Electro-Proportional Valves

HydraForce manufactures a comprehensive line of electro-proportional pressure, flow and directional valves. A proportional valve varies its output in response to a variable electric input.

Flow control valves (PV series) control the flow into or out of a hydraulic cylinder or motor, thereby regulating the speed of movement.

Pressure control valves (TS series) regulate the pressure applied to a hydraulic cylinder or motor. This regulates the torque of the motor, or the pressure or force that the cylinder applies to its load.

Directional control valves (SP series) determine whether the cylinder extends or retracts, or if the motor turns clockwise or counterclockwise.

Multi-function directional control valves (SPCL, HSPEC) with built-in load-sensing (SPCL) and flow compensation (HSPEC) reduce hydraulic space claim and improve system efficiencies by combining multiple functions in a single cartridge valve.

- Cartridges are voltage interchangeable.
- Water/Weather resistant coils are available for most valves.
- Manual override available on most models.
- Industry common cavities—compact sizes.
- Cartridges are voltage interchangeable.
- Wide variety of voltage and connector options.
- Coils are rated for continuous duty operation.
- Excellent linearity and hysteresis characteristics.

Recommended Electronic Controllers

RECOMMENDED ELECTRONIC CONTROLLERS FOR HYDRAFORCE PROPORTIONAL VALVES

Valve Model	Page No.	Controllers
EHPR08-33	2.970.1	Table 2
EHPR98-T33	2.971.1	Table 2
EHPR98-T35	2.972.1	Table 2
EHPR98-T38	2.973.1	Table 2
PV08-30	2.370.1	Table 1
PV08-31	2.380.1	Table 1
PV16-23	2.348.1	Table 1
PV42-M30	2.378.1	Table 1
PV70-30	2.372.1	Table 1
PV70-31	2.382.1	Table 1
PV70-33	2.400.1	Table 1
PV70-35	2.432.1	Table 1
PV72-20	2.330.1	Table 1
PV72-21	2.340.1	Table 1
PV72-30	2.374.1	Table 1
PV72-31	2.384.1	Table 1
PV72-33	2.406.1	Table 1
PV72-35	2.434.1	Table 1
PV76-30A	2.376.1	Table 1
PV76-31A	2.386.1	Table 1
SP08-20	2.008.1	Table 1
SP08-21	2.020.1	Table 1
SP08-22	2.024.1	Table 1
SP08-25	2.028.1	Table 1
SP08-46R	2.088.1	Table 1
SP08-47C	2.110.1	Table 3
SP08-47CL	2.111.1	Table 3
SP08-47D	2.120.1	Table 3
SP08-47DL	2.121.1	Table 3
SP08-57D	2.134.1	Table 3
SP08-58D	2.145.1	Table 3
SP10-20	2.010.1	Table 1
SP10-21	2.021.1	Table 1
SP10-24	2.027.1	Table 1
SP10-46R	2.090.1	Table 1
SP10-47C	2.112.1	Table 3
SP10-47D	2.122.1	Table 3
SP10-57D	2.136.1	Table 3
SP10-58D	2.146.1	Table 3
SP12-20	2.012.1	Table 1
SP12-21	2.022.1	Table 1
SP16-20	2.014.1	Table 1
SP16-21	2.023.1	Table 1
SPCL10-30	2.040.1	Table 1
SPCL10-32	2.042.1	Table 1
TS08-20	2.812.1	Table 2
TS08-27	2.860.1	Table 2
TS10-26	2.852.1	Table 2
TS10-27	2.862.1	Table 2
TS10-36	2.900.1	Table 2
TS12-26	2.854.1	Table 2
TS12-27	2.864.1	Table 2
TS12-36	2.901.1	Table 2
TS38-20	2.813.1	Table 2
TS38-21	2.823.1	Table 2
TS58-20	2.815.1	Table 2
TS58-21F	2.825.1	Table 2
TS90-31	2.884.1	Table 2
TS98-30	2.882.1	Table 2
TS98-T34	2.950.1	Table 2
ZL70-30	2.602.1	Table 1
ZL70-31	2.622.1	Table 1
ZL70-36	2.662.1	Table 1
ZL72-30	2.604.1	Table 1
ZL72-31	2.624.1	Table 1
ZL72-36	2.664.1	Table 1

The Newer **EVDR Series** controllers are now recommended for use with most HydraForce proportional valves. These new electronic controllers are versatile, reliable, and easily configured and customized for a wide range of applications. **See the EVDR Product Selection Guide** on catalog page 3.450.1.

TABLE 1 — For all PV, ZL and SP Valves (except SPxx-47, SPxx-57 and SPxx-58)

Valve Coil Voltage	Control Input Signal	RECOMMENDED ELECTRONIC CONTROLERS							
		DIN Coil Mount		PCB Board Only		Metal Box Style		DIN Rail Mount	
		Part No	Cat. Pg.	Part No.	Cat. Pg.	Part No.	Cat. Pg.	Part No.	Cat. Pg.
12	0–5 VDC	7114950	3.421.1	4000046	3.426.1	—	—	4000136	3.434.1
12	0–10 VDC	4000070	3.422.1	4000141	3.427.1	—	—	4000137	3.435.1
12	4–20 mA	—	—	—	—	4000130	3.432.1	4000139	3.436.1
12	PWM	—	—	—	—	4000133	3.433.1	4000140	3.437.1
24	0–5 VDC	4000161	3.421.1	4000194	3.426.1	—	—	4000136	3.434.1
24	0–10 VDC	4000165	3.422.1	4000141	3.427.1	4000182	3.431.1	4000137	3.435.1
24	4–20 mA	4000169	3.423.1	—	—	4000186	3.432.1	4000139	3.436.1
24	PWM	—	—	—	—	4000133	3.433.1	4000140	3.437.1

TABLE 2 — For all EHPR and TS Series Valves (for TS valves used in Fan Drive Applications see page 3.452.3)
For the **EHPR98-T3x** and **TS98-T34** valves, the **EVDR1** is the recommended controller, see page 3.451.1.

Valve Coil Voltage	Control Input Signal	RECOMMENDED ELECTRONIC CONTROLERS							
		DIN Coil Mount		PCB Board Only		Metal Box Style		DIN Rail Mount	
		Part No	Cat. Pg.	Part No.	Cat. Pg.	Part No.	Cat. Pg.	Part No.	Cat. Pg.
12 or 24	0–5 VDC	4000161	3.421.1	4000194	3.426.1	—	—	4000136	3.434.1
12 or 24	0–10 VDC	4000165	3.422.1	4000141	3.427.1	4000182	3.431.1	4000137	3.435.1
12 or 24	4–20 mA	4000169	3.423.1	—	—	4000186	3.432.1	4000139	3.436.1
12 or 24	PWM	—	—	—	—	4000133	3.433.1	4000140	3.437.1

TABLE 3 — Driver/Controller for SPxx-47, SPxx-57, SPxx-58 Series Dual-Solenoid Valves

Valve Coil Voltage	Driver Part No.	Cat. Pg.
12 or 24 VDC	4000149	3.438.1

SP Valves and Coil Operating Parameters

INTRODUCTION TO SP VALVES AND COIL OPERATION

For proportional valves, performance depends on the current in the coil. Coil current is a function of the applied voltage and the resistance in the coil. Increasing voltage will increase the current level while increasing resistance will decrease the current level. In most mobile equipment electrical systems the applied voltage is not controlled; instead it varies around the nominal battery voltage. In the case of battery-operated vehicles the voltage decreases continually until the battery is recharged. The internal resistance of the coil is a function of the material used in the coil winding, and the ambient temperature around the coil. As the temperature of the coil winding increases, the electrical resistance increases. This results in a decrease of the current in the coil, which can decrease the output of a proportional valve. To assure that constant current is delivered to the coil regardless of this change in resistance, a closed-loop current controller should be used.

In order to maintain maximum flow at high temperatures, it is important to know the actual applied voltage to the coil including any voltage drop across the controller. Generally, on engine-driven equipment where alternator voltage is several volts above battery voltage, a coil rated at nominal voltage may work well. On battery-operated equipment, a coil rated at several volts below nominal voltage works best.

In general, it is expected that in actual application, the current applied to the SP valve will vary. Sometimes the current applied may be close to maximum, while at other times it may be close to the threshold current. Therefore, the increase in coil resistance resulting from the power applied will typically stabilize around a nominal or average value. This stabilized, average current value is defined as:

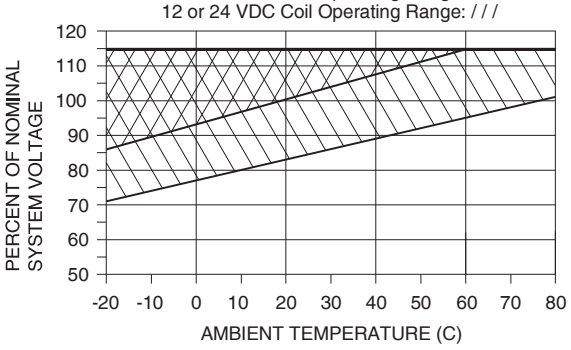
I-Average = (I-Threshold + I-Maximum) ÷ 2

The graphs illustrate the operating range of HydraForce standard coils on the SP valves. The graphs show the voltage required to continuously maintain average current. The voltage supplies sufficient power to reach maximum current on an intermittent basis. Since it is recommended to use the SP valve with a closed-loop current controller, a voltage drop of 1.5V across the controller has been taken into consideration in these graphs.

For example, the graph for the 08 size 10 VDC coil shows that at an ambient temperature of 20°C, maximum current is available with only 83% of nominal system voltage. If ambient temperature rises to 80°C, maximum output is achieved only if 102% of nominal voltage is available to the coil. However, with the 12 VDC coil, 102% of nominal voltage is required at 20°C. Notice that the voltage required at 80°C is above the maximum 115% of nominal voltage line. This indicates that the 12 VDC coil is not suitable for this ambient condition regardless of the system voltage available.

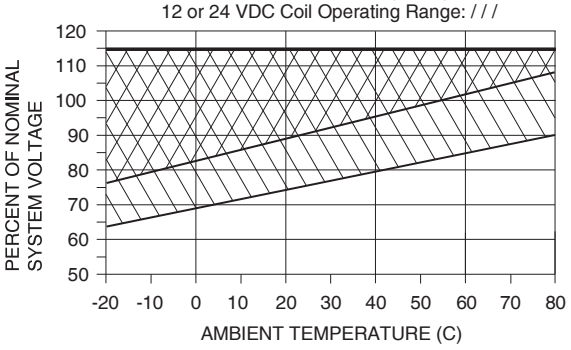
08 SIZE COIL

Percent of system voltage required to maintain average current (I-ave.) at various ambient temperatures
10 or 20 VDC Coil Operating Range: \ \ \
12 or 24 VDC Coil Operating Range: / / /



10 SIZE COIL

Percent of system voltage required to maintain average current (I-ave.) at various ambient temperatures
10 or 20 VDC Coil Operating Range: \ \ \
12 or 24 VDC Coil Operating Range: / / /

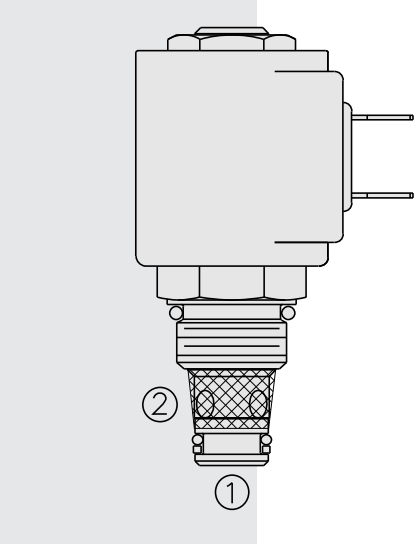


Coil Electrical Rating

Valve Size	Coil Voltage	Maximum Control Current
08	10	1170 ±115 mA
08	12	1000 ±100 mA
10	10	1320 ±120 mA
10	12	1100 ±100 mA

Note: I-Threshold varies from product to product. Refer to the Flow vs. Current graph shown for each product. The tolerance is the same as that given for I-Max.

SP08-20 Poppet, 2-Way, Normally Closed



DESCRIPTION

A proportional solenoid-operated, two-way, poppet-type, normally closed, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding applications

OPERATION

When de-energized, the **SP08-20** acts as a check valve, allowing flow from 1 to 2, and blocking flow from 2 to 1. When energized, the 2 to 1 flow path is opened. Flow is proportional to current applied to the coil. Flow varies with manual override.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Manual override options.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Flow: Without Manual Override: 22 lpm (5.8 gpm) at 34.5 bar (500 psid)
With Manual Override: 18.4 lpm (4.8 gpm) at 34.5 bar (500 psid)

Minimum Operating Dither/Pulse Frequency: 70 Hz

Hysteresis: Less than 5% up to 85% of I-max.; Less than 10% above 85% of I-max.

Max. Internal Leakage: 5 drops per minute at 250 bar (3625 psi)

Temperature: -40 to 120°C with standard Buna seals

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Filtration: See page 9.010.1; **Installation:** No Restrictions. See page 9.020.1

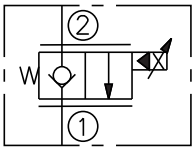
Cavity: VC08-2; See page 9.108.1; **Cavity Tool:** CT08-2XX; See page 8.600.1

Seal Kit: SK08-2X-T; See page 8.650.1

Coil Nut: Part No. 7004400; For E-coils manuf. prior to 1-1-04, see page 3.400.1

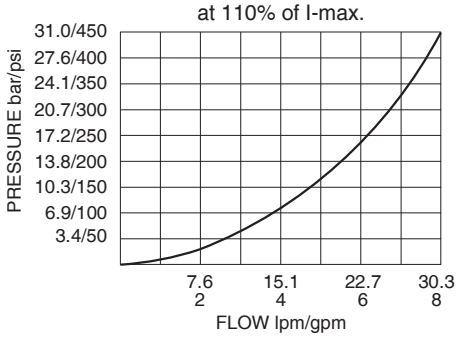
SYMBOLS

USASI/ISO:

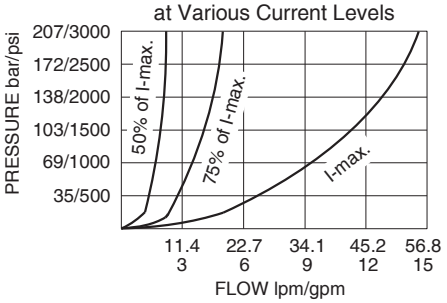


PERFORMANCE

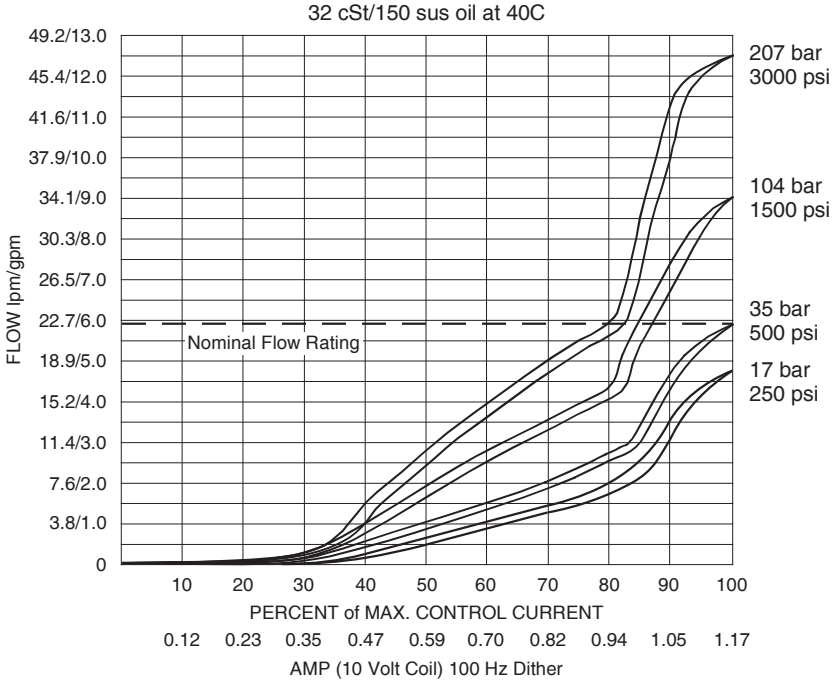
PRESSURE DROP 2 to 1
at 110% of I-max.



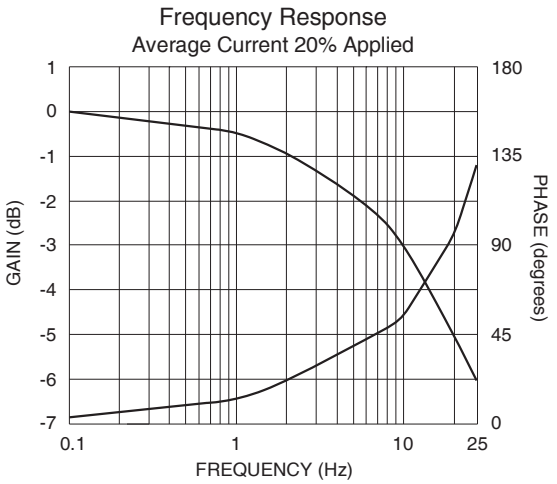
PRESSURE DROP 2 to 1
at Various Current Levels



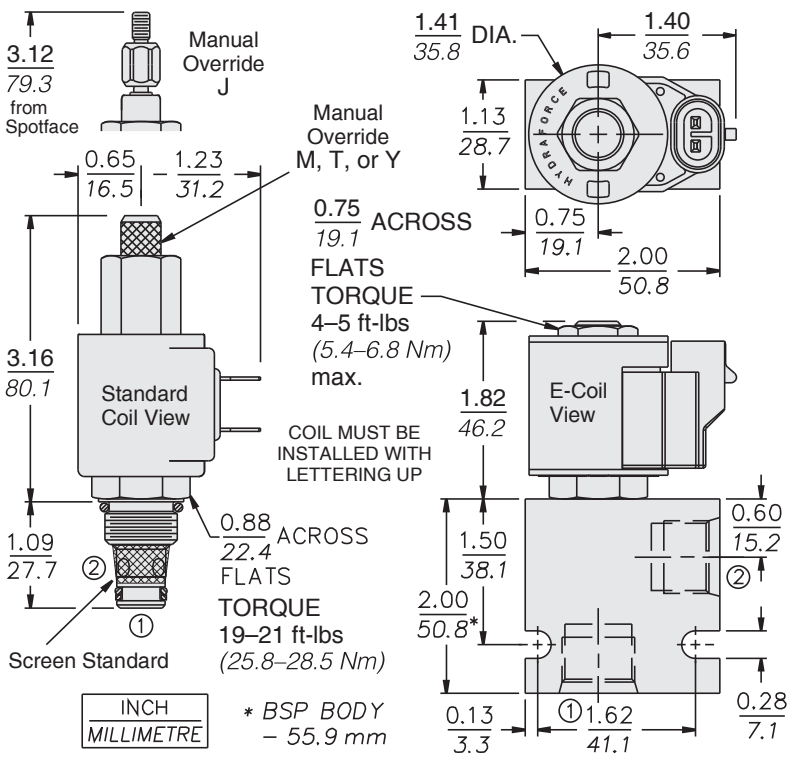
FLOW vs. CURRENT at Various Differential Pressures
32 cSt/150 sus oil at 40C



PERFORMANCE (cont'd.)



DIMENSIONS



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

MATERIALS

Cartridge: Weight: 0.09 kg. (0.20 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ; See page 8.008.1

Standard Coil: Weight: 0.11 kg. (0.25 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: Weight: 0.14 kg. (0.3 lbs.); Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors.
Note: See page 3.400.1 for all E-Coil retrofit applications.

TO ORDER

SP08-20__ - ___ ___ ___ - __ - ___ ___ ___ ___ __

Option

None	(Blank)
Manual Override	**J**
Manual Override	**M**
Manual Override	**T**
Manual Override	**Y**

For Manual Override details see page 1.001.1

Note: Flow varies with manual override options; see flow ratings on previous page.

Porting

Cartridge Only	**0**
SAE 4	**4T**
SAE 6	**6T**
1/4 in. BSP*	**2B**
3/8 in. BSP*	**3B**

*BSP Body; U.K. Mfr. Only

Seals

N	Buna N (Std.)
V	Fluorocarbon

Voltage

0	Less Coil**
10	10 VDC†
12	12 VDC
20	20 VDC†
24	24 VDC

**Includes Coil Nut

†10 VDC and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

Termination (VDC) Std. Coil

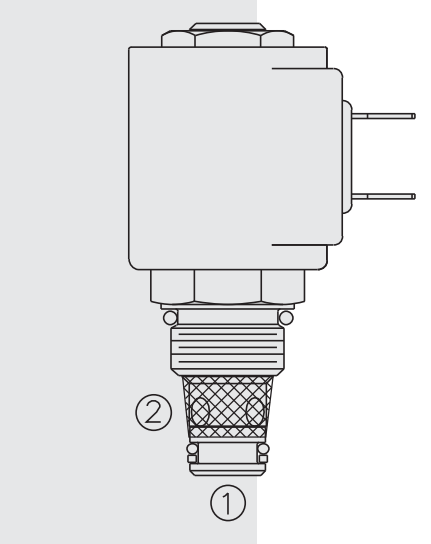
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC) E-Coil

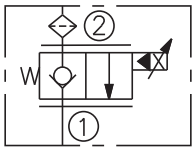
ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150.2A (IP69K Rated)

Coils with internal diode are available. Consult factory.

SP08-20A Poppet, 2-Way, Normally Closed



SYMBOL



DESCRIPTION

A proportional solenoid-operated, two-way, poppet-type, normally closed, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding applications

OPERATION

When de-energized, the **SP08-20A** acts as a check valve, allowing flow from 1 to 2, and blocking flow from 2 to 1. When energized, the 2 to 1 flow path is opened. Flow is proportional to current applied to the coil. Flow varies with manual override.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Manual override option.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Flow: 30.3 lpm (8 gpm) nominal; see performance charts

Minimum Operating Dither/Pulse Frequency: 70 Hz

Hysteresis: Less than 5% up to 85% of I-max.; Less than 10% above 85% of I-max.

Max. Internal Leakage: 5 drops per minute at 207 bar (3000 psi)

Operating Temperature: -40 to 100°C (-40° to 212°F) with standard Buna N seals
-26 to 204°C (-15°F to 400°F) with Fluorocarbon seals
-54 to 107°C (-65°F to 225°F) with Polyurethane seals

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Filtration: See page 9.010.1; **Installation:** No Restrictions. See page 9.020.1

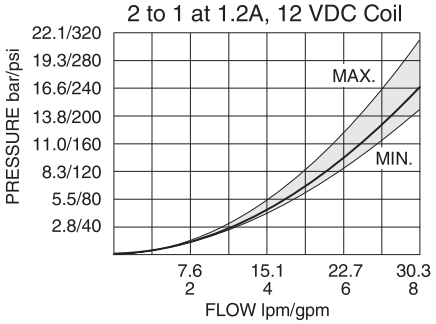
Cavity: VC08-2; See page 9.108.1; **Cavity Tool:** CT08-2XX; See page 8.600.1

Seal Kit: SK08-2X-T; See page 8.650.1

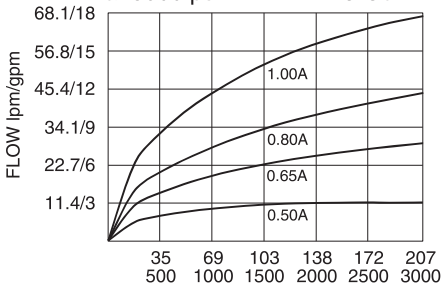
Coil Nut: Part No. 7004400

PERFORMANCE

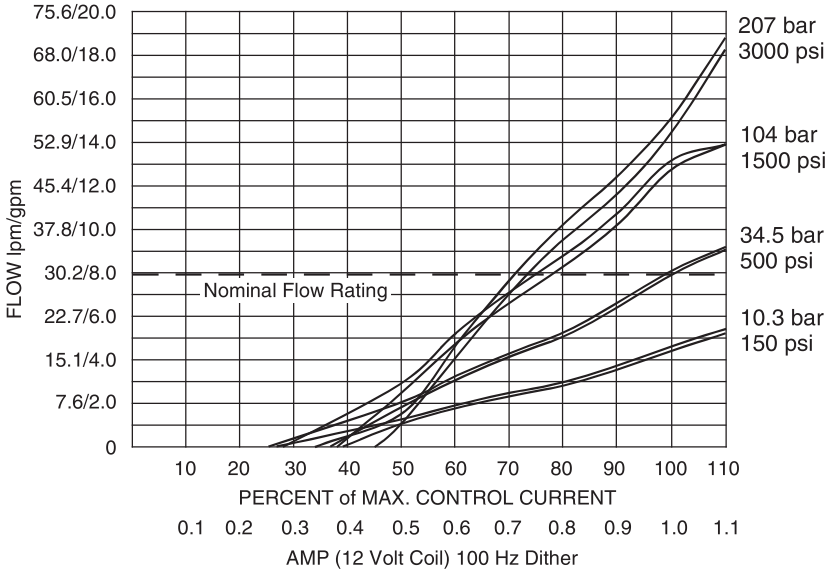
WIDE OPEN PRESSURE DROP
2 to 1 at 1.2A, 12 VDC Coil



TYPICAL PRESSURE RESPONSE
at 3000 psi with 12 VDC Coil

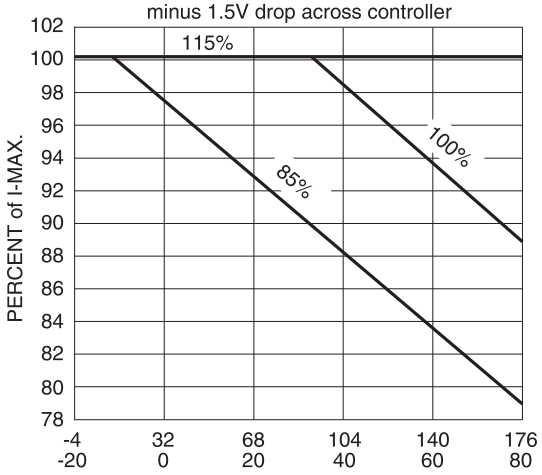


FLOW vs. CURRENT at Various Differential Pressures
32 cSt/150 sus oil at 40C

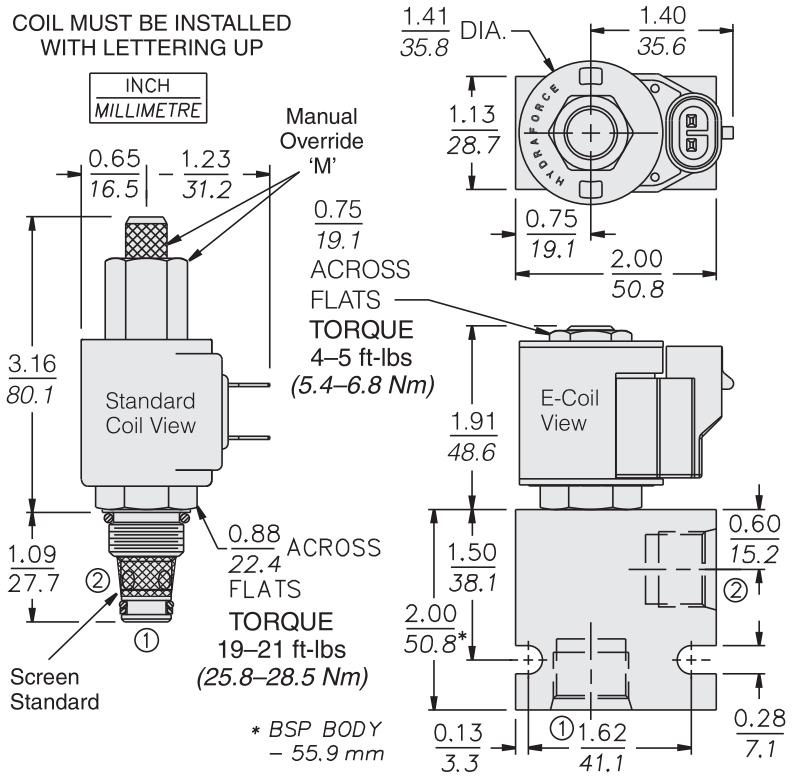


PERFORMANCE (cont'd.)

PERCENT I-MAX. vs. TEMPERATURE
for 10 or 20 VDC Coil (for 10V Coil I-Max. = 1.15A)
Curves show percent of nominal system voltage minus 1.5V drop across controller



DIMENSIONS



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

MATERIALS

Cartridge: Weight: 0.10 kg. (0.23 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-up standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi); Ductile iron bodies available; dimensions may differ. See page 8.008.1.

Standard Coil: Weight: 0.11 kg. (0.25 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire; See page 3.200.1.

E-Coil: Weight: 0.14 kg. (0.3 lbs.); Fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors; See page 3.400.1.

TO ORDER

SP08-20A__ - __ __ __ - __ - __ __ __ __ __

Option
None (Blank)
Manual Override **M**

For Manual Override details see page 1.001.1

Porting

Cartridge Only	**0**
SAE 6	**6T**
SAE 8	**8T**
1/4 in. BSP*	**2B**
3/8 in. BSP*	**3B**
1/2 in. BSP*	**4B**

*BSP Body; U.K. Mfr. Only

Seals

Buna N (Std.)	**B**
Fluorocarbon	**V**
Polyurethane	**P**

Voltage

0	Less Coil**
10	10 VDC (D- or E-Coil)
12	12 VDC (D- or E-Coil)
20	20 VDC (E-Coil)
24	24 VDC (D- or E-Coil)

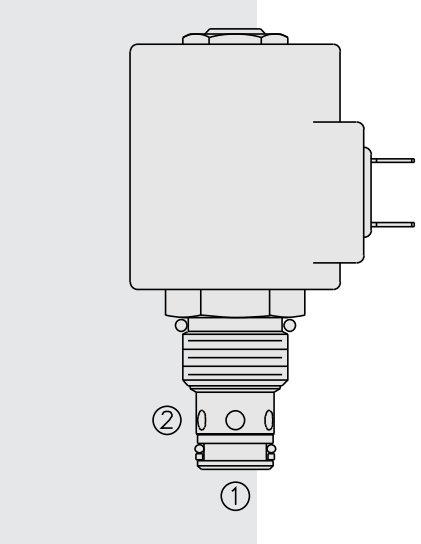
**Includes Std. D-Coil Nut.

Note: 10 VDC and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

Coil Termination	E-Coil	D-Coil
Deutsch DT04-2P	**ER** (IP69K)	**DR** (IP65)
Metri-Pak 150	**EY** (IP69K)	**DY** (IP65)
Dual Lead Wires	**EL** (IP69K)	**DL** (IP65)
Amp Jr. Timer	**EJ** (IP67)	—
DIN 43650	**EG** (IP65)	**DG** (IP65)
Dual Spades	—	**DS** (IP65)

For Coil with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models. See coil option info. on pages 3.200.1 & 3.400.1

SP10-20 Poppet, 2-Way, Normally Closed



DESCRIPTION

A proportional solenoid-operated, two-way, poppet-type, normally closed, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding applications.

OPERATION

When de-energized, the **SP10-20** acts as a check valve, allowing flow from 1 to 2, while blocking flow from 2 to 1. When energized, the 2 to 1 flow path opens. Flow is proportional to current applied to the coil. Flow varies with manual override.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Manual override option.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.
- Metering Option.

RATINGS

Operating Pressure: 250 bar (3625 psi)

Flow: Without Manual Override: 68 lpm (18 gpm) at 34.5 bar (500 psid)
With Manual Override M or T: 64.3 lpm (17 gpm) at 34.5 bar (500 psid)
With Manual Override Y or J: 41.2 lpm (10.9 gpm) at 34.5 bar (500 psid)

Minimum Operating Dither/Pulse Frequency: 70 Hz

Hysteresis: Less than 5% up to 75% of I-max.; Less than 10% above 75% of I-max.

Max. Internal Leakage: 5 drops per minute at 250 bar (3625 psi)

Temperature: -40 to 120°C with standard Buna seals

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Filtration: See page 9.010.1; **Installation:** No Restrictions. See page 9.020.1

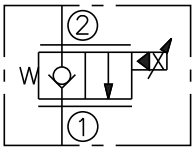
Cavity: VC10-2; See page 9.110.1; **Cavity Tool:** CT10-2XX; See page 8.600.1

Seal Kit: SK10-2X-T; See page 8.650.1

Coil Nut: Part No. 7004400; for E-coils manuf. prior to 1-1-04, see page 3.400.1.

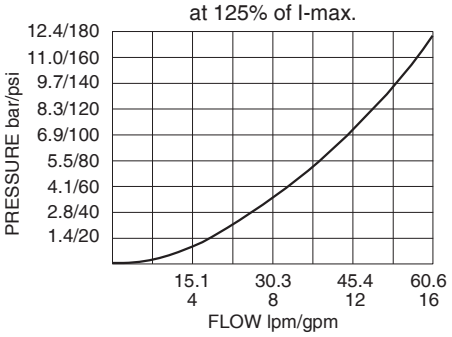
SYMBOLS

USASI/ISO:

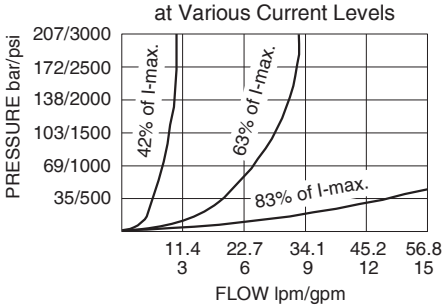


PERFORMANCE

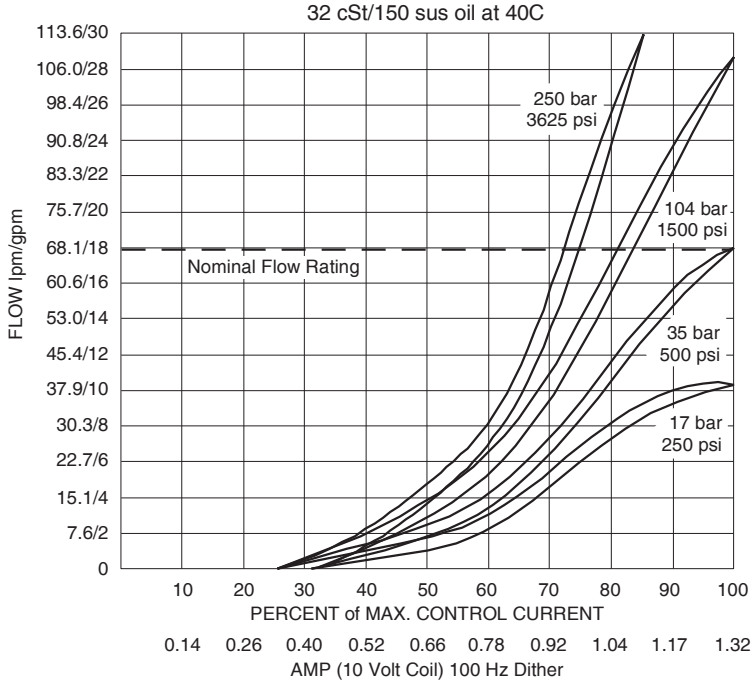
PRESSURE DROP 2 to 1
at 125% of I-max.



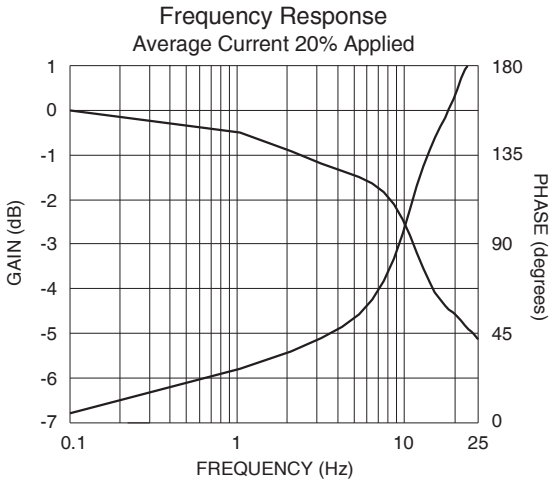
PRESSURE DROP 2 to 1
at Various Current Levels



FLOW vs. CURRENT at Various Differential Pressures
32 cSt/150 sus oil at 40C

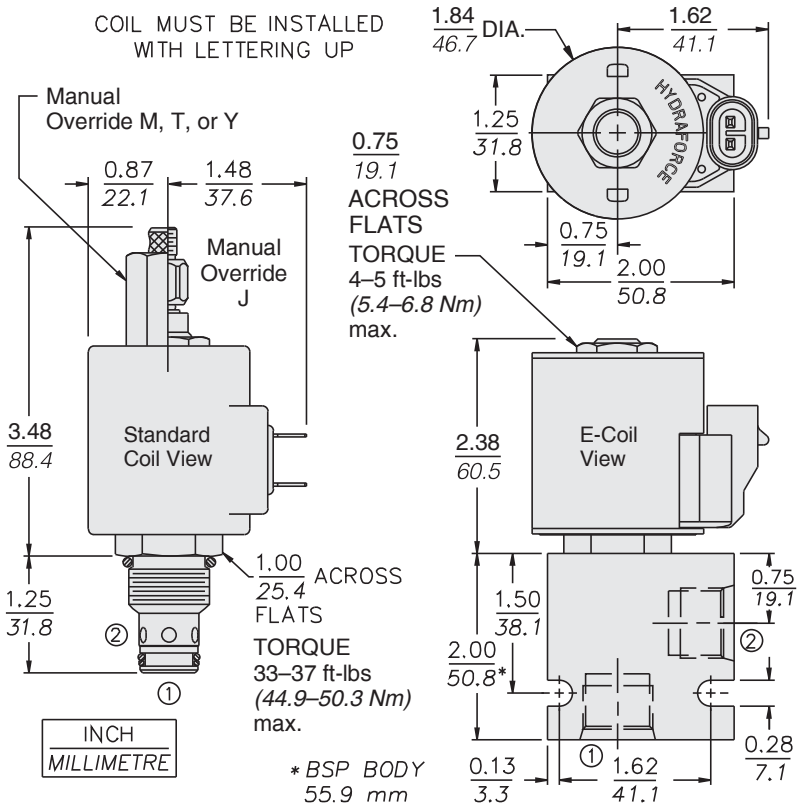


PERFORMANCE (cont'd.)



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.16 kg. (0.34 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1.

Standard Coil: Weight: 0.27 kg. (0.60 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire; See page 3.200.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SP10-20 __ - __ __ __ - __ - __ __ __ __ __

Option

None	(Blank)
Screen	**S**
Metering	**A**
Manual Override	**M**
Manual Override	**T**
Manual Override	**Y**
Manual Override	**J**

For Manual Override details see page 1.001.1

Note: Flow varies with manual override options; see flow ratings on previous page.

Porting

Cartridge Only	**0**
SAE 6	**6T**
SAE 8	**8T**
1/4 in. BSP*	**2B**
3/8 in. BSP*	**3B**
1/2 in. BSP*	**4B**

*BSP Body; U.K. Mfr. Only

Seals

N	Buna N (Std.)
V	Fluorocarbon
P	Polyurethane

Voltage

0	Less Coil**
10	10 VDC†
12	12 VDC
20	20 VDC†
24	24 VDC

**Includes Std. Coil Nut

†10 VDC and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

Termination (VDC) Std. Coil

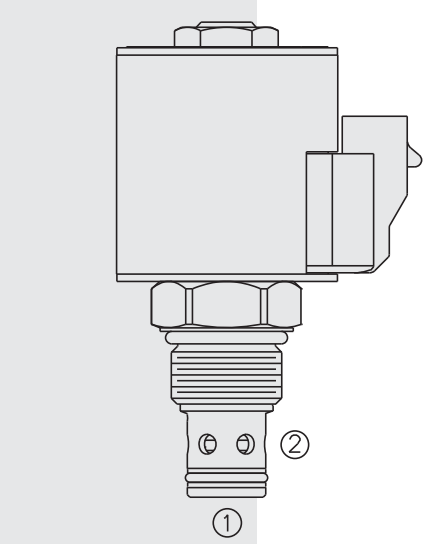
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC) E-Coil

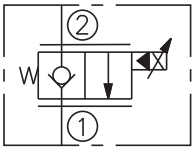
ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150.2A (IP69K Rated)

Coils with internal diode are available. Consult factory.

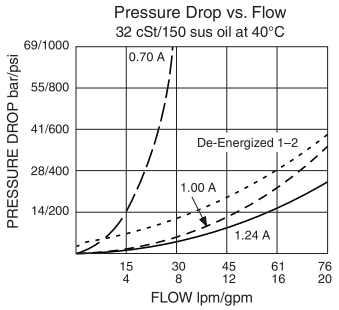
HSP10-20 HyPerformance™ Proportional, Poppet, 2-Way,



ISO SYMBOL



PERFORMANCE



DESCRIPTION

A high pressure proportional solenoid-operated, two-way, piloted, poppet-type, normally closed, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding applications.

OPERATION

When de-energized, the **HSP10-20** blocks flow from ports 2 to 1. In this mode, the cartridge will allow flow from ports 1 to 2 after overcoming the spring forces (see Performance graph). When energized, the valve will allow flow proportional to the applied current from ports 2 to 1 while severely restricting flow from ports 1 to 2.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Efficient wet-armature construction.
- Continuous-duty rated coils.
- Waterproof E-Coils rated up to IP69K.
- Manual override option.
- All HyPerformance products are tested to the rigorous standards of the NFPA specification T2.6.1.
- All HyPerformance valves are tested at a verification level of 90% and an assurance of 99%.

RATINGS

Operating Pressure: 350 bar (5075 psi); 10% cycle life: 420 bar (6090 psi)

Flow Rating: 53 lpm (14 gpm) with 11 bar (160 psi) compensation; 34 lpm (9 gpm) with 5.5 bar (80 psi) compensation

Max. Internal Leakage: 5 drops per minute at 350 bar (5075 psi) at port 2

Cycle Life: One million cycles

Temperature: -54° to 107°C (-65° to 225°F) with urethane seals

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

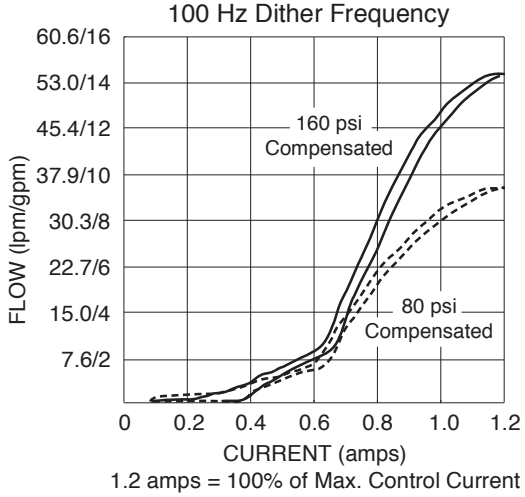
Filtration: See page 9.010.1; **Installation:** No Restrictions. See page 9.020.1

Cavity: HVC10-2; See page 9.110.1; **Cavity Tool:** HCT10-2XX; See page 8.600.1

Seal Kit: HSK10-2U-0 Urethane; See page 8.650.1

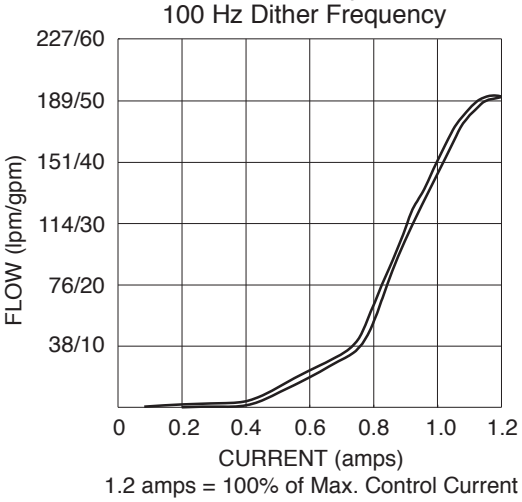
Coil Nut: Part No. 4553800; for E-coils manuf. prior to 1-1-04, see page 3.400.1.

Flow vs. Current
With Compensation
100 Hz Dither Frequency



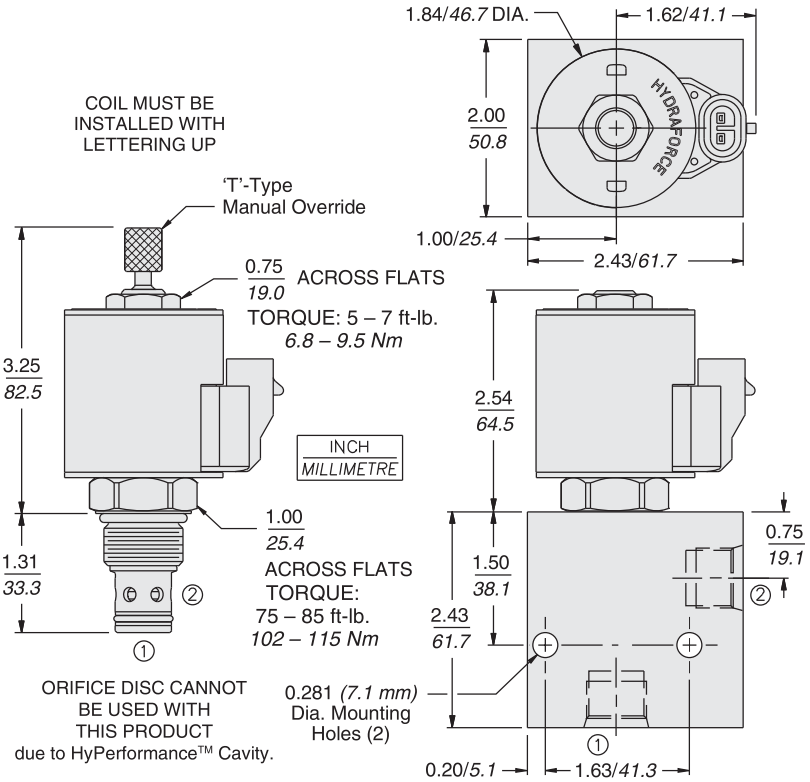
1.2 amps = 100% of Max. Control Current

Flow vs. Current, 242 bar (3000 psi)
Inlet with No Compensation
100 Hz Dither Frequency



1.2 amps = 100% of Max. Control Current

DIMENSIONS



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

MATERIALS

Cartridge: Weight: 0.18 kg. (0.4 lbs.) without coil and nut. Steel with hardened work surfaces. Zinc-plated exposed surfaces. PPDI Urethane seals without back-ups standard.

Standard Ported Body: Weight: 1.18 kg. (2.62 lbs.) HyPerformance™ Ductile iron (code 'D') standard. Rated to 345 bar (5000 psi) See page 8.010.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

HSP10-20 __ - __ __ __ - __ - __ __ __ __ __

Option
None (Blank)
Manual Override **T**

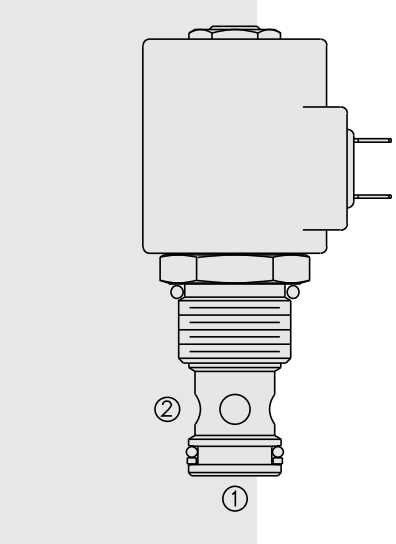
Porting
Cartridge Only **0**
SAE 8 **8TD**
1/2 in. BSP* **4BD**
*BSP Body; U.K. Mfr. Only

Seals
U PPDI Urethane
Consult factory for additional seal options.

Voltage
0 Less Coil**
12 12 VDC
24 24 VDC
**Includes Std. Coil Nut
Consult factory for additional voltage options.

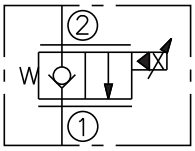
Termination (VDC) E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150.2A (IP69K Rated)
EL Dual Leads

SP12-20 Poppet, 2-Way, Normally Closed



SYMBOLS

USASI/ISO:



DESCRIPTION

A proportional solenoid-operated, two-way, poppet-type, normally closed, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding applications.

OPERATION

When de-energized, the **SP12-20** acts as a check valve, allowing flow from 1 to 2, and blocking flow from 2 to 1. When energized, the 2 to 1 flow path opens. Flow is proportional to current applied to the coil. Flow varies with manual override options.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Manual override option.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.
- Metering Option.

RATINGS

Operating Pressure: 250 bar (3625 psi)

Flow: Without Manual Override: 100 lpm (27 gpm) at 34.5 bar (500 psi)
With Manual Override M or T: 95.6 lpm (25.25 gpm) at 34.5 bar (500 psid)
With Manual Override Y or J: 68.1 lpm (18 gpm) at 34.5 bar (500 psid)

Minimum Operating Dither/Pulse Frequency: 70 Hz

Hysteresis: Less than 5% below 60% of I-max.; Less than 10% above 60% of I-max.

Max. Internal Leakage: 5 drops per minute at 250 bar (3625 psi)

Temperature: -40 to 120°C with standard Buna seals

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Filtration: See page 9.010.1; **Installation:** No Restrictions. See page 9.020.1

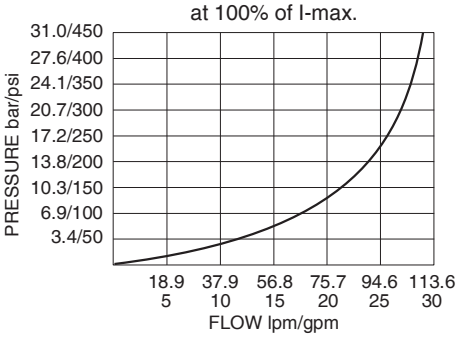
Cavity: VC12-2; See page 9.112.1; **Cavity Tool:** CT12-2XX; See page 8.600.1

Seal Kit: SK12-2X-T; See page 8.650.1

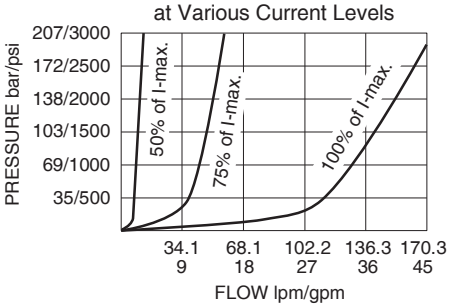
Coil Nut: Part No. 7004400; for E-coils manuf. prior to 1-1-04, see page 3.400.1.

PERFORMANCE

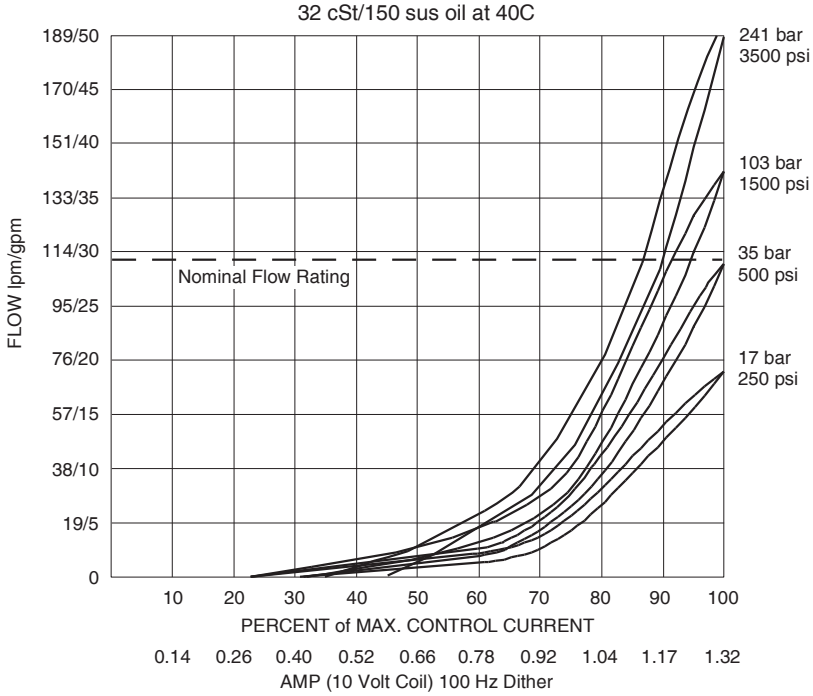
PRESSURE DROP 2 to 1
at 100% of I-max.



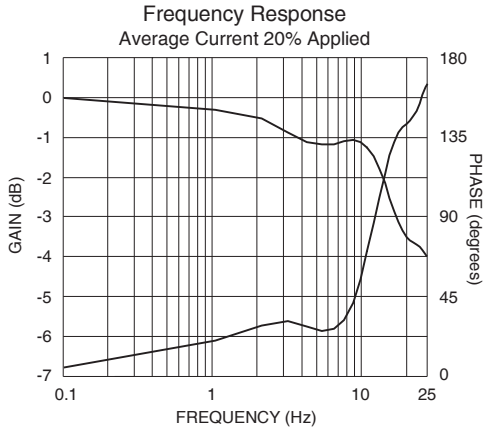
PRESSURE DROP 2 to 1
at Various Current Levels



FLOW vs. CURRENT at Various Differential Pressures
32 cSt/150 sus oil at 40C

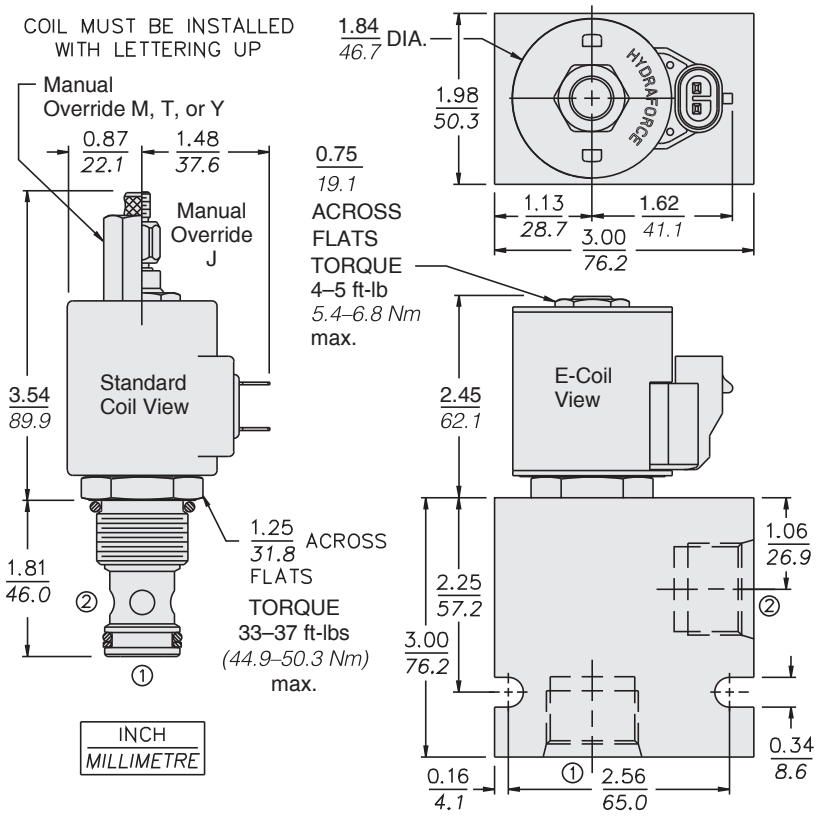


PERFORMANCE (cont'd.)



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.25 kg. (0.55 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.57 kg. (1.25 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available. dimensions may differ. See page 8.012.1.

Standard Coil: Weight: 0.27 kg. (0.60 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SP12-20 __ - __ __ __ - __ - __ __ __ __ __

Option

None	(Blank)
Metering	**A**
Manual Override	**M**
Manual Override	**T**
Manual Override	**Y**
Manual Override	**J**

For Manual Override details see page 1.001.1

Note: Flow varies with manual override options; see flow ratings on previous page.

Porting

Cartridge Only	**0**
SAE 10	**10T**
SAE 12	**12T**
SAE 16	**16T**
3/4 in. BSP*	**6B**
1 in. BSP*	**8B**

*BSP Body; U.K. Mfr. Only

Seals

N	Buna N (Std.)
V	Fluorocarbon
P	Polyurethane

Voltage

0	Less Coil**
10	10 VDC†
12	12 VDC
20	20 VDC†
24	24 VDC

**Includes Std. Coil Nut

†10 VDC and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

Termination (VDC) Std. Coil

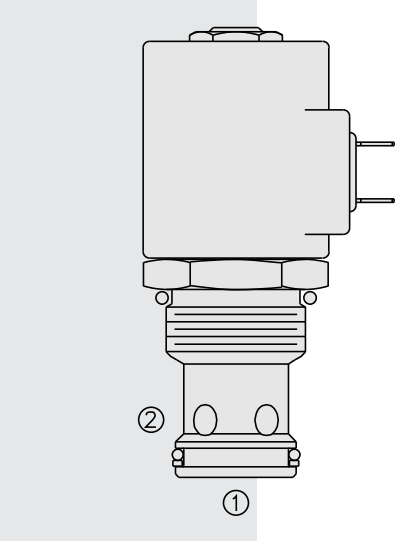
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC) E-Coil

ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150.2A (IP69K Rated)

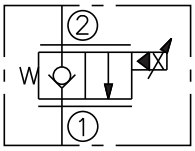
Coils with internal diode are available. Consult factory.

SP16-20 Poppet, 2-Way, Normally Closed



SYMBOLS

USASI/ISO:



DESCRIPTION

A proportional solenoid-operated, 2-way, poppet-type, normally closed, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding applications.

OPERATION

When de-energized, the **SP16-20** acts as a check valve, allowing flow from 1 to 2, and blocking flow from 2 to 1. When energized, the 2 to 1 flow path opens. Flow is proportional to current applied to the coil.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Manual override options.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: 250 bar (3625 psi)

Flow: Up to 265 lpm (70 gpm); see performance curves.

Dither/Pulse Frequency: 100 to 400 Hz

Hysteresis: Less than 5% below 60% of I-max.; Less than 10% above 60% of I-max.

Maximum Control Current: 1.2 amps

Max. Internal Leakage: 5 drops per minute at rated pressure

Temperature: -40 to 120°C with standard Buna seals

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Filtration: See page 9.010.1; **Installation:** No Restrictions. See page 9.020.1

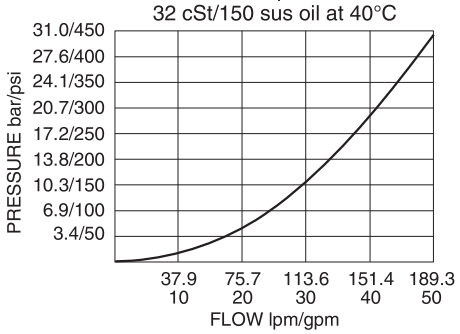
Cavity: VC16-2; See page 9.116.1; **Cavity Tool:** CT16-2XX; See page 8.600.1

Seal Kit: SK16-2X-T; See page 8.650.1

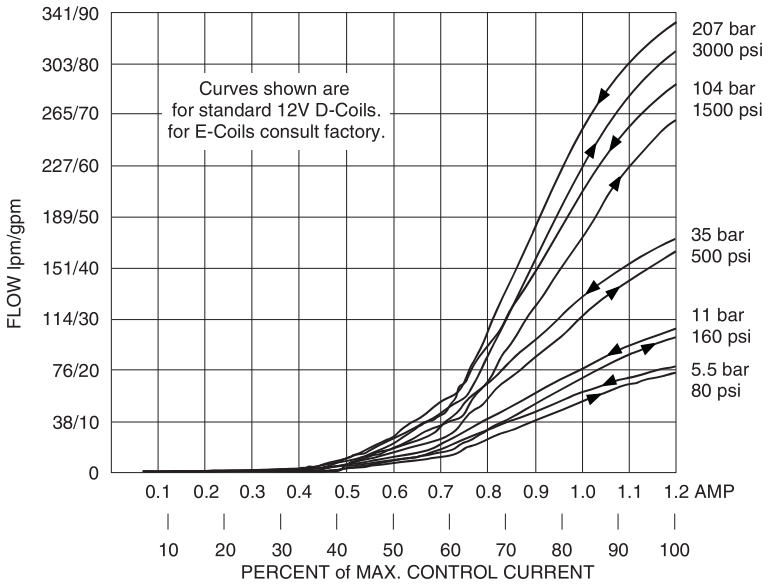
Coil Nut: Part No. 7004400; for E-coils manuf. prior to 1-1-04, see page 3.400.1.

PERFORMANCE

PRESSURE DROP (average)
Port 2 to 1; 1.5 Amp with 12VDC Coil
32 cSt/150 sus oil at 40°C

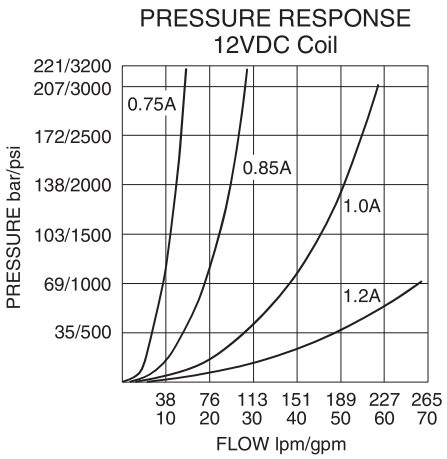


FLOW vs. CURRENT at Various Differential Pressures
32 cSt/150 sus oil at 40C



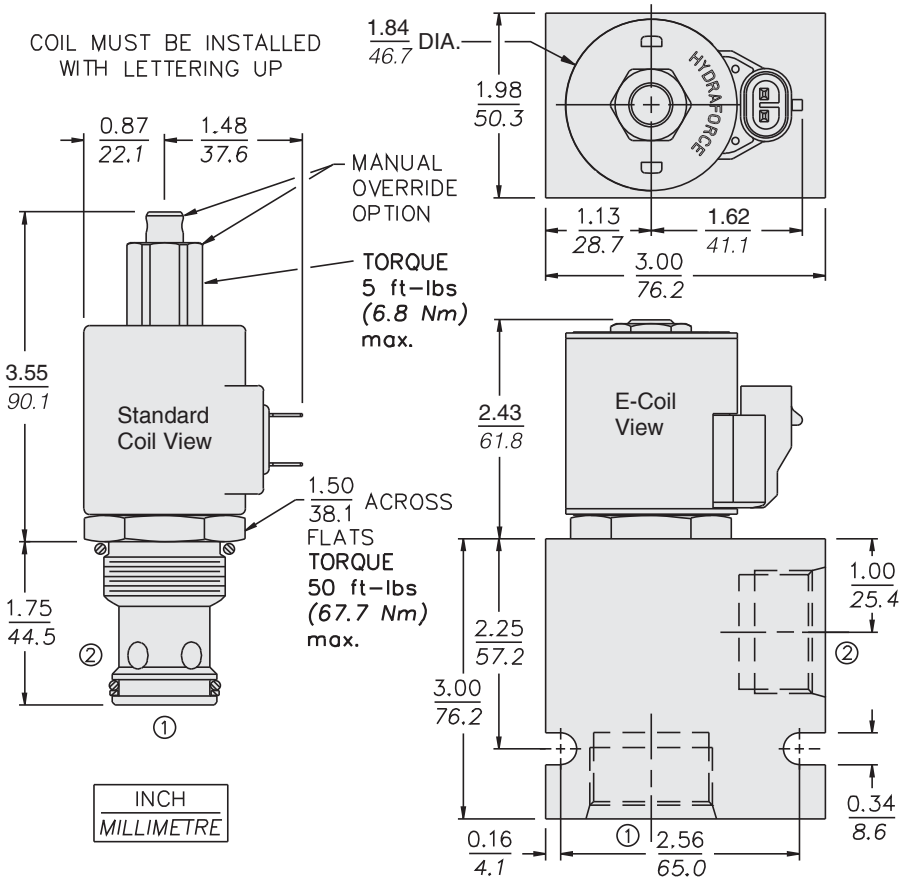
Performance information continued on following page.

PERFORMANCE (cont'd.)



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.32 kg. (0.71 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces; Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.57 kg. (1.25 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.016.1.

Standard Coil: Weight: 0.27 kg. (0.60 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors.
Note: See page 3.400.1 for all E-Coil retrofit applications.

TO ORDER

SP16-20 __ - __ __ __ - __ - __ __ __ __ __

Option

None	(Blank)
Manual Override	**M**
Manual Override	**Y**
Manual Override	**J**

For Manual Override details see page 1.001.1

Note: Flow performance varies with manual override options. Consult factory for details.

Porting

Cartridge Only	**0**
SAE 12	**12T**
SAE 16	**16T**
3/4 in. BSP*	**6B**
1 in. BSP*	**8B**

*BSP Body; U.K. Mfr. Only

Seals

N	Buna N (Std.)
V	Fluorocarbon
P	Polyurethane

Voltage

0	Less Coil**
10	10 VDC†
12	12 VDC
20	20 VDC†
24	24 VDC

**Includes Std. Coil Nut

†10 VDC and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

Termination (VDC) Std. Coil

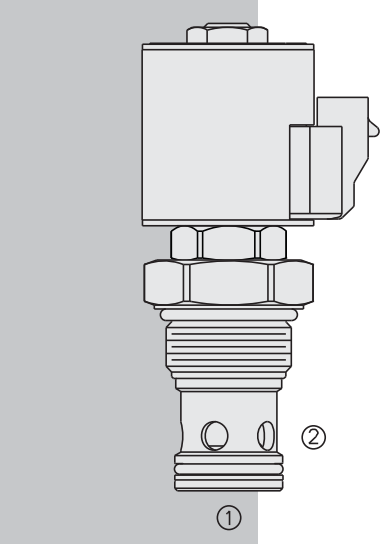
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC) E-Coil

ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150.2A (IP69K Rated)

Coils with internal diode are available. Consult factory.

HSP16-20 HyPerformance™ Poppet, 2-Way, N.C.



DESCRIPTION

A proportional solenoid-operated, 2-way, piloted, poppet-type, normally closed, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding in high pressure applications requiring low internal leakage.

OPERATION

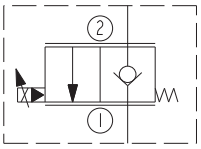
When de-energized, the **HSP16-20** blocks flow from ports 2 to 1. In this mode, the cartridge will allow flow from ports 1 to 2 after overcoming the spring forces (see performance graph). When energized, the valve will allow flow from ports 2 to 1 while severely restricting flow from ports 1 to 2.

Note: *If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.*

FEATURES

- Industry-common cavity.
- Efficient wet-armature construction.
- Continuous-duty rated coils.
- Waterproof E-Coils rated up to IP69K.
- 1000-hour salt-spray rated solenoid tubes.
- All HyPerformance products are tested to NFPA specification T2.6.1, and are tested at a verification level of 90% and an assurance of 99%.

ISO SYMBOL



RATINGS

Operating Pressure: 350 bar (5075 psi); 10% Cycle Life: 420 bar (6090 psi)

Fatigue Rating: 2 million cycles at 420 bar

Burst Pressure: 1380 bar (20,000 psi)

Flow: Up to 75.7 lpm (20 gpm); see performance curves.

Maximum Control Current: 1.2 amps

Max. Internal Leakage: 7 drops per minute at 345 bar (5000 psi) inlet

Temperature: -54° to 107°C (-65° to 225°F) with Urethane seals

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Filtration: See page 9.010.1

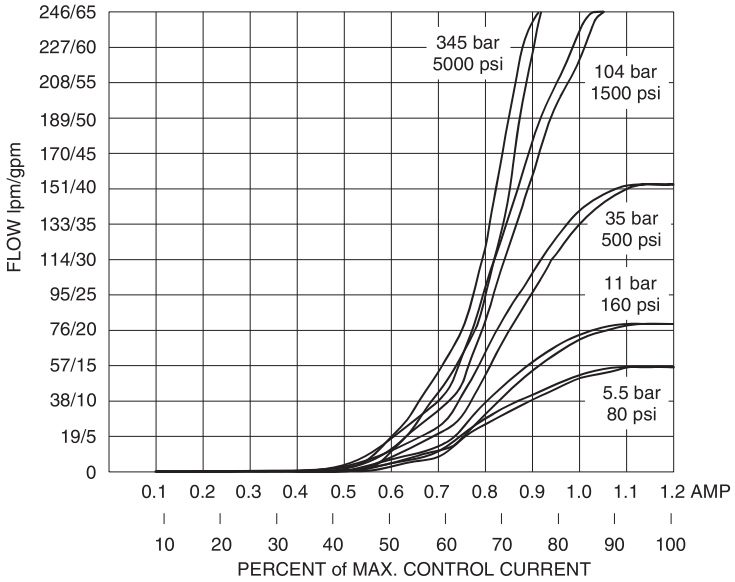
Installation: See note re: voltage under OPERATION heading. See page 9.020.1

Cavity: HVC16-2; See page 9.116.1; **Cavity Tool:** HCT16-2XX; See page 8.600.1

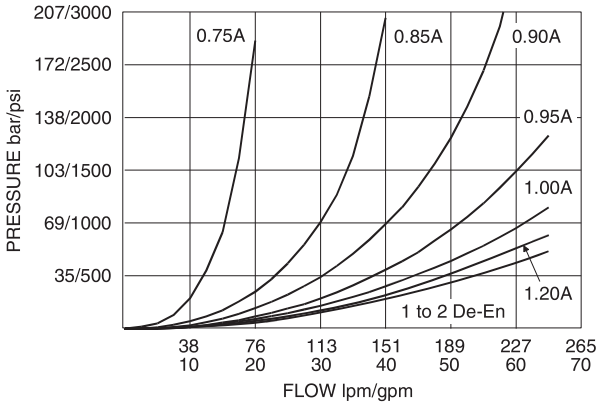
Seal Kit: SK16-2U-O; See page 8.650.1; **Coil Nut:** Part No. 4553800

PERFORMANCE

FLOW vs. CURRENT at Various Inlet Pressures
with 12 VDC Coil — 32 cSt/150 sus oil at 40°C

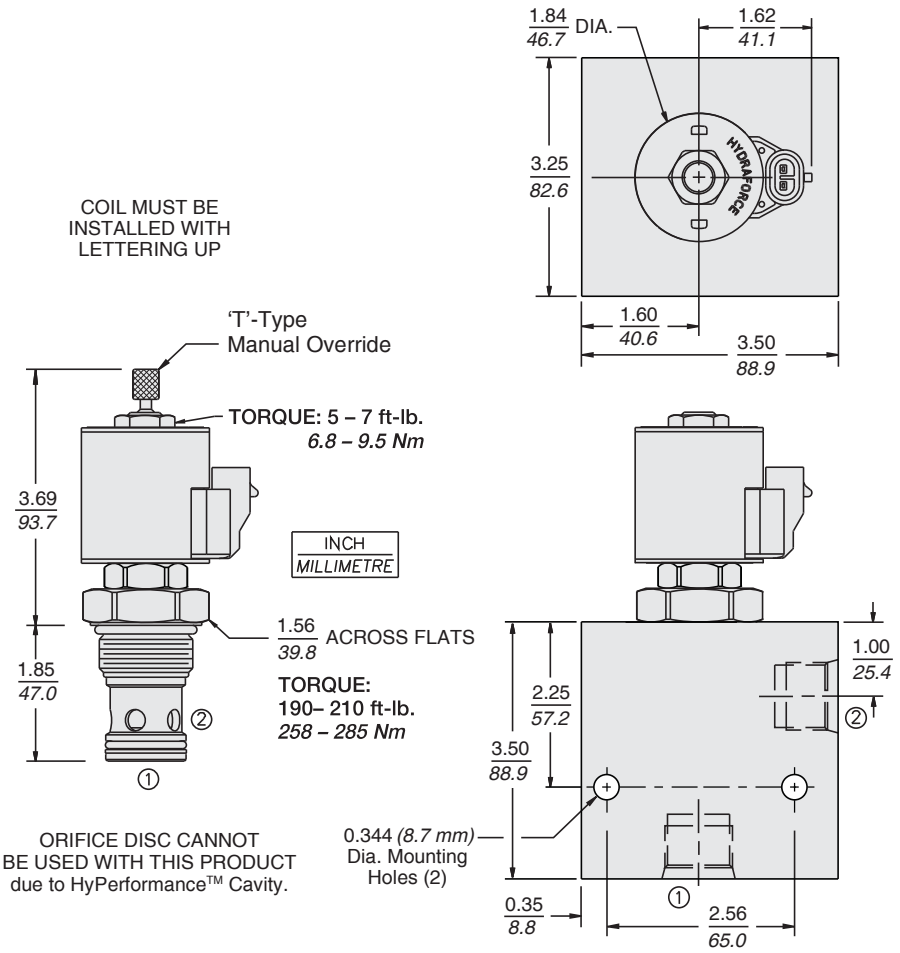


TYPICAL PRESSURE RESPONSE



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.43 kg. (0.95 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. Urethane seals without back-up rings standard.

Ported Body: Weight: 3.97 kg. (8.75 lbs.); HyPerformance™ Ductile iron (code 'D') standard. Rated to 345 bar (5000 psi).

E-Coil: Weight: 0.41 kg. (0.9 lbs.); Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. See page 3.400.1.

TO ORDER

HSP16-20 __ - __ __ __ - __ - __ __ __ __ __

Option
None (Blank)
Manual Override **T**

Porting
Cartridge Only **0**
SAE 16 **16TD**
1 in. BSP* **8BD**
*BSP Body; U.K. Mfr. Only

Seals
PPDI Urethane **U**
Recommended for pressures above 241 bar (3500 psi).

NOTE: *Other seal options available. Consult factory.*

Voltage
0 Less Coil**
12 12 VDC
24 24 VDC
**Includes Std. Coil Nut

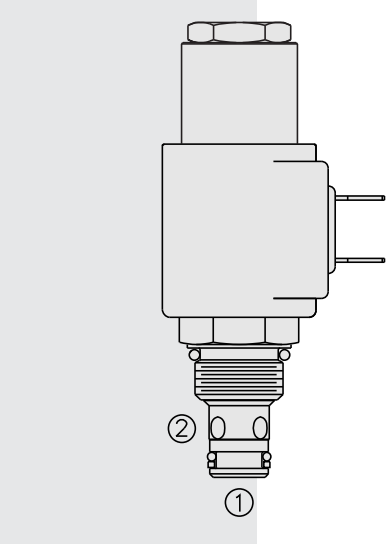
Consult factory for additional voltage options.

Coil Termination

Deutsch DT04-2P	**ER** (IP69K)
Metri-Pak 150	**EY** (IP69K)
Dual Lead Wires	**EL** (IP69K)
Amp Jr. Timer	**EJ** (IP67)
DIN 43650	**EG** (IP65)

For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models.
See coil option info. on page 3.400.1

SP08-21 Poppet, 2-Way, Normally Open



DESCRIPTION

A proportional solenoid-operated, 2-way, poppet-type, normally open, screw-in hydraulic cartridge valve for low-leakage load-holding applications and for starting or stopping a load or a pump system.

OPERATION

When de-energized, the **SP08-21** allows flow from 2 to 1. When the valve is partially energized, the valve begins to throttle the flow from 2 to 1. When fully energized, the poppet closes on the seat, blocking flow from 2 to 1. Flow from 1 to 2 will occur when hydraulic pressure exceeds the solenoid force.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Operating Voltage: See Performance Chart

Flow: 0 to 22.7 lpm (0 to 6 gpm)

Max. Internal Leakage: 5 drops per minute at 207 bar (3000 psi)

Temperature: -40 to 120°C with standard Buna seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No Restrictions. See page 9.020.1

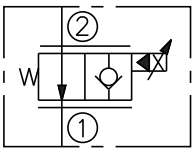
Cavity: VC08-2; See page 9.108.1; **Cavity Tool:** CT08-2XX; See page 8.600.1

Seal Kit: SK08-2X-T; See page 8.650.1

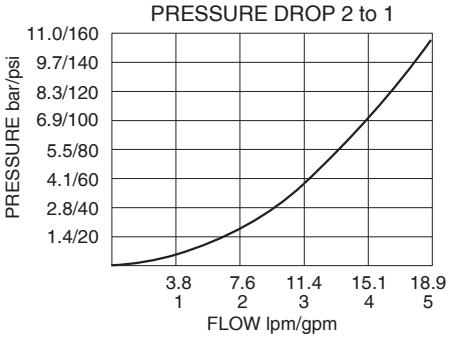
Coil Nut: Part No. 7004400;
For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut info.

SYMBOLS

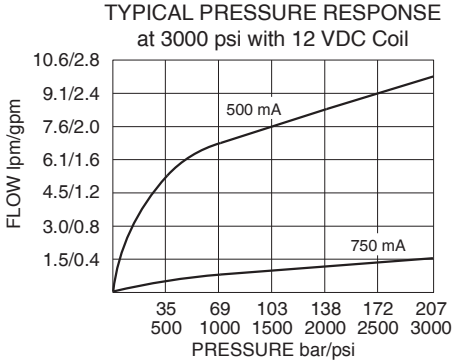
USASI/ISO:

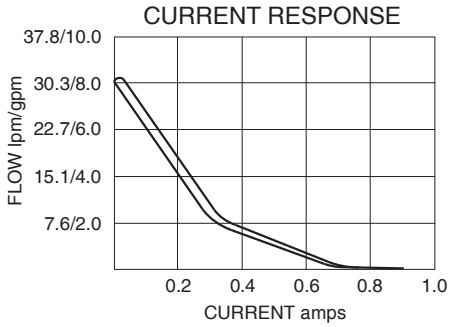


PERFORMANCE



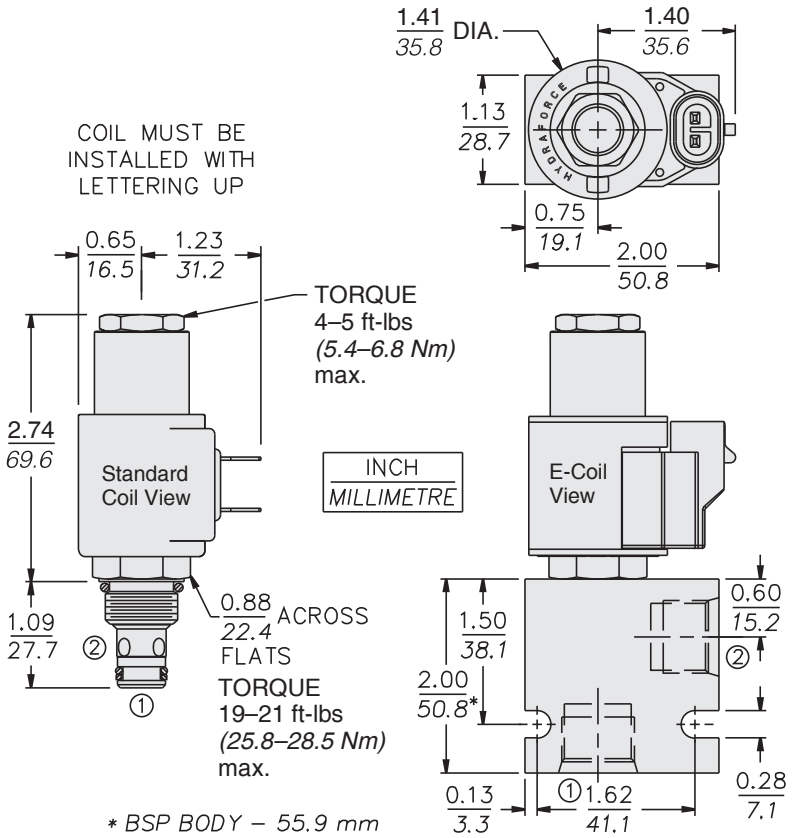
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.





Note: Electronic Controller is required to ramp current.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.11 kg. (0.25 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.008.1.

Standard Coil: Weight: 0.11 kg. (0.25 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight: 0.14 kg. (0.3 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. See page 3.400.1

TO ORDER

SP08-21 - ___ ___ ___ - ___ - ___ ___ ___ ___ ___

Porting

Cartridge Only	**0**
SAE 4	**4T**
SAE 6	**6T**
1/4 in. BSP*	**2B**
3/8 in. BSP*	**3B**

*BSP Body; U.K. Mfr. Only

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**
Polyurethane	**P**

Voltage

0	Less Coil**
10	10 VDC†
12	12 VDC
20	20 VDC†
24	24 VDC

**Includes Coil Nut

†10 VDC and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

Termination (VDC) Std. Coil

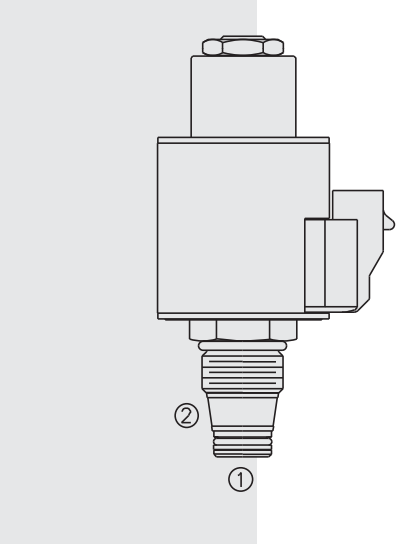
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC) E-Coil

ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150.2A (IP69K Rated)

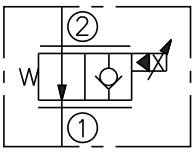
Coils with internal diode are available. Consult factory.

SP10-21 Poppet, 2-Way, Normally Open



SYMBOL

USASI/ISO:



DESCRIPTION

A proportional solenoid-operated, 2-way, poppet-type, normally open, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding applications and for starting or stopping a load or a pump system..

OPERATION

When de-energized, the **SP10-21** allows flow from 2 to 1. When the valve is partially energized, the valve begins to throttle the flow from 2 to 1. When fully energized, the poppet closes on the seat, blocking flow from 2 to 1. Flow from 1 to 2 will occur when hydraulic pressure exceeds the solenoid force.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: 250 bar (3625 psi)

Operating Voltage: See Performance Chart

Minimum Operating Dither/Pulse Frequency: 70 Hz

Flow: 0 to 60.6 lpm (0 to 16 gpm)

Max. Internal Leakage: 5 drops per minute at 207 bar (3000 psi)

Temperature: -40 to 120°C with standard Buna seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No Restrictions. See page 9.020.1

Cavity: VC10-2; See page 9.110.1; **Cavity Tool:** CT10-2XX; See page 8.600.1

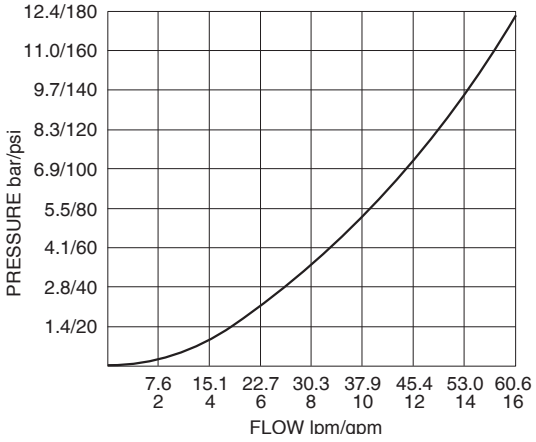
Seal Kit: SK10-2X-T; See page 8.650.1

Coil Nut: Part No. 7004400

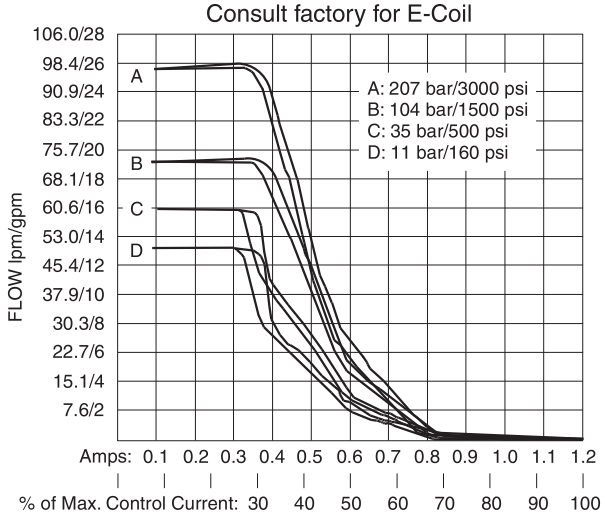
PERFORMANCE

Note: Electronic Controller is required to ramp current.

TYPICAL WIDE OPEN
PRESSURE DROP 2 to 1



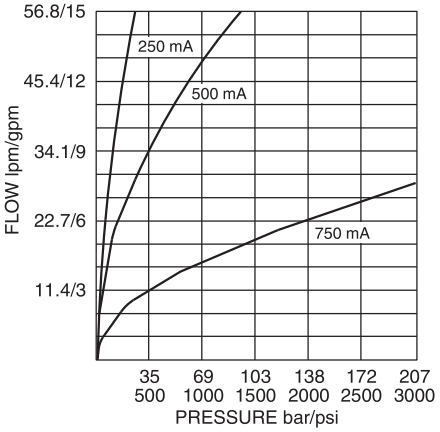
FLOW vs. CURRENT with 12 VDC D-Coil
Consult factory for E-Coil



Performance charts continued on next page.

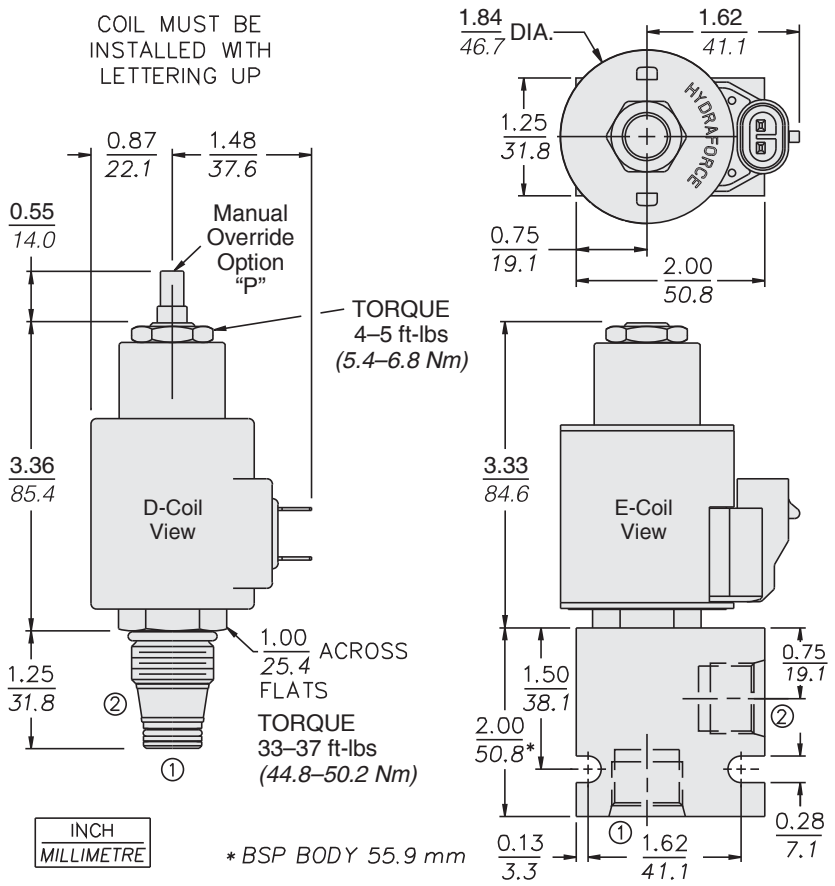
PERFORMANCE (cont'd.)

TYPICAL PRESSURE RESPONSE
with 12 VDC Coil



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.17 kg. (0.37 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ.
See page 8.010.1.

Standard D-Coil: Weight: 0.27 kg. (0.60 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire.
See page 3.200.1

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors.
See page 3.400.1

TO ORDER

SP10-21__ - __ __ __ - __ - __ __ __ __ __

Option
None (Blank)
Metering **A**
Screen **S**
Manual Override **P**
For Manual Override details see page 1.001.1

Porting
Cartridge Only **0**
SAE 6 **6T**
SAE 8 **8T**
1/4 in. BSP* **2B**
3/8 in. BSP* **3B**
1/2 in. BSP* **4B**
*BSP Body; U.K. Mfr. Only

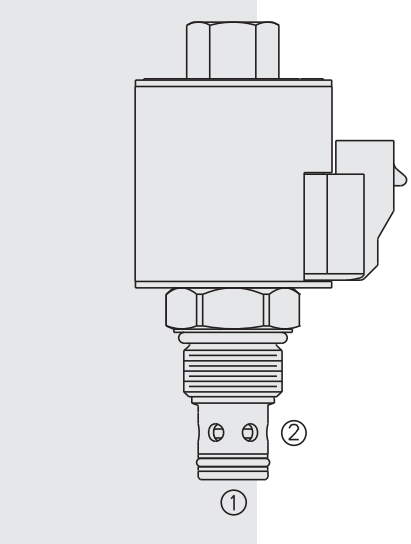
Seals
N Buna N (Std.)
V Fluorocarbon
P Polyurethane

Voltage
0 Less Coil**
10 10 VDC†
12 12 VDC
20 20 VDC†
24 24 VDC
**Includes Coil Nut
†10 VDC and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

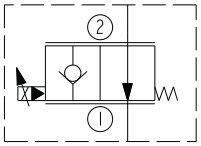
Termination (VDC) Std. D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

Termination (VDC) E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150.2A (IP69K Rated)
Coils with internal diode are available. Consult factory.

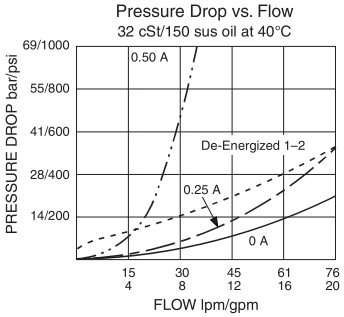
HSP10-21 HyPerformance™ Proportional, Poppet, 2-Way,



ISO SYMBOL



PERFORMANCE



DESCRIPTION

A high pressure proportional solenoid-operated, two-way, piloted, poppet-type, normally open, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding applications.

OPERATION

When de-energized, the **HSP10-21** allows flow proportional to the applied current from from ports 2 to 1 while severely restricting flow from ports 1 to 2. When energized, the valve blocks flow from ports 1 to 2 after overcoming the spring and actuator forces (see performance graph.)

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Efficient wet-armature construction.
- Continuous-duty rated coils.
- Optional waterproof E-Coils rated up to IP69K.
- All HyPerformance products are tested to the rigorous standards of the NFPA specification T2.6.1.
- All HyPerformance valves are tested at a verification level of 90% and an assurance of 99%.

RATINGS

Operating Pressure: 350 bar (5075 psi); 10% cycle life: 420 bar (6090 psi)

Flow Rating: 53 lpm (14 gpm) with 11 bar (160 psi) compensation; 34 lpm (9 gpm) with 5.5 bar (80 psi) compensation

Max. Internal Leakage: 5 drops per minute at 350 bar (5075 psi) at port 2

Cycle Life: One million cycles

Temperature: -54° to 107°C (-65° to 225°F) with Urethane seals

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Filtration: See page 9.010.1;

Installation: No Restrictions. See page 9.020.1

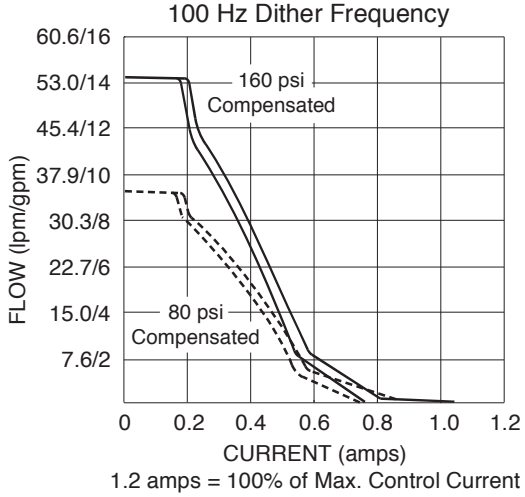
Cavity: HVC10-2; See page 9.110.1;

Cavity Tool: HCT10-2XX; See page 8.600.1

Seal Kit: SK10-2U-0 Urethane; See page 8.650.1

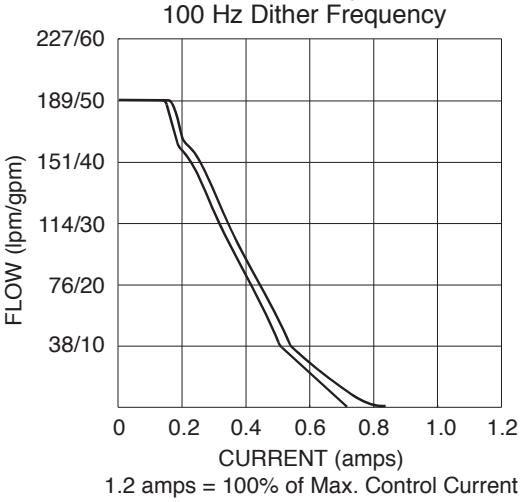
Coil Nut: Part No. 4553800; for E-coils manuf. prior to 1-1-04, see page 3.400.1.

Flow vs. Current
With Compensation
100 Hz Dither Frequency



1.2 amps = 100% of Max. Control Current

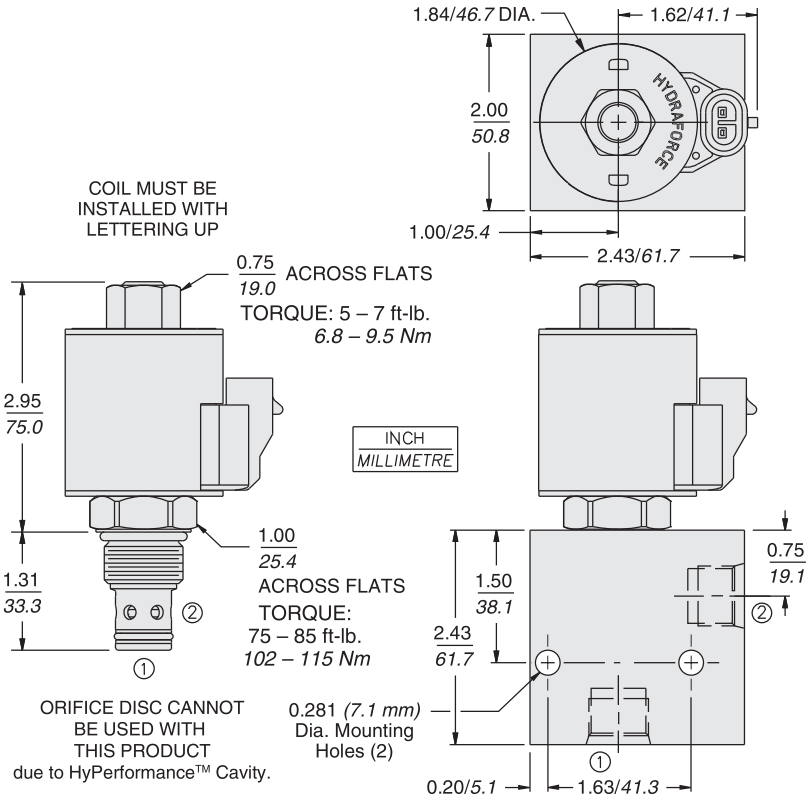
Flow vs. Current, 242 bar (3000 psi)
Inlet with No Compensation
100 Hz Dither Frequency



1.2 amps = 100% of Max. Control Current

Normally Open HSP10-21

DIMENSIONS



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

MATERIALS

Cartridge: Weight: 0.2 kg. (0.45 lbs.) without coil and nut. Steel with hardened work surfaces. Zinc-plated exposed surfaces. PPDI Urethane seals without back-ups standard.

Standard Ported Body: Weight: 1.18 kg. (2.62 lbs.) HyPerformance™ Ductile iron (code 'D') standard. Rated to 345 bar (5000 psi) See page 8.010.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. See page 3.400.1.

TO ORDER

HSP10-21 - _ _ _ - _ _ - _ _ _ _ _

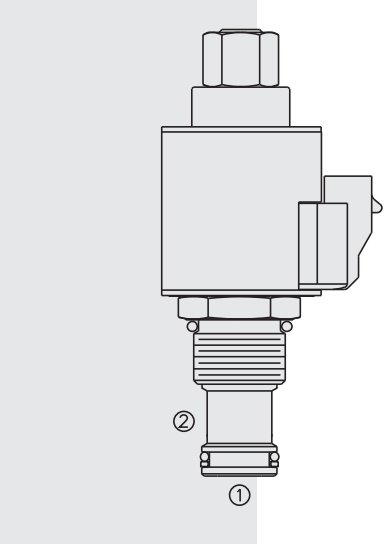
Porting
Cartridge Only **0**

Seals
PPDI Urethane **U**
Consult factory for additional seal options.

Voltage
0 Less Coil**
10 10 VDC
12 12 VDC
20 20 VDC
24 24 VDC
**Includes Std. Coil Nut
Consult factory for additional voltage options.

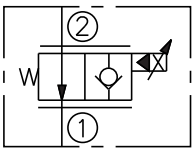
Termination (VDC) E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150.2A (IP69K Rated)
EG DIN 43650 (IP65 Rated)
EL Dual Leads

SP12-21 Poppet, 2-Way, Normally Open



SYMBOL

USASI/ISO:



DESCRIPTION

A proportional solenoid-operated, 2-way, poppet-type, normally open, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding applications

OPERATION

When de-energized, the **SP12-21** allows flow from 2 to 1. When the valve is partially energized, the valve begins to throttle the flow from 2 to 1. When fully energized, the poppet closes on the seat, blocking flow from 2 to 1. Flow from 1 to 2 will occur when hydraulic pressure exceeds the solenoid force.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: 250 bar (3625 psi)

Operating Voltage: See Performance Chart

Minimum Operating Dither/Pulse Frequency: 70 Hz

Flow: 0 to 200 lpm (0 to 53 gpm)

Max. Internal Leakage: 5 drops per minute at 207 bar (3000 psi)

Temperature: -40 to 120°C with standard Buna seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No Restrictions. See page 9.020.1

Cavity: VC12-2; See page 9.112.1; **Cavity Tool:** CT12-2XX; See page 8.600.1

Seal Kit: SK12-2X-T; See page 8.650.1

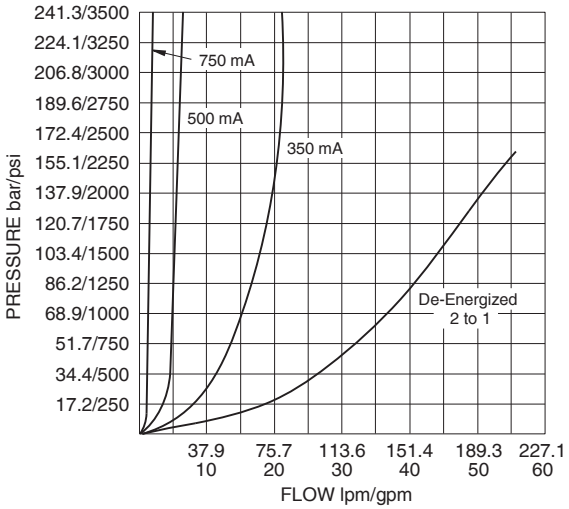
Coil Nut: Part No. 7004400

Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

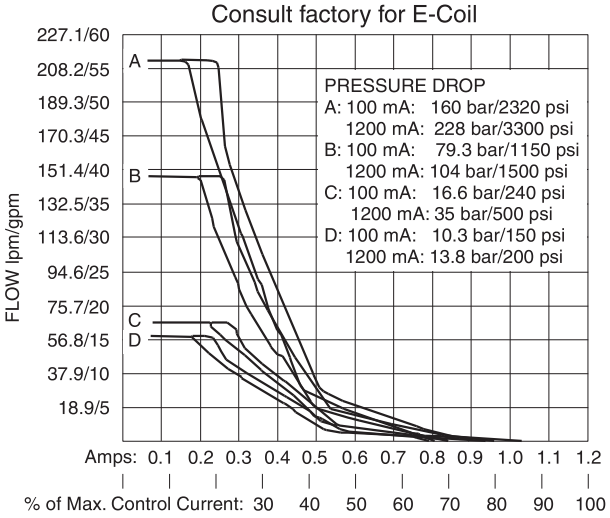
PERFORMANCE

Note: Electronic Controller is required to ramp current.

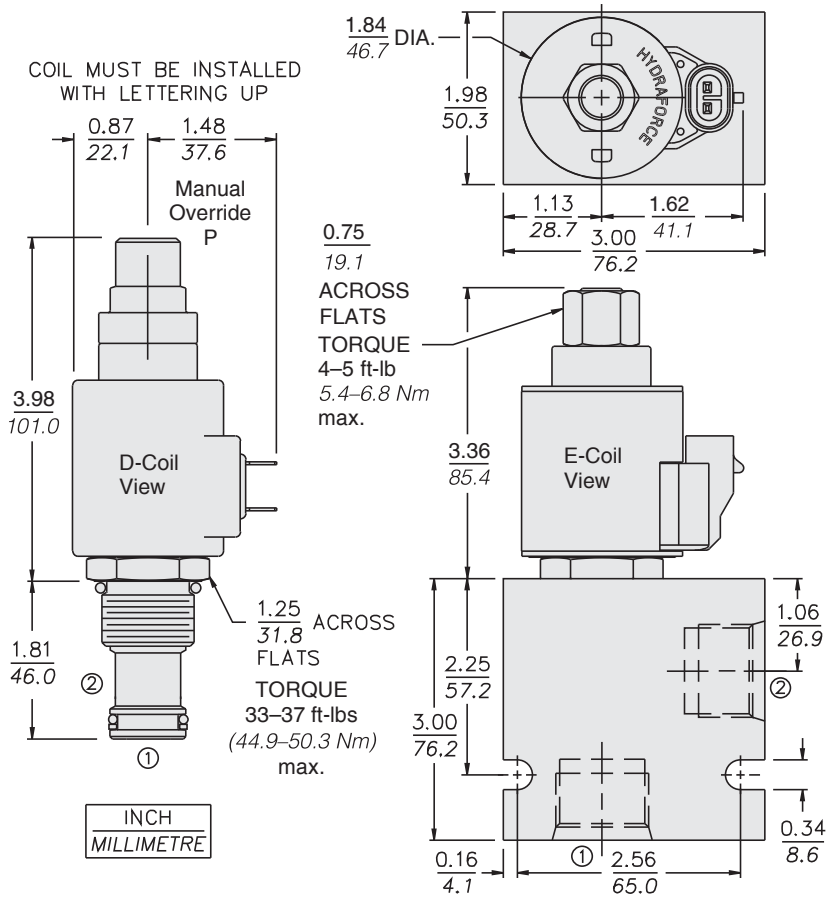
TYPICAL PRESSURE RESPONSE
with 12 VDC Coil



FLOW vs. CURRENT with 12 VDC D-Coil
Consult factory for E-Coil



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.27 kg. (0.60 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.57 kg. (1.25 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.012.1.

Standard D-Coil: Weight: 0.27 kg. (0.60 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. See page 3.400.1

TO ORDER

SP12-21__ - __ __ __ - __ - __ __ __ __ __

Option
None (Blank)
Metering **A**
Screen **S**
Manual Override **P**
For Manual Override details see page 1.001.1

Porting
Cartridge Only **0**
SAE 10 **10T**
SAE 12 **12T**
SAE 16 **16T**
3/4 in. BSP* **6B**
1 in. BSP* **8B**
*BSP Body; U.K. Mfr. Only

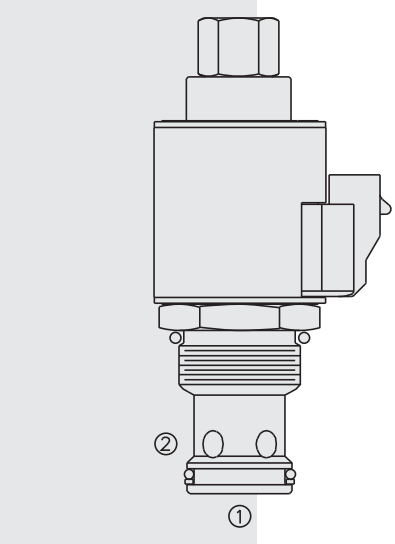
Seals
N Buna N (Std.)
V Fluorocarbon
P Polyurethane

Voltage
0 Less Coil**
10 10 VDC†
12 12 VDC
20 20 VDC†
24 24 VDC
**Includes Coil Nut
†10 VDC and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

Termination (VDC) Std. D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

Termination (VDC) E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150.2A (IP69K Rated)
Coils with internal diode are available. Consult factory.

SP16-21 Poppet, 2-Way, Normally Open



DESCRIPTION

A proportional solenoid-operated, 2-way, poppet-type, normally open, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding applications

OPERATION

When de-energized, the **SP16-21** allows flow from 2 to 1. When the valve is partially energized, the valve begins to throttle the flow from 2 to 1. When fully energized, the poppet closes on the seat, blocking flow from 2 to 1. Flow from 1 to 2 will occur when hydraulic pressure exceeds the solenoid force.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Manual override option.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: 250 bar (3625 psi)

Flow: 265 lpm (70 gpm); see performance charts

Max. Internal Leakage: 7 drops per minute at 207 bar (3000 psi)

Dither/Pulse Frequency: 100 to 400 Hz

Hysteresis: Less than 10% up to 70% of I-max.; Less than 5% above 70% of I-max.

Maximum Control Current: 1.2 amp required to achieve rated flow

Threshold Current: 0.3 A; see performance charts

Temperature: -40 to 120°C with standard Buna seals

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Filtration: See page 9.010.1; **Installation:** No Restrictions. See page 9.020.1

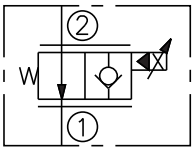
Cavity: VC16-2; See page 9.116.1; **Cavity Tool:** CT16-2XX; See page 8.600.1

Seal Kit: SK16-2X-T; See page 8.650.1

Coil Nut: Part No. 7004400

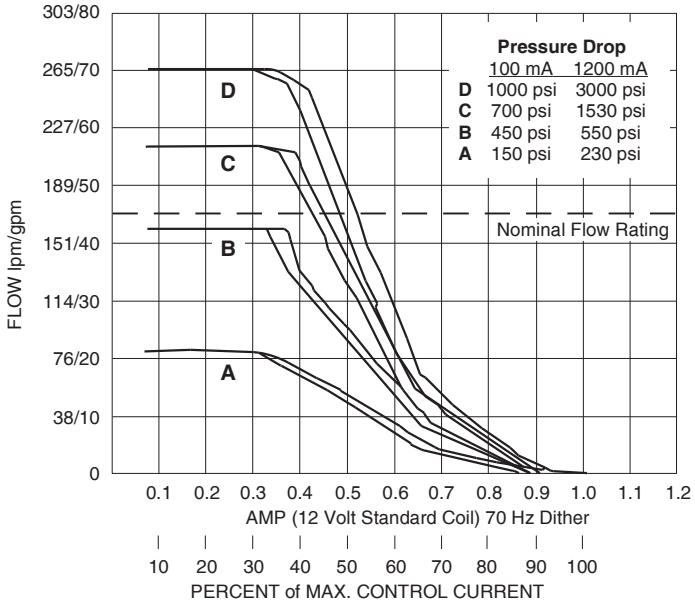
SYMBOLS

USASI/ISO:

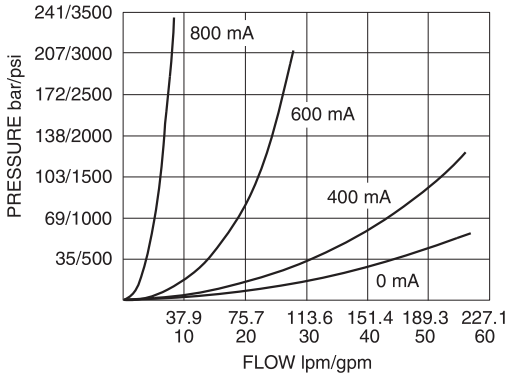


PERFORMANCE

FLOW vs. CURRENT at Various Differential Pressures
32 cSt/150 sus oil at 40°C

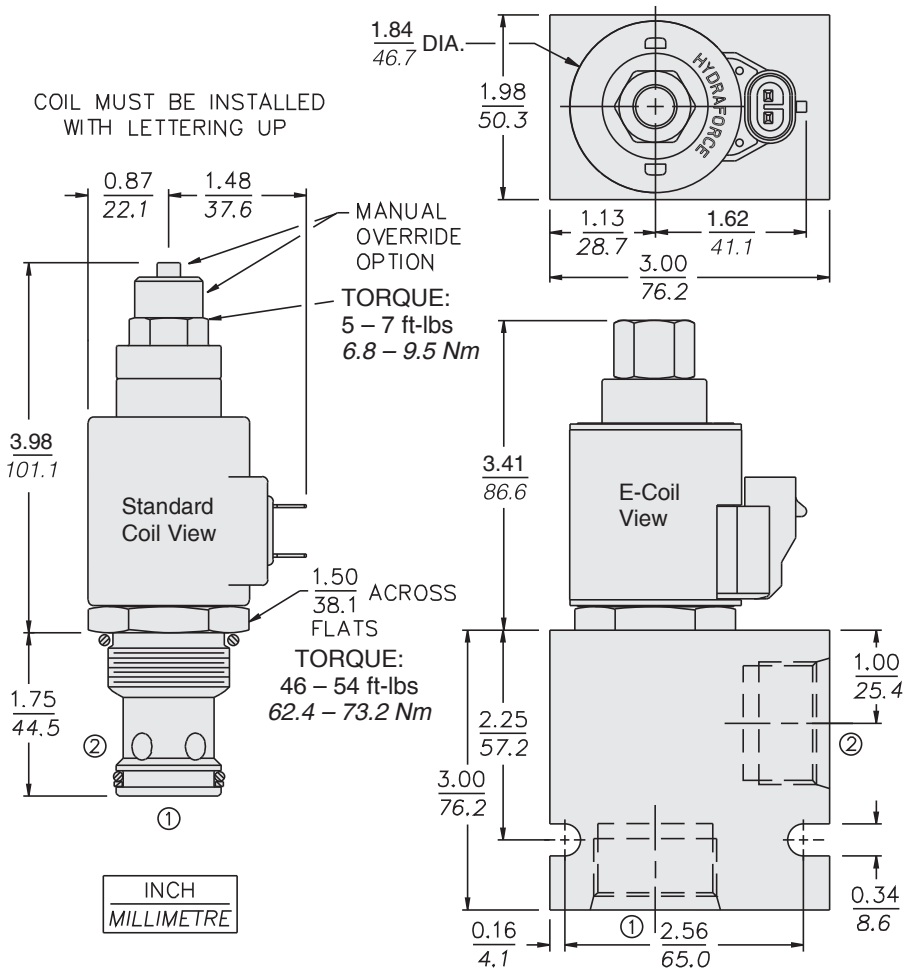


PRESSURE RESPONSE
with 12 VDC Coil



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.32 kg. (0.71 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces; Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.57 kg. (1.25 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.016.1.

Standard Coil: Weight: 0.27 kg. (0.60 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. See page 3.400.1.

TO ORDER

SP16-21 __ - __ __ __ - __ - __ __ __ __ __

Option

None	(Blank)
Manual Override	**P**

For Manual Override details see page 1.001.1

Porting

Cartridge Only	**0**
SAE 12	**12T**
SAE 16	**16T**
3/4 in. BSP*	**6B**
1 in. BSP*	**8B**

*BSP Body; U.K. Mfr. Only

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**
Polyurethane	**P**

Voltage

0	Less Coil**
10	10 VDC†
12	12 VDC
20	20 VDC†
24	24 VDC

**Includes Std. Coil Nut

†10 VDC and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

Termination (VDC) Std. Coil

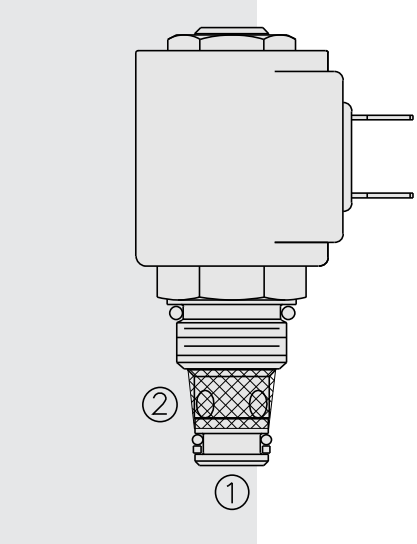
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC) E-Coil

ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150.2A (IP69K Rated)

Coils with internal diode are available. Consult factory.

SP08-22 Poppet, 2-Way, Normally Closed



DESCRIPTION

A proportional solenoid-operated, 2-way, bi-directional, poppet-type, normally closed, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding.

OPERATION

When de-energized, the **SP08-22** acts as a check valve, allowing flow from 1 to 2, while blocking flow from 2 to 1. When energized, the poppet lifts to open the 2 to 1 flow path. Flow is proportional to current applied to the coil. The reverse-flow check allows unrestricted flow from 1 to 2 when the valve is energized, but this flow is not proportional to the current.

Note: External circuitry is required to ramp current.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Hardened steel work surfaces.
- Optional waterproof E-Coils rated up to IP69K

RATINGS

Operating Pressure: 207 bar (3000 psi)

Flow: 30.3 lpm (8 gpm) nominal

Max. Internal Leakage: 5 drops per minute at 207 bar (3000 psi)

Temperature: -40 to 100°C with standard Buna seals

Filtration: Recommend ISO 4406 16/13; See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No Restrictions. See page 9.020.1

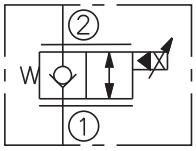
Cavity: VC08-2; See page 9.108.1; **Cavity Tool:** CT08-2XX; See page 8.600.1

Seal Kit: SK08-2X-M; See page 8.650.1

Coil Nut: Part No. 7004400; For E-coils manuf. prior to 1-1-04, see page 3.400.1

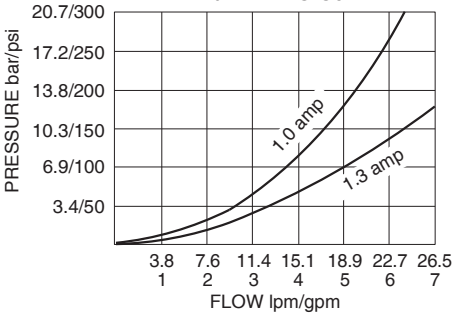
SYMBOLS

USASI/ISO:

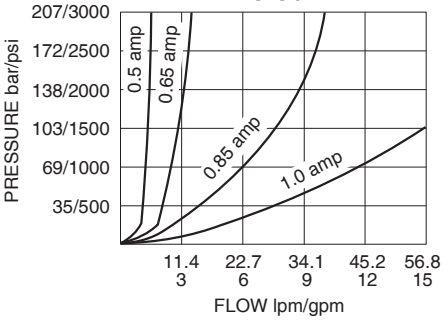


PERFORMANCE

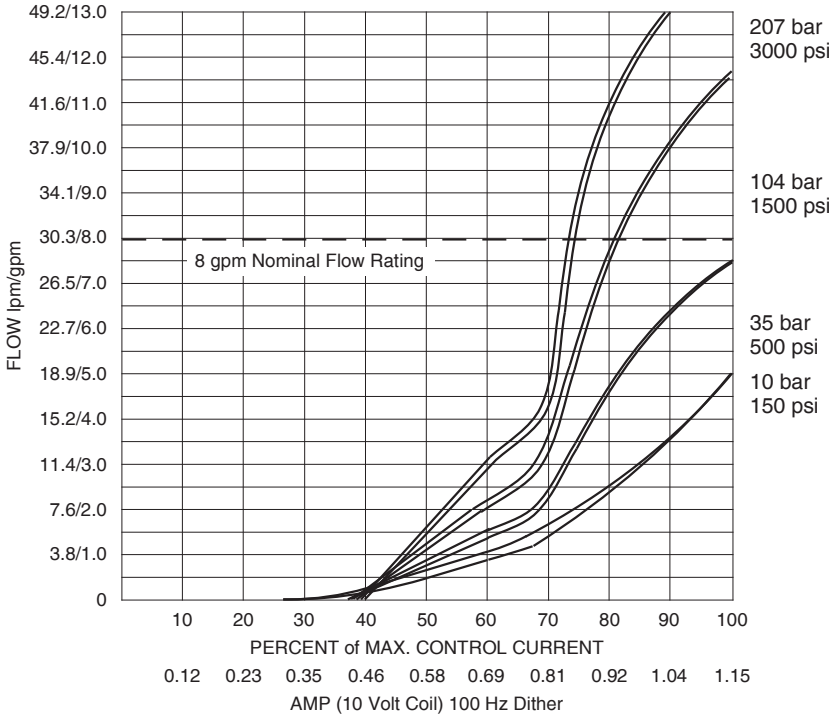
TYPICAL PRESSURE DROP 2 to 1
with 12 VDC Coil



TYPICAL PRESSURE RESPONSE
12 VDC Coil

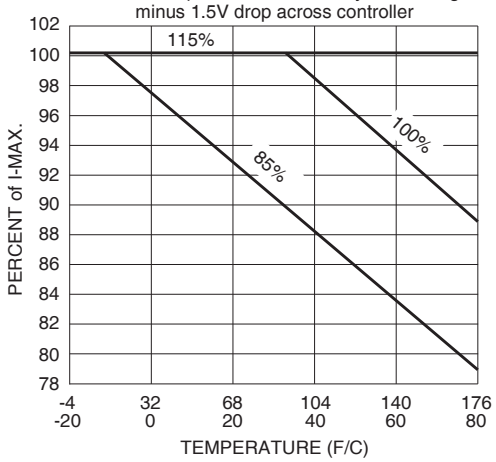


FLOW vs. CURRENT at Various Differential Pressures
for Standard Coils (consult factory for E-Coils)
32 cSt/150 sus oil at 40C



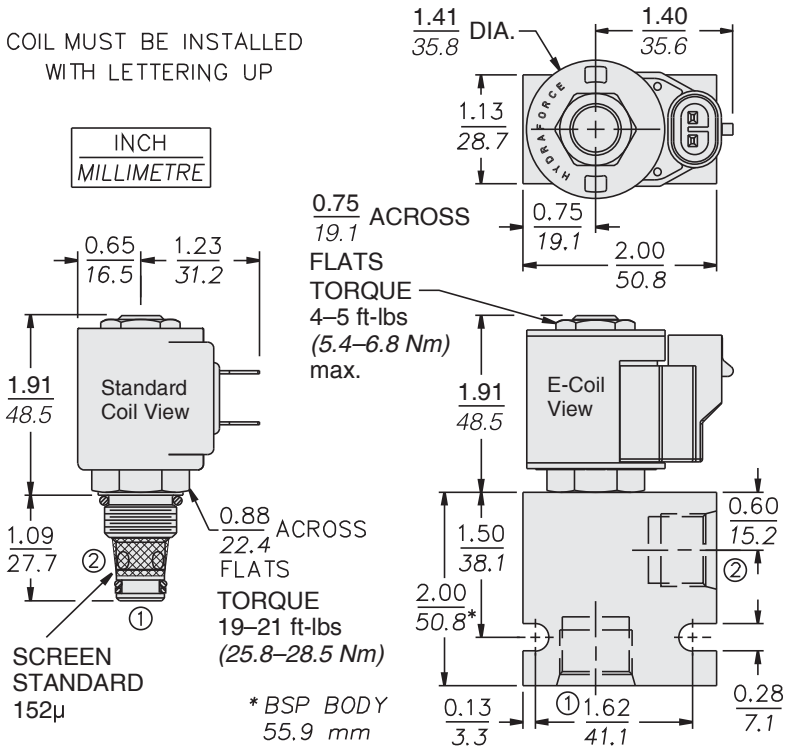
PERFORMANCE (cont'd.)

PERCENT I-MAX. vs. TEMPERATURE
for 10 or 20 VDC Coil (for 10V Coil I-Max. = 1.15A)
Curves show percent of nominal system voltage minus 1.5V drop across controller



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.10 kg. (0.23 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 240 bar (3500 psi). Ductile iron bodies available; dimensions may differ. See page 8.008.1

Standard Coil: Weight: 0.11 kg. (0.25 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight: 0.14 kg. (0.3 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SP08-22__ - _ _ _ _ - _ _ - _ _ _ _ _ _ _

Option
None (Blank)

Porting

Cartridge Only	**0**
SAE 4	**4T**
SAE 6	**6T**
1/4 in. BSP*	**2B**
3/8 in. BSP*	**3B**

*BSP Body; U.K. Mfr. Only

Seals
N Buna N (Std.)
V Fluorocarbon
P Polyurethane

Voltage

0	Less Coil**
10	10 VDC†
12	12 VDC
20	20 VDC†
24	24 VDC

**Includes Coil Nut

†10 VDC and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

Termination (VDC) Std. Coil

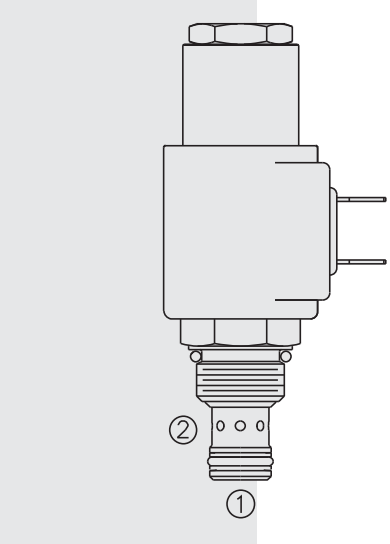
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC) E-Coil

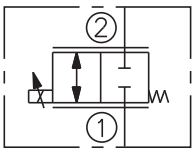
ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150.2A (IP69K Rated)

Coils with internal diode are available. Consult factory.

SP08-24 Spool, 2-Way, Normally Closed



SYMBOL



DESCRIPTION

A proportional solenoid-operated, 2-way, spool-type, normally closed, screw-in hydraulic cartridge valve designed to operate as a bi-directional metering valve.

OPERATION

When de-energized, the **SP08-24** blocks flow in both directions. When the coil is partially energized, the valve begins to throttle flow. When fully energized, the valve opens to allow full, bi-directional flow.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Operating Voltage: See Performance Chart

Flow: up to 11.4 lpm (3 gpm)

Max. Internal Leakage: 164 cc (10 cu. in.) per minute at 207 bar (3000 psi)

Maximum Control Current: 100 mA (12 VDC coil)

Minimum Control Current: 400 mA (12 VDC coil)

Threshold Current: 400 mA (12 VDC coil)

Hysteresis: < 10% full flow

Dither/PWM Frequency Range: 70 Hz min.

Operating Temperature: -40 to 100°C (-40° to 212°F) with standard Buna N seals
-26 to 204°C (-15°F to 400°F) with Fluorocarbon seals
-54 to 107°C (-65°F to 225°F) with Polyurethane seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No Restrictions. See page 9.020.1

Cavity: VC08-2; See page 9.108.1; **Cavity Tool:** CT08-2XX; See page 8.600.1

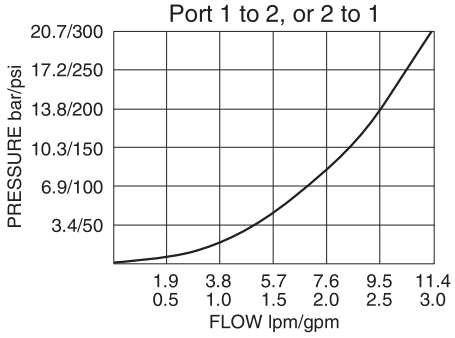
Seal Kit: SK08-2X-M; See page 8.650.1

Coil Nut: Part No. 7004400

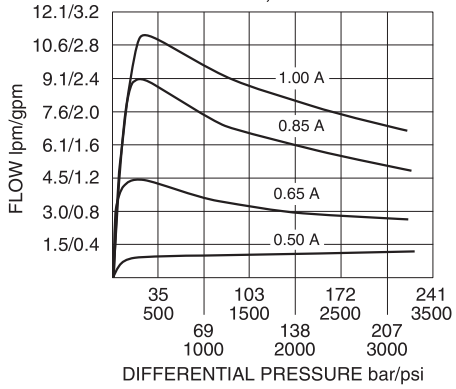
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

PERFORMANCE

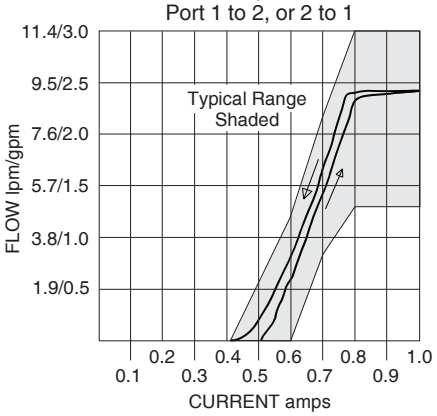
PRESSURE DROP vs. FLOW
Port 1 to 2, or 2 to 1



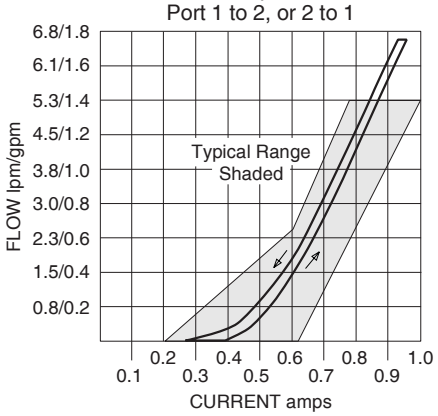
TYPICAL PRESSURE RESPONSE
Port 1 to 2, or 2 to 1



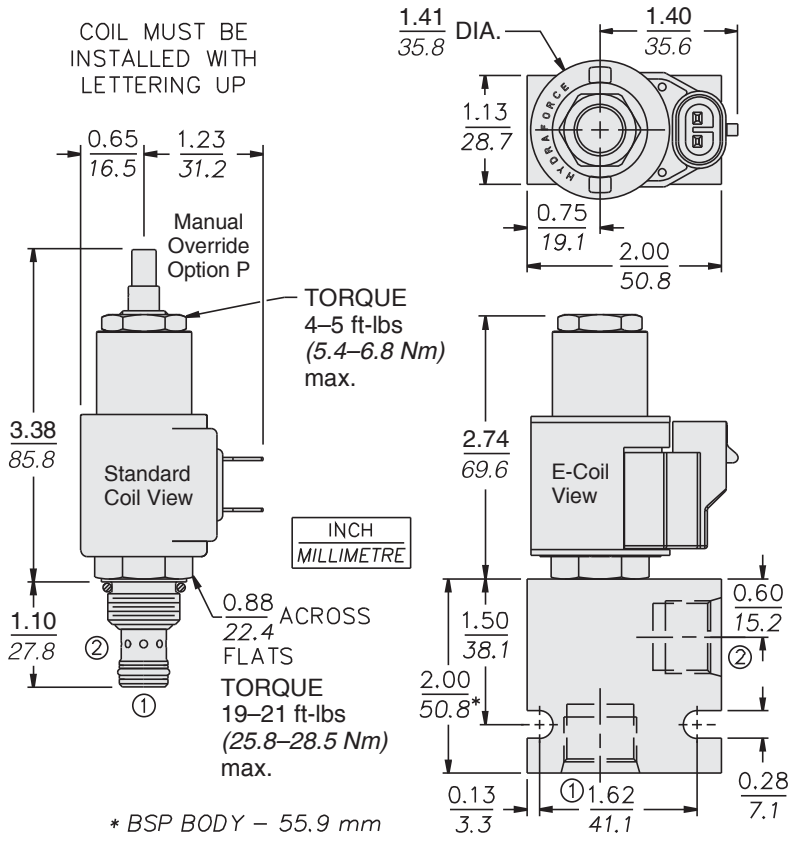
CURRENT RESPONSE
at 10.3 bar/150 psi; 12 VDC Coil
Port 1 to 2, or 2 to 1



CURRENT RESPONSE
at 207 bar/3000 psi; 12 VDC Coil
Port 1 to 2, or 2 to 1



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.11 kg. (0.25 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ.
See page 8.008.1.

Standard Coil: Weight: 0.11 kg. (0.25 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire.
See page 3.200.1

E-Coil: Weight: 0.14 kg. (0.3 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors.
See page 3.400.1

TO ORDER

SP08-24 __ - ___ ___ ___ - __ - ___ ___ ___ ___ __

Option
None (Blank)
Manual Override **P**

For Manual Override details see page 1.001.1

Porting
Cartridge Only **0**
SAE 4 **4T**
SAE 6 **6T**
1/4 in. BSP* **2B**
3/8 in. BSP* **3B**

*BSP Body; U.K. Mfr. Only

Seals
Buna N (Std.) **N**
Fluorocarbon **V**
Polyurethane **P**

Voltage
Less Coil **0
†10 VDC **10**
12 VDC **12**
†20 VDC **20**
24 VDC **24**

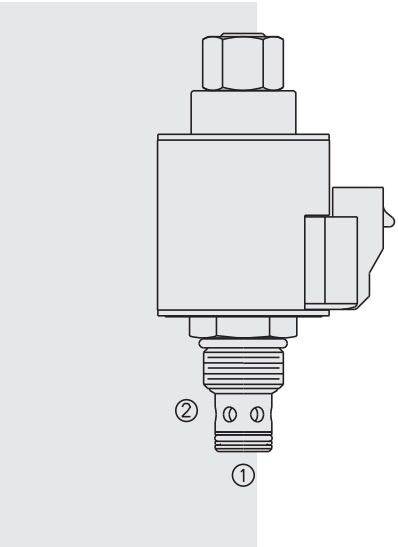
**Includes Coil Nut

†10 VDC and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

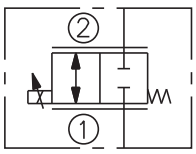
Coil Termination	E-Coil	D-Coil
Deutsch DT04-2P	**ER** (IP69K)	**DR** (IP65)
Metri-Pak 150	**EY** (IP69K)	**DY** (IP65)
Dual Lead Wires	**EL** (IP69K)	**DL** (IP65)
Amp Jr. Timer	**EJ** (IP67)	—
DIN 43650	**EG** (IP65)	**DG** (IP65)
Dual Spades	—	**DS** (IP65)

For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models. See coil option info. on pages 3.200.1 & 3.400.1

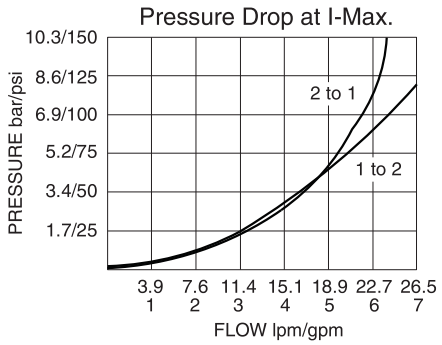
SP10-24 Spool, 2-Way, Normally Closed, Metering



SYMBOL



PERFORMANCE



DESCRIPTION

A proportional solenoid-operated, 2-way, spool-type, normally-closed, direct-acting, screw-in hydraulic cartridge valve for bi-directional metering.

OPERATION

When energized, the **SP10-24** acts as a bi-directional metering valve.
When de-energized, the valve blocks flow in both directions.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Manual Override option.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Minimum Operating Dither/Pulse Frequency: 70 Hz

Flow: 0 to 26.5 lpm (0 to 7 gpm)

Max. Internal Leakage: 328 cc/minute (20 cu. in./minute) at 207 bar (3000 psi)

Operating Temperature: -40 to 100°C (-40° to 212°F) with standard Buna N seals
-26 to 204°C (-15°F to 400°F) with Fluorocarbon seals
-54 to 107°C (-65°F to 225°F) with Polyurethane seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No Restrictions. See page 9.020.1

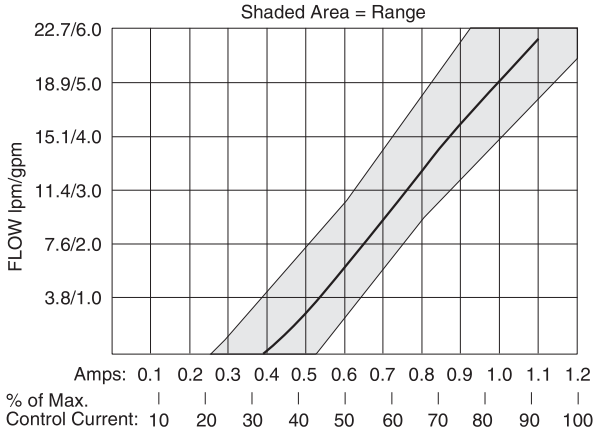
Cavity: VC10-2; See page 9.110.1;

Cavity Tool: CT10-2XX; See page 8.600.1

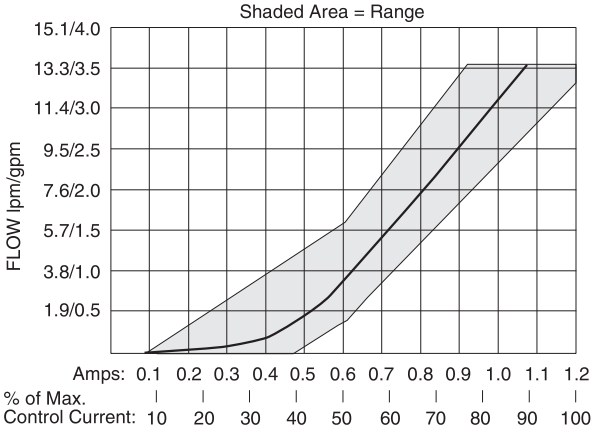
Seal Kit: SK10-2X-M; See page 8.650.1

Coil Nut: Part No. 7004420

Typical Flow vs. Current
at 11 bar (160 psi) with 12 VDC Coil
Shaded Area = Range

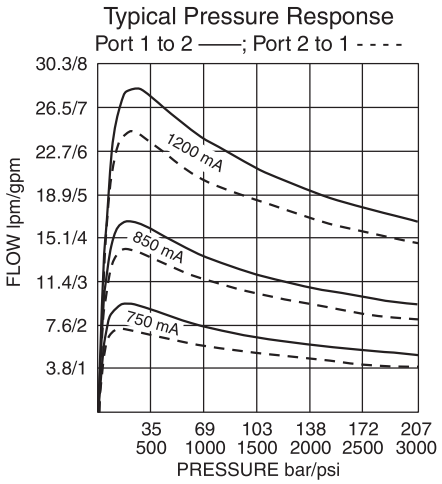


Typical Flow vs. Current
at 207 bar (3000 psi) with 12 VDC Coil
Shaded Area = Range



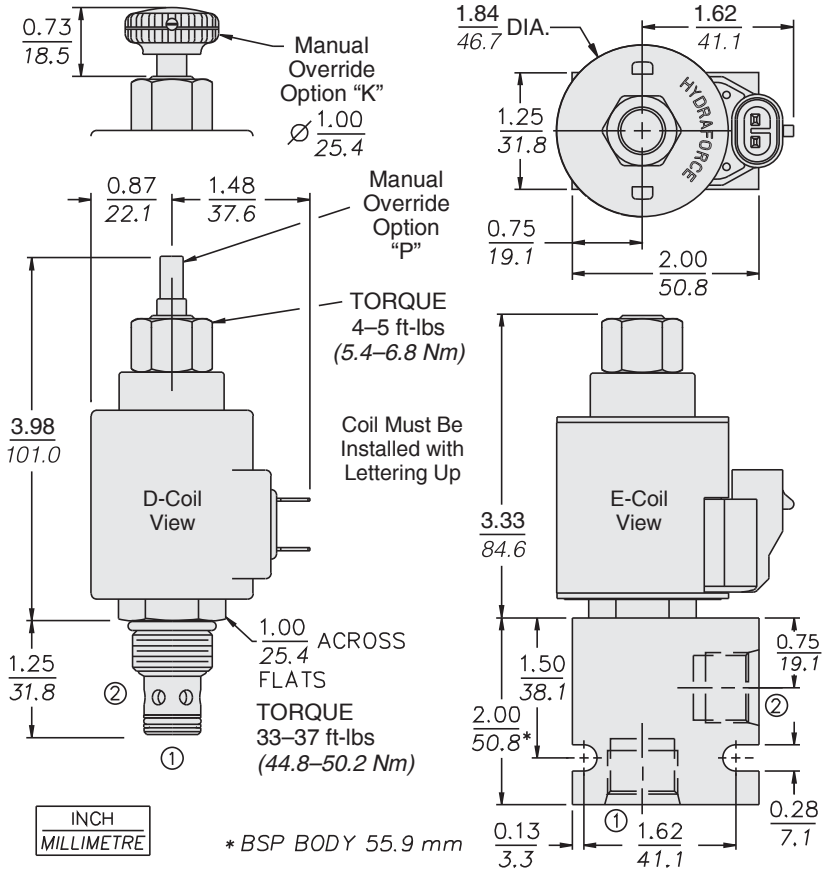
Performance charts continued on next page.

PERFORMANCE (cont'd.)



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.17 kg. (0.37 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available;
dimensions may differ.
See page 8.010.1.

Standard D-Coil: Weight: 0.27 kg. (0.60 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire.
See page 3.200.1

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors.
See page 3.400.1

TO ORDER

SP10-24__ - __ __ __ - __ - __ __ __ __ __

Option
None (Blank)
Manual Override **P**
Manual Override **K**
For Manual Override details see page 1.001.1

Porting
Cartridge Only **0**
SAE 6 **6T**
SAE 8 **8T**
1/4 in. BSP* **2B**
3/8 in. BSP* **3B**
1/2 in. BSP* **4B**
*BSP Body; U.K. Mfr. Only

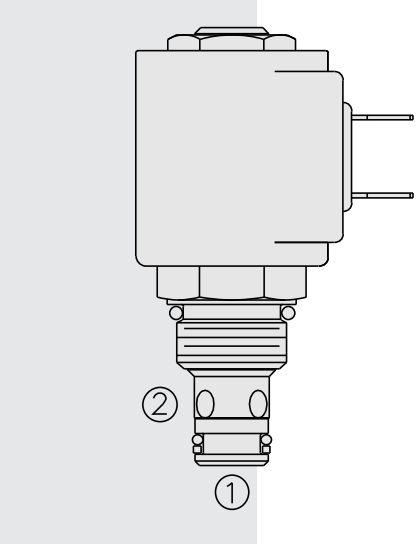
Seals
Buna N (Std.) **N**
Fluorocarbon **V**
Polyurethane **P**

Voltage
Less Coil **0
†10 VDC **10**
12 VDC **12**
†20 VDC **20**
24 VDC **24**
**Includes Coil Nut and Spacer.
†10 and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

Coil Termination	E-Coil	D-Coil
Deutsch DT04-2P	**ER** (IP69K)	**DR** (IP65)
Metri-Pak 150	**EY** (IP69K)	**DY** (IP65)
Dual Lead Wires	**EL** (IP69K)	**DL** (IP65)
Amp Jr. Timer	**EJ** (IP67)	—
DIN 43650	**EG** (IP65)	**DG** (IP65)
Dual Spades	—	**DS** (IP65)

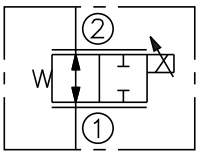
For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models. See coil option info. on pages 3.200.1 & 3.400.1

SP08-25 Spool, 2-Way, Normally Open



SYMBOLS

USASI/ISO:



DESCRIPTION

A proportional solenoid-operated, two-way, spool-type, normally open, bi-directional, screw-in hydraulic cartridge valve.

OPERATION

When de-energized, the **SP08-25** allows flow from 1 to 2 or from 2 to 1. When partially energized, the valve begins to throttle the flow in either direction. When fully energized, flow is blocked in either direction.

External circuitry is required to ramp current.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Hardened precision spool and cage for long life.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Operating Voltage: See performance chart

Flow: 0 to 15.4 lpm (0 to 4 gpm)

Internal Leakage: 25 ml per minute at 207 bar (3000 psi)

Temperature: -40 to 120°C with standard Buna seals

Filtration: Recommend ISO 4406 16/13; See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No Restrictions. See page 9.020.1

Cavity: VC08-2; See page 9.108.1

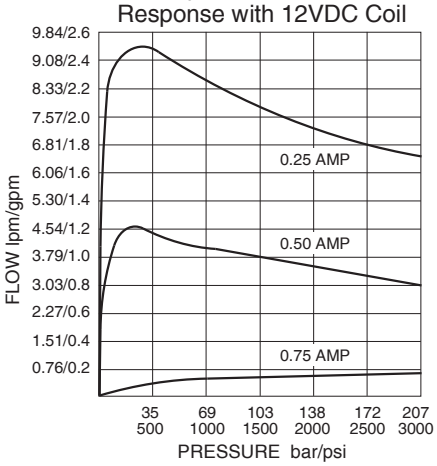
Cavity Tool: CT08-2XX; See page 8.600.1

Seal Kit: SK08-2X-T; See page 8.650.1

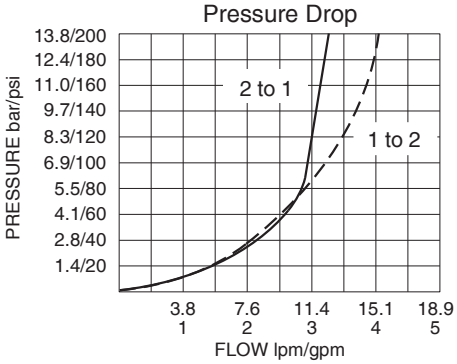
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

PERFORMANCE

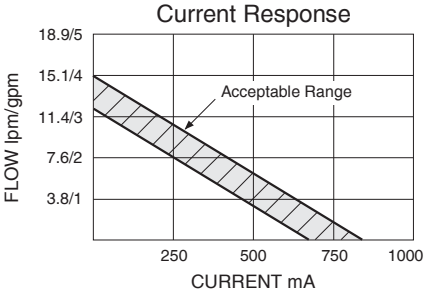
Typical Pressure Response with 12VDC Coil



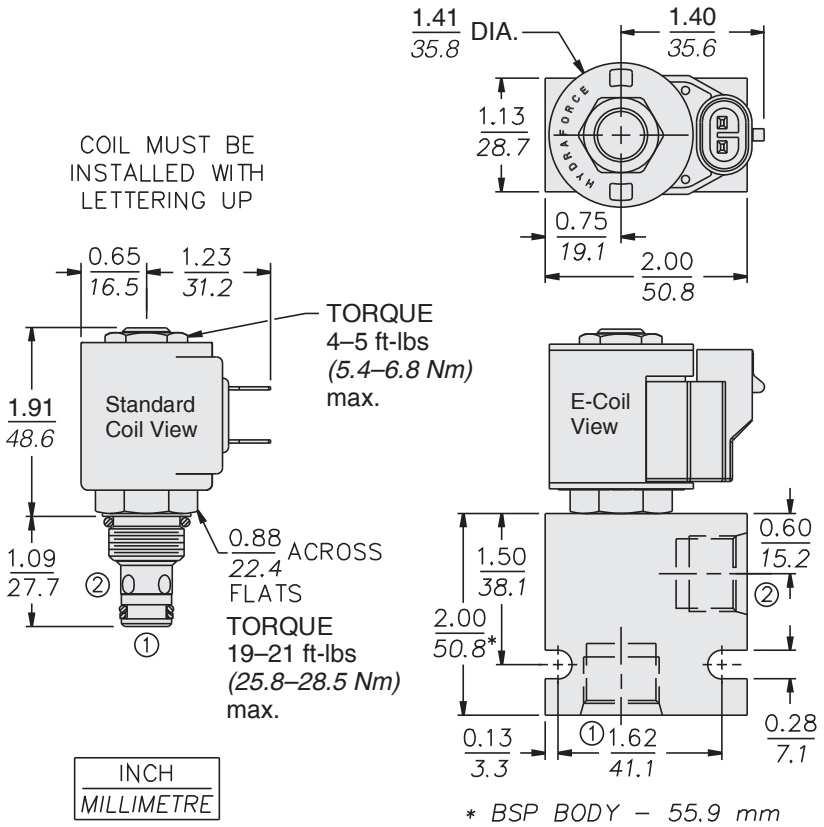
Pressure Drop



Current Response



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.11 kg. (0.25 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ.
See page 8.008.1

Standard Coil: Weight: 0.11 kg. (0.25 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire.
See page 3.200.1

E-Coil: Weight: 0.14 kg. (0.3 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors.
See page 3.400.1

TO ORDER

SP08-25 - ___ ___ ___ - ___ - ___ ___ ___ ___ ___

Porting

Cartridge Only	**0**
SAE 4	**4T**
SAE 6	**6T**
1/4 in. BSP*	**2B**
3/8 in. BSP*	**3B**

*BSP Body; U.K. Mfr. Only

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**
Polyurethane	**P**

Voltage

0	Less Coil**
10	10 VDC†
12	12 VDC
20	20 VDC†
24	24 VDC

**Includes Coil Nut

†10 VDC and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

Termination (VDC) Std. Coil

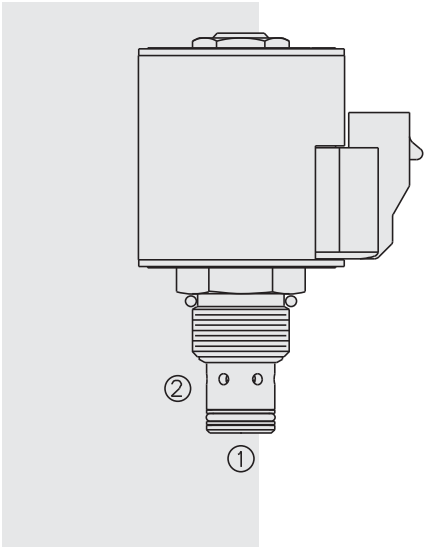
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC) E-Coil

ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150.2A (IP69K Rated)

Coils with internal diode are available. Consult factory.

SP10-25 Proportional, Spool, 2-Way, Normally Closed



DESCRIPTION

A proportional solenoid-operated, two-way, spool-type, normally open, bi-directional, screw-in hydraulic cartridge valve.

OPERATION

When de-energized, the **SP10-25** allows flow from 2 to 1 or from 1 to 2. When partially energized, the valve begins to throttle the flow in either direction. When fully energized, flow is blocked in either direction.

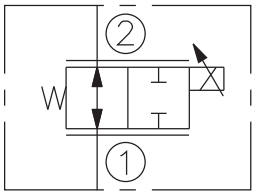
External circuitry is required to ramp current.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Hardened precision spool and cage for long life.
- Optional waterproof E-Coils rated up to IP69K.

ISO SYMBOL



RATINGS

Operating Pressure: 207 bar (3000 psi)

Electrical Parameters:

Coil	Typical Max. Current (amp) at 0 gpm		Typical Resistance ±5% at 20°C (ohms)	
	12 VDC	24 VDC	12 VDC	24 VDC
D-Coil	1.20 amp	0.60 amp	7.2 ±3%	28.8 ±5%
E-Coil	1.40 amp	0.70 amp	7.09 ±3%	28.5 ±5%

Flow Rating: 18.9 lpm (5 gpm)

Max. Internal Leakage: 196 cc/minute (10 cu. in./minute) at 207 bar (3000 psi)

Operating Temperature: -40 to 100°C (-40° to 212°F) with standard Buna N seals
-26 to 204°C (-15°F to 400°F) with Viton seals
-54 to 107°C (-65°F to 225°F) with Polyurethane seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No Restrictions. See page 9.020.1

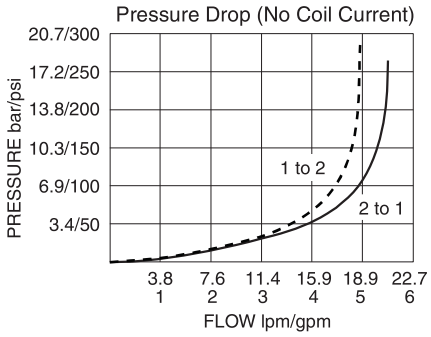
Cavity: VC10-2; See page 9.110.1;

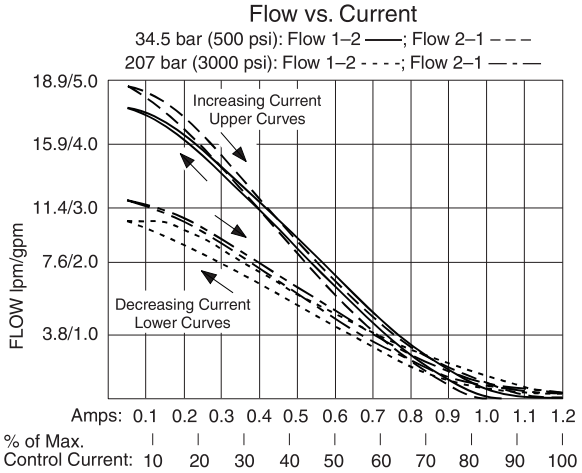
Cavity Tool: CT10-2XX; See page 8.600.1

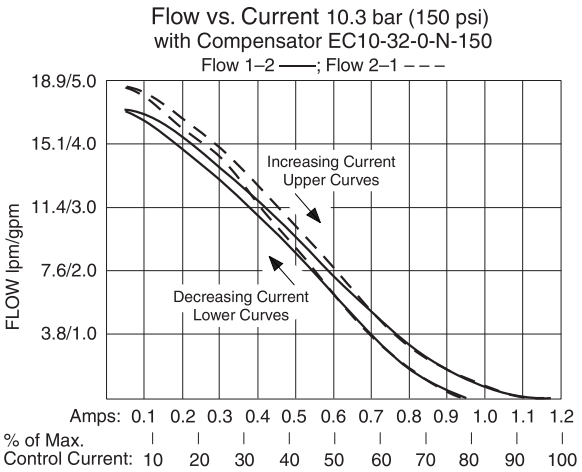
Seal Kit: SK10-2X-M; See page 8.650.1

Coil Nut: Part No. 7004400

PERFORMANCE







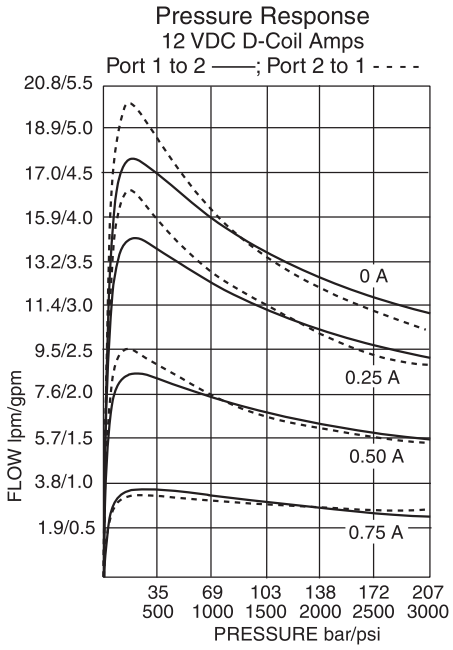
Graphs based on 12 VDC "D" coil current.

NOTE: Curves shown are at constant pressure. Limiting flow to the valve or significant changes in differential pressure will change valve performance. Without a pressure compensator, the valve requires a minimum of 250 psid to achieve stable control of the spool as shown on the flow vs. current graphs.

Reverse Flow Check

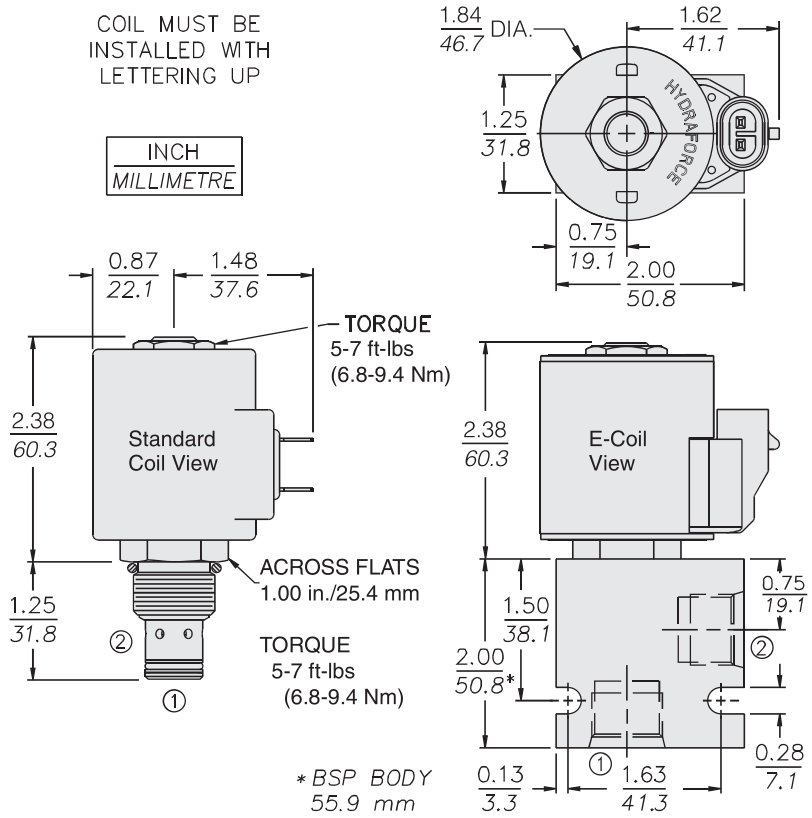
SP10-25

PERFORMANCE (cont'd.)



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.17 kg. (0.371 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1.

Standard D-Coil: Weight: 0.27 kg. (0.60 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. See page 3.400.1

TO ORDER

SP10-25__ - ___ ___ - ___ - ___ ___ ___ ___ ___

Option
None (Blank)

Porting

Cartridge Only	**0**
SAE 6	**6T**
SAE 8	**8T**
1/4 in. BSP*	**2B**
3/8 in. BSP*	**3B**
1/2 in. BSP*	**4B**

*BSP Body; U.K. Mfr. Only

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**
Polyurethane	**P**

Voltage

**Less Coil	**0**
†10 VDC	**10**
12 VDC	**12**
†20 VDC	**20**
24 VDC	**24**

**Includes Coil Nut and Spacer.

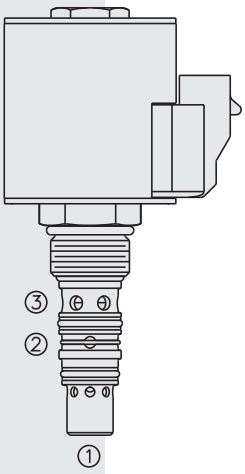
†10 and 20 VDC coils should be used for most continuous-duty applications. Consult factory.

Coil Termination	E-Coil	D-Coil
Deutsch DT04-2P	**ER** (IP69K)	**DR** (IP65)
Metri-Pak 150	**EY** (IP69K)	**DY** (IP65)
Dual Lead Wires	**EL** (IP69K)	**DL** (IP65)
Amp Jr. Timer	**EJ** (IP67)	—
DIN 43650	**EG** (IP65)	**DG** (IP65)
Dual Spades	—	**DS** (IP65)

For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models. See coil option info. on pages 3.200.1 & 3.400.1

SPCL10-30 Poppet, 3-Port, Normally Closed

U.S. Patent
7,921,880



DESCRIPTION

A solenoid-operated, normally-closed, proportional, poppet-type, screw-in hydraulic cartridge valve incorporating an integral load-sense pressure port with isolation check.

OPERATION

When de-energized, the **SPCL10-30** blocks flow at all ports. When energized, proportionally-regulated flow is allowed from 3 to 1 with a check-isolated load-sense signal supplied at 2. Reverse flow is not allowed from 1 to 3.

Note: When using this valve in bridge circuits, seals should not be used on the pilot pistons of the pilot-operated check valves. This is to avoid trapping oil which would keep the pilot-operated check valve open.

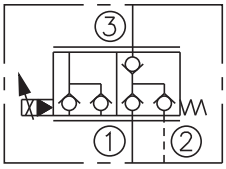
Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

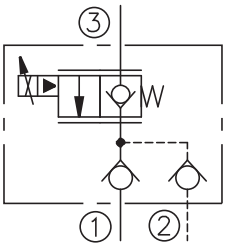
- Industry-common cavity.
- Continuous-duty rated coils.
- Reduce manifold space claim.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

SYMBOL

ISO:



Expanded:



RATINGS

Operating Pressure: 250 bar (3625 psi); Holding Pressure at 1: 350 bar (5000 psi)

Internal Leakage: Ports 1 and 3: 5 drops/minute max. at 250 bar (3625 psi)
Port 2: 10 drops/minute max. at 250 bar (3625 psi)

Operating Temperature: -40° to 100°C (-40° to 212° F) with standard Buna N seals;
-26° to 204°C (-15° to 400°F) with Fluorocarbon seals;
-54°C to 107°C (-65°F to 225°F) with Polyurethane seals

Coil Duty Rating: Continuous from 85% to 115% of nominal voltage

Initial Coil Current Draw at 20°C: Standard D-Coil: 1.67 amps at 12 VDC;
0.18 amps at 115 VAC (full wave rectified).
E-Coil: 1.7 amps at 12 VDC; 0.85 amps at 24 VDC

Minimum Pull-in Voltage: 85% of nominal at 207 bar (3000 psi)

Installation: No restrictions; See page 9.020.1; **Filtration:** See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Cavity: VC10-3, Variation "B"; See page 9.110.1

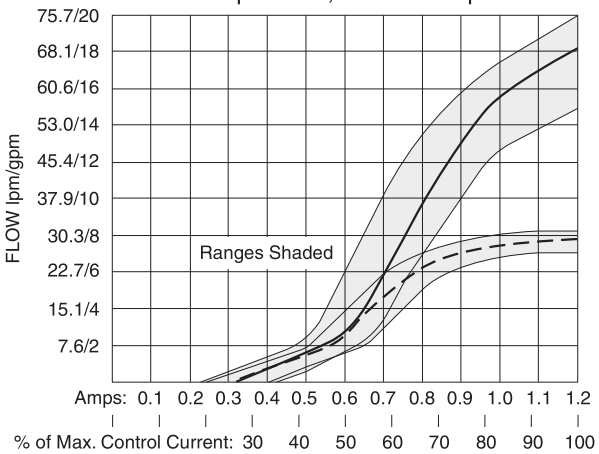
Cavity Tool: CT10-3xx; See page 8.600.1

Seal Kit: SK10-3X-MM; See page 8.650.1

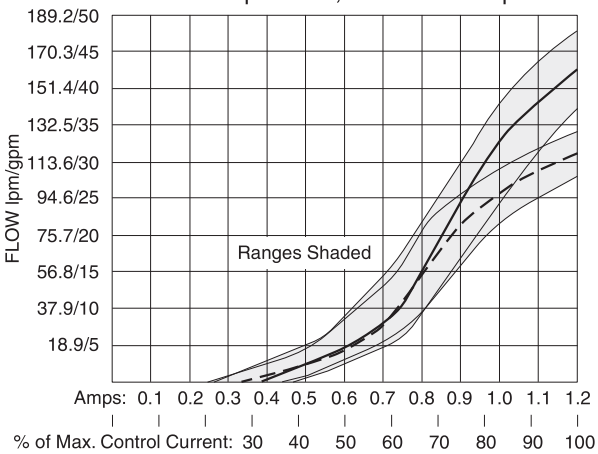
Coil Nut: Part No. 7004400

PERFORMANCE (Cartridge Only)

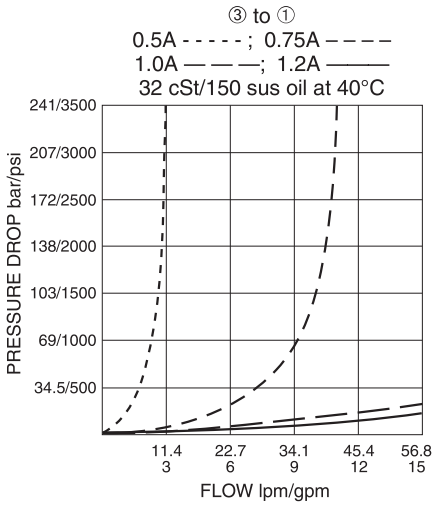
FLOW vs. CURRENT
16 bar/230 psi – – –; 35 bar/500 psi ——

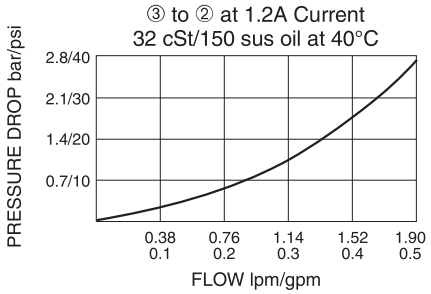


FLOW vs. CURRENT
103 bar/1500 psi – – –; 206 bar/3000 psi ——



PERFORMANCE (Continued)

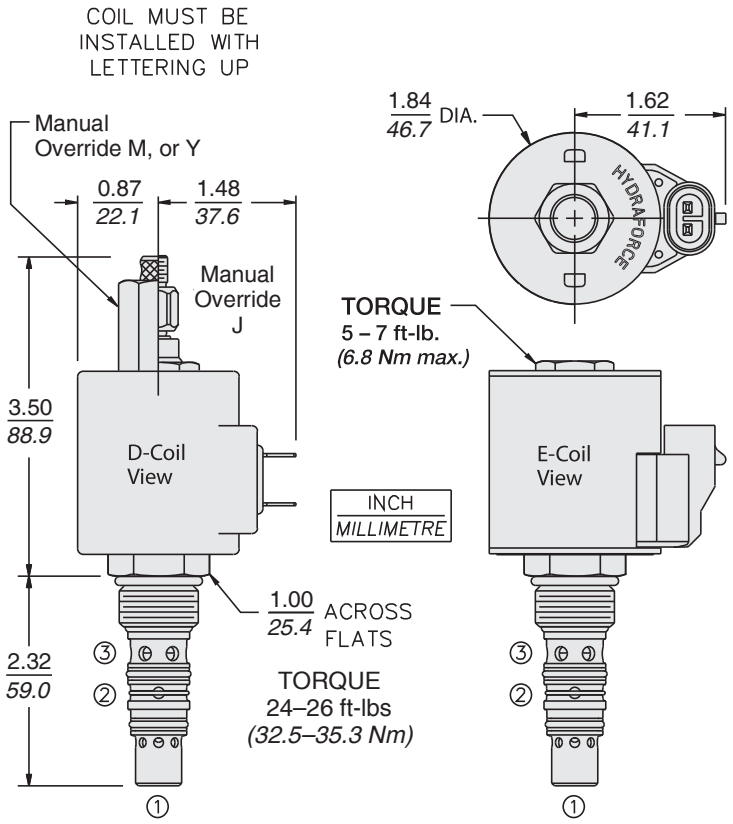




Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS

U.S. Patent 7,921,880



MATERIALS

Cartridge: Weight: 0.2 kg. (0.44 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-up standard.

Standard D-Coil: Weight: 0.27 kg. (0.60 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.); Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SPCL10-30__ - __ __ __ - __ - __ __ __ __ __

Option

None	(Blank)
Manual Override	**M**
Manual Override	**Y**
Manual Override	**J**

For Manual Override details see page 1.001.1

Note: Flow performance varies with manual override options. Consult factory for details.

Porting

Cartridge Only	**0**

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**
Polyurethane	**P**

Voltage

0	Less Coil**
12	12 VDC
20	20 VDC†
24	24 VDC

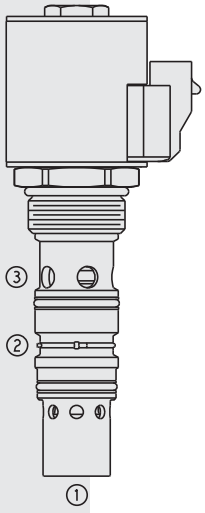
**Includes D-Coil Nut

Coil Termination	E-Coil	D-Coil
Deutsch DT04-2P	**ER** (IP69K)	**DR** (IP65)
Metri-Pack® 150	**EY** (IP69K)	**DY** (IP65)
Dual Lead Wires	**EL** (IP69K)	**DL** (IP65)
Amp Jr. Timer	**EJ** (IP67)	—
DIN 43650	**EG** (IP65)	**DG** (IP65)
Dual Spades	—	**DS** (IP65)

For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models. See coil option info. on pages 3.200.1 & 3.400.1

SPCL16-30 Poppet, 3-Port, Normally Closed

U.S. Patent
7,921,880



DESCRIPTION

A solenoid-operated, 3-port, normally-closed, proportional, poppet-type, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding applications.

OPERATION

When the **SPCL16-30** is energized, the poppet lifts to allow flow from port 3 to ports 1 and 2. Flow at port 2 is typical for load sensing applications and includes a check valve for isolation.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Reduce manifold space claim.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: Maximum: 250 bar (3625 psi); Minimum: 2.4 bar (35 psi)

Flow Rating: up to 152 lpm (40 gpm); see performance charts

Internal Leakage: Ports 1 and 3: 5 drops/minute max. at 250 bar (3625 psi)
Port 2: 15 drops/minute max. at 250 bar (3625 psi)

Operating Temperature: -40° to 100°C (-40° to 212° F) with standard Buna N seals;
-26° to 204°C (-15° to 400°F) with Fluorocarbon seals;
-54°C to 104°C (-65°F to 225°F) with Polyurethane seals

Valve Inductance: 173.3 mH at 1.2A (Max. Control Current)

Threshold Current: 0.40A to 0.60A

Hysteresis: Less than 10% of maximum flow at 1.2A (Max. Control Current)

Dither Frequency: 100 Hz recommended

Installation: No restrictions; See page 9.020.1; **Filtration:** See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Cavity: VC16-3SPCL; See page 9.116.1

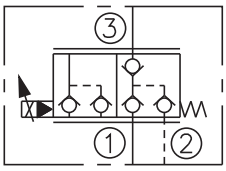
Cavity Tool: CT16-3SPCL; See page 8.600.1

Seal Kit: SK16-3X-MM; See page 8.650.1

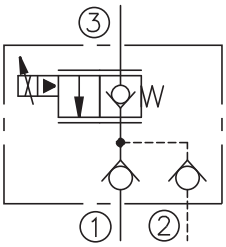
Coil Nut: Part No. 7004400

SYMBOL

ISO:

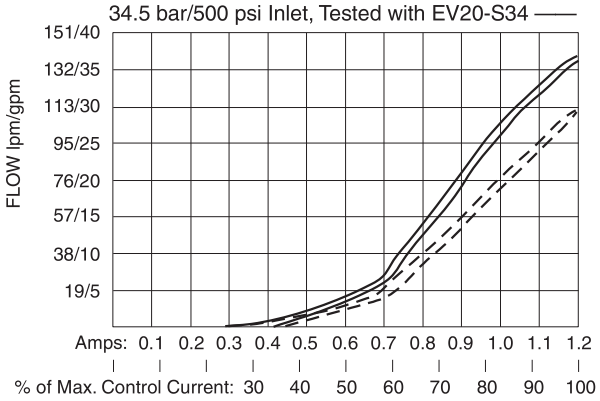


Expanded:

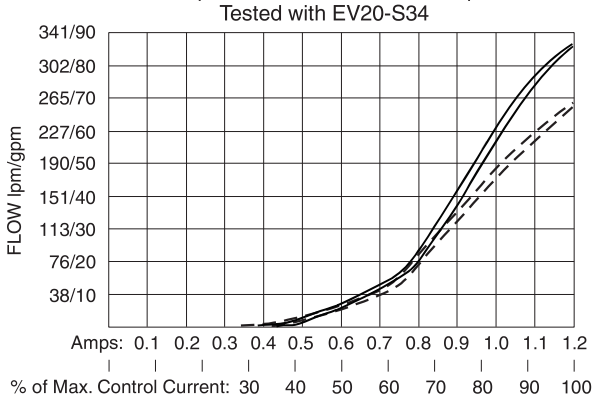


PERFORMANCE (Cartridge Only)

FLOW vs. CURRENT; Ports 3 to 1
Tested with EC16-32-160 – – –
34.5 bar/500 psi Inlet, Tested with EV20-S34 ——

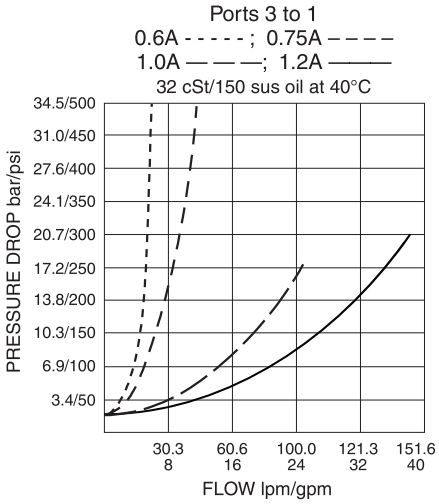


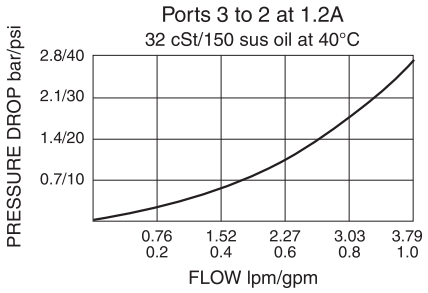
FLOW vs. CURRENT; Ports 3 to 1
103 bar/1500 psi Inlet – – –; 207 bar/3000 psi Inlet ——
Tested with EV20-S34



Performance info. continued on next page.

PERFORMANCE (Continued)

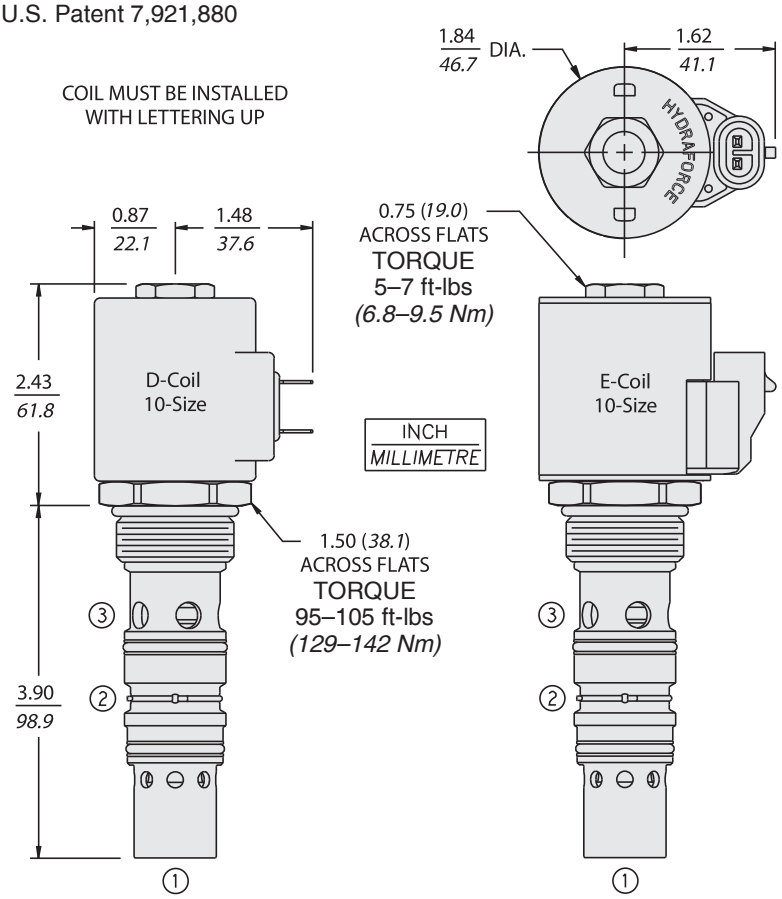




Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS

U.S. Patent 7,921,880



MATERIALS

Cartridge: Weight: 0.49 kg. (1.09 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-up standard.

Standard D-Coil: Weight: 0.27 kg. (0.60 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.); Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SPCL16-30 - _____ - ___ - _____

Porting

Cartridge Only	**0**

Voltage

0	Less Coil**
12	12 VDC
20	20 VDC†
24	24 VDC

**Includes D-Coil Nut

Seals

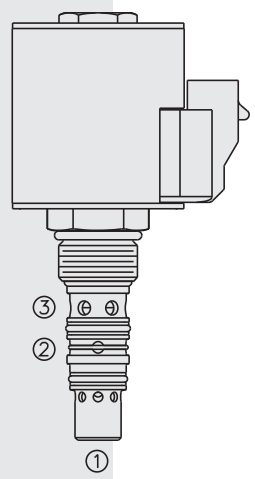
Buna N (Std.)	**N**
Fluorocarbon	**V**
Polyurethane	**P**

Coil Termination	E-Coil	D-Coil
Deutsch DT04-2P	**ER** (IP69K)	**DR** (IP65)
Metri-Pack® 150	**EY** (IP69K)	**DY** (IP65)
Dual Lead Wires	**EL** (IP69K)	**DL** (IP65)
Amp Jr. Timer	**EJ** (IP67)	—
DIN 43650	**EG** (IP65)	**DG** (IP65)
Dual Spades	—	**DS** (IP65)

For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models. See coil option info. on pages 3.200.1 & 3.400.1

SPCL10-32 Poppet, 3-Port, Normally Closed

U.S. Patent
7,921,880



DESCRIPTION

A solenoid-operated, normally-closed, proportional, poppet-type screw-in hydraulic cartridge valve providing an integral, non-isolated load signal to pilot counterbalance or other control valves in bridge circuit applications.

OPERATION

When de-energized, the **SPCL10-32** blocks flow at 1 and 3, while allowing the port 2 load signal to bleed to the low-pressure side of the circuit. When energized, proportionally-controlled flow is allowed from 3 to 1 with a load signal supplied at 2. Reverse flow is not allowed from 1 to 3.

Note: When using this valve in bridge circuits, seals should not be used on the pilot pistons of the pilot-operated check valves. This is to avoid trapping oil which would keep the pilot-operated check valve open.

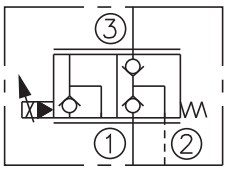
Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Reduce manifold space claim.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

SYMBOL

ISO:



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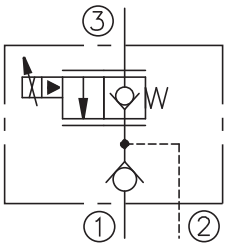


RATINGS

Operating Pressure: 250 bar (3625 psi); Holding Pressure at 1: 350 bar (5000 psi)

Internal Leakage: Ports 1 and 3: 5 drops/minute max. at 250 bar (3625 psi)

Operating Fluid Temperature: -40 to 121°C with Buna N seals;
-35 to 204°C with Fluorocarbon seals; -54 to 107°C with Polyurethane seals

Coil Duty Rating: Continuous from 85% to 115% of nominal voltage

Initial Coil Current Draw at 20°C: Standard D-Coil: 1.67 amps at 12 VDC;
0.18 amps at 115 VAC (full wave rectified).
E-Coil: 1.7 amps at 12 VDC; 0.85 amps at 24 VDC

Minimum Pull-in Voltage: 85% of nominal at 207 bar (3000 psi)

Installation: No restrictions; See page 9.020.1; **Filtration:** See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Cavity: VC10-3, Variation "B"; See page 9.110.1

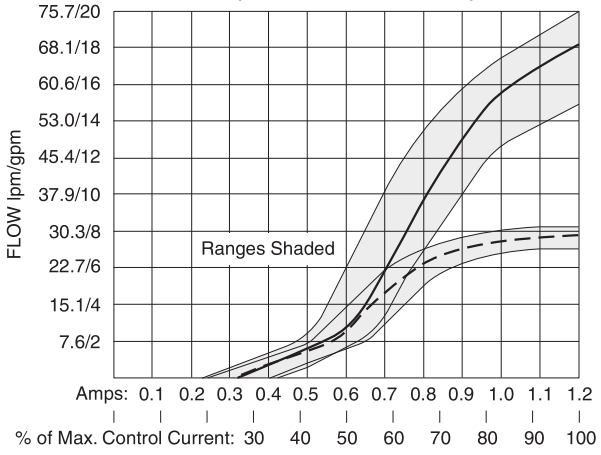
Cavity Tool: CT10-3XX; See page 8.600.1

Seal Kit: SK10-3X-MM; See page 8.650.1

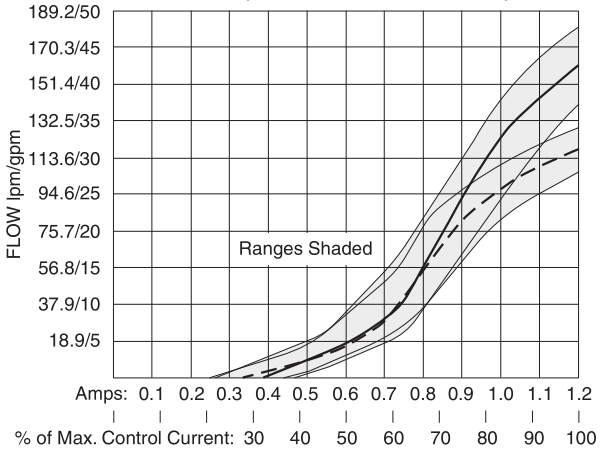
Coil Nut: Part No. 7004400

PERFORMANCE (Cartridge Only)

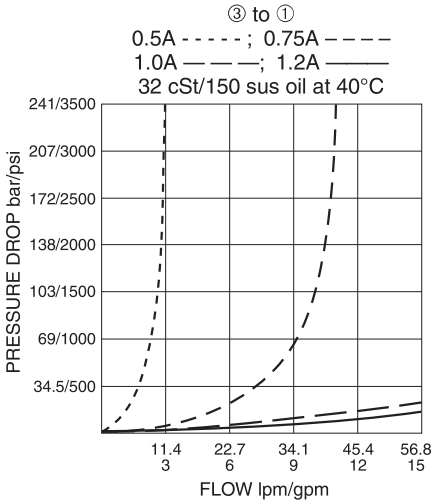
FLOW vs. CURRENT
16 bar/230 psi – – –; 35 bar/500 psi ——

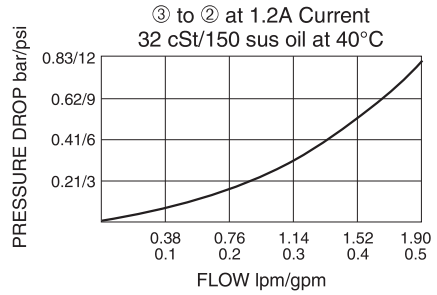


FLOW vs. CURRENT
103 bar/1500 psi – – –; 206 bar/3000 psi ——



PERFORMANCE (Continued)

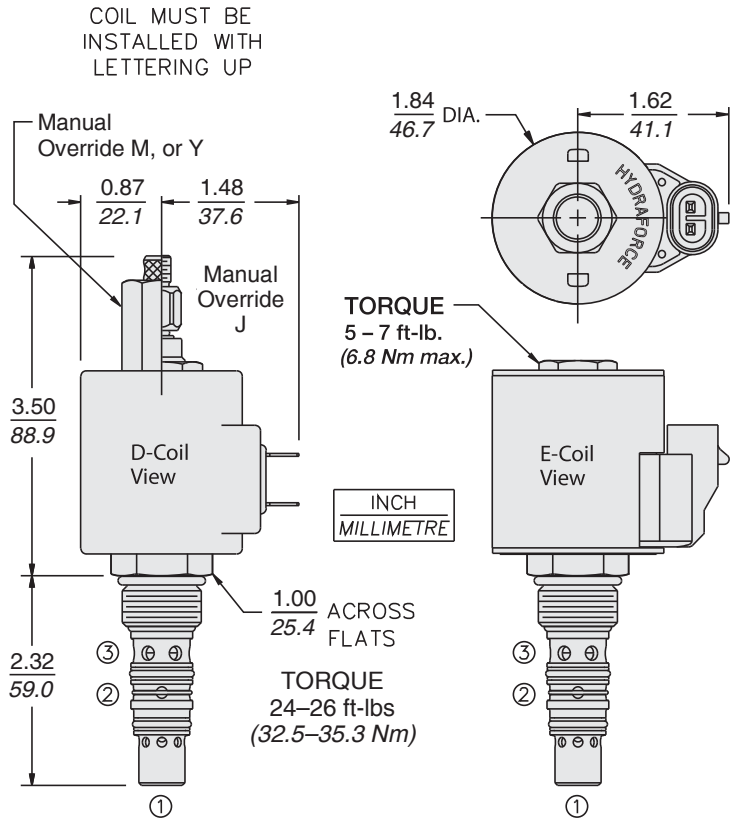




Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS

U.S. Patent 7,921,880



MATERIALS

Cartridge: Weight: 0.18 kg. (0.40 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-up standard.

Standard D-Coil: Weight: 0.27 kg. (0.60 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.); Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SPCL10-32__ - __ __ __ - __ - __ __ __ __ __

Option

None	(Blank)
Manual Override	**M**
Manual Override	**Y**
Manual Override	**J**

For Manual Override details see page 1.001.1

Note: Flow performance varies with manual override options. Consult factory for details.

Porting

Cartridge Only	**0**

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**
Polyurethane	**P**

Voltage

0	Less Coil**
12	12 VDC
20	20 VDC†
24	24 VDC

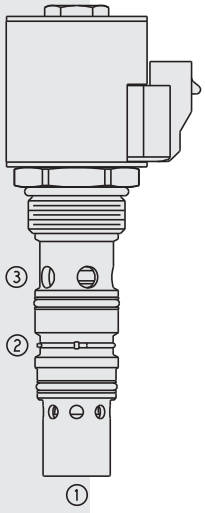
**Includes D-Coil Nut

Coil Termination	E-Coil	D-Coil
Deutsch DT04-2P	**ER** (IP69K)	**DR** (IP65)
Metri-Pack® 150	**EY** (IP69K)	**DY** (IP65)
Dual Lead Wires	**EL** (IP69K)	**DL** (IP65)
Amp Jr. Timer	**EJ** (IP67)	—
DIN 43650	**EG** (IP65)	**DG** (IP65)
Dual Spades	—	**DS** (IP65)

For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models. See coil option info. on pages 3.200.1 & 3.400.1

SPCL16-32 Poppet, 3-Port, Normally Closed

U.S. Patent
7,921,880



DESCRIPTION

A solenoid-operated, 3-port, normally-closed, proportional, poppet-type, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding applications.

OPERATION

When the **SPCL16-32** is energized, the poppet lifts to allow flow from port 3 to ports 1 and 2. Flow at port 2 is typical for load sensing applications.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Reduce manifold space claim.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: Maximum: 250 bar (3625 psi); Minimum: 2.4 bar (35 psi)

Flow Rating: up to 152 lpm (40 gpm); see performance charts

Internal Leakage: Ports 1 and 3: 5 drops/minute max. at 250 bar (3625 psi)
Port 2: 15 drops/minute max. at 250 bar (3625 psi)

Operating Temperature: -40° to 100°C (-40° to 212° F) with standard Buna N seals;
-26° to 204°C (-15° to 400°F) with Fluorocarbon seals;
-54°C to 104°C (-65°F to 225°F) with Polyurethane seals

Valve Inductance: 173.3 mH at 1.2A (Max. Control Current)

Threshold Current: 0.40A to 0.60A

Hysteresis: Less than 10% of maximum flow at 1.2A (Max. Control Current)

Dither Frequency: 100 Hz recommended

Installation: No restrictions; See page 9.020.1; **Filtration:** See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Cavity: VC16-3SPCL; See page 9.116.1

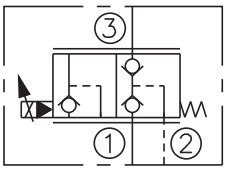
Cavity Tool: CT16-3SPCL; See page 8.600.1

Seal Kit: SK16-3X-MM; See page 8.650.1

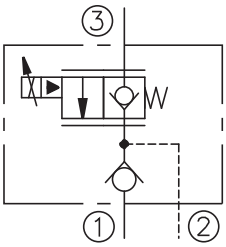
Coil Nut: Part No. 7004400

SYMBOL

ISO:

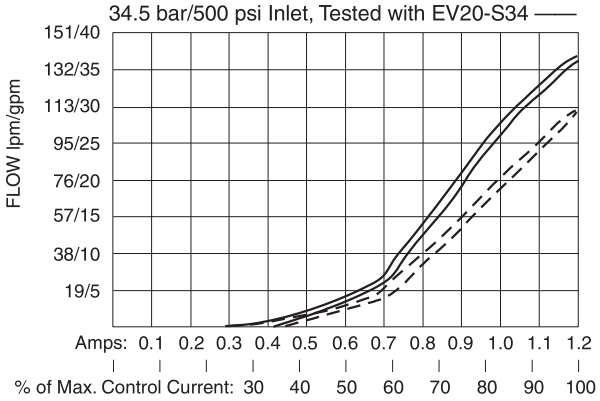


Expanded:

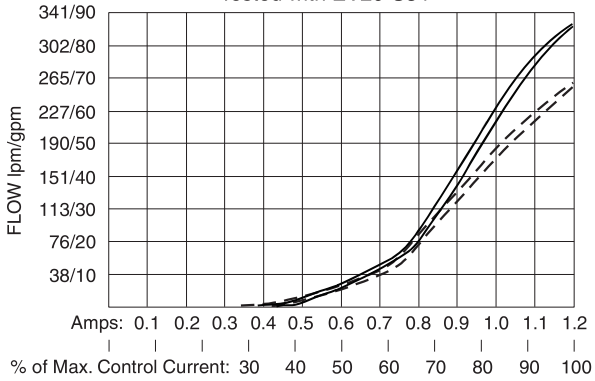


PERFORMANCE (Cartridge Only)

FLOW vs. CURRENT; Ports 3 to 1
Tested with EC16-32-160 – – –
34.5 bar/500 psi Inlet, Tested with EV20-S34 ——

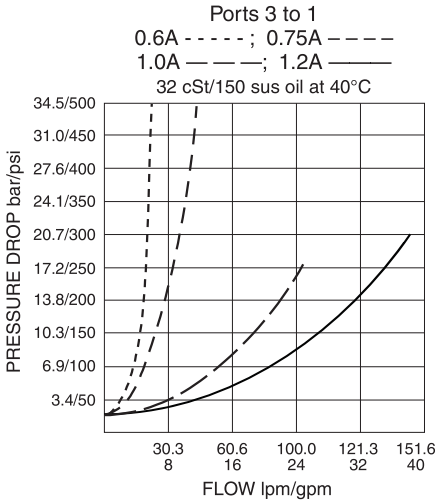


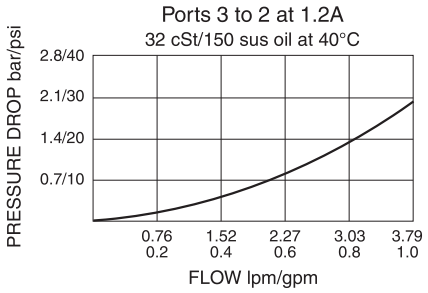
FLOW vs. CURRENT; Ports 3 to 1
103 bar/1500 psi Inlet – – –; 207 bar/3000 psi Inlet ——
Tested with EV20-S34



Performance info. continued on next page.

PERFORMANCE (Continued)

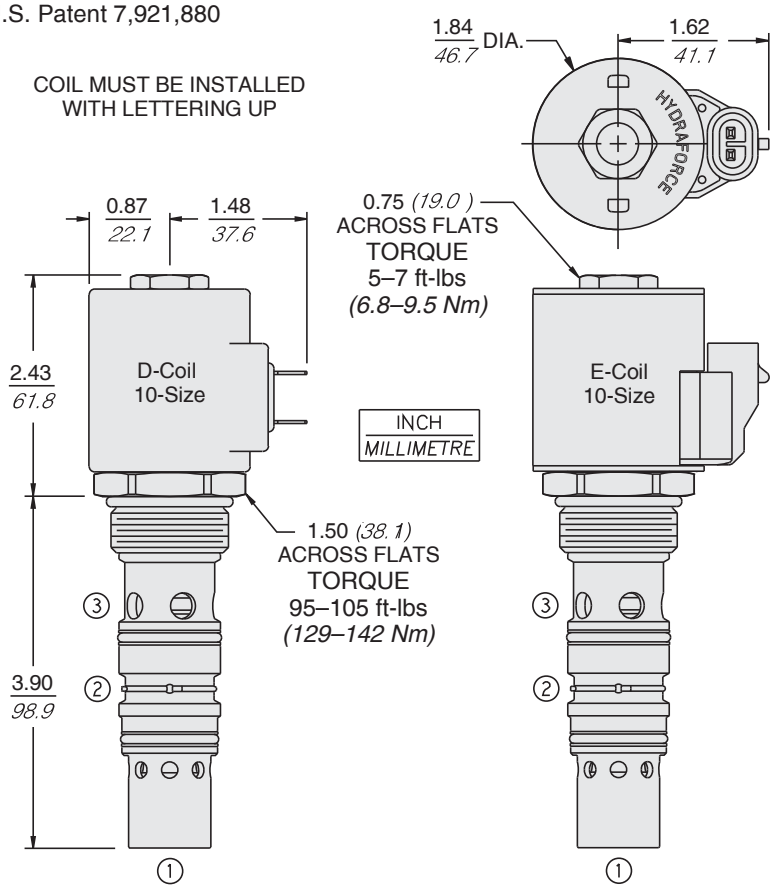




Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS

U.S. Patent 7,921,880



MATERIALS

Cartridge: Weight: 0.49 kg. (1.09 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-up standard.

Standard D-Coil: Weight: 0.27 kg. (0.60 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.); Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SPCL16-32 - _____ - ___ - _____

Porting
Cartridge Only **0**

Seals
Buna N (Std.) **N**
Fluorocarbon **V**
Polyurethane **P**

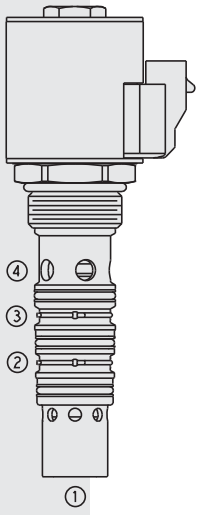
Voltage
0 Less Coil**
12 12 VDC
20 20 VDC†
24 24 VDC
**Includes D-Coil Nut

Coil Termination	E-Coil	D-Coil
Deutsch DT04-2P	**ER** (IP69K)	**DR** (IP65)
Metri-Pack® 150	**EY** (IP69K)	**DY** (IP65)
Dual Lead Wires	**EL** (IP69K)	**DL** (IP65)
Amp Jr. Timer	**EJ** (IP67)	—
DIN 43650	**EG** (IP65)	**DG** (IP65)
Dual Spades	—	**DS** (IP65)

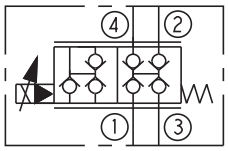
For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models. See coil option info. on pages 3.200.1 & 3.400.1

SPCL16-40 Poppet, 2-Way, Normally Closed

U.S. Patent 7,921,880



SYMBOL



DESCRIPTION

A solenoid-operated, 4-port, normally-closed, proportional, poppet-type, screw-in hydraulic cartridge valve for low-leakage blocking and load-holding applications.

OPERATION

When the **SPCL16-40** is energized, the poppet lifts to allow flow from port 4 to ports 1, 2, and 3. Flow at ports 2 and 3 is typical for load sensing applications and includes a check valve for isolation.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Reduce manifold space claim.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: Maximum: 250 bar (3625 psi); Minimum: 2.4 bar (35 psi)

Flow Rating: up to 152 lpm (40 gpm); see performance charts

Internal Leakage: Ports 1 and 4: 5 drops/minute max. at 250 bar (3625 psi)
Ports 2 and 3: 15 drops/minute max. at 250 bar (3625 psi)

Operating Temperature: -40° to 100°C (-40° to 212° F) with standard Buna N seals;
-26° to 204°C (-15° to 400°F) with Fluorocarbon seals;
-54°C to 104°C (-65°F to 225°F) with Polyurethane seals

Valve Inductance: 173.3 mH at 1.2A (Max. Control Current)

Threshold Current: 0.40A to 0.60A

Hysteresis: Less than 10% of maximum flow at 1.2A (Max. Control Current)

Dither Frequency: 100 Hz recommended

Installation: No restrictions; See page 9.020.1; **Filtration:** See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Cavity: VC16-4SPCL; See page 9.116.1

Cavity Tool: CT16-4SPCL; See page 8.600.1

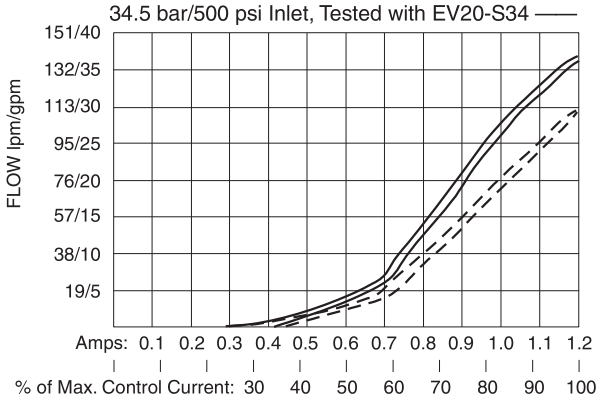
Seal Kit: SK16-4X-MM; See page 8.650.1

Coil Nut: Part No. 7004400

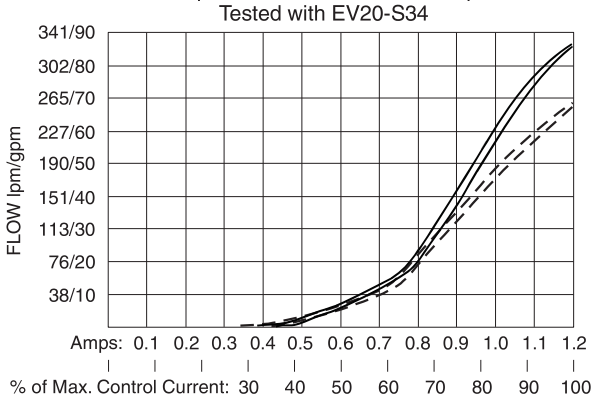
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

PERFORMANCE (Cartridge Only)

FLOW vs. CURRENT; Ports 4 to 1
Tested with EC16-32-160 – – –
34.5 bar/500 psi Inlet, Tested with EV20-S34 ——

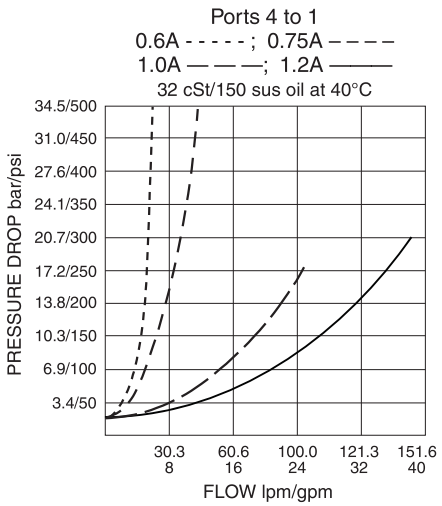


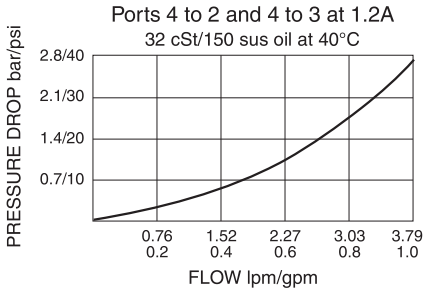
FLOW vs. CURRENT; Ports 4 to 1
103 bar/1500 psi Inlet – – –; 207 bar/3000 psi Inlet ——
Tested with EV20-S34



Performance info. continued on next page.

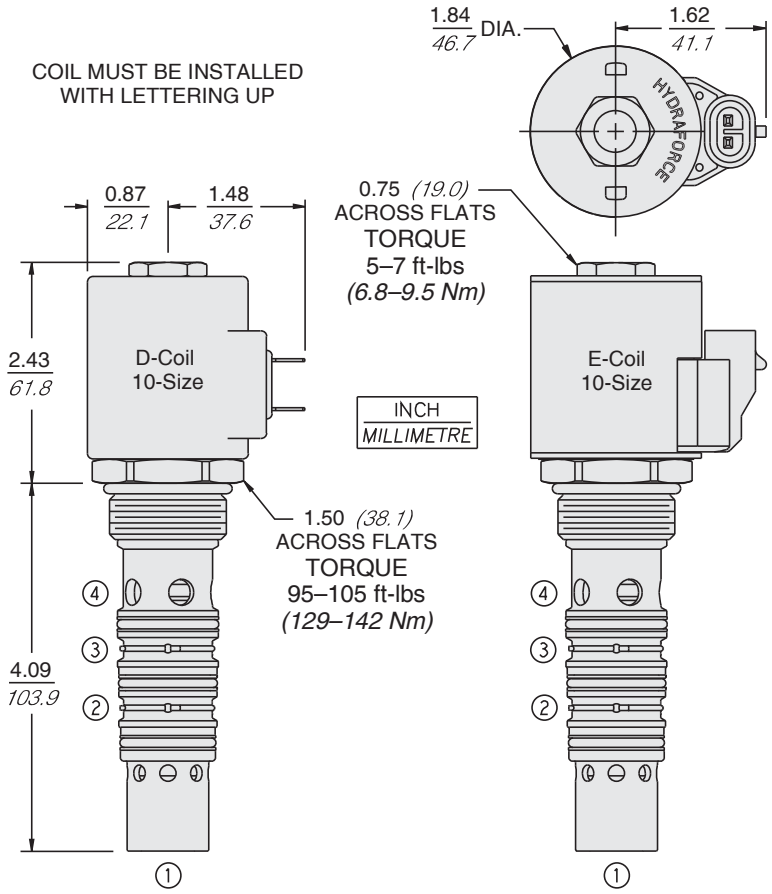
PERFORMANCE (Continued)





DIMENSIONS

U.S. Patent 7,921,880



MATERIALS

Cartridge: Weight: 0.50 kg. (1.11 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-up standard.

Standard D-Coil: Weight: 0.27 kg. (0.60 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.); Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SPCL16-40 - _____ - ___ - _____

Porting

Cartridge Only	**0**

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**
Polyurethane	**P**

Voltage

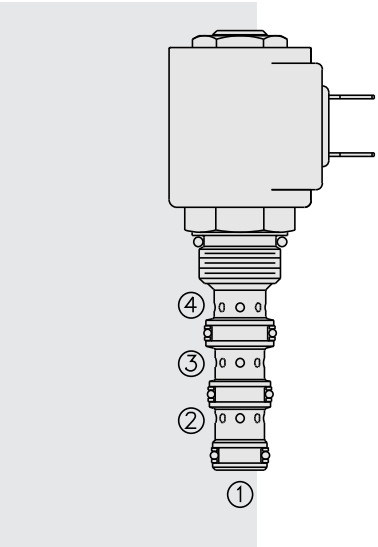
0	Less Coil**
12	12 VDC
20	20 VDC†
24	24 VDC

**Includes D-Coil Nut

Coil Termination	E-Coil	D-Coil
Deutsch DT04-2P	**ER** (IP69K)	**DR** (IP65)
Metri-Pack® 150	**EY** (IP69K)	**DY** (IP65)
Dual Lead Wires	**EL** (IP69K)	**DL** (IP65)
Amp Jr. Timer	**EJ** (IP67)	—
DIN 43650	**EG** (IP65)	**DG** (IP65)
Dual Spades	—	**DS** (IP65)

For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models. See coil option info. on pages 3.200.1 & 3.400.1

SP08-46R Spool, 4-Way, 2-Position



DESCRIPTION

A proportional, solenoid-operated, four-way, two-position, screw-in hydraulic cartridge valve.

OPERATION

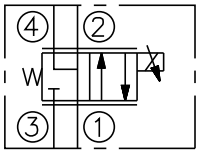
When de-energized, the **SP08-46R** allows flow from 2, 1 and 4, while blocking flow at 3. When energized, metered flow is allowed from 3 to 4, as well as metered return flow from 2 to 1. Please note that this valve will allow flow from 4 to 3 and from 1 to 2 but these flows will not be metered.

FEATURES

- Continuous-duty rated solenoid.
- Hardened parts for long life.
- Optional coil voltages and terminations.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Optional waterproof E-Coils rated up to IP69K.
- Good linearity and hysteresis.
- Industry common cavity.

SYMBOLS

USASI/ISO:



RATINGS

Operating Pressure: 247 bar (3625 psi) with standard Buna N seals

Flow: 11.4 lpm (3 gpm) maximum; see performance chart

Internal Leakage: 328 ml/minute (20 cu. in./minute) max. at 207 bar (3000 psi)

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Standard Coils and E-Coils: Continuous from 85% to 115% of nominal voltage

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1

Cavity: VC08-4; See page 9.108.1

Cavity Tool: CT08-4XX; See page 8.600.1

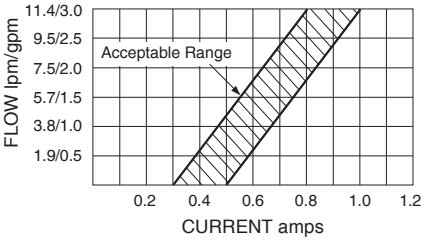
Seal Kit: SK08-4X-MMM; See page 8.650.1

Coil Nut: Part No. 7004400;
For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut info.

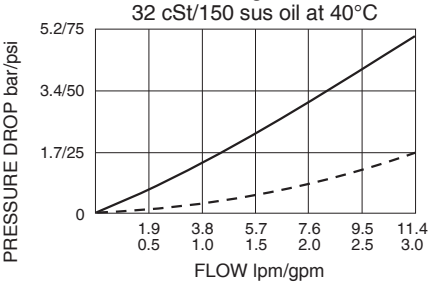
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

PERFORMANCE (Cartridge Only)

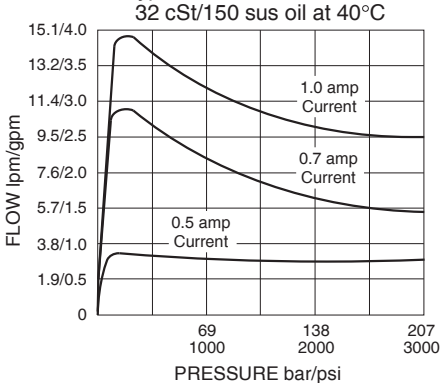
Flow vs. Current
100 Hz PWM; 12 VDC
32 cSt/150 sus oil at 40C



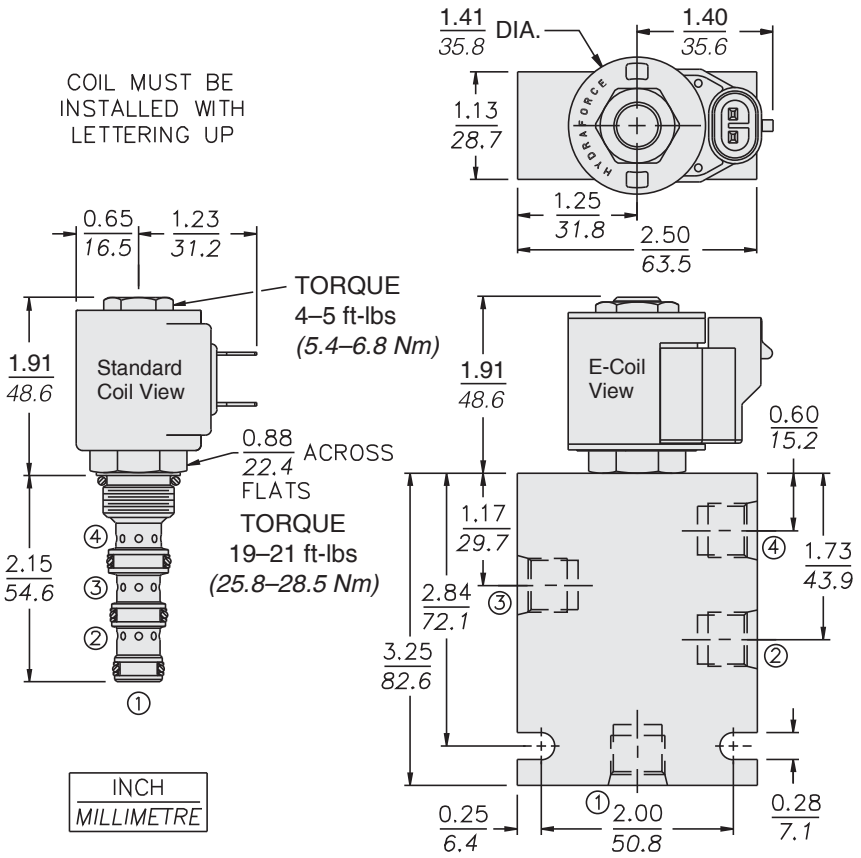
3 to 4, S2 energized: ——
2 to 1, S1 energized: - - - - - -
32 cSt/150 sus oil at 40°C



Pressure Compensation, Inlet to Work Port
Typical Differential Pressure
32 cSt/150 sus oil at 40°C



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.13 kg. (0.28 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces; Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.27 kg. (0.60 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi); Ductile iron bodies available; dimensions may differ. See page 8.008.1.

Standard Coil: Weight: 0.11 kg. (0.25 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: Weight: 0.14 kg. (0.3 lbs.); Perfect wound, fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors. **See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SP08-46R__ - __ __ __ __ - __ - __ __ __ __ __

Option
None (Blank)

Porting

Cartridge Only	**0**
SAE 6	**6T**
SAE 8	**8T**
1/4 in. BSP*	**2B**
3/8 in. BSP*	**3B**

*BSP Body; U.K. Mfr. Only

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**

Voltage
Std. Coil

0	Less Coil**
12	12 VDC
24	24 VDC

**Includes Std. Coil Nut

E-Coil

12	12 VDC
24	24 VDC

Termination (VDC)
Std. Coil

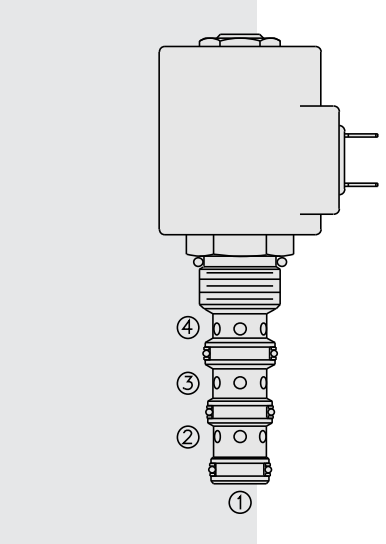
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC)
E-Coil

ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

SP10-46R Spool, 4-Way, 2-Position



DESCRIPTION

A proportional, solenoid-operated, four-way, two-position, screw-in hydraulic cartridge valve.

OPERATION

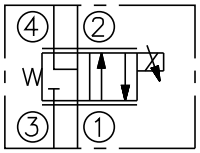
When de-energized, the **SP10-46R** allows flow from 2, 1 and 4, while blocking flow at 3. When energized, metered flow is allowed from 3 to 4, as well as metered return flow from 2 to 1.

FEATURES

- Continuous-duty rated solenoid.
- Hardened precision spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Optional waterproof E-Coils rated up to IP69K.
- Good linearity and hysteresis.
- Industry common cavity.

SYMBOLS

USASI/ISO:



RATINGS

Operating Pressure: 247 bar (3625 psi) with standard Buna N seals

Flow: 22.7 lpm (6 gpm) maximum; see performance chart

Internal Leakage: 328 ml/minute (20 cu. in./minute) max. at 207 bar (3000 psi)

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Standard Coils and E-Coils: Continuous from 85% to 115% of nominal voltage

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1

Cavity: VC10-4; See page 9.110.1

Cavity Tool: CT10-4XX; See page 8.600.1

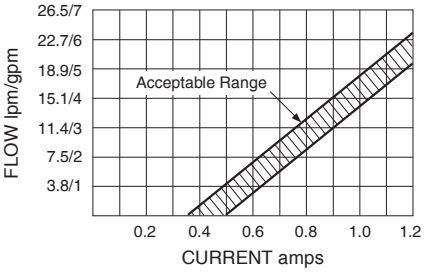
Seal Kit: SK10-4X-MMM; See page 8.650.1

Coil Nut: Part No. 7004400;
For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut info.

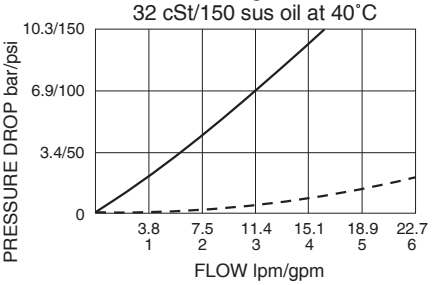
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

PERFORMANCE (Cartridge Only)

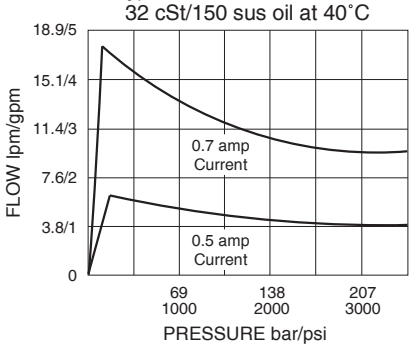
Flow vs. Current
100 Hz PWM; 12 VDC
32 cSt/150 ssu oil at 40C



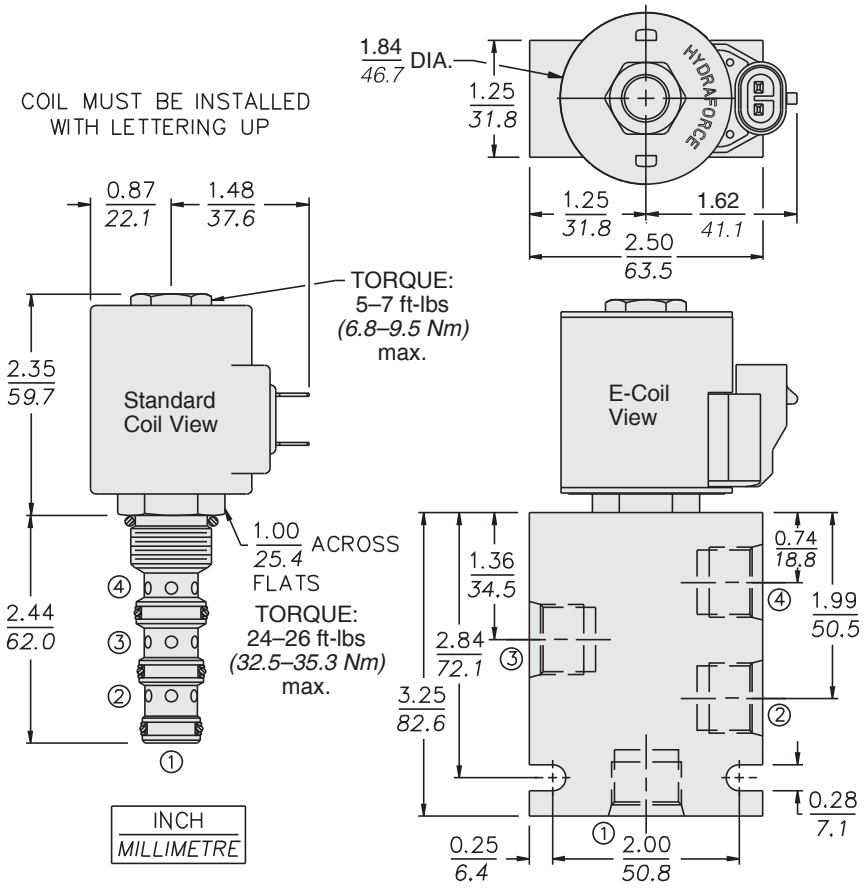
3 to 4, S2 energized: ——
2 to 1, S1 energized: - - - - - -
32 cSt/150 sus oil at 40˚C



Pressure Compensation, Inlet to Work Port
Typical Differential Pressure
32 cSt/150 sus oil at 40˚C



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.20 kg. (0.45 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-up standard.

Standard Ported Body: Weight: 0.36 kg. (0.80 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1.

Standard Coil: Weight: 0.27 kg. (0.60 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.); Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SP10-46R__ - ___ ___ ___ - __ - __ __ __ __ __

Option
None (Blank)

Porting

Cartridge Only	**0**
SAE 6	**6T**
SAE 8	**8T**
1/4 in. BSP*	**2B**
3/8 in. BSP*	**3B**

*BSP Body; U.K. Mfr. Only

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**

Voltage
Std. Coil

0	Less Coil**
12	12 VDC
24	24 VDC

**Includes Std. Coil Nut

E-Coil

12	12 VDC
24	24 VDC

Termination (VDC)
Std. Coil

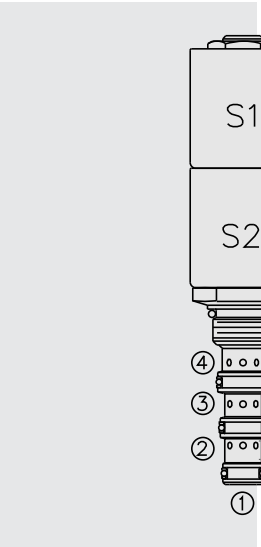
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC)
E-Coil

ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150 (IP69K Rated)
EG	DIN 43650 (IP65 Rated)

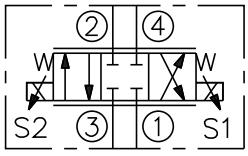
Coils with internal diode are available. Consult factory.

SP08-47C Spool, 4-Way, 3-Position, Closed Center

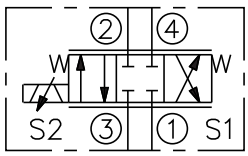


SYMBOLS

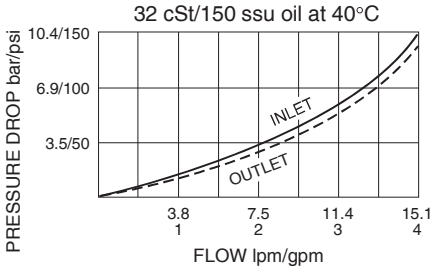
USASI:

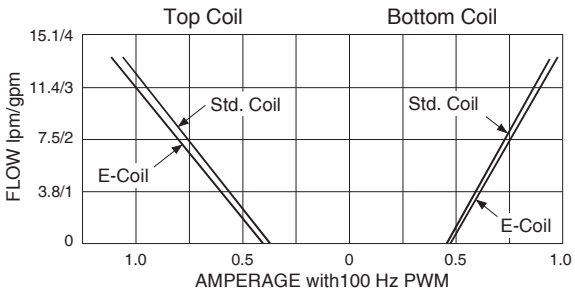


ISO:



PERFORMANCE (Cartridge Only)





DESCRIPTION

A proportional solenoid-operated, four-way, three-position, spool-type, closed center, screw-in hydraulic cartridge valve.

OPERATION

When de-energized, the **SP08-47C** blocks flow to all ports. When coil S1 is energized, flow is allowed from 3 to 4, and from 2 to 1. When coil S2 is energized, flow is allowed from 3 to 2, and from 4 to 1.

Initial meter-in flow begins at a nominal 0.4 amp on a 12 VDC system. Full flow of 3 gpm occurs at 1.0 to 1.1 amp on a 12 VDC system. Each coil has its own metering characteristics, which are quite similar (see performance chart).

While port 1 may be fully pressurized, it is not intended for use as the valve's inlet.

In circuits where work port flows are unequal due to cylinder ratios, the higher return flow should be directed to port 2.

FEATURES

- Continuous-duty rated solenoids.
- Efficient wet-armature construction.
- Optional coil voltages and terminations.
- Hardened precision spool and cage for long life.
- Cartridges are voltage interchangeable.
- Optional waterproof E-Coils rated up to IP69K.
- Designed for good linearity and hysteresis.
- Optional manual override.
- Industry-common cavity.

RATINGS

Operating Pressure: 240 bar (3500 psi)

Flow: 11.4 lpm (3 gpm) max. (see performance chart); Flow rate is based on 50% duty cycle and coil temperature of 20°C (140°F). Consult factory if higher duty cycle and coil temperatures are anticipated.

Internal Leakage: 164 cc/minute (10 cu. in./minute) max. per side at 207 bar (3000 psi)

Hysteresis: Less than 7%

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Standard Coils and E-Coils: Continuous up to 115% of nominal voltage

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results. See page 9.020.1

Cavity: VC08-4; See page 9.108.1; **Cavity Tool:** CT08-4XX; See page 8.600.1

Seal Kit: SK08-4X-MMM; See page 8.650.1

Coil Nut: Part No. 7004400; **Manual Override Coil Nut:** Part No. 4528180;

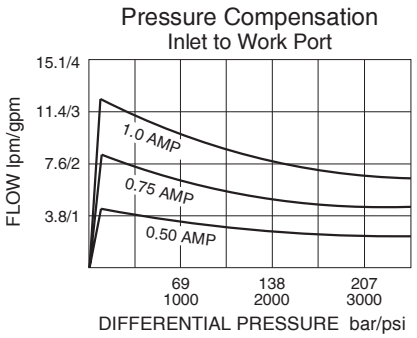
Coil Spacer: Part No. 4534720

For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut & spacer info.

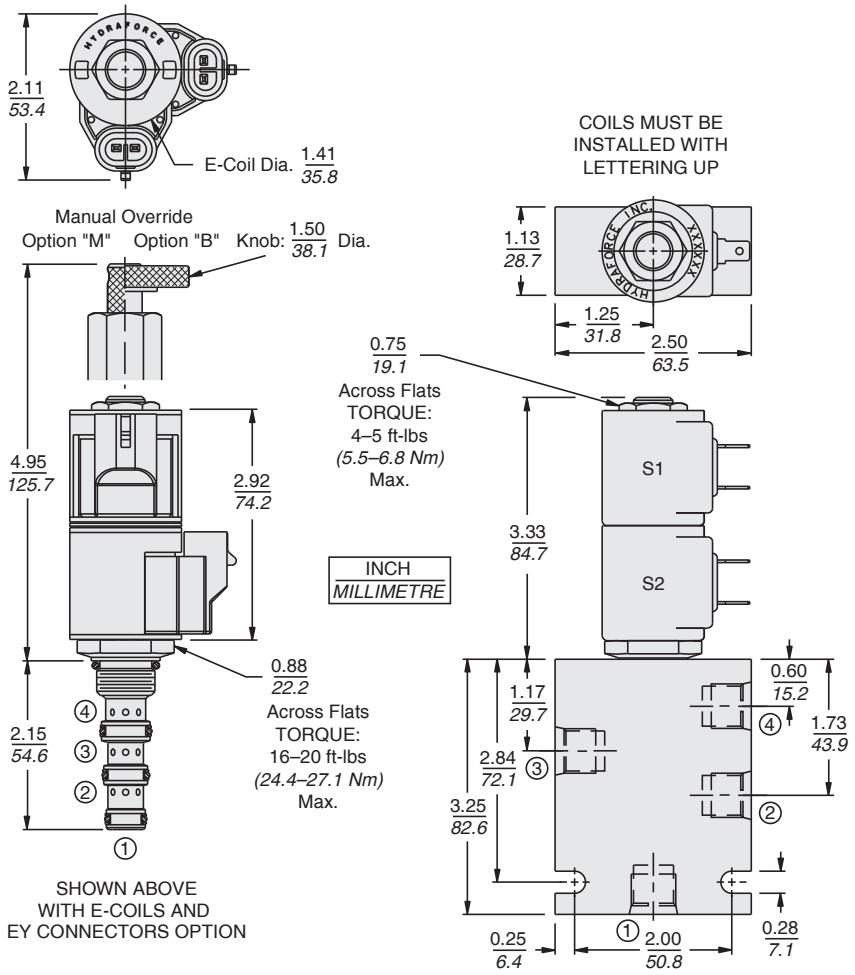
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Performance information continued on following page.

PERFORMANCE (cont'd.)



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.13 kg. (0.28 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups std.

Standard Ported Body: Weight: 0.18 kg. (0.40 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.008.1.

Standard Coil: 2 Required. Weight each: 0.11 kg. (0.25 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: 2 Required. Weight each: 0.14 kg. (0.3 lbs.); Perfect wound, fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors. **See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SP08-47C__ - __ __ __ - __ - __ __ __ __ __

Option
None (Blank)
Manual Override **B**
Manual Override **M**

Porting
Cartridge Only **0**
SAE 6 **6T**
1/4 in. BSP* **2B**
3/8 in. BSP* **3B**
*BSP Body; U.K. Mfr. Only

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Voltage
Std. Coil
0 Less Coil**
12 12 VDC
24 24 VDC
**Includes Std. Coil Nut

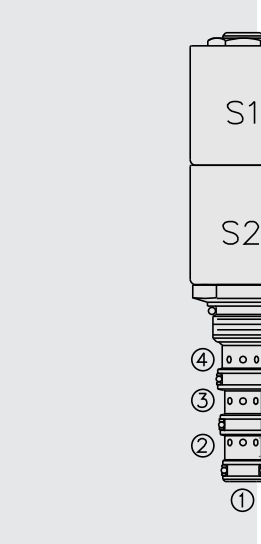
E-Coil
12 12 VDC
24 24 VDC

Termination (VDC)
Std. Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

Termination (VDC)
E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

SP08-47CL Spool, 4-Way, 3-Position, Closed Center,



DESCRIPTION

A proportional solenoid-operated, four-way, three-position, spool-type, closed center, screw-in hydraulic cartridge valve with lower maximum flow rate of 7.6 lpm (2 gpm).

OPERATION

When de-energized, the **SP08-47CL** blocks flow to all ports. When coil S1 is energized, flow is allowed from 3 to 4, and from 2 to 1. When coil S2 is energized, flow is allowed from 3 to 2, and from 2 to 1.

Initial meter-in flow begins at a nominal 0.4 amp on a 12 VDC system. Full flow of 2 gpm occurs at 1.0 to 1.1 amp on a 12 VDC system. Each coil has its own metering characteristics, which are quite similar (see performance chart).

While port 1 may be fully pressurized, it is not intended for use as the valve's inlet.

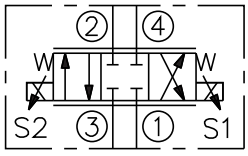
In circuits where work port flows are unequal due to cylinder ratios, the higher return flow should be directed to port 2.

FEATURES

- Continuous-duty rated solenoids.
- Efficient wet-armature construction.
- Optional coil voltages and terminations.
- Hardened precision spool and cage for long life.
- Cartridges are voltage interchangeable.
- Optional waterproof E-Coils rated up to IP69K.
- Designed for good linearity and hysteresis.
- Optional manual override.
- Industry-common cavity.

SYMBOLS

USASI:



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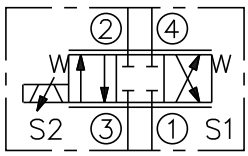


RATINGS

Operating Pressure: 240 bar (3500 psi)

Flow: 7.6 lpm (2 gpm) max. (see performance chart); Flow rate is based on 50% duty cycle and coil temperature of 20°C (140°F). Consult factory if higher duty cycle and coil temperatures are anticipated.

Internal Leakage: 164 cc/minute (10 cu. in./minute) max. per side at 207 bar (3000 psi)

Hysteresis: Less than 7%

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Standard Coils and E-Coils: Continuous up to 115% of nominal voltage

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results. See page 9.020.1

Cavity: VC08-4; See page 9.108.1; **Cavity Tool:** CT08-4XX; See page 8.600.1

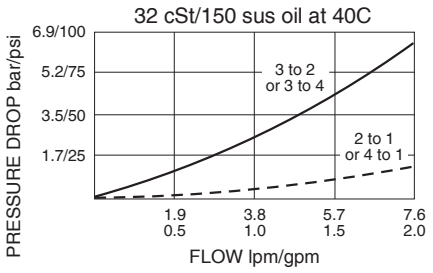
Seal Kit: SK08-4X-MMM; See page 8.650.1

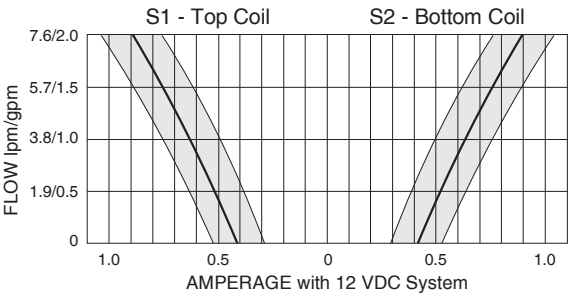
Coil Nut: Part No. 7004400; **Manual Override Coil Nut:** Part No. 4528180;

Coil Spacer: Part No. 4534720

For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut & spacer info.

PERFORMANCE (Cartridge Only)



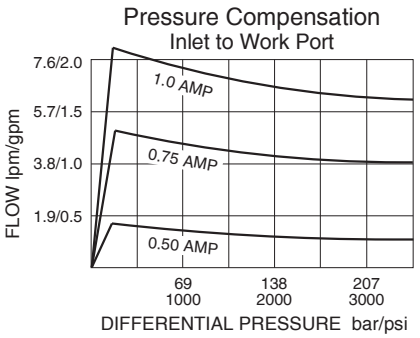


Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

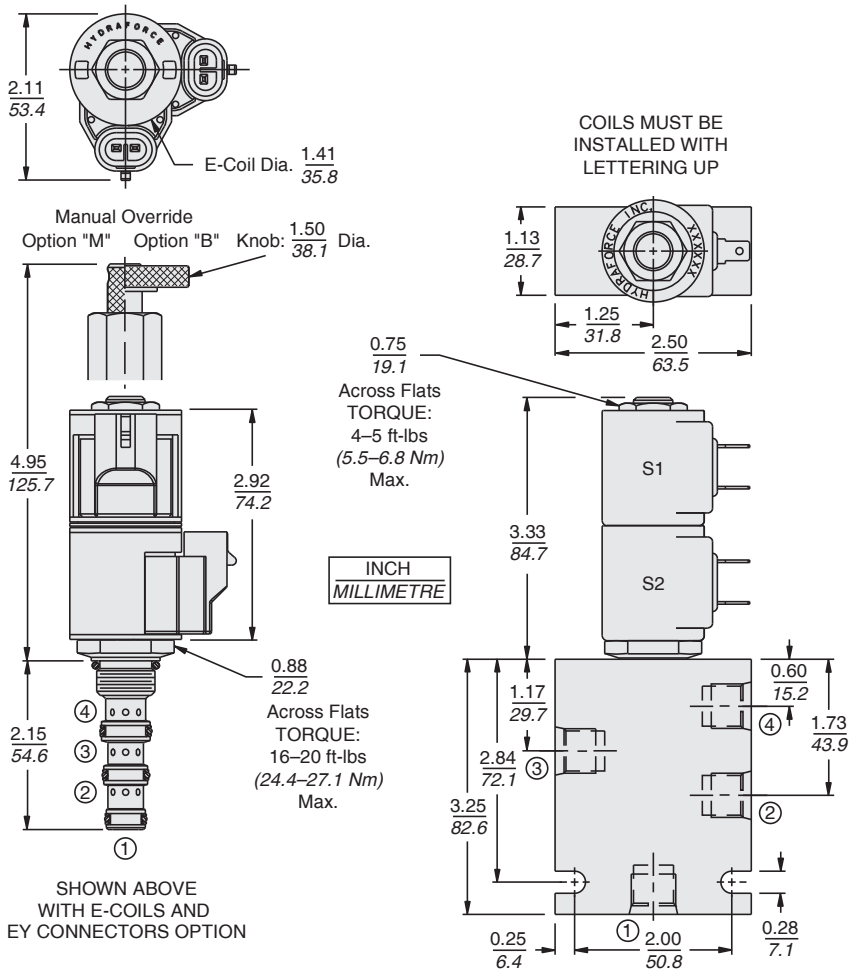
Performance information continued on following page.

Low Flow Version — SP08-47CL

PERFORMANCE (cont'd.)



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.13 kg. (0.28 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups std.

Standard Ported Body: Weight: 0.18 kg. (0.40 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.008.1.

Standard Coil: 2 Required. Weight each: 0.11 kg. (0.25 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: 2 Required. Weight each: 0.14 kg. (0.3 lbs.); Perfect wound, fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors. **See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SP08-47CL__ - _ _ _ _ - _ _ - _ _ _ _ _ _

Option

None	(Blank)
Manual Override	**B**
Manual Override	**M**

Porting

Cartridge Only	**0**
SAE 6	**6T**
1/4 in. BSP*	**2B**
3/8 in. BSP*	**3B**

*BSP Body; U.K. Mfr. Only

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**

Voltage
Std. Coil

0	Less Coil**
12	12 VDC
24	24 VDC

**Includes Std. Coil Nut

E-Coil

12	12 VDC
24	24 VDC

Termination (VDC)
Std. Coil

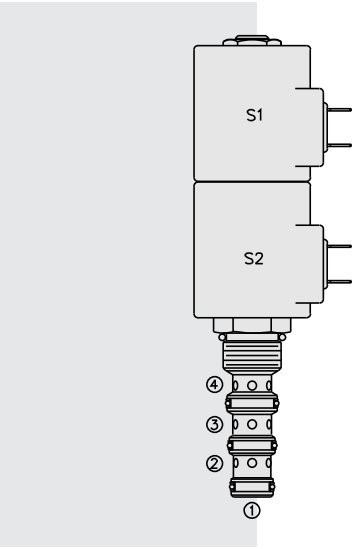
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC)
E-Coil

ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

SP10-47C Spool, 4-Way, 3-Position, Closed Center



DESCRIPTION

A proportional solenoid-operated, four-way, three-position, spool-type, closed center, screw-in hydraulic cartridge valve.

OPERATION

When de-energized, the **SP10-47C** blocks flow to all ports. When coil S1 is energized, flow is allowed from 3 to 4, and from 2 to 1. When coil S2 is energized, flow is allowed from 3 to 2, and from 4 to 1.

Initial meter-in flow begins at a nominal 0.4 amp on a 12 VDC system. Full flow of 6 gpm occurs at 1.1 to 1.2 amp on a 12 VDC system. Each coil has its own metering characteristics, which are quite similar (see performance chart).

While port 1 may be fully pressurized, it is not intended for use as the valve's inlet.

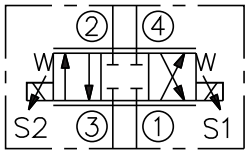
In circuits where work port flows are unequal due to cylinder ratios, the higher return flow should be directed to port 2.

FEATURES

- Continuous-duty rated solenoids.
- Hardened precision spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Optional waterproof E-Coils rated up to IP69K.
- Optional manual override.
- Industry-common cavity.
- Designed for good linearity and hysteresis.

SYMBOLS

USASI:



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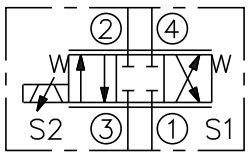


RATINGS

Operating Pressure: 248 bar (3600 psi)

Flow: 22.7 lpm (6 gpm) max. (see performance chart)

Internal Leakage: 164 cc/minute (10 cu. in./minute) max. per side at 248 bar (3600 psi)

Hysteresis: Less than 7%

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Standard Coils and E-Coils: Continuous up to 115% of nominal voltage

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results. See page 9.020.1

Cavity: VC10-4; See page 9.110.1; **Cavity Tool:** CT10-4XX; See page 8.600.1

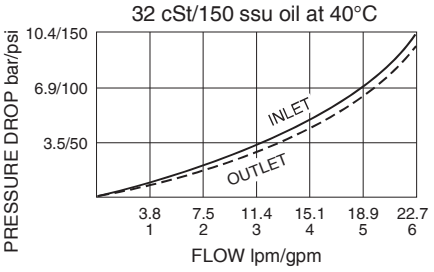
Seal Kit: SK10-4X-MMM; See page 8.650.1

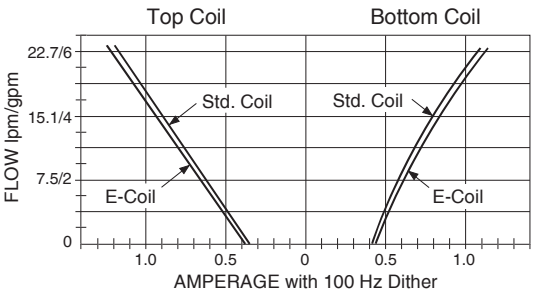
Coil Nut: Part No. 7004400; **Manual Override Coil Nut:** Part No. 4528180

Coil Spacer: Part No. 4539700

For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut & spacer info.

PERFORMANCE (Cartridge Only)

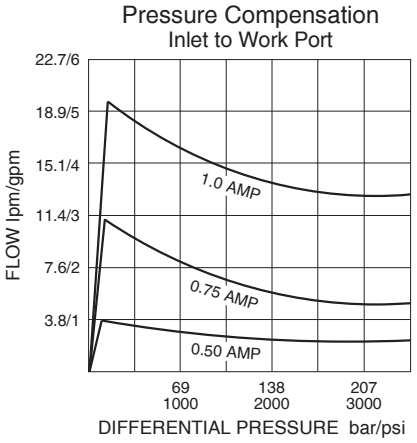




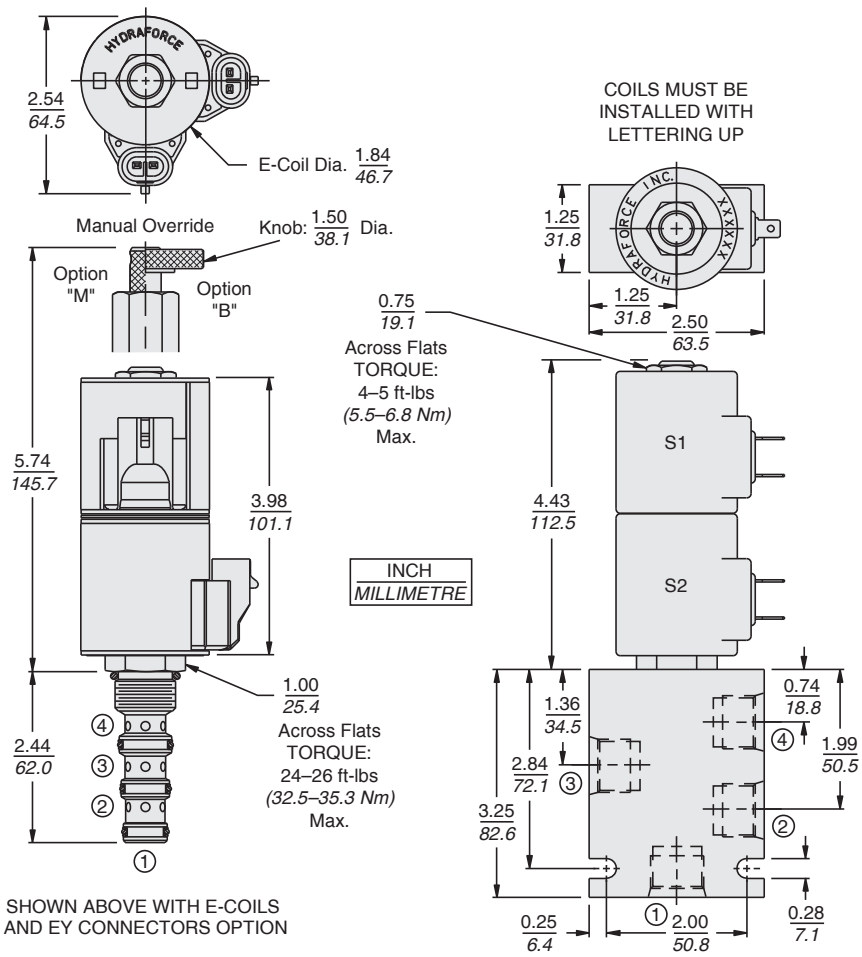
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Performance information continued on following page.

PERFORMANCE (cont'd.)



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.30 kg. (0.65 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups std.

Standard Ported Body: Weight: 0.36 kg. (0.80 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1.

Standard Coil: Weight each: 0.27 kg. (0.60 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight: 0.41 kg. (0.9 lbs.); Perfect wound, fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors.
See page 3.400.1 for all E-Coil retrofit applications.

TO ORDER

SP10-47C__ - __ __ __ - __ - __ __ __ __ __

Option
None (Blank)
Manual Override **M**
Manual Override **B**
For Manual Override options see page 1.001.1

Porting
Cartridge Only **0**
SAE 6 **6T**
SAE 8 **8T**
1/4 in. BSP* **2B**
3/8 in. BSP* **3B**
*BSP Body; U.K. Mfr. Only

Seals
N Buna N (Std.)
V Fluorocarbon

Voltage
Std. Coil
0 Less Coil**
12 12 VDC
24 24 VDC
**Includes Std. Coil Nut

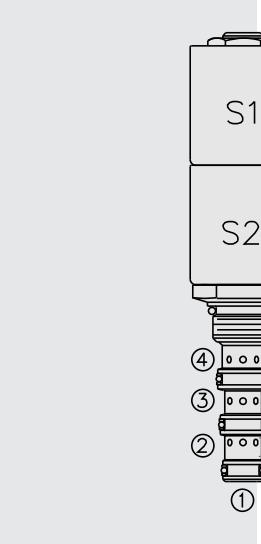
E-Coil
12 12 VDC
24 24 VDC

Termination (VDC)
Std. Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

Termination (VDC)
E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

SP08-47D Spool, 4-Way, 3-Position, "Motor Spool"



DESCRIPTION

A proportional solenoid-operated, four-way, three-position, spool-type, motor spool, screw-in hydraulic cartridge valve.

OPERATION

When de-energized, the **SP08-47D** blocks flow to 3 while allowing flow from 2 to 1, and from 4 to 1. When coil S1 is energized flow is allowed from 3 to 4 and from 2 to 1. When coil S2 is energized flow is allowed from 3 to 2 and from 4 to 1.

Initial meter-in flow begins at a nominal 0.4 amp on a 12 VDC system. Full flow of 3 gpm occurs at 1.0 to 1.1 amp on a 12 VDC system. Each coil has its own metering characteristics, which are quite similar (see performance chart).

While port 1 may be fully pressurized, it is not intended for use as the valve's inlet.

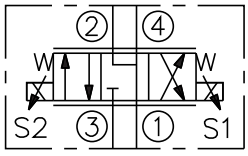
In circuits where work port flows are unequal due to cylinder ratios, the higher return flow should be directed to port 2.

FEATURES

- Continuous-duty rated solenoids.
- Optional coil voltages and terminations.
- Efficient wet-armature construction.
- Hardened precision spool and cage for long life.
- Cartridges are voltage interchangeable.
- Optional waterproof E-Coils rated up to IP69K.
- Designed for good linearity and hysteresis.
- Optional manual override.
- Industry-common cavity.

SYMBOLS

USASI:



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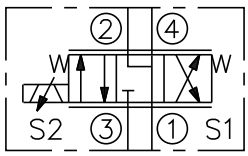


RATINGS

Operating Pressure: 240 bar (3500 psi)

Flow: 11.4 lpm (3 gpm) max. (see performance chart); Flow rate is based on 50% duty cycle and coil temperature of 20°C (140°F). Consult factory if higher duty cycle and coil temperatures are anticipated.

Internal Leakage: 328 cc/minute (20 cu. in./minute) max. per side at 207 bar (3000 psi)

Hysteresis: Less than 7%

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Standard Coils and E-Coils: Continuous up to 115% of nominal voltage

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results. See page 9.020.1

Cavity: VC08-4; See page 9.108.1; **Cavity Tool:** CT08-4XX; See page 8.600.1

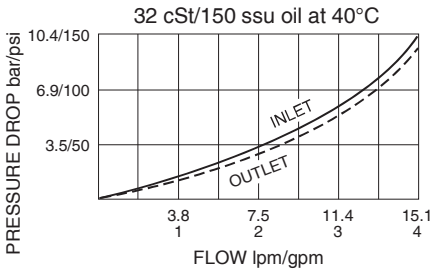
Seal Kit: SK08-4X-MMM; See page 8.650.1

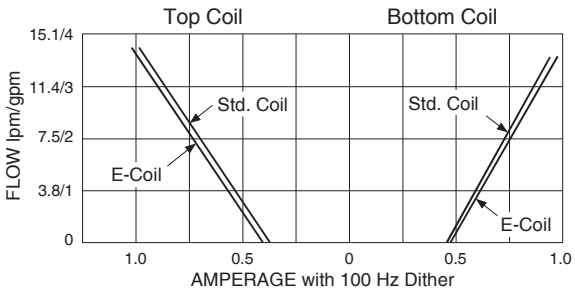
Coil Nut: Part No. 7004400; **Manual Override Coil Nut:** Part No. 4528180;

Coil Spacer: Part No. 4534720

For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut & spacer info.

PERFORMANCE (Cartridge Only)

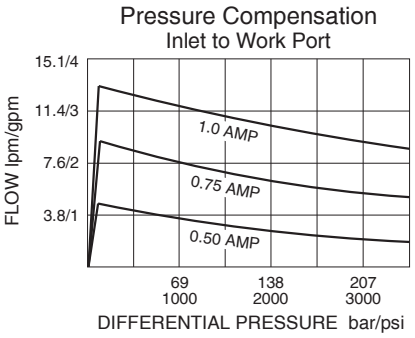




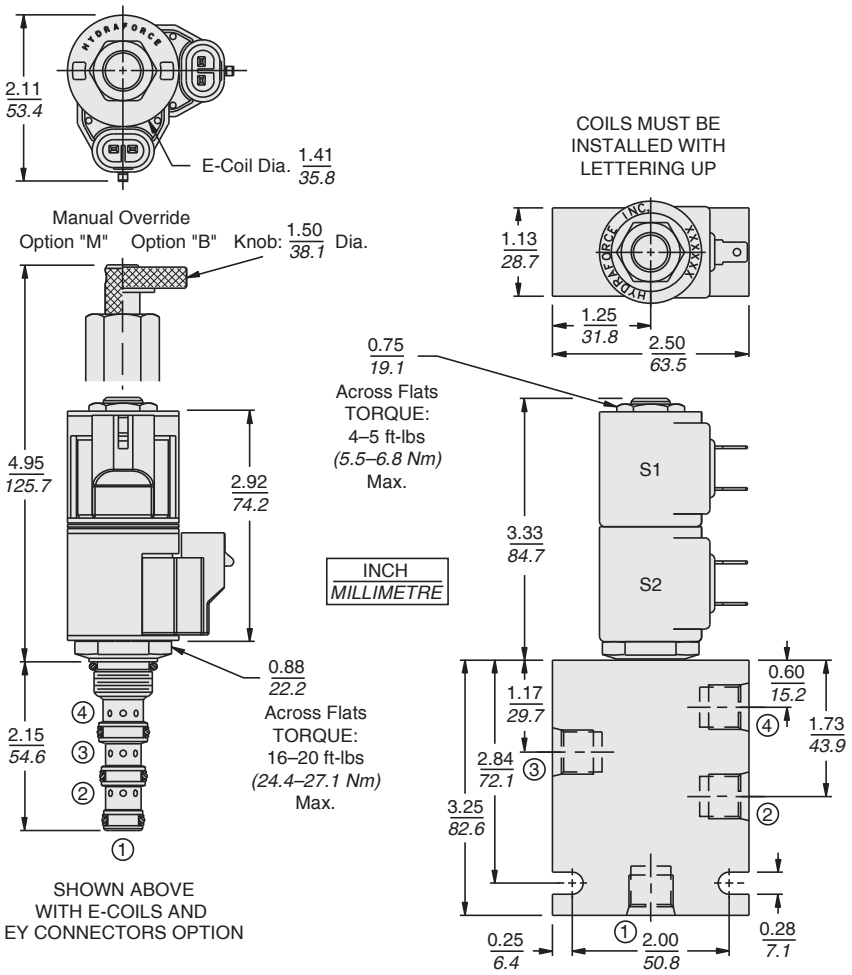
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Performance information continued on following page.

PERFORMANCE (cont'd.)



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.13 kg. (0.28 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups std.

Standard Ported Body: Weight: 0.18 kg. (0.40 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.008.1.

Standard Coil: 2 Required. Weight each: 0.11 kg. (0.25 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: 2 Required. Weight each: 0.14 kg. (0.3 lbs.); Perfect wound, fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors. **See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SP08-47D__ - __ __ __ - __ - __ __ __ __ __

Option

None	(Blank)
Manual Override	**B**
Manual Override	**M**

Porting

Cartridge Only	**0**
SAE 6	**6T**
1/4 in. BSP*	**2B**
3/8 in. BSP*	**3B**

*BSP Body; U.K. Mfr. Only

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**

Voltage
Std. Coil

0	Less Coil**
12	12 VDC
24	24 VDC

**Includes Std. Coil Nut

E-Coil

12	12 VDC
24	24 VDC

Termination (VDC)
Std. Coil

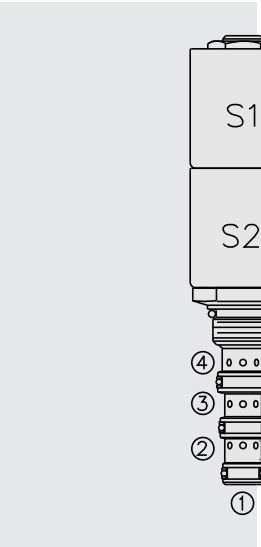
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC)
E-Coil

ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

SP08-47DL Spool, 4-Way, 3-Position, "Motor Spool"



SYMBOLS

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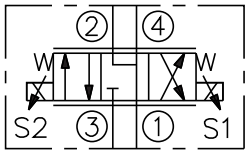

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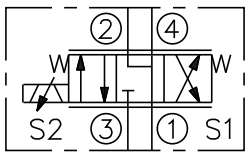
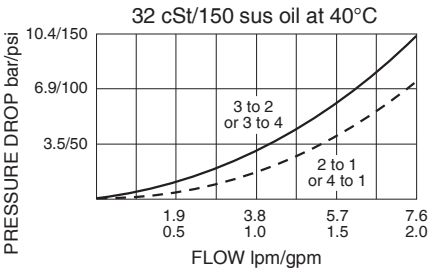
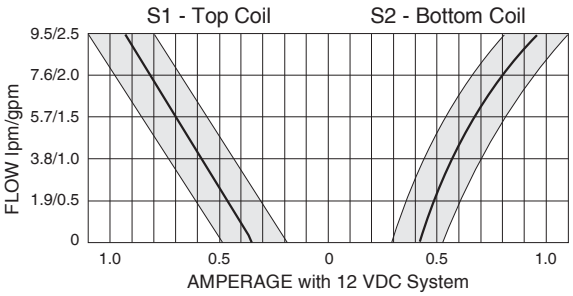


PERFORMANCE (Cartridge Only)





DESCRIPTION

A proportional solenoid-operated, four-way, three-position, spool-type, motor spool, screw-in hydraulic cartridge valve with lower maximum flow rate of 7.6 lpm (2 gpm).

OPERATION

When de-energized, the **SP08-47DL** blocks flow to 3 while allowing flow from 2 to 1, and from 4 to 1. When coil S1 is energized flow is allowed from 3 to 4 and from 2 to 1. When coil S2 is energized flow is allowed from 3 to 2 and from 4 to 1.

Initial meter-in flow begins at a nominal 0.4 amp on a 12 VDC system. Full flow of 2 gpm occurs at 1.0 to 1.1 amp on a 12 VDC system. Each coil has its own metering characteristics, which are quite similar (see performance chart).

While port 1 may be fully pressurized, it is not intended for use as the valve's inlet.

In circuits where work port flows are unequal due to cylinder ratios, the higher return flow should be directed to port 2.

FEATURES

- Continuous-duty rated solenoids.
- Optional coil voltages and terminations.
- Efficient wet-armature construction.
- Hardened precision spool and cage for long life.
- Cartridges are voltage interchangeable.
- Optional waterproof E-Coils rated up to IP69K.
- Designed for good linearity and hysteresis.
- Optional manual override.
- Industry-common cavity.

RATINGS

Operating Pressure: 240 bar (3500 psi)

Flow: 7.6 lpm (2 gpm) max. (see performance chart); Flow rate is based on 50% duty cycle and coil temperature of 20°C (140°F). Consult factory if higher duty cycle and coil temperatures are anticipated.

Internal Leakage: 328 cc/minute (20 cu. in./minute) max. per side at 207 bar (3000 psi)

Hysteresis: Less than 7%

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Standard Coils and E-Coils: Continuous up to 115% of nominal voltage

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results. See page 9.020.1

Cavity: VC08-4; See page 9.108.1; **Cavity Tool:** CT08-4XX; See page 8.600.1

Seal Kit: SK08-4X-MMM; See page 8.650.1

Coil Nut: Part No. 7004400; **Manual Override Coil Nut:** Part No. 4528180;

Coil Spacer: Part No. 4534720

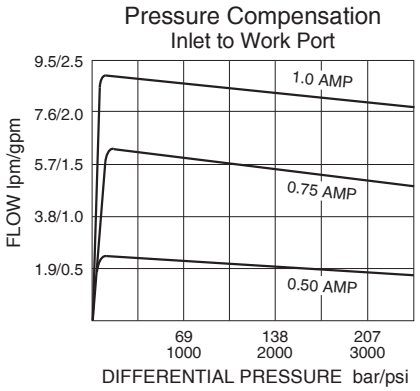
For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut & spacer info.

Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

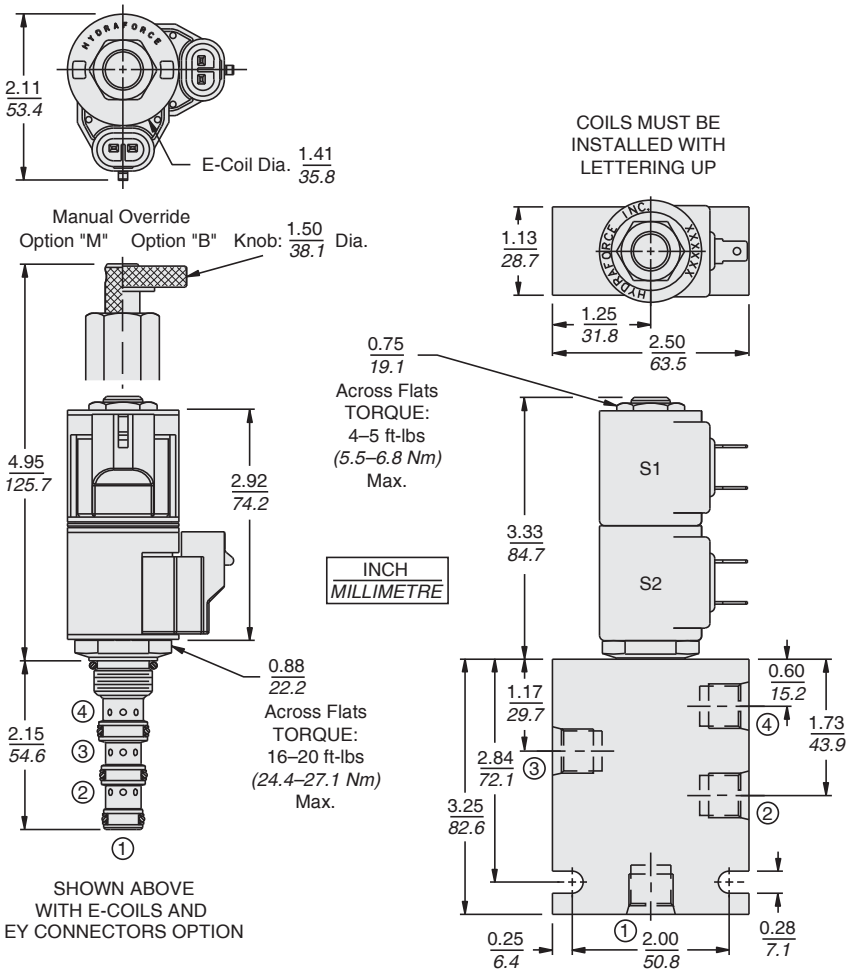
Performance information continued on following page.

Low Flow Version — SP08-47DL

PERFORMANCE (cont'd.)



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.13 kg. (0.28 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups std.

Standard Ported Body: Weight: 0.18 kg. (0.40 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.008.1.

Standard Coil: 2 Required. Weight each: 0.11 kg. (0.25 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: 2 Required. Weight each: 0.14 kg. (0.3 lbs.); Perfect wound, fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors. **See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SP08-47DL__ - _ _ _ _ - _ _ - _ _ _ _ _ _

Option
None (Blank)
Manual Override **B**
Manual Override **M**

Porting
Cartridge Only **0**
SAE 6 **6T**
1/4 in. BSP* **2B**
3/8 in. BSP* **3B**
*BSP Body; U.K. Mfr. Only

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Voltage
Std. Coil
0 Less Coil**
12 12 VDC
24 24 VDC
**Includes Std. Coil Nut

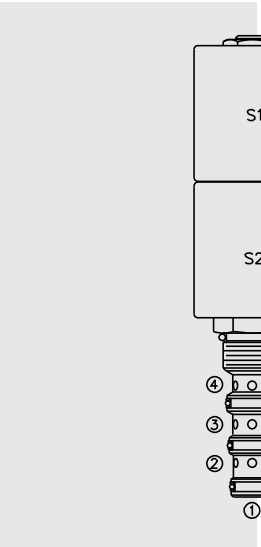
E-Coil
12 12 VDC
24 24 VDC

Termination (VDC)
Std. Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

Termination (VDC)
E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)

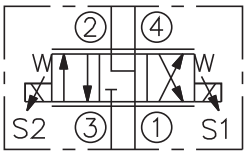
Coils with internal diode are available. Consult factory.

SP10-47D Spool, 4-Way, 3-Position, "Motor Spool"



SYMBOLS

USASI:



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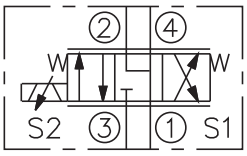
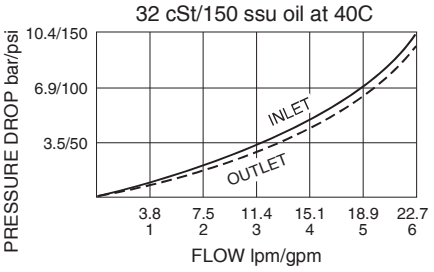
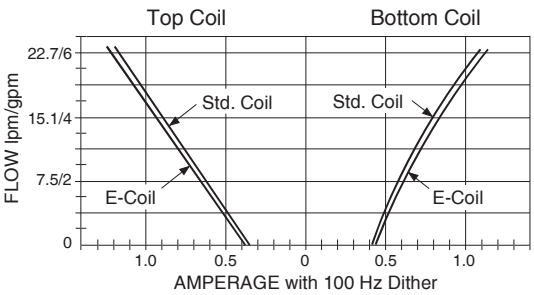


PERFORMANCE (Cartridge Only)





DESCRIPTION

A proportional solenoid-operated, 4-way, 3-position, spool-type, motor spool, screw-in hydraulic cartridge valve.

OPERATION

When de-energized, the **SP10-47D** blocks flow to 3 while allowing flow from 2 to 1, and from 4 to 1. When coil S1 is energized flow is allowed from 3 to 4 and from 2 to 1. When coil S2 is energized flow is allowed from 3 to 2 and from 4 to port 1.

Initial meter-in flow begins at a nominal 0.4 amp on a 12 VDC system. Full flow of 6 gpm occurs at 1.1 to 1.2 amp on a 12 VDC system. Each coil has its own metering characteristics, which are quite similar (see performance chart).

While port 1 may be fully pressurized, it is not intended for use as the valve's inlet.

In circuits where work port flows are unequal due to cylinder ratios, the higher return flow should be directed to port 2.

FEATURES

- Continuous-duty rated solenoids.
- Optional coil voltages and terminations
- Cartridges are voltage interchangeable.
- Optional waterproof E-Coils rated up to IP69K.
- Efficient wet-armature construction.
- Hardened precision spool and cage for long life.
- Designed for good linearity and hysteresis.
- Optional manual override.
- Industry-common cavity.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Flow: 22.7 lpm (6 gpm) max. (see performance chart)

Internal Leakage: 246 cc/minute (15 cu. in./minute) max. per side at 207 bar (3000 psi)

Hysteresis: Less than 7%

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Standard Coils and E-Coils: Continuous up to 115% of nominal voltage

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results. See page 9.020.1

Cavity: VC10-4; See page 9.110.1; **Cavity Tool:** CT10-4XX; See page 8.600.1

Seal Kit: SK10-4X-MMM; See page 8.650.1

Coil Nut: Part No. 7004400; **Manual Override Coil Nut:** Part No. 4528180

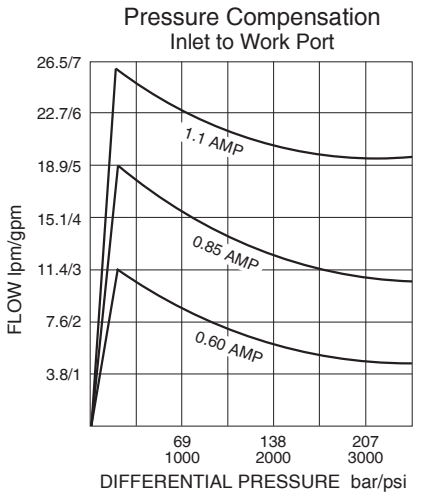
Coil Spacer: Part No. 4539700

For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut & spacer info.

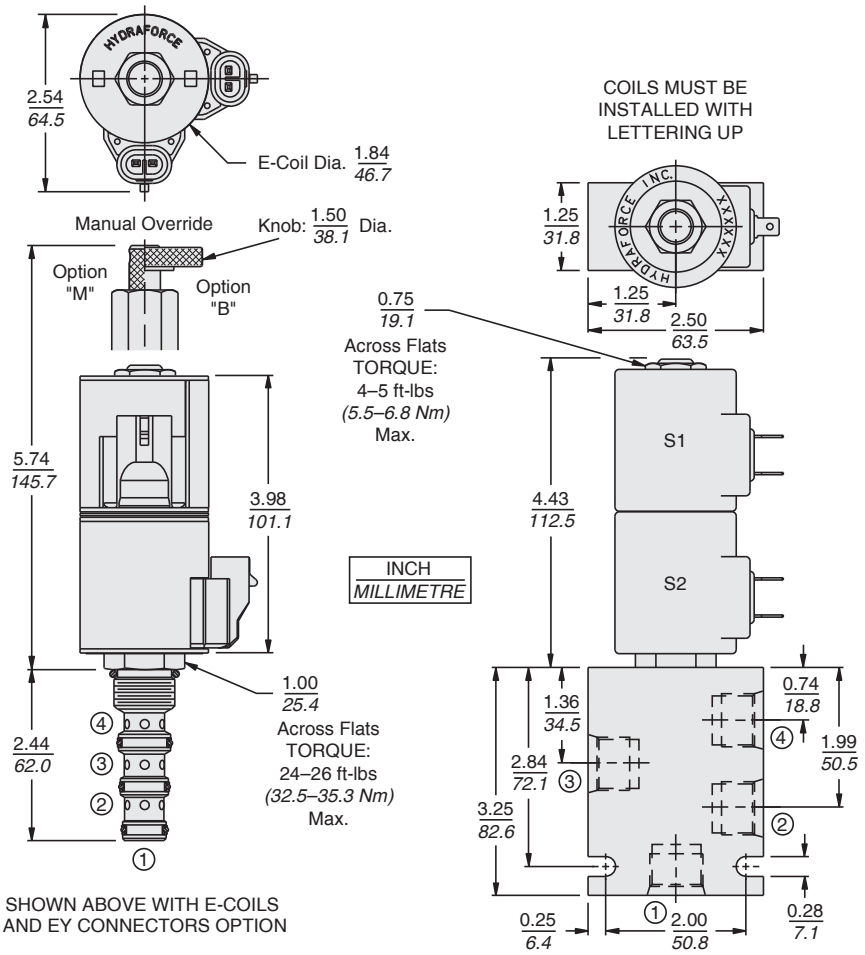
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Performance information continued on following page.

PERFORMANCE (cont'd.)



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.30 kg. (0.65 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups std.

Standard Ported Body: Weight: 0.36 kg. (0.80 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1.

Standard Coil: Weight each: 0.27 kg. (0.60 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight each: 0.41 kg. (0.9 lbs.); Perfect wound, fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors.
See page 3.400.1 for all E-Coil retrofit applications.

TO ORDER

SP10-47D__ - __ __ __ - __ - __ __ __ __ __

Option
None (Blank)
Manual Override **M**
Manual Override **B**
For Manual Override options see page 1.001.1

Porting
Cartridge Only **0**
SAE 6 **6T**
SAE 8 **8T**
1/4 in. BSP* **2B**
3/8 in. BSP* **3B**
*BSP Body; U.K. Mfr. Only

Seals
N Buna N (Std.)
V Fluorocarbon

Voltage
Std. Coil
0 Less Coil**
12 12 VDC
24 24 VDC
**Includes Std. Coil Nut

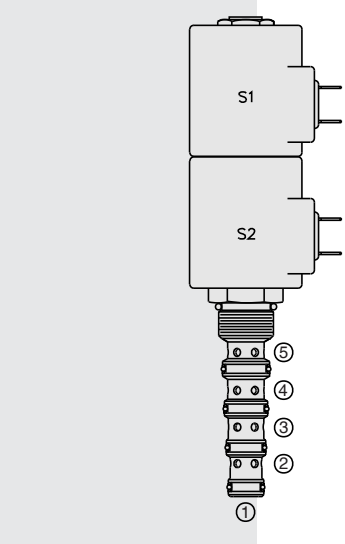
E-Coil
12 12 VDC
24 24 VDC

Termination (VDC)
Std. Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

Termination (VDC)
E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

SP10-57C Spool, 5-Way, 3-Position . . .



DESCRIPTION

A solenoid-operated, 5-way, 3-position, proportional, screw-in hydraulic cartridge valve with integral load-sense port.

OPERATION

When de-energized, the **SP10-57C** blocks flow to all ports. When coil #1 is energized, flow is allowed from 5 to 2, and from 4 to 3. When coil #2 is energized, flow is allowed from 5 to 4, and from 2 to 3. Load sense is connected to port 5 when the spool is in shifted positions.

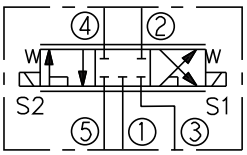
Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Continuous-duty rated solenoid.
- Hardened precision spool and cage for long life.
- Optional coil voltages and terminations
- Cartridges are voltage interchangeable.
- Optional manual override.
- Optional waterproof E-Coils rated up to IP69K.

SYMBOLS

USASI:



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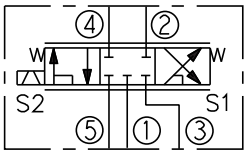


RATINGS

Operating Pressure: 250 bar (3625 psi) with standard Buna N seals

Flow: 22.7 lpm (6 gpm) max. See performance chart

Internal Leakage: 246 cc/minute (15 cu. in./minute) max. at 207 bar (3000 psi)

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Continuous from 85% to 115% of nominal voltage

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1

Cavity: VC10-5; See page 9.110.1; **Cavity Tool:** CT10-5XX; See page 8.600.1

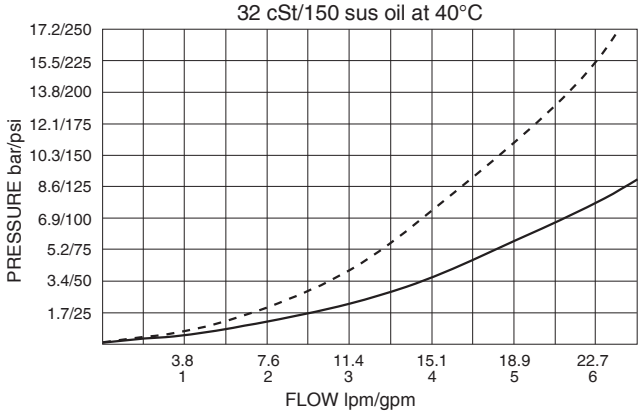
Seal Kit: SK10-5X-MMMM; See page 8.650.1

Coil Nut: Part No. 7004400; **Coil Spacer** for E-coils: Part No. 4539700

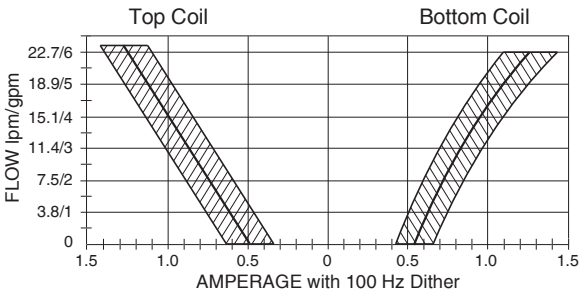
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

PERFORMANCE (Cartridge Only)

5 to 2 or 5 to 4 at 100% current, S1 or S2 energized: - - - - - - -
4 to 3 or 2 to 3 at 100% current, S1 or S2 energized: ————
32 cSt/150 sus oil at 40°C

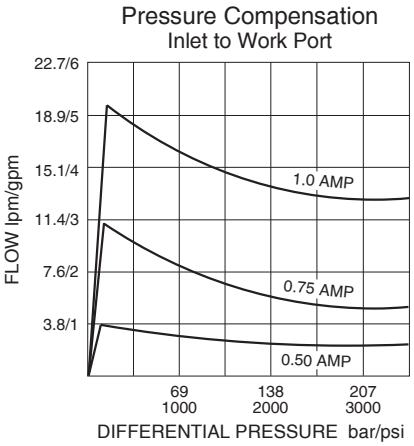


Performance with 12 VDC Coils
and 10.3 bar/150 psi inline compensator
(for other voltages consult factory)

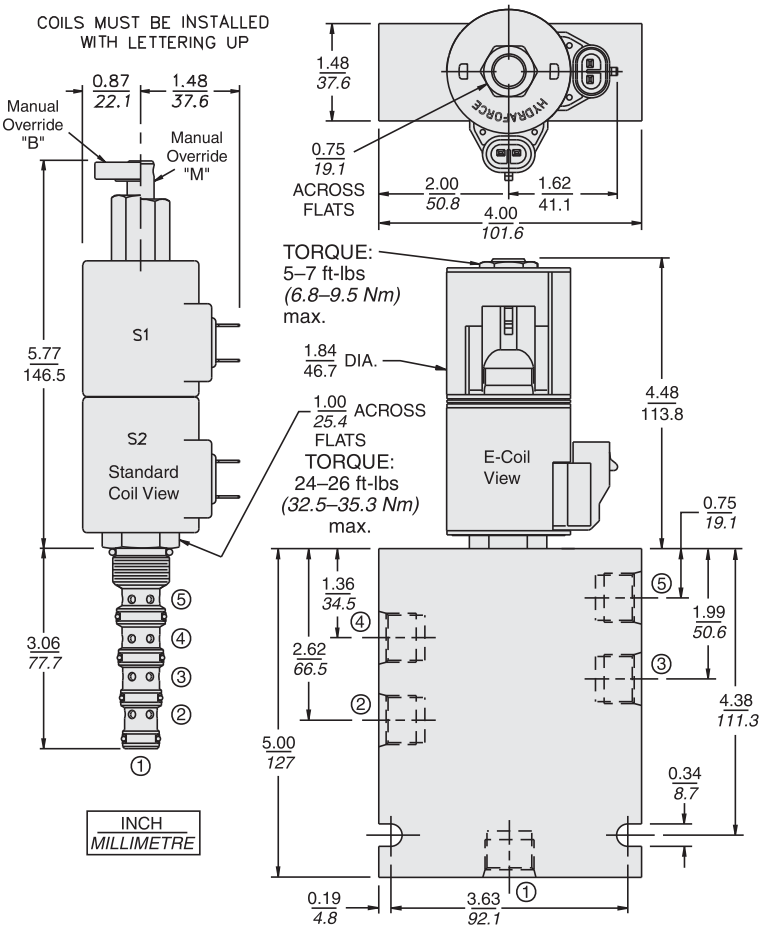


Performance information continued on following page.

PERFORMANCE (Continued)



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.36 kg. (0.80 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces; Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.41 kg. (0.85 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi); Ductile iron bodies available; dimensions may differ. See page 8.010.1.

Standard Coil: Weight each: 0.27 kg. (0.60 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight each: 0.41 kg. (0.9 lbs.); Perfect wound, fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors. **See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SP10-57C__ - __ __ __ - __ - __ __ __ __ __

Option

None	(Blank)
Manual Override	**B**
Manual Override	**M**

For Manual Override options see page 1.001.1

Porting

Cartridge Only	**0**
SAE 6	**6T**
SAE 8	**8T**

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**
Polyurethane	**P**

Voltage Std. Coil

0	Less Coil**
10	10 VDC†
12	12 VDC
20	20 VDC
24	24 VDC

**Includes Std. Coil Nut

† DS, DW or DL terminations only.

E-Coil

10	10 VDC
12	12 VDC
20	20 VDC
24	24 VDC

Termination (VDC) Std. Coil

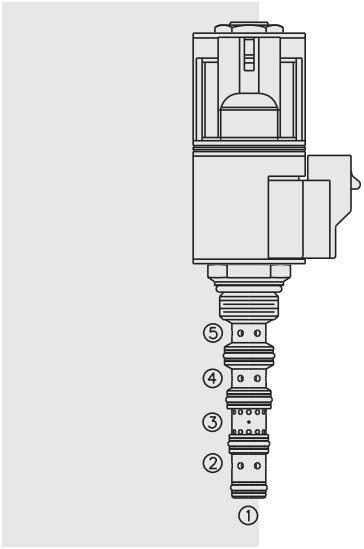
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC) E-Coil

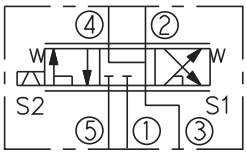
ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

SP08-57D Spool, 5-Way, 3-Position . . .



SYMBOL



DESCRIPTION

A solenoid-operated, five-way, three-position, proportional, screw-in hydraulic cartridge valve with integral load-sense port.

OPERATION

When de-energized, the **SP08-57D** blocks flow at 5 while allowing flow from both 2 and 4 to 3. When coil #1 is energized, flow is allowed from 5 to 2, and from 4 to 3. When coil #2 is energized, flow is allowed from 5 to 2, and from 4 to 3. Load sense is connected to port 5 when the spool is in shifted positions.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Continuous-duty rated solenoid.
- Hardened precision spool and cage for long life.
- Optional coil voltages and terminations
- Cartridges are voltage interchangeable.
- Compact size; Manual override options.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Operating Pressure: 241 bar (3500 psi) with standard Buna N seals

Flow: 9.5 lpm (2.5 gpm); see performance charts

Internal Leakage: 164 cc/minute (10 cu. in./minute) max. at 207 bar (3000 psi)

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Continuous from 85% to 115% of nominal voltage

Initial Coil Current Draw at 20° C: Standard Coil: 1.2 amps at 12 VDC; 0.13 amps at 115 VAC (full wave rectified).
E-Coil: 1.4 amps at 12 VDC; 0.7 amps at 24 VDC

Minimum Pull-in Voltage: 85% of nominal at 207 bar (3000 psi)

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1

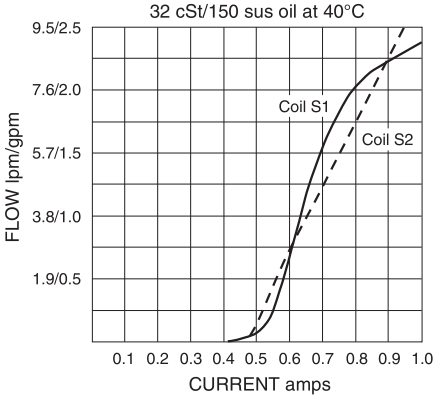
Cavity: VC08-5; See page 9.108.1; **Cavity Tool:** CT08-5XX; See page 8.600.1

Seal Kit: SK08-5X-MMM; See page 8.650.1

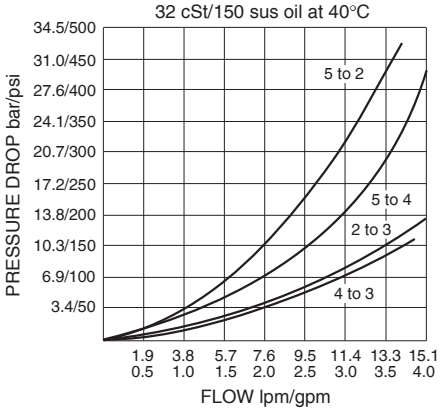
Coil Nut: Part No. 7004400; **Coil Spacer:** Part No. 4534720

PERFORMANCE (Cartridge Only)

Flow vs. Current
Typical Performance
32 cSt/150 sus oil at 40°C



Differential Pressure vs. Flow
at I-Max. with No Load; Port 5 to 3
32 cSt/150 sus oil at 40°C

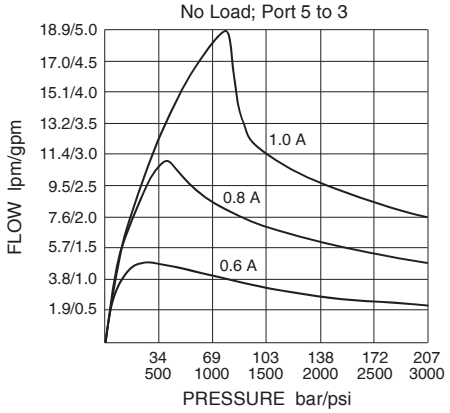


Performance information continued on following page.

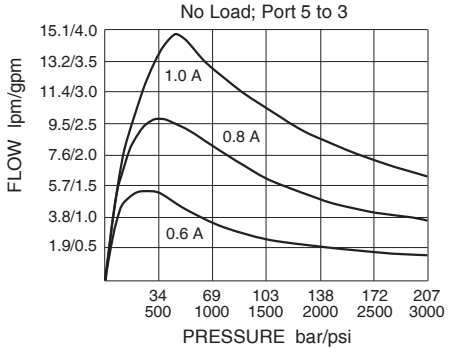
for Load Sense Applications — SP08-57D

PERFORMANCE (Continued)

Pressure Response; Coil S1
No Load; Port 5 to 3

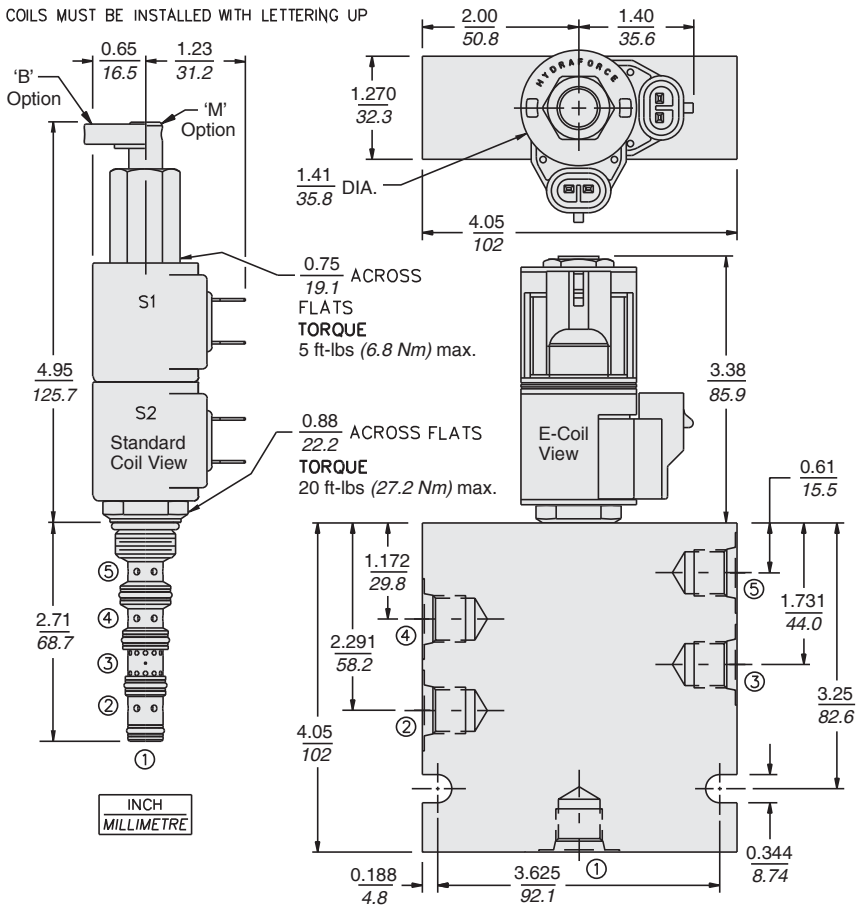


Pressure Response; Coil S2
No Load; Port 5 to 3



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.15 kg. (0.34 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces; Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.41 kg. (0.85 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi); Ductile iron bodies available; dimensions may differ. See page 8.008.1.

Standard Coil: Weight each: 0.11 kg. (0.25 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight: 0.14 kg. (0.3 lbs.); Perfect wound, fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors. **See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SV08-57D__ - __ __ __ - __ - __ __ __ __ __

Option
None (Blank)
Manual Override **B**
Manual Override **M**
For Manual Override options see page 1.001.1

Flow varies with manual override options; consult factory for details.

Porting
Cartridge Only **0**
SAE 4 **4T**
SAE 6 **6T**

Seals
Buna N (Std.) **N**
Fluorocarbon **V**
Polyurethane **P**

Voltage Std. Coil
0 Less Coil**
10 10 VDC†
12 12 VDC
20 20 VDC
24 24 VDC

**Includes Std. Coil Nut

† DS, DW or DL terminations only.

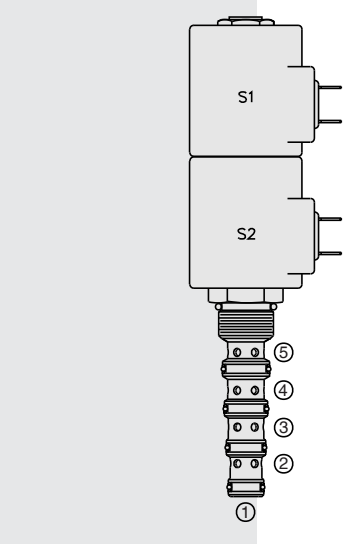
E-Coil
10 10 VDC
12 12 VDC
20 20 VDC
24 24 VDC

Termination (VDC) Std. Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

Termination (VDC) E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

SP10-57D Spool, 5-Way, 3-Position . . .



DESCRIPTION

A solenoid-operated, five-way, three-position, proportional, screw-in hydraulic cartridge valve with integral load-sense port.

OPERATION

When de-energized, the **SP10-57D** blocks flow at 5 while allowing flow from both 2 and 4 to 3. When coil #1 is energized, flow is allowed from 5 to 2, and from 4 to 3. When coil #2 is energized, flow is allowed from 5 to 4, and from 2 to 3. Load sense is connected to port 5 when the spool is in shifted positions.

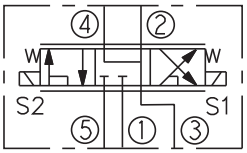
Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Continuous-duty rated solenoid.
- Hardened precision spool and cage for long life.
- Optional coil voltages and terminations
- Cartridges are voltage interchangeable.
- Optional manual override.
- Optional waterproof E-Coils rated up to IP69K.

SYMBOLS

USASI:



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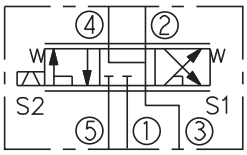


RATINGS

Operating Pressure: 250 bar (3625 psi) with standard Buna N seals

Flow: 22.8 lpm (6 gpm) max. See performance chart

Internal Leakage: 246 cc/minute (15 cu. in./minute) max. at 207 bar (3000 psi)

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Continuous from 85% to 115% of nominal voltage

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1

Cavity: VC10-5; See page 9.110.1; **Cavity Tool:** CT10-5XX; See page 8.600.1

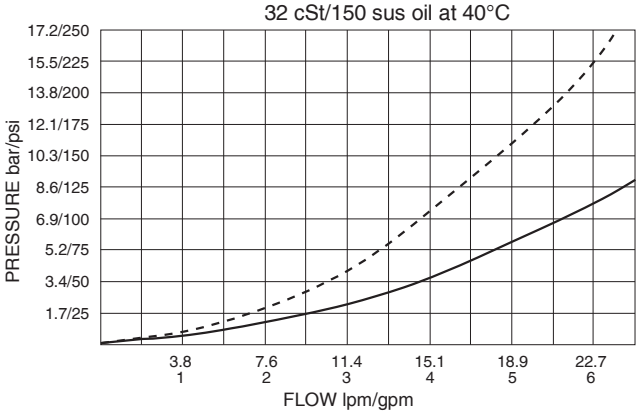
Seal Kit: SK10-5X-MMMM; See page 8.650.1

Coil Nut: Part No. 7004400; **Coil Spacer** for E-Coils: Part No. 4539700

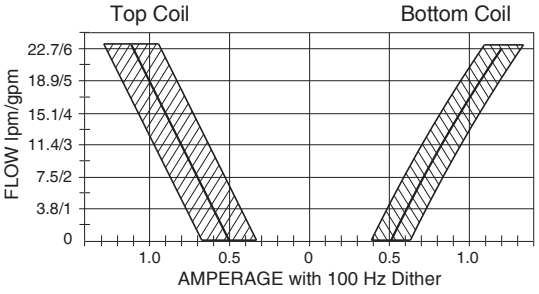
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

PERFORMANCE (Cartridge Only)

5 to 2 or 5 to 4 at 100% current, S1 or S2 energized: - - - - - - -
4 to 3 or 2 to 3 at 100% current, S1 or S2 energized: ———
32 cSt/150 sus oil at 40°C

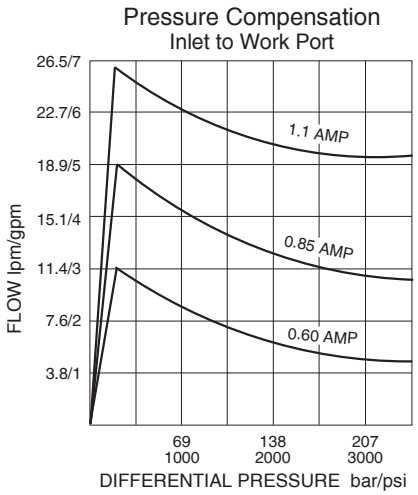


Performance with 12 VDC Coils
and 10.3 bar/150 psi inline compensator
(for other voltages consult factory)

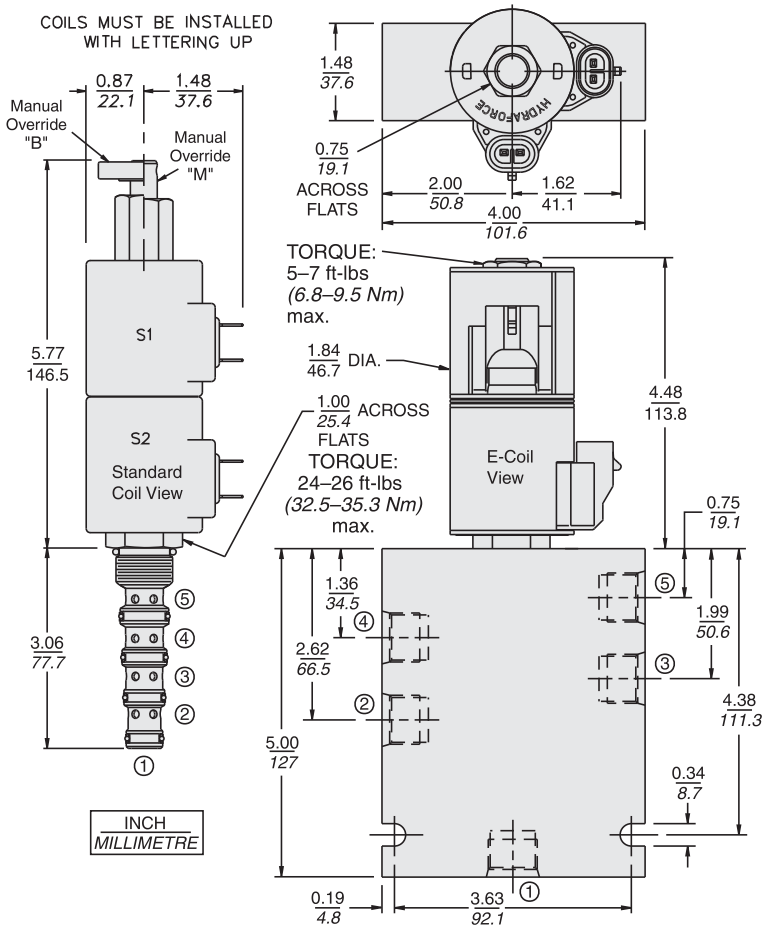


Performance information continued on following page.

PERFORMANCE (Continued)



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.36 kg. (0.80 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces; Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.41 kg. (0.85 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi); Ductile iron bodies available; dimensions may differ. See page 8.010.1.

Standard Coil: Weight each: 0.27 kg. (0.60 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight each: 0.41 kg. (0.9 lbs.); Perfect wound, fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors. **See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SV10-57D__ - ___ ___ ___ - ___ - ___ ___ ___ ___ ___

Option

None	(Blank)
Manual Override	**B**
Manual Override	**M**

For Manual Override options see page 1.001.1

Porting

Cartridge Only	**0**
SAE 6	**6T**
SAE 8	**8T**

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**

Voltage Std. Coil

0	Less Coil**
10	10 VDC†
12	12 VDC
20	20 VDC
24	24 VDC

**Includes Std. Coil Nut

† DS, DW or DL terminations only.

E-Coil

10	10 VDC
12	12 VDC
20	20 VDC
24	24 VDC

Termination (VDC) Std. Coil

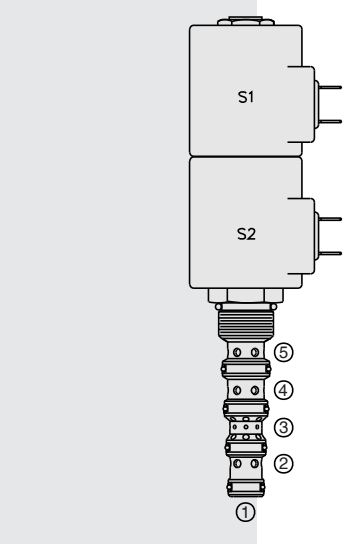
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC) E-Coil

ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

SP10-58C Spool, 5-Way, 3-Position . . .



DESCRIPTION

A solenoid-operated, 5-way, 3-position, proportional, screw-in hydraulic cartridge valve with integral brake release port.

OPERATION

When de-energized, the **SP10-58C** allows flow between 3 and 1. When coil #1 is energized, flow is allowed from 5 to 2, and from 4 to 3. When coil #2 is energized, flow is allowed from 5 to 4, and from 2 to 3. Load sense is connected to port 5 when the spool is in shifted positions.

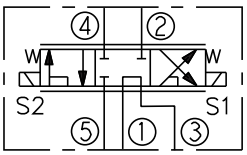
Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Continuous-duty rated solenoid.
- Hardened precision spool and cage for long life.
- Optional coil voltages and terminations
- Cartridges are voltage interchangeable.
- Optional manual override.
- Optional waterproof E-Coils rated up to IP69K.

SYMBOLS

USASI:



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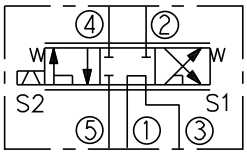


RATINGS

Operating Pressure: 250 bar (3625 psi) with standard Buna N seals

Flow: 22.7 lpm (6 gpm) max. See performance chart

Internal Leakage: 246 cc/minute (15 cu. in./minute) max. at 207 bar (3000 psi)

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Continuous from 85% to 115% of nominal voltage

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1

Cavity: VC10-5; See page 9.110.1; **Cavity Tool:** CT10-5XX; See page 8.600.1

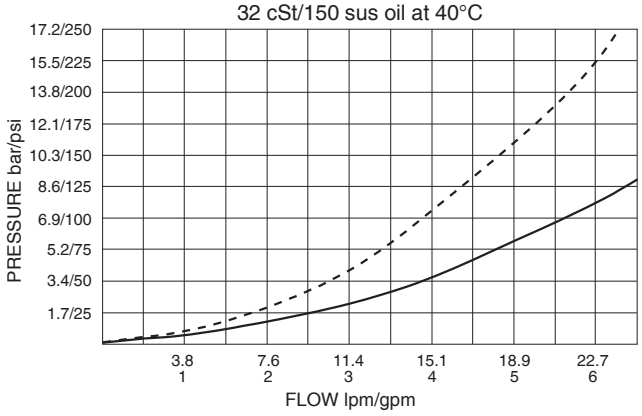
Seal Kit: SK10-5X-MMMM; See page 8.650.1

Coil Nut: Part No. 7004400; **Coil Spacer** for E-coils: Part No. 4539700

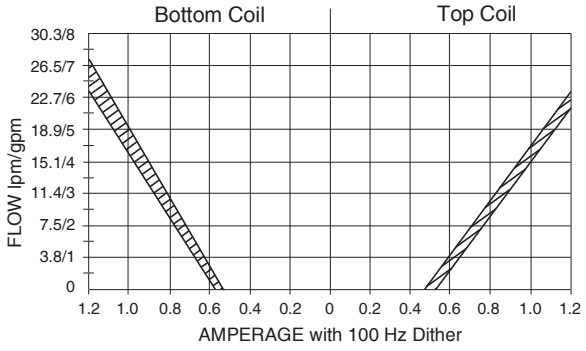
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

PERFORMANCE (Cartridge Only)

5 to 2 or 5 to 4 at 100% current, S1 or S2 energized: - - - - - - -
4 to 3 or 2 to 3 at 100% current, S1 or S2 energized: ————
32 cSt/150 sus oil at 40°C



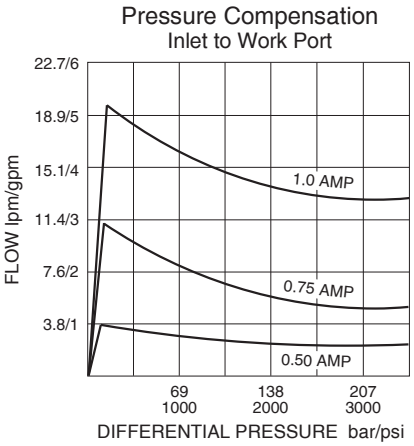
Performance with 12 VDC Coils
and 10.3 bar/150 psi inline compensator
(for other voltages consult factory)



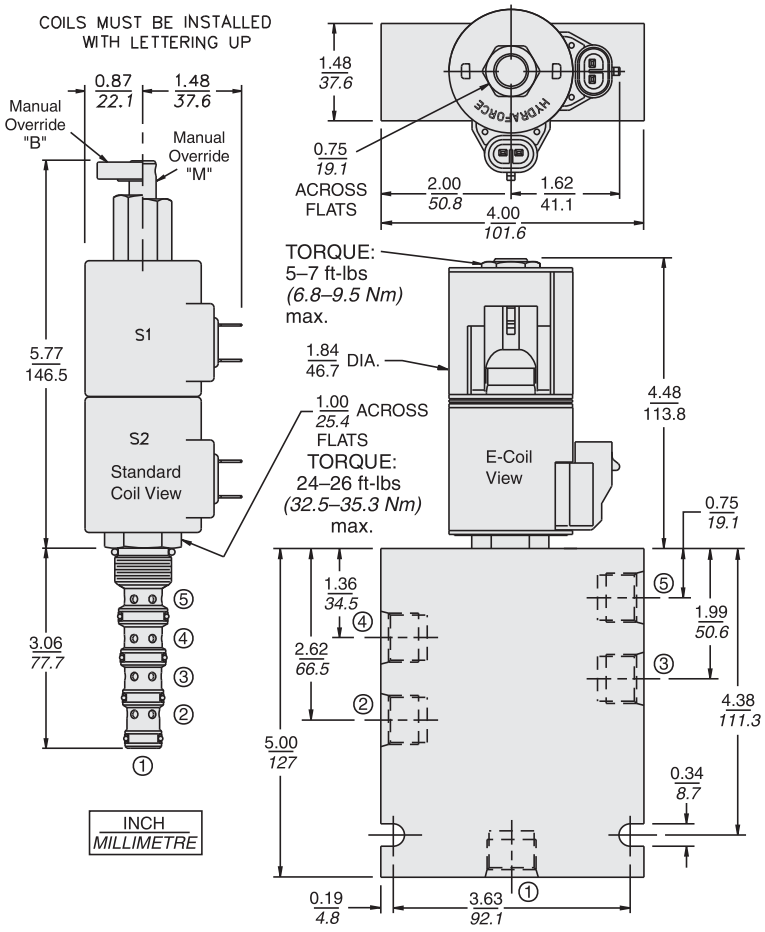
Performance information continued on following page.

for Brake Release Applications SP10-58C

PERFORMANCE (Continued)



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.36 kg. (0.80 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces; Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.41 kg. (0.85 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi); Ductile iron bodies available; dimensions may differ. See page 8.010.1.

Standard Coil: Weight each: 0.27 kg. (0.60 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight each: 0.41 kg. (0.9 lbs.); Perfect wound, fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors. **See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SP10-58C__ - ____ - __ - ____

Option

None	(Blank)
Manual Override	**B**
Manual Override	**M**

For Manual Override options see page 1.001.1

Porting

Cartridge Only	**0**
SAE 6	**6T**
SAE 8	**8T**

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**
Polyurethane	**P**

Voltage Std. Coil

0	Less Coil**
10	10 VDC†
12	12 VDC
20	20 VDC
24	24 VDC

**Includes Std. Coil Nut

† DS, DW or DL terminations only.

E-Coil

10	10 VDC
12	12 VDC
20	20 VDC
24	24 VDC

Termination (VDC) Std. Coil

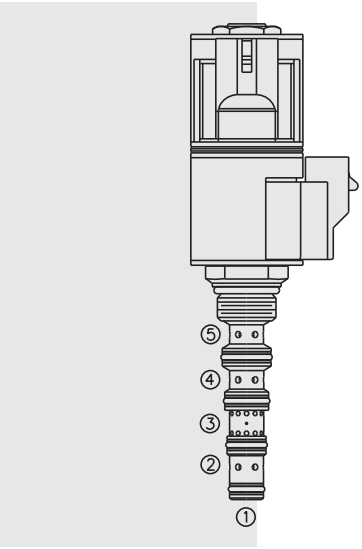
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC) E-Coil

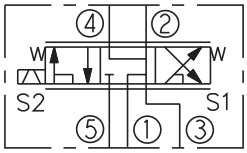
ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

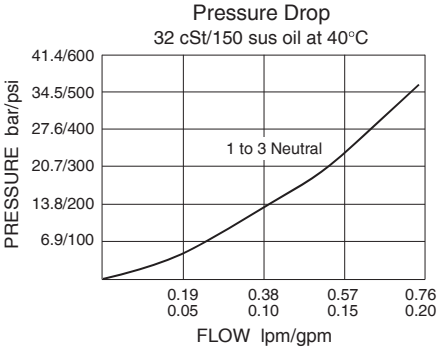
SP08-58D Spool, 5-Way, 3-Position . . .

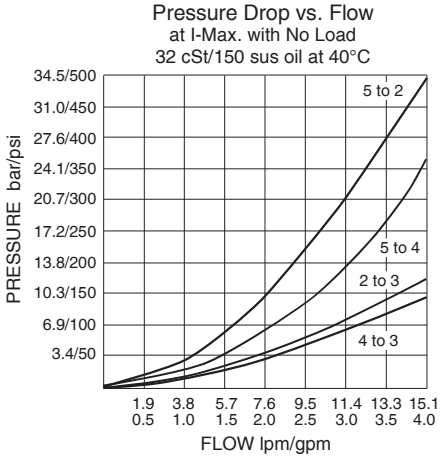


SYMBOL



PERFORMANCE (Cartridge Only)





DESCRIPTION

A solenoid-operated, 5-way, 3-position, proportional, screw-in, motor-spool-type hydraulic cartridge valve with integral load sense port.

OPERATION

When de-energized, the **SP08-58D** allows flow between 4, 3, 2, and 1. When coil #1 is energized, flow is allowed from 5 to 2, and from 4 to 3. When coil #2 is energized, flow is allowed from 5 to 4, and from 2 to 3. Load sense is connected to port 5 when the spool is in shifted positions.

Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

- Continuous-duty rated solenoid.
- Hardened precision spool and cage for long life.
- Optional coil voltages and terminations.
- Optional waterproof E-Coils rated up to IP69K.
- Compact size; Manual override options.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Unitized, molded coil design.

RATINGS

Operating Pressure: 241 bar (3500 psi)

Proof Pressure: 345 bar (5000 psi)

Flow: 15.1 lpm (4.0 gpm) maximum; see performance charts

Internal Leakage: 246 cc/minute (15 cu. in./minute) max. at 207 bar (3000 psi)

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Continuous from 85% to 115% of nominal voltage

Initial Coil Current Draw at 20° C: Standard Coil: 1.2 amps at 12 VDC; 0.13 amps at 115 VAC (full wave rectified). E-Coil: 1.4 amps at 12 VDC; 0.7 amps at 24 VDC

Minimum Pull-in Voltage: 85% of nominal at 207 bar (3000 psi)

Filtration: See page 9.010.1

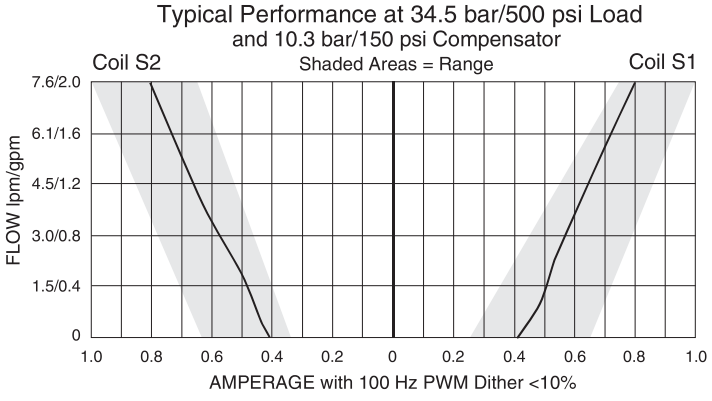
Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1

Cavity: VC08-5; See page 9.108.1; **Cavity Tool:** CT08-5XX; See page 8.600.1

Seal Kit: SK08-5X-MMM; See page 8.650.1

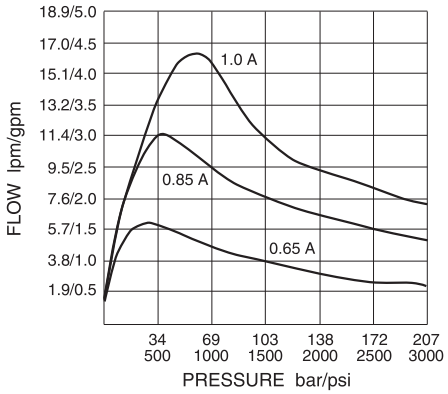
Coil Nut: Part No. 7004400; **Coil Spacer:** Part No. 4534720



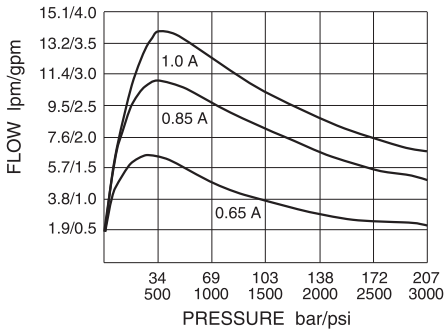
Performance info. continued on following page.

PERFORMANCE (Continued)

Pressure Response; Coil S1
No Load

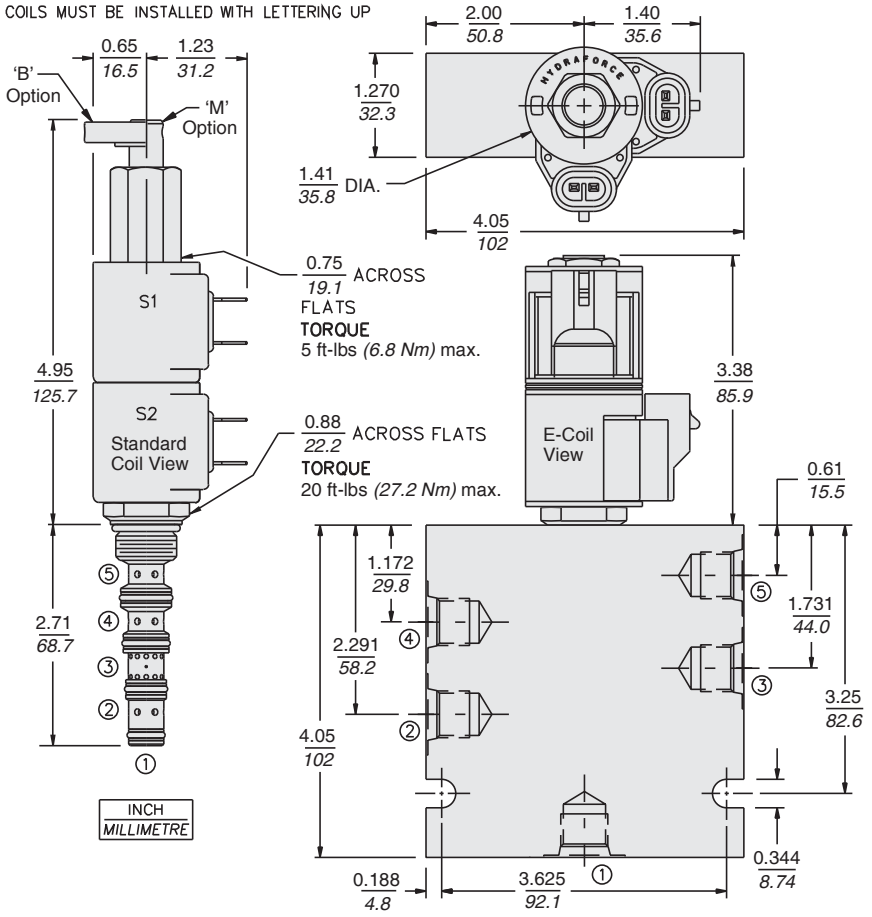


Pressure Response; Coil S2
No Load



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.15 kg. (0.34 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces; Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.41 kg. (0.85 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi); Ductile iron bodies available; dimensions may differ. See page 8.008.1.

Standard Coil: Weight each: 0.11 kg. (0.25 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight: 0.14 kg. (0.3 lbs.); Perfect wound, fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors.
See page 3.400.1 for all E-Coil retrofit applications.

TO ORDER

SP08-58D__ - __ __ __ - __ - __ __ __ __ __

Option
None (Blank)
Manual Override **B**
Manual Override **M**
For Manual Override options see page 1.001.1
Flow varies with manual override options; consult factory for details.

Porting
Cartridge Only **0**
SAE 4 **4T**
SAE 6 **6T**

Seals
Buna N (Std.) **N**
Fluorocarbon **V**
Polyurethane **P**

Voltage Std. Coil
0 Less Coil**
10 10 VDC†
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
24 24 VAC
115 115 VAC
230 230 VAC
**Includes Std. Coil Nut
† DS, DW or DL terminations only.

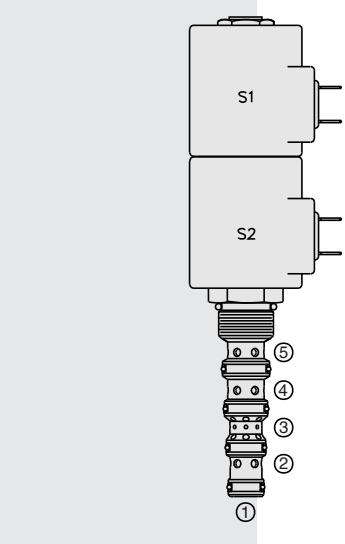
E-Coil
10 10 VDC
12 12 VDC
20 20 VDC
24 24 VDC

Termination (VDC) Std. Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

Termination (VAC) Std. Coil
AG DIN 43650
AP 1/2 in. Conduit

Termination (VDC) E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)
Coils with internal diode are available. Consult factory.

SP10-58D Spool, 5-Way, 3-Position . . .



DESCRIPTION

A solenoid-operated, 5-way, 3-position, proportional, screw-in hydraulic cartridge valve with integral brake release port.

OPERATION

When de-energized, the **SP10-58D** allows flow between 4, 3, 2, and 1. When coil #1 is energized, flow is allowed from 5 to 2, and from 4 to 3. When coil #2 is energized, flow is allowed from 5 to 4, and from 2 to 3. Load sense is connected to port 5 when the spool is in shifted positions.

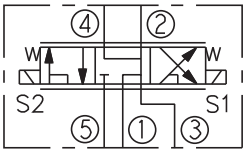
Note: If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. See "SP Valves and Coil Operating Parameters," page 2.002.1.

FEATURES

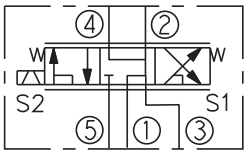
- Continuous-duty rated solenoid.
- Hardened precision spool and cage for long life.
- Optional coil voltages and terminations
- Cartridges are voltage interchangeable.
- Optional manual override.
- Optional waterproof E-Coils rated up to IP69K.

SYMBOLS

USASI:



ISO:



RATINGS

Operating Pressure: 250 bar (3625 psi) with standard Buna N seals

Flow: 22.8 lpm (6 gpm) max. See performance chart

Internal Leakage: 246 cc/minute (15 cu. in./minute) max. at 207 bar (3000 psi)

Temperature: -40 to 120°C with standard Buna seals

Coil Duty Rating: Continuous from 85% to 115% of nominal voltage

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1

Cavity: VC10-5; See page 9.110.1; **Cavity Tool:** CT10-5XX; See page 8.600.1

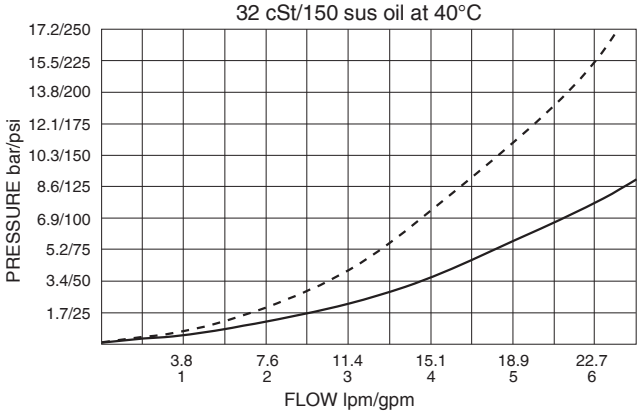
Seal Kit: SK10-5X-MMMM; See page 8.650.1

Coil Nut: Part No. 7004400; **Coil Spacer** for E-coils: Part No. 4539700

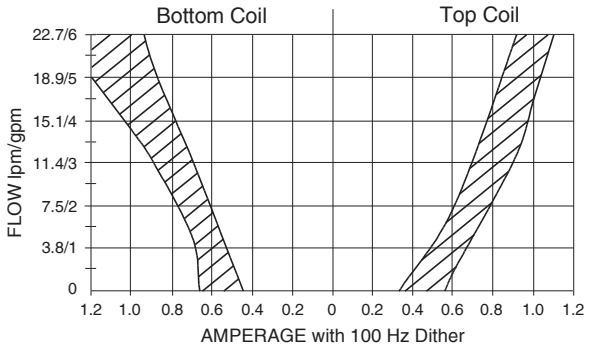
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

PERFORMANCE (Cartridge Only)

5 to 2 or 5 to 4 at 100% current, S1 or S2 energized: - - - - - - -
4 to 3 or 2 to 3 at 100% current, S1 or S2 energized: ————
32 cSt/150 sus oil at 40°C

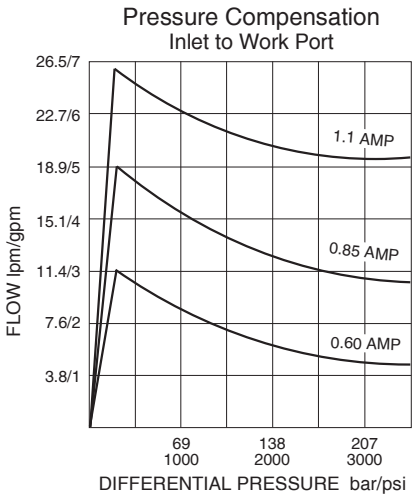


Performance with 12 VDC Coils
and 10.3 bar/150 psi inline compensator
(for other voltages consult factory)

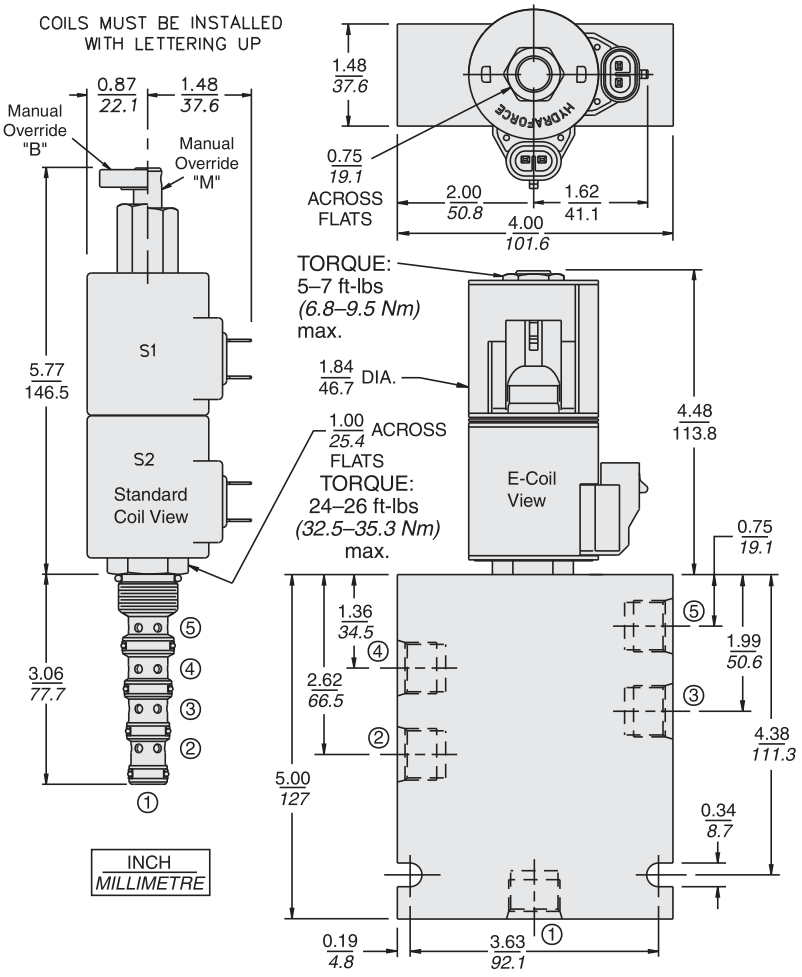


Performance information continued on following page.

PERFORMANCE (Continued)



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.36 kg. (0.80 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces; Buna N O-rings and back-ups standard.

Standard Ported Body: Weight: 0.41 kg. (0.85 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi); Ductile iron bodies available; dimensions may differ. See page 8.010.1.

Standard Coil: Weight each: 0.27 kg. (0.60 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight each: 0.41 kg. (0.9 lbs.); Perfect wound, fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors. **See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

SP10-58D__ - __ __ __ - __ - __ __ __ __ __

Option

None	(Blank)
Manual Override	**B**
Manual Override	**M**

For Manual Override options see page 1.001.1

Porting

Cartridge Only	**0**
SAE 6	**6T**
SAE 8	**8T**

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**

Voltage Std. Coil

0	Less Coil**
10	10 VDC†
12	12 VDC
20	20 VDC
24	24 VDC

**Includes Std. Coil Nut

† DS, DW or DL terminations only.

E-Coil

10	10 VDC
12	12 VDC
20	20 VDC
24	24 VDC

Termination (VDC) Std. Coil

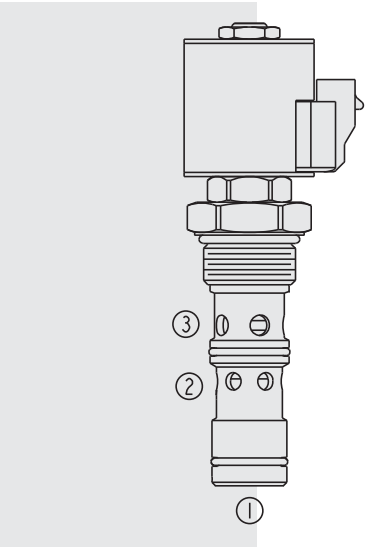
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination (VDC) E-Coil

ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

HSPEC16-30 Proportional Flow Control Valve



DESCRIPTION

A high pressure, proportional, solenoid-operated, 3-way, normally-closed, flow control, screw-in hydraulic cartridge valve intended for post-compensated applications with load-sense systems. In post-compensated systems, the load-sense port 1 of the **HSPEC16-30** valve is connected to the highest load, which maintains flow sharing when flow demand exceeds flow supply. Pressure compensation value of the valve defined as pressure difference between inlet and load sense ports is provided by appropriate setup of a pump load sense control or by additional pressure compensator valve, one for the whole system, in case the pump is non-adjustable.

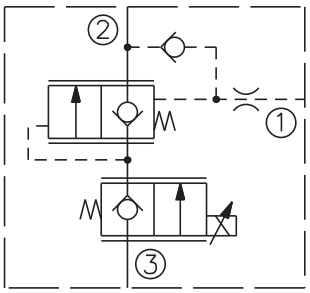
OPERATION

When de-energized, the **HSPEC16-30** blocks flow from port 3 to port 2. The valve will regulate flow out of port 2 regardless of load pressure with flow rate proportional to current applied to the solenoid.

FEATURES

- Industry-common cavity.
- Continuous-duty rated coils.
- Reduced manifold space claim.
- Efficient wet-armature construction.
- Optional waterproof E-Coils rated up to IP69K.
- Flow sharing possible
- All HyPerformance™ valves are tested to the rigorous standards of NFPA specification T2.6.1 and are tested at a verfication level of 90% and an assurance of 99%.

ISO SYMBOL



RATINGS

Operating Pressure: 350 bar (5075 psi); 10% cycle life; 420 bar (6090 psi)
Note: All HyPerformance™ products are tested for 900K cycles at 350 bar and 100K at 420 bar.

Flow Rating: 132 lpm (35 gpm) at 220 psi (15 bar) compensation value; 102 lpm (27 gpm) at 160 psi (11 bar) compensation value.

Internal Leakage: Port 3 to port 2 or port 1 to port 2: 7 drops/minute with 350 bar (5075 psi) at port 3.

Operating Temperature: -54° to 107°C (-65° to 225° F) with urethane seals

Installation: No restrictions; See page 9.020.1;

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

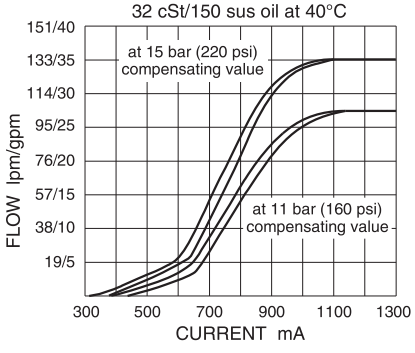
Cavity: HVC16-3SPEC; See page 9.116.1

Cavity Tool: HCT16-3SPEC; See page 8.600.1

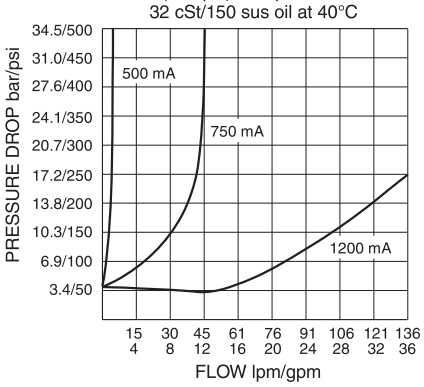
Seal Kit: HSK16-3U-0; See page 8.650.1

PERFORMANCE (Cartridge Only)

Flow vs. Current
12V Coil, 100 Hz PWM
310 bar (4500 psi) Load at Port 2
32 cSt/150 sus oil at 40°C



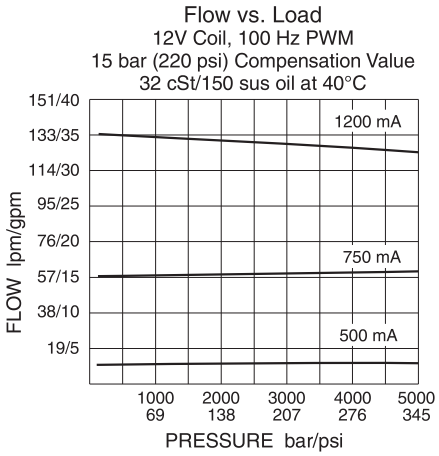
Pressure Drop vs. Flow
Port 3 to 2, 12V Coil, 100 Hz PWM
15 bar (220 psi) Compensation Value
32 cSt/150 sus oil at 40°C



Performance info. continued on next page.

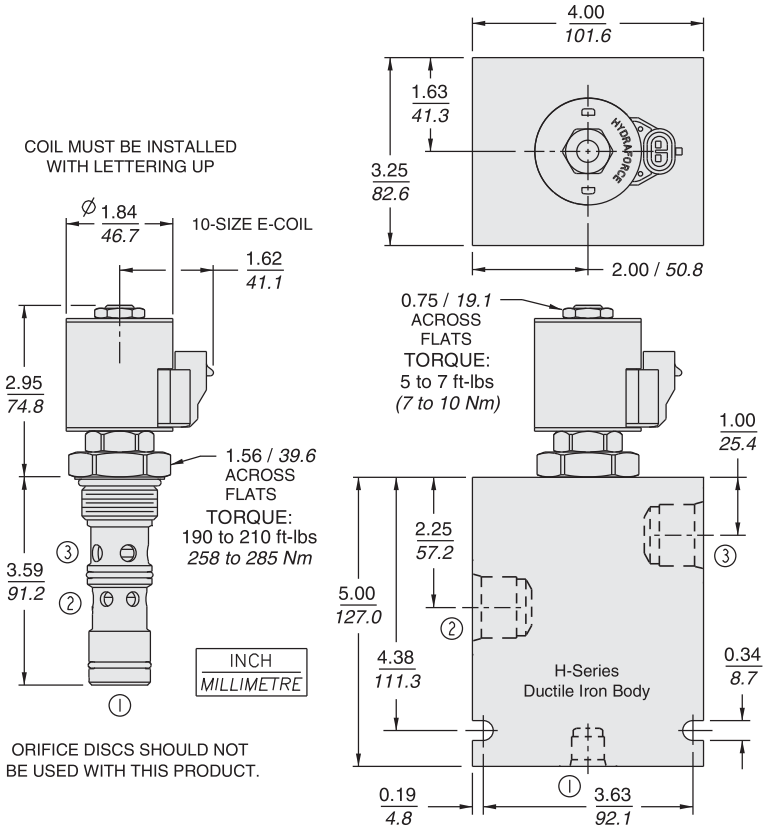
with Integral Compensator HSPEC16-30

PERFORMANCE (Continued)



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.53 kg. (1.17 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. PPDI urethane seals without back-up rings standard.

E-Coil: Weight: 0.41 kg. (0.9 lbs.); Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

HSPEC16-30 - ___ ___ ___ - ___ - ___ ___ ___ ___ ___

Porting
Cartridge Only **0**

Voltage
0 Less Coil**
12 12 VDC
24 24 VDC

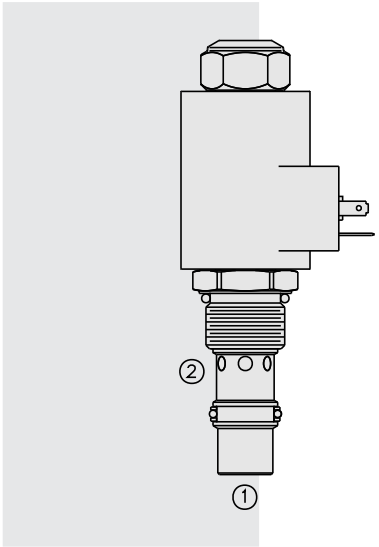
Seals
PPDI urethane **U**

NOTE: *Consult factory for additional seal options.*

Coil Termination	E-Coil
Deutsch DT04-2P	**ER** (IP69K)
Metri-Pack® 150	**EY** (IP69K)
Dual Lead Wires	**EL** (IP69K)
Amp Jr. Timer	**EJ** (IP67)
DIN 43650	**EG** (IP65)
Dual Spades	—

For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models. See coil option info. on pages 3.200.1 & 3.400.1

PV72-20 Proportional Flow Control Cartridge,



DESCRIPTION

A solenoid-operated, electrically-variable, two-port, pressure-compensated, spool-type, normally closed when de-energized, proportional flow control valve.

OPERATION

The **PV72-20** will regulate flow out of port 2 regardless of system working pressure. With an increasing current applied to the solenoid, the PV72-20 will increase output flow.

Operation of Manual Override:

To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

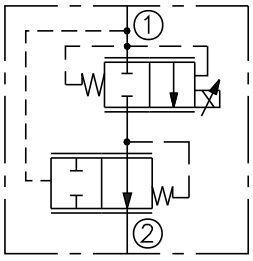
To Disengage: Turn counterclockwise approximately 6 turns until positive stop is found.

FEATURES

- Excellent linearity and hysteresis characteristics.
- Hardened spool and cage for long life.
- Efficient wet armature contsruction.
- Optional coil voltages and terminations.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Manual override option.

SYMBOLS

USASI/ISO:



RATINGS

Operating Pressure: Port 1: 240 bar (3500 psi); Port 2: 207 bar (3000 psi)

Regulated Flow Rate: 0 to 64 lpm (0 to 17 gpm)

Internal Leakage: .38 lpm (0.1 gpm) fully closed at 207 bar (3000 psi)

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	150 ± 100 mA	1500 ± 100 mA
24 VDC	75 ± 50 mA	750 ± 50 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

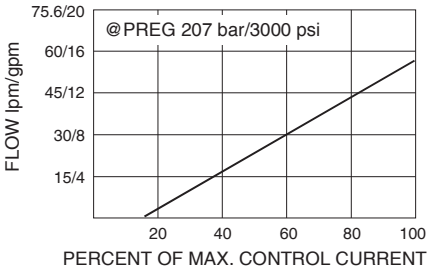
Cavity: VC12-2 Cavity Variation “B”; See page 9.112.1

Cavity Tool: CT12-2X-XX; See page 8.600.1

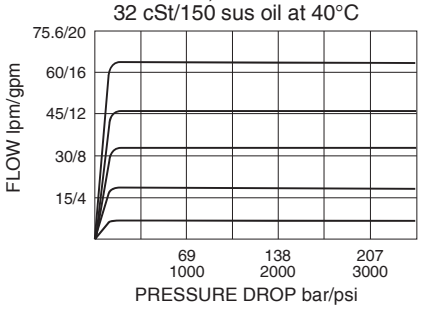
Seal Kit: SK12-2X-M; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

PERFORMANCE

Flow vs. Current
Input Pressure: 240 bar/3500 psi
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C

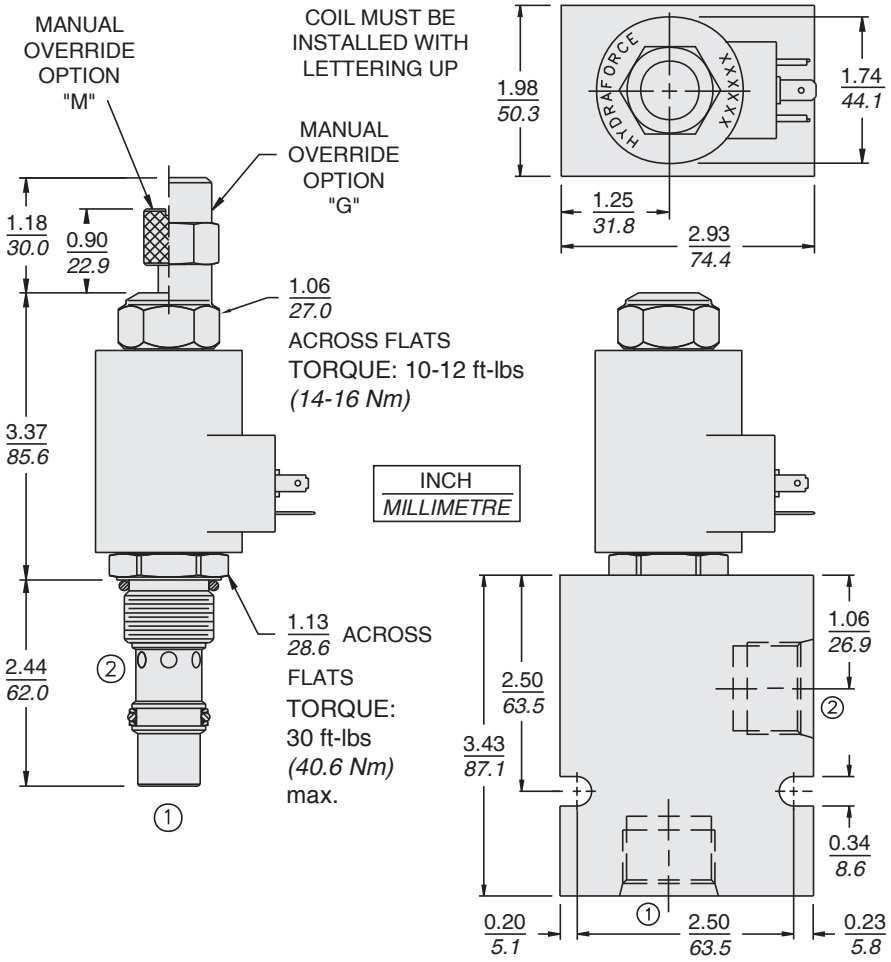


Regulated Flow vs. Pressure Drop
Input Pressure: 240 bar/3500 psi
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.32 kg. (0.7 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.59 kg. (1.3 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.012.1.

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

PV72-20 __ - ____ - __ - ____

Option(s)
- None (Blank)
- Manual Override **M**
- Manual Override with Guard **G**

Porting
- Cartridge Only **0**
- SAE 10 **10T**
- SAE 12 **12T**

Seals
- Buna N (Std.) **N**
- Fluorocarbon **V**

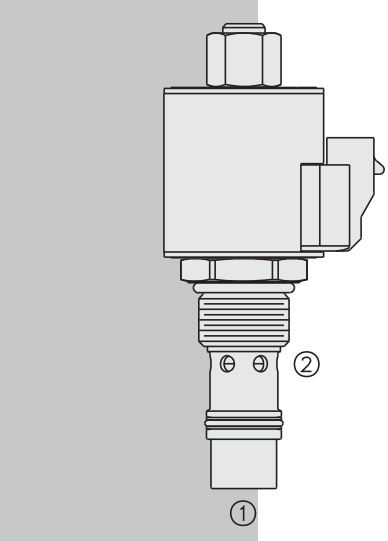
Voltage
- **0** Less Coil
- **12** 12 VDC
- **24** 24 VDC

Terminations D-Coil
- **DS** Dual Spades
- **DG** DIN 43650
- **DL** Leadwires (2)
- **DL/W** Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
- **ER** Deutsch DT04-2P
- **EY** Metri-Pack® 150

Coils with internal diode are available. Consult factory.

HPV12-20 HyPerformance™ Proportional Flow



DESCRIPTION

A solenoid-operated, electrically-variable, two-port, pressure-compensated, spool-type, normally closed when de-energized, proportional flow control valve for high pressure applications up to 350 bar (5075 psi).

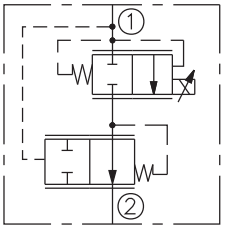
OPERATION

With inlet at port 1, the **HPV12-20** will regulate flow out of port 2 regardless of system working pressure with flow rate proportional to current applied to the solenoid.

FEATURES

- Continuous-duty rated solenoid with optional coil voltages and terminations.
- Hardened spool and cage for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Unitized, molded, waterproof E-Coils rated up to IP69K.
- 1000-hour salt-spray rated solenoid tubes and coils.
- All HyPerformance™ products are tested to the rigorous standards of the NFPA specification T2.6.1.
- All HyPerformance™ valves are tested at a verification level of 90% and an assurance of 99%.

ISO SYMBOL



RATINGS

Operating Pressure: 350 bar (5075 psi); 10% cycle life: 420 bar (6090 psi)
Note: All HyPerformance™ products are tested for 900K cycles at 350 bar and 100K cycles at 420 bar.

Burst Pressure: 1241 bar (18,000 psi)

Regulated Flow Rate: 0 to 68 lpm (0 to 18 gpm)

Max. Internal Leakage: 0.38 lpm (0.10 gpm) at port 2 at zero current and 345 bar (5000 psi) pressure at port 1

Temperature: -54° to 107°C (-65° to 225°F) with PPDI Urethane seals

Hysteresis: ±1.9 lpm (0.50 gpm) maximum

Dither/PWM Frequency Range: 100 to 250 Hz

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	250 ± 100 mA	1050 ± 100 mA
24 VDC	125 ± 50 mA	525 ± 50 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

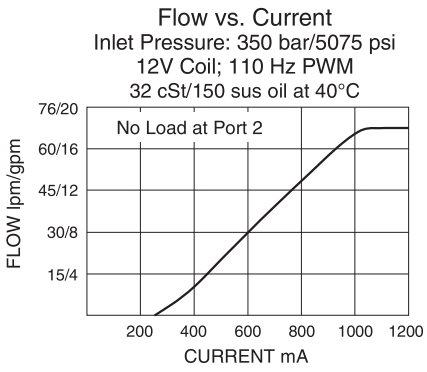
Cavity: HVC12-2 Cavity Variation “A”; See page 9.112.1

Cavity Tool: HCT12-2X-XX; See page 8.600.1

Seal Kit: HSK12-2U-O; See page 8.650.1

Coil Nut: Part No. 7004420

PERFORMANCE

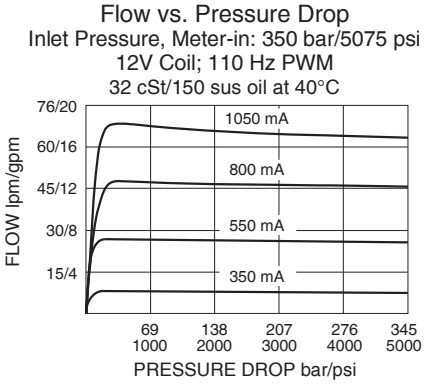


Performance info. continued on next page.

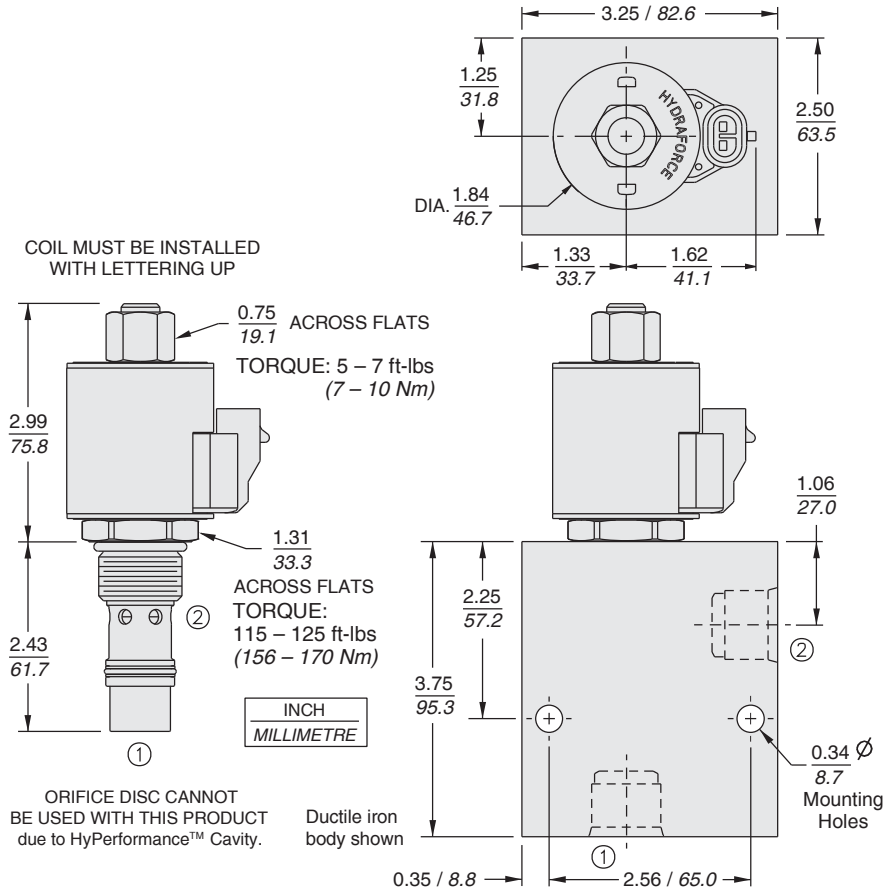
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Control Valve, Normally Closed — HPV12-20

PERFORMANCE (continued)



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.29 kg. (0.64 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Urethane O-rings without back-ups standard.

Ported Body: Weight: 2.74 kg. (6.05 lbs.); HyPerformance™ Ductile iron (code 'D') standard. Rated to 345 bar (5000 psi).
See page 8.012.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.); Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors.
See page 3.400.1.

TO ORDER

HPV12-20 - ___ ___ ___ - ___ - ___ ___ ___ ___ ___

Porting

Cartridge Only	**0**
SAE 16	**16TD**
1" BSP	**8BD**

Seals

PPDI Urethane	**U**

Recommended for pressures above 241 bar (3500 psi).

***Note**: Consult factory for additional seal options.*

Voltage

0	Less Coil**
12	12 VDC
24	24 VDC

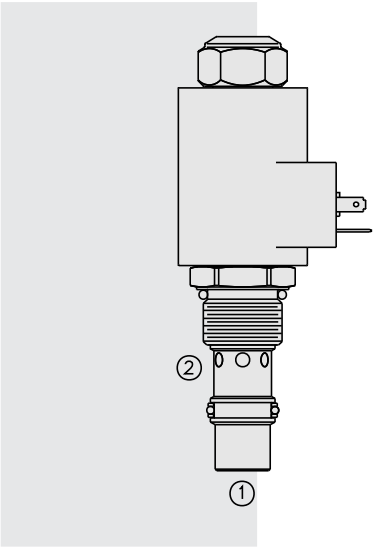
**Includes E-Coil Nut.

Coil Termination

Deutsch DT04-2P	**ER** (IP69K)
Metri-Pak 150	**EY** (IP69K)
Dual Lead Wires	**EL** (IP69K)
Amp Jr. Timer	**EJ** (IP67)
DIN 43650	**EG** (IP65)

For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models.
See coil option info. on page 3.400.1

PV72-21 Proportional Flow Control Cartridge,



DESCRIPTION

A solenoid operated, electrically-variable, two-port, pressure-compensated, spool-type, normally open when de-energized, proportional flow control valve.

OPERATION

The **PV72-21** will regulate flow out of port 2 regardless of system working pressure. With an increasing current applied to the solenoid, the PV72-21 will decrease output flow.

Operation of Manual Override:

To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

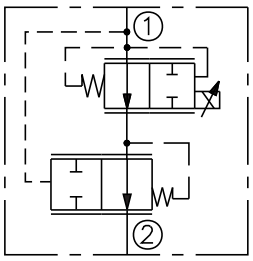
To Disengage: Turn counterclockwise approximately 6 turns until positive stop is found.

FEATURES

- Excellent linearity and hysteresis characteristics.
- Hardened spool and cage for long life.
- Efficient wet armature construction.
- Optional coil voltages and terminations.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Manual override option.

SYMBOLS

USASI/ISO:



RATINGS

Operating Pressure: Port 1: 240 bar (3500 psi); Port 2: 207 bar (3000 psi)

Regulated Flow Rate: 56 lpm (15 gpm)

Internal Leakage: .38 lpm (0.1 gpm) fully closed at 207 bar (3000 psi)

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	150 ± 100 mA	1350 ± 150 mA
24 VDC	75 ± 50 mA	675 ± 75 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

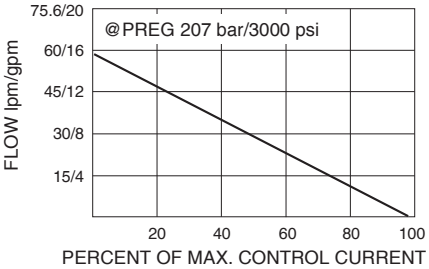
Cavity: VC12-2, Cavity Variation “B”; See page 9.112.1

Cavity Tool: CT12-2X-XX; See page 8.600.1

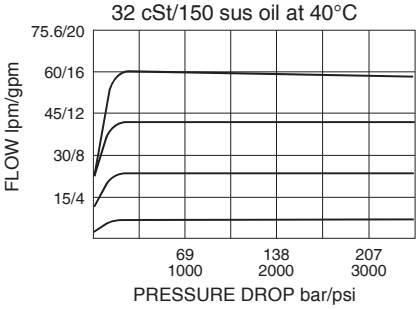
Seal Kit: SK12-2X-M; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

PERFORMANCE

Flow vs. Current
Input Pressure: 240 bar/3500 psi
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



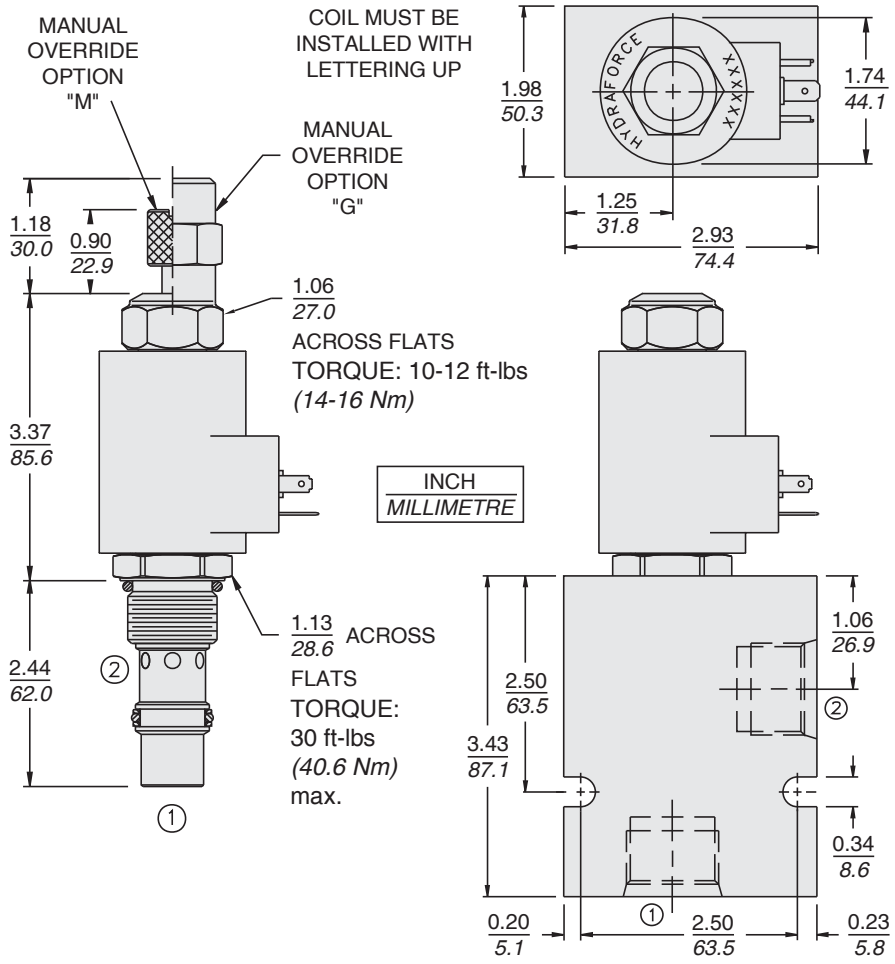
Regulated Flow vs. Pressure Drop
Input Pressure: 240 bar/3500 psi
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Normally Open PV72-21

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.32 kg. (0.7 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.59 kg. (1.3 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.012.1.

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

PV72-21 __ - __ __ __ - __ - __ __ __ __

Option(s)
- None (Blank)
- Manual Override **M**
- Manual Override with Guard **G**

Porting
- Cartridge Only **0**
- SAE 10 **10T**
- SAE 12 **12T**

Seals
- Buna N (Std.) **N**
- Fluorocarbon **V**

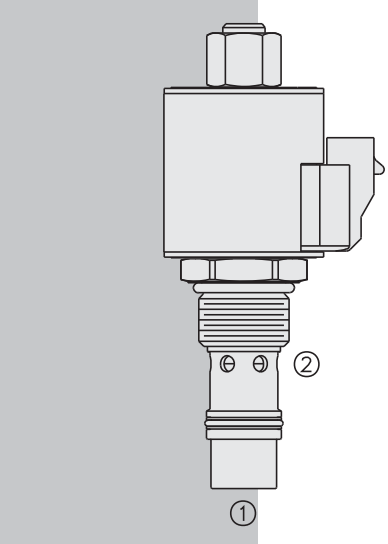
Voltage
- **0** Less Coil
- **12** 12 VDC
- **24** 24 VDC

Terminations D-Coil
- **DS** Dual Spades
- **DG** DIN 43650
- **DL** Leadwires (2)
- **DL/W** Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
- **ER** Deutsch DT04-2P
- **EY** Metri-Pack® 150

Coils with internal diode are available. Consult factory.

HPV12-21 HyPerformance™ Proportional Flow



DESCRIPTION

A solenoid-operated, electrically-variable, two-port, pressure-compensated, spool-type, normally open when de-energized, proportional flow control valve for high pressure applications up to 350 bar (5075 psi).

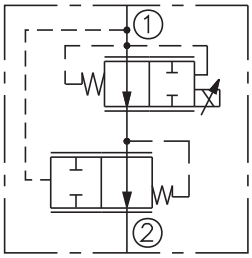
OPERATION

With inlet at port 1, the **HPV12-21** regulates flow out of port 2 regardless of system working pressure. Increasing current applied to the solenoid will decrease output flow.

FEATURES

- Continuous-duty rated solenoid with optional coil voltages and terminations.
- Hardened spool and cage for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Unitized, molded, waterproof E-Coils rated up to IP69K.
- 1000-hour salt-spray rated solenoid tubes and coils.
- All HyPerformance™ products are tested to the rigorous standards of the NFPA specification T2.6.1.
- All HyPerformance™ valves are tested at a verification level of 90% and an assurance of 99%.

SYMBOL



RATINGS

Operating Pressure: 350 bar (5075 psi); 10% Cycle Life: 420 bar (6090 psi)
Note: All HyPerformance products are tested for 900K cycles at 350 bar and 100K cycles at 420 bar.

Burst Pressure: 1241 bar (18,000 psi)

Regulated Flow Rate: 0 to 61 lpm (0 to 16 gpm)

Max. Internal Leakage: 0.38 lpm (0.10 gpm) at port 2 at zero current and 345 bar (5000 psi) pressure at port 1

Temperature: -54° to 107°C (-65° to 225°F) with PPDI Urethane seals

Hysteresis: ±1.9 lpm (0.50 gpm) maximum

Dither/PWM Frequency Range: 100 to 250 Hz

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	100 ± 50 mA	1100 ± 100 mA
24 VDC	50 ± 25 mA	550 ± 50 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

Cavity: HVC12-2 Cavity Variation “A”; See page 9.112.1

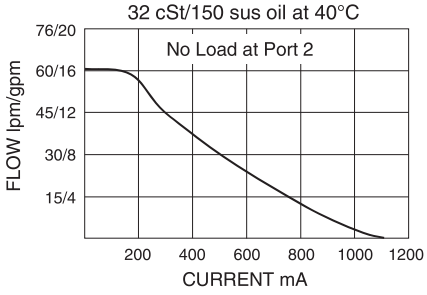
Cavity Tool: CT12-2X-XX; See page 8.600.1

Seal Kit: HSK12-2U-O; See page 8.650.1

Coil Nut: Part No. 7004420

PERFORMANCE

Flow vs. Current
Inlet Pressure: 350 bar/5075 psi
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C

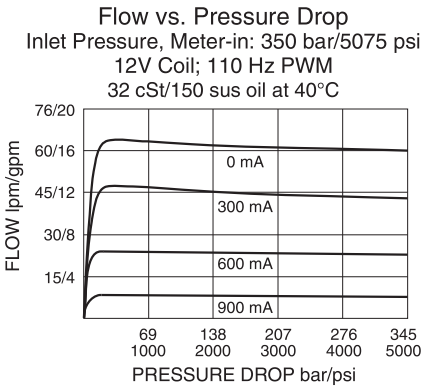


Performance info. continued on next page.

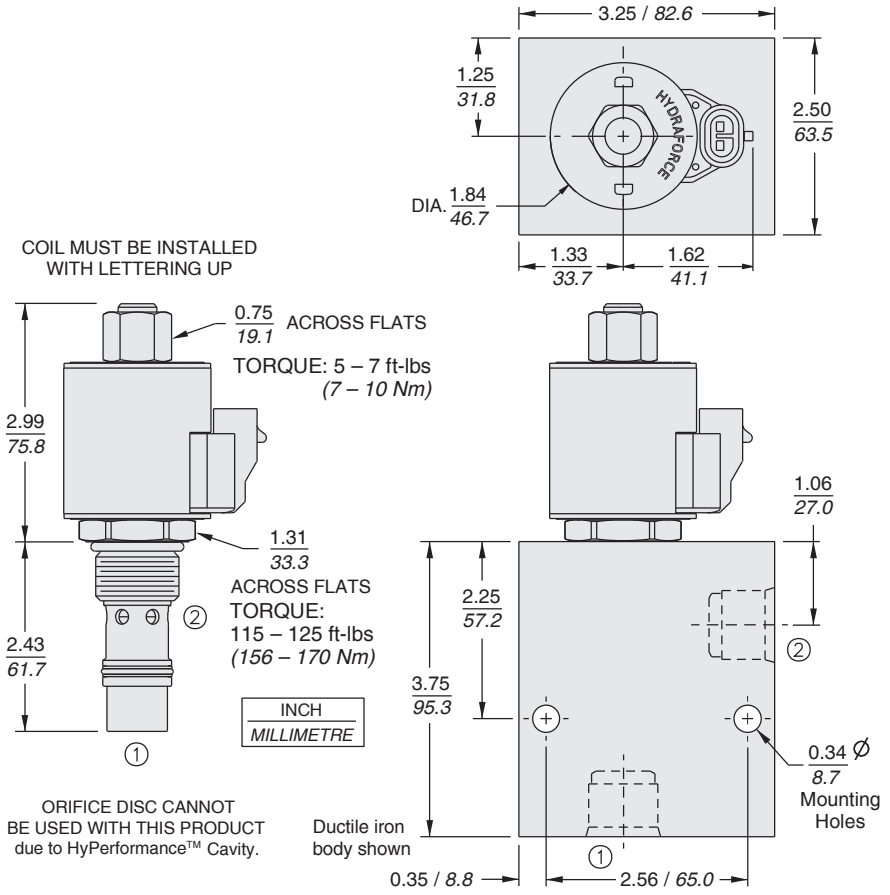
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Control Valve, Normally Open — HPV12-21

PERFORMANCE (continued)



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.29 kg. (0.64 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Urethane O-rings without back-ups standard.

Ported Body: Weight: 2.74 kg. (6.05 lbs.); HyPerformance™ Ductile iron (code 'D') standard. Rated to 345 bar (5000 psi).
See page 8.012.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.); Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors.
See page 3.400.1.

TO ORDER

HPV12-21 - _ _ _ - _ _ - _ _ _ _ _

Porting
Cartridge Only **0**
SAE 1616TD
1" BSP 8BD

Seals
PPDI Urethane **U**

Recommended for pressures above 241 bar (3500 psi).

Note: *Consult factory for additional seal options.*

Voltage
0 Less Coil**
12 12 VDC
24 24 VDC

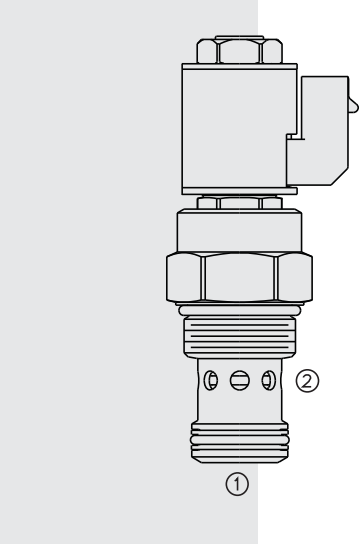
**Includes E-Coil Nut.

Coil Termination

Deutsch DT04-2P	**ER** (IP69K)
Metri-Pak 150	**EY** (IP69K)
Dual Lead Wires	**EL** (IP69K)
Amp Jr. Timer	**EJ** (IP67)
DIN 43650	**EG** (IP65)

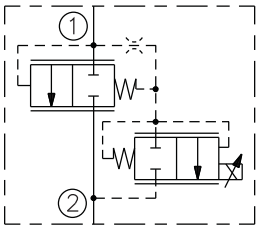
For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models.
See coil option info. on page 3.400.1

PV16-23 Proportional Flow Control Cartridge,



SYMBOL

USASI/ISO:



DESCRIPTION

A solenoid-operated, two-way, normally closed, electro-proportional, hydraulic cartridge valve intended for use with an external pressure compensator or load-sensing-style pump control.

OPERATION

When de-energized, the **PV16-23** blocks flow from 1 to 2. With increasing current applied to the solenoid, output flow from 1 to 2 will increase proportionally.

The PV16-23 is intended for use with an operating differential across the valve of 7 bar to 11 bar (100 psi to 160 psi). The set value of the external pressure compensator or pump control must provide for both the valve operating differential, as well as for system losses between the compensator and the PV16-23 at the maximum required flow.

Operation of Manual Override: To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift. To Disengage: Turn counterclockwise approximately 6 turns to positive stop.

FEATURES

- Excellent linearity and hysteresis characteristics.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.

RATINGS

Maximum Operating Pressure: 241 bar (3500 psi)

Maximum Flow Rate: 95 to 170 lpm (25 to 45 gpm); see performance graphs.

Maximum Internal Leakage: 0.38 lpm (0.10 gpm) at port 2 with 13.8 bar (200 psi) at port 1 with no current applied.

Electrical: EHPR08 Coil, 2 standard voltage ratings

Coil Voltage	Resistance at 20°C	Threshold Current	Max. Control Current
12 VDC	5.4 ohms	400 ± 100 mA	1400 ± 100 mA
24 VDC	21.7 ohms	200 ± 50 mA	700 ± 50 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

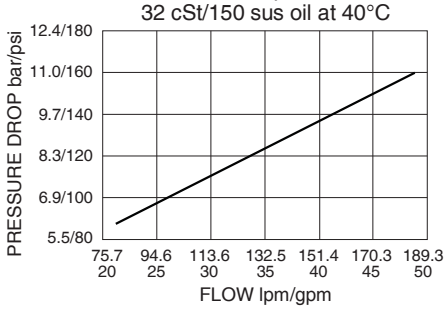
Installation: No restrictions; See page 9.020.1.

Cavity: VC16-2; See page 9.116.1; **Cavity Tool:** CT16-2XX; See page 8.600.1

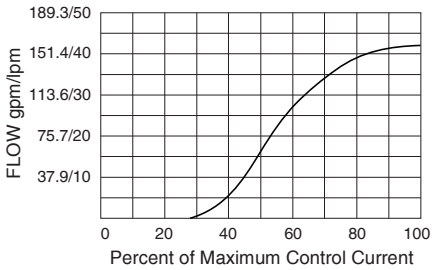
Seal Kit: SK16-2X-M; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

PERFORMANCE (Cartridge Only)

Pressure Drop vs. Flow 1 to 2
at Maximum Control Current
12V EHPR08 Coil, 110 Hz PWM
138 bar/2000 psi load at 2
32 cSt/150 sus oil at 40°C



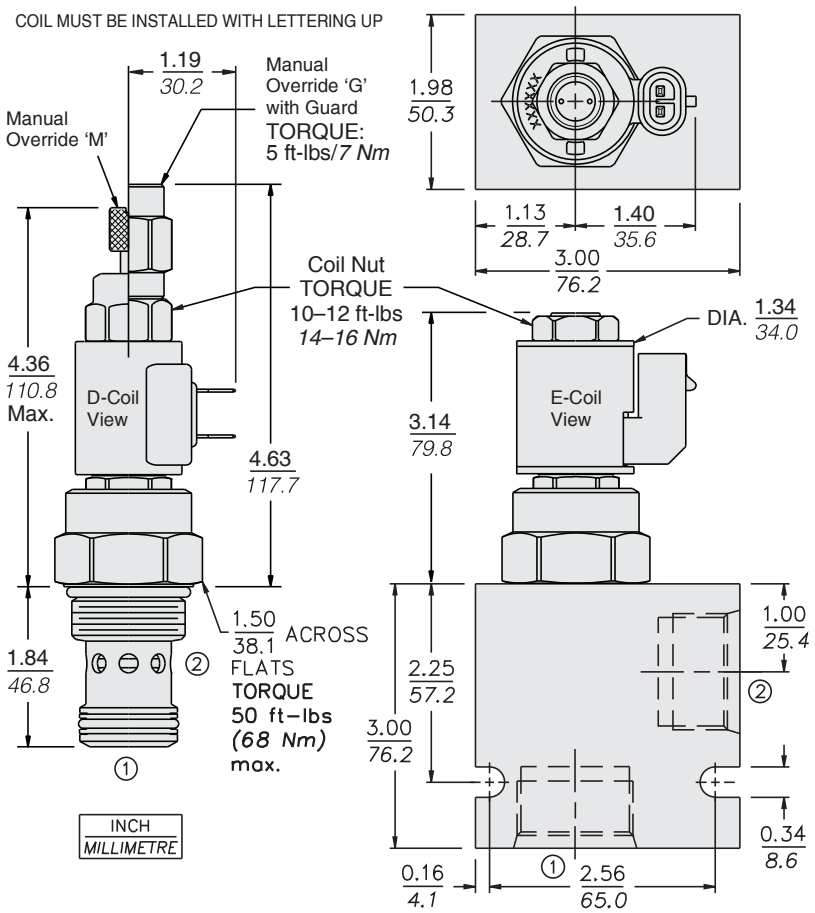
Flow vs. Current at 207 bar/3000 psi
Compensating Inlet at 10.3 bar/150 psi
12V EHPR08 Coil, 110 Hz PWM
32 cSt/150 sus oil at 40°C



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Normally Closed PV16-23

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.46 kg. (1.02 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-up standard.

Standard Ported Body: Weight: 0.57 kg. (1.25 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.016.1

EHPR08 D-Coil: Weight: 0.10 kg. (0.22 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

EHPR08 E-Coil: Weight: 0.14 kg. (0.3 lbs.) Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. See page 3.400.1

TO ORDER

PV16-23__ - ___ ___ - ___ - ___ ___ ___ ___ ___

Option
- None (Blank)
- Manual Override **M**
- Manual Override with Guard **G**

For Manual Override info. see page 1.001.1

Porting
- Cartridge Only **0**
- SAE 12 **12T**
- SAE 16 **16T**
- 3/4 in. BSP* **6B**
- 1 in. BSP* **8B**

*BSP Body; U.K. Mfr. Only

Seals
- **N** Buna N (Std.)
- **V** Fluorocarbon

Coil Voltage
- **0** Less Coil**
- **12** 12 VDC
- **24** 24 VDC

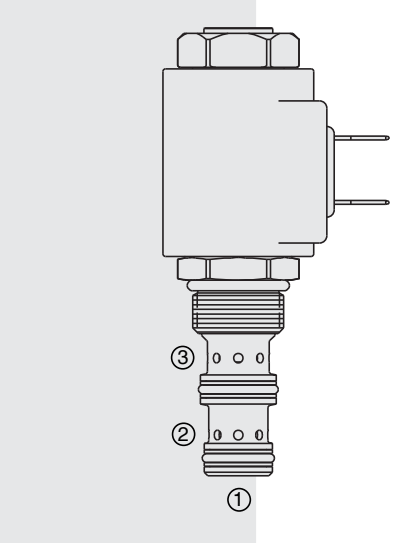
** Includes D-Coil Nut

Termination (VDC) D-Coil
- **DS** Dual Spades
- **DG** DIN 43650
- **DL** Leadwires (2)
- **DL/W** Leads w/Weatherpak® Connectors

Termination (VDC) E-Coil
- **ER** Deutsch DT04-2P (IP69K Rated)
- **EY** Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

PV08-30 Proportional Flow Control Cartridge,



DESCRIPTION

A solenoid-operated, electrically-variable, three-port, pressure-compensated, spool-type, normally closed when de-energized, proportional flow control valve. It can be used as a priority-type flow regulator with pressure-compensated, regulated and bypass flow. It can also be used as a restrictive-type 2-way, pressure-compensated flow regulator when the bypass line (port 2) is blocked.

OPERATION

The **PV08-30** will regulate flow out of port 3 regardless of system working pressure. With an increasing current applied to the solenoid, the PV08-30 will increase output flow.

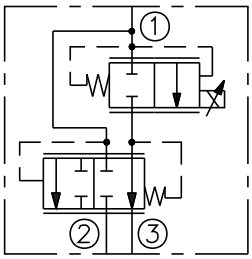
Note: When used as a bypass flow control in applications where the priority flow port will be blocked by external valving (dead-headed), a small bleed orifice is required at the priority port (port 3). Consult factory.

FEATURES

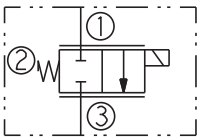
- Excellent linearity and hysteresis characteristics.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.

SYMBOLS

USASI/ISO:



2-Ported:



RATINGS

Operating Pressure: Inlet: 240 bar (3500 psi); Ports 2 and 3: 207 bar (3000 psi)

Regulated Flow Rate: Bypass Blocked, Range A: 11.4 lpm (3.0 gpm)
Bypass Blocked, Range B: 5.7 lpm (1.5 gpm)
Bypass Open, Range A: 11.4 lpm (3.0 gpm)
Bypass Open, Range B: 5.7 lpm (1.5 gpm)

Nominal Input Flow: Bypass Open, Range A: 15.2 lpm (4.0 gpm)
Bypass Open, Range B: 7.6 lpm (2.0 gpm)

Maximum Input Flow: Bypass Open, Range A: 22.8 lpm (6.0 gpm)
Bypass Open, Range B: 22.8 lpm (6.0 gpm)

Internal Leakage: 100 cc/min. (6 cu. in./min.) fully closed at 207 bar (3000 psi)

Electrical: 2 standard voltage ratings (Uses EHPR Series Coil; See page 3.200.8)

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	400 ± 100 mA	1400 ± 150 mA
24 VDC	200 ± 50 mA	700 ± 75 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

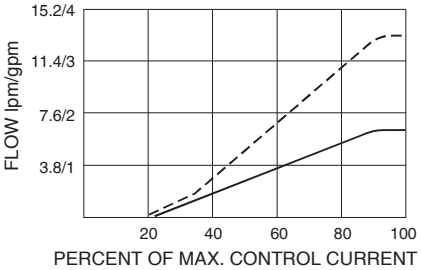
Installation: No restrictions; See page 9.020.1.

Cavity: VC08-3; See page 9.108.1; **Cavity Tool:** CT08-3X-XX; See page 8.600.1

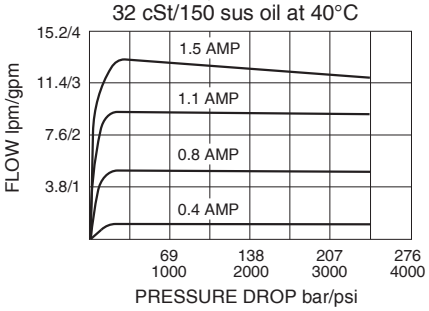
Seal Kit: SK08-3X-MM; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

PERFORMANCE

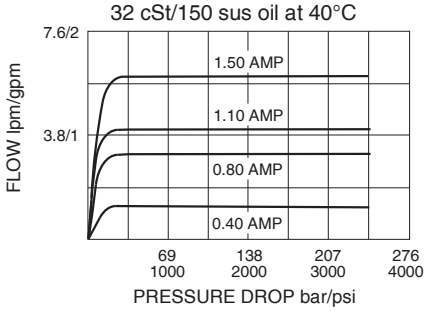
Nominal Flow vs. Current
207 bar/3000 psi; 12V Coil; 200 Hz PWM
32 cSt/150 sus oil at 40°C
Range A, 2-Ported or 3-Ported
Range B, 2-Ported or 3-Ported



Regulated Flow vs. Pressure Drop
2-Ported; Flow Range A
240 bar/3500 psi Inlet
12V Coil; 200 Hz PWM
32 cSt/150 sus oil at 40°C

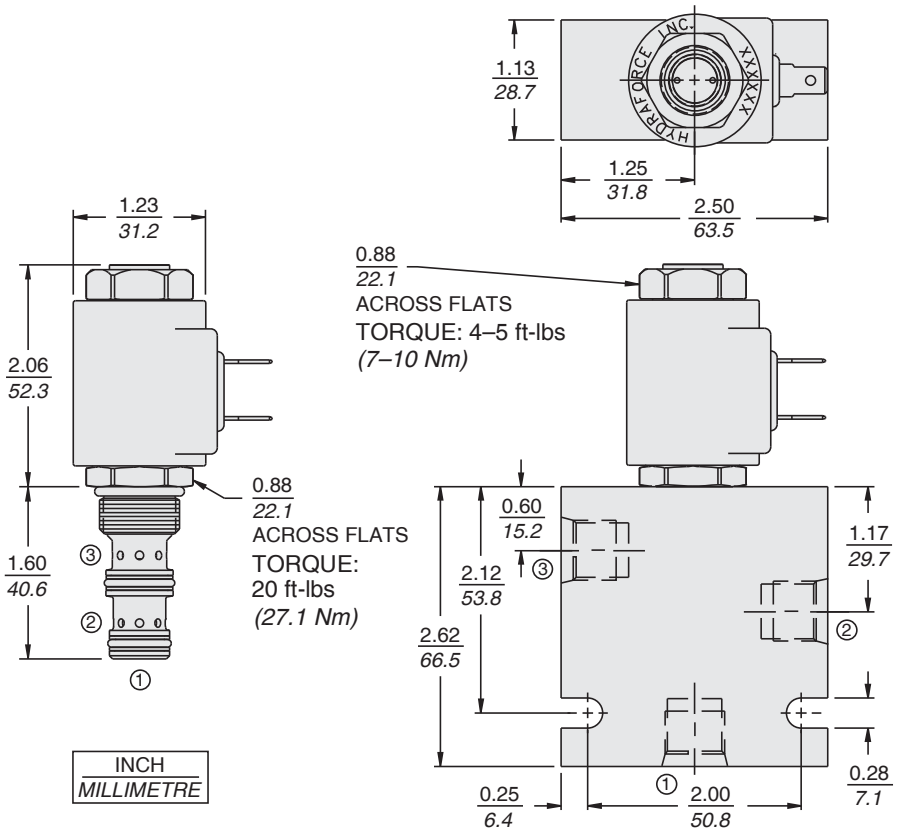


Regulated Flow vs. Pressure Drop
2-Ported; Flow Range B
240 bar/3500 psi Inlet
12V Coil; 200 Hz PWM
32 cSt/150 sus oil at 40°C



Normally Closed PV08-30

DIMENSIONS



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

MATERIALS

Cartridge: Weight: 0.13 kg. (0.28 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.27 kg. (0.60 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.008.1

EHPR Series Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.8.

TO ORDER

PV08-30 __ __ - __ __ __ - __ - __ __ __ __

Flow Range (Required. See Performance Curves)
- **A**
- **B**

Option
- None (Blank)

Porting
- Cartridge Only **0**
- SAE 6 **6T**
- 3/8 in. BSP* **3B**

*BSP Body; U.K. Mfr. Only

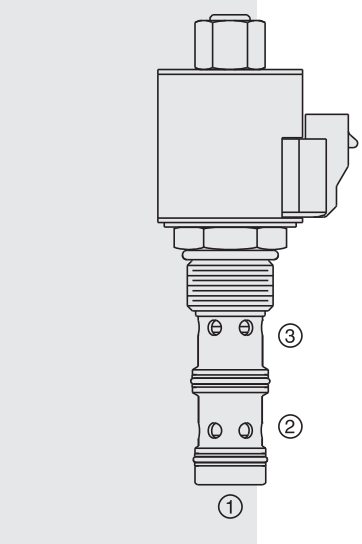
Seals
- Buna N (Std.) **N**
- Fluorocarbon **V**

Terminations
- **DS** Dual Spades
- **DG** DIN 43650
- **DL** Leadwires (2)
- **DL/W** Leads w/Weatherpak® Connectors

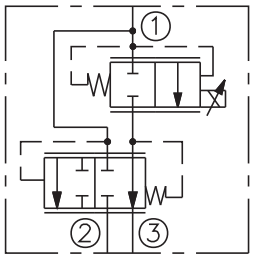
Coils with internal diode are available. Consult factory.

Voltage
- **0** Less Coil
- **12** 12 VDC
- **24** 24 VDC

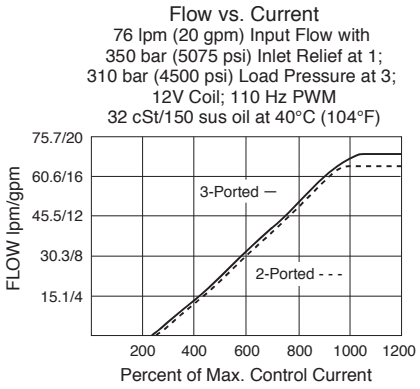
HPV12-30 HyPerformance™ Proportional Flow,



ISO SYMBOL



PERFORMANCE



DESCRIPTION

A high pressure, solenoid-operated, electrically-variable, three-port, pressure-compensated, spool-type, normally closed when de-energized, proportional flow control valve. It can be used as a priority-type flow regulator with pressure-compensated, regulated and bypass flow. It can also be used as a restrictive-type 2-way, pressure-compensated flow regulator when the bypass line (port 2) is blocked.

OPERATION

The **HPV12-30** will regulate flow out of port 3 regardless of system working pressure. With an increasing current applied to the solenoid, the HPV12-30 will increase output flow.

Note: When used as a bypass flow control in applications where the priority flow port will be blocked by external valving, bypass pressure drop will increase unless a small amount of leakage is provided for the priority port. Consult factory.

FEATURES

- Excellent linearity and hysteresis.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Cartridges voltage-interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Manual override option.
- All HyPerformance™ products are tested to the rigorous standards of the NFPA specification T2.6.1.
- All HyPerformance™ valves are tested at a verification level of 90% and an assurance of 99%.

RATINGS

Operating Pressure: 350 bar (5075 psi); 10% life cycle 420 bar (6090 psi)

Proof Pressure: 690 bar 10,000 psi

Burst Pressure: 1380 bar (20,000 psi)

Internal Leakage: 380 ml/min. (0.10 gpm) at port 3 at 0 current with 350 bar (5075 psi) at port 1 (port 2 blocked)

Electrical Parameters (with size 10 E-series coil):

Coil Voltage	Coil Inductance	Threshold Current	Max. Control Current
12 VDC	247	250 ± 100 mA	1100 ± 100 mA
24 VDC	973	125 ± 50 mA	550 ± 50 mA

Filtration: See page 9.010.1

Operating Fluid Temperature: -54°C - 107°C (-65°F - 225°F) with Urethane seals

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

Cavity: HVC12-3; See page 9.110.1

Cavity Tool: HCT10-3X-XX; See page 8.600.1

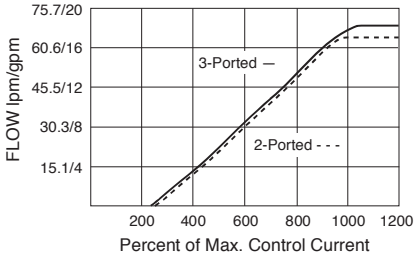
Seal Kit: HSK12-3X-00; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

Performance info. continued on following page.

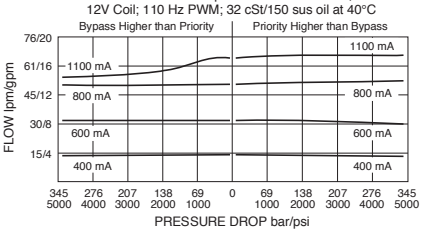
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

PERFORMANCE (Continued)

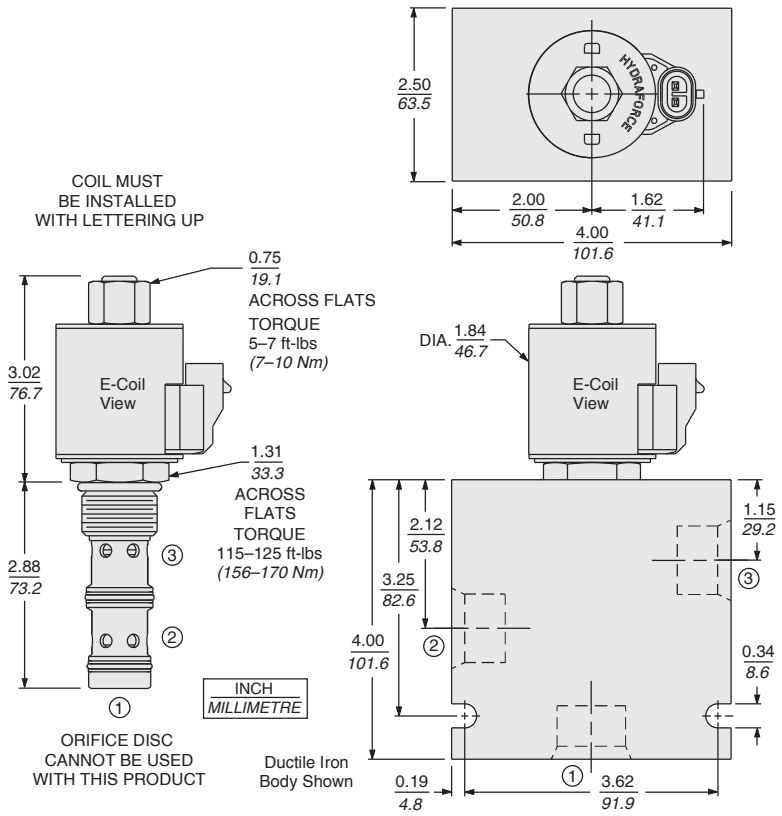
Flow vs. Current
76 lpm (20 gpm) Input Flow with
350 bar (5075 psi) Inlet Relief at 1;
310 bar (4500 psi) Load Pressure at 3;
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C (104°F)



Priority Flow vs. Load
3-Ported; 76 lpm (20 gpm) Input Flow
with 350 bar/5075 psi Inlet Relief at Port 1;
12V Coil; 110 Hz PWM; 32 cSt/150 sus oil at 40°C



DIMENSIONS



MATERIALS

Cartridge: Weight (without coil and nut): 0.32 kg. (0.70 lbs.) Steel with hardened work surfaces. PPDI urethane seals without back-up rings standard.

Standard Ported Body: Weight: 4.0 kg (8.93 lbs.) HyPerformance™ Ductile iron (Code 'D') standard. Rated to 345 bar (5000 psi).
See page 8.012.1.

12-Size "E" Coil: Weight: 1.0 kg. (2.2 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.15.

TO ORDER

HPV12-30 - __ __ __ - __ - __ __ __ __

Porting
Cartridge Only **0**
SAE 12 **12TD**
3/4" BSP **6BD**

Seals
PPDI Urethane **U**

Note: *PPDI Urethane seals are recommended for pressures over 241 bar (3500 psi).*

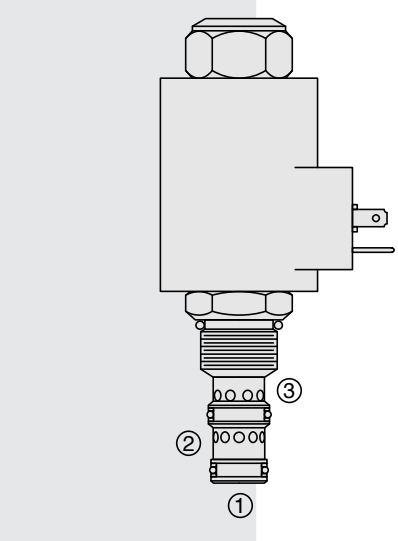
Note: *Consult factory for additional seal options.*

Coil Terminations
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150
EL Dual Leads

Coils with internal diode are available. Consult factory.

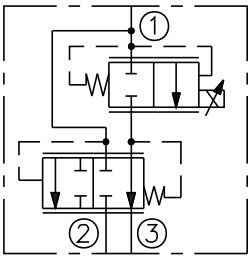
Voltage
0 Less Coil
12 12 VDC
24 24 VDC

PV70-30 Proportional Flow Control Cartridge,

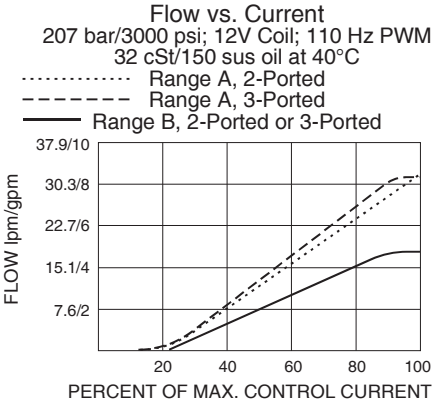


SYMBOLS

USASI/ISO:



PERFORMANCE



DESCRIPTION

A solenoid-operated, electrically-variable, three-port, pressure-compensated, spool-type, normally closed when de-energized, proportional flow control valve. It can be used as a priority-type flow regulator with pressure-compensated, regulated and bypass flow. It can also be used as a restrictive-type 2-way, pressure-compensated flow regulator when the bypass line (port 2) is blocked.

OPERATION

The **PV70-30** will regulate flow out of port 3 regardless of system working pressure. With an increasing current applied to the solenoid, the PV70-30 will increase output flow.

Note: When used as a bypass flow control in applications where the priority flow port will be blocked by external valving, bypass pressure drop will increase unless a small amount of leakage is provided for the priority port. Consult factory.

Operation of Manual Override:

To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

To Disengage: Turn counterclockwise approximately 6 turns to positive stop.

FEATURES

- Excellent linearity and hysteresis.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Manual override option.

RATINGS

Operating Pressure: Inlet: 240 bar (3500 psi); Ports 2 and 3: 207 bar (3000 psi)

Regulated Flow Rate: Bypass Blocked, Range A: 26 lpm (7 gpm)
Bypass Blocked, Range B: 17 lpm (4.5 gpm)
Bypass Open, Range A: 30 lpm (8 gpm)
Bypass Open, Range B: 17 lpm (4.5 gpm)

Maximum Input Flow: Bypass Open, Range A: 50 lpm (13 gpm)
Bypass Open, Range B: 26 lpm (7 gpm)

Internal Leakage: 197 cc/min. (12 cu. in./min.) fully closed at 207 bar (3000 psi)

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	250 ± 100 mA	1250 ± 150 mA
24 VDC	125 ± 50 mA	600 ± 75 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

Cavity: VC10-3; See page 9.110.1

Cavity Tool: CT10-3X-XX; See page 8.600.1

Seal Kit: SK10-3X-MM; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

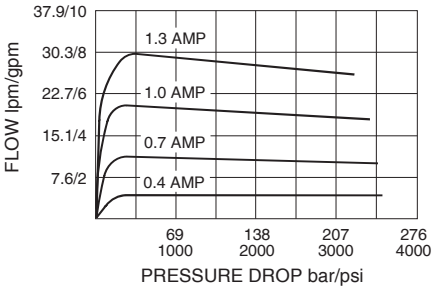
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Performance info. continued on following page.

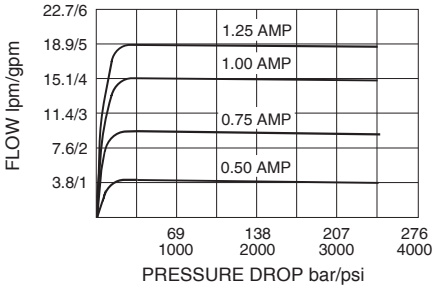
Normally Closed — PV70-30

PERFORMANCE (Continued)

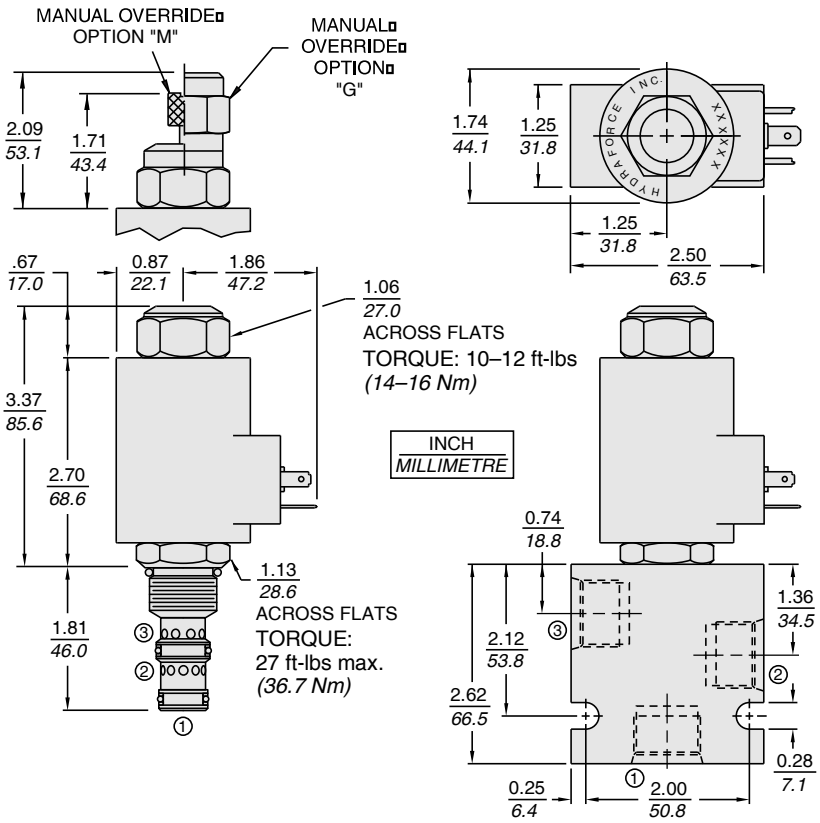
Regulated Flow vs. Pressure Drop
2-Ported; Flow Range A
240 bar/3500 psi Inlet
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



Regulated Flow vs. Pressure Drop
2-Ported; Flow Range B
240 bar/3500 psi Inlet
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.19 kg. (0.42 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.36 kg. (0.80 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

PV70-30 ___ ___ - ___ ___ ___ - ___ - ___ ___ ___ ___

Flow Range (Required. See Performance Curves.)
- **A**
- **B**

Option(s)
- None (Blank)
- Manual Override **M**
- Manual Override with Guard **G**

Porting
- **0** Cartridge Only
- **6T** SAE 6
- **8T** SAE 8
- **2B** 1/4 in. BSP*
- **3B** 3/8 in. BSP*

*BSP Body; U.K. Mfr. Only

Seals
- Buna N (Std.) **N**
- Fluorocarbon **V**

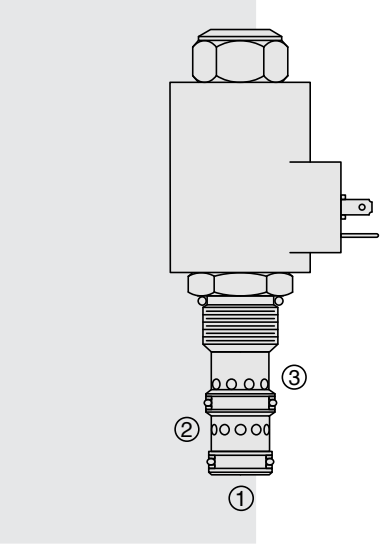
Terminations D-Coil
- **DS** Dual Spades
- **DG** DIN 43650
- **DL** Leadwires (2)
- **DL/W** Leads w/Weatherpak® Connectors

Terminations E-Coil (IP69K Rated)
- **ER** Deutsch DT04-2P
- **EY** Metri-Pack® 150

Coils with internal diode are available. Consult factory.

Voltage
- **0** Less Coil
- **12** 12 VDC
- **24** 24 VDC

PV72-30 Proportional Flow Control Cartridge,



DESCRIPTION

A solenoid-operated, electrically-variable, three-port, pressure-compensated, spool-type, normally closed when de-energized, proportional flow control valve. It can be used as a priority-type flow regulator with pressure-compensated, regulated and bypass flow. It can also be used as a restrictive-type 2-way, pressure-compensated flow regulator when the bypass line (port 2) is blocked.

OPERATION

The **PV72-30** will regulate flow out of port 3 regardless of system working pressure. With increasing current applied to the solenoid, the PV72-30 will increase output flow.

Note: When used as a bypass flow control in applications where the priority flow port will be blocked by external valving, bypass pressure drop will increase unless a small amount of leakage is provided for the priority port. Consult factory.

Operation of Manual Override:

To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

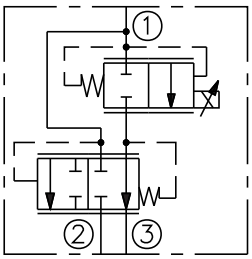
To Disengage: Turn counterclockwise approximately 6 turns to positive stop.

FEATURES

- Excellent linearity and hysteresis .
- Hardened spool and cage for long life.
- Efficient wet armature construction.
- Optional coil voltages and terminations.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Manual override option.

SYMBOLS

USASI/ISO:



RATINGS

Operating Pressure: Port 1: 240 bar (3500 psi); Ports 2 and 3: 207 bar (3000 psi)

Regulated Flow Rate in 3-Port Mode: Range A: 57 lpm (15 gpm)
Range B: 38 lpm (10 gpm)

Maximum Input Flow in 3-Port Mode: Range A and B: 114 lpm (30 gpm)

Maximum Flow Rate in 2-Port Mode: Range A: 53 lpm (14 gpm)
Range B: 31 lpm (8 gpm)

Note: For increased flow capacity in a 2-port flow control, see model PV72-20

Internal Leakage: .38 lpm (0.1 gpm) fully closed at 207 bar (3000 psi)

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	350 ± 100 mA	1600 ± 200 mA
24 VDC	175 ± 50 mA	800 ± 100 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

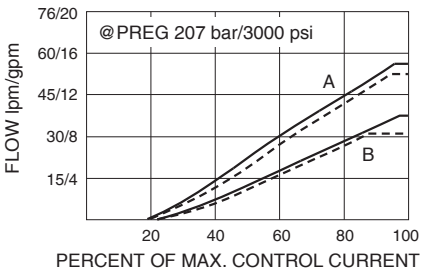
Installation: No restrictions; See page 9.020.1.

Cavity: VC12-3; See page 9.112.1; **Cavity Tool:** CT12-3X-XX; See page 8.600.1

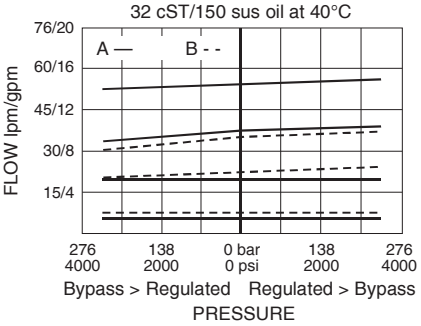
Seal Kit: SK12-3X-MM; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

PERFORMANCE

Flow vs. Current
Input Flow: 76 lpm/20 gpm
12V Coil; 110 Hz PWM
3-Ported —— ; 2 Ported - - - -
32 cSt/150 sus oil at 40°C



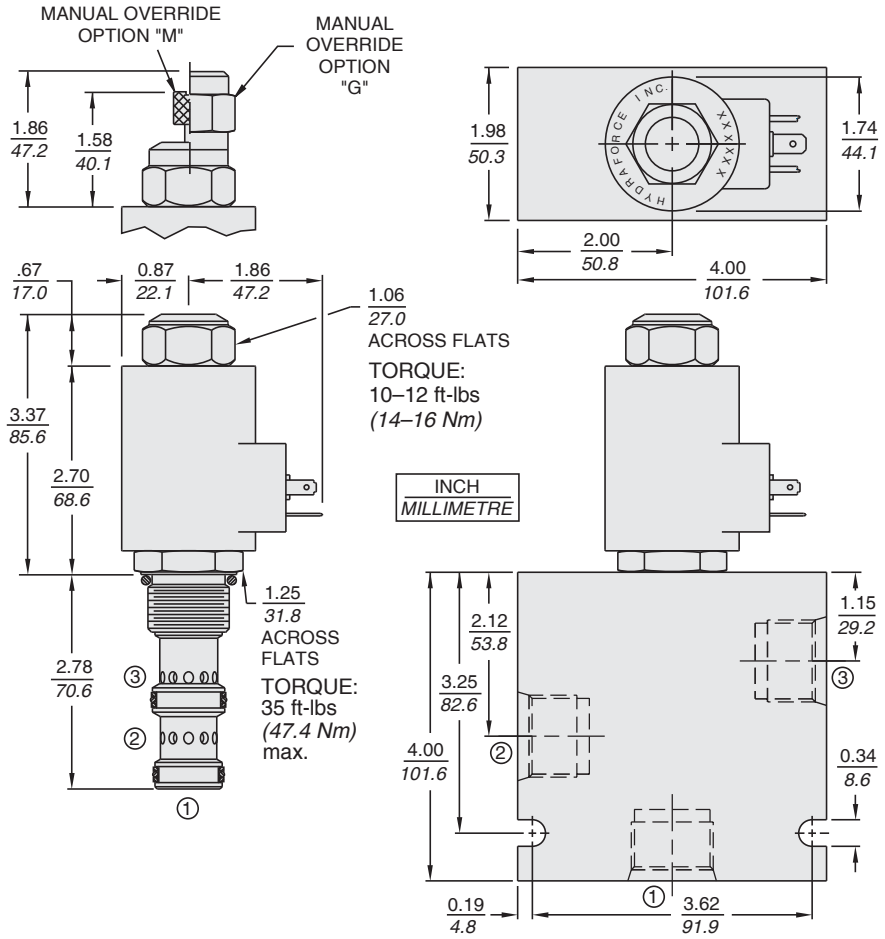
Regulated Flow vs. Pressure
Input Flow: 76 lpm/20 gpm
12V Coil; 110 Hz PWM
32 cST/150 sus oil at 40°C



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Normally Closed PV72-30

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.36 kg. (0.80 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 1.09 kg. (2.4 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.012.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

PV72-30__ __ - __ __ __ - __ - __ __ __ __

Flow Range
Required. See Performance Curves.
- **A**
- **B**

Option(s)
- None (Blank)
- Manual Override **M**
- Manual Override with Guard **G**

Porting
- **0** Cartridge Only
- **10T** SAE 10
- **12T** SAE 12
- **16T** SAE 16
- **4B** 1/2 in. BSP*
- **6B** 3/4 in. BSP*

*BSP Body; U.K. Mfr. Only

Seals
- Buna N (Std.) **N**
- Polyurethane **P**
- Fluorocarbon **V**

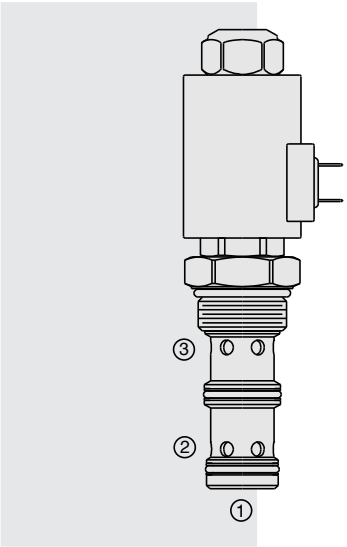
Voltage
- **0** Less Coil
- **12** 12 VDC
- **24** 24 VDC

Terminations D-Coil
- **DS** Dual Spades
- **DG** DIN 43650
- **DL** Leadwires (2)
- **DL/W** Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
- **ER** Deutsch DT04-2P
- **EY** Metri-Pack® 150

Coils with internal diode are available. Consult factory.

PV76-30A Proportional Flow Control Cartridge,



DESCRIPTION

A solenoid-operated, electrically-variable, three-port, pressure-compensated, spool-type, normally closed when de-energized, proportional flow control valve. It can be used as a priority-type flow regulator with pressure-compensated, regulated and bypass flow. It can also be used as a restrictive-type 2-way, pressure-compensated flow regulator when the bypass line (port 2) is blocked.

OPERATION

The **PV76-30A** will regulate flow out of port 3 regardless of system working pressure. With increasing current applied to the solenoid, output flow will increase.

Note: When used as a bypass flow control in applications where the priority flow port will be blocked by external valving, bypass pressure drop will increase unless a small amount of leakage is provided for the priority port. Consult factory.

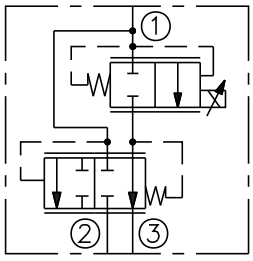
Operation of Manual Override: To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift. To Disengage: Turn counterclockwise approximately 6 turns to positive stop.

FEATURES

- Excellent linearity and hysteresis characteristics.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.

SYMBOLS

USASI/ISO:



RATINGS

Operating Pressure: Inlet: 240 bar (3500 psi); Ports 2 and 3: 207 bar (3000 psi)

Regulated Flow Rate: Range A: 3-Ported: 94.6 lpm (25.0 gpm)
Range A: 2-Ported: 85.2 lpm (22.5 gpm)

Nominal Input Flow: Bypass Open, 3-Ported: 121 lpm (32.0 gpm)

Maximum Input Flow: Bypass Open, 3-Ported: 151.4 lpm (40.0 gpm)

Internal Leakage: 0.38 lpm (0.10 gpm) at zero current

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	300 ± 100 mA	1600 ± 100 mA
24 VDC	150 ± 50 mA	800 ± 50 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

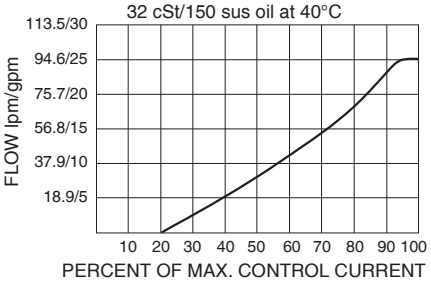
Installation: No restrictions; See page 9.020.1.

Cavity: VC16-3; See page 9.116.1; **Cavity Tool:** CT16-3X-XX; See page 8.600.1

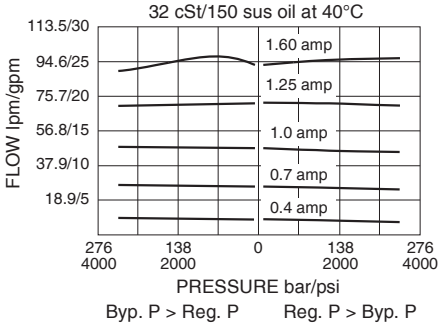
Seal Kit: SK16-3X-MM; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

PERFORMANCE

3-WAY VALVE
Regulated Flow vs. Current
240 bar/3500 psi Inlet
207 bar/3000 psi at Port 3; No Load at Port 2
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



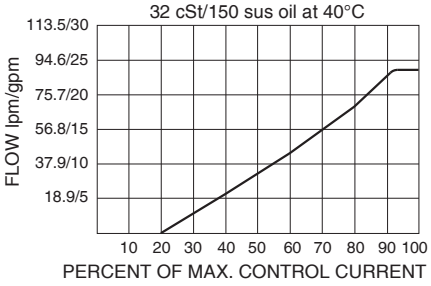
3-WAY VALVE
Regulated Flow vs. Load
240 bar/3500 psi, 121 lpm/32 gpm Inlet
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



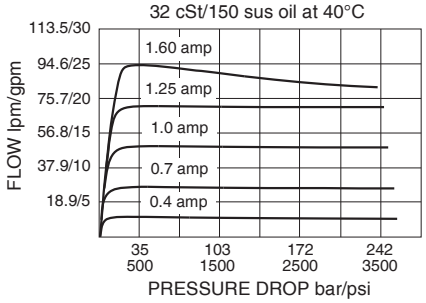
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

PERFORMANCE (continued)

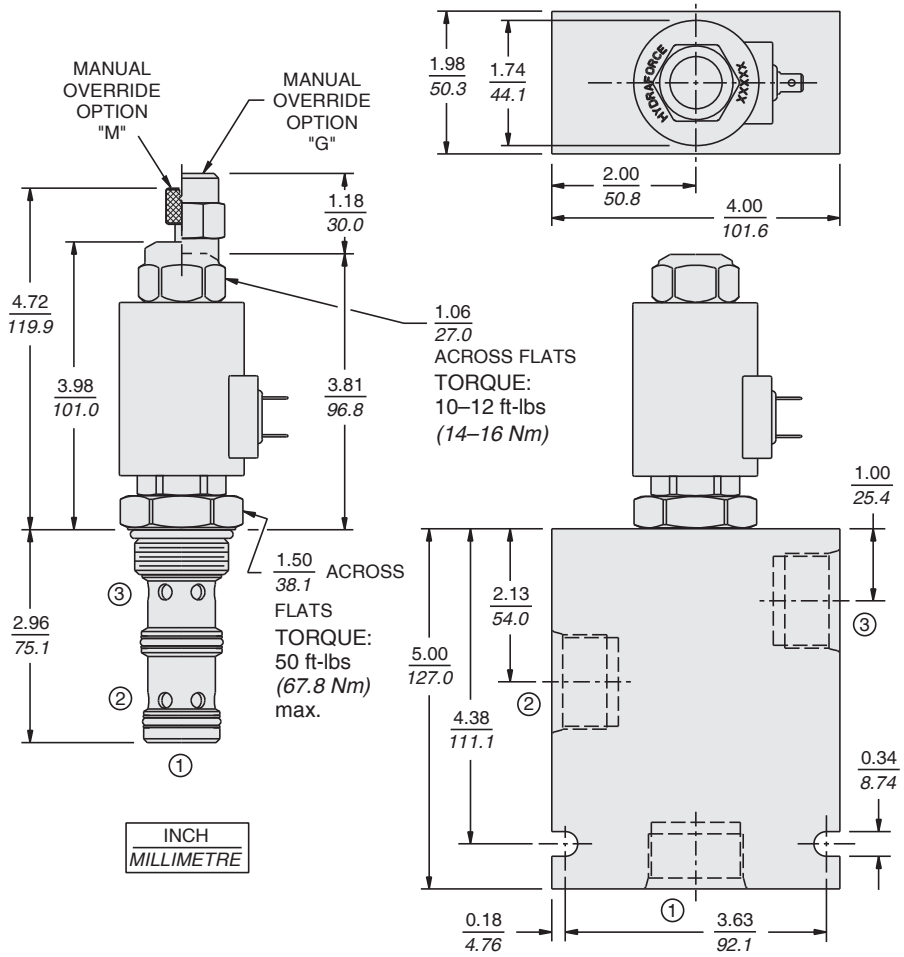
2-WAY VALVE
Regulated Flow vs. Current
240 bar/3500 psi Inlet
207 bar/3000 psi at Port 3
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



2-WAY VALVE
Regulated Flow vs. Pressure Drop
240 bar/3500 psi Inlet
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.54 kg. (1.19 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 1.6 kg. (3.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.016.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

PV76-30A ___ - ___ ___ ___ - ___ - ___ ___ ___ ___

Option(s)
None (Blank)
Manual Override **M**
Manual Override with Guard **G**

Porting
0 Cartridge Only
12T SAE 12
16T SAE 16

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Voltage
0 Less Coil
12 12 VDC
24 24 VDC

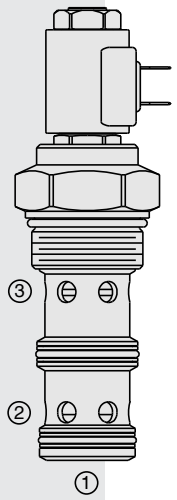
Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150

Coils with internal diode are available. Consult factory.

PV42-M30 Proportional Flow Control Cartridge,

U.S. Patent
6,966,329



DESCRIPTION

A solenoid-operated, two-stage, three-port, pressure-compensated, spool-type, normally closed when de-energized, proportional flow control valve. It can be used as a priority-type flow regulator with pressure-compensated, regulated and bypass flow.

OPERATION

The **PV42-M30** will regulate flow out of port 3 regardless of system working pressure at 3 or at bypass port 2. Two priority flow ranges are provided for better resolution: Range A for priority flow up to 170 lpm/45 gpm, and Range B for priority flow up to 132 lpm/35 gpm. For either range, the input flow at 1 can be up to 225 lpm/60 gpm.

Note: When used as a bypass flow control in applications where the priority flow port will be blocked by external valving, bypass pressure drop will increase unless a small amount of leakage is provided for the priority port. Consult factory.

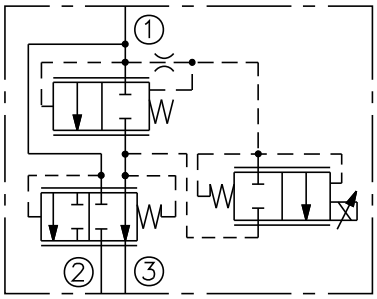
Operation of Manual Override: To Engage: Turn clockwise approximately 3 turns to reach start point. Continue another approximately 2 more turns to full shift. To Disengage: Turn counterclockwise approximately 5 turns to positive stop.

FEATURES

- Excellent linearity and hysteresis characteristics.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.

SYMBOLS

USASI/ISO:



RATINGS

Operating Pressure: Inlet: 240 bar (3500 psi); Ports 2 and 3: 207 bar (3000 psi)

Regulated Flow Rate: Range A: 190 lpm (50 gpm) maximum
Range B: 132 lpm (35 gpm) maximum

Maximum Input Flow: 225 lpm (60 gpm)

Maximum Internal Leakage: 1.52 lpm (0.40 gpm) at zero current

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	400 ± 100 mA	1400 ± 150 mA
24 VDC	200 ± 50 mA	700 ± 75 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

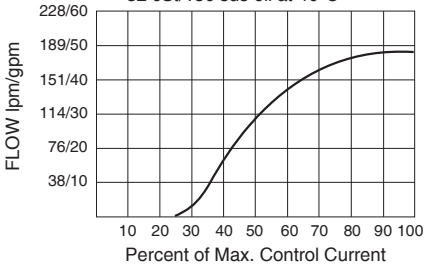
Installation: No restrictions; See page 9.020.1.

Cavity: VC42-M3; See page 9.142.1; **Cavity Tool:** CT42-M3X-XX; See page 8.600.1

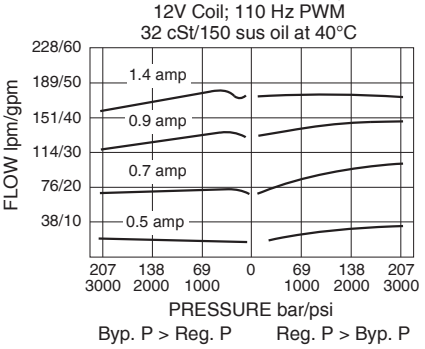
Seal Kit: SK42-3X-MM; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

PERFORMANCE

Range A
Regulated Flow vs. Current
207 bar/3000 psi at Port 3
at 190 lpm/50 gpm Input Flow
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



Range A, 3-Way
Regulated Flow vs. Load
240 bar/3500 psi, 190 lpm/50 gpm Inlet
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C

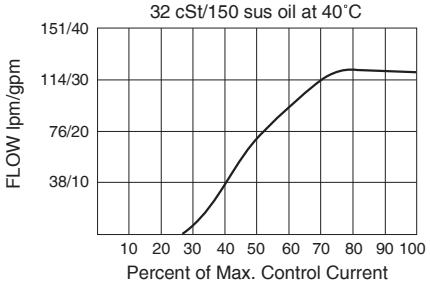


Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

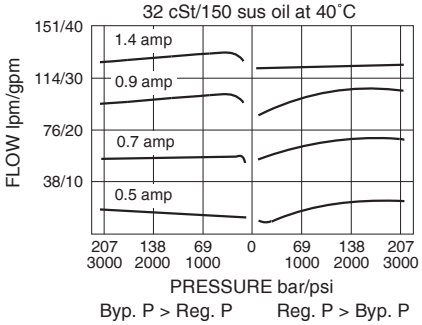
Normally Closed — PV42-M30

PERFORMANCE (continued)

Range B
Regulated Flow vs. Current
207 bar/3000 psi at Port 3
at 125 lpm/33 gpm Input Flow
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40˚C

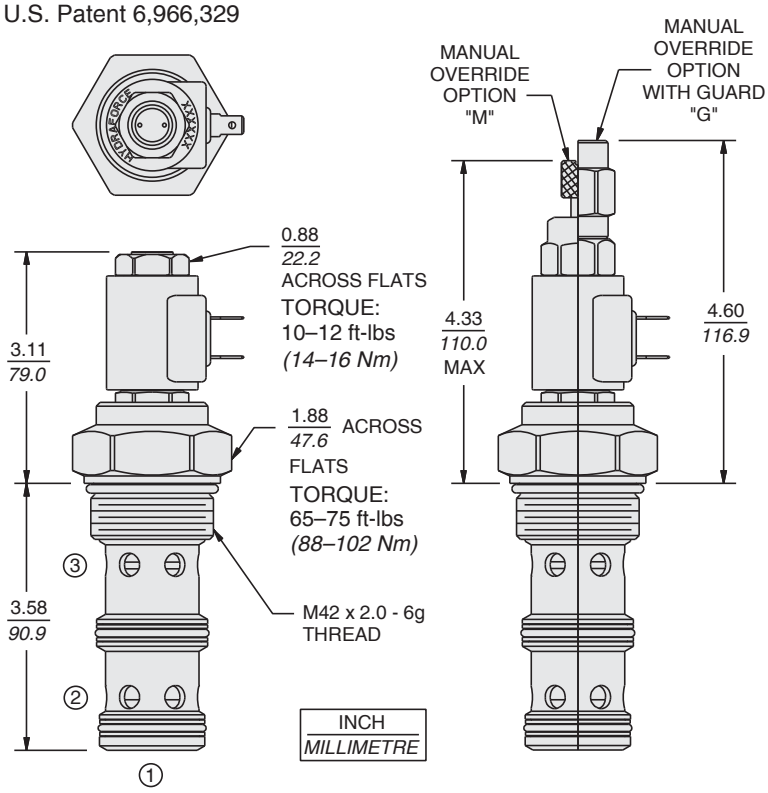


Range B, 3-Way
Regulated Flow vs. Load
240 bar/3500 psi, 125 lpm/33 gpm Inlet
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40˚C



DIMENSIONS

U.S. Patent 6,966,329



MATERIALS

Cartridge: Weight: 0.89 kg. (1.97 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Ported Body: Consult factory.

EHPR Series Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.8.

TO ORDER

PV42-M30 ___ ___ - ___ ___ ___ - ___ - ___ ___ ___ ___

Flow Range
- 190 lpm (50 gpm) **A**
- Up to 132 lpm (35 gpm) **B**

Option(s)
- None (Blank)
- Manual Override **M**
- Manual Override with Guard **G**

Porting
- Consult Factory

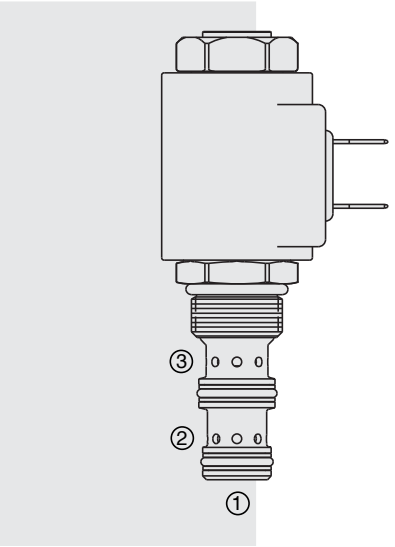
Seals
- Buna N (Std.) **N**
- Fluorocarbon **V**
- Polyurethane **P**

Voltage
- **0** Less Coil
- **12** 12 VDC
- **24** 24 VDC

Terminations
- **DS** Dual Spades
- **DG** DIN 43650
- **DL** Leadwires (2)
- **DL/W** Leads w/Weatherpak® Connector
- **ER** Deutsch DT04-2P

Coils with internal diode are available. Consult factory.

PV08-31 Proportional Flow Control Cartridge,



DESCRIPTION

A solenoid-operated, electrically-variable, three-port, pressure-compensated, spool-type, normally open when de-energized, proportional flow control valve. It can be used as a priority-type flow regulator with pressure-compensated, regulated and bypass flow. It can also be used as a restrictive-type 2-way, pressure-compensated flow regulator when the bypass line (port 2) is blocked.

OPERATION

The **PV08-31** will regulate flow from port 3 regardless of system working pressure. With increased current applied to the solenoid, the PV08-31 will decrease output flow.

Note: When used as a bypass flow control in applications where the priority flow port will be blocked by external valving (dead-headed), a small bleed orifice is required at the priority port (port 3). Consult factory.

FEATURES

- Excellent linearity and hysteresis characteristics.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.

RATINGS

Operating Pressure: Inlet: 240 bar (3500 psi); Ports 2 and 3: 207 bar (3000 psi)

Regulated Flow Rate: Bypass Blocked, Range A: 11.4 lpm (3.0 gpm)
Bypass Blocked, Range B: 5.7 lpm (1.5 gpm)
Bypass Open, Range A: 11.4 lpm (3.0 gpm)
Bypass Open, Range B: 5.7 lpm (1.5 gpm)

Nominal Input Flow: Bypass Open, Range A: 15.2 lpm (4.0 gpm)
Bypass Open, Range B: 7.6 lpm (2.0 gpm)

Maximum Input Flow: Bypass Open, Range A: 22.8 lpm (6.0 gpm)
Bypass Open, Range B: 22.8 lpm (6.0 gpm)

Internal Leakage: 100 cc/min. (6 cu. in./min.) fully closed at 207 bar (3000 psi)

Electrical: 2 standard voltage ratings (Uses EHPR Series Coil; See page 3.200.8)

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	250 ± 150 mA	1350 ± 150 mA
24 VDC	125 ± 75 mA	700 ± 75 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

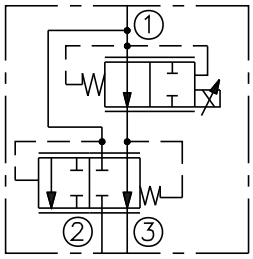
Installation: No restrictions; See page 9.020.1.

Cavity: VC08-3; See page 9.108.1; **Cavity Tool:** CT08-3X-XX; See page 8.600.1

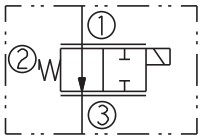
Seal Kit: SK08-3X-MM; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

SYMBOLS

USASI/ISO:

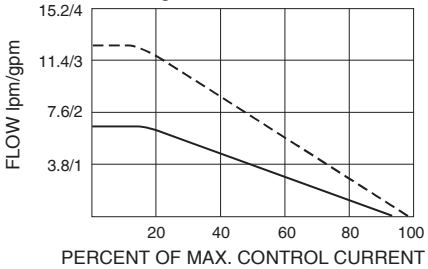


2-Ported:

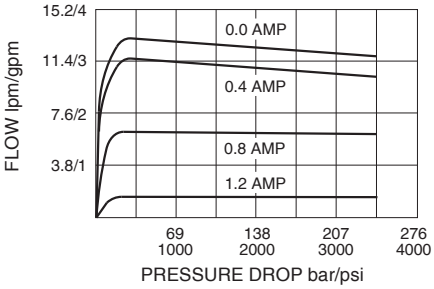


PERFORMANCE

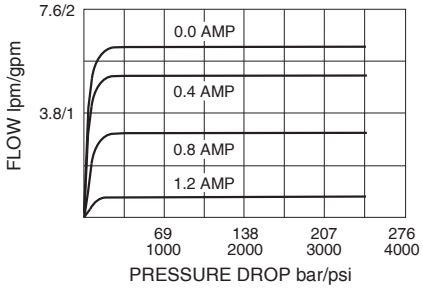
Nominal Flow vs. Current
207 bar/3000 psi; 12V Coil; 200 Hz PWM
32 cSt/150 sus oil at 40°C
Range A, 2 or 3-Ported
Range B, 2 or 3-Ported



Regulated Flow vs. Pressure Drop
2-Ported; Flow Range A
240 bar/3500 psi Inlet
12V Coil; 200 Hz PWM
32 cSt/150 sus oil at 40°C

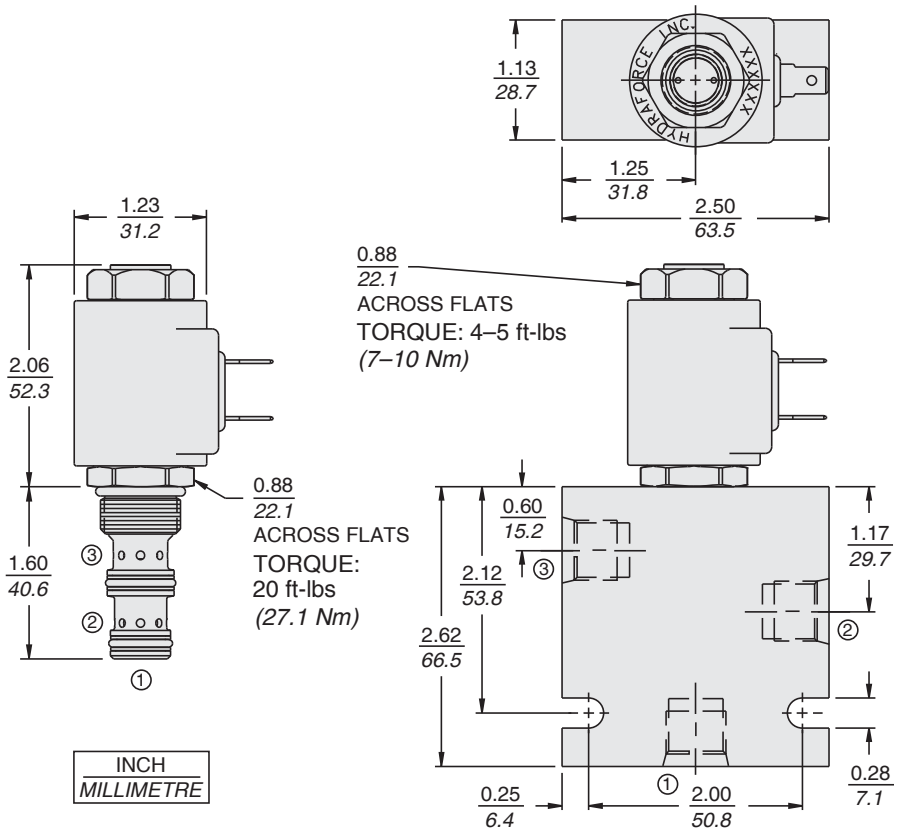


Regulated Flow vs. Pressure Drop
2-Ported; Flow Range B
240 bar/3500 psi Inlet
12V Coil; 200 Hz PWM
32 cSt/150 sus oil at 40°C



Normally Open PV08-31

DIMENSIONS



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

MATERIALS

Cartridge: Weight: 0.13 kg. (0.28 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.27 kg. (0.60 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.008.1

EHPR Series Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.8.

TO ORDER

PV08-31 __ __ - __ __ __ - __ - __ __ __ __

Flow Range (Required. See Performance Curves)
- **A**
- **B**

Option
- None (Blank)

Porting
- Cartridge Only **0**
- SAE 6 **6T**
- 3/8 in. BSP* **3B**

*BSP Body; U.K. Mfr. Only

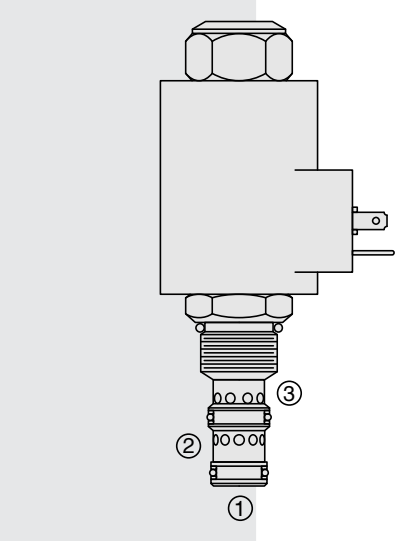
Seals
- Buna N (Std.) **N**
- Fluorocarbon **V**

Terminations
- **DS** Dual Spades
- **DG** DIN 43650
- **DL** Leadwires (2)
- **DL/W** Leads w/Weatherpak® Connectors

Coils with internal diode are available. Consult factory.

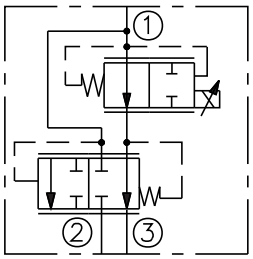
Voltage
- **0** Less Coil
- **12** 12 VDC
- **24** 24 VDC

PV70-31 Proportional Flow Control Cartridge,

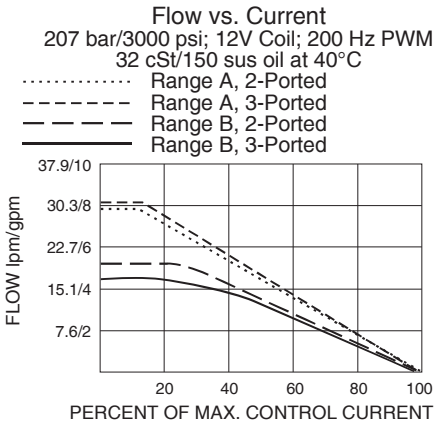


SYMBOLS

USASI/ISO:



PERFORMANCE



Performance information continued on following page.

DESCRIPTION

A solenoid operated, electrically-variable, three-port, pressure-compensated, spool-type, normally open when de-energized, proportional flow control valve. It can be used as a priority-type flow regulator with pressure-compensated, regulated and bypass flow. It can also be used as a restrictive-type two-way, pressure-compensated flow regulator when the bypass line (port 2) is blocked.

OPERATION

The **PV70-31** will regulate flow out of port 3 regardless of system working pressure. With increased current applied to the solenoid, the PV70-31 will decrease output flow.

Note: When used as a bypass flow control in applications where the priority flow port will be blocked by external valving, bypass pressure drop will increase unless a small amount of leakage is provided for the priority port. Consult factory.

Operation of Manual Override:

To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

To Disengage: Turn counterclockwise approximately 6 turns to positive stop.

FEATURES

- Excellent linearity and hysteresis.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Manual override option.

RATINGS

Operating Pressure: Inlet: 240 bar (3500 psi); Ports 2 and 3: 207 bar (3000 psi)

Regulated Flow Rate: Bypass Blocked, Range A: 26 lpm (7 gpm)
Bypass Blocked, Range B: 17 lpm (4.5 gpm)
Bypass Open, Range A: 30 lpm (8 gpm)
Bypass Open, Range B: 17 lpm (4.5 gpm)

Maximum Input Flow: Bypass Open, Range A: 50 lpm (13 gpm)
Bypass Open, Range B: 26 lpm (7 gpm)

Internal Leakage: 197 cc/min. (12 cu. in./min.) fully closed at 207 bar (3000 psi)

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	150 ± 70 mA	1400 ± 200 mA
24 VDC	75 ± 35 mA	700 ± 100 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

Cavity: VC10-3; See page 9.110.1; **Cavity Tool:** CT10-3X-XX; See page 8.600.1

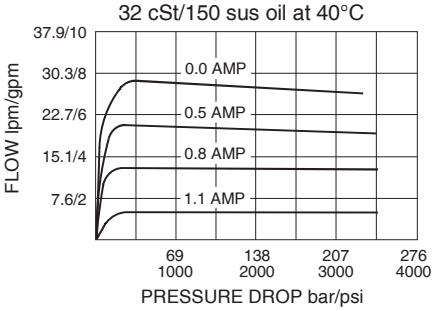
Seal Kit: SK10-3X-MM; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

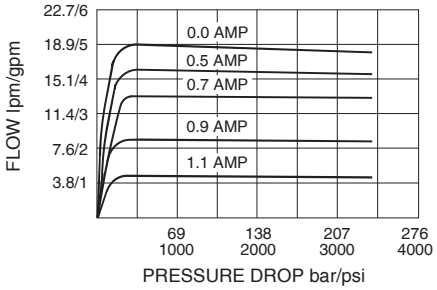
Normally Open — PV70-31

PERFORMANCE (Continued)

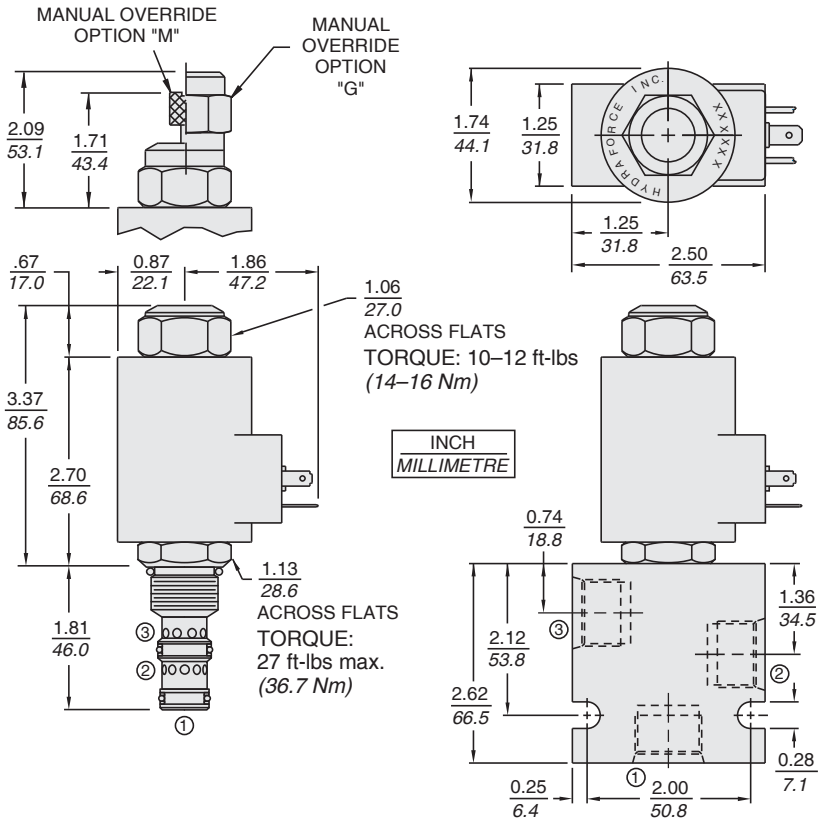
Regulated Flow vs. Pressure Drop
2-Ported; Flow Range A
240 bar/3500 psi Inlet
12V Coil; 200 Hz PWM
32 cSt/150 sus oil at 40°C



Regulated Flow vs. Pressure Drop
2-Ported; Flow Range B
240 bar/3500 psi Inlet
12V Coil; 200 Hz PWM
32 cSt/150 sus oil at 40°C



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.19 kg. (0.42 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.36 kg. (0.80 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

PV70-31 __ __ - __ __ __ - __ - __ __ __ __

Flow Range
Required. See Performance Curves.
- **A**
- **B**

Option(s)
- None (Blank)
- Manual Override **M**
- Manual Override with Guard **G**

Porting
- **0** Cartridge Only
- **6T** SAE 6
- **8T** SAE 8
- **2B** 1/4 in. BSP*
- **3B** 3/8 in. BSP*

*BSP Body; U.K. Mfr. Only

Seals
- Buna N (Std.) **N**
- Fluorocarbon **V**

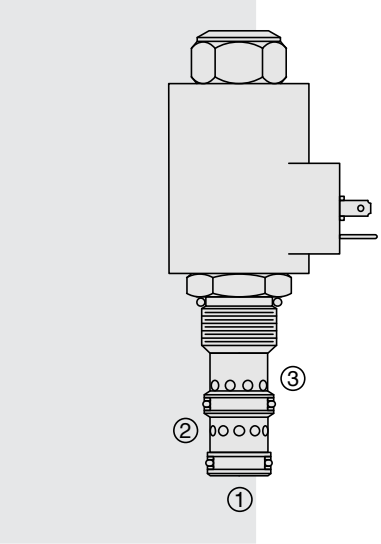
Terminations D-Coil
- **DS** Dual Spades
- **DG** DIN 43650
- **DL** Leadwires (2)
- **DL/W** Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
- **ER** Deutsch DT04-2P
- **EY** Metri-Pack® 150

Coils with internal diode are available. Consult factory.

Voltage
- **0** Less Coil
- **12** 12 VDC
- **24** 24 VDC

PV72-31 Proportional Flow Control Cartridge,



DESCRIPTION

A solenoid operated, electrically-variable, three-port, pressure-compensated, spool-type, normally open when de-energized, proportional flow control valve. It can be used as a priority-type flow regulator with pressure-compensated, regulated and by-pass flow. It can also be used as a restrictive-type, two-way, pressure-compensated flow regulator when the bypass line (port 2) is blocked.

OPERATION

The **PV72-31** will regulate flow out of port 3 regardless of system working pressure. With increased current applied to the solenoid, the PV72-31 will decrease output flow.

Note: When used as a bypass flow control in applications where the priority flow port will be blocked by external valving, bypass pressure drop will increase unless a small amount of leakage is provided for the priority port. Consult factory.

Operation of Manual Override:

To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

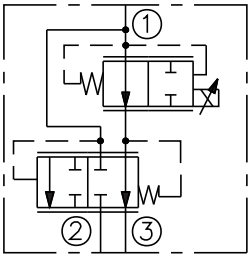
To Disengage: Turn counterclockwise approximately 6 turns to positive stop.

FEATURES

- Excellent linearity and hysteresis.
- Hardened spool and cage for long life.
- Efficient wet armature construction.
- Optional coil voltages and terminations.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Manual override option.

SYMBOLS

USASI/ISO:



RATINGS

Operating Pressure: Port 1: 240 bar (3500 psi); Ports 2 and 3: 207 bar (3000 psi)

Regulated Flow Rate in 3-Port Mode: Range A: 53 lpm (14 gpm)
Range B: 38 lpm (10 gpm)

Maximum Input Flow in 3-Port Mode: Range A and B: 114 lpm (30 gpm)

Maximum Flow Rate in 2-Port Mode: Range A: 42 lpm (11 gpm)
Range B: 31 lpm (8 gpm)

Note: For increased flow capacity in a 2-port flow control, see model PV72-21

Internal Leakage: .38 lpm (0.1 gpm) fully closed at 207 bar (3000 psi)

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	150 ± 100 mA	1350 ± 150 mA
24 VDC	75 ± 50 mA	675 ± 75 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

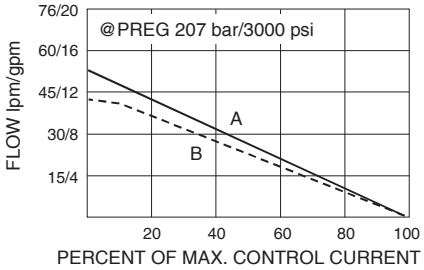
Installation: No restrictions; See page 9.020.1.

Cavity: VC12-3; See page 9.112.1; **Cavity Tool:** CT12-3X-XX; See page 8.600.1

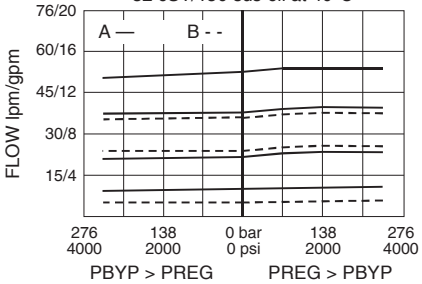
Seal Kit: SK12-3X-MM; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

PERFORMANCE

Flow vs. Current
Input Flow: 76 lpm/20 gpm
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



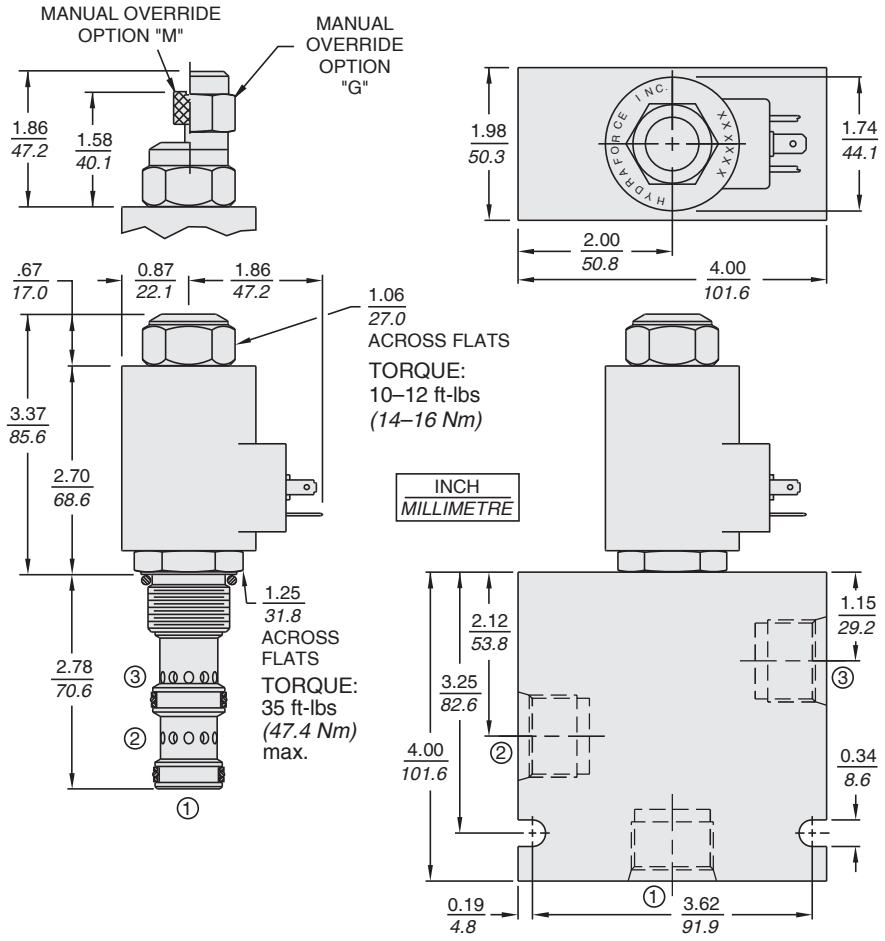
Regulated Flow vs. Pressure
Input Flow: 76 lpm/20 gpm
12V Coil; 110 Hz PWM
32 cST/150 sus oil at 40°C



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Normally Open PV72-31

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.36 kg. (0.80 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 1.09 kg. (2.4 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.012.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

PV72-31 __ __ - __ __ __ - __ - __ __ __

Flow Range (Required. See Performance Curves.)
- **A**
- **B**

Porting
- **0** Cartridge Only
- **10T** SAE 10
- **12T** SAE 12
- **16T** SAE 16
- **4B** 1/2 in. BSP*
- **6B** 3/4 in. BSP*

*BSP Body; U.K. Mfr. Only

Option(s)
- None (Blank)
- Manual Override **M**
- Manual Override with Guard **G**

Seals
- Buna N (Std.) **N**
- Fluorocarbon **V**

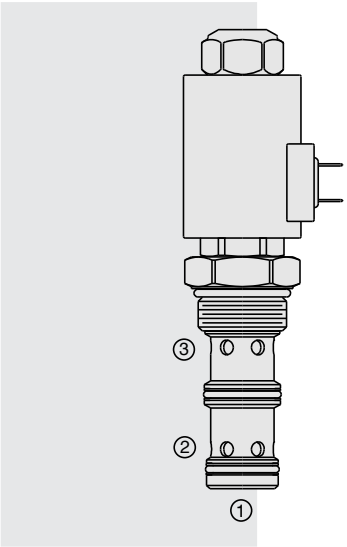
Terminations D-Coil
- **DS** Dual Spades
- **DG** DIN 43650
- **DL** Leadwires (2)
- **DL/W** Leads w/Weatherpak® Connectors

Terminations E-Coil (IP69K Rated)
- **ER** Deutsch DT04-2P
- **EY** Metri-Pack® 150

Coils with internal diode are available. Consult factory.

Voltage
- **0** Less Coil
- **12** 12 VDC
- **24** 24 VDC

PV76-31A Proportional Flow Control Cartridge,



DESCRIPTION

A solenoid-operated, electrically-variable, three-port, pressure-compensated, spool-type, normally open when de-energized, proportional flow control valve. It can be used as a priority-type flow regulator with pressure-compensated, regulated and by-pass flow. It can also be used as a restrictive-type, two-way, pressure-compensated flow regulator when the bypass line (port 2) is blocked.

OPERATION

The **PV76-31A** will regulate flow out of port 3 regardless of system working pressure. With an increasing current applied to the solenoid, output flow will decrease.

Note: When used as a bypass flow control in applications where the priority flow port will be blocked by external valving, bypass pressure drop will increase unless a small amount of leakage is provided for the priority port. Consult factory.

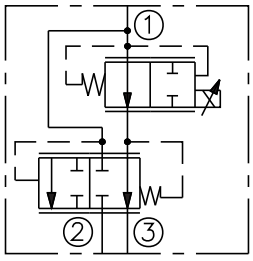
Operation of Manual Override: To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift. To Disengage: Turn counterclockwise approximately 6 turns to positive stop.

FEATURES

- Excellent linearity and hysteresis characteristics.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.

SYMBOLS

USASI/ISO:



RATINGS

Operating Pressure: Inlet: 240 bar (3500 psi); Ports 2 and 3: 207 bar (3000 psi)

Regulated Flow Rate: 3-Ported: 75.7 lpm (20.0 gpm)
2-Ported: 79.5 lpm (21.0 gpm)

Maximum Input Flow: Bypass Open, 3-Ported: 151.4 lpm (40.0 gpm)

Internal Leakage: 0.38 lpm (0.10 gpm) at maximum current

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	100 ± 50 mA	1500 ± 100 mA
24 VDC	50 ± 25 mA	750 ± 50 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

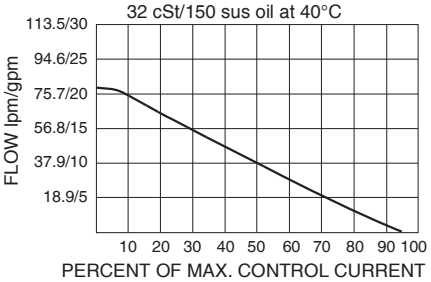
Installation: No restrictions; See page 9.020.1.

Cavity: VC16-3; See page 9.116.1; **Cavity Tool:** CT16-3X-XX; See page 8.600.1

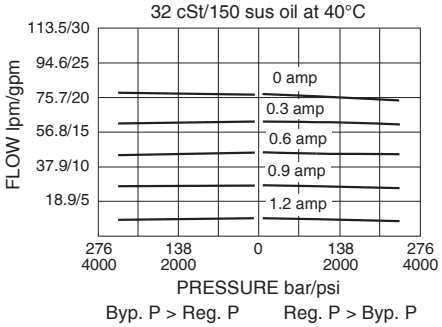
Seal Kit: SK16-3X-MM; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

PERFORMANCE

3-WAY VALVE
Regulated Flow vs. Current
240 bar/3500 psi Inlet
207 bar/3000 psi at Port 3; No Load at Port 2
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



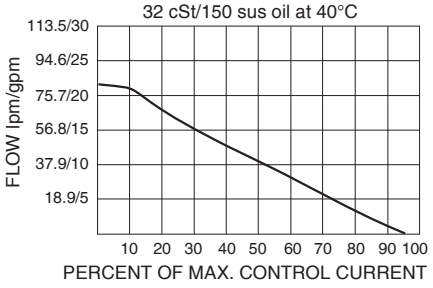
3-WAY VALVE
Regulated Flow vs. Load
240 bar/3500 psi Inlet
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



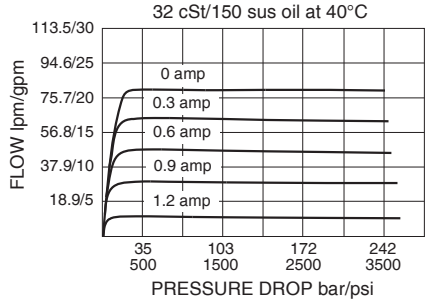
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

PERFORMANCE (continued)

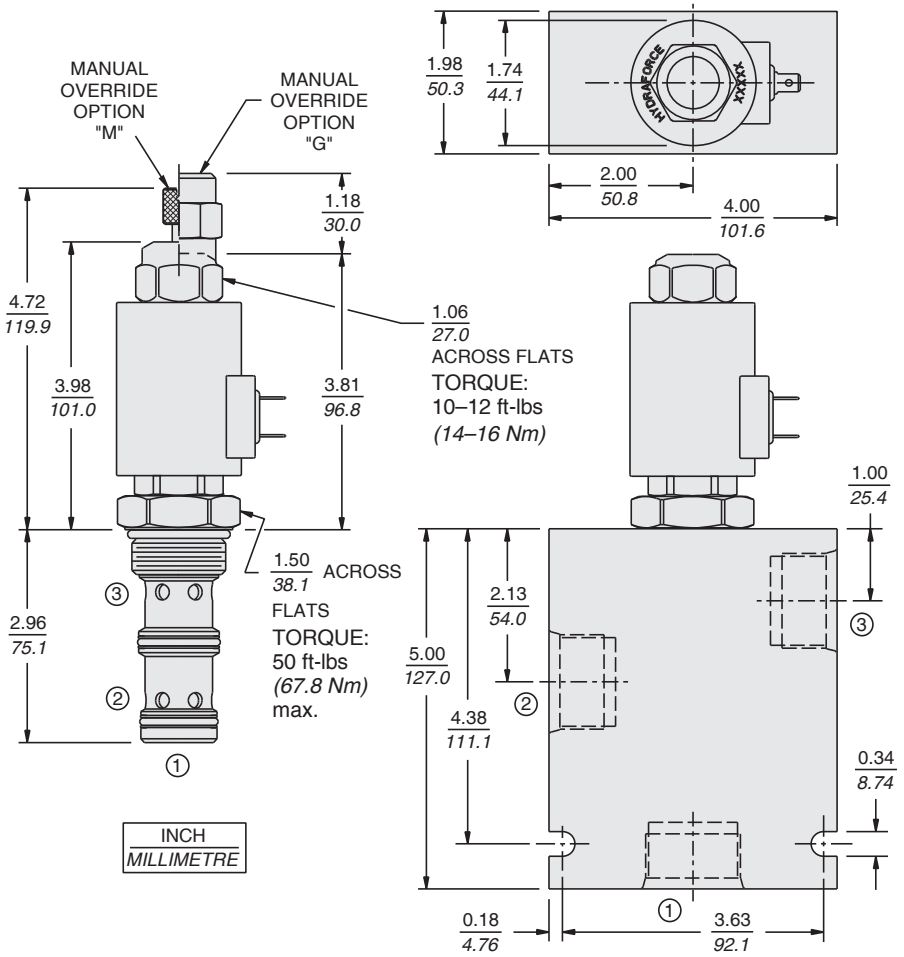
2-WAY VALVE
Regulated Flow vs. Current
240 bar/3500 psi Inlet
207 bar/3000 psi at Port 3
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



2-WAY VALVE
Regulated Flow vs. Pressure Drop
240 bar/3500 psi Inlet
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.54 kg. (1.19 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 1.6 kg. (3.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.016.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

PV76-31A __ - _____ - __ - _____

Option(s)
None (Blank)
Manual Override **M**
Manual Override with Guard **G**

Porting
0 Cartridge Only
12T SAE 12
16T SAE 16

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

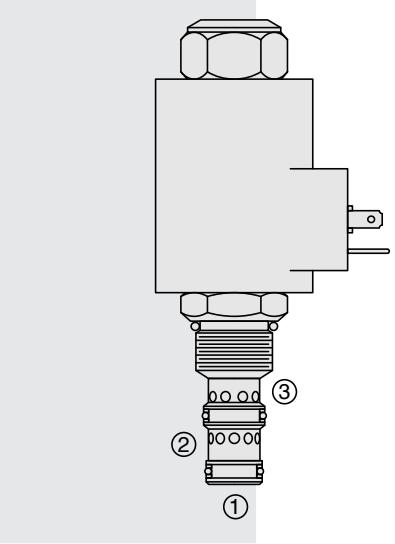
Voltage
0 Less Coil
12 12 VDC
24 24 VDC

Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150

Coils with internal diode are available. Consult factory.

PV70-33 Proportional Flow Control Cartridge,



DESCRIPTION

A linear solenoid-driven, two-way normally closed, screw-in cartridge valve designed for use with a pressure compensator to function as an electrically stroked variable flow regulator.

OPERATION

With increasing electric current, the **PV70-33** changes from full closed to full open with flow from port 3 to port 2. Port 1 is used only to pressure balance the spool and should be plugged. The proportional valve is intended to function in tandem with standard HydraForce pressure compensators at pressure differentials of 21 bar (300 psid) or less, or alone in variable volume pressure-compensated circuits with load sense capability.

The valve is designed to work with industry-common controllers which typically feature current capability to 2 amps @ 12 VDC, PWM, and start/stop trim adjustments (I-min./I-max.). Consult factory for details and potential sourcing.

Operation of Manual Override:

To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

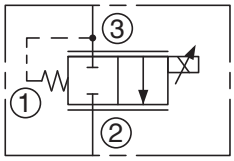
To Disengage: Turn counterclockwise approximately 6 turns to positive stop.

FEATURES

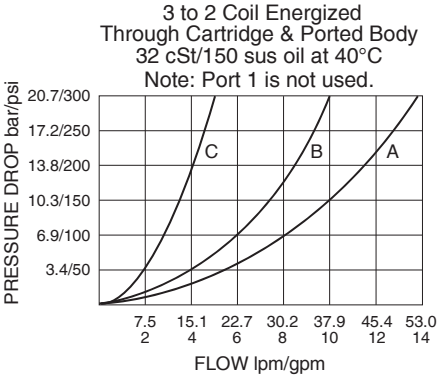
- Excellent linearity and hysteresis.
- Optional control orifice sizes.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Manual override option.

SYMBOLS

USASI/ISO:



PERFORMANCE



RATINGS

Operating Pressure: 207 bar (3000 psi)

Internal Leakage: 197 cc/min. (12 cu. in./min.) fully closed at 207 bar (3000 psi)

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current (mA) A & B Range	Threshold Current (mA) C Range	Max. Control Current (mA) A & B Range	Max. Control Current (mA) C Range
12 VDC	300 ± 70	360 ± 70	1500 ± 200	1400 ± 200
24 VDC	150 ± 35	180 ± 35	750 ± 100	700 ± 100

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

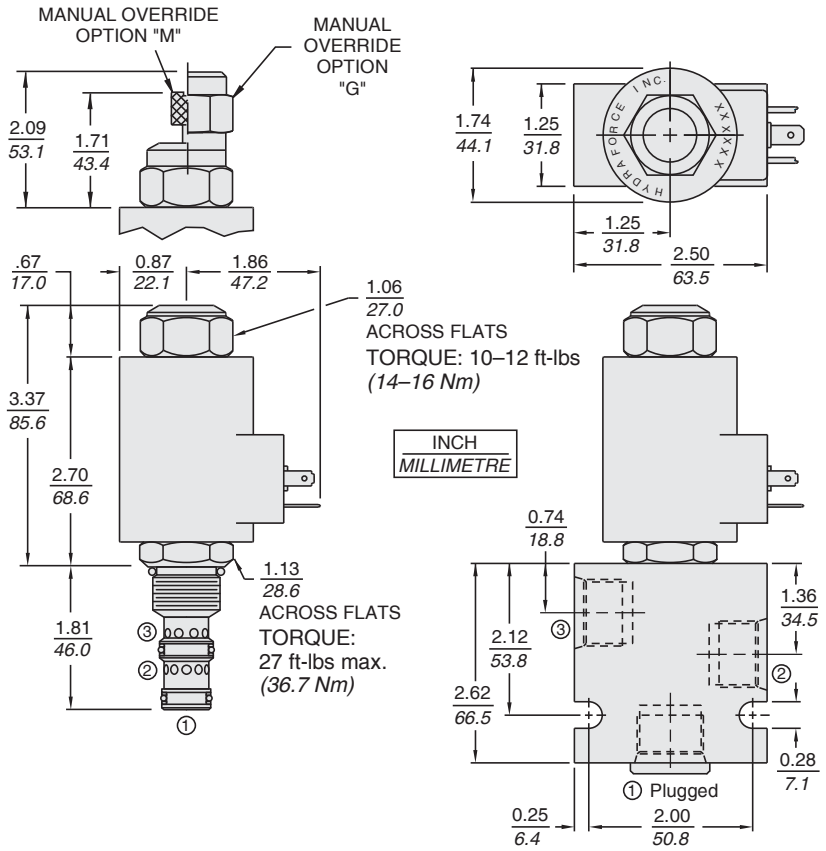
Cavity: VC10-3; See page 9.110.1; **Cavity Tool:** CT10-3X-XX; See page 8.600.1

Seal Kit: SK10-3X-MM; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Normally Closed PV70-33

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.19 kg. (0.42 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.36 kg. (0.80 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

Port Plug: For SAE 6 Port: 6103006
For SAE 8 Port: 6103008;
See page 8.500.1.

TO ORDER

PV70-33 __ __ - __ __ __ - __ - __ __ __ __

Flow Range
Required. See Performance Curves.
A
B

Porting
0 Cartridge Only
6T SAE 6
8T SAE 8
2B 1/4 in. BSP*
3B 3/8 in. BSP*
*BSP Body; U.K. Mfr. Only

Option(s)
None (Blank)
Manual Override **M**
Manual Override with Guard **G**

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

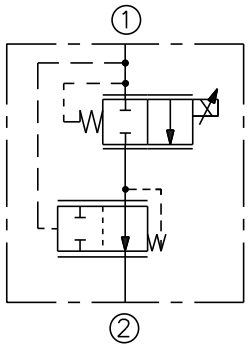
Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150
Coils with internal diode are available. Consult factory.

Voltage
0 Less Coil
12 12 VDC
24 24 VDC

PFR70-33x-E Proportional Flow Regulator, N.C.,

SYMBOLS

USASI:



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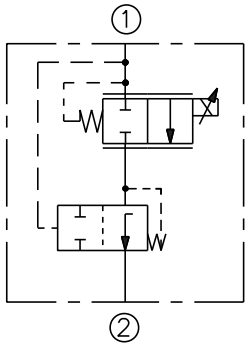


Attention Manifold Designers:
To obtain these high flow capabilities using proportional flow controls and compensators, optimized cavity drillings are required. Please consult factory.

DESCRIPTION

A pressure-compensated electrically-variable two-port flow regulator that is normally closed when de-energized. This combination valve uses a PV70-33x proportional cartridge and an EC10-30 compensator.

OPERATION

This proportional valve/compensator package will regulate flow out of port 2, regardless of system working pressure. With an increasing current applied to the solenoid, the **PFR70-33x-E** will increase output flow.

FEATURES

- Excellent linearity and hysteresis.
- Optional control orifice sizes.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Efficient wet armature construction.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Screw-in manual override option.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Internal Leakage: 410 cc/min. (25 cu. in./min.) fully closed at 207 bar (3000 psi) out port 2.

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current (mA) A & B Range	Threshold Current (mA) C Range	Max. Control Current (mA) A & B Range	Max. Control Current (mA) C Range
12 VDC	300 ± 70	360 ± 70	1500 ± 200	1400 ± 200
24 VDC	150 ± 35	180 ± 35	750 ± 100	700 ± 100

Operation of Manual Override:
To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.
To Disengage: Turn counterclockwise approximately 6 turns until positive stop is found.

Filtration: See page 9.010.1

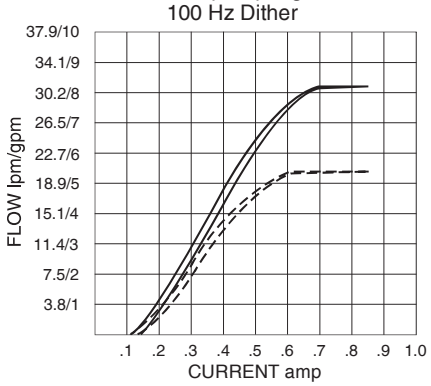
Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1

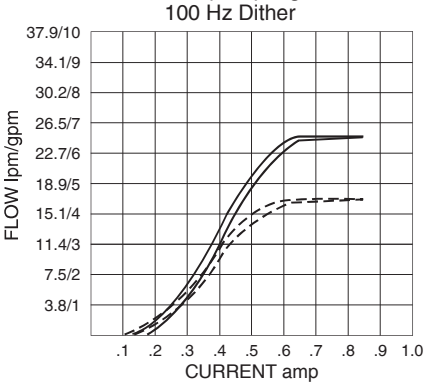
PERFORMANCE CURVES Regulated Flow Delivered Out Port □:

24 Volt coil used; 130 Hz dither; PWM controller. For 12 volt coils, double the current (amp) values shown.

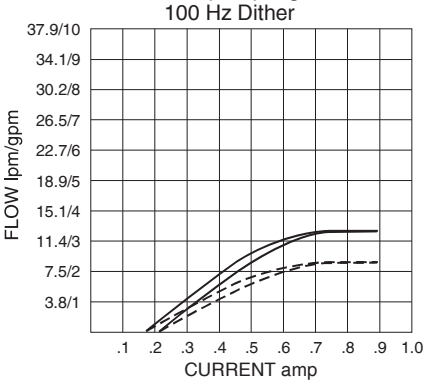
Flow vs. Current (207 bar/3000 psi Load)
PV70-33A with EC10-30
11 bar/160 psi spring ——
5.5 bar/80 psi spring - - - -
100 Hz Dither



Flow vs. Current (207 bar/3000 psi Load)
PV70-33B with EC10-30
11 bar/160 psi spring ——
5.5 bar/80 psi spring - - - -
100 Hz Dither

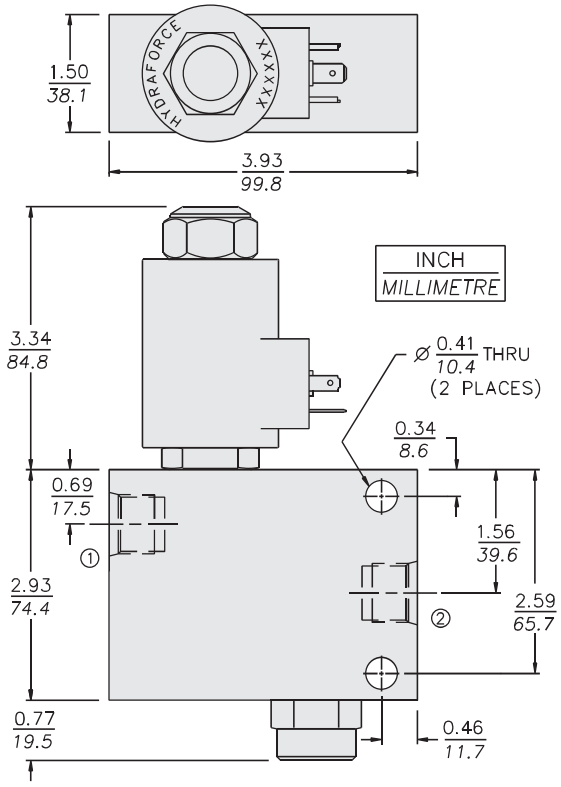


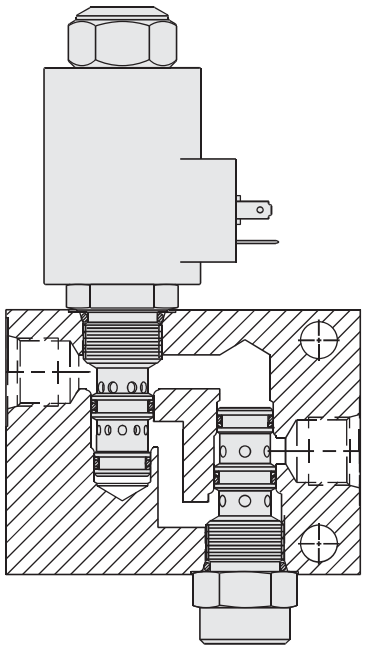
Flow vs. Current (207 bar/3000 psi Load)
PV70-33C with EC10-30
11 bar/160 psi spring ——
5.5 bar/80 psi spring - - - -
100 Hz Dither



2-Port, Pressure Compensated PFR70-33x-E

DIMENSIONS





NOTE: The normally open PV70-35 may not be substituted in this manifold due to port logic factors.

MATERIALS

Cartridge: Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups standard.

Standard Ported Body: Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. Consult factory.

Coil: D-Coil: See page 3.200.1
E-Coil: See page 3.400.1

Package Weight: 2.27 kg. (5 lbs.)

Seal Kit: SK10-3x-MM (PV)
SK10-3x-TB (EC)

TO ORDER

PFR70-33 __ - E __ - 8T - __ - __ __ __ __

***PV Orifice Range**
Orifice Range **A**
Orifice Range **B**
Orifice Range **C**

Override Option
(Blank) None
M Screw Type

***Compensator Spring**
5.52 bar (80 psi) **80**
11.03 bar (160 psi) **160**

*Select Orifice Range and Compensator Spring by referring to the Performance Curves on the preceding page.

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Voltage
0 Less Coil
12 12 VDC
24 24 VDC

Coils with internal diode are available. Consult factory.

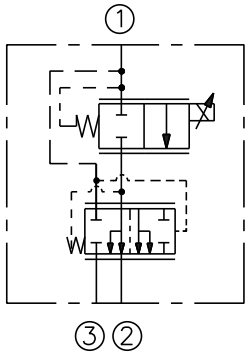
Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150

PFR70-33x-F Proportional Priority Flow Regulator, N.C.,

SYMBOLS

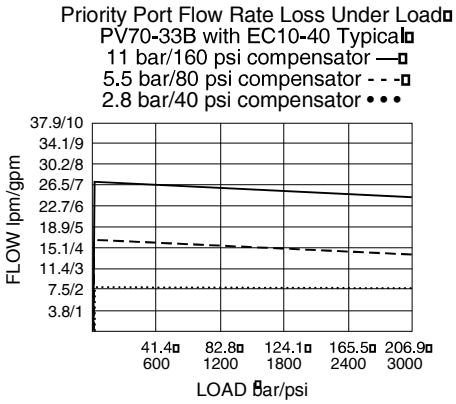
USASI/ISO:



Attention Manifold Designers:
To obtain these high flow capabilities using proportional flow controls and compensators, optimized cavity drillings are required. Please consult factory.

PERFORMANCE CURVES

24 Volt coil used; 130 Hz dither; PWM controller



DESCRIPTION

A pressure-compensated electrically-variable three-port flow regulator that is a priority (bypass) type control. This combination valve uses a PV70-33x proportional cartridge and an EC10-40 compensator.

OPERATION

The **PFR70-33x-F** series will bypass all flow out port 3 when de-energized at the pressure compensator spring value. When energized, this proportional valve/compensator package will increase and regulate flow out of port 2, regardless of system working pressure, with an increasing current applied to the solenoid.

FEATURES

- Excellent linearity and hysteresis.
- Optional control orifice sizes.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Screw-in manual override option.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Pressure Rise: Pressure at 1 begins to rise higher than the compensating pressure differential when bypass flow exceeds 26.5 lpm (7 gpm).

Internal Leakage: 410 cc/min. (25 cu. in./min.) fully closed at 207 bar (3000 psi) out port 2.

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current (mA) A & B Range	Threshold Current (mA) C Range	Max. Control Current (mA) A & B Range	Max. Control Current (mA) C Range
12 VDC	300 ± 70	360 ± 70	1500 ± 200	1400 ± 200
24 VDC	150 ± 35	180 ± 35	750 ± 100	700 ± 100

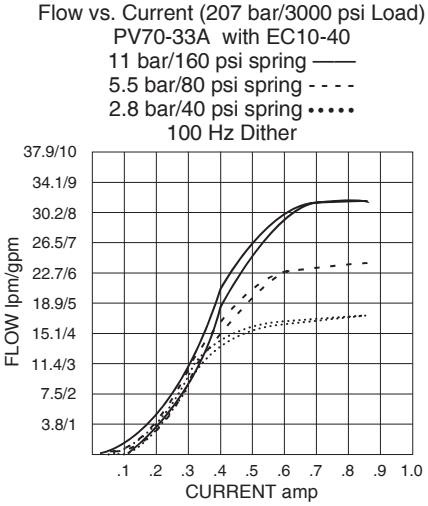
Operation of Manual Override:
To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.
To Disengage: Turn counterclockwise approximately 6 turns until positive stop is found.

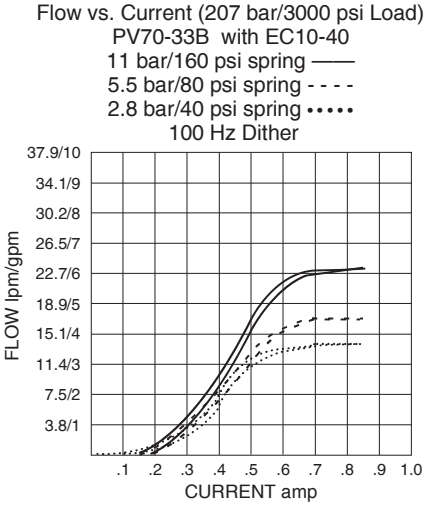
Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

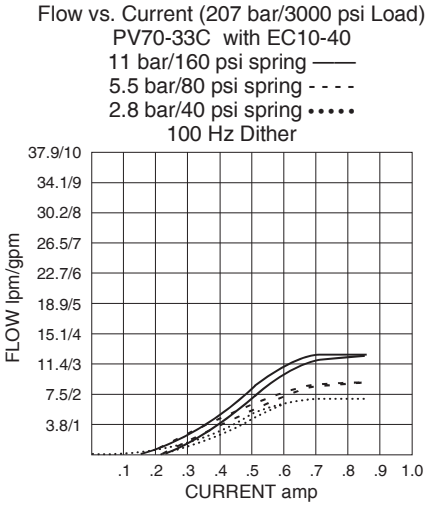
Installation: No restrictions; See page 9.020.1; **Filtration:** See page 9.010.1

Priority Port Flow Delivered Out Port 2:

For 12 volt coils, double the current (amp) values shown.

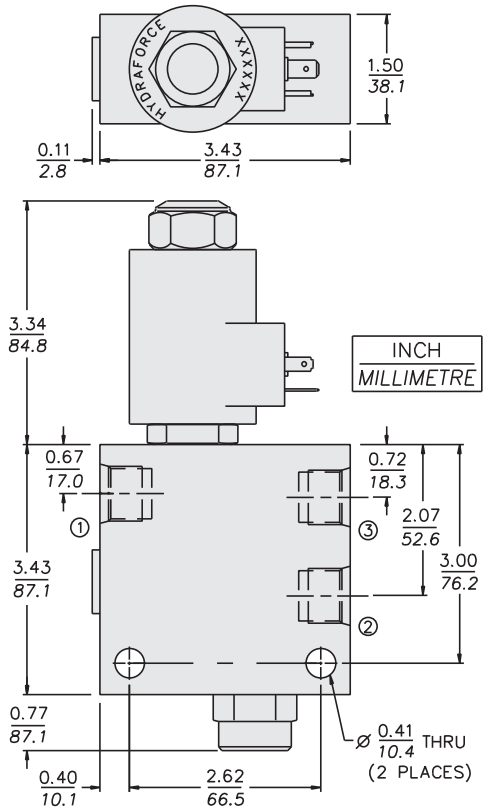


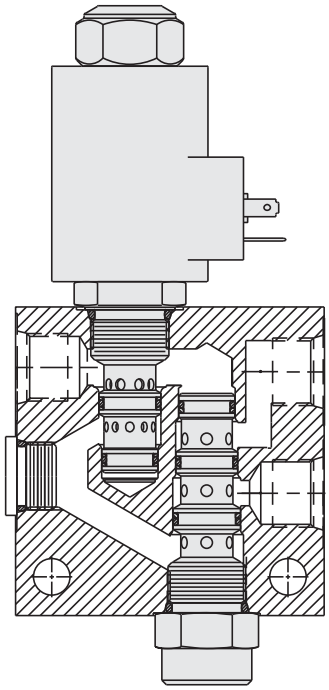




3-Port, Pressure Compensated PFR70-33x-F

DIMENSIONS





NOTE: The normally open PV70-35 may not be substituted in this manifold due to port logic factors.

MATERIALS

Cartridge: Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups standard.

Standard Ported Body: Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. Consult factory.

Coil: D-Coil: See page 3.200.1
E-Coil: See page 3.400.1

Package Weight: 2.27 kg. (5 lbs.)

Seal Kit: SK10-3x-MM (PV)
SK10-4x-TMB (EC)

TO ORDER

PFR70-33 __ - F __ - 8T - __ - __ __ __ __

***PV Orifice Range**
Orifice Range **A**
Orifice Range **B**
Orifice Range **C**

Override Option
(Blank) None
M Screw Type

***Compensator Spring**
2.76 bar (40 psi) **40**
5.52 bar (80 psi) **80**
11.03 bar (160 psi) **160**

*Select Orifice Range and Compensator Spring by referring to the Performance Curves on the preceding page.

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Voltage
0 Less Coil
12 12 VDC
24 24 VDC

Coils with internal diode are available. Consult factory.

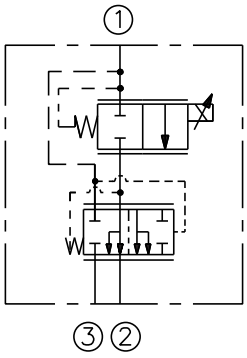
Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150

PFR70-33x-J Proportional Priority Flow Regulator, N.C.,

SYMBOLS

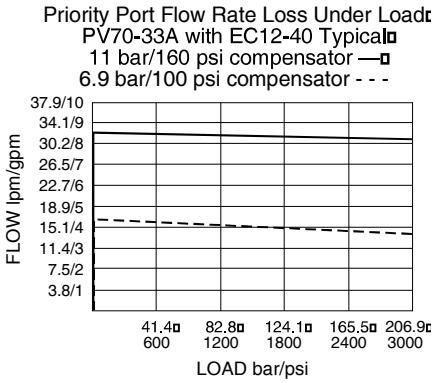
USASI/ISO:



Attention Manifold Designers:
To obtain these high flow capabilities using proportional flow controls and compensators, optimized cavity drillings are required. Please consult factory.

PERFORMANCE CURVES

24 Volt coil used; 130 Hz dither; PWM controller



DESCRIPTION

A pressure-compensated electrically-variable three-port flow regulator that is a priority (bypass) type control. This combination valve uses a PV70-33x proportional cartridge and an EC12-40 compensator.

OPERATION

The **PFR70-33x-J** series will bypass all flow when de-energized at the pressure compensator spring value. When energized, this proportional valve/compensator package will regulate flow out of port 2, regardless of system working pressure, with an increasing current applied to the solenoid.

FEATURES

- Excellent linearity and hysteresis.
- Optional control orifice sizes.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Screw-in manual override option.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Pressure Rise: Pressure at 1 begins to rise higher than the compensating pressure differential when bypass flow exceeds 41.6 lpm (11 gpm).

Internal Leakage: 410 cc/min. (25 cu. in./min.) fully closed at 207 bar (3000 psi) out port 2.

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current (mA) A & B Range	Threshold Current (mA) C Range	Max. Control Current (mA) A & B Range	Max. Control Current (mA) C Range
12 VDC	300 ± 70	360 ± 70	1500 ± 200	1400 ± 200
24 VDC	150 ± 35	180 ± 35	750 ± 100	700 ± 100

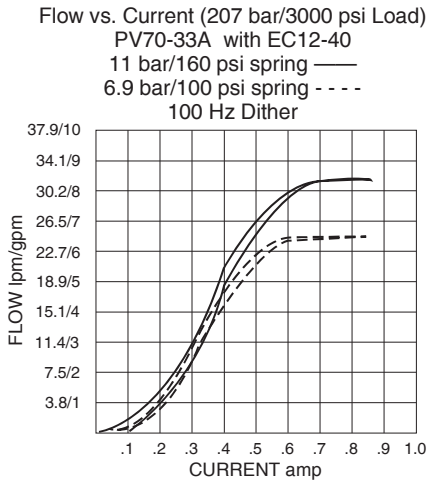
Operation of Manual Override:
To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.
To Disengage: Turn counterclockwise approximately 6 turns until positive stop is found.

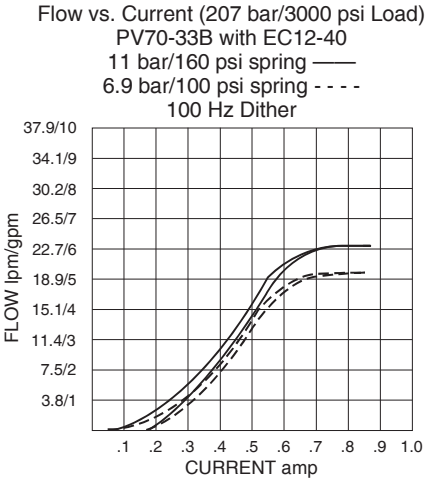
Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

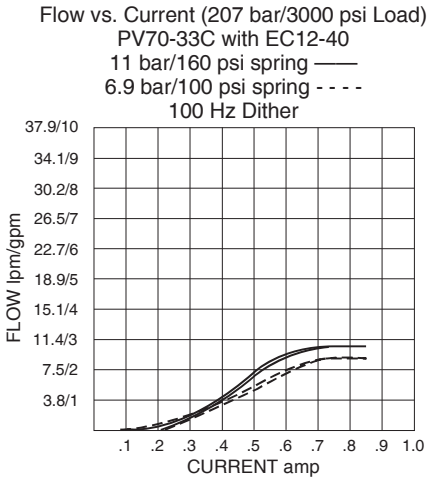
Installation: No restrictions; See page 9.020.1; **Filtration:** See page 9.010.1

Priority Port Flow Delivered Out Port 2:

For 12 volt coils, double the current (amp) values shown.

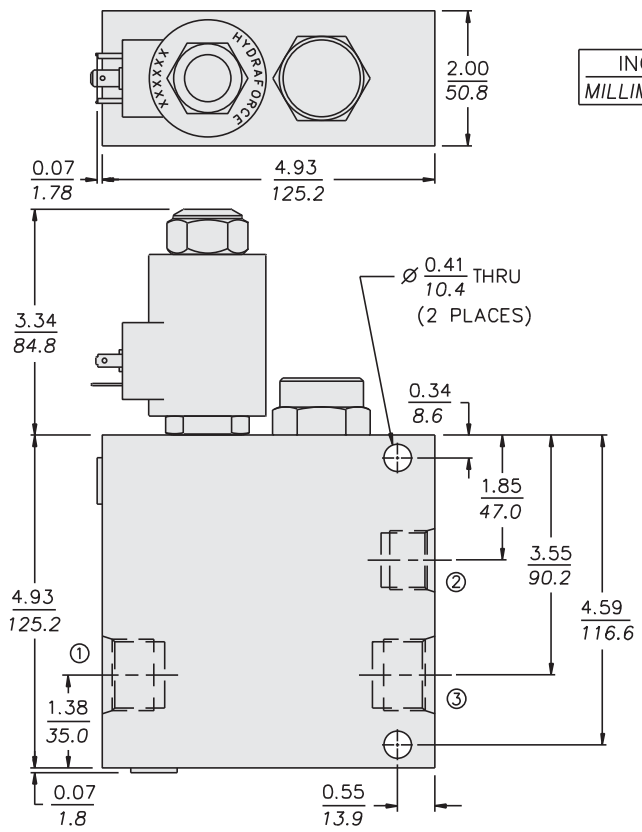


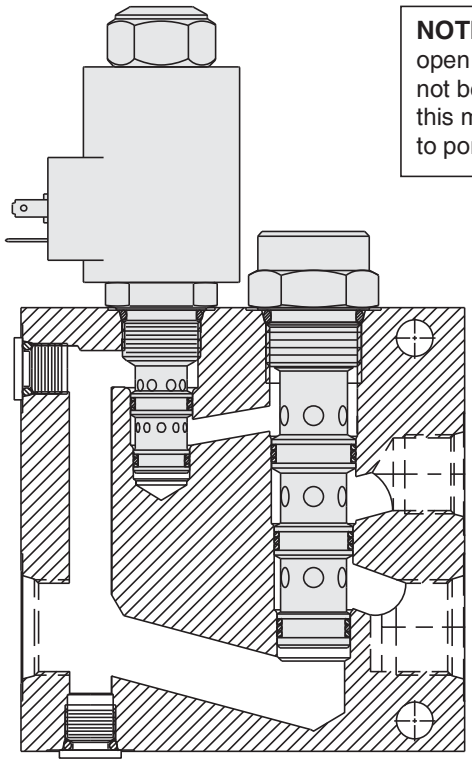




3-Port, Pressure Compensated PFR70-33x-J

DIMENSIONS





NOTE: The normally open PV70-35 may not be substituted in this manifold due to port logic factors.

MATERIALS

Cartridge: Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups standard.

Standard Ported Body: Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. Consult factory.

Coil: D-Coil: See page 3.200.1
E-Coil: See page 3.400.1

Package Weight: 2.72 kg. (6 lbs.)

Seal Kit: SK10-3x-MM (PV)
SK12-4x-TMB (EC)

TO ORDER

PFR70-33 __ - J __ - 10/12T† - __ - __ __ __ __

***PV Orifice Range**
Orifice Range **A**
Orifice Range **B**
Orifice Range **C**

Override Option
(Blank) None
M Screw Type

***Compensator Spring**
6.9 bar (100 psi) **100**
11.03 bar (160 psi) **160**

*Select Orifice Range and Compensator Spring by referring to the Performance Curves on the preceding page.

† Ports 1 & 3: SAE 12
Port 2: SAE 10

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

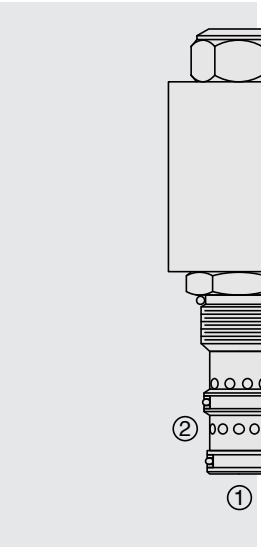
Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150

Voltage
0 Less Coil
12 12 VDC
24 24 VDC

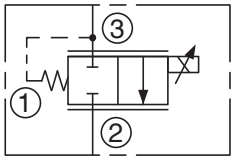
Coils with internal diode are available. Consult factory.

PV72-33 Proportional Flow Control Cartridge,

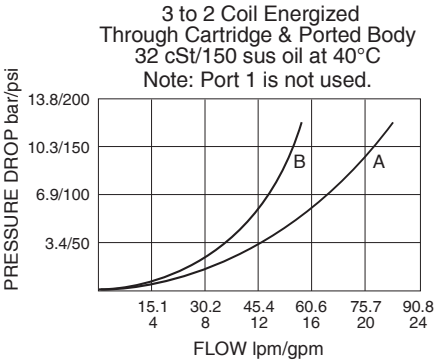


SYMBOLS

USASI/ISO:



PERFORMANCE



DESCRIPTION

A linear solenoid-driven, two-way normally closed, screw-in cartridge valve designed for use with a pressure compensator to function as an electrically stroked variable flow regulator.

OPERATION

With increasing electric current, the **PV72-33** changes from full closed to full open with flow from port 3 to port 2. Port 1 is used only to pressure balance the spool and should be plugged. The proportional valve is intended to function in tandem with standard HydraForce pressure compensators at pressure differentials of 12 bar (175 psid) or less, or alone in variable volume pressure-compensated circuits with load sense capability.

The valve is designed to work with industry-common controllers which typically feature current capability to 2 amps @ 12 VDC, PWM, and start/stop trim adjustments (I-min./I-max.). Consult factory for details and potential sourcing.

Operation of Manual Override:

To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

To Disengage: Turn counterclockwise approximately 6 turns to positive stop.

FEATURES

- Excellent linearity and hysteresis.
- Optional control orifice sizes.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Manual override option.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Internal Leakage: 492 cc/min. (30 cu. in./min.) fully closed at 207 bar (3000 psi)

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	300 ± 70 mA	1500 ± 100 mA
24 VDC	150 ± 35 mA	750 ± 100 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

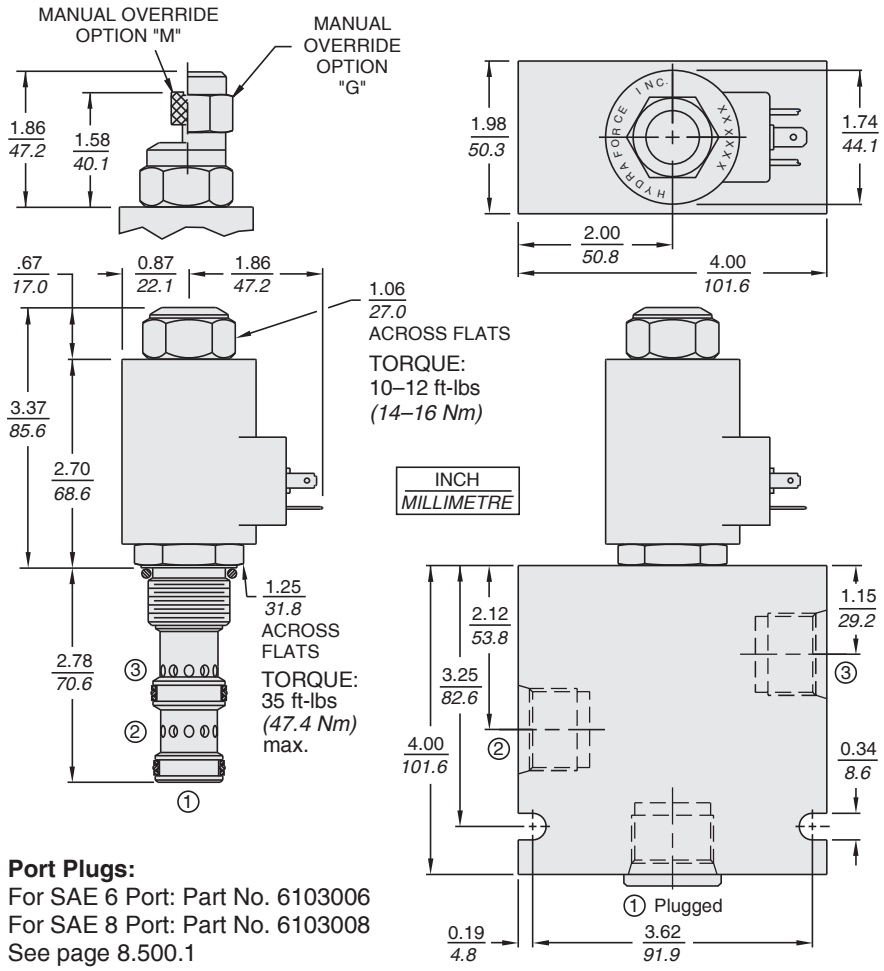
Cavity: VC12-3; See page 9.110.1; **Cavity Tool:** CT12-3X-XX; See page 8.600.1

Seal Kit: SK12-3X-MM; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Normally Closed PV72-33

DIMENSIONS



Port Plugs:
For SAE 6 Port: Part No. 6103006
For SAE 8 Port: Part No. 6103008
See page 8.500.1

MATERIALS

Cartridge: Weight: 0.36 kg. (0.80 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 1.09 kg. (2.4 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.012.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

PV72-33 __ __ - __ __ __ __ - __ - __ __ __ __

Flow Range
Required. See Performance Curves.
A
B

Porting
0 Cartridge Only
10T SAE 10
12T SAE 12
16T SAE 16
4B 1/2 in. BSP*
6B 3/4 in. BSP*
*BSP Body; U.K. Mfr. Only

Option(s)
None (Blank)
Manual Override **M**
Manual Override with Guard **G**

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

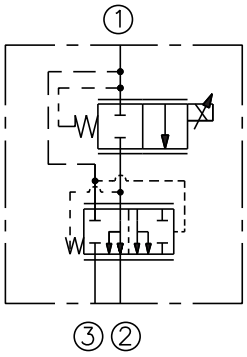
Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150
Coils with internal diode are available. Consult factory.

Voltage
0 Less Coil
12 12 VDC
24 24 VDC

PFR72-33x-J Proportional Priority Flow Regulator, N.C.,

SYMBOLS

USASI/ISO:



Attention Manifold Designers:

To obtain these high flow capabilities using proportional flow controls and compensators, optimized cavity drillings are required. Please consult factory.

DESCRIPTION

A pressure-compensated electrically-variable three-port flow regulator that is a priority (bypass) type control. This combination valve uses a PV72-33x proportional cartridge and an EC12-40 compensator.

OPERATION

The **PFR72-33x-J** series will bypass all flow when de-energized at the pressure compensator spring value. When energized, this proportional valve/compensator package will regulate flow out of port 2, regardless of system working pressure, with an increasing current applied to the solenoid.

FEATURES

- Excellent linearity and hysteresis.
- Optional control orifice sizes.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Screw-in manual override option.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Pressure Rise: Pressure at 1 begins to rise higher than the compensating pressure differential when bypass flow exceeds 41.6 lpm (11 gpm).

Internal Leakage: 492 cc/min. (30 cu. in./min.) fully closed at 207 bar (3000 psi) out port 2.

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	300 ± 70 mA	1500 ± 200 mA
24 VDC	150 ± 35 mA	750 ± 100 mA

Operation of Manual Override:

To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

To Disengage: Turn counterclockwise approximately 6 turns until positive stop is found.

Filtration: See page 9.010.1

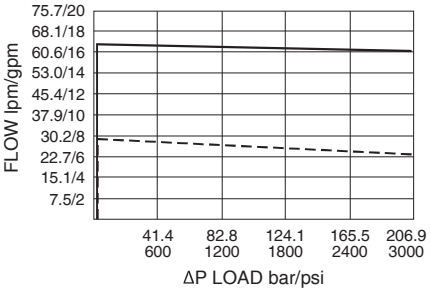
Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1

PERFORMANCE CURVES

24 Volt coil used; 100 Hz dither; PWM controller

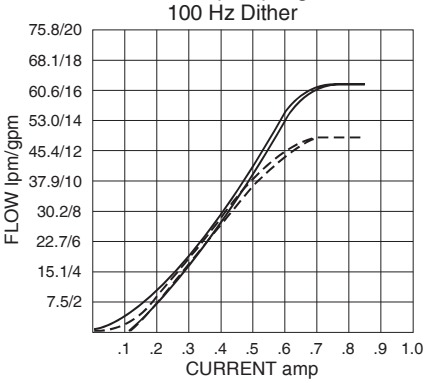
Priority Port Flow Rate Loss Under Load
PV72-33A with EC12-40 Typical
11 bar/160 psi compensator —
6.9 bar/100 psi compensator - - -



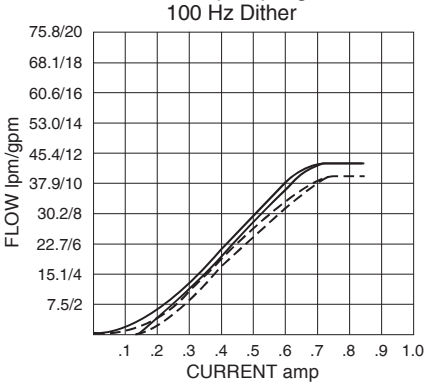
Priority Port Flow Delivered Out Port 2:

For 12 volt coils, double the current (amp) values shown.

Flow vs. Current (207 bar/3000 psi Load)
PV72-33A with EC12-40
11 bar/160 psi spring ——
6.9 bar/100 psi spring - - - -
100 Hz Dither

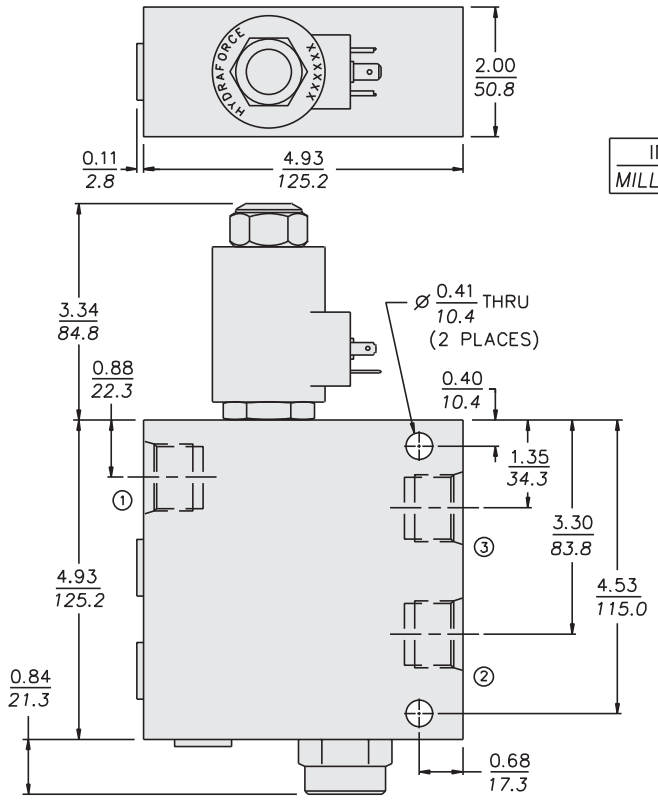


Flow vs. Current (207 bar/3000 psi Load)
PV72-33B with EC12-40
11 bar/160 psi spring ——
6.9 bar/100 psi spring - - - -
100 Hz Dither

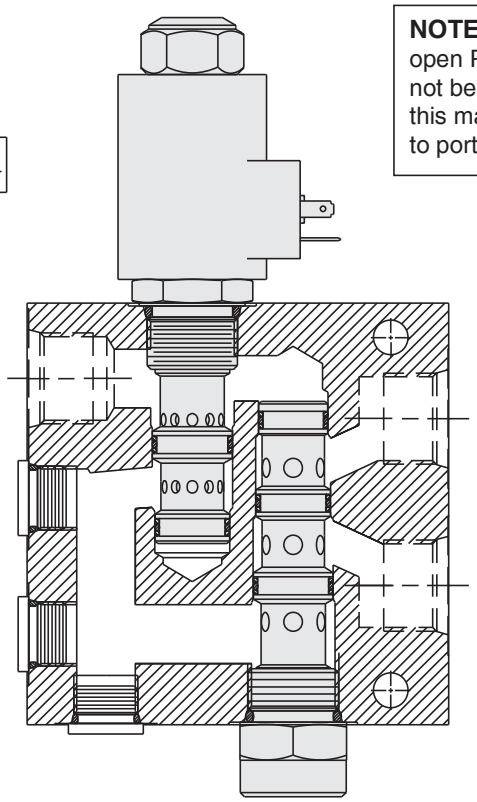


3-Port, Pressure Compensated — PFR72-33x-J

DIMENSIONS



INCH
MILLIMETRE



NOTE: The normally open PV72-35 may not be substituted in this manifold due to port logic factors.

MATERIALS

Cartridge: Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups standard.

Standard Ported Body: Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. Consult factory.

Coil: D-Coil: See page 3.200.1
E-Coil: See page 3.400.1

Package Weight: 2.95 kg. (6.5 lbs.)

Seal Kit: SK12-3x-MM (PV)
SK12-4x-TMB (EC)

TO ORDER

PFR72-33 __ - J __ - 12T - __ - __ __ __ __

***PV Orifice Range**
- **A** Orifice Range
- **B** Orifice Range

Override Option
- (Blank) None
- **M** Screw Type

***Compensator Spring**
- 4.14 bar (60 psi) **60**
- 5.17 bar (75 psi) **75**
- 6.89 bar (100 psi) **100**
- 11.03 bar (160 psi) **160**

*Select Orifice Range and Compensator Spring by referring to the Performance Curves on the preceding page.

Seals
- Buna N (Std.) **N**
- Fluorocarbon **V**

Voltage
- **0** Less Coil
- **12** 12 VDC
- **24** 24 VDC

Coils with internal diode are available. Consult factory.

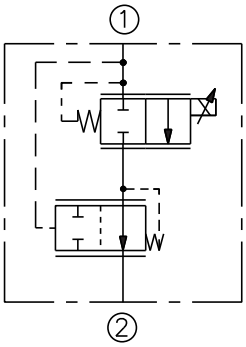
Terminations D-Coil
- **DS** Dual Spades
- **DG** DIN 43650
- **DL** Leadwires (2)
- **DL/W** Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
- **ER** Deutsch DT04-2P
- **EY** Metri-Pack® 150

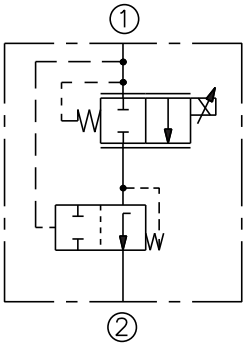
PFR72-33x-L Proportional Flow Regulator, N.C.,

SYMBOLS

USASI:



ISO:



Attention Manifold Designers:
To obtain these high flow capabilities using proportional flow controls and compensators, optimized cavity drillings are required. Please consult factory.

DESCRIPTION

A pressure-compensated electrically-variable two-port flow regulator that is normally closed when de-energized. This combination valve uses a PV72-33x proportional cartridge and an EC12-30 compensator.

OPERATION

This proportional valve/compensator package will regulate flow out of port 2 regardless of system working pressure. With an increasing current applied to the solenoid, the **PFR72-33x-L** will increase output flow.

FEATURES

- Excellent linearity and hysteresis.
- Optional control orifice sizes.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Screw-in manual override option.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Internal Leakage: 492 cc/min. (30 cu. in./min.) fully closed at 207 bar (3000 psi) out port 2.

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current (mA)	Max. Control Current (mA)
12 VDC	300 ± 200 mA	1500 ± 100 mA
24 VDC	150 ± 35 mA	750 ± 100 mA

Operation of Manual Override:
To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.
To Disengage: Turn counterclockwise approximately 6 turns until positive stop is found.

Filtration: See page 9.010.1

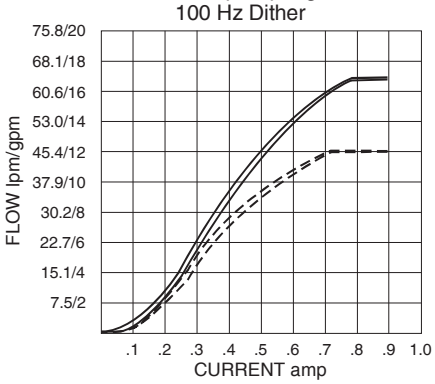
Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1

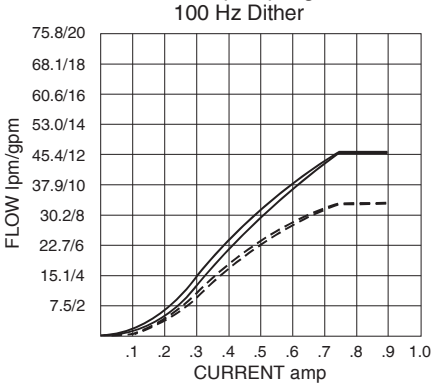
PERFORMANCE CURVES Regulated Flow Delivered Out Port 2:

24 Volt coil used; 100 Hz dither; PWM controller. For 12 volt coils, double the current (amp) values shown.

Flow vs. Current (207 bar/3000 psi Load)
PV72-33A with EC12-30
11 bar/160 psi spring ——
6.9 bar/100 psi spring - - - -
100 Hz Dither

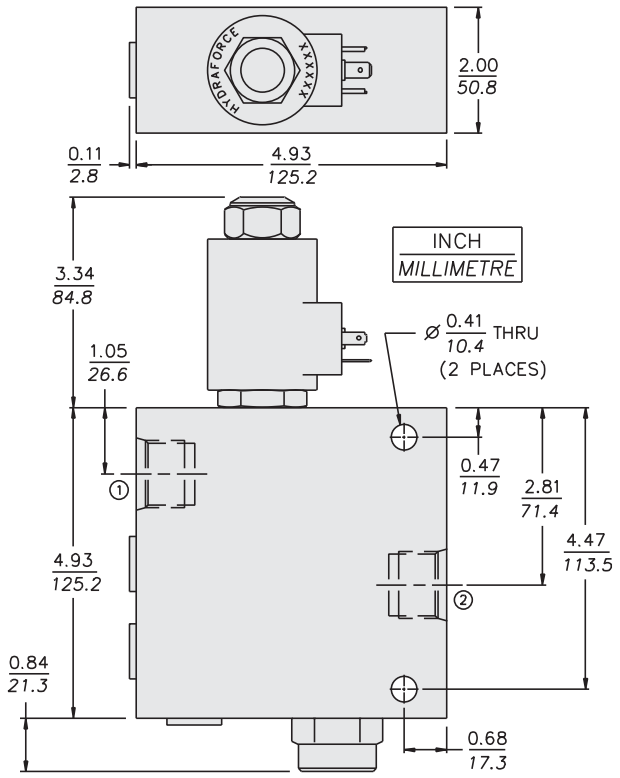


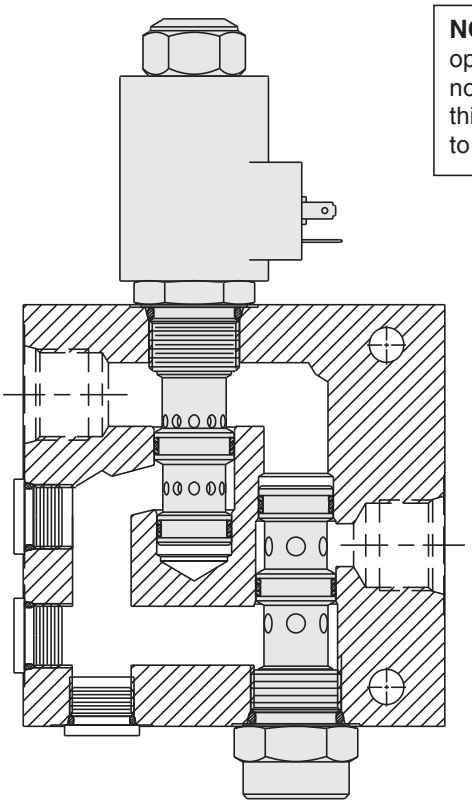
Flow vs. Current (207 bar/3000 psi Load)
PV72-33B with EC12-30
11 bar/160 psi spring ——
6.9 bar/100 psi spring - - - -
100 Hz Dither



2-Port, Pressure Compensated PFR72-33x-L

DIMENSIONS





NOTE: The normally open PV72-35 may not be substituted in this manifold due to port logic factors.

MATERIALS

Cartridge: Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and back-ups standard.

Standard Ported Body: Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. Consult factory.

Coil: D-Coil: See page 3.200.1
E-Coil: See page 3.400.1

Package Weight: 3.18 kg. (7 lbs.)

Seal Kit: SK12-3x-MM (PV)
SK12-3x-TB (EC)

TO ORDER

PFR72-33 __ - L __ - 12T - __ - __ __ __ __

***PV Orifice Range**
Orifice Range **A**
Orifice Range **B**

Override Option
(Blank) None
M Screw Type

***Compensator Spring**
6.89 bar (100 psi) **100**
11.03 bar (160 psi) **160**

*Select Orifice Range and Compensator Spring by referring to the Performance Curves on the preceding page.

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

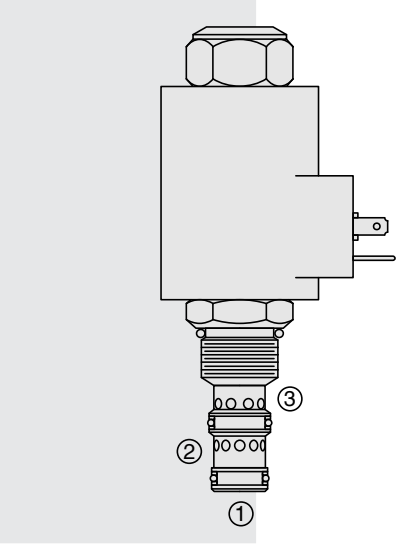
Voltage
0 Less Coil
12 12 VDC
24 24 VDC

Coils with internal diode are available. Consult factory.

Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

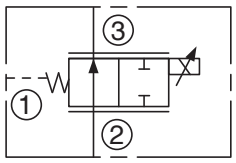
Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150

PV70-35 Proportional Flow Control Cartridge,

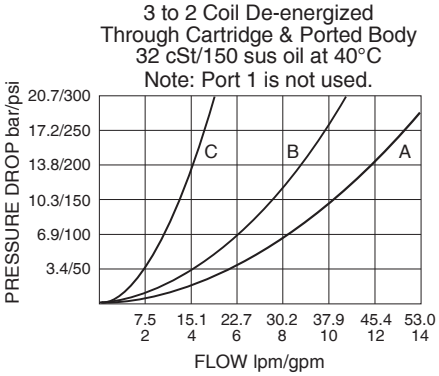


SYMBOLS

USASI/ISO:



PERFORMANCE



DESCRIPTION

A linear solenoid-driven, two-way normally open, screw-in cartridge valve designed for use with a pressure compensator to function as an electrically stroked variable flow regulator.

OPERATION

With increasing electric current, the **PV70-35** changes from full open to full closed with flow from port 2 to port 3. Port 1 is used only to pressure balance the spool and should be plugged. The proportional valve is intended to function in tandem with standard HydraForce pressure compensators at pressure differentials of 21 bar (300 psid) or less, or alone in variable volume pressure-compensated circuits with load sense capability.

The valve is designed to work with industry-common controllers which typically feature current capability to 2 amps @ 12 VDC, PWM, and start/stop trim adjustments (I min./I max.). Consult factory for details and potential sourcing.

Operation of Manual Override:

To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

To Disengage: Turn counterclockwise approximately 6 turns to positive stop.

FEATURES

- Excellent linearity and hysteresis.
- Optional control orifice sizes.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Manual override option.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Internal Leakage: 197 cc/min. (12 cu. in./min.) fully closed at 207 bar (3000 psi)

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	300 ± 200 mA	1500 ± 200 mA
24 VDC	150 ± 100 mA	750 ± 50 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

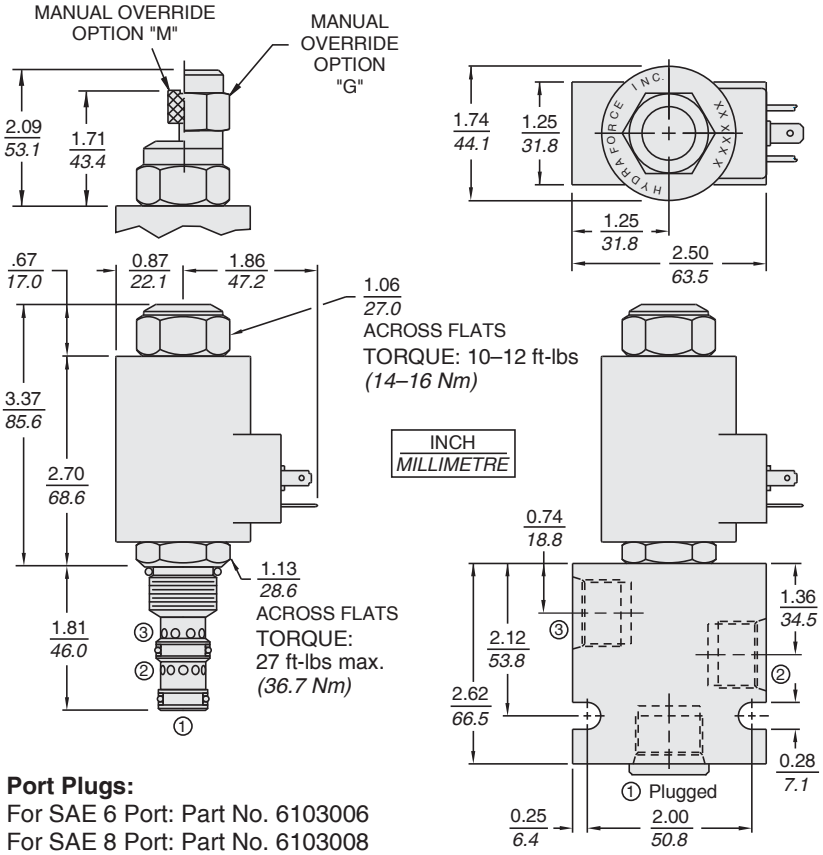
Cavity: VC10-3; See page 9.110.1; **Cavity Tool:** CT10-3X-XX; See page 8.600.1

Seal Kit: SK10-3X-MM; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Normally Open PV70-35

DIMENSIONS



Port Plugs:
For SAE 6 Port: Part No. 6103006
For SAE 8 Port: Part No. 6103008
See page 8.500.1

MATERIALS

Cartridge: Weight: 0.19 kg. (0.42 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.36 kg. (0.80 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

PV70-35 ___ ___ - ___ ___ ___ - ___ - ___ ___ ___ ___

Flow Range
Required. See Performance Curves.
A
B

Option(s)
None (Blank)
Manual Override **M**
Manual Override with Guard **G**

Porting
0 Cartridge Only
6T SAE 6
8T SAE 8
2B 1/4 in. BSP*
3B 3/8 in. BSP*
*BSP Body; U.K. Mfr. Only

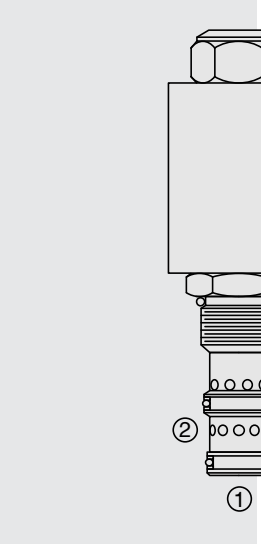
Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150
Coils with internal diode are available. Consult factory.

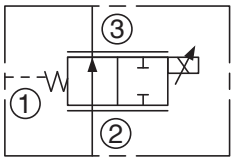
Voltage
0 Less Coil
12 12 VDC
24 24 VDC

PV72-35 Proportional Flow Control Cartridge,

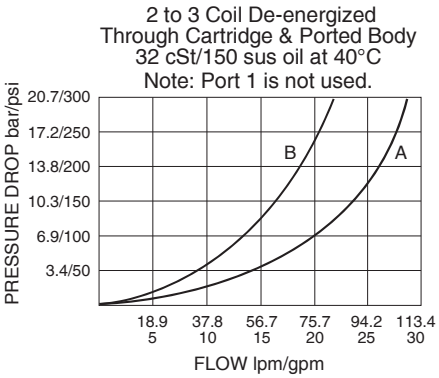


SYMBOLS

USASI/ISO:



PERFORMANCE



DESCRIPTION

A linear solenoid-driven, two-way normally open, screw-in cartridge valve designed for use with a pressure compensator to function as an electrically stroked variable flow regulator.

OPERATION

With increasing electric current, the **PV72-35** changes from full open to full closed with flow from port 2 to port 3. Port 1 is used only to pressure balance the spool and should be plugged. The proportional valve is intended to function in tandem with standard HydraForce pressure compensators at pressure differentials of 21 bar (300 psid) or less, or alone in variable volume pressure-compensated circuits with load sense capability.

The valve is designed to work with industry-common controllers which typically feature current capability to 2 amps @ 12 VDC, PWM, and start/stop trim adjustments (I-min./I-max.). Consult factory for details and potential sourcing.

Operation of Manual Override:

To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

To Disengage: Turn counterclockwise approximately 6 turns to positive stop.

FEATURES

- Excellent linearity and hysteresis.
- Optional control orifice sizes.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Manual override option.

RATINGS

Operating Pressure: 207 bar (3000 psi)

Internal Leakage: 328 cc/min. (20 cu. in./min.) fully closed at 207 bar (3000 psi)

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	300 ± 200 mA	1500 ± 100 mA
24 VDC	150 ± 100 mA	750 ± 50 mA

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

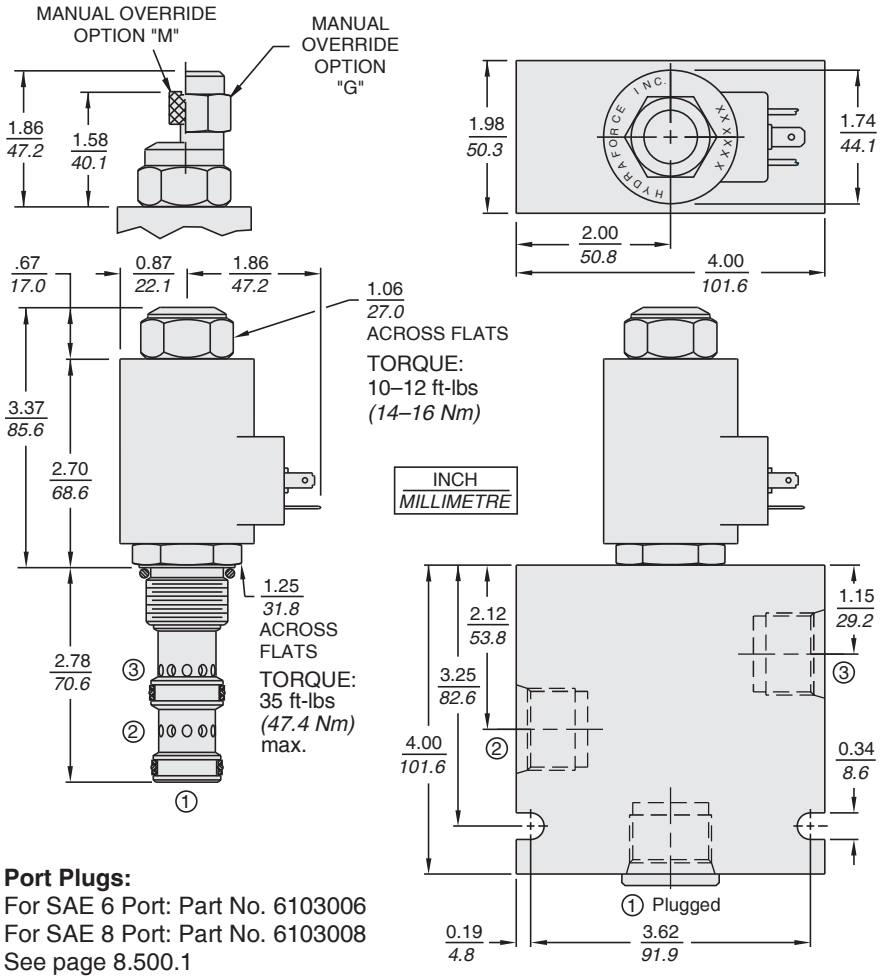
Cavity: VC12-3; See page 9.110.1; **Cavity Tool:** CT12-3X-XX; See page 8.600.1

Seal Kit: SK12-3X-MM; See page 8.650.1 for seal kit options and appropriate seals based on application temperature range.

Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Normally Open PV72-35

DIMENSIONS



Port Plugs:
For SAE 6 Port: Part No. 6103006
For SAE 8 Port: Part No. 6103008
See page 8.500.1

MATERIALS

Cartridge: Weight: 0.36 kg. (0.80 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 1.09 kg. (2.4 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.012.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

PV72-35 __ __ - __ __ __ - __ - __ __ __ __

Flow Range
Required. See Performance Curves.
A
B

Option(s)
None (Blank)
Manual Override **M**
Manual Override with Guard **G**

Porting
0 Cartridge Only
10T SAE 10
12T SAE 12
16T SAE 16
4B 1/2 in. BSP*
6B 3/4 in. BSP*
*BSP Body; U.K. Mfr. Only

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

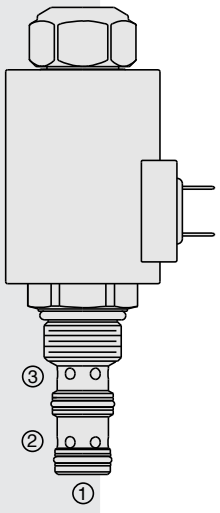
Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150

Coils with internal diode are available. Consult factory.

Voltage
0 Less Coil
12 12 VDC
24 24 VDC

ZL70-30 Proportional, Bi-Directional Flow Control,

U.S. Patent
6,167,906



DESCRIPTION

A solenoid-operated, electrically-variable, pressure-compensated, spool-type, normally closed when de-energized, proportional, bi-directional, flow control valve. An internal compensator spool provides compensated flow across the proportional orifice regardless of flow direction.

OPERATION

The **ZL70-30** provides regulated flow from port 2 to port 3, or regulated flow from port 3 to port 2. Port 1 should be blocked. Regulated flow is proportional to electric current applied to the solenoid.

Operation of Manual Override:

To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

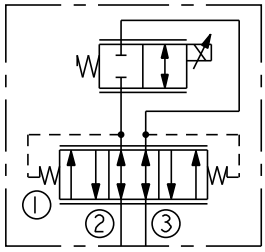
To Disengage: Turn counterclockwise approximately 6 turns until positive stop is found.

FEATURES

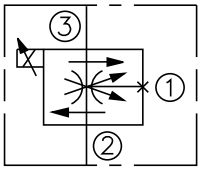
- Excellent linearity and hysteresis characteristics.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Manual Override option.

SYMBOLS

USASI/ISO:



ABBREVIATED SYMBOL:



RATINGS

Maximum Operating Pressure: 240 bar (3500 psi)

Regulated Flow: Range A: 0–20 lpm (0–5.3 gpm); Range B: 0–10 lpm (0–2.6 gpm)

Internal Leakage: 0.38 lpm (0.10 gpm) maximum at zero current

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	250 ± 100 mA	1400 ± 100 mA
24 VDC	125 ± 50 mA	750 ± 50 mA

Temperature: -40 to 120°C with Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

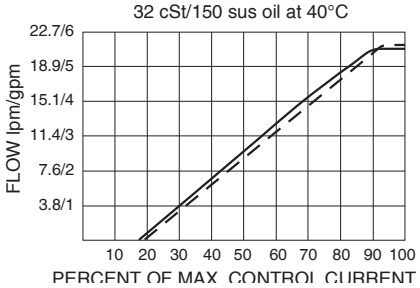
Cavity: VC10-3; See page 9.110.1

Cavity Tool: CT10-3X-XX; See page 8.600.1

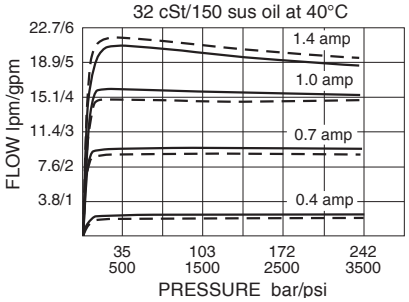
Seal Kit: SK10-3X-MM; See page 8.650.1

PERFORMANCE

FLOW RANGE "A"
Regulated Flow vs. Current
240 bar/3500 psi Inlet
207 bar/3000 psi at Regulated Port
2 to 3 ——— 3 to 2 – – – –
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



FLOW RANGE "A"
Regulated Flow vs. Pressure Drop
240 bar/3500 psi Inlet
2 to 3 ——— 3 to 2 – – – –
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C

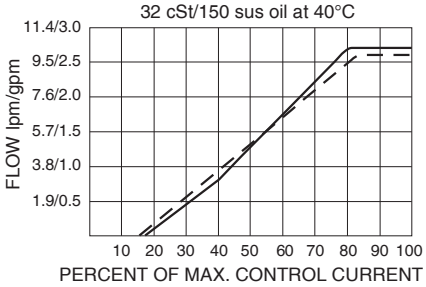


Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

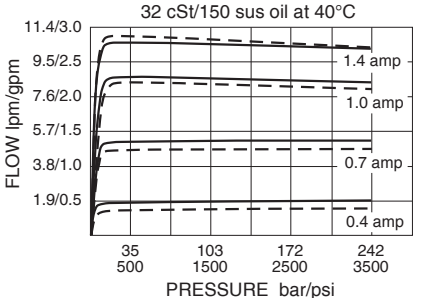
Normally Closed — ZL70-30

PERFORMANCE (continued)

FLOW RANGE "B"
Regulated Flow vs. Current
240 bar/3500 psi Inlet
207 bar/3000 psi at Regulated Port
2 to 3 ——— 3 to 2 – – – –
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C

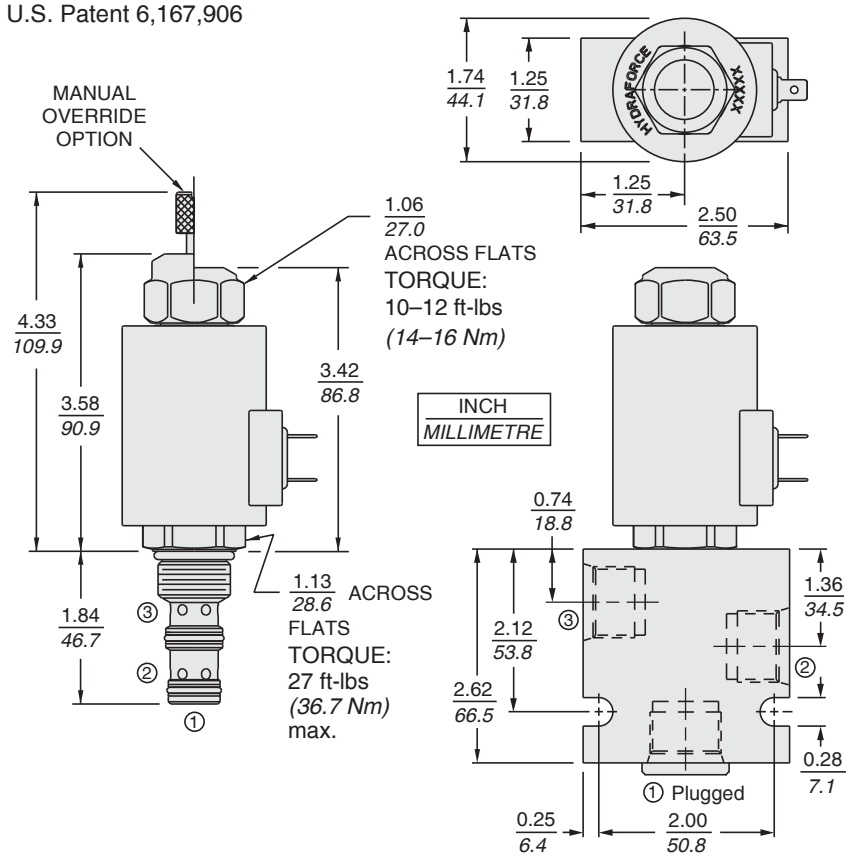


FLOW RANGE "B"
Regulated Flow vs. Pressure Drop
240 bar/3500 psi Inlet
2 to 3 ——— 3 to 2 – – – –
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



DIMENSIONS

U.S. Patent 6,167,906



MATERIALS

Cartridge: Weight: 0.32 kg. (0.7 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.59 kg. (1.3 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

ZL70-30 __ __ - __ __ __ - __ - __ __ __ __

Range
0–20 lpm (0–5.3 gpm) **A**
0–10 lpm (0–2.6 gpm) **B**

Option(s)
None (Blank)
Manual Override **M**

Porting
Cartridge Only **0**
SAE 6 **6T**
SAE 8 **8T**
SAE 10 **10T**

Seals
N Buna N (Std.)
V Fluorocarbon

Voltage
0 Less Coil
12 12 VDC
24 24 VDC

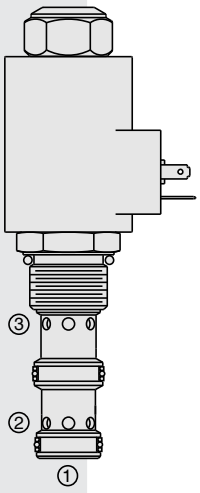
Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150

Coils with internal diode are available. Consult factory.

ZL72-30 Proportional, Bi-Directional Flow Control,

U.S. Patent
6,167,906



DESCRIPTION

A solenoid-operated, electrically-variable, pressure-compensated, spool-type, normally closed when de-energized, proportional, bi-directional flow control valve. An internal compensator spool provides compensated flow across the proportional orifice regardless of flow direction.

OPERATION

The **ZL72-30** provides regulated flow in both directions: from port 2 to port 3, or from port 3 to port 2. Port 1 should be blocked. Regulated flow is proportional to electric current applied to the solenoid.

Operation of Manual Override:

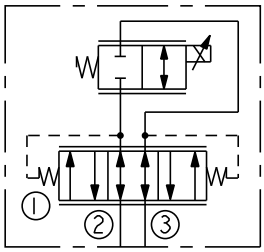
To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

To Disengage: Turn counterclockwise approximately 6 turns until positive stop is found.

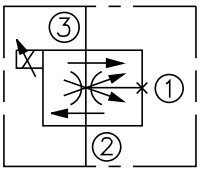
FEATURES

- Excellent linearity and hysteresis.
- Hardened spool and cage for long life.
- Efficient wet armature construction.
- Optional coil voltages and terminations.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Manual override option.

SYMBOLS



ABBREVIATED SYMBOL:



RATINGS

Maximum Operating Pressure: 240 bar (3500 psi)

Regulated Flow: 0-50 lpm (0-13 gpm)

Internal Leakage: 0.38 lpm (0.10 gpm) maximum at 0 current

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	250 ± 100 mA	1500 ± 200 mA
24 VDC	125 ± 50 mA	750 ± 100 mA

Temperature: -40 to 120°C with Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

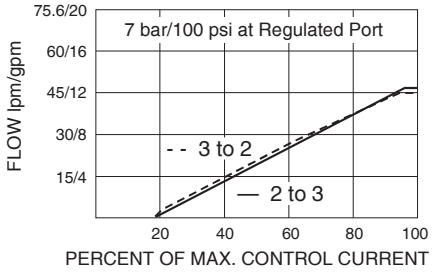
Cavity: VC12-3; See page 9.112.1

Cavity Tool: CT12-3X-XX; See page 8.600.1

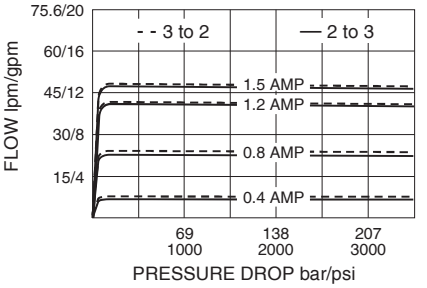
Seal Kit: SK12-3X-MM; See page 8.650.1

PERFORMANCE

Regulated Flow vs. Current
240 bar/3500 psi; 12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



Regulated Flow vs. Pressure Drop
240 bar/3500 psi; 12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C

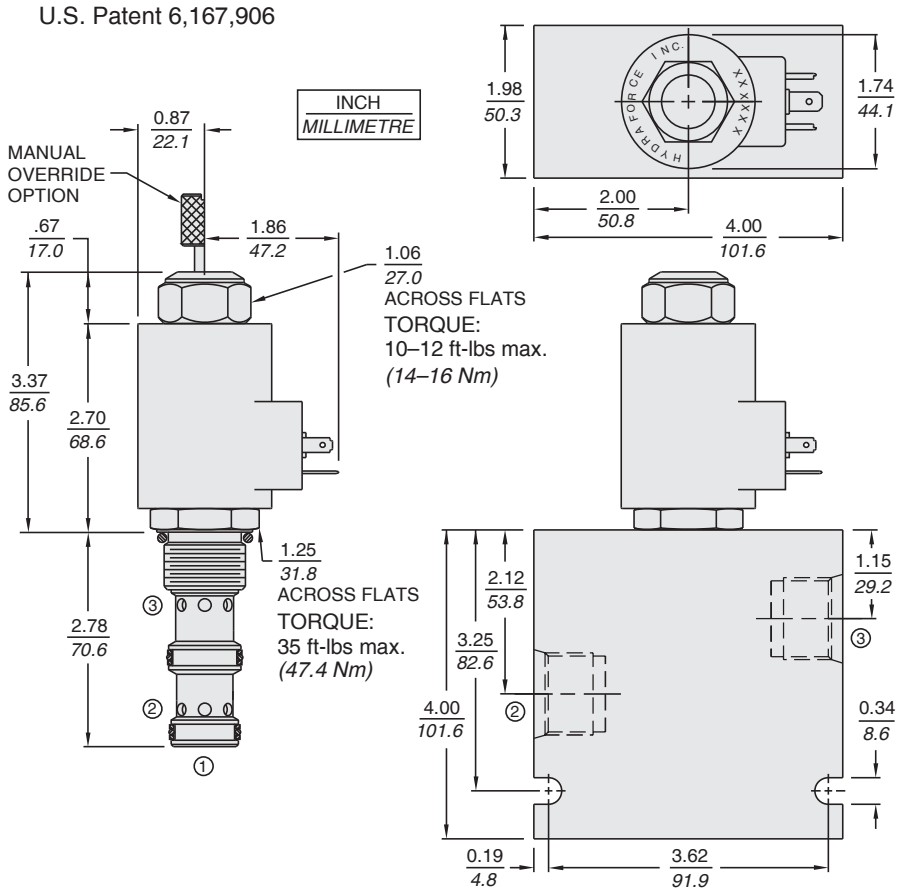


Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Normally Closed ZL72-30

DIMENSIONS

U.S. Patent 6,167,906



MATERIALS

Cartridge: Weight: 0.32 kg. (0.7 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.59 kg. (1.3 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.012.1.

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

ZL72-30 __ - __ __ __ - __ - __ __ __ __

Option(s)
None (Blank)
Manual Override **M**

Porting
Cartridge Only **0**
SAE 6 **6T**
SAE 8 **8T**
SAE 10 **10T**

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Voltage
0 Less Coil
12 12 VDC
24 24 VDC

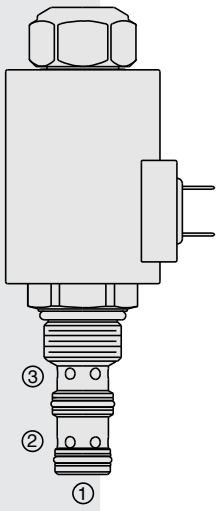
Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150

Coils with internal diode are available. Consult factory.

ZL70-31 Proportional, Bi-Directional Flow Control,

U.S. Patent 6,167,906



DESCRIPTION

A solenoid-operated, electrically-variable, three-port, pressure-compensated, spool-type, normally open when de-energized, proportional, bi-directional, flow control valve. An internal compensator spool provides compensated flow across the proportional orifice regardless of flow direction.

OPERATION

The **ZL70-31** provides regulated flow from port 2 to port 3, or regulated flow from port 3 to port 2. Port 1 should be blocked. Regulated flow is inversely proportional to electric current applied to the solenoid.

Operation of Manual Override:

To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

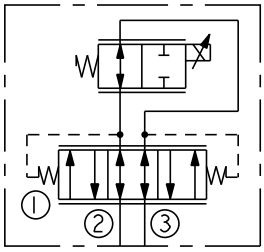
To Disengage: Turn counterclockwise approximately 6 turns until positive stop is found.

FEATURES

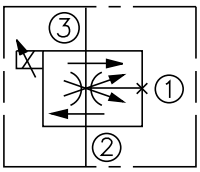
- Excellent linearity and hysteresis characteristics.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Manual Override option.

SYMBOLS

USASI/ISO:



ABBREVIATED SYMBOL:



RATINGS

Maximum Operating Pressure: 240 bar (3500 psi)

Regulated Flow: Range A: 0–19 lpm (0–5.0 gpm); Range B: 0–9.5 lpm (0–2.5 gpm)

Internal Leakage: 0.38 lpm (0.10 gpm) maximum at zero current

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	50 ± 50 mA	1300 ± 100 mA
24 VDC	25 ± 25 mA	650 ± 50 mA

Temperature: -40 to 120°C with Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

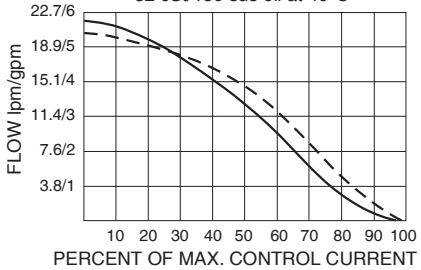
Cavity: VC10-3; See page 9.110.1

Cavity Tool: CT10-3X-XX; See page 8.600.1

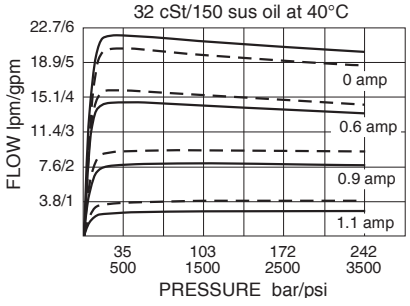
Seal Kit: SK10-3X-MM; See page 8.650.1

PERFORMANCE

FLOW RANGE "A"
Regulated Flow vs. Current
240 bar/3500 psi Inlet
207 bar/3000 psi at Regulated Port
2 to 3 ——— 3 to 2 – – – –
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



FLOW RANGE "A"
Regulated Flow vs. Pressure Drop
240 bar/3500 psi Inlet
2 to 3 ——— 3 to 2 – – – –
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C

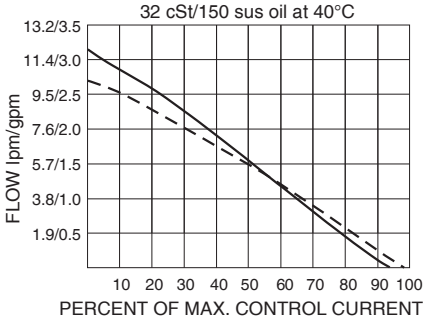


Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

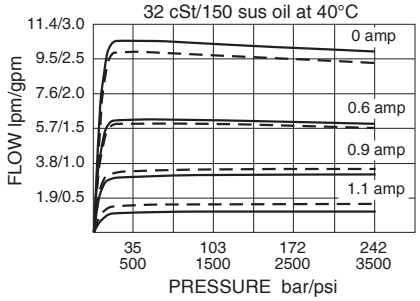
Normally Open — ZL70-31

PERFORMANCE (continued)

FLOW RANGE "B"
Regulated Flow vs. Current
240 bar/3500 psi Inlet
207 bar/3000 psi at Regulated Port
2 to 3 ——— 3 to 2 – – – –
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C

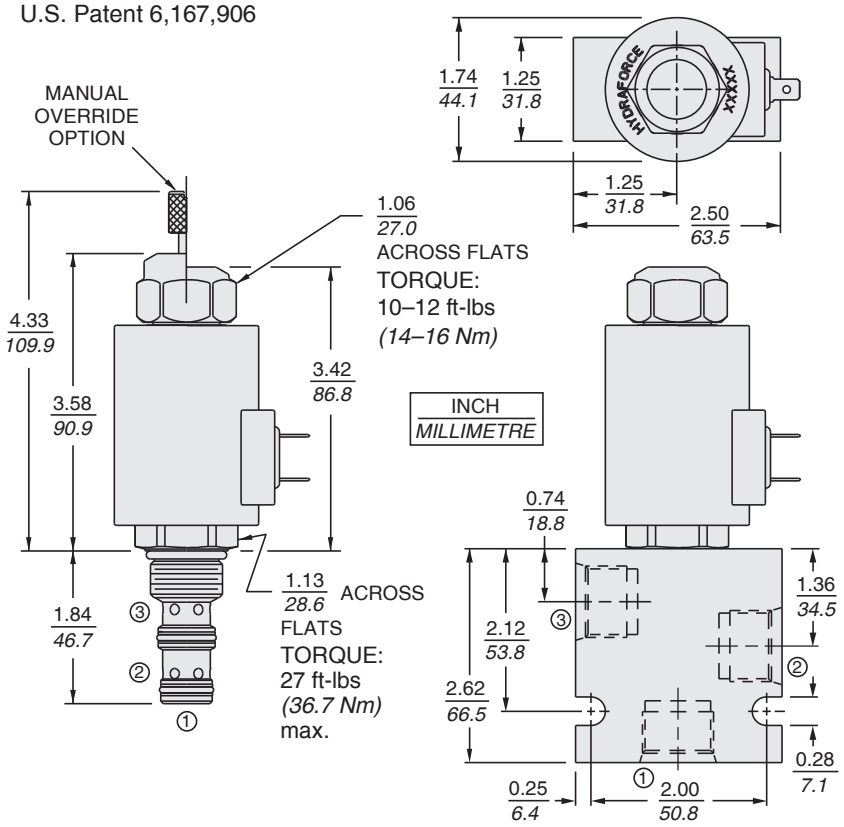


FLOW RANGE "B"
Regulated Flow vs. Pressure Drop
240 bar/3500 psi Inlet
2 to 3 ——— 3 to 2 – – – –
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



DIMENSIONS

U.S. Patent 6,167,906



MATERIALS

Cartridge: Weight: 0.32 kg. (0.7 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.59 kg. (1.3 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

ZL70-31 ___ ___ - ___ ___ ___ - ___ - ___ ___ ___ ___

Range
0–19 lpm (0–5.0 gpm) **A**
0–9.5 lpm (0–2.5 gpm) **B**

Option(s)
None (Blank)
Manual Override **M**

Porting
Cartridge Only **0**
SAE 6 **6T**
SAE 8 **8T**
SAE 10 **10T**

Seals
N Buna N (Std.)
V Fluorocarbon

Voltage
0 Less Coil
12 12 VDC
24 24 VDC

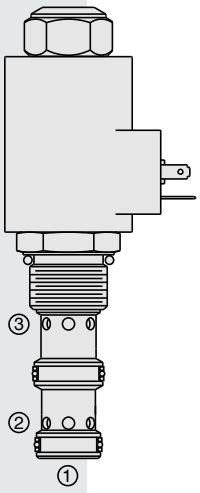
Coils with internal diode are available. Consult factory.

Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150

ZL72-31 Proportional, Bi-Directional Flow Control,

U.S. Patent
6,167,906



DESCRIPTION

A solenoid-operated, electrically-variable, pressure-compensated, spool-type, normally open when de-energized, proportional, bi-directional flow control valve. An internal compensator spool provides compensated flow across the proportional orifice regardless of flow direction.

OPERATION

The **ZL72-31** provides regulated flow in both directions: from port 2 to port 3, or from port 3 to port 2. Port 1 should be blocked. Regulated flow is inversely proportional to electric current applied to the solenoid.

Operation of Manual Override:

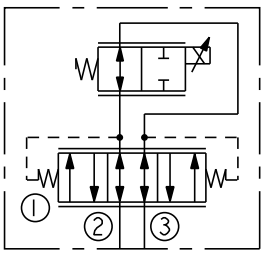
To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift.

To Disengage: Turn counterclockwise approximately 6 turns until positive stop is found.

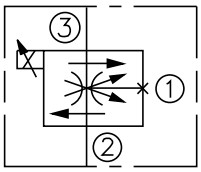
FEATURES

- Excellent linearity and hysteresis.
- Hardened spool and cage for long life.
- Efficient wet armature construction.
- Optional coil voltages and terminations.
- Cartridges voltage interchangeable.
- Unitized, molded coil design.
- Coil waterproofing standard.
- Manual override option.

SYMBOLS



ABBREVIATED SYMBOL:



RATINGS

Maximum Operating Pressure: 240 bar (3500 psi)

Regulated Flow: 0-50 lpm (0-13 gpm)

Internal Leakage: 0.38 lpm (0.10 gpm) maximum at 1.5 amp

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	150 ± 50 mA	1250 ± 100 mA
24 VDC	75 ± 25 mA	625 ± 50 mA

Temperature: -40 to 120°C with Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: No restrictions; See page 9.020.1.

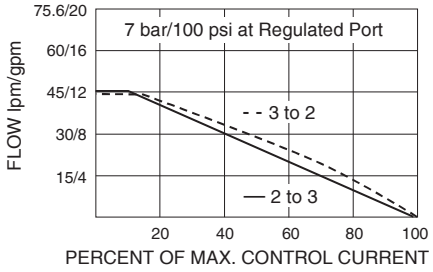
Cavity: VC12-3; See page 9.112.1

Cavity Tool: CT12-3X-XX; See page 8.600.1

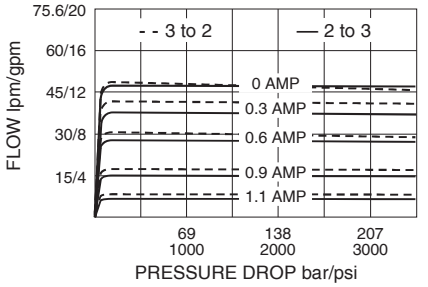
Seal Kit: SK12-3X-MM; See page 8.650.1

PERFORMANCE

Regulated Flow vs. Current
240 bar/3500 psi; 12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



Regulated Flow vs. Pressure Drop
240 bar/3500 psi; 12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C

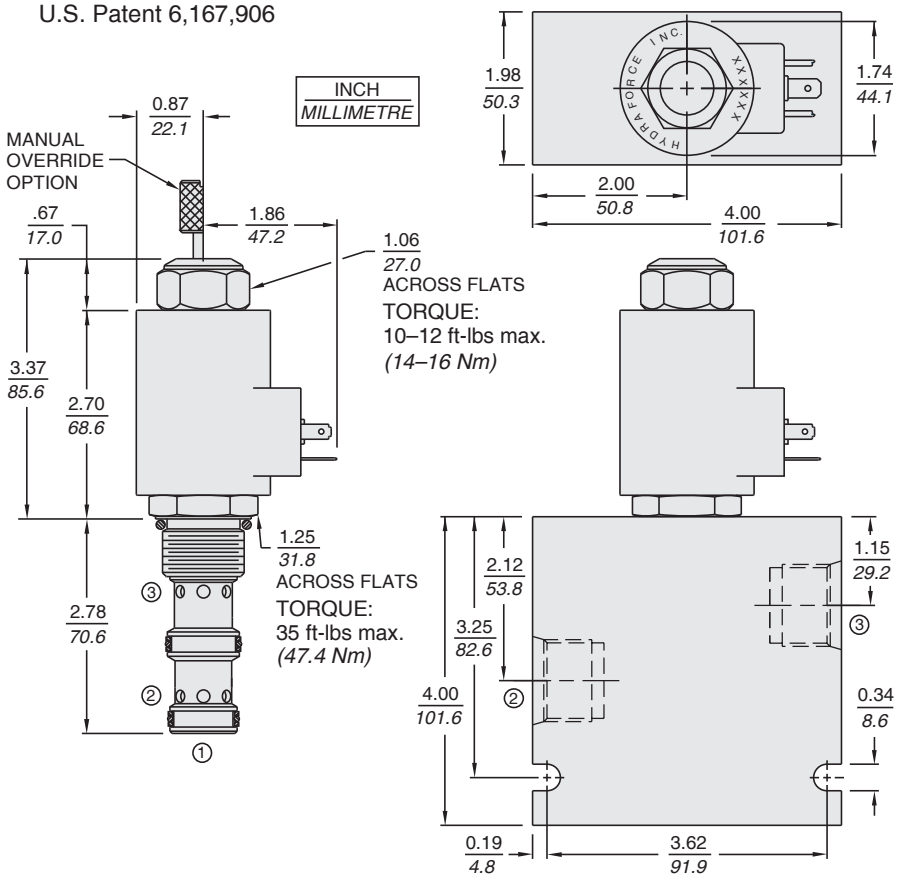


Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Normally Open — ZL72-31

DIMENSIONS

U.S. Patent 6,167,906



MATERIALS

Cartridge: Weight: 0.19 kg. (0.42 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.36 kg. (0.80 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.012.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

ZL72-31 __ - ___ - __ - ___

Option(s)
None (Blank)
Manual Override **M**

Porting
Cartridge Only **0**
SAE 6 **6T**
SAE 8 **8T**
SAE 10 **10T**

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Voltage
0 Less Coil
12 12 VDC
24 24 VDC

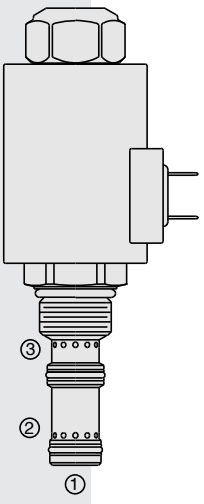
Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150

Coils with internal diode are available. Consult factory.

ZL70-36 Proportional, Bi-Directional Flow Control,

U.S. Patent
6,116,263



DESCRIPTION

A solenoid-operated, electrically-variable, three-port, pressure-compensated, spool-type, normally closed when de-energized, proportional, bi-directional, priority-type flow control valve.

OPERATION

The **ZL70-36** provides priority regulated flow from port 1 to port 3 with bypass at port 2; or regulated flow from port 3 to port 2 with port 1 blocked externally, typically with a check valve (see symbol drawing). Regulated flow is proportional to electric current applied to the solenoid.

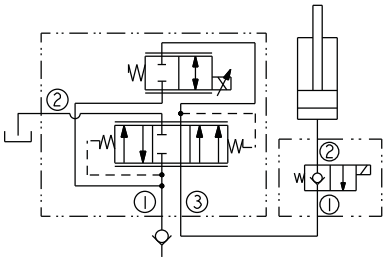
Application Notes: The ZL70-36 may be used for single-acting cylinder applications where lowering is provided by gravity force. The ZL 70-36 has no minimum load restrictions provided the load is enough to overcome cylinder friction and other frictions in the system. At low loads, the lowering speed can be slower than at heavier load if pressure drop is less than the compensation value of the valve.

The hydraulic circuit must include a check valve and a poppet-type solenoid valve (SV08-20 type) connected as shown on the circuit symbol and placed close to the ZL70-36 valve, if possible in the same manifold. See Application Guide.

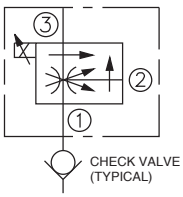
Operation of Manual Override: To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift. To Disengage: Turn counterclockwise approximately 6 turns until positive stop is found.

SYMBOLS

USASI/ISO:



ABBREVIATED SYMBOL:



FEATURES

- Excellent linearity and hysteresis.
- Hardened spool and cage for long life.
- Optional coil voltages and terminations.
- Efficient wet armature construction.
- Manual Override option.

RATINGS

Maximum Operating Pressure: 240 bar (3500 psi)

Regulated Flow: 0–19 lpm (0–5.0 gpm); **Input Flow:** 0–24.5 lpm (0–6.5 gpm)

Internal Leakage: 0.38 lpm (0.10 gpm) maximum at zero current

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	300 ± 100 mA	1400 ± 100 mA
24 VDC	150 ± 50 mA	700 ± 50 mA

Temperature: -40 to 120°C with Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

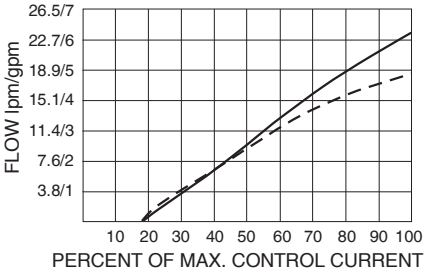
Installation: No restrictions; See page 9.020.1.

Cavity: VC10-L3; See page 9.110.1; **Cavity Tool:** CT10-3X-XX; See page 8.600.1

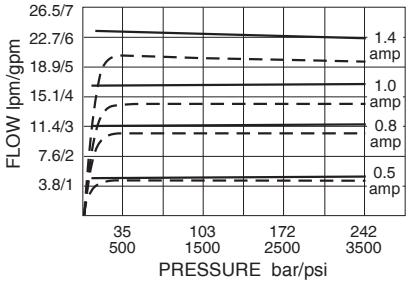
Seal Kit: SK10-3X-MM; See page 8.650.1

PERFORMANCE

REGULATED FLOW vs. CURRENT
Input Flow 24.6 lpm/6.5 gpm; Port 2 to Tank
1 to 3 207 bar/3000 psi at Port 3 ———
3 to 2 240 bar/3500 psi at Port 3 – – – –
12V Coil; 110 Hz PWM; 32 cSt/150 sus oil at 40°C



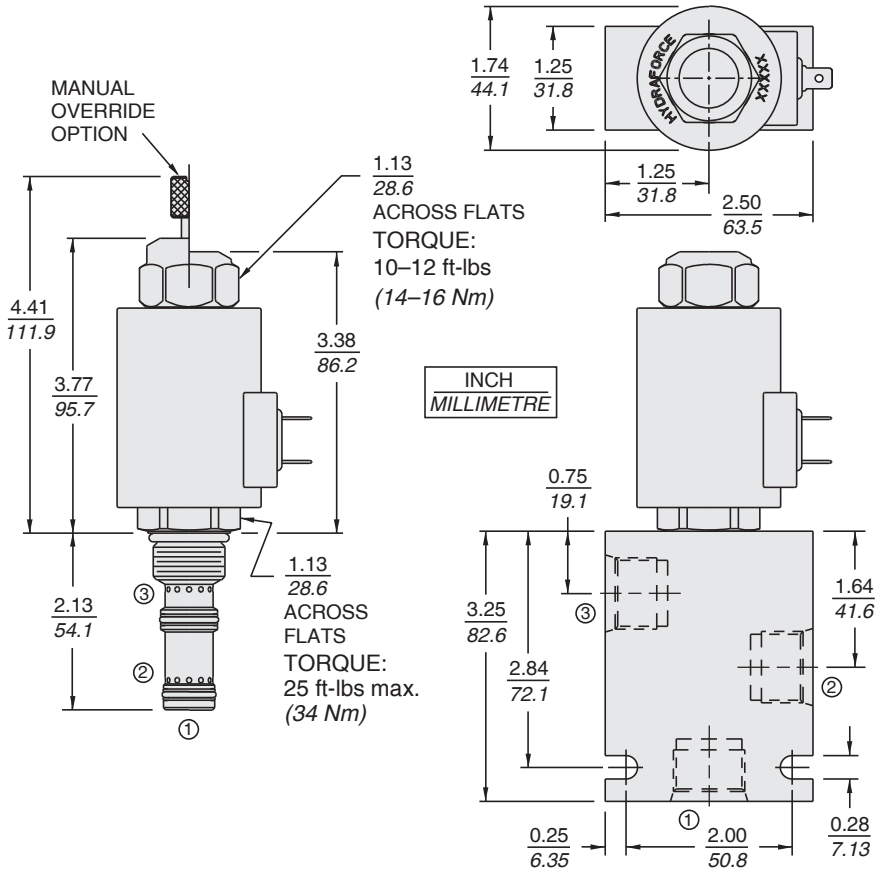
REGULATED FLOW vs. PRESSURE
Inlet Flow: 24.5 lpm/6.5 gpm; Port 2 to Tank
1 to 3 ——— 3 to 2 — — —
12V Coil; 110 Hz PWM; 32 cSt/150 sus oil at 40°C



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Normally Closed ZL70-36

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.32 kg. (0.7 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.59 kg. (1.3 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

ZL70-36 __ - ___ - __ - ____

Option(s)
None (Blank)
Manual Override **M**

Porting
Cartridge Only **0**
SAE 6 **6T**
SAE 8 **8T**

Seals
Buna N (Std.) **N**
Fluorocarbon **V**
Polyurethane **P**

Voltage
0 Less Coil
12 12 VDC
24 24 VDC

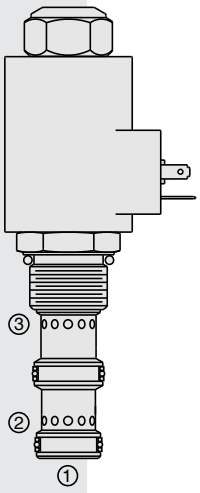
Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150

Coils with internal diode are available. Consult factory.

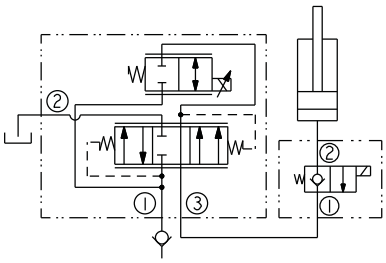
ZL72-36 Proportional, Bi-Directional Flow Control,

U.S. Patent
6,116,263

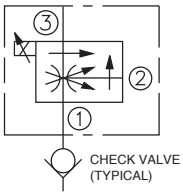


SYMBOLS

USASI/ISO:



ABBREVIATED SYMBOL:



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DESCRIPTION

A solenoid-operated, electrically-variable, three-port, pressure-compensated, spool-type, normally closed when de-energized, proportional, bi-directional, priority-type flow control valve.

OPERATION

The **ZL72-36** provides priority regulated flow to port 1 with input at port 3, and bypass at port 2; or regulated flow from port 3 to port 2 with input at port 1 blocked. Regulated flow is proportional to electric current applied to the solenoid.

Application Notes: The ZL72-36 may be used for single-acting cylinder applications where lowering is provided by gravity force. There are no minimum load restrictions, provided the load is enough to overcome cylinder friction and other frictions in the system. At low load the lowering speed can be slower than at heavier load if pressure drop is less than the compensation value of the valve.

The hydraulic circuit must include a check valve and a poppet-type solenoid valve (SV10-20 type) connected as shown on the circuit symbol and placed close to the ZL72-36 valve, if possible in the same manifold. See Application Guide.

Operation of Manual Override: To Engage: Turn clockwise approximately 1 turn to reach start point. Continue another approximately 5 turns to full shift. To Disengage: Turn counterclockwise approximately 6 turns until positive stop is found.

FEATURES

- Excellent linearity and hysteresis.
- Hardened spool and cage for long life.
- Efficient wet armature construction.
- Optional coil voltages and terminations.
- Manual override option.

RATINGS

Maximum Operating Pressure: 240 bar (3500 psi)

Regulated Flow: 0-45 lpm (0-12 gpm)

Internal Leakage: 0.38 lpm (0.10 gpm) at zero current

Electrical: 2 standard voltage ratings

Coil Voltage	Threshold Current	Max. Control Current
12 VDC	300 ± 100 mA	1600 ± 100 mA
24 VDC	150 ± 50 mA	800 ± 50 mA

Temperature: -40 to 120°C with Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

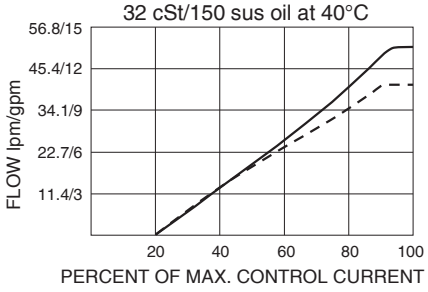
Installation: No restrictions; See page 9.020.1.

Cavity: VC12-3; See page 9.112.1; **Cavity Tool:** CT12-3X-XX; See page 8.600.1

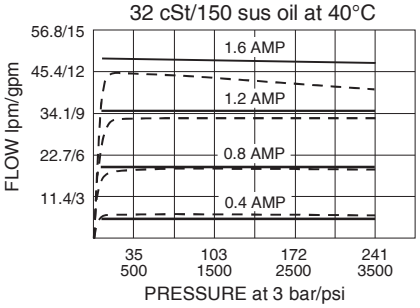
Seal Kit: SK12-3X-MM; See page 8.650.1

PERFORMANCE

Regulated Flow vs. Current
Inlet Flow: 57 lpm/15 gpm
Port 2 Connected to Tank
——— 1 to 3, 207 bar/3000 psi at 3
– – – – 3 to 2, 240 bar/3500 psi at 3
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



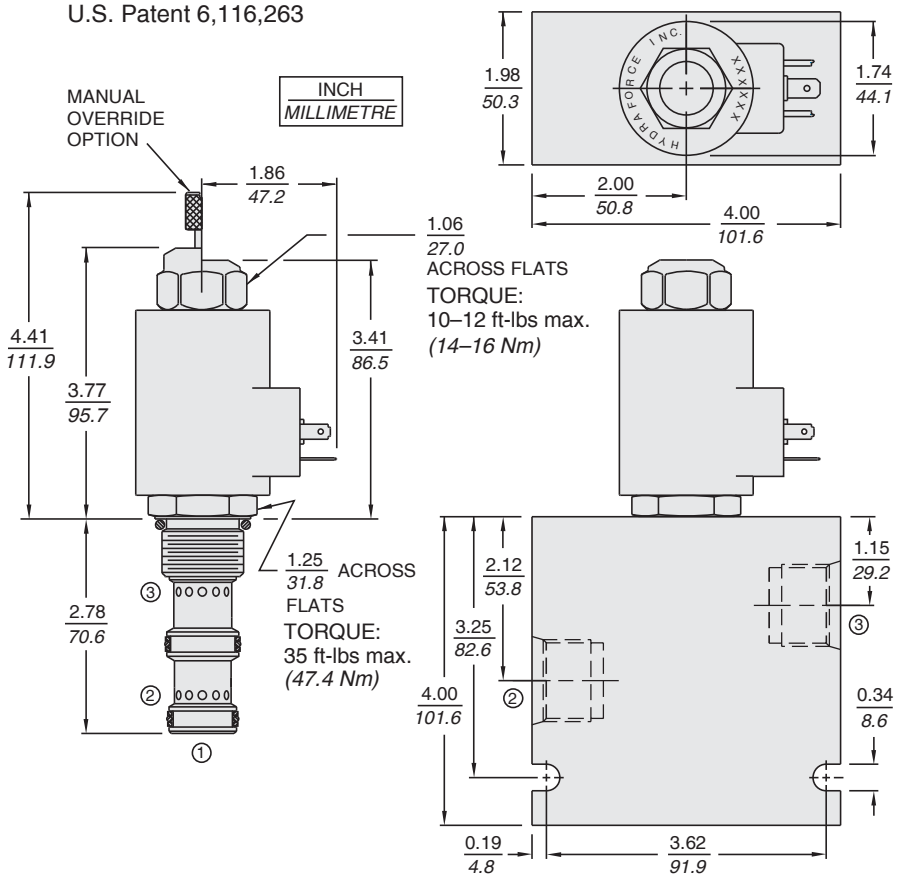
Regulated Flow vs. Pressure
Inlet Flow: 57 lpm/15 gpm
Port 2 Connected to Tank
——— 1 to 3
– – – – 3 to 2
12V Coil; 110 Hz PWM
32 cSt/150 sus oil at 40°C



Normally Closed ZL72-36

DIMENSIONS

U.S. Patent 6,116,263



MATERIALS

Cartridge: Weight: 0.34 kg. (0.7 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.98 kg. (2.15 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 240 bar (3500 psi). Ductile iron bodies available; dimensions may differ. See page 8.012.1

70-Size "D" Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.7.

70-Size "E" Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. IP69K rated. See page 3.400.13.

TO ORDER

ZL72-36 __ - ___ - __ - ____

Option(s)
None (Blank)
Manual Override **M**

Porting
Cartridge Only **0**
SAE 10 **10T**
SAE 12 **12T**
SAE 16 **16T**

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

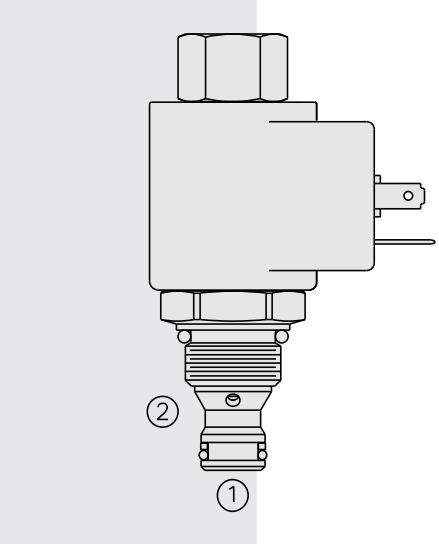
Voltage
0 Less Coil
12 12 VDC
24 24 VDC

Terminations D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

Terminations E-Coil
IP69K Rated
ER Deutsch DT04-2P
EY Metri-Pack® 150

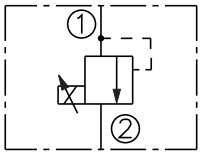
Coils with internal diode are available. Consult factory.

TS08-20 Proportional Electric Relief Valve



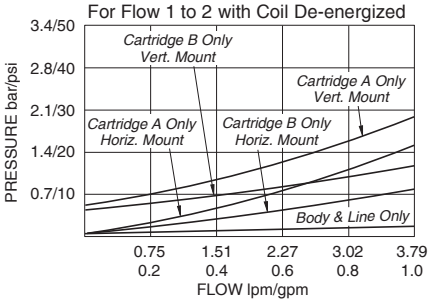
SYMBOLS

USASI/ISO:

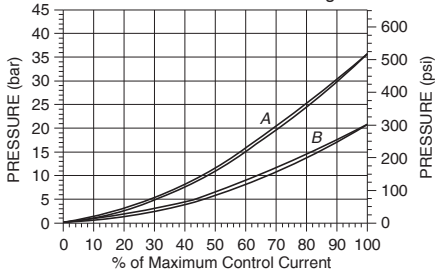


PERFORMANCE

Pressure Drop vs. Flow Characteristic
For Flow 1 to 2 with Coil De-energized



Relief Pressure vs.
Current (DC) 260 Hz Dither
Relieving Pressure 1 to 2
for Various Relief Pressure Ranges



DESCRIPTION

A screw-in, cartridge-style, direct acting, poppet-type hydraulic relief valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. This valve is intended for use as a pressure limiting device in demanding applications.

OPERATION

The **TS08-20** blocks flow from 1 to 2 until sufficient pressure is present at 1 to offset the electrically induced solenoid force. With no current applied to the solenoid, the valve will free flow from 1 to 2.

Note: Back pressure on port 2 becomes additive to the pressure setting at a 1:1 ratio.

FEATURES

- 12 and 24 volt coils standard.
- Optional waterproof E-Coils rated up to IP69K.
- Industry common cavity.
- Waterproofed coils standard.

RATINGS

Maximum Inlet Pressure: 34.5 bar (500 psi)

Maximum Control Current: 0.65 amps for 12 VDC coil; 0.33 amps for 24 VDC coil

Control Signal: DC or PWM (Significant improvements in valve performance occur with superimposed dither, with either control method.)

Dither Frequency: 250 Hz or higher

Hysteresis with Dither 250 Hz: 3.0% (7% maximum without dither)

Operational Relief Pressure Range from Zero to Maximum Control Current:
A: 0–34.5 bar (0–500 psi); **B:** 0–20.7 bar (0–300 psi)

Rated Flow: A: 3.8 lpm/1 gpm @ 1.4 bar/20 psi pressure drop
B: 3.8 lpm/1 gpm @ 0.8 bar/12 psi pressure drop

Step Response: T_{ON} <27 ms; T_{OFF} <50 ms

Flow Path: Free Flow: 1 to 2 coil de-energized; Relieving: 1 to 2 coil energized

Temperature: -40 to 100°C (-40 to 212°F) with standard Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

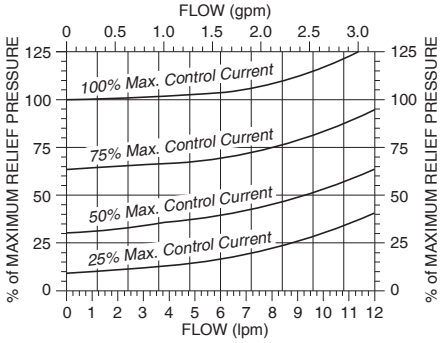
Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

Cavity: VC08-2; See page 9.108.1; **Cavity Tool:** CT08-2XX; See page 8.600.1

Seal Kit: SK08-2X-B; See page 8.650.1

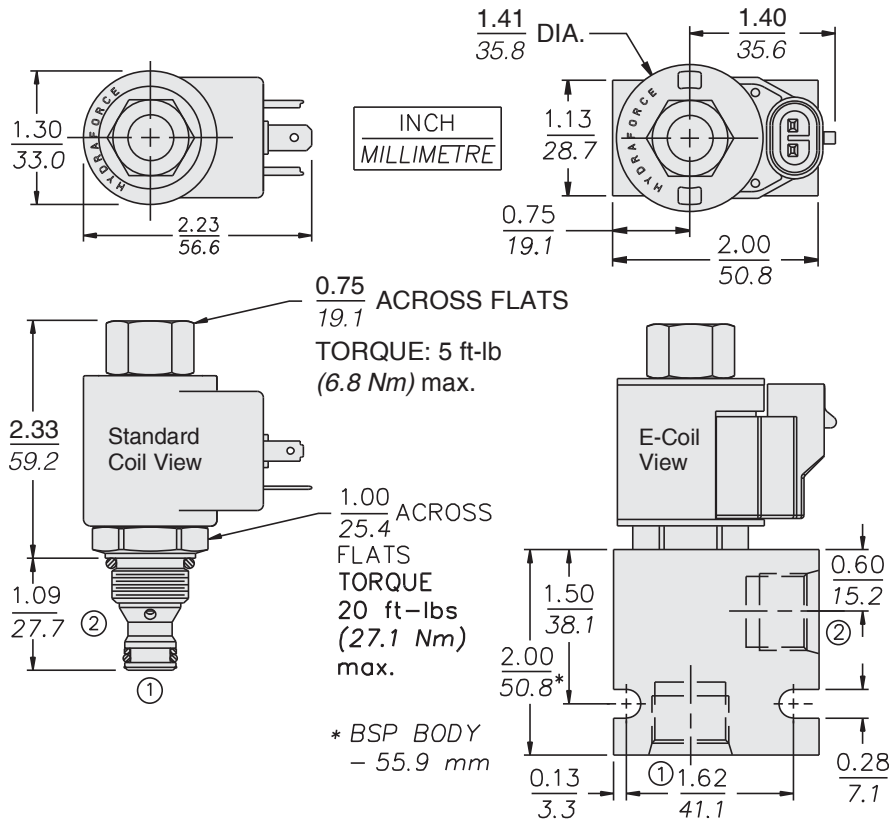
Coil Nut: Part No. 7004410;
For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut info.

Typical Relief Pressure vs. Flow Characteristic
Typical Relieving Pressure 1 to 2
at Various %'s of Maximum Control Current
Pressure Range "A" (20.7 bar/300 psi)
Pressure Range "B" (34.5 bar/5000 psi); Cartridge in Body



Recommended Electronic Controllers:
Model **EFDR2** Multi-Input Fan Drive Controller.
For more information go to:
http://www.hydraforce.com/Electro/fandrive.htm
or
Recommended Electronic Controllers
catalog page 2.001.1 (Table 2)

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.15 kg. (0.33 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.008.1

Standard Coil: Weight: 0.11 kg. (0.25 lbs.) Unitized, thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight: 0.14 kg. (0.3 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

TS08-20__ - __ - __ - __ __ __ __

Maximum Relief Pressure
34.5 bar (500 psi) **A**
20.7 bar (300 psi) **B**

Porting
Cartridge Only **0**
SAE 6 **6T**
3/8 in. BSP* **3B**
1/2 in. BSP* **4B**
*BSP Body; U.K. Mfr. Only

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

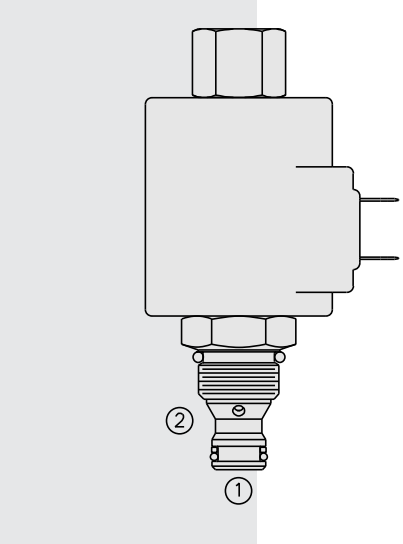
Voltage
0 Less Coil
10 10 VDC (0.80 amps max.)
12 12 VDC (0.65 amps max.)
20 20 VDC (0.40 amps max.)
24 24 VDC (0.33 amps max.)

Coils with internal diode are available. Consult factory.

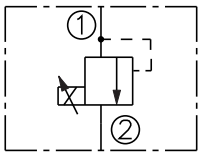
Termination Std. Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

Termination E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)

TS38-20 Proportional Electric Relief Valve

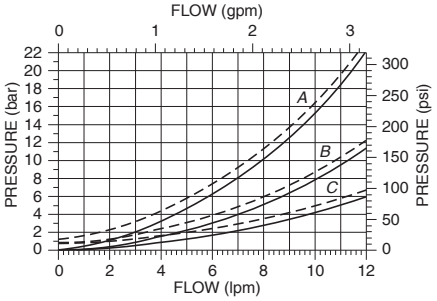


ISO SYMBOL

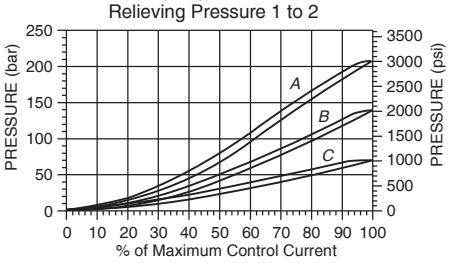


PERFORMANCE

Pressure Drop vs. Flow Characteristic
For Flow 1 to 2 with Coil De-energized
Vertical Mount - - - - Horizontal Mount ——



Relief Pressure vs.
Current (DC) 250 Hz Dither
Relieving Pressure 1 to 2



Performance info. continued on following page.

DESCRIPTION

A screw-in, cartridge-style, direct acting, poppet-type hydraulic relief valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. This valve is intended for use as a pressure limiting device in demanding applications.

OPERATION

The **TS38-20** blocks flow from 1 to 2 until sufficient pressure is present at 1 to offset the electrically induced solenoid force. With no current applied to the solenoid, the valve will free flow from 1 to 2.

Note: *Back pressure on port 2 becomes additive to the pressure setting at a 1:1 ratio.*

The optional manual override allows the valve to be set when the electric supply is lost. The manual setting is added to the electric setting. To prevent the system from being over pressurized, the manual override should always be disengaged prior to applying power to the coil.

FEATURES

- 12 and 24 volt coils standard.
- Industry common cavity.
- Optional waterproof E-Coils rated up to IP69K.
- Manual override optional.

RATINGS

Pressure Rating: 248.2 bar (3600 psi) **Proof Pressure:** 268.9 bar (3900 psi)

Burst Pressure: 751.5 bar (10900 psi)

Electrical Parameters:

COIL SERIES	NOMINAL VOLTAGE (VDC)	TYPICAL RESISTANCE AT 20°C (68°F) (OHMS)	VALVE INDUCTANCE (Mh)	MAXIMUM CONTROL CURRENT (A)
D	12	7.2 ± 3%	141	1.10
	24	28.8 ± 5%	626	0.55
E	12	7.1 ± 3%	139	1.32
	24	28.5 ± 5%	600	0.66

Control Signal: DC or PWM (Significant improvements in valve performance occur with superimposed dither, with either control method.)

Dither Frequency: 200 Hz or higher

Hysteresis with Dither 250 Hz: 3.3% (7% maximum without dither)

Operational Relief Pressure Range from Zero to Maximum Control Current: **A:** 0–207 bar (0–3000 psi); **B:** 0–138 bar (0–2000 psi); **C:** 0–69 bar (0–1000 psi) ***Note:*** *Minimum pressure setting is dependent on flow through the valve. (See Pressure Drop Curve)*

Rated Flow: A: 11.4 lpm/3 gpm @ 20 bar/290 psi pressure drop **B:** 11.4 lpm/3 gpm @ 10 bar/150 psi pressure drop **C:** 11.4 lpm/3 gpm @ 5.5 bar/80 psi pressure drop ***Note:*** *See Pressure Drop Curve.*

Internal Leakage: 1 ml/min (20 drops/minute) max. at 207 bar (3000 psi)

Step Response: T_{ON} <50 ms; T_{OFF} <7 ms

Flow Path: Free Flow: 1 to 2 coil de-energized; Relieving: 1 to 2 coil energized

Temperature: -40 to 120°C (-40 to 250°F) with standard Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

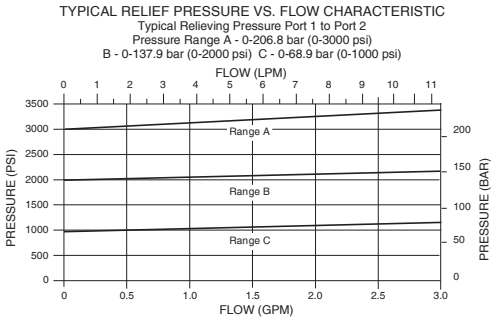
Cavity: VC08-2; See page 9.108.1; **Cavity Tool:** CT08-2XX; See page 8.600.1

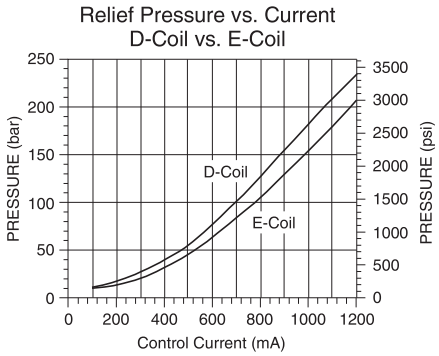
Seal Kit: SK08-2X-B; See page 8.650.1

Coil Nut: Part No. 4540560; Note: For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut info.

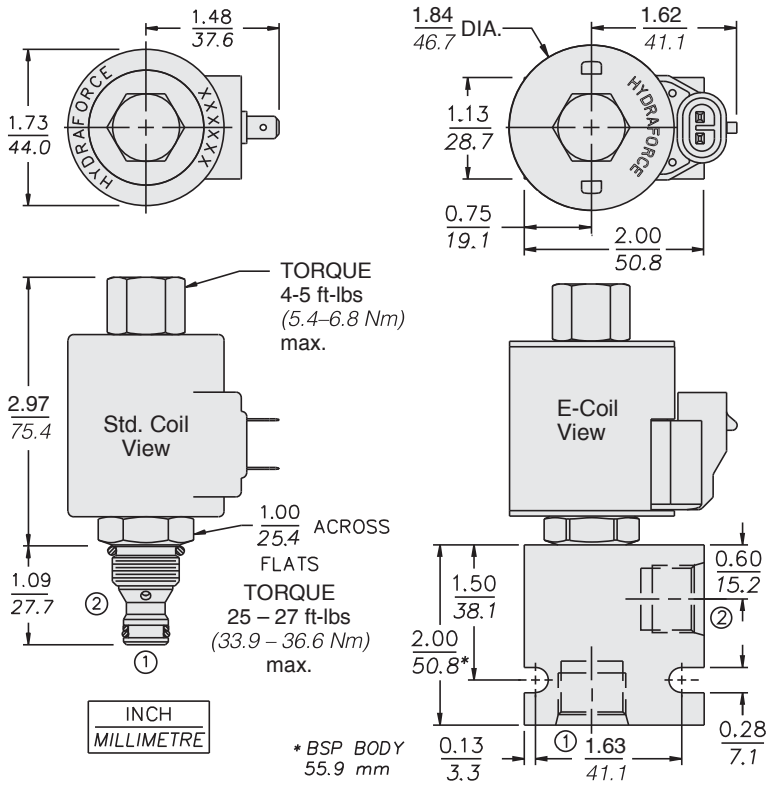
Recommended Electronic Controllers: Model **EFDR2** Multi-Input Fan Drive Controller.
For more information go to: http://www.hydraforce.com/Electro/fandrive.htm or **Recommended Electronic Controllers** catalog page 2.001.1 (Table 2)

PERFORMANCE (continued)





DIMENSIONS



MATERIALS

Cartridge: Weight: 0.18 kg. (0.39 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.008.1

Standard Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized, thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors.
Note: See page 3.400.1 for all E-Coil retrofit applications.

TO ORDER

TS38-20 ___ ___ - ___ - ___ - ___ ___ ___ ___

Maximum Relief Pressure
207 bar (3000 psi) **A**
138 bar (2000 psi) **B**
69 bar (1000 psi) **C**

Option
None (Blank)
Manual Override **M**

Porting
Cartridge Only **0**
SAE 6 **6T**
3/8 in. BSP* **3B**
1/2 in. BSP* **4B**
*BSP Body; U.K. Mfr. Only

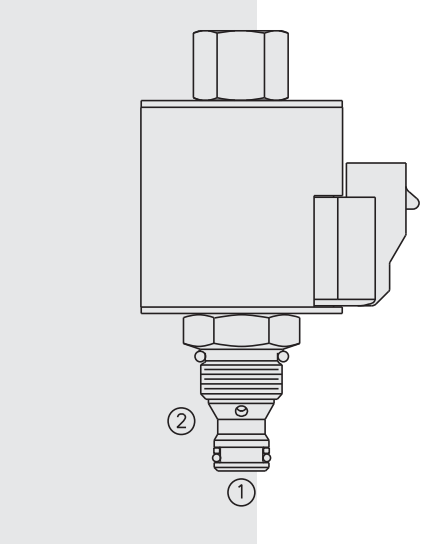
Seals
Buna N (Std.) **N**
Fluorocarbon **V**
Polyurethane **P**

Voltage
0 Less Coil
10 10 VDC (1/3 amps max.)
12 12 VDC (1.10 amps max.)
20 20 VDC (0.65 amps max.)
24 24 VDC (0.55 amps max.)

Termination Std. Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpack® Connectors
DR Deutsch DT04-2P

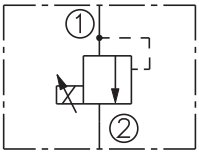
Termination E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)
EL IP69K Rated
EJ Amp. Jr. Timer (IP67 Rated)
EG DIN 43650 (IP65 Rated)

TS58-20 Proportional Electric Relief Valve

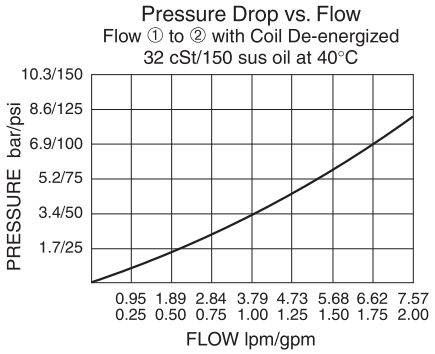


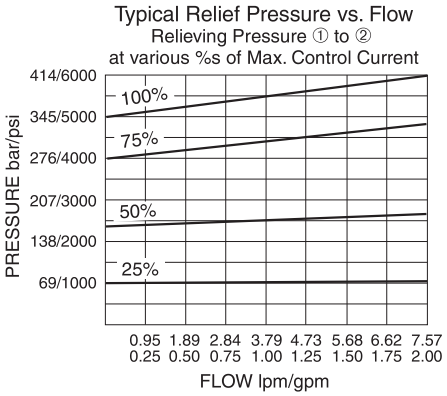
SYMBOLS

USASI/ISO:



PERFORMANCE





DESCRIPTION

A screw-in, cartridge-style, direct acting, poppet-type hydraulic relief valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. This valve is intended for use as a pressure limiting device in demanding applications.

OPERATION

The **TS58-20** blocks flow from 1 to 2 until sufficient pressure is present at 1 to offset the electrically induced solenoid force. With no current applied to the solenoid, the valve will free flow from 1 to 2.

Note: Back pressure on port 2 becomes additive to the pressure setting at a 1:1 ratio.

FEATURES

- 12 and 24 volt coils standard.
- Industry common cavity.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Maximum Operating Pressure: 345 bar (5000 psi)

Maximum Tank Port Pressure: 69 bar (1000 psi)

Relief Pressure Range: Model Code 40: 0–276 bar (0–4000 psi);
Model Code 50: 0–345 bar (0–5000 psi)

Note: Minimum pressure setting is dependent on flow through the valve. (See Pressure Drop Curve)

Flow: See Performance Charts

Flow Path: Free Flow: 1 to 2 coil de-energized; Relieving: 1 to 2 coil energized

Maximum Control Current: 1.10 amps for 12 VDC coil; 0.55 amps for 24 VDC coil

Control Signal: DC or PWM (Significant improvements in valve performance occur with superimposed dither, with either control method.)

Dither Frequency: 150 Hz or higher

Hysteresis with Dither 250 Hz: 3.3% (7% maximum without dither)

Step Response: T_{ON} <50 ms; T_{OFF} <7 ms

Operating Temperature: with standard Buna N seals: -40 to 120°C (-40 to 250°F)
with Fluorocarbon seals: -35 to 204°C (-31 to 400°F)
with Polyurethane seals: -54 to 107°C (-65 to 225°F)

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

Cavity: VC08-2; See page 9.108.1; **Cavity Tool:** CT08-2XX; See page 8.600.1

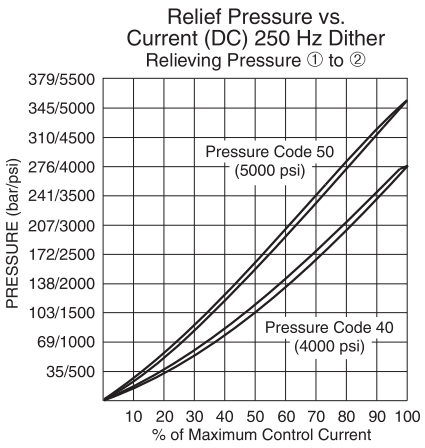
Seal Kit: SK08-2X-B; See page 8.650.1

Coil Nut: Part No. 4540560

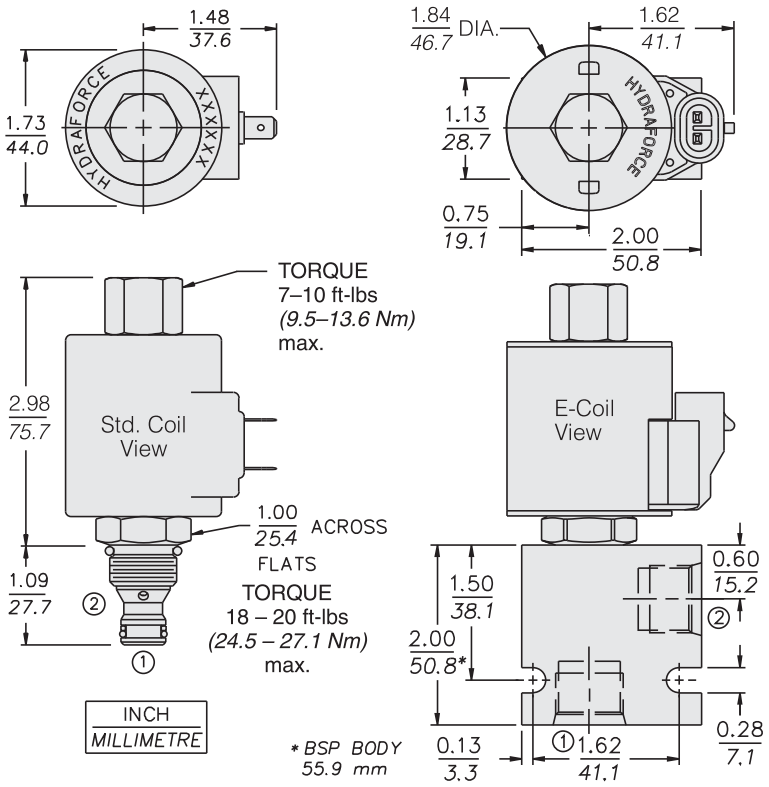
Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

Performance info. continued on following page.

PERFORMANCE (continued)



DIMENSIONS



MATERIALS

Cartridge: Weight: 0.25 kg. (0.55 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.54 kg (1.2 lbs.); Ductile Iron standard, rated to 345 bar (5000 psi); Aluminum bodies available; demensions may differ. See page 8.008.1

Standard Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized, thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors.
Note: See page 3.400.1 for all E-Coil retrofit applications.

TO ORDER

TS58-20 __ - ____ - __ - __ - ____

Option
None (Blank)
Screen **S**

Pressure Code
276 bar (4000 psi) **40**
345 bar (5000 psi) **50**

Porting
Cartridge Only **0**
SAE 4 **4TD**
SAE 6 **6TD**
SAE 8 **8TD**
1/4 in. BSP* **2BD**
3/8 in. BSP* **3BD**
*BSP Body; U.K. Mfr. Only

Seals
Buna N (Std.) **N**
Fluorocarbon **V**
Polyurethane **P**

Voltage
0 Less Coil
10 10 VDC (1.30 amps max.)
12 12 VDC (1.10 amps max.)
20 20 VDC (0.65 amps max.)
24 24 VDC (0.55 amps max.)

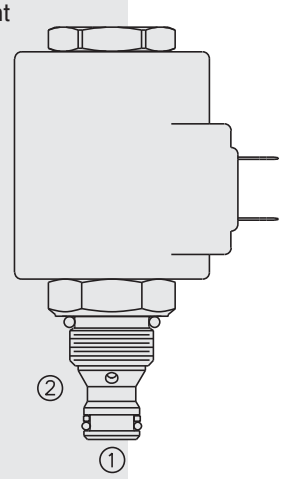
Coils with internal diode are available. Consult factory.

Termination E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)

Termination Std. Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

TS38-21 Proportional Electric Relief Valve

U.S. Patent
6,267,350



DESCRIPTION

A screw-in, cartridge-style, single-stage, poppet-type pressure relieving valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is inversely proportional to DC current input.

OPERATION

The **TS38-21** blocks flow from 1 to 2 until sufficient pressure is present at 1 to open the valve by overcoming the preset spring force. With no current applied, the valve will relieve at ±50 psi of the spring maximum. Applying current to the coil reduces the induced spring force thereby reducing the valve setting.

FEATURES

- 12 and 24 volt coils standard.
- Optional waterproof E-Coils rated up to IP69K.
- Industry common cavity.
- Hardened parts for long life.

RATINGS

Maximum Operating Pressure: 240 bar (3500 psi)

Maximum Control Current: 1.10 amps for 12 VDC coil; 0.55 amps for 24 VDC coil

Relief Pressure Range from Zero to Maximum Control Current:
Minimum Pressure is factory adjustable.
(A) 207–6.9 bar (3000–100 psi); **(B)** 138–6.9 bar (2000–100 psi)
(C) 69–6.9 bar (1000–100 psi); **(D)** 241–6.9 bar (3500–100 psi)

Rated Flow: 1.1 lpm/0.3 gpm; ΔP = 10 bar (150 psi), cartridge only, 1 to 2 coil energized

Flow Path: Free Flow: 1 to 2 coil energized; Relieving: 1 to 2 coil de-energized

Temperature: -40 to 120°C (-40 to 250°F) with standard Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

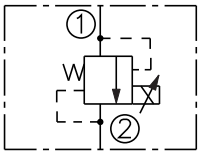
Cavity: VC08-2; See page 9.108.1; **Cavity Tool:** CT08-2XX; See page 8.600.1

Seal Kit: SK08-2X-B; See page 8.650.1

Coil Nut: Part No. 4540550;
For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut info.

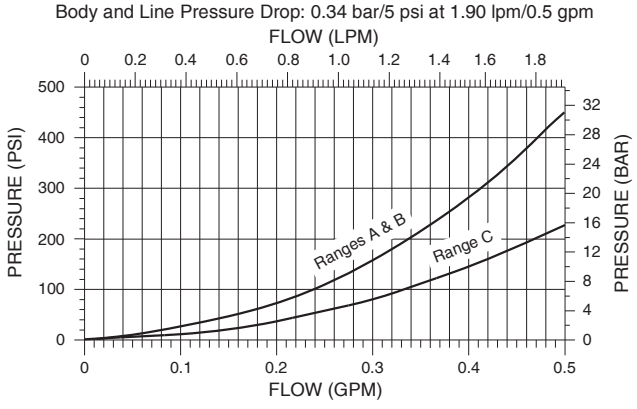
SYMBOLS

USASI/ISO:

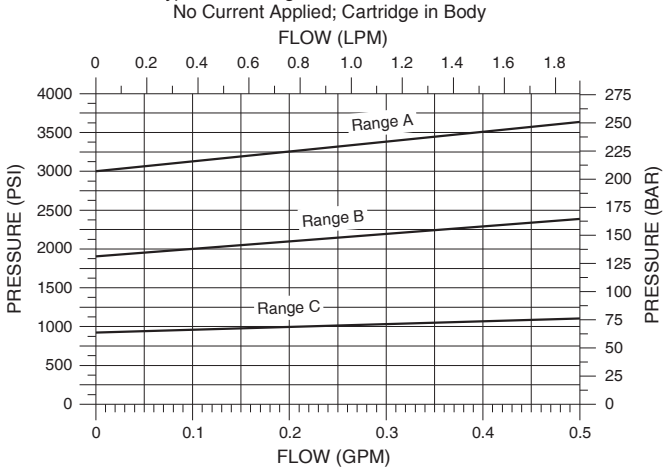


PERFORMANCE

PRESSURE DROP VS. FLOW CHARACTERISTIC
Flow from Port 1 to Port 2 with Coil Energized
Body and Line Pressure Drop: 0.34 bar/5 psi at 1.90 lpm/0.5 gpm

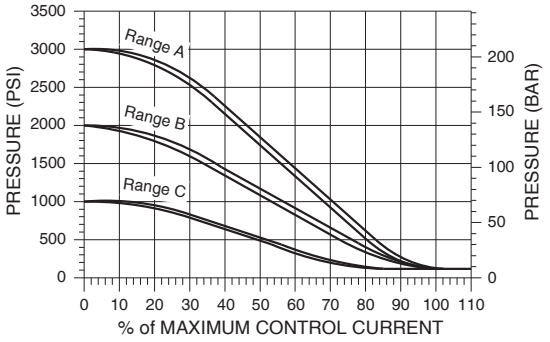


TYPICAL RELIEF PRESSURE VS. FLOW CHARACTERISTIC
Typical Relieving Pressure Port 1 to Port 2
No Current Applied; Cartridge in Body



PERFORMANCE (continued)

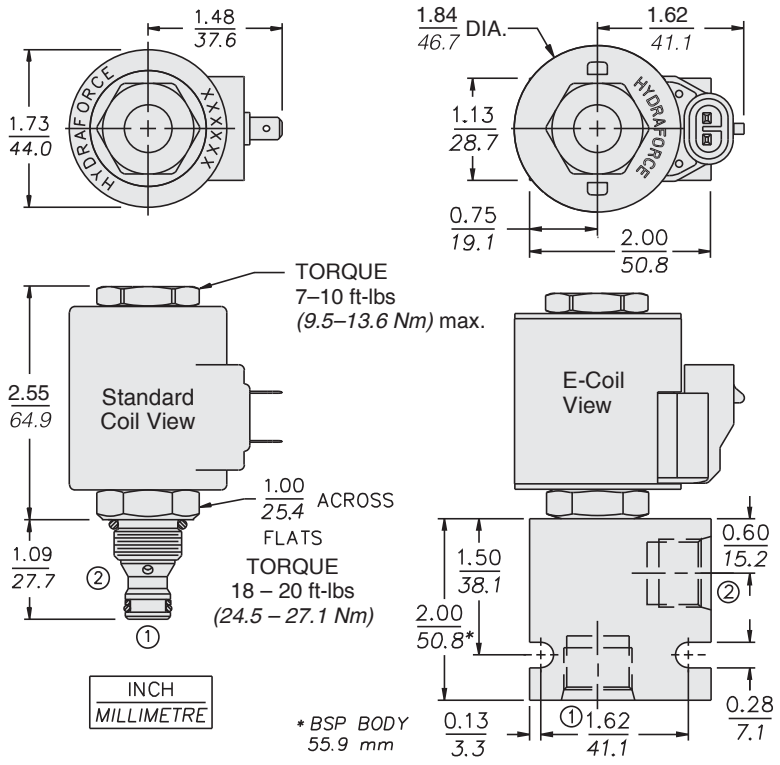
RELIEF PRESSURE VS. CURRENT 200 Hz PWM
Relieving Pressure Port 1 to Port 2
with Constant Flow of 0.76 lpm/0.2 gpm
Body and Line Pressure Drop: 0.34 bar/5 psi at 1.90 lpm/0.5 gpm



Recommended Electronic Controllers:
Model **EFDR2** Multi-Input Fan Drive Controller.
For more information go to:
http://www.hydraforce.com/Electro/fandrive.htm
or
Recommended Electronic Controllers
catalog page 2.001.1 (Table 2)

DIMENSIONS

U.S. Patent 6,267,350



MATERIALS

Cartridge: Weight: 0.25 kg. (0.55 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.008.1

Standard Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized, thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

TS38-21 ___ ___ - ___ - ___ ___ ___ ___

Maximum Operating Pressure

207 bar (3000 psi)	**A**
138 bar (2000 psi)	**B**
69 bar (1000 psi)	**C**
241 bar (3500 psi)	**D**

Porting

Cartridge Only	**0**
SAE 6	**6T**
3/8 in. BSP*	**3B**
1/2 in. BSP*	**4B**

*BSP Body; U.K. Mfr. Only

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**

Voltage

0	Less Coil
10	10 VDC (1.30 amps max.)
12	12 VDC (1.10 amps max.)
20	20 VDC (0.65 amps max.)
24	24 VDC (0.55 amps max.)

Coils with internal diode are available. Consult factory.

Termination E-Coil

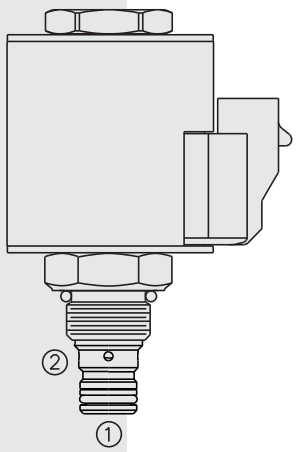
ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150 (IP69K Rated)

Termination Std. Coil

DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

TS58-21F Proportional Electric Relief Valve

U.S. Patent
6,267,350



DESCRIPTION

A screw-in, cartridge-style, single-stage, poppet-type pressure relieving valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is inversely proportional to DC current input.

OPERATION

The **TS58-21F** blocks flow from 1 to 2 until sufficient pressure is present at 1 to open the valve by overcoming the preset spring force. With no current applied, the valve will relieve at ±50 psi of the spring maximum. Applying current to the coil reduces the induced spring force thereby reducing the valve setting.

FEATURES

- 12 and 24 volt coils standard.
- Optional waterproof E-Coils rated up to IP69K.
- Industry common cavity.
- Hardened parts for long life.

RATINGS

Maximum Operating Pressure: 393 bar (5700 psi)

Maximum Control Current: 1.30 amps for 12 VDC coil; 0.65 amps for 24 VDC coil

Relief Pressure Range from Zero to Maximum Control Current: 344.7–6.9 bar (5000–100 psi)

Rated Flow: 1.9 lpm/0.5 gpm; ΔP = 6.9 to 9 bar (100 to 130 psi), cartridge only, 1 to 2 coil energized

Flow Path: Free Flow: 1 to 2 coil energized; Relieving: 1 to 2 coil de-energized

Temperature: -40° to 100°C (-40° to 212° F) with standard Buna N seals
-26° to 204°C (-15° to 400°F) with Fluorocarbon seals;
-54° to 104°C (-65° to 225°F) with Polyurethane seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

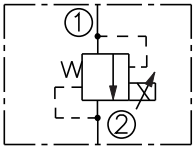
Cavity: VC08-2; See page 9.108.1; **Cavity Tool:** CT08-2XX; See page 8.600.1

Seal Kit: SK08-2X-B; See page 8.650.1

Coil Nut: Part No. 4540550

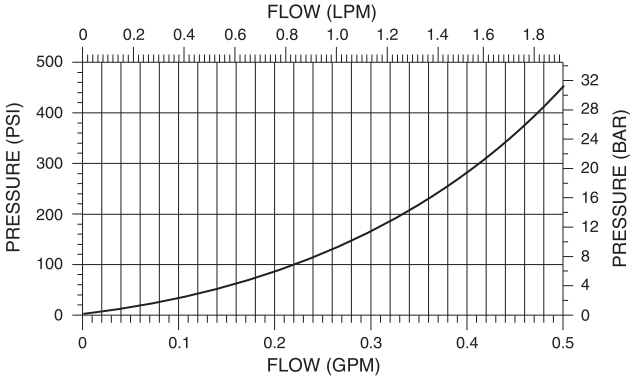
SYMBOLS

USASI/ISO:

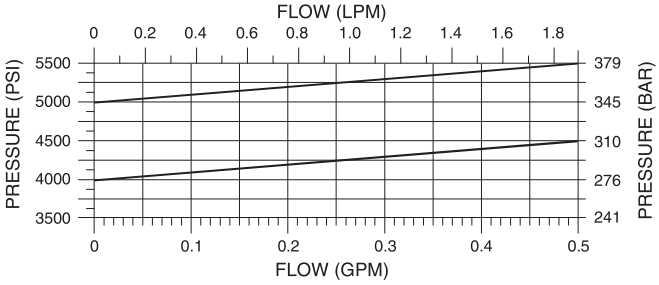


PERFORMANCE

PRESSURE DROP VS. FLOW CHARACTERISTIC
Flow from Port 1 to Port 2 with Coil Energized

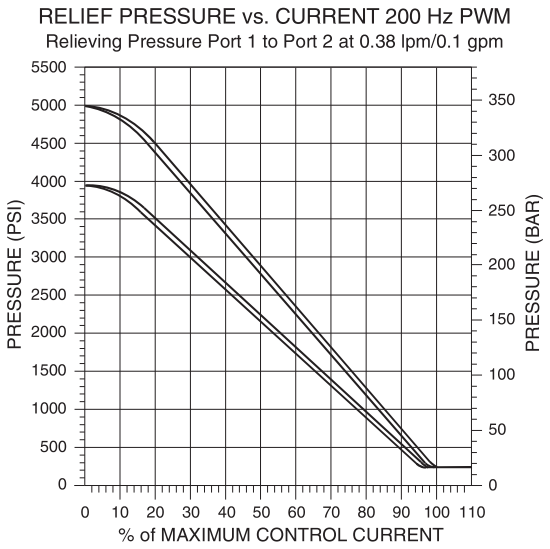


TYPICAL RELIEVING PRESSURE
Port 1 to Port 2; No Current Applied; Upper & Lower Limit



Performance info. continued on following page.

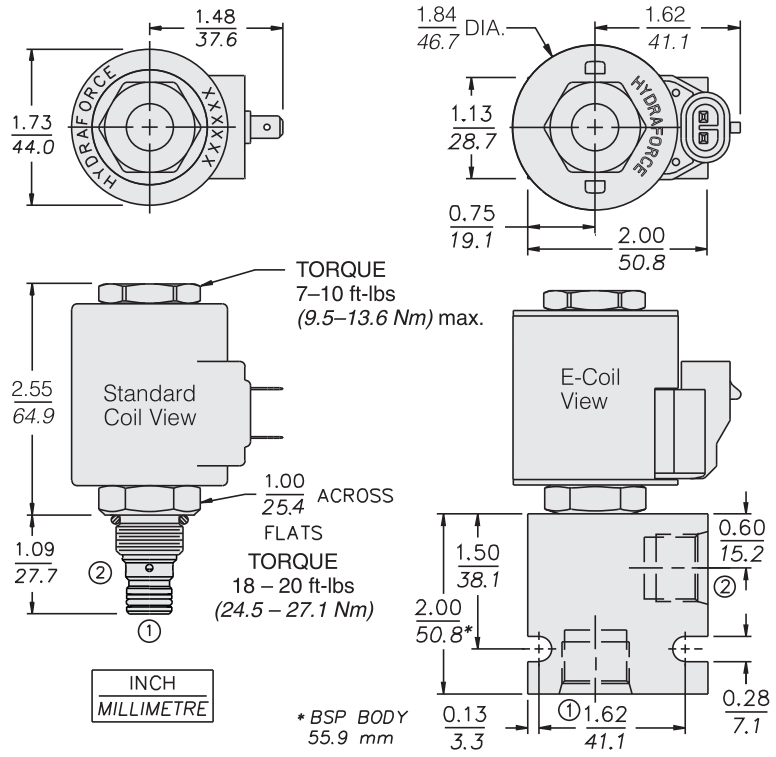
PERFORMANCE (continued)



Recommended Electronic Controllers:
Model **EFDR2** Multi-Input Fan Drive Controller.
For more information go to:
http://www.hydraforce.com/Electro/fandrive.htm
or
Recommended Electronic Controllers
catalog page 2.001.1 (Table 2)

DIMENSIONS

U.S. Patent 6,267,350



MATERIALS

Cartridge: Weight: 0.16 kg. (0.35 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Ported Body: Weight: 0.54 kg. (1.2 lbs.), Ductile iron standard; rated to 345 bar (5000 psi); See page 8.008.1.

Standard Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized, thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell; Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

TS58-21F ___ - ___ - ___ ___ ___ - ___ ___ ___ ___ ___

Screen
No Screen (blank)
150µ Screen **S**

Porting
Cartridge Only **0**
SAE 6 **6TD**
3/8 in. BSP* **3BD**
1/2 in. BSP* **4BD**
*BSP Body; U.K. Mfr. Only

Seals
Buna N (Std.) **N**
Fluorocarbon **V**
Polyurethane **P**

Pressure Setting in bar
275.8 to 344.7 bar only
Specify, for example:
300 bar **M300**

Pressure Setting in psi
4000 to 5000 psi only
Specify, for example:
4500 bar **45.0**

Voltage
0 Less Coil
10 10 VDC (1.30 amps max.)
12 12 VDC (1.10 amps max.)
20 20 VDC (0.65 amps max.)
24 24 VDC (0.55 amps max.)

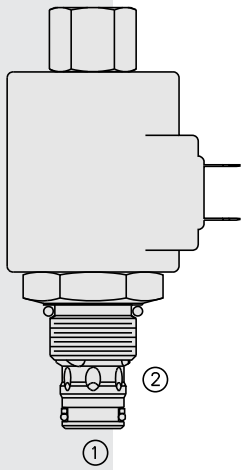
Pressure Setting
(X 100 psi [6,9 bar])
From 4000 psi [275,8 bar] to 5000 psi [344,7 bar] ONLY

Coil Termination	E-Coil	D-Coil
Deutsch DT04-2P	**ER** (IP69K)	**DR** (IP65)
Metri-Pak 150	**EY** (IP69K)	**DY** (IP65)
Dual Lead Wires	**EL** (IP69K)	**DL** (IP65)
Amp Jr. Timer	**EJ** (IP67)	—
DIN 43650	**EG** (IP65)	**DG** (IP65)
Dual Spades	—	**DS** (IP65)

For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models. See coil option info. on pages 3.200.1 & 3.400.1

TS10-26 Proportional Electric Relief w/Internally

Patent Pending



DESCRIPTION

A screw-in, cartridge-style, pilot-operated, spool-type hydraulic relief valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. This valve is intended for use as a pressure limiting device in demanding applications.

OPERATION

The **TS10-26** blocks flow from 1 to 2 until sufficient pressure is present at 1 to open the pilot section by offsetting the electrically induced solenoid force. With no current applied to the solenoid, the valve will relieve at approximately 100 psi.

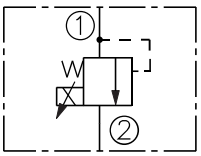
The optional manual override allows the valve to be set when the electric supply is lost. The manual setting is added to the electric setting. To prevent the system from being over pressurized, the manual override should always be disengaged prior to applying power to the coil.

FEATURES

- Optional Manual Override.
- Optional waterproof E-Coils rated up to IP69K.
- 12 and 24 volt coils standard.
- Industry common cavity.

SYMBOLS

USASI/ISO:



RATINGS

Maximum Operating Pressure: 241 bar (3500 psi)

Maximum Control Current: 1.10 amps for 12 VDC coil; 0.55 amps for 24 VDC coil

Relief Pressure Range from Zero to Maximum Control Current:
A: 6.9–207 bar (100–3000 psi) **C:** 6.9–117 bar (100–1700 psi)
B: 6.9–159 bar (100–2300 psi)

Rated Flow: 94.6 lpm (25 gpm), ΔP=13.1 bar (190 psi), Cartridge only, 1 to 2 coil de-energized

Maximum Pilot Flow: 0.76 lpm (0.2 gpm)

Hysteresis: Less than 3%

Flow Path: Free Flow: 1 to 2 coil de-energized; Relieving: 1 to 2 coil energized

Temperature: -40 to 100°C (-40 to 212°F) with standard Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

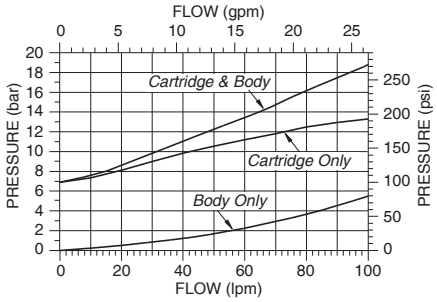
Cavity: VC10-2; See page 9.110.1; **Cavity Tool:** CT10-2XX; See page 8.600.1

Seal Kit: SK10-2N-B; See page 8.650.1

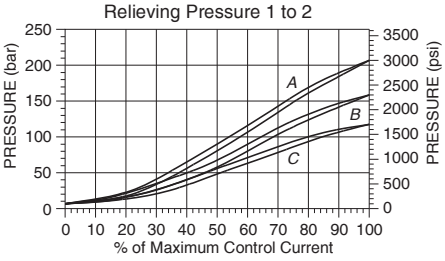
Coil Nut: Part No. 4540560;
For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut info.

PERFORMANCE

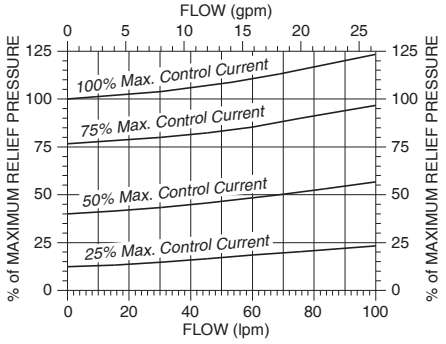
Pressure Drop vs. Flow Characteristic
For Flow 1 to 2 with Coil De-energized



Relief Pressure vs.
Current (DC) Characteristic
200 Hz PWM
Relieving Pressure 1 to 2



Typical Relief Pressure
vs. Flow Characteristic
Typical Relieving Pressure 1 to 2
at Various %'s of Maximum Control Current
Pressure Range "A" (207 bar/3000 psi); Cartridge in Body

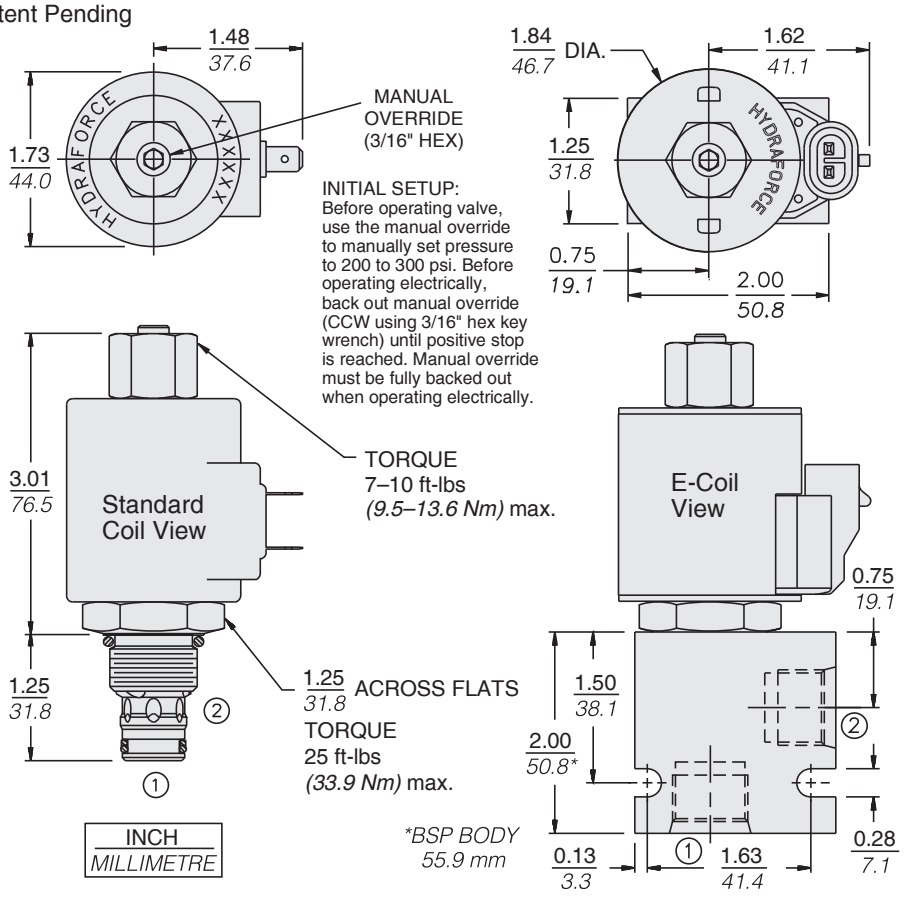


Recommended Electronic Controllers:
Model **EFDR2** Multi-Input Fan Drive Controller.
For more information go to:
http://www.hydraforce.com/Electro/fandrive.htm
or
Recommended Electronic Controllers
catalog page 2.001.1 (Table 2)

Piloted Spool — TS10-26

DIMENSIONS

Patent Pending



MATERIALS

Cartridge: Weight: 0.25 kg. (0.55 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard. Optional polyurethane seals with fluorocarbon back-up recommended for pressures over 240 bar (3500 psi).

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1

Standard Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized, thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

TS10-26 ___ ___ - ___ - ___ - ___ ___ ___ ___

Maximum Relief Pressure
207 bar (3000 psi) **A**
159 bar (2300 psi) **B**
117 bar (1700 psi) **C**

Option
None (Blank)
Manual Override **M**

Porting
Cartridge Only **0**
SAE 6 **6T**
SAE 8 **8T**
3/8 in. BSP* **3B**
1/2 in. BSP* **4B**
*BSP Body; U.K. Mfr. Only

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Voltage
0 Less Coil
10 10 VDC (1.30 amps max.)
12 12 VDC (1.10 amps max.)
20 20 VDC (0.65 amps max.)
24 24 VDC (0.55 amps max.)

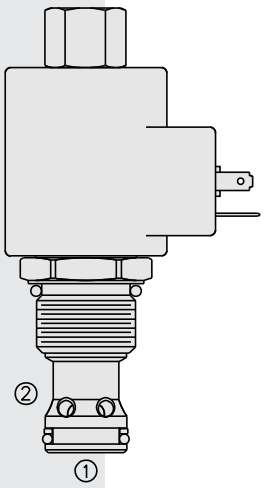
Coils with internal diode are available. Consult factory.

Termination Std. Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

Termination E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)

TS12-26 Proportional Electric Relief w/Internally

Patent Pending



DESCRIPTION

A screw-in, cartridge-style, pilot-operated, spool-type hydraulic relief valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. This valve is intended for use as a pressure limiting device in demanding applications.

OPERATION

The **TS12-26** blocks flow from 1 to 2 until sufficient pressure is present at 1 to open the pilot section by offsetting the electrically induced solenoid force. With no current applied to the solenoid, the valve will relieve at approximately 100 psi.

The optional manual override allows the valve to be set when the electric supply is lost. The manual setting is added to the electric setting. To prevent the system from being over pressurized, the manual override should always be disengaged prior to applying power to the coil.

FEATURES

- Manual Override option.
- 12 and 24 volt coils standard.
- Industry common cavity.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Maximum Operating Pressure: 241 bar (3500 psi)

Maximum Control Current: 1.10 amps for 12 VDC coil; 0.55 amps for 24 VDC coil

Relief Pressure Range from Zero to Maximum Control Current:
A: 6.9–207 bar (100–3000 psi)
B: 6.9–138 bar (100–2000 psi)
C: 2.1–69 bar (30–1000 psi)

Rated Flow: 189 lpm (50 gpm); See Performance Charts

Maximum Pilot Flow: A: 1.9 lpm (.5 gpm); **B:** 1.3 lpm (.35 gpm); **C:** .9 lpm (.25 gpm)

Hysteresis: Less than 3%

Flow Path: Free Flow: 1 to 2 coil de-energized; Relieving: 1 to 2 coil energized

Temperature: -40 to 100°C (-40 to 212°F) with standard Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

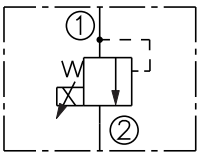
Cavity: VC12-2; See page 9.112.1; **Cavity Tool:** CT12-2XX; See page 8.600.1

Seal Kit: SK12-2X-B; See page 8.650.1

Coil Nut: Part No. 4540560;
For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut info.

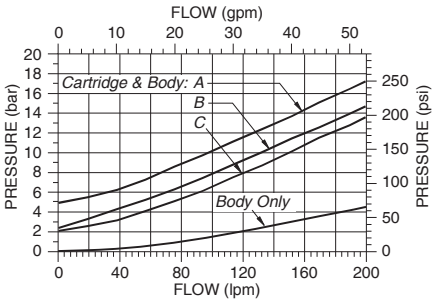
SYMBOLS

USASI/ISO:

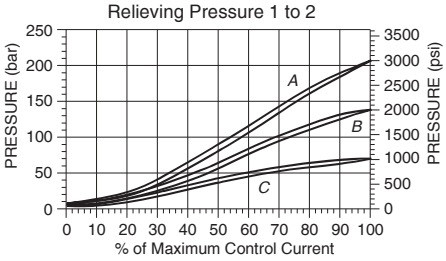


PERFORMANCE

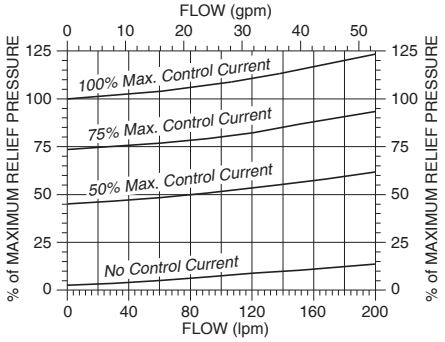
Pressure Drop vs. Flow Characteristic
For Flow 1 to 2 with Coil De-energized



Relief Pressure vs.
Current (DC) Characteristic
200 Hz PWM
Relieving Pressure 1 to 2



Typical Relief Pressure
vs. Flow Characteristic
Typical Relieving Pressure 1 to 2
at Various %'s of Maximum Control Current
Pressure Range "A" (207 bar/3000 psi); Cartridge in Body

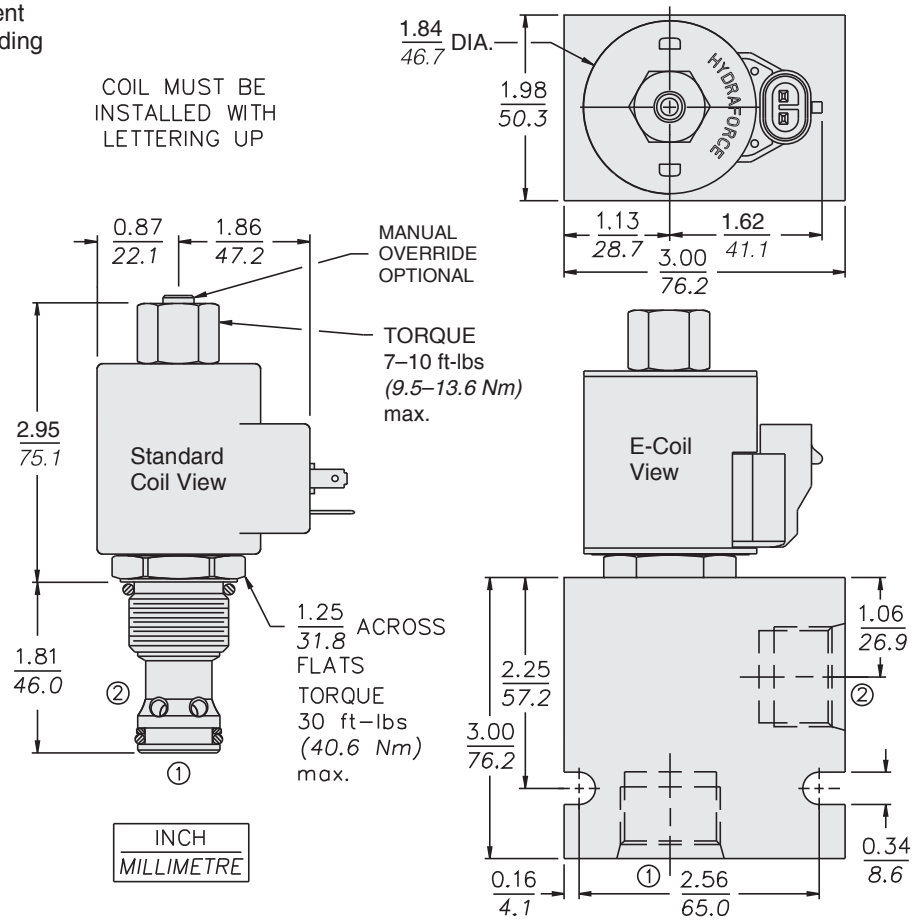


Recommended Electronic Controllers:
Model **EFDR2** Multi-Input Fan Drive Controller.
For more information go to:
http://www.hydraforce.com/Electro/fandrive.htm
or
Recommended Electronic Controllers
catalog page 2.001.1 (Table 2)

Piloted Spool — TS12-26

DIMENSIONS

Patent Pending



MATERIALS

Cartridge: Weight: 0.56 kg. (1.23 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.36 kg. (0.80 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.012.1

Standard Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.1

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell Rated up to IP69K with integral connectors.
Note: See page 3.400.1 for all E-Coil retrofit applications.

TO ORDER

TS12-26__ __ - __ - __ - __ __ __ __

Maximum Relief Pressure
207 bar (3000 psi) **A**
138 bar (2000 psi) **B**
69 bar (1000 psi) **C**

Option(s)
None (Blank)
Manual Override **M**

Porting
Cartridge Only **0**
SAE 10 **10T**
SAE 12 **12T**
1/2 in. BSP* **4B**
3/4 in. BSP* **6B**
*BSP Body; U.K. Mfr. Only

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Termination Std. Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

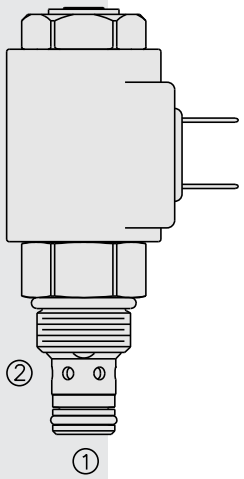
Termination E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

Voltage
0 Less Coil
10 10 VDC (1.30 amps max.)
12 12 VDC (1.10 amps max.)
20 20 VDC (0.65 amps max.)
24 24 VDC (0.55 amps max.)

TS08-27 Proportional Electric Relief Valve

U.S. Patent
6,267,350



DESCRIPTION

A screw-in, cartridge-style, pilot-operated, spool-type pressure relief valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is inversely proportional to DC current input. This valve is intended for use as a pressure limiting device in demanding applications.

OPERATION

The **TS08-27** blocks flow from 1 to 2 until sufficient pressure is present at 1 to open the valve by overcoming the preset induced spring force. With no current applied, the valve will relieve at ±50 psi of the spring maximum. Applying current to the coil reduces the induced spring force thereby reducing the valve setting. The regulated pressure is inversely proportional to the input electrical current.

Note: This valve is ideal for hydraulic fan drive applications. Consult factory for electronic controllers specifically designed for fan drive applications.

FEATURES

- 12 and 24 volt coils standard.
- Industry common cavity.
- Hardened parts for long life.

RATINGS

Maximum Operating Pressure: 241 bar (3500 psi)

Maximum Control Current: 1.20 amps for 12 VDC coil; 0.60 amps for 24 VDC coil

Relief Pressure Range from Zero to Maximum Control Current:
Minimum Pressure is factory adjusted.
A: 207–4.1 bar (3000–60 psi)
B: 138–4.1 bar (2000–60 psi)

Rated Flow: 19 lpm/5 gpm; ΔP = 7.8 bar (113.3 psi) ±10%, cartridge only, 1 to 2 coil energized

Maximum Pilot Flow: 0.76 lpm (0.2 gpm)

Hysteresis: Less than 3%

Flow Path: Free Flow: 1 to 2 coil energized; Relieving: 1 to 2 coil de-energized

Pressure Rise: A: 40 psi/gpm; **B:** 50 psi/gpm

Temperature: -40 to 120°C (-40 to 250°F) with standard Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

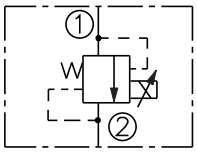
Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

Cavity: VC08-2; See page 9.108.1; **Cavity Tool:** CT08-2XX; See page 8.600.1

Seal Kit: SK08-2X-B; See page 8.650.1

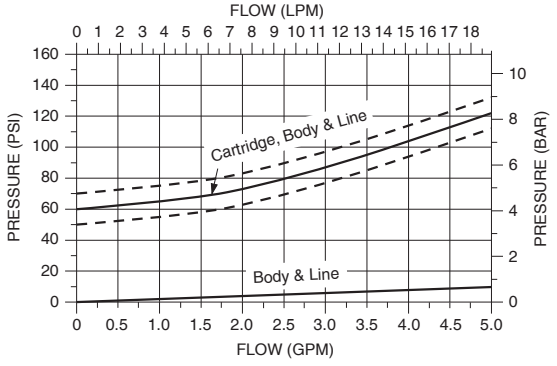
SYMBOLS

USASI/ISO:

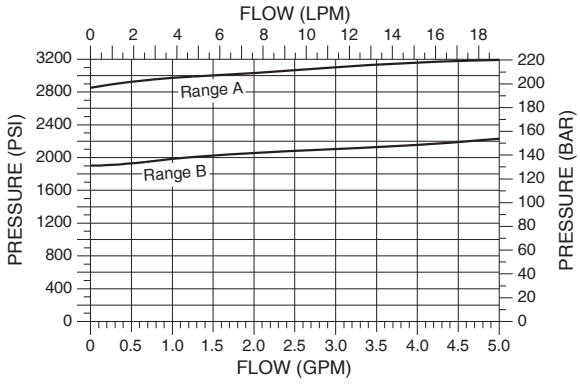


PERFORMANCE

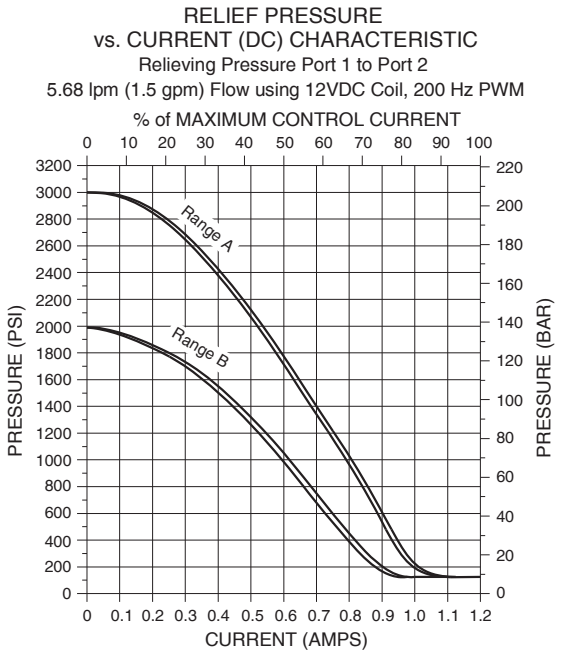
PRESSURE DROP VS. FLOW CHARACTERISTIC
Flow from Port 1 to Port 2 with Coil Energized, at Maximum Set Current



TYPICAL RELIEF PRESSURE VS. FLOW CHARACTERISTIC
Typical Relieving Pressure Port 1 to Port 2 ; Cartridge in Body



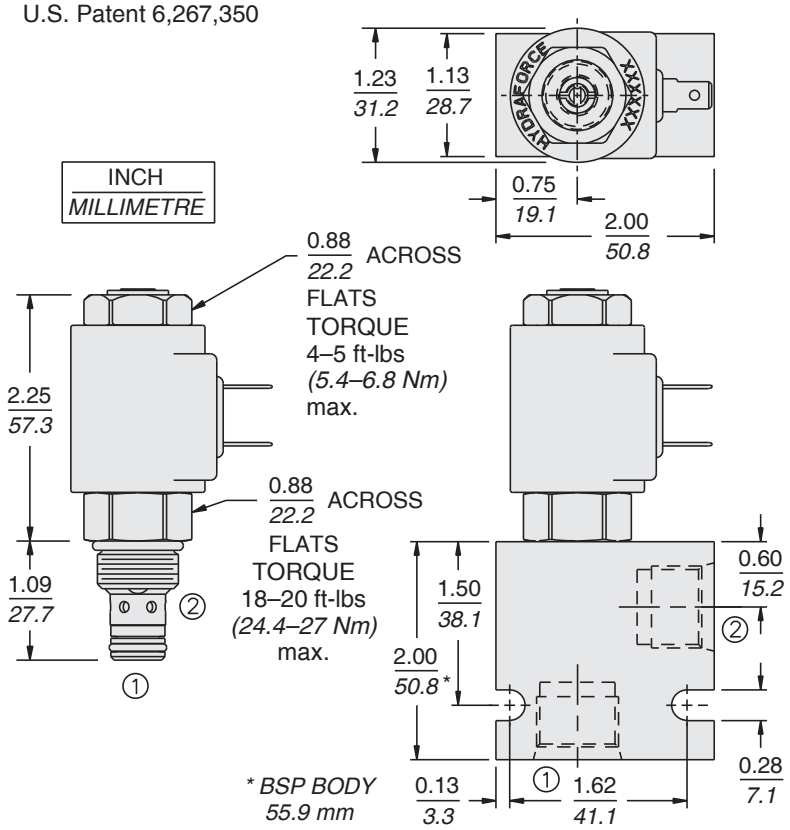
PERFORMANCE (continued)



Recommended Electronic Controllers:
Model **EFDR2** Multi-Input Fan Drive Controller.
For more information go to:
http://www.hydraforce.com/Electro/fandrive.htm
or
Recommended Electronic Controllers
catalog page 2.001.1 (Table 2)

DIMENSIONS

U.S. Patent 6,267,350



MATERIALS

Cartridge: Weight: 0.15 kg. (0.33 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ.
See page 8.008.1

EHPR Series Coils:

D-Coil: Weight: 0.11 kg. (0.25 lbs.) Unitized, thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight: 0.14 kg. (0.3 lbs.) Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. See page 3.400.1

TO ORDER

TS08-27 ___ - ___ - ___ ___

Maximum Operating Pressure
207 bar (3000 psi) **A**
138 bar (2000 psi) **B**

Porting
Cartridge Only **0**
SAE 6 **6T**
3/8 in. BSP* **3B**
*BSP Body; U.K. Mfr. Only

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Voltage
0 Less Coil
12 12 VDC (1.10 amps max.)
24 24 VDC (0.55 amps max.)

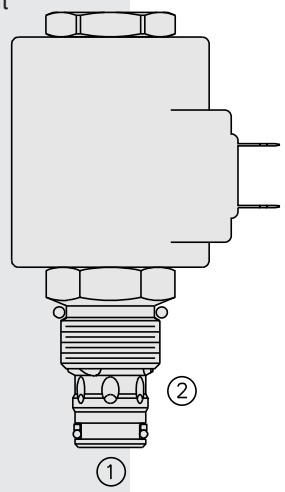
D-Coil Terminations
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

E-Coil Terminations
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pak® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

TS10-27 Proportional Electric Relief w/Internally

U.S. Patent
6,267,350



DESCRIPTION

A screw-in, cartridge-style, pilot-operated, spool-type hydraulic relief valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is inversely proportional to DC current input. This valve is intended for use as a pressure limiting device in demanding applications.

OPERATION

The **TS10-27** blocks flow from 1 to 2 until sufficient pressure is present at 1 to open the valve by overcoming the preset induced spring force. With no current applied, the valve will relieve at ±50 psi of the range maximum. Applying current to the coil decreases the induced spring force, thereby reducing the valve setting.

Note: This valve is ideal for hydraulic fan drive applications. Consult factory for electronic controllers specifically designed for fan drive applications.

FEATURES

- 12 and 24 volt coils standard.
- Industry common cavity.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Maximum Operating Pressure: 241 bar (3500 psi)

Maximum Control Current: 1.10 amps for 12 VDC coil; 0.55 amps for 24 VDC coil

Relief Pressure Range from Zero to Maximum Control Current:
A: 207–10.3 bar (3000–150 psi)
B: 138–10.3 bar (2000–150 psi)
C: 69–10.3 bar (1000–150 psi)

Rated Flow: 75.7 lpm (20 gpm), ΔP=14.8 bar (215 psi), Cartridge only, 1 to 2 coil energized

Maximum Pilot Flow: 0.76 lpm (0.2 gpm)

Hysteresis: Less than 3%

Flow Path: Free Flow: 1 to 2 coil energized; Relieving: 1 to 2 coil de-energized

Temperature: -40 to 120°C (-40 to 250°F) with standard Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

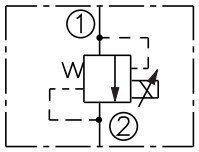
Cavity: VC10-2; See page 9.110.1; **Cavity Tool:** CT10-2XX; See page 8.600.1

Seal Kit: SK10-2X-B; See page 8.650.1

Coil Nut: Part No. 4540550;
For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut info.

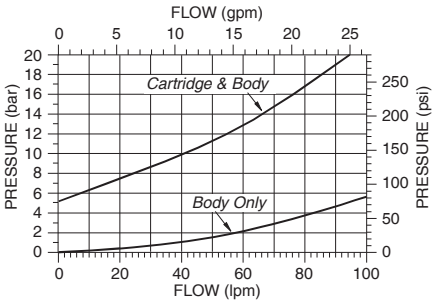
SYMBOLS

USASI/ISO:

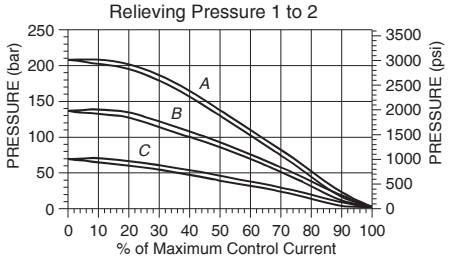


PERFORMANCE

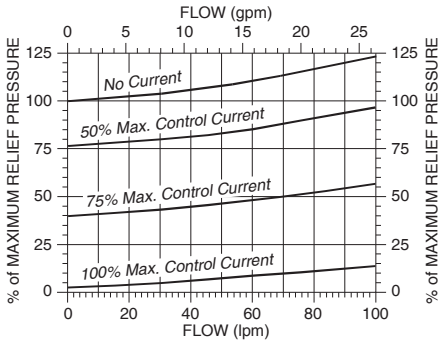
Pressure Drop vs. Flow Characteristic
For Flow 1 to 2 with Coil Energized



Relief Pressure vs.
Current (DC) Characteristic, 200 Hz PWM
Relieving Pressure 1 to 2



Typical Relief Pressure
vs. Flow Characteristic
Typical Relieving Pressure 1 to 2
at Various %'s of Maximum Control Current
Pressure Range "A" (207 bar/3000 psi); Cartridge in Body

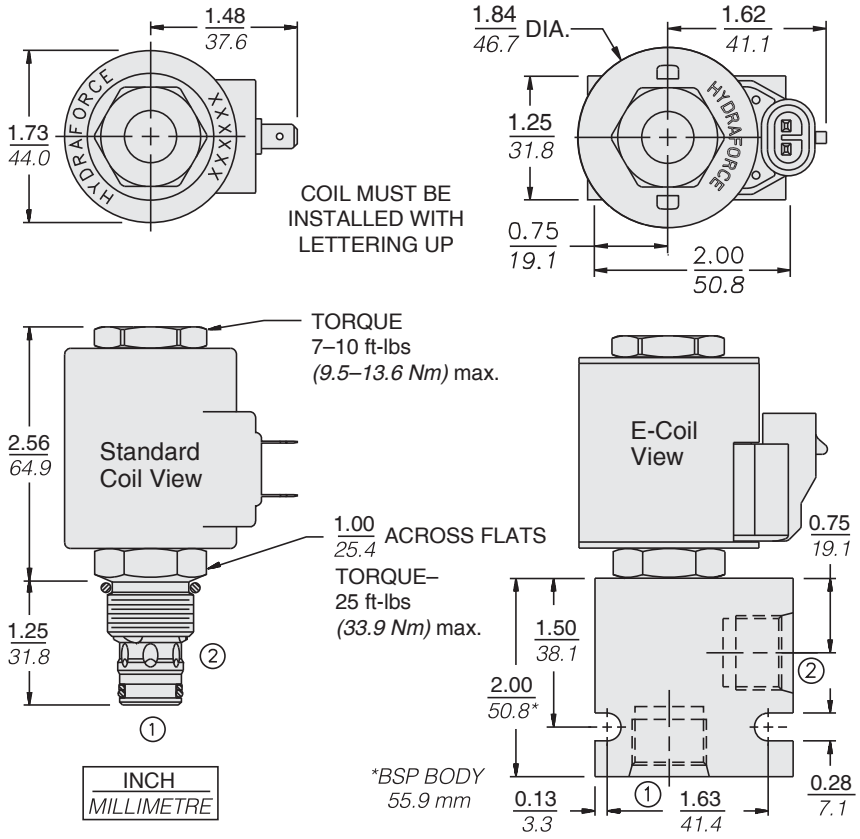


Recommended Electronic Controllers:
Model **EFDR2** Multi-Input Fan Drive Controller.
For more information go to:
http://www.hydraforce.com/Electro/fandrive.htm
or
Recommended Electronic Controllers
catalog page 2.001.1 (Table 2)

Piloted Spool TS10-27

DIMENSIONS

U.S. Patent 6,267,350



MATERIALS

Cartridge: Weight: 0.18 kg. (0.4 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard. Optional polyurethane seals with fluorocarbon back-up recommended for pressures over 240 bar (3500 psi).

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1

Standard Coil: Weight: 0.27 kg. (0.6 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.1

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

TS10-27__ - __ - __ - __ __ __ __

Maximum Relief Pressure

207 bar (3000 psi)	**A**
138 bar (2000 psi)	**B**
69 bar (1000 psi)	**C**

Porting

Cartridge Only	**0**
SAE 6	**6T**
SAE 8	**8T**
3/8 in. BSP*	**3B**
1/2 in. BSP*	**4B**

*BSP Body; U.K. Mfr. Only

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**

Voltage

0	Less Coil
10	10 VDC (1.30 amps max.)
12	12 VDC (1.10 amps max.)
20	20 VDC (0.65 amps max.)
24	24 VDC (0.55 amps max.)

Coils with internal diode are available. Consult factory.

Termination Std. Coil

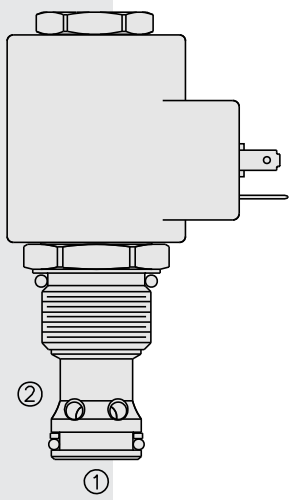
DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination E-Coil

ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150 (IP69K Rated)

TS12-27 Proportional Electric Relief Valve

U.S. Patent
6,267,350



DESCRIPTION

A screw-in, cartridge-style, pilot-operated, spool-type hydraulic relief valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is inversely proportional to DC current input. This valve is intended for use as a pressure limiting device in demanding applications.

OPERATION

The **TS12-27** blocks flow from 1 to 2 until sufficient pressure is present at 1 to open the pilot section by overcoming the induced spring force. With no current applied, the valve will relieve at ±50 psi of the range maximum. Applying current to the coil proportionally decreases the pressure required to open the valve from 1 to 2.

Note: This valve is ideal for hydraulic fan drive applications. Consult factory for electronic controllers specifically designed for fan drive applications.

FEATURES

- Hardened parts for long life.
- 12 and 24 volt coils standard.
- Industry common cavity.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Maximum Operating Pressure: 241 bar (3500 psi)

Maximum Control Current: 1.10 amps for 12 VDC coil; 0.55 amps for 24 VDC coil

Relief Pressure Range from Zero to Maximum Control Current:
A: 207–10.34 bar (3000–150 psi)
B: 138–10.34 bar (2000–150 psi)
C: 69–10.34 bar (1000–150 psi)

Rated Flow: 186.3 lpm (50 gpm), ΔP=16.4 bar (238 psi), Cartridge only, 1 to 2 coil energized

Maximum Pilot Flow: 0.76 lpm (.2 gpm)

Hysteresis: Less than 3%

Flow Path: Free Flow: 1 to 2 coil energized; Relieving: 1 to 2 coil de-energized

Temperature: -40 to 120°C (-40 to 250°F) with standard Buna N seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

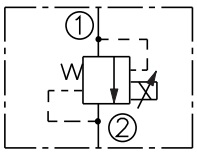
Cavity: VC12-2; See page 9.112.1; **Cavity Tool:** CT12-2XX; See page 8.600.1

Seal Kit: SK12-2X-B; See page 8.650.1

Coil Nut: Part No. 4540550;
For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut info.

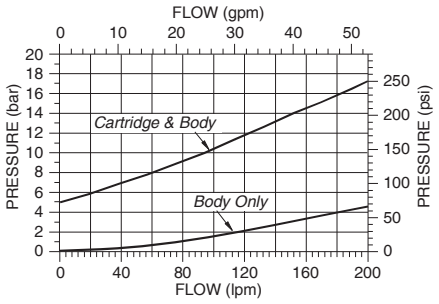
SYMBOLS

USASI/ISO:

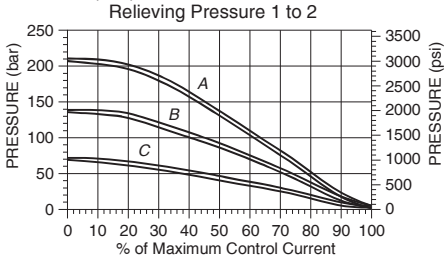


PERFORMANCE

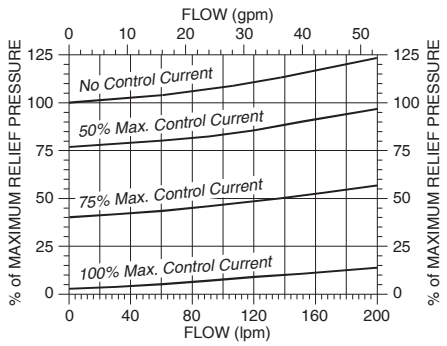
Pressure Drop vs. Flow Characteristic
For Flow 1 to 2 with Coil Energized



Relief Pressure vs.
Current (DC) Characteristic, 200 Hz PWM
Relieving Pressure 1 to 2



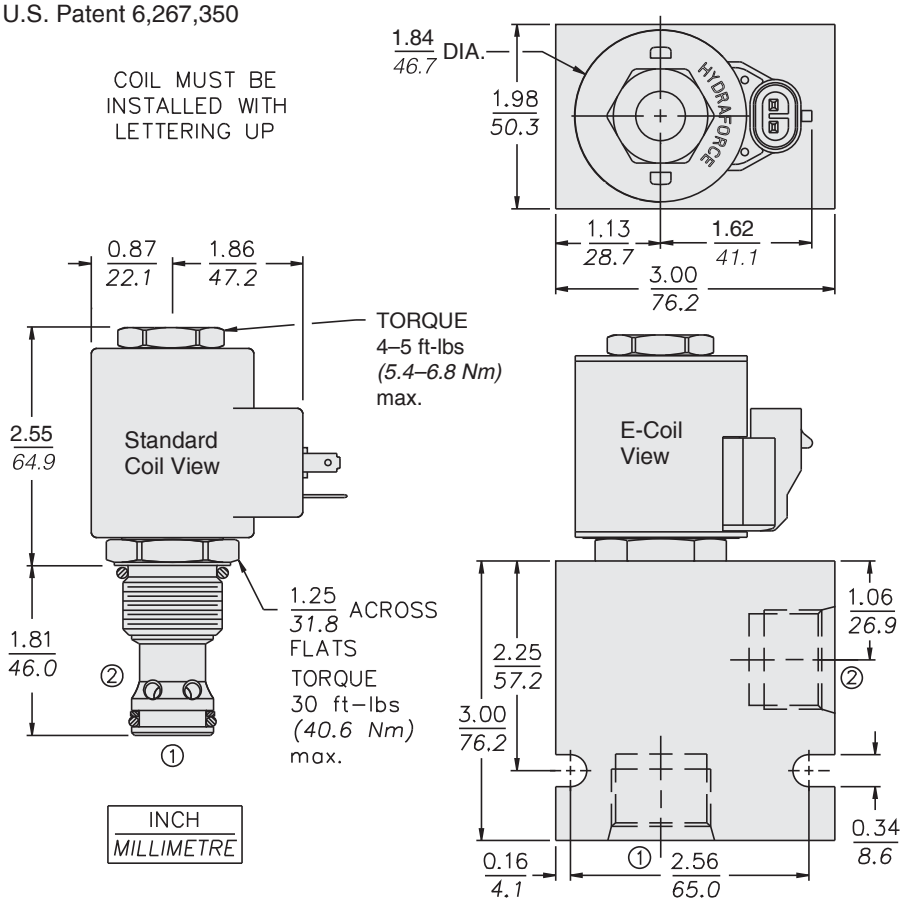
Typical Relief Pressure
vs. Flow Characteristic
Typical Relieving Pressure 1 to 2
at Various %'s of Maximum Control Current
Pressure Range "A" (207 bar/3000 psi); Cartridge in Body



Recommended Electronic Controllers:
Model **EFDR2** Multi-Input Fan Drive Controller.
For more information go to:
http://www.hydraforce.com/Electro/fandrive.htm
or
Recommended Electronic Controllers
catalog page 2.001.1 (Table 2)

DIMENSIONS

U.S. Patent 6,267,350



MATERIALS

Cartridge: Weight: 0.56 kg. (1.23 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and TFE back-ups standard.

Standard Ported Body: Weight: 0.36 kg. (0.80 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.012.1

Standard Coil: Weight: 0.32 kg. (0.7 lbs.); Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.1.

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

TS12-27__ - __ - __ - __ __ __ __

Maximum Relief Pressure

207 bar (3000 psi)	**A**
140 bar (2000 psi)	**B**
70 bar (1000 psi)	**C**

Porting

Cartridge Only	**0**
SAE 10	**10T**
SAE 12	**12T**
1/2 in. BSP*	**4B**
3/4 in. BSP*	**6B**

*BSP Body; U.K. Mfr. Only

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**

Termination Std. Coil

DS	Dual Spades
DG	DIN 43650
DL	Leadwires (2)
DL/W	Leads w/Weatherpak® Connectors
DR	Deutsch DT04-2P

Termination E-Coil

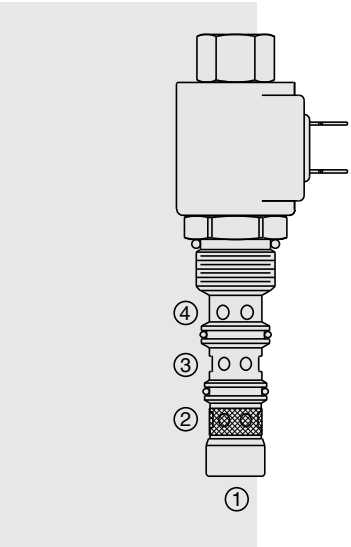
ER	Deutsch DT04-2P (IP69K Rated)
EY	Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

Voltage

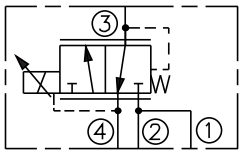
0	Less Coil
10	10 VDC (1.30 amps max.)
12	12 VDC (1.10 amps max.)
20	20 VDC (0.65 amps max.)
24	24 VDC (0.55 amps max.)

TS98-30 Proportional Electric Reducing/Relieving



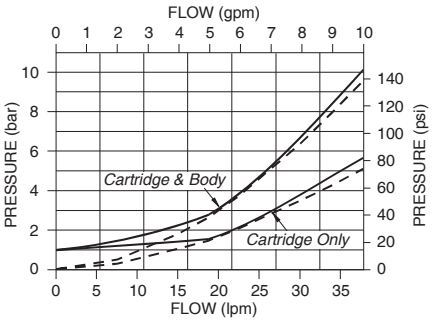
SYMBOLS

USASI/ISO:

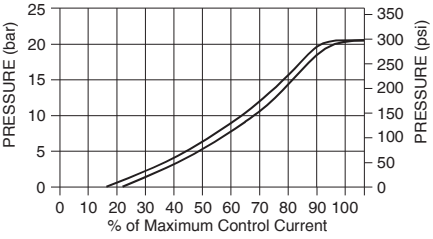


PERFORMANCE

Pressure Drop vs. Flow Characteristic
For Flow 3 to 4 with Coil De-energized
—— Reducing; – – – Relief



Reduced Pressure vs. Current Characteristic
For a Regulated Pressure Range of
0–20 bar (0–300 psi) with Input Pressure at 2
Control Current: 300 Hz



DESCRIPTION

A screw-in, cartridge-style, pilot-operated, spool-type reducing/relieving valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. This valve is intended for use as a pressure control device in demanding applications.

OPERATION

Without applied current, the **TS98-30** allows bidirectional flow from 3 to 4 while blocking 2. When the coil is energized, 3 is connected to 2, and pressure at 3 is controlled proportional to the amount of current applied to the coil. If pressure at 3 exceeds the setting induced by the coil, pressure is relieved to 4.

Back pressure on port 4 becomes additive to the pressure setting at a 1:1 ratio.

Note: This product may be customized for special OEM performance characteristics. Consult factory.

FEATURES

- 12 and 24 volt coils standard.
- Optional waterproofed E-Coils rated up to IP69K.

RATINGS

Maximum Inlet Pressure at Port 2: 24 bar (350 psi)

Maximum Control Current: 0.70 amps for 12 VDC coil; 0.35 amps for 24 VDC coil

Deadband: 0.150 amps @ 12 VDC; 0.075 amps @ 24 VDC

Hysteresis: 3.0% PWM

Reducing/Relieving Pressure Range from Zero to Maximum Control Current: 0–20.7 bar (0–300 psi)

Rated Flow: 30 lpm (8 gpm) at 45 psid port 3 to 4 with coil de-energized

Maximum Pilot Flow: 0.4 lpm (0.12 gpm)

Flow Path: Free Flow: 3 to 4 bidirectional coil de-energized; Reduced: 2 to 3 coil energized; Relieving: 3 to 4 coil energized; Port 1 is not plumbed externally

Temperature: -30 to 175°C (-20 to 350°F), with standard Fluorocarbon seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

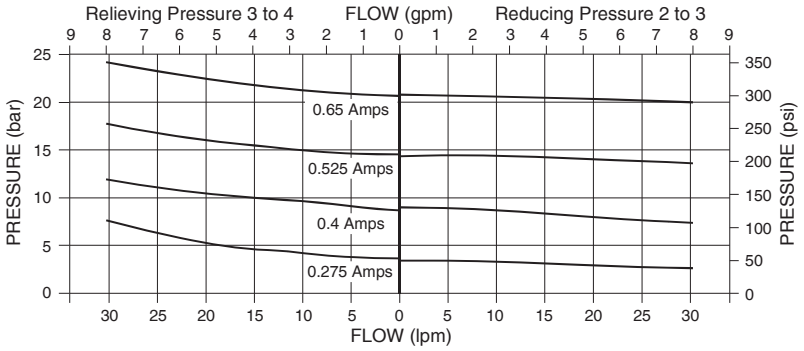
Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

Cavity: VC98-3; See page 9.110.1; **Cavity Tool:** CT98-3XX; See page 8.600.1

Seal Kit: SK90-3V; See page 8.650.1

Coil Nut: Part No. 7004410;
For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut info.

Reducing/Relieving Pressure vs. Flow Characteristic
Regulated Pressure Range: 0–20 bar (0–290 psi) with 24 bar (350 psi) Input
Pressure at 3 for Various Control Currents (ΔP Shown for Cartridge & Body)

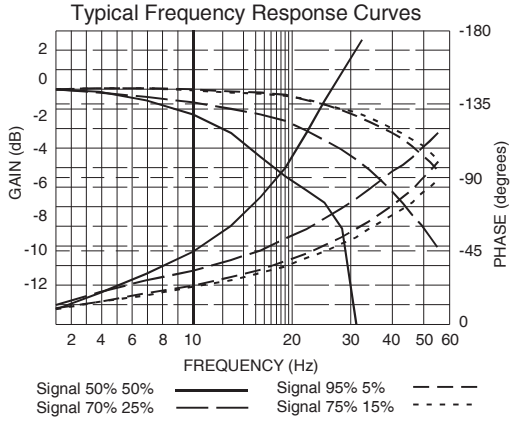


Performance info. continued on following page.

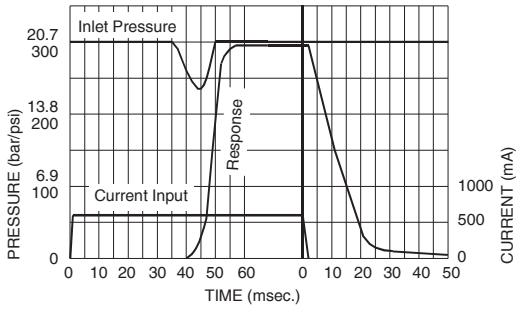
Valve w/Internally Piloted Spool — TS98-30

PERFORMANCE (continued)

Typical Frequency Response Curves

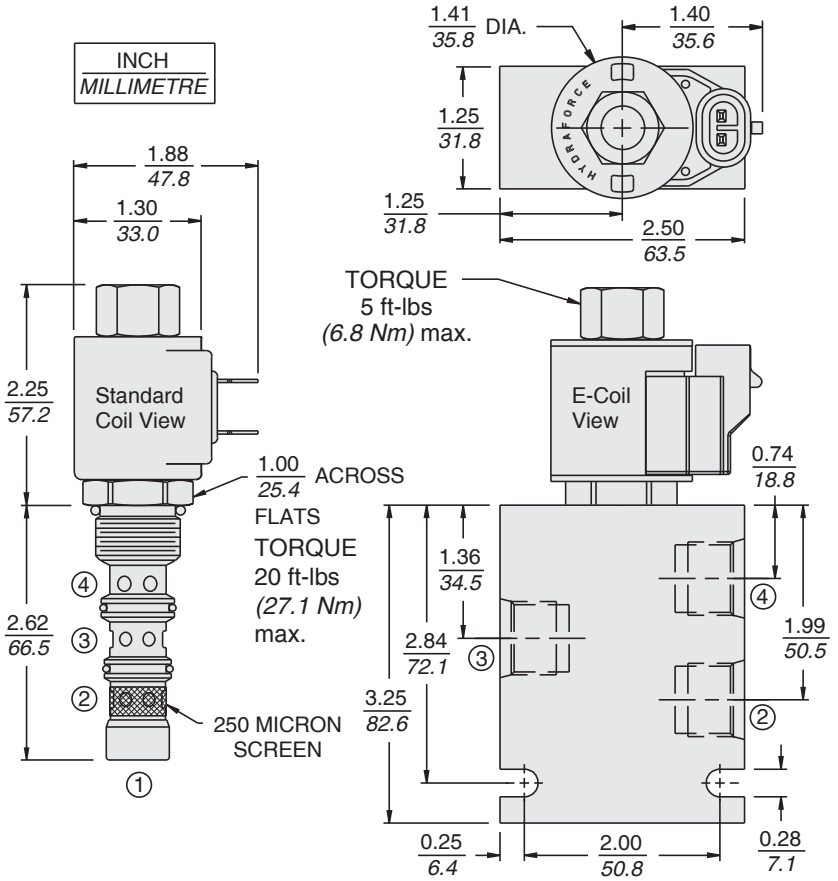


Typical Step Response Curve



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.25 kg. (0.55 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. O-rings standard.

Standard Ported Body: Weight: 0.34 kg. (0.75 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1.

Standard Coil: Weight: 0.27 kg. (0.60 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.1

E-Coil: Weight: 0.14 kg. (0.3 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors.
Note: See page 3.400.1 for all E-Coil retrofit applications.

TO ORDER

TS98-30 - __ - __ - __ __ __ __

Porting
Cartridge Only **0**
SAE 6 **6T**
SAE 8 **8T**

Seals
Fluorocarbon **V**

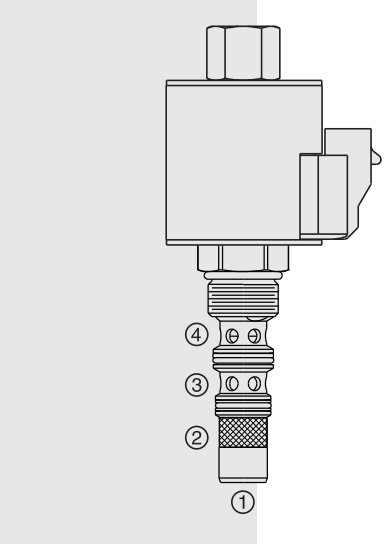
Voltage
Less Coil **0**
10 VDC (0.84 amps max.) **10**
12 VDC (0.70 amps max.) **12**
20 VDC (0.42 amps max.) **20**
24 VDC (0.35 amps max.) **24**
Consult factory for other voltages

Termination Std. Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

Termination E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

TS90-31 Proportional Electric Reducing/Relieving



DESCRIPTION

A screw-in, cartridge-style, pilot-operated, spool-type reducing/relieving valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. This valve is intended for use as a pressure control device in demanding applications.

OPERATION

Without applied current, the **TS90-31** allows flow from 3 to 4 while blocking 2. When the coil is energized, 3 is connected to 2, and pressure at 3 is controlled proportional to the amount of current applied to the coil. If pressure at 3 exceeds the setting induced by the coil, pressure is relieved to 4.

Back pressure on port 4 becomes additive to the pressure setting at a 1:1 ratio.

Note: This product may be customized for special OEM performance characteristics. Consult factory.

FEATURES

- 12 and 24 volt coils standard.
- Optional waterproofed E-Coils rated up to IP69K.

RATINGS

Maximum Operating Pressure at Ports 1 and 2: 207 bar (3000 psi)

Maximum Tank Pressure at Port 4: 69 bar (1000 psi)

Regulated Pressure Range from Zero to Max. Control Current: 0 to 137.9 bar (2000 psi)

Maximum Control Current: E-Coils: 0.88 amps for 12 VDC coil; 0.44 amps for 24 VDC coil; **D-Coils:** 0.68 amps for 12 VDC coil; 0.34 amps for 24 VDC coil

Deadband: 0.150 amps @ 12 VDC; 0.075 amps @ 24 VDC

Hysteresis: 3.0% PWM

Rated Flow: 38 lpm (10 gpm)

Maximum Pilot Flow: 0.85 lpm (0.23 gpm) with No Current

Flow Path: Free Flow: 3 to 4 coil de-energized; Reduced: 2 to 3 coil energized; Relieving: 3 to 4 coil energized; Port 1 is not plumbed externally

Temperature: -40 to 100°C (-40 to 212°F) with standard Buna N seals
-26 to 204°C (-15 to 400°F) with Fluorocarbon seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

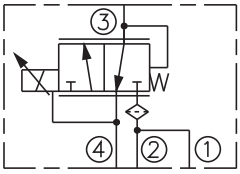
Cavity: VC98-3; See page 9.110.1; **Cavity Tool:** CT98-3XX; See page 8.600.1

Seal Kit: SK90-3X-BM; See page 8.650.1

Coil Nut: Part No. 4540560

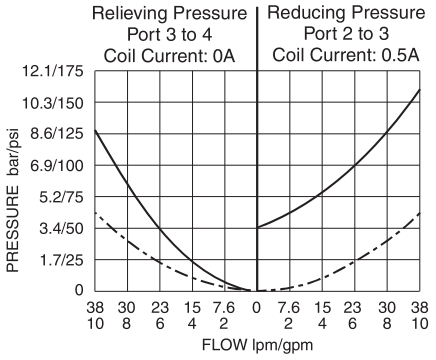
SYMBOLS

USASI/ISO:

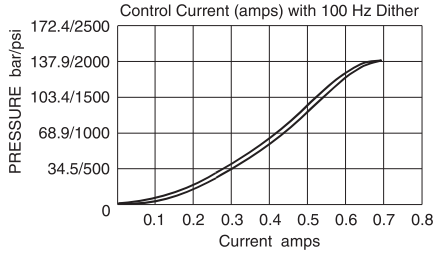


PERFORMANCE

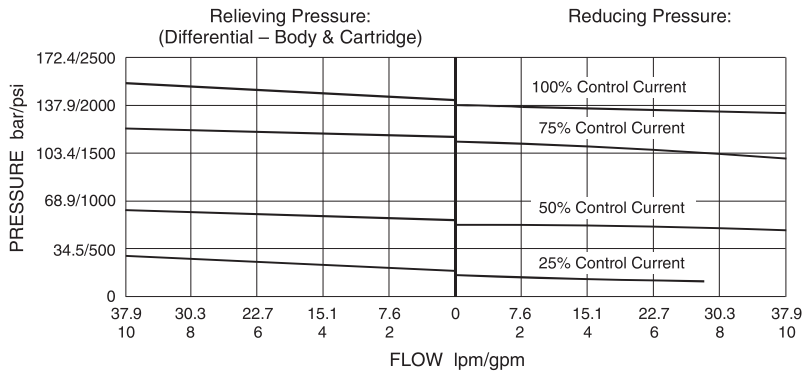
Typical Pressure Drop vs. Flow
Cartridge, Body & Line ——; Body & Line – – – -



Reducing Pressure vs. Current
Inlet Pressure 172 bar (2500 psi) at No Flow
Control Current (amps) with 100 Hz Dither



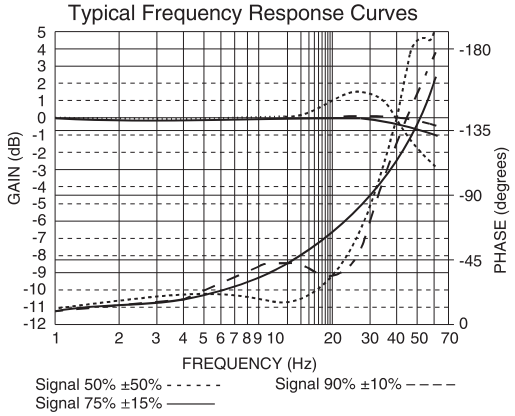
Typical Reducing/Relieving Pressure vs. Flow
For a Regulated Pressure with 172.4 bar (2500 psi) Inlet Pressure
for Various Percentages of Nominal Control Currents



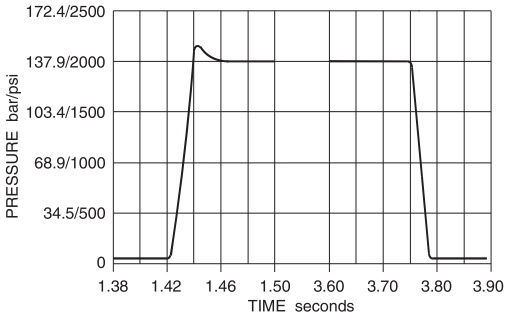
Valve, Internally Piloted — TS90-31

PERFORMANCE (continued)

Typical Frequency Response Curves

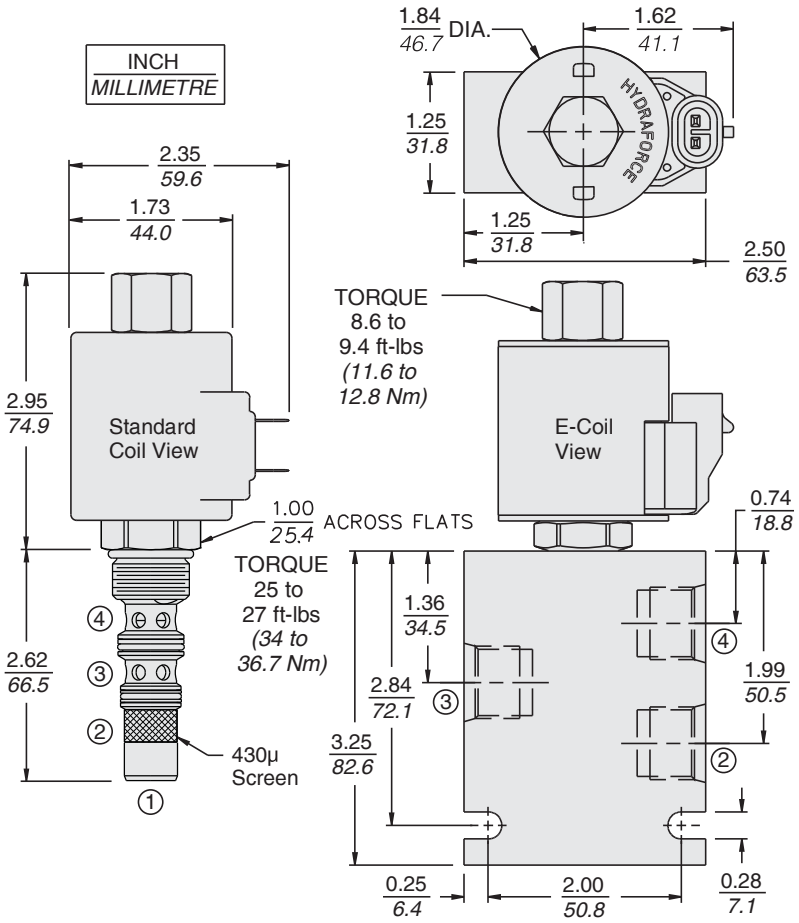


Typical Step Response Curve
Reducing Pressure Shown; No Flow
Inlet Pressure: 172.4 bar/ 2500 psi
12 VDC E-Series Coil



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



MATERIALS

Cartridge: Weight: 0.25 kg. (0.55 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. O-rings standard.

Standard Ported Body: Weight: 0.34 kg. (0.75 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1.

Standard Coil: Weight: 0.32 kg. (0.70 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.1

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Perfect wound, fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors.
Note: See page 3.400.1 for all E-Coil retrofit applications.

TO ORDER

TS90-31 - __ - __ - __ __ __ __

Porting
Cartridge Only **0**
SAE 6 **6T**
SAE 8 **8T**

Seals
Buna N **N**
Fluorocarbon **V**

Voltage
Less Coil **0**
12 VDC (0.88 amps max.) **12**
24 VDC (0.44 amps max.) **24**
Consult factory for other voltages

Termination Std. D-Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

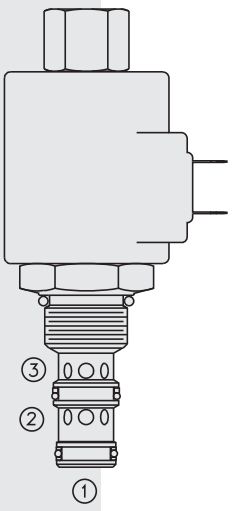
Termination E-Coil
EG DIN 43650 (IP65 Rated)
EL Leadwires (2) (IP69K Rated)
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)
EJ Amp Jr. Timer (IP69K Rated)

Coils with internal diode are available. Consult factory.

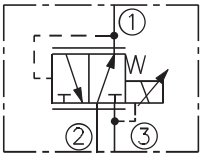
Note: This valve uses a 10-size coil and the VC98-3 cavity, which is a variation of a 10-size cavity.

TS10-36 Proportional Electric Reducing/Relieving

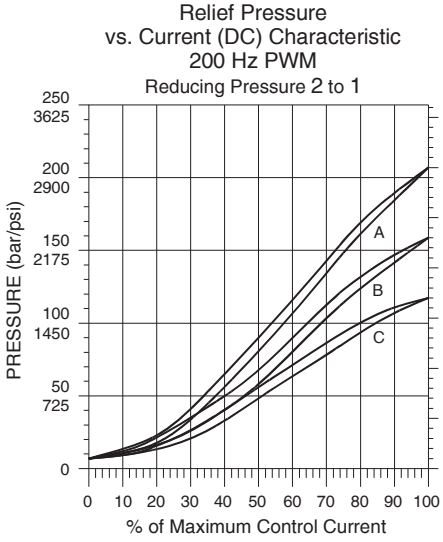
U.S. Patent
7,137,406



ISO SYMBOL



PERFORMANCE



DESCRIPTION

A screw-in, cartridge-style, pilot-operated, spool-type reducing/relieving valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. This valve is intended for use as a pressure limiting device in demanding applications.

OPERATION

With current applied to the valve coil, the **TS10-36** blocks flow from 2 to 1 until sufficient pressure is present at 1 to open the pilot section by offsetting the electrically induced solenoid force. Increasing electric current will increase the control (reduced) pressure at 1. With no current applied to the solenoid, the valve will relieve pressure at 1 at approximately 6,9 bar (100 psi), regardless of pressure at 2.

The TS10-36 has an optional manual override feature. This allows the valve to be set when the electric supply is lost. The manual setting is added to the electric setting, so when using the manual override feature to establish a minimum setting, care is required to prevent the system from becoming over-pressurized.

FEATURES

- Manual override option.
- Industry common cavity.
- 12 and 24 volt coils standard.
- Optional waterproof E-Coils rated up to IP69K.

RATINGS

Maximum Operating Pressure: 241 bar (3500 psi)

Electrical Parameters:

Coil	Typical Max. Current (A) at 0 gpm		Typical Resistance ± 5% @ 20°C (ohms)		Typical Apparent Inductance (mH)	
	12 VDC	24 VDC	12 VDC	24 VDC	12 VDC	24 VDC
D-Coil	1.10	0.55	7.25 ±5%	28.35 ±5%	141	626
E-Coil	1.20	0.60	7.3 ±5%	29.4 ±5%	139	600

Relief Pressure Range from Zero to Maximum Control Current:
A: 6.9–207 bar (100–3000 psi)
B: 6.9–159 bar (100–2300 psi)
C: 6.9–117 bar (100–1700 psi)

Rated Flow: 57 lpm (15 gpm), ΔP=22.8 bar (330 psi), Cartridge only, 1 to 3 coil de-energized

Maximum Pilot Flow: 0.21 lpm (0.08 gpm)

Flow Path: Free Flow: 1 to 3 coil de-energized; Reduced: 2 to 1 coil energized; Relieving: 1 to 3 coil energized

Temperature: -40 to 100°C (-40 to 212°F) for Buna N seals
-26° to 204°C (-15° to 400°F) with Fluorocarbon V seals

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

Cavity: VC10-3; See page 9.110.1

Cavity Tool: CT10-3XX; See page 8.600.1

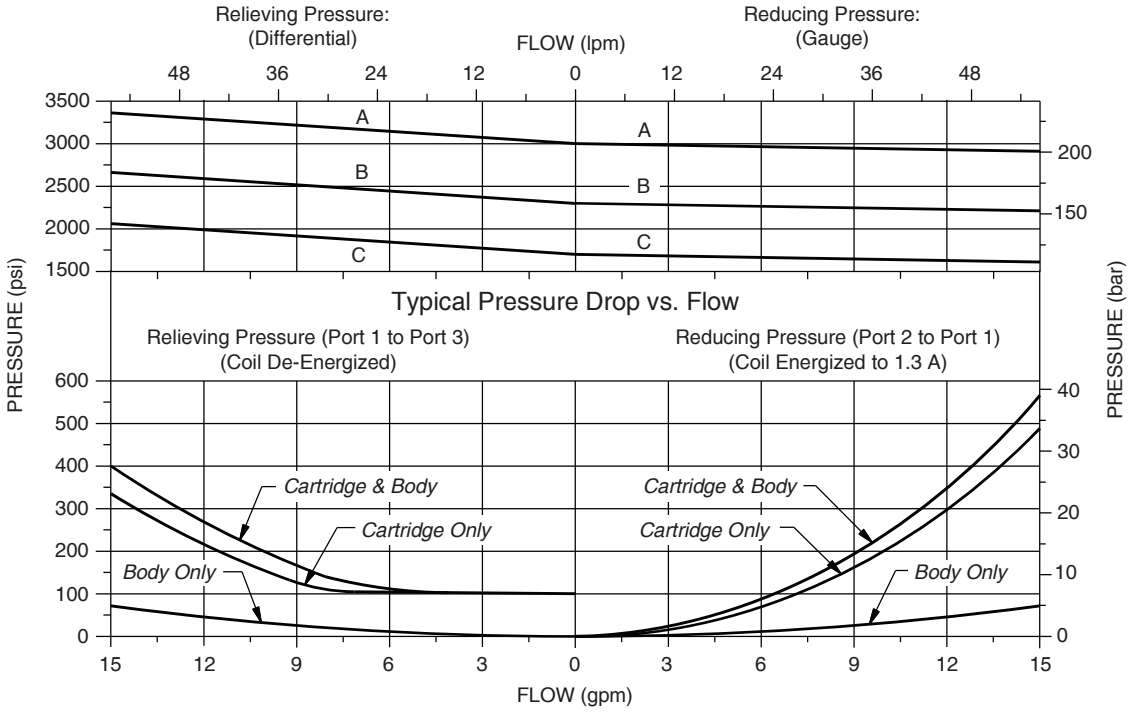
Seal Kit: SK10-3X-BM; See page 8.650.1 (X = seal option)

Coil Nut: Part No. 4540560; For E-coils made prior to 1-1-04, see page 3.400.1

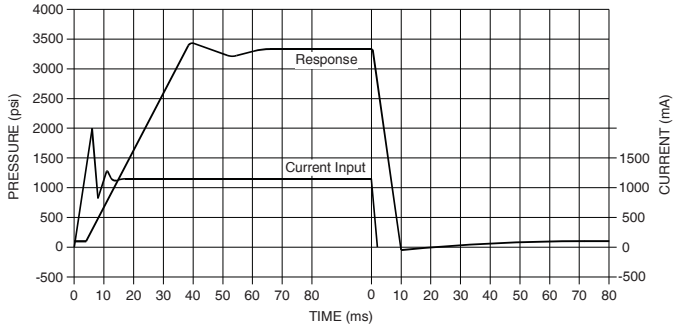
Valve w/Internally Piloted Spool — TS10-36

PERFORMANCE (cont'd)

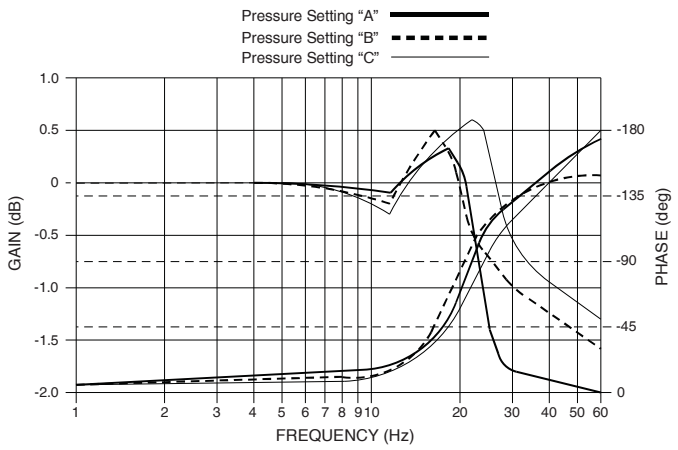
Typical Relieving/Reducing Pressure vs. Flow @ Maximum Current
Cartridge in Body Shown for TS10-36A, B and C



Typical Step Response Curve



Typical Frequency Response Curves



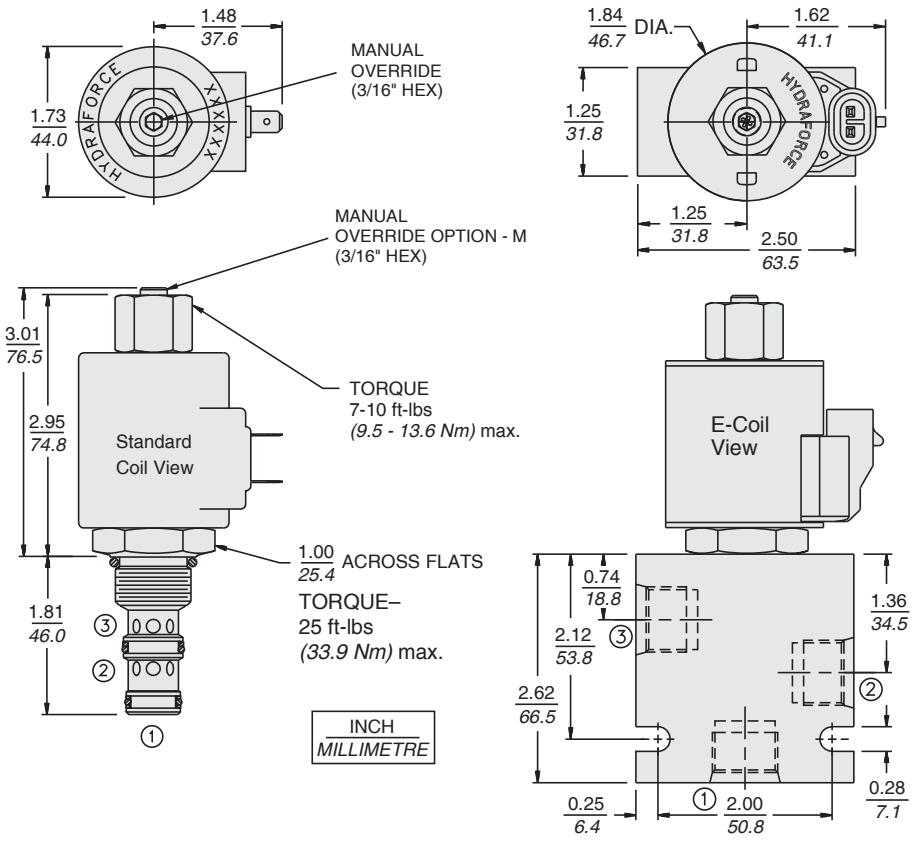
TS10-36 continued

Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

INITIAL SETUP:
Before operating valve, use the manual override to manually set pressure to 200 to 300 psi. Before operating electrically, manual override must be fully backed out—turn CCW using using 3/16" hex key wrench—until positive stop is reached.

DIMENSIONS

U.S. Patent No. 7,137,406



MATERIALS

Cartridge: Weight: 0.21 kg. (0.47 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard. Optional polyurethane seals with fluorocarbon back-up recommended for pressures over 240 bar (3500 psi).

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.010.1.

Standard Coil: Weight: 0.27 kg. (0.6 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.1

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. See page 3.400.1

TO ORDER

TS10-36 ___ ___ - ___ - ___ - ___ ___ ___ ___

Maximum Relief Pressure

207 bar (3000 psi)	**A**
159 bar (2300 psi)	**B**
117 bar (1700 psi)	**C**

Option

None	(Blank)
Manual Override	**M**

Porting

Cartridge Only	**0**
SAE 6	**6T**
SAE 8	**8T**
3/8 in. BSP*	**3B**

*BSP Body; U.K. Mfr. Only

Seals

Buna N (Std.)	**N**
Fluorocarbon	**V**

Coil Termination

Coil Termination	E-Coil	D-Coil
Deutsch DT04-2P	**ER** (IP69K)	**DR** (IP65)
Metri-Pack® 150	**EY** (IP69K)	**DY** (IP65)
Dual Lead Wires	**EL** (IP69K)	**DL** (IP65)
Amp Jr. Timer	**EJ** (IP67)	—
DIN 43650	**EG** (IP65)	**DG** (IP65)
Dual Spades	—	**DS** (IP65)

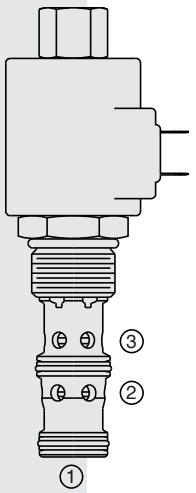
For Coils with Zener Diode, add "**/Z**" to option code. For example: "**ER/Z**". Not available on all models. See coil option info. on pages 3.200.1 & 3.400.1

Voltage

0	Less Coil
10	10 VDC (1.30 amps max.)
12	12 VDC (1.10 amps max.)
20	20 VDC (0.65 amps max.)
24	24 VDC (0.55 amps max.)

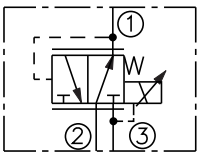
TS12-36 Proportional Electric Reducing/Relieving

Patent Pending



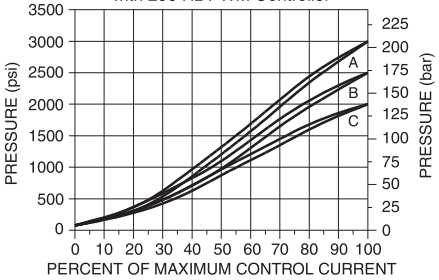
SYMBOLS

USASI/ISO:

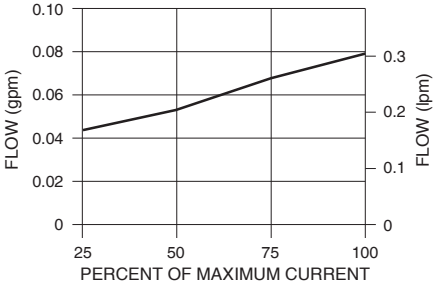


PERFORMANCE

Reducing Pressure vs. Current
for Flow @ 0 gpm; Port 2 to Port 1
with 200 Hz PWM Controller



Typical Pilot Flow & Leakage vs. Current
241 bar (3500 psi) Inlet Pressure
at 3.8–37.8 lpm (1–10 gpm)
with 200 Hz PWM Controller



DESCRIPTION

A screw-in, cartridge-style, pilot-operated, spool-type reducing/relieving valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. This valve is intended for use as a pressure limiting device in demanding applications.

OPERATION

The **TS12-36** allows flow from 2 to 1 until pressure at 1 equals the setting determined by the coil current. Port 3 is typically connected to the reservoir. If external load increases the pressure at 1 beyond this setting, pressure is relieved by allowing flow from 1 to 3. Minimum pressure at 1 without any current is 100 psi.

If external circuitry allows the pressure at 2 to fall below the pressure at 1, the valve will allow free flow from 1 to 2 regardless of the setting of the valve or the amount of current in the coil.

FEATURES

• 12 and 24 volt coils, standard or optional waterproofed.

RATINGS

Maximum Operating Pressure: Ports 1 and 2: 276 bar (4000 psi)

Maximum Tank Pressure: Port 3: 68.9 bar (1000 psi); Note: Tank pressure is additive to regulated pressure.

Reduced Pressure Range from Zero to Maximum Controlled Current:
A: 6.9–207 bar (100–3000 psi); **B:** 6.9–172 bar (100–2500 psi)
C: 6.9–138 bar (100–2000 psi)

Maximum Pilot Flow and Leakage: 0.49 lpm (0.13 gpm) with max. control current and with inlet pressure at 276 bar (4000 psi) at regulated flow of 3.8 lpm (1 gpm).

Flow Path: Free Flow: 1 to 3 coil de-energized; Reducing: 2 to 1 coil energized; Relieving: 1 to 3 coil energized

Performance Life: Less than 5% change in the slope of the pressure vs current characteristics over one million cycles.

Hysteresis: Less than 3%.

Temperature: -40 to 120°C (-40 to 250°F) with Buna N seals.

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

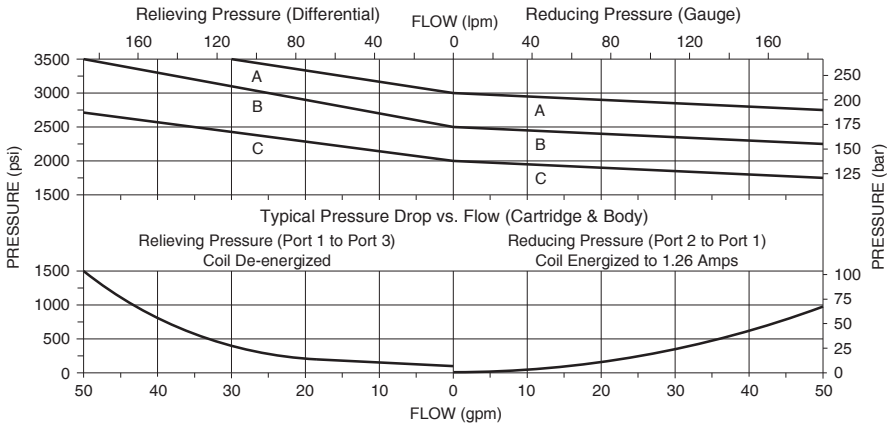
Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

Cavity: VC12-3; See page 9.110.1; **Cavity Tool:** CT12-3XX; See page 8.600.1

Seal Kit: SK12-3X-BM; See page 8.650.1

Coil Nut: Part No. 4526330;
For E-coils manufactured prior to 1-1-04, see page 3.400.1 for coil nut info.

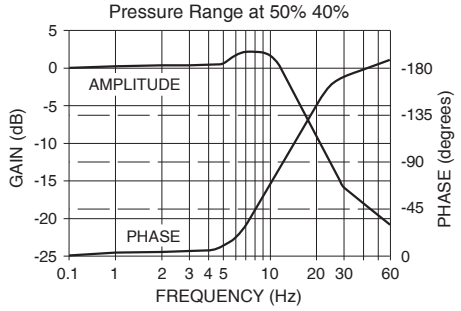
Typical Pressure vs. Flow at Maximum Current for Pressure options A, B and C
Body & Line Relieving ΔP: 4.5 bar @ 189.3 lpm (65 psi @ 50 gpm)
Body & Line Reducing ΔP: 4.8 bar @ 189.3 lpm (70 psi @ 50 gpm)



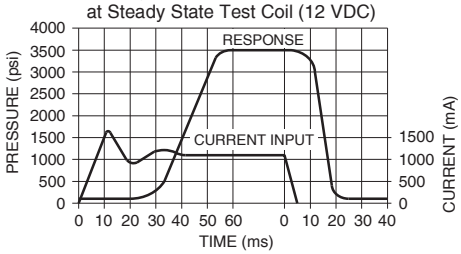
Valve w/Internally Piloted Spool — TS12-36

PERFORMANCE (cont'd)

Typical Frequency Response Curves
Flow at 0 gpm; Inlet Pressure at 241 bar (3500 psi)
Pressure Range at 50% 40%



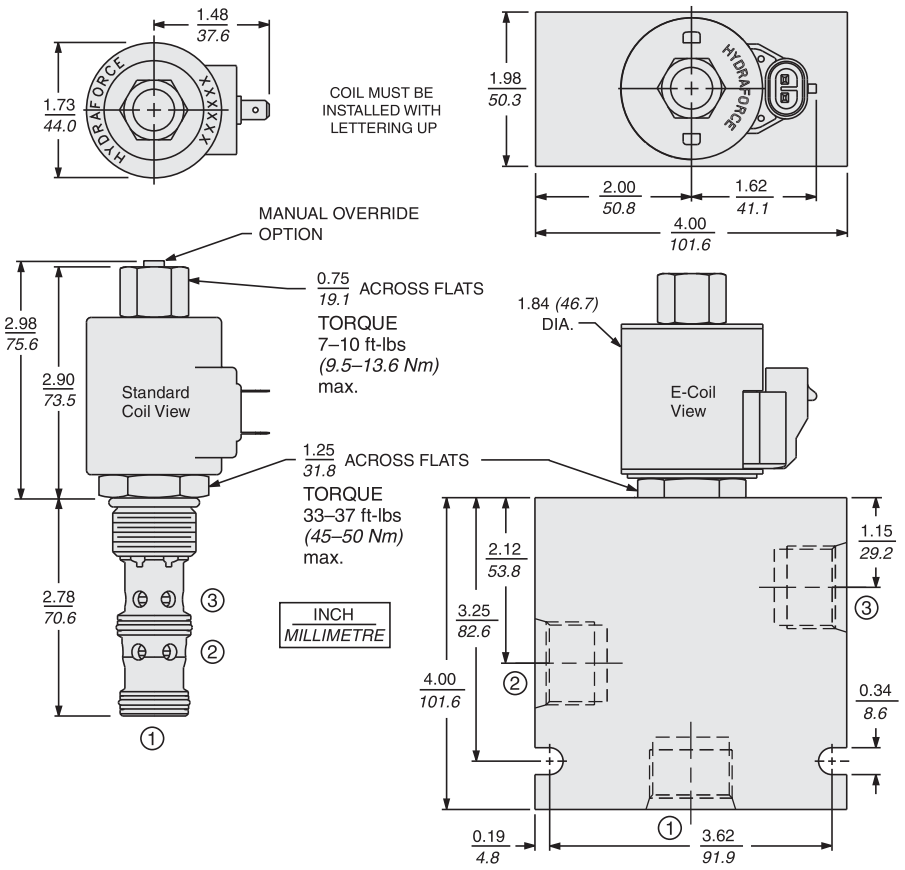
Typical Step Response Curve
Flow at 0 gpm, Inlet Pressure at 241 bar (3500 psi)
Voltage Set to Produce 1.1 amps
at Steady State Test Coil (12 VDC)



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS

Patent Pending



MATERIALS

Cartridge: Weight: 0.30 kg. (0.66 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard. Optional polyurethane seals with fluorocarbon back-up recommended for pressures over 240 bar (3500 psi).

Standard Ported Body: Weight: 0.23 kg. (0.50 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ; consult factory. See page 8.010.1

Standard Coil: Weight: 0.32 kg. (0.7 lbs.) Unitized thermoplastic encapsulated, Class H high temperature magnet-wire. See page 3.200.1

E-Coil: Weight: 0.41 kg. (0.9 lbs.) Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. **Note: See page 3.400.1 for all E-Coil retrofit applications.**

TO ORDER

TS12-36__ __ - __ - __ - __ __ __ __

Maximum Reducing Pressure
207 bar (3000 psi) **A**
172 bar (2500 psi) **B**
138 bar (2000 psi) **C**

Option
None (Blank)
Manual Override **M**

Porting
Cartridge Only **0**
SAE 8 **8T**
SAE 10 **10T**
SAE 12 **12T**
1/2 in. BSP* **4B**
3/4 in. BSP* **6B**
*BSP Body; U.K. Mfr. Only

Seals
N Buna N (Std.)
V Fluorocarbon

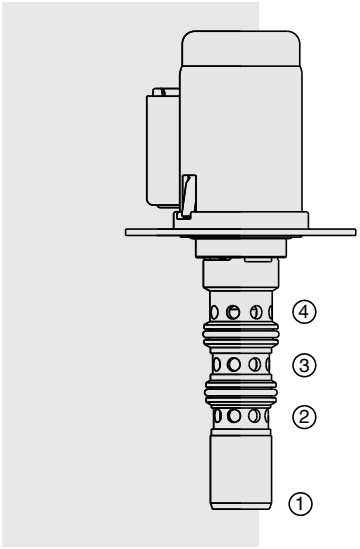
Voltage
0 Less Coil*
12 12 VDC
24 24 VDC
* Includes Coil nut.

Termination Std. Coil
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors
DR Deutsch DT04-2P

Termination E-Coil
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pack® 150 (IP69K Rated)

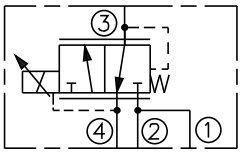
Coils with internal diode are available. Consult factory.

TS98-T34 Proportional Electric Reducing/Relieving



SYMBOLS

USASI/ISO:

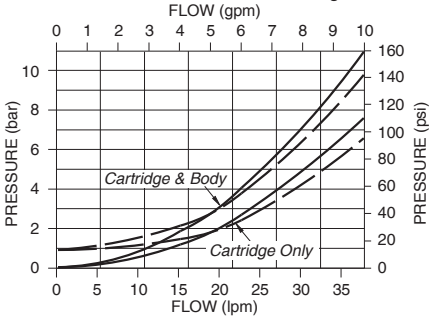


PERFORMANCE

Pressure Drop vs. Flow Characteristic

- - - - For Flow 3 to 4 with Coil De-energized

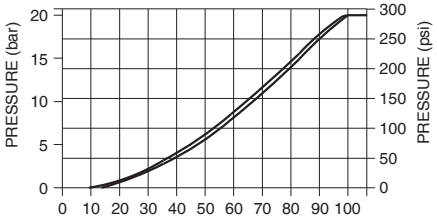
—— For Flow 2 to 3 with Coil Energized



Reduced Pressure vs. Current Characteristic

With Inlet Pressure at 2 of 0–20.7 bar (0–300 psi)

Control Current: 200 Hz Dither



Note: Regulated pressures up to 29.3 bar (425 psi) can be attained with increased current values and 30 bar (435 psi) inlet pressure.

DESCRIPTION

A drop-in, flange-mounted, cartridge-style, pilot-operated, spool-type reducing/relieving valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. This valve is intended for use as a pressure control device in demanding applications.

OPERATION

Without applied current, the **TS98-T34** allows flow from 3 to 4 while blocking 2. When the coil is energized, 3 is connected to 2, and pressure at 3 is controlled proportional to the amount of current applied to the coil. If pressure at 3 exceeds the setting induced by the coil, pressure is relieved to 4.

Back pressure on port 4 becomes additive to the pressure setting at a 1:1 ratio.

Note: This product may be customized for special OEM performance characteristics. Consult factory.

FEATURES

- Economical drop-in style.
- Integral waterproof coil standard.
  See page 3.400.1 for a description of tests conducted to verify coil waterproofing.
- 12 or 24 VDC coils.
- Several push-on termination options.

RATINGS

Maximum Inlet Pressure and Regulated Pressure: 30 bar (435 psi)

Maximum Control Current: To achieve 20 bar (290 psi) regulated pressure:
0.85 amps for 12 VDC coil; 0.43 amps for 24 VDC coil
Note: Regulated pressures up to 29.3 bar (425 psi) can be attained with increased current values and 30 bar (435 psi) inlet pressure.

Deadband: 0.150 amps @ 12 VDC; 0.075 amps @ 24 VDC

Hysteresis: 5% PWM for 20 bar (290 psi) control pressure

Reducing/Relieving Pressure Range from Zero to Maximum Control Current: 0–20.7 bar (0–300 psi)

Rated Flow: Port 3 to 4 with coil de-energized: 30 lpm (8 gpm)

Maximum Pilot Flow: 0.79 lpm (0.21 gpm) with 20.7 bar (300 psi) inlet

Flow Path: Free Flow: 3 to 4 coil de-energized; Reduced: 2 to 3 coil energized; Relieving: 3 to 4 coil energized; Port 1 is not plumbed externally

Oil Temperature: -40 to 120°C (-40 to 248°F)

Ambient Air Temperature: -40 to 120°C (-40 to 248°F)

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation Recommendation: When possible, the valve should be mounted below the reservoir oil level. This will maintain oil in the armature preventing trapped air instability. If this is not feasible, mount the valve horizontally for best results.

Flange Mounting Screws: M5 x 8; Part No. 4000039 (not provided with valve)

Cavity: VC-T003; See page 9.111.1; **Cavity Tool:** CT-T003R0-x-G; See page 8.600.1

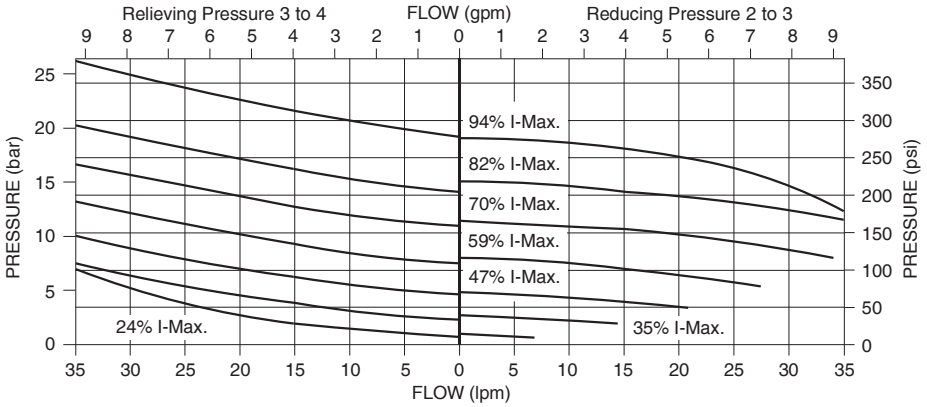
Seal Kit: SK98-T3N; See page 8.650.1

Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

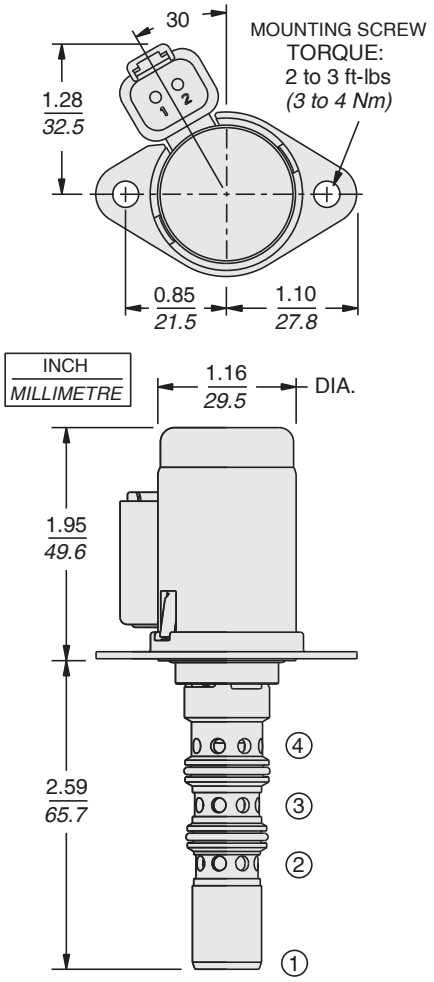
Valve w/Internally Piloted Spool — TS98-T34

PERFORMANCE (continued)

Reducing/Relieving Pressure vs. Flow Characteristic
Regulated Pressure Range: 0–20 bar (0–290 psi) with 20.7 bar (300 psi) Input
Pressure at 2 for Various Control Currents (ΔP Shown for Cartridge & Body)



DIMENSIONS



MATERIALS

Cartridge including Coil: Weight: 0.23 kg. (0.50 lbs.) Steel with hardened work surfaces. Zinc-Nickel plated exposed surfaces; HNBR O-rings standard. Coil is encapsulated, class H high-temperature magnetwire, with zinc-nickel plated shell.

Special Ported Body: Consult factory.

Mounting Screws: Must be ordered separately: Part No. 4000039

TO ORDER

TS98-T34__ - __ - __ - __ __ __ __ - __

Option
None (Blank)
Inlet Port Screen **S**

Porting
Cartridge Only **0**

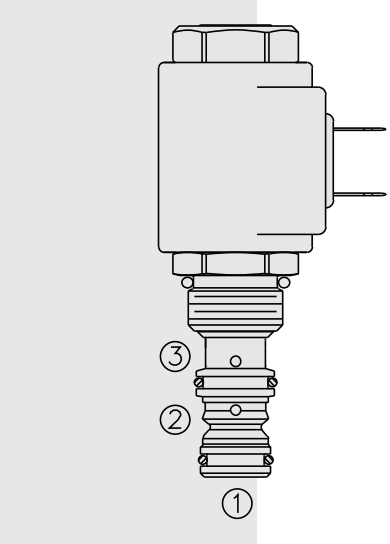
Seals
Hydrogenated Nitrile (HNBR) **N**

Voltage
12 12 VDC (0.70 amps max.)
24 24 VDC (0.35 amps max.)
Consult factory for other voltages

Termination
DJ Amp Junior Timer
Y2A Metri-Pack® 150.2A
DR Deutsch DT04-2P

Diode
(Blank) None
Z Zener Diode

EHPR08-33 Proportional Reducing/Relieving Valve



DESCRIPTION

A screw-in, cartridge-style, direct acting, spool-type reducing/relieving valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. This valve is intended for use as a pressure control device in demanding applications.

OPERATION

The **EHPR08-33** allows free flow from 1 to 3 when no current is applied to the coil. When the coil is energized, 2 is connected to 1. Increasing current applied to the coil will increase the control (reduced) pressure proportionally. If pressure at 1 exceeds the setting induced by the coil, pressure from 1 is relieved to 2.

Note: Back pressure on port 3 becomes additive to the pressure setting at a 1:1 ratio.

FEATURES

- 12 and 24 volt coils standard.
- Optional manual override.
- Industry common cavity.
- Optional waterproof E-coils rated up to IP69K.

RATINGS

Maximum Inlet Pressure at port 2: 207 bar (3000 psi)

Maximum Tank Pressure at port 3: 34.5 bar (500 psi)

Maximum Control Current: 1.2 amps for 12 VDC coil; 0.6 amps for 24 VDC coil; For other voltages, consult factory

Dither Frequency Required: 200 Hz

Typical Frequency Response: See Section 10

Hysteresis: Less than 3%

Reducing/Relieving Pressure Range from Zero to Maximum Control Current: 0–26 bar (0–375 psi)

Rated Flow: 4.0 lpm (1.05 gpm), ΔP=6 bar (87 psi), Cartridge only, 1 to 3 coil de-energized

Step Response: T_{ON} <30 ms; T_{OFF} <12 ms

Flow Path: Free Flow: 1 to 3 coil de-energized; Reduced: 2 to 1 coil energized; Relieving: 1 to 3 coil energized

Temperature: -40 to 120°C (-40 to 250°F), with standard Buna N seals

Ambient Air Temperature: -40 to 80°C (-40 to 176°F)

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

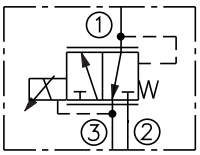
Installation: No restrictions; See page 9.020.1

Cavity: VC08-3; See page 9.108.1; **Cavity Tool:** CT08-3XX; See page 8.600.1

Seal Kit: SK08-3X-00; See page 8.650.1

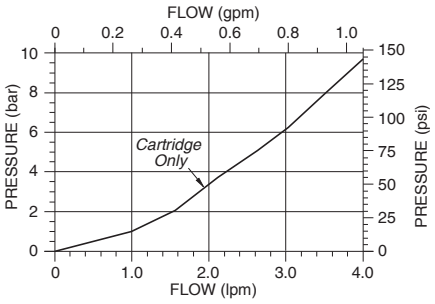
SYMBOLS

USASI/ISO:

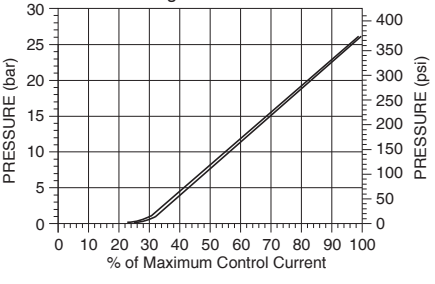


PERFORMANCE

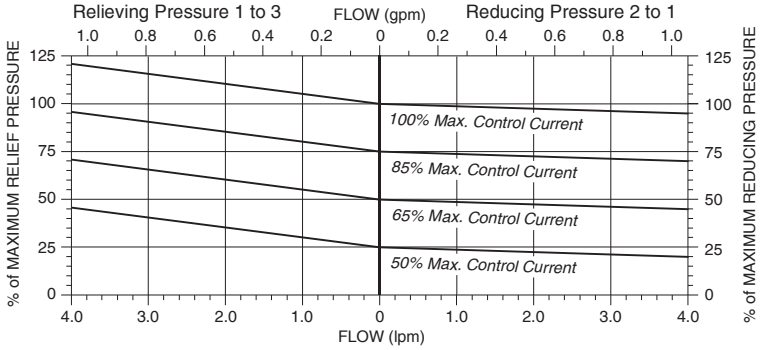
Pressure Drop vs. Flow Characteristic
For Flow 1 to 3 with Coil De-energized



Relief Pressure vs.
Current (DC) Characteristic
Reducing Pressure 2 to 1

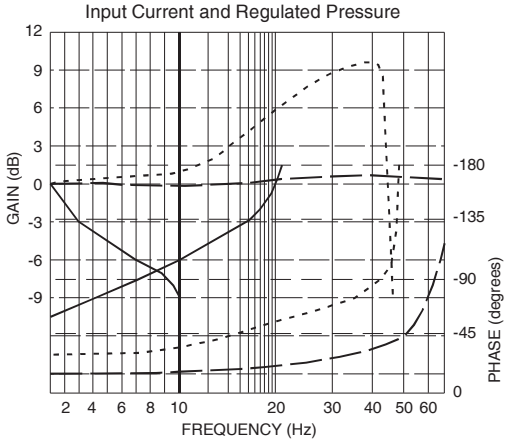


Typical Relieving/Reducing Pressure vs. Flow Characteristic
Typical Relieving Pressure at Various %'s of Maximum Control Current
Pressure Range "A" (26 bar/375 psi); Cartridge in Body



PERFORMANCE (continued)

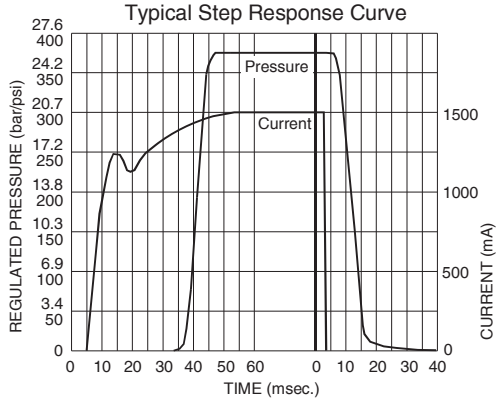
Typical Frequency Response Curves
Input Current and Regulated Pressure



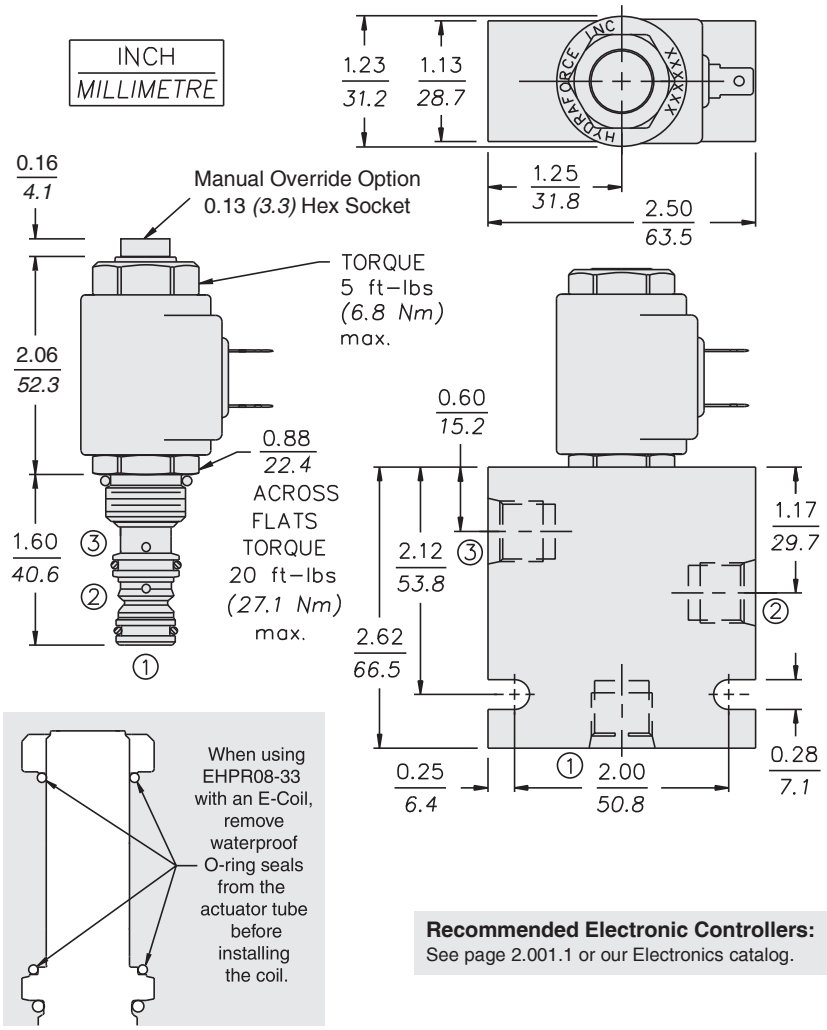
Signal 25% 10%
Signal 50% 50%
Signal 85% 10%

Inlet: 35 bar (500 psi), 4 lpm (1 gpm)
Regulated: Blocked
Tank: <0.15 bar (2 psi)
Input Signal: Sinusoidal

Typical Step Response Curve



DIMENSIONS



When using EHPR08-33 with an E-Coil, remove waterproof O-ring seals from the actuator tube before installing the coil.

Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

MATERIALS

Cartridge: Weight: 0.25 kg. (0.55 lbs.) Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings standard.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.) Anodized high-strength 6061 T6 aluminum alloy, rated to 207 bar (3000 psi). Ductile iron bodies available; dimensions may differ. See page 8.008.1

EHPR Series Coil:

D-Coil: Weight: 0.11 kg. (0.25 lbs.) Unitized, thermoplastic encapsulated, Class H high temperature magnetwire. See page 3.200.1

E-Coil: Weight: 0.14 kg. (0.3 lbs.) Fully encapsulated with rugged external metal shell. Rated up to IP69K with integral connectors. See page 3.400.1

TO ORDER

EHPR08-33__ - __ - __ - __ __ __ __

Option
None (Blank)
Manual Override **M**

Porting
Cartridge Only **0**
SAE 6 **6T**
SAE 8 **8T**
3/8 in. BSP* **3B**
1/2 in. BSP* **4B**

*BSP Body; U.K. Mfr. Only

Seals
Buna N (Std.) **N**
Fluorocarbon **V**

Voltage (Consult factory for other voltages.)
0 Less Coil
10 10 VDC* (1.5 amps max.)
12 12 VDC (1.2 amps max.)
20 20 VDC* (0.75 amps max.)
24 24 VDC (0.6 amps max.)

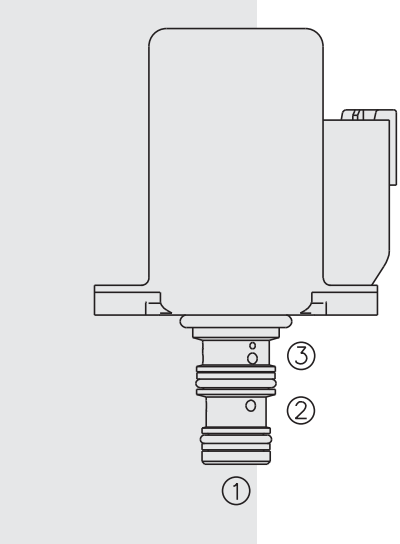
*For use where there is a voltage drop across the controller.

D-Coil Terminations
DS Dual Spades
DG DIN 43650
DL Leadwires (2)
DL/W Leads w/Weatherpak® Connectors

E-Coil Terminations
ER Deutsch DT04-2P (IP69K Rated)
EY Metri-Pak® 150 (IP69K Rated)

Coils with internal diode are available. Consult factory.

EHPR98-T33 Proportional Reducing/Relieving



DESCRIPTION

A direct-acting, spool-type, drop-in-style, flange-mounted, pressure reducing/relieving valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. The Ecoil is an integral part of the valve assembly, and cannot be replaced or field-serviced.

OPERATION

The **EHPR98-T33** allows free flow from 1 to 3 when no current is applied to the coil. When the coil is energized, 2 is connected to 1. Increasing current applied to the coil will increase the control (reduced) pressure proportionally. If pressure at 1 exceeds the setting induced by the coil, pressure from 1 is relieved to 3.

Note: Back pressure on port 3 becomes additive to the pressure setting at a 1:1 ratio.

FEATURES

- Economical drop-in style.
- 1000-hour salt spray protection.
- Several push-on termination options.
- Integral waterproof coil standard.
- 10, 12, 20 or 24 VDC coils.

RATINGS

Maximum Inlet Pressure: 241 bar (3500 psi)

Common Port Burst Pressure: One cycle at 158 bar (2300 psi) on all ports simultaneously pressurized

Tank Port (3) Pressure: 34.5 bar (500 psi) maximum for 100,000 cycles

Maximum Control Current: 1.38 amps for 10 VDC coil; 1.30 amps for 12 VDC coil; 0.69 amps for 20 VDC coil; 0.65 amps for 24 VDC coil

Resistance: 4.2 ohm (10V), 5.1 ohm (12V), 17.0 ohm (20V), 19.3 ohm (24V)

Inductance: 80 mH (12V)

Hysteresis: Less than 3% with 100 Hz PWM

Flow Rating: 3.8 lpm (1.0 gpm)

Step Response: T_{ON} <30 ms; T_{OFF} <12 ms

Temperature: -40 to 120°C (-40 to 250°F), with standard Buna N seals

Ambient Air Temperature: -40 to 80°C (-40 to 176°F)

Environmental Rating: IP69K

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Installation: Flange Mount

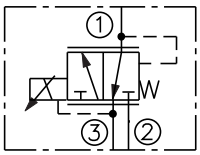
Mounting Screws: M4 x 0.7 x 12 Long; Part No. 4001015 (not provided with valve)

Cavity: VC-T009; See page 9.111.1; **Cavity Tool:** CT-T009R0-x-G; See page 8.600.1

Seal Kit: SKEHPR98-T3X; See page 8.650.1

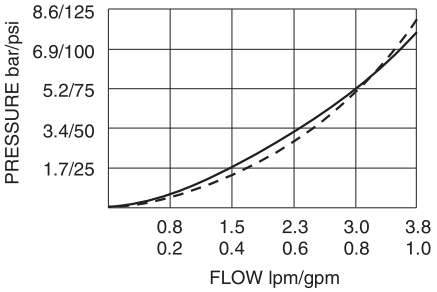
SYMBOLS

USASI/ISO:

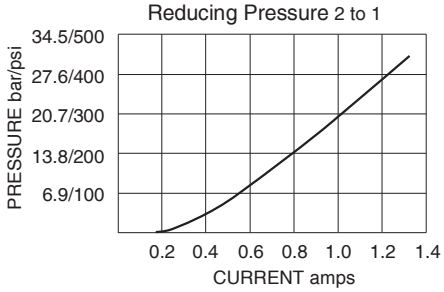


PERFORMANCE

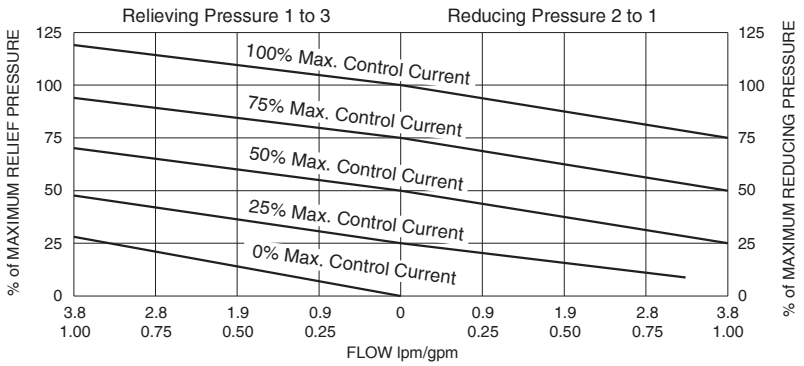
Pressure Drop vs. Flow
Cartridge Only
1 to 3 —— ; 2 to 1 - - - -



Reducing Pressure vs. Current
Inlet: 241 bar/3500 psi; 100 Hz PWM
Reducing Pressure 2 to 1



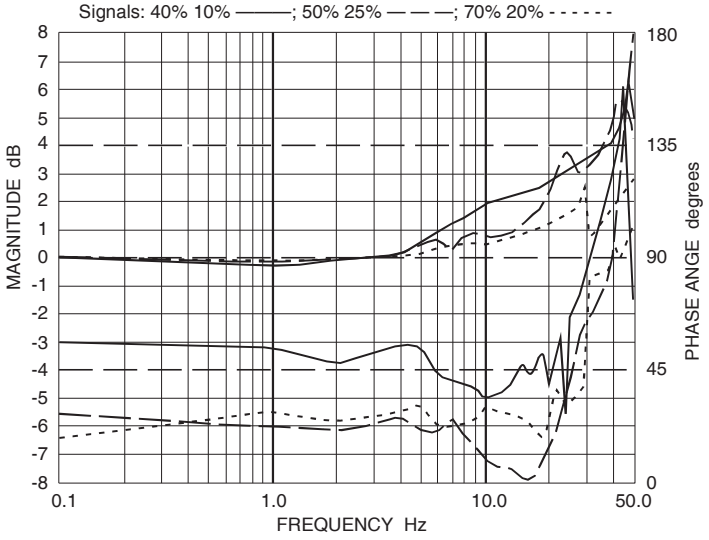
Typical Relieving/Reducing Pressure vs. Flow Characteristic
Typical Relieving Pressure at Various %s of Maximum Control Current
Inlet: 241 bar/3500 psi; 100 Hz PWM (Both Directions)



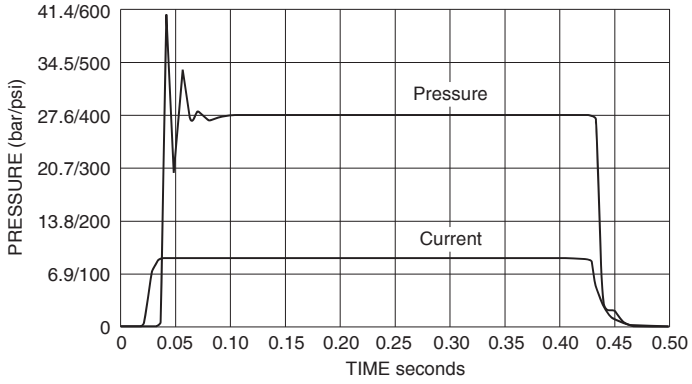
Drop-In-Style Valve — EHPR98-T33

PERFORMANCE (continued)

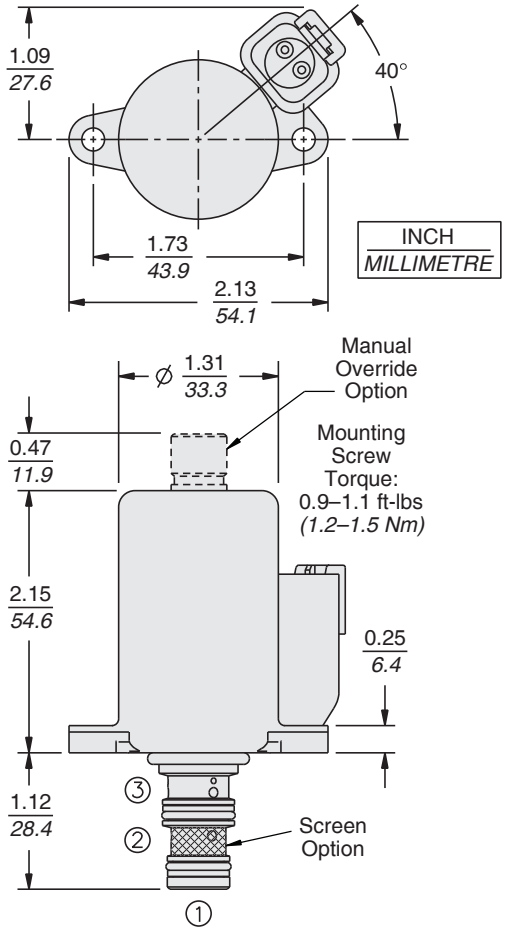
Typical Frequency Response Curves
Inlet: 241 bar/3500 psi; Regulated Port Blocked
Signals: 40% 10% ———; 50% 25% — — —; 70% 20% - - - - - -



Typical Step Response Curve
Inlet 241 bar/3500 psi; Regulated Port Blocked



DIMENSIONS



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

MATERIALS

Cartridge including Coil: Weight: 0.20 kg. (0.44 lbs.) Steel with hardened work surfaces. Zinc-Nickel plated exposed surfaces. HNBR O-rings standard. Coil is encapsulated, class H high-temperature magnetwire, with zinc-nickel plated shell.

Ported Test Body: Consult Factory

Mounting Screws: Must be ordered separately: Part No. 4001015

TO ORDER

EHPR98-T33 ___ ___ - ___ ___ - ___ - ___ ___ ___ ___ ___

Option
None (Blank)
Manual Override **M**

Screen Option
None (Blank)
142µ on Inlet Port 2 **S**

Porting
Cartridge Only **0**

Seals
Hydrogenated Nitrile (HNBR) **N**
Fluorocarbon **V**
Polyurethane **P**

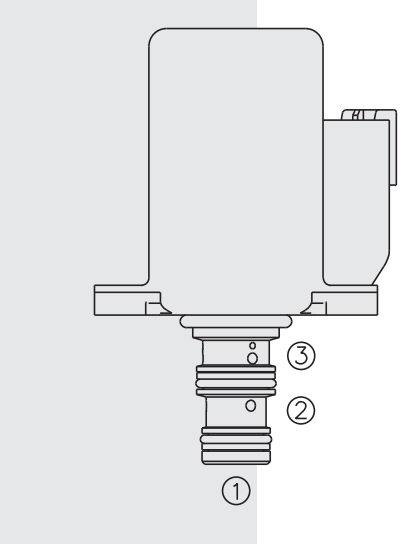
Voltage
10 10 VDC
12 12 VDC
20 20 VDC
24 24 VDC

Other voltages are available. Consult factory.

Termination
ER Deutsch DT04-2P
EJ Amp Junior Timer

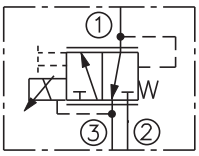
Diode
(Blank) None
Z Zener Diode, Bidirectional

EHPR98-T35 Proportional Reducing/Relieving



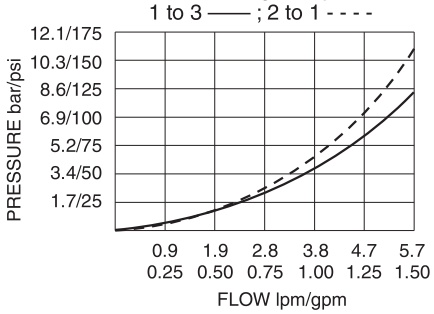
SYMBOLS

USASI/ISO:

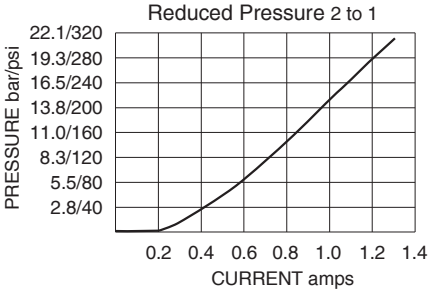


PERFORMANCE

Pressure Drop vs. Flow
Cartridge Only
1 to 3 —— ; 2 to 1 - - - -



Reducing Pressure vs. Current
Inlet: 25 bar/365 psi; 100 Hz PWM
Reduced Pressure 2 to 1



DESCRIPTION

A direct-acting, spool-type, drop-in-style, flange-mounted, pressure reducing/relieving valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. The Ecoil is an integral part of the valve assembly, and cannot be replaced or field-serviced.

OPERATION

The **EHPR98-T35** allows free flow from 1 to 3 when no current is applied to the coil. When the coil is energized, 2 is connected to 1. Increasing current applied to the coil will increase the control (reduced) pressure proportionally. If pressure at 1 exceeds the setting induced by the coil, pressure from 1 is relieved to 3.

Note: Back pressure on port 3 becomes additive to the pressure setting at a 1:1 ratio.

FEATURES

- Economical drop-in style.
- Integral waterproof coil standard.
- 10, 12, 20 or 24 VDC coils.
- Several push-on termination options.
- 1000-hour salt spray protection.

RATINGS

Maximum Inlet Pressure: 103 bar (1500 psi); If higher inlet pressure is required (103 bar/1500 psi to 241 bar/3500 psi) select the “A” option in the model code.

Maximum Tank Pressure: 34.5 bar (500 psi);
with Manual Override Option: 17.2 bar (250 psi)

Control Pressure at Maximum Control Current: 20.7 bar (300 psi)

Maximum Control Current: 1.38 amps for 10 VDC coil; 1.30 amps for 12 VDC coil; 0.69 amps for 20 VDC coil; 0.65 amps for 24 VDC coil

Resistance: 4.2Ω (10V); 5.1Ω (12V); 17.0Ω (20V); 19.3Ω (24V)

Inductance: 80 mH (12V); **Hysteresis:** Less than 4% with 100 Hz PWM

Flow Rating: 5.7 lpm (1.5 gpm)

Maximum Internal Leakage:
De-energized: 75 ml/minute (4.58 cu. in./minute) at 25 bar (365 psi);
200 ml/minute (12.2 cu. in minute) at 241 bar (3500 psi).
Energized at I-Max.: 125 ml/minute (7.63 cu. in./minute) at 25 bar (365 psi);
400 ml/minute (24.4 cu. in. minute) at 241 bar (3500 psi)

Temperature: -40 to 120°C (-40 to 250°F), with standard Buna N seals

Ambient Air Temperature: -40 to 80°C (-40 to 176°F)

Environmental Rating: IP69K

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

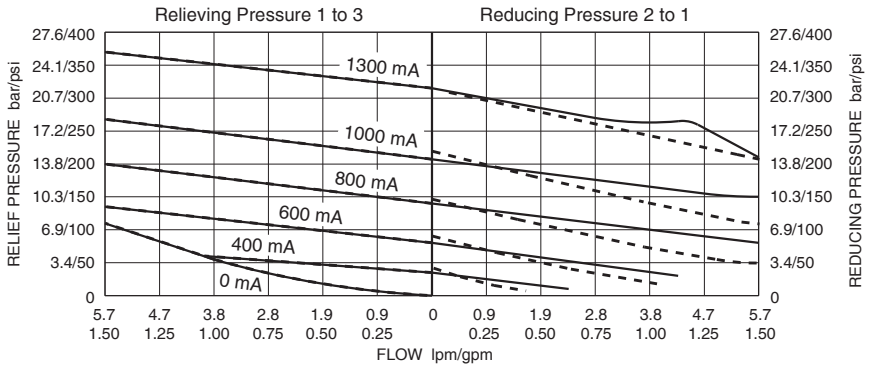
Installation: Flange Mount

Mounting Screws: M4 x 0.7 x 12 Long; Part No. 4001015 (not provided with valve)

Cavity: VC-T009; See page 9.111.1; **Cavity Tool:** CT-T009R0-x-G; See page 8.600.1

Seal Kit: SKEHPR98-T3X; See page 8.650.1

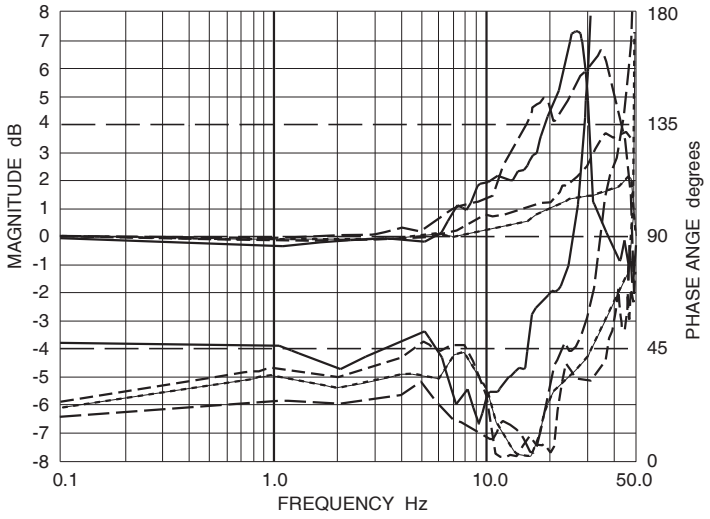
Typical Relieving/Reducing Pressure vs. Flow Characteristic
Inlet: 25 bar/365 psi ——— ; Inlet: 241 bar/3500 psi - - - - -
100 Hz PWM (Both Directions); Note: Curves overlap on Relieving Pressure (LH) side of graph



Drop-In-Style Valve — EHPR98-T35

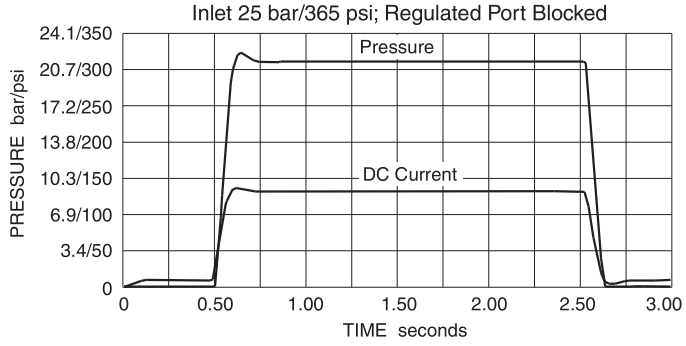
PERFORMANCE (continued)

Typical Frequency Response Curves
Inlet: 25 bar/365 psi; DC Current; Regulated Port Blocked
Signals: 40% ±10% ——; 50% ±25% — —; 70% ±20% – – –; 80% ±10% - - - -

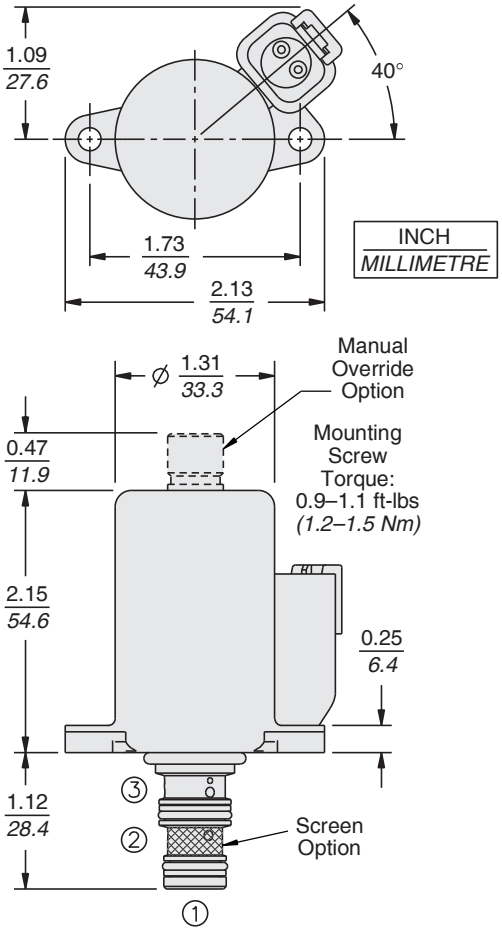


Note: For additional Frequency Response or Step Response information, consult factory.

Typical Step Response Curve
Inlet 25 bar/365 psi; Regulated Port Blocked



DIMENSIONS



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

MATERIALS

Cartridge including Coil:
Weight: 0.20 kg. (0.44 lbs.) Steel with hardened work surfaces. Zinc-Nickel plated exposed surfaces. HNBR O-rings standard. Coil is encapsulated, class H high-temperature magnetwire, with zinc-nickel plated shell.

Ported Test Body:
Consult Factory

Mounting Screws:
Must be ordered separately: Part No. 4001015

TO ORDER

EHPR98-T35 ___ ___ ___ - ___ ___ - ___ - ___ ___ ___ ___ ___

Inlet Pressure
0 to 103 bar (0 to 1500 psi) (Blank)
103 to 241 bar (1500 to 3500 psi) **A**

Option
None (Blank)
Manual Override **M**

Screen Option
None (Blank)
142µ on Inlet Port 2 **S**

Porting
Cartridge Only **0**

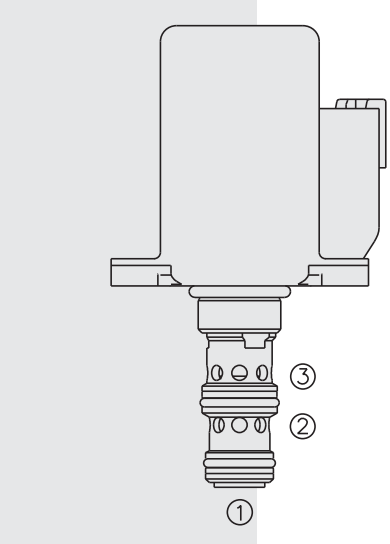
Seals
N Hydrogenated Nitrile (HNBR)
V Fluorocarbon

Voltage
10 10 VDC
12 12 VDC
20 20 VDC
24 24 VDC
Other voltages are available. Consult factory.

Diode
(Blank) None
Z Zener Diode, Bidirectional

Termination
ER Deutsch DT04-2P
EJ Amp Junior Timer

EHPR98-T38 Proportional Reducing/Relieving



DESCRIPTION

A direct-acting, spool-type, drop-in-style, flange-mounted, pressure reducing/relieving valve, which can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. The Ecoil is an integral part of the valve assembly, and cannot be replaced or field-serviced.

OPERATION

The **EHPR98-T38** allows free flow from 1 to 3 when no current is applied to the coil. When the coil is energized, 2 is connected to 1. Increasing current applied to the coil will increase the control (reduced) pressure proportionally. If pressure at 1 exceeds the setting induced by the coil, pressure from 1 is relieved to 3.

Note: Back pressure on port 3 becomes additive to the pressure setting at a 1:1 ratio.

FEATURES

- Economical drop-in style.
- Integral waterproof coil standard.
- 1000-hour salt spray protection.
- 10, 12, 20 or 24 VDC coils.

RATINGS

Maximum Inlet Pressure: 241 bar (3500 psi)

Tank Port (3) **Pressure:** 34.5 bar (500 psi) maximum; 17.2 bar (250 psi) maximum with manual override option.

Maximum Control Current: 1.38 amps for 10 VDC coil; 1.30 amps for 12 VDC coil; 0.69 amps for 20 VDC coil; 0.65 amps for 24 VDC coil;

Control Pressure at Maximum Control Current: 30 bar (435 psi)

Resistance: 4.3 ohm (10V); 5.2 ohm (12V); 17.5 ohm (20V); 20.9 ohm (24V)

Inductance: 80 mH (12V)

Hysteresis: at 150 Hz PWM: 5% of maximum control pressure

Flow Rating: 18.9 lpm (5.0 gpm)

Maximum Internal Leakage: De-engergized: 50 ml/min. (3 cu. in./min.) at 34.5 bar (500 psi); Energized at I-max: 100 ml/min. (6 cu. in./min.) at 34.5 bar (500 psi)

Temperature: -40 to 120°C (-40 to 250°F), with standard Buna N seals

Ambient Air Temperature: -40 to 80°C (-40 to 176°F)

Environmental Rating: IP69K

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus); See Temperature and Oil Viscosity, page 9.060.1

Mounting Screws: M4 x 0.7 x 12 Long; Part No. 4001015 (not provided with valve)

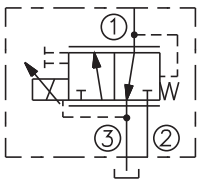
Cavity: VC-T011; See page 9.111.1

Cavity Tool: CT-T011R0-x-G; See page 8.600.1

Seal Kit: SK-T011; See page 8.650.1

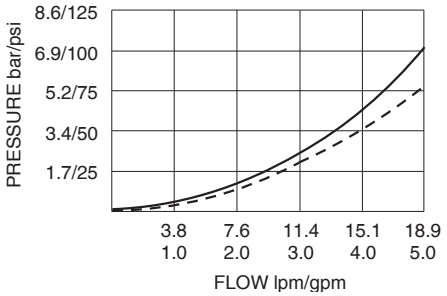
SYMBOLS

USASI/ISO:

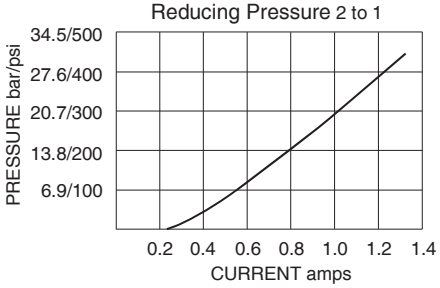


PERFORMANCE

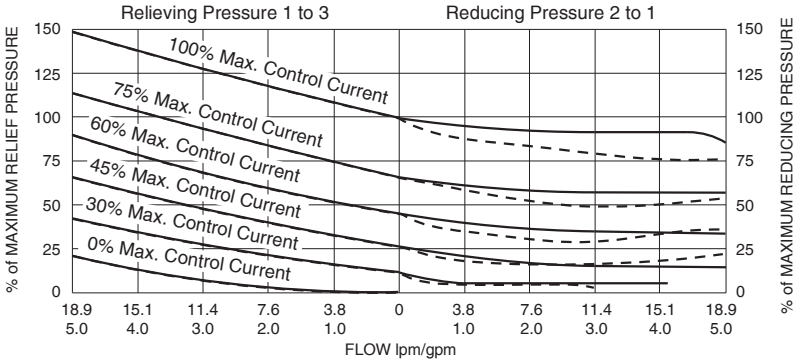
Pressure Drop vs. Flow
Cartridge Only
1 to 3 ——; 2 to 1- - - - -



Reducing Pressure vs. Current
Inlet: 34.5 bar/500 psi; 150 Hz PWM; 12V Coil
Reducing Pressure 2 to 1



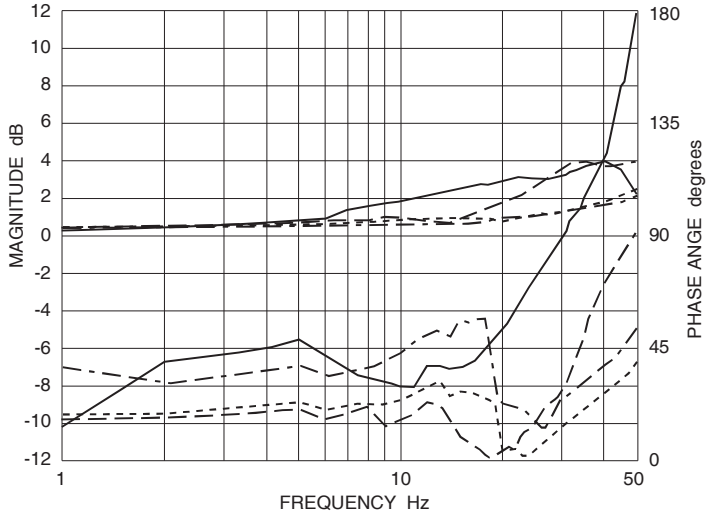
Typical Relieving/Reducing Pressure vs. Flow Characteristic
Typical Relieving Pressure at Various %s of Maximum Control Current
Inlet: 34.5 bar/500 psi ——; Inlet 241 bar/3500 psi – – –
(Curves overlap on Relieving Pressure side of graph); 150 Hz PWM (Both Directions)



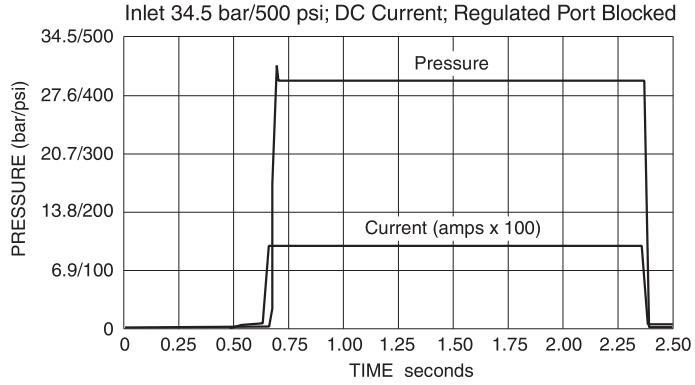
Drop-In-Style Valve — EHPR98-T38

PERFORMANCE (continued)

Typical Frequency Response Curves
Inlet: 34.5 bar/500 psi; DC Current; Regulated Port Blocked
(For 241 bar/3500 psi inlet frequency response curves, consult factory.)
Signals: 40% ±10% ———; 50% ±25% — — —
70% ±20% - - - - - -; 80% ±10% — · — · —

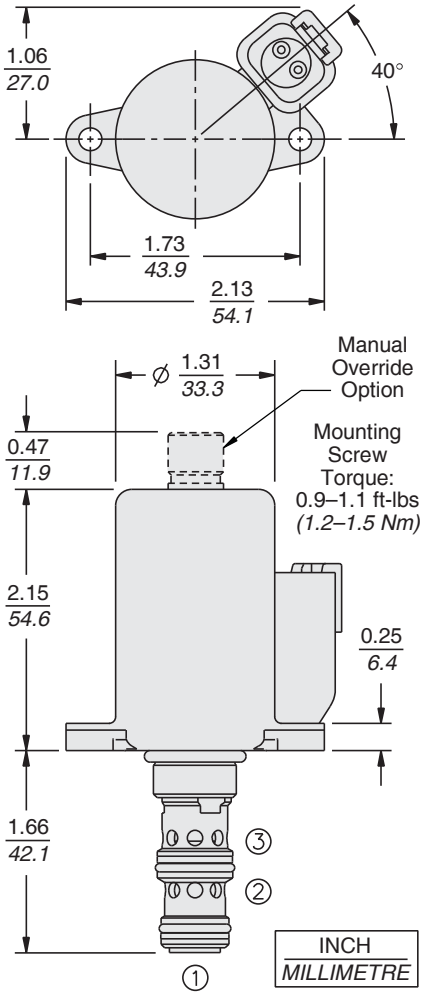


Typical Step Response Curve
Inlet 34.5 bar/500 psi; DC Current; Regulated Port Blocked



Recommended Electronic Controllers:
See page 2.001.1 or our Electronics catalog.

DIMENSIONS



Note: To operate manual override, rotate screw clockwise until desired pressure is achieved.

MATERIALS

Cartridge including Coil: Weight: 0.32 kg. (0.70 lbs.) Steel with hardened work surfaces. Zinc-Nickel plated exposed surfaces. HNBR O-rings standard. Coil is encapsulated, class H high-temperature magnetwire, with zinc-nickel plated shell.

Ported Test Body: Consult Factory

Mounting Screws: Must be ordered separately: Part No. 4001015

TO ORDER

EHPR98-T38 __ - __ __ - __ - __ __ __ __ __

Option
None (Blank)
Manual Override **M**

Porting
Cartridge Only **0**

Seals
Hydrogenated Nitrile (HNBR) **N**
Fluorocarbon **V**

Voltage
10 10 VDC
12 12 VDC
20 20 VDC
24 24 VDC

Other voltages are available. Consult factory.

Termination
ER Deutsch DT04-2P
EJ Amp Junior Timer

Diode
(Blank) None
Z Zener Diode, Bidirectional

Valve Sensor Options

INTEGRAL POSITION SENSOR — EMI/RFI CE-RATED

In order to provide a cost-effective solution, these sensing options are designed to be easily applied to numerous valves. These sensing options are interchangeable with existing cartridge valves, use industry standard cavities, and are compatible with our manual override options. The sensing element is a Hall Effect sensor which is known for its proven reliability in the field.

The sensing option design consists of assembling a common solenoid valve pole tube and adaptor assembly on the opposite ends of a coupling tube, which contains an elongated plunger. The new coupling tube, sensor and sensor housing are designed to be usable in both 10-size and 12-size valves using 10-size coils. These new components are connected to a Hall Effect sensor element which monitors and transmits the appropriate voltage signal when the valve is actuated or is in the neutral position.

For the normally-open and normally-closed 2-position 2-way poppet valves, a specially designed poppet assures proper detection of valve shift. Deutsch electrical connectors are IP67-rated.

- **CE Rated for global application.**
- **Burst, endurance and pressure ratings same as standard (without sensor) models.**
- **Common components reduce costs.**
- **Unique coupling tube that enables manual override.**
- **Single-piece plunger for durability.**
- **Normally-open and normally-closed options are available.**

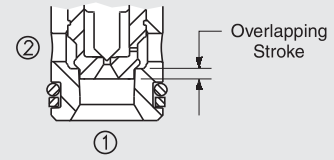
POSITION SENSOR RATINGS

Neutral Sensing
Supply Voltage (Vcc): +4.5 to +28 VDC
Output Voltage with Target Present: Vcc
Output Clamp Current: 40 mA min. to 65 mA max. for Vcc up to 28V
Connectors: Deutsch DT04-4P: Part No. 4001960, M12-4P
IP Rating: IP67
Mechanical Shock: 50 Gs, 11 ms half-sine
ESD: Nondestructive, ±15 KV Air Discharge
EMI: 20 MHz to 1 GHz, up to 100 V/m
Operating Temperature: -40°C to 110°C (-40°F to 230°F)
MTTFd: 125 years

SENSOR OPTIONS

- Dual Sensor Output, configurable as High to Low and Low to High

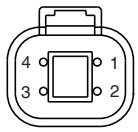
VALVE SHIFT SENSOR

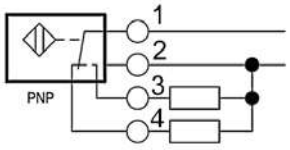


Safety specifications dictate that the poppet position signal will change status before the main-stage of the valve opens.

SENSOR WIRING

DT04-4P
DEUTSCH CONNECTOR

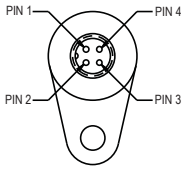


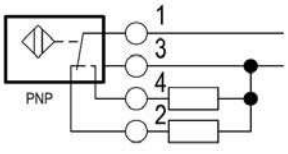


PIN 1 – (Red) Input Voltage
PIN 2 – (Black) Ground
PIN 3 – (White) N.O.
PIN 4 – (Green) N.C.

Mating Connector:
DT04-4S: Part No. 4001953

M12
CONNECTOR

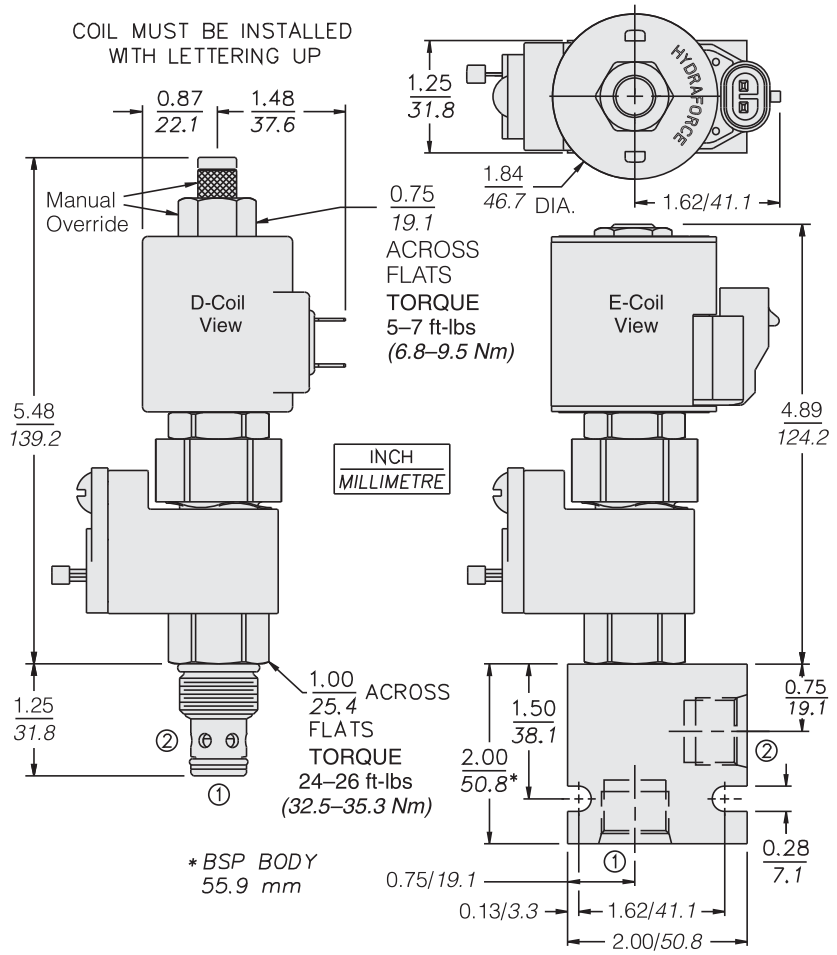




PIN 1 – Input Voltage
PIN 2 – Vcc N.C.
PIN 3 – Ground
PIN 4 – N.O.

Mating Connector:
M12-4S: Available from www.turck.com or www.binder.com

TYPICAL DIMENSIONS for SV10-P20A and SV10-P22A Valves with Sensor

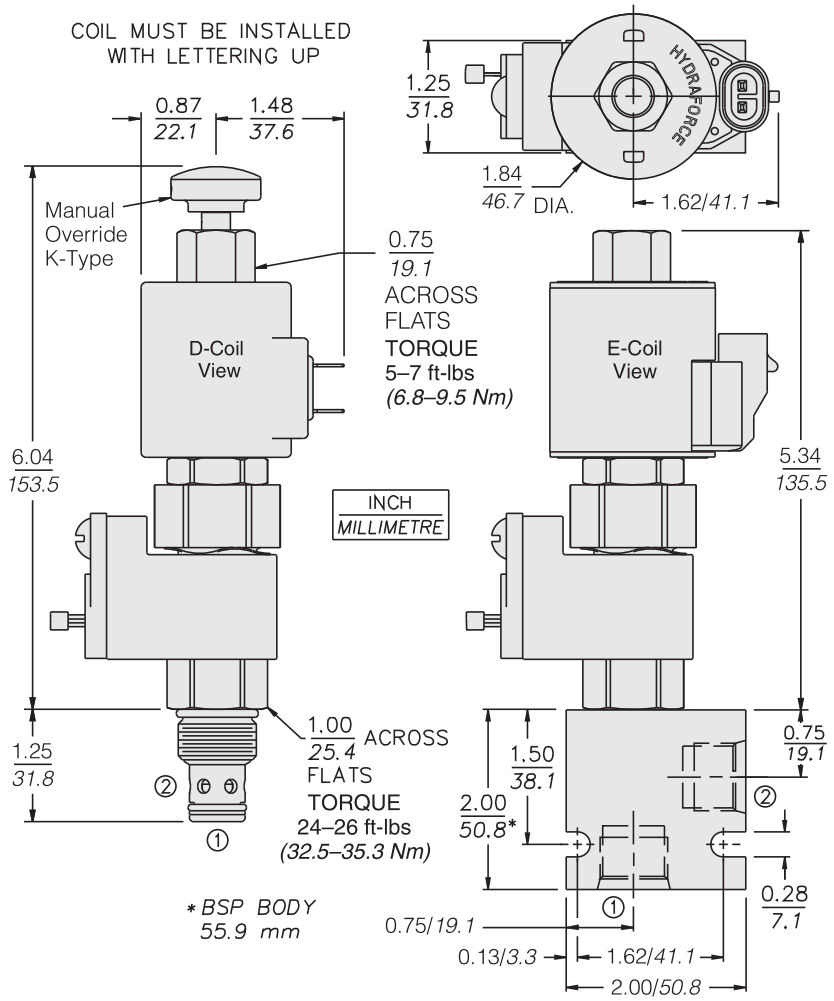


SV10-P20A
See catalog page 1.016.1 for more info. including complete ordering info.

SV10-P22A
See catalog page 1.044.1 for more info. including complete ordering info.

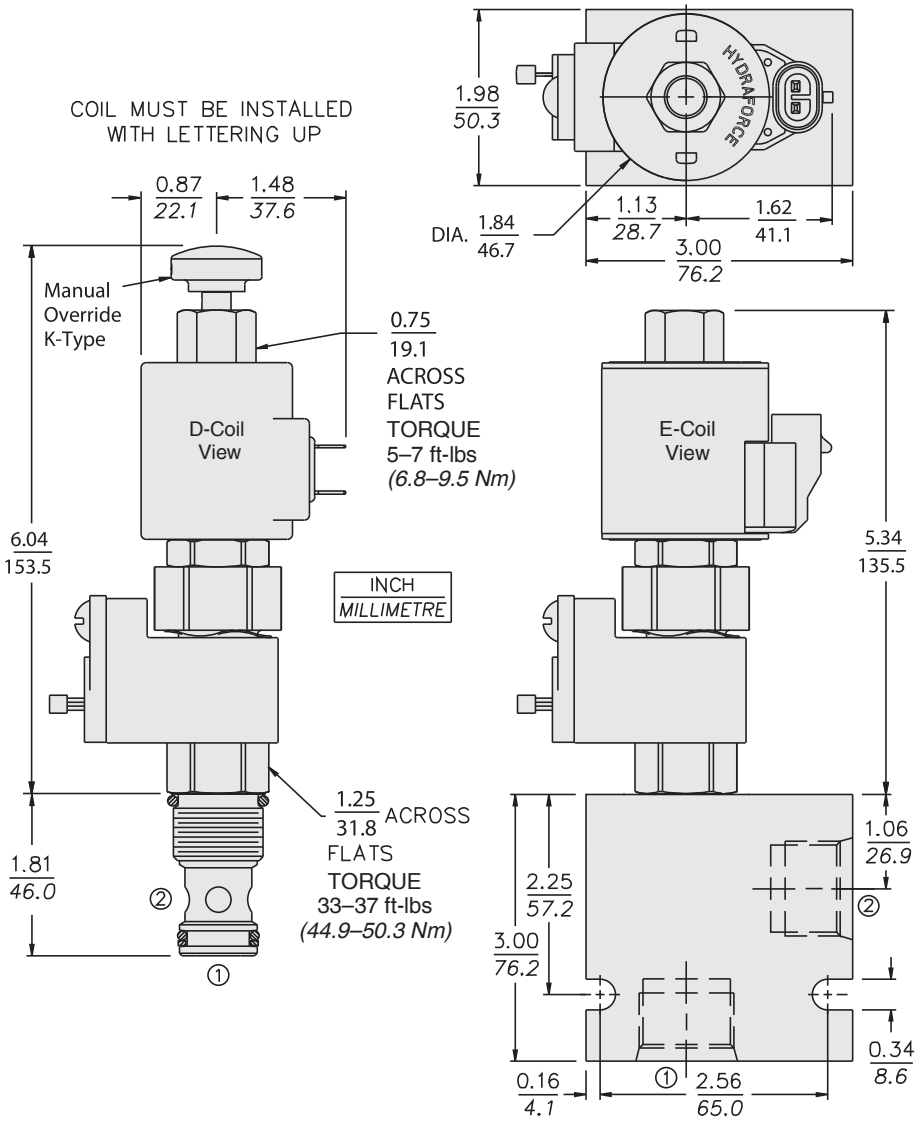
Valve Sensor Options

TYPICAL DIMENSIONS for SV10-P23A Valves with Sensor



SV10-P23A
See catalog page 1.053.1 for more info. including complete ordering info.

TYPICAL DIMENSIONS for SV12-P23A Valves with Sensor

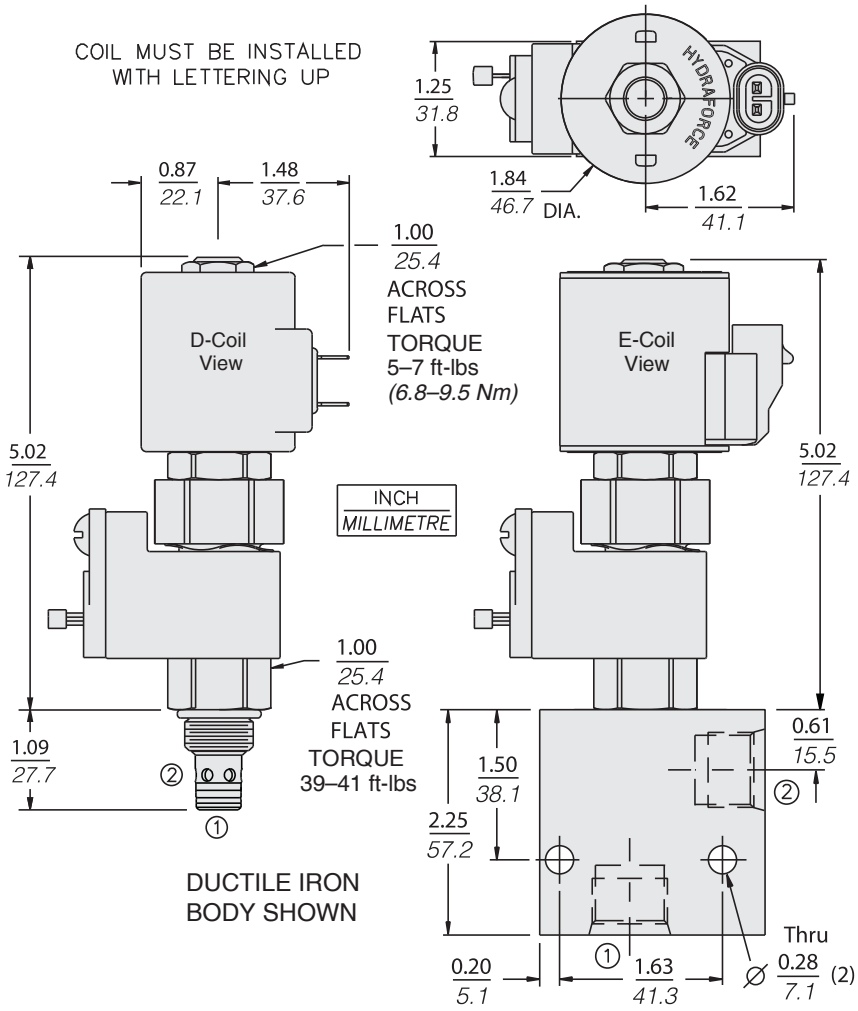


SV12-P23A

See catalog page 1.054.1 for more info. including complete ordering info.

Valve Sensor Options

TYPICAL DIMENSIONS for SV58-P20A Valves with Sensor



SV58-P20A
See catalog page 1.025.1 for more info. including complete ordering info.