

## Proportional valves

Proportional solenoid valves for pressure and flow control



**HYDRAULIC CONTROLS** Pty Ltd



# Proportional valves

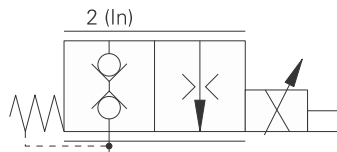
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# Proportional valves

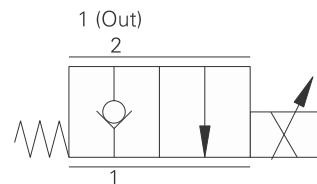
## Valve locator/section contents

**Note:** Proportional valve solenoid coils and electronic valve drivers are covered in section C of this Catalog.

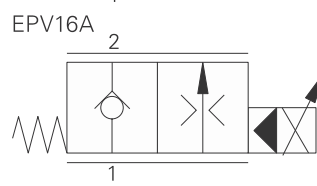
### Functional symbol



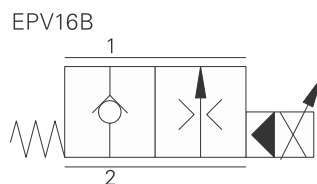
Model	Cavity	Flow rating	Typical pressure	Page
		<b>L/min (USgpm)</b>	<b>bar (psi)</b>	
PFR21H	A879	18 (5)	210 (3000)	B-8



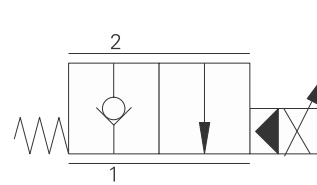
Model	Cavity	Flow rating	Typical pressure	Page
		<b>L/min (USgpm)</b>	<b>bar (psi)</b>	
EPV10	C-10-2	0-30 (0-8)	350 (5000)	B-10



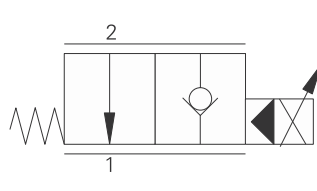
Model	Cavity	Flow rating	Typical pressure	Page
		<b>L/min (USgpm)</b>	<b>bar (psi)</b>	
EPV16A	C-16-3SU (undercut)	0-160	280 (4000)	B-17
EPV16B	C-16-3SU (undercut)	0-160	280 (4000)	B-18



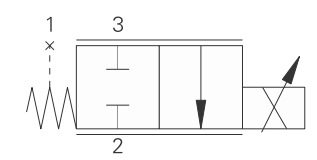
Model	Cavity	Flow rating	Typical pressure	Page
		<b>L/min (USgpm)</b>	<b>bar (psi)</b>	
ESV1-8-C	C-8-2	31 (9)	210 (3000)	B-20
ESV1-10-C	C-10-2	70 (19)	210 (3000)	B-22
ESV1-12-C	C-12-2	104 (27)	210 (3000)	B-24



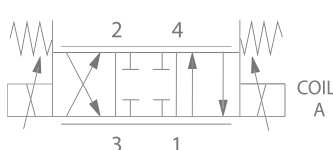
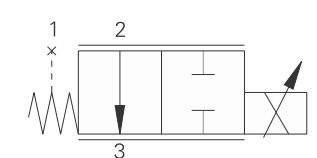
Model	Cavity	Flow rating	Typical pressure	Page
		<b>L/min (USgpm)</b>	<b>bar (psi)</b>	
ESV1-8-O	C-8-2	31 (9)	210 (3000)	B-26
ESV1-10-O	C-10-2	70 (19)	210 (3000)	B-28
ESV1-12-O	C-12-2	104 (27)	210 (3000)	B-30



Model	Cavity	Flow rating	Typical pressure	Page
		<b>L/min (USgpm)</b>	<b>bar (psi)</b>	
EFV1-10-C	C-10-3	38 (10)	210 (3000)	B-32
EFV1-12-C	C-12-3	77 (20)	210 (3000)	B-36



Model	Cavity	Flow rating	Typical pressure	Page
		<b>L/min (USgpm)</b>	<b>bar (psi)</b>	
EFV1-10-O	C-10-3	30 (10)	210 (3000)	B-40
EFV1-12-O	C-12-3	104 (28)	210 (3000)	B-44



Model	Cavity	Flow rating	Typical pressure	Page
		<b>L/min (USgpm)</b>	<b>bar (psi)</b>	
ESV9-8-E	C-8-4	11.0 (2.9)	210 (3,000)	B-48
ESV9-8-F	C-8-4	11.0 (2.9)	210 (3,000)	B-49
ESV9-10	C-10-5S	22.0 (5.8)	250 (3,600)	B-52

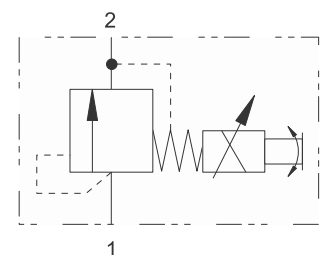
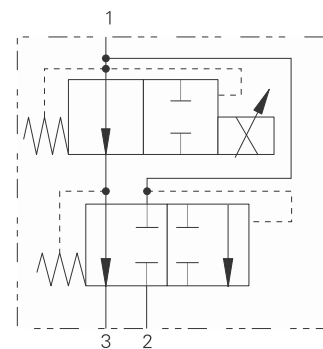
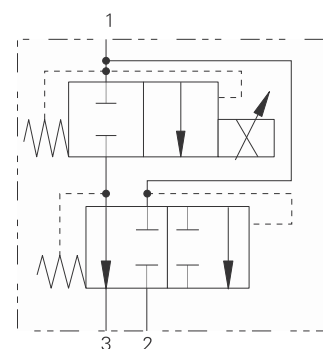
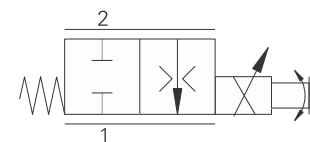
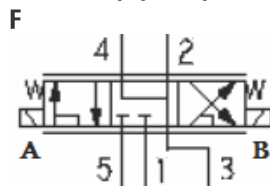
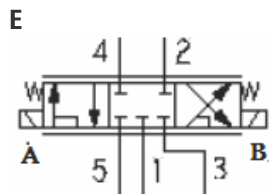
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.



# Proportional valves

Valve locator/section contents

## Functional symbol



Model	Cavity	Flow rating	Typical pressure	Page
		L/min (USgpm)	bar (psi)	
<i>Proportional flow Control, NC, spool</i>				
ESVL9-10-E	C-10-5S	23 (6)	250 (3600)	B-53
ESVL9-10-F	C-10-5S	23 (6)	250 (3600)	B-54

Model	Cavity	Flow rating	Typical pressure	Page
		L/min (USgpm)	bar (psi)	
<i>Proportional bi-directional, NC, poppet</i>				
PFR24A	A6701	18 (5)	210 (3000)	B-57

Model	Cavity	Flow rating	Typical pressure	Page
		L/min (USgpm)	bar (psi)	
<i>Proportional flow control, NC, spool</i>				
EFV2-12-C	C-12-3	<114 (30)	210 (3000)	B-59

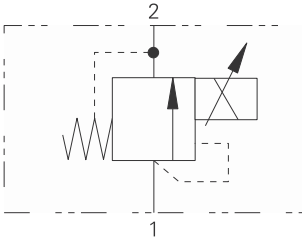
Model	Cavity	Flow rating	Typical pressure	Page
		L/min (USgpm)	bar (psi)	
<i>Proportional flow control, NO, spool</i>				
EFV2-12-0	C-12-3	<114 (<30)	210 (3000)	B-63

Model	Cavity	Flow rating	Typical pressure	Page
		L/min (USgpm)	bar (psi)	
<i>Proportional relief, NO, POPPET</i>				
PDR21A	A879	1.5 (.3)	350 (5000)	B-67

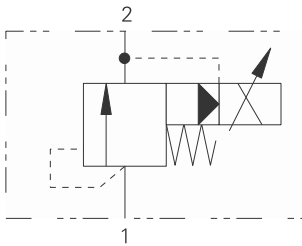
# Proportional valves

Valve locator/section contents

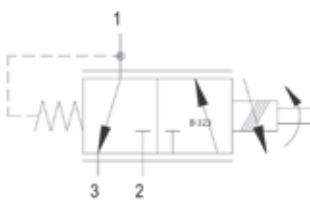
## Functional symbol



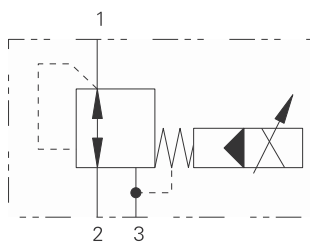
Model	Cavity	Flow rating L/min (USgpm)	Typical pressure bar (psi)	Page
<i>Proportional inverse relief, poppet</i>				
IRV1-10	C-10-2	1 (.25)	210 (3000)	B-69
IRV2-10	C-10-2	57 (15)	240 (3500)	B-71



Model	Cavity	Flow rating L/min (USgpm)	Typical pressure bar (psi)	Page
<i>Proportional relief, spool</i>				
ERV1-10	C-10-2	<60 (15)	210 (3000)	B-73
ERV1-16	C-16-2	<132 (<39)	210 (3000)	B-75
EPPV5	TC06025	8 (2.1)	50 (725)	B-81
EPPV6	TC06023	8 (2.1)	50 (725)	B-83



Model	Cavity	Flow rating L/min (USgpm)	Typical pressure bar (psi)	Page
<i>Proportional reducing/relief, spool</i>				
PPD22A	A879	20 (5)	210 (3000)	B-77
EPRV2-8	C-8-3	7.6 (2)	35 (500)	B-79



Model	Cavity	Flow rating L/min (USgpm)	Typical pressure bar (psi)	Page
<i>Proportional reducing/relief, spool</i>				
EPRV1-10	C-10-3	8 (2)	35 (500)	B-85
EPRV3-10	C-10-3	30 (8)	210 (3000)	B-87
EPRV1-16	C-16-3	7.6 (2)	35 (500)	B-89

B

This section gives basic specifications for the complete line of Vicker's screw-in proportional control valves. Its purpose is to provide a quick, convenient reference tool when choosing proportional valves or when designing a system using these components.

The **EPV10** has several outstanding performance features which give it a unique position in the screw-in cartridge valve market. Valve gain linearity, flow force pressure compensation characteristics above 20 bar (300 psi) and low internal leakage.

The **EPV16** is a proportionally controlled two-way poppet type valve. The main poppet amplifies a small flow through the pilot circuit and is comparable to a transistor. As the transistor uses small currents to control larger currents, the hydraulic valve transistor or VALVISTOR uses the pilot flow to control the main stage flow with servo-like response flow to control.

The **ESV1** is a proportional two-way, pressure compensated, poppet type flow control valve. The valve is available in 8, 10, and 12 sizes, both normally open or normally closed in the de-energized position.

The **EFV1** is a proportionally controlled two-way, spool type flow control valve. Technically the valve is not pressure compensated, but it is partial flow force pressure compensated.

The **EFV2** is a three port, pressure compensated, proportional flow control valve. The valve can be used as a priority flow regulator, with regulated flow being supplied to port 3 and excess flow being by-passed to port 2. If port 2 is blocked the valve functions as a restrictive, 2 way, pressure compensated flow regulator.

The **ERV1-10** is an electric, proportionally controlled, internally pilot operated, spool type screw-in relief valve. It is capable of handling flows from 3,8-60,0 L/min (1-15 USgpm) at pressures from 35-210 bar (500-3000 psi). Also available is an ERV1-16 which is capable of handling flows from 7,6-132 L/min. (2-35 USgpm) at pressures from 35-210 bar (100-500 psi).

The **ERV2-10** is a low flow electric proportionally controlled relief valve similar to the ERV1-10. This valve is rated for flows from 0,2-2,8 L/min (0.05-0.75 USgpm) and pressures up to 35 bar (500 psi).

The **EPRV2-8** is an electric, proportionally controlled, direct acting spool type, screw-in pressure reducing/relieving valve. It is capable of handling flows from 0-7,6 L/min (0-2 USgpm) at set pressures from 0-22 bar (0-320 psi).

The **EPRV1-10** is an electric, proportionally controlled, internally pilot operated, spool type, screw-in pressure reducing/relieving valve. It is capable of handling flows from 0-7,6 L/min (0-2 USgpm) at set pressures from 14-35 bar (200-500 psi). Also available is an **ERV1-16** which is capable of handling flows from 0-38 L/min (0-10 USgpm) at set pressures from 14-35 bar (200-500 psi).

The **EPRV3-10** is an electric, proportionally controlled, internally pilot operated, spool type, screw-in pressure reducing/relieving valve. It is capable of handling flows from 0-30 L/min (0-8 USgpm) at set pressures from 35-207 bar (500-3000 psi).

Vickers proportional pressure and flow control valves are designed to be easily controlled by the simplest of DC electrical devices such as a 12 volt battery and a potentiometer.

Varying the voltage at the coil is one of the simplest means of control available. Any of the Vickers DC coils will work on most of these valves simply by varying the voltage between 0 and 75% of the rated coil voltage. It should be noted that as the operating temperature of a coil increases, the solenoid force decreases. Therefore if the voltage is held constant as the coil heats up then valve pressure (or flow) will change.

The **IRV1** is a proportionally controlled poppet type, relief valve, with an inverse function. This valve is capable of handling flows up to 1 L/min (0.25 USgpm) and pressures up to 210 bar (3000 psi).

**IRV2-10** is an inverse proportionally controlled spool type two stage relief valve. Ideal for use to control fan drive or brush pressure, where full speed or force is required under electrical failure. Valve is capable to handle flow up to 57 lpm (15 USgpm) and pressure up to 240 bar (3500 psi).

### Electrical current controls with PWM are recommended for all Eaton proportional valves.

Closed-loop electrical control with feedback from the parameter to be monitored will provide the most accurate control.

### Valve features and benefits

- Products in this catalog have been fatigue tested to one million cycles at 132% or 10 million cycles at 115% of rated pressure
- All operating parts are hardened steel, ground and honed for long life and low leakage
- Designed for maximum flexibility and minimal space requirements
- All exposed cartridge surfaces are zinc dichromate plated to resist corrosion
- Reliable, economical and compact
- Rated flows up to 160 L/min (42 USgpm)
- Optional nose-in, side-out or side-in, nose out flow direction (EPV16 series)

### Coil features and benefits

The valves in this catalog are offered with a choice of two or three standard voltages and several types of electrical connections. For other coil ratings and connections, consult your Eaton applications engineer.

- Variety of voltages and terminations
- Coils are interchangeable for serviceability on the EPV10 and EPV16. Coils are interchangeable for serviceability on the ERV1-10, EPV1-16, EPRV1-10 and EPRV1-16
- Compact, one-piece weather-proof encapsulated design. Eliminates need for extra seals
- An arc suppression diode molded into the coil is available as a standard option on ERV, EPRV and EFV valves

### Fluid cleanliness

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity, and inclusion of air.

#### Warning

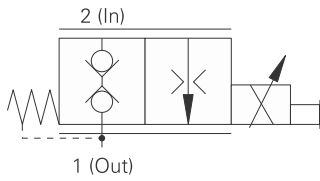
Application of these products beyond published performance specifications may cause valve malfunction which may result in personal injury and/or damage to the machine.

#### Warning

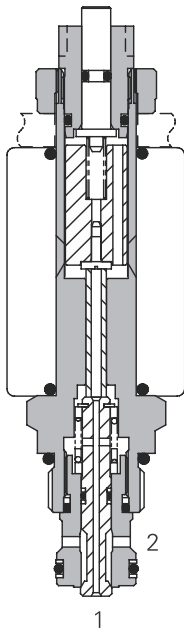
For pressures over 210 bar (3000 psi) use steel housing.

# PFR21H - Proportional valve

Proportional bi-directional poppet, flow control valve  
 Up to 18L/min (5 USgpm) • 210 bar (3000 psi)



Sectional view



## Description

This is a proportionally operated 2 way poppet valve. Ideal for use in lowering circuits to give good control to the operator. The valve will compensate as the pressure difference increases to prevent speed increase due to increasing load.

## Operation

In the de-energised position the valve is blocked in both directions. As the current to the coil is increased the valve opens proportionally. There is also an element of compensation as the pressure difference across the valve increases. See performance graphs.

## Features

- High flow capacity with reduced space requirements.
- Standard valve bodies and common cavities.
- One-piece encapsulated coil with minimal amperage draw.
- Oil immersed armature solenoid.
- Various coil terminals and voltages.
- Coil interchangeability with valves of same series.
- Manual override, seal variations and other options available.
- Sealed coil arrangement to protect stem from corrosion.
- Reversible coil without affecting performance.

## Performance data

### Ratings and specifications

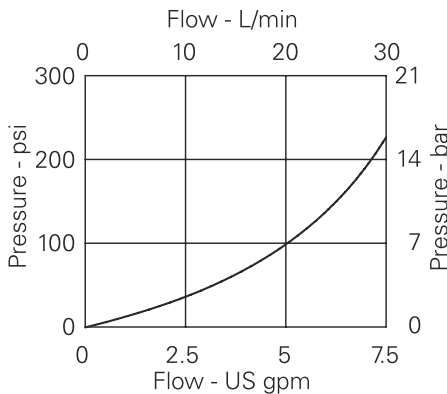
Performance data is typical with fluid at 32 cSt (150 SSU)

Max inlet pressure	210 bar (3000 psi)
Max regulated flow at rated current @ 50 bar	20 L/min (5.3 USgpm) @100%, 15 L/min (3.9 USgpm) @85%, 11 L/min (2.9 USgpm) @75%
Frequency	200 to 400 Hz - 200 recommended
Dead band	38-60% of rated current
Response time	80ms
Internal leakage	Up to 0.67 ml/min (10dpi) 210 bar differential at 32 centistrokes
Temperature range (oil)	-30° to 120°C (-22° to 248°F)
Cavity	A6701 (see Section M)
Electrical data	See coil data sheet
Torque cartridge into cavity	30 Nm (22 lbs ft)
Mounting position	Unrestricted
Fluids	Most general purpose hydraulics fluids
Seal material	Standard nitrile with PTFE back up rings
Filtration	BS5540/4 Class 16/13 (25 micron or better)
Nominal viscosity range	15 to 250 cSt
Standard housing materials	Aluminium
Coil model code	C16-*/-/29
Voltage available	12, 24 VDC
Coil weight	.3 kg (.6 lbs)
Weight	.2 kg (.44 lbs)
Seal kit	SK1138 (Nitrile) SK1138V (Viton®)

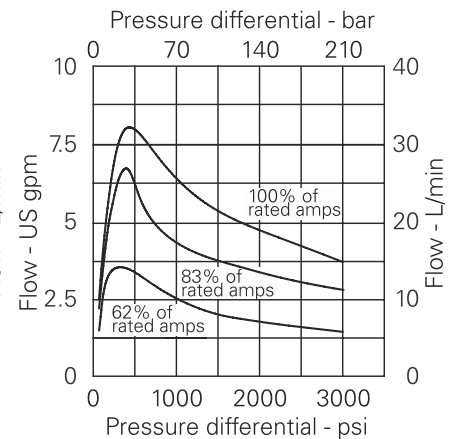
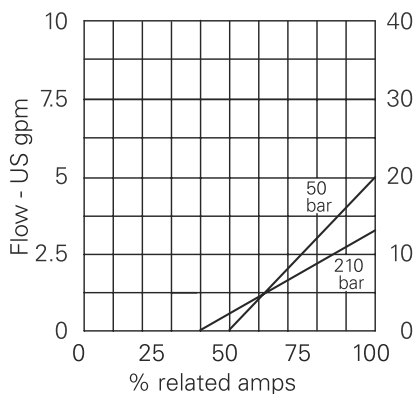
Viton is a registered trademark of E.I. DuPont

## Pressure drop

Viscosity = 32 cSt (150 SSU)  
 PFR21H @ 100%



## Performance curves

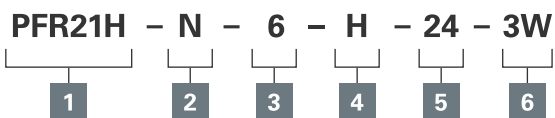


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# PFR21H - Proportional valve

Proportional bi-directional poppet, flow control valve  
Up to 18L/min (5 USgmp) • 210 bar (3000 psi)

## Model code



- 1 Function**  
PFR21H - Normally closed

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- 2 Seal material**  
N - Nitrile  
V - Viton

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- 3 Manual override**  
6 - Screw

- 4 Coil termination**  
H - DIN43650  
F - Flying Lead  
DM - Deutsch moulded  
Other terminations available on request.

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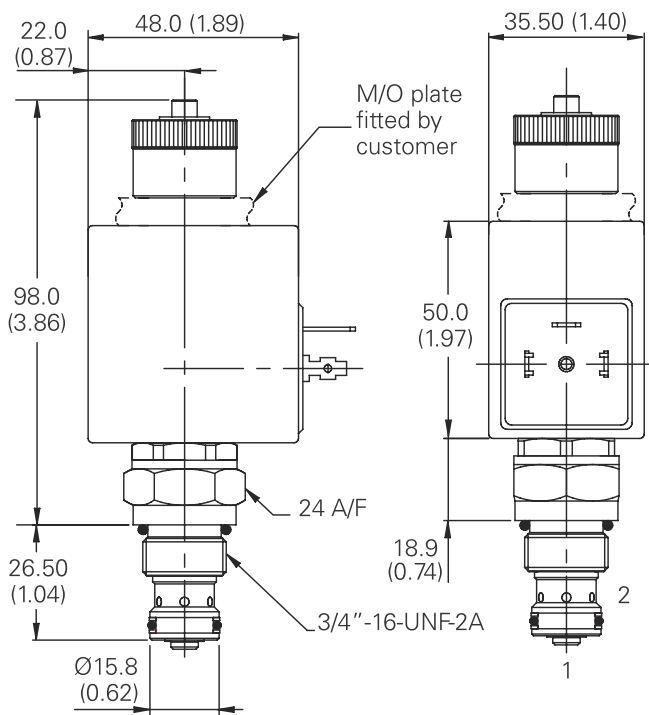
- 5 Voltage**  
12 - 12 VDC  
24 - 24 VDC

Code	Port size	Housing number
Blank	Cartridge only	
2W	1/4" BSP	A12592
3W	3/8" BSP	A7450
6T	3/8" SAE	A19355

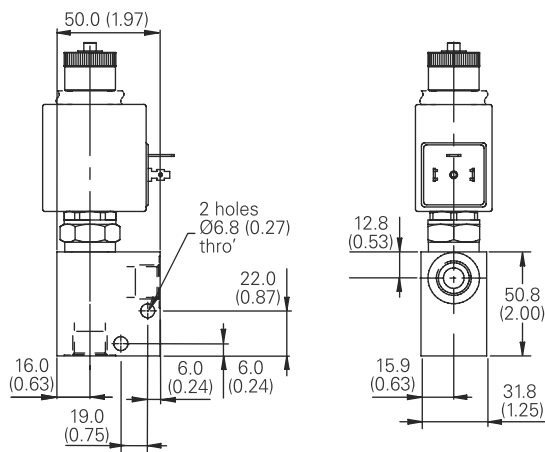
## Dimensions

mm (inch)

### Cartridge only



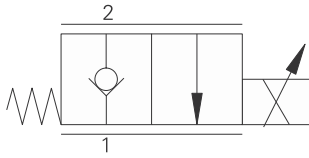
### Installation drawing



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPV10 - Proportional valve

Proportional uni-directional poppet, flow control valve  
Up to 30L/min (8 USgmp) • 350 bar (5000 psi)



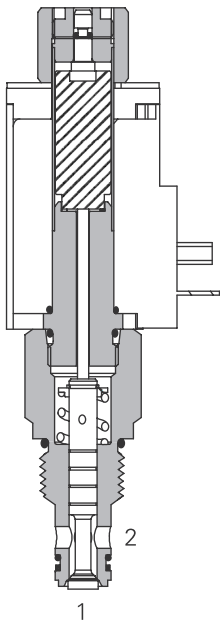
### Operation

In the de-energized condition, blocked from port 2 to 1 with no reverse flow permitted. When energized, flow is allowed from port 2 to port 1 in direct proportion to the current applied to the solenoid coil.

### Features

Hardened, ground and honed working parts to limit leakage. IP69K Tough coil compatibility. Continuously rated. Compact design with low pressure drop.

### Sectional view



### Performance data

#### Ratings and specifications

*Performance data is typical with fluid at 21,8 cSt (105 SSU) and 49°C (120°F)*

Typical application pressure (at port 2)	350 bar (5000 psi)
Cartridge fatigue pressure (infinite life)	350 bar (5000 psi)
Rated flow	0 - 30 L/min (0 - 8 USgpm)
Operating ambient temperature	-30° to 90°C (-22° to 194°F)
Cavity	C-10-2
Fluids	Anti-wear hydraulic oils with Buna-N seals (standard) Phosphate esters (non-alkyl) with Viton® seals are available by request Viton is a registered trademark of E.I. DuPont
Weight cartridge only	0,78 kg (1.72 lbs)
Filtration	70 - 210 bar (1000 - 3000 psi) Cleanliness code 17/15/12 210+ bar (3000+ psi) Cleanliness code 15/13/11
Standard housing materials	Aluminum or Steel
Typical hysteresis	Less than 4% of rated current at 10 bar pressure drop – Pulse Width Modulated (PWM)
Internal leakage	10 cm <sup>3</sup> maximum @ 140 bar (2000 psi) and oil viscosity of 30 cSt
Oil viscosity range	10 - 800 cSt
Nominal supply voltage	12 or 24 VDC
Threshold current	Adj from 300 - 600 mA (12 VDC) Adj from 150 - 300 mA (24 VDC)
Coil current @ max flow	0.7 amps max @ 24 VDC 1.4 amps max @ 12 VDC
Recommended PWM frequency	100 - 200 Hz application dependent, 150 Hz typ
Coil resistance @ 20°C (86°F)	12V-6.5Ω 24V-25.0Ω
Power consumption @ rated current and 20°C coil temperature	12V-12.8 watts 24V-12.8 watts
Cartridge seal kit	02-317580 (Buna-N)

### Description

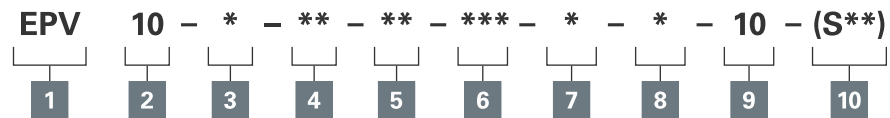
This is a uni-directional proportionally controlled, normally closed poppet valve. It is ideal for lowering circuits controlling the speed of movement with low leakage when closed.

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPV10 - Proportional valve

Proportional uni-directional poppet, flow control valve  
Up to 30L/min (8 USgmp) • 350 bar (5000 psi)

## Model code



### 1 Function

EPV - Electro-proportional flow control valve, poppet type

### 2 Size

10 - 10 Size

### 3 Valve housing material

Omit for cartridge only

A - Aluminum  
S - Steel

Maximum operating pressure for aluminum housing is 210 bar (3000 psi)

### 5 Seal material

N - Buna-N  
V - Viton (standard)  
NF - Buna-N and 60 mesh filter screen  
VF - Viton and 60 mesh filter screen

### 4 Port size

Code	Port size	Housing number	
		Aluminium	Steel
0	Cartridge only		
3G	3/8" BSPP	876703	02-175103
6H	SAE 6	876700	02-175100
8H	SAE 8	876701	02-175101

See section J for housing details.

### 8 Coil/Connector types

Connector			
	No connector	12VDC	24VDC
0	No connector		
W	Leadwire (DC only)	02-361830	02-363310
Q	Spade terminals (DC only)	02-361836	02-363311
U	DIN 43650	02-361837	02-363321
Y	Metri-Pack 150 male*	02-361845	02-363322
F	Weather-Pack male	02-361848	02-364328
N	Deutsch DT04-2P	02-154124	02-391571

\*Preferred Packard connector.

### 6 Voltage rating

12D - 12VDC  
24D - 24VDC  
00D - No coil

### 7 Manual override option

0 - No manual override  
M - Pin type  
S - Screw type (3mm Hex)

Manual override is available in two different configurations, either push pin type is used when system pressure does not exceed 210 bar (3000 psi). The screw type can be used at any system pressure.

### 9 Design number

10 - Design no.

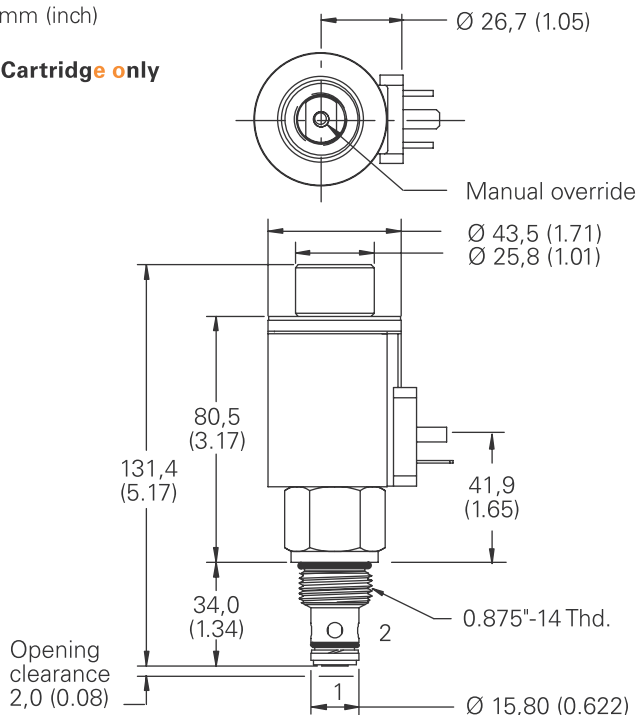
### 10 Special features

Blank - None

## Dimensions

mm (inch)

### Cartridge only



Valve is shown with "U" coil. See Section C for coil information. Torque cartridge in housing

A - 47-54 Nm (35-40 ft. lbs)  
S - 68-75 Nm (50-55 ft. lbs)

### Warning

The cavity should be machined to the 14,29 (0.562) maximum diameter and 36,00 (1.417) maximum depth. See section M.

### Warning

When using the "Screw Type" override, care must be taken to return the override back to its neutral position before activating the valve. Failure to take this precaution may result in personal injury or damage to the machine.

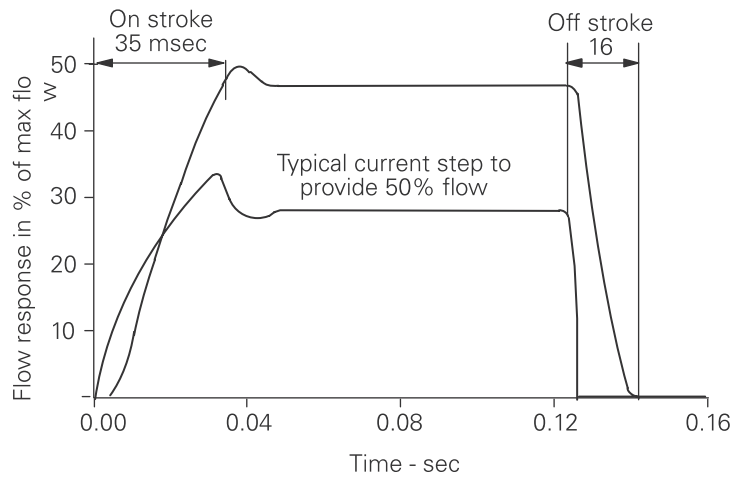
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPV10 - Proportional flow control valve

Proportional uni-directional poppet, flow control valve

Up to 30L/min (8 USgmp) • 350 bar (5000 psi)

## Step response data

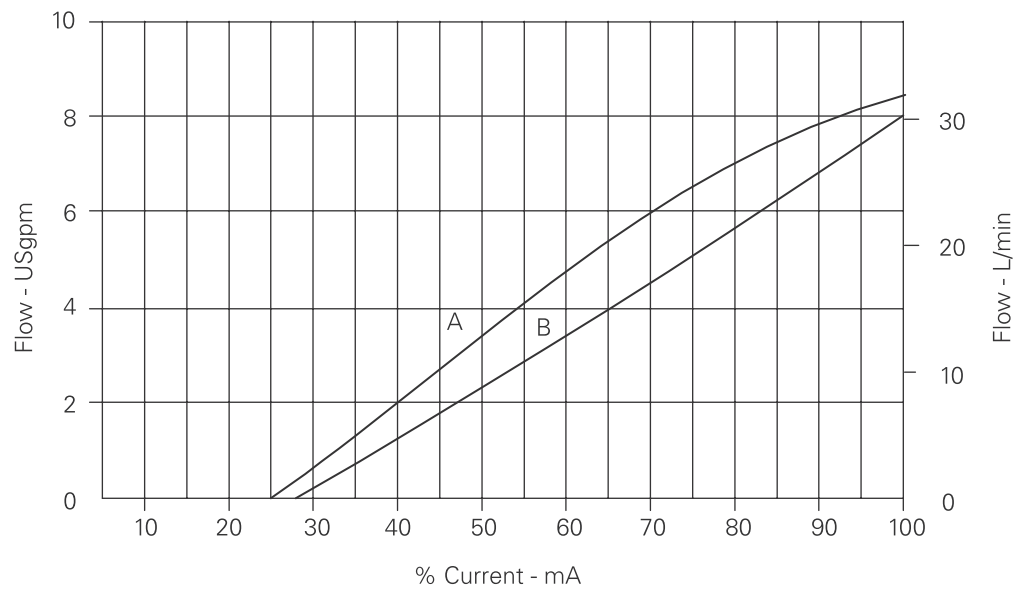


## Flow vs current

With 10 bar differential between inlet and outlet

**A** - 210 bar (3000 psi) pressure drop from Port 2 to Port 1

**B** - 10 bar (150 psi) pressure drop from Port 2 to Port 1



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

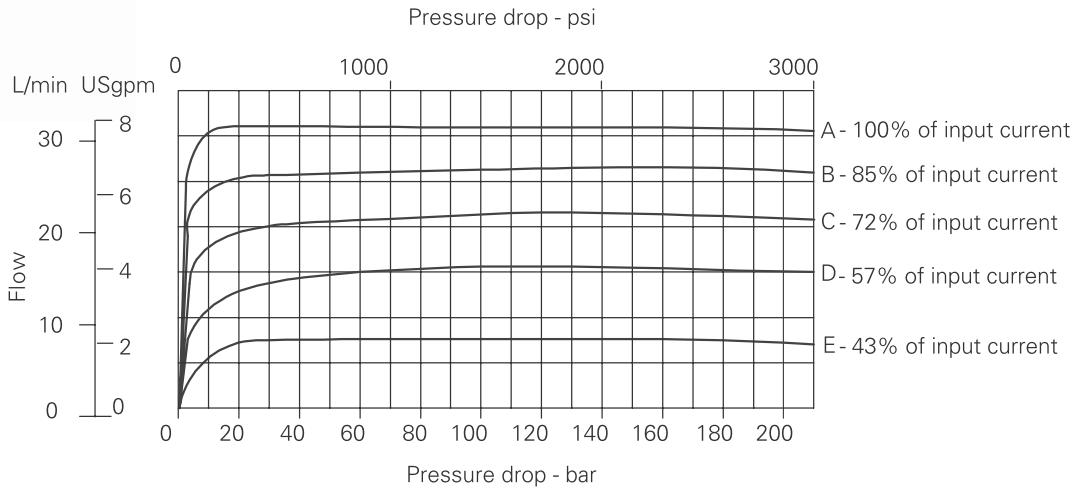


# EPV10 - Proportional flow control valve

Proportional uni-directional poppet, flow control valve  
Up to 30L/min (8 USgpm) • 350 bar (5000 psi)

## Flow vs pressure drop

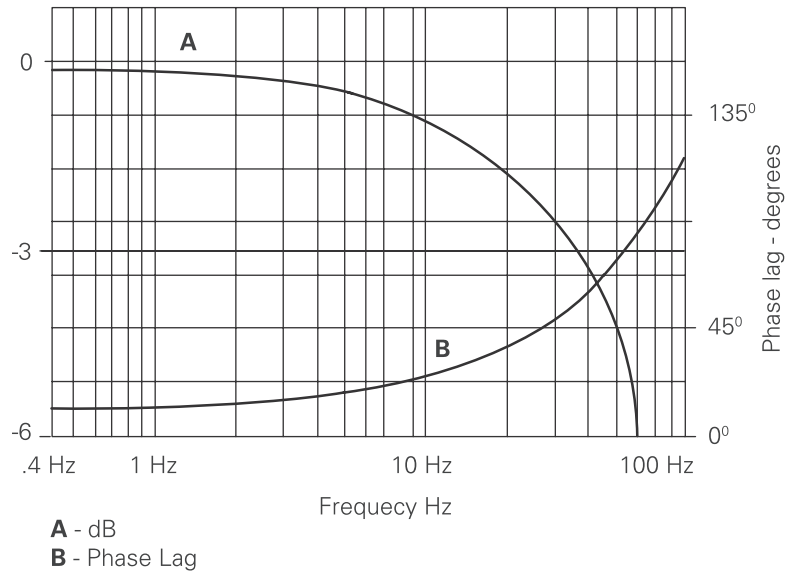
Per % of input current



## Typical flow response

For an amplitude of  $\pm 40\%$  maximum stroke (center to offset) about the 50% position.

$\Delta P = 10 \text{ bar (145 psi)}$

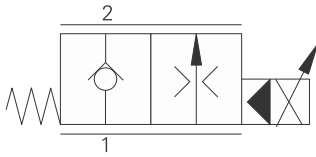


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

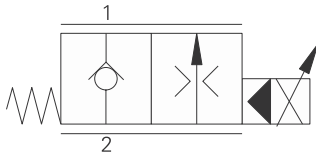
## EPV16 - Proportional valve

Proportional flow control, normally closed, poppet  
160L/min (42 USgpm) • 280 bar (4000 psi)

EPV16A



EPV16B



### Operation

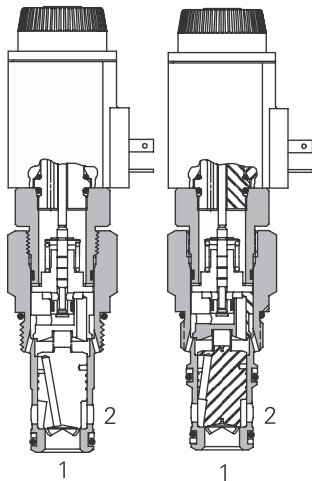
“A” style (nose in, side out) - In the de-energized position this valve remains closed from port 1 to port 2. When current is applied to the coil, a controlled increasing flow will be allowed from port 1 to port 2, in proportion to the current applied.

“B” style (side in, nose out) - in the de-energized position the valve remains closed from port 2 to port 1. When current is applied to the coil, a controlled increasing flow will be allowed from port 2 to port 1. In both examples free reverse flow is allowed in the opposite direction.

### Features

Hardened and ground working parts. 280 bar working pressure, very low hysteresis, long life.

### Sectional view



### Performance data

#### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

Typical application pressure (all ports)	280 bar (4000 psi)
Cartridge fatigue pressure (infinite life)	280 bar (4000 psi) NFPA rated
Rated flow	0 to 160 L/min (42 USgpm)
Internal leakage	EPV16A 50 cm <sup>3</sup> /min, max @ 140 bar (2000 psi) EPV16B 10 cm <sup>3</sup> /min, max @ 140 bar (2000 psi)
Oil viscosity range	10-800 cSt
Nominal supply voltage	12/24 VDC
Threshold current	Adj from 350-600 mA (12 VDC) Adj from 175-250 mA (24 VDC)
Coil current for maximum flow	0.7 amps @ 24 VDC 1.4 amps @ 12 VDC
Recommended PWM frequency	100-200 Hz application dependent, 150 Hz typ
Power consumption	12V-12.8 watts 24V-12.8 watts
Coil resistance	12v-6.5 V/24V-25.0 V
Temperature range	-30° to 90°C (-22° to 194°F)
Cavity	C-16-3S (undercut)
Fluids	Antiwear hydraulic oils with Buna-N seals (standard) Phosphate esters (non-alkyl) with Viton®
Filtration	70-210 bar (1000-3000 psi) Cleanliness code 17/ <b>15/12</b> 210+ bar (3000+ psi) Cleanliness code 15/ <b>13/11</b>
Housing material (standard)	Aluminum or steel
Typical hysteresis	less than 4% of rated current @ 10 bar pressure drop-pulse width modulated (PWM)
Weight cartridge only	1 kg (2.2 lbs)
Seal kit	02-154069 (Buna-N)

Viton is a registered trademark of E.I. DuPont

### Description

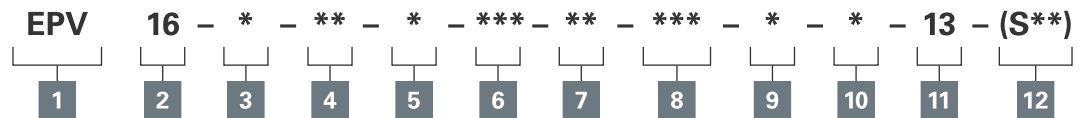
This is a 2 way normally closed, pressure compensated, poppet type, electro proportional screw in cartridge valve with a low hysteresis and fine control. The valve is suitable for demanding applications where long life and accuracy is demanded

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPV16 - Proportional valve

Proportional flow control, NC, poppet  
160L/min (42 USgpm) • 280 bar (4000 psi)

## Model code



**1 Function**  
EPV - Solenoid valve

**2 Size**  
16 - 16 size

**3 Flow direction**  
A - Nose-in, side-out  
B - Side-in, nose-out

**4 Rated flow**  
4 - 40 L/min (10.5 USgpm)  
6 - 60 L/min (16 USgpm)  
10 - 100 L/min (26 USgpm)  
16 - 160 L/min (42 USgpm)

**5 Valve housing material**  
Omit for cartridge only  
A - Aluminum  
S - Steel  
**Note:** Aluminum housings can be used for pressures up to 210 bar (3000 psi). Steel housing **must** be used for operating pressures **above** 210 bar (3000 psi).

**6 Port size**

Code	Port size	Housing number			
		Aluminium EPV16-A		Steel EPV16-A	
0	Cartridge only				
4G	1/2" BSPP	02-185448	02-166607	02-180050	02-165500
6G	3/4" BSPP	02-185449	02-161592	02-180051	02-164931
10H	SAE 10	02-185450	02-170238	02-180048	02-161983
12H	SAE 12	02-185447	02-166609	02-180049	02-161982
5C	CETOP5 (NFPA D05) Interface (Requires steel body)				

See section J for housing details.

**7 Seal material**  
N - Buna-N (standard)  
V - Viton  
NF - Buna-N and 60 mesh filter screen  
VF - Viton and 60 mesh filter screen

**8 Voltage rating**  
12D - 12VDC  
24D - 24VDC  
00D - No Coil

**9 Manual override option**  
Blank - No manual override  
0 - No manual override  
M - Pin type  
S - Screw type (3mm Hex)

Manual override is available in two different configurations, either push pin type is used when system pressure does not exceed 210 bar (3000 psi). The screw type can be used at any system pressure.

**Note:** When using the "Screw Type" override, care must be taken to return the override back to its neutral position before activating the valve. Failure to take this precaution may result in personal injury or damage to the machine.

**10 Connector type**

0 - No connector  
F - Weatherpack male  
Q - Spade Terminals (DC only)  
W - Flying Lead  
N - Deutsch DT04-2P  
Y - Metripack 150 male\*  
U - DIN 43650

\*Preferred Packard connector. For coil part numbers and dimensions see section C.

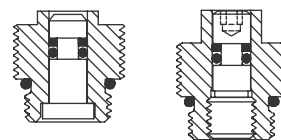
**11 Design number**

13 - Design no.

**12 Special features**

Blank - None

M - Pin type    S - Screw type



### ⚠ Warning

When using the "Screw Type" override, care must be taken to return the override back to its neutral position before activating the valve. Failure to take this precaution may result in personal injury or damage to the machine.

### ⚠ Caution

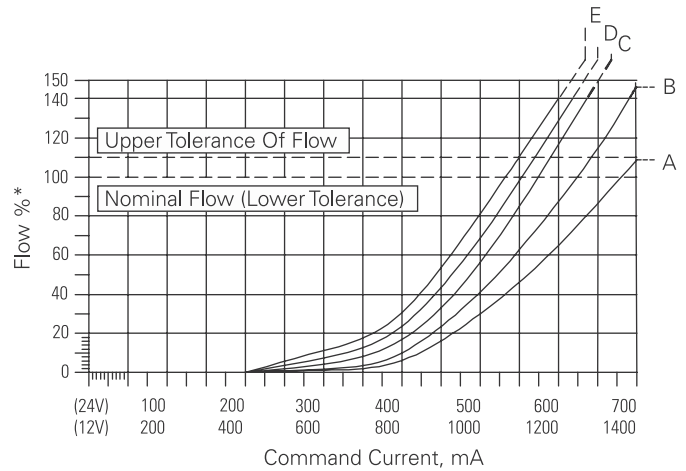
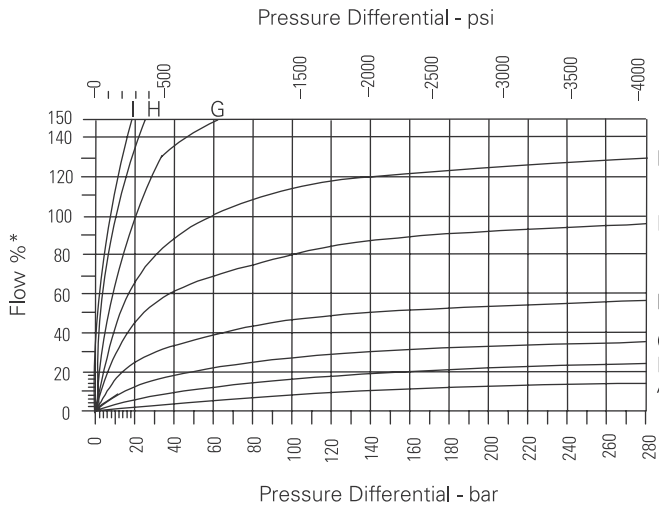
A separate check valve is required down stream to isolate the EPV valve from load forces when the EPV is used to hold a load.

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPV16 - Proportional valve

Proportional flow control, normally closed, poppet  
 160L/min (42 USgpm) • 280 bar (4000 psi)

## Pressure drop curves



\* Flow interims of % for each poppet size

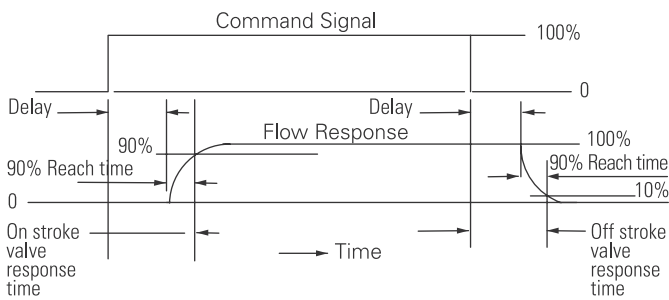
\* Flow interims of % for each poppet size

### Command current

	12V	24V
A-	600 mA	300mA
B-	700 mA	350mA
C-	800 mA	400mA
D-	900 mA	450mA
E-	1000 mA	500mA
F-	1100 mA	550mA
G-	1200 mA	600mA
H-	1300 mA	650mA
I-	1400 mA	700mA

### Pressure differential

A-	10 bar	150 psi
B-	20 bar	300 psi
C-	50 bar	700 psi
D-	100 bar	1500 psi
E-	200 bar	3000 psi



### Pressure drop @ 120 L/min (30 USgpm)

Pressure drop DP	On stroke Delay/reach 90%	Off stroke delay/reach 90%
20 bar (290 psi)	24 ms/35 ms	5 ms/15 ms
100 bar (1450 psi)	24 ms/17 ms	5 ms/7 ms

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPV16A

Proportional flow control, normally closed, poppet  
160L/min (42 USgpm) • 280 bar (4000 psi)

## Dimensions

mm (inch)

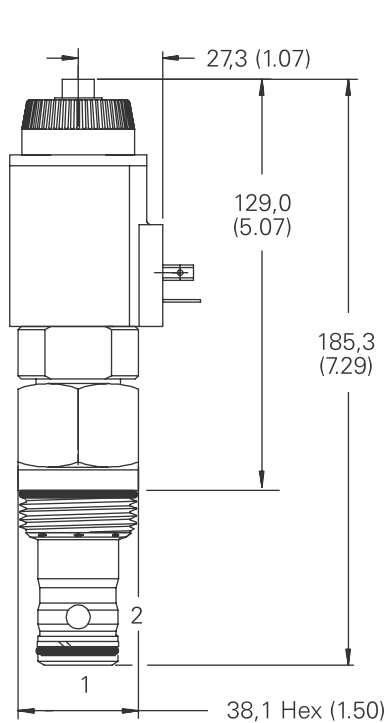
Valves are shown with "U" coil. See Section C for coil information.

Torque cartridge in aluminum housing 108-122 Nm (80-90 ft. lbs)

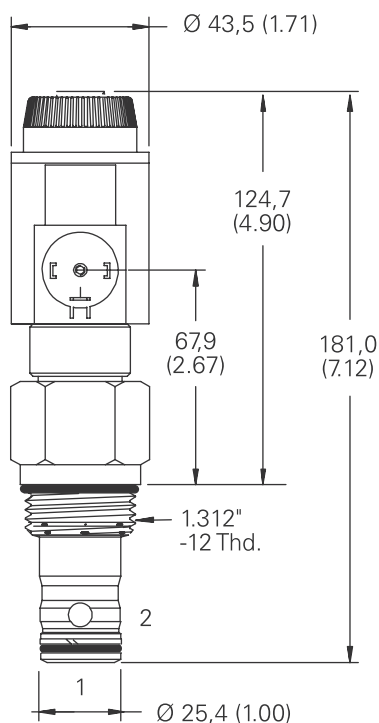
Torque cartridge in steel housing 136-149 Nm (100-110 ft. lbs)

## Cartridge only - EPV16A

Nose-in, side out



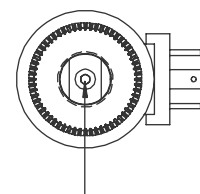
With manual actuator



No manual actuator

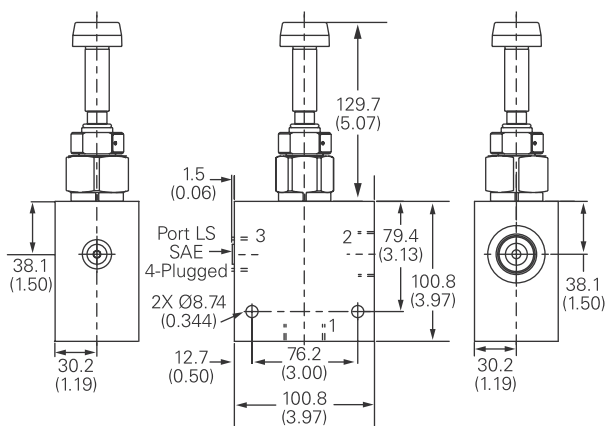
**Note:** When stand alone housings are used, the following guidelines apply:

- EPV16-A: Port 3 is to be plugged.
- EPV16-B: Port 3 is to be connected to port 1 in order to provide the required feedback flow path.



Screw type actuator (shown) 3 mm hex socket

## Installation drawing (Steel)



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPV16B

Proportional flow control, normally closed, poppet  
 160L/min (42 USgpm) • 280 bar (4000 psi)

## Dimensions

mm (inch)

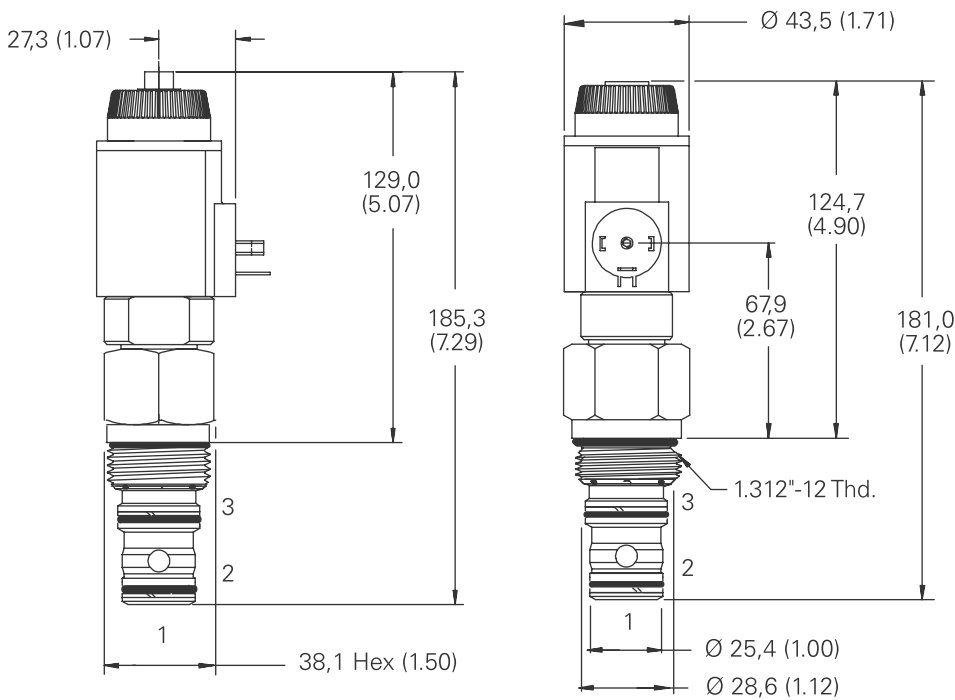
## Cartridge only - EPV16B

Side-in, nose out

For EPV16-B (flow 2 to 1), Port 3 must be connected to Port 1 externally to the cartridge, either by passages in the cavity block or external plumbing.

When purchased with undercut body, this connection is included in the body and Port 3 is not machined.

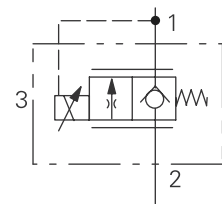
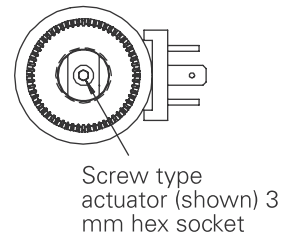
A separate external port connection is not required for EPV16-A (flow 1 to 2).



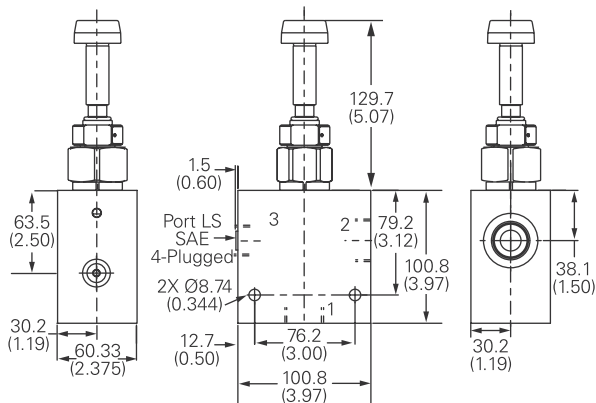
With manual actuator

No manual actuator

Required external connection with standard C-16-3S cavity.



## Installation drawing (Steel)



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

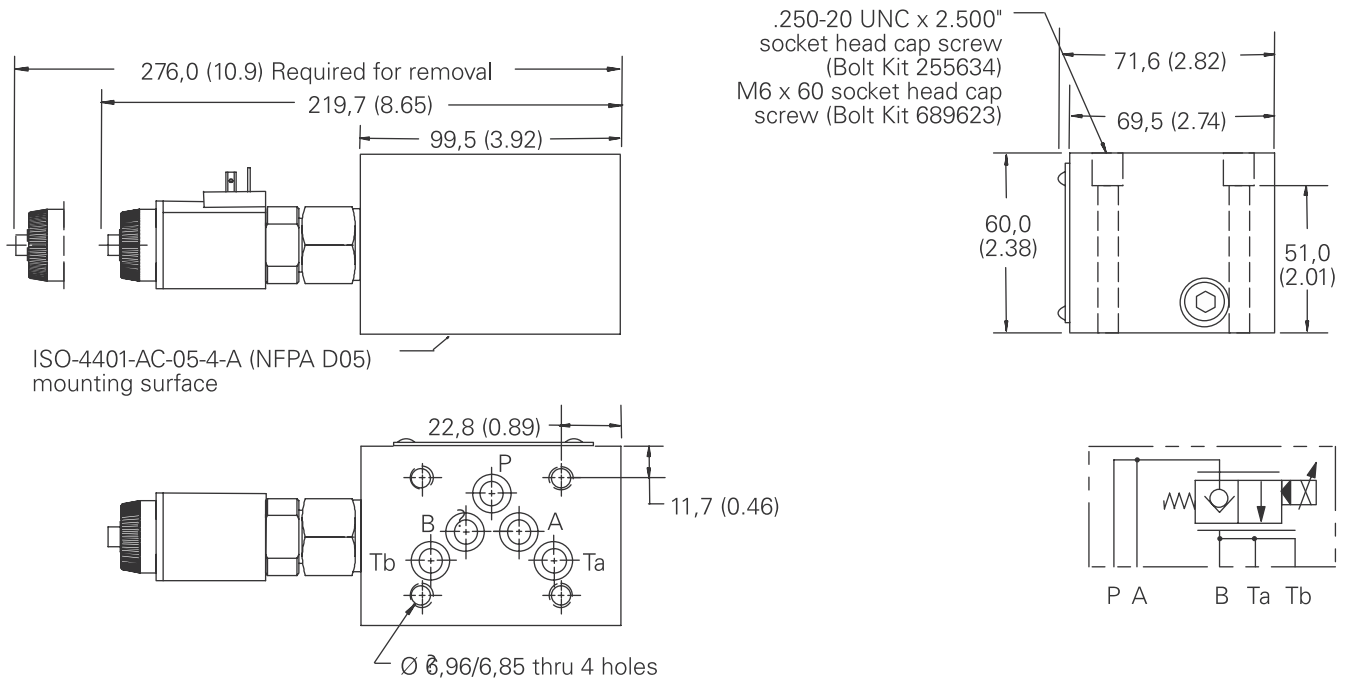
# EPV16 - Proportional valve

Proportional flow control, normally closed, poppet  
160L/min (42 USgpm) • 280 bar (4000 psi)

## EPV16-A-\*\*-S-5C-\*\*-D-\*\*-12

CETOP 5 Interface

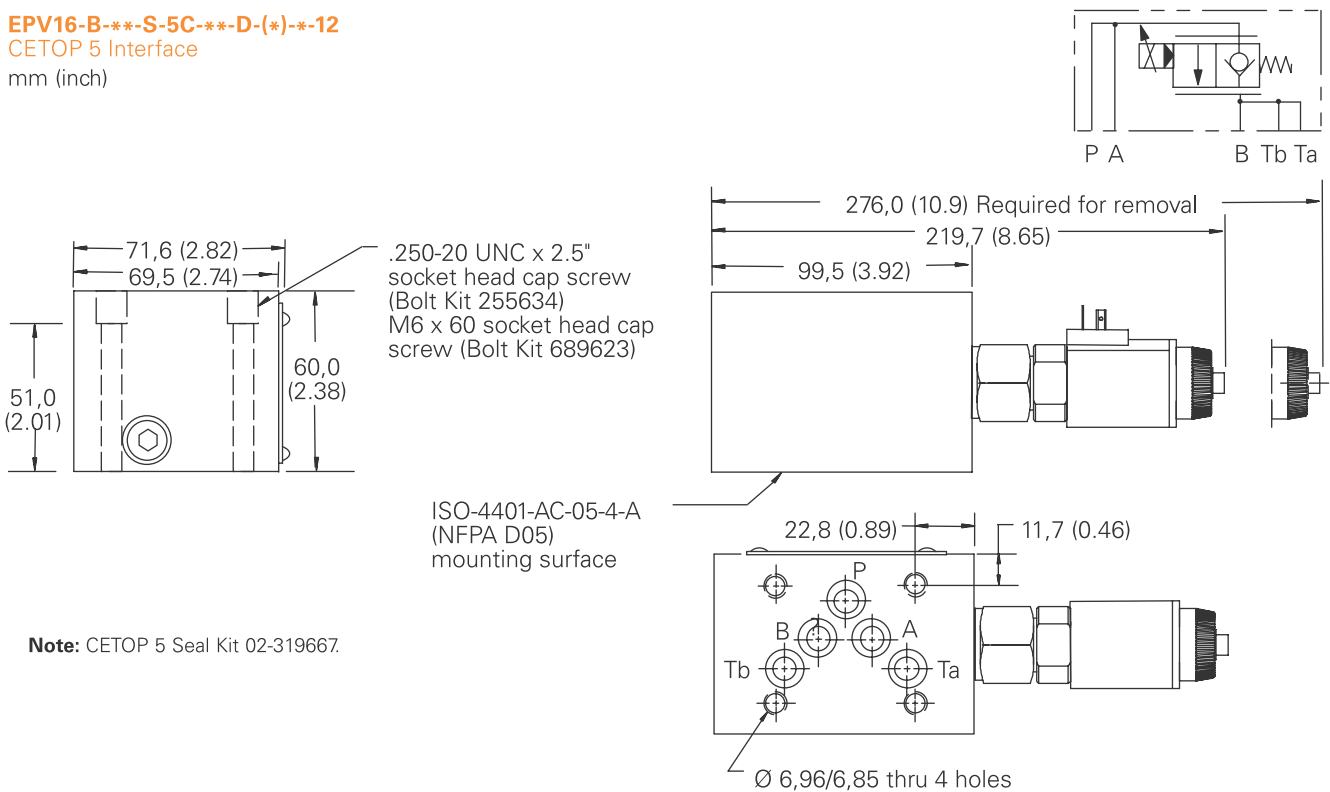
mm (inch)



## EPV16-B-\*\*-S-5C-\*\*-D-\*\*-12

CETOP 5 Interface

mm (inch)

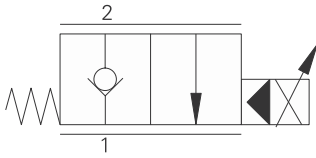


**Note:** CETOP 5 Seal Kit 02-319667.

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

## ESV1-8-C - Proportional valve

Proportional flow control, normally closed, poppet  
Up to 31 L/min (8 USgpm) • 210 bar (3000 psi)



### Operation

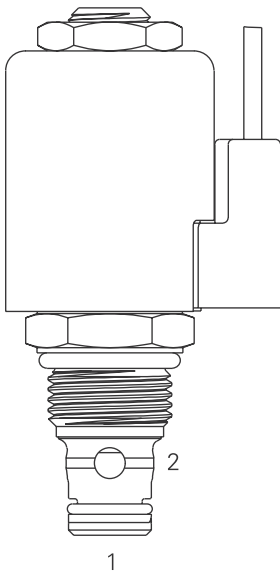
In the de-energized position, this valve blocks flow from port 2 to port 1 and free flow is allowed from port 1 to port 2.

In the energized position, flow from port 1 to port 2 is restricted while free flow is allowed from port 2 to port 1. The valve flow is proportional to the current applied to the coil.

### Features

Hardened and ground working parts to give long life and very low leakage. IP69K Tough coil compatibility, continuously rated. Compact design with low pressure drop.

### Profile view



### Performance data

#### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

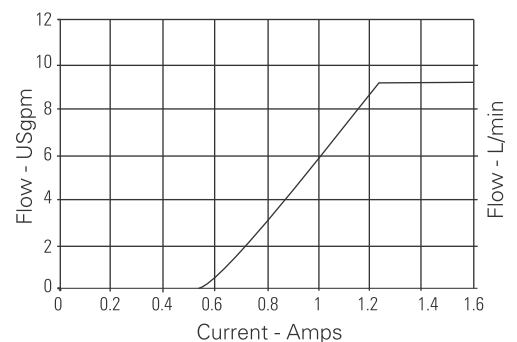
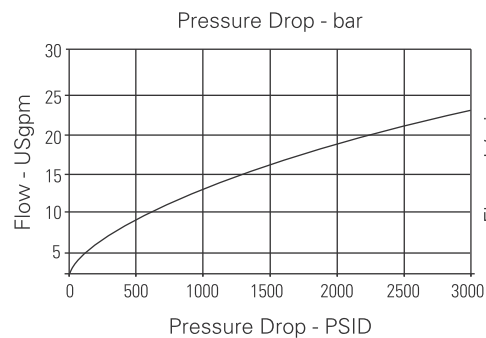
Typical application pressure	210 bar (3000 psi)
Cartridge endurance rating	1 million cycles
Cartridge fatigue pressure rating (NFPA/T2.6.1 R2-2000)	210 bar (3000 psi)
Rated flow	@ 500 psid, 8.4 gpm min, 9.3 gpm nom
Leakage (fully closed)	5 drops/min max @ 3000 psi
Nominal supply voltage	12/24 VDC
Current to open valve	1350-1450 mA (12V coil), 075-725 mA (24V coil)
Temperature range	-30° to 90°C (-22° to 194°F)
Maximum oil temperature	120°C (248°F)
Maximum internal oil temperature	200°C (392°F)
Cavity	C-8-2
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum
Hysteresis	1 USgpm with dither
Weight cartridge only	.11 kg (.24 lbs)
Seal kit	02-165875 (Buna-N), 02-165877 (Viton®)

Viton is a registered trademark of E.I. DuPont

### Description

This is a 2 way 2 position, pilot operated poppet type, normally closed, proportional flow control screw in cartridge valve. Ideal for lowering circuits or in conjunction with pressure compensators to provide proportional flow control to any actuator.

### Pressure drop curves



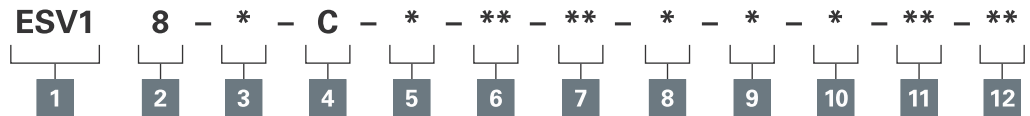
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.



# ESV1-8-C - Proportional Valve

Proportional flow control, normally closed, poppet  
Up to 31 L/min (8 USgpm) • 210 bar (3000 psi)

## Model code



### 1 Function

**ESV1** - Proportional flow control

### 2 Size

**8** - 8 size

### 3 Seal material

**N** - Buna-N  
**V** - Viton

### 4 Style

**C** - Normally open

### 5 Housing material

**Blank** - Cartridge only  
**A** - Aluminum

### 6 Port size

Code	Port size	Housing number
Aluminium		
<b>0</b>	Cartridge only	
<b>2G</b>	1/4" BSPP	02-160727
<b>3G</b>	3/8" BSPP	02-160728
<b>4T</b>	SAE 4	02-150730
<b>6T</b>	SAE 6	02-160731
<b>8T</b>	SAE 8	02-160732

See section J for housing details.

### 7 Coil voltage

**0** - No coil  
**12D** - 12VDC  
**24D** - 24VDC

### 8 Type of power

**Blank** - No coil  
**D** - DC w/o diode  
**B** - DC w/o diode

### 9 Connector type

**Blank** - No coil  
**G** - ISO 4400 DIN 43650  
**Q** - Spade Terminals  
**W** - Flying Lead  
**N** - Deutsch (DC only)  
**Y** - Amp JR (DC only)  
**P** - Conduit

For coil part numbers and dimensions see section C.

### 10 Coil series

**Blank** - No coil  
**S** - S Series, 20 W

For coil part numbers and dimensions see section C.

### 11 Coil special features

**Blank** - No coil  
**00** - No special feature

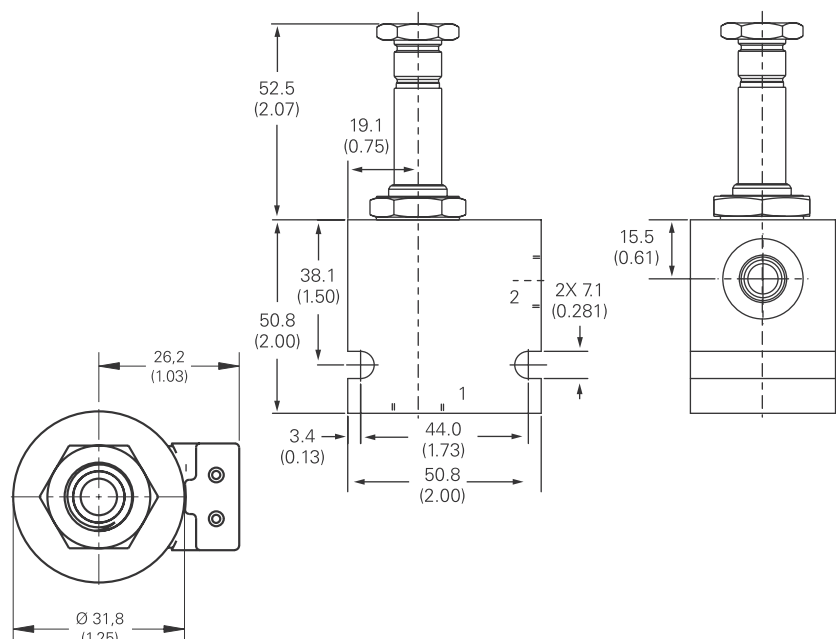
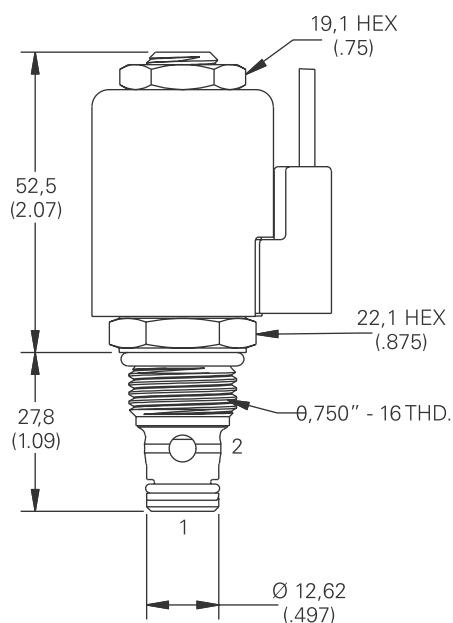
### 12 Valve special features

**Blank** - None

## Dimensions

mm (inch)

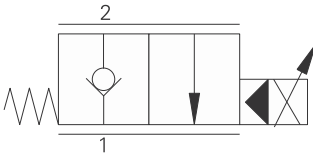
### Cartridge only



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ESV1-10-C - Proportional valve

Proportional flow control, normally closed, poppet  
 Up to 70 L/min (18.5 USgpm) • 210 bar (3000 psi)



### Operation

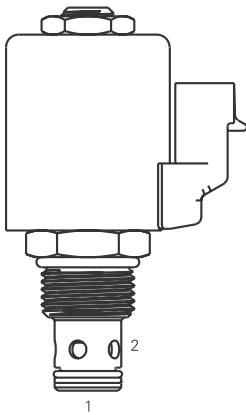
In the de-energized position, this valve blocks flow from port 2 to port 1 and free flow is allowed from port 1 to port 2.

In the energized position, flow from port 1 to port 2 is restricted while free flow is allowed from port 2 to port 1. The valve flow is proportional to the current applied to the coil.

### Features

Hardened and ground working parts to give long life and very low leakage. IP69K Tough coil compatibility, continuously rated. Compact design with low pressure drop.

### Profile view



### Performance data

#### Ratings and specifications

*Performance data is typical with fluid at 21.8 cST (105 SUS) and 49°C (120°F)*

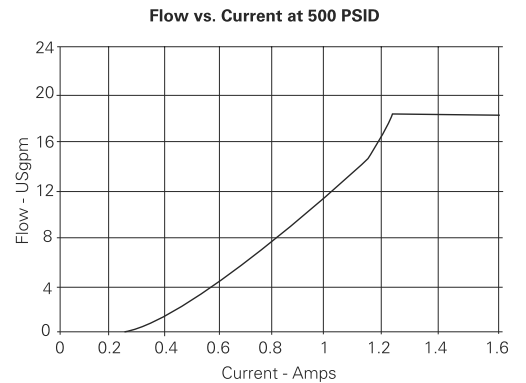
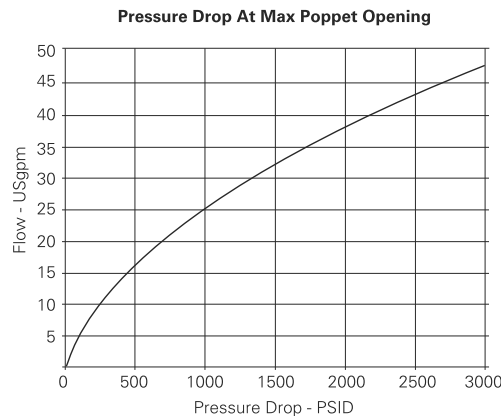
Typical application pressure	210 bar (3000 psi)
Cartridge endurance rating	1 million cycles
Cartridge fatigue pressure rating (NFPA/T2.6.1 R2-2000)	210 bar (3000 psi)
Rated flow	@ 500 psid, 18.5 gpm min, 19.4 gpm nom
Leakage (fully closed)	5 drops/min max @ 3000 psi
Nominal supply voltage	12/24 VDC
Current to open valve	900-1000 mA (12V coil), 450-500 mA (24V coil)
Temperature range	-30° to 90°C (-22° to 194°F)
Maximum oil temperature	120°C (248°F)
Maximum internal oil temperature	200°C (392°F)
Cavity	C-10-2
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum
Hysteresis	1 USgpm with dither
Weight cartridge only	.13 kg (.28 lbs)
Seal kit	0565803 (Buna-N), 0566086 (Viton®)

Viton is a registered trademark of E.I. DuPont

### Description

This is a 2 way 2 position, pilot operated poppet type, normally closed, proportional flow control screw in cartridge valve. Ideal for lowering circuits or in conjunction with pressure compensators to provide proportional flow control to any actuator.

### Pressure drop curves

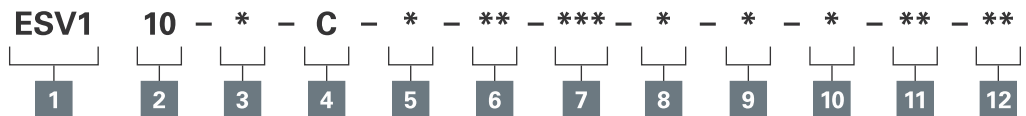


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ESV1-10-C - Proportional valve

Proportional flow control, normally closed, poppet  
Up to 70 L/min (18.5 USgpm) • 210 bar (3000 psi)

## Model code



**1 Function**  
ESV1 - Proportional flow control

**2 Size**  
10 - 10 size

**3 Seal material**  
Blank - Buna-N  
V - Viton

**4 Style**  
C - Normally closed

**5 Housing material**  
Blank - Cartridge only  
A - Aluminum

## 6 Port size

Code	Port size	Housing number
Aluminium		
0	Cartridge only	
3B	3/8" BSPP	02-175462
6T	SAE 6	566151
3G	3/8" BSPP	876703
6H	SAE 6	876700
8H	SAE 8	876701

See section J for housing details.

## 7 Coil voltage

0 - No coil  
12D - 12VDC  
24D - 24VDC

## 8 Type of power

Blank - No coil  
D - DC w/o diode  
B - DC w/o diode

## 9 Connector type

Blank - No coil  
G - ISO 4400 DIN 43650  
Q - Spade Terminals  
W - Flying Lead  
N - Deutsch (DC only)  
Y - Amp JR (DC only)  
P - Conduit

For coil part numbers and dimensions see section C.

## 10 Coil series

Blank - No coil  
J - J Series, 20 W

For coil part numbers and dimensions see section C.

## 11 Coil special features

Blank - No coil  
00 - No special feature

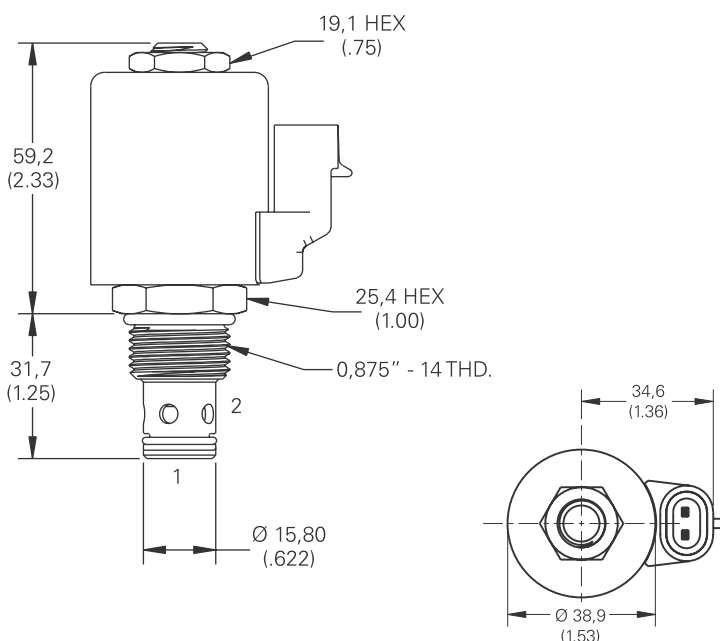
## 12 Valve special features

Blank - None

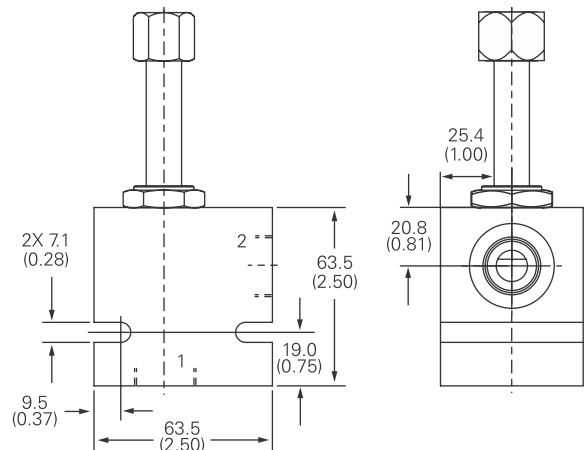
## Dimensions

mm (inch)

### Cartridge only



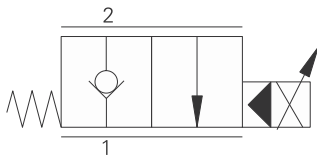
## Installation drawing



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

## ESV1-12-C - Proportional valve

Proportional flow control, normally closed, poppet  
Up to 104 L/min (27.3 USgpm) • 210 bar (3000 psi)



### Operation

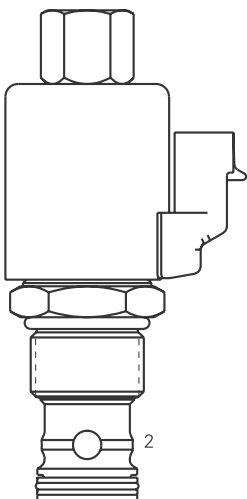
In the de-energized position, this valve blocks flow from port 2 to port 1 and free flow is allowed from port 1 to port 2.

In the energized position, flow from port 1 to port 2 is restricted while free flow is allowed from port 2 to port 1. The valve flow is proportional to the current applied to the coil.

### Features

Hardened and ground working parts to give long life and very low leakage. IP69K Tough coil compatibility, continuously rated. Compact design with low pressure drop.

### Profile view



### Performance data

#### Ratings and specifications

*Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)*

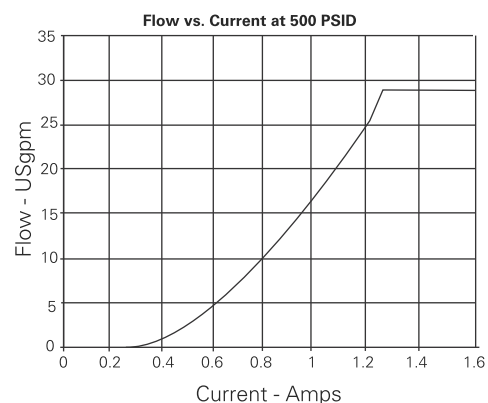
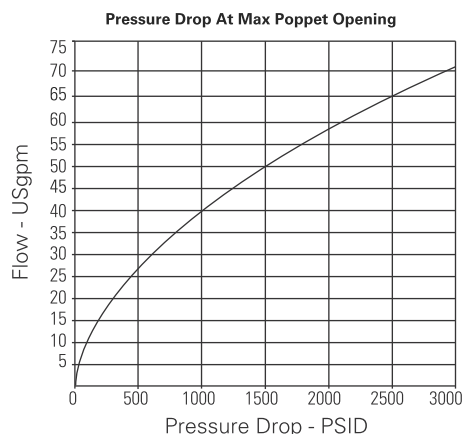
Typical application pressure	210 bar (3000 psi)
Cartridge endurance rating	1 million cycles
Cartridge fatigue pressure rating (NFPA/T2.6.1 R2-2000)	210 bar (3000 psi)
Rated flow	@ 500 psid, 27.3 gpm min, 28.9 gpm nom
Leakage (fully closed)	5 drops/min max @ 3000 psi
Nominal supply voltage	12/24 VDC
Current to open valve	800-900 mA (12V coil), 400-450 mA (24V coil)
Temperature range	-30° to 90°C (-22° to 194°F)
Maximum oil temperature	120°C (248°F)
Maximum internal oil temperature	200°C (392°F)
Cavity	C-12-2
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum
Hysteresis	1 USgpm with dither
Weight cartridge only	.23 kg (.48 lbs)
Seal kit	02-165889 (Buna-N), 02-165888 (Viton®)

Viton is a registered trademark of E.I. DuPont

### Description

This is a 2 way 2 position, pilot operated poppet type, normally closed, proportional flow control screw in cartridge valve. Ideal for lowering circuits or in conjunction with pressure compensators to provide proportional flow control to any actuator.

### Pressure drop curves

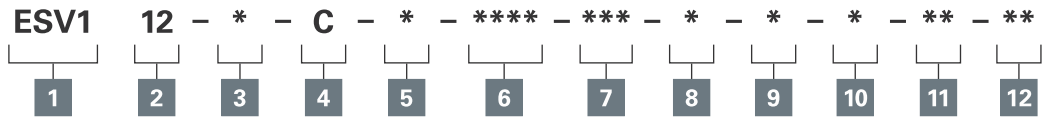


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ESV1-12-C - Proportional valve

Proportional flow control, normally closed, poppet  
Up to 104 L/min (27.3 USgpm) • 210 bar (3000 psi)

## Model code



### 1 Function

ESV1 - Proportional flow control

### 2 Size

12 - 12 size

### 3 Seal material

Blank - Buna-N  
V - Viton

### 4 Style

C - Normally closed

### 5 Housing material

Blank - Cartridge only  
A - Aluminum

### 6 Port size

Code	Port size	Housing number
Aluminium single		
3	Cartridge only	
4G	1/2" BSPP	02-161118
4GU	1/2" BSPP	02-161116
6G	3/4" BSPP	02-161117
6GU	3/4" BSPP	02-161115
10T	SAE 10	02-160640
10TU	SAE 10	02-160641
12T	SAE 12	02-160644
12TU	SAE 12	02-160645

See section J for housing details.

### 7 Coil voltage

0 - No coil  
12D - 12VDC  
24D - 24VDC

### 8 Type of power

Blank - No coil  
D - DC w/o diode  
B - DC w/o diode

### 9 Connector type

Blank - No coil  
G - ISO 4400 DIN 43650  
Q - Spade Terminals  
W - Flying Lead  
N - Deutsch (DC only)  
Y - Amp JR (DC only)  
P - Conduit

For coil part numbers and dimensions see section C.

### 10 Coil series

Blank - No coil  
J - J Series, 20 W

For coil part numbers and dimensions see section C.

### 11 Coil special features

Blank - No coil  
00 - No special feature

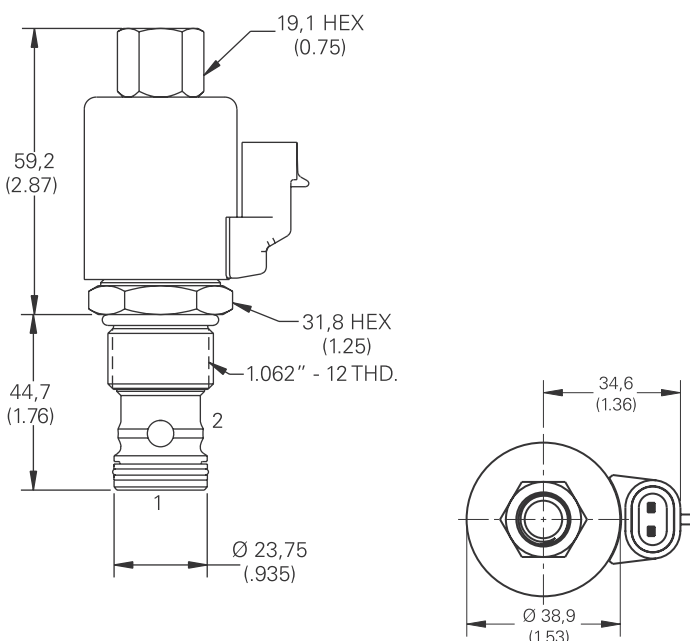
### 12 Valve special features

Blank - None

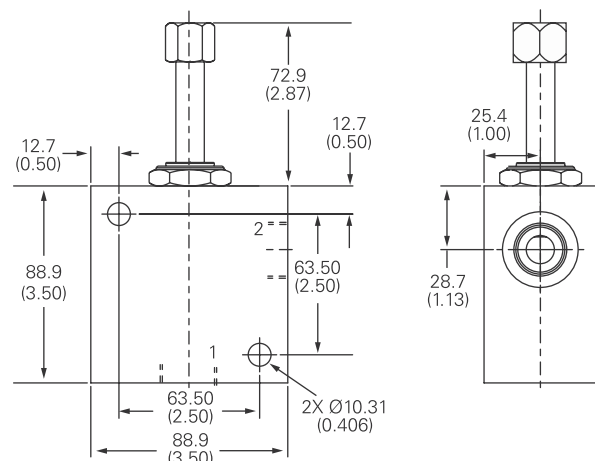
## Dimensions

mm (inch)

### Cartridge only



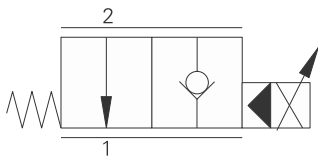
### Installation drawing



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

## ESV1-8-O - Proportional valve

Proportional flow control, normally open, poppet  
Up to 32 L/min (8.4 USgpm) • 210 bar (3000 psi)



### Operation

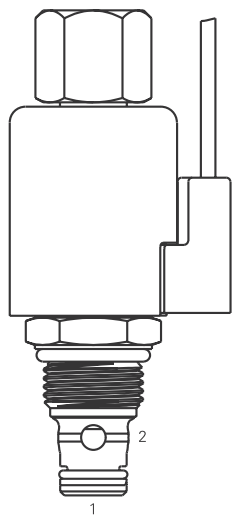
In the de-energized position, this valve allows free flow from port 2 to port 1 and restricts flow from port 1 to port 2.

In the energized position, flow is blocked from port 2 to port 1, and free flow is allowed from port 1 to port 2. The valve flow is proportional to the current applied to the coil.

### Features

Hardened and ground working parts to give long life and very low leakage. IP69K Tough coil compatibility, continuously rated. Compact design with low pressure drop.

### Profile view



### Performance data

#### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

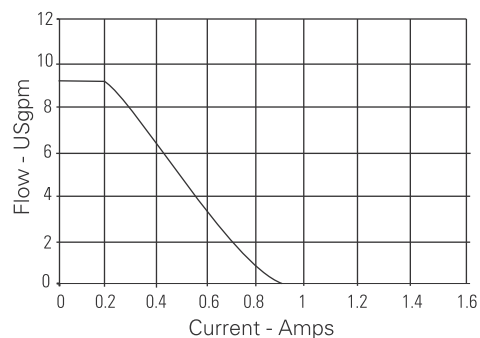
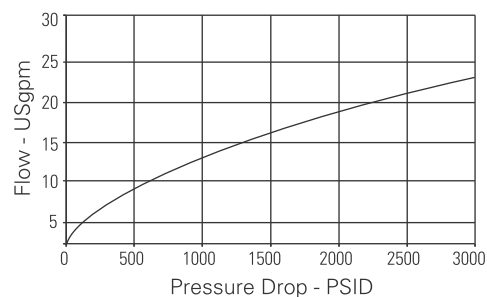
Typical application pressure (all ports)	210 bar (3000 psi)
Cartridge endurance rating	1 million cycles
Cartridge fatigue pressure rating (NFPA/T2.6.1 R2-2000)	210 bar (3000 psi)
Rated flow	@ 500 psid, 8.4 gpm min, 9.3 gpm nom
Leakage (fully closed)	5 drops/min, max @ 3000 psi
Nominal supply voltage	12/24 VDC
Current to fully close valve	1100-1250 mA (12V coil), 550-625 mA (24V coil)
Temperature range	-30° to 90°C (-22° to 194°F)
Maximum oil temperature	120°C (248°F)
Maximum internal oil temperature	200°C (392°F)
Cavity	C-8-2
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum
Hysteresis	1 USgpm with dither
Weight cartridge only	.10 kg (.23 lbs)
Seal kit	02-165875 (Buna-N), 02-165877 (Viton®)

Viton is a registered trademark of E.I. DuPont

### Description

This is a 2 way 2 position, pilot operated poppet type, normally open, proportional flow control screw in cartridge valve. Ideal for lowering circuits or in conjunction with pressure compensators to provide proportional flow control to any actuator.

### Pressure drop curves

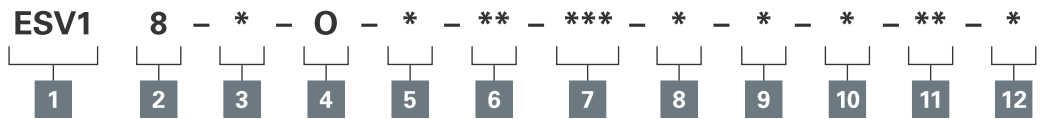


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ESV1-8-O - Proportional valve

Proportional flow control, normally open, poppet  
Up to 32 L/min (8.4 USgpm) • 210 bar (3000 psi)

## Model code



### 1 Function

**ESV1** - Proportional flow control

### 2 Size

**8** - 8 size

### 3 Seal material

**N** - Buna-N  
**V** - Viton

### 4 Style

**O** - Normally open

### 5 Housing material

**Blank** - Cartridge only  
**A** - Aluminum

### 6 Port size

Code	Port size	Housing number
Aluminium		
<b>0</b>	Cartridge only	
<b>3G</b>	3/8" BSPP	02-160728
<b>4T</b>	SAE 4	02-160730
<b>6T</b>	SAE 6	02-160731
<b>8T</b>	SAE 8	02-160732

See section J for housing details.

### 7 Coil voltage

**0** - No coil  
**12D** - 12VDC  
**24D** - 24VDC

### 8 Type of power

**Blank** - No coil  
**D** - DC w/o diode  
**B** - DC w/o diode

### 9 Connector type

**Blank** - No coil  
**G** - ISO 4400 DIN 43650  
**Q** - Spade Terminals  
**W** - Flying Lead  
**N** - Deutsch (DC only)  
**Y** - Amp JR (DC only)  
**P** - Conduit

For coil part numbers and dimensions see section C.

### 10 Coil series

**Blank** - No coil  
**S** - S Series, 20 W

For coil part numbers and dimensions see section C.

### 11 Coil special features

**Blank** - No coil  
**00** - No special feature

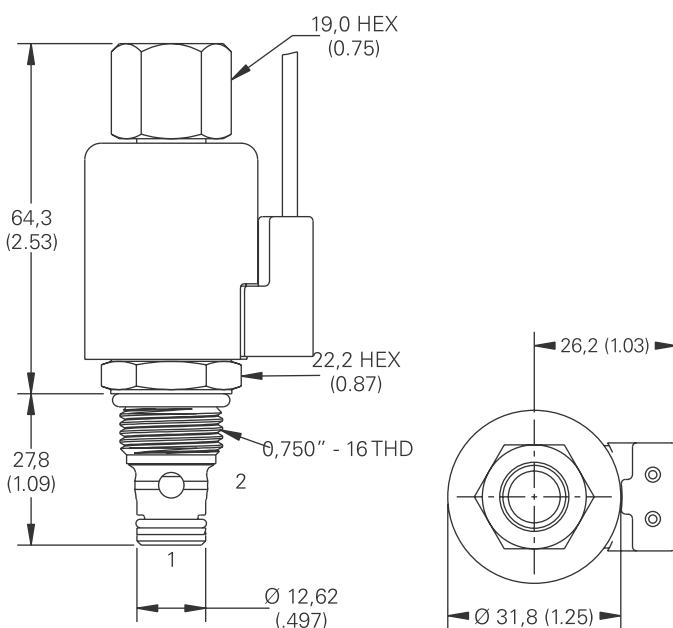
### 12 Valve special features

**Blank** - None

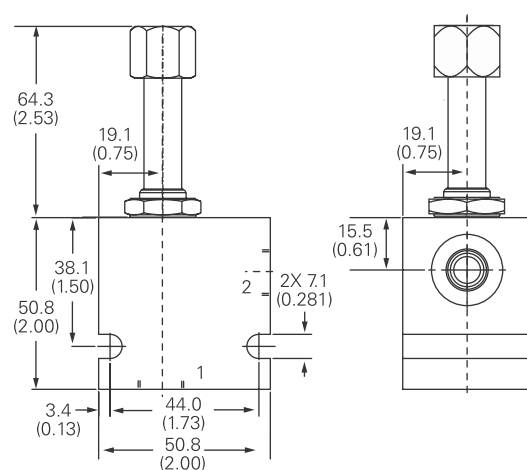
## Dimensions

mm (inch)

### Cartridge only



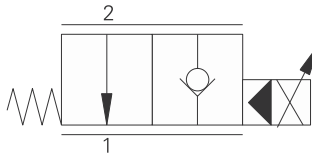
## Installation drawing



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ESV1-10-O - Proportional valve

Proportional flow control, normally open, poppet  
 Up to 70 L/min (18.5 USgpm) • 210 bar (3000 psi)



### Operation

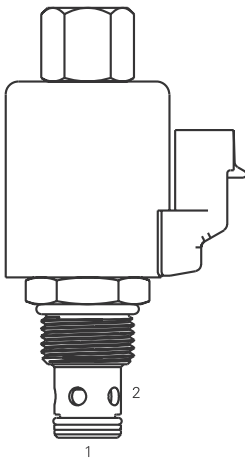
In the de-energized position, this valve allows free flow from port 2 to port 1 and restricts flow from port 1 to port 2.

In the energized position, flow is blocked from port 2 to port 1, and free flow is allowed from port 1 to port 2. The valve flow is proportional to the current applied to the coil.

### Features

Hardened and ground working parts to give long life and very low leakage. IP69K Tough coil compatibility, continuously rated. Compact design with low pressure drop.

### Profile view



### Performance data

#### Ratings and specifications

*Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)*

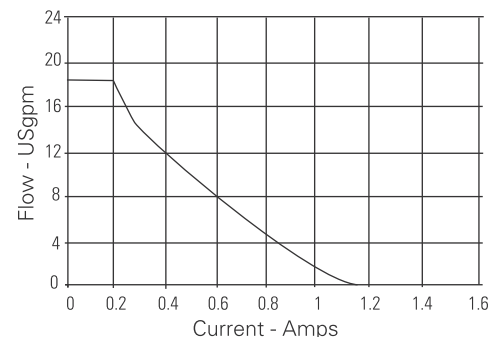
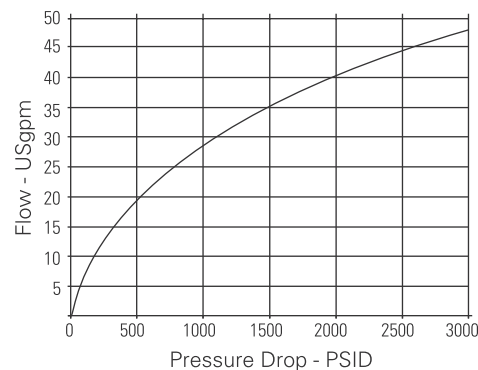
Typical application pressure	210 bar (3000 psi)
Cartridge endurance rating	1 million cycles
Cartridge fatigue pressure rating (NFPA/T2.6.1 R2-2000)	210 bar (3000 psi)
Rated flow	@ 500 psid, 18.5 gpm min, 19.4 gpm nom
Leakage (fully closed)	5 drops/min, max @ 3000 psi
Nominal supply voltage	12/24 VDC
Current to fully close valve	1000-1200 mA (12V coil), 500-600 mA (24V coil)
Temperature range	-30° to 90°C (-22° to 194°F)
Maximum oil temperature	120°C (248°F)
Maximum internal oil temperature	200°C (392°F)
Cavity	C-10-2
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum
Hysteresis	1 USgpm with dither
Weight cartridge only	.14 kg (.30 lbs)
Seal kit	0565803 (Buna-N), 02-165877 (Viton®)

Viton is a registered trademark of E.I. DuPont

### Description

This is a 2 way 2 position, pilot operated poppet type, normally open, proportional flow control screw in cartridge valve. Ideal for lowering circuits or in conjunction with pressure compensators to provide proportional flow control to any actuator.

### Pressure drop curves



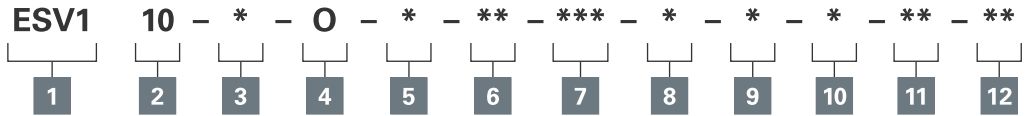
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.



# ESV1-10-O - Proportional valve

Proportional flow control, normally open, poppet  
Up to 70 L/min (18.5 USgpm) • 210 bar (3000 psi)

## Model code



**1 Function**  
ESV1 - Proportional flow control

**2 Size**  
10 - 10 size

**3 Seal material**  
N - Buna-N  
V - Viton

**4 Style**  
C - Normally closed

**5 Housing material**  
Blank - Cartridge only  
A - Aluminum

**6 Port size**

Code	Port size	Housing number
0	Cartridge only	
3G	3/8" BSPP	876703
6H	SAE 6	876700
8H	SAE 8	876701

See section J for housing details.

**7 Coil voltage**  
0 - No coil  
12 - 12VDC  
24 - 24VDC

**8 Type of power**  
Blank - No coil  
D - DC w/o diode  
B - DC w/o diode

**9 Connector type**  
Blank - No coil  
G - ISO 4400 DIN 43650  
Q - Spade Terminals  
W - Flying Lead  
N - Deutsch (DC only)  
Y - Amp JR (DC only)  
P - Conduit

For coil part numbers and dimensions see section C.

**10 Coil series**  
Blank - No coil  
J - J Series, 20 W  
For coil part numbers and dimensions see section C.

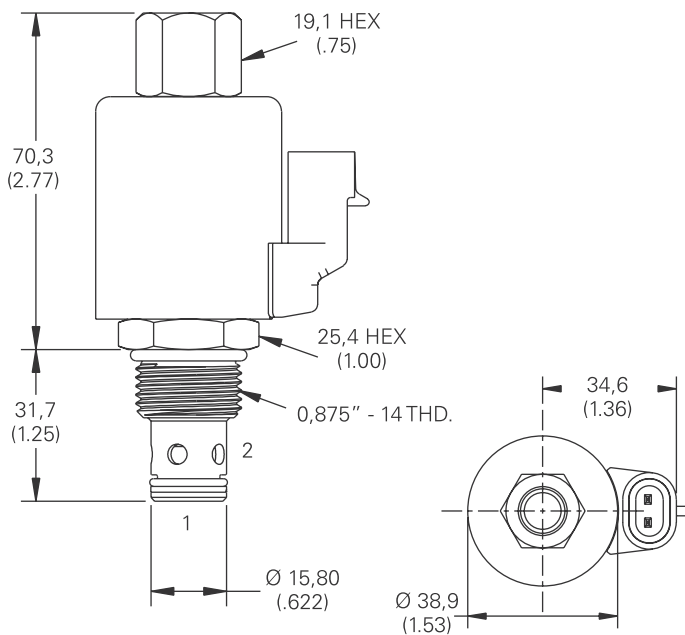
**11 Coil special features**  
Blank - No coil  
00 - No special feature

**12 Valve special features**  
Blank - None

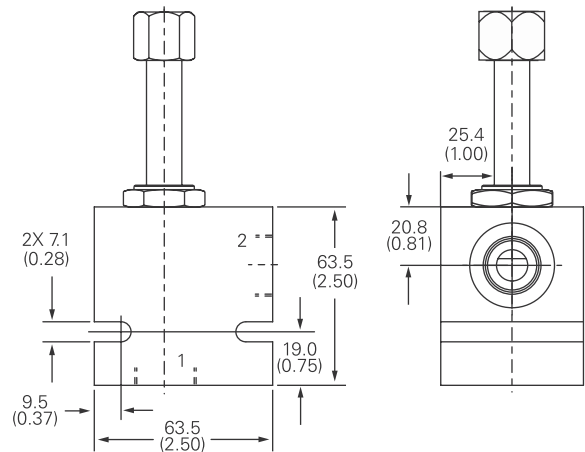
## Dimensions

mm (inch)

### Cartridge only



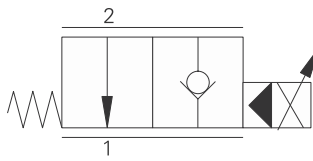
### Installation drawing



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ESV1-12-O - Proportional valve

Proportional flow control, normally open, poppet  
Up to 104 L/min (27.3 USgpm) • 210 bar (3000 psi)



## Operation

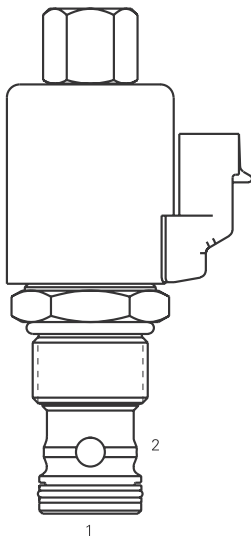
In the de-energized position, this valve allows free flow from port 2 to port 1 and restricts flow from port 1 to port 2.

In the energized position, flow is blocked from port 2 to port 1, and free flow is allowed from port 1 to port 2. The valve flow is proportional to the current applied to the coil.

## Features

Hardened and ground working parts to give long life and very low leakage. IP69K Tough coil compatibility, continuously rated. Compact design with low pressure drop.

## Profile view



## Performance data

### Ratings and specifications

Performance data is typical with fluid at 21.8 cST (105 SUS) and 49°C (120°F)

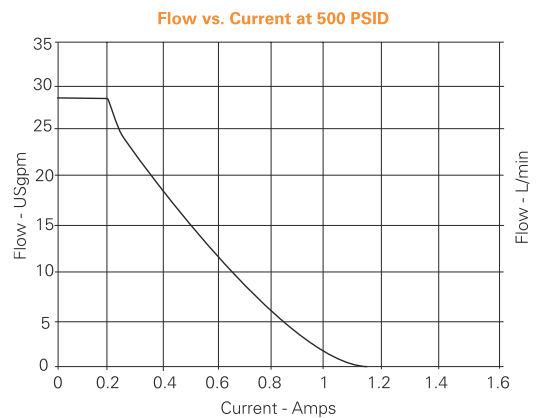
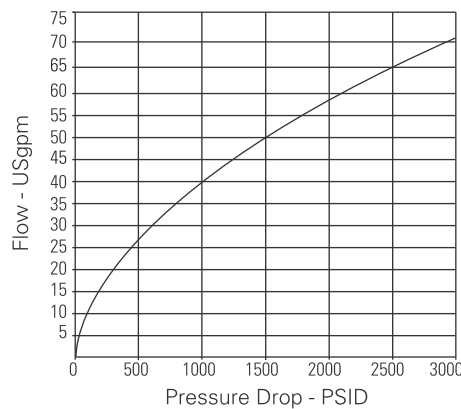
Typical application pressure	210 bar (3000 psi)
Cartridge endurance rating	1 million cycles
Cartridge fatigue pressure rating (NFPA/T2.6.1 R2-2000)	210 bar (3000 psi)
Rated flow	@ 500 psid, 27.3 gpm min, 28.9 gpm nom
Leakage (fully closed)	5 drops/min max @ 3000 psi
Nominal supply voltage	12/24 VDC
Current to fully close valve	800-900 mA (12V coil), 400-450 mA (24V coil)
Temperature range	-30° to 90°C (-22° to 194°F)
Maximum oil temperature	120°C (248°F)
Maximum internal oil temperature	200°C (392°F)
Cavity	C-12-2
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum
Hysteresis	1 USgpm with dither
Weight cartridge only	.10 kg (.23 lbs)
Seal kit	02-165889 (Buna-N), 02-165888 (Viton®)

Viton is a registered trademark of E.I. DuPont

## Description

This is a 2 way 2 position, pilot operated poppet type, normally open, proportional flow control screw in cartridge valve. Ideal for lowering circuits or in conjunction with pressure compensators to provide proportional flow control to any actuator.

## Pressure drop curves

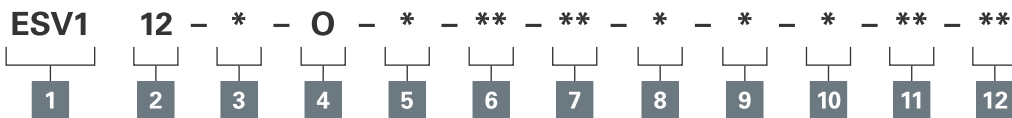


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ESV1-12-O - Proportional valve

Proportional flow control, normally open, poppet  
Up to 104 L/min (27.3 USgpm) • 210 bar (3000 psi)

## Model code



### 1 Function

ESV1 - Proportional flow control

### 2 Size

12 - 12 size

### 3 Seal material

Blank - Buna-N

V - Viton

### 4 Style

O - Normally open

### 5 Housing material

Blank - Cartridge only

A - Aluminum

### 6 Port size

Code	Port size	Housing number
Aluminium		
0	Cartridge only	
6G	3/4" BSPP	02-161117
6GU	3/4" BSPP	02-161115
10T	SAE 10	02-160640
10TU	SAE 10	02-160641
12T	SAE 12	02-160644
12TU	SAE 12	02-160645

See section J for housing details.

### 7 Coil voltage

0 - No coil

12 - 12VDC

24 - 24VDC

### 8 Type of power

Blank - No coil

D - 1DC w/o diode

B - DC w/o diode

### 9 Connector type

Blank - No coil

G - ISO 4400 DIN 43650

O - Spade Terminals

W - Flying Lead

N - Deutsch (DC only)

Y - Amp JR (DC only)

P - Conduit

For coil part numbers and dimensions see section C.

### 10 Coil series

Blank - No coil

J - J Series, 20 W

For coil part numbers and dimensions see section C.

### 11 Coil special features

Blank - No coil

00 - No special feature

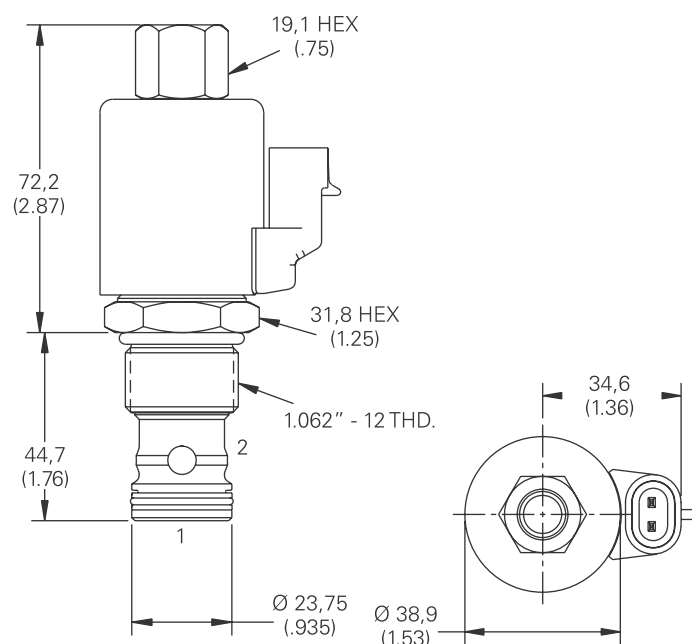
### 12 Valve special features

Blank - None

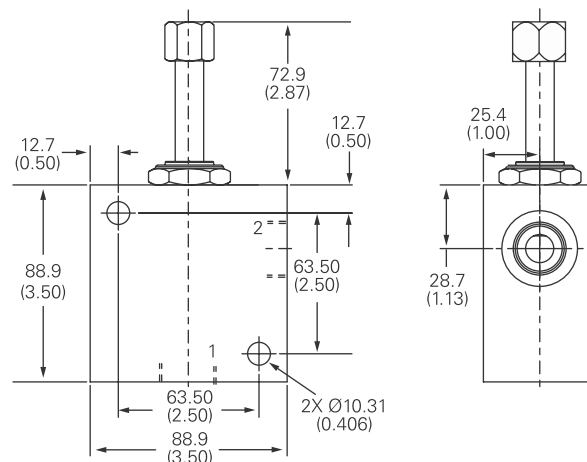
## Dimensions

mm (inch)

### Cartridge only



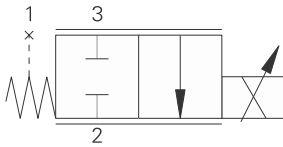
### Installation drawing



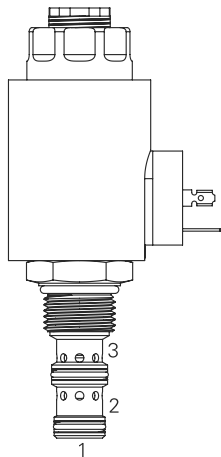
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

## EFV1-10-C - Proportional valve

Proportional flow, normally open, poppet  
Up to 38 L/min (10 USgpm) • 210 bar (3000 psi)



### Profile view



### Description

This is a 2 way 2 position, pilot operated spool type, normally closed, proportional flow control screw in cartridge valve. Ideal for speed control and in conjunction with pressure compensators to provide proportional pressure compensated flow control to any actuator.

### Operation

The valve is controlled by current supplied to the coil. At zero current, the valve is fully closed from port 3 to port 2. At 1500 mA (12V coil) the valve is considered fully open. This is the maximum intended current level for use in applications. Port 1 is used for pressure balancing the spool and armature and must be blocked in all cases. The maximum intended pressure drop is 300 PSID. At pressure drops above 300 PSID, almost no increase in flow is obtained. The intended flow direction is from port 3 to port 2.

Operation of the valve with flow from port 2 to port 3 will produce flow vs current and flow vs pressure drop curves that are significantly different from those obtained with flow from port 3 to port 2. Since the spool and armature are pressure balanced, the operating pressure does not affect the operating characteristics of the valve. The operating point of the valve is determined only by current, pressure drop and temperature.

### Features

Hardened and ground working parts to give long life with good control; Compact design with low pressure drop. IP69K Tough coil compatibility, continuously rated.

### Performance data

#### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

Typical application pressure	210 bar (3000 psi)
Cartridge endurance rating	1million cycles
Cartridge fatigue pressure (infinite life)	210 bar (3000 psi) NFPA rated
Rated flow	Flow rating "A" 15.1 L/min (4 USgpm) Flow rating "B" 30.2 L/min (8 USgpm) Flow rating "C" 37.9 L/min (10 USgpm)
Internal leakage	197 cm <sup>3</sup> /min (12in <sup>3</sup> /min) @ 3000 PSID
Nominal supply voltage	12/24 V
Current to fully close valve	1500-1600 mA (12V coil), 750-800 mA (24V coil)
Recommended PWM frequency	200-400 Hz
Coil resistance	4.7v V/12V, 19.0V/24V
Mass	Cartridge only 0,37 kg (0.82 lb), cartridge with coil and end nut 0,73 kg (1.62 lb)
Temperature range	-30° to 90°C (-22° to 194°F)
Maximum oil temperature	120°C (248°F)
Maximum internal coil temperature	200°C (392°F)
Cavity	C-10-3
Fluids	All general purpose hydraulics fluids such as: MIL-H-5606, SAE 10, SAE 20, DTE 24, etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum or steel
Hysteresis	1 USgpm with 400Hz PWM driver
Seal kit	9900225-000 (Buna-N), 9900226-000 (Viton®)

Viton is a registered trademark of E.I. DuPont

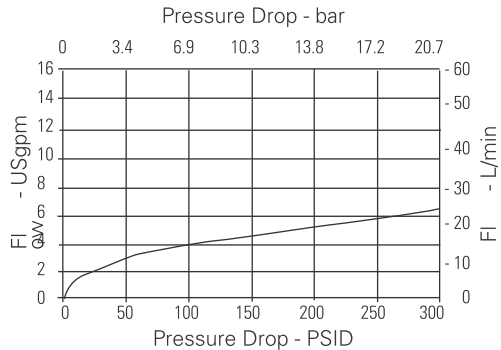
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

## EFV1-10-C - Proportional valve

Proportional flow, normally open, poppet  
Up to 38 L/min (10 USgpm) • 210 bar (3000 psi)

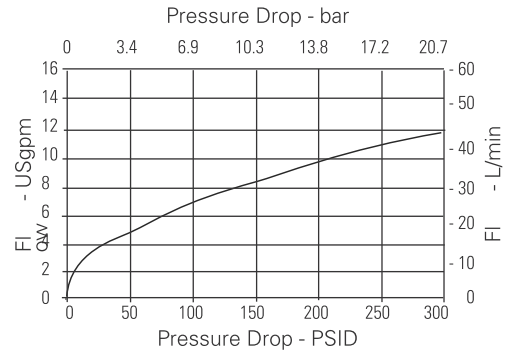
### Max Flow vs. Pressure drop

Flow rating "A" at zero current



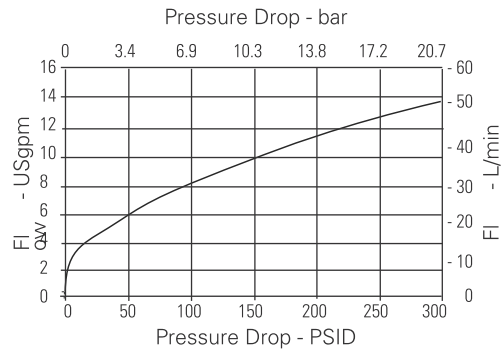
### Max Flow vs. Pressure drop

Flow rating "B" at zero current

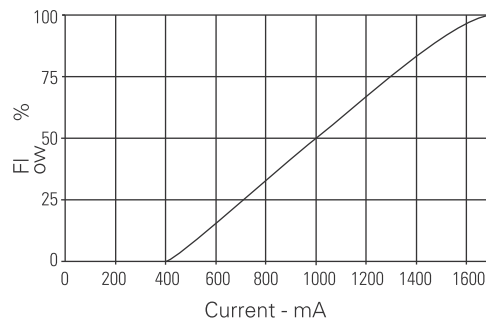


### Max Flow vs. Pressure drop

Flow rating "C" at zero current



### Flow vs. Current



**Note:** To determine operating characteristics for the flow rating selected, at a specific differential pressure, first determine maximum flow from upper curve at the differential pressure value. This will be the "100%" flow on the lower curve.

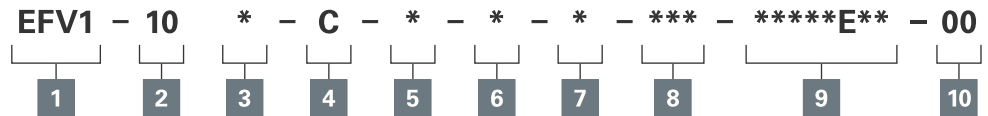
Parameters: 400 Hz PWM

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV1-10-C - Proportional valve

Proportional flow, normally open, poppet  
Up to 38 L/min (10 USgpm) • 210 bar (3000 psi)

## Model Code



**1 Function**  
EFV1 - Electro proportional flow control valve

**2 Size**  
10 - 10 size

**3 Seal material**  
N - Buna-N  
V - Viton®

**4 Logic**  
C - Normally closed

**5 Flow rating**  
A - 4 USgpm @ 160 PSID  
B - 8 USgpm @ 160 PSID  
C - 10 USgpm @ 160 PSID

**6 Manual override option**  
0 - No core tube special features  
S - Screw-in

### 8 Port size

Code	Port size	Housing number	
		Aluminium single	Steel single
0	Cartridge only		
3B	3/8" BSPP	02-173358*	
6T	SAE 6	566162*	02-175124
8T	SAE 8		02-175125
2G	1/4" BSPP	876705	02-175127
3G	3/8" BSPP	876714	02-175128
6H	SAE 6	876704	
8H	SAE 8	876711	

**Note:** Both the manifold and port plug are required.  
See section J for housing details.  
\*Aluminum – Light duty.

**7 Valve housing material**  
Blank - Cartridge only  
A - Aluminum  
S - Steel

**9 Coil series**  
E - E series coils  
\*These model digits will not be stamped on the valve.

For coil part numbers and dimensions see section C.

**10 Special features**  
00 - None  
Only required when valve has special features, omitted if "00".

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV1-10-C - Proportional valve

Proportional flow, normally open, poppet  
Up to 38 L/min (10 USgpm) • 210 bar (3000 psi)

## Dimensions

mm (inch)

Torque cartridge in housing

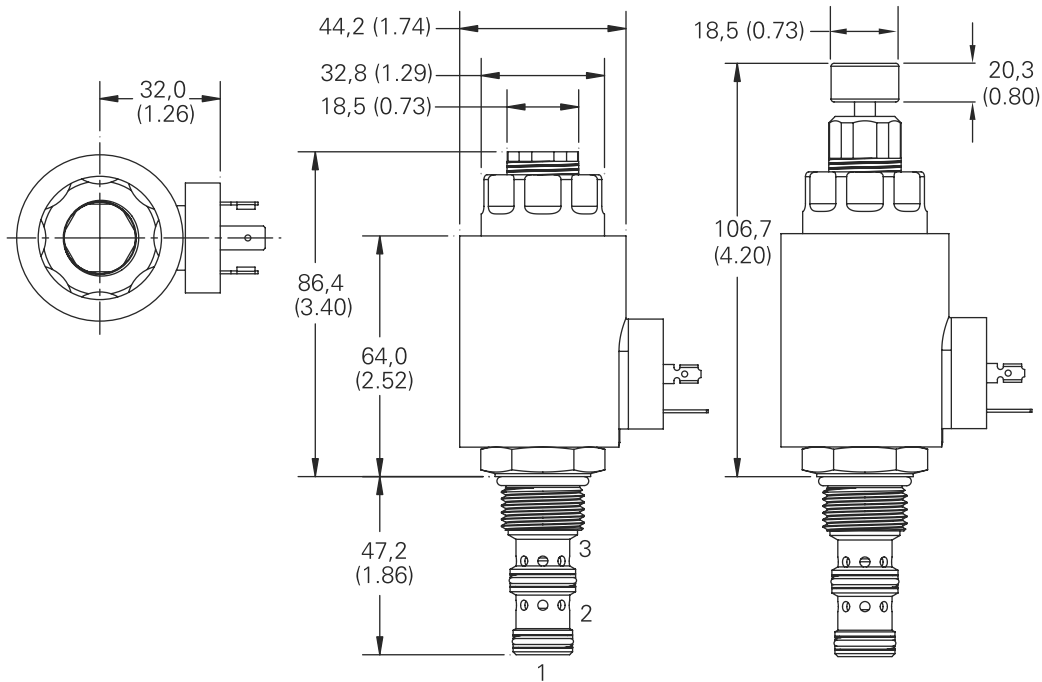
**S** - 68-75 Nm (50-55 ft lbs)

**A** - 47-54 Nm (35-40 ft lbs)

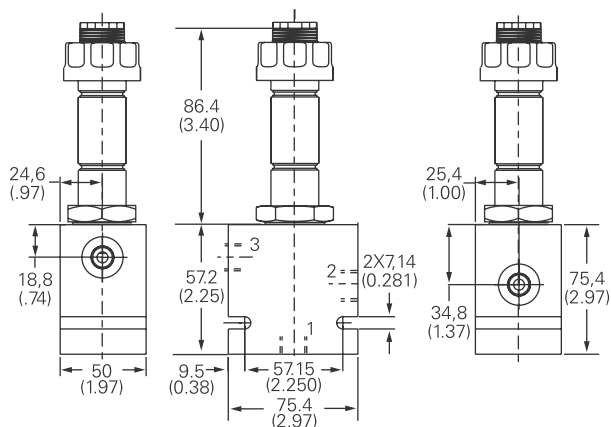
**Note:** S type manual override shown. DIN 43650 connector shown.

**Note:** Port 1 is unused and must be plugged.

## Cartridge only



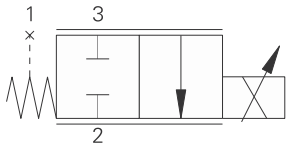
## Installation drawing (Aluminum)



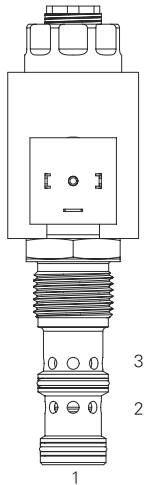
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV1-12-C - Proportional valve

Proportional flow, normally closed spool  
Up to 77 L/min (20.6 USgpm) • 210 bar (3000 psi)



### Profile view



### Description

This is a 2 way 2 position, pilot operated spool type, normally closed, proportional flow control screw in cartridge valve. Ideal for speed control and in conjunction with pressure compensators to provide proportional pressure compensated flow control to any actuator.

### Operation

The valve is controlled by current supplied to the coil. At zero current, the valve is fully closed from port 3 to port 2. At 1500 mA (12V coil) the valve is considered fully open. This is the maximum intended current level for use in applications. Port 1 is used for pressure balancing the spool and armature and must be blocked in all cases. The maximum intended pressure drop is 300 PSID. At pressure drops above 300 PSID, almost no increase in flow is obtained. The intended flow direction is from port 3 to port 2.

Operation of the valve with flow from port 2 to port 3 will produce flow vs current and flow vs pressure drop curves that are significantly different from those obtained with flow from port 3 to port 2. Since the spool and armature are pressure balanced, the operating pressure does not affect the operating characteristics of the valve. The operating point of the valve is determined only by current, pressure drop and temperature.

### Features

Hardened and ground working parts to give long life with good control; Compact design with low pressure drop. IP69K Tough coil compatibility, continuously rated.

### Performance data

#### Ratings and specifications

*Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)*

Typical application pressure	210 bar (3000 psi)
Cartridge endurance rating	1million cycles
Cartridge fatigue pressure (infinite life)	210 bar (3000 psi) NFPA rated
Rated flow	Flow rating "A" 55 L/min (14.3 USgpm) Flow rating "B" 77 L/min (20.6 USgpm)
Internal leakage (fully closed)	77-483 cm <sup>3</sup> /min (5-30 in <sup>3</sup> /min) @ 210 bar (3000 PSID)
Nominal supply voltage	12/24 V
Current to fully close valve	1500-1600 mA (12V coil), 750-800 mA (24V coil)
Recommended dither frequency	200-400 Hz
Coil resistance	4.7v V/12V, 19.0V/24V
Mass	Cartridge only 0,37 kg (0.82 lb), cartridge with coil and end nut 0,73 kg (1.62 lb)
Temperature range	-30° to 90°C (-22° to 194°F)
Maximum oil temperature	120°C (248°F)
Maximum internal coil temperature	200°C (392°F)
Cavity	C-12-3
Fluids	All general purpose hydraulics fluids such as: MIL-H-5606, SAE 10, SAE 20, DTE 24, etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum or steel
Hysterisis	1 USgpm with 400Hz PWM driver
Seal kit	9900171-000 (Buna-N), 9900172-000 (Viton®)

Viton is a registered trademark of E.I. DuPont

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

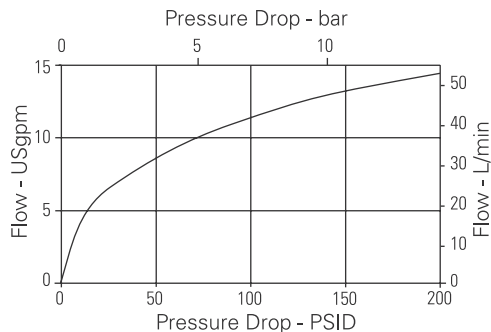


## EFV1-12-C - Proportional valve

Proportional flow, normally closed spool  
Up to 77 L/min (20.6 USgpm) • 210 bar (3000 psi)

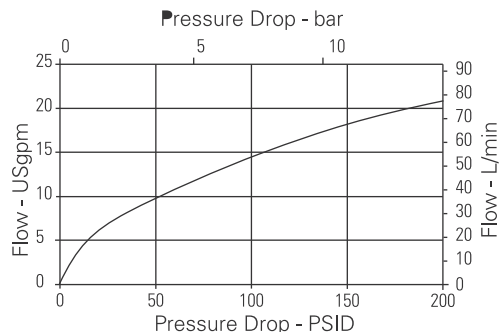
### Max flow vs. Pressure drop

Flow rating "A" at zero current

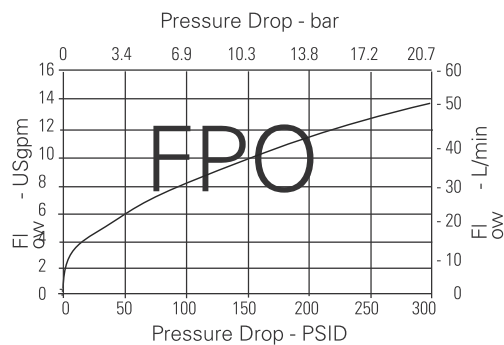


### Max flow vs. Pressure drop

Flow rating "B" at zero current



### Flow vs. Current



**Note:** To determine operating characteristics for the flow rating selected, at a specific differential pressure, first determine maximum flow from upper curve at the differential pressure value. This will be the "100%" flow on the lower curve.

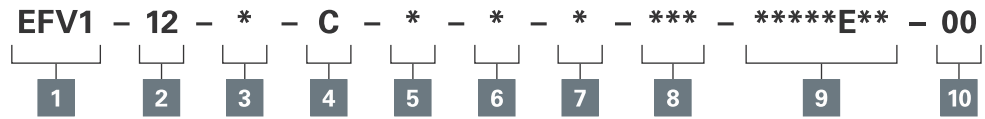
Parameters: 400 Hz PWM

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV1-12-C - Proportional valve

Proportional flow, normally closed spool  
Up to 77 L/min (20.6 USgpm) • 210 bar (3000 psi)

## Model code



**1 Function**  
EFV1 - Electro proportional flow control valve

**2 Size**  
12 - 12 size

**3 Seal material**  
N - Buna-N  
V - Viton®

**4 Logic**  
C - Normally closed

**5 Flow rating**  
A - 14.3 USgpm @ 300 PSID  
B - 20.6 USgpm @ 300 PSID

**6 Manual override option**  
0 - No core tube special features  
S - Screw-in

### 8 Port size

Code	Port size	Housing number	
		Aluminium single	Steel single
0	Cartridge only		
4G	1/2" BSPP	02-161817	02-169815
6G	3/4" BSPP	02-161816	02-169814
10T	SAE 10	02-160642	02-161070
12T	SAE 12	02-160646	02-169816

**Note:** Both the manifold and port plug are required. See section J for housing details.

**7 Valve housing material**  
Blank - Cartridge only  
A - Aluminum  
S - Steel

**9 Coil series**  
E - E series coils  
\*These model digits will not be stamped on the valve. For coil part numbers and dimensions see section C.

**10 Special features**  
00 - None  
Only required when valve has special features, omitted if "00".

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV1-12-C - Proportional valve

Proportional flow, normally closed spool  
Up to 77 L/min (20.6 USgpm) • 210 bar (3000 psi)

## Dimensions

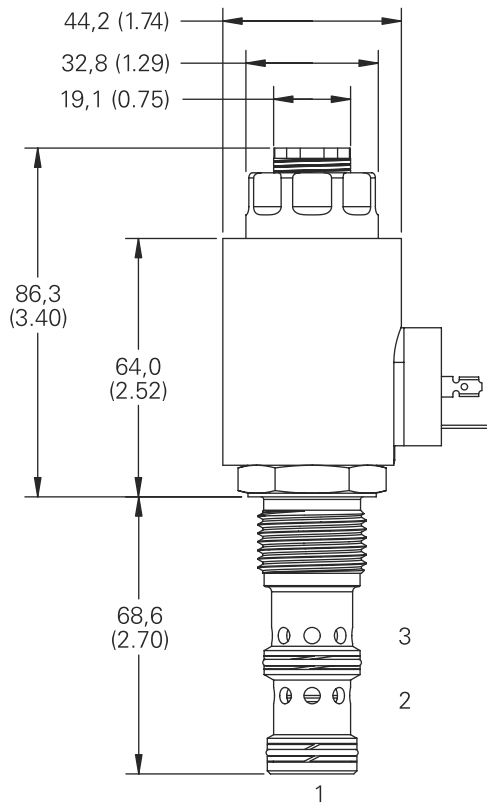
mm (inch)

Torque cartridge in steel housing  
**S** - 136-149 Nm (100-110 ft lbs)  
**A** - 108-122 Nm (80-90 ft lbs)

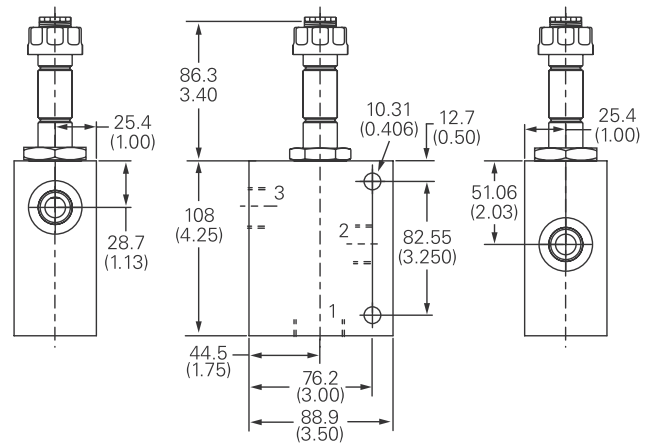
**Note:** Port 1 is unused and must be plugged.

**Note:** EFV1-12 with DIN-43650 connector shown.

## Cartridge only



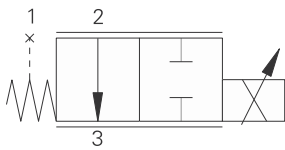
## Installation drawing (Aluminum)



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV1-10-O - Proportional valve

Proportional flow, normally open, poppet  
Up to 38 L/min (10 USgpm) • 210 bar (3000 psi)



## Operation

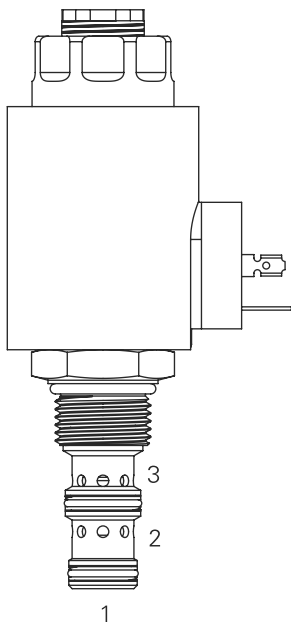
The valve is controlled by current supplied to the coil. At zero current, the valve is fully open from port 2 to port 3. At 1500 to 1600 mA (12V coil) the valve is fully closed. Port 1 is used for pressure balancing the spool and armature and must be blocked in all cases. The maximum intended pressure drop is 300 PSID. At pressure drops above 300 PSID, almost no increase in flow is obtained. The intended flow direction is from port 2 to port 3.

Operation of the valve with flow from port 3 to port 2 will produce flow vs current and flow vs pressure drop curves that are significantly different from those obtained with flow from port 2 to port 3. Since the spool and armature are pressure balanced, the operating pressure does not affect the operating characteristics of the valve. The operating point of the valve is determined only by current, pressure drop and temperature.

## Features

Hardened and ground working parts to give long life with good control; Compact design with low pressure drop. IP69K Tough coil compatibility, continuously rated.

## Profile view



## Performance data

### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

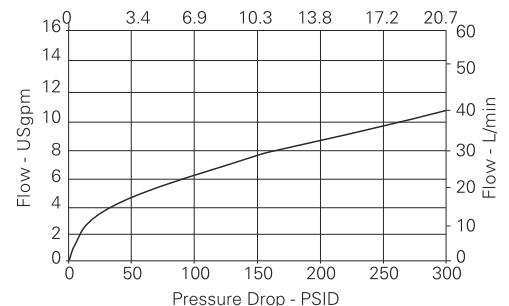
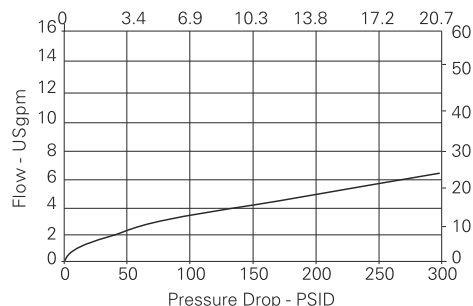
Typical application pressure	210 bar (3000 psi)
Cartridge endurance rating	1million cycles
Cartridge fatigue pressure (infinite life)	210 bar (3000 psi) NFPA rated
Rated flow	Flow rating "A" 15.1 L/min (4 USgpm) Flow rating "B" 30.2 L/min (8 USgpm) Flow rating "C" 37.9 L/min (10 USgpm)
Internal leakage	197 cm <sup>3</sup> /min (12in <sup>3</sup> /min) @ 210 (3000 PSID)
Nominal supply voltage	12/24 V
Current to fully close valve	1500-1600 mA (12V coil), 750-800 mA (24V coil)
Recommended PWM frequency	200-400 Hz
Coil resistance	4.7v V/12V, 19.0V/24V
Mass	Cartridge only 0,37 kg (0.82 lb), cartridge with coil and end nut 0,73 kg (1.62 lb)
Temperature range	-30° to 90°C (-22° to 194°F)
Maximum oil temperature	120°C (248°F)
Maximum internal coil temperature	200°C (392°F)
Cavity	C-10-3
Fluids	All general purpose hydraulics fluids such as: MIL-H-5606, SAE 10, SAE 20, DTE 24, etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum or steel
Hysteresis	1 USgpm with 400Hz PWM driver
Seal kit	9900225-000 (Buna-N), 9900226-000 (Viton®)

Viton is a registered trademark of E.I. DuPont

## Description

This is a 2 way 2 position, pilot operated spool type, normally open, proportional flow control screw in cartridge valve. Ideal for speed control and in conjunction with pressure compensators to provide proportional pressure compensated flow control to any actuator.

## Pressure drop curves



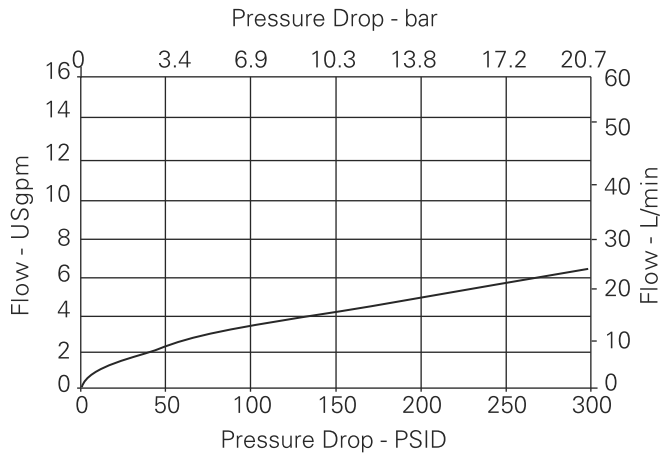
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV1-10-O - Proportional Valve

Up to 38 L/min (10 USgpm) • 210 bar (3000 psi)  
Performance Curves

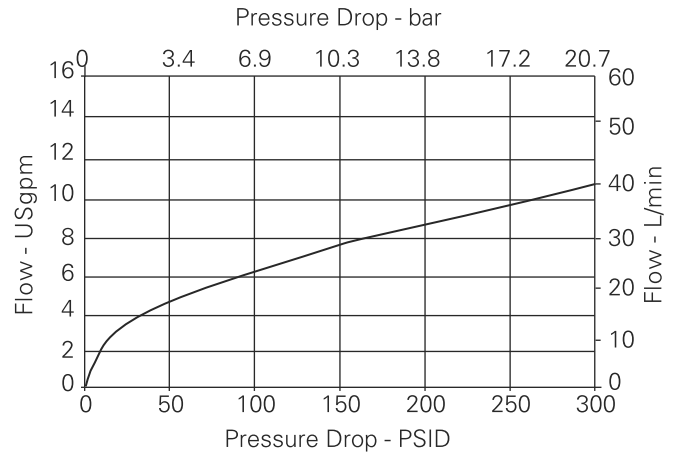
## Max. flow vs Pressure drop

Flow rating "A" (Valve fully open)



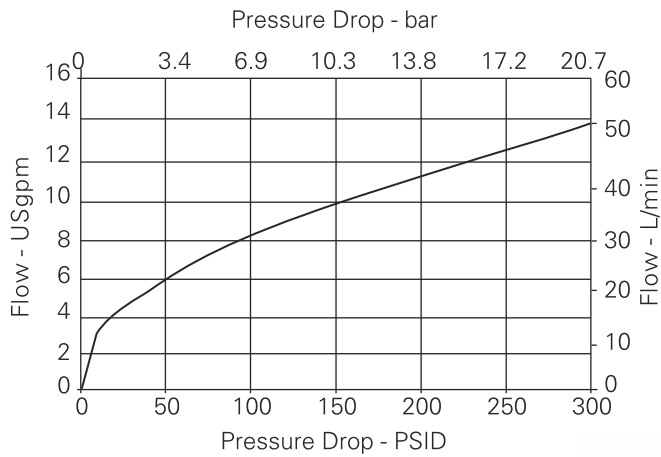
## Max. flow vs Pressure drop

Flow rating "B" (Valve fully open)

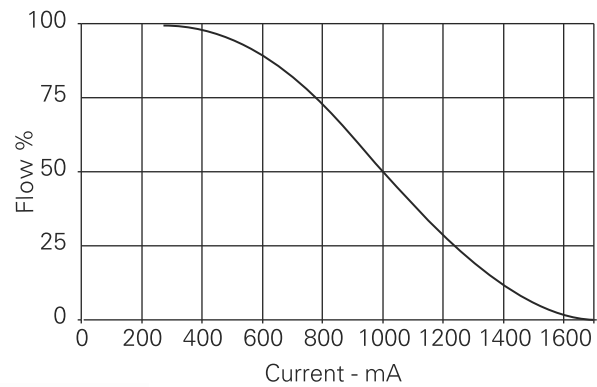


## Max. flow vs Pressure drop

Flow rating "C" (Valve fully open)



## Flow vs. Current



**Note:** To determine operating characteristics for the flow rating selected, at a specific differential pressure, first determine maximum flow from upper curve at the differential pressure value. This will be the "100% flow" flow on the lower curve.

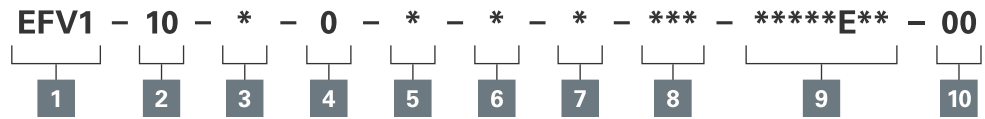
Parameters: 400 Hz PWM

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV1-10-O - Proportional valve

Proportional flow, normally open, poppet  
Up to 38 L/min (10 USgpm) • 210 bar (3000 psi)

## Model code



**1 Function**  
EFV1 - Electro proportional flow control valve

**2 Size**  
10 - 10 size

**3 Seal material**  
N - Buna-N  
V - Viton®

**4 Logic**  
0 - Normally open

**5 Flow rating**  
A - 4 USgpm @ 160 PSID  
B - 8 USgpm @ 160 PSID  
C - 10 USgpm @ 160 PSID

**6 Manual override option**  
0 - No core tube special features  
S - Screw-in

**8 Port size**

Code	Port size	Housing number	
		Aluminium single	Steel single
0	Cartridge only		
3B	3/8" BSPP	02-173358*	
6T	SAE 6	566162*	02-175124
8T	SAE 8		02-175125
3G	3/8" BSPP	876714	02-175128
6H	SAE 6	876704	
8H	SAE 8	876711	

**Note:** Both the manifold and port plug are required. See section J for housing details.  
\*Aluminum – Light duty.

**7 Valve housing material**  
Blank - Cartridge only  
A - Aluminum  
S - Steel

**9 Coil series**  
E - E series coils  
\*These model digits will not be stamped on the valve.  
For coil part numbers and dimensions see section C.

**10 Special features**  
00 - None  
Only required when valve has special features, omitted if "00".

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV1-10-O - Proportional valve

Proportional flow, normally open, poppet  
Up to 38 L/min (10 USgpm) • 210 bar (3000 psi)

## Dimensions

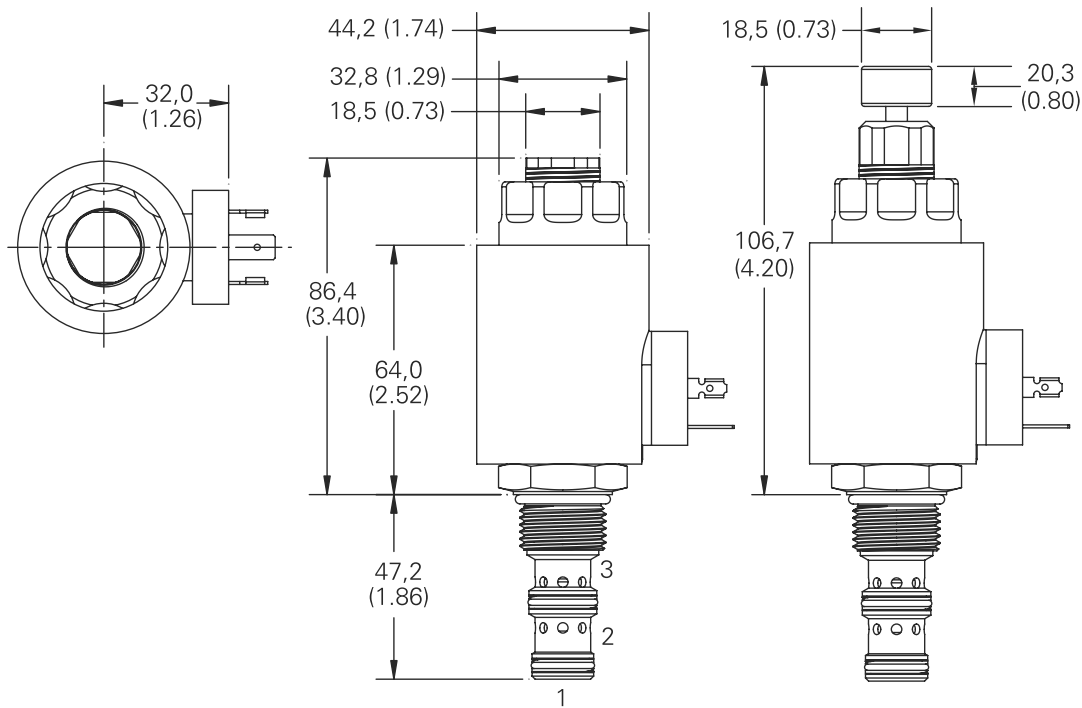
mm (inch)

Torque cartridge in housing  
**S** - 68-75 Nm (50-55 ft lbs)  
**A** - 47-54 Nm (35-40 ft lbs)

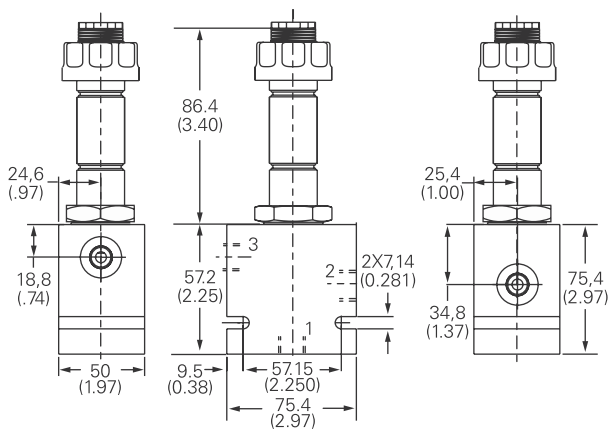
**Note:** S type manual override shown. DIN 43650 connector shown.

**Note:** Port 1 is unused and must be plugged.

## Cartridge only



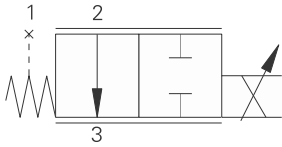
## Installation drawing (Aluminum)



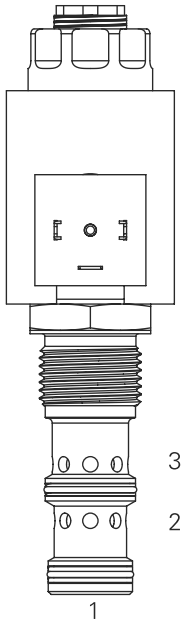
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

## EFV1-12-O - Proportional valve

Proportional flow, normally open spool  
Up to 104 L/min (27.5 USgpm) • 210 bar (3000 psi)



### Profile view



### Description

This is a 2 way 2 position, pilot operated spool type, normally open, proportional flow control screw in cartridge valve. Ideal for speed control and in conjunction with pressure compensators to provide proportional pressure compensated flow control to any actuator.

### Operation

The valve is controlled by current supplied to the coil. At zero current, the valve is fully open from port 2 to port 3. At 1500 to 1600 mA (12V coil) the valve is fully closed. Port 1 is used for pressure balancing the spool and armature and must be blocked in all cases. The maximum intended pressure drop is 300 PSID. At pressure drops above 300 PSID, almost no increase in flow is obtained. The intended flow direction is from port 2 to port 3.

Operation of the valve with flow from port 3 to port 2 will produce flow vs current and flow vs pressure drop curves that are significantly different from those obtained with flow from port 2 to port 3. Since the spool and armature are pressure balanced, the operating pressure does not affect the operating characteristics of the valve. The operating point of the valve is determined only by current, pressure drop and temperature.

### Features

Hardened and ground working parts to give long life with good control; Compact design with low pressure drop. IP69K Tough coil compatibility, continuously rated.

### Performance data

#### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

Typical application pressure	210 bar (3000 psi)
Cartridge endurance rating	1million cycles
Cartridge fatigue pressure (infinite life)	210 bar (3000 psi) NFPA rated
Rated flow	Flow rating "A" 95 L/min (25 USgpm) Flow rating "B" 104 L/min (27.5 USgpm)
Internal leakage (fully closed)	77-483 cm <sup>3</sup> /min (5-30 in <sup>3</sup> /min) @ 210 bar (3000 PSID)
Nominal supply voltage	12/24 V
Current to fully close valve	1500-1600 mA (12V coil), 750-800 mA (24V coil)
Recommended PWM frequency	200-400 Hz
Coil resistance	4.7v V/12V, 19.0 V/24V
Mass	Cartridge only 0,37 kg (0.82 lb), cartridge with coil and end nut 0,73 kg (1.62 lb)
Temperature range	-30° to 90°C (-22° to 194°F)
Maximum oil temperature	120°C (248°F)
Maximum internal coil temperature	200°C (392°F)
Cavity	C-12-3
Fluids	All general purpose hydraulics fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum or steel
Hysteresis	1 USgpm with 400Hz PWM driver
Seal kit	9900171-000 (Buna-N), 9900172-000 (Viton®)

Viton is a registered trademark of E.I. DuPont

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

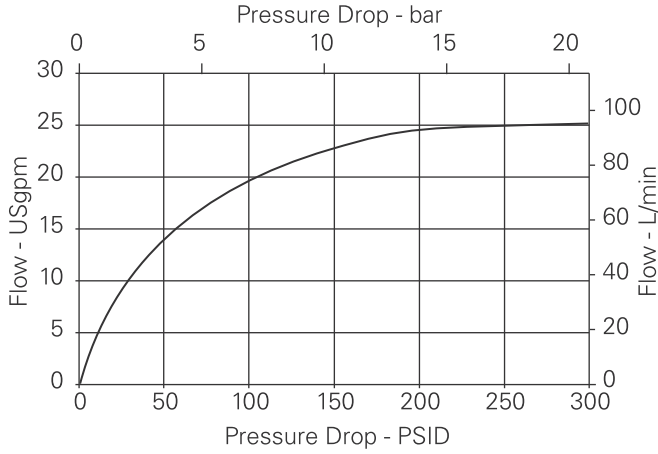


# EFV1-12-O - Proportional valve

Up to 104 L/min (275 USgpm) • 210 bar (3000 psi)  
Performance Curves

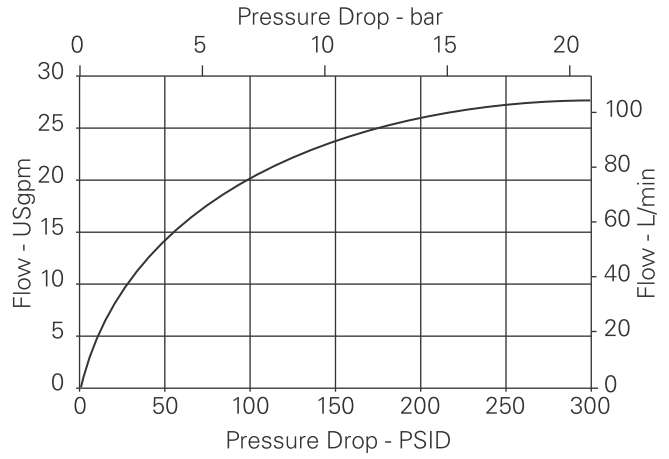
## Max. flow vs Pressure drop

Flow rating "A" (Zero Current)

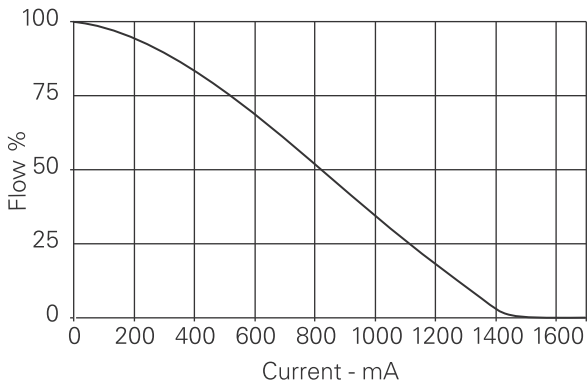


## Max. flow vs Pressure drop

Flow rating "B" (Zero Current)



## Flow vs Current



**Note:** To determine operating characteristics for the flow rating selected, at a specific differential pressure, first determine maximum flow from upper curve at the differential pressure value. This will be the "100%" flow on the lower curve.

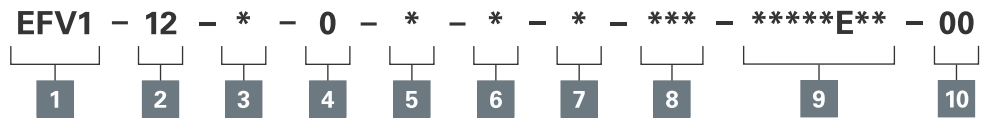
Parameters: 400 Hz PWM

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV1-12-O - Proportional valve

Proportional flow, normally open spool  
Up to 104 L/min (27.5 USgpm) • 210 bar (3000 psi)

## Model code



**1 Function**  
EFV1 - Electro proportional flow control valve

**2 Size**  
12 - 12 size

**3 Seal material**  
N - Buna-N  
V - Viton®

**4 Logic**  
0 - Normally open

**5 Flow rating**  
A - 25.0 USgpm @ 300 PSID  
B - 27.5 USgpm @ 300 PSID

**6 Manual override option**  
0 - No core tube special features  
S - Screw-in

**8 Port size**

Code	Port size	Housing number	
		Aluminium single	Steel single
0	Cartridge only		
4G	1/2" BSPP	02-161817	02-169815
6G	3/4" BSPP	02-161816	02-169814
10T	SAE 10	02-160642	02-161070
12T	SAE 12	02-160646	02-169816

**Note:** Both the manifold and port plug are required. See section J for housing details.

**7 Valve housing material**  
Blank - Cartridge only  
A - Aluminum  
S - Steel

**9 Coil series**  
E - E series coils  
\*These model digits will not be stamped on the valve.  
For coil part numbers and dimensions see section C.

**10 Special features**  
00 - None  
Only required when valve has special features, omitted if "00".

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV1-12-O - Proportional Valve

Proportional flow, normally open spool  
Up to 104 L/min (275 USgpm) • 210 bar (3000 psi)

## Dimensions

mm (inch)

Torque cartridge in housing

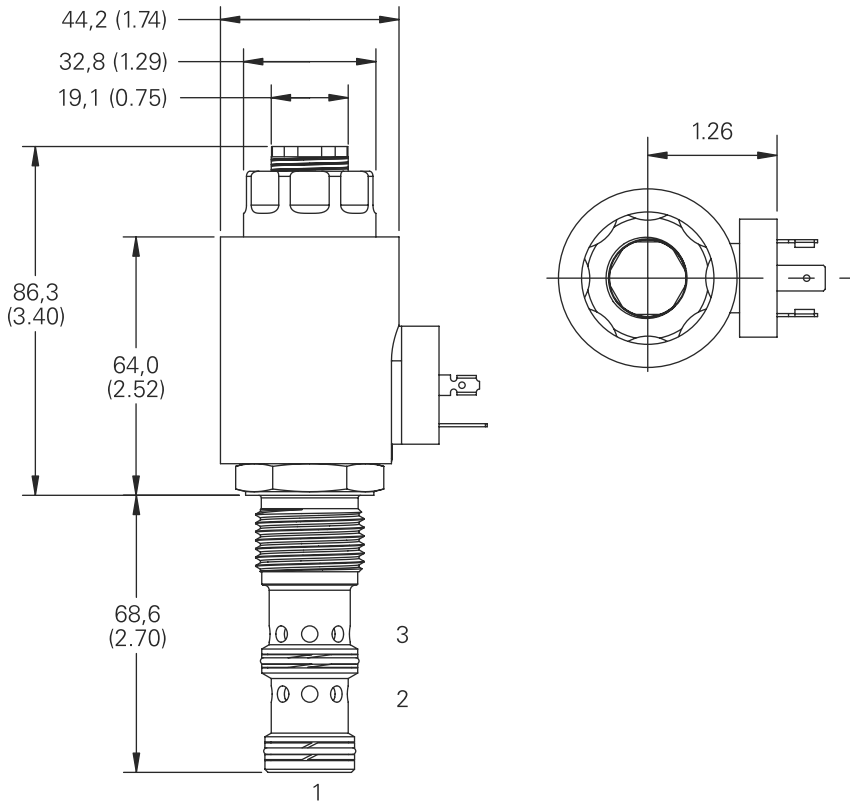
**S** - 136-149 Nm (100-110 ft lbs)

**A** - 108-122 Nm (80-90 ft lbs)

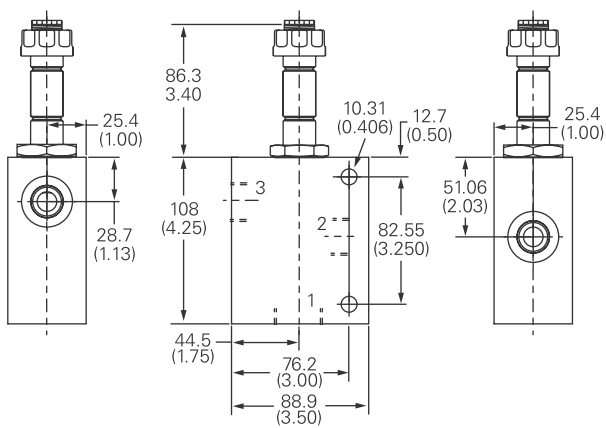
**Note:** Port 1 is unused and must be plugged.

**Note:** EFV1-12 with DIN-43650 connector shown.

## Cartridge only



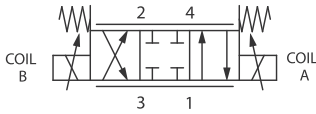
## Installation drawing (Aluminum)



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ESV9-8-E - Proportional solenoid valve

4-way, 3-position, screw-in cartridge, proportional solenoid valve  
 Up to 11 L/min (2.9 USgpm) • Up to 250 bar (3600 psi)



## Operation

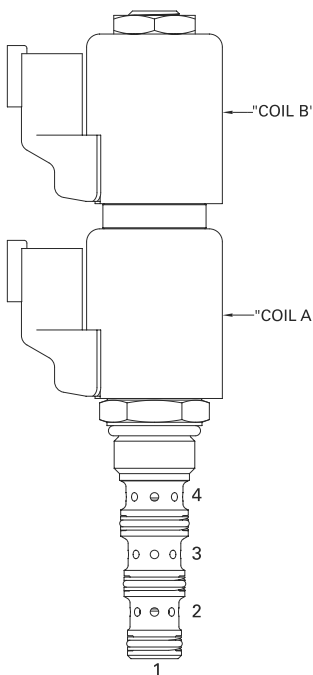
In the de-energized (center) position, all ports are blocked. When solenoid A is energized, flow is directed from port 3 to port 2 and from port 4 to port 1. Port 1 is not intended to be used as an inlet.

When solenoid B is energized, flow is directed from port 3 to port 4 and from port 2 to port 1. Port 1 is not intended to be used as an inlet.

## Features

- Highly engineered components
- Compact design with low pressure drop
- Designed for optimized linearity and hysteresis
- IP69K ToughCoils™ compatible
- Optional manual override
- Industry standard cavity tool

## Profile view



## Performance data

### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

Typical application pressure	
Operating Pressure Port 1 (T)	210 bar (3,000 psi)
Operating Pressure Port 2,3 and 4 (A, P and B)	250 bar (3,600 psi)
Cartridge fatigue pressure (infinite life)	
Port 1 (T)	210 bar (3,000 psi)
Port 2,3 and 4 (A, P and B)	250 bar (3,600 psi)
Rated burst pressure	750 bar (10,600 psi) per NFPA/T2-6-1 R2-2000
Rated flow	11.0 L/min (2.9 USgpm)
Temperature range	-40° to 120°C (-40° to 248°F)
Coil power	23 W*
Maximum hysteresis	7.0%
Step response	70 ms to 90% flow
Cavity	C-8-4
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20 etc.
Filtration	Cleanliness code 18/16/13
Standard housing material	Steel
Weight including coils	0.5 kg (1.1 lbs)
Seal kit	02-160757 (Buna-N), 02-160758 (Viton®)
Internal leakage	165 cm³/min (10 in³/min) max. @ 210 bar (3000 psi)

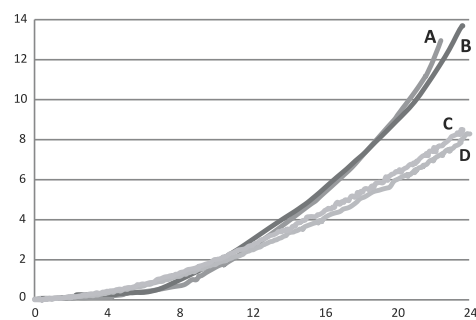
Viton is a registered trademark of E.I. DuPont.

\*AC coils must be used with a rectifying connector.

## Description

The ESV9 with E spool is a proportional four-way, three-position, direct acting, spool type solenoid valve with all ports closed in the de-energized position. This valve is ideal for moderate flow applications where an actuator needs to be controlled proportionally in both directions and stopped in any position.

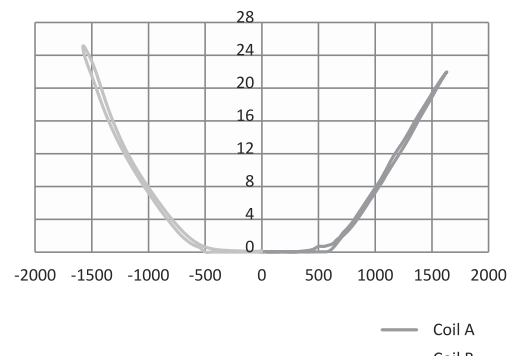
## Pressure drop



**A** - Port 3 to port 2  
**B** - Port 3 to port 4

**C** - Port 4 to port 1  
**D** - Port 2 to port 1

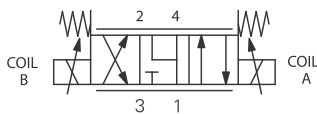
## Flow vs. Current at 10 bar ΔP



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ESV9-8-F - Proportional solenoid valve

4-way, 3-position, screw-in cartridge, proportional solenoid valve  
Up to 11 L/min (2.9 USgpm) • Up to 250 bar (3600 psi)



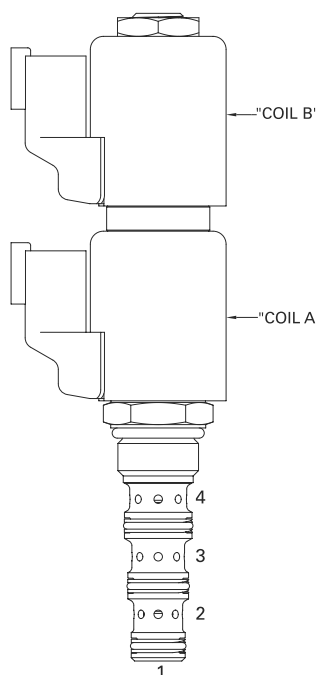
## Operation

In the de-energized (center) position, port 1, port 2, and port 4 are open to each other while port 3 is blocked. When solenoid A is energized, flow is directed from port 3 to port 2 and from port 4 to port 1. When solenoid B is energized, flow is directed from port 3 to port 4 and from port 2 to port 1.

## Features

- Highly engineered components
- Compact design with low pressure drop
- Designed for optimized linearity and hysteresis
- IP69K ToughCoils™ compatible
- Optional manual override
- Industry standard cavity tool.

## Profile view



## Performance data

### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

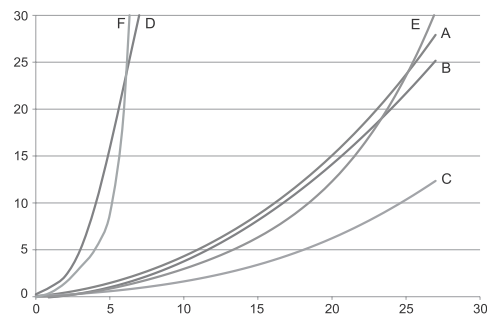
Typical application pressure	
Operating Pressure Port 1 (T)	210 bar (3,000 psi)
Operating Pressure Port 2,3 and 4 (A, P and B)	250 bar (3,600 psi)
Cartridge fatigue pressure (infinite life)	
Port 1 (T)	210 bar (3,000 psi)
Port 2,3 and 4 (A, P and B)	250 bar (3,600 psi)
Rated burst pressure	750 bar (10,600 psi) per NFPA/T2-6-1 R2-2000
Rated flow	11.0 L/min (2.9 USgpm)
Temperature range	-40° to 120°C (-40° to 248°F)
Coil power	23 W**
Maximum hysteresis	7.0%
Step response	70 ms to 90% flow
Cavity	C-8-4
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20 etc.
Filtration	Cleanliness code 18/16/13
Standard housing material	Steel
Weight including coils	1.1 kg (2.3 lbs)
Seal kit	02-160757 (Buna-N), 02-160758 (Viton®)
Internal leakage	250 cm³/min (15 in³/min) max. @ 210 bar (3000 psi)

Viton is a registered trademark of E.I. DuPont.

## Description

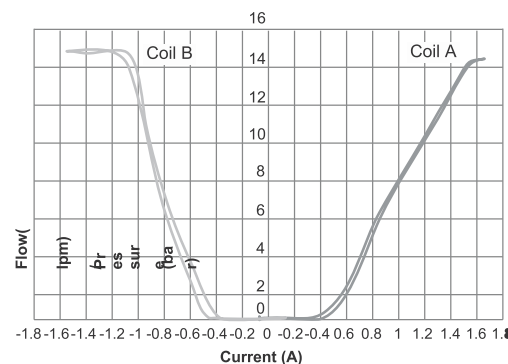
The ESV9 with F spool is a proportional four way, three position, direct acting, spool type solenoid valve. In the de-energized condition Port 2 and 4 are open to tank with the inlet port 3 blocked. This valve is ideal for moderate flow applications where an actuator needs to be moved in both directions and stopped in any position while allowing the service ports to decay to tank pressure in the de-energized condition.

## Pressure drop



- A** - Port 3 or port 2 energized
- B** - Port 3 to port 4 energized
- C** - Port 2 or port 1 energized
- D** - Port 2 to port 1 de-energized
- E** - Port 4 to port 1 energized
- F** - Port 4 to port 1 de-energized

## Flow vs. Current at 10 bar ΔP



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ESV9-8 - Proportional solenoid valve

4-way, 3-position, screw-in cartridge, proportional solenoid valve  
Up to 11 L/min (2.9 USgpm) • Up to 250 bar (3600 psi)

## Model code



### 1 Function

**ESV9** - Proportional solenoid valve

### 2 Size

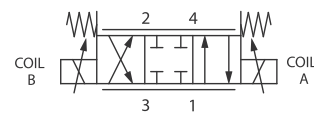
**8** - 8 size

### 3 Seal material

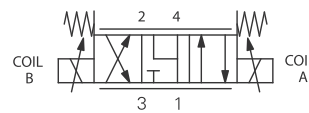
**Blank** - Buna-N  
**V** - Viton®

### 4 Spool center condition

**E**



**F**



### 9 Coil series

**Blank** - No coil  
**P** - P Series  
ToughCoils™ 23 W

### 10 Coil special feature

**00** - None

### 11 Valve special features<sup>1</sup>

**00** - None

(Only required if valve has special features omitted if "00".)

### 5 Manual override option

**0** - No manual override  
**M** - Manual override, push pull type  
For valve dimensions with manual override, see pages B873.

### 6 Housing material and ports

Code	Port size	Housing number	
		Aluminium	Steel
0	Cartridge only		
A2G	1/4" BSPP	02-160747	
A3G	3/8" BSPP	02-160748	
A6H	SAE 6	02-160749	
A8H	SAE 8	02-160750	
S2G	1/4" BSPP		02-160753
S3G	3/8" BSPP		02-160754
S6T	SAE 6		02-160751
S8T	SAE 8		02-160752

See section J for housing details.

### 7 Coil voltage and type

**000** - No coil  
**012D** - 12V DC without diode  
**024D** - 24V DC without diode  
**012B** - 12V DC with diode  
**024B** - 24V DC with diode

### 8 Connection type

**Blank** - No coil  
**N** - Deutsch male, DT04-2P, integrated  
**G** - DIN 43650  
**W** - Flying lead  
**Y** - Amp Jr (DC Only) Mating Connector:  
AMP 963040-3 or equivalent  
**D0** - MetriPackR 150 Male, Integrated (DC Only) Mating  
Connector: Delphi 12052641

See Section C for coil details.

### 12 Design code

**A** - Design code 00

<sup>1</sup>These model digits are not stamped on the valve.

### Warning

Aluminum housings can be used for pressures up to 210 bar (3000 psi). Steel housings must be used for operating pressures above 210 bar (3000 psi).

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

## ESV9-8 - Proportional solenoid valve

4-way, 3-position, screw-in cartridge, proportional solenoid valve  
Up to 11 L/min (2.9 USgpm) • 250 bar (3000 psi)

### Dimensions

mm (inch)

Torque cartridge in aluminum housing 34-41 Nm (25.0 - 30.0 ft. lbs.) and 34-41 Nm (25.0 - 30.0 ft. lbs.) in a steel housing

When solenoid valve is ordered without coils, it will be supplied with coil spacer and coil nut.

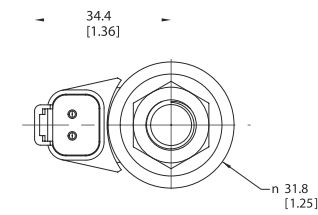
### Spare parts

Coil Nut for MO	565559
Coil Nut without MO	565558
Coil Spacer	02-186730

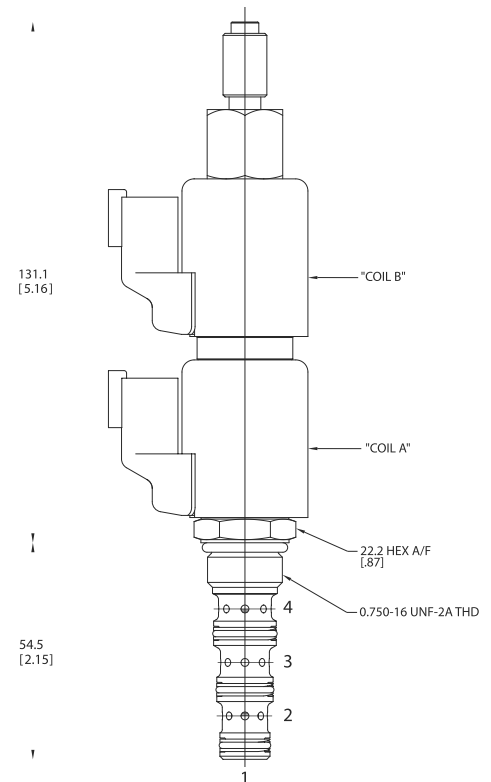
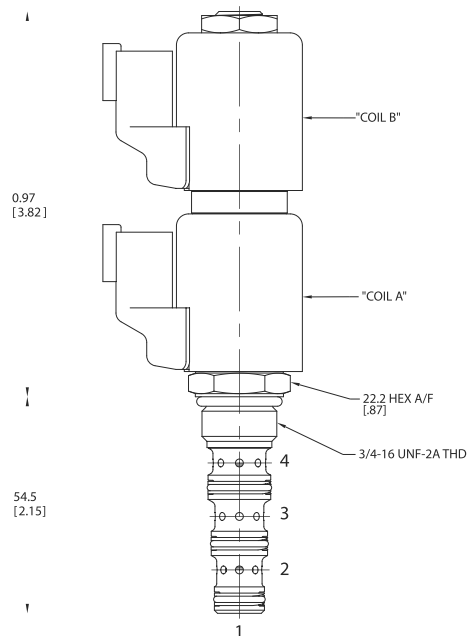
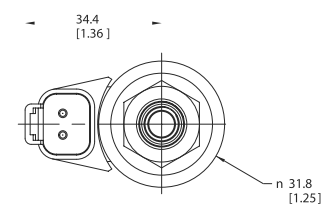
### Warning

Maintain 5-8 Nm (4-6 ft lbs) maximum torque on coil nut. Over tightening may cause valve failure.

### ESV9-8 without MO



### ESV9-8 with MO

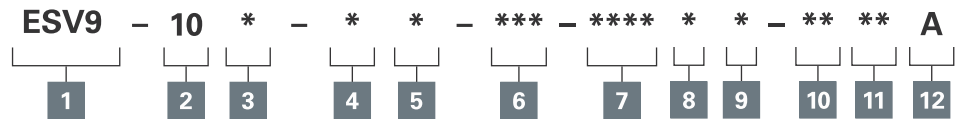


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ESV9-10 - Proportional solenoid valve

4-way, 3-position, screw-in cartridge, proportional solenoid valve  
Up to 22 L/min (5.8 USgpm) • Up to 250 bar (3600 psi)

## Model code

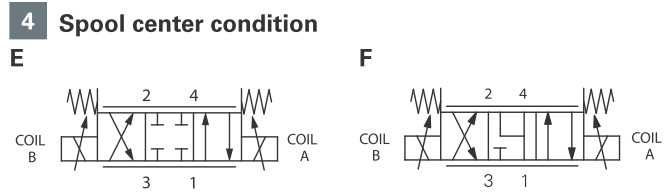


B

**1 Function**  
ESV9 - Proportional solenoid valve

**2 Size**  
10 - 10 size

**3 Seal material**  
Blank - Buna-N  
V - Viton®



**5 Manual override option**  
0 - No manual override  
M - Manual override, push pull type  
For valve dimensions with manual override, see pages B873.

**6 Housing material and ports**

Code	Port size	Housing number	
		Aluminium	Steel
0	Cartridge only		
A2G	1/4" BSPP	02-185804	
A3G	3/8" BSPP	02-185805	
A6H	SAE 6	02-185802	
A8H	SAE 8	02-185803	
S2G	1/4" BSPP		02-175139
S3G	3/8" BSPP		02-175140
S6T	SAE 6		02-175137
S8T	SAE 8		02-175138

See section J for housing details.

**7 Coil voltage and type**  
000 - No coil  
012D - 12V DC without diode  
024D - 24V DC without diode  
012B - 12V DC with diode  
024B - 24V DC with diode

**8 Connection type**  
Blank - No coil  
N - Deutsch male, DT04-2P, integrated  
G - DIN 43650  
W - Flying lead  
Y - Amp Jr (DC Only) Mating Connector: AMP 963040-3 or equivalent  
D0 - MetriPackR 150 Male, Integrated (DC Only) Mating Connector: Delphi 12052641

See Section C for coil details.

**9 Coil series**  
Blank - No coil  
L - L Series Large  
ToughCoils™ 28 W

**10 Coil special feature**  
00 - None

**11 Valve special features<sup>1</sup>**  
00 - None  
(Only required if valve has special features omitted if "00".)

**12 Design code**  
A - Design code 00

<sup>1</sup>These model digits are not stamped on the valve.

**Warning**  
Aluminum housings can be used for pressures up to 210 bar (3000 psi). Steel housings must be used for operating pressures above 210 bar (3000 psi).

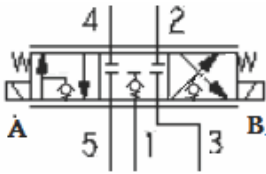
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.



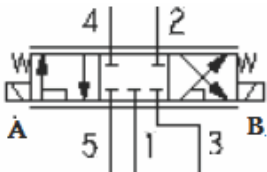
# ESVL9-10-E - Proportional solenoid valve

5 Port, 3-position, screw-in cartridge, proportional solenoid valve  
Up to 23 L/min (6 USgpm) • Up to 250 bar (3600 psi)

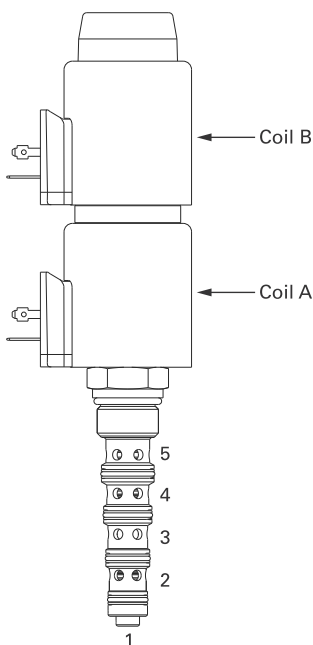
## With Load Sense check valve



## Without Load Sense check valve



## Profile view



## Operation

In the de-energized (center) position, all ports are blocked. When solenoid A is energized, flow is directed from port 5 to port 4 and from port 2 to port 3. Port 1 is connected to system load sense line.

When solenoid B is energized, flow is directed from port 5 to port 2 and from port 4 to port 3. Port 1 is connected to system load sense line.

## Features

- Integrated LS check feature in std. cavity
- Highly engineered components
- Compact design with low pressure drop
- Designed for optimized linearity and hysteresis
- IP69K ToughCoils™ compatible
- Optional manual override
- Industry standard cavity tool

## Performance data

### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

Typical application pressure for all ports	250 bar (3,600 psi)
Cartridge fatigue pressure (infinite life) for all ports	250 bar (3,600 psi)
Rated burst pressure	750 bar (10,600 psi) per NFPA/T2-6-1 R2-2000
Max. flow	23 L/min (6 USgpm)
Temperature range	-40° to 120°C (-40° to 248°F)
Coil power	28 W*
Recommended PWM and Dither frequency	100 Hz
Cavity	C-10-5S
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20 etc.
Filtration	Cleanliness code 18/16/13
Standard housing material	Steel
Weight including coils with check valve	1.25 KG
Seal kit	9901261-000 (Buna-N), 9901262-000 (Viton®)
Internal leakage	250 cm <sup>3</sup> /min (15 in <sup>3</sup> /min) max. @ 210 bar (3000 psi)

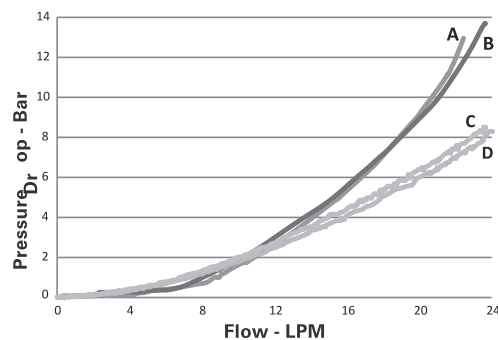
Viton is a registered trademark of E.I. DuPont.

\*AC coils must be used with a rectifying connector.

## Description

The ESVL9 with E spool is a proportional 5 ported, three-position, direct acting, spool type solenoid valve with all ports closed in the de-energized position. This valve is ideal for moderate flow applications where an actuator needs to be controlled proportionally in both directions and stopped in any position.

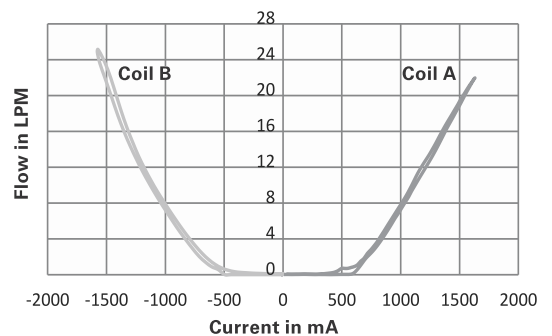
## Pressure drop



A - Port 5 to port 4  
B - Port 5 to port 2

C - Port 2 to port 3  
D - Port 4 to port 3

## Flow vs. Current at 10 bar ΔP

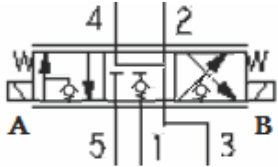


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

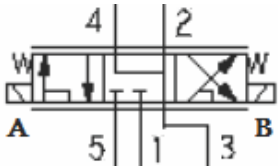
# ESVL9-10-F - Proportional solenoid valve

5 Port, 3-position, screw-in cartridge, proportional solenoid valve  
Up to 23 L/min (6 USgpm) • Up to 250 bar (3600 psi)

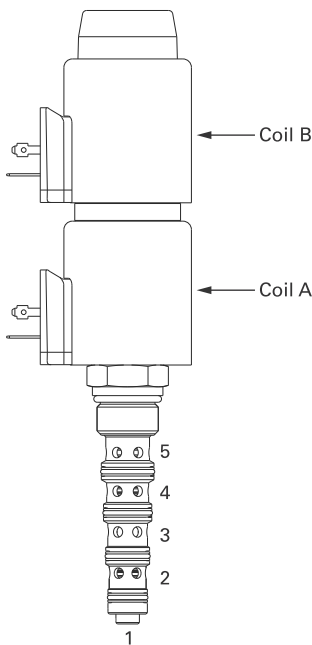
### With Load Sense check valve



### Without Load Sense check valve



### Profile view



### Operation

In the de-energized (center) position, port 3, port 2, and port 4 are open to each other while port 5 is blocked. When solenoid A is energized, flow is directed from port 5 to port 4 and from port 2 to port 3. When solenoid B is energized, flow is directed from port 5 to port 2 and from port 4 to port 3.

Port 1 is connected to system load sense line

### Features

- Integrated LS check feature in std. cavity
- Highly engineered components
- Compact design with low pressure drop
- Designed for optimized linearity and hysteresis
- IP69K ToughCoils™ compatible
- Optional manual override
- Industry standard cavity tool.

### Performance data

#### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

Typical application pressure for all ports	250 bar (3,600 psi)
Cartridge fatigue pressure (infinite life) for all ports	250 bar (3,600 psi)
Rated burst pressure	750 bar (10,600 psi) per NFPA/T2-6-1 R2-2000
Max. flow	23 L/min (6 USgpm)
Temperature range	-40° to 120°C (-40° to 248°F)
Coil power	28 W*
Recommended PWM and Dither frequency	100 Hz
Cavity	C-10-5S
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20 etc.
Filtration	Cleanliness code 18/16/13
Standard housing material	Steel
Weight including coils with check valve	1.25 KG
Seal kit	9901261-000 (Buna-N), 9901262-000 (Viton®)
Internal leakage	250 cm <sup>3</sup> /min (15 in <sup>3</sup> /min) max. @ 210 bar (3000 psi)

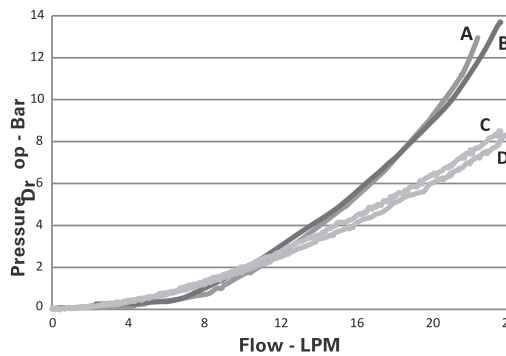
Viton is a registered trademark of E.I. DuPont.

\*AC coils must be used with a rectifying connector.

### Description

The ESV9 with F spool is a proportional 5 ported, three position, direct acting, spool type solenoid valve. In the de-energized condition Port 2 and 4 are open to tank with the inlet port 5 blocked. This valve is ideal for moderate flow applications where an actuator needs to be moved in both directions and stopped in any position while allowing the service ports to decay to tank pressure in the de-energized condition.

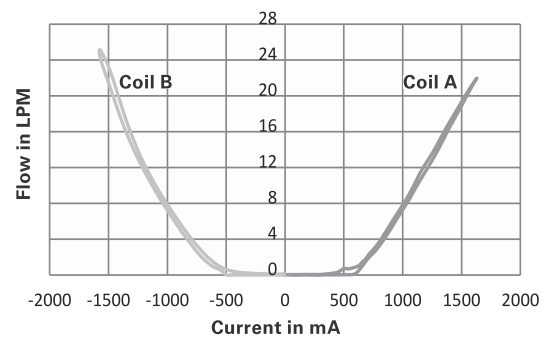
### Pressure drop



A - Port 5 to port 4  
B - Port 5 to port 2

C - Port 2 to port 3  
D - Port 4 to port 3

### Flow vs. Current at 10 bar ΔP

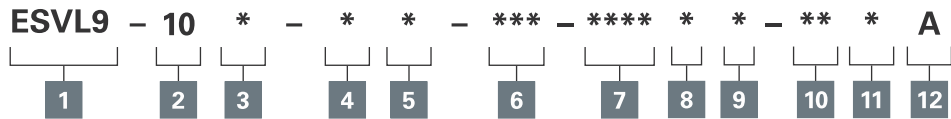


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ESVL9-10 - Proportional solenoid valve

5 Port, 3-position, screw-in cartridge, proportional solenoid valve  
Up to 23 L/min (6 USgpm) • Up to 250 bar (3600 psi)

## Model code



### 1 Function

**ESVL9** - Proportional solenoid valve

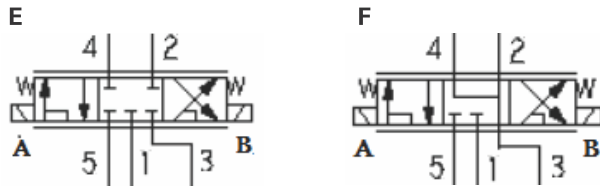
### 2 Size

**10** - 10 size

### 3 Seal material

**Blank** - Buna-N  
**V** - Viton®

### 4 Spool center condition



### 5 Manual override option

**0** - No manual override  
**M** - Manual override, push pull type  
For valve dimensions with manual override, see pages B873.

### 6 Housing material and ports

Code	Port size	Housing number	
		Aluminium	Steel
0	Cartridge only		
S3G	3/8" BSPP		6042921-001

See section J for housing details.

### 7 Coil voltage and type

**000** - No coil  
**012D** - 12V DC without diode  
**024D** - 24V DC without diode  
**012B** - 12V DC with diode  
**024B** - 24V DC with diode

### 8 Connection type

**Blank** - No coil  
**G** - DIN 43650-A Integrated  
**N** - Deutsch male, DT04-2P, Integrated  
**D** - Metric - Pack 150 male, Integrated  
**F** - Weather - Pack (packard) male, on wire leads  
**W** - Lead wire  
**Y** - AMP Junior, Integrated

See Section C for coil details.

### 9 Coil series

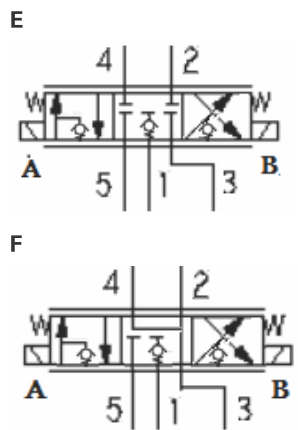
**Blank** - No coil  
**L** - L Series Large  
ToughCoils™ 28 W

### 10 Coil special feature

**00** - None

### 11 Valve special features<sup>1</sup>

**0** - None  
**C** - With valve check



(Only required if valve has special features omitted if "00".)

### 12 Design code

**A** - Design code 00

<sup>1</sup>These model digits are not stamped on the valve.

### ⚠ Warning

Aluminum housings can be used for pressures up to 210 bar (3000 psi). Steel housings must be used for operating pressures above 210 bar (3000 psi).

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ESVL9-10 - Proportional solenoid valve

5 Port, 3-position, screw-in cartridge, proportional solenoid valve  
 Up to 23 L/min (6 USgpm) • Up to 250 bar (3600 psi)

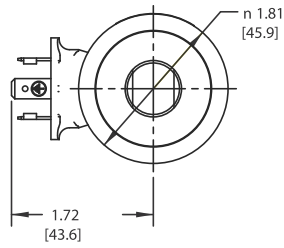
## Dimensions

mm (inch)

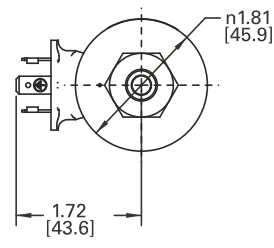
Torque cartridge in aluminum housing 25-30 Nm (25.0 - 30.0 ft. lbs.) and 34-41 Nm (25.0 - 30.0 ft. lbs.) in a steel housing

When solenoid valve is ordered without coils, it will be supplied with coil spacer and coil nut.

### ESVL9-10 without MO



### ESVL9-10 with MO

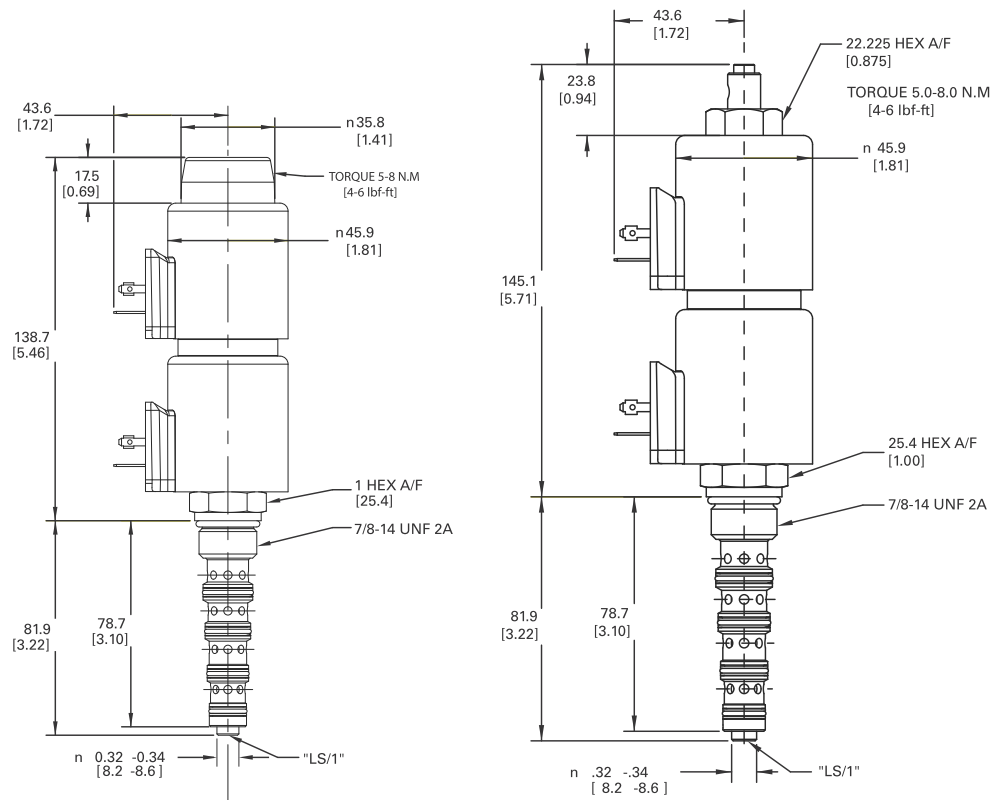


## Spare parts

Coil Nut for MO	6038813-001
Coil Nut without MO	02-148332
Coil Spacer	6038409-001

## Warning

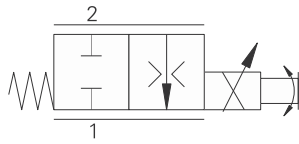
Maintain 5-8 Nm (4-6 ft lbs) maximum torque on valve tube nut. Over tightening may cause valve failure.



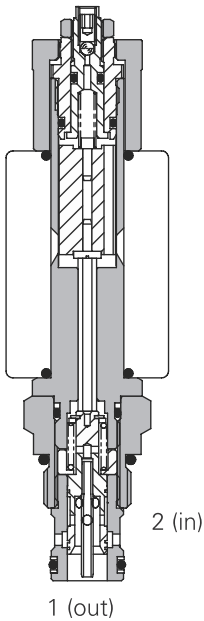
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# PFR24A - Proportional valve

Proportional bi-directional, normally closed poppet  
18 L/min at 75% • 210 bar (3000 psi)



## Sectional view



## Operation

In the de-energized condition the valve is closed. As current is applied to the coil the valve opens proportionally allowing flow from port 2 to port 1.

## Features

- High flow capacity with reduced space requirements.
- Standard valve bodies and common cavities.
- One-piece encapsulated coil with minimal amperage draw.
- Oil immersed armature solenoid.
- Various coil terminals and voltages.
- Coil interchangeability with valves of same series.
- Manual override, seal variations and other options available.
- Sealed coil arrangement to protect stem from corrosion.
- Reversible coil without affecting performance.

## Performance data

### Ratings and specifications

Performance data is typical with fluid at 32 cST (150 SUS)

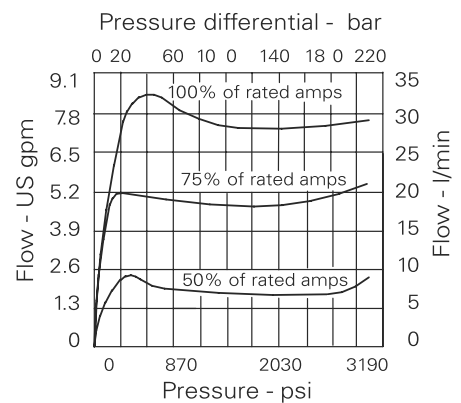
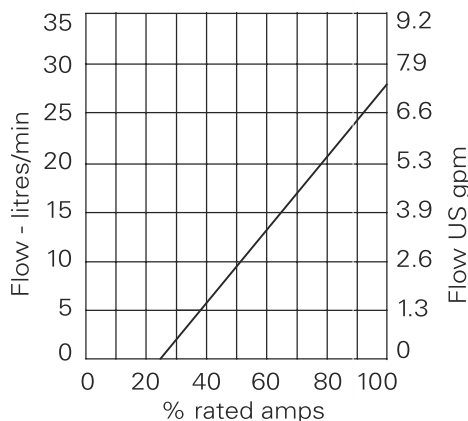
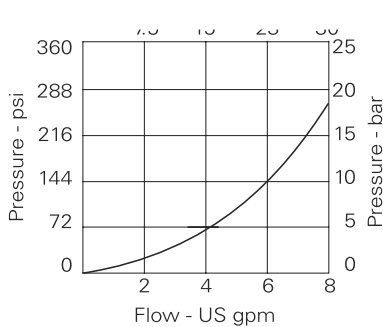
Max inlet pressure	210 bar (3000 psi)
Rated flow	28 L/min @ 100%, 23 L/min @ 85%, 18 L/min @ 75%
Hysteresis	8% maximum without PWM, 4% maximum with PWM
Frequency	200 Hz to 400 Hz - 200 recommended
Dead band	25-35% of rated current
Response time	300 ms
Internal leakage	Up to 200 ml/min, 210 bar differential
Temperature range	-30° to 120°C (-22° to 248°F)
Cavity	A6701 (see section M)
Electrical data	See coil data sheet
Torque cartridge into cavity	30 Nm (22 lbs ft)
Mounting position	Unrestricted
Fluids	All general purpose hydraulics fluids such as: MIL-H-5606, SAE 10, SAE 20, etc
Seal Material	Standard nitrile with PTFE back up rings
Filtration	BS5540/4 Class 16/13 (25 micron or better)
Nominal viscosity range	15 to 250 cSt
Standard housing materials	Aluminium alloy
Coil Weight	0.3 kg (.6 lbs)
Weight	0.2 kg (.44 lbs)
Seal kit	SK1138 (Nitrile) SK1138V (Viton®)

Viton is a registered trademark of E.I. DuPont

## Description

This is a compact 2 ported proportional, pressure compensated, spool type flow regulator. Ideal for speed regulation of actuators in many applications.

## Pressure drop curves

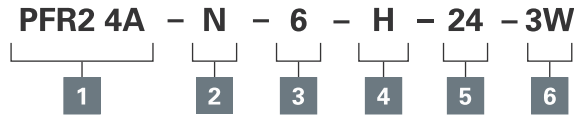


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# PFR24A - Proportional Valve

Proportional bi-directional, normally closed poppet  
18 L/min at 75% • 210 bar (3000 psi)

## Model code



**1 Function**  
PFR2 4A - Cartridge only

**2 Seal material**  
N - Nitrile  
V - Viton®

**3 Manual override**  
6 - Screw

**4 Coil termination**  
H - DIN43650  
F - Flying Lead  
DM - Deutsch moulded

Other terminations available on request.

**5 Voltage**  
12 - 12 VDC  
24 - 24 VDC

## 6 Port size

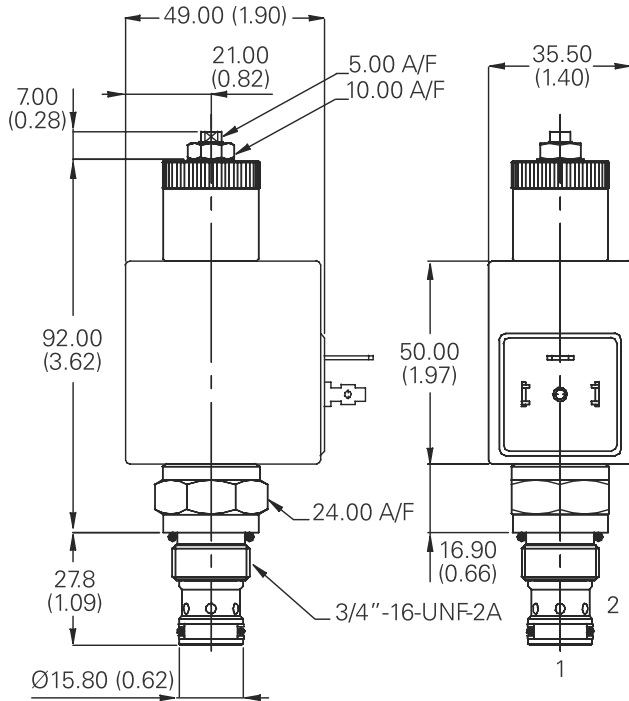
Code	Port size	Housing number
<b>Aluminium</b>		
0		Cartridge only
2W	1/4" BSP	A12592
3W	3/8" BSP	A7450
6T	3/8" SAE	A19355

See section J for housing details.

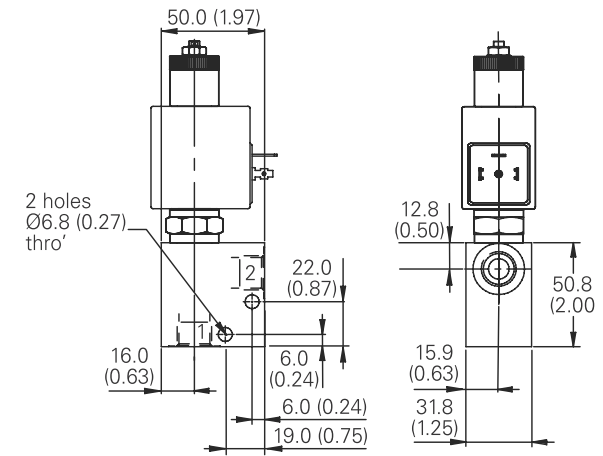
## Dimensions

mm (inch)

### Cartridge only



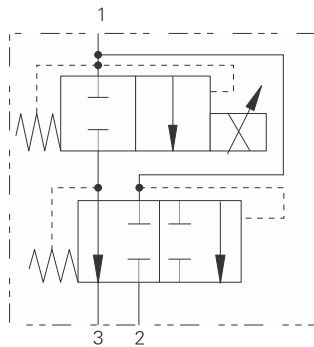
### Installation drawing



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV2-12-C - Proportional valve

Proportional flow, normally closed spool  
Up to 114 L/min (30 USgpm) • 210 bar (3000 psi)



## Operation

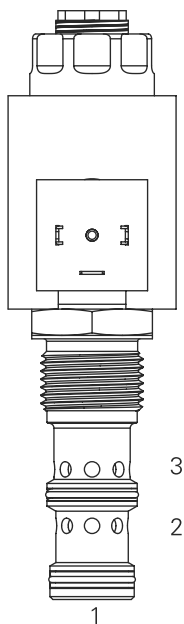
Current supplied to the coil controls the valve. At zero current, the valve is fully closed from port 1 to port 3. At 1500 to 1600 mA (12V coil) the valve is fully open.

The valve will regulate flow out of port 3 regardless of downstream system pressure. As current is increased to the solenoid the flow out of port 3 will increase.

## Features

Hardened and ground working parts to give long life with good control; Compact design with low pressure drop. IP69K Tough coil compatibility, continuously rated.

## Sectional view



## Description

This is a three port pressure compensated proportional normally closed flow control screw in cartridge valve. The valve can be used as a priority or a restrictive style valve allowing the valve to control the outlet flow with the option of the excess flow being used for another system.

## Performance data

### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

Typical application pressure	210 bar (3000 psi)
Cartridge endurance rating	1 million cycles
Cartridge fatigue pressure (infinite life)	210 bar (3000 psi) NFPA rated
Rated flow	<p>"A" Spool-max regulated flow (by-pass mode): 57 L/min (15 USgpm)                      max regulated flow (2 port mode): 53 L/min (14 USgpm)                      max input flow (input flow): 114 L/min (30 USgpm)</p> <p>"B" Spool-max regulated flow (by-pass mode): 38 L/min (10 USgpm)                      max regulated flow (2 port mode): 31 L/min (8 USgpm)                      max input flow (input flow): 114 L/min (30 USgpm)</p> <p><b>Note:</b> Max regulated flow may decrease slightly during compensation.</p>
Internal leakage (fully closed)	240 cm <sup>3</sup> /min (15 in <sup>3</sup> /min) @ 3000 PSID
Nominal supply voltage	12/24 V
Current to fully open valve	1600 6 200 mA (12V coil), 8006 100 mA (24V coil)
Current to fully close valve	350 6 100 mA (12V coil), 1756 50 mA (24V coil)
Recommended PWM frequency	200-400 Hz
Coil resistance	4.7v V/12V, 19.0 V/24V
Mass	Cartridge only 0,37 kg (0.82 lb), cartridge with coil and end nut 0,73 kg (1.62 lb)
Temperature range	-30° to 90°C (-22° to 194°F)
Maximum oil temperature	120°C (248°F)
Maximum internal coil temperature	200°C (392°F)
Cavity	C-12-3
Fluids	All general purpose hydraulics fluids such as: MIL-H-5606, SAE 10, SAE 20, DTE 24, etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum or steel
Hysteresis	1.5 USgpm with 400Hz PWM driver
Seal kit	9900171-000 (Buna-N), 9900172-000 (Viton®)

Viton is a registered trademark of E.I. DuPont

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV2-12-C - Proportional valve

Up to 114 L/min (30 USgpm) • 210 bar (3000 psi)

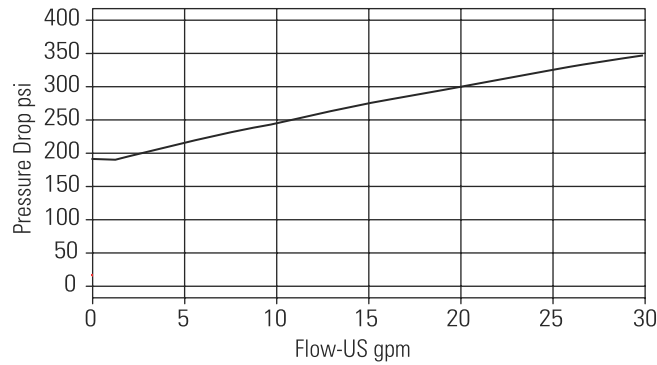
Performance Curves

B

## Flow is Pressure drop

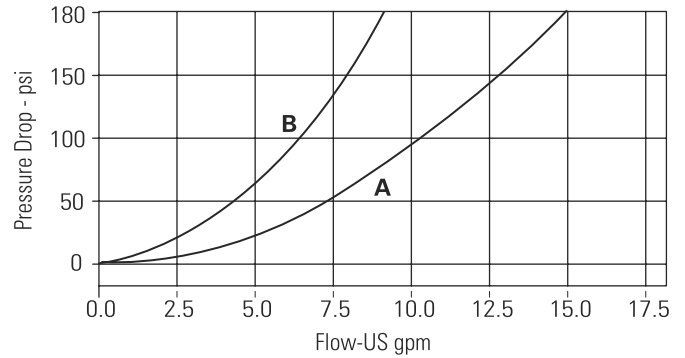
### Flow vs Pressure drop

Excess flow P1 to P2 (P3 to Atm)  
Full current (1700 mA on a 12V Coil)



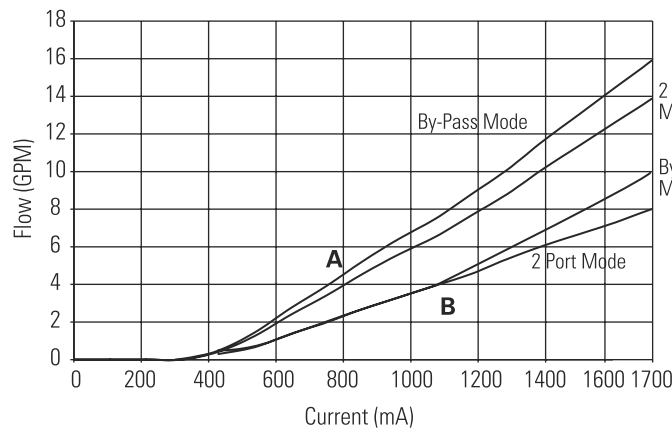
### Flow vs Pressure drop

Regulated flow P1 to P3 (P2 to Atm)  
Full current (1700 mA on a 12V Coil)



**A** - A spool pressure drop  
**B** - B spool pressure drop

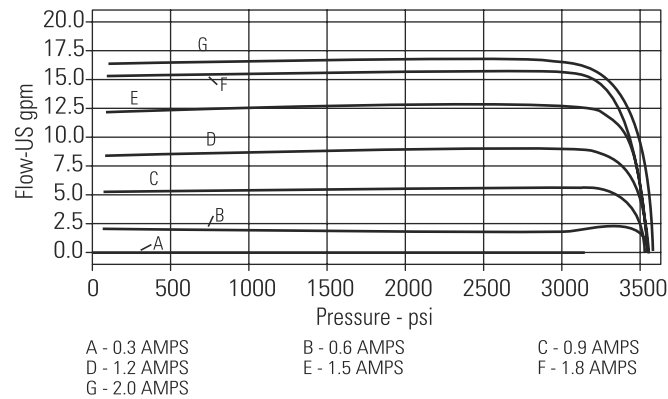
## Flow vs Current



**A** - A spool  
**B** - B spool

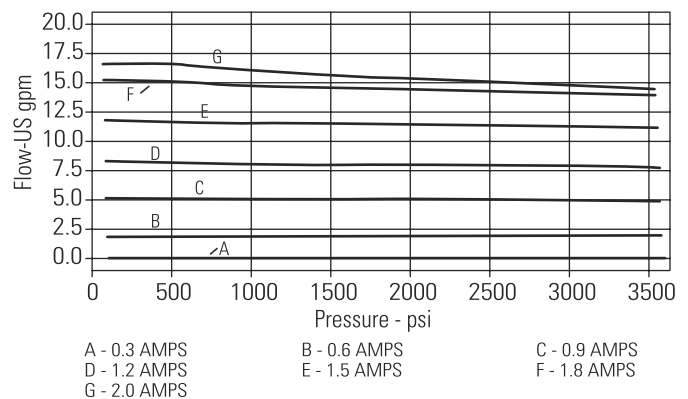
## Regulated flow vs Pressure

Regular to Bypass



## Regulated flow vs Pressure

Bypass to Regular



**Note:** Pressure Compensation curves are shown for "B" spool valves.

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.



# EFV2-12-C - Proportional valve

Proportional flow, normally closed spool  
Up to 114 L/min (30 USgpm) • 210 bar (3000 psi)

## Model code

EFV2 - 12 - \* - C - \* - \* - \* - \*\*\* - \*\*\*\*\*E\*\* - 00

1
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<p><b>1 Function</b> EFV2 - Electro proportional flow control valve</p>	<p><b>6 Manual override option</b> 0 - No core tube special features S - Screw-in</p>	<p><b>7 Valve housing material</b> 0 - Cartridge only A - Aluminum S - Steel</p>	<p><b>9 Coil series</b> E - E series coils  *These model digits will not be stamped on the valve. For coil part numbers and dimensions see section C.</p>																										
<p><b>2 Size</b> 12 - 12 size</p>	<p><b>8 Port Size</b></p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Code</th> <th rowspan="2">Port size</th> <th colspan="2">Housing number</th> </tr> <tr> <th>Aluminium single</th> <th>Steel single</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Cartridge only</td> <td></td> <td></td> </tr> <tr> <td>04G</td> <td>1/2" BSPP</td> <td>02-161817</td> <td>02-169815</td> </tr> <tr> <td>06G</td> <td>3/4" BSPP</td> <td>02-161816</td> <td>02-169814</td> </tr> <tr> <td>10T</td> <td>SAE 10</td> <td>02-160642</td> <td>02-161070</td> </tr> <tr> <td>12T</td> <td>SAE 12</td> <td>02-160646</td> <td>02-169816</td> </tr> </tbody> </table> <p><b>Note:</b> Both the manifold and port plug are required. See section J for housing details.</p>		Code	Port size	Housing number		Aluminium single	Steel single	0	Cartridge only			04G	1/2" BSPP	02-161817	02-169815	06G	3/4" BSPP	02-161816	02-169814	10T	SAE 10	02-160642	02-161070	12T	SAE 12	02-160646	02-169816	<p><b>10 Special features</b> 00 - None  Only required when valve has special features, omitted if "00".</p>
Code	Port size	Housing number																											
		Aluminium single	Steel single																										
0	Cartridge only																												
04G	1/2" BSPP	02-161817	02-169815																										
06G	3/4" BSPP	02-161816	02-169814																										
10T	SAE 10	02-160642	02-161070																										
12T	SAE 12	02-160646	02-169816																										
<p><b>3 Seal material</b> N - Buna-N V - Viton®</p>																													
<p><b>4 Logic</b> C - Normally closed</p>																													
<p><b>5 Flow rating</b> A - 15 USgpm @ 180 PSID B - 10 USgpm @ 180 PSID See specifications</p>																													

B

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV2-12-C - Proportional Valve

Proportional flow, normally closed spool  
 Up to 114 L/min (30 USgpm) • 210 bar (3000 psi)

### Dimensions

mm (inch)

Torque cartridge in housing

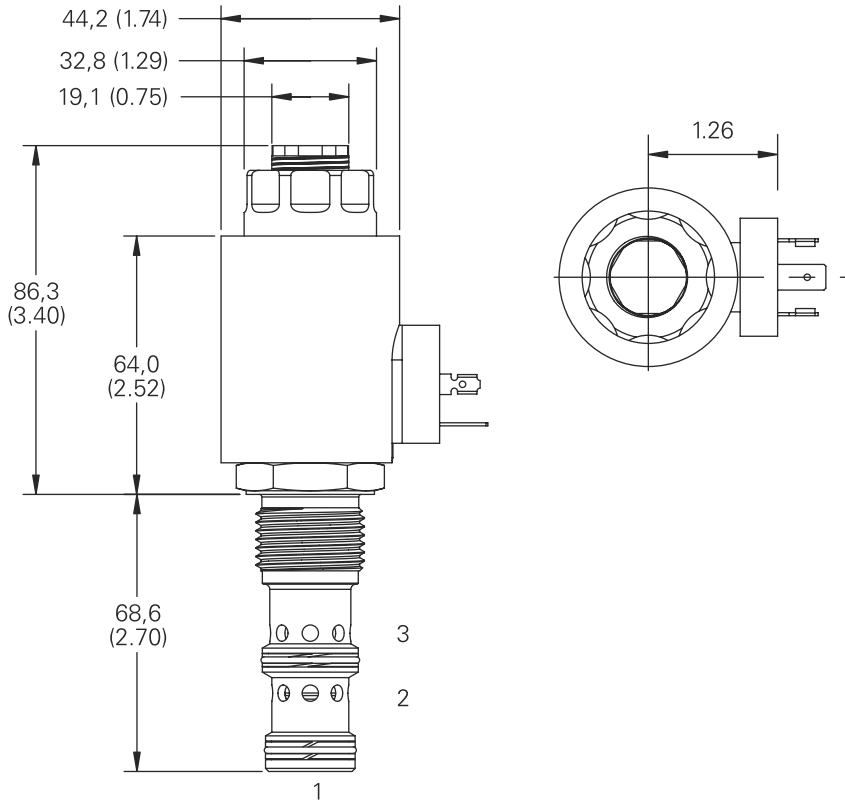
**S** - 136-149 Nm (100-149 ft lbs)

**A** - 108-122 Nm (80-90 ft lbs)

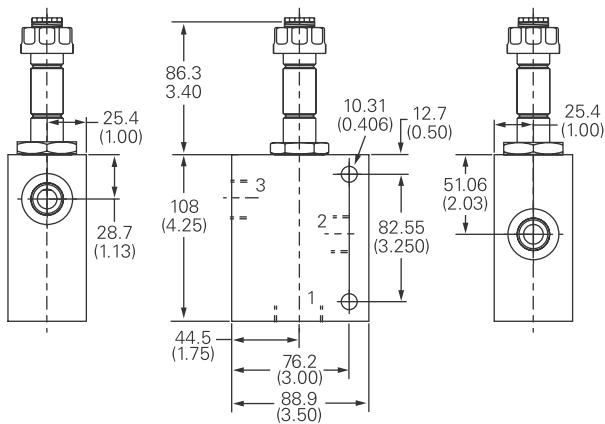
**Note:** EFV2-12 with DIN-43650 connector shown.

B

### Cartridge only



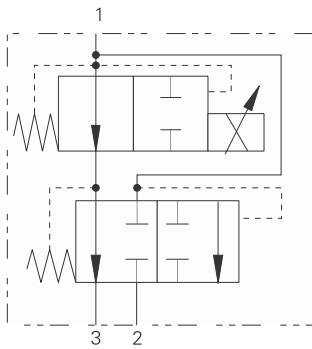
### Installation drawing (Aluminum)



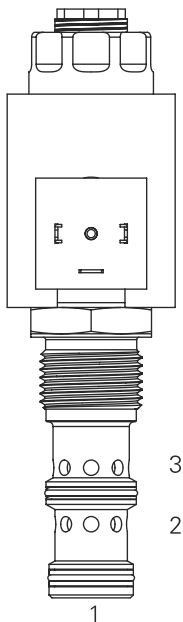
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV2-12-O - Proportional valve

Proportional flow, normally open spool  
Up to 114 L/min (30 USgpm) • 210 bar (3000 psi)



## Profile view



## Description

This is a three port pressure compensated normally open proportional flow control screw in cartridge valve. The valve can be used as a priority or a restrictive style valve allowing the valve to control the outlet flow with the option of the excess flow being used for another system.

## Operation

Current supplied to the coil controls the valve. At zero current, the valve is fully open from port 1 to port 3. At 1600 mA (12V coil) the valve is fully closed.

The valve will regulate flow out of port 3 regardless of downstream system pressure. As current is increased to the solenoid the flow out of port 3 will decrease.

## Features

Hardened and ground working parts to give long life with good control; Compact design with low pressure drop. IP69K Tough coil compatibility, continuously rated.

## Performance data

### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

Typical application pressure	210 bar (3000 psi)
Cartridge endurance rating	1 million cycles
Cartridge fatigue pressure (infinite life)	210 bar (3000 psi) NFPA rated
Rated flow	"A" Spool-max regulated flow (by-pass mode): 53 L/min (14 USgpm) max regulated flow (2 port mode): 42 L/min (11 USgpm) max input flow (input flow): 114 L/min (30 USgpm) "B" Spool-max regulated flow (by-pass mode): 38 L/min (10 USgpm) max regulated flow (2 port mode): 31 L/min (8 USgpm) max input flow (input flow): 114 L/min (30 USgpm) <b>Note:</b> Max regulated flow may decrease slightly during compensation.
Internal leakage (fully closed)	77-483 cm <sup>3</sup> /min (5-30 in <sup>3</sup> /min) @ 3000 PSID
Nominal supply voltage	12/24 V
Current to fully open valve	350 6 100 mA (12V coil), 8006 100 mA (24V coil)
Current to fully close valve	1600 6 200 mA (12V coil), 8006 100 mA (24V coil)
Recommended PWM frequency	200-400 Hz
Coil resistance	4.7v V/12V, 19.0 V/24V
Mass	Cartridge only 0,37 kg (0.82 lb), cartridge with coil and end nut 0,73 kg (1.62 lb)
Temperature range	-30° to 90°C (-22° to 194°F)
Maximum oil temperature	120°C (248°F)
Maximum internal coil temperature	200°C (392°F)
Cavity	C-12-3
Fluids	All general purpose hydraulics fluids such as: MIL-H-5606, SAE 10, SAE 20, DTE 24, etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum or steel
Hysteresis	1.5 USgpm with 400Hz PWM driver
Seal kit	9900171-000 (Buna-N), 9900172-000 (Viton®)

Viton is a registered trademark of E.I. DuPont.

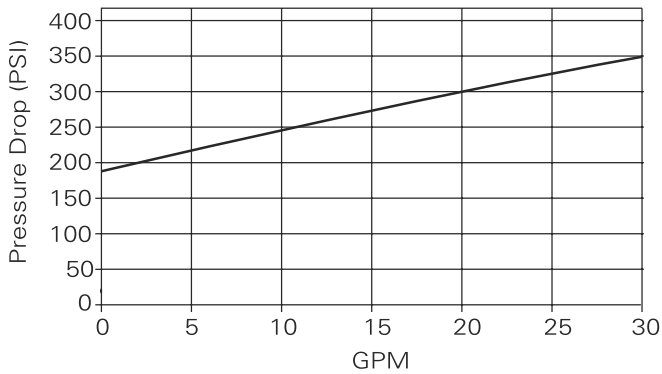
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV2-12-O - Proportional valve

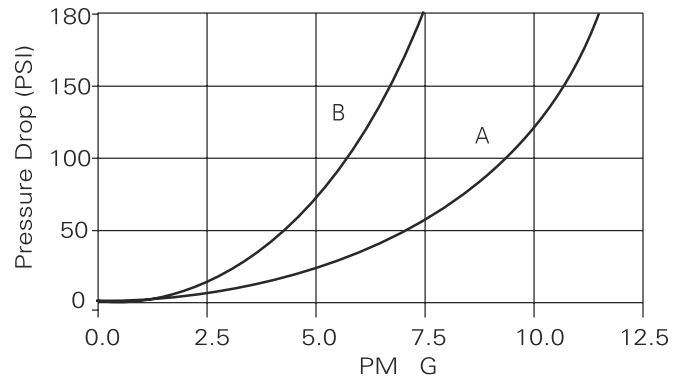
Up to 114 L/min (30 USgpm) • 210 bar (3000 psi)

Performance Curves

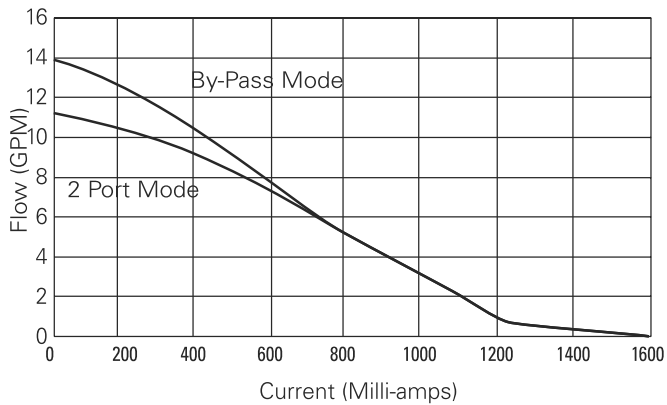
## Pressure drop port 1 to port 2



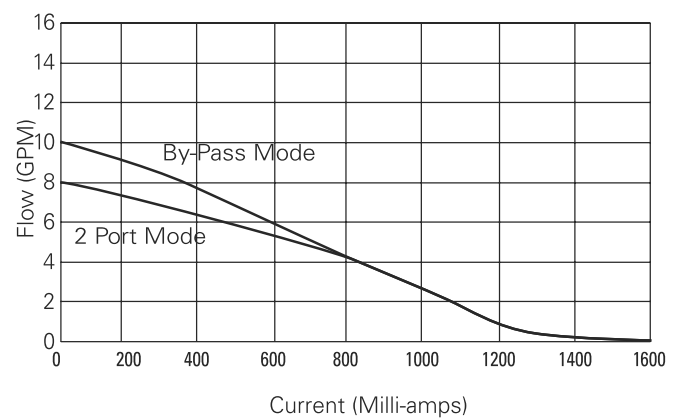
## Pressure drop port 1 to port 3



## Flow vs Current - A Spool



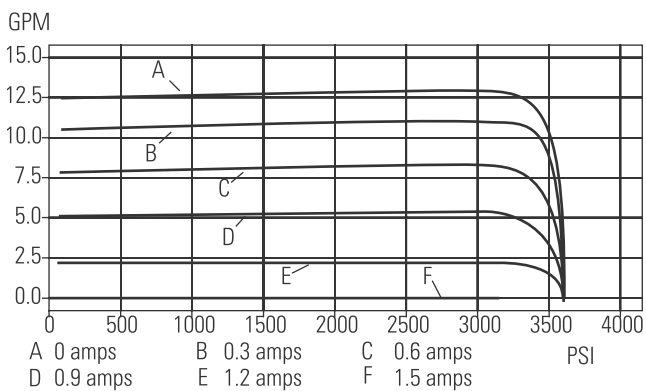
## Flow vs Current - B Spool



Parameters: 400 Hz PWM

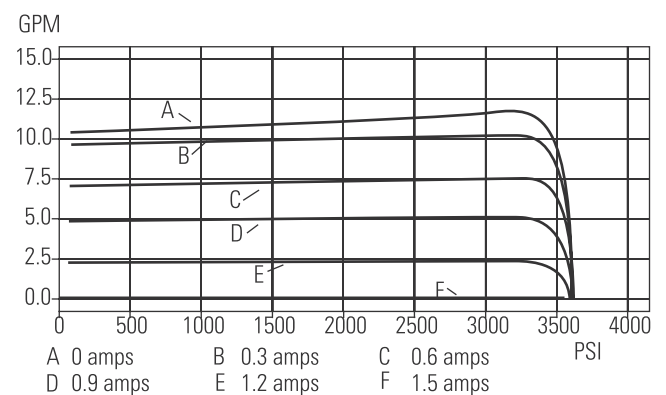
## Regulated flow vs Pressure

Port 3 Pressure > Port 2 Pressure



## Regulated flow vs Pressure

Port 2 Pressure > Port 3 Pressure



**Note:** Pressure Compensation curves are shown for "B" spool valves.

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV2-12-O - Proportional valve

Proportional flow, normally open spool  
Up to 114 L/min (30 USgpm) • 210 bar (3000 psi)

## Model code

EFV2 - 12 - \* - 0 - \* - \* - \* - \*\*\* - \*\*\*\*\*E\*\* - 00

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- 1 Function**  
EFV2 - Electro proportional flow control valve

---

- 2 Size**  
12 - 12 size

---

- 3 Seal material**  
N - Buna-N  
V - Viton®

---

- 4 Logic**  
0 - Normally open

---

- 5 Flow rating**  
A - 14 USgpm @ 180 PSID  
B - 10 USgpm @ 180 PSID  
See specifications

---

- 6 Manual override option**  
0 - No core tube special features  
S - Screw-in

---

- 7 Valve housing material**  
0 - Cartridge only  
A - Aluminum  
S - Steel

---

- 9 Coil series**  
E - E series coils  
\*These model digits will not be stamped on the valve. For coil part numbers and dimensions see section C.

---

**8 Port size**

Code	Port size	Housing number	
		Aluminium single	Steel single
0	Cartridge only		
4G	1/2" BSPP	02-161817	02-169815
6G	3/4" BSPP	02-161816	02-169814
10T	SAE 10	02-160642	02-161070
12T	SAE 12	02-160646	02-169816

**Note:** Both the manifold and port plug are required. See section J for housing details.

- 10 Special features**  
00 - None  
Only required when valve has special features, omitted if "00".

---

B

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EFV2-12-O - Proportional valve

Proportional flow, normally open spool  
 Up to 114 L/min (30 USgpm) • 210 bar (3000 psi)

## Dimensions

mm (inch)

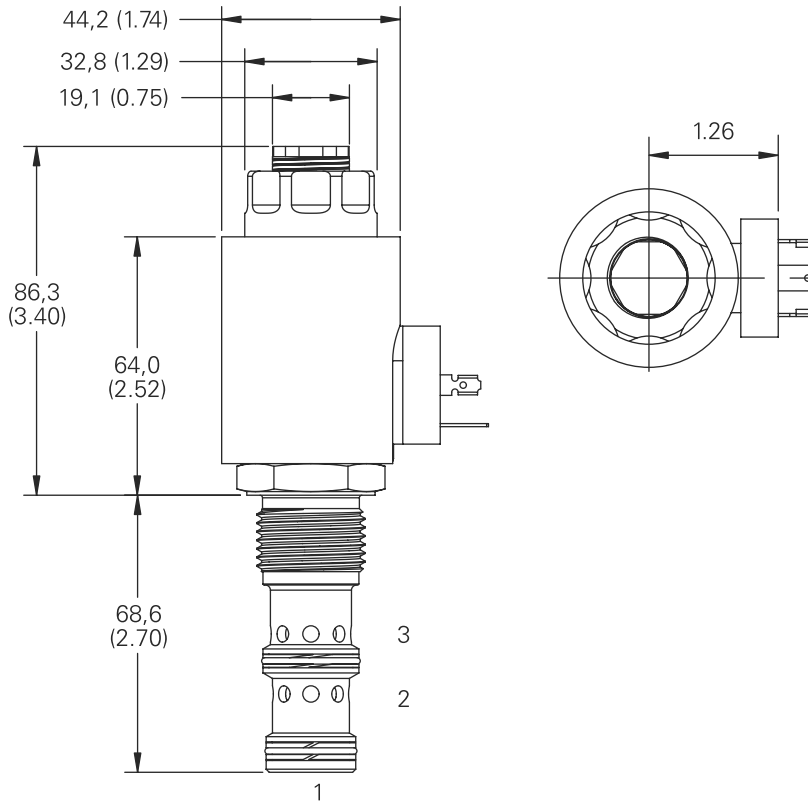
Torque cartridge in housing

**S** - 136-149 Nm (100-149 ft lbs)

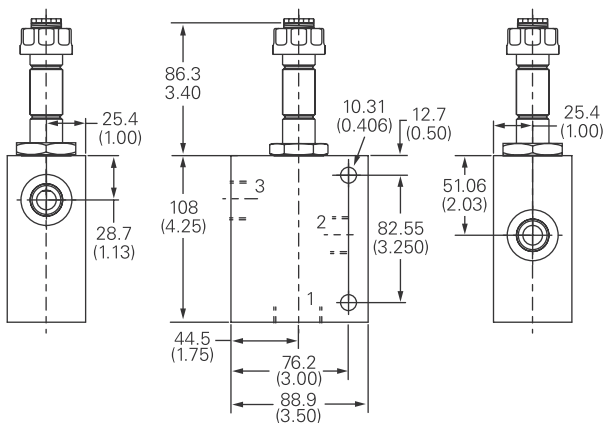
**A** - 108-122 Nm (80-90 ft lbs)

**Note:** EFV2-12 with DIN-43650 connector shown.

## Cartridge only



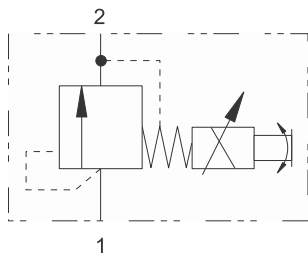
## Installation drawing (Aluminum)



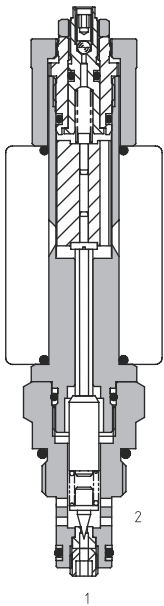
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# PDR21A - Proportional valve

Proportional relief  
1.5 L/min (.3 USgpm) • 350 bar (5000 psi)



## Sectional view



## Operation

The poppet is held on the seat by a light spring. The force is increased by the application of magnetic force due to the increase in current. This increases the pressure required to lift the poppet of the seat thus controlling the pressure.

## Features

- High flow capacity with reduced space requirements.
- No dynamic seals.
- Standard valve bodies and common cavities.
- One-piece encapsulated coil with minimal amperage draw.
- Oil immersed armature solenoid.
- Various coil terminals and voltages.
- Coil interchangeability with valves of same series.
- Manual override, seal variations and other options available.
- Sealed coil arrangement to protect stem from corrosion

## Performance data

### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

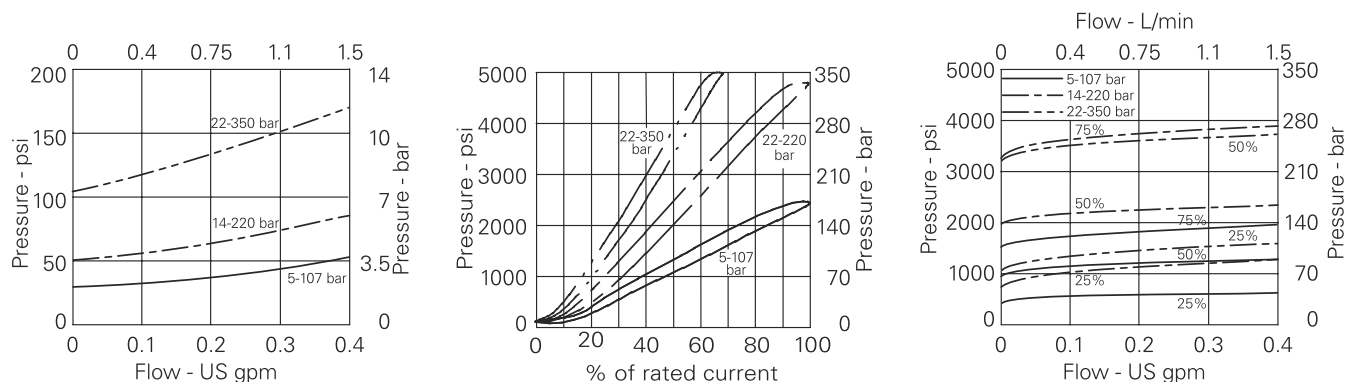
Max inlet pressure	350 bar (5000 psi)
Pressure range	10 = 5-107 bar (72-1550 psi), 20 = 14-220 bar (200-3200 psi), 35 = 22-350 bar (320-5000 psi)
Max press port 2	100 bar (1450 psi)
Max flow	1.5 L/min (.3 US GPM)
Hysteresis	<12.5% without PWM
Dead band	10% approx
Response time	10 = 2-193 ms, 20 = 3-395 ms, 35 = 2-358 ms
Internal leakage	<5 ml/min
Temperature range	-30° to 120°C (-22° to 248°F)
Cavity	A879 (see Section M)
Electrical data	See coil data sheet
Torque cartridge into cavity	40 Nm (29.5 lbs ft)
Mounting position	For best results mount below reservoir oil level. If this is not feasible mount horizontally
Fluids	All general purpose hydraulics fluids such as: MIL-H-5606, SAE 10, SAE 20, etc
Seal material	Standard nitrile with PTFE back up rings
Filtration	BS5540/4 Class 18/13 (25 micron or better)
Nominal viscosity range	15 to 250 cSt
Standard housing materials	Aluminium
Coil Model Code	C16-*/19
Coil Weight	.3 kg (.6 lbs)
Weight	.25 kg (.55 lbs)
Voltage available	12/24 VDC
Seal kit	SK1119 (Nitrile) SK1119V (Viton®)

Viton is a registered trademark of E. I. DuPont

## Description

This is a proportional poppet style pilot relief cartridge. The pressure setting is directly proportional to changes in DC current input. The valve is ideal for the control of larger valves for the control of a pressure within a system.

## Performance curves



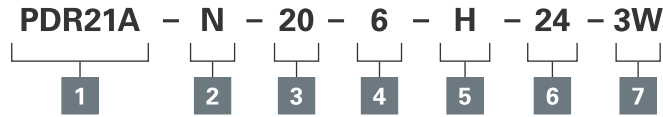
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# PDR21A - Proportional valve

Proportional relief

1.5 L/min (.3 USgpm) • 350 bar (5000 psi)

## Model code



**1 Function**  
PDR21A - Normally open

**2 Seal material**  
N - Nitrile  
V - Viton

**3 Pressure range**  
10 - 5 to 120 bar  
20 - 10 to 240 bar

**4 Manual override**  
6 - Screw

**5 Coil termination**  
H - DIN43650  
F - Flying Lead  
DM - Deutsch moulded  
Other terminations available on request.

**6 Voltage**  
12 - 12 VDC  
24 - 24 VDC

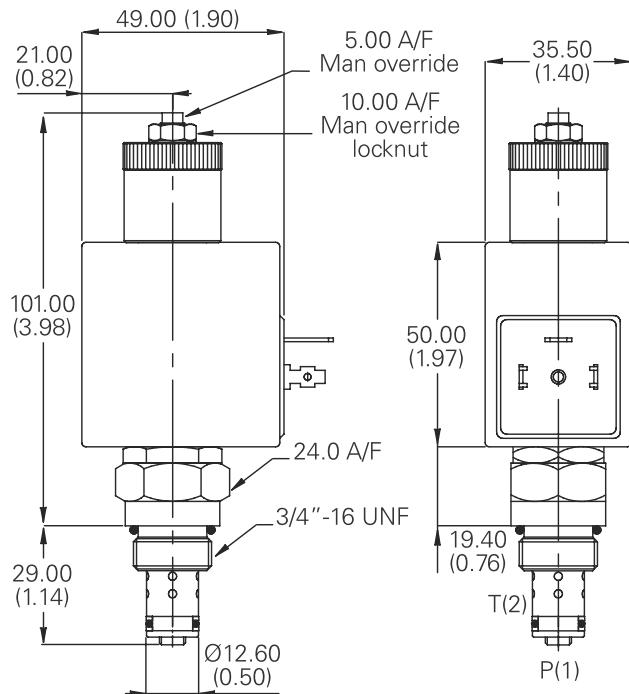
## 7 Port size

Code	Port size	Housing number	
		Aluminum	Steel
0	Cartridge only		
2W	1/4" BSP	A1485	A14128
3W	3/8" BSP	A1043	A14175
4T	1/4" SAE	A14842	-
6T	3/8" SAE	A15676	A14843

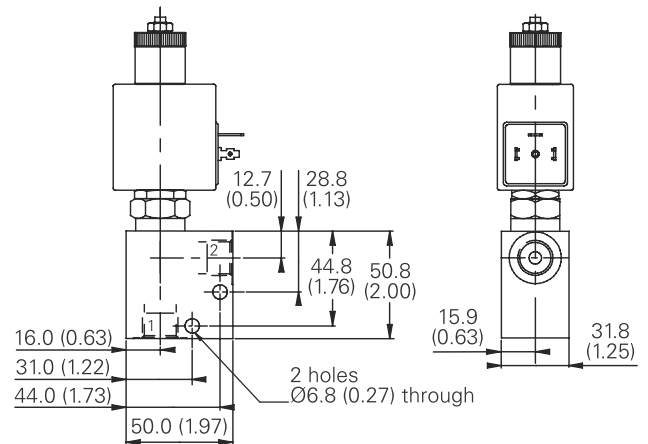
## Dimensions

mm (inch)

### Cartridge only



### Installation drawing

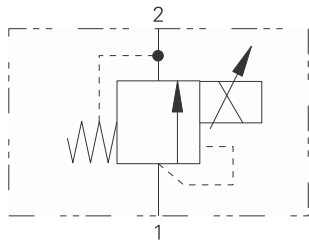


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.



# IRV1-10 - Proportional valve

Proportional inverse relief, poppet  
1 L/min (.25 USgpm) • 210 bar (3000 psi)



## Operation

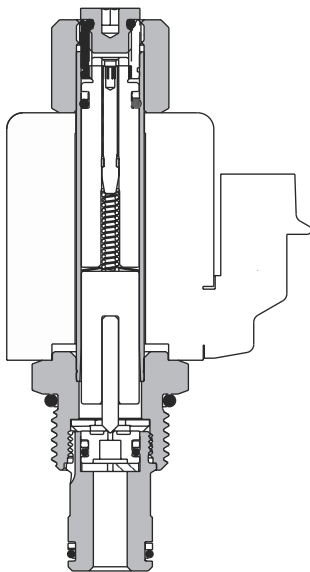
The IRV1-10 proportional relief is spring biased closed to the highest setting. Increasing current to the coil will proportionally decrease the pressure setting.

When the pressure at port 1 (inlet) is enough to overcome the spring force, the poppet lifts and allows flow from port 1 to port 2 (outlet).

## Features

Hardened and ground components for accurate consistent control and a long life. IP69K Tough coil compatibility continuously rated.

## Sectional view



## Performance data

### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

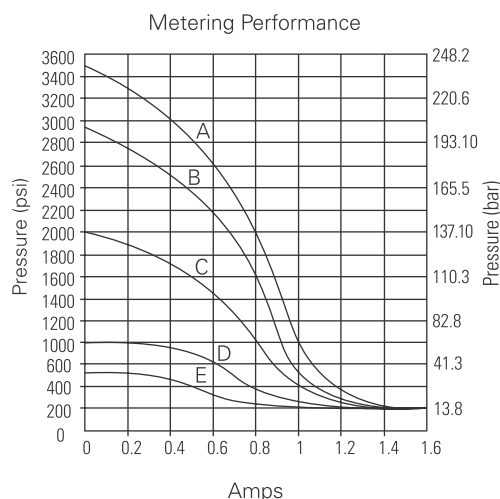
Typical application pressure	210 bar (3000 psi)
Cartridge endurance rating	1 million cycles
Cartridge fatigue pressure rating (NFPA/T2.6.1 R2-2000)	210 bar (3000 psi)
Maximum pressure setting range	35-210 bar (3000 psi)
Rated flow	1 L/min, (0.25 USgpm)
Nominal supply voltage	12/24 V
Temperature range	-30° to 90°C (-22° to 194°F)
Maximum oil temperature	120°C (248°F)
Maximum internal oil temperature	200°C (392°F)
Cavity	C-10-2
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum
Hysteresis	100 psi with dither
Weight cartridge only	0,13 kg (.3 lbs)
Seal kit	565803 (Buna-N), 566086 (Viton®)

Viton is a registered trademark of E.I. DuPont  
Endurance tested to 1 million cycles at full rated flow and pressure.

## Description

This is a proportionally controlled inverse pilot poppet relief valve. Ideal for use with logic elements to control fan or brush pressure where full speed or force is required under electrical failure.

## Pressure drop



### Pressure Differential

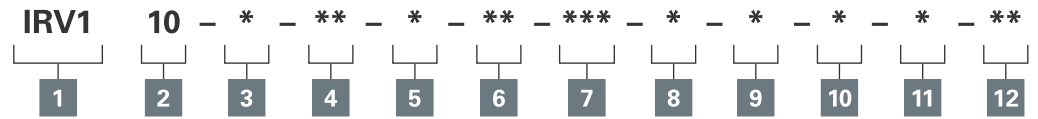
- A - 3500 psi
- B - 3000 psi
- C - 2000 psi
- D - 1000 psi
- E - 500 psi

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# IRV1-10 - Proportional valve

Proportional inverse relief, poppet  
1 L/min (.25 USgpm) • 210 bar (3000 psi)

## Model code



B

**1 Function**  
IRV1 - Inverse proportional relief

**2 Size**  
10 - 10 size

**3 Seal material**  
Blank - Buna-N  
V - Viton®

**4 Factory set pressure**  
User requested in **100 psi** increments. Max pressure setting range 500 - 3000 psi  
Example  
15 - 1500 psi  
30 - 3000 psi

**5 Housing material**  
Blank - Cartridge only  
A - Aluminum

**6 Port size**

Code	Port size	Housing number	
		Aluminum single Light duty	Aluminum single Fatigue rated
0	Cartridge only		
6T	SAE 6	566150	
8T	SAE 8	566151	
2G	1/4" BSPP		5986433-001
3G	3/8" BSPP		876703
6H	SAE 6		876700
8H	SAE 8		876701

See section J for housing details.

**7 Coil voltage**  
00 - No coil  
010 - 10VDC  
012 - 12VDC  
024 - 24VDC

**8 Type of power**  
Blank - No coil  
D - DC w/o diode  
B - DC with diode

**9 Connector type**  
Blank - No coil  
G - ISO 4400 DIN 43650  
Q - Spade Terminals  
W - Flying Lead  
N - Deutsch (DC only)  
Y - Amp JR (DC only)  
P - Conduit  
For coil part numbers and dimensions see section C.

**10 Coil series**  
Blank - No coil  
J - J Series, 20 W  
For coil part numbers and dimensions see section C.

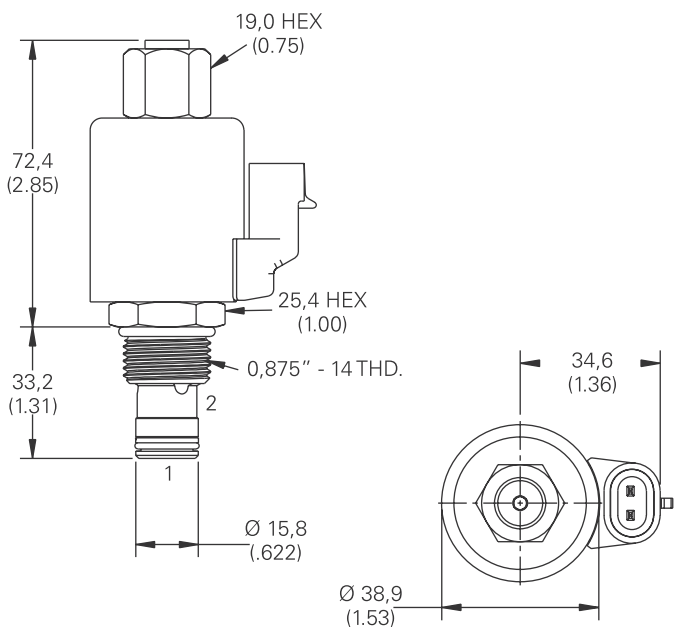
**11 Coil special features**  
Blank - No coil  
00 - No special feature

**12 Valve special features**  
Blank - No coil

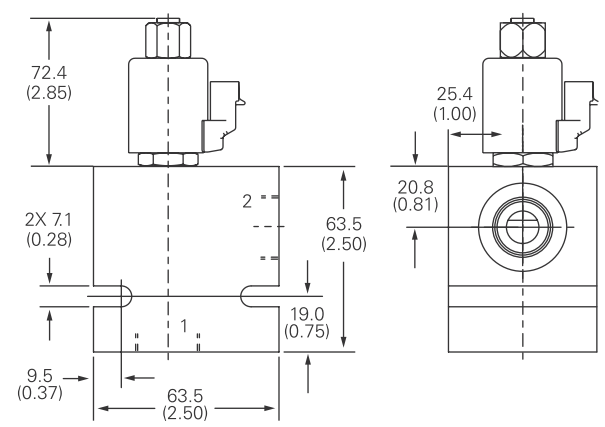
## Dimensions

mm (inch)

### Cartridge only



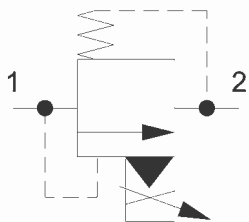
### Installation drawing



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# IRV2-10 - Proportional valve

Proportional inverse relief, Spool  
57 L/min (15 USgpm) • 240 bar (3500 psi)



## Operation

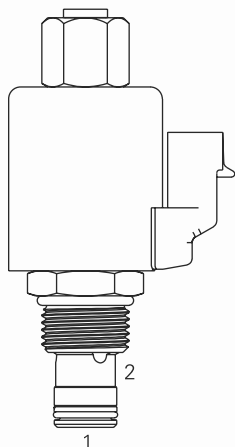
The IRV2-10 proportional relief is spring biased closed to highest setting. Increasing current to the coil will proportionally decrease the pressure setting.

This valve remains closed between port 1 and 2 until the predetermined pressure setting has been reached at port 1, overcoming the spring force and opening the spool to allow flow from port 1 to 2.

## Features

Hardened and ground components for accurate consistent control and a long life. Pilot style to give accurate pressure control over varying flows. IP9K Tough coil compatibility continuously rated.

## Profile view



## Performance data

### Ratings and specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

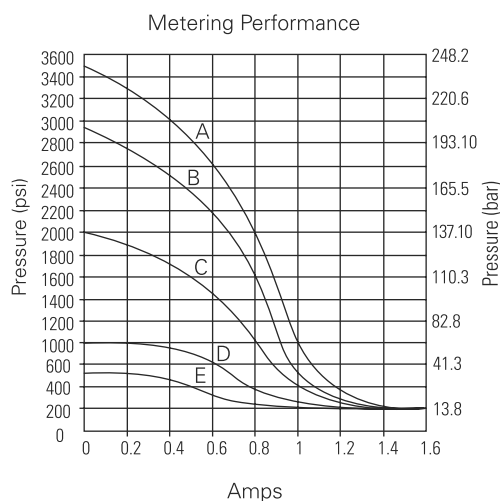
Typical application pressure (all ports)	240 bar (3500 psi)
Cartridge fatigue pressure (infinite life)	240 bar (3500 psi)
Maximum pressure setting range	35 bar to 240 bar (500 to 3500 psi)
Rated Flow	57 lpm ( 15 US gpm)
Nominal supply voltage	12/24 V
Cavity	C-10-2
Internal leakage, port 1 to port 2	114 cm <sup>3</sup> /min. (7 in <sup>3</sup> /min) @ 210 bar
Standard housing material	Aluminum or steel
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE10, SAE20 etc
Filtration	Cleanliness code 18/16/13
Temperature range	-40° to 120° C (-40° to 248° F)
Hysteresis	100 psi with dither
Weight cartridge only	0.13 kg (.3 lbs)
Seal Kit	565803 (Buna-N), 56086 (Viton®)

Viton is a registered trademark of E.I. DuPont.  
Endurance tested to 1 million cycles at full rated flow and pressure.

## Description

This is a inverse proportionally controlled spool type two stage relief valve. Ideal for use to control the fan drive or brush pressure where full speed or force is required under electrical failure.

## Pressure drop



### Pressure Differential

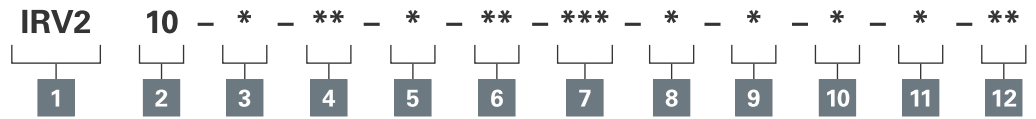
- A - 3500 psi
- B - 3000 psi
- C - 2000 psi
- D - 1000 psi
- E - 500 psi

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# IRV2-10 - Proportional valve

Proportional inverse relief, Spool  
57 L/min (15 USgpm) • 240 bar (3500 psi)

## Model code



### 1 Function

**IRV2** - Inverse proportional relief

### 2 Size

**10** - 10 size

### 3 Seal material

**Blank** - Buna-N  
**V** - Viton®

### 4 Factory set pressure

User requested in **100 psi** increments. Max pressure setting range 500 - 3000 psi

Example

**15** - 1500 psi  
**30** - 3000 psi

### 5 Housing material

**Blank** - Cartridge only  
**A** - Aluminum

### 6 Port size

Code	Port size	Housing number	
		Aluminum Single Light duty	Aluminum Single Fatigue rated
<b>0</b>	Cartridge only		
<b>6T</b>	SAE 6	566150	
<b>8T</b>	SAE 8	566151	
<b>2G</b>	1/4" BSPP		5986433-001
<b>3G</b>	3/8" BSPP		876703
<b>6H</b>	SAE 6		876700
<b>8H</b>	SAE 8		876701

See section J for housing details.

### 7 Coil voltage

**00** - No coil  
**010** - 10VDC  
**012** - 12VDC  
**024** - 24VDC

### 8 Type of power

**Blank** - No coil  
**D** - DC w/o diode  
**B** - DC with diode

### 9 Connector type

**Blank** - No coil  
**G** - ISO 4400 DIN 43650  
**Q** - Spade Terminals  
**W** - Flying Lead  
**N** - Deutsch (DC only)  
**Y** - Amp JR (DC only)  
**P** - Conduit

For coil part numbers and dimensions see section C.

### 10 Coil series

**Blank** - No coil  
**J** - J Series, 20 W

For coil part numbers and dimensions see section C.

### 11 Coil special features

**Blank** - No coil  
**00** - No special feature

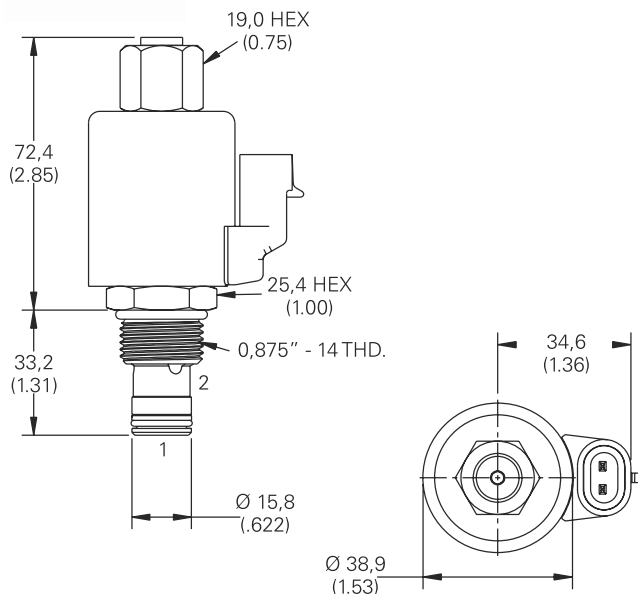
### 12 Valve special features

**Blank** - No coil

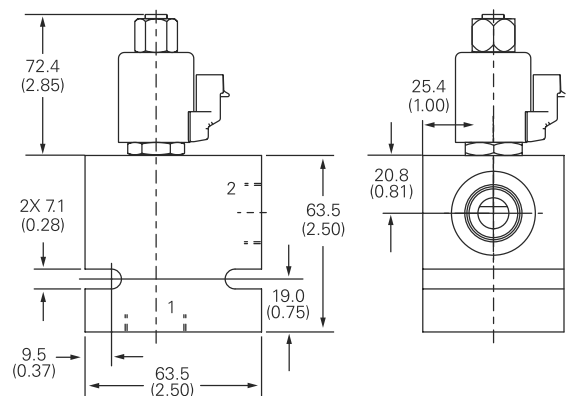
## Dimensions

mm (inch)

### Cartridge only



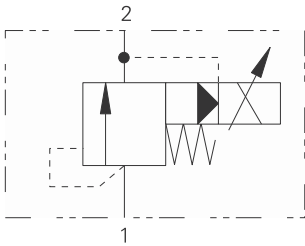
## Installation drawing



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ERV1-10 - Proportional valve

Proportional relief, spool  
3.8 - 6.0 L/min (1 - 15 USgpm) • 240 bar (3500 psi)



## Operation

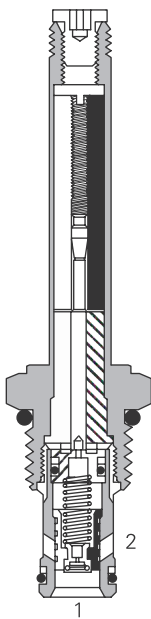
This valve remains closed between port 1 and 2 until the predetermined pressure setting has been reached

at port 1, overcoming the electrical force and opening the spool to allow flow from port 1 to port 2.

## Features

Hardened and ground components for accurate consistent control and a long life. Pilot style to give accurate pressure control over varying flows. IP69K Tough coil compatibility continuously rated.

## Sectional view



## Performance data

### Ratings and specifications

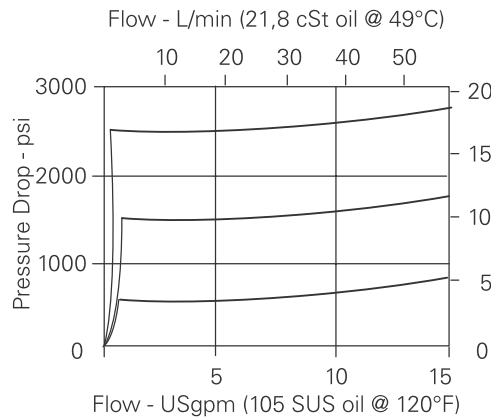
Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49°C (120°F)

Typical application pressure (all ports)	2-240 bar (30-3500 psi)
Cartridge fatigue pressure (infinite life)	240 bar (3500 psi)
Rated flow	3.8-60,0 L/min (1-15 USgpm)
Temperature range	-40° to 120°C (-40° to 248°F)
Cavity	C-10-2
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20 etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum
Weight including coil	0,44 kg (.98 lbs)
Seal kit	565803 (Buna-N), 889627 (Viton®)

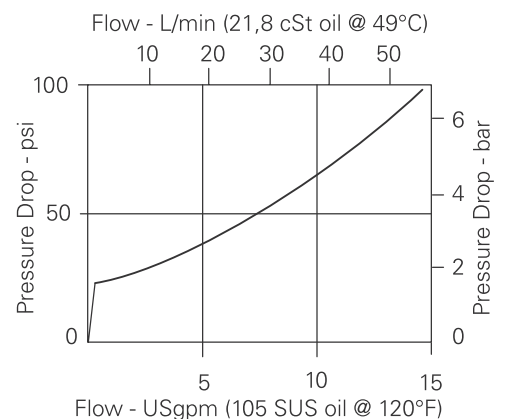
Viton is a registered trademark of E.I. DuPont

## Pressure drop curves

### Pressure override, energized



### Pressure override, de-energized



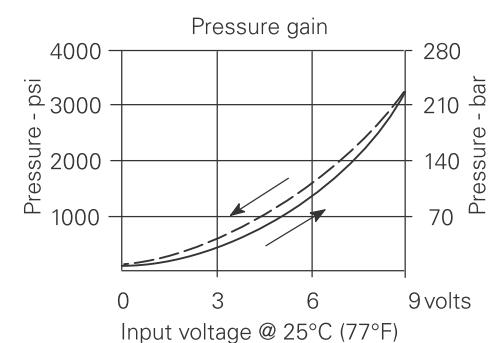
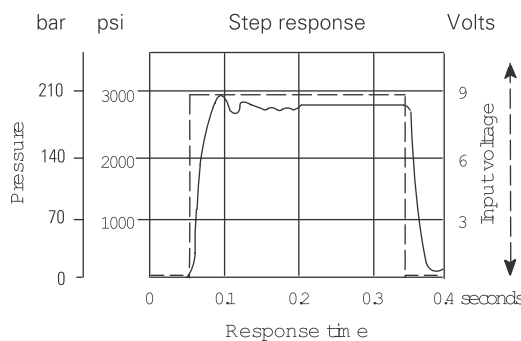
## Description

This is a proportional internally pilot operated screw in cartridge relief valve. Good control over large flows for the physical size of the cartridge. Ideal for the control of pressure under varying flow conditions.

## Performance curves

Zero outlet pressure

Cartridges only



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ERV1-10 - Proportional valve

Proportional relief, spool  
3.8 L/min (60 USgpm) • 240 bar (3500 psi)

## Model code



### 1 Function

ERV1 - Proportional relief valve

### 2 Size

10 - 10 size

### 3 Seal material

Blank - Buna-N  
V - Viton\*

### 4 Maximum pressure

Customer to specify settings in increments of 7 bar (100 psi) and coded in hundreds of psi within the 35-210 bar range (500-3000 psi) range.  
Example: 5-35,0 (500 psi)

### 5 Port size

Code	Port size	Housing number
		Aluminum single
0	Cartridge only	
6T	SAE 6	566151*
2G	1/4" BSPP	876702*
3G	3/8" BSPP	876703
6H	SAE 6	876700
8H	SAE 8	876701

\*Light duty housing.  
See section J for housing details.

### 6 Voltage rating

00 - No coil  
12D - 12VDC  
24D - 24VDC  
12B - 12VDC/w diode\*  
24B - 24VDC/w diode\*

\*Optional arc suppression diode.

**Note:** This valve uses the standard J series coils, see section C for coil part numbers and specifications.

### 7 Connector types

Blank - No coil  
G - DIN 43650  
Q - Spade Terminals  
W - Flying Lead  
N - Deutsch  
Y - Amp JR

For coil part numbers and dimensions see section C.

### 8 Special features

00 - None  
Only required if valve has special features, omitted if "00."

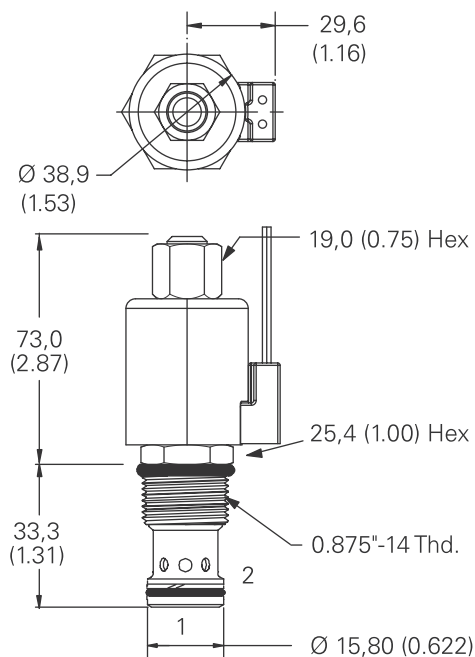
## Dimensions

mm (inch)

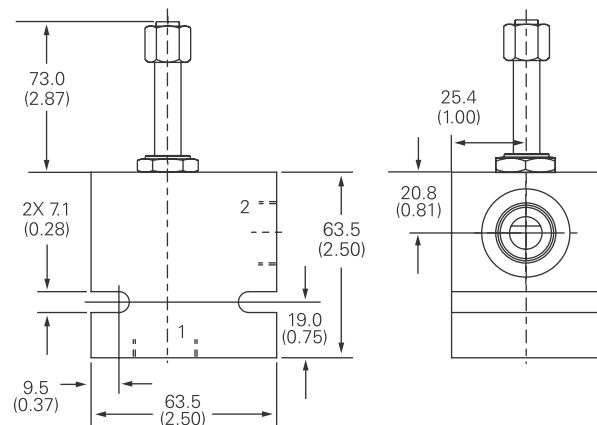
Torque cartridge in aluminum housing 47-54 Nm (35-40 ft lbs).

## Cartridge only

Valve is shown with "W" coil.



## Installation drawing



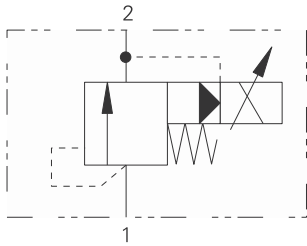
### Warning

Maintain 5-8 Nm (4-6 ft lbs) maximum torque on valve tube nut. Over tightening may cause valve failure.

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ERV1-16 - Proportional valve

Proportional relief, spool  
Up to 132 L/min (35 USgpm) • 210 bar (3000 psi)



## Operation

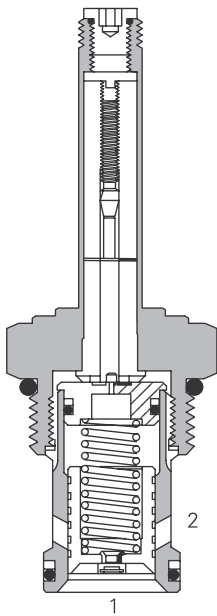
This valve remains closed between port 1 and 2 until the predetermined pressure setting has been reached

at port 1, overcoming the electrical force and opening the spool to allow flow from port 1 to port 2.

## Features

Hardened and ground components for accurate consistent control and a long life. Pilot style to give accurate pressure control over varying flows. IP69K Tough coil compatibility continuously rated.

## Sectional view



## Performance data

### Ratings and specifications

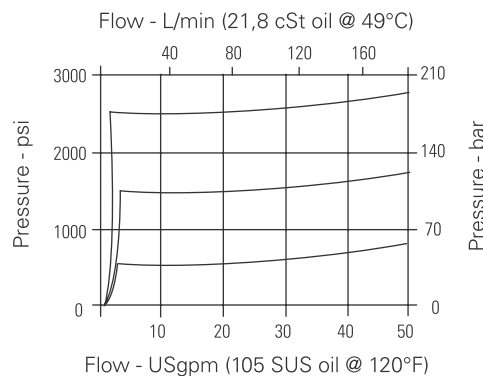
Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49°C (120°F)

Typical application pressure (all ports)	3,5-210 bar (50-3000 psi)
Cartridge fatigue pressure (infinite life)	210 bar (3000 psi)
Rated flow	7,6-132,0 L/min (2-35 USgpm)
Temperature range	-40° to 120°C (-40° to 248°F)
Cavity	C-16-2
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20 etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum
Weight including coil	0,44 kg (.98 lbs)
Seal kit	565810 (Buna-N), 889609 (Viton®)

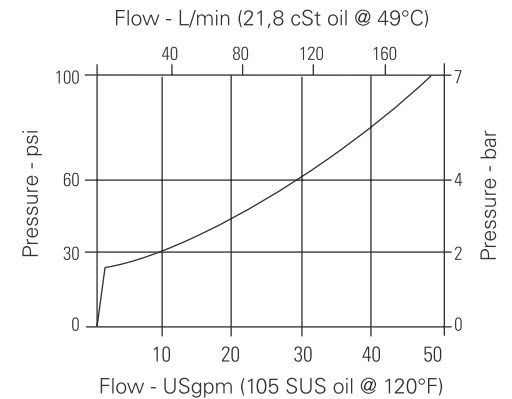
Viton is a registered trademark of E.I. DuPont

## Pressure drop curves

### Pressure override, energized



### Pressure override, de-energized



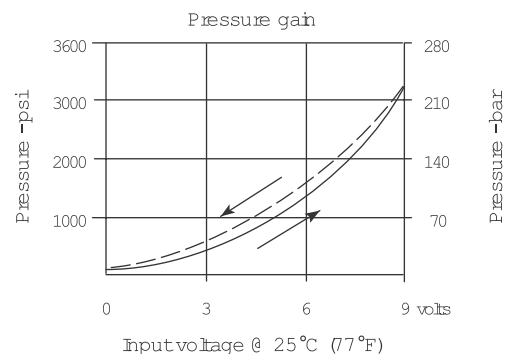
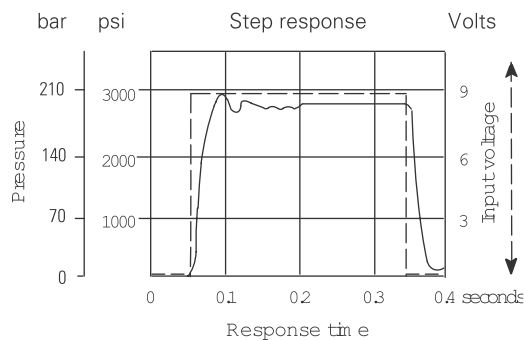
## Description

This is a proportional internally pilot operated screw in cartridge relief valve. Good control over large flows for the physical size of the cartridge. Ideal for the control of pressure under varying flow conditions.

## Performance curves

Zero outlet pressure

Cartridges only



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# ERV1-16 - Proportional valve

Proportional relief, spool

Up to 132 L/min (35 USgpm) • 210 bar (3000 psi)

## Model code



### 1 Function

ERV1 - Proportional relief valve

### 2 Size

16 - 16 size

### 3 Seal material

Blank - Buna-N  
V - Viton®

### 4 Maximum pressure

Customer to specify settings in increments of 7 bar (100 psi) and coded in hundreds of psi within the 35-210 bar range (500-3000 psi) range.

Example: 5-35,0 (500 psi)

### 5 Port size

Code	Port size	Housing number
Aluminum single		
0	Cartridge only	
12T	SAE 12	566149*
4G	1/2" BSPP	876716*
6G	3/4" BSPP	876718
10H	SAE 10	876717
12H	SAE 12	566113

\*Light duty housing.  
See section J for housing details.

### 6 Voltage rating

00 - No coil  
12D - 12VDC  
24D - 24VDC  
12B - 12VDC/w diode\*  
24B - 24VDC/w diode\*

\*Optional arc suppression diode.  
**Note:** This valve uses the standard J series coils, see section C for coil part numbers and specifications.

### 7 Connector types

Blank - No coil  
G - DIN 43650  
Q - Spade Terminals  
W - Flying Lead  
N - Deutsch  
Y - Amp JR

For coil part numbers and dimensions see section C.

### 8 Special features

00 - None

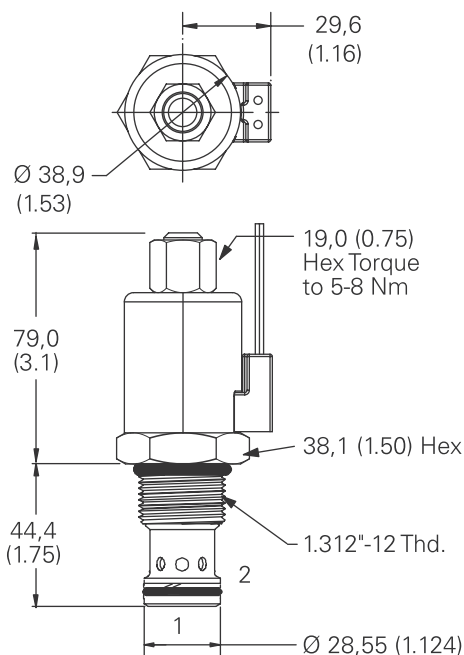
Only required if valve has special features, omitted if "00."

## Dimensions

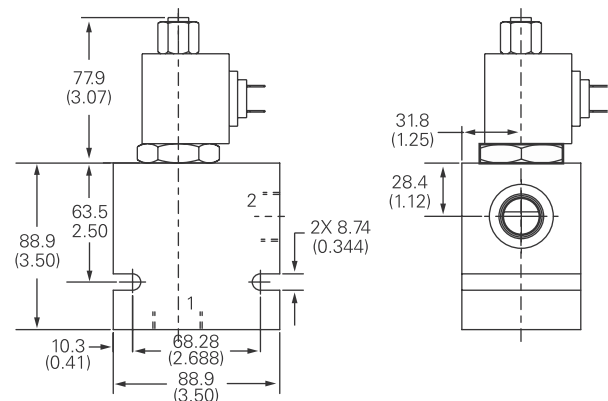
mm (inch)

Torque cartridge in aluminum housing 108-122 Nm (80-90 ft lbs).

### Cartridge only



### Installation drawing



### Warning

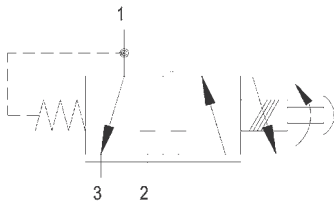
Maintain 5-8 Nm (4-6 ft lbs) maximum torque on valve tube nut. Over tightening may cause valve failure.

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.



# PPD22A - Proportional valve

Proportional reducing/relief, spool  
20 L/min (5.4 USgpm) • 210 bar (3000 psi)



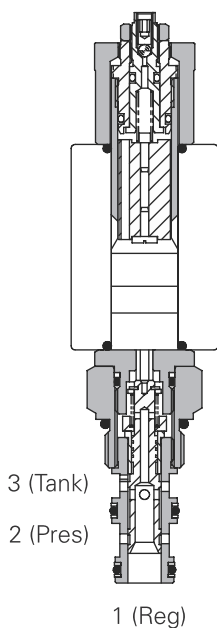
## Operation

In the de-energized position, pressure inlet port 2 is open to reduced pressure port 1, return port 3 is closed. As electrical current is increased, the setting of the valve increases allowing pressure at port 1 to increase. If the pressure at port 1 exceeds the setting of the valve, the spool will shift further and relieve to port 3.

## Features

- High flow capacity with reduced space requirements.
- No dynamic seals.
- Standard valve bodies and common cavities.
- One-piece encapsulated coil with minimal amperage draw.
- Oil immersed armature solenoid.
- Various coil terminals and voltages.
- Coil interchangeability with valves of same series.
- Manual override, seal variations and other options available.
- Sealed coil arrangement to protect stem from corrosion.

## Sectional view



## Performance data

### Ratings and specifications

Performance data is typical with fluid at 32 cST (150 SUS)

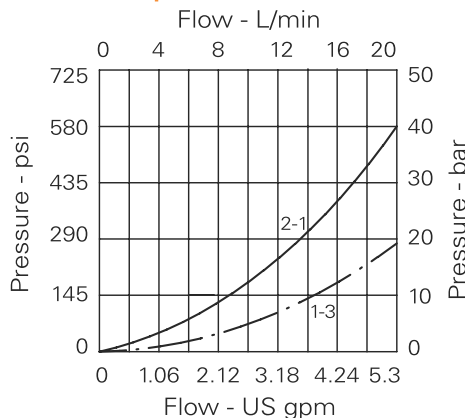
Max inlet pressure	210 bar (3000 psi)
Max regulated pressure	19 watt coil 24 bar, 29 watt coil 28 bar
Max flow	18.6 L/min (5 USgpm) 19 watt coil 20 L/min (5.4 USgpm) 29 watt coil
Hysteresis	16% max without PWM
Frequency	200 Hz
Dead band	19% approx
Response time	10 = 2-193 ms, 20 = 3-395 ms, 35 = 2-358 ms
Internal leakage	Up to 50 mL/min at 210 bar differential
Temperature range	-30° to 120°C (-22° to 248°F)
Cavity	A3531 (see Section M)
Torque cartridge into cavity	30 Nm (22 lbs ft)
Mounting position	Unrestricted
Fluids	All general purpose hydraulics fluids such as: MIL-H-5606, SAE 10, SAE 20, etc
Seal material	Standard nitrile with PTFE back up rings
Filtration	BS5540/4 Class 18/13 (25 micron or better)
Nominal viscosity range	15 to 250 cSt
Standard housing materials	Aluminium
Coil weight	.3 kg (.6 lbs)
Weight cartridge only	.25 kg (.55 lbs)
Seal kit	SK1119 (Nitrile) SK1119V (Viton®)
Coil part number	C16*-/19 (PPD21A) C16*-/29 (PPD21H)
Voltage available	12, 24 VDC

Viton is a registered trademark of E.I. DuPont

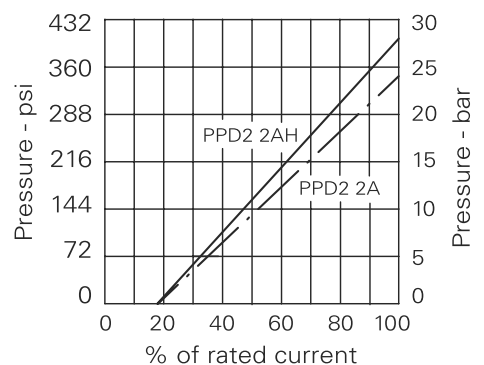
## Description

This is a low pressure proportional direct acting pressure reducing valve with a reverse relief screw in cartridge valve. It is ideal for the control of compensators on a pump or brake and clutch systems on a transmission circuit.

## Pressure Drop



## Performance curve

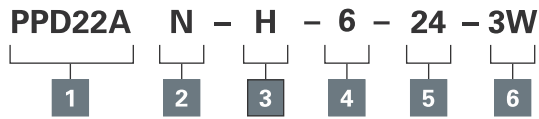


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# PPD22A - Proportional valve

Proportional Reducing/Relief, Spool  
 20 L/min (5.4 USgpm) • 210 bar (3000 psi)

## Model code



### 1 Function

**PPD22A** - Standard  
**PPD22H** - Heavy duty

### 2 Seal material

**N** - Nitrile  
**V** - Viton®

### 3 Coil termination

**H** - DIN43650  
**F** - Flying Lead  
**DM** - Deutsch moulded  
 Other terminations available on request.

### 4 Manual override

**6** - Screw Type Manual Override

### 5 Voltage

**12** - 12 VDC  
**24** - 24 VDC

### 6 Port size

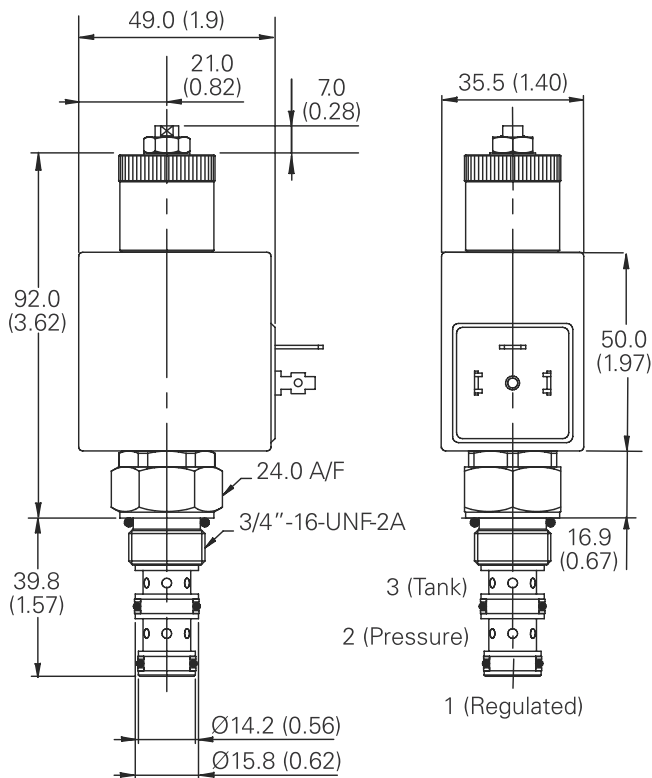
Code	Port size	Housing number
Aluminum single		
<b>0</b>	Cartridge only	
<b>2W</b>	1/4" BSP	A7724
<b>3W</b>	3/8" BSP	A6684
<b>6T</b>	3/8" SAE	B6516

See section J for housing details.

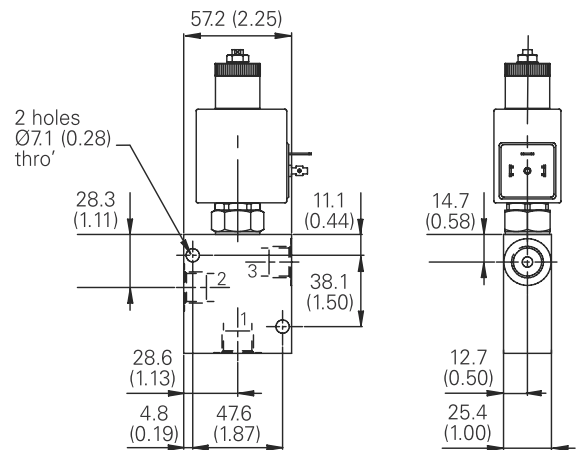
## Dimensions

mm (inch)

### Cartridge only



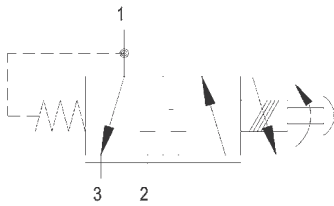
### Installation drawing



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPRV2-8 - Proportional valve

Proportional reducing/relief, spool  
7.6 L/min (2 USgpm) • 35 bar (500 psi)



## Operation

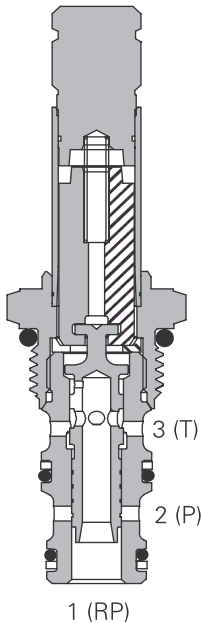
In the de-energized position, pressure inlet port 2 is closed and reduced pressure port 1 is open to return port 3. As electrical current is increased, port 2 opens to port 1 and port 3 closes, proportionally increasing pressure at port 1.

If the pressure at port 1 exceeds the setting of the valve, the spool will shift further and relieve to port 3.

## Features

Hardened and ground components for accurate consistent control and a long life. IP69K Tough coil compatibility continuously rated.

## Sectional view



## Performance data

### Ratings and specifications

Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49°C (120°F)

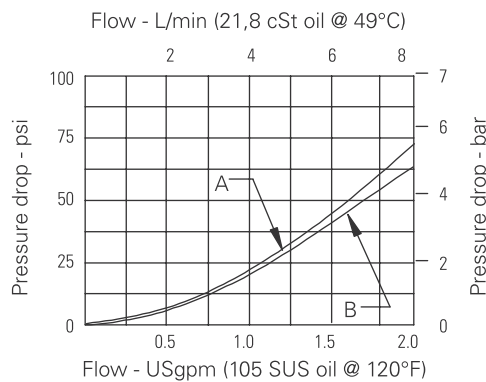
Maximum inlet pressure	35 bar (500 psi)
Cartridge fatigue pressure (infinite life)	35 bar (500 psi)
Reduced pressure range	0-22 bar (0-320 psi)
Maximum operating flow	7,6 L/min (2 USgpm)
Temperature range	-40° to 120°C (-40° to 248°F)
Cavity	C-8-3
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20 etc.
Filtration	Cleanliness code 18/16/13
Recommended PWM frequency	150 Hz
Hysteresis @ 150 Hz PWM	5%
Housing material (standard)	Aluminum
Weight including coil	0,29 kg (.64 lbs)
Seal kit	02-179451 (Buna-N), 02-179452 (Viton®)

Viton is a registered trademark of E.I. DuPont

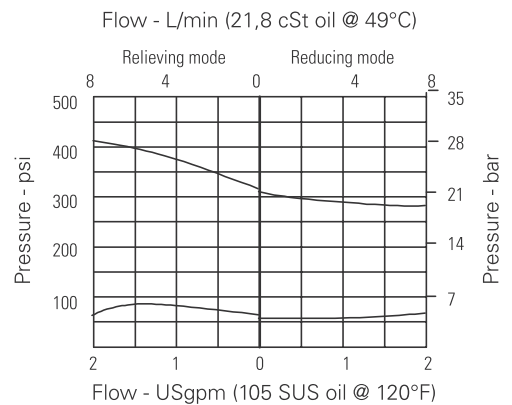
## Description

This is a low pressure proportional direct acting pressure reducing valve with a reverse relief screw in cartridge valve. It is ideal for the control of compensators on a pump or brake and clutch systems on a transmission circuit.

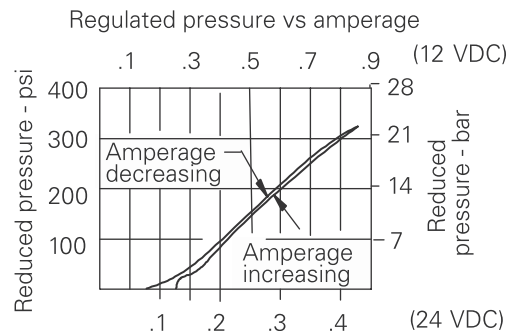
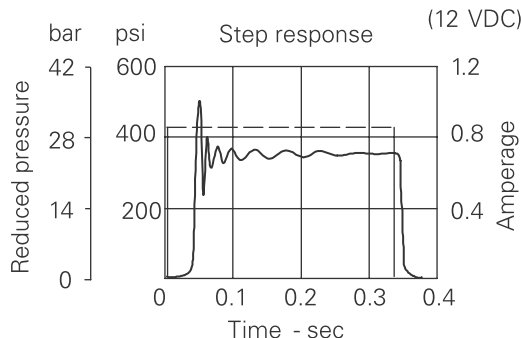
## Pressure drop curves



A - Port 1 to port 3    B - Port 2 to port 1



## Performance curves

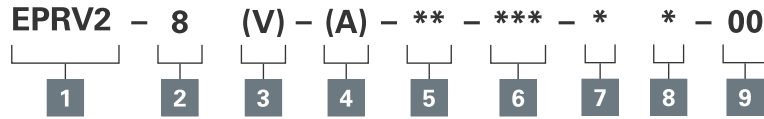


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPRV2-8 - Proportional valve

Proportional reducing/relief, spool  
7.6 L/min (2 USgpm) • 35 bar (500 psi)

## Model code



### 1 Function

**EPRV2** - Proportional reducing/relieving valve

### 2 Size

**8** - 8 size

### 3 Seal material

**Blank** - Buna-N  
**V** - Viton®

### 4 Valve housing material

Omit for cartridge only  
**A** - Aluminum

### 5 Port size

Code	Port size	Housing number
Aluminum single		
<b>0</b>	Cartridge only	
<b>4T</b>	SAE 4	02-160741
<b>6T</b>	SAE 6	02-160742
<b>2G</b>	1/4" BSPP	02-160739
<b>3G</b>	3/8" BSPP	02-160740

See section J for housing details.

### 6 Voltage rating

**00** - No coil  
**12D** - 12VDC  
**24D** - 24VDC  
**12B** - 12VDC/w diode\*  
**24B** - 24VDC/w diode\*

\*Optional arc suppression diode.

**Note:** This valve uses the standard S series coils, see section C for coil part numbers and specifications.

### 7 Connector types

**Blank** - No coil  
**G** - DIN 43650  
**Q** - Spade Terminals  
**W** - Flying Lead  
**N** - Deutsch  
**Y** - Amp JR

For coil part numbers and dimensions see section C.

### 8 Coil

**S** - S series coils

### 9 Special features

**00** - None

Only required if valve has special features, omitted if "00."

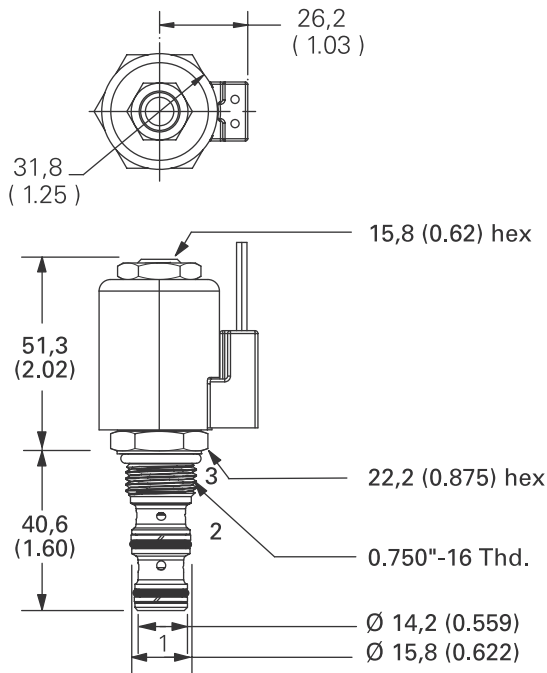
## Dimensions

mm (inch)

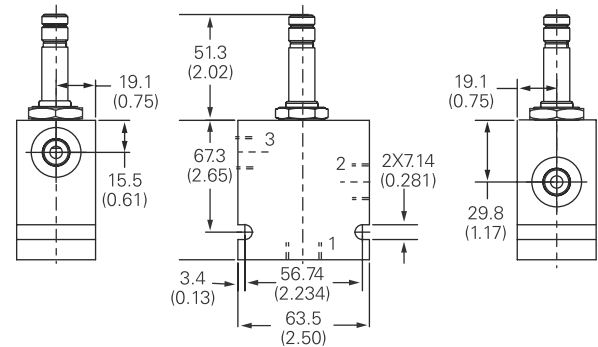
Torque cartridge in aluminum or steel housing 34-41 Nm (25-30 ft lbs)

## Cartridge only

Valve is shown with "N" coil.



## Installation drawing



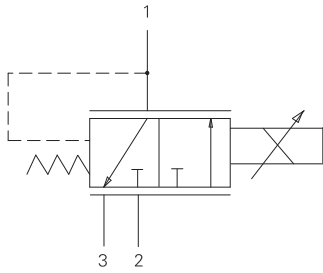
### Warning

Maintain 5-8 Nm (4-6 ft lbs) maximum torque on valve tube nut. Over tightening may cause valve failure.

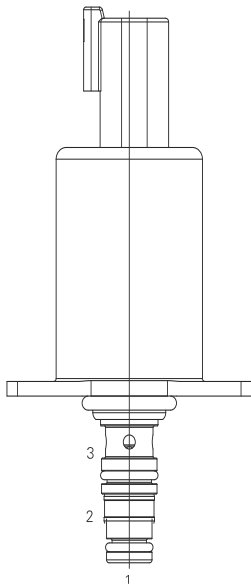
Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPPV5 - Proportional Valve

Proportional pressure reducing valve  
8.0 L/min (2.1 USgpm) • 50 bar (725 psi)



## Profile view



## Operation

In the de-energized position, pressure inlet port 2 is closed and reduced pressure port 1 is open to return port 3. As electrical current is increased, port 2 opens to port 1 and port 3 closes, proportionally increasing pressure at port 1.

If the pressure at port 1 exceeds the setting of the valve, the spool will shift further and relieve to port 3.

## Features

- Compact design allows for more flexible machine design
- Excellent repeatability, hysteresis and resolution due to bearing design
- Quality standard reduces maintenance and downtime costs

## Performance data

### Ratings and Specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

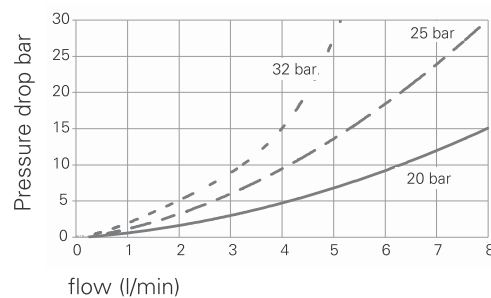
Maximum inlet pressure, A(1) and P(2)	50 bar (725 psi)
Maximum inlet pressure, Tank (3)	30 bar (425 psi)
Reduced pressure range	In accordance with control pressure range in model code
Maximum operating flow	8.0 L/min (2 USgpm)
Temperature range	-40° to 105°C (-40° to 221°F)
Cavity	TC06025
Fluids	Mineral oil according to DIN 51524
Filtration	Cleanliness code 20/18/15
Recommended PWM frequency	100 Hz
Hysteresis @100 Hz PWM	<0.7 bar (pA = 20)
	<1.0 bar (pA = 25)
	<1.5 bar (pA = 35)
Resistance	4.72 ohms +/-5% for 12V
	20.8 ohms +/-5% for 24V
Current	1500 mA for 12V 750 mA for 24V
Protection class	Up to IP6K6 / IPX9K

## Description

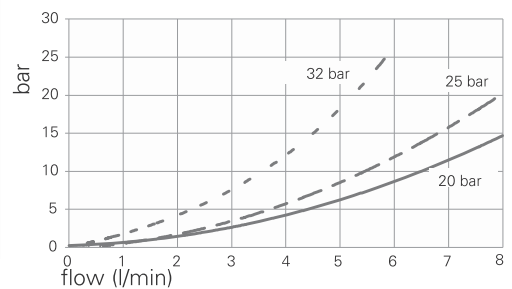
This is a low pressure proportional direct acting pressure reducing cartridge valve. It is ideal for the control of compensators on a pump or brake, proportional valve spool and clutch systems on a transmission circuit .

## Pressure drop curves

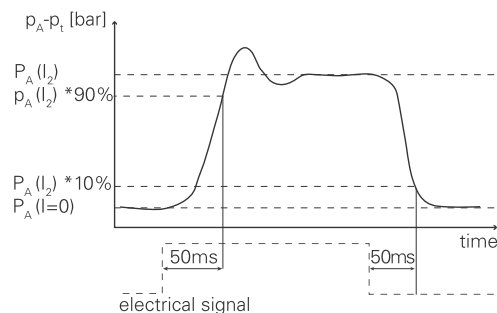
Port A to T



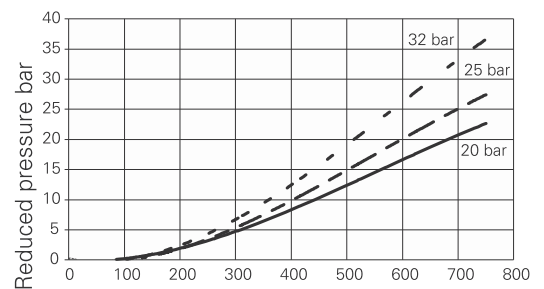
Port P to A



## Performance curves



## Regulated pressure vs. amperage

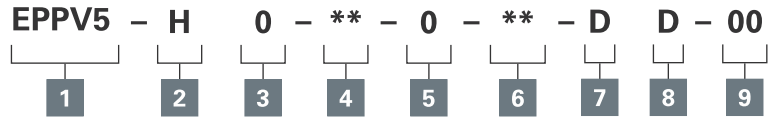


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPPV5 - Proportional Valve

Proportional pressure reducing valve/relief, spool  
8.0 L/min (2.1 USgpm) • 50 bar (725 psi)

## Model code



### 1 Function

**EPPV5** - Proportional pressure reducing valve

### 2 Seal material

**H** - Buna-HBNR

### 3 Manual override Option

**0** - Manual override not available

### 4 Control pressure

**20** - 20 bar (290 psi)  
**25** - 25 bar (360 psi)  
**32** - 32 bar (460 psi)

### 5 Port size

Code	Port size
<b>0</b>	Cartridge only

### 6 Voltage Rating

**12** - 12V  
**24** - 24V

### 7 Voltage type

**D** - DC

### 8 Connector type

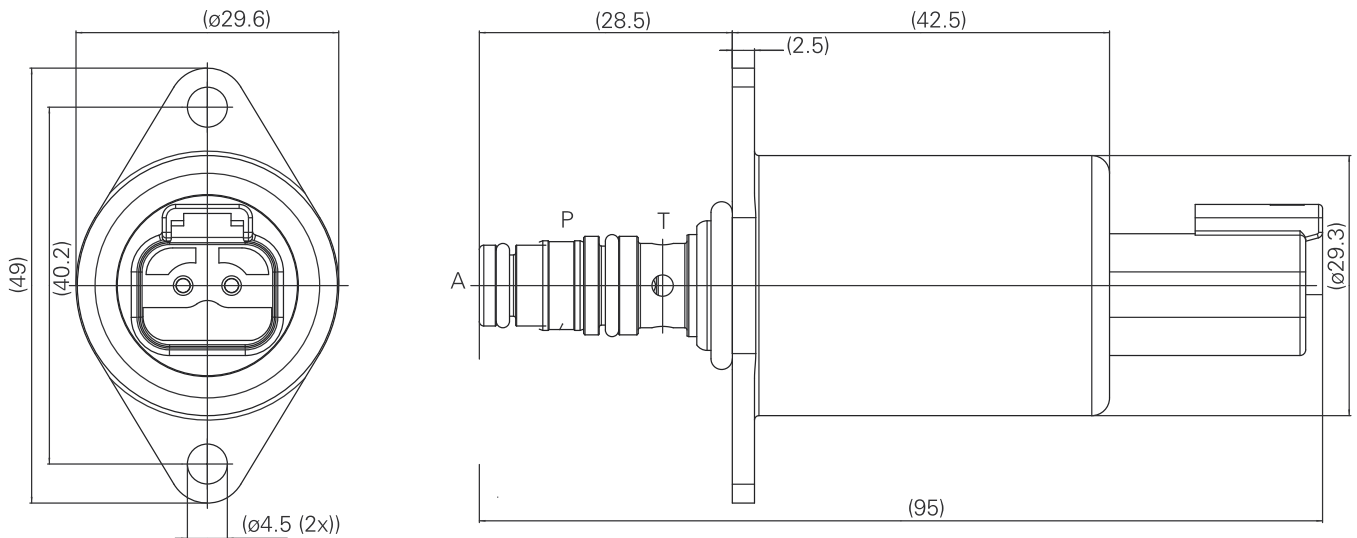
**N** - Deutsch DT04-2P

### 9 Special features

**00** - None

## Cartridge only

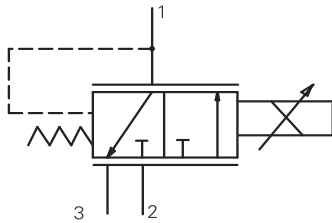
Dimensions (mm)



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPPV6 - Proportional Valve

Proportional pressure reducing valve  
8.0 L/min (2.1 USgpm) • 50 bar (725 psi)



## Operation

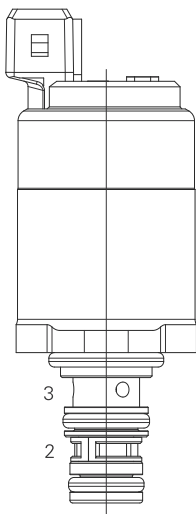
In the de-energized position, pressure inlet port 2 is closed and reduced pressure port 1 is open to return port 3. As electrical current is increased, port 2 opens to port 1 and port 3 closes, proportionally increasing pressure at port 1.

If the pressure at port 1 exceeds the setting of the valve, the spool will shift further and relieve to port 3.

## Features

- Compact design allows for more flexible machine design
- Excellent repeatability, hysteresis and resolution due to bearing design
- Quality standard reduces maintenance and downtime costs
- Available with manual override option

## Profile view



## Performance data

### Ratings and Specifications

Performance data is typical with fluid at 21,8 cST (105 SUS) and 49°C (120°F)

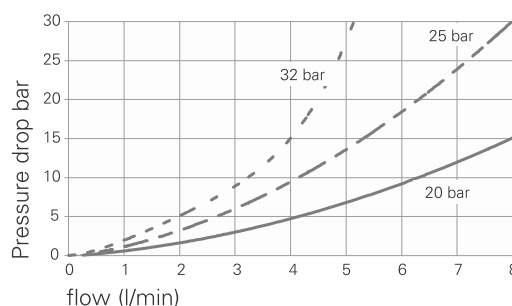
Maximum inlet pressure, A(1) and P(2)	50 bar (725 psi)
Maximum inlet pressure, Tank (3)	30 bar (425 psi)
Reduced pressure range	In accordance with control pressure range in model code
Maximum operating flow	8.0 L/min (2.1 USgpm)
Temperature range	-40° to 105°C (-40° to 221°F)
Cavity	TC06023
Fluids	Mineral oil according to DIN 51524
Filtration	Cleanliness code 20/18/15
Recommended PWM frequency	100 Hz
Hysteresis @100 Hz PWM	<0.7 bar (pA = 20) <1.0 bar (pA = 25) <1.5 bar (pA = 35)
Resistance	5.3 ohms +/-5% for 12V 21.2 ohms +/-5% for 24V
Current	1500 mA for 12V 750 mA for 24V
Protection class	Up to IP6K6 / IPX9K

## Description

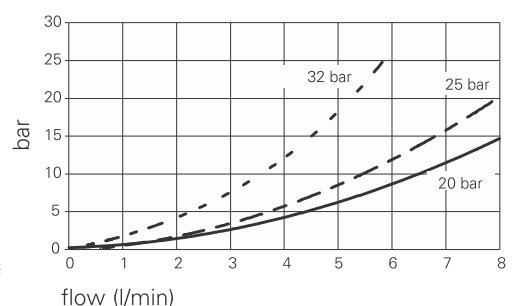
This is a low pressure proportional direct acting pressure reducing cartridge valve with manual override available. It is ideal for the control of compensators on a pump or brake and clutch systems on a transmission circuit.

## Pressure drop curves

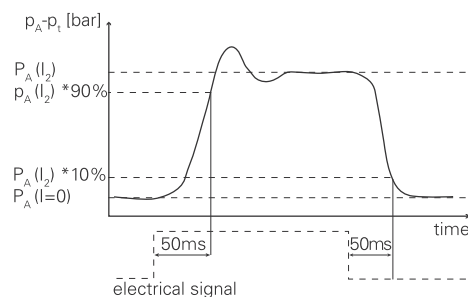
Port A to T



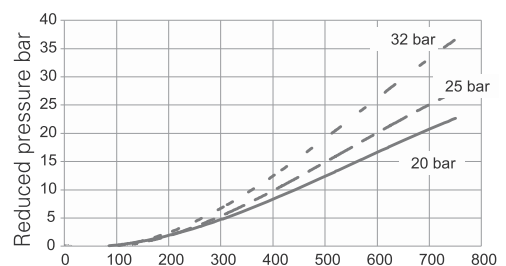
Port P to A



## Performance curves



## Regulated pressure vs. amperage

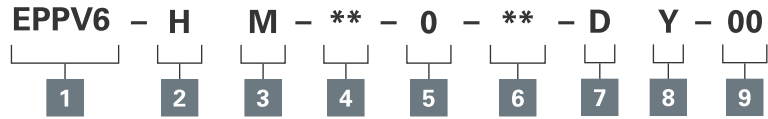


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPPV6 - Proportional Valve

Proportional pressure reducing valve/relief, spool  
 8.0 L/min (2.1 USgpm) • 50 bar (725 psi)

## Model code



### 1 Function

**EPPV6** - Proportional pressure reducing valve

### 4 Control pressure

**20** - 20 bar (290 psi)  
**32** - 32 bar (460 psi)

### 6 Voltage rating

**12** - 12V  
**24** - 24V

### 2 Seal material

**Blank** - NBR Buna

### 5 Port size

Code	Port size
<b>0</b>	Cartridge only

### 7 Voltage type

**D** - DC

### 3 Manual override option

**M**- with manual override

### 8 Connector type

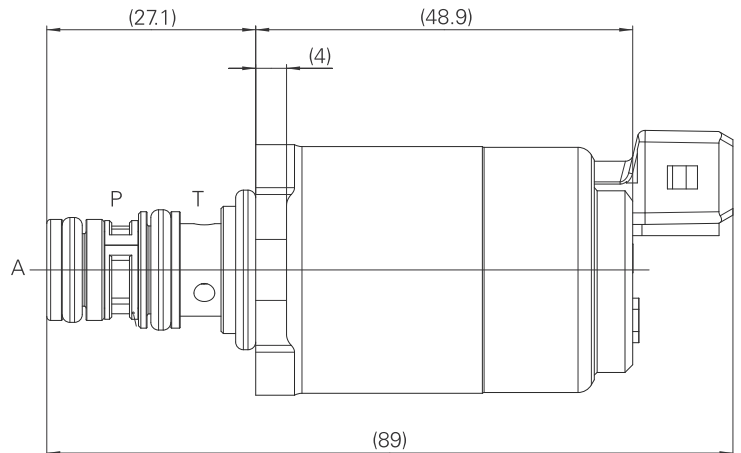
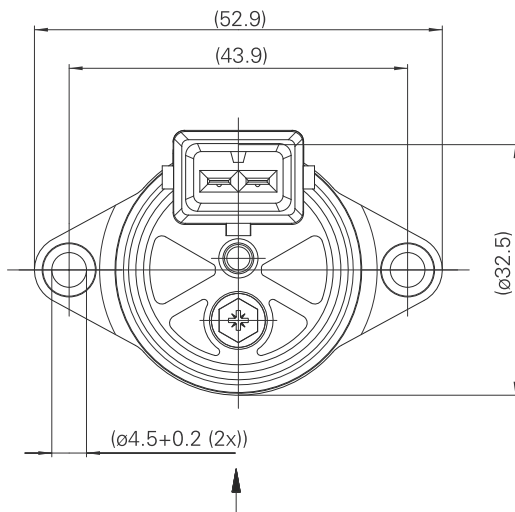
**Y** - AMP Jr Power Timer

### 9 Special features

**00** - None

## Cartridge only

Dimensions (mm)



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.



# EPRV1-10 - Proportional valve

Proportional reducing/relief, spool  
7.6 L/min (2 USgpm) • 35 bar (500 psi)

## Description

The EPRV1-10 is an electric, proportionally controlled, internally pilot operated, spool type, screw-in relief valve.

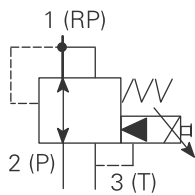
## Operation

This valve remains open from port 2 to port 1 (port 3 must be vented). Once the predetermined pressure is reached

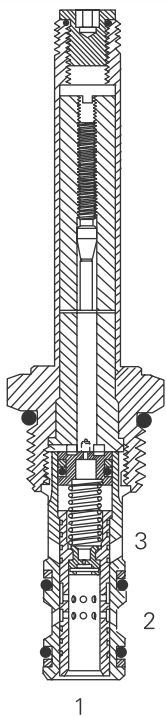
at port 1, the spool shifts to restrict the inlet flow at port 2, which regulates the pressure at port 1.

If the pressure at port 1 exceeds the setting of the valve, the spool will shift farther and relieve to port 3.

## Functional symbol



## Sectional view



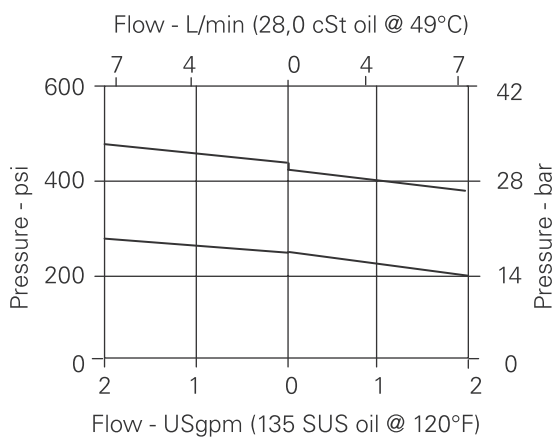
## Ratings and specifications

Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49°C (120°F)

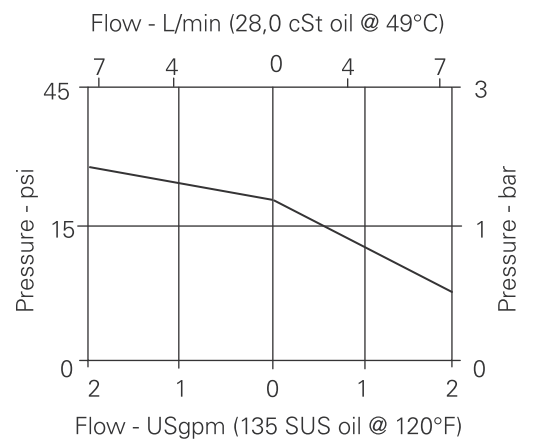
Typical application pressure (all ports)	3,5 - 35 bar (50 - 500 psi)
Cartridge fatigue pressure (infinite life)	35 bar (500 psi)
Rated flow	0 - 7,6 L/min (0 - 2.0 USgpm)
Cavity	C-10-3
Standard housing materials	Aluminum
Temperature range	-40° to 120°C (-40° to 248°F)
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Weight cartridge and coil	0,44 kg (0.98 lbs)
Seal kits	565804 (Buna-N) 889599 (Viton®) Viton is a registered trademark of E.I. DuPont

## Pressure override characteristics

Pressure override, energized



Pressure override, de-energized

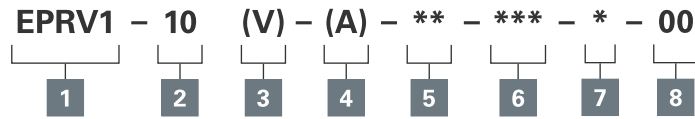


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPRV1-10 - Proportional valve

Proportional reducing/relief, spool  
7.6 L/min (2 USgpm) • 35 bar (500 psi)

## Model code



### 1 Function

**EPRV1** - Proportional reducing/relieving valve

### 2 Size

**10** - 10 size

### 3 Seal material

**Blank** - Buna-N  
**V** - Viton\*

### 4 Maximum pressure (factory set)

Customer to specify settings in increments of 7 bar (100 psi) and coded in hundreds of psi within the 14-35 bar range (200-500 psi) range.

Example: **5** - 35,0 (500 psi)

### 5 Port size

**0** - Cartridge only

Code	Port size	Housing number
<b>3B</b>	3/8" BSPP	02-173358*
<b>6T</b>	SAE 6	566162*
<b>2G</b>	1/4" BSPP	876702
<b>3G</b>	3/8" BSPP	876714
<b>6H</b>	SAE 6	876704
<b>8H</b>	SAE 8	876711

\*Light duty housing.  
See section J for housings.

### 6 Voltage rating

**00** - No coil  
**12D** - 12VDC  
**24D** - 24VDC  
**12B** - 12VDC/w diode\*  
**24B** - 24VDC/w diode\*

\*Optional arc suppression diode.  
**Note:** This valve uses the standard J series coils, see section C for coil part numbers and specifications.

### 7 Connector types

**Blank** - No coil  
**G** - DIN 43650  
**Q** - Spade Terminals  
**W** - Leadwire  
**N** - Deutch  
**Y** - Amp JR

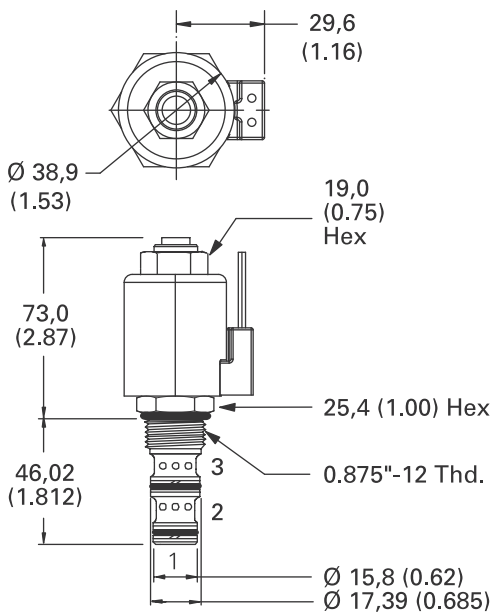
### 8 Special features

**00** - None  
(Only required if valve has special features, omitted if "00.")

## Dimensions

mm (inch)

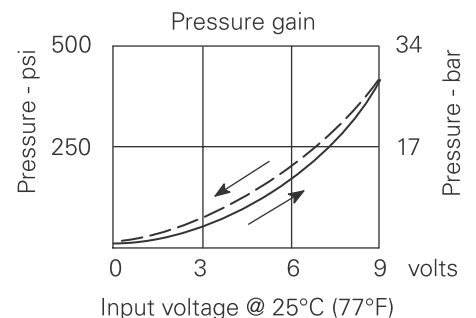
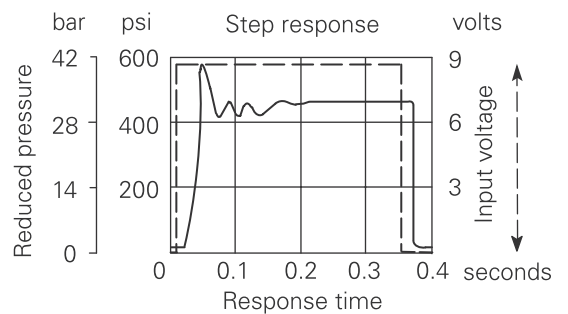
Torque cartridge in aluminum housing 47-54 Nm (35-40 ft. lbs)



Valve is shown with "W" coil.

## Performance Characteristics

Cartridges only  
Zero outlet pressure



## Warning

Maintain 5-8 Nm(4-6 ft lbs) maximum torque on valve tube nut. Over tightening may cause valve failure.

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPRV3-10- Proportional valve

Proportional reducing/relief, spool  
30 L/min (8 USgpm) • 207 bar (3000 psi)

## Description

The EPRV3-10 is an electric, proportionally controlled, internally pilot operated, spool type, screw-in relief valve.

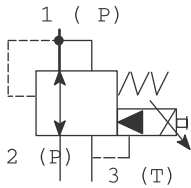
## Operation

This valve remains open from port 2 to port 1 (port 3 must be vented). Once

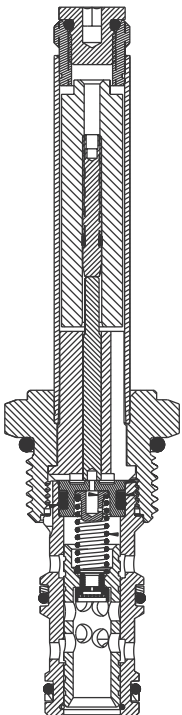
the predetermined pressure is reached at port 1, the spool shifts to restrict the inlet flow at port 2, which regulates the pressure at port 1.

If the pressure at port 1 exceeds the setting the valve, the spool will shift farther and relieve to port 3.

## Functional symbol



## Sectional view



## Ratings and specifications

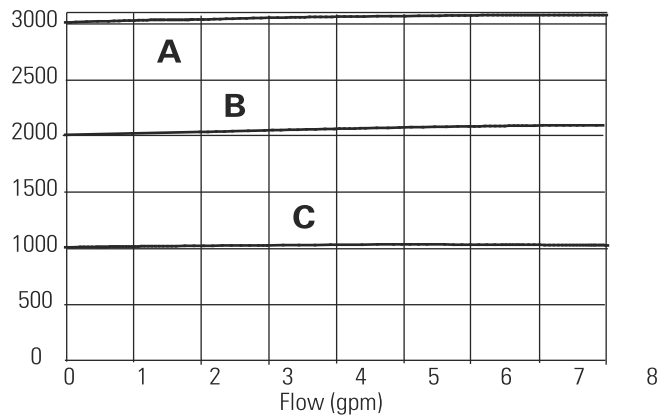
Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49°C (120°F)

Typical application pressure (all ports)	3,5 - 207 bar (50 - 3000 psi)
Maximum Inlet Pressure	240 bar (3500 psi)
Cartridge fatigue pressure (infinite life)	207 bar (3000 psi)
Rated flow	30 L/min (8 USgpm)
Cavity	C-10-3
Standard housing materials	Aluminum
Temperature range	-40° to 120°C (-40° to 248°F)
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Weight cartridge and coil	0,44 kg (0.98 lbs)
Seal kits	565804 (Buna-N) 889599 (Viton®)

Viton is a registered trademark of E.I. DuPont

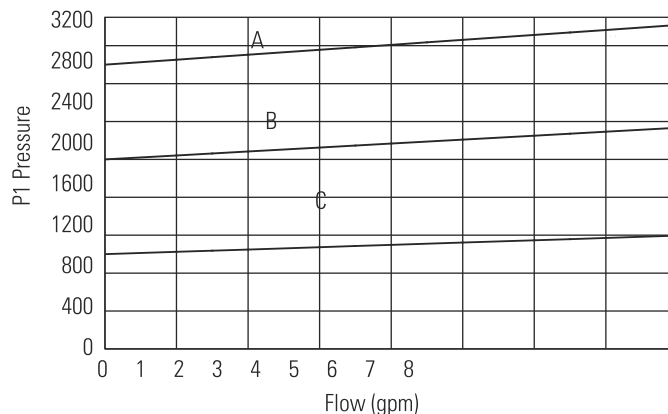
## Pressure override characteristics

Pressure override, energized



A – EPRV3-10X-30-0-00  
B – EPRV3-10X-20-0-00  
C – EPRV3-10X-10-0-00

Pressure override, de-energized



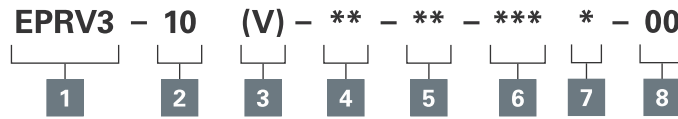
A – EPRV3-10X-30-0-00  
B – EPRV3-10X-20-0-00  
C – EPRV3-10X-10-0-00

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPRV3-10- Proportional valve

Proportional reducing/relief, spool  
30 L/min (8 USgpm) • 207 bar (3000 psi)

## Model code



B

### 1 Function

**EPRV3** - Proportional reducing/relieving valve

### 2 Size

**10** - 10 size

### 3 Seals

**Blank** - Buna-N  
**V** - Viton®

### Warning

Maintain 5-8 Nm (4-6 ft. lbs) maximum torque on valve tube nut. Over tightening may cause valve failure.

### 4 Maximum pressure (factory set)

Customer to specify settings in increments of 7 bar (100 psi) and coded in hundreds of psi within the 35-207 bar range (500-3000 psi) range.  
Example: **5** - 35,0 (500 psi)

### 6 Voltage rating

**00** - No coil  
**012D** - 12VDC  
**024D** - 24VDC  
**012B** - 12VDC/w diode\*  
**024B** - 24VDC/w diode\*

\*Optional arc suppression diode.  
Note: This valve uses the standard J series coils, see section C for coil part numbers and specifications.

### 5 Port size

**0** - Cartridge only

Code	Port size	Housing number
<b>A3B</b>	3/8" BSPP	02-173358*
<b>A6T</b>	SAE 6	566162*
<b>A2G</b>	1/4" BSPP	876702
<b>A3G</b>	3/8" BSPP	876714
<b>A6H</b>	SAE 6	876704
<b>A8H</b>	SAE 8	876711

\*Light duty housing.  
See section J for housings.

### 7 Connector types

**Blank** - No coil  
**G** - DIN 43650  
**Q** - Spade Terminals  
**W** - Leadwire  
**N** - Deutch  
**Y** - Amp JR

### 8 Coil series

**Blank** - No coil  
**J** - J series coil

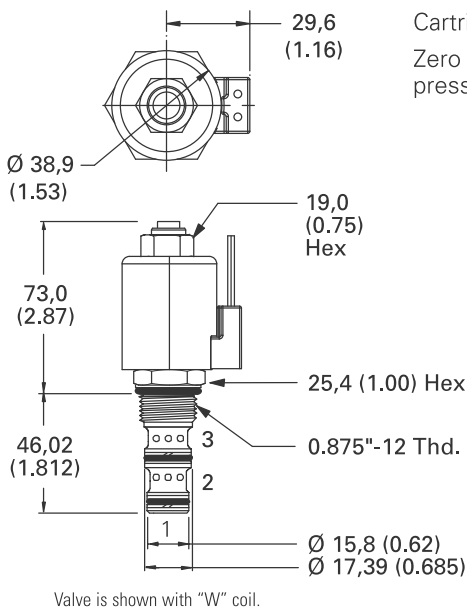
### 9 Coil special features

**00** - None  
(Only required when valve has special features, omitted if "00.")

## Dimensions

mm (inch)

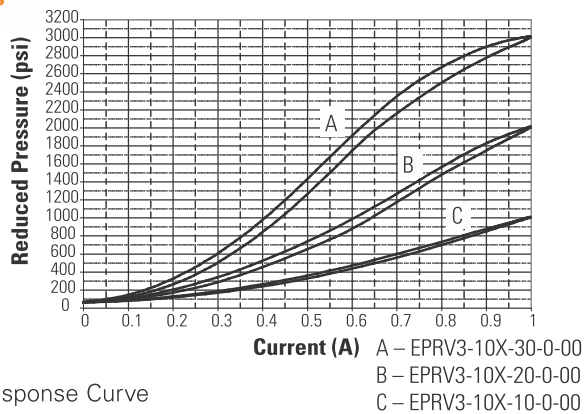
Torque cartridge in aluminum housing 47-54 Nm (35-40 ft. lbs).



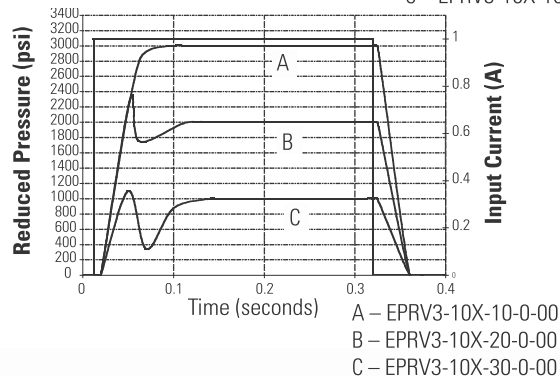
## Performance Characteristics

Cartridges only  
Zero outlet pressure

Pressure vs. Current



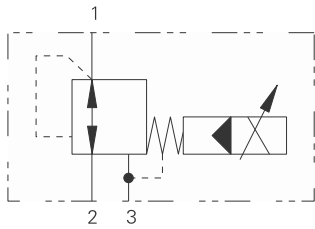
Step Response Curve



Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPRV1-16 - Proportional valve

Proportional reducing/relief, spool  
38 L/min (10 USgpm) • 35 bar (500 psi)



## Operation

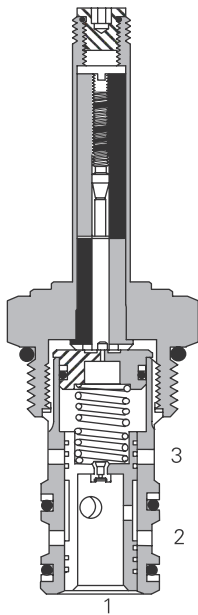
This valve remains open from port 2 to port 1 (port 3 must be vented). Once the predetermined pressure is reached at port 1, the spool shifts to restrict the inlet flow at port 2, which regulates the pressure at port 1.

If the pressure at port 1 exceeds the setting of the valve, the spool will shift farther and relieve to port 3.

## Features

Hardened and ground components for accurate consistent control and a long life. IP69K Tough coil compatibility continuously rated.

## Sectional view



## Performance data

### Ratings and specifications

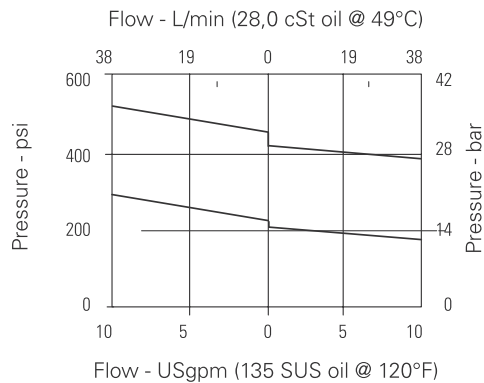
Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49°C (120°F)

Typical application pressure (all ports)	3,5-35 bar (0-500 psi)
Cartridge fatigue pressure (infinite life)	35 bar (500 psi)
Rated flow	0-38,0 L/min (0-10 USgpm)
Temperature range	-40° to 120°C (-40° to 248°F)
Cavity	C-16-3
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20 etc.
Filtration	Cleanliness code 18/16/13
Housing material (standard)	Aluminum
Weight including coil	0,9 kg (2.00 lbs)
Seal kit	565811 (Buna-N), 889599 (Viton®)

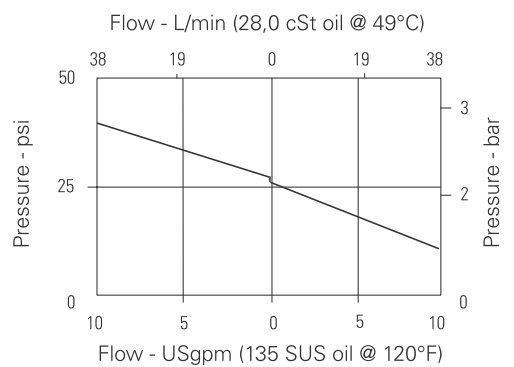
Viton is a registered trademark of E.I. DuPont.

## Pressure drop curves

### Pressure override, energized



### Pressure override, de-energized

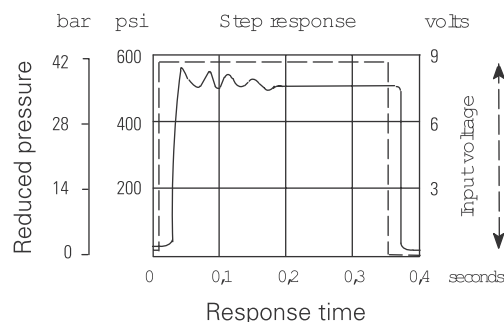


## Description

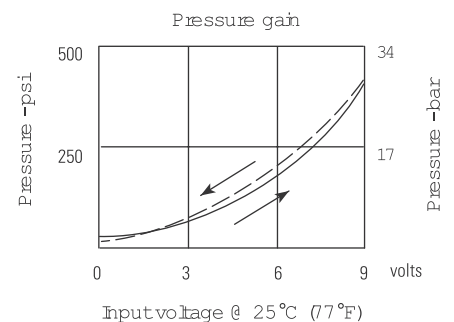
This is a low pressure proportional pilot operated pressure reducing valve with a reverse relief screw in cartridge valve. It is ideal for the control of compensators on a pump or brake and clutch systems on a transmission circuit.

## Performance curves

Cartridges only



Zero outlet pressure

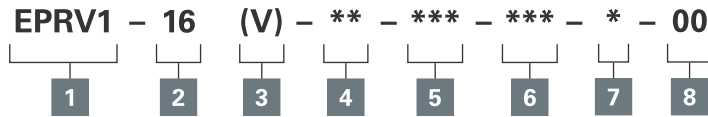


Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

# EPRV1-16 - Proportional valve

Proportional reducing/relief, spool  
38 L/min (10 USgpm) • 35 bar (500 psi)

## Model code



### 1 Function

**EPRV1** - Proportional reducing/relieving valve

### 2 Size

**16** - 16 size

### 3 Seal material

**Blank** - Buna-N  
**V** - Viton®

### 4 Maximum pressure

Customer to specify settings in increments of 7 bar (100 psi) and coded in hundreds of psi within the 14-35 bar range (200-500 psi) range.

Example: 5-35,0 (500 psi)

### 5 Port size

Code	Port size	Housing number
Aluminum single		
<b>0</b>	Cartridge only	
<b>6B</b>	3/4" BSPP	02-175465*
<b>12T</b>	SAE 12	566162*
<b>6G</b>	3/4" BSPP	876722
<b>10H</b>	SAE 10	876721
<b>12H</b>	SAE 12	876723

\*Light duty housing.  
See section J for housing details.

### 6 Voltage rating

**00** - No coil  
**12D** - 12VDC  
**24D** - 24VDC  
**36D** - 36VDC  
**12B** - 12VDC/w diode\*  
**24B** - 24VDC/w diode\*

\*Optional arc suppression diode.

### 7 Connector types

**Blank** - No coil  
**G** - DIN 43650  
**Q** - Spade Terminals  
**W** - Flying Lead  
**N** - Deutsch  
**Y** - Amp JR

For coil part numbers and dimensions see section C.

### 8 Special features

**00** - None

Only required if valve has special features, omitted if "00."

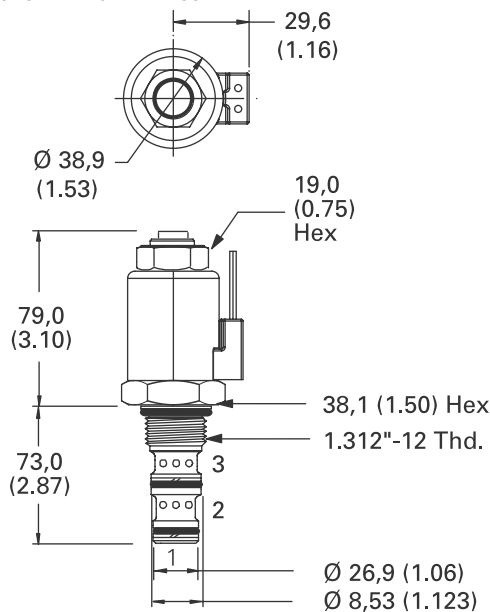
## Dimensions

mm (inch)

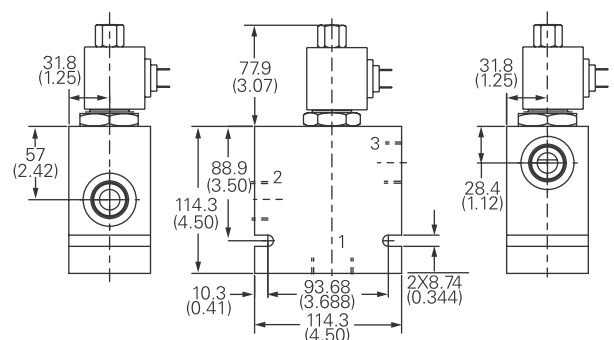
Torque cartridge in aluminum housing 108-122 Nm (80-90 ft lbs).

## Cartridge only

Valve is shown with "W" coil.



## Installation drawing



### Warning

Maintain 5-8 Nm (4-6 ft lbs) maximum torque on valve tube nut. Over tightening may cause valve failure.

Where measurements are critical request certified drawings. We reserve the right to change specifications without notice.

For enquiries please contact  
our Technical Sales Team directly;

**Tim Daniels: 0400 665 388**

**Neal Tuituu: 0455 025 706**

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