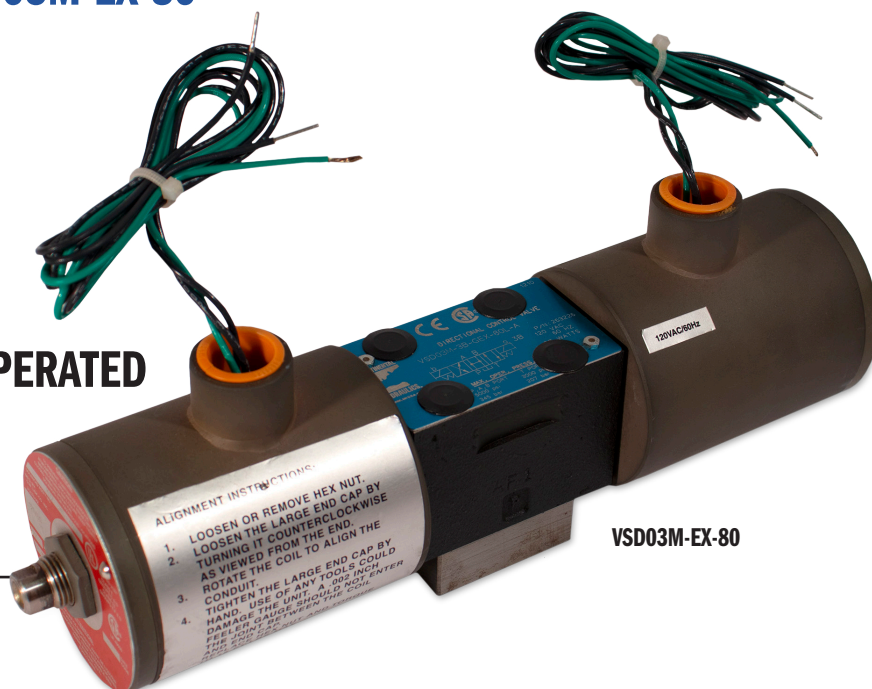


VSD03M-EX-80

HAZARDOUS DUTY SOLENOID ACTUATED, DIRECT OR PILOT OPERATED

MOUNTING SURFACE
NFPA D03 ISO 4401-03-02-0-03

P max 5000 PSI 350 bar
Q max 20 GPM 76 l/min



GENERAL SPECIFICATIONS:

This line of explosion proof, 4-way, directional control valves is available in 2 position spring offsets, 2 position detent, 2 and 3 position spring centered versions. Designed for use in hazardous condition locations, which demand special considerations. Special provisions used in the solenoids, allow these products to meet the Hazardous area classifications.

This direct operated directional valve is available in ISO 4401-03 size; and is also available for use as the pilot for pilot operated sizes: CETOP P05, ISO 4401-05, ISO 4401-07, ISO 4401-08 and ISO 4401-10.

Key Features:

- Solenoid assembly with viton seal.
- Approved by Underwriters Laboratories Inc. and Canadian Standards Associations for use in Hazardous locations: Class I Groups C and D, Class II Groups E, F, and G. U.L. File No. E71190 (N); CSA File No. LR 49650-1.
- Lead wires are #18 AWG and 24 inches long
- Conduit fitting 1/2 NPT, Five full threads min.
- Recognized by U.S. Coast Guard
- Registered by Lloyd's Register of Shipping

PERFORMANCE

| | | | |
|-------------------------|-----------------|--|---------|
| Max operating pressure: | P - A - B Ports | 5000 psi | 345 bar |
| | T Port | 1000 psi | 69 bar |
| Flow rate - (Up to) | | 20 gpm | 76 lpm |
| Max Cycle Rate | AC Solenoid | 400 cpm | |
| | DC Solenoid | 300 cpm | |
| Mounting Surface | | NFPA/T3.5.1M R1-1984 (D03) (Formerly D01) ANSI/B93.7M - 1986 - D03 ISO 4401 - SIZE 05 | |
| Weight | Single Actuator | 8.3 lbs | 3.76 kg |
| | Double Actuator | 14.1 lbs | 6.40 kg |
| Spool Codes Available | | See Chart | |



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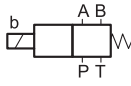
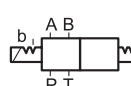
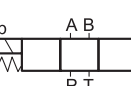
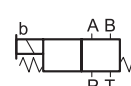


HAZARD LOCATION DIRECTIONAL VALVES

VSD03M-EX-80

IDENTIFICATION CODE:

VSD03M* - - **G** **EX** - - **A** ——— DESIGN LETTER

| FUNCTION | | SPOOLS | | EXPLOSION-PROOF OPTIONS | | SOLENOID | | SOLENOID MFG. | |
|----------|---|-------------------------------------|-------------|-------------------------|---------------------------|---------------------|-----------------|---------------|-------------|
| | | CODE | DESCRIPTION | CODE | DESCRIPTION | CODE | DESCRIPTION | CODE | DESCRIPTION |
| 1 |  | | | EX | Explosion Proof Solenoids | | | L | Lisk |
| | Single operator · 2 position spring offset | Refer to Spool Description Chart | | | | With 24" Lead Wires | | | |
| 2 |  | | | | | 80 | 120 V AC- 60 Hz | | |
| | Double operator · 2 position Detented (no spring) | | | | | 87 | 24 V DC | | |
| 3 |  | | | | | | | | |
| | Double operator · 3 position Spring centered | | | | | | | | |
| 5 |  | | | | | | | | |
| | Single operator · 2 position Spring centered | | | | | | | | |

| SEALS | | MECHANICAL OPTIONS | |
|----------|-------------|--------------------|---------------------------------|
| CODE | DESCRIPTION | CODE | DESCRIPTION |
| G | VITON | OMIT | Not Required |
| | | R | Single Solenoid 'B' Port End |

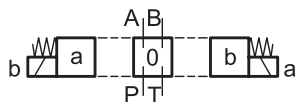
Note: The complete VSD03M valve assembly is not CSA or UL certified. However, the Lisk solenoid valves are certified. Rise block included.

TYPICAL ORDERING CODE:
VSD03M-3A-GEX-80L-A

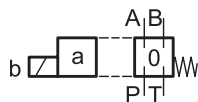
SPOOL TYPE

2 solenoids

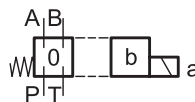
3 positions with spring centering



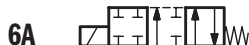
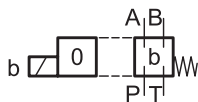
1 solenoid side A

2 positions (central + external)
with spring centering


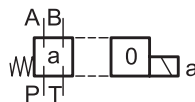
1 solenoid side B

2 positions (central + external)
with spring centering


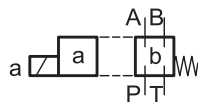
1 solenoid side A

2 positions (external + central)
with return spring


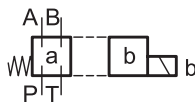
1 solenoid side B

2 positions (external + central)
with return spring


1 solenoid side A

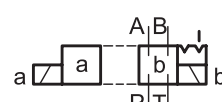
2 external positions with
return spring


1 solenoid side B

2 external positions with
return spring


2 solenoids

2 positions with mechanical retention



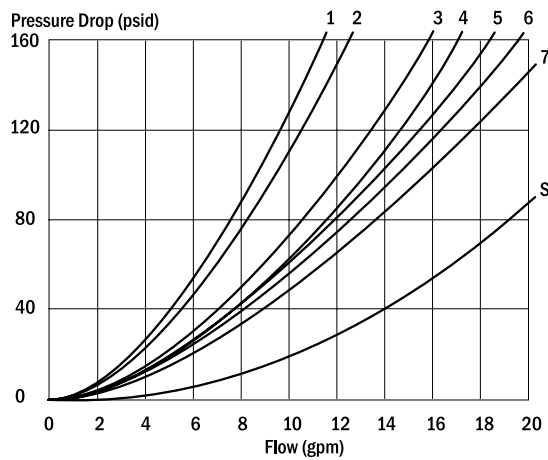
Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our technical department for their identification, feasibility and operating limits.



HAZARD LOCATION DIRECTIONAL VALVES

VSD03M-EX-80

TYPICAL PRESSURE DROP CURVES



FLOW PATH ΔP CURVES

| SPOOL TYPE | FLOW CURVE NUMBER | | | | |
|-------------------------|-------------------|-------------|----------------|-------------|--------|
| | SPOOL SHIFTED | | SPOOL CENTERED | | |
| | P to A or B | A or B to T | P to A or B | A or B to T | P to T |
| A | 5 | 4 | N/A | N/A | N/A |
| A Code 1 & 2 | 2 | 2 | N/A | N/A | N/A |
| B | 1 | 4 | 1 | 3 | 3 |
| B Code 1 & 2 | 2 | 1 | 3 | 3 | 4 |
| F | 5 | 1 | N/A | 6 | N/A |
| L | 3 | 5 | N/A | N/A | 7 |

All pressure drops shown on this data page are based on 100 SUS fluid viscosity and 0.87 specific gravity. See the chart below for other viscosities.

MAXIMUM FLOW

| | FUNCTION CODE | SPOOL CODE | | | | | | | |
|--------------------------------------|---------------|------------|------------|------------|------------|------------|------------|-----|-----|
| | | A | | B | | F* | | L | |
| | | AC | DC | AC | DC | AC | DC | AC | DC |
| (lpm) (70 bar) @ gpm 1000 psi | 1 | (49) 13 | (49) 13 | (60) 16 | (45) 12 | N/A | N/A | N/A | N/A |
| | 2 | (57) 15 | (49) 13 | (64) 17 | (49) 13 | N/A | N/A | N/A | N/A |
| | 3, 5 | (76) 20 | (68) 18 | (49) 13 | (38) 10 | (49) 13 | (45) 12 | N/A | N/A |
| (lpm) (140 bar) @ gpm 2000 psi | 1 | (42) 11 | (42) 11 | (53) 14 | (34) 9 | N/A | N/A | N/A | N/A |
| | 2 | (53) 14 | (45) 12 | (64) 17 | (49) 13 | N/A | N/A | N/A | N/A |
| | 3, 5 | (76) 20 | (68) 18 | (49) 13 | (38) 10 | (49) 13 | (38) 10 | N/A | N/A |
| (lpm) (210 bar) @ gpm 3000 psi | 1 | (42) 11 | (42) 11 | (49) 13 | (19) 5 | N/A | N/A | N/A | N/A |
| | 2 | (49) 13 | (45) 12 | (64) 17 | (34) 9 | N/A | N/A | N/A | N/A |
| | 3, 5 | (76) 20 | (64) 17 | (45) 12 | (38) 10 | (45) 12 | (23) 6 | N/A | N/A |
| (lpm) (276 bar) @ gpm 4000 psi | 1 | (42) 11 | (42) 11 | (49) 13 | (11) 3 | N/A | N/A | N/A | N/A |
| | 2 | (49) 13 | (42) 11 | (60) 16 | (23) 6 | N/A | N/A | N/A | N/A |
| | 3, 5 | (68) 18 | (64) 17 | (42) 11 | (26) 7 | (15) 4 | N/A | N/A | N/A |
| (lpm) (345 bar) @ gpm 5000 psi | 1 | (42) 11 | (42) 11 | (45) 12 | (11) 3 | N/A | N/A | N/A | N/A |
| | 2 | (49) 13 | (38) 10 | (60) 16 | (15) 4 | N/A | N/A | N/A | N/A |
| | 3, 5 | (68) 18 | (57) 15 | (38) 10 | (11) 3 | N/A | N/A | N/A | N/A |

N/A: Not Available.

* "F" spool pilot valve may be used up to 5000 psi.

** Performance measured on a four-way circuit (full circuit) with cylinder ports looped together @ 90% voltage for AC & DC solenoids measured @ 100 SUS oil viscosity & warm solenoids. Performance may be reduced from that shown with one flow direction as in the case when "A" or "B" port is plugged (half circuit).



HAZARD LOCATION DIRECTIONAL VALVES

VSD03M-EX-80

TYPICAL ELECTRICAL & RESPONSE TIME

| SOLENOID CODE NO. | RATED VOLTAGE & FREQUENCY (VOLTS - Hz.) | ACCEPTABLE VOLTAGE (MIN. - MAX.) | MAXIMUM INRUSH CURRENT (AMP) | HOLDING CURRENT & RATED VOLTAGE (AMP) | HOLDING CURRENT & MINIMUM ACCEPTABLE VOLTAGE | HOLDING POWER & RATED VOLTAGE (WATTS) |
|-------------------|---|----------------------------------|------------------------------|---------------------------------------|--|---------------------------------------|
| 80L | 120 - 60 | 108 - 126 | 2.2 | .58 | .38 | 27 |
| 87L | 24 DC | 21 - 26 | 1.36 | 1.37 | 1.20 | 33 |

Manufacture tolerance on above values of current, resistance and average stabilized coil temp is +/- 10%

SOLENOID DATA:

Electrical: Solenoid Code 80L

- Nominal Operating Voltage -120 VAC/60HZ
- Duty cycle - continuos
- Coil resistance at 76 F - 33.5 OHMS
- Wattage Holding - 27 Watts

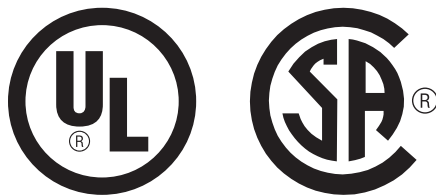
Electrical: Solenoid Code 87

- Nominal Operating Voltage - 24 VDC
- Duty Cycle - Continuous
- Coil Resistance at 76 F - 17.5 OHMS
- Wattage Holding - 33 Watts

Mechanical:

- Pressure Rating - 70 Bar (1000 PSI) Operating, 210 Bar (3000 PSI) static
- Temperature rating - Minus 65 F (-54 C) to 140 F (60 C)
- Average stabilized coil temperature operated continuously at rated current in an ambient of 77 F (25 C) while mounted to a valve body on a subplate = 265 F

SOLENOID - TYPE OF PROTECTION MARKINGS

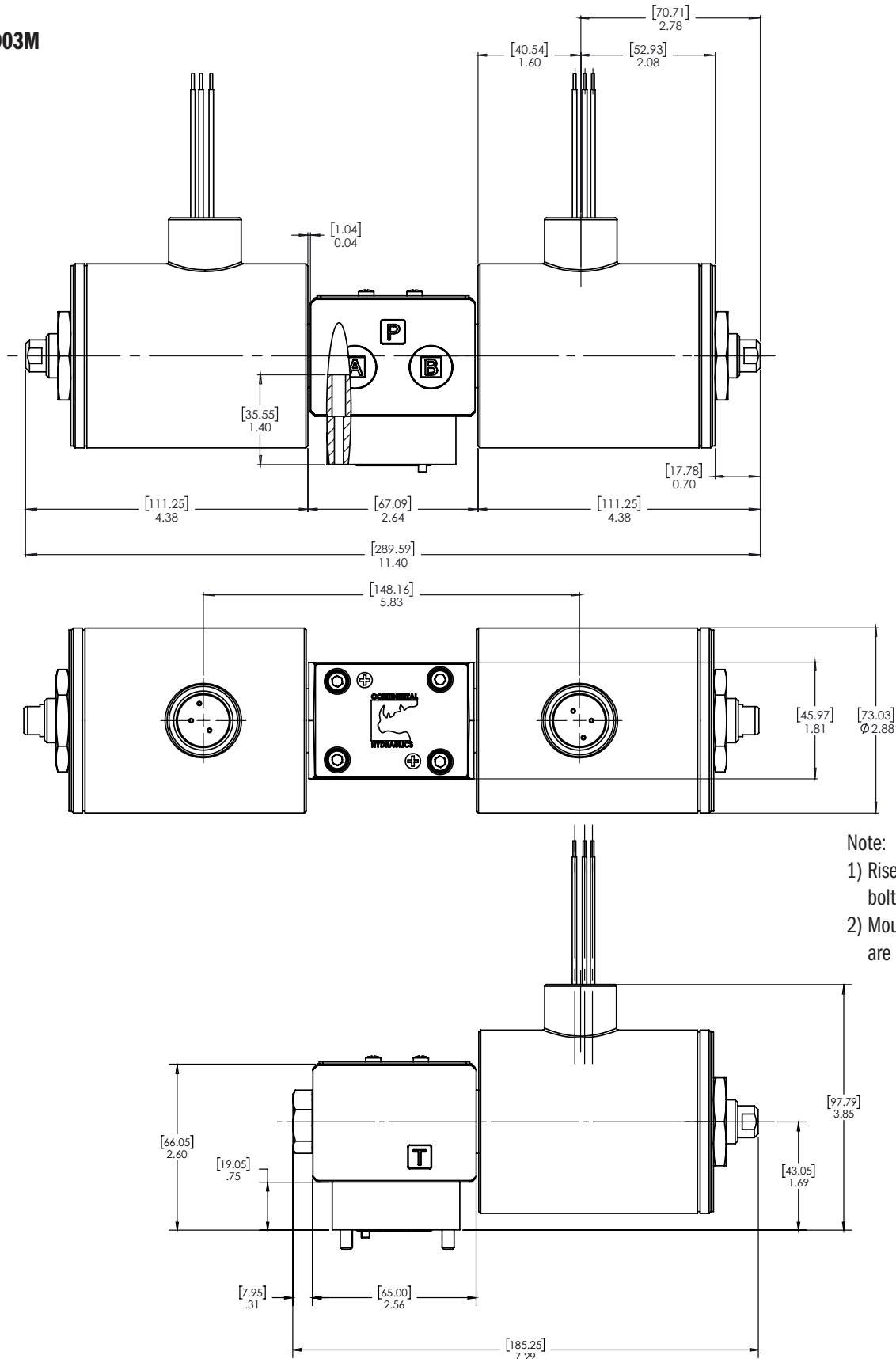


VSD03M-EX-80

OVERALL AND MOUNTING DIMENSIONS FOR DC SOLENOID VALVES

Dimensions in [mm]

VSD03M



Note:

- 1) Riser plate and mounting bolt come within the valve.
- 2) Mounting bolts supplied are 10-24 x 1.75



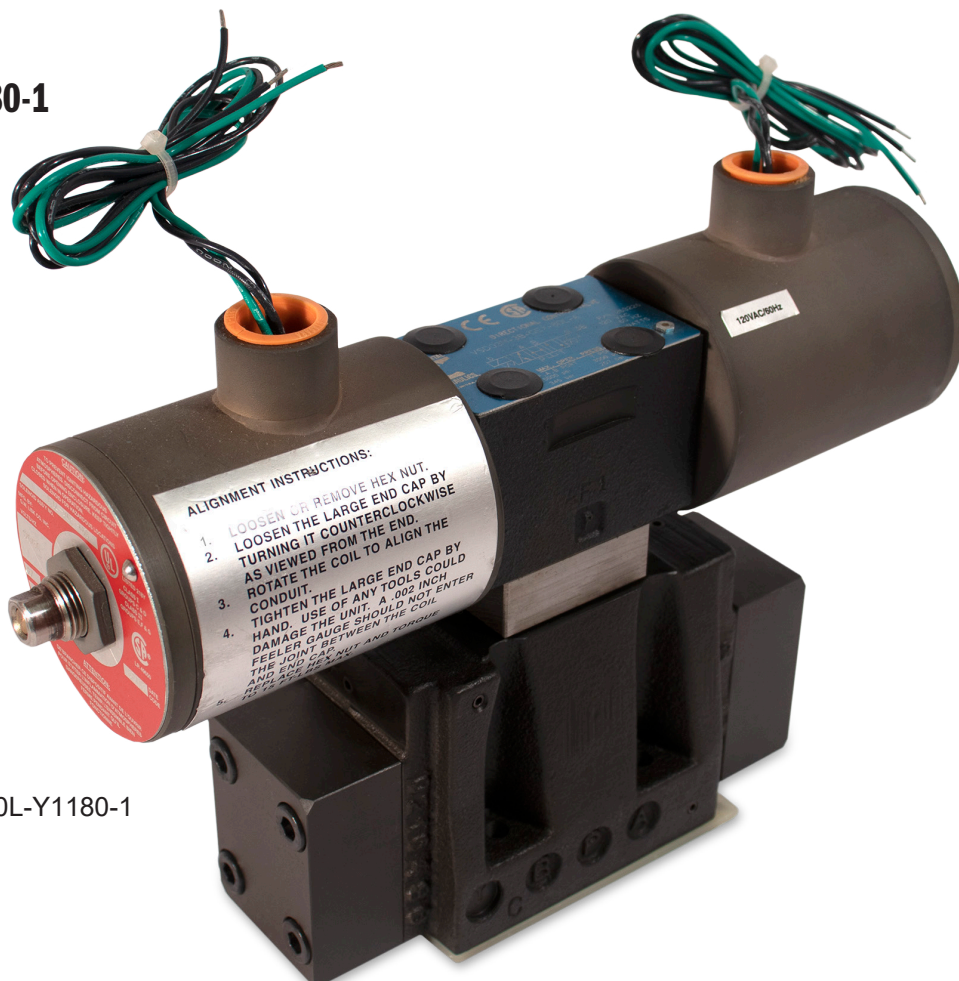
HAZARD LOCATION DIRECTIONAL VALVES

VSD03M-EX-80

HAZARDOUS DUTY PILOT OPERATED VALVES - Y1180-1

The Y1180-1 Suffix, allows the VSD03M with the 80 series solenoids to be used as the pilot valve for applications that require higher flow rates of the larger mounting pattern style valves offer.

This Y number covers explosion proof valves with the 80 series coils and the D03 PILOT VALVE.



Valve code example:

VSD05AM-3A-G3EX-80L-Y1180-1

TYPICAL PERFORMANCE SPECIFICATION

| | | VSD05*M | | VSD07M | | VSD08M | | VSD10M | |
|----------------------------|---------------------|--|-----------|---------------------------------|-----------|---------------------------------|-----------|---------------------------------|------------|
| MAXIMUM OPERATING PRESSURE | P - A - B Ports | 4600 psi | 320 bar | 5000 psi | 350 bar | 5000 psi | 350 bar | 5000 psi | 350 bar |
| | T Port (Ext. Drain) | 3600 psi | 250 bar | 3600 psi | 250 bar | 3000 psi | 210 bar | 3000 psi | 210 bar |
| | T Port (Int. Drain) | 1000 psi | 69 bar | 1000 psi | 69 bar | 1000 psi | 69 bar | 1000 psi | 69 bar |
| | Y Port | 1000 psi | 69 bar | 1000 psi | 69 bar | 1000 psi | 69 bar | 1000 psi | 69 bar |
| | X Port | 1000 psi | 210 bar | 4000 psi | 280 bar | 5000 psi | 350 bar | 4000 psi | 280 bar |
| MINIMUM PILOT PRESSURE | | 72 psi | 5 bar | 170 psi | 12 bar | 72 psi | 5 bar | 170 psi | 12 bar |
| MAX FLOW RATE | | 40 gpm | 150 l/min | 80 gpm | 300 l/min | 40 gpm | 473 l/min | 290 gpm | 1100 l/min |
| MOUNTING SURFACE | | NFPA D05 Alt. A/ Alt. B ISO 4401-05-05-0-05 | | NFPA D07 ISO 4401-07-07-0-05 | | NFPA D08 ISO 4401-08-08-0-05 | | NFPA D10 ISO 4401-10-09-0-05 | |



HAZARD LOCATION DIRECTIONAL VALVES

VSD03M-EX-80

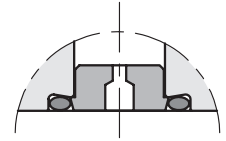
PORT RESTRICTIONS

Port restrictors are recommended if flow variations which exceed the valve performance limit during the switching processes occur, or for circuit dampening.

Port restrictor plugs can be ordered separately with the part numbers shown at right.

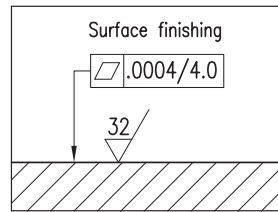
| Ø(mm) | PART NUMBER |
|-------|-------------|
| blank | M0144162 |
| 0.6 | M0144163 |
| 0.8 | M0144033 |
| 1 | M0144034 |

| Ø(mm) | PART NUMBER |
|-------|-------------|
| 1.2 | M0144035 |
| 1.5 | M0144036 |
| 1.8 | M0144164 |
| 2 | M0144165 |



INSTALLATION

The configurations with centering and return springs can be mounted in any position. Valve fitting takes place by means of bolts or stud kits, fixing the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.

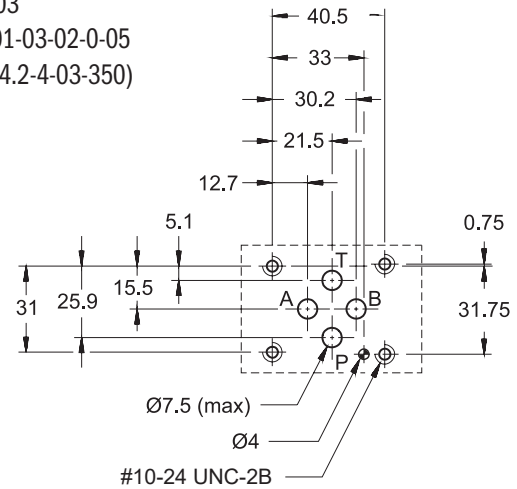


Valves are fixed by means of screws or tie rods on a flat surface with planarity and roughness equal to or better than those indicated in the relative symbols. If minimum values are not observed, fluid can easily leak between the valve and support surface.

MOUNTING SURFACE

Dimensions inch [mm]

NFPA D03
ISO 4401-03-02-0-05
(CETOP 4.2-4-03-350)



GENERAL SPECIFICATIONS

| FLUID VISCOSITIES | CS | 14.5 | 20.5 | 32 | 43 | 54 | 65 | 76 | 86 |
|-------------------|-----|------|------|------|------|------|------|------|------|
| | SUS | 75 | 100 | 150 | 200 | 250 | 300 | 350 | 400 |
| Multiplier | | 0.93 | 1.00 | 1.11 | 1.19 | 1.26 | 1.32 | 1.37 | 1.41 |

For any other specific gravity (G1) the pressure drop (ΔP) will be approximately $\Delta P1 = \Delta P (G1/G)$.



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