

## DIRECTIONAL VALVES

### VSD03M

# VSD03M

## Solenoid Operated Directional Valve

**SUBPLATE MOUNTING**  
ISO 4401-03

P max 5000 PSI 350 bar  
Q max 26 GPM 100 l/min

VSD03M-1A-GB-70L-C



VSD03M-1A-GB-60L-C



VSD03M-1A-GWD85A-60L-C



VSD03M-3F-ABD4A-70L-C



VSD03M-3B-GB-75L-C



VSD03M-3L-GB-60L-C



## ► DESCRIPTION:

These valves conform to NFPA D03 and ISO 4401 mounting standards. They are available in both 3 way and 4 way styles.

All versions are available in 2 position spring offset, 2 position detent, 2 position spring centered and 3 position spring centered versions.

A wide range of spools are available.

## ► PERFORMANCE:

<b>Max Operating Pressure:</b>	<b>P - A - B Ports</b>	Standard	5000 psi	350 bar
	<b>T Port</b>	Standard	3000 psi	210 bar
<b>Flowrate</b>		20 gpm	76 l/min	
<b>Mounting Surface</b>	NFPA D03 ISO 4401-03-02-0-03			
	AC	4 lbs	1.8 kg	
<b>Maximum Weight</b>	DC	4.6 lbs	2.1 kg	
	Ambient	-4 to +130°F	-20 to +54°F	
<b>Temperature Range</b>	Standard	-4 to +180°F	-20 to +82°F	
<b>Fluid Temperature Range</b>	Range	60-1900 SUS	10-400 cSt	
	Recommended	120 SUS	25 cSt	
<b>Fluid Contamination Degree</b>		ISO 4406:1999 Class 20/18/15		

(Obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control card)

### ► IDENTIFICATION CODE:

**VSD03M -**   **-**   **-**  DESIGN LETTER

BASIC VALVE FUNCTIONS / SPOOL CODES	
see page 3	

SEAL TYPE	
CODE	DESCRIPTION
A	BUNA
G	VITON

MECHANICAL (SELECT 1)	
CODE	DESCRIPTION
OMIT	No options
R	Single Solenoid - B port end
WD	Wash-Down

TYPICAL ORDERING CODE:  
**VSD03M-3A-GB-60L**

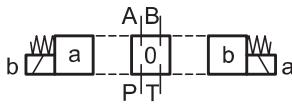
Please see Connectors Catalog  
Form #1027453

PILOT VALVES REQUIRING TERMINAL BOX CONNECTIONS			
Reference Page 7-8			
CODE	VOLTAGE	CONNECTION TYPE	
<b>B-60L</b>	120 - 60hz 110 - 50hz	Connection Box with terminal post and lights	
<b>B-61L</b>	240 - 60hz 220 - 50hz		
<b>B-68L</b> (Low Force)	120 - 60hz 110 - 50hz		
<b>B-70L</b>	24 V DC		
<b>B-75L</b>	12 V DC		
<b>B3H-60L</b>	120 - 60hz 110 - 50hz	Single Solenoid Box with 3 PIN MALE MINI RECEPTACLE CONNECTOR ON "B" PORT END	
<b>B3H-61L</b>	240 - 60hz 220 - 50hz		
<b>B3H-68L</b> (Low Force)	120 - 60hz 110 - 50hz		
<b>B3H-70L</b>	24 V DC		
<b>B3H-75L</b>	12 V DC		
<b>B3A-60L</b>	120 - 60hz 110 - 50hz	Single Solenoid Box with 3 PIN MALE MINI RECEPTACLE CONNECTOR ON "A" PORT END	
<b>B3A-61L</b>	240 - 60hz 220 - 50hz		
<b>B3A-68L</b> (Low Force)	120 - 60hz 110 - 50hz		
<b>B3A-70L</b>	24 V DC		
<b>B3A-75L</b>	12 V DC		
<b>B4-70L</b>	24 V DC	Box with 4 PIN MALE MICRO RECEPTACLE CONNECTOR ON "B" PORT END	
<b>B4-75L</b>	12 V DC		
<b>B4A-70L</b>	24 V DC		
<b>B4A-75L</b>	12 V DC		
<b>BD4-70L</b>	24 V DC		
<b>BD4-75L</b>	12 V DC	Box with 4 PIN MALE MICRO RECEPTACLE CONNECTOR ON "B" PORT END	
<b>BD4A-70L</b>	24 V DC		
<b>BD4A-75L</b>	12 V DC		
<b>B5H-60L</b>	120 - 60hz 110 - 50hz		Box with 5 PIN MALE MINI RECEPTACLE CONNECTOR ON "B" PORT END
<b>B5H-61L</b>	240 - 60hz 220 - 50hz		
<b>B5H-68L</b> (Low Force)	120 - 60hz 110 - 50hz		
<b>B5H-70L</b>	24 V DC		
<b>B5H-75L</b>	12 V DC		
<b>B5A-60L</b>	120 - 60hz 110 - 50hz	Box with 5 PIN MALE MINI RECEPTACLE CONNECTOR ON "A" PORT END	
<b>B5A-61L</b>	240 - 60hz 220 - 50hz		
<b>B5A-68L</b> (Low Force)	120 - 60hz 110 - 50hz		
<b>B5A-70L</b>	24 V DC		
<b>B5A-75L</b>	12 V DC		

### ► FUNCTIONS/SPOOL CODES:

2 solenoids

3 positions with spring centering



**3A**

**3B**

**3F**

**3L**

**3J**

**3E**

**3H**

**3Q**

**3FI**

**3G**

**3K**

**3AI**

**3KI**

**3N**

**3EI**

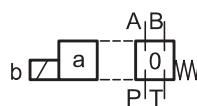
**3R**

**3V**

**3S**

**3T**

1 solenoid side A  
2 positions (central + external)  
with spring centering



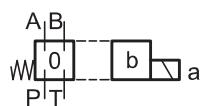
**5A**

**5B**

**5F**

**5L**

1 solenoid side B  
2 positions (central + external)  
with spring centering



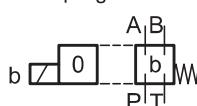
**5A\*R**

**5B\*R**

**5F\*R**

**5L\*R**

1 solenoid side A  
2 positions (external + central)  
with return spring



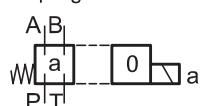
**6A**

**6B**

**6F**

**6L**

1 solenoid side B  
2 positions (external + central)  
with return spring



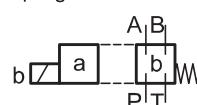
**6A\*R**

**6B\*R**

**6F\*R**

**6L\*R**

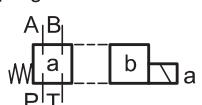
1 solenoid side A  
2 external positions with  
return spring



**1A**

**1B**

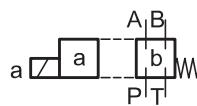
1 solenoid side B  
2 external positions with  
return spring



**1A\*R**

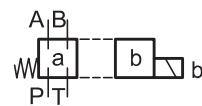
**1B\*R**

1 solenoid side A  
2 positions with return spring



**9X**

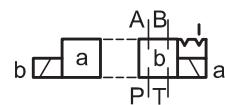
1 solenoid side B  
2 positions with return spring



**9X\*R**

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.

2 solenoids  
2 positions with mechanical retention



**2A**

**2B**

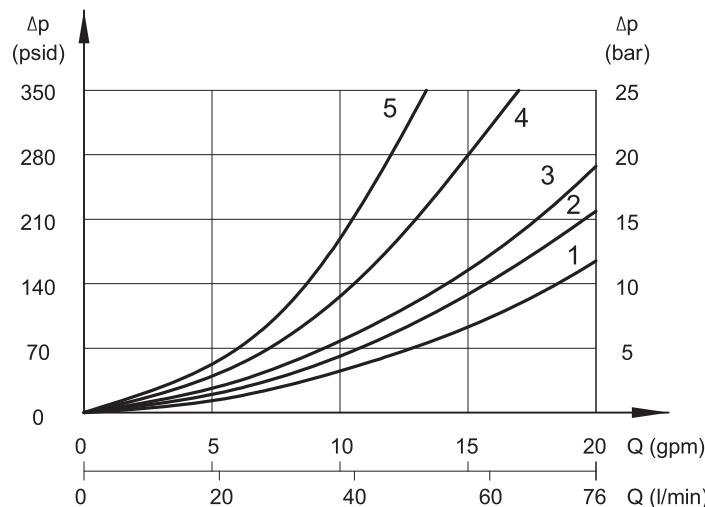
**2AN**

**2AJ**

## ► PERFORMANCE DATA:

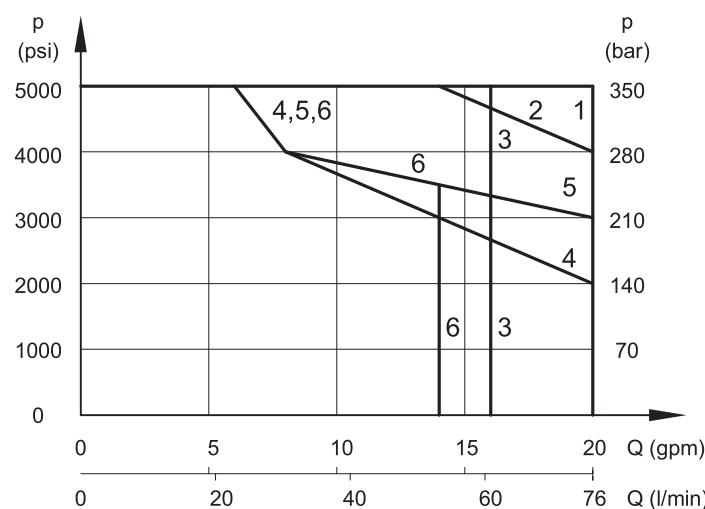
### PRESSURE DROPS $\Delta p$ -Q

(Obtained with viscosity of 170 SUS - 36 CST at 70°F - 50°C)



SPOOL TYPE	FLOW DIRECTION				
	$P \rightarrow A$	$P \rightarrow B$	$A \rightarrow T$	$B \rightarrow T$	$P \rightarrow T$
CURVES ON GRAPH					
A, A1, K1, F1, E1	2	2	3	3	
B	1	1	3	3	2
E	2	2	3	1	
F	3	3	1	1	
G	1	3	1	3	
H, Q	4	5	5	5	3
J	2	1	3	3	
K	2	2	1	3	
L	5	5	5	5	3
N	1	2	3	3	
1A, 2A, 2AN, 2AJ	3	3	3	3	
1A, 1B, 2A	2	2	2	2	
9X	3	3			

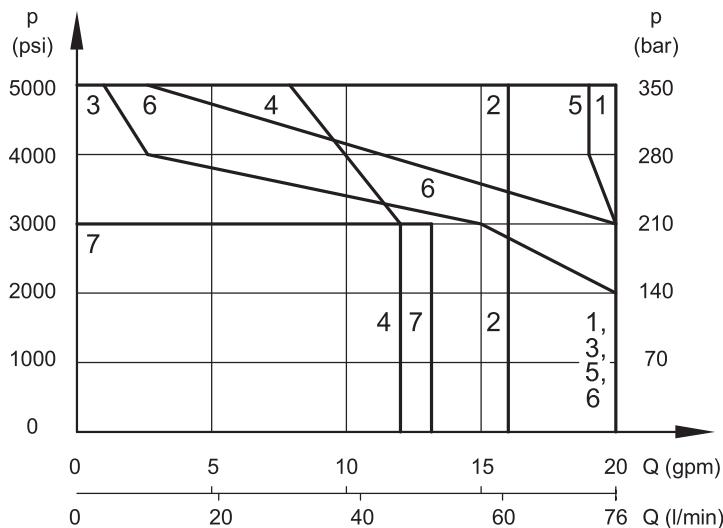
### PERFORMANCE CURVE - DC VOLTAGE



CURVE	SPPOOL
1	A, 2A, A1, AN, AJ, E1, G, K1, J, N, X
2	F1
3	H, L, Q, B
4	F
5	1A
6	1B, E, K

## ► PERFORMANCE DATA:

### PERFORMANCE CURVE - AC VOLTAGE

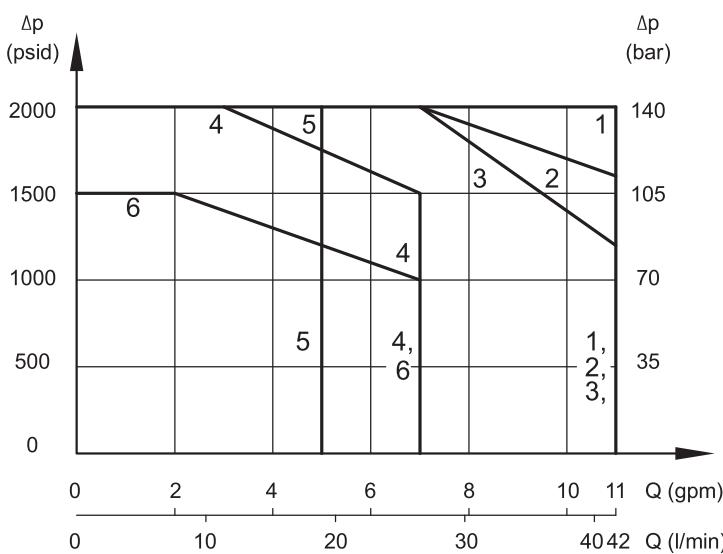


CURVE	SPOOL
1	A, A1, AN, AJ, G, X
2	B
3	F
4	L, H, Q
5	J, N
6	F1, E1, K1
7	K, E

#### NOTES:

1. The values indicated in the graphs are relevant to the standard solenoid valve, with 70L coils.
2. Valve performance was tested in a four way circuit (full loop). Performances may be reduced from that shown when used in a three-way circuit (half circuit), i.e. A or B port plugged.
3. The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage. The values have been obtained with filtration according to ISO 4406:1999 class 18/16/13.

### PERFORMANCE CURVE - AC VOLTAGE - LOW FORCE



CURVE	SPOOL
1	2A, AN, B
2	1A, 1B, G
3	A
4	A1
5	L
6	F

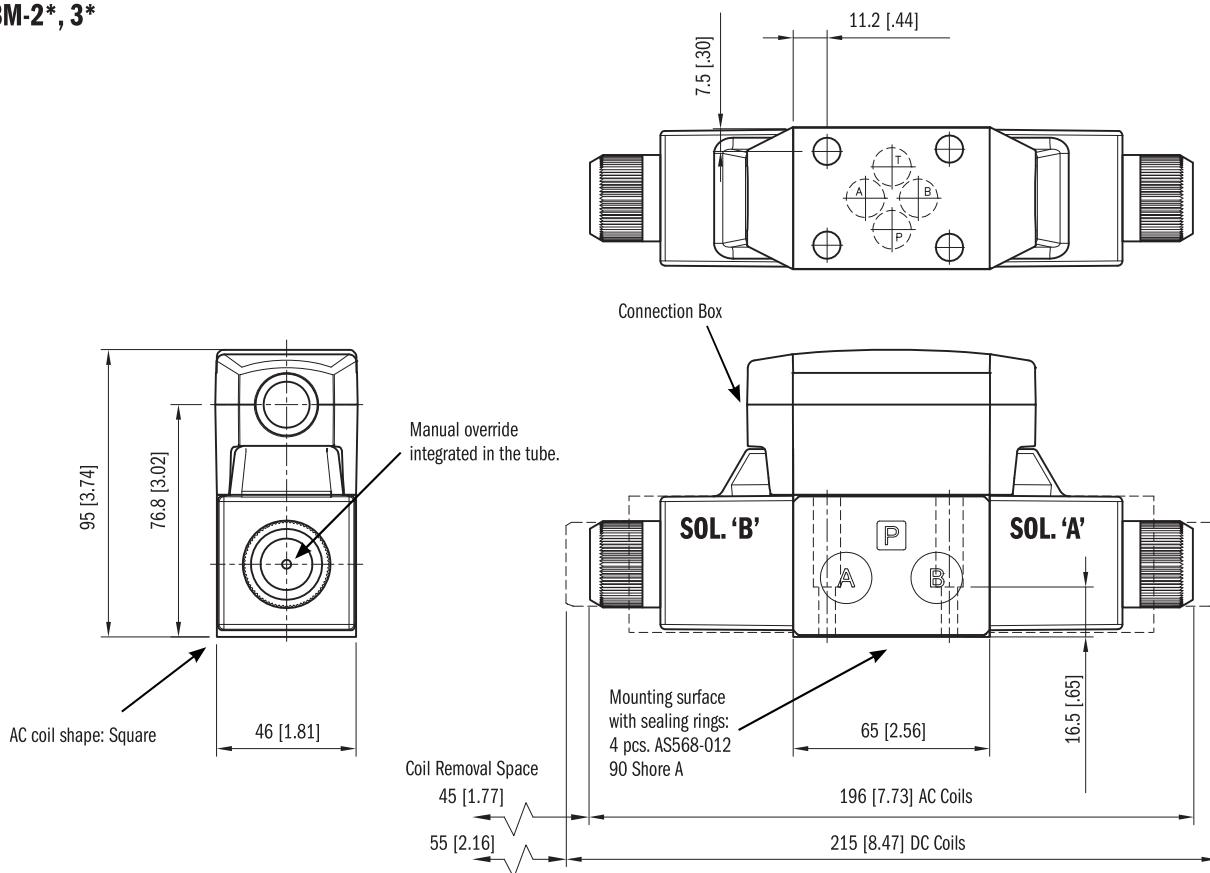
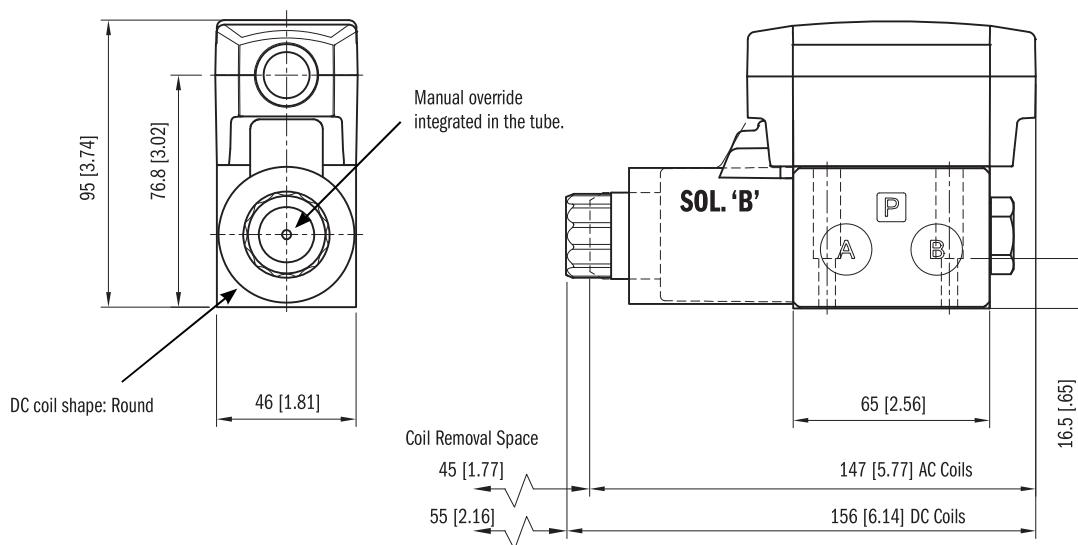
### RESPONSE TIME

TIMES ( $\pm 10\%$ ) [MS]	
ENERGIZING	DE-ENERGIZING
AC 10 - 25	AC 15 - 30
DC 25 - 75	DC 15 - 25

## ► INSTALLATION DATA:

Dimensions mm [in]

### OVERALL AND MOUNTING DIMENSIONS CONNECTION BOX VERSION

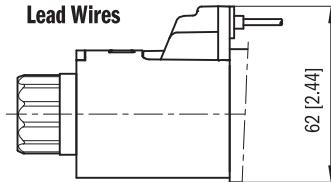
**VSD03M-2\*, 3\***

**VSD03M-1\*, 5\*, 6\*, 9\***


### ► ELECTRICAL:

Dimensions mm [in]

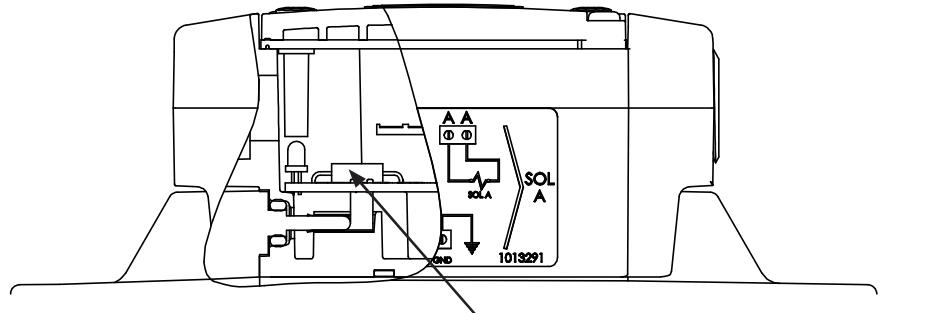
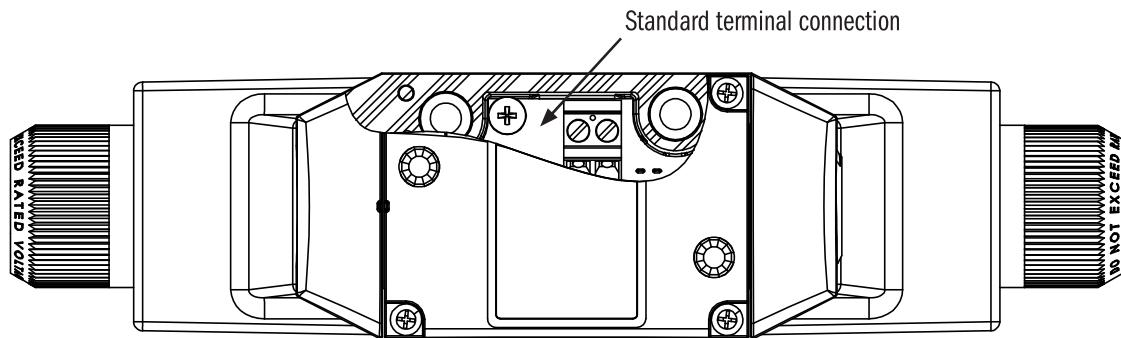
#### CONNECTION BOX SOLENOIDS

This is a two pin solenoid which connects to the circuit board. Wiring is done on the terminal strip inside the box.



BOX CONNECTION COIL CODE	VOLTAGE & FREQ. [VOLT - HERTZ]	VOLTAGE LIMITS [MIN - MAX]	RESISTANCE $\pm 10\%$ [OHM]	INRUSH CURRENT [A]	HOLDING CURRENT [A]	HOLDING POWER [W]	REPLACEMENT
60L	120 - 60 110 - 50	108 - 126 99 - 116	35.7	1.35 1.41	0.46 0.53	22 23	1012953AD
61L	240 - 60 120 - 50	216 - 252 198 - 231	146.4	0.61 0.71	0.23 0.26	22 23	1012953AC
68L (Low Force)	120 - 60 110 - 50	108 - 132 99 - 121	75.8	0.72 0.74	0.22 0.24	10 10	1012953AB
70L	24 V DC	21 - 26	19.2	1.25	1.25	30	1012957AC
75L	12 V	10 - 13	4.8	2.5	2.5	30	1012957AB

#### STANDARD TERMINAL BOX CODE "B"

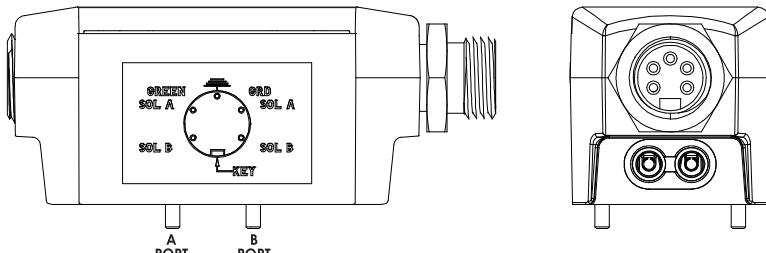
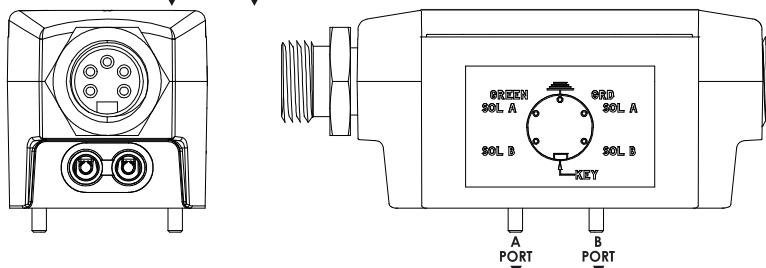
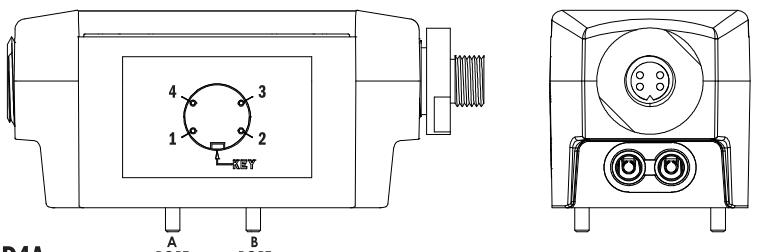
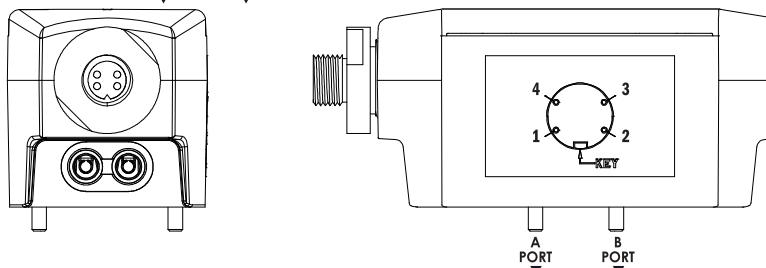
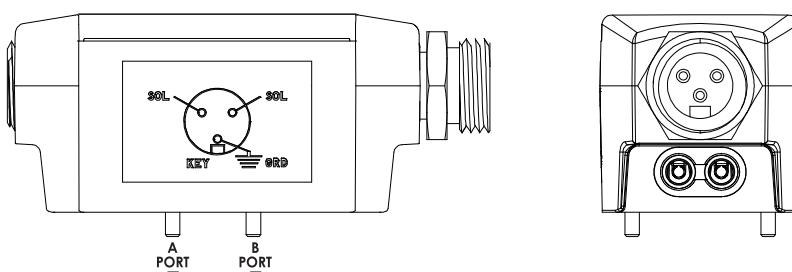
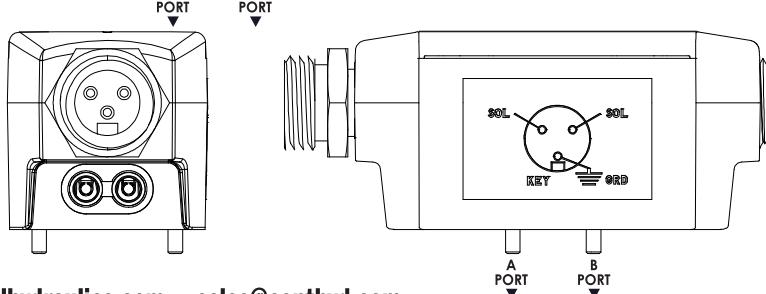


#### WASHDOWN OPTION (CODE WD)

The wash-down option with the electrical box is designed for an IP65 rating. This option uses a special cover without the mounting bolt access holes and uses silicone sealant to help seal between the coil and core tube.

For valve requiring DIN, Deutsch solenoid connections with high IP ratings:  
Please see the VS6M series catalog.

## ► ELECTRICAL OPTIONS: TERMINAL BOX CONNECTION

**CODE: B5H**

**CODE: B5A**

**CODE: B4 / BD4**
**(4 PIN CONNECTION OPTION FOR DC VOLTAGE COILS ONLY)**

**CODE: B4A / BD4A**

**CODE: B3H**

**CODE: B3A**


### 5 PIN RECEPTACLE

Male mini receptacles conform to NFPA/T3.5.29 R1 - 2007 used with single or double solenoid valve.  
26 mm [1"] Wrench

<b>1</b>	Lead to Solenoid B
<b>2</b>	Lead to Solenoid A
<b>3</b>	Ground Lead (Green)
<b>4</b>	Lead to Solenoid A
<b>5</b>	Lead to Solenoid B

### 4 PIN RECEPTACLE

Male micro receptacles (M12x1 thread) used with DC valve only.  
23 mm [7/8"] Wrench

4A & 4		
<b>1</b>	Brown	Lead to Solenoid A
<b>2</b>	White	No Connection
<b>3</b>	Blue	Common Lead to Sol. A & B
<b>4</b>	Black	Lead to Solenoid B

D4A & D4		
<b>1</b>	Brown	No connection
<b>2</b>	White	Lead to Solenoid A
<b>3</b>	Blue	Common Lead to Sol. A & B
<b>4</b>	Black	Lead to Solenoid B

### 3 PIN RECEPTACLE

Male mini receptacles conform to NFPA/T3.5.29 R1 - 2007 used with single solenoid valve.  
26 mm [1"] Wrench

<b>1</b>	Ground Lead (Green)
<b>2</b>	Lead to Solenoid
<b>3</b>	Lead to Solenoid

## ► APPLICATION DATA:

### Protection from atmospheric agents IEC 60529

All pressure drops shown on these data pages are based on 170 SUS fluid viscosity and 0.87 specific gravity. For any other specific gravity (G1) the pressure drop ( $\Delta P$ ) will be approx.  $\Delta P_1 = \Delta P (G1/G)$ . See the chart for other viscosities.

Fluid Viscosities	Cst	10	14.5	32	36	43	54	65	76	86	108	216	324	400
SUS	60	75	150	170	200	250	300	350	400	500	1000	1500	1900	
Multiplier	0.77	0.81	0.97	1.00	1.04	1.10	1.15	1.20	1.24	1.31	1.56	1.72	1.83	

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code G). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department.

Using fluids at temperatures higher than 180°F causes the accelerated degradation of seals as well as degradation of the fluids physical and chemical properties. From a safety standpoint, temperatures above 130° F are not recommended.

Temperature Ranges	Ambient	-4 to +130°F	-20 to +54°F
Fluid Temperature Range	Standard	-4 to +180°F	-20 to +82°F
Fluid Viscosity	Range	60-1900 SUS	10-400 cSt
Fluid Contamination Degree	ISO 4406:1999 Class 20/18/15		

### ► INSTALLATION DATA:

#### INSTALLATION

Valves with centering and return springs can be mounted in any position without impairing correct operation. Valves with mechanical detent should have horizontal mounting.

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.

#### SEAL KIT

BUNA SEAL KIT	1013326
VITON SEAL KIT	1013327

#### BOLT KIT

VSD03M	121472
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Dimensions inch [mm]

#### Surface Finishing

