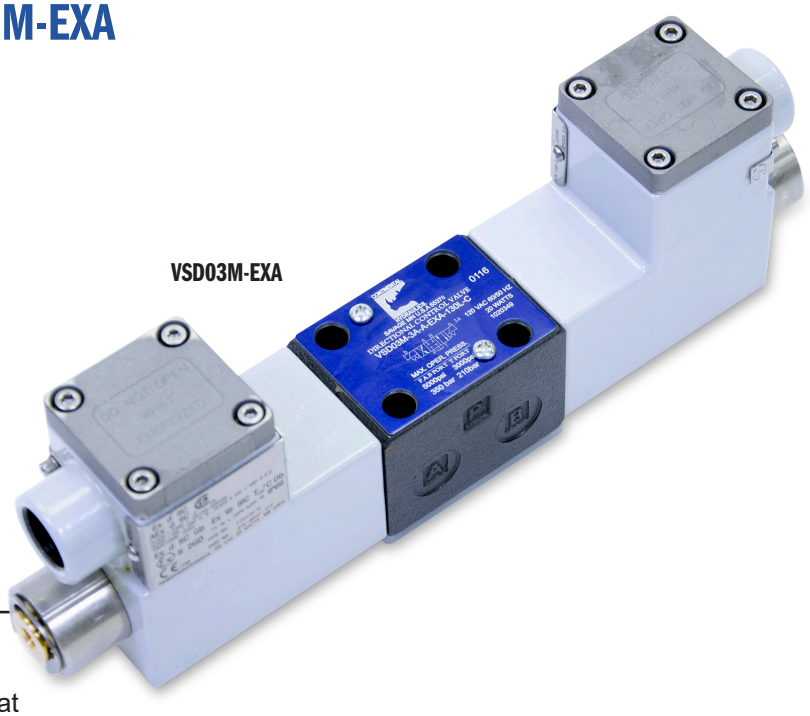
VSD03M-EXA

HAZARDOUS DUTY SOLENOID ACTUATED, DIRECT OPERATED

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

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



DESCRIPTION

This Directional Control valve utilizes Solenoids that are in compliance with ATEX 94/9/CE standards and for Class1/Zone1 (Class I Div 1 GRP C,D / Class II Div 1 GRP E, F, G) CSA listed to US and Canada Safety Standards. See Page 6 for complete list of certifications.

CERTIFICATE NUMBER: CEC II ATEX 076

Continental's line of explosion proof, 4-way, directional control valves is available in 2 position spring offset, 2 position detent, 2 position spring centered and 3 position spring centered versions.

The explosion proof solenoids are available in 12 VDC, 24VDC and 120VAC. The AC coil is equipped with a rectifier bridge.
The DC coils have a built-in bi-directional diode for surge suppression.

Key Features:

- Solenoid actuated direct operated
- Can be used as pilot valve
- Mounting Surface NFPA D03 (ISO 4401-03-02-0-03)
- Max Pressure 5000 PSI (350 bar)
- Max Flow Rate 20 gpm (76 l/min)
- CSA certified Explosion-Proof coils (Class I / Zone I)

PERFORMANCE

Max operating pressure:	**P - A - B Ports**	5000 psi	350 bar
	T Port	3000 psi	210 bar
Maximum flowrate		GPM (l/mi)	20 (76)
Cycle Rate		DC Solenoid	Up To 18,000 cycles/hr
Weight	**DC Single Solenoid**	5.3 lbs	2.4 kg
	DC Dual Solenoid	8.6 lbs	3.9 kg
T4 Solenoid	**Gas**	T4 @ -54° C to + 60°C	
	Dust	T4 / 135°C	
Fluid Viscosity	**Range**	60 -1900 SUS	10 - 400 cSt
	Recommended	120 SUS	25 cSt
Fluid contamination degree		ISO 4406:1999 Class 18/16/13	

VSD03M-EXA

IDENTIFICATION CODE:

VSD03M - ☐ ☐ - ☐ ☐ - EXA - ☐ L - ☐ ← DESIGN LETTER

BASIC VALVE FUNTIONS / SPOOL CODES
see page 3

SEAL TYPE	
CODE	**DESCRIPTION**
A	BUNA (STD)
G	VITON

MECHANICAL	
CODE	**DESCRIPTION**
OMIT	No options
R	Single Solenoid 'B' Port End. Available Only With Function 1 And 5.

CERTIFICATION	
CODE	**DESCRIPTION**
A	94/9/EC Directive (ATEX)

SOLENOID	
CODE	**DESCRIPTION**
130	120 V AC- 60 Hz With Built-In Rectifier
137	24 V DC
138	12 V DC

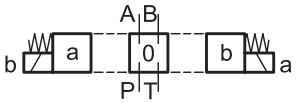
Note: the VSD03M-EXA valves can also be used as the pilot valves on all pilot opperated D05H/D07/D08/D10 size values. Consult factory for more infomration.

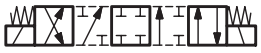
TYPICAL ORDERING CODE:
VSD03M-3A-A-EXA-137L-C

VSD03M-EXA

SPOOL TYPE

2 solenoids
3 positions with spring centering



3A 
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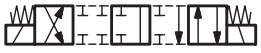
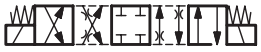
3F 
3L 
3J 
3E 
3H 
3Q 
3FI 
3G 
3K 
3AI 
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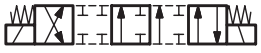
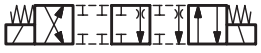
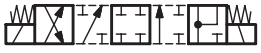
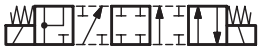
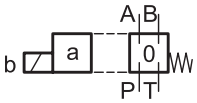
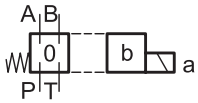
3N 
3EI 
3R 
3V 
3S 
3T 

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



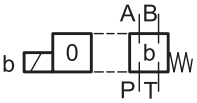
5A 
5B 
5F 
5L 

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



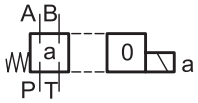
5A-R 
5B-R 
5F-R 
5L-R 

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

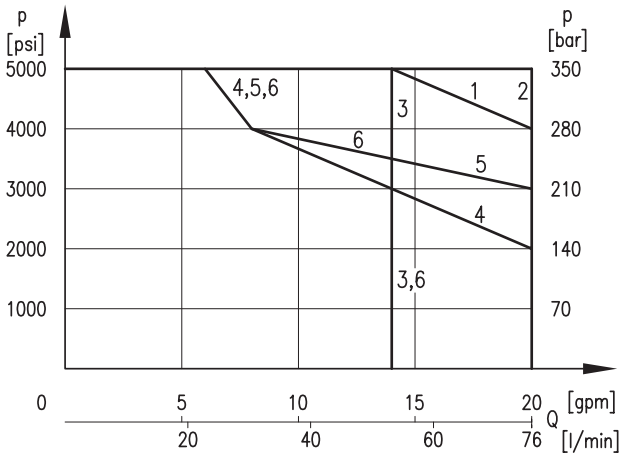
1A-R
1B-R

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 CURVE

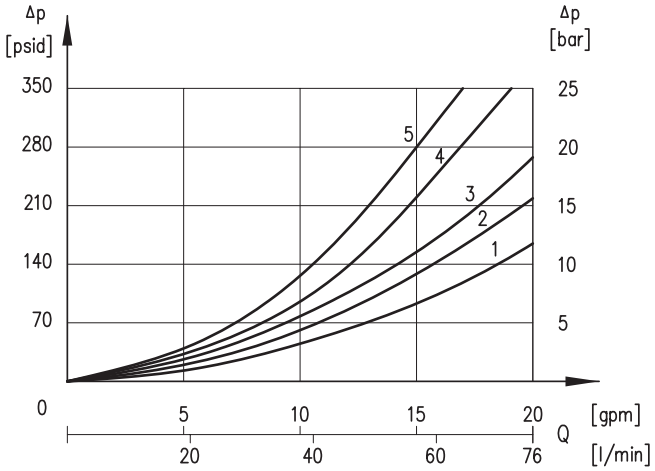


CURVE	SPOOLS
1	A
2	2A, A1, AN, AJ, E1, F1, K1, G, J, N, X
3	B, E, K, H, L, Q
4	F
5	1A
6	1B

Notes:

1. The values indicated in the graphs are relevant to the standard solenoid valve, with 137L 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 value have been obtained with filtration according to ISO 4406:1999 class 18/16/13.

PRESSURE DROPS Δp-Q (OBTAINED WITH VISCOSITY OF 170 SUS (36 cSt) AT 122°F (50°C)



SPOOL TYPE	FLOW CURVE NUMBER				
	P → A	P → B	A → T	B → T	P → T
	SHIFTED				CENTERED
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			

SWITCHING TIMES

Note: Switching times obtained with 1A solenoid valve with Q = 6.6 gpm (25 l/min) and p = 2150 psi (150 bar).

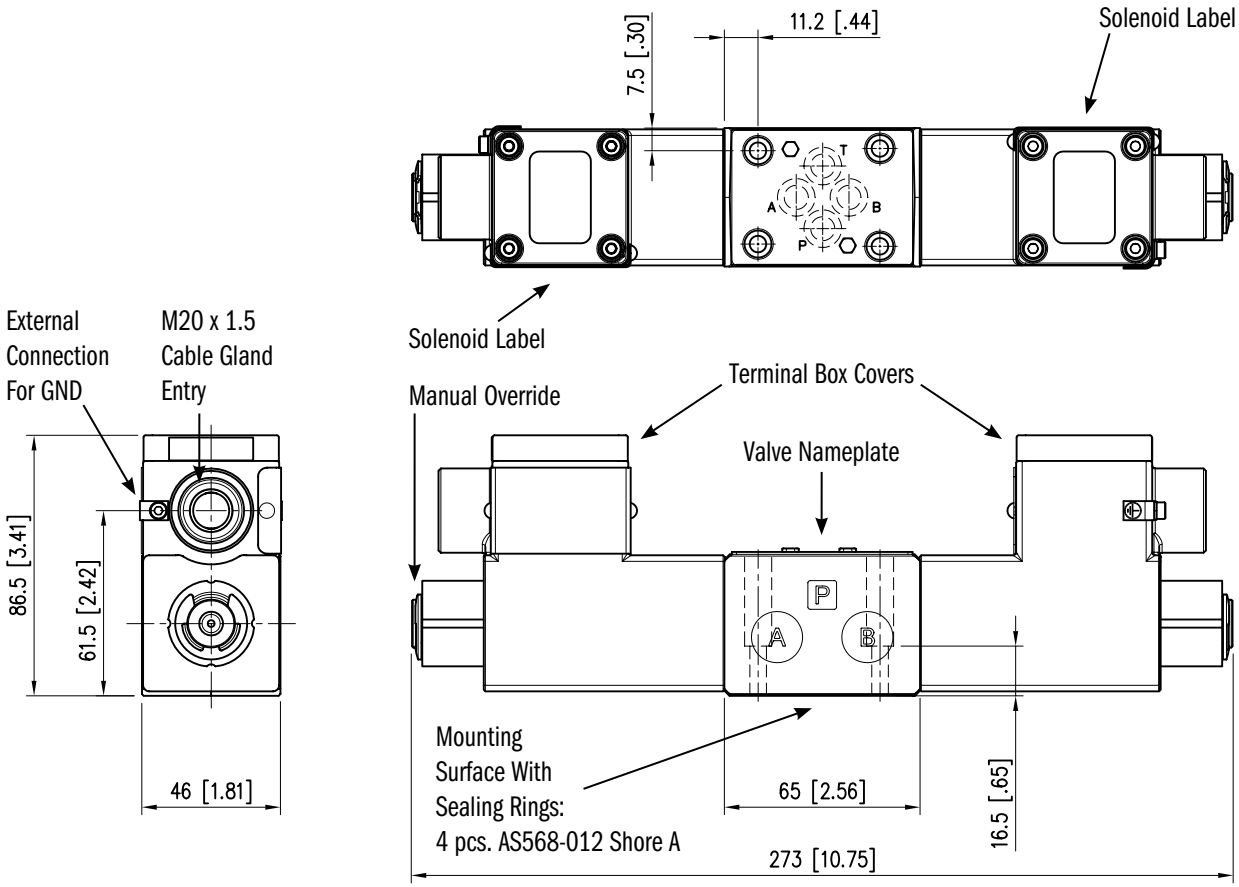
The energizing time is obtained at the time the spool switches over. The de-energized time are measured at the time pressure variation occurs on the line.

TIMES (±10%) [MS]	
ENERGIZING	DE-ENERGIZING
60	45

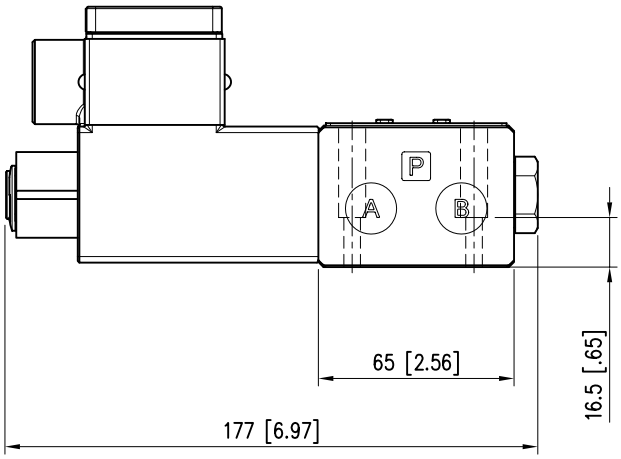
OVERALL AND MOUNTING DIMENSIONS FOR DC SOLENOID VALVES

Dimensions mm [in]

VSD03M - 2*, 3*



VSD03M - 1*, 5*



Do not remove the cover from the coils while energized.

HAZARDOUS DUTY

CLASSIFICATION

The valves can be used for applications and installations in potentially explosive atmospheres that fall within either the ATEX II 2G or the ATEX II 2D classification

- Group: II (Surface Plants)
- Category: 2 (High Protection For Areas 1 and 2)
- Type of Atmosphere:

  G (Explosive Atmosphere With Gas Or Vapours)
  D (Explosive Atmosphere With Dust).

VALVE - TYPE OF PROTECTION

RANGE OF APPLICATION AS PER DIRECTIVE 94//9/EC	II 2GD
TEMPERATURE CLASS	T4 (Surface Temperature ≤ 135°C)

VALVE - ELECTRICAL DATA

SUPPLY VOLTAGE FLUCTUATION	±10 % Vnom	
MAX SWITCH ON FREQUENCY	18,000 cycles/hr	
DUTY CYCLE	100%	
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2004/108/EC	
IP DEGREE	IEC EN 60529	IP 66

SOLENOIDS

These are essentially made up of two parts: tube and coil. The tube is threaded onto the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a retainer provided with anti-unlocking safety bowed retaining ring.

The 'D' type of mechanical construction of the coil housing is made in order to ensure its resistance to possible internal explosion and to avoid any explosion propagation to the outside environment.

Moreover, the solenoid is designed to maintain its surface temperature below the limits specified to the relevant class.

CURRENT AND POWER CONSUMPTION

The table shows current and power consumption values relevant to the different coil types, for direct or alternating 50 or 60 Hz current supply. Code 130L coil must be used when the valve is fed with AC power supply and then rectified by means of the rectifier bridge incorporated into the coil.

COIL TYPE	VOLTAGE	ABSORBED CURRENT A (± 5%)	POWER W (± 10%)
130L	120 V AC- 60 Hz	0.188	20
137L	24 V DC	0.54	13
138L	24 V DC	1.02	12.5

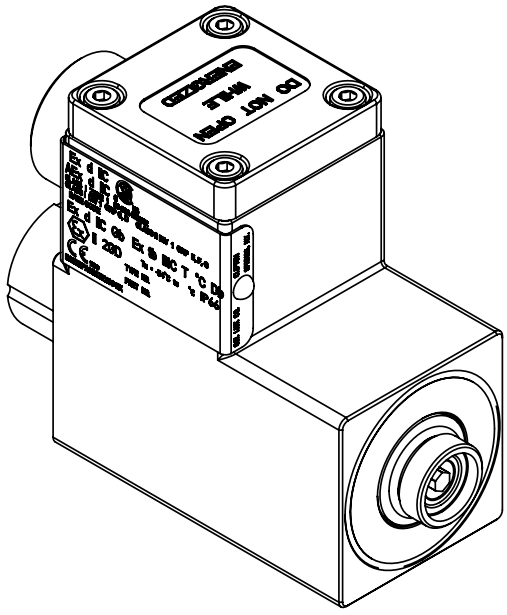
SOLENOID - TYPE OF PROTECTION

COMPLIES WITH EN60079-0, EN60079-1, EN61241-0 & EN61241-1
Ex d IIC Ex tD A21 CE 1180 II 2GD BASEEFA08ATEX0041X

CSA 22.2 No. E60079-0, E60079-1 AND UL60079-0, UL60079-1
CSA LISTED TO U.S. AND CANADA SAFETY STANDARDS.
FILE 08-CSA-1932102

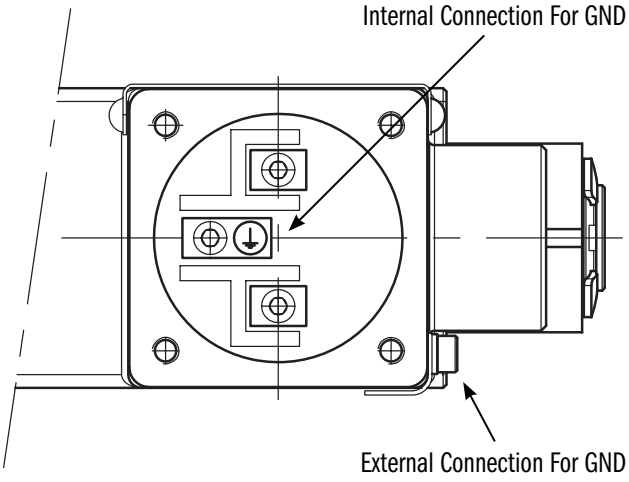
U US
Ex d IIC, AEx d IIC FOR CLASS I ZONE 1
CLASS I DIV 1 GROUPS C, D
UL1203, UL 1604, CSA E61241-1-1
FOR CLASS II DIV 1, GROUPS E, F, & G

CLASS OF PROTECTION FOR INSULATION :	Copper Wire	Class H (356°F)
	Coil	Class H (356°F)



WIRING PRACTICES

TOP VIEW OF COIL FOR WIRING



A cable entry hole is provided to accommodate any suitable certified flameproof cable entry device. Cable entry temperature may exceed 158 °F (70 °C).

Connect external ground where required. (North American applications - external ground connections: Use where local codes or authorities permit or require external ground connections.)

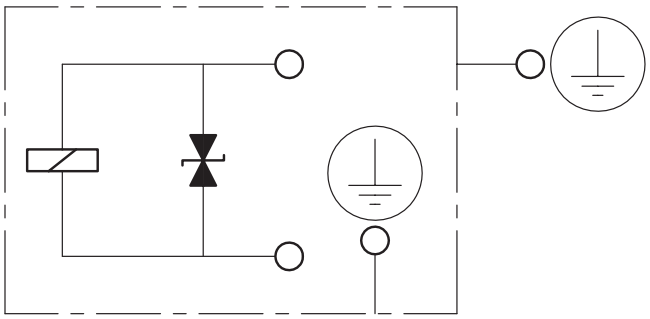
Remove the terminal box cover and connect electrical supply and ground to terminal block, torque to 0.23 - 0.90 Nm (2-8 lb.in).

AWG 16 for all internal connections.

NOTE: Coil is polarity insensitive.

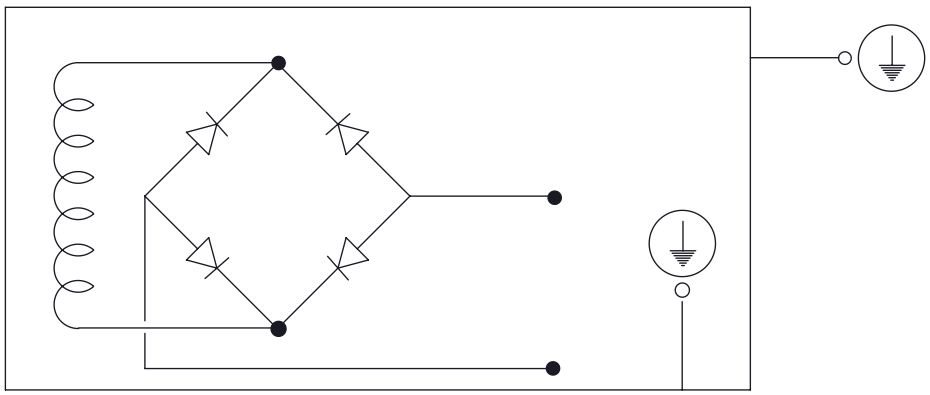
Replace cover and secure with the 4 screws with lock washers, torque to 1.7 Nm (1.25 lb.ft).

WIRING DIAGRAM FOR DC



NOTE:
The circuit is provided with a surge suppressor: A component designed to dissipate the coil energy to protect circuit components.

WIRING DIAGRAM FOR AC



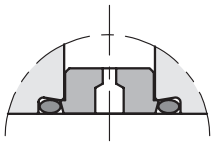
PORT RESTRICTIONS

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

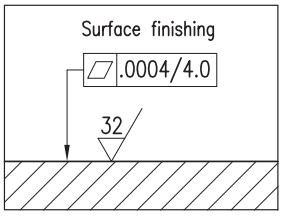
Port restrictor plugs can be ordered separately with the part numbers shown at right.

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



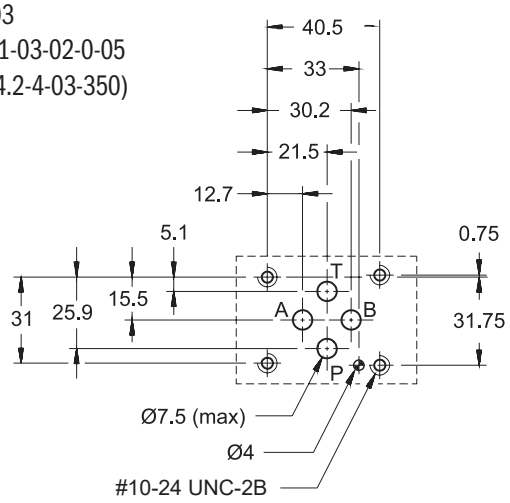
The configurations with centering and return springs can be mounted in any position. Valve fitting takes place by means of bolts or stud kits, fixing the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum 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)



SEAL KIT

VSD03M-EXA Buna Seal Kit	1013275
VSD03M-EXA Viton Seal Kit	1013276

BOLT KIT

BD03-100 (Valve Only)	121472

NOTES:

1. Bolt kit consists of: Qty. 4 10-24NC screws / Qty. 4 #10 Lock washer
2. The recommended torque value for fasteners is: 4-5 lb.ft (5-7 Nm)

CONTINENTAL HYDRECO

INDUSTRIAL AND MOBILE SOLUTIONS

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