

# VED\*M

## Proportional Pilot Operated Directional Control Valve

**P max** 5000 PSI 350 bar  
**Q max** See Characteristic Curves

### DESCRIPTION

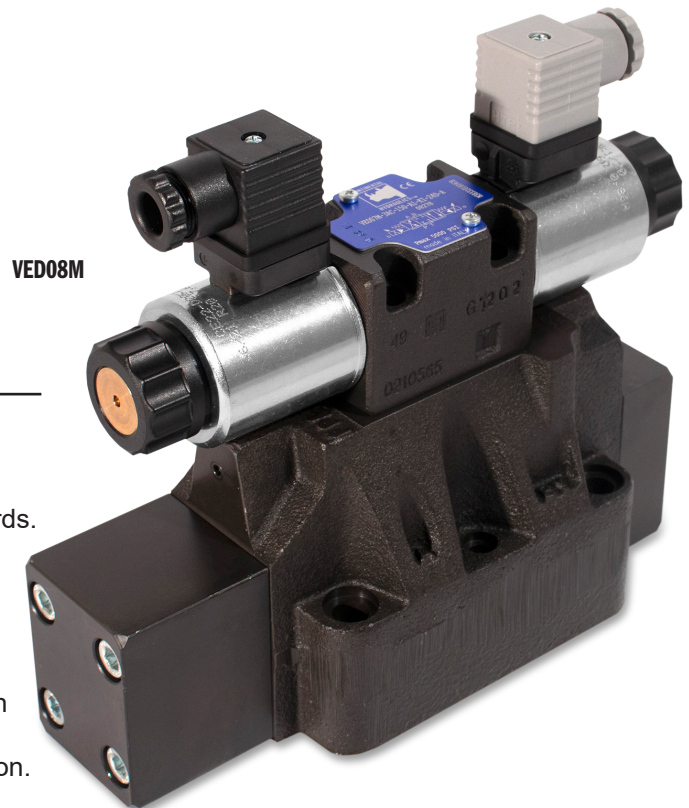
Continental's VED\*M pilot operated 4-way proportional valves conform to NFPA D05\* to D10 and ISO 4401 mounting standards.

These valves are designed for use with remote electronic controls allowing for durable performance in locations that require components to survive in rugged and harsh conditions.

The valves are designed to control the direction and oil flow rate based on the amount of current supplied to the solenoid. In event of a loss in electrical power or pilot supply pressure, the centering springs will return the valve spool to the center position. The valve solenoids can be driven by a variable current power supply or by use of external Power Amplifier Cards designed to maximize the valves performance. A variety of manual overrides and a version with a pressure reducing valve are also available.

### Key Features:

- It is suitable for directional and speed control of hydraulic actuators
- Valve opening and flow rate can be modulated continuously in proportion to the current supplied to the solenoid
- Can be controlled directly by a current control supply unit or combined with an external electronic card to maximize the valve performances
- Several manual overrides are available
- 12 Volt or 24 Volt Solenoids – with DIN 43650 or Deutsch Connections

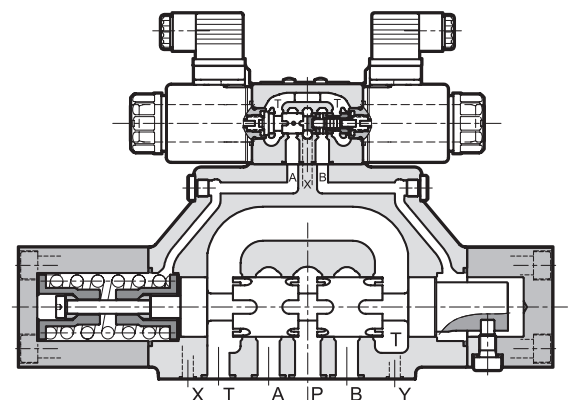


VED08M

### SUBPLATE MOUNTING

<b>VED05 M</b> (Alt A or B)	<b>ISO 4401-05</b>
<b>VED07M</b>	<b>ISO 4401-07</b>
<b>VED08M</b>	<b>ISO 4401-08</b>
<b>VED10M</b>	<b>ISO 4401-10</b>
<b>VED11M</b>	<b>ISO 4401-10</b> oversize ports

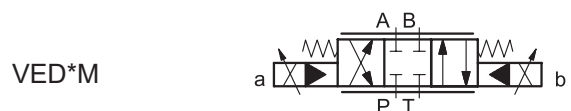
### OPERATION PRINCIPLE



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

		VED05M	VED07M	VED08M	VED10M	VED11M
<b>Max operating pressure:</b> P - A - B ports T port	PSI (bar)	5000 (350) see page 7				
<b>Rated flow with Δp 10 bar P-T</b>	(l/mi)	80	150	300	800	1000
<b>Step response</b>		see page 6				
<b>Hysteresis (with PWM 100 Hz)</b>	% Q max	< 4%				
<b>Repeatability</b>	% Q max	< ±2%				
<b>Electrical characteristics</b>		see page 6				
<b>Ambient temperature range</b>	°F (°C)	-4 / 140 (-20 / +60)				
<b>Fluid temperature range</b>	°F (°C)	-4 / 176 (-20 / +80)				
<b>Fluid viscosity range</b>	cSt	10 + 400				
<b>Fluid contamination degree</b>		according to ISO 4406:1999 class 18/16/13				
<b>Recommended viscosity</b>	cSt	25				
<b>Mass:</b> single solenoid valve double solenoid valve	lbs (kg)	15.2 (6.9) 16.75 (7.6)	17 (7.7) 18.5 (8.4)	36 (16.3) 37.5 (17)	94.4 (42.8) 96 (43.5)	88.2 (40) 90 (40.7)

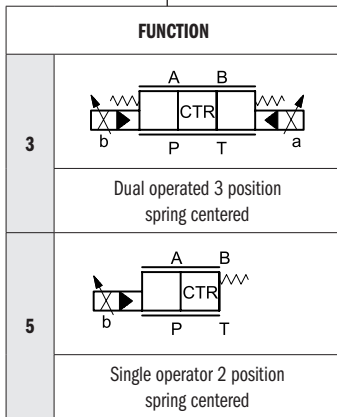
### HYDRAULIC SYMBOLS (typical)



### IDENTIFICATION CODE:

**VED**   **M** -     -   -     -   -   -   ——— DESIGN LETTER

SIZE	
CODE	DESCRIPTION
05A	NFPA D05 alt. A
05B	NFPA D05 alt. B
07	NFPA D07
08	NFPA D08
10	NFPA D10
11	NFPA D10 oversized ports



SEALS	
CODE	DESCRIPTION
A	BUNA (STD)
G	VITON

CONNECTION	
CODE	DESCRIPTION
K1	DIN 43650 (STD)
K7	DT04-2P 'Deutsch'

VOLTAGE	
CODE	DESCRIPTION
12D	12 V DC
24D	Current 24 V DC (STD)

NOMINAL FLOW with ΔP P-T 143 psi (10 bar)		
SIZE	CODE	FLOW RATE
05	80	80 l/min (21 gpm)
	80/40	Asymmetrical Spool: 80 l/min (21 gpm) on P-A 40 l/min (10.5 gpm) on B-T
07	100	100 l/min (26.5 gpm)
	150	150 l/min (40 gpm)
08	150/75	Asymmetrical Spool: 150 l/min (40 gpm) on P-A 75 l/min (20 gpm) on B-T
	200	200 l/min (53 gpm)
10	300	300 l/min (80 gpm)
	300/150	Asymmetrical Spool: 300 l/min (80 gpm) on P-A 150 l/min (40 gpm) on B-T
11	350	350 l/min (53 gpm)
	500	500 l/min (80 gpm)
10	500/250	Asymmetrical Spool: 500 l/min (132 gpm) on P-A 250 l/min (66 gpm) on B-T
	800	800 l/min (210 gpm)
11	1000	1000 l/min (264 gpm)

PILOT / DRAIN	
CODE	DESCRIPTION
1	Internal pilot External drain
2	External pilot External drain
3	Internal pilot Internal drain
4	External pilot Internal drain

MECHANICAL (Omit if not required)	
CODE	DESCRIPTION
R	Reverse operator 2 position spring centered solenoid A supplied
Z	Pilot pressure reducer. Mandatory with pilot drain 1 and 3 when pressure is higher than 3000 psi (210 bar)

TYPICAL ORDERING CODE:  
**VED07M-3AC-100-A1-K1-24D-C**

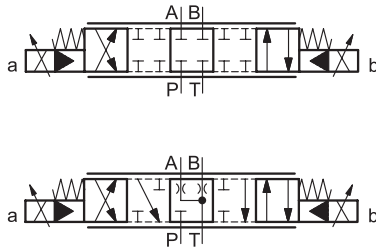
SPOOLS					
NAME	SYMBOLS	DESCRIPTION	APPLICATION	SIZE	FUNCTION MATCHING
AC		METER IN / METER OUT	MOTION CONTROL	05, 07, 08, 10	3, 5
FC		METER IN / METER OUT		05, 07, 08, 10	3, 5
RL		METER IN / METER OUT (REGEN)		07, 08, 10	3
RA		METER IN / METER OUT (REGEN)		07, 08, 10	3

### AVAILABLE CONFIGURATIONS:

The valve configuration depends on the combination of the following elements:  
number of proportional solenoids, spool type, nominal flow rate.

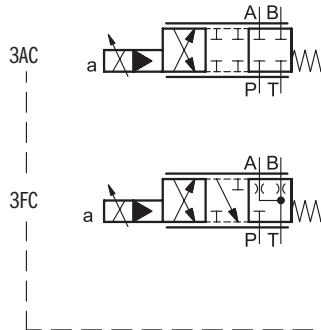
#### Code 3

2 solenoids configuration:  
3 positions with spring centering



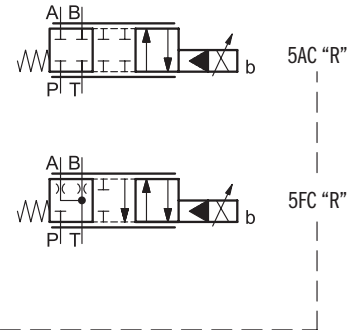
#### Code 5

Configuration: 1 solenoid on side A.  
2 positions (central + external) with return spring

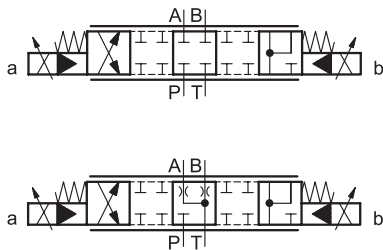


#### Reverse Build

Configuration: 1 solenoid on side B.  
2 positions (central + external) with return spring



Type of valve	*	NOMINAL FLOW with $\Delta P$ P-T 143 PSID
VED05 M	80	80 l/min (21 gpm)
	80/40	80 l/min (21 gpm) on P-A 40 l/min (10.5 gpm) on B-T
VED07M	100	100 l/min (26.5 gpm)
	150	150 l/min (40 gpm)
VED08M	150/75	150 l/min (40 gpm) on P-A 75 l/min (20 gpm) on B-T
	200	200 l/min (53 gpm)
	300	300 l/min (80 gpm)
VED10M	300/150	300 l/min (80 gpm) on P-A 150 l/min (40 gpm) on B-T
	350	350 l/min (53 gpm)
VED11M	500	500 l/min (80 gpm)
	500/250	500 l/min (132 gpm) on P-A 250 l/min (66 gpm) on B-T
	800	800 l/min (210 gpm)
	1000	1000 l/min (264 gpm)



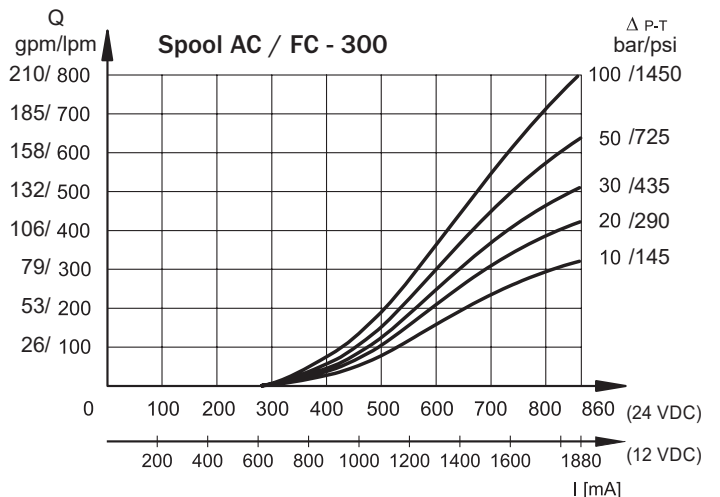
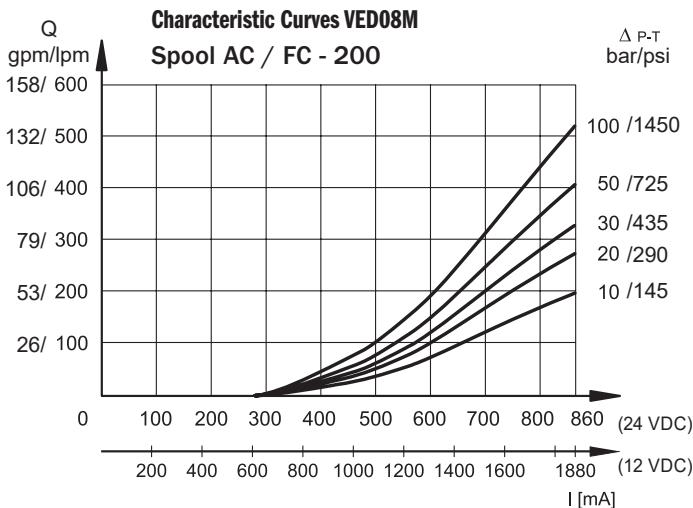
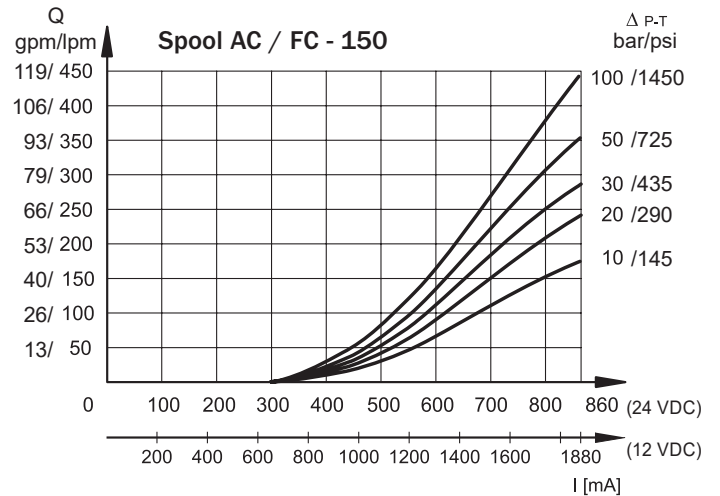
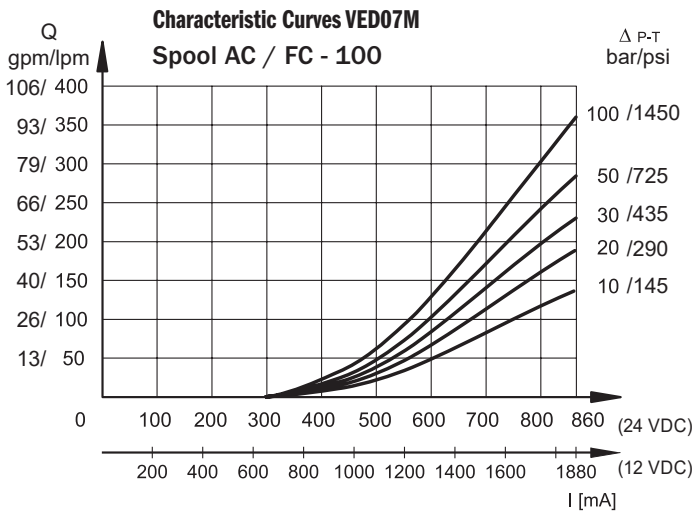
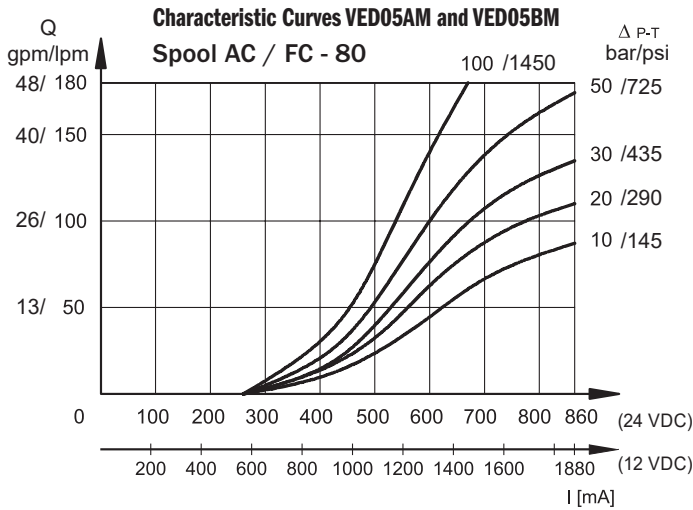
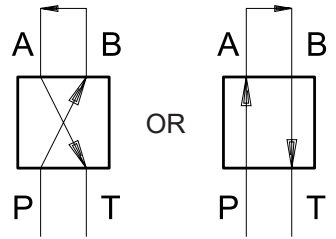
3RL  
3RA

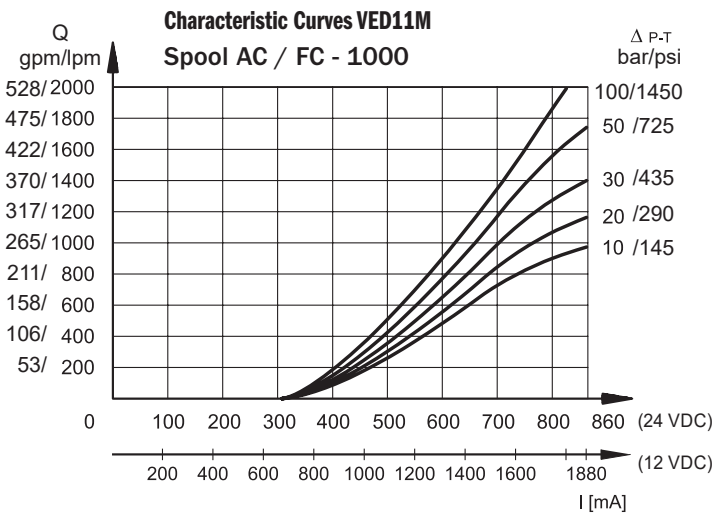
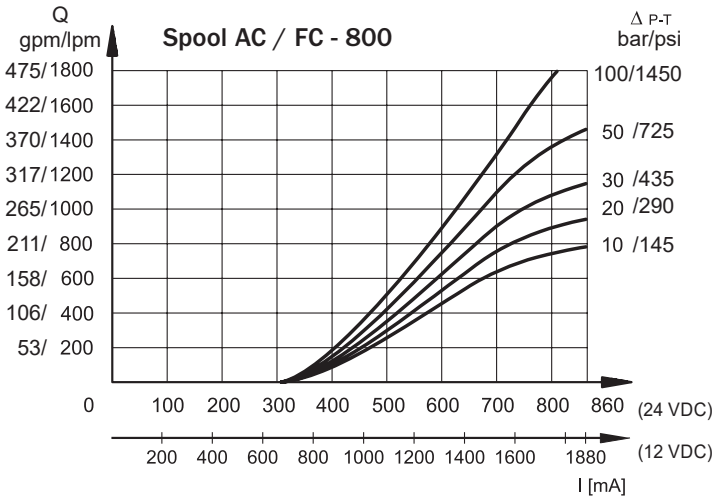
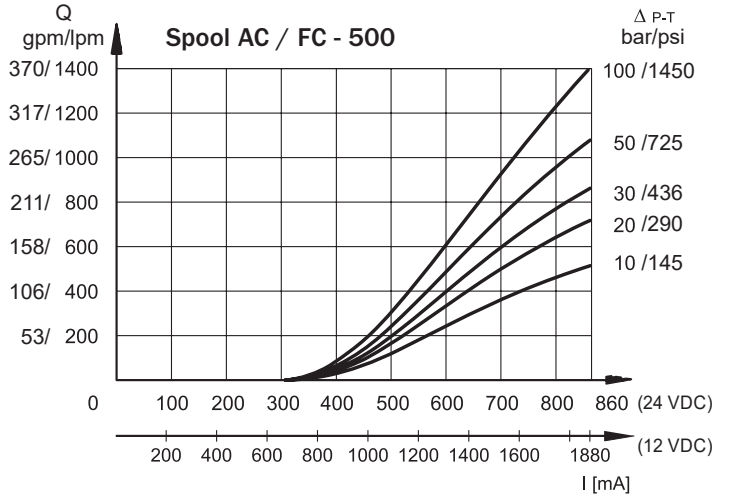
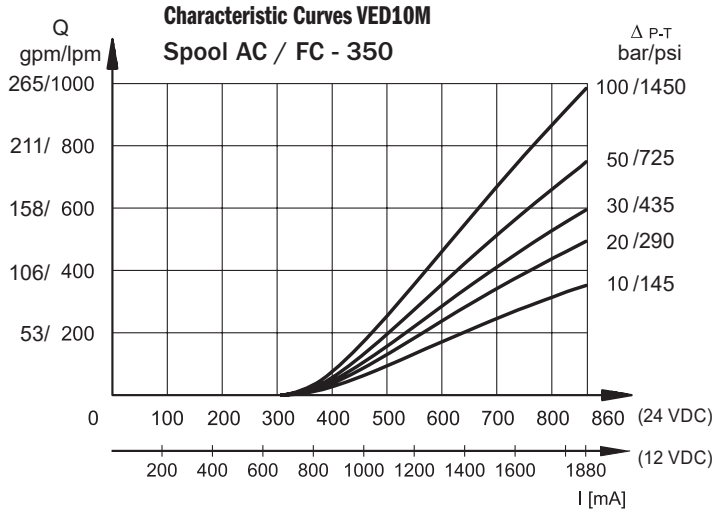
Type of valve	*	NOMINAL FLOW with $\Delta P$ P-T 151 PSID
D07	150/75	150 (P-A, A-T) / 75 (P-B, B-P) l/min
D08	300/150	300 (P-A, A-T) / 150 (P-B, B-P) l/min
D10	500/250	500 (P-A, A-T) / 250 (P-B, B-P) l/min

**CHARACTERISTIC CURVES**

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

Typical flow rate control curves according to the current supply to solenoid. The reference  $\Delta p$  values are measured between ports P and T on the valve.





### ELECTRICAL CHARACTERISTICS

Proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube and is secured by means of a lock nut. It can be rotated through 360° depending on installation clearances.

<b>NOMINAL VOLTAGE</b>	V DC	<b>12</b>	<b>24</b>
<b>RESISTANCE (at 20°C) K1 coil K7, WK1, Wk7 coil</b>	Ω	3.66	17.6
		4.4	18.6
<b>NOMINAL CURRENT</b>	A	1.88	0.86
<b>DUTY CYCLE</b>		100%	
<b>ELECTROMAGNETIC COMPATIBILITY (EMC)</b>	According to 2014/30/EU		
<b>PROTECTION FROM ATMOSPHERIC AGENTS (IEC 60529)</b>	IP65		
	The IP protection degree is guaranteed only with both valve and connectors of an equivalent IP degree correctly connected and installed.		
<b>CLASS OF PROTECTION</b> Coil insulation (VDE 0580) Impregnation	Class H		
	Class F		

### STEP RESPONSE

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

Step response is the time taken for the valve to reach 90% of the set pressure value following a step change of reference signal.

The table shows the typical step response tested with static pressure 100 bar.

REFERENCE SIGNAL	0 → 100%	100 → 0%
	Step response [ms]	
<b>VED05*M</b>	50	40
<b>VED07M</b>	80	50
<b>VED08M</b>	100	70
<b>VED1*M</b>	200	120

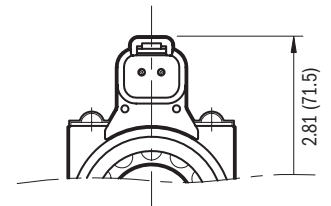
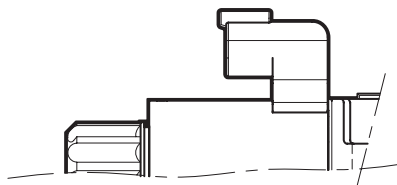
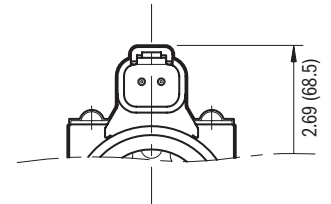
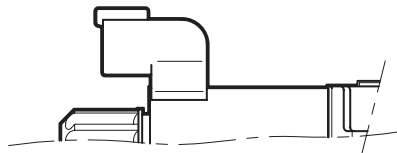
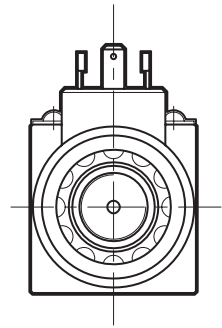
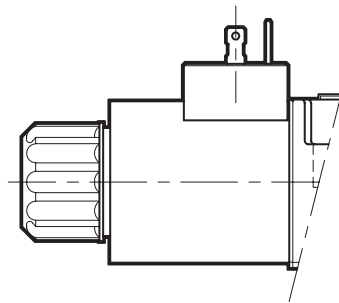
### ELECTRICAL CONNECTIONS

Connectors for K1 connection are always delivered together with the valve.

Connection for EN 175301-803  
(ex DIN 43650) connector  
code K1 (standard)  
code WK1 (W7 version only)

Connection for  
DEUTSCH DT06-2S male connector  
code K7

Connection for  
DEUTSCH DT06-2S male connector  
code WK7 (W7 version only)



Dimensions inch (mm)

### HYDRAULIC CHARACTERISTICS

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

REFERENCE SIGNAL		VED05*M	VED07M	VED08M	VED10M	VED11M
Max flow rate	l/min	180	450	800	1800	2000
Pilot supply flow requested with operation 0 → 100%	l/min	2.1	2.4	5.5	6.5	6.5
Pilot supply volume requested with operation 0 → 100%	cm <sup>3</sup>	1.7	3.2	9.2	21.6	21.6

PRESSURES (bar)/psi	Min	Max
Piloting pressure on X port	(30) 435	(210) 3000 (note)
Pressure on T port with internal drain	-	(10) 145
Pressure on T port with external drain	-	(250) 3600

**NOTE:** If the valve operates at higher pressures it is necessary to use the version with external pilot supply with reduced pressure.

Otherwise, the valve with internal pilot and pressure reducing valve with 30 bar fixed adjustment can be ordered (mechanical code option Z).

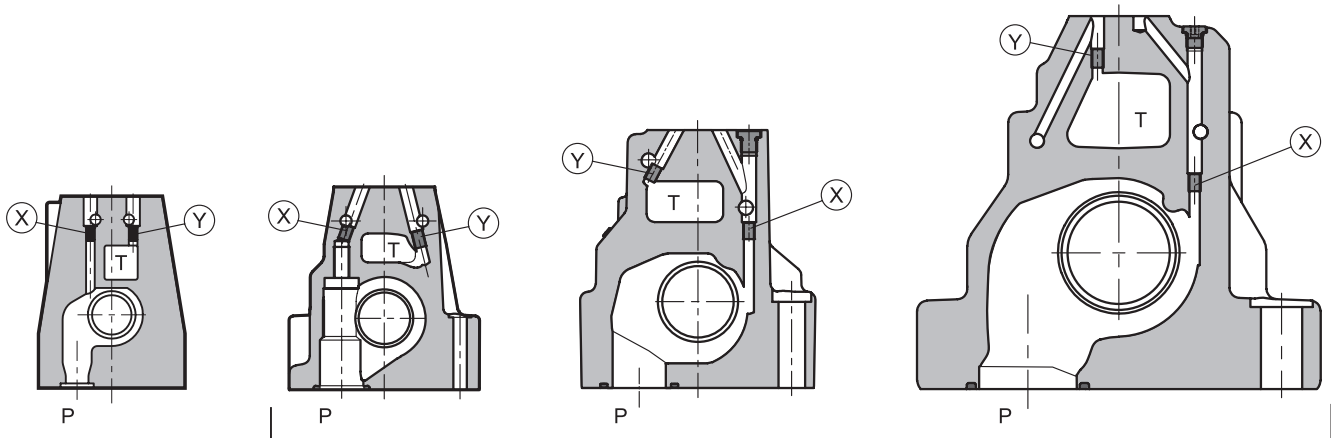
### HYDRAULIC CHARACTERISTICS - Pilot and Drain

Valves are available with pilot and drain both internal or external. The version with external drain allows a higher back pressure on the unloading. The version with external pilot with reduced pressure must be used when higher pressures are needed.

The pilot supply Z type consists of an arrangement with internal piloting and 30 bar supply pressure for the pilot stage by means of a fixed adjustment pressure reducing valve.

**NOTE:** The configuration of pilots and drains must be chosen when ordering. Subsequent modifications are allowed only to specialized operators with authorization and in factory.

TYPE OF VALVE	Plug Assembly	
	X	Y
Internal pilot and external drain	NO	YES
External pilot and external drain	YES	YES
Internal pilot and internal drain	NO	NO
External pilot and internal drain	YES	NO

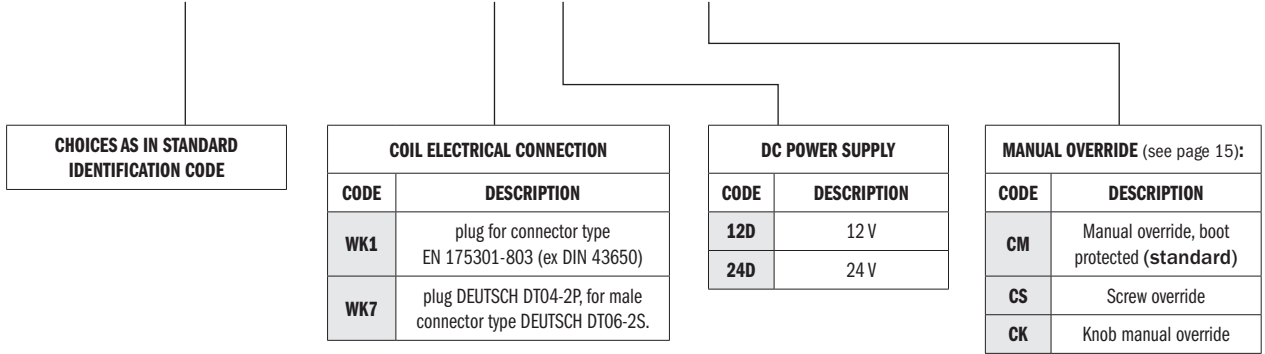


**VED05\*M**

X: plug M5x6 for external pilot  
Y: plug M5x6 for external drain

**VED07M, VED08M, VED10M, VED11M**

X: plug M6x8 for external pilot  
Y: plug M6x8 for external drain

**HIGH IP AND CORROSION RESISTANCE VERSION**
**VED** [ ] / [ ] [ ] / [ ] / **W7**

**Corrosion resistance**

This version features the zinc-nickel coating on all exposed metal parts of the valve, making it resistant to exposure to the salt spray for 600 hours (test performed according to UNI EN ISO 9227 and assessment test performed according to UNI EN ISO 10289).

The boot protected manual override is fitted as standard in order to protect the solenoid tube. See the dimensions of the CM manual override in page 15.

**Coils**

The coils feature a zinc-nickel surface treatment. The electrical characteristics do not change compared to the standard version: see table in page 6.

**Protection from atmospheric agents IEC 60529**

The IP protection degree is guaranteed only with both valve and connectors of an equivalent IP degree correctly connected and installed.

Electrical Connection	Electric connection protection	Whole valve protection
<b>WK1 EN 175301-803 (ex DIN 43650)</b>	IP66	IP66
<b>WK7 DEUTSCH DT04 male</b>	IP66/IP68/IP69 IP69K*	IP66/IP68/IP69 IP69K*

(\*) The IP69K protection degree is not taken into account in IEC 60529 but it is included in ISO 20653.

**NOTE:** As regards the liquid ingress protection (second digit), there are three means of protection.

Codes from 1 to 6 are related to water jets.

Rates 7 and 8 are related to immersion.

Rate 9 is reserved for high pressure and temperature water jets.

This means that IPX6 covers all the lower steps, rate IPX8 covers IPX7 but not IPX6 and lower, instead IPX9 does not cover any of them.

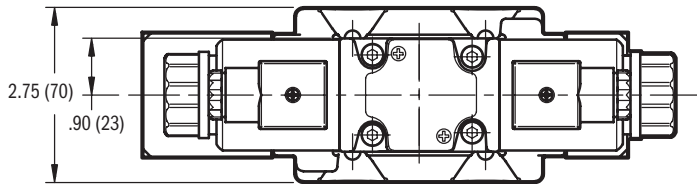
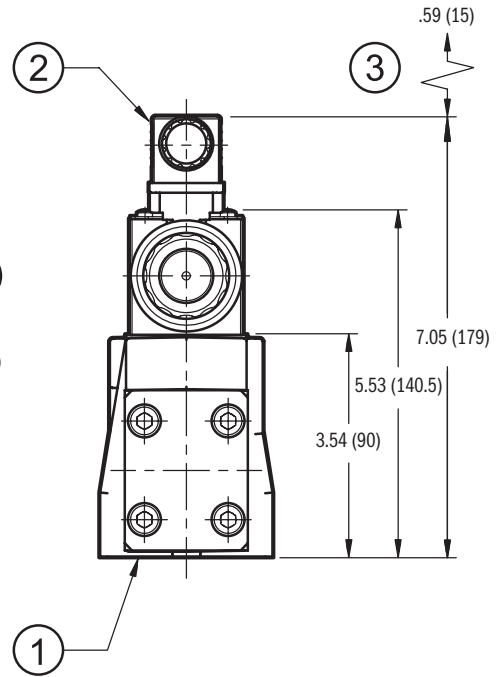
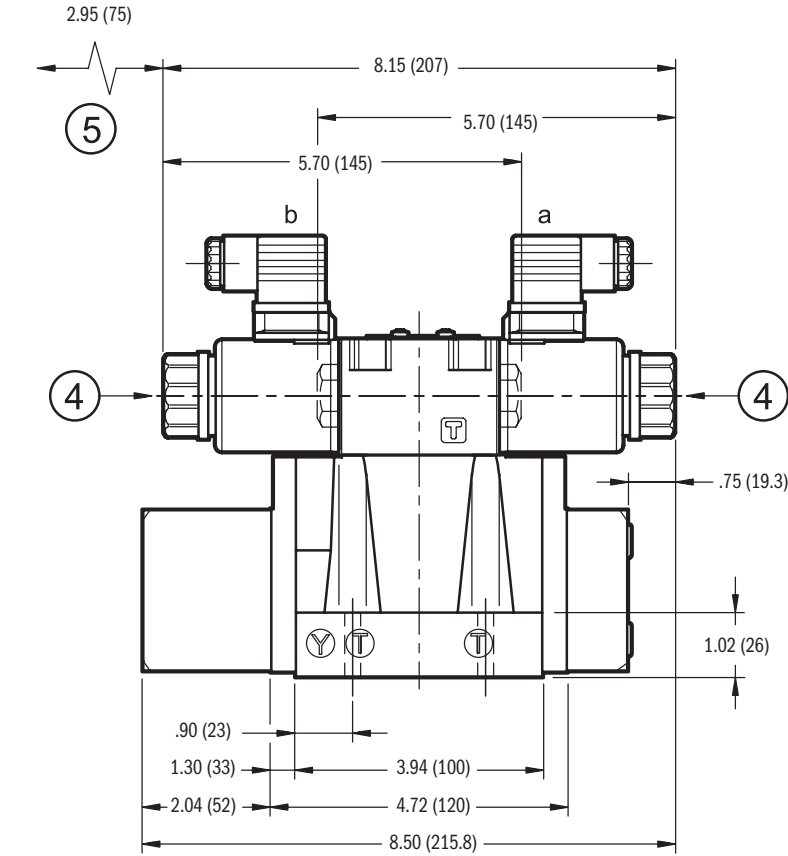
Whether a device meets two types of protection requirements it must be indicated by listing both the tests separated by a slash.

(E.g. a marking of an equipment covered both by temporary immersion and water jets is IP66/IP68).



### OVERALL AND MOUNTING DIMENSIONS VED05AM AND VED05BM

Dimensions inch (mm)



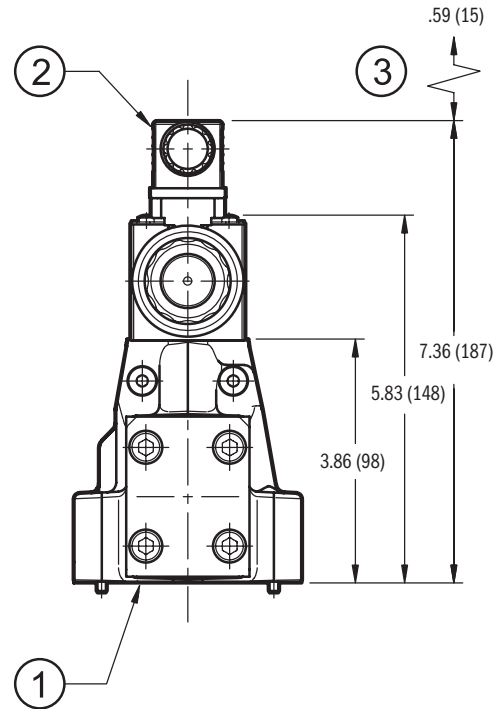
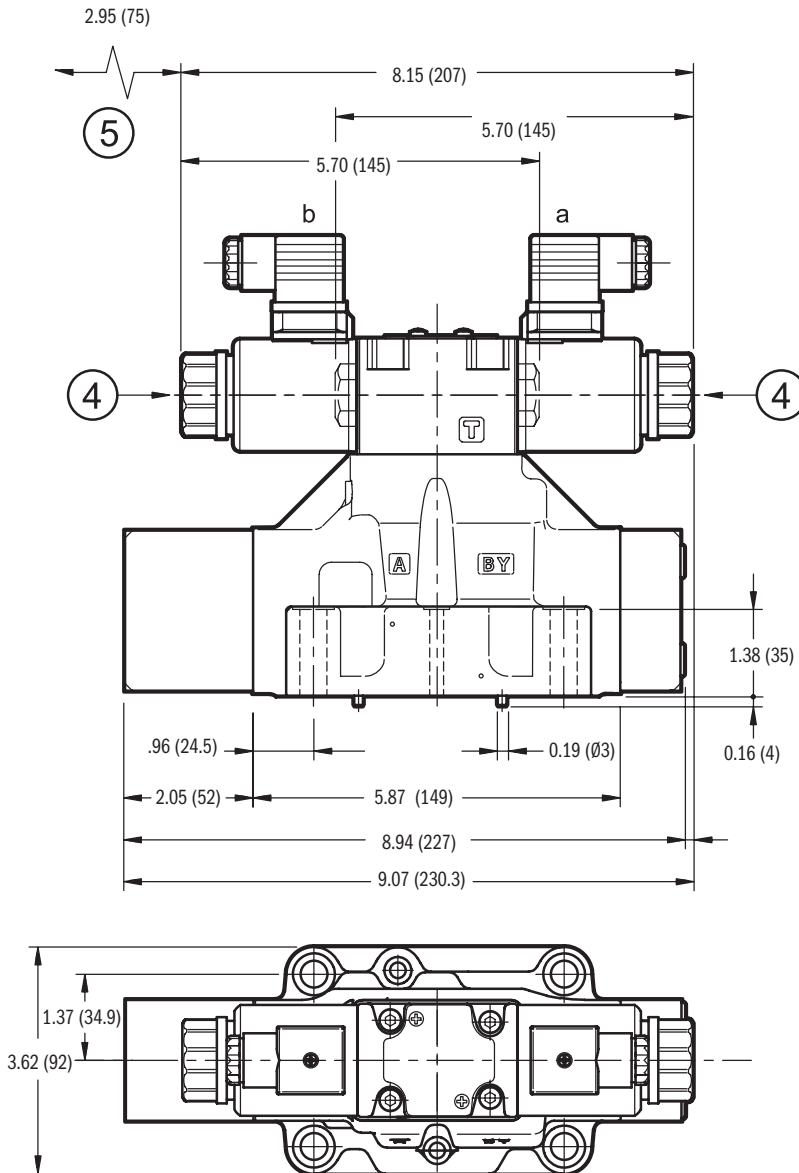
(BD05H-150-B) Valve fastening: N. 4 SHC screws - ISO 4762 1/4 - 20 UNC - 2B x 1.5 Tightening torque: 8 Nm (A 8.8 bolts) 6lbs ft.
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<b>1</b>	Mounting surface with sealing rings: N. 5 OR type AS569-014 - 90 Shore A N. 2 OR type AS568-012 - 90 Shore A
<b>2</b>	(DIN 43650) electrical connector
<b>3</b>	Connector removal space
<b>4</b>	Standard manual override embedded in the solenoid tube
<b>5</b>	Coil removal space

NOTE: For overall dimensions with Z option (fixed adjustment pressure reducing valve) see page 13. Mounting interface at page 14.

### OVERALL AND MOUNTING DIMENSIONS VED07M

Dimensions inch (mm)



(BD07-200-A)

Valve fastening: N. 4 SHC screws - ISO 4762

3/8 - 16 UNC - 2B x 2.0

1/4 - 20 UNC - 2B x 2.0

Tightening torque:

3/8 - 16 30LBf ft (40Nm)

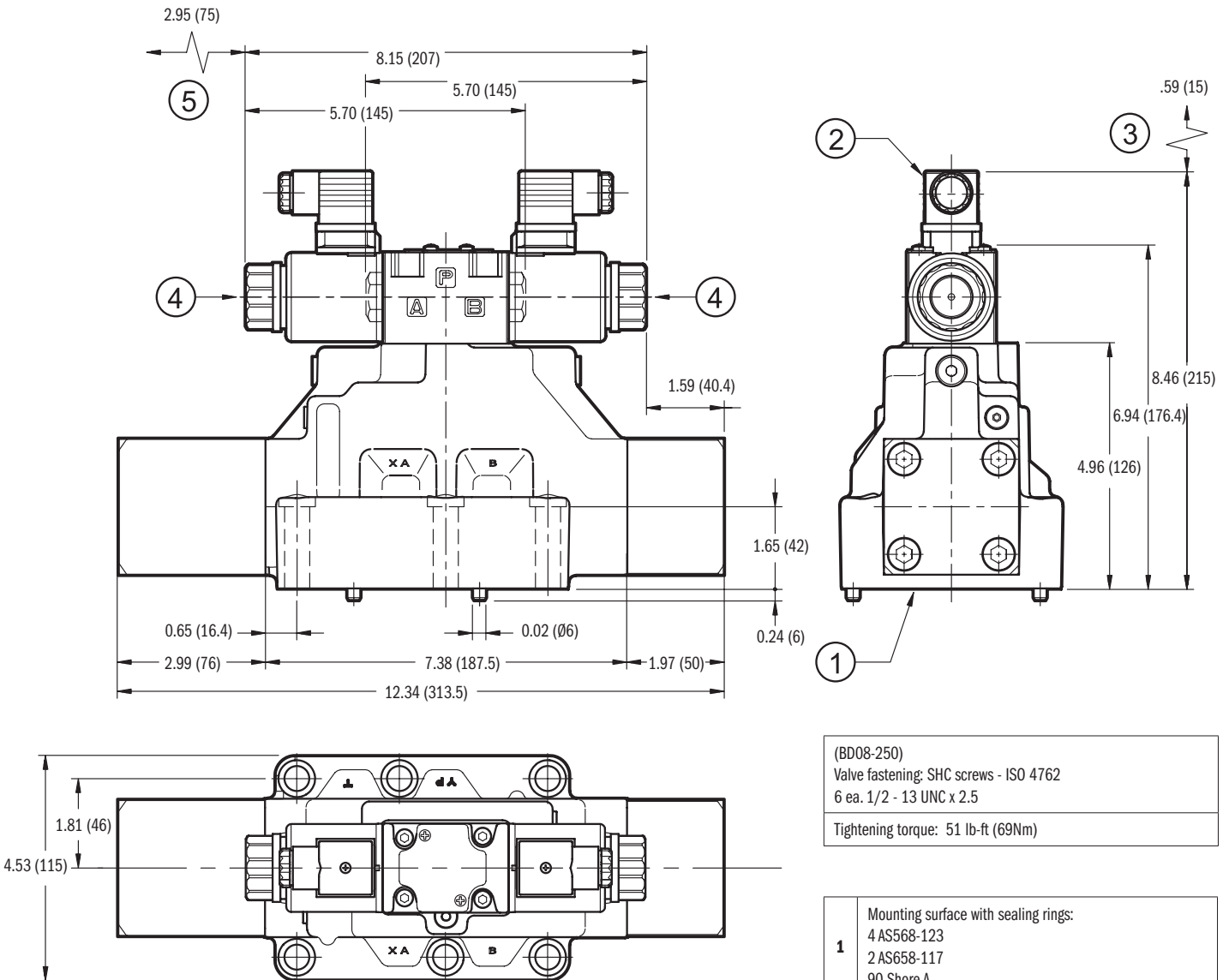
1/4 - 20 6LBf ft (8Nm)

	Mounting surface with sealing rings: N. 5 OR type AS569-014 - 90 Shore A N. 2 OR type AS568-012 - 90 Shore A
1	(DIN 43650) electrical connector
2	Connector removal space
3	Standard manual override embedded in the solenoid tube
4	Coil removal space

NOTE: For overall dimensions with Z option (fixed adjustment pressure reducing valve) see page 13. Mounting interface at page 14.

### OVERALL AND MOUNTING DIMENSIONS VED08M

Dimensions inch (mm)



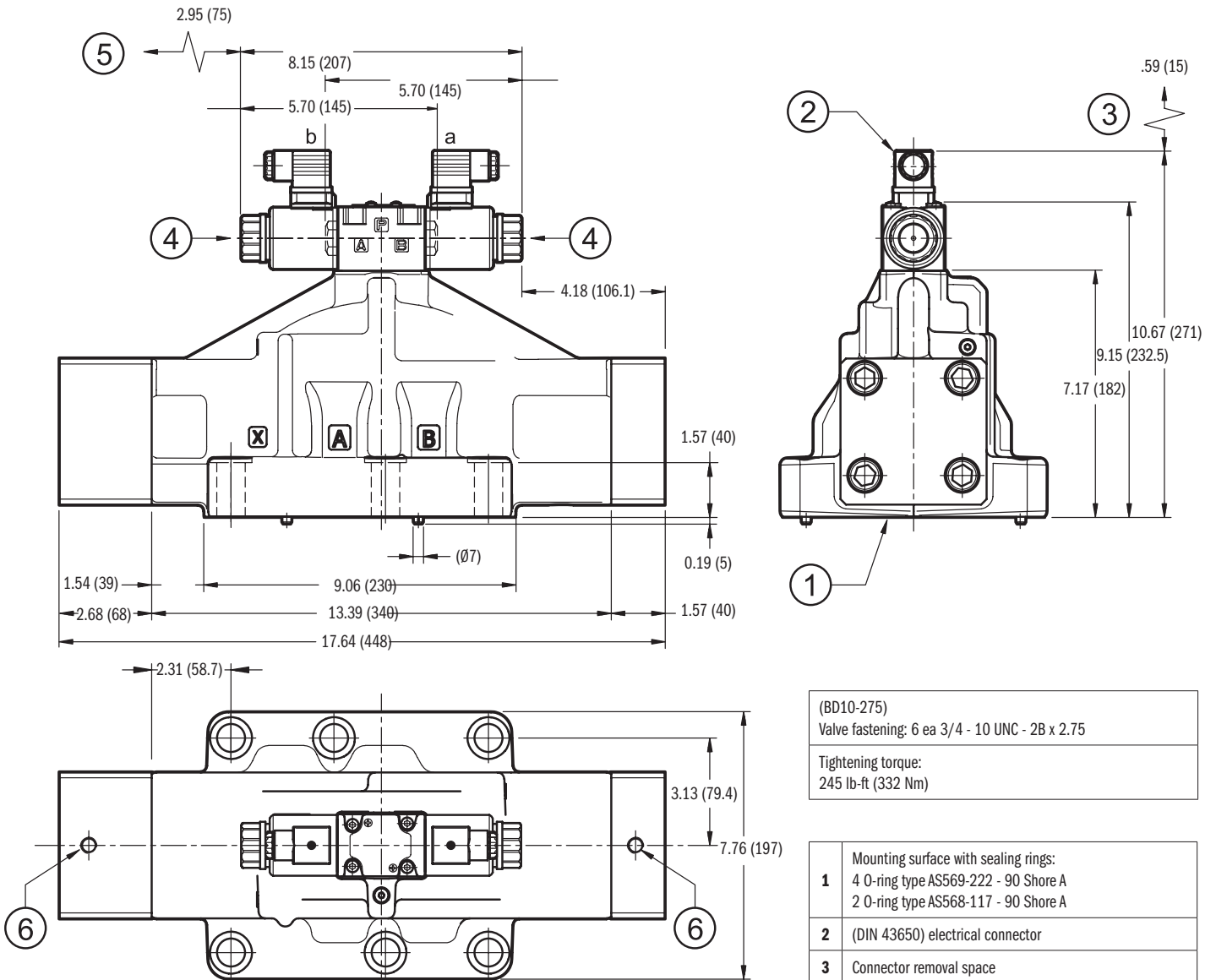
(BD08-250)  
 Valve fastening: SHC screws - ISO 4762  
 6 ea. 1/2 - 13 UNC x 2.5  
 Tightening torque: 51 lb-ft (69Nm)

1	Mounting surface with sealing rings: 4 AS568-123 2 AS658-117 90 Shore A
2	(DIN 43650) electrical connector
3	Connector removal space
4	Standard manual override embedded in the solenoid tube
5	Coil removal space

NOTE: For overall dimensions with Z option (fixed adjustment pressure reducing valve) see page 13. Mounting interface at page 14.

**OVERALL AND MOUNTING DIMENSIONS VED10M and VED11M**

Dimensions inch (mm)



(BD10-275)  
 Valve fastening: 6 ea 3/4 - 10 UNC - 2B x 2.75  
 Tightening torque:  
 245 lb-ft (332 Nm)

	Mounting surface with sealing rings:
1	4 O-ring type AS569-222 - 90 Shore A 2 O-ring type AS568-117 - 90 Shore A
2	(DIN 43650) electrical connector
3	Connector removal space
4	Standard manual override embedded in the solenoid tube
5	Coil removal space

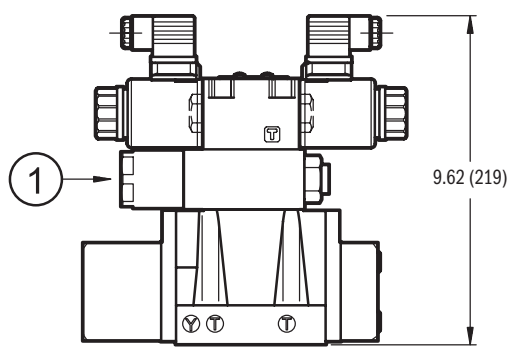
NOTE: For overall dimensions with Z option (fixed adjustment pressure reducing valve) see page 13. Mounting interface at page 14.

**VED\*M**

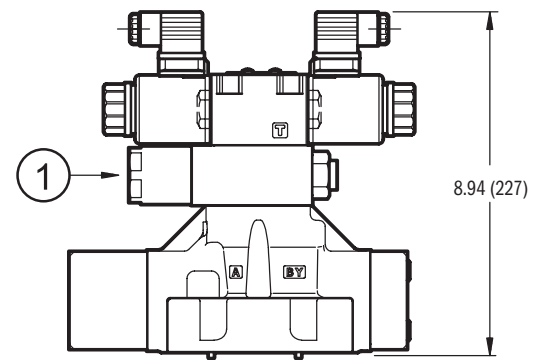
**13 - OVERALL AND MOUNTING DIMENSIONS - PILOT SUPPLY TYPE Z**

Dimensions inch (mm)

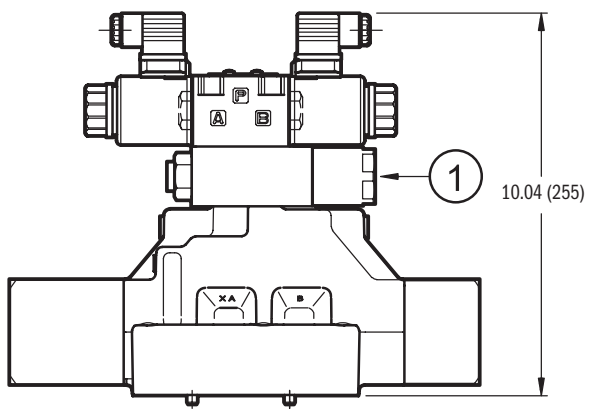
**VED05 M**



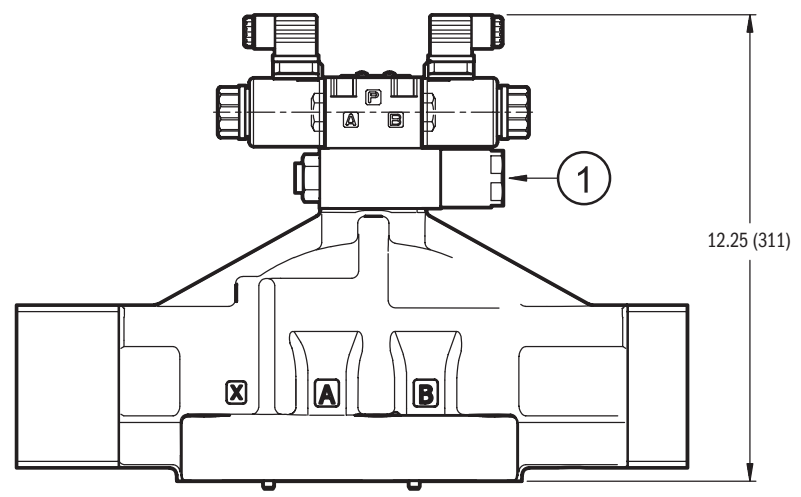
**VED07M**



**VED08M**



**VED10M / VED11M**

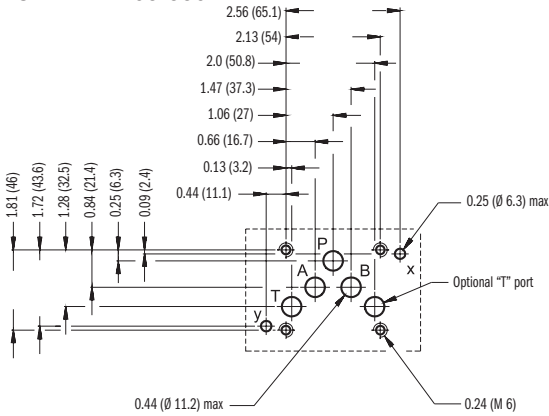


<b>1</b>	30 bar fixed adjustment pressure reducing valve P03MSV-PDRP-F43-AC
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### OVERALL AND MOUNTING DIMENSIONS Dimensions inch [mm]

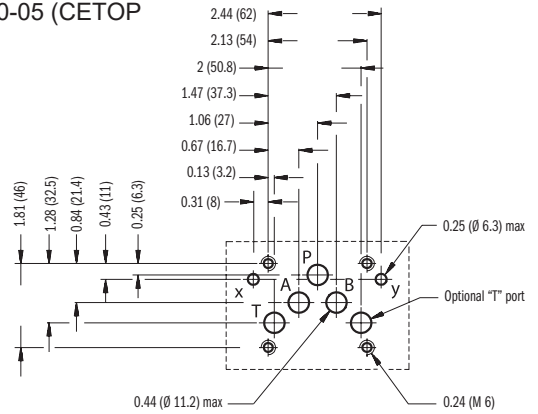
#### VED05BM

CETOP 4.2-4 P05-350



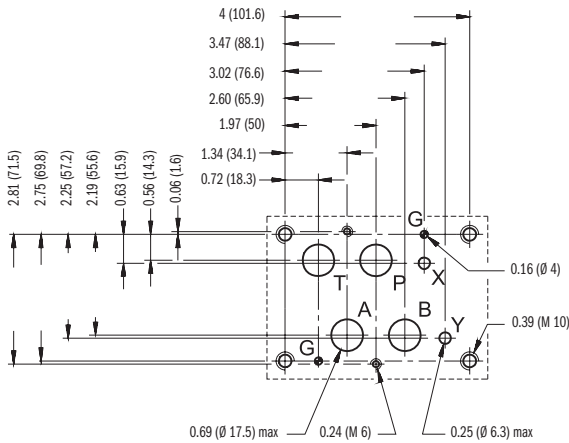
#### VED05AM

ISO 4401-05-05-0-05 (CETOP 4.2-4 R05-350)



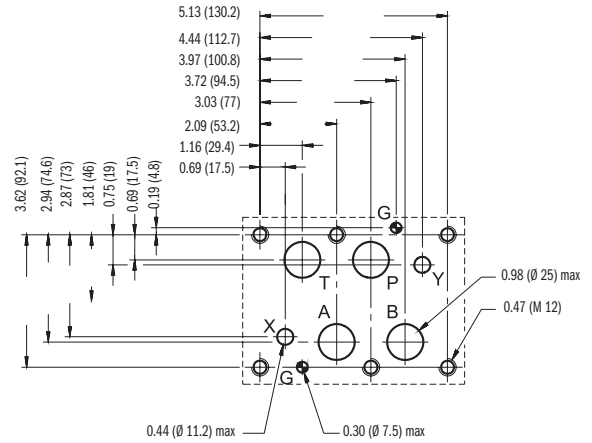
#### VED07M

ISO 4401-07-07-0-05 (CETOP 4.2-4-07-350)



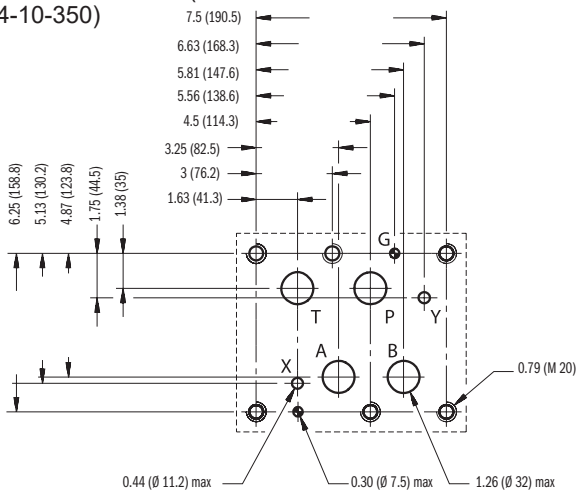
#### VED08M

ISO 4401-08-08-0-05 (CETOP 4.2-4-08-350)



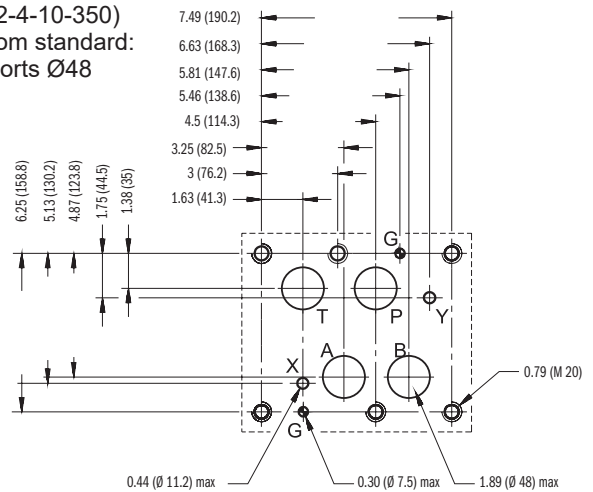
#### VED10M

ISO 4401-10-09-0-05 (CETOP 4.2-4-10-350)



#### VED11M

ISO 4401-10-09-0-05 (CETOP 4.2-4-10-350) deviating from standard: P, T, A, B ports Ø48



### MANUAL OVERRIDE

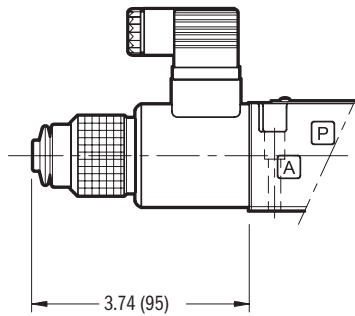
The standard valve has solenoids whose pin for the manual operation is integrated in the tube. The operation of this control must be executed with a suitable tool, minding not to damage the sliding surface.

Three different manual override version are available upon request: Three other manual overrides are available, using the proper letter in the ordering code.

- CM version, manual override belt protected
- CS version, with metal ring nut provided with a M4 screw and a blocking locknut
- CK version, knob. When the set screw is screwed and its point is aligned with the edge of the knob, tighten the knob till it touches the spool: in this position the override is not engaged and the valve is de-energized. After adjusting the override, tighten the set screw in order to avoid the knob loosening.

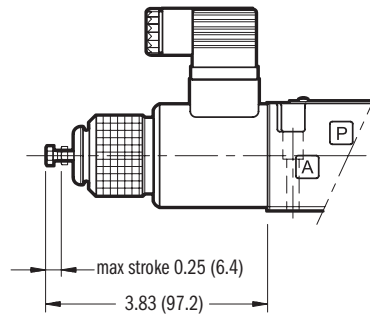
NOTE: The manual override use doesn't allow any proportional regulation; in fact, using this kind of override the main stage spool opens completely and the valve will behave as an on-off valve..

CM version



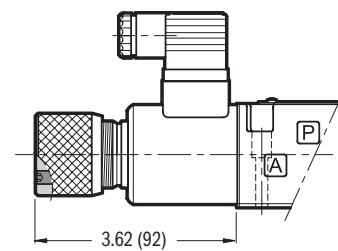
Code: M3803210003 VND

CS version



Code: M3803210004

CK version



Allen key for set screw: 3 mm

Code: M3803210005

### HYDRUALIC FLUIDS

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

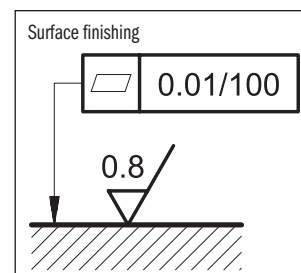
Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics. The fluid must be preserved in its physical and chemical characteristics.

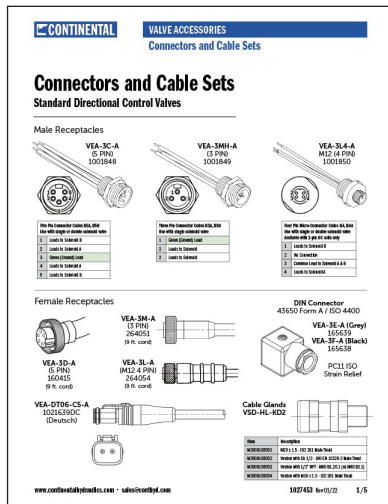
### INSTALLATION

The DSPE\* valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

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 from the mounting surface.





**Connectors and Cables Sets**  
Form #1027453



a member of **DAIKIN** group

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