



# Electrohydraulic Motion Controls

Proportional Directional & Pressure Control Valves  
Servovalves, Electronics, Accessories

Catalog HY14-2550/US

May 2014

- aerospace
- climate control
- electromechanical
- filtration
- fluid & gas handling
- hydraulics**
- pneumatics
- process control
- sealing & shielding



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 **WARNING – USER RESPONSIBILITY**

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For safety information, see Safety Guide SG HY14-1000 at [www.parker.com/safety](http://www.parker.com/safety) or call 1-800-CParker.

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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. Consult your Parker Hydraulic Sales Office for the location of the distributor serving your area (see listing at the back of this catalog).





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## General Description

**A**

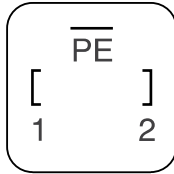
Series D\*FW direct operated proportional directional control solenoid valves are available in sizes NG6 (CETOP 3) and NG10 (CETOP 5).

Typical applications include reproducible control of actuator speed in rapid/slow speed profiling, and smooth acceleration and deceleration performance.

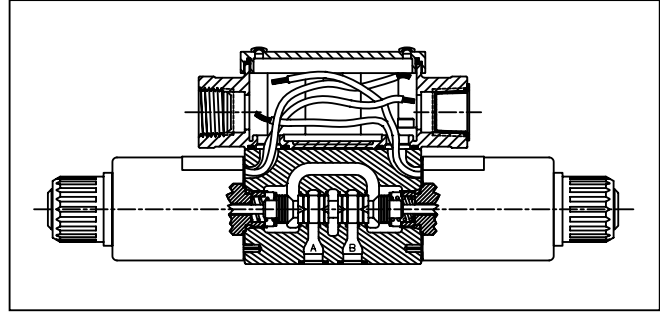
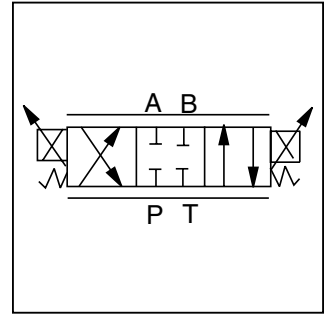
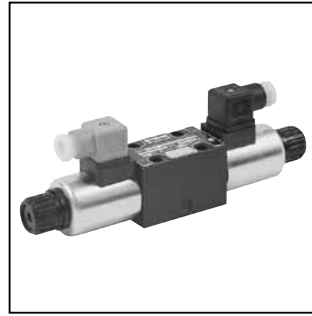
## Features

- Standard DIN/ISO/CETOP/NFPA interfaces.
- Progressive flow characteristics for improved low flow resolution.
- Spring centered spool.
- Wide selection of spool options and flow capacity.

## Wiring D\*FW — Solenoid Coil (without integrated electronics)



- 1 = coil connection
- 2 = coil connection
- PE = ground potential



## Specifications

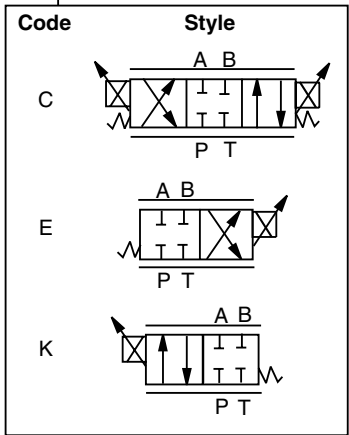
Interface DIN	NG6 (CETOP 3)		NG10 (CETOP 5)	
<b>Flow Rating</b> @10 Bar (150 PSI) $\Delta p$ (P→A, B→T) (spool options up to)	LPM (GPM)		20 (5.3)	60 (15.9)
<b>Maximum Flow</b> (refer to operating limit curves)	LPM (GPM)		48 (12.5)	170 (45)
<b>Step Response</b> (time to reach 90% of a 100% step command)	ms		100	165
<b>Hysteresis</b>	%	<8	<b>Fluid Viscosity, Recommended</b>	80 – 1000 SSU
<b>Repeatability</b>	%	<2	<b>Fluid Temperature, Recommended</b>	0°C to +60°C (+32°F to +140°F)
<b>Max. Operating Pressure</b>	Bar (PSI)	315 (4500)	<b>Environmental Protection Class</b>	NEMA 1 (IP54)
Port P, A, B		35 (500)	<b>Ambient Operating Temperature</b>	-20°C to +60°C (-4°F to +140°F)
Port T				
<b>Fluid Cleanliness Level</b>	ISO Class 16/13			

<b>D</b>		<b>F</b>	<b>W</b>							<b>0</b>																																				
Directional Control Valve	Size	Flow Control	Open Loop	Spool Type	Flow	Style	Seal	Solenoid Voltage	Solenoid Accessories	Valve Accessories	Design Series																																			
<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>NG6/CETOP 3</td> </tr> <tr> <td>3</td> <td>NG10/CETOP 5</td> </tr> </tbody> </table>		Code	Description	1	NG6/CETOP 3	3	NG10/CETOP 5									<p>NOTE: Not required when ordering.</p>																														
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1) Reduced Flow Rate on Port B, Nominal Flow Rate on Port A  
Code A\* for spool  $Q_B > Q_A$  optional  
Refer to factory for ratio spool options.  
\* Use E01 or E02 for new applications.

Code	Flow at $\Delta p$ 5 Bar (72.5 PSI) per metering edge	
	D1FW LPM (GPM)	D3FW LPM (GPM)
C	7.5 (2.0)*†	-
F	15 (4.0)	-
H	20 (5.3)†#	20 (5.3)*†
K**	-	30 (7.8)
M	-	40 (10.6)
S	-	60 (15.9)†#

Refer to factory for ratio spool options.  
\* E09 spools only available where indicated.  
\*\* E01 spool only.  
† Type E spool only.  
# Not available with E81, E82.



**Bolt Kits:**  
**D1FW** BK209 (4) 10-24x1.25 SHCS  
**D3FW** BK98 (4) 1/4-20x1.62 SHCS

**Weight:**  
**D1FW** 2.5 kg (5.5 lbs.)  
**D3FW** 6.8 kg (15.0 lbs.)

**Driver Cards**

Refer to the Electronics section for driver cards and support electronics.

**Mounting Interface**

Refer to Mounting Interface Dimensions in the Proportional Directional Valve section of this catalog.

**Accessories**

Refer to the Accessories section for bolt kits, subplates and connectors.



**Electrical Specifications**

**A**

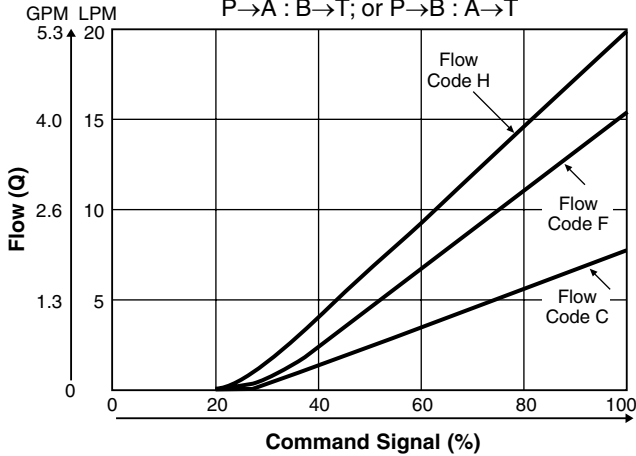
**Series D\*FW**  
 without integrated electronics

Interface DIN	NG6 (CETOP 3)			NG10 (CETOP 5)	
Solenoid Order Code	<b>J</b>	<b>K</b>	<b>M</b>	<b>K</b>	<b>J</b>
Nominal Resistance ohms	24	6	3.3	4	16
Nominal Current amps	0.9	1.8	2.5	2.5	1.25
Nominal Voltage voltage	<b>24</b>	<b>12</b>	<b>9</b>	<b>12</b>	<b>24</b>
Environmental Protection Class	NEMA 1 (IP54)				
Mating Connectors — Solenoid (DIN 43650)	Part #692914 (Black) Part #692915 (Gray)				

**Performance Curves**

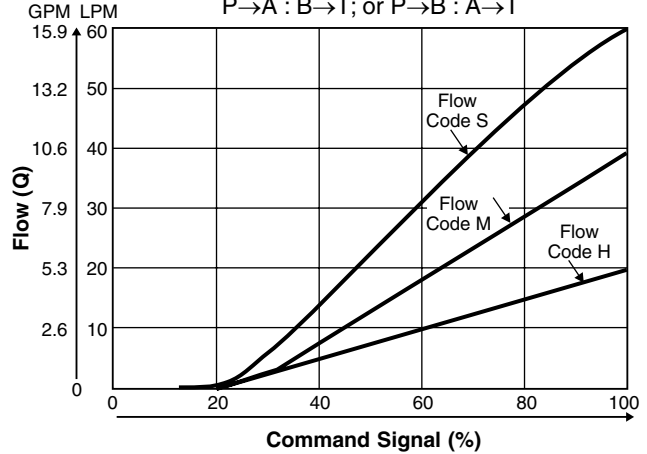
**D1FW Flow Characteristics**

at  $\Delta p = 5$  Bar (72.5 PSI) per metering edge  
 P→A : B→T; or P→B : A→T



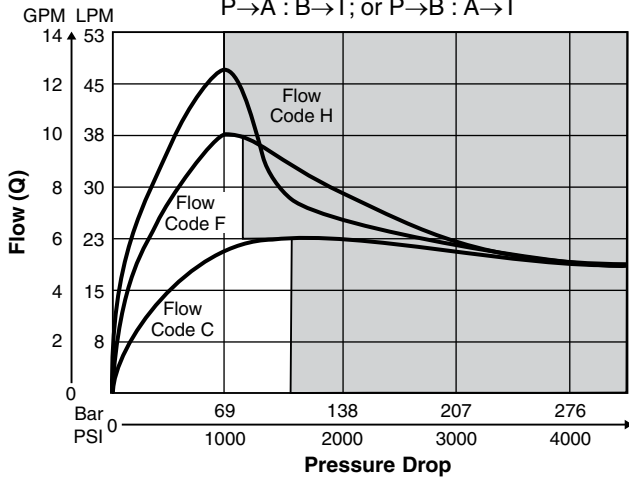
**D3FW Flow Characteristics**

at  $\Delta p = 5$  Bar (72.5 PSI) per metering edge  
 P→A : B→T; or P→B : A→T



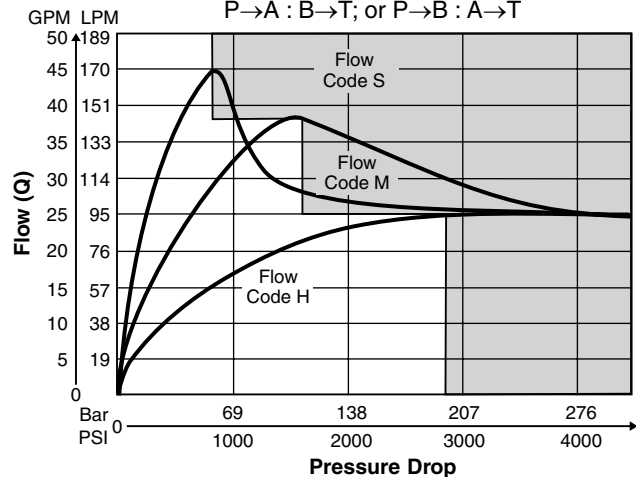
**D1F\* Operating Limits 1)**

at 100% Command  
 P→A : B→T; or P→B : A→T



**D3F\* Operating Limits 1)**

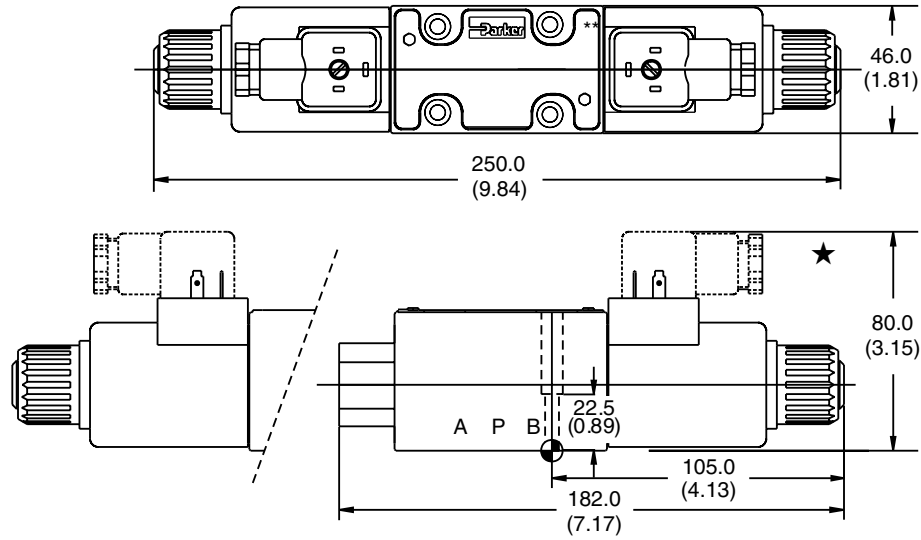
at 100% Command  
 P→A : B→T; or P→B : A→T



1) Shaded area: Actual flow subject to the system load dynamics  
 Note: 81 and 82 spools - decrease limits by 15%

**D1FW with Hirschmann Connectors**

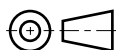
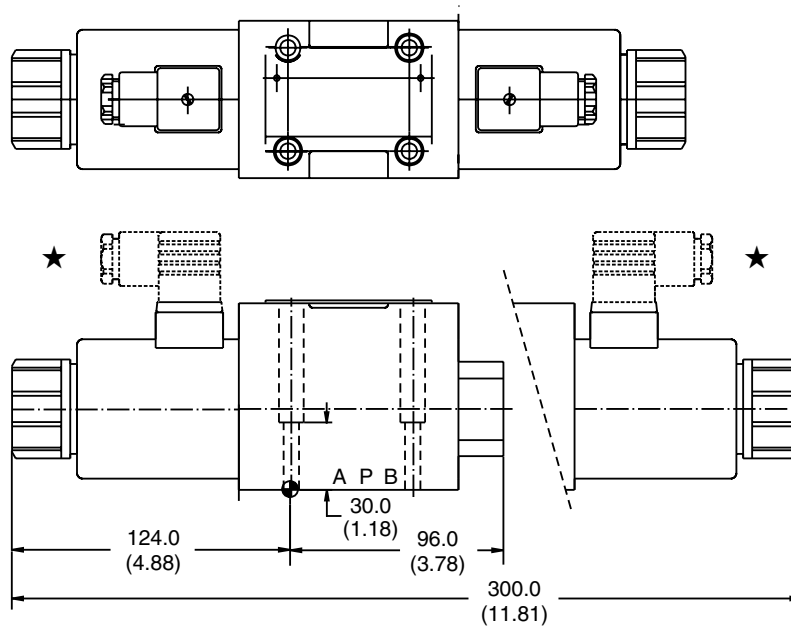
Inch equivalents for millimeter dimensions are shown in (\*\*)



**D3FW with Hirschmann Connectors**

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

★ Order plugs separately.



## General Description

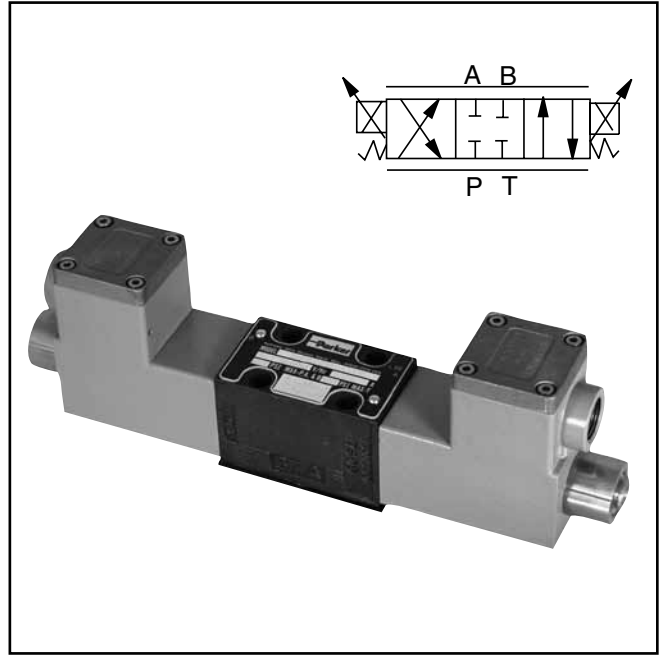
**A**

Series D1FW direct operated proportional directional control solenoid valves are available with explosion proof solenoids for hazardous conditions. Valves are available in sizes NG6 (CETOP 3).

Typical applications include reproducible control of actuator speed in rapid/slow speed profiling, and smooth acceleration and deceleration performance.

## Features

- Standard DIN/ISO/CETOP/NFPA interfaces.
- Progressive flow characteristics for improved low flow resolution.
- Spring centered spool.
- Wide selection of spool options and flow capacity.
- Single piece rugged solenoid assembly.



## Specifications

Interface DIN			NG6 (CETOP 3)	
<b>Flow Rating</b> @ 10 Bar (150 PSI) $\Delta p$ (P→A, B→T) (spool options up to)			LPM (GPM)	
			20 (5.3)	
<b>Maximum Flow</b> (refer to operating limit curves)			LPM (GPM)	
			48 (12.5)	
<b>Step Response</b> (time to reach 90% of a 100% step command)			ms	
			100	
<b>Hysteresis</b>	%	<8	<b>Fluid Viscosity, Recommended</b>	80 – 1000 SSU
<b>Repeatability</b>	%	<2	<b>Fluid Temperature, Recommended</b>	0°C to +60°C (+32°F to +140°F)
<b>Max. Operating Pressure</b>			<b>Environmental Protection Class</b>	NEMA 4 (IP65)
Port P, A, B	Bar (PSI)	315 (4500)	<b>Ambient Operating Temperature</b>	-20°C to +60°C (-4°F to +140°F)
Port T		35 (500)		
<b>Fluid Cleanliness Level</b>		ISO Class 16/13		

### Complies with:

Ex d IIC

AEx d IIC for Class I Zone 1

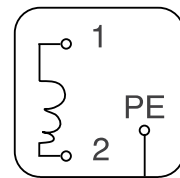
UL1203, UL1604, CSA E61241-1-1  
 Class II Div 1

Ex d IIC Ex tD A21  $\text{CE}_{1180}$   $\text{Ex}$  II 2GD

EN60079-0, EN60079-1  
 EN61241-0, EN61241-1



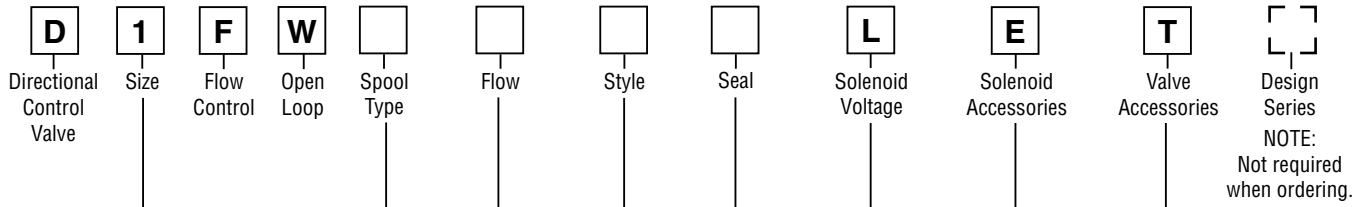
### Wiring D1FW — Solenoid Coil (without integrated electronics)



- 1 = coil connection
- 2 = coil connection
- PE = ground potential







Code	Description
1	DIN NG6 CETOP 3 NFPA D03

Code	Description
L	6 VDC

Code	Description
T	Exd IIc ATEX / CSA

Code		Spool Type
Spool Overlap		
10%	20%	
E01	E81*	
E02	E82*	
E09	-	

Refer to factory for ratio spool options.

\* Use E01 or E02 for new applications.

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
E	Explosion Proof

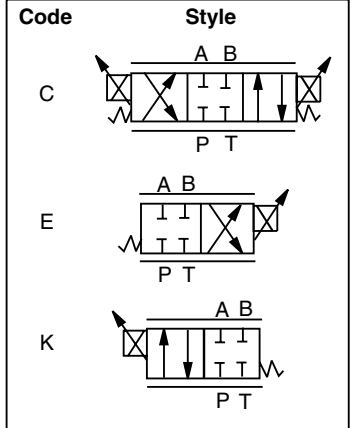
Code	Flow at $\Delta p$ 5 Bar (72.5 PSI) per metering edge LPM (GPM)
C	7.5 (2.0)*
F	15 (4.0)
H	20 (5.3)†#

Refer to factory for ratio spool options.

\* E09 spools only available where indicated.

† Type E spool only.

# Not available with E81, E82.



- Bolt Kit:**  
 BK209 (4) 10-24x1.25 SHCS  
 BK375 (4) M5 x 30mm SHCS

**Weight:**  
 NG6 4.1 kg (9.1 lbs.)



**Electrical Specifications**

**Explosion Proof**

**A**

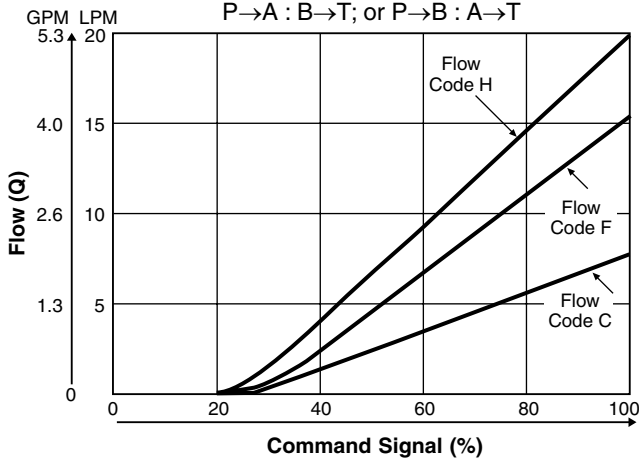
<b>Interface DIN</b>		<b>NG6 (CETOP 3)</b>	
<b>Solenoid Order Code</b>		<b>L</b>	
Nominal Resistance	ohms	2.0	
Nominal Current	amps	2.4	
Nominal Voltage	voltage	5	
Nominal Wattage	watts	11.5	
<b>Environmental Protection Class</b>		<b>IP66</b>	

<b>Explosion Proof Ratings</b>	
<b>CSA</b>	Exd IIc, AExd Class I Zone I
<b>ATEX</b>	EEx d IIc G T4 -54°C to 90°C

**Performance Curves**

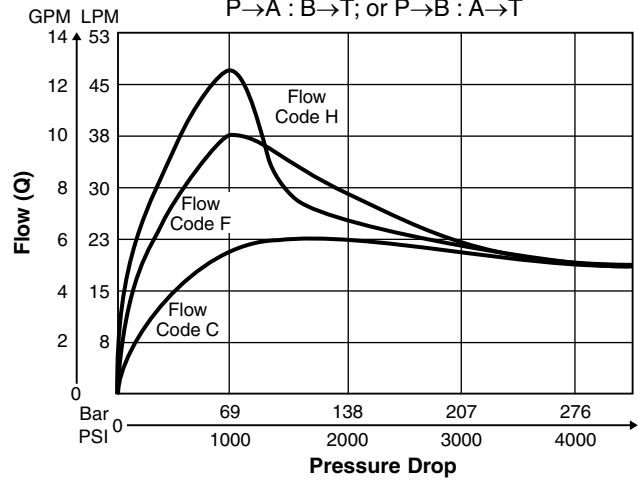
**D1FW Flow Characteristics**

at  $\Delta p = 5 \text{ Bar (72.5 PSI)}$  per metering edge  
 P→A : B→T; or P→B : A→T



**D1FW Operating Limits**

at 100% Command  
 P→A : B→T; or P→B : A→T



**Dimensions**

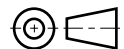
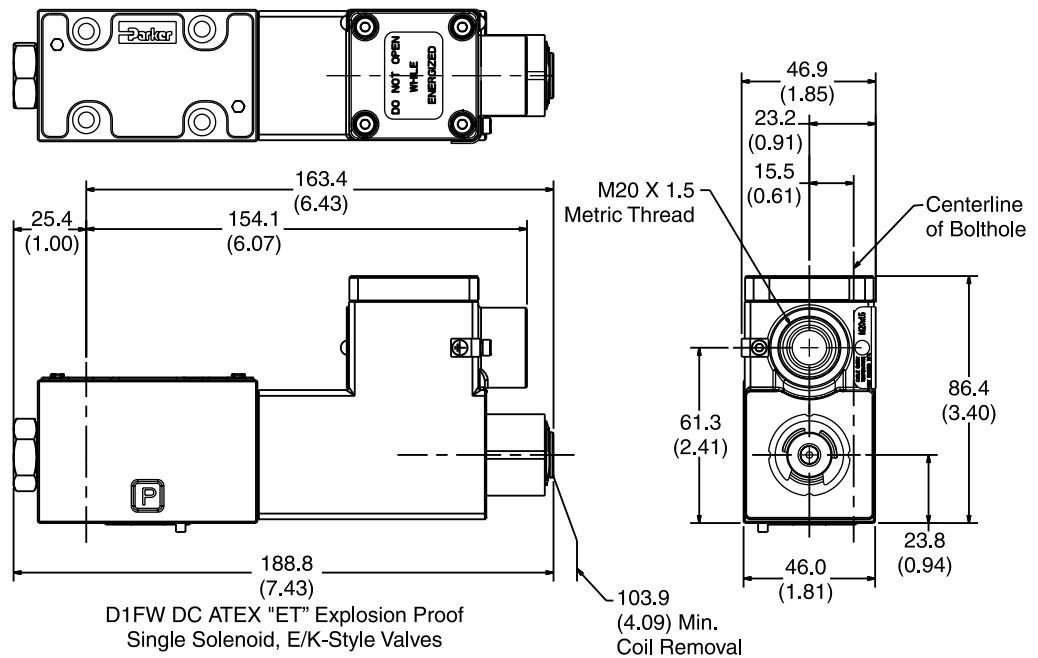
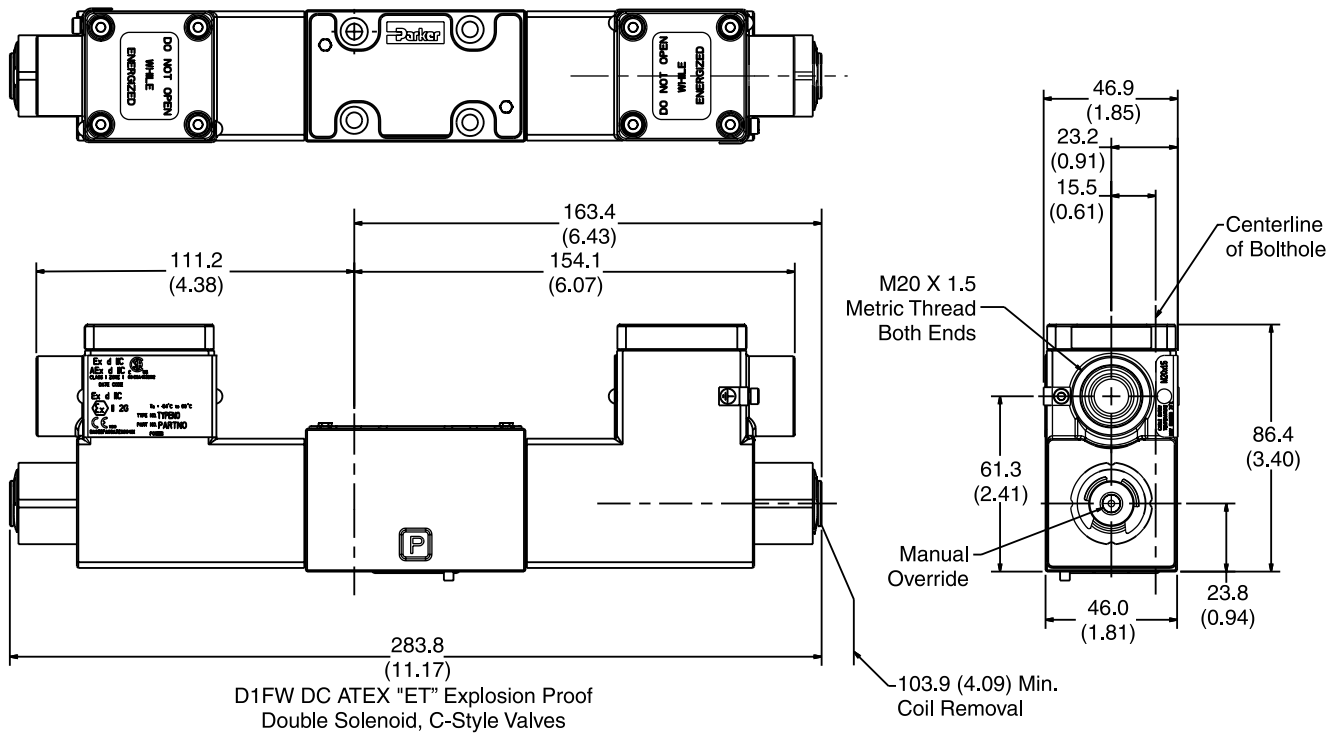
**Proportional Directional Control Valves  
Series D1FW with ATEX Coils**

Return to  
**ALPHA  
TOC**

Return to  
**SECTION  
TOC**

**A**

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





**General Description**

Series D1FB (NG6) proportional directional valves are available with and without onboard electronics (OBE).

**D1FB OBE:**

The digital onboard electronics is situated in a robust metal housing, which allows the usage under rough environmental conditions.

The nominal values are factory set. The cable connection to a serial RS-232 interface is available as an accessory.

**D1FB for external electronics:**

The parameters can be saved, changed and duplicated in combination with the digital power amplifier PWD00A-400.

The valve parameters can be edited with the common ProPxD software for both versions.

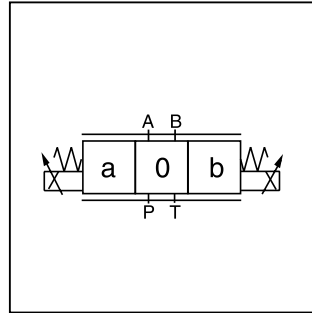
Series D1FB valves can be ordered with spool/sleeve design (D1FB\*0) for maximum precision, as well as spool/body design (D1FB\*3) for high nominal flow – see functional limit curves for maximum flow capability.



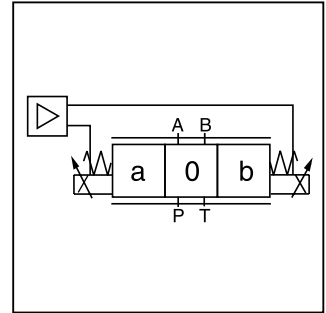
D1FB



D1FB OBE



D1FB



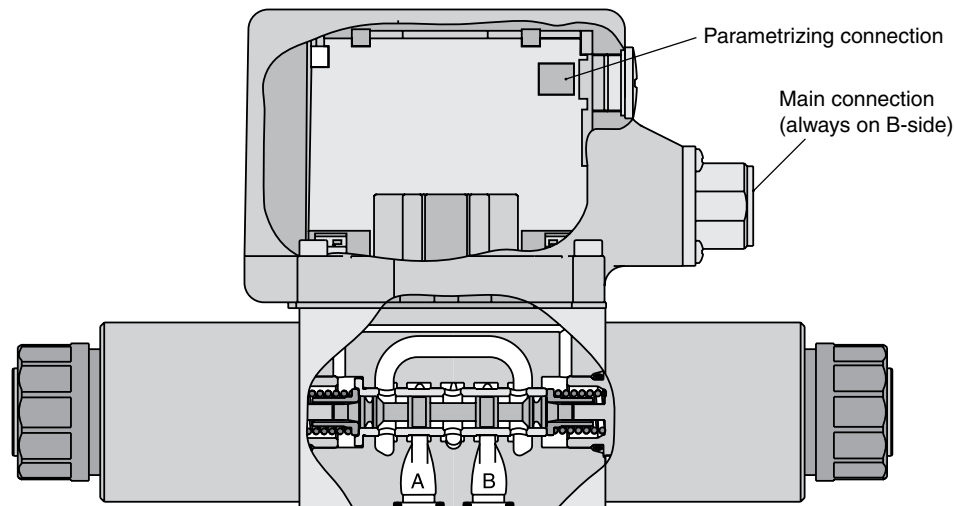
D1FB OBE

**Features**

- Spool/sleeve and spool/body.
- 3 command options for D1FB OBE:  
+/- 10V, 4...20mA, +/- 20mA
- High repeatability from valve to valve.
- Low hysteresis.
- Manual override.
- Digital onboard electronics.

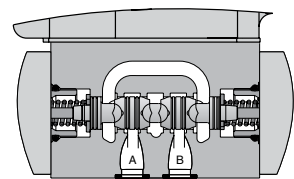
**D1FB\*0 OBE**

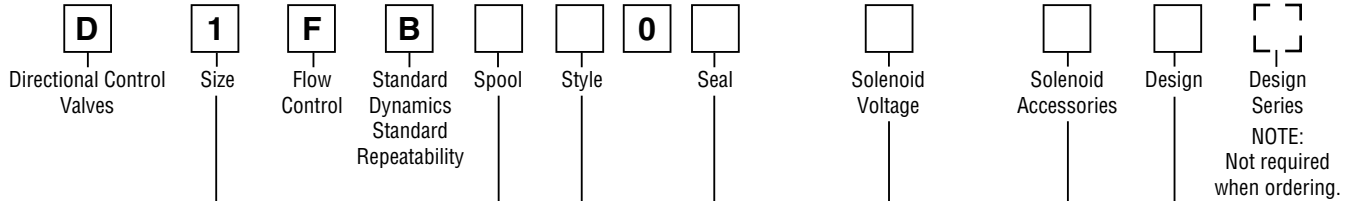
Spool/Sleeve Design



**D1FB\*3 OBE**

Spool/Body Design





Code	Description
1	DIN NG6 CETOP 3 NFPA D03

D1FB*0: Spool/Sleeve Design	
Code	Solenoid
M	9V/2.7A
J	24V/0.8A

Code	Description
0	Spool/sleeve design
3	Spool/body design

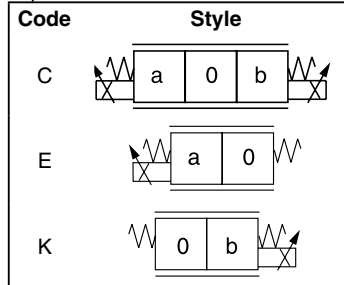
D1FB*3: Spool/Body Design	
Code	Solenoid
K	12V / 2.2A
J	24V / 1.1A

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
W*	Connector as per DIN 43650 without plug
J	Connector DT04-2P "Deutsch"

\* Please order plugs separately.

D1FB*0: Spool/Sleeve Design		
Overlap		
Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01H E01F E01C		20 (5.3) 12 (3.2) 6 (1.6)
E02H E02F E02C		20 (5.3) 12 (3.2) 6 (1.6)
E03H E03F E03C		20 (5.3) 12 (3.2) 6 (1.6)
B31H B31F	$Q_b = Q_a / 2$ 	20/10 (5.3/2.6) 12/6 (3.2/1.6)
B32H B32F	$Q_b = Q_a / 2$ 	20/10 (5.3/2.6) 12/6 (3.2/1.6)



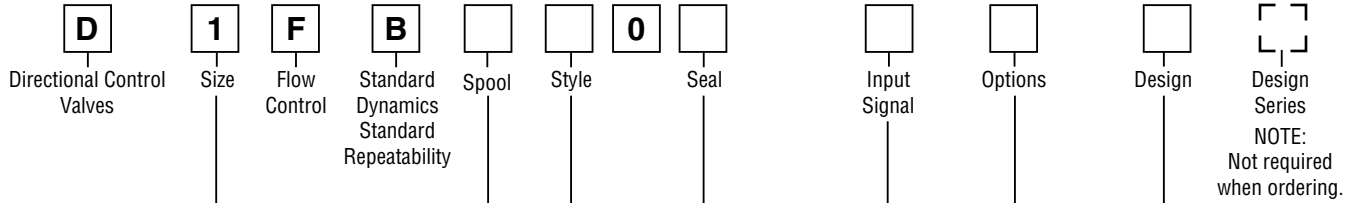
D1FB*3: Spool/Body Design		
Overlap		
Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01K E01H E01F		30 (7.9) 20 (5.3) 10 (2.6)
E02K E02H E02F		30 (7.9) 20 (5.3) 10 (2.6)

**Bolt Kit:**

- BK209 (4) 10-24x1.25 SHCS
- BK375 (4) M5x30

**Weight:**

D1FB 2.2 kg (4.9 lbs.)



Code	Description
1	DIN NG6 CETOP 3 NFFA D03

Code	Description
0	Spool/sleeve design
3	Spool/body design

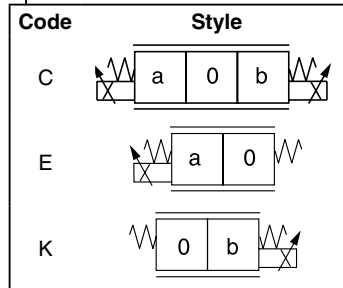
D1FB*0: Spool/Sleeve Design		
Overlap		
Code	Spool	Flow LPM (GPM) at $\Delta p$ 5 Bar (72.5 PSI) per metering edge
E01H E01F E01C		20 (5.3) 12 (3.2) 6 (1.6)
E02H E02F E02C		20 (5.3) 12 (3.2) 6 (1.6)
E03H E03F E03C		20 (5.3) 12 (3.2) 6 (1.6)
B31H B31F	$Q_B = Q_A / 2$ 	20/10 (5.3/2.6) 12/6 (3.2/1.6)
B32H B32F	$Q_B = Q_A / 2$ 	20/10 (5.3/2.6) 12/6 (3.2/1.6)

Code	Input signal <sup>1)</sup>	Function	Port	Options
F0	0...+/-10V	0...+10V > P-A	6 + PE	Potentiometer supply
G0	0...+/-20mA	0...+20mA > P-A	6 + PE	—
S0	4...20mA	12...20mA > P-A	6 + PE	—
W5 <sup>2)</sup>	0...+/-10V 4...20mA	0...+10V > P-A 12...20mA > P-A	11 + PE	Potentiometer supply & command preset channel

<sup>1)</sup> Single solenoid always 0...+10V respectively 4...20 mA  
<sup>2)</sup> Factory set  $\pm$  10V on delivery

Code	Description
N	Nitrile
V	Fluorocarbon

D1FB*3: Spool/Body Design		
Overlap		
Code	Spool	Flow LPM (GPM) at $\Delta p$ 5 Bar (72.5 PSI) per metering edge
E01K E01H E01F		30 (7.9) 20 (5.3) 10 (2.6)
E02K E02H E02F		30 (7.9) 20 (5.3) 10 (2.6)



**Bolt Kit:**  
 BK209 (4) 10-24x1.25 SHCS  
 BK375 (4) M5x30

**Weight:**  
 D1FB 2.5 kg (5.5 lbs.)

Please order plugs separately. See Accessories.

Parametrizing cable OBE => RS-232  
 Item no. 40982923

A

General			
Design	Direct operated proportional DC valve		
Actuation	Proportional solenoid		
Size	NG6 / CETOP 3 / NFPA D03		
Mounting Interface	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA		
Mounting Position	Unrestricted		
Ambient Temperature	[°C]	-20...+60; (-4°F...+140°F)	
MTTF <sub>d</sub> Value (OBE)	[years]	150 (75)	
Vibration Resistance	[g]	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27	
Hydraulic			
Maximum Operating Pressure	Ports P, A, B 350 Bar (5075 PSI); Port T 210 Bar (3045 PSI)		
Maximum Pressure Drop PABT / PBAT	350 Bar (5075 PSI)		
Fluid	Hydraulic oil as per DIN 51524...51535, other on request		
Fluid Temperature	[°C]	-20...+60; (-4°F...+140°F)	
Viscosity Permitted	[cSt] / [mm <sup>2</sup> /s]	20...380 (93...1761 SSU)	
Recommended	[cSt] / [mm <sup>2</sup> /s]	30...80 (139...371 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		
Nominal Flow at Δp= 5 Bar (72.5 PSI) per Control Edge *	D1FB*0 (Spool/sleeve)		D1FB*3 (Spool/body)
	6 LPM (1.6 GPM) / 12 LPM (3.2 GPM) / 20 LPM (5.3 GPM)		10 LPM (2.6 GPM) / 20 LPM (5.3 GPM) / 30 LPM (7.9 GPM)
Leakage at 100 Bar (1450 PSI) Per Land	[ml/min]	<50 (overlap spool)	<60
Overlap	[%]	25, electrically normalized at 10 (see flow characteristics for OBE valves)	
Static / Dynamic			
Step Response at 100% Step	[ms]	30	30
Hysteresis	[%]	<4	<6
Temperature Drift Solenoid Current	[%/K]	<0.02	
Electrical			
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible	
Protection Class	Standard (as per EN175301-803) IP65 in accordance with EN60529 (plugged and mounted) DT04-2P "Deutsch" IP69K (plugged and mounted)		
Solenoid		Code "M"	Code "K" Code "J" (Spool/sleeve)
Supply Voltage	[V]	9	12 24
Current Consumption	[A]	2.7	2.2 0.8 (1.1)
Resistance	[Ohm]	2.7	4.4 18.6
Coil Insulation Class	F (155 °C); (331°F)		
Solenoid Connection	Connector as per EN 175301-803 (code W), DT04-2P "Deutsch" connector (code J). Solenoid identification as per ISO 9461.		
Wiring Minimum	[mm <sup>2</sup> ]	3x1.5 (AWG 16) overall braid shield (Code W), "Deutsch" connector DP4 2-Pin (Code J)	
Wiring Length Maximum	[m]	50 (164 ft.)	

\* Flow rate for different Δp per control edge:  $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

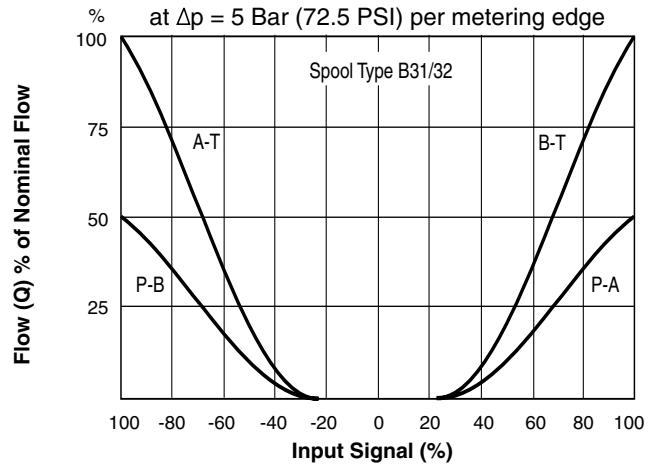
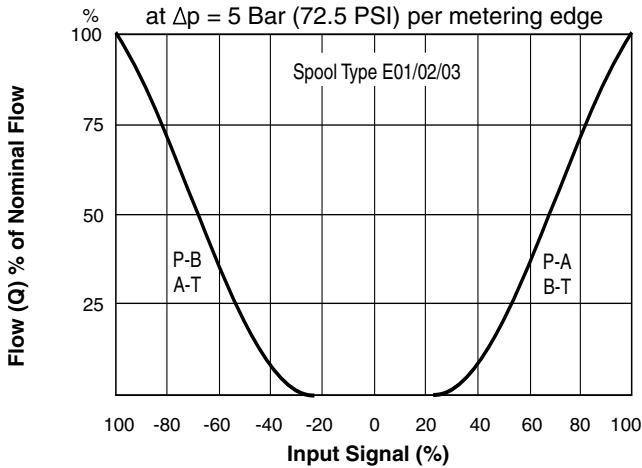
Continued on the next page



Electrical		
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/ripple DC	[V]	18...30, ripple < 5% eff., surge free
Current Consumption Maximum	[A]	2.0
Pre-fusing Medium Lag	[A]	2.5
Input Signal		
Codes F0 & W5 Voltage	[V]	+10...0...-10, ripple < 0.01 % eff., surge free, Ri = 100kOhm, 0...+10V => P -> A
Codes S0 & W5 Current	[mA]	4...12...20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 12...20mA => P -> A < 3.6 mA = enable off, > 3.8 mA = enable on (acc. to NAMUR NE43)
Code G0	[mA]	+20...0...-20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 0...+20mA => P -> A
Differential Input Maximum		
Codes F0, G0 & S0	[V]	30 for terminal D and E against PE (terminal G) 11 for terminal D and E against 0V (terminal B)
Code W5	[V]	30 for terminal 4 and 5 against PE (terminal PE) 11 for terminal 4 and 5 against 0V (terminal 2)
Voltage References:		<b>Not a powered output, +10 VDC at Pin C, -10 VDC at Pin F Only for 10K Ohm pots</b>
Channel Recall Signal	[V]	0...2.5: off / 5...30: on / Ri = 100 kOhm
Adjustment Ranges:		
Min	[%]	0...50
Max	[%]	50...100
Ramp	[s]	0...32.5
Interface		RS-232, parametrizing connection 5 pole
EMC		EN 61000-6-2, EN 61000-6-4
Central Connection		
Codes F0, G0 & S0		6 + PE acc. to EN 175201-804
Code W5		11 + PE acc. to EN 175201-804
Wiring Minimum		
Codes F0, G0 & S0	[mm <sup>2</sup> ]	7 x 1.0 (AWG16) overall braid shield
Code W5	[mm <sup>2</sup> ]	11 x 1.0 (AWG20) overall braid shield
Wiring Length Maximum	[m]	50 (164 ft.)

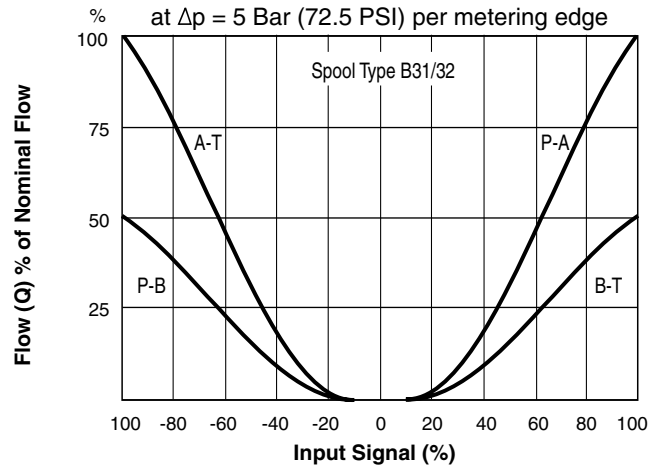
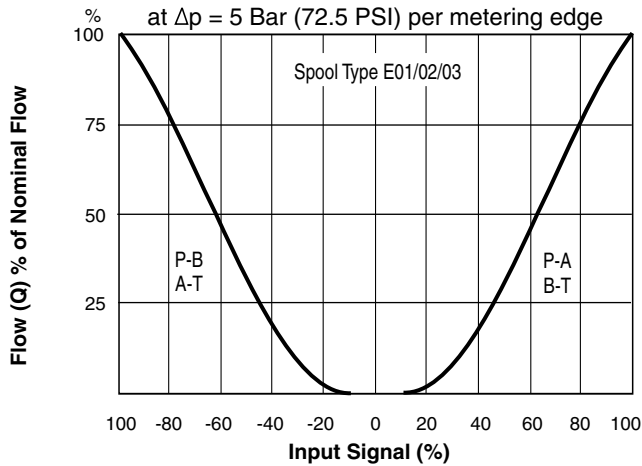


**D1FB Flow**



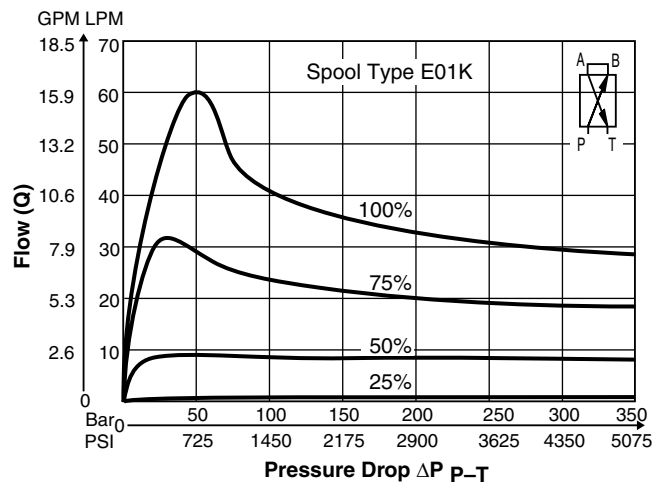
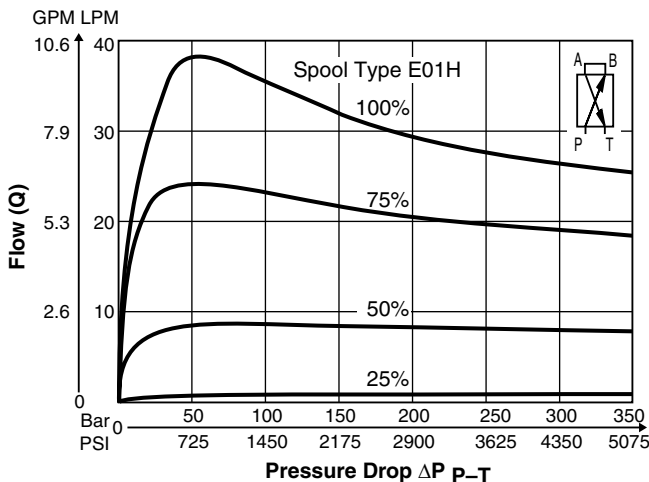
**D1FB OBE Flow**

(Electrically set to opening point 10%)



**Functional Limits**

At 25%, 50%, 75% and 100% command signal (symmetric flow). At asymmetric flow a reduced flow limit has to be considered – typically approx. 10% lower.

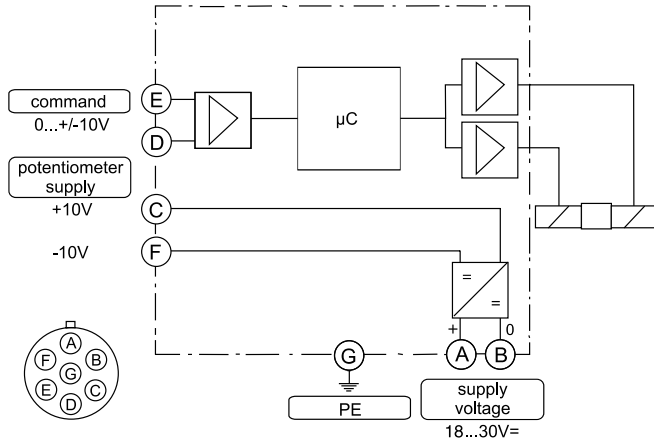


All performance curves measured with HLP46 at 50°C (122°F).

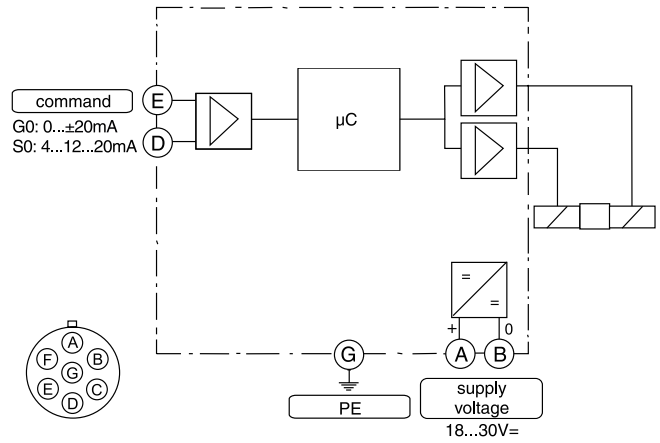
D1FB.indd, ddp



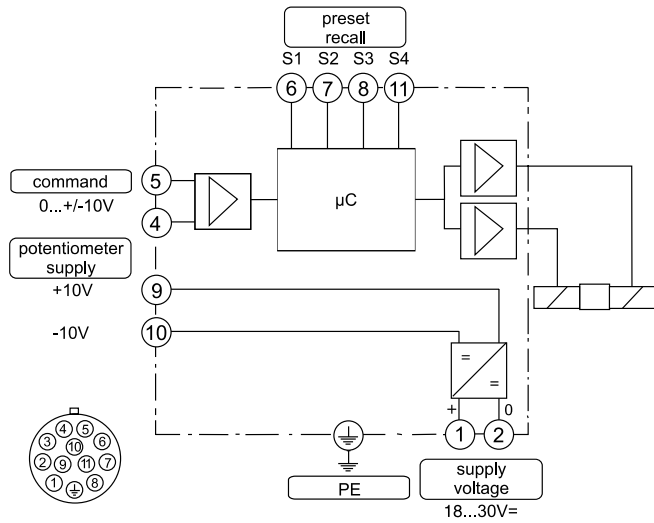
**Code F0**  
**6 + PE acc. to EN 175201-804**



**Code G0, S0**  
**6 + PE acc. to EN 175201-804**



**Code W5**  
**11 + PE acc. to EN 175201-804**



## ProPxD Interface Program

**A**

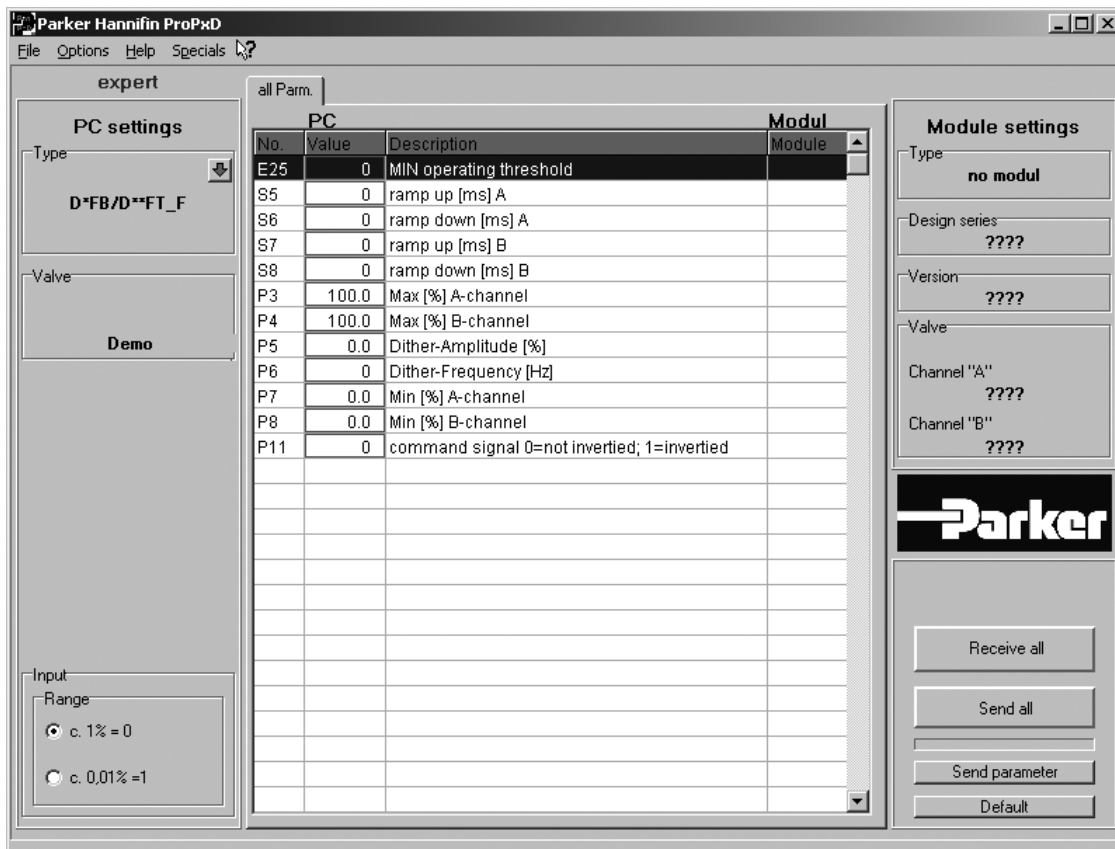
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

## Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

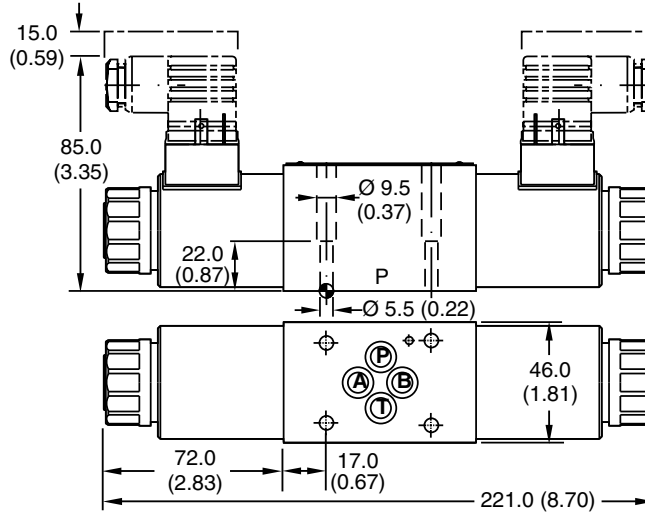
Simple to use interface program. Download free of charge [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) → **Services** → **downloads**



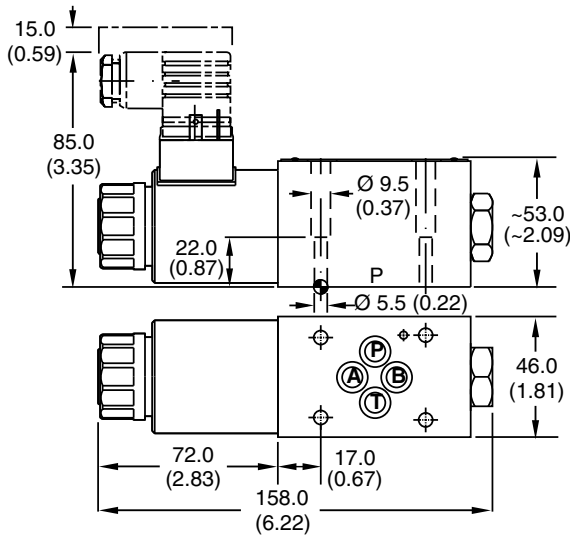
The parametrizing cable may be ordered under item no. 40982923.

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

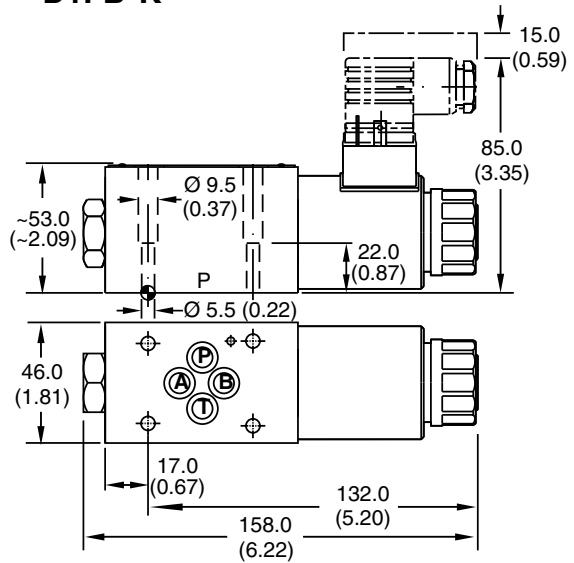
**D1FB\*C**



**D1FB\*E**

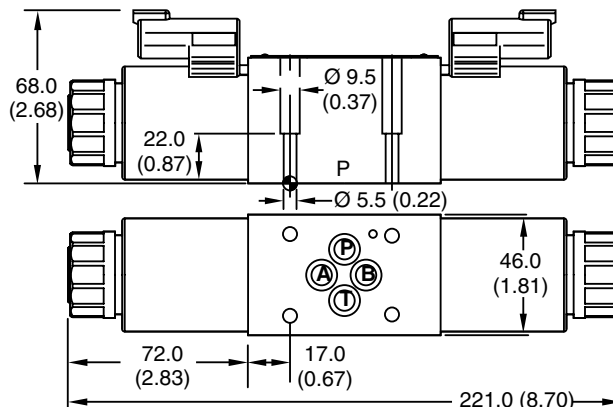


**D1FB\*K**

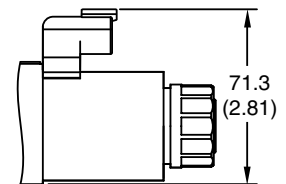


**D1FB\*C\*0 with DT04-2P "Deutsch" Connector**

(Only C style shown)



**D1FB\*C\*3**



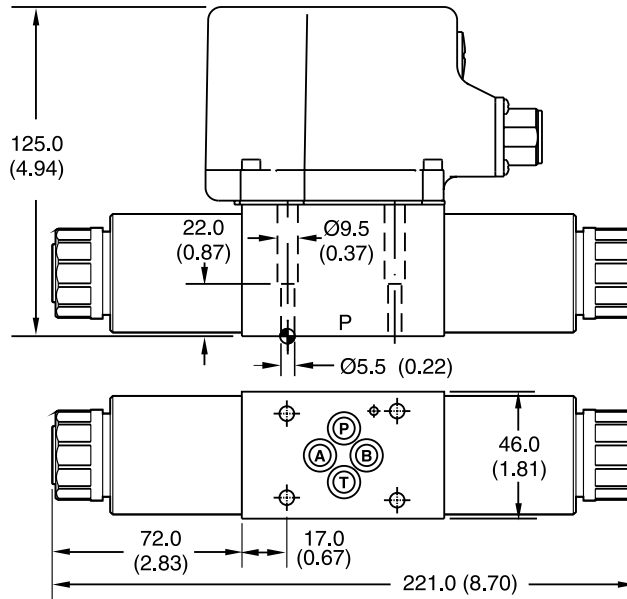
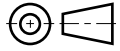
Surface Finish	Kit	Kit	Kit	Seal Kit
	BK375	4x M5x30 DIN 912 12.9	7.6 Nm (5.6 lb.-ft.) ±15 %	Nitrile: SK-D1FB Fluorocarbon: SK-D1FBV
	BK209	4x 10-24x1.25		

D1FB.indd, ddp

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

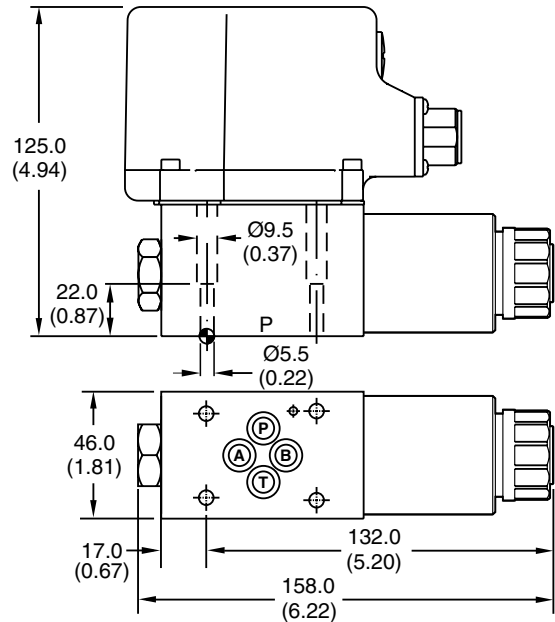
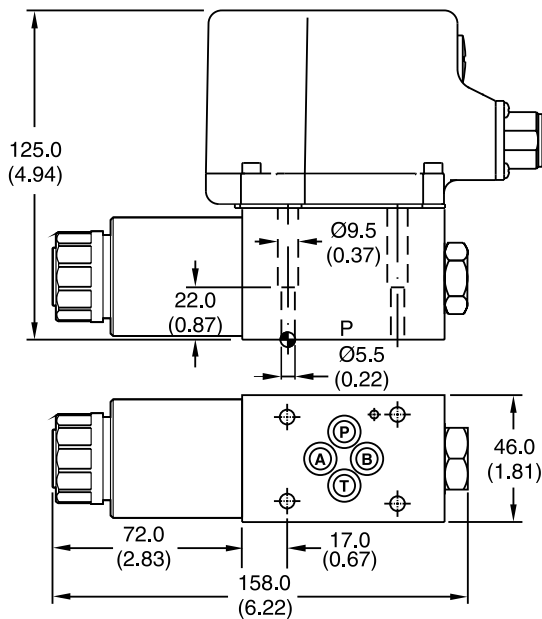


**D1FB\*C OBE**



**D1FB\*E OBE**

**D1FB\*K OBE**



Surface Finish	Kit	Kit	Kit	Seal  Kit
	BK375	4x M5x30 DIN 912 12.9	7.6 Nm (5.6 lb.-ft.) ±15 %	Nitrile: SK-D1FB Fluorocarbon: SK-D1FBV
	BK209	4x 10-24x1.25		

D1FB.indd, ddp



**General Description**

Series D3FB (NG10) proportional directional valves are available with and without onboard electronics (OBE).

**D3FB OBE:**

The digital onboard electronics is situated in a robust metal housing, which allows the usage under rough environmental conditions.

The nominal values are factory set. The cable connection to a serial RS-232 interface is available as accessory.

**D3FB for external electronics:**

The parameters can be saved, changed and duplicated in combination with the digital power amplifier PWD00A-400.

The valve parameters can be edited with the common ProPxD software for both versions.

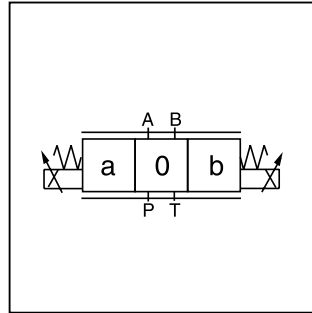
Series D3FB valves can be ordered with spool/sleeve design (D3FB\*0) for maximum precision, as well as spool/body design (D3FB\*3) for high nominal flow – see functional limit curves for maximum flow capability.



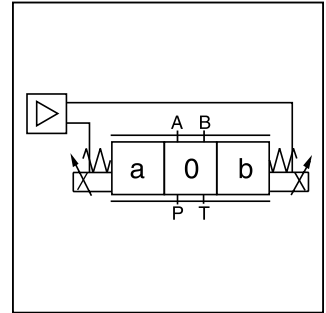
D3FB



D3FB OBE



D3FB



D3FB OBE

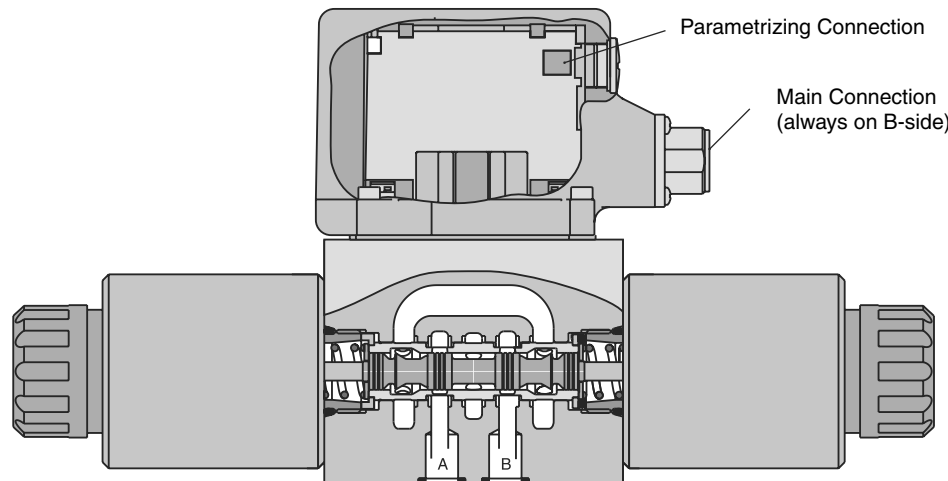
**Features**

- Spool/sleeve and spool/body.
- 3 command options for D3FB OBE:  
+/- 10V, 4...20mA, +/- 20mA
- High repeatability from valve to valve.
- Low hysteresis.
- Manual override.
- Digital onboard electronics.



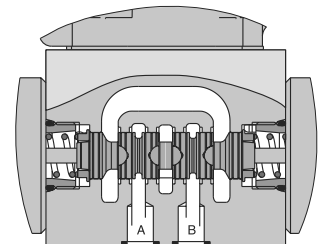
**D3FB\*0 OBE**

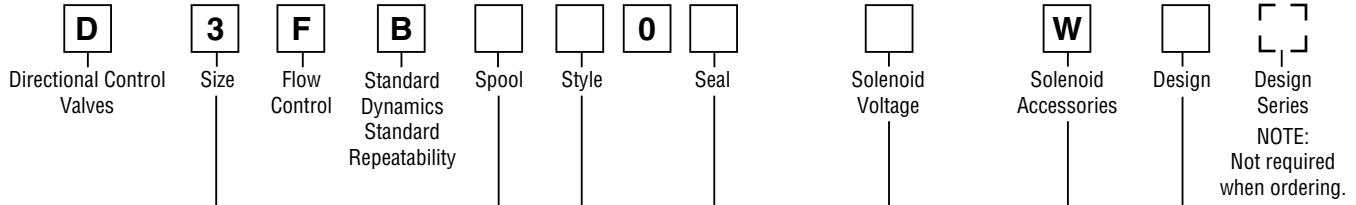
Spool/Sleeve Design



**D3FB\*3 OBE**

Spool/Body Design





Code	Description
3	DIN NG10 CETOP 5 NFPA D05

D3FB*0: Spool/Sleeve Design	
Code	Solenoid
K	12V / 2.95A

D3FB*3: Spool/Body Design	
Code	Solenoid
K	12V / 2.95A
J	24V / 1.5A

Code	Description
0	Spool/sleeve design
3	Spool/body design

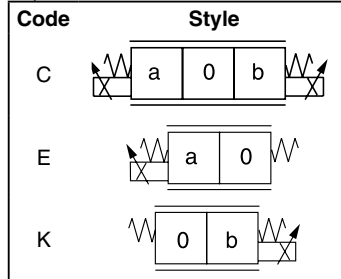
Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
W*	Connector as per DIN 43650 without plug

\* Please order plugs separately.  
 See Accessories.

D3FB*0: Spool/Sleeve Design		
Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01M E01S		40 (10.6) 60 (15.9)
E02M E02S		40 (10.6) 60 (15.9)
B31M B31S	$Q_b = Q_a/2$ 	40 / 20 (10.6 / 5.3) 60 / 30 (15.9 / 7.9)
B32M B32S	$Q_b = Q_a/2$ 	40 / 20 (10.6 / 5.3) 60 / 30 (15.9 / 7.9)

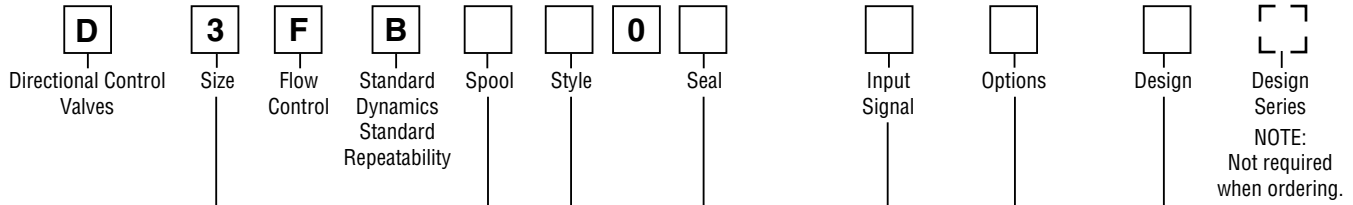
D3FB*3: Spool/Body Design		
Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01M E01S E01U		40 (10.6) 60 (15.9) 80 (21.2)
E02M E02S E02U		40 (10.6) 60 (15.9) 80 (21.2)



- Bolt Kit:**  
 BK98 (4) 1/4-24x1.625 SHCS  
 BK385 (4) M6x40

**Weight:**  
 D3FB 6.5 kg (14.3 lbs.)





Code	Description
3	DIN NG10 CETOP 5 NFPA D05

Code	Description
0	Spool/sleeve design
3	Spool/body design

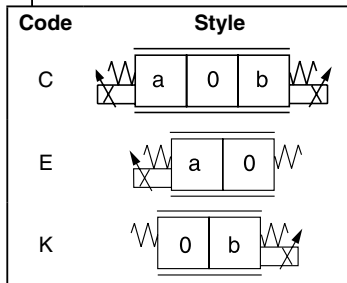
D3FB*0: Spool/Sleeve Design		
Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01M E01S		40 (10.6) 60 (15.9)
E02M E02S		40 (10.6) 60 (15.9)
B31M B31S	$Q_b = Q_a/2$ 	40 / 20 (10.6 / 5.3) 60 / 30 (15.9 / 7.9)
B32M B32S	$Q_b = Q_a/2$ 	40 / 20 (10.6 / 5.3) 60 / 30 (15.9 / 7.9)

D3FB*3: Spool/Body Design		
Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01M E01S E01U		40 (10.6) 60 (15.9) 80 (21.2)
E02M E02S E02U		40 (10.6) 60 (15.9) 80 (21.2)

Code	Input signal <sup>1)</sup>	Function	Port	Options
F0	0...+/-10V	0...+10V > P-A	6 + PE	Potentiometer supply
G0	0...+/-20mA	0...+20mA > P-A	6 + PE	—
S0	4...20mA	12...20mA > P-A	6 + PE	—
W5 <sup>2)</sup>	0...+/-10V 4...20mA	0...+10V > P-A 12...20mA > P-A	11 + PE	Potentiometer supply & command preset channel

<sup>1)</sup> Single solenoid always 0...+10V respectively 4...20 mA  
<sup>2)</sup> Factory set ± 10V on delivery

Code	Description
N	Nitrile
V	Fluorocarbon



**Bolt Kit:**  
 BK98 (4) 1/4-20x1.625 SHCS  
 BK385 (4) M6x40

**Weight:**  
 D3FB 7.2 kg (15.9 lbs.)

Please order plugs separately. See Accessories.

Parametrizing cable OBE => RS-232  
 Item no. 40982923

**A**

General		
Design	Direct operated proportional DC valve	
Actuation	Proportional solenoid	
Size	NG10 / CETOP 5 / NFPA D05	
Mounting Interface	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA	
Mounting Position	Unrestricted	
Ambient Temperature	[°C]	-20...+60; (-4°F...+140°F)
MTTF <sub>D</sub> Value (OBE)	[years]	150 (75)
Vibration Resistance	[g]	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27
Hydraulic		
Maximum Operating Pressure	Ports P, A, B 350 Bar (5075 PSI); Port T 210 Bar (3045 PSI)	
Maximum Pressure Drop PABT / PBAT	350 Bar (5075 PSI)	
Fluid	Hydraulic oil as per DIN 51524...51535, other on request	
Fluid Temperature	[°C]	-20...+60; (-4°F...+140°F)
Viscosity		
Permitted	[cSt] / [mm <sup>2</sup> /s]	20...380 (93...1761 SSU)
Recommended	[cSt] / [mm <sup>2</sup> /s]	30...80 (139...371 SSU)
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	
Nominal Flow at Δp=5 Bar (72.5 PSI) per Control Edge *	<b>D3FB*0 (Spool/sleeve)</b>	<b>D3FB*3 (Spool/body)</b>
	40 LPM (10.6 GPM) / 60 LPM (15.9 GPM)	40 LPM (10.6 GPM) 60 LPM (15.9 GPM) / 80 LPM (21.2 GPM)
Leakage at 100 Bar (1450 PSI)	[ml/min]	<100
Overlap	[%]	25, electrically normalized at 10 (see flow characteristics)
Static / Dynamic		
Step Response at 100% Step	[ms]	40
Hysteresis	[%]	<4
Temperature Drift Solenoid Current	[%/K]	<0.02
Electrical		
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)	
Solenoid	<b>Code "K"</b>	<b>Code "J"</b>
Supply Voltage	[V]	12
Current Consumption	[A]	2.95
Resistance	[Ohm]	3.84
Solenoid Connection	Connector as per EN 175301-803	
Wiring Minimum	[mm <sup>2</sup> ]	3x1.5 recommended
Wiring Length Maximum	[m]	50 (164 ft.)

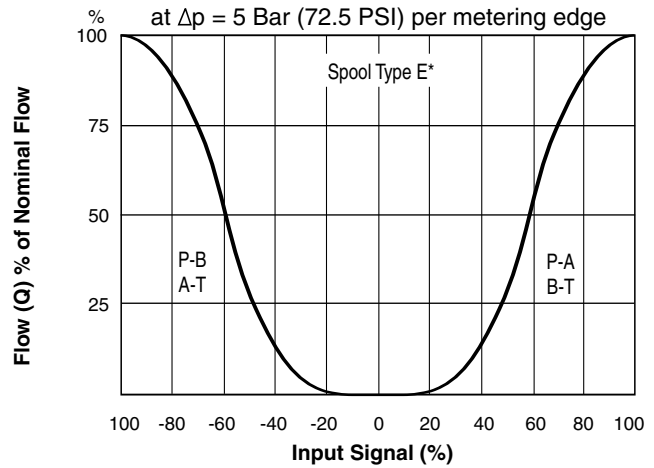
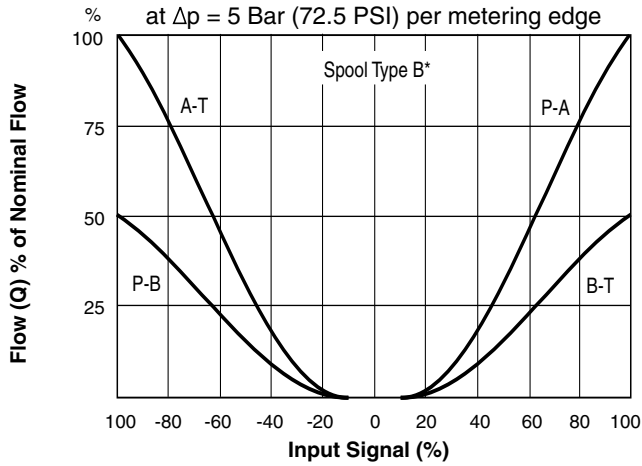
\* Flow rate for different Δp per control edge:  $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

Continued on the next page

Electrical		
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/Ripple DC	[V]	18...30, ripple < 5% eff., surge free
Current Consumption Maximum	[A]	3.5
Pre-fusing Medium Lag	[A]	4.0
Input Signal		
Codes F0 & W5 Voltage	[V]	+10...0...-10, ripple < 0.01 % eff., surge free, Ri = 100kOhm, 0...+10V => P -> A
Codes S0 & W5 Current	[mA]	4...12...20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 12...20mA => P -> A < 3.6 mA = enable off, > 3.8 mA = enable on (acc. to NAMUR NE43)
Code G0	[mA]	+20...0...-20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 0...+20mA => P -> A
Differential Input Maximum		
Codes F0, G0 & S0	[V]	30 for terminal D and E against PE (terminal G) 11 for terminal D and E against 0V (terminal B)
Code W5	[V]	30 for terminal 4 and 5 against PE (terminal PE) 11 for terminal 4 and 5 against 0V (terminal 2)
Voltage References:		<b>Not a powered output</b> <b>Only for 10K Ohm pots</b>
Channel Recall Signal	[V]	0...2.5: off / 5...30: on / Ri = 100 kOhm
Adjustment Ranges:		
Minimum	[%]	0...50
Maximum	[%]	50...100
Ramp	[s]	0...32.5
Interface		RS-232, parametrizing connection 5 pole
EMC		EN 61000-6-2, EN 61000-6-4
Central Connection		
Codes F0, G0 & S0		6 + PE acc. to EN 175201-804
Code W5		11 + PE acc. to EN 175201-804
Wiring Minimum		
Codes F0, G0 & S0	[mm <sup>2</sup> ]	7 x 1.0 (AWG16) overall braid shield
Code W5	[mm <sup>2</sup> ]	11 x 1.0 (AWG20) overall braid shield
Wiring Length Maximum	[m]	50 (164 ft.)

(Electrically set to opening point 10%)

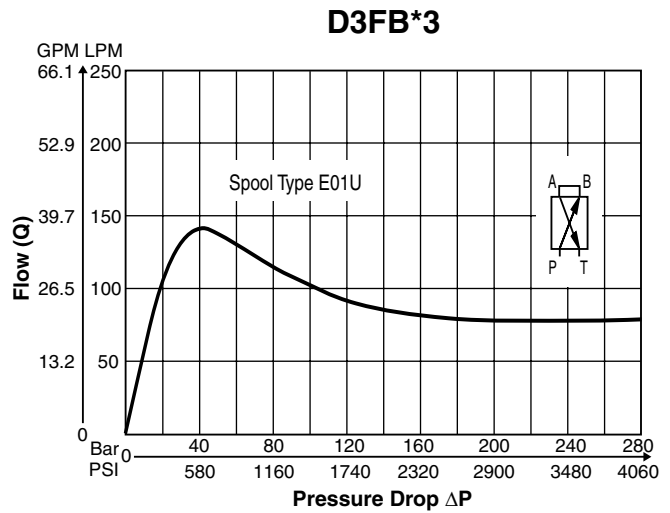
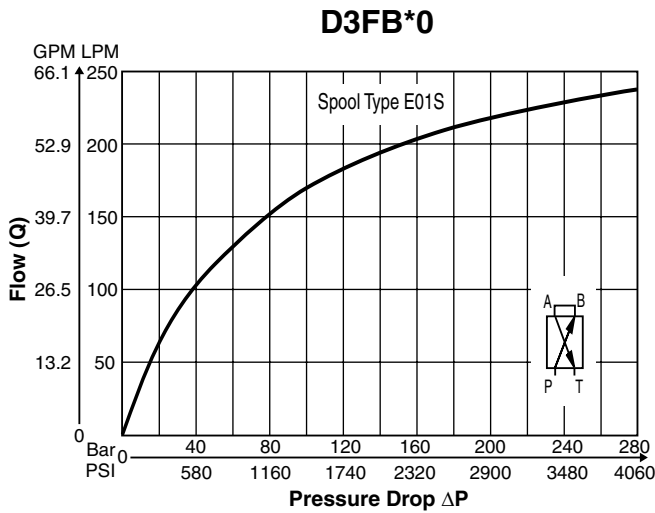
**A**



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

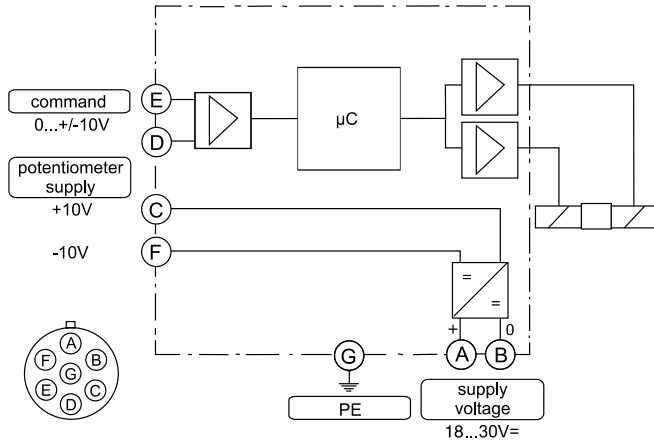
**Functional Limits**

100% command signal (symmetric flow). At asymmetric flow a reduced flow limit has to be considered – typically approx. 10% lower.

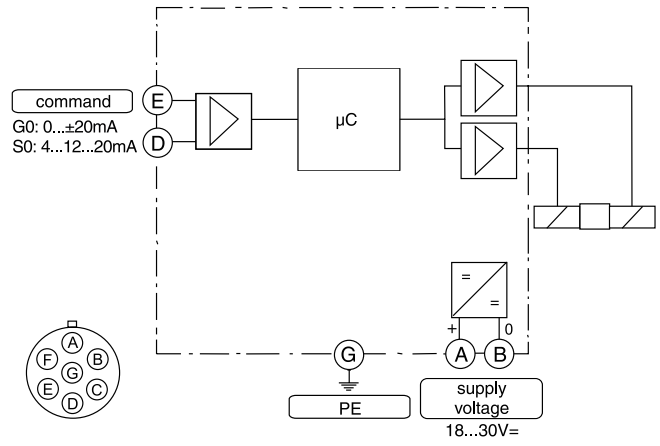


All performance curves measured with HLP46 at 50°C (122°F).

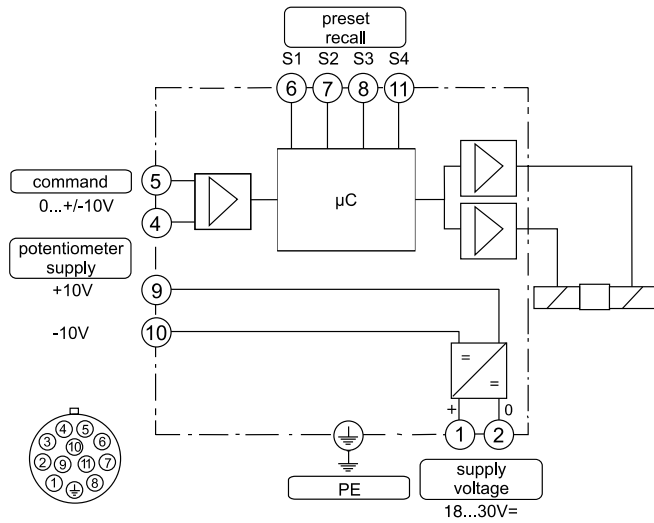
**Code F0**  
**6 + PE acc. to EN 175201-804**



**Code G0, S0**  
**6 + PE acc. to EN 175201-804**



**Code W5**  
**11 + PE acc. to EN 175201-804**



## ProPxD Interface Program

**A**

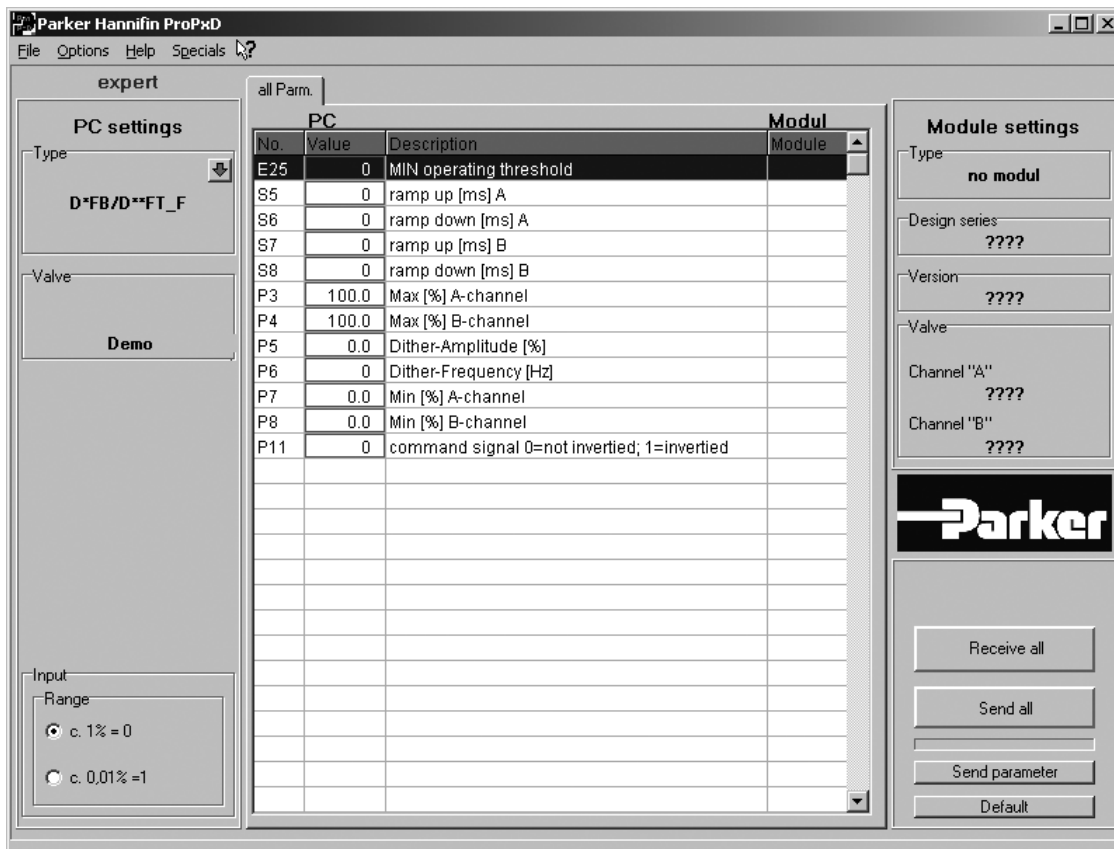
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

## Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

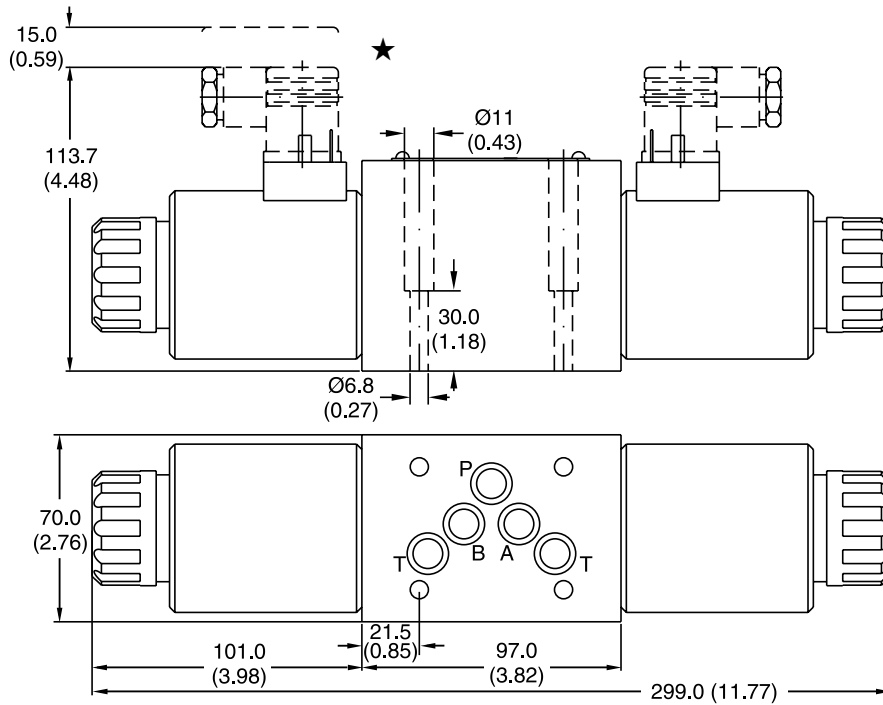
Simple to use interface program. Download free of charge [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) → **Services** → **downloads**



The parametrizing cable may be ordered under item no. 40982923.

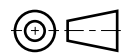
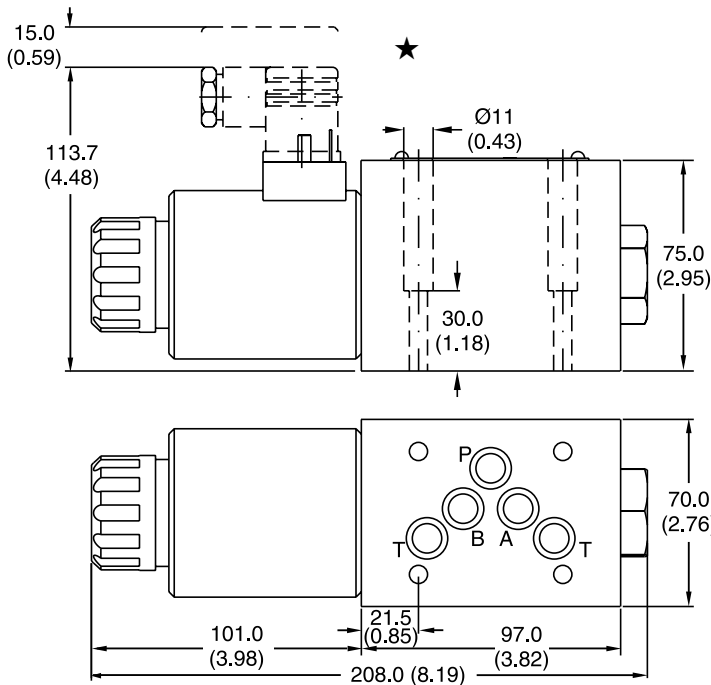
Inch equivalents for millimeter dimensions are shown in (\*\*)

**D3FB\*C**



**D3FB\*K**

★ Order plugs separately.

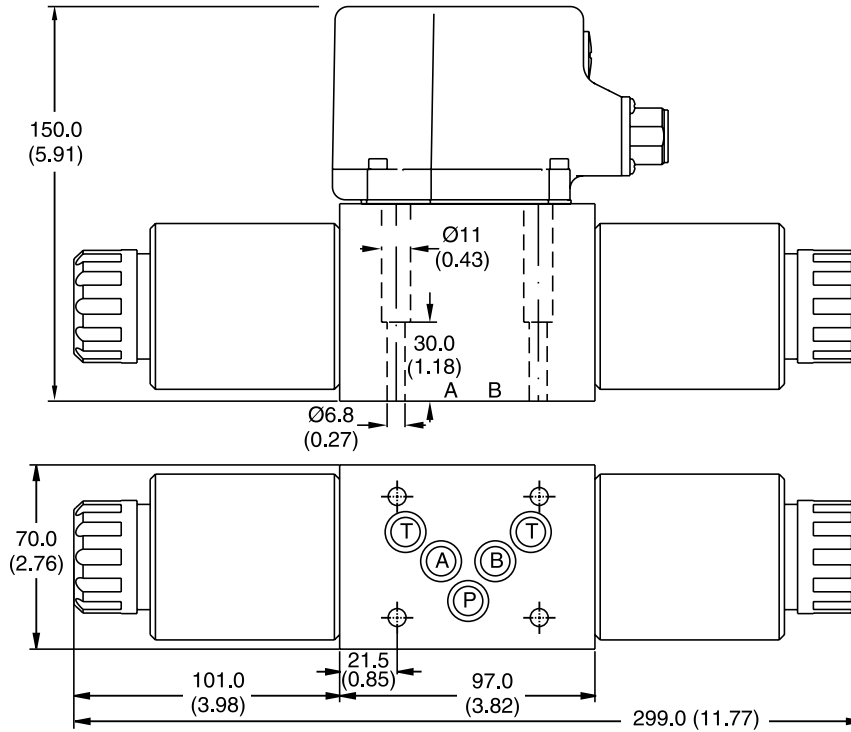


Surface Finish	Kit	Kit	Kit	Seal Kit
$\sqrt{R_{max}6.3}$ $\square 0.01/100$	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D3FB Fluorocarbon: SK-D3FBV

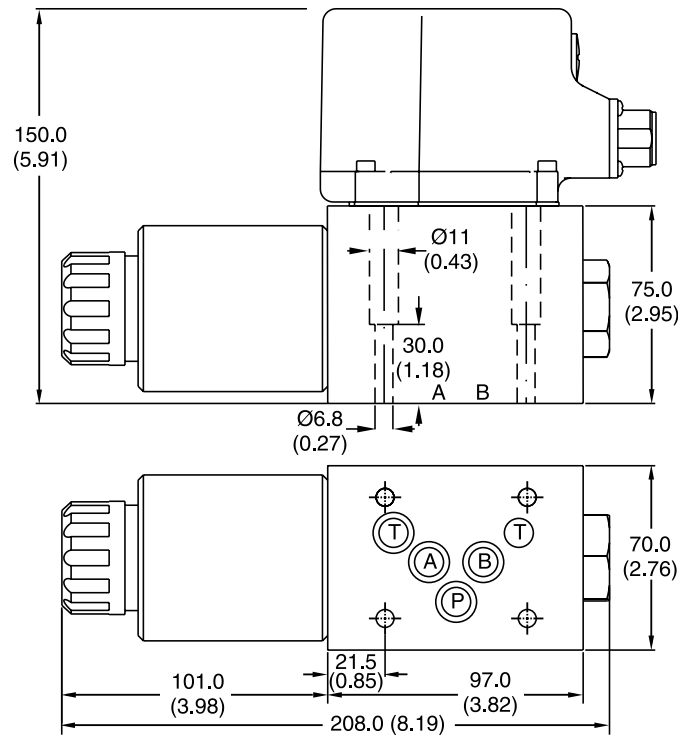
Inch equivalents for millimeter dimensions are shown in (\*\*)

**A**

**D3FB\*C OBE**



**D3FB\*E OBE**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK385	4x M6x40 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D3FB Fluorocarbon: SK-D3FBV
	BK98	4x 1/4-20x1.62		

D3FB.indd, ddp







**A**

**General Description**

Series D\*1FB pilot operated proportional directional valves come in 4 sizes:

- D31FB NG10 (CETOP 5)
- D41FB NG16 (CETOP 7)
- D91FB NG25 (CETOP 8)
- D111FB NG32 (CETOP 10)

The valves are available with and without onboard electronics (OBE).

**D\*1FB OBE:**

The digital onboard electronics is situated in a robust metal housing, which allows usage under rough environmental conditions.

The nominal values are factory set. The cable connection to a serial RS-232 interface is available as an accessory.

**D\*1FB for external electronics:**

The parameters can be saved, changed and duplicated in combination with the digital power amplifier PWD00A-400.

Series D\*1FB valve parameters can be edited with the common ProPxD software for both versions.

The D\*1FB valves work with barometric feedback of the main stage to the pressure reducing pilot valve. The pilot control pressure of 25 Bar (363 PSI) allows high flow rates of maximum of stability.

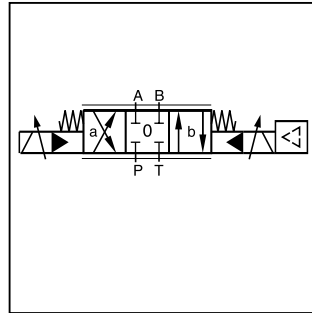
The innovative integrated regenerative function into the A-line (optional) allows new energy saving circuits for differential cylinders. The hybrid version can be switched between regenerative mode and standard mode at any time.



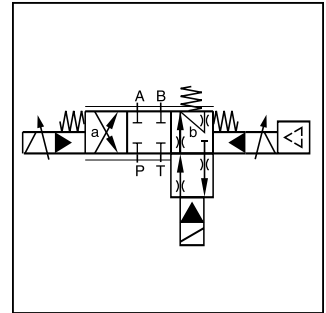
D91FB



D91FB OBE



D\*1FB

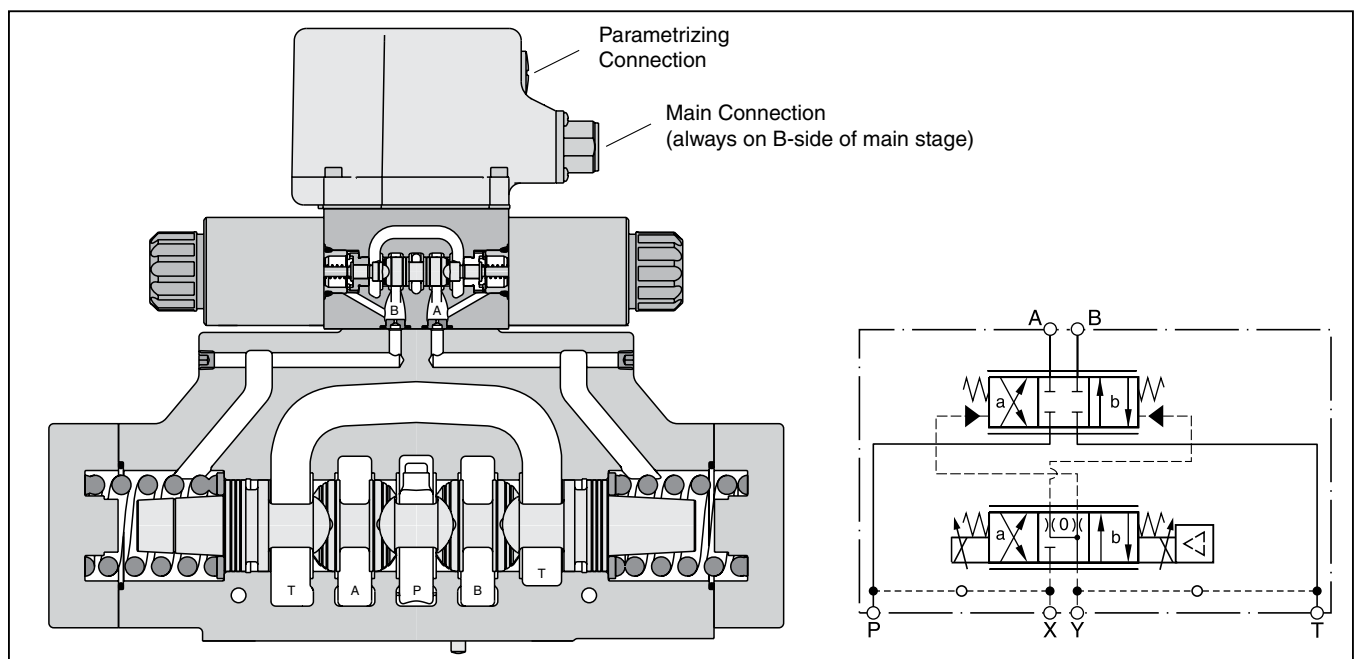


D\*1FBZ

**Features**

- Progressive flow characteristics for precise adjustment of flow rate.
- High flow capacity.
- Digital onboard electronics.
- Center position monitoring optional.
- New: Switchable regenerative hybrid version.

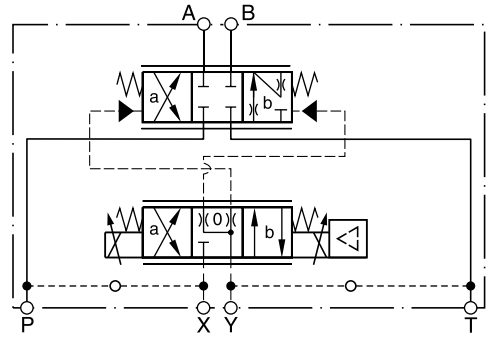
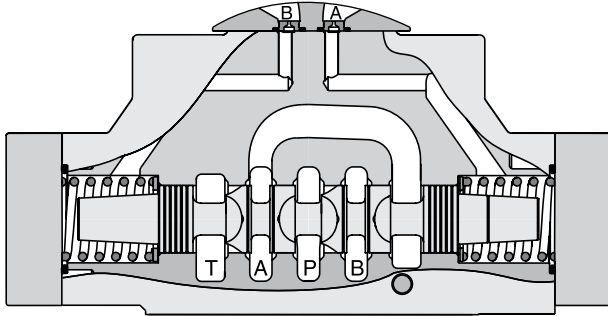
**D91FB OBE**



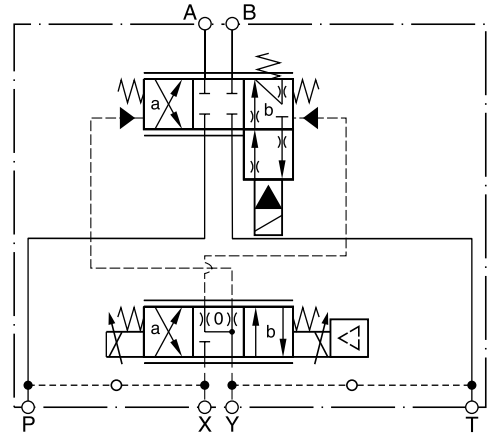
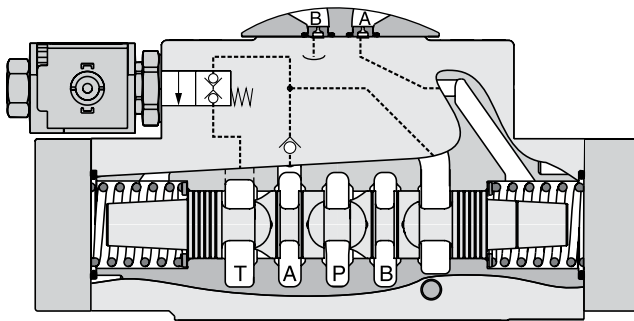
D\_1FB.indd, ddp

**D\*1FBR and D\*1FBZ**

**Regenerative Valve D\*1FBR**



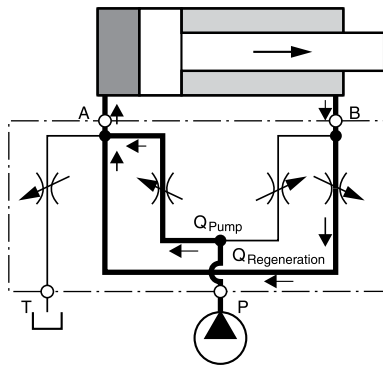
**Hybrid Valve D\*1FBZ**



**A**

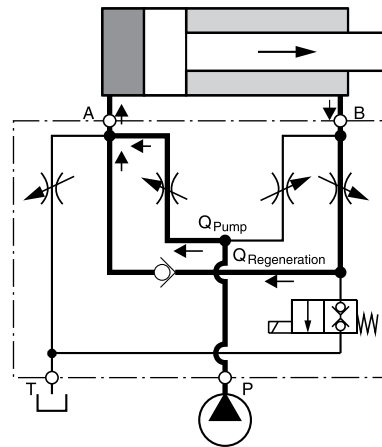
**D\*1FBR (Regenerative Valve)**

Cylinder extending

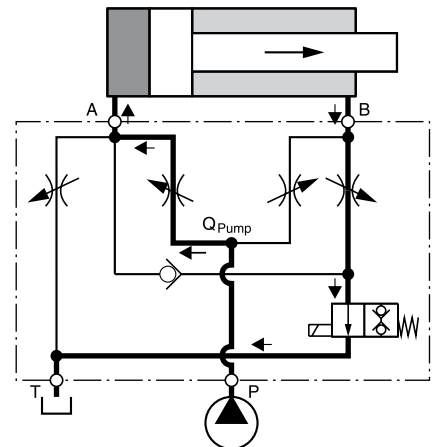


**D\*1FBZ (Hybrid Valve)**

Cylinder extending  
 regenerative mode  
 (high speed)



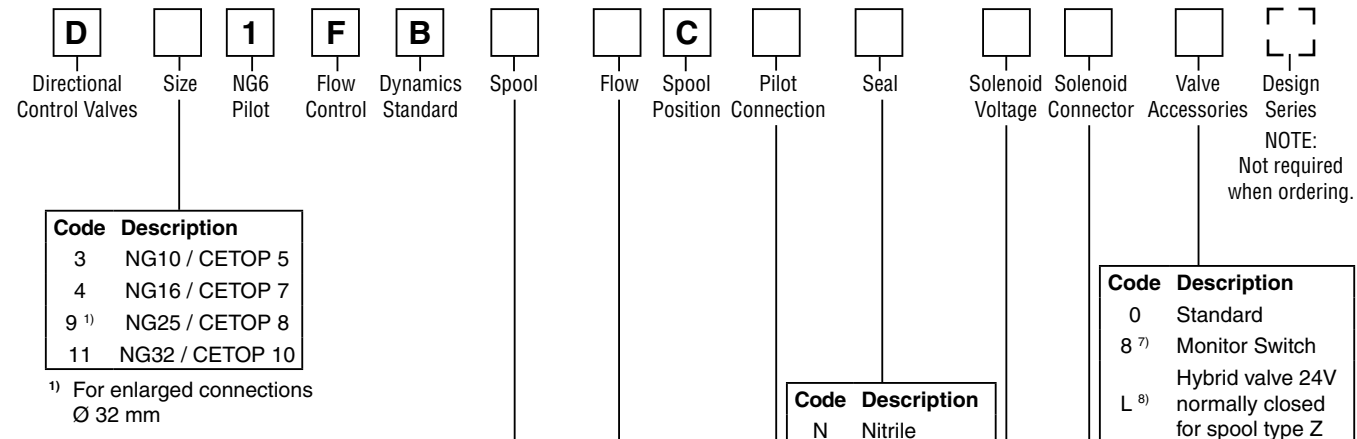
Cylinder extending  
 standard mode  
 (high force)



**Flow Rate in % of Nominal Flow**

Size	Spool	Port					
		A-T	P-A	P-B	B-A (R-Valve)	B-A (Hybrid)	B-T (Hybrid)
D41FBR/Z	31/32	100%	50%	100%	50%	45%	20%
D91FBR/Z	31/32	100%	50%	100%	50%	50%	25%
D111FBR/Z	31/32	100%	50%	100%	50%	50%	20%

**A**



Code	Description
3	NG10 / CETOP 5
4	NG16 / CETOP 7
9 <sup>1)</sup>	NG25 / CETOP 8
11	NG32 / CETOP 10

<sup>1)</sup> For enlarged connections  
 Ø 32 mm

Code	Description
0	Standard
8 <sup>7)</sup>	Monitor Switch
L <sup>8)</sup>	Hybrid valve 24V normally closed for spool type Z

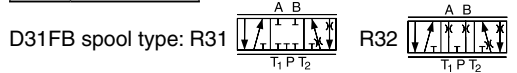
Code	Description
N	Nitrile
V	Fluorocarbon

Standard		NEW: Regenerative Function		NEW: Hybrid Function <sup>2)</sup>	
Code	Spool Type	Code	Spool Type	Code	Spool Type
E01					
E02					
B31	$Q_B = Q_A / 2$ 	R31		Z31	
B32	$Q_B = Q_A / 2$ 	R32		Z32	

Code	Inlet	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

Code	Description
W <sup>5)</sup>	Connector as per DIN 43650 without plug
J <sup>5) 6)</sup>	Connector DT04-2P "Deutsch"

<sup>5)</sup> Please order plugs separately. See Accessories.  
<sup>6)</sup> Not available with hybrid function.



<sup>2)</sup> not available in D31FB.

Code	Flow LPM (GPM) at $\Delta p$ 5 Bar (72.5 PSI) per metering edge			
	D31	D41	D91	D111
B	—	100 <sup>3) 4)</sup> (26.4)	—	—
C	75 <sup>4)</sup> (19.8)	130 <sup>3) 4)</sup> (34.3)	—	—
D	90 <sup>4)</sup> (23.8)	—	—	—
E	120 (31.7)	—	250 <sup>3) 4)</sup> (66.0)	—
F	—	200 (52.8)	—	—
H	—	—	400 (105.7)	—
L	—	—	—	1000 (264.2)

<sup>3)</sup> Not available with spool type B31 und B32.  
<sup>4)</sup> Not available with regenerative or hybrid function.

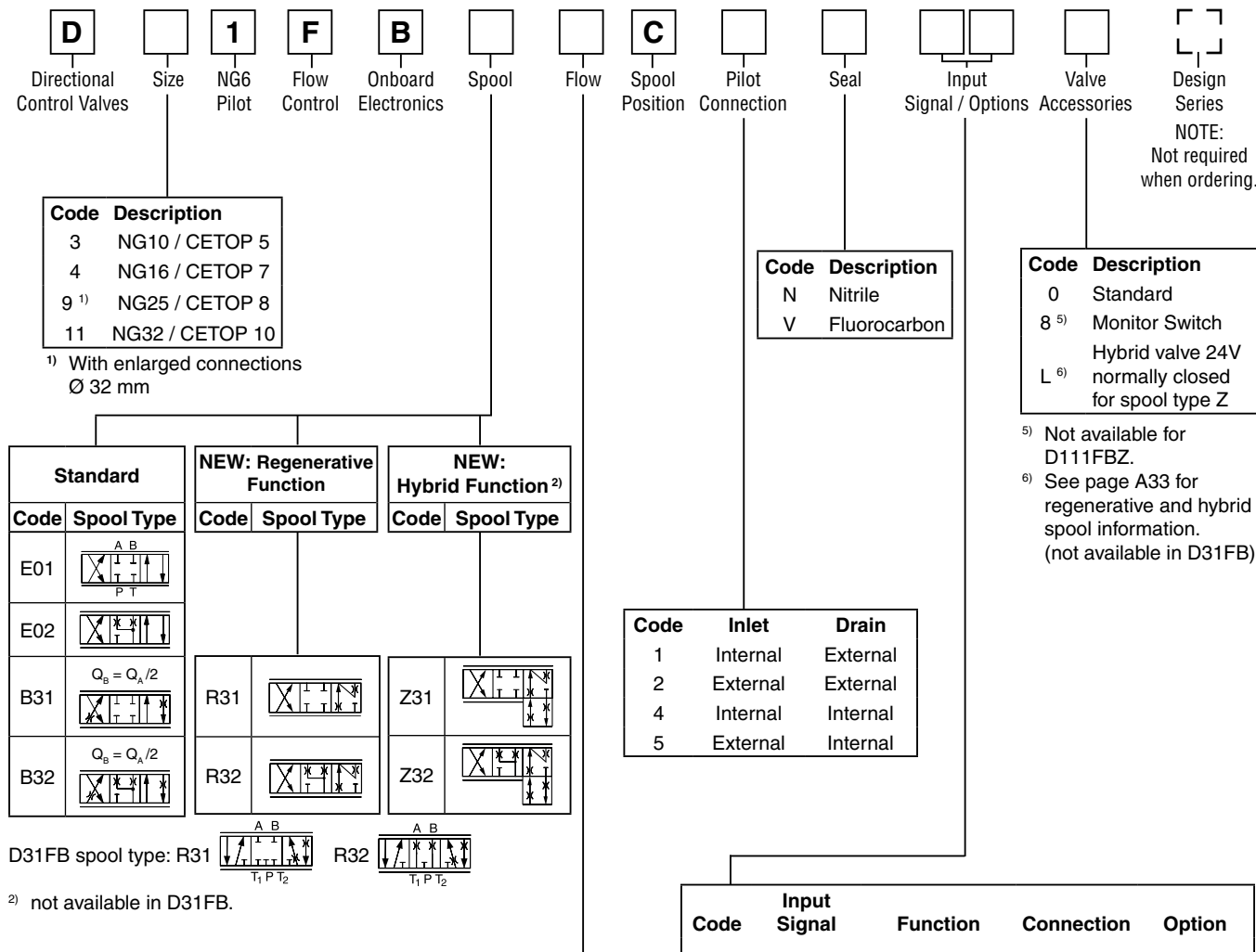
Code	Solenoid
K	12V / 2.5A
J	24V / 1.1A

**Bolt Kits:**

D31FB	BK98	(4) 1/4-20x1.625 SHCS
D41FB	BK160	(4) 3/8-16x2.5 SHCS (2) 1/4-20x2.5 SHCS
D91FB	BK228	(6) 1/2-13x3 SHCS
D111FB	BK150	(6) 3/4-10x3.5 SHCS

**Weight:**

D31FB	8.1 kg (17.9 lbs.)
D41FB	10.8 kg (23.8 lbs.)
D91FB	19.0 kg (41.9 lbs.)
D111FB	68.0 kg (149.9 lbs.)



**Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge**

Code	D31	D41	D91	D111
B	—	100 <sup>3) 4)</sup> (26.4)	—	—
C	75 <sup>4)</sup> (19.8)	130 <sup>3) 4)</sup> (34.3)	—	—
D	90 <sup>4)</sup> (23.8)	—	—	—
E	120 (31.7)	—	250 <sup>3) 4)</sup> (66.0)	—
F	—	200 (52.8)	—	—
H	—	—	400 (105.7)	—
L	—	—	—	1000 (264.2)

<sup>3)</sup> Not available with spool type B31 und B32.  
<sup>4)</sup> Not available with regenerative or hybrid function.

**Input Signal Function Connection Option**

Code	Input Signal	Function	Connection	Option
F0	0...±10V	0...+10V P->B	6 + PE	Pot.-supply
G0	0...±20mA	0...+20mA P->B	6 + PE	—
M0	0...±10V	0...+10V P->A	6 + PE	Pot.-supply
S0	4...20mA	12...20mA P->A	6 + PE	—
W5	0...±10V 4...20mA	0...+10V P->A 12...20mA P->A	11 + PE	Pot.-supply + Preset Commands

**Bolt Kits:**

D31FB	BK98	(4) 1/4-20x1.625 SHCS
D41FB	BK160	(4) 3/8-16x2.5 SHCS (2) 1/4-20x2.5 SHCS
D91FB	BK228	(6) 1/2-13x3 SHCS
D111FB	BK150	(6) 3/4-10x3.5 SHCS

**Weight:**

D31FB	8.4 kg (18.5 lbs.)
D41FB	11.1 kg (24.5 lbs.)
D91FB	19.3 kg (42.6 lbs.)
D111FB	68.3 kg (150.6 lbs.)

Please order plugs separately. See Accessories.  
 Parametrizing cable OBE => RS-232  
 Item no. 40982923

**A**

General				
Design	Pilot operated DC valve			
Actuation	Proportional solenoid			
Size	NG10 (CETOP 5)	NG16 (CETOP 7)	NG25 (CETOP 8)	NG32 (CETOP 10)
Mounting Interface	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA			
Mounting Position	Unrestricted			
Ambient Temperature [°C]	-20...+60; (-4°F...+140°F)			
MTTF <sub>D</sub> Value (OBE) [years]	75 (50)			
Vibration Resistance [g]	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27			
Hydraulic				
Maximum Operating Pressure	Pilot Drain Internal: Ports P, A, B, X 350 Bar (5075 PSI); Port T, Y 185 Bar (2683 PSI) NG10: Port T, Y 15 Bar (218 PSI) Pilot Drain External: Ports P, A, B, T, X 350 Bar (5075 PSI); Port Y 185 Bar (2683 PSI) NG10: Port Y 15 Bar (218 PSI)			
Fluid	Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature [°C]	-20...+60; (-4°F...+140°F)			
Viscosity Permitted [cSt] / [mm <sup>2</sup> /s]	20...380 (93...1761 SSU)			
Viscosity Recommended [cSt] / [mm <sup>2</sup> /s]	30...80 (139...371 SSU)			
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Nominal Flow at Δp=Bar (72.5 PSI) per Control Edge *	D31FB	D41FB	D91FB	D111FB
	75 LPM (19.8 GPM)	100 LPM (26.4 GPM)	250 LPM (66.1 GPM)	1000 LPM (264.2 GPM)
	90 LPM (23.8 GPM)	130 LPM (34.4 GPM)	400 LPM (105.8 GPM)	
Leakage at 100 Bar (1450 PSI) [ml/min]	100	200	600	1000
Pilot Supply Pressure	Minimum 30 Bar (435 PSI) [+T/Y pressure]; Maximum 350 Bar (5075 PSI) Optimal Dynamics at 50 Bar (725 PSI)			
Pilot Flow at 100 Bar (1450 PSI)	<0.5 LPM (0.13 GPM)	<1.2 LPM (0.3 GPM)	<1.2 LPM (0.3 GPM)	<1.2 LPM (0.3 GPM)
Pilot Flow, Step Response	2 LPM (0.5 GPM)	1.9 LPM (0.5 GPM)	4.5 LPM (1.2 GPM)	18 LPM (4.8 GPM)
Static / Dynamic				
Step Response at 100% Step [ms]	50	75	100	180
Hysteresis [%]	<5			
Electrical				
Duty Ratio [%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible			
Protection Class	Standard (as per EN175301-803) IP65 in accordance with EN60529 (plugged and mounted) DT04-2P "Deutsch" IP69K (plugged and mounted)			
Solenoid	Code "K"		Code "J"	
Supply Voltage [V]	12		24	
Current Consumption [A]	2.5		1.1	
Resistance [Ohm]	4.4		18.6	
Coil Insulation Class	F (155 °C); (331°F)			
Solenoid Connection	Connector as per EN 175301-803 (code W), DT04-2P "Deutsch" connector (code J). Solenoid identification as per ISO 9461.			
Wiring Minimum [mm <sup>2</sup> ]	3x1.5 (AWG 16) overall braid shield			
Wiring Length Maximum [m]	50 (164 ft.)			

\* Flow rate for different Δp per control edge:  $Q_x = Q_{Nom} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom}}}$

Continued on next page

Electrical Monitor Switch (Offboard Electronics)	
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature [°C]	0...70; (32°F...158°F)
Supply Voltage/Ripple [V]	18...42, ripple <10% eff.
Current Consumption without Load [mA]	<30
Maximum Output Current per Channel, Ohmic [mA]	400
Minimum Output Load per Channel, Ohmic [kOhm]	100
Max. output drop at 0.2A [V]	<1.1
Max. output drop at 0.4A [V]	<1.6
EMV	EN 50081-1 / EN50082-2
Maximum tol. Ambient Field Strength [A/m]	1200
Minimum Distance to next AC Solenoid [m]	0.1 (0.2 ft.)
Interface	4+PE acc. IEC 61076-2-101 (M12)
Wiring Minimum [mm <sup>2</sup> ]	5x0.5 (AWG 20) overall braid shield
Wiring Length Maximum [m]	50 (164 ft.)

Electrical (Onboard Electronics)	
Duty Ratio [%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/ripple DC [V]	18...30, ripple < 5% eff., surge free
Current Consumption Maximum [A]	2.0
Pre-fusing Medium Lag [A]	2.5
Input Signal	
Codes F0, M0 & W5 Voltage [V]	+10...0...-10, ripple < 0.01 % eff., surge free, Ri = 100kOhm, 0...+10V
Codes S0 & W5 Current [mA]	4...12...20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 12...20mA < 3.6 mA = enable off, > 3.8 mA = enable on (acc. to NAMUR NE43)
Code G0 [mA]	+20...0...-20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 0...+20mA
Differential Input Maximum	
Codes F0, G0, M0 & S0 [V]	30 for terminal D and E against PE (terminal G) 11 for terminal D and E against 0V (terminal B)
Code W5 [V]	30 for terminal 4 and 5 against PE (terminal PE) 11 for terminal 4 and 5 against 0V (terminal 2)
Voltage References:	Not a powered output Only for 10K Ohm pots
Channel Recall Signal [V]	0...2.5: off / 5...30: on / Ri = 100 kOhm
Adjustment Ranges:	
Minimum [%]	0...50
Maximum [%]	50...100
Ramp [s]	0...32.5
Interface	RS-232, parametrizing connection 5 pole
EMC	EN 61000-6-2, EN 61000-6-4
Central Connection	
Codes F0, G0 & S0	6 + PE acc. to EN 175201-804
Code W5	11 + PE acc. to EN 175201-804
Wiring Minimum	
Codes F0, G0 & S0 [mm <sup>2</sup> ]	7 x 1.0 (AWG16) overall braid shield
Code W5 [mm <sup>2</sup> ]	11 x 1.0 (AWG20) overall braid shield
Wiring Length Maximum [m]	50 (164 ft.)

Continued on next page

**Specifications (cont.)**

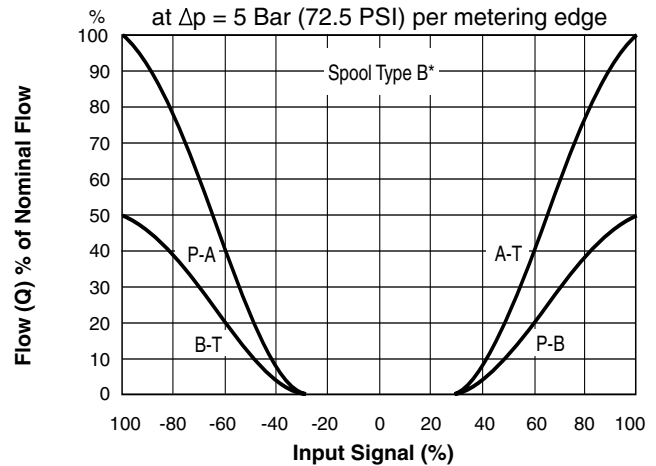
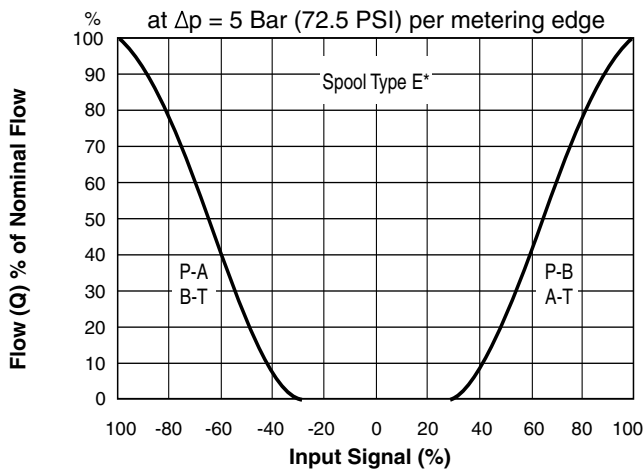
**A**

<b>Electrical (Hybrid Option)</b>			
<b>Duty Ratio</b>	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible	
<b>Protection Class</b>		IP65 in accordance with EN 60529 (plugged and mounted)	
		<b>D41</b>	<b>D91</b>
<b>Supply Voltage</b>	[V]	24	24
<b>Tolerance Supply Voltage</b>	[%]	±10	±10
<b>Current Consumption</b>	[A]	1.21	0.96
<b>Power Consumption</b>	[W]	29	23
<b>Solenoid Connection</b>		Connector as per EN 175301-803	
<b>Wiring Minimum</b>	[mm <sup>2</sup> ]	3 x 1.5 recommended	
<b>Wiring Length Maximum</b>	[m]	50 (164 ft.) recommended	

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

**Performance Curves**

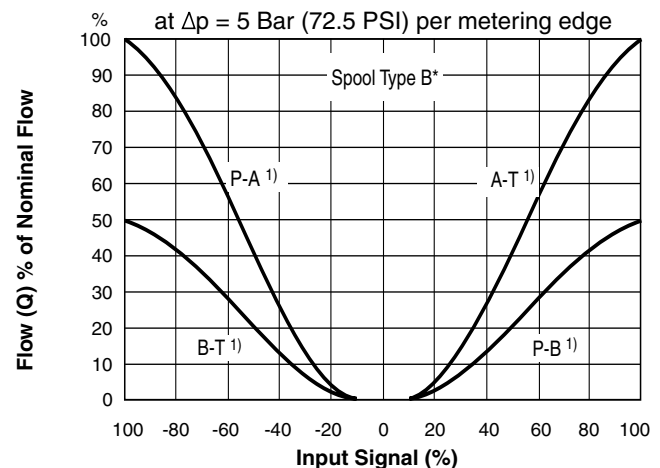
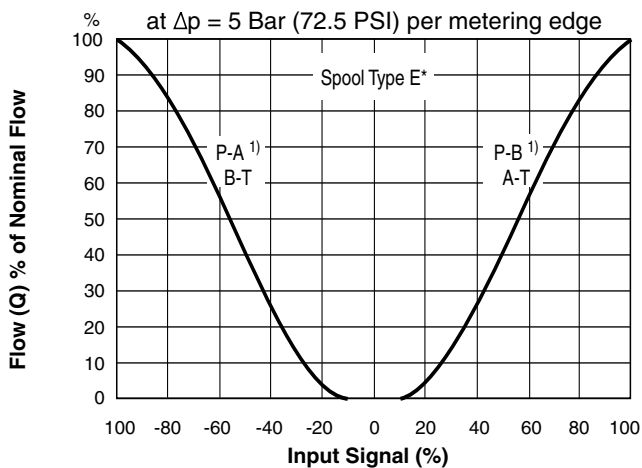
**D\*1FB Flow**



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

**D\*1FB OBE Flow**

(Electrically set to opening point 10%)



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

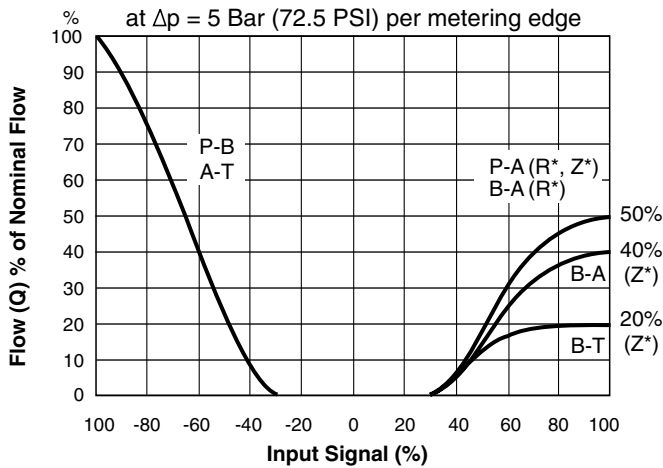
<sup>1)</sup> Flow direction depending on ordering code.



**D\*1FB R/Z (Regenerative and Hybrid)**

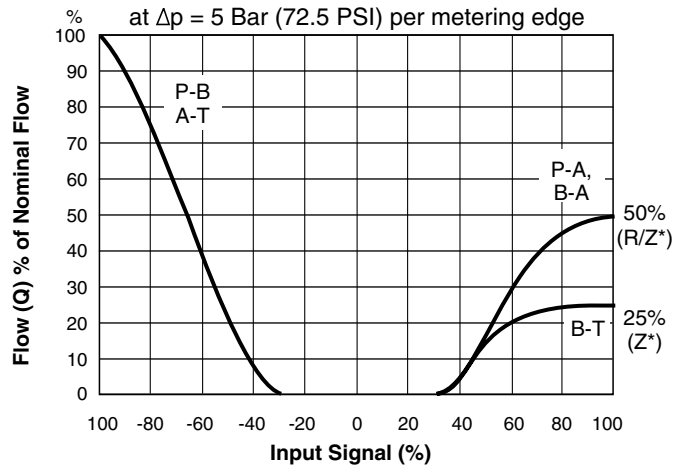
**D41FB R/Z**

Spool Code **R/Z31/32**



**D91FB R/Z**

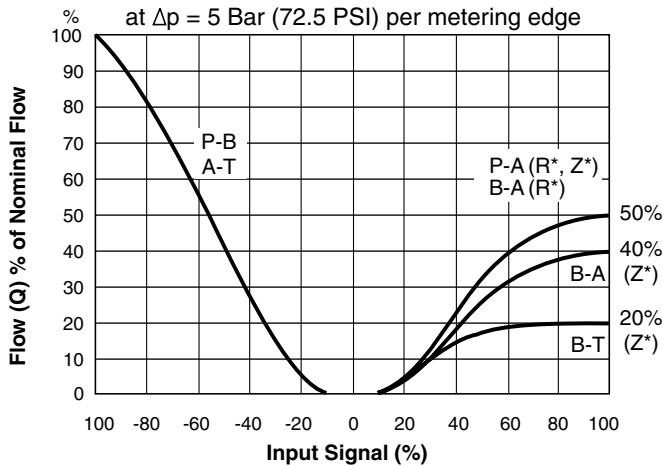
Spool Code **R/Z31/32**



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

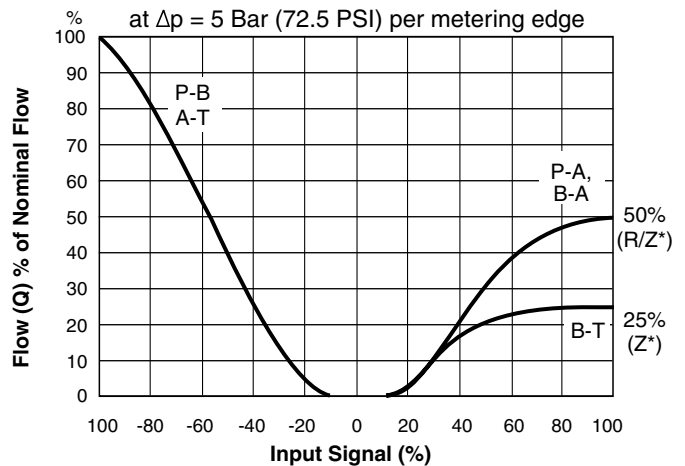
**D41FB R/Z OBE**

Spool Code **R/Z31/32**



**D91FB R/Z OBE**

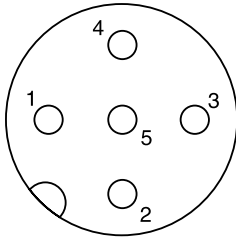
Spool Code **R/Z31/32**



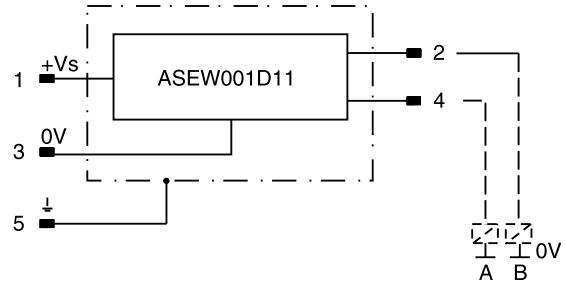
All performance curves measured with HLP46 at 50°C (122°F).

**Monitor Switch M12x1 Pin Assignment**

**A**



- 1 + Supply 18...42V
- 2 Output B (normally closed)
- 3 0V
- 4 Output A (normally closed)
- 5 Earth ground



Signal	Output A (pin 4)	Output B (pin 2)
neutral	closed	closed
	open	closed
	closed	open

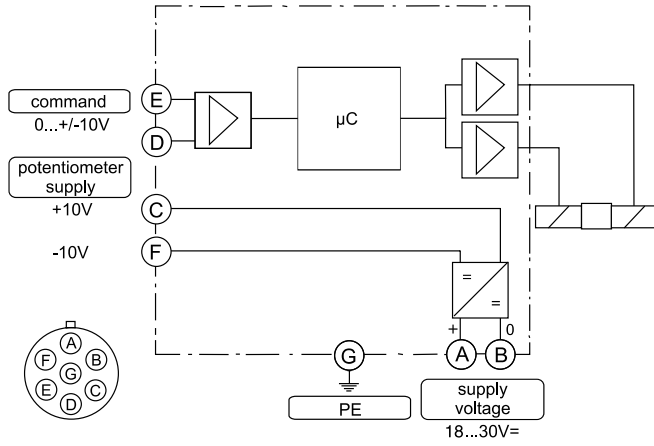
The neutral position is monitored. The signal changes after less than 10% of the spool stroke.

**Electrical Monitor Switch**

Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature	[°C] 0...70; (32°F...158°F)
Supply Voltage/Ripple	[V] 18...42, ripple < 10% eff.
Current Consumption without Load	[mA] < 30
Maximum Output Current per Channel, Ohmic	[mA] 400
Minimum Output Load per Channel, Ohmic	[kOhm] 100
Maximum Output Drop at 0.2A	[V] < 1.1
Maximum Output Drop at 0.4A	[V] < 1.6
EMC	EN 50081-1, EN50082-2
Maximum tol. Ambient Field Strength	[A/m] 1200
Minimum Distance to Next AC solenoid	[m] 0.1
Interface	4+PE acc. IEC 61076-2-101 (M12)
Wiring Minimum	[mm²] 5 x 0.5 (AWG 20) overall braid shield
Wiring Length Maximum	[m] 50 (164 ft.)

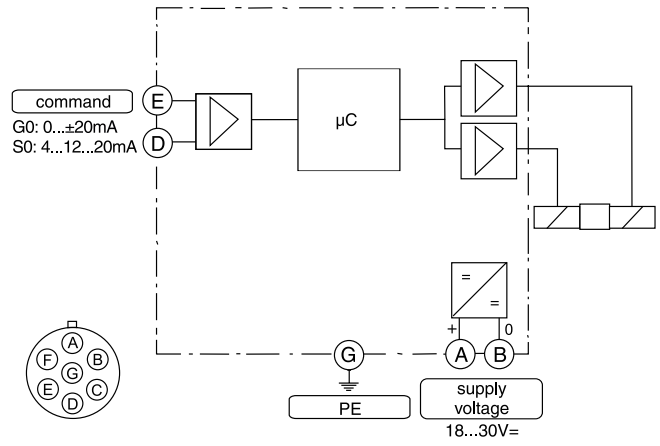
**Code F0, M0**

6 + PE acc. to EN 175201-804



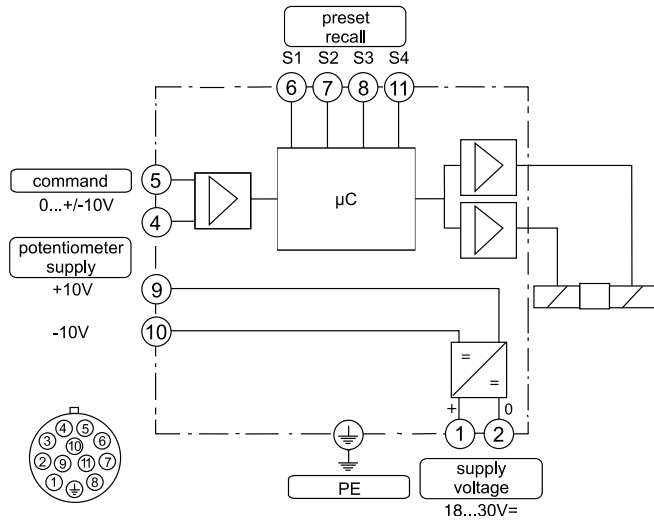
**Code G0, S0**

6 + PE acc. to EN 175201-804



**Code W5**

11 + PE acc. to EN 175201-804



## ProPxD Interface Program

**A**

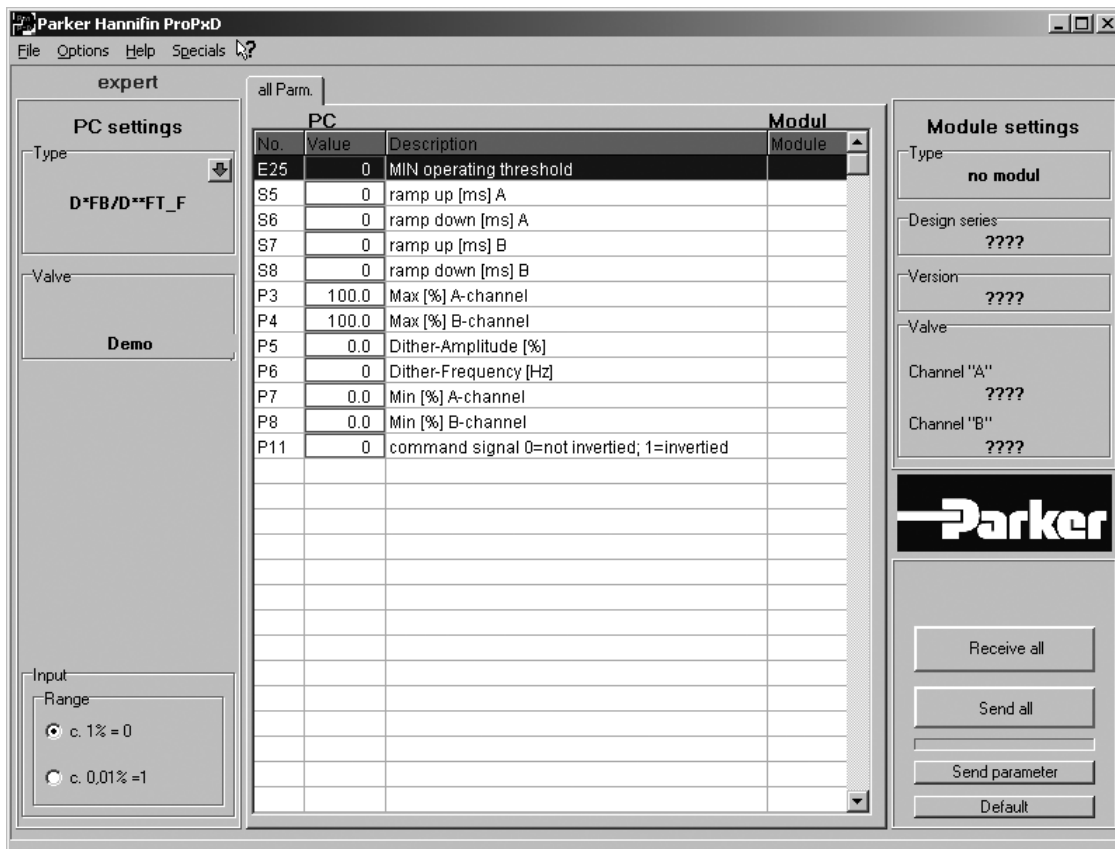
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

## Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

Simple to use interface program. Download free of charge [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) → **Services** → **downloads**

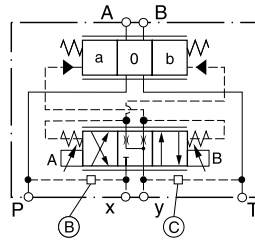


The parametrizing cable may be ordered under item no. 40982923.

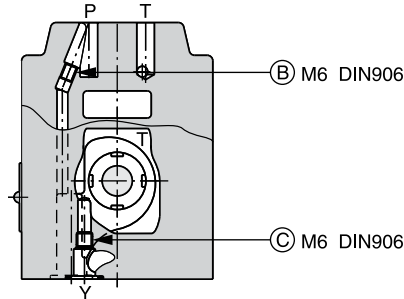
**Pilot Flow — Pilot Oil Inlet (Supply) and Outlet (Drain)**

○ open, ● closed

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

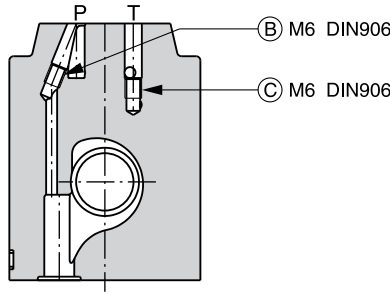


**D31FBB/E**

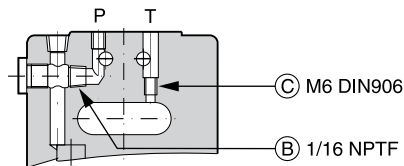


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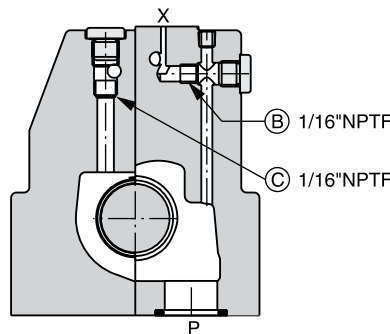
**D31FBR**



**D41FBB/E**

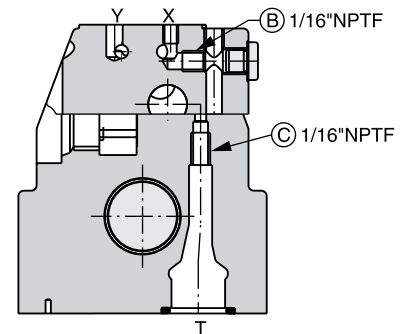


**D41FBR**



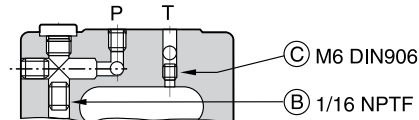
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**D41FBZ**

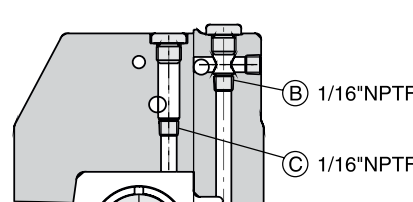


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**D91FBB/E**

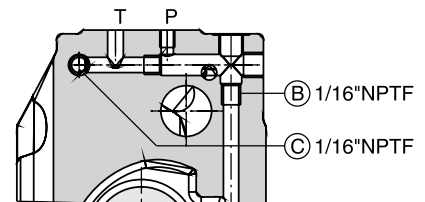


**D91FBR**

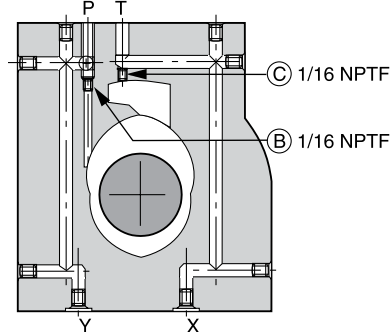


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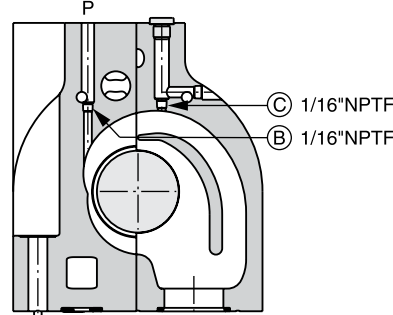
**D91FBZ**



**D111FBB/E**

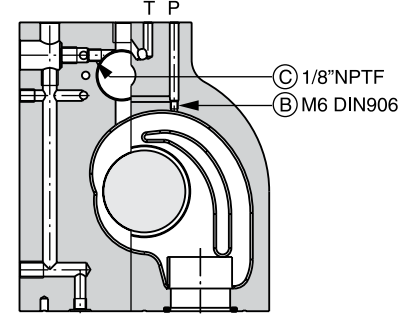


**D111FBR**



(drawn offset)

**D111FBZ**



(drawn offset)

**Dimensions**

**Proportional Directional Control Valves  
Series D\*1FB (Offboard Electronics)**

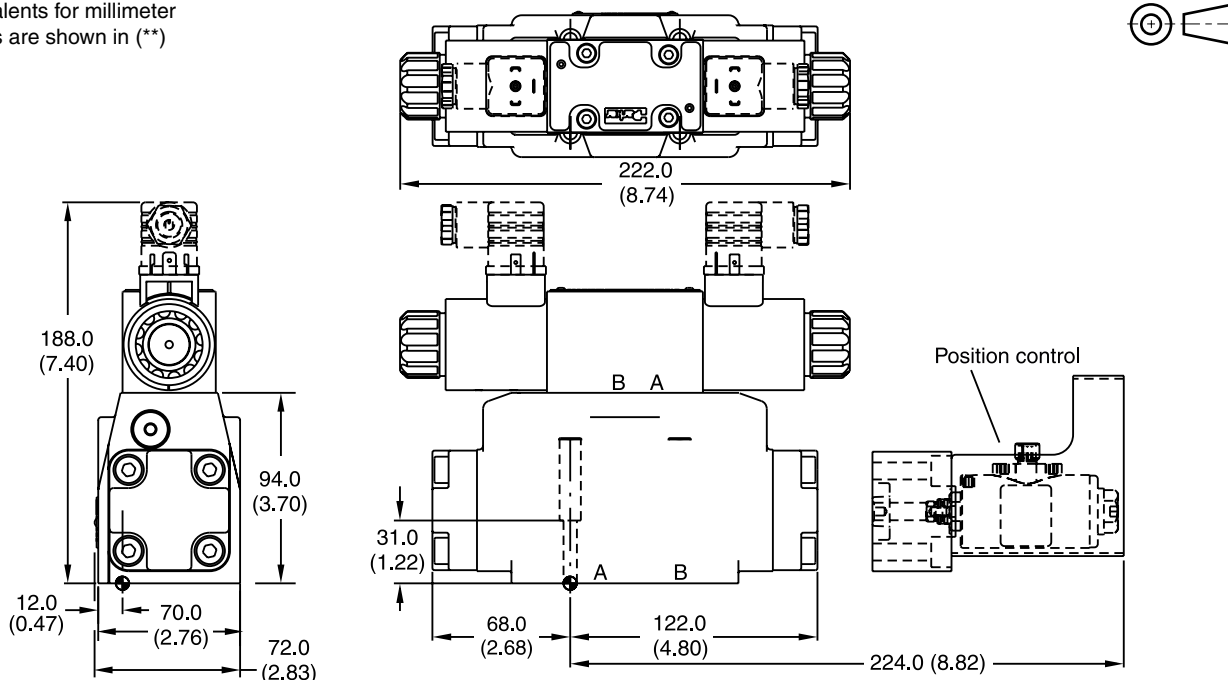
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**ALPHA  
TOC**

Return to  
**SECTION  
TOC**

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

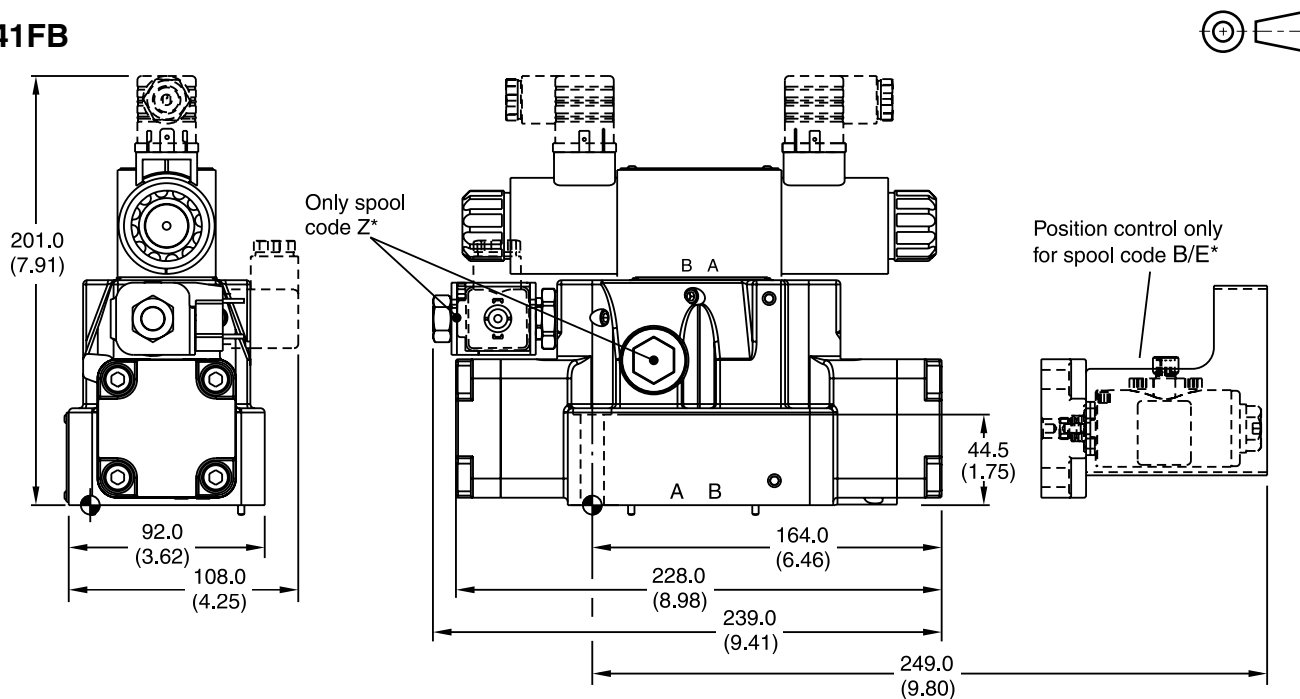
**A**

**D31FB**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK385	4x M6x40 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D31FB Fluorocarbon: SK-D31FBV
	BK98	4x 1/4-20x1.62		

**D41FB**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK320	2x M6x55 4x M10x60 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.) 63 Nm (46.5 lb.-ft.) ±15 %	Nitrile: SK-D41FB Fluorocarbon: SK-D41FBV
	BK160	4x 3/8-16x2.5 2x 1/4-20x2.5		

**Dimensions**

**Proportional Directional Control Valves  
Series D\*1FB (Offboard Electronics)**

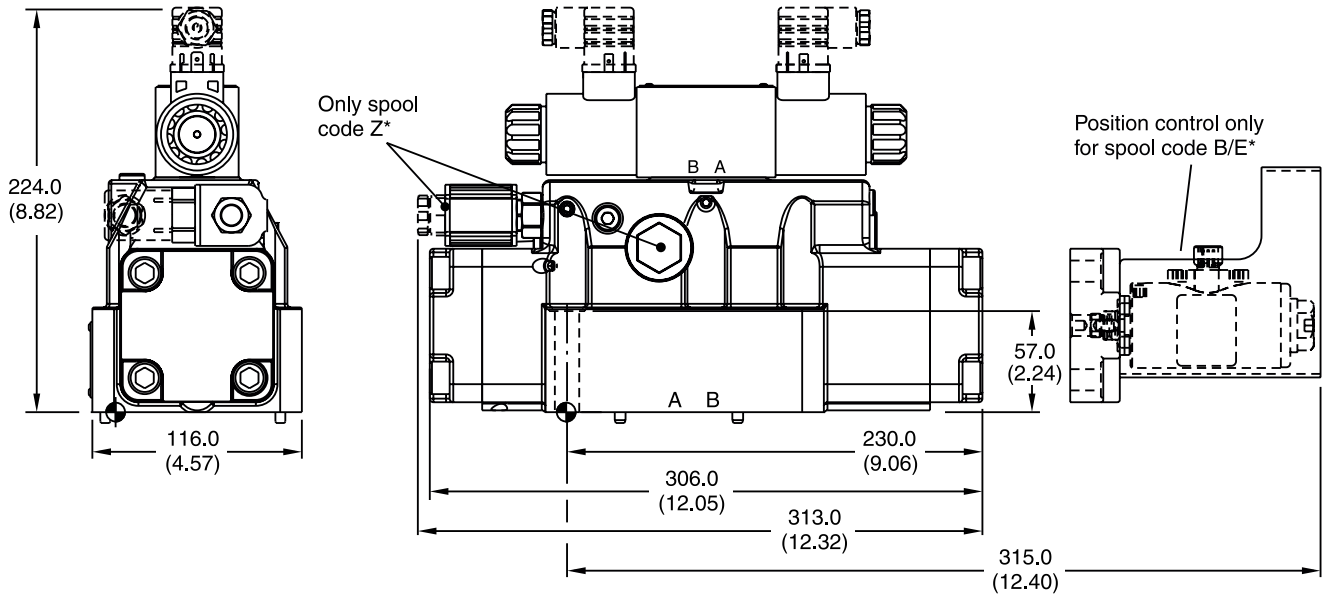
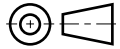
Return to  
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TOC

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SECTION  
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**A**

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

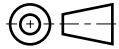
**D91FB**



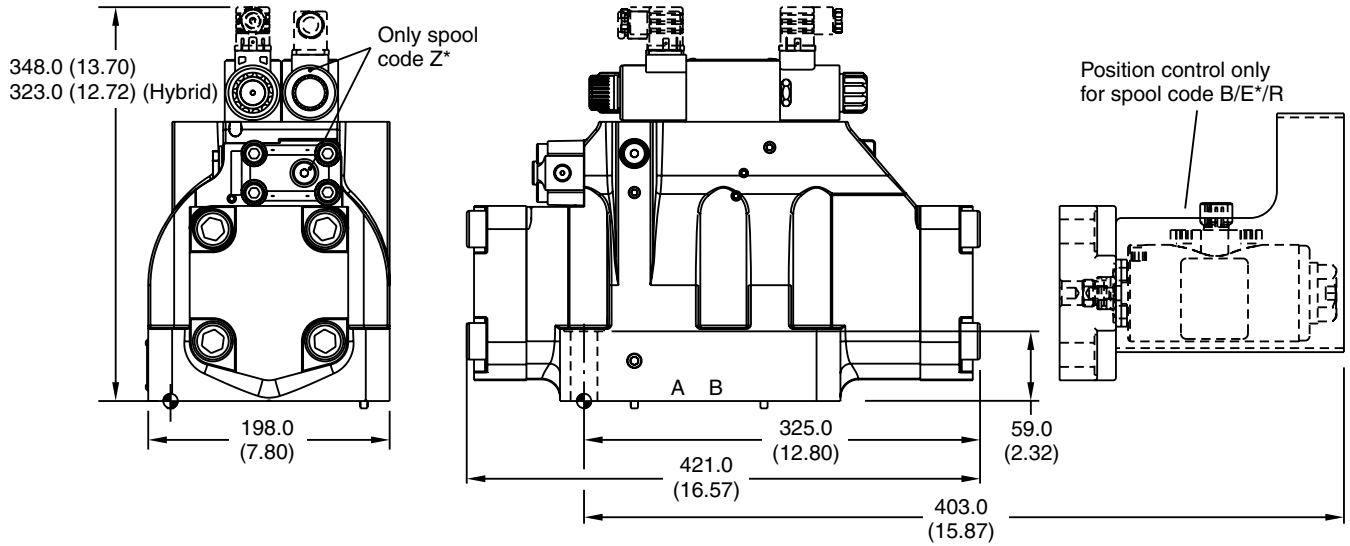
Surface Finish	Kit	Kit	Kit	Seal Kit
	BK360 BK228	6x M12x75 DIN 912 12.9 6x 1/2-13x3.0	108 Nm (79.7 lb.-ft.) ±15 %	Nitrile: SK-D91FB Fluorocarbon: SK-D91FBV

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

**D111FB**

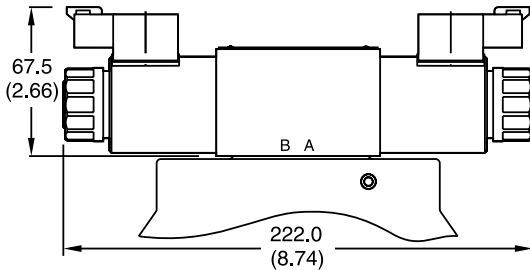


**A**



Surface Finish	Kit	Key	Wrench	Seal Kit
	BK386 BK150	6x M20x90 DIN 912 12.9 6x 3/4-10x3.5	517 Nm (373.9 lb.-ft.) ±15 %	Nitrile: SK-D111FB Fluorocarbon: SK-D111FBV

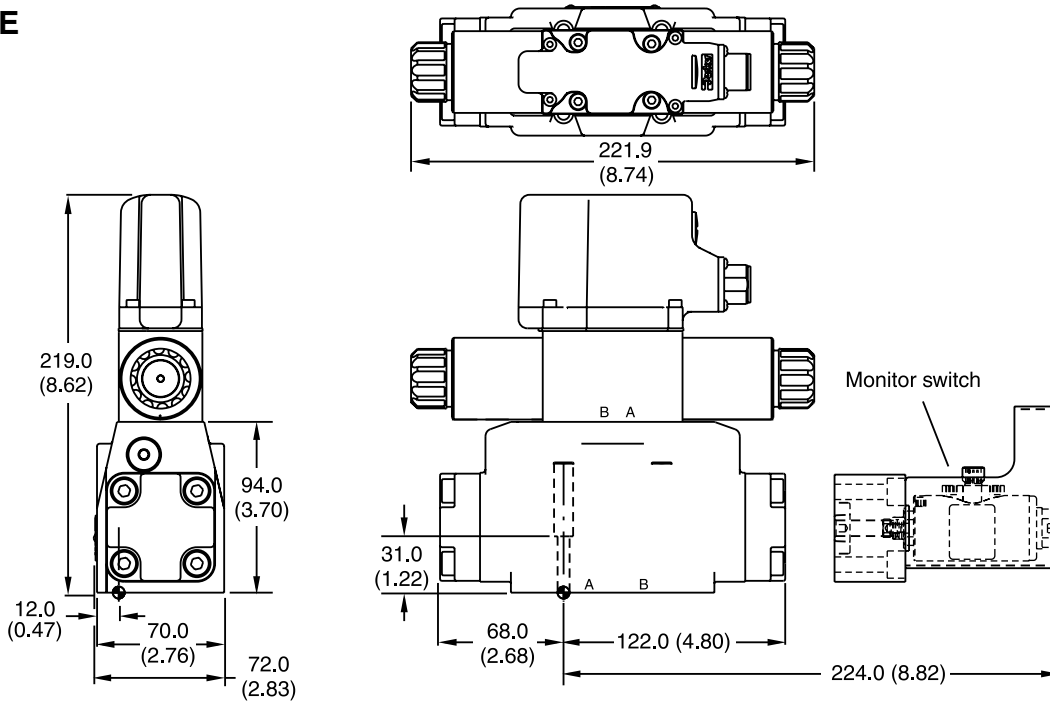
**Dimension with DT04-2P "Deutsch" Connector**





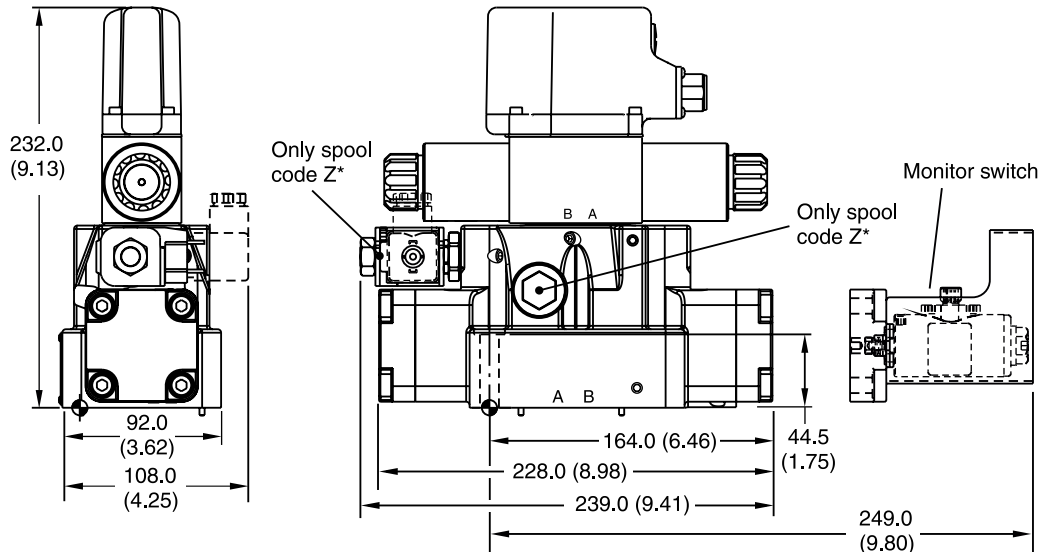
Inch equivalents for millimeter dimensions are shown in (\*\*)

**D31FB OBE**



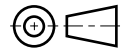
Surface Finish	Kit	Kit	Kit	Seal Kit
	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D31FB Fluorocarbon: SK-D31FBV

**D41FB OBE**



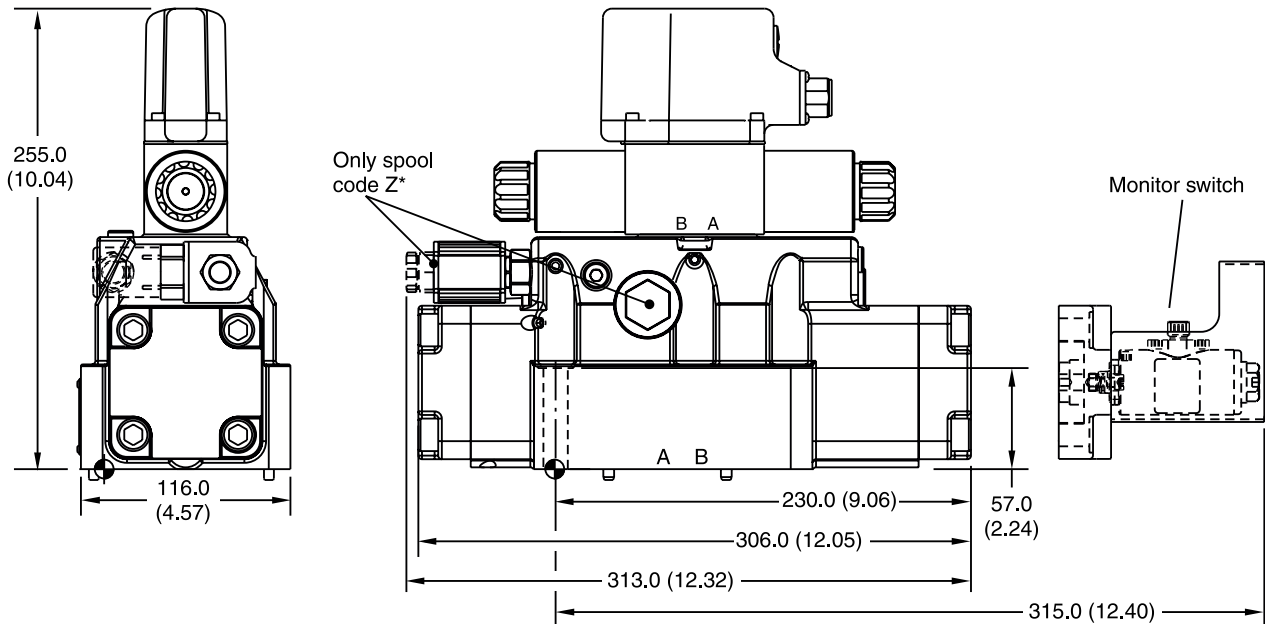
Surface Finish	Kit	Kit	Kit	Seal Kit
	BK320 BK160	2x M6x55 4x M10x60 DIN 912 12.9 4x 3/8-16x2.5 2x 1/4-20x2.5	13.2 Nm (9.7 lb.-ft.) 63 Nm (46.5 lb.-ft.) ±15 %	Nitrile: SK-D41FB Fluorocarbon: SK-D41FBV

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



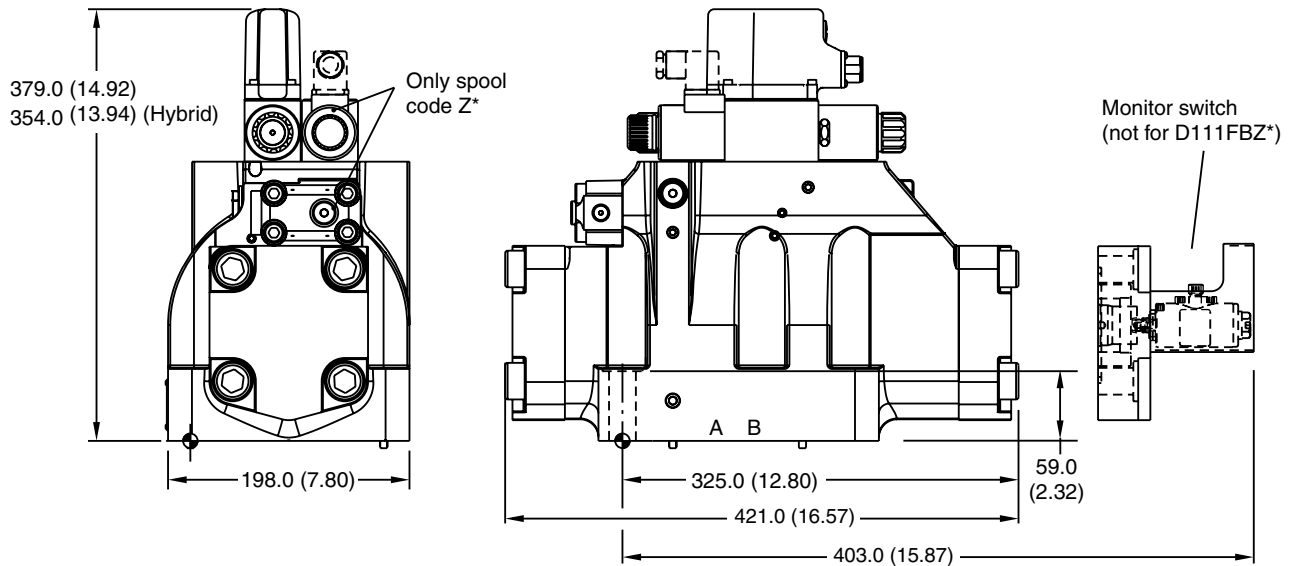
**D91FB OBE**

**A**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK360 BK228	6x M12x75 DIN 912 12.9 6x 1/2-13x3.0	108 Nm (79.7 lb.-ft.) ±15 %	Nitrile: SK-D91FB Fluorocarbon: SK-D91FBV

**D111FB OBE**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK386 BK150	6x M20x90 DIN 912 12.9 6x 3/4-10x3.5	517 Nm (373.9 lb.-ft.) ±15 %	Nitrile: SK-D111FB Fluorocarbon: SK-D111FBV

**General Description**

Series D1FB (NG6) and D3FB (NG10) proportional directional valves with CANOpen interface are based on the series for standard digital electronics of the same name.

**CANopen-Profile**

CANopen Application Layer and Communication Layer  
 CiA DS - 301 Version 4.01

CANopen Layer Setting Services (LSS) and Protocols  
 CiA DS – 305 Version 2.0

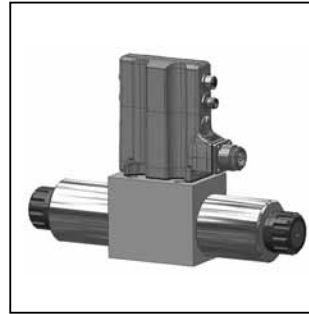
Device Profile in accordance with  
 CiA DSP – 408 Version 1.5.2

The baud rate and node ID can be set by dip switches or Layer Setting Service (LSS).

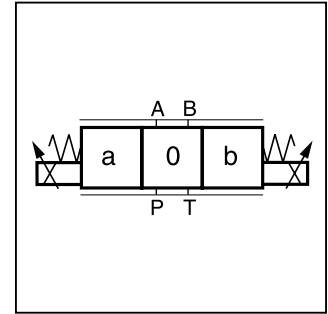
The valve parameters are factory set. Additionally the ProPxD software permits the editing of all parameters via the separate communication port. The software is also used for the valves with digital onboard electronics and the electronics modules. The cable for connection to a serial RS-232 interface is available as accessory.

The digital onboard electronics is situated in a robust metal housing and can be used in rough environments.

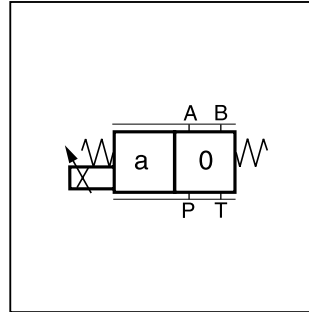
The series D1FB and D3FB are available with spool/sleeve design as well as with spool/body design.



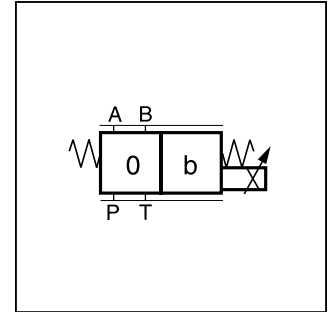
D3FB\*C



D\*FB\*C



D\*FB\*E



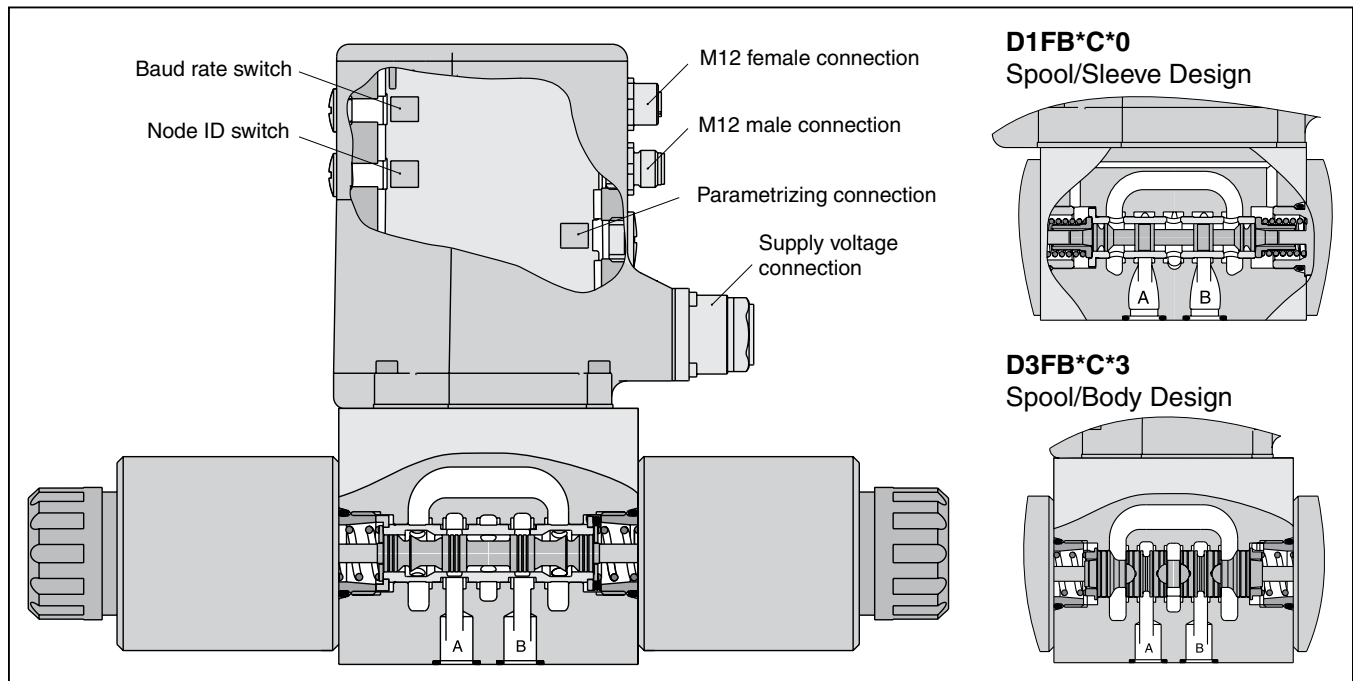
D\*FB\*K

**Features**

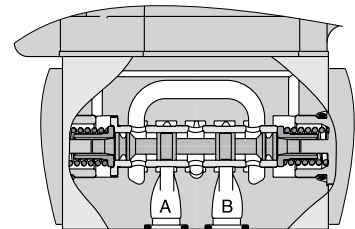
- CANopen interface.
- Spool/sleeve design and spool/body design.
- High repeatability from valve to valve.
- Low hysteresis.
- Manual override.
- Failsafe center position.

**D3FB\*C\*0**

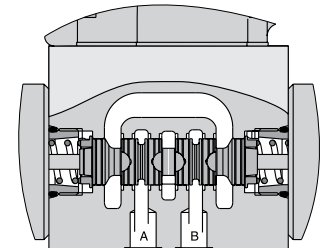
Spool/Sleeve Design

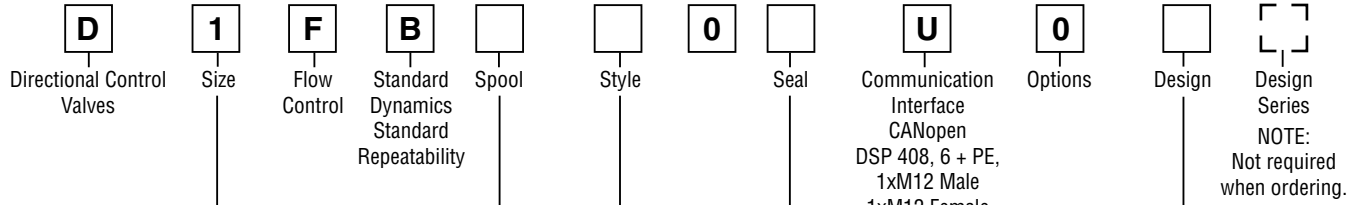


**D1FB\*C\*0**  
 Spool/Sleeve Design



**D3FB\*C\*3**  
 Spool/Body Design



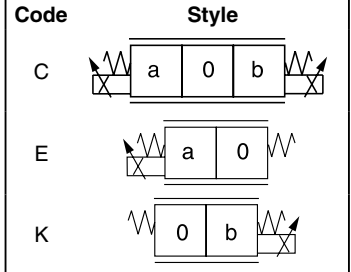


Code	Description
1	DIN NG6 CETOP 3 NFFA D03

Code	Description
0	Spool/sleeve design
3	Spool/body design

Code	Description
N	Nitrile
V	Fluorocarbon

D1FB*0: Spool/Sleeve Design		
Code	Spool	Flow LPM (GPM) at $\Delta p$ 5 Bar (72.5 PSI) per metering edge
E01H E01F E01C		20 (5.3) 12 (3.2) 6 (1.6)
E02H E02F E02C		20 (5.3) 12 (3.2) 6 (1.6)
E03H E03F E03C		20 (5.3) 12 (3.2) 6 (1.6)
B31H B31F	$Q_b = Q_a/2$ 	20/10 (5.3/2.6) 12/6 (3.2/1.6)
B32H B32F	$Q_b = Q_a/2$ 	20/10 (5.3/2.6) 12/6 (3.2/1.6)



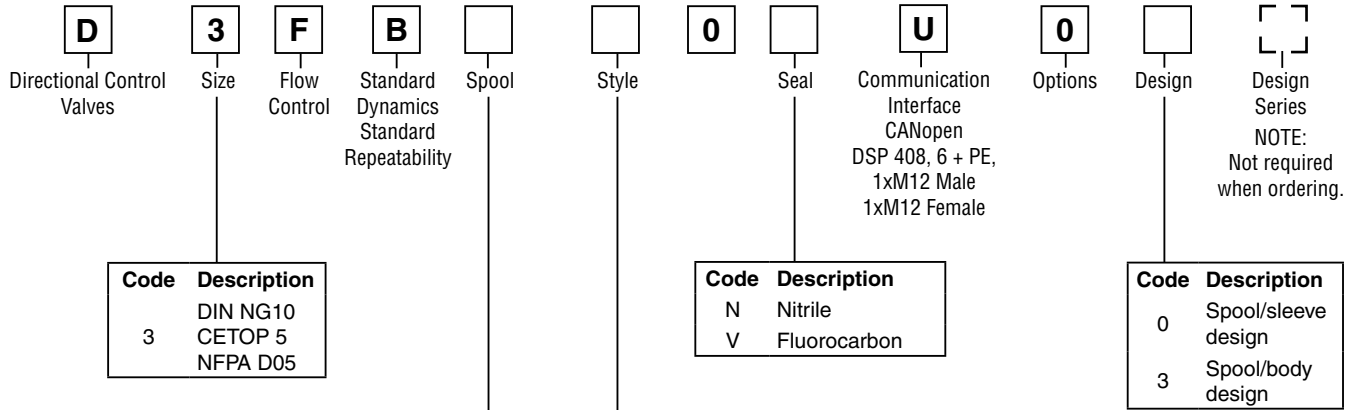
D1FB*3: Spool/Body Design		
Code	Spool	Flow LPM (GPM) at $\Delta p$ 5 Bar (72.5 PSI) per metering edge
E01K E01H E01F		30 (7.9) 20 (5.3) 10 (2.6)
E02K E02H E02F		30 (7.9) 20 (5.3) 10 (2.6)

**Bolt Kit:**  
 BK209 (4) 10-24x1.25 SHCS  
 BK375 4x M5x30

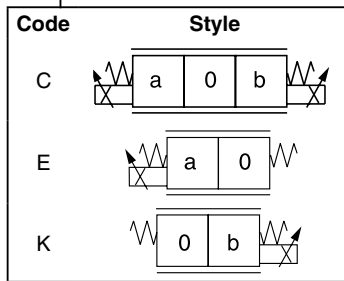
**Weight:**  
 D1FB 2.5 kg (5.5 lbs.)

Parametrizing cable OBE => RS-232  
 Item no. 40982923





D3FB*0: Spool/Sleeve Design		
Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01M E01S		40 (10.6) 60 (15.9)
E02M E02S		40 (10.6) 60 (15.9)
B31M B31S	$Q_b = Q_a/2$ 	40 / 20 (10.6 / 5.3) 60 / 30 (15.9 / 7.9)
B32M B32S	$Q_b = Q_a/2$ 	40 / 20 (10.6 / 5.3) 60 / 30 (15.9 / 7.9)



D3FB*3: Spool/Body Design		
Code	Spool	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge
E01M E01S E01U		40 (10.6) 60 (15.9) 80 (21.2)
E02M E02S E02U		40 (10.6) 60 (15.9) 80 (21.2)

**Bolt Kit:**

BK98 (4) 1/4-20x1.625 SHCS  
 BK385 4x M6x40

**Weight:**

D3FB 7.0 kg (15.4 lbs.)

Parametrizing cable OBE => RS-232  
 Item no. 40982923

A

General			
Design	Direct operated proportional DC valve		
Actuation	Proportional solenoid		
Size	NG6 / CETOP 3 / NFPA D03	NG10 / CETOP 5 / NFPA D05	
Mounting Interface	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA		
Mounting Position	Unrestricted		
Ambient Temperature	[°C]	-20...+60 (-4°F...+140°F)	
MTTF <sub>D</sub> Value (OBE)	[years]	75	
Vibration Resistance	[g]	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27	
Hydraulic			
Maximum Operating Pressure	Ports P, A, B 350 Bar (5075 PSI); Port T 210 Bar (3045 PSI)		
Maximum Pressure Drop PABT / PBAT	350 Bar (5075 PSI)		
Fluid	Hydraulic oil as per DIN 51524...51535, other on request		
Fluid Temperature	[°C]	-20...+60 (-4°F...+140°F)	
Viscosity Permitted	[cSt] / [mm <sup>2</sup> /s]	20...380 (93...1761 SSU)	
Viscosity Recommended	[cSt] / [mm <sup>2</sup> /s]	30...80 (139...371 SSU)	
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		
Nominal Flow at Δp=5 Bar (72.5 PSI) per Control Edge *	D1FB*0	D1FB*3	D3FB*0/3
	6 LPM (1.6 GPM) / 12 LPM (3.2 GPM) / 20 LPM (5.3 GPM)	10 LPM (2.6 GPM) / 20 LPM (5.3 GPM) / 30 LPM (7.9 GPM)	40 LPM (10.6 GPM) / 60 LPM (15.9 GPM) / 80 LPM (21.2 GPM)
Leakage at 100 Bar (1450 PSI)	[ml/min]	<50 (3.0 cu. in.)	<60 (3.7 cu. in.)
Overlap	[%]	25, electrically normalized at 10 (see flow characteristics)	
Static / Dynamic			
Step Response at 100% Step	[ms]	30	30
Hysteresis	[%]	<4	<6
Temperature Drift Solenoid Current	[%/K]	<0.02	
Electrical			
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible	
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)		
Supply Voltage/Ripple DC	[V]	18...30, ripple < 5% eff., surge free	
Current Consumption Maximum	[A]	2.0	3.0
Pre-fusing Medium Lag	[A]	2.5	4.0
EMC	EN 61000-6-2, EN 61000-6-4		
Connection Supply Voltage	6 + PE acc. to EN 175201-804		
Connection CANopen	1 x Male M12x1: 5p 1 x Female M12x1: 5p acc. to IEC61076-2-101		
Wiring Supply Voltage Minimum	[mm <sup>2</sup> ]	3 x 1.0 (AWG16) overall braid shield	
Wiring Length Maximum	[m]	50 (164 ft.)	
Wiring CANopen	acc. to CiA DS-301 Version 4 / Twisted pair cable acc. to ISO11898		

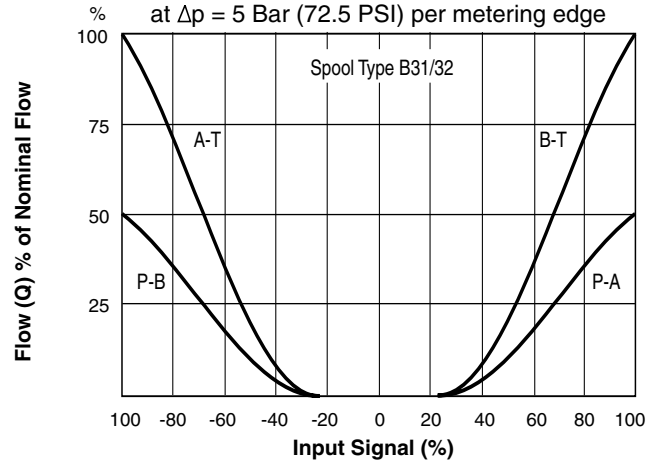
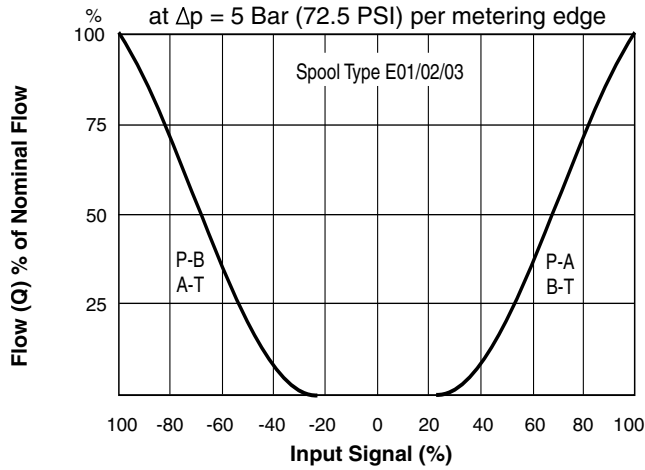
\* Flow rate for different Δp per control edge:  $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

Continued on the next page

<b>CANopen</b>	
<b>Profiles</b>	Communication Layer CIA DS - 301 Version 4 Device Profile in accordance with CIA DS - 408 Version 1.5.2 Layer Setting Service CIA DS - 305 Version 2
<b>Functionality</b>	CANopen slave One PDO (Receive) One PDO (Transmit) One SDO (not useable for valve parameterizing) Emergency object Sync object Node guarding Life guarding Heartbeat time (producer/consumer) Minimum boot - up Node - ID - adjustment by DIP switch and LSS Baud Rate - adjustment by DIP switch and LSS
<b>Parameterization</b>	
<b>Interface</b>	RS-232, parametrizing cable order code 40982923
<b>Interface Program</b>	ProPxD (see <a href="http://www.parker.com/euro_hcd">www.parker.com/euro_hcd</a> )
<b>Adjustment Ranges</b>	
<b>Minimum</b>	<b>[%]</b> 0...50
<b>Maximum</b>	<b>[%]</b> 50...100
<b>Ramp</b>	<b>[s]</b> 0...32.5

**D1FB\*0 Flow**

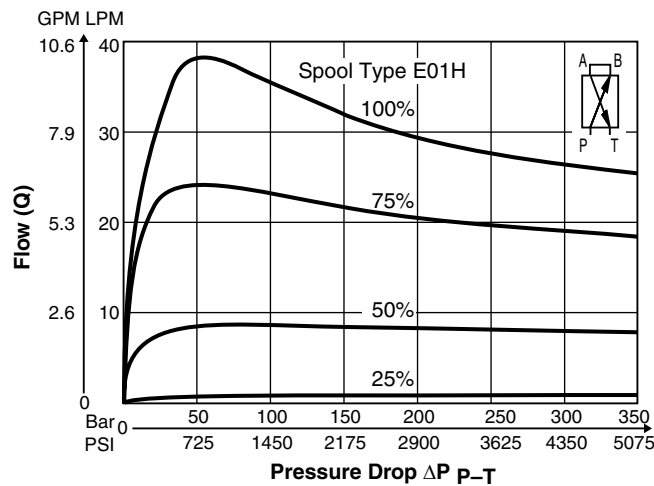
**A**



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

**Flow Limit**

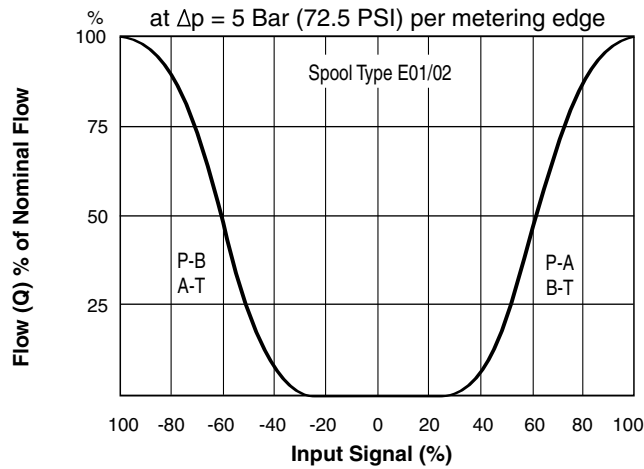
At 25%, 50%, 75% and 100% command signal (symmetric flow). At asymmetric flow a reduced flow limit has to be considered – typically approx. 10% lower.



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



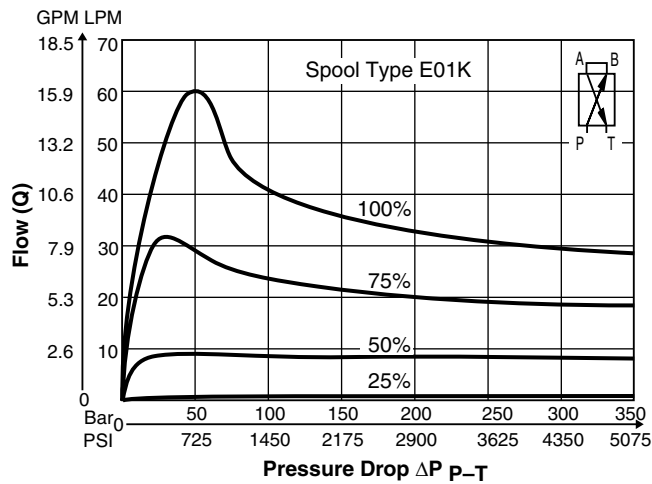
**D1FB\*3 Flow**



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

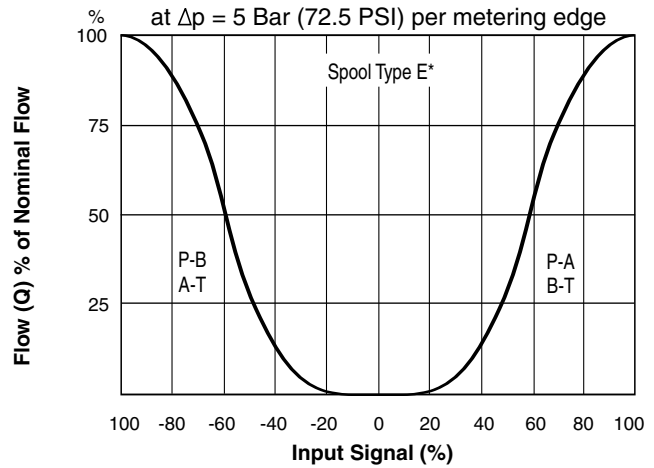
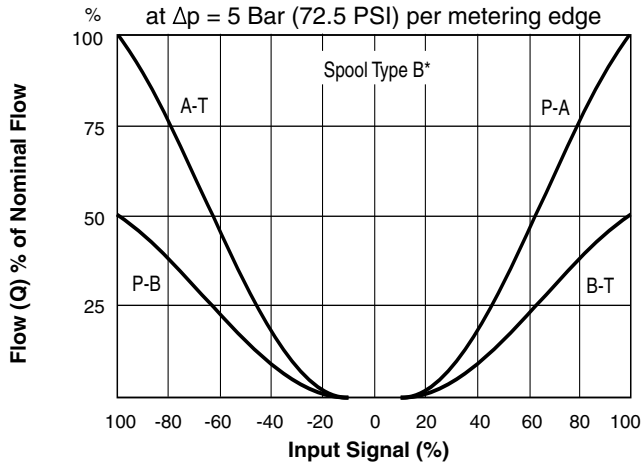
**Flow Limit**

At 25%, 50%, 75% and 100% command signal (symmetric flow). At asymmetric flow a reduced flow limit has to be considered – typically approx. 10% lower.



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

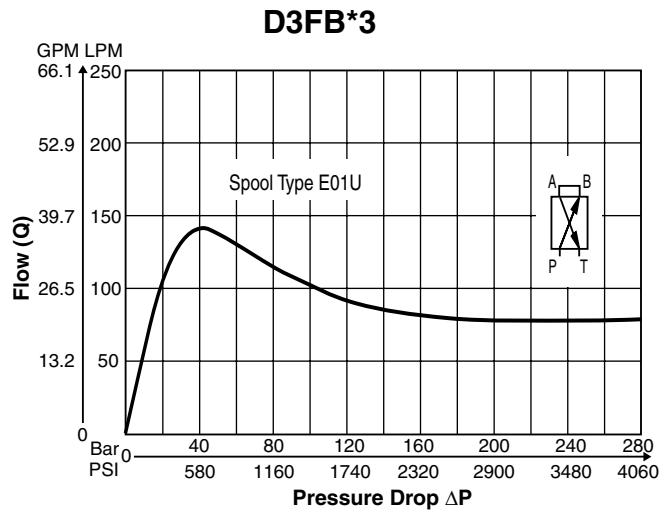
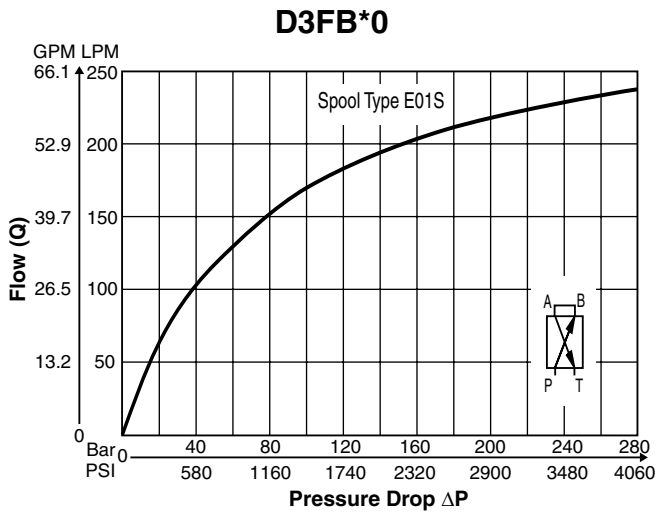
**D3FB Flow**



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

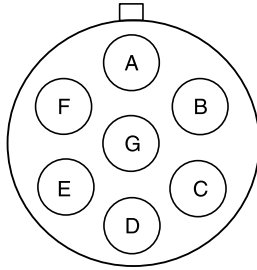
**Flow Limit**

100% command signal (symmetric flow). At asymmetric flow a reduced flow limit has to be considered – typically approx. 10% lower.



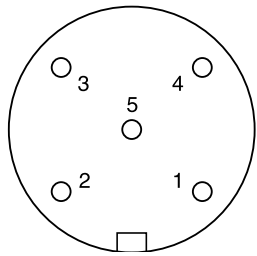
All performance curves measured with HLP46 at 50°C (122°F).

### Supply Voltage Connection 6 + PE



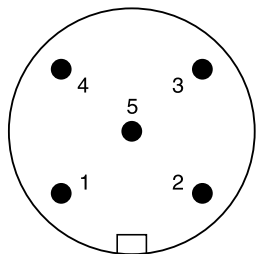
- A Supply voltage 18...30V
- B Supply voltage 0V
- C hC
- D hC
- E hC
- F hC
- G PE

### CANopen Connection



- CAN in: M12, 5 pole male terminals.  
Pin 1: CAN\_SHLD  
Pin 2: nc  
Pin 3: CAN\_GND  
Pin 4: CAN\_H  
Pin 5: CAN\_L

Shield is CAN\_GND.

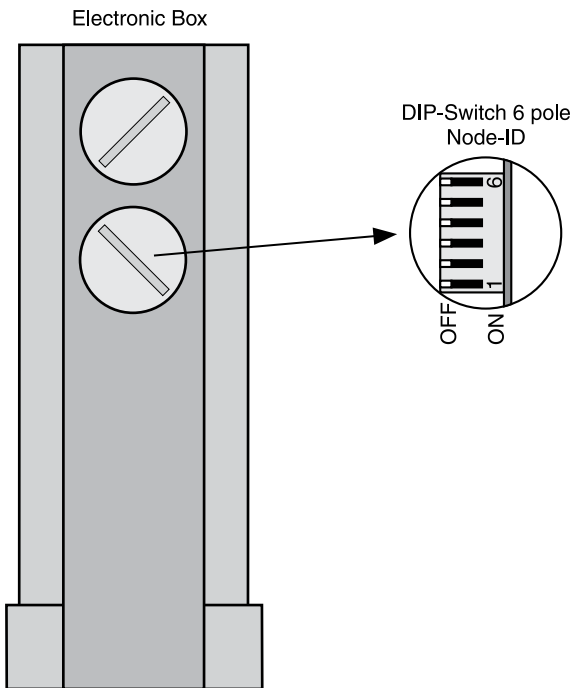


- CAN out: M12, 5 pole female terminals.  
Pin 1: CAN\_SHLD  
Pin 2: nc  
Pin 3: CAN\_GND  
Pin 4: CAN\_H  
Pin 5: CAN\_L

Shield is CAN\_GND.

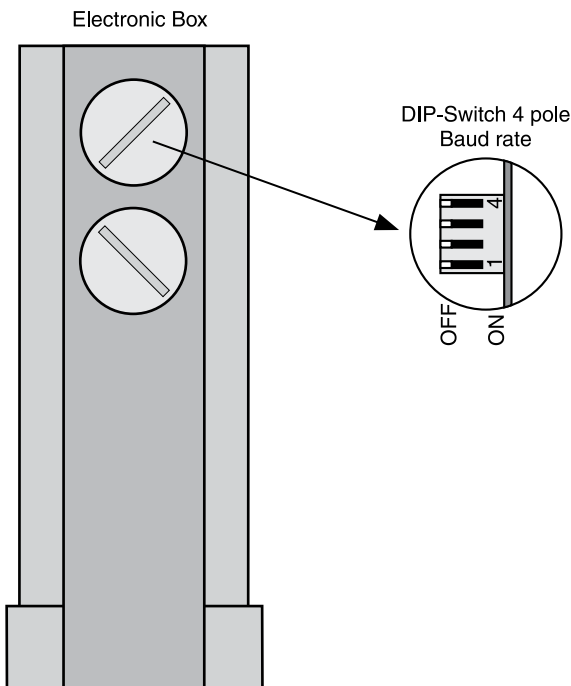
**Node-ID Adjustment with DIP Switches**

**A**



Node-ID	DIP Switch Setting					
	1	2	3	4	5	6
<b>0 LSS -Priority</b>	OFF	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF	OFF
...						
61	ON	OFF	ON	ON	ON	ON
62	OFF	ON	ON	ON	ON	ON
63	ON	ON	ON	ON	ON	ON
	1	2	3	4	5	6
	<b>Value</b>					

**Baud Rate Adjustment with DIP Switches**



Baud Rate	DIP Switch Setting			
	1	2	3	4
<b>0 LSS -Priority</b>	OFF	OFF	OFF	Valve Parameterization and Diagnostics ON/OFF
10 kBit/s	ON	OFF	OFF	
20 kBit/s	OFF	ON	OFF	
50 kBit/s	ON	ON	OFF	
125 kBit/s	OFF	OFF	ON	
250 kBit/s	ON	OFF	ON	
500 kBit/s	OFF	ON	ON	
1 MBit/s	ON	ON	ON	

## ProPxD Interface Program

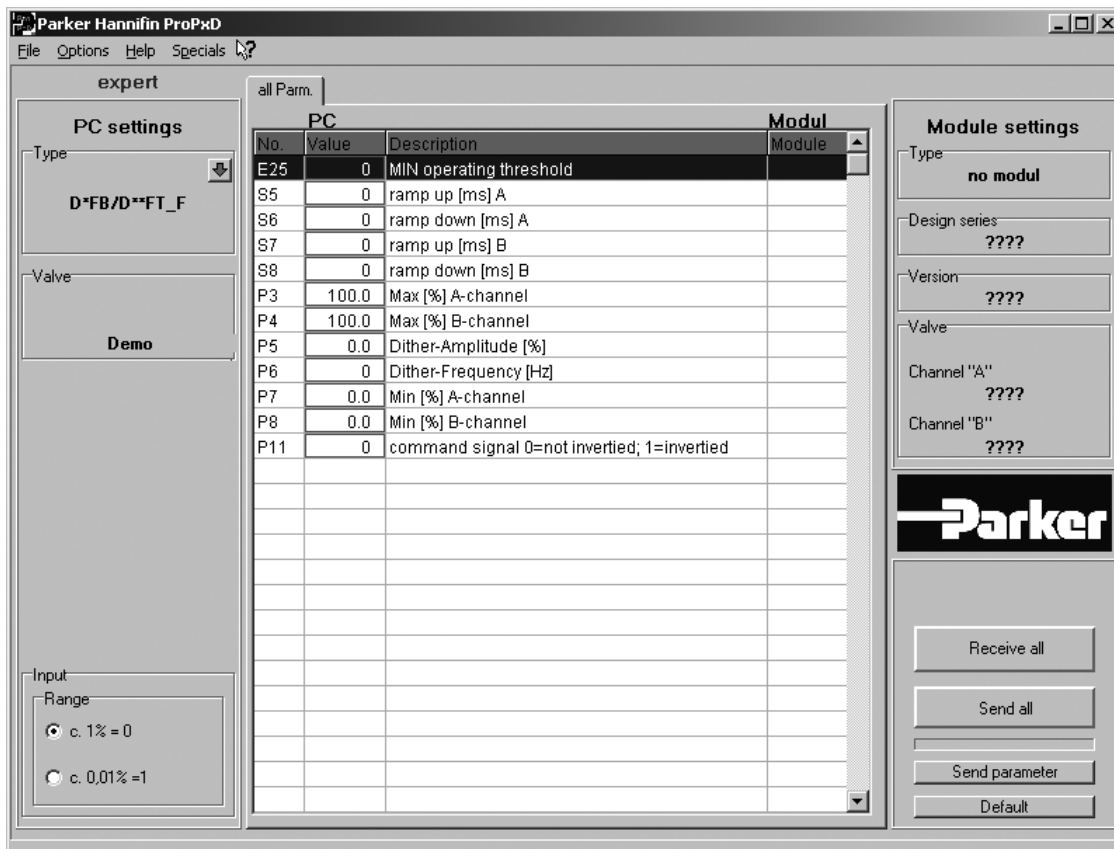
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

## Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

Simple to use interface program. Download free of charge [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) → **Services** → **downloads**



The parametrizing cable may be ordered under item no. 40982923.

**Dimensions**

**Proportional Directional Control Valves  
Series D1FB with CANopen**

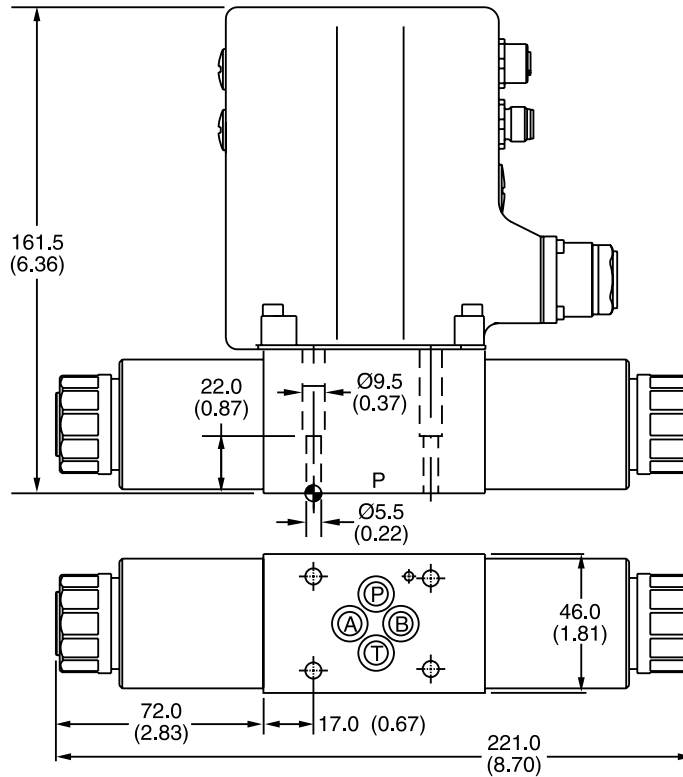
Return to  
ALPHA  
TOC

Return to  
SECTION  
TOC

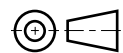
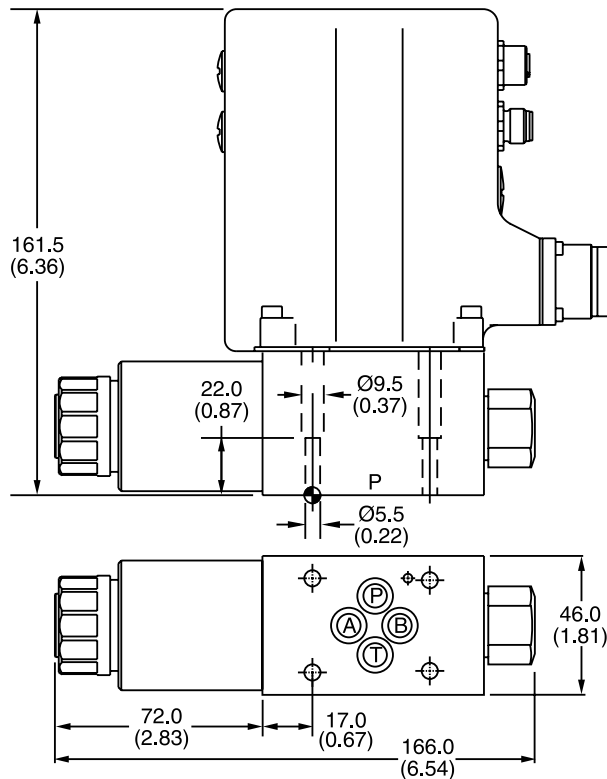
Inch equivalents for millimeter dimensions are shown in (\*\*)

**A**

**D1FB\*C**



**D1FB\*E**



Surface Finish	Kit	Kit	Kit	Seal  Kit
	BK375	4x M5x30 DIN 912 12.9	7.6 Nm (5.6 lb.-ft.) ±15 %	Nitrile: SK-D1FB Fluorocarbon: SK-D1FBV
	BK209	4x 10-24x1.25		

**Dimensions**

**Proportional Directional Control Valves  
Series D3FB with CANopen**

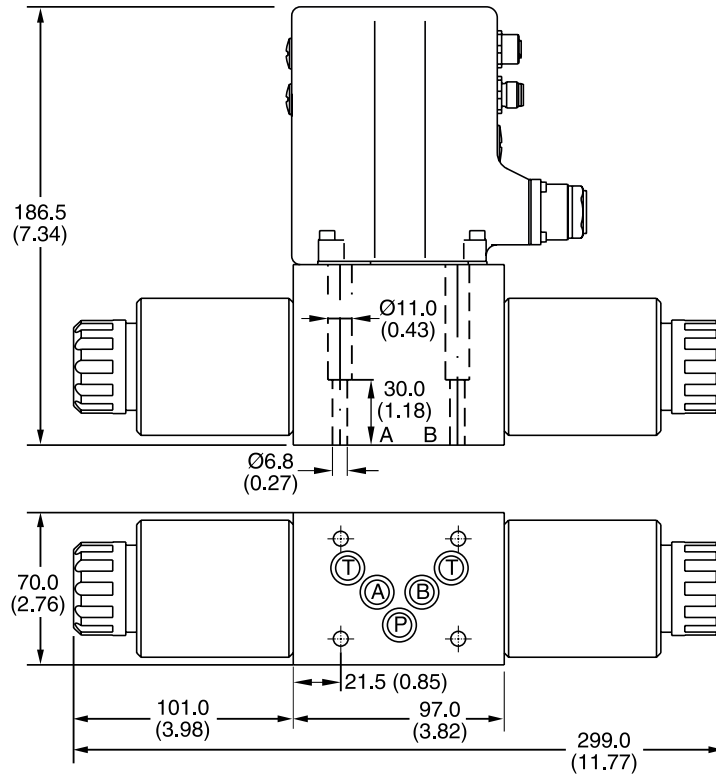
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ALPHA  
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SECTION  
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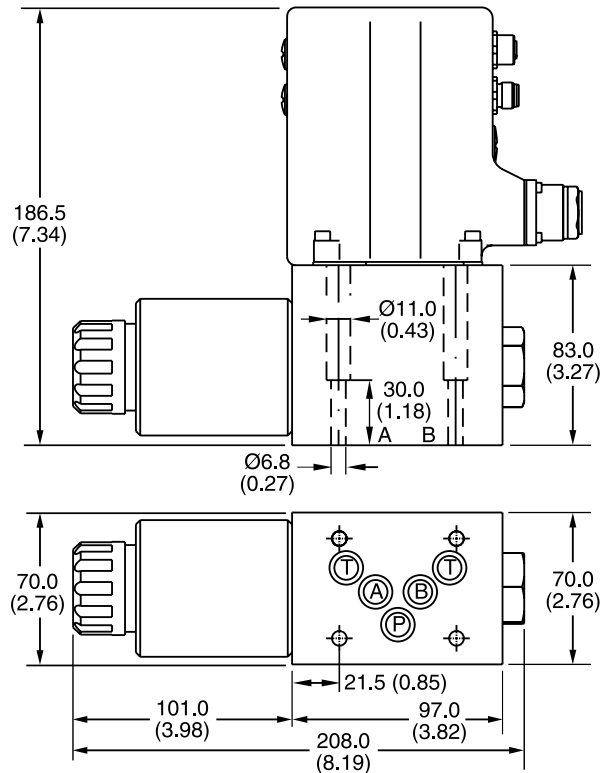
**A**

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

**D3FB\*C**



**D3FB\*E**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK385	4x M6x40 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D3FB Fluorocarbon: SK-D3FBV
	BK98	4x 1/4-20x1.62		

**General Description**

**A**

Series D\*1FB\*EE pilot operated proportional directional valves come in 4 sizes:

- D31FB\*EE NG10 (CETOP 5)
- D41FB\*EE NG16 (CETOP 7)
- D91FB\*EE NG25 (CETOP 8)
- D111FB\*EE NG32 (CETOP 10)

The D\*1FB\*EE series with explosion proof solenoids is based on the standard D\*1FB series. The specific solenoid design allows the usage in hazardous environments. The explosion proof class is

CE  II 2 G

Ex mbe II T4

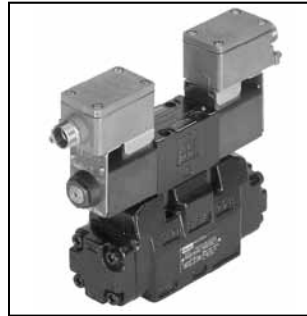
for use in zone 1 (conform to ATEX).

The parameters can be saved, changed and duplicated in combination with the digital power amplifier PWD00A-400 (to be used in an explosion proof cabinet or outside of the hazardous area).

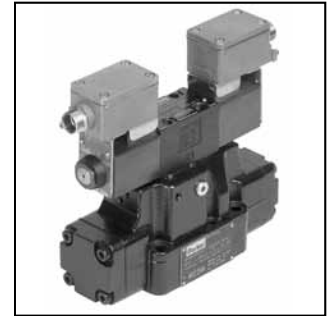
The valve parameters can be edited with the common ProPxD software.

**Features**

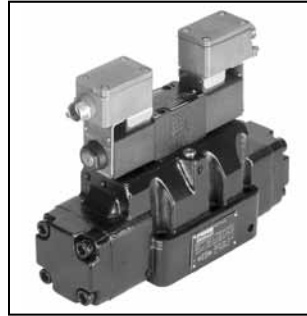
- Progressive flow characteristics for precise adjustment of flow rate
- High flow capacity



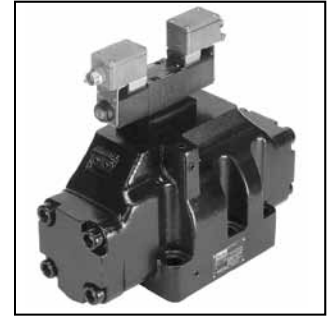
D31FB



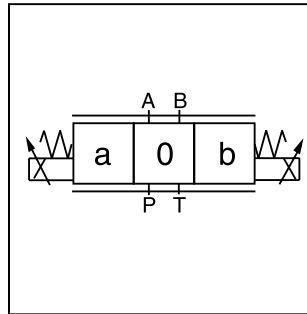
D41FB



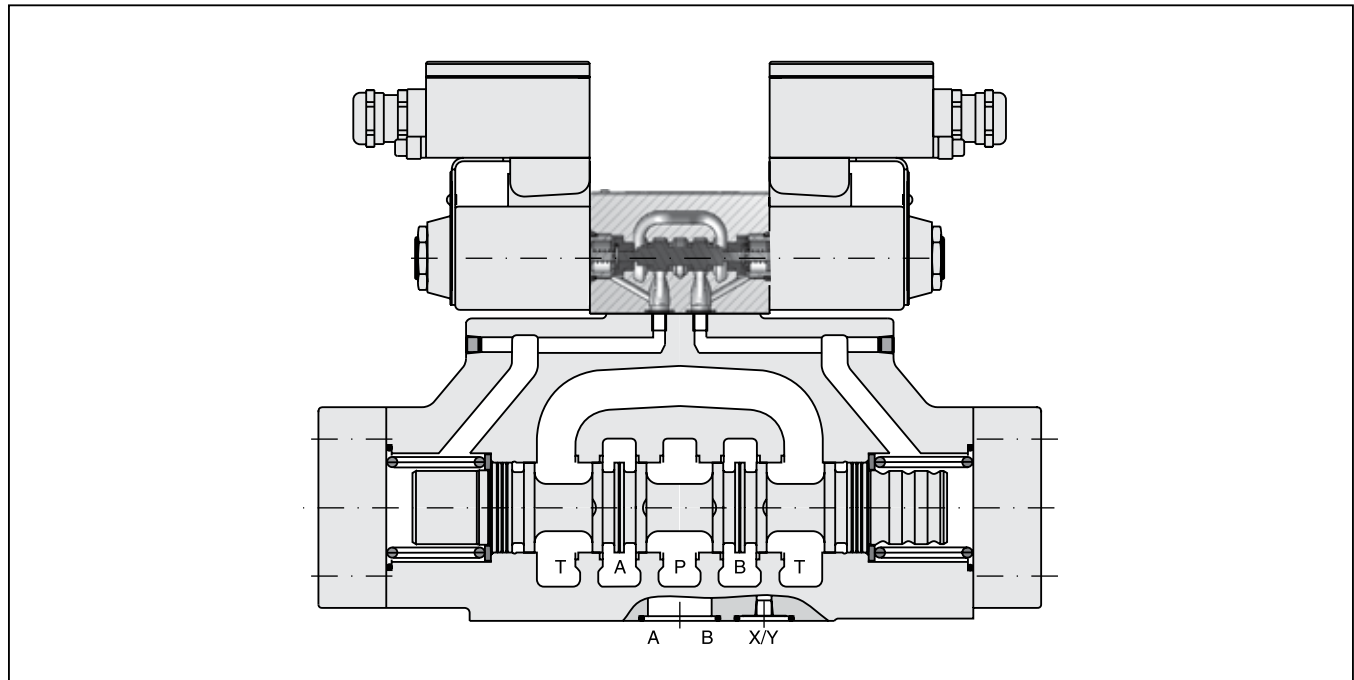
D91FB



D111FB

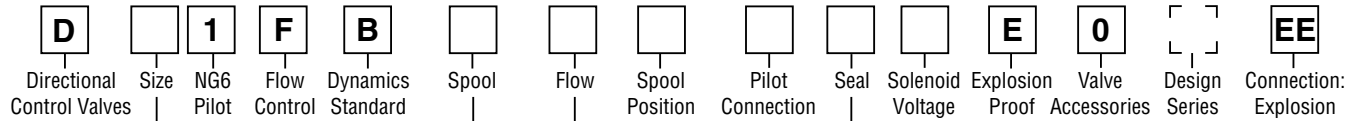


**D91FB\*EE**





**Ordering Information**



Code	Description
3	NG10 / CETOP 5
4	NG16 / CETOP 7
9 <sup>1)</sup>	NG25 / CETOP 8
11	NG32 / CETOP10

<sup>1)</sup> With enlarged connections Ø 32 mm

Code	Spool Type
E01	
E02	
B31	$Q_B = Q_A / 2$ 
B32	$Q_B = Q_A / 2$ 

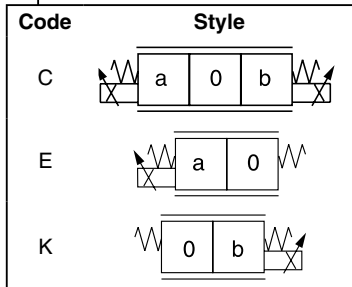
Code	Description
J	24V / 1.5A
K	24V / 2.3A

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Flow LPM (GPM) at $\Delta p$ 5 Bar (72.5 PSI) per metering edge			
	D31	D41	D91	D111
B	-	100 <sup>2)</sup> (26.4)	-	-
C	75 <sup>2)</sup> (19.8)	130 <sup>2)</sup> (34.3)	-	-
D	90 (23.8)	-	-	-
E	120 (31.7)	-	250 <sup>2)</sup> (66.1)	-
F	-	200 (52.8)	-	-
H	-	-	400 (105.8)	-
L	-	-	-	1000 (264.2)

<sup>2)</sup> Not for spool type B31 and B32

Code	Inlet	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

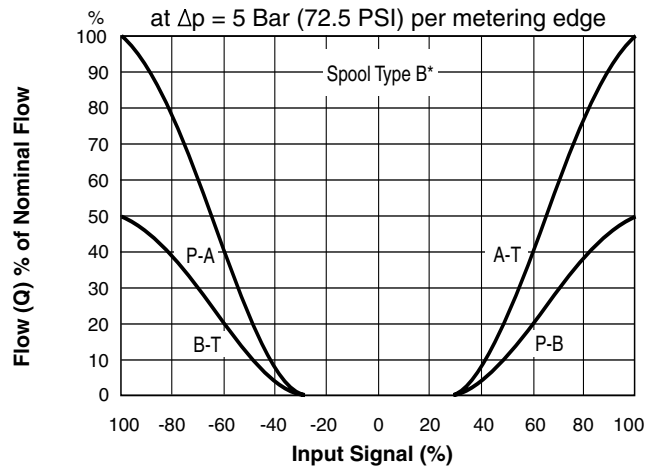
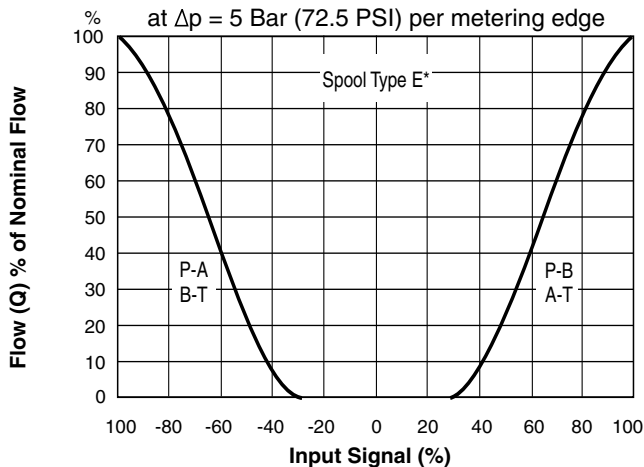


**Mounting Bolt Kits:**  
D31FB\*EE BK98  
D41FB\*EE BK160  
D91FB\*EE BK228  
D111FB\*EE BK150

**Weight:**  
D31FB\*EE 9.4 kg (20.7 lbs.)  
D41FB\*EE 12.8 kg (28.2 lbs.)  
D91FB\*EE 20.3 kg (44.8 lbs.)  
D111FB\*EE 69.3 kg (152.8 lbs.)


**Performance Curves**

**D\*1FB Flow**



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

**A**

General				
Design	Pilot operated DC valve			
Actuation	Proportional solenoid			
Size	<b>NG10 (CETOP 5)</b>	<b>NG16 (CETOP 7)</b>	<b>NG25 (CETOP 8)</b>	<b>NG32 (CETOP 10)</b>
Mounting Interface	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA			
Mounting Position	unrestricted			
Ambient Temperature	[°C] -20...+40; (-4°F...+104°F)			
MTTF <sub>p</sub> Value	[years] 75			
Vibration Resistance	[g] 10 Sinus 5...200Hz acc. IEC 68-2-6 30 Random noise 20...20Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27			
Hydraulic				
Maximum Operating Pressure	Pilot Drain Internal: Ports P, A, B, X 350 Bar (5075 PSI); Port T, Y 185 Bar (2683 PSI) NG10: Port T, Y 15 Bar (218 PSI) Pilot Drain External: Ports P, A, B, T, X 350 Bar (5075 PSI); Port Y 185 Bar (2683 PSI) NG10: Port Y 15 Bar (218 PSI)			
Fluid	Hydraulic oil as per DIN 51524...51535, other on request			
Fluid temperature	[°C] -20...+40; (-4°F...+104°F)			
Viscosity	Permitted [cSt] / [mm²/s] 20...380 (93...1761 SSU) Recommended [cSt] / [mm²/s] 30...80 (139...371 SSU)			
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Nominal Flow at Δp=Bar (72.5 PSI) per Control Edge *	75 LPM (19.8 GPM) 90 LPM (23.8 GPM) 120 LPM (31.7 GPM)	100 LPM (26.4 GPM) 130 LPM (34.4 GPM) 200 LPM (52.9 GPM)	250 LPM (66.1 GPM) 400 LPM (105.8 GPM)	1000 LPM (264.2 GPM)
Leakage at 100 Bar	[ml/min] 100	200	600	1000
Pilot Supply Pressure	Minimum 30 Bar (435 PSI) [+T/Y pressure]; Maximum 350 Bar (5075 PSI) Optimal Dynamics at 50 Bar (725 PSI)			
Pilot flow at 100 Bar	<0.5 LPM (0.13 GPM)	<1.2	<1.2	<1.2
Pilot Flow, Step Response	2 LPM (0.5 GPM)	1.9 LPM (0.5 GPM)	4.5 LPM (1.2 GPM)	18 LPM (4.8 GPM)
Static / Dynamic				
Step Response at 100% Step	[ms] 50	75	100	180
Hysteresis	[%] <5			
Electrical				
Duty Ratio	[%] 100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible			
Protection Class	CE  II 2 G, Ex mbe II T4, IP66 (plugged and mounted)			
Solenoid Code	<b>K</b>		<b>J</b>	
Supply Voltage	[V] 12		24	
Current Consumption	[A] 2.3		1.15	
Resistance	[Ohm] 3.7		14.8	
Solenoid Connection	Box with M20x1.5 entry for cableglands. Solenoid identifications per ISO 9461.			
Wiring Minimum	[mm²] 3 x 1.5 recommended			
Wiring Length Maximum	[m] 50 (164 ft.) recommended			

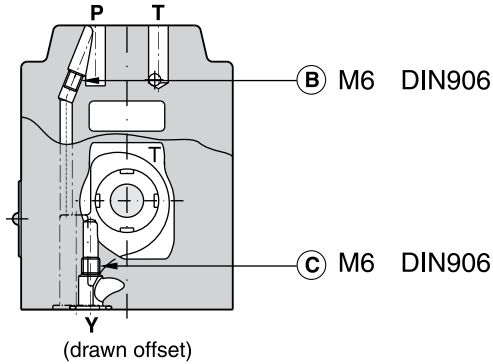
With electrical connections the protective conductor (PE  $\perp$ ) must be connected according to the relevant regulations.

\* Flow rate for different Δp per control edge:  $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

**Pilot Flow**

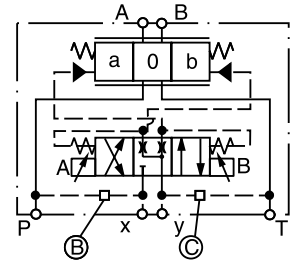
**Pilot Oil Inlet (supply) and Outlet (drain)**

**D31FB**

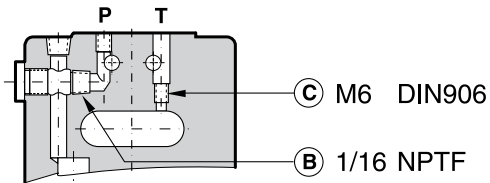


○ open, ● closed

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

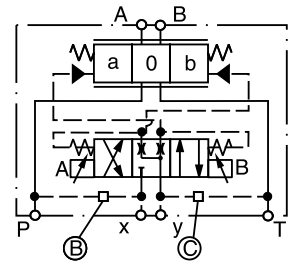


**D41FB**

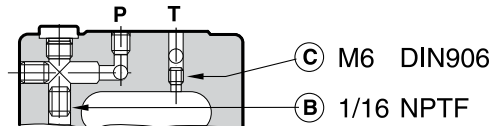


○ open, ● closed

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

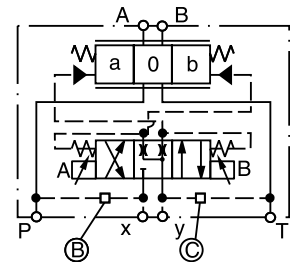


**D91FB**

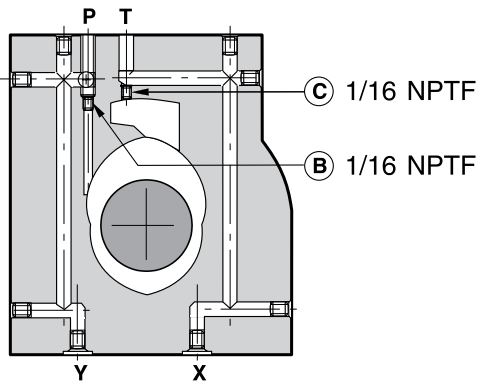


○ open, ● closed

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

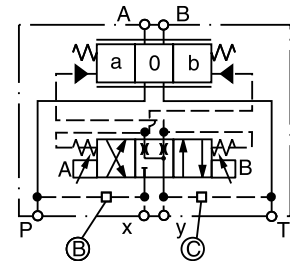


**D111FB**



○ open, ● closed

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



**Dimensions**

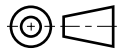
**Proportional Directional Control Valves  
Series D\*1FB\*EE with Atex Coils**

Return to  
**ALPHA  
TOC**

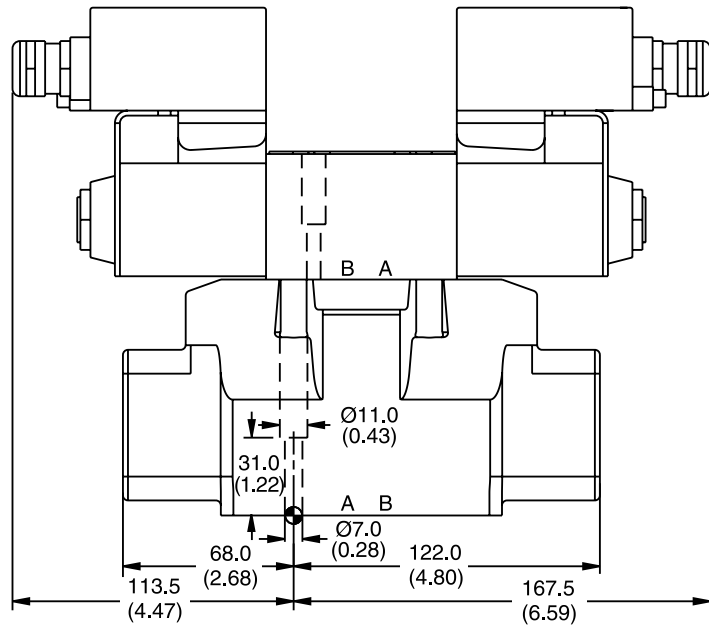
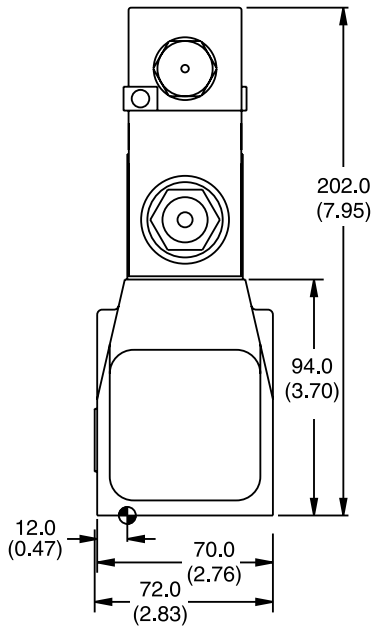
Return to  
**SECTION  
TOC**

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

**D31FB\*EE**

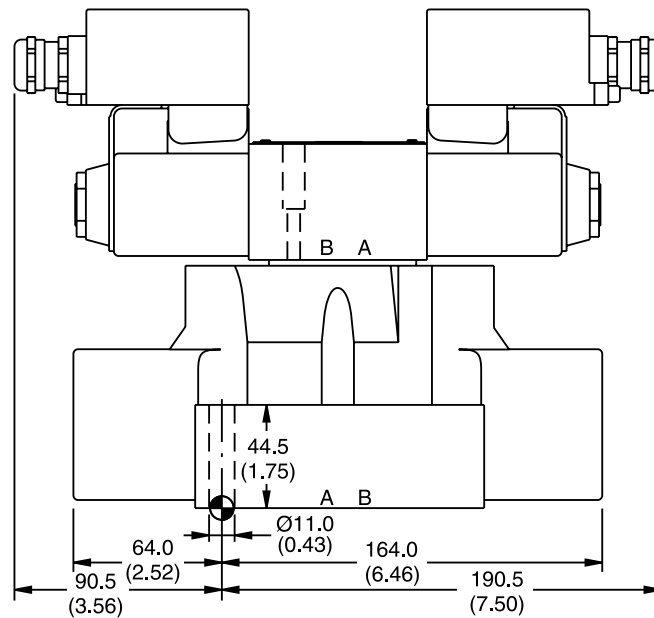
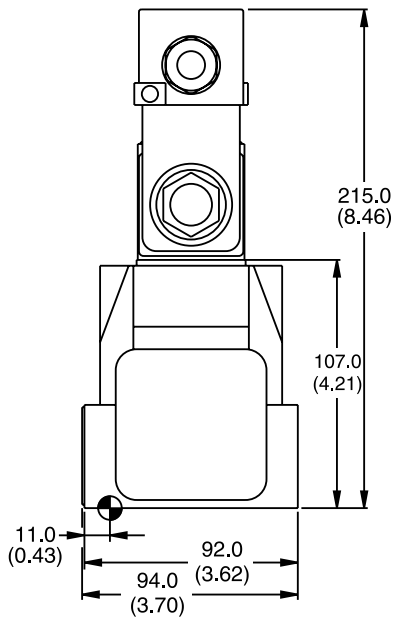
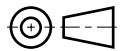


**A**



Surface Finish	Kit			Seal Kit
	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D31FB Fluorocarbon: SK-D31FBV

**D41FB\*EE**



Surface Finish	Kit			Seal Kit
	BK320 BK160	2x M6x55 4x M10x60 DIN 912 12.9 4x 3/8-16x2.5 4X 3/8-16X2.5	13.2 Nm (9.7 lb.-ft.) 63 Nm (46.5 lb.-ft.) ±15 %	Nitrile: SK-D41FB Fluorocarbon: SK-D41FBV

**Dimensions**

**Proportional Directional Control Valves  
Series D\*1FB\*EE with Atex Coils**

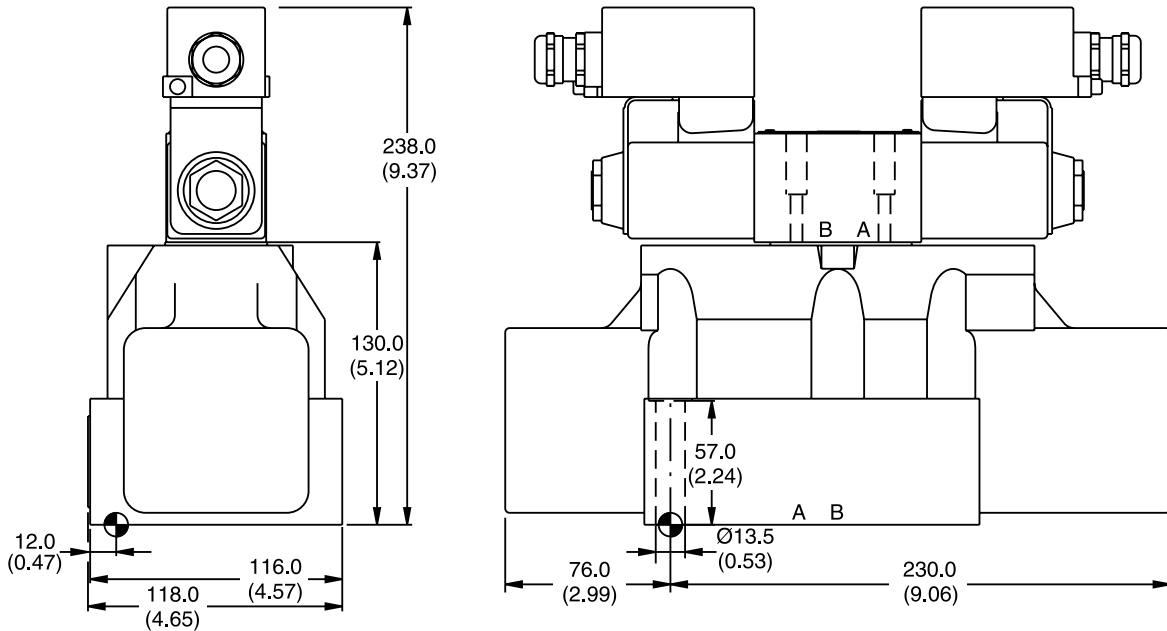
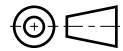
Return to ALPHA TOC

Return to SECTION TOC

**A**

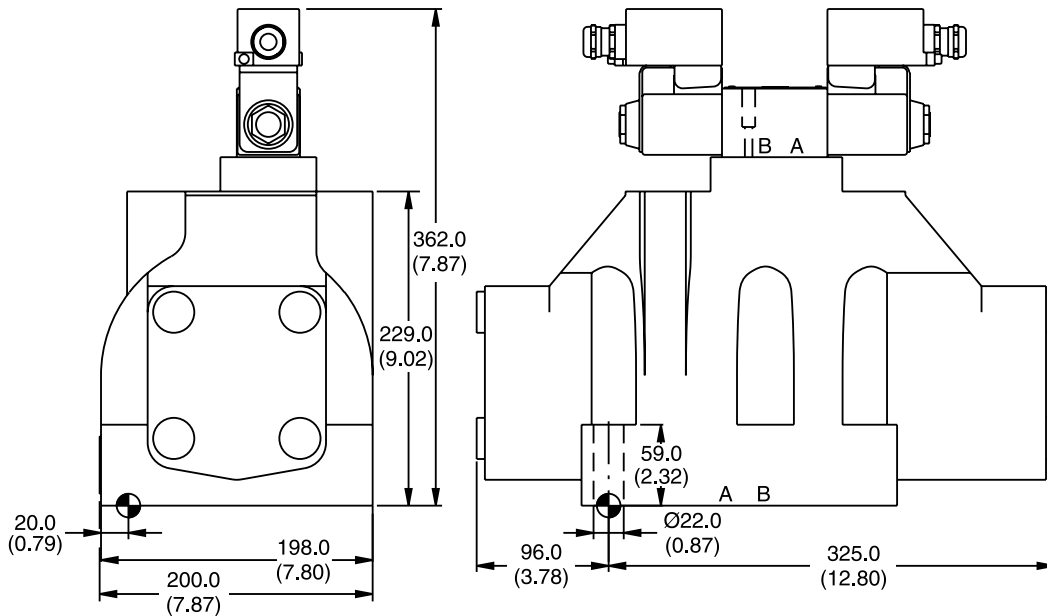
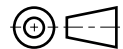
Inch equivalents for millimeter dimensions are shown in (\*\*)

**D91FB\*EE**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK360	6x M12x75 DIN 912 12.9	108 Nm (79.7 lb.-ft.) ±15 %	Nitrile: SK-D91FB Fluorocarbon: SK-D91FBV
	BK228	6x 1/2-13x3.0		

**D111FB\*EE**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK386	6x M20x90 DIN 912 12.9	517 Nm (373.9 lb.-ft.) ±15 %	Nitrile: SK-D111FB Fluorocarbon: SK-D111FBV
	BK150	6x 3/4-10x3.5		





**General Description**

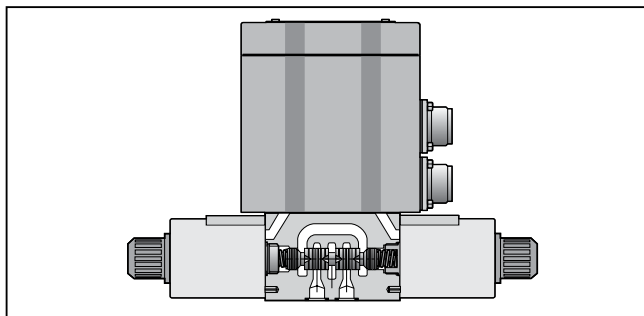
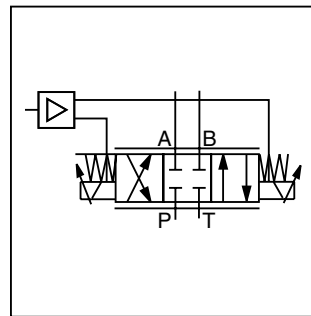
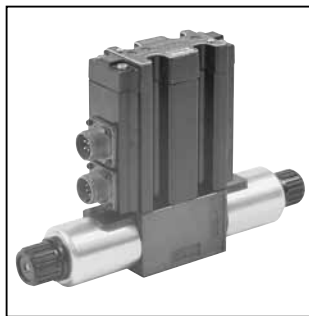
Series D\*\*FL proportional directional control valves are packaged with an integrated microprocessor based open-loop motion profiler. The valve directly accepts electrical on/off logic signals which trigger simple motion profiles controlling actuator speed, acceleration, and deceleration.

D\*\*FL valves are user configurable to operate in one of two control modes: 'Slow Shift' or 'Motion Profiler'. Refer to application guidelines for details. Both DC and AC voltage logic interfaces are available providing a direct interface to PLC's, for a simple field upgrade from AC operated directional valves.

Valves are available in sizes NG6 (CETOP 3), NG10 (CETOP 5), NG16 (CETOP 7) and NG25 (CETOP 8).

**Features**

- Integrated microprocessor based valve electronics.
- On-board, open-loop motion control profiler.
- Optically isolated 'on-off' inputs trigger motion profiles.
- User selectable operation modes: Slow Shift or Profiler.
- Test points indicating speed and ramp settings.
- On-board microprocessor self diagnostics on start-up.



- LED functional diagnostic indicators.
- Spring centered spool.
- Manual overrides.



**Specifications**

Interface DIN	NG6 (CETOP 3)	NG10 (CETOP 5)	NG16 (CETOP 7)	NG25 (CETOP 8)
<b>Flow Rating</b> @10 Bar (150 PSI) Δp (P→A, B→T) (spool options up to) <sup>1)</sup> LPM (GPM)	20 (5.3)	60 (15.9)	100 (26)	200 (53)
<b>Maximum Flow</b> LPM (GPM)	27 (7.3)   34.1 (9)   30 (8)	62.1 (18)   83.3 (22)   118 (31)	144 (38)	372 (98)
<b>Pilot Flow</b>				
Continuous LPM (GPM)	N/A	N/A	<1.2 (0.3)	<1.2 (0.3)
Step Input LPM (GPM)	N/A	N/A	2.2 (0.6)	4.5 (1.2)
<b>Operating Pressure</b>				
Port P, A, B Bar (PSI)	315 (4500)		345 (5000) max.	
Port P, internal pilot	N/A		20 (290) min.	
Port T, internal drain	35 (500)		10 (150) max.	
Port T, external drain	N/A		345 (5000) max.	
Port Y, pilot drain	N/A		10 (150) max.	
Port X, external pilot	N/A		20-345 (290-5000)	
<b>Fluid Cleanliness Level</b>	ISO Class 16/13			
<b>Fluid Viscosity, Recommended</b>	80 – 1000 SSU			
<b>Fluid Temperature, Recommended</b>	0°C to +60°C (+32°F to +140°F)			
<b>Environmental Protection Class</b>	NEMA 4 (IP65)			
<b>Ambient Operating Temperature</b>	-20°C to +60°C (-4°F to +140°F)			

1) Actual pressure drop required for each metering land, up to the specified maximum flow rate is:

$$\Delta P_{\text{actual}} = (5) \left( \frac{Q_{\text{actual}}}{Q_{\text{rated}}} \right)^2 \text{ Bar; (Q in LPM)} \quad [\text{or}] \quad = (75) \left( \frac{Q_{\text{actual}}}{Q_{\text{rated}}} \right)^2 \text{ PSI; (Q in GPM)}$$

Flow rate for different Δp per control edge:  $Q_x = Q_{\text{Nom.}} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{\text{Nom.}}}}$

**D\*FL** Proportional Directional Control Valves with Intergrated Motion Control Electronics

Spool Type

Flow

**C** Style

Seal

Electronic Variation

**J** Supply Voltage

**0** Electronic Accessories

Valve Accessories

Design Series

NOTE: Not required when ordering.

Code	Description
D1FL	NG6/CETOP 3
D3FL	NG10/CETOP 5

See Note 1.

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
J	24 VDC

Code	Description
T	AC Voltage Logic Interface
W	DC Voltage Logic Interface

Code	Description
0	Standard
4	CSA Approved

Code	Style
C	

Code	Flow at Δp 5 Bar (72.5 PSI) per metering edge	
	D1FL LPM (GPM)	D3FL LPM (GPM)
C	7.5 (2.0)*	—
F	15 (4.0)	—
H	20 (5.3)*	20 (5.3)*
M	—	40 (10.6)
S	—	60 (15.9)*

Note 1: NG10 (CETOP5) valves are supplied with bolt kit BK98 (1/4-20 x 1.625). For metric bolt kit BK385 (M6 x 40 mm), add "-X6181" to ordering code.

**Weight:**  
D1FL 3.2 kg (7.0 lbs.)  
D3FL 7.9 kg (17.5 lbs.)

1) Reduced flow rate on Port B, nominal flow on Port A.

\* Only with spool type E\*

**D\*\*FL** Pilot Operated Proportional Directional Control Valves with Intergrated Motion Control Electronics

Spool Type

Flow

**C** Style

Pilot Connection

Seal

Electronic Variation

**0** Electronic Accessories

Valve Accessories

Design Series

NOTE: Not required when ordering.

Code	Description
D41FL	NG16/CETOP 7
D91FL	NG25/CETOP 8

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

Code	Description
T	AC Voltage Logic Interface
W	DC Voltage Logic Interface

Code	Description
0	Standard
2	Pilot Pressure Reducer <sup>(3)</sup>
4	CSA Approved

(3) Recommended for pilot pressure applications >205 Bar (3000 PSI)

Code	Flow at Δp 5 Bar (72.5 PSI) per metering edge	
	D41FL LPM (GPM)	D91FL LPM (GPM)
D	100 (26.5)	—
F	—	200 (53)

V-Notch Spools			Spool Type
Code	Q <sub>A</sub> =Q <sub>B</sub>	Q <sub>A</sub> >Q <sub>B</sub>	
E21	B41	A41	
E22	B42	A42	

**Weight:**  
D41FL 10.9 kg (24.0 lbs.)  
D91FL 19.1 kg (42.0 lbs.)

**Mounting Interface**

Refer to Mounting Interface Dimensions in the Proportional Directional Valve section of this catalog.

**Accessories**

Refer to the Accessories section for bolt kits, subplates, connectors and pre-assembled cable assemblies.

A

<b>Supply Voltage</b>	V	12 to 28	
<b>Maximum Current</b>	A	3.5	
<b>Motion Profile Adjustment</b> Speed Ramps (minimum limited by actual valve step response)		User set; potentiometers inside electronics enclosure. 0 to 100% valve opening; two speeds forward, two speeds retract. 0.025 to 15 seconds; one acceleration, two deceleration adjustments. Shared both forward/retract.	
<b>Test Points</b> V1, V2, V3, V4 R1, R2, R3		Inside electronics enclosure. 0 to 5 volts, corresponding to 0 to 100% valve opening, or speed. 0 to 5 volts, corresponding to 0.025 to 15 seconds ramp time.	
<b>Logic Interface</b> Ordering code field: Electrical variation (options available all valve sizes)		<b>W</b>	<b>T</b>
<b>Electrical Isolation</b>		DC Optical-Coupled	AC Optical-Coupled
<b>Polarity</b>		Signal pins A, C & E; referenced to 0V pins B, D & F respectively.	Signal pins A, C & E; referenced to AC neutral pins B, D & F respectively.
<b>Input Impedance</b>	ohms	>2000	>2000
<b>Input Voltage, Absolute Max.</b>	V	28 VDC	130 VAC
<b>Logic "on" (1), Min. Voltage</b>	V	>9.6 VDC	>96 VAC
<b>Logic "on" (1), Current</b>	mA	3.2 mA	3.2 mA
<b>Logic "off" (0), Min. Voltage</b>	V	<6.0 VDC	<51 VAC
<b>Logic "off" (0), Current</b>	mA	3.2 mA	3.2 mA
<b>Mating Connectors</b> (order separately) <b>Power Supply Connector</b> <b>Logic Input Connector</b>		Part # 1210292 (4-pin MS) Part # MS3106E-14S-6S (6-pin MS)	

## Application Guidelines

The D\*\*FL series proportional valves accept discrete on/off logic signals which trigger simple motion profiles controlling actuator speed, acceleration, and deceleration. All motion control potentiometer adjustments and jumper headers are located inside the electronics enclosure. Two modes of operation are user selectable by a jumper setting (JP1): 'Motion Profiler' or 'Slow Shift'. The 'Motion Profiling' mode provides two-speed velocity control typically used in rapid traverse and feed circuits. The 'Slow Shift' provides single velocity control. Both modes allow individual speed adjustment for actuator extend and retract. Ramp adjustments for extend and retract profiles are shared.

Refer to **Interface and Motion Profile** diagrams on the following pages.

Both DC and AC voltage logic interfaces are available. Refer to ordering code field 'Electronic Variation' and the technical data sheet for more information. Note that the interface connections are polarity sensitive. Refer to the block diagram and technical specifications.

Refer to the Installation Guide for set-up, configuration, and application guidelines (packaged with each valve):

D1FL: Installation Guide Bulletin 2589-M2/USA

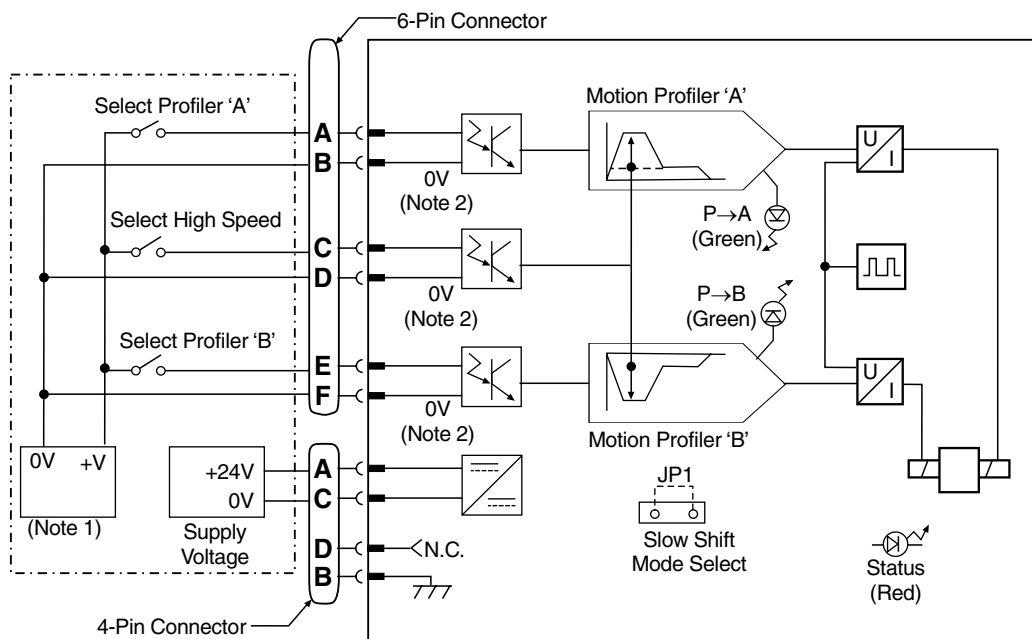
D3FL: Installation Guide Bulletin 2589-M3/USA

D41FL,

D91FL: Installation Guide Bulletin 2589-M1/USA



**Block Diagram — Wiring**

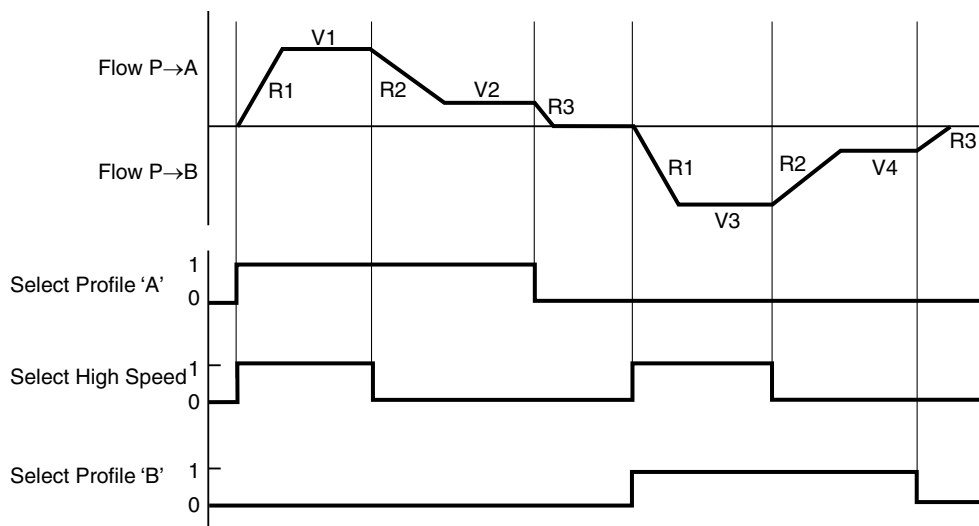


**Notes:**

- 1) DC logic source shown, refer to technical data for A.C.
- 2) 0V reference for DC interface, neutral for AC version.

**Interface — ‘Motion Profiler’ mode (see timing diagram below)**

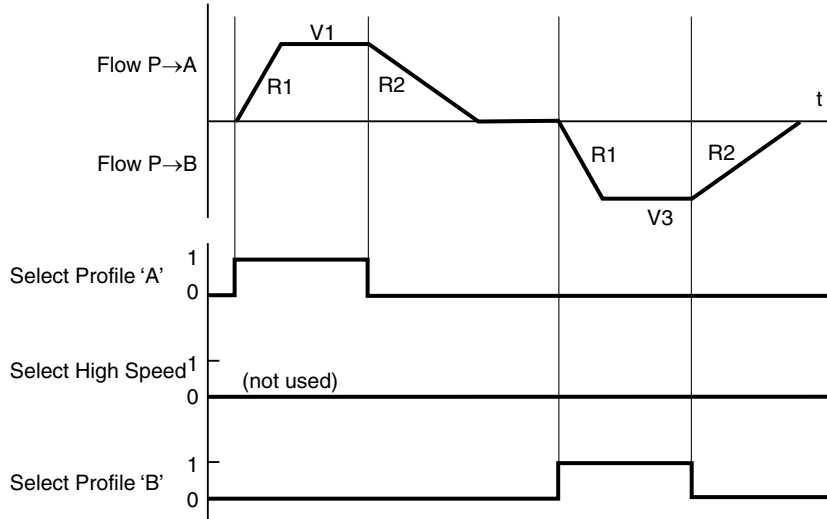
The ‘Motion Profiler’ mode is selected by removing connecting jumper ‘JP1’ on the electronics card inside the electronics enclosure. To trigger a rapid traverse, opening the valve P→A / B→T; apply a positive logic signal to logic inputs ‘Select Profile A’, and ‘Select High Speed’ (6-pin connector input pins A&B, and C&D). The valve will smoothly accelerate the actuator to the velocity set by potentiometer ‘V1’, at a ramp rate set by potentiometer ‘R1’. When logic input ‘Select High Speed’ is deselected the actuator will smoothly decelerate the actuator to the feed velocity set by Potentiometer ‘V2’, at a ramp rate set by potentiometer ‘R2’. When logic input ‘Select Profile A’ is deselected the actuator will smoothly decelerate the actuator to a stop at a ramp rate set by potentiometer ‘R3’. When neither ‘Select Profile’ inputs are selected, regardless of the ‘Select High Speed’ input state, the valve is held in the centered hydraulic condition. Reversing the actuator, directing flow P→B / A→T, follows the same logic using logic input ‘Select Profile B’. Refer to the timing diagram below for the corresponding potentiometers. Note that although all four speeds are independent, the three ramps are shared by both ‘A’ and ‘B’ profiles.



**Interface — ‘Slow Shift’ mode (see timing diagram below)**

**A**

The ‘Slow Shift’ mode is selected by connecting jumper ‘JP1’ on the electronics card inside the electronics enclosure. The ‘Slow Shift’ mode logically operates the same as the ‘Motion Profiler’ mode, except the ‘Select High Speed’ logic input is not used and only one speed for each actuator direction is available.



**4-Pin Power Supply Plug**

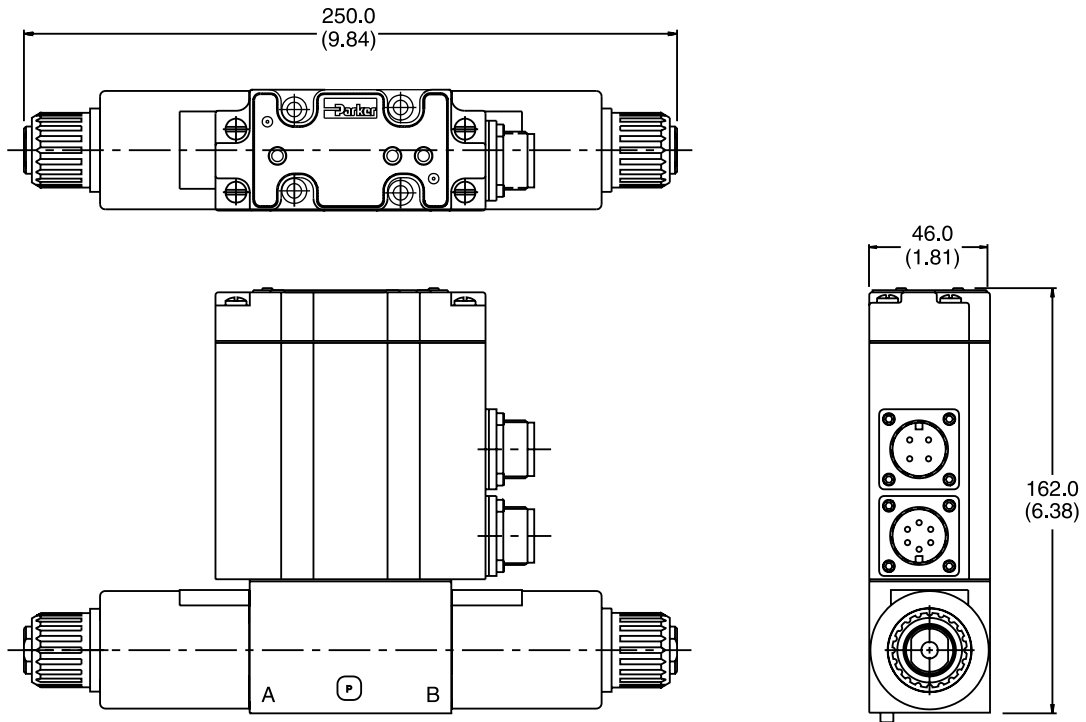
	Pin	Description
	A	Supply Voltage
	B	Protective Ground
	C	Supply 0V
	D	Not Used

**6-Pin Logic Input Plug**

	Pin	Description
	A	Select Profile "A" (+)
	B	Select Profile "A" (0V or neutral)
	C	Select "High Speed" (+)
	D	Select "High Speed" (0V or neutral)
	E	Select Profile "B" (+)
	F	Select Profile "B" (0V or neutral)

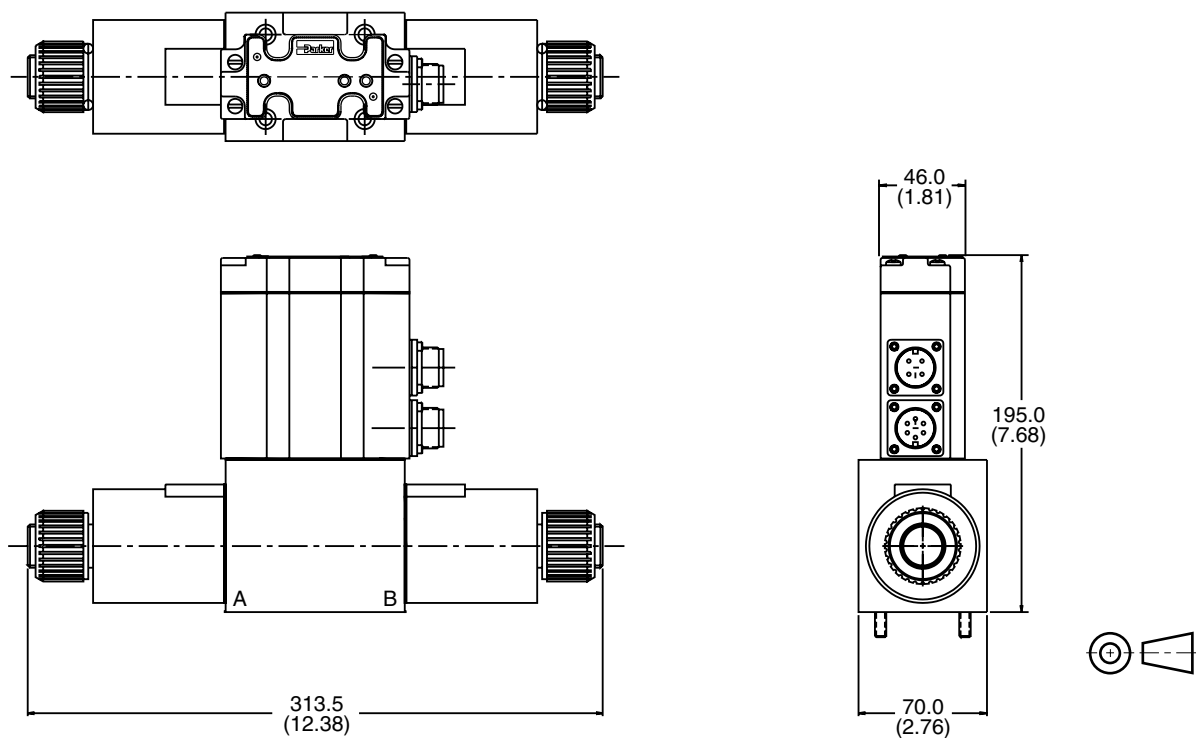
**D1FL**

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



**D3FL**

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



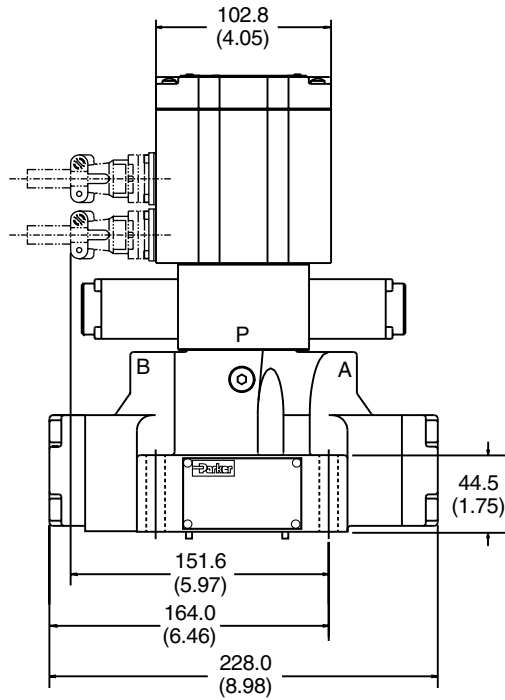
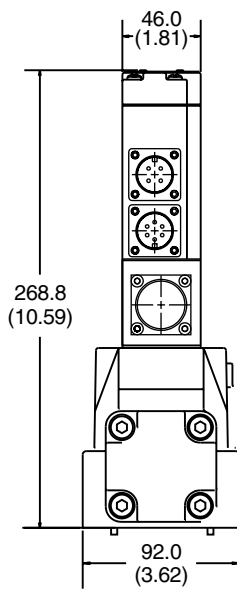
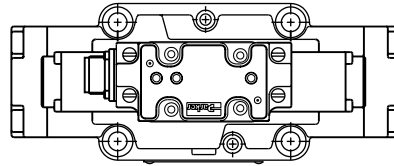
**Dimensions**

**Proportional Directional Control Valves  
Series D41FL and D91FL**

**D41FL**

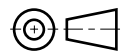
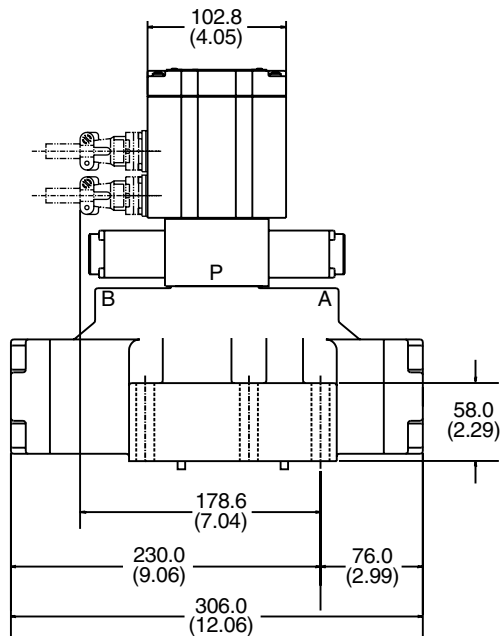
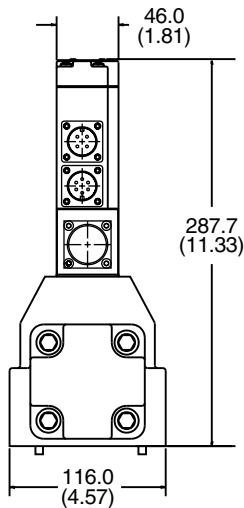
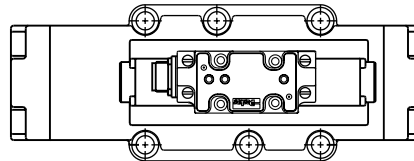
Inch equivalents for millimeter dimensions are shown in (\*\*)

**A**



**D91FL**

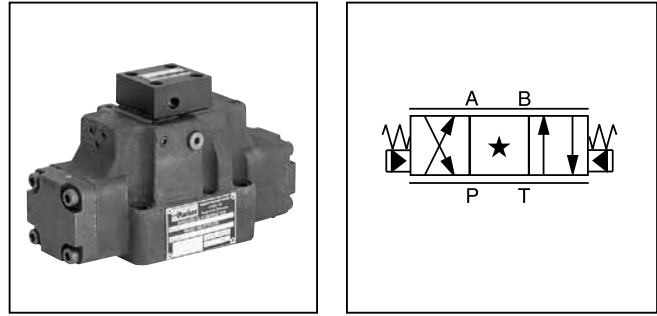
Inch equivalents for millimeter dimensions are shown in (\*\*)



**General Description**

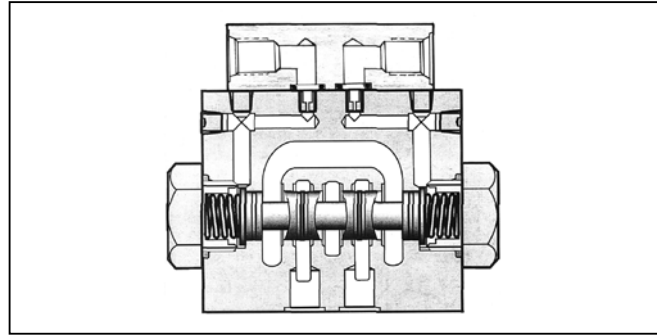
Series D\*9FF main-stage, pilot operated, proportional directional control valves are operated with remote hydraulic hand controllers. Valves are available in sizes NG10 (CETOP 5), NG16 (CETOP 7), NG25 (CETOP 8) and NG32 (CETOP 10).

Typical applications include reproducible control of actuator speed in rapid/slow speed profiling, and smooth acceleration and deceleration performance.



**Features**

- Standard DIN/ISO/CETOP/NFPA interfaces.
- Progressive flow characteristics for improved low flow resolution.
- Spring centered main stage spool.
- 2:1 ratio spool options.



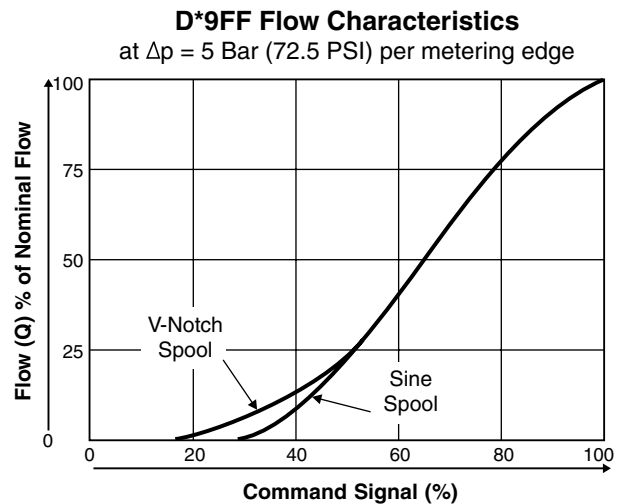
**Specifications**



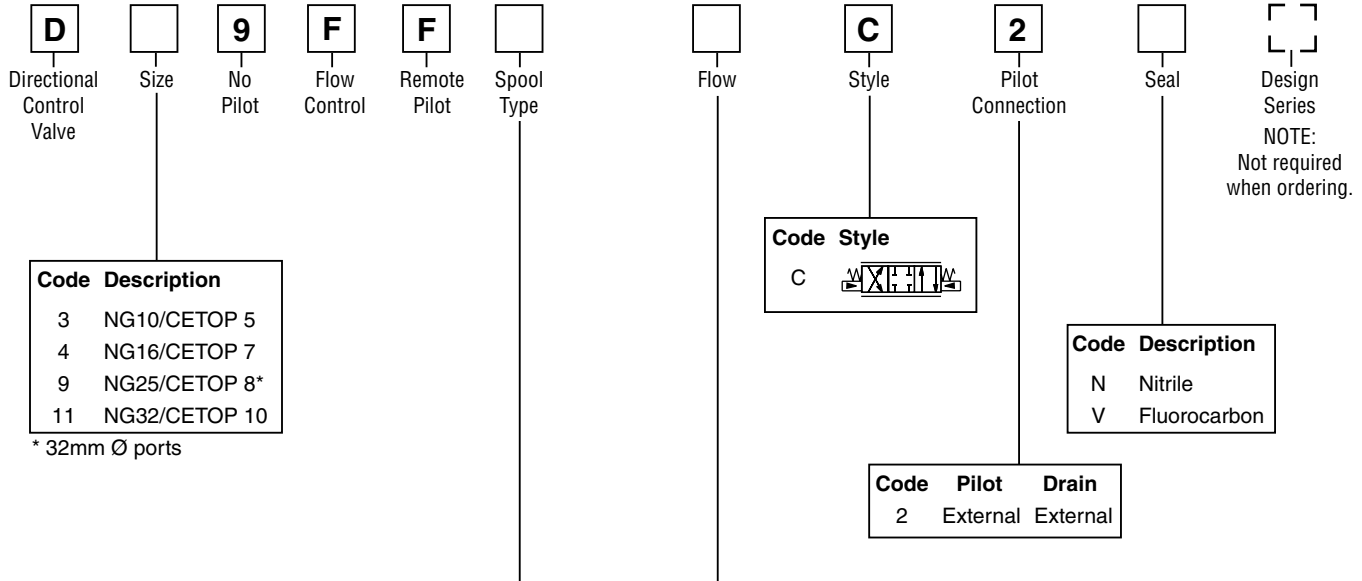
Interface DIN	NG10 (CETOP 5)	NG16 (CETOP 7)	NG25 (CETOP 8)	NG32 (CETOP 10)
<b>Flow Rating</b> @ 10 Bar (150 PSI) $\Delta p$ (P→A, B→T) (Spool options up to) LPM (GPM)	75 (20)	200 (53)	400 (106)	1000 (264)
<b>Pilot Flow</b> – Continuous LPM (GPM)	1.2 (0.3)	1.2 (0.3)	1.2 (0.3)	1.2 (0.3)
<b>Step Response</b> (time to reach 90% of a 100% step command) ms	60	75	100	200

<b>Hysteresis</b> %	<5
<b>Repeatability</b> %	<2
<b>Operating Pressure</b>	
Port P, A, B, T Bar (PSI)	345 (5000) max.
<b>Pilot Pressure Ranges</b> Bar (PSI)	0-25 (0-363 PSI)
<b>Fluid Cleanliness Level</b>	ISO Class 16/13
<b>Fluid Viscosity, Recommended</b>	80 – 1000 SSU
<b>Fluid Temperature, Recommended</b>	0°C to +60°C (+32°F to +140°F)
<b>Ambient Operating Temperature</b>	-50°C to +100°C (-58°F to +212°F)

**Performance Curves**



**A**



**Sine Spool Options - Spool Type and Flow Codes**

Code	Code		Sine Spool Type	Flow at $\Delta p$ 5 Bar (72.5 PSI) per metering edge			
	$Q_A = Q_B$	$Q_A > Q_B^{1)}$		Code	D39 LPM (GPM)	D49 LPM (GPM)	D99 LPM (GPM)
E01	B31		C	75 (20)	-	-	-
E02	B32		F	-	200 (53)	-	-
			H	-	-	400 (106)	-
			L	-	-	-	1000 (264)

**V-Notch Spool Options - Spool Type and Flow Codes**

Code	Code		V-Notch Spool Type	Flow at $\Delta p$ 5 Bar (72.5 PSI) per metering edge			
	$Q_A = Q_B$	$Q_A > Q_B^{1)}$		Code	D39 LPM (GPM)	D49 LPM (GPM)	D99 LPM (GPM)
E21	B41		B	-	-	-	-
E22	B42		D	-	120 (32)	-	-
			F	-	-	300 (79)	-
			L	-	-	-	1000 (264)

1) Reduced Flow Rate on Port B,  
 Nominal Flow Rate on Port A  
 Code A\* for spool  $Q_B > Q_A$  optional

**Bolt Kits:**

- D39FF BK98 (4) 1/4-20x1.62 SHCS
- D49FF BK160 (4) 3/8-16x2.5 SHCS  
(2) 1/4-20x2.5 SHCS
- D99FF BK228 (6) 1/2-13x3.0 SHCS
- D119FF BK150 (6) 3/4-10x3.5 SHCS

**Weight:**

- D39FF 7.1 kg (16.0 lbs.)
- D49FF 10.8 kg (25.0 lbs.)
- D99FF 19.0 kg (42.0 lbs.)
- D119FF 62.0 kg (136.0 lbs.)

**Dimensions**

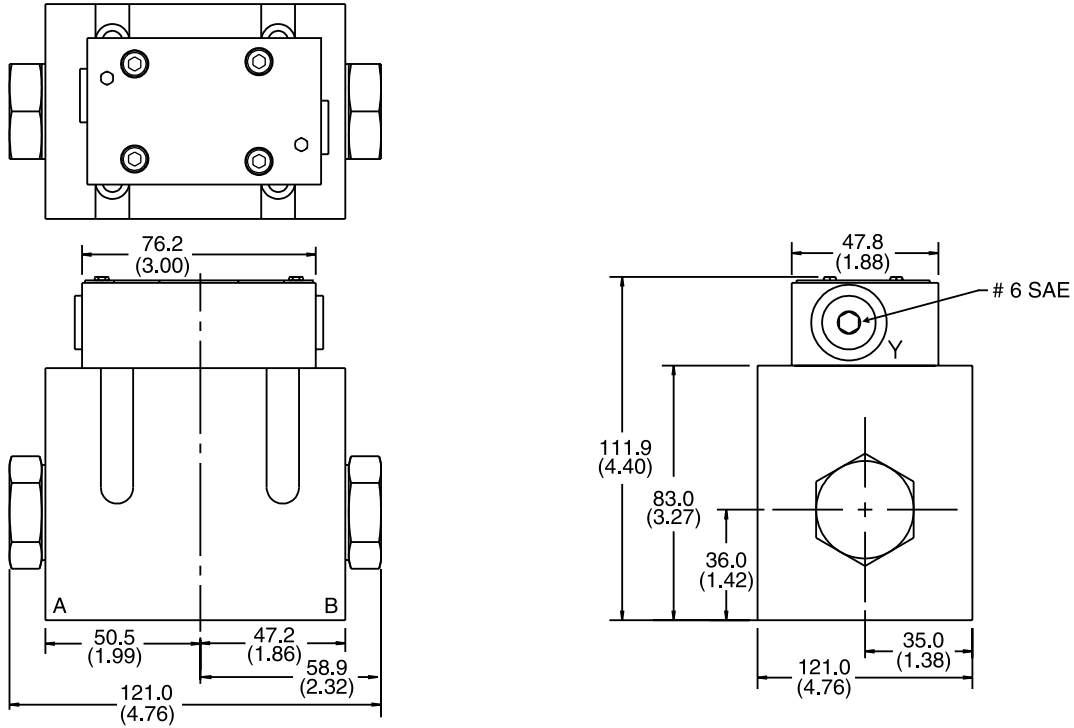
**Proportional Directional Control Valves  
Series D39FF and D49FF**

Return to  
ALPHA  
TOC

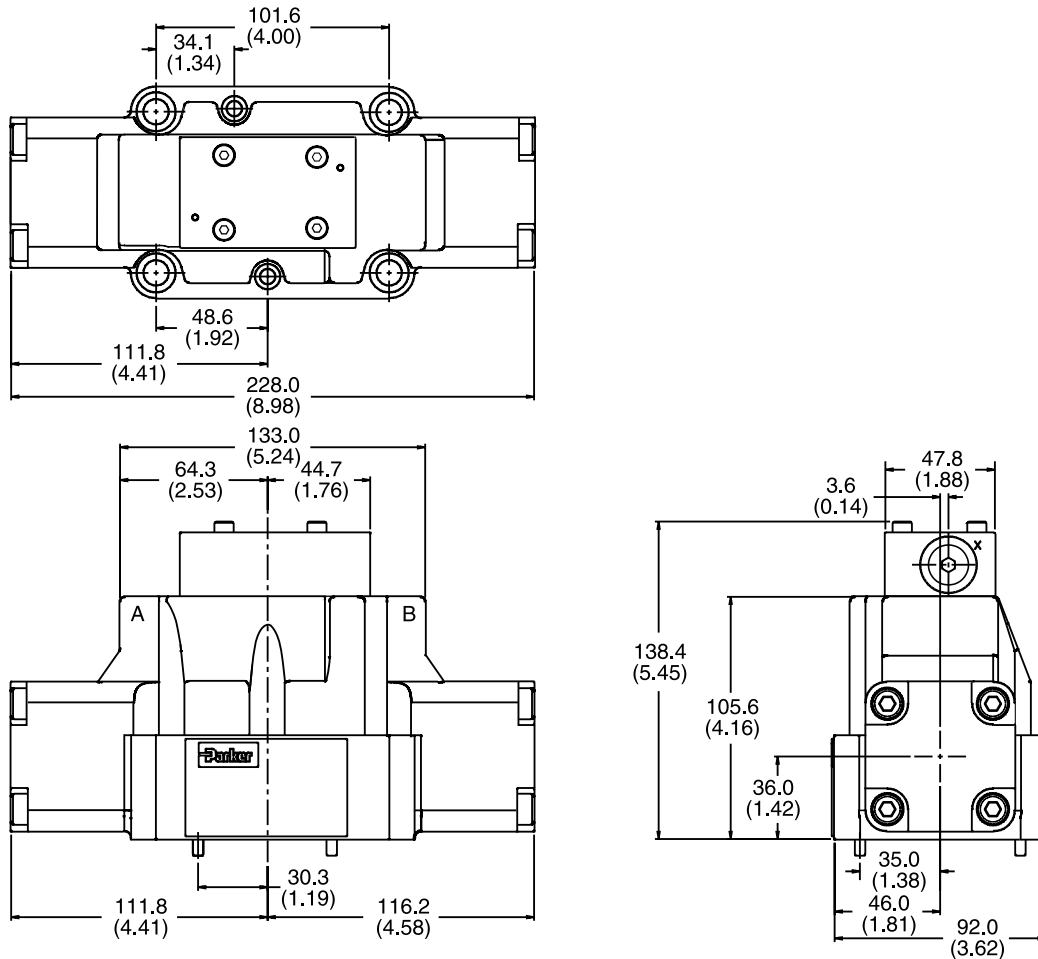
Return to  
SECTION  
TOC

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

**D39FF**



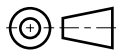
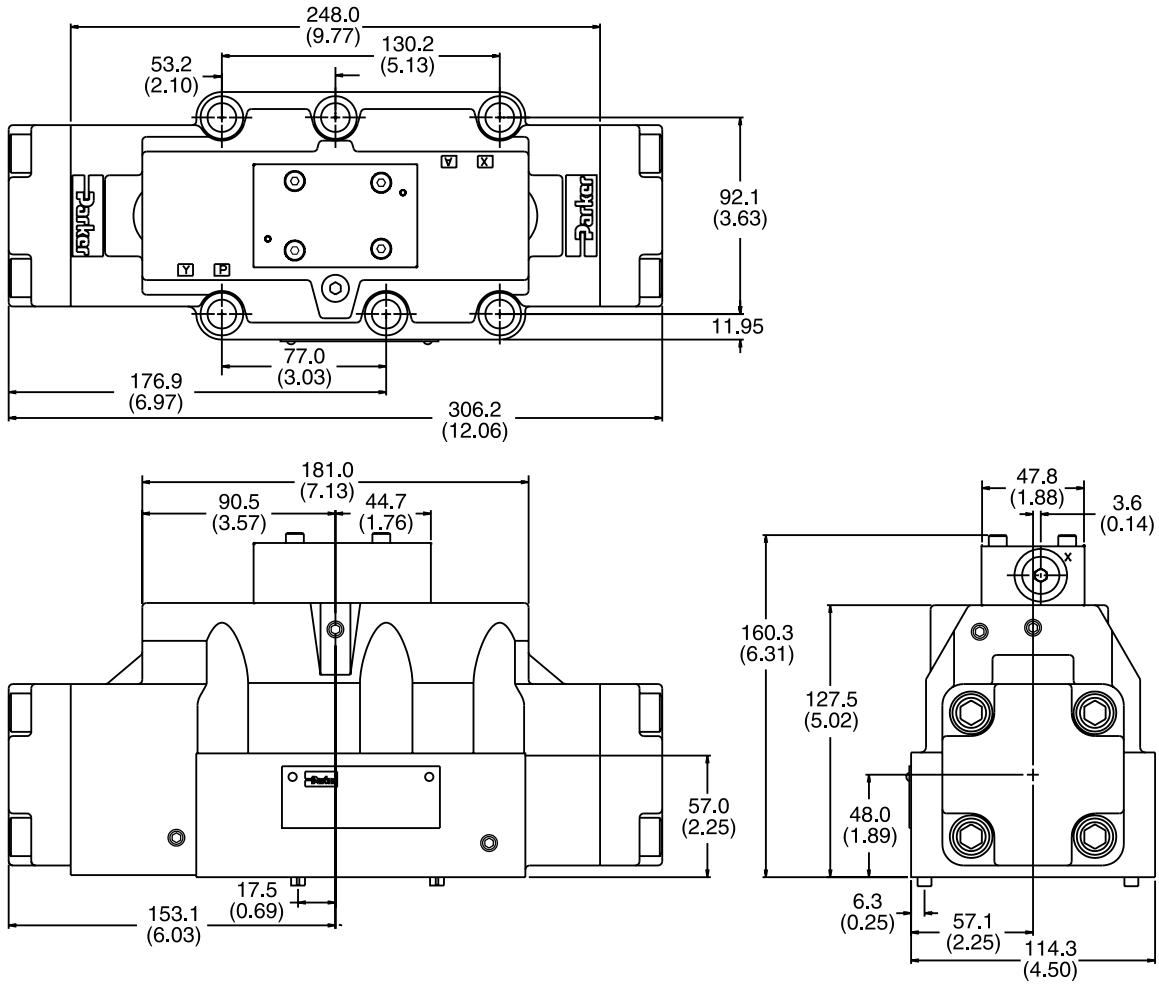
**D49FF**



**A**

**D99FF**

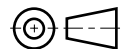
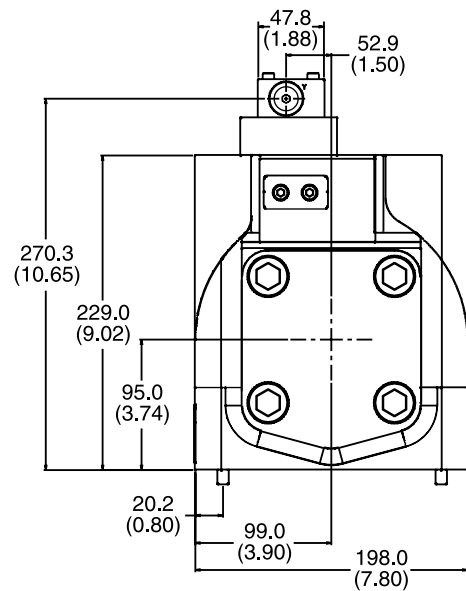
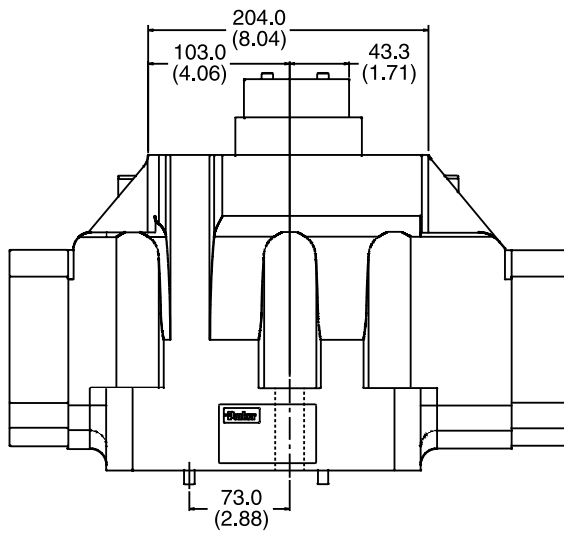
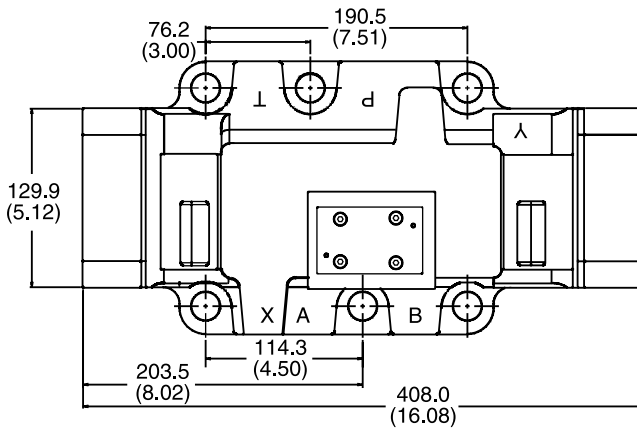
Inch equivalents for millimeter dimensions are shown in (\*\*)





**D119FF**

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



**Bolt Kits, Subplates, Mounting Interface**

**A**

Interface	Valve	Bolt Kit	Qty	Size	Subplate <sup>(1)</sup>	Port Size	Port Location
NG10 CETOP 5	D39F*	BK98	4	1/4-20 x 1.62"	SPD31D6NS35	3/4" NPTF	Bottom
		BK385	4	M6 x 40mm	SPD31D6NAS35	3/4" NPTF	Side
					SPD31D6SS35	#12 SAE	Bottom
					SPD31D6SAS35	#12 SAE	Side
NG16 CETOP 7	D49F*	BK160	4	3/8-16 x 2.5"	SPD46SA	#12 SAE	Side
			2	1/4-20 x 2.25"			
		BK320	4	M10 x 60mm			
			2	M6 x 55mm			
NG25 CETOP 8	D99F*	BK228	6	1/2-13 x 3"	SPD66NS35	3/4" NPTF	Bottom
		BK360	6	M12 x 75	SPD66NAS35	3/4" NPTF	Side
					SPD68NS35	1" NPTF	Bottom
					SPD68NAS35	1" NPTF	Side
					SPD610NS35	1 1/4" NPTF	Bottom
					SPD610NAS35	1 1/4" NPTF	Side
					SPD610SS35	#20 SAE	Bottom
					SPD610SAS35	#20 SAE	Side
NG32 CETOP 10	D119F*	BK150	6	3/4-10 x 3.5"	SPD1010N35	1 1/4" NPTF	Bottom
		BK386	6	M20 x 90	SPD1012N35	1 1/2" NPTF	Bottom

(1) Ductile iron; maximum operating pressure: 350 Bar (5075 PSI). Refer to valve specifications for actual recommended maximums.

**Note:** All subplates listed use SAE mounting bolt hardware. Refer to Catalog HY14-2500/US for metric options.

**General Description**

Series D\*1FC pilot operated proportional directional valves come in 4 sizes:

- D31FC NG10 (CETOP 5)
- D41FC NG16 (CETOP 7)
- D91FC NG25 (CETOP 8)
- D111FC NG32 (CETOP 10)

The digital onboard electronics is situated in a robust metal housing, which allows usage under rough environmental conditions.

The nominal values are factory set. The cable connection to a serial RS-232 interface is available as an accessory.

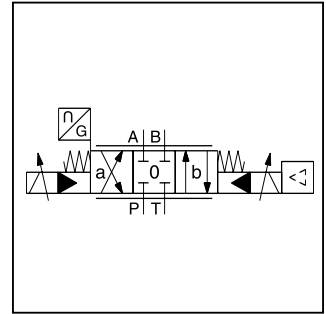
The innovative integrated regenerative function into the A-line (optional) allows energy saving circuits for differential cylinders. The hybrid version can be switched between regenerative mode and standard mode at any time.

**Features**

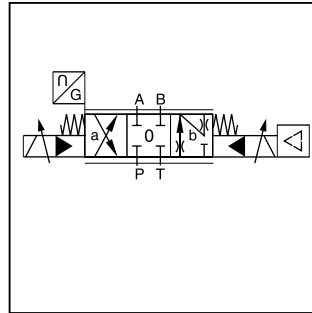
- Progressive flow characteristics for precise adjustment of flow rate.
- Low hysteresis.
- High dynamics.
- High flow capacity.
- Center position monitoring optional.
- Energy saving A-regeneration optional.
- Switchable hybrid version optional.



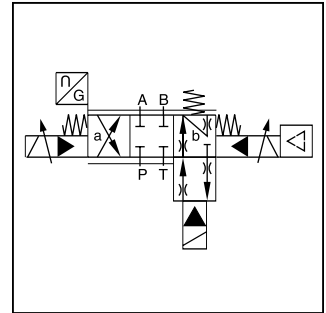
D41FC



Standard D\*1FC



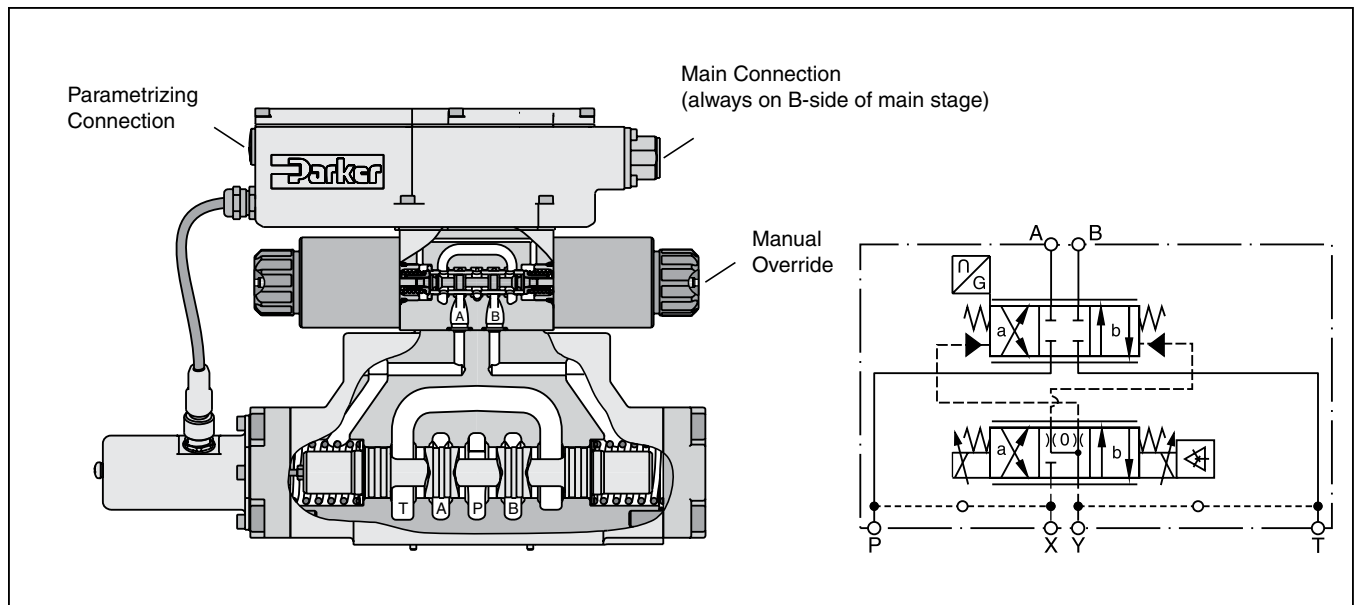
Regeneration D\*1FCR



Hybrid D\*1FCZ

**Further literature about the opportunities of energy savings and more functional details of the integrated regeneration is available on request at Parker HVD Technical Service.**

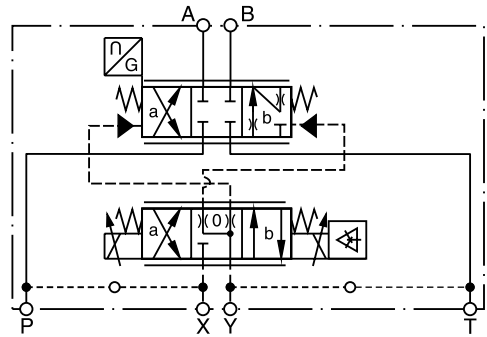
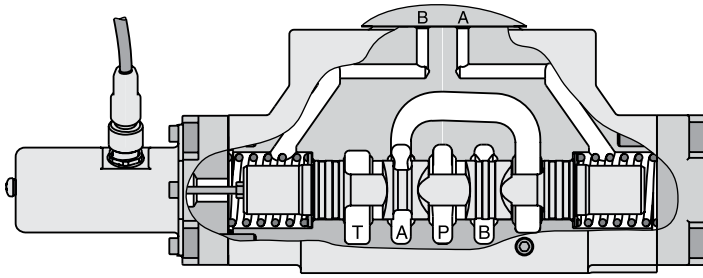
**D41FC**



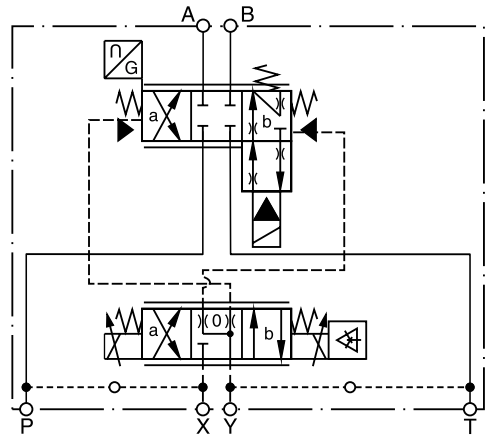
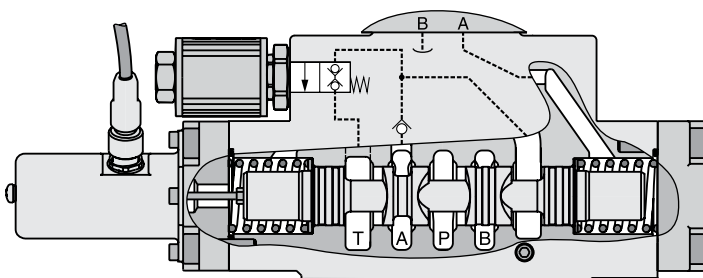
**D\*1FCR and D\*1FCZ**

**A**

**Regenerative Valve D\*1FCR**

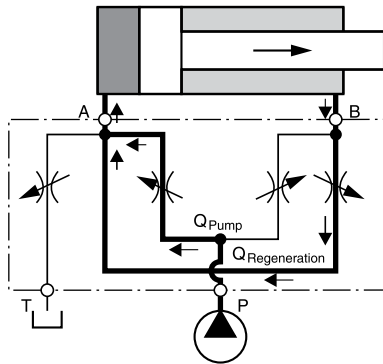


**Hybrid Valve D\*1FCZ**



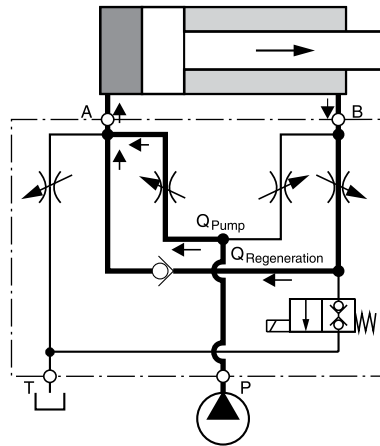
**D\*1FCR (Regenerative Valve)**

Cylinder extending  
 (high speed)

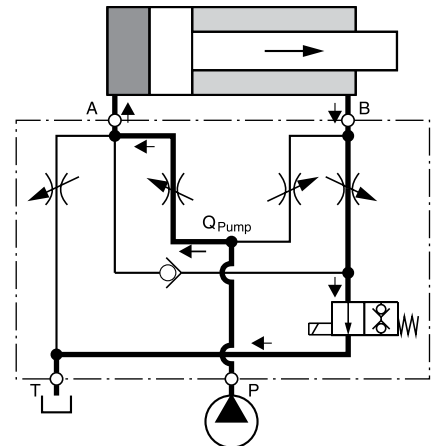


**D\*1FCZ (Hybrid Valve)**

Cylinder extending  
 regenerative mode  
 (high speed)

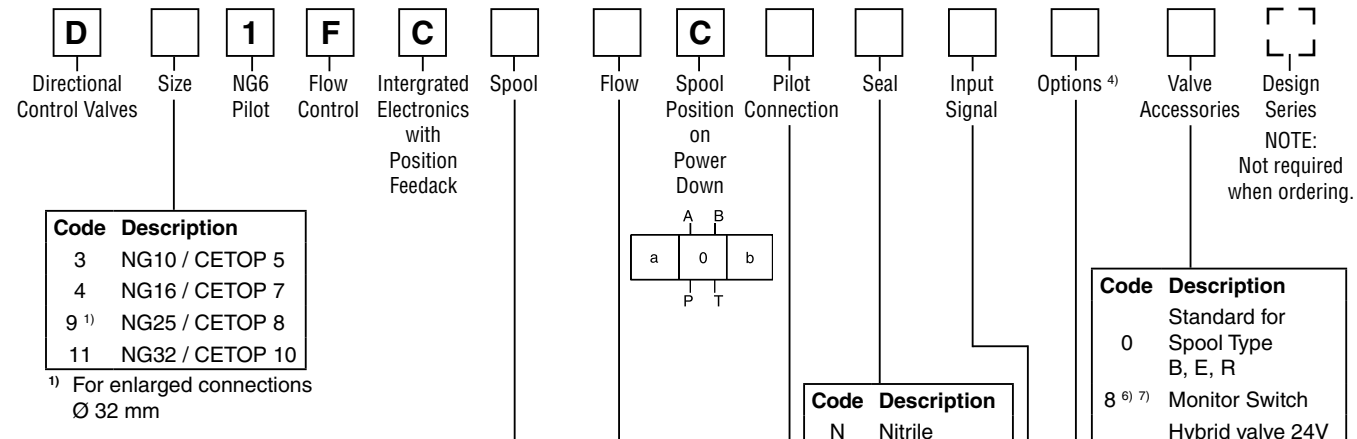


Cylinder extending  
 standard mode  
 (high force)



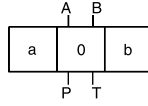
**Flow Rate in % of Nominal Flow**

Size	Spool	Port					
		A-T	P-A	P-B	B-A (R-Valve)	B-A (Hybrid)	B-T (Hybrid)
D41FCR/Z	31/32	100%	50%	100%	50%	45%	20%
D91FCR/Z	31/32	100%	50%	100%	50%	50%	25%
D111FCR/Z	31/32	100%	50%	100%	50%	50%	20%



Code	Description
3	NG10 / CETOP 5
4	NG16 / CETOP 7
9 <sup>1)</sup>	NG25 / CETOP 8
11	NG32 / CETOP 10

<sup>1)</sup> For enlarged connections Ø 32 mm



Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
0	Standard for Spool Type B, E, R
8 <sup>6) 7)</sup>	Monitor Switch Hybrid valve 24V normally closed for spool type Z
L <sup>5)</sup>	

<sup>5)</sup> See previous page for regenerative and hybrid spool information. (not available in D31FC)  
<sup>6)</sup> Not for D111FCZ\*  
<sup>7)</sup> Monitor switch for hybrid valves: Code 8 includes options of Code L (24 normally closed).

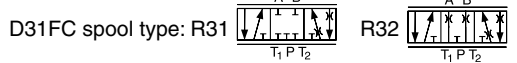
Standard		NEW: Regenerative Function <sup>2)</sup>		NEW: Hybrid Function <sup>2)</sup>	
Code	Spool Type	Code	Spool Type	Code	Spool Type
E01					
E02					
B31	$Q_B = Q_A / 2$ 	R31		Z31	
B32	$Q_B = Q_A / 2$ 	R32		Z32	

Code	Inlet	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

Code	Signal	Function
B	0...±10V	0...+10V P->B
E	0...±20mA	0...+20mA P->B
K	0...±10V	0...+10V P->A
S	4...20mA	12...20mA P->A

Code	Description
0	6+PE acc. EN175201-804
7	6+PE + enable

<sup>4)</sup> Please order plugs separately. See Accessories.



<sup>2)</sup> For regenerative and hybrid function at D31FC (NG10) please refer to solutions with sandwich and adapter plates: A10-1664 / A10-1665L / H10-1662 / H10-1666L.

Code	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge			
	D31	D41	D91	D111
D	90 (23.8)	—	—	—
E	120 (31.7)	—	—	—
F	—	200 (52.8)	—	—
H	—	—	450 (119.0)	—
L	—	—	—	1000 (264.2)

- Bolt Kits:**  
 D31FC BK385  
 D41FC BK320  
 D91FC BK360  
 D111FC BK386

- Weight:**  
 D31FC 9.0 kg (19.8 lbs.)  
 D41FC 12.5 kg (27.6 lbs.)  
 D91FC 21.0 kg (46.3 lbs.)  
 D111FC 68.5 kg (151.0 lbs.)



**A**

General				
Design	Pilot operated DC valve			
Actuation	Proportional solenoid			
Size	NG10 (CETOP 5) D31	NG16 (CETOP 7) D41	NG25 (CETOP 8) D91	NG32 (CETOP 10) D111
Mounting Interface	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA			
Mounting Position	Unrestricted			
Ambient Temperature	[°C]	-20...+60; (-4°F...+140°F)		
MTTF <sub>D</sub> Value	[years]	50		
Vibration Resistance	[g]	10 Sinus 5...200 Hz acc. IEC 68-2-6 30 Random noise 20...20 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27		
Hydraulic				
Maximum Operating Pressure	Pilot Drain Internal Ports P, A, B, X 350 Bar (5075 PSI); Ports T, Y 210 Bar (3045 PSI) Pilot Drain External Ports P, A, B, T, X 350 Bar (5075 PSI); Port Y 210 Bar (3045 PSI)			
Fluid	Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature	[°C]	-20...+60; (-4°F...+140°F)		
Viscosity				
Permitted	[cSt] / [mm²/s]	20...380 (93...1761 SSU)		
Recommended	[cSt] / [mm²/s]	30...80 (139...371 SSU)		
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Nominal Flow at Δp= 5 Bar (72.5 PSI) per Control Edge <sup>1)</sup>	90/120 LPM (23.8/31.7 GPM)	200 LPM (52.9 GPM)	450 LPM (119.0 GPM)	1000 LPM (264.6 GPM)
Leakage at 100 Bar (1450 PSI)				
Main Stage	[ml/min]	200 (12 cu. in.)	200 (12 cu. in.)	600 (37 cu. in.)
Pilot Stage	[ml/min]	<100 (6.1 cu. in.)		
Pilot Supply Pressure	20 Bar (290 PSI) to 350 Bar (5075 PSI)			
Pilot Flow, Step Response	2.9 LPM (0.8 GPM)	4.1 LPM (1.1 GPM)	6.7 LPM (1.8 GPM)	15.0 LPM (4.0 GPM)
Static / Dynamic				
Step Response at 100% Step <sup>2)</sup>	[ms]	35	37	66
Hysteresis	[%]	≤ 0.1		
Sensitivity	[%]	≤ 0.5		

<sup>1)</sup> Flow rate for different Δp per control edge:  $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

<sup>2)</sup> Measured with load [210 Bar (3045 PSI) pressure drop/two control edges].

Continued on the next page

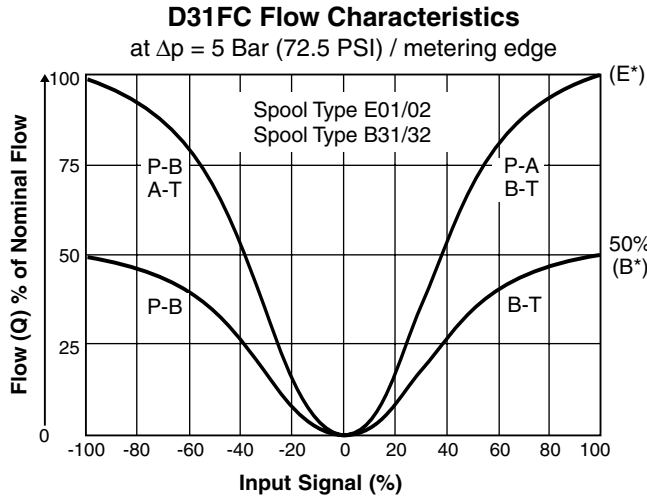
Electrical		
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/Ripple DC	[V]	18...30, ripple < 5% eff., surge free
Current Consumption Maximum	[A]	2.0
Pre-fusing Medium Lag	[A]	2.5
Input Signal		
Code K (B)	Voltage Impedance [V] [kOhm]	+10...0...-10, ripple < 0.01 % eff., surge free, 0...+10V P→A (P→B) 100
Code E	Current Impedance [mA] [Ohm]	20...0...-20, ripple < 0.01 % eff., surge free, 0...+20 mA P→A (P→B) 200
Code S	Current Impedance [mA] [Ohm]	4...12...20, ripple < 0.01 % eff., surge free, 12...20mA P→A < 3.6 mA = enable off, > 3.8 mA = enable on (acc. to NAMUR NE43) 200
Differential Input Maximum		
Code 0/7	[V]	30 for terminal D and E against PE (terminal G)
Code 0	[V]	11 for terminal D and E against 0V (terminal B)
Adjustment Ranges:		
Minimum	[%]	0...50
Maximum	[%]	50...100
Ramp	[s]	0...32.5
Interface		RS-232, parametrizing connection 5 pole
EMC		EN 61000-6-2, EN 61000-6-4
Electrical Connection		6 + PE acc. to EN 175201-804
Wiring Minimum	[mm <sup>2</sup> ]	7 x 1.0 (AWG16) overall braid shield
Wiring Length Maximum	[m]	50 (164 ft.)
Electrical (Hybrid Option)		
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		IP65 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	[mm <sup>2</sup> ]	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.

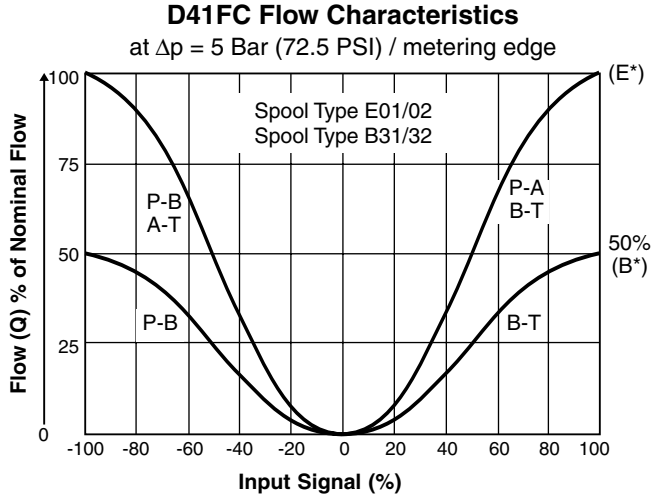
**D\*1FC B/E**

**A**

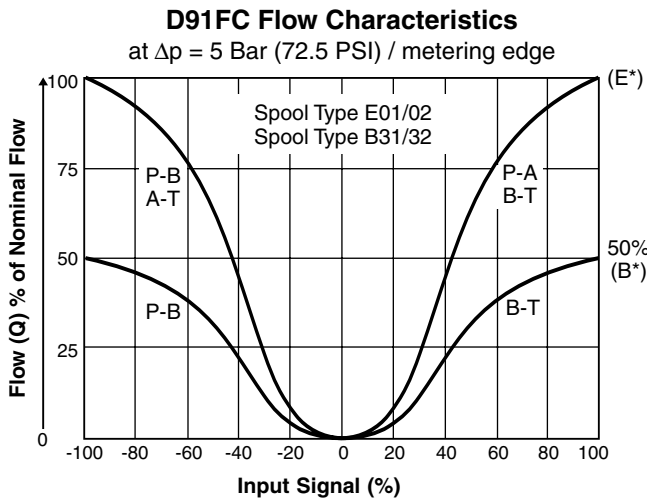
**D31FC**



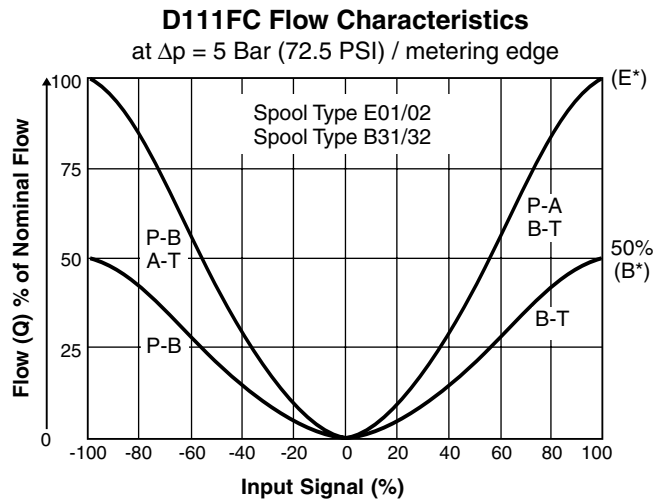
**D41FC**



**D91FC**



**D111FC**



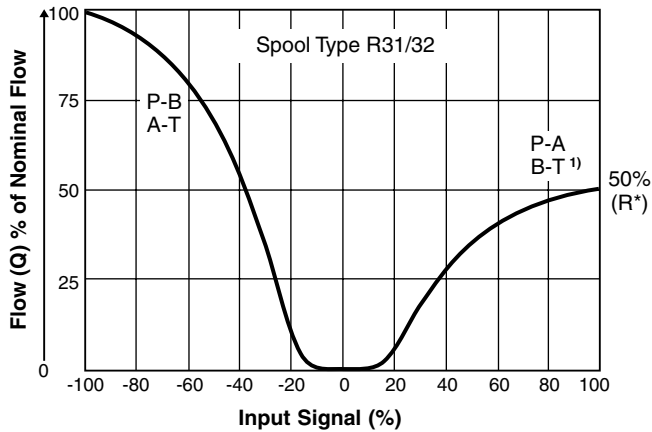
All performance curves measured with HLP46 at 50°C (122°F).



**D\*1FCR/Z**

**D31FC**

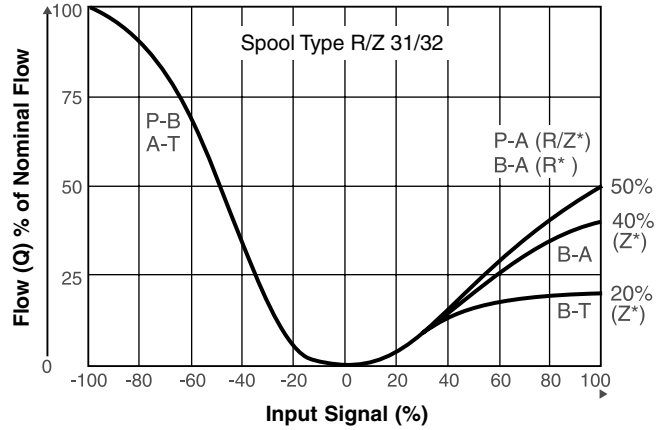
**D31FCR Flow Characteristics**  
 at  $\Delta p = 5$  Bar (72.5 PSI) / metering edge



<sup>1)</sup> with 2 tank ports

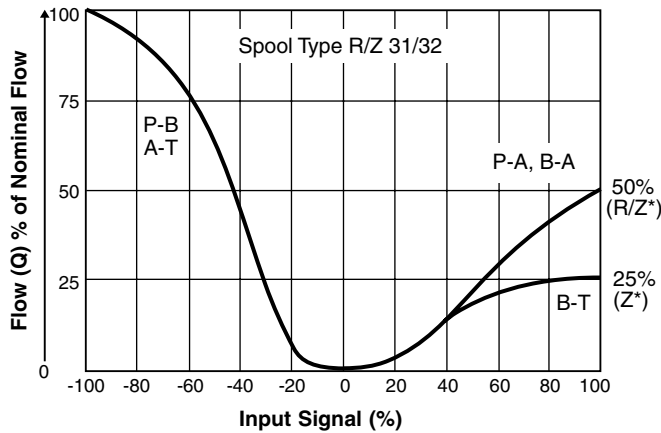
**D41FC**

**D41FCR/Z Flow Characteristics**  
 at  $\Delta p = 5$  Bar (72.5 PSI) / metering edge



**D91FC**

**D91FCR/Z Flow Characteristics**  
 at  $\Delta p = 5$  Bar (72.5 PSI) / metering edge

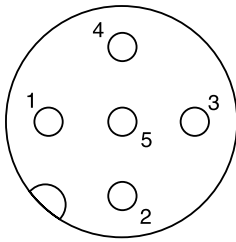


**D111FC – Spool Type R/Z on request**

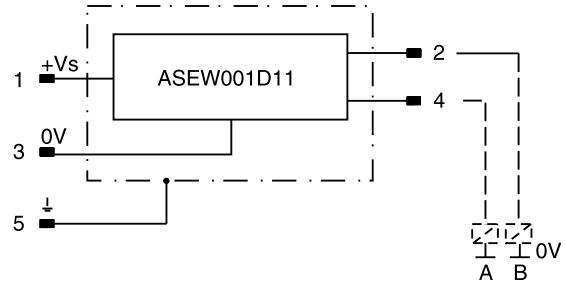
All performance curves measured with HLP46 at 50°C (122°F).

### Monitor Switch M12x1 Pin Assignment

**A**



- 1 + Supply 18...42V
- 2 Output B (normally closed)
- 3 0V
- 4 Output A (normally closed)
- 5 Earth ground



Signal	Output A (pin 4)	Output B (pin 2)
neutral	closed	closed
	open	closed
	closed	open

The neutral position is monitored. The signal changes after less than 10% of the spool stroke.

### Electrical Monitor Switch

Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature	[°C] 0...70; (32°F...158°F)
Supply Voltage/Ripple	[V] 18...42, ripple < 10% eff.
Current Consumption without Load	[mA] < 30
Maximum Output Current per Channel, Ohmic	[mA] 400
Minimum Output Load per Channel, Ohmic	[kOhm] 100
Maximum Output Drop at 0.2A	[V] < 1.1
Maximum Output Drop at 0.4A	[V] < 1.6
EMC	EN 61000-6-2, EN61000-6-4
Maximum tol. Ambient Field Strength	[A/m] 1200
Minimum Distance to Next AC solenoid	[m] 0.1
Interface	4+PE acc. IEC 61076-2-101 (M12)
Wiring Minimum	[mm²] 5 x 0.5 (AWG 20) overall braid shield
Wiring Length Maximum	[m] 50 (164 ft.)

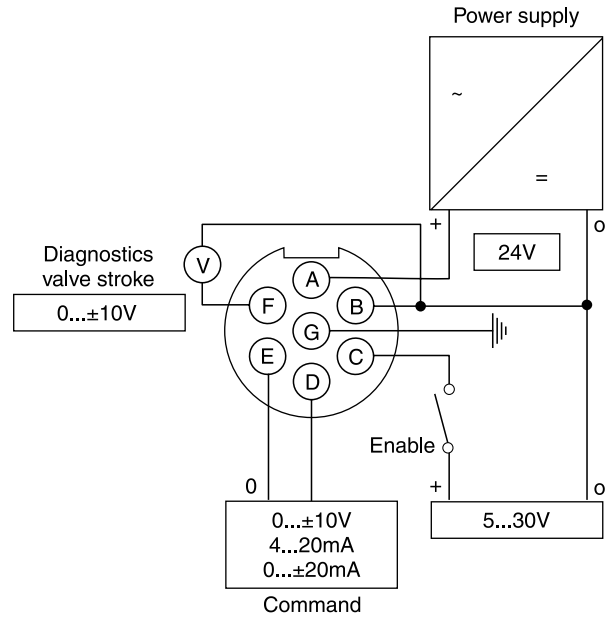
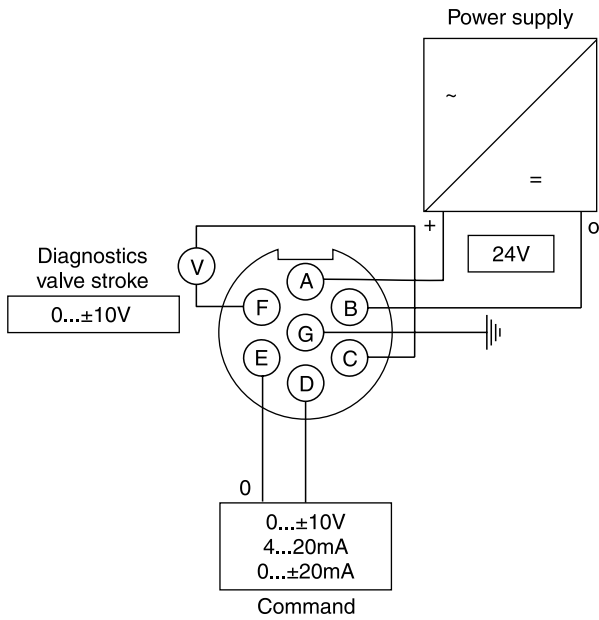
**Code 0**

**6 + PE acc. to EN 175201-804**

**Code 7**

**6 + PE acc. to EN 175201-804 + enable**

**A**



## ProPxD Interface Program

**A**

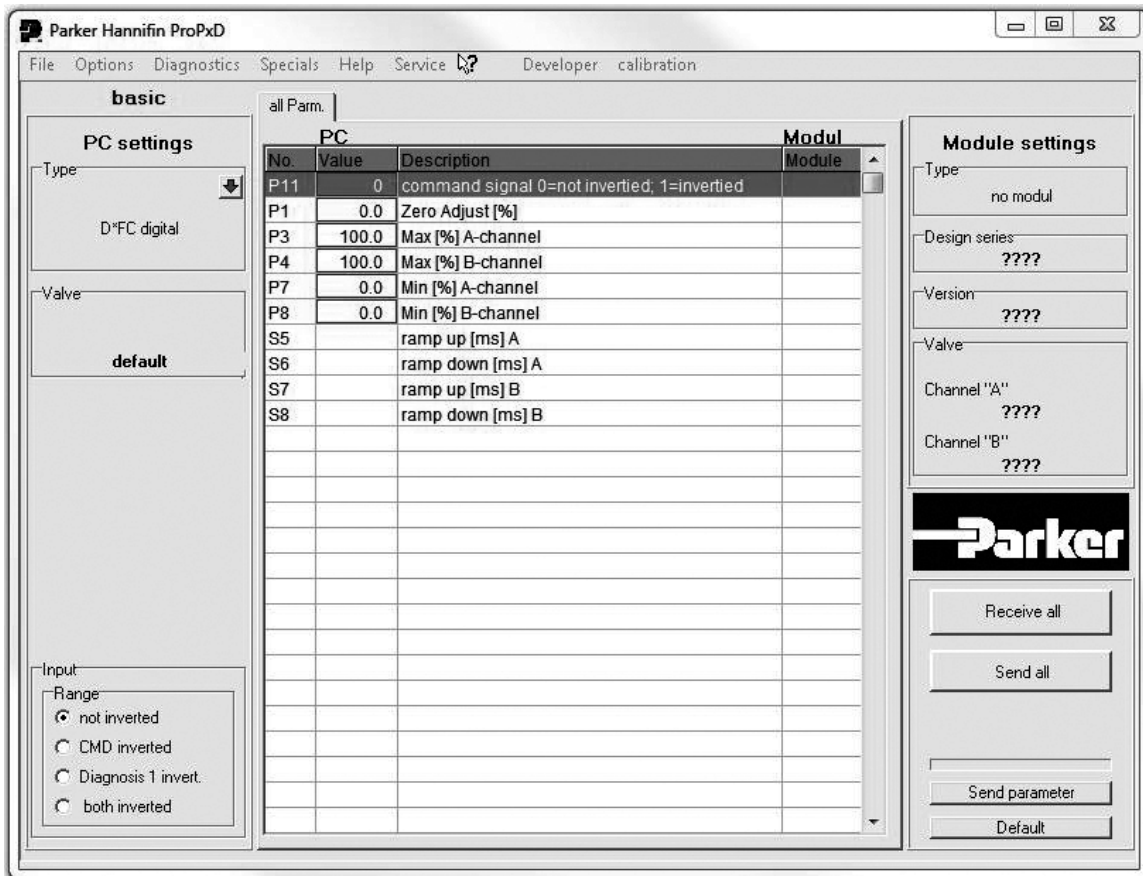
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

## Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

Simple to use interface program. Download free of charge [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) → **Services** → **downloads**

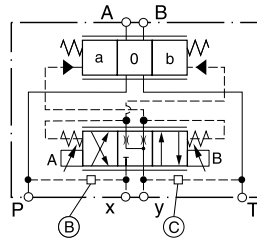


The parametrizing cable may be ordered under item no. 40982923.

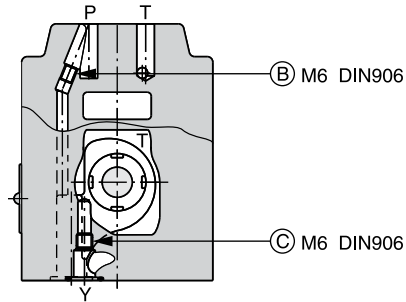
**Pilot Flow — Pilot Oil Inlet (Supply) and Outlet (Drain)**

○ open, ● closed

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

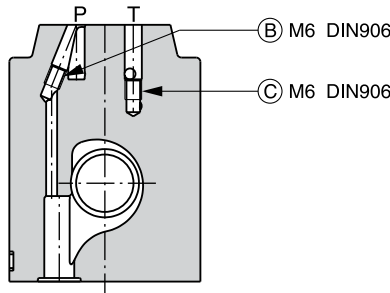


**D31FCB/E**

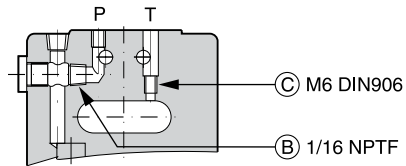


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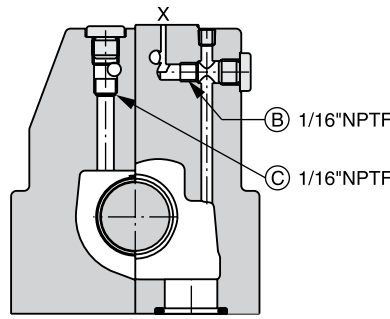
**D31FCR**



**D41FCB/E**

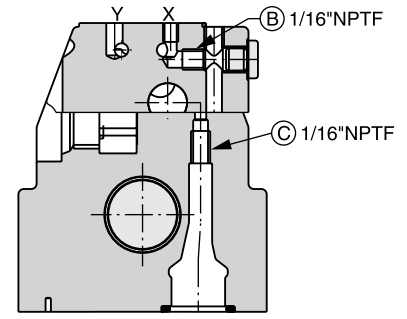


**D41FCR**



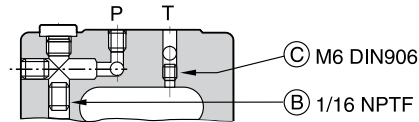
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**D41FCZ**

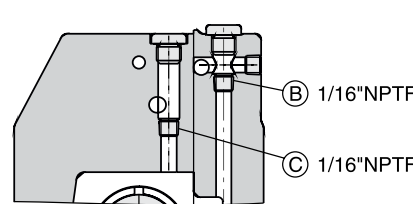


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**D91FCB/E**

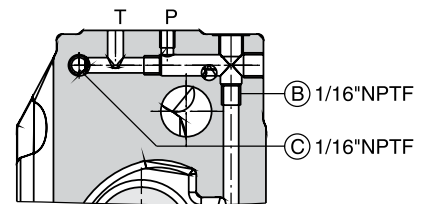


**D91FCR**

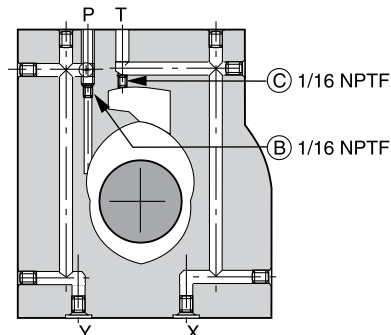


(drawn offset)

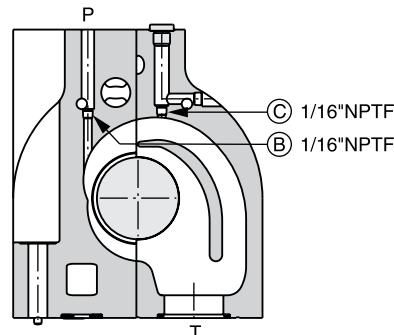
**D91FCZ**



**D111FCB/E**

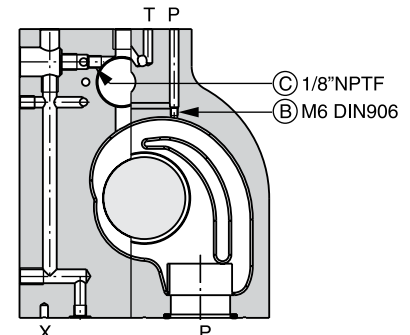


**D111FCR**



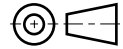
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**D111FCZ**



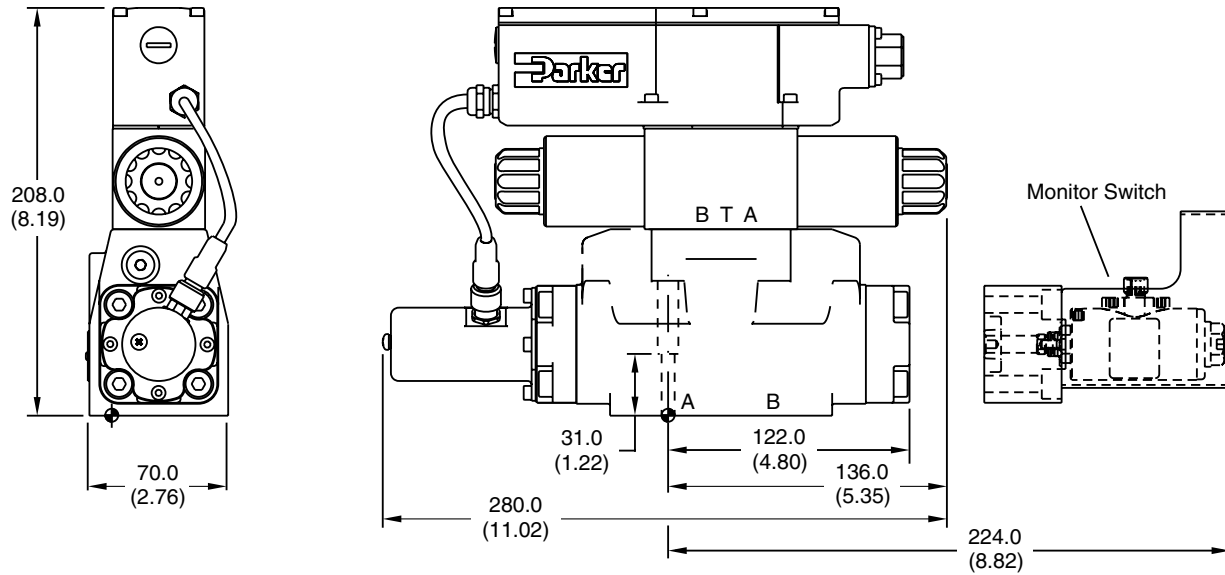
(drawn offset)

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



**A**

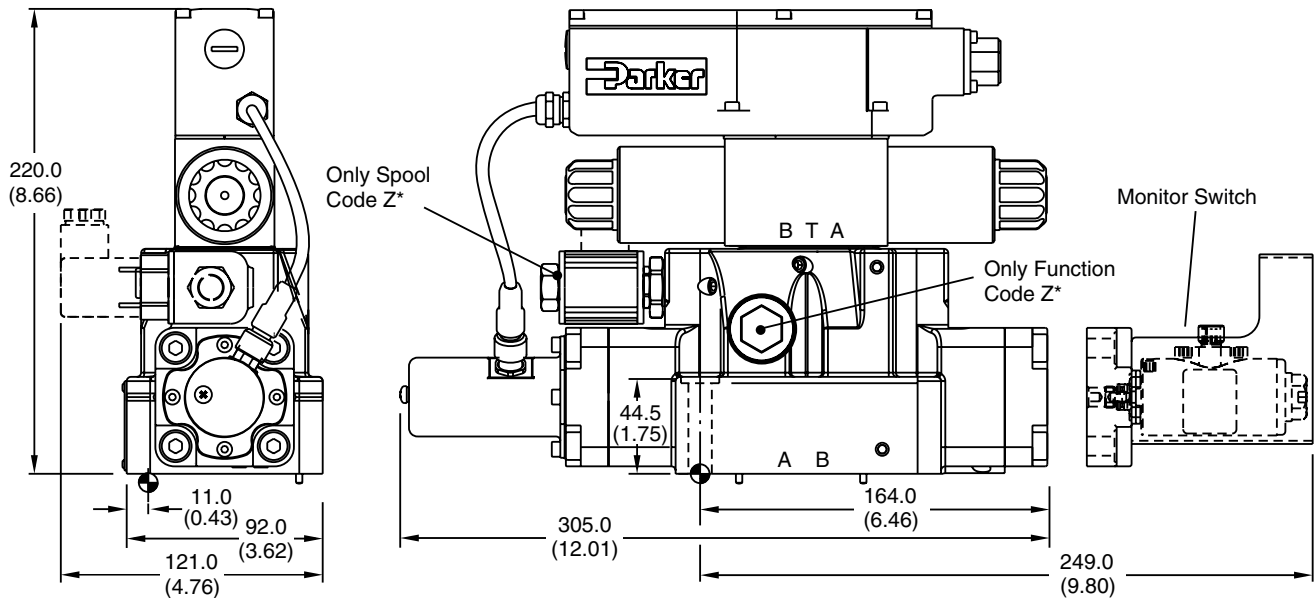
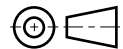
**D31FC**



Regenerative and hybrid function with additional plate H10-1666L, H10-1662, A10-1664, A10-1665L.

Surface Finish	Kit			Seal Kit
	BK385	4x M6x40 ISO 4762-12.9	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D31FC Fluorocarbon: SK-D31FC-V

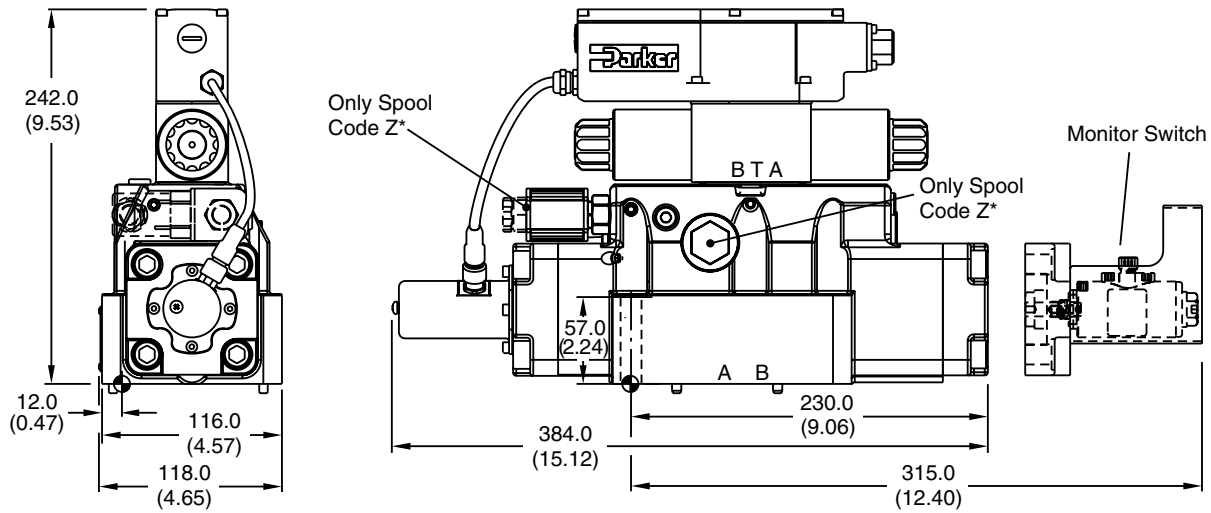
**D41FC**



Surface Finish	Kit			Seal Kit
	BK320	2x M6x55 4x M10x60 ISO 4762-12.9	13.2 Nm (9.7 lb.-ft.) 63 Nm (46.5 lb.-ft.) ±15 %	Nitrile: SK-D41FC Fluorocarbon: SK-D41FC-V

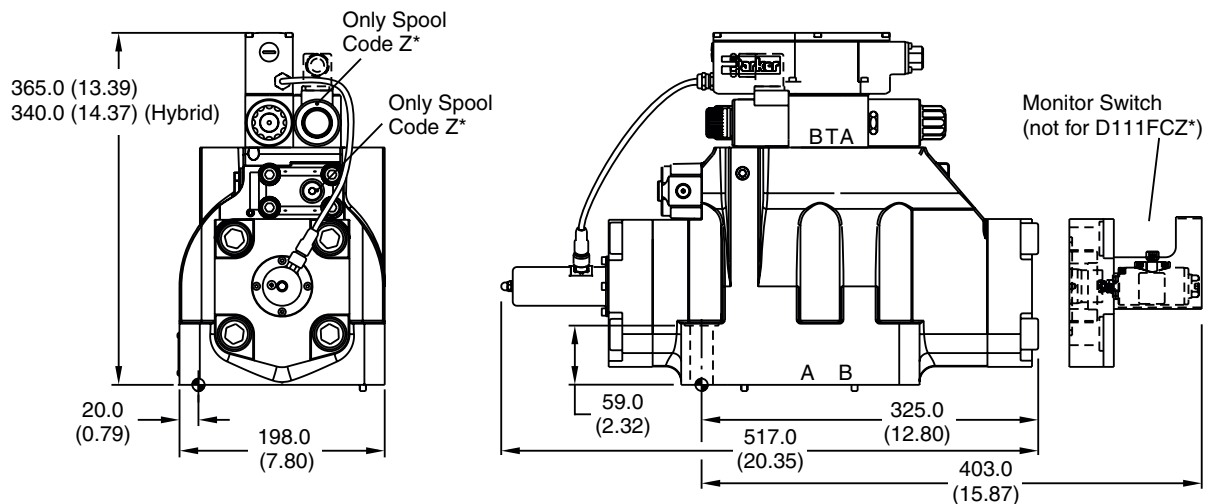
Inch equivalents for millimeter dimensions are shown in (\*\*)

**D91FC**



Surface Finish	Kit	ISO 4762-12.9	Torque	Seal Kit
$\sqrt{R_{max}6.3}$ $\square 0.01/100$	BK360	6x M12x75 ISO 4762-12.9	108 Nm (79.7 lb.-ft.) ±15 %	Nitrile: SK-D91FC Fluorocarbon: SK-D91FC-V

**D111FC**



Surface Finish	Kit	ISO 4762-12.9	Torque	Seal Kit
$\sqrt{R_{max}6.3}$ $\square 0.01/100$	BK386	6x M20x90 ISO 4762-12.9	517 Nm (381.3 lb.-ft.) ±15 %	Nitrile: SK-D111FC Fluorocarbon: SK-D111FC-V



**General Description**

Series D\*FX proportional directional control valves are direct operated solenoid valves with electronic spool position feedback, and on-board integrated control electronics. D\*FX valves are user configurable to proportionally control flow in response to voltage or current command signals. Valves are available in sizes NG6 (CETOP 3) and NG10 (CETOP 5).

Three electronic control options are available simplifying user application. Configurations include the industrial standard 7-pin interface, or options for a user configurable simple proportional analog outer closed loop, or ± 10V reference outputs which can be used as user command voltage references.

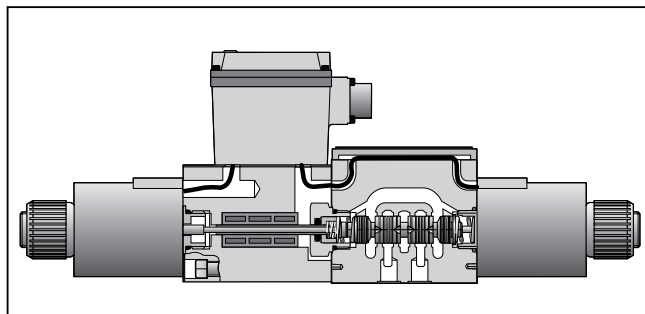
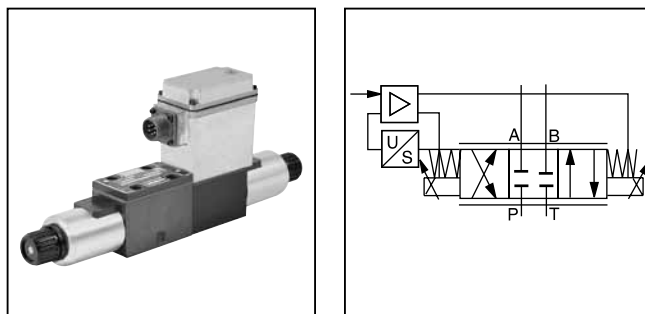
D\*FX valve performance is characterized by high resolution flow control, repeatability, and good dynamic performance. Typical applications include precise and reproducible control of actuator speed in rapid/slow speed profiling, and smooth acceleration and deceleration performance.

**Features**

- Integrated valve electronics.
- Versatile electronic control options.
- Spool position feedback.

**Specifications**

Interface DIN			NG6 (CETOP 3)	NG10 (CETOP 5)	
Flow Rating @10 Bar (150 PSI) Δp (P→A, B→T) (spool options up to) <sup>1)</sup>			LPM (GPM)	20 (5.3)	60 (15.9)
Maximum Flow			LPM (GPM)	47 (12.5)	170 (45)
Step Response (time to reach 90% of a 100% step command) ms			60	75	
Hysteresis	%	<1.5	Command Signal (impedance) (select by ordering code) 24V Version 'J'		
Repeatability	%	<0.5			
Max. Operating Pressure			Command Polarity		
Port P, A, B	Bar (PSI)	315 (4500)			Pin 'D' more positive than 'E'; Flow P to A
Port T		35 (500)			
Fluid Cleanliness Level		ISO Class 18/16/13	Spool Position Monitor 24V Version 'J' 12V Version 'K'		
Fluid Viscosity, Recommended		75 – 600 SSU			
Fluid Temperature, Recommended		0°C to +60°C (+32°F to +140°F)	Voltage References:		
Ambient Operating Temperature		-20°C to +60°C (-4°F to +140°F)			Not a powered output Only for 10K Ohm pots
Electrical Power Requirements			Mating Connector Only for 10K Ohm pots 7-Pin CE for Electronic Design 'B' 6-Pin for Electronic Design 'C' & 'D'		
24V Version 'J': NG6	(03)	18 to 30 VDC, 3A			Part #5004072
24V Version 'J': NG10	(05)	18 to 30 VDC, 4A			
12V Version 'K': NG06	(03) only	11.5 to 15 VDC, 4A			
			Environmental Protection Class		NEMA 4 (IP65)



- Spring centered spool.
- Manual override.
- Progressive flow characteristics for high resolution flow rate adjustment for small commands.
- LED functional diagnostics.

1) Actual pressure drop required for each metering land, up to the specified maximum flow rate is:

$$\Delta P_{\text{actual}} = (5) \left( \frac{Q_{\text{actual}}}{Q_{\text{rated}}} \right)^2 \text{ Bar; (Q in LPM)} \quad [\text{or}] \quad = (75) \left( \frac{Q_{\text{actual}}}{Q_{\text{rated}}} \right)^2 \text{ PSI; (Q in GPM)}$$

Flow rate for different Δp per control edge:  $Q_x = Q_{\text{Nom.}} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{\text{Nom.}}}}$

D\_FX.indd, ddp





**D\*FX**

Proportional Directional Flow Control Valve with Spool Position Feedback and Integrated Electronics

Code	Description
D1FX	NG6/CETOP 3
D3FX	NG10/CETOP 5

Spool Type

Flow

Style

Seal

Electronic Design

Supply Voltage

0  
Electronic Accessories

0  
Valve Accessories

Design Series

NOTE:  
Not required when ordering.

Code	Description
J	24 VDC
K	12 VDC*

\* Available only with D1FX Electronic Design Codes C & D.

Code			Spool Type
Q <sub>A</sub> =Q <sub>B</sub>	Q <sub>A</sub> >Q <sub>B</sub> *	Q <sub>B</sub> >Q <sub>A</sub> **	
E01	B31	A31	
E02	B32	A32	
E85***	-	-	

\* Reduced flow rate on port B.  
 \*\* Reduced flow rate on port A.  
 \*\*\* 5% lap spool for special applications. Consult Factory;  
 D1FX: Flow code F, C style only.  
 D3FX: Flow code M, C style only.

Code	Description*
B	Standard CE Compliant
C	On-board Configurable Outer Closed Loop
D	On-board ±10V Reference Voltages

\*All designs are user configurable to voltage or current command.

Code	Description
N	Nitrile
V	Fluorocarbon

Note: NG10 (CETOP5) valves are supplied with bolt kit BK98 (1/4 – 20 x 1.625). For metric bolt kit BK385 (M6 x 40 mm), add "-X6181" to ordering code.

Code	Flow at Δp 5 Bar (72.5 PSI) per metering edge	
	D1FX LPM (GPM)	D3FX LPM (GPM)
C	7.5 (2)*	-
F	15 (4)	-
H	20 (5.3)*	20 (5.3)*
K**	-	30 (7.9)
M	-	40 (10.6)
S	-	60 (15.9)*

\* Spool type E only.  
 \*\* Spool type E01 only.

Code	Style
C	
K	
E*	

\* Only available on D1FX

**Weight:**

D1FX	3.4 kg (7.5 lbs.)
D3FX	8.3 kg (18.3 lbs.)

**Mounting Interface**

Refer to Mounting Interface Dimensions in the Proportional Directional Valve section of this catalog.

**Accessories**

Refer to the Accessories section for bolt kits, subplates, connectors and pre-assembled cable assemblies.

**Application Guidelines**

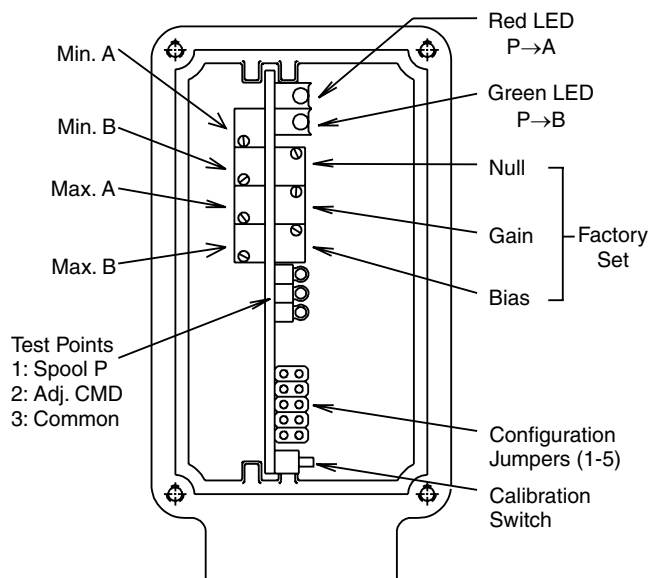
D\*FX proportional valves are available in three control configurations. Option 'B' conforms to the industrial proportional valve standard and is interchangeable with most competitors' valves of this type. Options 'C' and 'D' are designed to simplify user application by providing specific features. Note that the 'B' control option uses the industrial standard CE compliant 7-pin MS connector while options 'C' and 'D' use a 6-pin MS connector. Refer to the table below for connector pin-out assignments.

Specifications	Electronic Design Option			
		'-B'	'-C'	'-D'
<b>Function</b>		Connector Pin Assignment		
Power Supply	+V	A	E	E
	0V	B	D	D
Reference	+10V	-	A	A
Outputs	-10V	-	F	F
Enable		C	-	-
Command	+CMD	D	B	B
	-CMD	E	-	-
Spool Position Monitor		F	-	C
Outer Loop Feedback – user		-	C	-
Protective Ground		G	-	-

**Internal Adjustment**

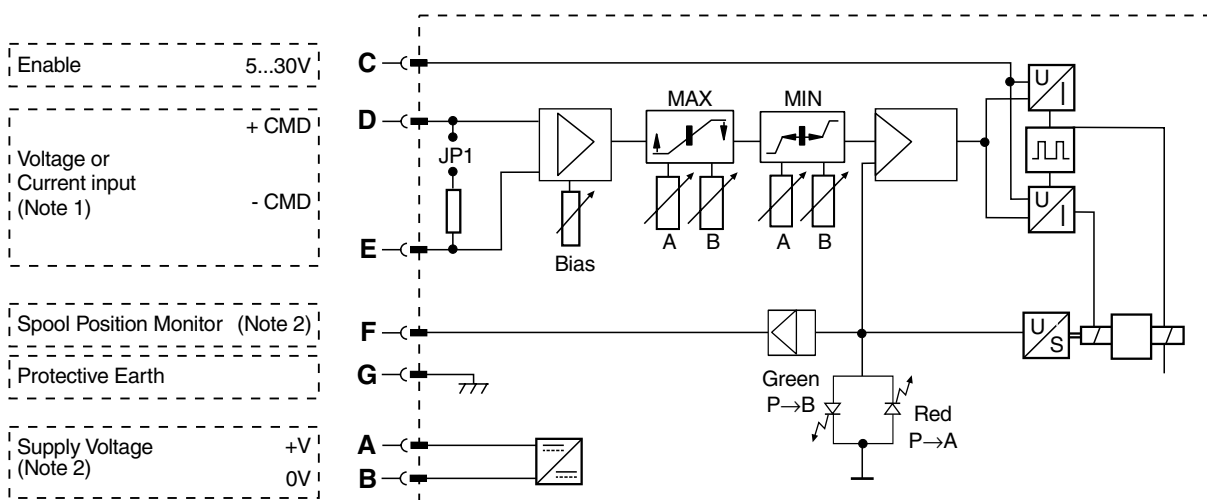
Refer to the Installation Guide for set-up, configuration, and application guidelines (packaged with each valve).

D1FX: Installation Bulletin 2583-M1/USA  
D3FX: Installation Bulletin 2587-M1/USA



**Design 'B' Option — Industrial Standard 7-Pin MS Connector Interface**

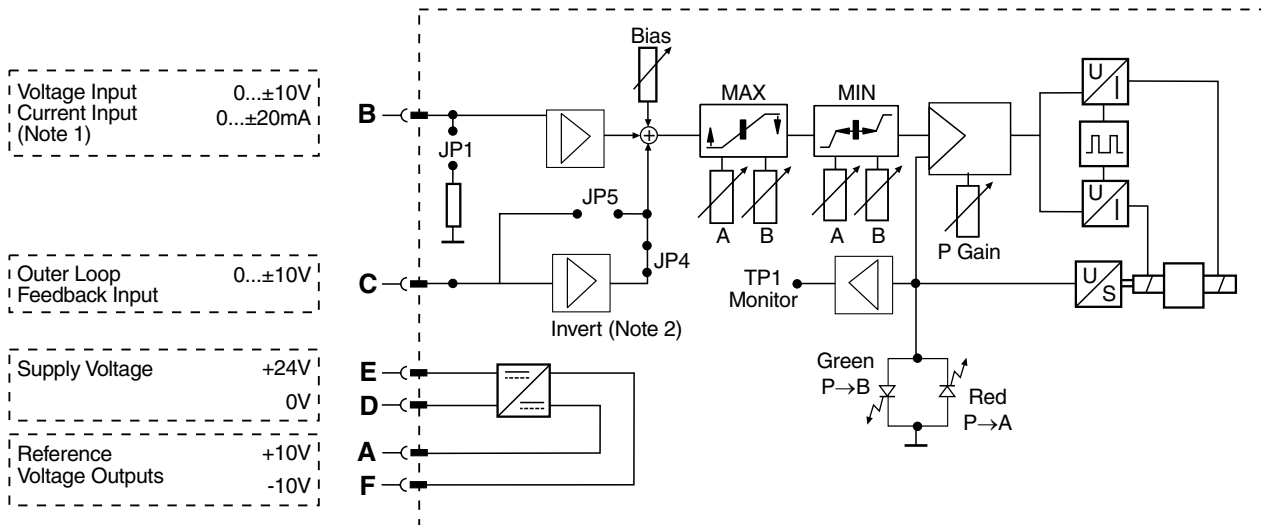
Electronic design option 'B' implements the industrial standard 7-pin MS connector interface. The design provides a differential command input that is user configurable as voltage or current, an external valve enable feature, and a spool position monitor output. To specify this option, refer to the Ordering Information page, Electronic Design block.



Note 1: Install jumper JP1 for current command input. Refer to Installation Bulletin 2583-M1/USA (D1FX).  
Note 2: Refer to specifications.

### Design 'C' Option — User Configurable Analog Outer Closed Loop

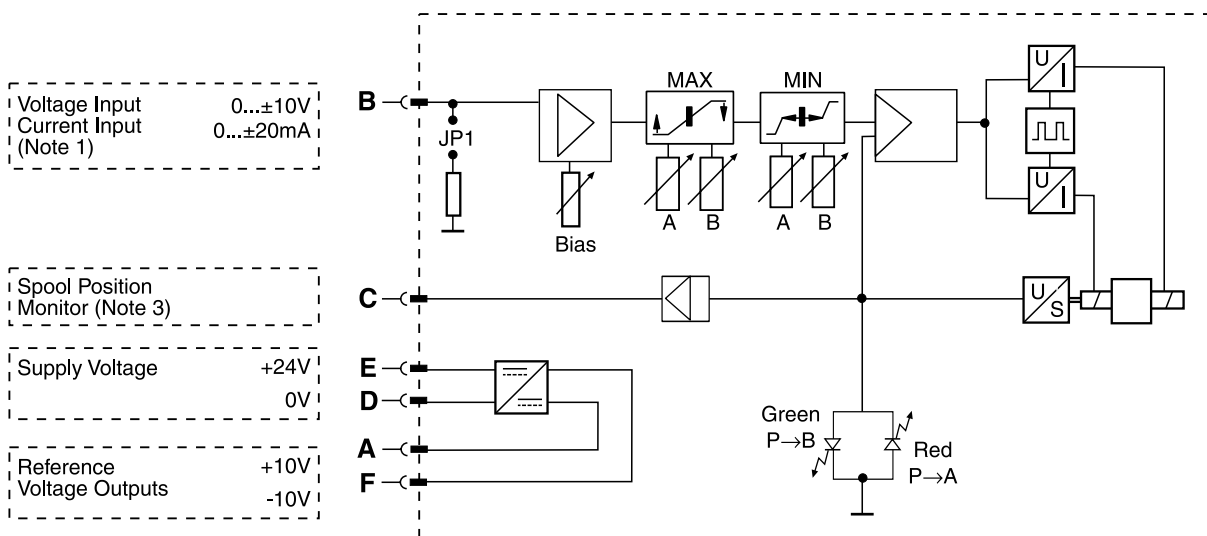
Electronic design option 'C' provides an additional analog closed outer loop function for user application. This feature can be used to control simple position control loops where analog resolution and a single proportional gain control are adequate. The design provides a single ended command input that is user configurable as voltage or current, and an outer loop feedback sensor voltage input.  $\pm 10$  volt outputs are available to reference the outer loop feedback sensor if required. To specify this option, refer to the Ordering Information page, Electronic Design block.



Note 1: Install jumper JP1 for current command input. Refer to Installation Bulletin 2583-M1/USA (D1FX).  
 Note 2: Install jumper JP4 to invert user outer loop feedback input signal.

### Design 'D' Option — Single Ended, Bipolar Command Input, with $\pm$ Volt Reference Output

Electronic design option 'D' provides a single ended, bipolar command input that is user configurable as voltage or current.  $\pm 10$  volt references are available for user supplied off-board command potentiometers. A spool position monitor output is also provided. To specify this option, refer to the Ordering Information page, Electronic Design block.

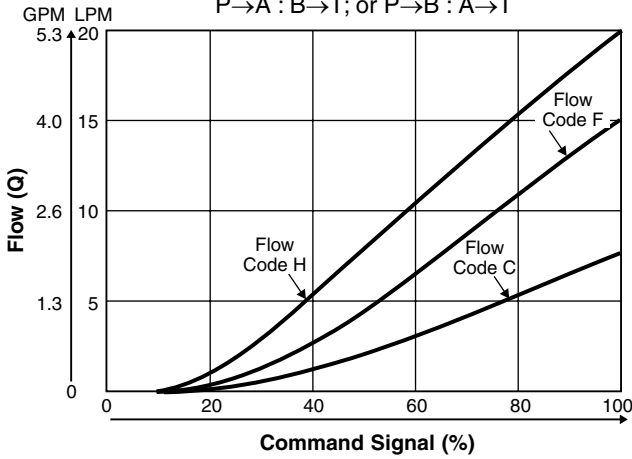


Note 1: Install jumper JP1 for current command input. Refer to Installation Bulletin 2583-M1/USA (D1FX).  
 Note 2: Refer to specifications.

**A**

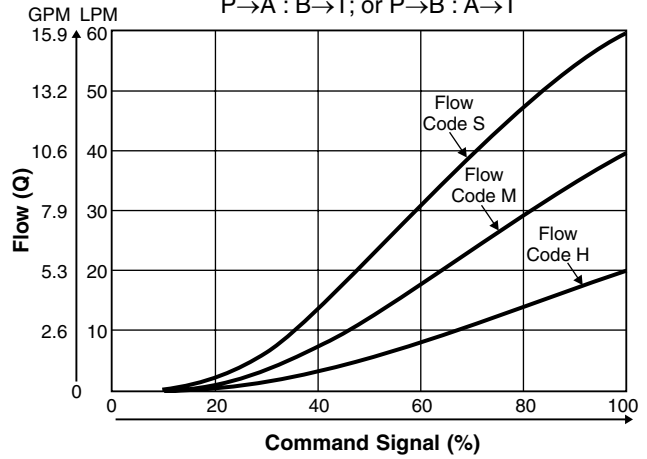
**D1FX Flow Characteristics**

at  $\Delta p = 5 \text{ Bar (72.5 PSI)}$  per metering edge  
 $P \rightarrow A : B \rightarrow T$ ; or  $P \rightarrow B : A \rightarrow T$



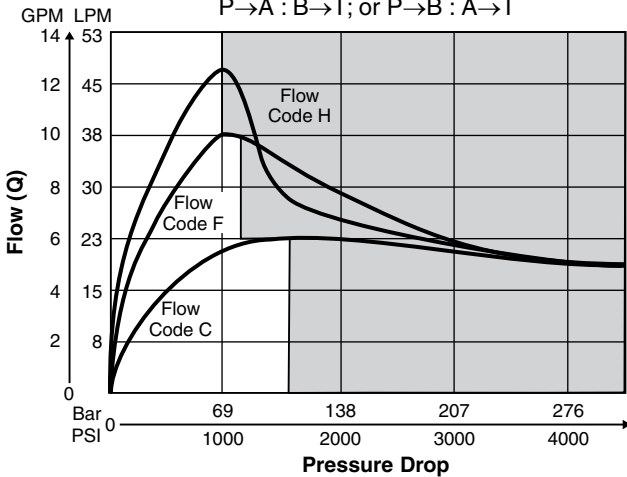
**D3FX Flow Characteristics**

at  $\Delta p = 5 \text{ Bar (72.5 PSI)}$  per metering edge  
 $P \rightarrow A : B \rightarrow T$ ; or  $P \rightarrow B : A \rightarrow T$



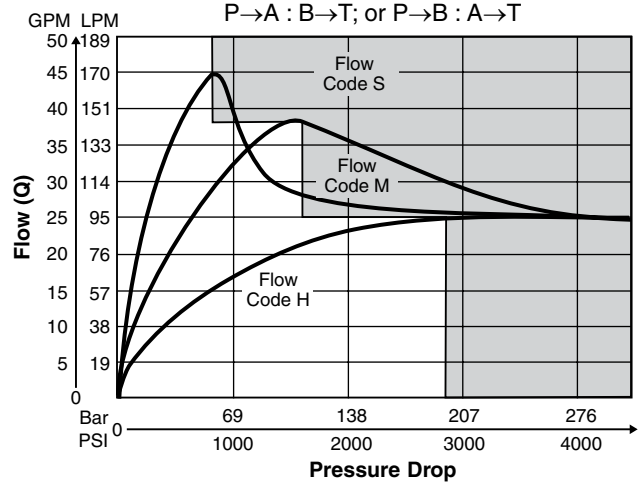
**D1FX Operating Limits 1)**

at 100% Command  
 $P \rightarrow A : B \rightarrow T$ ; or  $P \rightarrow B : A \rightarrow T$



**D3FX Operating Limits 1)**

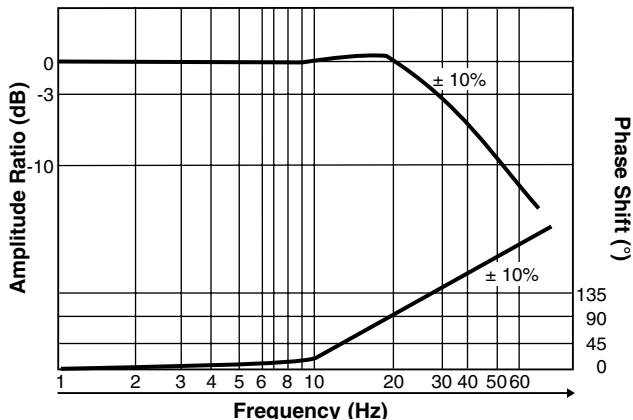
at 100% Command  
 $P \rightarrow A : B \rightarrow T$ ; or  $P \rightarrow B : A \rightarrow T$



1) Shaded area: Actual flow subject to the system load dynamics  
 Note: 81 and 82 spools - decrease limits by 15%

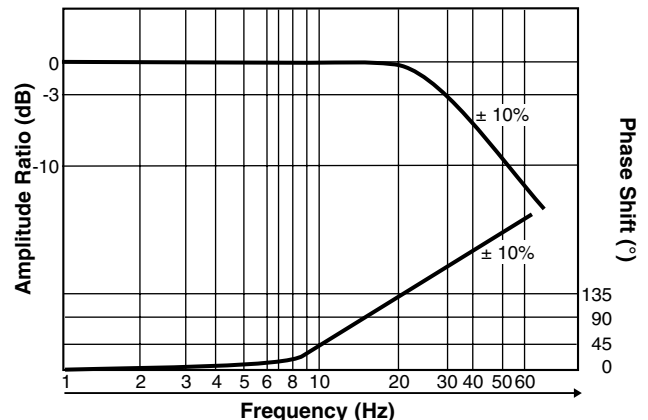
**D1FX Frequency Response**

at 10% Command, 50% Offset



**D3FX Frequency Response**

at 10% Command, 50% Offset

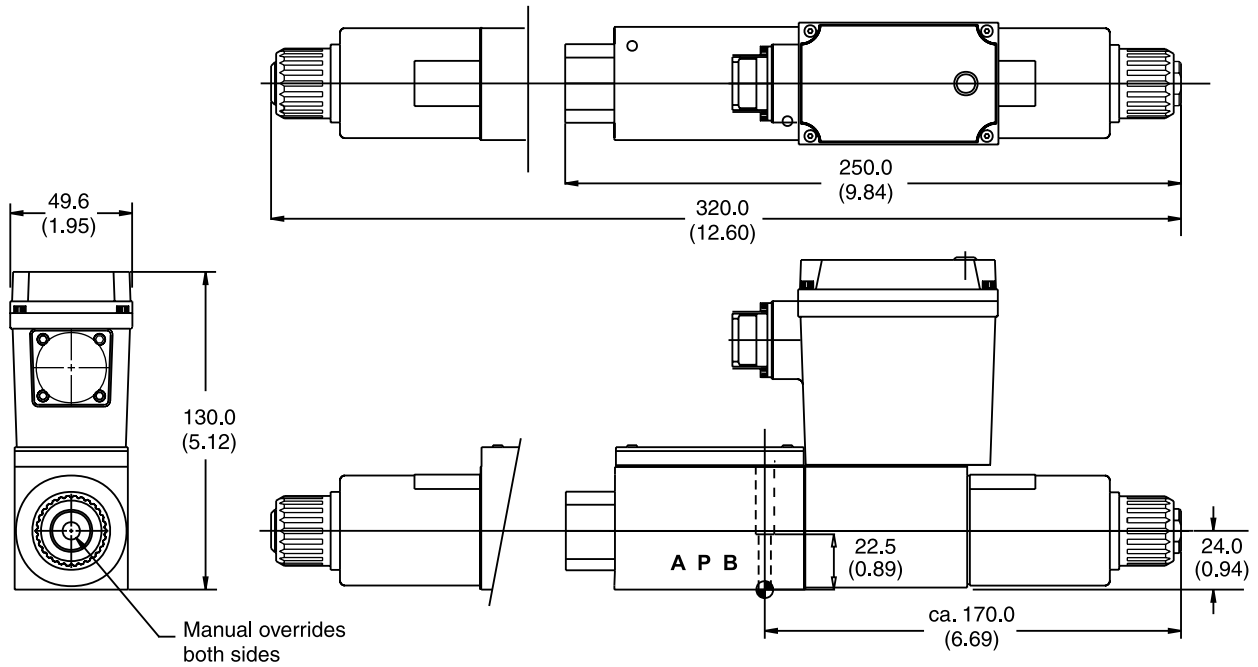


**Dimensions**

**Proportional Directional Control Valves  
Series D\*FX**

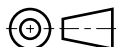
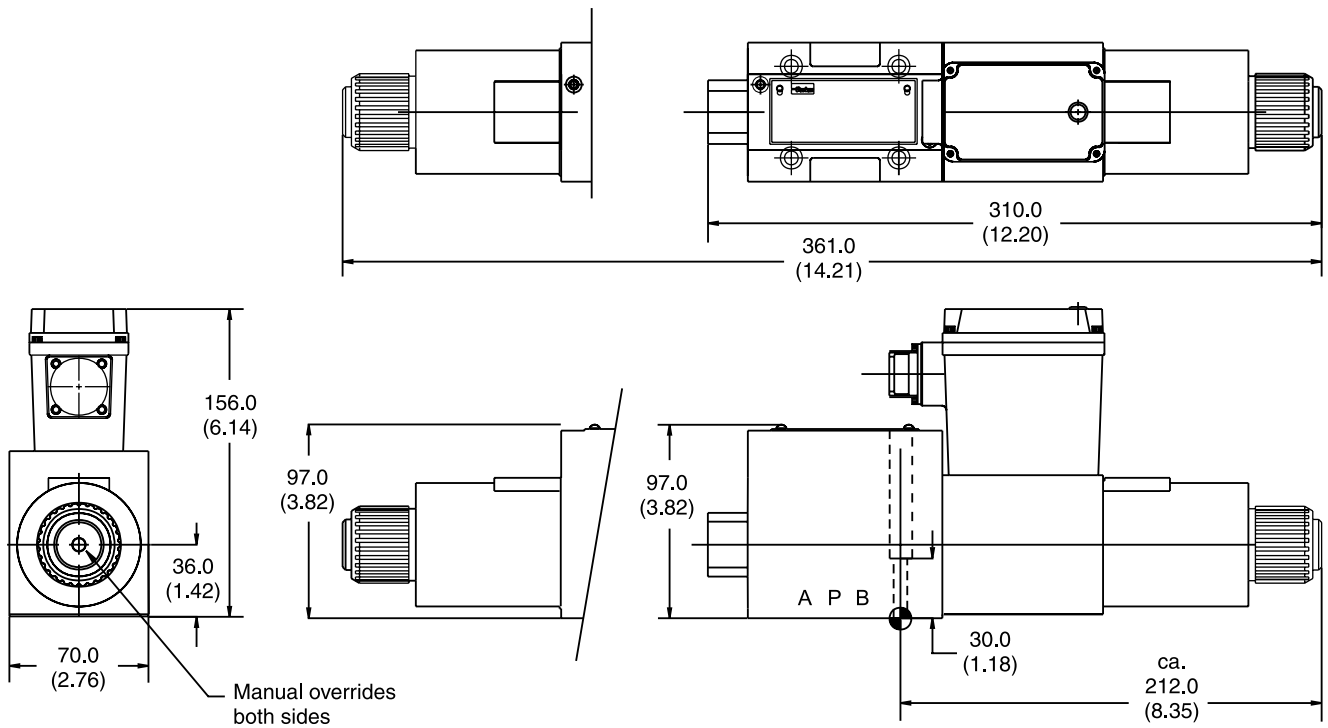
**D1FX**

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



**D3FX**

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



**General Description**

**A**

The D1TX throttle valve is designed to vary the amount of fluid flow in proportion to a variable input command signal. The valve will respond to voltage command signals of 0 to +10 VDC, or current command signals of 4-20 mA. The valve features on-board electronics and built-in spool position feedback for low hysteresis.

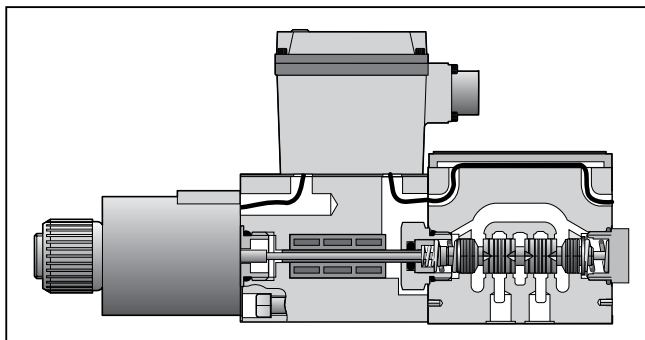
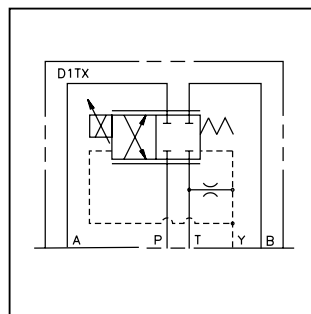
**Operation**

A minimum of 20 PSI must be maintained on the “Y or L” ports for proper operation. An external supply of 20 PSI or a 20 PSI check valve may be used for this purpose.

To simplify piping of the valve for the maximum flow output, order our flow conversion module, FCB03\*\* which has the 20 PSI check valve already installed. This module converts all of the flow paths internally. Connect the “P” for supply pressure, “B” for outlet flow, and “Y or L” for drain line flow.

**Features**

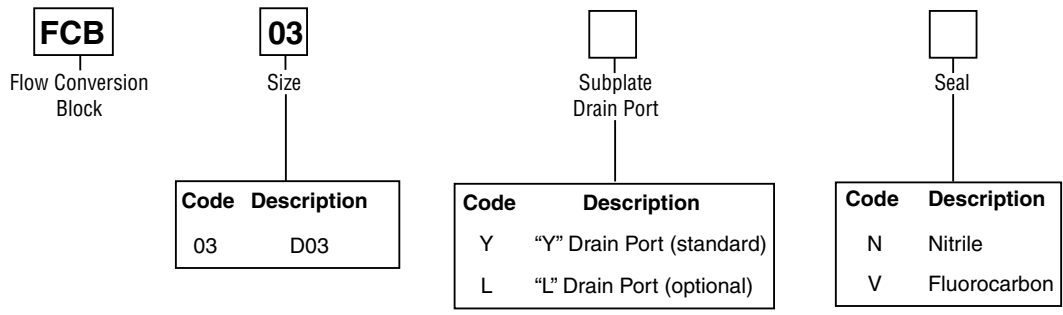
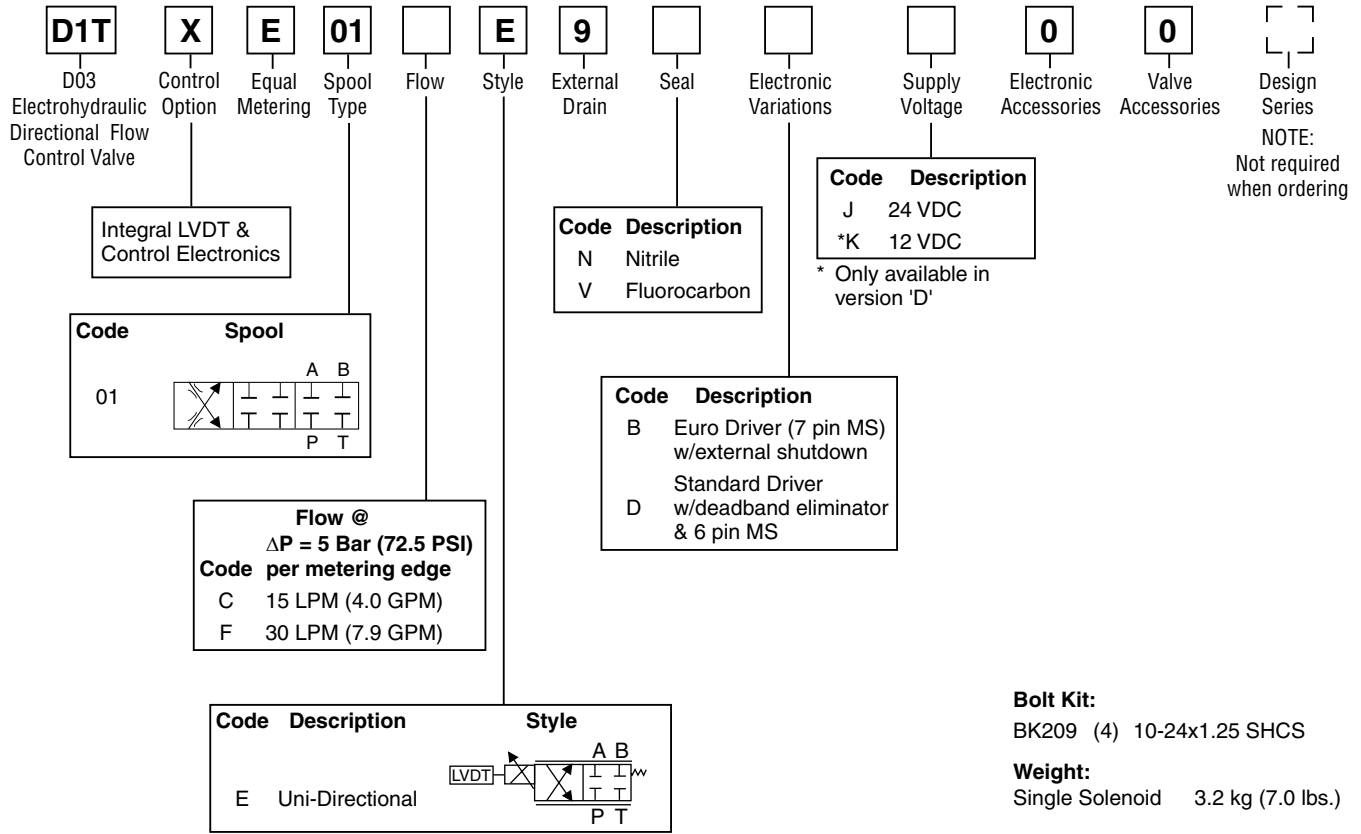
- **Integral Electronics** — Eliminates the time consuming and often costly wiring between the valve and driver card. Provides a fully tested valve/driver package.
- **LVDT** — The spool position feedback provides low hysteresis.
- **Manual Override**



- **Diagnostic Indicator** — An LED confirms movement of the spool.
- **Rugged Construction** — Integral electronics are packaged in a rugged die cast aluminum enclosure to protect it from harsh environments.
- **Electrical Interface** — Standard MS style connector for interface to computers and PLC's.

**Specifications**

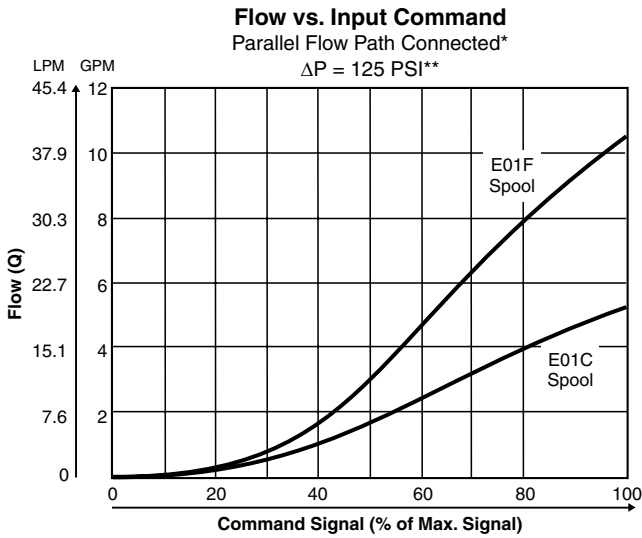
<b>Interface</b>	NFPA D03, CETOP 3	<b>Version</b>	<b>Command Signal</b>	<b>Input Impedance</b>
<b>Maximum Pressure</b>	207 Bar (3000 PSI)	BJ, DJ	0 to + 10 VDC Sgl. Coil	100 k ohms
<b>Drain Line Pressure ("T" and "Y" or "L")</b>	1.4 Bar (20 PSI) minimum 35 Bar (500 PSI) maximum	DK	0 to + 5 VDC Sgl. Coil	100 k ohms
<b>Flow</b>	Up to 61 LPM (16 GPM) (Dual Ported)	BJ, DJ	4 to 20 mA Command	499 ohms
<b>Frequency Response</b>	> 20 Hz with 10% CMD at 50% spool stroke	DK	4 to 20 mA Command	249 ohms
<b>Step Response</b>	Versions BJ, DJ: Full Shift, <60 mS Version DK: Full Shift, <70 mS	<b>Operating Temp. Range (Ambient)</b>	24 volt model: -20° to 60°C (-4° to 140°F) 12 volt model: -29° to 60°C (-20° to 140°F)	
<b>Repeatability</b>	< 0.5% of spool stroke	<b>Spool Position Voltage</b>	Version BJ, DJ: (-10 VDC) Version DK: (-5 VDC)	
<b>Hysteresis</b>	< 1.5%	<b>Reference Supply</b>	+10 VDC @ 10 mA (BJ, DJ) +5 VDC @ 10 mA (DK)	
<b>Nominal Deadband</b>	10%	<b>Low Power Fault Protection</b>	20 VDC (BJ, DJ) 11 VDC (DK)	
<b>Power Requirements</b>	24 VDC @ 3 amps nom.** (BJ, DJ) Range 21 to 30 VDC regulated 12 VDC @ 3 amps nom. (DK)** Range 11.5 to 15 VDC regulated <b>**4 amp regulated power supply recommended</b>	<b>Diagnostics</b>	Red LED for spool position	
		<b>Viscosity Range</b>	75 - 600 SSU	
		<b>Fluid Cleanliness</b>	ISO Class 16/13, SAE Class 4 or better	
		<b>Protection Class</b>	Nema 4 (IP65)	



**Use Bolt Kit BK243 when including the FCB under the D1TX.**

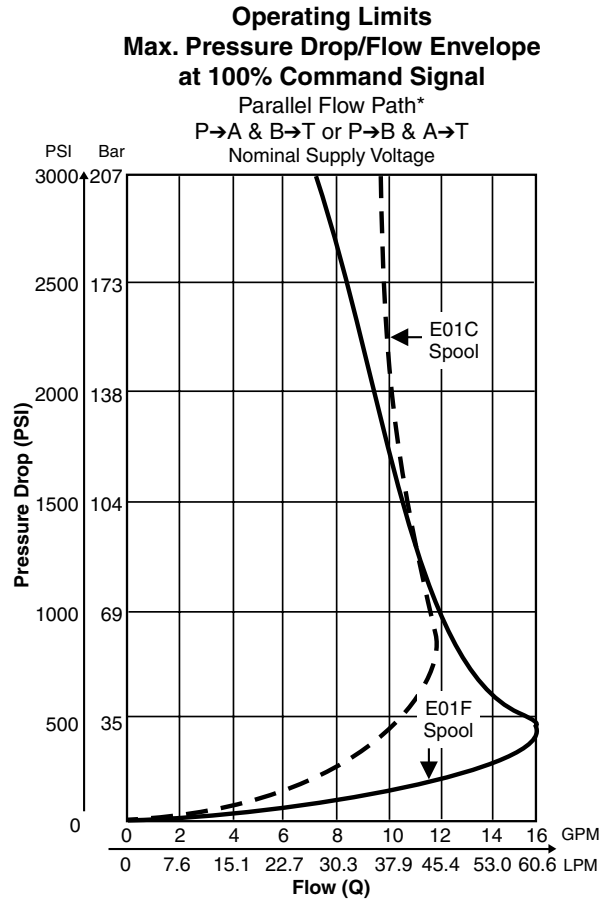
**Performance Curves**

**A**



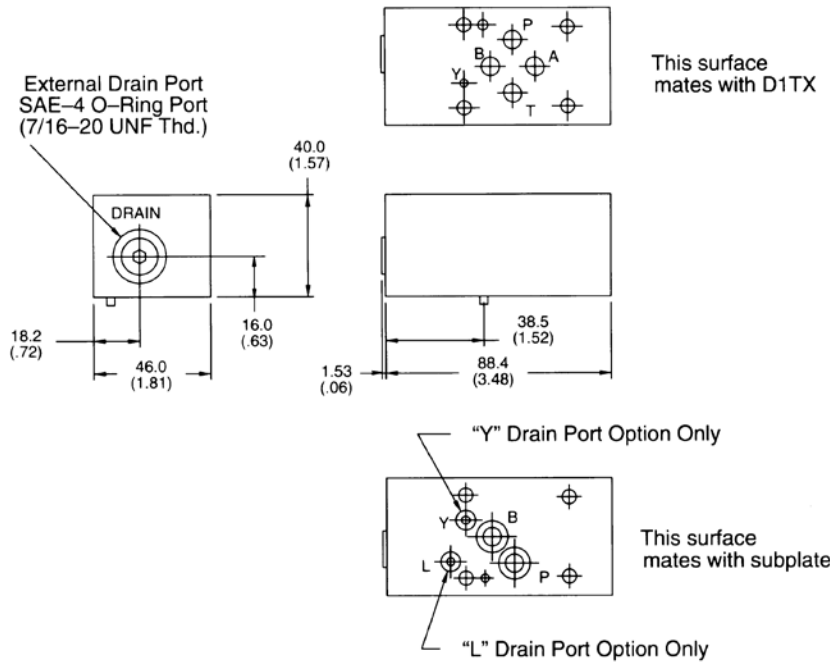
\* Requires Flow Conversion Block FCB\*\*

\*\* Flow rate for different Δp per control edge:  $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$



**Flow Conversion Block FCB03**

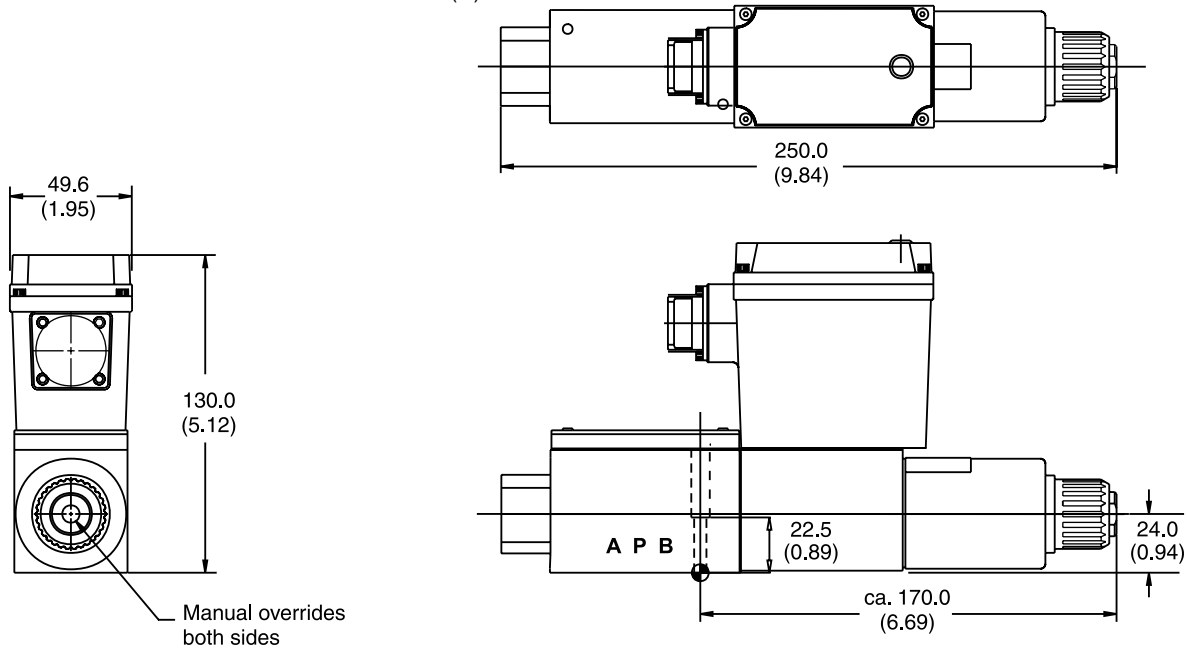
Inch equivalents for millimeter dimensions are shown in (\*\*)





**Dimensions**

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

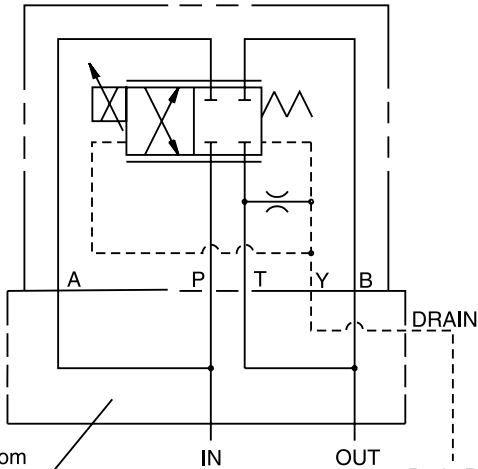


Manual overrides  
 both sides



**Hydraulic Connections**

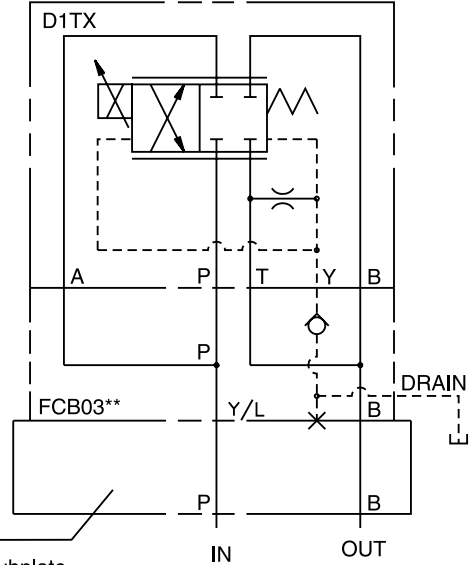
Parallel Flow Hydraulic  
 Connections for D1TX Valve



Custom  
 Manifold  
 or Subplate

Drain Pressure:  
 35 Bar (500 PSI) max.  
 Must maintain minimum  
 back pressure of  
 1.4 Bar (20 PSI)

Parallel Flow Hydraulic Connections for  
 D1TX Valve with Flow Conversion Block



Standard  
 NFPA D03  
 CETOP 3 Subplate

**Mounting Surface**

Surface must be flat within  
 0.10 (.0004) T.I.R. and  
 smooth within 32 micro-inch.

Torque bolts to 5.6 N.m.  
 (50 in.-lbs.)

COMBINATION	Required Ports					
	P	A	B	T	Y	L
D1TX valve alone	✓	✓	✓	✓	✓	
D1TX w/FCB03Y	✓		✓		✓*	
D1TX w/FCB03L	✓		✓			✓*

\*Y & L port not required if external drain port  
 (SAE-4) is used.

**A**

**General Description**

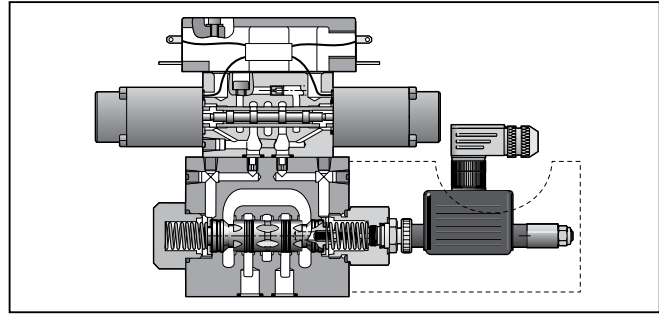
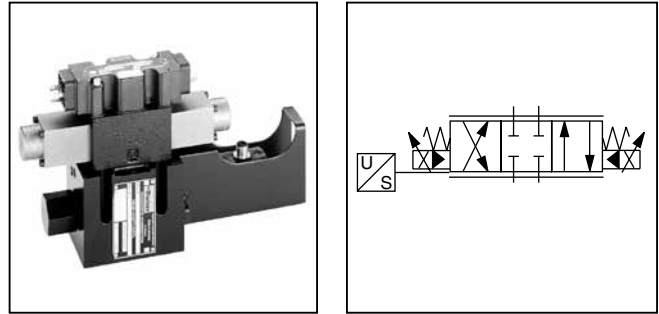
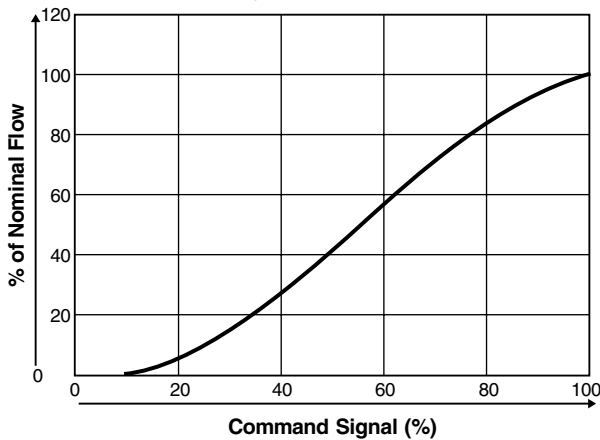
Series D\*1FS proportional directional control valves are high performance, two stage pilot operated solenoid valves with electronic spool position feedback. Valves are controlled by 'PWD' Series DIN electronics. Valves are available in sizes NG10 (CETOP 5), NG16 (CETOP 7), NG25 (CETOP 8) and NG32 (CETOP 10).

D\*1FS valve performance is characterized by high resolution flow control, repeatability and good dynamic performance. Typical applications include precise and reproducible control of actuator speed in rapid / slow speed profiling, and smooth acceleration and deceleration performance.

**Performance Curve**

**Flow Characteristics**

at 5 Bar (72.5 PSI) per metering edge  
 Typical flow curve

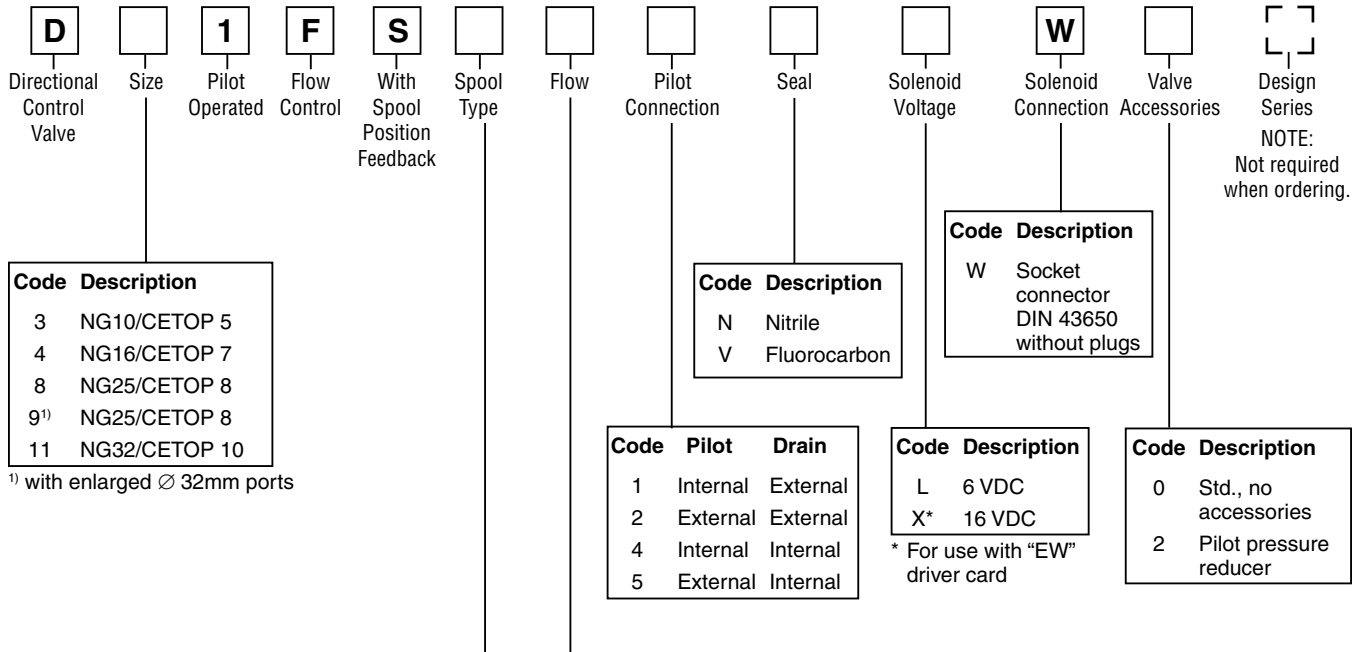


**Features**

- Standard DIN/ISO/CETOP/NFPA interfaces.
- Spool position feedback.
- High Frequency response.
- Spring centered main stage spool.
- LED functional diagnostic indicator.
- Wide selection of spool options, and flow capacity.
- 2:1 ratio, and Regeneration spool options.

**Specifications**

Interface DIN		NG10 (CETOP 5)	NG16 (CETOP 7)	NG25 (CETOP 8)	NG32 (CETOP 10)
<b>Flow Rating @ 10 Bar (150 PSI) Δp (P→A, B→T)</b>					
	LPM (GPM)	45 (12)	120 (32)	300/400 (79/106)	1000 (264)
<b>Maximum Flow</b>					
		389@ 1500 PSID	1208@ 2700 PSID	193@ 1500 PSID	
<b>Step Response</b> (time to reach 90% of a 100% step command)		ms	35	60	80
<b>Repeatability</b>	%	<0.5		<b>Fluid Cleanliness Level</b>	
<b>Hysteresis</b>	%	<0.5		ISO Class 16/13	
<b>Pilot Flow</b>				<b>Fluid Temperature, Recommended</b>	
Continuous	LPM (GPM)	<1.2 (0.3)		0°C to +60°C (+32°F to +140°F)	
<b>Operating Pressure</b>				<b>Ambient Operating Temperature</b>	
Port P, A, B	Bar (PSI)	345 (5000) max.		-20°C to +60°C (-4°F to +140°F)	
Port P, internal pilot		20 (290) min.		<b>Electronic Driver Boards</b> (refer to electronics section)	
Port T, internal drain		10 (150) max.		PWD Series Drivers	
Port T, external drain		345 (5000) max.		<b>Mating Connector</b>	
Port Y, pilot drain		10 (150) max.		Solenoid (DIN 43650)	
Port X, external pilot		20-345 (290-5000)		LVDT (M12, 5 pin)	
<b>Fluid Viscosity, Recommended</b>		80 – 1000 SSU		<b>Environmental Protection Class</b>	
				NEMA 1 (IP54)	



V-Notch Spool Options - Spool Type and Flow Codes								
Code		Spool Type	Flow: LPM (GPM) at $\Delta p$ 5 Bar (72.5 PSI) per metering edge					
$Q_A=Q_B$	$Q_A>Q_B$ <sup>2)</sup>		Code	D31	D41	D81	D91	D111
E01	B31		B	45 (12)	-	-	-	-
E02	B32		C	-	120 (32)	-	-	-
			E	-	-	300 (79)	-	-
			H	-	-	-	400 (106)	-
			L	-	-	-	-	1000 (264)

<sup>2)</sup> Reduced flow rate on port B, nominal flow at port A  
 Code A\* for spool  $Q_b > Q_a$  optional

**Weight:**  
 D31FS 7.1 kg (15.7 lbs.)  
 D41FS 10.8 kg (23.8 lbs.)  
 D81/91FS 19.0 kg (41.9 lbs.)

**Accessories**

Refer to the Accessories section for bolt kits, subplates, connectors.

**Driver Cards**

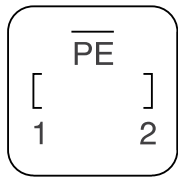
Refer to the Electronics section for driver cards and support electronics.

**Mounting Interface**

Refer to Mounting Interface Dimensions in the Proportional Directional Valve Section of this catalog.

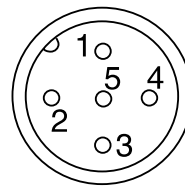
**Wiring**

**Solenoid Coil**



- 1 = coil connection
- 2 = coil connection
- PE = ground potential

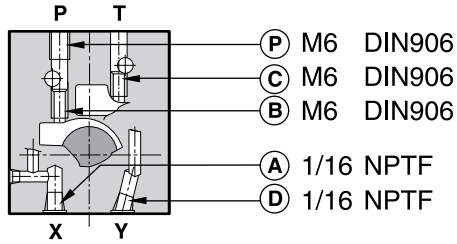
**Spool position sensor (LVDT)**



- 1 = output, spool position
- 2 = supply (+24V)
- 3 = GND (0V)
- 4 = not used
- 5 = protective ground

**Pilot Connection**

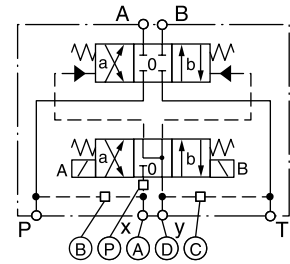
**D31FS**



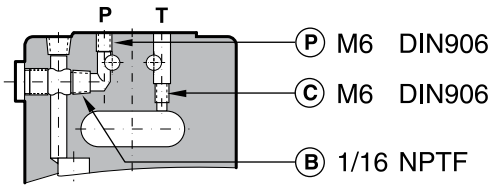
- Ⓐ M6 DIN906
- Ⓑ M6 DIN906
- Ⓒ M6 DIN906
- Ⓓ 1/16 NPTF
- Ⓔ 1/16 NPTF

○ open, ● closed

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



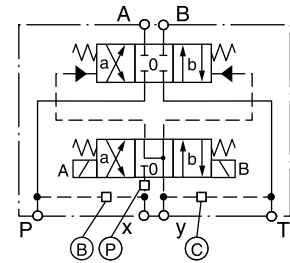
**D41FS**



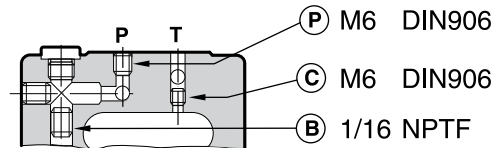
- Ⓐ M6 DIN906
- Ⓑ M6 DIN906
- Ⓒ 1/16 NPTF

○ open, ● closed

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



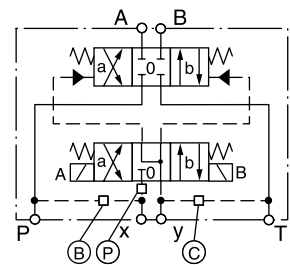
**D91FS**



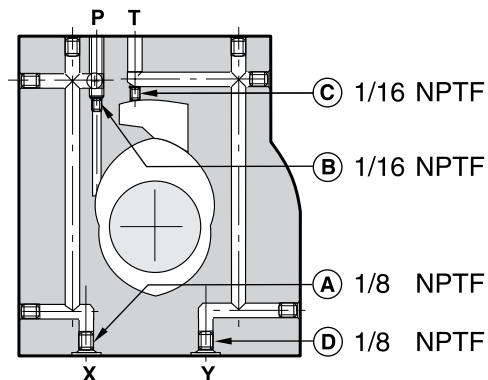
- Ⓐ M6 DIN906
- Ⓑ M6 DIN906
- Ⓒ 1/16 NPTF

○ open, ● closed

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



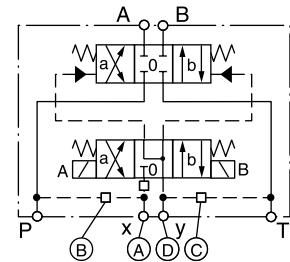
**D111FS**



- Ⓐ 1/8 NPTF
- Ⓑ 1/16 NPTF
- Ⓒ 1/16 NPTF
- Ⓓ 1/8 NPTF

○ open, ● closed

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



**Dimensions**

**Proportional Directional Control Valves  
Series D31FS and D41FS**

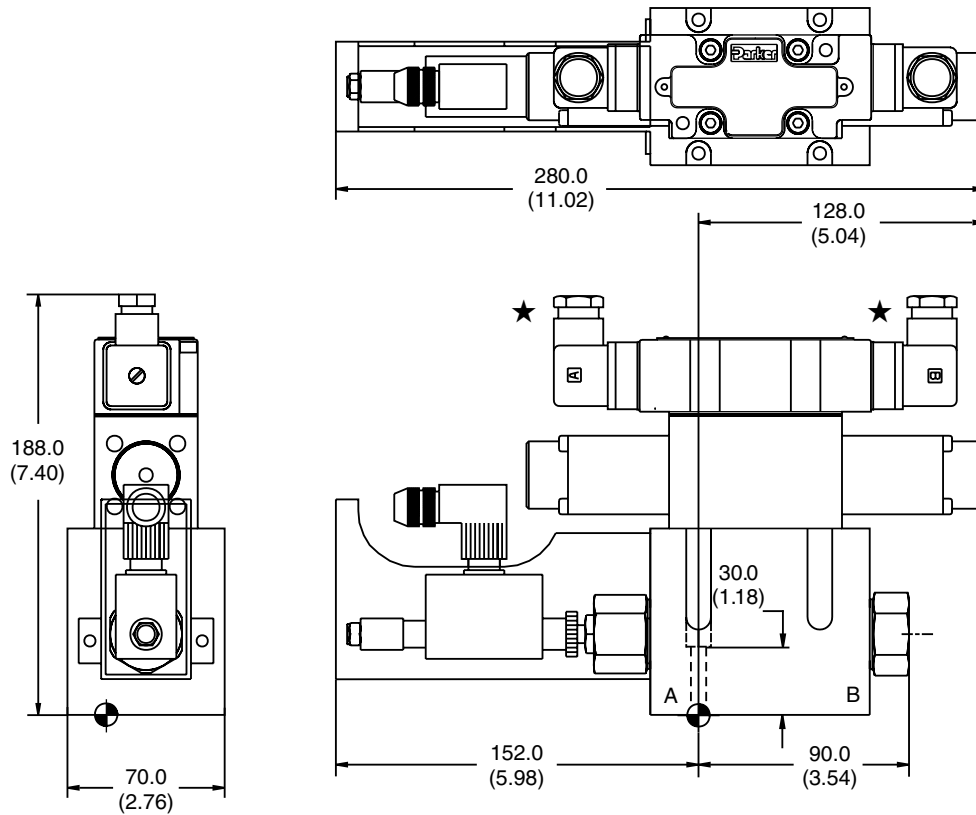
Return to  
ALPHA  
TOC

Return to  
SECTION  
TOC

**A**

**D31FS**

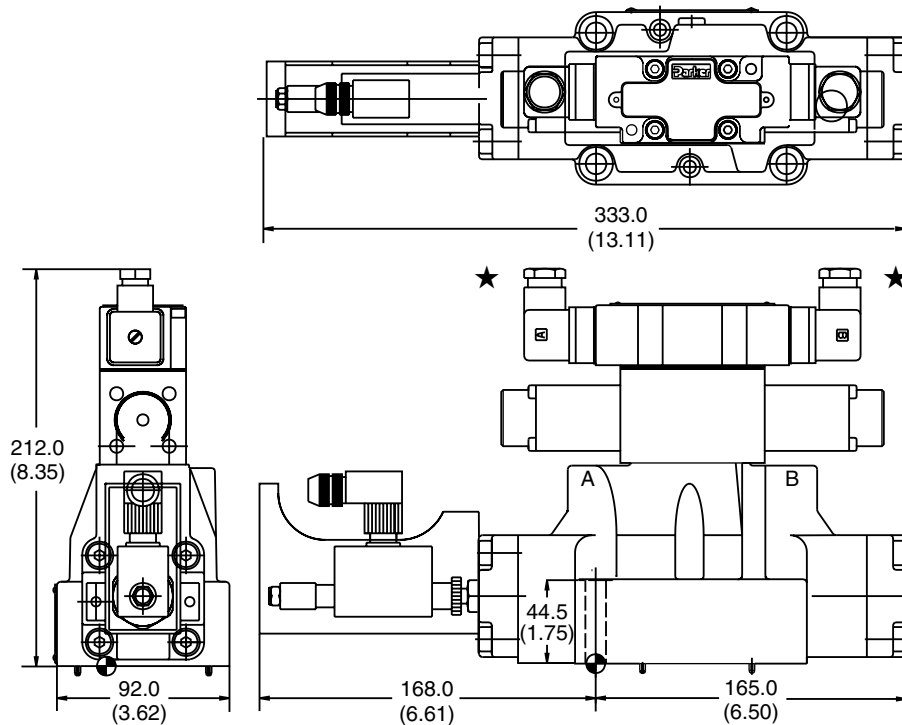
Inch equivalents for millimeter dimensions are shown in (\*\*)



★ Order plugs separately.

**D41FS**

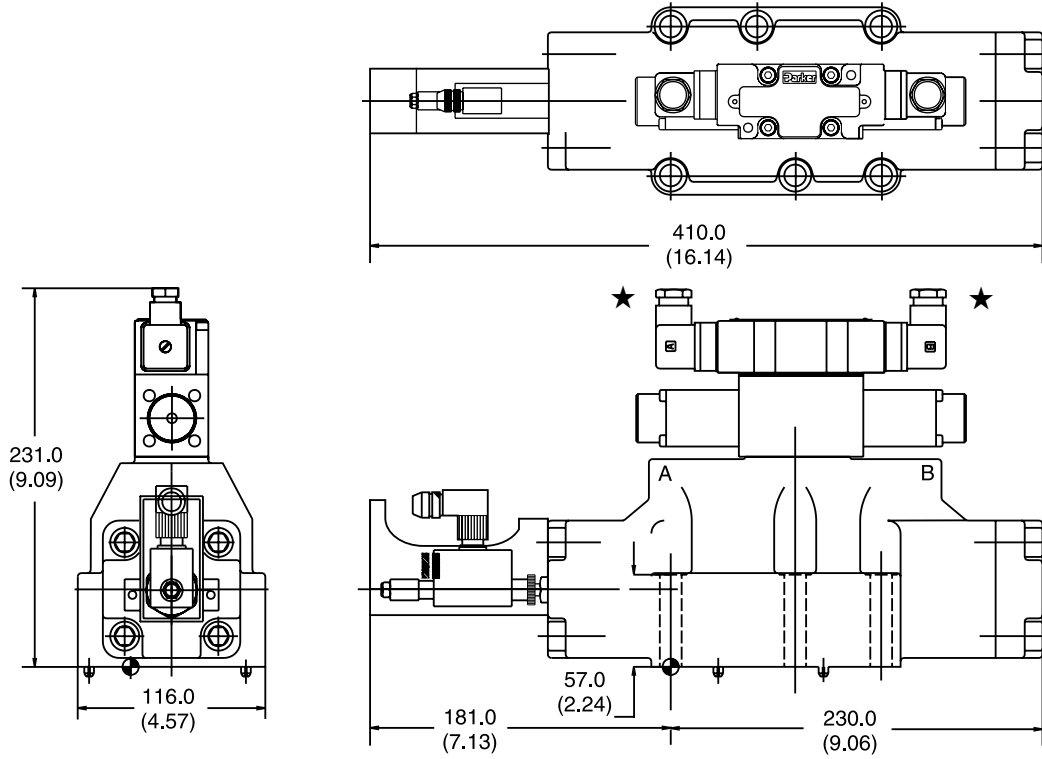
Inch equivalents for millimeter dimensions are shown in (\*\*)



**D81FS and D91FS**

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

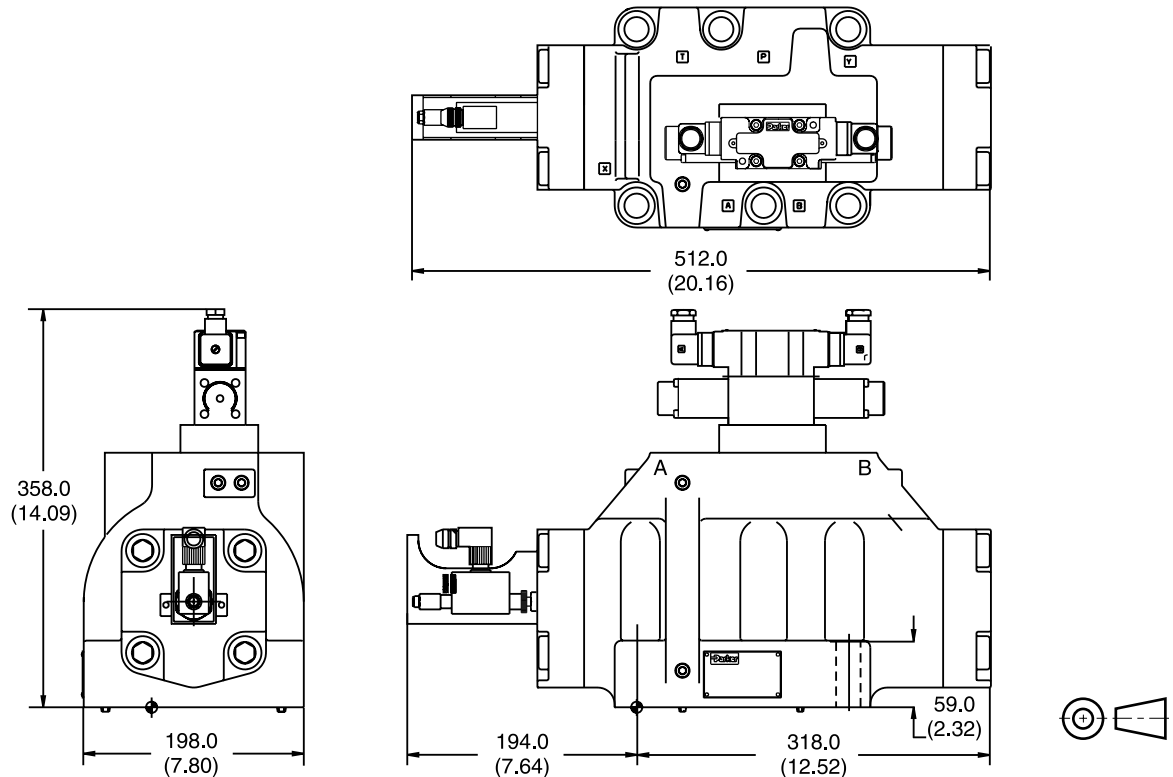
**A**



★ Order plugs separately.

**D111FS**

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



## General Description

Series D\*FH is a high response, proportional servo-valve with an on-board drive amplifier. The D\*FM is a high response, direct actuated servovalve with high resolution around low command inputs. The D\*FM is designed for more precise control of position loops, force loops, and machine tool feed rates.

Series D\*FH and D\*FM incorporate the use of state-of-the-art drive electronics with an LVDT for continuous monitoring of the spool position. Zero lap spools are standard for closed loop applications with two different 'power down' configurations. The valves feature frequency response levels greater than 100 Hz for D1FH and D1FM, and 45 Hz for D3FH and D3FM, along with low hysteresis and excellent repeatability.

## Operation

### Series D\*FH

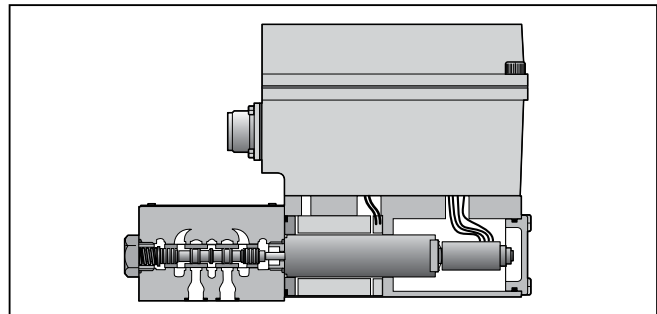
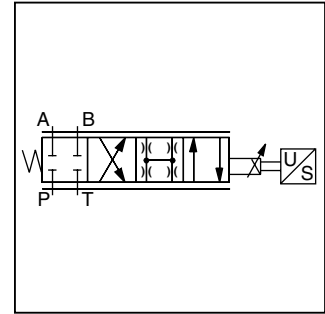
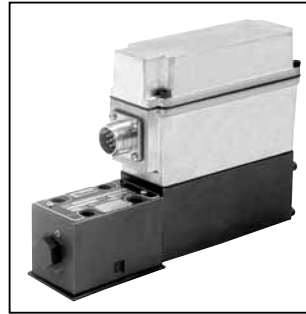
Series D\*FH valve uses a precision lapped spool and sleeve configured with four control positions. During normal operation, the valve will shift from the center position to either side providing flow out the 'A' or 'B' port. When the drive amplifier is disabled by either removing the enable or loss of electrical power, the valve will shift through P→B in less than 10ms to a fourth position. The fourth position will block all four ports in one version. A second version that is available will block the 'P' port and allow the 'A' and 'B' ports to bleed to the 'T' (tank line). (Refer to the "Flow With No Enable" in Troubleshooting section)

### Series D\*FM

The high resolution Series D\*FM adds hydraulic and electronic control compensation to the standard D\*FH valve. This feature enhances the tuning and accuracy of systems utilizing high resolution feedback transducers and control compensation available in high performance motion controllers. The D\*FM valve uses a precision lapped spool and sleeve configured with four control positions. The fourth position (disabled) is available in an all ports blocked configuration or 'A' and 'B' ports bleed to tank configuration.

#### Note:

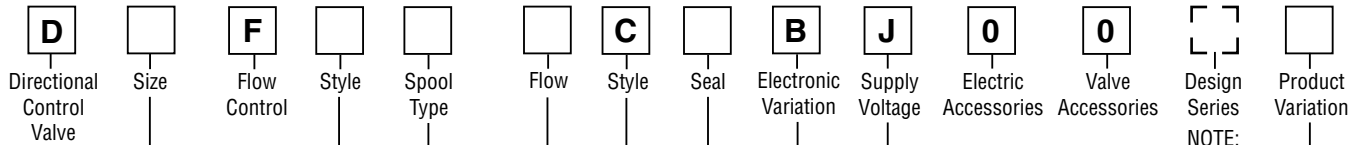
**The tank line of either style valve must have a minimum pressure of 1.4 Bar (20 PSI). Maximum tank line pressure is 35 Bar (500 PSI).**



## Features

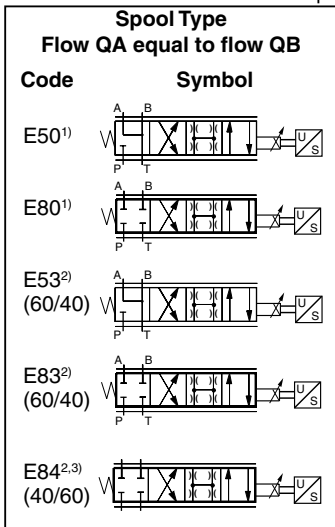
- **On-Board Electronic Drive Amplifier** — The unit is shipped as a factory preset and tested unit. (No adjustment is necessary)
- **High Frequency Response** — The valve has a very high frequency response which is necessary for many closed loop applications.
- **Four Position Spool Capability** — The four position spool provides predictable flow in the event of a power failure to the drive electronics, within the limits of the power curve.
- **315 Bar Pressure Capability** — The maximum operating pressure rating for the D\*FH and D\*FM is 315 Bar or 4500 PSI (Port P, A, B).
- **Spool Position Feedback** — The LVDT continuous feedback monitoring circuit provides low hysteresis and excellent repeatability.
- **Drive Enable Feature** — Output to the coil is shut down when the enable signal (10 to 30 VDC) is not present. The valve will then shift to the fourth position flow path selected by the user. (E50 or E80 spool)
- **High Resolution Around Null** — For precise control of critical position, force, or feed rates (D\*FM Version only)
- **Cylinder Ratio Adjust** — To match following error on extend and retract. (D\*FM Version only)

**A**



Code	Description
1	NG6/CETOP 3
3	NG10/CETOP 5

Code	Description
H	High Response
M	High Response, Dual Gain



- 1) D1FH and D3FH only
- 2) D1FM only
- 3) D1FM\*M flow code only  
D3FM\*Y flow code only

Code	Description
J	24 VDC

Code	Description
B	Voltage Input 0 ... ±10 V (user configurable to 0 ... ± 20 mA)

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
C	Bi-directional, 4 way, with 4 <sup>th</sup> position on power down

Code	Description
Omit	Standard (with enable)
X6262	Pin 'C' is 0V reference instead of an enable (for competitive interchange only). Valve enables with power. (note 4)

**Note 4: Do NOT apply an enable signal to Pin C.** Unlike many other valves with the same 7-pin connector, Pin C is not for an enable signal. Pin C is a 0V reference used for DMMs or scopes to monitor pin F. It is not a power supply common. Using it as a power supply common will damage the PC board.

Code	Flow at Δp 35 Bar (500 PSI) per metering edge			
	D1FH LPM (GPM)	D1FM LPM (GPM)	D3FH LPM (GPM)	D3FM LPM (GPM)
B	5 (1.3)	—	—	—
D	10 (2.6)	—	—	—
F	—	12 (3.2)	—	—
H	20 (5.3)	—	—	—
M	40 (10.6)	40 (10.6)	—	—
P	—	—	50 (13.2)	—
Y	—	—	100 (26.5)	100 (26.5)

Maximum supply pressure is 315 Bar (4500 PSI). This is the pressure drop across the load and the valve. For maximum pressure drop per land, refer to the table on page A111.

**Weight:**

D1F	3.7 kg (8.2 lbs.)
D3F	7.7 kg (17.0 lbs.)

**Mounting Interface**

Refer to the Mounting Interface Dimensions in the Proportional Directional Valve section of this catalog.

**Accessories**

Refer to the Accessories section for bolt kits, subplates, connectors and pre-assembled cable assemblies.



**Specifications**

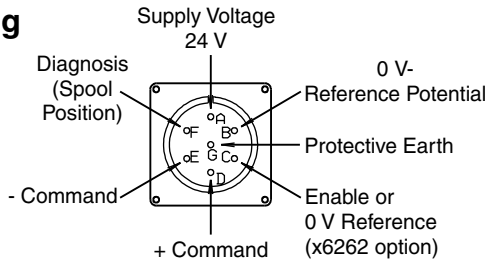
	<b>D1FH, D1FM</b>	<b>D3FH, D3FM</b>
<b>Interface</b>	NFPA D03, CETOP 3, NG6	NFPA D05, CETOP 5, NG10
<b>Flow Rating</b> At 35 Bar DP (500 PSI) per metering edge	<sup>1)</sup> B spool 5 LPM (1.3 GPM) <sup>1)</sup> D spool 10 LPM (2.6 GPM) <sup>1)</sup> H spool 20 LPM (5.3 GPM) <sup>1,2)</sup> M spool 40 LPM (10.6 GPM) <sup>2)</sup> F spool 12 LPM (3.2 GPM)	<sup>1)</sup> P spool 50 LPM (13.2 GPM) <sup>1,2)</sup> Y spool 100 LPM (26.4 GPM)
<b>Frequency Response</b>	> 100 Hz (-3 dB at 5% signal)	> 45Hz (-3 dB at 5% signal)
<b>Step Response</b>	< 12 ms at 100% signal	< 25 ms at 100% signal
<b>Power Consumption</b>	40 VA max (See voltage supply)	60 VA max (See voltage supply)
<b>D1FH, D1FM, D3FH, D3FM</b>		
<b>Max. Operating Press.</b> Port P, A, B Port T	315 Bar (4500 PSI) 35 Bar (500 PSI)	<b>Operating Temp. Range (Ambient)</b> 0 to 60° C (32 to 140° F)
	<b>Fluid Cleanliness Level</b>	
<b>Min. Tank Line Press.</b>	1.4 Bar (20 PSI)	<b>Voltage Supply</b> 24 VDC (21 VDC Min., 30 VDC Max.) Peak Current 4A (PSD24 power supply recommended)
<b>Typical Spool Overlap</b>	Zero Lap	
<b>Pressure Gain % of Change/1% Change in Command</b>	<sup>1)</sup> Typical 40% <sup>1)</sup> Minimum 25% <sup>2)</sup> Typical 90%	<b>Command Signals</b> ± 10 VDC at 100 K ohm input impedance ± 20 mA at 499 ohm input impedance
<b>Hysteresis</b>	< 0.5%	
<b>Repeatability</b>	< 0.5%	
<b>Viscosity Range</b>	17 to 65 cSt / mm <sup>2</sup> /s (79 to 301 SSU)	<b>Protection Class</b> IP65, NEMA 4 (As factory sealed)
<b>Fluids</b>	Mineral base hydraulic fluid	

**Note:** 1) D\*FH only      2) D\*FM only

**Maximum Flow and Pressure Differential**

<b>Spool Code</b>		<b>Flow Code</b>						
		<b>B</b>	<b>D</b>	<b>F</b>	<b>H</b>	<b>M</b>	<b>P</b>	<b>Y</b>
<b>E50</b>	<b>Max ΔP Per Land</b>	100 Bar (1500 PSI)	100 Bar (1500 PSI)	60 Bar (850 PSI)	70 Bar (1000 PSI)	52 Bar (750 PSI)	70 Bar (1000 PSI)	50 Bar (725 PSI)
	<b>Max Flow</b>	8.3 LPM (2.2 GPM)	16.3 LPM (4.3 GPM)	9.7 LPM (5.2 GPM)	26.9 LPM (7.1 GPM)	46.2 LPM (12.2 GPM)	69.6 LPM (18.4 GPM)	121 LPM (32 GPM)
<b>E80</b>	<b>Max ΔP Per Land</b>	100 Bar (1500 PSI)	100 Bar (1500 PSI)	60 Bar (850 PSI)	70 Bar (1000 PSI)	52 Bar (750 PSI)	70 Bar (1000 PSI)	50 Bar (725 PSI)
	<b>Max Flow</b>	8.3 LPM (2.2 GPM)	16.3 LPM (4.3 GPM)	9.7 LPM (5.2 GPM)	26.9 LPM (7.1 GPM)	46.2 LPM (12.2 GPM)	69.6 LPM (18.4 GPM)	121 LPM (32 GPM)

**Wiring**

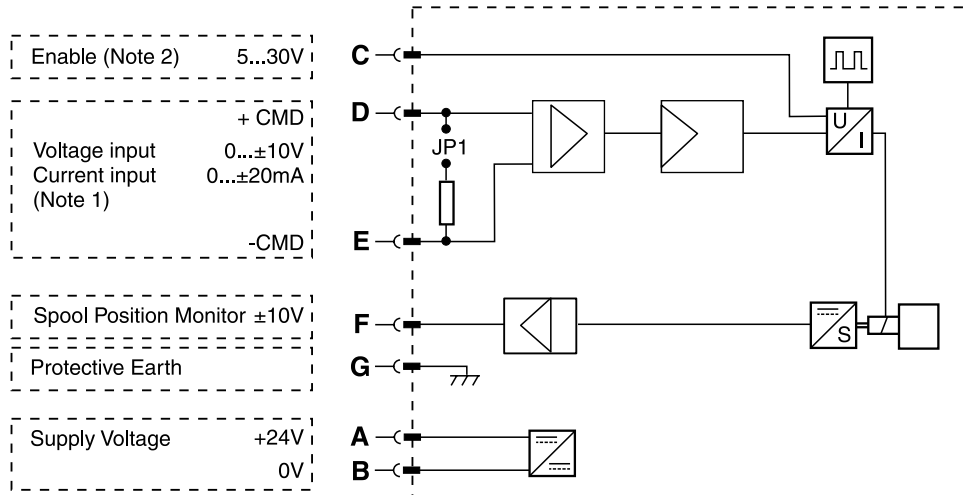


**Installation Guidelines**

Refer to the Installation Guide for set-up, configuration, and application guidelines (packaged with each valve).

D\*FH and D\*FM: Bul. HY14-2599-M1/US

**Block Diagram**



Note 1: Install jumper JP1 for current command input. Refer to installation guide Bul. HY14-2599-M1/US.  
 Note 2: Valves can be ordered with pin 'C' internally grounded to be interchangeable with some competitor products. Refer to Ordering Information page.

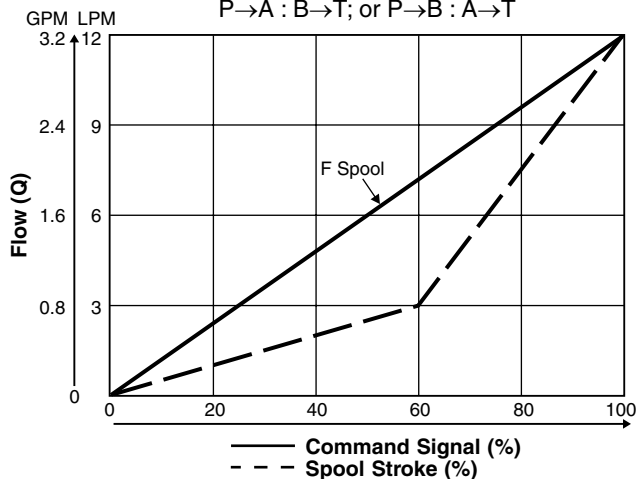
**Performance Curves**

D1FM series proportional valves are electronically compensated dual flow-gain valves. The command voltage/flow transfer function is linear while the actual spool stroke/flow gain is designed to provide very high resolution at low flows. The D1FM series proportional

valves are particularly well suited for machine tool feed applications, or where very fine flow resolution is required while maintaining a rapid advance function in a single valve. The D1FM frequency response is the same as the D1FH; refer to the next page.

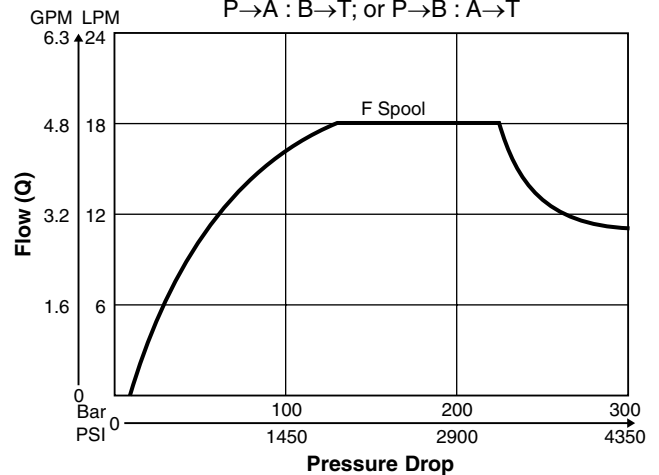
**D1FM Flow Characteristics**

at  $\Delta p = 35$  Bar (500 PSI) per metering edge  
 P→A : B→T; or P→B : A→T



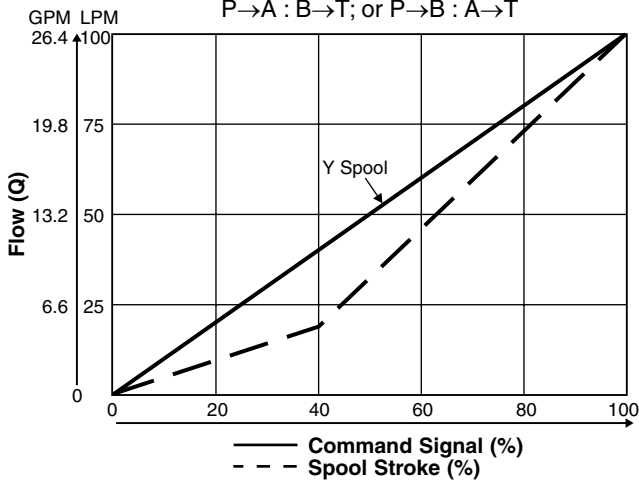
**D1FM Operating Limits**

at 100% Command  
 P→A : B→T; or P→B : A→T



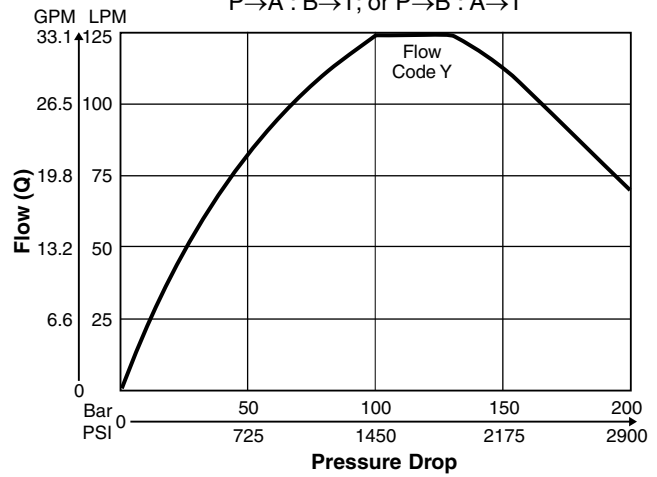
**D3FM Flow Characteristics**

at  $\Delta p = 35$  Bar (500 PSI) per metering edge  
 P→A : B→T; or P→B : A→T



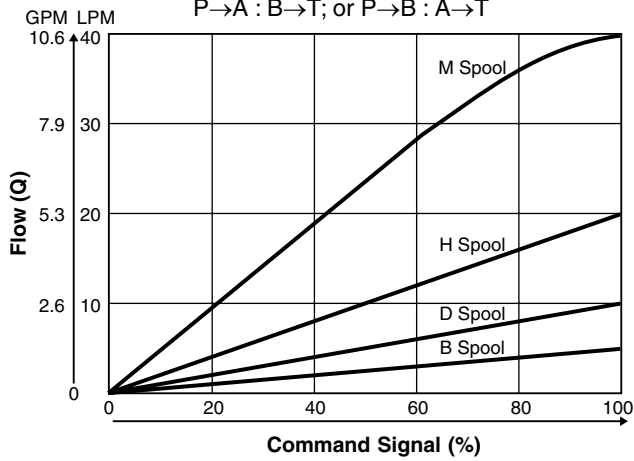
**D3FM Operating Limits**

at 100% Command  
 P→A : B→T; or P→B : A→T



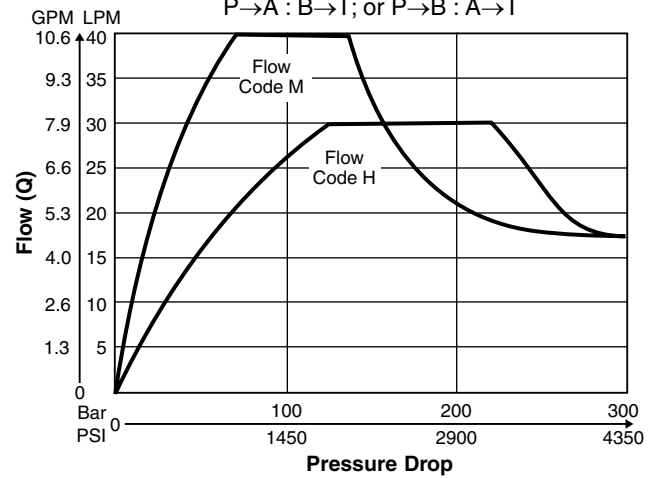
**D1FH Flow Characteristics**

at  $\Delta p = 35$  Bar (500 PSI) per metering edge  
 P→A : B→T; or P→B : A→T



**D1FH Operating Limits**

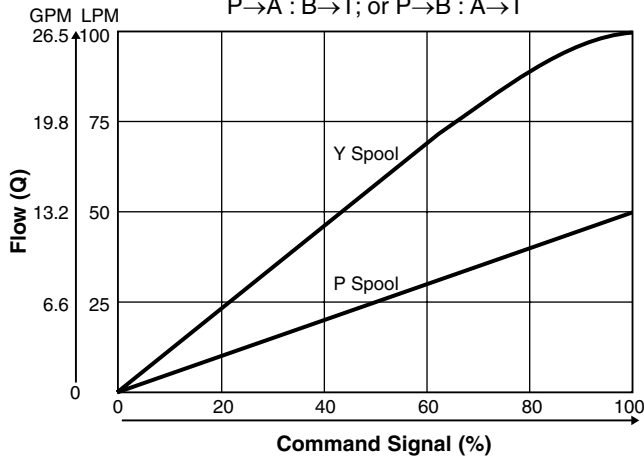
at 100% Command  
 P→A : B→T; or P→B : A→T





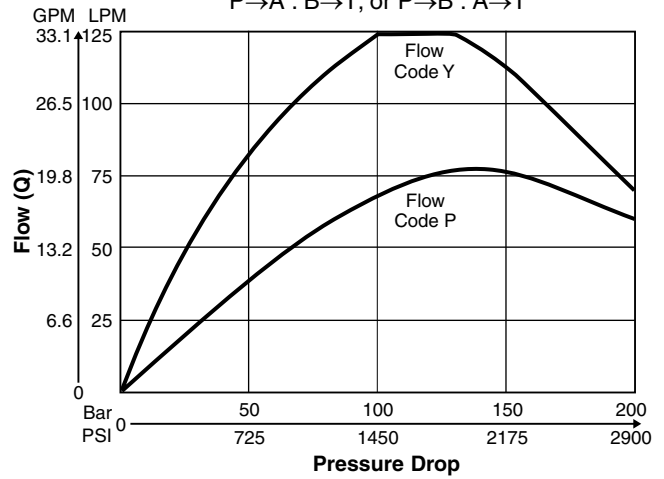
**D3FH Flow Characteristics**

at  $\Delta p = 35$  Bar (500 PSI) per metering edge  
 P→A : B→T; or P→B : A→T



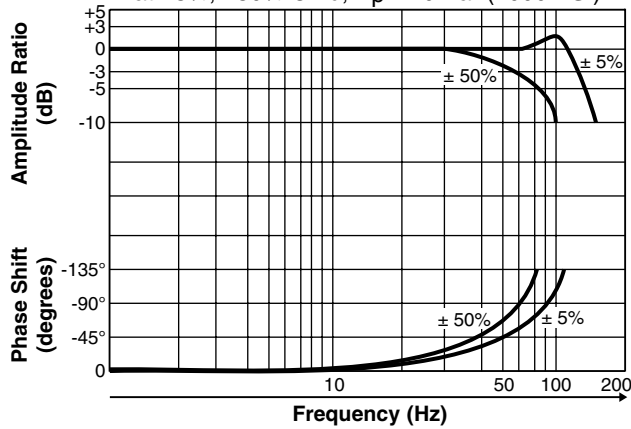
**D3FH Operating Limits**

at 100% Command  
 P→A : B→T; or P→B : A→T



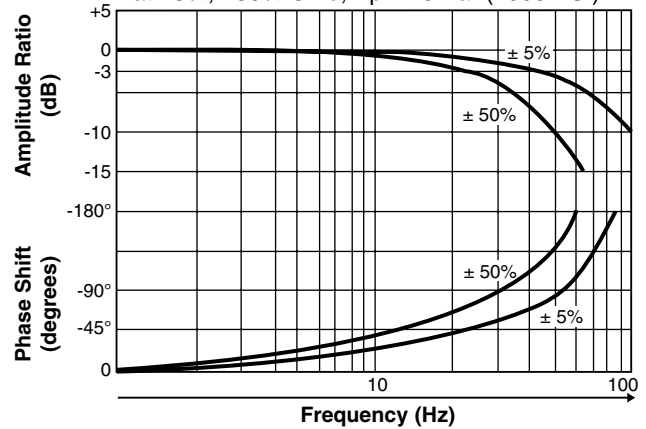
**D1FH and D1FM Frequency Response**

at  $\pm 5\%$ ,  $\pm 50\%$  Cmd,  $\Delta p = 70$  Bar (1000 PSI)



**D3FH and D3FM Frequency Response**

at  $\pm 5\%$ ,  $\pm 50\%$  Cmd,  $\Delta p = 70$  Bar (1000 PSI)



**Dimensions**

**Proportional Directional Control Valves  
Series D\*FH and D\*FM**

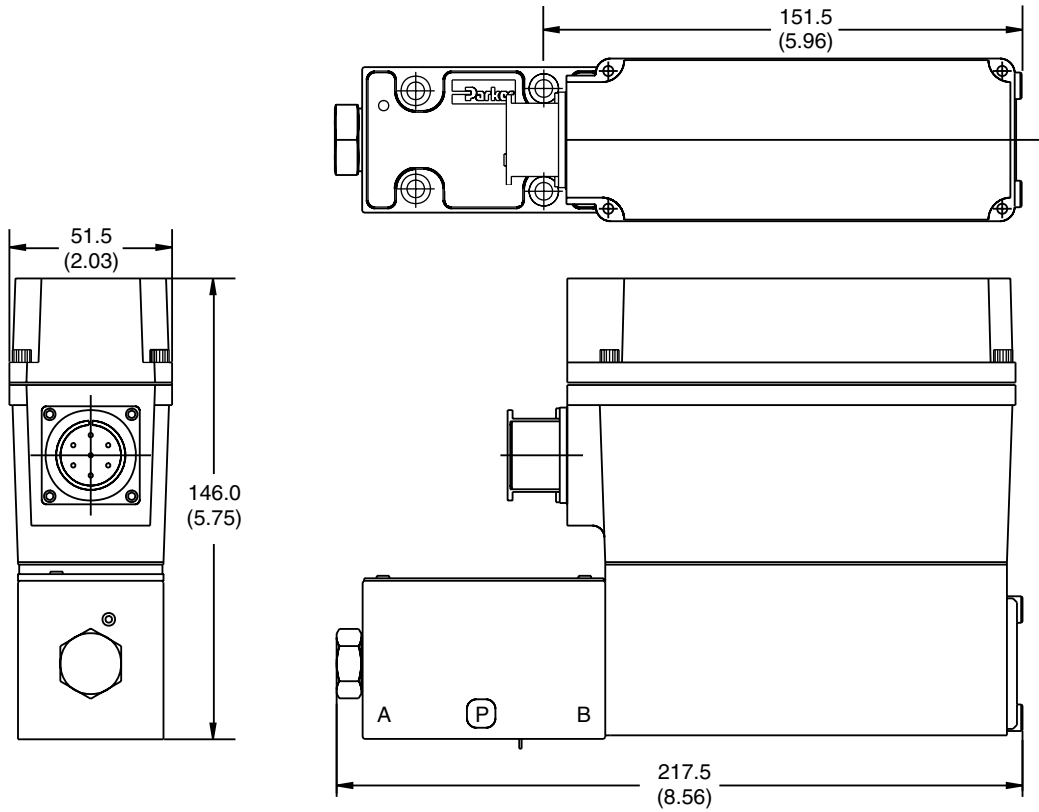
Return to  
ALPHA  
TOC

Return to  
SECTION  
TOC

**A**

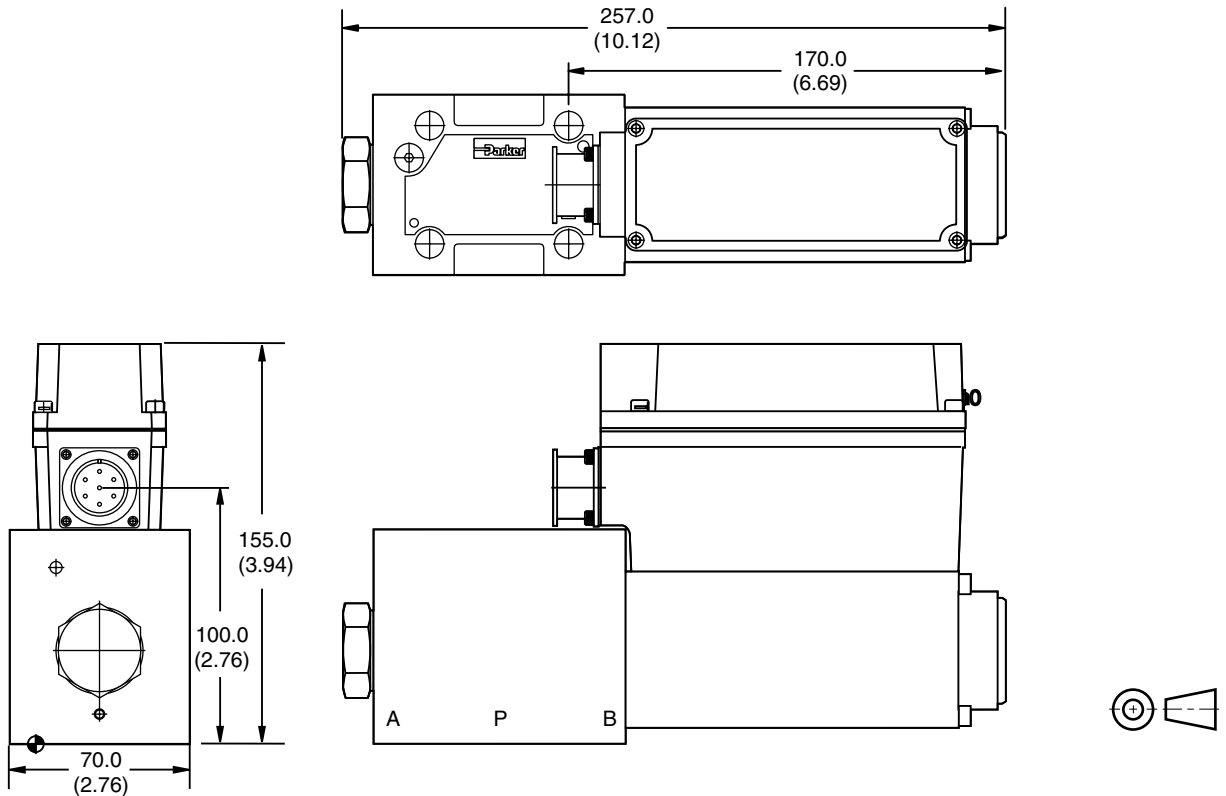
**D1FH and D1FM**

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



**D3FH and D3FM**

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



A

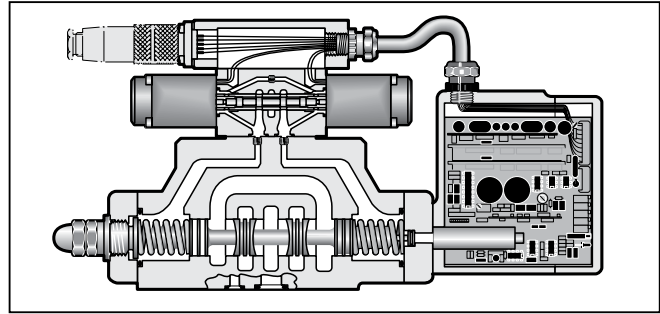
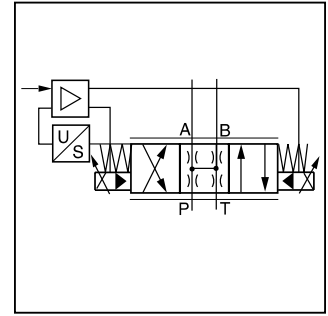
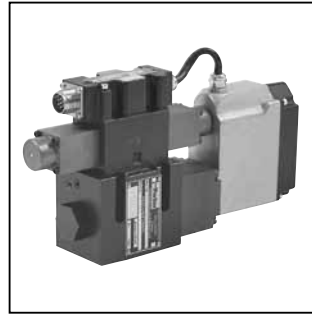
### General Description

Series D\*1FH proportional directional control valves are high performance, two stage pilot operated solenoid valves with electronic spool position feedback, and on-board integrated control electronics. Valves are available in sizes NG10 (CETOP 5), NG16 (CETOP 7), NG25 (CETOP 8) and NG32 (CETOP 10).

D\*1FH valve performance is characterized by high resolution flow control, repeatability and high dynamic performance. Typical applications include precise and reproducible control of actuator speed in rapid/slow speed profiling, and smooth acceleration and deceleration performance. Zero lap spools are available for closed loop applications.

### Features

- Standard DIN/ISO/CETOP/NFPA interfaces.
- Integrated valve electronics.
- Spool position feedback.
- High frequency response.
- Spring centered main stage spool.
- LED functional diagnostic indicator.



- Wide selection of spool options, and flow capacity.
- 2:1 ratio spool options.



### Specifications

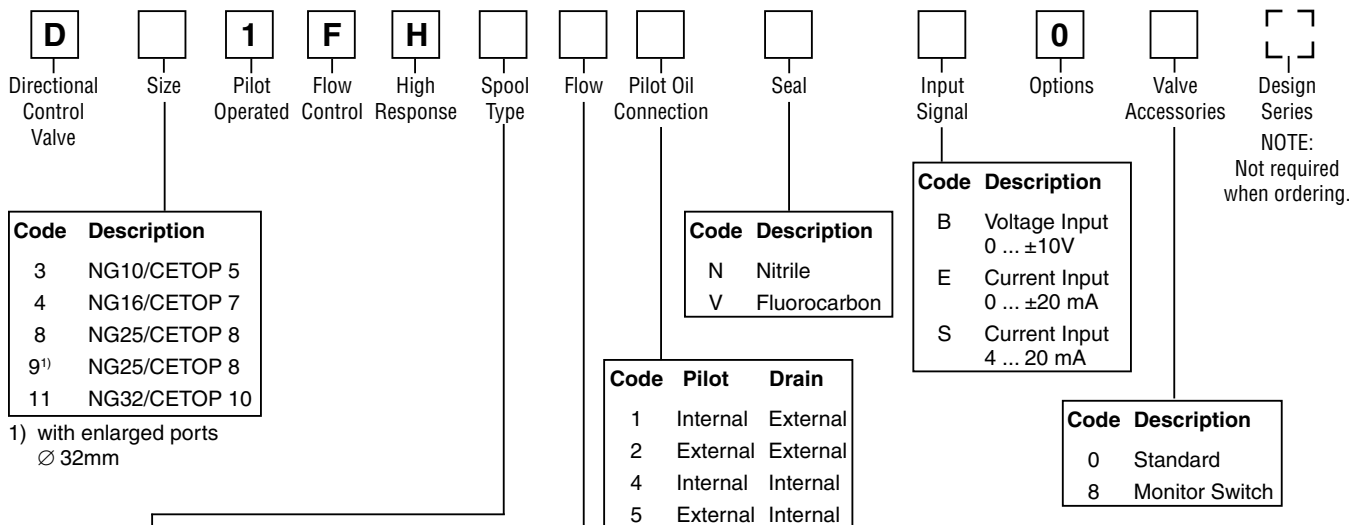
Use D\*1FC for new applications

Interface DIN		NG10 (CETOP 5)	NG16 (CETOP 7)	NG25 (CETOP 8)	NG32 (CETOP 10)
<b>Flow Rating</b> @10 Bar (150 PSI) Δp (P→A, B→T) (spool options up to) <sup>1)</sup>	LPM (GPM)	80 (21)	240 (63)	400 (106)	1000 (264)
<b>Pressure Gain</b> (Zero Lap Spool)	%	3.5	3.0	2.5	—
<b>Maximum Flow</b> (spool options up to) <sup>1)</sup>	LPM (GPM)	170 (45)	420 (111)	900 (238)	2000 (528)
<b>Pilot Flow</b>					
Continuous	LPM (GPM)	<1.2 (0.3)	<1.2 (0.3)	<1.2 (0.3)	<1.2 (0.3)
Step Input	LPM (GPM)	2 (0.5)	4 (1.1)	9 (2.4)	18 (4.8)
<b>Step Response</b> (time to reach 90% of a 100% step command) ms		25	45	65	150
<b>Hysteresis</b>	%	<0.5		<b>Mating Connector</b> (order separately)	
<b>Repeatability</b>	%	<0.5		Part #5004072 (7-pin CE)	
<b>Operating Pressure</b>				<b>Fluid Cleanliness Level</b>	
Port P, A, B Bar (PSI)		345 (5000) max. 20 (290) min.		ISO Class 16/13	
Port P, internal pilot		10 (150) max.		<b>Fluid Viscosity, Recommended</b>	
Port T, internal drain		345 (5000) max. 10 (150) max.		80 – 1000 SSU	
Port T, external drain		20-345 (290-5000)		<b>Fluid Temperature, Recommended</b>	
Port Y, pilot drain				0°C to +60°C (+32°F to +140°F)	
Port X, external pilot				<b>Environmental Protection Class</b>	
<b>Electrical Power Requirements</b>		18 to 30 VDC, 2.2A		NEMA 4 (IP65)	
<b>Command Signal (impedance)</b> (select by ordering code)		0 ± 10 VDC (100K ohm) 0 ± 20 mA (500 ohm)		<b>Ambient Operating Temperature</b>	
<b>Command Polarity</b>		Pin 'D' more positive than 'E' produces flow P to B		-20°C to +60°C (-4°F to +140°F)	
				<b>Temperature Drift</b>	
				0.005%/°C (0.009%/°F)	

1) Actual pressure drop required for each metering land, up to the specified maximum flow rate is:

$$\Delta P_{\text{Actual}} = (5) \left( \frac{Q_{\text{Actual}}}{Q_{\text{Rated}}} \right)^2 \text{ Bar; (Q in LPM) [or] } = (75) \left( \frac{Q_{\text{Actual}}}{Q_{\text{Rated}}} \right)^2 \text{ PSI; (Q in GPM)}$$

Flow rate for different Δp per control edge:  $Q_x = Q_{\text{Nom.}} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{\text{Nom.}}}}$



Code			Spool Type
Q <sub>A</sub> =Q <sub>B</sub>	Q <sub>A</sub> >Q <sub>B</sub> <sup>2)</sup>	Q <sub>B</sub> >Q <sub>A</sub> <sup>3)</sup>	
E01	B31	A31	Overlap Sine
E02	B32	A32	Overlap Sine

- 2) 2:1 Ratio: Reduced Flow Rate; Port B, Rated Flow Rate; Port A
- 3) 2:1 Ratio: Reduced Flow Rate; Port A, Rated Flow Rate; Port B

Code	Flow at Δp 5 Bar (72.5 PSI) per Metering Edge			
	Sine Notch Spools			
	D31 LPM (GPM)	D41 LPM (GPM)	D81/91 LPM (GPM)	D111 LPM (GPM)
A	55 (14.6)	-	-	-
B	-	105 (27.8)	-	-
C	80 (21)	140 (37)	-	-
E	-	190 (50)	250 (66)	-
F	-	240 (63)	310 (82)	-
H	-	-	400 (106)	500 (32)
L	-	-	-	1000 (264)

V-Notch Spool Options - Spool Type and Flow Codes					
Code		V-Notch Spool Type	Flow at Δp 5 Bar (72.5 PSI) per metering edge		
Q <sub>A</sub> =Q <sub>B</sub>	Q <sub>A</sub> >Q <sub>B</sub> <sup>4)</sup>		D31 LPM (GPM)	D41 LPM (GPM)	D81/D91 LPM (GPM)
E21	B41		-	-	-
E22	B42		-	120 (32)	-

- 4) 2:1 Ratio: Reduced Flow Rate on Port B, Rated Flow Rate on Port A
- Code A\* for spool Q<sub>B</sub>>Q<sub>A</sub> optional

Bolt Kit:		Weight:	
D31FH	BK98	D31FH	8.1 kg (17.9 lbs.)
D41FH	BK160	D41FH	11.6 kg (25.6 lbs.)
D81/91FH	BK228	D81/91FH	20.7 kg (45.6 lbs.)
D111FH	BK150	D111FH	62.0 kg (137.0 lbs.)

Mating Connector: Part # 5004072 (7-Pin CE) Order Separately

**Use D\*1FC for new applications**

**Mounting Interface**

Refer to the Mounting Interface Dimensions in the Proportional Directional Valve section of this catalog.

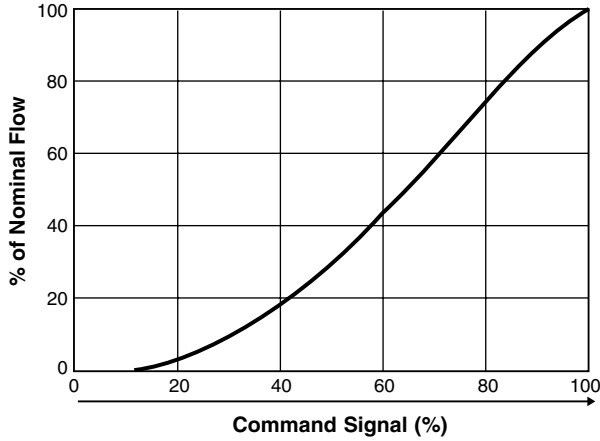
**Accessories**

Refer to the Accessories section for bolt kits, subplates, connectors and pre-assembled cable assemblies.

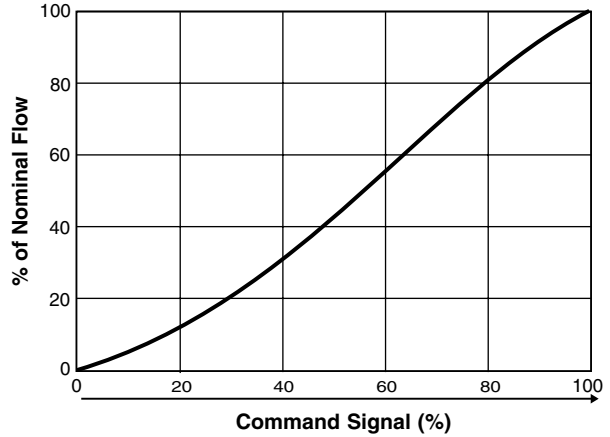
Note: Depending on the spool type selected, the actual flow characteristic may deviate from the typical flow curves as shown.

**A**

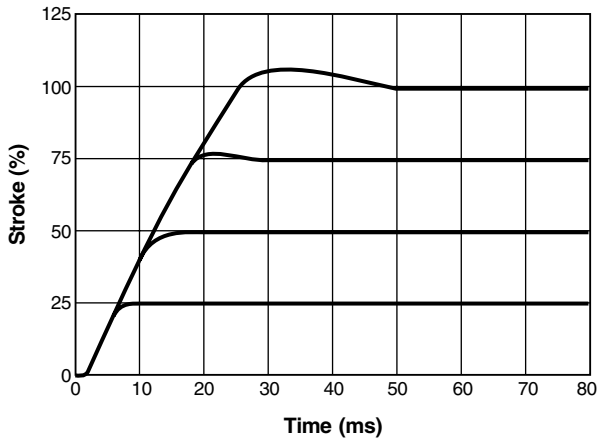
**Flow Characteristics – Overlap Spools**  
 Typical, at 5 Bar (72.5 PSI) per metering edge



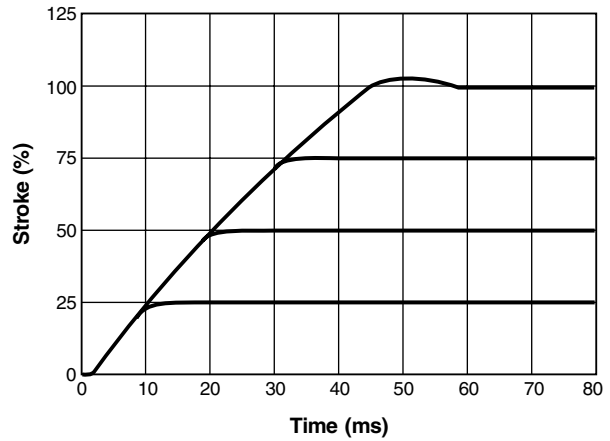
**Flow Characteristics – Zero Lap Spools**  
 Typical, at 5 Bar (72.5 PSI) per metering edge



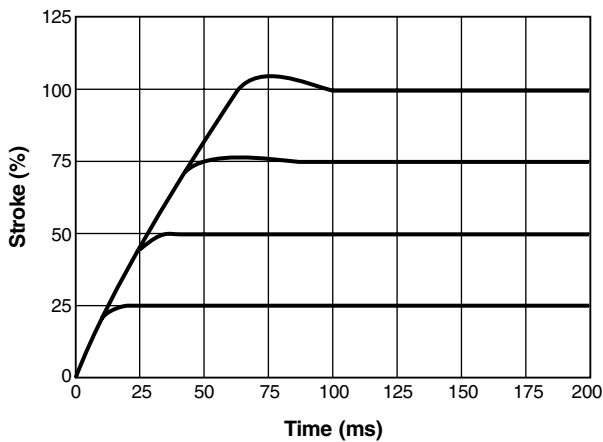
**D31FH Step Response**



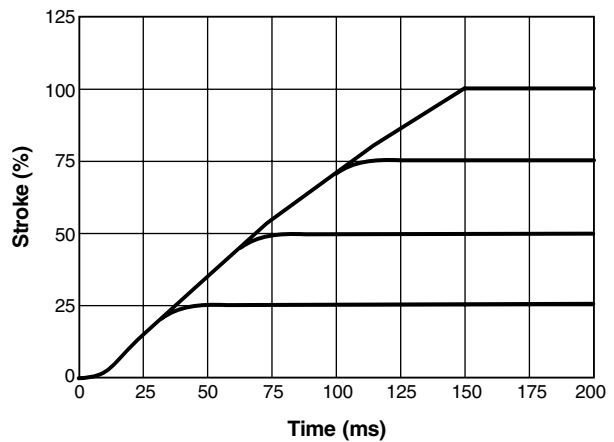
**D41FH Step Response**



**D81FH and D91FH Step Response**



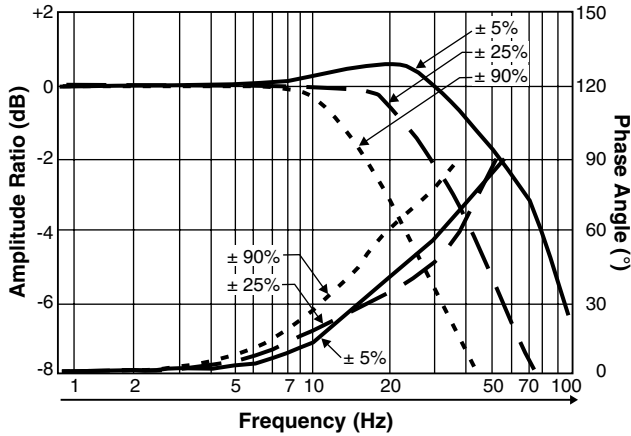
**D111FH Step Response**



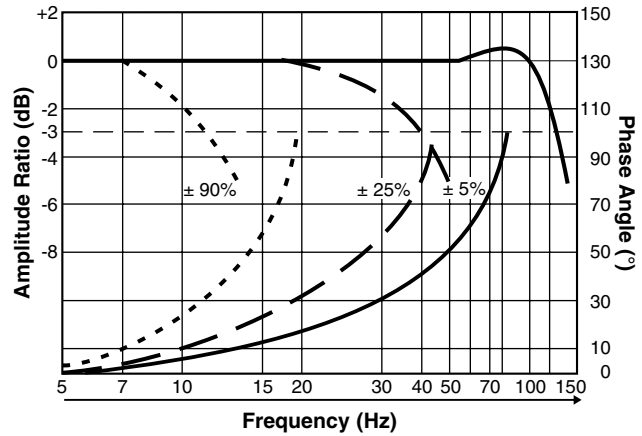
**Use D\*1FC for new applications**



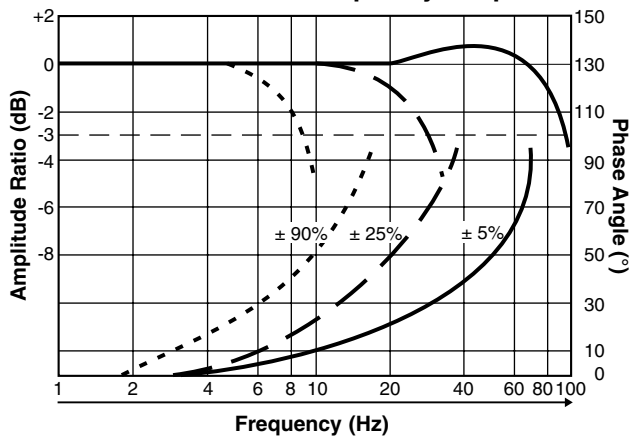
**D31FH Frequency Response**



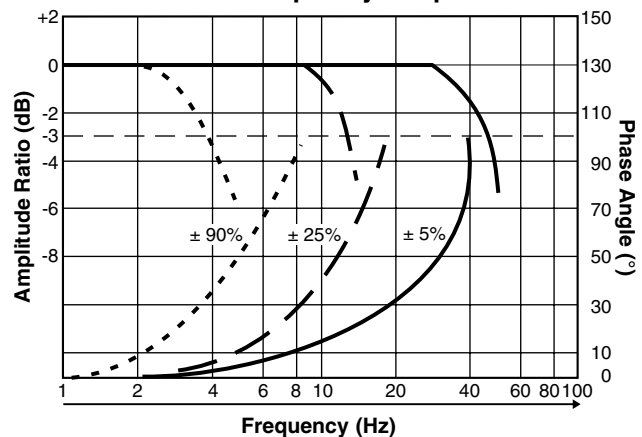
**D41FH Frequency Response**



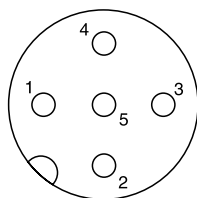
**D81FH and D91FH Frequency Response**



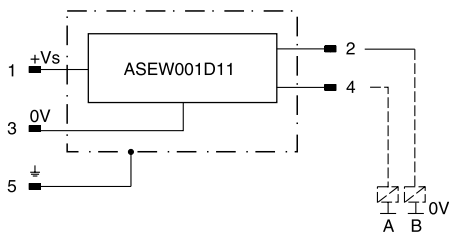
**D111FH Frequency Response**



**Monitor Switch M12x1 Pin Assignment**



- 1 + Supply 18...42V
- 2 Output B (normally closed)
- 3 0V
- 4 Output A (normally closed)
- 5 Earth ground



Signal	Output A (pin 4)	Output B (pin 2)
Neutral	Closed	Closed
	Open	Closed
	Closed	Open

<b>Protection Class</b>	IP65 in accordance with EN 60529 (plugged and mounted)
<b>Ambient Temperature</b>	[°C] 0...70; (32°F...158°F)
<b>Supply Voltage/Ripple</b>	[V] 18...42, ripple < 10% eff.
<b>Current Consumption without Load</b>	[mA] < 30
<b>Maximum Output Current per Channel, Ohmic</b>	[mA] 400
<b>Minimum Output Load per Channel, Ohmic</b>	[kOhm] 100
<b>Maximum Output Drop at 0.2A</b>	[V] < 1.1
<b>Maximum Output Drop at 0.4A</b>	[V] < 1.6
<b>EMC</b>	EN 61000-6-2, EN61000-6-4
<b>Maximum tol. Ambient Field Strength</b>	[A/m] 1200
<b>Minimum Distance to Next AC solenoid</b>	[m] 0.1
<b>Interface</b>	4+PE acc. IEC 61076-2-101 (M12)
<b>Wiring Minimum</b>	[mm²] 5 x 0.5 (AWG 20) overall braid shield
<b>Wiring Length Maximum</b>	[m] 50 (164 ft.)

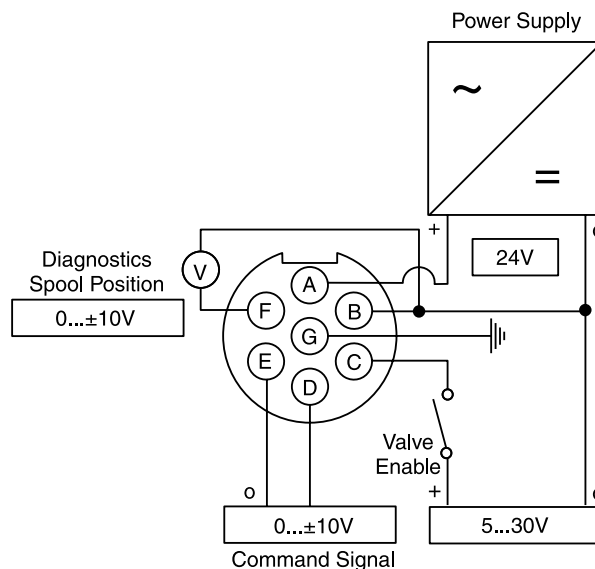
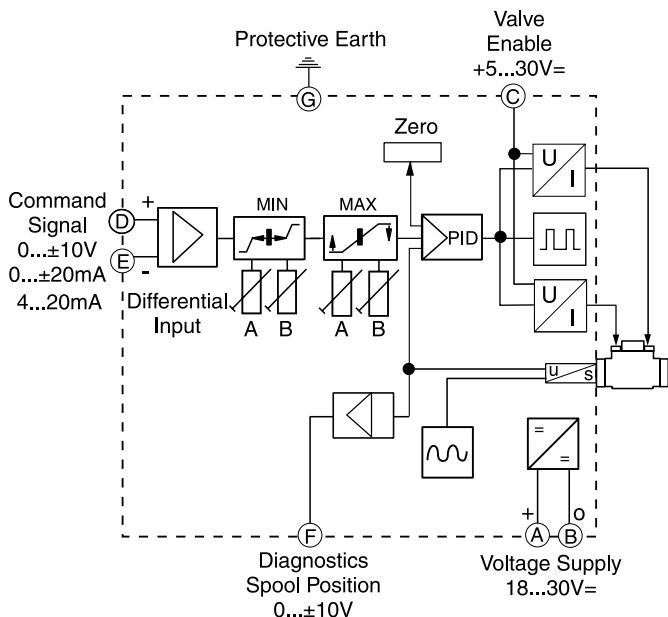
The neutral position is monitored. The signal changes after less than 10% of the spool stroke.

**Use D\*1FC for new applications**

**Function Diagram, Valve Electronics**

**Wiring Connection**

**A**



**Valve Enable Input**

The valve power stage electronics is enabled by applying a positive voltage to pin 'C' with respect to power supply 0V pin 'B'. A voltage between 5 and 30 volts is a logical enable, less than 5 volts disables the valve.

**Electronics Adjustment**

Electronic valve adjustments are located inside the electronics enclosure. Refer to installation manual: DFH- (Series 30) 2573 / GB.

**Diagnostics — Valve Spool Position**

Spool position can be monitored by measuring the voltage on pin 'F' with respect to power supply 0V pin 'B' of the valve input connector. The same signal is available inside the enclosure as a calibration aid as shown.

**Integrated Control Electronics**

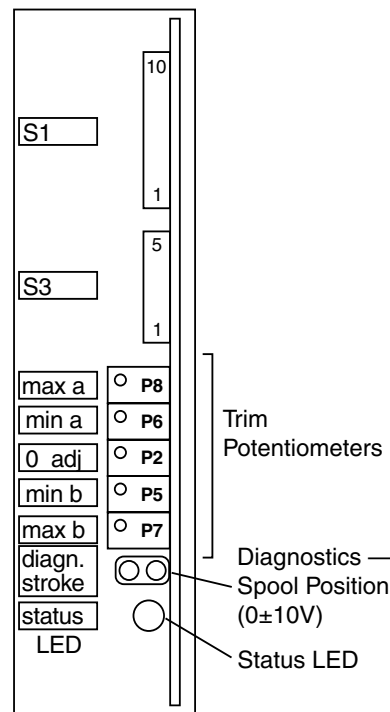
Arrangement of potentiometers, status LED, and internal valve spool monitor point.

**Status LED**

A status lamp (LED) is located inside the electronics enclosure and visible through a transparent lens. Refer to the table below.

Display Color	Indicates
Green	Normal operation
Off	Supply voltage outside permissible range of 18 to 30 VDC
Red	Spool position error / Low pilot pressure

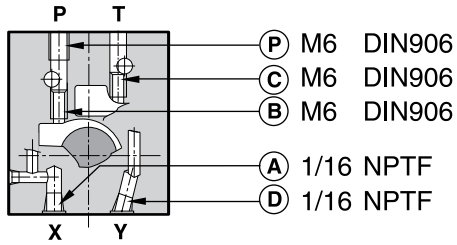
**Use D\*1FC for new applications**



**Pilot Flow**  
**Oil Inlet (Supply) and Outlet (Drain)**

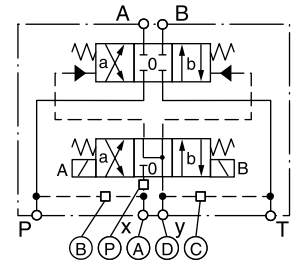
**Use D\*1FC for new applications**

**D31FH**

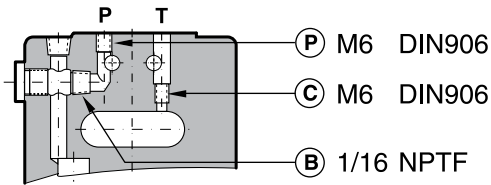


○ open, ● closed

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

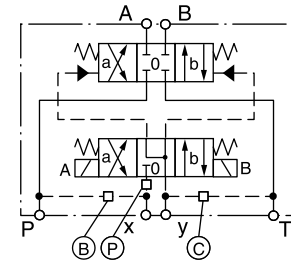


**D41FH**

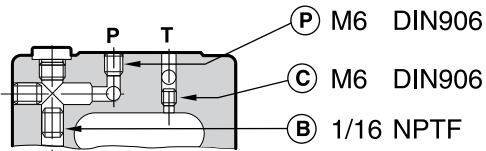


○ open, ● closed

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

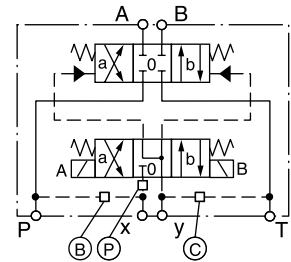


**D81FH and D91FH**

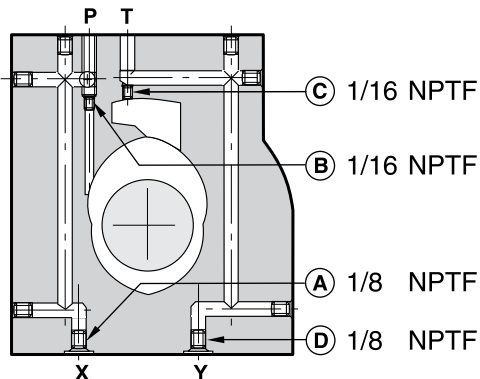


○ open, ● closed

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

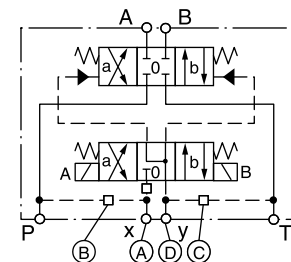


**D111FH**



○ open, ● closed

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

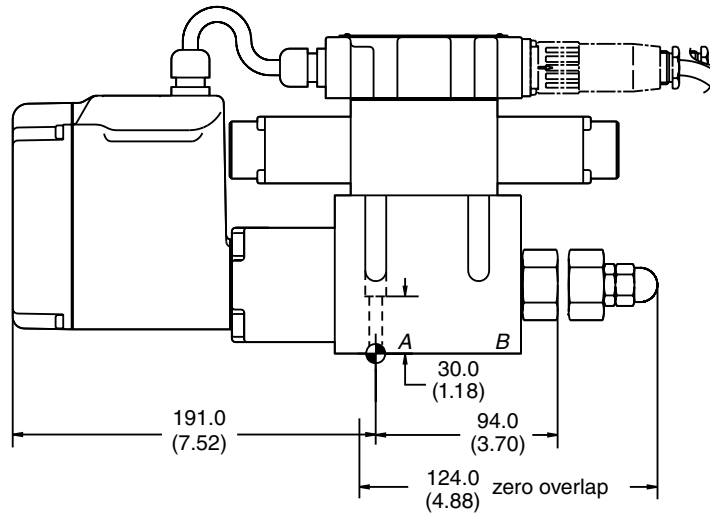
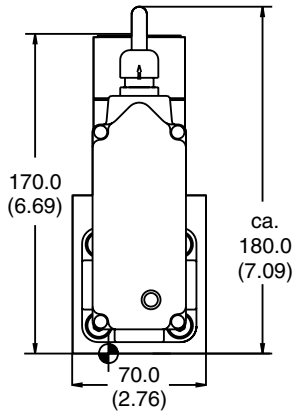
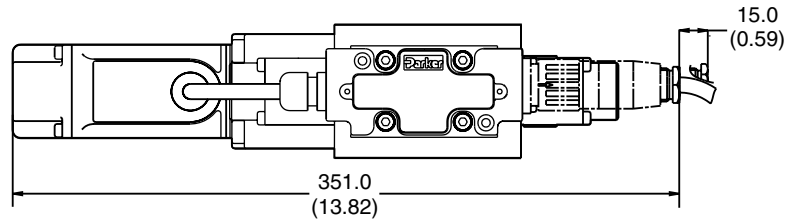


**D31FH**

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

**A**

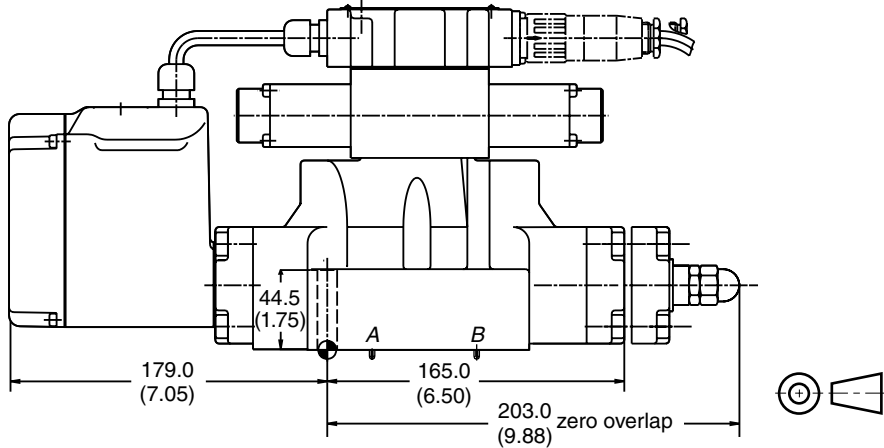
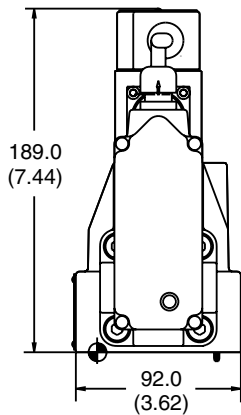
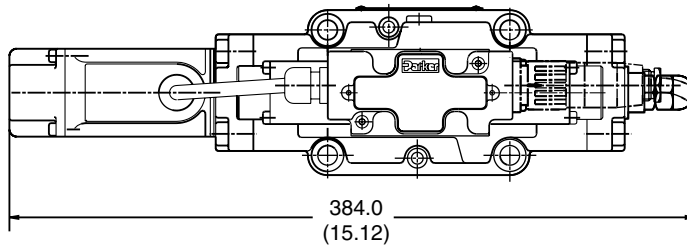
**Use D31FC  
for new applications**



**D41FH**

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

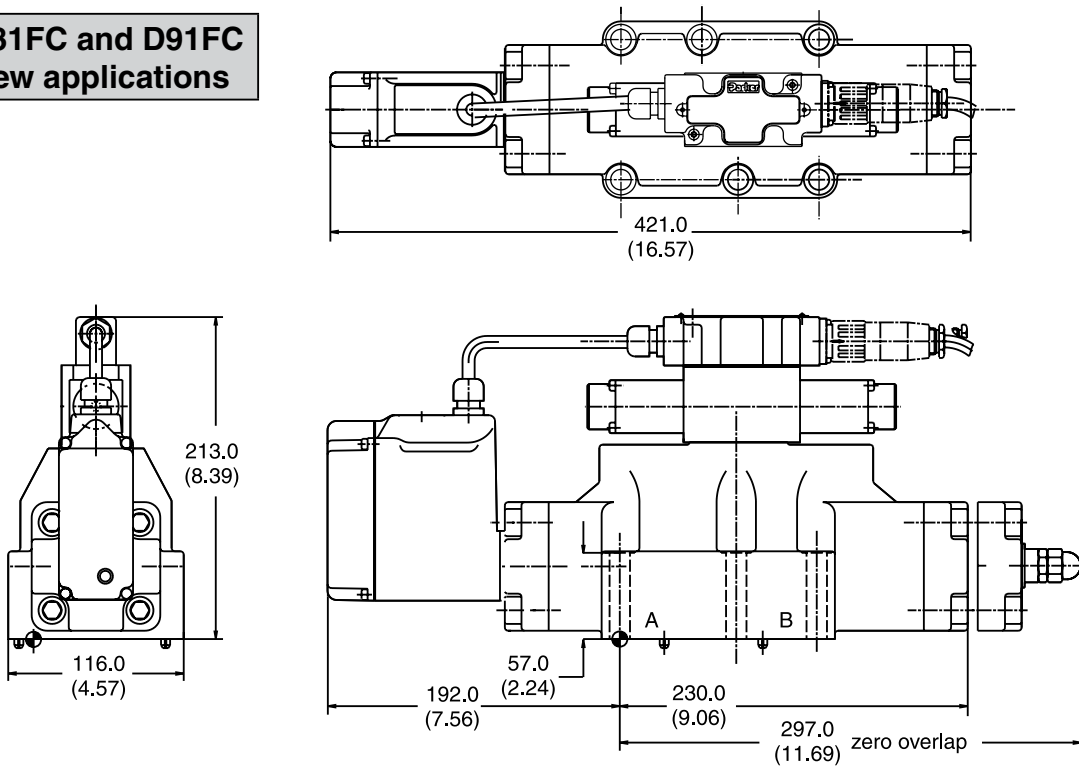
**Use D41FC  
for new applications**



**D81FH and D91FH**

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

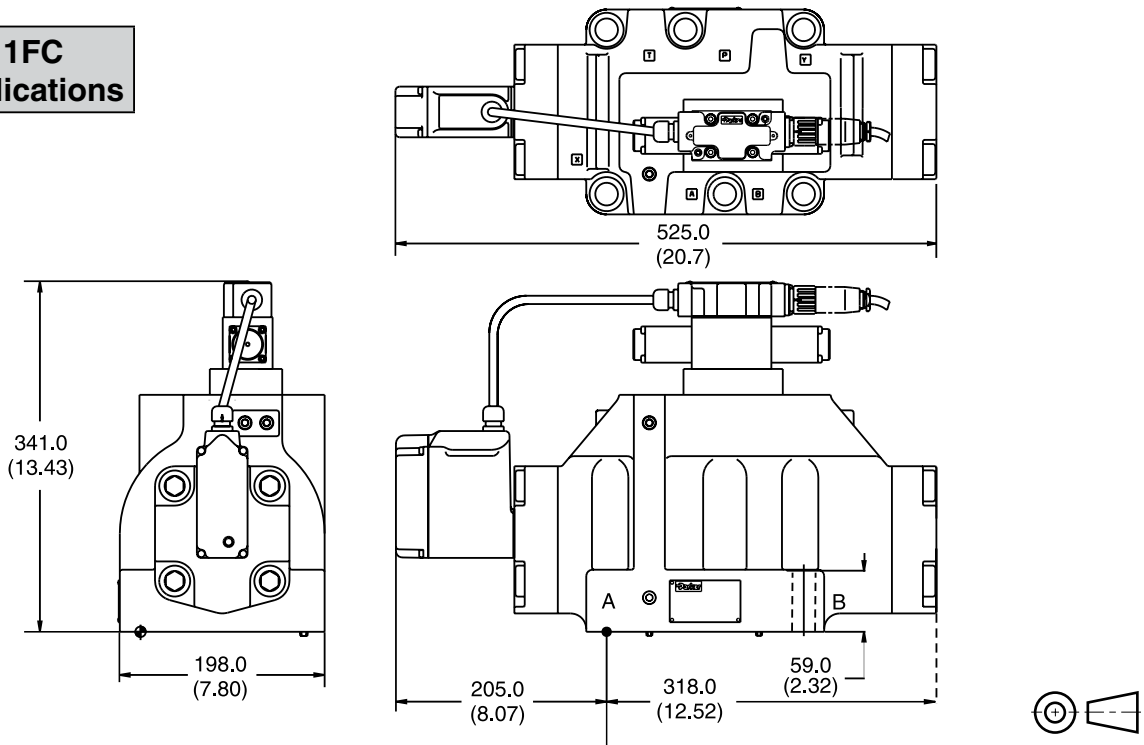
**Use D81FC and D91FC  
for new applications**



**D111FH**

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

**Use D111FC  
for new applications**



## General Description

**A**

Series D\*1FE pilot operated proportional valves are designed for high precision applications that require a safe middle position of the main spool at power down.

The pilot is a 3-position valve with an overlapped middle position. This ensures that the main stage spring pushes the spool into the middle position at power down without an unintended jerk of the actuator.

The D\*1FE series is available in 5 sizes:

D31FE NG10 (CETOP 5)

D41FE NG16 (CETOP 7)

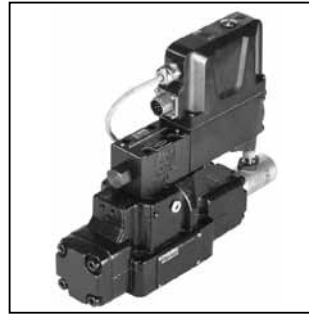
D91FE NG25 (CETOP 8) for port diam. up to 32 mm

D111FE NG32 (CETOP10)

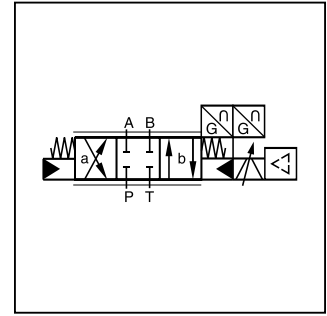
The innovative integrated regenerative function in the A-line (optional) allows new energy saving circuits with differential cylinders. The hybrid version can switch between regenerative mode and standard mode at any time.

## Features

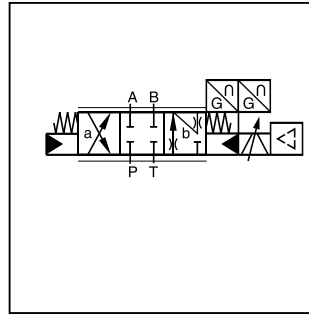
- High dynamics.
- High flow.
- Defined spool positioning at power-down.
- Onboard electronics.
- **NEW:** Energy saving A-regeneration optionally integrated.
- **NEW:** Switchable hybrid version.



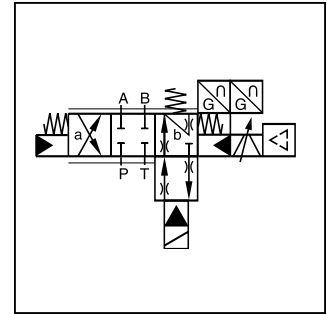
D41FE Standard



Standard D\*1FE



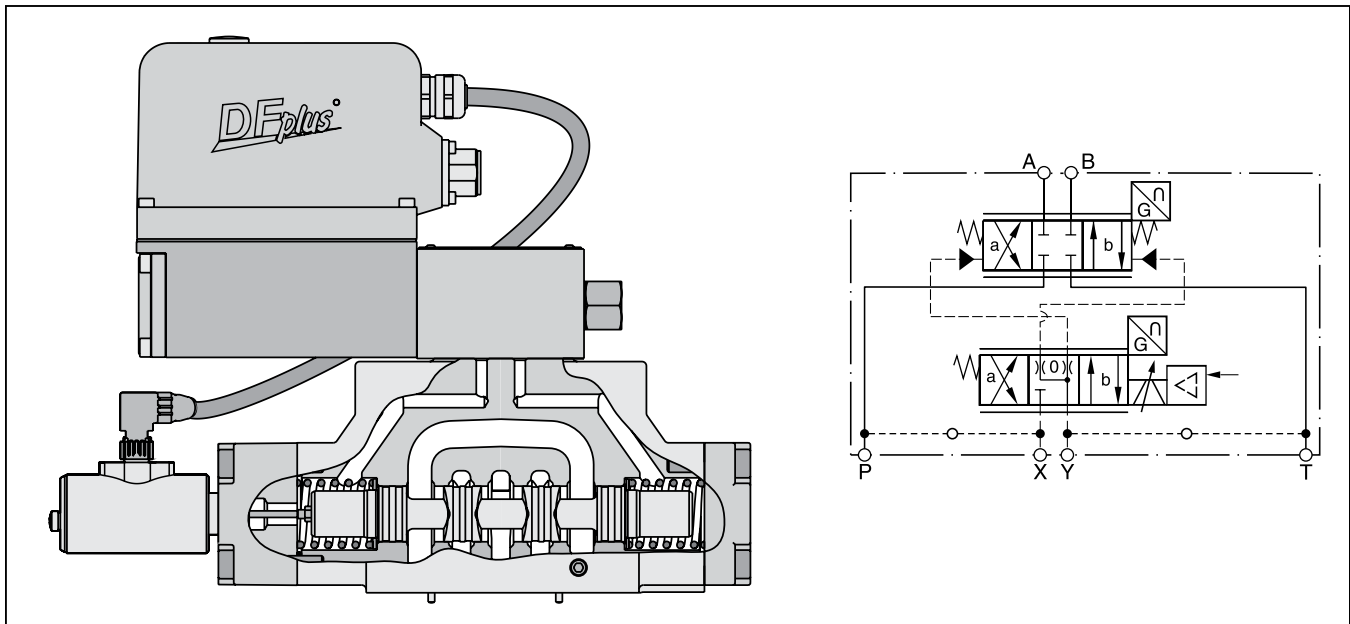
**NEW:** A-Regeneration D\*1FER



**NEW:** Hybrid D\*1FEZ

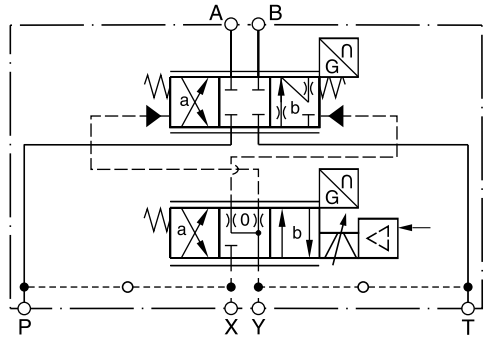
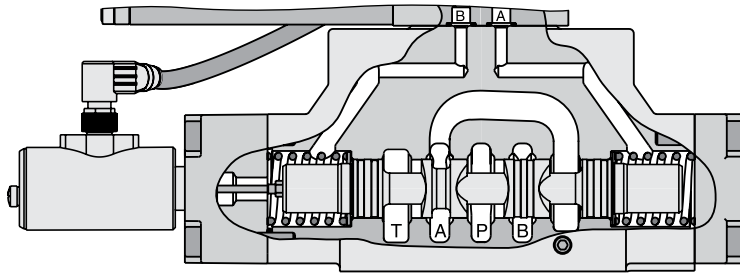


## D41FEE01 (Standard)

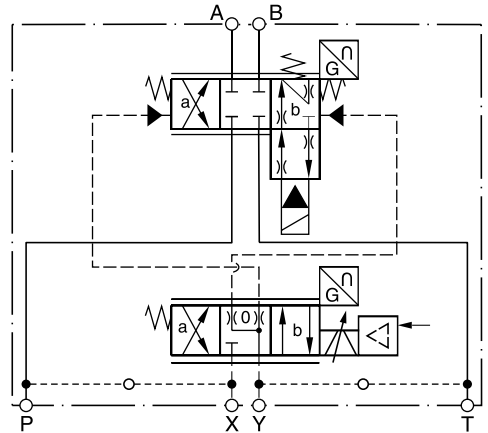
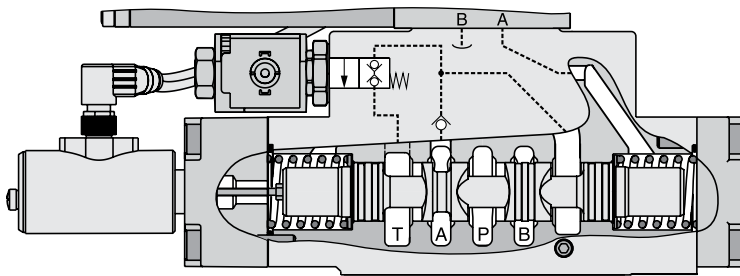


**D\*1FER and D\*1FEZ**

**Regenerative Valve D\*1FER**



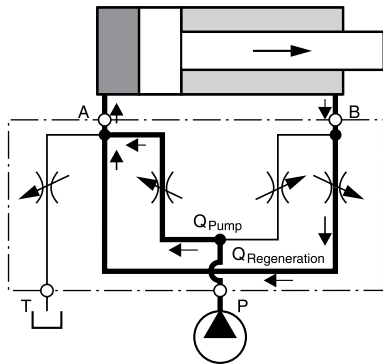
**Hybrid Valve D\*1FEZ**



**A**

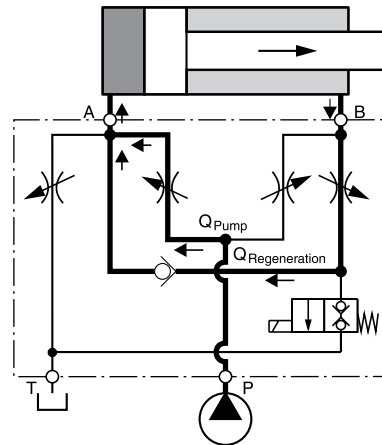
**D\*1FER (Regenerative Valve)**

Cylinder extending

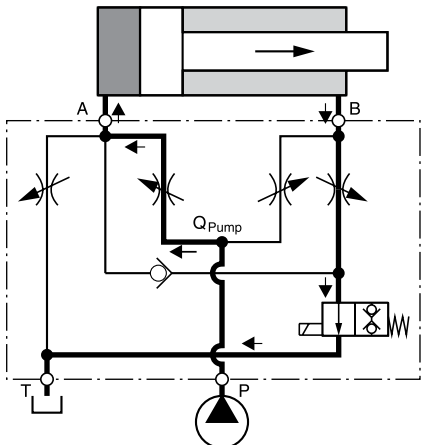


**D\*1FEZ (Hybrid Valve)**

Cylinder extending  
 in regenerative mode (high speed)



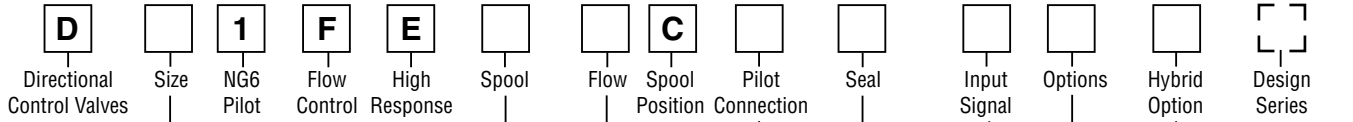
Cylinder extending  
 in standard mode (high force)



**Flow Rate in % of Nominal Flow**

Size	Spool	Port					
		A-T	P-A	P-B	B-A (R-Valve)	B-A (Hybrid)	B-T (Hybrid)
D41FER/Z	31/32	100%	50%	100%	50%	40%	20%
D91FER/Z	31/32	100%	50%	100%	50%	50%	25%
D111FER/Z	31/32	100%	50%	100%	50%	50%	20%

**A**



Code	Description
3	NG10 / CETOP 5
4	NG16 / CETOP 7
9 <sup>1)</sup>	NG25 / CETOP 8
11	NG32 / CETOP 10

<sup>1)</sup> With enlarged connections  
 Ø 32 mm

Code	Description
N	Nitrile
V	Fluorocarbon
H	For HFC fluid

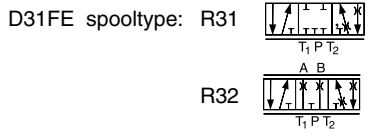
Code	Description
0	Standard for Spool Codes B, E, R
8 <sup>5)</sup>	Monitor Switch
L <sup>6)</sup>	Hybrid valve 24V normally closed for spool type Z

<sup>5)</sup> Not available for D111FEZ.  
<sup>6)</sup> See previous page for regenerative and hybrid spool information. (not available in D31FE).

Standard		NEW: Regenerative Function <sup>2)</sup>		NEW: Hybrid Function <sup>4)</sup>	
Code	Spool Type	Code	Spool Type	Code	Spool type
E01		R31		Z31	
E02		R32		Z32	
B31	$Q_B = Q_A / 2$ 	<sup>2)</sup> Not available in D91FE. <sup>4)</sup> Not available in D31FE.			
B32	$Q_B = Q_A / 2$ 				

Code	Inlet	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

Code	Description
0	6+PE acc. EN175201-804
5	11+PE acc. EN175201-804
7	6+PE + Enable



Code	Signal	Function
B	0...±10V	0...+10V P -> B
E	0...±20mA	0...+20mA P -> B
K	0...±10V	0...+10V P -> A
S	4...20mA	12...20mA P -> A

Code	Flow LPM (GPM) at Δp 5 Bar (72.5 PSI) per metering edge			
	D31	D41	D91	D111
D	90 (24)	—	—	—
E	120 (32)	—	—	—
F	—	200 (53)	—	—
H	—	—	450 (119)	—
L	—	—	—	1000 (265)

**Weight:**

D31FE	11.3 kg (24.9 lbs.)
D41FE	14.2 kg (31.3 lbs.)
D91FE	23.5 kg (51.8 lbs.)
D111FE	64.5 kg (142.2 lbs.)



General				
Design	Proportional directional control valve, pilot operated			
Actuation	VCD® actuator			
Size	<b>NG10 (CETOP 5) D31</b>	<b>NG16 (CETOP 7) D41</b>	<b>NG25 (CETOP 8) D91</b>	<b>NG32 (CETOP 10) D111</b>
Mounting Interface	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA			
Mounting Position	Unrestricted			
Ambient Temperature	[°C]	-20...+60; (-4°F...+140°F)		
MTTF <sub>D</sub> Value	[years]	50		
Vibration Resistance	[g]	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27		
Hydraulic				
Maximum Operating Pressure	Pilot Drain Internal: Ports P, A, B, X 350 Bar (5075 PSI); Port T, Y 35 Bar (507.5 PSI) Pilot Drain External: Ports P, A, B, T, X 350 Bar (5075 PSI); Port Y 35 Bar (507.5 PSI)			
Fluid	Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature	[°C]	-20...+60; (-4°F...+140°F)		
Viscosity Permitted	[cSt] / [mm²/s]	20...380 (93...1761 SSU)		
Viscosity Recommended	[cSt] / [mm²/s]	30...80 (139...371 SSU)		
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Nominal Flow at Δp=Bar (72.5 PSI) per Control Edge <sup>1)</sup>	LPM (GPM)	120 (31.7)	200 (52.9)	400/450 (105.8/119.0)
Max. Recommended Flow (Standard) Regenerative B-A / B-T	LPM (GPM)	250 (66.1)	600 (158.7)	1000 (264.2)
		Depending on application, all flow curves		
Leakage at 100 Bar (1450 PSI)	[ml/min]	200 (12 cu. in.)	200 (12 cu. in.)	600 (37 cu. in.)
Pilot	[ml/min]	<100 (6.1 cu. in.)	<100 (6.1 cu. in.)	<100 (6.1 cu. in.)
Pilot Supply Pressure	20 Bar (290 PSI) 350 Bar (5075 PSI)			
Pilot Flow, Step Response @ 210 Bar		9 LPM (2.4 GPM)	10 LPM (2.6 GPM)	18 LPM (4.8 GPM)
				30 LPM (7.9 GPM)
Static / Dynamic				
Step Resp. at 100% Stroke <sup>2)</sup>	[ms]	13	19	24
Frequency Response Amplitude ±5% at 210 Bar (3045 PSI)	[Hz]	180	80	65
Phase ±5% at 210 Bar (3045 PSI)	[Hz]	130	100	75
Hysteresis	[%]	<0.1		
Sensitivity	[%]	<0.05		
Temperature Drift of Center Position	[%K]	<0.025		

<sup>1)</sup> Flow rate for different Δp per control edge:  $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

<sup>2)</sup> Measured with load [210 Bar (3045 PSI) pressure drop/two control edges].

Continued on the next page

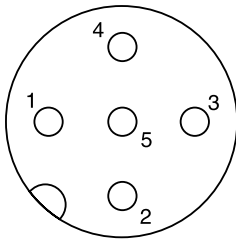
**A**

<b>Electrical (Onboard Electronics)</b>	
<b>Duty Ratio</b>	[%] 100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
<b>Protection Class</b>	IP65 in accordance with EN 60529 (plugged and mounted)
<b>Supply Voltage/Ripple</b>	[V] 18...30, ripple < 5% eff., surge free
<b>Current Consumption Maximum</b>	[A] 3.5
<b>Pre-fusing Medium Lag</b>	[A] 4.0
<b>Input Signal</b>	
Code K (B) Voltage Impedance	[V] +10...0...-10, ripple < 0.01 % eff., surge free, 0...+10 P→A (P→B) [kOhm] 100
Code E Voltage Impedance	[mA] +20...0...-20 ripple < 0.01 % eff., surge free, 0...+20mA P→B [Ohm] 250
Code S Current Impedance	[mA] 4...12...20, ripple < 0.01 % eff., surge free, 12...20mA P→A < 3.6 mA = enable off, > 3.8 mA = enable on (acc. to NAMUR NE43) [Ohm] 250
<b>Input Capacitance Typ.</b>	[nF] 1
<b>Differential Input Maximum</b>	
Code 0	[V] 30 for terminal D and E against PE (terminal G) 11 for terminal D and E against 0V (terminal B)
Code 5	[V] 30 for terminal 4 and 5 against PE (terminal ⊥) 11 for terminal 4 and 5 against 0V (terminal 2)
Code 7	[V] 30 for terminal D and E against PE (terminal G)
<b>Enable Signal Code 5 / 7</b>	[V] 5...30, Ri = 9 kOhm
<b>Diagnostic Signal</b>	[V] +10...0...-10 / +ub, rated max. 5 mA
<b>EMC</b>	EN 61000-6-2, EN 61000-6-4
<b>Electrical Connection</b>	
Code 0 / 7	6 + PE acc. to EN 175201-804
Code 5	11 + PE acc. to EN 175201-804
<b>Wiring Minimum</b>	
Code 0 / 7	[mm²] 7 x 1.0 (AWG16) overall braid shield
Code 5	[mm²] 11 x 1.0 (AWG20) overall braid shield
<b>Wiring Length Maximum</b>	[m] 50 (164 ft.)

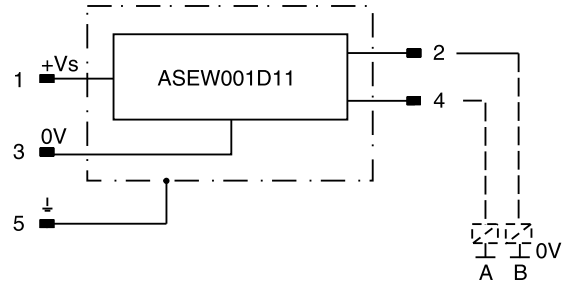
<b>Electrical (Hybrid Option)</b>			
<b>Duty Ratio</b>	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible	
<b>Protection Class</b>		IP65 in accordance with EN 60529 (plugged and mounted)	
		<b>D41</b>	<b>D91</b>
<b>Supply Voltage</b>	[V]	24	24
<b>Tolerance Supply Voltage</b>	[%]	±10	±10
<b>Current Consumption</b>	[A]	1.21	0.96
<b>Power Consumption</b>	[W]	29	23
<b>Solenoid Connection</b>		Connector as per EN 175301-803	
<b>Wiring Minimum</b>	[mm²]	3 x 1.5 recommended	
<b>Wiring Length Maximum</b>	[m]	50 (164 ft.) recommended	

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

**Monitor Switch M12x1 Pin Assignment**



- 1 + Supply 18...42V
- 2 Output B (normally closed)
- 3 0V
- 4 Output A (normally closed)
- 5 Earth ground



Signal	Output A (pin 4)	Output B (pin 2)
neutral	closed	closed
	open	closed
	closed	open

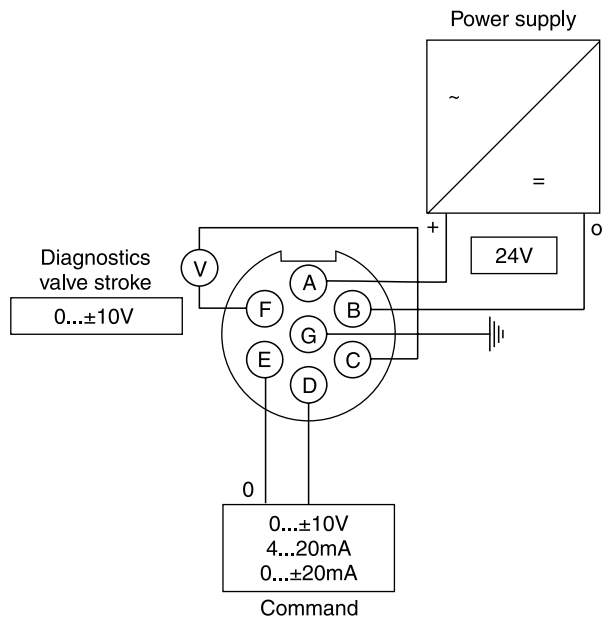
The neutral position is monitored. The signal changes after less than 10% of the spool stroke.

**Electrical Monitor Switch**

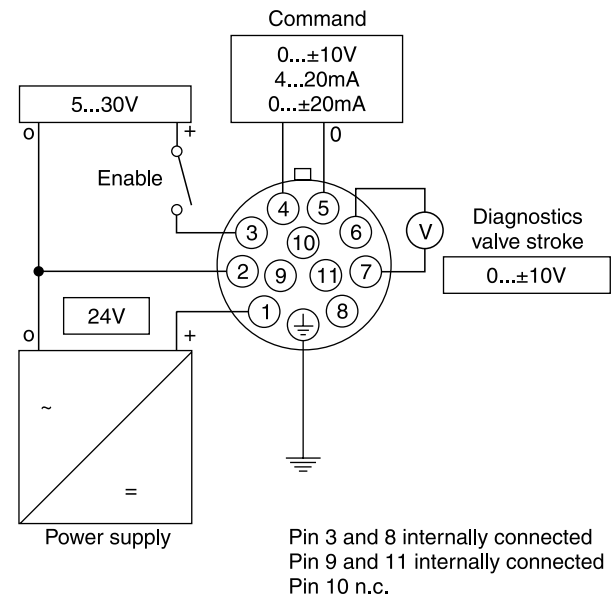
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)
Ambient Temperature	[°C] 0...70; (32°F...158°F)
Supply Voltage/Ripple	[V] 18...42, ripple < 10% eff.
Current Consumption without Load	[mA] < 30
Maximum Output Current per Channel, Ohmic	[mA] 400
Minimum Output Load per Channel, Ohmic	[kOhm] 100
Maximum Output Drop at 0.2A	[V] < 1.1
Maximum Output Drop at 0.4A	[V] < 1.6
EMC	EN 61000-6-2, EN61000-6-4
Maximum Tol. Ambient Field Strength	[A/m] 1200
Minimum Distance to Next AC solenoid	[m] 0.1
Interface	4+PE acc. IEC 61076-2-101 (M12)
Wiring Minimum	[mm²] 5 x 0.5 (AWG 20) overall braid shield
Wiring Length Maximum	[m] 50 (164 ft.)



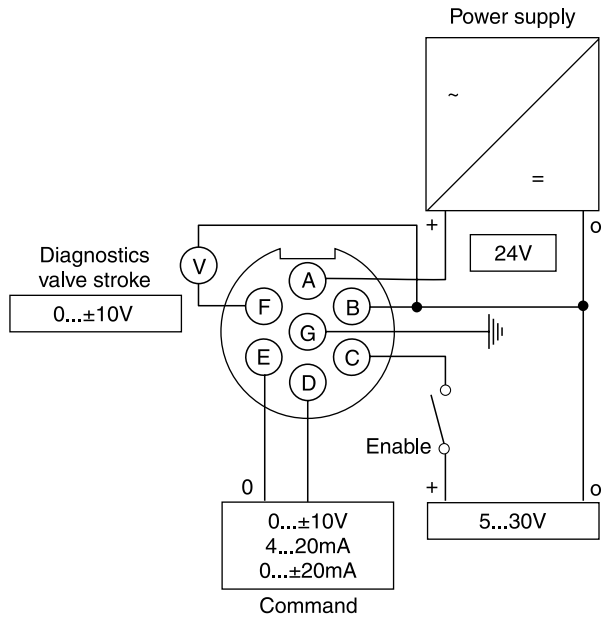
**Code 0**  
**6 + PE acc. EN 175201-804**



**Code 5**  
**11 + PE acc. EN 175201-804**



**Code 7**  
**6 + PE acc. EN 175201-804 + Enable**



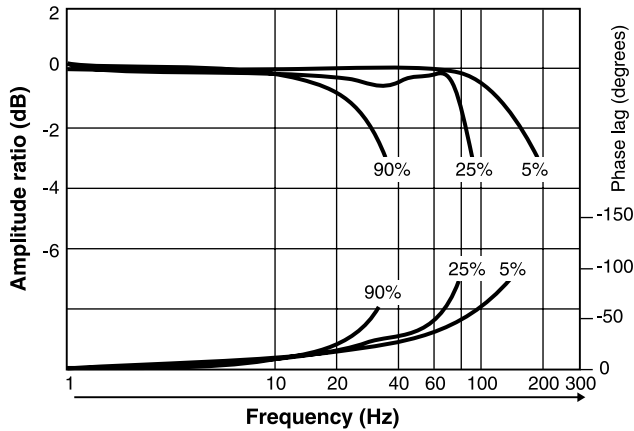


**Frequency Response**

±5% / ±25% / ±90% command signal  
 Dynamics at 210 bar pilot supply pressure

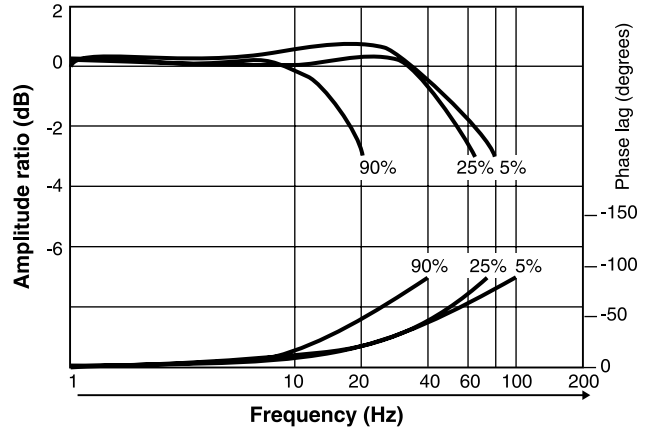
**D31FE**

**D31 FE Frequency Response**  
 ±5% / ±25% / ±90% Command Signal  
 Dynamics at 210 Bar (3045 PSI) Pilot Supply Pressure



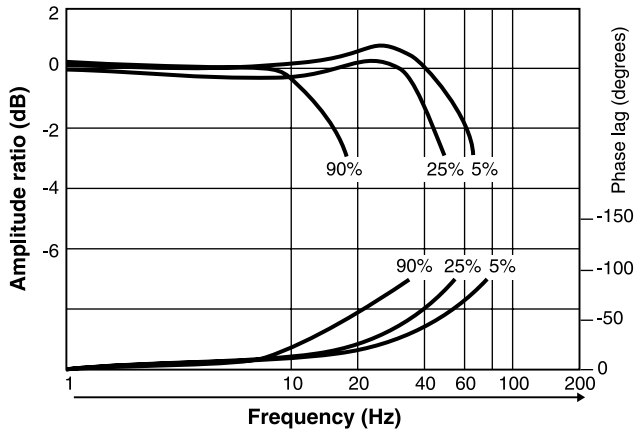
**D41FE**

**D41FE Frequency Response**  
 ±5% / ±25% / ±90% Command Signal  
 Dynamics at 210 Bar (3045 PSI) Pilot Supply Pressure



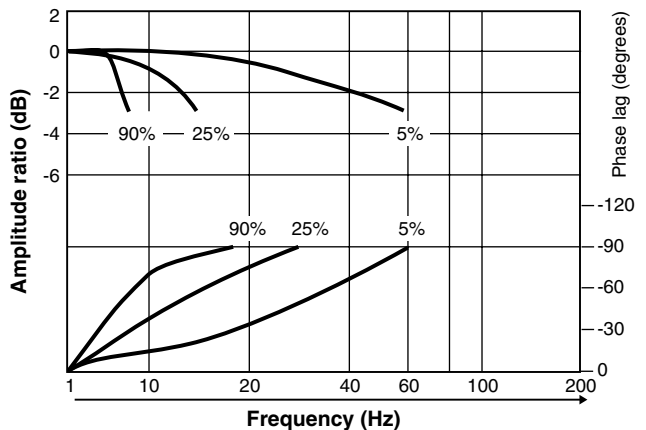
**D91FE**

**D91FE Frequency Response**  
 ±5% / ±25% / ±90% Command Signal  
 Dynamics at 210 Bar (3045 PSI) Pilot Supply Pressure



**D111FE**

**D111FE Frequency Response**  
 ±5% / ±25% / ±90% Command Signal  
 Dynamics at 210 Bar (3045 PSI) Pilot Supply Pressure



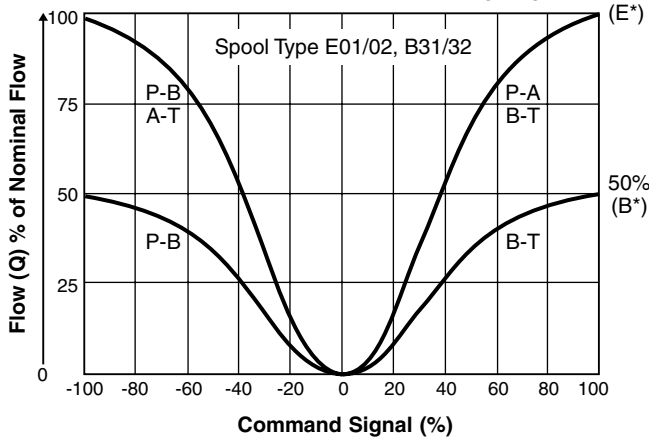
All performance curves measured with HLP46 at 50°C (122°F).

**D\*1FEB/E Flow**



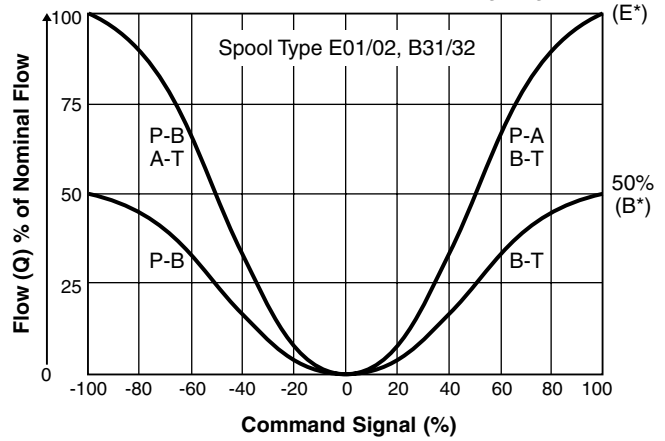
**D31FE Flow Characteristics**

at  $\Delta p = 5$  Bar (72.5 PSI) / metering edge



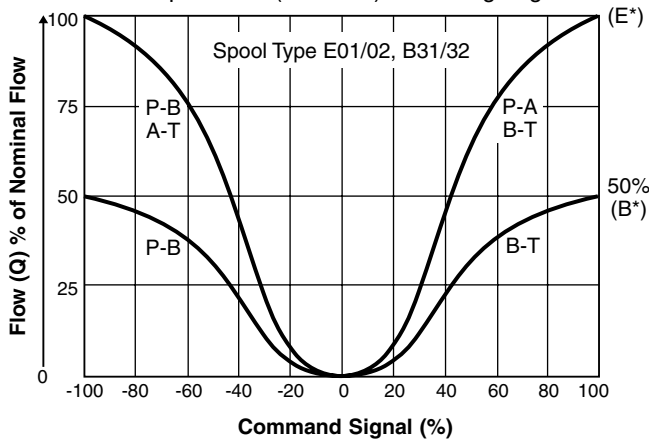
**D41FE Flow Characteristics**

at  $\Delta p = 5$  Bar (72.5 PSI) / metering edge



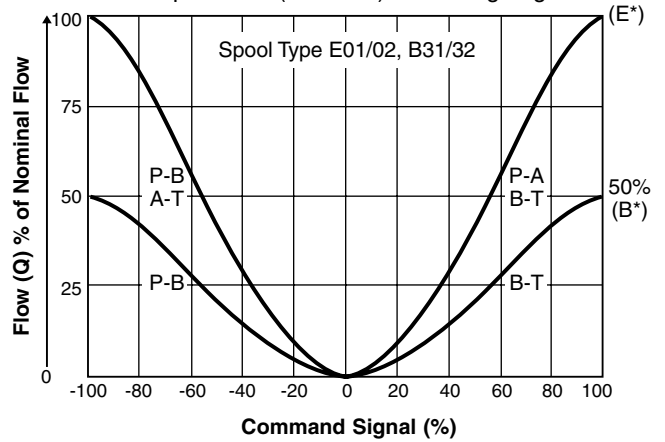
**D91FE Flow Characteristics**

at  $\Delta p = 5$  Bar (72.5 PSI) / metering edge



**D111FE Flow Characteristics**

at  $\Delta p = 5$  Bar (72.5 PSI) / metering edge



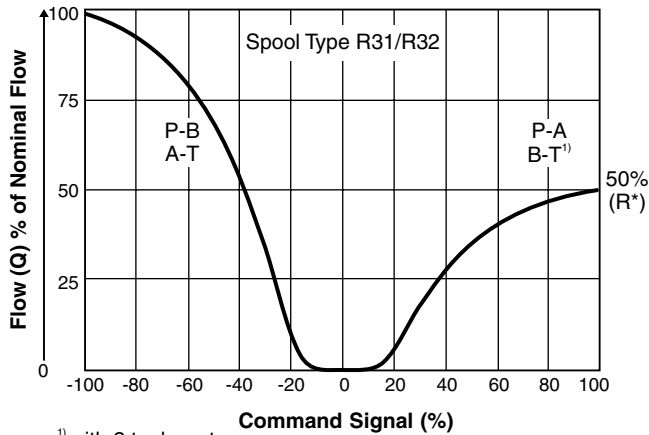
All performance curves measured with HLP46 at 50°C (122°F).

**D\*1FE R/Z Flow**

**D31FE R/Z**

**D31FE Flow Characteristics**

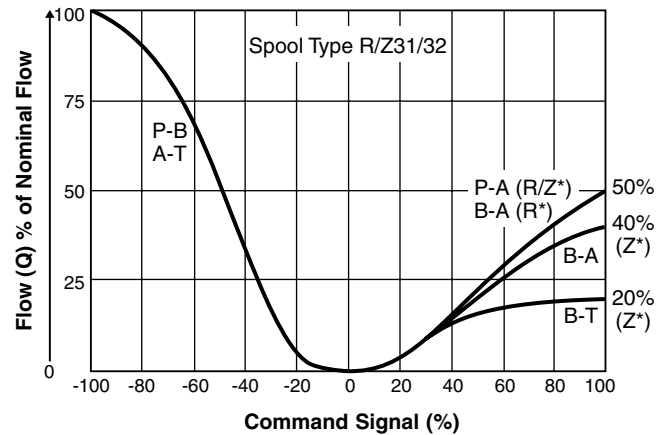
at  $\Delta p = 5$  Bar (72.5 PSI) / metering edge



**D41FE R/Z**

**D41FE Flow Characteristics**

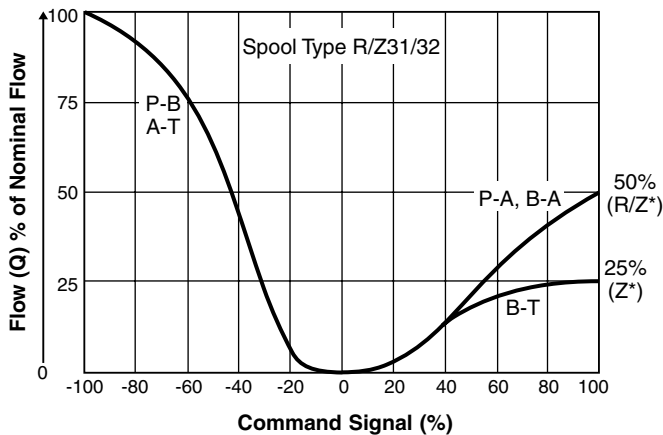
at  $\Delta p = 5$  Bar (72.5 PSI) / metering edge



**D91FE R/Z**

**D91FE Flow Characteristics**

at  $\Delta p = 5$  Bar (72.5 PSI) / metering edge



**D111FE R/Z\***

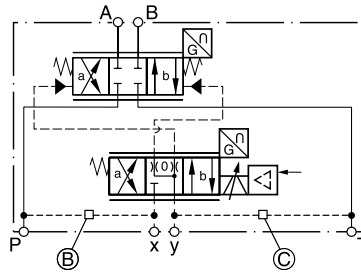
SpoolType R/Z\* on request

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

**Pilot Flow — Pilot Oil Inlet (supply) and Outlet (drain)**

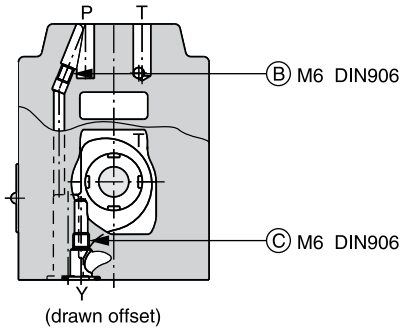
○ open, ● closed

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

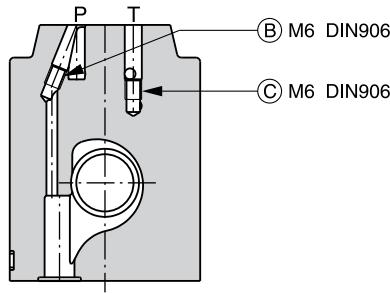


**A**

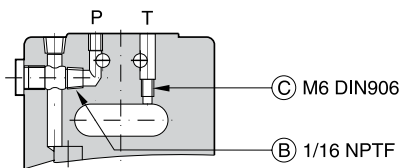
**D31FEB/E**



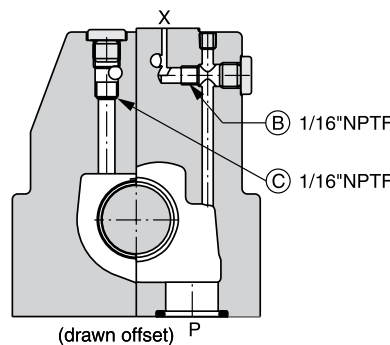
**D31FER**



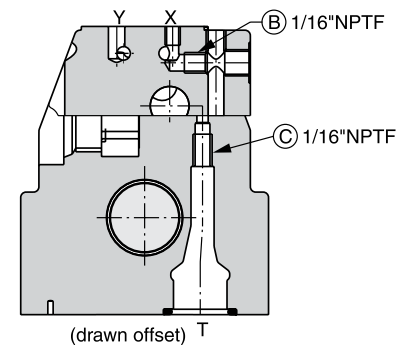
**D41FEB/E**



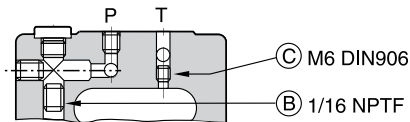
**D41FER**



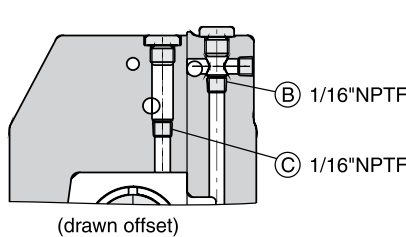
**D41FEZ**



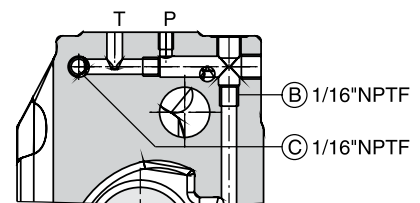
**D91FEB/E**



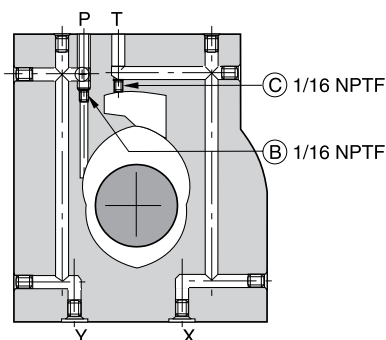
**D91FER**



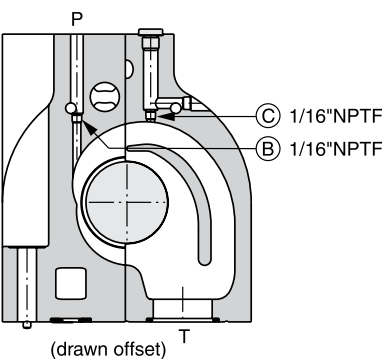
**D91FEZ**



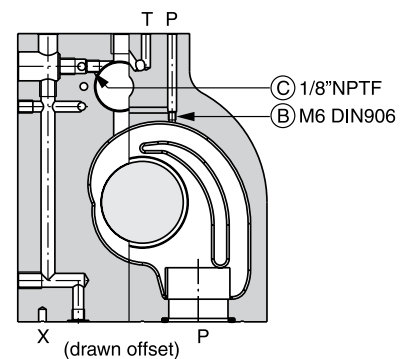
**D111FEB/E**



**D111FER**



**D111FEZ**





**Dimensions**

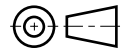
**Proportional Directional Control Valves  
Series D\*1FE**

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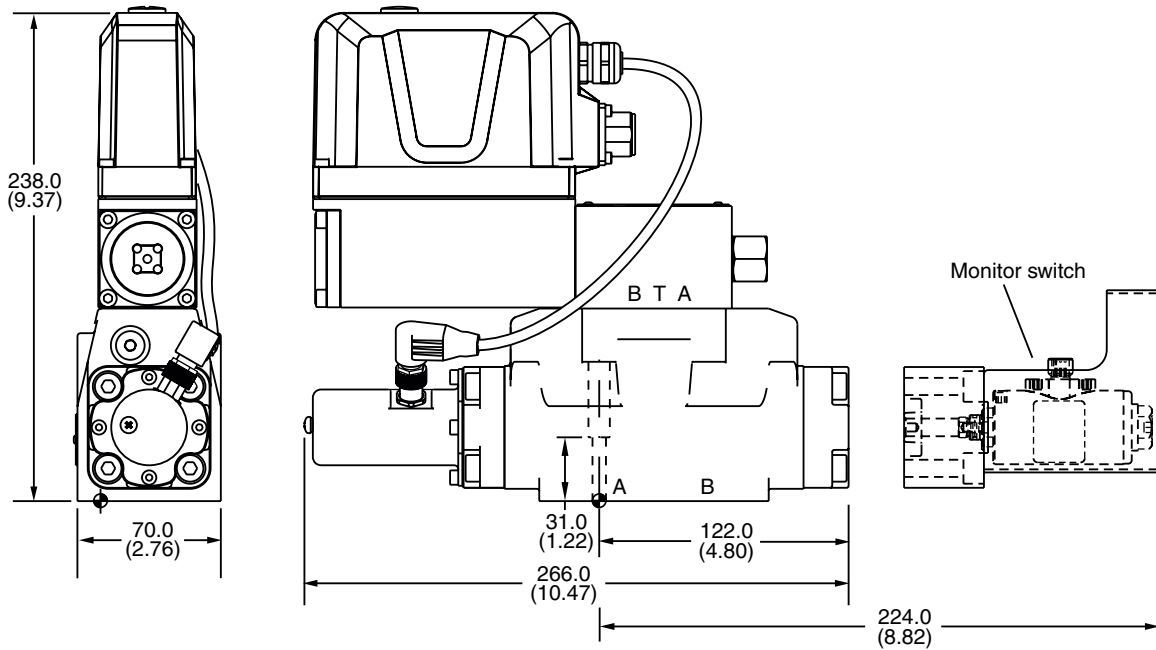
Return to  
SECTION  
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**A**

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

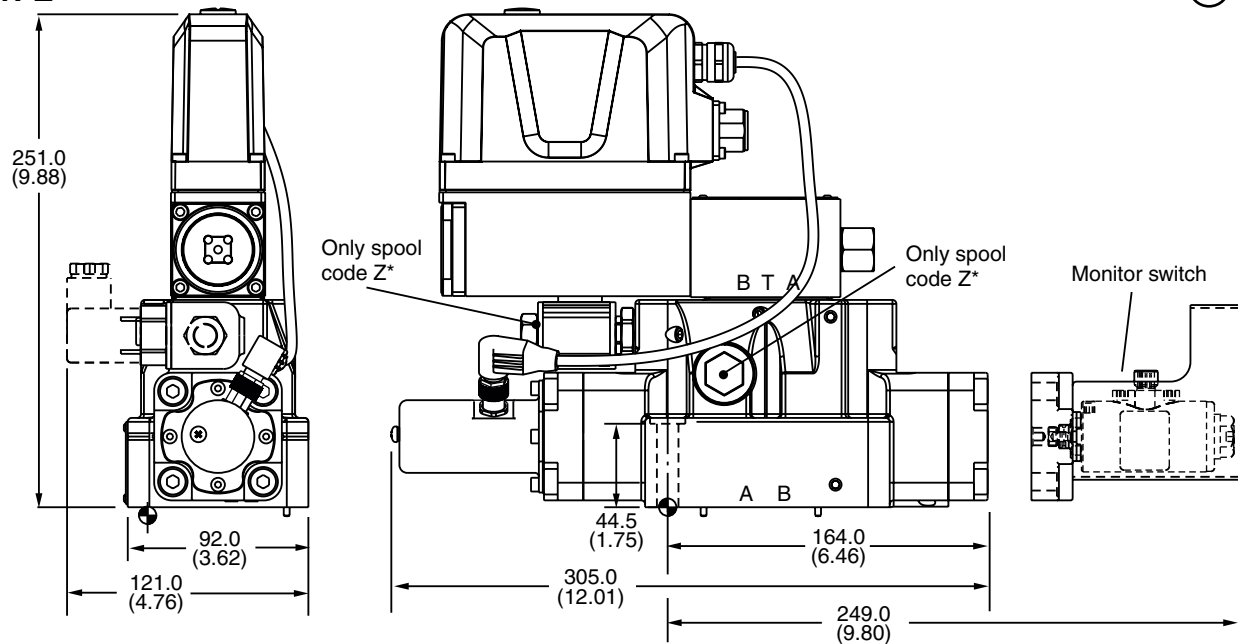


**D31FE**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK385	4x M6x40 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D31FP Fluorocarbon: SK-D31FP-V
	BK98	4x 1/4-20x1.625		

**D41FE**

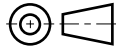


Surface Finish	Kit	Kit	Kit	Seal Kit
	BK320	2x M6x55 4x M10x60 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.) 63 Nm (46.5 lb.-ft.) ±15 %	Nitrile: SK-D41FP Fluorocarbon: SK-D41FP-V
	BK160	4x 3/8-16x2.5 2x 1/4-20x2.5		

D\_1FE.indd, ddp

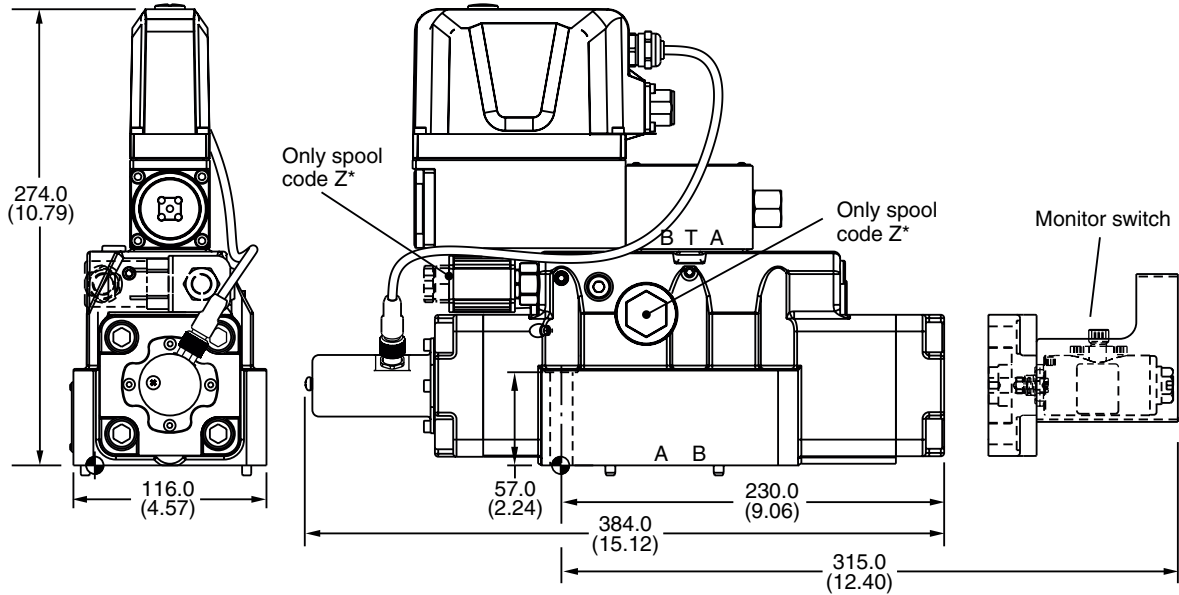


Inch equivalents for millimeter dimensions are shown in (\*\*)



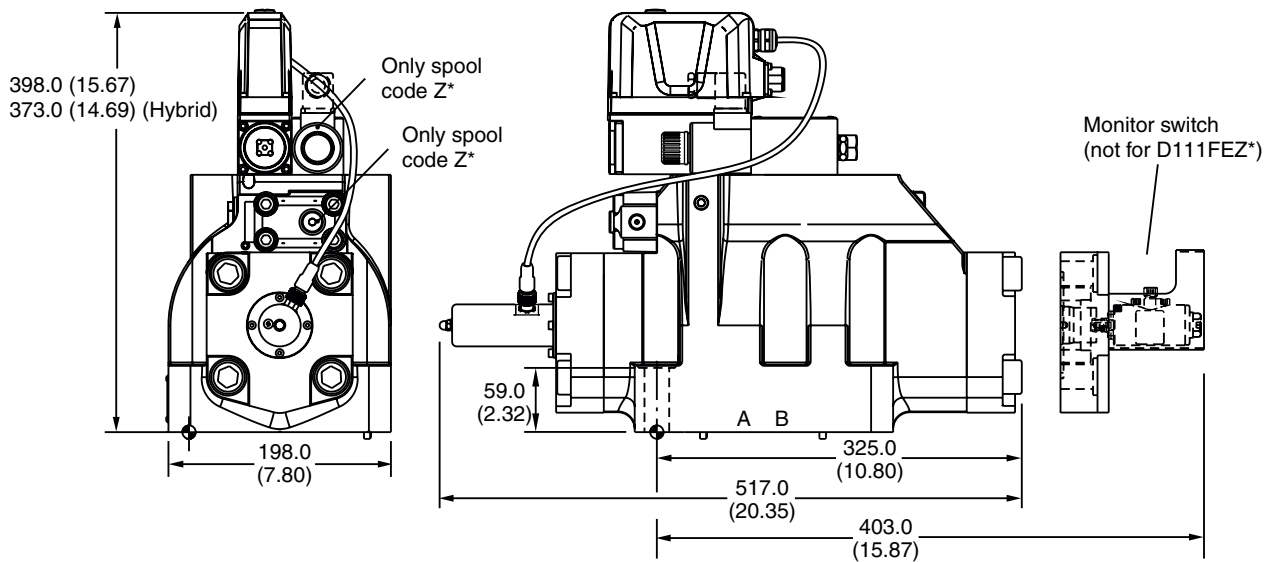
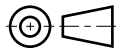
**A**

**D91FE**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK360	6x M12x75 DIN 912 12.9	108 Nm (79.7 lb.-ft.) ±15 %	Nitrile: SK-D91FP Fluorocarbon: SK-D91FP-V
	BK228	6x 1/2-13x3.0		

**D111FE**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK386	6x M20x90 DIN 912 12.9	517 Nm (381.3 lb.-ft.) ±15 %	Nitrile: SK-D111FP Fluorocarbon: SK-D111FP-V
	BK150	6x 3/4-10x3.5		

**General Description**

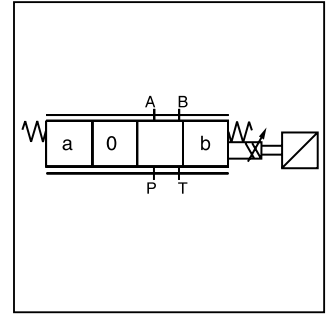
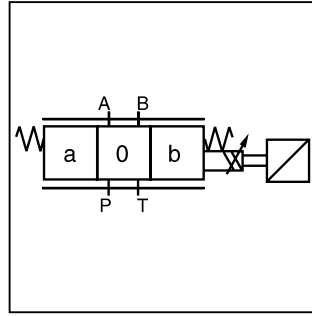
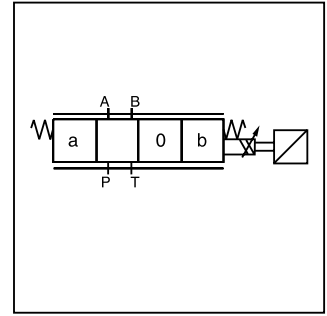
Series D1FP direct operated control NG6 (CETOP 3) valve features extremely high dynamics combined with maximum flow. It is used for high accuracy in positioning of a hydraulic axis, and for controlling force and velocity.

Driven by the new patented VCD® actuator, the D1FP reaches the frequency response of servovalves. Compared with solenoid driven valves, the D1FP can also be used in applications with pressure drops up to 350 Bar (5075 PSI) across the valve. Because of the high flow capability the D1FP can be a substitute for NG10 valves in some cases.

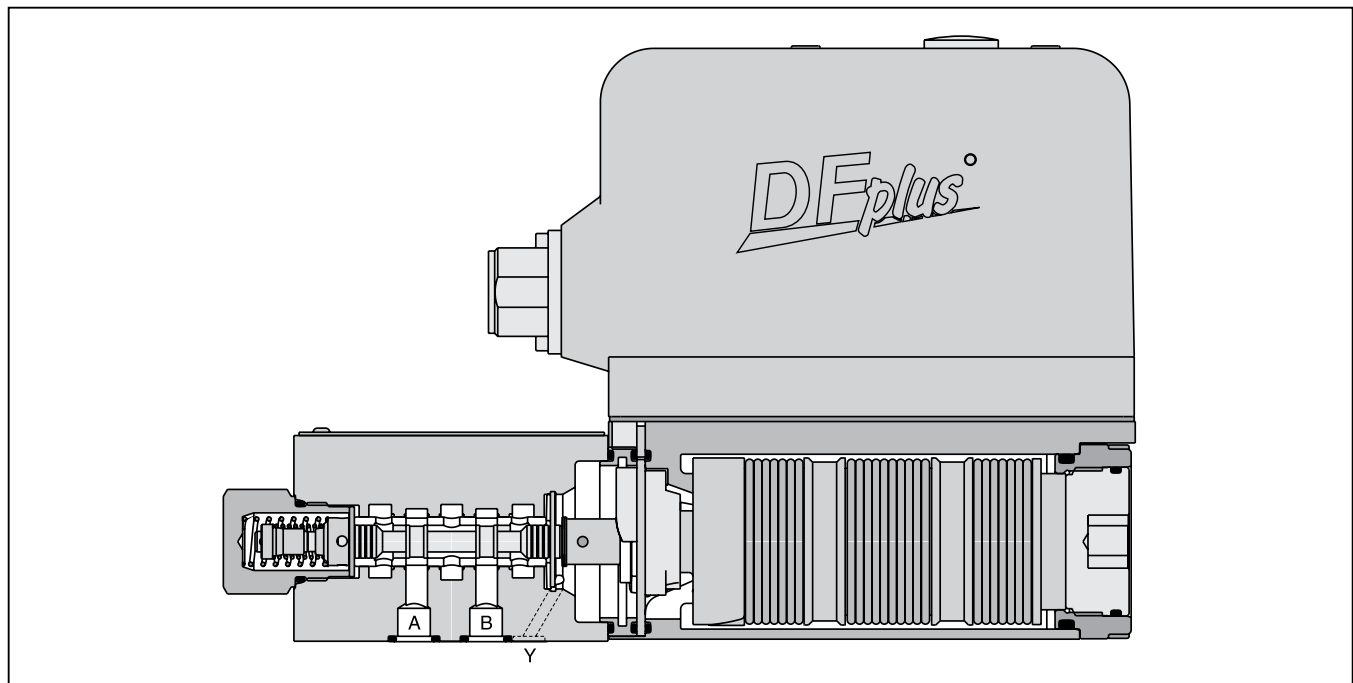
At power-down the spool moves in a defined position. All common input signals are available.

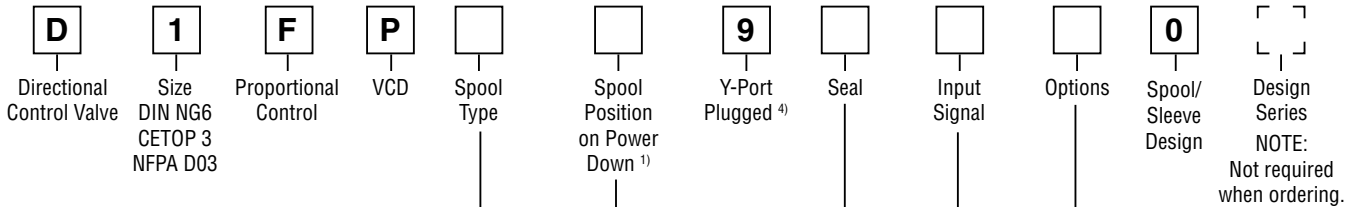
**Features**

- Servovalve dynamics:  
 -3dB/350Hz at ±5% input signal
- Full flow capacity up to 350 Bar (5075 PSI) pressure drop through the valve.
- Maximum tank pressure 350 Bar (5075 PSI) with external drain Y-port.
- High flow.
- Defined spool positioning in case of loss of electric power supply.



- Defined spool positioning at power-down.
- Onboard electronics.



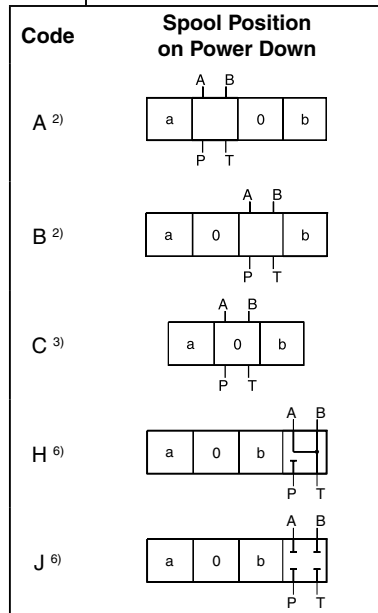


Code	Spool	Flow LPM (GPM) at Δp 35 Bar (508 PSI) per metering edge
<b>Zerolap</b>		
E50M		40 (10.6)
E50H		25 (6.6)
E50G		16 (4.2)
E50F		12 (3.2)
E50C		6 (1.6)
E50B	3 (0.8)	
B60M	$Q_B = Q_A/2$ 	40 (10.6) / 20 (5.3)
B60H		25 (6.6) / 12.5 (3.3)
B60G		16 (4.2) / 8 (2.1)
B60F		12 (3.2) / 6 (1.6)
B60C		6 (1.6) / 3 (0.8)
<b>Underlap approximately -0.5%</b>		
E55M		40 (10.6)
E55H		25 (6.6)
E55G		16 (4.2)
E55F		12 (3.2)
E55C		6 (1.6)
E55B	3 (0.8)	
<b>Overlap 25%</b>		
E01M		40 (10.6)
E01H		25 (6.6)
E01G		16 (4.2)
E01F		12 (3.2)
E01C		6 (1.6)
E01B	3 (0.8)	
B31M	$Q_B = Q_A/2$ 	40 (10.6) / 20 (5.3)
B31H		25 (6.6) / 12.5 (3.3)
B31G		16 (4.2) / 8 (2.1)
B31F		12 (3.2) / 6 (1.6)
B31C		6 (1.6) / 3 (0.8)
E02M		40 (10.6)
E02H		25 (6.6)
E02G		16 (4.2)
E02F		12 (3.2)
E02C		6 (1.6)
E02B	3 (0.8)	
B32M	$Q_B = Q_A/2$ 	40 (10.6) / 20 (5.3)
B32H		25 (6.6) / 12.5 (3.3)
B32G		16 (4.2) / 8 (2.1)
B32F		12 (3.2) / 6 (1.6)
B32C		6 (1.6) / 3 (0.8)

Please order plugs separately. See Accessories.

Code	Description
N	Nitrile
V	Fluorocarbon
H	For HFC Fluid

Code	Description
0	6 + PE acc. EN175201-804
5	11 + PE acc. EN175201-804
7	6 + PE + Enable



Code	Signal	Flow Direction <sup>5)</sup>
B	+/- 10V	0...+10V -> P-A
E	+/- 20mA	0...+20mA -> P-A
S	4...20mA	12...20mA -> P-A

- 1) On power down the spool moves in a defined position. This cannot be guaranteed in case of single flow path on the control edge A→T resp. B→T with pressure drops above 120 Bar (1740 PSI) or contamination in the hydraulic fluid.
- 2) Approximately 10% opening, only available with zerolap spools and underlap spools.
- 3) Only available with overlap spools.
- 4) Needs to be removed at tank pressure >35 Bar (507.5 PSI).
- 5) Flow direction P→A with Pin D > Pin E.
- 6) Not for flow code M.

**Bolt Kit:**

- BK209 (4) 10-24x1.25
- BK375 (4) M5x30

**Weight:** 5.0 kg (11.0 lbs.)

General		
Design	Direct operated proportional DC valve	
Actuation	VCD® actuator	
Size	NG6 / CETOP 3 / NFPA D03	
Mounting Interface	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA	
Mounting Position	Unrestricted	
Ambient Temperature	[°C]	-20...+50; (-4°F...+122°F)
MTTF <sub>n</sub> Value	[years]	75
Vibration Resistance	[g]	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27
Hydraulic		
Maximum Operating Pressure	Ports P, A, B 350 Bar (5075 PSI) Port T max. 35 Bar (508 PSI), port Y max. 35 Bar (508 PSI) <sup>1)</sup>	
Fluid	Hydraulic oil as per DIN 51524...51535, other on request	
Fluid Temperature	[°C]	-20...+60; (-4°F...+140°F)
Viscosity		
Permitted	[cSt] / [mm²/s]	20...380 (93...1761 SSU)
Recommended	[cSt] / [mm²/s]	30...80 (139...371 SSU)
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	
Nominal Flow at Δp=35 Bar (508 PSI) per Control Edge <sup>2)</sup>	3 LPM (0.08 GPM) / 6 LPM (1.6 GPM) / 12 LPM (3.2 GPM) / 25 LPM (6.6 GPM) / 40 LPM (10.6 GPM)	
Flow Maximum	90 LPM (23.8 GPM) at Δp=350 Bar (5075 PSI) over two control edges	
Leakage at 100 Bar (1450 PSI)	[ml/min]	<400 (zerolapped spool); <50 (overlapped spool)
Static / Dynamic		
Step Response at 100% Step <sup>3)</sup>	[ms]	<3.5
Frequency Response (±5% signal) <sup>3)</sup>	[Hz]	350 (amplitude ratio -3dB), 350 (phase lag -90°)
Hysteresis	[%]	<0.05
Sensitivity	[%]	<0.03
Temperature Drift	[%/K]	<0.025
Electrical		
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)	
Supply Voltage/Ripple	[V]	DC 22 ... 30, ripple <5% eff., surge free
Current Consumption Maximum	[A]	3.5
Pre-Fusing	[A]	4.0 medium lag
Input Signal		
Voltage	[V]	10...0...-10, ripple <0.01% eff., surge free, 0...+10V P->A
Impedance	[kOhm]	100
Current	[mA]	20...0...-20, ripple <0.01% eff., surge free, 0...+20mA P->A
Impedance	[Ohm]	250
Current	[mA]	4...12...20, ripple <0.01% eff., surge free, 12...20mA P->A <3.6 mA = disable, >3.8 mA = according to NAMUR NE43
Impedance	[Ohm]	250
Differential Input Maximum		
Code 0	[V]	30 for terminal D and E against PE (terminal G)
Code 5 / 7	[V]	30 for terminal 4 and 5 against PE (terminal ⊥)
Enable Signal (Only Code 5 / 7)	[V]	5...30, Ri = 9 kOhm
Diagnostic Signal	[V]	+10...0...-10 / +Ub, rated max. 5mA
EMC	EN61000-6-2 / EN61000-6-4	
Electrical Connection	Code 0	6 + PE acc. EN 175201-804
	Code 5	11 + PE acc. EN 175201-804
	Code 7	6 + PE + Enable
Wiring Miniimum		
Code 0	[mm²]	7x1.0 (AWG 18) overall braid shield
Code 5	[mm²]	12x1.0 (AWG 20) overall braid shield
Code 7	[mm²]	12x1.0 (AWG 18) overall braid shield
Wiring Length Maximum	[m]	50 (164 ft.)

<sup>1)</sup> For applications with pT>35 Bar (508 PSI) the Y-port has to be connected and the plug in the Y-port has to be removed.

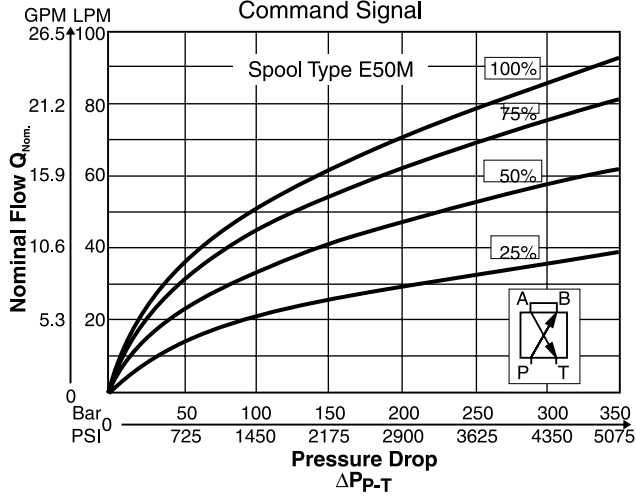
<sup>2)</sup> Flow rate for different Δp per control edge:  $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

<sup>3)</sup> Measured with load 100 Bar (1450 PSI) pressure drop/two control edges.



**Functional Limit**

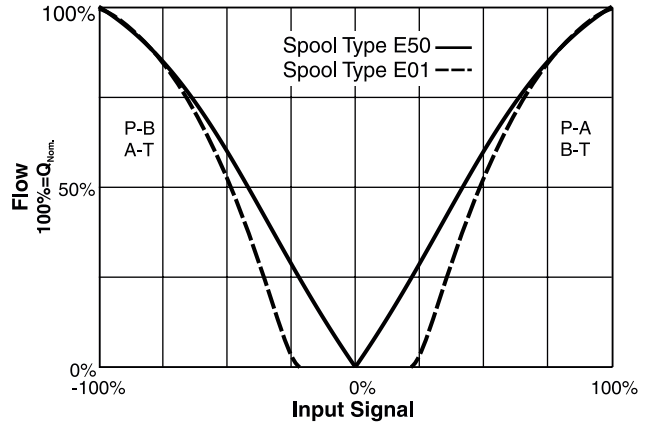
at 25%, 50%, 75% and 100%  
 Command Signal



**Spool Type E01/E50**

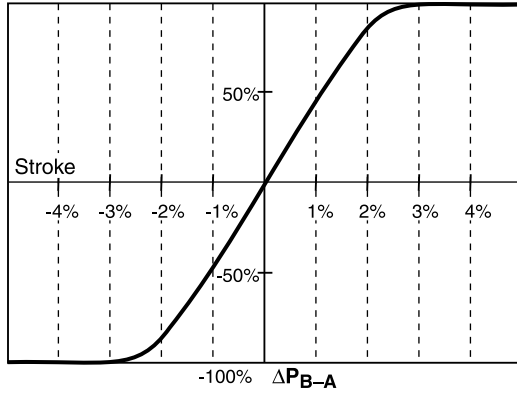
**Flow Curves**

at  $\Delta p = 35$  Bar (508 PSI) per metering edge



**Pressure Gain**

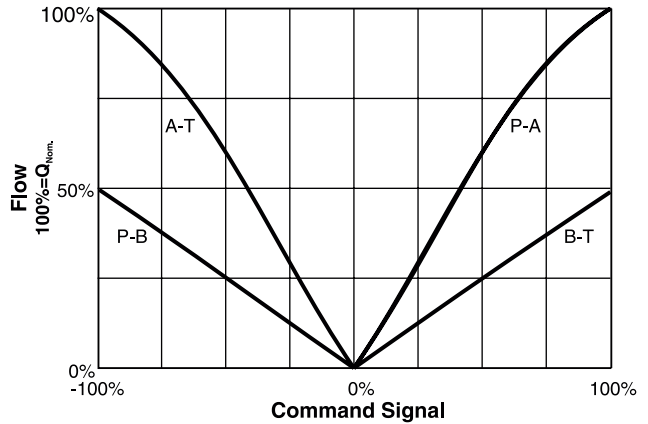
100%  $\Delta P_{A-B}$



**Spool Type B60**

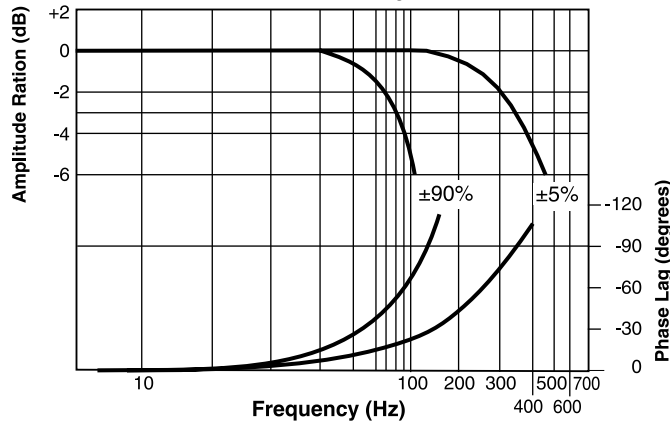
**Flow Curves**

at  $\Delta p = 35$  Bar (508 PSI) per metering edge

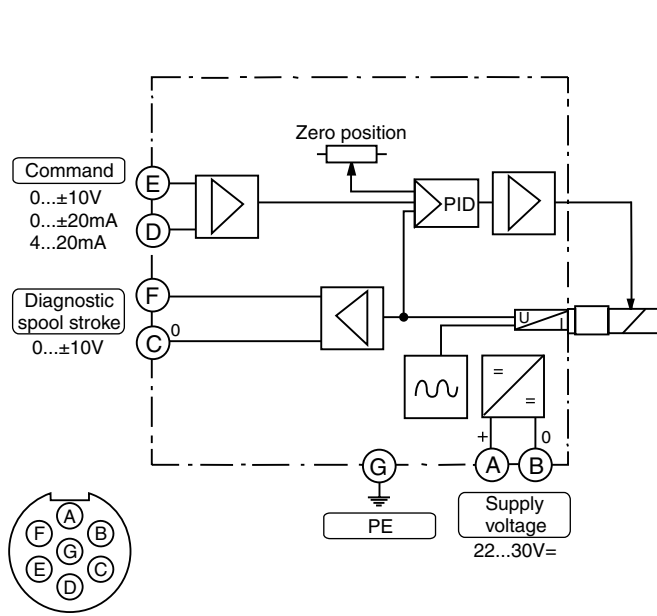


**Frequency Response**

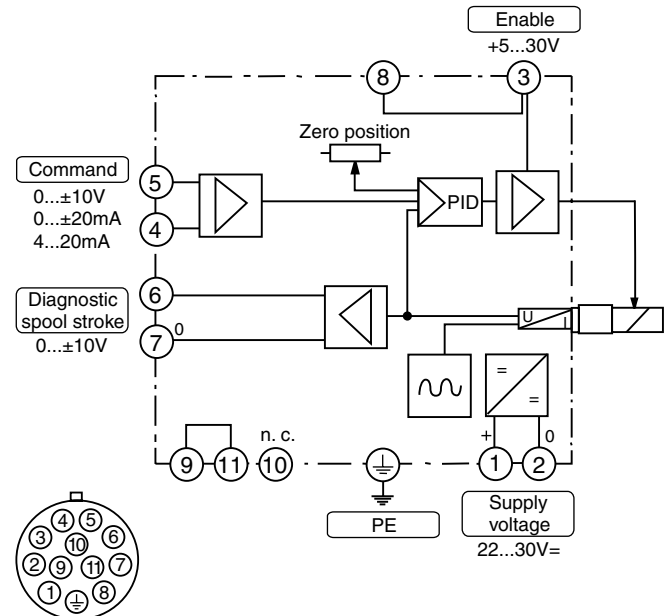
$\pm 5\%$  Command Signal  
 $\pm 90\%$  Command Signal



**Code 0**  
 6 + PE acc. to EN 175201-804

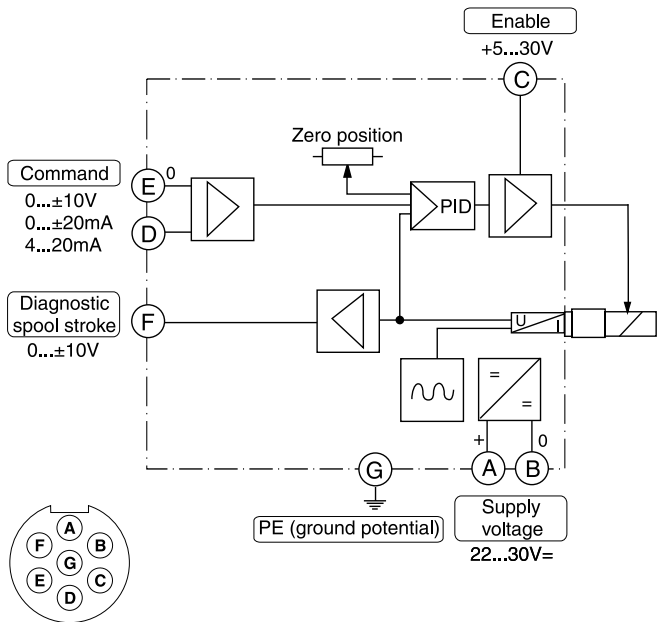


**Code 5**  
 11 + PE acc. to EN 175201-804



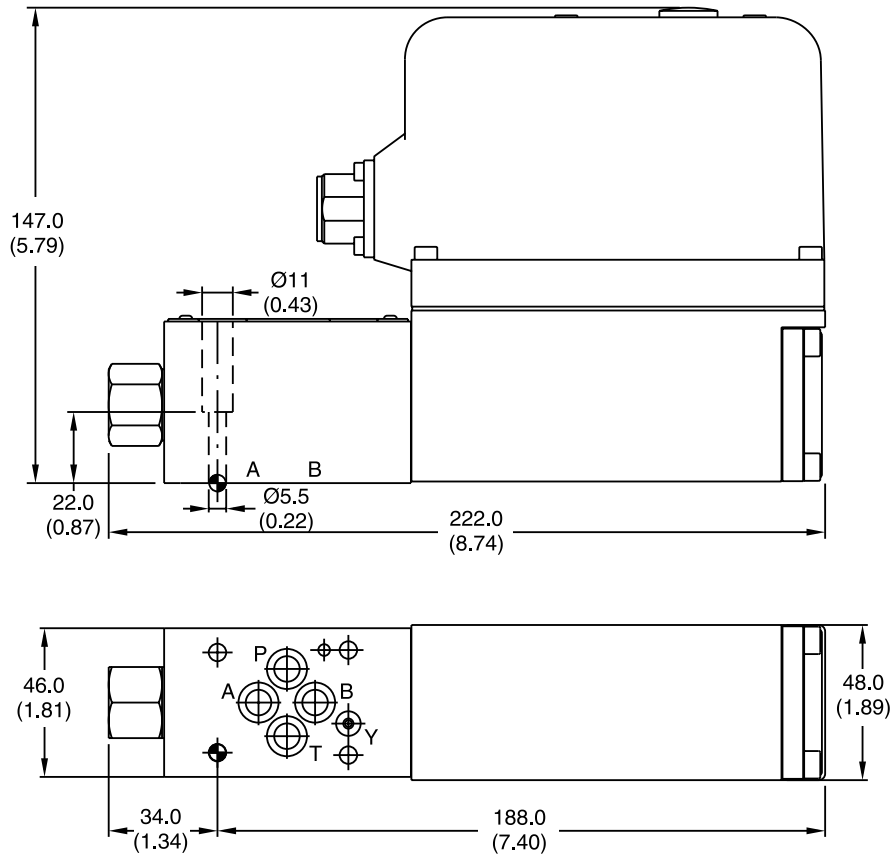
**Note:** When replacing another valve, verify Pin C is 0 V and not wired as an enable.

**Code 7**  
 6 + PE + Enable acc. to EN 175201-804



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

**A**



Surface Finish	Kit			Seal Kit
	BK375 BK209	4x M5x30 DIN 912 12.9 4x 10-24x1.25	7.6 Nm (5.6 lb.-ft.) ±15 %	Nitrile: SK-D1FP Fluorocarbon: SK-D1FP-V for HFC Fluid: SK-D1FP-H



**General Description**

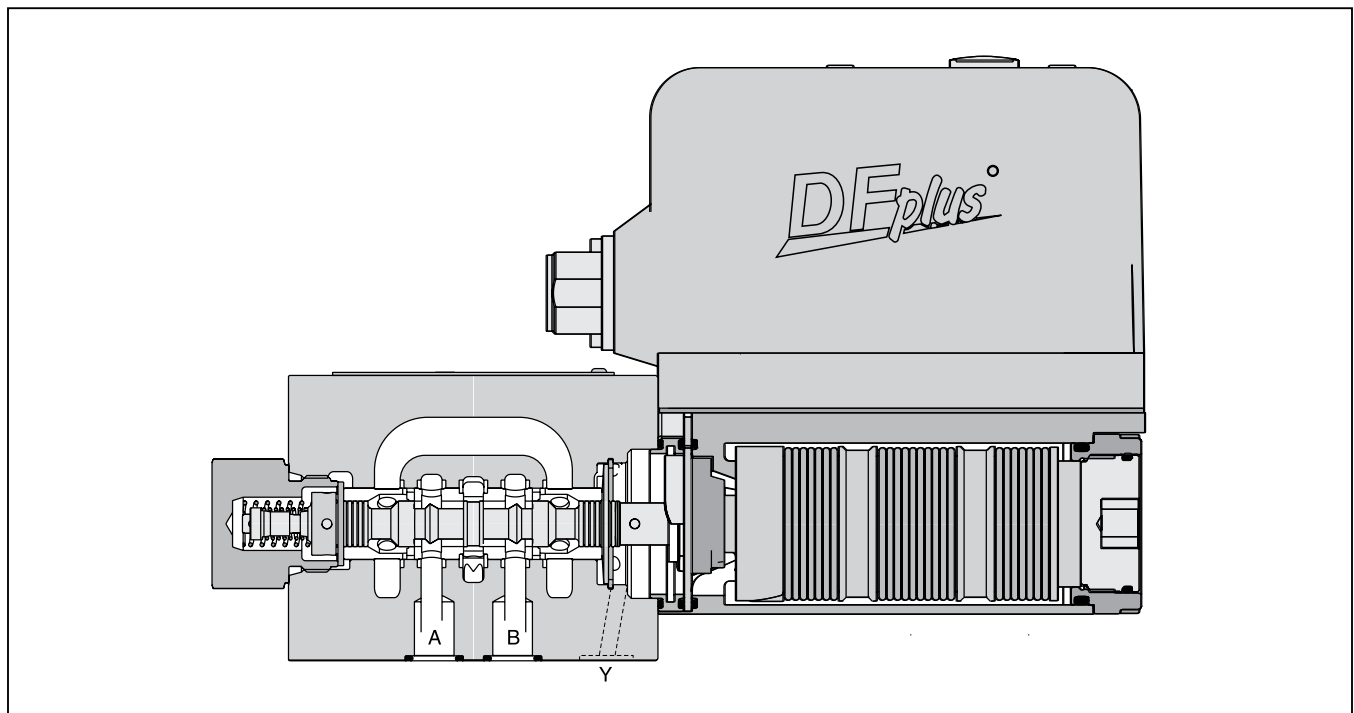
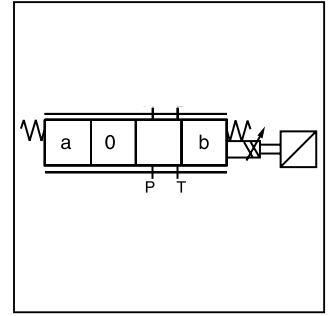
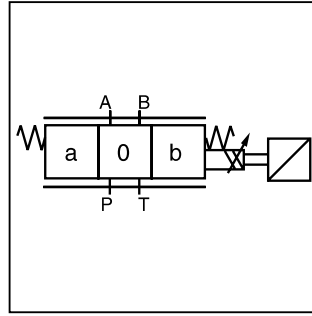
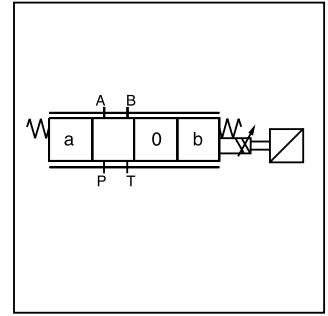
Series D3FP direct operated control NG10 (CETOP 5) valve features extremely high dynamics combined with maximum flow. It is used for high accuracy positioning of a hydraulic axis, and for controlling force and velocity.

Driven by the new patented VCD® actuator, the D3FP reaches the frequency response of servovalves.

At power-down the spool moves in a defined position. All common input signals are available.

**Features**

- Extremely high dynamics.
- Maximum tank pressure 250 Bar (3600 PSI) with external drain Y-port.
- Defined spool positioning at power down.
- Onboard electronics.
- Spool/Sleeve design.



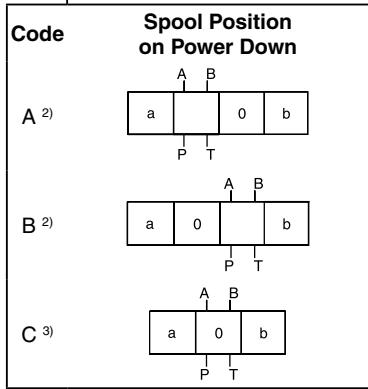
**A**

<b>D</b> Directional Control Valve	<b>3</b> Size DIN NG10 CETOP 5 NFPA D05	<b>F</b> Proportional Control	<b>P</b> VCD	<b> </b> Spool Type	<b> </b> Spool Position on Power Down <sup>1)</sup>	<b>9</b> Y-Port Plugged <sup>4)</sup>	<b> </b> Seal	<b> </b> Input Signal	<b> </b> Options	<b>0</b> Spool/Sleeve Design	<b> </b> Design Series NOTE: Not required when ordering.
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Code	Spool	Flow LPM (GPM) at Δp 35 Bar (508 PSI) per metering edge
<b>Zerolap</b>		
E50Y		100 (26.5)
E50P		50 (13.2)
B60Y	$Q_B = Q_A / 2$ 	100 (26.5)
B60P	$Q_B = Q_A / 2$ 	50 (13.2)
<b>Underlap approximately -0.5%</b>		
E55Y		100 (26.5)
E55P		50 (13.2)
<b>Overlap 18%</b>		
E01Y E01P		100 (26.5) 50 (13.2)
E02Y E02P		100 (26.5) 50 (13.2)
B31Y B31P		100 / 50 (26.5 / 13.2) 50 / 25 (13.2 / 6.6)
B32Y B32P		100 / 50 (26.5 / 13.2) 50 / 25 (13.2 / 6.6)

Code	Description
N	Nitrile
V	Fluorocarbon
H	For HFC Fluid

Code	Description
0	6 + PE acc. EN175201-804
5	11 + PE acc. EN175201-804
7	6 + PE + Enable



Code	Signal	Flow Direction <sup>5)</sup>
B	+/- 10V	0...+10V -> P-A
E	+/- 20mA	0...+20mA -> P-A
S	4...20mA	12...20mA -> P-A

- 1) On power down the spool moves in a defined position. This cannot be guaranteed in case of single flow path on the control edge A→T resp. B→T with pressure drops above 120 Bar (1740 PSI) or contamination in the hydraulic fluid.
- 2) Approximately 10% opening, only available with zerolap spools and underlap spools.
- 3) Only available with overlap spools.
- 4) Needs to be removed at tank pressure >35 Bar (507.5 PSI).
- 5) Flow direction P→A with Pin D > Pin E.

**Bolt Kit:**  
 BK98      (4) 1/4-20x1.62  
 BK385    (4) M6x40  
**Weight:** 6.5 kg (14.3 lbs.)

Please order plugs separately. See Accessories.

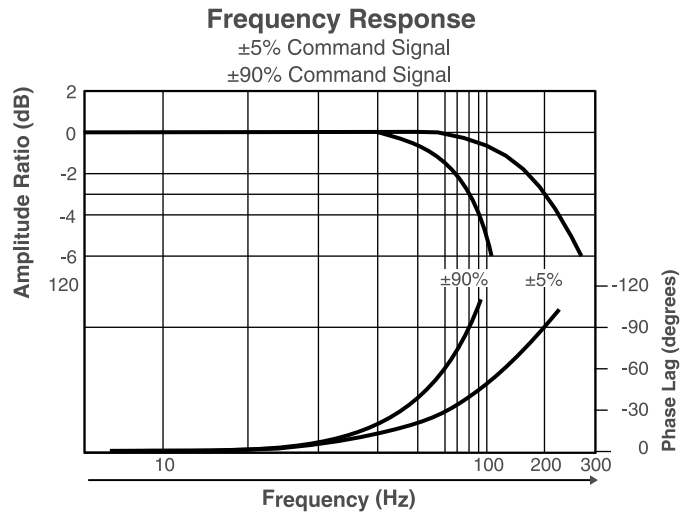
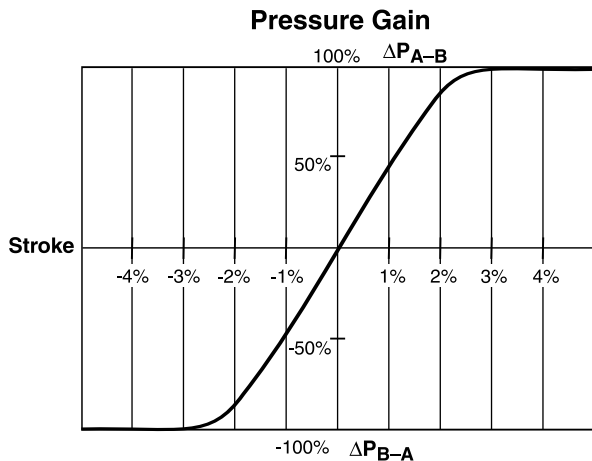
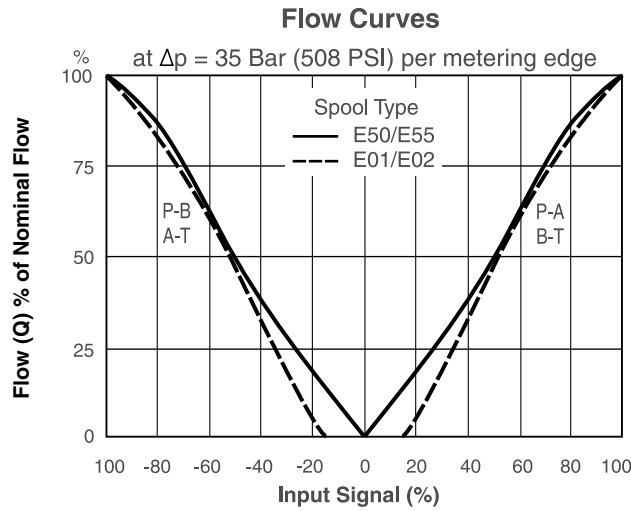
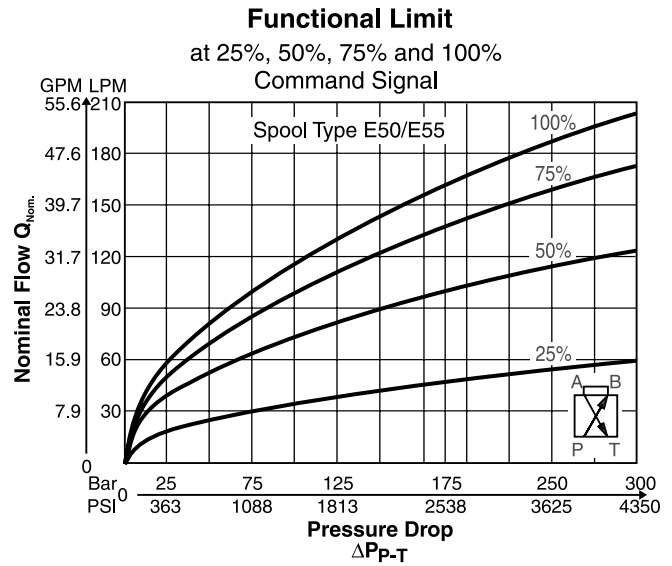
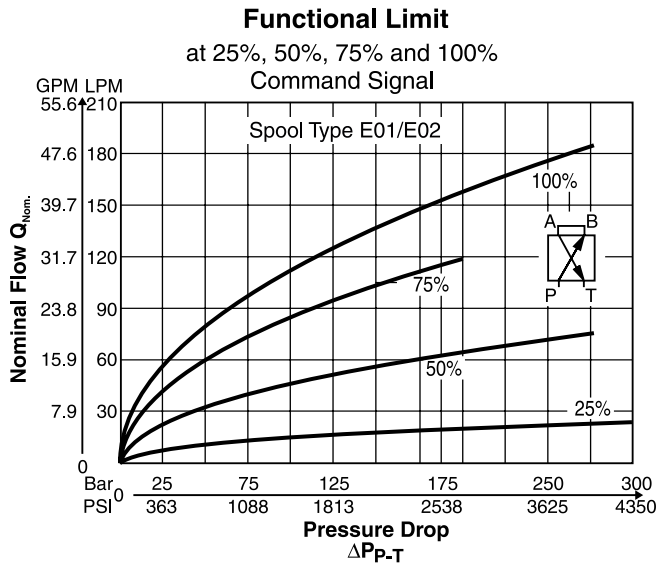
General		
Design	Direct operated proportional DC valve	
Actuation	VCD® actuator	
Size	NG10 / CETOP 5 / NFPA D05	
Mounting Interface	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA	
Mounting Position	Unrestricted	
Ambient Temperature	[°C]	-20...+50; (-4°F...+122°F)
MTTF <sub>D</sub> Value	[years]	75
Vibration Resistance	[g]	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27
Hydraulic		
Maximum Operating Pressure	Ports P, A, B 350 Bar (5075 PSI) Port T max. 250 Bar (3600 PSI), port Y max. 35 Bar (508 PSI) <sup>1)</sup>	
Fluid	Hydraulic oil as per DIN 51524...51535, other on request	
Fluid Temperature	[°C]	-20...+60; (-4°F...+140°F)
Viscosity		
Permitted	[cSt] / [mm²/s]	20...380 (93...1761 SSU)
Recommended	[cSt] / [mm²/s]	30...80 (139...371 SSU)
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	
Nominal Flow at Δp=35 Bar (508 PSI) per Control Edge <sup>2)</sup>	50 LPM (13.2 GPM) / 100 LPM (26.5 GPM)	
Flow Maximum	150 LPM (39.7 GPM)	
Leakage at 100 Bar (1450 PSI)	[ml/min]	<400 (zerolap spool); <50 (overlap spool)
Static / Dynamic		
Step Response at 100% Step <sup>3)</sup>	[ms]	<6
Frequency Response (±5% signal) <sup>3)</sup>	[Hz]	350 (amplitude ratio -3dB), 350 (phase lag -90°)
Hysteresis	[%]	<0.05
Sensitivity	[%]	<0.03
Temperature Drift	[%/K]	<0.025
Electrical		
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)	
Supply Voltage/Ripple	[V]	DC 22 ... 30, ripple <5% eff., surge free
Current Consumption Maximum	[A]	3.5
Pre-Fusing	[A]	4.0 medium lag
Input Signal		
Voltage	[V]	10...0...-10, ripple <0.01% eff., surge free, 0...+10V P->A
Impedance	[kOhm]	100
Current	[mA]	20...0...-20, ripple <0.01% eff., surge free, 0...+20mA P->A
Impedance	[Ohm]	250
Current	[mA]	4...12...20, ripple <0.01% eff., surge free, 12...20mA P->A <3.6 mA = disable, >3.8 mA = according to NAMUR NE43
Impedance	[Ohm]	250
Differential Input Maximum		
Code 0	[V]	30 for terminal D and E against PE (terminal G)
Code 5 / 7	[V]	30 for terminal 4 and 5 against PE (terminal ↓)
Voltage References:	Not a powered output Only for 10K Ohm pots	
Enable Signal (Only Code 5 / 7)	[V]	5...30, Ri = 9 kOhm
Diagnostic Signal	[V]	+10...0...-10 / +Ub, rated max. 5mA
EMC	EN61000-6-2 / EN61000-6-4	
Electrical Connection	Code 0 Code 5 Code 7	6 + PE acc. EN 175201-804 11 + PE acc. EN 175201-804 6 + PE + Enable
Wiring Minimum	Code 0 Code 5 Code 7	[mm²] 7x1.0 (AWG 18) overall braid shield 12x1.0 (AWG 20) overall braid shield 12x1.0 (AWG 18) overall braid shield
Wiring Length Maximum	[m]	50 (164 ft.)

<sup>1)</sup> For applications with pT>35 Bar (508 PSI) the Y-port plug must be removed and the Y-port connected to tank.

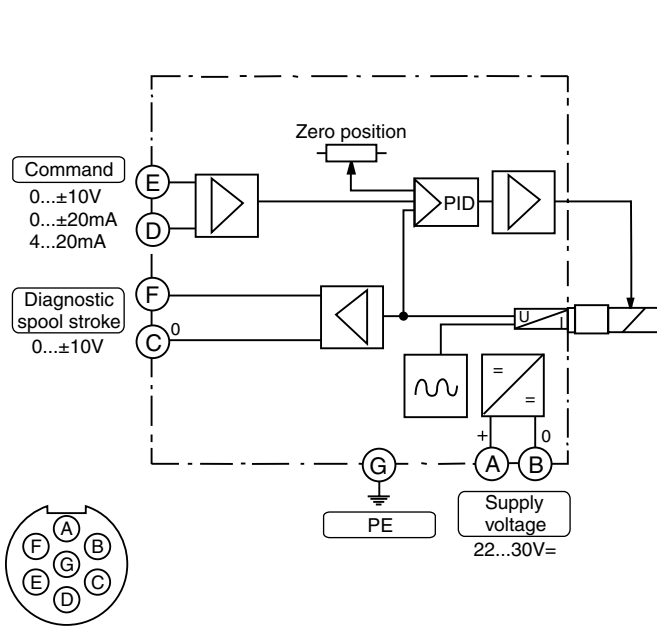
<sup>2)</sup> Flow rate for different Δp per control edge:  $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$   
 $\Delta P_{Nom.} \cdot \left(\frac{Q_x}{Q_{Nom.}}\right)^2 = \Delta P_x$

<sup>3)</sup> Measured with load 100 Bar (1450 PSI) pressure drop/two control edges

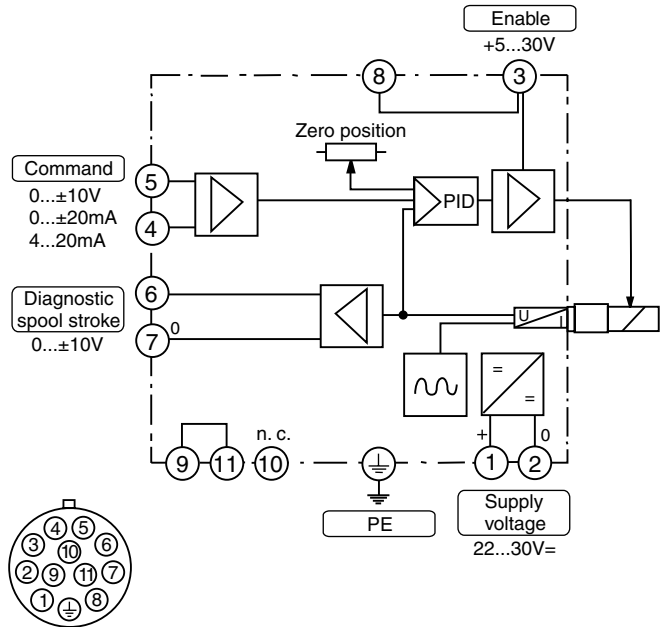
**A**



**Code 0**  
 6 + PE acc. to EN 175201-804

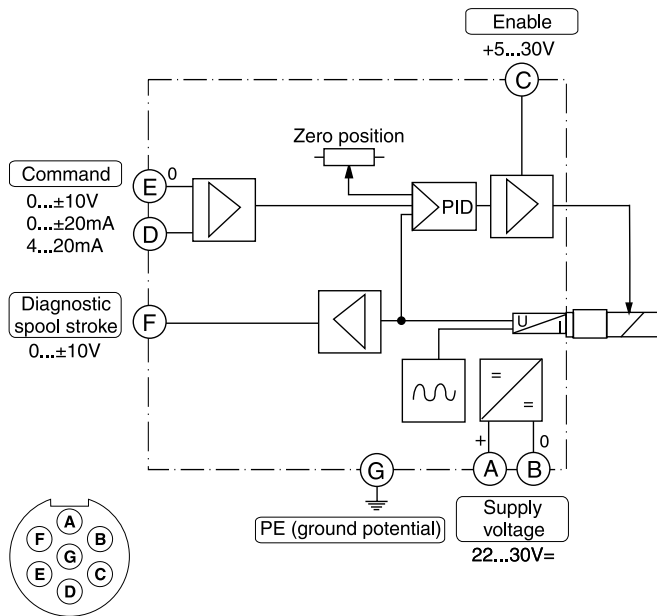


**Code 5**  
 11 + PE acc. to EN 175201-804



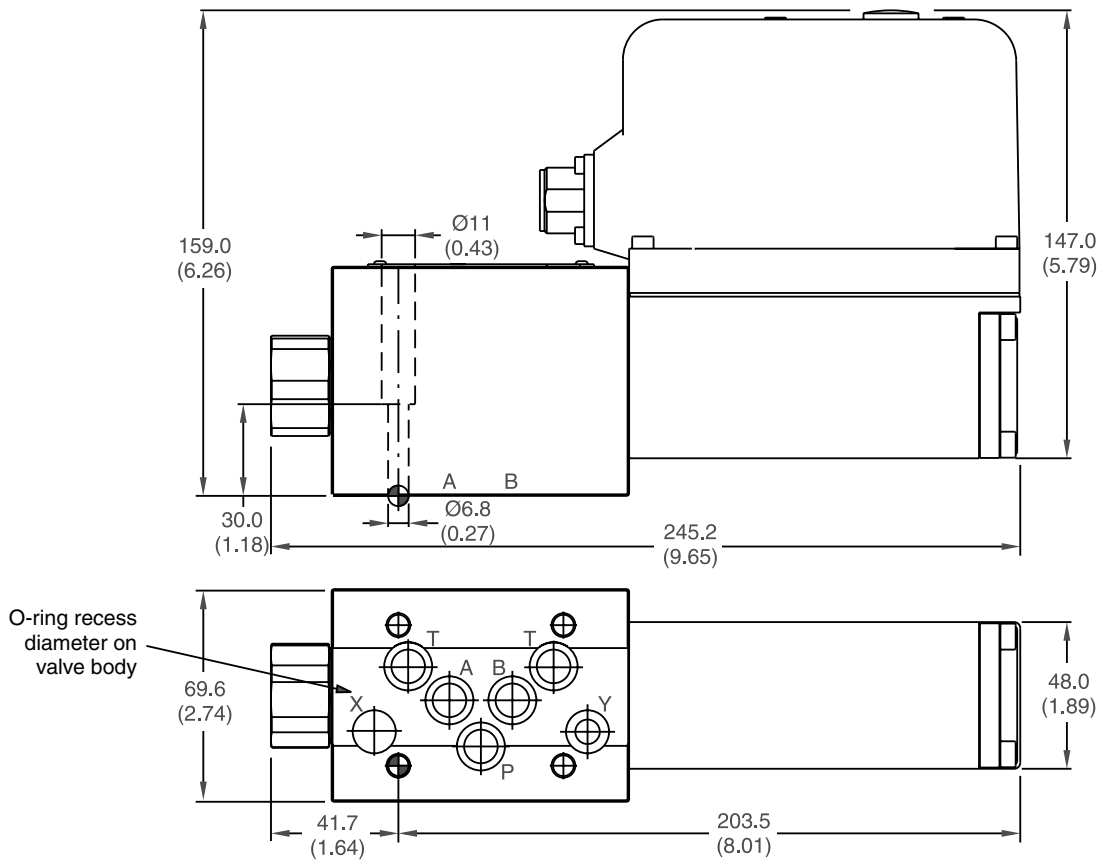
**Note:** When replacing another valve, verify Pin C is 0 V and not wired as an enable.





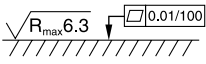
**Code 7**  
 6 + PE + Enable acc. to EN 175201-804



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

**A**



Surface Finish	 Kit	 Kit	 Kit	Seal  Kit
	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D3FP Fluorocarbon: SK-D3FP-V for HFC Fluid: SK-D3FP-H

**General Description**

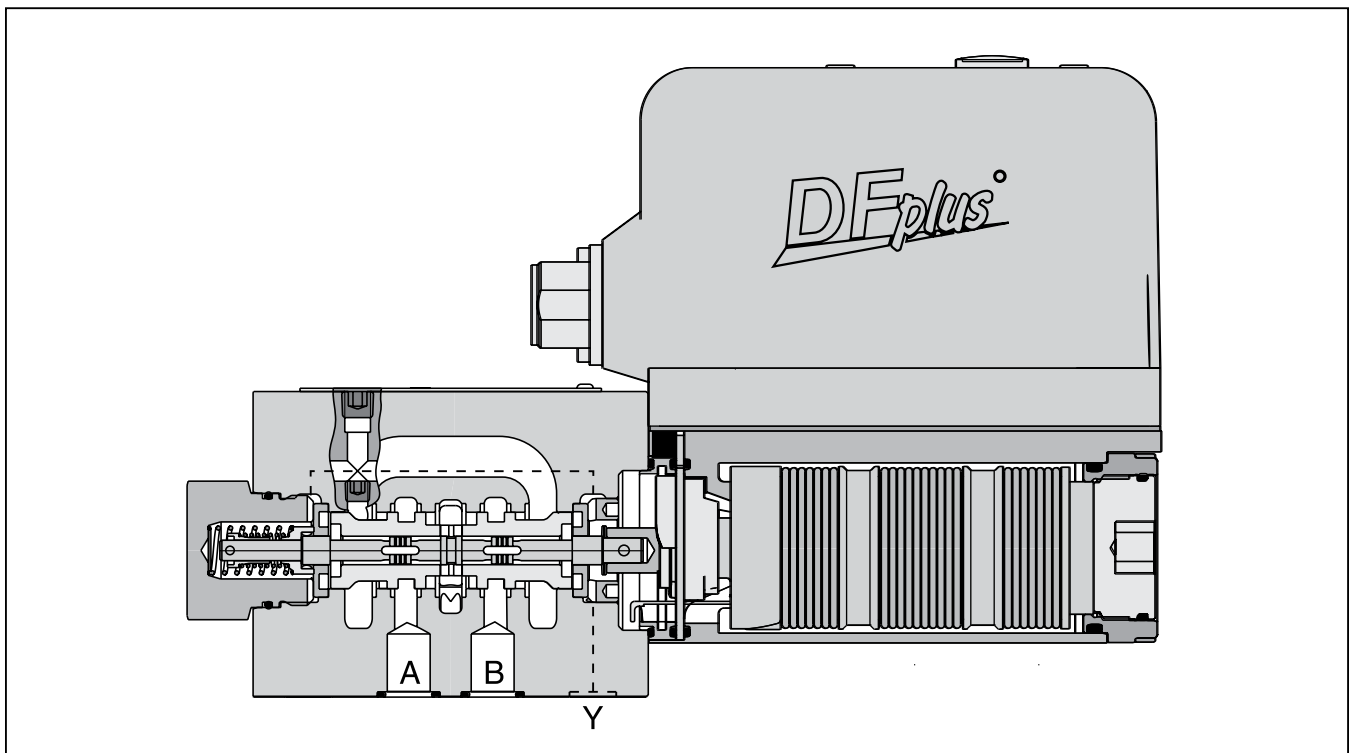
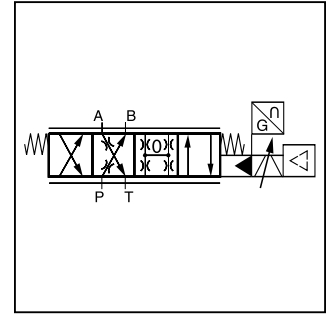
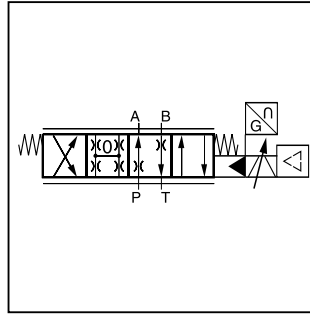
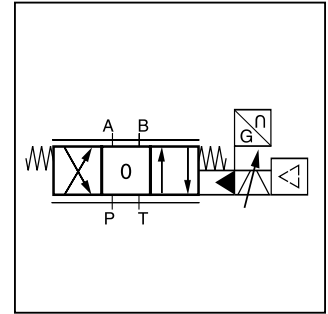
Series D30FP pilot operated control valve closes the gap between the direct operated D3FP valves and the conventional pilot operated D31FP valves.

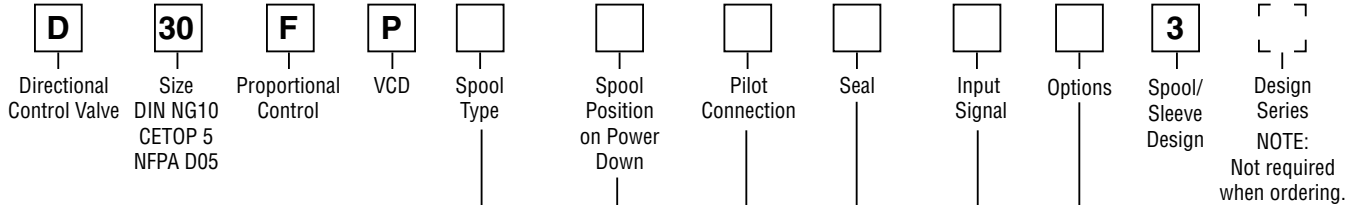
Providing high flow capacity and practically no flow limits like D31FP in the envelope size of the D3FP.

The valve works with the hydraulic follower principle, with a moving sleeve as main spool.

**Features**

- Pilot operated with hydraulic follower sleeve.
- No flow limit up to 350 bar through the valve.
- Defined spool positioning at power down.





Code	Spool	Flow LPM (GPM) at $\Delta p$ 5 Bar (72.5 PSI) per metering edge
<b>Zerolap</b>		
E50U		80 (21.2)
B60U	$Q_B = Q_A/2$ 	80 (21.2)
<b>Overlap 18%</b>		
E01U		80 (21.2)
E02U		80 (21.2)
B31U	$Q_B = Q_A/2$ 	80 (21.2)
B32U	$Q_B = Q_A/2$ 	80 (21.2)

Code	Description
N	Nitrile
V	Fluorocarbon

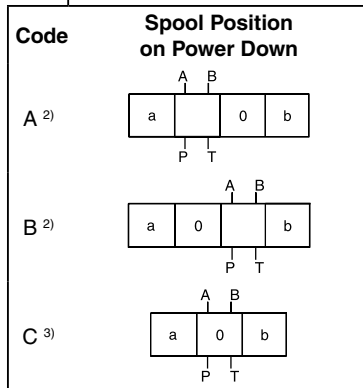
Code	Description
0	6 + PE acc. EN175201-804
5	11 + PE acc. EN175201-804
7	6 + PE + Enable

Code	Inlet	Dain
1 <sup>1)</sup>	Internal	External
4	Internal	Internal

Code	Signal	Flow Direction <sup>4)</sup>
B	+/- 10V	0...+10V -> P-A
E	+/- 20mA	0...+20mA -> P-A
S	4...20mA	12...20mA -> P-A

<sup>1)</sup> For tank pressure >35 Bar (508 PSI).

<sup>4)</sup> Flow direction P → A with Pin D > Pin E.



<sup>2)</sup> Approximately 10% opening, only available with zerolap spools and underlap spools.

<sup>3)</sup> Only available with overlap spools.

Please order plugs separately. See Accessories.

**Bolt Kit:**

BK98 (4) 1/4-20x1.62

BK385 (4) M6x40

**Weight:** 6.5 kg (14.3 lbs.)

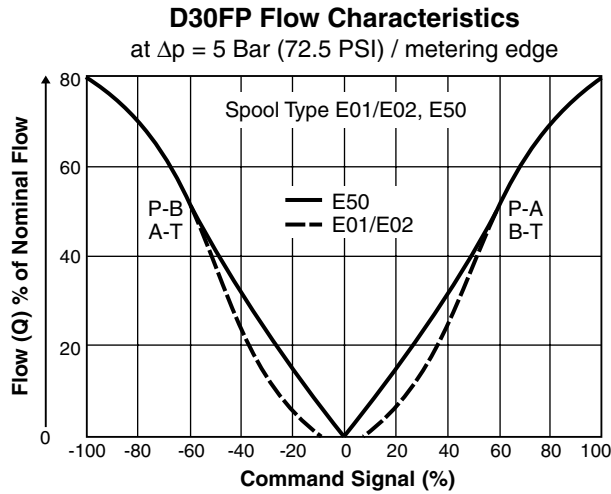


General		
Design	Pilot operated proportional DC valve	
Actuation	VCD® actuator	
Size	NG10 / CETOP 5 / NFPA D05	
Mounting Interface	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA	
Mounting Position	Unrestricted	
Ambient Temperature	[°C]	-20...+50; (-4°F...+122°F)
MTTF <sub>d</sub> Value	[years]	50
Vibration Resistance	[g]	10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27
Hydraulic		
Maximum Operating Pressure	Ports P, A, B 350 Bar (5075 PSI) Port T 35 Bar (508 PSI) for internal drain, 250 Bar (3600 PSI) for external drain Port Y 35 Bar (508 PSI)	
Fluid	Hydraulic oil as per DIN 51524...51535, other on request	
Fluid Temperature	[°C]	-20...+60; (-4°F...+140°F)
Viscosity		
Permitted	[cSt] / [mm²/s]	20...380 (93...1761 SSU)
Recommended	[cSt] / [mm²/s]	30...80 (139...371 SSU)
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	
Nominal Flow at Δp=5 Bar (72.5 PSI) per Control Edge <sup>1)</sup>	80 LPM (21.2 GPM)	
Flow Maximum	250 LPM (66.1 GPM)	
Leakage at 100 Bar (1450 PSI)	[ml/min]	<1800 (zerolap spool); <1000 (overlap spool)
Pilot Supply Pressure	5 Bar (72.5 PSI) greater than the tank line pressure	
Static / Dynamic		
Step Response at 100% Step <sup>2)</sup>	[ms]	<7
Frequency Response (±5% signal) <sup>2)</sup>	[Hz]	120 (amplitude ratio -3dB), 120 (phase lag -90°)
Hysteresis	[%]	<0.05
Sensitivity	[%]	<0.03
Temperature Drift	[%/K]	<0.025
Electrical		
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)	
Supply Voltage/Ripple	[V]	DC 22 ... 30, ripple <5% eff., surge free
Current Consumption Maximum	[A]	3.5
Pre-Fusing	[A]	4.0 medium lag
Input Signal		
Voltage	[V]	10...0...-10, ripple <0.01% eff., surge free, 0...+10V P->A
Impedance	[kOhm]	100
Current	[mA]	20...0...-20, ripple <0.01% eff., surge free, 0...+20mA P->A
Impedance	[Ohm]	250
Current	[mA]	4...12...20, ripple <0.01% eff., surge free, 12...20mA P->A
Impedance	[Ohm]	<3.6 mA = disable, >3.8 mA = according to NAMUR NE43 250
Differential Input Maximum		
Code 0	[V]	30 for terminal D and E against PE (terminal G)
Code 5 / 7	[V]	30 for terminal 4 and 5 against PE (terminal ⊥)
Enable Signal (Only Code 5 / 7)	[V]	5...30, Ri = 9 kOhm
Diagnostic Signal	[V]	+10...0...-10 / +Ub, rated max. 5mA
EMC	EN 50081-2 / EN50082-2	
Electrical Connection		
Code 0	6 + PE acc. EN 175201-804	
Code 5	11 + PE acc. EN 175201-804	
Code 7	6 + PE + Enable	
Wiring Minimum		
Code 0	[mm²]	7 x 1.0 (AWG 18) overall braid shield
Code 5	[mm²]	12 x 1.0 (AWG 20) overall braid shield
Code 7	[mm²]	12 x 1.0 (AWG 18) overall braid shield
Wiring Length Maximum	[m]	50 (164 ft.)

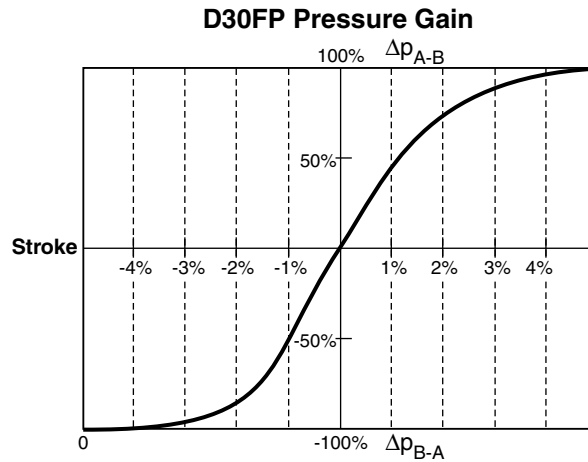
1) Flow rate for different Δp per control edge:  $Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}}$

2) Measured with load (100 Bar (1450 PSI) pressure drop/two control edges)

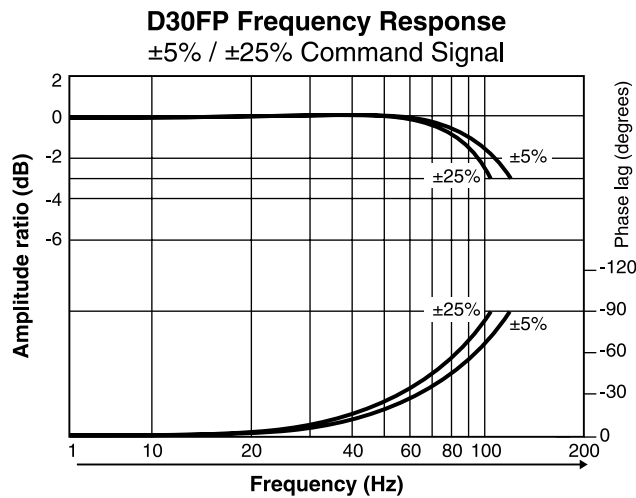
**Flow**



**Pressure Gain**

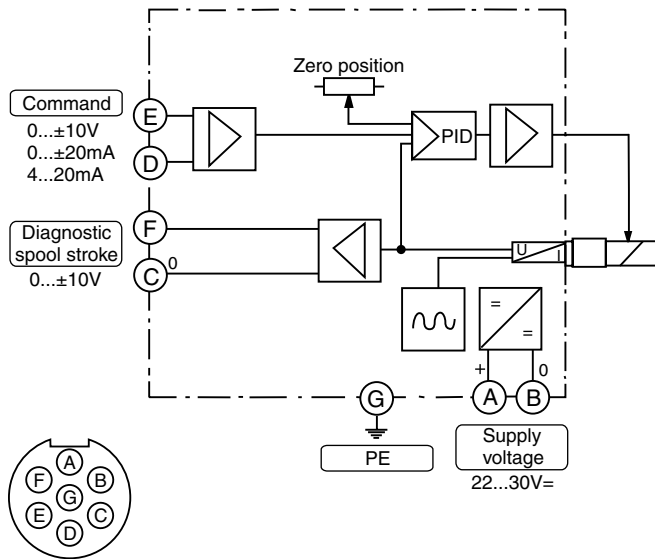


**Frequency Response**



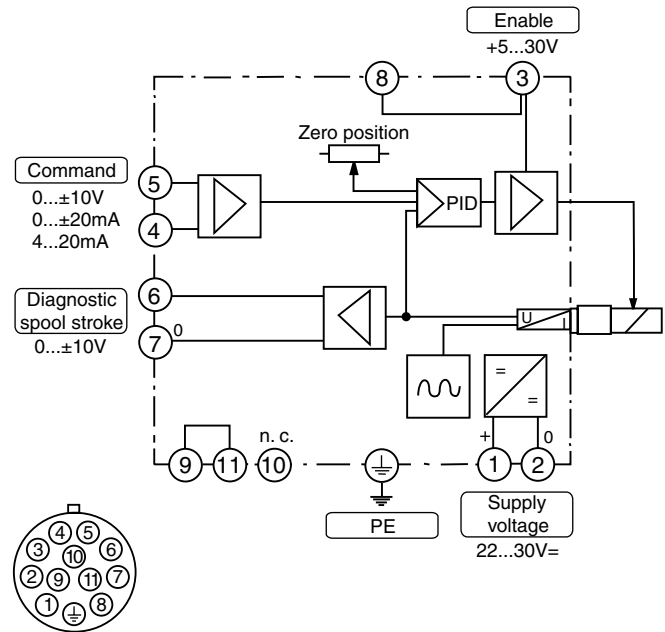
**Code 0**

**6 + PE acc. to EN 175201-804**



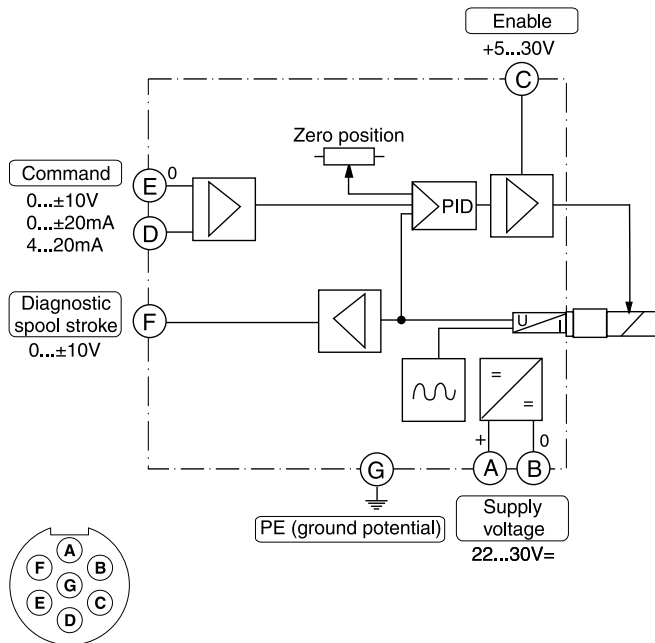
**Code 5**

**11 + PE acc. to EN 175201-804**



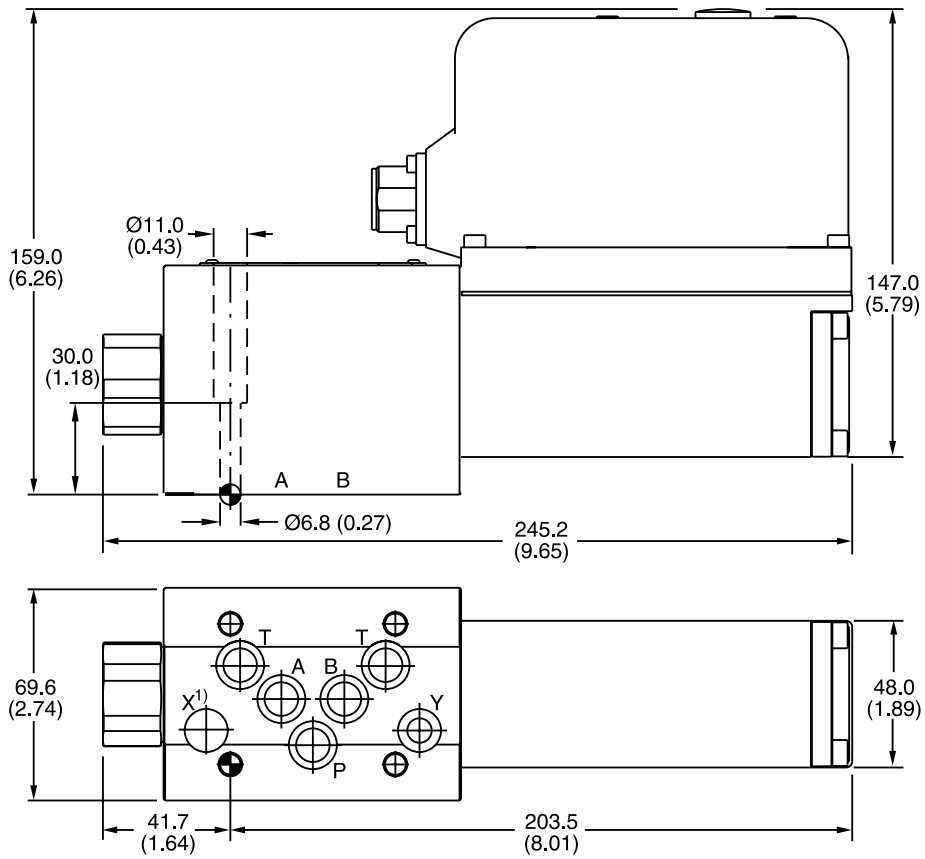
**Code 7**

**6 + PE + Enable acc. to EN 175201-804**



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

**A**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK385 BK98	4x M6x40 DIN 912 12.9 4x 1/4-20x1.62	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D3FP Fluorocarbon: SK-D3FP-V

**General Description**

Series D\*1FP pilot operated servo proportional valves transfer the advantages of the Parker patented Voice Coil Drive (VCD®) to larger frame sizes for high flow rates. The high dynamic / high precision drive of the pilot valve allows the optimum control of the main spool and results in servo performance of the complete valve.

Series D\*1FP is available in 5 sizes:

D31FP NG10 (CETOP 5)

D41FP NG16 (CETOP 7)

D91FP NG25 (CETOP 8)  
for port diameter up to 32 mm (1.26 in.)

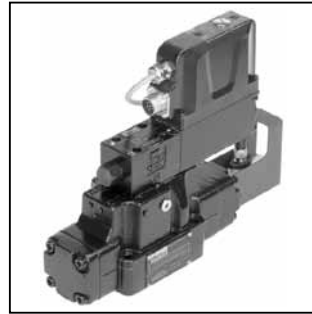
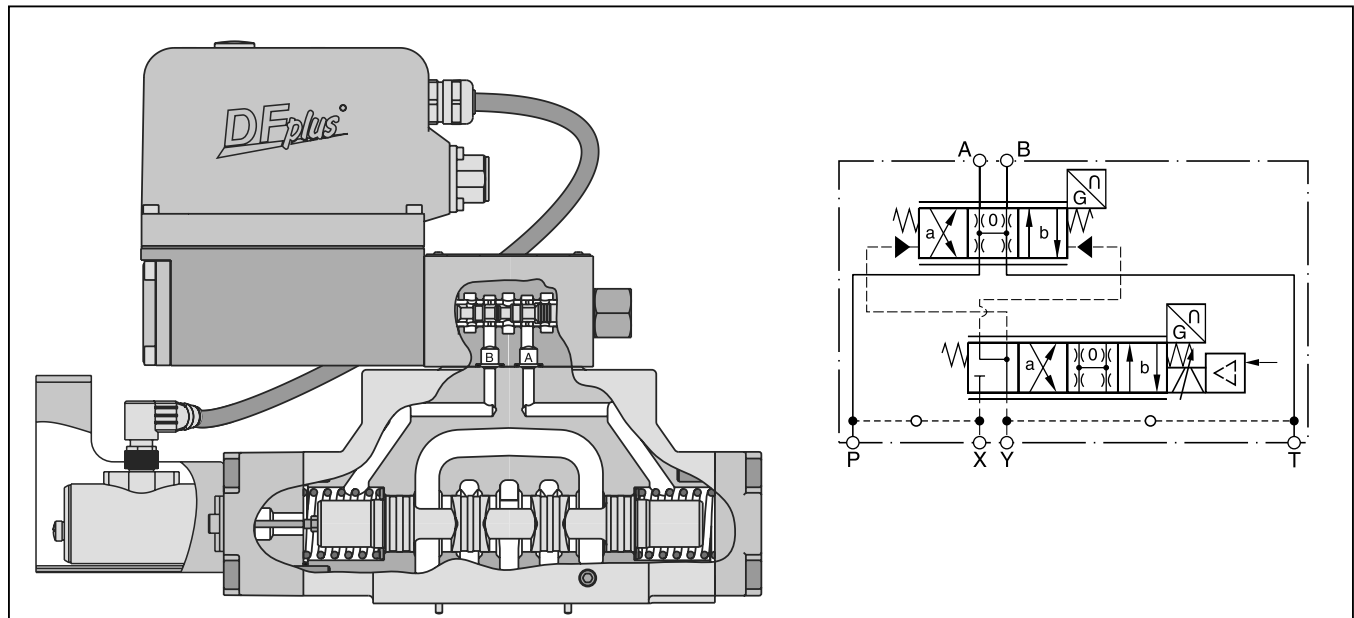
D111FP NG32 (CETOP 10)

The power down mode works with a safe 4th position of the D1FP pilot valve. This ensures that the main stage is hydraulically balanced at power down and allows the main spool spring to center (for overlapped spools), or approximately 10% spring offset to spool position A or B (for zerolap spools).

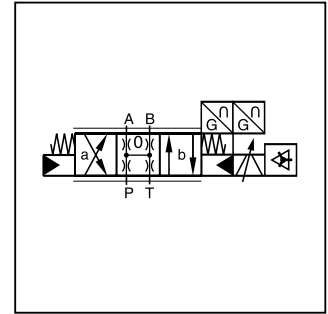
The innovative integrated regenerative function into the A-line (optional) allows new energy saving circuits for differential cylinders. The hybrid version can be switched between regenerative mode and standard mode at any time.



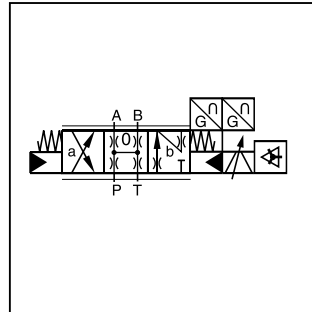
**D41FPE52 (Standard)**



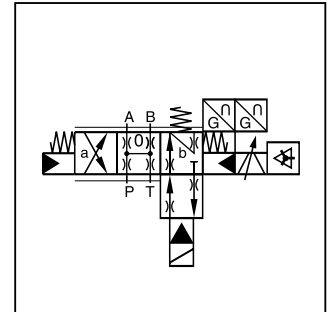
D41FP Standard



Standard D\*1FPE



NEW: A-Regeneration D\*1FPR



NEW: Hybrid D\*1FPZ

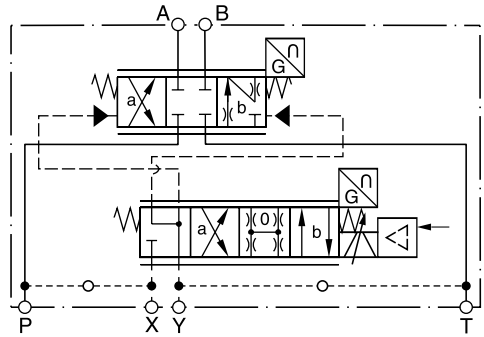
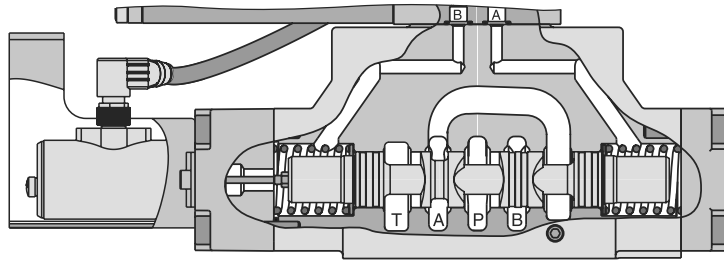
**Features**

- High dynamics.
- High flow.
- Defined spool positioning at power-down – optional P-A/B-T or P-B/A-T or center position (for overlapped spools).
- Onboard electronics.
- Closed loop position – controlled pilot valve and main stage.
- **NEW:** Energy saving A-Regeneration.
- **NEW:** Switchable hybrid version.

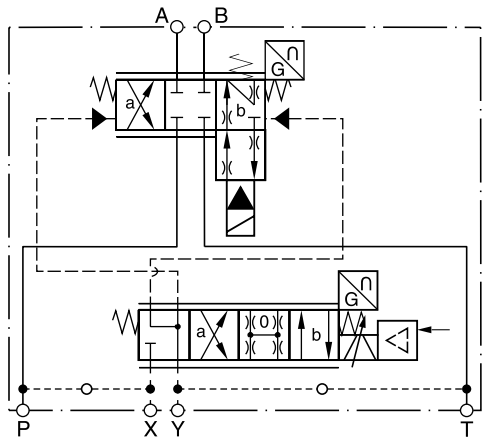
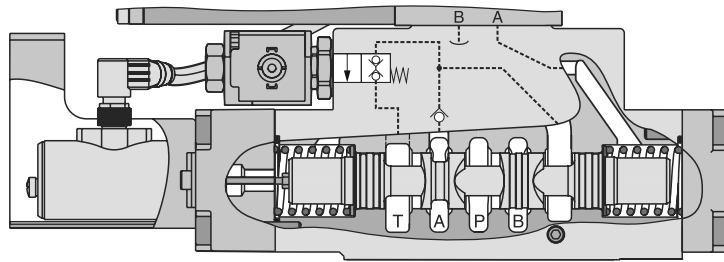
**D\*1FPR and D\*1FPZ**

**A**

**Regenerative Valve D\*1FPR**

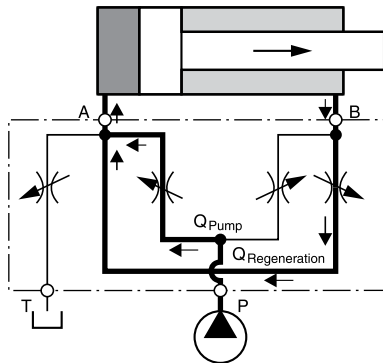


**Hybrid Valve D\*1FPZ**



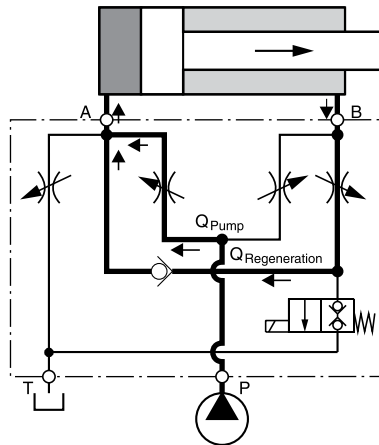
**D\*1FPR (Regenerative Valve)**

Cylinder extending

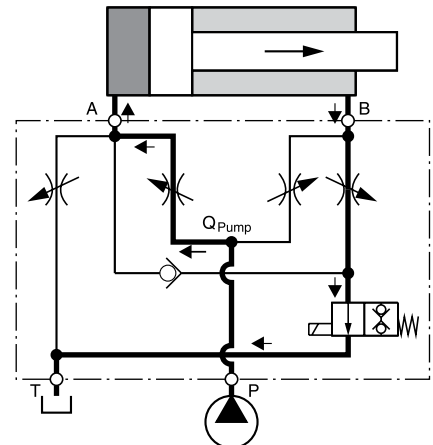


**D\*1FPZ (Hybrid Valve)**

Cylinder extending  
 regenerative mode  
 (high speed)

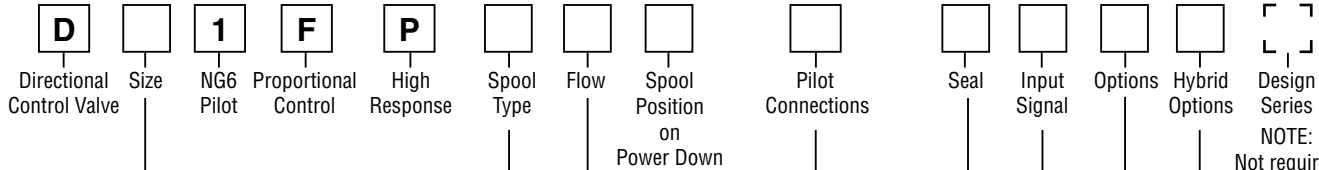


Cylinder extending  
 standard mode  
 (high force)



**Flow Rate in % of Nominal Flow**

Size	Spool	Port					
		A-T	P-A	P-B	B-A (R-Valve)	B-A (Hybrid)	B-T (Hybrid)
D41FPR/Z	31/32/61	100%	50%	100%	50%	40%	20%
D91FPR/Z	31/32/61	100%	50%	100%	50%	50%	25%
D111FPR/Z	31/32/61	on request					



Code	Description
3	NG10 / CETOP 5
4	NG16 / CETOP 7
9 <sup>1)</sup>	NG25 / CETOP 8
11	NG32 / CETOP 10

<sup>1)</sup> For enlarged connections  
 Ø 32 mm

Code	Inlet	Drain
1	Internal	External
2	External	External
4	Internal	Internal
5	External	Internal

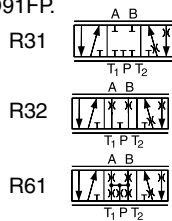
Code	Description
N	Nitrile
V	Fluorocarbon
H	For HFC fluid

Code	Signal	Function
B	0...±10V	0...+10V P -> B
E	0...±20mA	0...+20mA P -> B
K	0...±10V	0...+10V P -> A
S	4...20mA	12...20mA P -> A

Code	Description
0	6+PE acc. EN175201-804
5	11+PE acc. EN175201-804
7	6+PE + Enable

Standard		NEW: Regenerative Function <sup>4)</sup>		NEW: Hybrid Function <sup>5)</sup>	
Code	Spool Type	Code	Spool Type	Code	Spool Type
<b>Overlap 10%</b>					
E01		R31		Z31	
E02		R32		Z32	
B31	$Q_B = Q_A / 2$				
B32	$Q_B = Q_A / 2$				
<b>Zerolap</b>					
E52		R61		Z61	
B61	$Q_B = Q_A / 2$				

<sup>4)</sup> Not available with D91FP.  
 D31FP spool style: R31



For regenerative and hybrid function at D31FP (NG10) please refer to solutions with sandwich and adapter plates:  
 A10-1664 / A10-1665L / H10-1662 / H10-1666L.

<sup>5)</sup> Not available in valve D31FP.

Code	Spool Position on Power Down
A <sup>2)</sup>	
B <sup>2)</sup>	
C <sup>3)</sup>	

Code	Description
0	Standard
L <sup>6)</sup>	Hybrid valve 24V normally closed for spool type Z

<sup>6)</sup> See previous page for regenerative and hybrid spool information. (not available in D31FP)

<sup>2)</sup> Approx. 10% opening, only zerolap spools.  
<sup>3)</sup> Only overlap spools.

Code	Flow LPM (GPM) at Δp = 5 Bar (72.5 PSI) per metering edge			
	D31	D41	D91	D111
D	90 (23.8)	—	—	—
E	120 (32)	—	—	—
F	—	200 (53)	—	—
H	—	—	450 (119)	—
L	—	—	—	1000 (265)

Bolt Kit:	
D31FP	BK98
D41FP	BK160
D91FP	BK228
D111FP	BK150

Weight:	
D31FP	11.3 kg (24.9 lbs.)
D41FP	14.2 kg (31.3 lbs.)
D91FP	23.5 kg (51.8 lbs.)
D111FP	64.5 kg (142.2 lbs.)

Please order plugs separately. See Accessories.

A

General					
Size		NG10 (CETOP 5)	NG16 (CETOP 7)	NG25 (CETOP 8)	NG32 (CETOP 10)
Mounting	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA				
Mounting Position	Unrestricted				
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)				
Hydraulic					
Maximum Operating Pressure	Internal Pilot Drain P, A, B, X: 350 Bar (5075 PSI); T, Y: 35 Bar (508 PSI) External Pilot Drain P, A, B, T, X: 350 Bar (5075 PSI); Y: 35 Bar (508 PSI)				
Fluid	Hydraulic oil as per DIN 51524...51535, other on request				
Fluid Temperature	-20°C to +60°C (-4°F to +140°F)				
Viscosity Permitted Recommended	20 to 380 cSt / mm <sup>2</sup> /s (93 to 1761 SSU) 30 to 80 cSt / mm <sup>2</sup> /s (139 to 371 SSU)				
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)				
Nominal Flow at Δp=5 Bar (72.5 PSI) per control edge <sup>1)</sup>	LPM (GPM)	120 (32)	200 (53)	450 (119)	1000 (265)
Max. Recommended Flow Std	LPM (GPM)	250 (66)	600 (159)	1000 (265)	3000 (794)
Regenerative B-A /B-T	Depending on application, see flow curves				
Leakage at 100 Bar (1450 PSI) Overlap Spool	LPM (GPM)	0.2 (0.05)	0.2 (0.05)	0.6 (0.16)	1 (0.26)
Zerolap Spool	LPM (GPM)	0.9 (0.24)	0.9 (0.24)	1 (0.26)	—
Pilot	LPM (GPM)	< 1 LPM (0.26 GPM)			
Pilot Supply Pressure	20 Bar (290 PSI) to 350 Bar (5075 PSI)				
Pilot Flow, Step Response at 210 Bar (3045 PSI)	LPM (GPM)	10 (2.6)	12 (3.2)	24 (6.3)	40 (10.6)
Static / Dynamic					
Step Response at 100% Stroke <sup>2)</sup>		10 ms	13 ms	19 ms	45 ms
Frequency Response ± 5% at 210 Bar (3045 PSI)	Amplitude Phase	28 Hz 118 HZ	95 Hz 95 Hz	95 Hz 90 Hz	40 Hz 75 Hz
Hysteresis	< 0.1%				
Sensitivity	< 0.05%				
Temperature Drift	< 0.025%				
Electrical					
Duty Ratio	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible				
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)				
Supply Voltage / Ripple	22...30V, ripple < 0.5% eff., surge free				
Current Consumption	3.5 A maximum				
Input Signal	Voltage	+10...0...-10V, ripple < 0.01% eff., surge free, 0...+10V P→A			
	Impedance	100k Ohm			
	Current	4...12...20 mA, ripple < 0.01% eff., surge free, 12...20 mA P→A < 3.6 mA = enable off, > 3.8 mA = enable on acc. NAMUR NE43			
	Impedance	250 Ohm			
	Input Capacitance	1 nF, typical			
Differential Input Maximum	Code 0	30V for terminal D and E against PE (terminal G) 11V for terminal D and E against 0V (terminal B)			
	Code 5	30V for terminal 4 and 5 against PE (terminal W) 11V for terminal 4 and 5 against 0V (terminal 2)			
	Code 7	30V for terminal D and E against PE (terminal G)			
Enable Signal	Code 5 / 7	5...30V, Ri = 9 kOhm			
Diagnostic Signal	+10...0...-10V / +Ub, rated maximum 5 mA				
Pre-fusing	4.0 A medium lag				
EMC	EN 61000-6-2, EN 61000-6-4				
Electrical Connection	Code 0 / 7 Code 5	6 + PE acc. EN 175201-804 11 + PE acc. EN 175201-804			
Wiring Min.	Code 0 / 7 Code 5	mm <sup>2</sup> mm <sup>2</sup>	7 x 1.0 (AWG16) overall braid shield 11 x 1.0 (AWG20) overall braid shield		
Wiring Length	50m (164 ft.) maximum				

<sup>1)</sup> Flow rate for different Δp per control edge:  $Q_x = Q_{Nom} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom}}}$

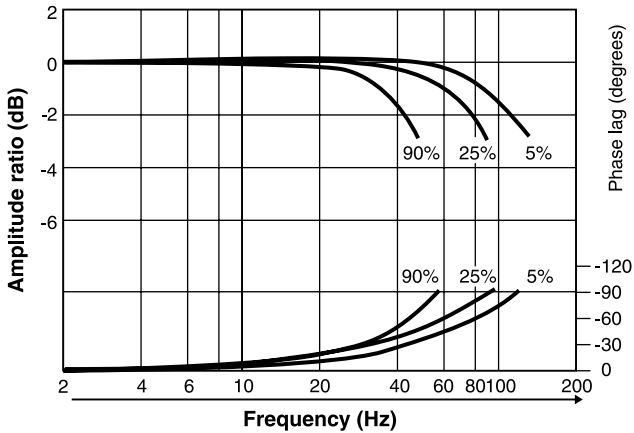
<sup>2)</sup> Measured with load 210 Bar (3045 PSI) pressure drop; two control edges



**Frequency Response**

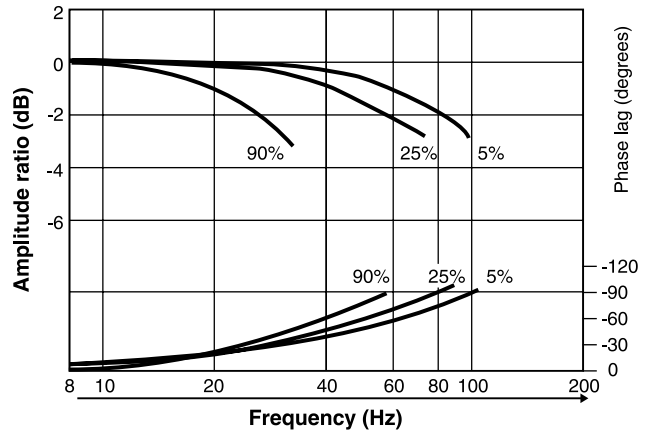
**D31FP Frequency Response**

±5% / ±25% / ±90% Command Signal  
 Dynamics at 210 Bar (3045 PSI) Pilot Supply Pressure



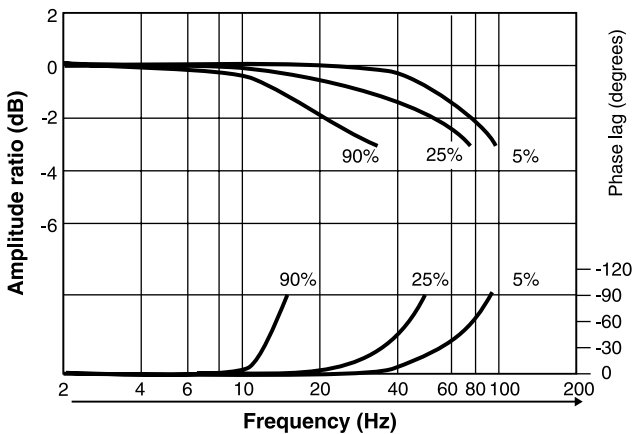
**D41FP Frequency Response**

±5% / ±25% / ±90% Command Signal  
 Dynamics at 210 Bar (3045 PSI) Pilot Supply Pressure



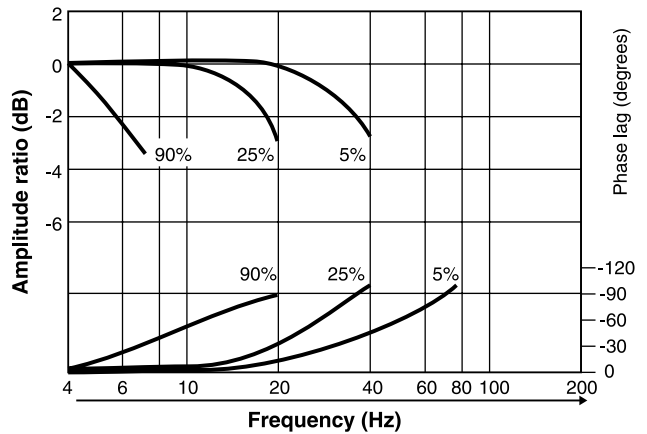
**D91FP Frequency Response**

±5% / ±25% / ±90% Command Signal  
 Dynamics at 210 Bar (3045 PSI) Pilot Supply Pressure



**D111FP Frequency Response**

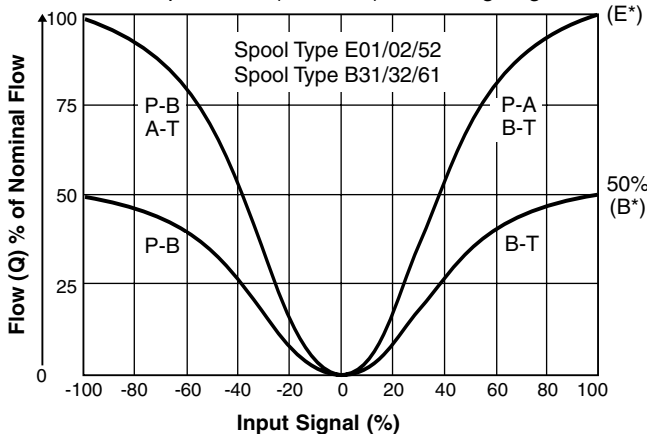
±5% / ±25% / ±90% Command Signal  
 Dynamics at 210 Bar (3045 PSI) Pilot Supply Pressure



**D\*1FPB/E Flow**

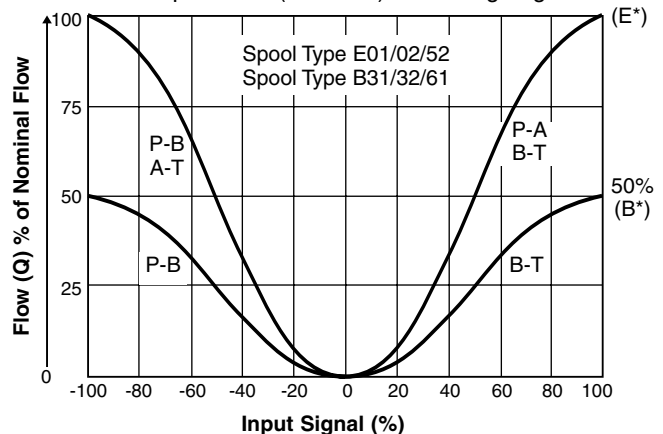
**D31FP Flow Characteristics**

at Δp = 5 Bar (72.5 PSI) / metering edge



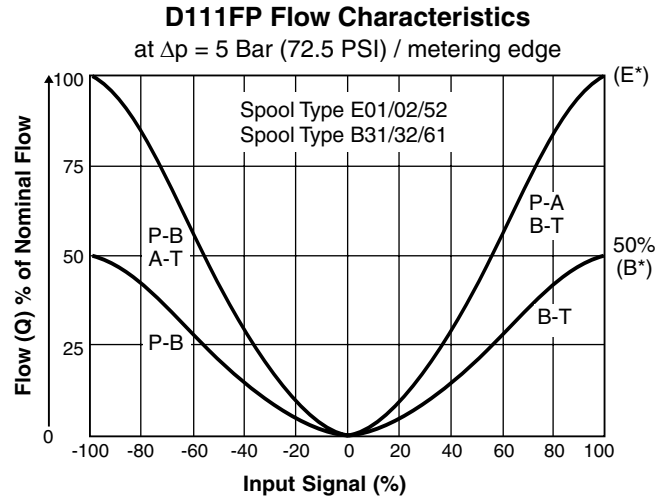
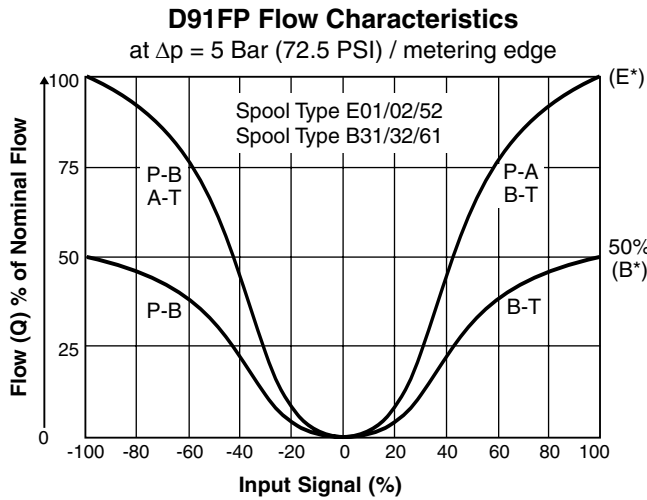
**D41FP Flow Characteristics**

at Δp = 5 Bar (72.5 PSI) / metering edge

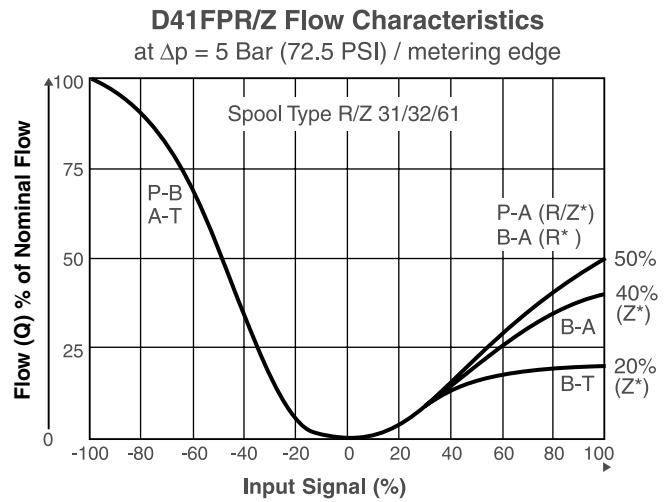
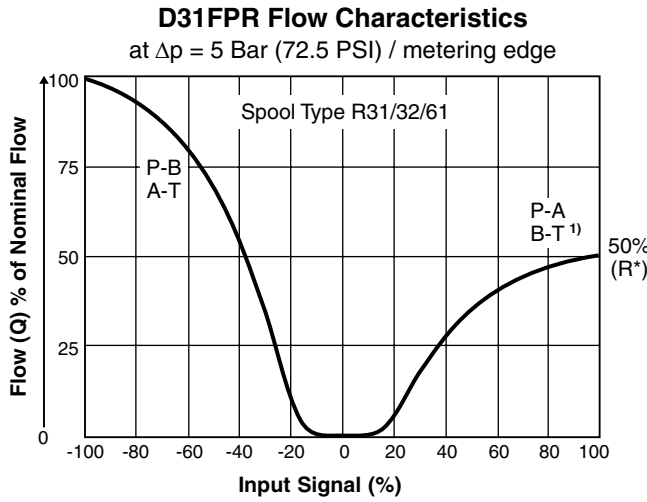




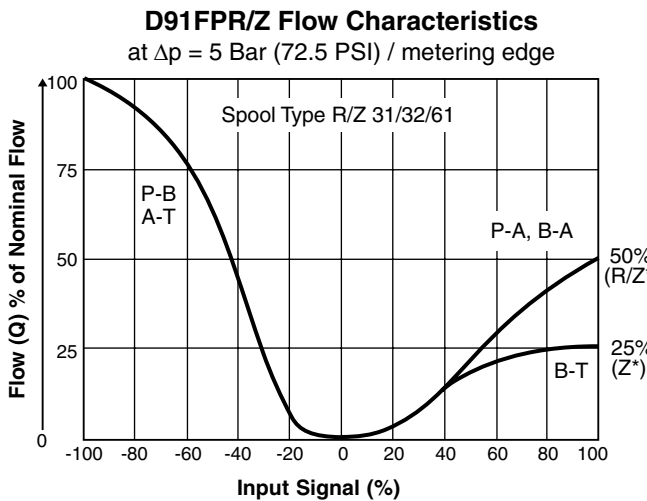
**D\*1FPB/E Flow**



**D\*1FPR/Z Flow**

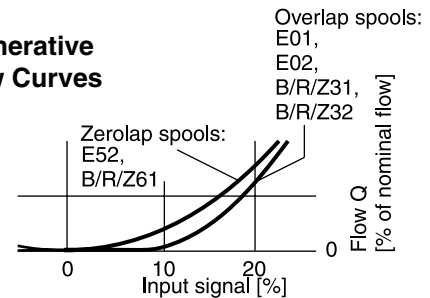


<sup>1)</sup> with 2 tank ports



**D111FP R/Z \***  
 Spool Type R/Z\* on request

**Detail:**  
**Standard, Regenerative and Hybrid Flow Curves**



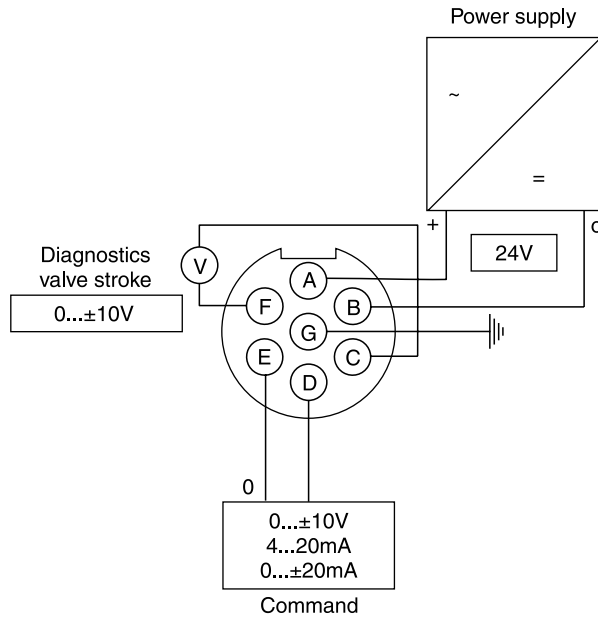
**Electrical Specifications Hybrid Option**

<b>Duty Ratio</b>	100%
<b>Protection Class</b>	IP 65 in accordance with EN 60529 (with correctly mounted plug-in connector)
	<b>D41</b> <b>D91</b> <b>D111</b>
<b>Supply Voltage</b> [V]	24                      24                      24
<b>Tolerance Supply Voltage</b> [%]	±10                      ±10                      ±10
<b>Current Consumption</b> [A]	1.21                      0.96                      1.29
<b>Power Consumption</b> [W]	29                      23                      31
<b>Solenoid Connection</b>	Connector as per EN 175301-803
<b>Wiring Minimum</b> [mm <sup>2</sup> ]	3 x 1.5 recommended
<b>Wiring Length Maximum</b> [m]	50 (164 ft.) recommended

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

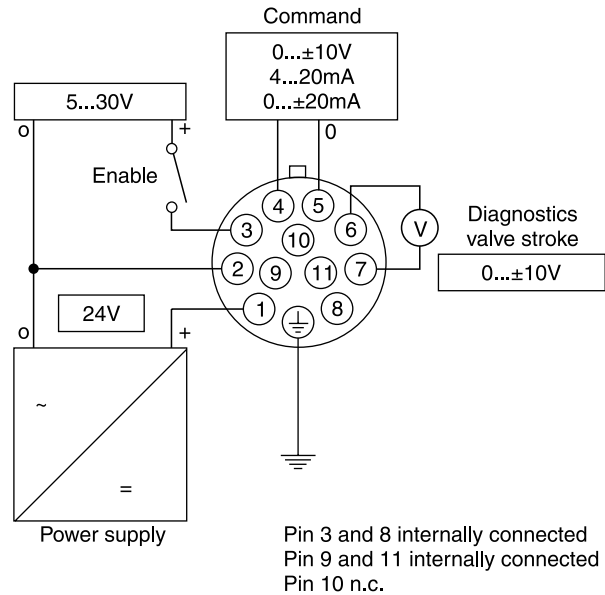
**Code 0**

**6 + PE acc. EN 175201-804**



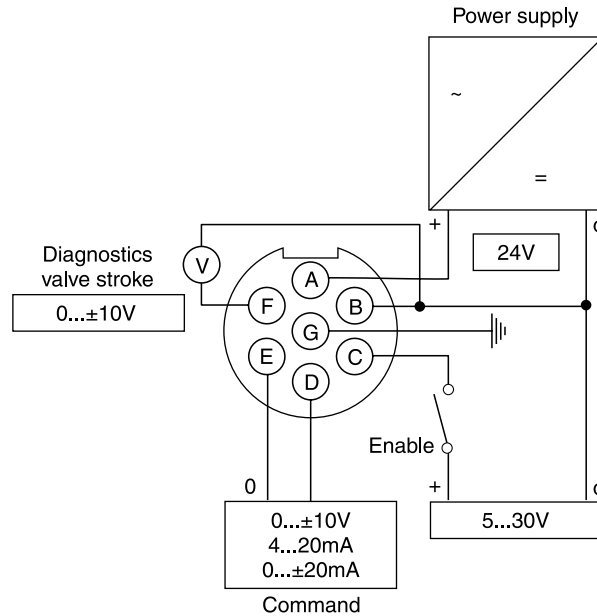
**Code 5**

**11 + PE acc. EN 175201-804**



**Code 7**

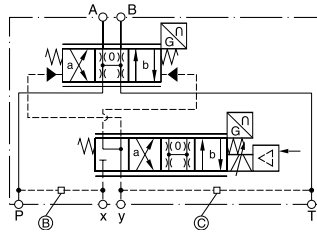
**6 + PE acc. EN 175201-804 + Enable**



**Pilot Flow — Pilot Oil Inlet (Supply) and Outlet (Drain)**

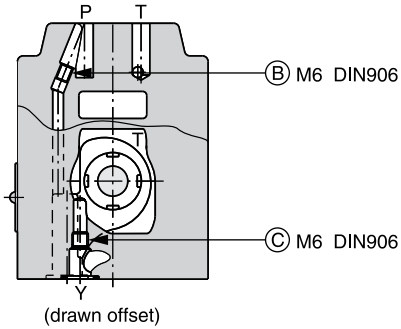
○ open, ● closed

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

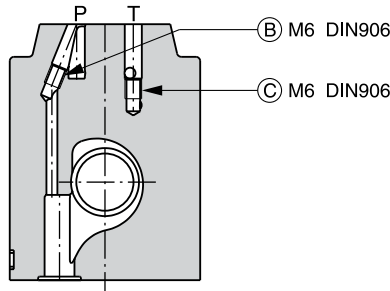


**A**

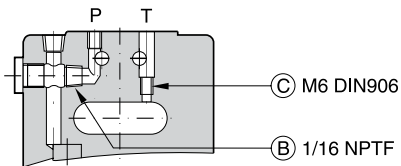
**D31FPB/E**



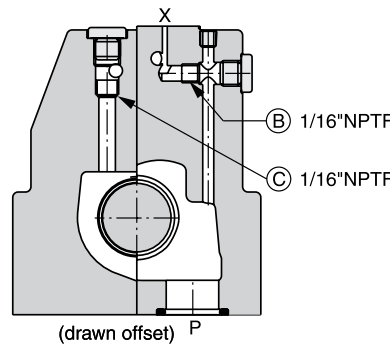
**D31FPR**



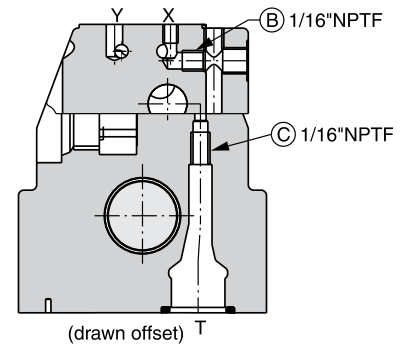
**D41FPB/E**



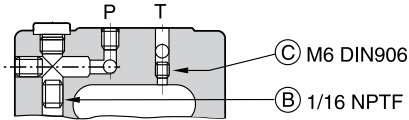
**D41FPR**



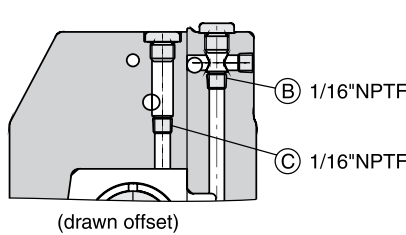
**D41FPZ**



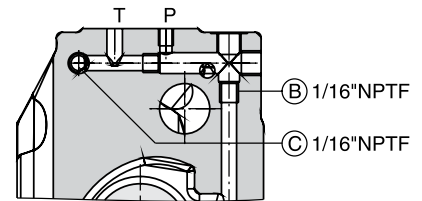
**D91FPB/E**



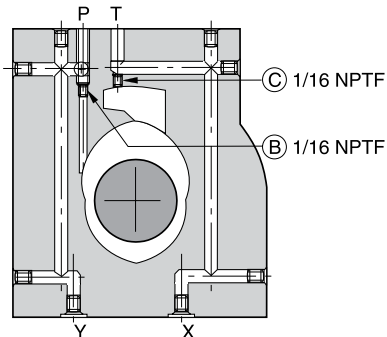
**D91FPR**



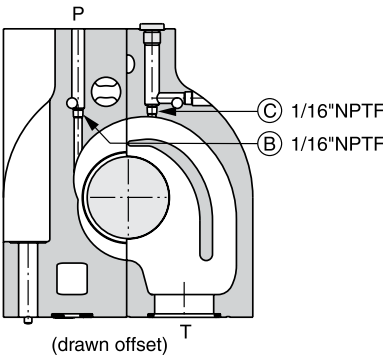
**D91FPZ**



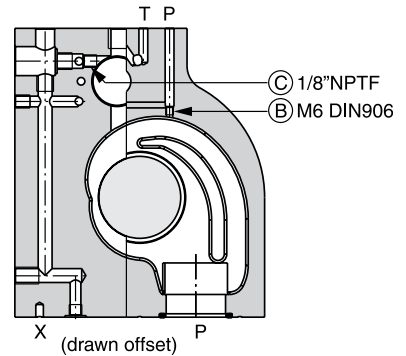
**D111FPB/E**



**D111FPR**



**D111FPZ**



D\_1FP.indd, ddp

**Dimensions**

**Proportional Directional Control Valves  
Series D\*1FP**

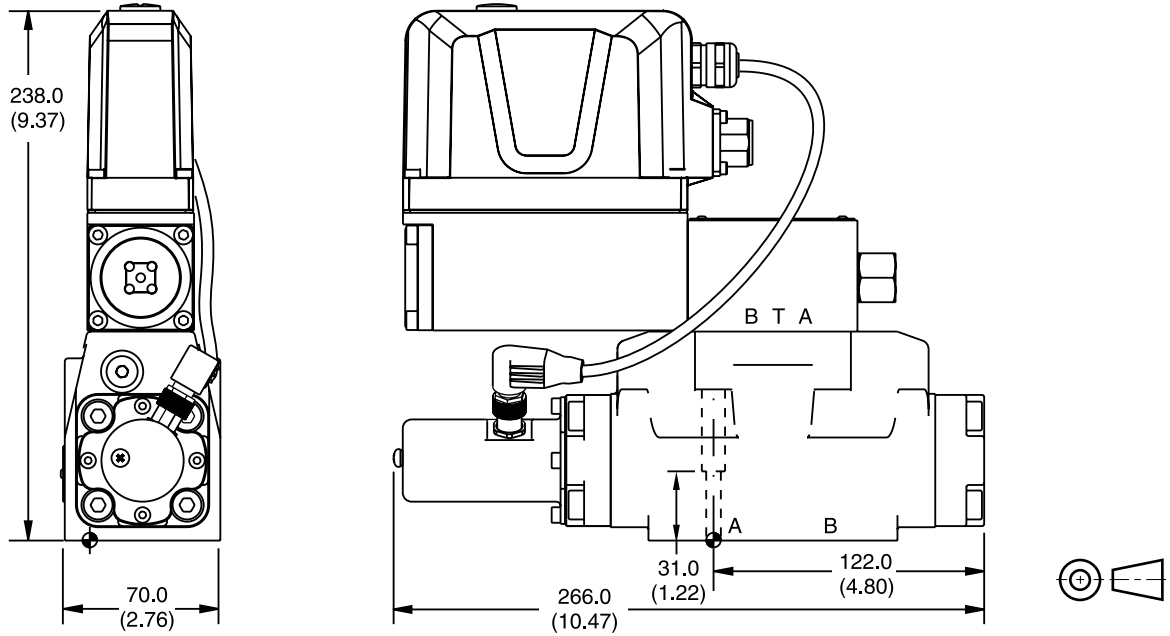
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ALPHA  
TOC

Return to  
SECTION  
TOC

**A**

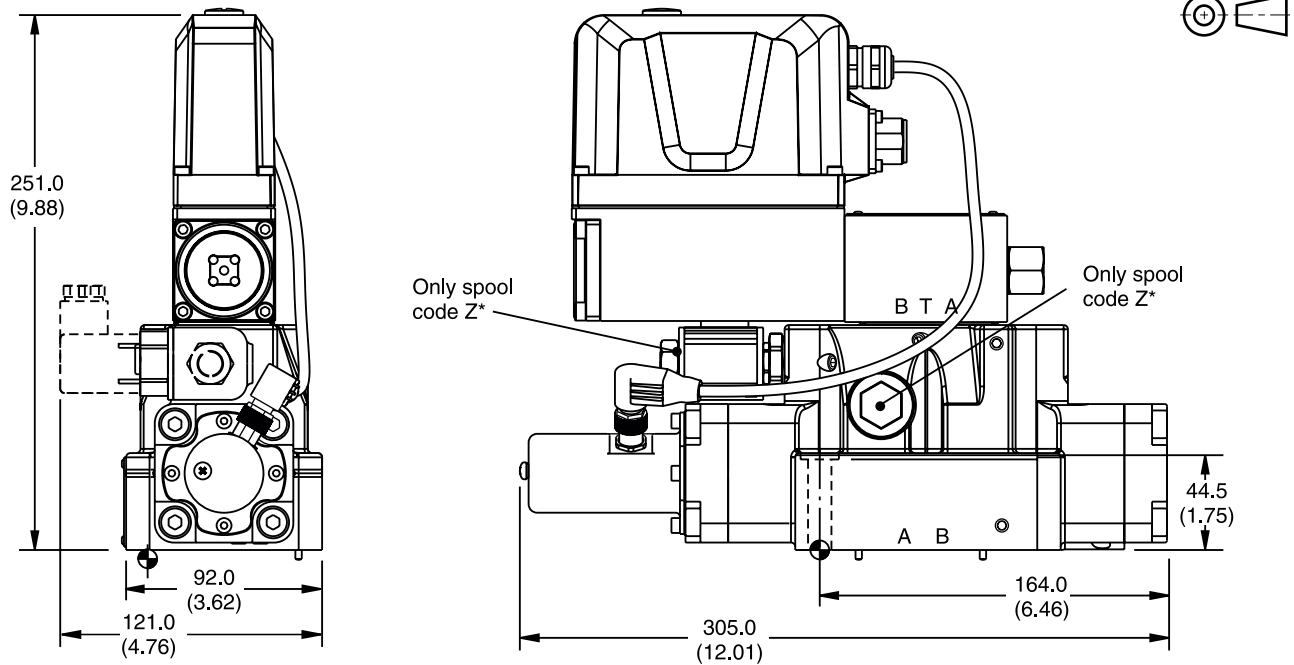
Inch equivalents for millimeter dimensions are shown in (\*\*)

**D31FP**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK385	4x M6x40 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.) ±15 %	Nitrile: SK-D31FP Fluorocarbon: SK-D31FP-V
	BK98	4x 1/4-20x1.62		

**D41FP**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK320	2x M6x55 4x M10x60 DIN 912 12.9	13.2 Nm (9.7 lb.-ft.) 63 Nm (46.5 lb.-ft.) ±15 %	Nitrile: SK-D41FP Fluorocarbon: SK-D41FP-V
	BK160	4x 3/8-16x2.5 2x 1/4-20x2.5		

**Dimensions**

**Proportional Directional Control Valves  
Series D\*1FP**

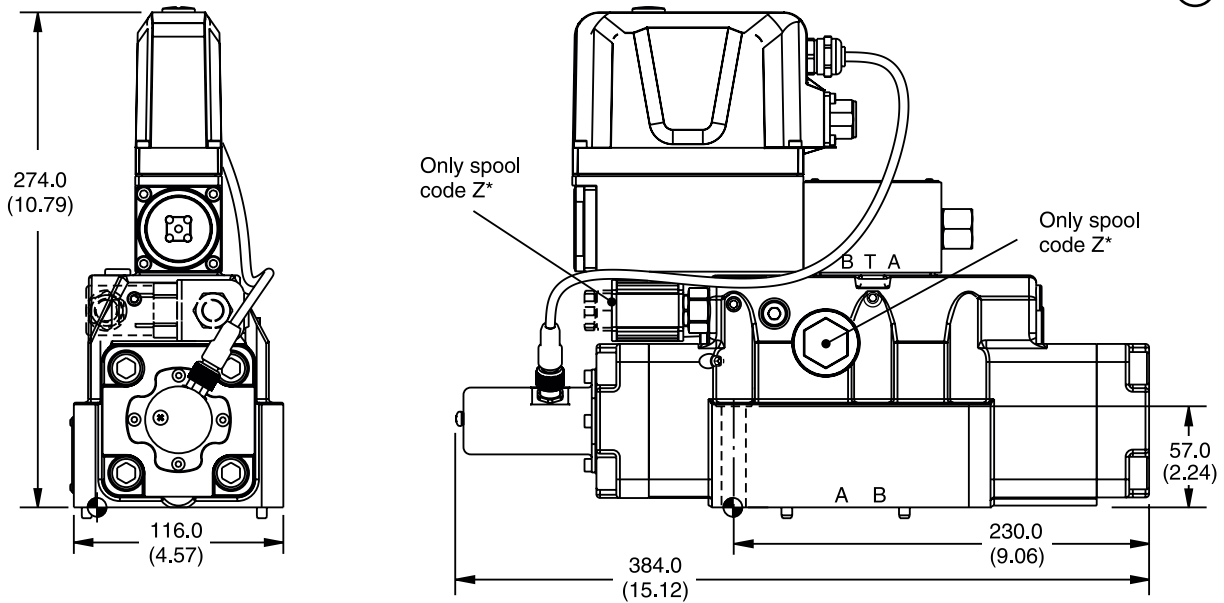
Return to  
**ALPHA  
TOC**

Return to  
**SECTION  
TOC**

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

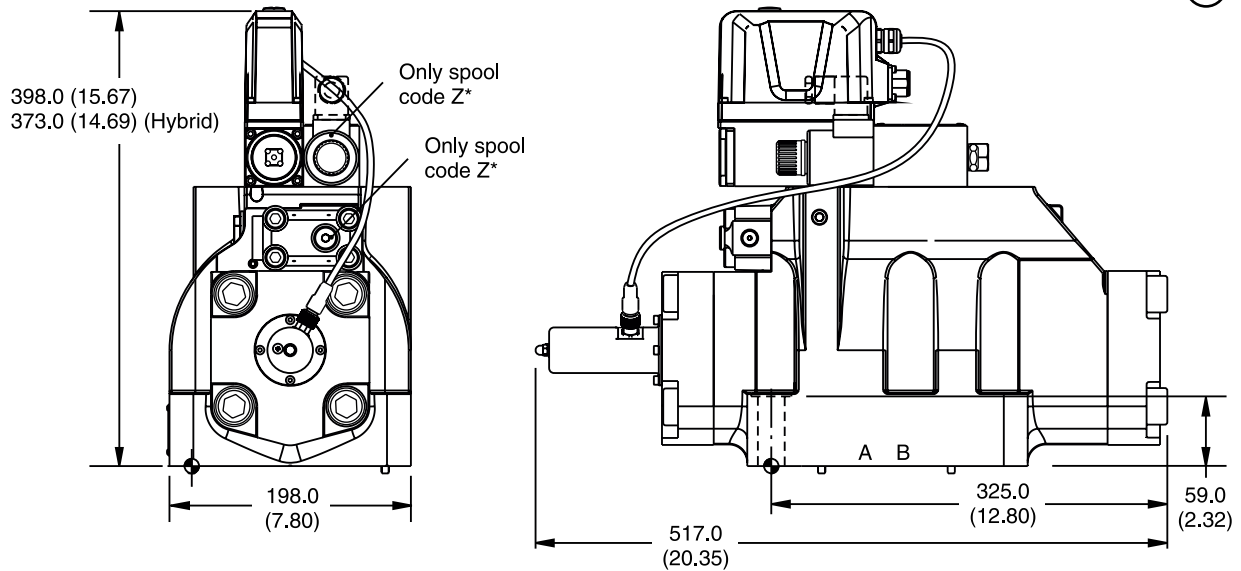
**D91FP**

**A**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK360 BK228	6x M12x75 DIN 912 12.9 6x 1/2-13x3.0	108 Nm (79.7 lb.-ft.) ±15 %	Nitrile: SK-D91FP Fluorocarbon: SK-D91FP-V

**D111FP**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK386 BK150	6x M20x90 DIN 912 12.9 6x 3/4-10x3.5	517 Nm (373.9 lb.-ft.) ±15 %	Nitrile: SK-D111FP Fluorocarbon: SK-D111FP-V

D\_1FP.indd, ddp



**RFI/EMC Immunity for Valves with Integrated Electronics**

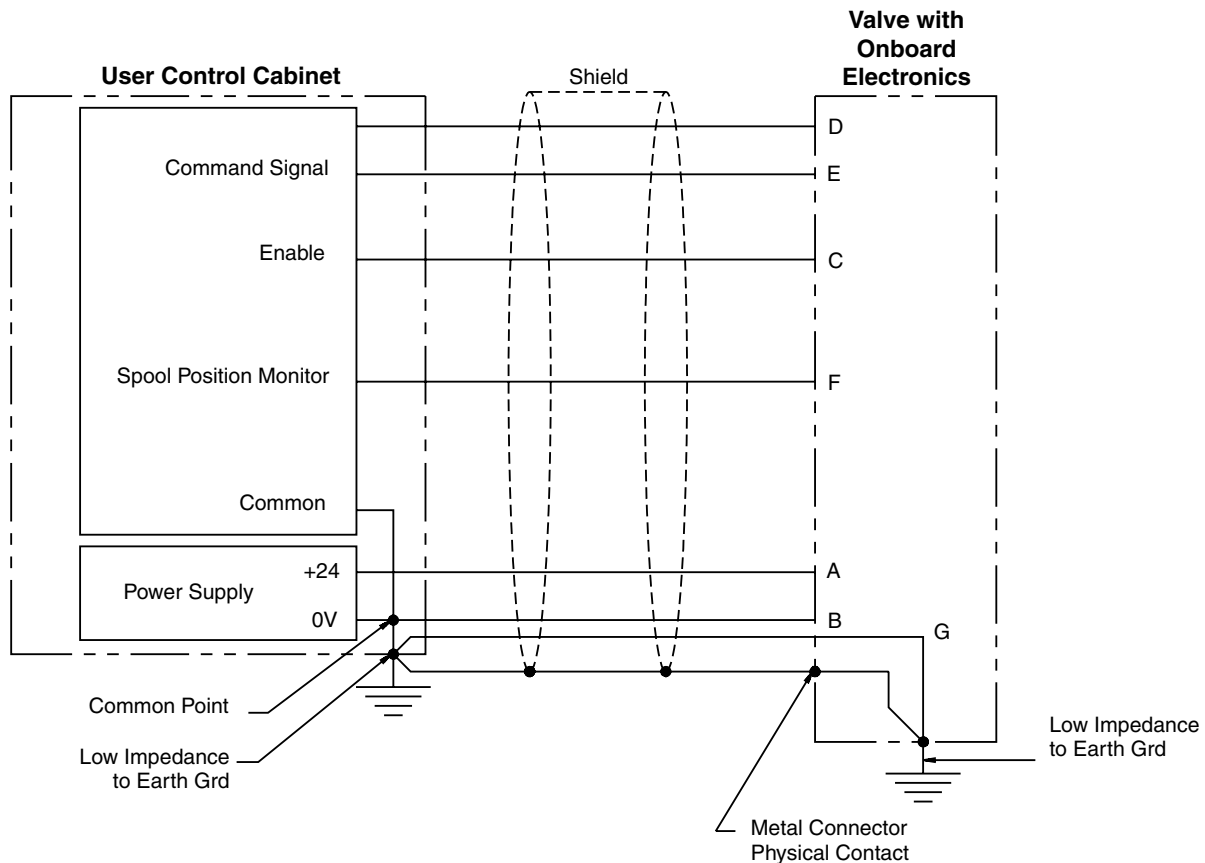
Conformance to the CE RFI/EMC susceptibility and emissions regulations require valves with integrated electronics be properly wired and grounded. The wiring diagram below suggests proper practices, and should be used as a guide for wiring any new application. In some retrofit applications it may be necessary to significantly alter an existing wiring layout and grounding methods to achieve the desired RFI/EMC immunity and avoid ground loops. Note that an improperly wired application can render a system unusable.

Valves should be wired to the user control cabinet by shielded cable where the shield is grounded at both ends. These ground points must be very low impedance earth grounds, and proper wiring practices are required to avoid system ground loops. In some appli-

cations it may be necessary to install a low impedance ground strap between the valve or manifold and earth to achieve a proper ground.

Note that when assembling cable/connector assemblies, the shield must be in electrical contact with the connector shell to complete the shield circuit through the valve mating receptacle. (Refer to the Accessories section of this catalog for pre-assembled 'EHC' cable assemblies)

To minimize the exposure to RFI/EMC radiation, electronic equipment should be isolated from sources of high-energy electromagnetic radiation such as cables carrying high currents, radio transmitters, electrical load control centers and contactors.

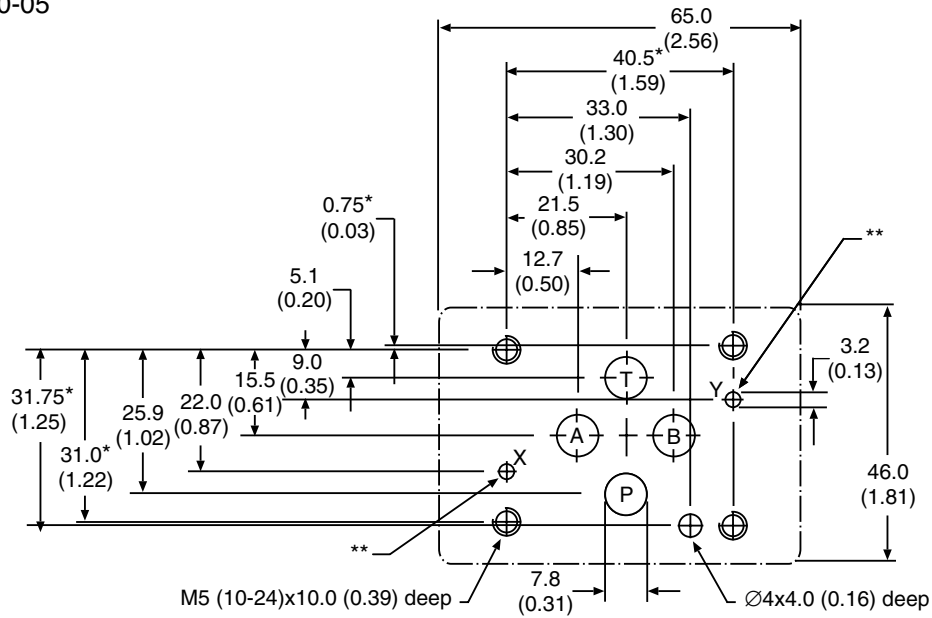


Note: PE on Functional Block Diagrams refers to "Potential Earth".

**Size NG6 (NFPA/ISO/CETOP 3)**

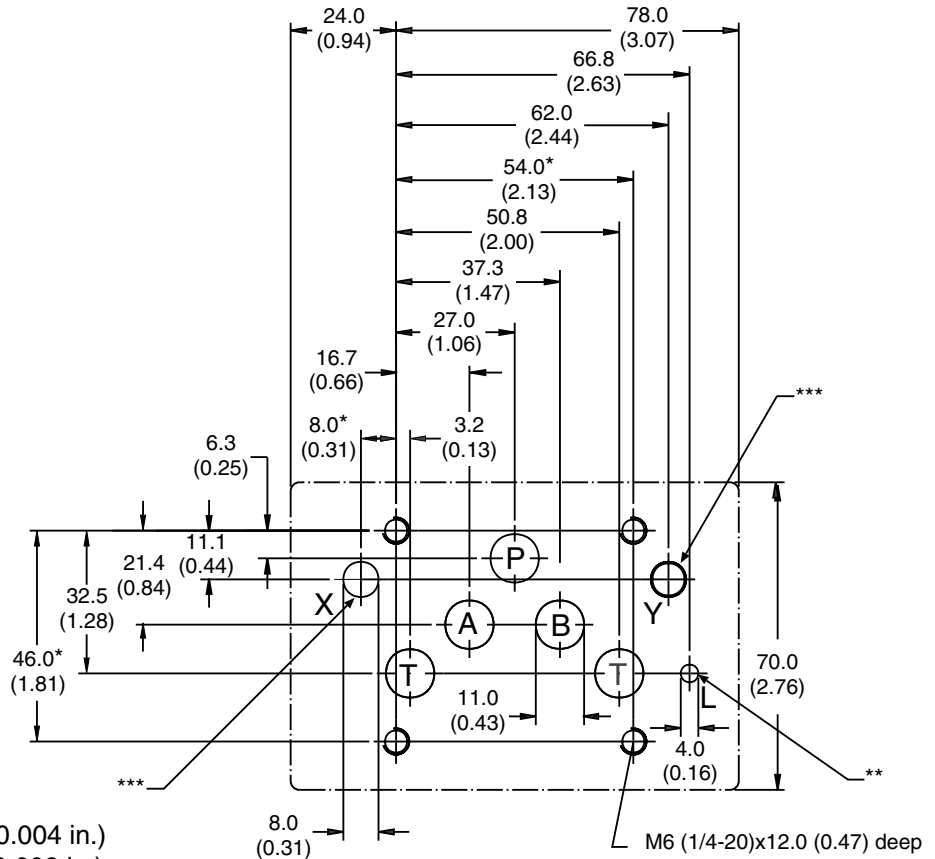
mounting pattern per DIN24340-A6,  
 ISO 4401-03-03-0-05

**A**



**Size NG10 (NFPA/ISO/CETOP 5HE)**

mounting pattern per DIN 24340-A6,  
 ISO 4401-05-05-0-05



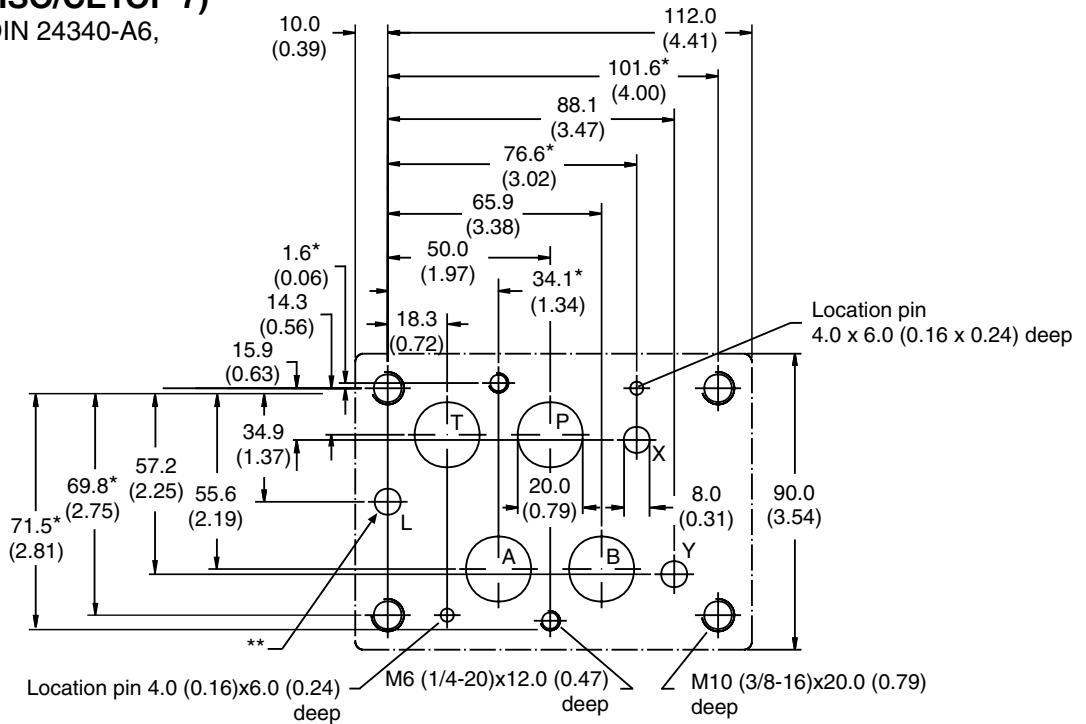
- \* Dimension tolerance  $\pm 0.1$  mm (0.004 in.)  
 All other dimensions  $\pm 0.2$  mm (0.008 in.)
- \*\* Port not used with valves in this catalog
- \*\*\* Ports only used for pilot operated valves





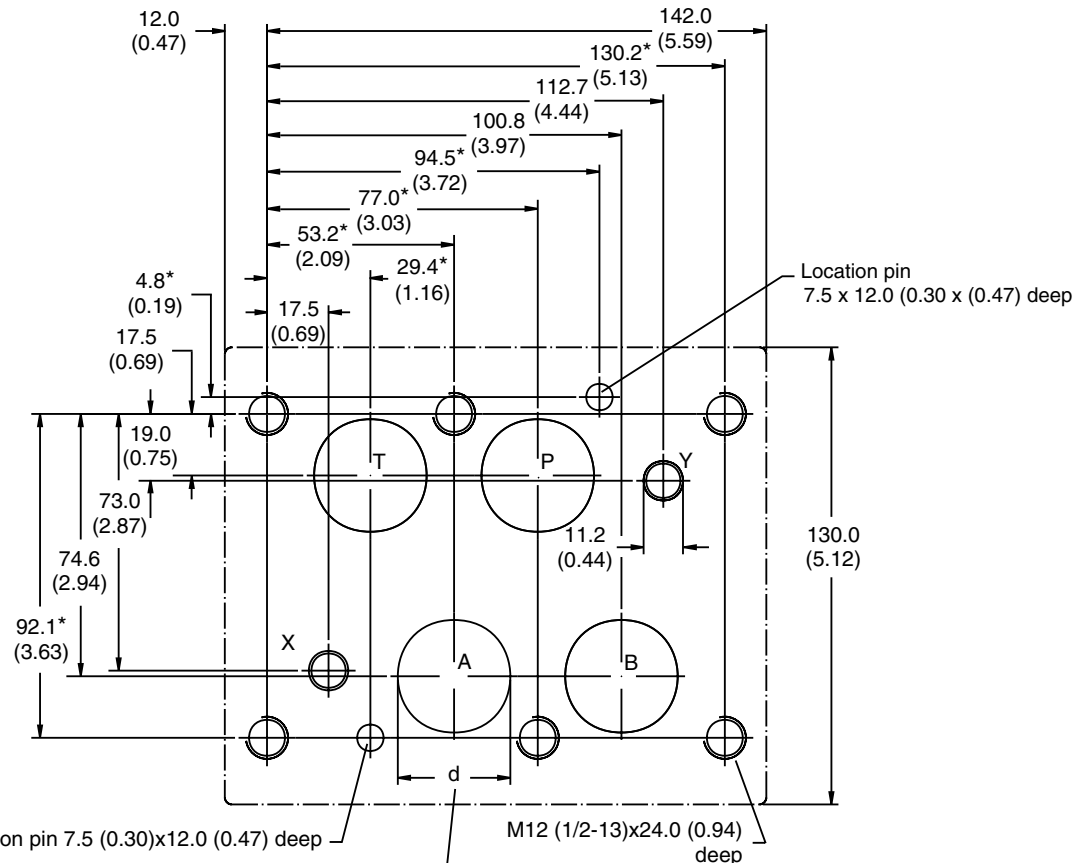
**Size NG16 (NFPA/ISO/CETOP 7)**

mounting pattern per DIN 24340-A6,  
 ISO 4401-07-07-0-05



**Size NG25 (NFPA/ISO/CETOP 8)**

mounting pattern per DIN 24340-A6,  
 ISO 4401-08-08-0-05



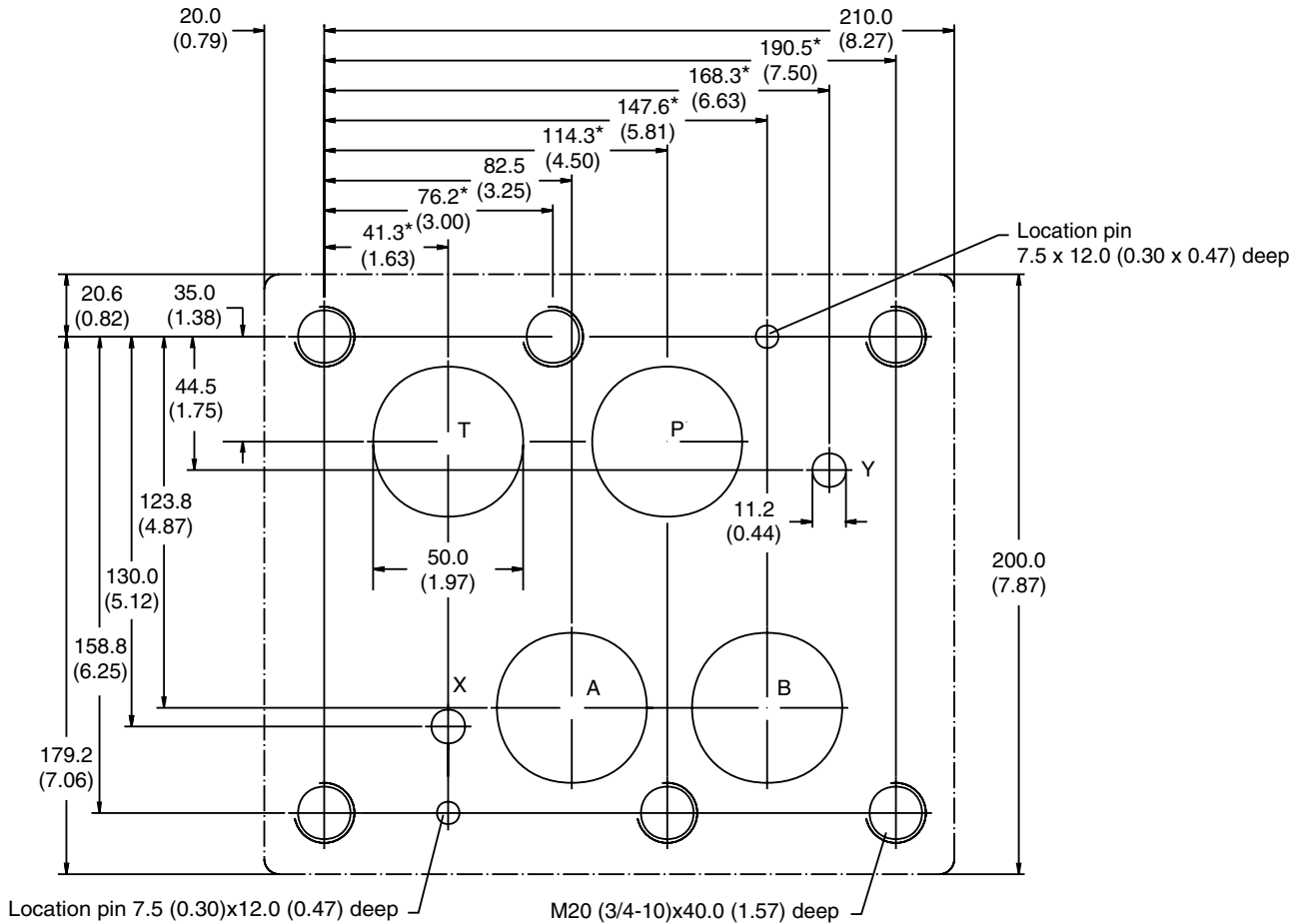
\* Dimension tolerance  $\pm 0.1$  mm (0.004 in.)  
 All other dimensions  $\pm 0.2$  mm (0.008 in.)  
 \*\* Port not used with valves in this catalog

d (A,B,T) series 8:  $\varnothing 27.0$  (1.06)  
 d (P) series 8:  $\varnothing 26.5$  (1.04)  
 d (P,A,B,T) series 9:  $\varnothing 32.0$  (1.26)

**Size NG32 (NFPA/ISO/CETOP 10)**

mounting pattern per DIN 24340-A6,  
 ISO 4401-10-09-0-05

**A**



\* Dimension tolerance  $\pm 0.1$  mm (0.004 in.)  
 All other dimensions  $\pm 0.2$  mm (0.008 in.)

**Contents**

Series	Description	Direct Operated	Pilot Operated	Flange Mount	Threaded Body	Page
	[ size: NG ] [ size: ISO/CETOP ]	6 3	6 10 25 32 3 5 8 10	Inch <sup>3</sup> / <sub>4</sub> 1 1 <sup>1</sup> / <sub>4</sub> 1 <sup>1</sup> / <sub>2</sub>	Inch <sup>1</sup> / <sub>2</sub> <sup>3</sup> / <sub>4</sub> 1 1 <sup>1</sup> / <sub>4</sub>	
RE06M*W	Prop. Press. Relief Valves Offboard	•				B2
4VP01	Prop. Press. Relief Valves	•				B6
RE06M*T	Prop. Press. Relief Valves Onboard	•				B10
R4V, R6V	Prop. Press. Relief Valves Offboard (Replaces Series RE*W)		• • •			B17
R4V, R6V	Prop. Press. Relief Valves Onboard (Replaces Series RE*T)		• • •			B27
R4V*P2	Prop. Press. Relief Valves In-line Mounted				• • • •	B38
R5V*P2	Prop. Press. Relief Valves Flange Mounted			• • • •		B43
RPDM2	Prop. Press. Relief Valves	•				B50
VBY*K	Prop. Press. Relief/Sequence Valves		• •			B51
VMY*K	Prop. Press. Reducing Valves		• •			B57
D1FV	Prop. Press. Reducing Valves Offboard	•				B64
D1FV OBE	Prop. Press. Reducing Valves Onboard	•				B64
R4R*P2	Prop. Press. Reducing Valves Subplate Mounted		• • •			B73
R4R*P2	Prop. Press. Reducing Valves In-line Mounted				• • • •	B78
R5R*P2	Prop. Press. Reducing Valves Flange Mounted			• • •		B83
PRPM	Prop. Press. Reducing Valves		• •			B87
DUR*L06	Prop. Flow Control Valves		•			B92
F5C	Proportional Throttle Valves Flange Mounted			• • •		B96
R5A	Pressure Compensator Valves Direct Operated, SAE Flange			• • •		B100
R5P	Pressure Compensator Valves Direct Operated, SAE Flange			• • •		B103
LCM	Pressure Compensator Valves		• •			B110
SPC	Pressure Compensator Valves (Available in Size NG16 also)		• • •			B111

**B**

## General Description

Series RE06M\*W proportional relief valves are direct operated proportional valves typically used as remote control valves for flow rates of below 3 LPM (0.8 GPM).

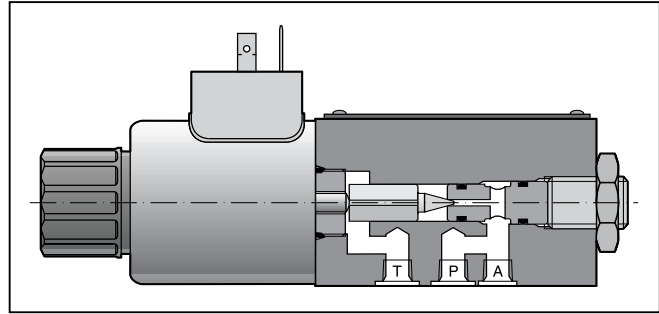
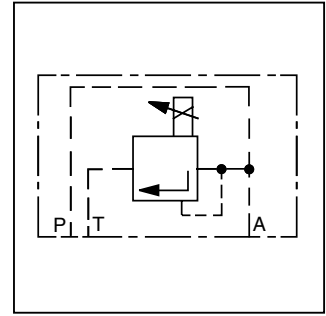
## Function

When the pressure in port P or A exceeds the pressure setting at the solenoid, the cone opens to port T and limits the pressure in port P to the adjusted level.

The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.

## Features

- Direct operated by proportional solenoid.
- Very low pressure adjustment of  $p_{min}$ .
- Two pressure ports, A and P.
- Subplate mounting according to ISO 6264.
- Four pressure ranges available.



## Specifications

General	
Nominal Size	DIN NG6 / CETOP 3 / NFPA D03
Interface	Subplate mounting according to ISO 6264
Mounting Position	as desired, horizontal mounting preferred
Ambient Temperature	[°C] -20 ... +70 (-4°F ... +158°F)
MTTF <sub>d</sub> value	[years] 150
Hydraulic	
Maximum Operating Pressure	Ports P and A up to 350 (5075 PSI); port T 30 Bar (435 PSI)
Pressure Range	105 Bar (1523 PSI), 175 Bar (2538 PSI), 250 Bar (3625 PSI), 350 (5075 PSI)
Nominal Flow	[l/min] See p/Q curves
Fluid	Hydraulic oil as per DIN 51524...51535, other on request
Viscosity, Recommended	[cSt] / [mm <sup>2</sup> /s] 30 ... 80 (139 ... 371 SSU)
Permitted	[cSt] / [mm <sup>2</sup> /s] 12 ... 380 (56 ... 1761SSU)
Fluid Temperature	[°C] -20 ... +60; (-4°F ... +140°F)
Filtration	ISO 4406 (1999), 18/16/13 (acc. NAS 1638: 7)
Linearity	[%] ±2.8
Repeatability	[%] <±1
Hysteresis	[%] ±1.5 of $p_{max}$
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)
Nominal Voltage	[V] 12 (2.3 A max. current), 16 (1.3 A max. current)
Coil Resistance	[Ohm] 4 at 20°C (68°F) = K Coil 11.4 - 12 for X Coil
Solenoid Connection	Connector as per DIN 43650
Power Amplifier, Recommended	PCD00A-400

**Ordering Information**

<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">RE</div> <p style="text-align: center; font-size: small;">Proportional Pressure Relief Valve</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">06</div> <p style="text-align: center; font-size: small;">Size</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">M</div> <p style="text-align: center; font-size: small;">Manifold Mounting</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"> </div> <p style="text-align: center; font-size: small;">Pressure Range</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">W</div> <p style="text-align: center; font-size: small;">Offboard Electronics</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">2</div> <p style="text-align: center; font-size: small;">Seal</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">1</div> <p style="text-align: center; font-size: small;">Valve Open at Zero Command</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"> </div> <p style="text-align: center; font-size: small;">Solenoid Type</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">W</div> <p style="text-align: center; font-size: small;">Electronic Connection</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;"> </div> <p style="text-align: center; font-size: small;">Design Series</p> <p style="text-align: center; font-size: x-small;">NOTE: Not required when ordering.</p>
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<table border="0" style="width: 100%; font-size: x-small;"> <tr><th style="text-align: left;">Code</th><th style="text-align: left;">Description</th></tr> <tr><td>06</td><td>NG6 D03, CETOP 3</td></tr> </table>	Code	Description	06	NG6 D03, CETOP 3	<table border="0" style="width: 100%; font-size: x-small;"> <tr><th style="text-align: left;">Code</th><th style="text-align: left;">Description</th></tr> <tr><td>N</td><td>Nitrile</td></tr> <tr><td>V</td><td>Fluorocarbon</td></tr> </table>	Code	Description	N	Nitrile	V	Fluorocarbon	<table border="0" style="width: 100%; font-size: x-small;"> <tr><th style="text-align: left;">Code</th><th style="text-align: left;">Description</th></tr> <tr><td>10</td><td>up to 105 Bar (1522 PSI)</td></tr> <tr><td>17</td><td>up to 175 Bar (2538 PSI)</td></tr> <tr><td>25</td><td>up to 250 Bar (3625 PSI)</td></tr> <tr><td>35</td><td>up to 350 Bar (5075 PSI)</td></tr> </table>	Code	Description	10	up to 105 Bar (1522 PSI)	17	up to 175 Bar (2538 PSI)	25	up to 250 Bar (3625 PSI)	35	up to 350 Bar (5075 PSI)
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35	up to 350 Bar (5075 PSI)																					

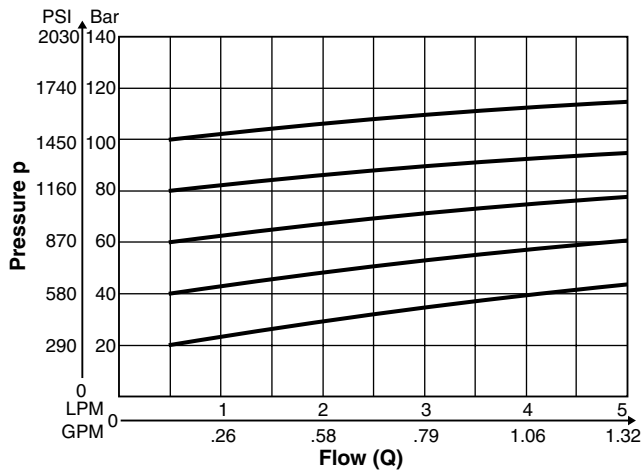
<table border="0" style="width: 100%; font-size: x-small;"> <tr><th style="text-align: left;">Code</th><th style="text-align: left;">Solenoid Voltage</th></tr> <tr><td>K*</td><td>12 V, 2.5 A</td></tr> <tr><td>X**</td><td>16 V, 1.3 A</td></tr> </table> <p style="font-size: x-small;">* Use with "PCD" Series Driver cards              ** Order if currently using "ED" card</p>	Code	Solenoid Voltage	K*	12 V, 2.5 A	X**	16 V, 1.3 A	<table border="0" style="width: 100%; font-size: x-small;"> <tr><th style="text-align: left;">Code</th><th style="text-align: left;">Description</th></tr> <tr><td> </td><td>Socket Connector</td></tr> <tr><td>W</td><td>DIN 43650 without plug</td></tr> </table> <p style="font-size: x-small;">Please order plug separately. See Accessories.</p>	Code	Description		Socket Connector	W	DIN 43650 without plug	<table border="0" style="width: 100%;"> <tr><th style="text-align: left;">Bolt Kit</th><th style="text-align: left;">Qty</th><th style="text-align: left;">Size</th></tr> <tr><td>BK209</td><td>4</td><td>10-24 X 1.25"</td></tr> <tr><td>BK375</td><td>4</td><td>M5 x 30mm</td></tr> </table>	Bolt Kit	Qty	Size	BK209	4	10-24 X 1.25"	BK375	4	M5 x 30mm
Code	Solenoid Voltage																						
K*	12 V, 2.5 A																						
X**	16 V, 1.3 A																						
Code	Description																						
	Socket Connector																						
W	DIN 43650 without plug																						
Bolt Kit	Qty	Size																					
BK209	4	10-24 X 1.25"																					
BK375	4	M5 x 30mm																					

Weight: 1.8 kg (4.0 lbs.)

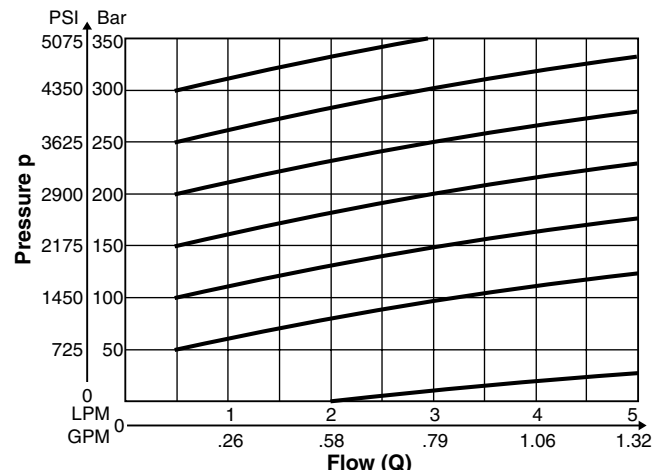
**Performance Curves**

**p/Q Curves**

**Pressure Stage 105 Bar**

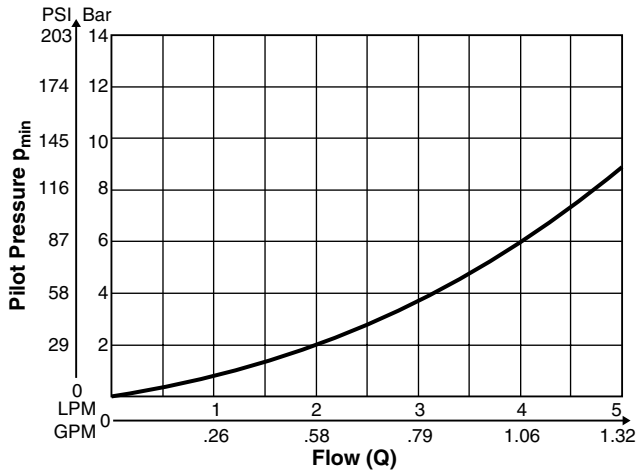


**Pressure Stage 350 Bar**

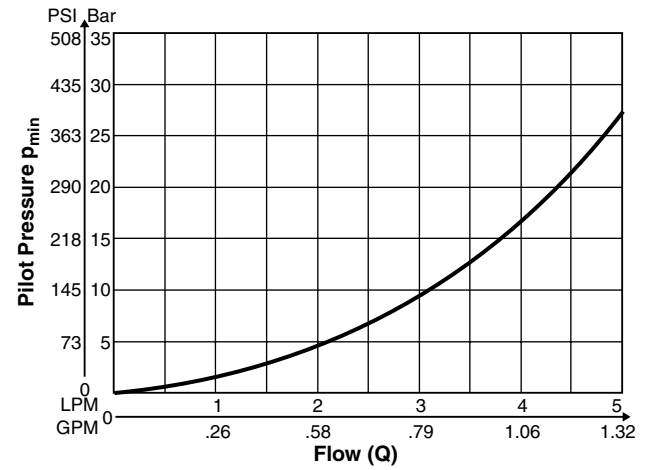


**B**

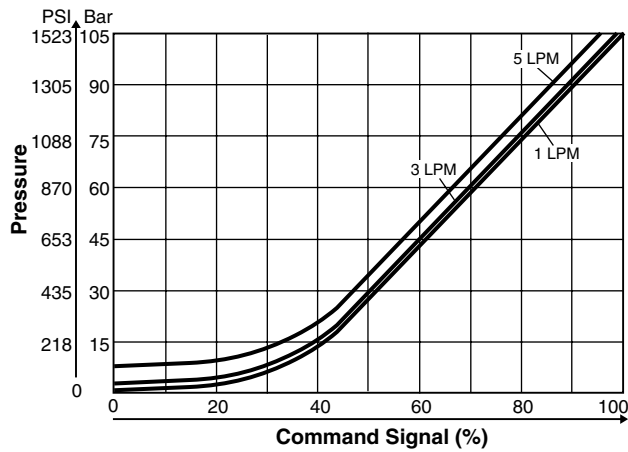
**$p_{min}/Q$  Curves**  
**Pressure Stage 105 Bar**



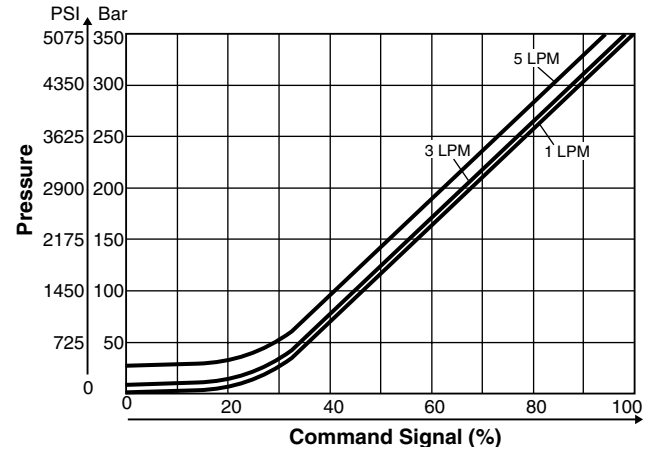
**Pressure Stage 350 Bar**



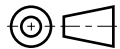
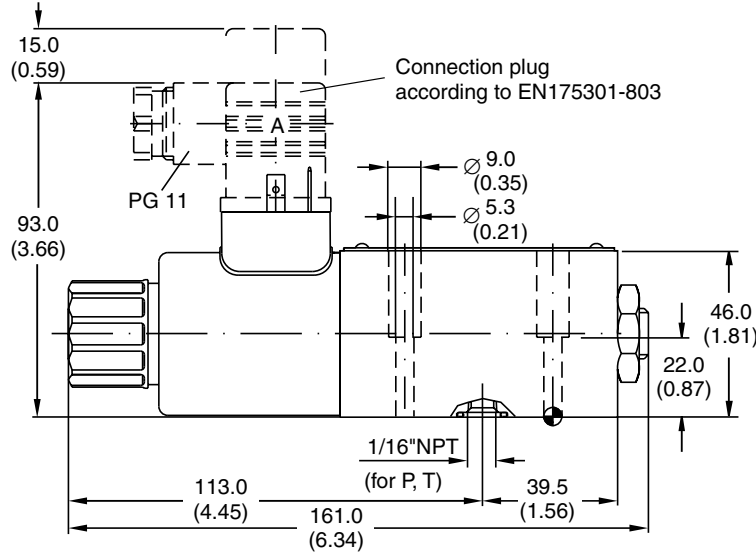
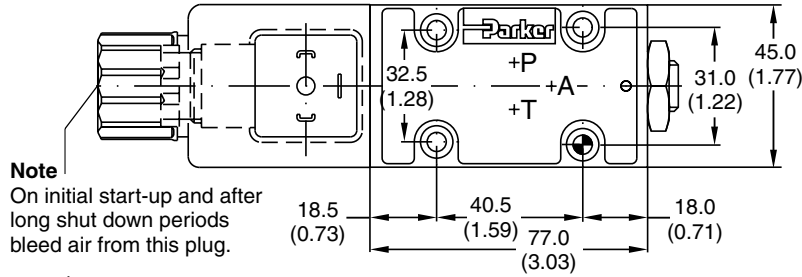
**$p_{set-voltage}$  Curves**  
**Pressure Stage 105 Bar**



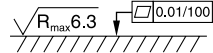


**Pressure Stage 350 Bar**



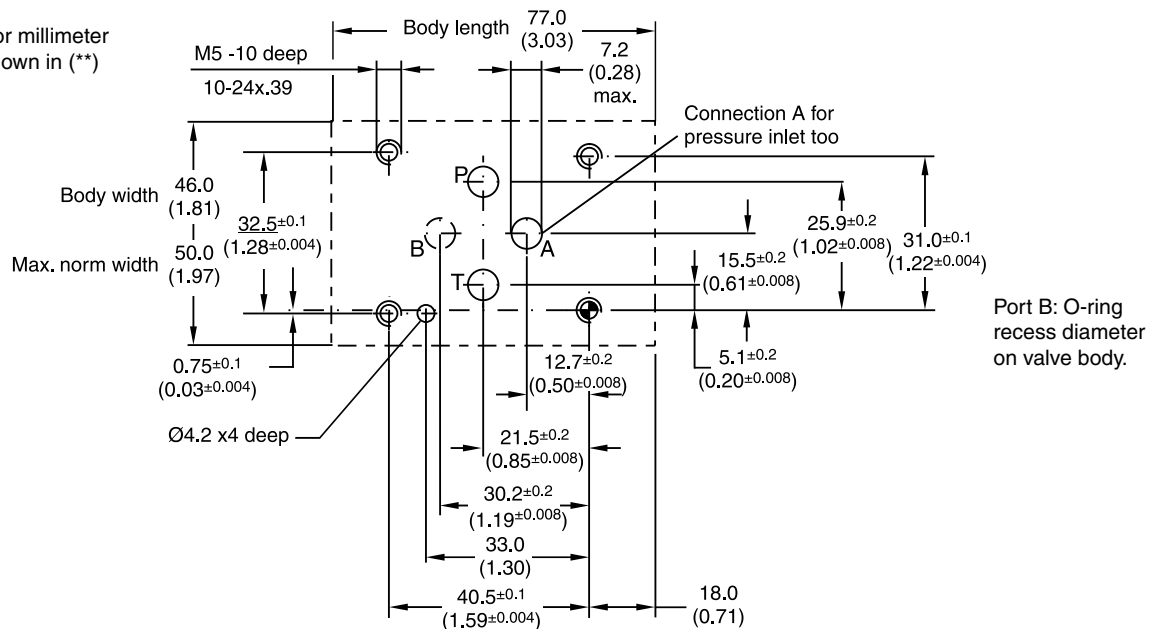
Inch equivalents for millimeter dimensions are shown in (\*\*)



Surface Finish	Bolt Kit			Seal Kit
				<b>Nitrile</b> <b>Fluorocarbon</b>
	BK375 BK209	4x M5x30 DIN 912 12.9 4x 10-24x1.25	7.6 Nm (5.6 lb.-ft.) ±15%	SK-RE06MWN   SK-RE06MWV

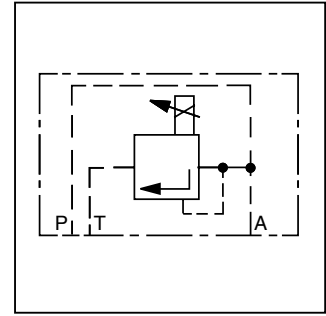
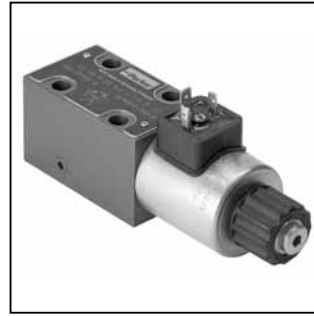
**Mounting Pattern ISO 6264-03-04-\*-97**

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



**General Description**

Series 4VP01 direct operated proportional pressure relief valves are equipped with one pressure port (port P). The solenoid is located on the A port side of the mounting pattern.



**B**

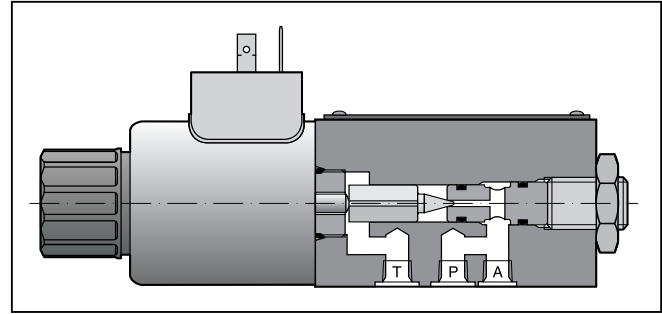
**Function**

When the pressure in port P exceeds the pressure setting at the solenoid, the cone opens to port T and limits the pressure in port P to the adjusted level.

Optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.

**Features**

- Direct operated by proportional solenoid.
- Very low pressure adjustment of  $p_{min}$ .
- 1 pressure port.
- Subplate mounting according to ISO 6264.
- 4 pressure ranges.



**Use RE0M\*W2 for new applications**

**Ordering Information**

**4VP01**

Proportional Pressure Relief Valve

Pressure Range

Orifice in Port P

**G12**

Solenoid Voltage  
 12V / 2.3 A

**B**

Design Series

Seal

Options Check with Factory

Code	Description
1	up to 50 Bar (725 PSI)
2	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
0	Without (Standard)
1	Ø 0.6 mm
2	Ø 0.8 mm
3	Ø 1.0 mm
4	Ø 1.2 mm

Code	Description
1	Nitrile
5	Fluorocarbon

**Bolt Kits:**

- BK209 (4) 10-14x1.25 SHCS
- BK375 (4) M5x30 SHCS

**Weight:** 1.8 kg (4.0 lbs.)



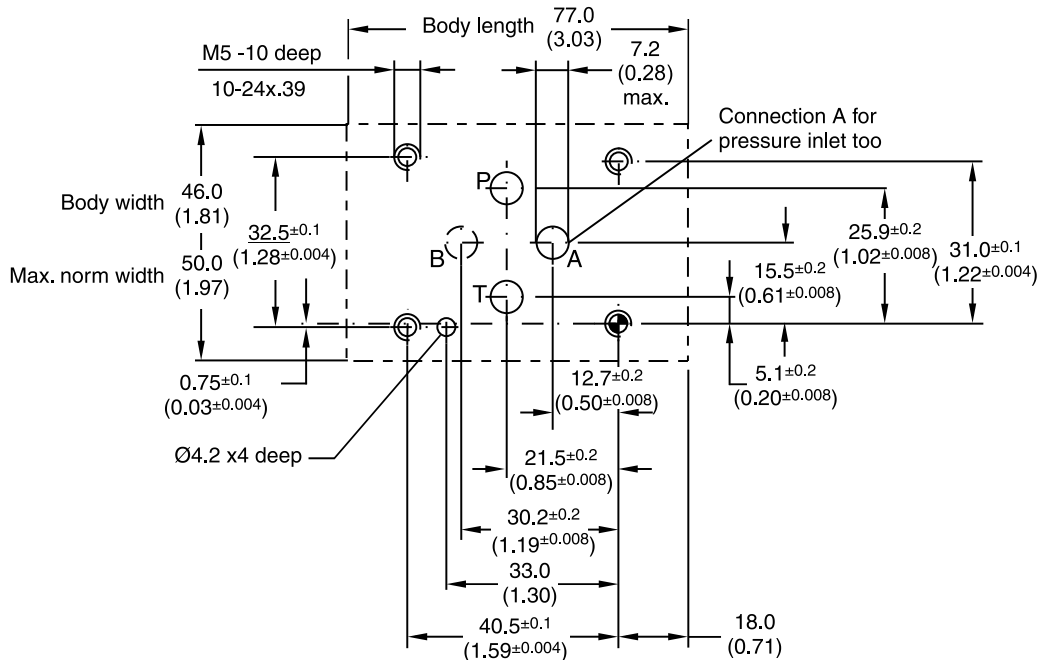
**Specifications**

General	
Size	DIN NG6 / CETOP 3 / NFPA D03
Interface	Subplate Mounting acc. ISO 6264
Mounting Position	As desired, horizontal position preferred
Ambient Temperature Range	-20°C to +70°C (-4°F to +158°F)
Hydraulic	
Maximum Operating Pressure	Port P 350 Bar (5075 PSI); Port T depressurized
Pressure Range	50 Bar (725 PSI), 105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)
Nominal Flow	See p/Q Curves
Fluid	Hydraulic oil as per DIN 51524...51535, other on request
Fluid Temperature	-20°C to +60°C (-4°F to +140°F)
Viscosity Permitted Recommended	12 to 380 cSt / mm <sup>2</sup> /s (56 to 1761 SSU) 30 to 80 cSt / mm <sup>2</sup> /s (139 to 371 SSU)
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)
Linearity	±2.8%
Repeatability	<±1%
Hysteresis	±1.5 of p <sub>max</sub>
Electrical	
Duty Ratio	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)
Supply Voltage	12 VDC
Maximum Current	2.3 amps
Coil Resistance	4 Ohm at 20°C (68°F)
Solenoid Connection	Connector as per EN 175301-803
Power Amplifier	PCD00A-400, recommended

**Mounting Pattern ISO 6264-03-04-\*-97**

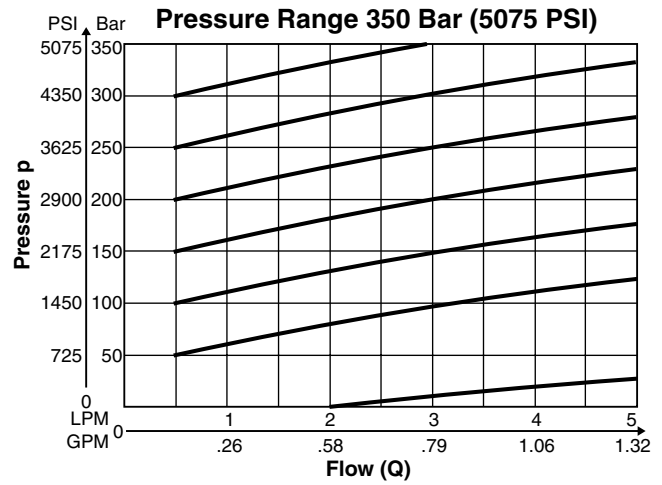
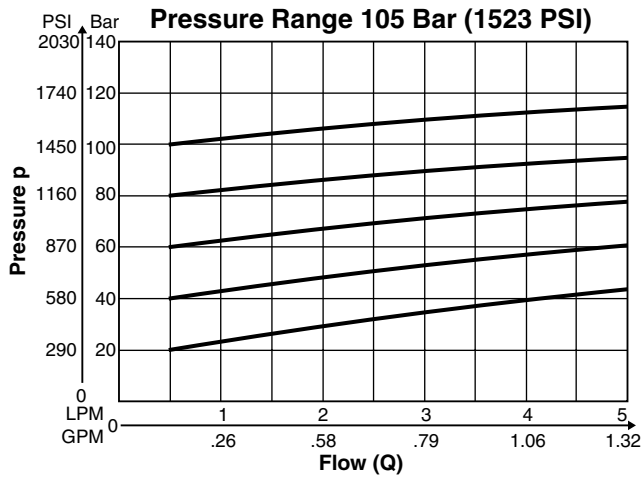
**Use RE0M\*W2 for new applications**

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

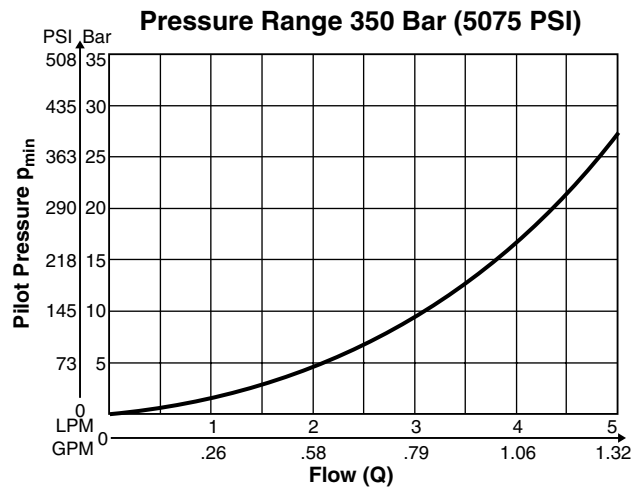
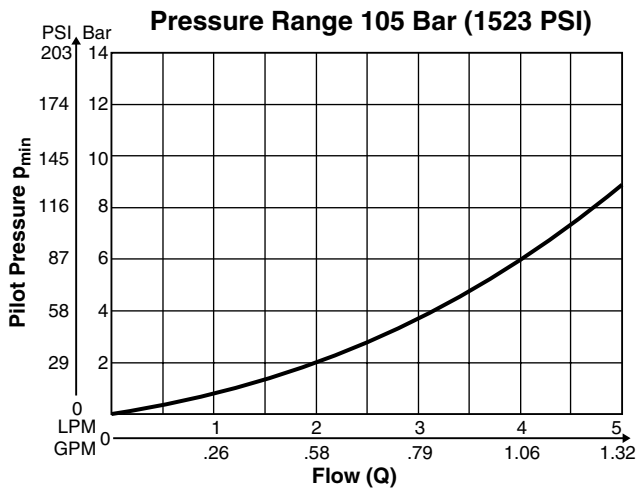


**p/Q Curves**

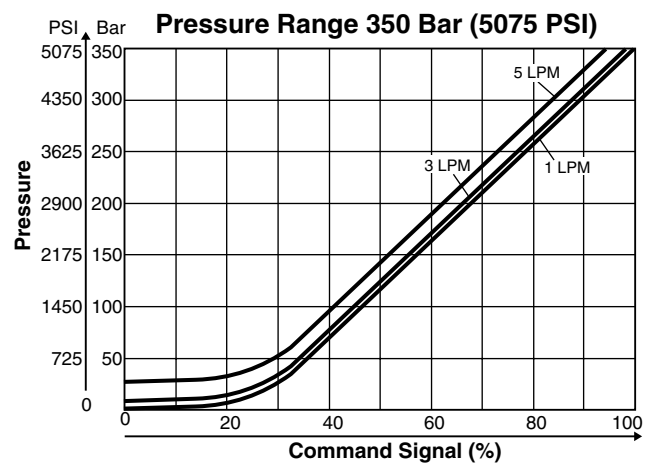
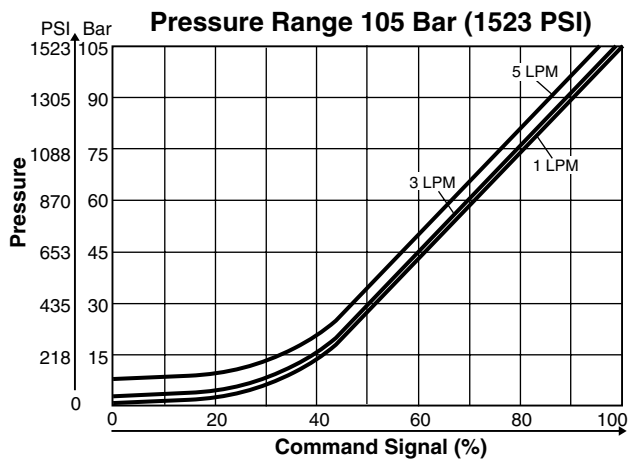
**B**



**Minimum Adjusted Pressure**

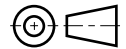
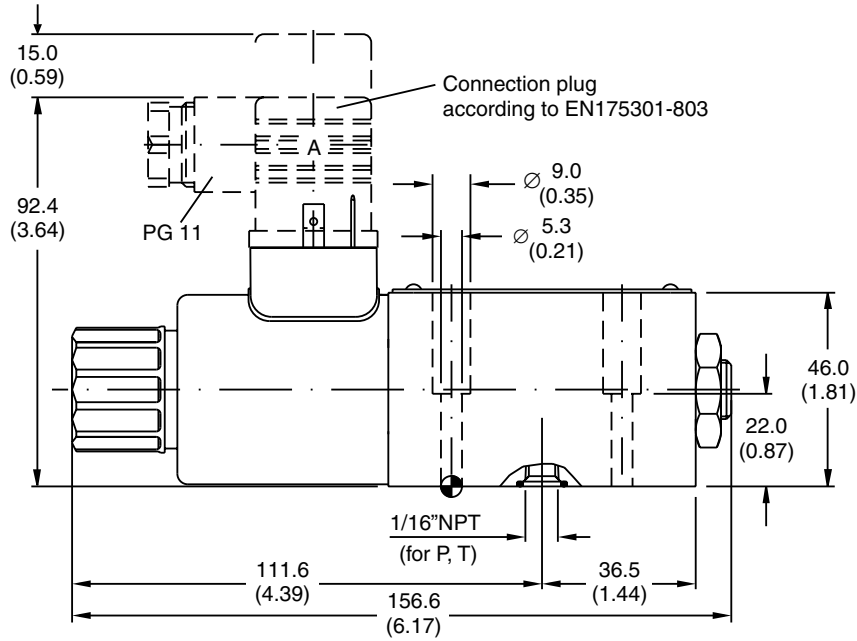
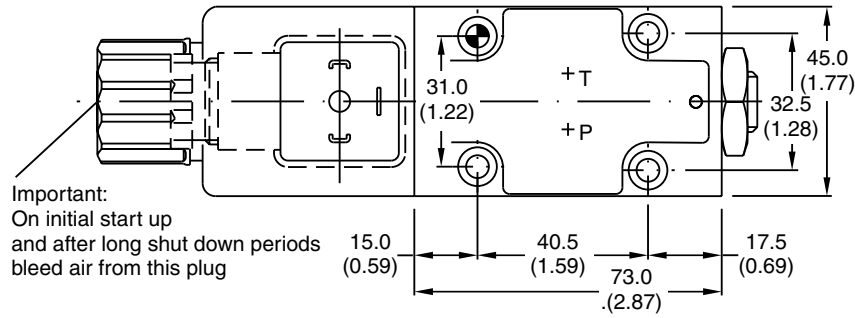




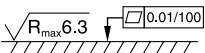
**Pressure / Signal Curve**



**Use RE0M\*W2 for new applications**

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



Surface Finish	Bolt Kit			Seal Kit	
				Nitrile	Fluorocarbon
	BK375 BK209	4x M5x30 DIN 912 12.9 4x 10-24x1.25	7.6 Nm (5.6 lb.-ft.) ±15%	SK-RE06MWN	SK-RE06MWV

**Use RE0M\*W2 for new applications**

**General Description**

Series RE06\*T (NG6) proportional pressure relief valves are direct operated proportional solenoid valves with integral control electronics.

The digital onboard electronic is situated in a robust metal housing and can be used in rough environments. The nominal values of the valves are factory set. Additionally the ProPx software permits the editing of all parameters. The software is also used for the digital electronic modules. The cable for connection to a serial RS232 interface is available as accessory.

The electrical connection is available in 2 options:

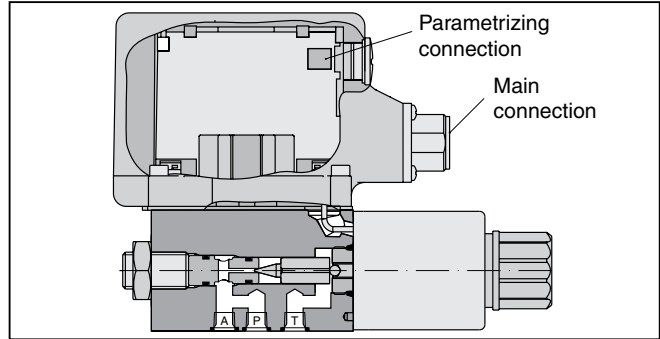
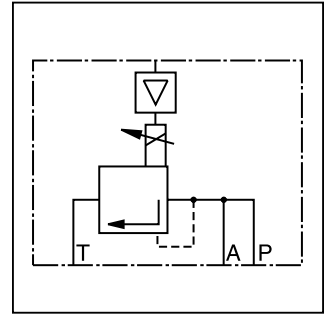
Code F: 6 + PE central connection  
+/- 10V command signal (preset)  
+10V reference voltage output

Code R: 6 + PE central connection  
4...20mA command signal (preset)

**Function**

When the pressure in port P or A exceeds the pressure setting at the solenoid, the cone opens to port T and limits the inlet pressure to the adjusted level.

The pressure adjustment is effected by applying current to the solenoid. The control signal is modulated to the solenoid current by the electronics.



**Features**

- Direct operated pressure relief valve.
- Onboard electronics.
- Very low pressure adjustment of  $p_{min}$ .
- Subplate mounting acc. to ISO 6264.
- 6 pressure ranges.
- 2 pressure inlet ports, A and P.

**Ordering Information**

<b>RE</b>	<b>06</b>	<b>M</b>	□	<b>T</b>	<b>2</b>	□	<b>1</b>	□	<b>0</b>	□
Proportional Pressure Relief Valve	Size	Manifold Mounting	Pressure Range	Integrated Electronics	Configuration	Seal	Valve Open at Zero Command	Electronic Variations	Electronic Option	Design Series
	Code Description					Code Description				NOTE: Not required when ordering.
	06 NG6 D03, CETOP 3					N Nitrile V Fluorocarbon				
			Code Description					Code Description		
			05 50 Bar (725 PSI) 10 105 Bar (1523 PSI) 17 175 Bar (2538 PSI) 21 210 Bar (3045 PSI) 25 250 Bar (3625 PSI) 35 350 Bar (5075 PSI)					Voltage input F 0...+10V with reference output +10V R Current input 4...20mA		

**Weight:** NG6 2.2 kg (4.9 lbs.)

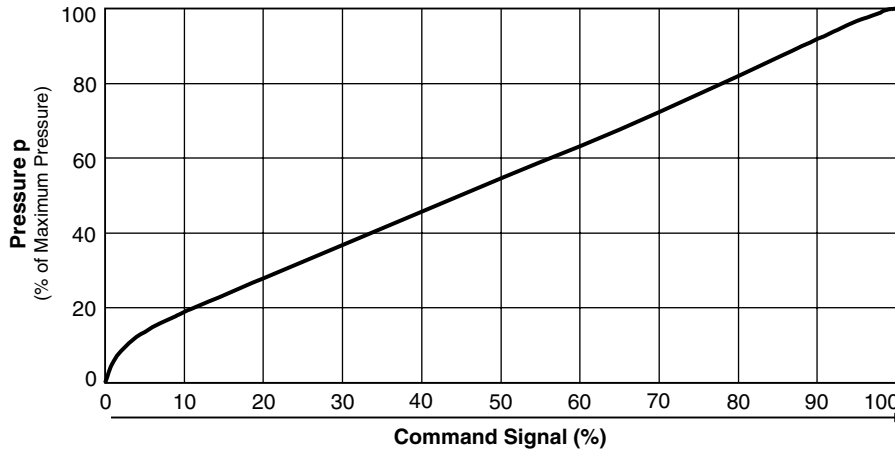
Bolt Kit	Qty	Size
BK375	4	M5x30mm
BK209	4	10-24x1.25

Please order plugs separately. See Accessories.

Parametrizing cable OBE => RS232  
Item no. 40982923

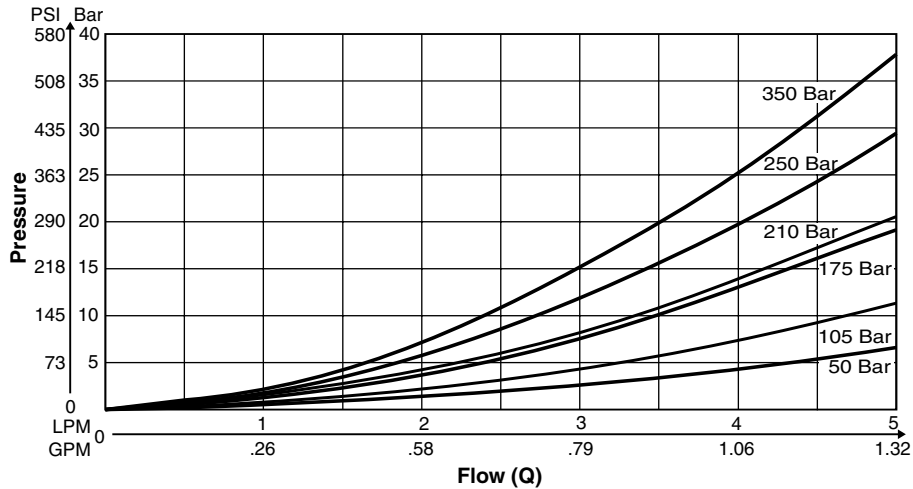
General		
Size		DIN NG6 / CETOP 3 / NFPA D03
Interface		Subplate mounting according to ISO 6264
Mounting Position		as desired, horizontal mounting preferred
Ambient Temperature	[°C]	-20...+60; (-4°F ... +140°F)
MTTF <sub>D</sub> value	[years]	75
Vibration Strength	[g]	10 sinus 5...2000 Hz acc. to IEC 68-2-6 30 noise 20...2000 Hz acc. to IEC 68-2-36 15 shock acc. to IEC 68-2-27
Hydraulic		
Maximum Operating Pressure		Ports A and P 350 Bar (5075 PSI), Port T 30 Bar (435 PSI)
Pressure Range		50 Bar (725 PSI), 105 Bar (1523 PSI), 175 Bar (2538 PSI), 210 Bar (3045 PSI), 250 Bar (3625 PSI), 350 (5075 PSI)
Nominal Flow		See p/Q curves
Fluid		Hydraulic oil according to DIN 51524...51535, other on request
Viscosity		
Recommended	[cSt] / [mm <sup>2</sup> /s]	30 ... 80 (139 ... 371 SSU)
Permitted	[cSt] / [mm <sup>2</sup> /s]	12 ... 38 (56 ... 1761 SSU)
Fluid Temperature	[°C]	-20 ... +60; (-4°F ... +140°F)
Filtration		ISO 4406 (1999), 18/16/13 (acc. NAS 1638: 7)
Linearity	[%]	See curve
Repeatability	[%]	<±1
Hysteresis	[%]	±1.5 of p <sub>max</sub>
Electrical		
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Supply Voltage	[VDC]	18...30, ripple < 5% eff., surge free
Current Consumption Maximum	[A]	2.0
Pre-fusing	[A]	2.5 medium lag
Potentiometer Supply	[V]	+10 / ±5% max. 10mA
Command Signal	[V]	0...+10, ripple < 0.01 % eff., surge free, Ri = 100 kOhm
Code F Voltage	[mA]	4...20, ripple < 0.01 % eff., surge free, Ri = 200 Ohm
Code R Current		< 3.6 mA = enable off, > 3.8 mA = enable on (acc. NAMUR NE43)
Differential Input Voltage Max.	[V]	30 for terminal D and E against PE (terminal G)
	[V]	11 for terminal D and E against 0V (terminal B)
Adjustment Ranges		
Minimum Current	[%]	0...50
Maximum Current	[%]	50...100
Ramp	[s]	0...32.5
Interface		RS 232, parametrizing connection 5pole
EMC		EN 61000-6-2, EN 61000-6-4
Central Connection		6 + PE acc. EN 175201-804
Cable Specification	[mm <sup>2</sup> ]	7 x 1.0 (AWG 18) overall braid shield
Cable Length Maximum	[m]	50 (164 ft.)

**Command/Pressure Curve**

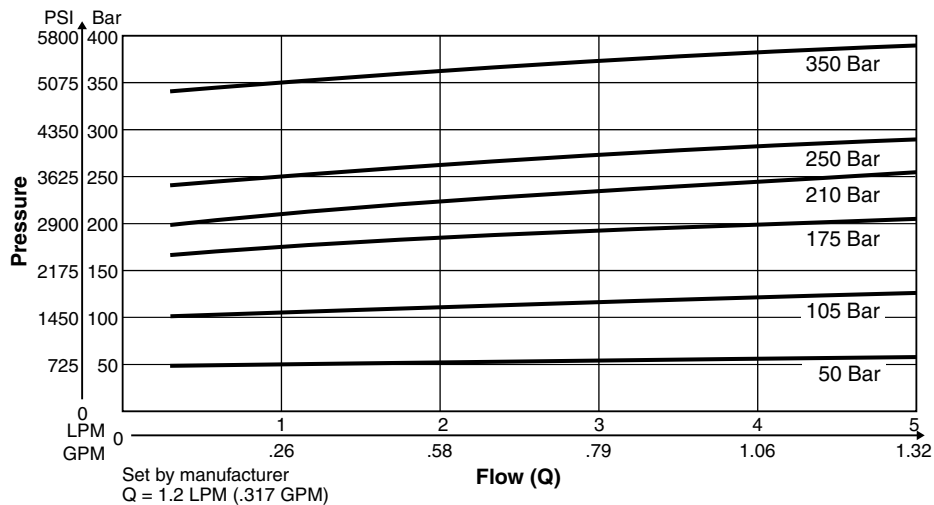


**B**

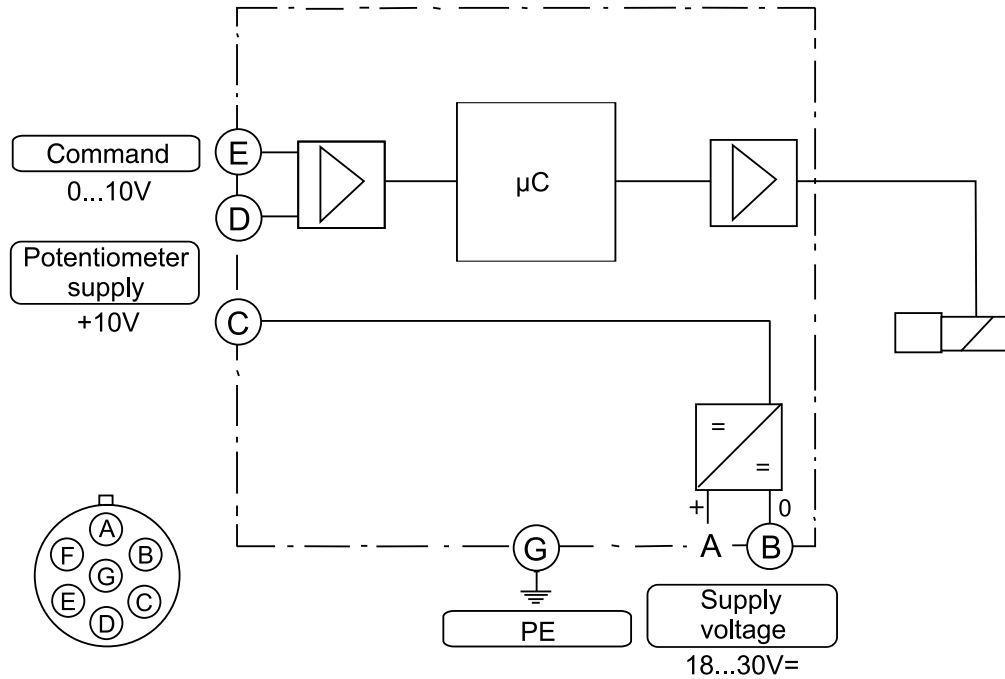
**$p_{min}/Q$  Curves**



**P/Q Curves**

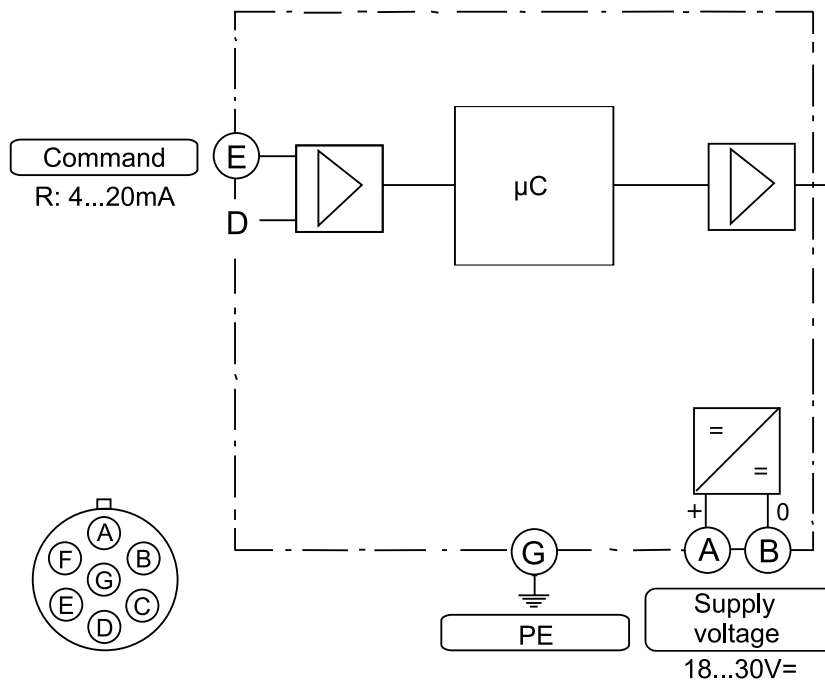


**Code F**  
**6 + PE acc. EN 175201-804**



**B**

**Code R**  
**6 + PE acc. EN 175201-804**



## ProPxD Interface Program

The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

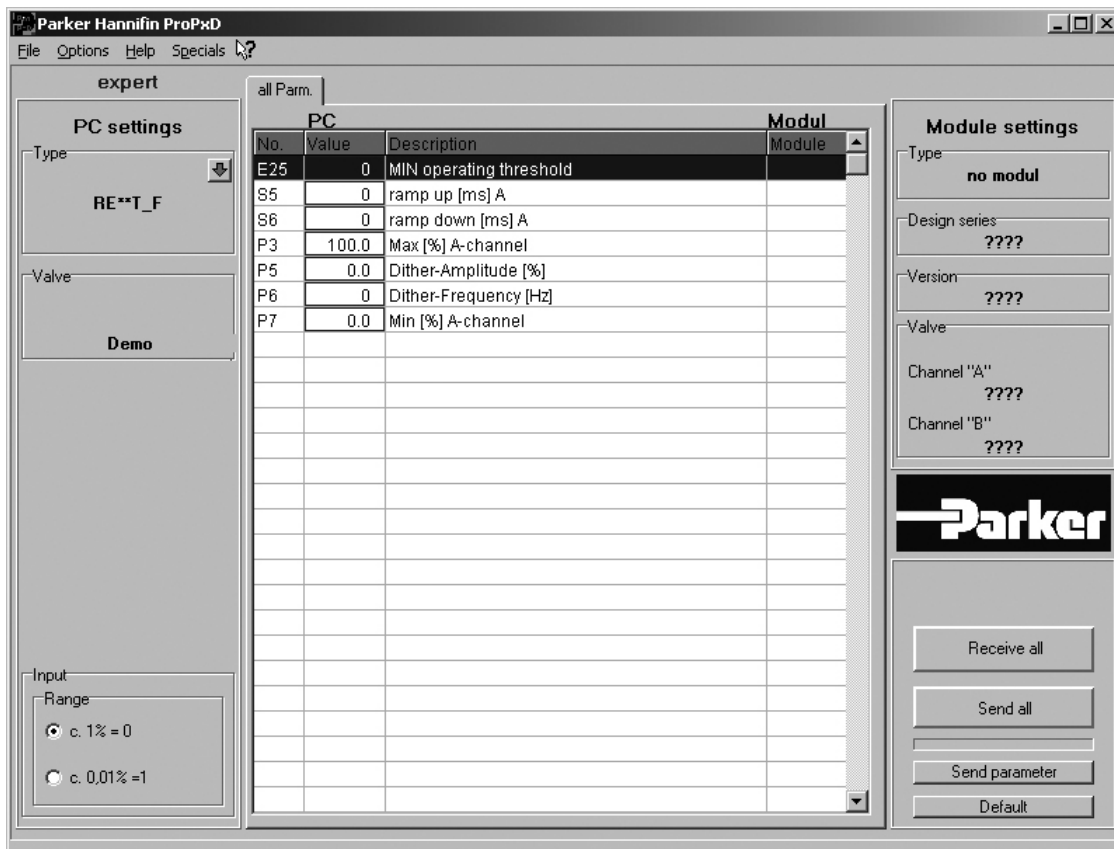
## Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

Simple to use interface program. Download free of charge [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) → **Services** → **downloads**

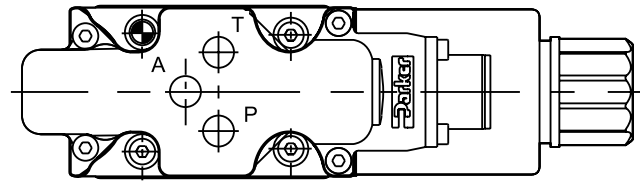
**B**



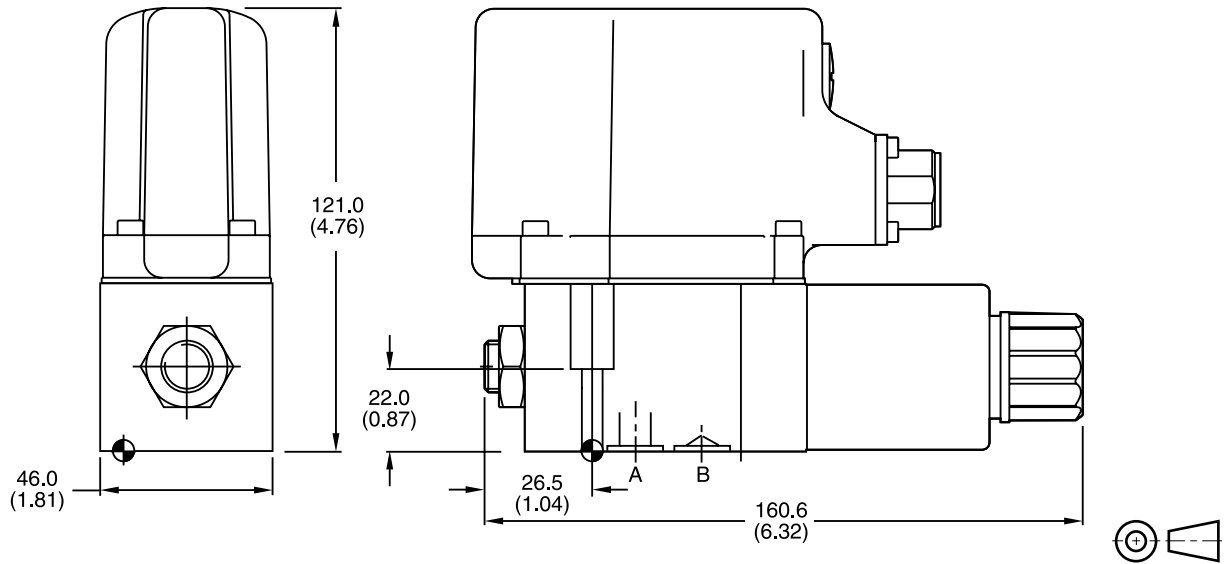
The parametrizing cable may be ordered under item no. 40982923.



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



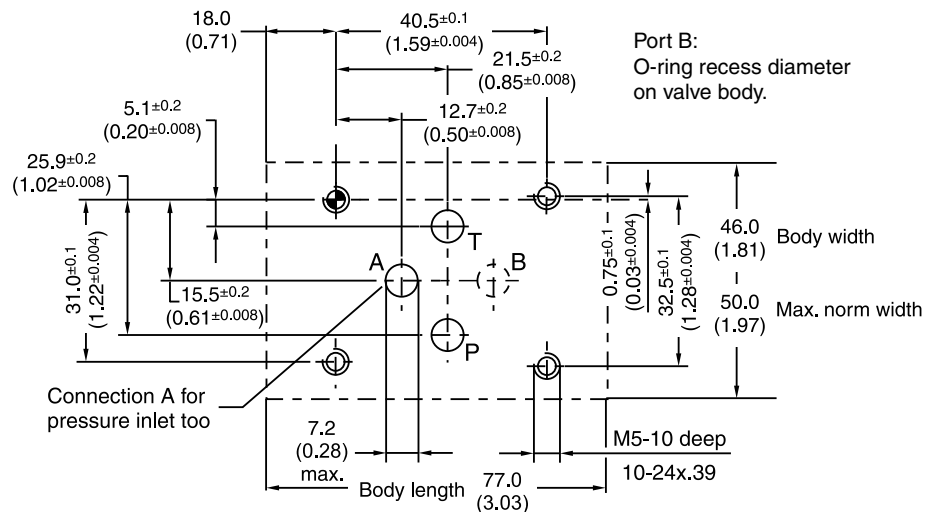
**B**



Surface Finish	Bolt Kit	 4x M5x30 DIN 912 12.9 4x 10-24x1.25	 7.6 Nm (5.6 lb.-ft.) ±15%	Seal Kit	
				Nitrile	Fluorocarbon
	BK375 BK209			SK-RE06MTN	SK-RE06MTV

**Mounting Pattern ISO 6264-03-04-\*-97**

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





**General Description**

Series R4V and R6V proportional pressure relief valves for external electronics feature a proportionally adjusted pilot stage which controls a seated type main stage. The valves are equipped with a mechanical maximum pressure stage (optional for R6V).

The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.

**Features**

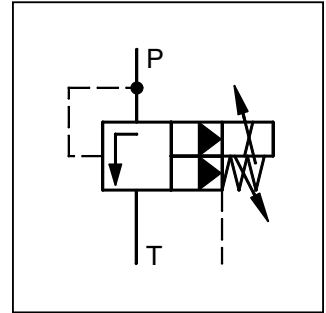
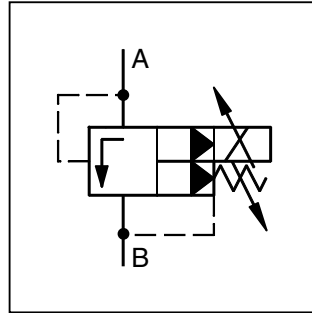
- Pilot operated with proportional solenoid.
- Continuous adjustment by proportional solenoid.
- 3 pressure ranges.
- Optional mechanical maximum pressure adjustment.
- 2 interfaces  
 R4V Subplate ISO 6264 (DIN 24340 Form D)  
 R6V Subplate ISO 6264 (DIN 24340 Form E).



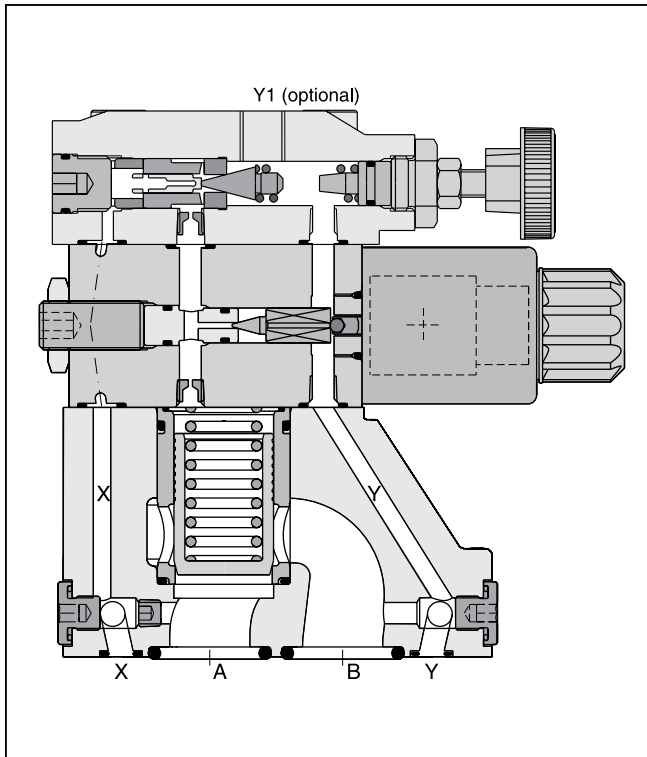
R4V



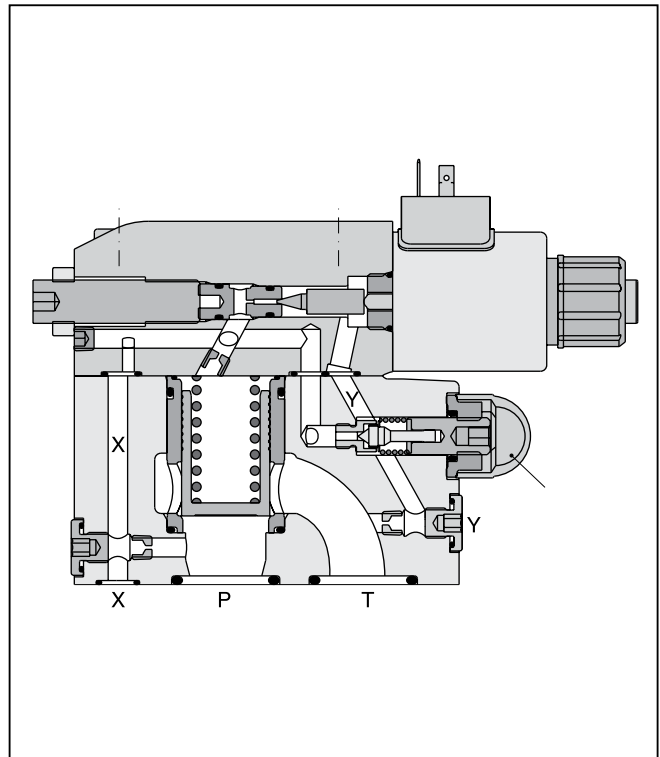
R6V



**R4V**



**R6V**



**B**

<b>R</b>		<b>V</b>		<b>5</b>										
Pressure Relief Valve	Interface	Relief Function	Size	Maximum Pressure 350 Bar (5075 PSI)	Drain Port	Pressure Range	Mechanical Adjustment	Pilot Oil	Options	Solenoid Voltage	Design Series	Seal	Options Check with Factory	

Code	Description
03	NG10
06	NG25
10	NG32

Code	Interface	Drain
3	R4V	Y-port in mounting pattern
9	R6V	Y-port = G1/8"

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Interface	Mechanical Adj.
P <sup>1)</sup>	R6V	Hexagon Screw with Lock Nut
1	R4V	Hand Knob
3	R4V	Acorn Nut with Lead Seal

<sup>1)</sup> Use Code P also for valve without mechanical adjustment.

Code	Description
G0R	12V 2.3A
G0S	16V 1.3A

Code	Description
P2	with Mechanical maximum adjustment
PS <sup>4)</sup>	without Mechanical maximum adjustment

<sup>4)</sup> R6V only

Code	Drain Port
0	Internal
1 <sup>2)</sup>	External from Subplate
2	External from Valve Body (Y-port)

<sup>2)</sup> R4V only

Code	Description
4	Subplate Mounting ISO 6264
6	ISO 6264

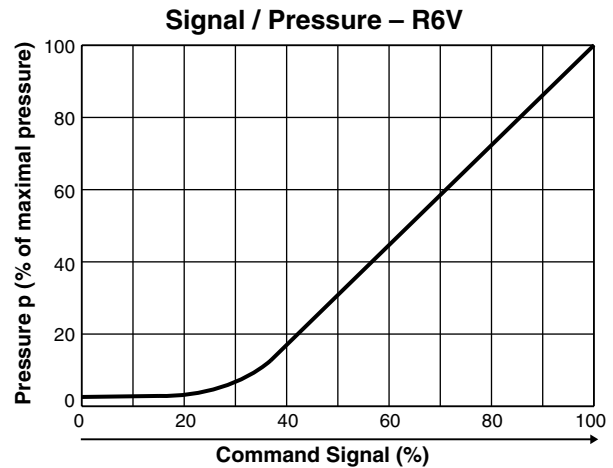
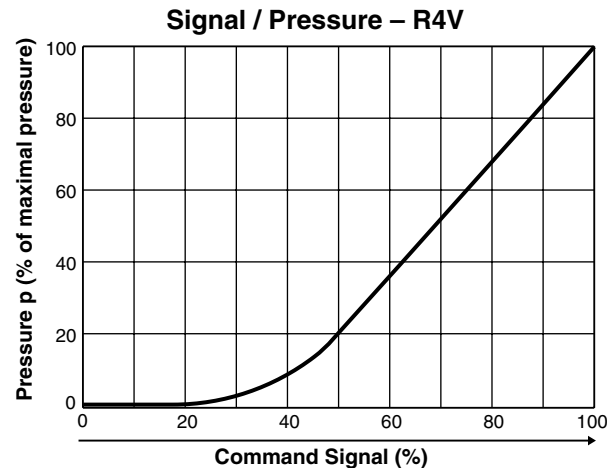
- Bolt Kits:**
- R4V03 BK505
  - R4V06 BK485
  - R4V10 BK506
  - R6V03 BK494
  - R6V06 BK366
  - R6V10 BK507

- Weight:**
- R4V03 4.5 kg (9.9 lbs.)
  - R4V06 6.3 kg 13.9 (lbs.)
  - R4V10 7.8 kg (17.2 lbs.)
  - R6V03 5.2 kg (11.5 lbs.)
  - R6V06 6.4 kg (14.1 lbs.)
  - R6V10 8.3 kg (18.3 lbs.)

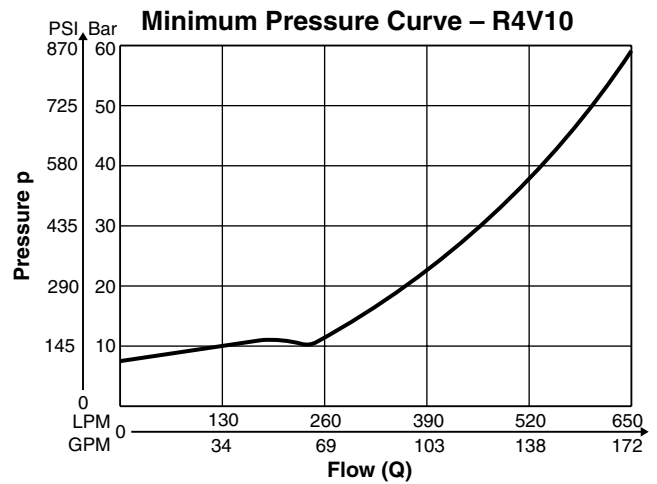
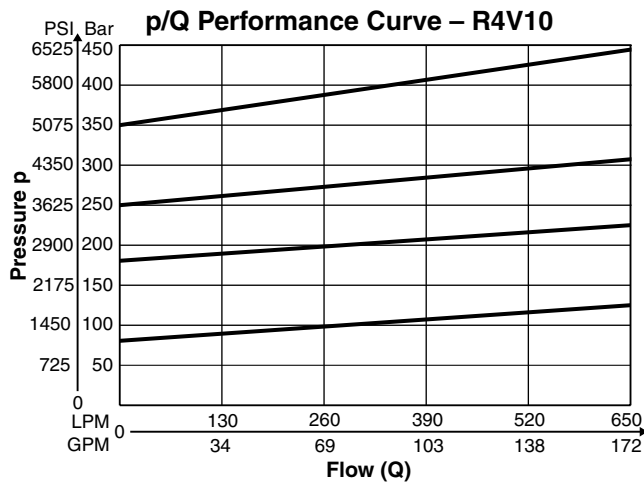
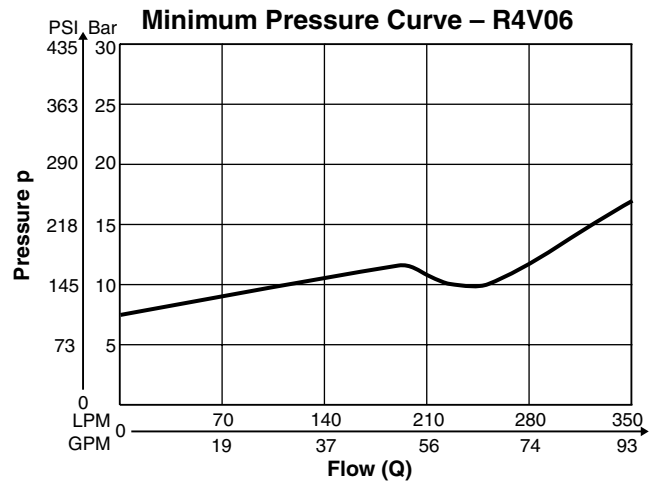
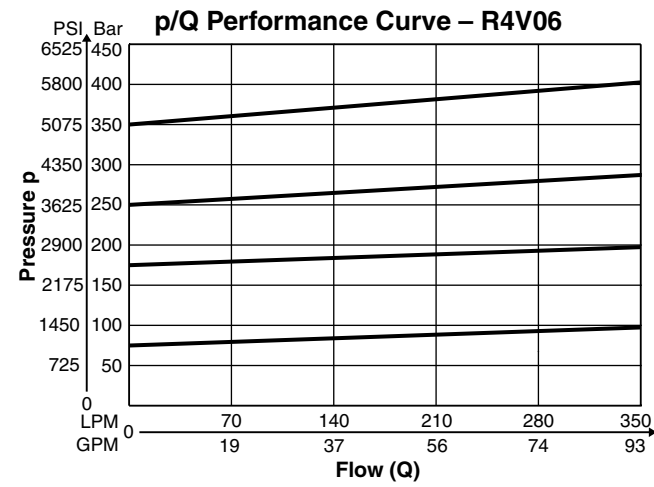
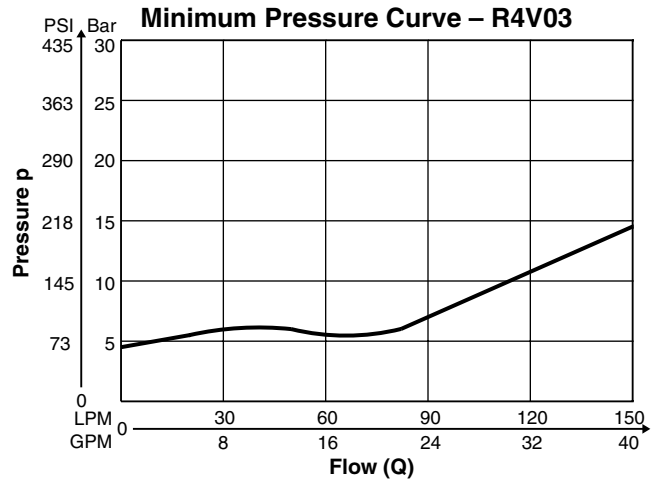
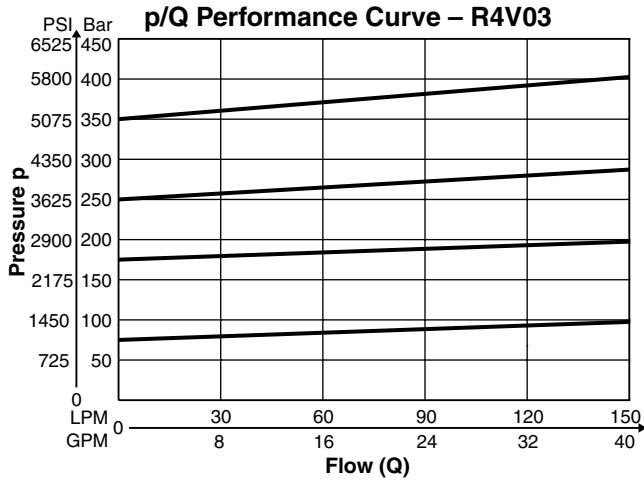
**Specifications**

General				
Size	NG10		NG25	NG32
Interface	Subplate Mounting acc. ISO 6264			
Mounting Position	As desired, horizontal position preferred			
Ambient Temperature Range	-20°C to +80°C (-4°F to +176°F)			
Hydraulic				
Maximum Operating Pressure	Ports P (or A) and X 350 Bar (5075 PSI); Port T (or B) and Y depressurized			
Pressure Range	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)			
Nominal Flow	R4V R6V	150 LPM (39.7 GPM) 250 LPM (66.1 GPM)	350 LPM (92.6 GPM) 500 LPM (132.3 GPM)	650 LPM (172.0 GPM) 650 LPM (172.0 GPM)
Fluid	Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature	-20°C to +70°C (-4°F to +158°F)			
Viscosity	Permitted	20 to 380 cSt / mm <sup>2</sup> /s (93 to 1761 SSU)		
	Recommended	30 to 50 cSt / mm <sup>2</sup> /s (139 to 232 SSU)		
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Electrical (Proportional Solenoid)				
Duty Ratio	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible			
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)			
Supply Voltage	12 VDC (maximum current 2.3 amps) or 16 VDC (maximum current 1.3 amps)			
Coil Resistance	4 Ohm at 20°C (68°F) for 12V; 12 Ohm at 20°C (68°F) for 16V			
Solenoid Connectors	Connector as per EN 175301-803			
Power Amplifier, Recommended	PCD00A-400			

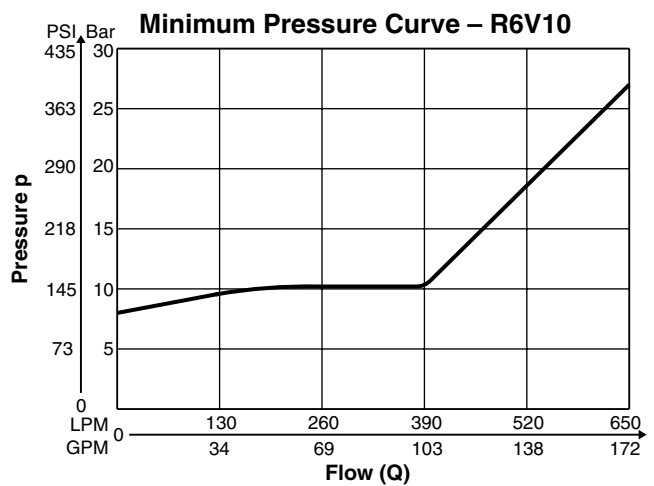
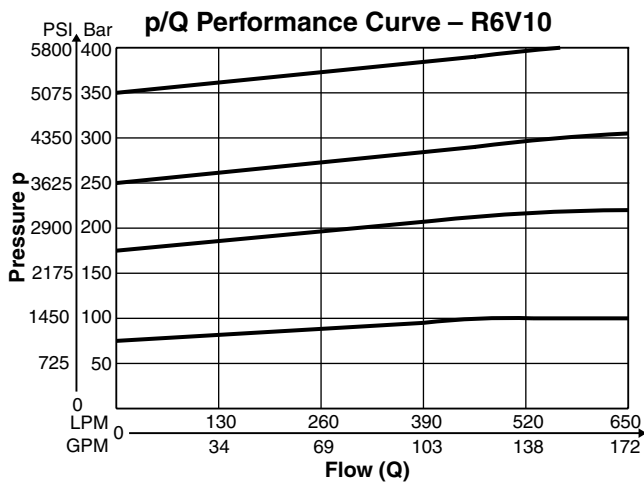
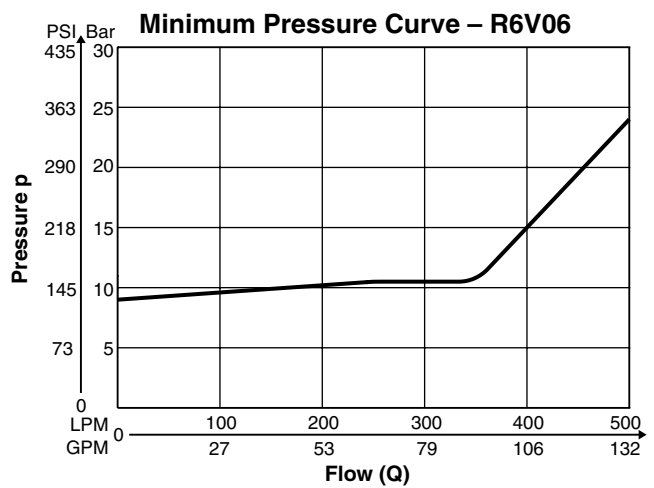
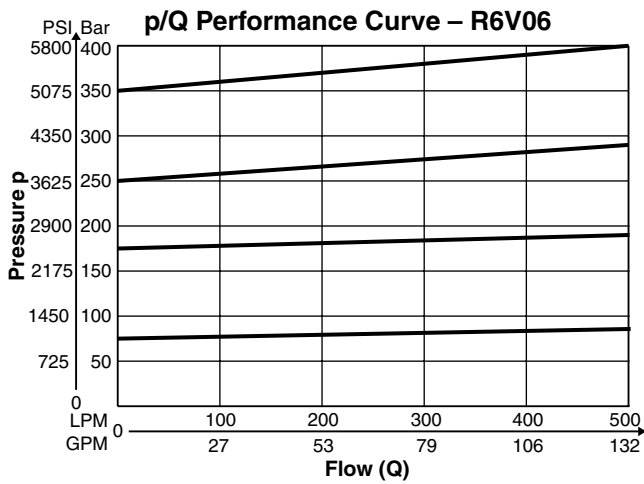
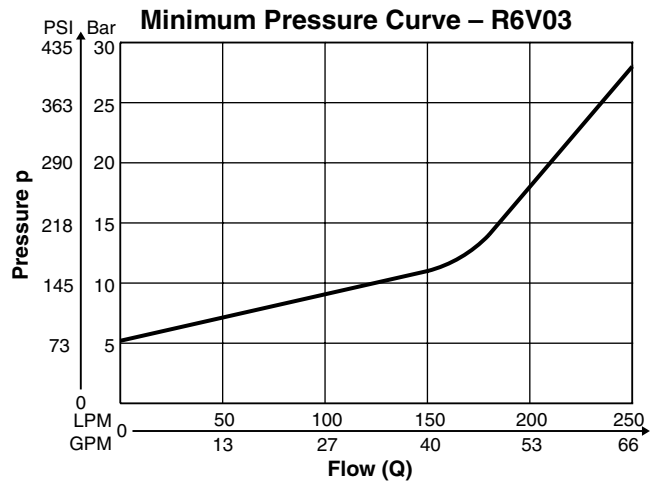
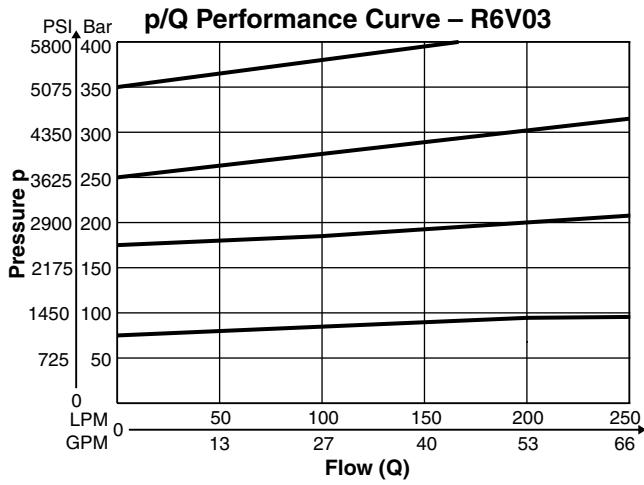
**Performance Curves**



**B**

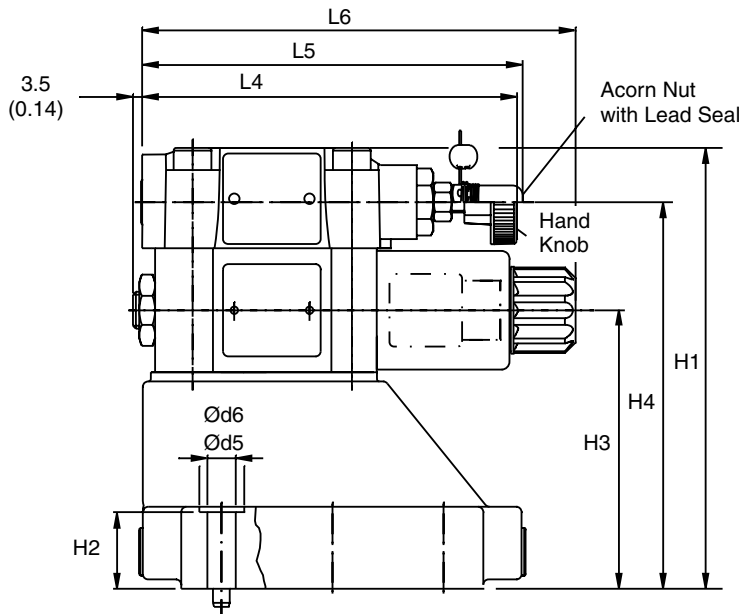
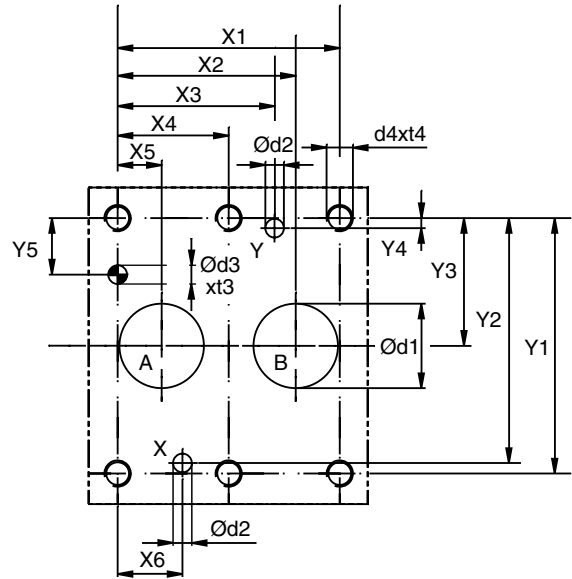
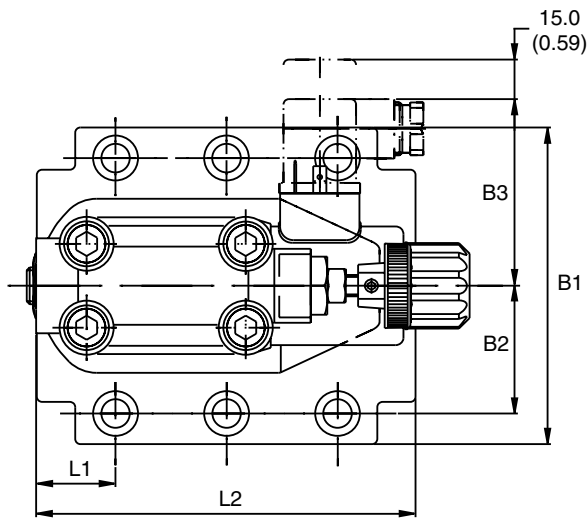


The performance curves are measured with external drain.  
 For internal drain the tank pressure has to be added to curve.



The performance curves are measured with external drain.  
 For internal drain the tank pressure has to be added to curve.

**B**





**Dimensions**

**Proportional Pressure Relief Valves  
Series R4V (Offboard Electronics)**

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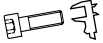

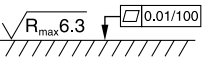
Inch equivalents for millimeter dimensions are shown in (\*\*)

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-07-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	-	7.2 (0.28)	21.5 (0.85)	0	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	14.3 (0.56)	-
25	6264-08-11-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	-	11.1 (0.44)	20.6 (0.81)	0	79.4 (3.13)	73 (2.87)	39.7 (1.56)	6.4 (0.25)	15.9 (0.63)	-
32	6264-10-15-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	0	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	21.4 (0.84)	-

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

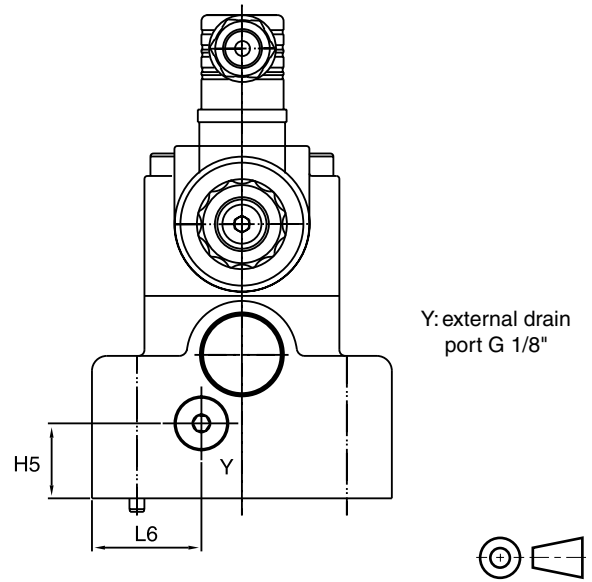
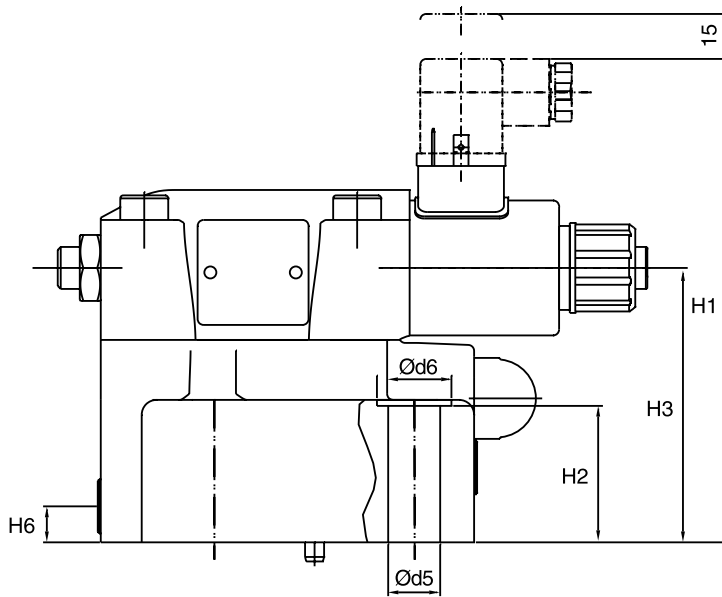
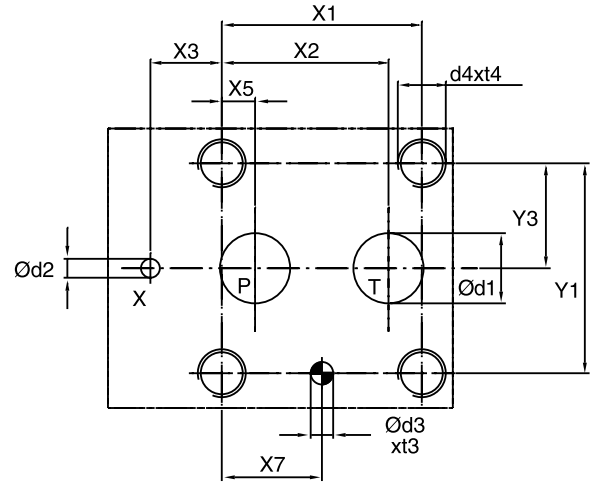
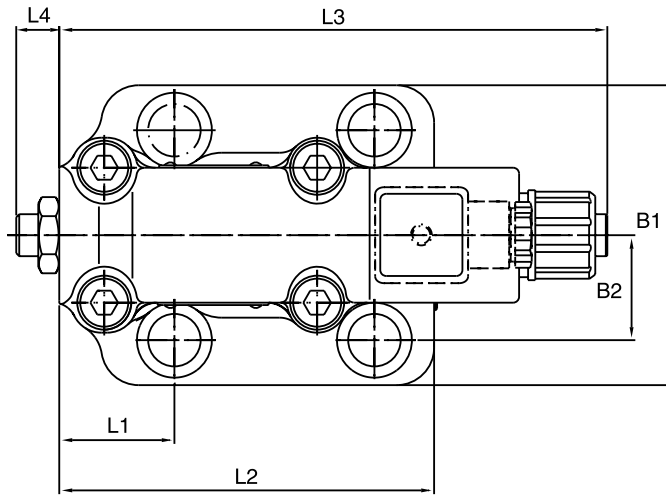
NG	ISO-code	B1	B2	B3	H1	H2	H3	H4	H6	L1	L2	L3	L4	L5	L6
10	6264-06-07-*-97	87.3 (3.44)	33.4 (1.31)	71.0 (2.80)	130.0 (5.12)	21.0 (0.83)	68.5 (2.70)	109.5 (4.31)	-	25.0 (0.98)	90.8 (3.57)	-	143.0 (5.63)	144.8 (5.70)	164.8 (6.49)
25	6264-08-11-*-97	105.0 (4.13)	39.7 (1.56)	71.0 (2.80)	154.5 (6.08)	29.0 (1.14)	95.0 (3.74)	136.0 (5.35)	-	30.9 (1.22)	123.0 (4.84)	-	143.0 (5.63)	144.8 (5.70)	164.8 (6.49)
32	6264-10-15-*-97	120.0 (4.72)	48.4 (1.91)	71.0 (2.80)	167.0 (6.57)	30.0 (1.18)	105.5 (4.15)	146.5 (5.77)	-	29.8 (1.17)	143.5 (5.65)	-	143.0 (5.63)	144.8 (5.70)	164.8 (6.49)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6	Subplate
10	6264-06-07-*-97	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)	SPP3M6B910
25	6264-08-11-*-97	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)	SPP6M8B910
32	6264-10-15-*-97	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)	SPP10M12B910

NG	ISO-code	Bolt Kit			Seal Kit		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-07-*-97	BK505	4x M10 x 35 DIN912 12.9	63 Nm	S26-58507-0	S26-58507-5	
25	6264-08-11-*-97	BK485	4x M10 x 45 DIN912 12.9	(46.5 lb.-ft.)	S26-58475-0	S26-58475-5	
32	6264-10-15-*-97	BK506	6x M10 x 45 DIN912 12.9	±15%	S26-58508-0	S26-58508-0	
Prop Section P2*					S26-58473-0	S26-58473-5	

\* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.

**B**



**Dimensions**

**Proportional Pressure Relief Valves  
Series R6V (Offboard Electronics)**

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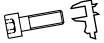


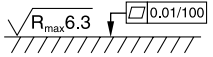
Inch equivalents for millimeter dimensions are shown in (\*\*)

NG	ISO-code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.00)	-	22.1 (0.87)	-	22.1 (0.87)	53.8 (2.12)	-	26.9 (1.06)	-	-	-
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.94)	-	11.1 (0.44)	-	33.4 (1.31)	70.0 (2.76)	-	35.0 (1.38)	-	-	-
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	-	12.7 (0.50)	-	44.5 (1.75)	82.6 (3.25)	-	41.3 (1.63)	-	-	-

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

NG	ISO-code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-09-*-97	80.0 (3.15)	26.9 (1.06)	158.7 (6.25)	27.0 (1.06)	88.0 (3.46)	-	20.5 (0.81)	25.0 (0.98)	52.0 (2.05)	117.0 (4.61)	182.3 (7.18)	14.4 (0.57)	-	29.5 (1.16)
25	6264-08-13-*-97	100.0 (3.94)	35.0 (1.38)	161.2 (6.35)	45.5 (1.19)	91.5 (3.60)	-	25.0 (0.98)	12.0 (0.47)	37.9 (1.49)	124.5 (4.90)	182.3 (7.18)	14.4 (0.57)	-	36.5 (1.44)
32	6264-10-17-*-97	120.0 (4.72)	41.3 (1.63)	166.7 (6.56)	52.0 (2.05)	97.0 (3.82)	-	26.5 (1.04)	13.5 (0.53)	44.3 (1.74)	153.0 (6.02)	182.3 (7.18)	14.4 (0.57)	-	46.5 (1.83)

NG	ISO-code	d1max	d2max	d3	t3	d4	t4	d5	d6	Subplate
10	6264-06-09-*-97	14.7 (0.58)	4.8 (0.19)	7.5 (0.30)	10.0 (0.39)	M12	20.0 (0.79)	13.5 (0.53)	20.0 (0.79)	SPP3R6B910
25	6264-08-13-*-97	23.4 (0.92)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M16	27.0 (1.06)	17.5 (0.69)	25.0 (0.98)	SPP6R10B910
32	6264-10-17-*-97	32.0 (1.26)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M18	28.0 (1.10)	20.0 (0.79)	30.0 (1.18)	SPP10R12B910

NG	ISO-code	Bolt Kit			Seal  Kit		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-09-*-97	BK494	4x M12 x 45 DIN912 12.9	108 Nm (79.7 lb.-ft.) ±15%	S26-98589-0	S26-98589-5	
25	6264-08-13-*-97	BK366	4x M16 x 70 DIN912 12.9	264 Nm (194.7 lb.-ft.) ±15%	S26-96396-0	S26-96396-5	
32	6264-10-17-*-97	BK507	4x M18 x 75 DIN912 12.9	398 Nm (293.5 lb.-ft.) ±15%	S26-96392-0	S26-96392-5	

**B**



**General Description**

Series R4V and R6V proportional pressure relief valves feature onboard electronics based on the functionality of the digital amplifier PCD00.

The digital onboard electronic is situated in a robust metal housing and can be used in rough environments.

The nominal values of the valves are factory set. Additionally the ProPxD software permits the editing of all parameters. The software is also used for the digital electronic modules. The cable for connection to a serial RS-232 interface is available as accessory.

The electrical connection is available in 2 options:

Code 10V: 6 + PE central connection  
0...+10V command signal (preset)  
+10V reference voltage output

Code 4MA: 6 + PE central connection  
4...20mA command signal (preset)

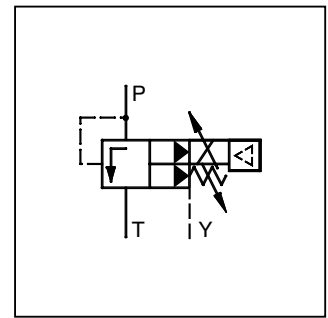
The proportional solenoid operated pilot stage with integrated electronics controls a seated type main stage. The valves are available with an optional mechanical maximum pressure adjustment.

**Features**

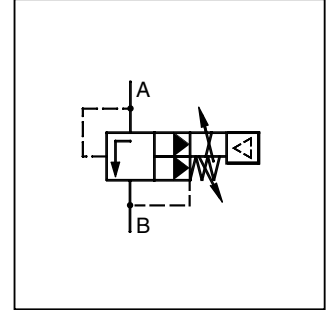
- Pilot operated pressure relief valve.
- Onboard electronics.
- Factory set.
- Ramp time adjustment.
- Linearized characteristics.



R6V06



R6V

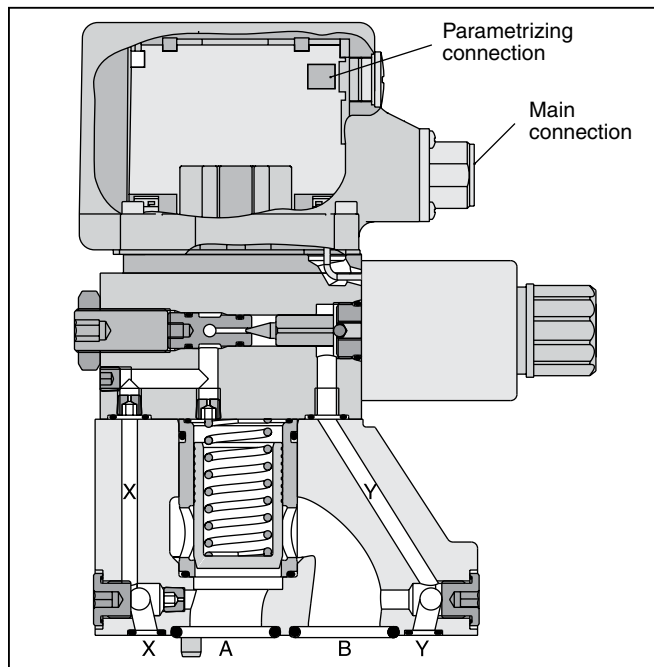


R4V

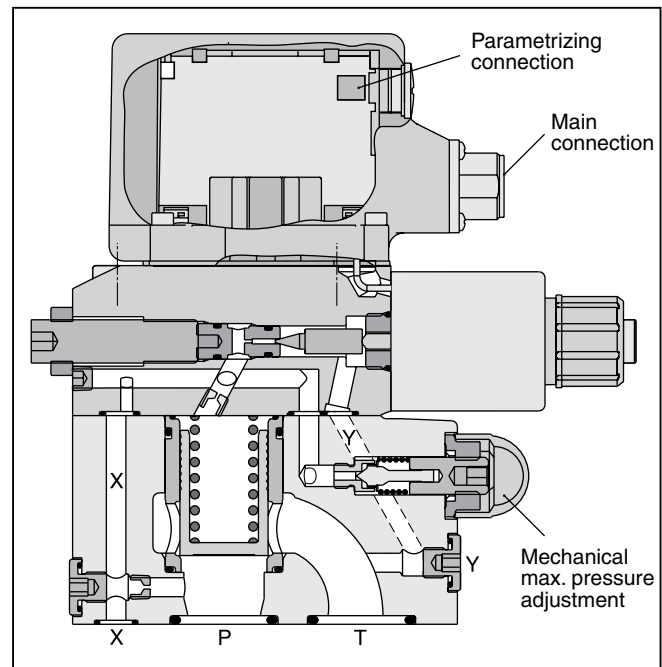
**B**

- 3 pressure ranges.
- 2 interfaces:  
R4V Subplate, ISO 6264 (DIN 24340 Form D)  
R6V Subplate, ISO 6264 (DIN 24340 Form E)
- Optional mechanical maximum pressure adjustment.

**R4V OBE**



**R6V OBE**



**Ordering Information**

**B**

<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;">R</div> <p>Pressure Relief Valve</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;"></div> <p>Interface</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;">V</div> <p>Relief Function</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;"></div> <p>Size</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;">5</div> <p>Maximum Pressure 350 Bar (5075 PSI)</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;"></div> <p>Drain Port</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;"></div> <p>Pressure Range</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;">P</div> <p>Proportional Operation</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;"></div> <p>Pilot Oil</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;"></div> <p>Options</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;"></div> <p>Input Signal</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;"></div> <p>Design Series</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;"></div> <p>Seal</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; height: 20px; margin: 0 auto;"></div> <p>Options Check with Factory</p>
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Code	Description
03	NG10
06	NG25
10	NG32

Code	Interface	Drain
3	R4V	Y-port in mounting pattern
9	R6V	Y-port = G1/8"

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

Code	Description
1	0...+10V with ref. output +10V
4MA	4...20mA

Code	Description
PN	without Mechanical maximum adjustment
PM	with Mechanical maximum adjustment

Code	Description
0	Internal
1 <sup>1)</sup>	External from Subplate
2	External from Valve Body (Y-port)

<sup>1)</sup> R4V only

Code	Description
4	Subplate Mounting ISO 6264
6	ISO 6264

**Bolt Kits:**

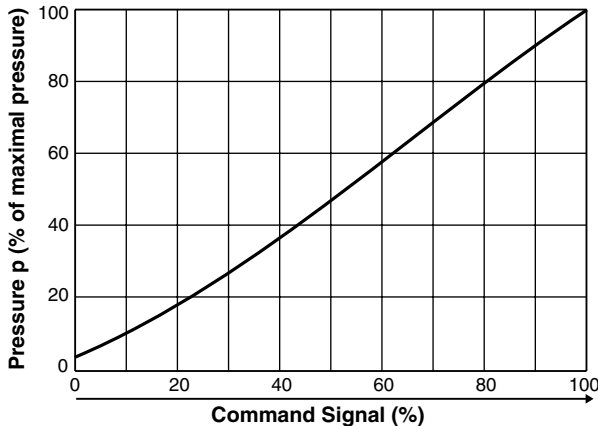
R4V03	BK505
R4V06	BK485
R4V10	BK506
R6V03	BK494
R6V06	BK366
R6V10	BK507

**Weight:**

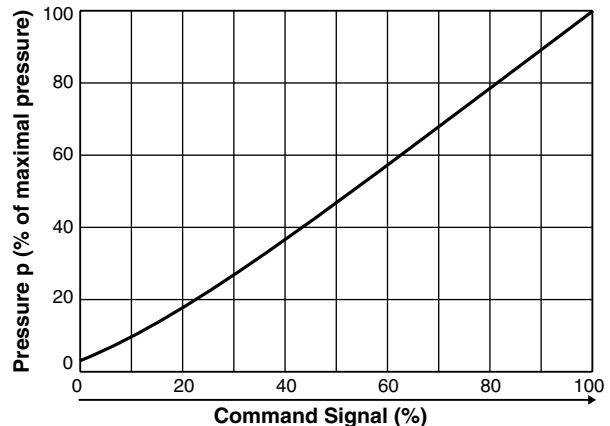
R4V03	4.5 kg (9.9 lbs.)
R4V06	6.3 kg (13.9 lbs.)
R4V10	7.8 kg (17.2 lbs.)
R6V03	5.4 kg (11.9 lbs.)
R6V06	6.6 kg (14.6 lbs.)
R6V10	8.6 kg (19.0 lbs.)

**Performance Curves**

**Signal/Pressure Curve – R4V**

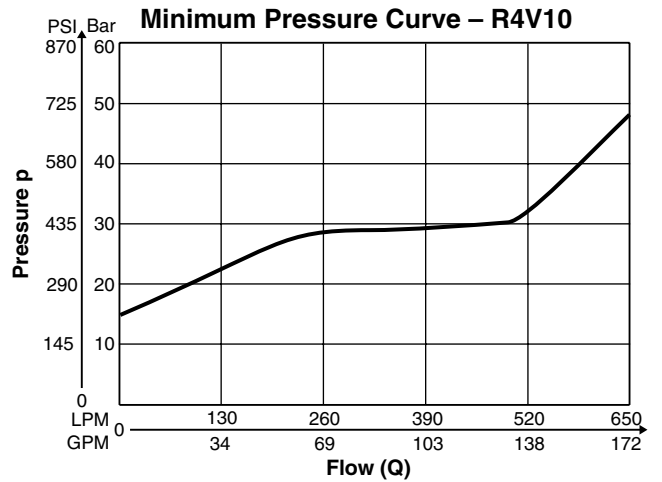
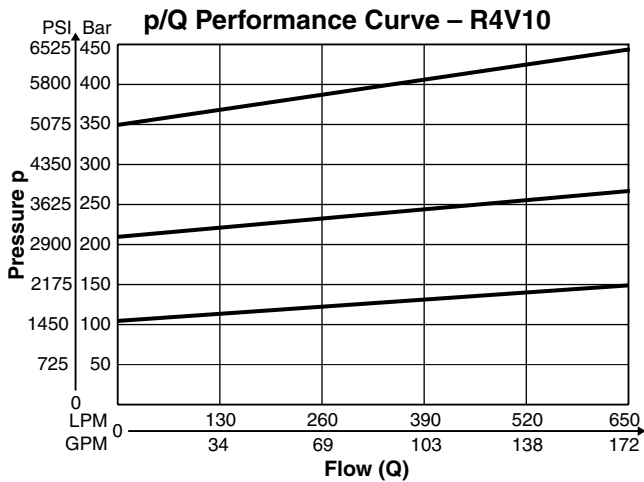
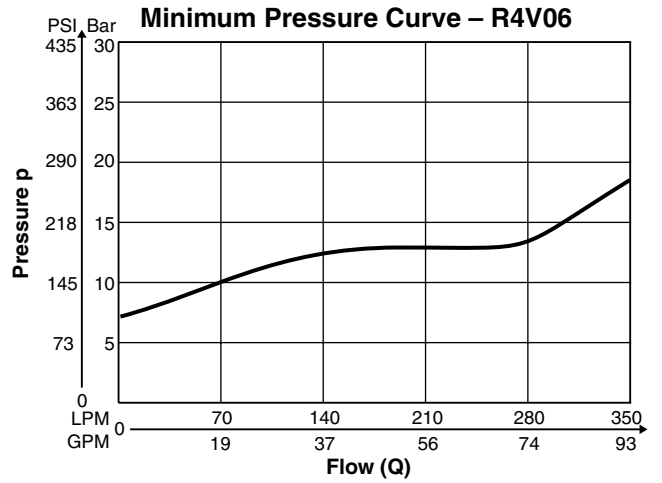
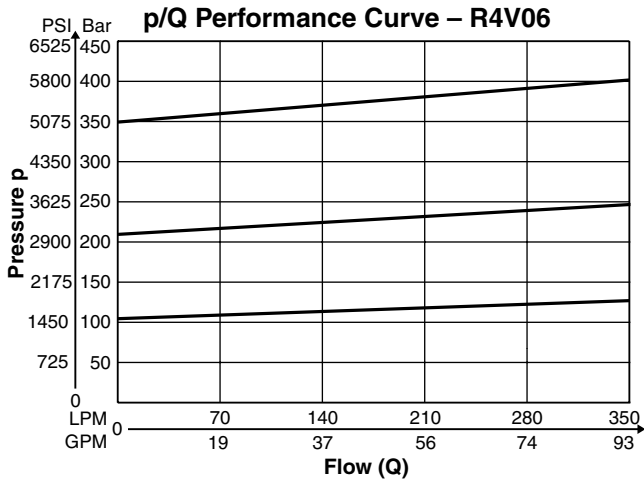
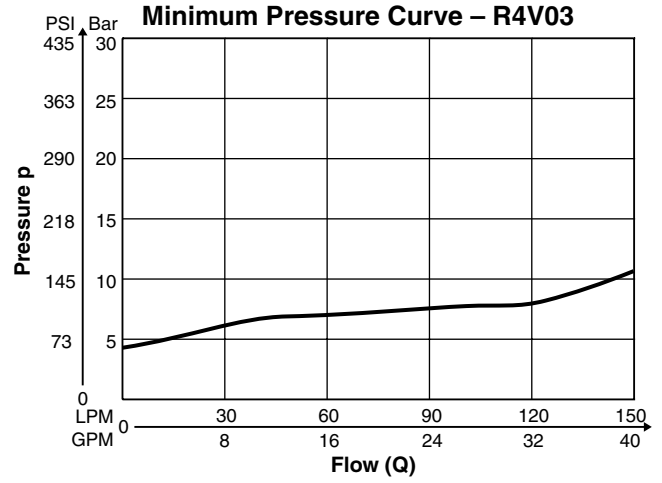
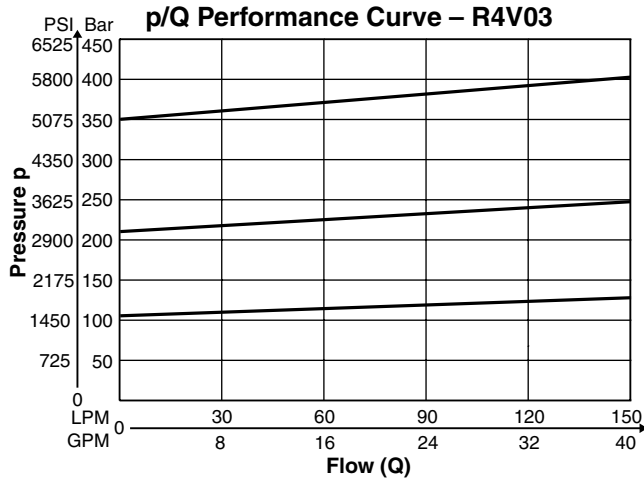


**Signal/Pressure Curve – R6V**

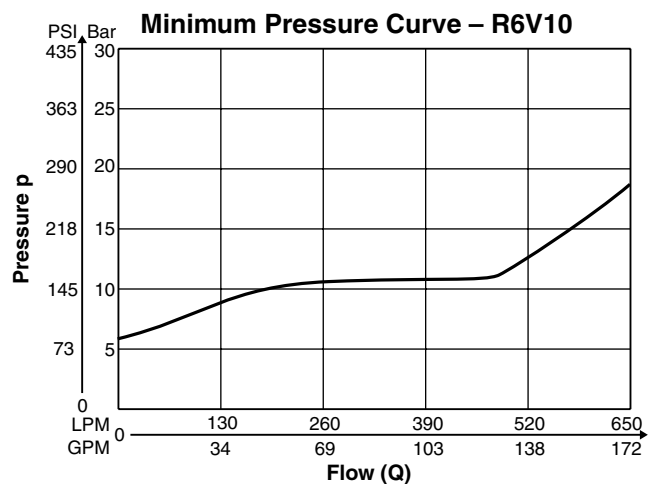
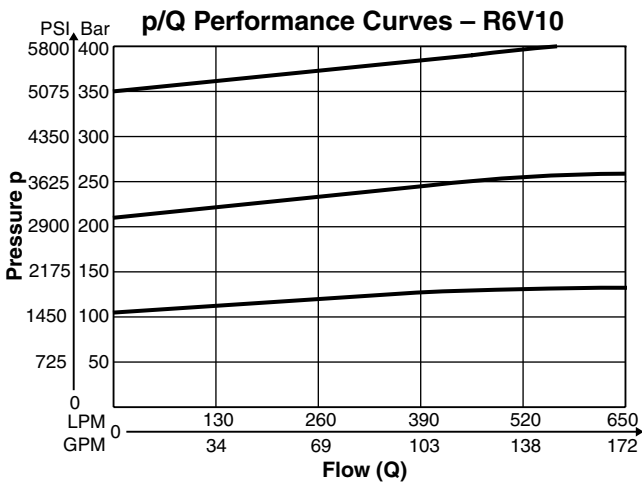
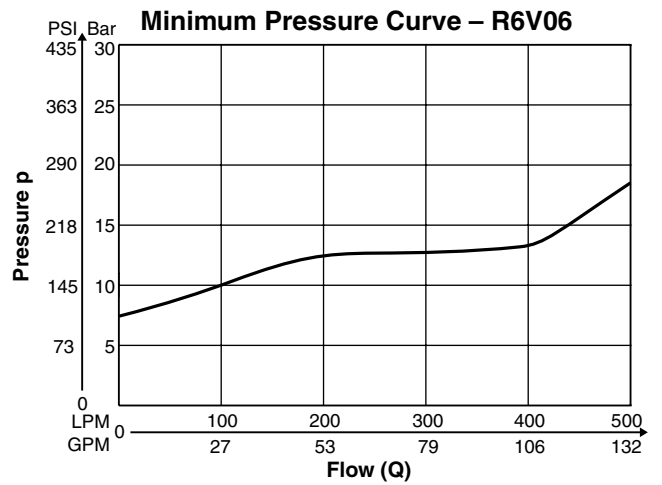
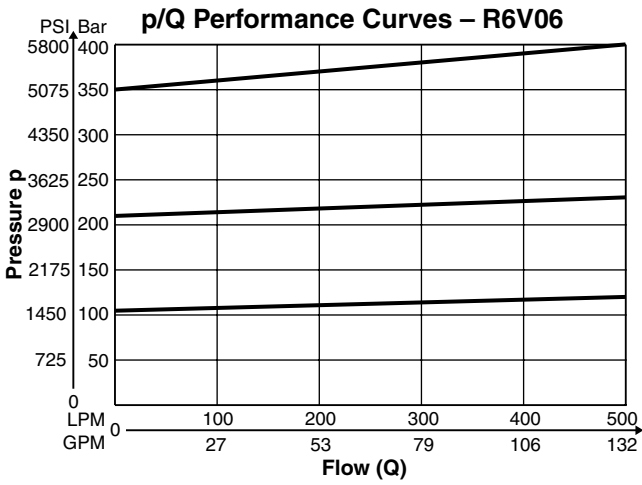
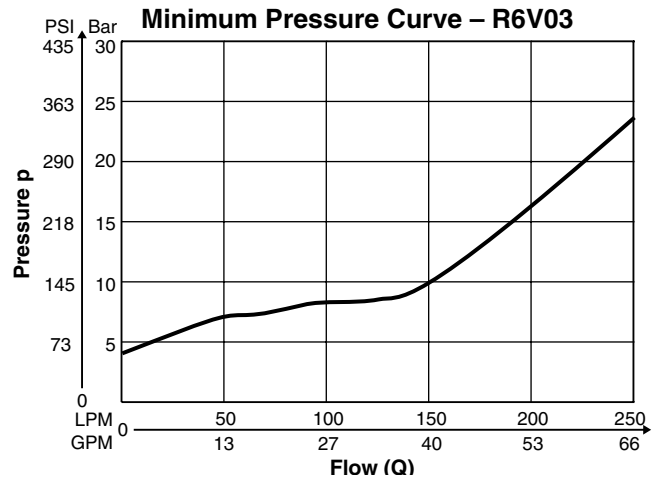
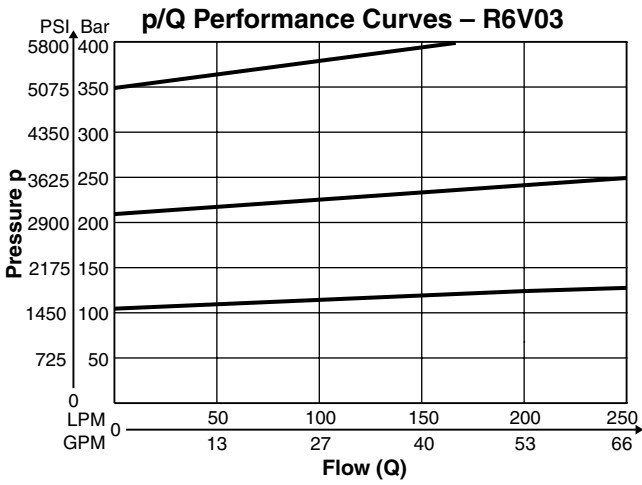


General				
Size		NG10	NG25	NG32
Interface	Subplate mounting acc. ISO 6264			
Mounting Position	as desired, horizontal mounting preferred			
Ambient Temperature	[°C]	-20...+60; (-4°F ... +140°F)		
MTTF <sub>D</sub> Value	[years]	50		
Vibration Strength	[g]	10 sinus 5...2000 Hz acc. to IEC 68-2-6 30 noise 20...2000 Hz acc. to IEC 68-2-36 15 shock acc. to IEC 68-2-27		
Hydraulic				
Maximum Operating Pressure	Ports P (or A) and X up to 350 Bar (5075 PSI), port T (or B) and Y 30 Bar (435 PSI)			
Pressure Range	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 (5075 PSI)			
Nominal Flow				
Series R4V		150 LPM (39.7 GPM)	350 LPM (92.6 GPM)	650 LPM (172.0 GPM)
Series R6V		250 LPM (66.1 GPM)	500 LPM (132.3 GPM)	650 LPM (172.0 GPM)
Fluid	Hydraulic oil according to DIN 51524...51535, other on request			
Viscosity				
Recommended	[cSt] / [mm <sup>2</sup> /s]	30 ... 50 (139 ... 232 SSU)		
Permitted	[cSt] / [mm <sup>2</sup> /s]	20 ... 380 (93 ... 1761 SSU)		
Fluid Temperature	[°C]	-20 ... +60; (-4°F ... +140°F)		
Filtration	ISO 4406 (1999); 18/16/13 (acc. NAS 1638: 7)			
Hysteresis	[%]	< 1.5		
Electrical				
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible		
Supply Voltage	VDC	18...30, ripple < 5% eff., surge free		
Current Consumption Maximum	[A]	2.0		
Pre-fusing	[A]	2.5 medium lag		
Potentiometer Supply	[V]	+10 / ±5% max. 10mA		
Command Signal				
Code 10V Voltage	[V]	0...+10, ripple < 0.01 % eff., surge free, Ri = 100 kOhm		
Code 4MA Current	[mA]	4...20, ripple < 0.01 % eff., surge free, Ri = 200 Ohm < 3.6 mA = enable off, > 3.8 mA = enable on (acc. NAMUR NE43)		
Differential Input Voltage Max.	[V]	30 for terminal D and E against PE (terminal G)		
	[V]	11 for terminal D and E against 0V (terminal B)		
Adjustment Ranges				
Minimum current	[%]	0...50		
Maximum current	[%]	50...100		
Ramp	[s]	0...32.5		
Interface	RS-232, parametrizing connection 5 pole			
EMC	EN 61000-6-2, EN 61000-6-4			
Central Connection	6 + PE acc. EN 175201-804			
Cable Specification	[mm <sup>2</sup> ]	7 x 1.0 (AWG 18) overall braid shield		
Cable Length Maximum	[m]	50 (164 ft.)		

**B**

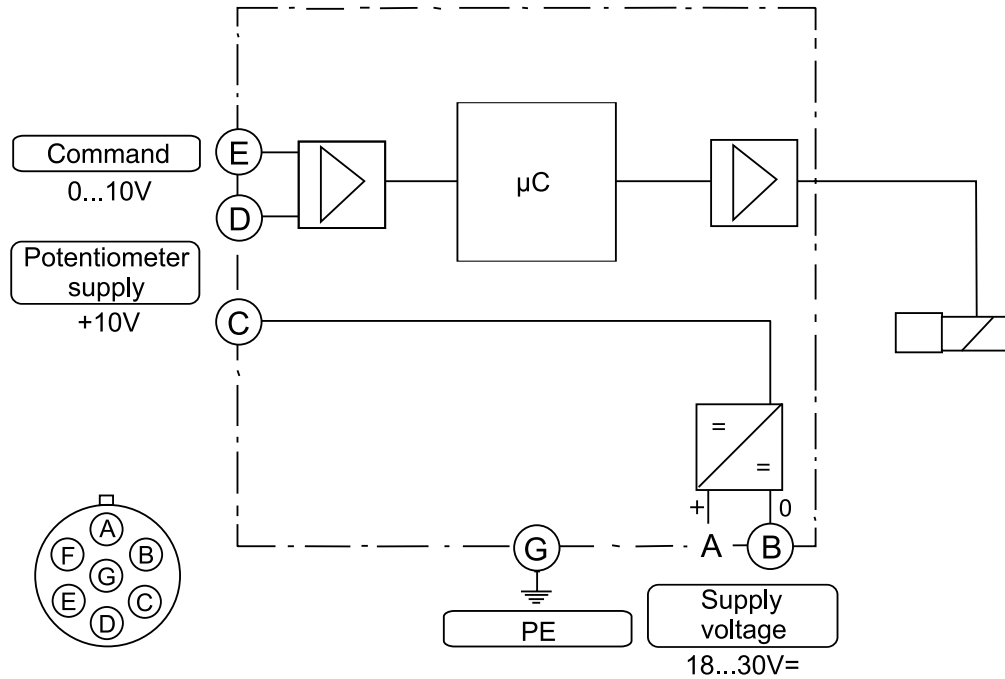




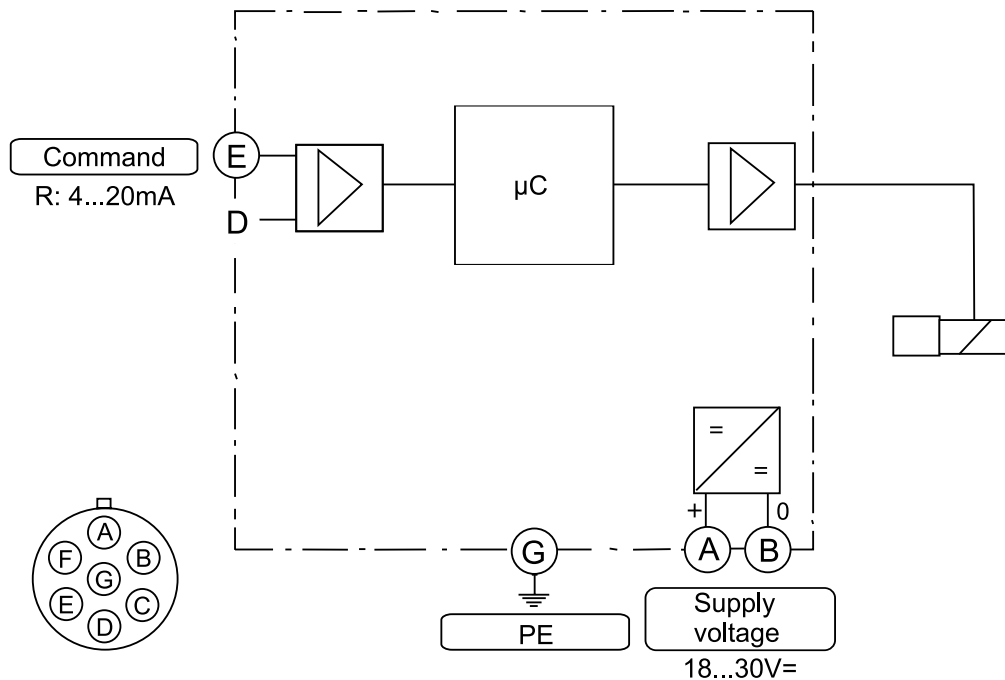


**Code 10V**  
**6 + PE acc. EN 175201-804**

**B**



**Code 4MA**  
**6 + PE acc. EN 175201-804**



### ProPx D Interface Program

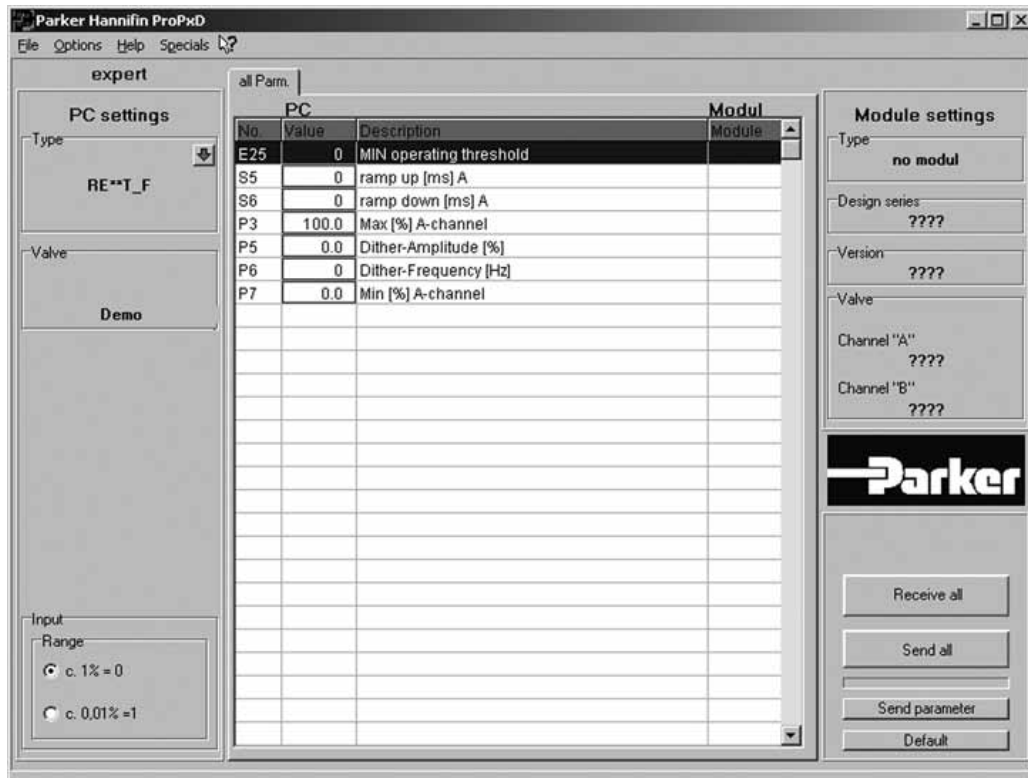
The ProPx D software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

### Features

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

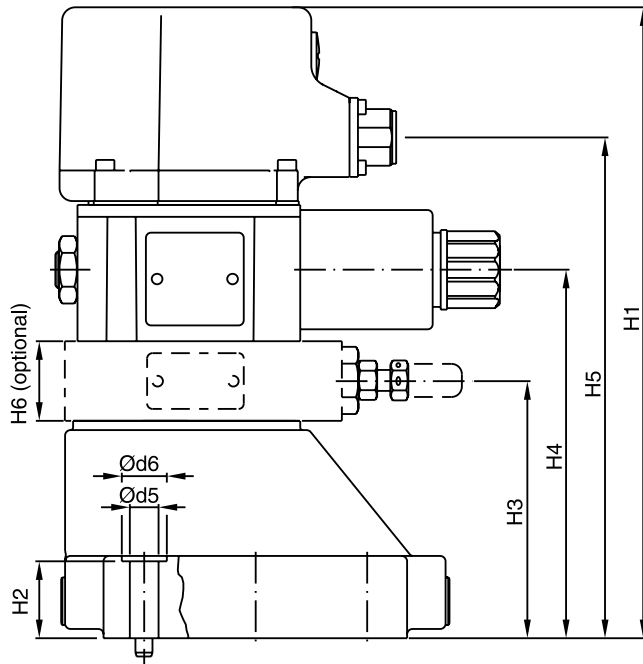
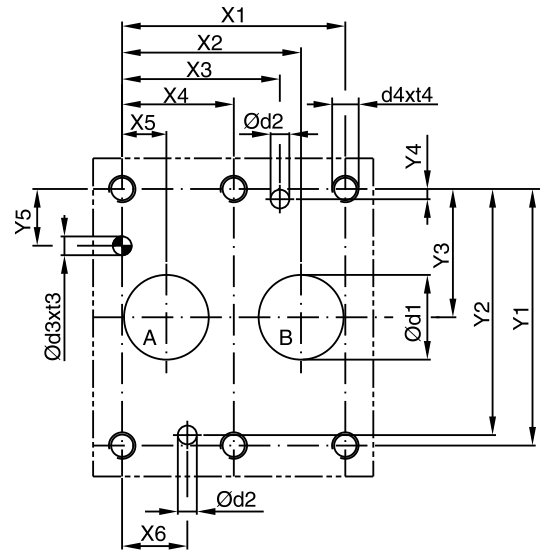
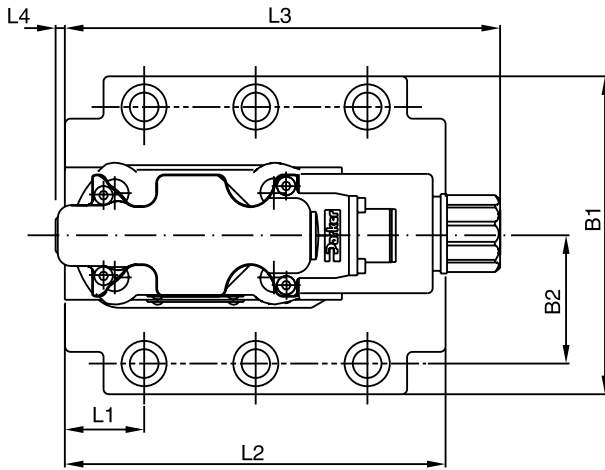
The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

Simple to use interface program. Download free of charge [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) → **Services** → **downloads**



The parametrizing cable may be ordered under item no. 40982923.

**B**



**Dimensions**

**Proportional Pressure Relief Valves  
Series R4V (Onboard Electronics)**

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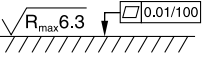
Inch equivalents for millimeter dimensions are shown in (\*\*)

NG	ISO-Code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-07-*-97	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	-	7.2 (0.28)	21.5 (0.85)	0	66.7 (2.63)	58.8 (2.31)	33.4 (1.31)	7.9 (0.31)	14.3 (0.56)	-
25	6264-08-11-*-97	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	-	11.1 (0.44)	20.6 (0.81)	0	79.4 (3.13)	73 (2.87)	39.7 (1.56)	6.4 (0.25)	15.9 (0.63)	-
32	6264-10-15-*-97	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	24.6 (0.97)	0	96.8 (3.81)	92.8 (3.65)	48.4 (1.91)	3.8 (0.15)	21.4 (0.84)	-

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

NG	ISO-Code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-07-*-97	87.3 (3.44)	33.4 (1.31)	200.3 (7.89)	21.0 (0.83)	60.0 (2.36)	102.0 (4.02)	151.0 (5.94)	30.0 (1.18)	25.0 (0.98)	90.8 (3.57)	164.2 (6.46)	4.5 (0.18)	-	-
25	6264-08-11-*-97	105.0 (4.13)	39.7 (1.56)	226.8 (8.93)	29.0 (1.14)	86.5 (3.41)	128.5 (5.06)	184.0 (7.24)	30.0 (1.18)	30.9 (1.22)	123.0 (4.84)	164.2 (6.46)	4.5 (0.18)	-	-
32	6264-10-15-*-97	120.0 (4.72)	48.4 (1.91)	237.3 (9.34)	29.0 (1.14)	97.0 (3.82)	139.0 (5.47)	194.5 (7.66)	30.0 (1.18)	29.8 (1.17)	143.5 (5.65)	164.2 (6.46)	4.5 (0.18)	-	-

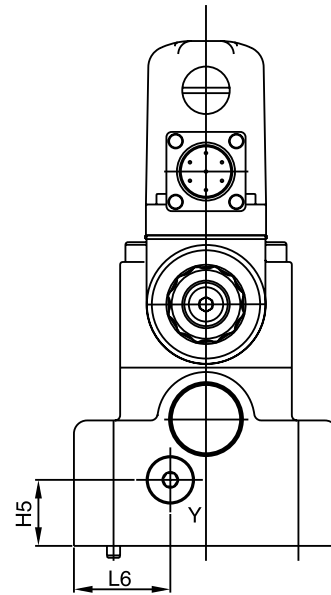
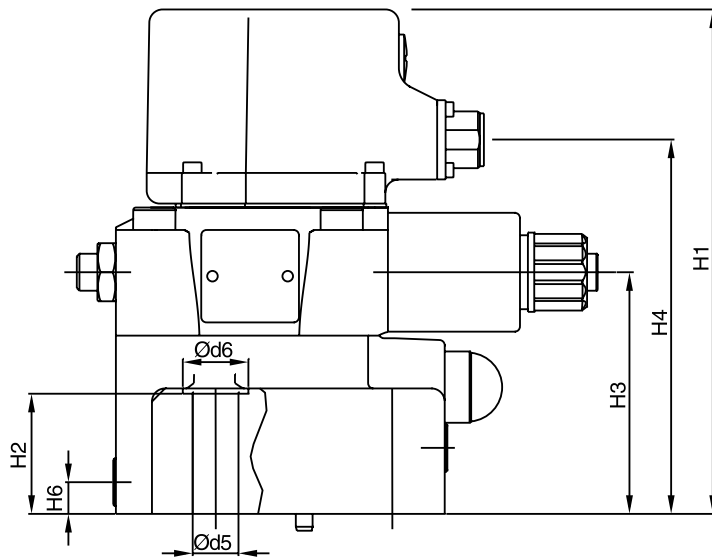
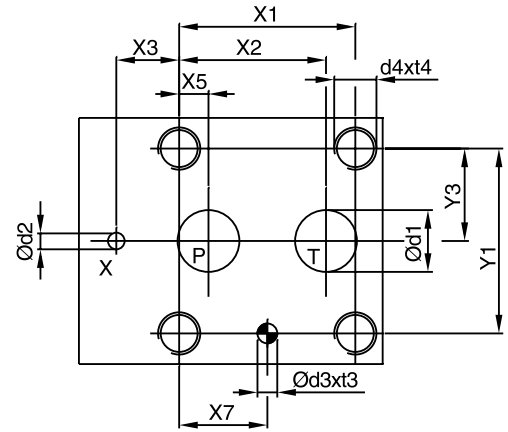
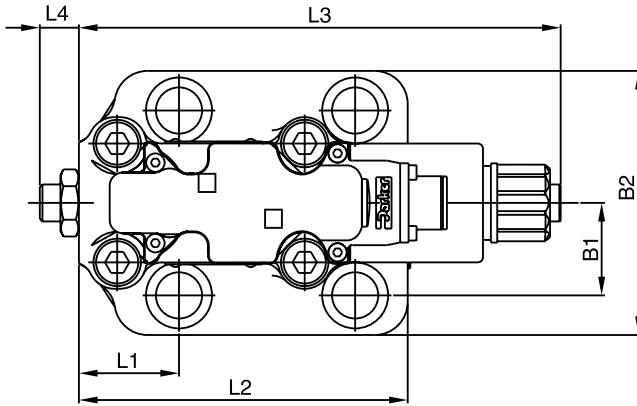
NG	ISO-Code	d1max	d2max	d3	t3	d4	t4	d5	d6	Subplate
10	6264-06-07-*-97	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)	SPP3M6B910
25	6264-08-11-*-97	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)	SPP6M8B910
32	6264-10-15-*-97	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)	SPP10M12B910

NG	ISO-Code	Bolt Kit			Seal Kit		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-07-*-97	BK505	4x M10 x 35 DIN912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58507-0*	S26-58507-5*	
25	6264-08-11-*-97	BK485	4x M10 x 45 DIN912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58475-0*	S26-58475-5*	
32	6264-10-15-*-97	BK506	6x M10 x 45 DIN912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58508-0*	S26-58508-5*	
Prop. Section P2*					S26-58473-0	S26-58473-5	

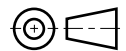
\* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.

**B**

**B**



Y: external drain  
port G 1/8"



**Dimensions**

**Proportional Pressure Relief Valves  
Series R6V (Onboard Electronics)**

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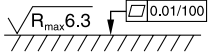
Inch equivalents for millimeter dimensions are shown in (\*\*)

NG	ISO-Code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	6264-06-09-*-97	53.8 (2.12)	47.5 (1.87)	0.0 (0.00)	-	22.1 (0.87)	-	22.1 (0.87)	53.8 (2.12)	-	26.9 (1.06)	-	-	-
25	6264-08-13-*-97	66.7 (2.63)	55.6 (2.19)	23.8 (0.94)	-	11.1 (0.44)	-	33.4 (1.31)	70.0 (2.76)	-	35.0 (1.38)	-	-	-
32	6264-10-17-*-97	88.9 (3.50)	76.2 (3.00)	31.8 (1.25)	-	12.7 (0.50)	-	44.5 (1.75)	82.6 (3.25)	-	41.3 (1.63)	-	-	-

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

NG	ISO-Code	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6
10	6264-06-09-*-97	80.0 (3.15)	26.9 (1.06)	185.1 (7.29)	27.0 (1.06)	88.0 (3.46)	135.8 (5.35)	20.5 (0.81)	25.0 (0.98)	52.0 (2.05)	117.0 (4.61)	182.3 (7.18)	14.4 (0.57)	-	29.5 (1.16)
25	6264-08-13-*-97	100.0 (3.94)	35.0 (1.38)	188.6 (7.43)	45.5 (1.79)	91.5 (3.60)	139.8 (5.50)	25.0 (0.98)	12.0 (0.47)	37.9 (1.49)	124.5 (4.90)	182.3 (7.18)	14.4 (0.57)	-	36.5 (1.44)
32	6264-10-17-*-97	120.0 (4.72)	41.3 (1.63)	194.1 (7.64)	52.0 (2.05)	97.0 (3.82)	144.8 (5.70)	26.5 (1.04)	13.5 (0.53)	44.3 (1.74)	153.0 (6.02)	182.3 (7.18)	14.4 (0.57)	-	46.5 (1.83)

NG	ISO-Code	d1max	d2max	d3	t3	d4	t4	d5	d6	Subplate
10	6264-06-09-*-97	14.7 (0.58)	4.8 (0.19)	7.5 (0.30)	10.0 (0.39)	M12	20.0 (0.79)	13.5 (0.53)	20.0 (0.79)	SPP3R6B910
25	6264-08-13-*-97	23.4 (0.92)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M16	27.0 (1.06)	17.5 (0.69)	25.0 (0.98)	SPP6R10B910
32	6264-10-17-*-97	32.0 (1.26)	6.3 (0.25)	7.5 (0.30)	10.0 (0.39)	M18	28.0 (1.10)	20.0 (0.79)	30.0 (1.18)	SPP10R12B910

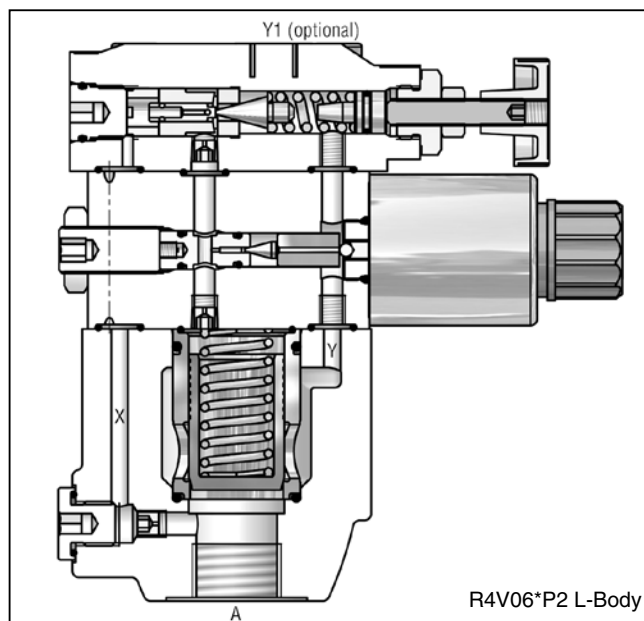
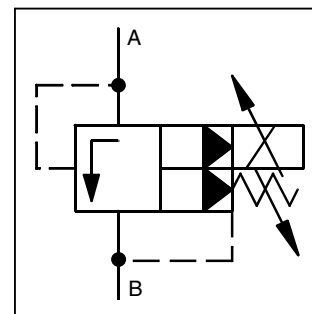
NG	ISO-Code	Bolt Kit			Seal Kit		Surface Finish
					Nitrile	Fluorocarbon	
10	6264-06-09-*-97	BK494	4x M12 x 45 DIN912 12.9	108 Nm (79.7 lb.-ft.) ±15%	S26-98589-0	S26-98589-5	
25	6264-08-13-*-97	BK366	4x M16 x 70 DIN912 12.9	264 Nm (194.7 lb.-ft.) ±15%	S26-96396-0	S26-96396-5	
32	6264-10-17-*-97	BK507	4x M18 x 75 DIN912 12.9	398 Nm (293.5 lb.-ft.) ±15%	S26-96392-0	S26-96392-5	

**B**

## General Description

Series R4V\*P2 proportional pressure relief valves are based on the mechanically adjusted Series R4V. The additional proportional unit between the mechanical pilot valve and the main stage allows continuous pressure adjustment.

The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.



## Features

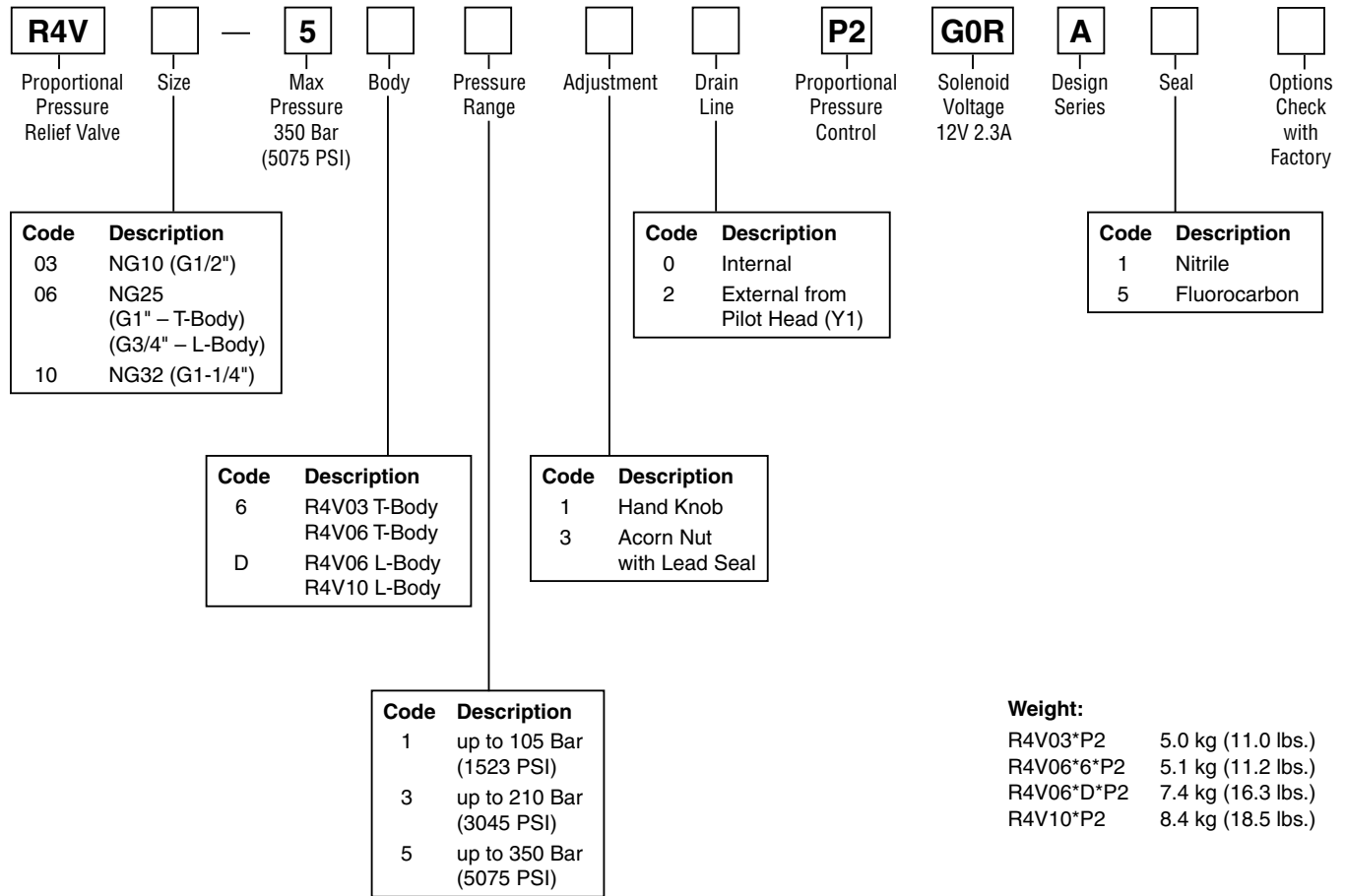
- Pilot operated with manual adjustment.
- Continuous adjustment by proportional solenoid.
- 2 interfaces:
  - L-body (R4V06-G3/4", R4V10-G1 1/4")
  - T-body (R4V03-G1/2", R4V06-G1")
- 3 pressure ranges.
- With mechanical maximum pressure adjustment.

## Specifications

General				
Size	T-Body		L-Body	
	03 (1/2")	06 (1")	06 (3/4")	10 (1-1/4")
Mounting	Threaded Body			
Mounting Position	Unrestricted			
Ambient Temp. Range	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Max. Operating Pressure	Ports A and X up to 350 Bar (5075 PSI); Ports B and Y 30 Bar (435 PSI)			
Pressure Range	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)			
Nominal Flow	60 LPM (15.9 GPM)	200 LPM (52.9 GPM)	200 LPM (52.9 GPM)	450 LPM (119.0 GPM)
Fluid	Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature	-20°C to 80°C (-4°F to 176°F)			
Viscosity Permitted	10 to 380 cSt / mm <sup>2</sup> /s (46 to 1761 SSU)			
Viscosity Recommended	30 to 80 cSt / mm <sup>2</sup> /s (139 to 371 SSU)			
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Electrical (Proportional Solenoid)				
Duty Ratio	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible			
Nominal Voltage	12 VDC			
Max. Current	2.3 amps			
Coil Resistance	4 Ohm at 20°C (68°F)			
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)			
Power Amplifier	PCD00A-400			

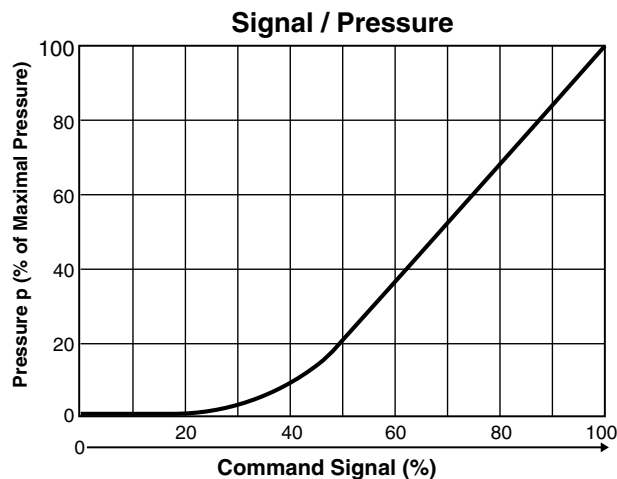


**Ordering Information**



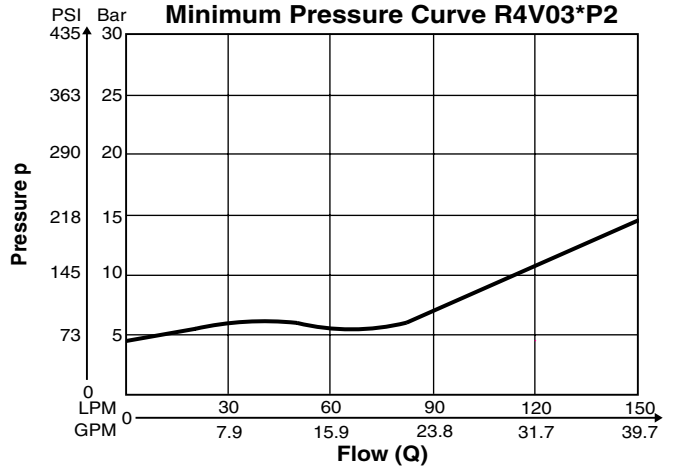
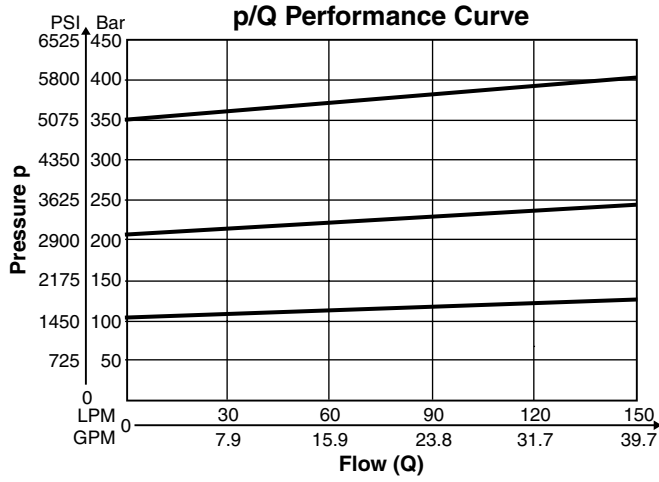
**B**

**Performance Curve**

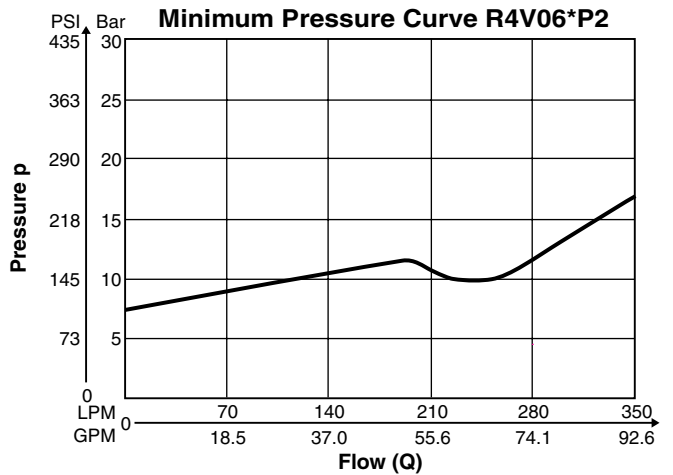
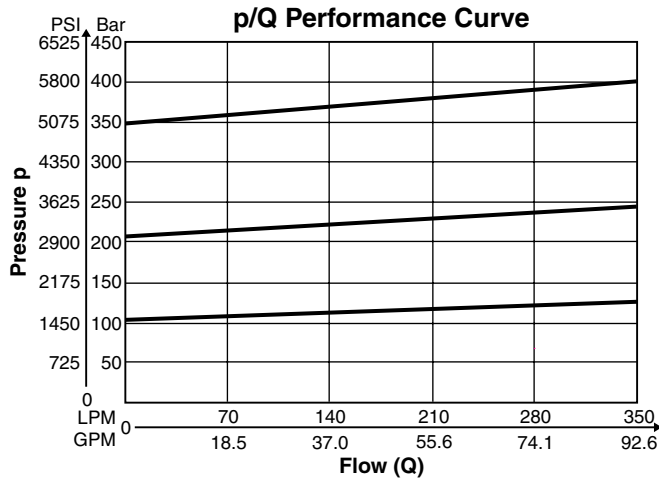


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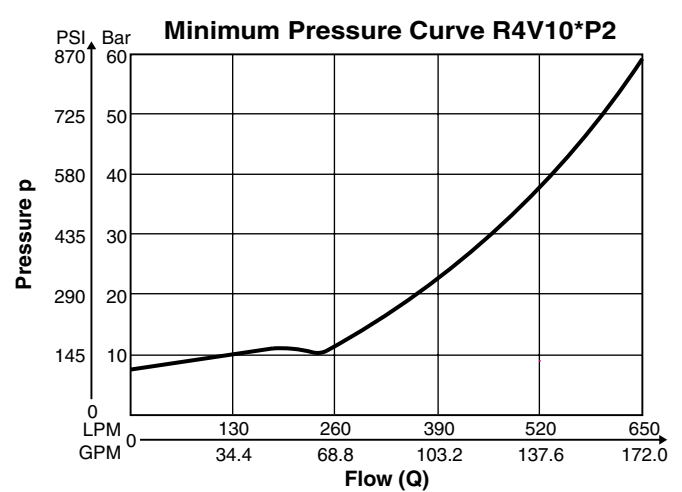
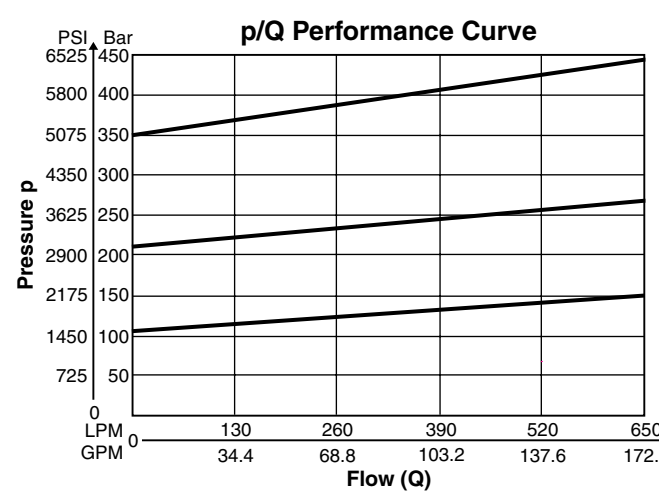
**R4V03\*P2 <sup>1)</sup>**



**R4V06\*P2 <sup>1)</sup>**



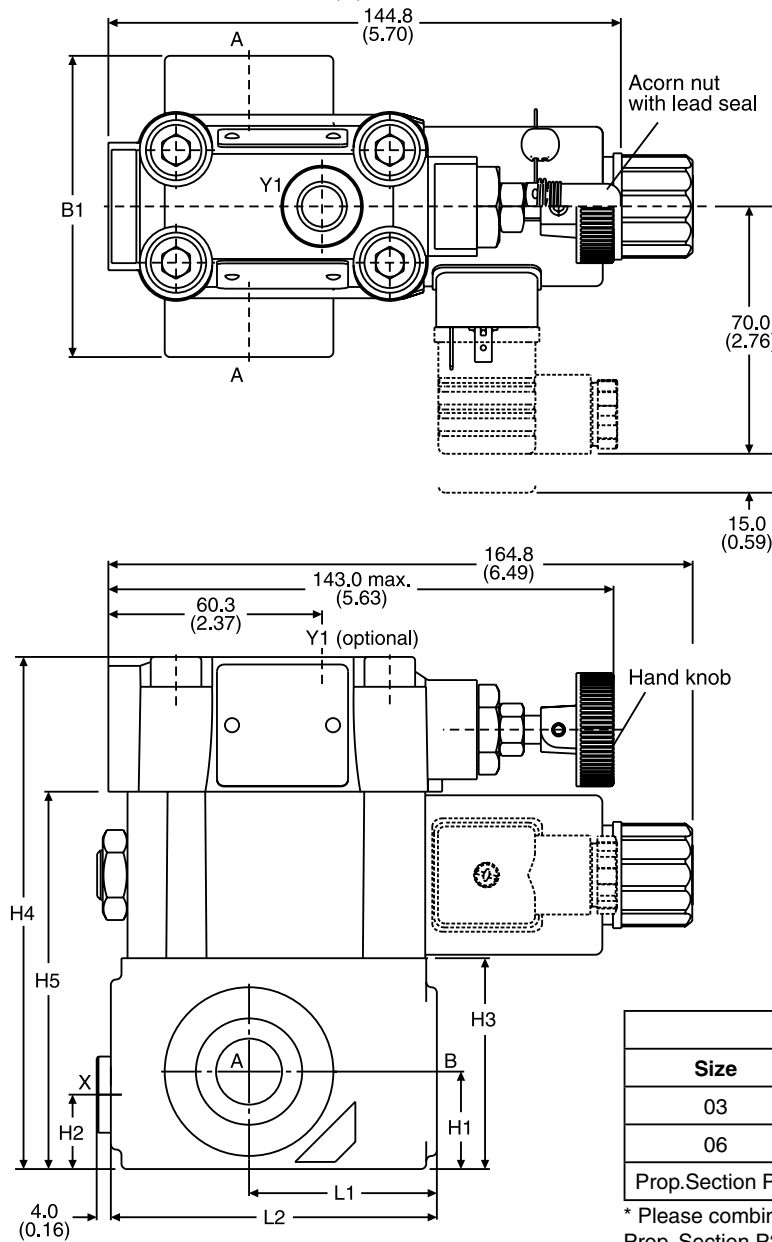
**R4V10\*P2 <sup>1)</sup>**



<sup>1)</sup> The performance curves are measured with external drain.  
 For internal drain, the tank pressure has to be added to the curve.

**T-Body**

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



Seal Kits		
Size	Nitrile	Fluorocarbon
03	S26-58507-0	S26-58507-5
06	S26-58475-0	S26-58475-5
Prop. Section P2*	S26-58473-0	S26-58473-5

\* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.

Size	Body	B1	H1	H2	H3	H4	H5	L1	L2
03	T-body	85.0 (3.35)	27.5 (1.08)	21.0 (0.83)	59.5 (2.34)	144.5 (5.69)	106.5 (4.19)	53.0 (2.09)	92.0 (3.62)
06	T-body	136.0 (5.35)	38.0 (1.50)	28.0 (1.10)	93.0 (3.66)	178.0 (7.01)	140.0 (5.51)	66.5 (2.62)	117.5 (4.63)

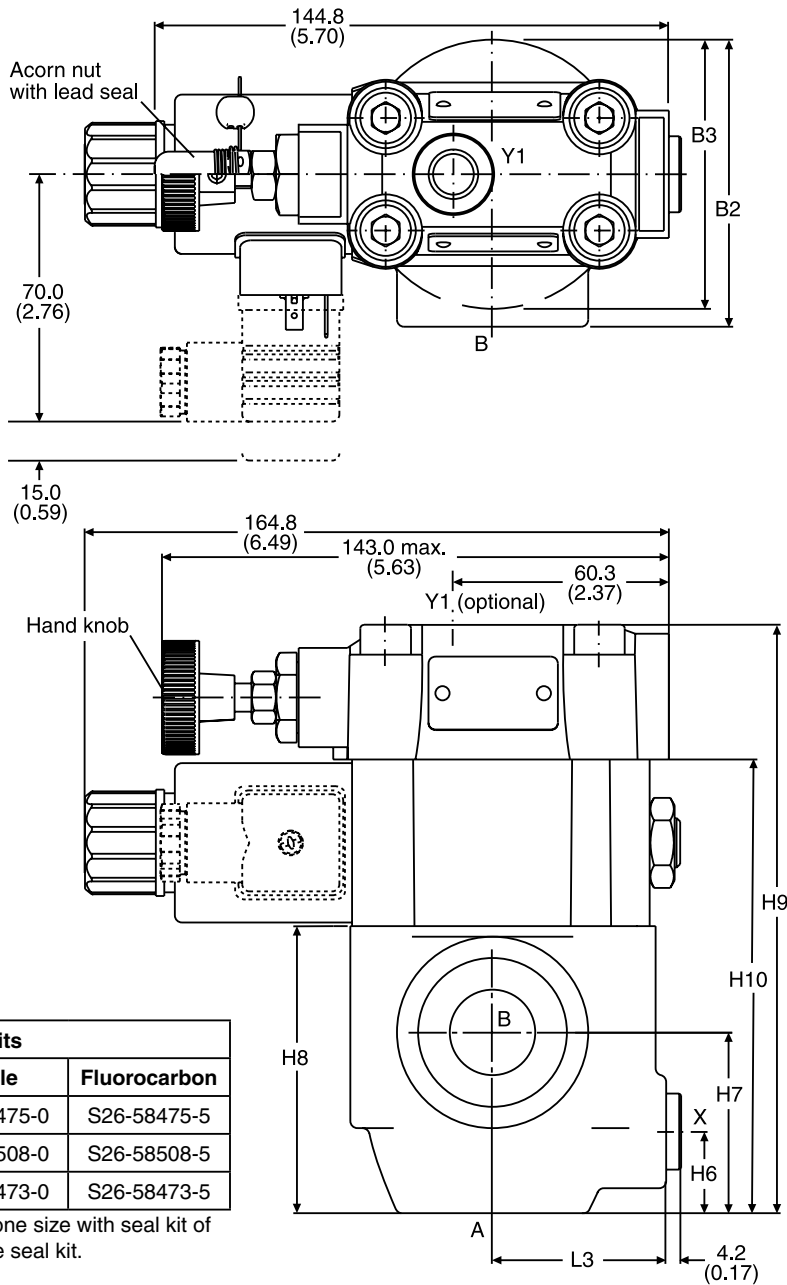
Ports	Function	Port Size	
		R4V03*P2 T-body	R4V06*P2 T-body
A	Pressure (inlet)	G1/2"	G1"
B	Tank (outlet)	G1/2"	G1"
X <sup>1)</sup>	Ext. Remote Control or Vent Connection	G1/4"	
Y1 <sup>2)</sup>	External Drain	G1/4"	

<sup>1)</sup> Closed when supplied

<sup>2)</sup> Port Y1 is only available at drain line (code 2) external from the pilot head

**L-Body**

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



Seal Kits		
Size	Nitrile	Fluorocarbon
06	S26-58475-0	S26-58475-5
10	S26-58508-0	S26-58508-5
Prop. Section P2*	S26-58473-0	S26-58473-5

\* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.

Size	Body	B2	B3	H6	H7	H8	H9	H10	L3
06	L-body	81.0 (3.19)	76.0 (2.99)	23.0 (0.91)	51.0 (2.01)	81.0 (3.19)	166.0 (6.54)	128.0 (5.04)	49.0 (1.93)
10	L-body	120.7 (4.75)	85.8 (3.38)	31.8 (1.25)	50.8 (2.00)	96.0 (3.78)	181.0 (7.13)	143.0 (5.63)	49.8 (1.96)

Ports	Function	Port size	
		R4V06 L-body	R4V10 L-body
A	Pressure (inlet)	G3/4"	G1-1/4"
B	Tank (outlet)	G3/4"	G1-1/4"
X <sup>1)</sup>	Ext. Remote Control or Vent Connection	G1/4"	
Y1 <sup>2)</sup>	External Drain	G1/4"	

<sup>1)</sup> Closed when supplied

<sup>2)</sup> Port Y1 is only available at drain line (code 2) external from the pilot head

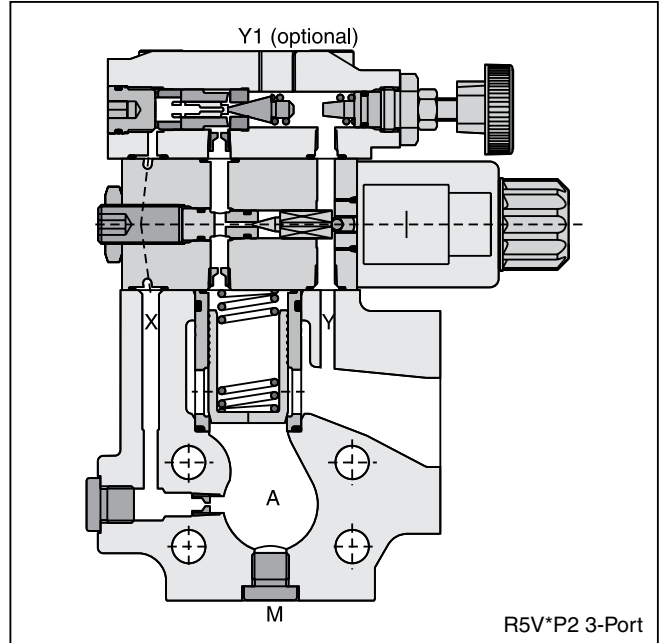
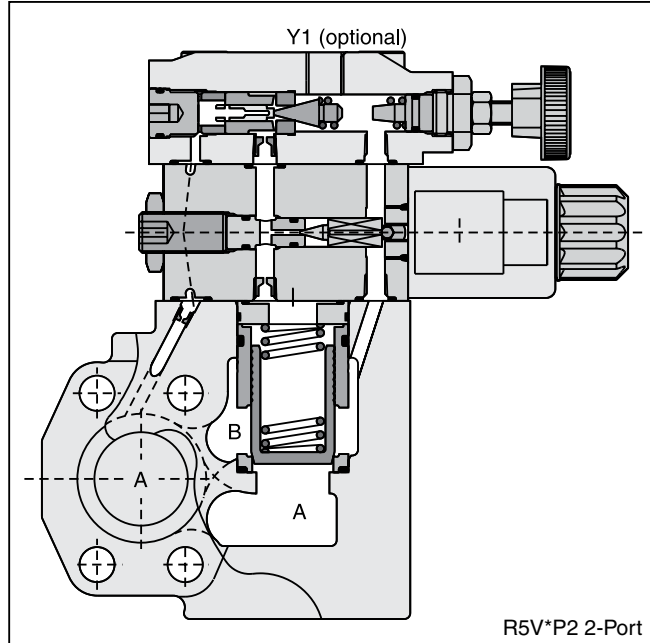
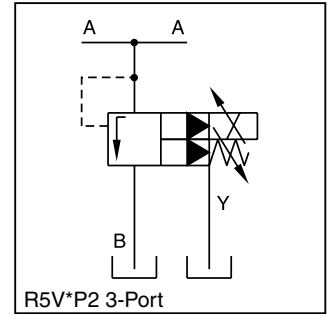
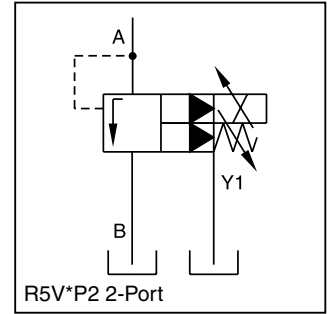
**General Description**

Series R5V\*P2 proportional pressure relief valves are based on the mechanical adjusted Series R5V. The additional proportional unit between the mechanical pilot valve and the main stage allows continuous pressure adjustment.

The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.

**Features**

- Pilot operated with manual adjustment.
- Continuous adjustment by proportional solenoid.
- R5V with 2-port body:
  - 3 sizes (SAE 3/4", 1", 1-1/4")
  - SAE 61 flange
- R5V with 3-port body:
  - 4 sizes (SAE 3/4", 1", 1-1/4", 1-1/2")
  - SAE 61 and SAE 62 flange
- 3 pressure ranges.
- With mechanical maximum pressure adjustment.



**B**

General					
<b>Size</b>		<b>06 (3/4")</b>	<b>08 (1")</b>	<b>10 (1-1/4")</b>	<b>12 (1-1/2")</b>
<b>Mounting</b>	Flanged according to SAE 61				
<b>Mounting Position</b>	Unrestricted				
<b>Ambient Temperature Range</b>	-20°C to +50°C (-4°F to +122°F)				
Hydraulic					
<b>Maximum Operating Pressure</b>	<b>SAE 61 Ports A, B</b>	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)	210 Bar (3045 PSI)
	<b>SAE 61 Port Y1</b>	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)
	<b>SAE 62 Ports A, B</b>	350 Bar (5075 PSI)	350 Bar (5075 PSI)	350 Bar (5075 PSI)	350 Bar (5075 PSI)
	<b>SAE 62 Port Y1</b>	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)
<b>Pressure Range</b>	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)				
<b>Nominal Flow</b>	90 LPM (23.8 GPM)	300 LPM (79.4 GPM)	600 LPM (158.7 GPM)	600 LPM (158.7 GPM)	
<b>Fluid</b>	Hydraulic oil as per DIN 51524...51535, other on request				
<b>Fluid Temperature</b>	-20°C to +80°C (-4°F to +176°F)				
<b>Viscosity</b>	<b>Permitted</b>	10 to 650 cSt / mm <sup>2</sup> /s (46 to 3013 SSU)			
	<b>Recommended</b>	30 to 80 cSt / mm <sup>2</sup> /s (139 to 371 SSU)			
<b>Filtration</b>	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)				
Electrical (Proportional Solenoid)					
<b>Duty Ratio</b>	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible				
<b>Nominal Voltage</b>	12 VDC				
<b>Max. Current</b>	2.3 amps				
<b>Coil Resistance</b>	4 Ohm at 20°C (68°F)				
<b>Solenoid Connection</b>	Connector as per EN175301-803				
<b>Protection Class</b>	IP65 in accordance with EN60529 (plugged and mounted)				
<b>Power Amplifier</b>	PCD00A-400				

**Ordering Information**

<b>R5V</b>	□	—	□	□	□	□	□	<b>P2</b>	<b>G0R</b>	<b>A</b>	□	□
Proportional Pressure Relief Valve	Size		SAE Interface	Pilot Ports	Pressure Range	Adjustment	Pilot Oil	Proportional Pressure Control	Solenoid Voltage 12V 2.3A	Design Series	Seal	Options

<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Code</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>06</td><td>SAE 3/4"</td></tr> <tr><td>08</td><td>SAE 1"</td></tr> <tr><td>10</td><td>SAE 1-1/4"</td></tr> <tr><td>12*</td><td>SAE 1-1/2"</td></tr> </tbody> </table> <p>* R5V 3-Port only</p>	Code	Description	06	SAE 3/4"	08	SAE 1"	10	SAE 1-1/4"	12*	SAE 1-1/2"	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Code</th> <th>Drain Line</th> </tr> </thead> <tbody> <tr><td>2</td><td>Internal</td></tr> <tr><td>6</td><td>External from Y1-Port</td></tr> </tbody> </table>	Code	Drain Line	2	Internal	6	External from Y1-Port
Code	Description																
06	SAE 3/4"																
08	SAE 1"																
10	SAE 1-1/4"																
12*	SAE 1-1/2"																
Code	Drain Line																
2	Internal																
6	External from Y1-Port																

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
Omit	Standard
152	3-Port body with metric threads

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

SAE 61		
Code	Size	Maximum Pressure
3*	12	210 Bar (3045 PSI)
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

SAE 62		
Code	Size	Maximum Pressure
6*	06/08/10/12	350 Bar (5075 PSI)

\* R5V 3-Port only

2-Port Body	
Code	Description
3*	No Ports
7	Y1 = G1/4"

3-Port Body	
Code	Description
9	Y1**, X1, M = G1/4"

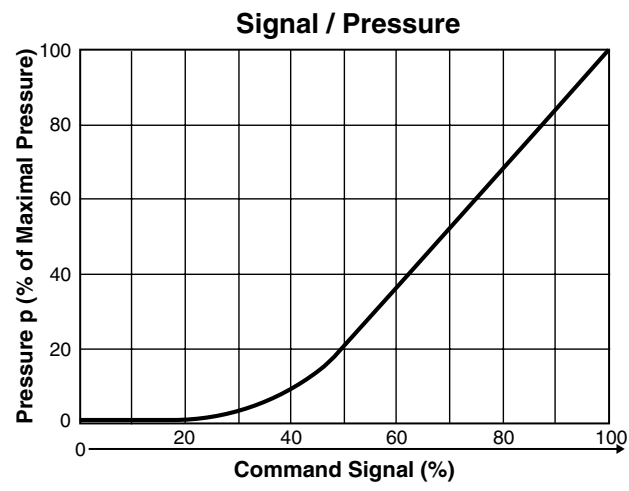
\* 2-Port: only in combination with pilot oil code 2.  
 \*\* 3-Port: Y1 only available at external drain (pilot oil code 6).

	<b>Weight: 2-Port</b>	<b>3-Port</b>
R5V06*P2	5.8 kg (12.8 lbs.)	5.4 kg (11.9 lbs.)
R5V08*P2	6.4 kg (14.1 lbs.)	6.4 kg (14.1 lbs.)
R5V10*P2	7.7 kg (17.0 lbs.)	7.0 kg (15.4 lbs.)
R5V12*P2	—	9.8 kg (21.6 lbs.)

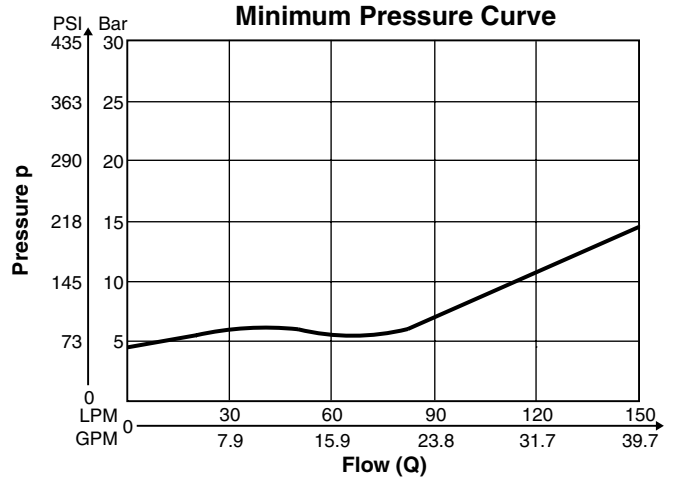
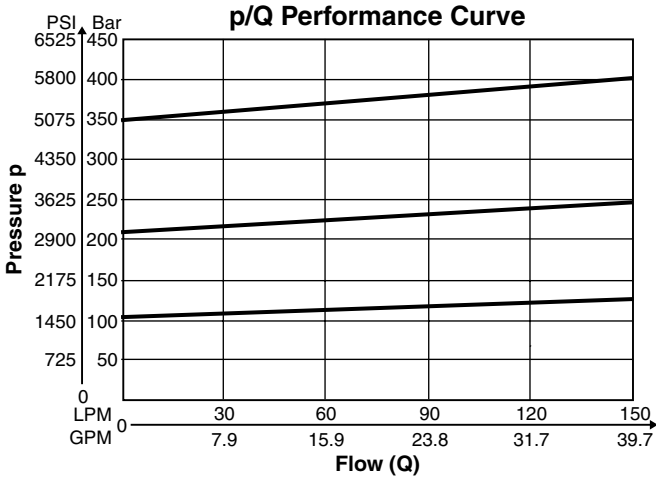


**Performance Curve**

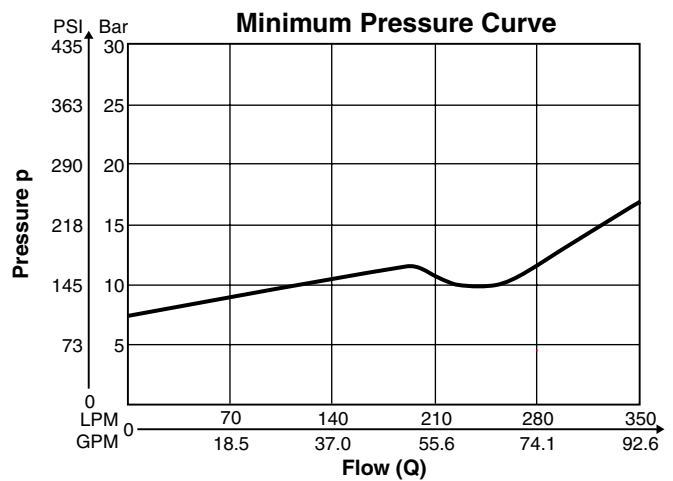
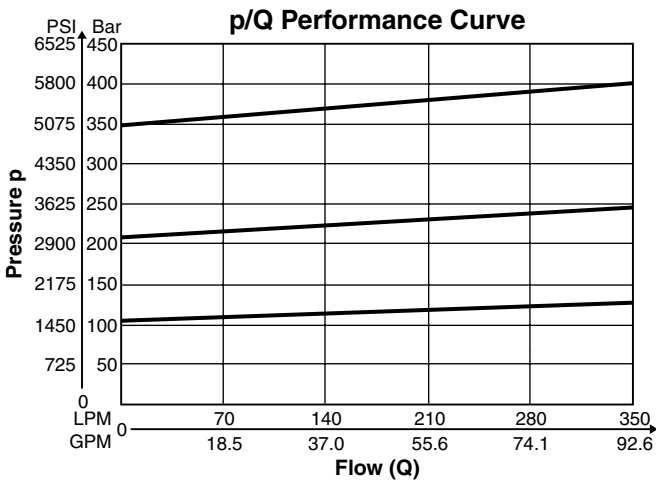


**B**

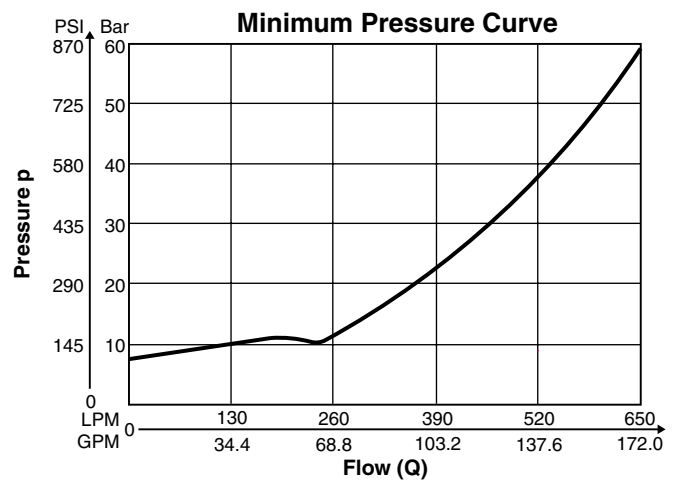
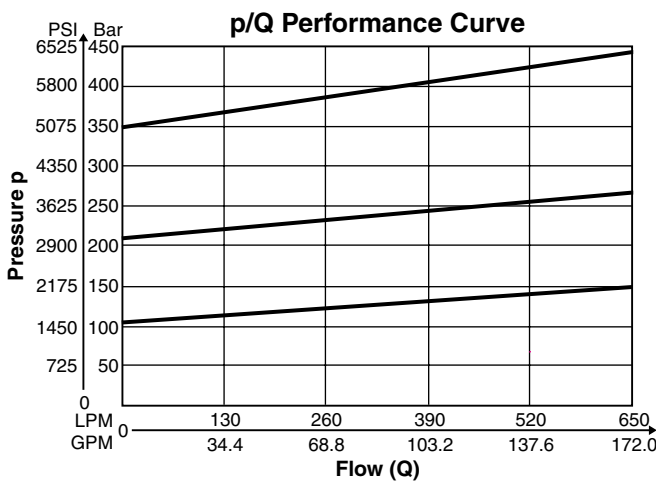
**R5V06\*P2 1)**



**R5V08\*P2 1)**



**R5V10\*P2 1)**



1) The performance curves are measured with external drain.  
 For internal drain, the tank pressure has to be added to the curve.



**Dimensions**

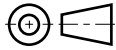
**Proportional Pressure Relief Valves  
Series R5V\*P2 (Flange Mounted)**

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TOC**

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**SECTION  
TOC**

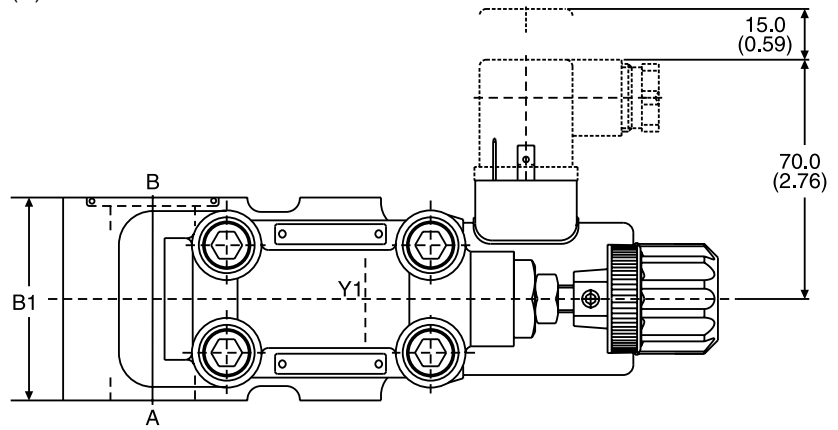
Inch equivalents for millimeter dimensions are shown in (\*\*)

**2-Port**

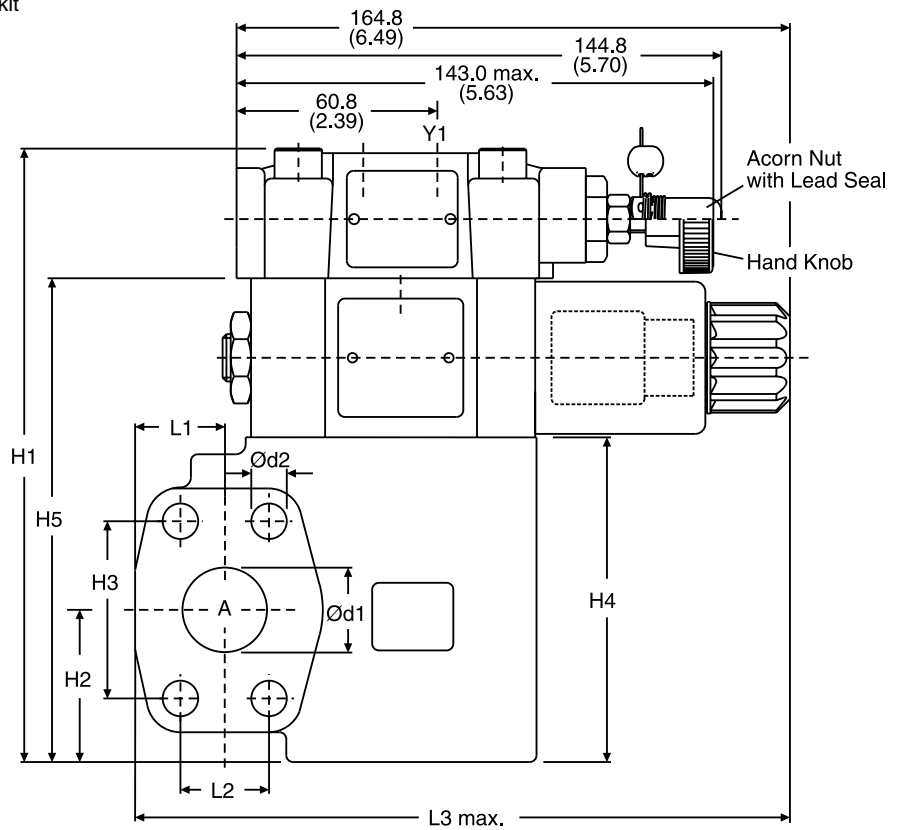
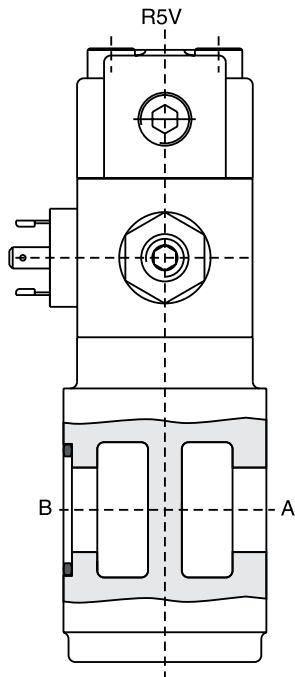


Seal Kits		
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
Prop. Section P2*	S26-58473-0	S26-58473-5

\* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.



**B**



**SAE 61**

Size	B1	H1	H2	H3	H4	H5	L1	L2	L3	d1	d2
06	60.0 (2.36)	175.0 (6.89)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	137.0 (5.39)	24.6 (0.97)	22.2 (0.87)	174.0 (6.85)	19.0 (0.75)	10.5 (0.41)
08	60.0 (2.36)	181.0 (7.13)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	143.0 (5.63)	26.5 (1.04)	26.2 (1.03)	193.6 (7.62)	25.0 (0.98)	10.5 (0.41)
10	75.0 (2.95)	194.0 (7.64)	48.0 (1.89)	58.7 (2.31)	109.0 (4.29)	156.0 (6.14)	34.0 (1.34)	30.2 (1.19)	201.0 (7.91)	32.0 (1.26)	12.5 (0.49)

Port	Function	Port size		
		R5V06	R5V08	R5V10
A	Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
B	Tank	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
Y1	External Drain	G1/4"		

R5V\_P2.indd, ddp



**Dimensions**

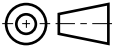
**Proportional Pressure Relief Valves  
Series R5V\*P2 (Flange Mounted)**

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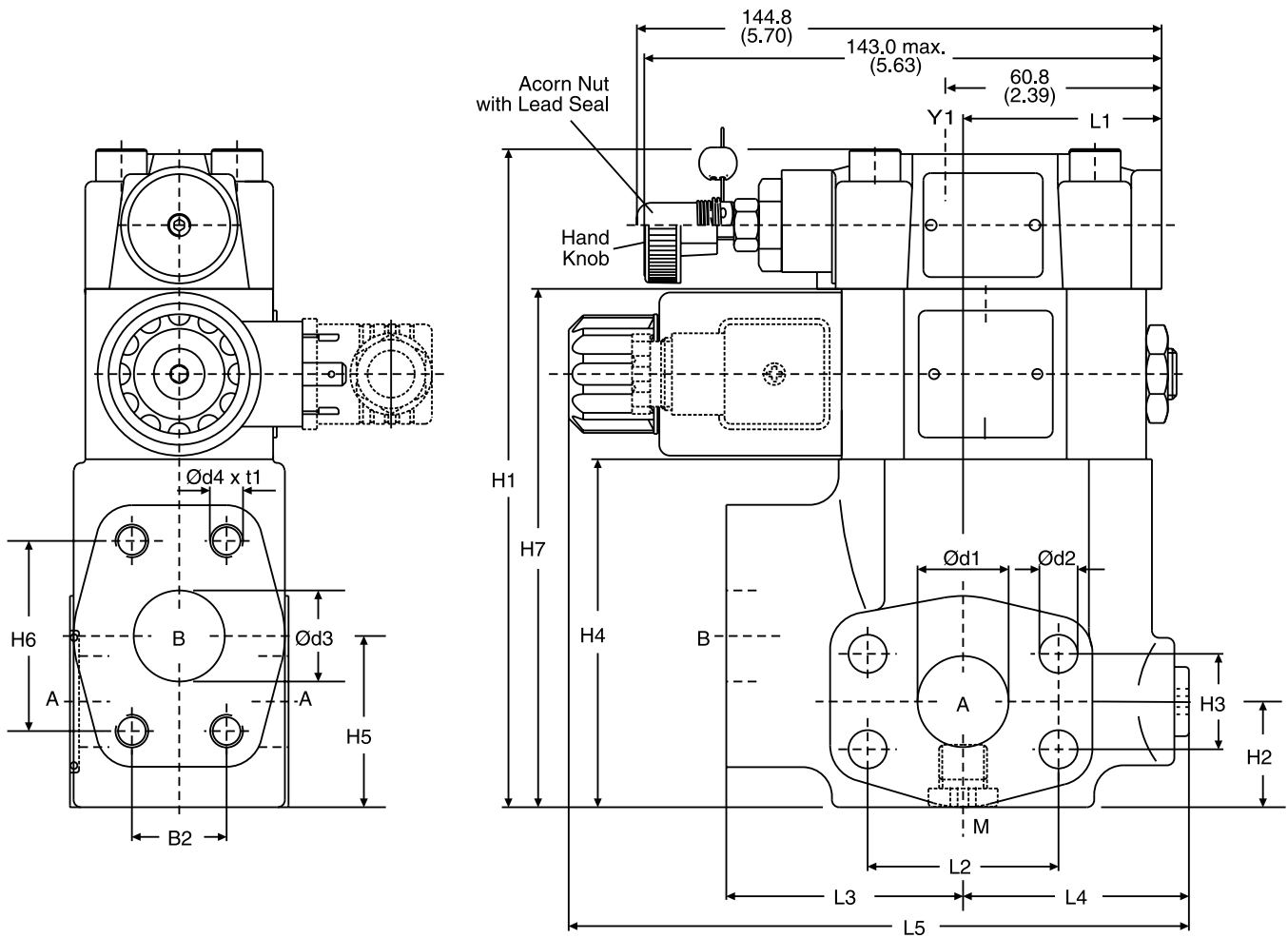
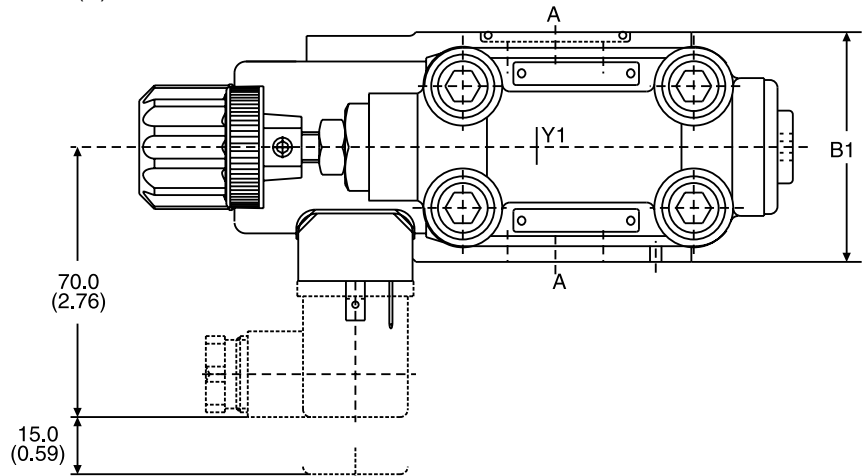
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SECTION  
TOC

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

**3-Port**



**B**



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

**3-Port**

**SAE 61**

Size	B1	B2	H1	H2	H3	H4	H5	H6	H7	L1	L2	L3	L4	L5	d1	d2	d3	d4 (option 152)	t1
06	60.0 (2.36)	22.2 (0.87)	166.0 (6.54)	28.0 (1.10)	22.2 (0.87)	81.0 (3.19)	41.6 (1.64)	47.6 (1.87)	128.0 (5.04)	50.3 (1.98)	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	174.6 (6.87)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	3/8"-16 UNC (M10)	20.0 (0.79)
08	60.0 (2.36)	26.2 (1.03)	188.0 (7.40)	29.0 (1.14)	26.2 (1.03)	103.0 (4.06)	47.0 (1.85)	52.4 (2.06)	150.0 (5.91)	55.8 (2.20)	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	177.0 (6.97)	25.0 (0.98)	10.5 (0.41)	25.0 (0.98)	3/8"-16 UNC (M10)	23.0 (0.91)
10	75.0 (2.95)	30.2 (1.19)	198.0 (7.80)	34.5 (1.36)	30.2 (1.19)	113.0 (4.45)	64.0 (2.52)	58.7 (2.31)	160.0 (6.30)	57.8 (2.28)	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	179.1 (7.05)	32.0 (1.26)	12.5 (0.49)	32.0 (1.26)	7/16"-14 UNC (M12)	22.0 (0.87)
12	80.0 (3.15)	35.7 (1.41)	225.0 (8.86)	34.0 (1.34)	35.7 (1.41)	140.0 (5.51)	73.0 (2.87)	69.8 (2.75)	187.0 (7.36)	37.3 (1.47)	69.8 (2.75)	92.5 (3.64)	55.2 (2.17)	186.8 (7.35)	38.0 (1.50)	13.5 (0.53)	38.0 (1.50)	1/2"-13 UNC (M12)	27.0 (1.06)



**SAE 62**

Size	B1	B2	H1	H2	H3	H4	H5	H6	L1	L2	L3	L4	L5	d1	d2	d3	d4 (option 152)	t1
06	60.0 (2.36)	23.8 (0.94)	119.0 (4.69)	28.0 (1.10)	23.8 (0.94)	81.0 (3.19)	41.6 (1.64)	50.8 (2.00)	50.3 (1.98)	50.8 (2.00)	63.0 (2.48)	56.0 (2.20)	152.0 (5.98)	19.0 (0.75)	10.5 (0.41)	19.0 (0.75)	3/8"-16 UNC (M10)	20.0 (0.79)
08	60.0 (2.36)	27.8 (1.09)	141.0 (5.55)	29.0 (1.14)	27.8 (1.09)	103.0 (4.06)	47.0 (1.85)	57.2 (2.25)	55.8 (2.20)	57.2 (2.25)	65.0 (2.56)	58.0 (2.28)	149.0 (5.87)	25.0 (0.98)	12.5 (0.49)	25.0 (0.98)	7/16"-14 UNC (M12)	22.0 (0.87)
10	75.0 (2.95)	31.8 (1.25)	151.0 (5.94)	34.5 (1.36)	31.8 (1.25)	113.0 (4.45)	64.0 (2.52)	66.7 (2.63)	57.8 (2.28)	66.7 (2.63)	61.0 (2.40)	62.0 (2.44)	150.5 (5.93)	32.0 (1.26)	13.5 (0.53)	32.0 (1.26)	1/2"-13 UNC (M12)	24.0 (0.94)
12	80.0 (3.15)	36.5 (1.44)	178.0 (7.01)	34.0 (1.34)	36.5 (1.44)	140.0 (5.51)	73.0 (2.87)	79.4 (3.13)	37.3 (1.47)	79.4 (3.13)	92.5 (3.64)	55.2 (2.17)	171.2 (6.74)	38.0 (1.50)	17.0 (0.67)	38.0 (1.50)	5/8"-11 UNC (M16)	33.0 (1.30)

Port	Function	Port Size			
		R5V06	R5V08	R5V10	R5V12
A (2)	Pressure	3/4" SAE61/62	1" SAE61/62	1-1/4" SAE61/62	1-1/2" SAE61/62
B	Tank	3/4" SAE61/62	1" SAE61/62	1-1/4" SAE61/62	1-1/2" SAE61/62
Y1	External Drain	G1/4"			
M	Pressure Gauge	G1/4"			

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
Prop. Section P2*	S26-58473-0	S26-58473-5

\* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.

**General Description**

Series RPDM2 pressure relief valves are direct operated proportional valves typically used as remote control valves for flow rates of below 3 LPM (0.8 GPM).

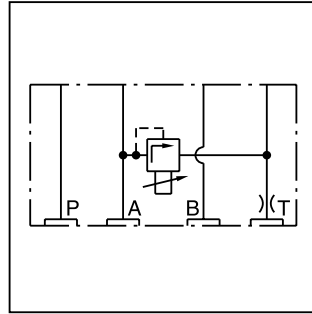
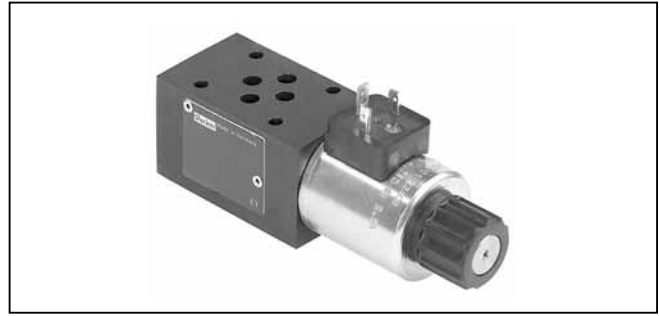
**Function**

When the pressure in port P exceeds the pressure setting at the solenoid, the cone opens to port T and limits the pressure in port P to the adjusted level.

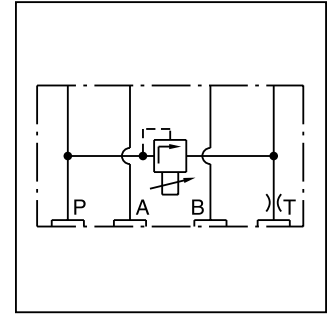
The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.

**Features**

- Direct operated by proportional solenoid.
- Very low pressure adjustment of  $p_{min}$ .
- $MTTF_D$  value 150 years.
- Sandwich style NG6 / D03 mount.
- 4 pressure ranges.



RPDM2AT



RPDM2PT

**Ordering Information**

<div style="border: 1px solid black; padding: 2px; width: 60px; margin: 0 auto;">RPDM</div> <p>Pressure Control Valve</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; margin: 0 auto;">2</div> <p>Size NG6 / D03</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div> <p>Pressure Relief</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div> <p>Pressure Range</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div> <p>Solenoid Voltage</p>	<div style="border: 1px solid black; padding: 2px; width: 60px; margin: 0 auto;">V</div> <p>Seal Fluorocarbon</p>	<div style="border: 1px dashed black; width: 30px; height: 30px; margin: 0 auto;"></div> <p>Design Series</p> <p>NOTE: Not required when ordering.</p>
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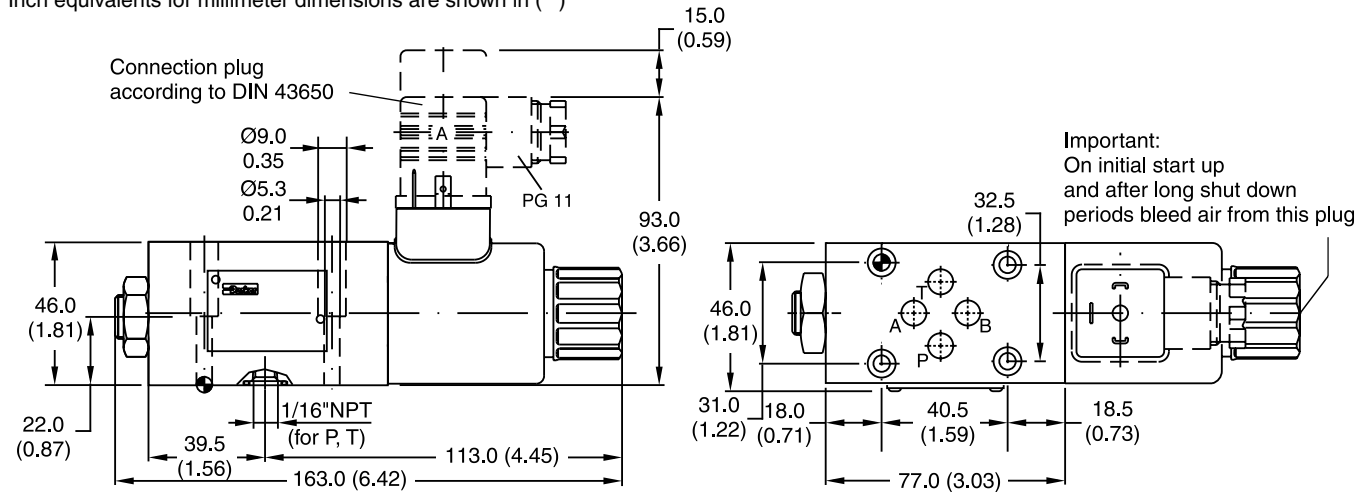
  

<table border="1" style="border-collapse: collapse; width: 100%;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr> <td>AT</td> <td>A to T</td> </tr> <tr> <td>PT</td> <td>P to T</td> </tr> </tbody> </table>	Code	Description	AT	A to T	PT	P to T	<table border="1" style="border-collapse: collapse; width: 100%;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>105 Bar (1523 PSI)</td> </tr> <tr> <td>17</td> <td>175 Bar (2538 PSI)</td> </tr> <tr> <td>25</td> <td>250 Bar (3625 PSI)</td> </tr> <tr> <td>35</td> <td>350 Bar (5075 PSI)</td> </tr> </tbody> </table>	Code	Description	10	105 Bar (1523 PSI)	17	175 Bar (2538 PSI)	25	250 Bar (3625 PSI)	35	350 Bar (5075 PSI)	<table border="1" style="border-collapse: collapse; width: 100%;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr> <td>K</td> <td>12V, 2.3A</td> </tr> <tr> <td>X</td> <td>16V, 1.3A</td> </tr> </tbody> </table>	Code	Description	K	12V, 2.3A	X	16V, 1.3A
Code	Description																							
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PT	P to T																							
Code	Description																							
10	105 Bar (1523 PSI)																							
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25	250 Bar (3625 PSI)																							
35	350 Bar (5075 PSI)																							
Code	Description																							
K	12V, 2.3A																							
X	16V, 1.3A																							

**Seal Kit:** SK-RPDM20  
**Weight:** 1.3 kg (2.9 lbs.)

**Dimensions**

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



Please order plugs separately. See Accessories.

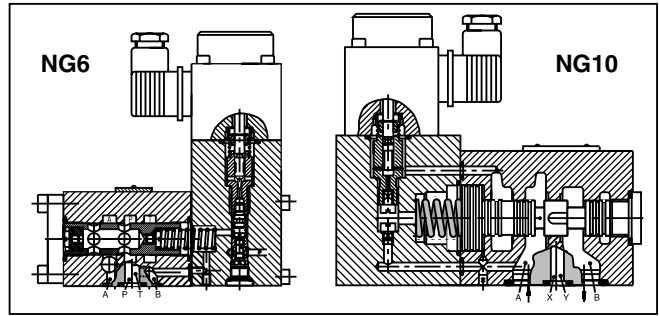
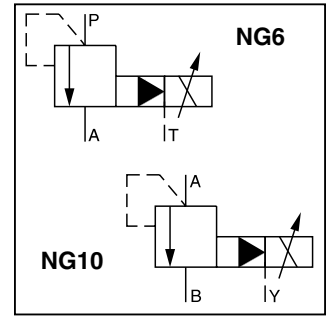
**General Description**

Series VBY\*K pilot operated sequence valves feature proportional adjustment and an external drain. The external drain allows application as both a sequence valve and as a pressure relief valve.

These valves can also be used as a pressure relief valve. Please observe hydraulic connection.

**Features**

- Proportional adjustment.
- Manifold mounting acc. to ISO 5781.
- External drain.
- Main stage spool type valve.
- Pilot stage seated type valve.



**Specifications**

General		NFPA D03 / NG6 / CETOP 3	NFPA D05 / NG10 / CETOP 5
Size			
Design		Proportional Pressure Valve	
Mounting Pattern		ISO 5781	
Actuation		Proportional Solenoid	
Mounting Position		Any	
Ambient Temperature		-20°C to +70°C (-4°F to +158°F)	
Hydraulics			
Operating Pressure, Ports		P, A 315 Bar (4500 PSI) T depressurized	A, B 315 Bar (4500 PSI) Y depressurized
Flow		40 LPM (10.6 GPM)	160 LPM (42.3 GPM)
Pressure Ranges		64, 100, 160, 210, 315 Bar (928, 1450, 2320, 3045, 4568 PSI)	
Fluid		Hydraulic oil as per DIN 51524...51535, other on request	
Fluid Temp.	Recommended Permitted	+30°C to +50°C (+86°F to +122°F) -20°C to +70°C (-4°F to +158°F)	
Viscosity Range	Recommended Permitted	30 to 50 cST / mm <sup>2</sup> /s (139 to 232 SSU) 20 to 380 cST / mm <sup>2</sup> /s (93 to 1761 SSU)	
Filtration		ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)	
Linearity		±3.5% at > 15% p <sub>nom</sub>	
Repeatability		<±2%	
Hysteresis		<3%	
Response Time		<150 ms	<200 ms
Manufacturing Tolerance		±5% to p <sub>max</sub>	
Electrical			
Duty Cycle		100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible	
Protection Class		IP54 at DIN 40050 (plugged and mounted)	
Nominal Voltage		9 VDC	
Maximum Current		2.5 A	
Coil Resistance		21 ohm at 20°C (68°F)	
Plug Connectors		2 pole + PE / connector EN 175301-803 / cable Ø 8 to 10mm	
Power Amplifier		PCD00A-400	

VBY\_K.indd ddp



**Ordering Information**

**B**

**VBY**  
 Sequence Valve

**Pressure Range**

Code	Description
064	64 Bar (928 PSI)
100	100 Bar (1450 PSI)
160	160 Bar (2320 PSI)
210	210 Bar (3000 PSI)
315	315 Bar (4500 PSI)

**K**  
 Linear Solenoid

Code	Description
K	9 VDC, 2.5 A

**Size**

Code	Description
06	NG6
10	NG10

**Seal**

Code	Description
N	Nitrile
V	Fluorocarbon

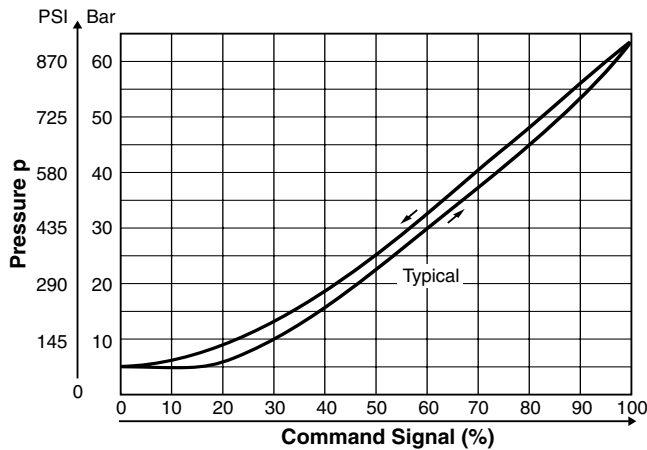
**Design Series**  
 NOTE:  
 Not required when ordering.

**Weight:**  
 VBY\*K06 2.4 kg (5.3 lbs.)  
 VBY\*K10 4.5 kg (8.9 lbs.)

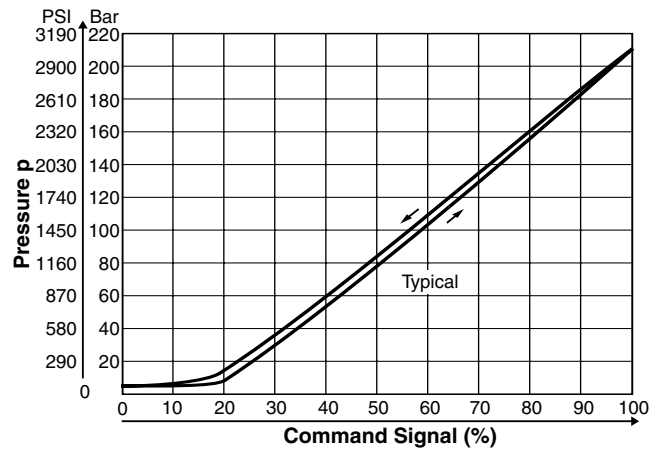
**Performance Curves - NG6**

Pressure Curves where  $p = f(U_{set})$

**Setting Range max. 64 Bar (928 PSI)**

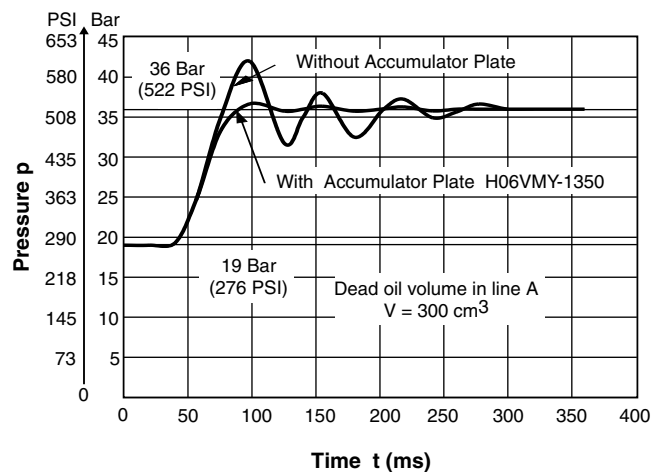
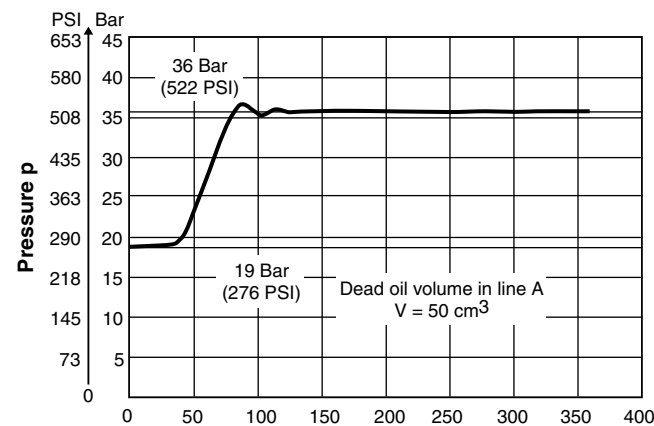


**Setting Range max. 210 Bar (3045 PSI)**



**Step Response Signal**

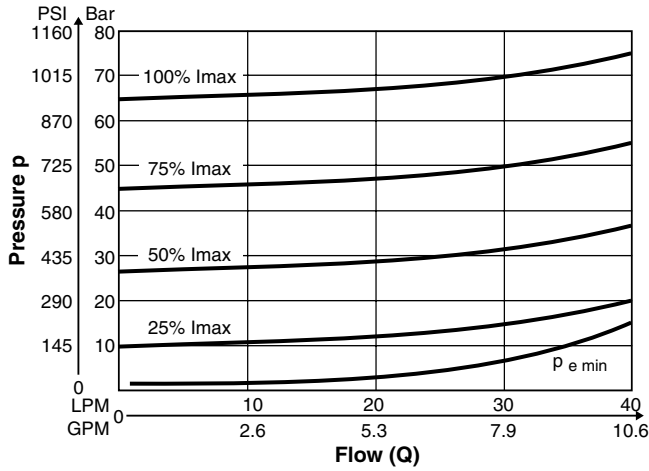
**Setting Range max. 210 Bar (3045 PSI)**



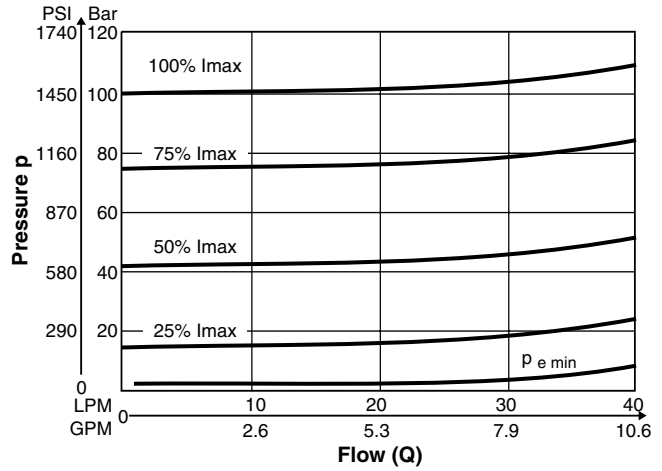
**NG6**

p/Q Performance Curves measured at  $t = 50^{\circ}\text{C}$  ( $122^{\circ}\text{F}$ ) and  $v = 36\text{mm}^2/\text{s}$

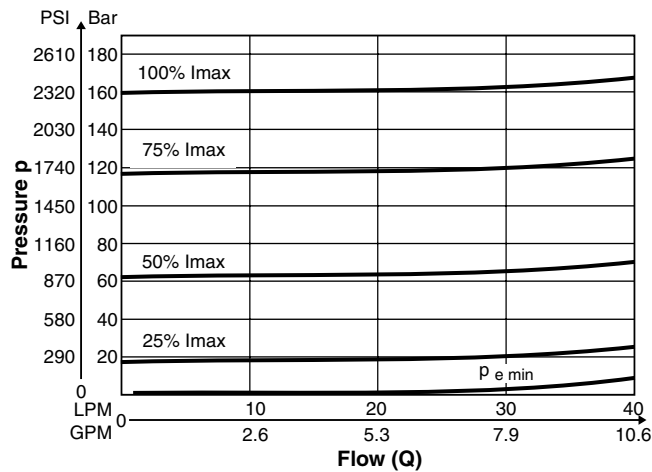
**Setting Range max. 64 Bar (928 PSI)**



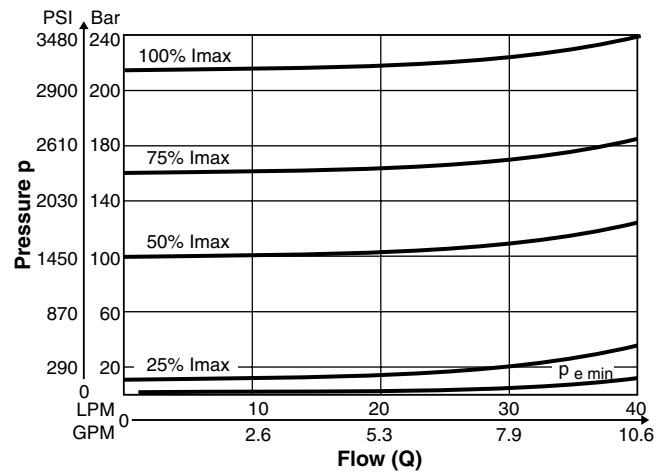
**Setting Range max. 100 Bar (1450 PSI)**



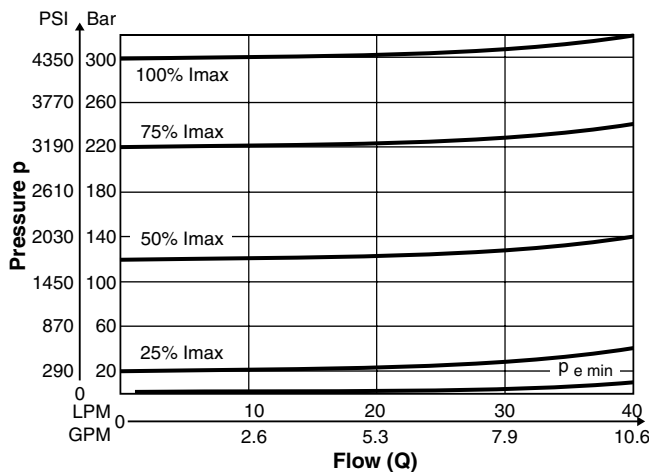
**Setting Range max. 160 Bar (2320 PSI)**



**Setting Range max. 210 Bar (3000 PSI)**



**Setting Range max. 315 Bar (4500 PSI)**



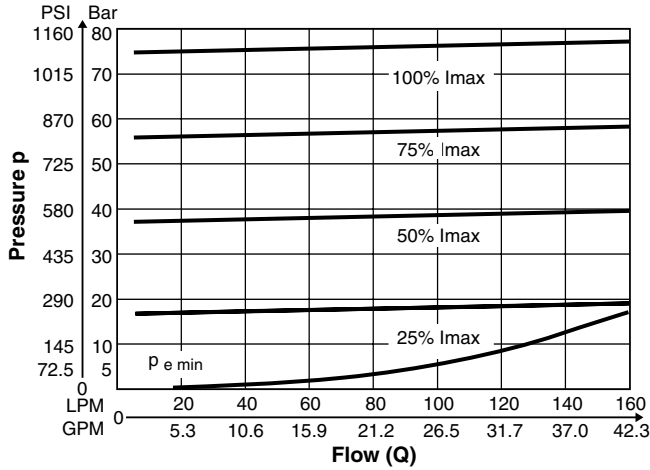
**Note:**  
 Accumulator Plate  
 H06VMY-1350  
 Height: 40 mm (1.58 in.)



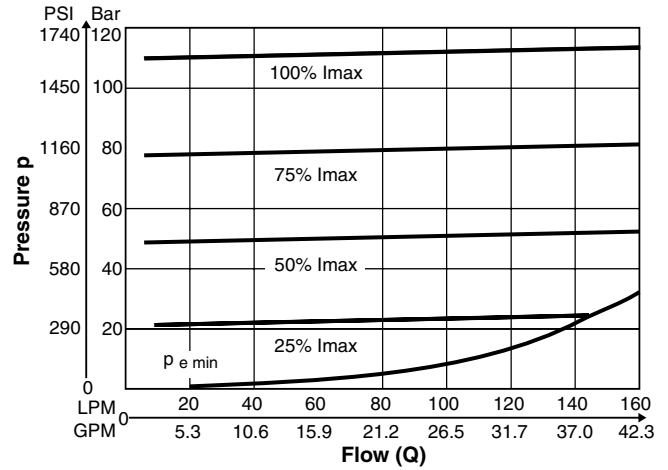
**NG10**

p/Q Performance Curves measured at  $t = 50^{\circ}\text{C}$  ( $122^{\circ}\text{F}$ ) and  $v = 36\text{mm}^2/\text{s}$

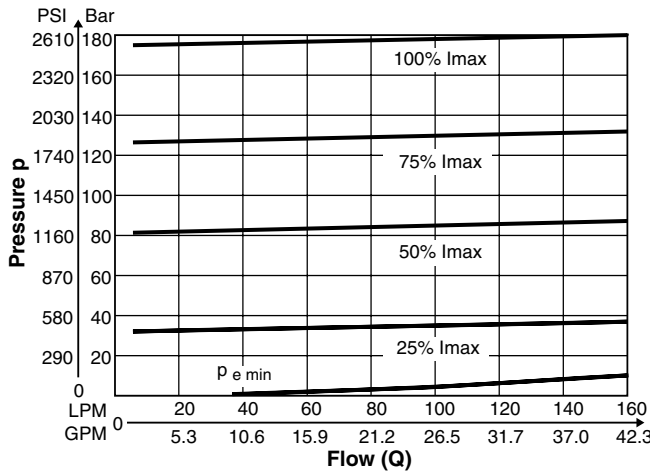
**Setting Range max. 64 Bar (928 PSI)**



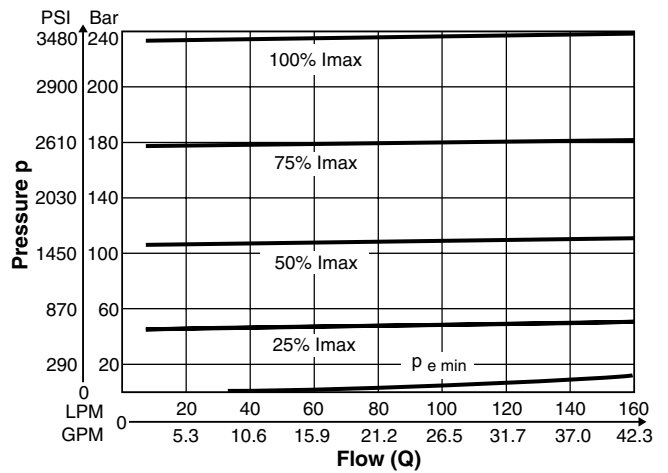
**Setting Range max. 100 Bar (1450 PSI)**



**Setting Range max. 160 Bar (2320 PSI)**



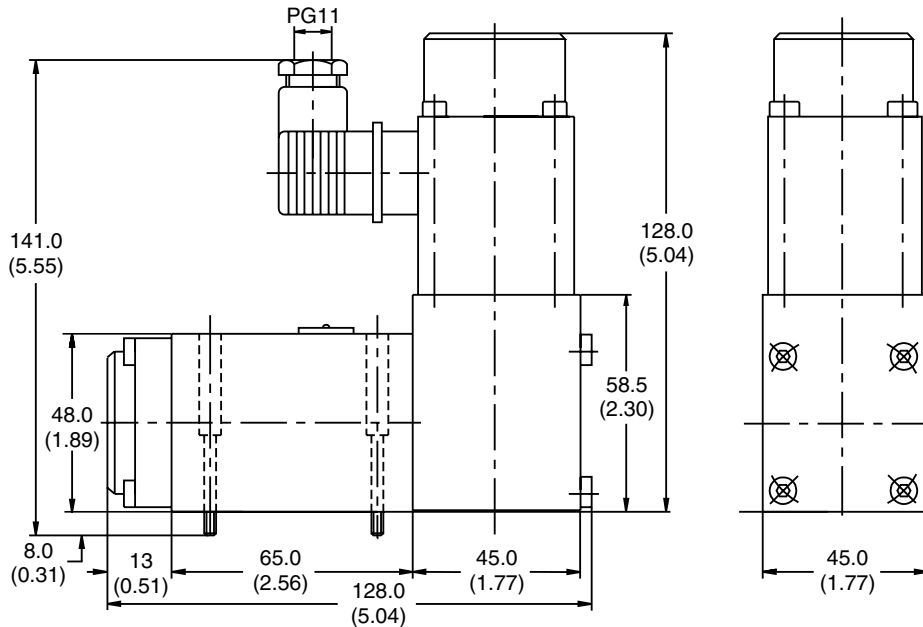
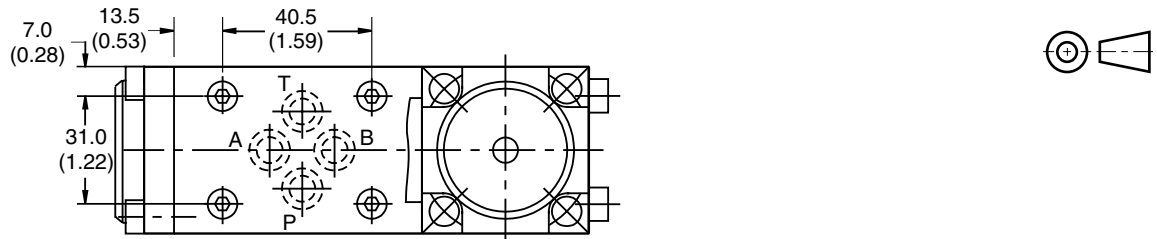
**Setting Range max. 210 Bar (3045 PSI)**





**Size NG6**

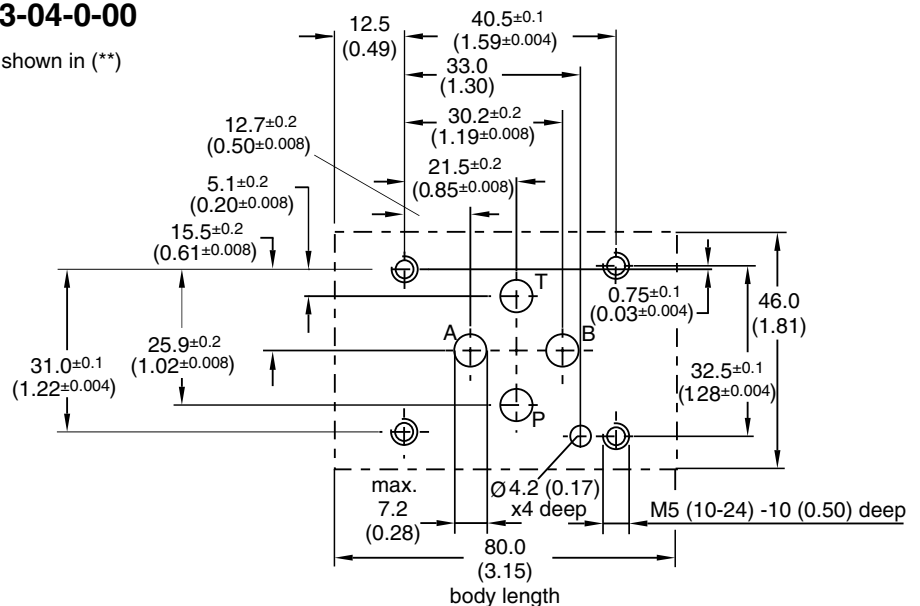
Inch equivalents for millimeter dimensions are shown in (\*\*)



<b>Surface Finish</b> 	<b>Bolt Kit</b> <b>DIN912 12.9</b> BK375 4x-M5x30 BK209 4x10-24x1.25"	<b>7.5 Nm (5.5 lb.-ft.)</b>	<b>Seal</b> <b>Kit</b> <b>Nitrile</b> SK-VMY-L06-N <b>Fluorocarbon</b> SK-VMY-L06-V
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**Mounting Pattern ISO 5781-03-04-0-00**

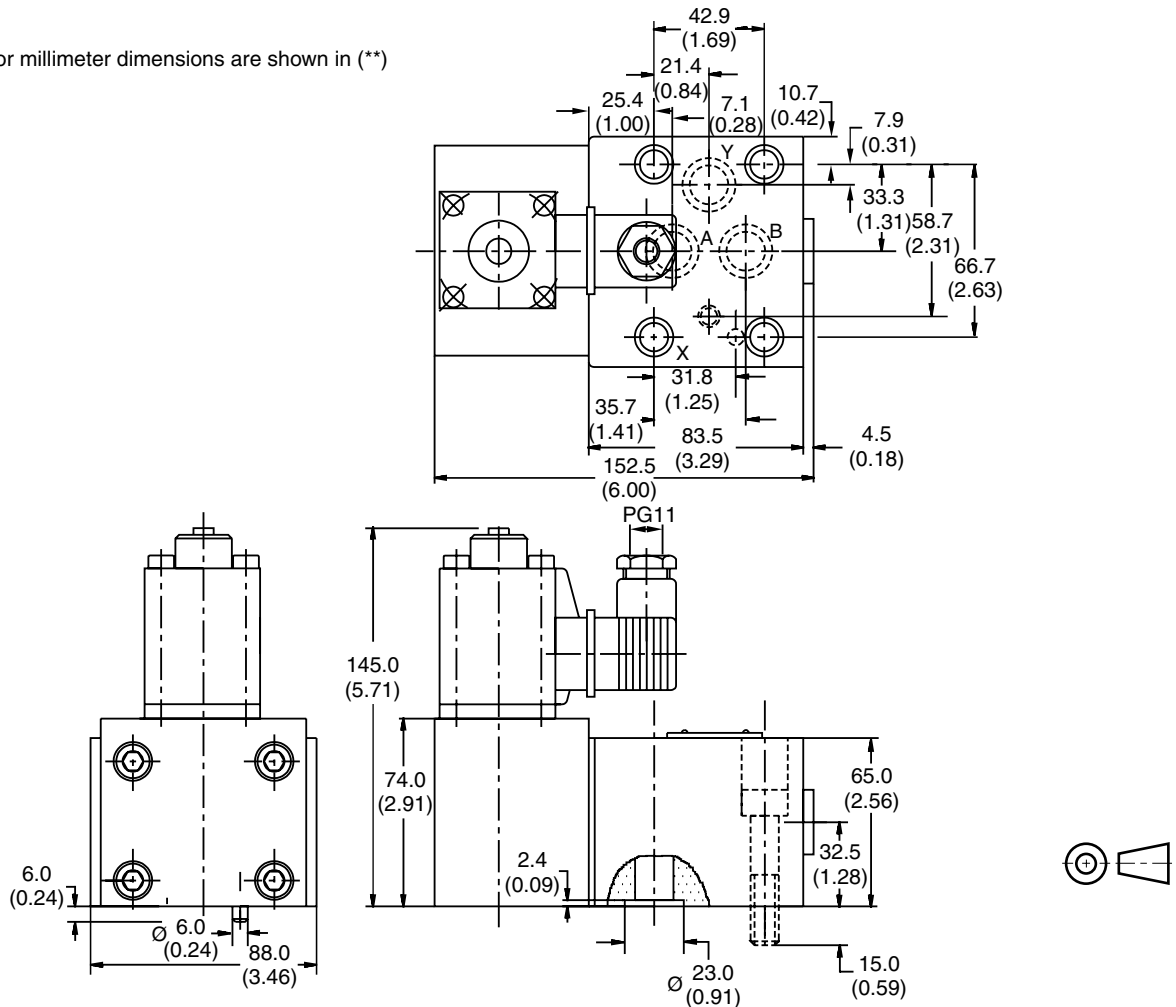
Inch equivalents for millimeter dimensions are shown in (\*\*)




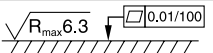


**Size NG10**

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

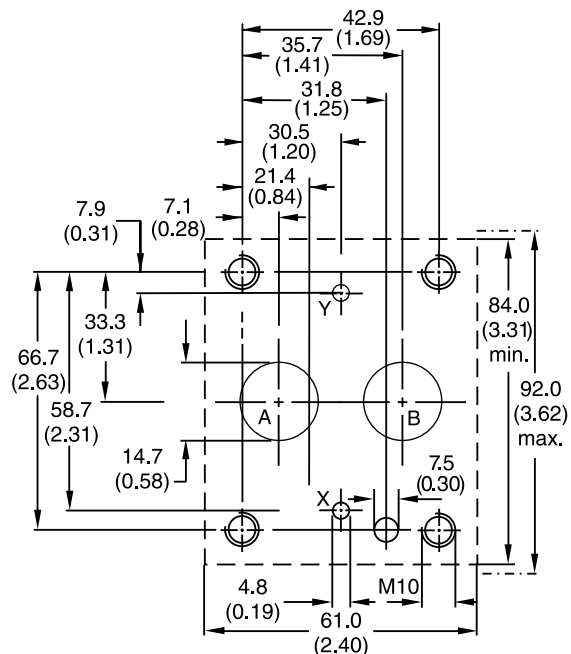
**B**



Surface Finish	Bolt Kit  DIN912 12.9		Seal  Kit
	BK389 4xM10x50 BK242 4x3/8-16x2	65 Nm (47.9 lb.-ft.)	Nitrile: SK-VB/VM-A10 Fluorocarbon: SK-VB/VM-A10V

**Mounting Pattern ISO 5781-06-07-0-00**

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



**General Description**

Series VMY\*K valves consist of the main stage with valve spools and the pilot stage with the proportional solenoids. The desired pressure can be variably set corresponding to the command signal specified on the amplifier. The proportional solenoid converts the current of the amplifier into force on the valve poppet of the pilot stage.

In the pilot stage, there is a flow limiter which supplies the pilot valve with pressure-independent pilot oil flow from the pressure port P.

The proportional pressure reducing valves of the series VMY\*06 allow the variable adjustment of the reduced pressure from 0 bar up to  $p_{max}$ . Typical applications are pressure systems, test equipment, or counterweight systems. The electrical control of the valve takes place using the digital amplifier module PCD00A-400. Used in closed loop pressure control circuits with the PWDXXA-400.

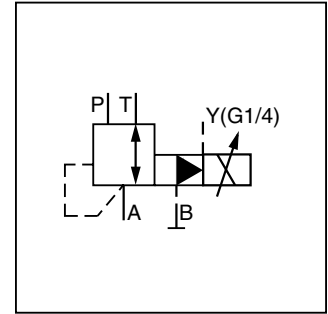
**Function**

With the proportional solenoids de-energized the main spring forces the main spool into the neutral position. Port A is connected to port T. Thus the reduced pressure only depends on the back pressure in the external drain pipe and/or the tank pressure and can accordingly be reduced down to 0 bar. The pressure present in the P line delivers the pilot oil to the pilot stage via a flow control valve.

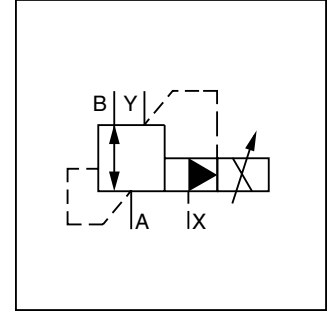
When the proportional solenoid is energized, the pilot pressure is increased in the pilot pressure area, and



VMY\*K06



VMY\*K06



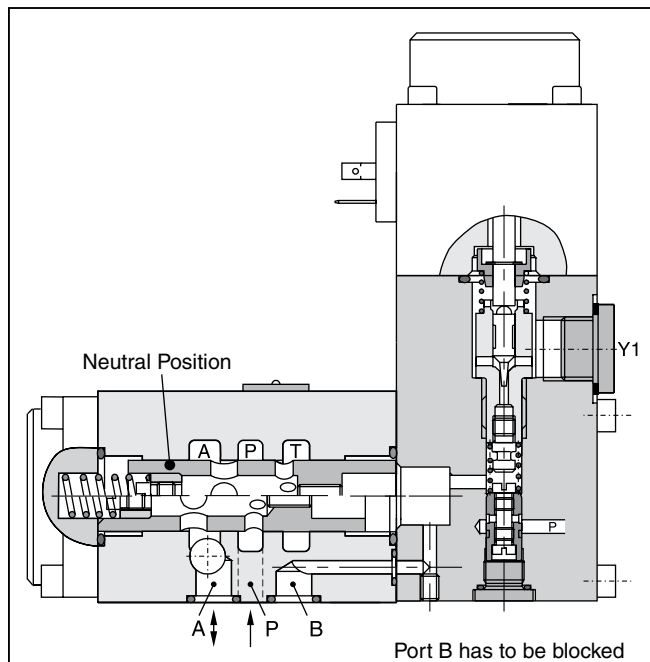
VMY\*K10

the main spool moves against the spring until the connection P - A opens. The regulation of the reduced pressure on connection A takes place by the constant comparison of the actual pressure and the reference pressure of the pilot stage.

**Features**

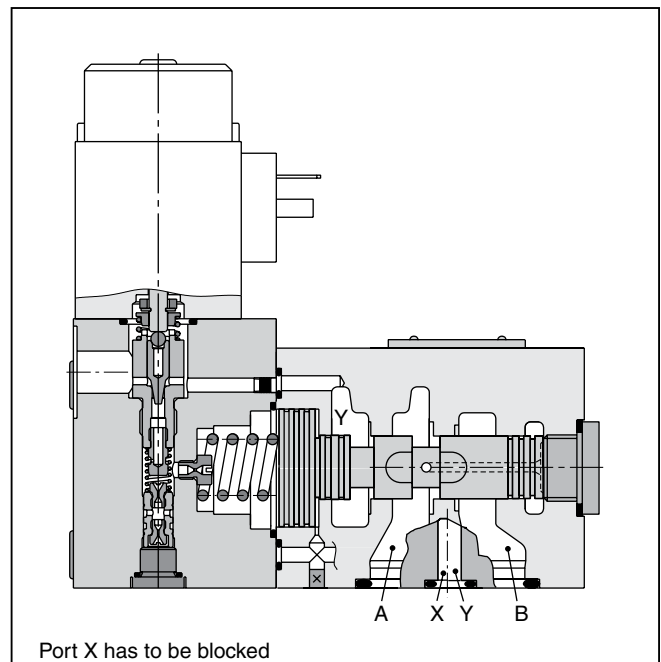
- Consistent performance.
- Variable adjustment.
- Pilot operated with proportional solenoid.
- Subplate according to ISO 5781

**VMY\*K06N**

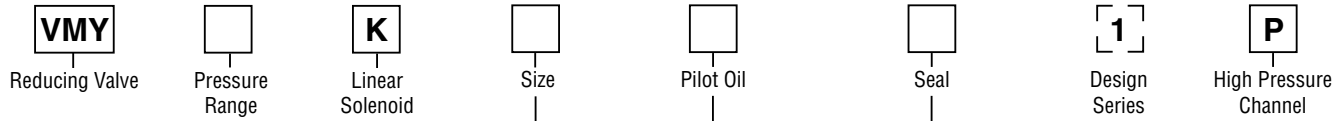


VMY.indd, ddp

**VMY\*K10**



**Ordering Information**



Code	Description
064	64 Bar (928 PSI)
100	100 Bar (1450 PSI)
160	160 Bar (2320 PSI)
210	210 Bar (3000 PSI)
315	315 Bar (4568 PSI)

Code	Description
06	NG6
10	NG10

Code	Description
N*	Nitrile
V	Fluorocarbon

\* Size 10 only

Pilot Oil				
Code	Size	Pilot	Drain	p <sub>min</sub>
Omit	10	Internal	Internal	3 - 4 Bar (43.5 - 58 PSI)
N <sup>1)</sup>	06	Internal	External <sup>2)</sup>	0.5-1 Bar (7 - 14.5 PSI)
T	06	Internal	Internal	1-2 Bar (14.5 - 29 PSI)

**Weight:**

VMY\*06 2.8 kg (6.2 lbs.)  
 VMY\*10 5.0 kg (11.0 lbs.)

<sup>1)</sup> Connection on port Y  
<sup>2)</sup> p<sub>min</sub> = 0 Bar (0 PSI) possible

**Specifications**

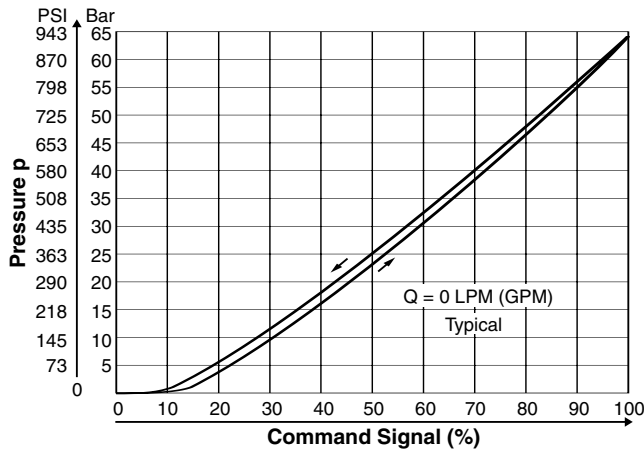
General	
<b>Design</b>	Proportional Reducing Valve
<b>Size</b>	NFPA D03 / CETOP 3 / DIN NG6      DIN NG10
<b>Mounting Pattern</b>	ISO 5781
<b>Actuation</b>	Proportional Solenoid
<b>Mounting Position</b>	Any
<b>Ambient Temperature</b>	-20°C to +80°C (-4°F to +176°F)
Hydraulics	
<b>Operating Pressure, Ports</b>	Ports P, A 315 Bar (4500 PSI) Ports T, Y depressurized; Port B has to be blocked      Ports A, B 350 Bar (5075 PSI) Port Y depressurized; Port X has to be blocked
<b>Flow</b>	40 LPM (10.6 GPM)      160 LPM (42.2 GPM)
<b>Pilot Flow</b>	0.3 - 0.4 LPM (.08 - .011 GPM), not dependent on pressure
<b>Pressure Ranges</b>	64, 100, 160, 210, 315 Bar (928, 1450, 2320, 3045, 4568 PSI)
<b>Fluid</b>	Hydraulic oil as per DIN 51524...51535, other on request
<b>Fluid Temperature</b>	<b>Recommended Permitted</b> +30°C to +50°C (+86°F to +122°F) -20°C to +70°C (-4°F to +158°F)
<b>Viscosity</b>	<b>Recommended Permitted</b> 30 to 50 cSt / mm <sup>2</sup> /s (139 to 232 SSU) 20 to 380 cSt / mm <sup>2</sup> /s (93 to 1761 SSU)
<b>Filtration</b>	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)
<b>Linearity</b>	See Performance Curves      ±3.5 at >15% p <sub>nom</sub>
<b>Repeatability</b>	<±2%
<b>Hysteresis</b>	<3%
<b>Response Time</b>	<150 ms      <200 ms
Electrical	
<b>Duty Cycle</b>	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible
<b>Protection Class</b>	IP65 in accordance with EN 60529 (plugged and mounted)
<b>Nominal Voltage</b>	9 VDC
<b>Maximum Current</b>	2.5 A
<b>Ambient Temperature</b>	-20°C to +70°C (-4°F to +158°F)
<b>Coil Resistance</b>	2.1 ohm at 20°C (68°F)
<b>Plug Connectors</b>	2 pole + PE / connector EN 175301-803 / cable Ø 8 to 10mm
<b>Power Amplifier</b>	PCD00A-400

VMY.indd, ddp

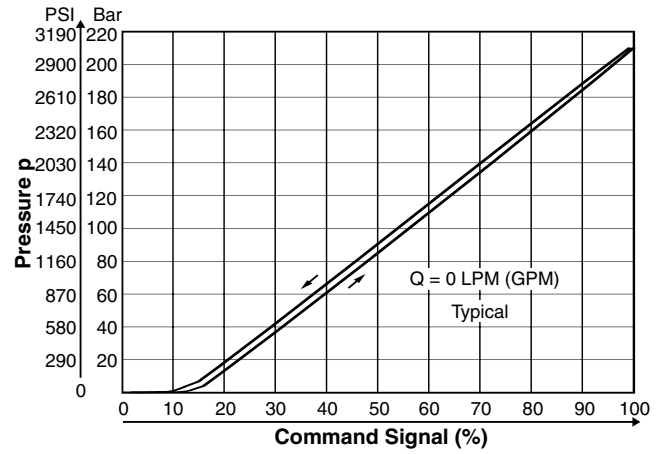


Pressure Curves where  $p = f(U_{set})$

Setting Range max. 64 Bar (928 PSI)

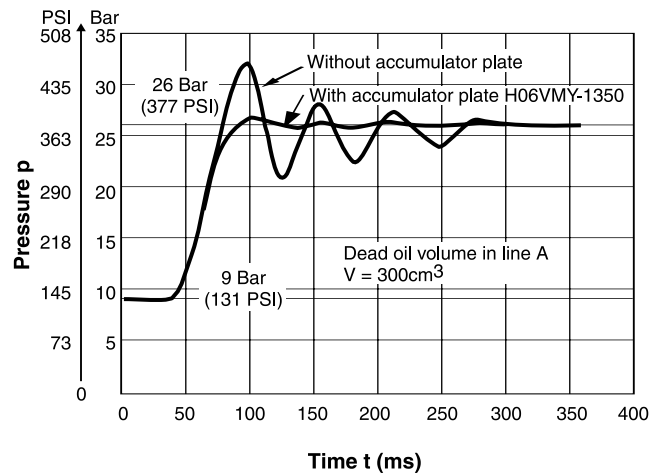
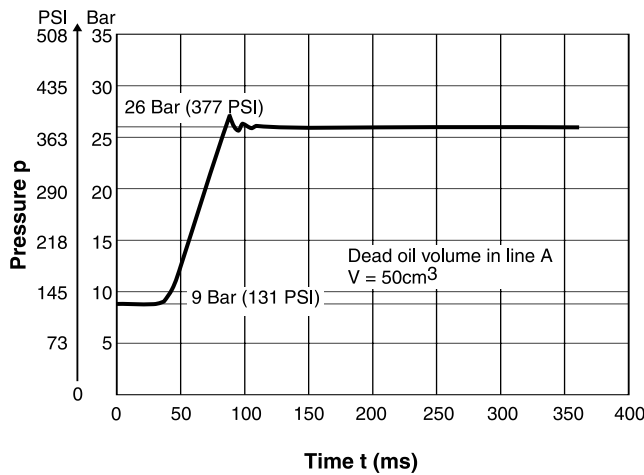


Setting Range max. 210 Bar (3045 PSI)



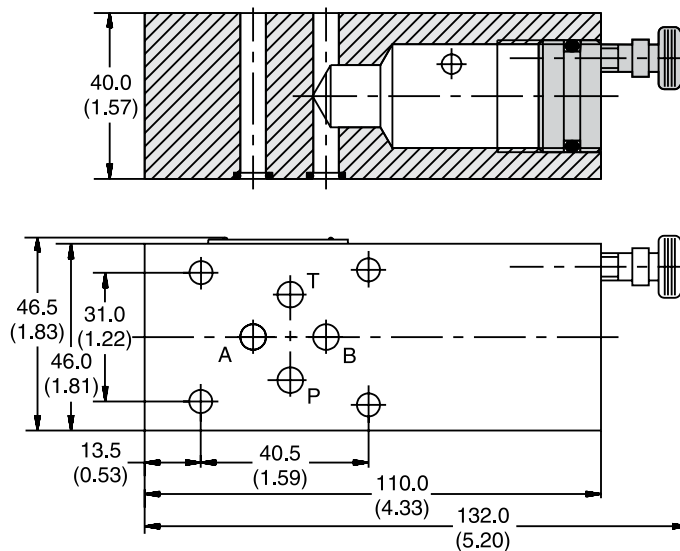
**Step Response**

Typical Curve



**Accumulator Plate H06VMY-1350**

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

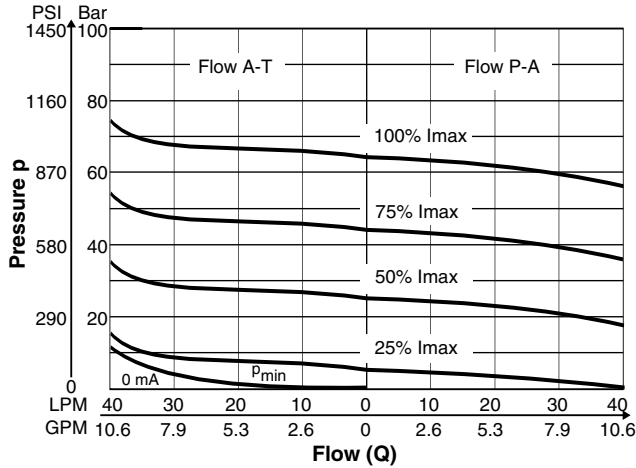


VMY.indd, ddp

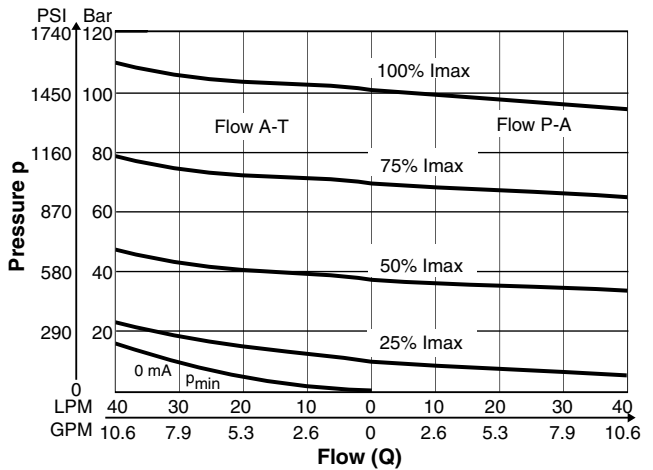


p/Q Performance Curves measured at  $t = 50^{\circ}\text{C}$  ( $122^{\circ}\text{F}$ ) and  $v = 35\text{mm}^2/\text{s}$ .

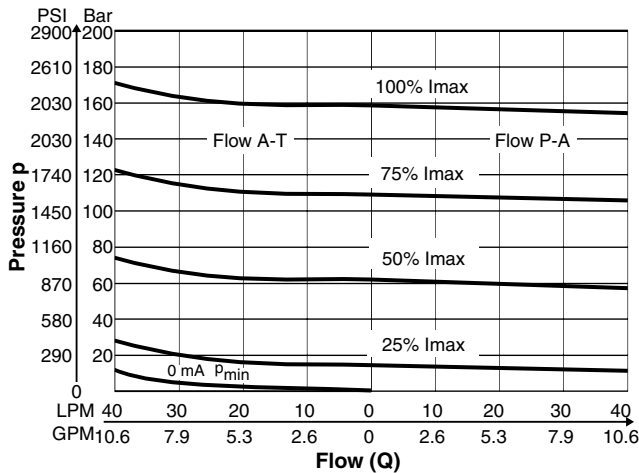
**Setting Range max. 64 Bar (928 PSI)**



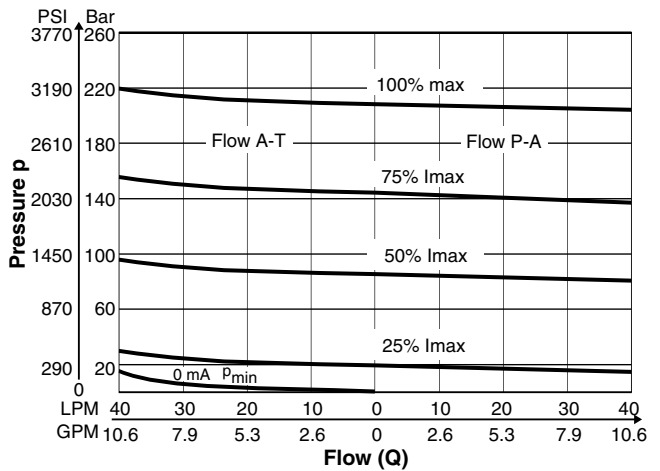
**Setting Range max. 100 Bar (1450 PSI)**



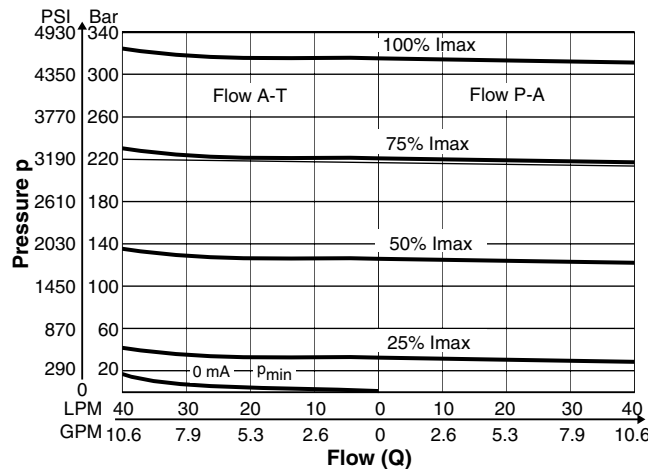
**Setting Range max. 160 Bar (2320 PSI)**



**Setting Range max. 210 Bar (3045 PSI)**

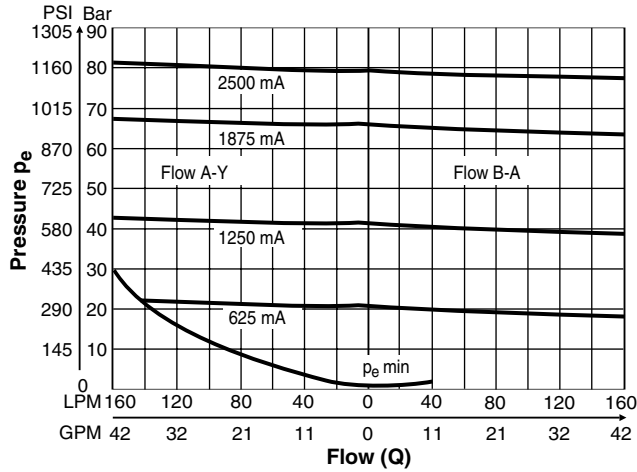


**Setting Range max. 315 Bar (4568 PSI)**

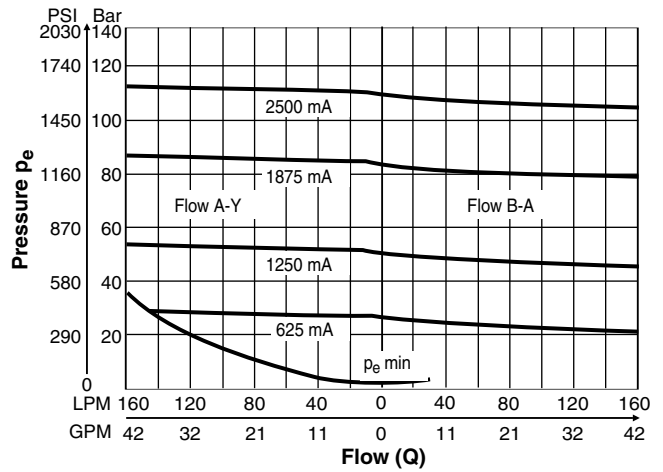


p/Q Performance Curves for pilot oil supply from high pressure channel P, measured with HLP46 at 50°C (122°F).

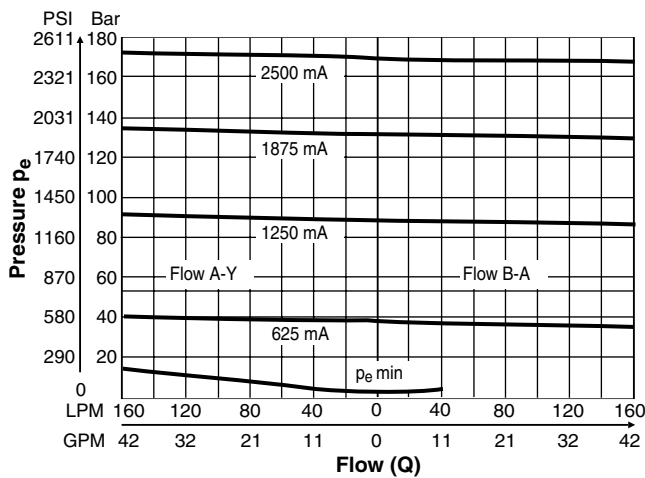
**Setting Range max. 64 Bar (928 PSI)**



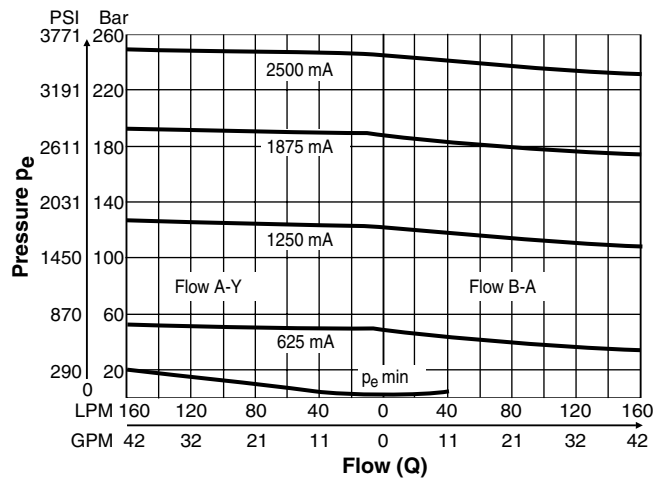
**Setting Range max. 100 Bar (1450 PSI)**



**Setting Range max. 160 Bar (2320 PSI)**



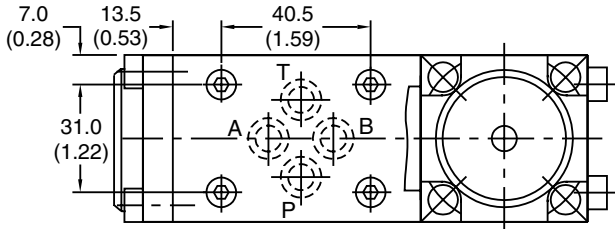
**Setting Range max. 210 Bar (3045 PSI)**



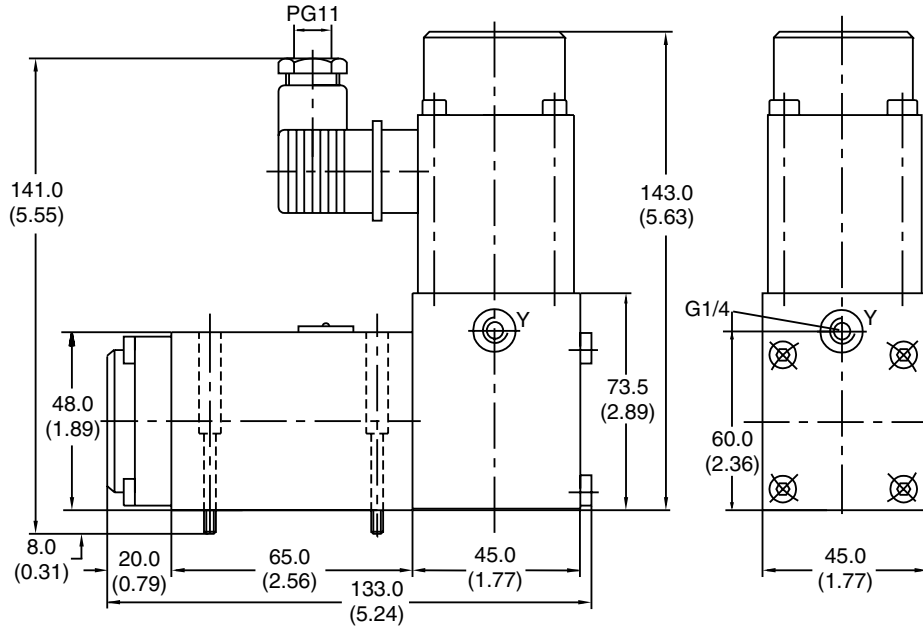
**B**

**Size NG6**

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






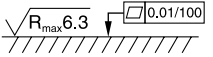
**B**



Port Y: G1/4

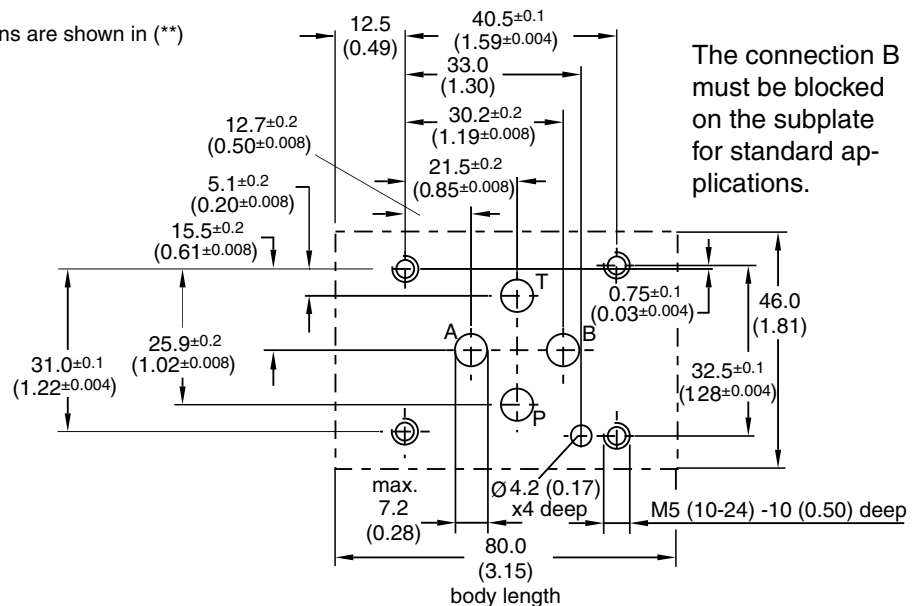
VMY\*K06T:  
Ports Y1 and Y2:  
closed

VMY\*K06N:  
Drain Ports Y1 or Y2:  
Port Y1 closed,  
Port Y2 open

Surface Finish	Bolt kit  DIN912 12.9		Seal  Kit
	BK209 (4) 10-24x1.25 BK375 (4) M5x30	7.5 Nm (5.5 lb.-ft.)	Fluorocarbon: SK-VB/VM-A06V

**Mounting Pattern ISO 5781-03-04-0-00**

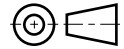
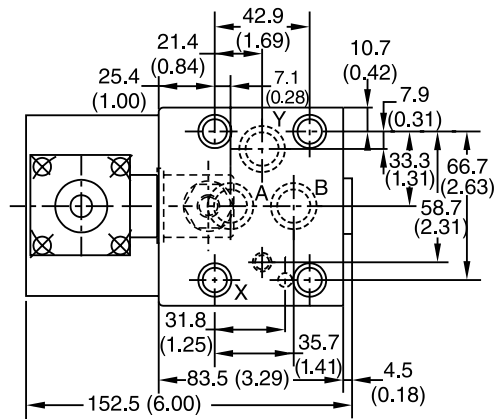
Inch equivalents for millimeter dimensions are shown in (\*\*)



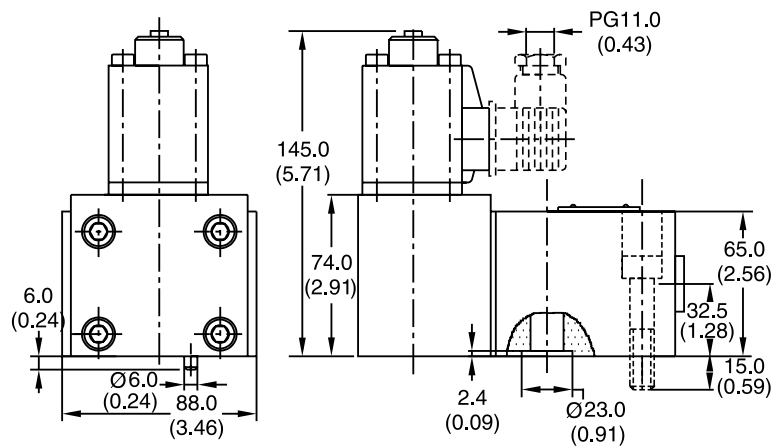





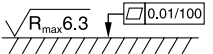
**Size NG10**

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



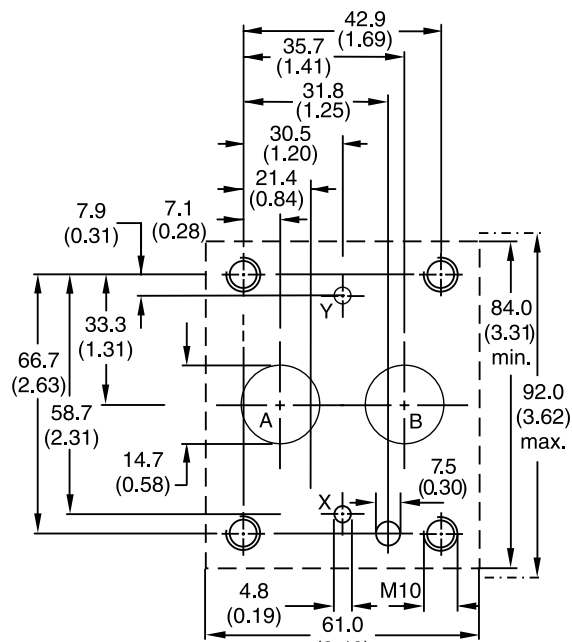
**B**



Surface Finish	Bolt kit  DIN912 12.9		Seal  Kit
	BK153 (4) 3/8-16x2 BK242 (4) M10x50	63 Nm (5.5 lb.-ft.)	Nitrile: SK-VB/VM-A10 Fluorocarbon: SK-VB/VM-A10V

**Mounting Pattern ISO 5781-06-07-0-00**

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



**General Description**

Series D1FV proportional pressure reducing valves are available with and without onboard electronics (OBE).

**D1FV OBE**

The digital onboard electronics is situated in a robust metal housing, which allows the usage under rough environmental conditions.

The nominal values are factory set. The cable for connection to a serial RS-232 interface is available as accessory.

**D1FV for External Electronics**

The parameters can be saved, changed and duplicated in combination with the digital power amplifier PWD00A-400. The value parameters can be edited with the common ProPxD software for both versions.

The D1FV values control the pressure in the A- or B-ports using the barometric feedback principle.

**Features**

- Barometric feedback.
- 3 command options for D1FV OBE: ±10V, 4...20mA, ±20mA.
- High repeatability from valve to valve.
- Low hysteresis.
- Manual override.
- Pressure ranges 25 Bar (363 PSI) and 45 Bar (653 PSI).

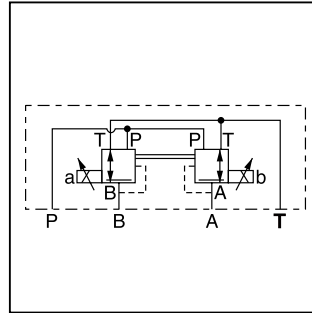
**B**



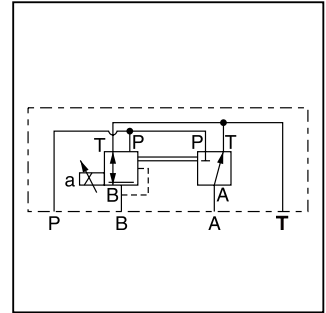
D1FV



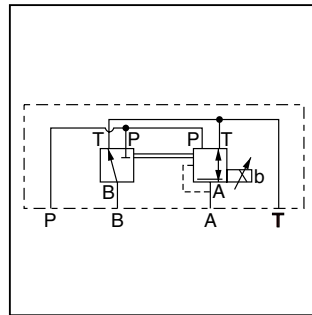
D1FV OBE



Function C

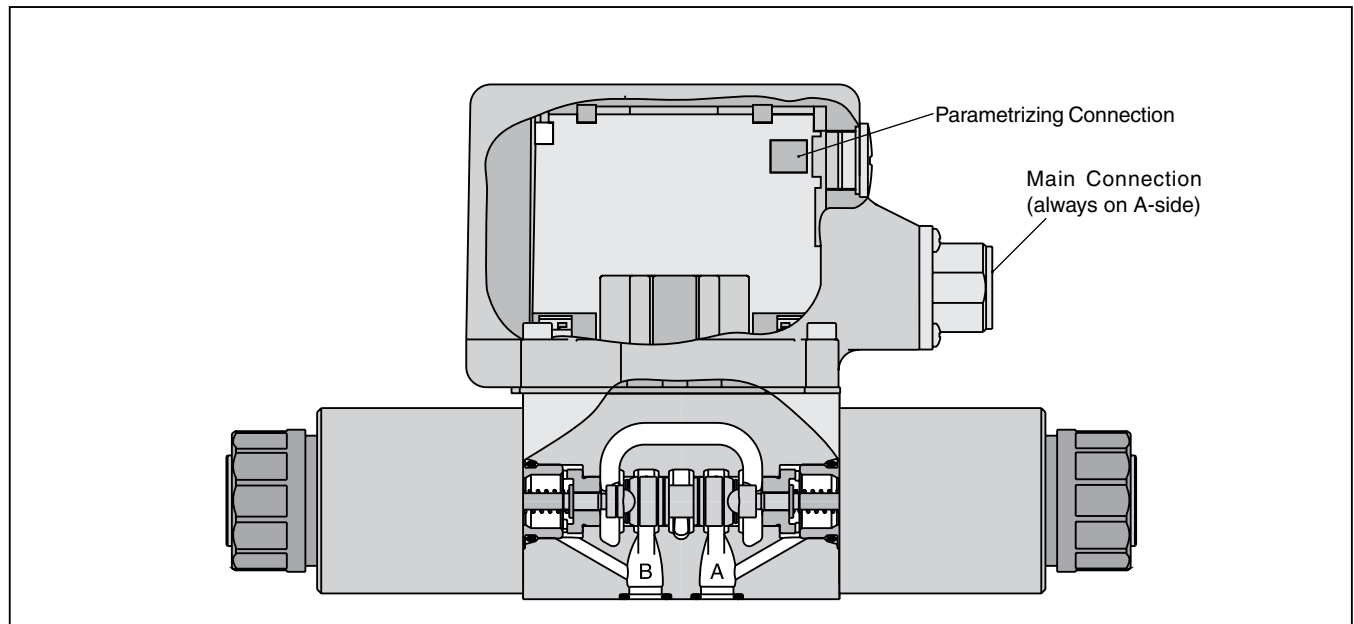


Function E



Function K

**D1FV\*3 OBE**



**D1FV Offboard Electronics**

<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">D</div> <p style="font-size: 8px; text-align: center;">Proportional Pressure Reducing Valve</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">1</div> <p style="font-size: 8px; text-align: center;">Size DIN NG6 CETOP 3 NFPA D03</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">F</div> <p style="font-size: 8px; text-align: center;">Proportional Control</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">V</div> <p style="font-size: 8px; text-align: center;">Spool Type</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">E02</div> <p style="font-size: 8px; text-align: center;">Spool Type</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"></div> <p style="font-size: 8px; text-align: center;">Pressure Range</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"></div> <p style="font-size: 8px; text-align: center;">Spool Position</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">0</div> <p style="font-size: 8px; text-align: center;">Seal</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"></div> <p style="font-size: 8px; text-align: center;">Solenoid Voltage 12V 2.2A</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"></div> <p style="font-size: 8px; text-align: center;">Connector</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">3</div> <p style="font-size: 8px; text-align: center;">Spool / Body Design</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"></div> <p style="font-size: 8px; text-align: center;">Design Series NOTE: Not required when ordering.</p>
--	---	--	--	--	--	--	--	---	---	---	---

Code	Description
C	25 Bar (363 PSI)
D	45 Bar (653 PSI)

Code	Style
C	
E	
K	

Code	Description
W*	Connector as per DIN 185301-803 without plug
J*	Connector DT04-2P "Deutsch"

\* Please order plugs separately.  
See Accessories.

Code	Description
N	Nitrile
V	Fluorocarbon

Weight: Offboard  
 D1FV 2.2 kg (4.9 lbs.)

B

**D1FV Onboard Electronics**

<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">D</div> <p style="font-size: 8px; text-align: center;">Proportional Pressure Reducing Valve</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">1</div> <p style="font-size: 8px; text-align: center;">Size DIN NG6 CETOP 3 NFPA D03</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">F</div> <p style="font-size: 8px; text-align: center;">Proportional Control</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">V</div> <p style="font-size: 8px; text-align: center;">Spool Type</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">E02</div> <p style="font-size: 8px; text-align: center;">Spool Type</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"></div> <p style="font-size: 8px; text-align: center;">Pressure Range</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"></div> <p style="font-size: 8px; text-align: center;">Spool Position</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">0</div> <p style="font-size: 8px; text-align: center;">Seal</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"></div> <p style="font-size: 8px; text-align: center;">Input Signal</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"></div> <p style="font-size: 8px; text-align: center;">Options</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center; font-weight: bold;">3</div> <p style="font-size: 8px; text-align: center;">Spool / Body Design</p>	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"></div> <p style="font-size: 8px; text-align: center;">Design Series NOTE: Not required when ordering.</p>
--	---	--	--	--	--	--	--	--	---	---	---

Code	Description
C	25 Bar (363 PSI)
D	45 Bar (653 PSI)

Code	Style
C	
E	
K	

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Input Signal <sup>1)</sup>	Function	Port	Options
F0	0...+/-10V	0...+10V > P-A	6 + PE	Potentiometer supply
G0	0...+/-20mA	0...+20mA > P-A	6 + PE	—
M0	0...+/-10V	0...+10V > P-B	6 + PE	Potentiometer supply
S0	4...20mA	12...20mA > P-A	6 + PE	—
W5 <sup>2)</sup>	0...+/-10V 4...20mA 0...+/-20mA	0...+10V > P-A 12...20mA > P-A 0... 20mA > P-A	11 + PE	Potentiometer supply & command preset channel

**Bolt Kit:**  
 BK209 (4) 10-24x1.25  
 BK375 (4) M5x30  
**Weight: Onboard**  
 D1FV 2.9 kg (6.4 lbs.)  
 Please order plugs separately. See Accessories.

<sup>1)</sup> Single solenoid always 0...+/-10V respectively 4...20mA.  
<sup>2)</sup> Factory set ± 10V on delivery.

Parametrizing cable OBE => RS-232  
 Item no. 40982923

B

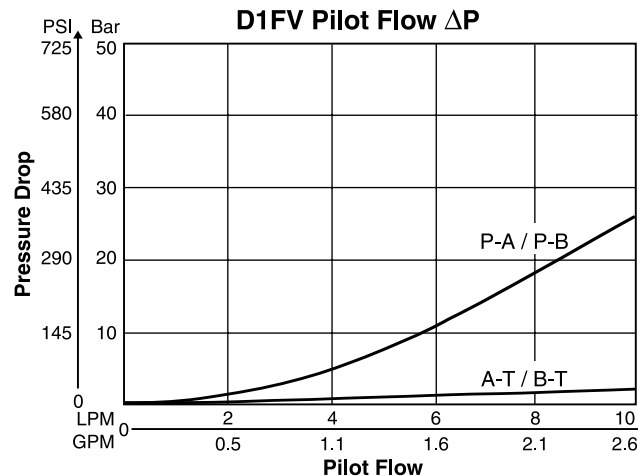
General	
Design	Direct operated proportional pressure reducing valve
Actuation	Proportional solenoid
Size	NG6 / CETOP 3 / NFPA D03
Mounting Interface	DIN 24340 / ISO 4401 / CETOP RP121 / NFPA
Mounting Position	Unrestricted
Ambient Temperature	[°C] -20...+40; (-4°F...+104°F)
MTTF <sub>d</sub> Value	[years] 150 (75)
Vibration Resistance	[g] 10 Sinus 5...2000 Hz acc. IEC 68-2-6 30 Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27
Hydraulic	
Maximum Operating Pressure	Ports P, A, B 350 Bar (5075 PSI) Port T 185 Bar (2683 PSI)
Maximum Pressure Drop PABT / PBAT	350 Bar (5075 PSI)
Fluid	Hydraulic oil as per DIN 51524...51535, other on request
Fluid Temperature	[°C] -20...+40 (-4°F...+104°F)
Viscosity Permitted	[cSt] / [mm <sup>2</sup> /s] 20...380 (93...1761 SSU)
Recommended	[cSt] / [mm <sup>2</sup> /s] 30...80 (139...371 SSU)
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)
Maximum Flow	10 LPM (2.6 GPM)
Minimum Primary Pressure	30 Bar (435 PSI)
Static / Dynamic	
Hysteresis	[%] <4
Temperature Drift Solenoid Current	[%/K] <0.02
Electrical	
Duty Ratio	[%] 100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class	Standard (as per EN175301-803) IP65 in accordance with EN60529 (with correctly mounted plug-in connector); DT04-2P "Deutsch" IP69K (with correctly mounted plug-in connector)
Supply Voltage	[V] 12
Current Consumption	[A] 2.2
Resistance	[Ohm] 4.4
Coil Insulation Class	F (155 °C) (311°F)
Solenoid Connection	Connector as per EN 175301-803 (code W), DT04-2P "Deutsch" connector (code J). Solenoid identification as per ISO 9461.
Wiring Minimum	[mm <sup>2</sup> ] 3x1.5 (AWG 16) overall braid shield (Code W), "Deutsch" connector DP4 2-Pin (Code J)
Wiring Length Maximum	[m] 50 (164 ft.) recommended

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

**Electrical Specifications**

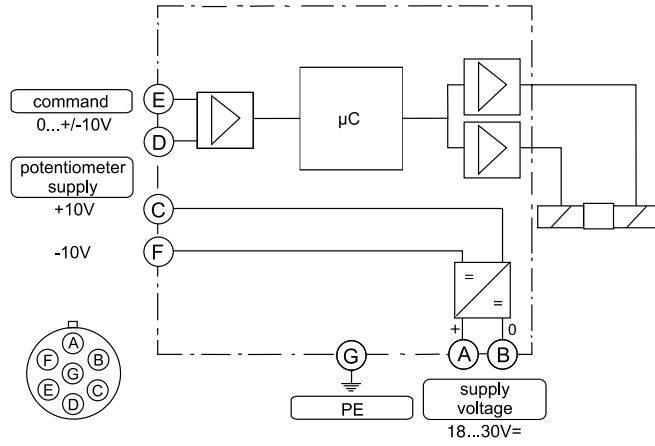
Electrical		
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Protection Class		IP65 in accordance with EN 60529 (plugged and mounted)
Supply Voltage/ripple DC	[V]	18...30, ripple < 5% eff., surge free
Current Consumption Maximum	[A]	2.0
Pre-fusing Medium Lag	[A]	2.5
Input Signal		
Codes F0 & W5 Voltage	[V]	+10...0...-10, ripple < 0.01 % eff., surge free, Ri = 100kOhm, 0...+10V => P -> A
Code M0 Voltage	[V]	+10...0...-10, ripple < 0.01 % eff., surge free, Ri = 100kOhm, 0...+10V => P -> B
Codes S0 & W5 Current	[mA]	4...12...20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 12...20mA => P -> A < 3.6 mA = enable off, > 3.8 mA = enable on (acc. to NAMUR NE43)
Code G0	[mA]	+20...0...-20, ripple < 0.01 % eff., surge free, Ri = 200Ohm, 0...+20mA => P -> A
Differential input max.		
Codes F0, G0, M0 & S0	[V]	30 for terminal D and E against PE (terminal G) 11 for terminal D and E against 0V (terminal B)
Code W5	[V]	30 for terminal 4 and 5 against PE (terminal PE) 11 for terminal 4 and 5 against 0V (terminal 2)
Channel Recall Signal	[V]	0...2.5: off / 5...30: on / Ri = 100 kOhm
Adjustment Ranges:		
Min	[%]	0...50
Max	[%]	50...100
Ramp	[s]	0...32.5
Interface		RS-232, parametrizing connection 5 pole
EMC		EN 61000-6-2, EN 61000-6-4
Central Connection		
Codes F0, G0 M0 & S0		6 + PE acc. to EN 175201-804
Code W5		11 + PE acc. to EN 175201-804
Wiring Minimum		
Codes F0, G0 M0 & S0	[mm <sup>2</sup> ]	7 x 1.0 (AWG16) overall braid shield
Code W5	[mm <sup>2</sup> ]	11 x 1.0 (AWG16) overall braid shield
Wiring Length Maximum	[m]	50 (164 ft.)

**Performance Curves**

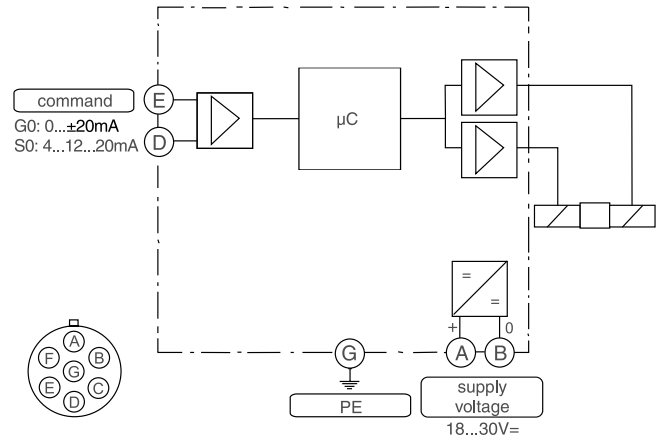


All performance curves measured with HLP46 at 50°C (122°F).

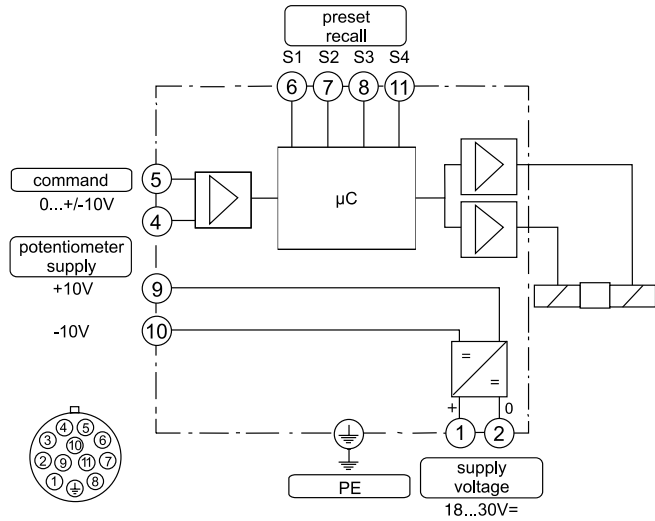
**Code F0, M0**  
**6 + PE acc. to EN 175201-804**



**Code G0, S0**  
**6 + PE acc. to EN 175201-804**



**Code W5**  
**11 + PE acc. to EN 175201-804**



**B**

**ProPxD Interface Program**

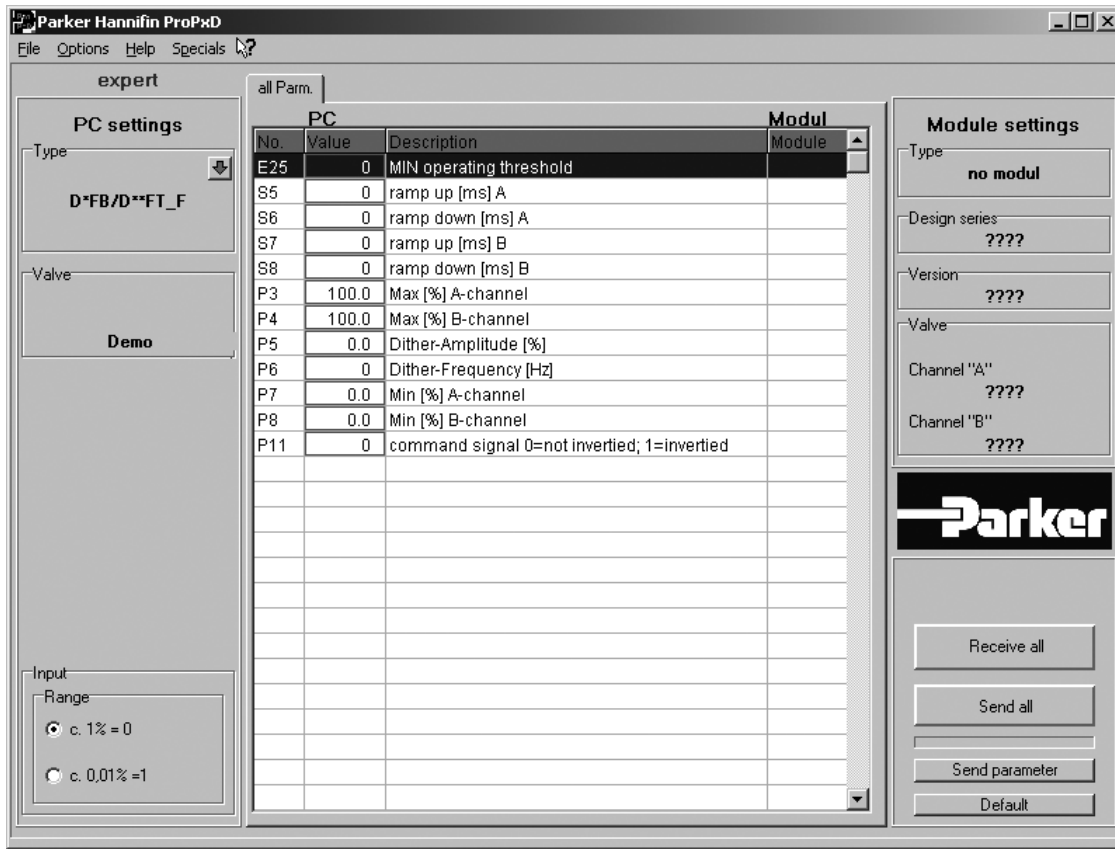
The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

**Features**

- Simple editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronics via serial interface RS-232.

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

Simple to use interface program. Download free of charge [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) → **Services** → **downloads**



The parametrizing cable may be ordered under item no. 40982923.

**Dimensions**

**Proportional Pressure Reducing Valves  
Series D1FV (Offboard Electronics)**

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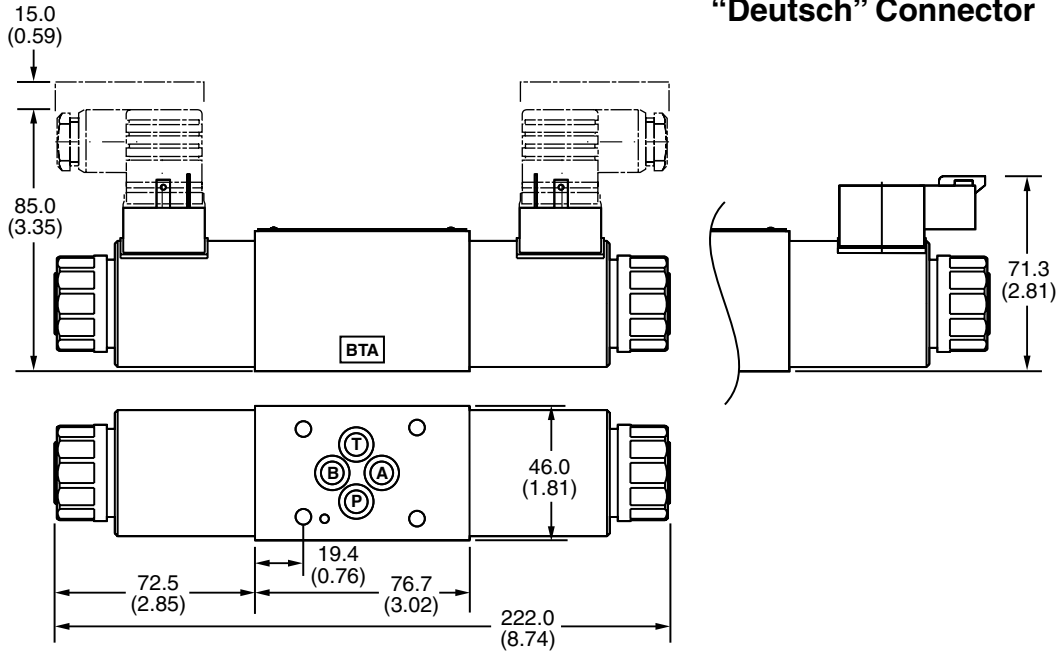
Inch equivalents for millimeter dimensions are shown in (\*\*)

**D1FV\*C**

with DT04-2P  
“Deutsch” Connector

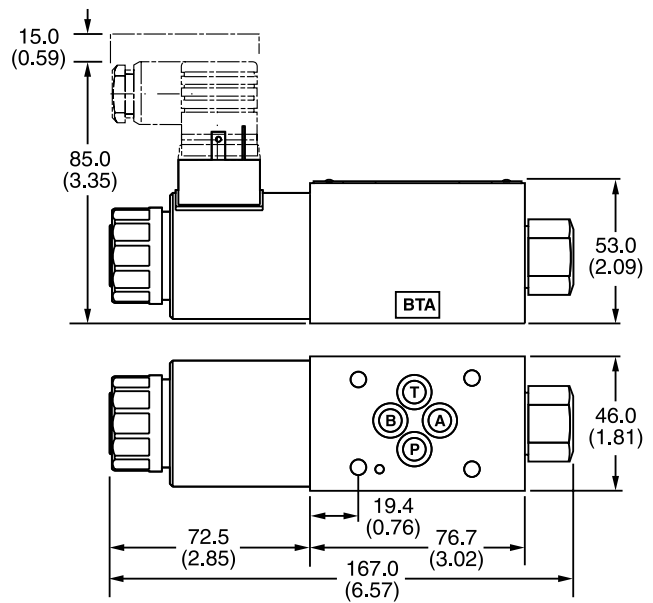
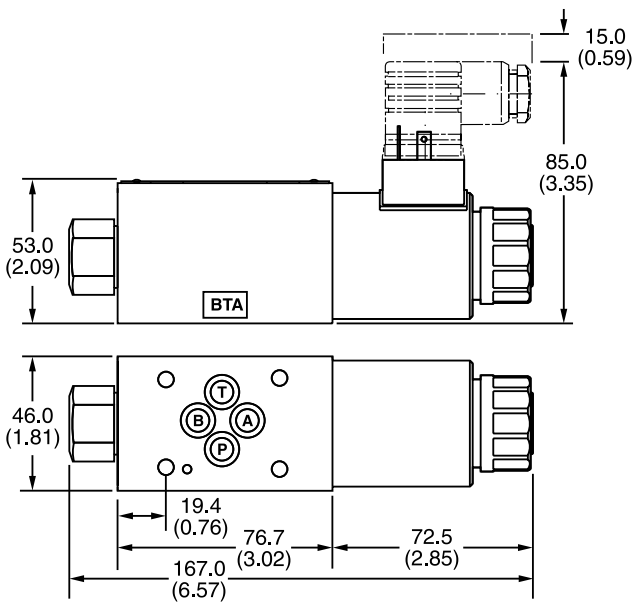


**B**



**D1FV\*E**

**D1FV\*K**



Surface Finish	Kit			Seal  Kit
	BK375	4x M5x30 DIN 912 12.9	7.6 Nm (5.6 lb.-ft.) ±15 %	Nitrile: SK-D1FB-N Fluorocarbon: SK-D1FBV

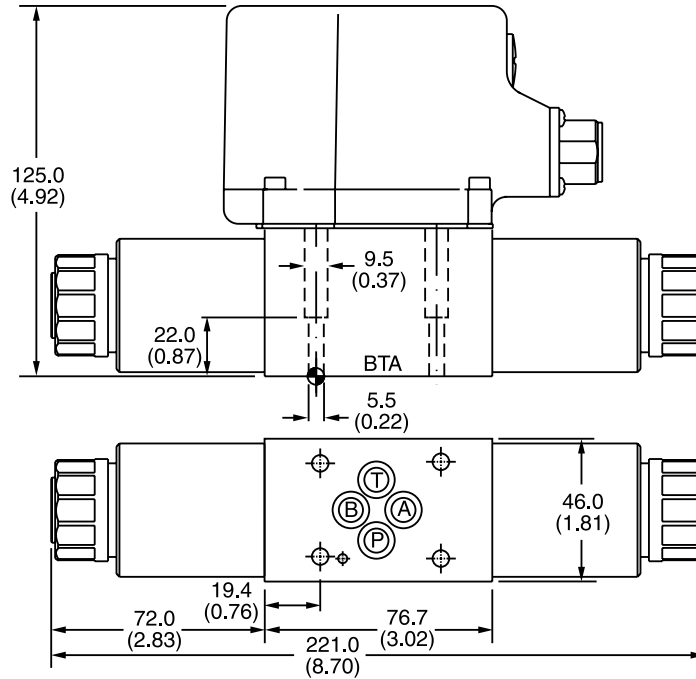
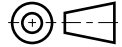
D1FV.indd, ddp





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

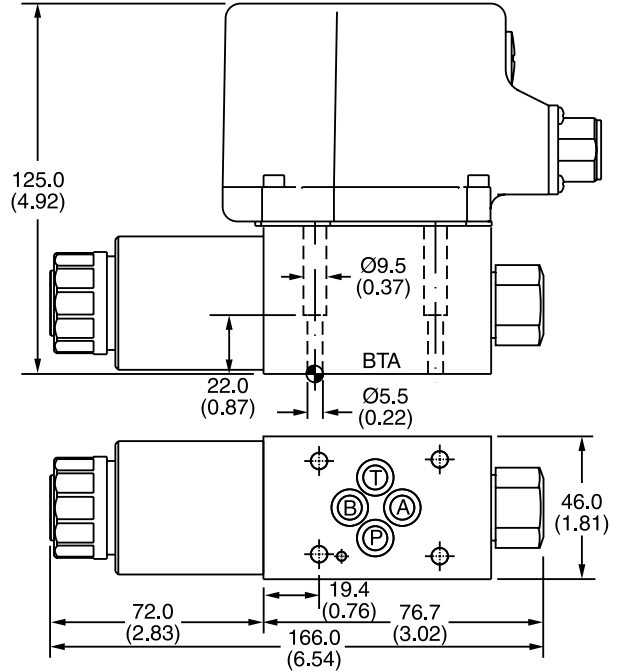
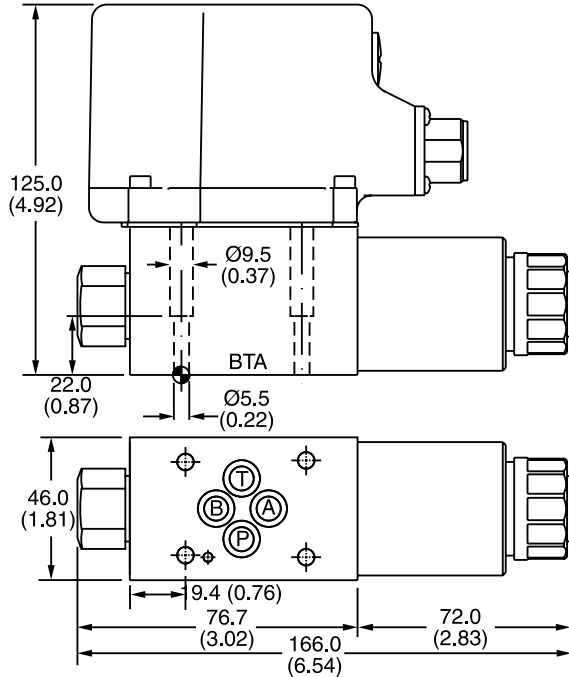
**D1FV\*C OBE**



**B**

**D1FV\*E OBE**

**D1FV\*K OBE**



Surface Finish	Kit	Kit	Kit	Seal Kit
	BK375	4x M5x30 DIN 912 12.9	7.6 Nm (5.6 lb.-ft.) ±15 %	Nitrile: SK-D1FB-N Fluorocarbon: SK-D1FBV



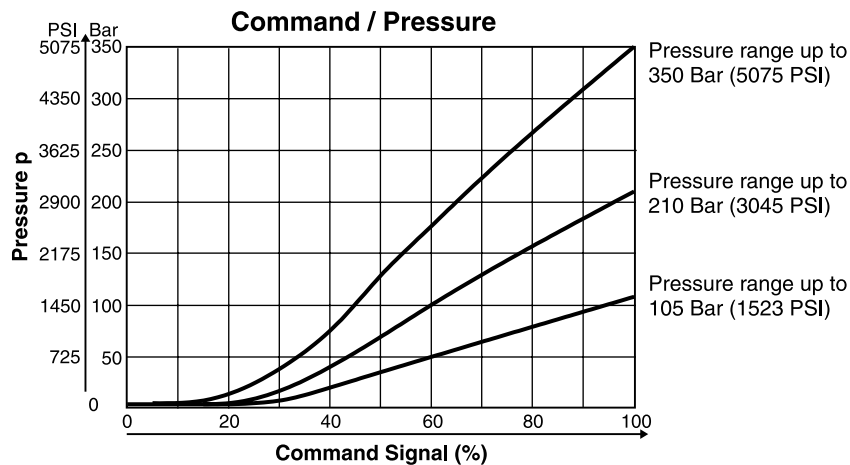


**Specifications**

**B**

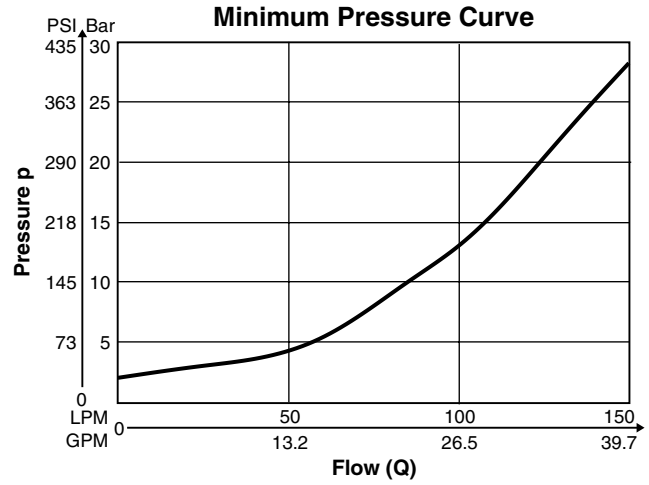
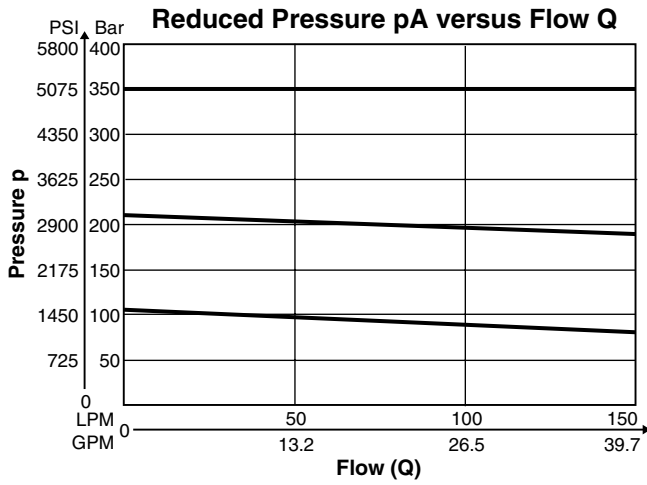
General				
Size		NG10	NG25	NG32
Interface	Subplate mounting acc. ISO 5781			
Mounting Position	Unrestricted, horizontal mounting preferred			
Ambient Temperature	[°C]	-20 ... +80; (-4°F ... +176°F)		
MTTF <sub>D</sub> Value	[years]	75		
Hydraulic				
Maximum Operating Pressure	Ports A, B and X 350 Bar (5075 PSI), Port Y depressurized			
Pressure Ranges	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)			
Nominal Flow		150 LPM (39.7 GPM)	350 LPM (92.6 GPM)	500 LPM (132.3 PSI)
Fluid	Hydraulic oil according to DIN 51524...51535, other on request			
Viscosity		30 ... 50 (139 ... 232 SSU)		
Recommended Permitted	[cSt] / [mm²/s]	20 ... 380 (93 ... 1761 SSU)		
Fluid Temperature	[°C]	-20 ... +70 (-4°F ... +158°F)		
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Electrical				
Duty Ratio	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible		
Protection Class	IP65 in accordance with EN 60529 (plugged and mounted)			
Nominal Voltage	[V]	12		
Maximum Current	[A]	2.3		
Coil Resistance	[Ohm]	4 at 20°C (68°F)		
Solenoid Connection	Connector as per EN 175301-803, Solenoid identificaton as per ISO9461			
Power Amplifier, Recommended	PCD00A-400			

**Performance Curves**

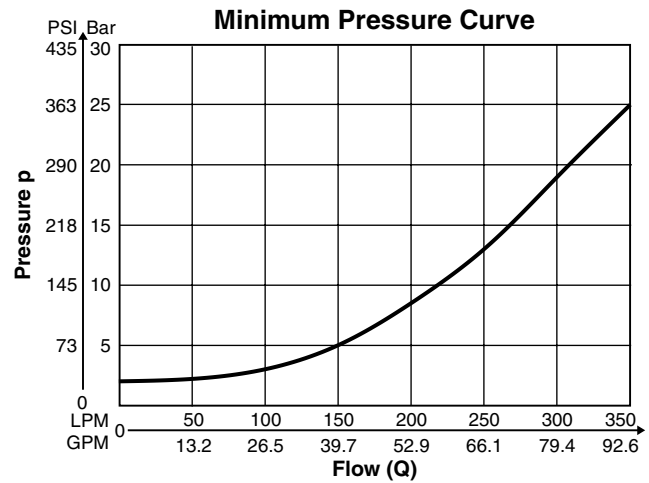
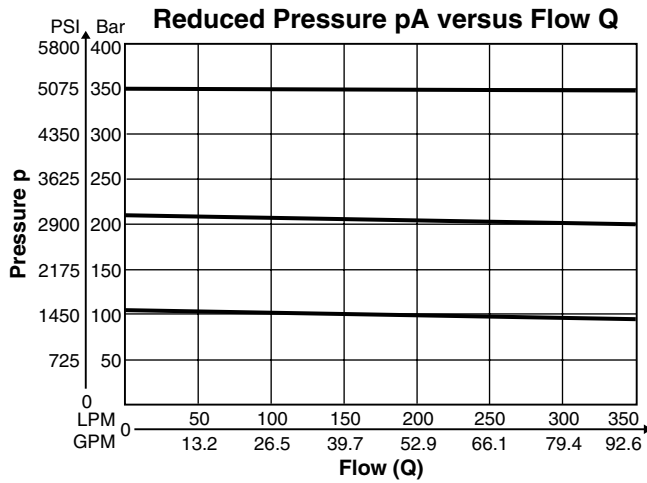


**B**

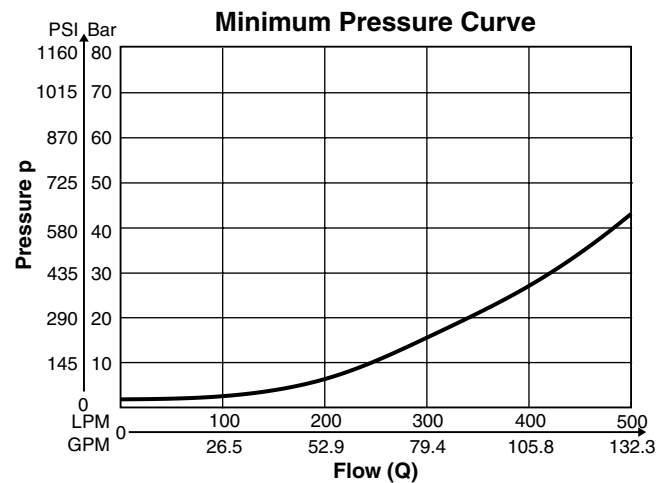
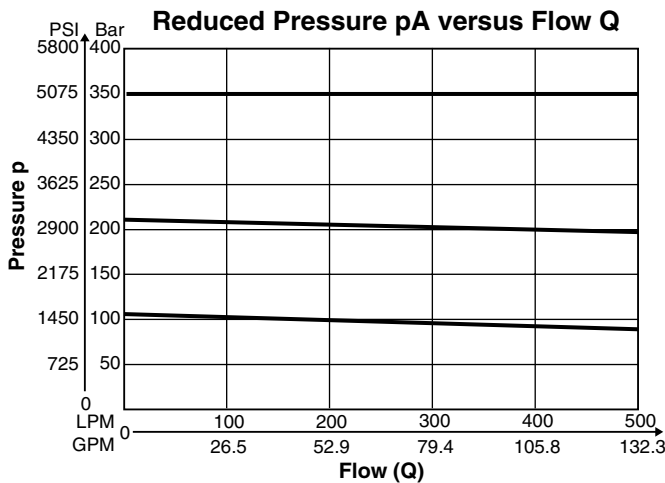
**R4R03\*P2 <sup>1)</sup>**



**R4R06\*P2 <sup>1)</sup>**

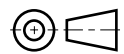
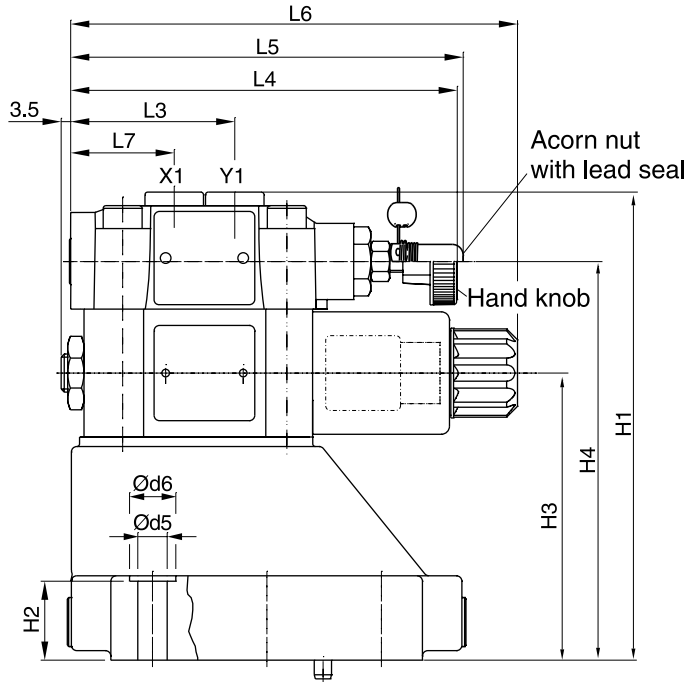
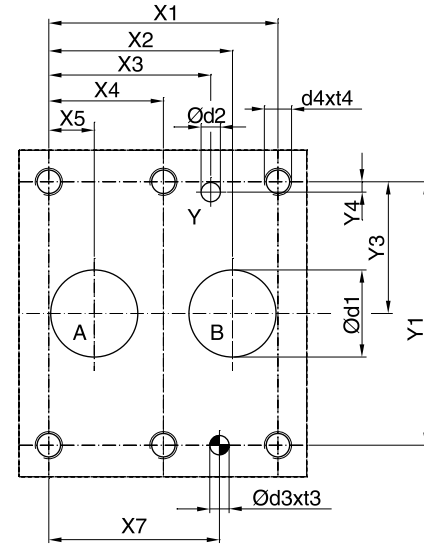
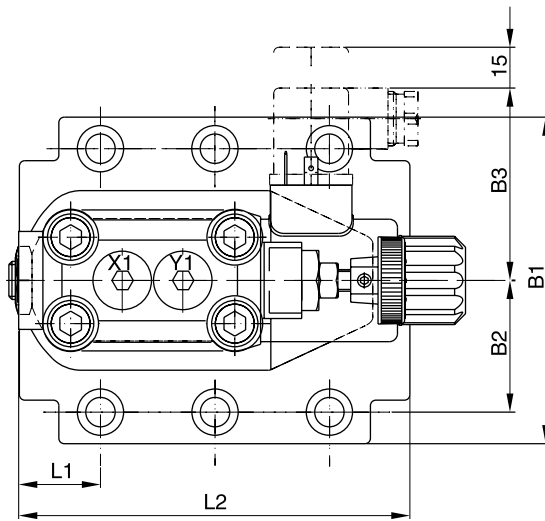


**R4R10\*P2 <sup>1)</sup>**



<sup>1)</sup> Measured at 350 Bar (5075 PSI) primary pressure pB.

**B**



**Dimensions**

**Proportional Pressure Reducing Valves  
Series R4R\*P2 (Subplate Mounted)**

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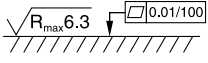
Inch equivalents for millimeter dimensions are shown in (\*\*)

NG	ISO-Code	x1	x2	x3	x4	x5	x6	x7	y1	y2	y3	y4	y5	y6
10	5781-06-07-0-00	42.9 (1.69)	35.8 (1.41)	21.5 (0.85)	-	7.2 (0.28)	-	31.8 (1.25)	66.7 (2.63)	-	33.4 (1.31)	7.9 (0.31)	-	-
25	5781-08-10-0-00	60.3 (2.37)	49.2 (1.94)	39.7 (1.56)	-	11.1 (0.44)	-	44.5 (1.75)	79.4 (3.13)	-	39.7 (1.56)	6.4 (0.25)	-	-
32	5781-10-13-0-00	84.2 (3.31)	67.5 (2.66)	59.5 (2.34)	42.1 (1.66)	16.7 (0.66)	-	62.7 (2.47)	96.8 (3.81)	-	48.4 (1.91)	3.8 (0.15)	-	-

Tolerance at X and Y pin holes and screw holes ±0.1, at port holes ±0.2.

NG	ISO-Code	B1	B2	B3	H1	H2	H3	H4	L1	L2	L3	L4	L5	L6	L7
10	5781-06-07-0-00	87.3 (3.44)	33.4 (1.31)	71.0 (2.80)	134.0 (5.28)	21.0 (0.83)	68.5 (2.70)	109.5 (4.31)	25.0 (0.98)	90.8 (3.57)	60.8 (2.38)	143.0 (5.63)	144.8 (5.70)	164.0 (6.49)	38.6 (1.52)
25	5781-08-10-0-00	105.0 (4.13)	39.7 (1.56)	71.0 (2.80)	158.5 (6.24)	29.0 (1.14)	95.0 (3.74)	136.0 (5.35)	30.9 (1.22)	123.0 (4.84)	60.8 (2.38)	143.0 (5.63)	144.8 (5.70)	164.0 (6.49)	38.6 (1.52)
32	5781-10-13-0-00	120.0 (4.72)	48.4 (1.91)	71.0 (2.80)	171.0 (6.73)	30.0 (1.18)	105.5 (4.15)	146.5 (5.77)	29.8 (1.17)	143.5 (5.65)	60.8 (2.38)	143.0 (5.63)	144.8 (5.70)	164.0 (6.49)	38.6 (1.52)

NG	ISO-Code	d1max	d2max	d3	t3	d4	t4	d5	d6	Subplate
10	5781-06-07-0-00	15.0 (0.59)	7.0 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	16.0 (0.63)	10.8 (0.43)	17.0 (0.67)	SPP3M6B910
25	5781-08-10-0-00	23.4 (0.92)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	18.0 (0.71)	10.8 (0.43)	17.0 (0.67)	SPP6M8B910
32	5781-10-13-0-00	32.0 (1.26)	7.1 (0.28)	7.1 (0.28)	8.0 (0.31)	M10	20.0 (0.79)	10.8 (0.43)	17.0 (0.67)	SPP10M12B910

NG	ISO-Code	Bolt Kit			Seal Kit		Surface Finish
					Nitrile	Fluorocarbon	
10	5781-06-07-0-00	BK505	4x M10 x 35 DIN912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58507-0*	S26-58507-5*	
25	5781-08-10-0-00	BK485	4x M10 x 45 DIN912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58475-0*	S26-58475-5*	
32	5781-10-13-0-00	BK506	6x M10 x 45 DIN912 12.9	63 Nm (46.5 lb.-ft.) ±15%	S26-58508-0*	S26-58508-5*	
Prop. Section P2					S26-58473-0	S26-58473-5	

\* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit

**General Description**

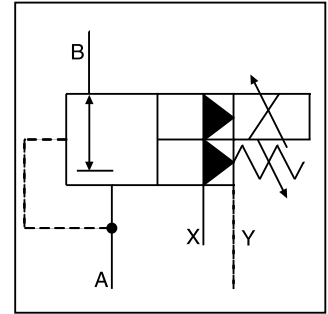
Series R4R\*P2 proportional pressure reducing valves are based on the mechanically adjusted Series R4R. The additional proportional unit between the mechanical pilot valve and the main stage allows continuous pressure adjustment.

**B**

The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.

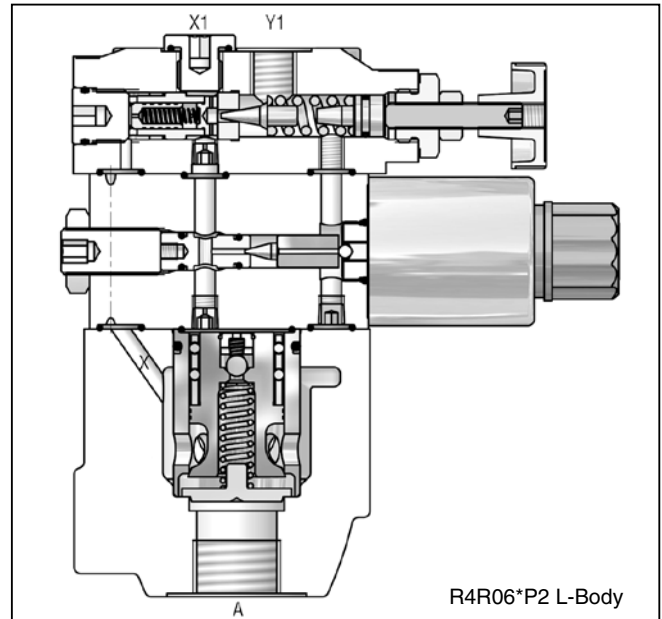


R4R10\*P2 L-Body



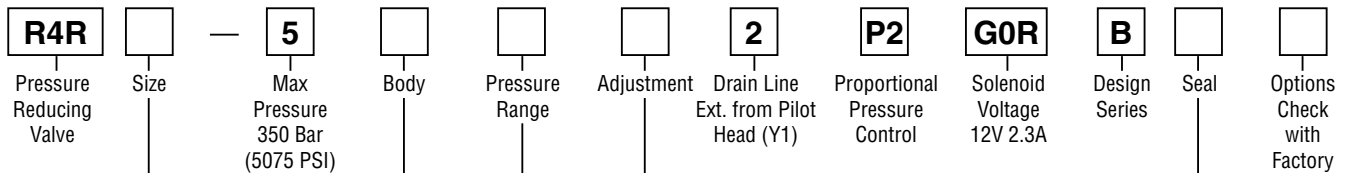
**Features**

- Pilot operated with proportional solenoid.
- Normally closed to avoid undesired motion.
- Continuous adjustment by proportional solenoid.
- 2 interfaces:
  - L-body (R4R06-G3/4", R4R10-G1-1/4") BSPP
  - T-body (R4R03-G1/2", R4R06-G1") BSPP
- 4 sizes (SAE 1/2", 3/4", 1", 1-1/4").
- 3 pressure ranges.
- With mechanical maximum pressure adjustment.



R4R06\*P2 L-Body

**Ordering Information**



Code	Description
03	NG10 (G1/2")
06	NG25 (G1" – T-Body) (G3/4" – L-Body)
10	NG32 (G1-1/4")

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal

Code	Description
1	Nitrile
5	Fluorocarbon

Code	Description
6	R4R03 T-Body R4R06 T-Body
D	R4R06 L-Body R4R10 L-Body

Code	Description
1	up to 105 Bar (1523 PSI)
3	up to 210 Bar (3045 PSI)
5	up to 350 Bar (5075 PSI)

**Bolt Kits:**

R4R03:	BK505	(4)	M10x35
R4R06:	BK485	(4)	M10x45
R4R10:	BK506	(6)	M10x45

**Weight:**

R4R03*P2:	5.0 kg (11.0 lbs.)
R4R06*6*P2:	5.1 kg (11.2 lbs.)
R4R06*D*P2:	7.4 kg (16.3 lbs.)
R4R10*P2:	8.4 kg (18.5 lbs.)

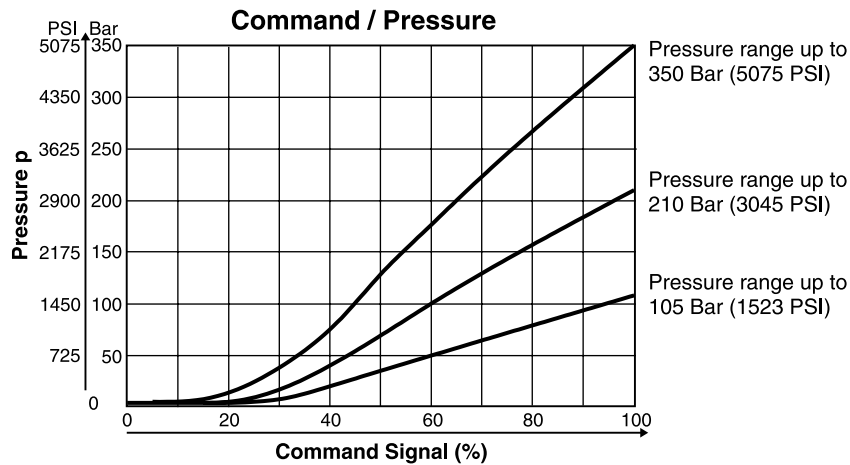


**Specifications**

General				
Size	T-Body		L-Body	
	03 (1/2")	06 (1")	06 (3/4")	10 (1-1/4")
Mounting	Threaded Body			
Mounting Position	Unrestricted			
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)			
MTTF <sub>D</sub> Value	75 years			
Hydraulic				
Max. Operating Pressure	Ports A, B and X 350 Bar (5075 PSI); Port Y depressurized			
Pressure Ranges	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)			
Nominal Flow	60 LPM (15.9 GPM)	200 LPM (52.9 GPM)	200 LPM (52.9 GPM)	450 LPM (119.0 GPM)
Fluid	Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity	10 to 380 cSt / mm <sup>2</sup> /s (46 to 1761 SSU)			
Permitted Recommended	30 to 80 cSt / mm <sup>2</sup> /s (139 to 371 SSU)			
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			
Electrical (Proportional Solenoid)				
Duty Ratio	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible			
Nominal Voltage	12 VDC			
Maximum Current	2.3 amps			
Coil Resistance	4 Ohm at 20°C (68°F)			
Solenoid Connection	Connector as per EN175301-803, Solenoid identification as per ISO9461			
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)			
Power Amplifier	PCD00A-400			

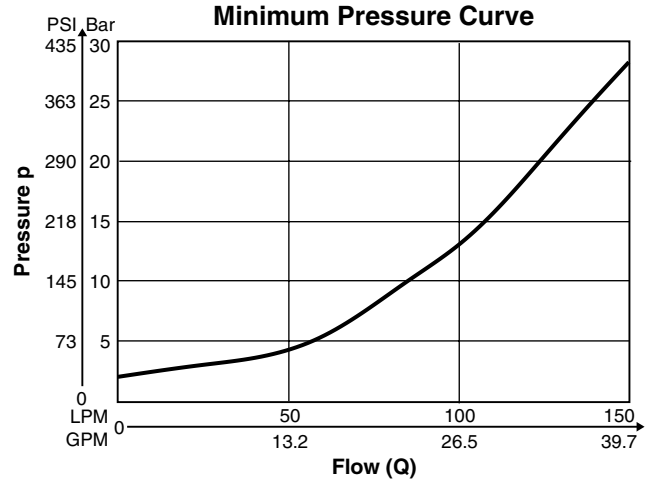
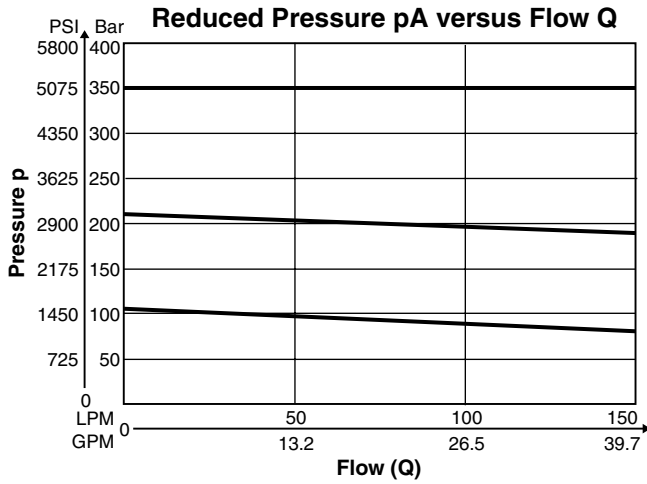
**B**

**Performance Curves**

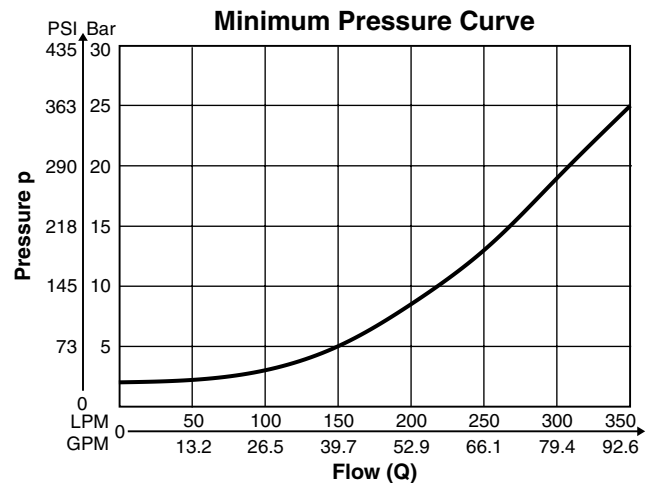
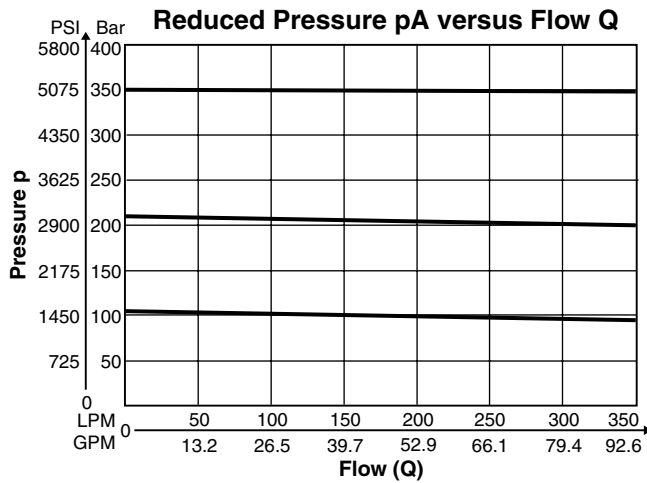


**B**

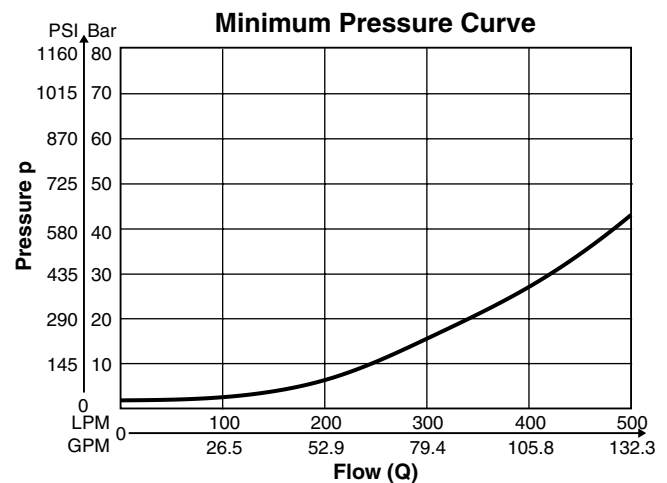
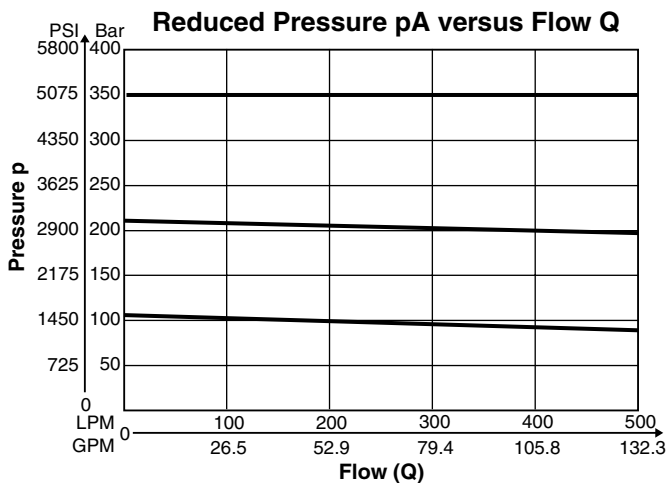
**R4R03\*P2** <sup>1)</sup>



**R4R06\*P2** <sup>1)</sup>



**R4R10\*P2** <sup>1)</sup>



<sup>1)</sup> Measured at 350 Bar (5075 PSI) primary pressure pB.

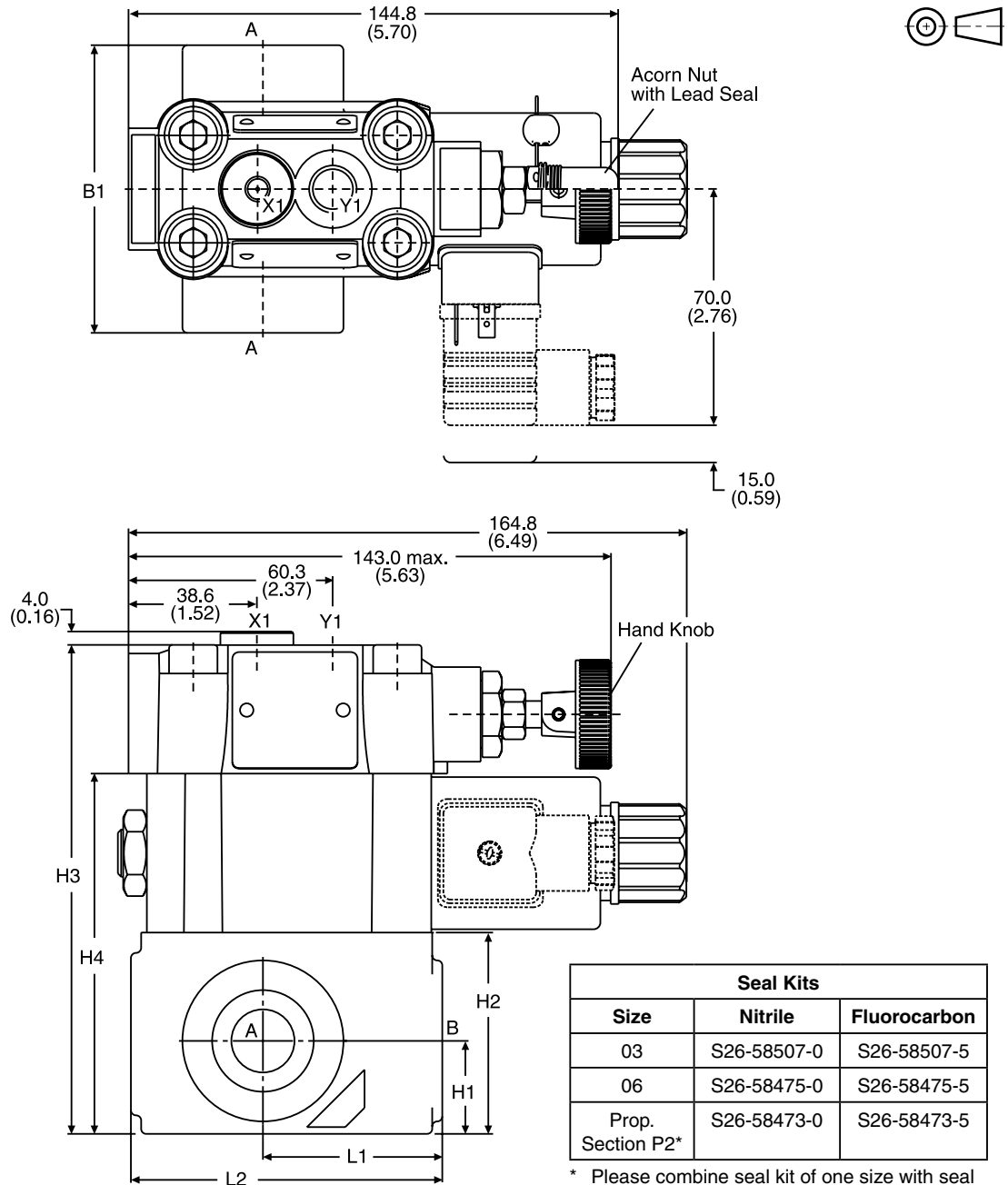
**Dimensions**

**Proportional Pressure Reducing Valves  
Series R4R\*P2 (In-line Mounted)**

Return to ALPHA TOC  
Return to SECTION TOC

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

**T-Body**



\* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.

Size	Body	B1	H1	H2	H3	H4	L1	L2
03	T-Body	85.0 (3.35)	27.5 (1.08)	59.5 (2.34)	144.5 (5.69)	106.5 (4.19)	53.0 (2.09)	92.0 (3.62)
06	T-Body	136.0 (5.35)	38.0 (1.50)	93.0 (3.66)	178.0 (7.01)	140.0 (5.51)	66.5 (2.62)	117.5 (4.63)

Port	Function	Port Size	
		R4R03*P2 T-Body	R4R06*P2 T-Body
B	Inlet Pressure	G1/2"	G1"
A	Outlet Pressure	G1/2"	G1"
X1*	External Remote Control or Vent Connection	G1/4"	
Y1	External Drain	G1/4"	

\* Closed when supplied.

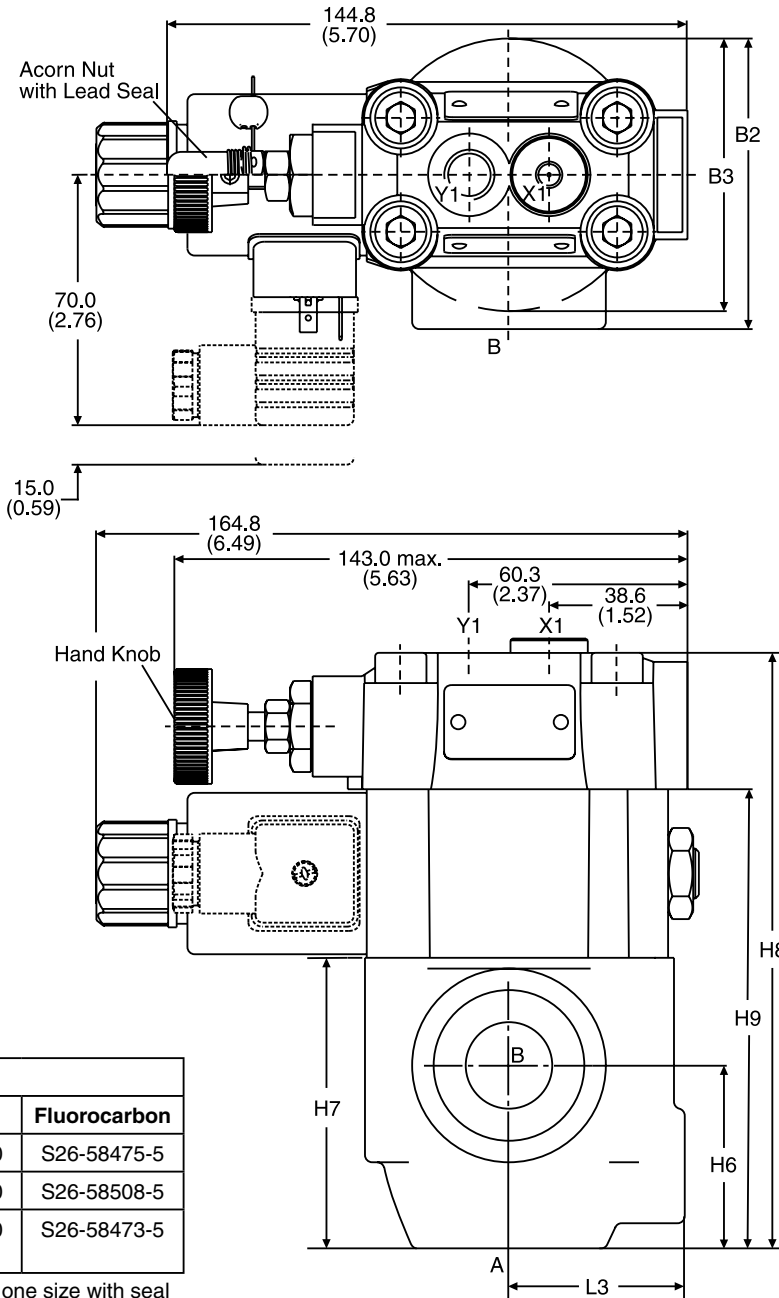
R4R\_P2-Inline.indd, dd



**B**

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

**L-Body**



Seal Kits		
Size	Nitrile	Fluorocarbon
06	S26-58475-0	S26-58475-5
10	S26-58508-0	S26-58508-5
Prop. Section P2*	S26-58473-0	S26-58473-5

\* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.

Size	Body	B2	B3	H6	H7	H8	H9	L3
06	L-Body	81.0 (3.19)	76.0 (2.99)	51.0 (2.01)	81.0 (3.19)	166.0 (6.54)	128.0 (5.04)	49.0 (1.93)
10	L-Body	120.7 (4.75)	85.8 (3.38)	50.8 (2.00)	96.0 (3.78)	181.0 (7.13)	143.0 (5.63)	49.8 (1.96)

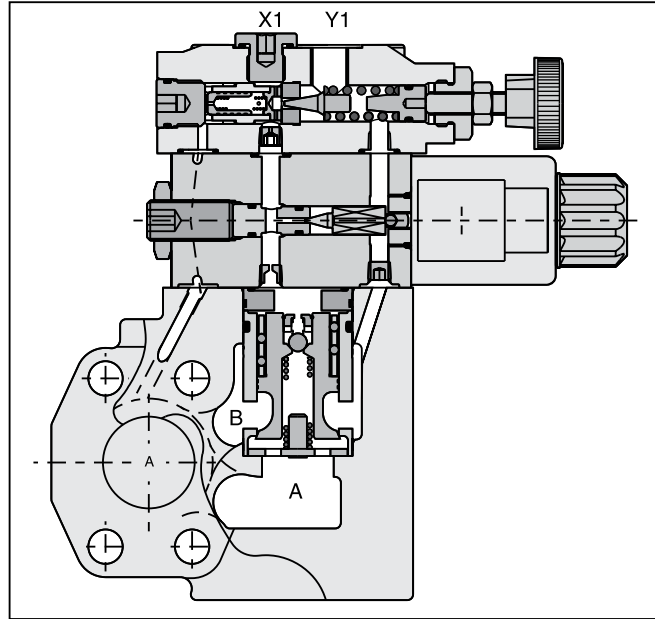
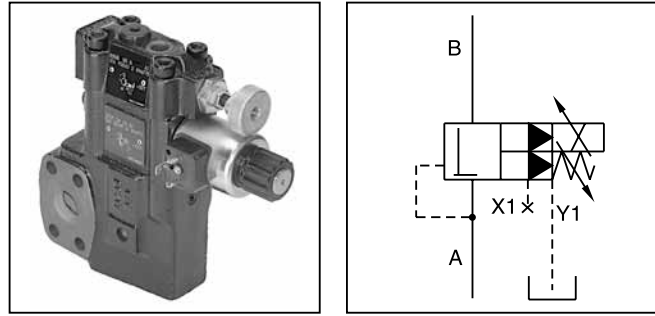
Port	Function	Port Size	
		R4R06*P2 L-Body	R4R10*P2 L-Body
B	Inlet Pressure	G3/4"	G1-1/4"
A	Outlet Pressure	G3/4"	G1-1/4"
X1*	External Remote Control or Vent Connection	G1/4"	
Y1	External Drain	G1/4"	

\* Closed when supplied.



**General Description**

Series R5R\*P2 proportional pressure reducing valves are based on the mechanical adjusted Series R5R. The additional proportional unit between the mechanical pilot valve and the main stage allows continuous pressure adjustment. The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400.



**Features**

- Pilot operated with proportional solenoid.
- Continuous adjustment by proportional solenoid.
- 2-port body with SAE 61 flange.
- 3 sizes (SAE Code 61 3/4", 1", 1-1/4").
- 3 pressure ranges.
- With mechanical maximum pressure adjustment.

**Ordering Information**

<b>R5R</b>	□	—	□	<b>8</b>	□	□	<b>6</b>	<b>P2</b>	<b>G0R</b>	<b>A</b>	□	□																			
Pressure Reducing Valve	Size		SAE 61 Interface	Body 2-Port X1, Y1 = G1/4"	Pressure Range	Adjustment	External Drain from Y1 Port	Proportional Pressure Control	Solenoid Voltage 12V 2.3A	Design Series	Seal	Options Check with Factory																			
<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; font-weight: normal;">Code</th> <th style="text-align: left; font-weight: normal;">Description</th> </tr> <tr> <td>06</td> <td>SAE 3/4"</td> </tr> <tr> <td>08</td> <td>SAE 1"</td> </tr> <tr> <td>10</td> <td>SAE 1-1/4"</td> </tr> </table>	Code	Description	06	SAE 3/4"	08	SAE 1"	10	SAE 1-1/4"						<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; font-weight: normal;">Code</th> <th style="text-align: left; font-weight: normal;">Description</th> </tr> <tr> <td>1</td> <td>Hand Knob</td> </tr> <tr> <td>3</td> <td>Acorn Nut with Lead Seal</td> </tr> </table>	Code	Description	1	Hand Knob	3	Acorn Nut with Lead Seal				<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; font-weight: normal;">Code</th> <th style="text-align: left; font-weight: normal;">Description</th> </tr> <tr> <td>1</td> <td>Nitrile</td> </tr> <tr> <td>5</td> <td>Fluorocarbon</td> </tr> </table>	Code	Description	1	Nitrile	5	Fluorocarbon	
Code	Description																														
06	SAE 3/4"																														
08	SAE 1"																														
10	SAE 1-1/4"																														
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	<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; font-weight: normal;">Code</th> <th style="text-align: left; font-weight: normal;">Size</th> <th style="text-align: left; font-weight: normal;">Max. Pressure</th> </tr> <tr> <td>4</td> <td>10</td> <td>280 Bar (4060 PSI)</td> </tr> <tr> <td>5</td> <td>06/08</td> <td>350 Bar (5075 PSI)</td> </tr> </table>	Code	Size	Max. Pressure	4	10	280 Bar (4060 PSI)	5	06/08	350 Bar (5075 PSI)		<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; font-weight: normal;">Code</th> <th style="text-align: left; font-weight: normal;">Description</th> </tr> <tr> <td>1</td> <td>up to 105 Bar (1523 PSI)</td> </tr> <tr> <td>3</td> <td>up to 210 Bar (3045 PSI)</td> </tr> <tr> <td>5</td> <td>up to 350 Bar (5075 PSI)</td> </tr> </table>	Code	Description	1	up to 105 Bar (1523 PSI)	3	up to 210 Bar (3045 PSI)	5	up to 350 Bar (5075 PSI)			<p><b>Weight:</b></p> <p>R5R06*P2    5.8 kg (12.8 lbs.)</p> <p>R5R08*P2    6.4 kg (14.1 lbs.)</p> <p>R5R10*P2    7.7 kg (17.0 lbs.)</p>								
Code	Size	Max. Pressure																													
4	10	280 Bar (4060 PSI)																													
5	06/08	350 Bar (5075 PSI)																													
Code	Description																														
1	up to 105 Bar (1523 PSI)																														
3	up to 210 Bar (3045 PSI)																														
5	up to 350 Bar (5075 PSI)																														

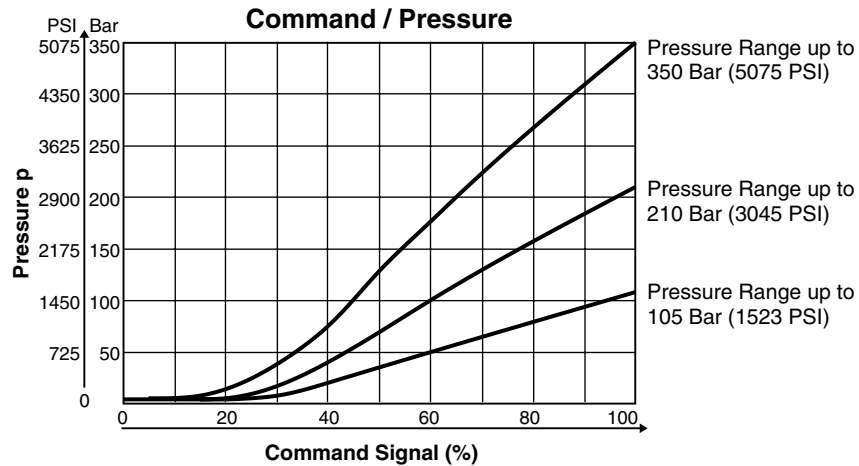
Further options on request.

**B**

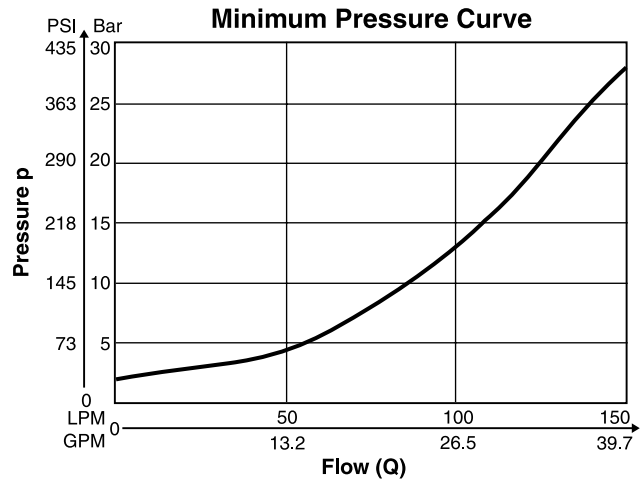
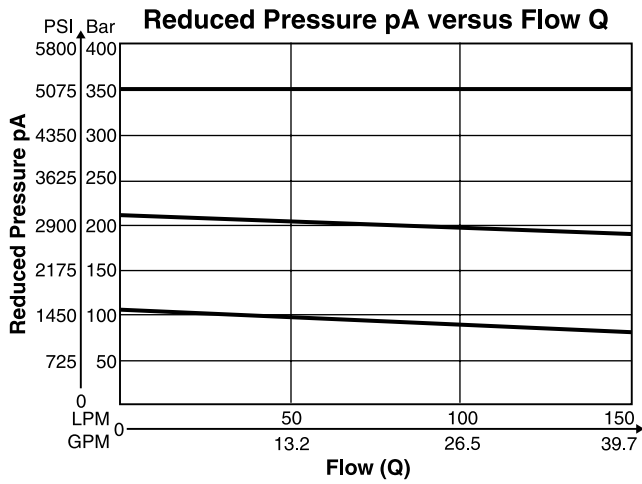
**Specifications**

General		06	08	10
Size				
Mounting		Flanged according to SAE 61		
Mounting Position		Unrestricted		
Ambient Temperature Range		-20°C to +50°C (-4°F to +122°F)		
Hydraulic				
Max. Operating Pressure	Ports A,B, X1	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)
	Port Y1	30 Bar (435 PSI)	30 Bar (435 PSI)	30 Bar (435 PSI)
Pressure Ranges		105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)		
Nominal Flow		90 LPM (23.8 GPM)	300 LPM (79.4 GPM)	500 LPM (132.3 GPM)
Fluid		Hydraulic oil as per DIN 51524...51535, other on request		
Fluid Temperature		-20°C to +80°C (-4°F to +176°F)		
Viscosity	Permitted	10 to 650 cSt / mm <sup>2</sup> /s (46 to 3013 SSU)		
	Recommended	30 to 80 cSt / mm <sup>2</sup> /s (139 to 371 SSU)		
Filtration		ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		
Electrical (Solenoid)				
Duty Ratio		100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible		
Nominal Voltage		12 VDC		
Maximum Current		2.3 amps		
Coil Resistance		4 Ohm at 20°C (68°F)		
Solenoid Connection		Connector as per EN175301-803, Solenoid identificaton as per ISO9461		
Protection Class		IP65 in accordance with EN60529 (plugged and mounted)		
Power Amplifier		PCD00A-400		

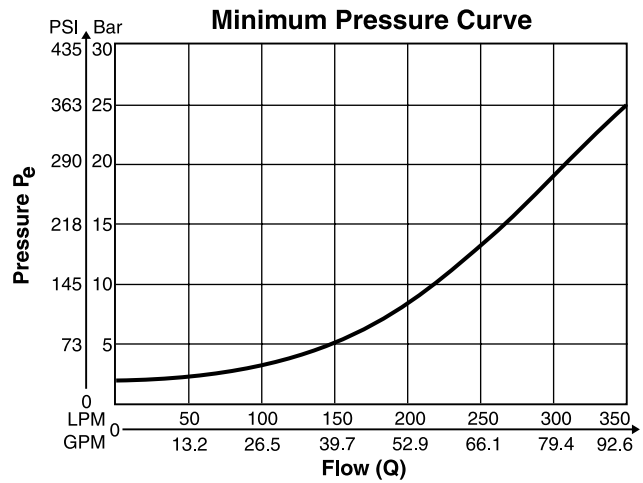
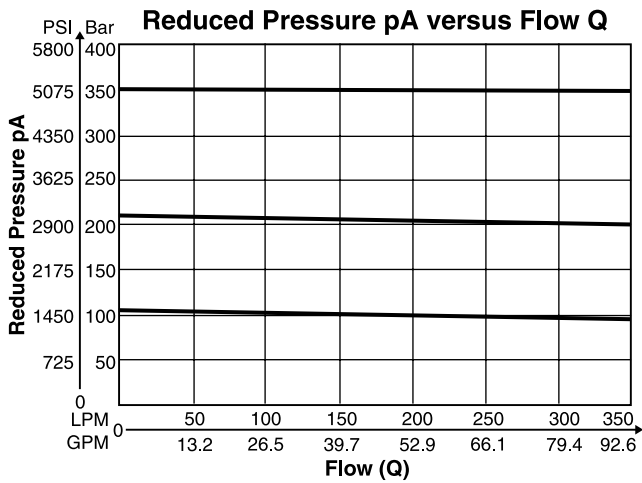
**Performance Curves**



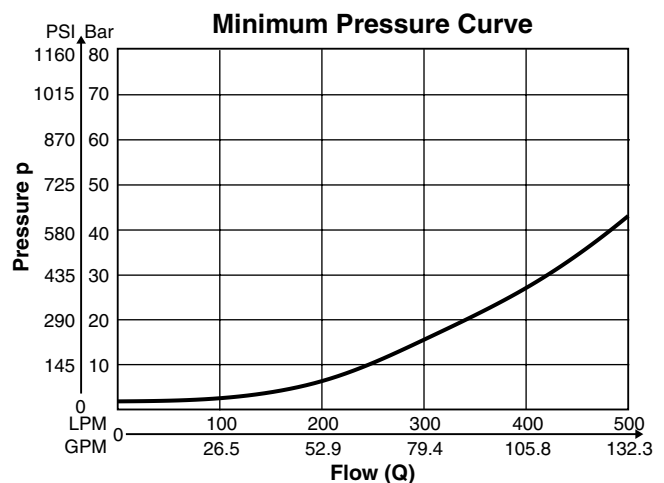
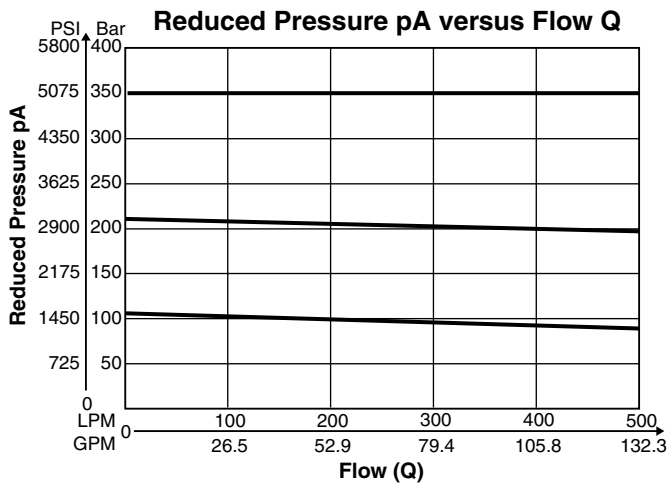
**R5R06\*P2 1)**



**R5R08\* P2 1)**



**R5R10\* P2 1)**



1) Measured at 350 Bar (5075 PSI) primary pressure pB.

**Dimensions**

**Proportional Pressure Reducing Valves  
Series R5R\*P2 (Flange Mounted)**

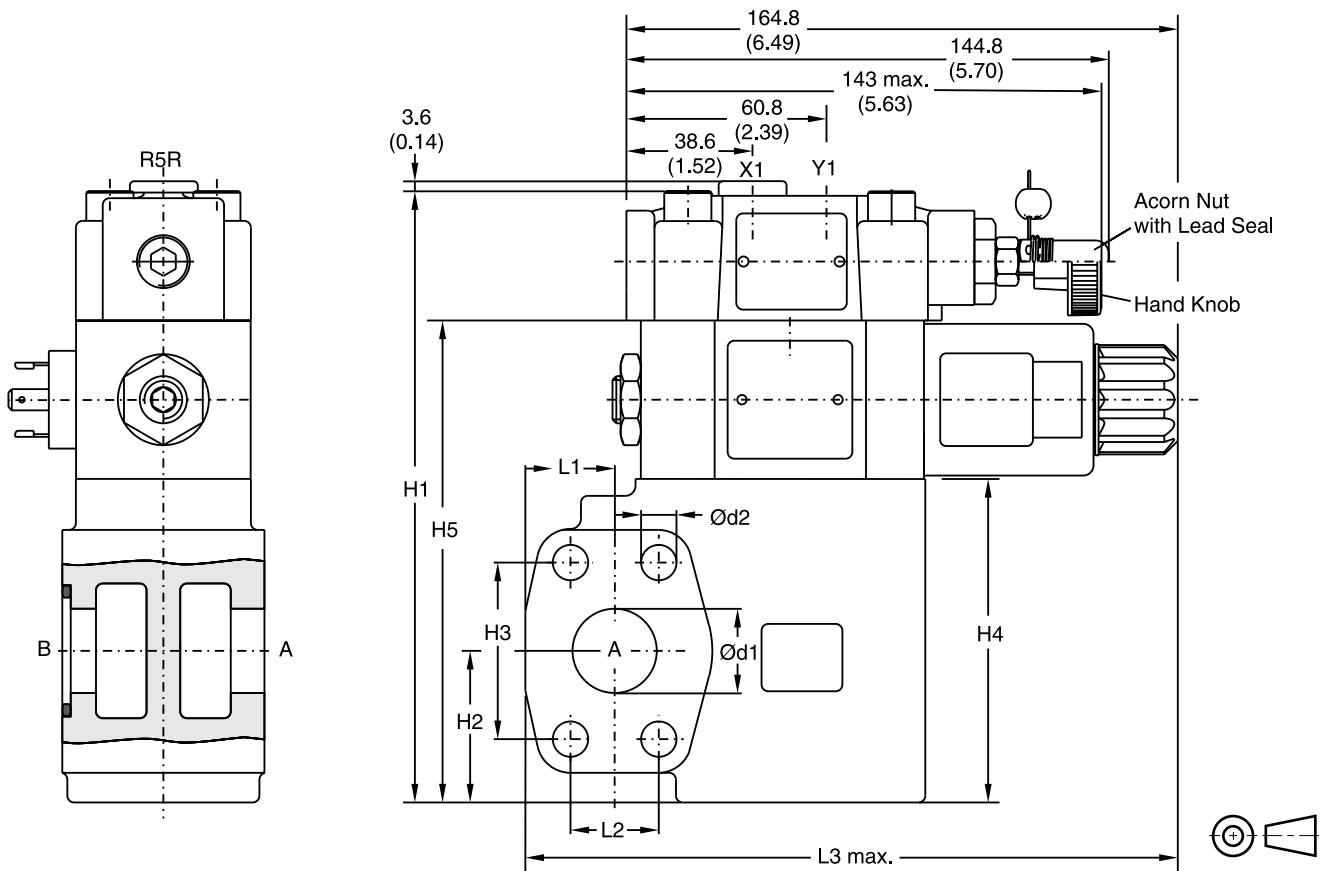
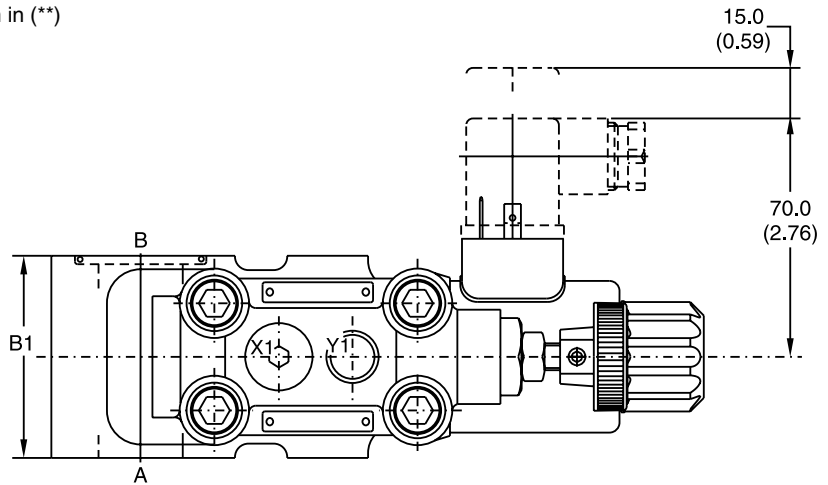
Return to  
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SECTION  
TOC

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

Seal Kits		
Size	Nitrile	Fluorocarbon
06	S16-91850-0	S16-91850-5
08	S16-91851-0	S16-91851-5
10	S16-91852-0	S16-91852-5
Prop. Section P2*	S26-58473-0	S26-58473-5

\* Please combine seal kit of one size with seal kit of Prop. Section P2 for complete seal kit.



Size	B1	H1	H2	H3	H4	H5	L1	L2	L3	d1	d2
06	60.0 (2.36)	175.0 (6.89)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	137.0 (5.39)	24.6 (0.97)	22.2 (0.87)	174.0 (6.85)	19.0 (0.75)	10.5 (0.41)
08	60.0 (2.36)	181.0 (7.13)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	143.0 (5.63)	26.5 (1.04)	26.2 (1.03)	193.6 (7.62)	25.0 (0.98)	10.5 (0.41)
10	75.0 (2.95)	194.0 (7.64)	48.0 (1.89)	58.7 (2.31)	109.0 (4.29)	156.0 (6.14)	34.0 (1.34)	30.2 (1.19)	201.0 (7.91)	32.0 (1.26)	12.5 (0.49)

Port	Function	Port Size		
		R5R06	R5R08	R5R10
B	Inlet Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
A	Reduced Outlet Pressure	3/4" SAE 61	1" SAE 61	1-1/4" SAE 61
Y1	External Drain	G1/4"		
X1	Pressure Gauge	G1/4"		

R5R\_P2.indd, ddp



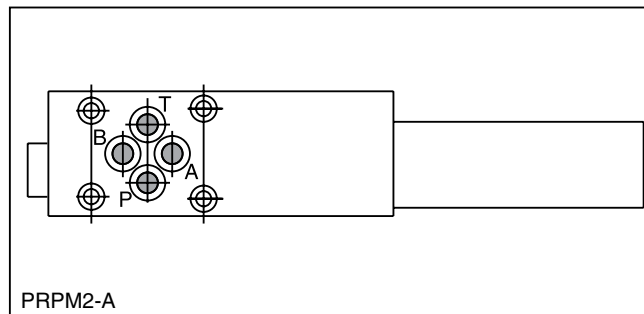
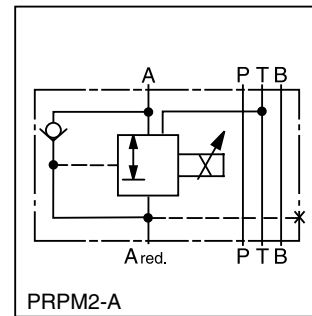


**General Description**

Series PRPM proportional pressure reducing valves keep a constant pressure  $p_{red}$  on the secondary, or regulated, side, independent of pressure fluctuations on the primary side. The integrated pressure relief function eliminates the need for an additional pressure relief valve on the secondary side and reliefs to tank, if  $p_{red}$  rises above the set pressure.

The proportional pressure reducing valve reduces the pressure in output port  $p_{red}$  in proportion to the solenoid current. The PRPM works practically independent of the inlet pressure  $p_E$ . In non-activated mode, the connection to the tank is fully open with a min. pressure corresponding to the spring force.

The gauge port is connected to the secondary side. Types A and B have an integrated bypass check valve. The PRPM provides optimum performance in combination with a digital amplifier module PCD00A-400.



**Specifications**

General		
<b>Size (according to ISO 4401)</b>	<b>NFPA D03 / NG6 / CETOP 3</b>	<b>NFPA D05 / NG10 / CETOP 5</b>
<b>Construction</b>	Sandwich type	
<b>Operation</b>	Proportional solenoid	
<b>Mounting</b>	4 holes for socket cap screws M5 (NG10: M6) or studs M5 (NG10: M6)	
<b>Port</b>	Sandwich valve	
<b>Mounting Position</b>	Horizontal preferred	
<b>Ambient Temperature Range</b>	-20°C to +50°C (-4°F to +122°F)	
<b>Fastening Torque</b>	$M_D = 5.5 \text{ Nm (4.1 lb.-ft.)}$ (qual. $8.8 \text{ Nm (6.5 lb.-ft.)}$ ) for socket cap screws $M_D = 50 \text{ Nm (36.9 lb.-ft.)}$ for cartridges	$M_D = 9.5 \text{ Nm (7.0 lb.-ft.)}$ (qual. $8.8 \text{ Nm (6.5 lb.-ft.)}$ ) for socket cap screws $M_D = 50 \text{ Nm (36.9 lb.-ft.)}$ for cartridges
Hydraulic		
<b>Max. Operating Pressure</b>	350 Bar (5075 PSI)	
<b>Pressure Range</b>	100 Bar (1450 PSI), 200 Bar (2900 PSI), 350 Bar (5075 PSI)	
<b>Maximum Flow</b>	0 to 60 LPM (0 to 15.9 GPM)	
<b>Pilot Flow</b>	See performance curves	
<b>Fluid</b>	Mineral oil (other fluid on request)	
<b>Fluid Temperature</b>	-20°C to +80°C (-4°F to +176°F)	
<b>Viscosity Permitted</b>	10 to 380 cSt / mm <sup>2</sup> /s (46 to 1761 SSU)	
<b>Filtration</b>	ISO Class 1406 16/13, to be achieved with $\beta_{6...10} > 75$	
<b>Resolution</b>	1 mA	
<b>Repeatability</b>	≤1% (with optimal dither signal)	
<b>Hysteresis</b>	≤4% (with optimal dither signal)	
Electrical		
<b>Solenoid</b>	Proportional solenoid, wet-pin push type, pressure tight	
<b>Duty Ratio</b>	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible	
<b>Protection Class</b>	IP65 in accordance with EN 60529	
<b>Supply Voltage</b>	12 VDC (1320 mA) / 24 VDC (680 mA)	
<b>Solenoid Connection</b>	Connector as per EN 175301-803	
<b>Amplifier</b>	PCD00A-400	

PRPM.indd, ddp

**Ordering Information**

**PRP**

Proportional  
 Pressure  
 Reducing  
 Valve

**M**

Sandwich

Size

Code	Description
2	NG6
3	NG10

Red.  
 Port

Code	Port
AA	A
BB	B
PP	P

Pressure  
 Range

Code	Description
10	100 Bar (1450 PSI)
20	200 Bar (2900 PSI)
35	350 Bar (5075 PSI)

Soleoid Voltage

Code	Description
J	24V, 680 mA
K	12V, 1250 mA

**V**

Seal  
 Fluorocarbon

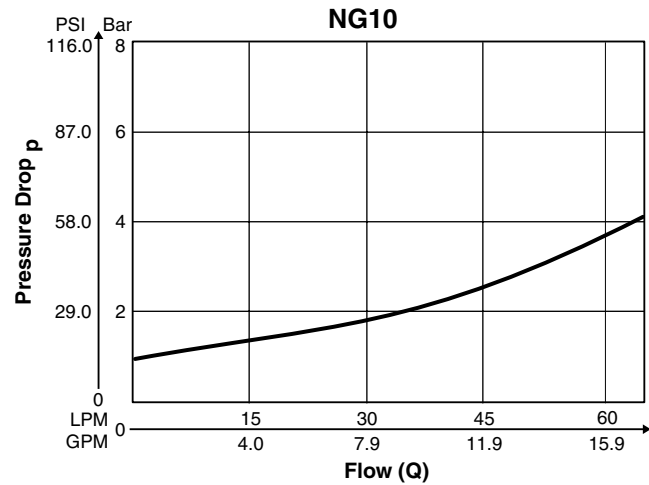
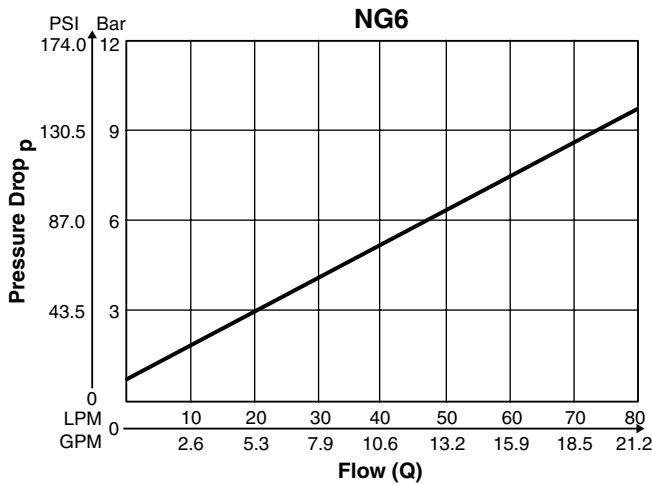
**B**

**Weight:**

PRPM2 0.2 kg (0.4 lbs.)  
 PRPM3 3.2 kg (7.1 lbs.)

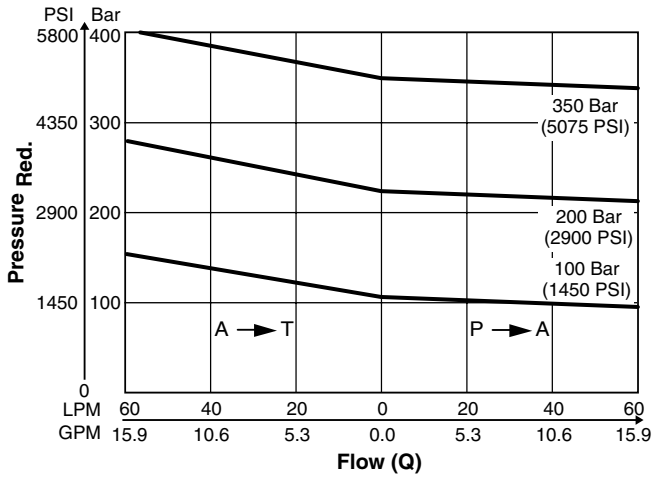
**Performance Curves**

**Pressure Drop/Flow over check valve**

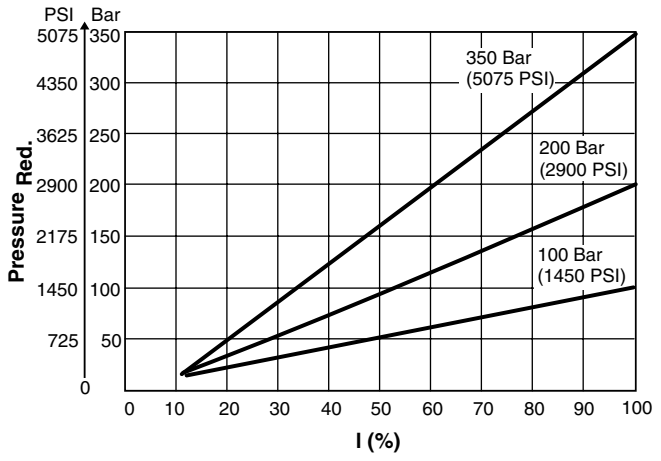


All measures taken at viscosity  $\nu = 30\text{mm}^2/\text{s}$ .

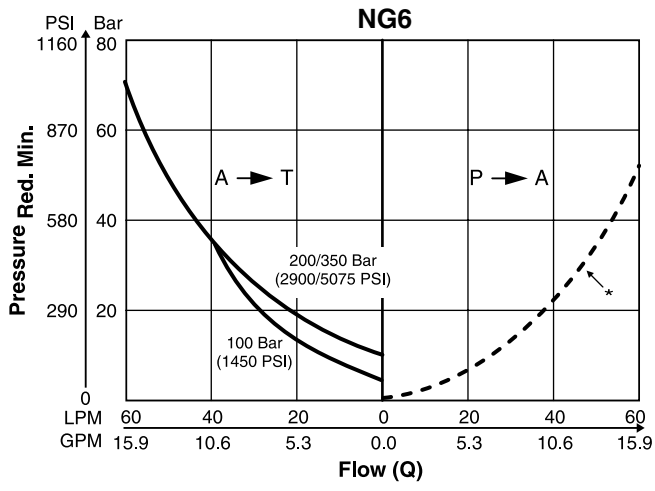
**Pressure/Flow NG6/NG10  $p_{red} = f(Q)$**



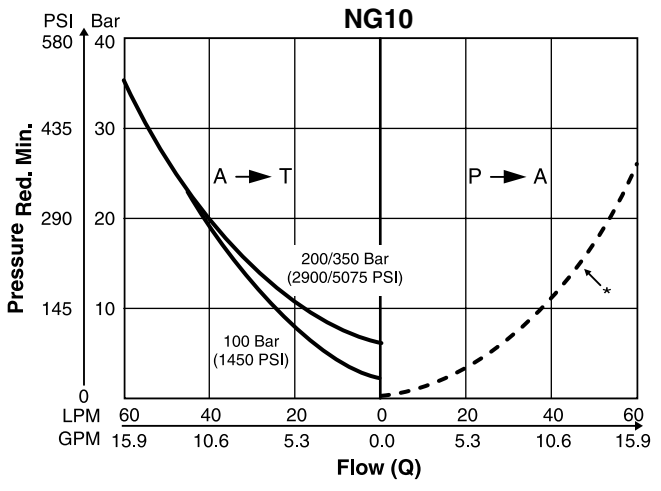
**Pressure/Adjustment  $p_{red} = f(I)$ , at Q=0 LPM (static)**



**Pressure/Flow (min. adjustable)  $p_{red} = f(Q)$**

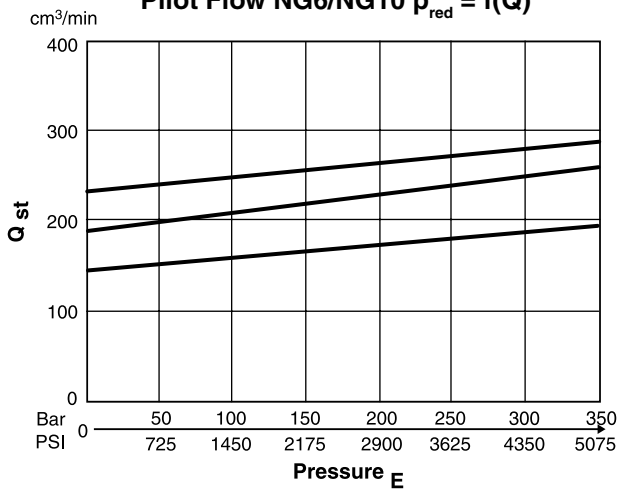


\* Backpressure depends on system



\* Backpressure depends on system

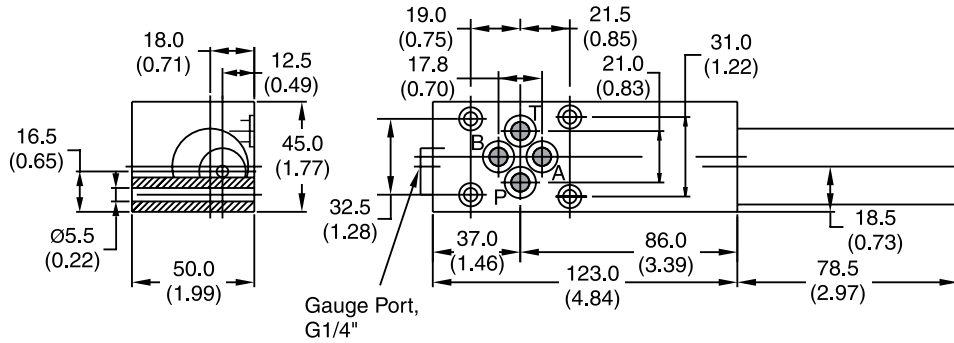
**Pilot Flow NG6/NG10  $p_{red} = f(Q)$**



**PRPM2A\*, B\***

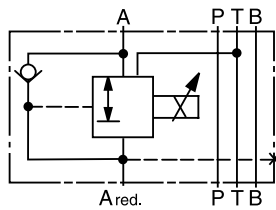
Inch equivalents for millimeter dimensions are shown in (\*\*)

**B**

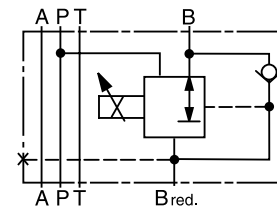


**Sandwich type: Pressure reduction code B is located on cartridge side B.**

Symbol PRPM2A\*

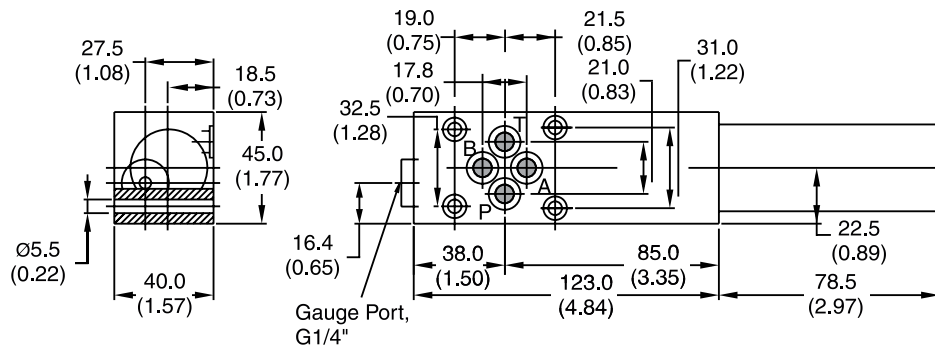


Symbol PRPM2B\*

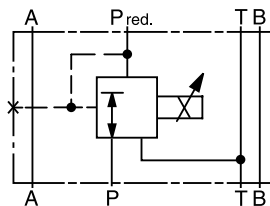


**PRPM2P\***

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

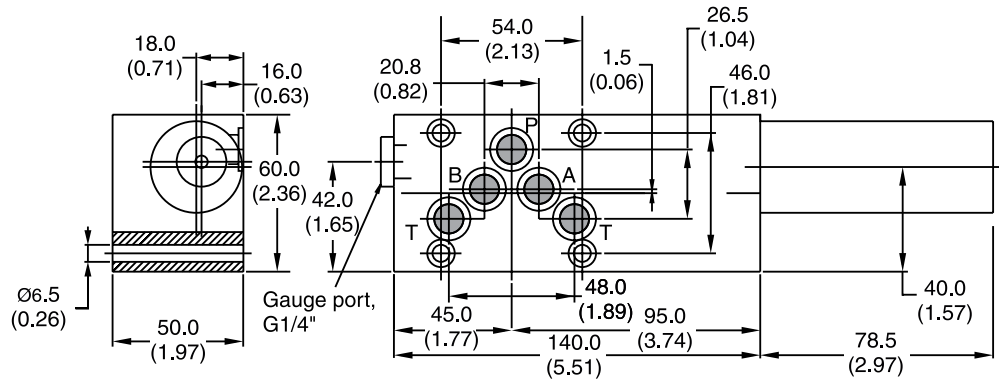


Symbol PRPM2P\*



**PRPM3A\*, B\***

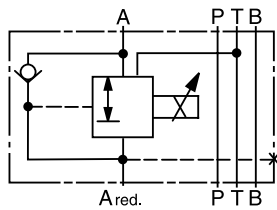
Inch equivalents for millimeter dimensions are shown in (\*\*)



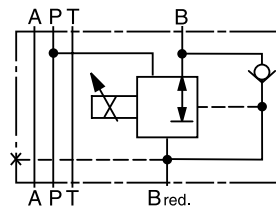
**B**

**Sandwich type: Pressure reduction code B is located on cartridge side B.**

Symbol PRPM3A\*

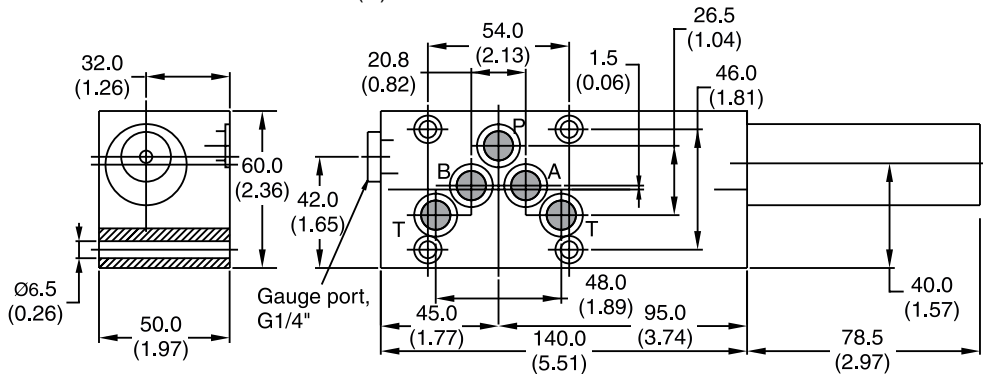


Symbol PRPM3B\*

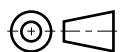
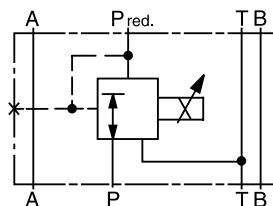


**PRPM3P\***

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



Symbol PRPM3P\*



**General Description**

Series DUR\*L06 proportional flow control valves are used to generate pressure-compensated flow from A to B. The valves are equipped with a built-in check valve for the return flow.

A rectifier plate can be used for meter-in and meter-out control of an actuator.

**Function**

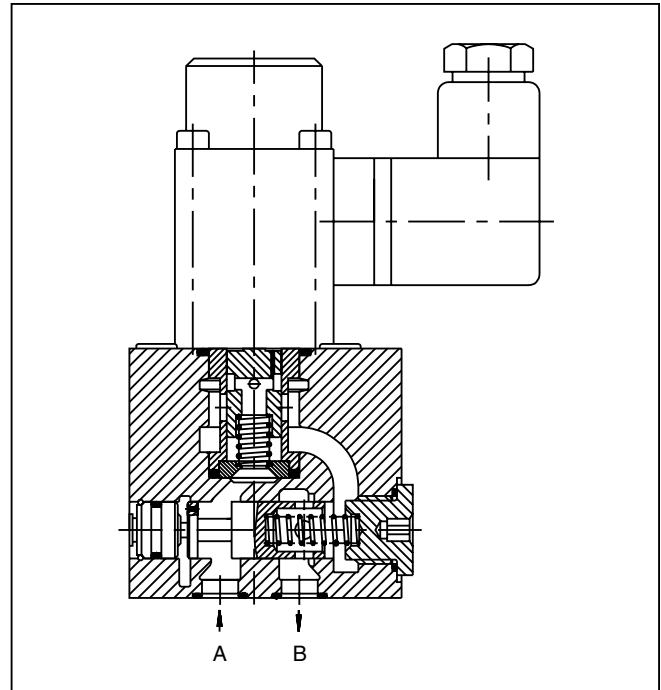
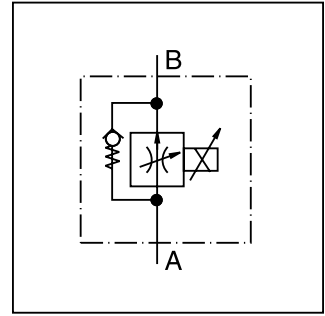
When solenoid current is applied, the metering spool opens against the reset spring and the flow is regulated by the pressure compensating spool to port B.

With the aid of the pressure compensating spool, the pressure drop is held constant on the metering window. Thus pressure load changes are compensated, and the oil flow remains constant.

The valve parameters can be saved, changed and duplicated in combination with the digital electronic module PCD00A-400.

**Features**

- Low hysteresis
- High reproducibility
- Load-independent oil flow
- Bypass check valve
- Mounting pattern to ISO 6263
- 5 flow rates



**Ordering Information**

**DUR**

Proportional Pressure Reducing Valve

**□**

Nominal Flow

**L**

Linear Solenoid 24V / 0.68 A

**06**

Size NG6

**P**

Progressive Performance Curve

**K**

**□**

Seal

**□**

Design Series

NOTE:  
 Not required when ordering.

Code	Description
1.6	1.6 LPM (0.4 GPM)
3.2	3.2 LPM (0.8 GPM)
6.3	6.3 LPM (1.7 GPM)
12	12.0 LPM (3.2 GPM)
18	18.0 LPM (4.8 GPM)

Code	Description
A	Nitrile
1	Fluorocarbon

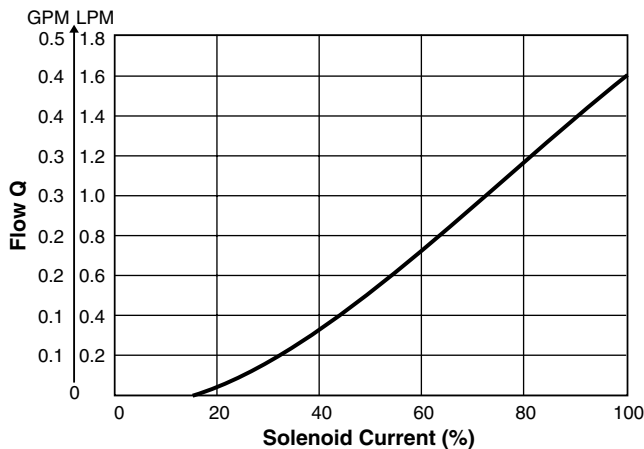
**Weight:** 1.6 kg (3.5 lbs.)

**Specifications**

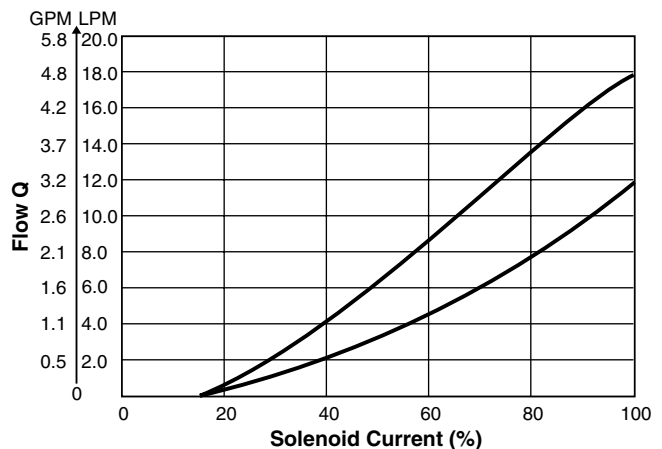
General		
Design		Electrically adjustable orifice valve with load sensing
Mounting Interface		Subplate NG6, Interface DIN 24340, ISO, CETOP
Mounting Position		Unrestricted, preferably horizontal
Ambient Temperature	[°C]	-20...+50; (-43°F...+122°F)
MTTF <sub>d</sub> Value	[years]	150
Supply Voltage	[V]	24
Solenoid Nominal Current	[mA]	680
Duty Cycle	[%]	100 ED; CAUTION: Coil temperature up to 150°C (302°F) possible
Solenoid Connection		Connector as per EN 175301-803
Protection Class		IP 65 in accordance with EH 60529 (plugged and mounted)
Amplifier Module		PCD00A-400
Operating Pressure		210 Bar (3045 PSI)
Fluid		Hydraulic oil according to DIN 51524...51535, other on request
Fluid Temperature	[°C]	+20 ... +70 (+68°F...+158°F)
Viscosity Range	[cSt]/[mm²/s]	12...230 (56...1066 SSU)
Filtration		ISO 4406 (1999); 18/16/13 (acc. NAS 1638: 7)
Minimum Pressure Difference		DUR 1.6/3.2: 3 Bar (43.5 PSI); DUR 6.3/12: 5 Bar (72.5 PSI); DUR 18: 8 Bar (116 PSI)
Hysteresis at Q <sub>nom</sub>	[%]	6
Hysteresis at Q ≤ 20 % • Q <sub>nom</sub>	[%]	6
Repeatability at ΔU <sub>set</sub> = 5 V	[%]	2

**Performance Curves**

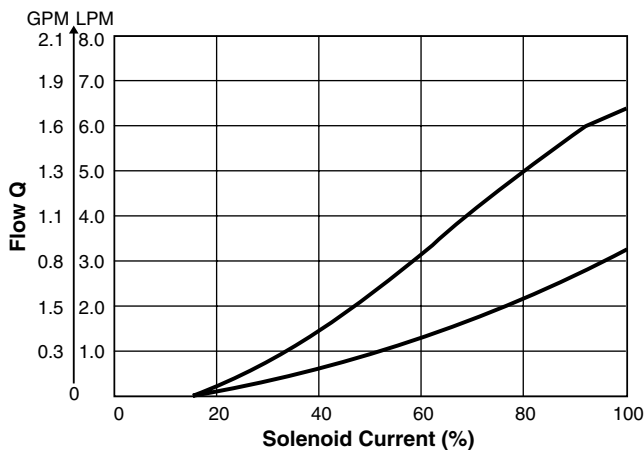
**DUR 1.6 L 06 PK\***



**DUR 12 L 06 PK\* / DUR 18 L 06 PK\***

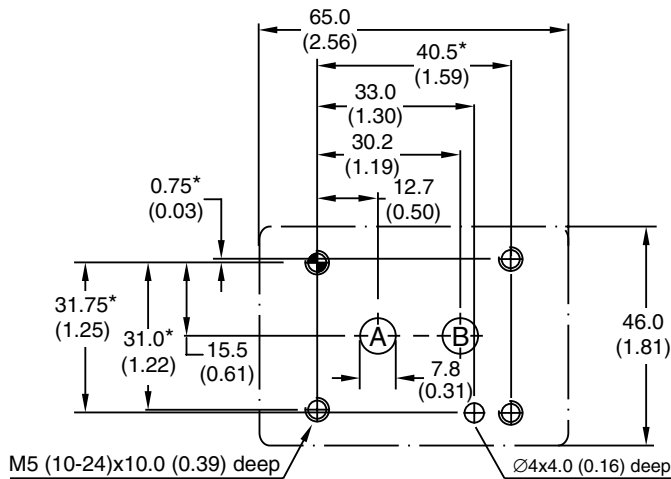
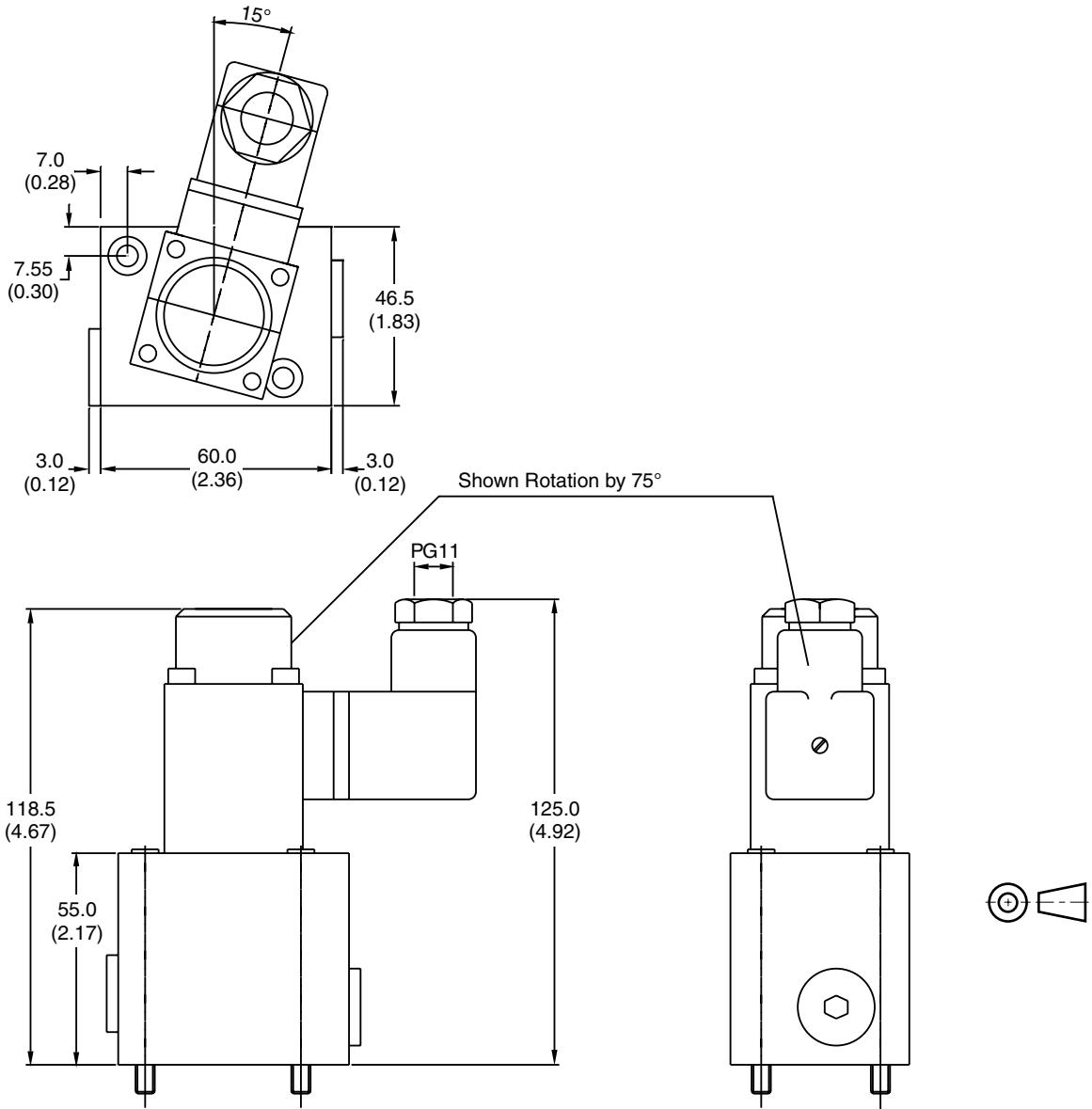


**DUR 3.2 L 06 PK\* / DUR 6.3 L 06 PK\***



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

**B**



\* ... ± 0.1mm  
Others ... ± 0.2mm

**Seal Kits**

Nitrile	Fluorocarbon
SK-DURL	SK-DURLV

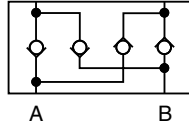


**Sandwich Rectifier Plate**

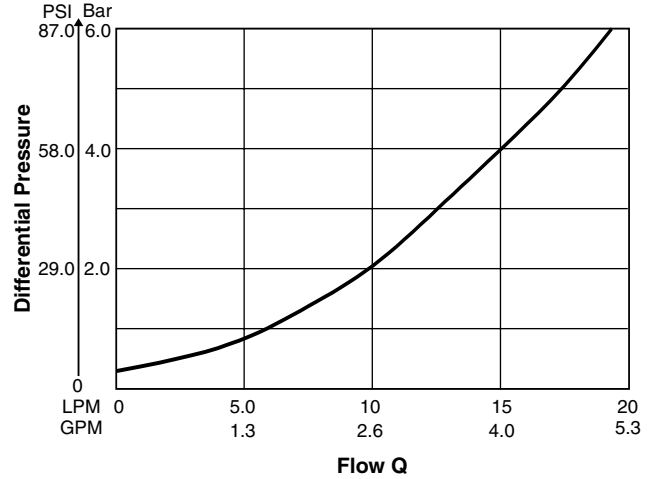
If a 2-way flow control valve is used in combination with a rectifier plate, the valve can be used for meter-in and meter-out flow control of an actuator.

**Design**

The intermediate rectifier plate is designed with four identical, symmetrically arranged check valves. Thus the differential pressure is the same in both flow directions.

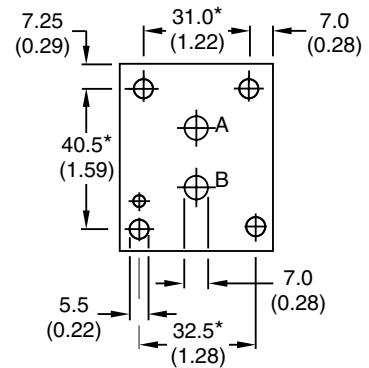
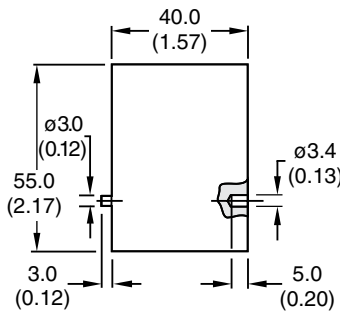
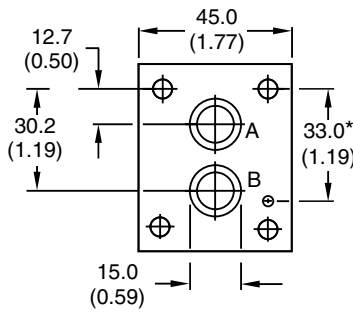


**Performance Curve  $\Delta p/Q$**



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

**Dimensions**

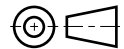


**Dimension Tolerances**

\* ...  $\pm 0.1\text{mm}$

Others ...  $\pm 0.2\text{mm}$

Holes and Silhouette of Valve Body ... Untoleranced Dimension



**Rectifier Plate**

**Ordering Code: HROA06C**

**O-ring** for sealing the connecting surface (not included)

Connections	Dimensions	Required Units
A, B	12 x 1.5	2

**Subplates**

Ordering Code	Description
SPD22B910	P, A, B and T = G1/4
SPD23B910	P, A, B and T = G1/8

## General Description

Series F5C proportional throttle valves adjust flow in proportion to the input signal. The combination of the F5C with pressure compensators R5A or R5P serves as a flow control valve, providing load compensated flow.

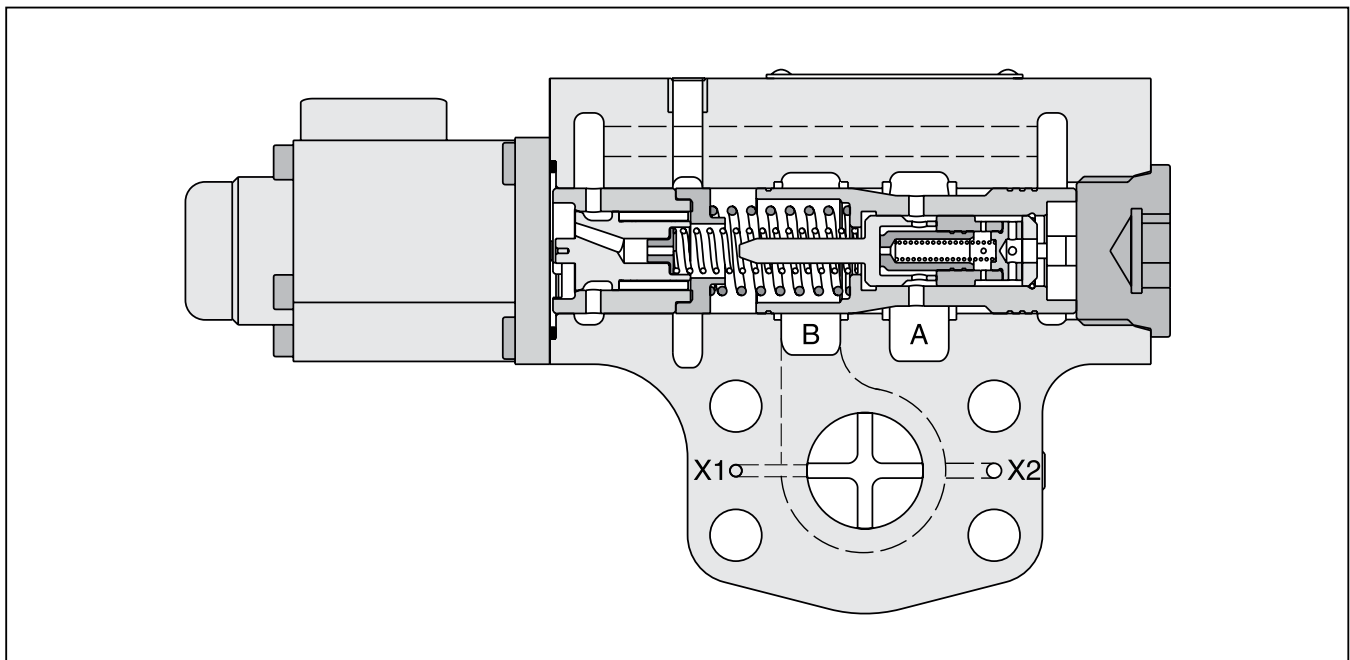
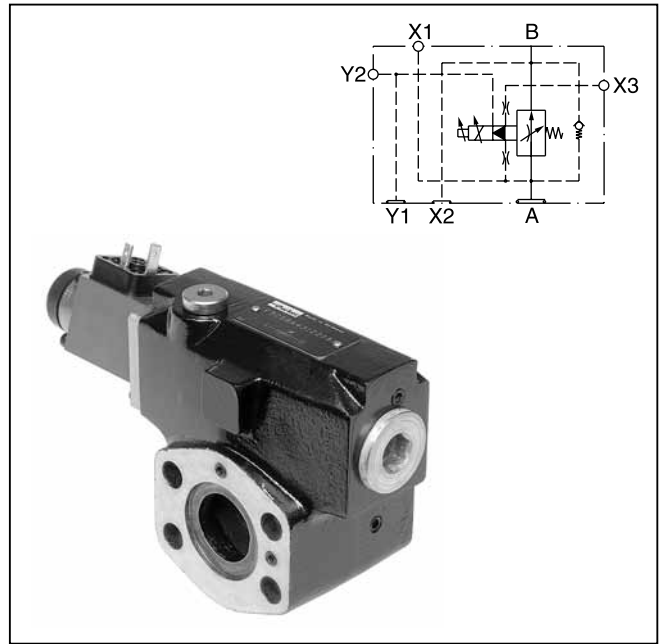
**B**

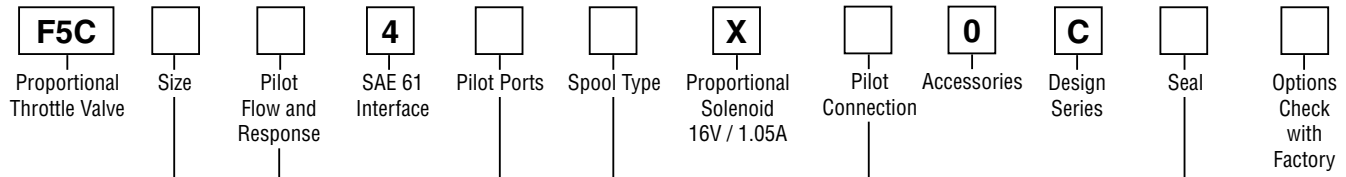
The F5C is offered with two types of response time:

Standard 350 ms at 1 LPM (0.3 GPM) pilot flow  
Code A 250 ms at 2 LPM (0.5 GPM) pilot flow

## Features

- Spool type proportional throttle valve.
- SAE 61 flange.
- Maximum pressure 270 Bar (3915 PSI).
- Maximum flow 380 LPM (100.5 GPM).
- 3 sizes: SAE 3/4", 1", 1 1/4".
- Load compensated flow in combination with R5A and R5P.





Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1 3/4"

Code	Description
3	G1/4"
N	1/4" NPT

Code	Description
1	Nitrile
5	Fluorocarbon

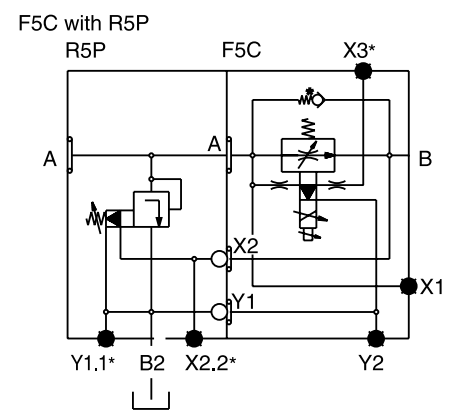
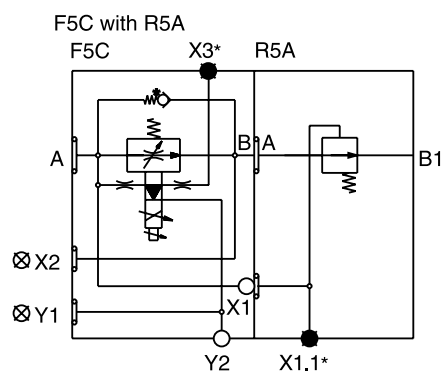
Code	Pilot Flow	Maximum Response
Omit	1 LPM (0.3 GPM)	350 ms
A	2 LPM (0.5 GPM)	250 ms

Code	Size	Maximum Flow*
A	06	23 LPM (6.1 GPM)
B	06/08	45 LPM (11.9 GPM)
1	06/08/10	95 LPM (25.1 GPM)
2	08/10	190 LPM (50.3 GPM)
3	10	380 LPM (100.5 GPM)

\* At nominal pressure drop (Δp = 8.4 Bar (121.8 PSI))

**Weight:**  
 F5C06 3.9 kg (8.6 lbs.)  
 F5C08 4.1 kg (9.0 lbs.)  
 F5C10 5.8 kg (12.8 lbs.)

Code	Pilot Connections	F5C without Compensators R5A, R5P	F5C for Combined with R5A	F5C for Combined with R5P
2	Internal PD (Y) Internal PP (X)			X1, X3, Y2 ● X2, Y1 ○ X2, Y1 ○
3	External PD (Y) External PP (X)		X1, X3, Y2 ○ X2, Y1 ⊗	
4	External PD (Y) External PP (X)	X3, Y2 ○ X1 ● X2, Y1 ⊗		X2, X3, Y1, Y2 ○ X1 ●
5	External PD (Y) Internal PP (X)		X1, Y2 ○ X3 ● X2, Y1 ⊗	
6	External PD (Y) Internal PP (X)	X1, X3 ● X2, Y1 ⊗ Y2 ○		X1, X3 ● X2, Y1, Y2 ○



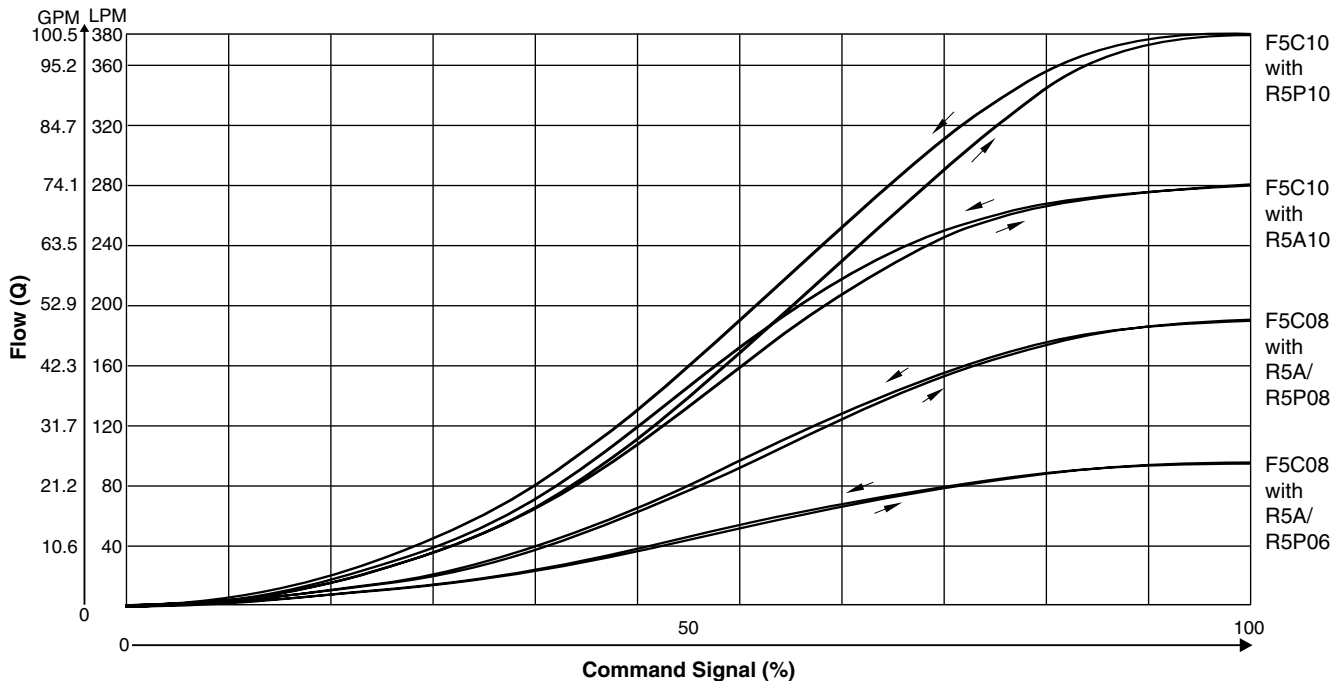
\* optional ○ open ● closed ⊗ closed by counterpart

**B**

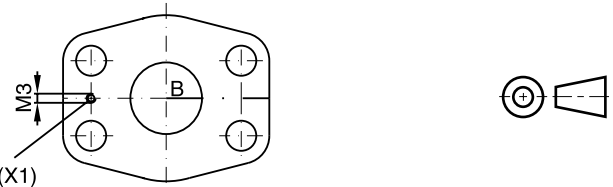
**Specifications**

General			
<b>Size</b>	<b>06</b>	<b>08</b>	<b>10</b>
<b>Mounting</b>	Flanged according to SAE 61		
<b>Mounting Position</b>	Unrestricted		
<b>Ambient Temperature Range</b>	-20°C to +50°C (-4°F to +122°F)		
Hydraulic			
<b>Maximum Operating Pressure</b>	Ports A, B, X1, X2, X3 270 Bar (3915 PSI) Ports Y1, Y2 70 Bar (1015 PSI)		
<b>Maximum Pressure Drop (from A to B)</b>	21 Bar (304.5 PSI)		
<b>Flows</b>	26 LPM (6.1 GPM) 45 LPM (11.9 GPM) 95 LPM (25.1 GPM)	45 LPM (11.9 GPM) 95 LPM (25.1 GPM) 190 LPM (50.3 GPM)	95 LPM (25.1 GPM) 190 LPM (50.3 GPM) 380 LPM (100.5 GPM)
<b>Fluid</b>	Hydraulic oil as per DIN 51524...51535, other on request		
<b>Fluid Temperature</b>	-20°C to +80°C (-4°F to +176°F)		
<b>Viscosity Permitted Recommended</b>	10 to 380 cSt / mm <sup>2</sup> /s (46 to 1761 SSU) 30 to 80 cSt / mm <sup>2</sup> /s (139 to 371 SSU)		
<b>Filtration</b>	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		
Electrical			
<b>Duty Ratio</b>	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible		
<b>Solenoid Connection</b>	Connector as per EN175301-803		
<b>Protection Class</b>	IP65 in accordance with EN60529 (plugged and mounted)		
<b>Supply Voltage</b>	16 VDC		
<b>Power Consumption</b>	1.05A		
<b>Resistance</b>	11.3 Ohm		
<b>Response Time</b>	See Ordering information		
<b>Coil Insulation Class</b>	H (180°C) (356°F)		

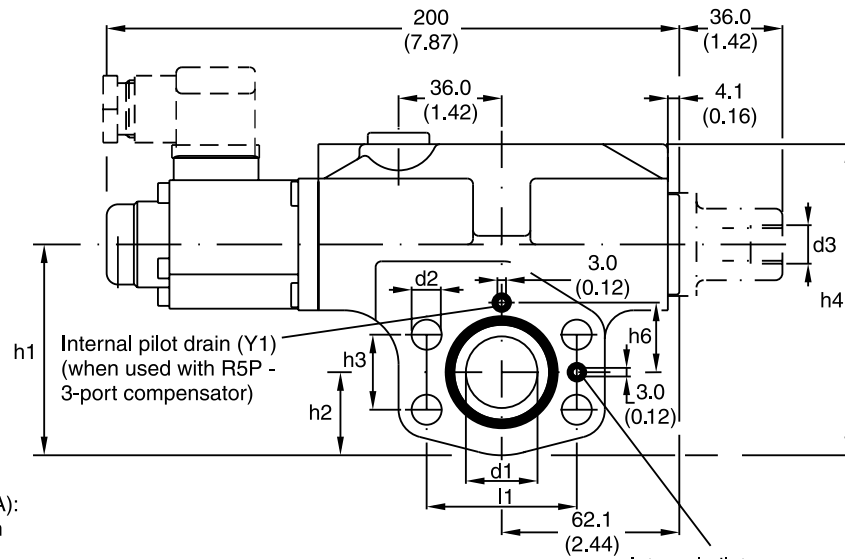
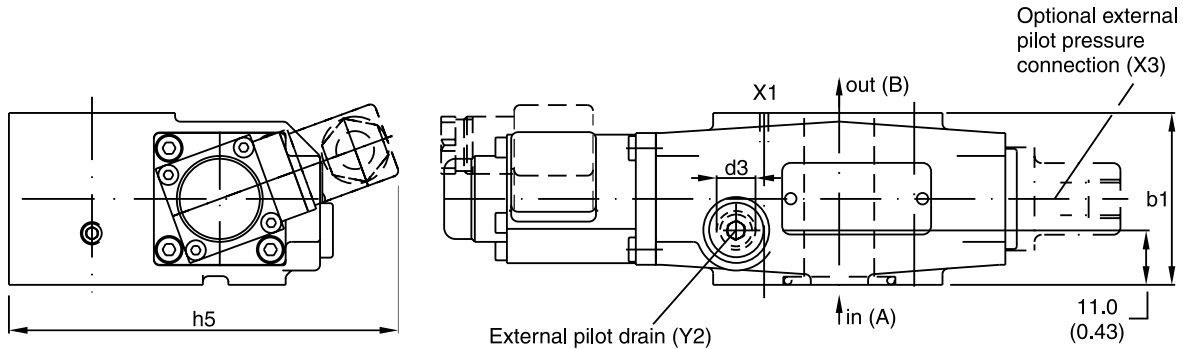
**Performance Curves**



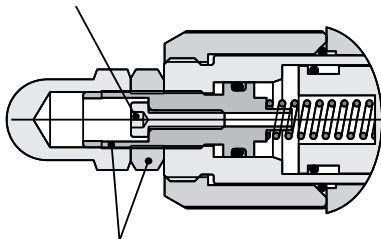
Inch equivalents for millimeter dimensions are shown in (\*\*)



Internal pilot pressure connection (X1)  
(for use with R5A - 2-port compensator)



Important (only for solenoid type 1-220 mA):  
On initial start up and after long shut down  
periods bleed air from this plug.



Zero point is factory set!  
Lock nut must not be loosened!

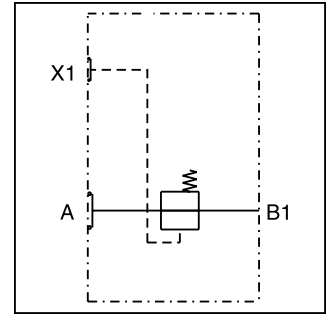
Internal pilot pressure (X2)  
(when used with R5P -  
3-port compensator)

Seal Kits		
Size	Nitrile	Fluorocarbon
06 / 08 / 10	S16-91850-0	S16-91850-5

Size	l1	b1	h1	h2	h3	h4	h5	h6	d1	d2	d3
06	47.6 (1.87)	60.0 (2.36)	68.2 (2.69)	26.0 (1.02)	22.2 (0.87)	103.2 (4.06)	183.0 (7.20)	20.8 (0.82)	19.0 (0.75)	10.5 (0.41)	G1/4"
08	52.4 (2.06)	60.0 (2.36)	73.6 (2.90)	29.0 (1.14)	26.2 (1.03)	108.6 (4.28)	187.0 (7.36)	24.3 (0.96)	25.0 (0.98)	10.5 (0.41)	G1/4"
10	58.7 (2.31)	75.0 (2.95)	83.5 (3.29)	36.5 (1.44)	30.2 (1.19)	118.5 (4.67)	198.0 (7.80)	29.3 (1.15)	32.0 (1.26)	12.5 (0.49)	G1/4"

### General Description

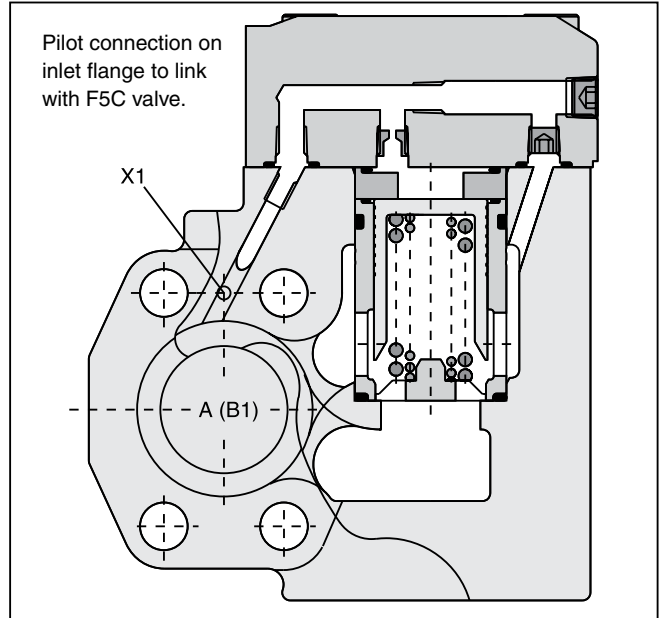
Series R5A direct operated, 2-way pressure compensators can be combined with any type of fixed or adjustable flow valve (throttle) to provide a load compensated flow. The combination with the proportional throttle valve F5C serves as a compact 2-way flow control unit in SAE flange design. The R5A is typically used as meter-out compensator behind the flow resistor.



**B**

### Features

- Seated type, 2-way pressure compensator.
- SAE 61 flange.
- 8.4 bar (121.8 PSI) control pressure.
- 3 sizes, SAE Code 61 3/4", 1", 1 1/4".
- Load compensated flow in combination with F5C.



### Specifications

General			
Size	06	08	10
Subplate Mounting	Flanged according to SAE 61		
Mounting Position	Unrestricted		
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)		
Hydraulic			
Control Pressure	8.4 Bar (121 PSI)		
Maximum Operating Pressure	350 Bar (5075 PSI)	350 Bar (5075 PSI)	280 Bar (4060 PSI)
Nominal Flow	90 LPM (23.8 GPM)	300 LPM (79.4 GPM)	600 LPM (158.7 GPM)
Fluid	Hydraulic oil as per DIN 51524...51535, other on request		
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)		
Viscosity	Recommended Permitted	30 to 80 cSt / mm <sup>2</sup> /s (139 to 371 SSU) 10 to 650 cSt / mm <sup>2</sup> /s (46 to 1761 SSU)	
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)		

**Ordering Information**

<div style="border: 1px solid black; padding: 2px; width: 40px; margin: 0 auto;">R5A</div> <p>2-Port Compensator</p>	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> <p>Size</p>	<p>—</p>	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> <p>SAE 61 Interface</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; margin: 0 auto;">4</div> <p>2-Port Body</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; margin: 0 auto;">1</div> <p>Plain Cap</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; margin: 0 auto;">01</div> <p>Pilot Connection thru Port X1</p>	<div style="border: 1px solid black; padding: 2px; width: 20px; margin: 0 auto;">B</div> <p>Design Series</p>	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> <p>Seal</p>	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> <p>Options Check with Factory</p>
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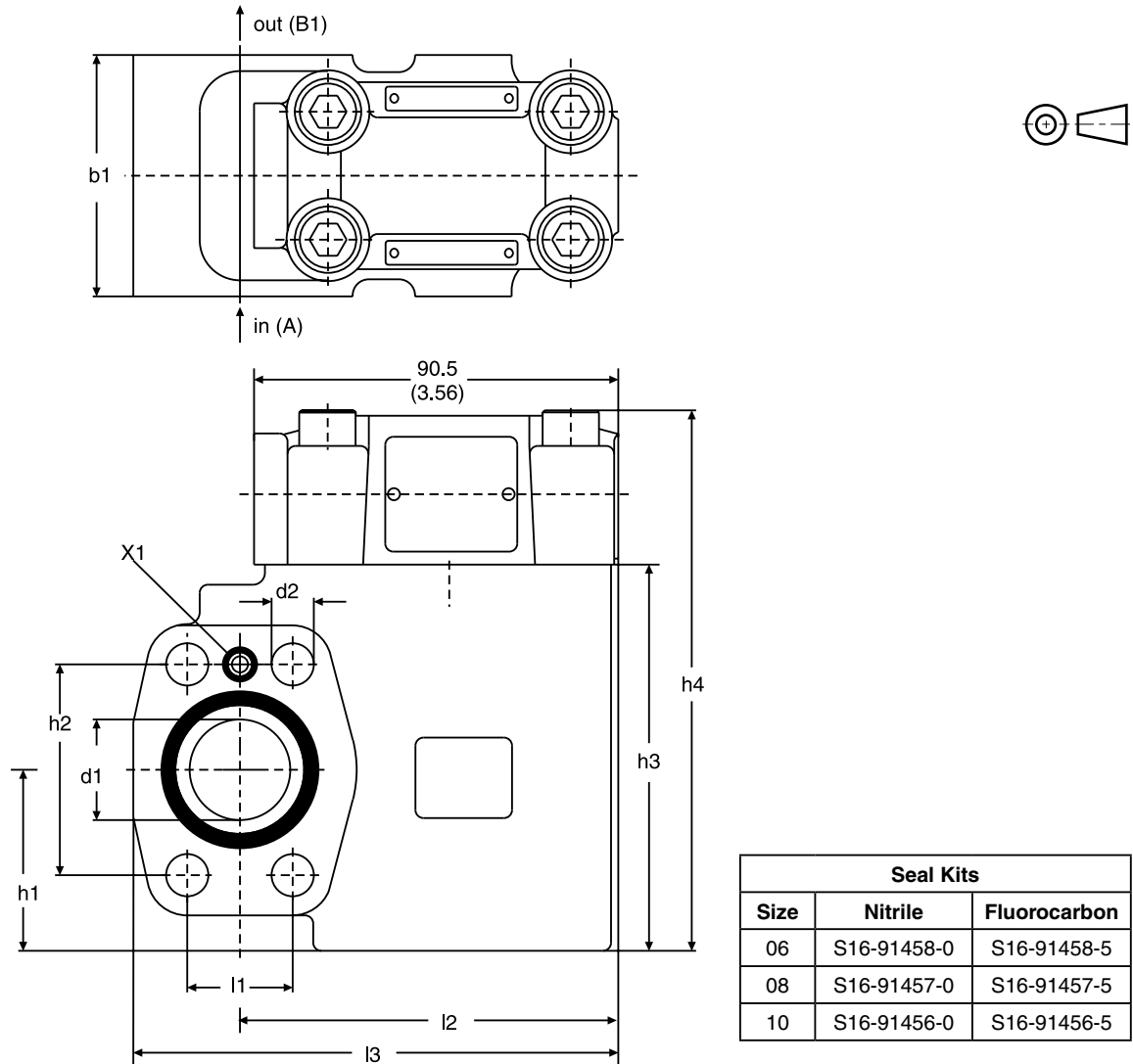
  

Code	Description	Code	Size	Max. Pressure	Code	Description	Weight
06	SAE 3/4"	4	10	280 Bar (4060 PSI)	1	Nitrile	R5A06 3.6 kg (7.9 lbs.)
08	SAE 1"	5	06/08	350 Bar (5075 PSI)	5	Fluorocarbon	R5A08 4.3 kg (9.5 lbs.)
10	SAE 1-1/4"						R5A10 5.6 kg (12.3 lbs.)

B

**Dimensions**

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



Size	l1	l2	l3	b1	h1	h2	h3	h4	d1	d2
06	22.2 (0.87)	84.0 (3.31)	108.0 (4.25)	60.0 (2.36)	37.0 (1.46)	47.6 (1.87)	90.0 (3.54)	128.0 (5.04)	19.0 (0.75)	10.5 (0.41)
08	26.2 (1.03)	101.0 (3.98)	128.0 (5.04)	60.0 (2.36)	45.0 (1.77)	52.4 (2.06)	96.0 (3.78)	134.0 (5.28)	25.0 (0.98)	10.5 (0.41)
10	30.2 (0.44)	101.0 (3.98)	135.0 (5.31)	75.0 (2.95)	48.0 (1.89)	58.7 (2.31)	109.0 (4.29)	147.0 (5.79)	32.0 (1.26)	12.5 (0.49)





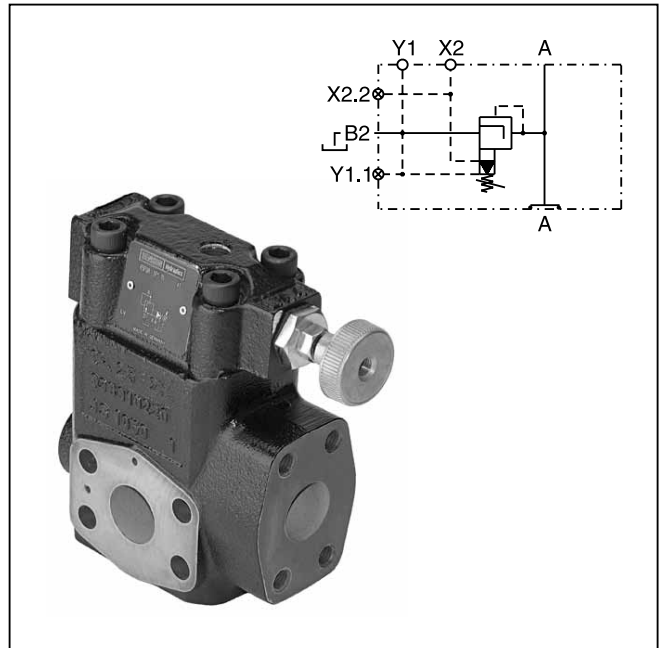
**General Description**

Series R5P direct operated, 3-way pressure compensators can be combined with any type of fixed or adjustable flow resistor (throttle) to provide a load compensated flow. The combination with the proportional throttle valve F5C serves as a compact 3-way flow control unit in SAE flange design. The R5P is typically used as meter-in compensator in front of the flow resistor.

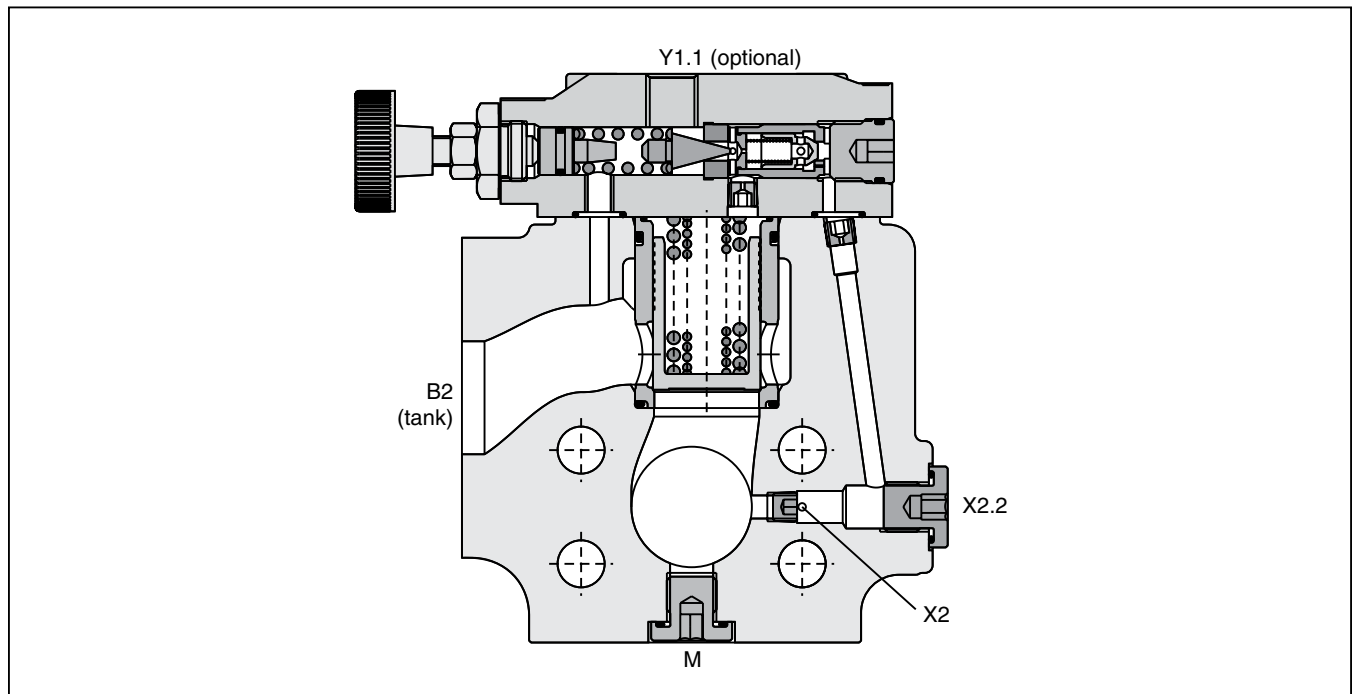
The R5P is additionally equipped with a pressure relief pilot that controls the compensator cartridge and operates a system pressure relief valve. The R5P\*P2 provides a proportional relief function.

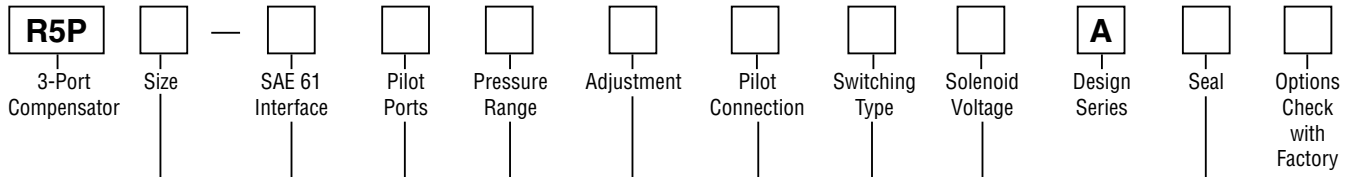
**Features**

- Seated type 3-way pressure compensator.
- SAE 61 flange.
- 8.4 Bar (121.8 PSI) control pressure.
- Pressure relief function (optionally proportional).
- With optional vent function.
- 3 sizes (SAE Code 61 3/4", 1", 1-1/4").
- Load compensated flow in combination with F5C.



**B**





**B**

Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1-1/4"

Code	Size	Max. Pressure
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

Code	Description
1	Hand Knob
3	Acorn Nut with Lead Seal

Code	Description
2	Internal PD Internal PP*
6	External PD** Internal PP*

\* PP through port X1 in outlet flange.  
 \*\* Through port Y1.1.

Code	Description
Omit	Standard w/o vent function
G0R	12 VDC
G0Q	24 VDC
G0H	48 VDC
GAR	98 VDC
W30	110V 50Hz/ 120V 60Hz
W31	220V 50Hz/ 240V 60Hz

Code	Description*
1	Nitrile
5	Fluorocarbon

\* Further seals on request.

Code	Pilot Port	Port Y1*
3	SAE	Plugged
S	SAE	Open

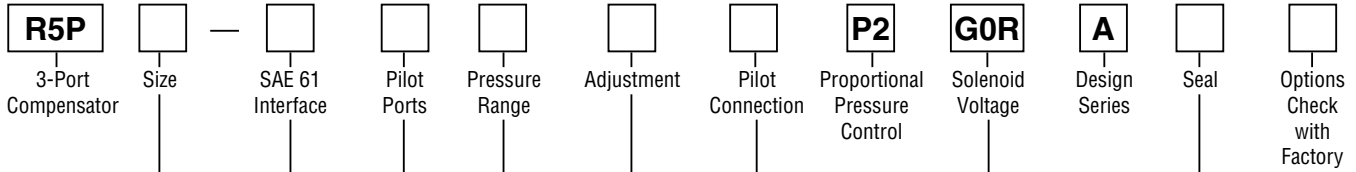
\* Y1 port is used in combination with F5C, when the F5C should be drained through the R5P (internal or external drain).

Code	Description
Omit	Standard w/o vent function
09*	Solenoid not activated unload circulation
11**	Solenoid activated unload circulation

\* Solenoid de-energized: open to tank  
 solenoid energized: vent line blocked.  
 \*\* Solenoid de-energized: vent line blocked  
 solenoid energized: open to tank.

Code	Description
1	7 to 105 Bar (102 to 1523 PSI)
3	7 to 210 Bar (102 to 3045 PSI)
5	7 to 350 Bar (102 to 5075 Bar)

Weight:	R5P	R5P with VV01
R5P06	3.7 kg (8.2 lbs.)	5.4 kg (11.9 lbs.)
R5P08	4.4 kg (9.7 lbs.)	6.1 kg (13.5 lbs.)
R5P10	5.3 kg (11.7 lbs.)	7.0 kg (15.4 lbs.)



Code	Description
06	SAE 3/4"
08	SAE 1"
10	SAE 1 1/4"

Code	Description
1	Hand knob
3	Acorn nut with lead seal

Code	Description
G0R	12V, 2.3A

Code	Description
1	Nitrile
5	Fluorocarbon

Further seals on request

Code	Size	Max. Pressure
4	10	280 Bar (4060 PSI)
5	06/08	350 Bar (5075 PSI)

Code	Description
2	Internal PD Internal PP <sup>4)</sup>
6	External PD <sup>3)</sup> Internal PP <sup>4)</sup>

<sup>3)</sup> Through port Y1.1  
<sup>4)</sup> PP through port X1 in outlet flange

Code	Pilot Ports	Port Y1 <sup>1)</sup>
3	SAE	Plugged
S	SAE	Open

<sup>1)</sup> Y1 port is used in combination with F5C, when the F5C should be drained through the R5P (internal or external drain)

Code	Description
1	7 to 105 Bar (102 to 1523 PSI)
3	7 to 210 Bar (102 to 3045 PSI)
5 <sup>2)</sup>	7 to 350 Bar (102 to 5075 Bar)

<sup>2)</sup> R5P10-4\*5 up to 280 Bar (4060 PSI)

<b>Weight:</b>	<b>R5P*P2</b>
R5P06*P2	5.5 kg (12.1 lbs.)
R5P08*P2	6.2 kg (13.7 lbs.)
R5P10*P2	7.1 kg (15.7 lbs.)

B

## R5P

General							
Size			06 (3/4")	08 (1")	10 (1 1/4")		
Mounting	Flanged according to SAE 61						
Mounting Position	Unrestricted						
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)						
MTTF <sub>D</sub>	150 years						
Hydraulic							
Max. Operating Pressure	Ports A, B	350 Bar (5075 PSI)		350 Bar (5075 PSI)		280 Bar (4060 PSI)	
Pressure Ranges	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)						
Nominal Flow	90 LPM (23.8 GPM)		300 LPM (79.4 GPM)		600 LPM (158.7 GPM)		
Fluid	Hydraulic oil as per DIN 51524...51535, other on request						
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)						
Viscosity	Permitted Recommended	10 to 650 cSt / mm <sup>2</sup> /s (46 to 3013 SSU) 30 to 80 cSt / mm <sup>2</sup> /s (139 to 371 SSU)					
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)						
Electrical (Solenoid) R5P with VV01							
Duty Ratio	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible						
Solenoid Connection	Connector as per EN175301-803						
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)						
	Code	G0R	G0Q	GAR	GOH	W30	W31
Supply Voltage		12 VDC	24 VDC	98 VDC	48 VDC	110V at 50Hz 120V at 60Hz	230V at 50Hz 240V at 60Hz
Tolerance Supply Voltage	[%]	±10	±10	±10	±10	±5	±5
Power Consumption	Hold	[W]	32.7	31	32	30	70 / 70 VA
	In Rush	[W]	32.7	31	32	30	280 / 290 VA
Response Time	Energized / De-energized AC 20/18ms, DC 46/27 ms						
Maximum Switching Frequency	AC up to 7200, DC 70 to 16,000 switchings/hour						
Coil Insulation Class	H (180°C) (356°F)						

## R5P\*P2 (Proportional)

General							
Size			06 (3/4")	08 (1")	10 (1-1/4")		
Mounting	Flanged according to SAE 61						
Mounting Position	Unrestricted						
Ambient Temperature Range	-20°C to +50°C (-4°F to +122°F)						
MTTF <sub>D</sub>	150 years						
Hydraulic							
Max. Operating Pressure	Ports A, B	350 Bar (5075 PSI)		350 Bar (5075 PSI)		280 Bar (4060 PSI)	
Pressure Range	105 Bar (1523 PSI), 210 Bar (3045 PSI), 350 Bar (5075 PSI)						
Nominal Flow	90 LPM (23.8 GPM)		300 LPM (79.4 GPM)		600 LPM (158.7 GPM)		
Fluid	Hydraulic oil as per DIN 51524...51535, other on request						
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)						
Viscosity	Permitted Recommended	10 to 380 cSt / mm <sup>2</sup> /s (46 to 1761 SSU) 30 to 80 cSt / mm <sup>2</sup> /s (139 to 371 SSU)					
Filtration	ISO Class 4406 (1999) 18/16/13 (acc. NAS 1638: 7)						
Electrical (Solenoid) R5P with VV01							
Duty Ratio	100% ED; CAUTION: Coil temperature up to 150°C (302°F) possible						
Nominal Voltage	12 VDC						
Maximum Current	2.3 A						
Coil Resistance	4 Ohm at 20°C (68°F)						
Solenoid Connection	Connector as per EN175301-803, Solenoid identification as per ISO 9461						
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)						
Power Amplifier	PCD00A-400						

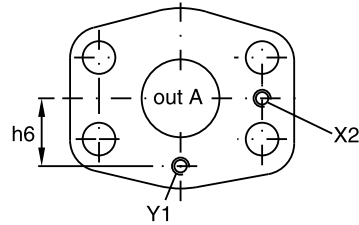
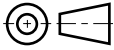
**Dimensions**

**Pressure Compensator Valves  
Series R5P (SAE Flange Mounted)**

Return to ALPHA TOC

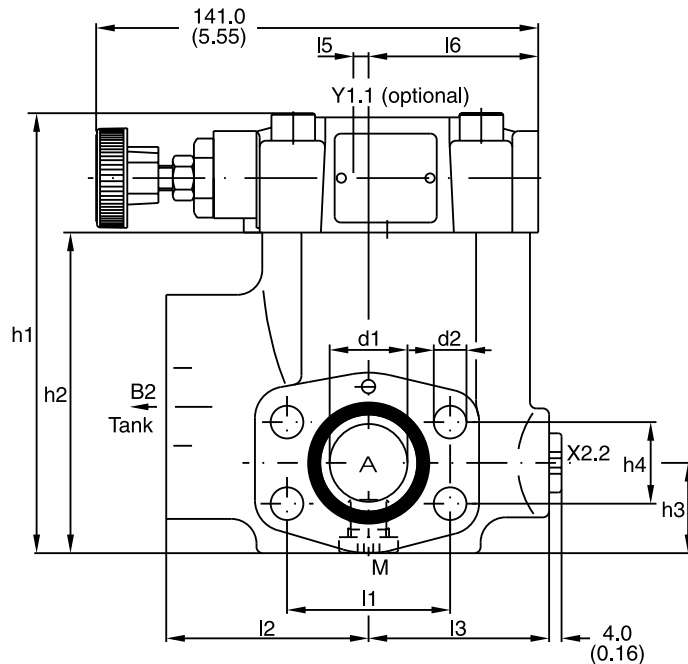
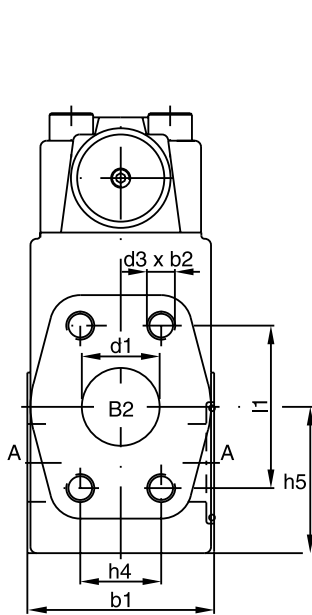
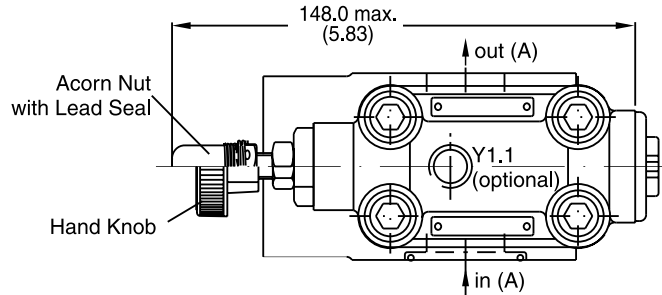
Return to SECTION TOC

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



Seal Kits*		
Size	Nitrile	Fluorocarbon
06	S16-91461-0	S16-91461-5
08	S16-91460-0	S16-91460-5
10	S16-91459-0	S16-91459-5

\* Does not include P2 seal kit.



Size	l1	l2	l3	l4	l5	l6	b1	b2	h1	h2	h3	h4	h5	h6	d1	d2	d3
06	47.6 (1.87)	63.0 (2.48)	56.0 (2.20)	148.0 (5.83)	1.0 (0.04)	49.0 (1.93)	60.0 (2.36)	20.0 (0.79)	119.0 (4.69)	81.6 (3.21)	28.5 (1.13)	22.2 (0.87)	41.6 (1.64)	20.8 (0.82)	19.0 (0.75)	10.5 (0.41)	3/8" UNC
08	52.4 (2.06)	65.0 (2.56)	58.0 (2.28)	144.6 (5.69)	5.0 (0.20)	54.5 (2.15)	60.0 (2.36)	23.0 (0.91)	142.0 (5.59)	103.0 (4.06)	30.5 (1.20)	26.2 (1.03)	48.6 (1.91)	24.3 (0.96)	25.0 (0.98)	10.5 (0.41)	3/8" UNC
10	58.7 (2.31)	61.0 (2.40)	62.0 (2.44)	146.6 (5.77)	3.0 (0.12)	56.5 (2.22)	75.0 (2.95)	22.0 (0.87)	149.0 (5.87)	111.5 (4.39)	37.5 (1.48)	30.2 (1.19)	64.1 (2.52)	29.3 (1.15)	32.0 (1.26)	12.5 (0.49)	7/16" UNC

Port	Function	Port size		
		R5P06	R5P08	R5P10
A	Inlet/Outlet	3/4"	1"	1-1/4"
B2	Tank	3/4"	1"	1-1/4"
X2	Internal Pilot Pressure	M3		
X2.2	External Pilot Pressure	G1/4"		
Y1	Internal Pilot Drain	M3		
Y1.1	External Pilot Drain	G1/4"		
M	Pressure Gauge	G1/4"		

R5P.indd, ddp

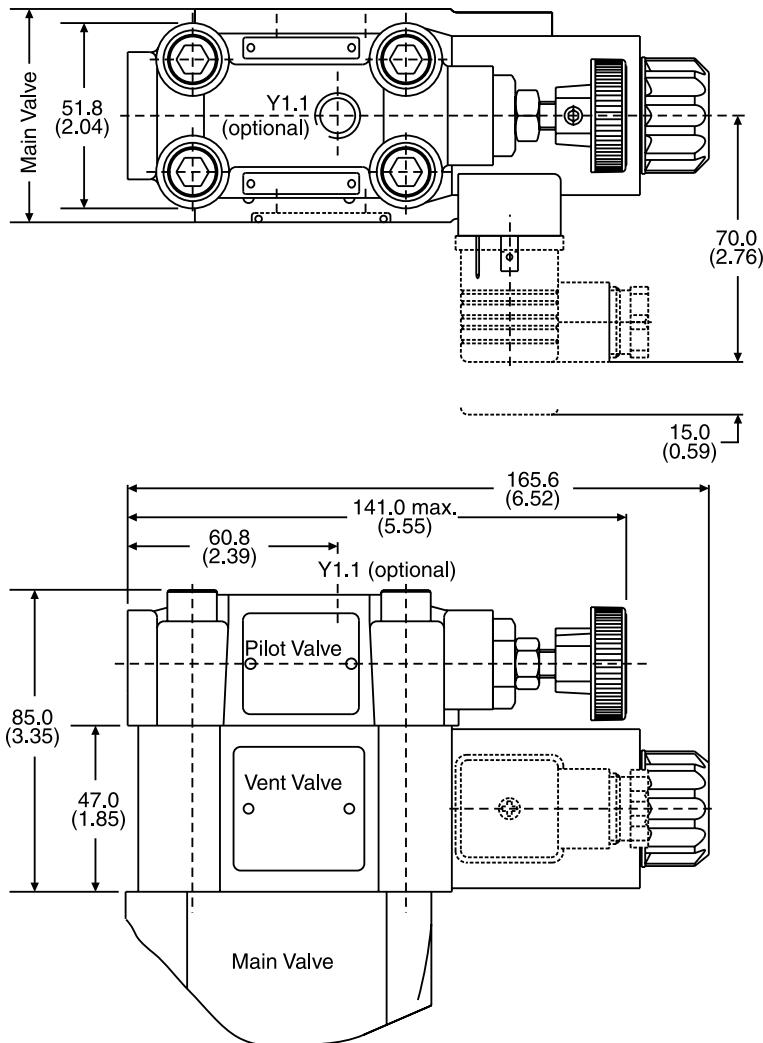


**B**

**R5P with Vent Function**

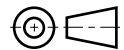
Inch equivalents for millimeter dimensions are shown in (\*\*)

**B**



Seal Kits*	
Nitrile	Fluorocarbon
<b>DC solenoid</b>	
S26-58515-0	S26-58515-5
<b>AC solenoid</b>	
S26-35237-0	S26-35237-5

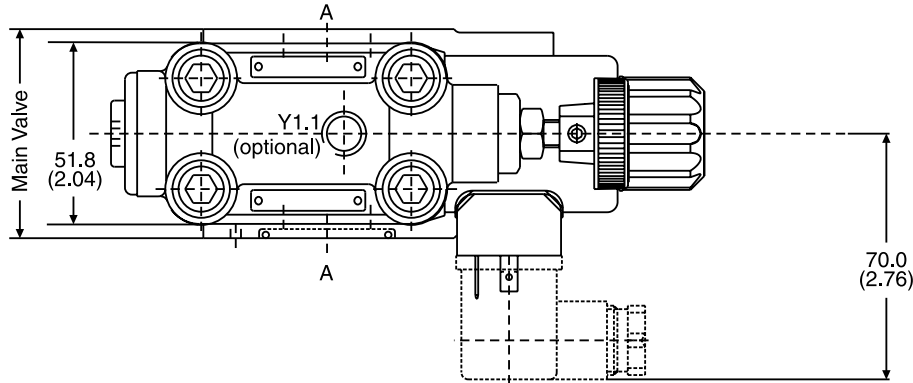
\* For vent valve only.



Code	Internal Drain	External Drain
11		
09		

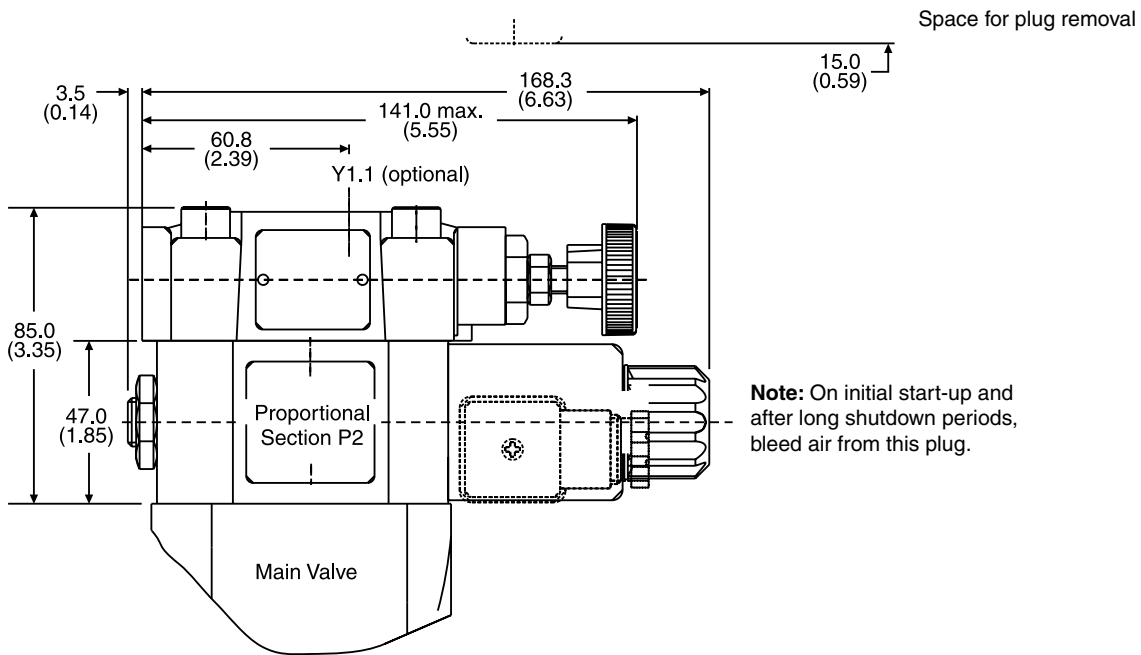
**R5P with Proportional Function**

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



Drain line only external from the pilot head (Y1.1). The pilot drain port must be connected to a stable low pressure tank line. Pressure variations in the drain port should be avoided.

**B**



**Note:** On initial start-up and after long shutdown periods, bleed air from this plug.

	Seal Kit *	
	Nitrile	Fluorocarbon
Prop. Section P2	S26-58473-0	S26-58473-5

\* P2 seal kit only.

See previous page for full valve seal kit

**General Description**

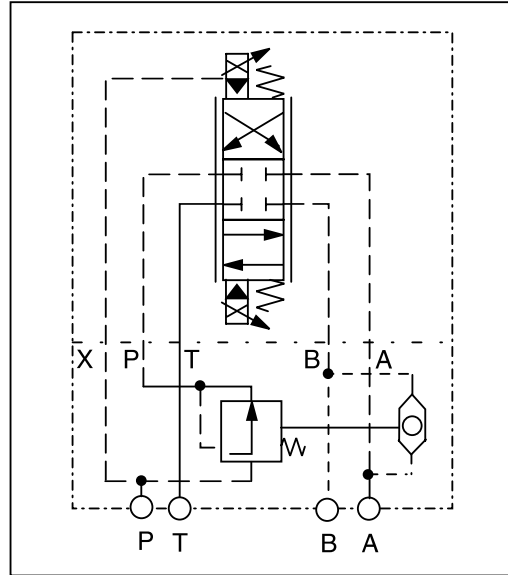
Series LCM 2-way pressure compensators are sandwich valves designed for stacking beneath a proportional directional control valve with a standardized mounting pattern.

**B**

The valve maintains a constant pressure differential between ports P and A or P and B across the directional valve. When the cross sectional opening of the directional valves is held steady, a constant flow rate is achieved, regardless of load fluctuations.

The control pressure applied to the spring side of the compensator spool is supplied from port A or B via a shuttle valve. Flow rate regulation is automatically effective in the port with the highest pressure.

**Application Example**



Proportional DC valve model D31FB with 2-way pressure compensator LCM3 maintains a constant flow rate. The diagram shows the design according to Code X

**Specifications**

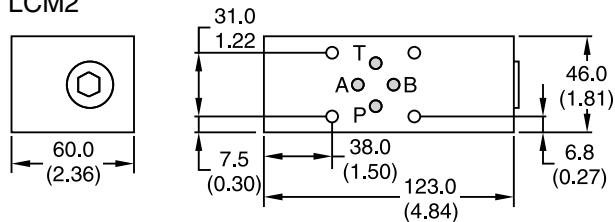
General		
Size	NG6	NG10
Mounting Position	NFPA D03 CETOP 3	NFPA D05 CETOP 5
Maximum Flow	20 LPM (5.28 GPM)	52 LPM (13.73 GPM)
Maximum Operating Pressure	350 Bar (5075 PSI)	
Pressure Differential	10 Bar (145 PSI)	

**Ordering Information**

<div style="border: 1px solid black; padding: 2px; width: 40px; margin: 0 auto;">LCM</div> <p>Pressure Compensator</p>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> <p>Size</p>	<div style="border: 1px solid black; padding: 2px; width: 40px; margin: 0 auto;">PP</div> <p>Control Connection</p>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> <p>Pilot Oil</p>	<div style="border: 1px solid black; padding: 2px; width: 40px; margin: 0 auto;">02</div> <p>Differential Pressure 10 Bar (14.5 PSI)</p>	<div style="border: 1px solid black; padding: 2px; width: 40px; margin: 0 auto;">V</div> <p>Seal Fluorocarbon</p>	<div style="border: 1px dashed black; width: 40px; height: 40px; margin: 0 auto;"></div> <p>Design Series</p> <p>NOTE: Not required when ordering.</p>															
<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>NG6</td> </tr> <tr> <td>3</td> <td>NG10</td> </tr> </tbody> </table>		Code	Description	2	NG6	3	NG10	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Omit</td> <td>Internal</td> </tr> <tr> <td>X*</td> <td>External</td> </tr> </tbody> </table> <p>* NG10 only.</p>		Code	Description	Omit	Internal	X*	External	<p><b>Weight:</b></p> <table border="0"> <tr> <td>LCM2</td> <td>2.5 kg (5.5 lbs.)</td> </tr> <tr> <td>LCM3</td> <td>3.1 kg (6.8 lbs.)</td> </tr> </table>		LCM2	2.5 kg (5.5 lbs.)	LCM3	3.1 kg (6.8 lbs.)
Code	Description																				
2	NG6																				
3	NG10																				
Code	Description																				
Omit	Internal																				
X*	External																				
LCM2	2.5 kg (5.5 lbs.)																				
LCM3	3.1 kg (6.8 lbs.)																				

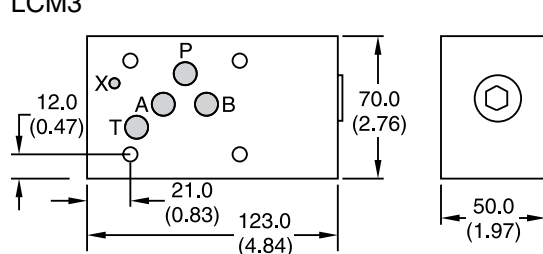
**Dimensions** — Inch equivalents for millimeter dimensions are shown in (\*\*)

**LCM2**



Mounting Screws: BK403 (4) M5 x 90  
For mounting screws connected with directional valves D1 or 2-stage valves

**LCM3**



Mounting Screws: BK412 (4) M6 x 90  
The views show the mounting surface for the directional valve



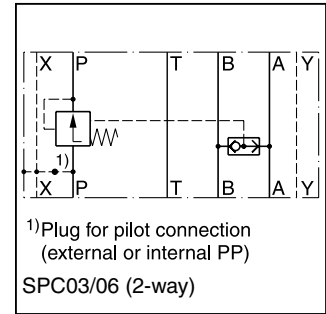
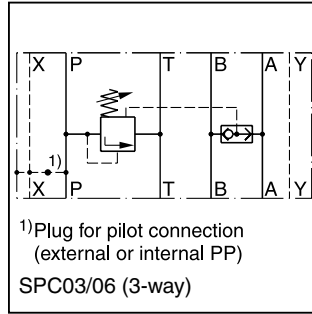
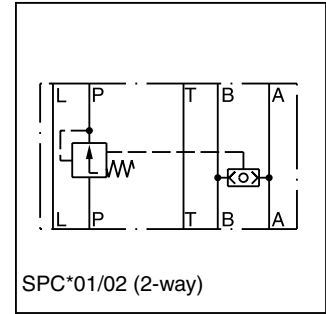
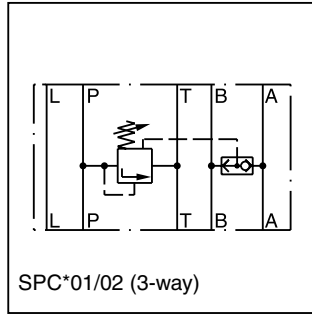
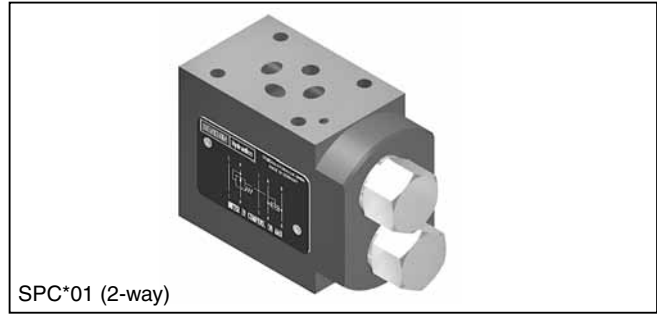
**General Description**

Series SPC sandwich type pressure compensators are typically used in combination with proportional directional control valves. The compensator keeps the pressure drop over the directional valve constant and thus provides load-independent flow to the actuator.

**Features**

- 2-way or 3-way pressure compensators.
- Standard pressure differential 5 Bar (73 PSI).
- Adjustable differential (2 to 5 Bar) (29 to 73 PSI) and 10 Bar (145 PSI) optional.
- Sizes:
 

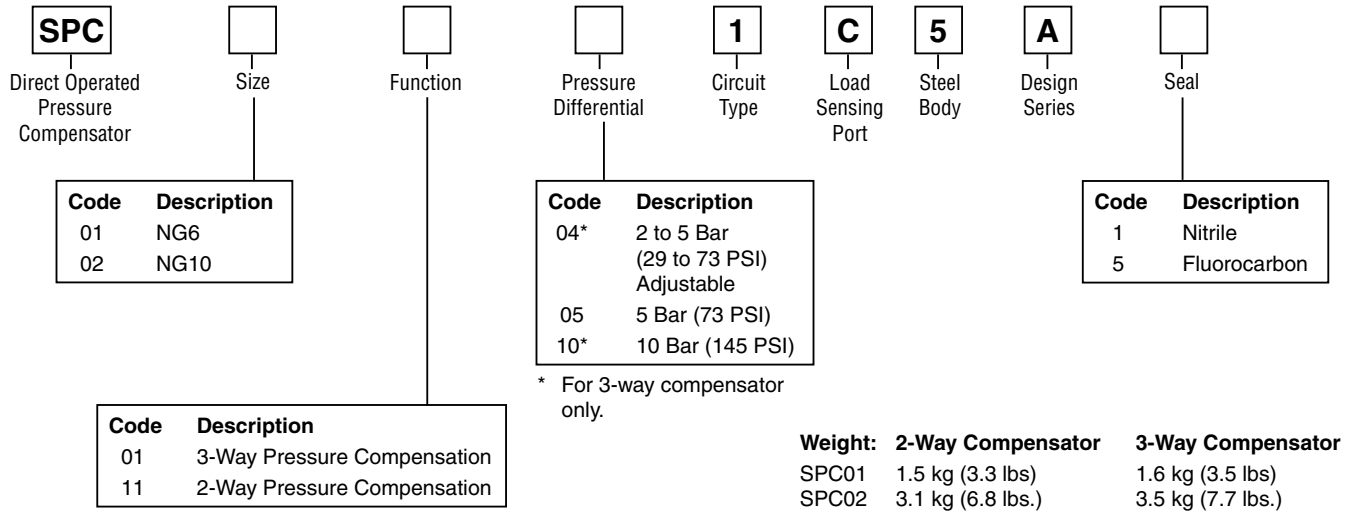
NG6 / CETOP 3	SPC01
NG10 / CETOP 5	SPC02
NG16 / CETOP 7	SPC03
NG25 / CETOP 8	SPC04



**Specifications**

General				
Size	NG6	NG10	NG16	NG25
Mounting Interface	DIN 24340 A6 ISO 4401 NFFA D03 CETOP 3	DIN 24340 A10 ISO 4401 NFFA D05 CETOP 5	DIN 24340 A16 ISO 4401 NFFA D07 CETOP 7	DIN 24340 A25 ISO 4401 NFFA D08 CETOP 8
Mounting Position	Unrestricted			
Ambient Temperature	-20°C to +50°C (-4°F to +122°F)			
Hydraulic				
Max. Operating Pressure	P, A, B: 350 Bar (5075 PSI) T: 210 Bar (3045 PSI) L: 10 Bar (145 PSI)	P, A, B: 315 Bar (4568 PSI) T: 210 Bar (3045 PSI) L: 10 Bar (145 PSI)	—	—
	Without Drain Port: 350 Bar (5075 PSI) T: 160 Bar (2320 PSI) L: 160 Bar (2320 PSI)	P, A, B: 315 Bar (4568 PSI) T: 210 Bar (3045 PSI) L: 210 Bar (3045 PSI)	P, A, B, X: 350 Bar (5075 PSI) T, Y: 105 Bar (1523 PSI)	P, A, B, X: 350 Bar (5075 PSI) T, Y: 105 Bar (1523 PSI)
Nominal Flow	30 LPM (7.9 GPM)	80 LPM (21.1 GPM)	200 LPM (52.9 GPM)	400 LPM (105.8 GPM)
Fluid	Hydraulic oil as per DIN 51524...51535, other on request			
Fluid Temperature	-20°C to +80°C (-4°F to +176°F)			
Viscosity Permitted Recommended	10 to 650 cSt / mm <sup>2</sup> /s (46 to 3013 SSU) 30 to 80 cSt / mm <sup>2</sup> /s (139 to 371 SSU)			
Filtration	ISO 4406 (1999) 18/16/13 (acc. NAS 1638: 7)			

**B**

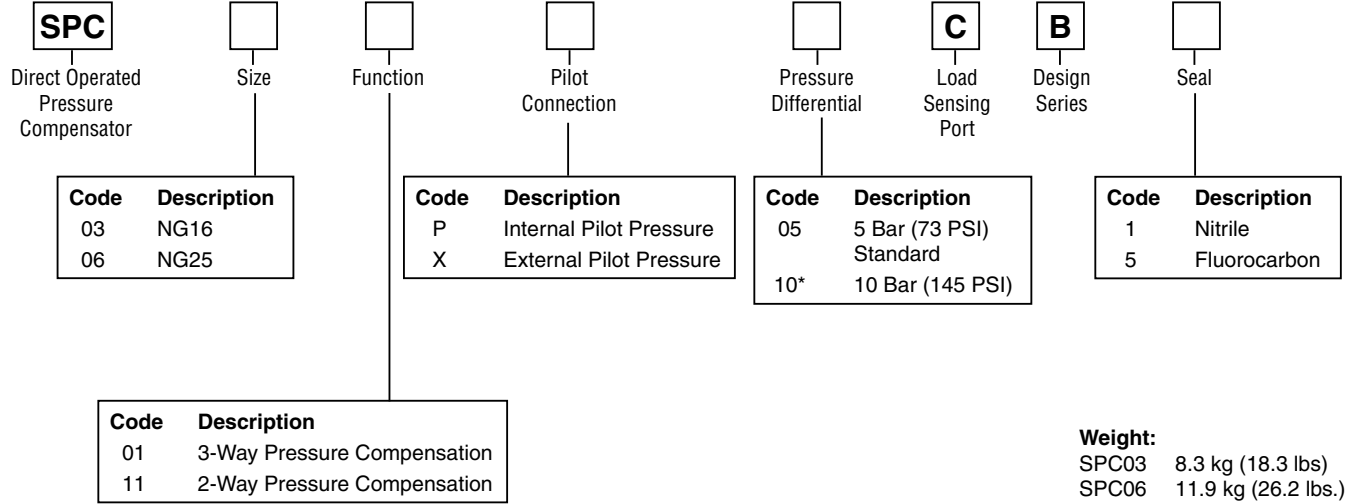


**SPC01**

Type	Model No.
3-Way Compensators with Shuttle Valve P-A/B	SPC0101041C5A1
	SPC0101051C5A1
	SPC0101101C5A1
2-Way Compensators with Shuttle Valve P-A/B	SPC0111051C5A1

**SPC02**

Type	Model No.
3-Way Compensators with Shuttle Valve P-A/B	SPC0201041C5A1
	SPC0201051C5A1
	SPC0201101C5A1
2-Way Compensators with Shuttle Valve P-A/B	SPC0211051C5A1



**SPC03**

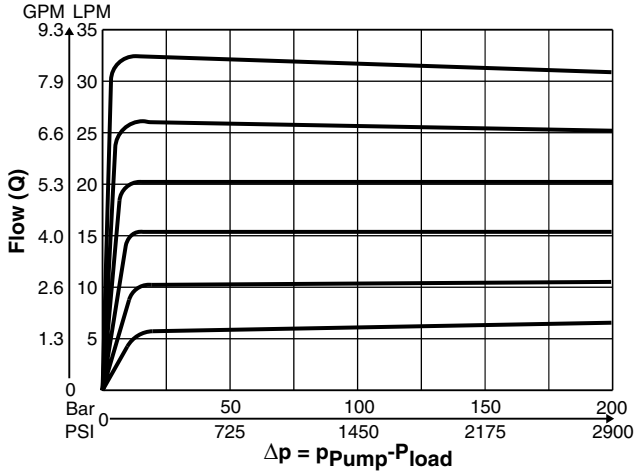
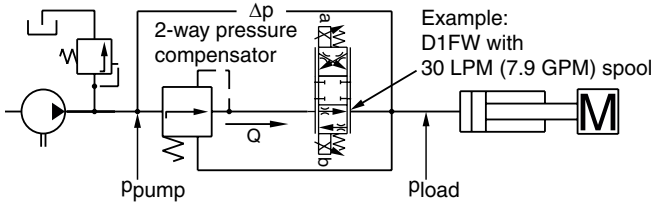
Type	Model No.
3-Way Compensators with Shuttle Valve P-A/B	SPC0301P05CB1
	SPC0301X05CB1
	SPC0311P05CB1
2-Way Compensators with Shuttle Valve P-A/B	SPC0311P10CB1
	SPC0311X05CB1
	SPC0311X10CB1

**SPC06**

Type	Model No.
3-Way Compensators with Shuttle Valve P-A/B	SPC0601P05CB1
	SPC0601X05CB1
	SPC0611P05CB1
2-Way Compensators with Shuttle Valve P-A/B	SPC0611P10CB1
	SPC0611X05CB1
	SPC0611X10CB1

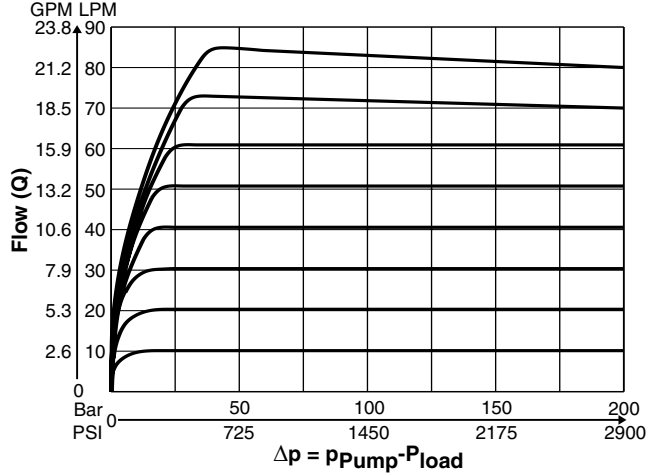
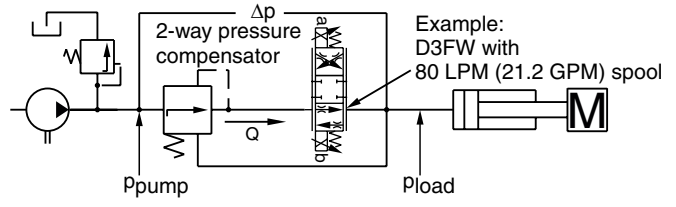
**SPC01**

**Flow Regulation Example:**  
**2-Way Pressure Compensator at  $\Delta p = 5$  Bar**



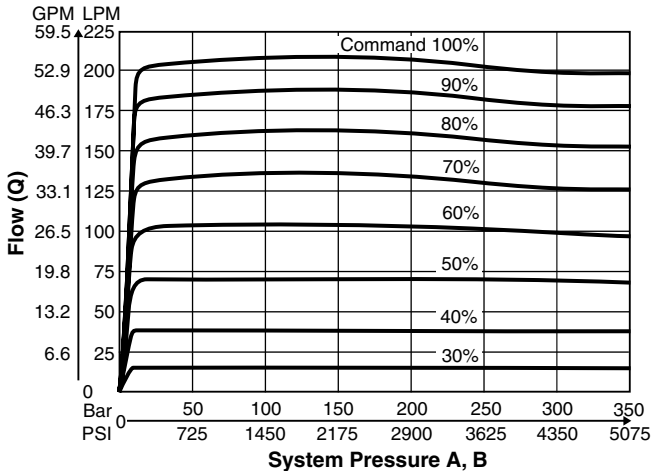
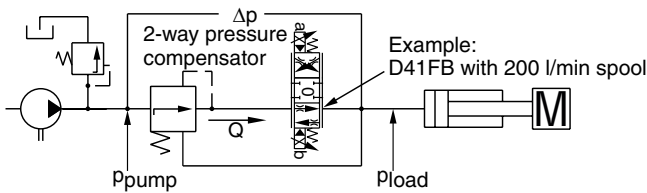
**SPC02**

**Flow Regulation Example:**  
**2-Way Pressure Compensator at  $\Delta p = 5$  Bar**



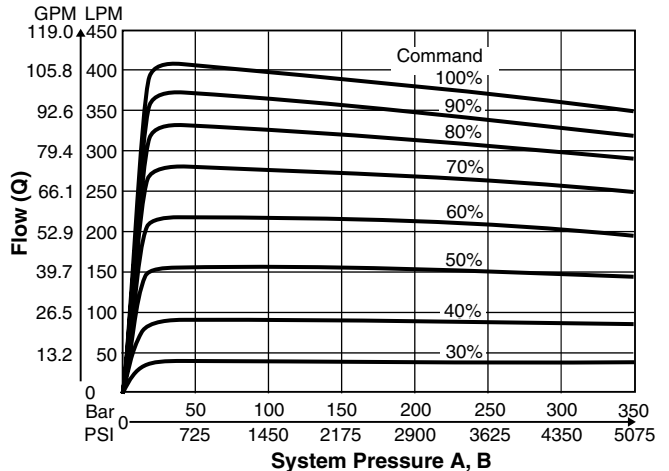
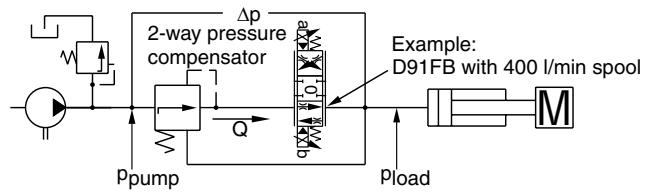
**SPC03**

**Flow Regulation Example:**  
**2-Way Pressure Compensator at  $\Delta p = 5$  Bar**



**SPC06**

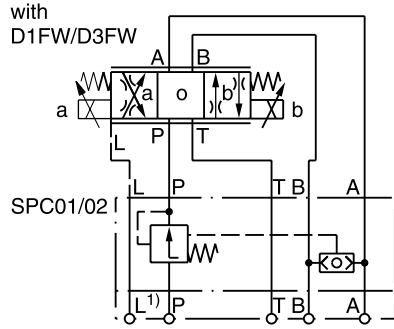
**Flow Regulation Example:**  
**2-Way Pressure Compensator at  $\Delta p = 5$  Bar**



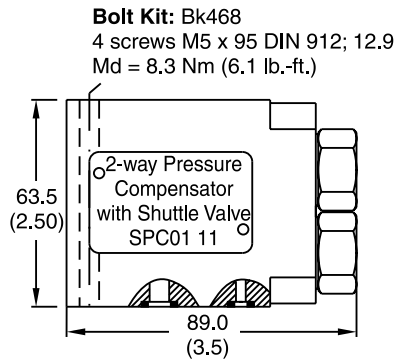
Inch equivalents for millimeter dimensions are shown in (\*\*)

**2-Way Pressure Compensator**

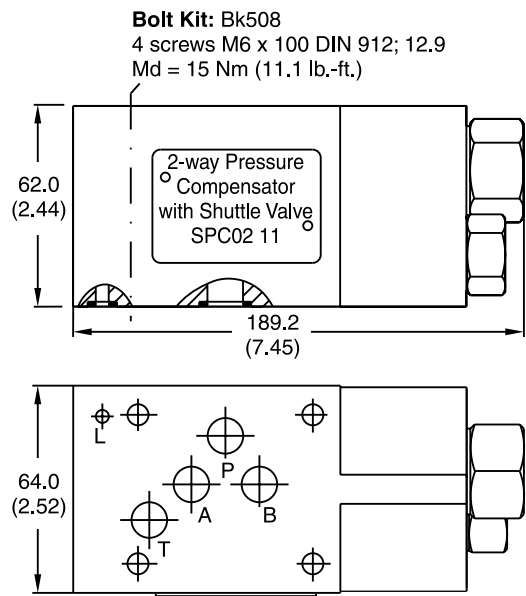
**B**



**SPC01**

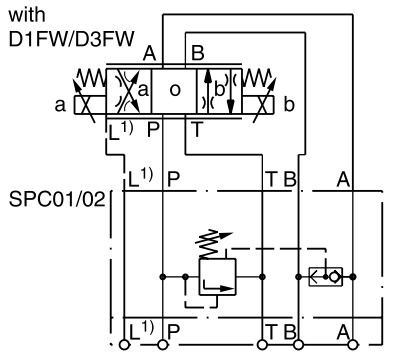


**SPC02**

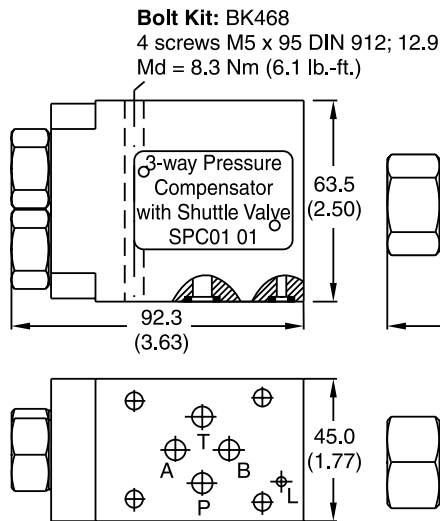


- 1) Always connect L to tank when  
SPC01 T > 160 Bar (2320 PSI)  
SPC02 T > 210 Bar (3045 PSI)

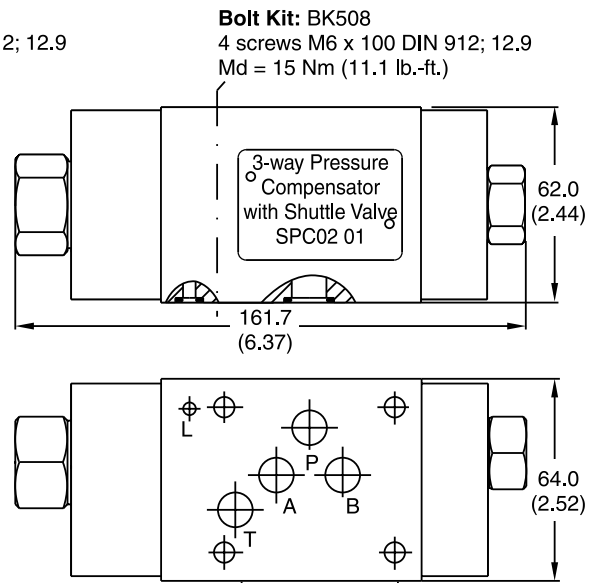
**3-Way Pressure Compensator**



**SPC01**



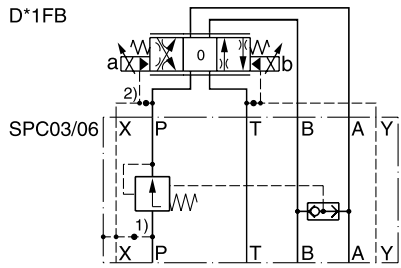
**SPC02**



- 1) Always connect L to tank when  
SPC01 T > 160 Bar (2320 PSI)  
SPC02 T > 210 Bar (3045 PSI)

**2-Way Pressure Compensator**

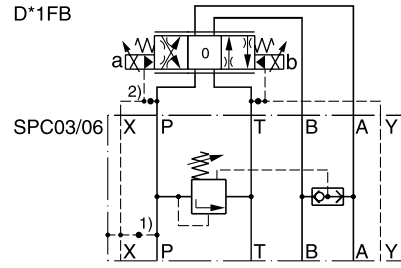
**SPC03/SPC06**



- 2) Plug in PX (obligatory for the use with pressure compensator)
- 1) Plug for pilot connection (external or internal PP)

**3-Way Pressure Compensator**

**SPC03/SPC06**



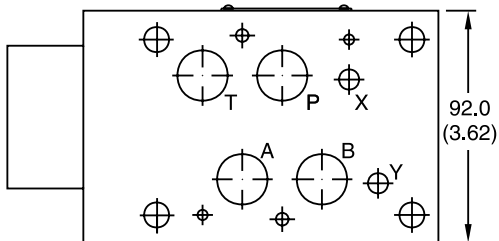
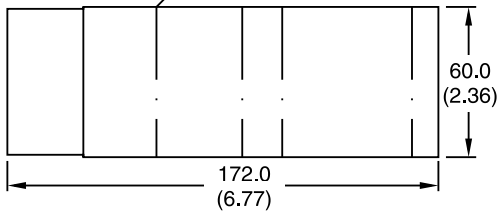
- 2) Plug in PX (obligatory for the use with pressure compensator)
- 1) Plug for pilot connection (external or internal PP)

**B**

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

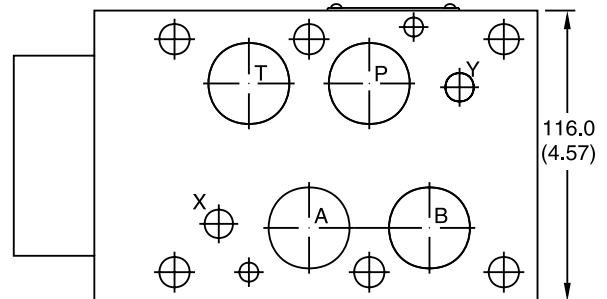
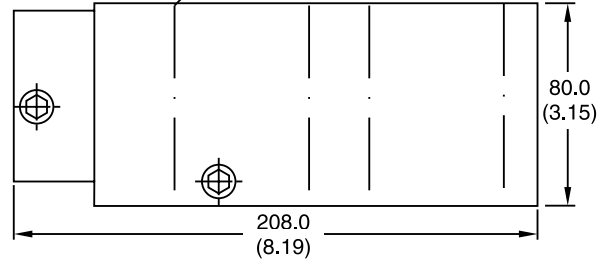
**SPC03**

**Bolt Kit: BK251**  
4 screws M10 x 120 DIN 912, 12.9,  
2 screws M6 x 120 DIN912, 12.9



**SPC06**

**Bolt Kit: BK522**  
6 screws M12 x 140 DIN 912, 12.9





**Contents**

**Manifold Mounted Valves**

Series	Description	Page
BD15 .....	Two-Stage Torque Motor Servovalve (up to 20 GPM) .....	C2 - C8
BD30 .....	Two-Stage Torque Motor Servovalve (up to 40 GPM) .....	C2 - C5, C9 - C11

**Flapper Nozzle**

Series	Description	Page
PH76 .....	Two-Stage Torque Motor Servovalve (up to 15 GPM) .....	C12 - C15
DY1S .....	One-Stage Torque Motor Servovalve (Pressure Control) .....	C16 - C18
DY3H/DY6H.....	Two-Stage Torque Motor Servovalve (up to 6 GPM) .....	C19 - C22
DY01.....	Two-Stage Torque Motor Servovalve (up to 3 GPM) .....	C23 - C26
DY05.....	Two-Stage Torque Motor Servovalve (.25 to 5 GPM) .....	C27 - C30
DY10.....	Two-Stage Torque Motor Servovalve (7.5 to 10 GPM) .....	C31 - C34
DY12.....	Two-Stage Torque Motor Servovalve (12.5 to 15 GPM) .....	C35 - C38
DY15.....	Two-Stage Torque Motor Servovalve (15 to 25 GPM) .....	C39 - C42
DY25.....	Two-Stage Torque Motor Servovalve (25 to 30 GPM) .....	C43 - C46
DY45.....	Two-Stage Torque Motor Servovalve (40 to 60 GPM) .....	C47 - C50
SEMT .....	Two-stage, 4-way, Flapper and Nozzle Servovalve .....	C51 - C54
SE05, SE10, SE15.....	Two-stage, 4-way, Flapper and Nozzle Servovalve .....	C55 - C61
SE2N.....	Two-stage, 4-way, Flapper and Nozzle Servovalve .....	C62 - C65
SE20.....	Two-stage, 4-way, Flapper and Nozzle Servovalve .....	C66 - C70
SE2E .....	Two-stage, 4-way, Flapper and Nozzle Servovalve .....	C71 - C75
SE31.....	Two-stage, 4-way, Flapper and Nozzle Servovalve .....	C76 - C80
SE60.....	Two-stage, 4-way, Flapper and Nozzle Servovalve .....	C81 - C84



**Description**

Series BD servovalves provide high resolution in the control of position, velocity and force in motion control applications.

**Features**

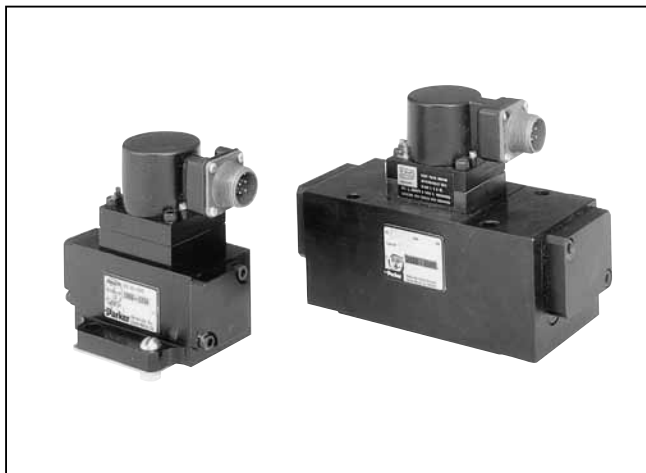
- Rugged reliable trouble-free operation.
- Reduced contaminant sensitivity.
- Linear flow gain characteristics.
- Intrinsically safe model available.
- Explosion proof model available.

**Operation**

When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

**Specifications**

Rated Flow @ 1000 PSI ΔP	3.78–151 LPM (1.0 – 40 GPM)	
Linearity	≤ 5%	
Hysteresis	≤ 3%	
Threshold	≤ 0.5%	
Fluid	Mineral oil, 60–225 SSU, max. 1000 SSU	
Oper. Temp.	-1 to +82°C (+30 to +180°F)	
Pressure Gain	3% of spool shift	
Null Shift with Temperature with Supply Pressure	< ± 2% per 38°C (100°F) < 2% per 69 Bar (1000 PSI)	
Quiescent Flow (Std. Spool Lap)	BD15 – 1.5–2.1 LPM (.40–.55 GPM) BD30 – 2.1–3.78 LPM (.55 – 1.0 GPM)	
Step Response Input	Model	Typical Step Response Input
	BD15 BD30	10 to 90%, 26 ms 10 to 90%, 30 ms
Pressure Ranges	For optimum performance, Parker Servo Valves are designed to operate within specific system supply pressure ranges. <u>System Supply Pressure</u>	
	180–210 Bar (2600–3000 PSI)	48–66 Bar (700–950 PSI)
	138–172 Bar (2000–2500 PSI)	14–45 Bar (200–650 PSI)
	95–133 Bar (1400–1950 PSI)	0–210 Bar (0–3000 PSI)
	68–90 Bar (1000–1300 PSI)	External Pilot
Filtration	SAE Class 3 or better, ISO Code 17/15/12	
Protection Class	NEMA 1 (IP54)	



**Flow–Load Characteristics**

Control flow to the load will change with load pressure and valve current as shown in figure 1. These characteristics closely follow the theoretical square–root relationship for sharp–edged orifices as illustrated in the equation below.

$$Q = K \sqrt{\Delta P}$$

- Q = Control flow, cubic inches/sec
- K = Valve constant
- ΔP = Valve pressure drop

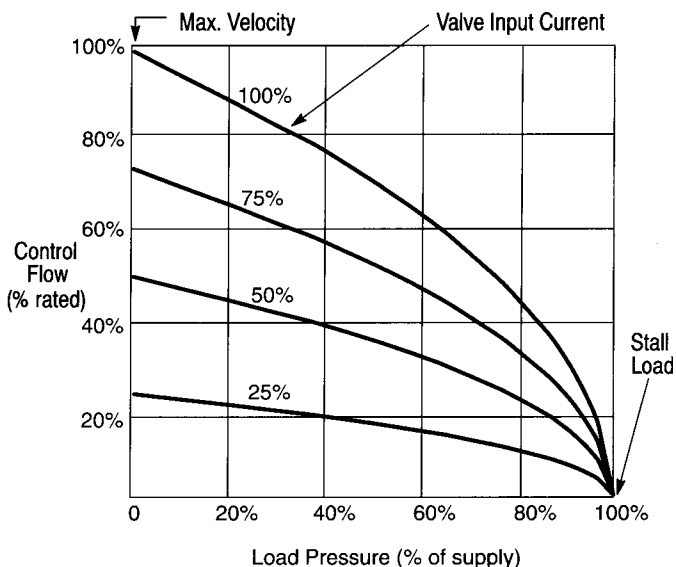
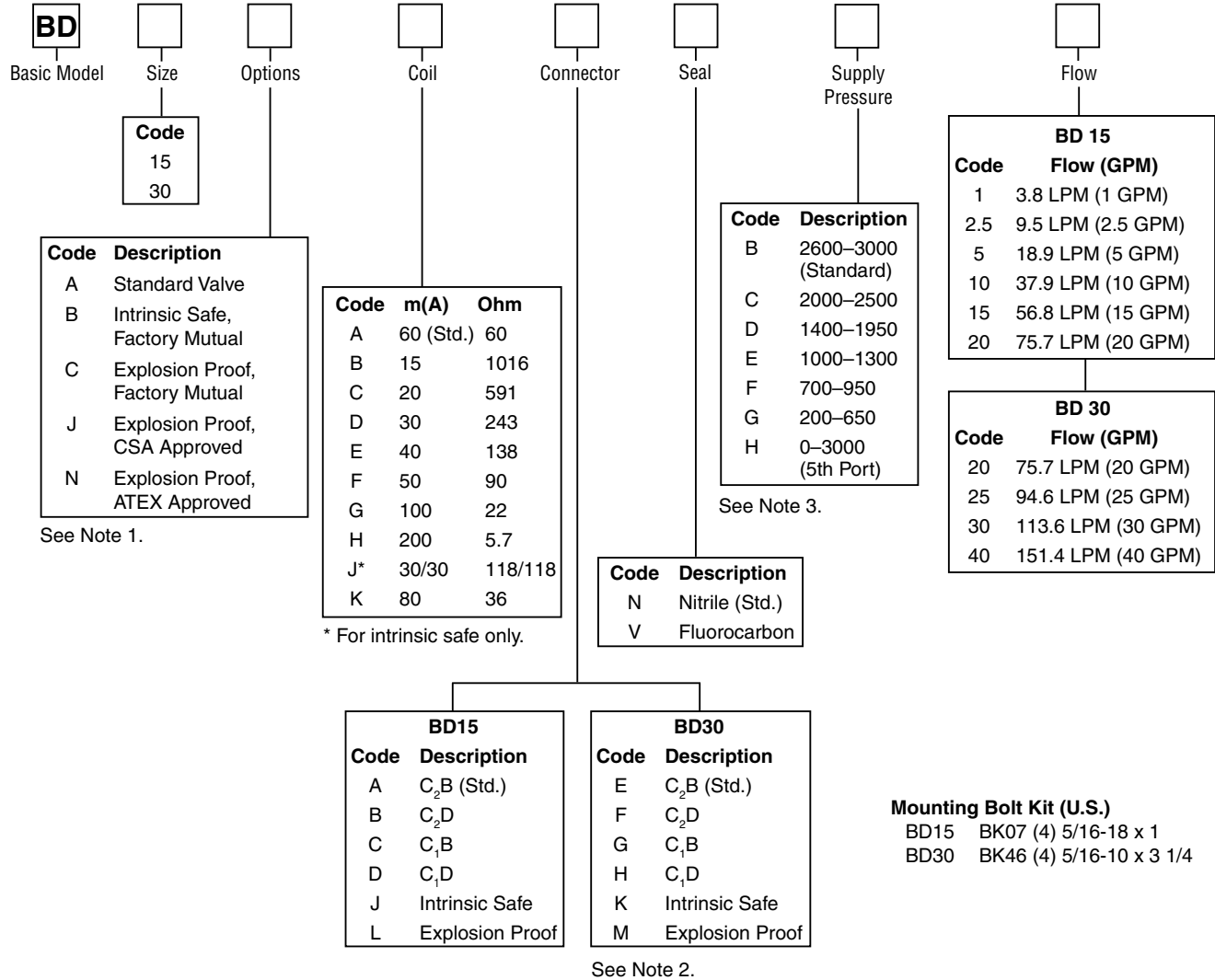


Figure 1. Change in flow with current and load pressure

**Quick Reference Data Chart**

Model	Flow Capacity @ 1000 PSID LPM (GPM)	Max. Pressure Rating	Max. Tank Pressure	Port Circle	Electrical Input (Std.) Single Coil	Coil Resistance (Std.) Each Coil	Weight
BD15	3.8, 9.5, 19, 37, 57, 76 (1, 2.5, 5, 10, 15, 20)	210 Bar (3000 PSI)	14 Bar (200 PSI)	.875	60 mA (Full Flow)	60 ohms	1.2 kg (2.6 lbs.)
BD30	76, 95, 113, 151 (20, 25, 30, 40)	210 Bar (3000 PSI)	14 Bar (200 PSI)	1.75	60 mA (Full Flow)	60 ohms	2.9 kg (6.3 lbs.)





**Note 1: “B” Intrinsic Safe Option meets** Factory Mutual Intrinsically Safe Class I, II and III, Division 1 Groups A through G. Refer to Parker Bulletin 1452.

**“C” Explosion Proof meets:**  
 Factory Mutual Explosion Proof  
 Class I, II, III, Division 1, Groups A through G

**“J” Explosion Proof meets:**  
 Canadian Standards Association  
 Class I, Groups A through D  
 Class II, Groups E, F and G  
 Class III  
 Refer to Parker Bulletin 1451.

**“N” Explosion Proof meets:**  
 ATEX Ex⊕II2G EExm II T3 T<sub>amb</sub> 45°C to -50°C  
 Request Parker Documentation Package: 1200074

**Note 2: Connector Location & Flow Polarity**  
 (Standard connector over C<sub>2</sub> + to B = P to C<sub>1</sub> flow).  
 C<sub>2</sub>B = Connector over Port C<sub>2</sub> + to Pin B = P to C<sub>1</sub> flow.  
 C<sub>2</sub>D = Connector over Port C<sub>2</sub> + to Pin D = P to C<sub>1</sub> flow.  
 C<sub>1</sub>B = Connector over Port C<sub>1</sub> + to Pin B = P to C<sub>1</sub> flow.  
 C<sub>1</sub>D = Connector over Port C<sub>1</sub> + to Pin D = P to C<sub>1</sub> flow.

**Note 3: Supply Pressure:** Code “H” applies to 5th Port/External Pilot Option. This requires the use of a blank orifice “-00”. First stage pressure should be limited to 41.4 Bar (600 PSI) and no less than 27.6 Bar (400 PSI).  
 Servo valve rated flow at 1000 PSID ±10%.

**Accessories**

Model	Description	Model	Description
6522A11	1/16" Hex Allen Wrench	820089-1	BD30 Servovalve Shipping Container
810005-1	Orifice Filter	BD830008	BD90/95 Amplifier Board Shipping Container
810013-**	Valve Orifice Kit, Fluorocarbon		
810014-**	Valve Orifice Kit, Nitrile	810089-1	BD15 Servovalve Shipping Container
<b>**Dash #</b>	<b>Operating Pressure</b>	820000TF3	Filter Wrench
-16	180 – 210 Bar (2600 – 3000 PSI) B	MS3106E-14S-2S	SV Mating Connector
-18	138 – 176 Bar (2000 – 2550 PSI) C		
-20	96 – 134 Bar (1400 – 1950 PSI) D		
-22	69 – 93 Bar (1000 – 1350 PSI) E	1200127	Flushing valve for BD15
-33	48 – 66 Bar (700 – 950 PSI) F	1200128	Flushing valve for BD30
-50	14 – 45 Bar (200 – 650 PSI) G	810107	BD15 Block off Plate
-00	0 – 210 Bar (0 – 3000 PSI) 5th Port H		



**Adapters**

Type of Adapter

Code	To Mount A _____	Onto A _____	Pattern
810092-1	BD15	BD30 (1.75)	
810093-5	BD15	D05	
810094-5	BD15	D03	
810098-1	BD15	.937 Port Circle	
810097-3	BD15	.785 Port Circle	
810096-5	BD15	.625 Port Circle	
820006-1	BD30	Moog 62-303B & Atchley 231	
820007-1	BD30	D08	
820091-1	BD30	BD15 (.875)	
Consult Factory	BD30	1.375	
Consult Factory	BD15	D05H	

Seals

Code	Description
Omit	Nitrile
V	Fluorocarbon

**Subplates**

Valve Model	Subplate	Port Size	Location	Bolt Kit	Torque Specifications (Lubricated)
BD15	810090-3	SAE12	Side	BK07	17 ft. lbs.
BD30	820090-3	SAE16	Side	BK46	17 ft. lbs.

**Cables**

**EHC**  
 Electrohydraulic  
 Cable for BD  
 Series Valves

Length

Code	Length
9	Length
15	in Feet

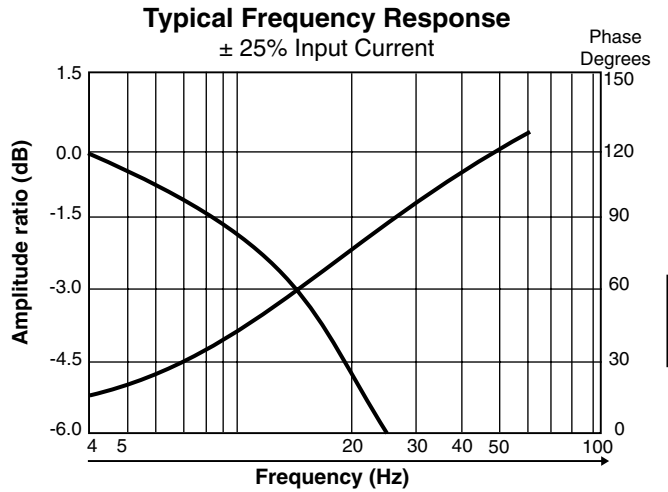
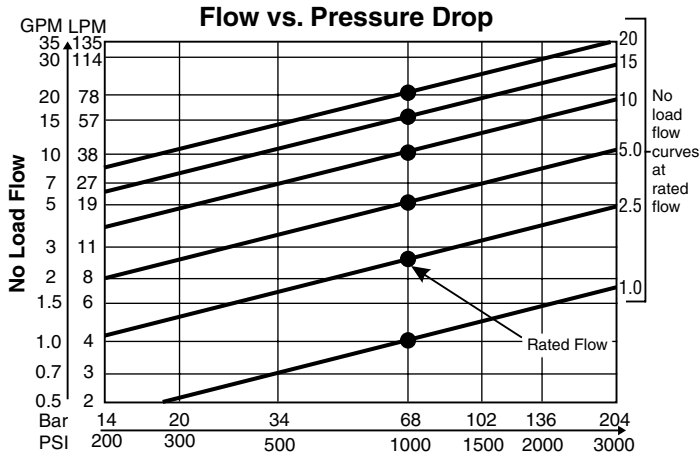
4   
 Cable Type

Code	Description
4	4-wire, 20 awg. shielded (Belden 9402)

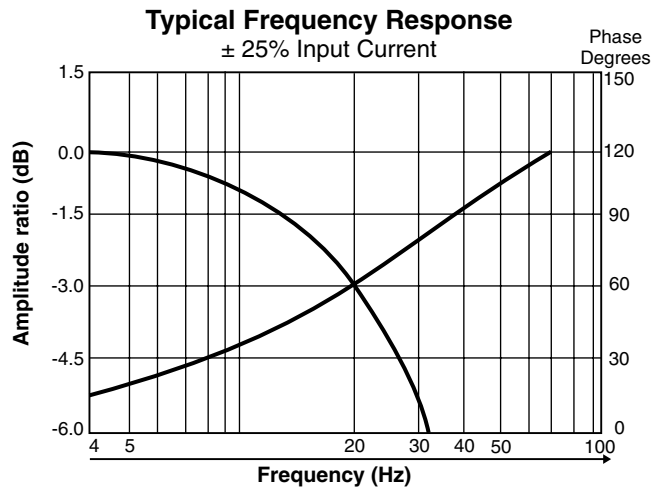
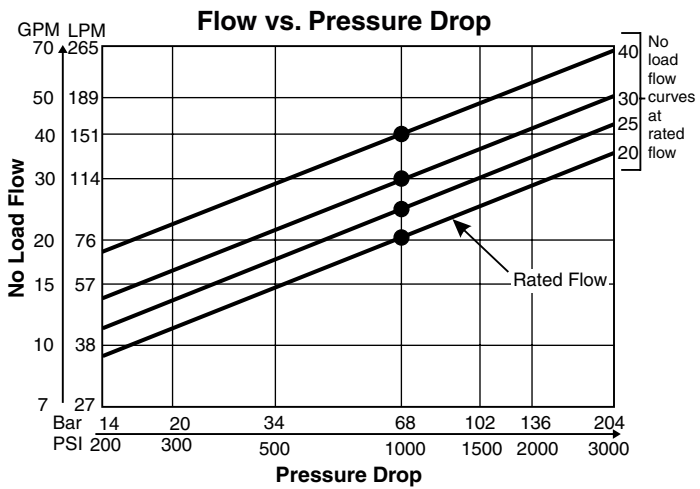
**S**   
 Pin Orientation

Code	Description
S	BD Series

**Series BD15**

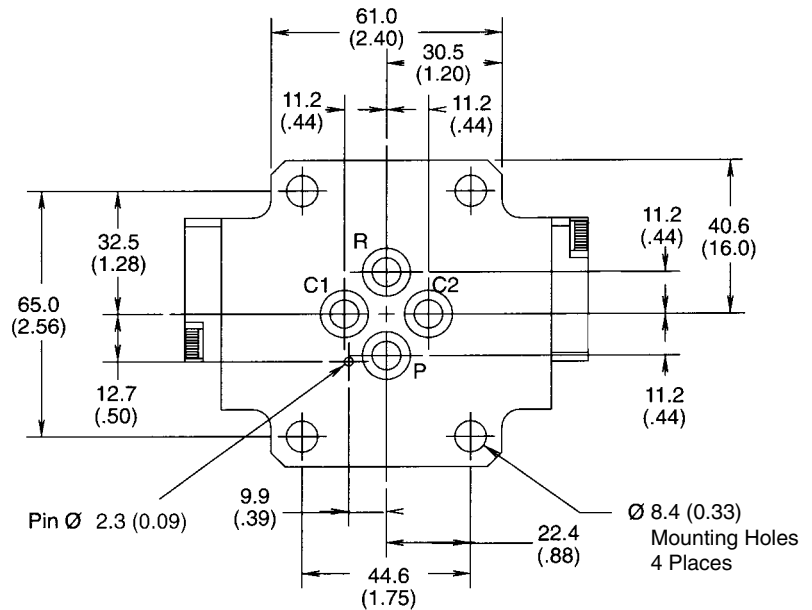
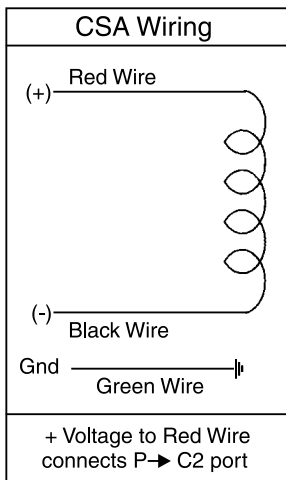
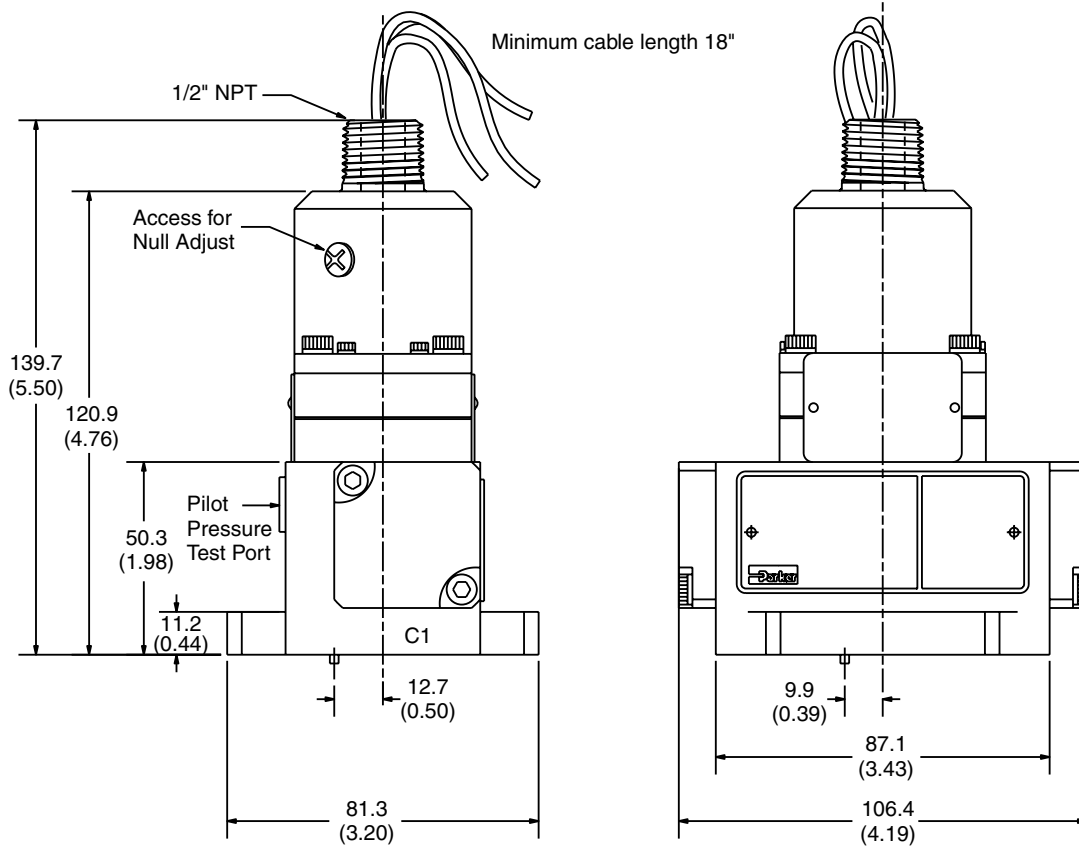


**Series BD30**





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

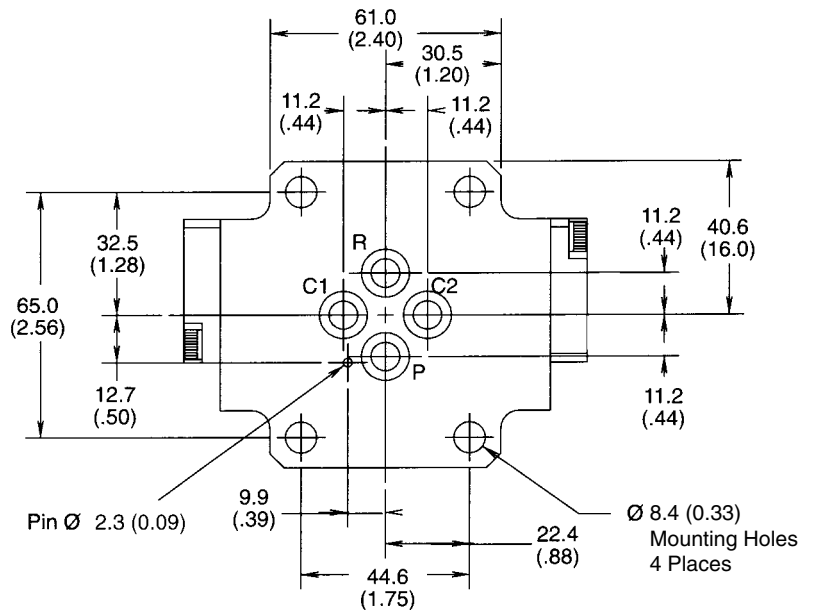
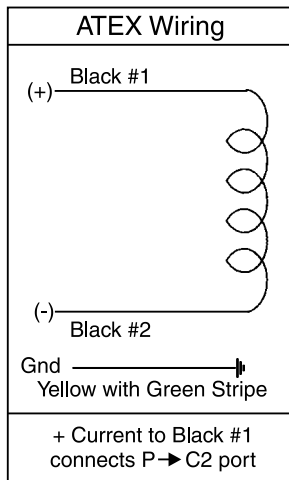
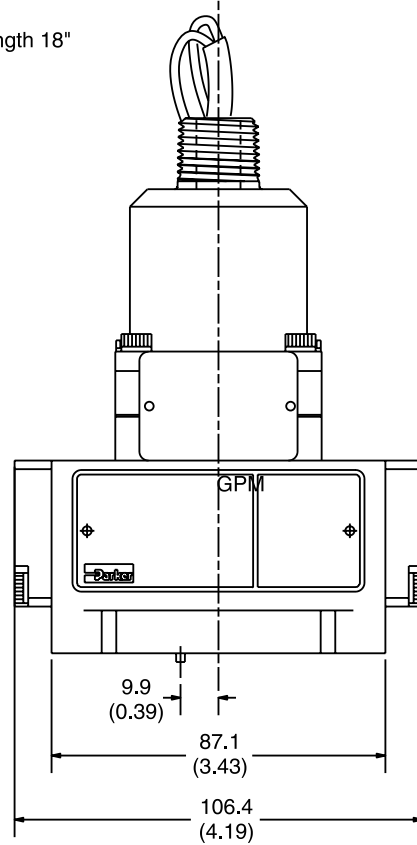
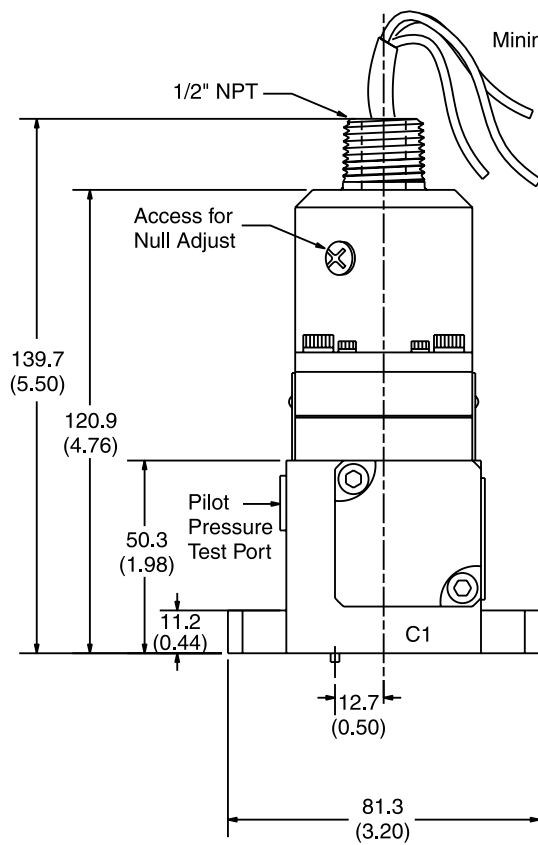
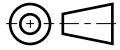


Note: Valve mating surface to be flat within 0.002 TIR, and smooth to within 63 RMS

**Dimensions**

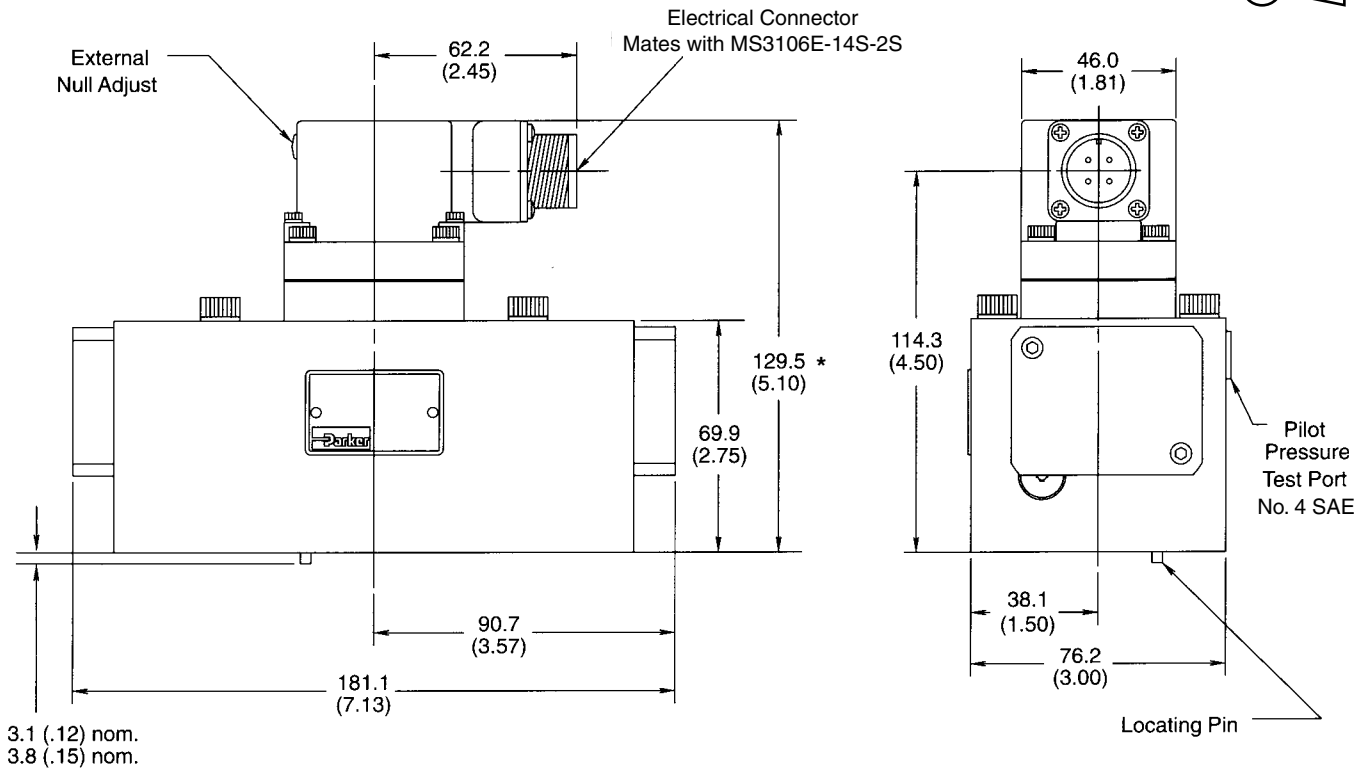
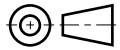
**Series BD15, ATEX Version BD15N\*L**

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

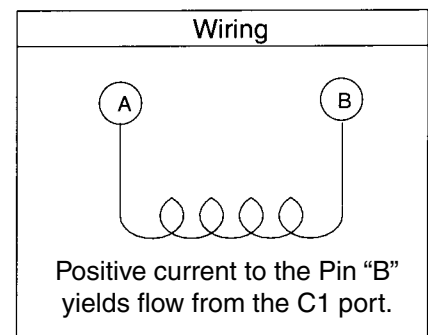
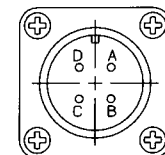
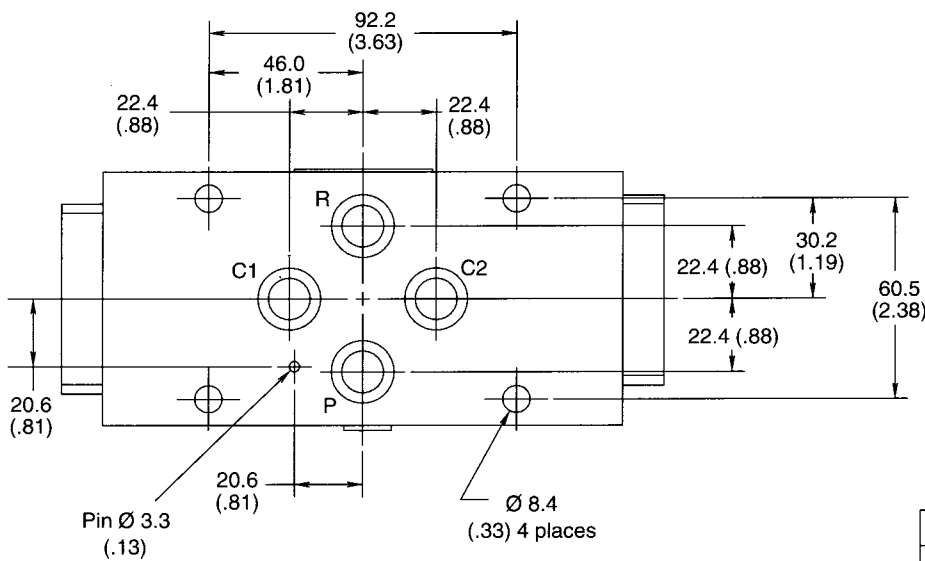


Note: Valve mating surface to be flat within 0.002 TIR, and smooth to within 63 RMS

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



3.1 (.12) nom.  
3.8 (.15) nom.

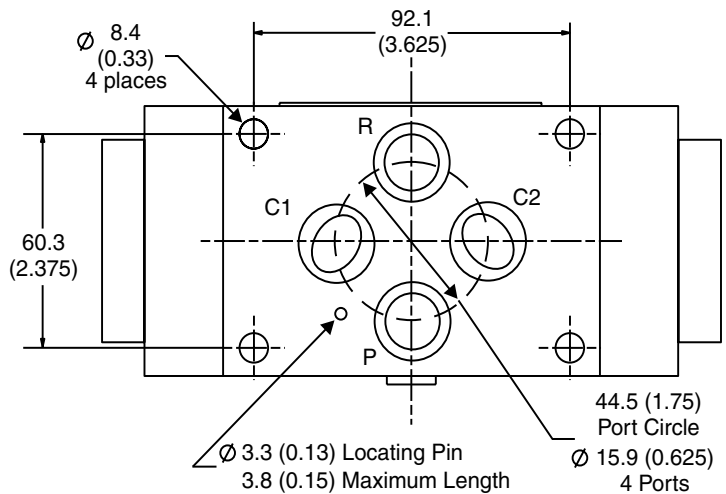
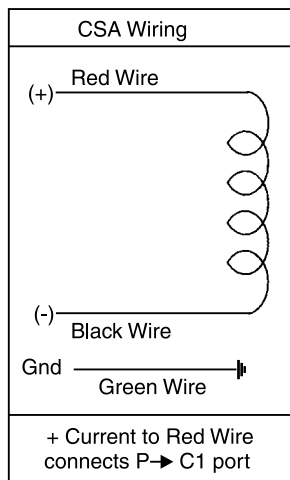
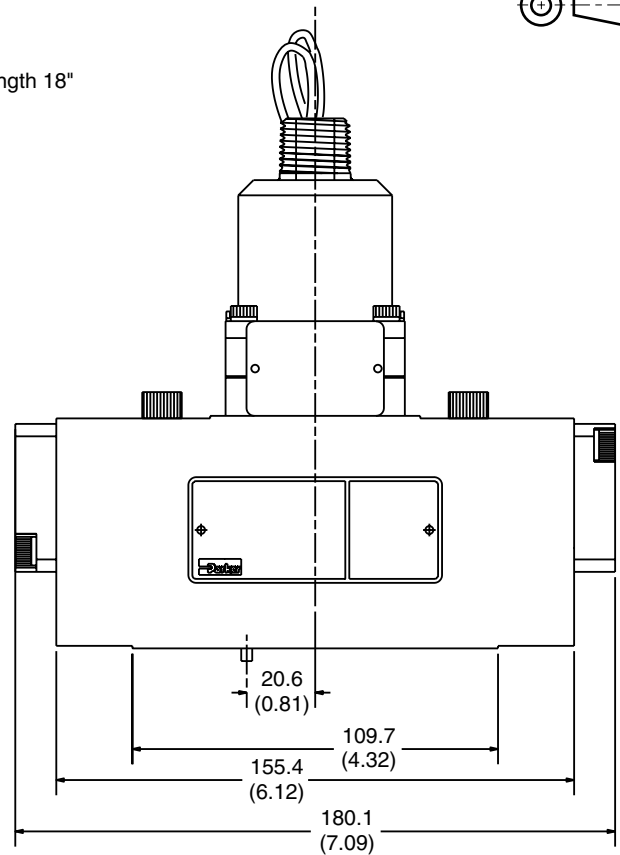
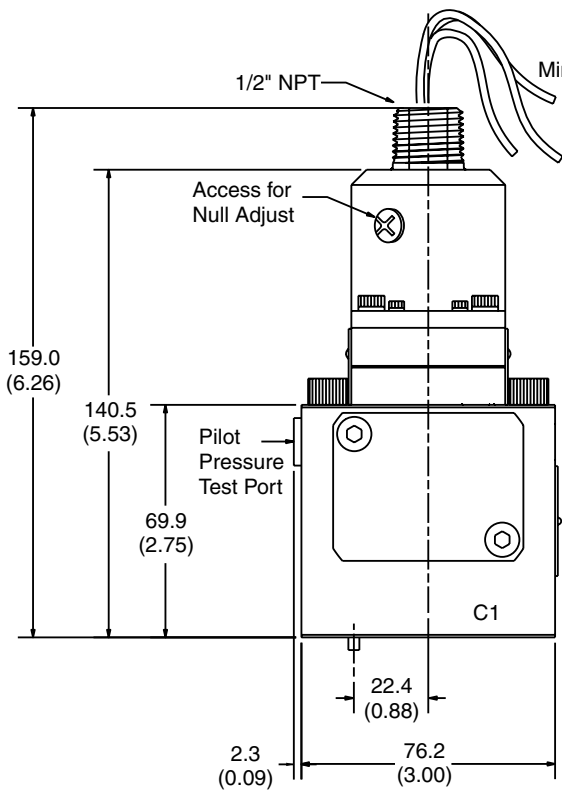


Note: Valve mating surface to be flat within 0.002 TIR, and smooth to within 63 RMS

\* 160 (6.25) for BD30C; explosion proof, FM approved.  
Note: Vertically oriented 1/2 NPT threaded male conduit connection with lead wires (not as shown).

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

**C**



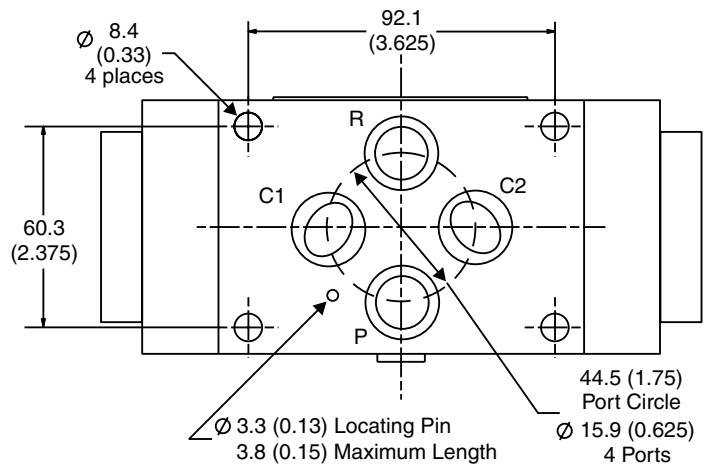
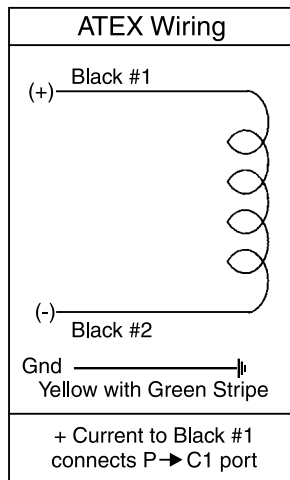
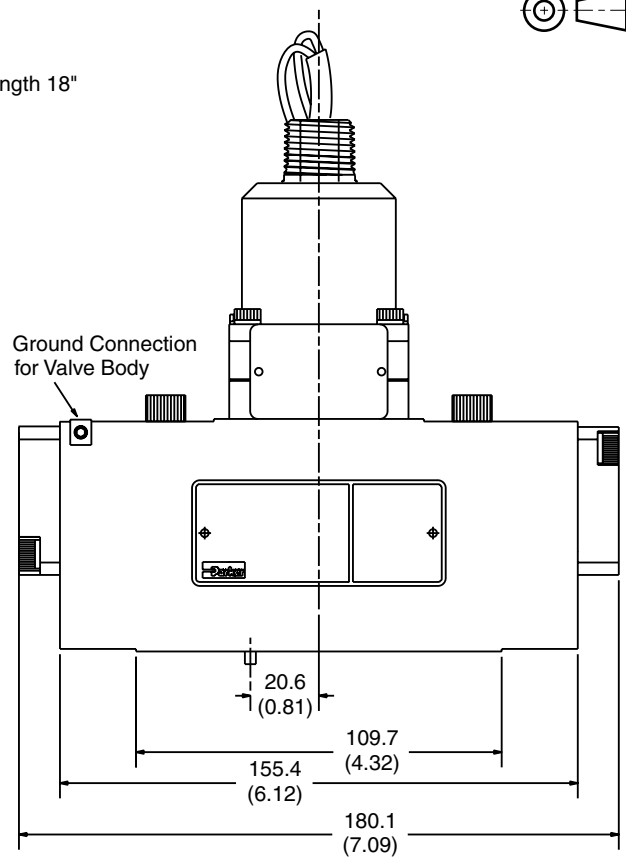
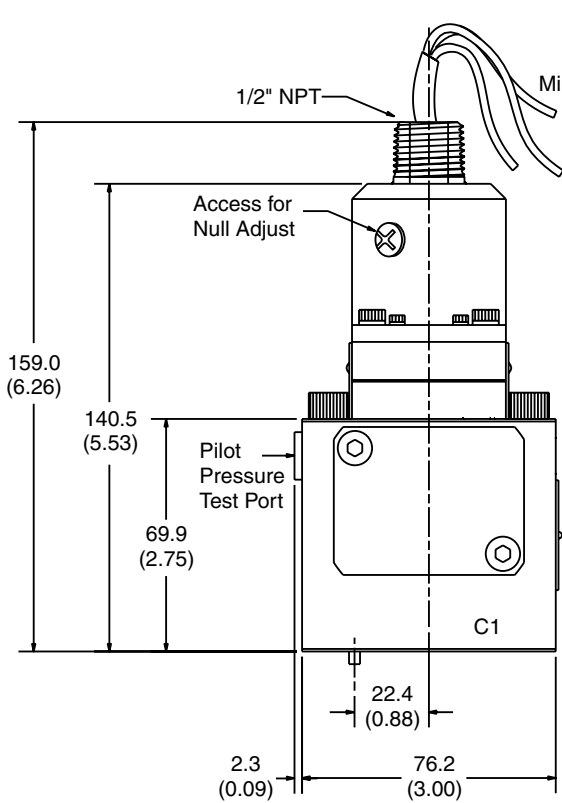
Note: Valve mating surface to be flat within 0.002 TIR, and smooth to within 63 RMS



**Dimensions**

**Series BD30, ATEX Version BD30N\*M**

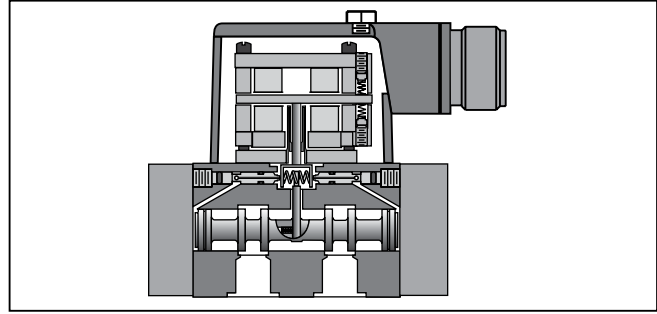
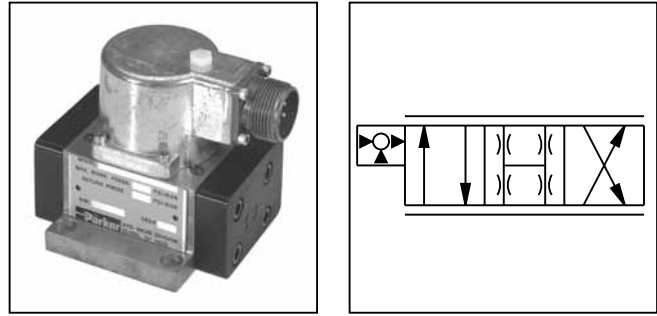
Inch equivalents for millimeter dimensions are shown in (\*\*)



Note: Valve mating surface to be flat within 0.002 TIR, and smooth to within 63 RMS

## General Description

Series PH76 servovalves are high performance, two stage valves, with a range of rated flows from 3.8 to 57 LPM (1 to 15 GPM). The pilot stage is a symmetrical double-nozzle and flapper, driven by a double air gap, dry torque motor. A low current signal to the torque motor pilot stage results in a proportional flow from the output stage. The output stage is a 4-way, sliding spool which provides a mechanical feedback using an exclusive “no ball glitch” design.



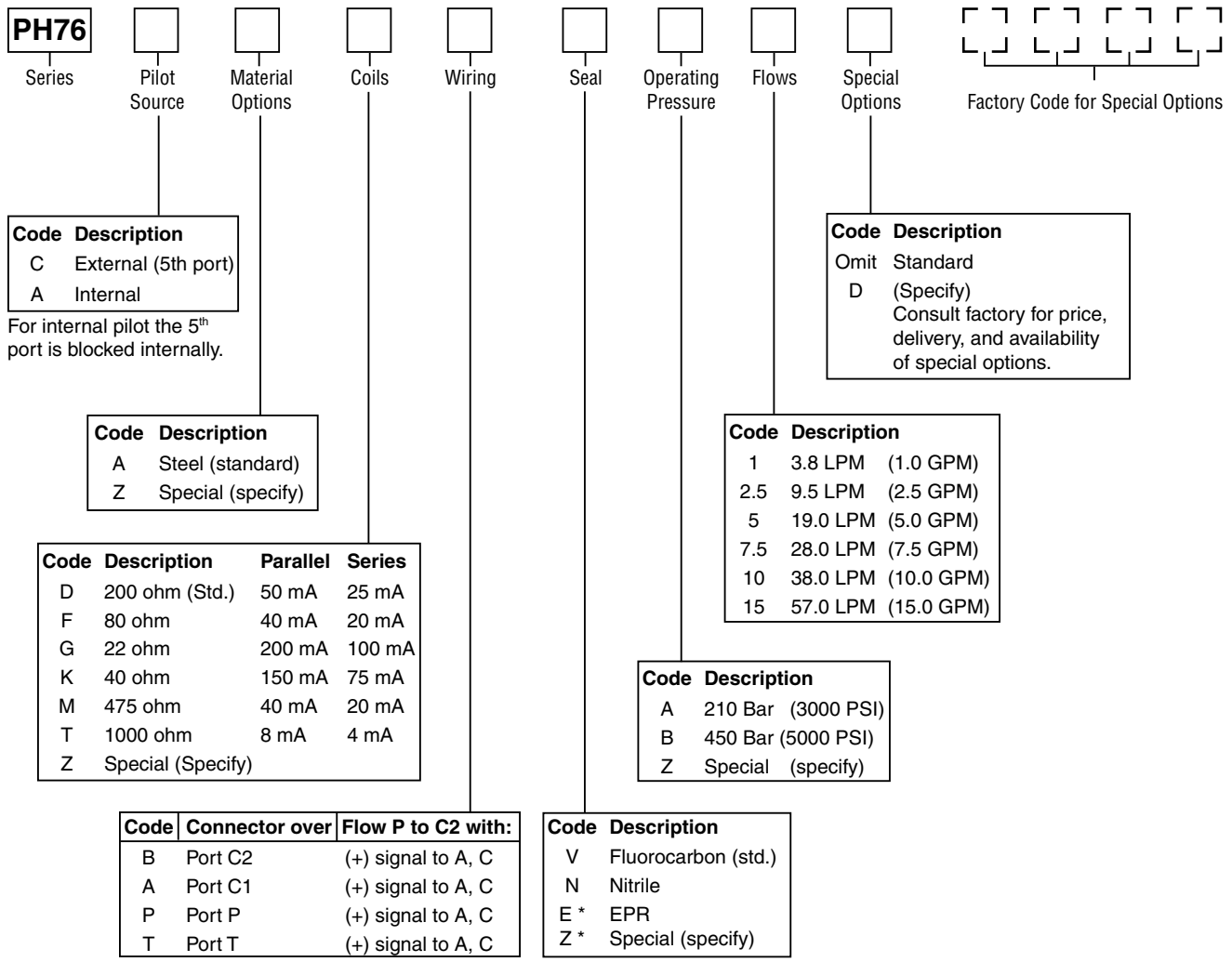
## C

## Features

- Built to survive tank port pressure spikes.
- No ball glitch.
- Tool steel spool and body.
- Optional 5<sup>th</sup> port for external pilot.
- ISO 10372 standard 22.23 mm (0.875 in) port circle.

## Specifications

<b>Flow Rating ±10%</b> @ 70 Bar (1000 PSID)	3.8, 9.5, 19, 28, 38, 57 LPM (1, 2.5, 5, 7.5, 10, 15 GPM)	<b>Threshold</b>	≤ 0.5%
<b>Supply Pressure</b>	10 – 210 Bar (145 – 3000 PSI)	<b>Null Shift</b> with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance	<b>Pressure Gain</b> % change in pressure per 1% change in input command	30% minimum, 70% max.
<b>Null Leakage Flow</b> per 70 Bar (1000 PSID)	0.2 – 0.8 LPM (0.05 – 0.20 GPM)	<b>Step Response</b>	10 – 90%, < 6 ms
<b>Pilot Flow</b> @ 210 Bar (3000 PSID)	0.8 – 1.2 LPM (0.21 – 0.33 GPM)	<b>Fluid</b>	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
<b>Input Command</b>	±50 mA std.	<b>Operating Temperature</b>	-1°C to +82°C (+30°F to +180°F)
<b>Frequency Response</b> @ 90° phase shift	> 90 Hz (See Performance Curves)	<b>Protection Class</b>	NEMA 4, IP65
<b>Non-Linearity</b>	≤ 10%	<b>Fluid Cleanliness</b>	ISO 4406 15/12 or better



**Weight:** 1 kg (2.2 lb)  
**Cable with mating connector:** EHC154S  
**Mating connector:** MS3106E-14S-2S  
**Bolt kit:** Included with valve. BK07 (4) 5/16-18x1"  
**Flushing valve:** 1200127 (same for 4 or 5 port PH76 valve)  
**Subplate, 5 ports:** 1402303 (4) #12 SAE side ports, (1) #4 SAE side port  
**Subplate, 4 ports:** 810090-3 (4) #12 SAE side ports  
**Null adjust tool:** 6522A13  
**Driver cards:** 23-7030, BD90\*, BD101\*

When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

\* For output currents >15 mA



Flushing valve is rated for 3000 psi operation.

\* Consult factory for delivery.

**Performance Curves**

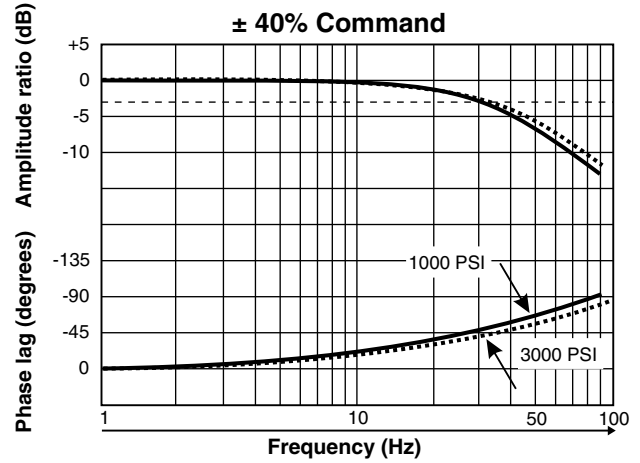
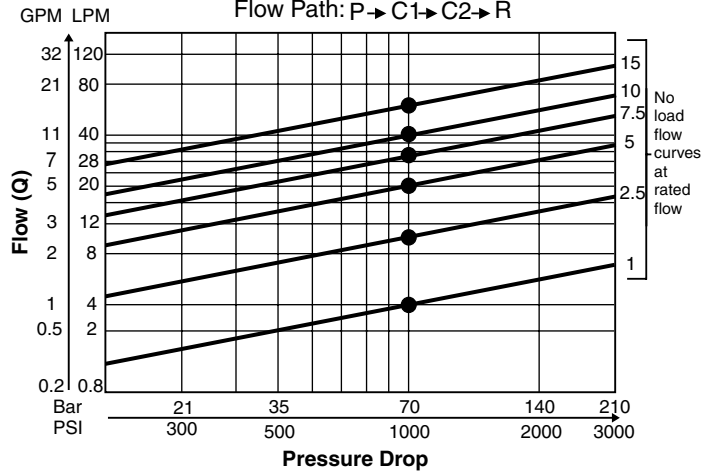
Servo valve flow is proportional to the square root of the pressure drop through the valve. The nominal flow rating for the servo-valves is based upon a 70 Bar (1000 PSI) pressure drop.

**Frequency Response**

The frequency response curves for the PH76 servo valves show no significant change for signal amplitudes between  $\pm 10\%$  and  $\pm 40\%$ . Frequency response is unaffected by changes in supply pressures above 70 Bar (1000 PSI).

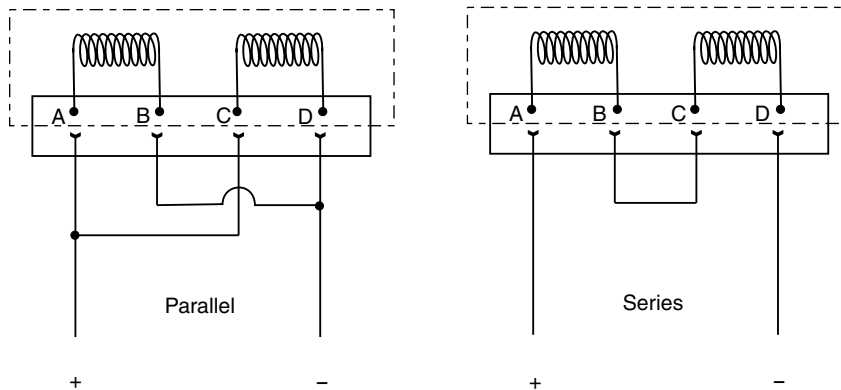
**Flow vs. Pressure Drop**

at 100% command  
 Flow Path: P  $\rightarrow$  C1  $\rightarrow$  C2  $\rightarrow$  R



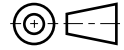
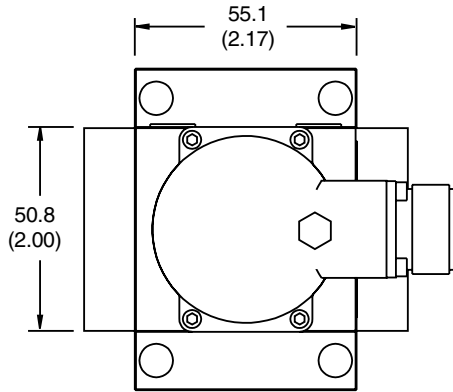
**Installation Wiring Options**

The PH76 servo valve has two coils. One is wired across pins A to B, the other across pins C to D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. In either case, a positive voltage to pin A connects valve flow from ports P to C2 and ports C1 to R.



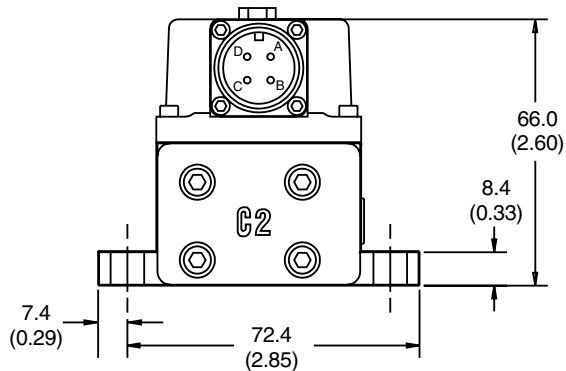
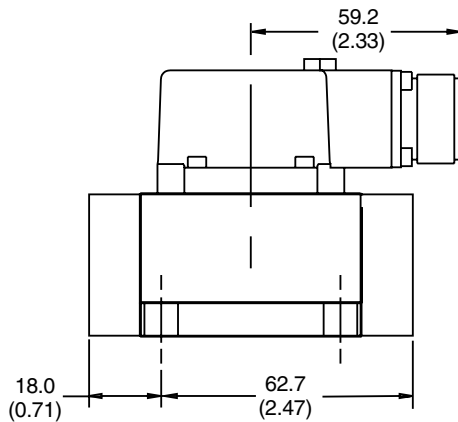
Polarity shown (+A, -B, +C, -D) connects flow from P to C2 port.

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



Connector shown over C2 port. See ordering information for other connector locations.

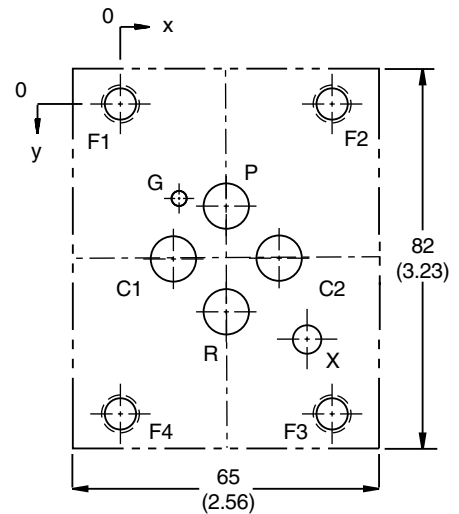
The connector location is factory set and is not field changeable.



**Mounting Surface Dimensions**

Metric Dimensions (millimeters)										± 0.1 mm
Axis	P	C1	R	C2	G	X	F1	F2	F3	F4
	∅ 8.2 max.	∅ 8.2 max.	∅ 8.2 max.	∅ 8.2 max.	∅ 3.5 max.	∅ 5	M8	M8	M8	M8
X	22.2	11.1	22.2	33.3	12.3	49.5	0	44.4	44.4	0
Y	21.4	32.5	43.6	32.5	19.8	39	0	0	65	65

U.S. Dimensions (inches)										± .004 in
Axis	P	C1	R	C2	G	X	F1	F2	F3	F4
	∅ 0.32 max.	∅ 0.32 max.	∅ 0.32 max.	∅ 0.32 max.	∅ 0.14 max.	∅ 0.2	5/16 - 18			
X	0.875	0.437	0.875	1.311	0.484	1.531	0	1.750	1.750	0.000
Y	0.846	1.280	1.717	1.280	0.780	1.950	0	0	2.562	2.562



Minimum depth of G is 2 mm (0.08 in)

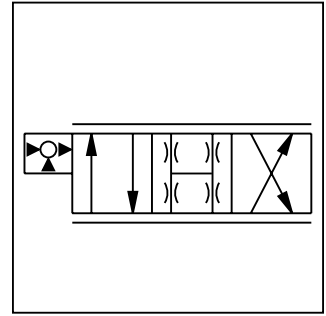
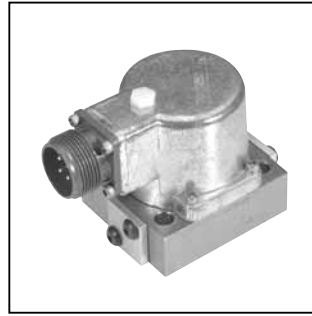
Recommended full thread depth for bolt holes 22 mm (0.87 in)

Surface roughness: Ra < 0.8 μm (0.031 in) as specified in ISO 468 and 1302

Surface flatness: 0.025 mm (0.001 in) as specified in ISO 1101

**General Description**

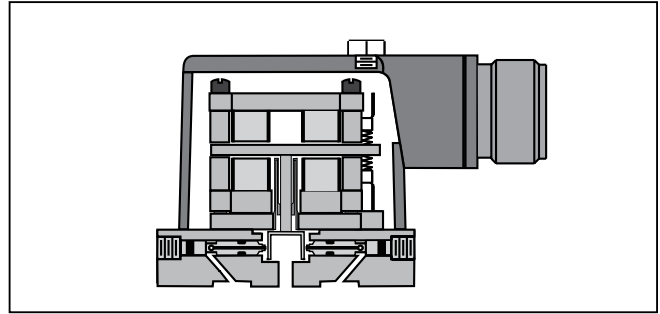
Series DY1S are open center, single stage differential pressure control valves. They are operated by a current driven torque motor. These valves controls the pressure difference between the two actuator ports, C1 and C2, by varying the resistance to flow through their nozzles.



**Features**

**C**

- No mechanical wear points.
- High frequency response.
- Nozzle and flapper design.
- Versatile 21.59 mm (0.850 in.) port circle, can mount to standard 19.81 mm (0.780 in.) and 23.62 mm (0.930 in.) port circle patterns.



**Specifications**

<b>Flow Rating</b> @ 90 Bar (1300 PSI)	0.4 LPM (0.1 GPM)	<b>Null Shift</b> with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Quiescent Flow</b> @ 90 Bar (1300 PSI)	1.3 – 1.9 LPM (0.3 – 0.5 GPM)	<b>Pressure Gain</b> % change in pressure per 1% change in input command	1% minimum
<b>Supply Pressure</b>	7 – 90 Bar (100 – 1300 PSI)	<b>Step Response</b>	10 – 90%, < 5 ms
<b>Tank Port Pressure</b>	90 Bar (1300 PSI) Max. < 10 Bar (145 PSI) for best performance	<b>Fluid</b>	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
<b>Input Command</b>	±50 mA std.	<b>Operating Temperature</b>	-1°C to +82°C (+30°F to +180°F)
<b>Frequency Response</b> @ 90° phase shift	> 100 Hz	<b>Protection Class</b>	NEMA 4, IP65
<b>Non-Linearity</b>	≤ 10%	<b>Filtration</b>	ISO 4406 15/12 or better
<b>Threshold</b>	≤ 0.5%		

**DY1S**

Series

**Description**

0.4 LPM (0.1 GPM)  
 90 Bar (1300 PSI)

Material  
Options

Coils

Wiring

Seal

Special  
Options

Factory Code for Special Options

Code	Description
A	Standard
Z	Special (specify)

Code	Description
Omit	Standard
D	(Specify) See list below

Code	Description
N	Nitrile
V	Fluorocarbon (standard)
E *	EPR
Z *	Special (specify)

\* Consult factory for delivery

Code	Description
C	Standard
Z	Special

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
F	80 ohm	80 mA	40 mA
L	360 ohm	30 mA	15 mA
M	475 ohm	40 mA	20 mA
R	650 ohm	30 mA	15 mA
T	1000 ohm	10 mA	5 mA
V	1200 ohm	40 mA	20 mA
Z	Special (specify)		



**Accessories**

- Cable with Mating Connector:** EHC154S
- Mating Connector:** MS3106E-14S-2S
- Bolt Kit:** Included with valve
- Flushing Valve:** 11-0500
- Subplate:** 55-0100-2 SAE-6 Side ports
- Null Adjust Tool:** 6522A13
- Electronic Drivers:** 23-7030, BD90\*, BD101\*

When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

\* For output currents >15 mA

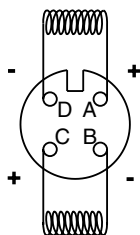
**Special Options:**

Consult factory for price, delivery and availability of special options.

- Special coil
- Special wiring
- Special seals

**Weight:** 0.5 kg (1.2 lbs.)

**Wiring Option C  
 (Standard)**

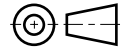
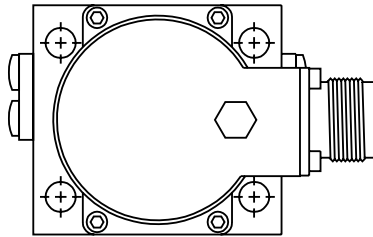


Polarity shown connects  
 P to C2 port.

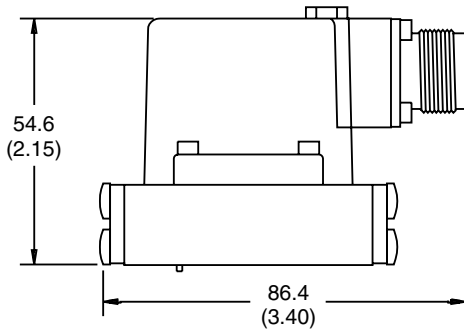


Flushing valve is rated for 3000 psi operation.

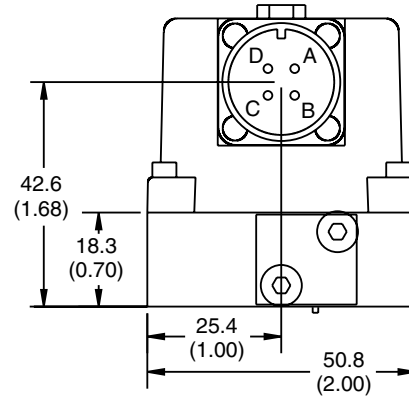
Inch equivalents for millimeter dimensions are shown in (\*\*)



**C**

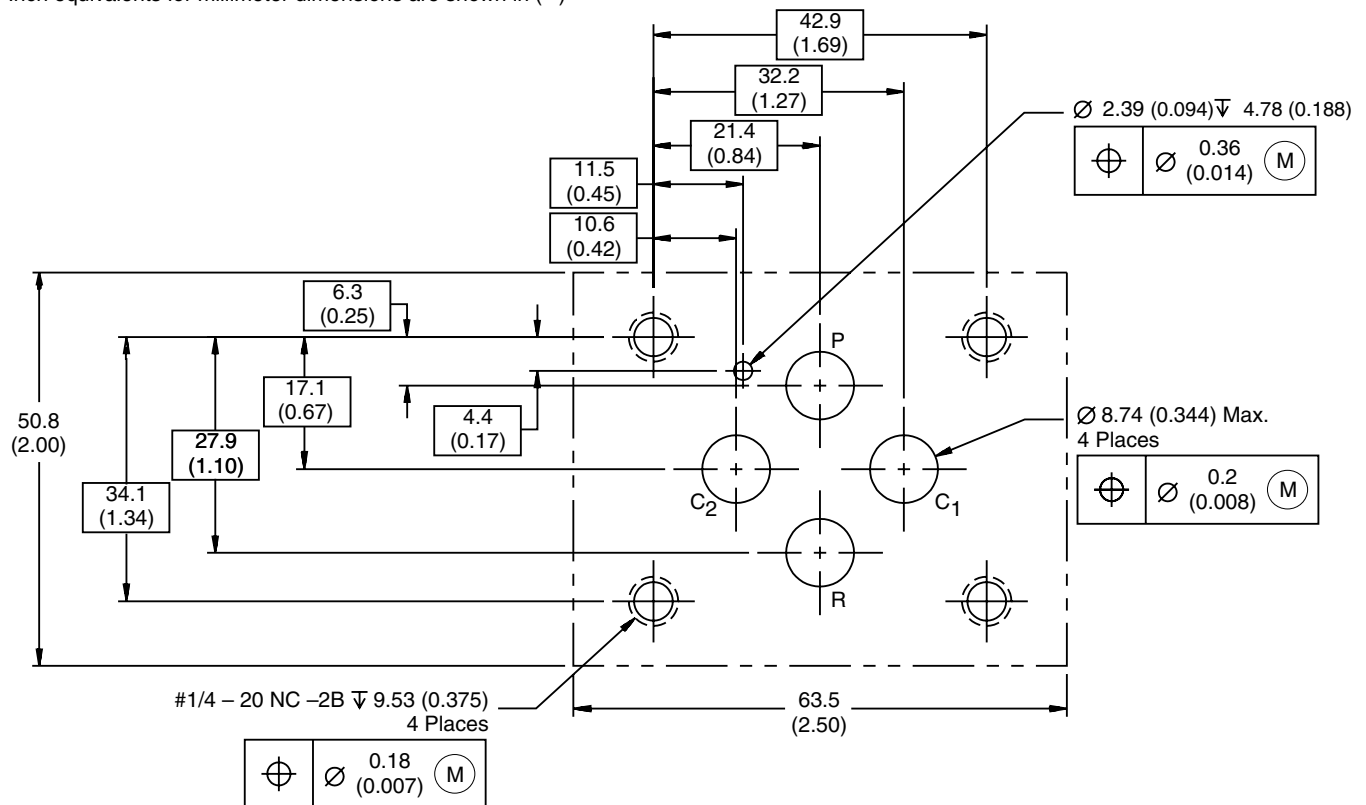


Connector over C1 port



**Mounting Interface**

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





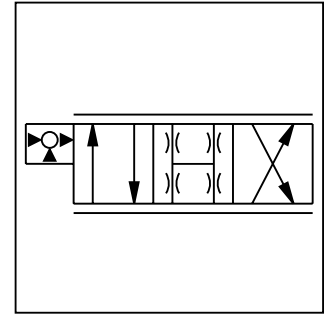
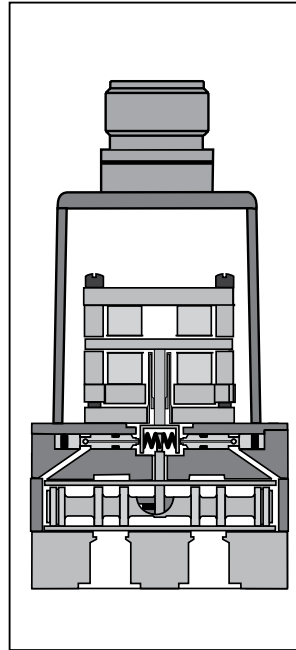
**General Description**

Series DY3H and DY6H are two stage, 4-way, high frequency, closed loop servovalves, with mechanical spool position feedback. These valves use a flapper and nozzle type, torque motor driven pilot stage to drive the sliding spool second stage. The unique rigid pin feedback design avoids ball glitch problems, which can occur in other types of servovalves.

The DY3H and DY6H offer a compact, lower cost alternative without sacrificing performance in systems operating at 105 Bar (1500 PSI) or less.

**Features**

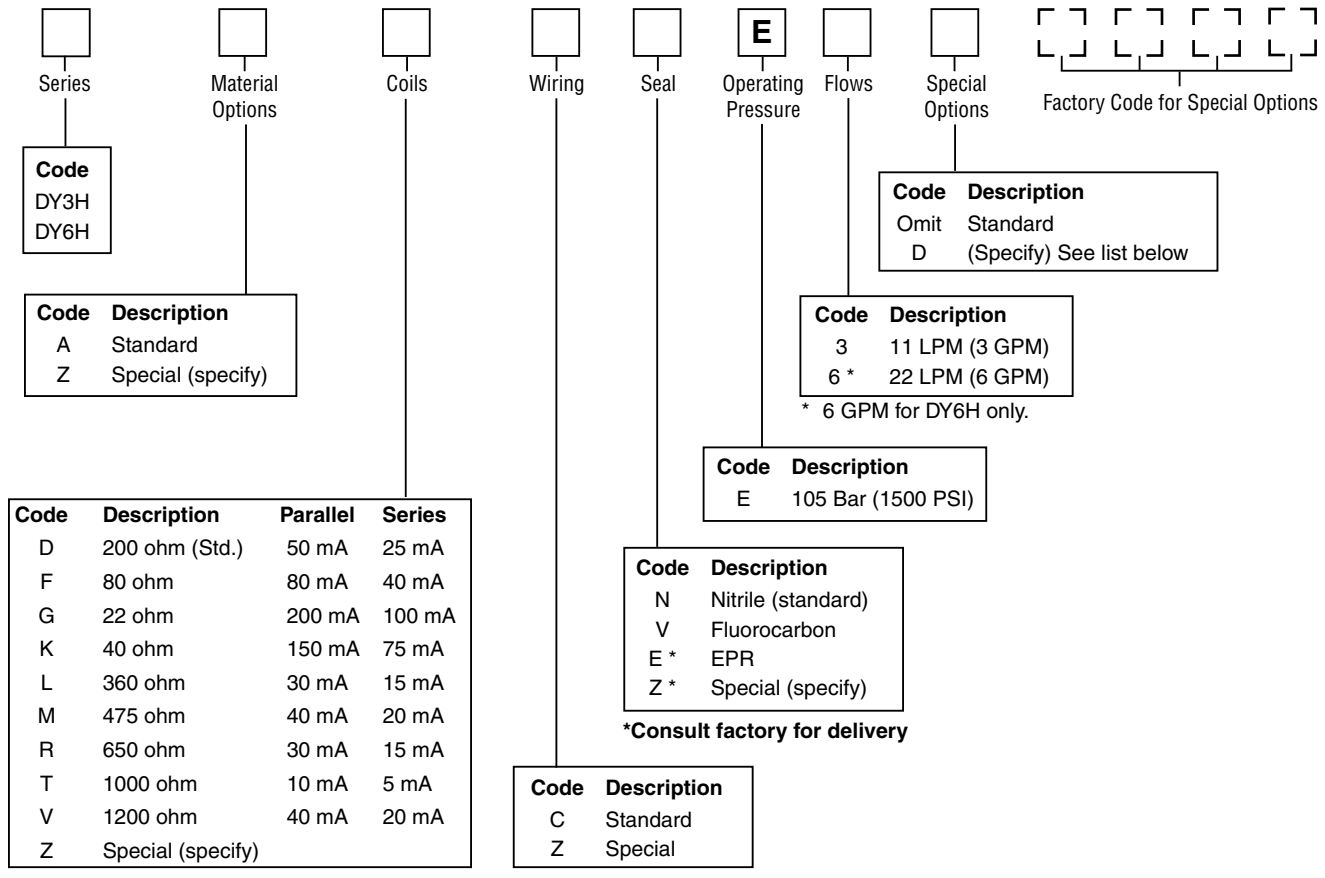
- Precision lapped spool and sleeve.
- No ball glitch.
- High frequency response.
- Nozzle and flapper design.
- Adapters available for mounting to D03 or ISO port patterns.



**Specifications**

<b>Flow Rating</b> @ 70 Bar (1000 PSID)	11 and 22 LPM (3 and 6 GPM)	<b>Null Shift</b> with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Supply Pressure</b>	10 – 105 Bar (145 – 1500 PSI)	<b>Pressure Gain</b> % change in pressure per 1% change in input command	30% minimum, 70% maximum
<b>Leakage Flow</b> @ 70 Bar (1000 PSID)	1.3 – 1.9 LPM (0.3 – 0.5 GPM)	<b>Step Response</b>	10 – 90%, < 6 ms for DY3H < 8 ms for DY6H
<b>Tank Port Pressure</b>	105 Bar (1500 PSI) Max. < 10 Bar (145 PSI) for best performance	<b>Fluid</b>	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
<b>Input Command</b>	±50 mA std.	<b>Operating Temperature</b>	-1°C to +82°C (+30°F to +180°F)
<b>Frequency Response</b> @ 90° phase shift	> 190 Hz (See Performance Curves)	<b>Protection Class</b>	NEMA 4, IP65
<b>Non-Linearity</b>	≤ 10%	<b>Filtration</b>	ISO 4406 15/12 or better
<b>Threshold</b>	≤ 0.5%		

**C**



**Accessories**

- Cable with Mating Connector:** EHC154S
- Mating Connector:** MS3106E-14S-2S
- Bolt Kit:** Included with valve
- Flushing Valve:** 11-0300
- Subplate:** 55-0800-2 SAE-4 Side ports
- Null Adjust Tool:** 6522A13
- Electronic Drivers:** 23-7030, BD90\*, BD101\*

When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

\* For output currents >15 mA

**Special Options:**

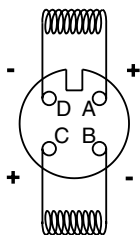
Consult factory for price, delivery and availability of special options.

- Special coil
- Special wiring
- Special seals

**Weight:**

DY3H	0.34 kg (0.56 lbs.)
DY6H	0.34 kg (0.56 lbs.)

**Wiring Option C  
 (Standard)**



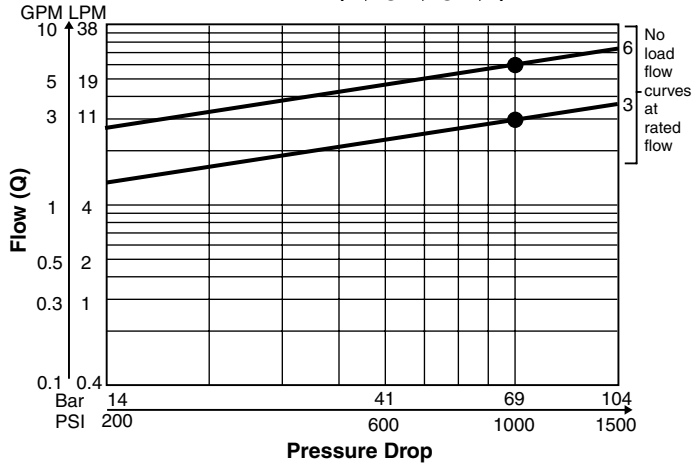
Polarity shown connects P to C2 port.



Flushing valve is rated for 3000 psi operation.

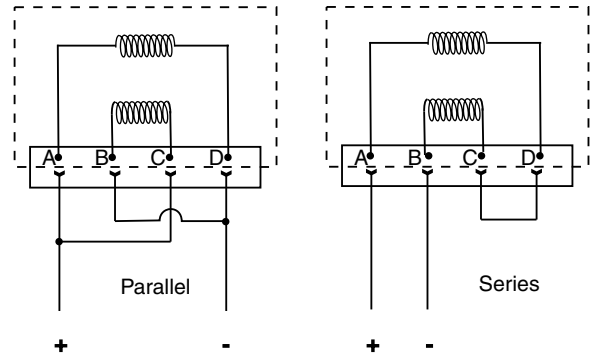
**Performance Curves**

**Flow vs. Pressure Drop**  
 at 100% command  
 Flow Path: P → C1 → C2 → T



**Installation Wiring Options**

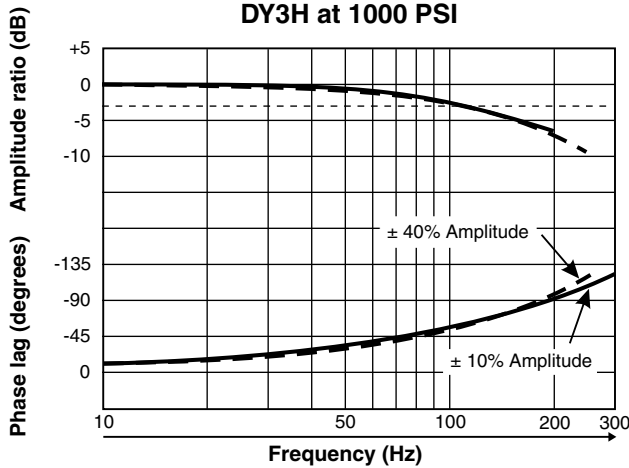
This servovalve has two coils. This illustration shows the internal wiring configurations for these valves. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustration below and to the mounting pattern for this valve to insure proper control phasing.



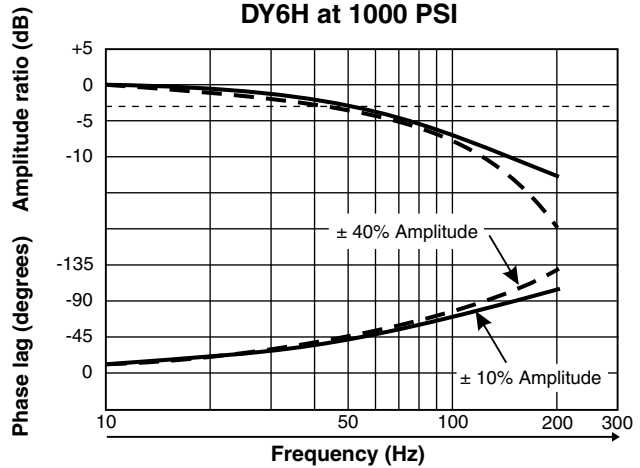
Polarity shown connects flow from P to C2 port.

**Frequency Response**

**DY3H at 1000 PSI**



**DY6H at 1000 PSI**





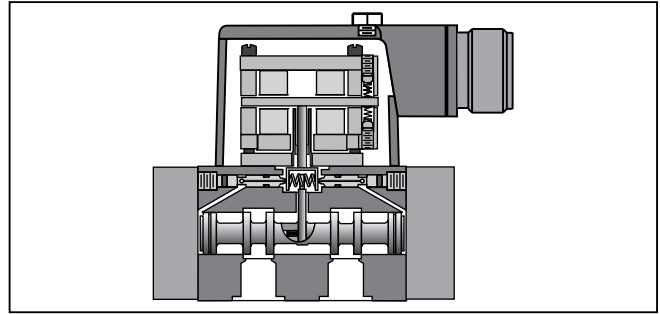
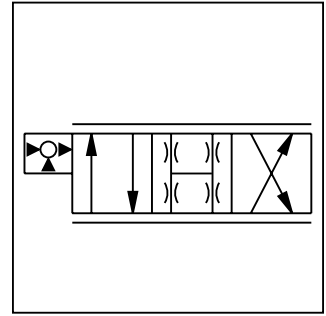
## General Description

Series DY01 are two stage, 4-way, flapper and nozzle style servovalves. The DY01 servovalve combines a spool and sleeve construction, and a high frequency torque motor, for optimal performance. The unique rigid pin feedback design avoids ball glitch problems, which can occur in other types of servovalves. This valve is rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction or the optional stainless steel spool and body.

The DY01 servovalve was specially designed for high precision flight simulator applications.

## Features

- Precision lapped spool and sleeve.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Versatile 21.59 mm (0.850 in.) port circle, can mount to standard 19.81 mm (0.780 in.) and 23.62 mm (0.930 in.) port circle patterns.



## Specifications

<b>Flow Rating</b> @ 70 Bar (1000 PSID)	3 and 11 LPM (1 and 3 GPM)	<b>Null Shift</b> with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Supply Pressure</b>	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)	<b>Pressure Gain</b> % change in pressure per 1% change in input command	30% Minimum, 70% Maximum
<b>Leakage Flow</b> @ 70 Bar (1000 PSID)	0.42 – 0.95 LPM (0.11 – 0.25 GPM)	<b>Step Response</b>	10 – 90%, < 8 ms
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance	<b>Fluid</b>	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
<b>Input Command</b>	±50 mA std.	<b>Operating Temperature</b>	-1°C to + 82°C (+30°F to +180°F)
<b>Frequency Response</b> @ 90° phase shift	> 180 Hz (See Performance Curves)	<b>Protection Class</b>	NEMA 4, IP65
<b>Non-Linearity</b>	≤ 10%	<b>Filtration</b>	ISO 4406 15/12 or better
<b>Threshold</b>	≤ 0.5%		

**DY01**

Series

Material Options

Code Description  
 A Steel (standard)  
 B Stainless Steel  
 Z\* Special (specify)

Coils

Wiring

Seal

Code Description  
 N Nitrile (standard)  
 V Fluorocarbon  
 E\* EPR  
 Z\* Special (specify)

\* Consult factory for delivery

Operating Pressure

Code Description  
 A 210 Bar (3000 PSI)  
 B 350 Bar (5000 PSI)  
 Z Special (specify)

Operating pressure is independent of material selection.

Flows

Code Description  
 1 3.8 LPM (1 GPM)  
 1.5 5.7 LPM (1.5 GPM)  
 3 11 LPM (3 GPM)

Special Options

Code Description  
 Omit Standard  
 D (Specify) See list below

Factory Code for Special Options

Code Description  
 A Steel (standard)  
 B Stainless Steel  
 Z\* Special (specify)

\* Material selection does not affect operating pressure.

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
L	360 ohm	30 mA	15 mA
M	475 ohm	40 mA	20 mA
R	750 ohm	30 mA	15 mA
T	1000 ohm	10 mA	5 mA
V	1200 ohm	40 mA	20 mA
Z	Special (specify)		

**Code Connector over: Flow P to C2 with:**

C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z	Special (specify)	

**Weight:** 1.0 kg (2.1 lbs.)

**Accessories**

**Cable with Mating Connector:** EHC154S

**Mating Connector:** MS3106E-14S-2S

**Bolt Kit:** Included with valve

**Flushing Valve:** 11-0500

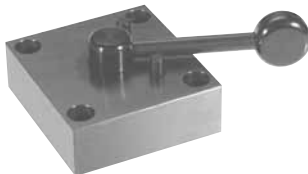
**Subplate:** 55-0100-8S SAE-8 Side ports

**Null Adjust Tool:** 6522A13

**Electronic Drivers:** 23-7030, BD90\*, BD101\*

When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

\* For output currents >15 mA



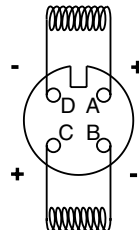
Flushing valve is rated for 3000 psi operation.

**Special Options:**

Consult factory for price, delivery and availability of special options.

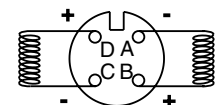
- Special coil
- Special wiring
- Special seals
- Special flow rate
- Dual flow rate
- Dual gain
- Zener barriers

**Wiring Option C  
 (Standard)**



Polarity shown connects P to C2 port.

**Wiring Option D**

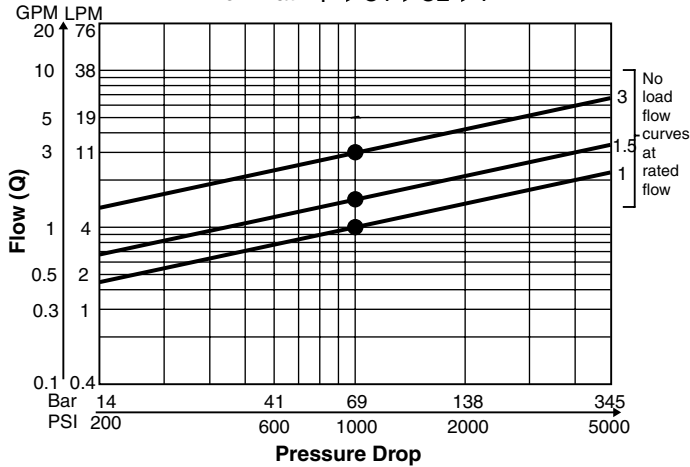


Moog, Atchley and Vickers standard.

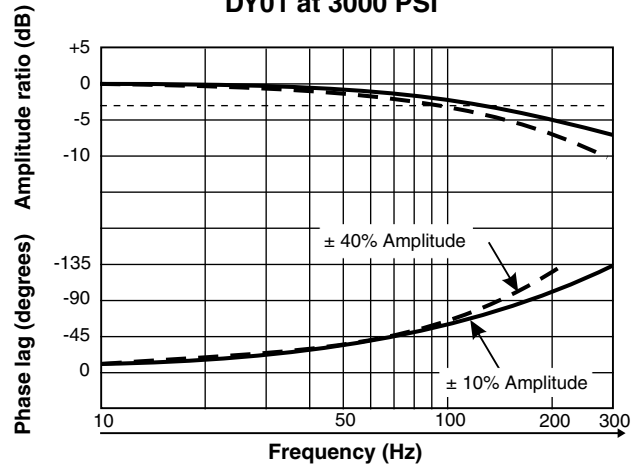
**Performance Curves**

**Frequency Response**

**DY01 Flow vs. Pressure Drop**  
 at 100% command  
 Flow Path: P → C1 → C2 → T



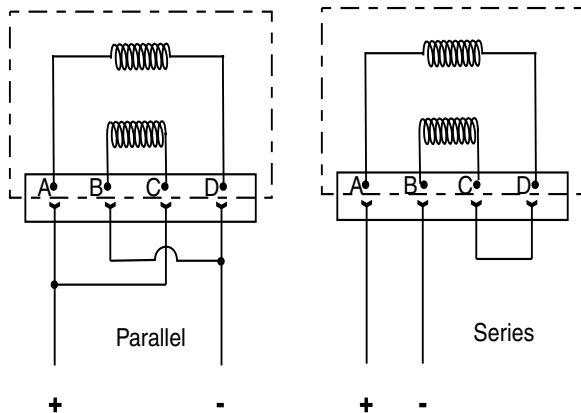
**DY01 at 3000 PSI**



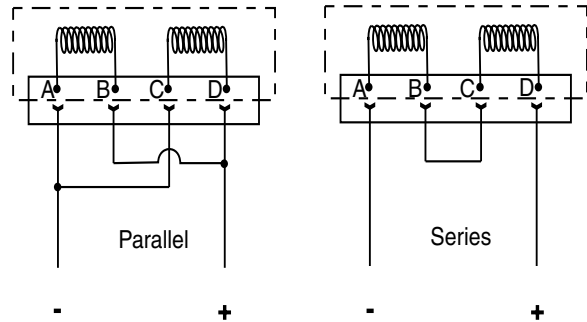
**Installation Wiring Options**

This servovalve has two coils. This illustration shows the internal wiring configurations for options C and D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

**Option C**

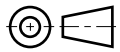
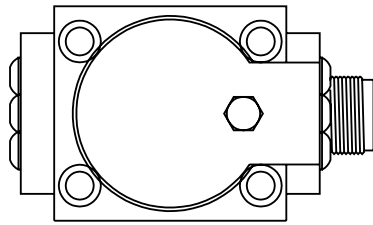


**Option D**

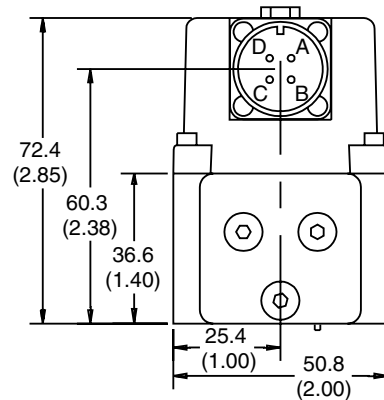
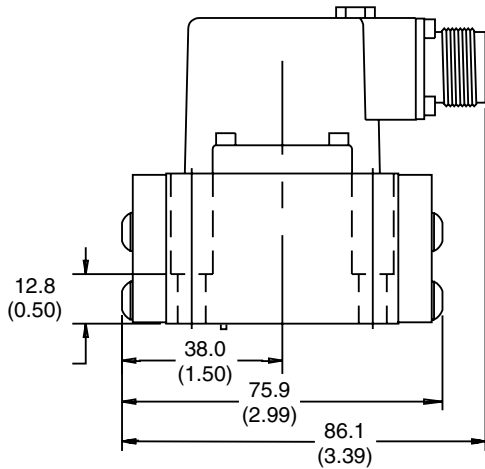


Polarity shown connects flow from P to C2 port.

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

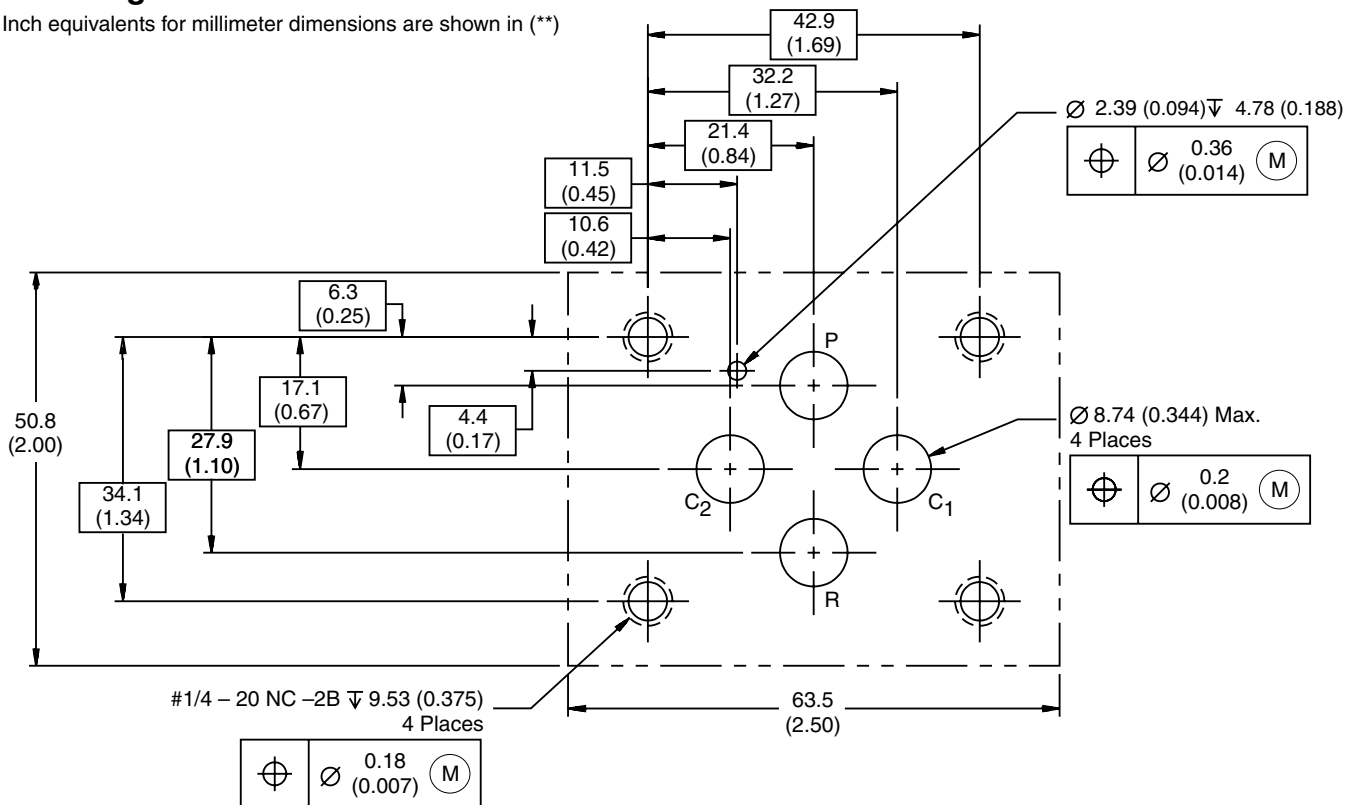


Connector over port C1



**Mounting Interface**

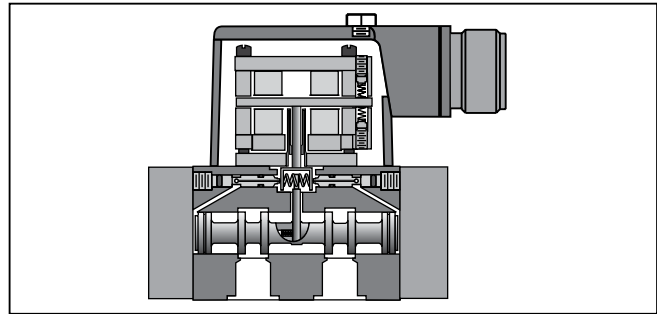
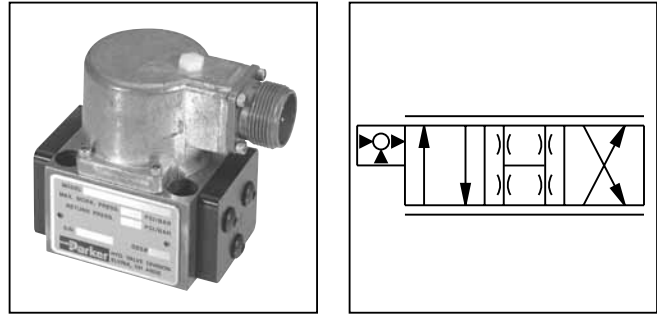
Inch equivalents for millimeter dimensions are shown in (\*\*)





**General Description**

Series DY05 are two stage, 4-way, flapper and nozzle style servovalves. The DY05 has a wide range of flow ratings within a lower cost spool and body design. The unique rigid pin feedback design avoids ball glitch problems, which can occur in other types of servovalves. These valves are rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction or the optional stainless steel spool and body.



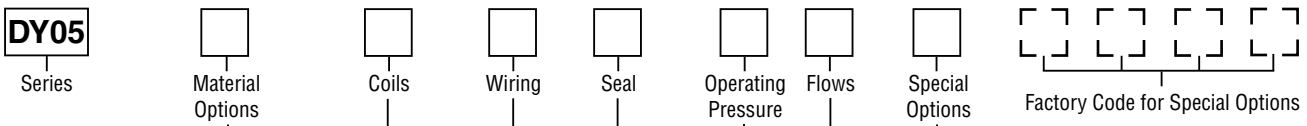
**Features**

- Lapped spool and body.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Versatile 21.59 mm (0.850 in.) port circle, can mount to standard 19.81 mm (0.780 in.) and 23.62 mm (0.930 in.) port circle patterns.
- Survives high tank port pressures.

**Specifications**

<b>Flow Rating</b> @ 70 Bar (1000 PSID)	0.95, 1.9, 3.8, 9.5 and 19 LPM (0.25, 0.5, 1.0, 2.5 & 5 GPM)	<b>Null Shift</b> with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Supply Pressure</b>	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)	<b>Pressure Gain</b> % change in pressure per 1% change in input command	30% minimum, 70% maximum
<b>Leakage Flow</b> @ 70 Bar (1000 PSID)	0.42 – 0.95 LPM (0.11 – 0.25 GPM)	<b>Step Response</b>	10 – 90%, < 11 ms
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance	<b>Fluid</b>	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
<b>Input Command</b>	±50 mA std.	<b>Operating Temperature</b>	-1°C to +82°C (+30°F to +180°F)
<b>Frequency Response</b> @ 90° phase shift	> 100 Hz (See Performance Curves)	<b>Protection Class</b>	NEMA 4, IP65
<b>Non-Linearity</b>	≤ 10%	<b>Filtration</b>	ISO 4406 15/12 or better
<b>Threshold</b>	≤ 0.5%		

**C**



Code	Description
A	Steel (standard)
B	Stainless Steel
Z*	Special (specify)

\* Material selection does not affect operating pressure.

Code	Description
Omit	Standard
D	(Specify) See list below

Code	Description
0.25	0.95 LPM (0.25 GPM)
0.5	1.9 LPM (0.5 GPM)
1	3.8 LPM (1 GPM)
2.5	9.5 LPM (2.5 GPM)
5	19 LPM (5 GPM)

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
L	360 ohm	30 mA	15 mA
M	475 ohm	40 mA	20 mA
R	750 ohm	30 mA	15 mA
T	1000 ohm	10 mA	5 mA
V	1200 ohm	40 mA	20 mA
Z	Special (specify)		

Code	Description
A	210 Bar (3000 PSI)
B	350 Bar (5000 PSI)
Z	Special (specify)

Operating pressure is independent of material selection.

**Weight:** 1.0 kg (2.1 lbs.)

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E*	EPR
Z*	Special (specify)

\* Consult factory for delivery

Code	Connector over:	Flow P to C2 with:
C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z	Special (specify)	

**Special Options:**

Consult factory for price, delivery and availability of special options.

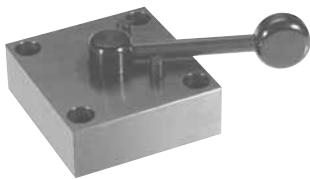
- Special coil
- Special wiring
- Special seals
- Special flow rate
- Dual flow rate
- Dual gain
- Zener barriers
- High frequency torque motor (Models 5, 10, 12 & 15 only)

**Accessories**

- Cable with Mating Connector:** EHC154S
- Mating Connector:** MS3106E-14S-2S
- Bolt Kit:** Included with Valve
- Flushing Valve:** 11-0500
- Subplate:** 55-0100-8S SAE-8 Side ports
- Null Adjust Tool:** 6522A13

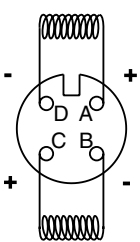
**Electronic Drivers:** 23-7030, BD90\*, BD101\*  
 When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

\* For output currents >15 mA



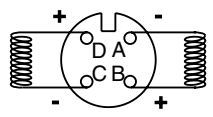
Flushing valve is rated for 3000 psi operation.

**Wiring Option C (Standard)**



Dyval and Pegasus standard.

**Wiring Option D**



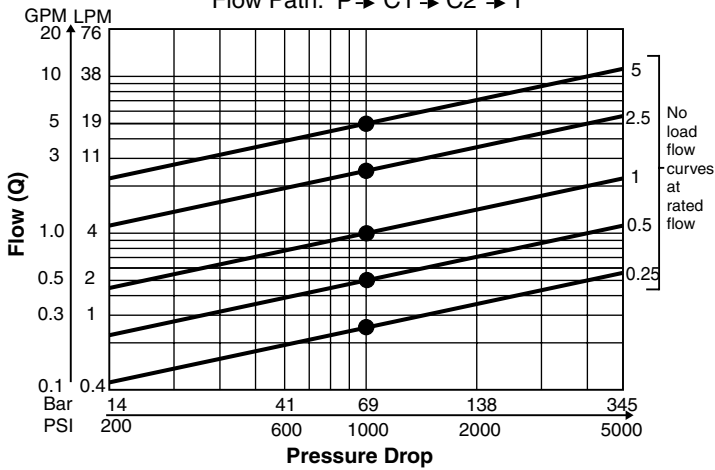
Moog, Atchley and Vickers standard.

In both cases, polarity shown connects P to C2 port.

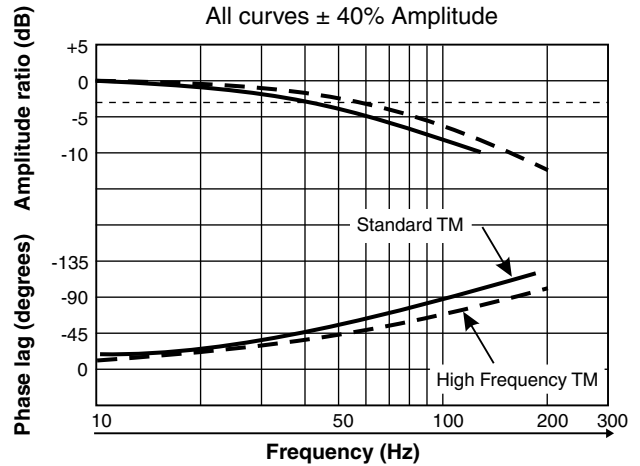
**Performance Curves**

**Frequency Response**

**DY05 Flow vs. Pressure Drop**  
 at 100% command  
 Flow Path: P → C1 → C2 → T



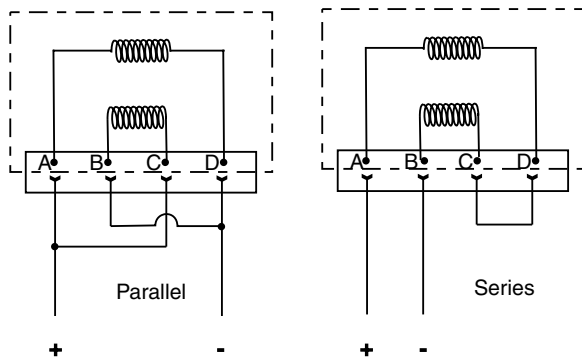
**DY05 at 3000 PSI**  
 All curves ± 40% Amplitude



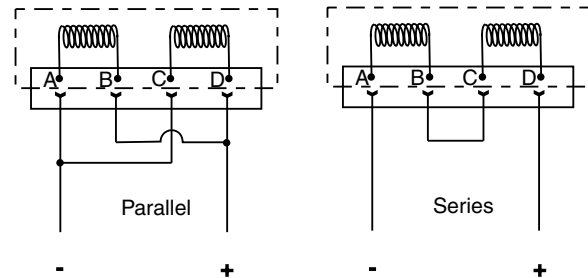
**Installation Wiring Options**

This servovalve has two coils. This illustration shows the internal wiring configurations for options C and D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

**Option C**

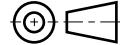
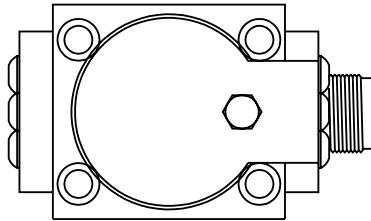


**Option D**

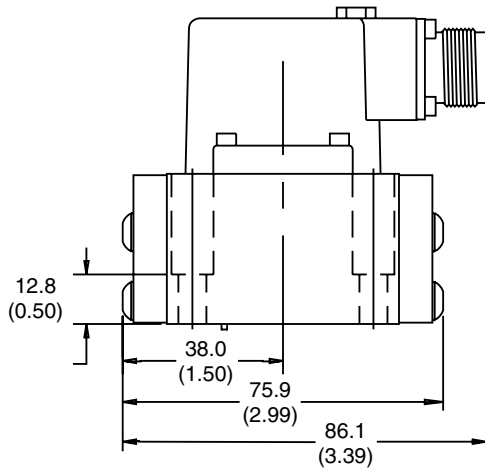


Polarity shown connects flow from P to C2 port.

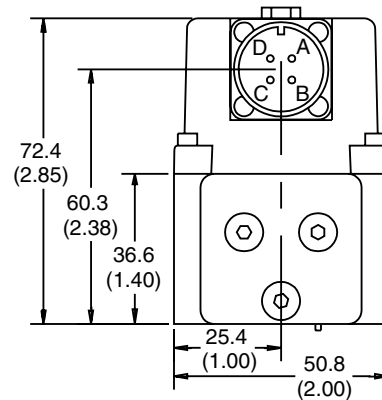
Inch equivalents for millimeter dimensions are shown in (\*\*)



**C**

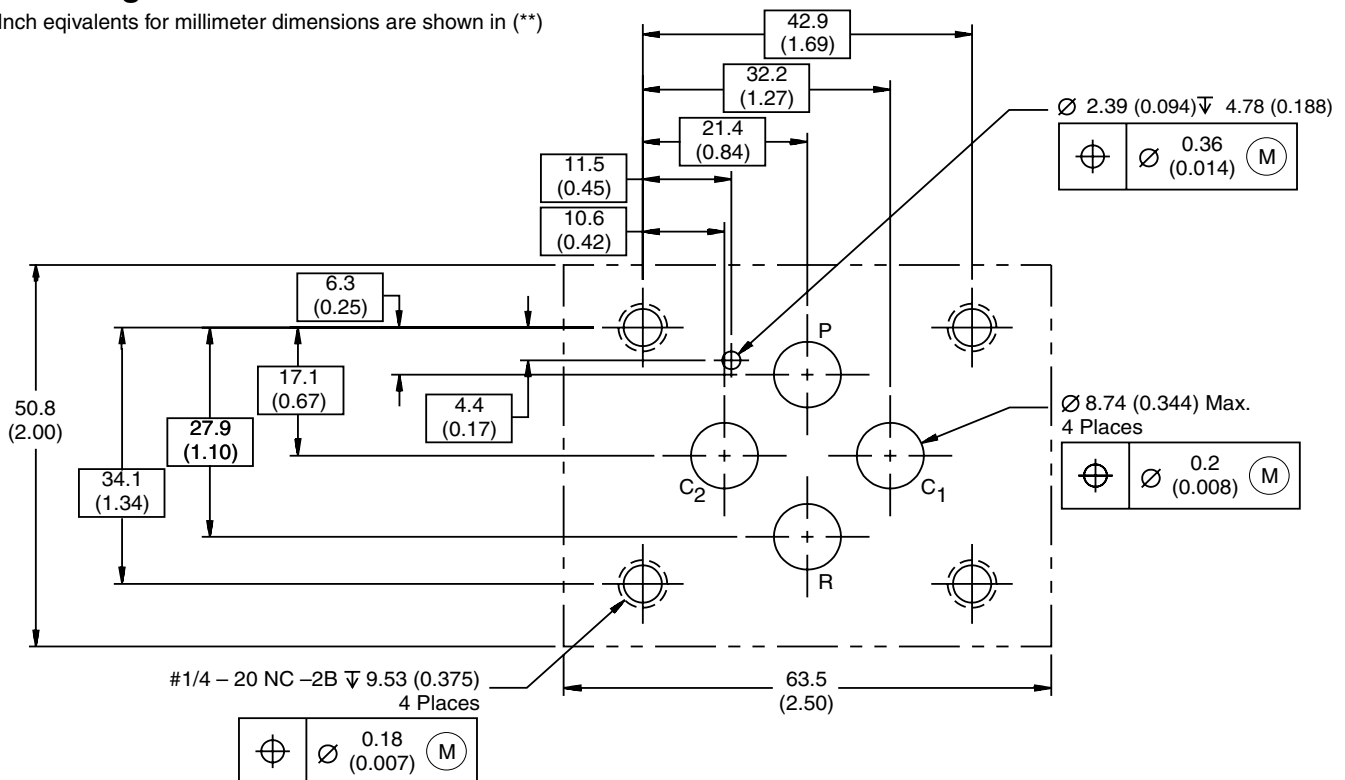


Connector over port C1



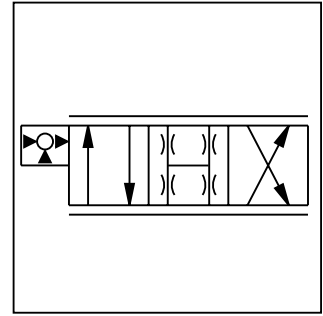
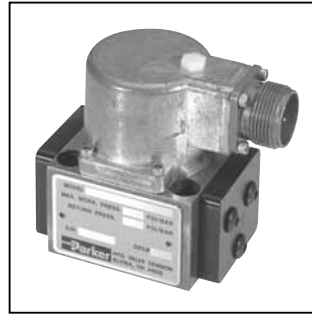
**Mounting Interface**

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



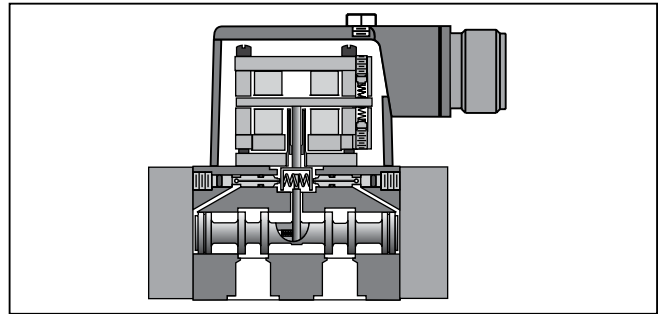
**General Description**

Series DY10 are two stage, 4-way, flapper and nozzle style servovalves. The DY10 is a higher flow version of the DY05. The unique rigid pin feedback design avoids ball glitch problems, which can occur in other types of servovalves. These valves are rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction or the optional stainless steel spool and body.



**Features**

- Lapped spool and body.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Versatile 21.59 mm (0.850 in.) port circle, can mount to standard 19.81 mm (0.780 in.) and 23.62 mm (0.930 in.) port circle patterns.
- Survives high tank port pressures.



**Specifications**

<b>Flow Rating</b> @ 70 Bar (1000 PSID)	28 and 38 LPM (7.5 and 10 GPM)	<b>Null Shift</b> with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Supply Pressure</b>	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)	<b>Pressure Gain</b> % change in pressure per 1% change in input command	30% minimum, 70% maximum
<b>Leakage Flow</b> @ 70 Bar (1000 PSID)	0.57 – 1.1 LPM (0.15 – 0.3 GPM)	<b>Step Response</b>	10 – 90%, < 13 ms
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance	<b>Fluid</b>	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
<b>Input Command</b>	±50 mA std.	<b>Operating Temperature</b>	-1°C to +82°C (+30°F to +180°F)
<b>Frequency Response</b> @ 90° phase shift	> 100 Hz (See Performance Curves)	<b>Protection Class</b>	NEMA 4, IP65
<b>Non-Linearity</b>	≤ 10%	<b>Filtration</b>	ISO 4406 15/12 or better
<b>Threshold</b>	≤ 0.5%		

**DY10**

Series

Material Options

Coils

Wiring

Seal

Operating Pressure

Flows

Special Options

Factory Code for Special Options

Code	Description
A	Steel (standard)
B	Stainless Steel
Z*	Special (specify)

\* Material selection does not affect operating pressure.

Code	Description
Omit	Standard
D	(Specify) See list below

Code	Description
7.5	28 LPM (7.5 GPM)
10	38 LPM (10 GPM)

Code	Description
A	210 Bar (3000 PSI)
B	350 Bar (5000 PSI)
Z	Special (specify)

Operating pressure is independent of material selection.

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E*	EPR
Z*	Special (specify)

\* Consult factory for delivery

**Weight:** 1.0 kg (2.1 lbs.)

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
L	360 ohm	30 mA	15 mA
M	475 ohm	40 mA	20 mA
R	750 ohm	30 mA	15 mA
T	1000 ohm	10 mA	5 mA
V	1200 ohm	40 mA	20 mA
Z	Special (specify)		

Code	Connector over:	Flow P to C2 with:
C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z	Special (specify)	

**Special Options:**

Consult factory for price, delivery and availability of special options.

- Special coil
- Special wiring
- Special seals
- Special flow rate
- Dual flow rate
- Dual gain
- Zener barriers
- High frequency torque motor (Models 5, 10, 12 & 15 only)

**Accessories**

**Cable with Mating Connector:** EHC154S

**Mating Connector:** MS3106E-14S-2S

**Bolt Kit:** Included with valve

**Flushing Valve:** 11-0500

**Subplate:** 55-0100-8S SAE-8 Side ports

**Null Adjust Tool:** 6522A13

**Electronic Drivers:** 23-7030, BD90\*, BD101\*

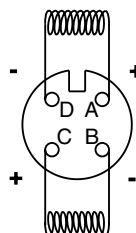
When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

\* For output currents >15 mA



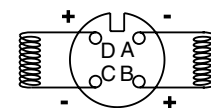
Flushing valve is rated for 3000 psi operation.

**Wiring Option C  
 (Standard)**



Dyval and Pegasus standard.

**Wiring Option D**



Moog, Atchley and Vickers standard.

In both cases, polarity shown connects P to C2 port.

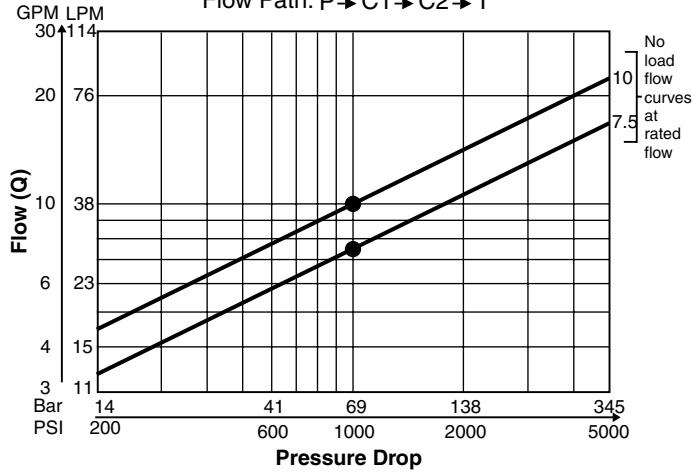
**Performance Curves**

**Frequency Response**

**DY10 Flow vs. Pressure Drop**

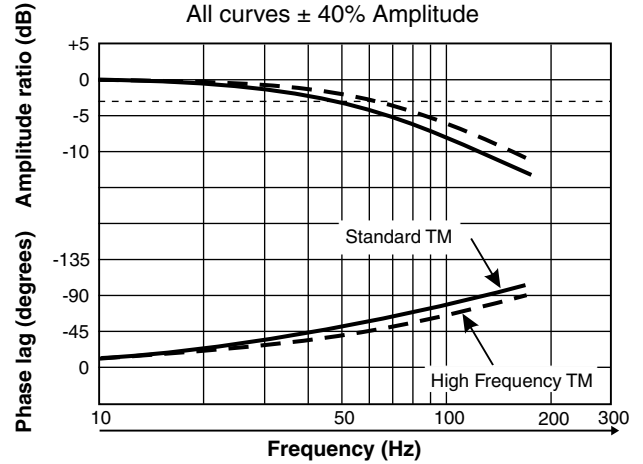
at 100% command

Flow Path: P → C1 → C2 → T



**DY10 at 3000 PSI**

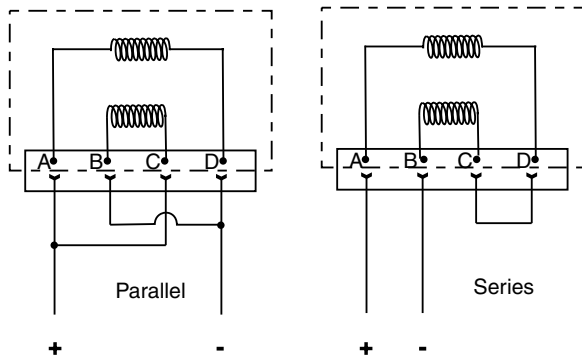
All curves ± 40% Amplitude



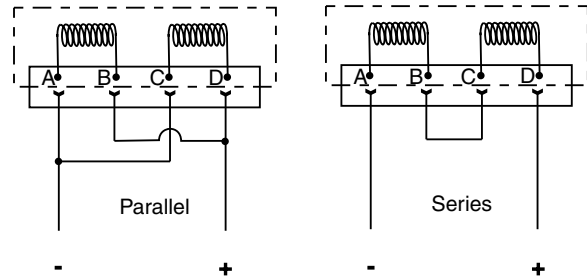
**Installation Wiring Options**

This servovalve has two coils. This illustration shows the internal wiring configurations for options C and D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

**Option C**

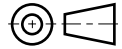
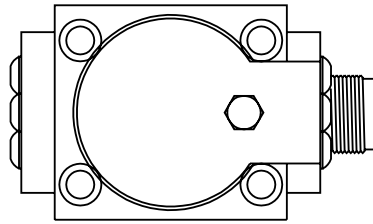


**Option D**

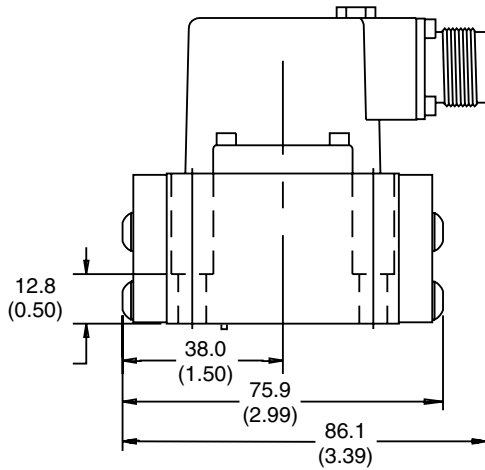


Polarity shown connects flow from P to C2 port.

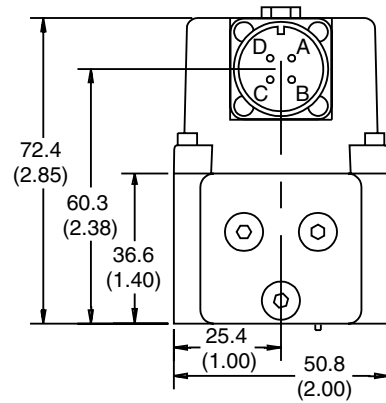
Inch equivalents for millimeter dimensions are shown in (\*\*)



**C**

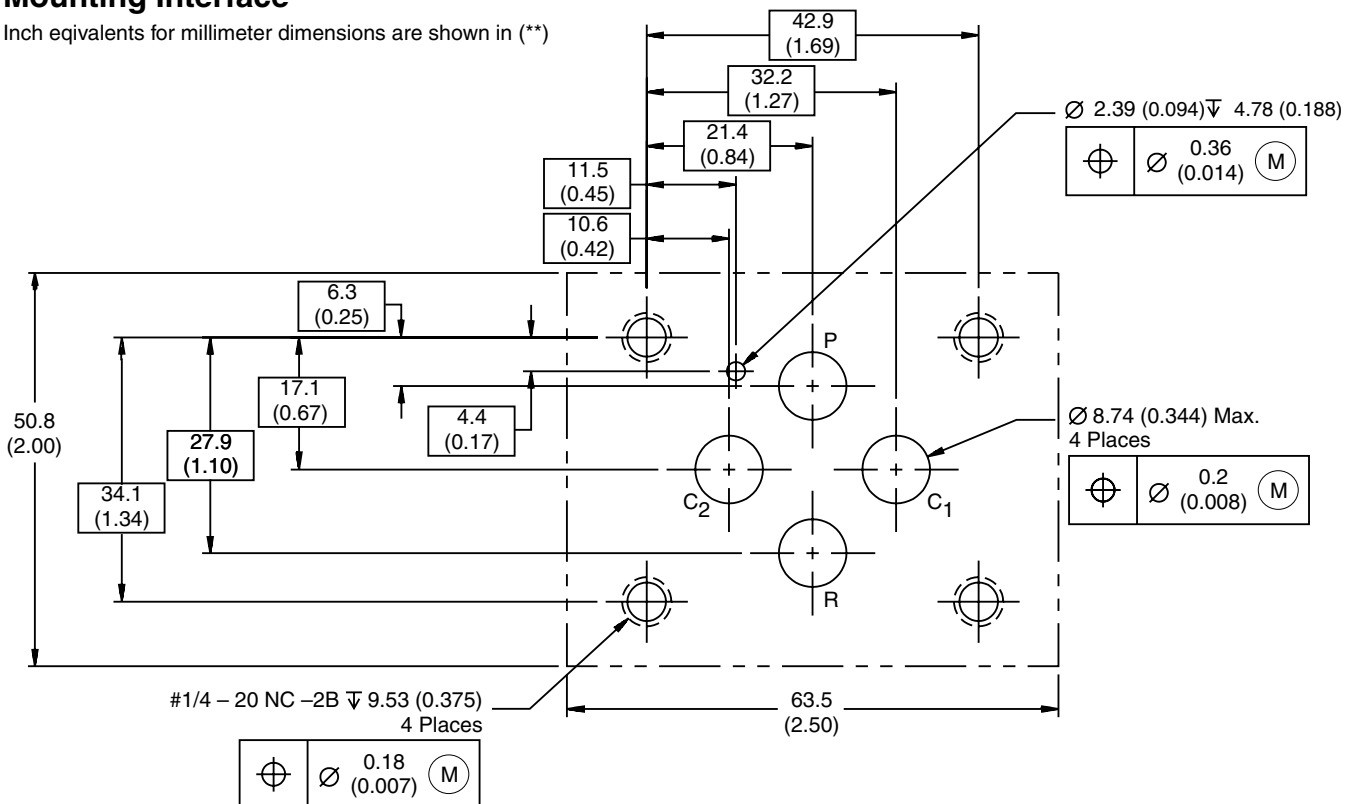


Connector over port C1



**Mounting Interface**

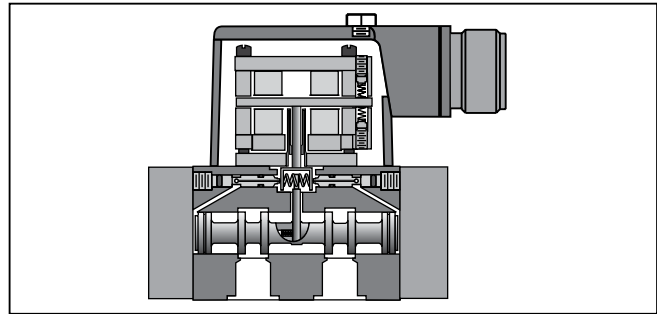
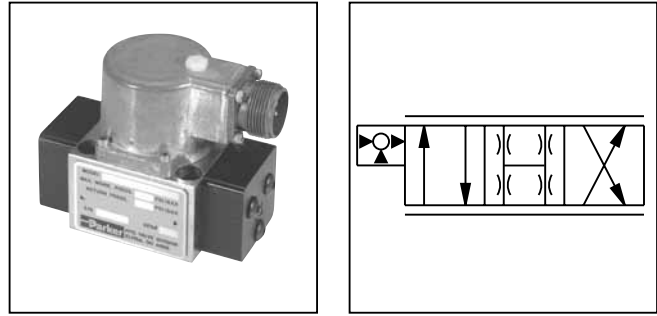
Inch equivalents for millimeter dimensions are shown in (\*\*)





**General Description**

Series DY12 are two stage, 4-way, flapper and nozzle style servovalves. They have the same port pattern and body as the DY10 valve, but have a longer spool stroke for higher flow. The unique rigid pin feedback design avoids ball glitch problems, which can occur in other types of servovalves. These valves are rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction or the optional stainless steel spool and body.



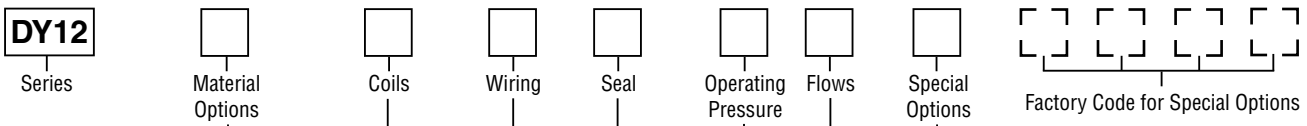
**Features**

- Lapped spool and body.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Nozzle and flapper design.
- Versatile 21.59 mm (0.850 in.) port circle, can mount to standard 19.81 mm (0.780 in.) and 23.62 mm (0.937 in.) port circle patterns.
- Survives high tank port pressures.

**Specifications**

<b>Flow Rating</b> @ 70 Bar (1000 PSID)	47 and 57 LPM (12.5 and 15 GPM)	<b>Null Shift</b> with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Supply Pressure</b>	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)	<b>Pressure Gain</b> % change in pressure per 1% change in input command	30% minimum, 70% maximum
<b>Leakage Flow</b> @ 70 Bar (1000 PSID)	0.57 – 1.1 LPM (0.15 – 0.3 GPM)	<b>Step Response</b>	10 – 90%, < 13 ms
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance	<b>Fluid</b>	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
<b>Input Command</b>	±50 mA std.	<b>Operating Temperature</b>	-1°C to +82°C (+30°F to +180°F)
<b>Frequency Response</b> @ 90° phase shift	> 100 Hz (See Performance Curves)	<b>Protection Class</b>	NEMA 4, IP65
<b>Non-Linearity</b>	≤ 10%	<b>Filtration</b>	ISO 4406 15/12 or better
<b>Threshold</b>	≤ 0.5%		

**C**



Code	Description
A	Steel (standard)
B	Stainless Steel
Z*	Special (specify)

\* Material selection does not affect operating pressure.

Code	Description
Omit	Standard
D	(Specify) See list below

Code	Description
12.5	47 LPM (12.5 GPM)
15	57 LPM (15 GPM)

Code	Description
A	210 Bar (3000 PSI)
B	350 Bar (5000 PSI)
Z	Special (specify)

Operating pressure is independent of material selection.

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E*	EPR
Z*	Special (specify)

\* Consult factory for delivery

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
L	360 ohm	30 mA	15 mA
M	475 ohm	40 mA	20 mA
R	750 ohm	30 mA	15 mA
T	1000 ohm	10 mA	5 mA
V	1200 ohm	40 mA	20 mA
Z	Special (specify)		

Code	Connector over:	Flow P to C2 with:
C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z*	Special (specify)	

**Weight:** 1.0 kg (2.1 lbs.)

**Special Options:**

Consult factory for price, delivery and availability of special options.

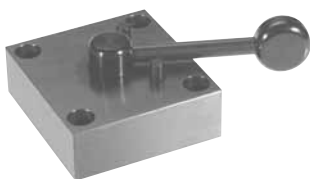
- Special coil
- Special wiring
- Special seals
- Special flow rate
- Dual flow rate
- Dual gain
- Zener barriers
- High frequency torque motor (Models 5, 10, 12 & 15 only)

**Accessories**

- Cable with Mating Connector:** EHC154S
- Mating Connector:** MS3106E-14S-2S
- Bolt Kit:** Included with valve
- Flushing Valve:** 11-0500
- Subplate:** 55-0100-8S SAE-8 Side ports
- Null Adjust Tool:** 6522A13
- Electronic Drivers:** 23-7030, BD90\*, BD101\*

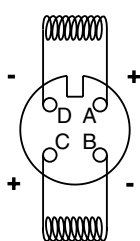
When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

\* For output currents >15 mA



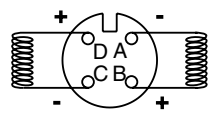
Flushing valve is rated for 3000 psi operation.

**Wiring Option C (Standard)**



Dyval and Pegasus standard.

**Wiring Option D**

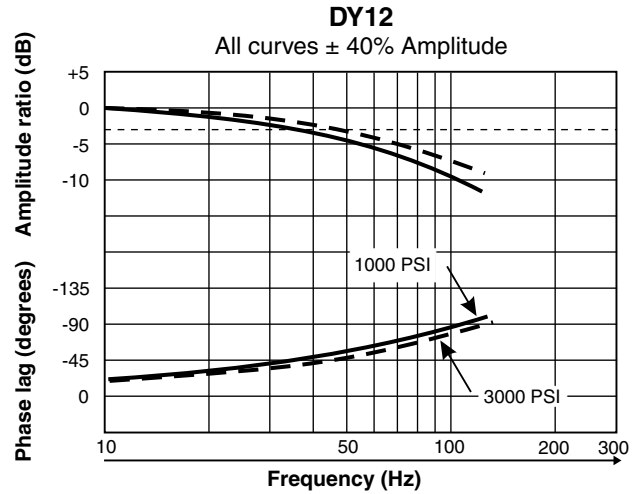
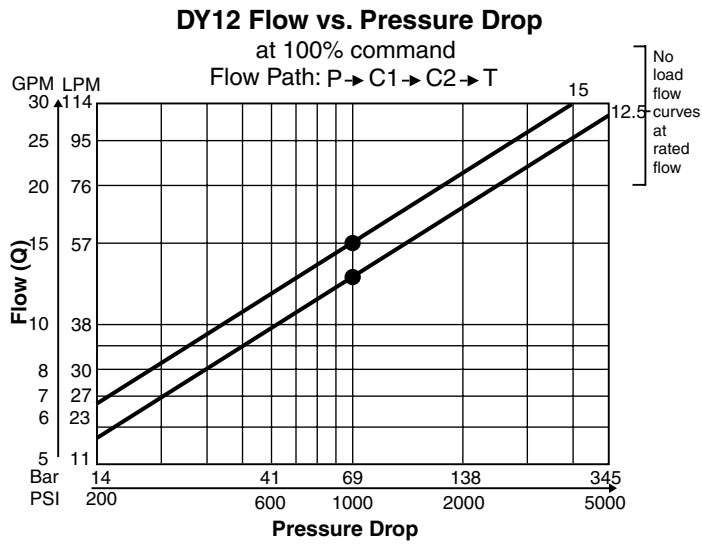


Moog, Atchley and Vickers standard.

In both cases, polarity shown connects P to C2 port.

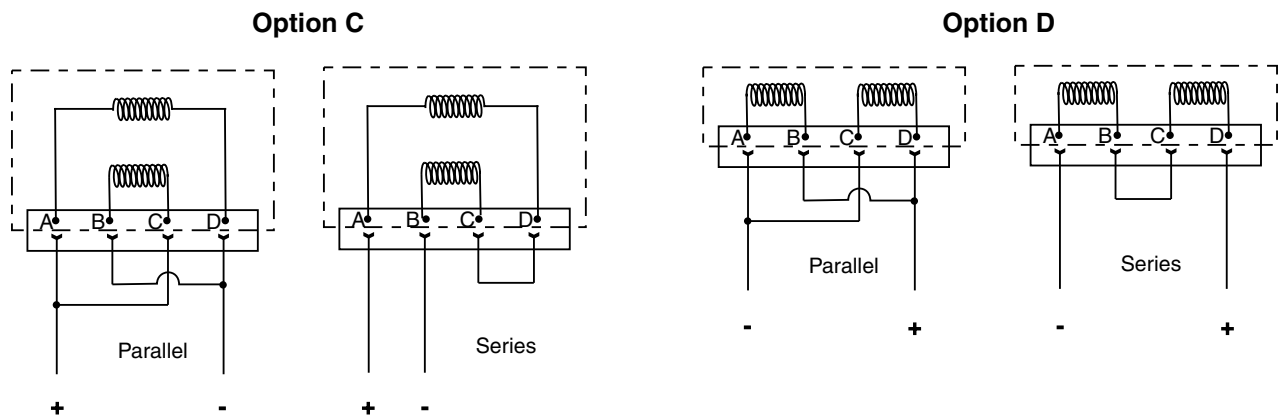
**Performance Curves**

**Frequency Response**



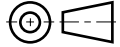
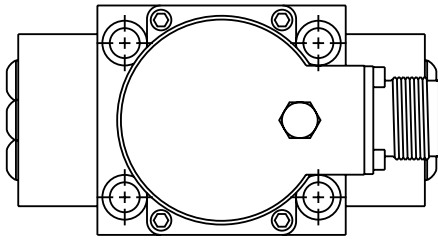
**Installation Wiring Options**

This servovalve has two coils. This illustration shows the internal wiring configurations for these valves. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustration below and to the mounting pattern for this valve to insure proper control phasing.

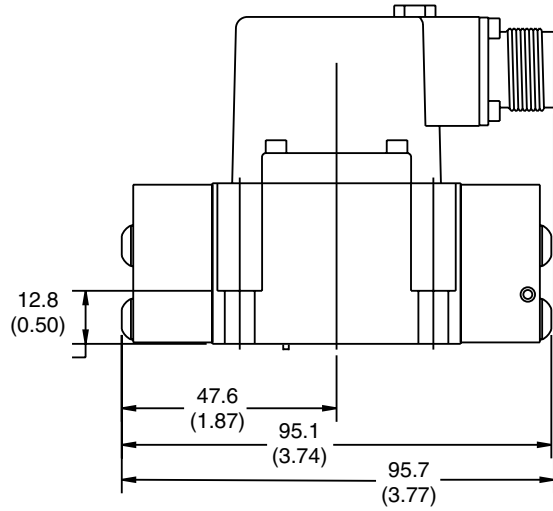


Polarity shown connects flow from P to C2 port.

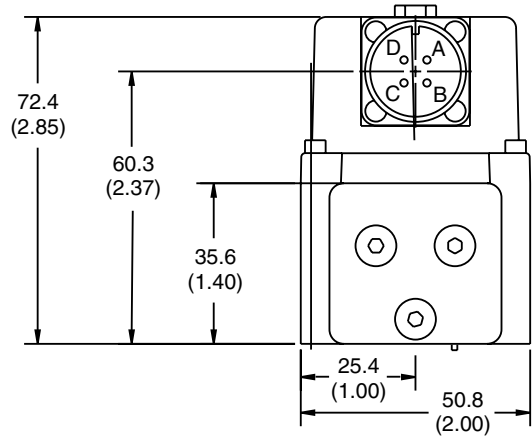
Inch equivalents for millimeter dimensions are shown in (\*\*)



**C**

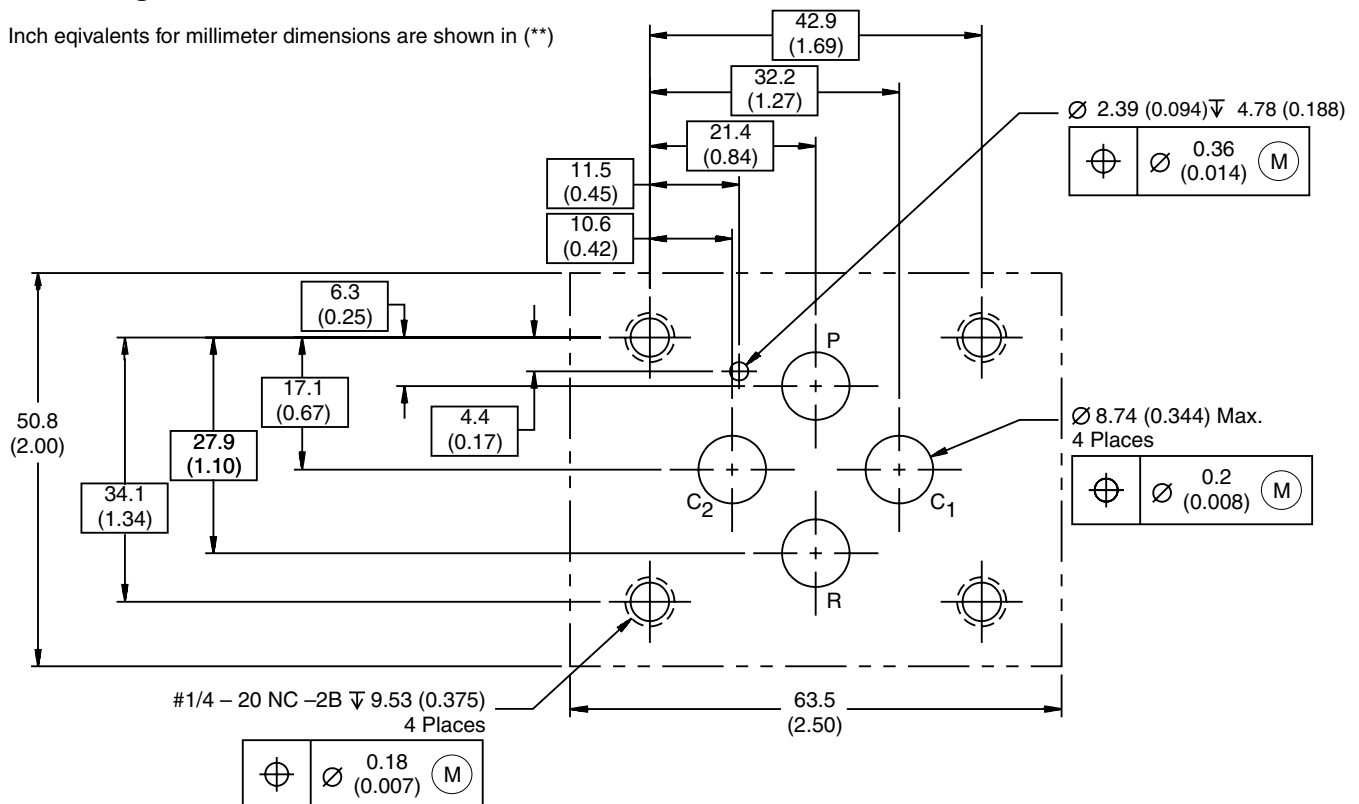


Connector over C1 port



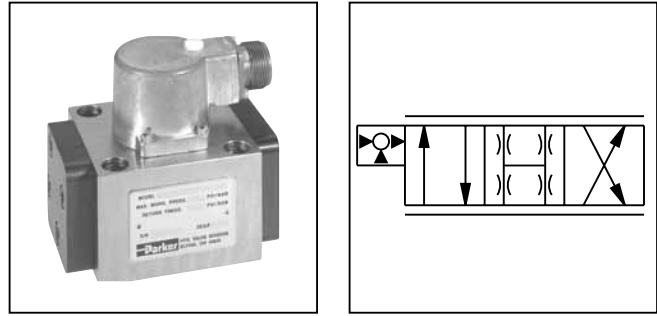
**Mounting Interface**

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



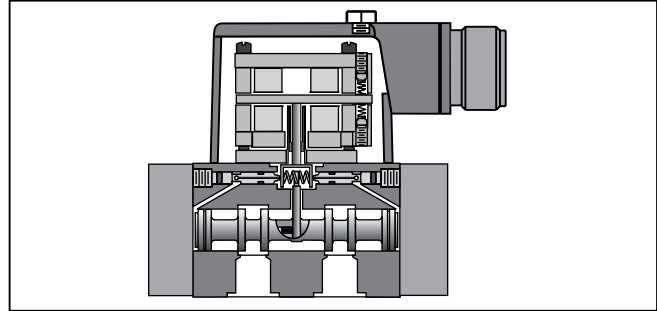
## General Description

Series DY15 are two stage, 4-way, flapper and nozzle style servovalves. This valve is rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction or the optional stainless steel spool and body.



## Features

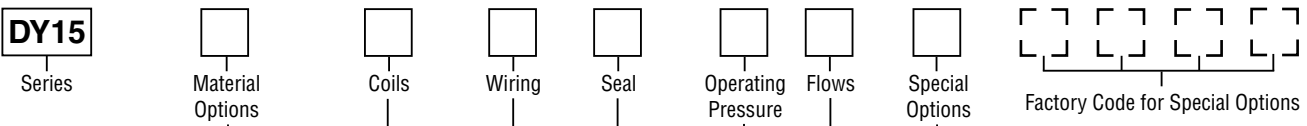
- Lapped spool and body.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Nozzle and flapper design.
- Unique port pattern (see next page). (1 in. port circle)
- Survives high tank port pressures.



## Specifications

<b>Flow Rating</b> @ 70 Bar (1000 PSID)	57, 75 and 95 LPM (15, 20 and 25 GPM)	<b>Null Shift</b> with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Supply Pressure</b>	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)	<b>Pressure Gain</b> % change in pressure per 1% change in input command	30% minimum, 70% maximum
<b>Leakage Flow</b> @ 70 Bar (1000 PSID)	0.95 – 1.7 LPM (0.25 – 0.45 GPM)	<b>Step Response</b>	10 – 90%, < 18 ms < 18 ms up to 75 LPM (20 GPM) < 20 ms up to 95 LPM (25 GPM)
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance	<b>Fluid</b>	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
<b>Input Command</b>	±50 mA std.	<b>Operating Temperature</b>	-1°C to +82°C (+30°F to +180°F)
<b>Frequency Response</b> @ 90° phase shift	> 45 Hz (See Performance Curves)	<b>Protection Class</b>	NEMA 4, IP65
<b>Non-Linearity</b>	≤ 10%	<b>Filtration</b>	ISO 4406 15/12 or better
<b>Threshold</b>	≤ 0.5%		

**C**



Code	Description
A	Steel (standard)
B	Stainless Steel
Z*	Special (specify)

\* Material selection does not affect operating pressure

Code	Description
Omit	Standard
D	(Specify) See list below

Code	Description
15	57 LPM (15 GPM)
20	76 LPM (20 GPM)
25	95 LPM (25 GPM)

Code	Description
A	210 Bar (3000 PSI)
B	350 Bar (5000 PSI)
Z	Special (specify)

Operating pressure is independent of material selection.

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E*	EPR
Z*	Special (specify)

\* Consult factory for delivery

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
L	360 ohm	30 mA	15 mA
M	475 ohm	40 mA	20 mA
R	750 ohm	30 mA	15 mA
T	1000 ohm	10 mA	5 mA
V	1200 ohm	40 mA	20 mA
Z	Special (specify)		

Code	Connector over:	Flow P to C2 with:
C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z	Special (specify)	

**Weight:** 1.8 kg (3.9 lbs.)

**Accessories**

**Cable with Mating Connector:** EHC154S

**Mating Connector:** MS3106E-14S-2S

**Bolt Kit:** Included with valve

**Flushing Valve:** 11-0600

**Subplate:** 55-0300-2 SAE-16 Side ports

**Null Adjust Tool:** 6522A13

**Electronic Drivers:** 23-7030, BD90\*, BD101\*

When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

\* For output currents >15 mA



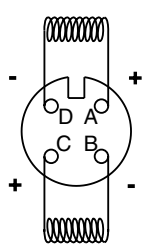
Flushing valve is rated for 3000 psi operation.

**Special Options:**

Consult factory for price, delivery and availability of special options.

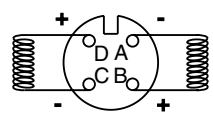
- Special coil
- Special wiring
- Special seals
- Special flow rate
- Dual flow rate
- Dual gain
- Zener barriers
- High frequency torque motor (Models 5, 10, 12 & 15 only)

**Wiring Option C (Standard)**



Dyval and Pegasus standard.

**Wiring Option D**

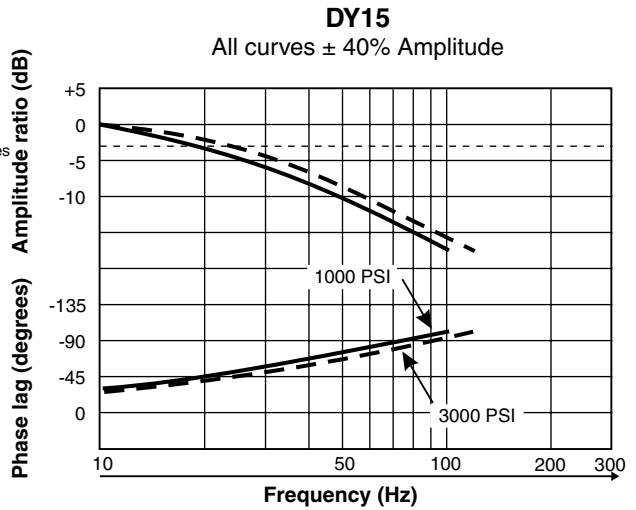
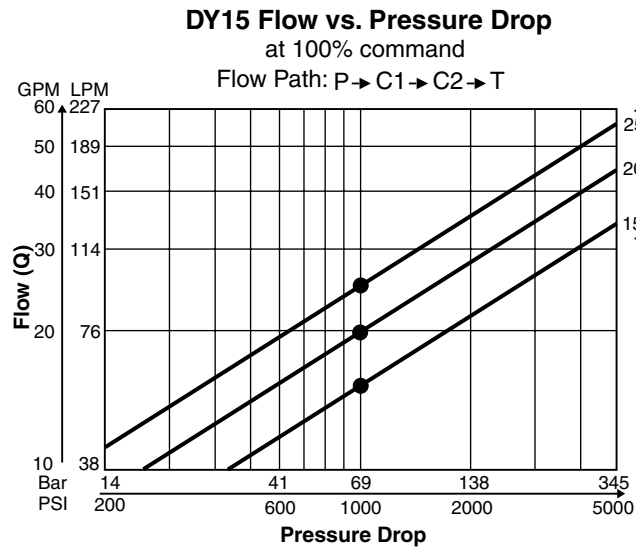


Moog, Atchley and Vickers standard.

In both cases, polarity shown connects P to C2 port.

**Performance Curves**

**Frequency Response**

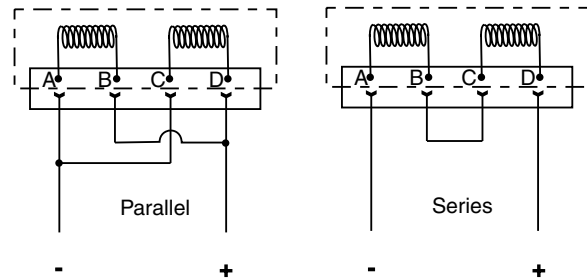
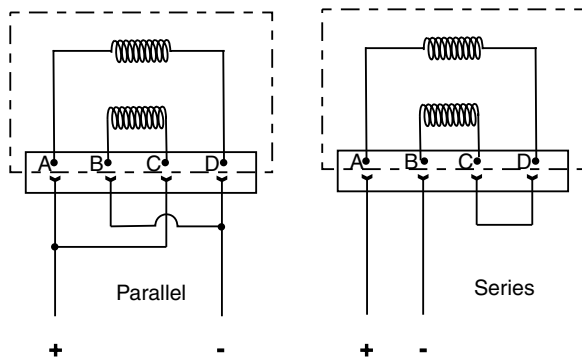


**Installation Wiring Options**

This servovalve has two coils. This illustration shows the internal wiring configurations for options C and D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

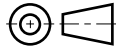
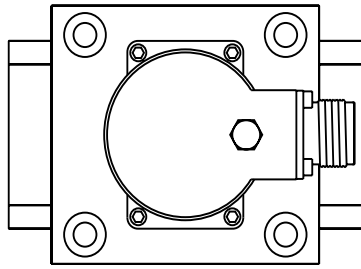
**Option C**

**Option D**

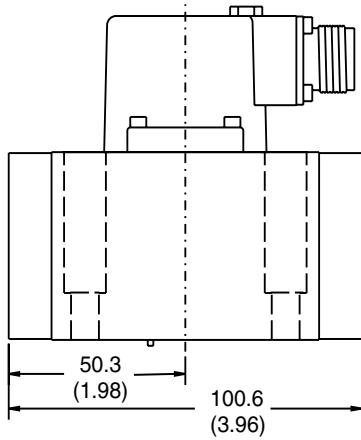


Polarity shown connects flow from P to C2 port.

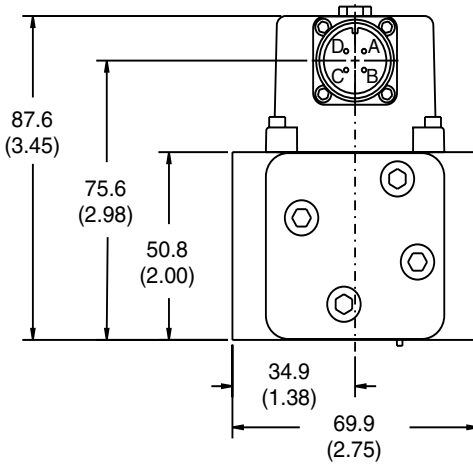
Inch equivalents for millimeter dimensions are shown in (\*\*)



**C**

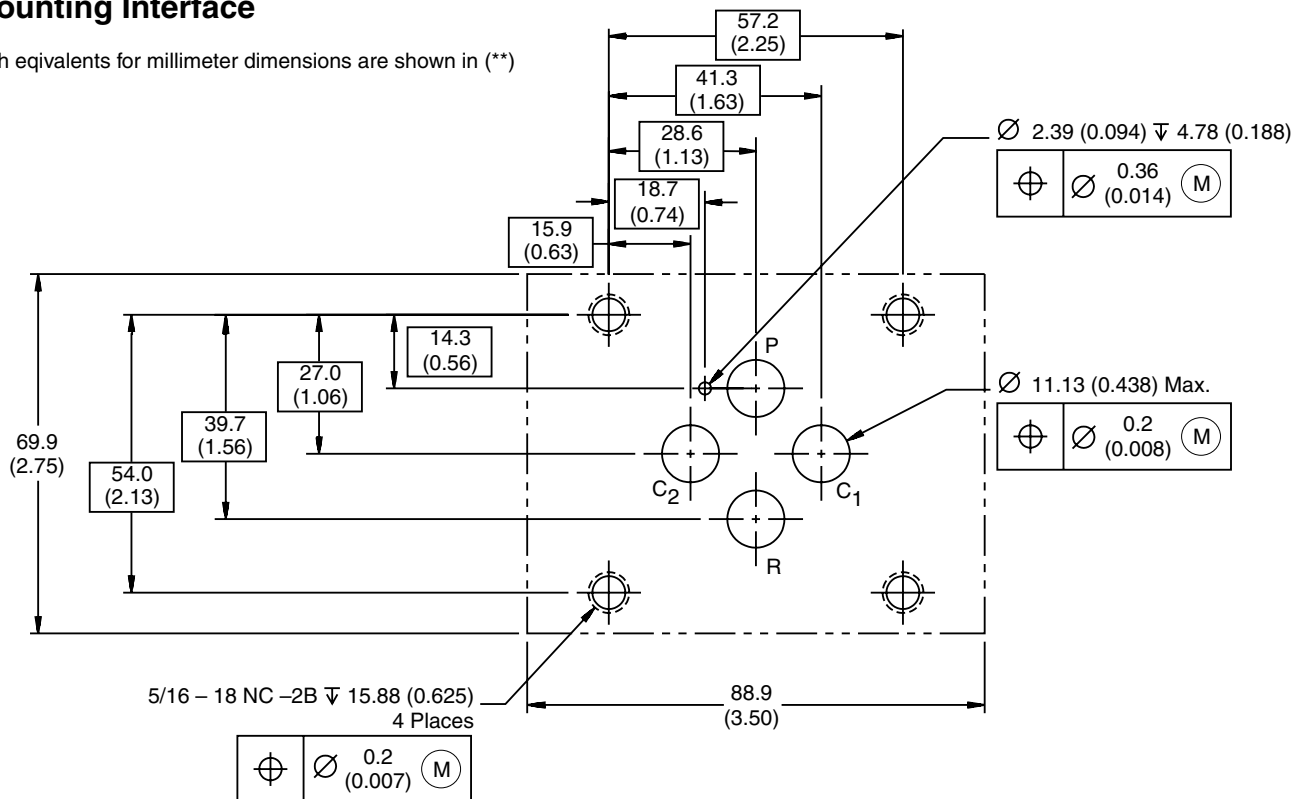


Connector over port C1



**Mounting Interface**

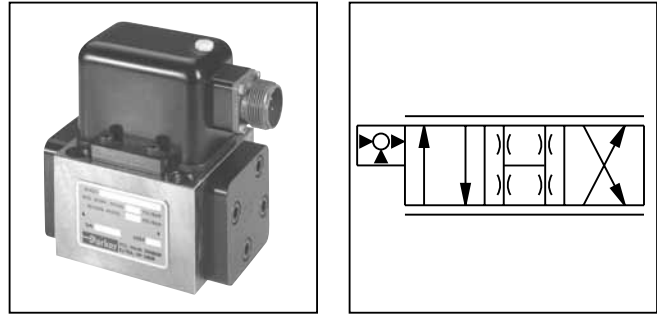
Inch equivalents for millimeter dimensions are shown in (\*\*)





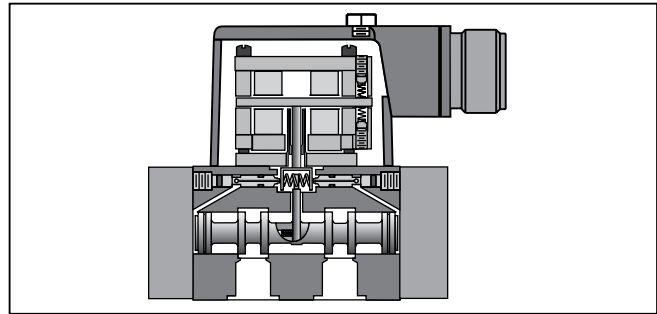
**General Description**

Series DY25 are two stage, 4-way, flapper and nozzle style servovalves. They have the same port pattern and body dimensions as the DY15, but use a higher force torque motor pilot. These valves are rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction, and the optional stainless steel spool and body.



**Features**

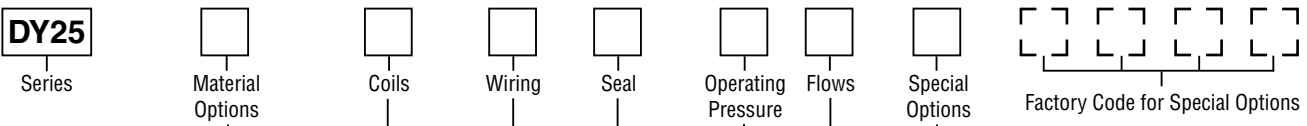
- Lapped spool and body.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Nozzle and flapper design.
- Unique port pattern (see next page). (1 in. port circle)
- Survives high tank port pressures.



**C**

**Specifications**

<b>Flow Rating</b> @ 70 Bar (1000 PSID)	57 and 75 LPM (25 and 30 GPM)	<b>Null Shift</b> with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Supply Pressure</b>	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)	<b>Pressure Gain</b> % change in pressure per 1% change in input command	30% minimum, 70% maximum
<b>Leakage Flow</b> @ 70 Bar (1000 PSID)	0.95 – 1.7 LPM (0.25 – 0.45 GPM)	<b>Step Response</b>	10 – 90%, < 18 ms @ 95 LPM (25 GPM) < 20 ms @ 114 LPM (30 GPM)
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance	<b>Fluid</b>	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
<b>Input Command</b>	±50 mA std.	<b>Operating Temperature</b>	-1°C to +82°C (+30°F to +180°F)
<b>Frequency Response</b> @ 90° phase shift	> 35 Hz (See Performance Curves)	<b>Protection Class</b>	NEMA 4, IP65
<b>Non-Linearity</b>	≤ 10%	<b>Filtration</b>	ISO 4406 15/12 or better
<b>Threshold</b>	≤ 0.5%		



Code	Description
A	Steel (standard)
B	Stainless Steel
Z*	Special (specify)

\* Material selection does not affect operating pressure

Code	Description
Omit	Standard
D	(Specify) See list below

Code	Description
25	95 LPM (25 GPM)
30	114 LPM (30 GPM)

Code	Description
A	210 Bar (3000 PSI)
B	350 Bar (5000 PSI)
Z	Special (specify)

Operating pressure is independent of material selection.

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
R	750 ohm	30 mA	15 mA
Z	Special (specify)		

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E*	EPR
Z*	Special (specify)

\* Consult factory for delivery

Code	Connector over:	Flow P to C2 with:
C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z	Special (specify)	

**Weight:** 1.9 kg (4.2 lbs.)

**Special Options:**

Consult factory for price, delivery and availability of special options.

- Special coil
- Special wiring
- Special seals
- Special flow rate
- Dual flow rate
- Dual gain
- Zener barriers

**Accessories**

**Cable with Mating Connector:** EHC154S

**Mating Connector:** MS3106E-14S-2S

**Bolt Kit:** Included with valve

**Flushing Valve:** 11-0600

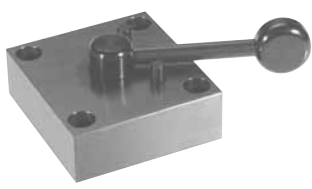
**Subplate:** 55-0300-2 SAE-16 Side ports

**Null Adjust Tool:** 6522A13

**Electronic Drivers:** 23-7030, BD90\*, BD101\*

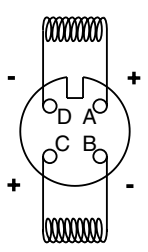
When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

\* For output currents >15 mA



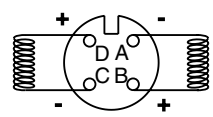
Flushing valve is rated for 3000 psi operation.

**Wiring Option C  
 (Standard)**



Dyval and Pegasus standard.

**Wiring Option D**

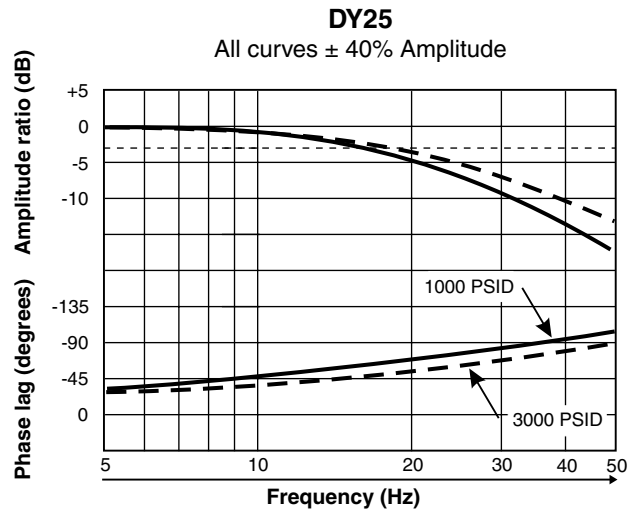
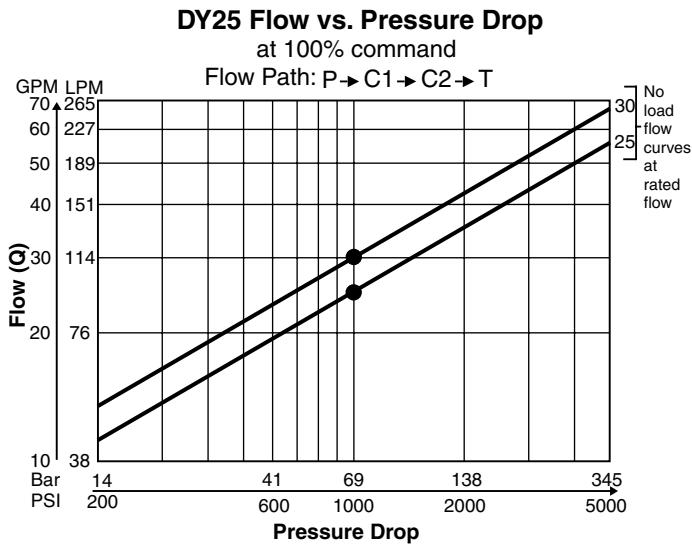


Moog, Atchley and Vickers standard.

In both cases, polarity shown connects P to C2 port.

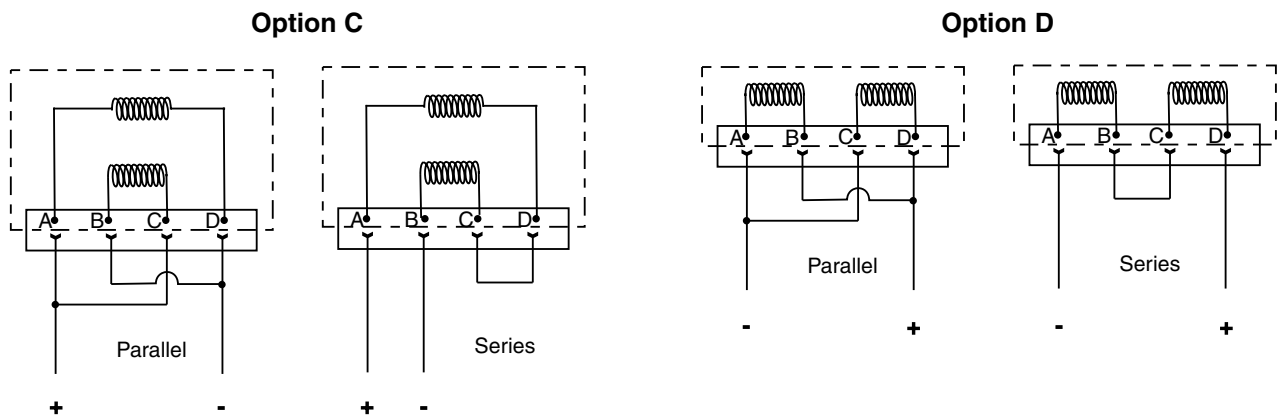
**Performance Curves**

**Frequency Response**



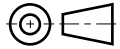
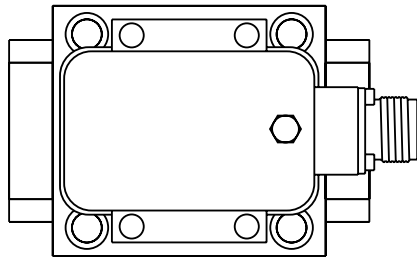
**Installation Wiring Options**

This servovalve has two coils. This illustration shows the internal wiring configurations for options C and D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

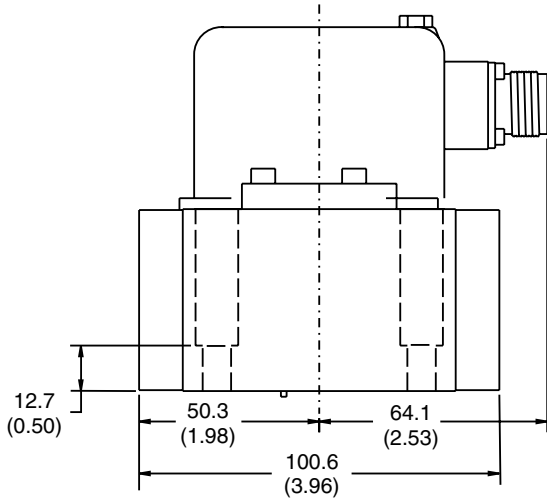


Polarity shown connects flow from P to C2 port.

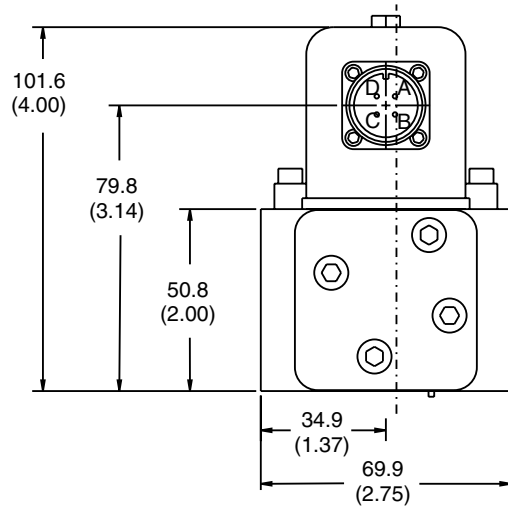
Inch equivalents for millimeter dimensions are shown in (\*\*)



**C**

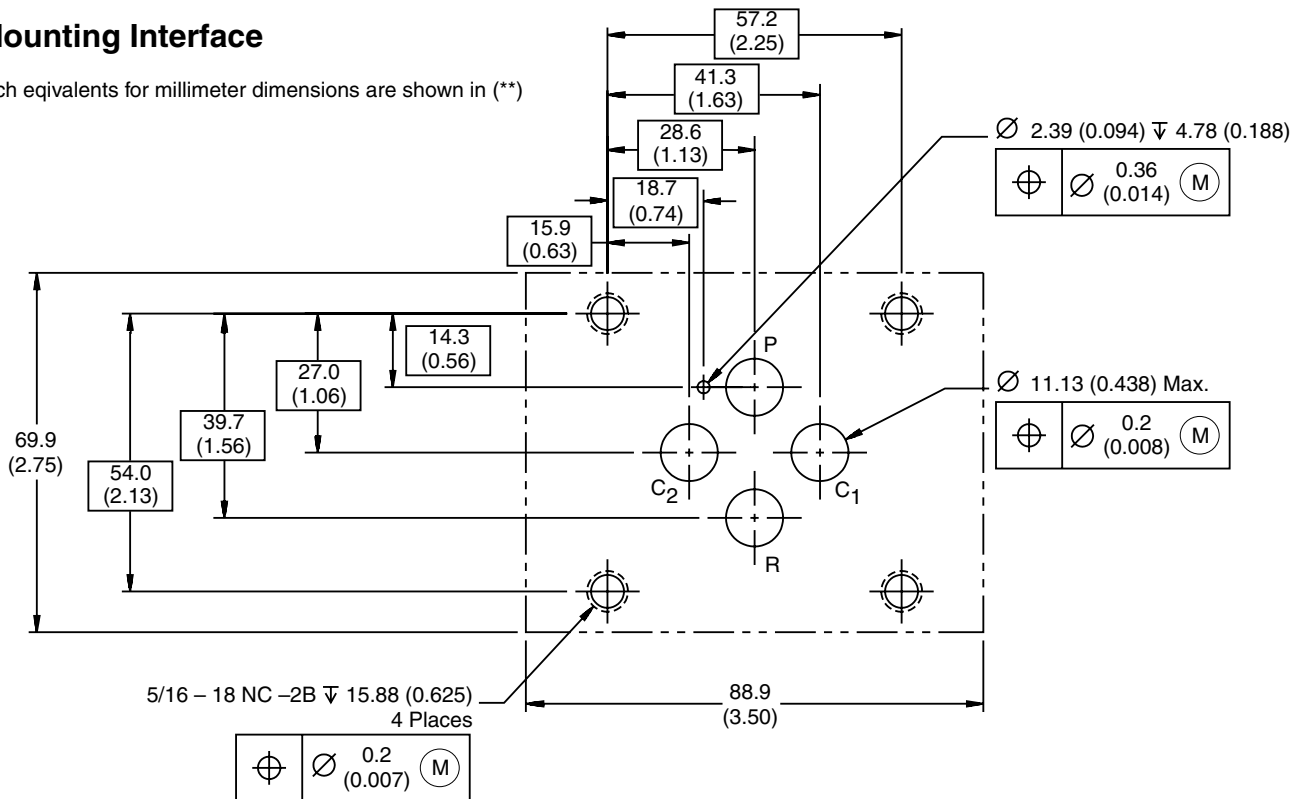


Connector over C1 port



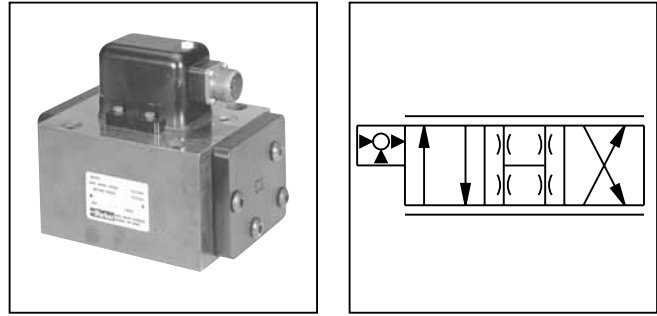
**Mounting Interface**

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



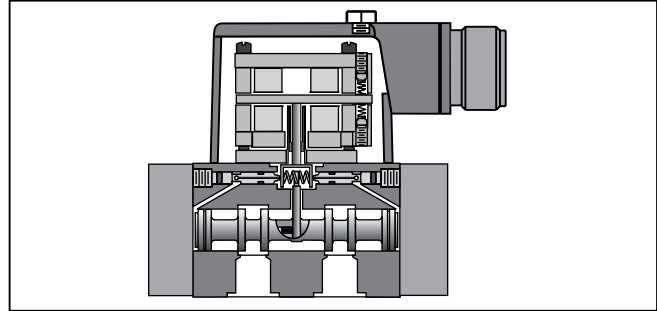
**General Description**

Series DY45 are two stage, 4-way, flapper and nozzle style servovalves. These valves are rated for 210 Bar (3000 PSI) standard, or can be built for 350 Bar (5000 PSI) service. The pressure ratings are the same for both the tool steel construction, and the optional stainless steel spool and body.



**Features**

- Lapped spool and body.
- No ball glitch.
- Tool steel, or stainless steel, spool and body.
- Nozzle and flapper design.
- Unique port pattern (see mounting pattern). (1.8" port circle)
- Survives high tank port pressures.



**Specifications**

<b>Flow Rating</b> @ 70 Bar (1000 PSID)	150, 190 and 225 LPM (40, 50 and 60 GPM)	<b>Null Shift</b> with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Supply Pressure</b>	10 – 210 Bar (145 – 3000 PSI) opt. 350 Bar (5000 PSI)	<b>Pressure Gain</b> % change in pressure per 1% change in input command	30% minimum, 70% maximum
<b>Leakage Flow</b> @ 70 Bar (1000 PSID)	1.3 – 2.7 LPM (0.35 – 0.70 GPM)	<b>Step Response</b>	10 – 90%, < 25 ms
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance	<b>Fluid</b>	Mineral Oil, 60 – 225 SSU 1000 SSU maximum
<b>Input Command</b>	±50 mA std.	<b>Operating Temperature</b>	-1°C to +82°C (+30°F to +180°F)
<b>Frequency Response</b> @ 90° phase shift	> 30 Hz at ±10% amplitude	<b>Protection Class</b>	NEMA 4, IP65
<b>Non-Linearity</b>	≤ 10%	<b>Filtration</b>	ISO 4406 15/12 or better
<b>Threshold</b>	≤ 0.5%		



**DY45**

Series

Material Options

Coils

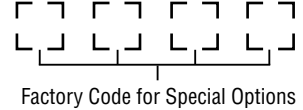
Wiring

Seal

Operating Pressure

Flows

Special Options



Factory Code for Special Options

Code	Description
A	Steel (standard)
B	Stainless Steel
Z*	Special (specify)

\* Material selection does not affect operating pressure

Code	Description
Omit	Standard
D	(Specify) See list below

Code	Description
40	150 LPM (40 GPM)
50	190 LPM (50 GPM)
60	225 LPM (60 GPM)

Code	Description
A	210 Bar (3000 PSI)
B	350 Bar (5000 PSI)
Z	Special (specify)

Operating pressure is independent of material selection.

Code	Description	Parallel	Series
D	200 ohm (Std.)	50 mA	25 mA
F	80 ohm	80 mA	40 mA
G	22 ohm	200 mA	100 mA
K	40 ohm	150 mA	75 mA
R	750 ohm	30 mA	15 mA
Z	Special (specify)		

Code	Connector over:	Flow P to C2 with:
C	Port C1	(+) Signal to A, C
D	Port C1	(+) Signal to B, D
Z	Special (specify)	

Code	Description
N	Nitrile (standard)
V	Fluorocarbon
E*	EPR
Z*	Special (specify)

\* Consult factory for delivery

**Weight:** .3 kg (16.0 lbs.)

**Special Options:**

Consult factory for price, delivery and availability of special options.

- Special coil
- Special wiring
- Special seals
- Special flow rate
- Dual flow rate
- Dual gain
- Zener barriers

**Accessories**

**Cable with Mating Connector:** EHC154S

**Mating Connector:** MS3106E-14S-2S

**Bolt Kit:** Included with valve

**Flushing Valve:** 11-0700

**Subplate:** 55-0200-2 SAE-24 Side ports

**Null Adjust Tool:** 6522A13

**Electronic Drivers:** 23-7030, BD90\*, BD101\*

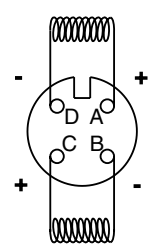
When used in conjunction with Series BD90 and BD101 servo amplifiers or a motion controller, Series BD valves will provide accurate control of rotary and linear actuators.

\* For output currents >15 mA



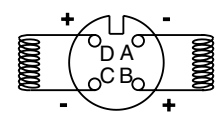
Flushing valve is rated for 3000 psi operation.

**Wiring Option C (Standard)**



Dyval and Pegasus standard.

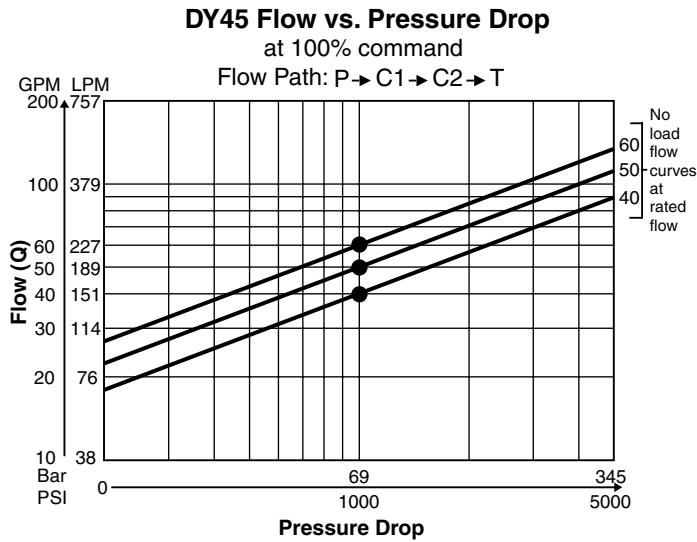
**Wiring Option D**



Moog, Atchley and Vickers standard.

In both cases, polarity shown connects P to C2 port.

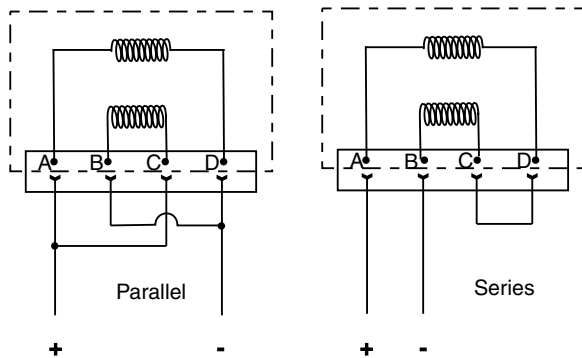
**Performance Curves**



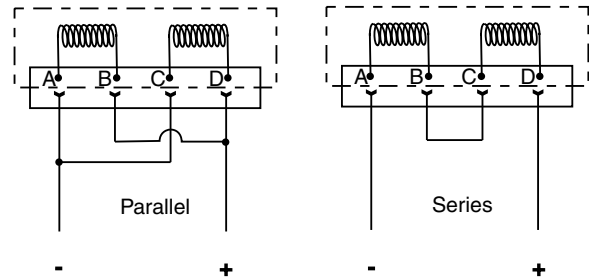
**Installation Wiring Options**

This servovalve has two coils. This illustration shows the internal wiring configurations for options C and D. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

**Option C**



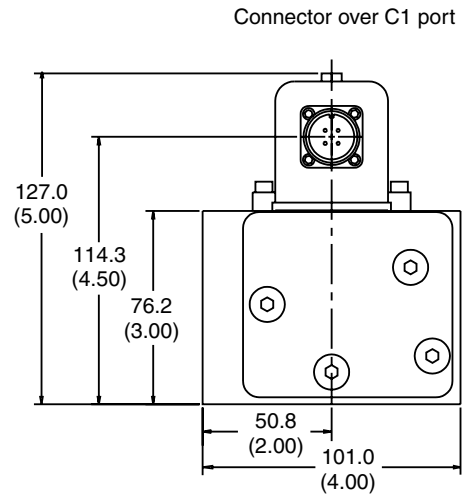
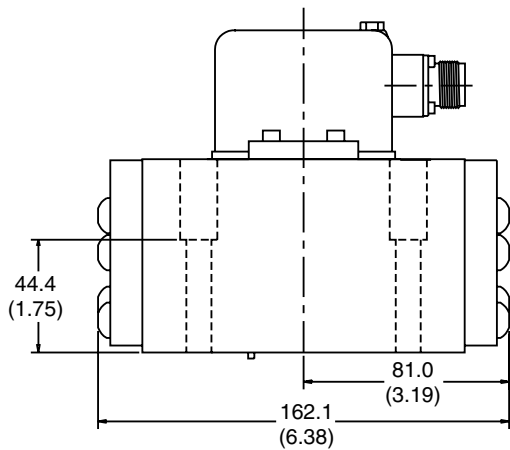
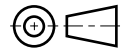
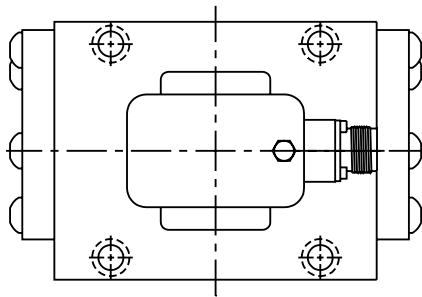
**Option D**



Polarity shown connects flow from P to C2 port.

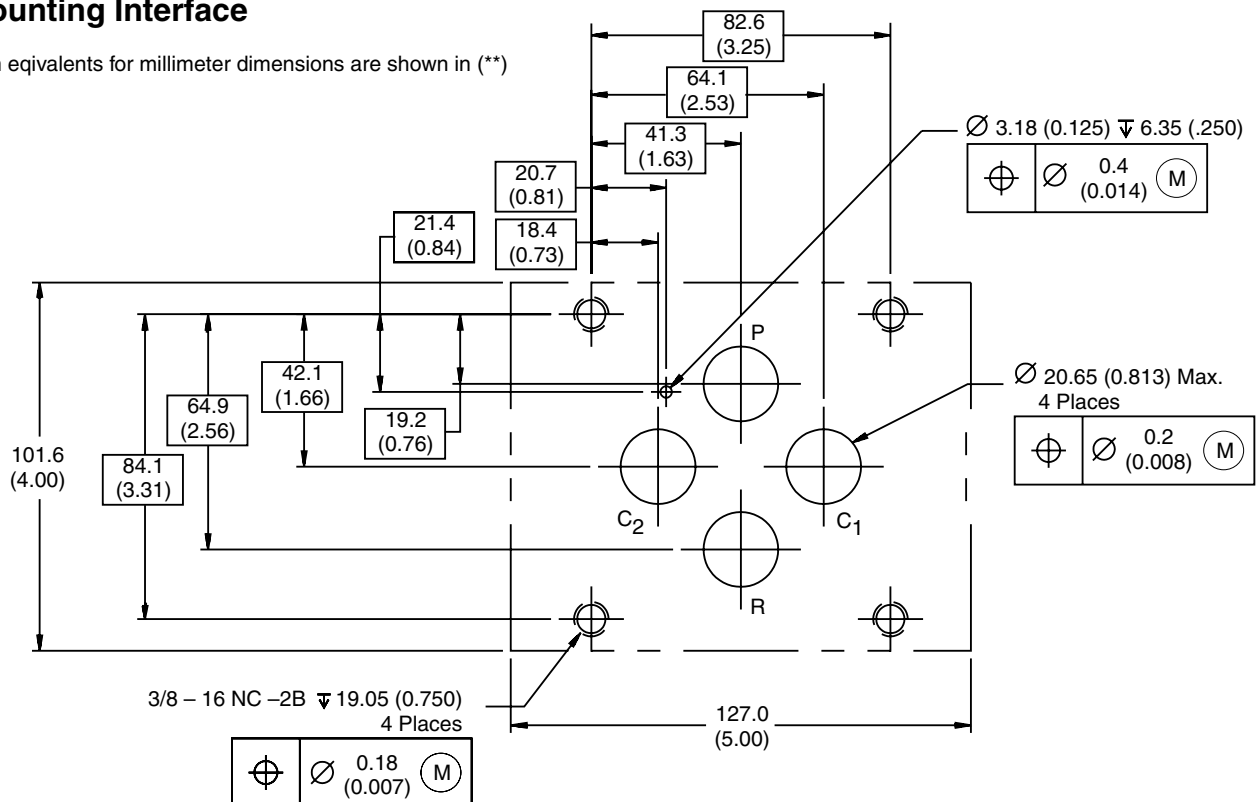
Inch equivalents for millimeter dimensions are shown in (\*\*)

**C**



**Mounting Interface**

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





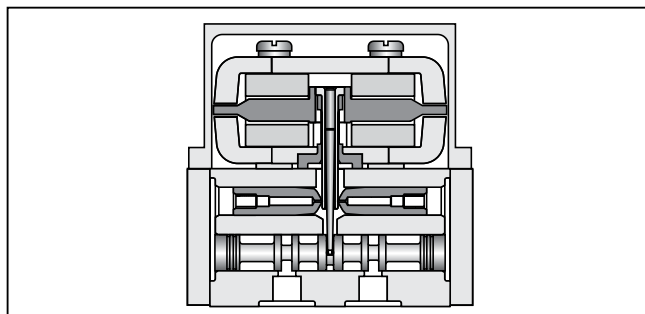
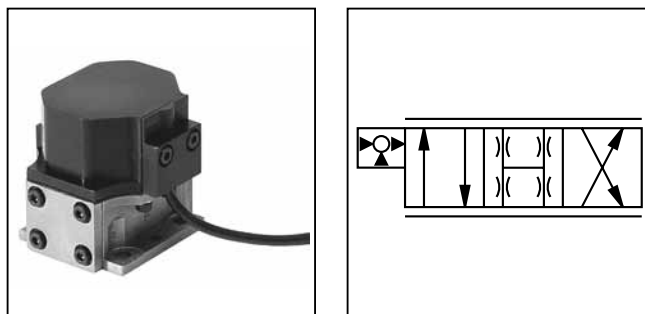
**General Description**

Series SEMT mini-valve is a two stage, 4-way, flap-per and nozzle style servovalve. Its remarkably small size makes it optimal for Remotely Operated Vehicles (ROV), motorsport suspension control, or any application requiring a compact, and light-weight, high performance servovalve.

A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. This valve is rated for 210 Bar (3000 PSI) service. Higher pressure capability is available upon request.

**Features**

- Jewel feedback ball for durability
- Compact steel body
- High performance
- ISO 10372 standard 12.2 mm (0.480 in.) port circle

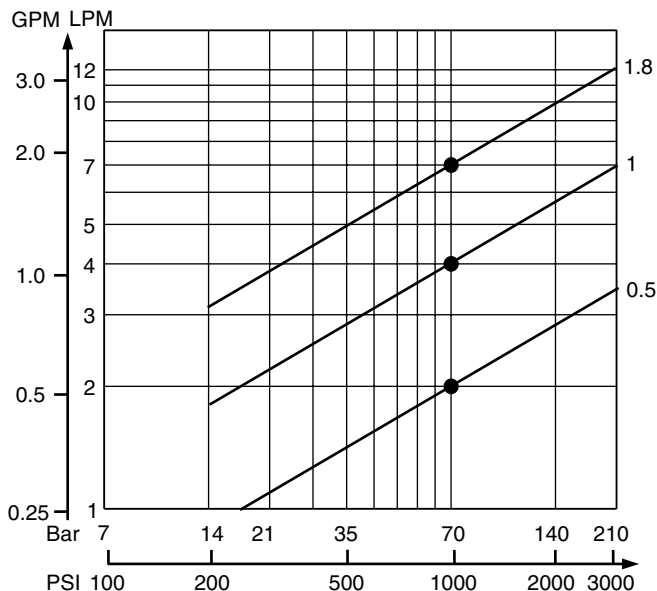


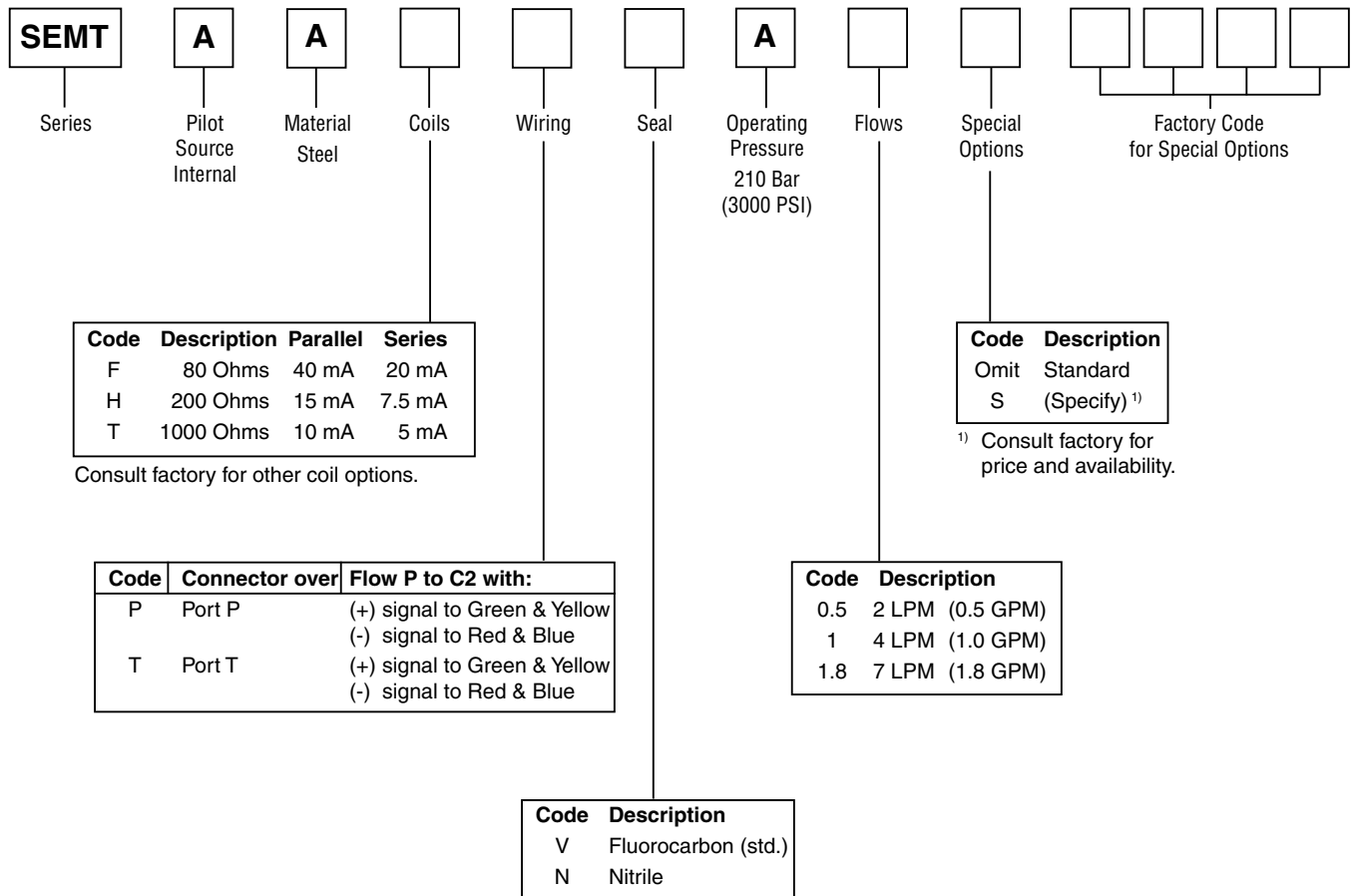
**Specifications**

<b>Flow Rating ±10%</b> @ 70 Bar (1000 PSI)	2, 4, 7 LPM (0.5, 1.0, 1.8 GPM)
<b>Supply Pressure</b>	15 – 210 Bar (220 – 3000 PSI)
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
<b>Pilot &amp; Null Leakage Flow</b> per 140 Bar (2000 PSI)	0.4 – 0.7 LPM (0.1 – 0.2 GPM)
<b>Input Command</b>	±10 mA std.
<b>Frequency Response</b> @ 90° phase shift	> 170 Hz (See Performance Curves)
<b>Non-Linearity</b>	≤ 10%
<b>Hysteresis</b>	≤ 3%
<b>Threshold</b>	≤ 0.5%
<b>Null Shift</b> with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Pressure Gain</b> change in pressure per 1% change in input command	60% typical
<b>Step Response</b>	10 – 100%, < 4 ms
<b>Fluid</b>	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
<b>Fluid Cleanliness</b>	ISO 4406 15/12 or better
<b>Operating Temperature</b>	-30°C to +130°C (-22°F to +266°F)
<b>Protection Class</b>	NEMA 4, IP65

**Flow vs. Pressure Drop**

at 100% command  
Flow Path: P→C1→C2→R





**Weight:** 0.23 kg (0.5 lbs.)  
**Bolt kit:** Qty 4 of M4 x 10 mm, or Qty 4 of # 6-32 x 7/16"  
**Subplate:** Consult factory.  
**Electronics:** BD101, 23-7030, BD90, or BD95

**Performance Curves**

**Frequency Response at 210 Bar (3000 PSI)**

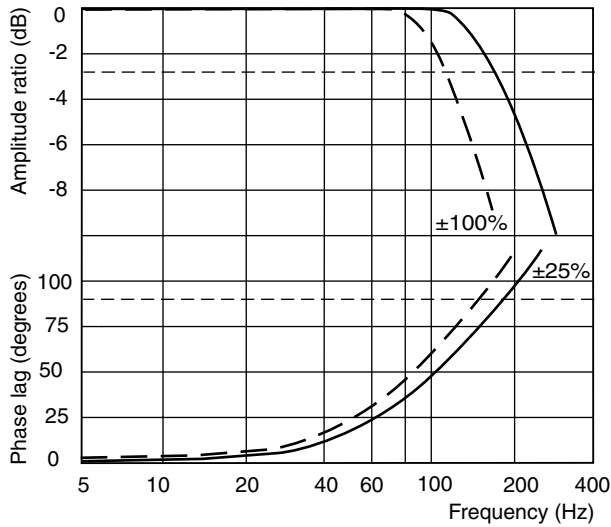
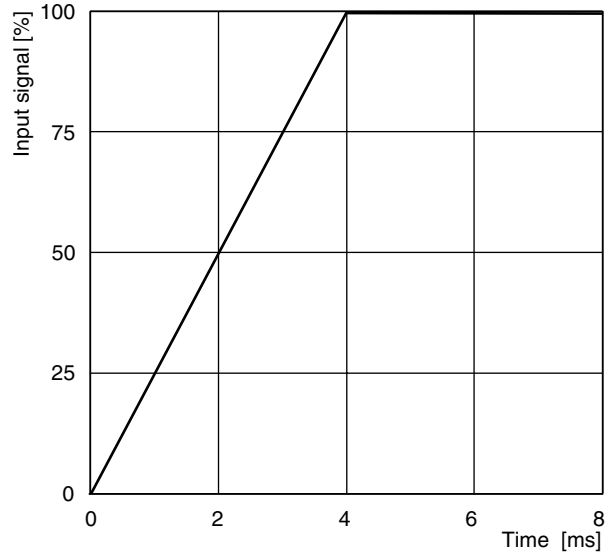


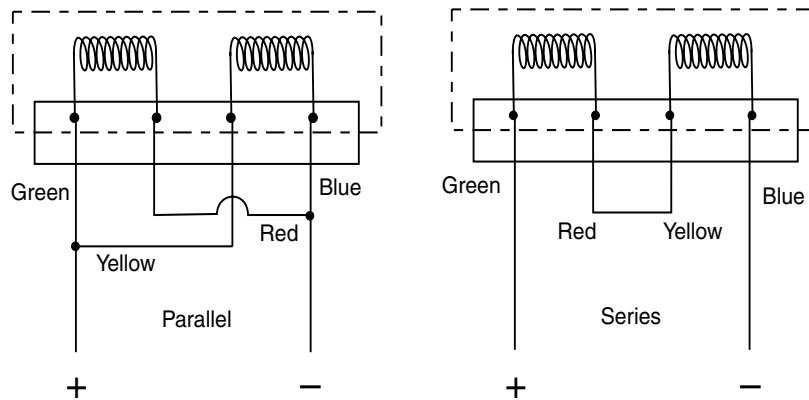
Figure for 7 LPM (1.8 GPM).

**Step Response**  
 at 100% command



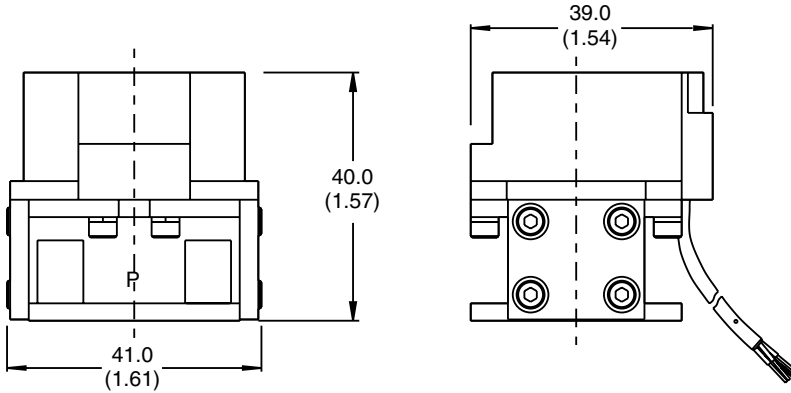
**Installation Wiring Options**

This servovalve has two coils. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

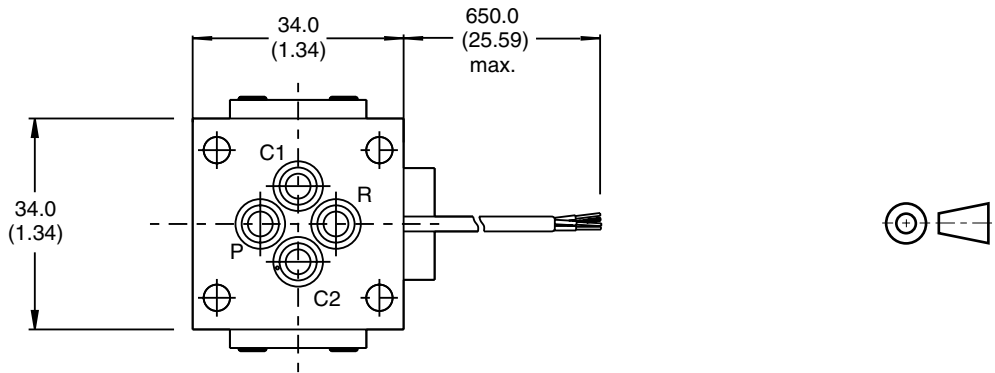


Polarity shown connects flow from P to C2 port.

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



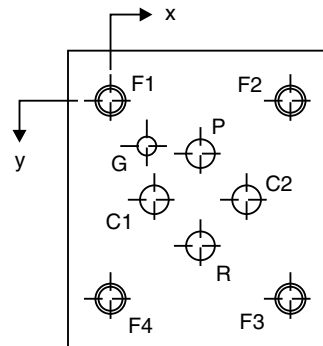
1. Recommended mounting bolts  
M4 x 10 mm or #6-32 x 7/16" high  
tensile steel socket-head cap screws.
2. Base O-Rings: 6 mm x 1 mm section,  
70 durometer.



**Mounting Surface**

ISO 10372-01-01-0-92

1. The minimum engagement of mounting threads is 1.5D, where D is the screw diameter.  
The ISO recommended full-thread depth is 14 mm (0.551 in.).
2. The minimum depth of hole G is 2 mm (0.079 in.).
3. Surface roughness Ra < 0.8 μm [N6], as specified in ISO 468 and ISO 1302.
4. Surface flatness: 0.025 mm (0.001) as specified in ISO 1101.



Metric Dimensions (mm)						(± 0.1 mm)			
Axis	P	C1	R	C2	G	F1	F2	F3	F4
	Ø 3.8 max	Ø 3.8 max	Ø 3.8 max	Ø 3.8 max	Ø 2.5	M4	M4	M4	M4
x	11.9	5.8	11.9	18.0	4.8	0	23.8	23.8	0
y	7.0	13.1	19.2	13.1	6.0	0	0	26.2	26.2

U.S. Dimensions (inches)						(± 0.004 in.)			
Axis	P	C1	R	C2	G	F1	F2	F3	F4
	Ø 0.15 max	Ø 0.15 max	Ø 0.15 max	Ø 0.15 max	Ø 0.10	# 6 - 32	# 6 - 32	# 6 - 32	# 6 - 32
x	0.469	0.228	0.469	0.709	0.189	0	0.937	0.937	0
y	0.276	0.516	0.756	0.516	0.238	0	0	1.031	1.031

SEMT.indd, ddp



**General Description**

Series SE05, SE10 and SE15 are two stage, 4-way, flapper and nozzle style servovalves. These valves have high performance spool and sleeve designs.

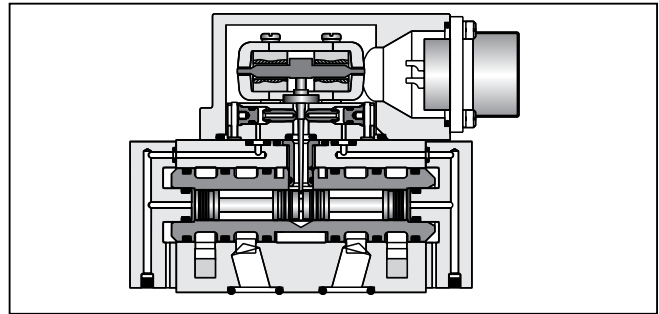
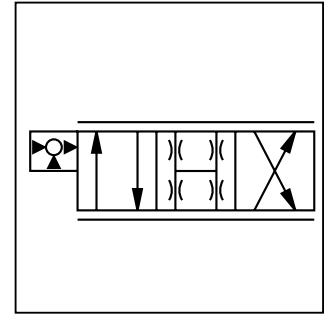
A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. These valves are rated for 315 Bar (4500 PSI) service.

**Features**

- Lapped spool and sleeve
- Jewel feedback ball for durability
- Aluminum body
- Medium and High performance
- SE05 15.88 mm (0.625 in.) port circle
- SE10 19.81 mm (0.780 in.) port circle
- SE15 23.80 mm (0.937 in.) port circle

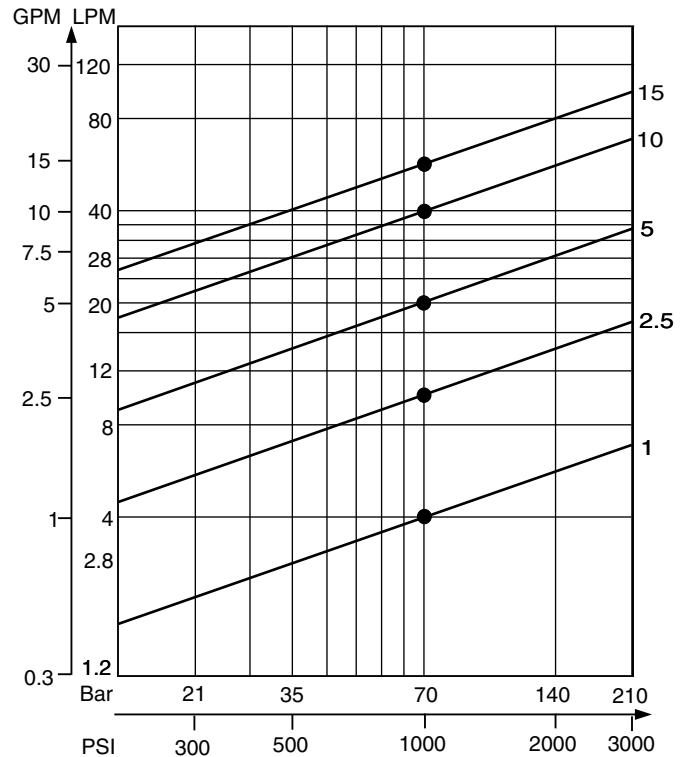
**Specifications**

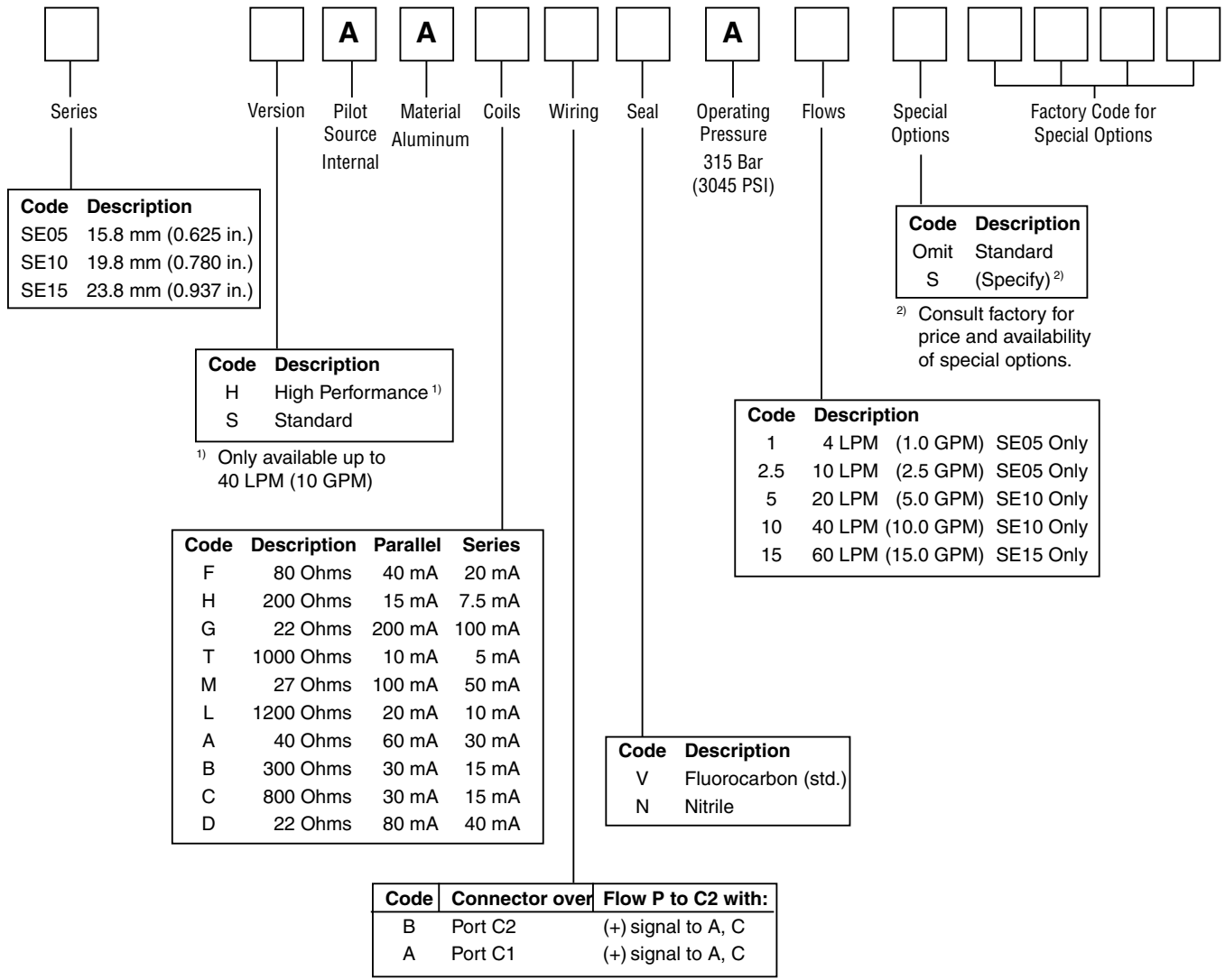
<b>Flow Rating ±10% @ 70 Bar (1000 PSI)</b>	4, 10, 20, 40, 60 LPM (1.0, 2.5, 5, 10, 15 GPM)
<b>Supply Pressure</b>	10 – 315 Bar (145 – 4500 PSI)
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
<b>Null Leakage Flow per 70 Bar (1000 PSI)</b>	0.6 – 1.0 LPM (0.16 – 0.26 GPM)
<b>Pilot Flow @ 210 Bar (3000 PSI)</b>	0.4 – 0.7 LPM (0.1 – 0.2 GPM)
<b>Input Command @ 210 Bar (3000 PSI)</b>	±40 mA std.
<b>Frequency Response @ 90° phase shift</b>	> 100 Hz (See Performance Curves)
<b>Non-Linearity</b>	≤ 10%
<b>Hysteresis</b>	≤ 3%
<b>Threshold</b>	≤ 0.5%
<b>Null Shift with temperature with pressure</b>	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Pressure Gain change in pressure per 1% change in input command</b>	60% typical
<b>Step Response</b>	10 – 100%, < 6 ms
<b>Fluid</b>	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
<b>Fluid Cleanliness</b>	ISO 4406 15/12 or better
<b>Operating Temperature</b>	-30°C to +130°C (-22°F to +266°F)
<b>Protection Class</b>	NEMA 4, IP65



**Flow vs. Pressure Drop**

at 100% command  
Flow Path: P→C1→C2→R





**Weight:** 1.0 kg (2.2 lbs.)  
**Cable with mating connector:** EHC154S  
**Mating connector:** MS3106E-14S-2S  
**Electronics:** BD101, 23-5030, 23-7030, PMC10, BD90, or BD95

**SE05**  
**Bolt kit:** 4 of M5 x 60 mm, or 4 of #10-32x2.25"  
**Flushing valve:** 11-0500  
**Metric Subplate:** DS02SPS8M (M18x1.5 ISO 6149 side ports)  
**SAE Subplate:** DS02SPS8S (#8 SAE side ports)

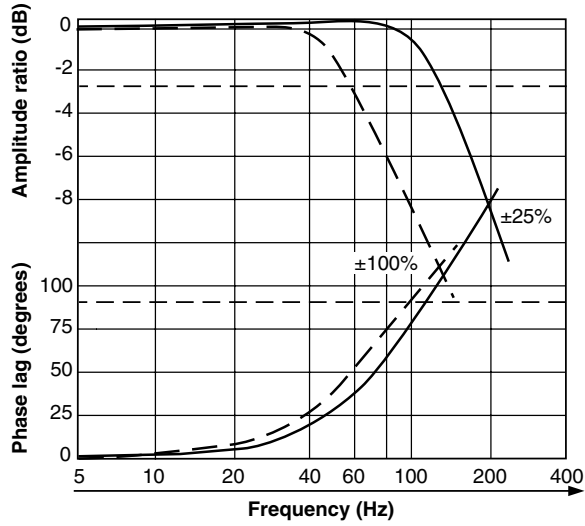
**SE10**  
**Bolt kit:** 4 of M5 x 60 mm, or 4 of #10-32x2.25"  
**Flushing valve:** 11-0500  
**Metric Subplate:** DS71SPS8M (M18x1.5 ISO 6149 side ports)  
**SAE Subplate:** DS71SPS8S (#8 SAE side ports)

**SE15**  
**Bolt kit:** 4 of M6 x 60 mm, or 4 of 1/4-20x2.25"  
**Flushing valve:** 11-0500  
**Metric Subplate:** DS72SPS8M (M18x1.5 ISO 6149 side ports)  
**SAE Subplate:** DS72SPS8S (#8 SAE side ports)

**Frequency Response at 210 Bar (3000 PSI)**

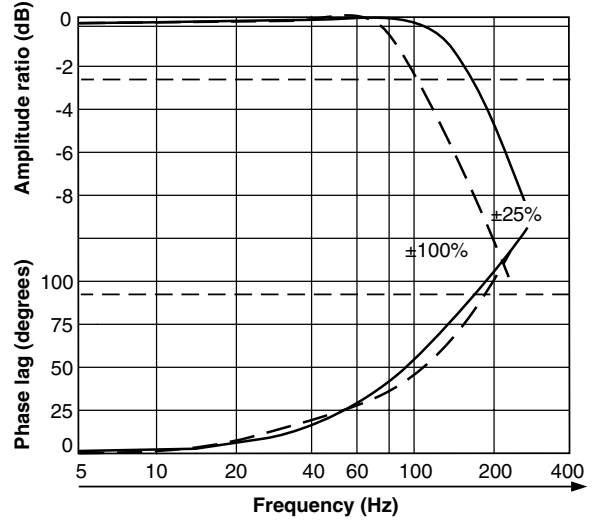
**Standard Response**

**SE05: 4 – 20 LPM (1 – 5 GPM)**



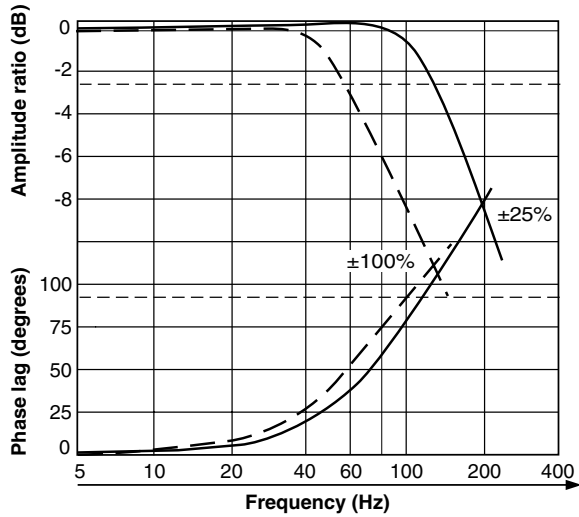
**High Response**

**SE05: 4 – 20 LPM (1 – 5 GPM)**



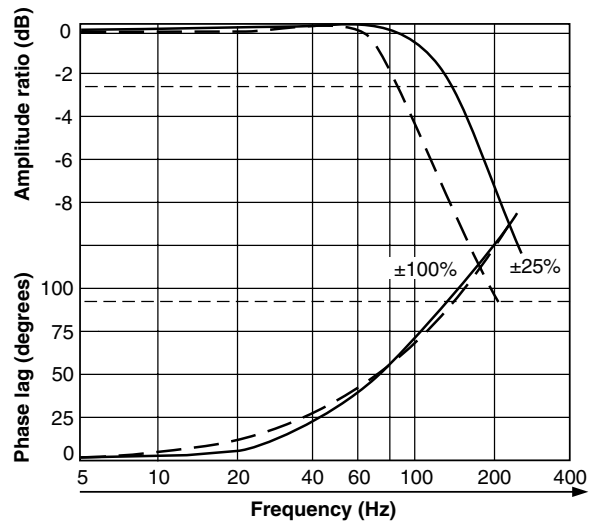
**Standard Response**

**SE10: 40 LPM (10 GPM)**

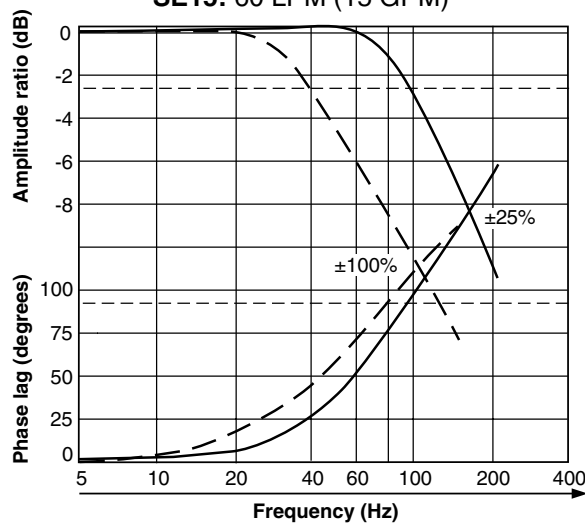


**High Response**

**SE10: 40 LPM (10 GPM)**



**Standard Response**  
**SE15: 60 LPM (15 GPM)**

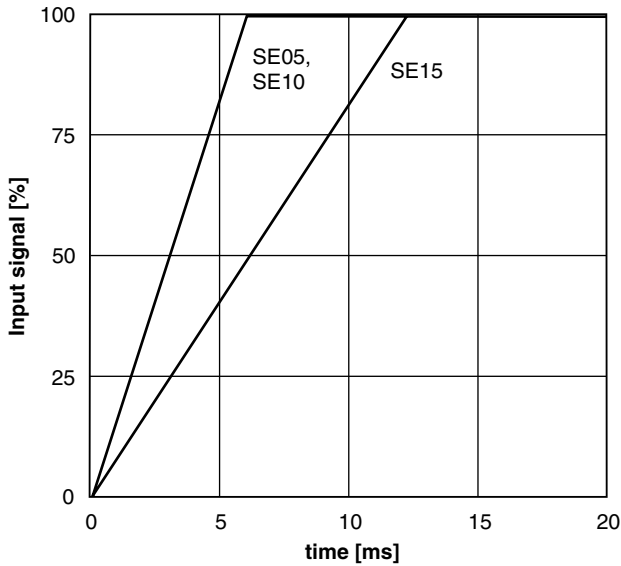


**Performance Curves**

**Step Response at 210 Bar (3000 PSI)**

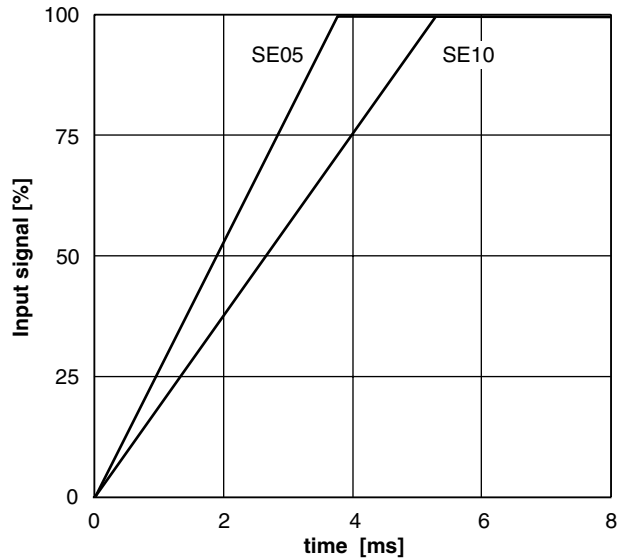
**Standard Response**

SE05, SE10 & SE15: 4 – 40 LPM (1 – 10 GPM)



**High Response**

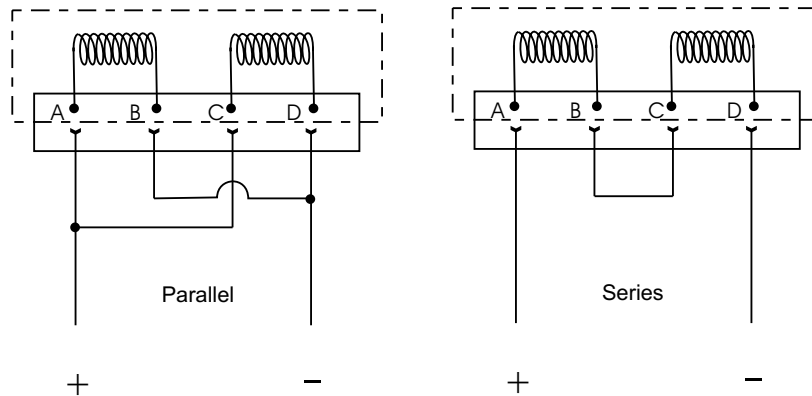
SE05, SE10 & SE15: 4 – 40 LPM (1 – 10 GPM)



**C**

**Installation Wiring Options**

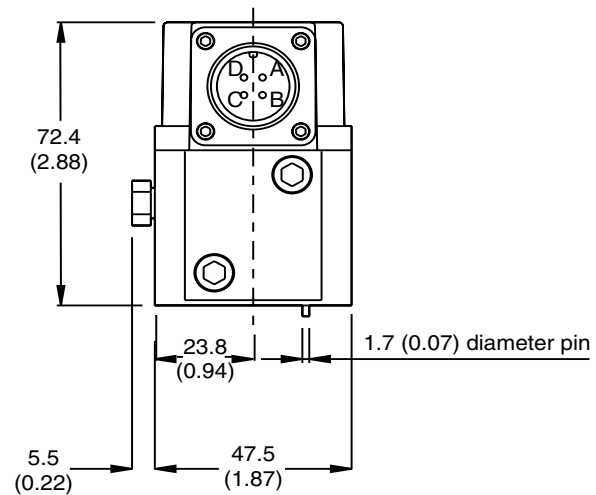
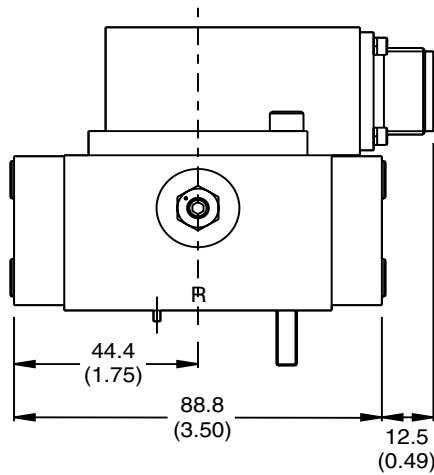
This servovalve has two coils. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.



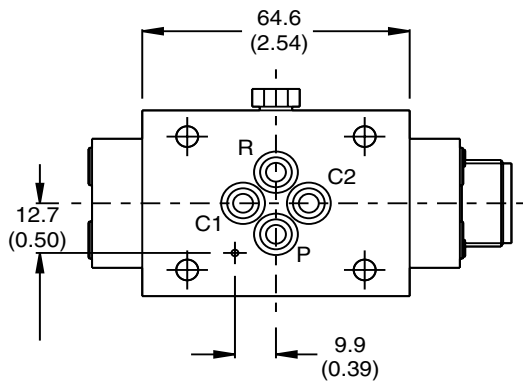
Polarity shown connects flow from P to C2 port.



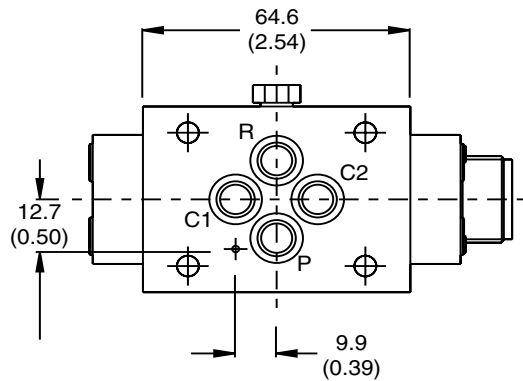
Inch equivalents for millimeter dimensions are shown in (\*\*)



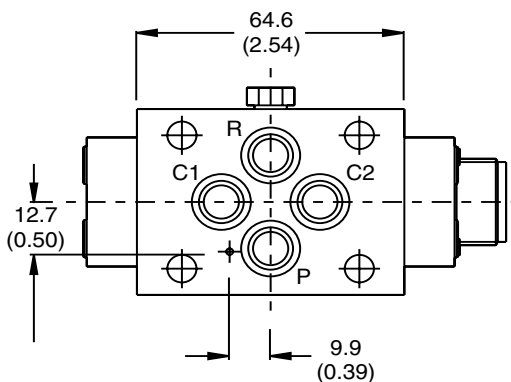
**SE05**



**SE10**



**SE15**



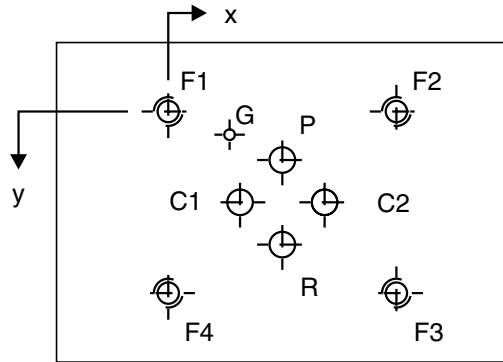
1. Suggested mounting bolts: For SE05 and SE10 use M5 x 60 mm or #10-32 x 2.25" long high tensile steel, socket-head cap screws. For SE15 use M6 x 60 mm or 1/4-20 x 2.25" long high tensile steel, socket-head cap screws.
2. 4-way electrical connector mates with MS3106E-14S-2S or equivalent. Is available at 180° to position shown (advise desired position at time of order).
3. Base O-Rings:  
SE05 use Parker 2011V-9 (7.66 mm I/D x 1.78 section)  
SE10 use Parker 2012V-9 (9.25 mm I/D x 1.78 section)  
SE15 use Parker 2013V-9 (10.82 mm I/D x 1.78 section)
4. Null adjust requires 10 A/F ring spanner (10 mm box end wrench) and 2.5 hexagon key. Flow out of C1 will increase with clockwise rotation of key.
5. See mounting dimensions for port size and locations.



**SE05 Mounting Surface**

1. The recommended full-thread depth is 16 mm (0.630 in.).
2. The minimum depth of hole G is 4 mm (0.157 in.).
3. Surface roughness  $R_a < 0.8 \mu\text{m}$  [N6], as specified in ISO 468 and ISO 1302.
4. Surface flatness: 0.025 mm (0.001) as specified in ISO 1101.

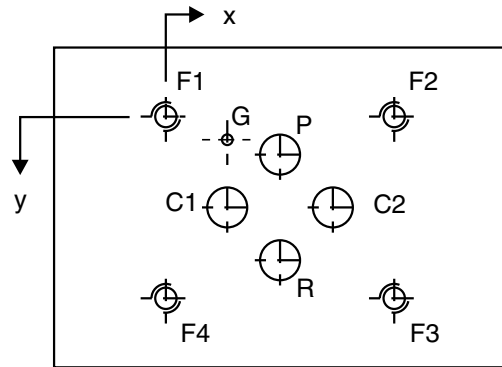
15.88 (0.625) port circle



**SE10 Mounting Surface**

1. The recommended full-thread depth is 16 mm (0.630 in.).
2. The minimum depth of hole G is 4 mm (0.157 in.).
3. Surface roughness  $R_a < 0.8 \mu\text{m}$  [N6], as specified in ISO 468 and ISO 1302.
4. Surface flatness: 0.025 mm (0.001) as specified in ISO 1101.

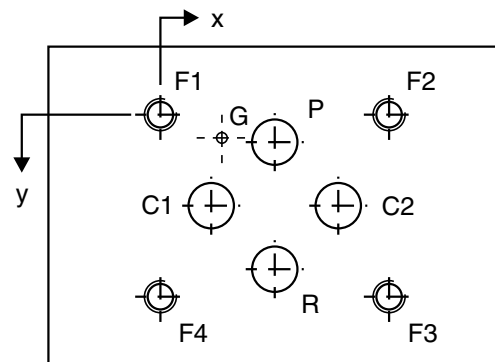
19.81 (0.780) port circle



**SE15 Mounting Surface**

1. The recommended full-thread depth is 18 mm (0.709 in.).
2. The minimum depth of hole G is 4 mm (0.157 in.).
3. Surface roughness  $R_a < 0.8 \mu\text{m}$  [N6], as specified in ISO 468 and ISO 1302.
4. Surface flatness: 0.025 mm (0.001 in.) as specified in ISO 1101.

23.80 (0.937) port circle



**SE05**

Metric Dimensions (mm) <span style="float:right">(± 0.1 mm)</span>									
Axis	P	C1	R	C2	G	F1	F2	F3	F4
		Ø 5 max	Ø 5 max	Ø 5 max	Ø 5 max	Ø 3.5	M5	M5	M5
x	21.4	13.5	21.4	29.3	11.5	0	42.8	42.8	0
y	9.2	17.1	25.0	17.1	4.4	0	0	34.2	34.2

U.S. Dimensions (inches) <span style="float:right">(± 0.004 in.)</span>									
Axis	P	C1	R	C2	G	F1	F2	F3	F4
		Ø 0.195 max	Ø 0.195 max	Ø 0.195 max	Ø 0.195 max	Ø 0.136	# 10 -32	# 10 -32	# 10 -32
x	0.843	0.531	0.843	1.153	0.453	0	1.685	1.685	0
y	0.362	0.673	0.984	0.673	0.173	0	0	1.347	1.347

**C**

**SE10**

Metric Dimensions (mm) <span style="float:right">(± 0.1 mm)</span>									
Axis	P	C1	R	C2	G	F1	F2	F3	F4
		Ø 7.5 max	Ø 7.5 max	Ø 7.5 max	Ø 7.5 max	Ø 3.5	M5	M5	M5
x	21.4	11.5	21.4	31.3	11.5	0	42.8	42.8	0
y	7.2	17.1	27.0	17.1	4.4	0	0	34.2	34.2

U.S. Dimensions (inches) <span style="float:right">(± 0.004 in.)</span>									
Axis	P	C1	R	C2	G	F1	F2	F3	F4
		Ø 0.290 max	Ø 0.290 max	Ø 0.290 max	Ø 0.195 max	Ø 0.14	# 10 -32	# 10 -32	# 10 -32
x	0.843	0.453	0.843	1.232	0.453	0	1.685	1.685	0
y	0.283	0.673	1.063	0.673	0.173	0	0	1.347	1.347

**SE15**

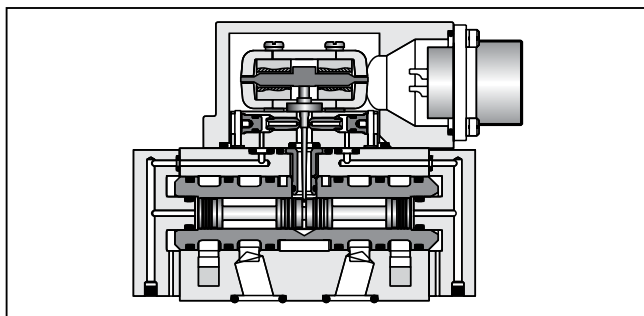
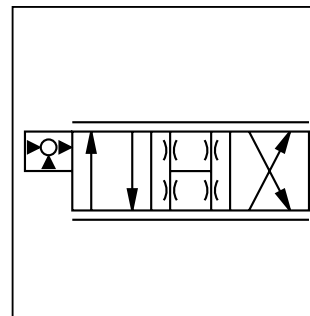
Metric Dimensions (mm) <span style="float:right">(± 0.1 mm)</span>									
Axis	P	C1	R	C2	G	F1	F2	F3	F4
		Ø 8 max	Ø 8 max	Ø 8 max	Ø 8 max	Ø 3.5	M6	M6	M6
x	21.4	9.5	21.4	33.3	11.5	0	42.8	42.8	0
y	5.1	17.1	29.0	17.1	4.4	0	0	34.2	34.2

U.S. Dimensions (inches) <span style="float:right">(± 0.004 in.)</span>									
Axis	P	C1	R	C2	G	F1	F2	F3	F4
		Ø 0.312 max	Ø 0.312 max	Ø 0.312 max	Ø 0.312 max	Ø 0.14	1/4 - 20	1/4 - 20	1/4 - 20
x	0.843	0.374	0.843	1.311	0.453	0	1.685	1.685	0
y	0.201	0.673	1.142	0.673	0.173	0	0	1.347	1.347

**General Description**

Series SE2N is a two stage, 4-way, flapper and nozzle style servovalve. The SE2N has a narrow body that is a popular size for steam turbine control applications. This valve uses a high performance spool and sleeve design.

A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. This valve is rated for 210 Bar (3000 PSI) service.



**C**

**Features**

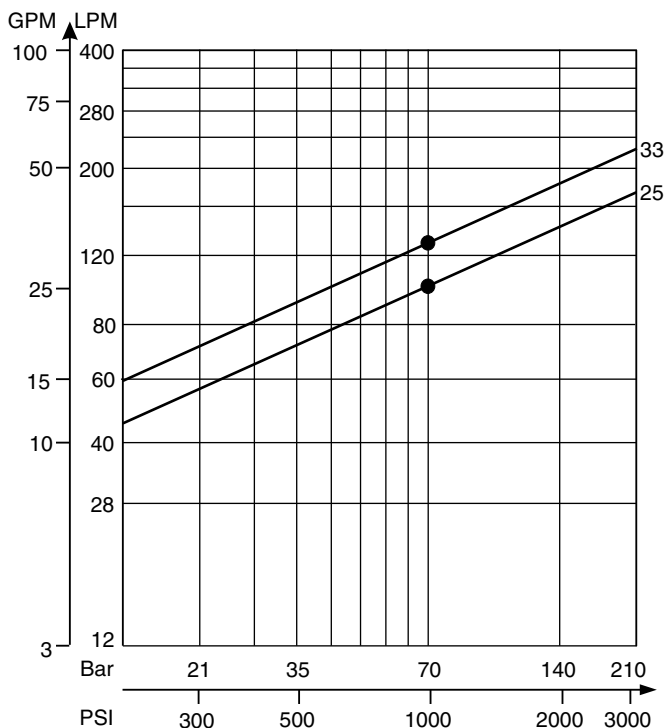
- Lapped spool and sleeve
- Jewel feedback ball for durability
- Aluminum body
- Medium and High performance
- Steam turbine pattern 34.93 mm (1.375 in.) port circle

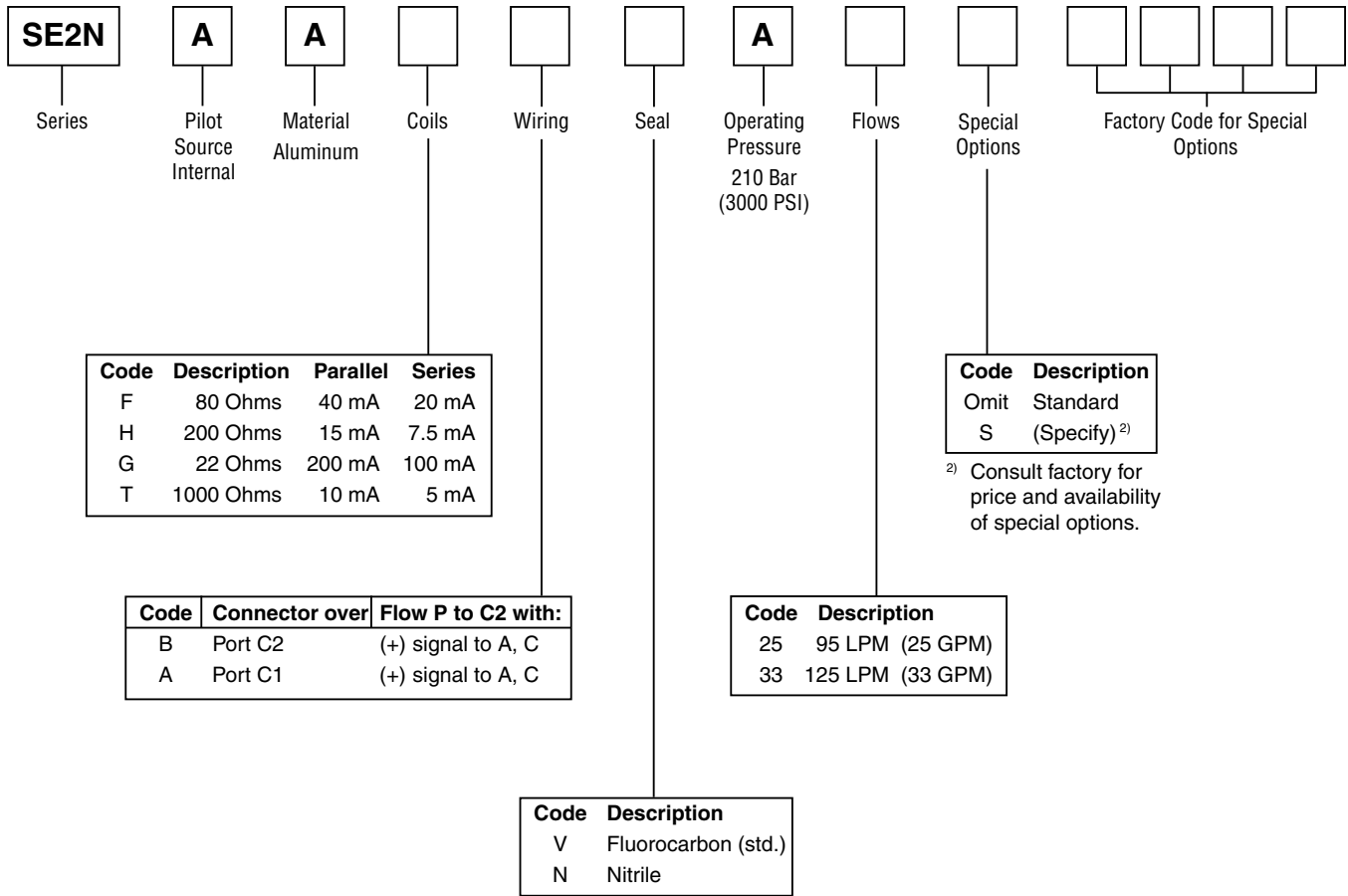
**Specifications**

<b>Flow Rating ±10%</b> @ 70 Bar (1000 PSI)	95, 125 LPM (25, 33 GPM)
<b>Supply Pressure</b>	10 – 210 Bar (145 – 3000 PSI)
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
<b>Null Leakage Flow</b> per 70 Bar (1000 PSI)	2.4 LPM (0.6 GPM)
<b>Pilot Flow</b> @ 210 Bar (3000 PSI)	0.4 LPM (0.1 GPM)
<b>Input Command</b>	±40 mA std.
<b>Frequency Response</b> @ 90° phase shift	> 50 Hz (See Performance Curves)
<b>Non-Linearity</b>	≤ 10%
<b>Hysteresis</b>	≤ 3%
<b>Threshold</b>	≤ 0.5%
<b>Null Shift</b> with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Pressure Gain</b> change in pressure per 1% change in input command	60% typical
<b>Step Response</b>	10 – 100%, < 30 ms
<b>Fluid</b>	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
<b>Fluid Cleanliness</b>	ISO 4406 15/12 or better
<b>Operating Temperature</b>	-30°C to +130°C (-4°F to +266°F)
<b>Protection Class</b>	NEMA 4, IP65

**Flow vs. Pressure Drop**

at 100% command  
Flow Path: P→C1→C2→R

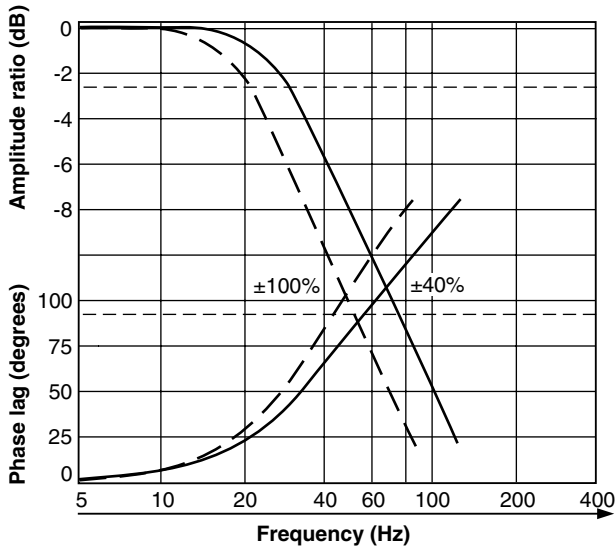




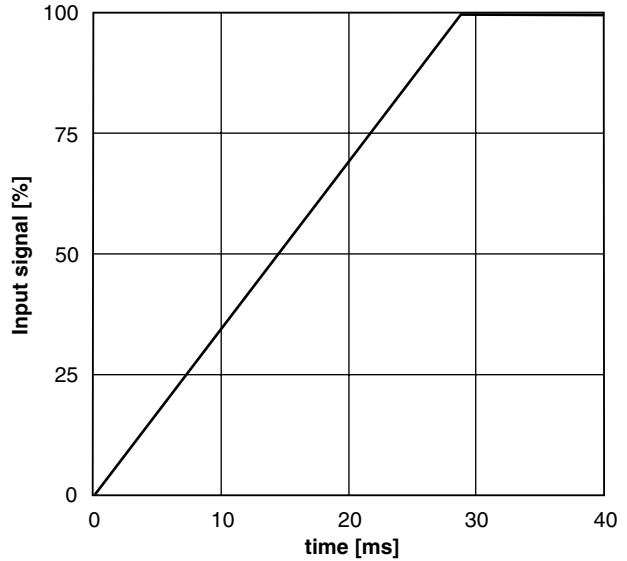
**Weight:** 1.1 kg (2.4 lbs.)  
**Cable with mating connector:** EHC154S  
**Mating connector:** MS3106E-14S-2S  
**Bolt kit:** 4 of M8 x 70 mm, or 4 of 5/16-18 x 2.75"  
**Flushing valve:** Consult factory  
**U.S. subplate:** AS73SPS8S (SAE #8 side ports)  
**Metric subplate:** AS73SPS8M (M18 x 1.5 ISO 6149 side ports)  
**Electronics:** BD101, 23-7030, BD90, or BD95

**Performance Curves**

**Frequency Response at 210 Bar (3000 PSI)**  
**Standard Response**  
**SE2N – 95 LPM (25 GPM)**

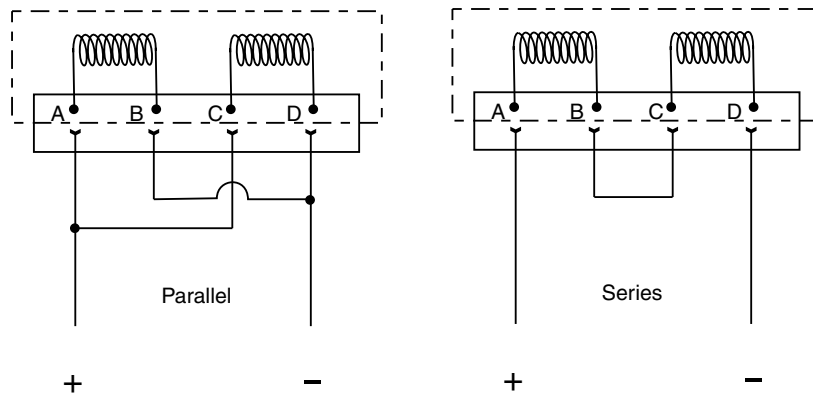


**Step Response at 210 Bar (3000 PSI)**  
**Standard Response**  
**SE2N – 95 LPM (25 GPM)**



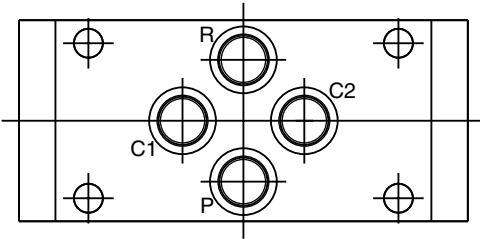
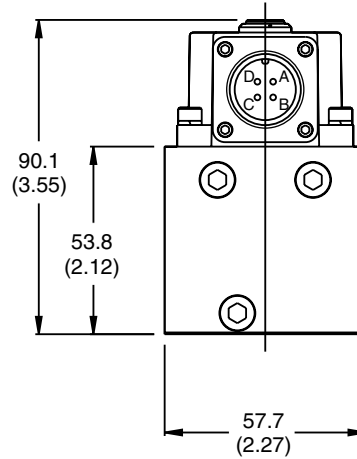
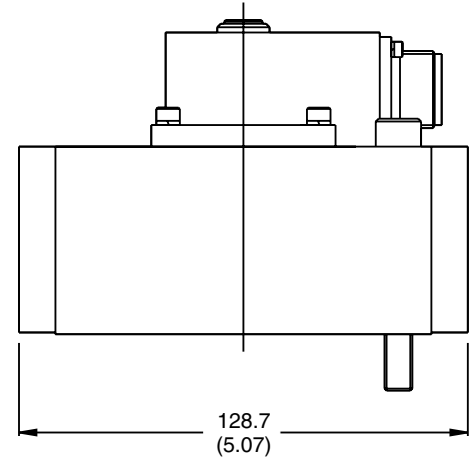
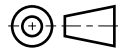
**Installation Wiring Options**

This servovalve has two coils. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.



Polarity shown connects flow from P to C2 port.

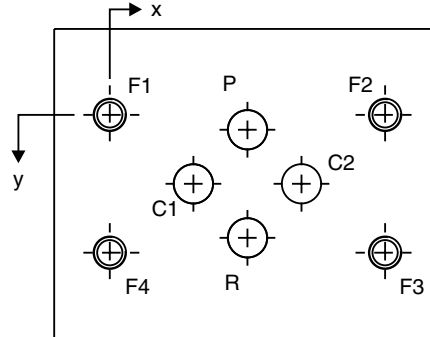
Inch equivalents for millimeter dimensions are shown in (\*\*)



1. Suggested mounting bolts M8 x 70 mm or 5/16-18 x 2.75" long high tensile steel, socket-head cap screws.
2. The 4-way electrical connector mates with MS3106E-14S-2S or equivalent. Is available at 180° to position shown (advise desired position at time of order).
3. Base O-Rings: 14.6 I/D x 2.4 section
4. Null adjust requires 2.5 hexagon key. Flow out of C2 will increase with clockwise rotation of key.

**Mounting Surface**

1. The recommended full-thread depth is 22 mm (0.866 in.).
2. Surface roughness Ra < 0.8 μm [N6], as specified in ISO 468 and ISO 1302.
3. Surface flatness: 0.025 mm (0.001 in.) as specified in ISO 1101.



Metric Dimensions (mm)				(± 0.1 mm)				
Axis	P	C1	R	C2	F1	F2	F3	F4
		Ø 12.7 max	Ø 12.7 max	Ø 12.7 max	Ø 12.7 max	M10	M10	M10
x	44.5	27.0	44.5	61.9	0	88.9	88.9	0
y	4.8	22.3	39.7	22.3	0	0	44.5	44.5

U.S. Dimensions (inches)				(± 0.004 in.)				
Axis	P	C1	R	C2	F1	F2	F3	F4
		Ø 0.5 max	Ø 0.5 max	Ø 0.5 max	Ø 0.5 max	3/8 - 16	3/8 - 16	3/8 - 16
x	1.750	1.063	1.750	2.437	0	3.500	3.500	0
y	0.189	0.876	1.563	0.876	0	0	1.750	1.750

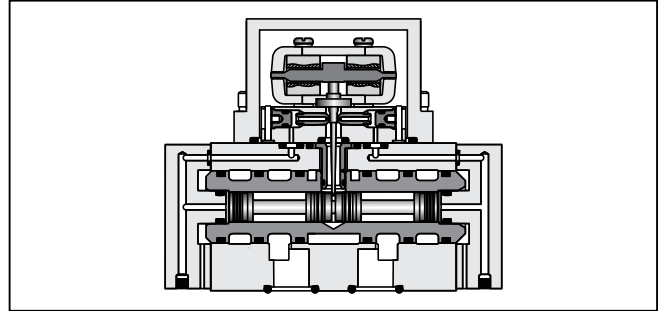
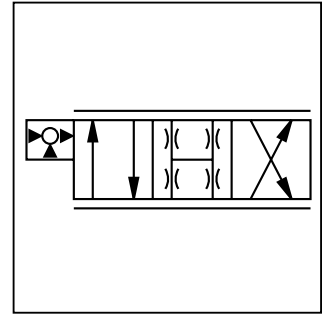
SE2N.indd, ddp



**General Description**

Series SE20 is a two stage, 4-way, flapper and nozzle style servovalve. The SE20 has a wide range of flow ratings and a high performance spool and sleeve design.

A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. This valve is rated for 315 Bar (4500 PSI) service with an option for 500 Bar (7250 PSI).



**C**

**Features**

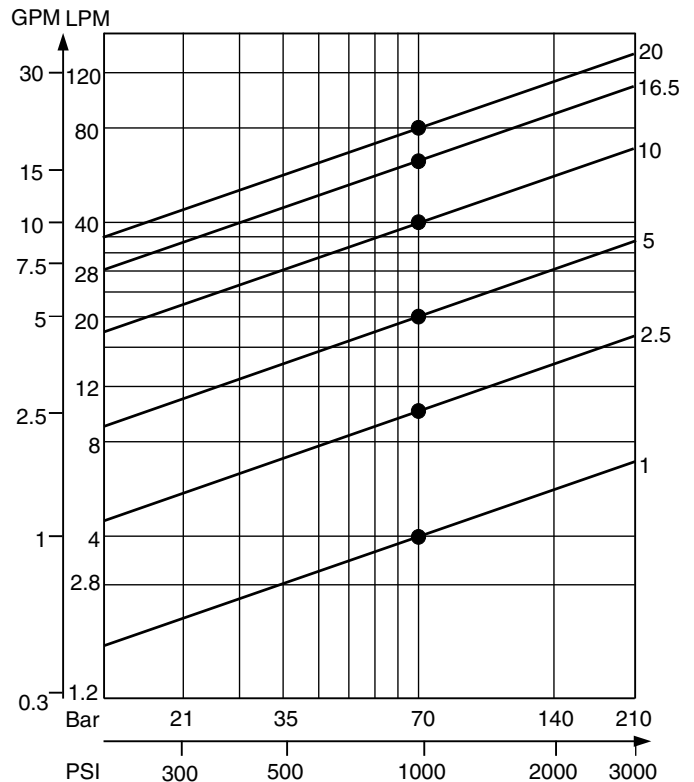
- Lapped spool and sleeve
- Jewel feedback ball for durability
- Aluminum body
- Medium and High performance
- ISO 10372 standard 22.23 mm (0.875 in.) port circle

**Specifications**

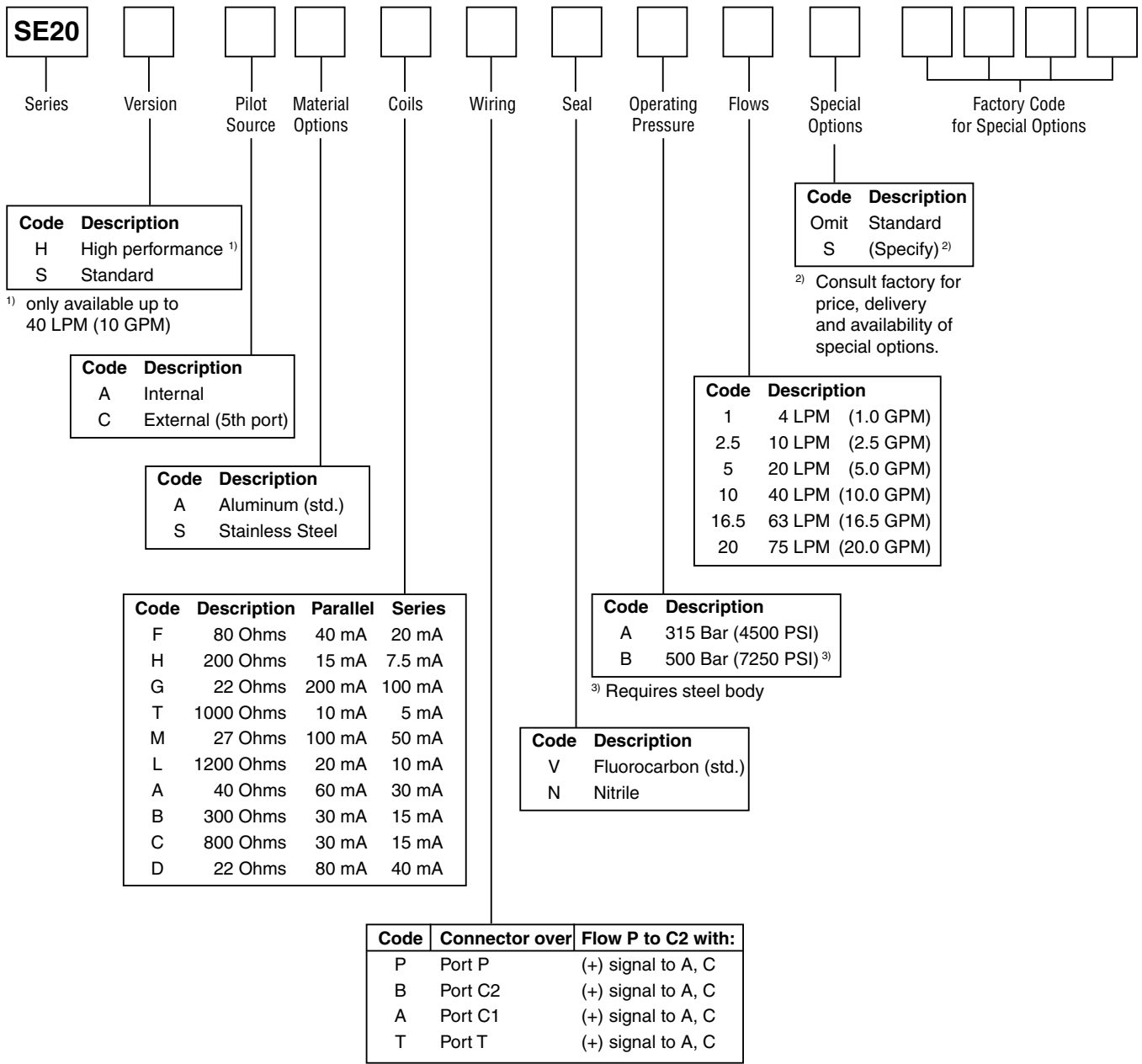
<b>Flow Rating ±10% @ 70 Bar (1000 PSI)</b>	3.8, 9.5, 19, 38, 63, 75 LPM (1, 2.5, 5, 10, 16.5, 20 GPM)
<b>Supply Pressure</b>	10 – 315 Bar (145 – 4500 PSI) 500 Bar (7250 PSI) Optional
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
<b>Null Leakage Flow per 70 Bar (1000 PSI)</b>	1.2 – 1.9 LPM (0.3 – 0.5 GPM)
<b>Pilot Flow @ 210 Bar (3000 PSI)</b>	0.4 – 0.7 LPM (0.1 – 0.2 GPM)
<b>Input Command</b>	±40 mA std.
<b>Frequency Response @ 90° phase shift</b>	> 100 Hz (See Performance Curves)
<b>Non-Linearity</b>	≤ 10%
<b>Hysteresis</b>	≤ 3%
<b>Threshold</b>	≤ 0.5%
<b>Null Shift with temperature with pressure</b>	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Pressure Gain change in pressure per 1% change in input command</b>	60% typical
<b>Step Response</b>	See graphs
<b>Fluid</b>	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
<b>Fluid Cleanliness</b>	ISO 4406 15/12 or better
<b>Operating Temperature</b>	-30°C to +130°C (-22°F to +266°F)
<b>Protection Class</b>	NEMA 4, IP65

**Flow vs. Pressure Drop**

at 100% command  
Flow Path P →C1 →C2 →R



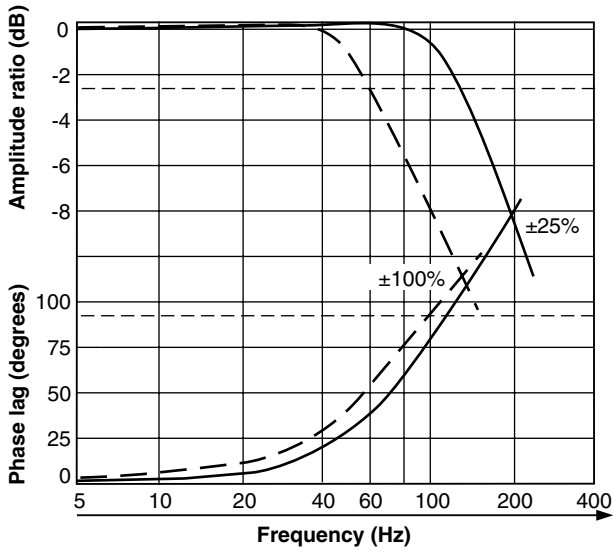




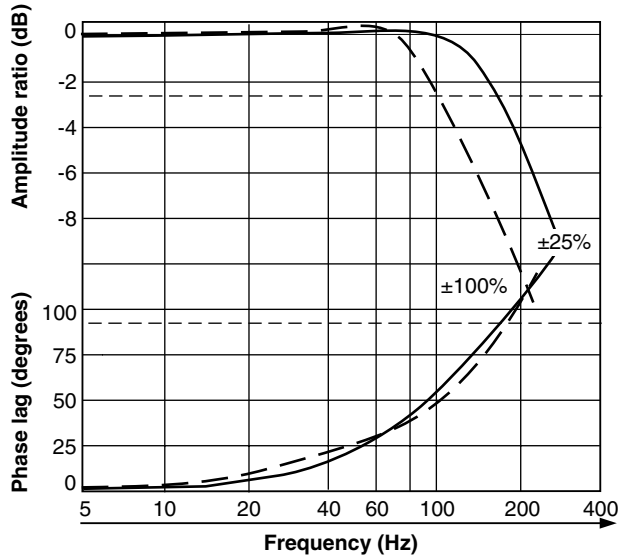
**Weight:** 1.0 kg (2.2 lbs.)  
**Cable with mating connector:** EHC154S  
**Bolt kit:** 4 of M8 x 60 mm, or 4 of 5/16-18x2.25"  
**Flushing valve:** 1200127 (does not cover 5<sup>th</sup> port)  
**U.S. Subplate, 5 ports:** 1402303 (4) #12 SAE side ports, (1) #4 SAE side ports  
**U.S. Subplate, 4 ports:** 810090-3 (4) #12 SAE side ports  
**Metric Subplate, 4 ports:** DS04SPS12M (M27 x 2.0 ISO 6149 side ports)  
**Electronics:** BD101, 23-7030, BD90, or BD95

**Frequency Response at 210 Bar (3000 PSI)**

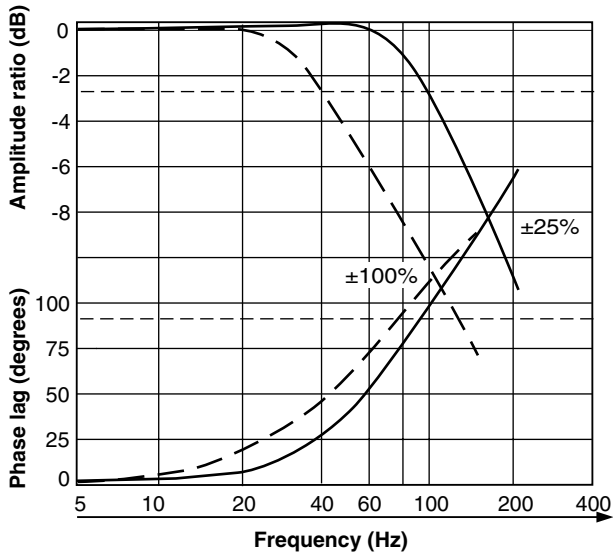
**Standard Response**  
 SE20 – 4 LPM (1.0 GPM)



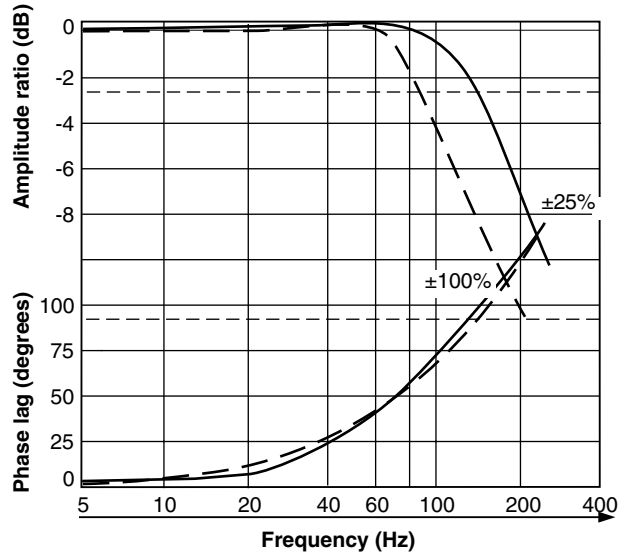
**High Response**  
 SE20 – 4 LPM (1.0 GPM)



**Standard Response**  
 SE20 – 63 LPM (16.5 GPM)



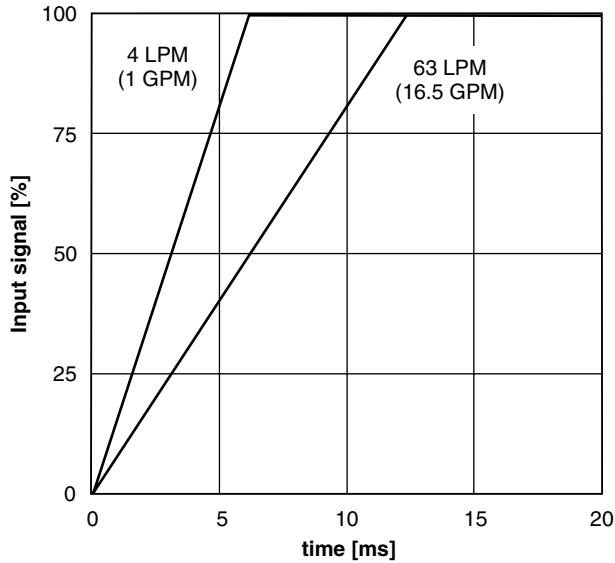
**High Response**  
 SE20 – 40 LPM (10 GPM)



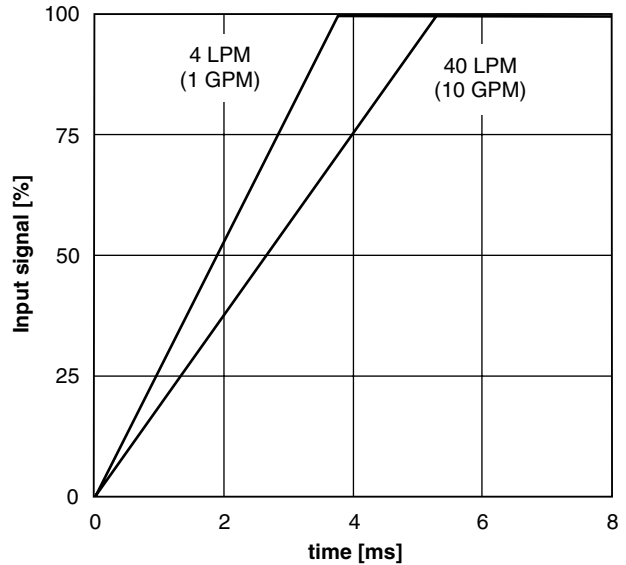
**C**

**Performance Curves**

**Step Response at 210 Bar (3000 PSI)**  
**Standard Response**

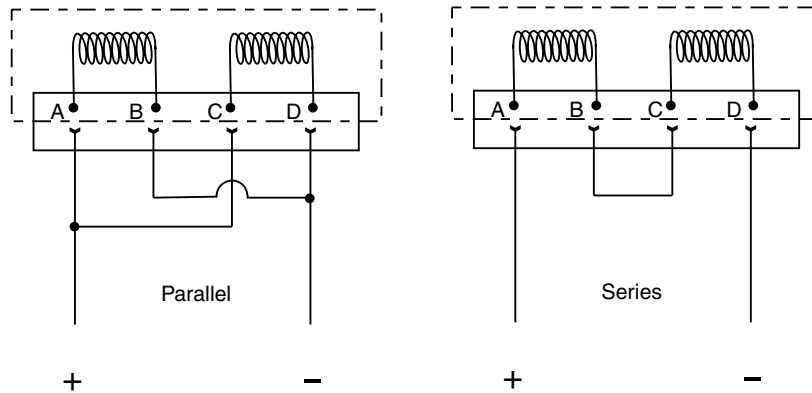


**High Response**



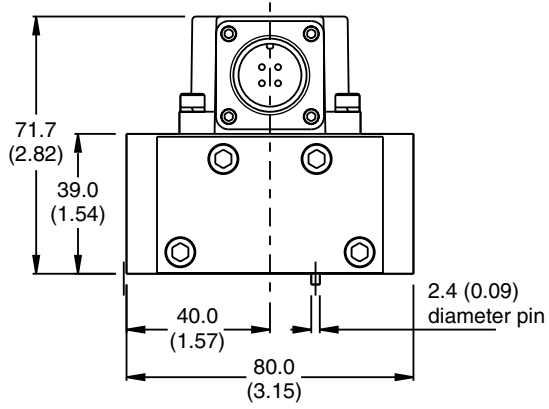
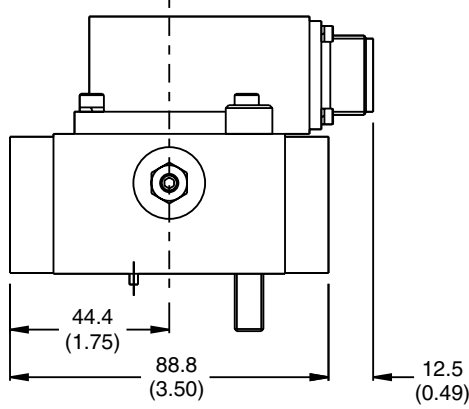
**Installation Wiring Options**

This servovalve has two coils. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.

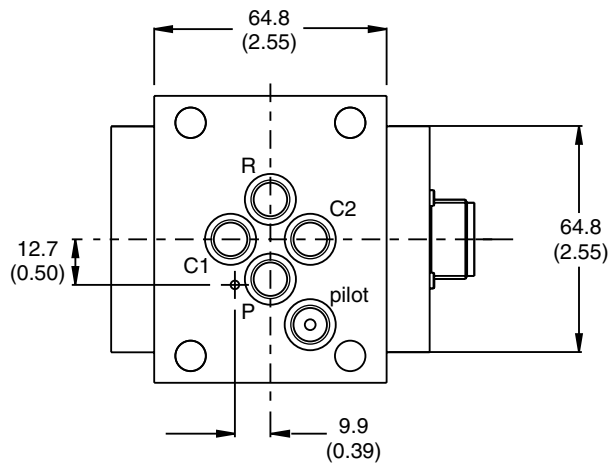


Polarity shown connects flow from P to C2 port.

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



**C**

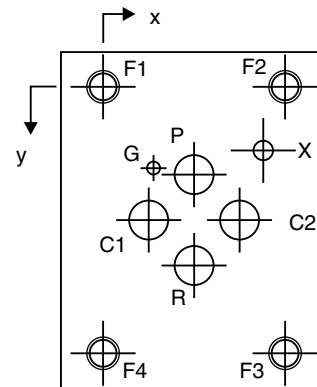


Mounting Torque  
29 Nm (21.4 lb.-ft.)

1. Suggested mounting bolts M8 x 60 mm or 5/16-18 x 2.25" high tensile steel, socket-head cap screws.
2. The 4-way electrical connector mates with MS3106-14S-2S or equivalent. It is available at ±90° and 180° to position shown (advise desired position at time of order).
3. Base O-Rings: 10.82 I/D x 1.78 section (2013N-9 or 2013V-9) 5 pcs.
4. Null adjust requires 10 A/F ring spanner (10 mm box-end wrench) and 2.5 hexagon key. Flow out of C1 will increase with clockwise rotation of key.

**Mounting Surface**

1. The minimum depth of hole G is 2 mm (0.079 in.). The ISO recommended full-thread depth is 22 mm (0.866 in.).
2. Surface roughness Ra < 0.8 µm [N6], as specified in ISO 468 and ISO 1302.
3. Surface flatness: 0.025 mm (0.001 in.) as specified in ISO 1101.



Metric Dimensions (mm)										
(± 0.1 mm)										
Axis	P	C1	R	C2	G	X	F1	F2	F3	F4
	Ø 8.2 max	Ø 8.2 max	Ø 8.2 max	Ø 8.2 max	Ø 3.5	Ø 5	M8	M8	M8	M8
x	22.2	11.1	22.2	33.3	12.3	33.3	0	44.4	44.4	0
y	21.4	32.5	43.6	32.5	19.8	8.7	0	0	65.0	65.0

U.S. Dimensions (inches)										
(± 0.004 in.)										
Axis	P	C1	R	C2	G	X	F1	F2	F3	F4
	Ø 0.32 max.	Ø 0.32 max.	Ø 0.32 max.	Ø 0.32 max.	Ø 0.14 max.	Ø 0.2	5/16 - 18	5/16 - 18	5/16 - 18	5/16 - 18
x	0.875	0.437	0.875	1.311	0.484	1.310	0	1.750	1.750	0
y	0.846	1.280	1.717	1.280	0.780	0.343	0	0	2.562	2.562

SE20.indd, ddp



**General Description**

Series SE2E features electronic spool position feedback and on-board electronics. Spool position feedback can be used as a safety monitoring tool, or for minimizing valve hysteresis. The SE2E is a two stage, 4-way, flapper and nozzle style servovalve.

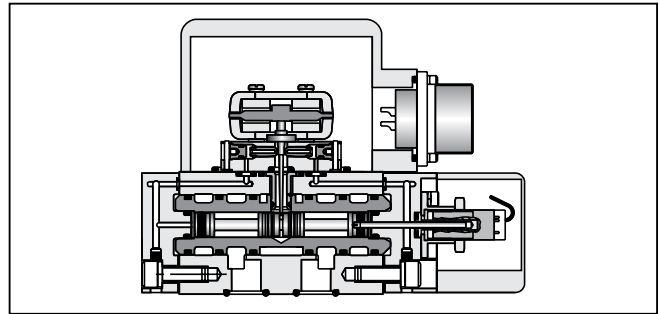
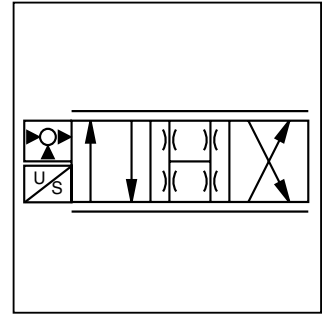
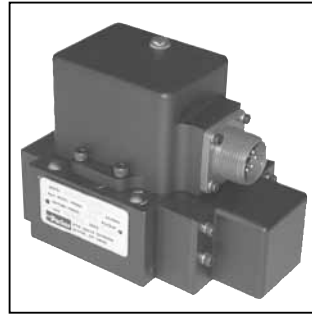
A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. This valve is rated for 315 Bar (4500 PSI) service.

**Features**

- On-board electronics
- Electronic spool position feedback
- Jewel feedback ball for durability
- High performance
- ISO 10372 standard 22.23 mm (0.875 in.) port circle

**Specifications**

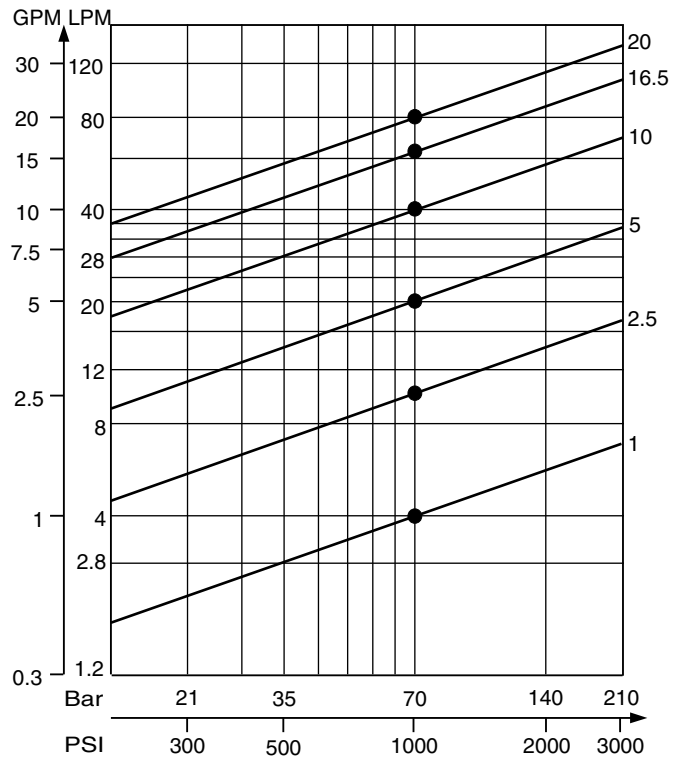
<b>Flow Rating ±10% @ 70 Bar (1000 PSI)</b>	3.8, 9.5, 19, 38, 63, 75 LPM (1, 2.5, 5, 10, 16.5, 20 GPM)
<b>Supply Pressure</b>	10 – 315 Bar (145 – 4500 PSI)
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
<b>Null Leakage Flow per 70 Bar (1000 PSI)</b>	1.2 – 1.9 LPM (0.3 – 0.5 GPM)
<b>Pilot Flow @ 210 Bar (3000 PSI)</b>	0.4 – 0.8 LPM (0.1 – 0.2 GPM)
<b>Input Command</b>	±10 V std.
<b>Frequency Response @ 90° phase shift</b>	≥ 300 Hz (See Performance Curves)
<b>Non-Linearity</b>	≤ 5%
<b>Hysteresis</b>	≤ 0.5%
<b>Threshold</b>	≤ 0.1%
<b>Null Shift with temperature with pressure</b>	≤ 1% per 55°C (100°F) ≤ 1% per 70 Bar (1000 PSI)
<b>Pressure Gain change in pressure per 1% change in input command</b>	80% typical
<b>Step Response</b>	0 - 100%, 4 to 9 ms
<b>Fluid</b>	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
<b>Fluid Cleanliness</b>	ISO 4406 15/12 or better
<b>Operating Temperature</b>	-20°C to +85°C (-4°F to +185°F)
<b>Protection Class</b>	NEMA 4, IP65

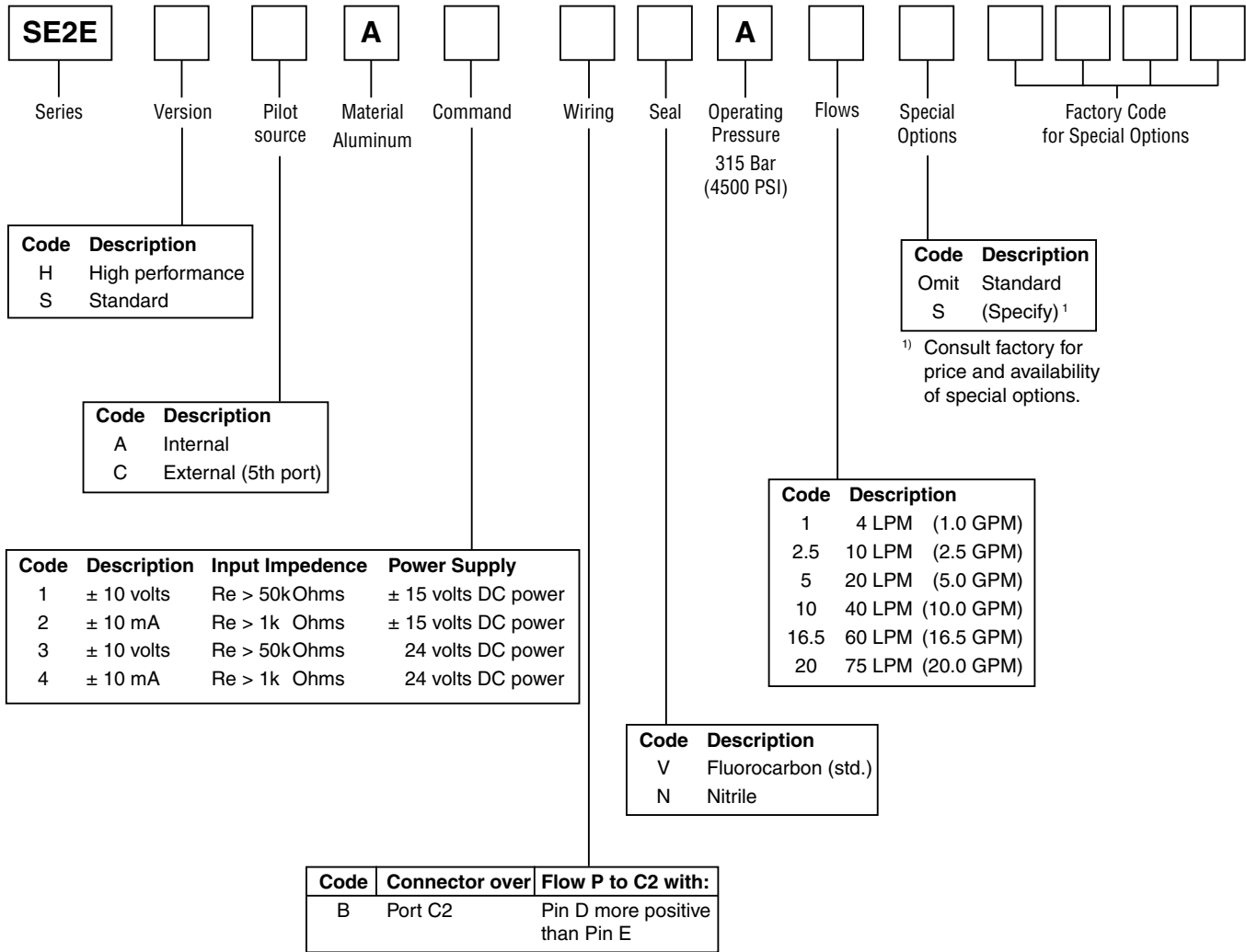


**C**

**Flow vs. Pressure Drop**

at 100% command  
Flow Path P → C1 → C2 → R

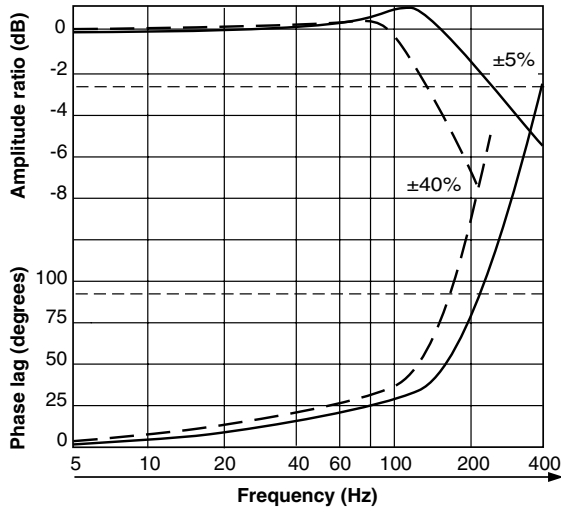




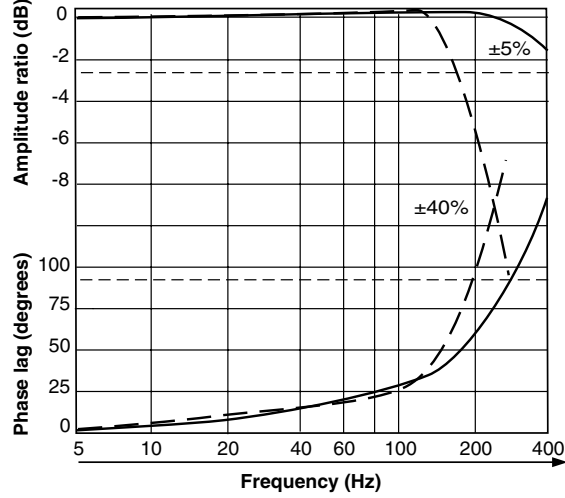
**Weight:** 1.5 kg (3.3 lbs.)  
**Cable with mating connector:** EHC158GE  
**Mating connector:** 5004072 (a 7-pin metal CE connector)  
**Bolt kit:** 4 of M8 x 60 mm, or 4 of 5/16-18x2.25"  
**Flushing valve:** 1200127 (does not cover 5<sup>th</sup> port)  
**U.S. Subplate, 5 ports:** 1402303 (4) #12 SAE side ports, (1) #4 SAE side ports  
**U.S. Subplate, 4 ports:** 810090-3 (4) #12 SAE side ports  
**Metric Subplate, 4 ports:** DS04SPS12M (M27 x 2.0 ISO 6149 side ports)  
**Electronics:** BD101, 23-7030, BD90, or BD95

**Frequency Response at 210 Bar (3000 PSI)**

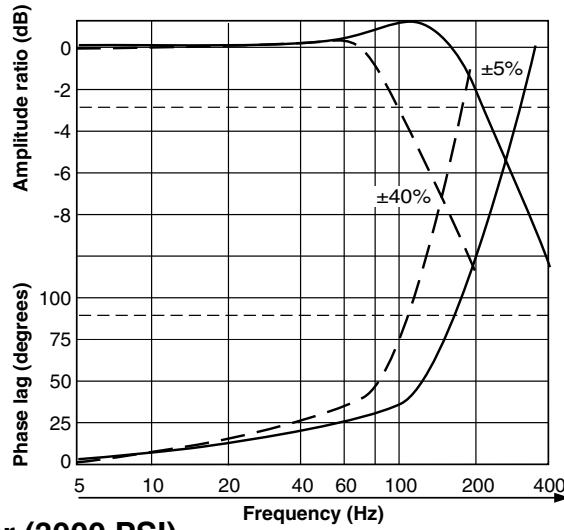
**Standard Response**  
**SE2E – 20 LPM (5 GPM)**



**High Response**  
**SE2E – 4 - 40 LPM (1.0 - 10 GPM)**

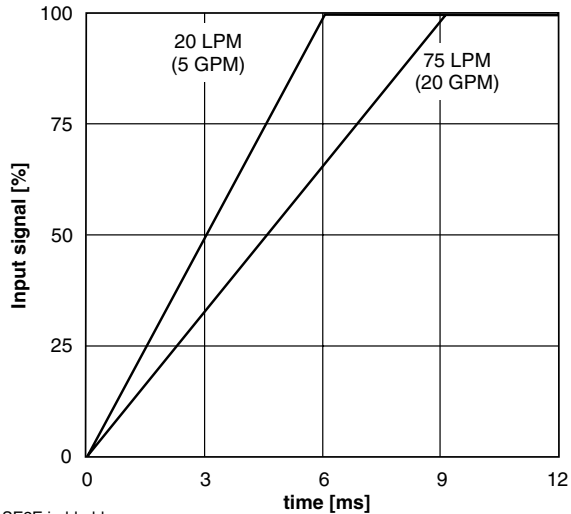


**Standard Response**  
**SE2E – 75 LPM (20 GPM)**

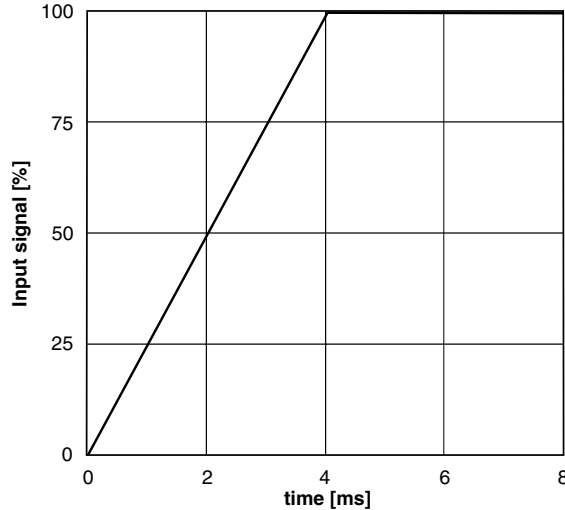


**Step Response at 210 Bar (3000 PSI)**

**Standard Response**



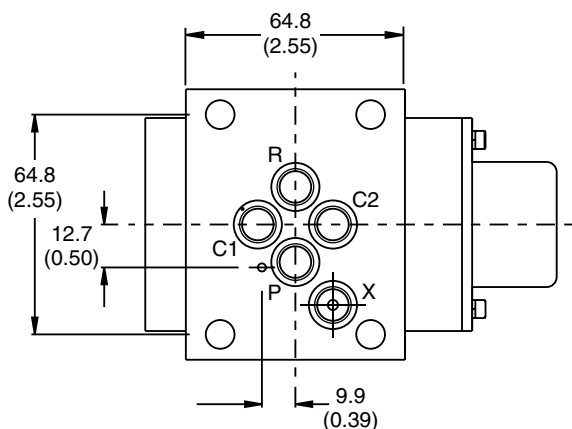
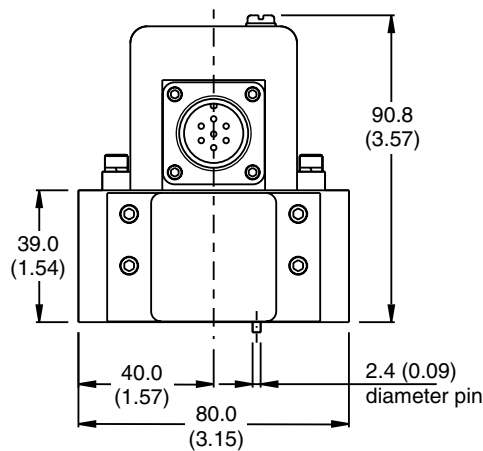
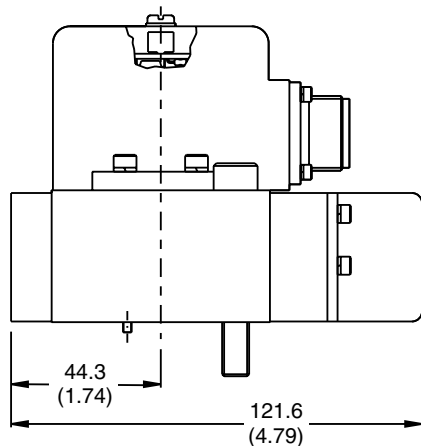
**High Response**  
**SE2E – 4 - 40 LPM (1.0 - 10 GPM)**



SE2E.indd, ddp



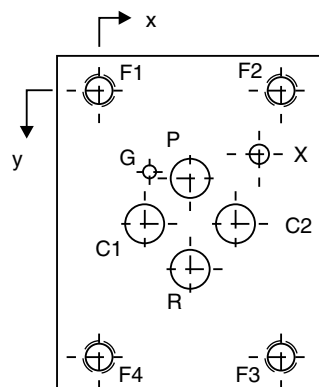
Inch equivalents for millimeter dimensions are shown in (\*\*)



1. Suggested mounting bolts M8 x 60 mm or 5/16-18 x 2.25" long high tensile steel, socket-head cap screws.
2. The 7-pin electrical connector mates with Parker 5004072 connector or equivalent. The connector is available at 180° to position shown (advise desired position at time of order).
3. Base O-Rings: 10.82 I/D x 1.78 section (2013N-9 or 2013V-9) 5 pcs.
4. Null adjustment potentiometer.

**Mounting Surface**

1. The minimum depth of hole G is 2 mm (0.079 in.). The ISO recommended full-thread depth is 22 mm (0.866 in.).
2. Surface roughness Ra < 0.8 µm [N6], as specified in ISO 468 and ISO 1302.
3. Surface flatness: 0.025 mm (0.001 in.) as specified in ISO 1101.





Metric Dimensions (mm)		(± 0.1 mm)								
Axis	P	C1	R	C2	G	X	F1	F2	F3	F4
	Ø 8.2 max	Ø 8.2 max	Ø 8.2 max	Ø 8.2 max	Ø 3.5	Ø 5	M8	M8	M8	M8
x	22.2	11.1	22.2	33.3	12.3	33.3	0	44.4	44.4	0
y	21.4	32.5	43.6	32.5	19.8	8.7	0	0	65.0	65.0



U.S. Dimensions (inches)		(± 0.004 in.)								
Axis	P	C1	R	C2	G	X	F1	F2	F3	F4
	Ø 0.32 max.	Ø 0.32 max.	Ø 0.32 max.	Ø 0.32 max.	Ø 0.14 max.	Ø 0.2	5/16 - 18	5/16 - 18	5/16 - 18	5/16 - 18
x	0.875	0.437	0.875	1.311	0.484	1.310	0	1.750	1.750	0
y	0.846	1.280	1.717	1.280	0.780	0.343	0	0	2.562	2.562

SE2E.indd, ddp





	Pin	Voltage Command	Current Command
Supply voltage +15/0/-15 VDC ±3%  Ripple < 50 mV <sub>p-p</sub>	A	+15 VDC  $I_{max} = 200 \text{ mA}$	
	B	-15 VDC  $I_{max} = 200 \text{ mA}$	
	C	↓	
Command signal  	D	0...±10 VDC  $R_e \geq 50 \text{ k}\Omega$	0...±10 mA  $R_e \geq 1 \text{ k}\Omega$
	E		
Spool position output	F	0...±10 VDC  load resistance 10 kΩ	0...±10 VDC  load resistance 10 kΩ
Protective Earth	G		

	Pin	Voltage Command	Current Command
Supply voltage +24 VDC ±3%  Ripple < 50 mV <sub>p-p</sub>	A	+24 VDC  $I_{max} = 200 \text{ mA}$	
	B	↓	
	C	Not used	
Command signal  	D	0...±10 VDC  $R_e \geq 50 \text{ k}\Omega$	0...±10 mA  $R_e \geq 1 \text{ k}\Omega$
	E		
Spool position output	F	0...±10 VDC  load resistance 10 kΩ	0...±10 VDC  load resistance 10 kΩ
Protective Earth	G		

Spool stroke is proportional to command signal.  
 +10 VDC to pin D causes 100% rated flow in the direction  
 of P→C2, C1→R.

One input D or E must be connected to common if a single  
 ended driver is used.

Connection cable to be 6-core, 0.75 mm<sup>2</sup> (0.03 in<sup>2</sup>), screened.  
 External diameter 6.5~9.5 mm (0.26 - 0.37 in.).  
 Connect screening to ↓ on supply side only.

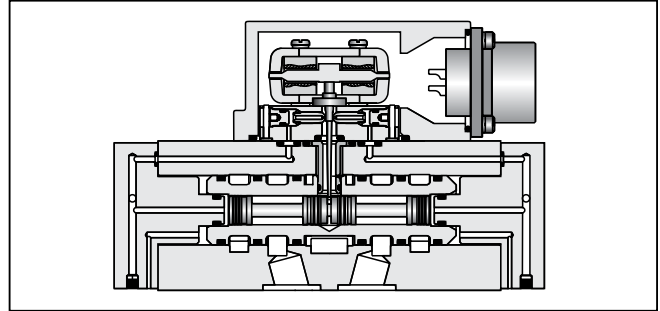
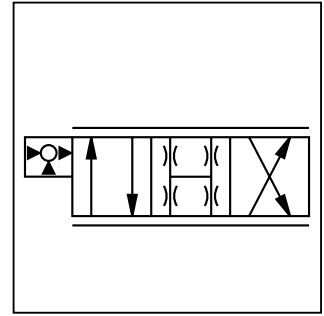
Mating connector is Parker number 5004072.  
 A mating cable with connector is Parker number EHC158GE.



### General Description

Series SE31 is a two stage, 4-way, flapper and nozzle style servovalve. This valve is designed to fit onto DIN NG10 or NFPA D05 port patterns. The SE31 has a wide range of flow ratings and a high performance spool and sleeve design.

A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. This valve is rated for 210 Bar (3000 PSI) service.



### C

### Features

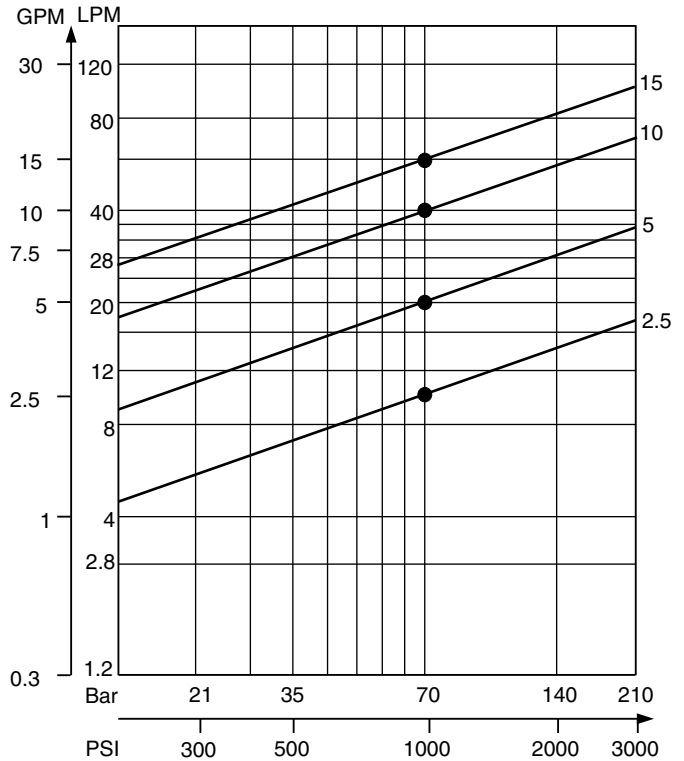
- Lapped spool and sleeve
- Jewel feedback ball for durability
- Aluminum body
- Medium and High performance
- ISO 440 -05-05-0-94 (4-ports), DO5HE (no "Y" port)

### Specifications

<b>Flow Rating ±10%</b> @ 70 Bar (1000 PSI)	10, 20, 40, 60 LPM (2.5, 5, 10, 15 GPM)
<b>Supply Pressure</b>	10 – 210 Bar (145 – 3000 PSI)
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
<b>Null Leakage Flow</b> per 70 Bar (1000 PSI)	1.2 – 1.9 LPM (0.3 – 0.5 GPM)
<b>Pilot Flow</b> @ 210 Bar (3000 PSI)	0.4 – 0.7 LPM (0.1 – 0.2 GPM)
<b>Input Command</b>	±100 mA std.
<b>Frequency Response</b> @ 90° phase shift	> 100 Hz (See Performance Curves)
<b>Non-Linearity</b>	≤ 10%
<b>Hysteresis</b>	≤ 3%
<b>Threshold</b>	≤ 0.5%
<b>Null Shift</b> with temperature with pressure	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Pressure Gain</b> change in pressure per 1% change in input command	60% typical
<b>Step Response</b>	0 - 100%, < 15 ms
<b>Fluid</b>	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
<b>Fluid Cleanliness</b>	ISO 4406 15/12 or better
<b>Operating Temperature</b>	-30°C to +130°C (-22°F to +266°F)
<b>Protection Class</b>	NEMA 4, IP65

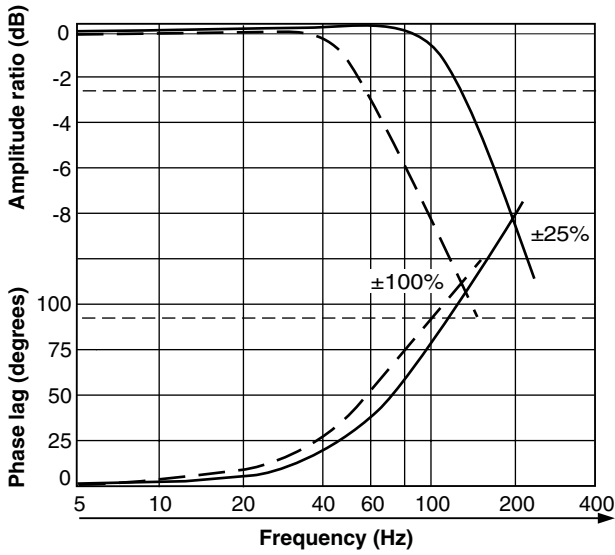
### Flow vs. Pressure Drop

at 100% command  
Flow Path P → C1 → C2 → R

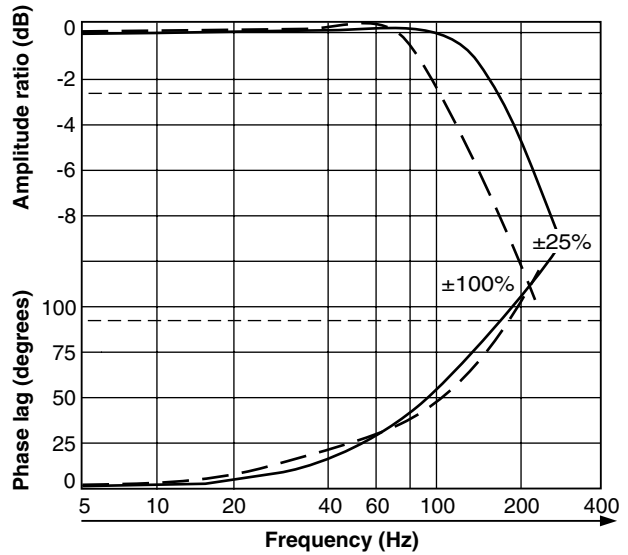




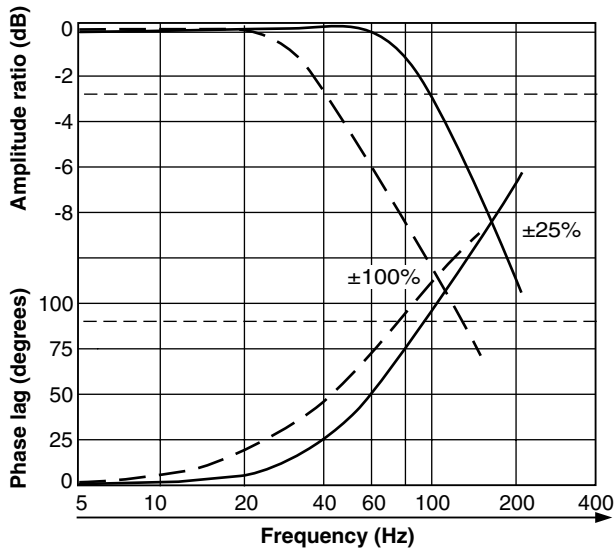
**Frequency Response at 210 Bar (3000 PSI)**  
**Standard Response**  
**SE31 – 4 LPM (1.0 GPM)**



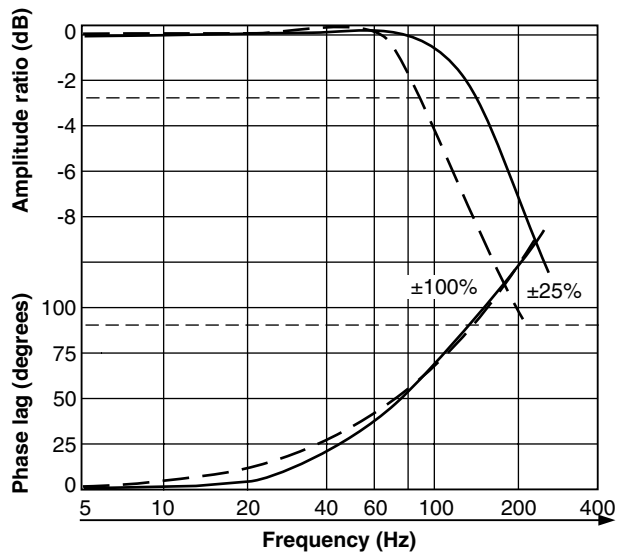
**High Response**  
**SE31 – 4 LPM (1.0 GPM)**



**Standard Response**  
**SE31 – 60 LPM (15 GPM)**



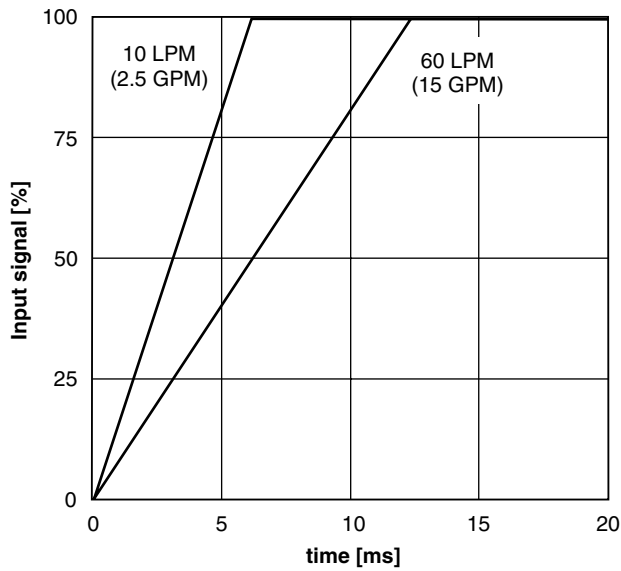
**High Response**  
**SE31 – 40 LPM (10 GPM)**



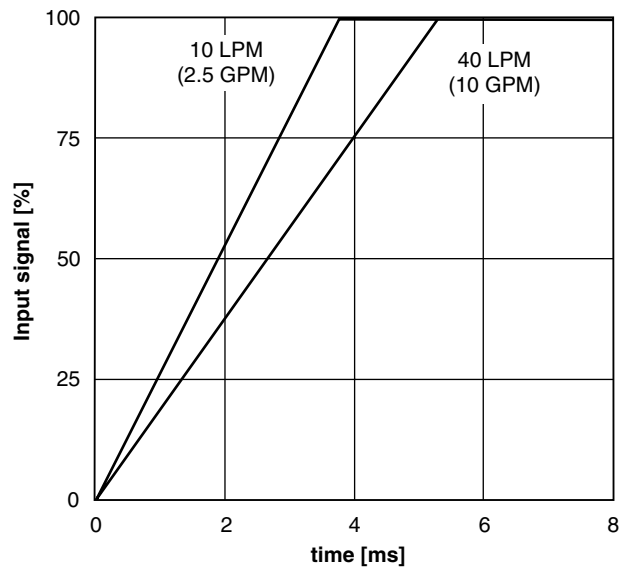
**C**

**Performance Curves**

**Step Response at 210 Bar (3000 PSI)**  
**Standard Response**

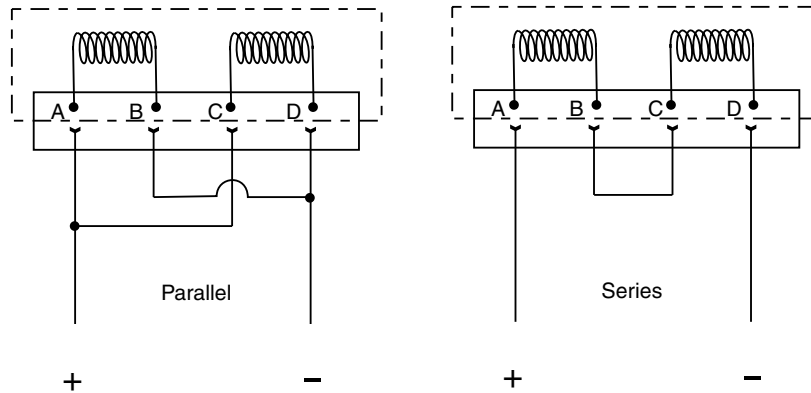


**High Response**



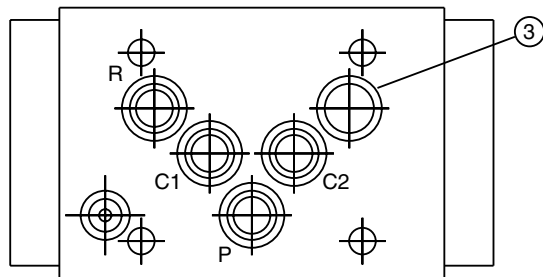
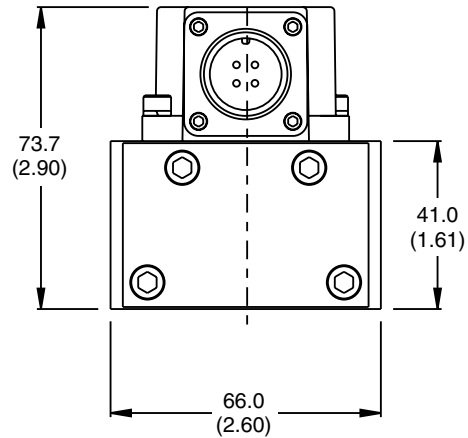
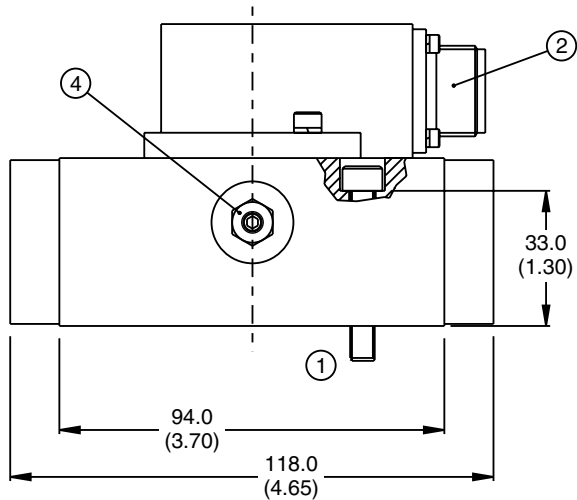
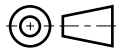
**Installation Wiring Options**

This servovalve has two coils. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.



Polarity shown connects flow from P to C2 port.

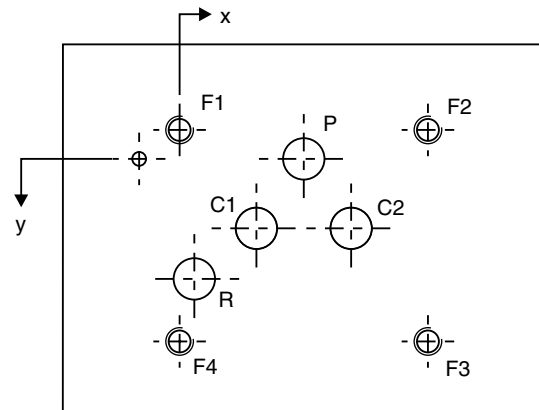
Inch equivalents for millimeter dimensions are shown in (\*\*)



1. Suggested mounting bolts M6 x 50 mm or 1/4-20 x 2.25" long high tensile steel, socket-head cap screws.
2. The 4-pin electrical connector mates with MS3106E-14S-2S or equivalent. The valve connector is available ±90° or 180° from the position shown.
3. Base O-Rings: 12 mm I.D. by 2.0 mm section, 90 durometer.
4. Null adjust requires a 10 A/F ring spanner (10 mm box end wrench) and a 2.5 hexagon key. Flow out of C1 will increase with clockwise rotation of key.

**Mounting Surface**

1. The minimum depth of hole G is 2 mm (0.079 in.). The ISO recommended full-thread depth is 18 mm (0.709 in.).
2. Surface roughness Ra < 0.8 µm [N6], as specified in ISO 468 and ISO 1302.
3. Surface flatness: 0.025 mm (0.001 in.) as specified in ISO 1101.



Metric Dimensions (mm)									
(± 0.1 mm)									
Axis	P	C1	R	C2	X	F1	F2	F3	F4
	Ø 9 max	Ø 9 max	Ø 9 max	Ø 9 max	Ø 3	M6	M6	M6	M6
x	27.0	16.7	3.2	37.3	-8.8	0	54.0	54.0	0
y	6.3	21.4	32.4	21.4	6.3	0	0	46.0	46.0

U.S. Dimensions (inches)									
(± 0.004 in.)									
Axis	P	C1	R	C2	X	F1	F2	F3	F4
	Ø 0.354 max	Ø 0.354 max	Ø 0.354 max	Ø 0.354 max	Ø 0.12	1/4 - 20	1/4 - 20	1/4 - 20	1/4 - 20
x	1.063	0.657	0.126	1.469	-0.347	0	2.126	2.126	0
y	0.248	0.843	1.275	0.843	0.248	0	0	1.811	1.811

**General Description**

Series SE60 is a two stage, 4-way, flapper and nozzle style servovalve. The SE60 has a wide range of flow ratings and a high performance spool and sleeve design.

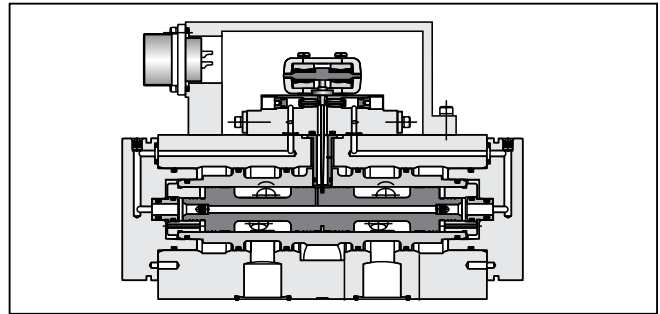
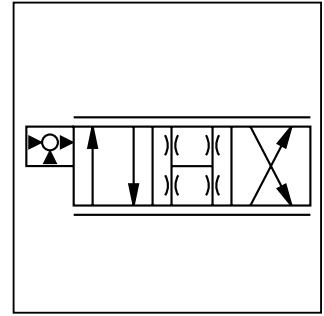
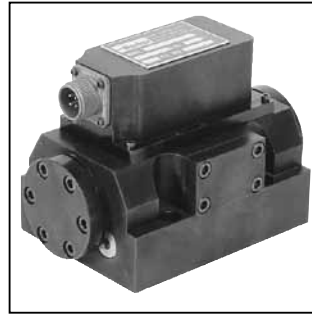
A special jewel feedback design enhances durability and prevents ball glitch problems, which can occur in other types of servovalves. This valve is rated for 210 Bar (3000 PSI) service.

**Features**

- Lapped spool and sleeve
- Jewel feedback ball for durability
- Aluminum body
- Medium and High performance
- ISO 10372 size 6 standard 50.8 mm (2.000 in.) port circle

**Specifications**

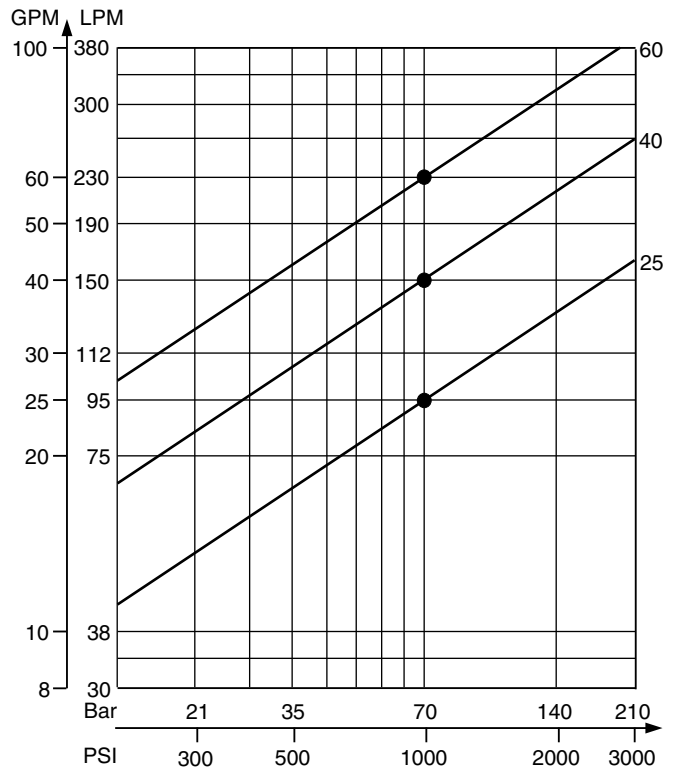
<b>Flow Rating ±10% @ 70 Bar (1000 PSI)</b>	95, 150, 230 LPM (25, 40, 60 GPM)
<b>Supply Pressure</b>	10 – 210 Bar (145 – 3000 PSI)
<b>Tank Port Pressure</b>	210 Bar (3000 PSI) Max. < 10 Bar (145 PSI) for best performance
<b>Null Leakage Flow per 70 Bar (1000 PSI)</b>	2.4 – 3.6 LPM (0.6 – 1.0 GPM)
<b>Pilot Flow @ 210 Bar (3000 PSI)</b>	0.4 LPM (0.1 GPM)
<b>Input Command</b>	±40 mA std.
<b>Frequency Response @ 90° phase shift</b>	> 100 Hz (See Performance Curves)
<b>Non-Linearity</b>	≤ 10%
<b>Hysteresis</b>	≤4%
<b>Threshold</b>	≤ 1%
<b>Null Shift with temperature with pressure</b>	≤ 2% per 55°C (100°F) ≤ 2% per 70 Bar (1000 PSI)
<b>Pressure Gain change in pressure per 1% change in input command</b>	60% typical
<b>Step Response</b>	0 - 100%, < 15 ms
<b>Fluid</b>	Petroleum based Mineral Oil, 10 – 110 cSt at 38°C (100°F)
<b>Fluid Cleanliness</b>	ISO 4406 15/12 or better
<b>Operating Temperature</b>	-30°C to +130°C (-22°F to +266°F)
<b>Protection Class</b>	NEMA 4, IP65

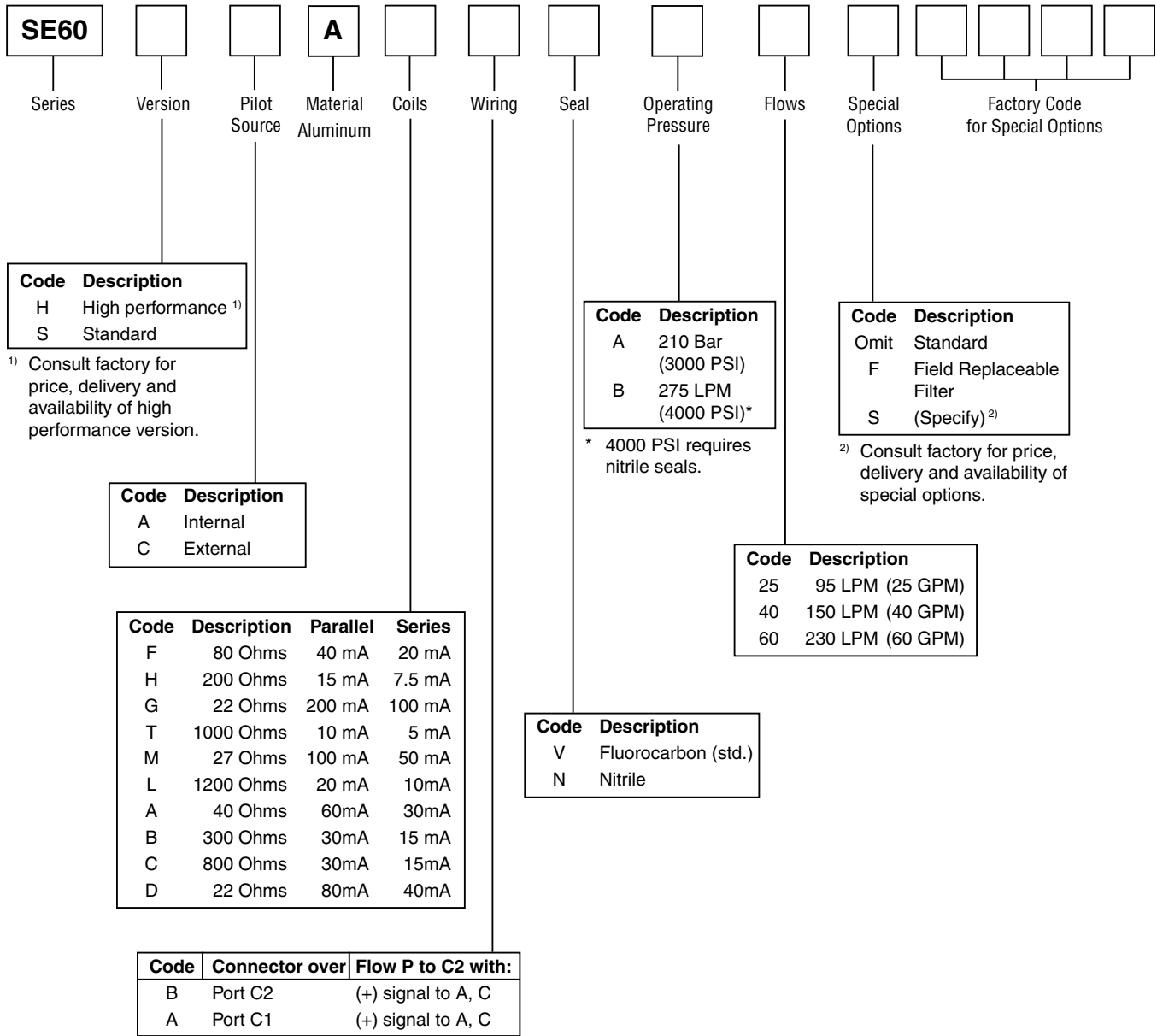


**C**

**Flow vs. Pressure Drop**

at 100% command  
Flow Path P →C1 →C2 →R





**Weight:** 3.4 kg (7.5 lbs.)  
**Cable with mating connector:** EHC154S  
**Mating connector:** MS3106E-14S-2S  
**Bolt kit:** 4 of M10 x 60 mm, or 4 of 3/8-16x2.375"  
**Flushing valve:** Consult factory. Use 1278007 and 11-0700.  
**US Subplate, 4 ports:** AS06SPS20S (# 20 SAE side ports)  
**Metric Subplate, 4 ports:** AS06SPS20M (M42 x 2.0 ISO 6149 side ports)  
**Electronics:** BD101, 23-7030, BD90, or BD95

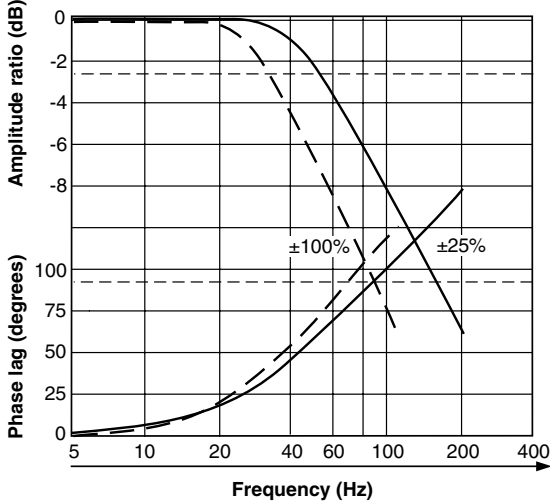


**Performance Curves**

**Frequency Response at 210 Bar (3000 PSI)**

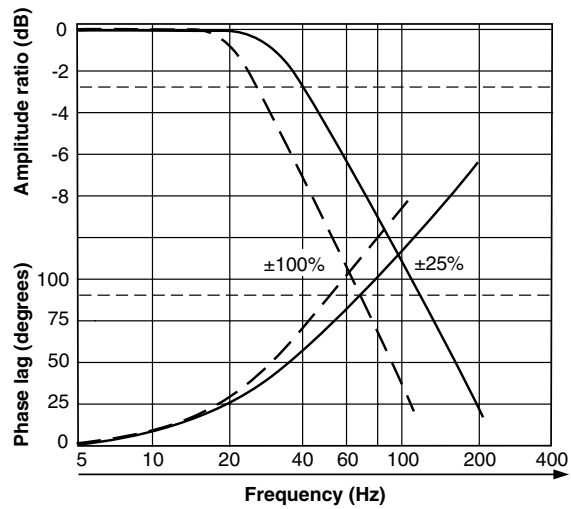
**Standard Response**

**SE60 – 95 LPM (25 GPM)**



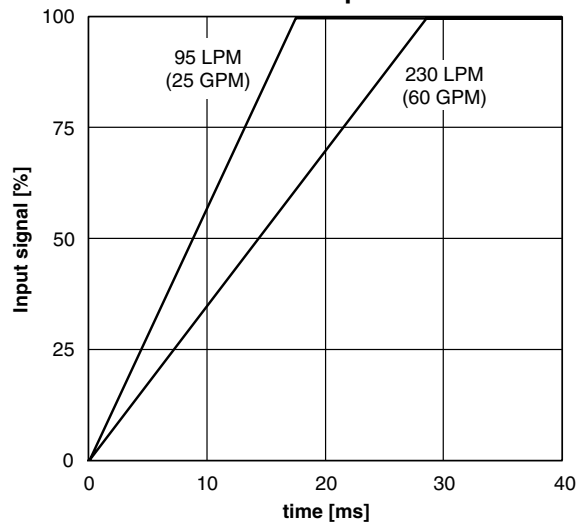
**High Response**

**SE60 – 230 LPM (60 GPM)**



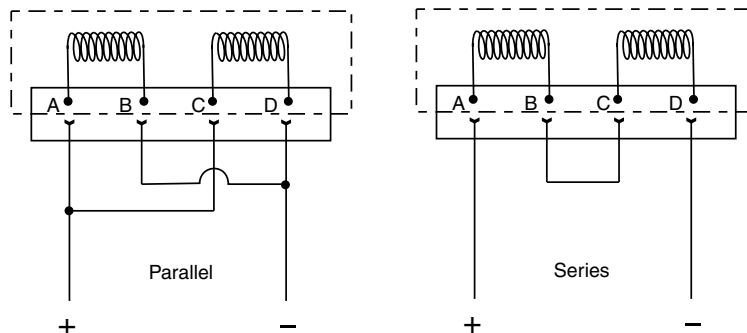
**Step Response at 210 Bar (3000 PSI)**

**Standard Response**



**Installation Wiring Options**

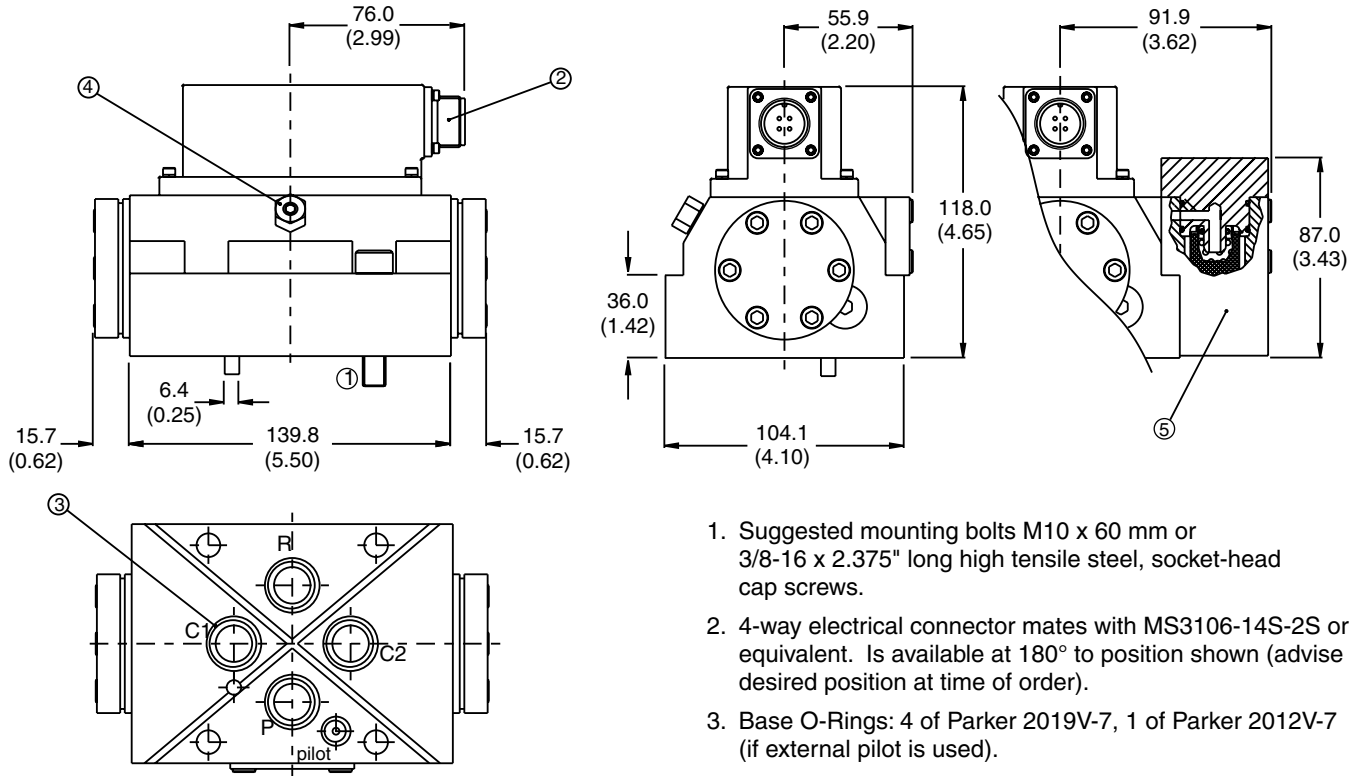
This servovalve has two coils. When connecting the valve to a drive amplifier, the user's external wiring may put the coils either in parallel or in series as needed. Refer to the illustrations below and to the mounting pattern for this valve to insure proper control phasing.



Polarity shown connects flow from P to C2 port.



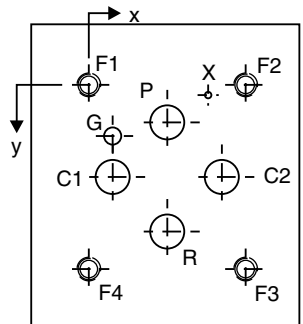
Inch equivalents for millimeter dimensions are shown in (\*\*)



1. Suggested mounting bolts M10 x 60 mm or 3/8-16 x 2.375" long high tensile steel, socket-head cap screws.
2. 4-way electrical connector mates with MS3106-14S-2S or equivalent. Is available at 180° to position shown (advise desired position at time of order).
3. Base O-Rings: 4 of Parker 2019V-7, 1 of Parker 2012V-7 (if external pilot is used).
4. Null adjust requires 12 A/F ring spanner (12 mm box end wrench) and 3.0 hexagon key. Flow out of C2 will increase with clockwise rotation of key.
5. Optional field replaceable filter housing. Element P/N SRS1479.

**Mounting Surface**

1. The minimum depth of hole G is 2 mm (0.079 in.). The ISO recommended full-thread depth is 30 mm (1.181 in.).
2. Surface roughness Ra < 0.8 μm [N6], as specified in ISO 468 and ISO 1302.
3. Surface flatness: 0.025 mm (0.001 in.) as specified in ISO 1101.



Metric Dimensions (mm)										
(± 0.1 mm)										
Axis	P	C1	R	C2	G	X	F1	F2	F3	F4
	Ø 17.5 max	Ø 17.5 max	Ø 17.5 max	Ø 17.5 max	Ø 8	Ø 5	M10	M10	M10	M10
x	36.5	11.1	36.5	61.9	11.1	55.6	0	73.0	73.0	0
y	17.4	42.8	68.2	42.8	23.7	4.7	0	0	85.7	85.7

U.S. Dimensions (inches)										
(± 0.004 in.)										
Axis	P	C1	R	C2	G	X	F1	F2	F3	F4
	Ø 0.688 max	Ø 0.688 max	Ø 0.688 max	Ø 0.688 max	Ø 0.39	Ø 0.20	3/8 - 16	3/8 - 16	3/8 - 16	3/8 - 16
x	1.437	0.437	1.437	2.437	0.437	2.187	0	2.875	2.875	0
y	0.687	1.687	2.687	1.687	0.937	0.187	0	0	3.375	3.375

**Contents**

**Proportional Directional Valves**

Series	Valve Application	Description	Page
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PWDXXA-40*	D**FS, D*FC, RLL*R	Programmable, Feedback, Min, Max, Ramps	D5 - D8
EW*104	D**FS	Adjustable; Min, Max, 2 Ramps	D9 - D10

**Proportional Pressure Control Valves**

Series	Valve Application	Description	Page
ED00104	DWE, DWU, RE*W	Adjustable; Min, Max, 2 Ramps	D11 - D12
PCD00A-400	VBY, VMY, RE*W, PE*W	Programmable, Min, Max, Ramp	D13 - D16

**Proportional Throttle Valves**

Series	Valve Application	Description	Page
PCD00A-400	TDA, TEA	Programmable, Min, Max, Ramp	D13 - D16
ET*104	TDA	Adjustable; Min, Max., 2 Ramps ("L" Solenoid)	D17 - D18

**Servo Valves**

Series	Valve Application	Description	Page
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BD101	BD15/BD30/Dyval	Closed Loop, PI, Snap Track	D21 - D22

**Auxiliary Function Cards**

Series	Valve Application	Description	Page
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PZD00A-40*	all	Programmable, Signal Conditioning	D27 - D30

**Motion Controllers**

Series	Valve Application	Description	Page
C3F Compax		Motion Controller	D31 - D49

**Power Supplies**

Series	Valve Application	Description	Page
PSD24	all	24 Volt Power Supply	D50 - D51

<b>Card Holders</b>	all	DIN Card Holders	D52
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## General Description

Series PWD00A-400 electronic module for driving open loop proportional valves is compact and easy to install with DIN rail mounting and plug-in terminals. The digital design allows for programmable parameters such as solenoid drive current, mins and maxs, and ramps. Profiles controlled by on-off logic signals can be configured through internal velocity setpoints and ramps. The module provides flexibility for different applications and repeatability from unit to unit. The module parameters are programmed with an RS-232 interface and user friendly software (ProPxD) with default values for the standard valves.

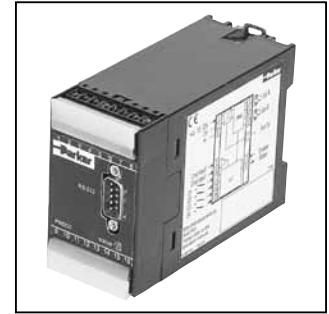
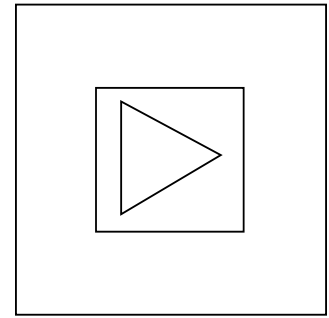
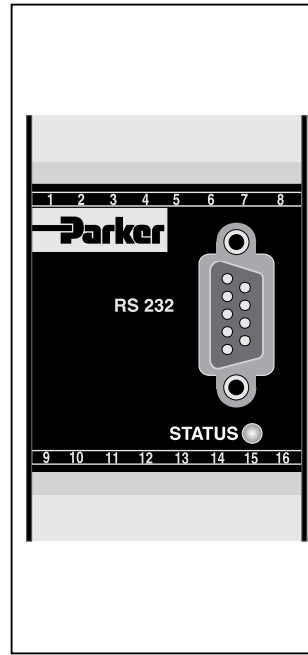
The PWD00A-400 module contains the functions required by typical open loop proportional valve applications (series D\*FB, D\*FW, D\*1FW, WLL, RLL valves).

## Features

- Programmable parameters.
- Analog or Profile Capability.
- RS-232 Interface.
- User friendly programming software.
- Plug-in terminals.
- Four independent ramps.

## Specifications

General			
<b>Model</b>	Module package for snap-on mounting on EN 50022 rail	<b>Mounting Position</b>	Any
<b>Package Material</b>	Polycarbonate	<b>Ambient Temperature Range</b>	-20°C to +60°C (-4°F to +140°F)
<b>Inflammability Class</b>	V2 to V0 acc. UL 94	<b>Protection Class</b>	IP 20 acc. DIN 40050
Electrical			
<b>Duty Ratio</b>	100%	<b>Channel Recall Signal</b>	Off – 0 to 5.0 VDC; On – 8.5 to 30 VDC; Ri = 30K ohm
<b>Supply Voltage</b>	18 VDC to 30 VDC, ripple < 5% eff., surge free (29 VDC to 30 VDC for 24V coils)	<b>Status Signal</b>	Off – 0 to 0.5 VDC; On – Supply Voltage; rated max. 15 mA
<b>Switch-on Current Typ.</b>	22A for 0.2 mS	<b>Adjustment Ranges</b>	<b>preset</b>
<b>Current Consumption Max.</b>	2.0A	Minimum	0 to 50%
<b>Pre-fusing</b>	2.5A medium lag	Maximum	50 to 100%
<b>Command Signal</b>	+10 to 0 to -10 VDC, ripple < 0.01 % eff., surge free, Ri = 150K ohm <b>Do not input a command greater than ±10 VDC.</b>	Ramp Time	0 to 32.5 s
<b>Input Signal Resolution</b>	0.025%	Zero Offset	+75 to -75%
<b>Differential Input Voltage Maximum</b>	30V for terminals 5 and 6 against PE (terminal 8)	Current	0.8/3.5/2.7/1.8/1.3 A
<b>Enable Signal</b>	Off – 0 to 5.0 VDC On – 8.5 to 30 VDC; Ri = 30K ohm	<b>Interface</b>	RS 232C, DSub 9p. male for null modem cable
		<b>EMC</b>	EN 50081-2, EN 50082-2
		<b>Connection</b>	Screw terminals 0.2 to 2.5 mm <sup>2</sup> , plug-in
		<b>Cable Specification</b>	16 AWG overall braid shield for supply voltage and solenoids 20 AWG overall braid shield for sensor and signal
		<b>Cable Length</b>	50m (164 ft.)

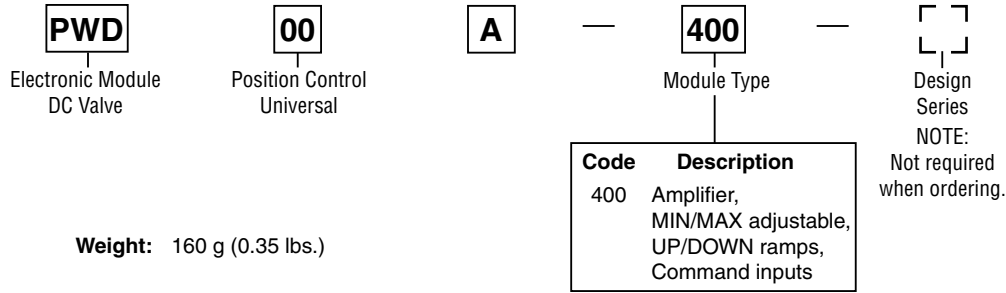


- Input Enable with Status indicator.
- Differential input on analog command.
- Compliant with European EMC Standards.

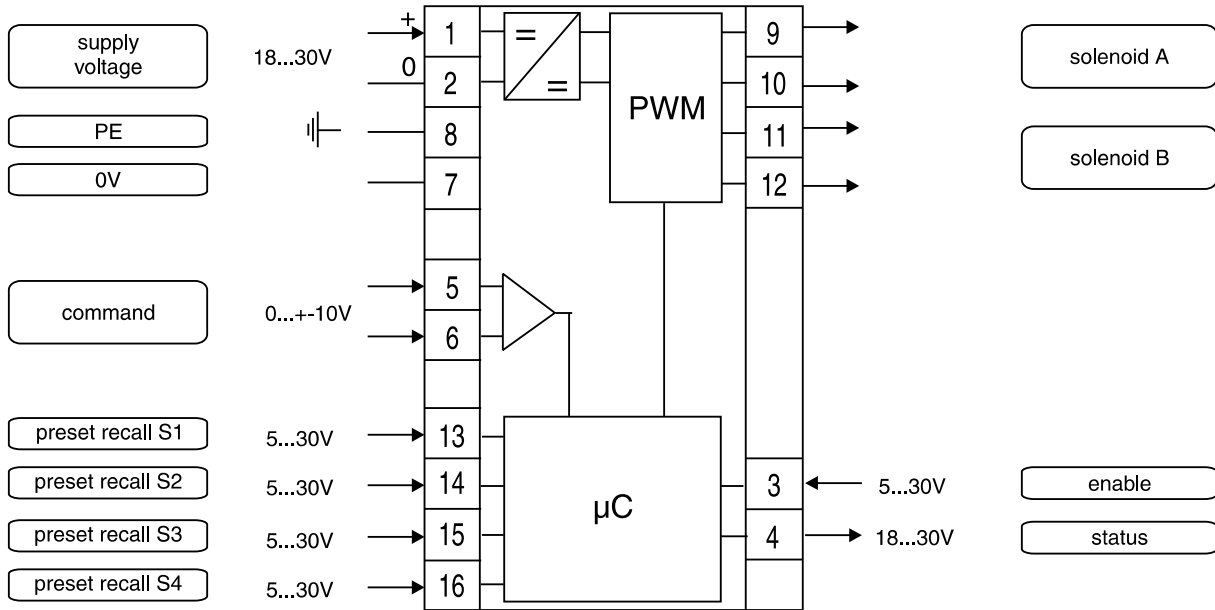


D

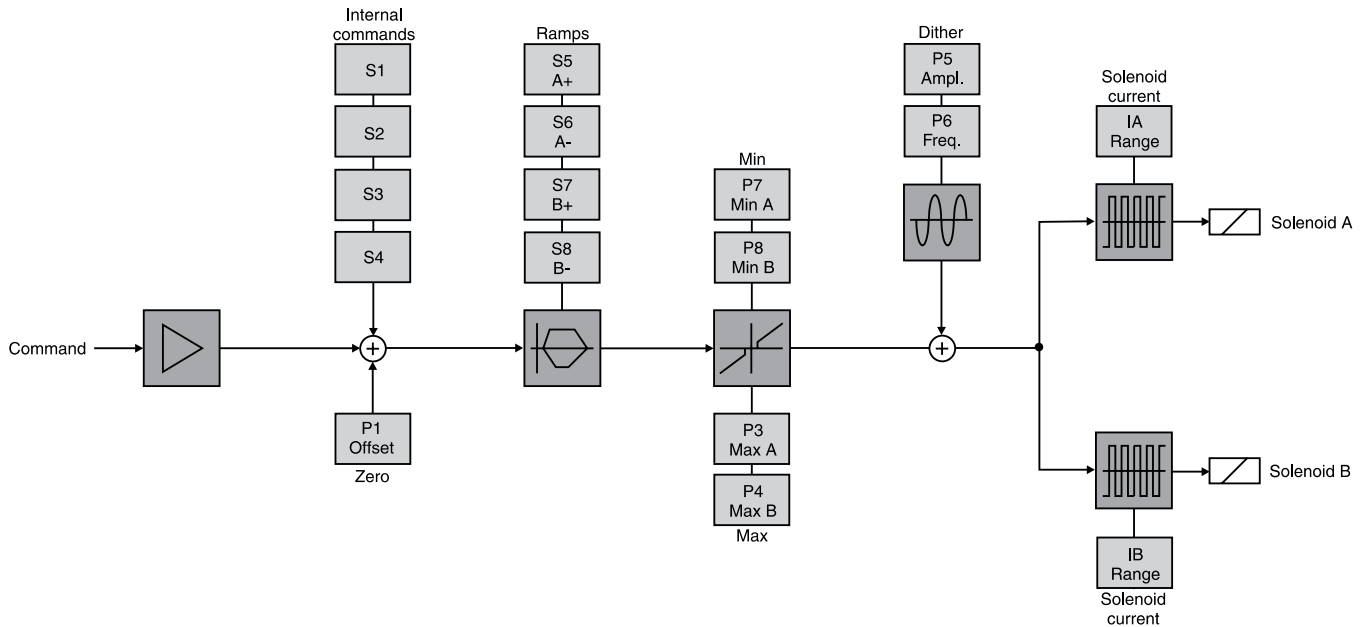
**Ordering Information**



**Block Diagram — Wiring**

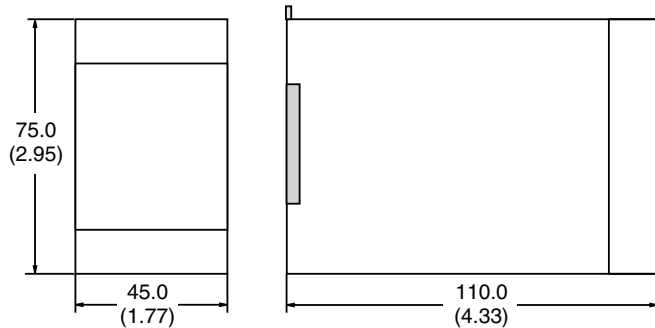


**Signal Flow Diagram**



## Dimensions

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



## ProPxD Interface Program

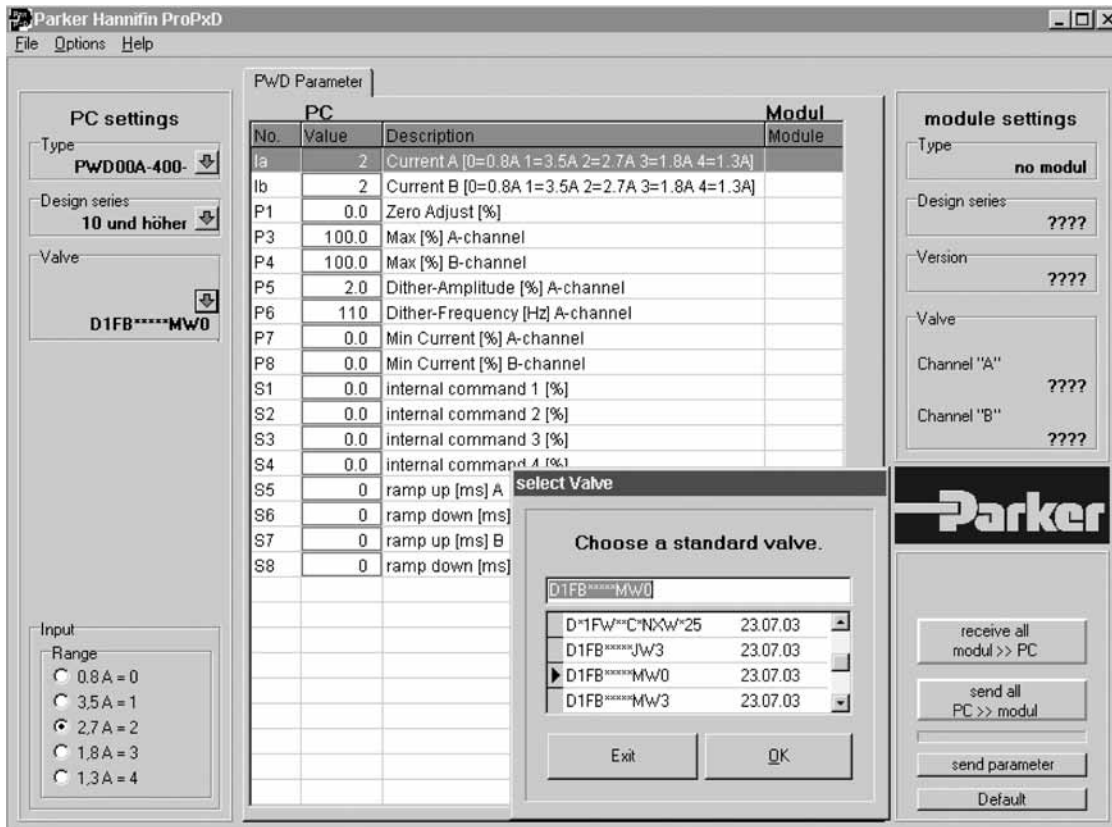
The new ProPxD software permits comfortable parameter setting for the electronic module series PCD, PWD, PZD and PID.

Via the clearly arranged entry mask the parameters can be noticed and modified. Storage of complete parameter sets to floppy or hard disk is possible as well as printout or record as a text file for further documentation. Stored parameter sets may be loaded anytime and transmitted to the electronic module in the same manner as the basic parameters which are available for all usable valve series. Inside the electronic a nonvolatile memory stores the data with the option for recalling or modification.

## Features

- User-friendly editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronic via serial interface RS-232 and null modem cable.
- Simple to use interface program. Download free of charge [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) → **Services** → **downloads**

**D**



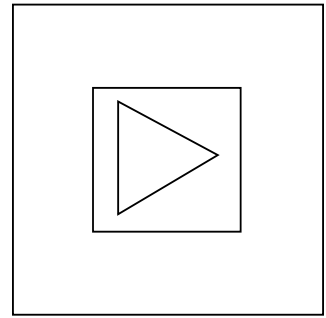
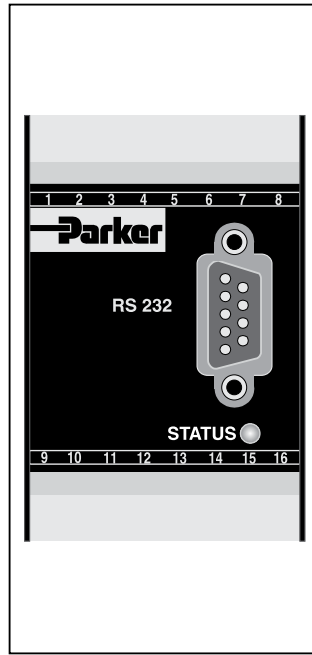
## General Description

Series PWDXXA-40\* electronic module for driving proportional valves with spool position feedback is compact and easy to install with DIN rail mounting and plug-in terminals. The digital design allows for programmable parameters such as solenoid drive current, mins, maxs, ramps and a range of position feedback signals. The module provides flexibility and repeatability from unit to unit. The module parameters are programmed with an RS-232 interface and user friendly software (ProPxD) with default values for standard valves.

The PWDXXA-40\* module contains the functions required by typical internal closed loop proportional valve applications (series D\*FC, D\*1FS, RLL\*R, WLL\*R and TEL valves).

## Features

- Interface and tuning for spool position feedback.
- Programmable parameters.
- $\pm 10V$ ,  $\pm 20$  mA, 4-20 mA position transducer input.
- RS-232 Interface.
- User friendly programming software.
- Plug-in terminals.
- Four independent ramps.
- Input Enable with Status indicator.
- Differential command input.
- Compliant with European EMC Standards.

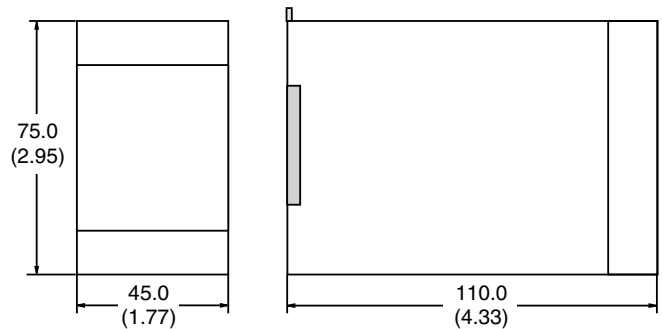


**D**

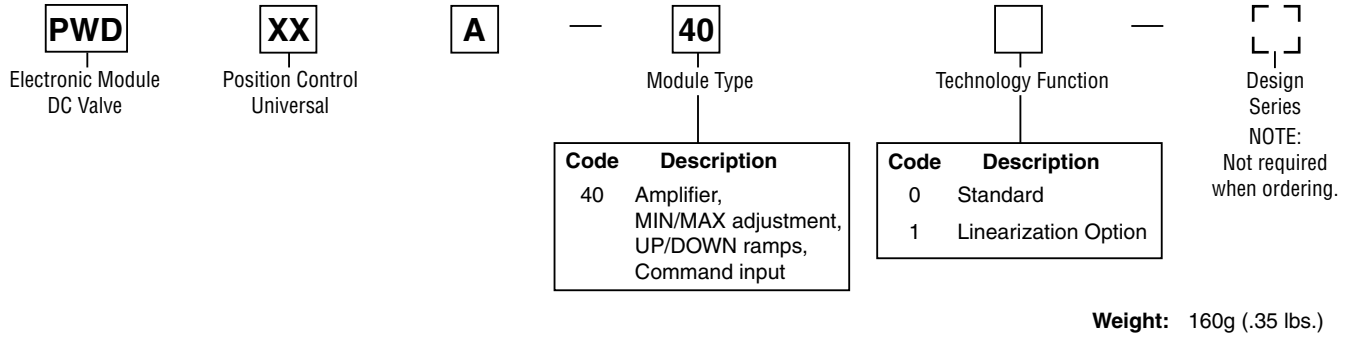


## Dimensions

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



**Ordering Information**



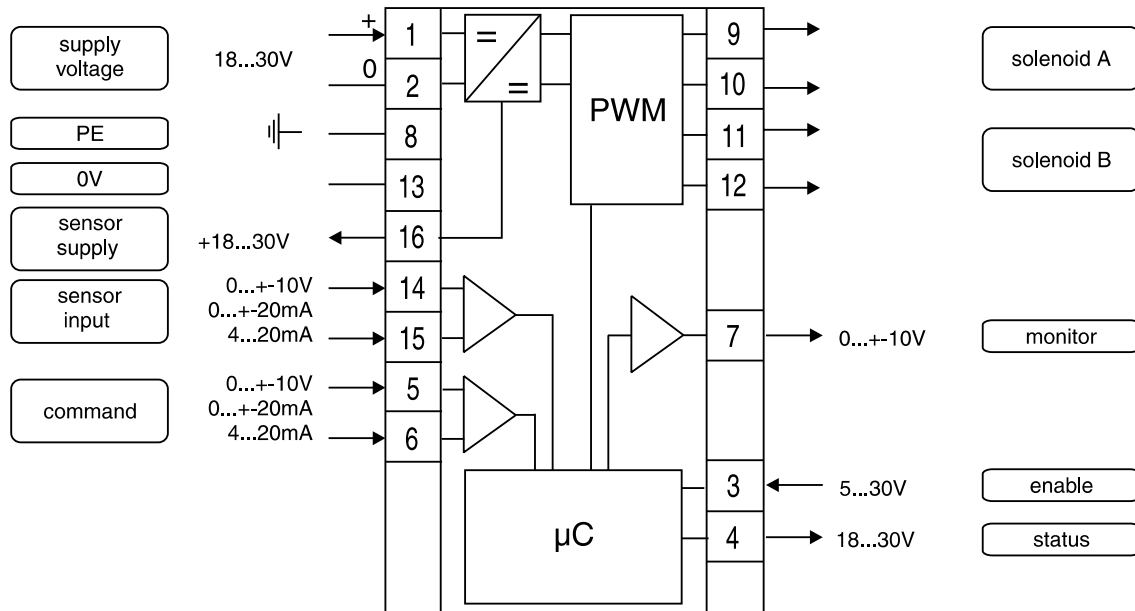
**D**

**Specifications**

General			
<b>Model</b>	Module package for snap-on mounting on EN 50022 rail	<b>Mounting Position</b>	Any
<b>Package Material</b>	Polycarbonate	<b>Ambient Temperature Range</b>	-20°C to +60°C (-4°F to +140°F)
<b>Inflammability Class</b>	V2 to V0 acc. UL 94	<b>Protection Class</b>	IP 20 acc. DIN 40050
Electrical			
<b>Duty Ratio</b>	100%	<b>Status Signal</b>	Off – 0 to 0.5 VDC; On – Supply Voltage; rated max. 15 mA
<b>Supply Voltage</b>	18 VDC to 30 VDC, ripple < 5% eff., surge free	<b>Monitor Signal</b>	+10 to 0 to -10 VDC, rated max. 5 mA, signal resolution 0.4%
<b>Switch-on Current Typ.</b>	22A for 0.2 mS	<b>Adjustment Ranges</b>	Minimum 0 to 50%
<b>Current Consumption Max.</b>	2.0A		Maximum 50 to 100%
<b>Pre-fusing</b>	2.5A medium lag		Ramp Time 0 to 32.5 s
<b>Command Signal</b>	+10 to 0 to -10 VDC, ripple < 0.01 % eff., surge free, Ri = 100K ohm +20 to 0 to -20 mA, ripple < 0.01 % eff., surge free, Ri = 200 Ohm 4 to 12 to 20 mA, ripple < 0.01 % eff., surge free, Ri = 200 Ohm < 3.6 mA = solenoid output off, > 3.8 mA = solenoid output on (acc. NAMUR NE43)		Zero Offset +100 to -100%
<b>Input Signal Resolution</b>	0.025%	<b>Interface</b>	RS 232C, DSub 9p. male for null modem cable
<b>Differential Input Voltage Max.</b>	30V for terminals 5 and 6 against PE (terminal 8)	<b>EMC</b>	EN 50081-2, EN 50082-2
<b>Enable Signal</b>	Off – 0 to 2.5 VDC On – 5 to 30 VDC; Ri = 30K ohm	<b>Connection</b>	Screw terminals 0.2 to 2.5 mm <sup>2</sup> , plug-in
<b>Cable Specification</b>		<b>Cable Length</b>	50m (164 ft.)
<b>Options</b>			
<b>Technology Function</b>	Code 1 – Software adjustable transfer function with 10 compensation points for linearization of valve behavior.		

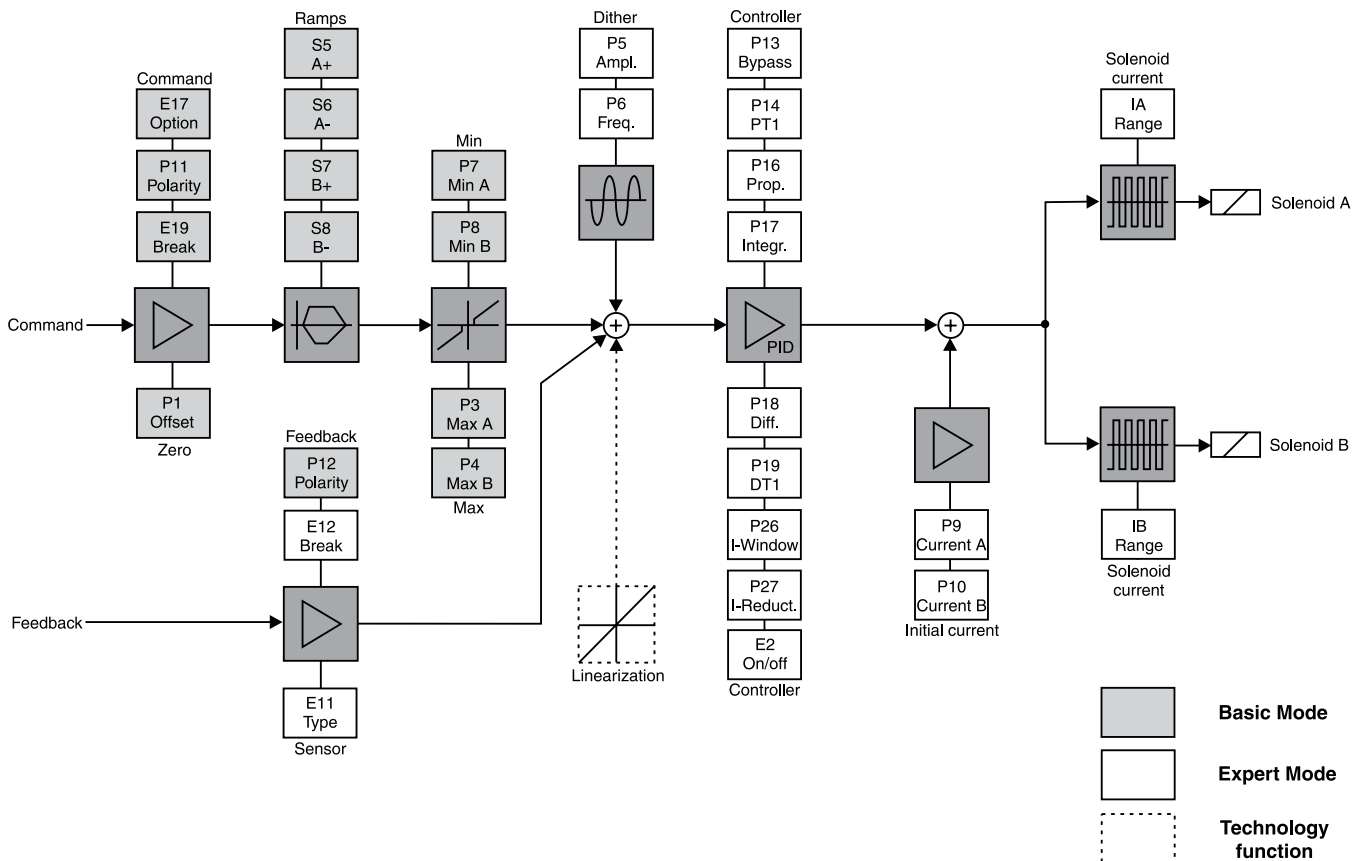


**Block Diagram — Wiring**



**D**

**Signal Flow Diagram**



## ProPxD Interface Program

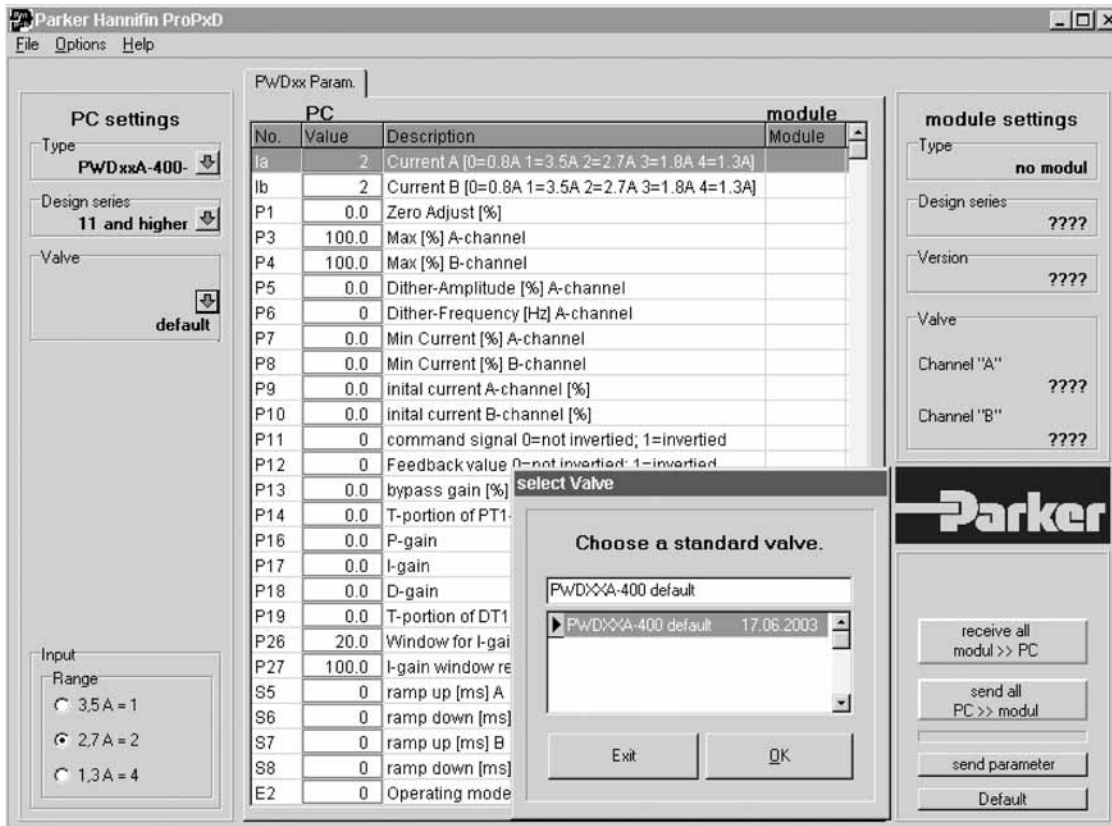
The new ProPxD software permits comfortable parameter setting for the electronic module series PCD, PWD, PZD and PID.

Via the clearly arranged entry mask the parameters can be noticed and modified. Storage of complete parameter sets to floppy or hard disk is possible as well as printout or record as a text file for further documentation. Stored parameter sets may be loaded anytime and transmitted to the electronic module in the same manner as the basic parameters which are available for all usable valve series. Inside the electronic a nonvolatile memory stores the data with the option for recalling or modification.

## Features

- User-friendly editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronic via serial interface RS-232 and null modem cable.
- Simple to use interface program. Download free of charge [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) → **Services** → **downloads**

**D**



**General Description**

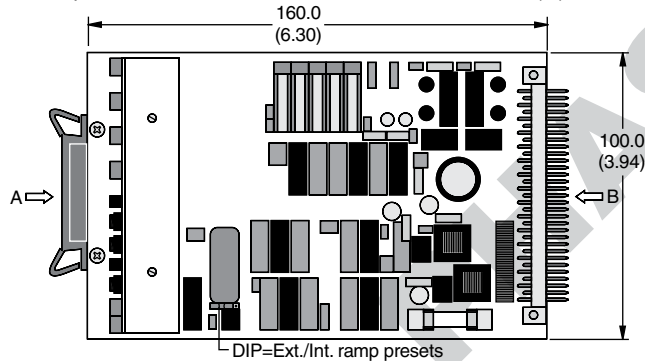
Series EW\*104 electronic module is used to control pilot operated D\*\*FS proportional directional valves with main stage spool position feedback. The module accepts a ±10 volt command signal where spool position is controlled by a closed loop PID circuit on the module.

**Features**

- Spool overlap range can be manipulated with MIN potentiometer, adjustable by feeding a constant set value of 0.2V.
- MAX limiting of spool stroke with full set value range. Can be set up after MIN has been set and feeding a constant set value of 10V.
- DIP-switch from internal ramp generation to external ramp supply.
- Pulsed low-loss amplifier power stage with supporting constant current control for consistent temperature-independent solenoid forces.
- Dither generator with applied frequency to improve static characteristics.
- Diagnosis of spool stroke by means of measuring sockets as well as LEDs for indicating working conditions.

**Dimensions**

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



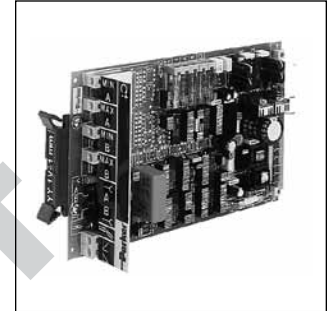
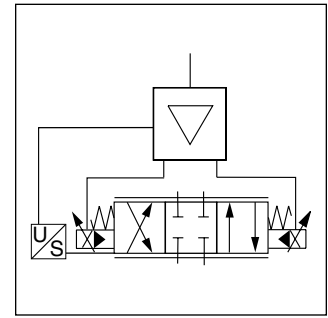
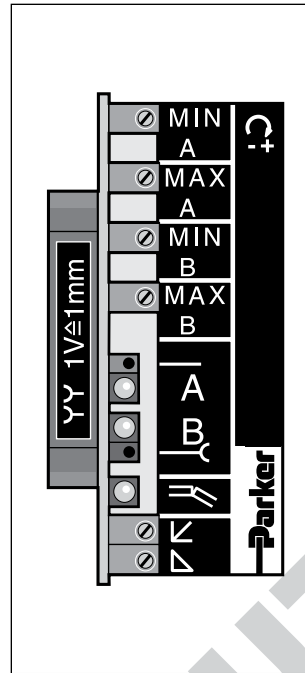
**For new applications:  
EW\*104: Refer to PWDXXA-400**

**Ordering Information**



Code	Valve Size	Mounting Pattern	Valve Spool Stroke
10	D31FS	NG10	±5.0 mm (0.20 in.)
16	D41FS	NG16	±6.0 mm (0.24 in.)
25	D81FS	NG25	±9.3 mm (0.37 in.)
26	D91FS	NG25	±9.3 mm (0.37 in.)
32	D111FS	NG32	±15.0 mm (0.59 in.)

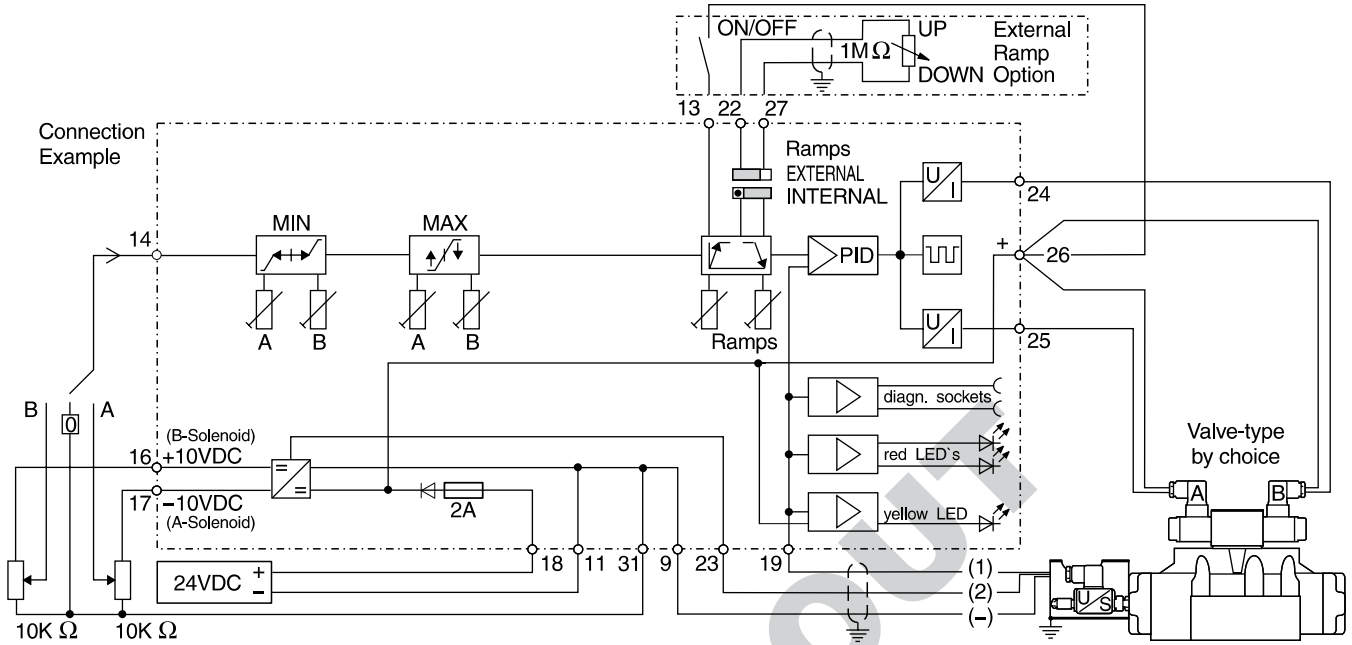
Code	Description
104	Amplifier, adjustable, MIN/MAX-limiting Up/Down ramps



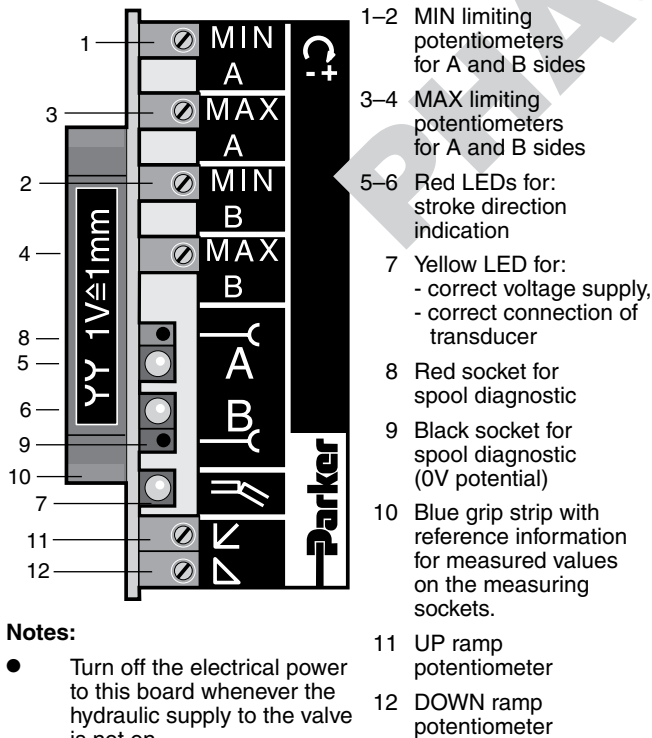
**Specifications**

<b>Connection</b>	31 Pole Male Connector, DIN 41617
<b>Power Supply</b>	Regulated: 18-26V Unregulated: 22-38V
<b>Command Signal</b>	0 to +10 VDC and 0 to -10 VDC
<b>Input Select Voltage</b>	5 to 30 VDC
<b>Power Required</b>	40 VA
<b>Reference Outputs</b>	±10 VDC @ 10 mA
<b>Max. Solenoid Output Current</b>	1.3A
<b>Ambient Temp. Range</b>	0°C to +70°C (+32°F to +158°F), Standard Range
<b>Ramps</b>	0 to 5 seconds adjustable
<b>Shielded Cable Connection</b>	Supply connections + valve: 1.5 sq. mm (16 AWG) Transducer + Command Signals: 0.5 sq. mm (20 AWG)
<b>Fuse</b>	2A medium lag, DIN 41571/5x20 mm

**Block Diagram — Wiring**



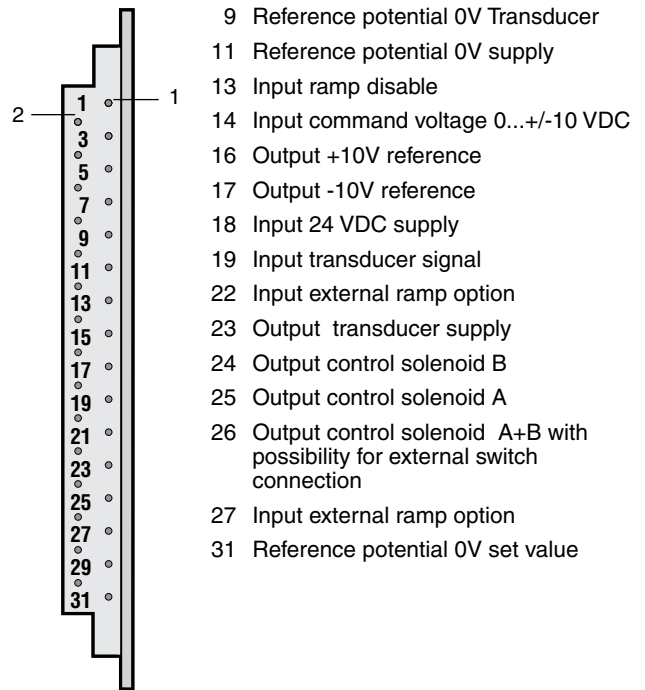
**Operating and Diagnostic Elements  
 (Elevation A)**



**Notes:**

- Turn off the electrical power to this board whenever the hydraulic supply to the valve is not on.
- Always turn off the power to this board before removing it from the card holder.

**Connector  
 (Elevation B)**



**General Description**

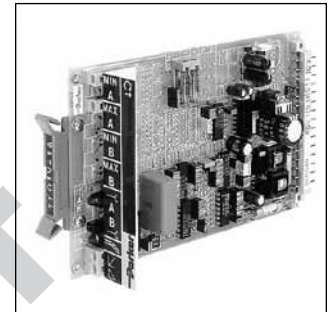
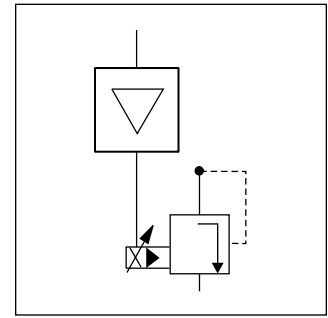
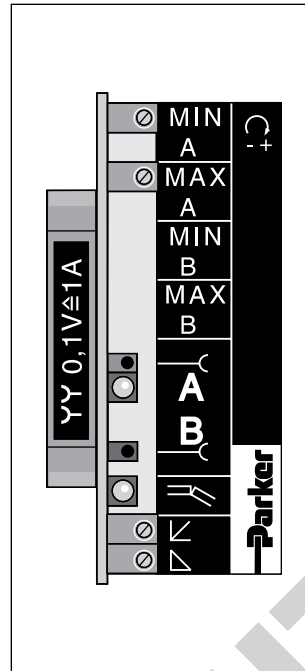
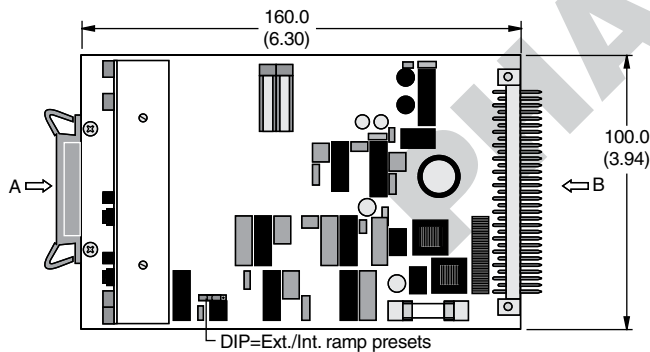
Series ED00104 electronic module is used to control DSA/DWE/DWU pressure control valves. The module accepts a 0 to 10 volt command signal, and produces a proportionally linear output current used to drive the valve's proportional solenoid. Two ramp adjustments provide smooth transition between selected pressures. Note that the linearity of the valve itself determines the linearity of the system. Refer to the specific valve data for actual linearity performance.

**Features**

- Processing and amplification of the externally supplied positive set-values into output signals for the control solenoid.
- Can be combined with PZD00A-400 or external programmable control.
- DIP switch from internal ramp generation to external ramp setting.
- MIN/MAX limiters for matching the working range to the full set value range.
- Pulsed low-loss amplifier power stage with supporting constant current control for consistent, temperature-independent, solenoid forces.
- Dither generator with applied frequency to improve static characteristics.
- Diagnosis by means of diagnostic sockets as well as LEDs for indicating working conditions.

**Dimensions**

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

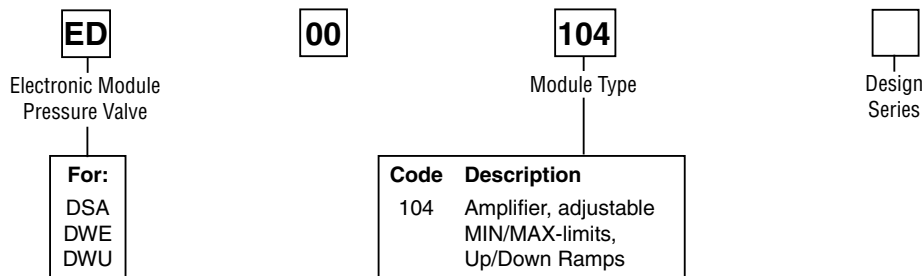


**Specifications**

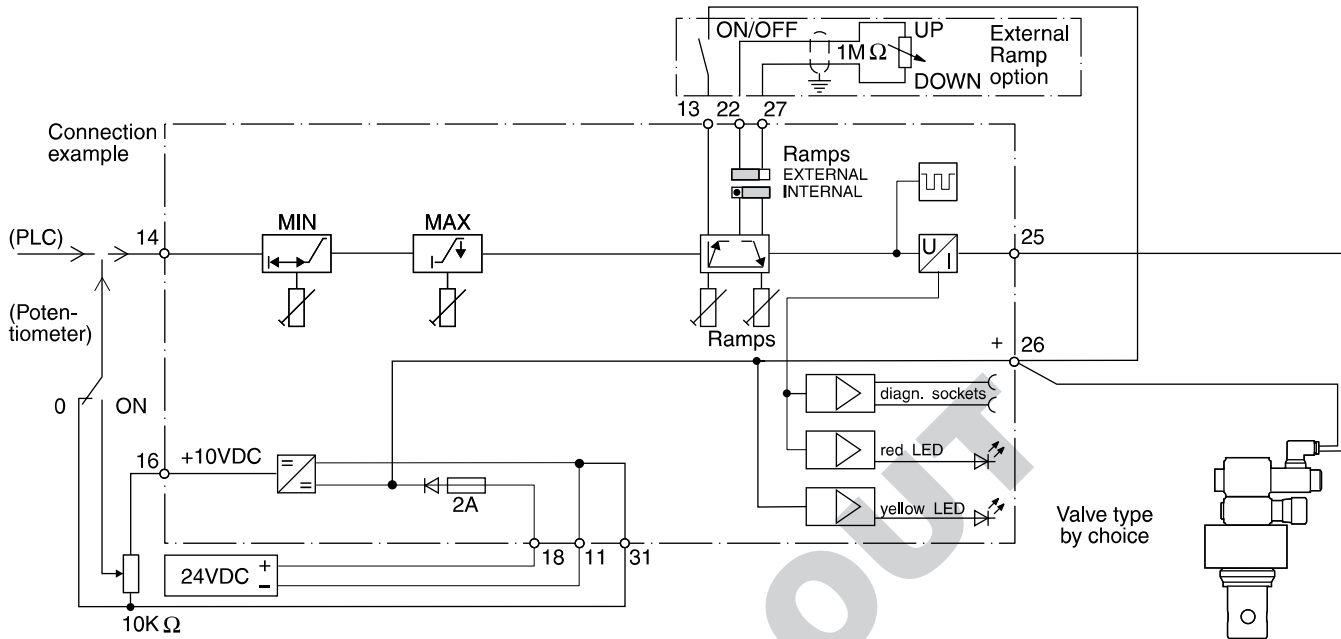
<b>Connection</b>	31 Pole Male Connector, DIN 41617
<b>Power Supply</b>	Regulated: 18-26V Unregulated: 22-38V
<b>Command Signal</b>	0 to +10 VDC and 0 to -10 VDC
<b>Input Select Voltage</b>	5 to 30 VDC
<b>Power Required</b>	40 VA
<b>Reference Outputs</b>	+10 VDC 10 mA
<b>Max. Solenoid Output Current</b>	1.3A with set value 10V
<b>Ambient Temp. Range</b>	0°C to +70°C (+32°F to +158°F), Standard Range
<b>Ramps</b>	0 to 5 seconds adjustable
<b>Shielded Cable Connection</b>	Supply connections + valve: 1.5 sq. mm (16 AWG) Command Signals: 0.5 sq. mm (20 AWG)
<b>Fuse</b>	2A medium lag, DIN 41571/5x20 mm

**Ordering Information**

**For new applications:  
ED00104: Refer to PCD00A-400**

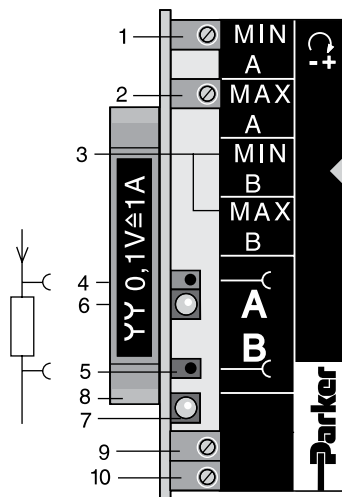


**Block Diagram — Wiring**



**D**

**Operating and Diagnostic Elements  
 (Elevation A)**



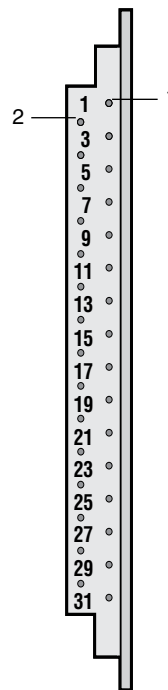
- 1 MIN-limiting for matching the lowest pressure
- 2 MAX-limiting for matching the highest pressure
- 3 Not used
- 4 Red socket for current diagnostic
- 5 Black socket for current diagnostic
- 6 Red LED (A) for:  
 - function indicator control solenoid  
 - (B unused here)
- 7 Yellow LED for:  
 - correct voltage supply
- 8 Red grip strip with reference information for measured values on the diagnostic sockets
- 9 UP ramp potentiometer
- 10 Down ramp potentiometer

**Notes:**

- Turn off the electrical power to this board whenever the hydraulic supply to the valve is not on.
- Always turn off the power to this board before removing it from the card holder.

Only potential-free measuring equipment to be used

**Connector  
 (Elevation B)**



- 11 Reference potential 0V supply
- 13 Input ramp disable
- 14 Input command voltage 0 to +10 VDC
- 16 Output +10V reference
- 18 Input 24 VDC supply
- 22 Input external ramp option
- 25 Output control solenoid
- 26 Output control solenoid
- 27 Input external ramp option
- 31 Reference potential 0V set value

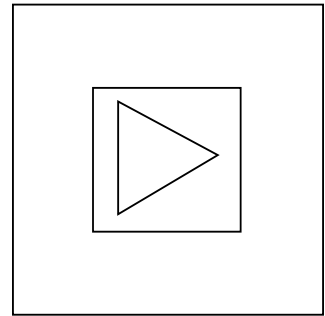
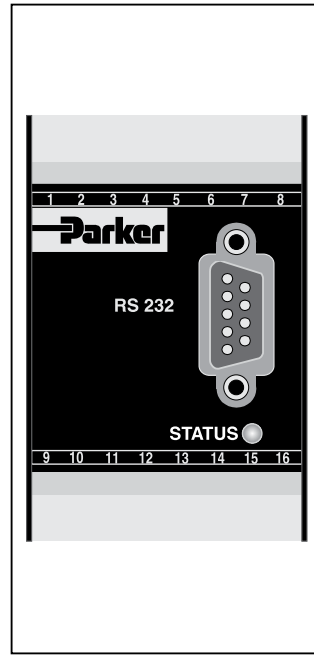
**General Description**

Series PCD00A-400 electronic module for driving proportional pressure control and proportional throttle valves is compact and easy to install with DIN rail mounting and plug-in terminals. The module is designed to drive two coils independent of each other. The digital design allows for programmable parameters such as solenoid drive current, mins, maxs, ramps and setpoints. The module provides flexibility and repeatability from unit to unit. The module parameters are programmed with an RS-232 interface and user friendly software (ProPxD) with default values for standard valves.

The PCD00A-400 module contains the functions required by typical pressure control and throttle valve applications (series RE\*W, PE\*W, DSAE, VBYP, VMY, TDA, and TEA valves).

**Features**

- Two independent valve drivers.
- Ramps, Setpoints, Mins, Maxs.
- 5 output current selections.
- Programmable parameters.
- RS-232 Interface.



- User friendly programming software.
- Plug-in terminals.
- Compliant with European EMC Standards.

**Specifications**

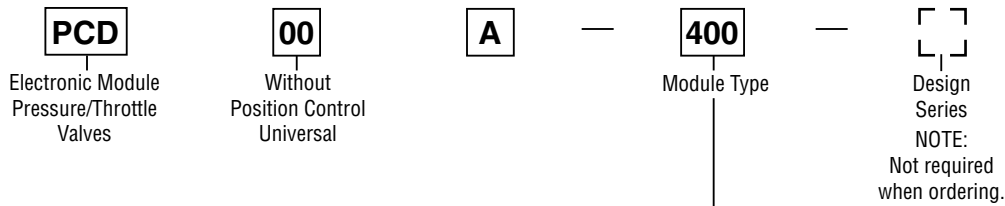
General			
<b>Model</b>	Module package for snap-on mounting on EN 50022 rail	<b>Mounting Position</b>	Any
<b>Package Material</b>	Polycarbonate	<b>Ambient Temperature Range</b>	-20°C to +60°C (-4°F to +140°F)
<b>Inflammability Class</b>	V2 to V0 acc. UL 94	<b>Protection Class</b>	IP 20 acc. DIN 40050
Electrical			
<b>Duty Ratio</b>	100%	<b>Status Signal</b>	Off – 0 to 0.5 VDC; On – Us; rated max. 15 mA
<b>Supply Voltage</b>	18 VDC to 30 VDC, ripple < 5% eff., surge free* (29 VDC to 30 VDC for 24 V coils)	<b>Adjustment Ranges</b>	<b>preset</b>
<b>Switch-on Current Typ.</b>	22A for 0.2 mS	Minimum	0 to 50%      0 to 1000
<b>Current Consumption Max.</b>	5.0A	Maximum	50 to 100%      0 to 1000
<b>Pre-fusing</b>	6.3A medium lag	Ramp Time	0 to 32.5 s      0 to 32.5
<b>Command Signal</b>	0 to +10 VDC, ripple < 0.01 % eff., surge free, Ri = 150K ohm	Current	0.8/3.5/2.7/1.8/1.3 A      0/1/2/3/4/5
<b>Input Signal Resolution</b>	0.025%	<b>Interface</b>	RS 232C, DSub 9p. male for null modem cable
<b>Differential Input Voltage Max.</b>	30V for terminals 5 and 6 against PE (terminal 8)	<b>EMC</b>	EN 50081-2, EN 50082-2
<b>Enable Signal</b>	Off – 0 to 5.0 VDC; On – 8.5 to 30 VDC; Ri = 30K ohm	<b>Connection</b>	Screw terminals 0.2 to 2.5 mm <sup>2</sup> , plug-in
<b>Channel Recall Signal</b>	Off – 0 to 5.0 VDC; On – 8.5 to 30 VDC; Ri = 30K ohm	<b>Cable Specification</b>	16 AWG overall braid shield for supply voltage and solenoids 20 AWG overall braid shield for sensor and signal
		<b>Cable Length</b>	50m (164 ft.)

PCD00A-400.indd, ddp





**Ordering Information**

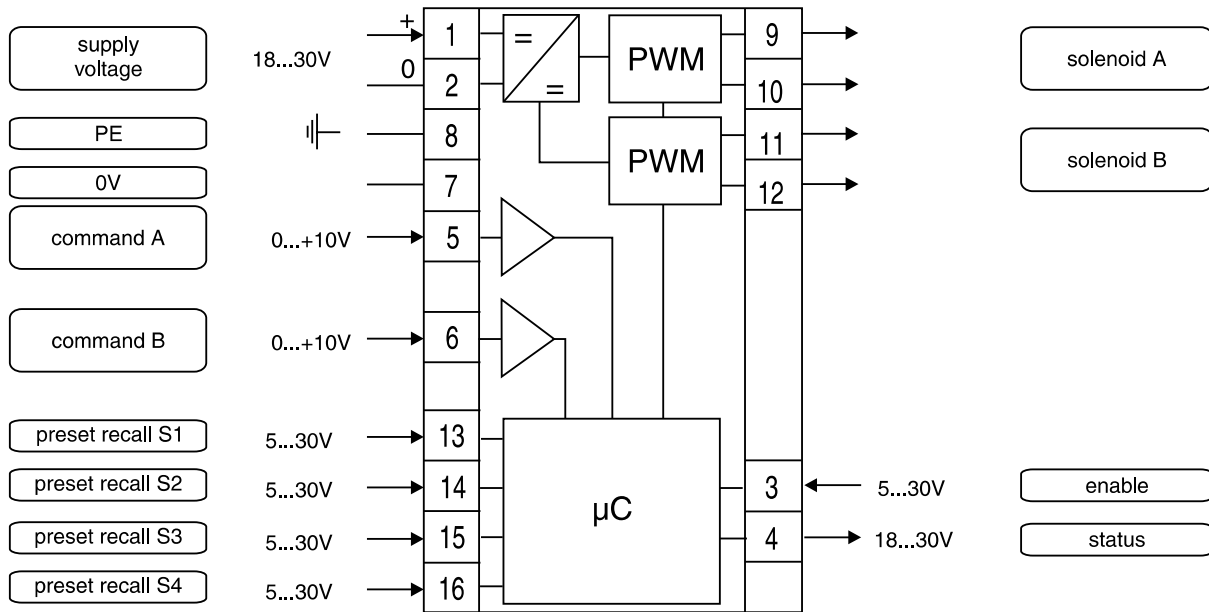


**Weight:** 160 g (0.35 lbs.)

Code	Description
400	2 Amplifiers, MIN/MAX-adjustment, UP/DOWN ramps, Command inputs, 4 Command signal presets

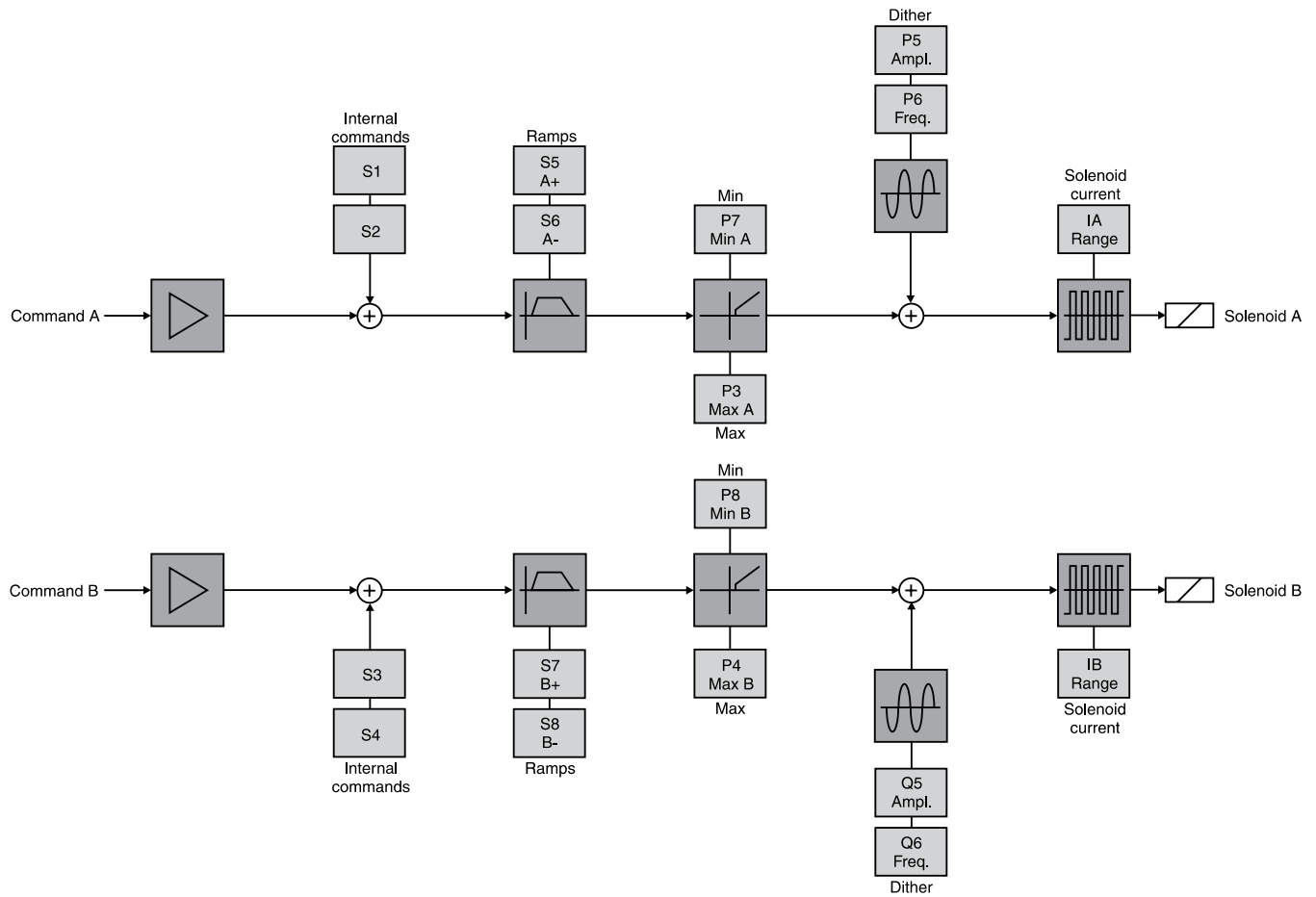


**Block Diagram — Wiring**



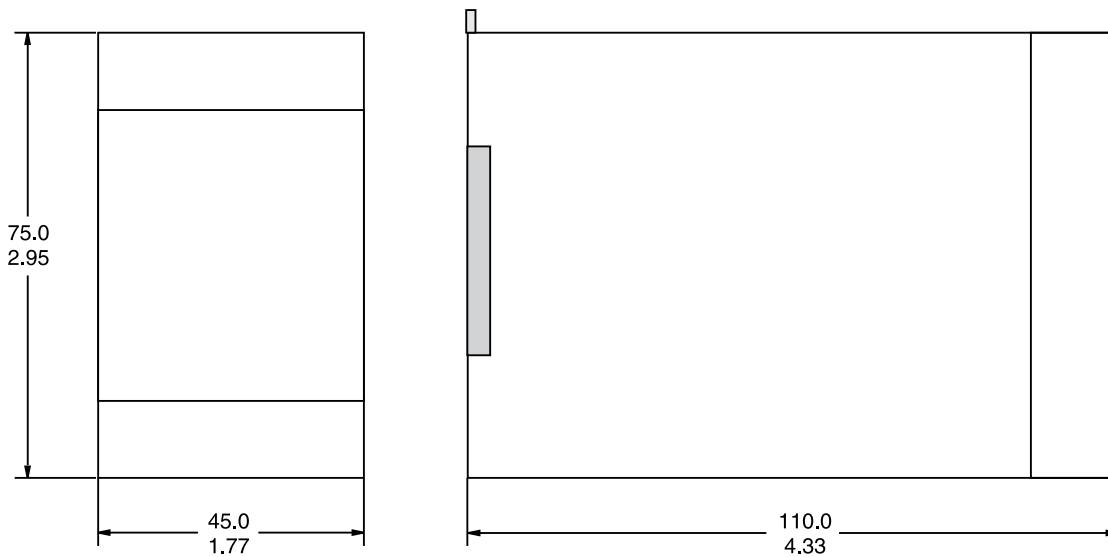


**Signal Flow Diagram**



**Dimensions**

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



## ProPxD Interface Program

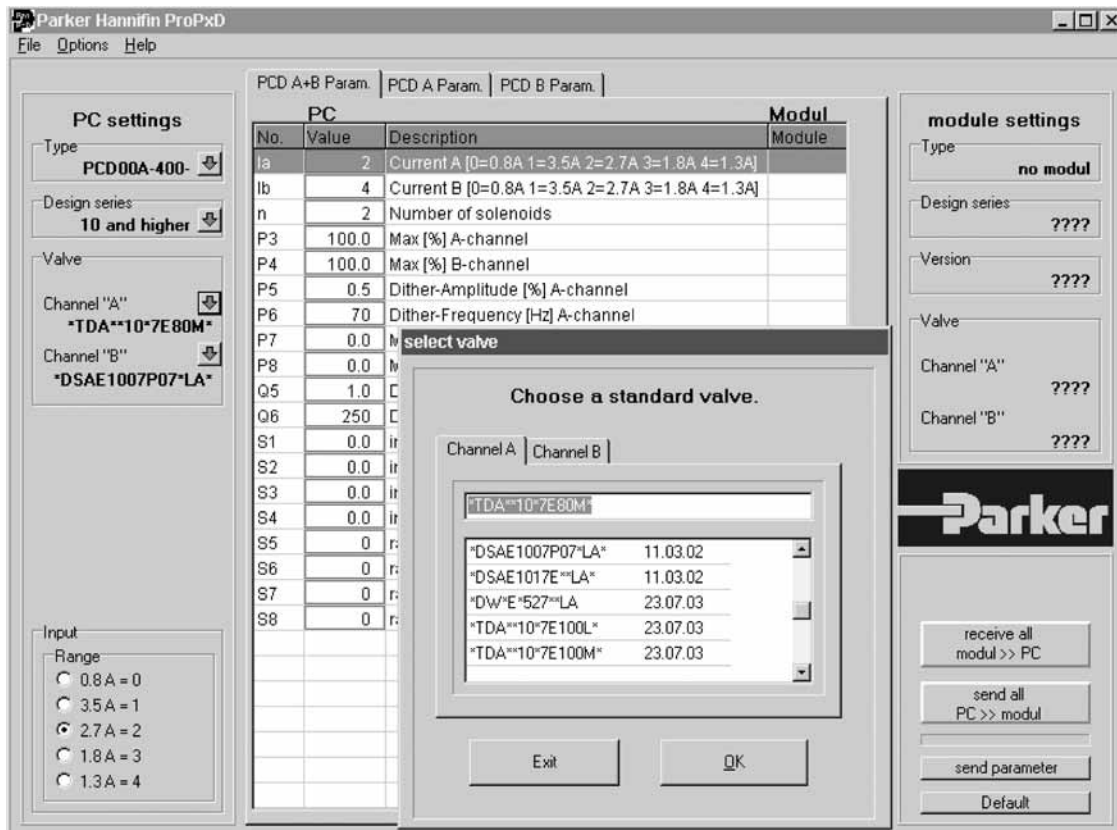
The new ProPxD software permits comfortable parameter setting for the electronic module series PCD, PWD, PZD and PID.

Via the clearly arranged entry mask the parameters can be noticed and modified. Storage of complete parameter sets to floppy or hard disk is possible as well as printout or record as a text file for further documentation. Stored parameter sets may be loaded anytime and transmitted to the electronic module in the same manner as the basic parameters which are available for all usable valve series. Inside the electronic a nonvolatile memory stores the data with the option for recalling or modification.

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- Communication between PC and electronic via serial interface RS-232 and null modem cable.
- Simple to use interface program. Download free of charge [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) → **Services** → **downloads**

**D**



**General Description**

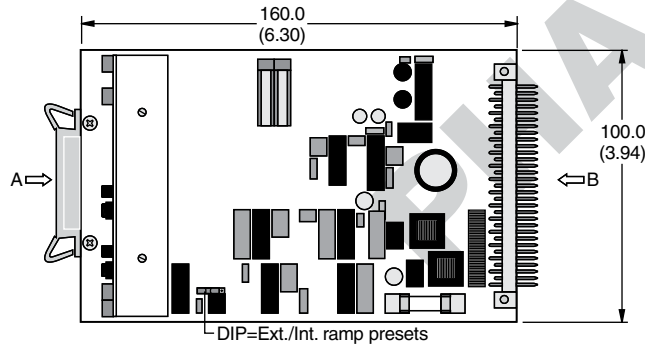
Series ET\*104 electronic module is used to control TDA and TEA proportional throttle valves configured with the 'L' solenoid option. For valves configured with the 'M' solenoid option, refer to driver card PC-D00A-400. The module accepts a 0 to 10 volt command signal, and produces a proportionally linear output current used to drive the valve's proportional solenoid. Note that the linearity of the valve itself determines the linearity of the system. Refer to the specific valve data for actual linearity performance. Two ramp adjustments provide control of actuator acceleration and deceleration.

**Features**

- Processing and amplification of the externally supplied positive set-values into output signals for the control solenoid.
- Can be combined with PZD00A-400 or external programmable control.
- DIP switch from internal ramp generation to external ramp setting.
- MIN/MAX limiters for matching the working range to the full set value range.
- Pulsed low-loss amplifier power stage with supporting constant current control for constant, temperature-independent, solenoid forces.
- Dither generator with applied frequency to improve static characteristics.
- Diagnosis by means of diagnostic sockets as well as LEDs for indicating working conditions.

**Dimensions**

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



**For new applications:  
ET\*104: Refer to PCD00A-400**

**Ordering Information**

**ET**  
Electronic Module  
Pressure Valve

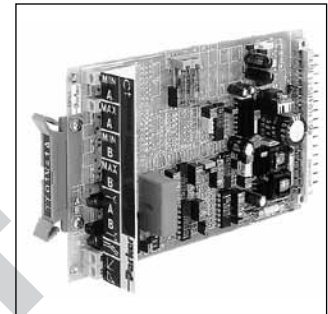
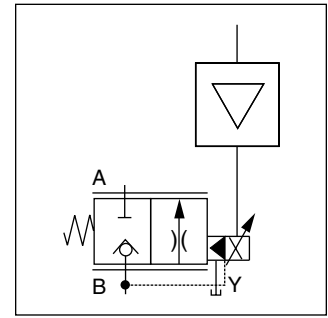
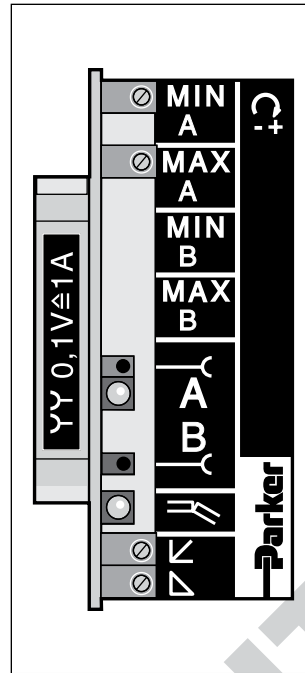
**□**  
Size

**104**  
Module Type

**□**  
Design Series

Code	Valve	Sol.
00	TDA...LAF E16 to E50	35mm
00	TEA...LAF E16 to E50	35mm
99	TDA...LAF E63 to E100	60mm
99	TEA...LAF E63 to E100	60mm

Code	Description
104	Amplifier, adjustable MIN/MAX limits, UP/DOWN ramps for valves with 'L' solenoid option

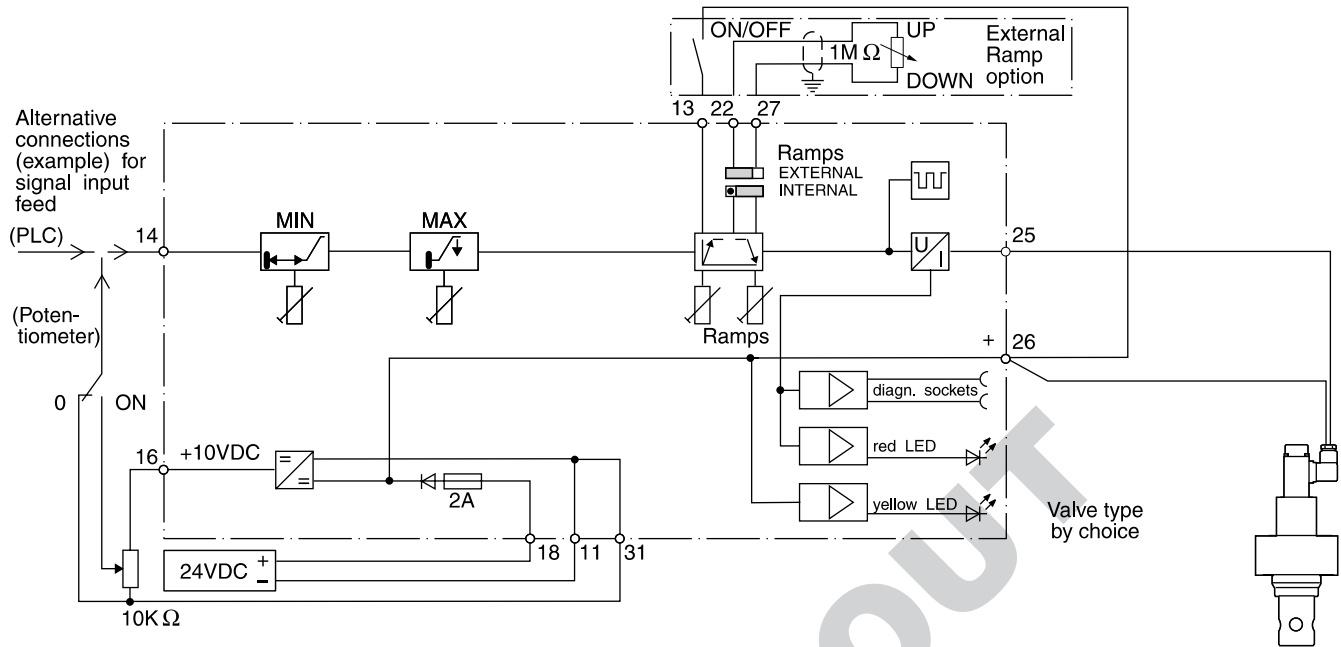


**D**

**Specifications**

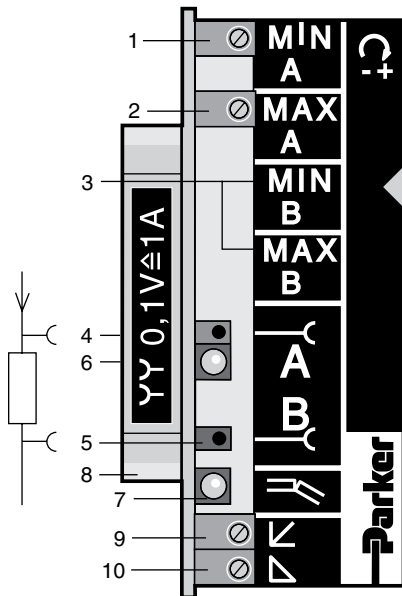
<b>Connection</b>	31 Pole Male Connector, DIN 41617
<b>Power Supply</b>	Regulated: 18-26V Unregulated: 22-38V
<b>Power Required</b>	40 VA
<b>Command Signal</b>	0 to +10 VDC
<b>Input Select Voltage</b>	5 to 30 VDC
<b>Reference Outputs</b>	+10 VDC 10 mA
<b>Max. Solenoid Output Current</b>	1.05A with set value 10V
<b>Ambient Temp. Range</b>	0°C to +70°C (+32°F to +158°F), Standard Range
<b>Ramps</b>	0 to 5 seconds adjustable
<b>Shielded Cable Connection</b>	Supply connections + valve: 1.5 sq. mm (16 AWG) Command Signals: 0.5 sq. mm (20 AWG)
<b>Fuse</b>	2A medium lag, DIN 41571/5x20 mm

**Block Diagram — Wiring**



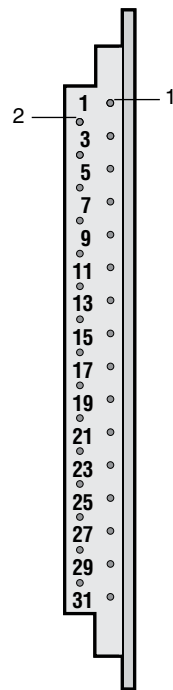
**D**

**Operating and Diagnostic Elements (Elevation A)**



- 1 MIN limiter for matching the smallest throttle aperture
- 2 MAX limiter for matching the largest throttle aperture
- 3 not used
- 4 Red socket for current diagnostic
- 5 Black socket for current diagnostic
- 6 Red LED (A) for:  
- function indicator control solenoid  
- (B not used)
- 7 Yellow LED for:  
- correct voltage supply
- 8 Green grip strip with reference information for measured values
- 9 UP ramp potentiometer
- 10 DOWN ramp potentiometer

**Connector (Elevation B)**



- 11 Reference potential 0V supply
- 13 Input ramp disable
- 14 Input command voltage 0...+10 VDC
- 16 Output +10V reference
- 18 Input 24 VDC supply
- 22 Input external ramp option
- 25 Output control solenoid
- 26 Output control solenoid
- 27 Input external ramp option
- 31 Reference potential 0V set value

**Notes:**

- Turn off the electrical power to this board whenever the hydraulic supply to the valve is not on.
- Always turn off the power to this board before removing it from the card holder.

Only potential-free measuring equipment to be used

## General Description

Series BD90 servo amplifiers are high performance amplifiers designed to work with Series BD and DY servovalves. The amplifiers are packed with many desirable features that make them extremely versatile performers in motion control systems.

## Features

- **Voltage or Current Commands** — The user has the option of command input ranges of either  $\pm 14$  VDC or  $\pm 28$  mA.
- **Two Differential Input Feedback Amplifiers** — Both inner and outer loops have Proportional-Integral-Derivative gain.
- **Built-in Power Supply** — The BD90 has its own power supply with inputs rated at either 115 VAC or 230 VAC.
- **Dither Circuitry** — The user can select either the on-board 60 Hz dither circuit, or input his own external dither frequency.
- **Reference Power Supply** — A reference supply voltage of  $\pm 15$  VDC @ 350 mA, and  $\pm 10$  VDC @ 50 mA.
- **External Logic Shutdown** — Allows the user to shut down the output to the valve by applying an external voltage signal.
- **Convenient Mounting** — The BD90 mounts in a convenient standard “Snap-Trac” mount.
- **Plug-in Terminal Strips** — This feature makes it unnecessary to remove the wires from the terminal strip.

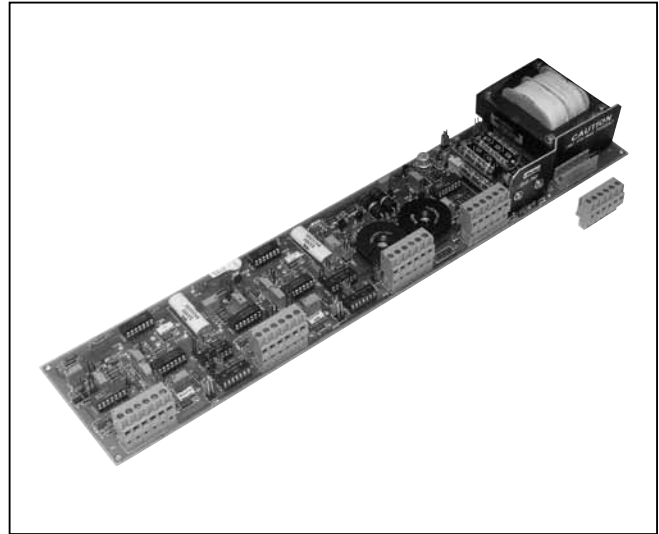
## Ordering Information

**BD**  
Servo Amplifier  
for BD Series and  
DY (>15mA) Series  
Servovalves

**90**  
Input Power

Code	Description
90	115 VAC

BD90 Connector 1000177  
Snap-Trac BD90 830007-15  
**Snap-Trac is included with delivery**

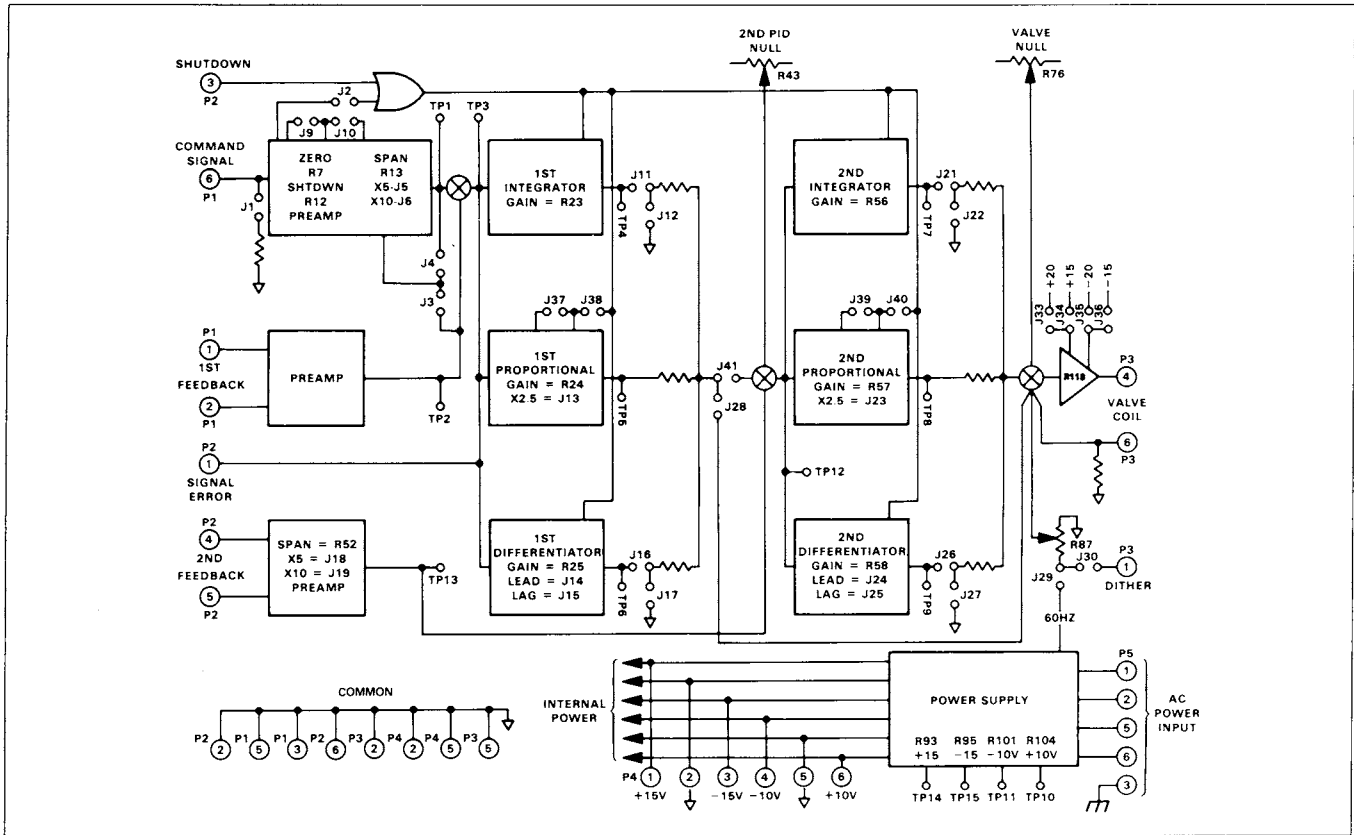


## Specifications

<b>Power Supply</b>	BD90 – 115 VAC or 230 VAC @ 30 VA, 50/60 Hz
<b>Command Signal Range</b>	$\pm 14$ VDC, $\pm 28$ mA
<b>Input Impedance on Command Terminals</b>	100k ohm minimum
<b>Input Impedance on Feedback Terminals</b>	50K ohm minimum
<b>Current Output</b>	15 to 150 mA $I_{coil} \times R_{coil} \leq 12.5V$ (BD90 up to 200 mA with J33 and J35)
<b>Operating Temperature Range</b>	0°C to 70°C (32°F to 158°F)
<b>Reference Voltage</b>	$\pm 15$ VDC @ 350 mA
<b>Supplies</b>	$\pm 10$ VDC @ 50 mA
<b>External Logic Shutdown Voltage Required</b>	+4 to +10 VDC, sink input
<b>Shutdown Input Impedance</b>	10K ohm
<b>Protection Class</b>	Open, not rated

**D**

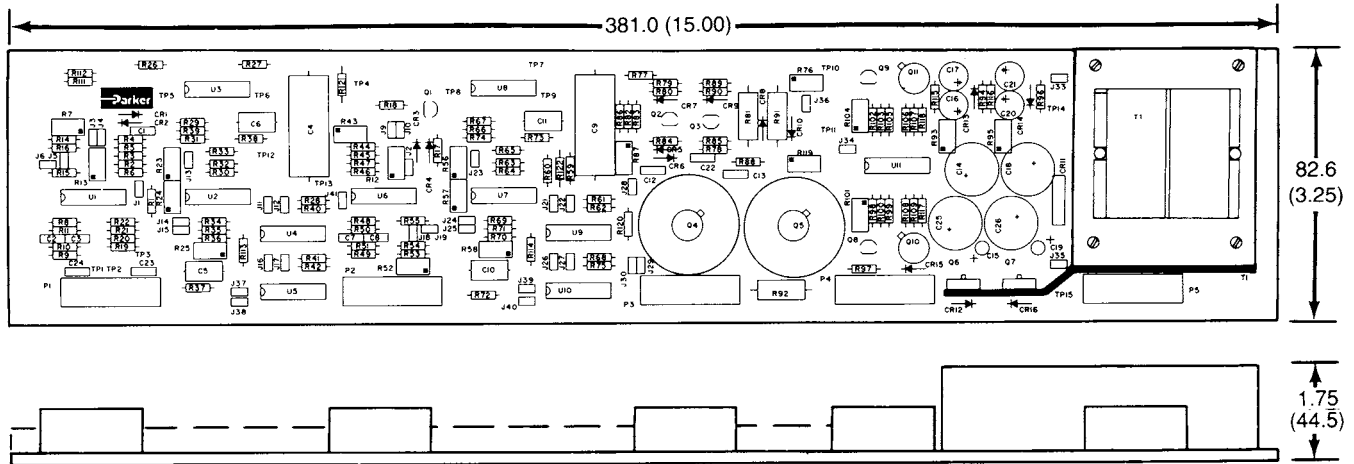
**Block Diagram — Wiring**



**BD90 Servo Amplifier**

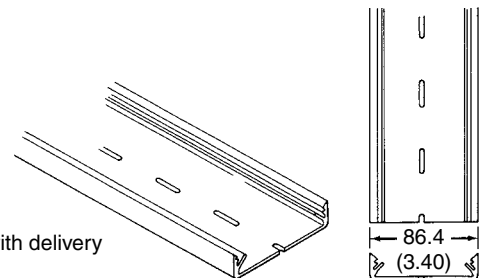
**Dimensions**

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



**BD90 Servo Amplifier**

Snap-Trac is included with delivery



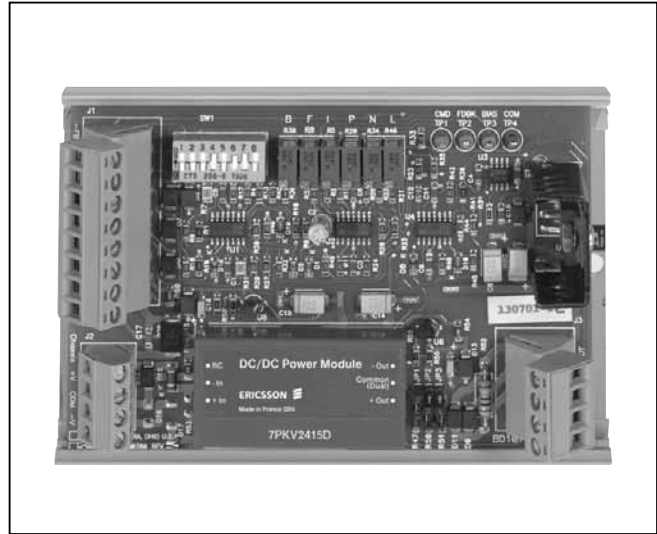
## General Description

Series BD101 is an accessory card designed to solve a variety of common system problems. It is available in both  $\pm 15$  VDC and 24 VDC versions.

This card can function as a current driver for the BD servo valves. Maximum current outputs of  $\pm 30$  mA,  $\pm 60$  mA,  $\pm 100$  mA and  $\pm 150$  mA are jumper configurable.

Closed loop options are switch selectable with integral and proportional control. Feedback scaling, input bias, and gain adjustments are provided. Outputs currents up to  $\pm 150$  mA or voltage output of  $\pm 10$  VDC are available.

Current command of  $\pm 20$  mA can be converted to  $\pm 10$  VDC.



## Features

- Open loop current driver for up to  $\pm 150$  mA.
- $\pm 20$  mA input to  $\pm 10$  VDC output option.
- Closed loop option with proportional and/or integral control.
- $\pm 10$  VDC reference voltages available.
- Available in  $\pm 15$  VDC and +24 VDC versions.
- Differential inputs provide better noise immunity.
- Scaling and bias available on input signals.

## Specifications

<b>Power Supply Input</b>	BD101-15 $\pm 15$ VDC @ 200 mA BD101-24 24 VDC Nominal (22-28 VDC) @ 250 mA
<b>CMD and FDBK Inputs Voltage</b>	Differential Inputs $\pm 10$ VDC max. 100K ohm input impedance
<b>Current</b>	$\pm 20$ mA max switch configurable 499 ohm input impedance
<b>Reference Voltages</b>	$\pm 10$ VDC @ 10 mA
<b>Current Output</b>	$\pm 30$ mA, $\pm 60$ mA, $\pm 100$ mA, or $\pm 150$ mA Fixed up to $\pm 150$ mA Adjustable lcoil Rcoil $\leq 12.5$ V
<b>Voltage Output</b>	$\pm 10$ VDC @ 10 mA 1000 ohm output impedance
<b>Operating Temperature Range (Ambient)</b>	BD101-15: 0°C to 70°C (32°F to 158°F)  BD101-24: 0°C to 70°C (32°F to 158°F) ( $\leq 100$ mA load)  0°C to 55°C (32°F to 131°F) ( $> 100$ mA load)
<b>Size</b>	82.6mm (3.25") wide x 127mm (5.00") long x 38.1mm (1.5") high
<b>Mounting</b>	Snap-Trac Parker PN 830007-5.25





**Ordering Information**

**BD**  
 Signal  
 Conditional  
 Card

**101**  
 Style

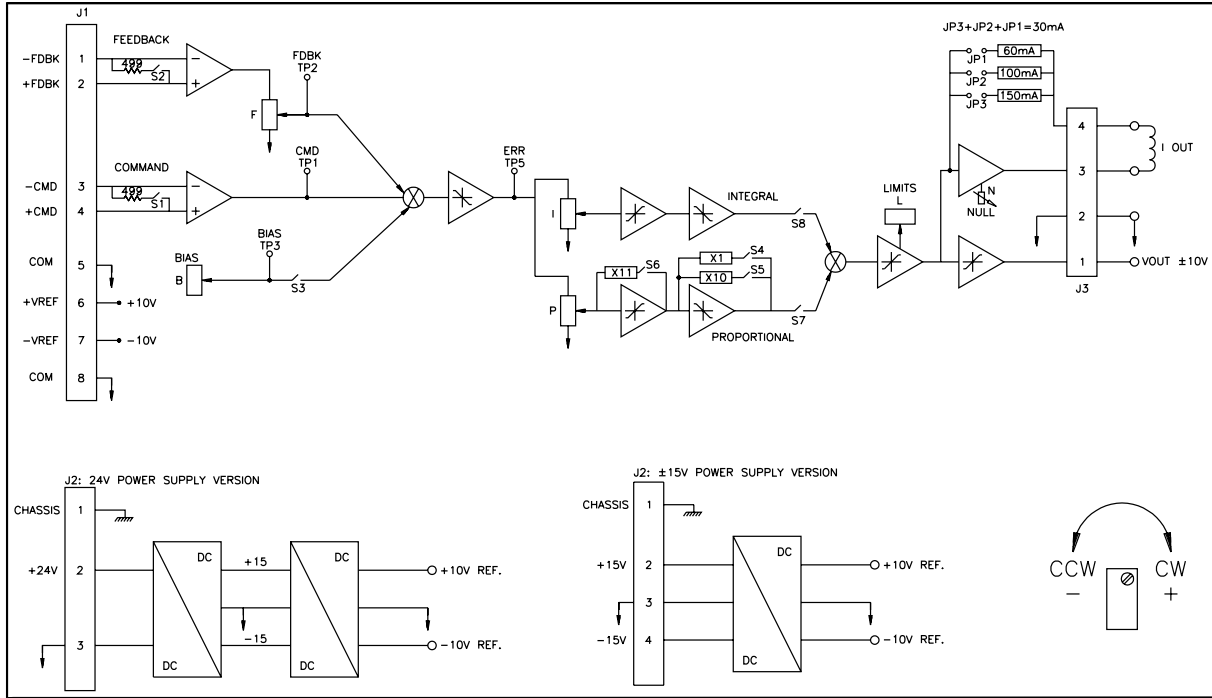
Code	Description
15	±15 VDC @ 200 mA
24	24 VDC nominal

Design  
 Series

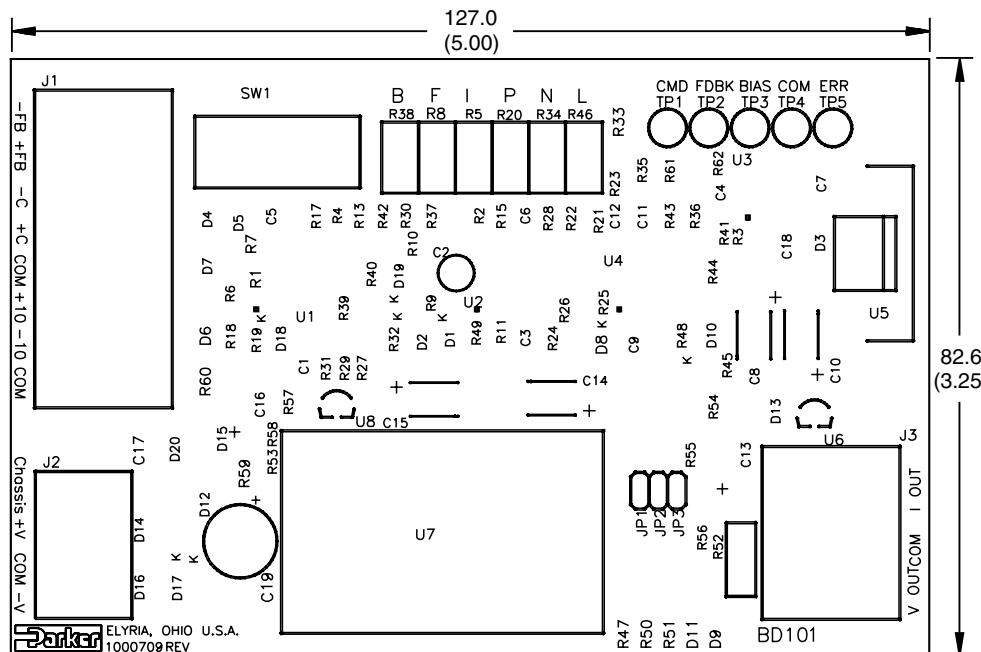
NOTE:  
 Not required  
 when ordering.

Note: Snap-Trac is included with delivery

**Block Diagram — Wiring**



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



BD101.indd, ddp





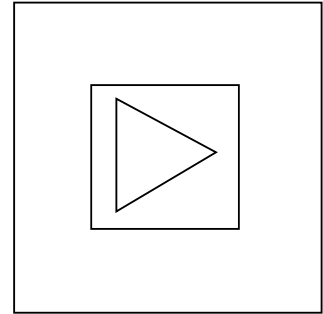
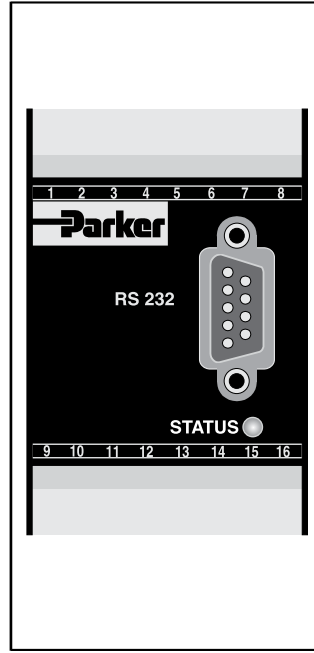
**General Description**

Parker electronic modules PID00A-40\* for rail mounting are compact, easy to install and provide time saving wiring by disconnectable terminals. The digital design of the circuit results in good accuracy and optimal adaption for closed loop controls by a comfortable interface program.

**Features**

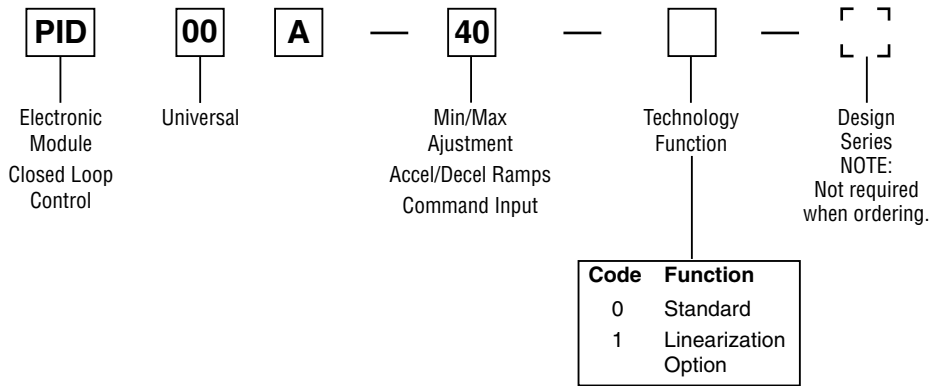
The described electronic unit combines all necessary functions for the optimal operation of closed loop controls. The most important features are:

- Extended PID controls.
- Speed control with position feedback.
- Differential input stage with different signal options.
- Output stage with different output options.
- Four-quadrant ramp function.
- Status indicator.
- Digital circuit design.
- Parametering by serial interface RS-232.
- Connection by disconnectable terminals.
- Compatible to the relevant European EMC standards.



- Optional technology function "linearization"
- Simple to use interface program.

**Ordering Information**



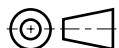
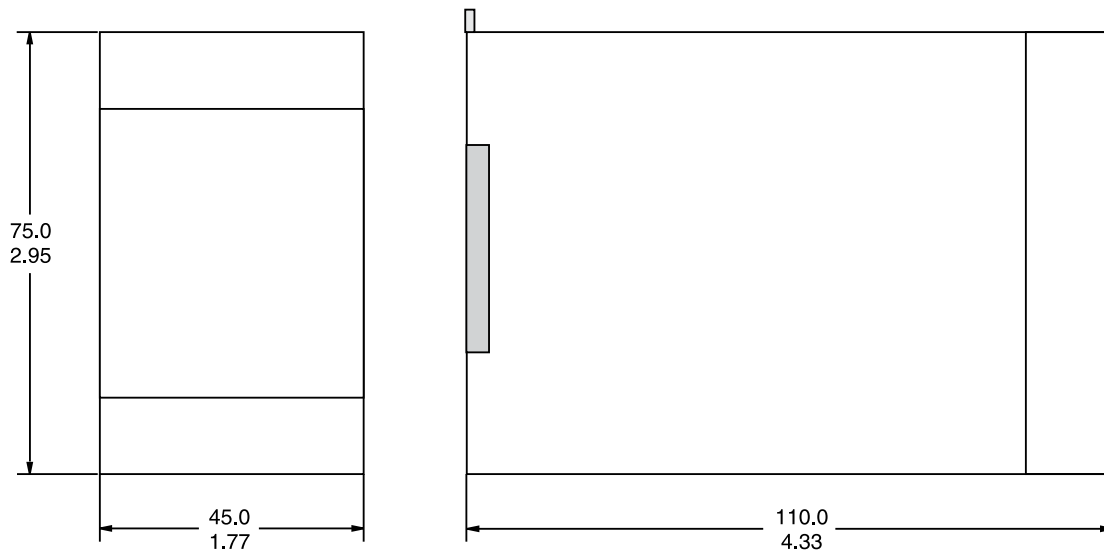
## Specifications

General		Electrical (cont.)	
<b>Model</b>	Module package for snap-on mounting on EN 50022 rail	<b>Input Signal Resolution</b>	0.025 %
<b>Package Material</b>	Polycarbonate	<b>Differential Input Voltage Max.</b>	30 V for terminals 5 and 6 against PE (terminal 8)
<b>Inflammability Class</b>	V2...V0 acc. UL 94	<b>Enable Signal</b>	0...2.5 V: OFF / 5...30 V: ON Ri = 100 kOhm
<b>Mounting Position</b>	Any	<b>Status Signal</b>	0...0.5 V: OFF / Us: ON rated 15 mA maximum
<b>Ambient Temperature</b>	-20°C to +60°C (-4°F to +140°F)	<b>Monitor Signal</b>	+10...0...-10 V, rated 5 mA max., signal resolution 0.4%
<b>Protection Class</b>	IP 20 acc. DIN 40050	<b>Adjustment Ranges</b>	Minimum: 0...50 % Maximum: 50...100% Ramp: 0...32.5 s Zero Offset +100%...-100%
<b>Weight</b>	0.16 kg (0.35 lbs.)	<b>Interface</b>	RS 232C, DSub 9p. male for null modem cable
Electrical		<b>EMC</b>	EN 50081-2, EN 50082-2
<b>Duty Ratio</b>	100%	<b>Connection</b>	Screw Terminals 0.2...2.5 mm <sup>2</sup> , disconnectable
<b>Supply Voltage</b>	18...30 VDC, ripple <5% eff., surge free	<b>Cable Specification</b>	20 AWG overall braid shield
<b>Current Consumption Max.</b>	100 mA	<b>Cable Length</b>	50 m (164 ft.)
<b>Pre-fusing</b>	500 mA	Options	
<b>Command Signal Options</b>	+10...0...-10 V, ripple <0.01 eff., surge free, Ri = 100 kOhm +20...0...-20 mA, ripple <0.01 eff., surge free, Ri = 200 kOhm 4...12...20 mA, ripple <0.01 eff., surge free, Ri = 200 kOhm <3.6 mA = solenoid output OFF, <3.8 mA = solenoid output ON, (acc. NAMUR NE43)	<b>Technology Function</b>	Code 1: Software adjustable transfer function with 10 compensation points for linearization of valve behavior

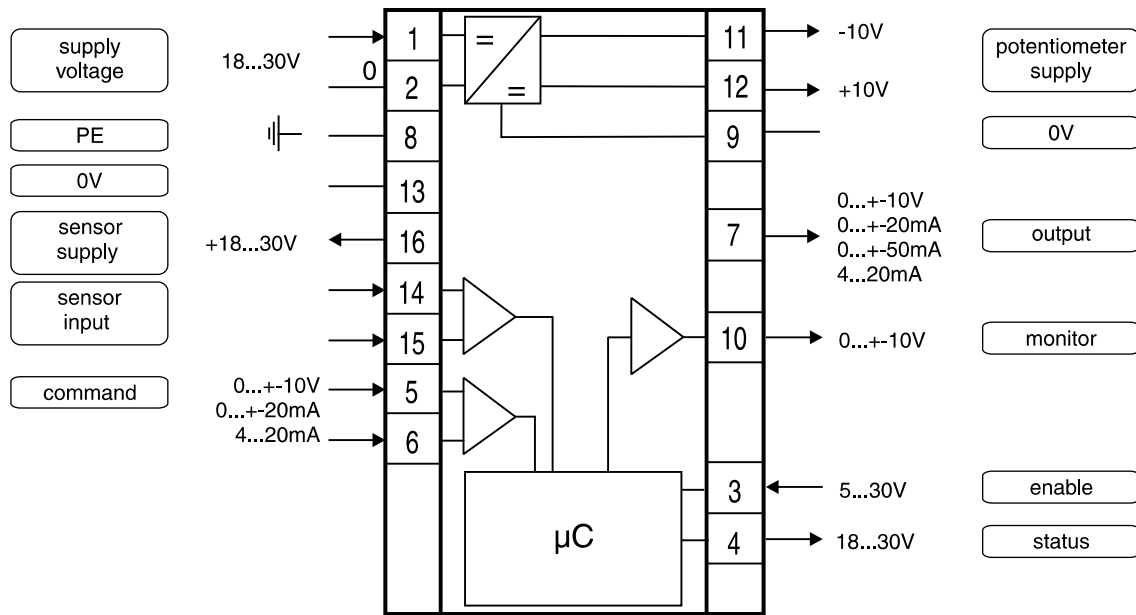
**D**

## Dimensions

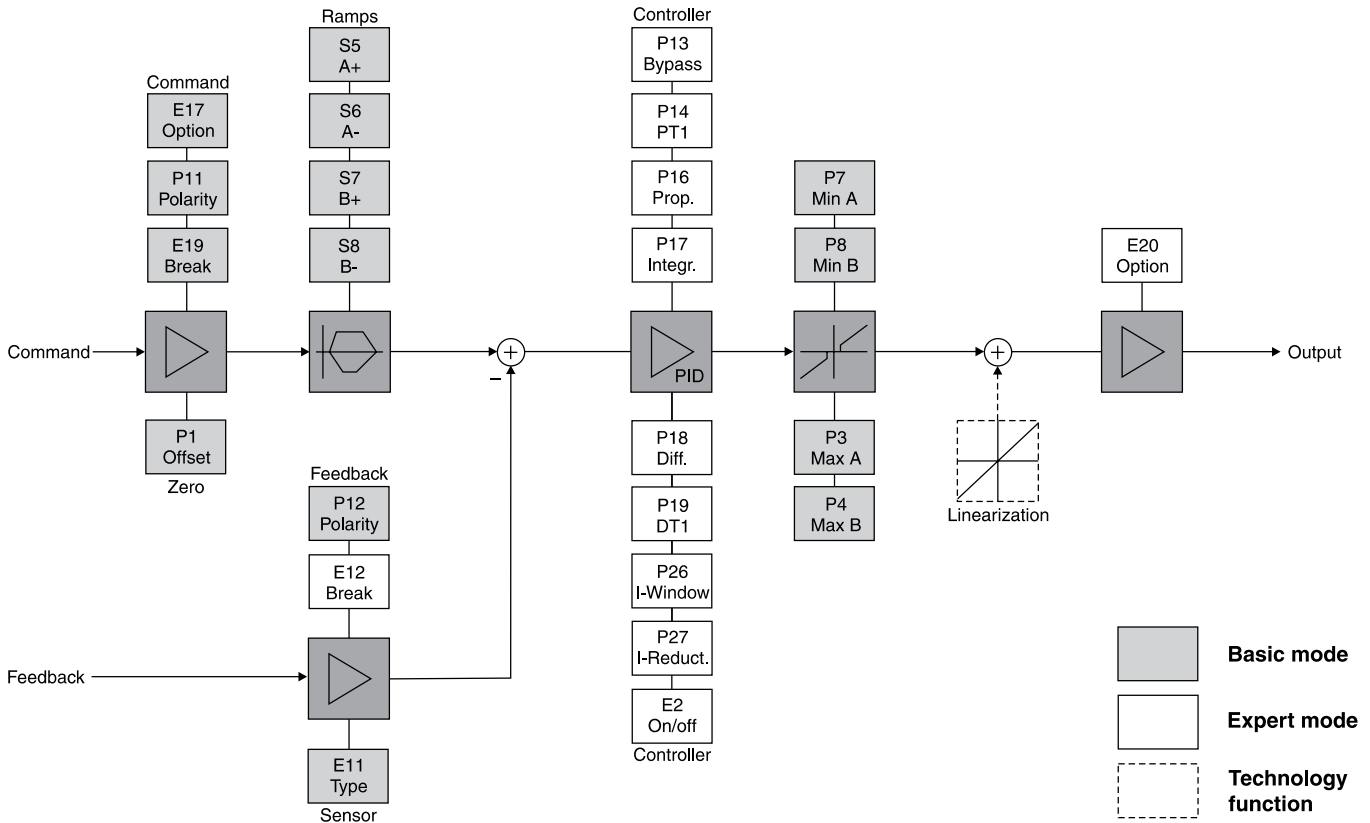
Inch equivalents for millimeter dimensions are shown in (\*\*)



**Block Diagram — Wiring**



**Signal Flow Diagram**



## ProPxD Interface Program

The new ProPxD software permits comfortable parameter setting for the electronic module series PCD, PWD, PZD and PID.

Via the clearly arranged entry mask the parameters can be noticed and modified. Storage of complete parameter sets to floppy or hard disk is possible as well as printout or record as a text file for further documentation. Stored parameter sets may be loaded anytime and transmitted to the electronic module in the same manner as the basic parameters which are available for all usable valve series. Inside the electronic a nonvolatile memory stores the data with the option for recalling or modification.

## Features

- User-friendly editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronic via serial interface RS-232 and null modem cable.
- Simple to use interface program. Download free of charge [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) → **Services** → **downloads**

**D**

The screenshot shows the Parker Hannifin ProPxD software interface. It features a menu bar (File, Options, Help, Specials), a main table of PID parameters, and several side panels for settings and module information.

PID Param			PC	Modul
No	Value	Description	Module	Module
E17	1	Command Input (see Installation man)	1	1
E19	0	cable break detection cmd in 1= active(4...20mA)	0	0
E11	15	Type of feedback transducer (see Installation man)	15	15
P20	100 0	feedback scale [%]	100 0	100 0
E12	0	cable break detection fdb 1= active	0	0
E20	1	Command Output (see Installation man)	1	1
P3	100 0	Max [%] A-channel	100 0	100 0
P4	100 0	Max [%] B-channel	100 0	100 0
P7	0 0	Min [%] A-channel	0 0	0 0
P8	0 0	Min [%] B-channel	0 0	0 0
S5	0	ramp up [ms] A	0	0
S6	0	ramp down [ms] A	0	0
S7	0	ramp up [ms] B	0	0
S8	0	ramp down [ms] B	0	0
E8		Ramp 0=const. time;1=const. rise rate, 2=1/e-fun		
E2	0	Operating mode 0=Open loop, 1=closed, 2=extern	0	0
P11	0	command signal 0=not inverted, 1=inverted	0	0
P12	0	Feedback value 0=not inverted; 1=inverted	0	0
P29	0	command output signal 0=not inverted; 1=invertie	0	0
P13	50 0	bypass gain [%]	50 0	50 0
P14	0 0	T-portion of PT1-element	0 0	0 0
P16	4 0	P-gain	4 0	4 0
P17	10 0	I-gain	10 0	10 0
P18	0 0	D-gain	0 0	0 0
P19	0 0	T-portion of DT1-element	0 0	0 0
P26	200 0	Window for I-gain activation [%]	200 0	200 0

**PC settings**  
 Type: PID00A-40\*  
 Design series: 10 und höher

**Input**  
 Range:  
 ±10V = 1  
 ±20mA = 2  
 4-20mA bi = 3  
 4-20mA uni = 12  
 0-10V uni = 15  
 ±50mA = 16

**Module settings**  
 Type: PID00A-40\*  
 Design series: 10 und höher  
 Version: 1@H

**Buttons:** Receive all PID >> PC, Send all PC >> PID, Send parameter, Default

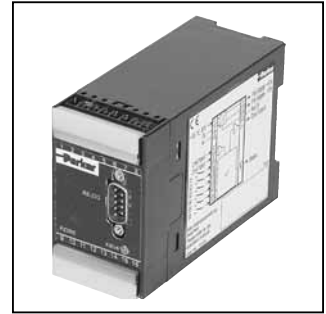
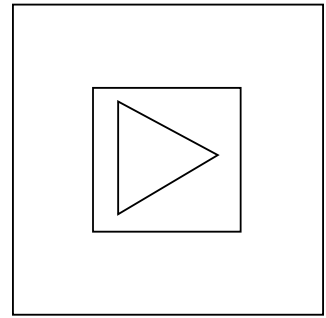
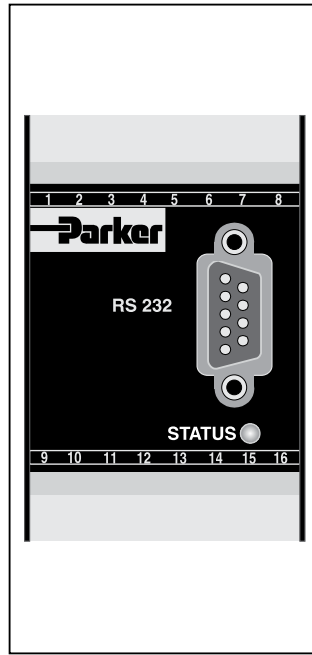
### General Description

Series PZD00A-40\* electronic modules provide options to enhance PWD, PCD driver modules and valves with onboard electronics. The modules are compact and easy to install with DIN rail mounting and plug-in terminals. The digital design allows for programmable parameters such as input signal conditioning, set-points, ramps, mins, maxs, and command output options. The modules provide flexibility for different applications and repeatability from unit to unit. The module parameters are programmed with an RS-232 interface and user friendly software (ProPxD) with default values for the standard valves.

The PZD00A-40\* module contains the functions required by typical proportional valve applications (series D\*FP, D\*\*FH valves, PWD, PCD modules).

### Features

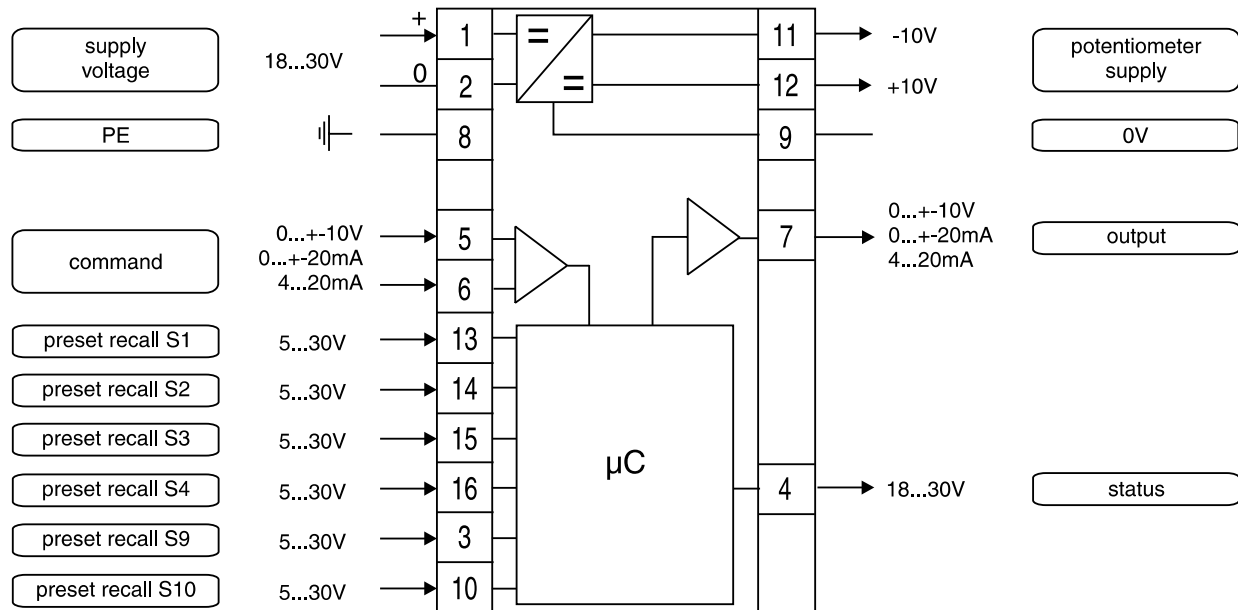
- Setpoints, ramp options, mins, maxs.
- Command output options.
- Programmable parameters.
- Reference voltages.
- RS-232 Interface.
- User friendly programming software.
- Plug-in terminals.
- Compliant with European EMC Standards.



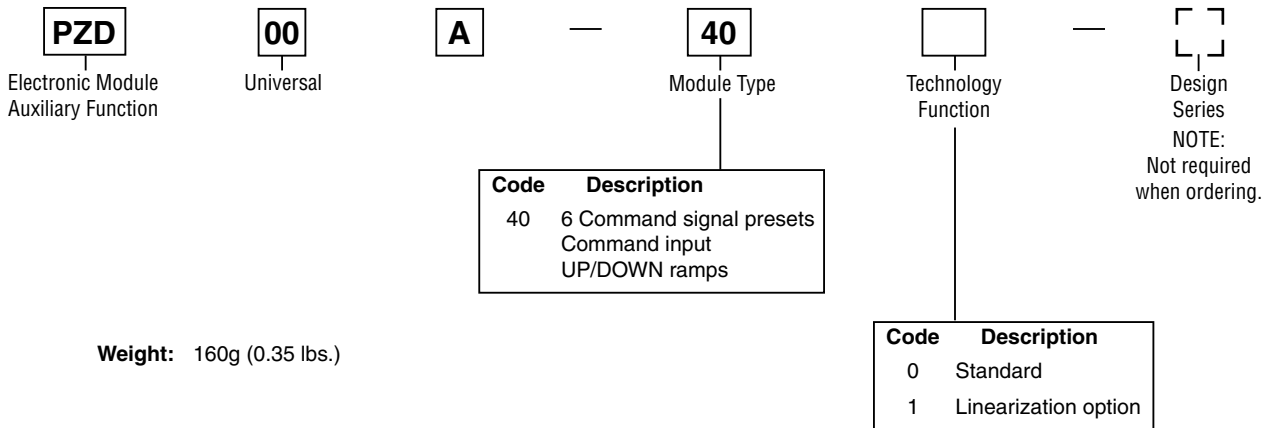
**D**



### Block Diagram — Wiring



**Ordering Information**



**Weight:** 160g (0.35 lbs.)

**D**

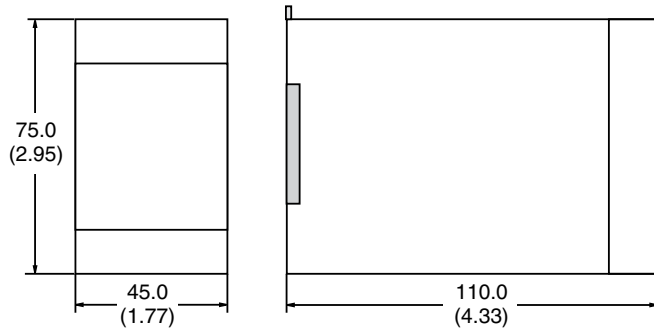
**Specifications**

General			
<b>Model</b>	Module package for snap-on mounting on EN 50022 rail	<b>Mounting Position</b>	Any
<b>Package Material</b>	Polycarbonate	<b>Ambient Temperature Range</b>	-20°C to +60°C (-4°F to +140°F)
<b>Inflammability Class</b>	V2 to V0 acc. UL 94	<b>Protection Class</b>	IP 20 acc. DIN 40050
Electrical			
<b>Duty Ratio</b>	100%	<b>Status Signal</b>	Off – 0 to 0.5 VDC; On – Supply Voltage; rated max. 15 mA
<b>Supply Voltage</b>	18 VDC to 30 VDC, ripple < 5% eff., surge free	<b>Output Signal</b>	+10 to 0 to -10 VDC, rated max. 15 mA +20 to 0 to -20 mA, Ro < 500 ohm 4 to 12 to 20 mA, Ro < 500 ohm
<b>Current Consumption Max.</b>	100 mA	<b>Output Signal Resolution</b>	0.025%
<b>Pre-fusing</b>	500 mA medium lag	<b>Reference output</b>	+10 / -10, 2%, rated max. 15 mA
<b>Command Signal</b>	+10 to 0 to -10 VDC, ripple < 0.01 % eff., surge free, Ri = 100K ohm +20 to 0 to -20 mA, ripple < 0.01 % eff., surge free, Ri = 200 Ohm 4 to 12 to 20 mA, ripple < 0.01 % eff., surge free, Ri = 200 Ohm < 3.6 mA = output signal 0 V / 0 mA / 12 mA acc. to output option > 3.8 mA = output signal on (acc. NAMUR NE43)	<b>Adjustment Ranges</b>	Minimum 0 to 50% Maximum 50 to 100% Cmd Channels +100 to -100% Ramp Time 0 to 32.5 s Zero Offset +100 to -100%
<b>Input Signal Resolution</b>	0.025%	<b>Interface</b>	RS 232C, DSub 9p. male for null modem cable
<b>Differential Input Voltage Max.</b>	30 VDC for terminals 5 and 6 against PE (terminal 8)	<b>EMC</b>	EN 50081-2, EN 50082-2
<b>Channel Recall Signal</b>	Off – 0 to 2.5 VDC On – 5 to 30 VDC Ri = 100K ohm	<b>Connection</b>	Screw terminals 0.2 to 2.5 mm <sup>2</sup> , disconnectable
		<b>Cable Specification</b>	20 AWG overall braid shield
		<b>Cable Length</b>	50m (164 ft.)
Options			
<b>Technology Function</b>	Code 1: Software adjustable transfer function with 10 compensation points for linearization of valve behavior.		



## Dimensions

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



## ProPxD Interface Program

The new ProPxD software permits comfortable parameter setting for the electronic module series PCD, PWD, PZD and PID.

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## Features

- User-friendly editing of all parameters.
- Storage and loading of optimized parameter adjustments.
- Executable with all Windows® operating systems from Windows® 95 upwards.
- Communication between PC and electronic via serial interface RS-232 and null modem cable.
- Simple to use interface program. Download free of charge [www.parker.com/euro\\_hcd](http://www.parker.com/euro_hcd) → **Services** → **downloads**

**D**

**PC settings**  
 Type: PZD00A-400  
 Design series: 11 und höher

**Input**  
 upper limit: 100.0  
 lower limit: -100.0  
 P1 = 100  
 update list

PC		Modul
No.	Value	Module
P1	0.0	
P3	100.0	
P4	100.0	
P7	0.0	
P8	0.0	
P11	0	
S1	0.0	
S2	0.0	
S3	0.0	
S4	0.0	
S9	0.0	
S10	0.0	
S5	0	
S6	0	
S7	0	
S8	0	
E22	0	
S11	0	
S12	0	
S13	0	
S14	0	
S15	0	
S16	0	
S17	0	
E17	1	
E19	0	

**module settings**  
 Type: no modul  
 Design series: ????  
 Version: ????  
 Valve:  
 Channel "A": ????  
 Channel "B": ????

receive all modul >> PC  
 send all PC >> modul  
 send parameter  
 Default



## General Description

Series Compax3F is the new member of the servo drive family of Parker Hannifin. It is especially designed for the requirements of electrohydraulic systems and in particular for position and force control of electrohydraulic axis.

### Attention:

**For application support and customized software, please contact your local Parker representative.**

### Large Drive Range

- Valves:
  - Proportional direction control valves
  - Proportional pressure relief and pressure reducing valves
  - Flow valves
- Drives:
  - Cylinders
  - Rotary drives
  - Motors

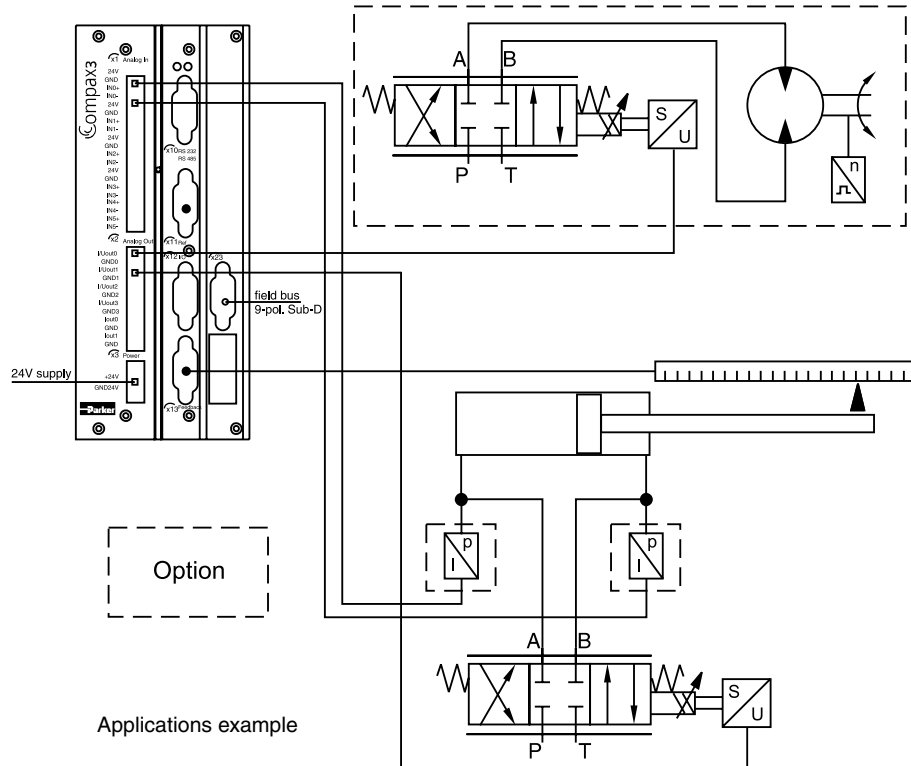
### Range of Application

- Closed loop position and force control of linear cylinders and rotary drives
- Switching between position and force control
- Synchronous run with up to 64 axes
- Feeder axis
- Position and force control of press cylinders in material forming machines
- Roller clearance control in roller presses
- Die casting machines



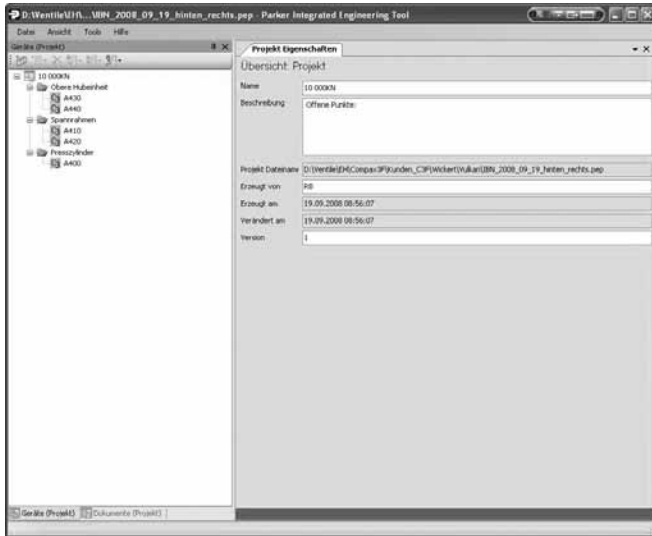
**D**

### Typical Applications



Applications example

**Project Development, Commissioning and Programming**  
**PC-Tools - Open and Transparent**



**D**

- Compax3 ServoManager
  - Intuitively understandable user interface
  - Wizard technology
  - Online help
  - Oscilloscope function
  - Optimized co-ordination of complete mechatronic systems
- Valve and Drive manager
  - All technical data of Parker valves, cylinders and drives available
  - Additionally support through the Compax3F Hydraulics-Manager by configuration of user defined valves and drives.

**Software download, free of charge:**  
**[www.compax3.com](http://www.compax3.com)**

**Monitoring and Control**

**Operator Panels**

Control equipment for all text and graphics applications in industrial environments, from two-line displays to touch-panels using field buses:

- Profibus DP
- CANopen
- DeviceNET
- Interbus-S

For further information please refer to POP: "Parker Operator Panels".

Download: [www.parker-eme.com/pop](http://www.parker-eme.com/pop).

In addition to drivers for Compax3/Compax3 powerPLmC, drivers for other PLC products can be integrated on request.



**Flexible Service and Maintenance**

**Operating Module**

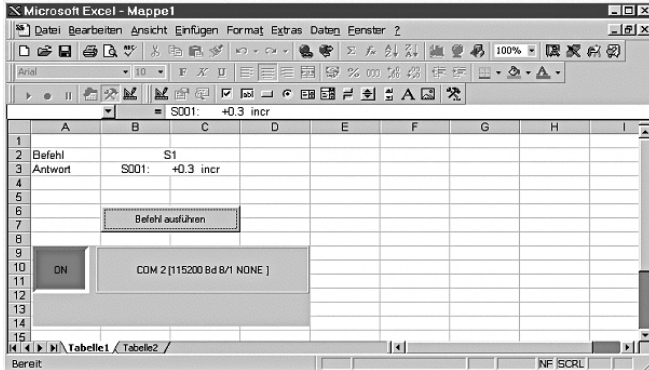
- Backlit plug-in module, text display with two sixteen-character lines
- Simple menu navigation with 4 keys
  - Display of status values and
  - clear text error messages
- Used for changing parameters and manual operation



## Integration with the Office Environment

### ActiveX Plug-in

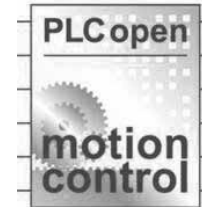
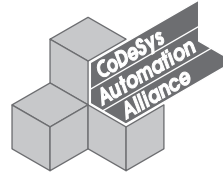
- Office and industrial environments are constantly growing closer together.
- The use of ActiveX technology allows simple integration into Office application.



## International Standards in Programming

### Advantages Offered by Integrated Standards

- Programming system
  - CoDeSys
- Programming language
  - IEC61131-3
  - Function modules based on PLCopen



**D**

## Interface

### Field Bus

- Profibus DP
- CANopen (CiADS402)
- DeviceNet
- PowerLink
- EtherCAT
- Address configurable via Dip switch

## Connection of External Inputs/Outputs

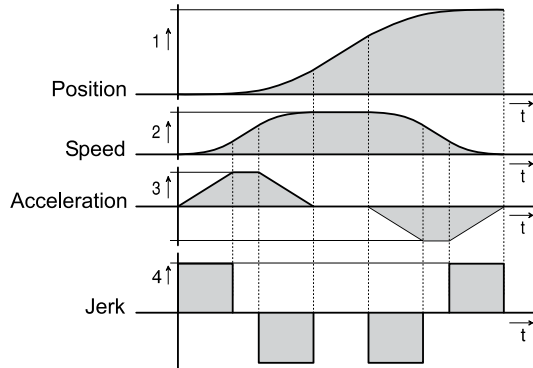
### Parker E/A-System (PIO)

Additional external digital and analog inputs and outputs can be integrated via the CANopen.



**Jerk-limited Set Point Generation, Resulting In:**

- Gentle handling of the items being moved
- Increased service life of mechanical components
- Overshoot-free positioning
- Reduced excitation of mechanical resonance frequencies



**D**

**Control**

- 2 control loops for each axis for combined position and force/pressure control

**Position Control**

- Automatic controller design for position control
  - User-oriented optimization of parameters
- Feed forward control of speed and acceleration which results in:
  - Optimization of the response behaviour
  - Minimization of the following error

**Force/Pressure Controller**

- PID controller with feed forward control of speed

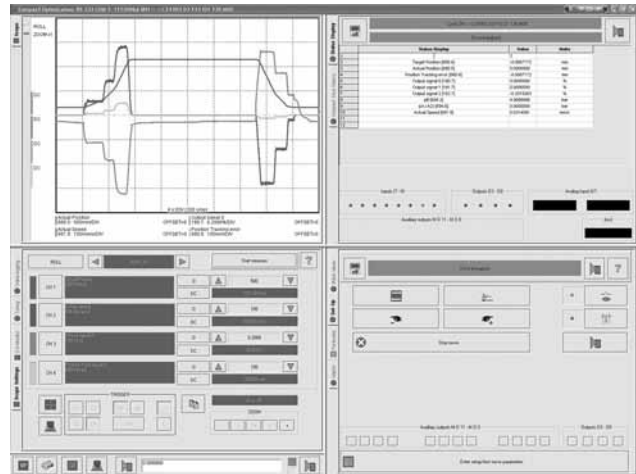
**2-Axis Synchronous Run**

**Hydraulic Specific Functions**

- Realization of many different circuit concepts with up to 4 proportional valves possible
- Linearization functions:
  - Consideration of the area of differential cylinders
  - Inverting of the valve set value
  - Compensation of the load pressure (additional pressure sensors necessary)
  - Correction of the nonlinear flow characteristic of the valve
  - Overlap compensation
  - Valve zero point correction
  - Valve set value filters
  - Valve set value limitation
  - All functions for each valve individually available
  - Automatic configuration by component selection in the Compax3 ServoManager

**Set Up Controller Optimization**

- Compax3F HydraulicsManager
  - All necessary technical data of Parker valves and drives are available
  - additional supported
- Test movement for automatic controller attitude
- Optimization with integrated oscilloscope function
- Automatic pre-setting of the controller for position control possible



<b>Function</b>	Motion control with motion profiles. Suitable for position and force/pressure control
<b>Housing / Protection Class</b>	closed metal housing, isolation according to VDE 0160 / IP 20
<b>Supply Voltage</b> [VDC]	21...27VDC, ripple <1VSS
<b>Current Requirements</b> [A]	0,8 for the device, digital outputs 100mA each
<b>Supported Feedback-Systems</b>	<ul style="list-style-type: none"> <li>• Analog 0..20mA, 4..20mA, ±10V</li> <li>• Start-Stop-Interface</li> <li>• SSI-Interface</li> <li>• EnDat2.1-Interface</li> <li>• 1VSS (max. 400kHz) Interface, 13.5Bit / Distance coding</li> <li>• TTL (RS422) (max. 5MHz), internal post-quadrature resolution</li> </ul>
<b>Set Point Generator</b>	<ul style="list-style-type: none"> <li>• Jerk-limited ramps</li> <li>• Travel data in increments, mm, inches or variable by scale factor</li> <li>• Specification of speed, acceleration, delay and jerk factor</li> <li>• Force/pressure inputs in N, psi, etc. variable by scale factor</li> </ul>
<b>Monitoring Functions</b>	<ul style="list-style-type: none"> <li>• Power/auxiliary supply range</li> <li>• Following error monitoring</li> <li>• Hard- and Software switches</li> </ul>
<b>Inputs and Outputs</b>	<ul style="list-style-type: none"> <li>• 8 control inputs: 24V DC / 10kOhm.</li> <li>• 4 control inputs Active HIGH / short-circuit protected / 24V / 100mA.</li> <li>• 4 analog current input (14Bit).</li> <li>• 2 analog voltage input (14Bit).</li> <li>• 4 analog output (16Bit, current or voltage) switchable in pairs.</li> </ul>
<b>RS232 / RS485 (switchable)</b>	<ul style="list-style-type: none"> <li>• 115200Baud</li> <li>• Word length 8 bits, 1 start bit, 1 stop bit</li> <li>• Hardware handshake XON, XOFF</li> </ul>
<b>RS485 (2 or 4-wire):</b>	<ul style="list-style-type: none"> <li>• 9600, 19200, 38400, 57600 or 115200 Baud</li> <li>• Word length 7/8Bit, 1 Start-, 1 Stop bit</li> <li>• Parity (switchable) even/odd</li> </ul>
<b>Bus Systems</b>	<ul style="list-style-type: none"> <li>• Profibus DP V0-V2 (I20), 12Mbit/s, PROFIdrive-Profil Drive technology</li> <li>• CANopen (CiADS402) (I21)</li> <li>• DeviceNet (I22)</li> <li>• PowerLink (I30)</li> <li>• EtherCAT (I31)</li> </ul>
<b>CE Compliance</b>	<ul style="list-style-type: none"> <li>• EMC interference emission/limit values for industrial utilization according to EN61 800-3 first environment (commercial and residential area), class A via integrated mains filter for up to 10mCable length, otherwise with external mains filter</li> <li>• EMC immunity/limit values for industrial utilization according to EN61 800-3</li> </ul>
<b>Insulation Requirements</b>	<ul style="list-style-type: none"> <li>• Protection class I according to EN 50178 (VDE 0160 part 1)</li> <li>• Contact protection: according to DIN VDE 0106, part 100</li> <li>• Overvoltage: Voltage class III according to HD 625 (VDE 0110-1)</li> <li>• Degree of contamination 2 according to HD 625 (VDE 0110 part 1) and EN 50178 (VDE 0160 part 1)</li> </ul>
<b>Environmental Conditions</b>	<ul style="list-style-type: none"> <li>• Climate (temperature / humidity / barometric pressure)</li> <li>• Class 3K3</li> <li>• Operation: 0 to +45 °C class 3K3</li> <li>• Storage: -25 to +70 °C class 2K3</li> <li>• Transport: -25 to +70 °C class 2K3</li> <li>• Operation: &lt;= 85% class 2K3</li> <li>• Storage: &lt;= 95% class 3K3 (relative humidity)</li> <li>• Transport: &lt;= 95% class 2K3</li> <li>• Please inquire for greater elevations</li> <li>• Protection class IP20 according EN 60 529</li> </ul>
<b>General environmental conditions acc. to EN 60 721-3-1 to 3-3</b>	
<b>Permissible ambient temperature</b>	
<b>Tolerated humidity: non condensing</b>	
<b>Elevation of operating site: &lt;=1000m above sea level for 100% load ratings</b>	
<b>EMC Directives and Harmonized EC Norms</b>	<ul style="list-style-type: none"> <li>• EC low voltage directive 73/23/EEC and RL 93/68/EEC: EN 50 178, General industrial safety norm Equipping electric power systems with electronic operating equipment</li> <li>• HD 625, general electrical safety. Insulation principles for electrical operating equipment EN 60 204-1, Machinery norm, partly applied</li> <li>• EC-EMC directive 89/336/EEC: EN 61 800-3, EMC norm Product standard for variable speed drives EN 50 081-2 ... 50 082-2, EN 61 000-4-2 ...61 000-4-5</li> </ul>
<b>UL Certification</b>	<ul style="list-style-type: none"> <li>• USL according to UL508 (listed) / CNL according to C22.2 No: 142-M1987 (listed)</li> <li>• Certified: E-File-No: E198563</li> </ul>

**C3** **F001** **D2** **F12**

Series

Interface

Technology  
 Functions

Options

Code	Interface	T11	T30	T40
I11	Digital inputs/outputs		•	•
I12	Digital inputs/outputs	•		
I20	Profibus DP V0/V1/V2 (12Mbit/s)	•	•	•
I21	CANopen		•	•
I22	DeviceNet		•	•
I30	PowerLink		•	•
I31	EtherCAT		•	•

Code	Technology Functions
T11	Positioning/pressure and force control
T30	Programmable motion control according to IEC61131
T40	Electronic Cam

Code	Options
M00	Standards
M10	Extension 12 digital I/Os & HEDA (motion bus)
M11	HEDA (motionbus)
M12	Extension 12 digital I/Os

**Weight:** 2.0 kg (4.4 lbs.)

**D**

Please order connection set ZBH02/04 for Compax 3F separately.

Complete kit with mating plug connectors (X1, X2 and X3) for Compax3 connectors and special shield connecting terminal

**Overview Technology Functions**

	T11	T30	T40
<b>Set tables for up to 31 motion profiles</b>	x		
<b>Absolute or relative positioning</b>	x	x	x
<b>Force/pressure control</b>	x	x	x
<b>Electronic Gearbox</b>	x	x	x
<b>Dynamic positioning</b>	x	x	x
<b>Hydraulic specific control technology</b>	x	x	x
<b>Reg-related positioning</b>	x	x	x
<b>Programmable according to IEC61131-3</b>		x	x
<b>Programming system DoDeSys</b>		x	x
<b>Up to 6500 instructions</b>		x	x
<b>Recipe table with 288 variables</b>		x	x
<b>PLCopen</b>		x	x
<b>Mark synchronization</b>			x
<b>Cam switching mechanism</b>			x
<b>Cam profiles</b>			x
<b>Coupling and decoupling function</b>			x
<b>Digital I/Os (RS232/485)</b>	x	x	x
<b>Profibus</b>	O	O	O
<b>CANopen</b>		O	O
<b>DeviceNet</b>		O	O
<b>Ethernet Powerlink</b>		O	O
<b>EtherCAT</b>		O	O

x = Standard  
 O = Optional

**Compax3F T11**

**Benefits**

- No programming skills necessary
- Set table with various motion
- Full controller range available
- an ideal basis for many applications in high-performance motion automation

**Function Range T11**

- Set tables for positioning, pressure and force control up to 31 motion profiles:
  - Absolute or relative positioning
  - Force/pressure control
  - speed control
  - electronic gearing
- superimposed force and pressure control
- Controller switching between position and force/pressure control

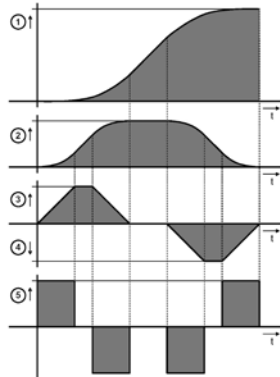
**Extended Function Range**

- Absolute force control
- superimposed force and pressure control
- Controller switching between position and force/pressure control
- 2-axis synchronous

**Absolute or Relative Positioning**

A motion set defines a complete motion with all settable parameters

1. Target position
2. Travel speed
3. Maximum acceleration
4. Maximum deceleration
5. Maximum jerk



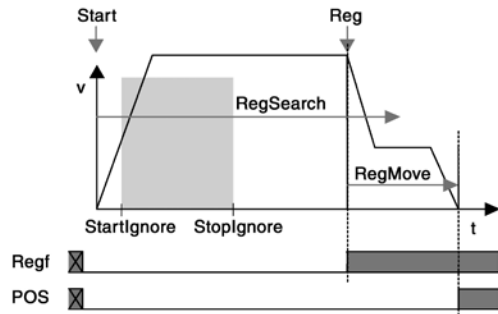
**Stop Movement**

The Stop set interrupts the current motion set.

**Reg-related Positioning**

For registration mark-related positioning, 2 motions are defined:

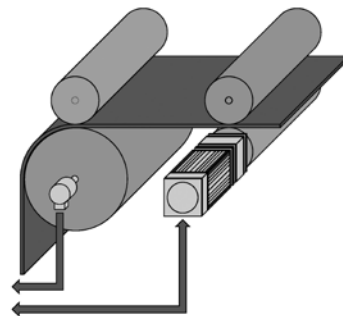
- RegSearch: Search of an external signal, e.g. a registration mark on a product
- RegMove: The external signal interrupts the search movement and the second movement by an offset follows without transition
- Precision of the registration mark detection: <math><1\mu s</math>



**Electronic Gearbox:**

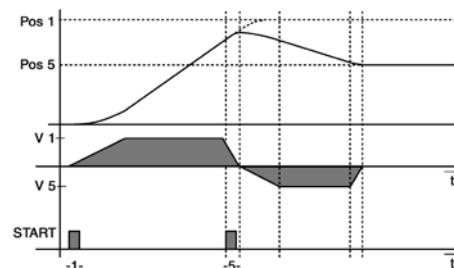
Motion synchronized to a master axis with any transmission ratio. The position of a master axis can be detected via:

- +/-10V analog input
- Step/direction command Input
- the encoder input or
- HEDA, with Compax3 Master



**Dynamic Positioning**

A new motion profile can be selected during a positioning sequence - a smooth transition takes place.





**Compax3 T30 Motion Control According to PLCopen****General**

Due to its high flexibility and efficiency the Compax3 motion control according to PLCopen is for most applications the optimal basis for decentralized motion control.

**Positioning with function modules based on PLCopen**

- Programmable based on IEC61131-3
- Programming system: CoDeSys
- Up to 5000 instructions
- 500 16-bit variables / 150 32-bit variables
- Recipe table with 288 variables
- 3 16-bit saved variables (power failure protected) / 3 32-bit saved variables (power failure protected)
- PLCopen-function modules:
  - Positioning: absolute, relative, additive and continuous
  - Machine Zero.
  - Stop, energizing the power stage, quit
  - Position, device status, reading axis error
  - Electronic gearbox (Mc\_GearIn)
- IEC61131-3-standard modules:
  - Up to 8 timers (TON, TOF, TP)
  - Trigger (R\_TRIG, F\_TRIG)
  - Flip-flops (RS, SR)
  - Counters (CTU, CTD, CTUD)
- Device-specific function modules:
  - C3\_Input: reading digital inputs
  - C3\_Output: writing digital inputs
  - C3\_ReadArray: access to recipe table
- Inputs/outputs:
  - 8 digital inputs (24V level)
  - 4 digital outputs (24V level)
  - 6 analog inputs (14 bits)
  - 4 analog outputs (16 bits)
  - Optional addition of 12 digital inputs/outputs

**PLCopen function blocks**

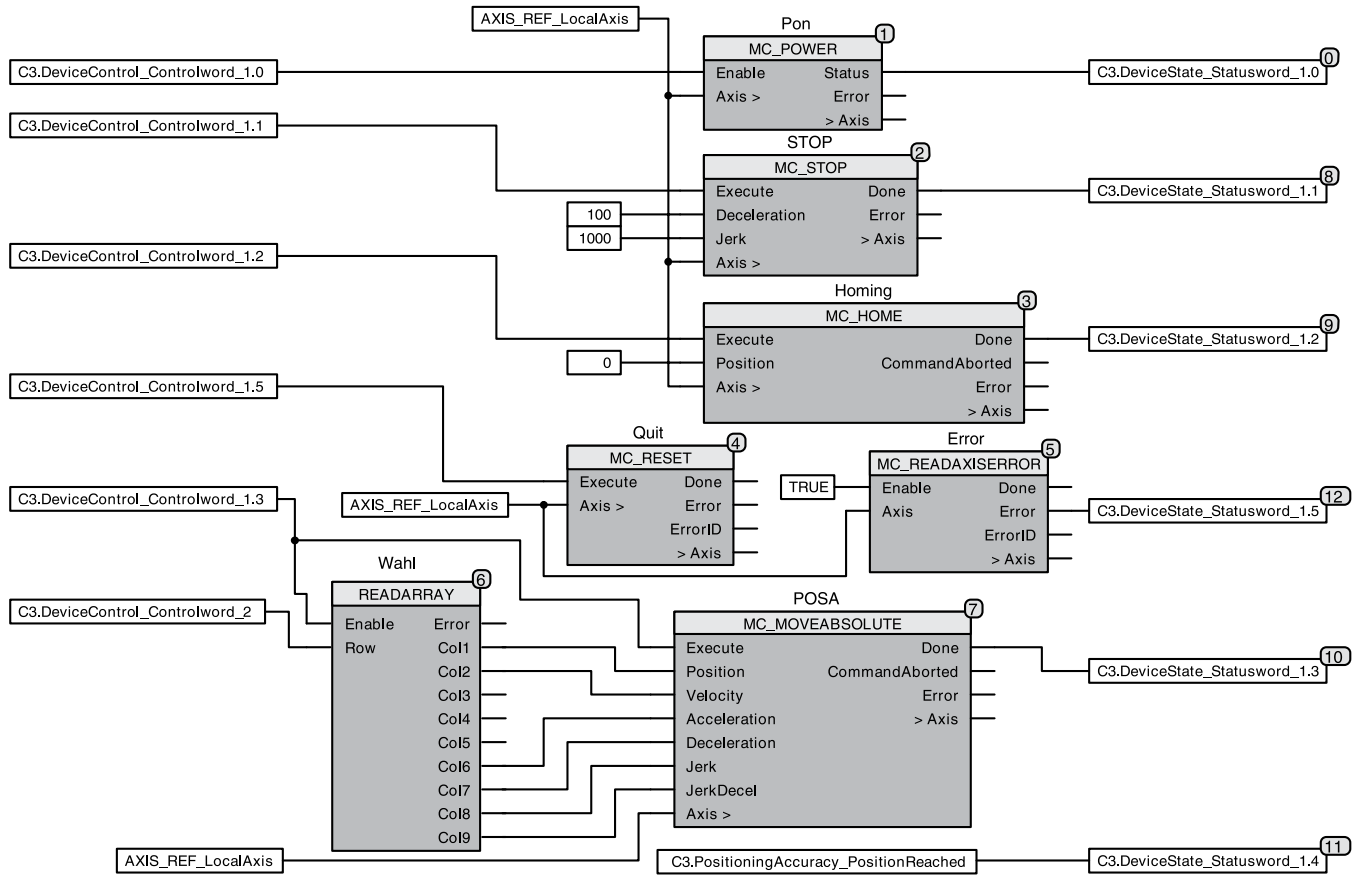
- Absolute positioning
- Relative positioning
- Additive positioning
- Continuous positioning
- Stop
- Machine zero
- Energizing the power output stage
- Reading device status
- Reading axis error
- Acknowledging errors
- Reading the current position
- Electronic gearbox (gearing)

**Example of an field bus interface controlled IEC61131-application**

- 2 control words are placed on the cyclic channel of the bus.
- The position data records (position, speed, acceleration etc.) are stored in a table (array).
- The desired position data record is selected with Controlword\_2.
- The individual bits of Controlword\_1 control positioning.
- A return message is sent via a status word on the cyclic channel of the bus.

**D**





Example of a bus interface controlled IEC61131 application

**Compax3 T40 IEC61131-3 Positioning  
with Cam Function Modules**

**General**

Compax3 T40 is able to simulate mechanical cams and cam switching mechanisms electronically. The T40 electronic cam was especially optimized for:

- The packaging machine industry
- For the printing industry
- All applications, where a mechanical cam is to be replaced by a flexible, cyclic electronic solution

This helps to solve discontinuous material supply, flying-knife and similar drive applications using distributed drive technology.

Compax3 T40 supports both real and virtual master movements. In addition, the user can switch to other cam profiles or cam segments on the fly.

Programming is carried out in the well-known IEC61131-3 environment.

With the aid of the cam function modules and Cam-Designer, cam applications can be implemented very easily.

**Function T40**

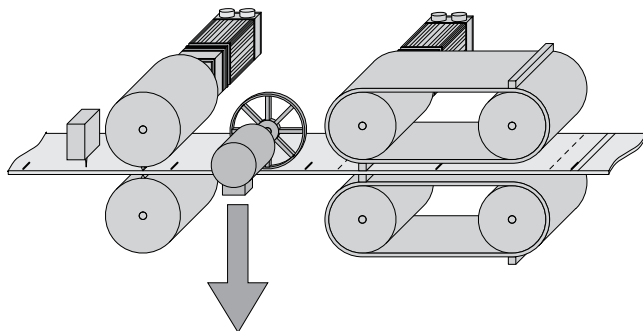
- Technology functions of the T30 version fully integrated and available
- Master position acquisition
- Mark synchronization
- Cam switching mechanism
- Coupling and decoupling function
- Cam profiles
- Cam memory
- Cam creation with CamDesigner

**Master Position Acquisition**

- Acquisition by incremental encoder
- Acquisition by the HEDA real-time bus

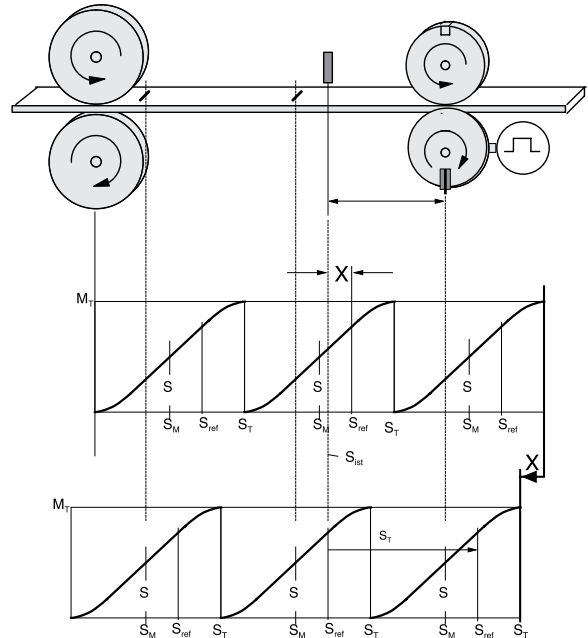
Virtual Master:

A second axis in the IEC program can be used to program a motion profile, which serves as a master for one or several axes.



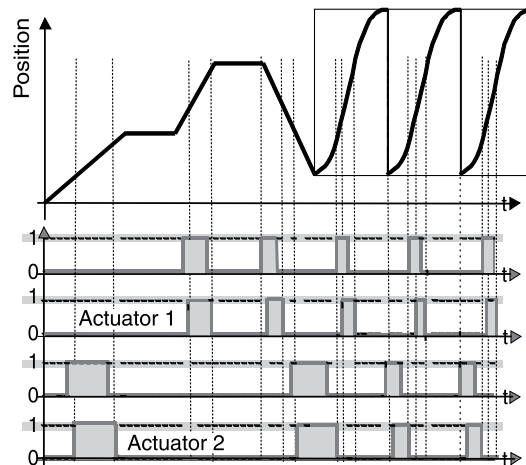
**Mark Synchronization**

- Master or slave oriented (simultaneous, cam-independent)
- Highly-precise mark recognition (accuracy <math><1\mu\text{s}</math>; Touchprobe)



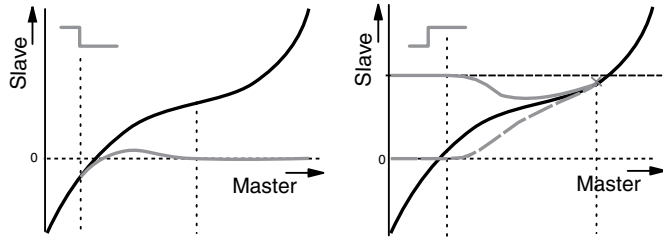
**Cam Switching Mechanism**

- 36 cams with individual profiles
- 4 fast cams (125 $\mu\text{s}$  per cam) standard: 500 $\mu\text{s}$
- 32 serial cams, 16ms/cam cycle (0.5ms/cam)
- Delay-time compensated cams: Compax3 can advance the cam to compensate for delays in switching elements.



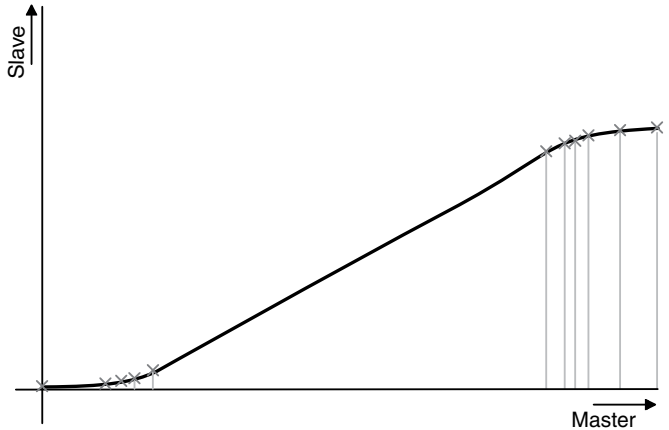
**Coupling and Decoupling Functions**

- By means of a set point generator
- By means of a change-over function
- Without overspeeding by coupling over several master cycles
- Virtually free set-up of the coupling and decoupling movement
- Master-guided coupling movement
- Random standstill position



**Cam Memory**

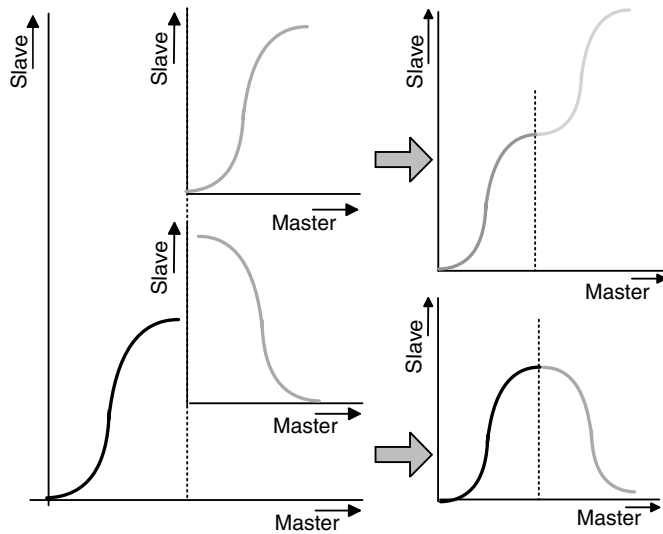
- 10,000 points (Master/Slave) in 24-bit format
- High-precision profile generation:
  - Variable point spacing with full backup of the current master and slave coordinates (even if the power fails)
  - Linear interpolation between points
- Cam memory for up to 20 curves



**D**

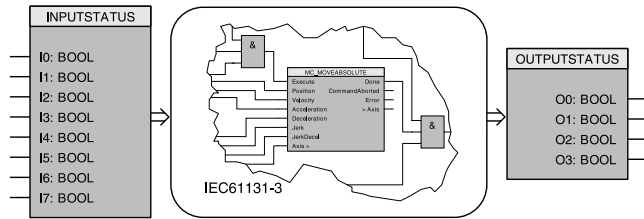
**Cam Profiles**

- Up to 20 cam segments can be produced by:
- Virtually random cam links (forwards and backwards)
- Freely programmable event-controlled cam branches
- Scalable cam segments and complete cam profiles



**Connection of High-Level Controllers**

**Control via Digital Inputs/Outputs  
Compax3 I11T30 / I11T40 / I12T11**



The digital I/Os can be optionally extended by 12 I/Os (M10 and M12 option).

**D**

**Control via Profibus,  
Compax3 I20T11 / I20T30 / I20T40**

Profibus-ratings	
DP-Versions	DPV0 / DPV1
Baud rate [MBit/s]	up to 12
Profibus ID	C320

**Control via CANopen, Compax3 I21T30 / I21T40**

CANopen-ratings	
Baud rate [kBit/s]	20, 50, 100, 125, 250, 500, 800, 1000
Service-Data-Object	SDO1
Process-Data-Objects	PDO1, ... PDO4

**Control via DeviceNet, Compax3 I22T30 / I22T40**

DeviceNet-ratings	
I/O - data	up to 32 bytes
Baud rate [kBit/s]	125...500
Nodes	up to 63 Slaves

**Control via Ethernet Powerlink,  
Compax3 I30T30 / I30T40**

Ethernet Powerlink ratings	
Baud rate	100Mbits (FastEthernet)
Cycle time	<200µs; to 240 nodes

**Control via EtherCAT  
Compax3 I30T30 / I30T40**

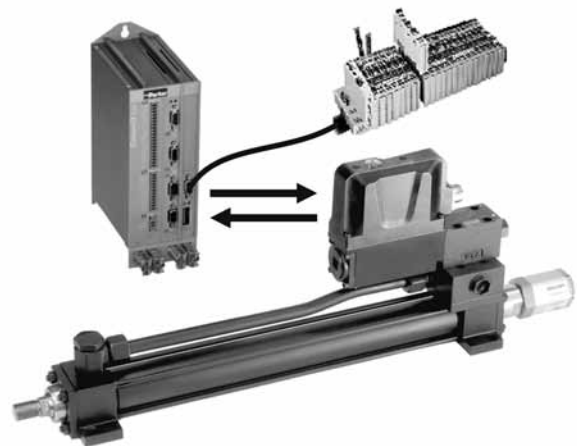
EtherCAT-ratings	
Bau drate	100Mbits (FastEthernet)
Cycle time	<200µs; to 240 nodes

**Decentralized Control via CANopen, I21T30 / I21T40**

**With External Inputs/Outputs (PIO)**

Additional external digital and analog inputs and outputs can be integrated via the CANopen master function. For this purpose we offer the Parker I/O system (PIO):

- CANopen field bus coupler: 650mA/5V, 1650mA/5V
- Digital input terminals: 2-, 4-, and 8-channel
- Analog input terminals: 2-channel (0-10V), 4-channel (0-20mA)
- Digital output terminals: 2-, 4-, and 8-channel
- Analog output terminals: 2-channel (0-10V, 0-20mA, +/-10V)

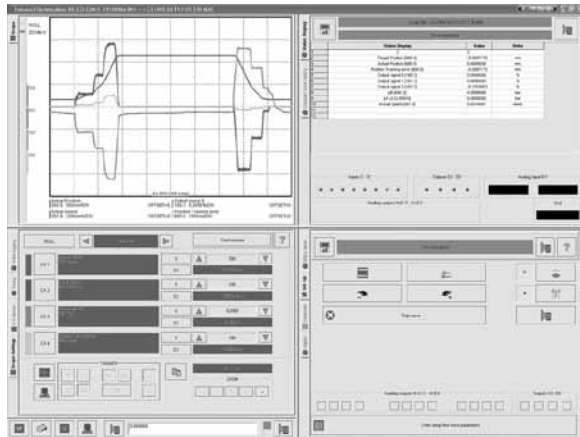


**Simple, Wizard-guided Configuration and Commissioning Compax3 ServoManager**

**Software Tool C3 ServoManager**

Configuration is carried out on a PC using the Compax3 ServoManager.

- Wizard-guided configuration
  - Automatic querying of all necessary entries
  - Graphically supported selection
- Setup mode
  - Moving individual axes
  - Predefined profiles
  - Convenient operation
  - Storage of defined profiles
  - Controller pre-setting possible
- Integrated 4-channel oscilloscope
  - Signal tracing directly on the PC
  - Various modes (single/normal/auto/roll)
  - Zoom function
  - Export as image or table (for example to Excel)



**Software Tool HydraulicsManager**

- Simple set up of customer valves, cylinders and drives.
- Technical data of all Parker valves, cylinders and drives available.

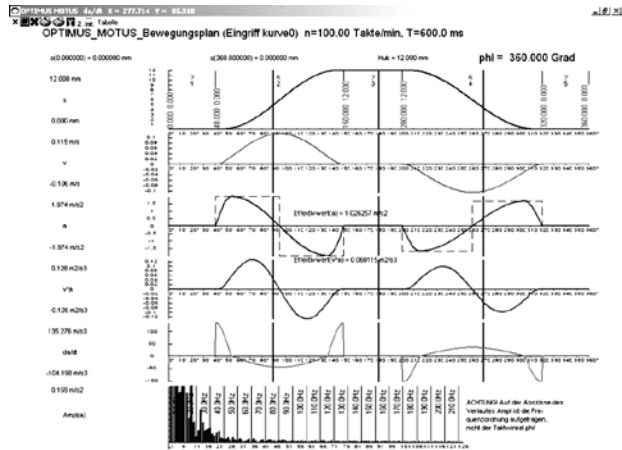


C3 HydraulicsManager valve database

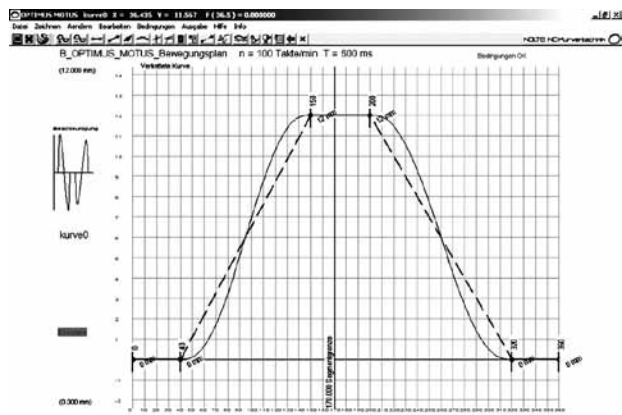
**Cam Creation with CamDesigner**

**Software Tool CamDesigner**

- Standardized Nolte cam generating tool with:
  - Standard or extended range of functions
  - Evaluation of the motion profiles
  - Verification of the drive sizing
- Transition laws from VDI directive 2143:
  - Selection of motion laws
  - The CamDesigner basic version features 15 motion laws (based on the dwell-to-dwell (interpolation method))



Evaluation of the motion profile



Cam generation with the integrated CamEditor



**Advantages Offered by International Standards in Programming**

**IEC61131-3 Programming Language**

IEC61131-3 is the only company- and product-independent programming language with worldwide support for industrial automation devices.

- IEC61131-3 includes graphical and textual programming languages:
  - Instruction list
  - Structured text
  - Ladder diagram
  - Sequential function chart
  - Function block diagram

Integrated standards offer:

**D**

- A trusted programming environment
- Standardized programming

Integrated standards reduce:

- The overhead of development
- Maintenance costs
- Software upkeep
- Training overhead

Integrated standards increase:

- Productivity
- Software quality
- Concentration on core competence

**Examples:**

- Program development in IL

```

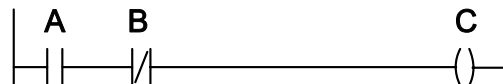
0001 FUNCTION_BLOCK AWL_EXAMPLE
0002 (* Sinus und CoSinus einer Zahl berechnen *)
0003 VAR_INPUT
0004   r1: REAL := 0.0;
0005 END_VAR
0006 VAR_OUTPUT
0007   sinus: REAL;
0008   cosinus: REAL := 9.9;
0009 END_VAR
0010
0001 (* Den Sinus einer Zahl berechnen und mit 1000 multiplizieren *)
0002 LD r1
0003 SIN
0004 MUL 1000.0
0005 ST sinus
0006 (* Den Cosinus einer Zahl berechnen und mit 1000 multiplizieren *)
0007 LD r1
0008 COS
0009 MUL 1000.0
0010 ST cosinus
0011
0012 (* Die Zahl weiterschalten *)
0013 LD r1
0014 ADD 0.1
0015 ST r1
0016
    
```

- Instruction list (IL)

```

LD      A
ANDN   B
ST      C
    
```

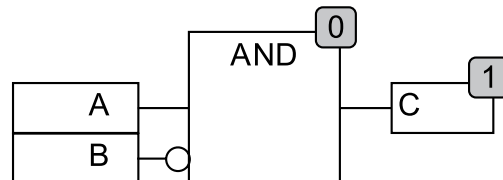
- Ladder diagram



- Structured text

```
C := A AND NOT B
```

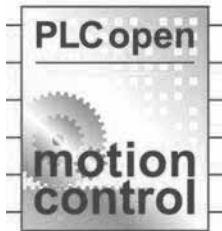
- Function plan



**Function Modules Based on PLCopen**

PLCopen is a product and company independent organization that plays a significant role in supporting the IEC61131-3 programming language. Its specific tasks also include defining basic processes relevant to motion. The PLCopen organization consists of both users and manufacturers of automation components.

Parker Hannifin is an active member of the “Motion Control” task force. This is a great advantage for the users of Parker drive technology, since they are constantly able to profit directly from the latest developments in PLCopen.



**Professional Development Tool CoDeSys**

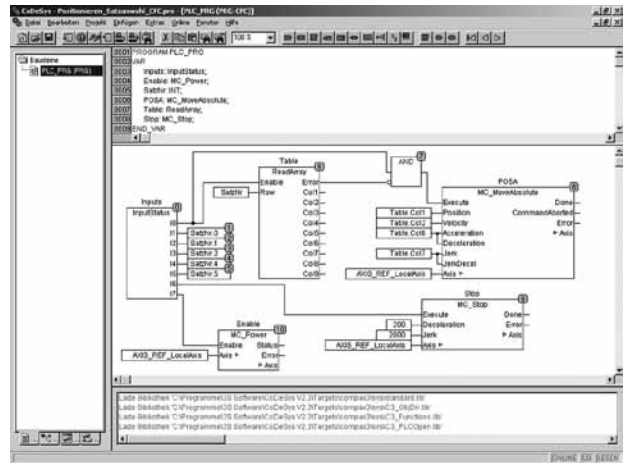
CoDeSys is a development environment for programming that saves a significant amount of time as applications are created.

- One of the most powerful development environments available, established world-wide
- Universal programming platform for various devices
- Visual elements
- Library management for user-defined applications
- Context-sensitive help wizard
- Data exchange between devices from different manufacturers
- Complete online functionality
- Sophisticated technological features
- Standard function modules deposited
- ... and all this for no additional cost



Parker is a member of the “CoDeSys Automation Alliance”.

**Program Development in CFC**



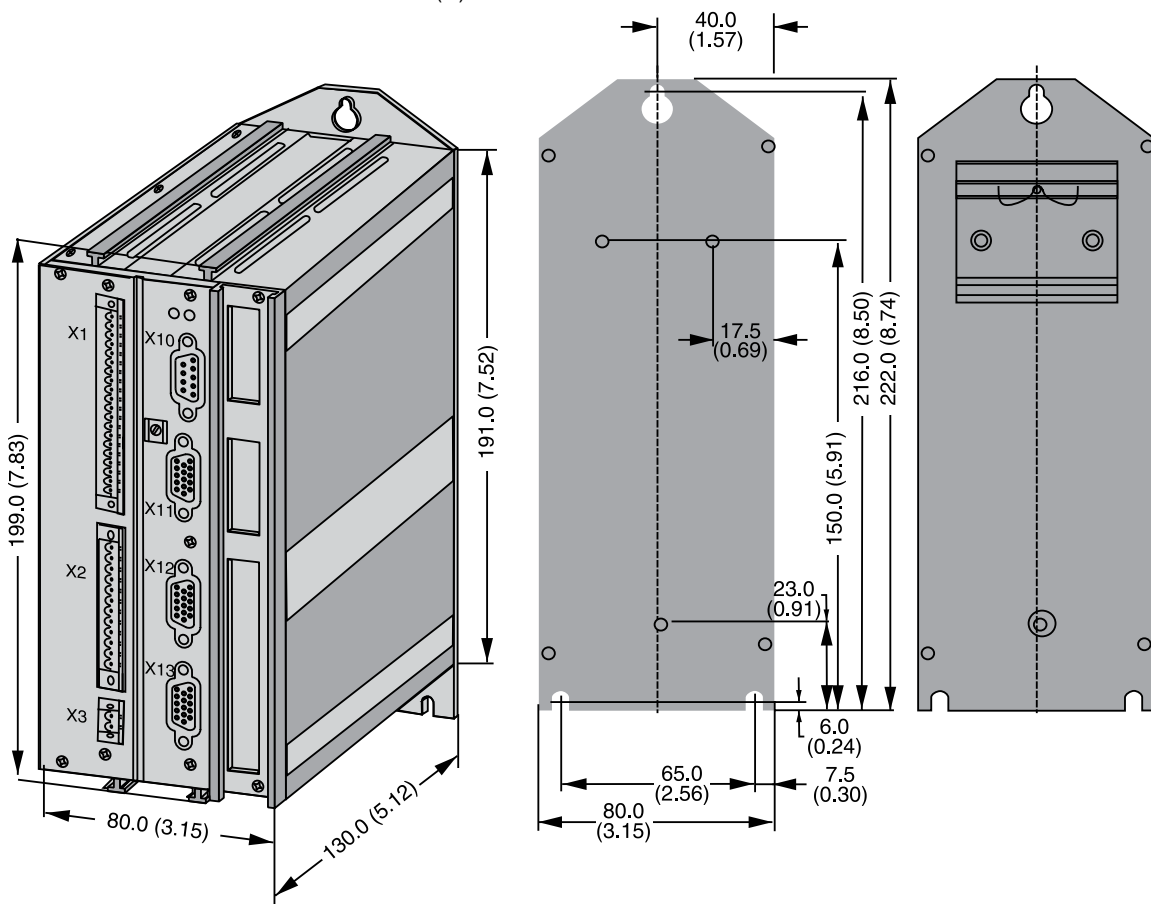
**Project Management**

Saving an entire project (source file) including symbols and comments to make service calls easier, because there is no need for any project data on the device itself

- Archiving projects as ZIP files
- Creating user-specific libraries that can be reused as tested sections of programs
  - These libraries can be protected
  - Examples include winders, synchronization components etc.
- Various user levels make it possible to lock sections of the program with passwords
- Depending on the task at hand, users can select from among 5 IEC languages plus CFC. These languages can also be mixed



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



**D**

**Connection Set ZBH02/04**

Complete kit with mating plug connectors (X1, X2 and X3) for Compax3 connectors and special shield connecting terminal

**Feedback Cable GBK../..**

Connection to the Motor:

Under the designation "REK.. + GBK.." (Feedback cable) we can deliver feedback connecting cables in various lengths to order.

- Prefabricated with plug and cable eye
- The plugs of the Parker motor and feedback cables contain a special surface area screening.
- Cable plans, if you wish to make up your own cables



**Terminal Block EAM06/..**

For additional wiring of the inputs and outputs:

- Available with or without LED display
- Can be mounted in the control cabinet on a supporting rail
- Connection EAM06/.. via SSK23/.. to X11, SSK24/.. to X12







D

<b>Connection set for Compax 3</b>												
for C3F001 D2 F12xxx	ZBH 02/04	Z	B	H	0	2	/			0	4	
<b>Operating module</b>												
Operating module		B	D	M	0	1	/			0	1	
<b>Terminal block</b>												
for I/Os without luminous indicator	for X11, X12	E	A	M	0	6	/			0	1	
for I/Os with luminous indicator	for X12	E	A	M	0	6	/			0	2	
<b>Interface cables and connectors</b>												
PC-Compax3 (RS232)		S	S	K	0	1	/			...	... <sup>1)</sup>	
on X11/X13 (Transducer)	With flying leads	S	S	K	2	1	/			...	... <sup>1)</sup>	
on X12 (I/O digital)	With flying leads	S	S	K	2	2	/			...	... <sup>1)</sup>	
on X11 (Ref/Analog)	For I/O terminal	S	S	K	2	3	/			...	... <sup>1)</sup>	
on X12 (I/Os digital)	For I/O terminal	S	S	K	2	4	/			...	... <sup>1)</sup>	
PC - POP (RS232)		S	S	K	2	5	/			...	... <sup>1)</sup>	
Compax3 - POP (RS485)		S	S	K	2	7	/	..		...	... <sup>3)</sup>	
Compax3 HEDA - Compax3 HEDA or PC - C3powerPLmC		S	S	K	2	8	/			...	... <sup>2)</sup>	
Compax3 X11 - Compax3 X11 (Encoder coupling of 2 axes)		S	S	K	2	9	/			...	... <sup>1)</sup>	
HEDA bus terminal connector (for the 1st and the last Compax3 in the HEDA Bus)		B	U	S	0	7	/			0	1	
Feedback cable for Balluff SSI transducer and start/stop		G	B	K	4	0	/			...	... <sup>1)</sup>	
Feedback cable for SSI transducer and start/stop	With flying leads	G	B	K	5	3	/			...	... <sup>1)</sup>	
Profibus cable <sup>4)</sup>	Not prefabricated	S	S	L	0	1	/			...	... <sup>1)</sup>	
Profibus connector		B	U	S	0	8	/			0	1	
CAN-Bus cable <sup>4)</sup>	Not prefabricated	S	S	L	0	2	/			...	... <sup>1)</sup>	
CAN-Bus connector		B	U	S	1	0	/			0	1	

<sup>1)</sup> Length code

Length code 1 (Example: SSK01/09: Length 25m)

Length [m]	1.0	2.5	5.0	7.5	10.0	12.5	15	20	25	30	50
Code	01	02	03	04	05	06	07	08	09	10	14

<sup>2)</sup> Length code for SSK28

Length code 2 (Example: SSK28/22: Length 3m)

Length [m]	0.25	0.5	1.0	3.0	5.0	10.0
Code	20	21	01	22	03	05

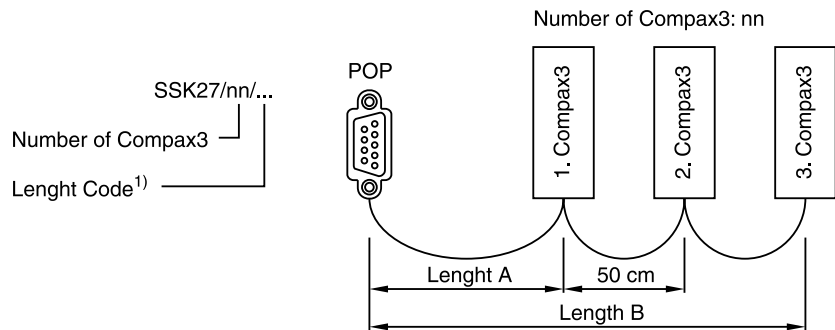
<sup>3)</sup> Length code for SSK27

Length A: Cable or connection from POP with **one** Compax3 (POP - 1.Compax3), variable length according to length code<sup>1)</sup>  
(Example: SSK27/01/01: Length 1.0m)

Length B: Cable or connection from POP with **more than one** Compax3 (nn > 01) (1.Compax3 - 2.Compax3 - ...), length between Compax connectors is fixed to 50cm, variable length A from POP with first Compax according to length code<sup>1)</sup>  
(Example: SSK27/03/01: Length 1.0m)

<sup>4)</sup> Colors according to DESINA

Length Code for SSK27



<b>Decentralized Input terminals</b>									
PIO 2DI 24V DC 3.0ms	2-Channel Digital-Input terminal		P	I	O	4	0	0	
PIO 4DI 24V DC 3.0ms	4-Channel Digital-Input terminal		P	I	O	4	0	2	
PIO 8DI 24V DC 3.0ms	8-Channel Digital-Input terminal		P	I	O	4	3	0	
PIO 2AI DC $\pm$ 10V	2-Channel Analog-Input terminal	( $\pm$ 10V Differential input)	P	I	O	4	5	6	
PIO 4AI 0-10V DC S.E.	4-Channel Analog-Input terminal	(0-10V Signal voltage)	P	I	O	4	6	8	
PIO 2AI 0-20mA	2-Channel Analog-Input terminal	(0 - 20mA Differential input)	P	I	O	4	8	0	
<b>Decentralized Output terminals</b>									
PIO 2DO 24V DC 0.5A	2-Channel Digital-Output terminal	(Output current 0.5A)	P	I	O	5	0	1	
PIO 4DO 24V DC 0.5A	4-Channel Digital-Output terminal	(Output current 0.5A)	P	I	O	5	0	4	
PIO 8DO 24V DC 0.5A	8-Channel Digital-Output terminal	(Output current 0.5A)	P	I	O	5	3	0	
PIO 2AO 0-10V DC	2-Channel Analog-Output terminal	(0-10V Signal voltage)	P	I	O	5	5	0	
PIO 4AO 0-20mA	2-Channel Analog-Output terminal	(0-20mA Signal voltage)	P	I	O	5	5	2	
PIO 2AO DC $\pm$ 10V	2-Channel Analog-Output terminal	( $\pm$ 10V Signal voltage)	P	I	O	5	5	6	
<b>CANopen Fieldbus coupler</b>									
CANopen Standard			P	I	O	3	3	7	
CANopen ECO			P	I	O	3	4	7	

D

**General Description**

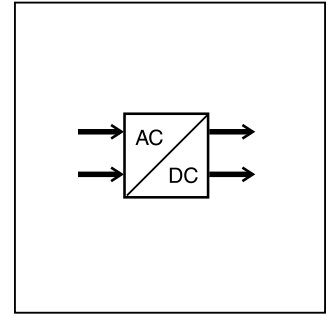
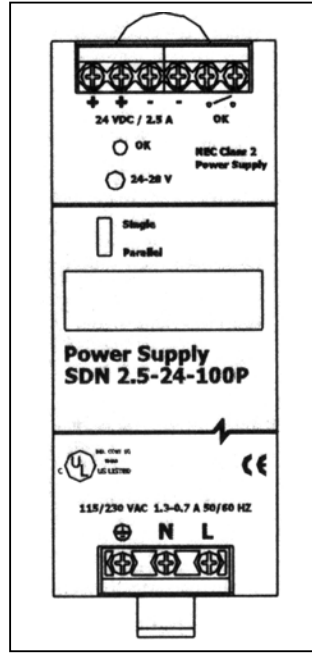
Series PSD24 power supplies are the compact DIN Rail mount version for easy installation with use of the Digital Modules. This single phase power supply automatically adjusts for either 115 or 230 VAC, 50 or 60 Hz input. The nominal output is a filtered and regulated 24 VDC / 120 Watts 5 amperes. Series PSD power supplies are UL recognized, meet CSA standards and also the CE ms. It is ATEX approved for Class 1, Div 2 Hazardous Locations.

These power supplies provide the power necessary to operate the following Electrohydraulic products:

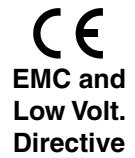
- D\*FP, D\*1FP, D\*FH, D\*FL, D\*FX, D\*FB and RE\* valves
- PWD00, PCD00, PWDXX, PID, PZD and EW, electronics

**Operation**

Series PSD24 power supplies have capability for parallel operation. Conductor sizes are listed below in the specification. DIN rail design provides easy installation. A green LED and power on logic is provided (DC OK signal). Compact, rugged, and with > 640,000 hours MTBF make this ideal for industrial applications.



**D**



**Ordering Information**

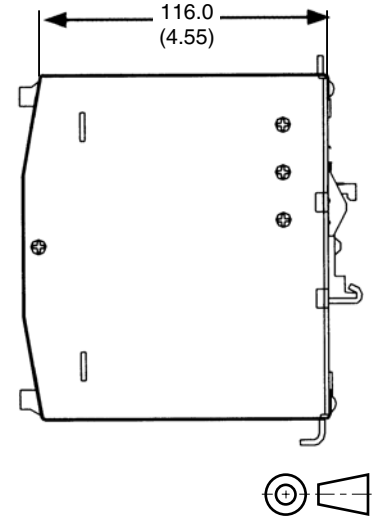
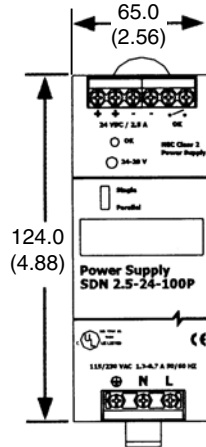


Code	Description
24	24 VDC, 5.0 amp, on Rail Power Supply

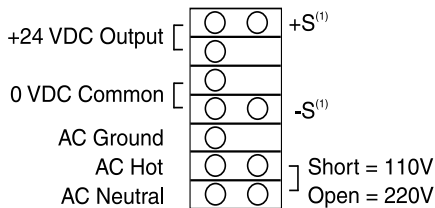
**Weight:** 0.62 kg (1.5 lbs)

**Dimensions**

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



**Connector - Pinout**



(1) Refer to Operation

**Specifications  
 SDN 2.5-24-100P**

<b>Input Power Requirements</b>	
<b>Nominal Voltage</b>	115/230 VAC auto select
<b>AC Range</b>	85 - 132 / 176 - 264 VAC
<b>DC Range <sup>2</sup></b>	210 - 375 VDC
<b>Frequency</b>	47 - 63 Hz
<b>Nominal Current <sup>1</sup></b>	2.2 A / 1.0 A
<b>Inrush Current Maximum</b>	typ. < 20 A
<b>Output Power Specifications</b>	
<b>Nominal Voltage</b>	24 VDC (22.5 - 28.5 VDC adjustable)
<b>Tolerance</b>	< ± 2% overall (combination line, load, time and temperature related changes)
<b>Ripple <sup>3</sup></b>	< 50m Vpp
<b>Nominal Current</b>	5 A (120 W)
<b>Peak Current <sup>4</sup></b>	6 A 2x Nominal Current < 2 sec.
<b>General Protection Safety</b>	Protected against continuous short-circuit, overload, open-circuit. Protection class 1 (IEC 536), degree of protection IP20 (IEC 529). Safe low voltage: SELV (acc. EN60950)
<b>Installation</b>	
<b>Fusing Input</b>	Internally fused. External 10 A slow acting fusing for the input is recommended to protect input wiring
<b>Mounting</b>	Simple snap on system for DIN Rail TS35/7.5.
<b>Input Connections</b>	IP20-rated screw terminals; connector size range: 16-10 AWG (1.5-6 mm <sup>2</sup> ) for solid conductors, 16-12 AWG (0.5-4 mm <sup>2</sup> ) for flexible conductors
<b>Output Connections</b>	Two connectors per output; Connector size range: 16-10 AWG (1.5-6 mm <sup>2</sup> ) for solid conductors

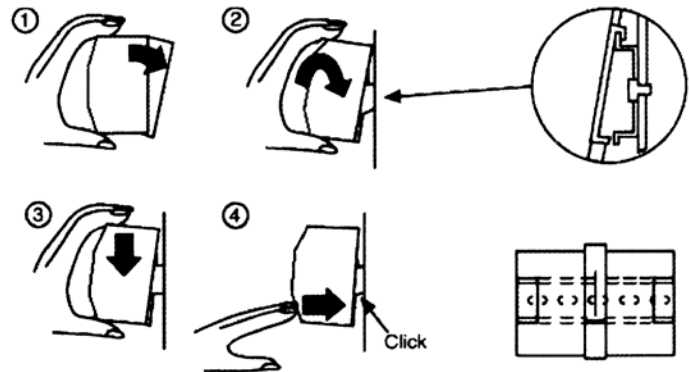
Notes:

1. Input current ratings are conservatively specified with low input, worst case efficiency and power factor.
2. Losses are heat dissipation in watts at full load, nominal input line.
3. Ripple/noise is stated as typical values when measured with a 20 MHz bandwidth scope and 50 Ohm resistor.
4. All peak current is calculated at 24V levels.

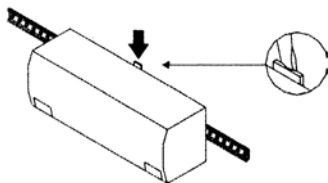
**DIN Rail Mounting**

Snap on the DIN Rail

1. Tilt unit slightly backwards
2. Put it onto the DIN Rail
3. Push downwards until stopped
4. Push at the lower front edge to lock
5. Shake the unit slightly to ensure that the retainer has locked



Detachment from DIN Rail



Press button downwards (to unlock) and remove the unit from the DIN Rail.

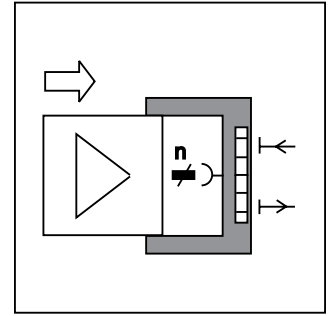
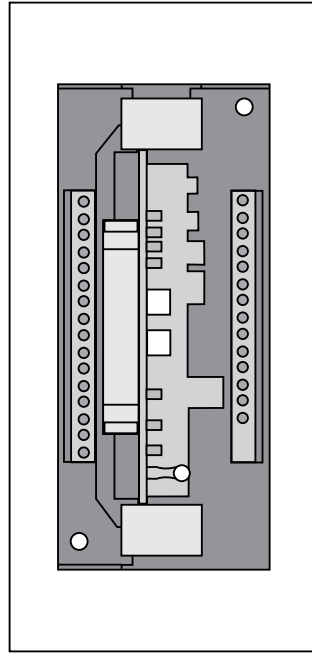
**D**

**General Description**

Card holders allow easy assembly and wiring of individual electronic driver card models EW, ED, EZ, and ET.

**Technical Data**

<b>Base-unit</b>	Fastened with screws or DIN rails 35mm
<b>Printed circuit board</b>	Carries the female connector and connection component for the terminal strip
<b>Terminals</b>	Screw terminals per DIN 41617 with wire prot. nominal cross-section AWG11, 5mm pitch
<b>Female connector (per order code)</b>	31 pole to DIN 41617, double row contacts.  15-, 48-, 96 pole to DIN 41612, 2 or 3 rows of contacts



**Ordering Code**

**K Card Holder**

For Driver card models:  
 EW 101, 102, 104  
 ED 101, 102, 104  
 ET 101, 102, 104, 105  
 EZ 150, 154, 155, 305

**Ordering Code**

**KH32F**

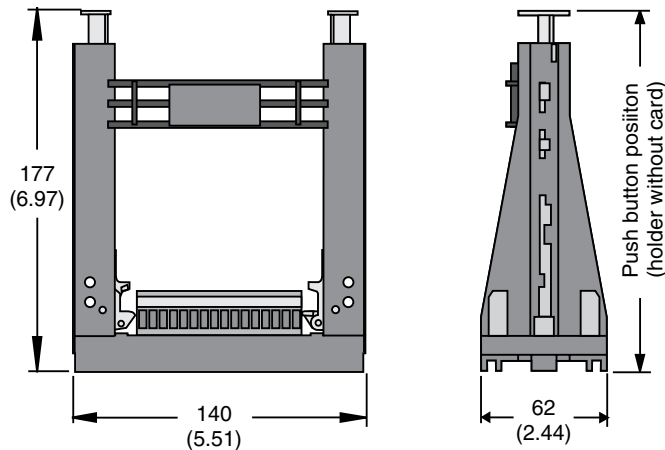
**= EX00-S05**

For Driver card models:  
 ET 154  
 EZ 595

**Weight:** 0.5 kg (1.0 lbs)

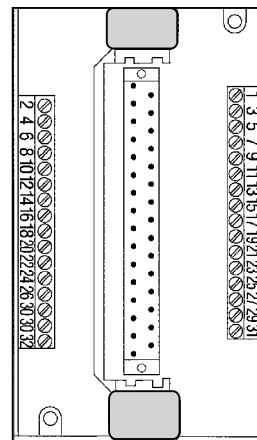
**Dimensions**

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

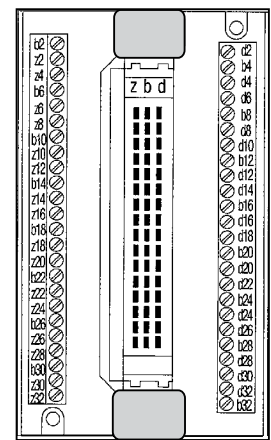


Card Holder for Denison 32 Pin Boards = EX00-S07

**Terminal Locations**



Model K



Model KH32F

**Contents**

Return to  
ALPHA  
TOC

Return to  
SECTION  
TOC

Description	Page
EHC Cable Assemblies .....	E2
Communication Cable Assemblies.....	E2
Connectors .....	E3
Bolt Kits/Subplates .....	E4
EHC Cable Asemblies Wire Color Assignments.....	E4
Terms of Sale and Warranty Limitations.....	E5
Safety Guide.....	E6 - E7

**E**



**General Description**

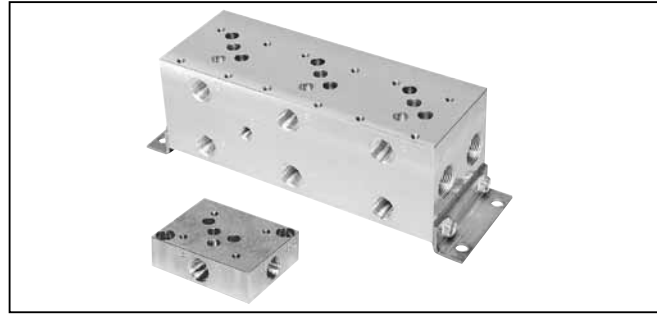
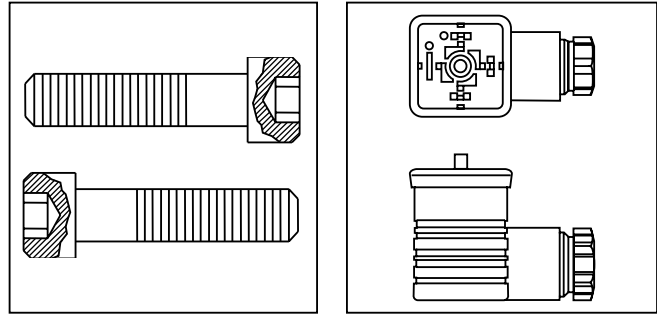
Supporting accessory products for proportional valves listed in this section include cable assemblies, connectors, bolt kits, and subplates. Valve drivers and power supplies can be found in the electronics section.

EHC cable assemblies are listed for specific valves, by function, and are supplied with an installed connector as specified at one end, pig-tails leads at the other.

Note that all valves are not shipped with a mating connector. Mating connectors are listed by valve application.

**Electronic Accessories**

Refer to the Electronics section for valve driver electronics, power supplies and accessories.



**EHC Cable Assemblies**

Valve Application	Connector		Function	Model
	Option	Pins		
D*FB OBE D*1FB OBE D*FH D*1FH D*FP D*1FP D*FX ('B' ele. option) D*6FH D*FT D*1FT RE**T RE06*T	CE compliant, 'MS' style (Preferred)	7	Primary cable assembly	EHC158GE
D*FX ('C' and 'D' ele. option)	'MS' Style	6	Primary cable assembly	EHC158
D*FL	Environmental 'MS' style Environmental 'MS' style CE compliant 'MS' style CE compliant 'MS' style	4 6 4 6	Power cable Logic I/O Power cable Logic I/O	EHC154LR EHC156R EHC154LRE EHC156RE
BD, DY	'MS' style	4	Primary cable assembly	EHC154S
D*FP B50 D*1FP B50 D*FB W5 D*1FB W5	CE compliant	12	Primary cable assembly	EHC1512GE

**Communication Cable Assemblies**

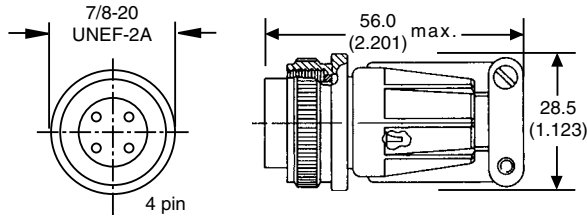
Valve Application	Cable	Function	Model
D*FB OBE D*1FB OBE D*FP D*1FP D*1FC D*FT 52 Design D*1FT 40 Design RE06*T 26 Design	RS-232 to Mini USB	Parameter change via "ProPxD" software	40982923
D*FB OBE D*1FB OBE D*FT 52 Design D*1FT 40 Design RE06*T 26 Design	USB to Mini USB	Parameter change via "ProPxD" software	1210846 * * Not for Windows 7 or newer.

accessories.indd, ddp



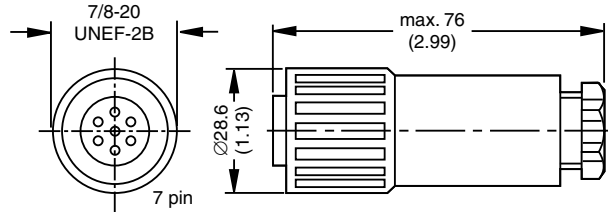


**Power Connector — D\*FL**



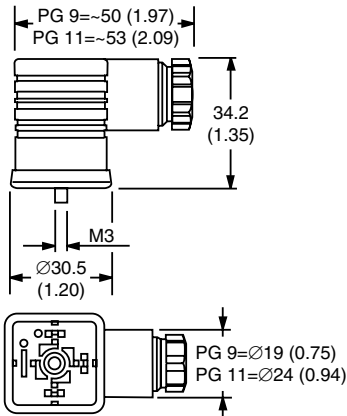
Description	Order Number
4 pin	1210292

**Primary Connector — D\*FT, D\*FH, D\*FM, D\*FX (Ele. Design 'B'), RE06\*T, RE\*\*T, D\*FB and D\*1FB (OBE), D\*FP\*0 and D\*FP\*3**



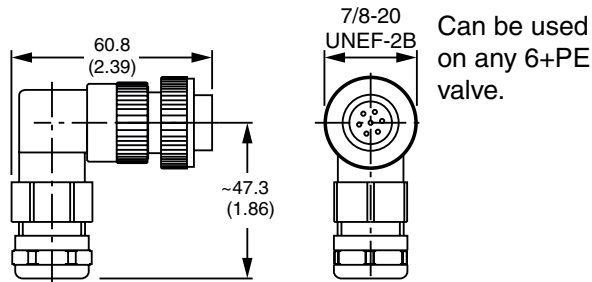
Description	Order Number
DIN 43563 6+PE	5004072

**Solenoid Connectors**



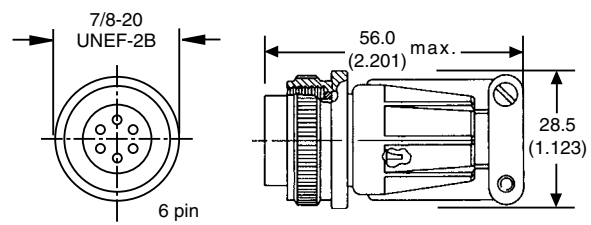
Description	Variation	Order Number
DIN 43650	Black	692914
DIN 43650	Grey	692915

**Primary Connector — TDP025 and TDP050**



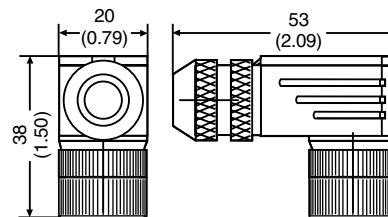
Description	Order Number
90° 7-Pin	5005160

**I/O Connector — D\*FL**



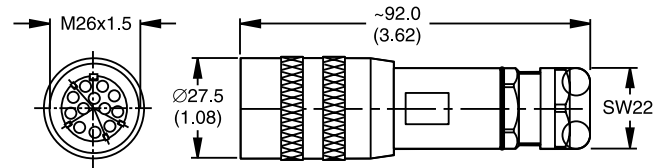
Description	Order Number
6 pin D*FL	MS3106E-14S-6S
Rubber Boot	801227
6 pin D*FX (ele. design A, C & D)	697561

**LVDT Connector — D\*1FS**



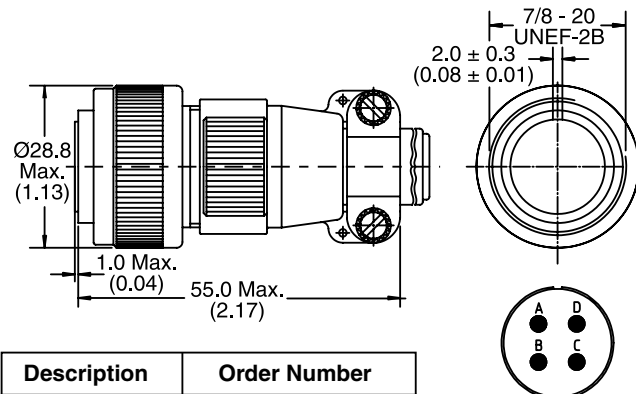
Description	Order Number
M12 / 5 pin	5004109

**Primary Connector — D\*FP\*5, D\*1FP\*5, D\*FB\*W5 and D\*1FB\*W5**



Description	Order Number
EN 175201-804 11+PE	5004711

**Primary Connector — BD, PH, DY and SE**



Description	Order Number
4-pin	MS3106E-14S-2S



Interface	Valve	Bolt Kit	Qty	Size	Subplate <sup>(1)</sup>	Port Size	Port Location
NG6 CETOP 3	D1F*  RE06	BK209	4	10-24 x 1.25"	SPD23NS35	3/8" NPTF	Bottom
		BK375	4	M5 x 30mm	SPD23NAS35	3/8" NPTF	Side
		BK210	4	10-24 x 1.875"	SPD26SS35 SPD26SAS35	#12 SAE #12 SAE	Bottom Side
NG10 CETOP 5	D3F*	BK98	4	1/4-20 x 1.625"	SPD31D6NS35	3/4" NPTF	Bottom
		BK385	4	M6 x 40mm	SPD31D6NAS35	3/4" NPTF	Side
					SPD31D6SS35	#12 SAE	Bottom
					SPD31D6SAS35	#12 SAE	Side
	D31F*	BK02	4	1/4-20 x 1.5"	SPD31D6NS35	3/4" NPTF	Bottom
		BK385	4	M6 x 40mm	SPD31D6NAS35 SPD31D6SS35 SPD31D6SAS35	3/4" NPTF #12 SAE #12 SAE	Side Bottom Side
D36F*	BK03	6	1/4-20 x 1.5"	1402190	#16 SAE	Side	
	BK439	6	M6 x 40mm				
NG16 CETOP 7	D41F*	BK160	4	3/8-16 x 2.5"	DD07SPS012S	#12 SAE	Side
			2	1/4-20 x 2.25"			
		BK320	4	M10 x 60mm	SPD46B910	G3/4"	Bottom
			2	M6 x 55mm			
	D46F*	BK153	6	3/8-16 x 2.0"	1402191	#20 SAE	Side
	BK440	6	M10 x 50mm				
NG25 CETOP 8	D81F* D91F*	BK228	6	1/2-13 x 3"	SPD66NS35	3/4" NPTF	Bottom
		BK360	6	M12 x 75	SPD66NAS35	3/4" NPTF	Side
					SPD68NS35	1" NPTF	Bottom
					SPD68NAS35	1" NPTF	Side
					SPD610NS35	1 1/4" NPTF	Bottom
					SPD610NAS35	1 1/4" NPTF	Side
					SPD610SS35	#20 SAE	Bottom
					SPD610SAS35	#20 SAE	Side
D96F*	BK227	6	1/2-13 x 2.5"	1402192	#24 SAE	Side	
	BK462	6	M12 x 60mm				
NG32 CETOP 10	D111F*	BK150	6	3/4-10 x 3.5"	SPD1010N35	1 1/4" NPTF	Bottom
		BK386	6	M20 x 90	SPD1012N35	1 1/2" NPTF	Bottom

(1) Ductile iron; maximum operating pressure: 350 Bar (5075 PSI). Refer to valve specifications for actual recommended maximums.

**Note:** All subplates listed use SAE mounting bolt hardware.

**EHC Cable Assemblies Wire Color Assignments**

Pin	Cable Model – Wire Color					
	154LR 154LRE	156R 156RE	Metal 158	Plastic 158G	Metal 158GE	154S
<b>A</b>	Red	Black	Orange	Red	Red	Black
<b>B</b>	Green	Red	Blue	Black	Black	Red
<b>C</b>	Black	White	Black	Yellow	Red/Black	Green
<b>D</b>	White	Green	Green/Yellow	Blue	Blue	White
<b>E</b>	–	Orange	Red	Orange	Orange	–
<b>F</b>	–	Blue	White	White	White	–
<b>G</b>	–	–	–	Green	Green	–

# Terms of Sale with Warranty Limitations

## Offer of Sale

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors ("Seller") are hereby offered for sale at prices to be established by Seller. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods, services or work described will be referred to as "Products".

1. **Terms and Conditions.** Seller's willingness to offer Products, or accept an order for Products, to or from Buyer is subject to these Terms and Conditions or any newer version of the terms and conditions found on-line at [www.parker.com/saleterms/](http://www.parker.com/saleterms/). Seller objects to any contrary or additional terms or conditions of Buyer's order or any other document issued by Buyer.

2. **Price Adjustments; Payments.** Prices stated on Seller's quote or other documentation offered by Seller are valid for 30 days, and do not include any sales, use, or other taxes unless specifically stated. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). Payment is subject to credit approval and is due 30 days from the date of invoice or such other term as required by Seller's Credit Department, after which Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. **Delivery Dates; Title and Risk; Shipment.** All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the manner of shipment, title to any products and risk of loss or damage shall pass to Buyer upon placement of the products with the shipment carrier at Seller's facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferral of shipment at Buyers' request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.

4. **Warranty.** Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of eighteen months from the date of delivery to Buyer. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

5. **Claims; Commencement of Actions.** Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 30 days after delivery. Buyer shall notify Seller of any alleged breach of warranty within 30 days after the date the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for an amount due on any invoice) must be commenced within 12 months from the date of the breach without regard to the date breach is discovered.

6. **LIMITATION OF LIABILITY, UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.**

7. **User Responsibility.** The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product 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 and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

8. **Loss to Buyer's Property.** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, will be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. **Special Tooling.** A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

10. **Buyer's Obligation; Rights of Seller.** To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.

11. **Improper Use and Indemnity.** Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright

infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

12. **Cancellations and Changes.** Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

13. **Limitation on Assignment.** Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

14. **Force Majeure.** Seller does not assume the risk and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

15. **Waiver and Severability.** Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

16. **Termination.** Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days written notice of termination. Seller may immediately terminate this agreement, in writing, if Buyer: (a) commits a breach of any provision of this agreement (b) appointments a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or by a third party (d) makes an assignment for the benefit of creditors, or (e) dissolves or liquidates all or a majority of its assets.

17. **Governing Law.** This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.

18. **Indemnity for Infringement of Intellectual Property Rights.** Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

19. **Entire Agreement.** This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

20. **Compliance with Law, U. K. Bribery Act and U.S. Foreign Corrupt Practices Act.** Buyer agrees to comply with all applicable laws and regulations, including both those of the United Kingdom and the United States of America, and of the country or countries of the Territory in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA") and the U.S. Anti-Kickback Act (the "Anti-Kickback Act"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that they are familiar with the provisions of the U. K. Bribery Act, the FCPA and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer shall not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase products or otherwise benefit the business of Seller.

02/12



## Parker Safety Guide for Selecting and Using Hydraulic Valves and Related Accessories

**WARNING:** Failure or improper selection or improper use of Parker Hydraulic Valve Division (HVD) Valves or related accessories (“Products”) can cause death, personal injury and property damage. Possible consequences of failure or improper use of these Products include but are not limited to:

- Valves or parts thereof thrown off at high speed
- High velocity fluid discharge
- Explosion or burning of the conveyed fluid
- Contact with suddenly moving or falling objects controlled by the Valve
- Injections by high-pressure fluid discharge
- Contact with fluid that may be hot, cold, toxic or otherwise injurious
- Injuries resulting from injection, inhalation or exposure to fluids
- Injury from handling a heavy item (dropped, awkward lift)
- Electric shock from improper handling of solenoid connections
- Injury from slip or fall on spilled or leaked fluid

Before selecting or using any of these Products, it is important that you read and follow the instructions below. In general, the Products are not approved for in-flight aerospace applications. Consult the factory for the few that are FAA approved.

### 1.0 GENERAL INSTRUCTIONS

- 1.1 **Scope:** This safety guide provides instructions for selecting and using (including assembling, installing and maintaining) these Products. For convenience all items in this guide are called “Valves”. This safety guide is a supplement to and is to be used in conjunction with the specific Parker catalogs for the specific Valves and/or accessories being considered for use. See item 1.6 below for obtaining those catalogs.
- 1.2 **Fail-Safe:** Valves can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of the Valve or Valve Assembly will not endanger persons or property.
- 1.3 **Safety Devices:** Never disconnect, override, circumvent or otherwise disable any safety lockout on any system whether powered by HVD Valves or any motion control system of any manufacturer. (e.g. Automatic shut-off on a riding lawn mower should the operator get out of the seat).
- 1.4 **Distribution:** Provide a copy of this safety guide to each person that is responsible for selecting or using HVD Valve Products. Do not select HVD Valves without thoroughly reading and understanding this safety guide as well as the specific Parker catalogs for the Products considered or selected.
- 1.5 **User Responsibility:** Due the wide variety of operating conditions and applications for Valves, HVD and its distributors do not represent or warrant that any particular Valve is suitable for any specific system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing is solely responsible for:
  - Making the final selection of the Valve
  - Assuring that the user’s requirements are met and that the application presents no health or safety hazards.
  - Providing all appropriate health and safety warnings on the equipment on which the Valves are used.
  - Assuring compliance with all applicable government and industry standards.
- 1.6 **Additional Questions:** Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to [www.parker.com](http://www.parker.com), for the telephone numbers of the appropriate technical service department. For additional copies of this or any other Parker Safety Guide go to [www.parker.com](http://www.parker.com) and click on the safety button on the opening page. Catalogs and/or catalog numbers for the various HVD Valve Products can be obtained by calling HVD at 440-366-5100. Phone numbers and catalog information is also available on the Parker website, [www.parker.com](http://www.parker.com).

### 2.0 VALVE SELECTION INSTRUCTIONS

- 2.1 **Pressure:** Valve selection must be made so that the maximum working pressure of the Valve is equal to or greater than the maximum system pressure. Surge, impulse or peak transient pressures in the system must be below the maximum working pressure of the Valve. Surge, impulse and peak pressures can usually be determined by sensitive electrical instrumentation that measures and indicates pressures at millisecond intervals. Mechanical pressure gauges indicate only average pressure and cannot be used to determine surge, impulse or peak transient pressures. Burst pressure ratings if given or known are for manufacturing purposes only and are not an indication that the Product can be used in applications at the burst pressure or otherwise above the maximum working pressure.
- 2.2 **Temperature:** The fluid temperature must be regulated or controlled so that the operating viscosity of the fluid is maintained at a level specified for the particular Valve product. Such ranges are given in the product catalogs or can be obtained from the appropriate customer service department for the particular Valve product.
- 2.3 **Fluid Compatibility:** The fluid conveyed in Valves has direct implications on the Valve selection. The fluid must be chemically compatible with the Valve component materials. Elastomer seals, brass, cast iron, aluminum for example all are potentially affected by certain fluids. Additionally, fluid selection affects the performance of various Valves. Considerations relative to fluid selection are outlined in the specific HVD Valve product catalog. Of particular importance is that the fluid be for hydraulic use, contain the proper additives and wear inhibitors. See 1.6 “Additional Questions” above for information to obtain such HVD catalogs.
- 2.4 **Changing Fluids:** If a system requires a different fluid, it should be done with the guidance in number 2.3 above. Additionally, it may be necessary to flush the system (including the Valves) to remove any of the previous fluid. Consult the Parker Valve Division for guidance.
- 2.5 **Size:** Transmission of power by means of pressurized fluid varies with pressure and rate of flow. The size of the components must be adequate to keep pressure losses to a minimum and avoid damage due to heat generation or excessive fluid velocity.
- 2.6 **Placement:** Installation of Valves must take into account the orientation of the Valve and the proximity of the Valve to other parts of the system. This includes but is not limited to closeness to hot and cold areas, access for servicing and operation as well as orientation for proper connectors.
- 2.7 **Ports:** Connection of Valves in systems can be by threaded ports, sub-base surfaces, flanges and manifolds. In all cases, the proper fitting, surface or mounting hardware must be selected to properly seal and contain the system fluid so as to avoid the adverse conditions listed in the initial warning box above. Specifically, if using threaded ports, the designer must make sure that the mating fitting is of the compatible thread. Also, the instructions provided by the connector hardware supplier must be read and understood so as to properly assemble the connector. The Parker Safety Guide for using Hose, Tubing and Fittings and Related Accessories is but one reference to this end.
- 2.8 **Environment:** Care must be taken to insure that the Valve and Valve Assemblies are either compatible with or protected from the environment (that is, surrounding conditions) to which they are exposed. Environmental conditions including but not limited to ultraviolet radiation, sunlight, heat, ozone, moisture, water, salt water, chemicals and air pollutants can cause degradation and premature failure.
- 2.9 **Electric Power:** For Valves requiring electric power for control, it is imperative that the electricity be delivered at the proper voltage, current and wattage requirements. To obtain the proper control requirements please refer to the respective Parker product catalog for the specific Valve that is intended for use. If further guidance is required, call the appropriate technical service department identified in the respective Parker product catalog.
- 2.10 **Specifications and Standards:** When selecting Valves, government, industry and Parker specifications and recommendations must be reviewed and followed as applicable.
- 2.11 **Accessories:** All accessories used in conjunction with any Parker Valve product must be rated to the same requirements of the Valve including but not limited to pressure, flow, material compatibility, power requirements. All of these items must be examined as stated in the “VALVE INSTALLATION INSTRUCTIONS” paragraph 3.0.

(continued on next page)



### 3.0 VALVE INSTALLATION INSTRUCTIONS

- 3.1 **Component Inspection:** Prior to use, a careful examination of the Valve(s) must be performed. The Valve intended for use must be checked for correct style, size, catalog number and external condition. The Valve must be examined for cleanliness, absence of external defects or gouges, cracked or otherwise deformed parts or missing items. The mounting surface or port connections must be protected and free of burrs, scratches, corrosion or other imperfections. Do NOT use any item that displays any signs of nonconformance. In addition, any accessory including but not limited to fittings, bolt kits, hoses, sub bases, manifolds, and electrical connectors must be subjected to the same examination.
- 3.2 **Handling Valves:** Many Valves whether HVD Valves or of another manufacturer can be large, bulky or otherwise difficult to handle. Care must be taken to use proper lifting techniques, tools, braces, lifting belts or other aids so as not to cause injury to the user, any other person or to property.
- 3.3 **Filtration:** Fluid cleanliness is a necessity in any hydraulic system. Fluid filters must be installed and maintained in the system to provide the required level of fluid cleanliness. Filters can be placed in the inlets, pressure lines and return lines. The level of cleanliness required is specified in the HVD product catalog for the specific Valve(s) selected or intended for use. For additional information on Filter selection contact Parker Filter Division at 800-253-1258 or 419-644-4311.
- 3.4 **Servo Valves:** Application of Servo Valves in general requires knowledge and awareness of “closed loop control theory” and the use of electronic controls for successful and safe operation. Individuals who do not have such experience or knowledge must gain training before use of such Products. Parker offers both classroom training as well as manuals to assist in gaining this knowledge. These aids can be obtained by contacting Hydraulic Valve Division at 440-366-5100, calling the general Parker help line 800-CPARKER or going to the Parker web site at [www.parker.com](http://www.parker.com).
- 3.5 **Accessory Ratings:** All accessories used in combination with the selected or intended Valve product must be rated and compatible with the selected Valve. Specifically, the items must be of equal or greater rating including but not limited to pressure, flow, power, size, port style, thread connectors and material.
- 3.6 **Connection Styles:** It is the responsibility of the user of the Parker product to properly select connectors and accessories that match the connections on the sub plate, Valve, flange or threaded connection or manifold. It is also the responsibility of the installer to possess adequate skill and knowledge including but not limited to thread preparation, torque technique, hose assembly and inspection, tube preparation and assembly, and fitting installation. Parker Tube Fitting Division ([www.parker.com/tfd](http://www.parker.com/tfd)) catalog 4300 and Parker Hose Products ([www.parkerhose.com](http://www.parkerhose.com)) catalog 4400 describe some basic technical information relative to proper fitting assembly.
- 3.7 **Electrical Connections:** All electrical connections must be made to the applicable codes and local safety requirements.
- 3.8 **Gauges and Sensors:** The user must install sufficient gauges and sensors in the system so as to be able to determine the condition of the system. This includes but is not limited to pressure gauges, flow meters, temperature sensors and site gauges. These are of utmost importance should removal or disassembly of a Valve, portion of a Valve or portion of the system become necessary. Refer to “VALVE MAINTENANCE AND REPLACEMENT INSTRUCTIONS” for details and especially item 4.8.
- 3.9 **System Checkout:** Once installed, the Valve installation must be tested to insure proper operation and that no external leakage exists. All safety equipment must be in place including but not limited to safety glasses, helmets, ear protection, splash guards, gloves, coveralls and any shields on the equipment. All air entrapment must be eliminated and the system pressurized to the maximum system pressure (at or below the Valve maximum working pressure) and checked for proper function and freedom from leaks. Personnel must stay out of potentially hazardous areas while testing and using.

### 4.0 VALVE MAINTENANCE AND REPLACEMENT INSTRUCTIONS

- 4.1 **Maintenance Program:** Even with proper installation, Valves and Valve System life may be significantly reduced without a continuing maintenance program. The severity of the application and risk potential must determine the frequency of the inspection and the replacement of the Products so that Products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at a minimum, must include instructions 4.2 through 4.10. An FMEA (Failure Mode and Effects Analysis) is recommended in determining maintenance requirements.
- 4.2 **Visual Inspection-Valves:** Any of the following conditions require immediate shut down and replacement of the Valve.
- Evidence that the Valve is in partial dis-assembly.
  - Visible crack or suspicion of a crack in the Valve housing or bent, cracked or otherwise damaged solenoid.
  - Missing or partially extending drive pin on a flow control knob.
  - Missing, loose components, obstructions or other condition impeding the motion or function of the manual knob, lever, foot pedal or other mechanical operator of a hydraulic Valve.
  - Any evidence of burning or heat induced discoloration.
  - Blistered, soft, degraded or loose cover of any kind.
  - Loose wire or electrical connector.
- 4.3 **Visual Inspection-Other:** The following conditions must be tightened, repaired, corrected or replaced as required.
1. Fluid on the ground must be cleaned immediately. Also, the source of the fluid must be determined prior to running the equipment again.
  2. Leaking port or excessive external dirt build-up.
  3. System fluid level is too low or air is entrapped or visible in the reservoir.
  4. Equipment controlled by the Valve or Valve assembly has been losing power, speed, efficiency
- 4.4 **Filter Maintenance:** System filters must be maintained and kept in proper working order. The main service requirement is periodic replacement of the filter element or screen. Contact Parker Filter Division at 800-253-1258 or 419-644-4311 for further filter maintenance details.
- 4.5 **Functional Test:** See “System Checkout” number 3.9 above in “VALVE INSTALLATION INSTRUCTIONS”.
- 4.6 **Replacement Intervals:** Valves and Valve Systems will eventually age and require replacement. Seals especially should be inspected and replaced at specific replacement intervals based on previous experience, government or industry recommendations, or when failures could result in unacceptable downtime, damage or injury risk. At a minimum seals must be replaced whenever service is rendered to a Valve product.
- 4.7 **Adjustments, Control Knobs, and Other Manual Controls:** System Pressure and Flow are typically adjusted by knobs and/or handles. A set-screw or lock-nut secures the adjustment device so as to maintain the desired setting. This set-screw or lock-nut must first be loosened prior to making any adjustments and re-tightened after adjustment on the HVD Valve. All adjustments must be made in conjunction with pressure gauges and/or flow meters (or by watching the speed of the actuator in the case of setting flow only). See paragraph “Gauges and Sensors” above in the section “VALVE INSTALLATION INSTRUCTIONS”. Under no circumstances should any control knob, adjustment stem, handle, foot pedal or other actuating device be forced beyond the mechanical stop(s) on the Valve. For example, the Parker Safety Notice Bulletin **HY14-3310-B1/US** for HVD Colorflow Valves specifically restricts the adjustment torque to “hand adjust” or “less than 10 ft/lbs” if it cannot be adjusted by hand. Failure to adhere to this may force the knob beyond the stop point allowing it to be ejected at high speed resulting in death, personal injury and property damage. For complete safety instructions on HVD Colorflow Valves, copies of Safety Notice **Bulletin HY14-3310-B1/US** can be obtained directly from the Hydraulic Valve Division at 440-366-5100 or from the Parker web site at [www.parker.com](http://www.parker.com) by selecting the “Safety” button. Parker help line 800-CPARKER is on call 24/7 as well should there be any question about the use of a HVD Valve. Additionally, when making adjustments, always adjust the Valve with all parts of your body to the side of the Valve (that is, the knob is not pointing toward you or anyone else).
- 4.8 **High pressure Warning:** Hydraulic power is transmitted by high-pressure fluids through hoses, fittings and valves, pumps and actuators. This condition can be dangerous and potentially lethal and, therefore, extreme caution must be exercised when working with fluids under pressure. From time to time, hoses, Valves, tubes or fittings fail if they are not replaced at proper time intervals. Typically these failures are the result of some form of misapplication, abuse, wear, or failure to perform proper maintenance. When such failure occurs, generally the high pressure fluid inside escapes in a stream which may or may not be visible to the user. Under no circumstances should the user attempt to locate the leak by “feeling” with their hands or any other part of their body. High-pressure fluids can and will penetrate the skin and cause severe tissue damage and possible loss of limb or life. Even seemingly minor hydraulic fluid injection injuries must be treated immediately by a physician with knowledge of the tissue damaging properties of hydraulic fluid.
- If a hose, tube, fitting or Valve failure occurs, immediately shut down the equipment and leave the area until pressure has been completely released from the system. Simply shutting down the pump may or may not eliminate the pressure in the system. It may take several minutes or even hours for the pressure to be relieved so that the leak area can be examined safely. Once the pressure has been reduced to zero, the suspected leaking item can be taken off the equipment and examined. It must always be replaced if a failure has occurred. Never attempt to patch or repair a connector (especially a hose) or Valve that has failed. Consult the nearest Parker distributor or the appropriate Parker division for component replacement information. Never touch or examine a failed hydraulic component unless it is obvious that the item no longer contains fluid under pressure.



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