



Mobile Directional Valve

Product Catalog

MDG for Mobile Equipment
Flows to 60 l/min (15.8 USgpm)

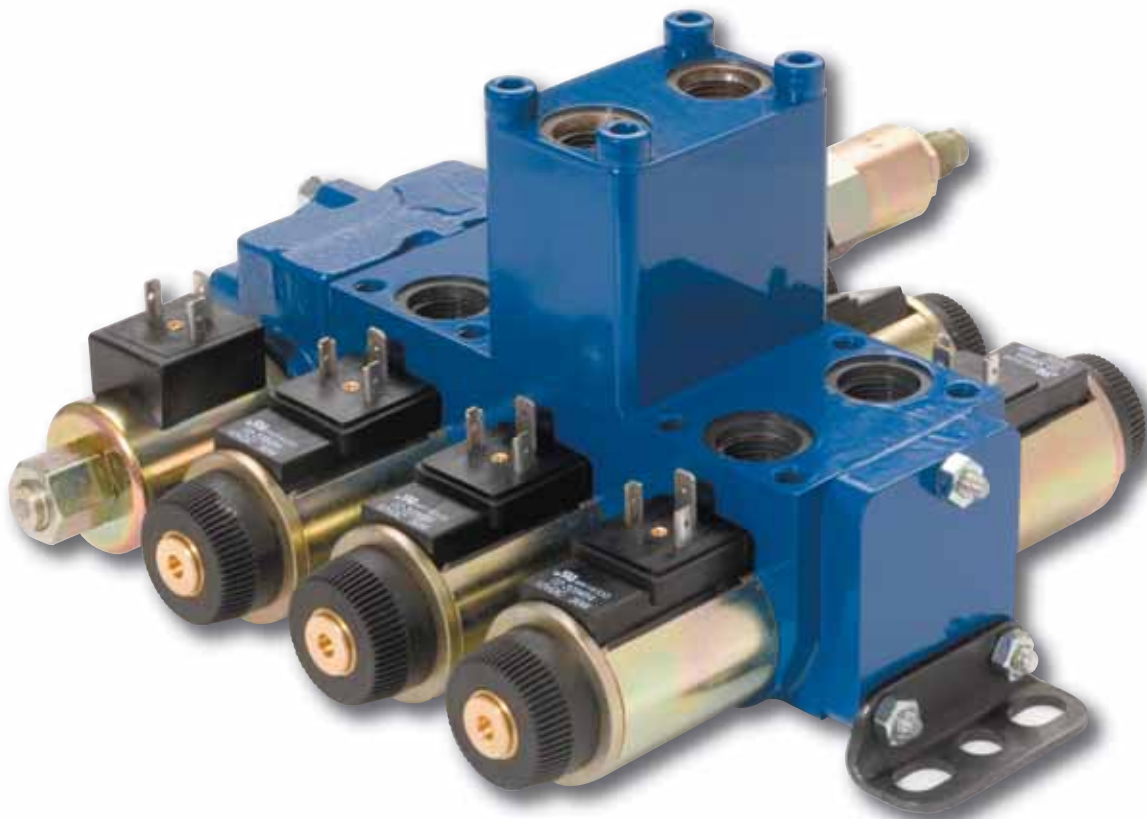


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Product Overview

Flows to 60 l/min (15.8 USgpm)

Rated Pressures per NFPA T 2.6.1:

P, A & B: 350 bar (5000 psi)

T: 210 bar (3000 psi)

Fatigue Rating Verified for 1 Million Cycles at the following pressures:

P, A & B: 400 bar (5,800 psi)

T: 245 bar (3,500 psi)

The Eaton® MDG mobile directional control valve is a versatile and modular design based upon the Eaton's proven Vickers™ industry leading DG4V3 design. The MDG valve design is a closed center, parallel or series circuit that can also function as an open center circuit through the use of unloading inlet options.

The MDG valve offers versatility and flexibility in system applications through a sectional design, allowing the use of up to six sections per bank assembly. Further, the MDG valve can be configured to create custom, multi-functional circuits through the use of optional banking functions such as inlet and work port options.

Features and Benefits

Modularity

- Sectional design allows the use of up to 6 sections per bank assembly.

Flexibility and Versatility

- Optional banking functions with various inlet and work port options.

Performance and Reliability

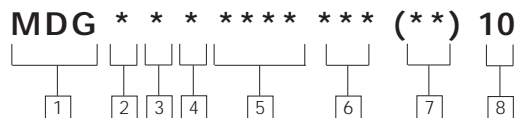
- Mobile design is based upon Eaton's Vickers™ industry leading DG4V3 valve.
- Meets key OEM specifications regarding temperature, vibration, heat rise/drop, impact test, water dunk (thermal shock and hermetic seal), salt spray, and dielectric strength test.

- Modular banking design concept eliminates costly fittings and potential leak points

Model Code

MDG Valve Section

() indicates optional code character.



1 Mobile Valve Section

MDG - Mobile Valve

2 Section Options

P - Standard parallel section
S - Standard series section
N - Non through-bored end section (available for parallel sections only)

3 Ports

S - SAE, -8
M - ISO 6149 metric, M18
D - Direct port STC, -8
B - Option block mount with SAE -8
C - Option block mount with SAE -6

4 Actuation Options

S - Dual solenoids
T - Single solenoid on A
U - Single solenoid on B
K - Proportional; dual solenoids
L - Proportional; single solenoid on A
M - Proportional; single solenoid on B

5 Spool Type

00* - Open center (all ports)
02* - Closed center
06* - Closed center, motor
07* - P to A&B, T blocked
08 - Tandem center
22 - Closed center (2 way)
33 - Closed center, bleed A & B to T
34 - Closed center, bleed A & B to T
52 - Closed center (all ports) regen. towards workport A
56 - A & B to T, P blocked, regen. by solenoid A
66 - Closed center (P blocked) A & B to T
521 - Closed center (all ports) regen. towards workport B
561 - A & B to T, P blocked, regen. by solenoid B
P2A - Proportional; type 2, 8 LPM, meter-out
P2B - Proportional; type 2, 15 LPM, meter-out
P2C - Proportional; type 2, 19 LPM, meter-out
P2D - Proportional; type 2, 8 LPM, meter-in/out
P2E - Proportional; type 2, 15 LPM, meter-in/out
P2F - Proportional; type 2, 19 LPM, meter-in/out
P3A - Proportional; type 33, 8 LPM, meter-in
P3B - Proportional; type 33, 15 LPM, meter-in
P3C - Proportional; type 33, 22 LPM, meter-in
Spring Positioning
C - Spring Centered
F - Spring Offset, shift to center.
* Indicates available spool types with spring offset.

6 Coil Voltage

G - 12 VDC, no diode
H - 24 VDC, no diode
J - 12 VDC, with diode
K - 24 VDC, with diode

Coil Lead Types

A0 - Dual spade
A1 - Single spade
D1 - Deutsch DT04 2P, on 6" leads
L1 - Flying leads, 18" on 6" leads
M1 - MetriPack 280 male, on 6" leads
N1 - MetriPack 280 female, on 6" leads
P1 - MetriPack 150 male, on 6" leads
U0 - DIN 43650 connector
U1 - DIN 43650 with mating plug
W1 - Weatherpack male, on 6" leads

7 Manual Override Options

No symbol - Plain override(s) in solenoid end(s) only ▲
H - Water-resistant override(s) on solenoid end(s) ▲
H2 - Water resistant overrides on both ends
P2 - Standard overrides on both ends
Y - Latching manual override(s) on solenoid end(s) (includes "H" feature seal) ▲
▲ No override in non-solenoid end of single solenoid valves.

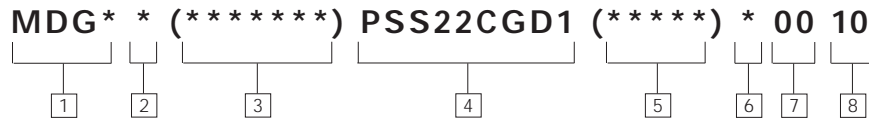
8 Design Level

10 - Design Level

Model Code

MDG Valve Assembly

() indicates optional code character.



1 Mobile Valve Section

MDG1 – 1 working section
MDG2 – 2 working sections
MDG3 – 3 working sections
MDG4 – 4 working sections
MDG5 – 5 working sections
MDG6 – 6 working sections

2 Inlet Module Ports

A – Top ports, SAE -8
B – Top ports, M18
D – Top STC, -8
E – End ports, SAE -8
F – End ports, M18
T – End ports, SAE -6

3 Inlet Module Options

Blank - No main relief cavity
P10 - C-10-2 cavity, plugged
P12 - C-12-2 cavity, plugged
B035 - Normally open 350 bar solenoid operated bypass (SBV11-10-O)
S24 - Screw adjust relief, 17-240 bar range (RV5-10)
S35 - Screw adjust relief, 35-350 bar range (RV5-10)
UXXX - Normally open bypass/relief (SRV4-12).
 XXX=Fixed setting in bar (210, 250).

Coil Voltage

(B035, UXXX Option)

G – 12 VDC, no diode
H – 24 VDC, no diode
J – 12 VDC, with diode
K – 24 VDC, with diode

Coil Lead Types

(B035, UXXX Option)

A0 – Dual spade
D1 – Deutsch DT04 2P, on 6" leads
L1 – Flying leads, 18"
M1 – MetriPack 280 male, on 6" leads
N1 – MetriPack 280 female, on 6" leads
P1 – MetriPack 150 male, on 6" leads
U0 – DIN 43650 connector
U1 – DIN 43650 with mating plug
W1 – Weatherpack male, on 6" leads

4 Operating Section

Repeat valve section code 2

through 7.
 One required for each section, up to six sections

5 Work Port Option Block Ports

S – SAE, -8
M – ISO 6149 metric, M18
D – Direct port STC, -8
C – SAE, -6

Port Relief Options

Screw adjust, pressure range 38-350 bar (RV8-10).
RR - Relief on A, B ports
R0 - Relief on A port only
OR - Relief on B port only

Single PO Check Valve Options

350 bar, 3:1 pilot ratio, free flow cracking pressure at 2.0 bar (POC1-10).
P0 - Pilot check on A port only.
OP - Pilot check on B port only.

Dual PO Check Valve Option

240 bar, 3:1 pilot ratio, free flow cracking pressure at 1.7 bar (DPC2-8).
PP - Pilot check on A, B ports

Counterbalance Option

350 bar, 4:1 pilot ratio, screw adjust, pressure range 62-210 bar (CBV1-10).
CC - Counterbalance on both ports.

Note: Normal factory setting at approximate mid-range. Inquire upon special features for specific setting.

6 End Cover

A – Plain - no ports, parallel sections
T – Standard tank port, series section (SAE -8)
N – None (non-drilled through section)

7 Special Features

00 – None

8 Design Level

10 – Design Level

Spool Data

SPOOL TYPE	PART NUMBER	SPOOL SCHEMATIC
00C	617121	
02C	617118	
06C	617119	
07C	617125	
08C	02-111834	
22C	617455	
33C	617123	
34C	617128	
52C	617131	
56C	617132	
66C	698745	
521C	617131	
561C	617132	

SPOOL TYPE	PART NUMBER	SPOOL SCHEMATIC
00F	617498	
02F	617120	
06F	694574	
07F	458151	
P2A	02-134552	
P2B	02-134553	
P2C	02-134554	
P2D	02-134557	
P2E	02-134558	
P2F	02-134559	
P3A	02-134555	
P3B	02-134556	
P3C	02-134576	

Specifications and Performance

Pressure Ratings per NFPA T 2.6.1

P, A, and B ports	350 bar (5000 psi)
T port	210 bar (3000 psi)

Flow rating	See performance data
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Relative duty factor	Continuous; ED =100%
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Type of protection	
ISO 4400 coils with plug fitted correctly	IEC 144 class IP67 (depending on connector)
AO – Dual spade 6,3 mm	IEC 760
Coil Winding	Class H
Lead wires (coils type KU)	Class H
Coil encapsulation	Class F
EN490 Coil	IP65 (standard override)

Permissible voltage fluctuation	
Maximum	Refer to temperature limits
Minimum	90% rated

Typical response times at 100% rated volts measured application/removal of voltage to full spool displacement of "2C" spool at:	
Flow rate P-A, B-T	20 l/min (5.3 USgpm)
Pressure	175 bar (2537 psi)
DC (=) energizing	60 ms
DC (=) de-energizing	40 ms

Power Consumption	
DC solenoids at rated voltage and 20°C (68°F)	
Full Power coils	
12V model type "G"	30W
24V, model type "H"	30W

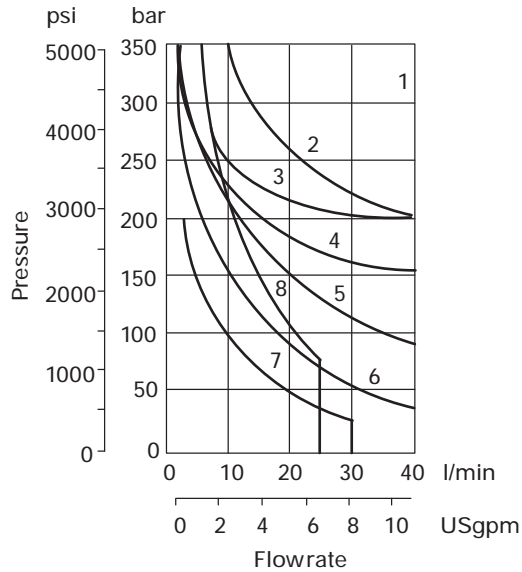
Performance Data

Maximum Flow Rates

Spool/Spring Code	Curve
0A(L)	3
0B(L) & 0C, 0F	1
2A(L)	3
2B(L) & 2C, 2F	3
6B(L) & 6C, 6F	5
7B(L) & 7C, 7F	2
8B(L) & 8C	8
2f2A(L)	7
22B(L) & 22C	6
33B(L) & 33(C)	4
34B(L) & 34C	5
52BL, 52C, 56BL & 56C	5
66B(L) & 66C	5
521B & 561B	5

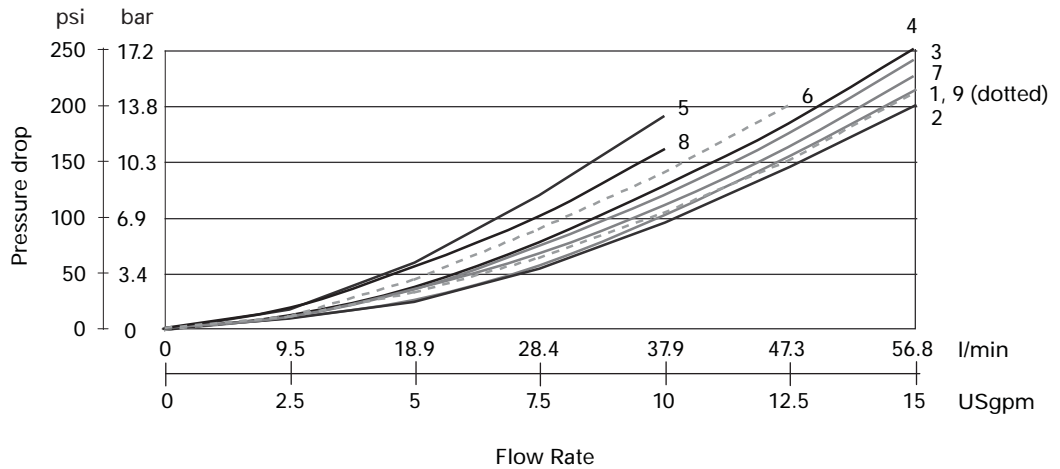
Performance based on full power solenoid coils warm and operating at 90% rated voltage

Typical with mineral oil at 36 cSt (168.6 SUS) and a specific gravity of 0.87.



Standard Parallel Circuit - Pressure Drop

Pressure drops in offset positions except where otherwise indicated



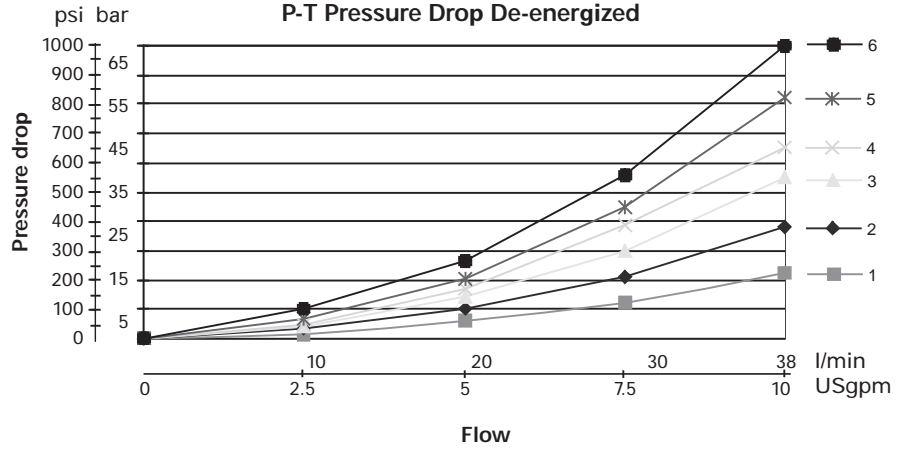
Curve Numbers

Spool/Spring Code	P-A Energized	P-B Energized	A-T Energized	B-T Energized	P-T De- Energized
00C, 00F	3	3	7	7	1
02C, 02F	6	6	7	7	-
06C, 06F	6	6	9	9	-
08C, 08F	5	5	8	8	2
33C, 33F	4	4	7	7	-
34C, 34F	4	4	7	7	-

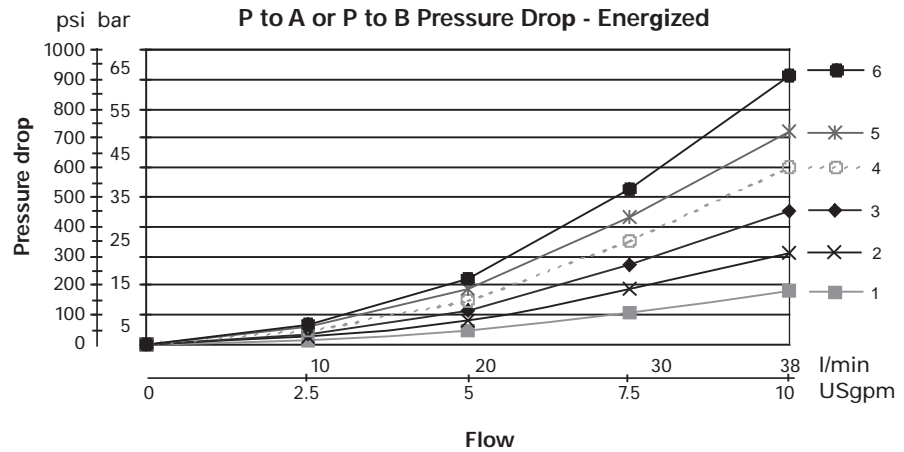
Performance Data

MDG Pressure Drop; Series Circuit with 1-6 Sections.

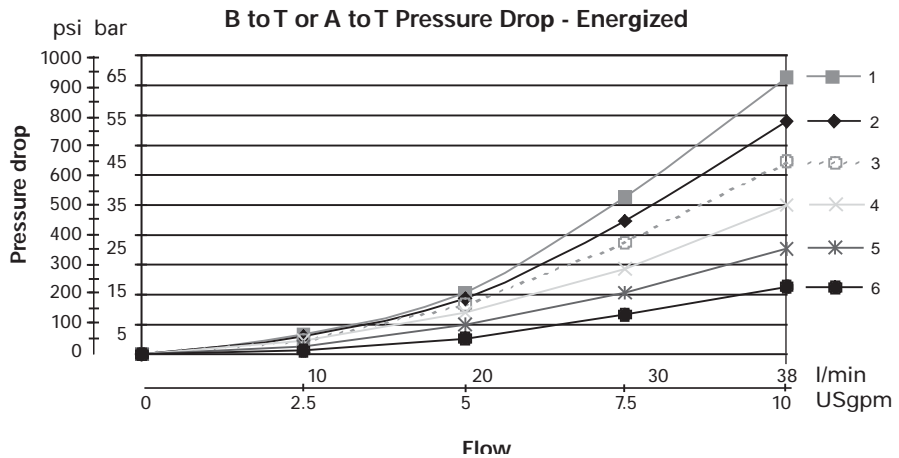
Series body, type 8 spool, De-energized P-T Pressure Drop for 1 to 6 Sections



Series body, type 8 spool, Energized P-A or P-B Pressure Drop for 1 to 6 Sections



Series body, type 8 spool, Energized A-T or B-T Pressure Drop for 1 to 6 Sections



Proportional Valves

Specifications and Performance

Specifications

Maximum operating pressure (A, B and P ports)

350 bar (5000 psi) (See "Flow Gain Curves")

Maximum tank line pressure (T port)

210 bar (3000 psi)

Maximum recommended pressure drop (four-way models at max. flow)

210 bar (3000psi)*

*At pressure drops above 10 bar (145 psid) dither amplitudes in the electronic controller may need to be set at or near minimum to eliminate potential high frequency circuit noise.

Operating temperature

20 to 82 C (-4 to 180 F)

Fluid viscosity

16 – 54 cSt (75–250 SUS)

Performance

Frequency Response

18Hz @ -3db (10Hz @ 45 degree phase lag)

For an amplitude of 25% max stroke (center to offset) about the 50% position and P (P-A-B-T) = 10 bar (145 psid).

See proportional frequency response graph.

Hysteresis

With pulse width modulation: 4%

With direct DC voltage: 8%

Repeatability: 1%

Deadband : 15–35% of full solenoid input. Vickers electronic controllers have a deadband eliminator to reduce this value to near zero.

Solenoid Specifications

Maximum current @ 50°C (122°F) ambient

12 VDC	3.2A
24 VDC	1.6A

Power Consumption @ 20°C (68°F)

12 VDC	30 Watts
24 VDC	30 Watts

Coil Resistance @ 20°C (68°F)

12 VDC	4.9 Ohms
24 VDC	19.6 Ohms

Coil Inductance @ 1000 Hz

12 VDC	16 mH
24 VDC	67 mH

Step Response Time

The following response times were measured from the point of energization/de-energization to the point of first indication of inlet pressure change.

Response up to full system pressure is dependent on the system's compressed volume and can vary with each application.

0–100% (center to full spool travel) 100 msec

100–0% (full spool travel to center –fast drop out) 15 msec

10–90% (10% full flow to 90% full flow) 100 msec

90–10% (90% full flow to 10% full flow) 25 msec

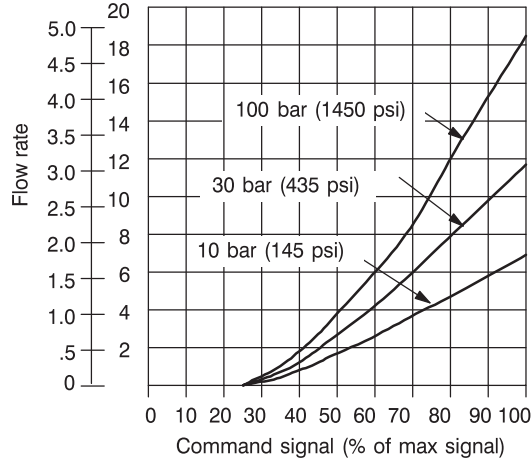
100–100% (100% full flow travel in one direction to 100 % full flow travel in the reverse direction) 80 msec

Proportional Flow Gain Curves

At the stated valve pressure drops, the percentage command signals are applicable to whichever solenoid is energized.

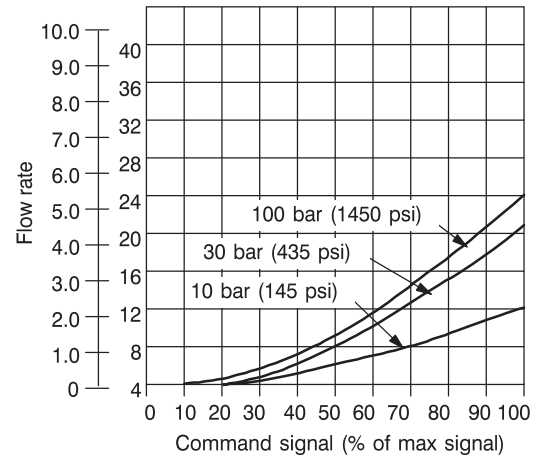
Looped Flow Path

USgpm l/min Spool "P2A" P-A or B plus B or A-T

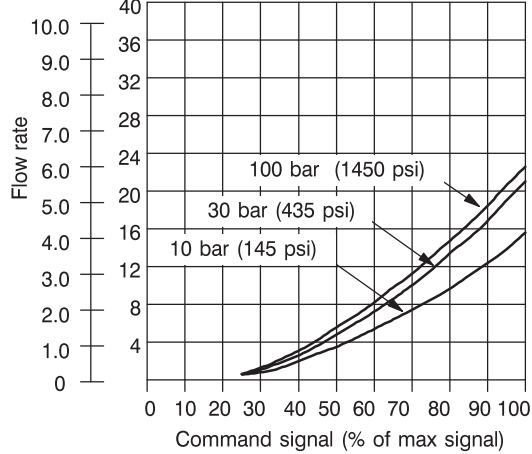


Looped Flow Path

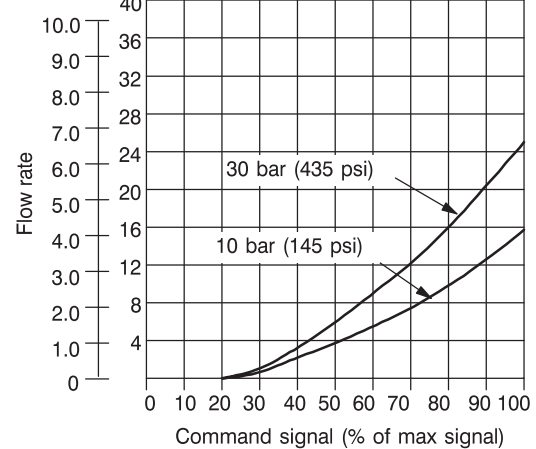
USgpm l/min Spool "P2D" P-A or B, or A or B-T



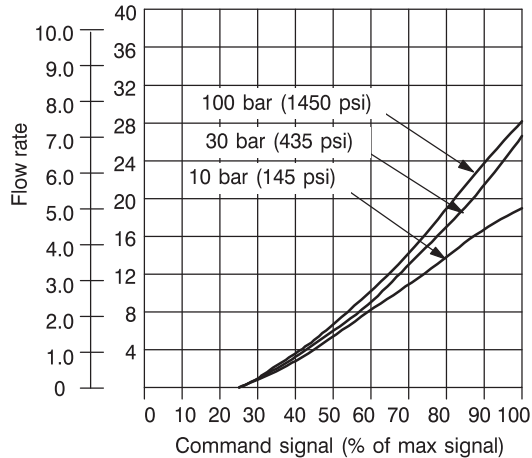
USgpm l/min Spool "P2B" P-A or B plus B or A-T



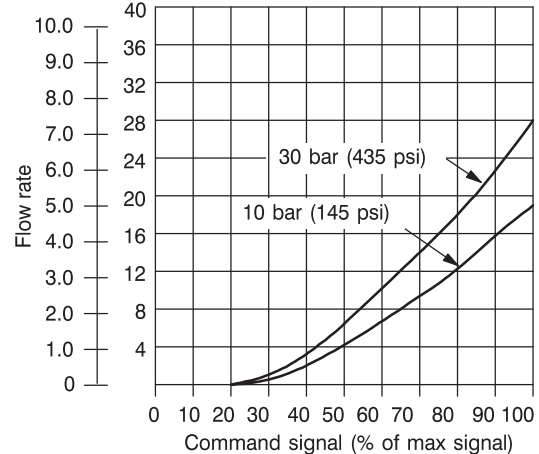
USgpm l/min Spool "P2E" P-A or B, or A or B-T



USgpm l/min Spool "P2C" P-A or B plus B or A-T



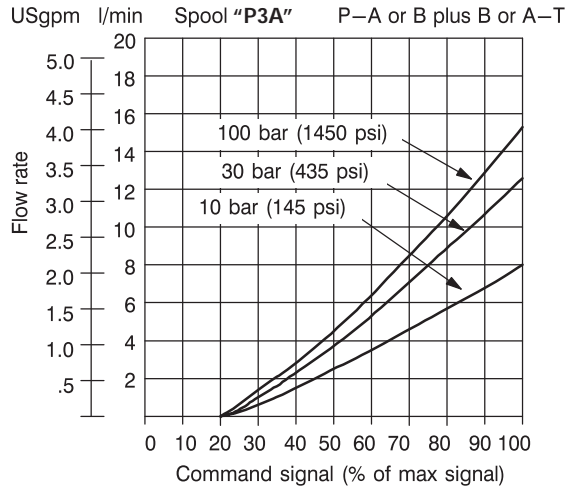
USgpm l/min Spool "P2F" P-A or B, or A or B-T



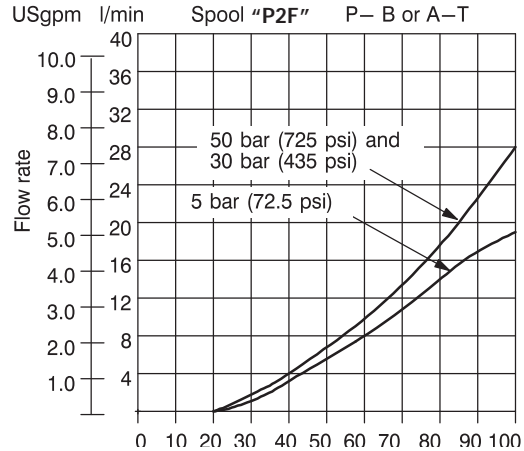
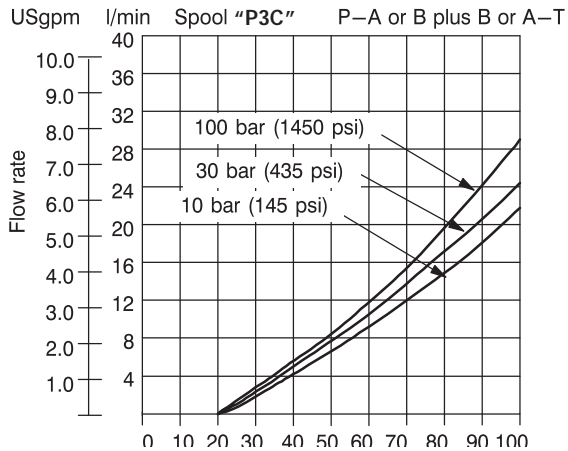
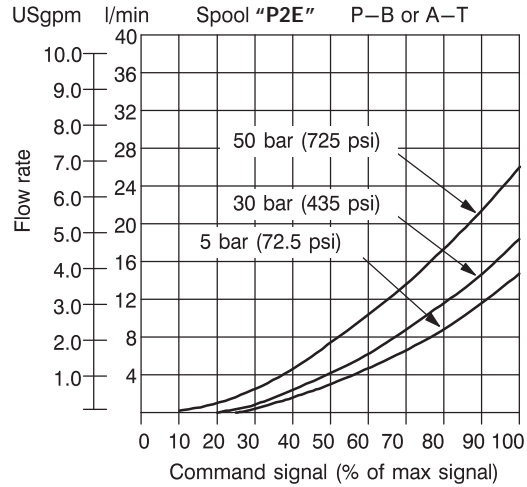
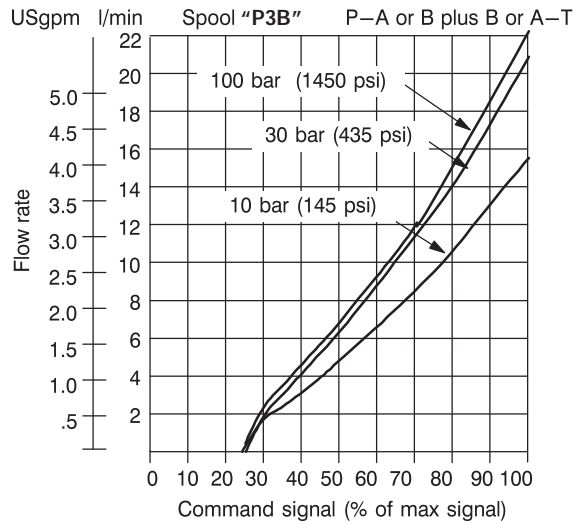
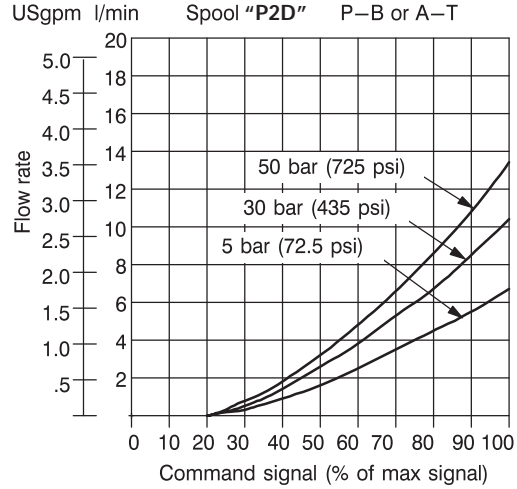
Proportional Flow Gain Curves

At the stated valve pressure drops, the percentage command signals are applicable to whichever solenoid is energized.

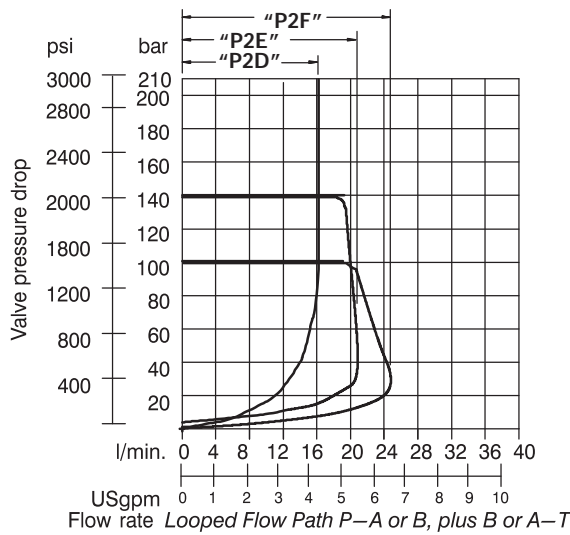
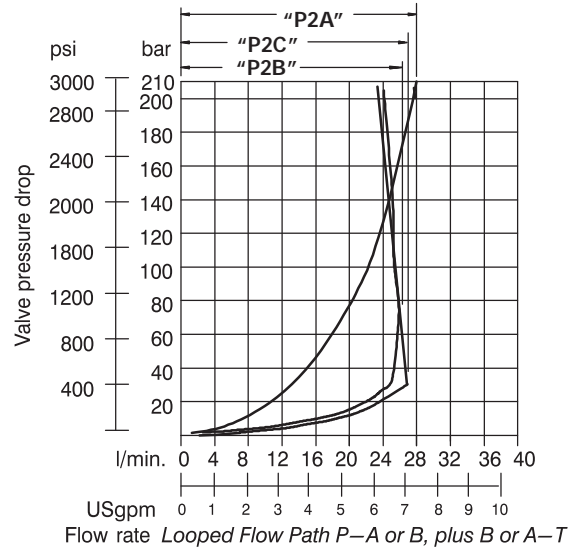
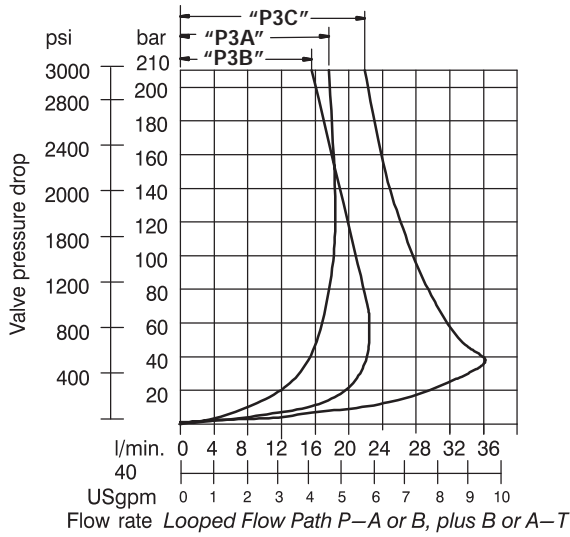
Looped Flow Path



Single Flow Path

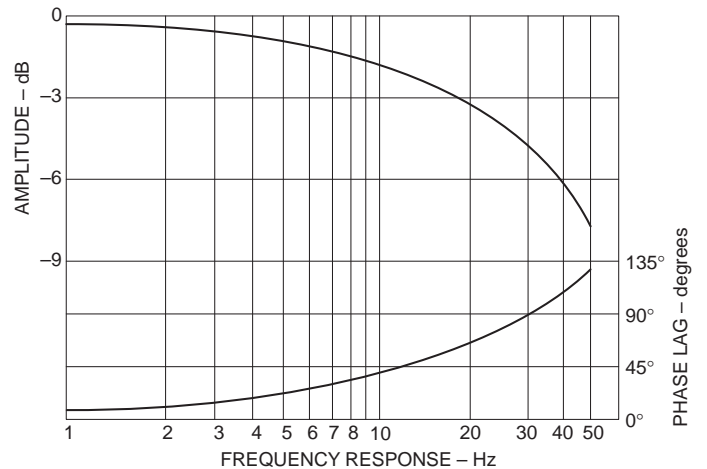


Proportional Power Capacity Envelopes and Frequency Response



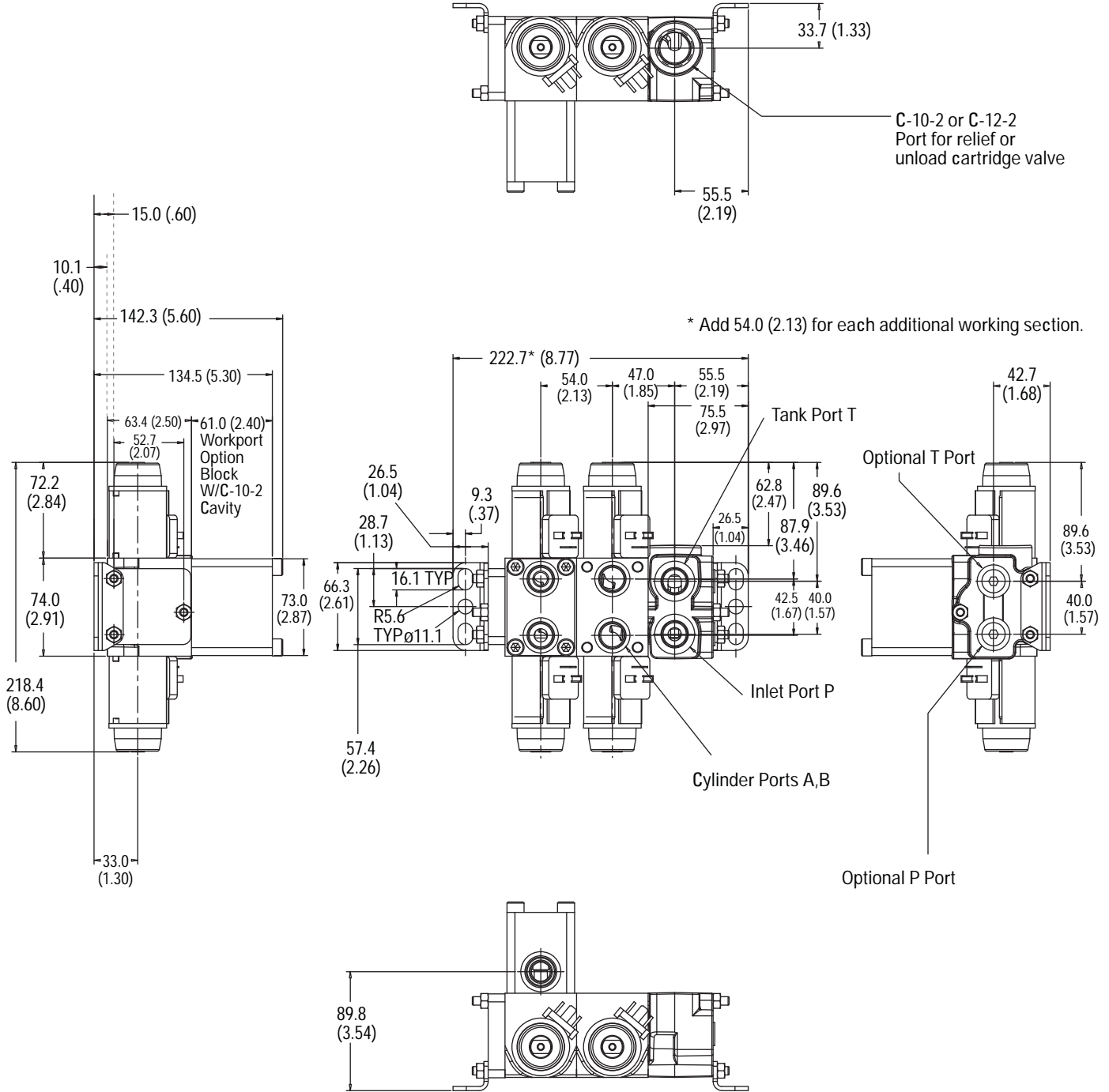
Proportional Frequency Response

For amplitude of 25% maximum stroke (center to offset) about 50% position and Δp (P→A→B→T)=10 bar (145 psi).



Installation Dimensions

mm (inch)

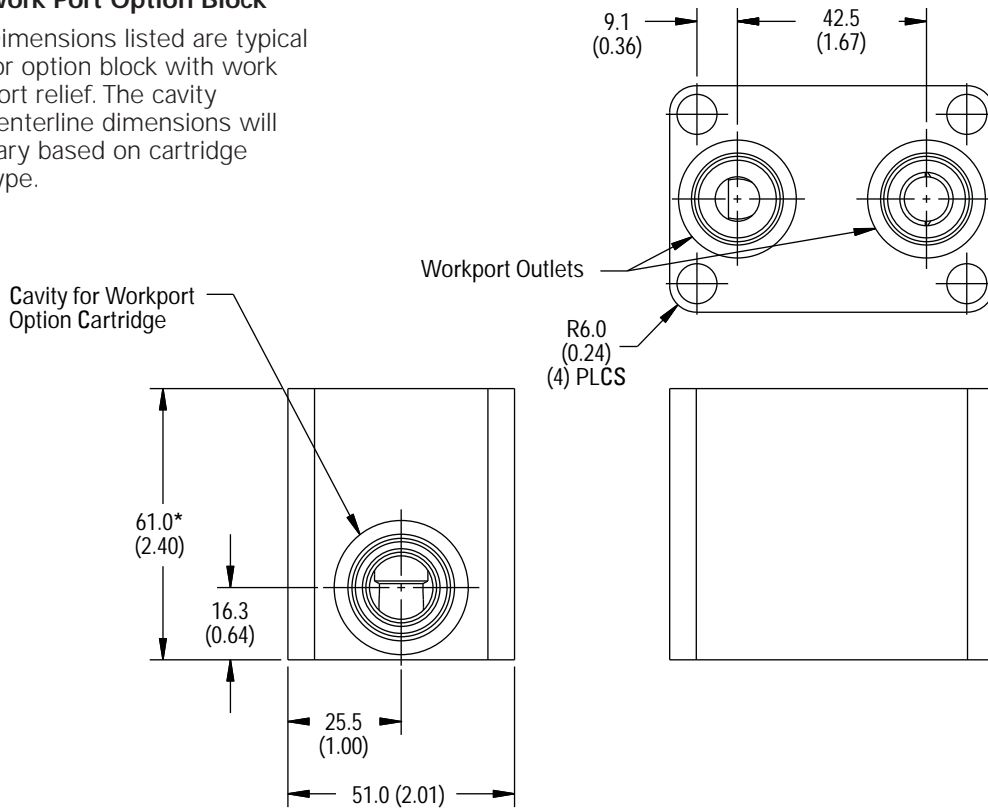


Installation Dimensions

mm (inch)

Work Port Option Block

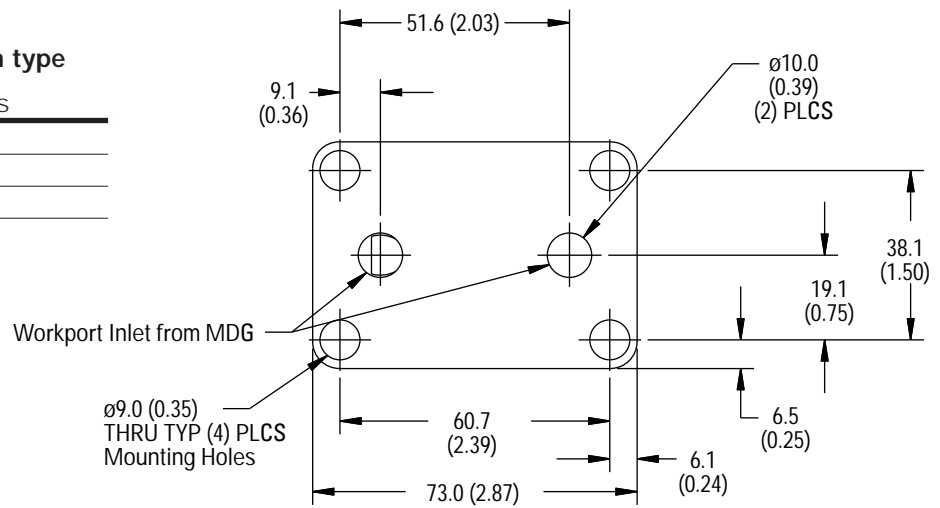
Dimensions listed are typical for option block with work port relief. The cavity centerline dimensions will vary based on cartridge type.



***Dimension is based on option type**

WORK PORT OPTION BLOCK HEIGHTS

OP,P0,PP,OR,R0	61.0mm (2.40")
RR	75.0mm (2.95")
CC	95.0mm (3.74")



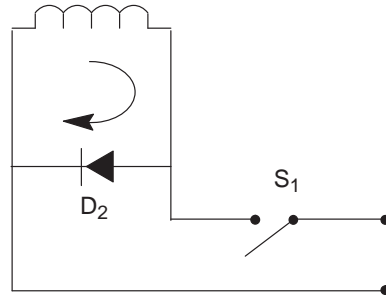
Surge Suppression Devices

(For DC Valves)

Standard diode (D₂)

Diode in parallel with coil. When switch (S₁) is opened, the energy stored in the coil is trapped and dissipated by the diode (D₂)

- Works only with DC voltage
- Polarity dependent
- Increases drop out time



Note: These surge suppression devices are "Polarity Dependent." Proper biasing conditions must be met when installing/connecting a coil in a system.

Valve Shift and Dropout Times With and Without Surge Suppression.

	Shift	Dropout
No Diode	23	60
Diode	23	141

Times represent cessation/application of voltage to coil versus velocity (start/stop) of a cylinder using a single solenoid, spring offset valve (time in milliseconds),

Spare Parts

Seal Kits

Kit No. 858995

Note: Each seal kit covers a variety of models and may have redundant seals for a particular model.

Standard On/Off Coils

COIL CONNECTION TYPE	12V W/O DIODE	24V W/O DIODE	12V WITH DIODE	24V WITH DIODE
A0 Dual Spade	02-309456	02-309457	02-309458	02-309459
A1 Single Spade	02-309460	02-309461	02-309462	02-309463
D1 Deutsch DT042P	02-309468	02-309469	02-360868	02-396965
L1 18" Flying Leads	02-309452	02-309453	02-339613	02-394209
M1 MetriPack 280 male	02-343208	–	02-343289	–
N1 MetriPack 280 female	02-343209	–	02-343290	–
P1 MetriPack 150 male	02-309464	02-309465	02-393998	–
U0 DIN 43650	02-309454	02-309455	02-396491	02-393190
W1 Weatherpack male	02-309466	02-309467	02-337335	–

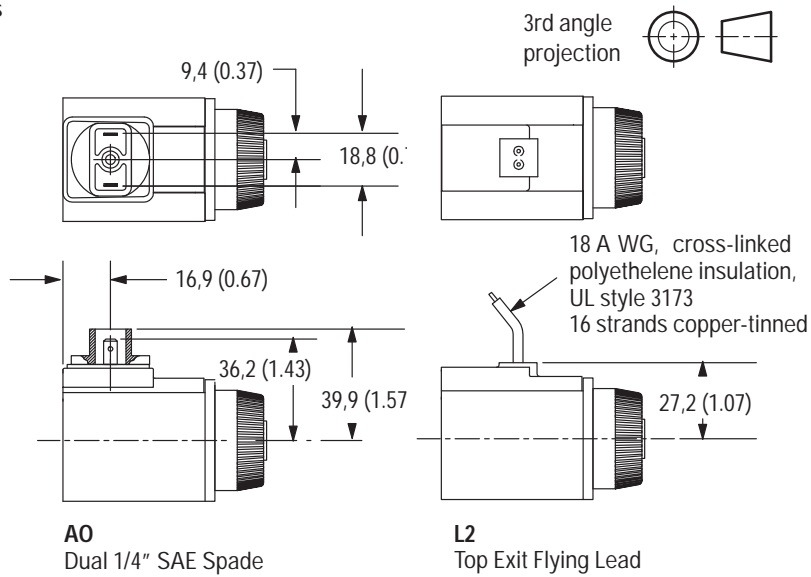
Proportional Coils

COIL CONNECTION TYPE	12V W/O DIODE	24V W/O DIODE	12V WITH DIODE	24V WITH DIODE
A0 Dual Spade	02-301282	02-301283	02-301291	02-301292
A1 Single Spade	02-301279	02-301280	02-301288	02-301289
D1 Deutsch DT042P	02-154124	02-301294	02-395673	–
L1 18" Flying Leads	02-154416	02-154417	–	–
M1 MetriPack 280 male	–	–	–	–
N1 MetriPack 280 female	02-390339	02-390340	–	–
P1 MetriPack 150 male	02-300823	02-300824	–	–
U0 DIN 43650	02-154422	02-154423	–	–
W1 Weatherpack male	02-301393	02-301394	02-337921	–

Electrical Plugs & Connectors

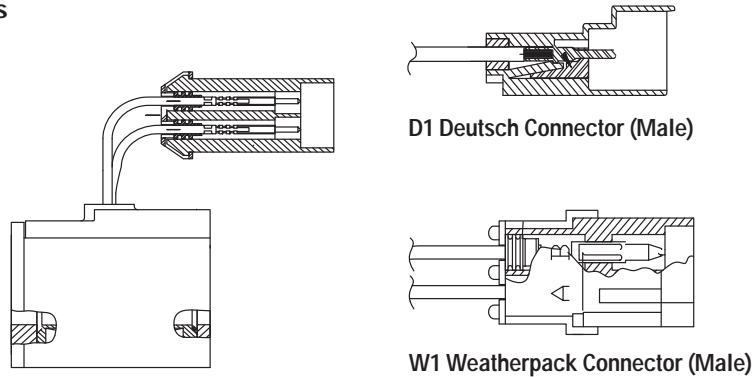
Solenoid Connections

mm (inch)



Note: A1 same as A0 except 1 terminal.

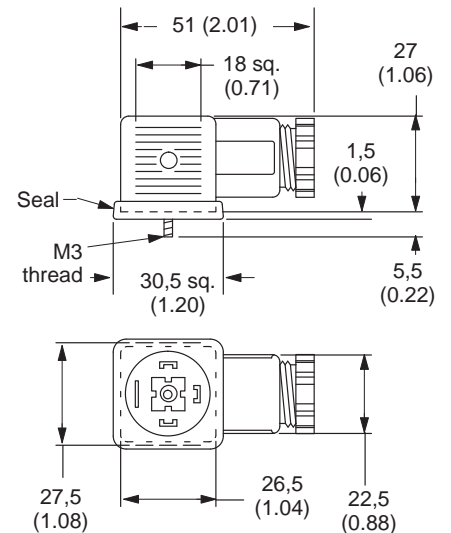
Typical Connector Assembly and Connectors



DIN 43650 CONNECTOR

Cable diameter range	06-10mm (0.24-0.40)
Wire section range	0.5-1.5mm ² (0.0008-0.0023in ²)
Terminals	Screw type
Type of protection	IEC 144 class IP65, when plugs are fitted correctly to the valves with interface seals (supplied with plugs)in place.

Connector can be positioned at 90° intervals on valve by re-assembling contact holder into appropriate position inside connector housing.



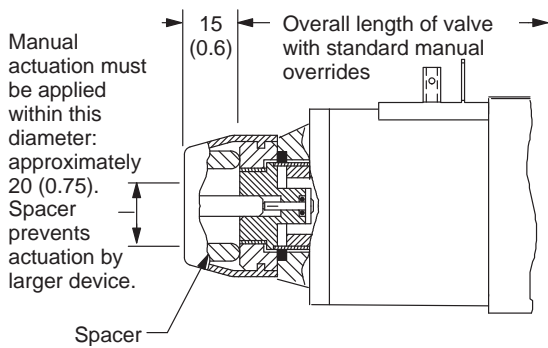
Manual Overrides

Water-resistant manual override on solenoid

Model Code Option H10

Application

General use where finger operation is required (standard manual overrides cannot be operated without using small tool).

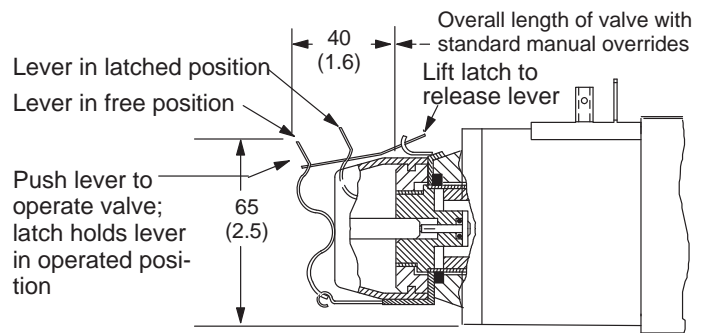


Latching manual override on solenoid

Model Code Option Y10

Application

Stainless steel lever/latch mechanism and water-resistant seal make this feature ideal for vehicle-mounted and exposed applications requiring emergency selection of valve for a period of time in the event of electrical failure.



Notes:

1. Opposite solenoid (on "C" and "N" double solenoid models) should not be energized while the valve is latched in selected position.
2. "Y" feature is field-convertible from "H" type manual override (omitting spacer), but is not field-convertible from other models.

Fluid Cleanliness

Fluid Cleanliness

Essential information on the correct methods for treating hydraulic fluid is included in publication 561 (Guide to Systemic Contamination Control) and is available from your local Eaton distributor.

Recommendations on filtration and the selection of products to control fluid condition are included in 561.

Recommended cleanliness levels, using petroleum oil under common conditions, are based on the highest fluid pressure levels in the system. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these cleanliness codes. See publication 561 for exact details.

Filtration Requirements

Fluid Cleanliness Level per ISO 4406: 19/17/14

Build Kits

Inlet Module

PART NUMBER	DESCRIPTION
02-397492	Top ports, SAE -8, C-10-2 plugged cavity
02-396089	Top ports, SAE -8, C-12-2 plugged cavity
02-397488	End ports, SAE -8, C-10-2 plugged cavity
02-396009	End ports, SAE -8, C-12-2 plugged cavity

Work Port Option Blocks (SAE -8)

PART NUMBER	DESCRIPTION
02-396077	Single PO check, C-10-3-S cavity
02-397512	Dual PO check, C-8-4 cavity
02-396078	Single port relief, (2) C-10-2 cavities
02-397502	Dual port reliefs, (2) C-10-2 cavities
02-397527	Dual counterbalance, (2) C-10-3-S cavities

End Cover

PART NUMBER	DESCRIPTION
02-396044	Without ports – to be used for parallel sections
02-397506	Standard tank port (SAE -8) – to be used for series sections

Accessories

PART NUMBER	DESCRIPTION
02-397521	Tie bolt set for (1) section assembly
02-397522	Tie bolt set for (2) section assembly
02-397523	Tie bolt set for (3) section assembly
02-397524	Tie bolt set for (4) section assembly
02-397525	Tie bolt set for (5) section assembly
02-397526	Tie bolt set for (6) section assembly
02-397558	Bolt kit for work port options block (dual counterbalance)
02-396092	Bolt kit for work port option block (all others)
02-396013	(1) Mounting bracket

Operating Sections

PART NUMBER	DESCRIPTION
100AP10006A	Valve Section, Parallel, SAE ports, 12V Deutsch, 0C spool
100AP10007A	Valve Section, Parallel, SAE ports, 12V Deutsch, 2C spool
100AP10008A	Valve Section, Parallel, SAE ports, 12V Deutsch, 6C spool
100AP10009A	Valve Section, Parallel, SAE ports, 12V Deutsch, 8C spool
100AP10010A	Valve Section, Parallel, SAE ports, 12V DIN, 0C spool
100AP10011A	Valve Section, Parallel, SAE ports, 12V DIN, 2C spool
100AP10012A	Valve Section, Parallel, SAE ports, 12V DIN, 6C spool
100AP10013A	Valve Section, Parallel, SAE ports, 12V DIN, 8C spool
100AP10014A	Valve Section, Parallel, Option ports, 12V Deutsch, 0C spool
100AP10015A	Valve Section, Parallel, Option ports, 12V Deutsch, 2C spool
100AP10016A	Valve Section, Parallel, Option ports, 12V Deutsch, 6C spool
100AP10017A	Valve Section, Parallel, Option ports, 12V Deutsch, 8C spool
100AP10018A	Valve Section, Parallel, Option ports, 12V DIN, 0C spool
100AP10019A	Valve Section, Parallel, Option ports, 12V DIN, 2C spool
100AP10020A	Valve Section, Parallel, Option ports, 12V DIN, 6C spool
100AP10021A	Valve Section, Parallel, Option ports, 12V DIN, 8C spool
100AP10022A	Valve Section, Series, SAE ports, 12V Deutsch, 0C spool
100AP10023A	Valve Section, Series, SAE ports, 12V Deutsch, 8C spool
100AP10024A	Valve Section, Series, SAE ports, 12V DIN, 0C spool
100AP10025A	Valve Section, Series, SAE ports, 12V DIN, 8C spool
100AP10026A	Valve Section, Series, Option ports, 12V Deutsch, 0C spool
100AP10027A	Valve Section, Series, Option ports, 12V Deutsch, 8C spool
100AP10028A	Valve Section, Series, Option ports, 12V DIN, 0C spool
100AP10029A	Valve Section, Series, Option ports, 12V DIN, 8C spool

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