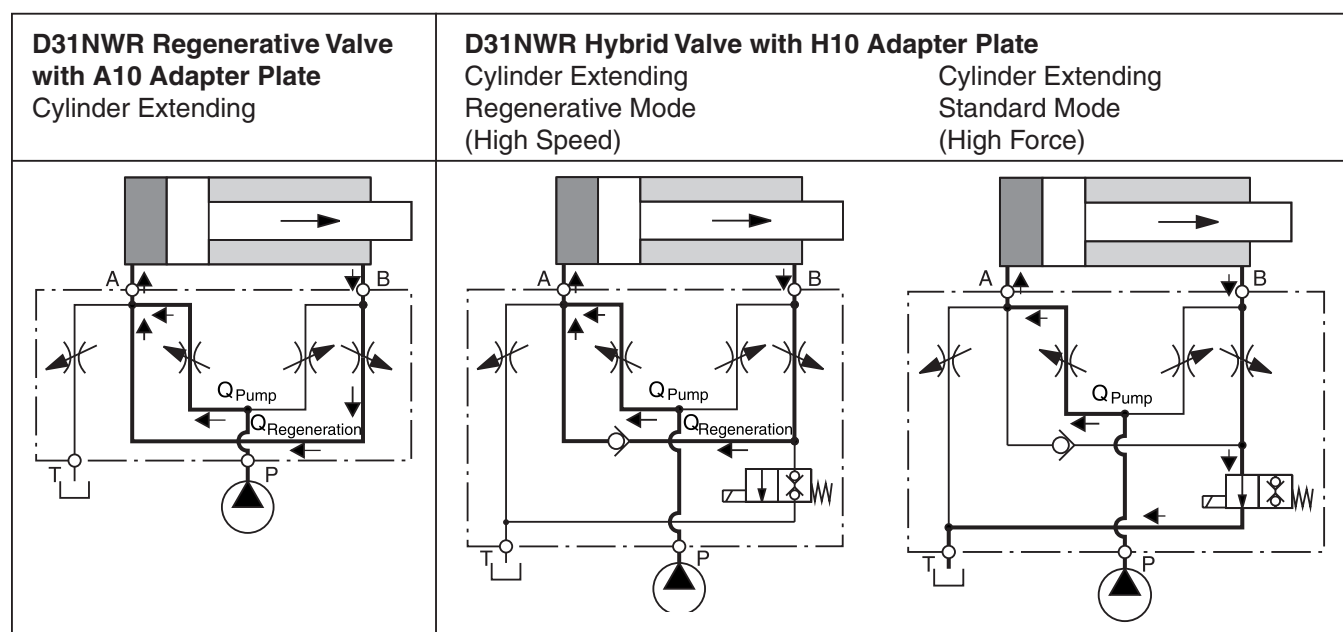
Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



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.

Ordering Information

D

Directional Control Valve

31N

Basic Valve

W

Actuator Solenoid Wet Pin

R

Regenerative

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

Valve Variations

A

Design Series

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).

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

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
Omit	Standard
T	No override

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

Weight:

8.1 kg (17.9 lbs.)

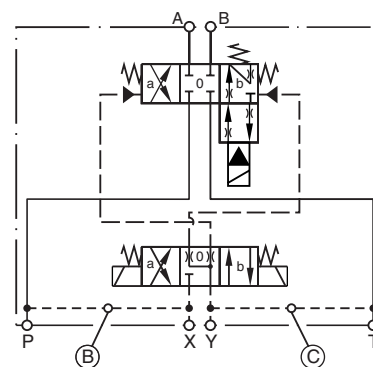
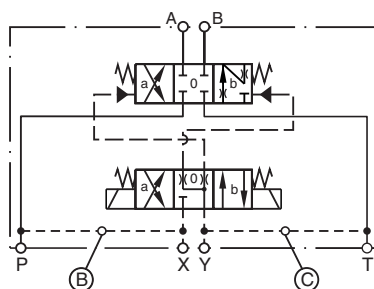
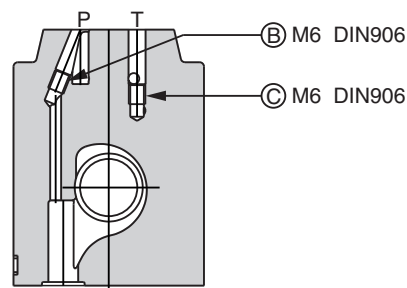
Bold: Designates Tier I products and options.

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	●	○



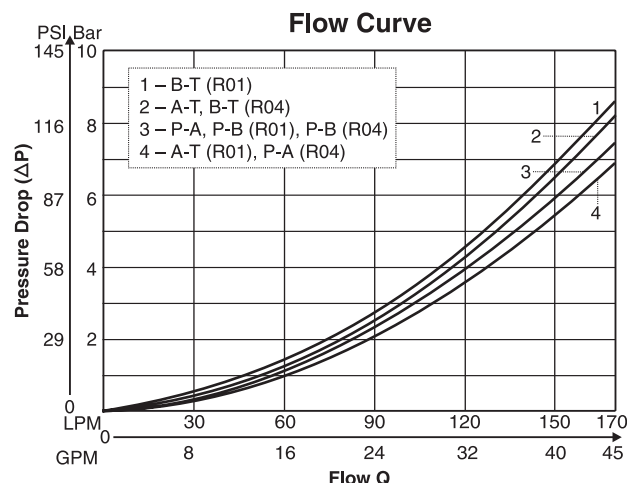
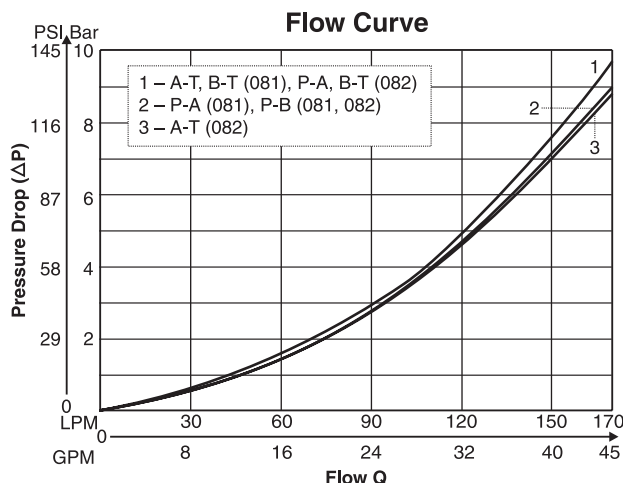
Specifications

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)	[ms]	50	60
250 & 350 Bar (3625 & 5075 PSI)	[ms]	50	50
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.

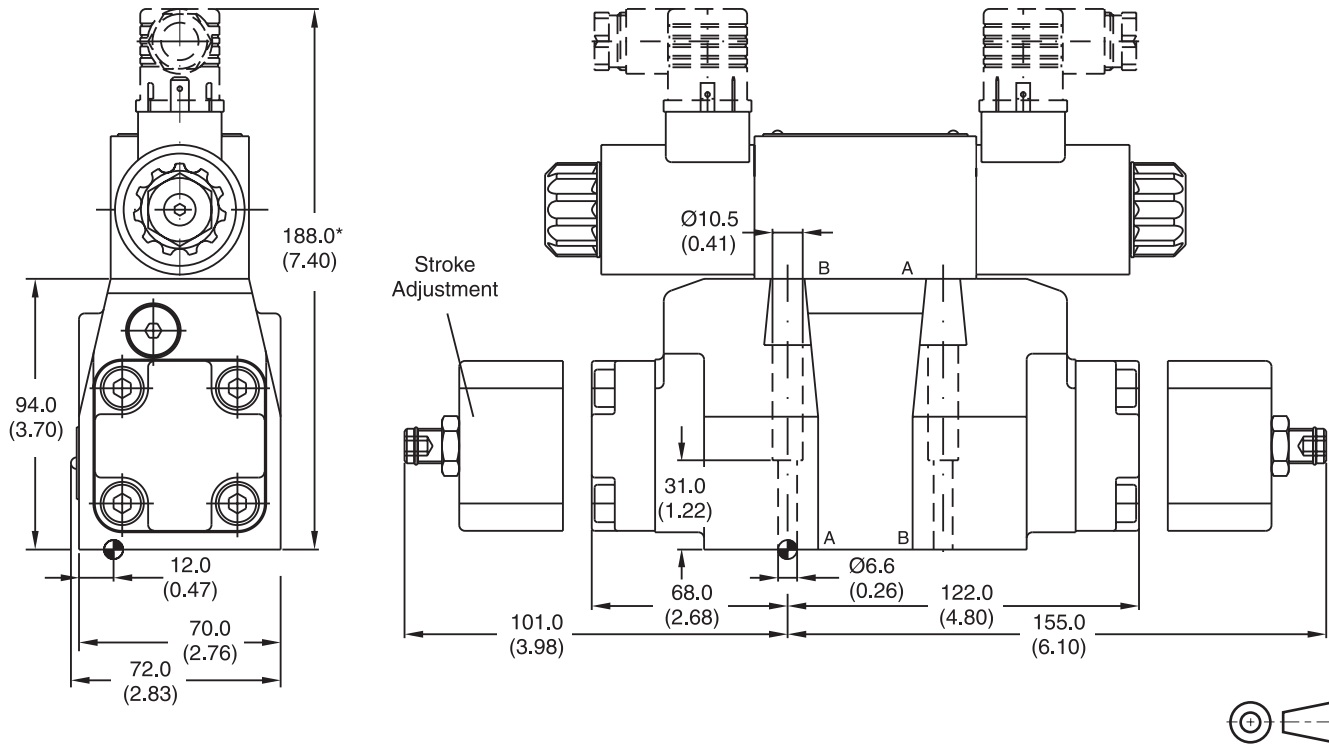
Performance Curve



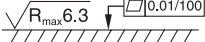
Regenerative and Hybrid Function with Additional Plate
H10-1666L / H10-1662 / A10-1664 / A10-1666L

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

A



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

Surface Finish	 Kit	 4x M6x40 DIN 912 12.9	 13.2 Nm (9.7 lb.-ft.)	Seal  Kit
	BK385			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

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

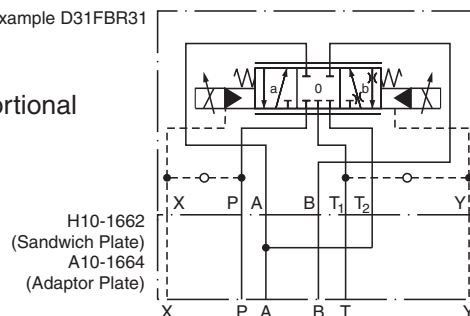
Features

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

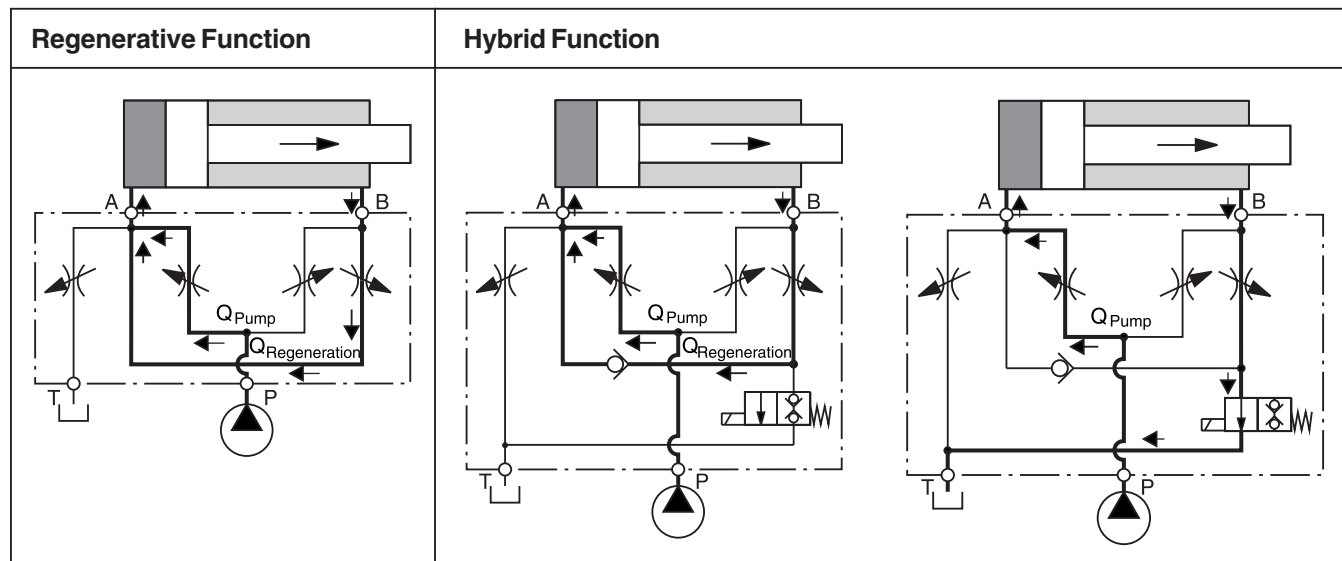
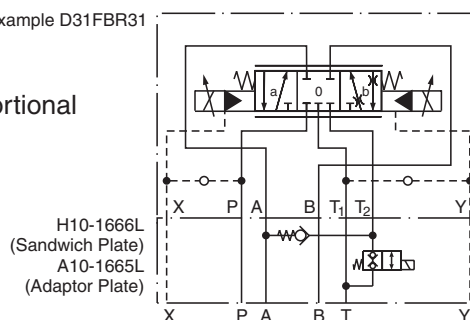
Note:
Proportional



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.

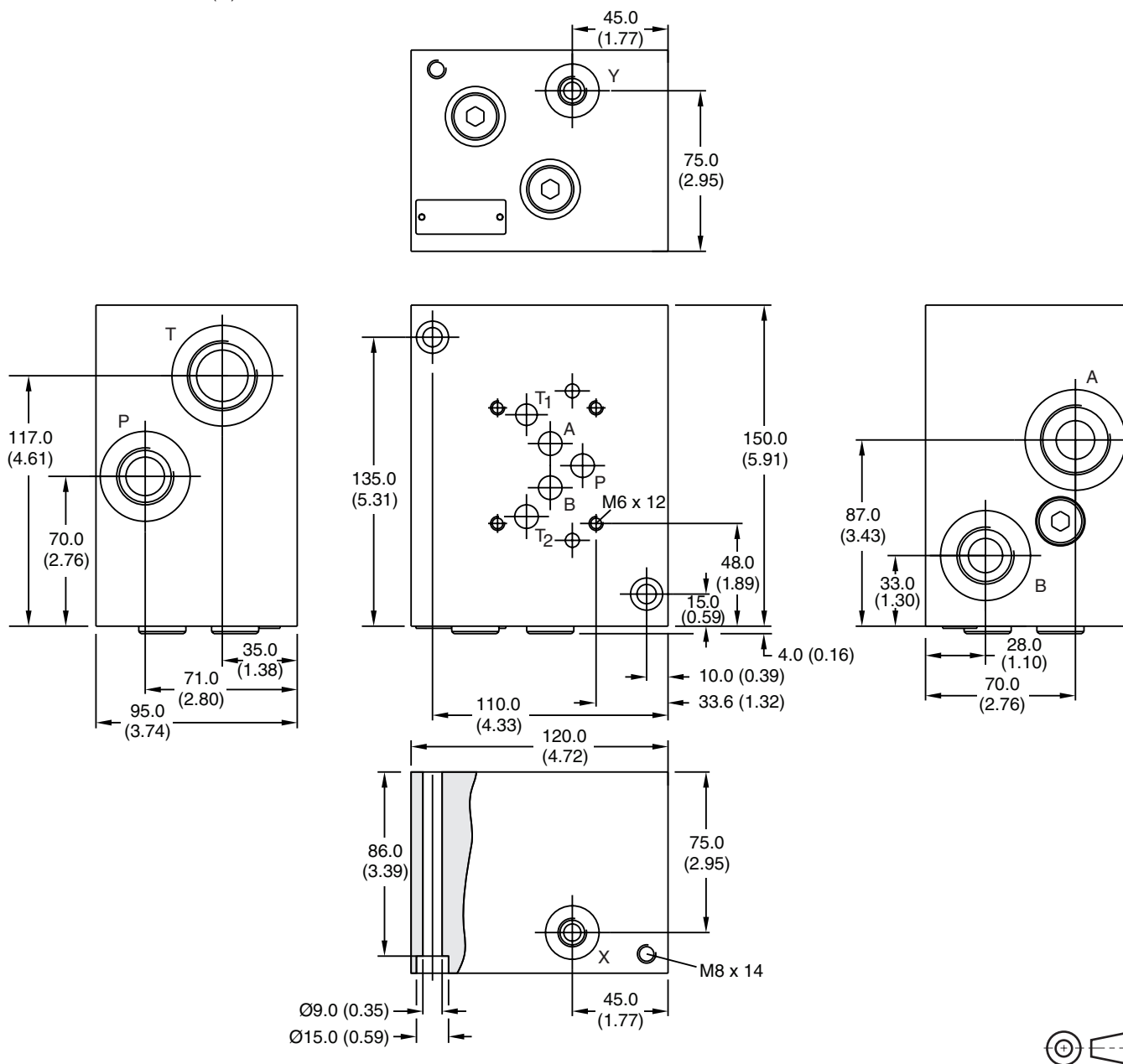
General				
Actuation		Solenoid – A10-1665L and H10-1666L		
Size		DIN NG10 / CETOP 5H		
Mounting interface		DIN 24340 A10 / ISO 4401 / CETOP RP 121-H / NFPA D05		
Mounting Position		Unrestricted		
Ambient Temperature		[°C]	-25...+50 (-13°F...+122°F)	
MTTF _D Value		[years]	150	
		A10-1664	A10-1665L	H10-1662
Weight		11.9 kg (26.5 lbs.)	14.4 kg (31.8 lbs.)	2.8 kg (6.2 lbs.)
				H10-1666L
				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

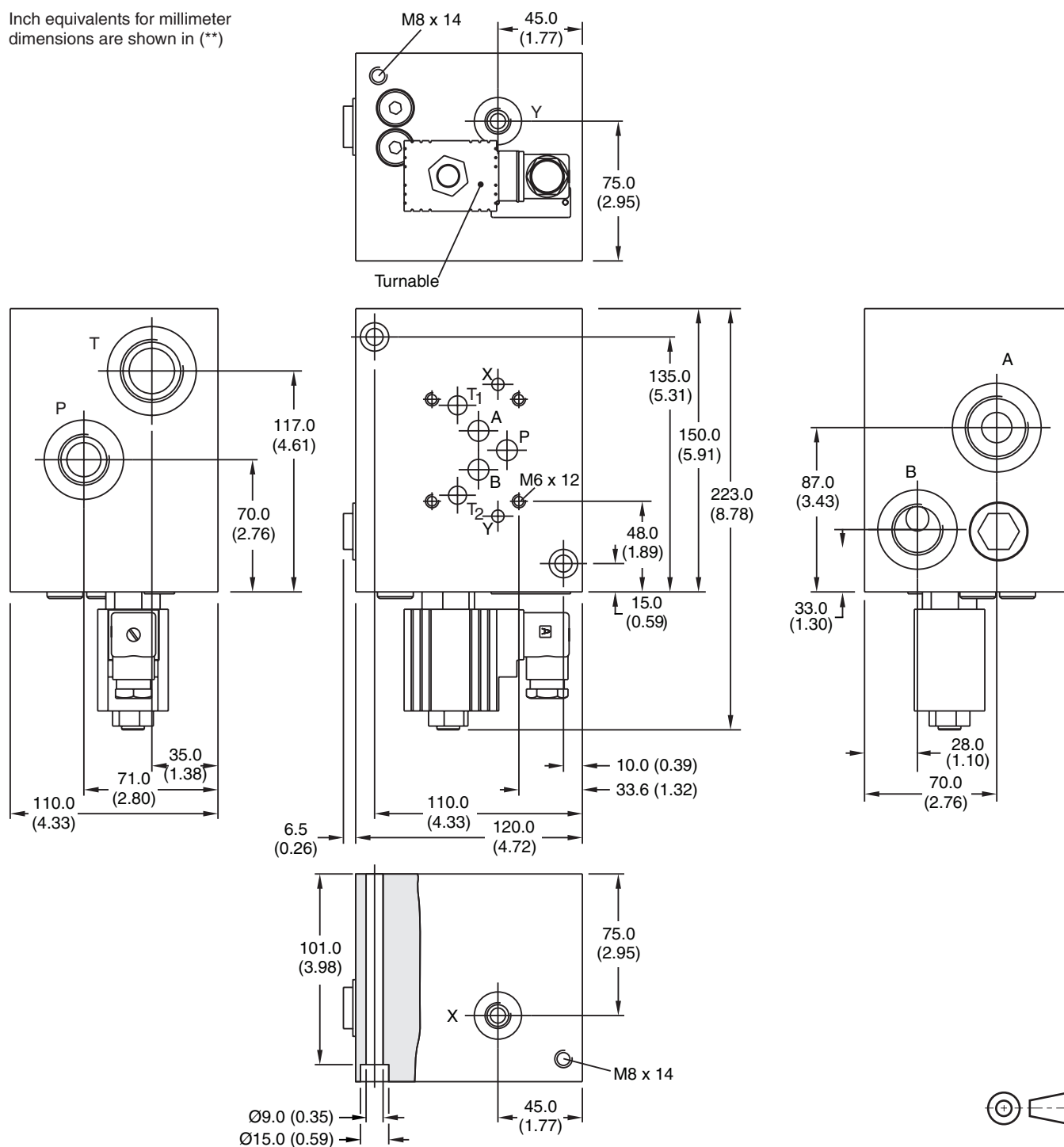
Inch equivalents for millimeter dimensions are shown in (**)

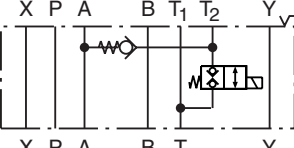


Symbol	Ordering Code	Port
Valve Side	A10-1664	A, T = G1 B, P = G3/4 X, Y = G1/4

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

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



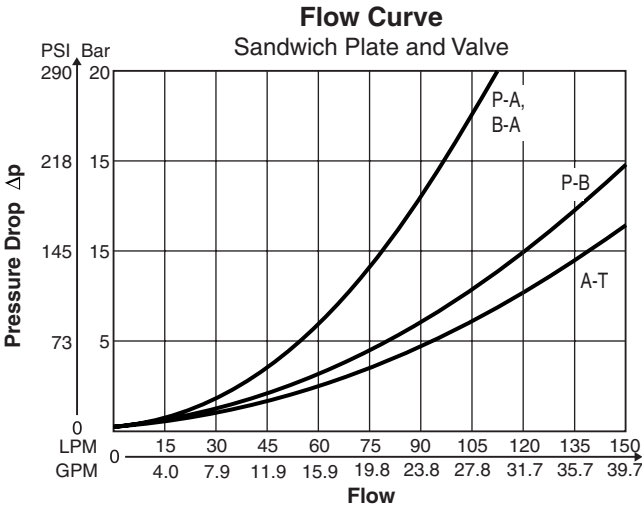
Symbol	Ordering Code	Port	Seal  Kit
	A10-1665L	A, T = G1 B, P = G3/4 X, Y = G1/4	Nitrile: SK-A10-1665

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

A

Performance Curves

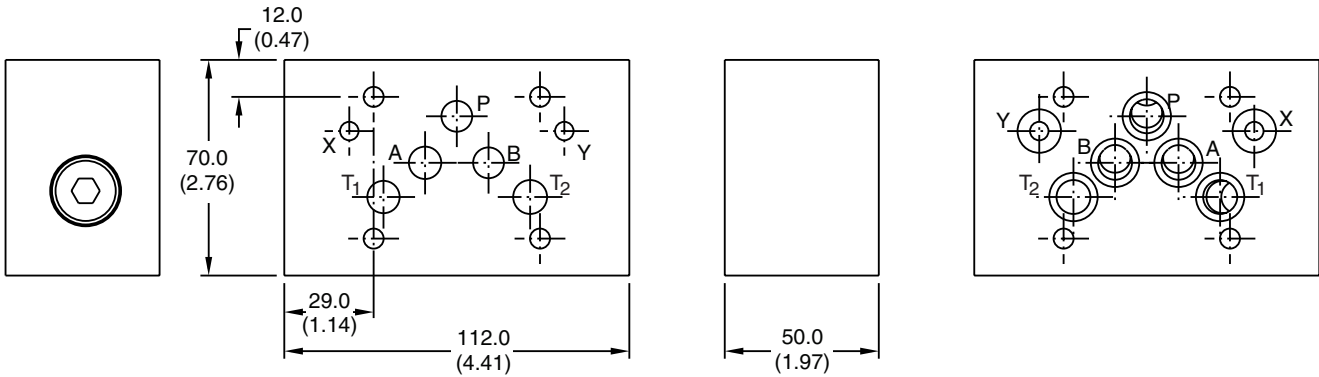
D31FP/FE/FB*

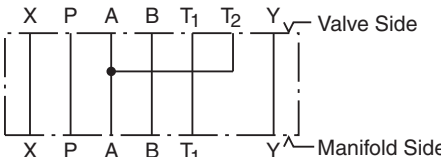


Measured with Spool Z31 at command signal 100%.

Dimensions

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

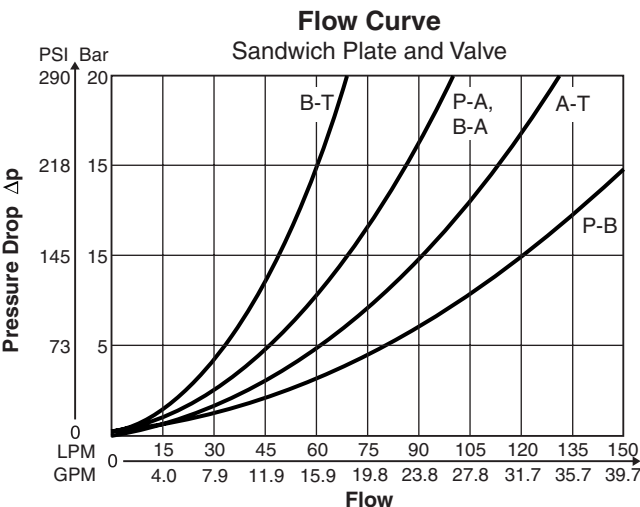


Symbol	Ordering Code	 Kit	 	 Seal Kit
	H10-1662 (O-rings included in delivery)	BK412	4x M6x90 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.) ±15%
				Nitrile: SK-H10-1662

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

Performance Curves

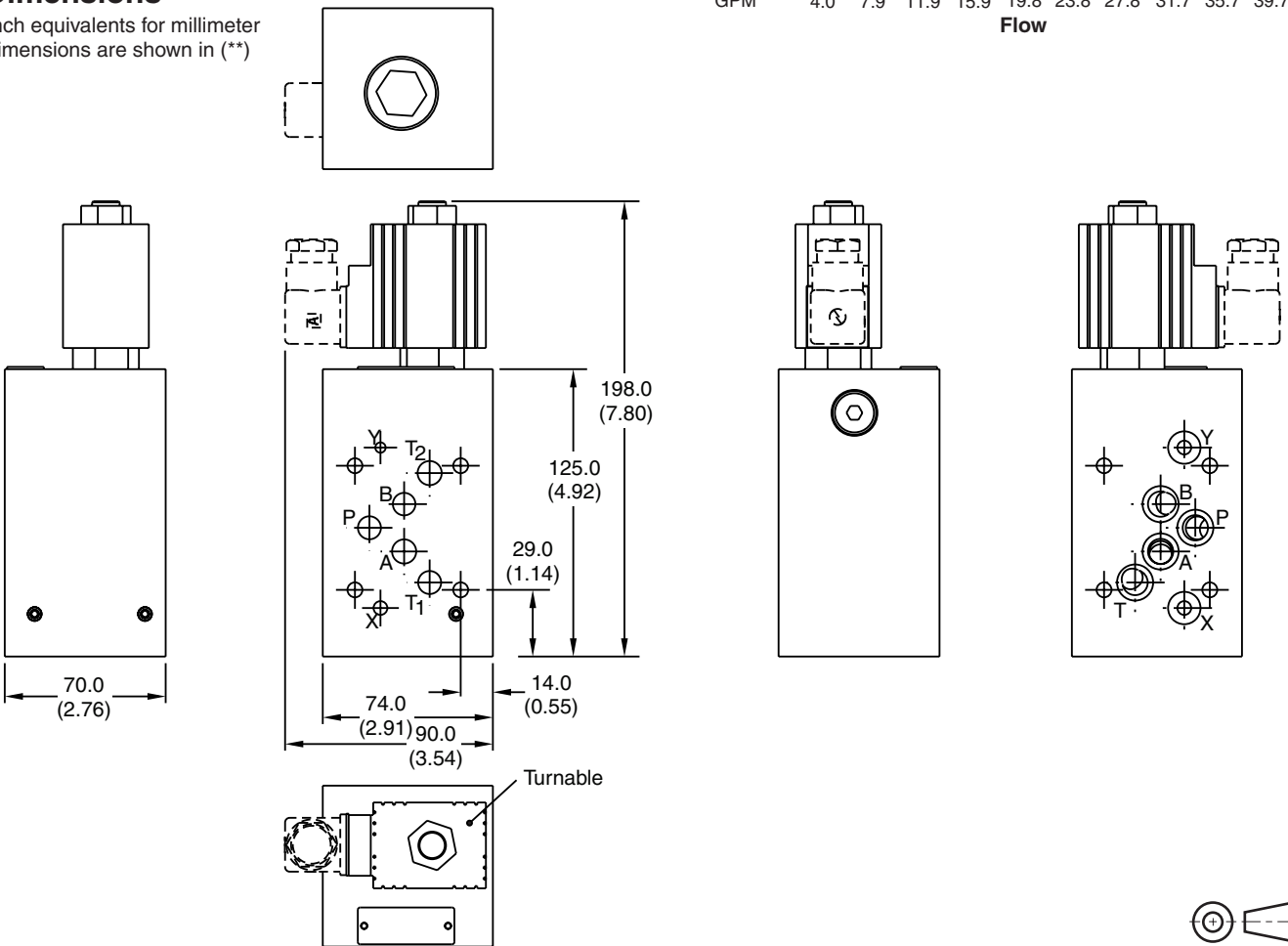
D31FP/FE/FB*

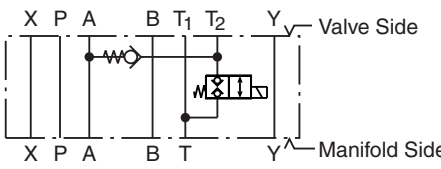


Measured with Spool Z31
at command signal 100%.

Dimensions

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



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

General Description

A

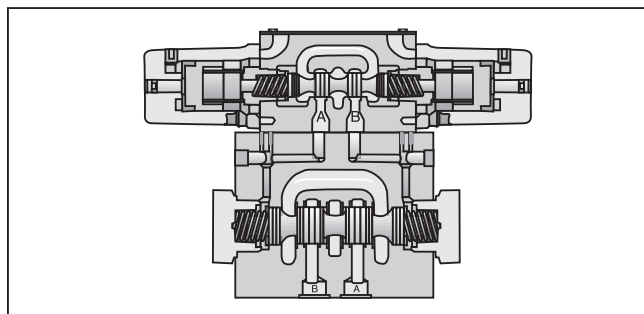
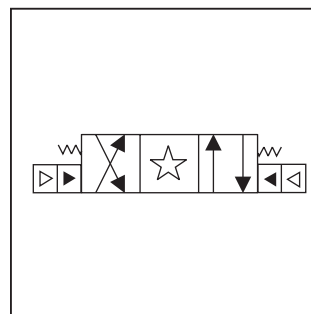
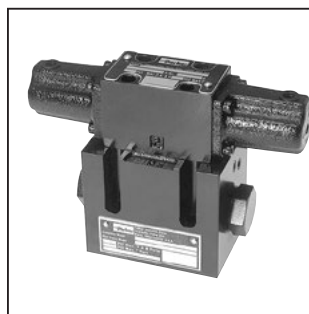
Series D31*A directional control valves are 5-chamber, air pilot operated valves. The valves are suitable for manifold or subplate mounting.

Features

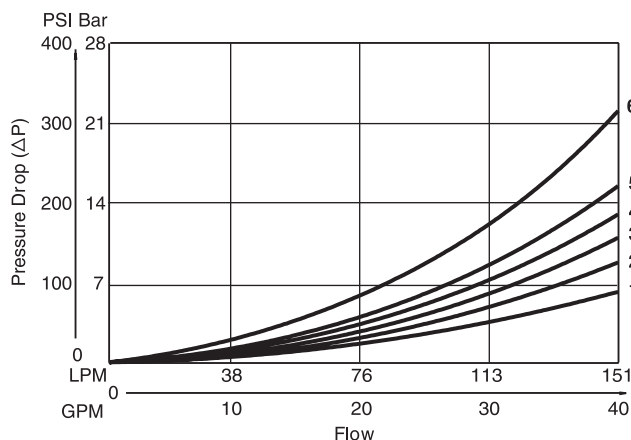
- **World design** – Available worldwide.
- **Mounting bolts below center line of spool** – Minimizes spool binding.
- **Five chamber style** – Eliminates pressure spikes in tubes, increasing valve life.
- **High pressure and flow ratings** – Increased performance options in a compact valve.

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.

Ordering Information

Code	Description
D	Directional Control Valve
	Basic Valve
A	Air 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

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.

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 Symbol

001

002

004

008†

009*

020†

030*

† 008 and 020 spools have closed crossover.

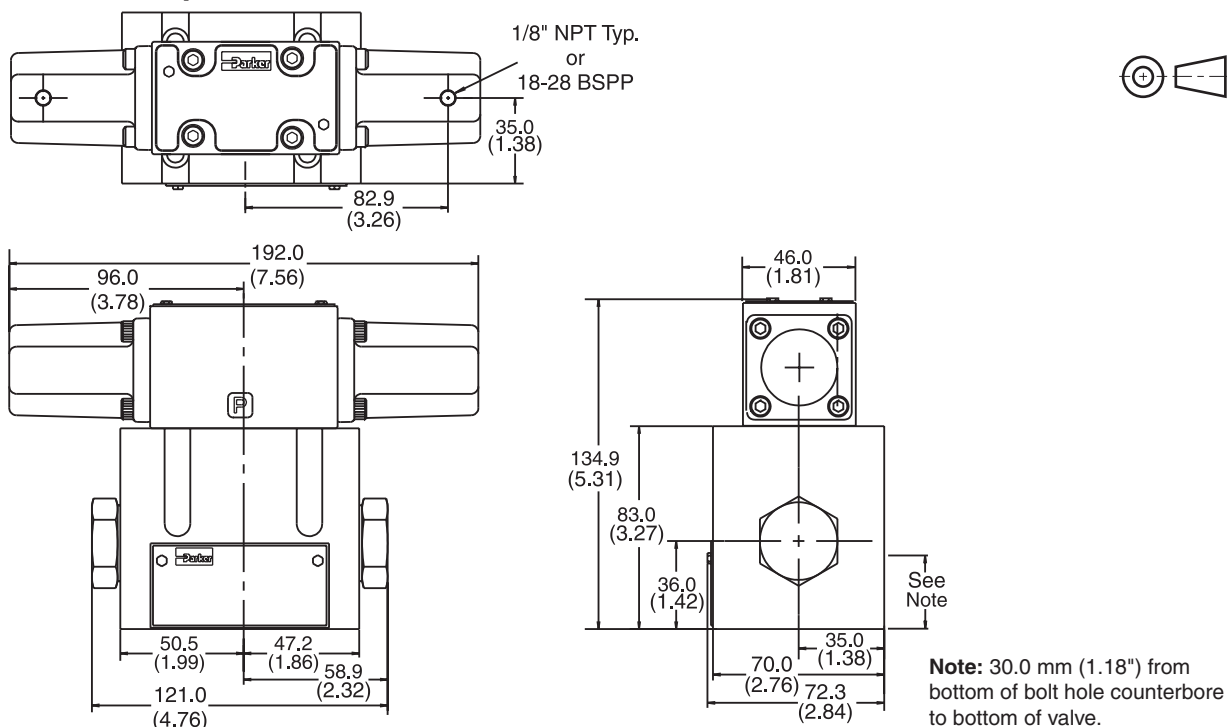
* 009 and 030 spools have open crossover.

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

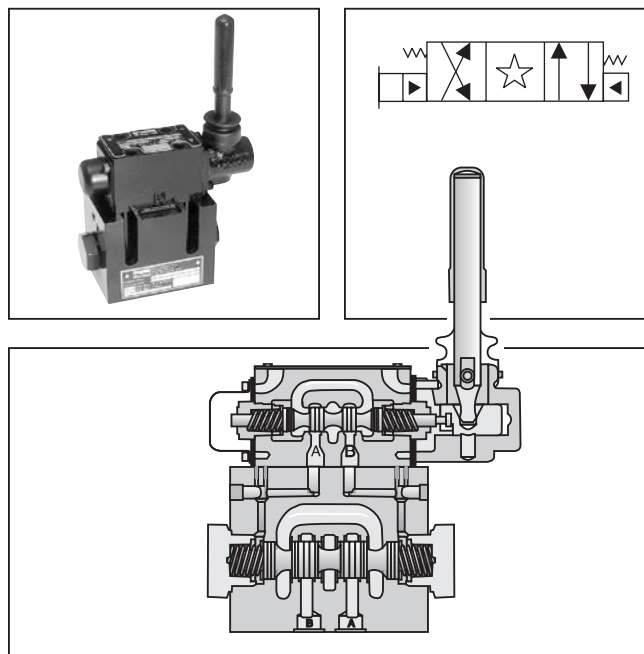
- **World design** – Available worldwide.
- **Mounting bolts below center line of spool** – Minimizes spool binding.
- **Five chamber style** – Eliminates pressure spikes in tubes, increasing valve life.
- **High pressure and flow ratings** – Increased performance options in a compact valve.

Specifications

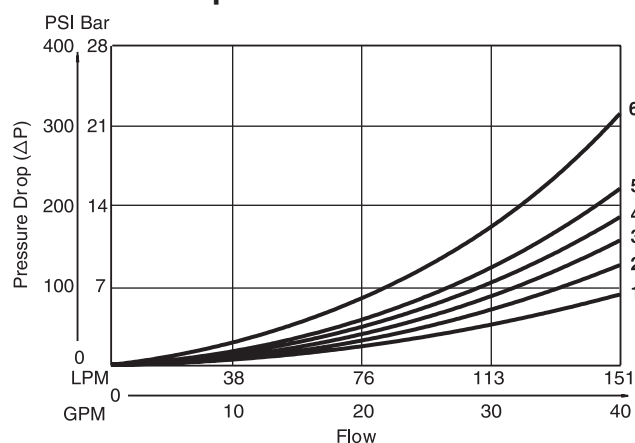
Mounting Pattern	NFPA D05H , CETOP 5 NFPA D05HE, CETOP 5H
Max. Operating Pressure	345 Bar (5000 PSI)
Max. Tank Line Pressure	Internal Drain Model: 34 Bar (500 PSI) External Drain Model: 207 Bar (3000 PSI)
Maximum Flow	See Switching Limit Charts
Pilot Pressure	Oil Min 6.9 Bar (100 PSI) Oil Max 345 Bar (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.



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
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

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.

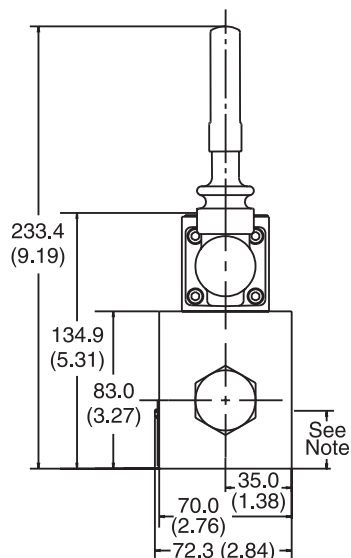
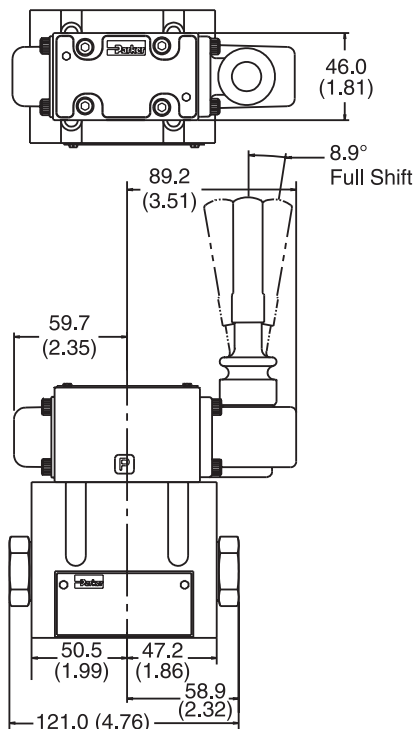
Valve Weight: 5.4 kg (12.0 lbs.)
Standard Bolt Kit: BK98
Metric Bolt Kit: BKM98

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.

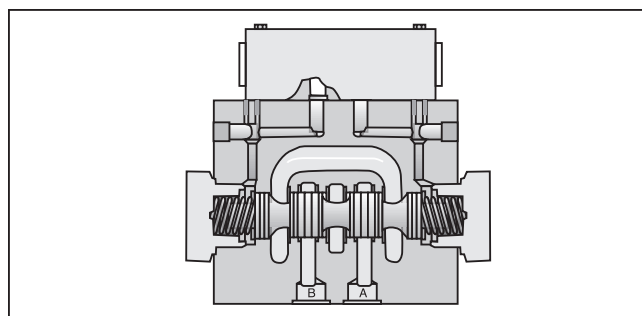
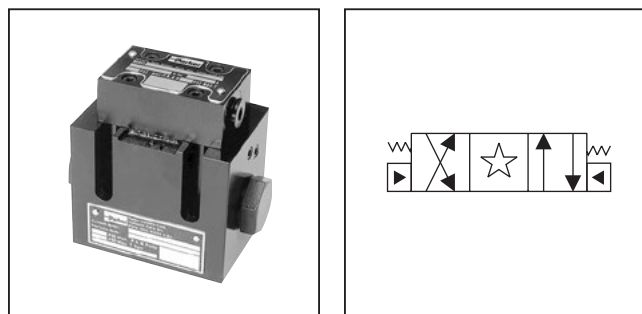
Features

- **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.

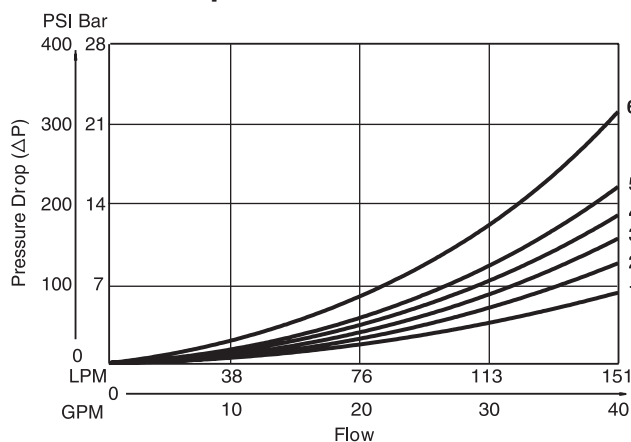
Specifications

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.

Ordering Information

Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
D	Directional Control Valve	P	Hydraulic Pilot		Style		Pilot Supply and Drain		Seal
	Basic Valve		Spool						Valve Variations
									Design Series
									NOTE: Not required when ordering.

Code	Description	Code	Description	Code	Description
3D	NFPA D05HE, CETOP 5H	001		N	Nitrile
3	NFPA D05H, CETOP 5	002		V	Fluorocarbon
		004			
		008**			
		009*			
		020**			
		030*			

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

Available on "B" style only.

Code	Description	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		

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.

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 #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:

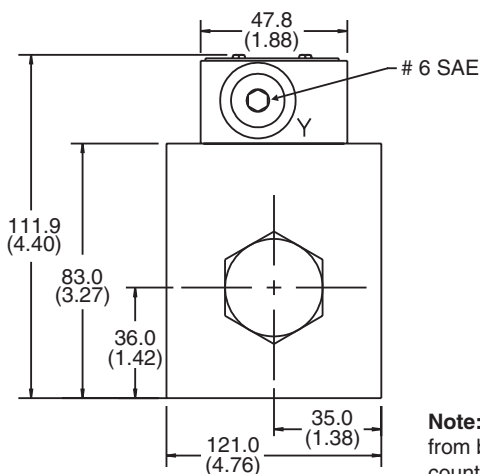
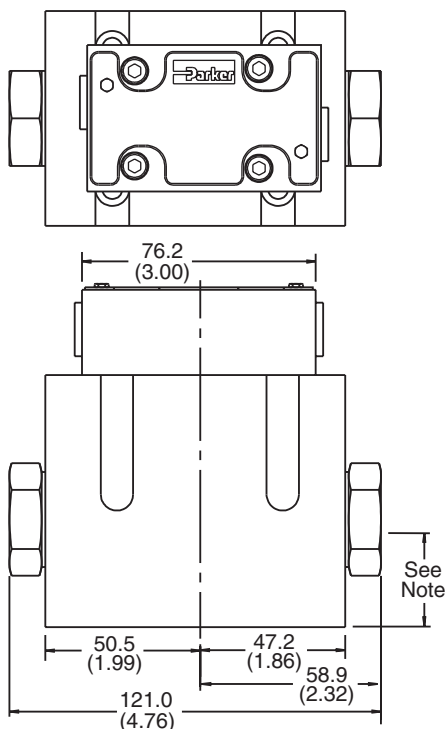
Nitrile SKD3P
 Fluorocarbon SKD3PV

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

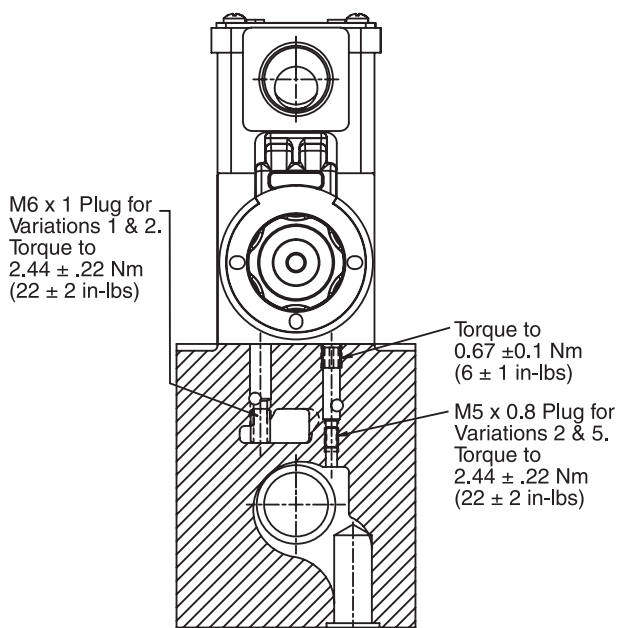
Premium quality hydraulic oil with a viscosity range between 32-54 cst. (150-250 SSU) At 38°C (100°F) is recommended. The absolute operating viscosity range is from 16-220 cst. (80-1000 SSU). Oil should have maximum anti-wear properties and rust and oxidation treatment.

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

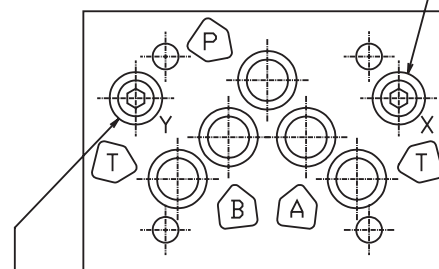
Series	NFPA	Size
D31V*, D3P	D05H, CETOP 5	3/8"
D31D*, D3DP, D31NW	D05HE, CETOP 5H	3/8"

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)



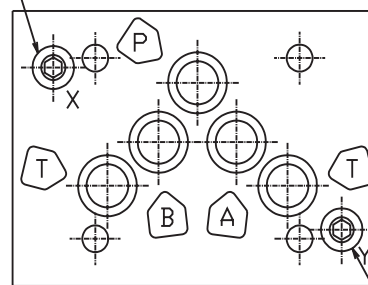
1/16 Pipe Plug for Variations 4 & 5

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.

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	

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

A

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).

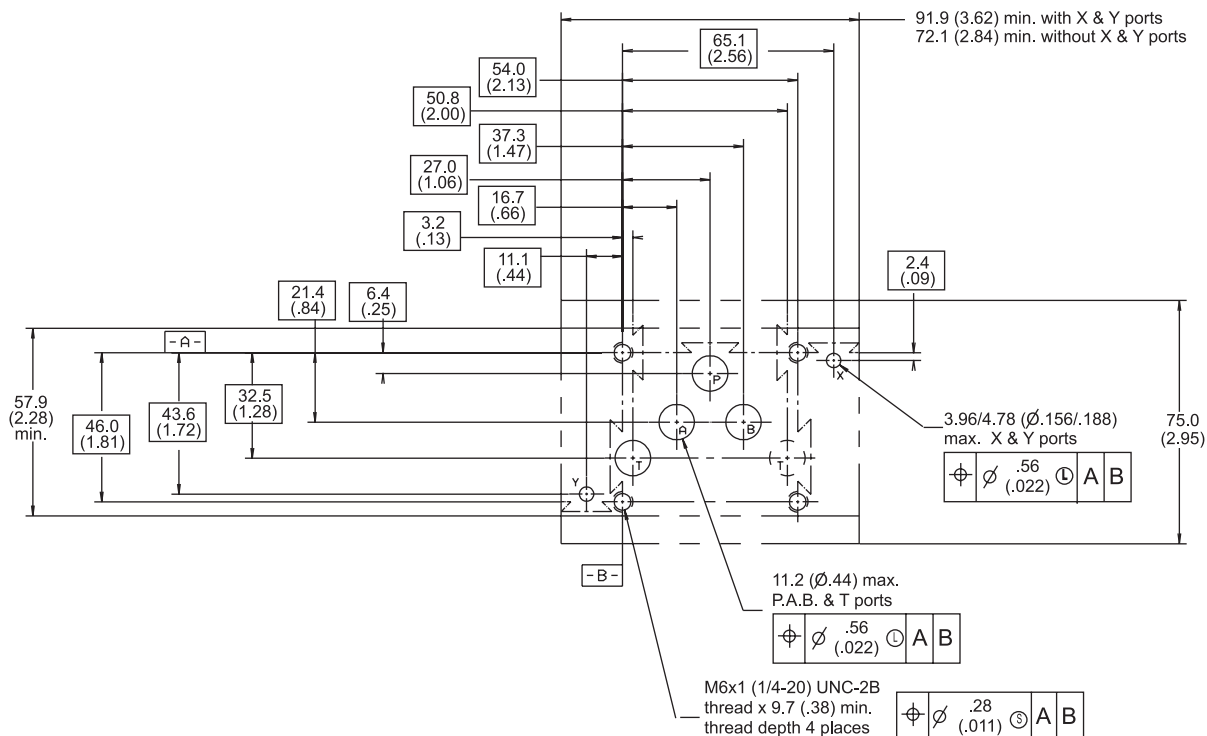
Mounting Position

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 D05H, CETOP 5

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).

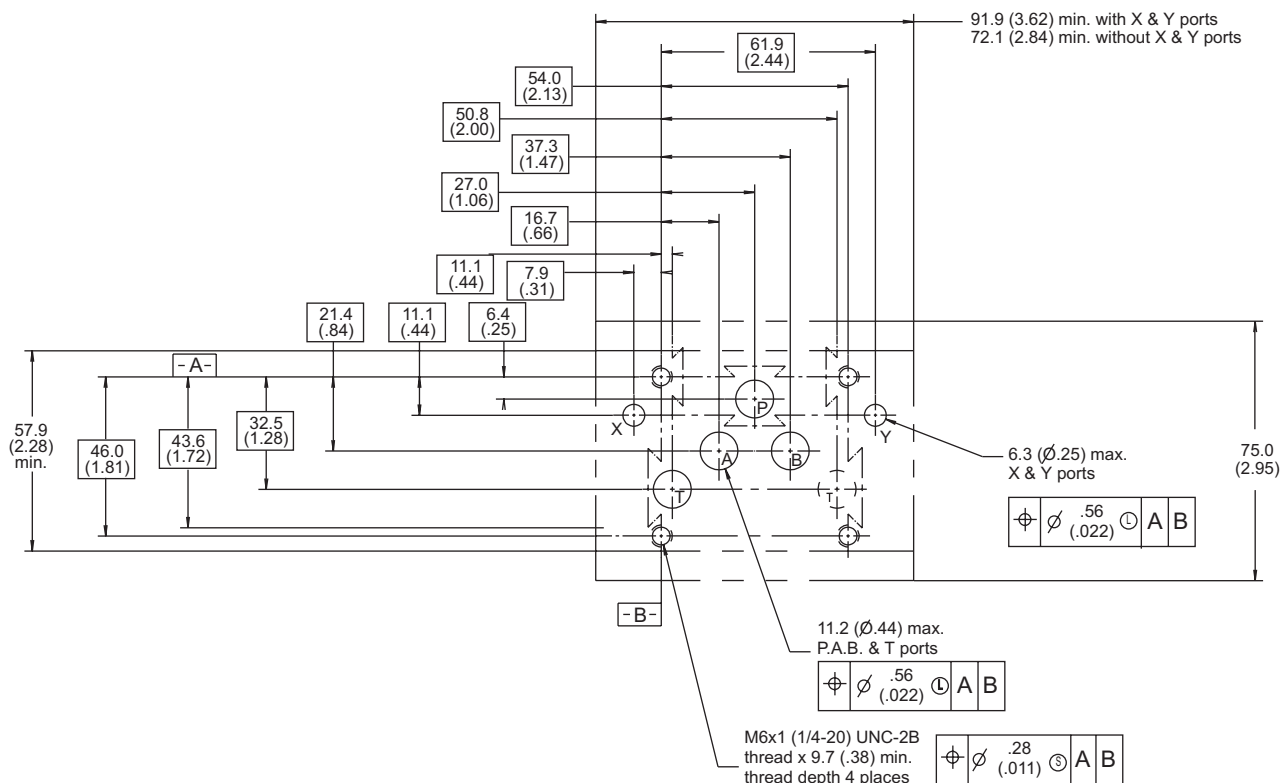
Mounting Position

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 (**)



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**

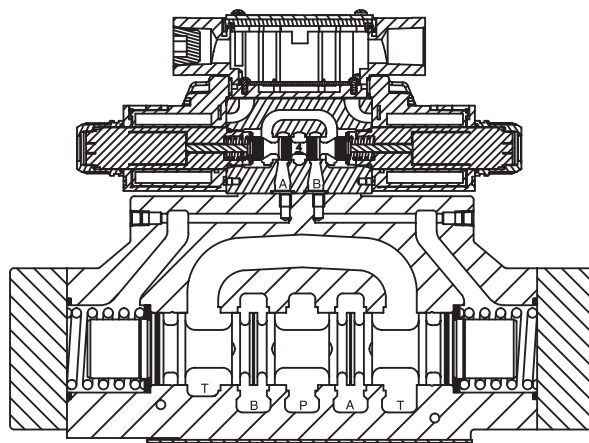
Series D41 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3 position styles and are manifold mounted. These valves conform to NFPA's D07, CETOP 7 mounting patterns.

Operation

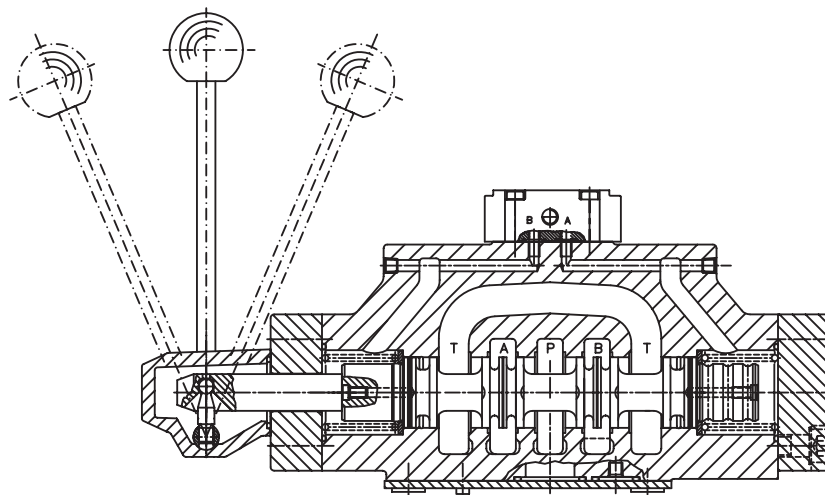
Series D41 directional valves consist of a 5-chamber style main body, a case hardened sliding spool, and a pilot valve or oil pilot operator.

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

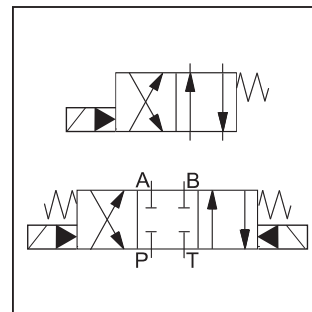
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information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

General Description

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

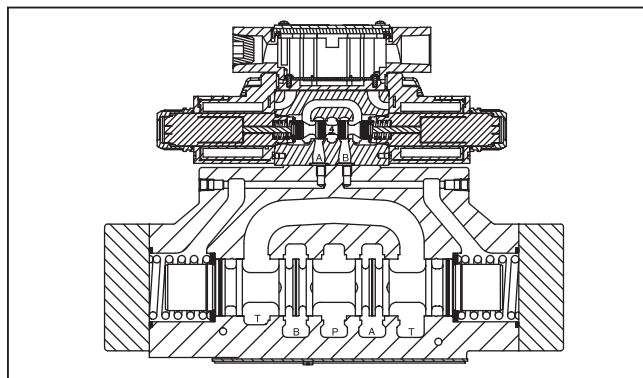
The minimum pilot pressure must be ensured for all operating conditions of the directional valve.

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



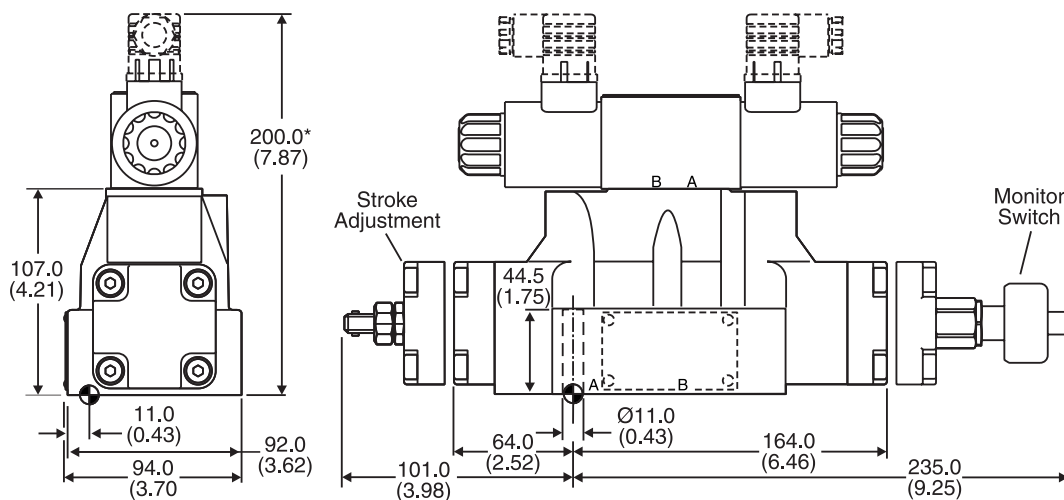
Features

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



Dimensions

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



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

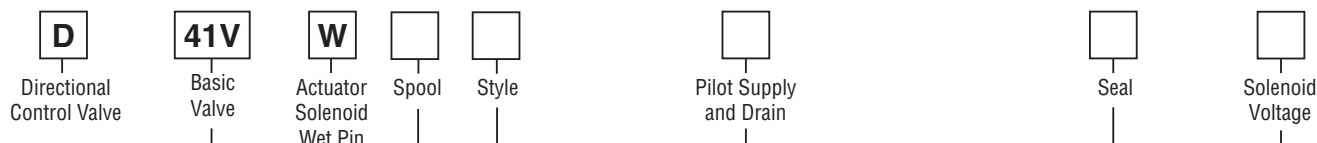


Surface Finish	Kit			Seal Kit
$\sqrt{R_{max}6.3}$ $\downarrow$ $\square 0.01/100$	BK320	4x M10x60 2x M6x55 ISO 4762-12.9	63 Nm (46.5 lb.-ft.) 13.2 Nm (9.7 lb.-ft.) $\pm 15\%$	Nitrile: SK-D41VW-N-91 Fluorocarbon: SK-D41VW-V-91

The space necessary to remove the plug per EN 175301-803, design type AF is at least 15 mm (0.59").
The torque for the screw M3 of the plug has to be 0.5 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.

A



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

* Not available with 002, 009, or 030 spools.

Code	Description
N	Nitrile
V	Fluorocarbon

3-Position Spools		
Code	Spool Type	
	a	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	 Operated in position "a".	 Operated in position "b".
F	 Spring offset in position "b".	 Spring offset in position "a".
K	 Operated in position "b".	 Operated in position "a".
M	 Spring offset in position "a".	 Spring offset in position "b".
R	 No center in offset position.	 No center in offset position.
S	 No center in offset position.	 No center in offset position.

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

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

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

Weight:

Single Solenoid: 9.7 kg (21.4 lbs.)

Double Solenoid: 10.3 kg (22.7 lbs.)

* 020 & 030 spools only.

Bold: Designates Tier I products and options.

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


 Solenoid Connection


 Coil Options


 Tube Options


 Manual Override Options


 Electrical Options


 Shift Indication


 Approvals


 Valve Variations


 Design Series
 NOTE:
 Not required
 when ordering.


 Monitor Switch Cover

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

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

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

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

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

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

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

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

Code	Description
Omit	No Variation
4B	Monitor Switch Cover

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

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

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

* Manual override options not available on Explosion Proof or soft shift. Not available with high pressure AC tube H.

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

* Not available with CSA or Explosion Proof.

A

Bold: Designates Tier I products and options.

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

Valve Variations

A OPTIONS ARE NOT AVAILABLE ON MONITOR SWITCH VALVES.

Code	Description
5*	Signal Lights – Standard
	Signal Lights – Hirsch. (DIN with Plug) (the DC Lighted Plug has Integral Surge Suppression)
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

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

** Must have plug-in style conduit box.

Bold: Designates Tier I products and options.

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

Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-10% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact 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 (ER, ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013; Ex d IIC Gb; Ex tb IIIC Db IP66; IECEx BAS 14.0164X ATEX: EN60079-0, EN60079-1, EN60079-31; CE 1180 Ex II 2G BASEEFA08ATEX0041X CSA 22.2 No. 60079-0:07, 60079-1:07 and UL 60079-0:05, UL 60079-1:05; CSA listed to US and Canada Safety Standards. File 08-CSA-1932102 CSA Ex d IIC, AEx d IIC for Class I Zone 1; Class I Div 1 Grp. C & D; Class II Div 1 Grp. E, F & G

* Allowable Voltage Deviation $\pm 10\%$.

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
E	F	24 VAC	4.8 AMPS	120 VA	2.07 Amps	21 W	1.29 Ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 Ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 Ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 Ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 Ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 Ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 Ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 Ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 Ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 Ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 Ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 Ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 Ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 Ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 Ohms
Explosion Proof Solenoids							
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
ER & ET Explosion Proof Solenoids							
J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

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

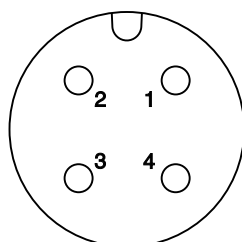
Single Solenoid Valves

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

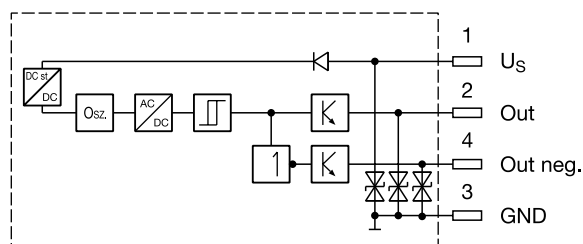
Protection Class		IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Ambient Temperature	[°C]	-20...+60; (-4°F...140°F)
Supply Voltage / Ripple	[V]	24 ≤10%
Tolerance Supply Voltage	[%]	±20
Polarity Protection	[V]	300
Current Consumption without Load	[mA]	≤ 20
Switching Hysteresis	[mm]	<0.06
Max. Output Current per Channel, Ohmic	[mA]	250
Min. Distance to Next AC Solenoid	[m]	0.1 (0.33 ft.)
Interface		M12x1 to IEC 61076-2-101
Wiring Minimum	[mm²]	5 x 0.25 braided shield recommended
Wiring Length Maximum	[m]	50 (164 ft.) recommended
CE Conform		EN 61000-4-2/EN 61000-4-4/EN 61000-4-6 ¹⁾ /ENV 50140/ENV 50240

1) Only guaranteed with screened cable and female connector.

M12 Pin Assignment



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



Outputs: Open collector

Definitions

Start position monitored:

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

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

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

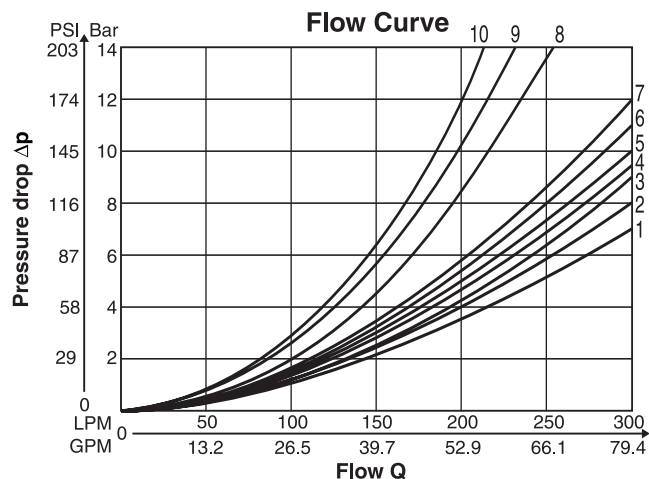
End position monitored:

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

Performance Curves

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.

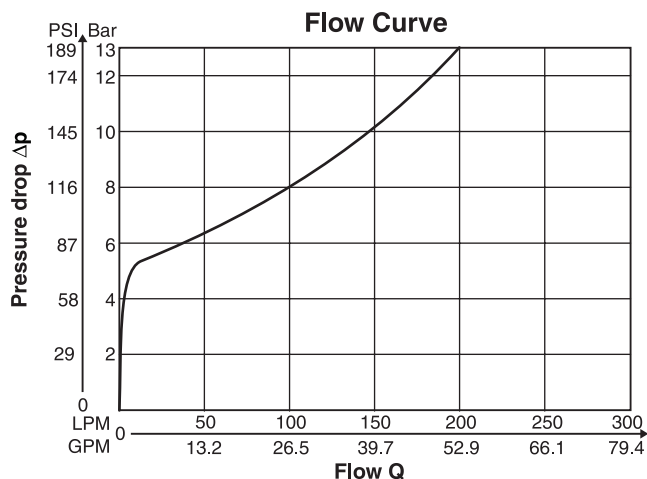


All characteristic curves measured with HLP46 at 50°C.

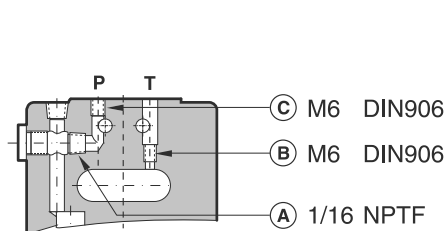
Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
001	1	1	—	4	5
002	1	2	6	4	6
003	1	2	—	5	6
004	1	1	—	5	5
005	2	2	—	3	5
006	1	2	—	3	6
007	1	1	6	4	5
009	2	9	8	7	10
011	1	1	—	4	5
014	1	1	6	4	5
015	1	2	—	4	6
016	2	2	—	3	5
020	3	5	—	3	5
021	2	8	—	2	—
022	8	2	—	—	3
026	3	5	—	—	—
030	2	3	—	6	7
031	—	—	—	—	—
032	—	—	—	—	—
054	2	3	—	6	7
081	—	—	—	—	—
082	—	—	—	—	—

Integral Check Valve in the P port

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

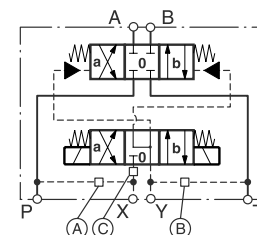


Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

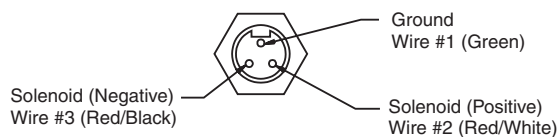
Pilot oil Inlet	Outlet	A	B	C
internal	external	○	●	Orifice Ø1.5
external	external	●	●	Orifice Ø1.5
internal	internal	○	○	Orifice Ø1.5
external	internal	●	○	Orifice Ø1.5



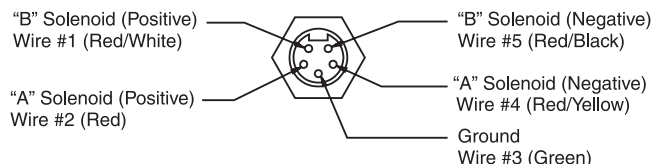
All orifice sizes for standard valves

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**

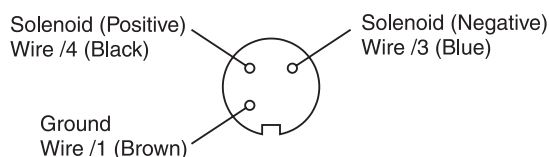
Single Solenoid Valves – Installed Opposite Side of Solenoid

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

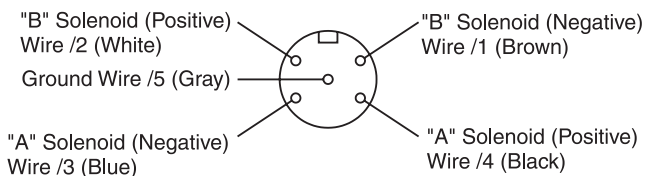
Single Solenoid Valves – Installed Opposite Side of Solenoid

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**

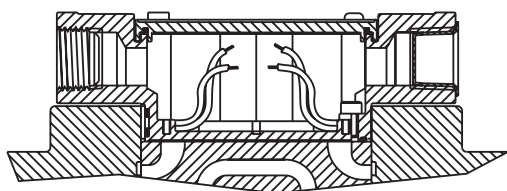
- EP336-30 3 Pin Plug
 EP316-30 5 Pin Plug (Double Solenoid)
 EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

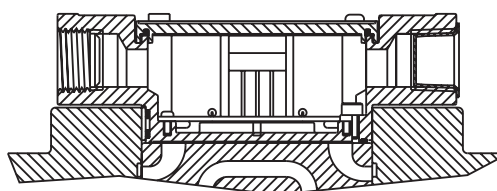
- EP337-30 3 Pin Plug
 EP317-30 5 Pin Plug (Double Solenoid)
 EP31B-30 5 Pin Plug (Single Solenoid)

Conduit Box Option C

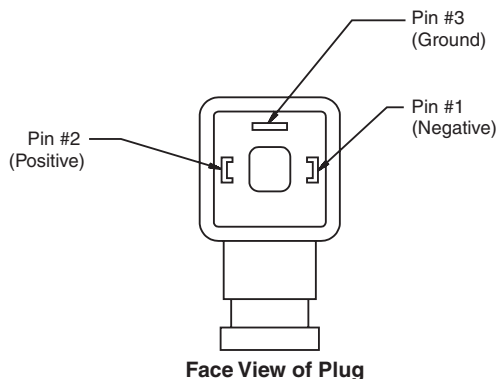
- No Wiring Options Available

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

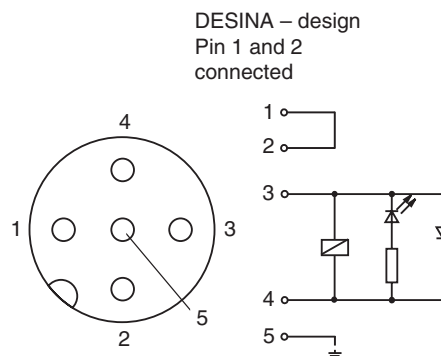
- LED Interface
- Meets Nema 4/IP67

**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.

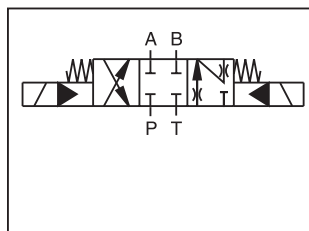
Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



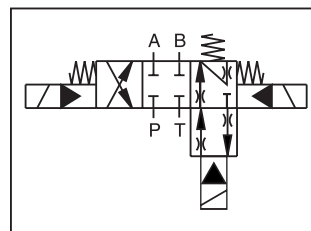
D41VWR



D41VWZ

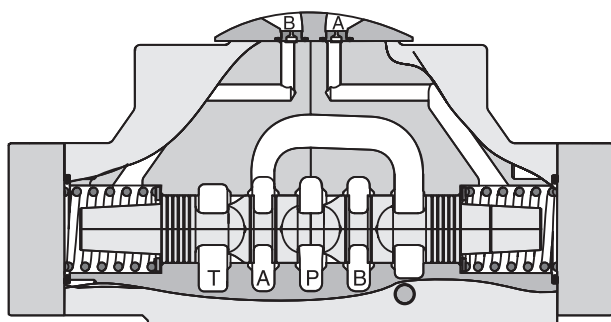


Regenerative D41VWR

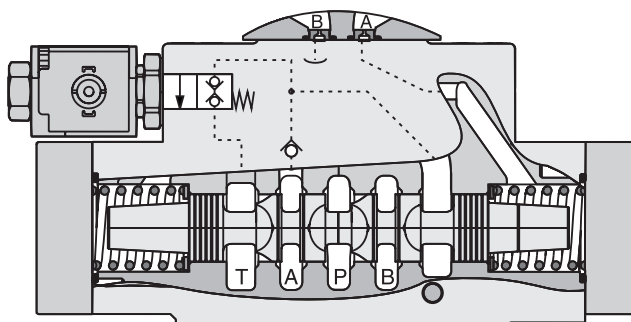


Hybrid D41VWZ

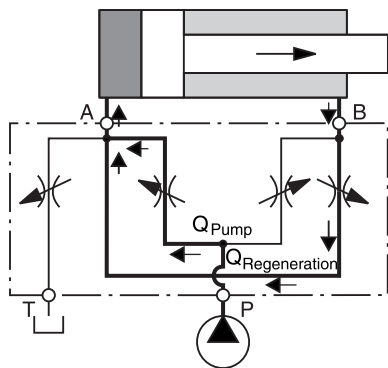
Regenerative Valve D41VWR



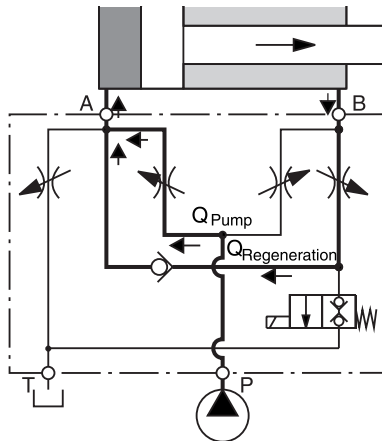
Hybrid Valve D41VWZ



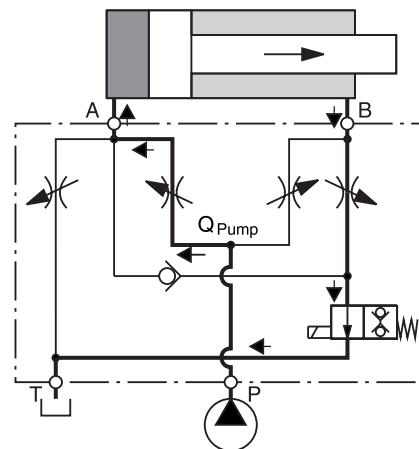
D41VWR Regenerative Valve Cylinder Extending



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.

Ordering Information

D41VW

Series

NFPA D07,
CETOP7,
DIN NG16

Spool

C

Style

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

Pilot Supply and Drain

Code	Description
N	Nitrile
V	Fluorocarbon

Seal

J

Solenoid Voltage 24VDC

W

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

Manual Override

Code	Description
Omit	Standard
T	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		

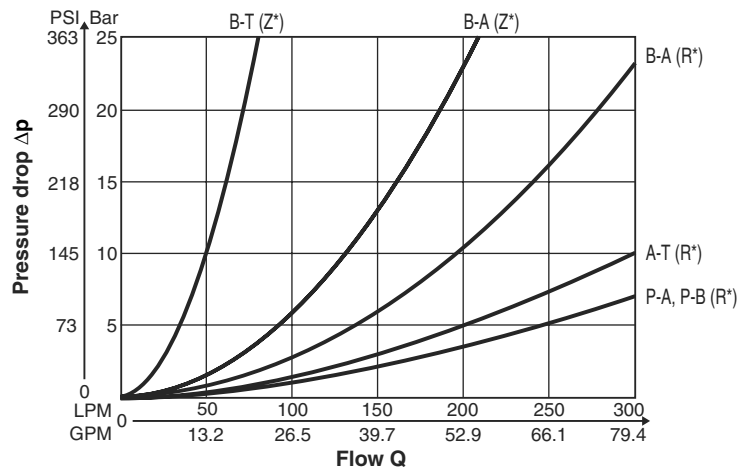
Weight:

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

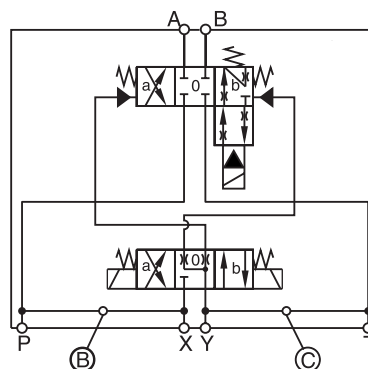
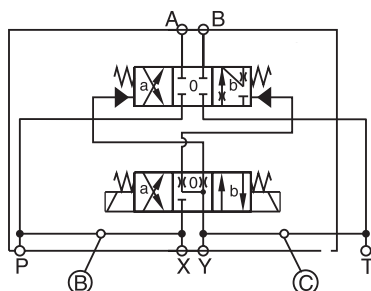
With electrical connections the protective conductor (PE ≡) must be connected according to the relevant regulations.

Pilot Flow

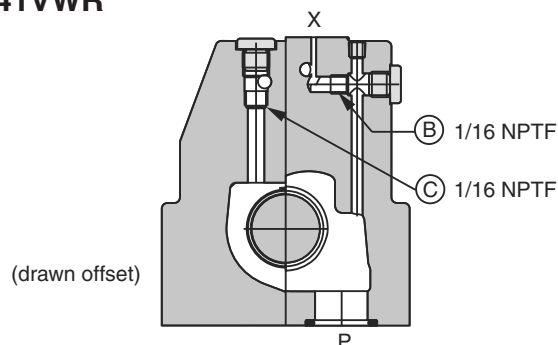
Pilot Oil Inlet (Supply) and Outlet (Drain)

○ open, ● closed

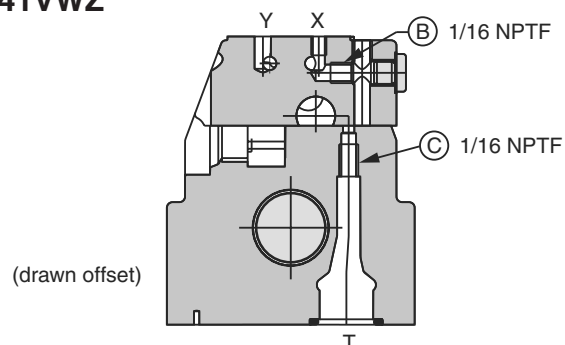
Pilot Oil Inlet	Pilot Oil Outlet	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



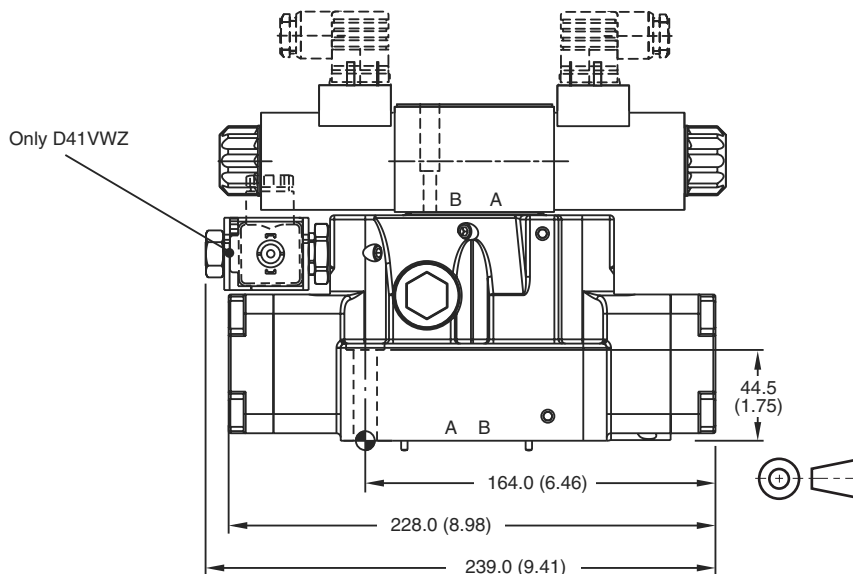
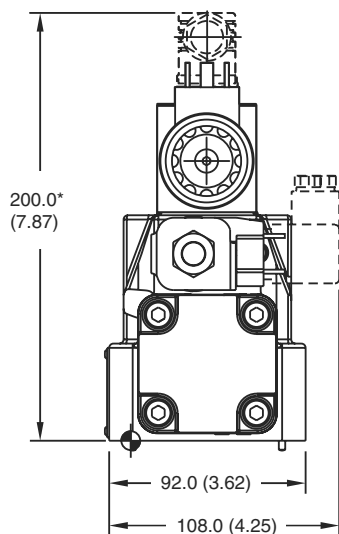
D41VWR



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
	BK160	4x 3/8-16x2.5 2x 1/4-20x2.25 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.) ±15%	Fluorocarbon: SK-D41VW-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.).

A

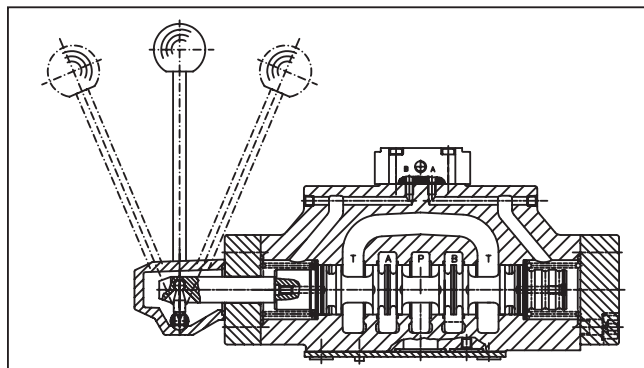
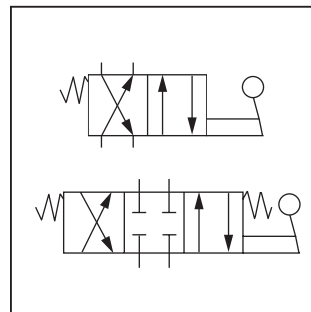
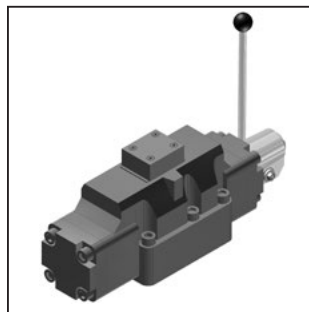
General Description

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

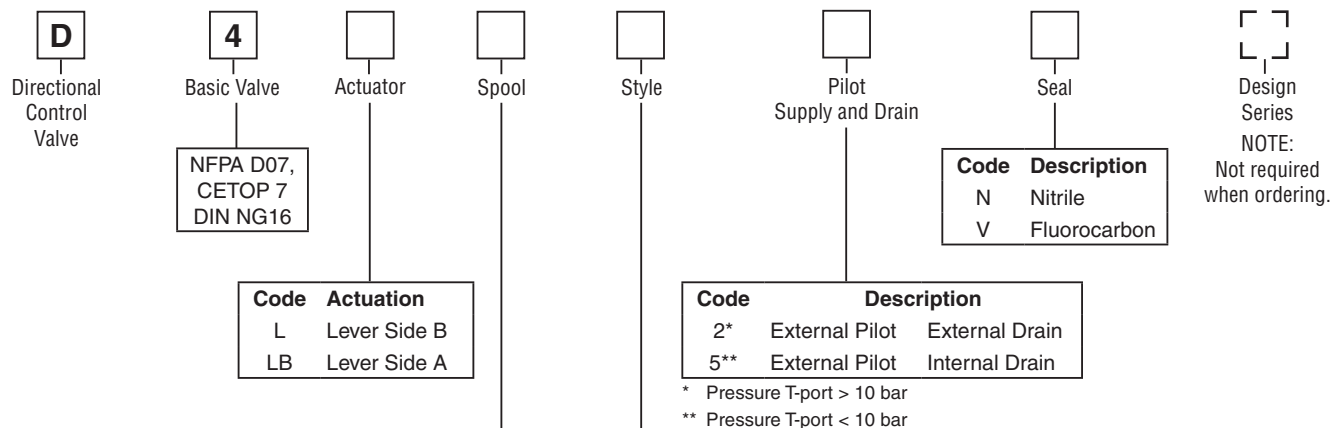
- Low force required to shift spool.
- Hardened spools provide long life.
- Low pressure drop design.



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.



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".

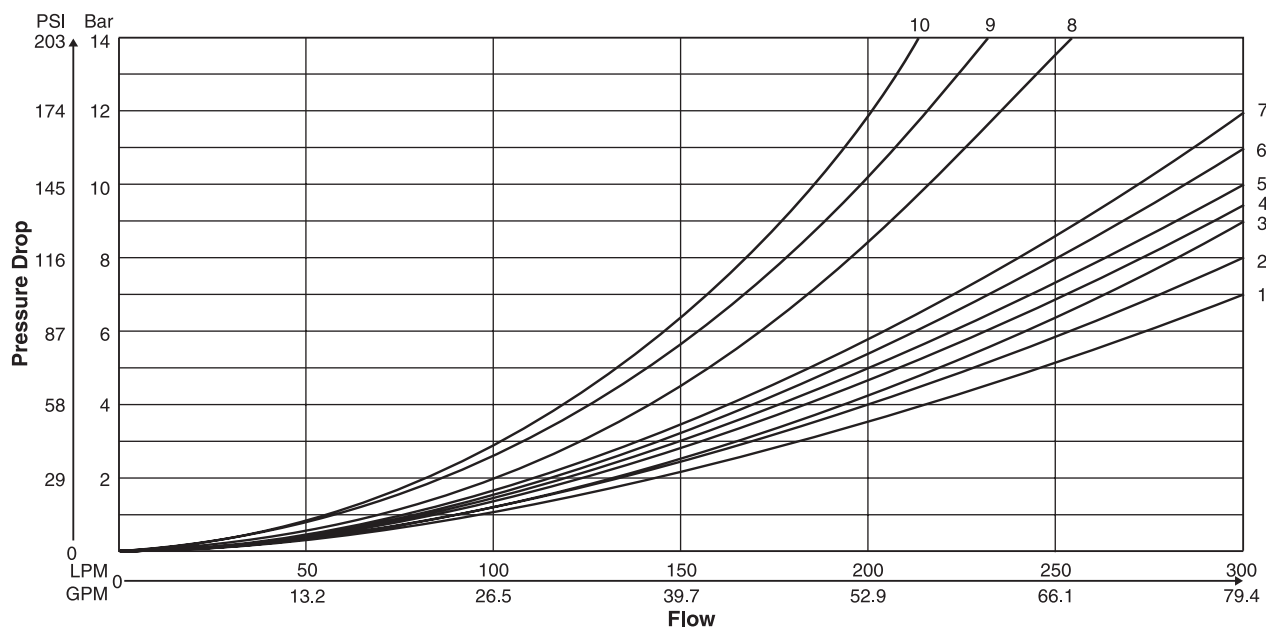
Weight: 9.0 kg (19.8 lbs.)

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.

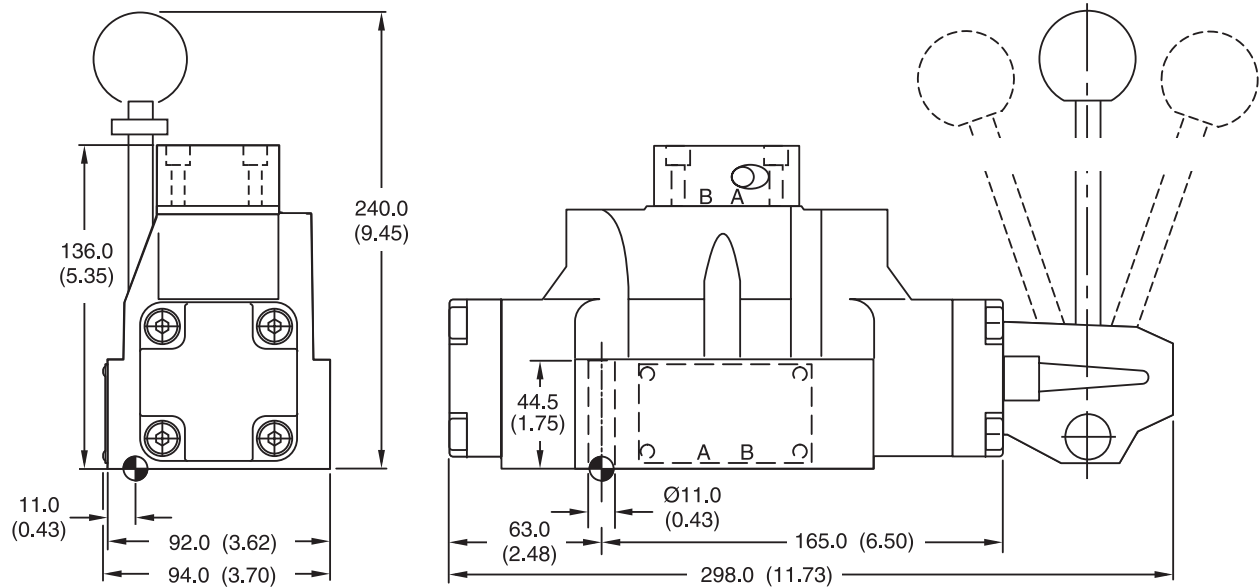
Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
001	1	1	—	4	5
002	1	2	6	4	6
003	1	2	—	5	6
004	1	1	—	5	5
006	1	2	—	3	6
007	1	1	6	4	5
009	2	9	8	7	10
011	1	1	—	4	5
014	1	1	6	5	4
015	2	1	—	6	5
020	3	5	—	3	5
030	2	3	—	6	7

All characteristic curves measured with HLP46 at 50°C.

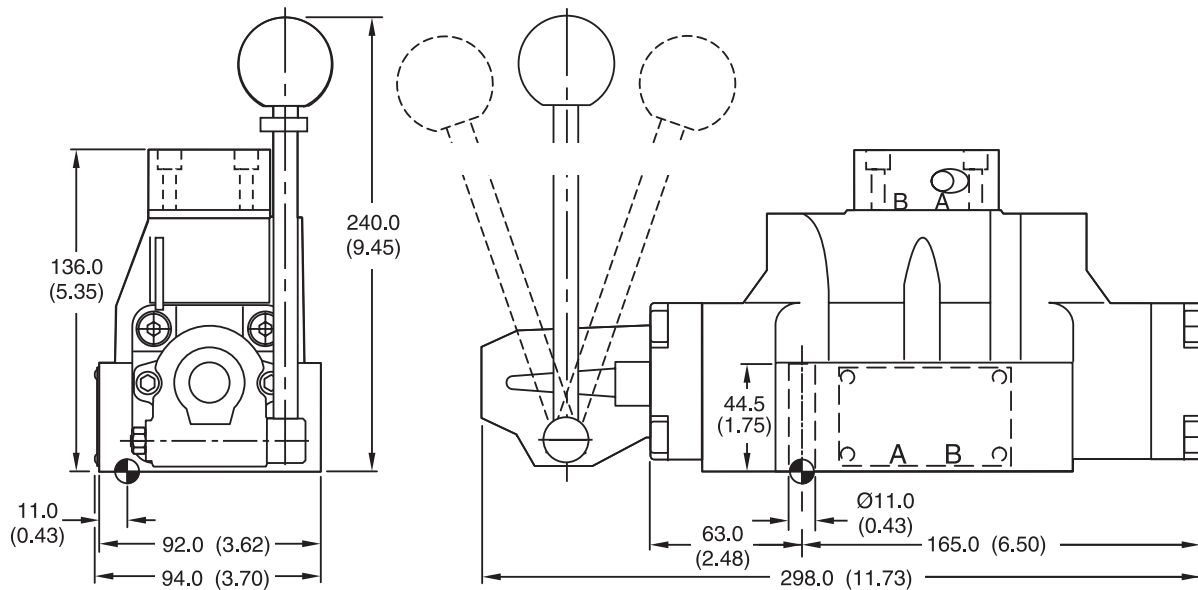


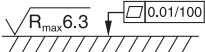
Inch equivalents for millimeter dimensions are shown in (**)

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

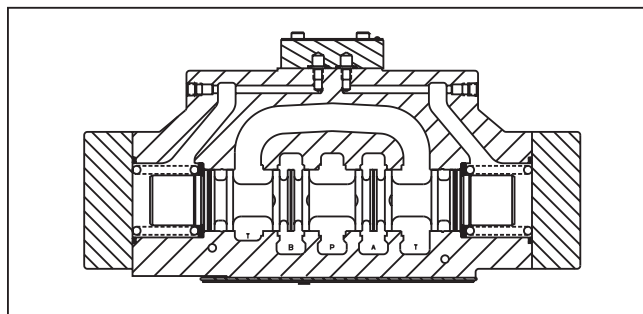
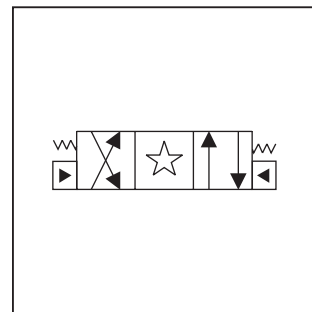
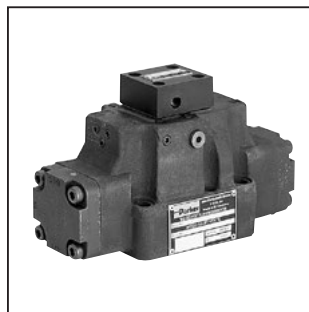
A

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

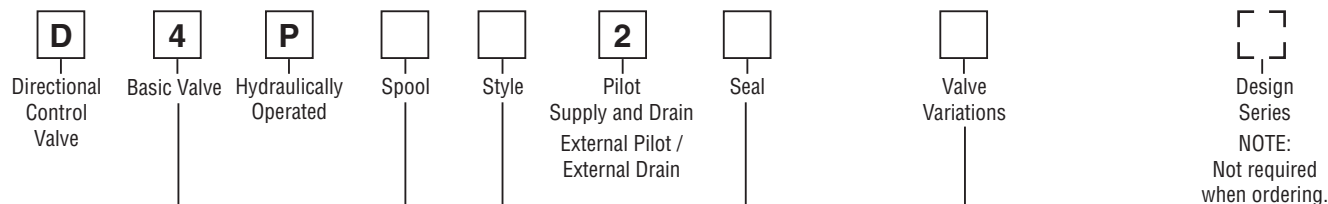
- Low pressure drop design.
- Hardened spools for long life.



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.



A

3 Position Spools	
Code	Spool Type
001	
002	
003	
004	
005	
006	
007	
009	
011	
014	
015	
016	
021	
022	
054	
081	
082	

2 Position Spools	
Code	Spool Type
020	
026	
030	

3-Position Spools			
Code	All 3-Position Spools		
C		3 positions. Spring offset in position "0". Operated in position "a" or "b".	
	Standard	Spool Type 009	
E	 Operated in position "a".	 Operated in position "b".	2 positions. Spring offset in position "0".
F	 Spring offset in position "b".	 Spring offset in position "a".	2 positions. Operated in position "0".
K	 Operated in position "b".	 Operated in position "a".	2 positions. Spring offset in position "0".
M	 Spring offset in position "a".	 Spring offset in position "b".	2 positions. Operated in position "0".
R	 No center in offset position.	 No center in offset position.	2 positions, detent. Operated in position "0" or "b".
S	 No center in offset position.	 No center in offset position.	2 positions, detent. Operated in position "0" or "a". No center in offset position.

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

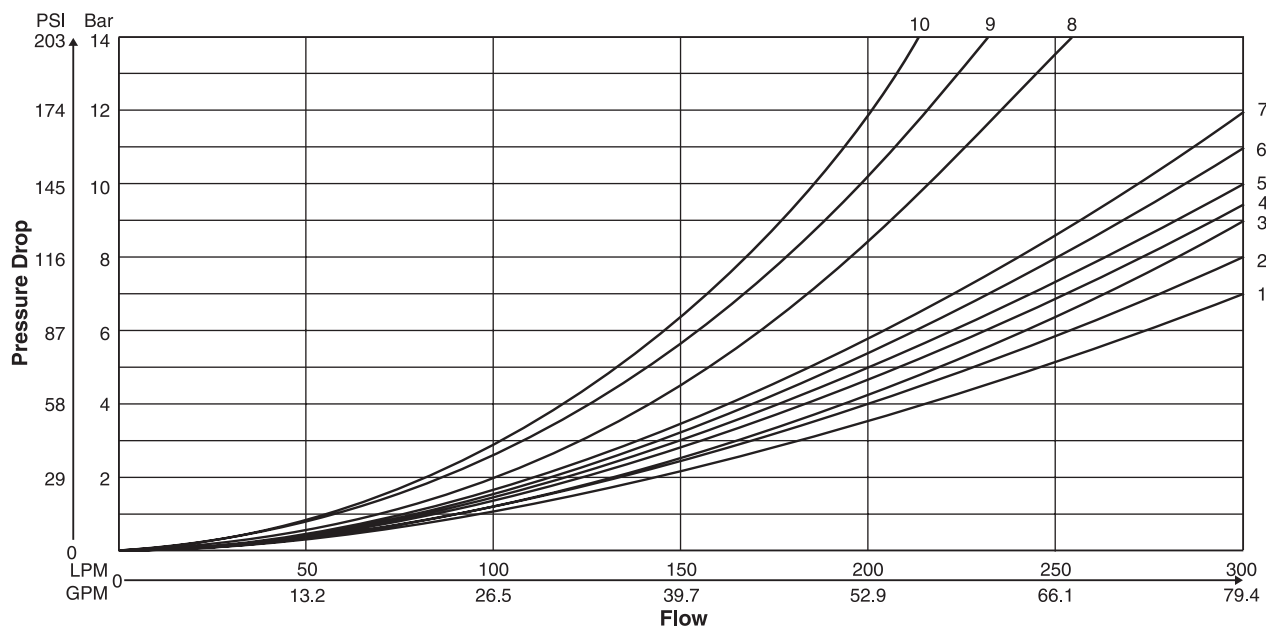
Weight: 9.0 kg (19.8 lbs.)

* 020 & 030 spools only.

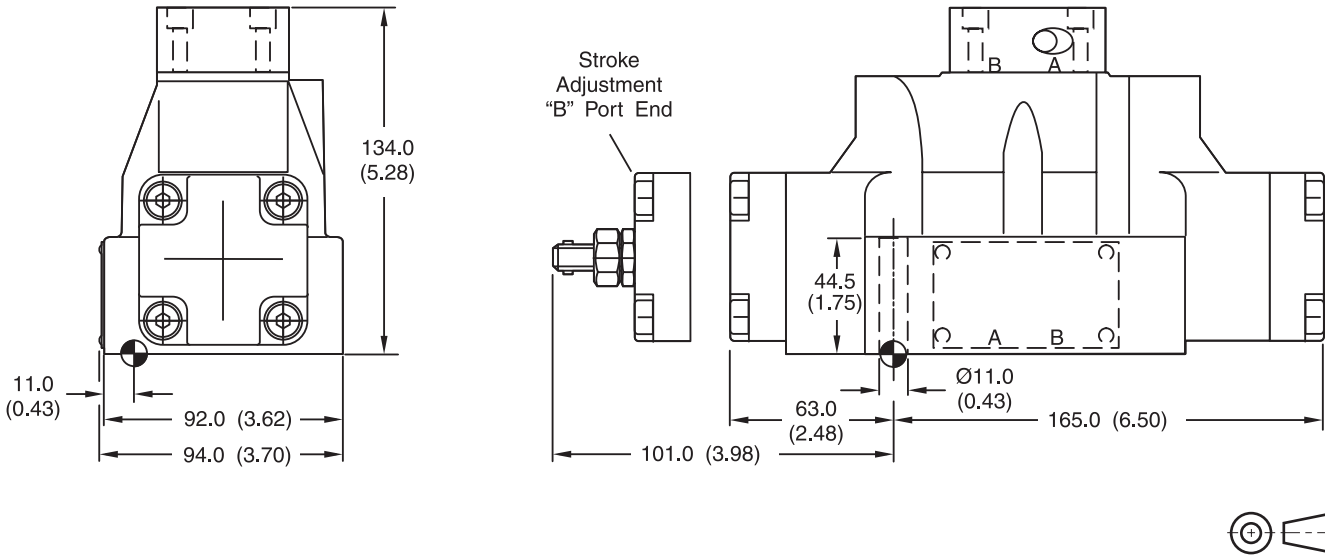
A

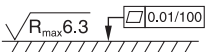
The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.

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 (**)



Surface Finish	 Kit	 Kit	 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	—

A

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).

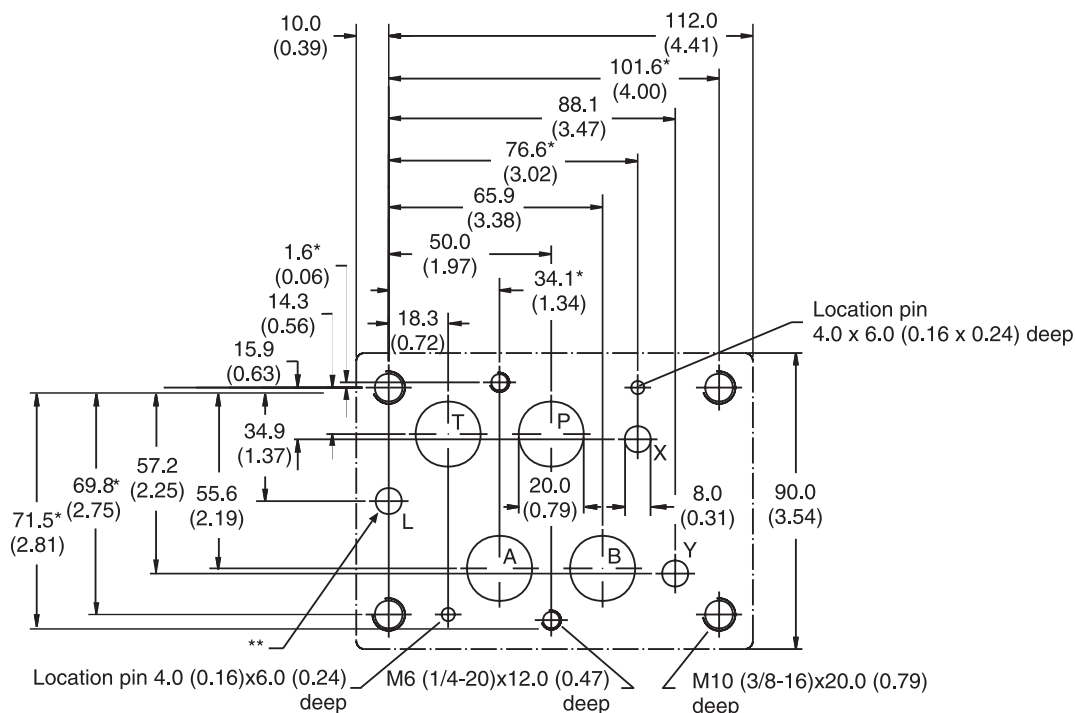
Mounting Position

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.

A

Application

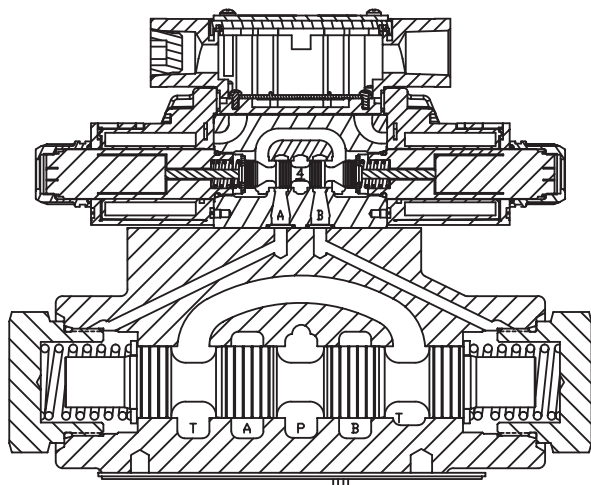
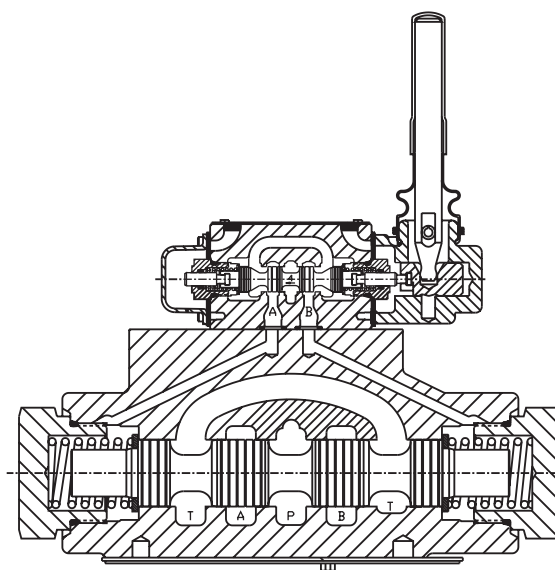
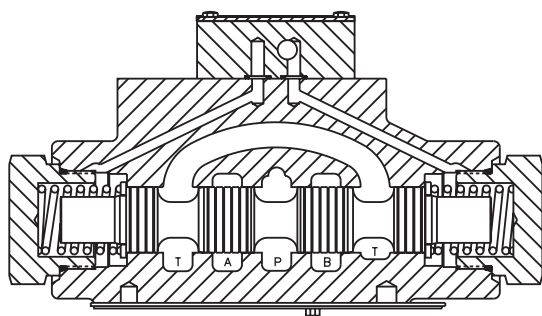
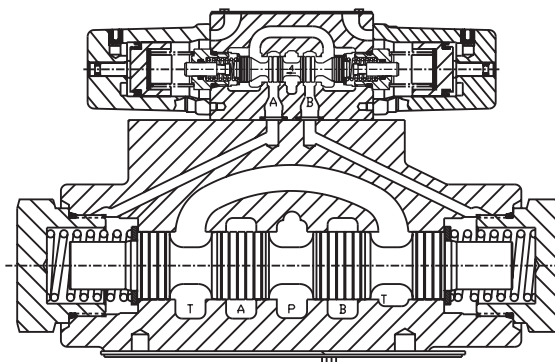
Series D6 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles. These valves are manifold mounted, and conform to NFPA's D08, CETOP 8 mounting patterns.

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.

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.

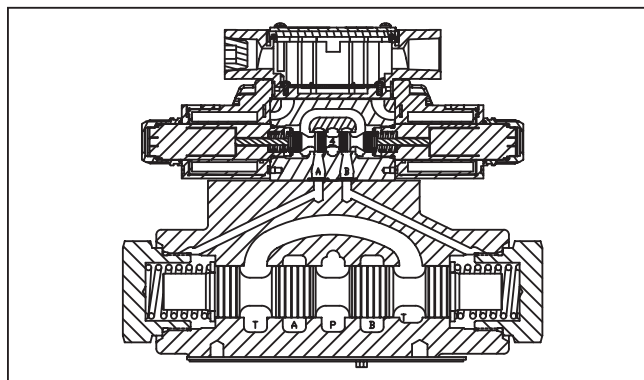
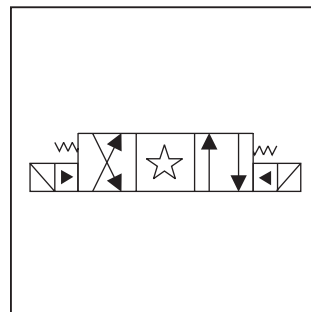
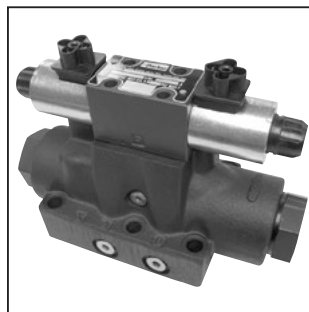
Features

- 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

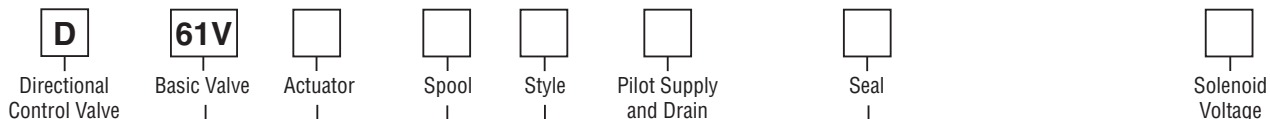
Response times (milliseconds) are measured at 205 Bar (3000 PSI) and 195 LPM (50 GPM) with various pilot pressures as indicated.

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.

A



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

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

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

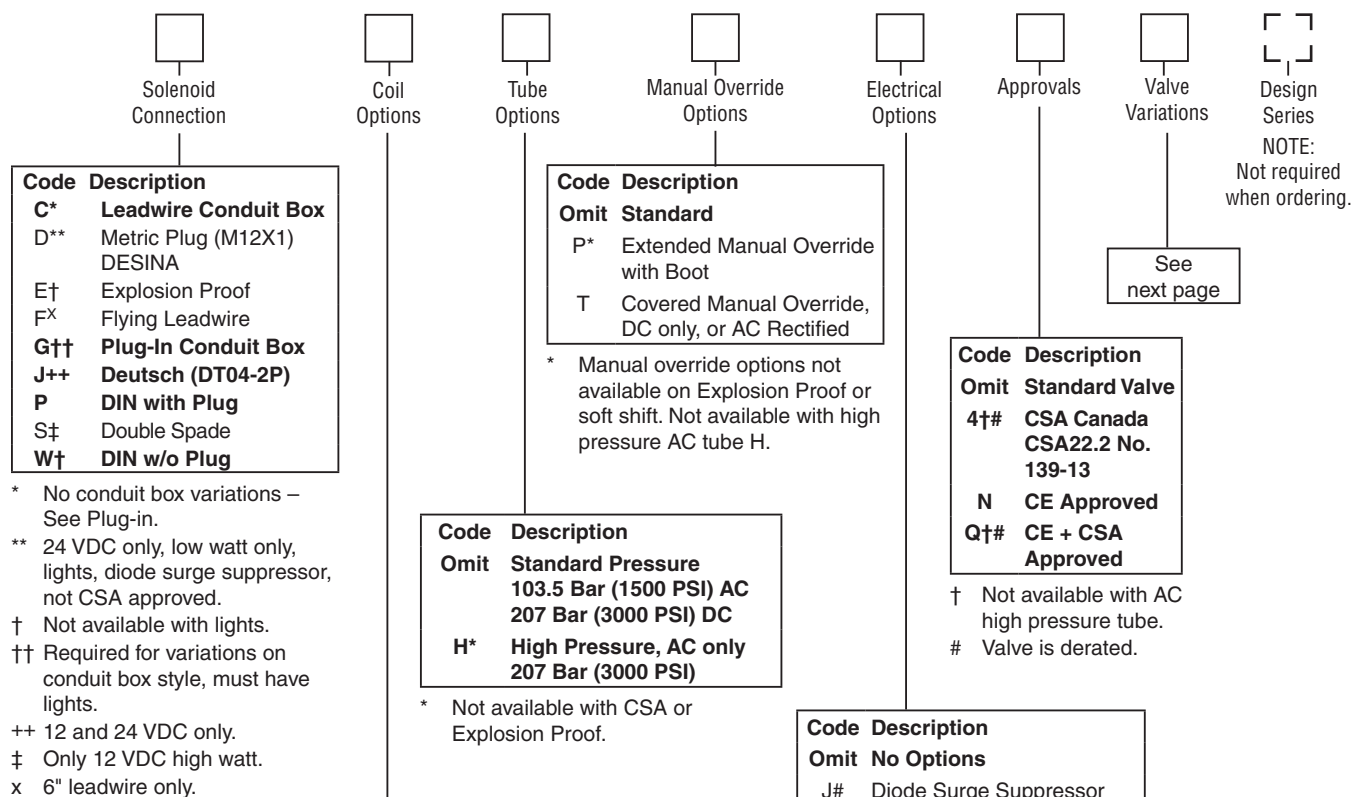
* 008 spool has closed crossover.
** 009 spool has open crossover.

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
R#	Explosion Proof, ATEX/UL/CSA/IECEX, configurable cable connection
T#	Explosion Proof, ATEX/UL/CSA/IECEX, fixed horizontal cable connection
U##	Explosion Proof, UL/CSA

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

Valve Weight:

Double Solenoid 12.1 kg (26.6 lbs.)

Seal Kit:

Nitrile SKD61VWN91
 Fluorocarbon SKD61VWV91

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

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

Mounting Bolt Kits

UNC Bolt Kits for use with D6 and D8 Directional Control Valves & 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.

Valve Variations

A

Code	Description
5*	Signal Lights – Standard
	Signal Lights – Hirsch. (DIN with plug) (the DC Lighted Plug has Integral Surge Supression)
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

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

** Must have plug-in style conduit box.

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

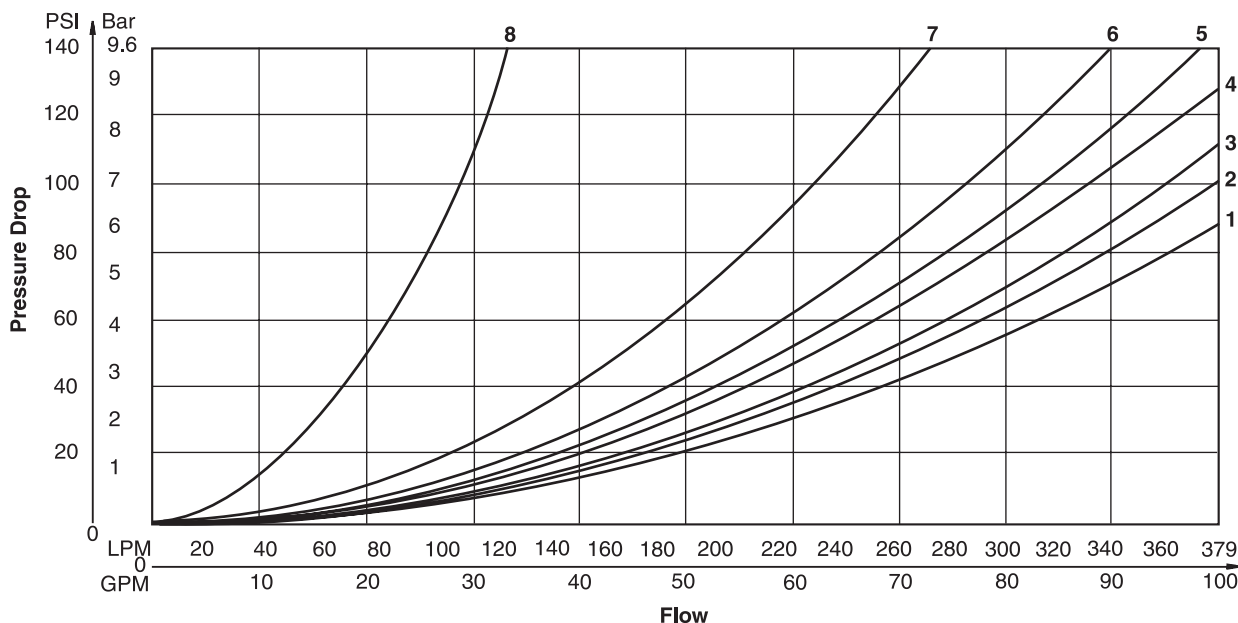
The following chart provides the flow vs. pressure drop curve reference for the Series D61V valves by spool type.

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



A

Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-10% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact 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 (ER, ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013; Ex d IIC Gb; Ex tb IIIC Db IP66; IECEx BAS 14.0164X ATEX: EN60079-0, EN60079-1, EN60079-31; CE 1180 Ex II 2G BASEEFA08ATEX0041X CSA 22.2 No. 60079-0:07, 60079-1:07 and UL 60079-0:05, UL 60079-1:05; CSA listed to US and Canada Safety Standards. File 08-CSA-1932102 CSA Ex d IIC, AEx d IIC for Class I Zone 1; Class I Div 1 Grp. C & D; Class II Div 1 Grp. E, F & G

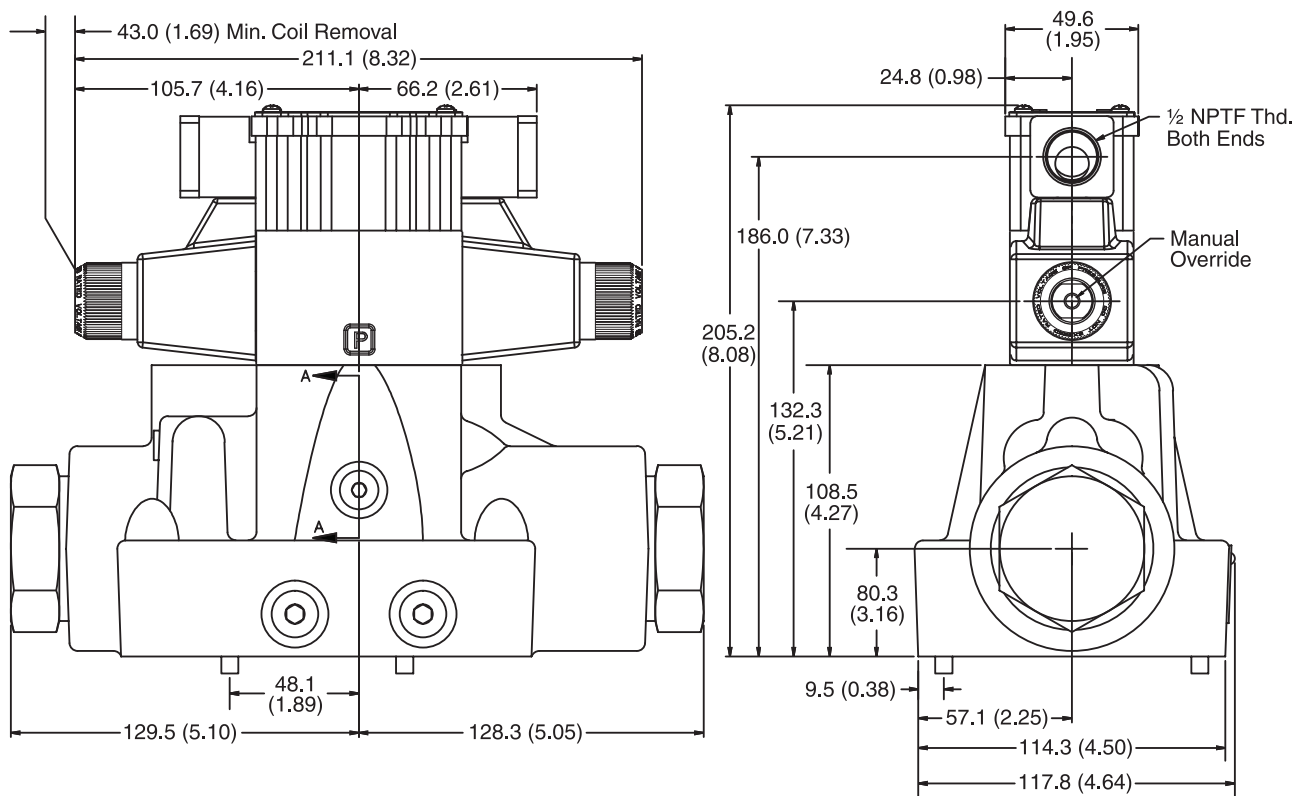
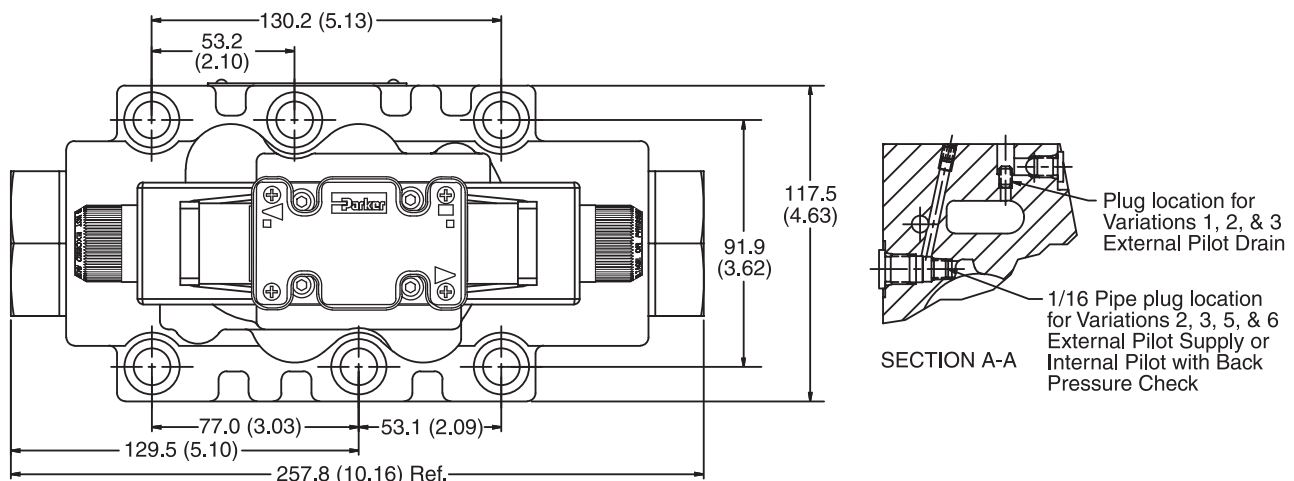
* Allowable Voltage Deviation $\pm 10\%$.

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
E	F	24 VAC	4.8 AMPS	120 VA	2.07 Amps	21 W	1.29 Ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 Ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 Ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 Ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 Ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 Ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 Ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 Ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 Ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 Ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 Ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 Ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 Ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 Ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 Ohms
Explosion Proof Solenoids							
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
ER & ET Explosion Proof Solenoids							
J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

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

Plug-in Conduit Box, Double AC Solenoid

A



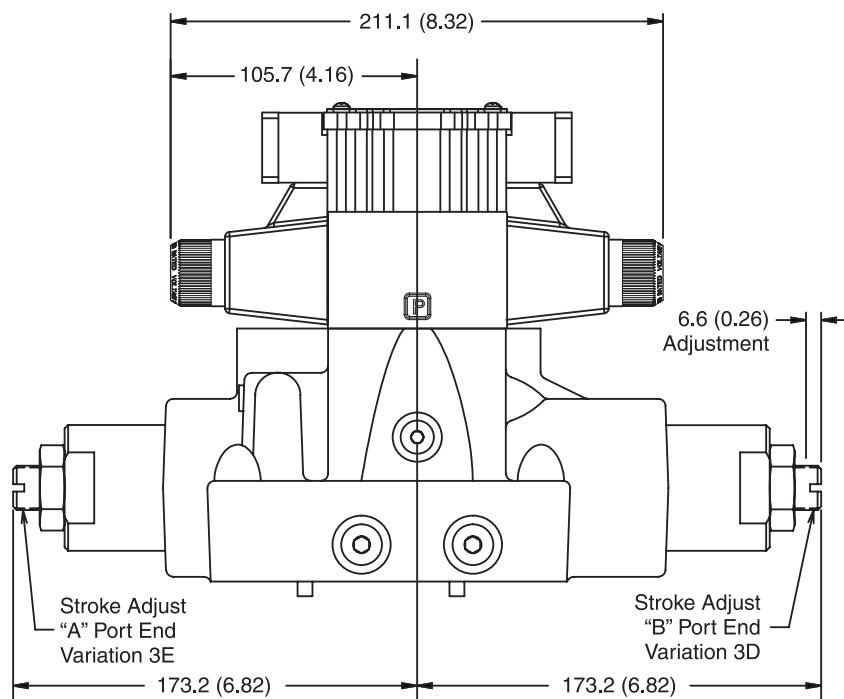
Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.



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

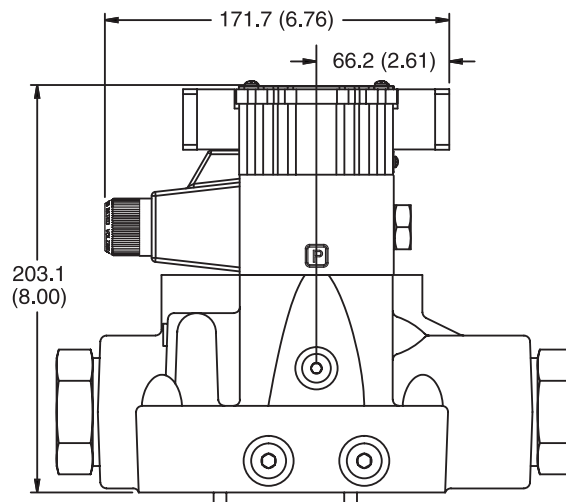
A

Plug-in Conduit Box and Stroke Adjust, Double AC Solenoid



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

Plug-in Conduit Box, Single AC Solenoid

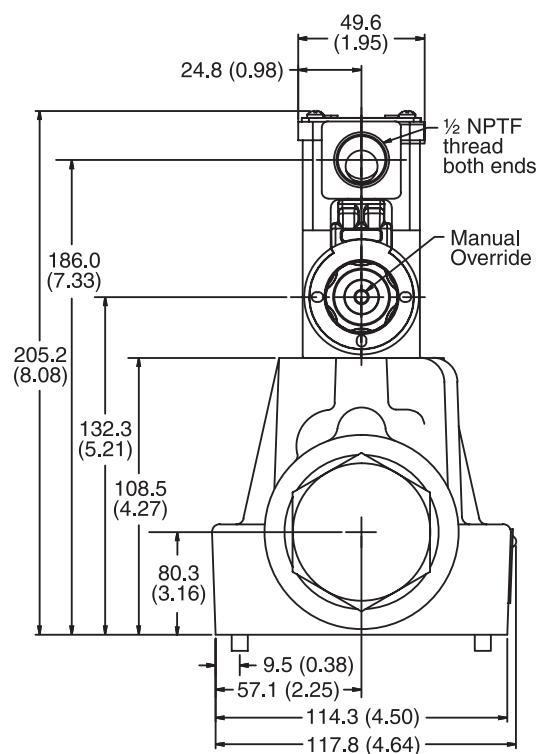
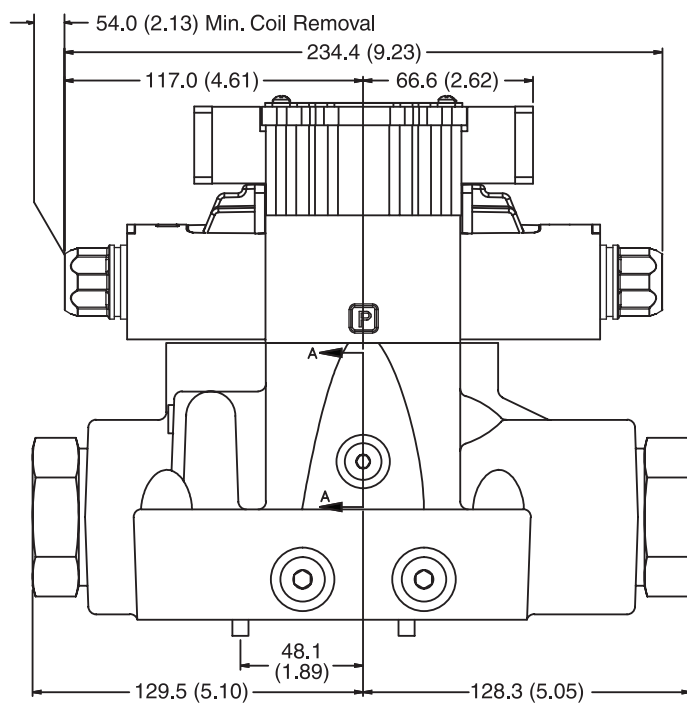
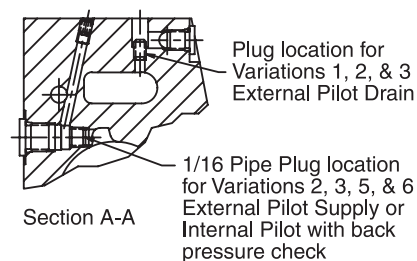
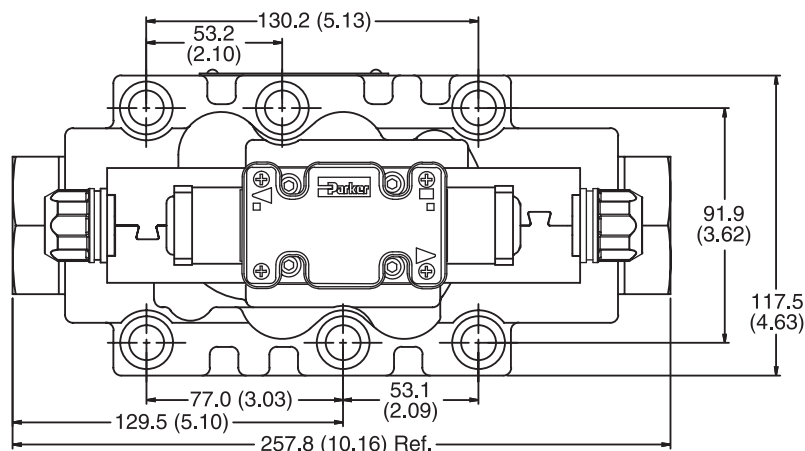


Note: 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.

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

Plug-in Conduit Box, Double DC Solenoid

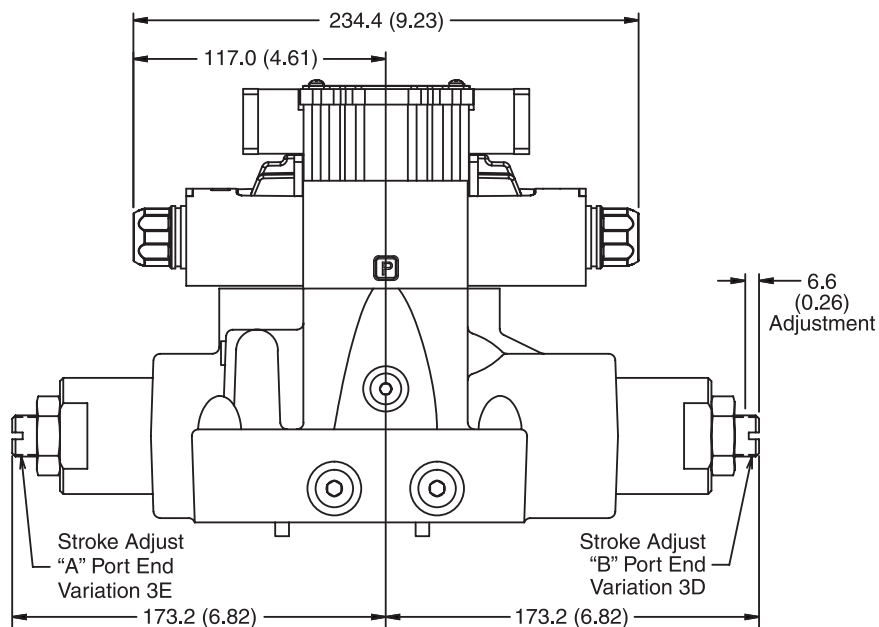
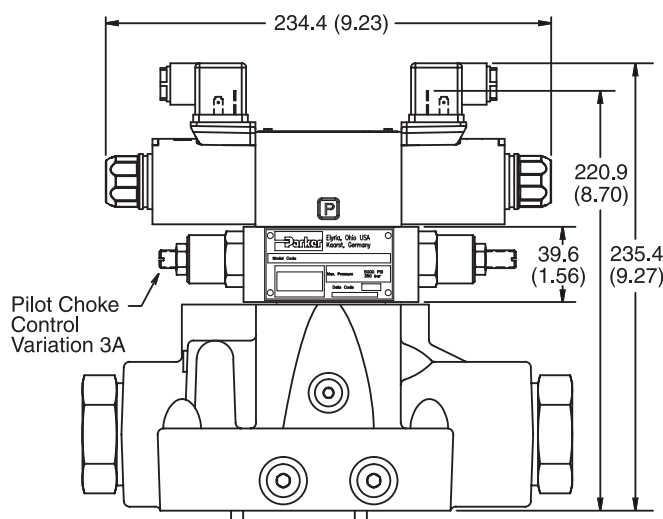
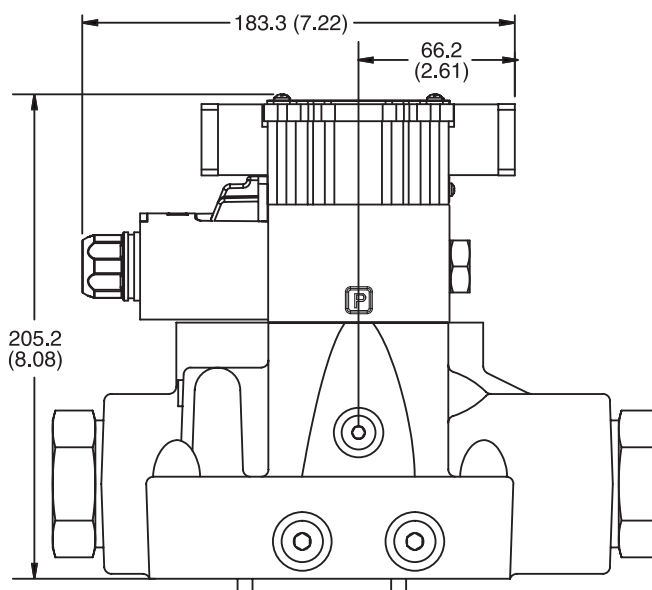
A



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

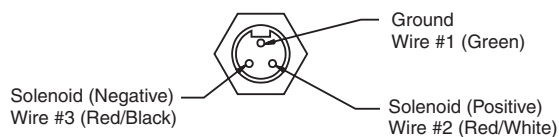


Inch equivalents for millimeter dimensions are shown in (**)

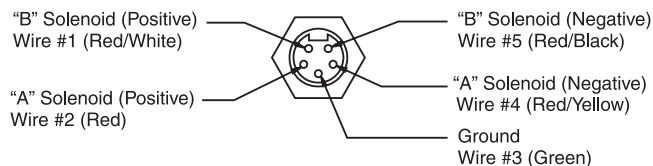
A**Plug-in Conduit Box and Stroke Adjust, Double DC Solenoid****Note:** 41.9mm (1.65") from bottom of bolt hole counterbore to bottom of valve.**Hirschmann and Pilot Choke Control, Double DC Solenoid****Plug-in Conduit Box, Single DC Solenoid**

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**

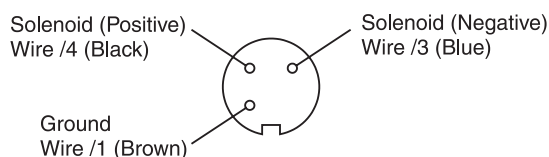
Single Solenoid Valves – Installed Opposite Side of Solenoid

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

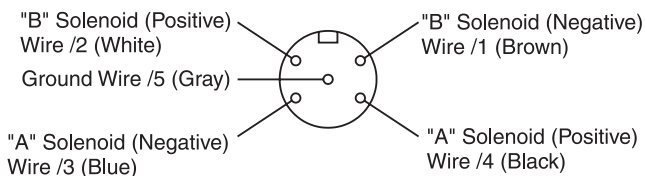
Single Solenoid Valves – Installed Opposite Side of Solenoid

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**

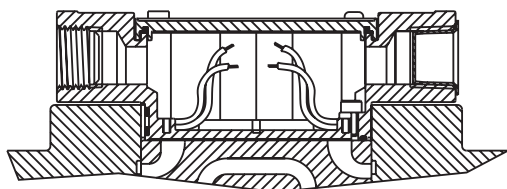
- EP336-30 3 Pin Plug
 EP316-30 5 Pin Plug (Double Solenoid)
 EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

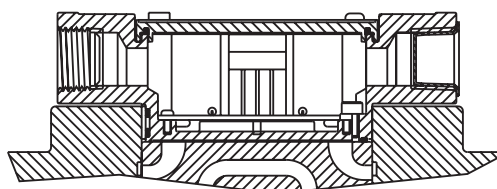
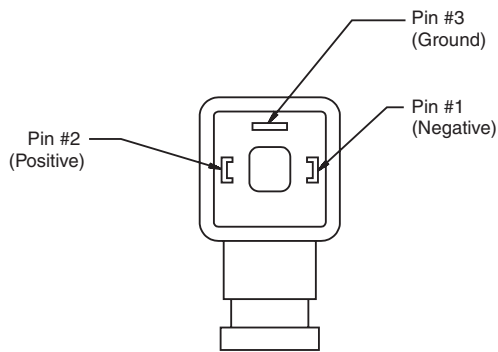
- EP337-30 3 Pin Plug
 EP317-30 5 Pin Plug (Double Solenoid)
 EP31B-30 5 Pin Plug (Single Solenoid)

Conduit Box Option C

- No Wiring Options Available

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

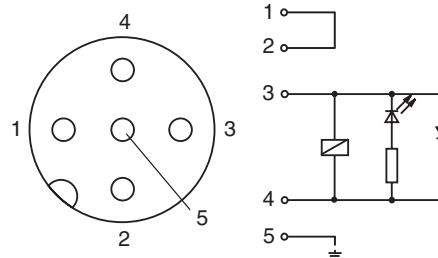
- LED Interface
 – Meets Nema 4/IP67

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

Face View of Plug

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

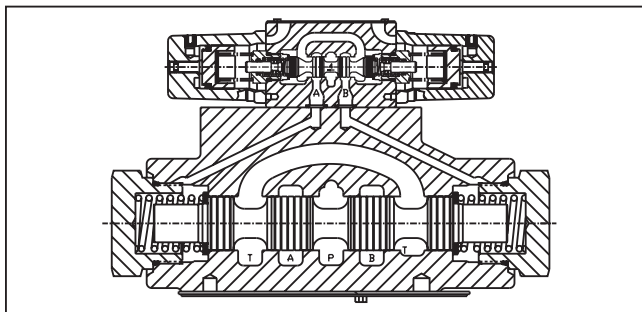
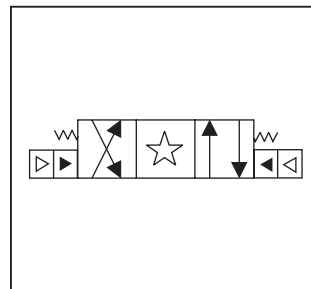
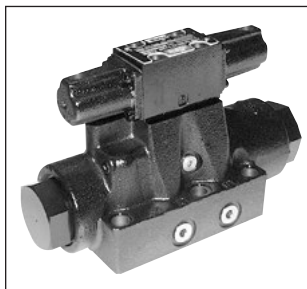
General Description

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																																																												
<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>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>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>		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>Omit</td> <td>Standard</td> </tr> <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	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	Symbol	Code	Symbol																																																									
001		011																																																										
004		012																																																										
008*																																																												
009**																																																												
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																																																											
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																																																											

* 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.

Valve Weight: 12.4 kg (27.3 lbs.)

Standard Bolt Kit: BK227

Metric Bolt Kit: BKM227

Seal Kit: Nitrile SKD61VA
 Fluorocarbon SKD61VAV

Code	Description	Symbol
B*	Single 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.	

* Not available on 008 and 009 spools.

This condition varies with spool code.

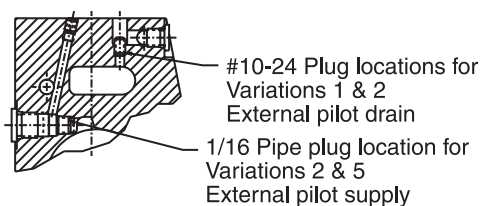
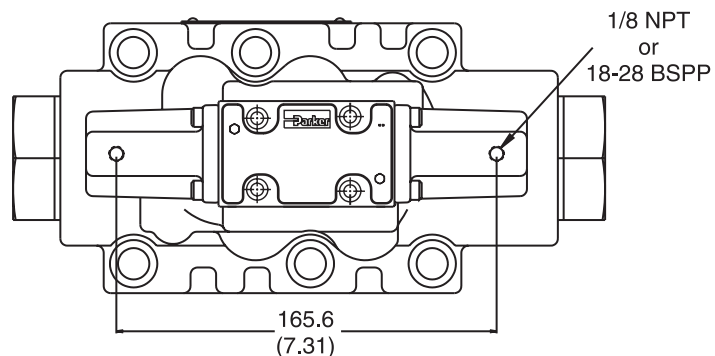
Bold: Designates Tier I products and options.

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

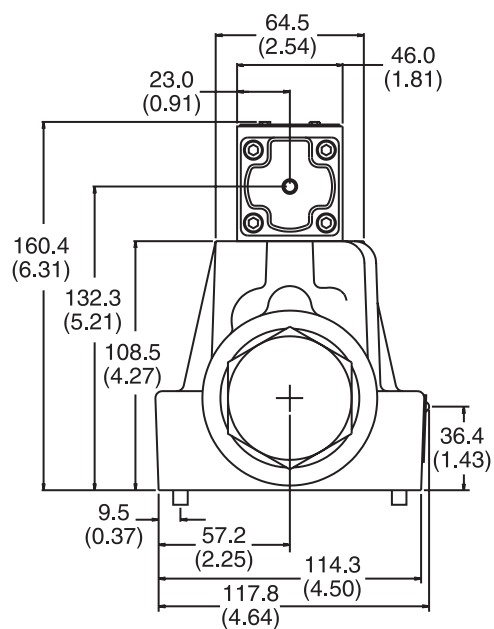
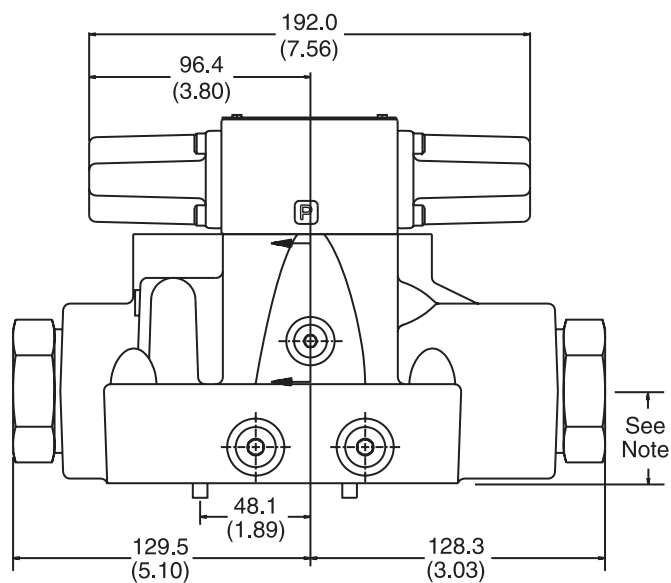
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information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

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> </tr> </thead> <tbody> <tr> <td>001</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> </tbody> </table>	Code	Symbol	001		004		008*		009**		<table border="1"> <thead> <tr> <th>Code</th> <th>Symbol</th> </tr> </thead> <tbody> <tr> <td>011</td> <td></td> </tr> <tr> <td>012</td> <td></td> </tr> </tbody> </table>	Code	Symbol	011		012		<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> # Not available with 008 & 009 spools.	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	NOTE: Not required when ordering.
Code	Symbol																																																		
001																																																			
004																																																			
008*																																																			
009**																																																			
Code	Symbol																																																		
011																																																			
012																																																			
Code	Description																																																		
1	Int. pilot/Ext. drain																																																		
2	Ext. pilot/Ext. drain																																																		
4#	Int. pilot/Int. drain																																																		
5	Ext. pilot/Int. drain																																																		
Code	Description																																																		
N	Nitrile																																																		
V	Fluorocarbon																																																		
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																																																		

* 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

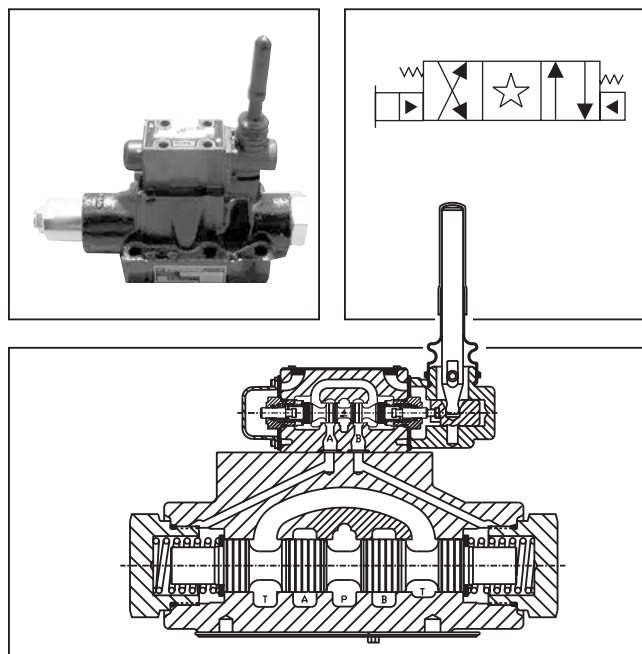
Code	Description	Symbol
B*	Single operator, 2 position, spring offset. P to A and B to T in offset position.	
C	Double operator, 3 position, spring centered.	
D*	Double operator, 2 position, detent.	
E	Single operator, 2 position, spring centered. P to B and A to T in shifted position.	
H*	Single operator,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

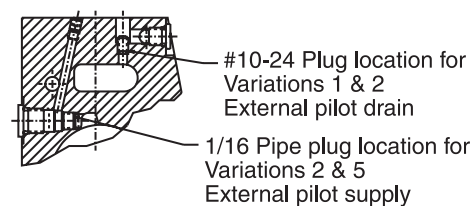
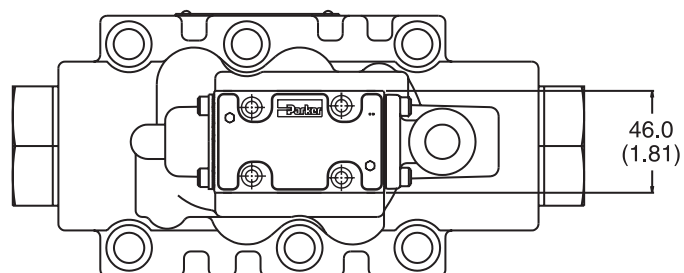


Features

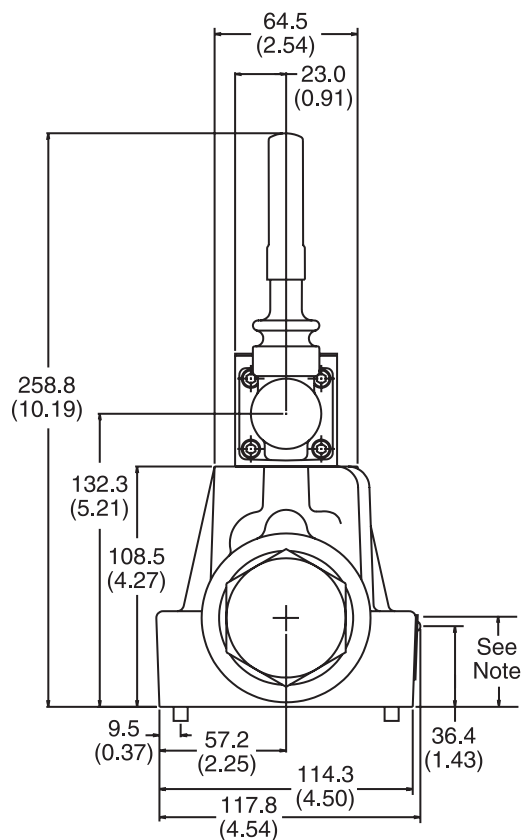
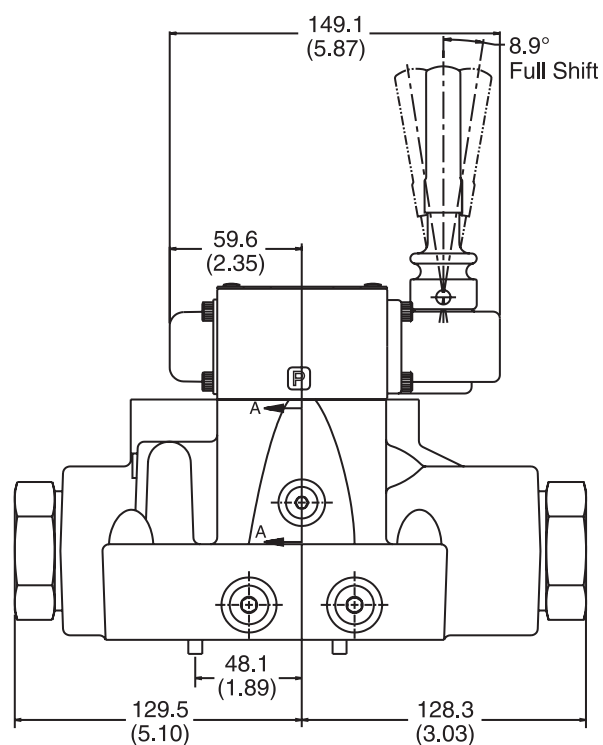
- Low force required to shift spool.
- Hardened spools provide long life.
- Low pressure drop design.

Dimensions**Directional Control Valves
Series D61VL**

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



SECTION A-A



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



General Description

A

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

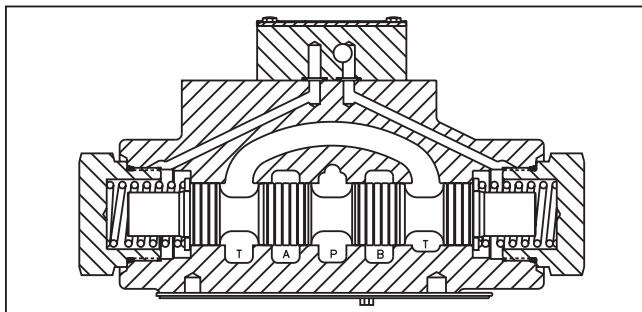
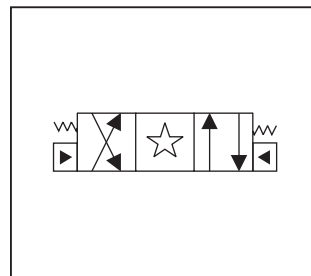
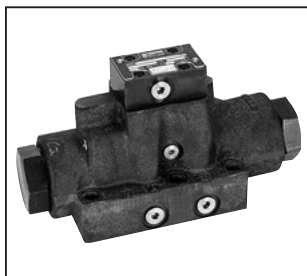
- Low pressure drop design.
- Hardened spools provide long life.
- Fast response option available.

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

D Directional Control Valve	6 Basic Valve	P Hydraulic Pilot	Spool	Style	Pilot Supply and Drain	Seal	Valve Variations	Design Series																																														
NFPA D08 CETOP 8																																																						
<table border="1" style="width: 100%; border-collapse: collapse;"> <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" style="width: 100%; border-collapse: collapse;"> <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" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>Ext. Pilot — Ext. Drain</td> </tr> <tr> <td>5#</td> <td>Ext. Pilot — Int. Drain</td> </tr> </tbody> </table> # Available in "B" & "H" styles only.			Code	Description	2	Ext. Pilot — Ext. Drain	5#	Ext. Pilot — Int. Drain	<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>20</td> <td>Fast Response</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	20	Fast Response	60	Pilot Choke — Meter In	89	Stroke Adj. 'A' & 'B' Ends
Code	Symbol	Code	Symbol																																																			
001		011																																																				
004		012																																																				
008*																																																						
009**																																																						
Code	Description																																																					
N	Nitrile																																																					
V	Fluorocarbon																																																					
Code	Description																																																					
2	Ext. Pilot — Ext. Drain																																																					
5#	Ext. Pilot — Int. Drain																																																					
Code	Description																																																					
7	Pilot Choke — Meter Out																																																					
8	Stroke Adj. 'B' End																																																					
9	Stroke Adj. 'A' End																																																					
20	Fast Response																																																					
60	Pilot Choke — Meter In																																																					
89	Stroke Adj. 'A' & 'B' Ends																																																					
* 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 008 and 009 spools. See installation information for details. Valve Weight: 11.0 kg (24.2 lbs.) Standard Bolt Kit: BK227 Metric Bolt Kit: BKM227		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Description</th> <th>Symbol</th> </tr> </thead> <tbody> <tr> <td>B*</td> <td>Single operator, 2 position, spring offset. P to A and B to T in offset position.</td> <td></td> </tr> <tr> <td>C</td> <td>Double operator, 3 position, spring centered.</td> <td></td> </tr> <tr> <td>H*</td> <td>Single operator, 2 position, spring offset. P to B and A to T in offset position.</td> <td></td> </tr> </tbody> </table> * Not available with 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.		H*	Single operator, 2 position, spring offset. P to B and A to T in offset position.		This condition varies with spool code.																																					
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.																																																					

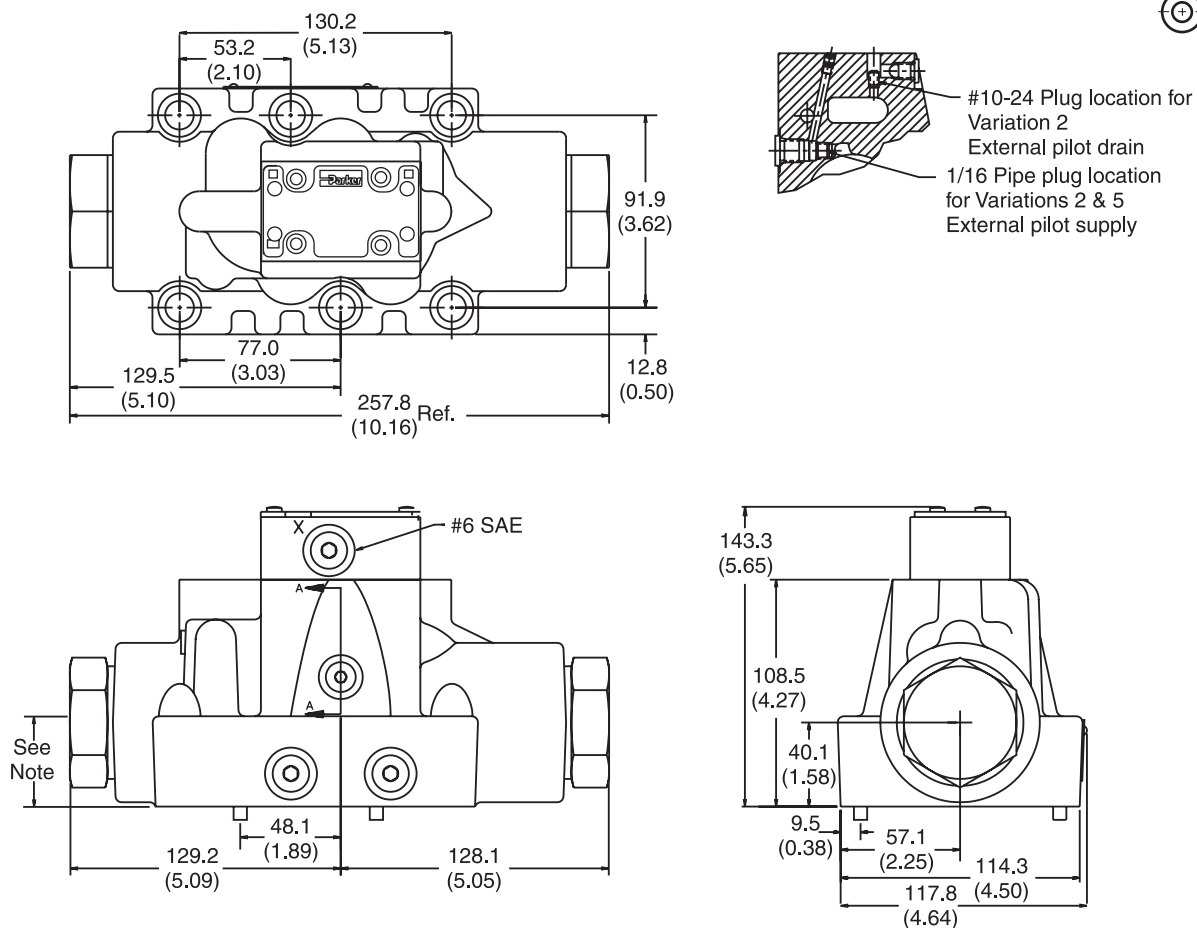
Bold: Designates Tier I products and options.

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

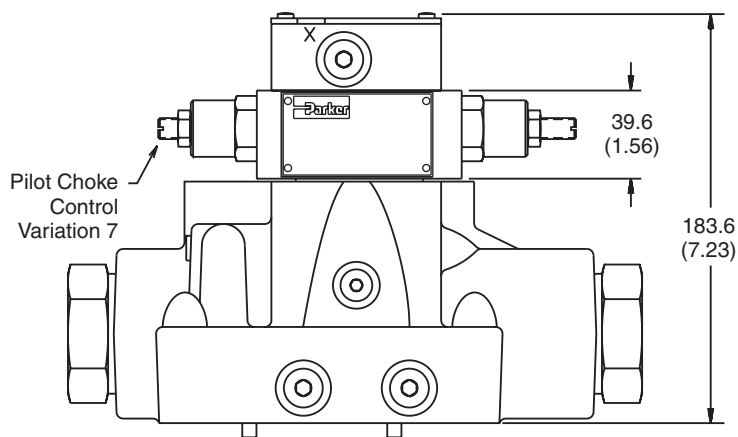
WARNING: This product can expose you to chemicals including Lead, Nickel (Metallic), or 1,3-Butadiene which are known to the State of California to cause cancer, and Lead or 1,3-Butadiene which is known to the State of California to cause birth defects and other reproductive harm. For more information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

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

Standard Pilot Operated

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

Pilot Operated with Pilot Choke Control

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

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
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.

A

Series D6P

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).

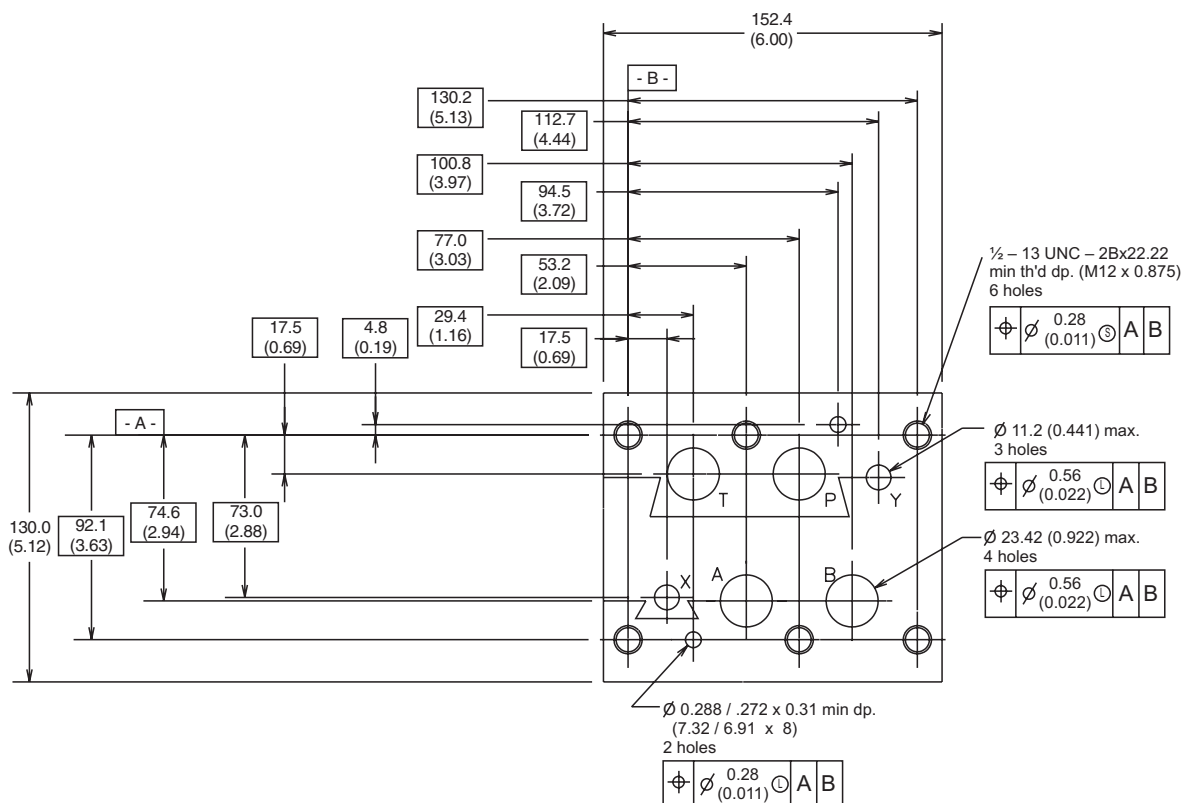
Mounting Position

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**

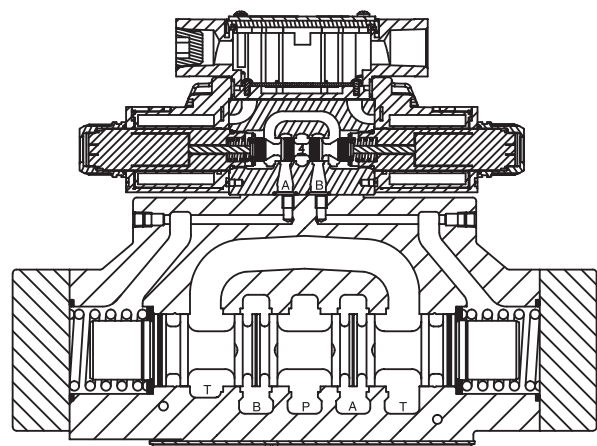
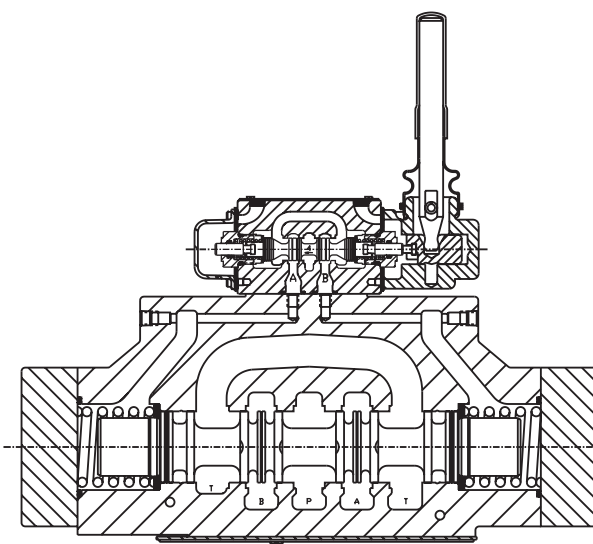
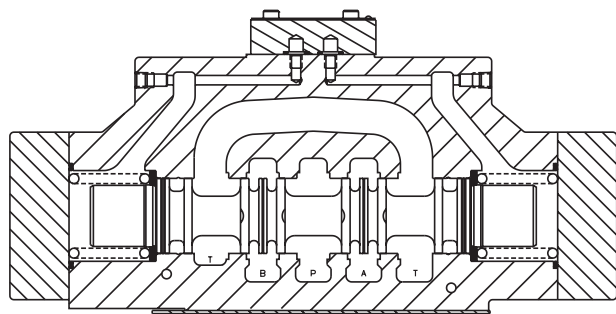
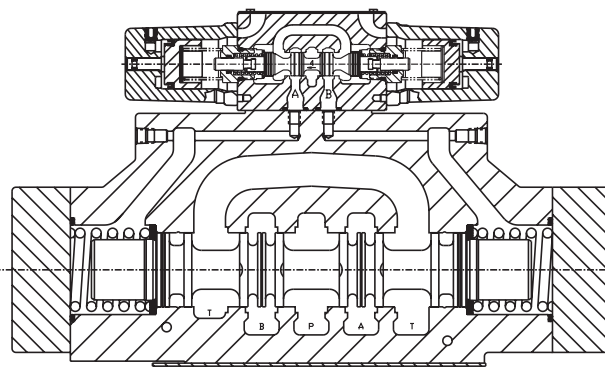
Series D81 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles and are manifold mounted. These valves conform to NFPA's D08, CETOP 8 mounting pattern.

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.

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

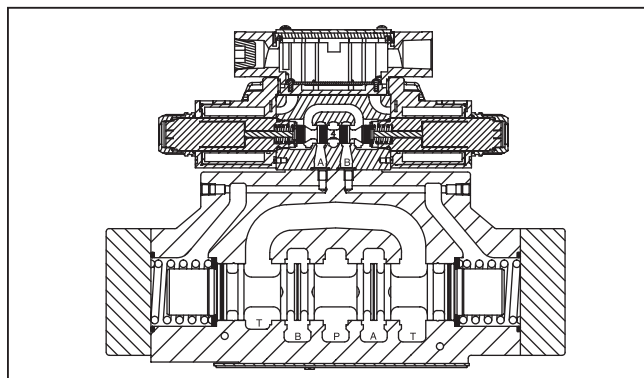
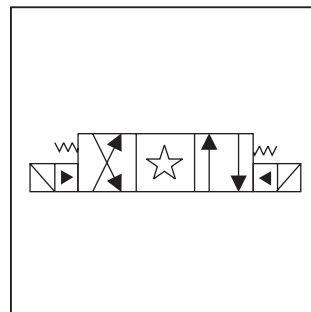
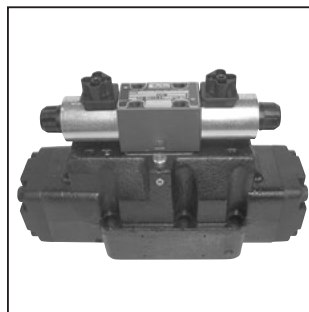
- Low pressure drop design.
- Hardened spools provide long life.
- Fast response option available.
- Wide variety of voltages and electrical connection options.
- Explosion proof availability.
- No tools required for coil removal.

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.



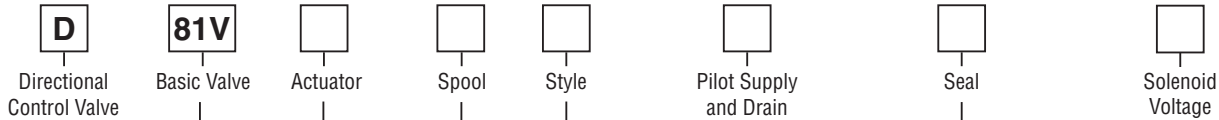
Response Time

Response times (milliseconds) are measured at 345 Bar (5000 PSI) and 300 LPM (80 GPM) with various pilot pressures as indicated.

Solenoid Type	Pilot Pressure	Pull-In		Drop-Out	
		Std	Fast	Std	Fast
DC	500	140	100	70	70
	1000	125	90	76	76
	2000	100	70	70	70
AC	500	100	60	60	60
	1000	85	50	60	60
	2000	60	30	60	60

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

A



NFPA D08
 CETOP 8
 DIN NG25
 High Flow, D03 Pilot

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

* To configure per DIN standards (A coil over A port, B coil over B port) code valves as D81VHW***.

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
N	Nitrile
V	Fluorocarbon

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

* Not available with 002, 008, 009 & 030 spools.

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

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

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.


 Solenoid Connection


 Coil Options


 Tube Options


 Manual Override Options*


 Electrical Options


 Shift Indication


 Approvals


 Valve Variations


 Monitor Switch Cover


 Design Series
 NOTE:
 Not required when ordering.

Code Description

C* **Leadwire Conduit Box**

D** Metric Plug (M12X1) DESINA

E† Explosion Proof

F^x Flying Leadwire

G†† **Plug-In Conduit Box**

J++ **Deutsch (DT04-2P)**

P **DIN with Plug**

S‡ Double Spade

W† **DIN w/o Plug**

* No conduit box variations – See Plug-in.

** 24 VDC only, low watt only, lights, diode surge suppressor, not CSA approved.

† Not available with lights.

†† Required for variations on conduit box style, must have lights.

++ 12 and 24 VDC only.

‡ Only 12 VDC high watt.

x 6" leadwire only.

Code Description

Omit No Options

J# Diode Surge Suppressor

Z† Rectified Coil

Plug-In – 24 VDC only.

DIN – DC only with Lighted Plug (5), which has integrated Surge Suppression. "J" not required here.

Deutsch – as follows:

- 12 VDC Hi watt only
- 24 VDC Hi & Lo watt

24 VDC "JER" required. "JET" available. Adds dust rating, not polarity sensitive [IIC, D].

Leadwire – not available

† DC tube standard, Plug-In conduit box only. Not polarity sensitive. Only available with Y voltage.

Code Description

Omit No Variation

4B Monitor Switch Cover

Code Description

Omit Standard

P* Extended Manual Override with Boot

T Covered Manual Override, DC only, or AC Rectified

* Manual override options not available on Explosion Proof or soft shift. Not available with high pressure AC tube H.

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

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

Valve Weight:
 Double Solenoid 19.6 kg (43.2 lbs.)

Seal Kit:
 Nitrile SKD81VWN91
 Fluorocarbon SKD81VWV91

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

* Manual override options not available on Explosion Proof or soft shift. Not available with high pressure AC tube H.

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

* Not available with CSA or Explosion Proof.

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

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

Mounting Bolt Kits

UNC Bolt Kits for use with D6 and D8 Directional Control Valves & 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.

Valve Variations

A

OPTIONS ARE NOT AVAILABLE ON MONITOR SWITCH VALVES.

Code	Description
5*	Signal Lights – Standard
	Signal Lights – Hirsch. (DIN with Plug) (the DC Lighted Plug has Integral Surge Suppression)
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

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

** Must have plug-in style conduit box.

Reference Data

Model	Spool Symbol	Maximum Flow, LPM (GPM) 345 Bar (5000 PSI) w/o Malfunction
D81V*001		624 (160)
D81V*002		624 (160)
D81V*003		624 (160)
D81V*004		624 (160)
D81V*006		624 (160)
D81V*008 D61V*009		312 (80)
D81V*011		624 (160)
D81V*012		312 (80)
D81V*015		624 (160)
D81V*016		624 (160)
D81V*020 D81V*030		624 (160)

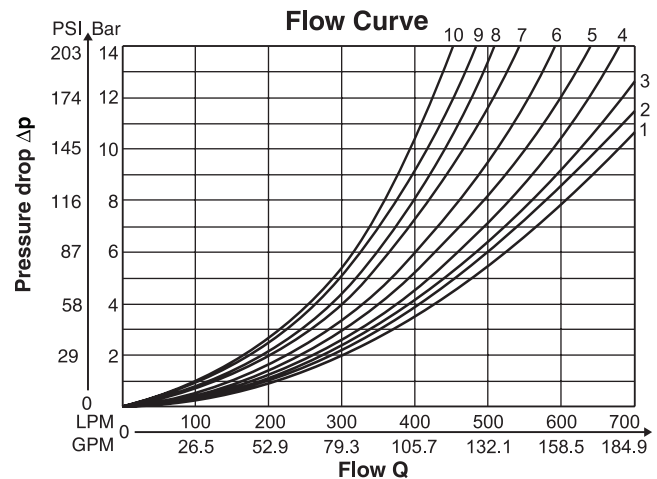
D81V* Series Pressure Drop Chart

The following chart provides the flow vs. pressure drop curve reference for the Series D81V* valve by spool type.

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

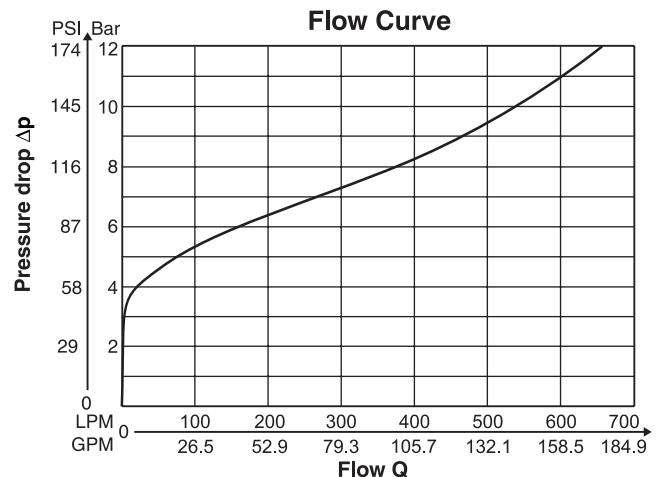
Spool Code	Curve Number				
	P-A	P-B	P-T	A-T	B-T
001	3	2	—	3	5
002	2	1	1	3	5
003	4	2	—	3	6
004	4	3	—	3	5
005	1	2	—	4	5
006	2	2	—	4	6
007	3	1	7	3	5
009	4	8	9	4	10
011	3	2	—	3	5
014	1	2	8	3	5
015	3	3	—	4	5
016	3	3	—	4	5
020	6	5	—	6	8
021	5	10	—	3	—
022	10	5	—	—	5
026	6	5	—	—	—
030	3	2	—	3	5
054	4	3	—	3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

D81VW Performance Curves



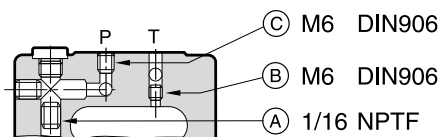
Integral Check Valve in the P Port

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



All characteristic curves measured with HLP46 at 50°C.

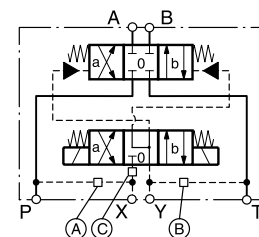
Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

Pilot oil		A	B	C
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



A

Solenoid Ratings

Insulation System	Class F
Allowable Deviation from rated voltage	-10% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
Armature	Wet pin type
CSA File Number	LR60407
Environmental Capability	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact 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 (ER, ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013; Ex d IIC Gb; Ex tb IIIC Db IP66; IECEx BAS 14.0164X ATEX: EN60079-0, EN60079-1, EN60079-31; CE 1180 Ex II 2G BASEEFA08ATEX0041X CSA 22.2 No. 60079-0:07, 60079-1:07 and UL 60079-0:05, UL 60079-1:05; CSA listed to US and Canada Safety Standards. File 08-CSA-1932102 CSA Ex d IIC, AEx d IIC for Class I Zone 1; Class I Div 1 Grp. C & D; Class II Div 1 Grp. E, F & G

* Allowable Voltage Deviation $\pm 10\%$.

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
E	F	24 VAC	4.8 AMPS	120 VA	2.07 Amps	21 W	1.29 Ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 Ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 Ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 Ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 Ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 Ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 Ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 Ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 Ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 Ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 Ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 Ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 Ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 Ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 Ohms
Explosion Proof Solenoids							
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
ER & ET Explosion Proof Solenoids							
J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

Single Solenoid Valves

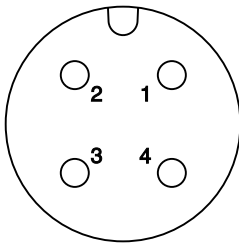
Electrical Specifications of Position Control as per IEC 61076-2-101 (M12x1)

A

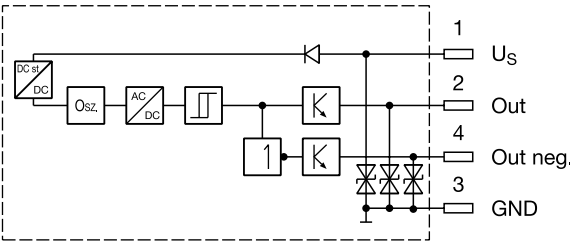
Protection Class		IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Ambient Temperature	[°C]	-20...+60; (-4°F...140°F)
Supply Voltage / Ripple	[V]	24 ≤10%
Tolerance Supply Voltage	[%]	±20
Polarity Protection	[V]	300
Current Consumption without Load	[mA]	≤ 20
Switching Hysteresis	[mm]	<0.06
Max. Output Current per Channel, Ohmic	[mA]	250
Min. Distance to Next AC Solenoid	[m]	0.1 (0.33 ft.)
Interface		M12x1 to IEC 61076-2-101
Wiring Minimum	[mm²]	5 x 0.25 brad shield recommended
Wiring Length Maximum	[m]	50 (164 ft.) recommended
CE Conform		EN 61000-4-2/EN 61000-4-4/EN 61000-4-6 ¹⁾ /ENV 50140/ENV 50240

1) Only guaranteed with screened cable and female connector.

M12 Pin Assignment



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



Outputs: Open collector

Definitions

Start position monitored:

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

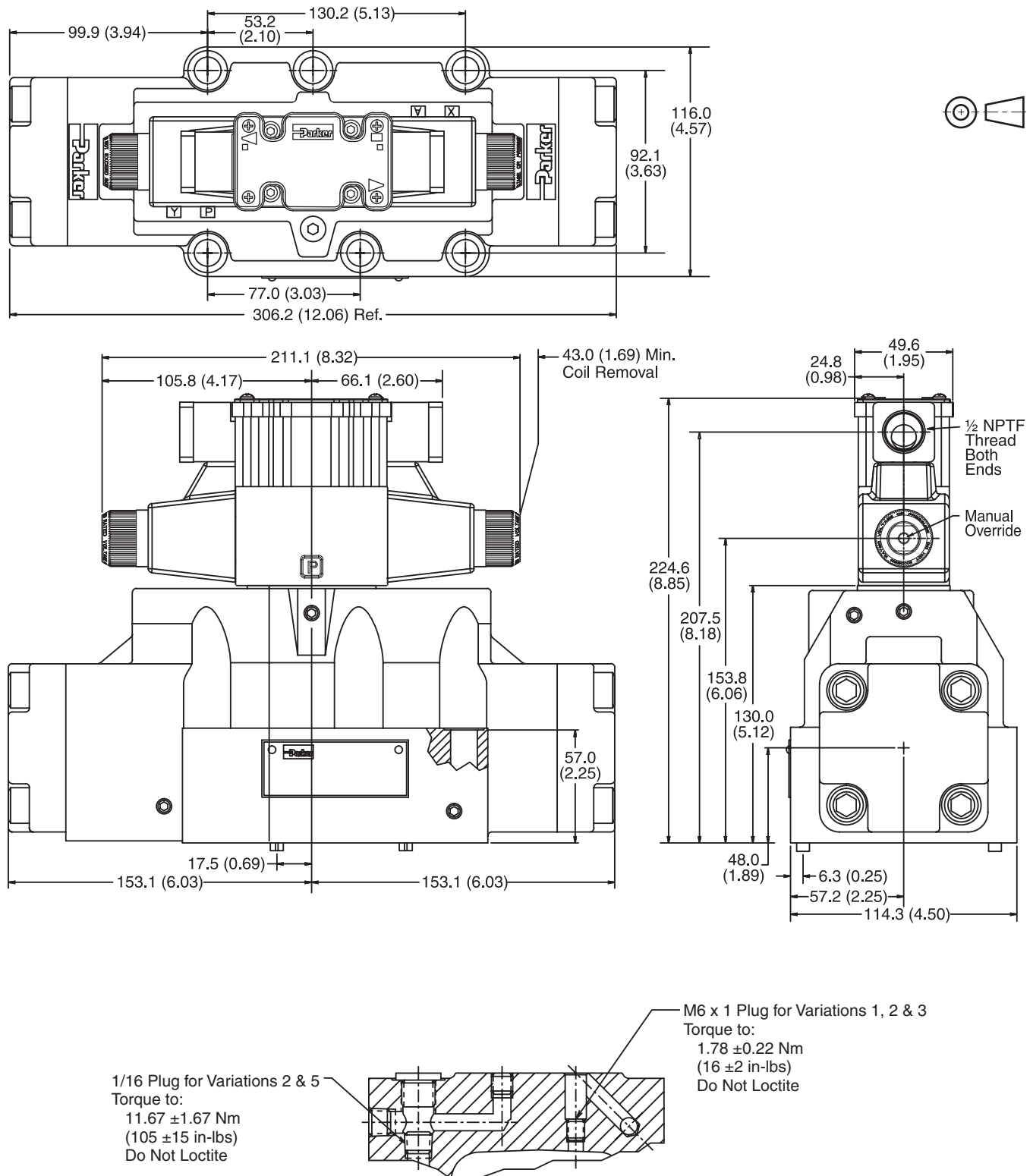
At the switching point the spool is located within the closed position. It is secured so that only the flow paths of the offset position are granted.

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

End position monitored:

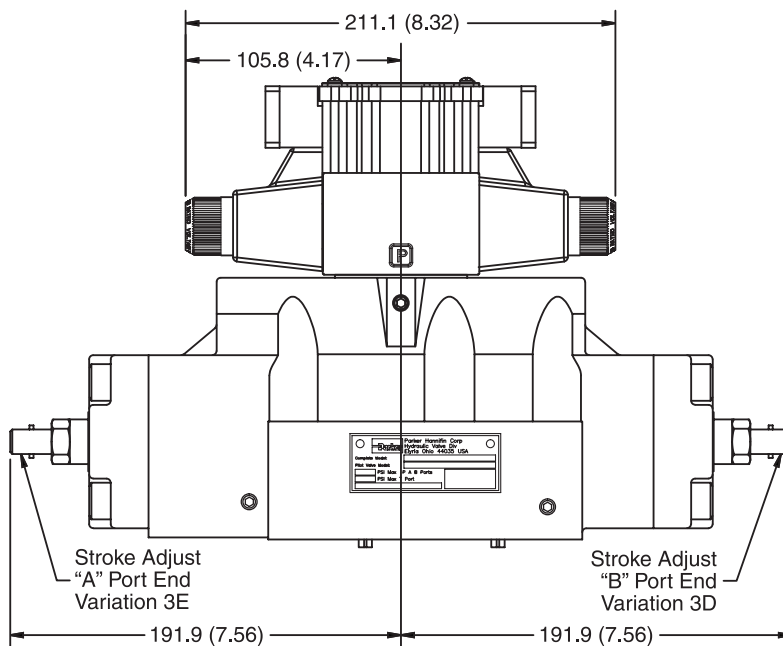
The inductive switch gives a signal before the end position is reached. (above 85% spool stroke).

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

A**Plug-in Conduit Box, Double AC Solenoid****Note:** 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

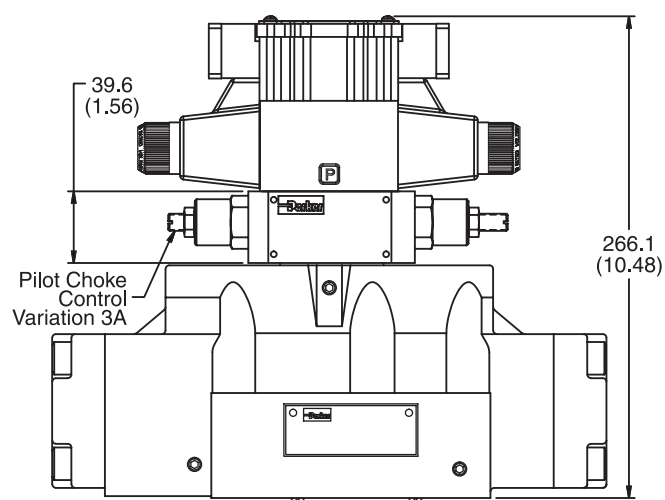
Inch equivalents for millimeter dimensions are shown in (**)

Conduit Box and Stroke Adjust, Double AC Solenoid

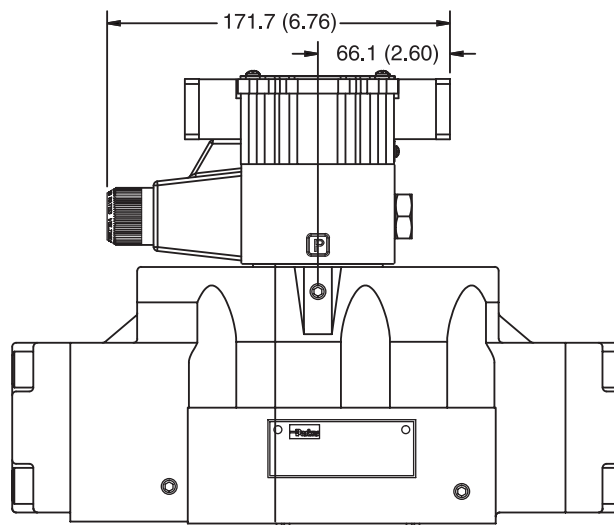
A


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

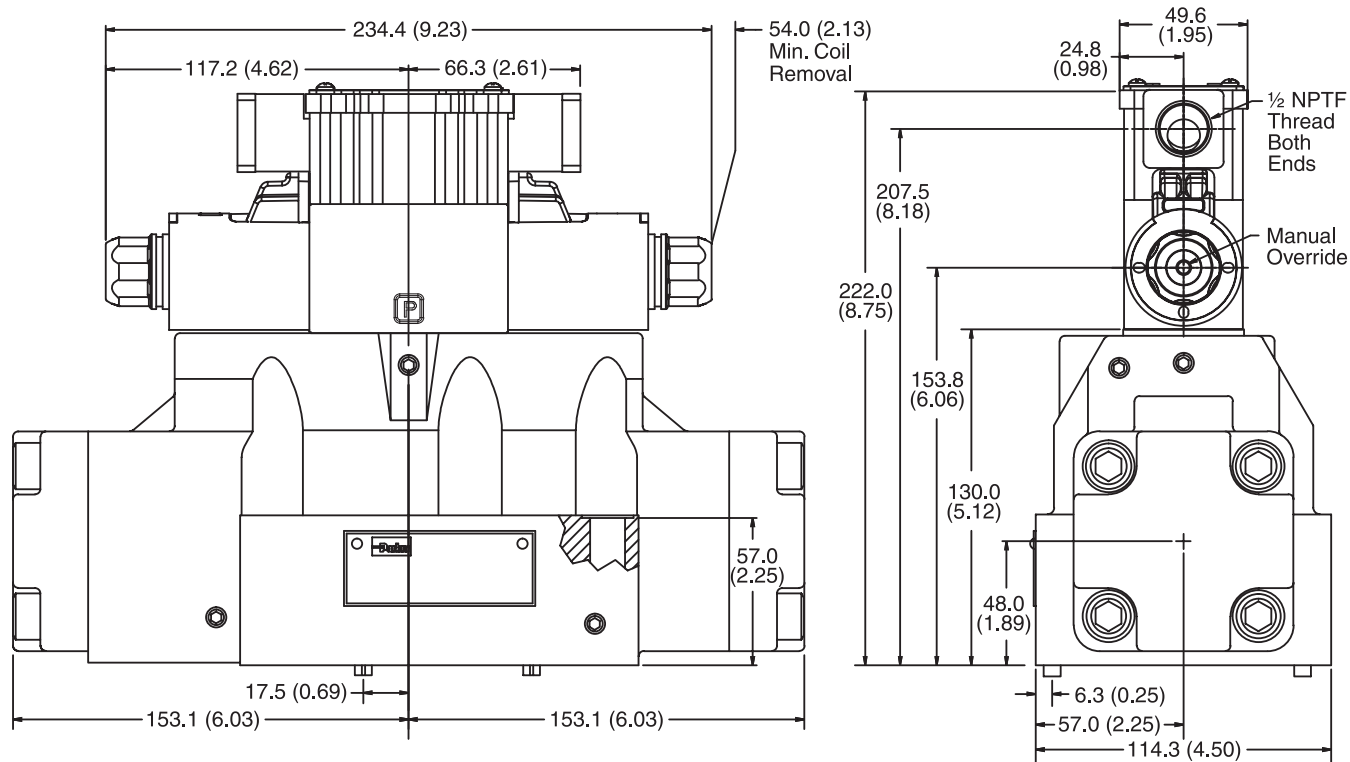
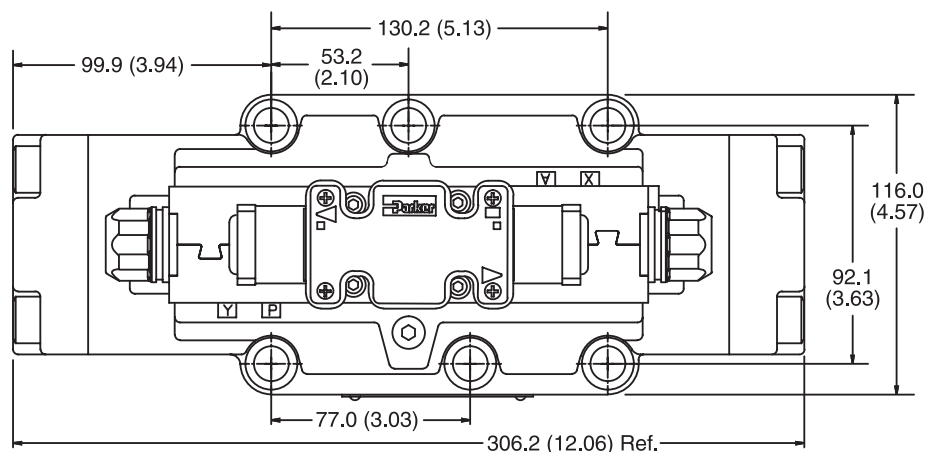
Conduit Box and Pilot Choke Control, Double AC Solenoid



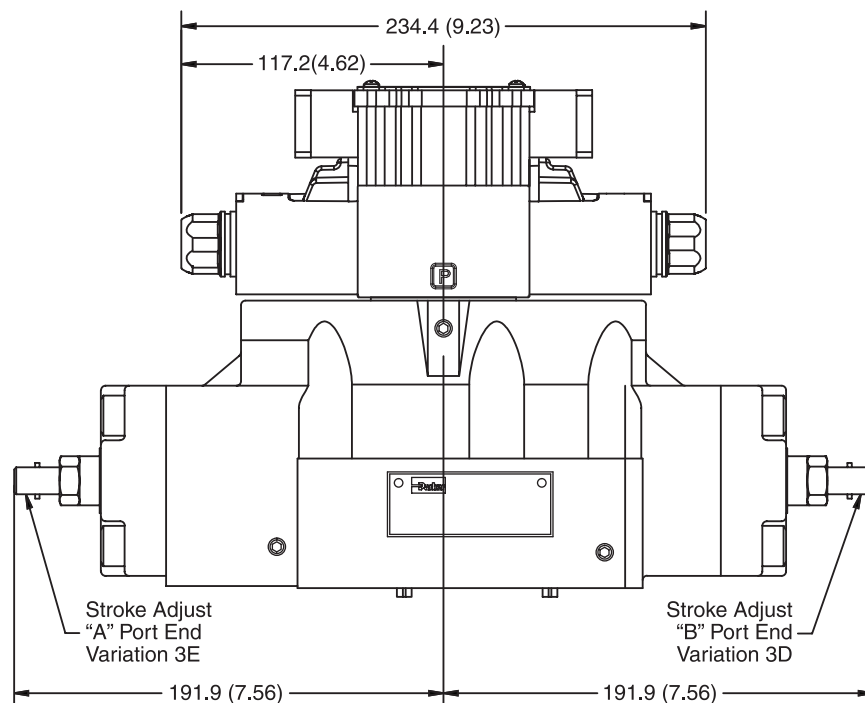
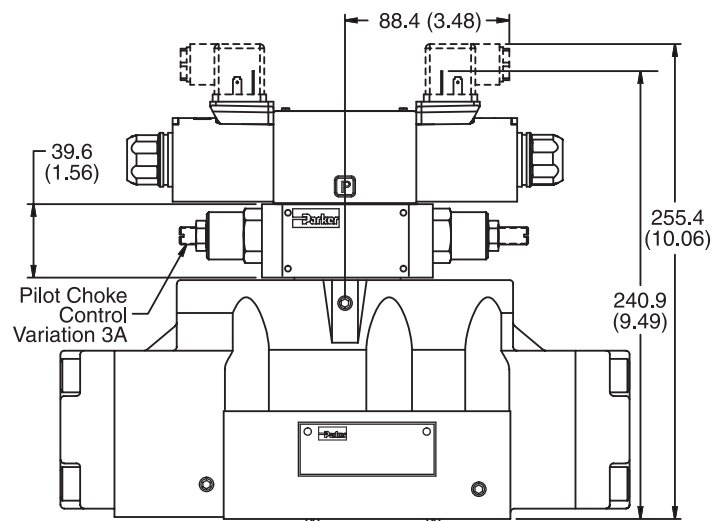
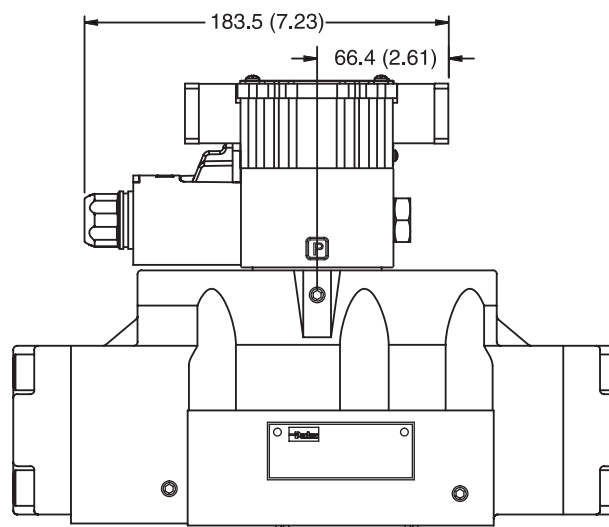
Conduit Box, Single AC Solenoid



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

A**Plug-In Conduit Box, Double DC Solenoid****Note:** 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

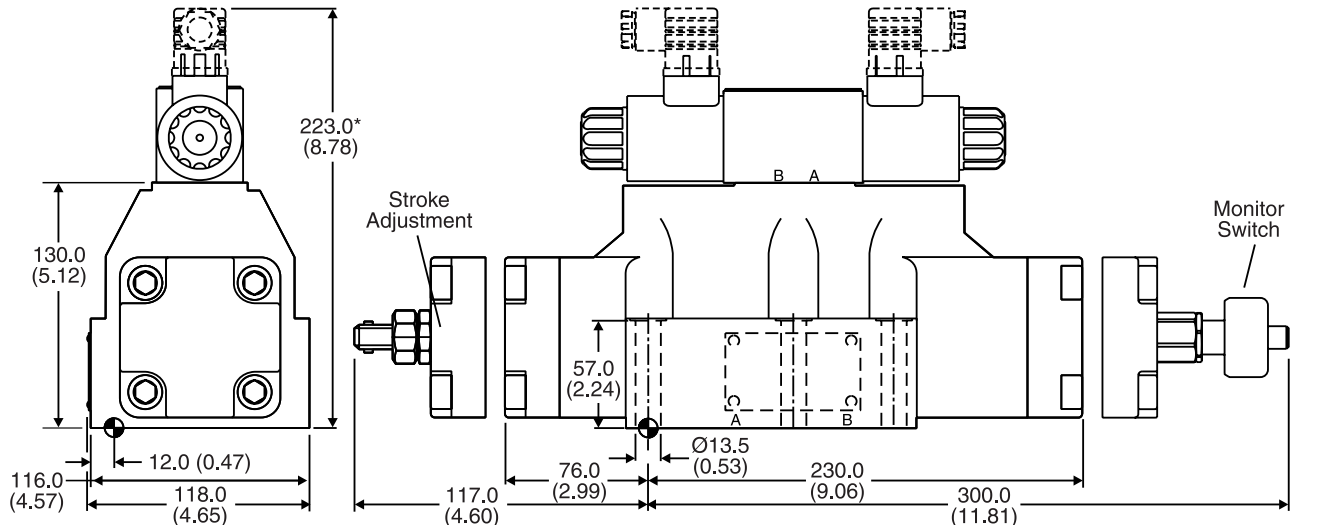
Inch equivalents for millimeter dimensions are shown in (**)

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

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

A

Series D81VW



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

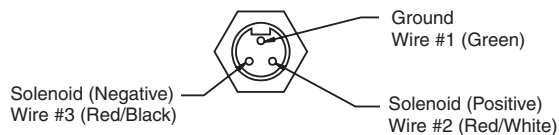


Surface Finish	Kit			Seal Kit
	BK360	6x M12x75 ISO 4762-12.9	108 Nm (79.7 lb.-ft.) ±15%	Nitrile: SK-D81VW-N-91 Fluorocarbon: SK-D81VW-V-91

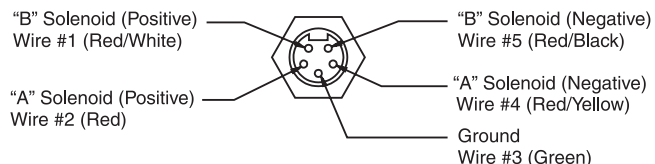
The space necessary to remove the plug per DIN 43650, design type AF is at least 15 mm (0.59").
The torque for the screw M3 of the plug has to be 0.5 Nm (0.37 lb.-ft.) to 0.6 Nm (0.44 lb.-ft.).

Manaplug (Options 56 & 1C)

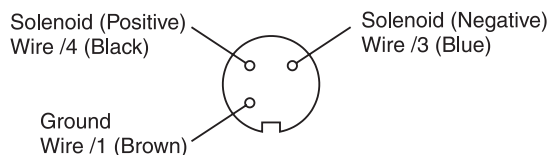
- Interface — Brad Harrison Plug
- 3-Pin for Single Solenoid
 - 5-Pin for Double Solenoid

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

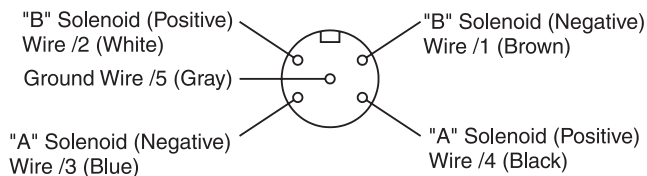
Single Solenoid Valves — Installed Opposite Side of Solenoid

**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**

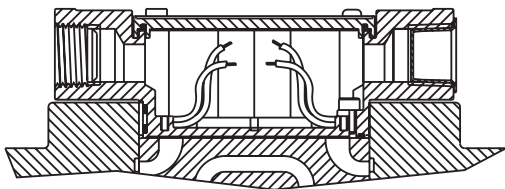
Single Solenoid Valves — Installed Opposite Side of Solenoid

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

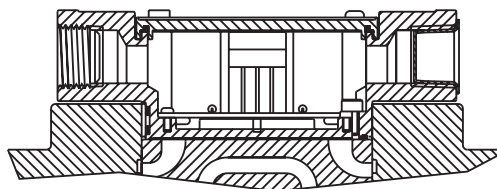
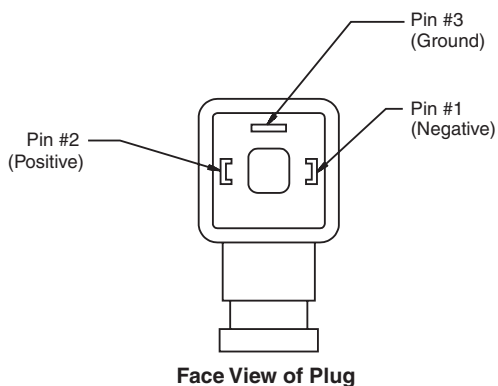
Single Solenoid Valves — Installed Opposite Side of Solenoid
 Double Solenoid Valves — Installed Over "A" Solenoid
 ("A" and "B" Solenoids Reversed for #8 and #9 Spools)

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

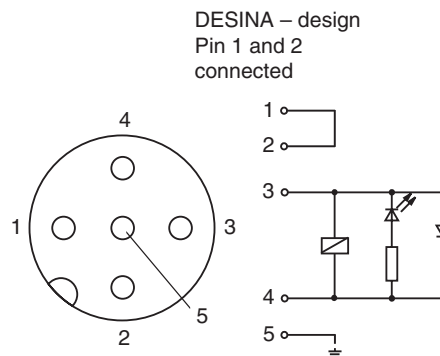
- No Wiring Options Available

**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)**

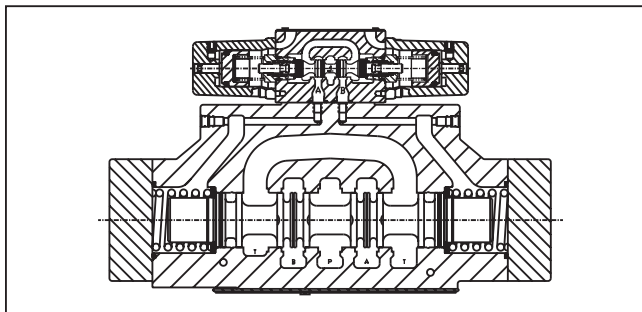
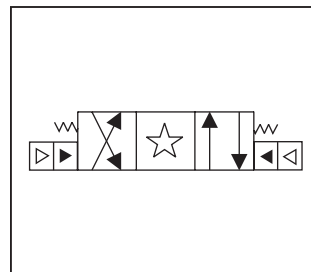
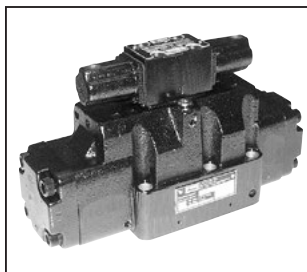
General Description

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

D Directional Control Valve	81V Basic Valve NFPA D08 CETOP 8 DIN NG25	A Air Operated Pilot	Spool	Style	Pilot Supply and Drain	Seal	Valve Variations	Design Series NOTE: Not required when ordering.
--	--	---	---	---	--	--	--	--

<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> * 020 spool has closed crossover. ** 009 & 030 spools have open crossover.	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> # Not available with 002, 008, 009 & 030 spools.	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
Code	Symbol	Code	Symbol																																											
001		011																																												
002		012																																												
004		020*																																												
009**		030**																																												
Code	Description																																													
1	Int. pilot/Ext. drain																																													
2	Ext. pilot/Ext. drain																																													
4#	Int. pilot/Int. drain																																													
5	Ext. pilot/Int. drain																																													
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																																													

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 009 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.

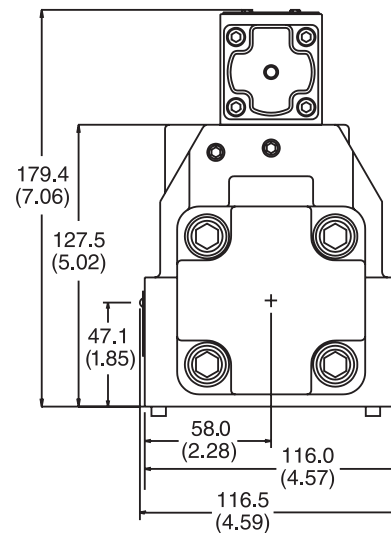
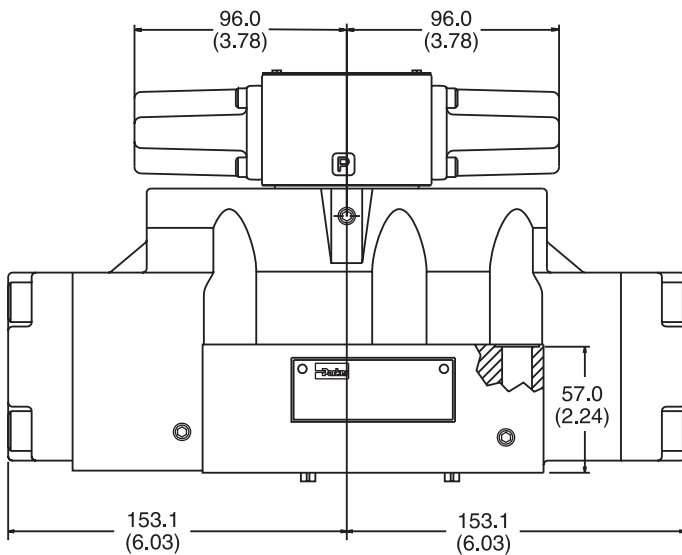
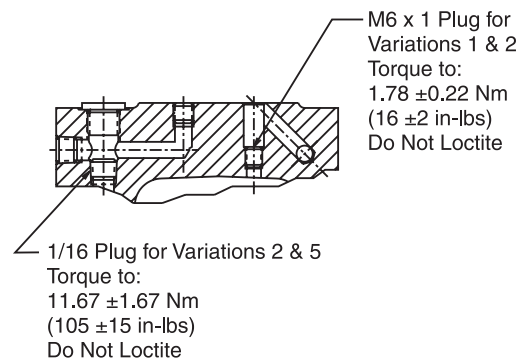
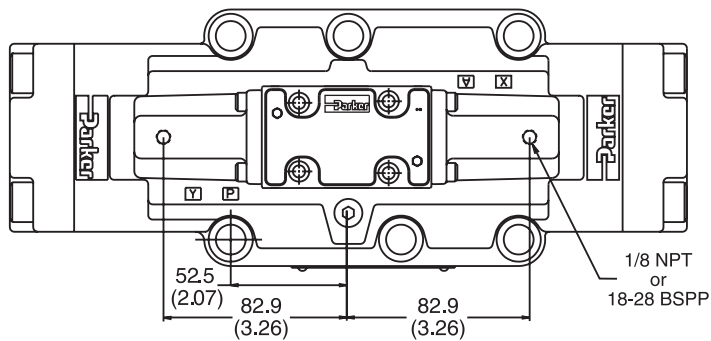
Non-bold: Designates Tier II products and options. These products will have longer lead times.

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.

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

Air Operated

A



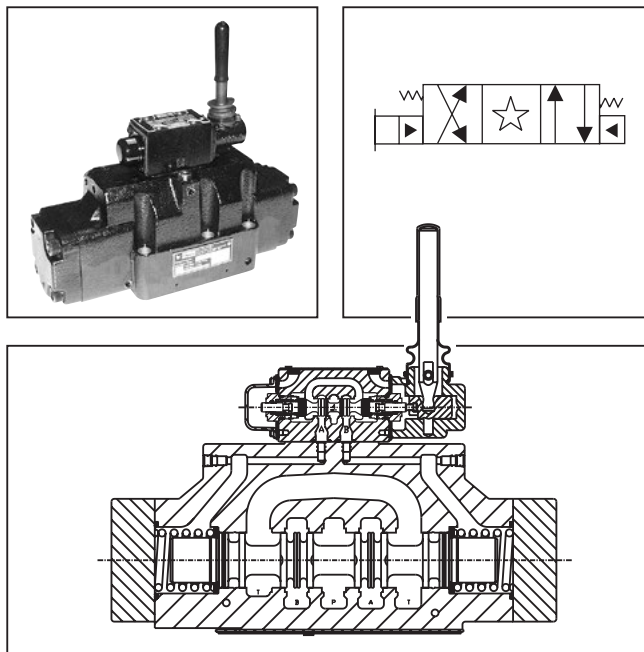
Note: 57mm (2.24") from bottom of bolt hole counterbore to bottom of valve.

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

D Directional Control Valve	81V Basic Valve NFPA D08 CETOP 8	L Lever Operated Pilot	Spool	Style	Pilot Supply and Drain	Seal	Valve Variations	Design Series NOTE: Not required when ordering.
--	---	---	---	---	--	--	--	--

<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> * 008 & 020 spools have closed crossover. ** 009 & 030 spools have open crossover. Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator A. Note operators reverse sides for 009 spool. See installation information for details. Valve Weight: 19.6 kg (43.2 lbs.) Standard Bolt Kit: BK228 Metric Bolt Kit: BKM228	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> # Not available with 002, 008, 009 & 030 spools.	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'
Code	Symbol	Code	Symbol																																																				
001		011																																																					
002		012																																																					
004		020*																																																					
008*		030**																																																					
009**																																																							
Code	Description																																																						
1	Int. pilot/Ext. drain																																																						
2	Ext. pilot/Ext. drain																																																						
4#	Int. pilot/Int. drain																																																						
5	Ext. pilot/Int. drain																																																						
Code	Description																																																						
N	Nitrile																																																						
V	Fluorocarbon																																																						
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'																																																						

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.	

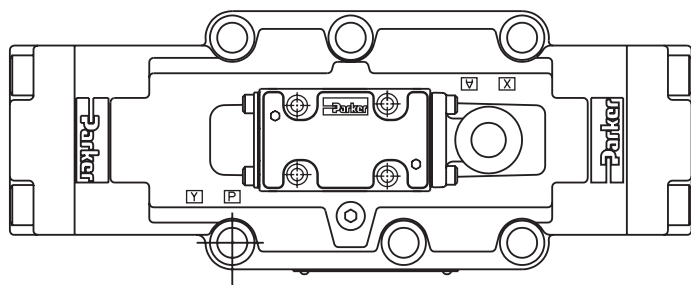
† Available with 020 & 030 spools only.

Bold: Designates Tier I products and options.

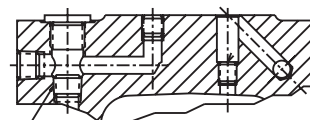
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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.

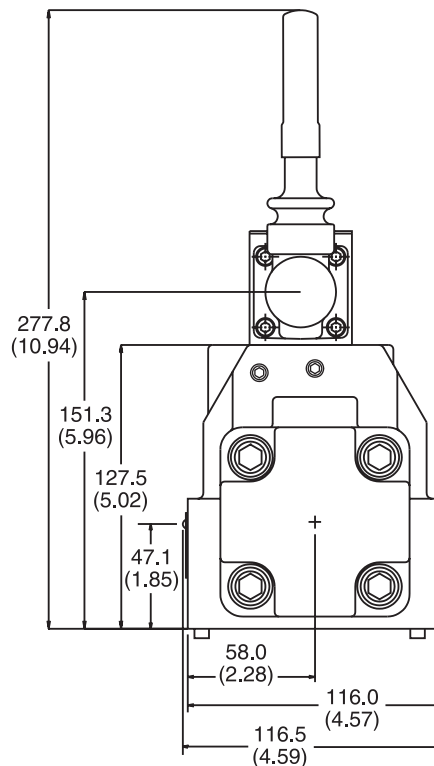
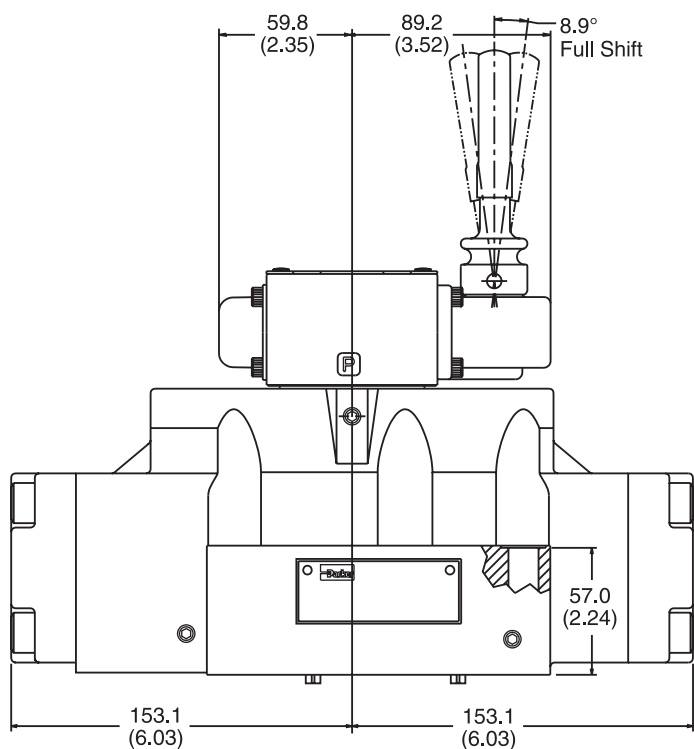
Inch equivalents for millimeter dimensions are shown in (**)

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

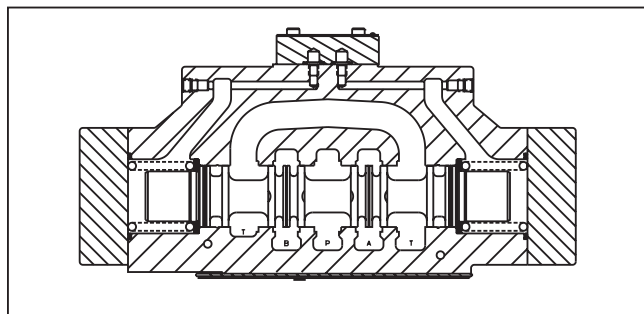
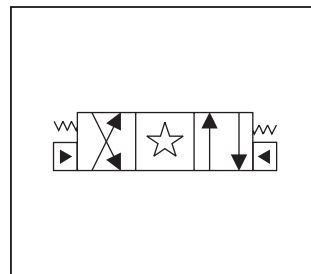
- Low pressure drop design.
- Hardened spools provide long life.

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.



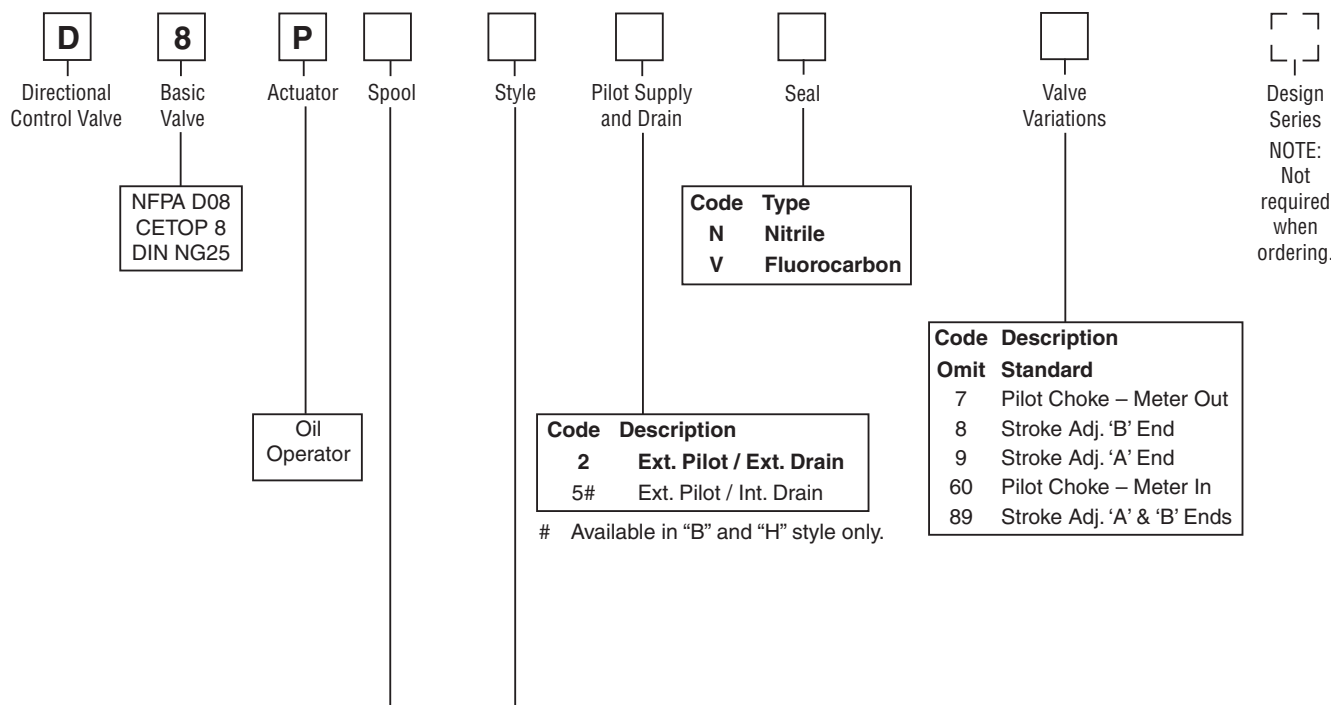
Response Time

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.



NFPA D08
CETOP 8
DIN NG25

Oil
Operator

Code	Type
N	Nitrile
V	Fluorocarbon

Code	Description
2	Ext. Pilot / Ext. Drain
5#	Ext. Pilot / Int. Drain

Available in "B" and "H" style only.

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

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 020 & 030 spools only.



This condition varies with spool code.

Valve Weight: 18.9 kg (41.7 lbs.)

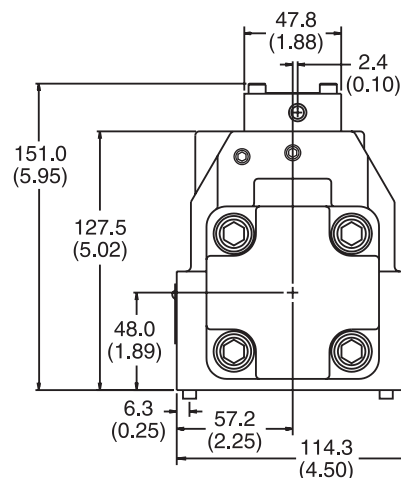
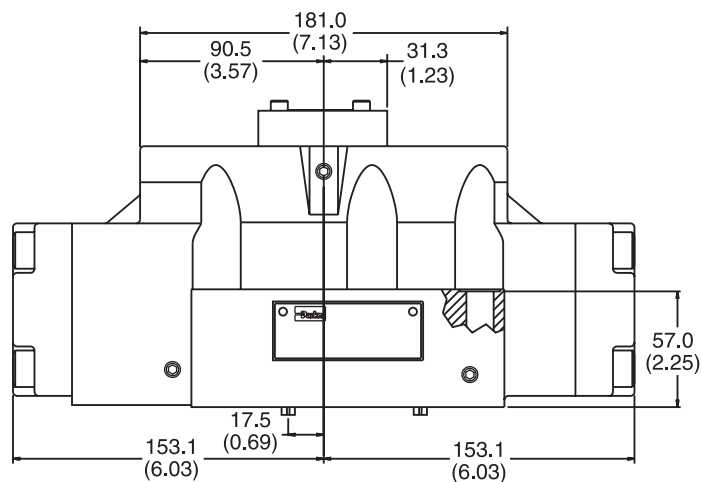
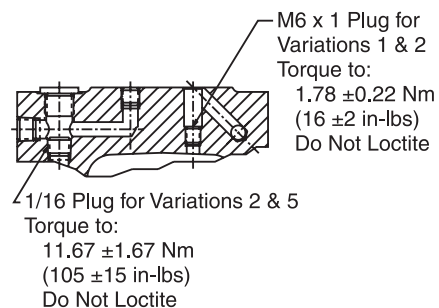
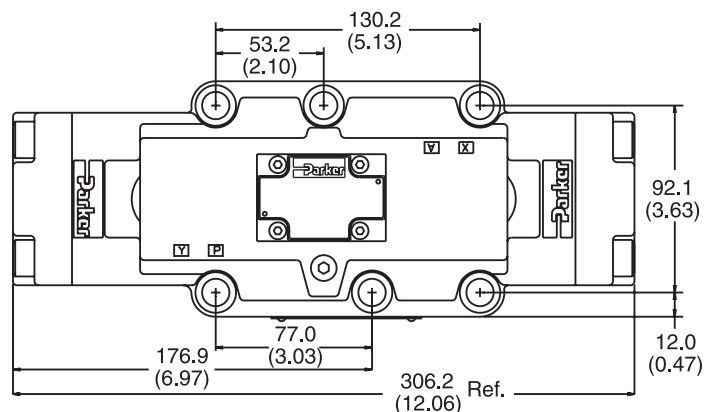
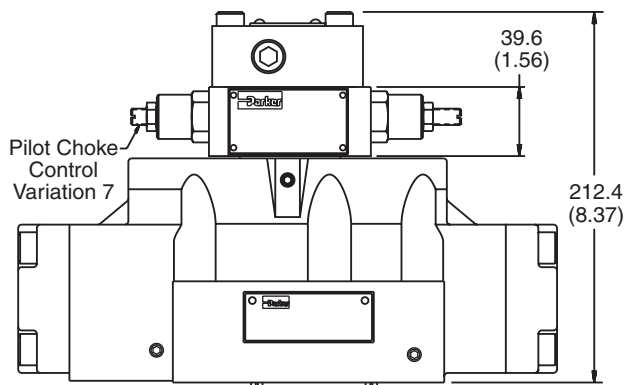
Standard Bolt Kit: BK228

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.

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).

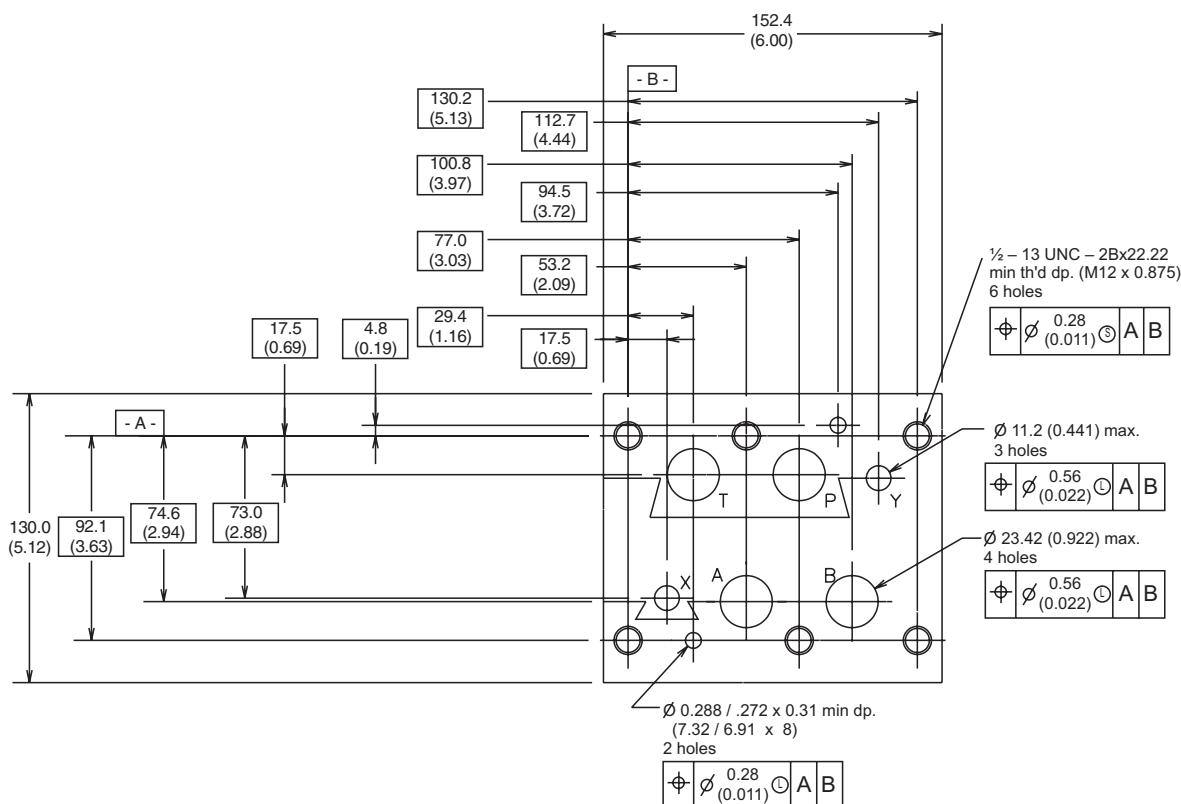
Mounting Position

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 D91VW directional control valves are 5-chamber, pilot operated, solenoid controlled valves. They are available in 2 or 3-position styles. These valves are manifold or subplate mounted, and conform to NFPA's D08, CETOP 8 mounting pattern.

Operation

Series D91VW pilot operated valves are standard with low shock spools and pilot orifice. The orifice can be removed if a faster shift is required. It is recommended, however, that all systems operating above 138 Bar (2000 PSI) use the standard valve to avoid severe shock.

Features

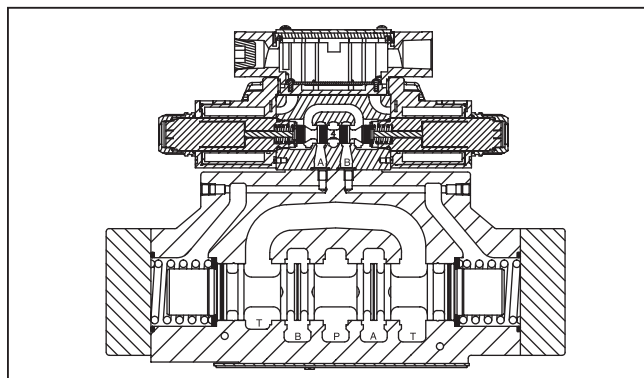
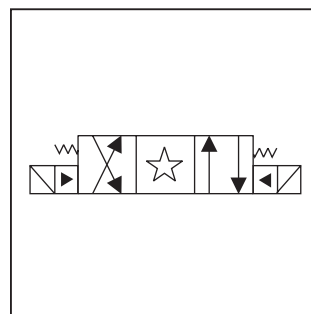
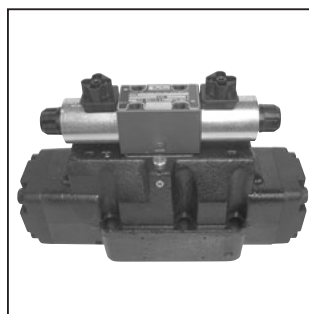
- Low pressure drop design.
- Hardened spools provide long life.
- Fast response option available.
- Wide variety of voltages and electrical connection options.
- Explosion proof availability.
- No tools required for coil removal.

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.



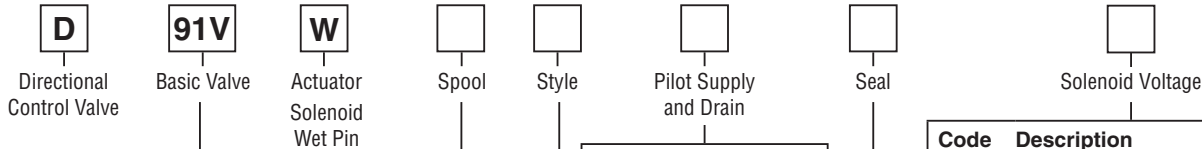
Response Time

Response times (milliseconds) are measured at 345 Bar (5000 PSI) and 300 LPM (80 GPM) with various pilot pressures as indicated.

Solenoid Type	Pilot Pressure	Pull-In		Drop-Out	
		Std	Fast	Std	Fast
DC	500	140	100	70	70
	1000	125	90	76	76
	2000	100	70	70	70
AC	500	100	60	60	60
	1000	85	50	60	60
	2000	60	30	60	60

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

A



NFPA D08
 CETOP 8
 DIN NG25
 High Flow, D03 Pilot

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

* Not available with 002, 008, 009 & 030 spools.

Code	Description
N	Nitrile
V	Fluorocarbon

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

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

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

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***.

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

3-Position Spools			
Code	All 3-Position Spools		
C			3 positions. Spring offset in position "0". Operated in position "a" or "b".
	Standard	Spool Type 009	
E			2 positions. Spring offset in position "0".
F			2 positions. Operated in position "0".
K			2 positions. Spring offset in position "0".
M			2 positions. Operated in position "0".
R			2 positions, detent. Operated in position "0" or "b".
S			2 positions, detent. Operated in position "0" or "a".

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

* 020 & 030 spools only.

Bold: Designates Tier I products and options.

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


 Solenoid Connection


 Coil Options


 Tube Options


 Manual Override Options*


 Electrical Options


 Shift Indication


 Approvals


 Valve Variations


 Monitor Switch Cover


 Design Series
 NOTE:
 Not required when ordering.

Code Description

C* **Leadwire Conduit Box**

D** Metric Plug (M12X1) DESINA

E† Explosion Proof

F^x Flying Leadwire

G†† **Plug-In Conduit Box**

J++ **Deutsch (DT04-2P)**

P **DIN with Plug**

S‡ Double Spade

W† **DIN w/o Plug**

* No conduit box variations – See Plug-in.

** 24 VDC only, low watt only, lights, diode surge suppressor, not CSA approved.

† Not available with lights.

†† Required for variations on conduit box style, must have lights.

++ 12 and 24 VDC only.

‡ Only 12 VDC high watt.

x 6" leadwire only.

Code Description

Omit No Options

J# Diode Surge Suppressor

Z† Rectified Coil

Plug-In – 24 VDC only.

DIN – DC only with Lighted Plug (5), which has integrated Surge Suppression. "J" not required here.

Deutsch – as follows:

- 12 VDC Hi watt only
- 24 VDC Hi & Lo watt

24 VDC "JER" required. "JET" available. Adds dust rating, not polarity sensitive [IIC, D].

Leadwire – not available

† DC tube standard, Plug-In conduit box only. Not polarity sensitive. Only available with Y voltage.

Code Description

Omit No Variation

4B Monitor Switch Cover

Code Description

Omit Standard

P* Extended Manual Override with Boot

T Covered Manual Override, DC only, or AC Rectified

* Manual override options not available on Explosion Proof or soft shift. Not available with high pressure AC tube H.

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

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

Valve Weight:
 Double Solenoid 19.6 kg (43.2 lbs.)

Seal Kit:
 Nitrile SKD81VWN91
 Fluorocarbon SKD81VWV91

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

* Manual override options not available on Explosion Proof or soft shift. Not available with high pressure AC tube H.

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

* Not available with CSA or Explosion Proof.

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

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

Mounting Bolt Kits

UNC Bolt Kits for use with D6 and D8 Directional Control Valves & 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.

Valve Variations

A **OPTIONS ARE NOT AVAILABLE ON MONITOR SWITCH VALVES.**

Code	Description
5*	Signal Lights – Standard
	Signal Lights – Hirsch. (DIN with Plug) (the DC Lighted Plug has Integral Surge Suppression)
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

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

** Must have plug-in style conduit box.

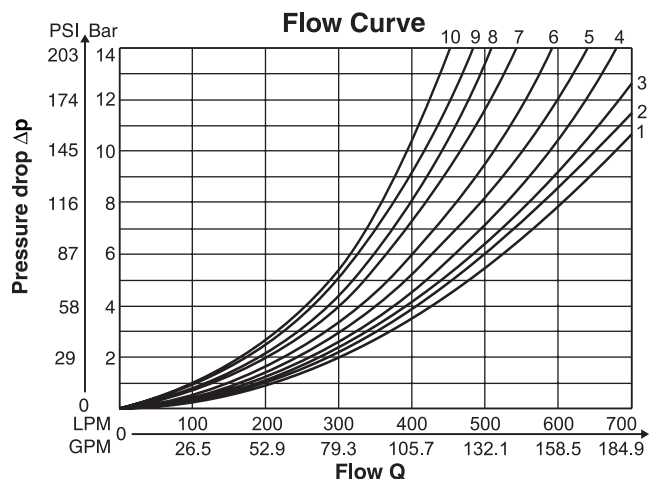
Series Pressure Drop Chart

The following chart provides the flow vs. pressure drop curve reference for the Series D91V* valve by spool type.

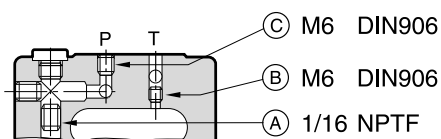
VISCOSITY CORRECTION FACTOR							
Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141
Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change as per chart.							

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
005	1	2	—	4	5
006	2	2	—	4	6
007	3	1	7	3	5
009	4	8	9	4	10
011	3	2	—	3	5
014	1	2	8	3	5
015	3	3	—	4	5
016	3	3	—	4	5
020	6	5	—	6	8
021	5	10	—	3	—
022	10	5	—	—	5
026	6	5	—	—	—
030	3	2	—	3	5
054	4	3	—	3	5

Performance Curves



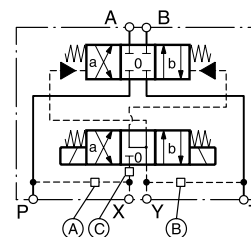
Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

Pilot oil		A	B	C
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



A

Solenoid Ratings

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

Explosion Proof Solenoid Ratings*

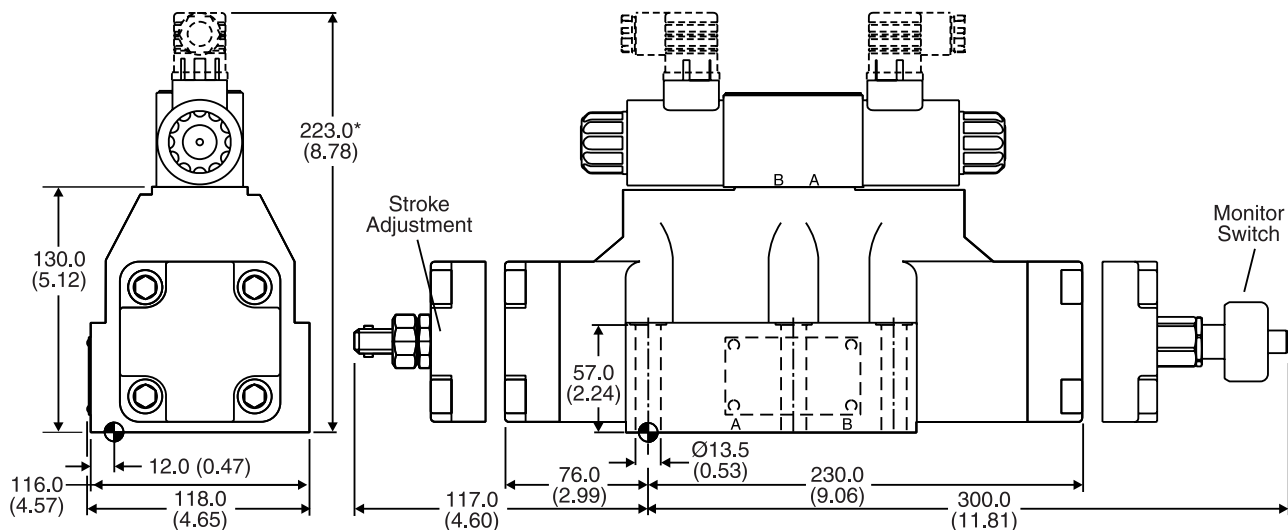
U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (ER, ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013;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

* Allowable Voltage Deviation $\pm 10\%$.

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
E	F	24 VAC	4.8 AMPS	120 VA	2.07 Amps	21 W	1.29 Ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 Ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 Ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 Ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 Ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 Ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 Ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 Ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 Ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 Ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 Ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 Ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 Ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 Ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 Ohms
Explosion Proof Solenoids							
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
ER & ET Explosion Proof Solenoids							
J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

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

A



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



Surface Finish	Kit			Seal Kit
	BK360	6x M12x75 ISO 4762-12.9	108 Nm (79.7 lb.-ft.) ±15%	Nitrile: SK-D81VW-N-91 Fluorocarbon: SK-D81VW-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.).

General Description

A

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.

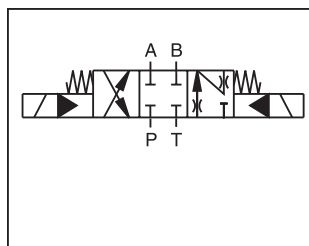
Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



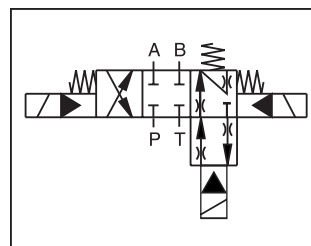
D41VWR (shown)



D41VWZ (shown)

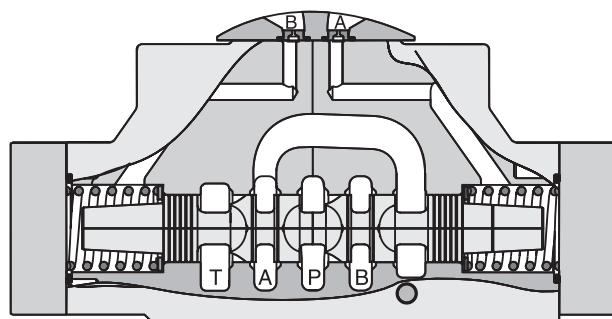


Regenerative D91VWR

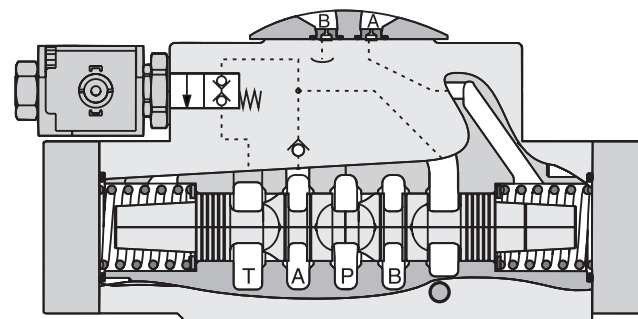


Hybrid D91VWZ

Regenerative Valve D91VWR

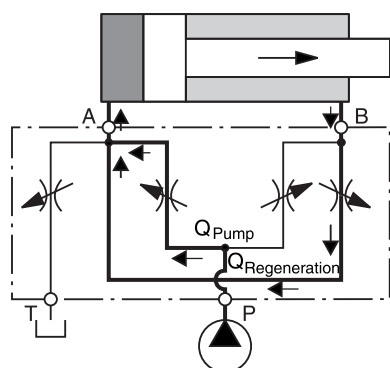


Hybrid Valve D91VWZ



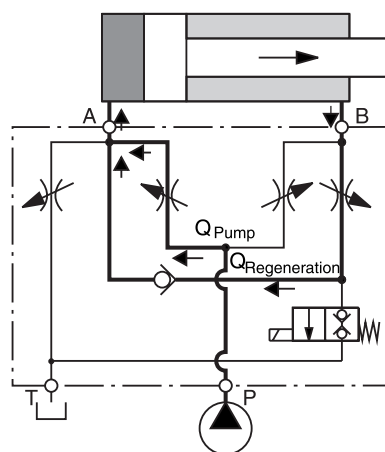
D91VWR Regenerative Valve

Cylinder Extending

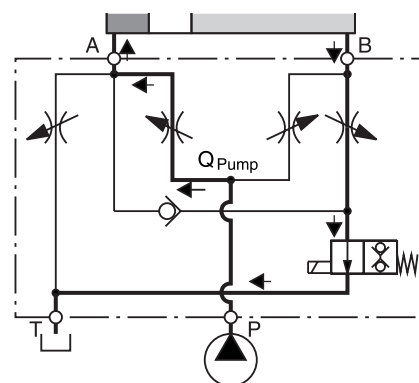


D91VWZ Hybrid Valve

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.

Ordering Information

D91VW

Series

NFPA D08,
CETOP 8
DIN NG25
32mm

C

Style

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

J

Solenoid
Voltage
24VDC

W

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

**Manual
Override**

**Valve
Variations**

**Design
Series**

NOTE:
Not required
when ordering.

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

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
Omit	Standard
T	No manual 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	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

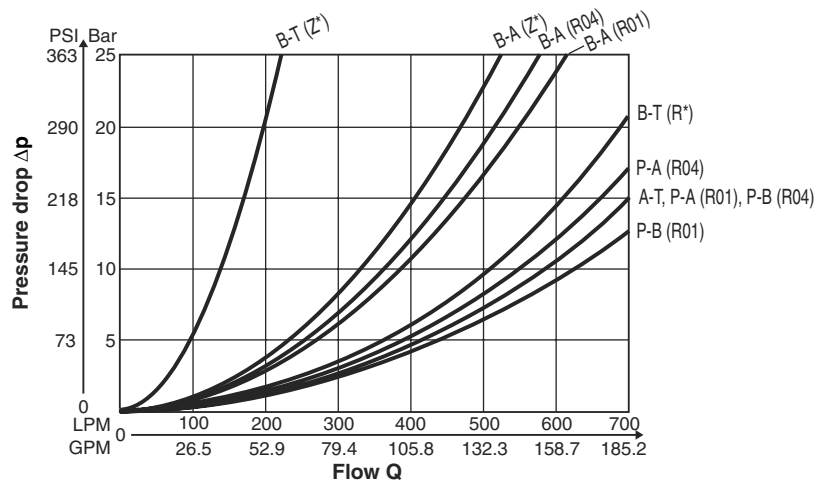
Regenerative Function			Hybrid Function		
Code	Spool Type		Code	Spool Type	
	a	b 0		a	b 0
R01			Z01		
R04			Z04		
R81			Z81		
R82			Z82		

Weight:
D91VVR, 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

A

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

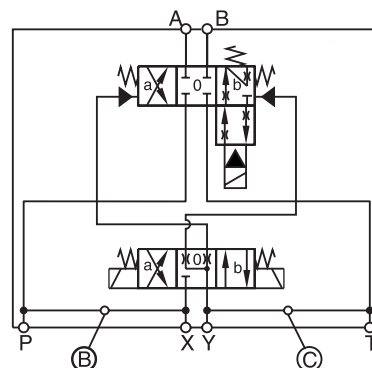
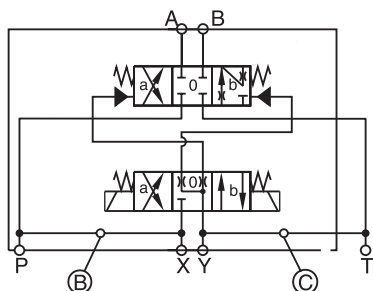
With electrical connections the protective conductor (PE ≡) must be connected according to the relevant regulations.

Pilot Flow

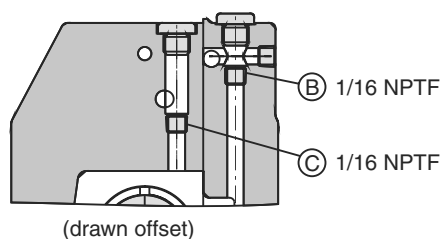
Pilot Oil Inlet (Supply) and Outlet (Drain)

○ open, ● closed

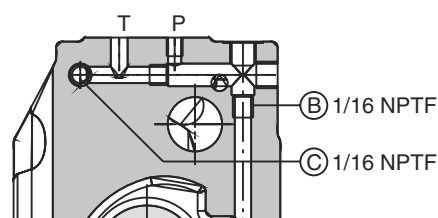
Pilot Oil Inlet	Pilot Oil Outlet	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



D91VWR

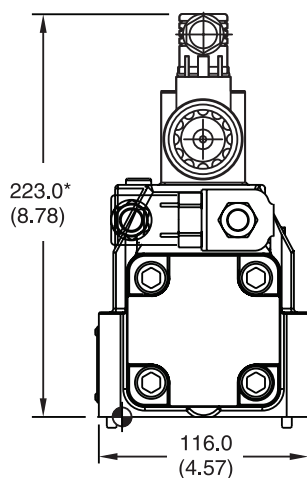


D91VWZ

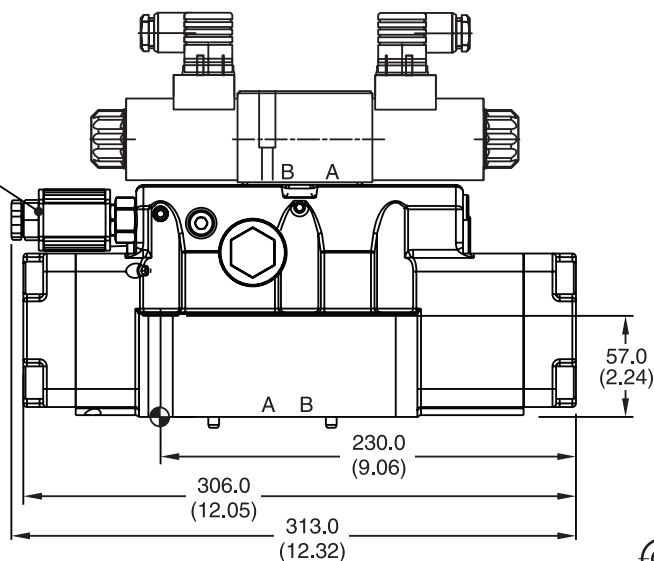


Dimensions

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).

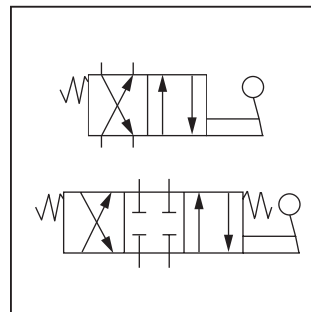
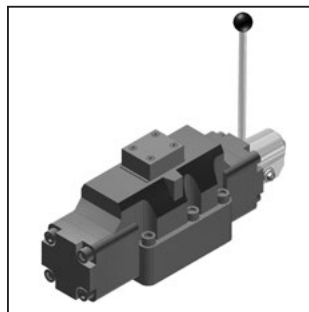
Surface Finish	Kit	Kit	Kit	Seal Kit
	BK360	4x M10x60 2x M6x55 DIN 912 12.9	63 Nm (46.5 lb.-ft.) 13.2 Nm (9.7 lb.-ft.) ±15%	Nitrile: SK-D91VW-N-91 Fluorocarbon: SK-D91VW-V-91

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.).

A

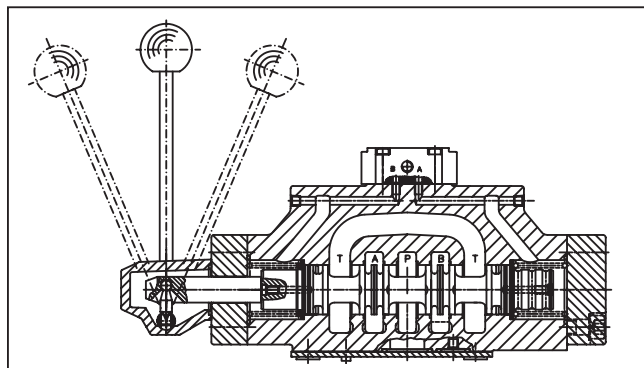
General Description

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.

D
 Directional Control Valve

9
 Basic Valve

NFPA D08
 CETOP 8
 DIN NG25
 32 mm

Actuator

Spool

Style

Pilot Supply and Drain

Seal

Design Series

NOTE:
 Not required when ordering.

A

Code	Actuation
L	Lever Side B
LB	Lever Side A

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

* Pressure T-port < 10 bar

** Pressure T-port > 10 bar

Code	Description
N	Nitrile
V	Fluorocarbon

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.	

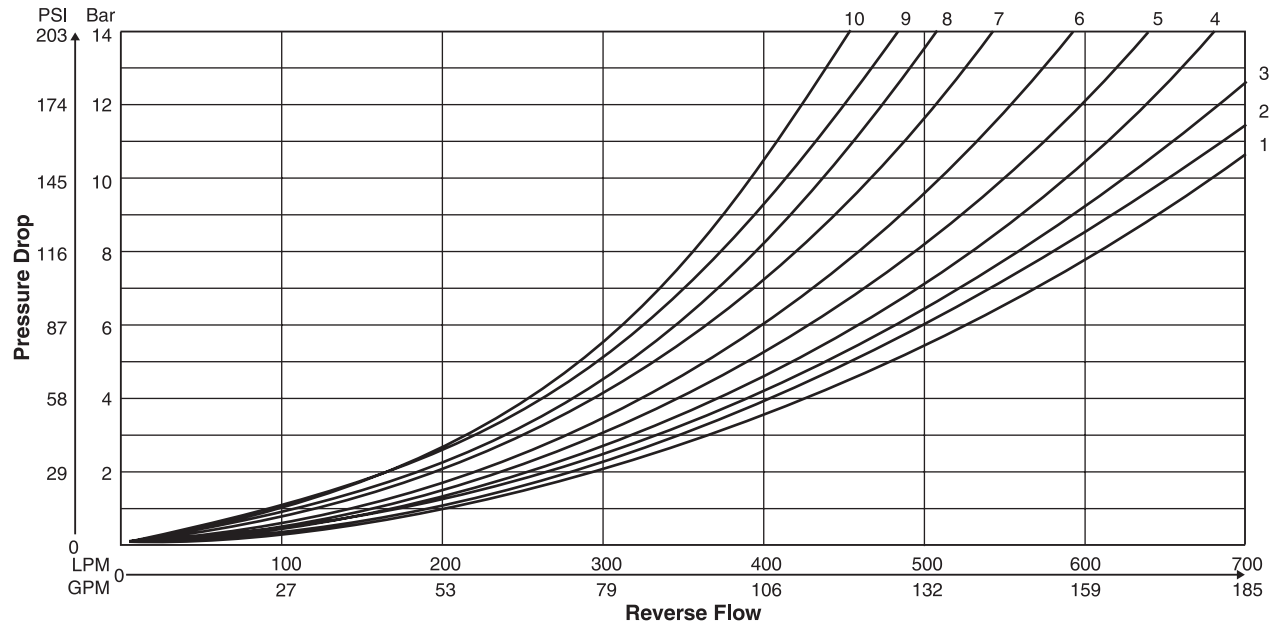
* Only available with 020 and 030 spools

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.

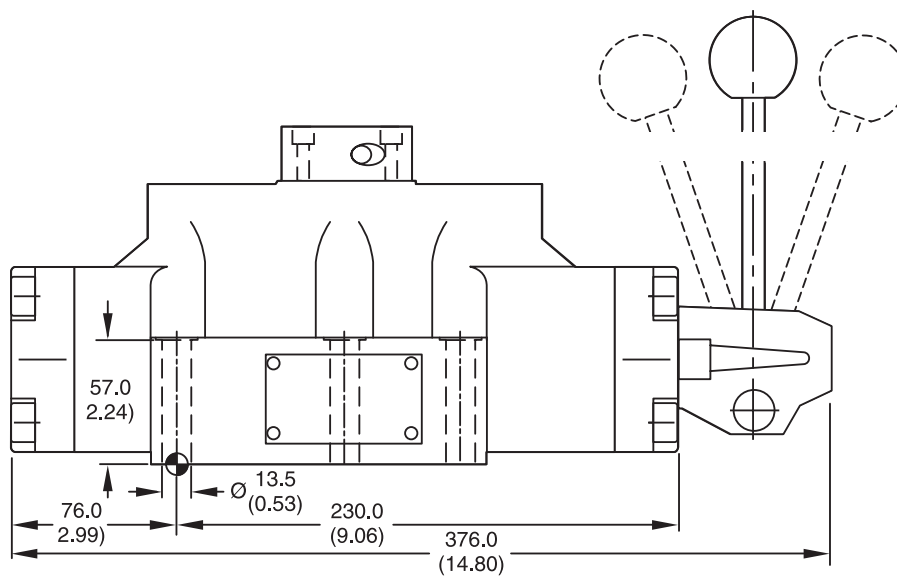
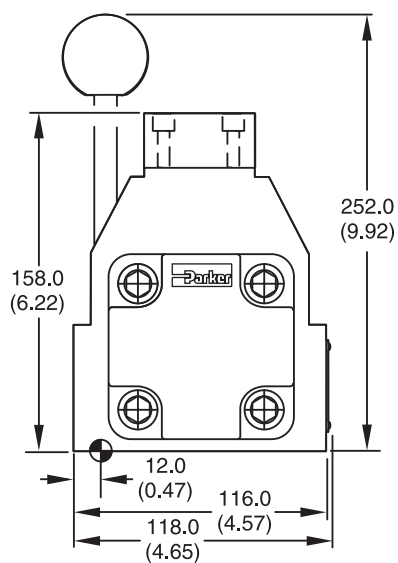
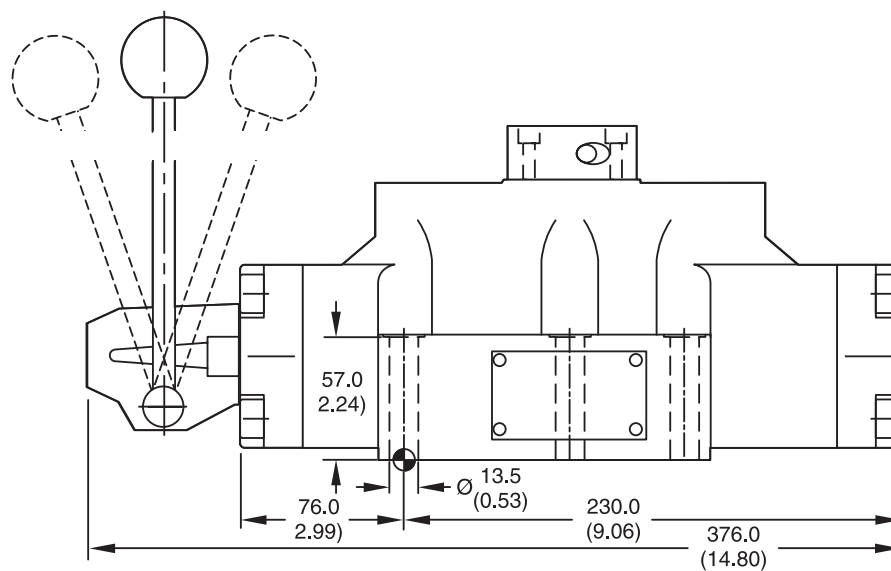
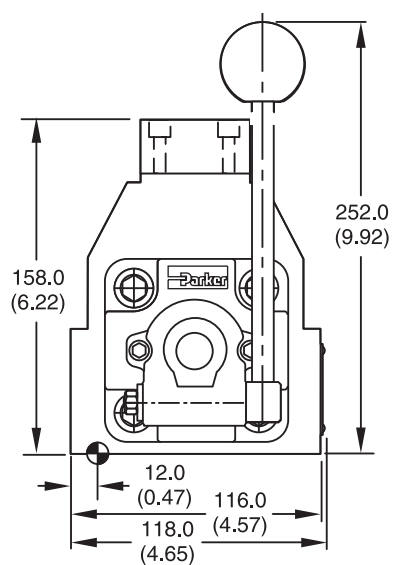
A

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



Dimensions**Series D9L**

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

**D9L****D9LB**

Surface Finish	 Kit	 Kit	 Kit	Seal  Kit
$\sqrt{R_{max} 6.3}$ 	BK360	6x M5x75 DIN 912 12.9	108 Nm $\pm 15\%$	Nitrile: SK-D9LN Fluorocarbon: SK-D9LV

A**Application**

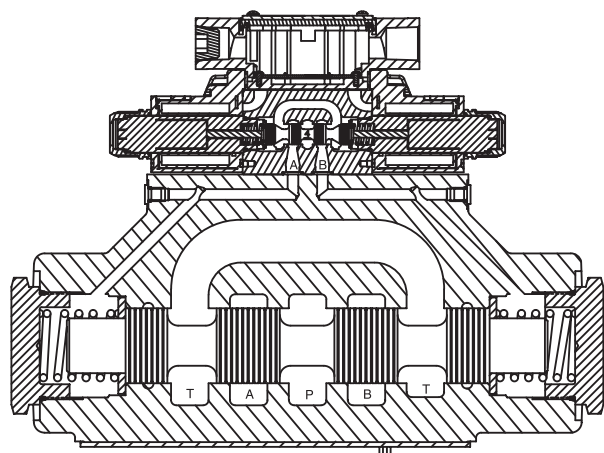
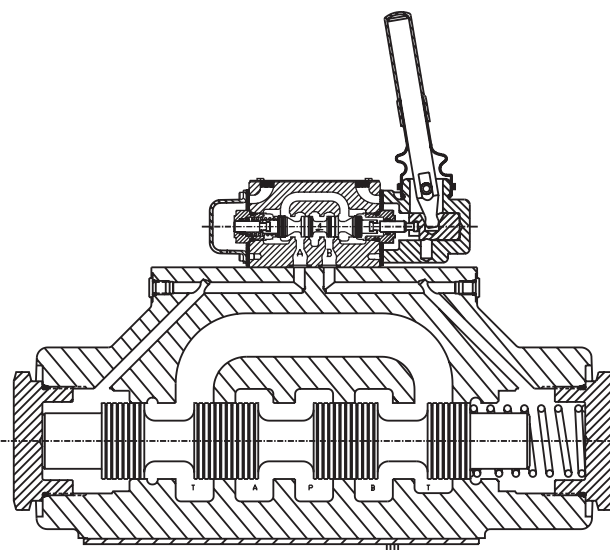
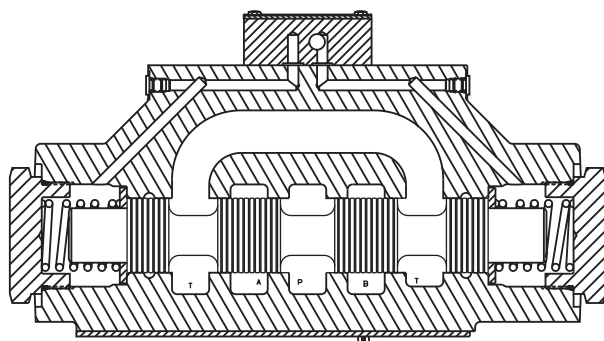
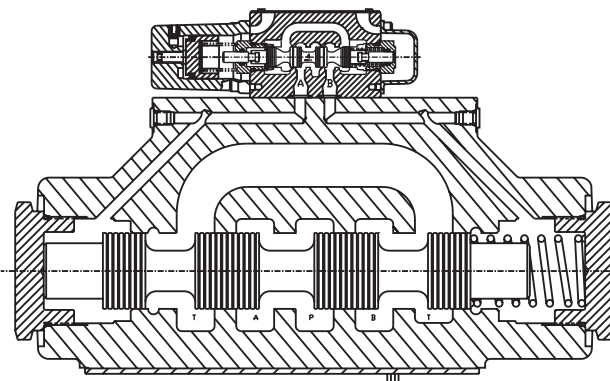
Series D101 hydraulic directional control valves are high performance, solenoid controlled, pilot operated, 2-stage, 4-way valves. They are available in 2 or 3-position styles and are manifold mounted. These valves conform to NFPA's D10, CETOP 10 mounting pattern.

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.

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

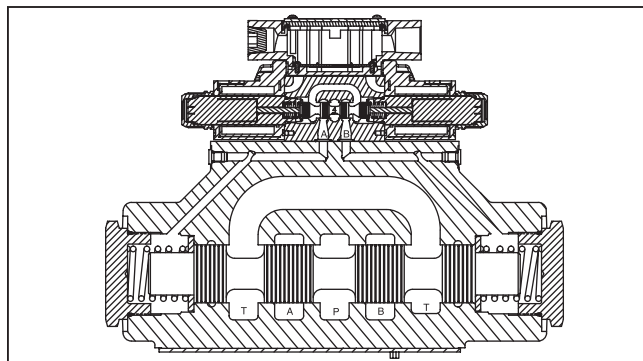
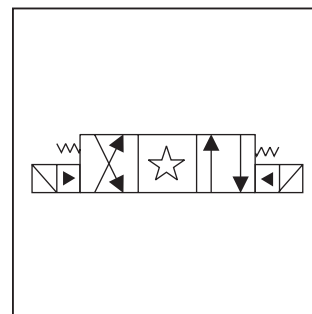
Series D101V pilot operated valves are standard with low shock spools and pilot orifice. The orifice can be removed if a faster shift is required. However, it is recommended that all systems operating above 138 Bar (2000 PSI) use the standard valve to avoid severe shock.

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.

A

D Directional Control Valve	101V Basic Valve	Actuator	Spool	Style	Pilot Supply and Drain	Seal	Solenoid Voltage																																															
NFPA D10 CETOP 10 DIN NG32 D03 Pilot		<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>W</td> <td>Solenoid, Wet Pin, Screw-in</td> </tr> <tr> <td>HW*</td> <td>Reversed Wiring</td> </tr> </tbody> </table> * To configure per DIN standards (A coil over A port, B coil over B port) code valves as D81VHW***.		Code	Description	W	Solenoid, Wet Pin, Screw-in	HW*	Reversed Wiring	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Internal Pilot, External Drain</td> </tr> <tr> <td>2</td> <td>External Pilot, External Drain</td> </tr> <tr> <td>3</td> <td>Internal Pilot w/Check, External Drain</td> </tr> <tr> <td>4#</td> <td>Internal Pilot, Internal Drain</td> </tr> <tr> <td>5</td> <td>External Pilot, Internal Drain</td> </tr> <tr> <td>6</td> <td>Internal Pilot w/Check, Internal Drain</td> </tr> </tbody> </table> # Not available with 002, 007, 008 and 009 spools.		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	<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>D†#</td> <td>120 VDC</td> </tr> <tr> <td>E*</td> <td>24/60 - 24/50 VAC</td> </tr> <tr> <td>J</td> <td>24 VDC</td> </tr> <tr> <td>K***</td> <td>12 VDC</td> </tr> <tr> <td>Q††#</td> <td>100/60 VAC</td> </tr> <tr> <td>QD††#</td> <td>100 VAC/60 Hz - 100 VAC/50 Hz</td> </tr> <tr> <td>T^^</td> <td>240/60 - 220/50 VAC</td> </tr> <tr> <td>U***#</td> <td>98 VDC</td> </tr> <tr> <td>Y</td> <td>120/60 - 110/50 VAC</td> </tr> </tbody> </table> # High watt only. * Leadwire only, low watt only. ** DIN, low watt available. *** Leadwire not available. ^^ Plug-in is low watt only. † DIN & Leadwire only. †† DIN only.	Code	Description	D†#	120 VDC	E*	24/60 - 24/50 VAC	J	24 VDC	K***	12 VDC	Q††#	100/60 VAC	QD††#	100 VAC/60 Hz - 100 VAC/50 Hz	T^^	240/60 - 220/50 VAC	U***#	98 VDC	Y	120/60 - 110/50 VAC
Code	Description																																																					
W	Solenoid, Wet Pin, Screw-in																																																					
HW*	Reversed Wiring																																																					
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																																																					
Code	Description																																																					
N	Nitrile																																																					
V	Fluorocarbon																																																					
Code	Description																																																					
D†#	120 VDC																																																					
E*	24/60 - 24/50 VAC																																																					
J	24 VDC																																																					
K***	12 VDC																																																					
Q††#	100/60 VAC																																																					
QD††#	100 VAC/60 Hz - 100 VAC/50 Hz																																																					
T^^	240/60 - 220/50 VAC																																																					
U***#	98 VDC																																																					
Y	120/60 - 110/50 VAC																																																					

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***.

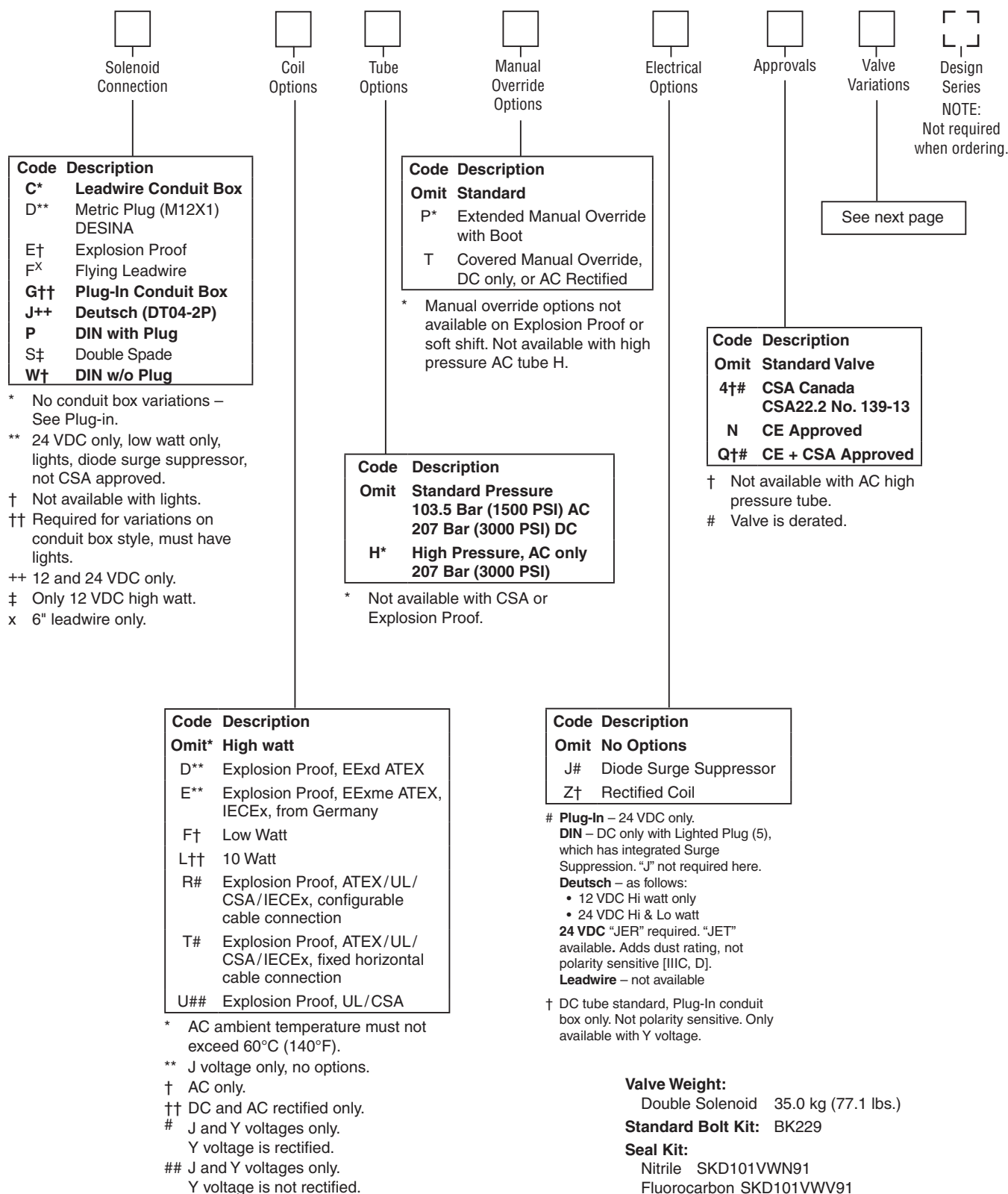
Code	Symbol	Code	Symbol	Code	Description	Symbol
001		005		B*	Single solenoid, 2 position, spring offset. P to A and B to T in offset position.	
002		006		C	Double solenoid, 3 position, spring centered.	
003		008*		D*	Double solenoid, 2 position, detent.	
004		009**		E	Single solenoid, 2 position, spring centered. P to B and A to T when energized.	
		011		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.	

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

* 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.

A

Valve Variations

Code	Description
5*	Signal Lights – Standard
	Signal Lights – Hirsch. (DIN with Plug) (the DC Lighted Plug has Integral Surge Suppression)
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

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

** Must have plug-in style conduit box.

Bold: Designates Tier I products and options.

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

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)			

A

D101VW Series Pressure Drop Chart

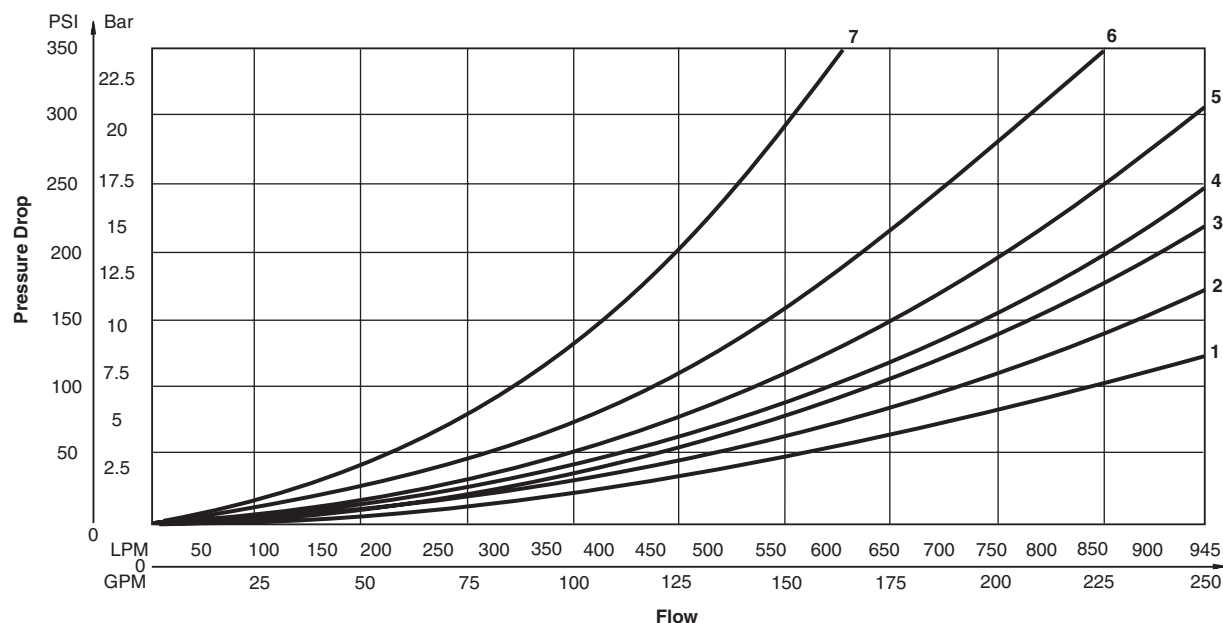
The following chart provides the flow vs. pressure drop curve reference for the Series D101VW valve by spool type.

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



A

Solenoid Ratings

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

Explosion Proof Solenoid Ratings*

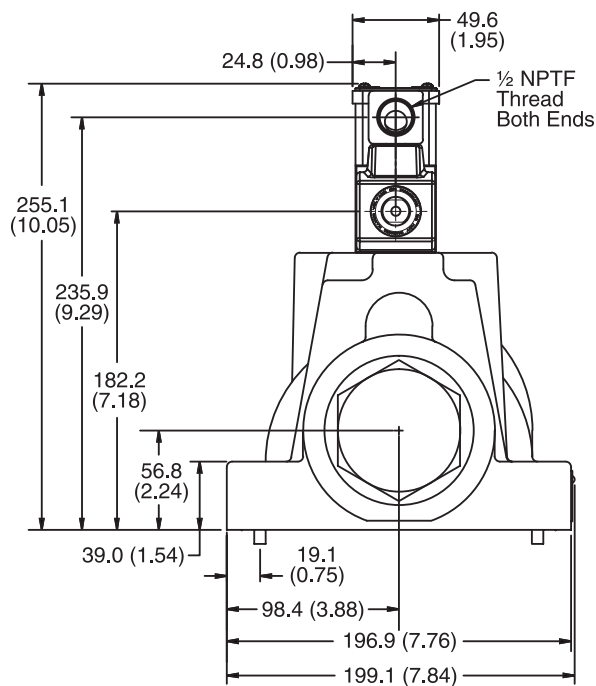
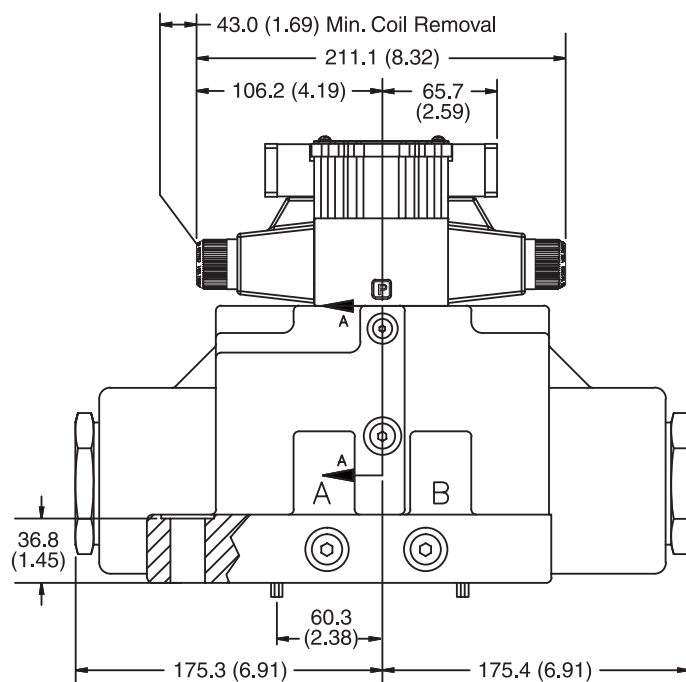
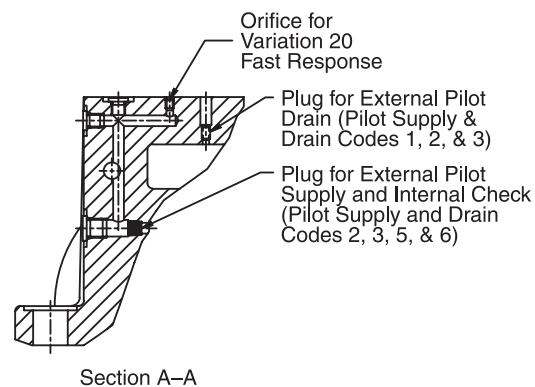
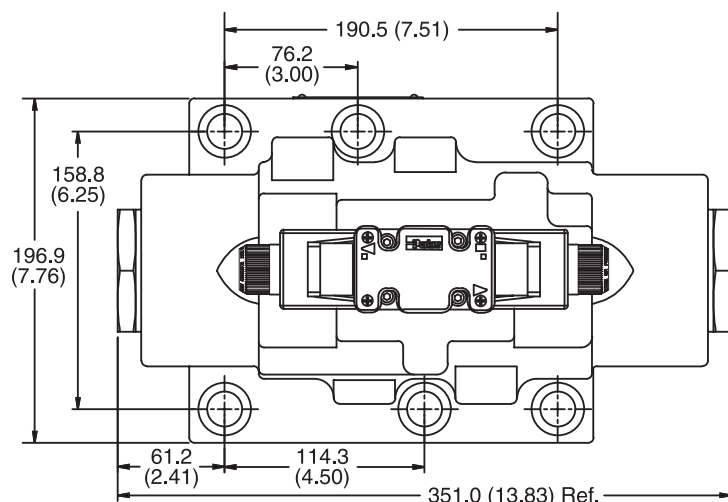
U.L. & CSA (EU)	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the N.E.C.
ATEX (ED)	Complies with ATEX requirements for: Ex d IIB Gb; EN60079-0:2012, EN60079-1:2007
ATEX, IECEx & CSA/US (ER, ET) (Tri-rated)	Complies with IEC 60079-0:2011, IEC 60079-1:2007, IEC 60079-31:2013;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

* Allowable Voltage Deviation $\pm 10\%$.

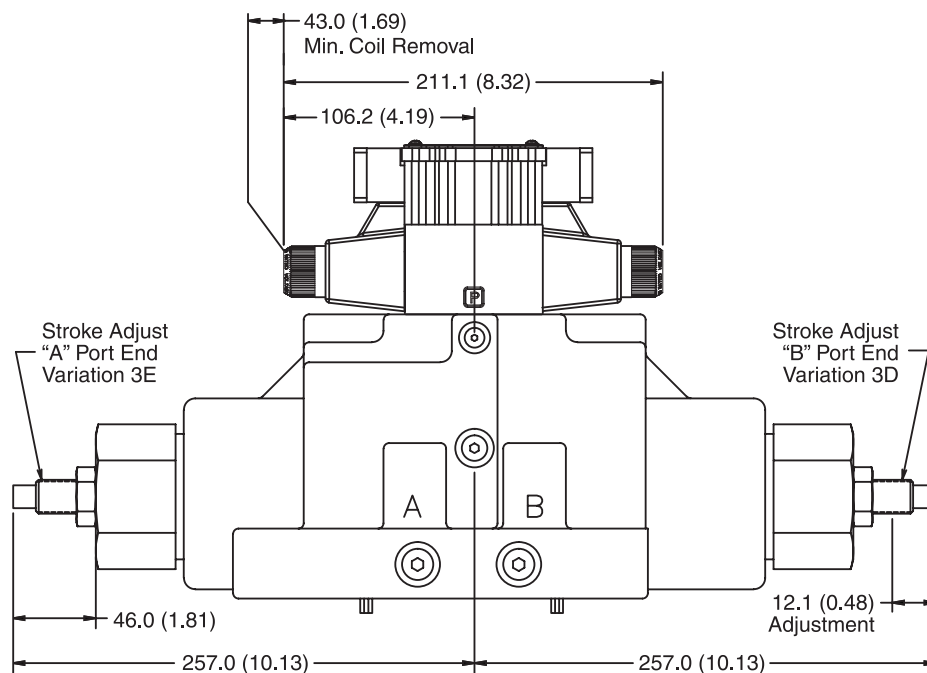
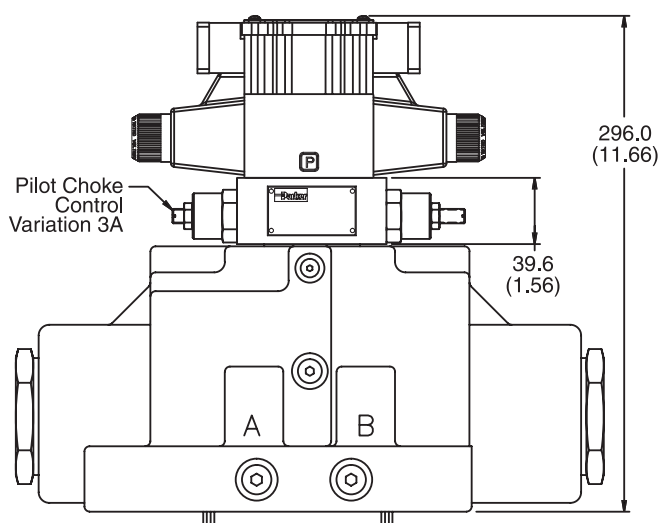
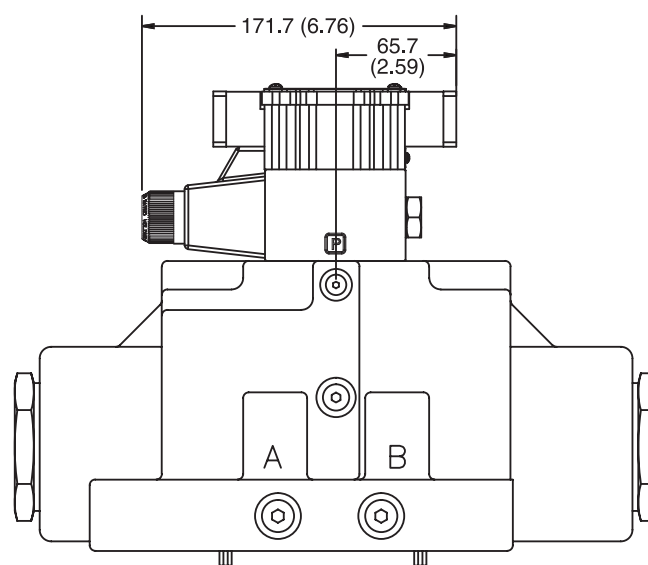
Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3 mm	Watts	Resistance
Voltage Code	Power Code						
D	Omit	120 VDC	N/A	N/A	0.26 Amps	30 W	528.00 Ohms
E	F	24 VAC	4.8 AMPS	120 VA	2.07 Amps	21 W	1.29 Ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 Ohms
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 Ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 Ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 Ohms
Q	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	0.77 Amps	30 W	19.24 Ohms
QD	Omit	100 VAC / 60 Hz	2.05 Amps	170 VA	.77 Amps	30 W	19.24 Ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 Ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 Ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 Ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 Ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 Ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 Ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 Ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 Ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 Ohms
Explosion Proof Solenoids							
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 Ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 Ohms
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms
ER & ET Explosion Proof Solenoids							
J		24 VDC	N/A	N/A	0.54 Amps	13 W	44.30 Ohms
Y		120/60 VAC	N/A	N/A	0.16 Amps	17 W	667.00 Ohms

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.

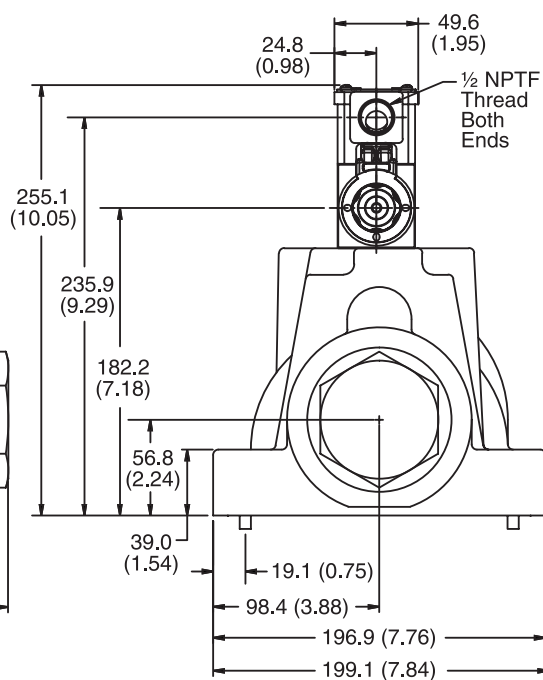
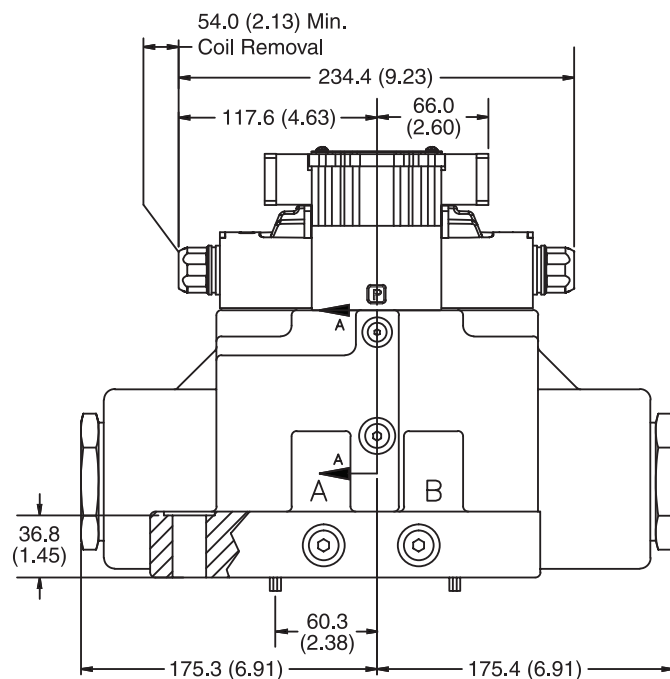
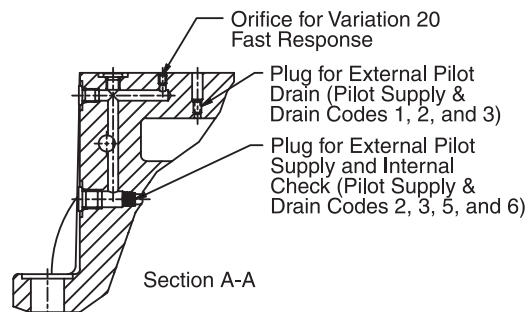
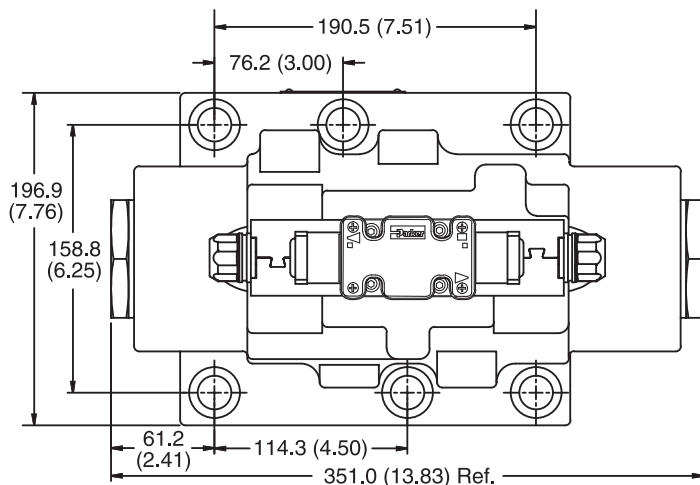
Inch equivalents for millimeter dimensions are shown in (**)

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**

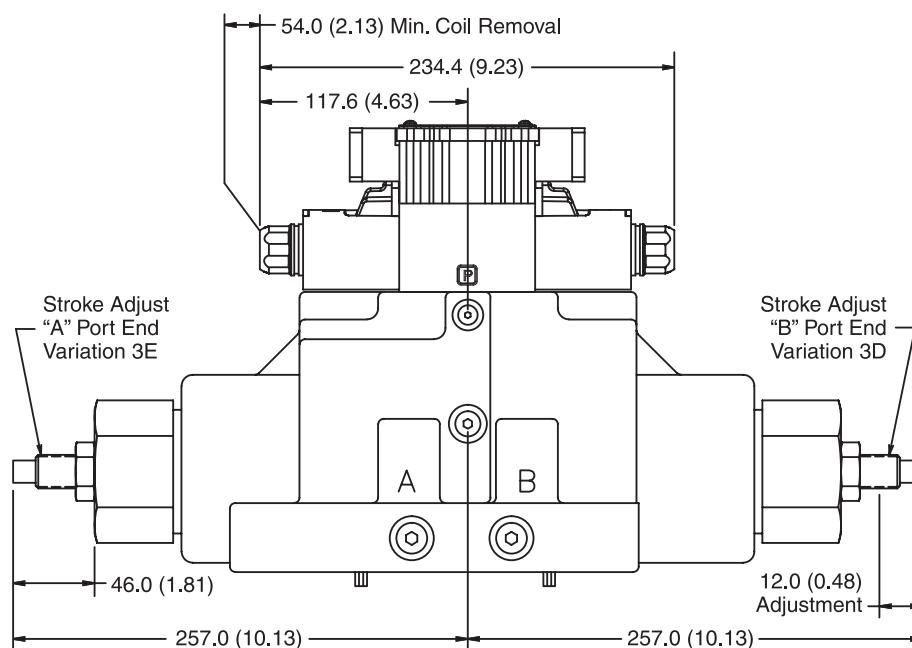
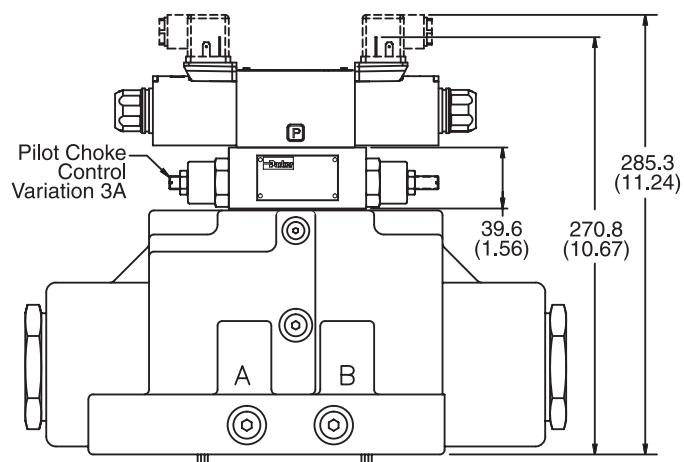
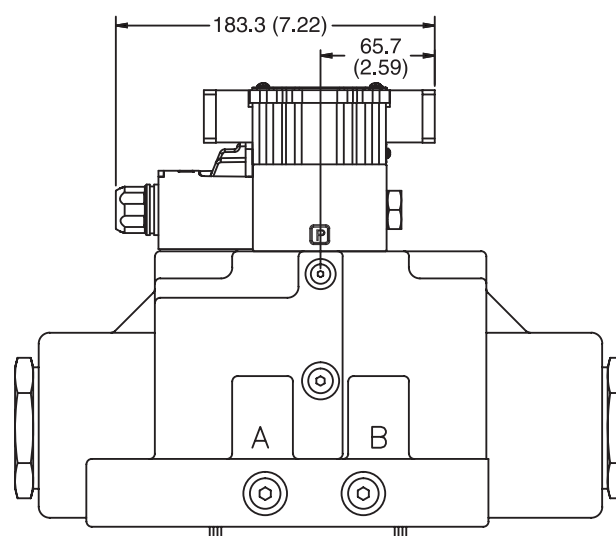
Inch equivalents for millimeter dimensions are shown in (**)

Plug-in Conduit Box, Double DC Solenoid

A

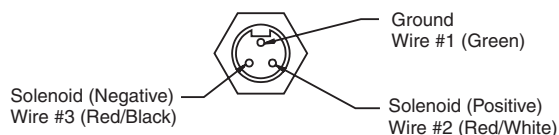
**Note:** 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.

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

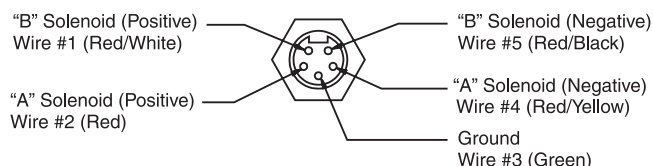
A**Plug-in Conduit Box and Stroke Adjust, Double DC Solenoid****Note:** 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.**Hirschmann and Pilot Choke Control, Double DC Solenoid****Note:** 36.83mm (1.45") from bottom of bolt hole counterbore to bottom of valve.**Plug-in Conduit Box, Single DC Solenoid**

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

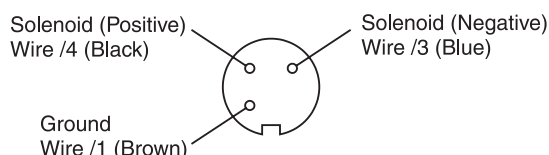
- Interface – Brad Harrison Plug
- 3-Pin for Single Solenoid
 - 5-Pin for Double Solenoid

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

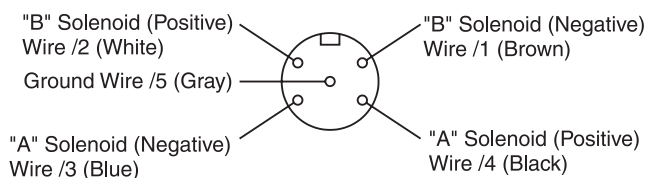
Single Solenoid Valves – Installed Opposite Side of Solenoid

**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**

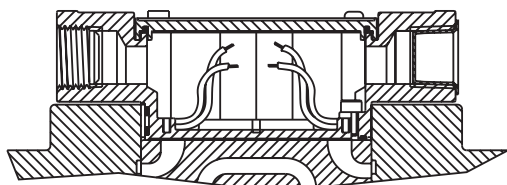
- EP336-30** 3 Pin Plug
EP316-30 5 Pin Plug (Double Solenoid)
EP31A-30 5 Pin Plug (Single Solenoid)

Manaplug – Electrical Micro Plug

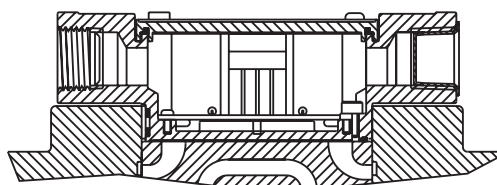
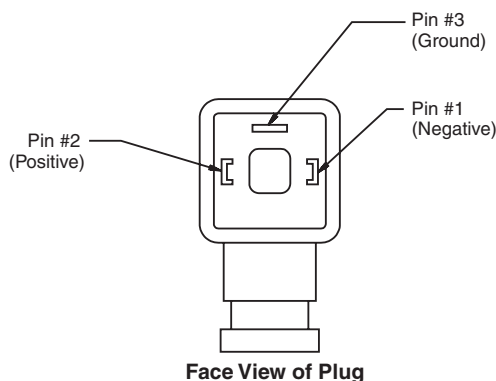
- EP337-30** 3 Pin Plug
EP317-30 5 Pin Plug (Double Solenoid)
EP31B-30 5 Pin Plug (Single Solenoid)

Conduit Box Option C

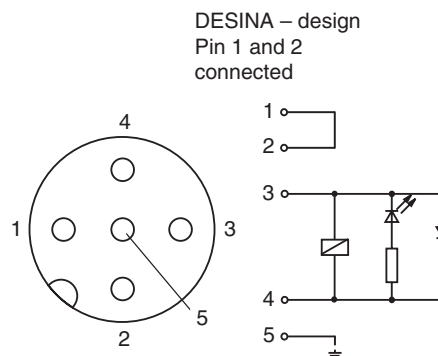
- No Wiring Options Available

**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



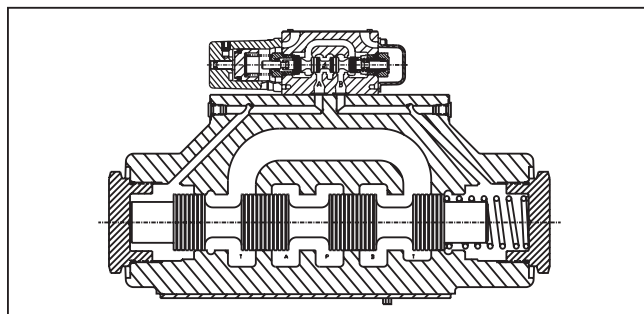
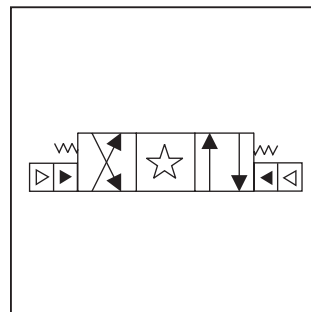
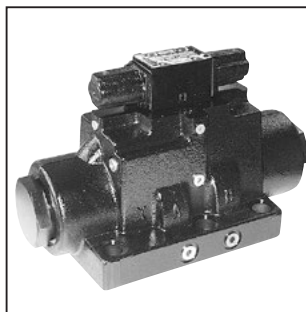
General Description

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

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
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

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.

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.

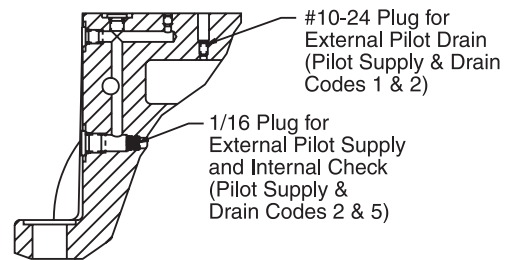
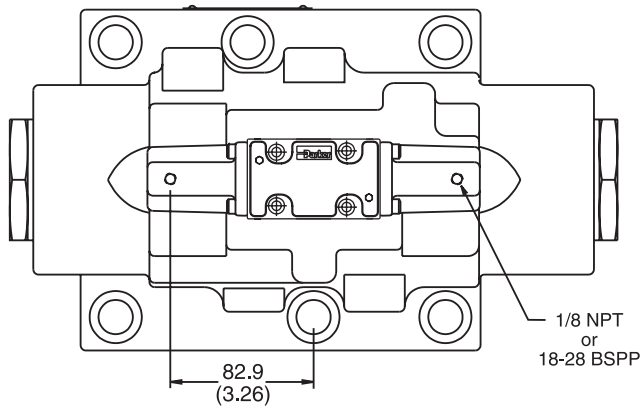
Valve Weight: 35.3 kg (77.8 lbs.)
Standard Bolt Kit: BK229
Metric Bolt Kit: BKM229

Bold: Designates Tier I products and options.

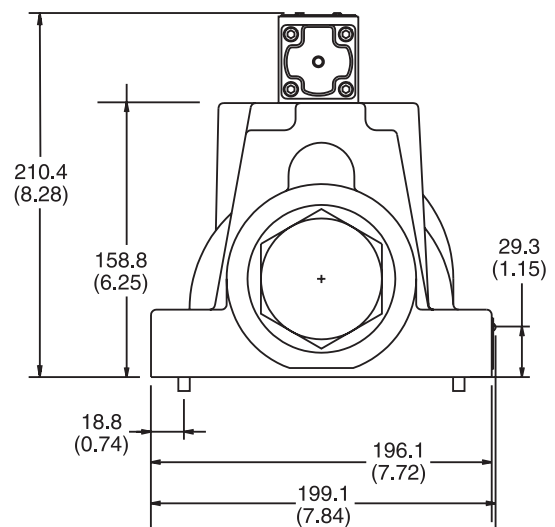
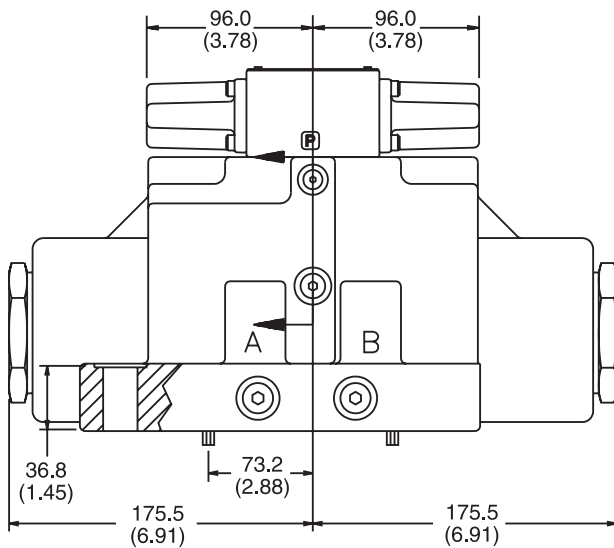
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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.

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.

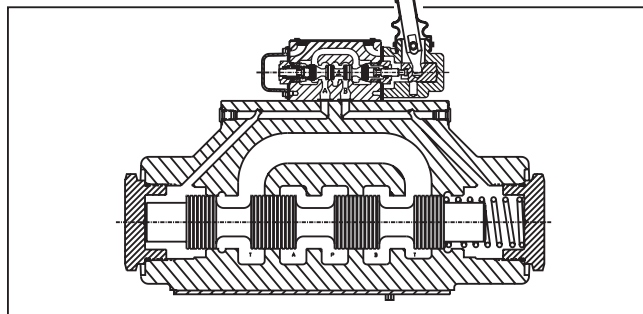
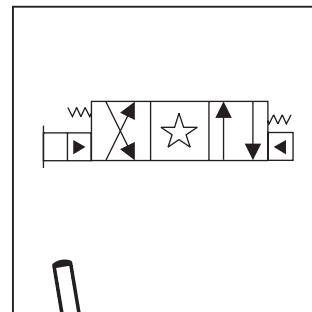
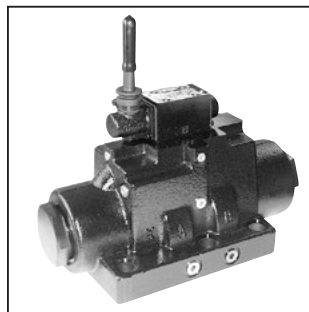
General Description

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

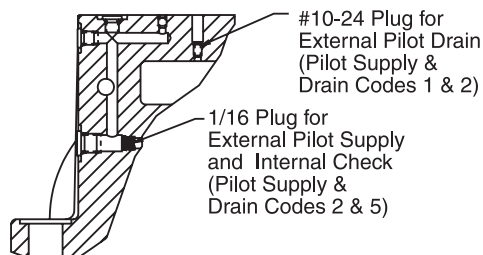
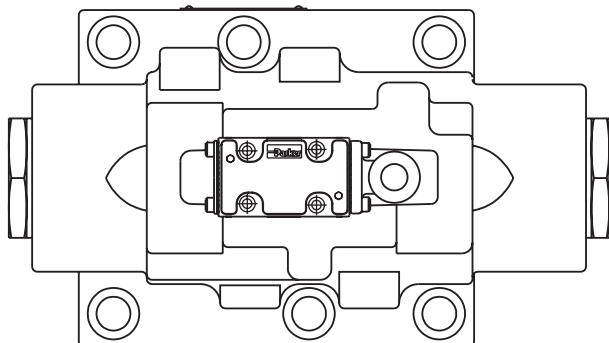
D Directional Control Valve	101V Basic Valve	L Lever Operated Pilot	Spool	Style	Pilot Supply and Drain	Seal	Valve Variations	Design Series																														
NFPA D10 CETOP 10		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th><th>Symbol</th></tr> </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> * 008 spool has closed crossover. ** 009 spool has open crossover.		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.
Code	Symbol																																					
001																																						
002																																						
004																																						
008*																																						
009**																																						
011																																						
Code	Type																																					
N	Nitrile																																					
V	Fluorocarbon																																					
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																																					
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.		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th><th>Supply — Drain</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> # Not available with 002, 008 & 009 spools.	Code	Supply — Drain	1	Int. pilot/Ext. drain	2	Ext. pilot/Ext. drain	4#	Int. pilot/Int. drain	5	Ext. pilot/Int. drain																										
Code	Supply — Drain																																					
1	Int. pilot/Ext. drain																																					
2	Ext. pilot/Ext. drain																																					
4#	Int. pilot/Int. drain																																					
5	Ext. pilot/Int. drain																																					
Valve Weight: 35.0 kg (77.2 lbs.) Standard Bolt Kit: BK229 Metric Bolt Kit: BKM229		<table border="1" style="width: 100%; border-collapse: collapse;"> <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> † Available with 001, 002, 004 & 011 spools only.		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.																						
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.																																					

Bold: Designates Tier I products and options.

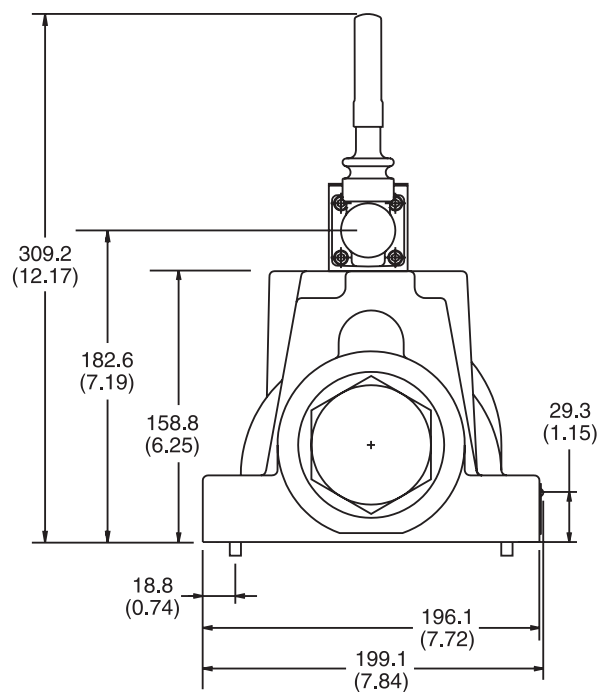
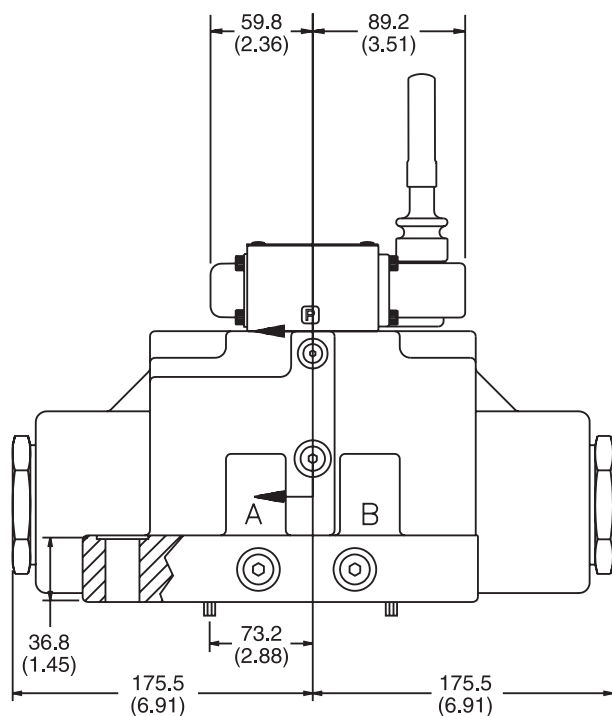
Non-Bold: Designates Tier II products and options. These products will have longer lead times.

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.

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.

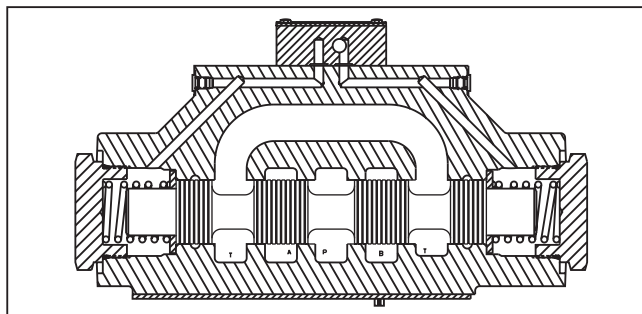
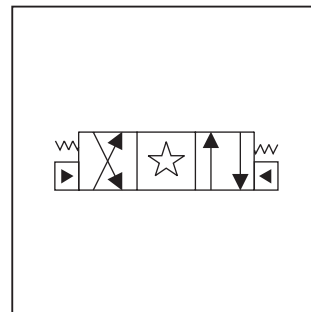
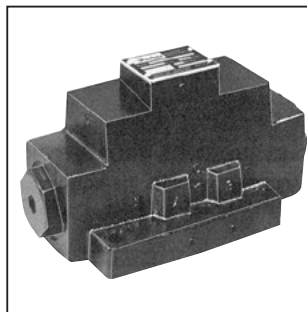
Features

- 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.

D Directional Control Valve	10 Basic Valve	P Actuator	 Spool	 Style	 Pilot Supply and Drain	 Seal	 Valve Variations	 Design Series NOTE: Not required when ordering.
---	--	--	---	---	--	--	--	---

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.

Code	Symbol
001	
002	
004	
008*	
009**	
011	

* 8 spool has closed crossover.
 ** 9 spool has open crossover.

Code	Description
2	Ext. Pilot / Ext. Drain
5#	Ext. Pilot / Int. Drain

Available in "B" & "H" styles only.

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

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.

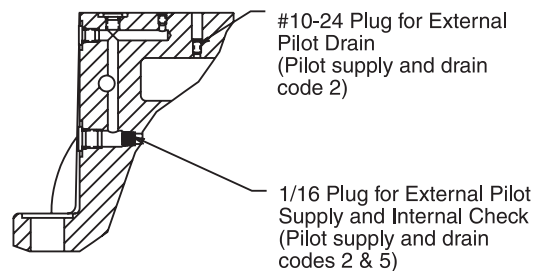
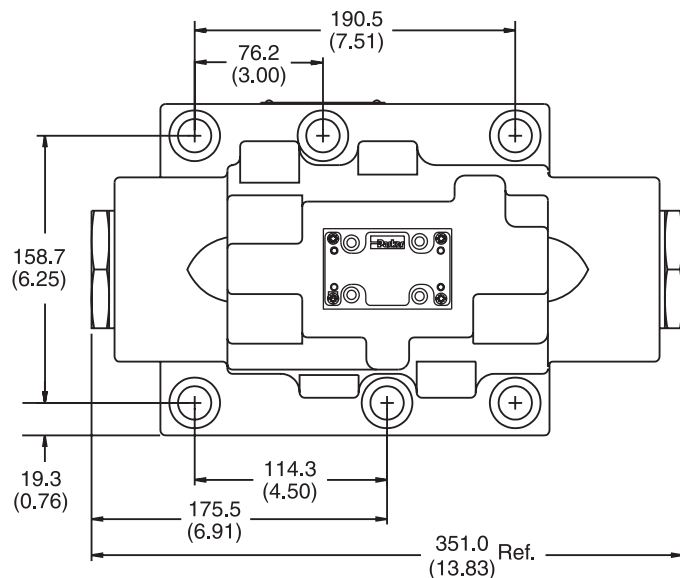
This condition varies with spool code.

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.

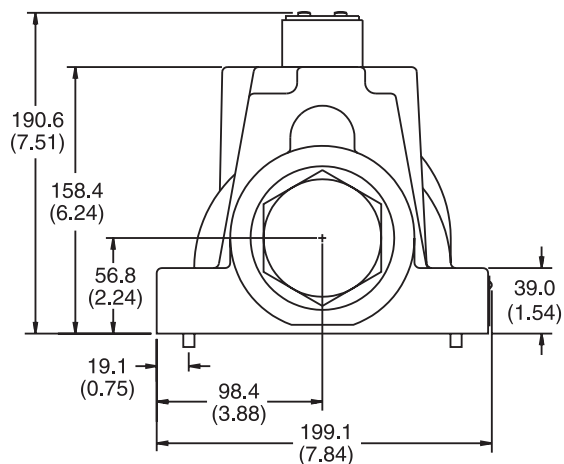
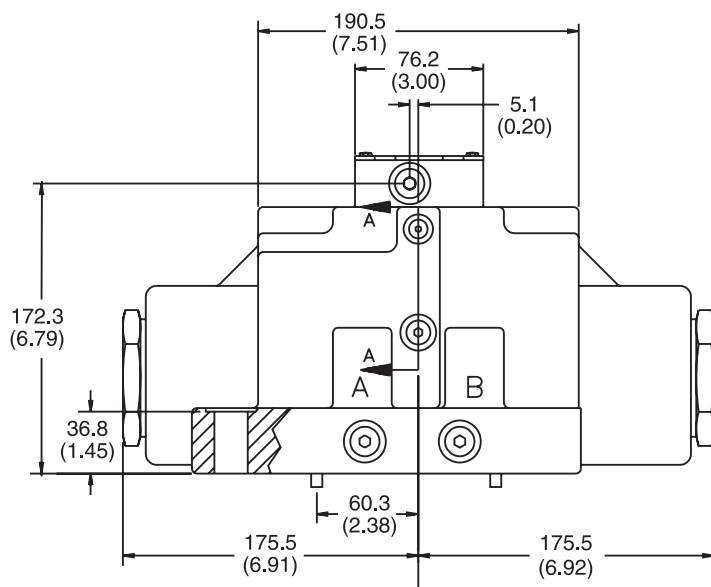
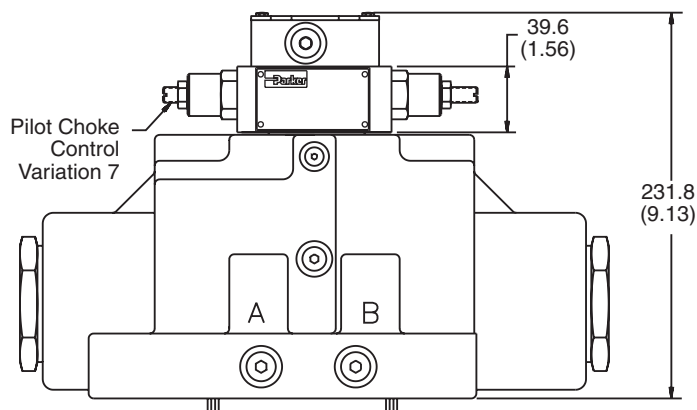
Inch equivalents for millimeter dimensions are shown in (**)

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:

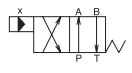
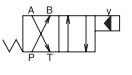
4.4 to 207 Bar (65 to 3000 PSI)

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).

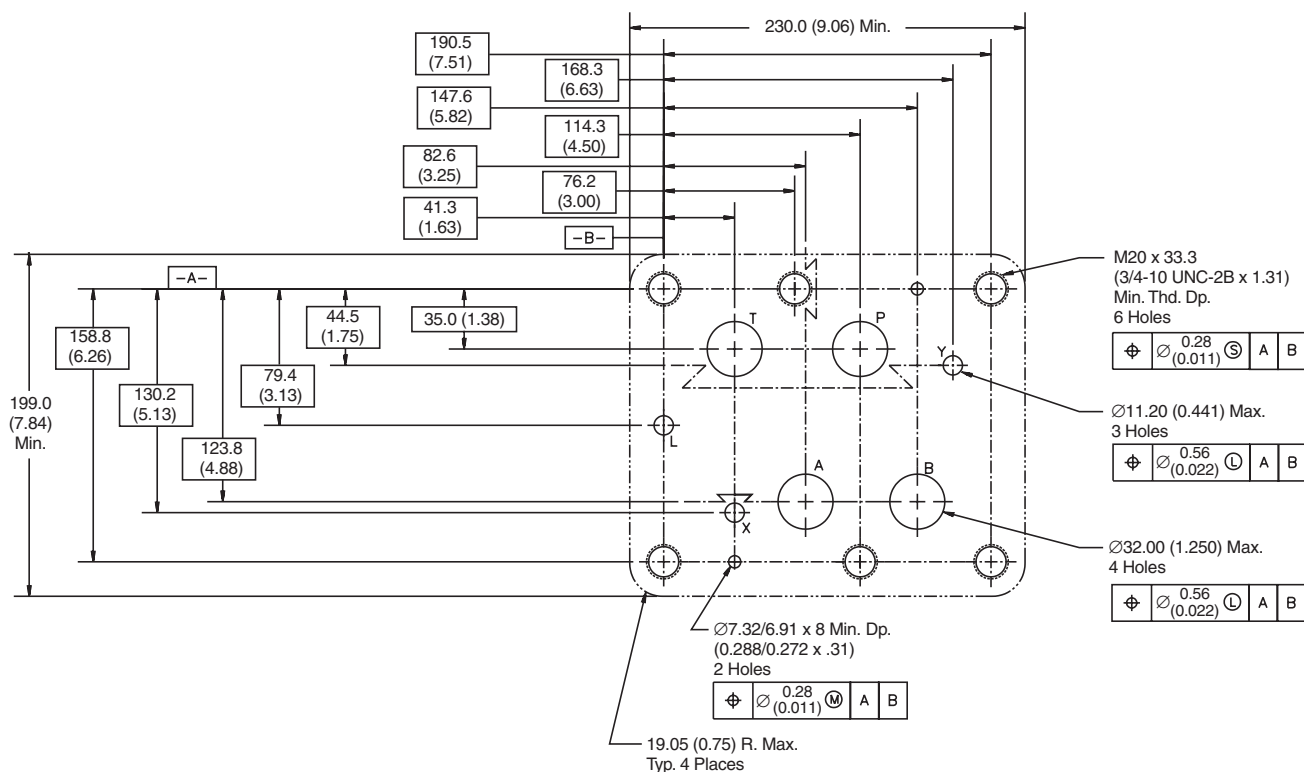
Mounting Position

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.

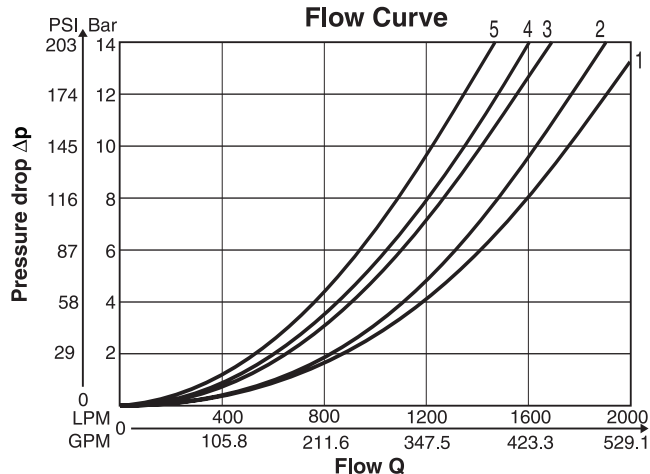
Additionally spools with a P to T connection in the de-energized position need an external pressure supply (external inlet).

Features

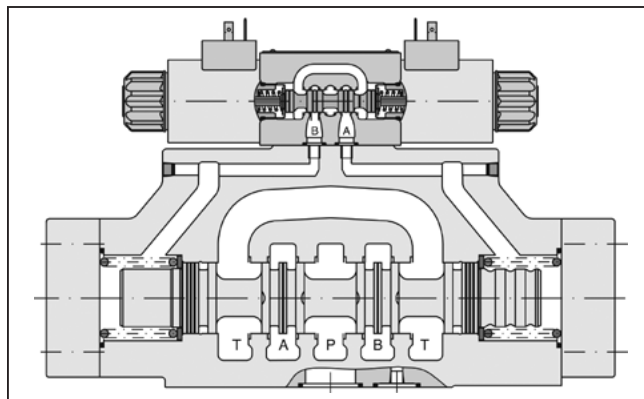
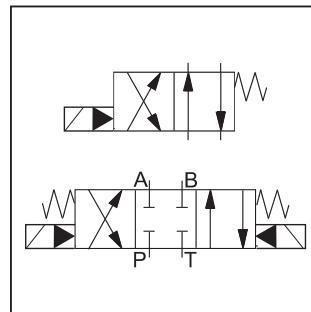
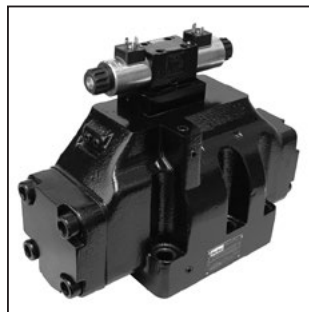
- Low pressure drop design.
- Hardened spools provide long life.
- Wide variety of voltages and electrical connection options.
- Explosion proof availability.
- No tools required for coil removal.

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
003	—	—	—	—	—
004	5	5	—	4	1
005	—	—	—	—	—
006	—	—	—	—	—
007	—	—	—	—	—
009	3	3	2	3	1
011	—	—	—	—	—
014	—	—	—	—	—
015	—	—	—	—	—
016	—	—	—	—	—
020	5	5	—	3	1
021	—	—	—	—	—
022	—	—	—	—	—
026	—	—	—	—	—
030	5	5	—	4	1
054	5	5	—	4	1

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

A

D Directional Control Valve	111V Basic Valve	W 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																
Code	Description																											
N	Nitrile																											
V	Fluorocarbon																											
					<table border="1"> <tr> <th>Code</th> <th>Description</th> </tr> <tr> <td>1</td> <td>Internal Pilot External Drain</td> </tr> <tr> <td>2</td> <td>External Pilot External Drain</td> </tr> <tr> <td>4*</td> <td>Internal Pilot Internal Drain</td> </tr> <tr> <td>5</td> <td>External Pilot Internal Drain</td> </tr> </table>	Code	Description	1	Internal Pilot External Drain	2	External Pilot External Drain	4*	Internal Pilot Internal Drain	5	External Pilot Internal Drain	<table border="1"> <tr> <th>Code</th> <th>Description</th> </tr> <tr> <td>J</td> <td>24 VDC</td> </tr> <tr> <td>K</td> <td>12 VDC</td> </tr> <tr> <td>T</td> <td>240/60 - 220/50 VAC</td> </tr> <tr> <td>U</td> <td>98 VDC</td> </tr> <tr> <td>Y</td> <td>120/60 - 110/50 VAC</td> </tr> </table>	Code	Description	J	24 VDC	K	12 VDC	T	240/60 - 220/50 VAC	U	98 VDC	Y	120/60 - 110/50 VAC
Code	Description																											
1	Internal Pilot External Drain																											
2	External Pilot External Drain																											
4*	Internal Pilot Internal Drain																											
5	External Pilot Internal Drain																											
Code	Description																											
J	24 VDC																											
K	12 VDC																											
T	240/60 - 220/50 VAC																											
U	98 VDC																											
Y	120/60 - 110/50 VAC																											

* Not for spools 002, 009 & 030.

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". 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".

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.

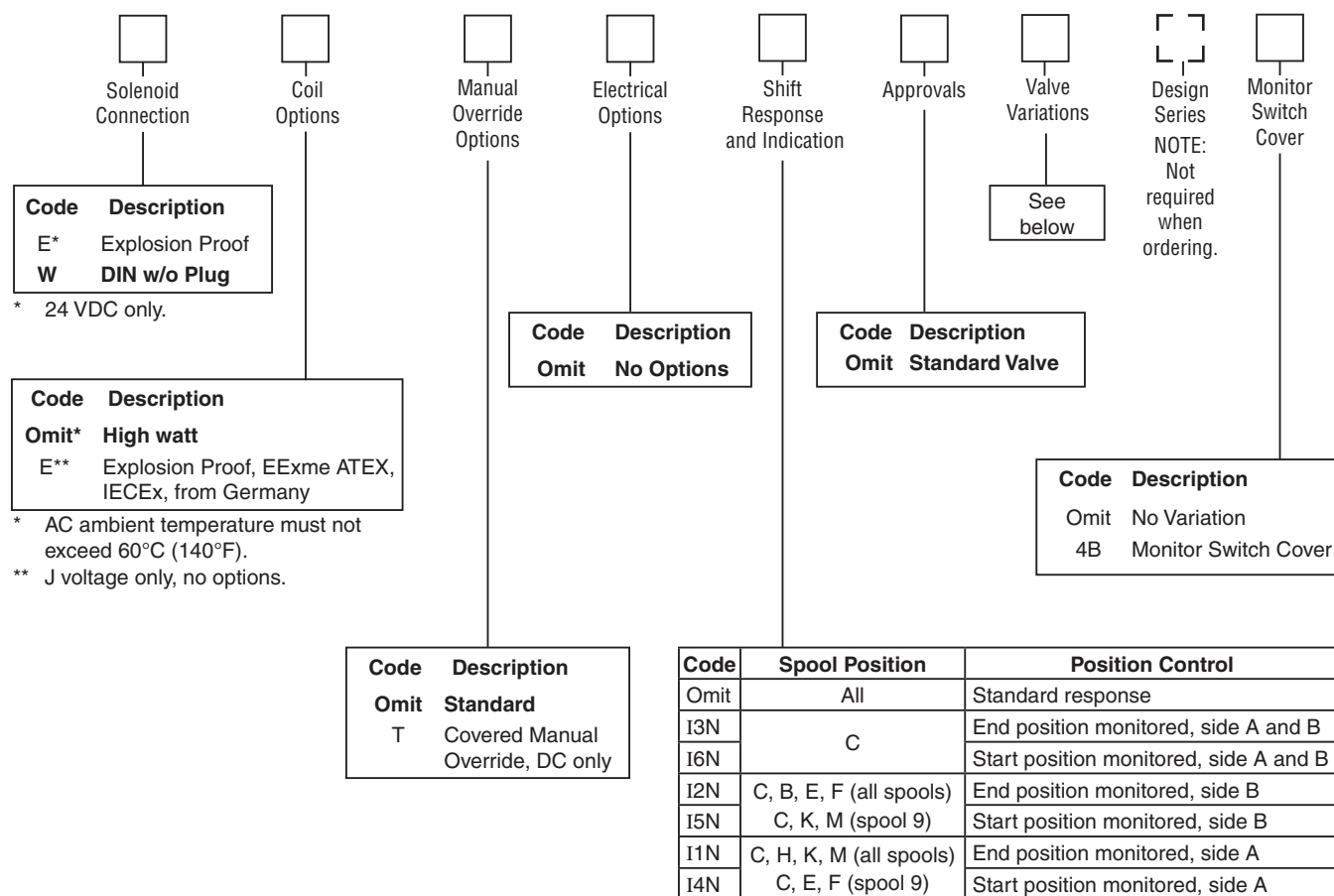
Weight:

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.



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.

Not available with Explosion Proof solenoid connection.

DC DIN, high watt coils only.

Valve Variations

OPTIONS ARE NOT AVAILABLE ON MONITOR SWITCH VALVES.

Code	Description
Omit	Standard without accessories
3A	Pilot Choke Meter Out
3B	Pilot Choke Meter In
3C	Pilot Pressure Reducer
3R	Pilot Choke Meter Out & Pilot Pressure Reducer
1T	Pilot Choke Meter In & Pilot Pressure Reducer

Bold: Designates Tier I products and options.

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

A

Solenoid Ratings

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

Explosion Proof Solenoid Ratings*

ATEX (EE)	Complies with ATEX requirements for: EExme ATEX, IECEX, from Germany
------------------	--

* Allowable Voltage Deviation $\pm 10\%$.

Code		Voltage	In Rush Amps Amperage	In Rush VA	Holding Amps @ 3 mm	Watts	Resistance
Voltage Code	Power Code						
J	Omit	24 VDC	N/A	N/A	1.32 Amps	30 W	17.27 Ohms
K	Omit	12 VDC	N/A	N/A	2.64 Amps	30 W	4.32 Ohms
T	Omit	240/60 VAC	0.83 Amps	199 VA	0.30 Amps	30 W	120.40 Ohms
T	Omit	220/50 VAC	0.87 Amps	191 VA	0.34 Amps	30 W	120.40 Ohms
U	Omit	98 VDC	N/A	N/A	0.31 Amps	30W	288.00 Ohms
Y	Omit	120/60 VAC	1.7 Amps	204 VA	0.60 Amps	30 W	28.20 Ohms
Y	Omit	110/50 VAC	1.7 Amps	187 VA	0.68 Amps	30 W	28.20 Ohms
Explosion Proof Solenoids (German)							
J		24 VDC	N/A	N/A	1.0 Amps	24 W	24 Ohms

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
	100 Bar	[ms]	320
	250 Bar	[ms]	210
	350 Bar	[ms]	200
AC Solenoids	Pilot Pressure	[ms]	
	50 Bar	[ms]	450
	100 Bar	[ms]	300
	250 Bar	[ms]	190
	350 Bar	[ms]	180
			390
			375
			375
			375
			375

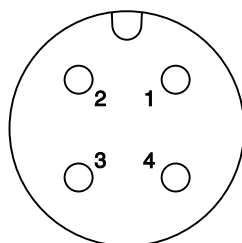
Single Solenoid Valves

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

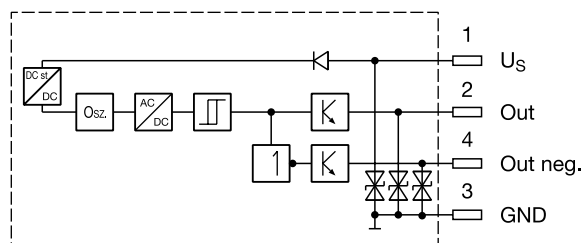
Protection Class	IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)
Ambient Temperature	[°C] -20...+60; (-4°F...140°F)
Supply Voltage / Ripple	[V] 24 ≤10%
Tolerance Supply Voltage	[V] ±20
Polarity Protection	[V] 300
Current Consumption without Load	[mA] ≤ 20
Switching Hysteresis	[mm] <0.06
Max. Output Current per Channel, Ohmic	[mA] 250
Min. Distance to Next AC Solenoid	[m] 0.1 (0.33 ft.)
Interface	M12x1 to IEC 61076-2-101
Wiring Minimum	[mm²] 5 x 0.25 brad shield recommended
Wiring Length Maximum	[m] 50 (164 ft.) recommended
CE Conform	EN 61000-4-2/EN 61000-4-4/EN 61000-4-6 ¹⁾ /ENV 50140/ENV 50240

1) Only guaranteed with screened cable and female connector.

M12 Pin Assignment



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



Outputs: Open collector

Definitions

Start position monitored:

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

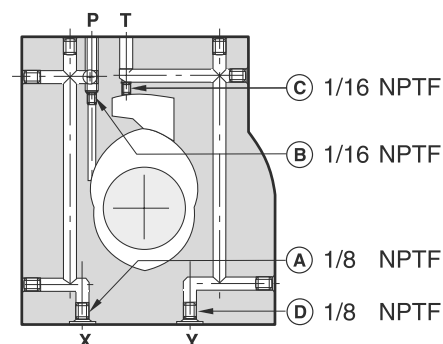
At the switching point the spool is located within the closed position. It is secured so that only the flow paths of the offset position are granted.

End position monitored:

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

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

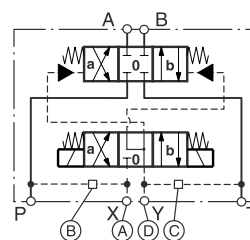
Pilot Oil Inlet (Supply) and Outlet (Drain)



○ open, ● closed

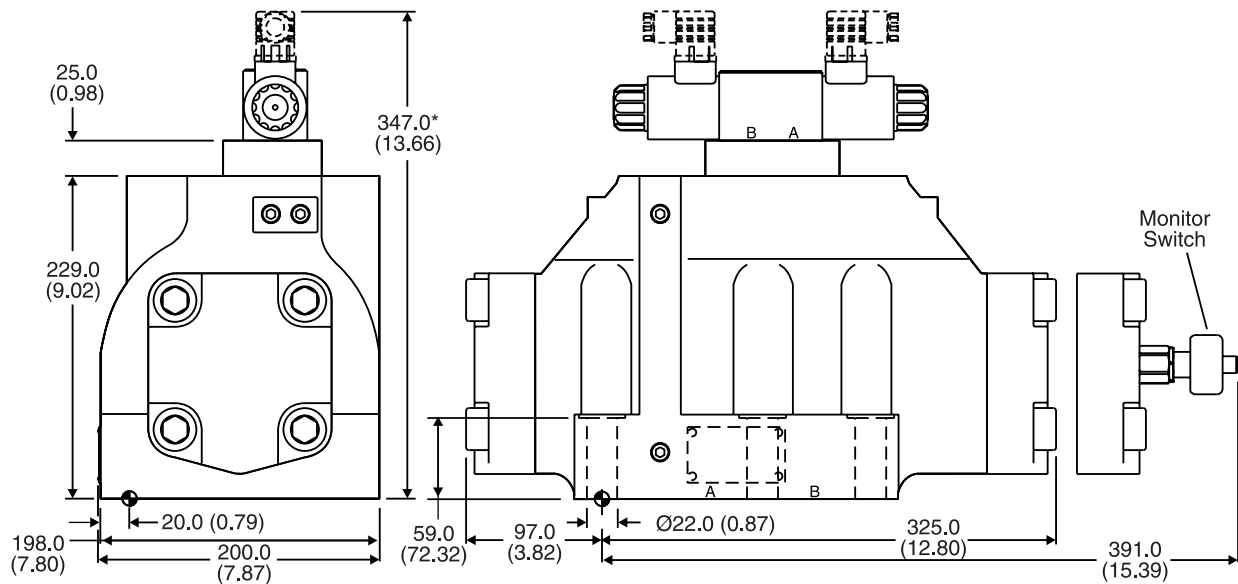
Pilot oil		A	B	C	D
Inlet	Outlet				
internal	external	○	Orifice Ø1.5	●	○
external	external	Orifice Ø1.5	●	●	○
internal	internal	○	Orifice Ø1.5	○	○
external	internal	Orifice Ø1.5	●	○	○

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).

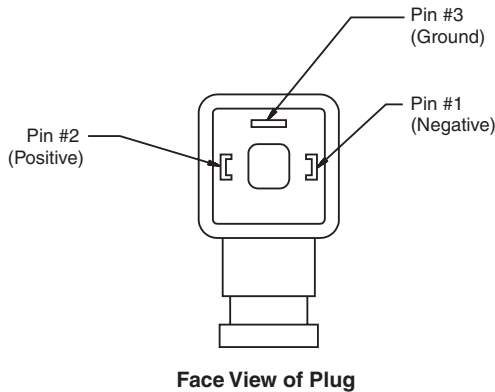
Surface Finish	Kit			Seal Kit
	BK386	 6x M20x90 DIN 912 12.9	 517 Nm (381.3 lb.-ft.)	Nitrile: SK-D111VW-N-91 Fluorocarbon: SK-D111VW-V-91

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).

Accessories

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



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

A

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).

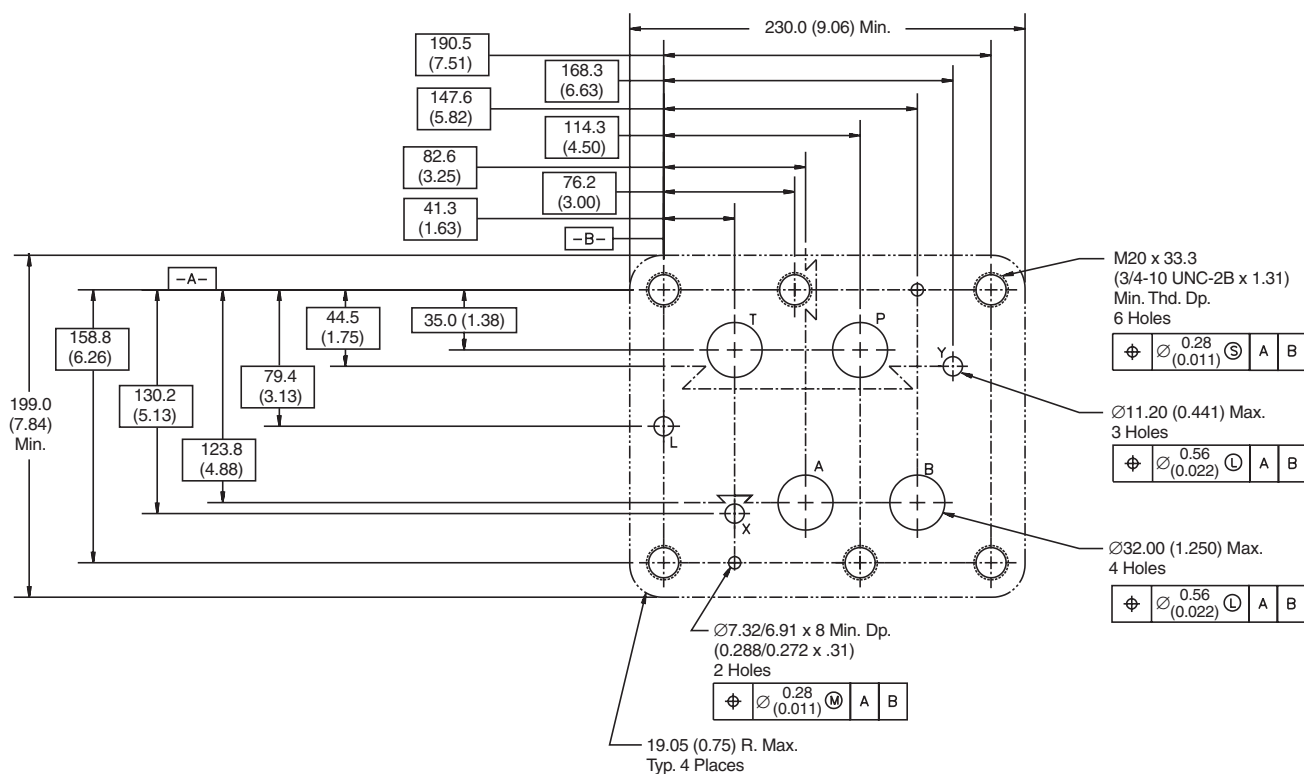
Mounting Position

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.

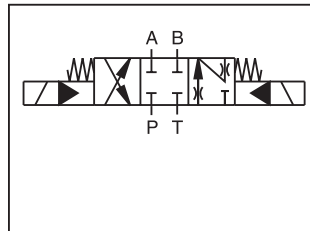
Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request.



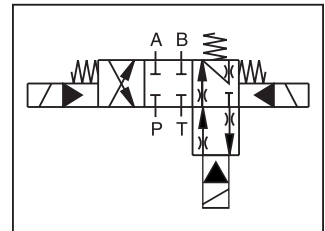
D41VWR (shown)



D41VWZ (shown)

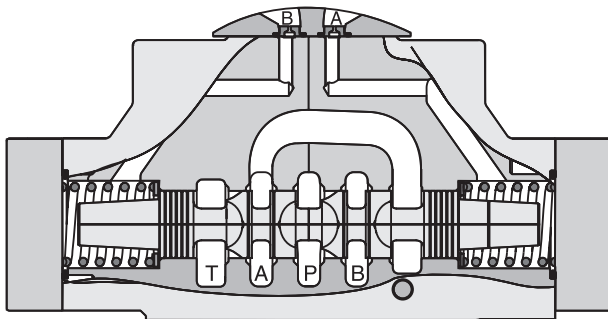


Regenerative D111VWR

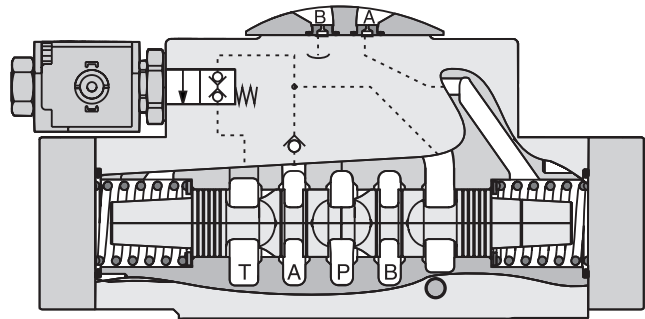


Hybrid D111VWZ

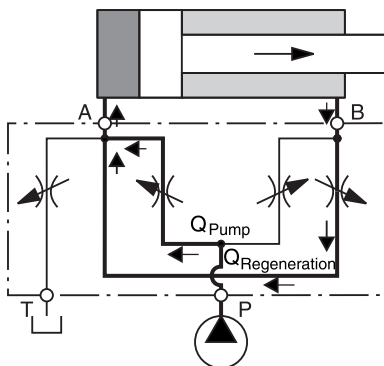
Regenerative Valve D111VWR



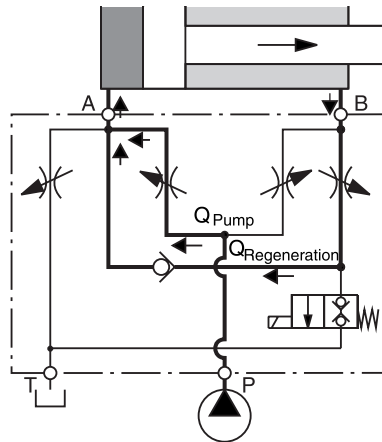
Hybrid Valve D111VWZ



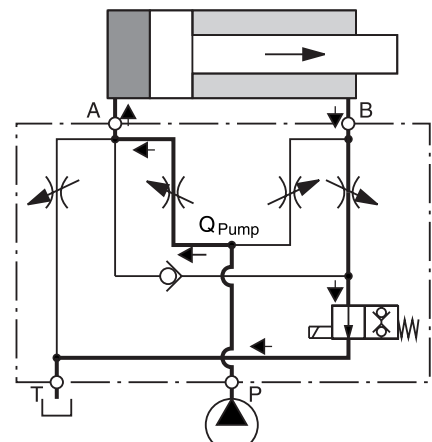
D111VWR Regenerative Valve Cylinder Extending



D111VWZ Hybrid Valve Cylinder Extending Regenerative Mode (High Speed)



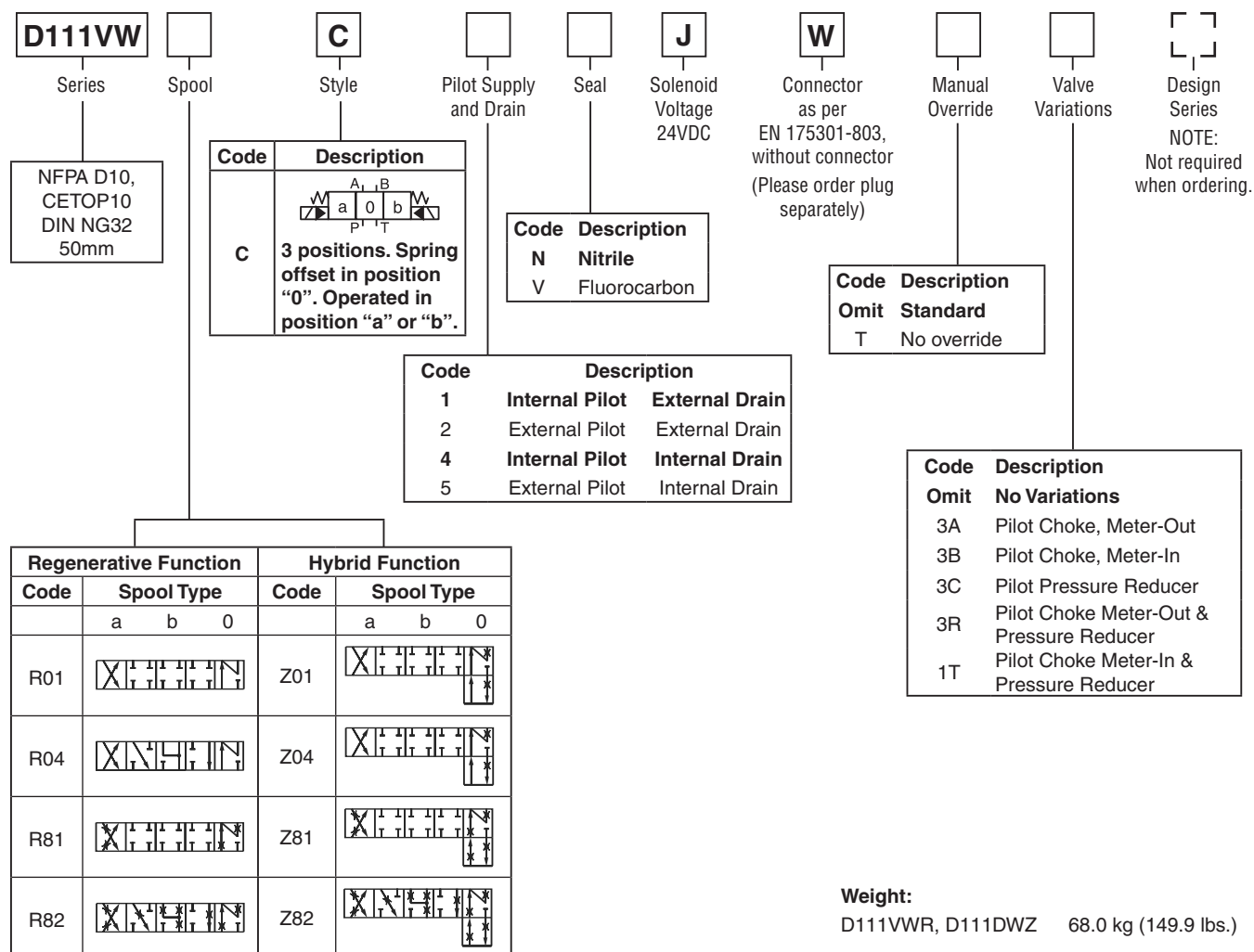
Cylinder Extending Standard Mode (High Force)



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.

Ordering Information

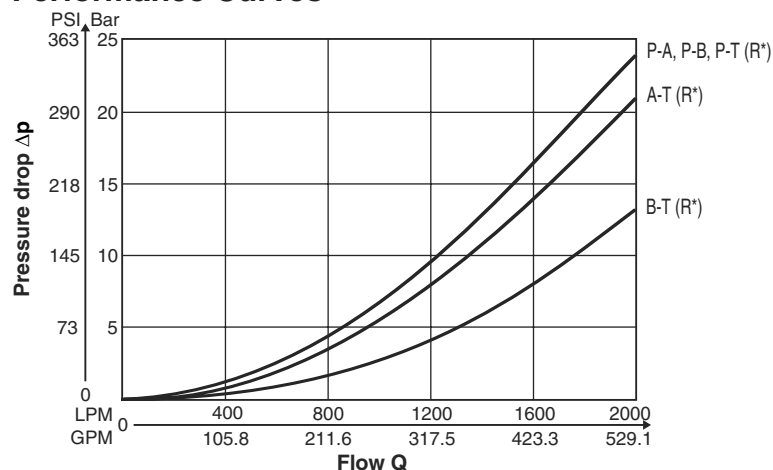
A



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%			
DC Solenoids		Energized	De-energized
Pilot Pressure			
50 Bar (725 PSI)		[ms]	470
100 Bar (1450 PSI)		[ms]	390
250 Bar (3625 PSI)		[ms]	390
350 Bar (5075 PSI)		[ms]	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	

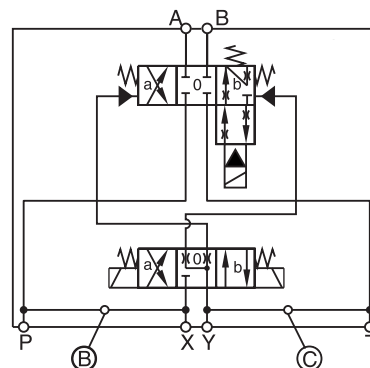
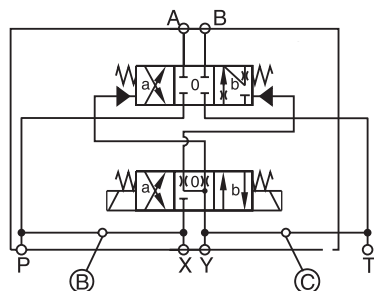
With electrical connections the protective conductor (PE ≡) must be connected according to the relevant regulations.

Pilot Flow

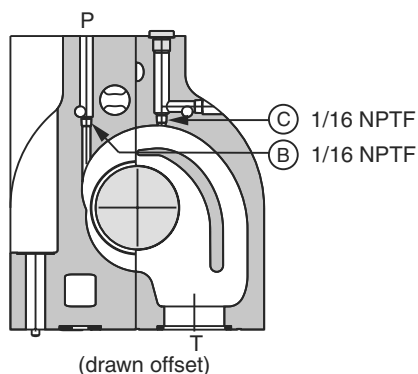
Pilot Oil Inlet (Supply) and Outlet (Drain)

○ open, ● closed

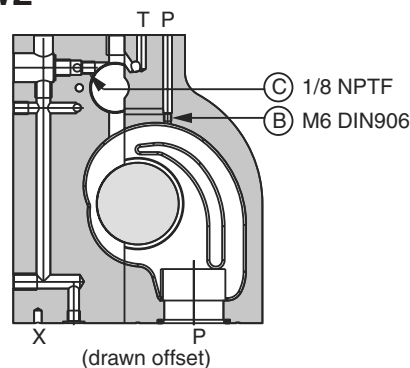
Pilot Oil Inlet	Pilot Oil Outlet	B	C
internal	external	○	●
external	external	●	●
internal	internal	○	○
external	internal	●	○



D111VWR

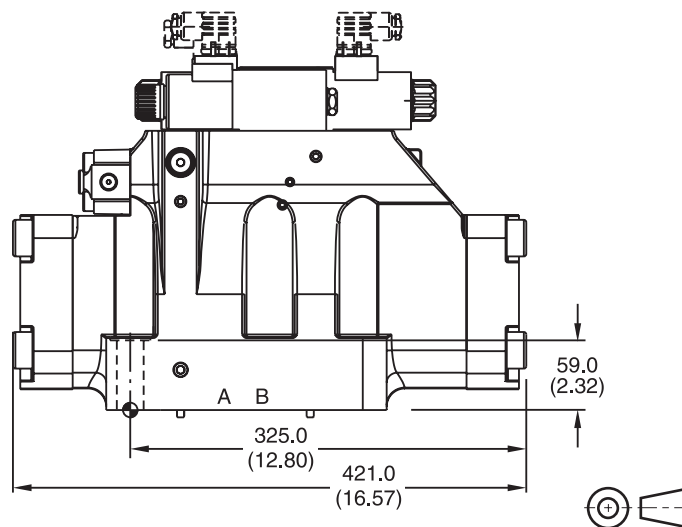
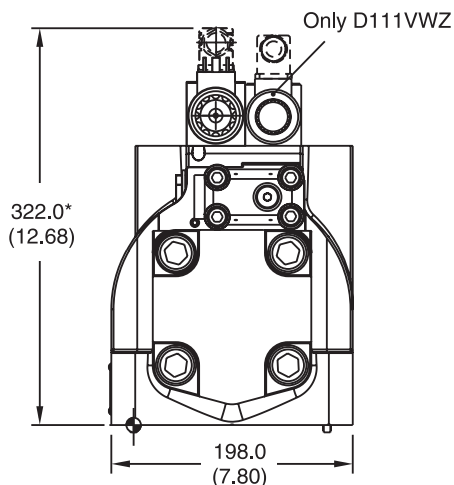


D111VWZ



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.).

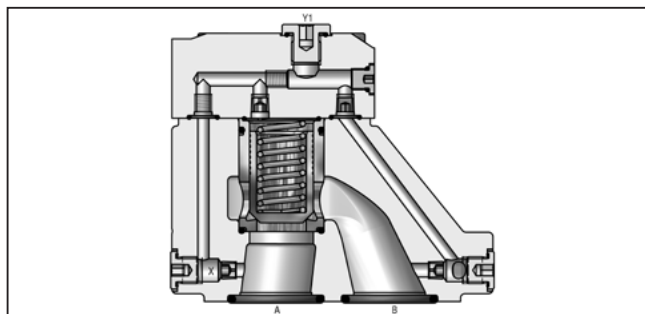
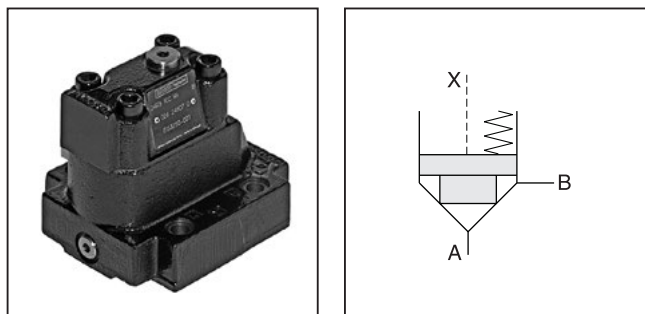
General Description

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.

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	●	●	—	—	—	—

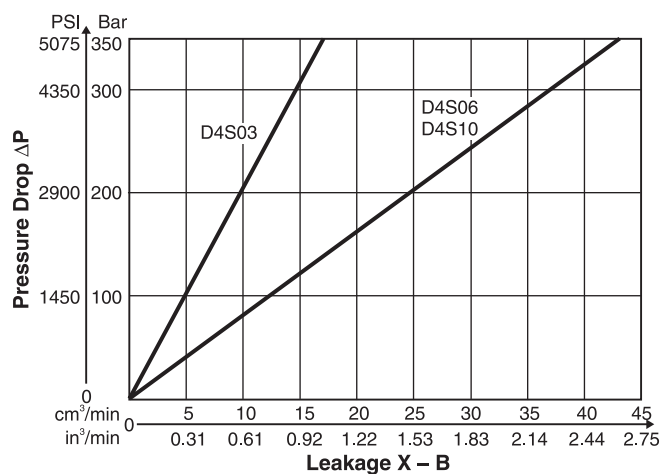
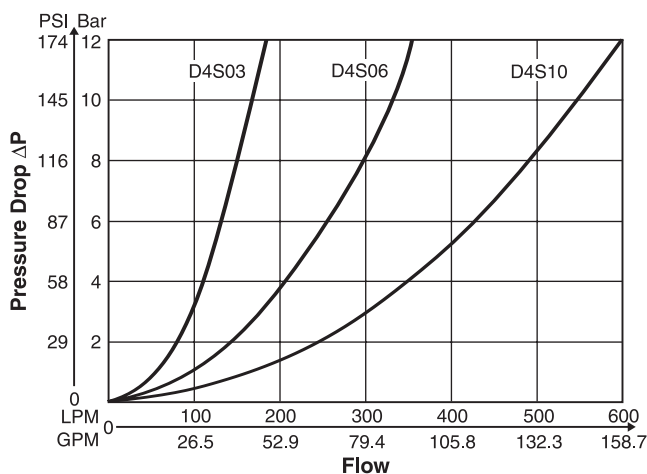
Key: ○ Open Bore ● Closed Bore ● Orifice Ø 1.2

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

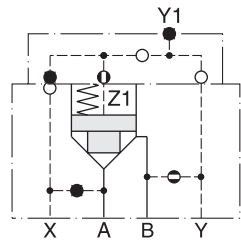
A

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)						

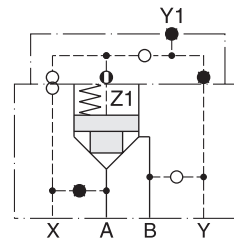
D4S Pilot Configuration

D4S Direct Operated	D4S with VV01

D4S Direct Operated Examples

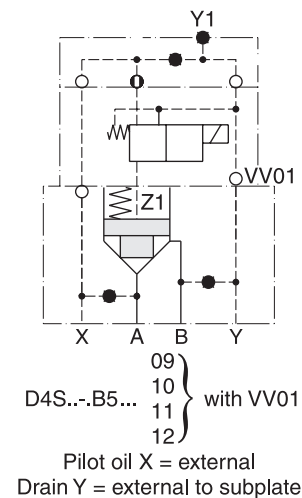
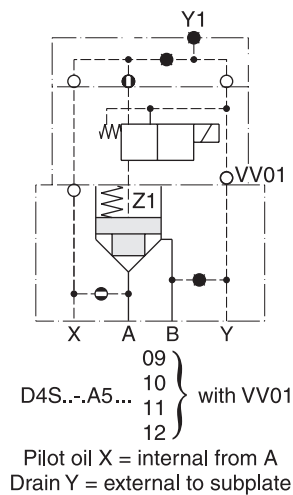
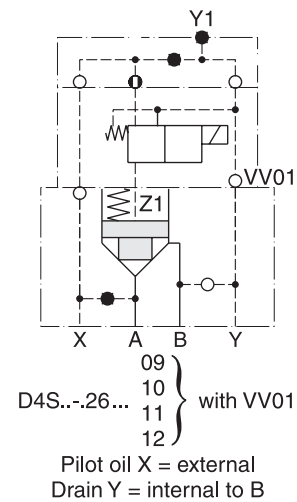
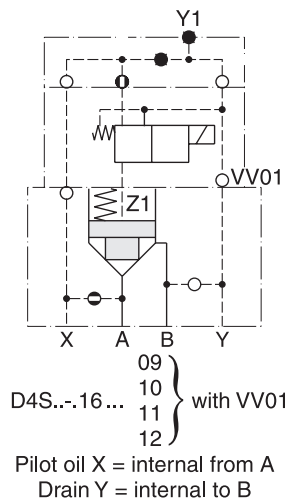


D4S...DC
Pilot oil Y = internal from B



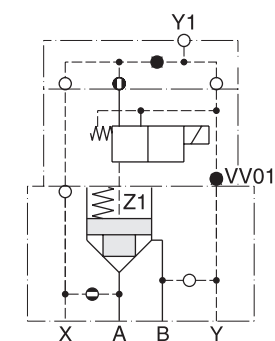
D4S...21
Pilot oil X = external

D4S with VV01 Examples



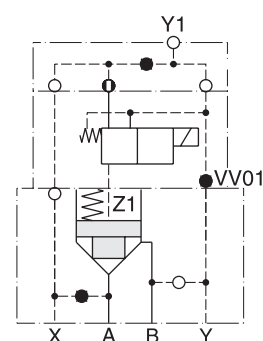
D4S with VV01 Examples

A



D4S...12...
 09 } with VV01
 10
 11
 12

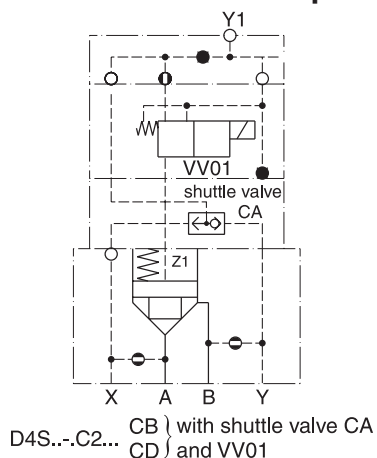
Pilot oil X = internal from A
 Drain Y1 = external out of the cap



D4S...22...
 09 } with VV01
 10
 11
 12

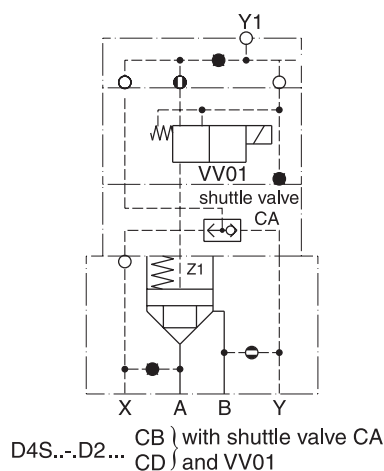
Pilot oil X = external
 Drain Y1 = external out of the cap

D4S with Shuttle Valve Examples



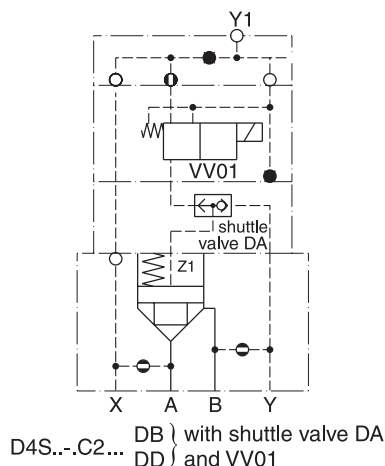
D4S...C2... CB } with shuttle valve CA
 CD } and VV01

Pilot oil = internal from A and B
 Drain Y1 = external out of the cap



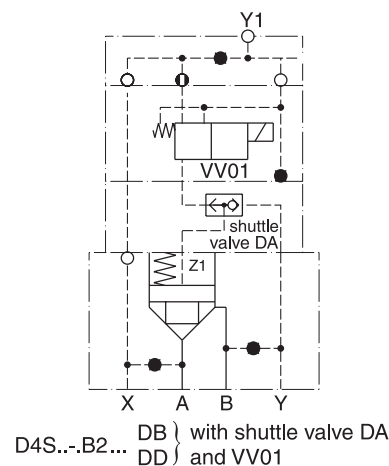
D4S...D2... CB } with shuttle valve CA
 CD } and VV01

Pilot oil = internal from B and
 external from X
 Drain Y1 = external out of the cap



D4S...C2... DB } with shuttle valve DA
 DD } and VV01

Pilot oil = internal from A and B
 (B-A = Check valve function)
 Drain Y1 = external out of the cap

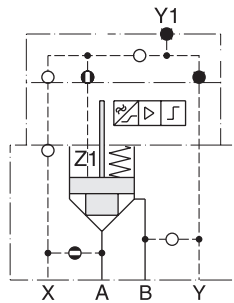


D4S...B2... DB } with shuttle valve DA
 DD } and VV01

Pilot oil = external from X and Y
 Drain Y1 = external out of the cap

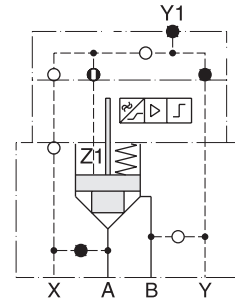
D4S with Position Control Examples

A



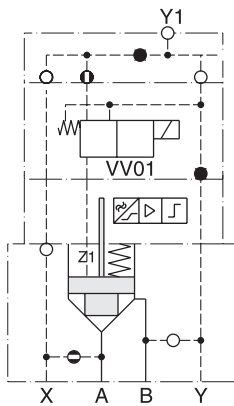
D4S...113A.BA
 (with position control)

Pilot oil X = internal from A



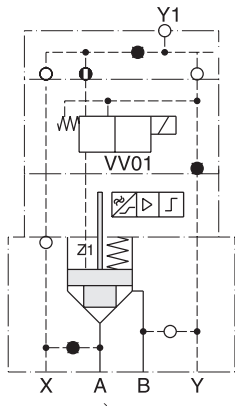
D4S...213A.BA
 (with position control)

Pilot oil X = external



D4S...123A. BC } with position control
 BE } and VV01

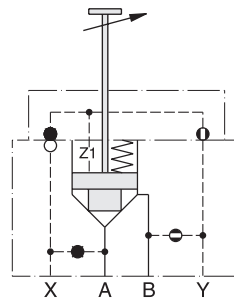
Pilot oil X = internal from A
 Drain Y1 = external out of the cap



D4S...223A. BC } with position control
 BE } and VV01

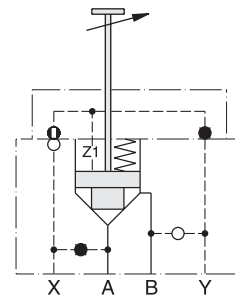
Pilot oil X = external
 Drain Y1 = external out of the cap

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

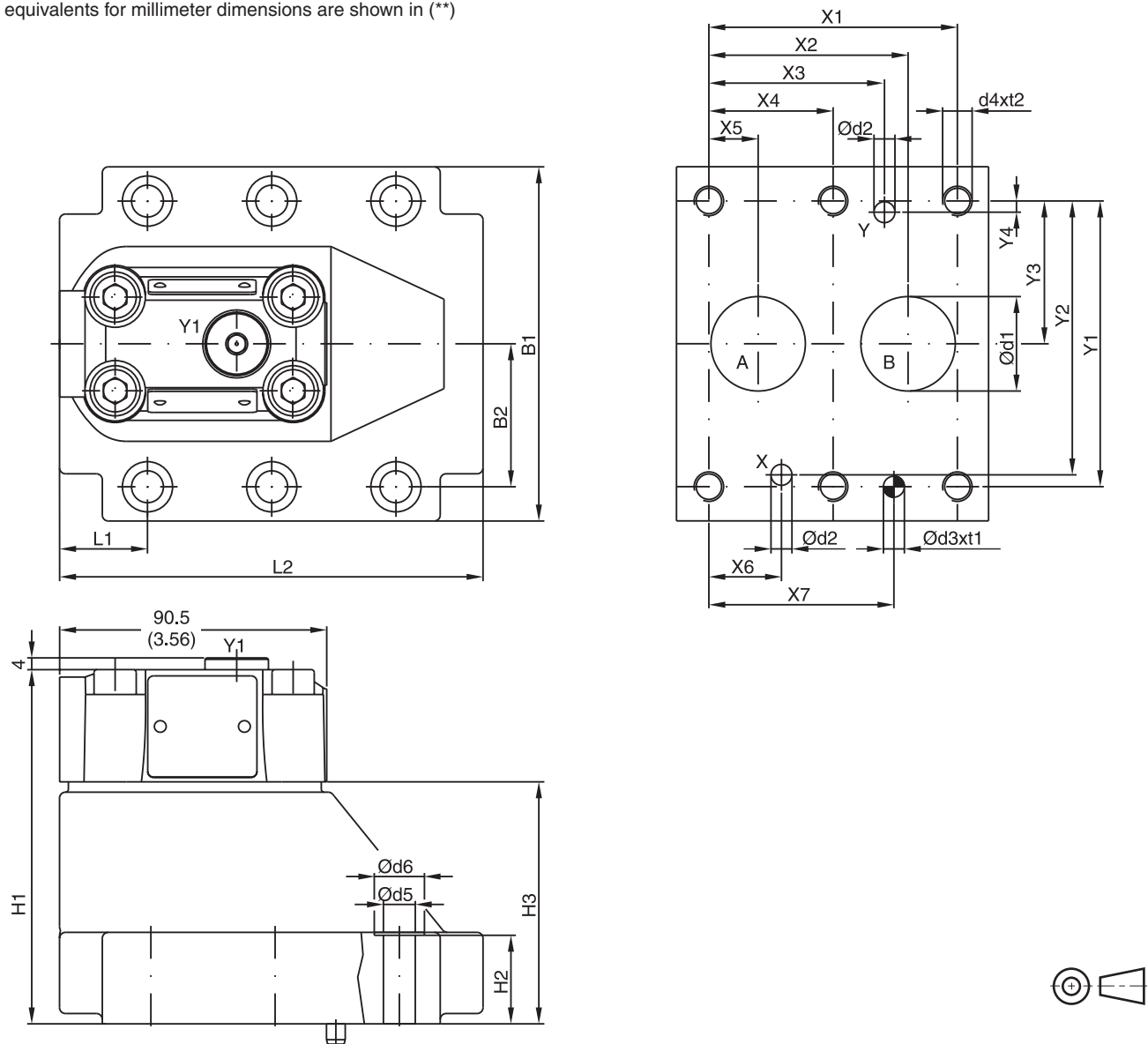
Note: for D4S06 and D4S10 only

Dimensions

Series D4S

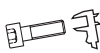
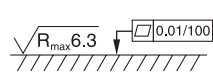
Inch equivalents for millimeter dimensions are shown in (**)

A

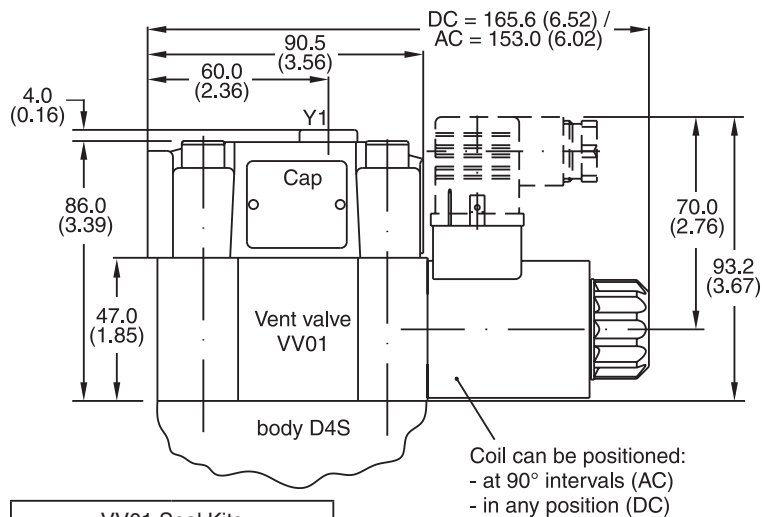


NG	ISO-code	X1	X2	X3	X4	X5	X6	X7	Y1	Y2	Y3	Y4
10	6264-06-09-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	—	7.2 (0.28)	21.5 (0.85)	31.8 (1.25)	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)
25	6264-08-13-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	—	11.1 (0.44)	20.6 (0.81)	44.5 (1.75)	79.4 (3.13)	73.0 (2.87)	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)

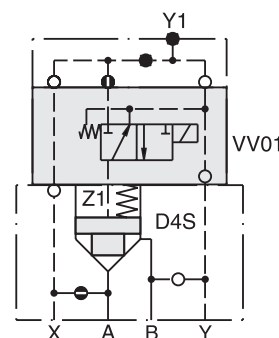
NG	ISO-code	B1	B2	H1	H2	H3	L1	L2	D1	D2	D3	t1	D4	t2	D5	D6
10	6264-06-09-*-97	87.3 (3.44)	33.35 (1.31)	83.0 (3.27)	21.0 (0.83)	45.0 (1.77)	29.0 (1.14)	94.8 (3.73)	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)
25	6264-08-13-*-97	105.0 (4.13)	39.7 (1.56)	109.5 (4.31)	29.0 (1.14)	71.5 (2.81)	34.7 (1.37)	126.8 (4.99)	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	110.8 (4.33)	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 Nitrile	Seal Kit Fluorocarbon	Surface Finish
10	6264-06-07-*-97	BK 505	4x M10 x 35 DIN 912 12.9	63 Nm	S26-58507-0	S26-58507-5	
25	6264-08-11-*-97	BK 485	4x M10 x 45 DIN 912 12.9	(46.5 lb.-ft.)	S26-58475-0	S26-58475-5	
32	6264-10-15-*-97	BK 506	6x M10 x 45 DIN 912 12.9	±15%	S26-58508-0	S26-58508-5	

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

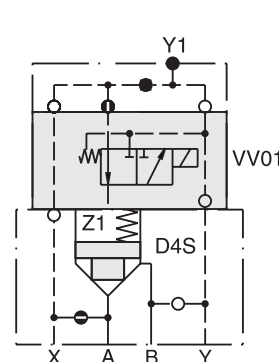
D4S with VV01

VV01 Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5



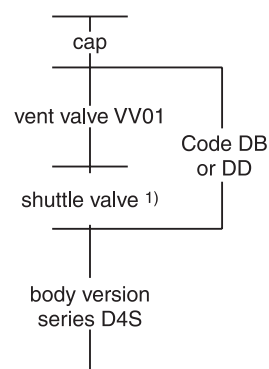
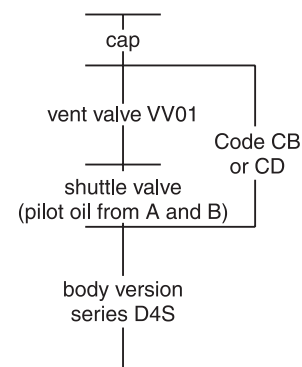
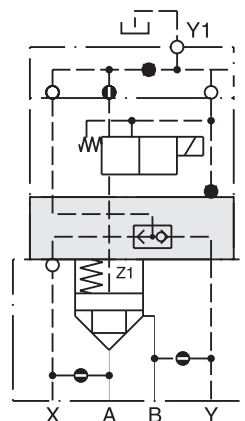
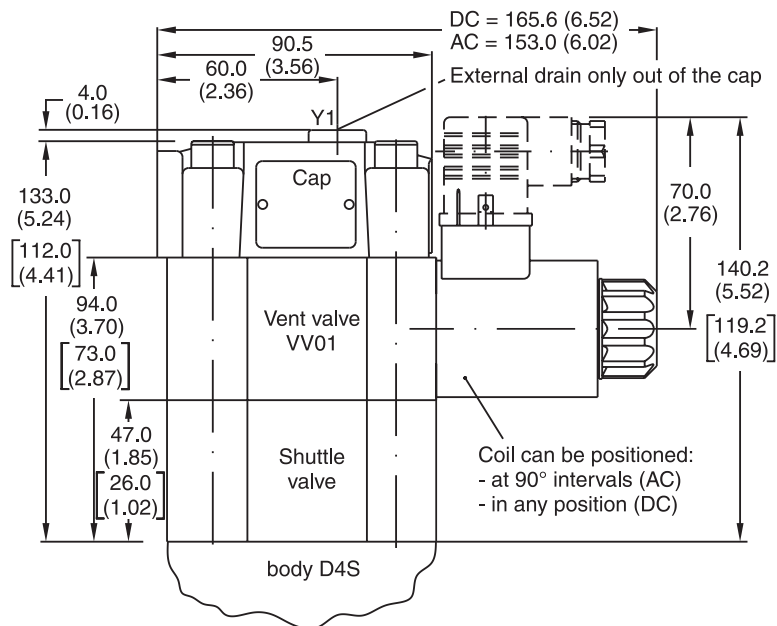
with manual override without manual override

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

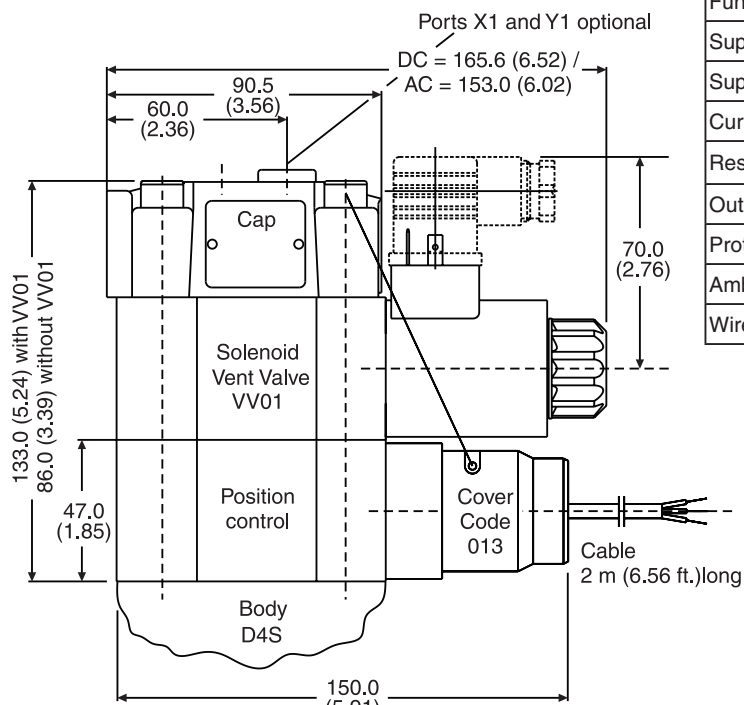
D4S with Shuttle Valve

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)**

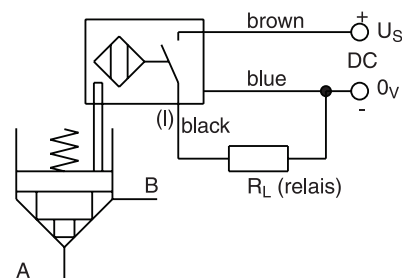
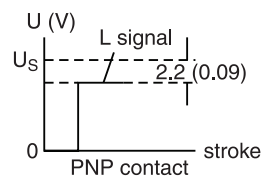
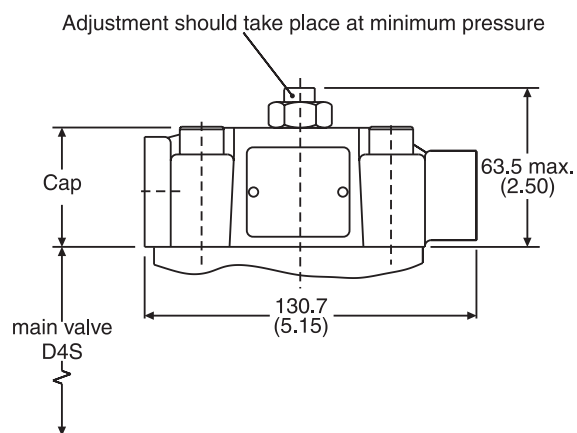
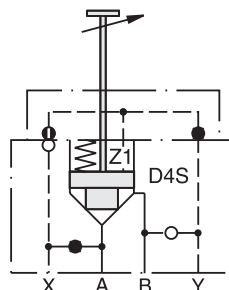
Valve open: proximity switch activated.

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 (U _s)	[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

**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).

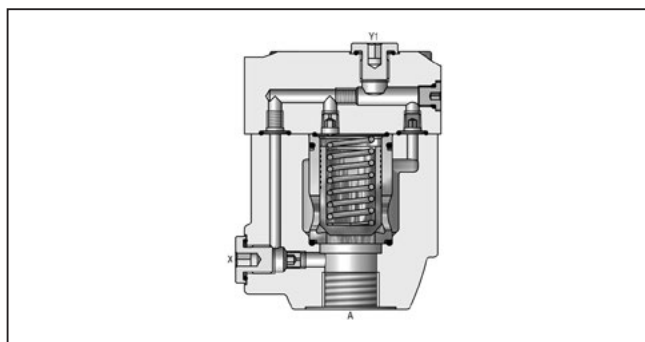
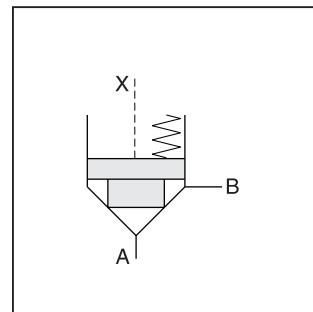
A complete program is offered under the Parker brand: subplate mounted valves (D4S), SAE flange valves (D5S), pipe mounted valves (D4S), slip-in cartridges (CAR – on request).

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



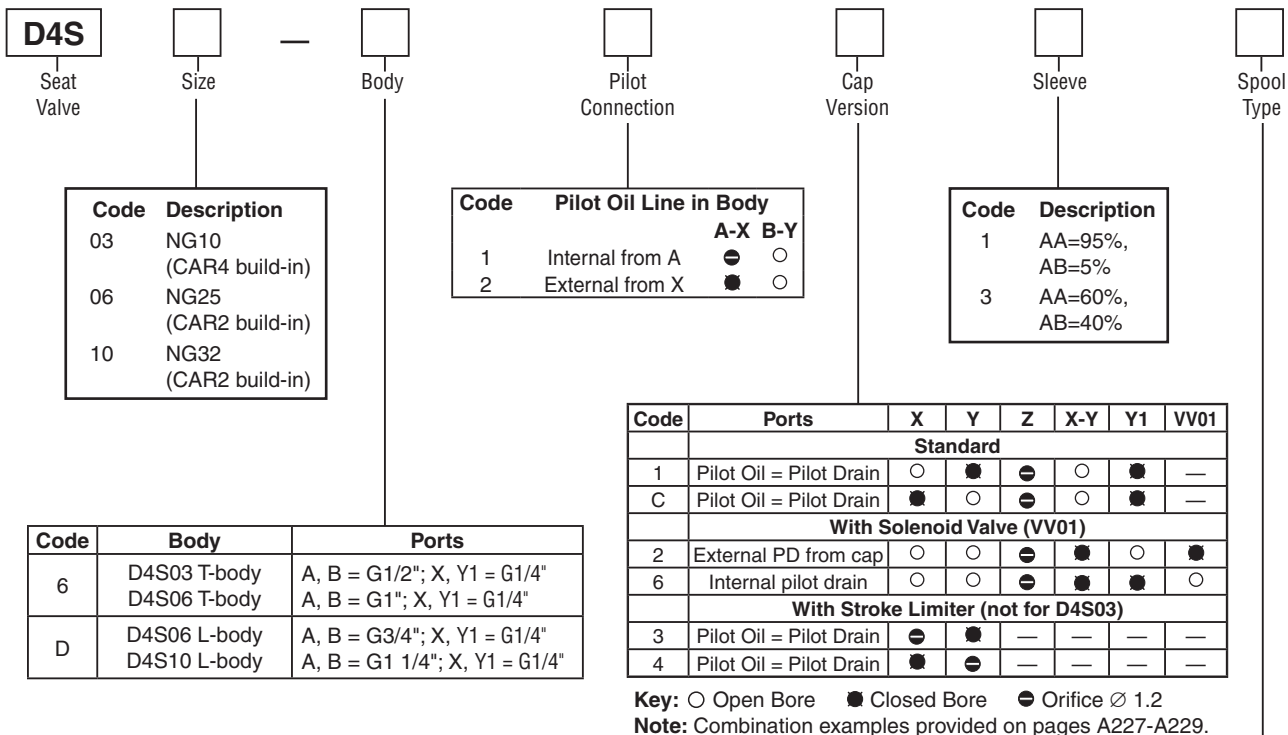
D4S06 L-Body

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.

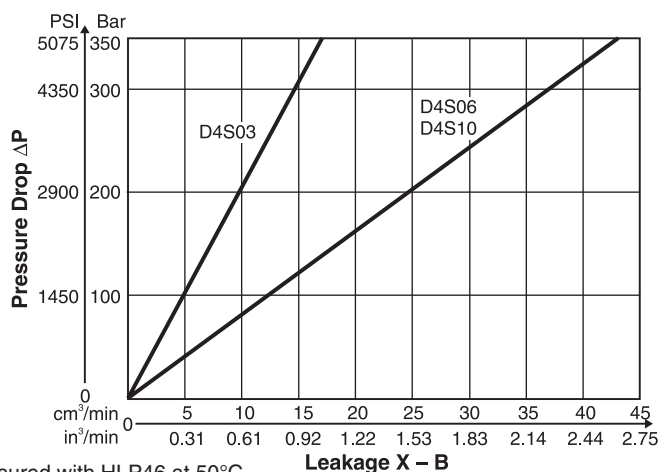
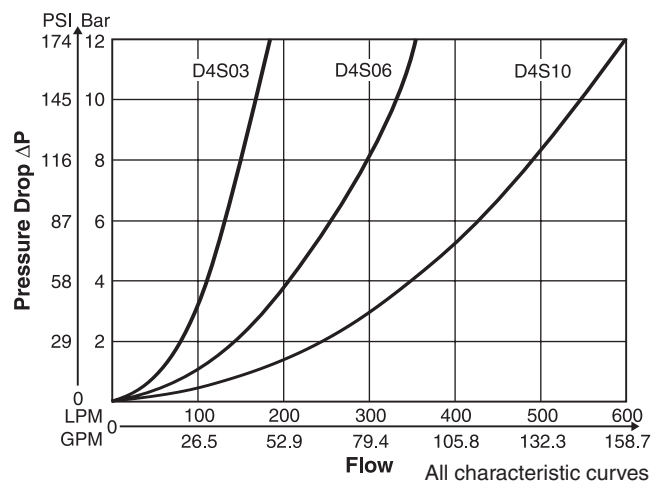
Ordering Information, Performance Curves Series D4S (Inline Mounted)

A

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



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)	—

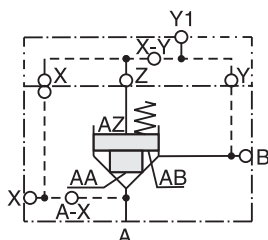
Specifications

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		cSt / mm²/s	10 to 650 (46 to 3013 SSU)					
Recommended		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)						

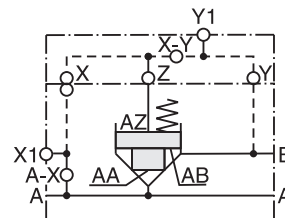
D4S Pilot Configuration

L-body (2-port)

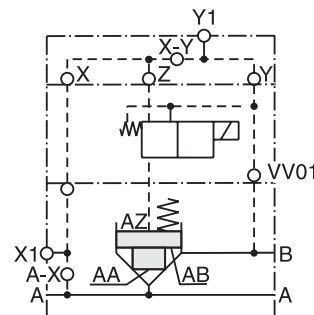
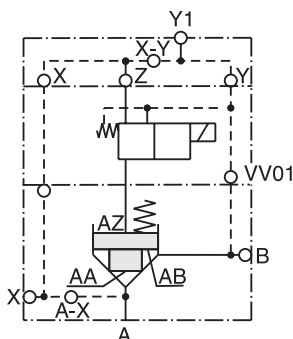


Standard

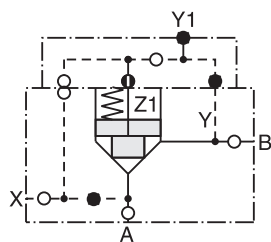
T-body (3-port)



With Vent Valve VV01

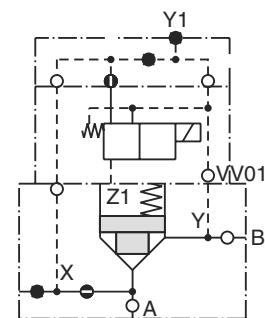


D4S Direct Operated Example



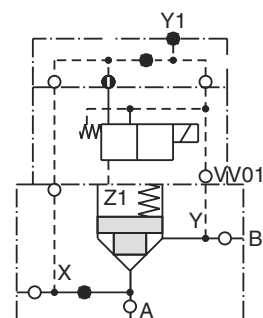
D4S...-21
Pilot Oil X = External

D4S with Solenoid Valve VV01 Examples



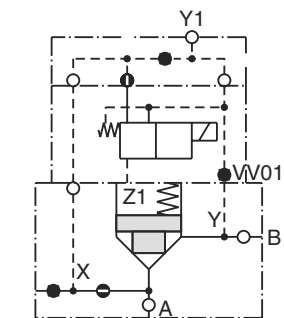
09
10
11
12 } with VV01

Pilot Oil X = Internal from A
Drain Y = Internal to B



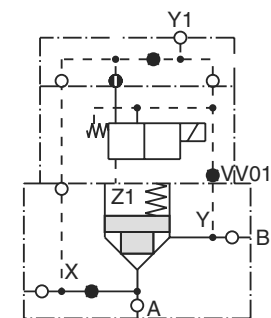
09
10
11
12 } with VV01

Pilot Oil X = Internal from A
Drain Y = Internal to B



09
10
11
12 } with VV01

Pilot Oil X = Internal from A
Drain Y1 = External out of cap

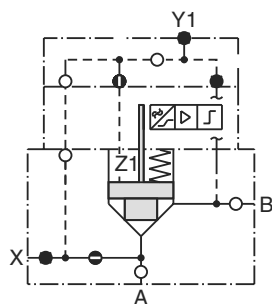


09
10
11
12 } with VV01

Pilot Oil X = External
Drain Y1 = External out of cap

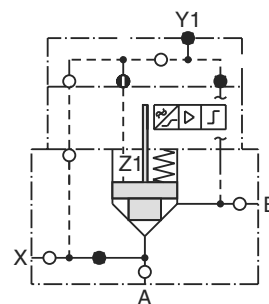
D4S with Position Control Examples

A



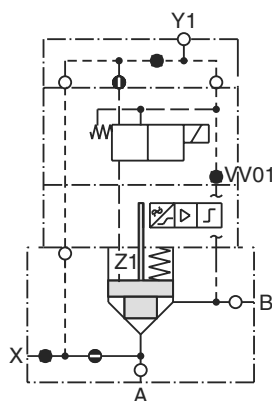
D4S...113A.BA
(with Position Control)

Pilot Oil X = Internal from A



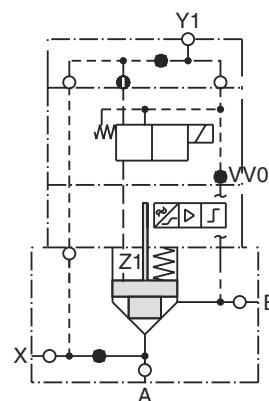
D4S...213A.BA
(with Position Control)

Pilot Oil X = External



D4S...123A. BC } with Position Control
BE } and VV01

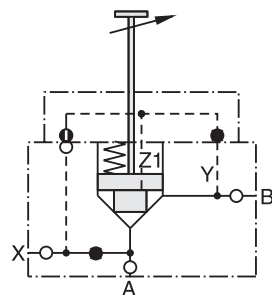
Pilot Oil X = Internal from A
Drain Y1 = External out of Cap



D4S...223A. BC } with Position Control
BE } and VV01

Pilot Oil X = External
Drain Y1 = External out of Cap

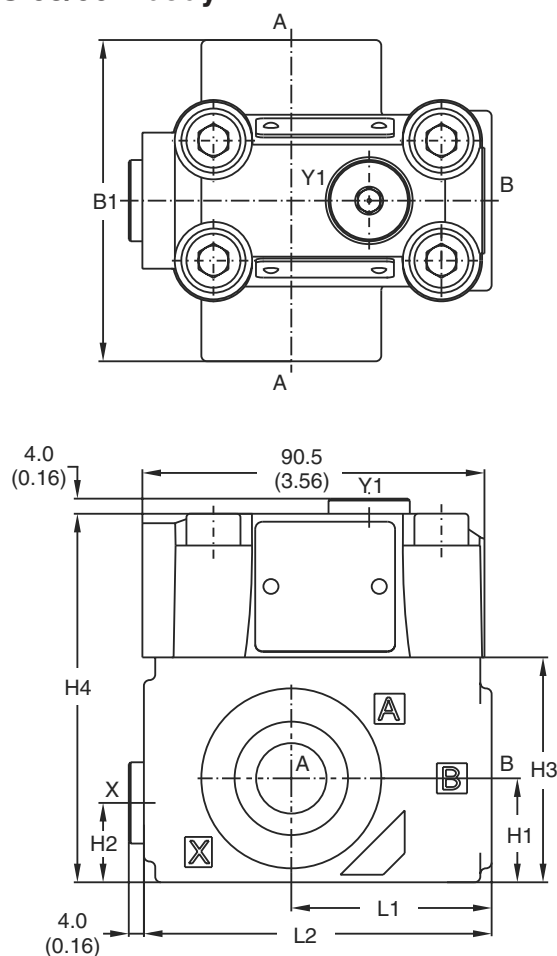
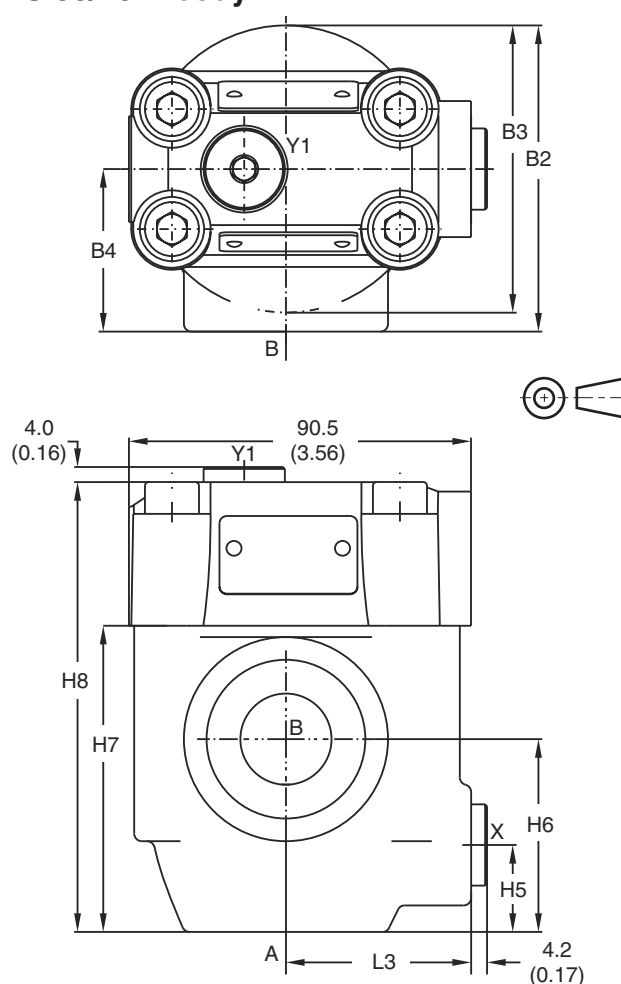
D4S with Stroke Limiter Example



D4S...233B. with Stroke Limiter
Pilot Oil X = External
(Note: for D4S06 and D4S10 only)

Dimensions**Directional Control Valves
Series D4S (Inline Mounted)**

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)

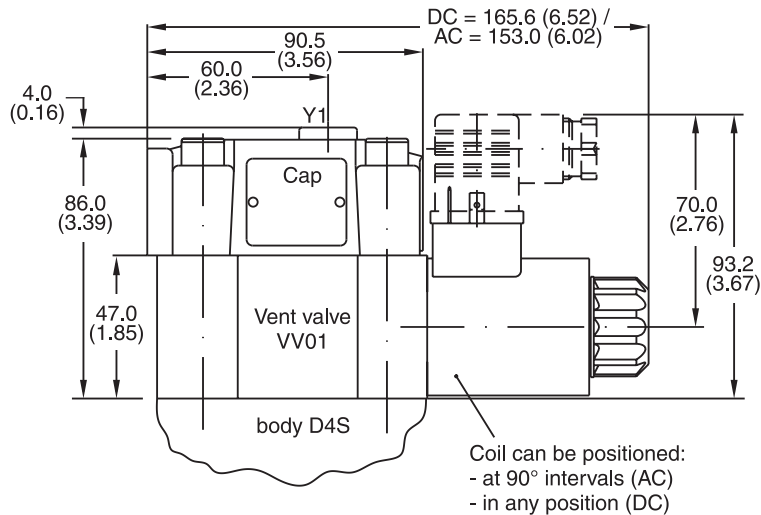
Size	L3	B2	B3	B4	H5	H6	H7	H8
06 (L-body)	49.0 (1.93)	81.0 (3.19)	76.0 (2.99)	43.0 (1.69)	23.0 (0.91)	51.0 (2.01)	81.0 (3.19)	119.0 (4.69)
10 (L-body)	49.8 (1.96)	120.7 (4.75)	85.6 (3.37)	77.8 (3.06)	38.1 (1.50)	50.8 (2.00)	96.0 (3.78)	134.0 (5.28)

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"			

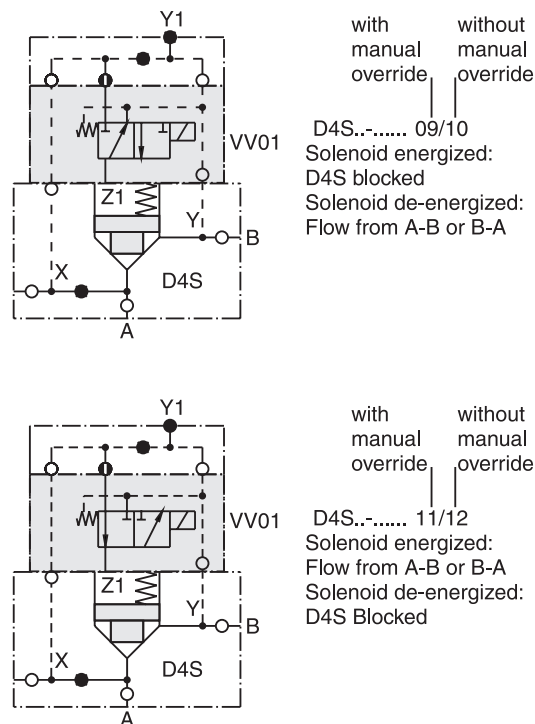
* With VV01 only.

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

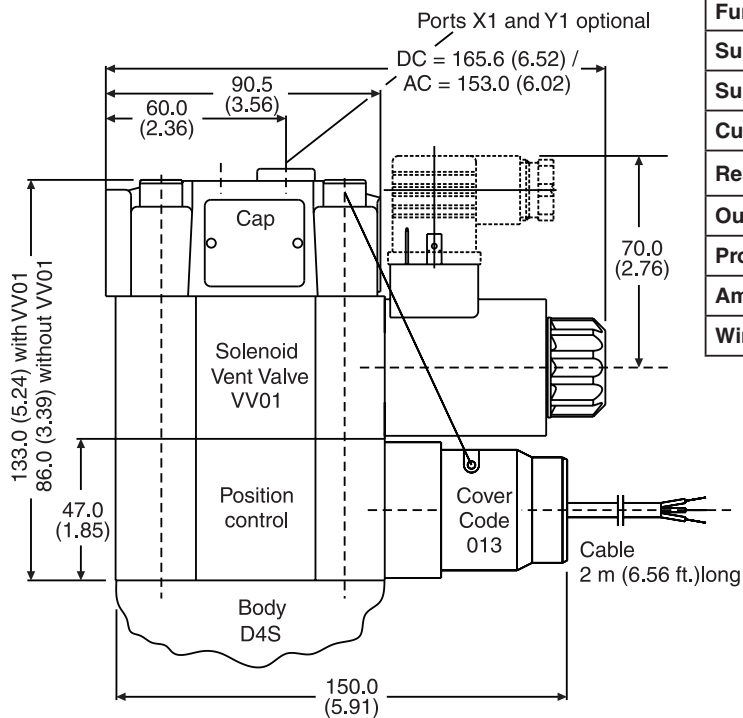
Inch equivalents for millimeter dimensions are shown in (**)

A**D4S with VV01**

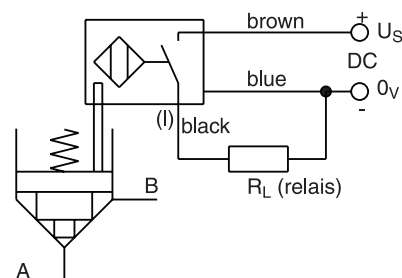
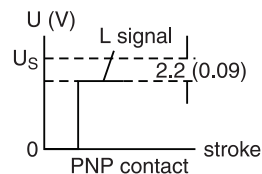
VV01 Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5



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

D4S Position Control**Technical Information (proximity switch)**

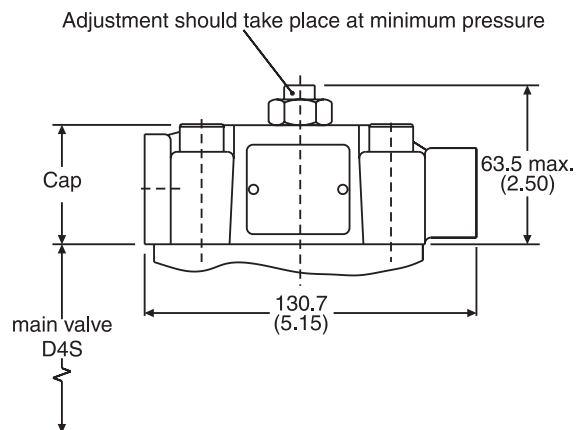
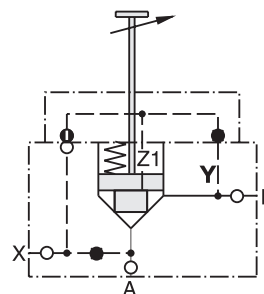
Function	PNP, contact
Supply voltage (U _s)	[VDC] 10...30
Supply voltage ripple	[%] ≤ 10
Current consumption	[mA] max. 8
Residual voltage L-signal	[V] U _s - 2.2 at I _{max}
Output current (I)	[mA] ≤ 200
Protection class	IP67
Ambient temperature	[C°] -25...+70; (-13°F...+158°F)
Wire cross section	[mm²] 3 x 0.5

**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.

D4S Stroke LimiterExample: 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 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

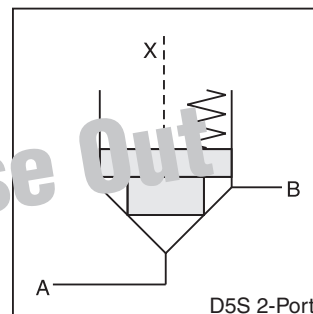
Series D5S seat valves are designed for directional control functions. They enable individual hydraulic solutions for nominal flow up to 800 LPM (211.6 GPM) due to a large variety of poppets, springs and covers, including shuttle valves, stroke limiters, solenoid valves (VV01) and position control.

Features

- Leak-free seat valve design.
- 2- and 3-port bodies.
Note: 2-port bodies are being phased out.
- SAE61 flange.
- Numerous pilot options.
- 6 poppet types.
- 4 sizes (SAE 3/4", 1", 1 1/4", 1 1/2").



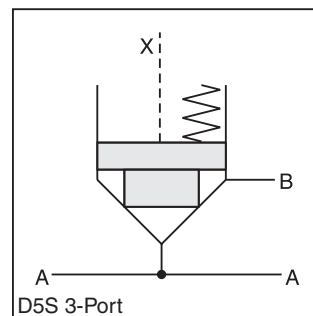
D5S 2-Port



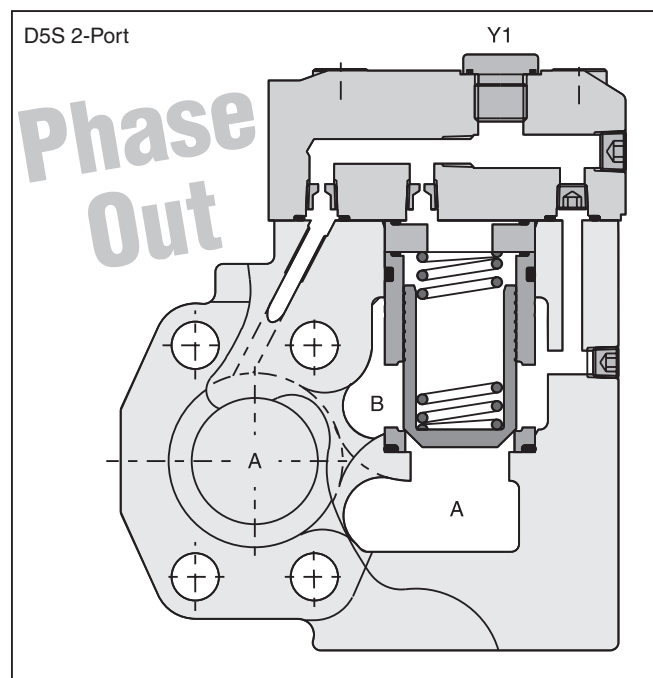
D5S 2-Port



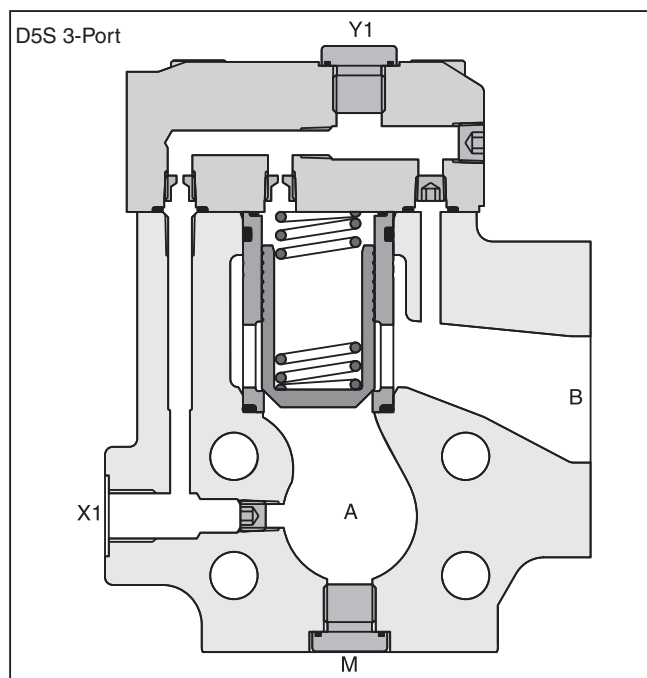
D5S 3-Port



D5S 3-Port



D5S 2-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.

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	Description
1	AA=95%, AB=5%
3	AA=60%, AB=40%

Note: All 2-Port bodies are being phased out.

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	●	●	●	—	○	—	—

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

Key: ○ Open Bore ● Closed Bore ● Orifice Ø 1.2

Note: Combination examples provided on pages A238-A242.

* Springs 2, 3 and 6 only.

Spring

Switching
Type

Solenoid
Voltage

B
Design
Series

Seal

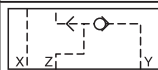
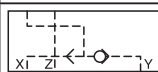
Options

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

3.4 kg (7.5 lbs)
4.4 kg (9.7 lbs)
5.0 kg (11.0 lbs)
7.8 kg (17.2 lbs)

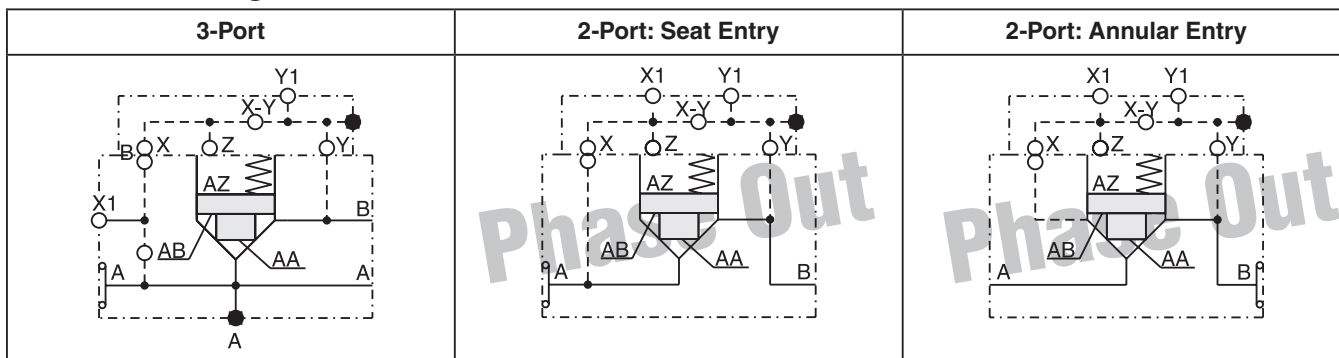
Code	Spring — Approx. Cracking Pressure in Bar (PSI)					
	Sleeve Code 1			Sleeve Code 3		
	A -> B		A -> B		B -> A	
	D5S06	D5S08/12	D5S06	D5S08/12	D5S06	D5S08/12
1	2.8 (40.6)	3.5 (50.8)	6.5 (94.3)	6.5 (94.3)	9.5 (137.8)	11.0 (159.5)
2	0.5 (7.3)	0.5 (7.3)	1.0 (14.5)	1.0 (14.5)	1.5 (21.8)	1.7 (24.7)
3	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)						

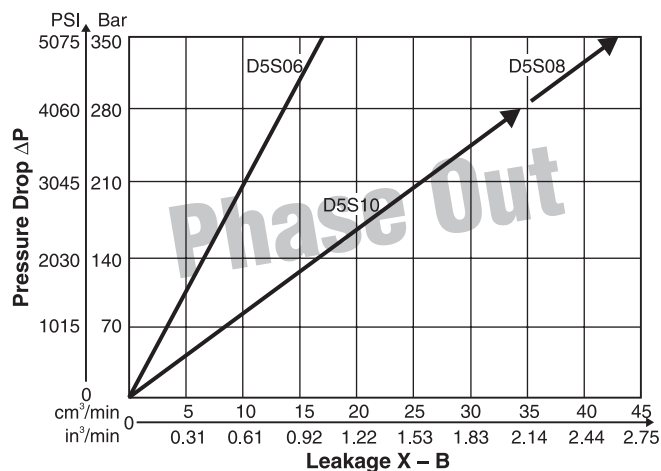
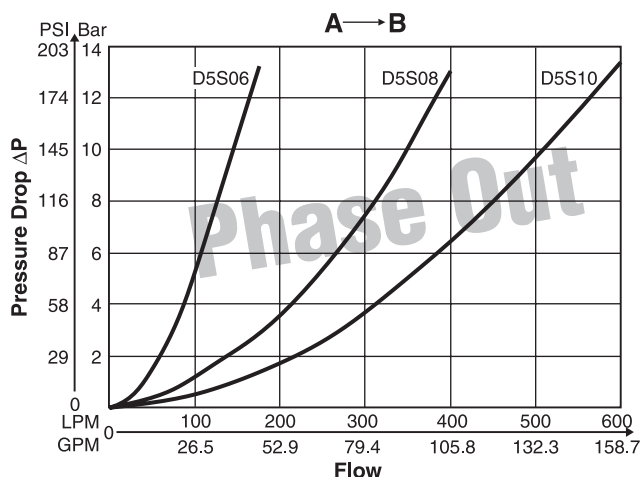
D5S Pilot Configuration



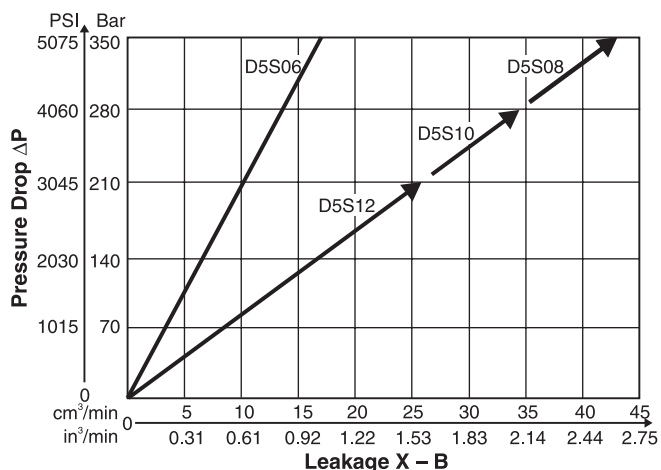
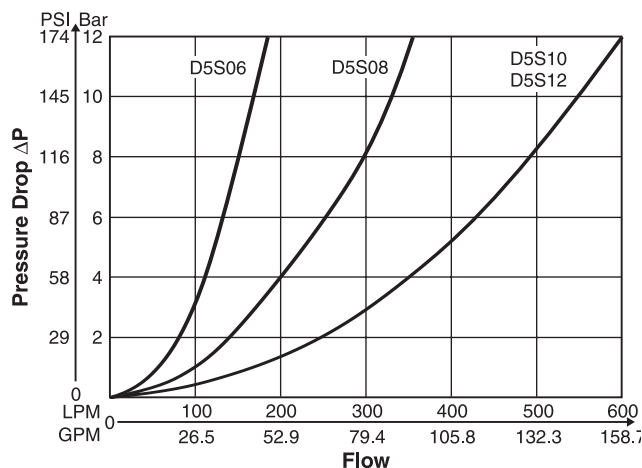
Note: 2-port bodies are being phased out.

Performance Curves

D5S 2-Port* Note: 2-port bodies are being phased out.



D5S 3-Port*



*Fluid viscosity 38cSt at 50°C (122°F)

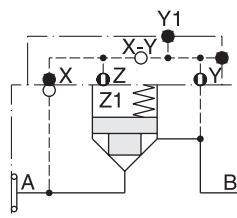
Selection of Cartridges

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

D5S 2-Port Examples *Note: 2-port bodies are being phased out.*

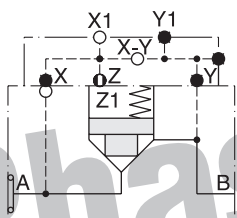
A

Seat Entry



D5S.-722

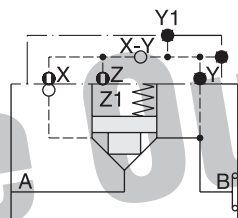
Pilot oil: internal from B



D5S.-743

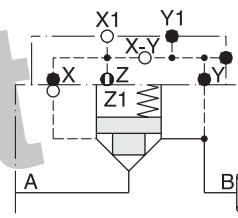
Pilot oil: external from X1

Annular Entry



D5S.-821

Pilot oil: internal from B

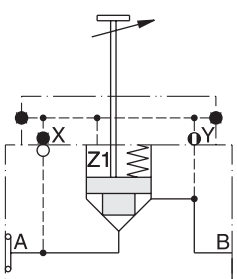


D5S.-843

Pilot oil: external from X1

Stroke Limiter D5S 2-Port Examples

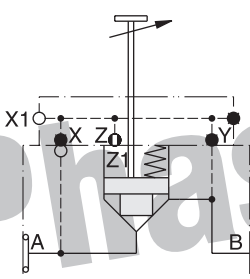
Seat Entry



D5S08-72B

10

Pilot oil: internal from B

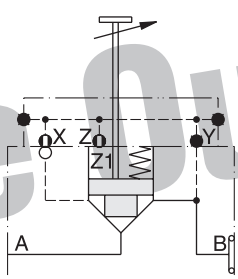


D5S08-74C

10

Pilot oil: external from X1

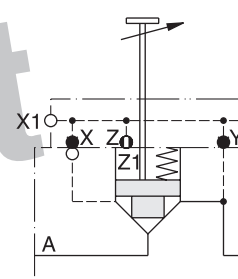
Annular Entry



D5S08-82A

10

Pilot oil: internal from B

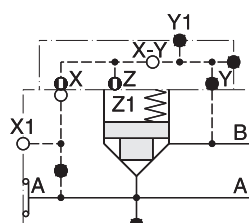


D5S08-84C

10

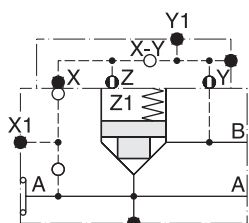
Pilot oil: external from X1

D5S 3-Port Examples



D5S ..-541

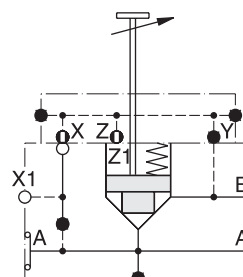
Pilot oil: external from X1



D5S ..-522

Pilot oil: internal from B

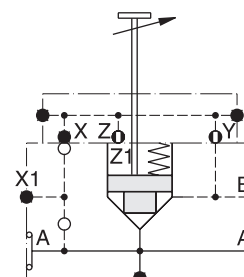
Stroke Limiter D5S 3-Port Examples



D5S08-54A

10

12
Pilot oil: external from X1



D5S08-52B

10

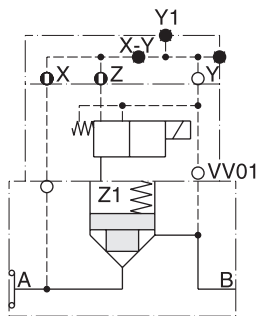
12
Pilot oil: internal from B

D5S 2-Port with Solenoid Valve VV01 Examples *Note: 2-port bodies are being phased out.*

Seat Entry

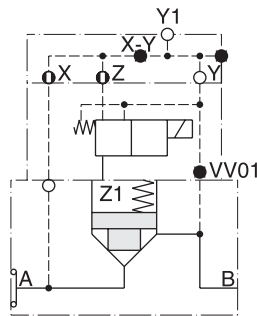
Annular Entry

A



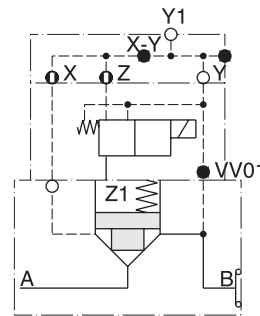
D5S..-714...09
 10
 11
 12

Pilot oil: internal from A
 Pilot drain: internal to B



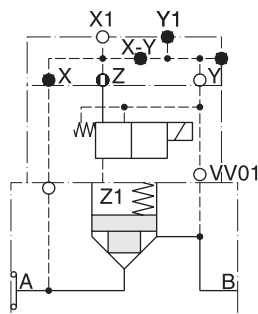
D5S..-716...09
 10
 11
 12

Pilot oil: internal from A
 Pilot drain: external out of Y1



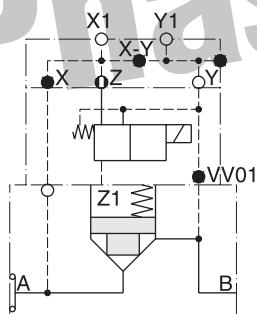
D5S..-826...09
 10
 11
 12

Pilot oil: internal from B
 Pilot drain: external out of Y1



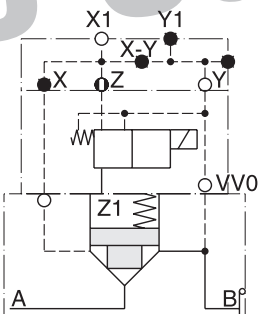
D5S..-745...09
 10
 11
 12

Pilot oil: internal from X1
 Pilot drain: internal to B



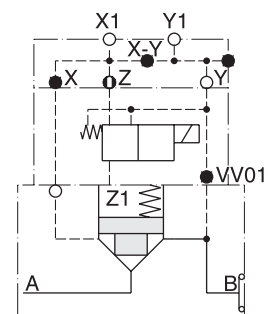
D5S..-747...09
 10
 11
 12

Pilot oil: internal from X1
 Pilot drain: external out of Y1



D5S..-845...09
 10
 11
 12

Pilot oil: internal from X1
 Pilot drain: external out of Y1



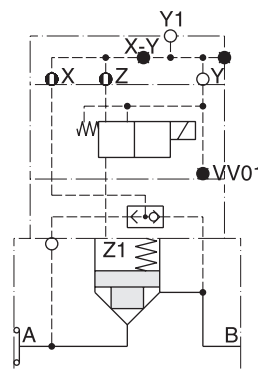
D5S..-847...09
 10
 11
 12

Pilot oil: internal from X1
 Pilot drain: external out of Y1

D5S 2-Port with Solenoid Valve VV01 and Shuttle Valve Examples *Note: 2-port bodies are being phased out.*

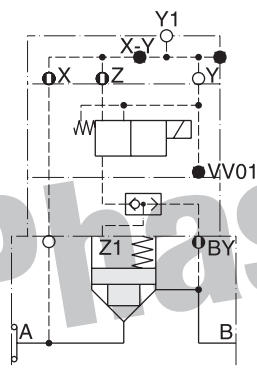
Seat Entry

Annular Entry



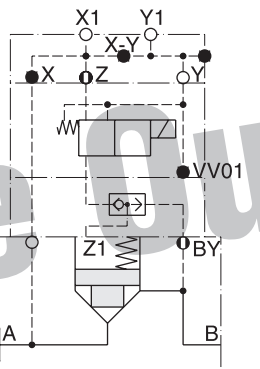
D5S..-736...CB
 CD

Pilot oil: internal from A +
 internal from B
 Pilot drain: external out of Y1



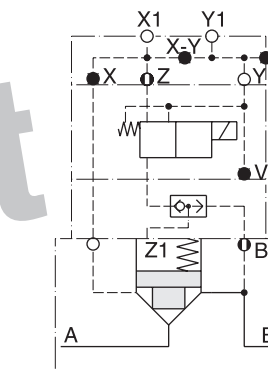
D5S..-736...DB
 DD

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

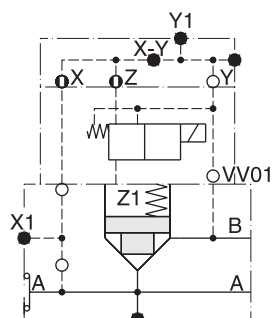


D5S..-857...DB
 DD

Pilot oil: external from X1 +
 internal from B
 Pilot drain: external out of Y1

D5S 3-Port with Solenoid Valve VV01 Examples

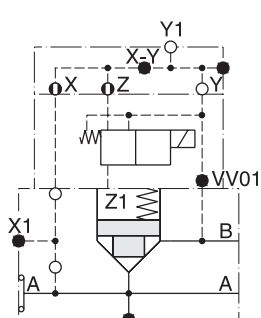
A



D5S ..-514...09

10
11
12

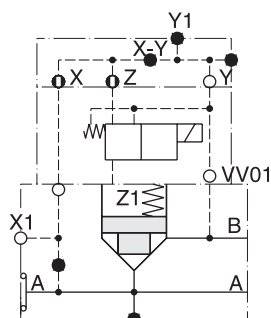
Pilot oil: internal from A
Pilot drain: internal to B



D5S ..-516...09

10
11
12

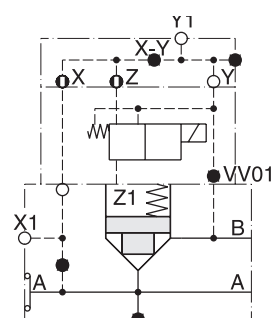
Pilot oil: internal from A
Pilot drain: external out of Y1



D5S ..-544...09

10
11
12

Pilot oil: external from X1
Pilot drain: internal to B

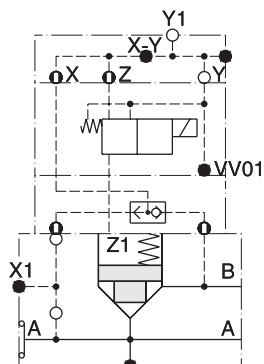


D5S ..-546...09

10
11
12

Pilot oil: external from X1
Pilot drain: external out of Y1

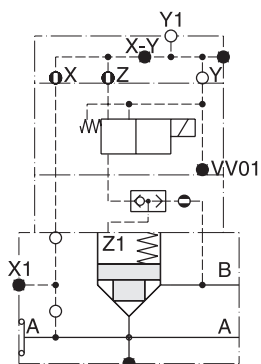
D5S 3-Port with Solenoid Valve VV01 and Shuttle Valve Examples



D5S ..-536...CB

CD

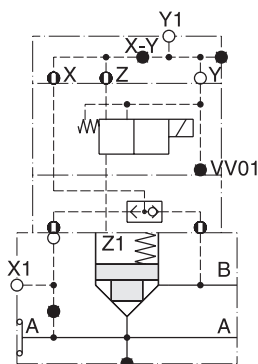
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1



D5S ..-536...DB

DD

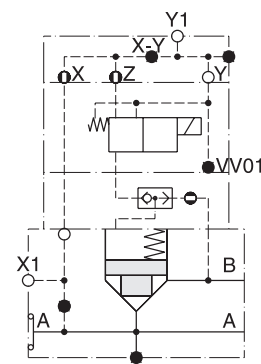
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1



D5S ..-556...CB

CD

Pilot oil: internal from X1 +
internal from B
Pilot drain: external out of Y1



D5S ..-556...DB

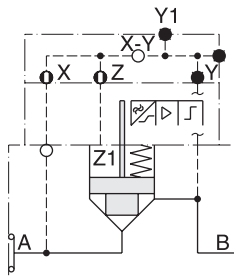
DD

Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1

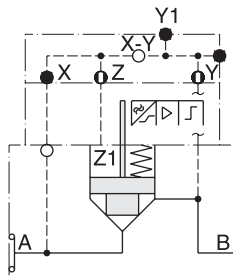
D5S 2-Port Position Control Examples

Note: 2-port bodies are being phased out.

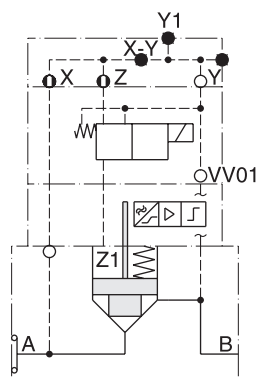
Seat Entry



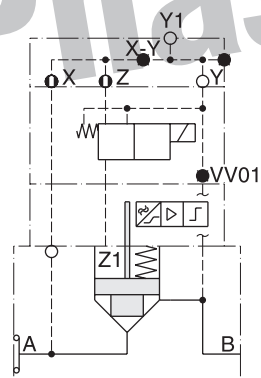
D5S08-7113A.BA
D5S10
Pilot oil: internal from A



D5S08-7223A.BA
D5S10
Pilot oil: internal from B

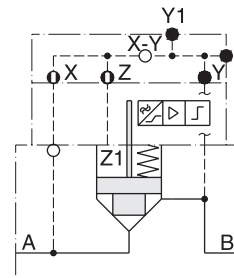


D5S08-7143A.BC
D5S10 BE
Pilot oil: internal from A
Pilot drain: internal to B

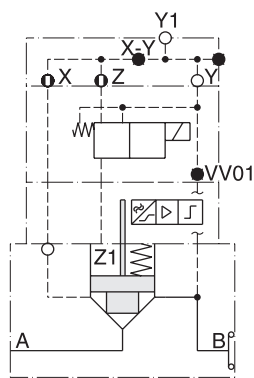


D5S08-7163A.BC
D5S10 BE
Pilot oil: internal from A
Pilot drain: external out of Y1

Annular Entry

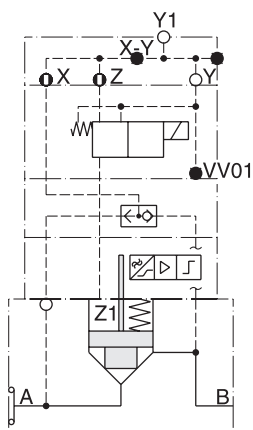


D5S08-8213A.BA
D5S10
Pilot oil: internal from B

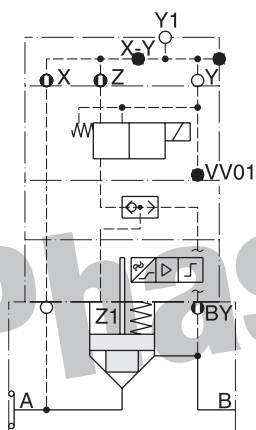


D5S08-8263A.BC
D5S10 BE
Pilot oil: internal from B
Pilot drain: external out of Y1

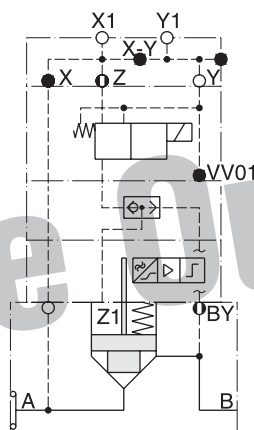
Seat Entry



D5S ..-736...BH
BK
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1

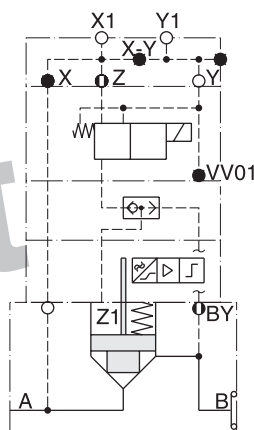


D5S ..-736...BN
BQ
Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1



D5S ..-757...BN
BQ
Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1

Annular Entry

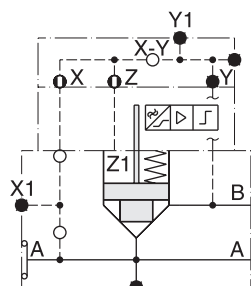


D5S ..-857...BN
BQ
Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1

D5S 3-Port Position Control Examples

A

Seat Entry

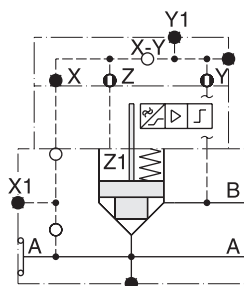


D5S08-5113A.BA

10

12

Pilot oil: internal from A



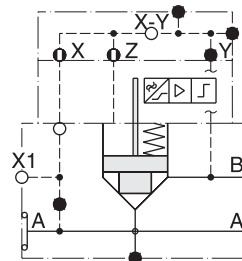
D5S08-5223A.BA

10

12

Pilot oil: internal from B

Annular Entry

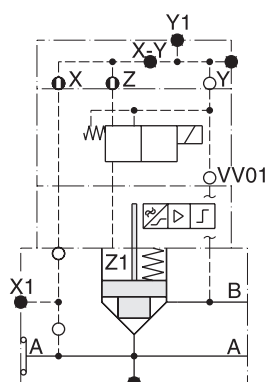


D5S08-5213A.BA

10

12

Pilot oil: external from X1

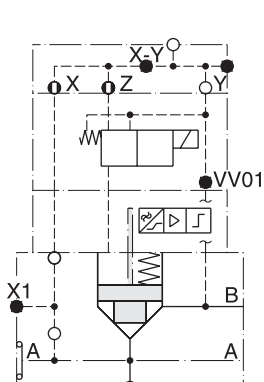


D5S08-5143A.BC

10

12

Pilot oil: internal from A
Pilot drain: internal to B

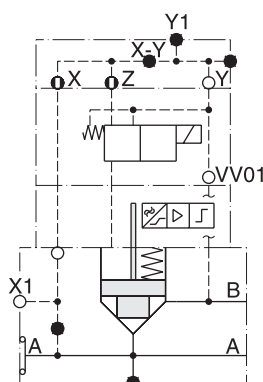


D5S08-5163A.BC

10

12

Pilot oil: internal from A
Pilot drain: external out of Y1

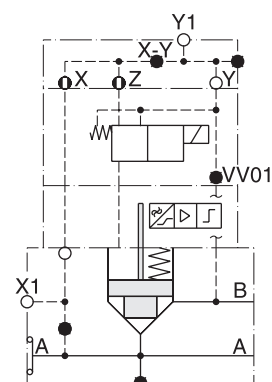


D5S08-5443A.BC

10

12

Pilot oil: external from X1
Pilot drain: internal to B



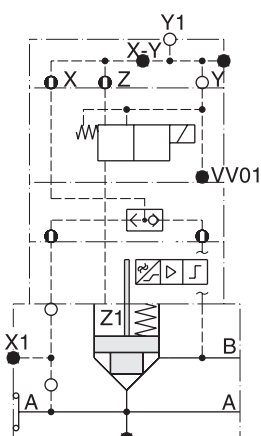
D5S08-5463A.BC

10

12

Pilot oil: external from X1
Pilot drain: external out of Y1

Seat Entry

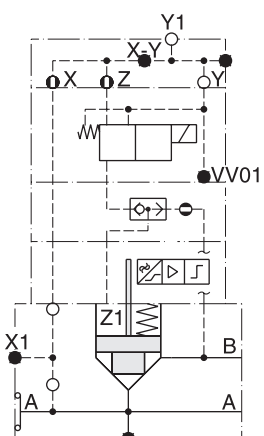


D5S08-5363A.BH

10

12

Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1

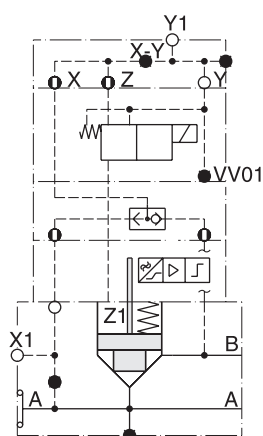


D5S08-5363A.BN

10

12

Pilot oil: internal from A +
internal from B
Pilot drain: external out of Y1

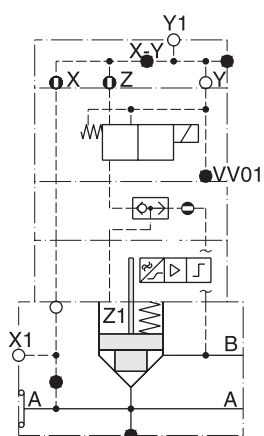


D5S08-5563A.BH

10

12

Pilot oil: external from X1 +
internal from B
Pilot drain: external out of Y1



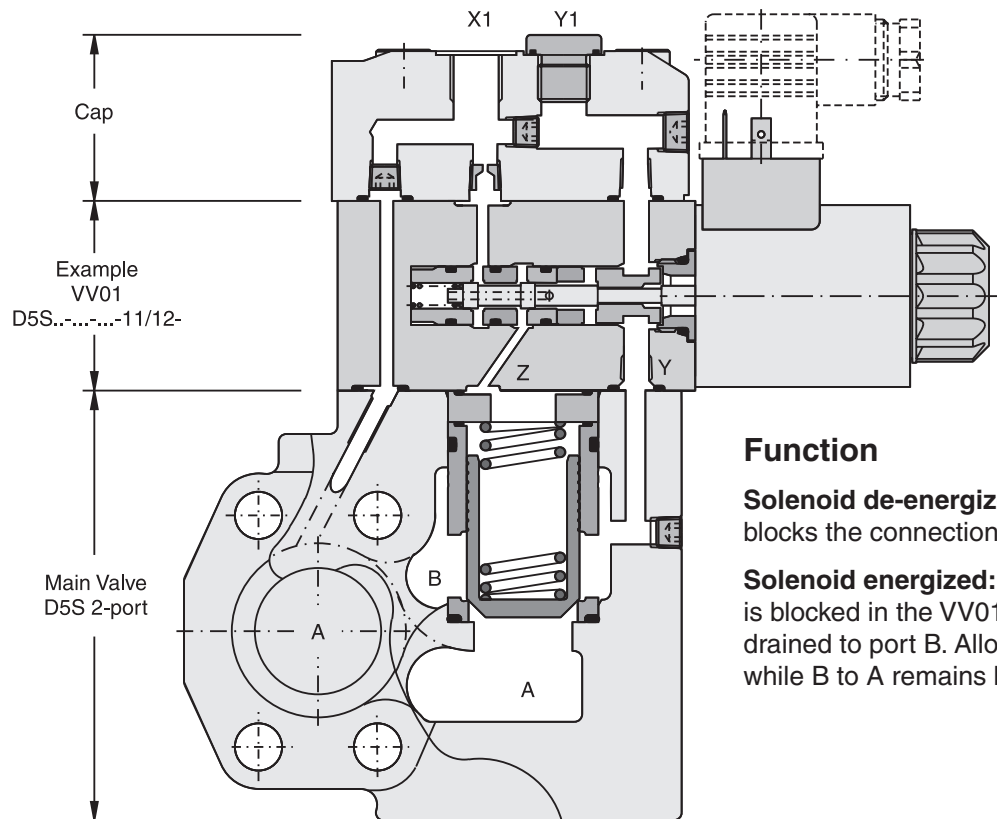
D5S08-5563A.BN

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



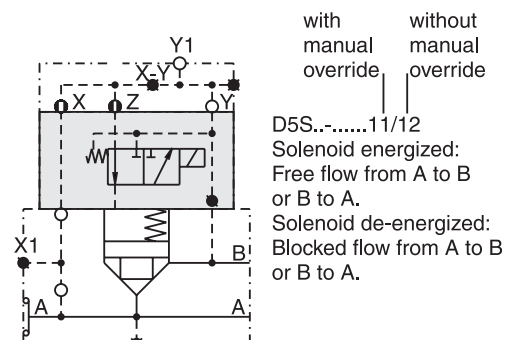
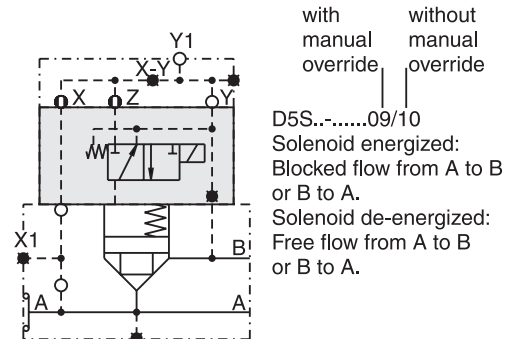
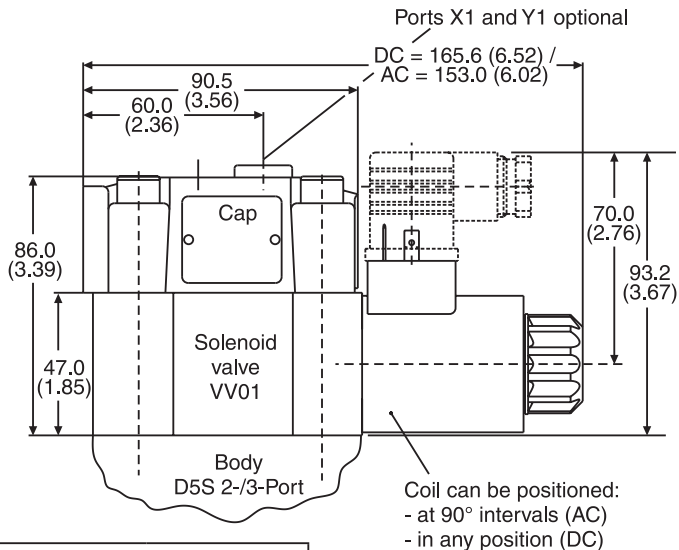
Function

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

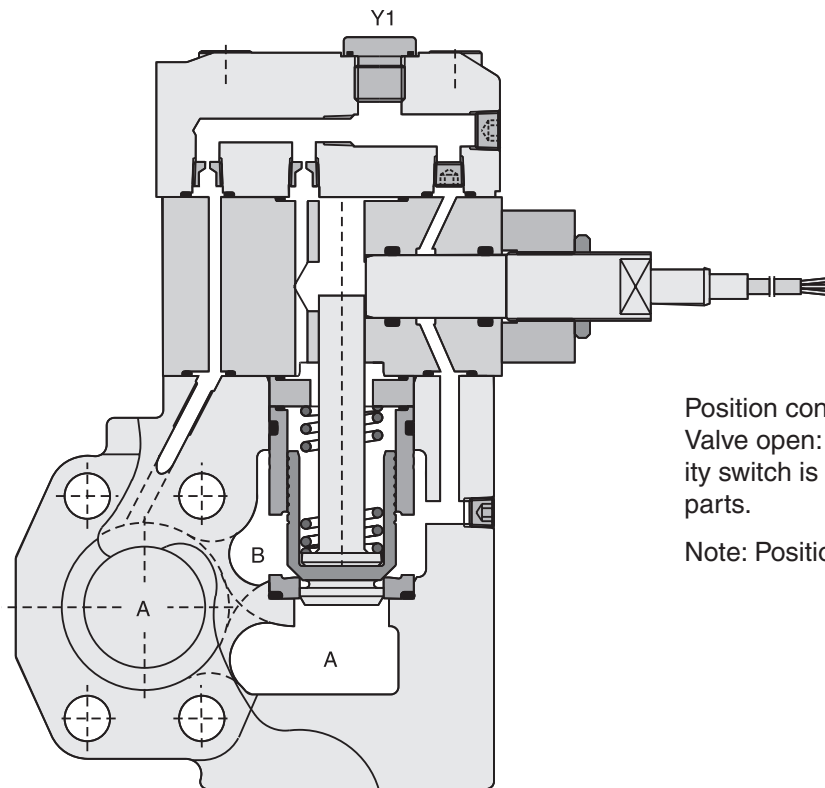
Inch equivalents for millimeter dimensions are shown in (**)



VV01 Seal Kits	
Nitrile	Fluorocarbon
DC Solenoid	
S26-58515-0	S26-58515-5
AC Solenoid	
S26-35237-0	S26-35237-5

Example Pilot Oil External from X1, Pilot Drain Internal Out of B with Position Control

A

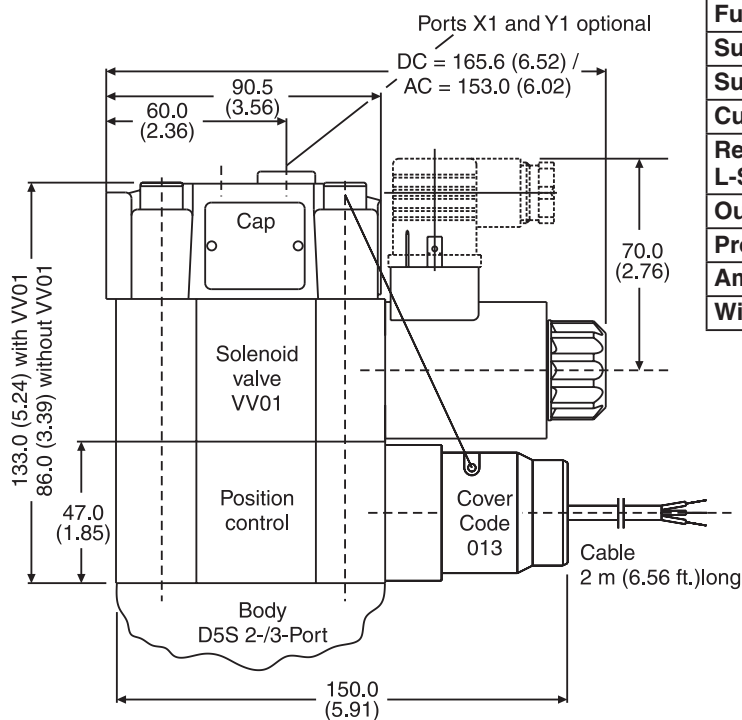


Position control by proximity switch (incl. amplifier). Valve open: proximity switch activated. This proximity switch is pressure proof and has no wearing parts.

Note: Position control for D5S08 and D5S10 only.

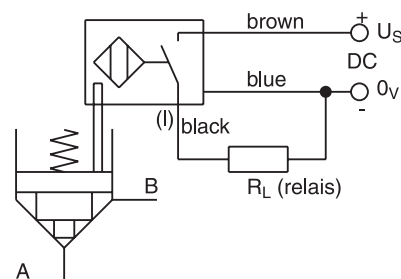
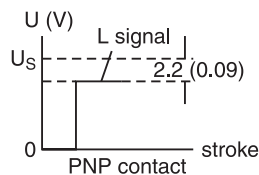
Dimensions — D5S with Position Control

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



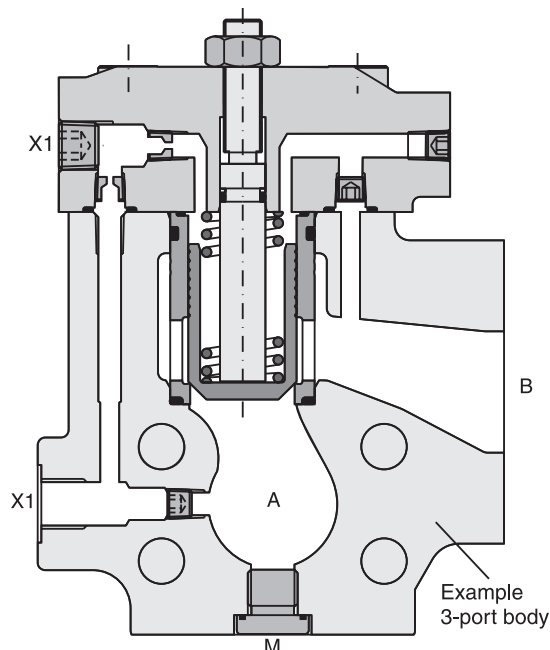
Technical Data (Proximity Switch)

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 (**)

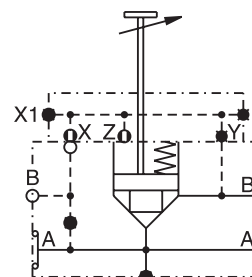
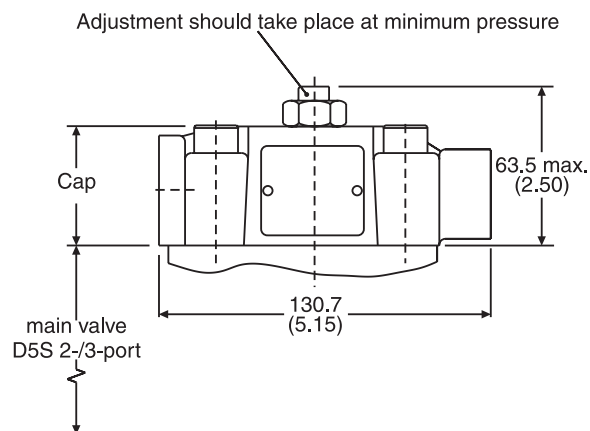
D5S Stroke Limiter



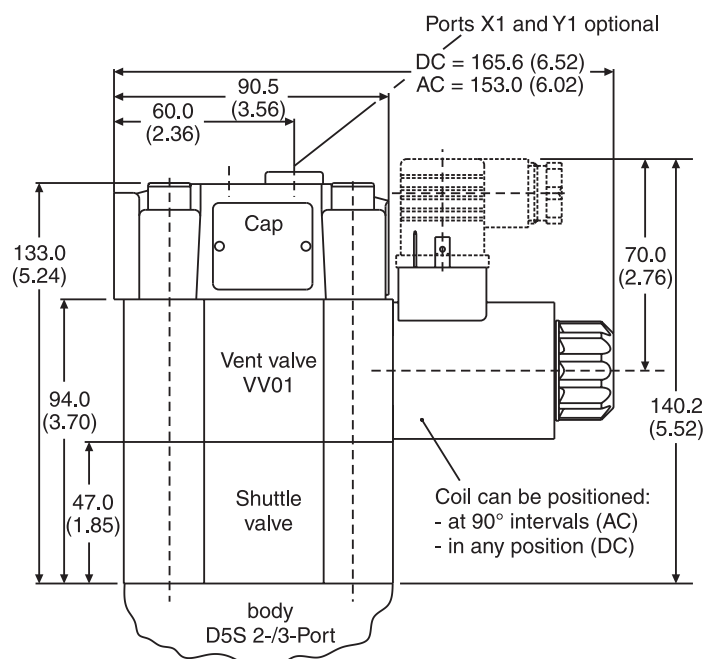
X1 = external pilot-oil (optional)

Note: Stroke limiter not for use with D5S06, solenoid valve VV01, shuttle valve and position control.

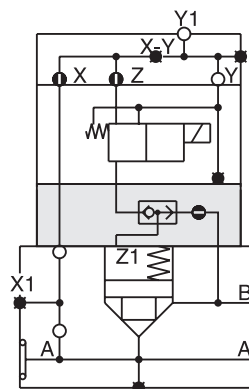
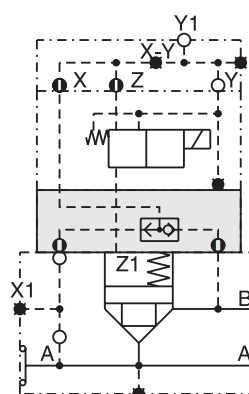
D5S Stroke Limiter Dimensions



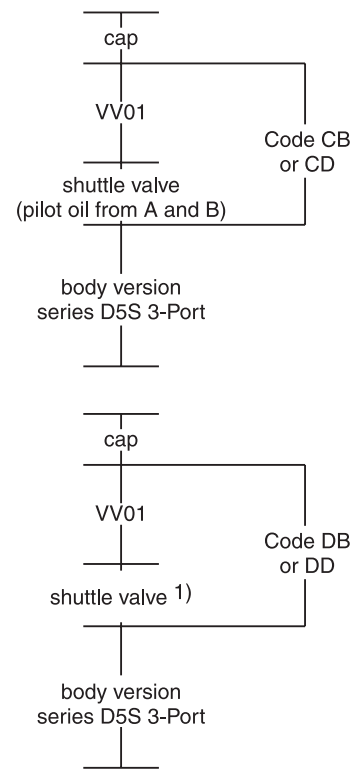
D5S with Shuttle Valve Dimensions



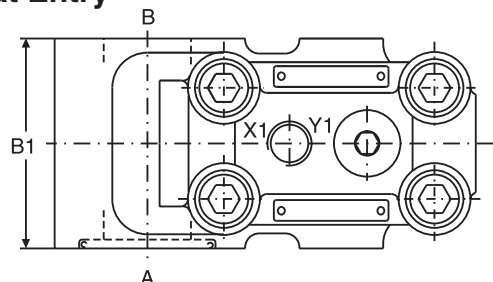
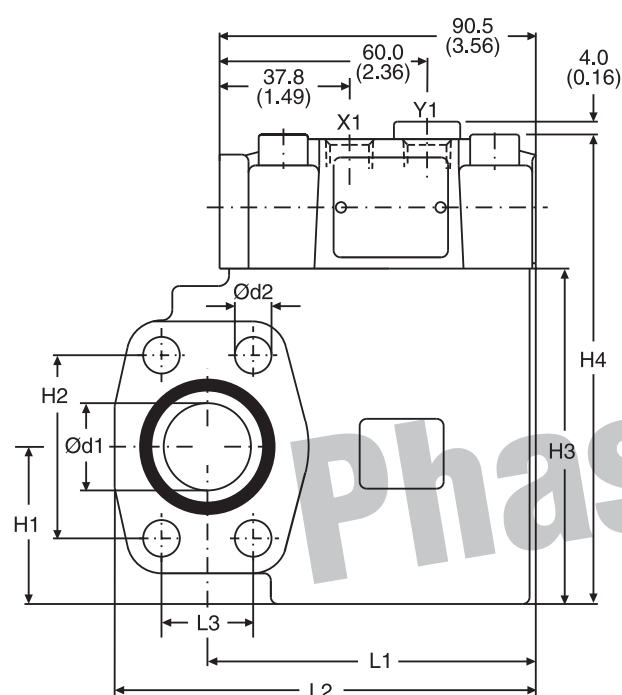
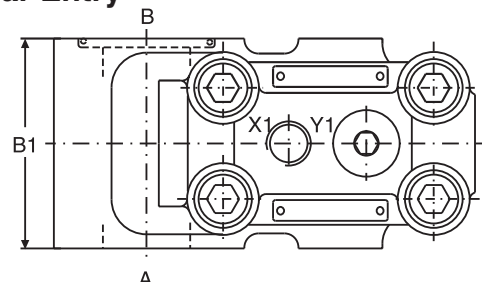
Shuttle valve only in connection with vent valve VV01.



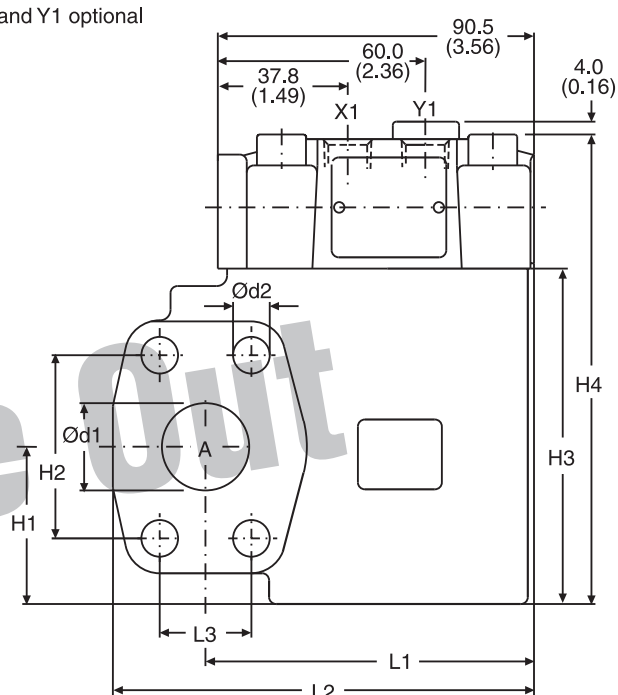
1) pilot oil from A and B, from B to A check valve function



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

A**2-Port** *Note: 2-port bodies are being phased out.***Seat Entry****Annular Entry**

Ports X1 and Y1 optional

**Seal Kits**

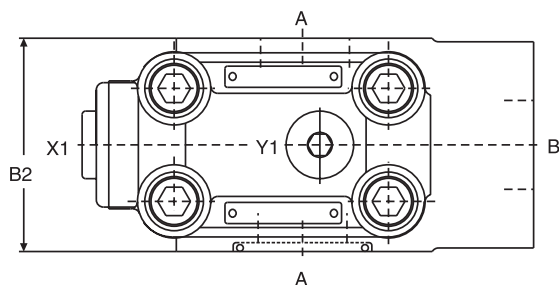
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5

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)

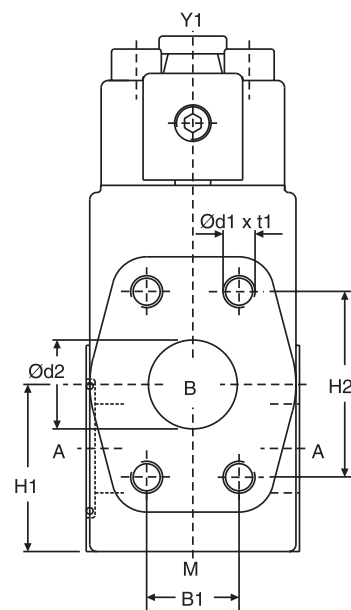
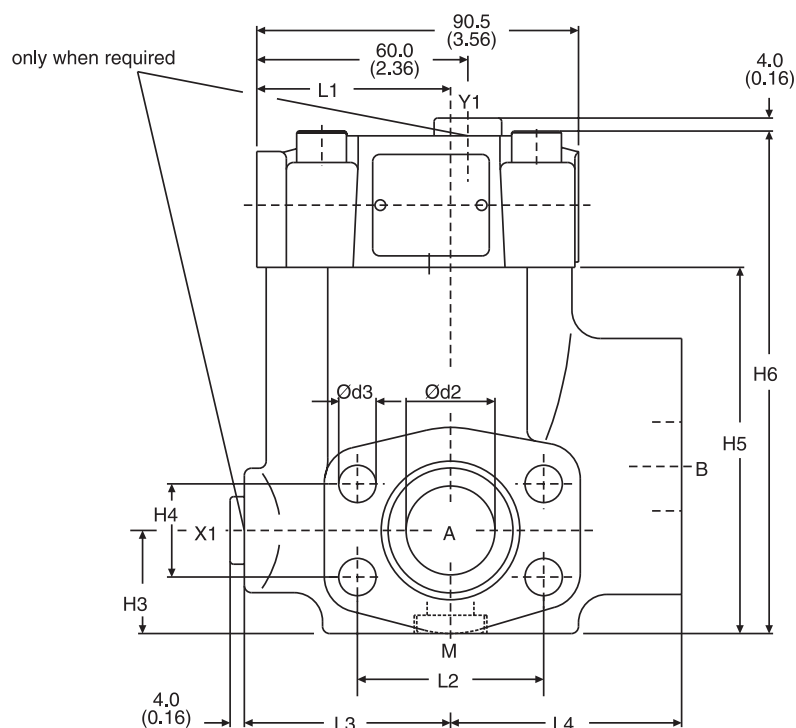
Ports	Function	Port size		
		D5S06	D5S08	D5S10
A	Inlet or outlet	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
B	Outlet or inlet	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
X1	External pilot port	SAE 4		
Y1	External pilot drain			

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.

A

This image shows a full page of blank graph paper. The grid consists of small, uniform squares formed by thin, light gray lines. There are no margins, text, or other markings on the page.