CONTINENTAL HYDRAULICS

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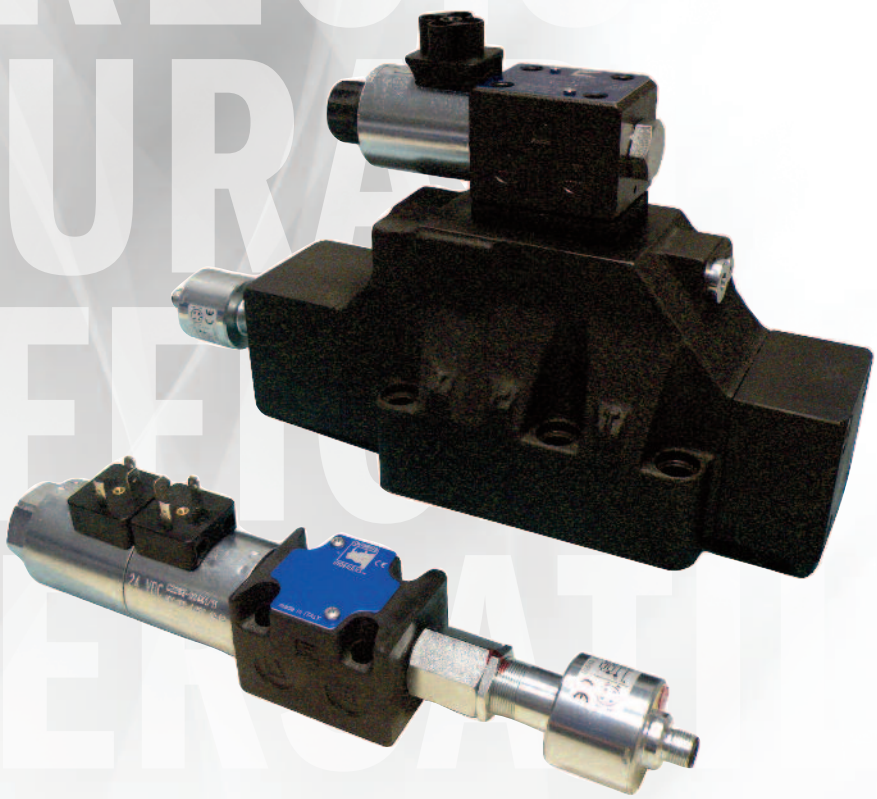
VSD*S

MONITORED DIRECTIONAL CONTROL VALVES

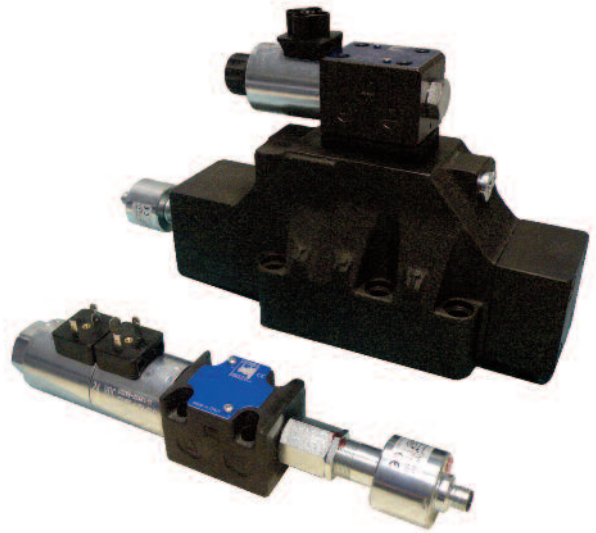


VSD*S -MONITORED DIRECTIONAL CONTROL VALVES

4895 12th Avenue East, Shakopee, MN 55379 / continentalhydraulics.com / 952-895-6400

VSD*S

MONITORED DIRECTIONAL CONTROL VALVES



DESCRIPTION

Spool Position Monitored Valves can be used as a component to help meet compliance with current machine safety standards. These devices are only one part of an overall system and are intended to be combined with other safety rated components to provide energy isolation and/or energy dissipation. According to current safety standards, a Risk Assessment should be performed as a part of the component selection.

Solenoid operated directional control valves are provided with one or two switches to monitor the position of the spool. In the case of pilot operated directional control valves, the slave spool is monitored. The switching position is indicated with a binary code.

NFPA D03 (ISO 4401-03) and NFPA D05 (ISO 4401-05) size valves are direct operated and are available with DC solenoids.

Pilot operated valves are available in the following sizes: 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) and NFPA D10 (ISO 4401-10-09-0-05). They are available with DC solenoids.

There are no manual overrides according to EN 693:2011.

MACHINE DIRECTIVE CERTIFICATION

All solenoid valves and solenoid operated valves of the VSD*S family were tested on a voluntary basis by TÜV and found to comply with the applicable requirements of the following standards:
- UNI EN ISO 4413:2012 - Hydraulic fluid power – General rules and safety requirements for systems and their components
- UNI EN 12622:2014 - Safety of machine tools - Hydraulic press brakes
- UNI EN 693:2001+A2:2011 - Machine tools – Safety – Hydraulic presses
- UNI EN 201:2010 - Plastics and rubber machines - Injection moulding machines - Safety requirements
- UNI EN 422:2009 - Rubber and Plastic machines – Safety requirements

TYPICAL PERFORMANCE SPECIFICATIONS

		VSD03S		VSD05S		VSD05AS VSD05BS		VSD07S		VSD08S		VSD10S	
MAXIMUM OPERATING PRESSURE	P - A - B Ports	5000 psi	350 bar	4600 psi	320 bar	4600 psi	320 bar	5000 psi	350 bar	5000 psi	350 bar	5000 psi	350 bar
	T Port (Ext. Drain)	-	-	-	-	3000 psi	210 bar	3000 psi	210 bar	3000 psi	210 bar	3000 psi	210 bar
	T Port (Int. Drain)	3000 psi	210 bar	3000 psi	210 bar	2000 psi	140 bar	2000 psi	140 bar	2000 psi	140 bar	2000 psi	140 bar
PILOT PRESSURE	Minimum	-	-	-	-	72-145 psi	5-10 bar	72-175 psi	5-12 bar	102-204 psi	7-14 bar	87-175 psi	6-12 bar
	Maximum	-	-	-	-	3000 psi	210 bar	3000 psi	210 bar	3000 psi	210 bar	4061 psi	280 bar
MAX FLOW RATE		21 gpm	80 l/min	32 gpm	120 l/min	40 gpm	150 l/min	80 gpm	300 l/min	160 gpm	600 l/min	290 gpm	1100 lpm
MOUNTING SURFACE		NFPA D03 ISO 4401-03-02-0-03		NFPA D05 ISO 4401-05-04-0-05		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	
MAX WEIGHT		4.9 lbs	2.2 kg	11 lbs	5 kg	17.6 lbs	8 kg	21.2 lbs	9.6 kg	36.6 lbs	16.6 kg	111 lbs	50.5 kg

IDENTIFICATION CODE - MONITORED - DIRECT OPERATED

VSD □ S - □ □ - □ □ - □ - □ - □

DESIGN LETTER

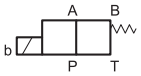
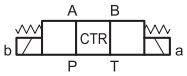
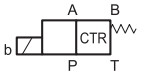
SOLENOID OPERATED

SPOOL POSITION MONITORED

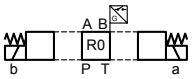
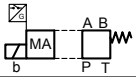
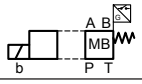
SOLENOIDS
see codes on page 25

SIZE	
03	NFPA D03
05	NFPA D05

MECHANICAL OPTIONS OMIT IF NOT REQUIRED	
R	Reverse Mode Sol. A supplied

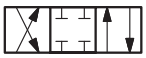
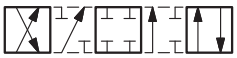
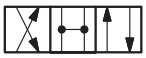
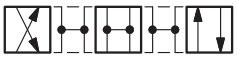
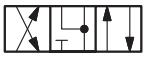
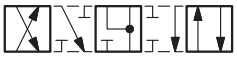
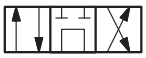
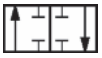
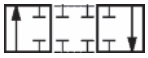
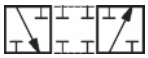
FUNCTION	
1	 Single operator 2 Position Spring Offset
3	 Dual operator 3 Position Spring Centered
5	 Single operator 2 Position Spring Centered

SEAL	
A	Buna (STD)
G	Viton

SWITCH OPTIONS		
CODE	CONTROLLED POSITION	FUNCTION SYMBOL
R0	Monitor "Center" condition, Dual Solenoid Valve	
MA	Monitor "A" condition, Single Solenoid Valve	
MB	Monitor "B" condition, Single Solenoid Valve	

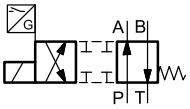
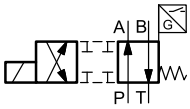
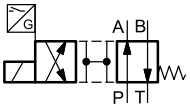
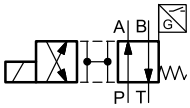
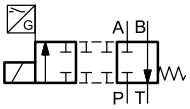
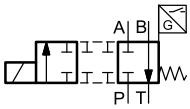
TYPICAL ORDERING CODE:
VSD03S-1A-AMB-D24K1-A

NOTE: See pages 4 and 5 for available Function and Spool combination

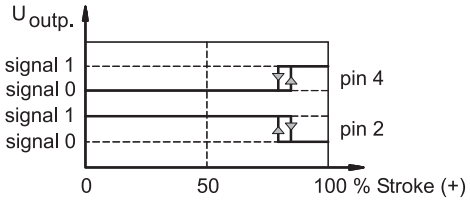
SPOOLS					
NAME	**SYMBOL**	**FUNCTION**	**CENTER POSITION**	**CROSSOVER**	**FUNCTION MATCHING**
A			All ports blocked	P →B or P →A T blocked	1, 3, 5
B			All ports open	All ports open	1 (D05 only)
F			P blocked and A →T or B →T	P blocked and A →T or B →T	3
L			P →T A and B blocked	All ports open, restricted	3, 5
U			-	All ports blocked	1
U-*R			-	All ports blocked	1-*R

SPRING OFFSET FUNCTION AND SPOOL CODE VALVES

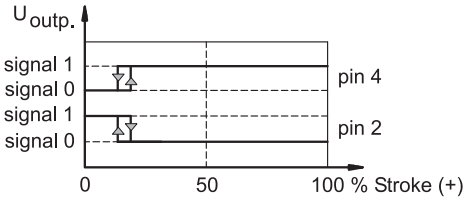
CODE 1 (B solenoid supplied) - Single solenoid, 2 position, spring offset

Function / Spool code	Sensor code **MA**	Sensor code **MB**
1A		
1B		
1U		

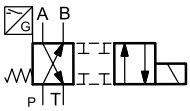
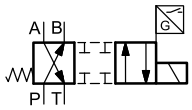
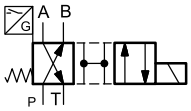
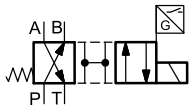
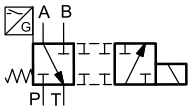
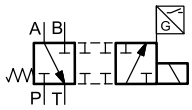
Energized position monitored with one positioning sensor



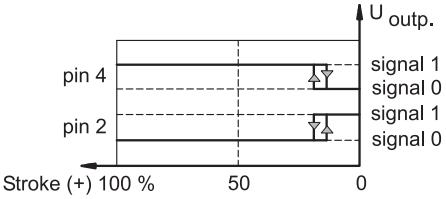
De-energized position monitored with one positioning sensor



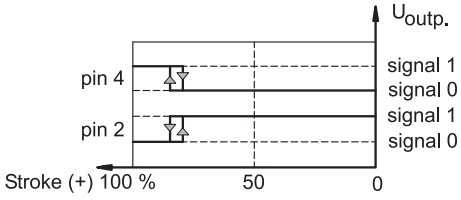
CODE 1 with code R option (A solenoid supplied) - Single solenoid, 2 position, spring offset

Function / Spool code	Sensor code **MA**	Sensor code **MB**
1A-R		
1B-R		
1U-R		

De-energized position monitored with one positioning sensor



Energized position monitored with one positioning sensor



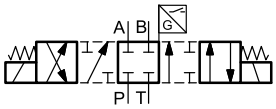
SPRING CENTERED FUNCTION AND SPOOL CODE VALVES

CODE 3 - Double solenoid, 3 position, spring centered

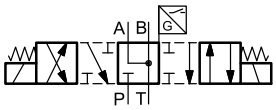
Function / Spool code

Sensor code **RO**

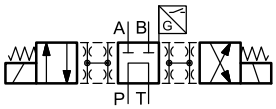
3A



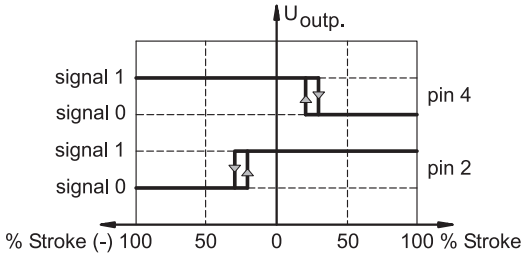
3F



3L



Central position monitored with one positioning sensor

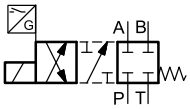


CODE 5 (B solenoid supplied) - Single solenoid, 2 position, spring centered

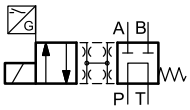
Function / Spool code

Sensor code **MA**

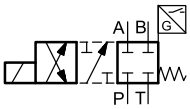
5A

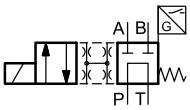


5L

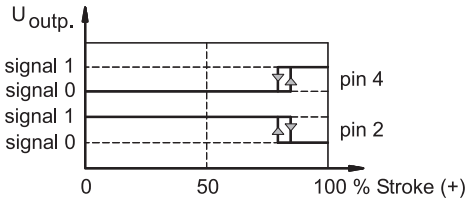


Sensor code **MB**

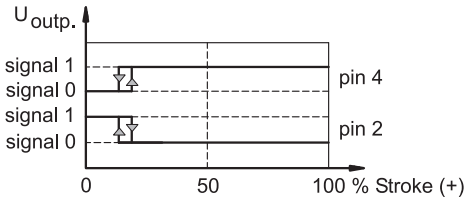




Energized position monitored with one positioning sensor



De-energized position monitored with one positioning sensor

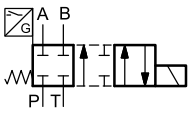


CODE 5 with code R option (A solenoid supplied) - Single solenoid, 2 position, spring centered

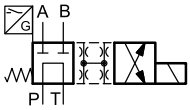
Function / Spool code

Sensor code **MA**

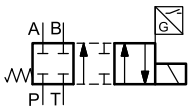
5A-R

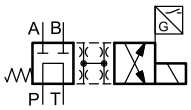


5L-R

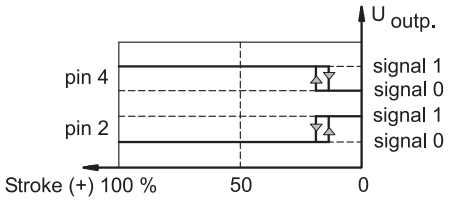


Sensor code **MB**

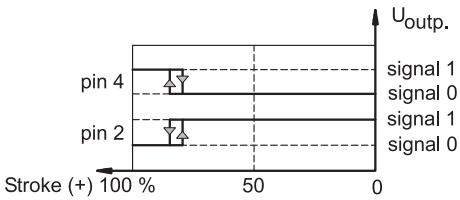




De-energized position monitored with one positioning sensor



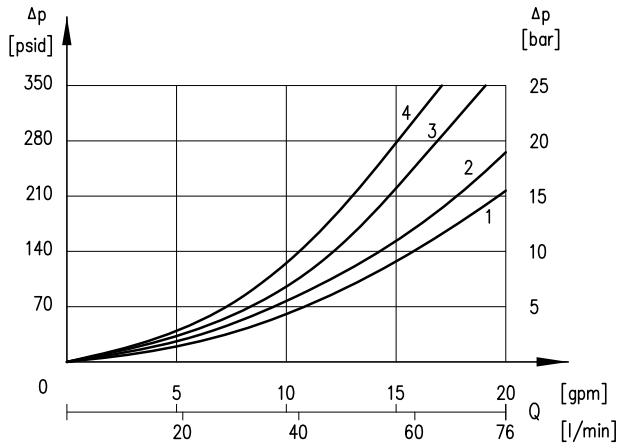
Energized position monitored with one positioning sensor



PRESSURE DROPS ΔP-Q DIRECT OPERATED VALVES

(OBTAINED WITH VISCOSITY OF 170 SUS - 36 CST AT 122°F - 50°C)

VSD03S

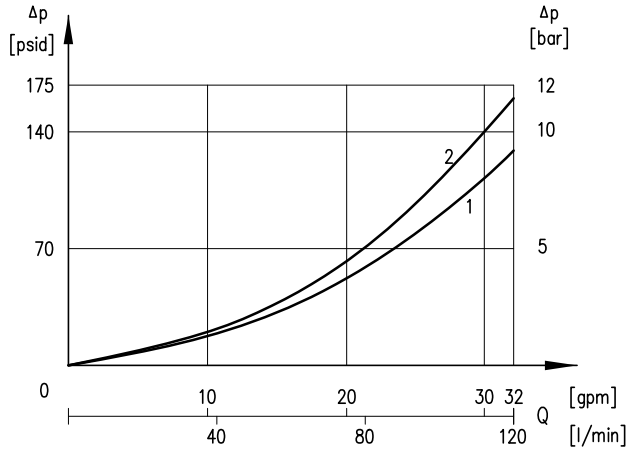


SPOOL	FLOW CURVE NUMBER				
	P→A	P→B	A→T	B→T	P→T
A	1	1	2	2	-
L	4	4	4	4	2
1A, 1B	1	1	1	1	-
U, U-*R	3	3	3	3	-
F	2	2	1	1	-

NOTES:

1. The values indicated in the graphs are relevant to the standard solenoid valve, with D24K1 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.

VSD05S

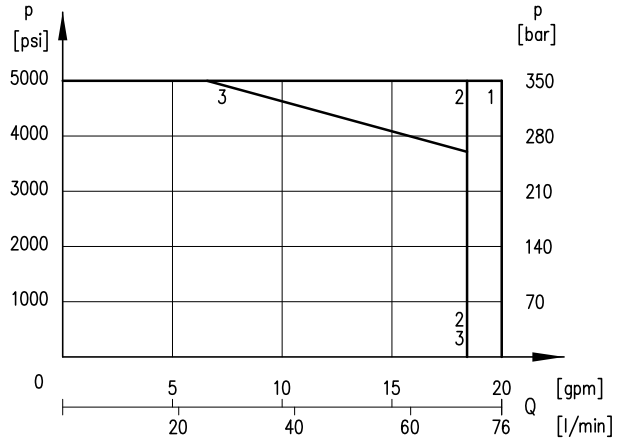


SPOOL	FLOW CURVE NUMBER			
	P→A	P→B	A→T	B→T
1A, 1B	2	2	1	1
U, U-*R	1	1	1	1
A	1	1	1	1
F	2	2	1	1
L	1	1	1	1

PERFORMANCE CURVES

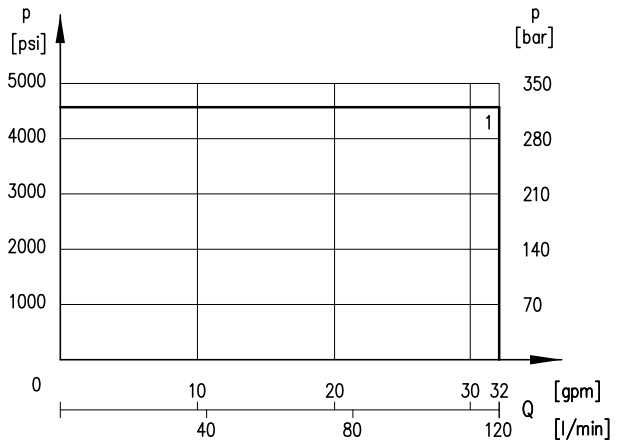
Curves obtained with mineral oil viscosity of 170 sus (36 cSt) at 122°F (50°C); the Δp values are measured between P and T (full loop) valve ports.

VSD03S



SPOOL	CURVE NUMBER	
	P→A	P→B
A	1	1
L	2	2
1A	3	3
U, U-*R	2	2
F	4	4

VSD05S



SPOOL	CURVE NUMBER	
	P→A	P→B
1A	1	1
1B	1	1
U	1	1

RESPONSE TIMES

	TIME [ms]	
	ENERGIZING 0→100%	DE-ENERGIZING 100%→0
D03	25 - 75	15 - 25
D05	100 - 150	20 - 50

OVERALL AND MOUNTING DIMENSIONS - VSD03S

Dimensions in mm [IN]

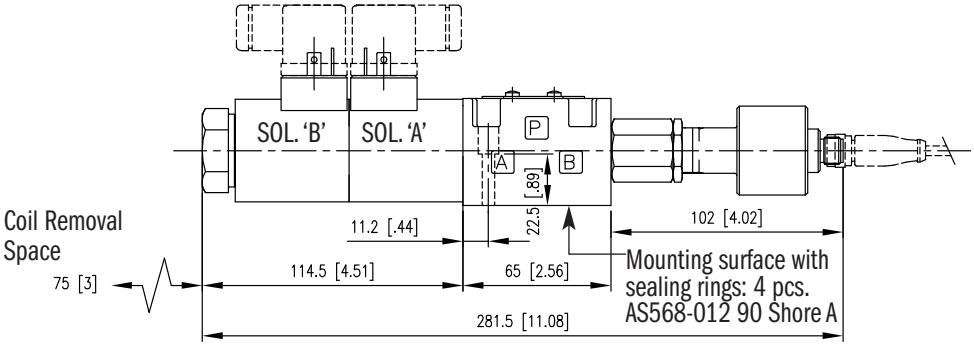
THREAD OF MOUNTING HOLE
10-24 UNC-2B x 0.50

FASTENING
4 bolts - 10-24 UNC-3A X 1 1/4

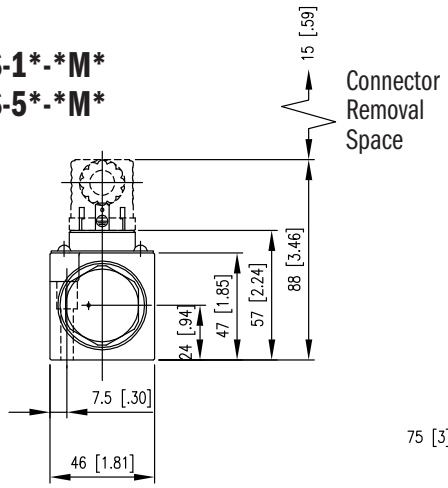
TIGHTENING TORQUE
4-5 lbf-ft (5.5-6.8 Nm)

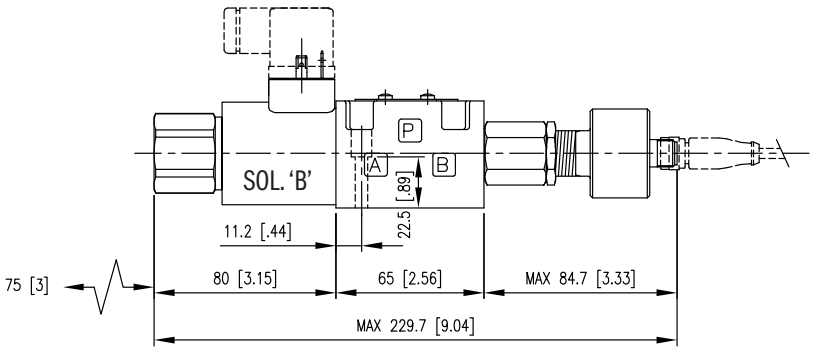
SEALING RINGS
4 O-rings AS568-012 90 Shore A

VSD03S-3*-*R0

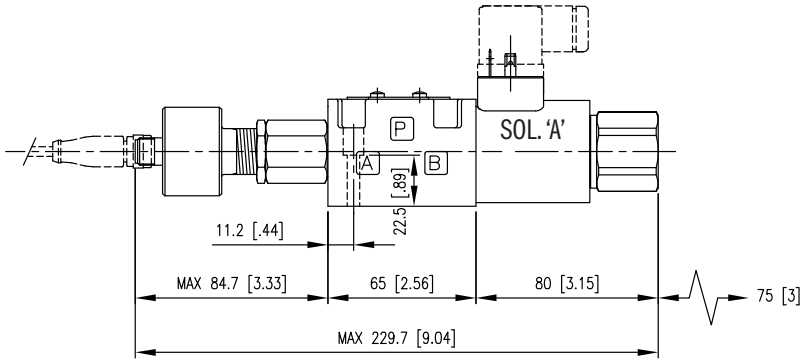


VSD03S-1*-*M*
VSD03S-5*-*M*





VSD03S-1*-*M*-R
VSD03S-5*-*M*-R
Reverse mode



OVERALL AND MOUNTING DIMENSIONS - VSD05S

Dimensions in mm [IN]

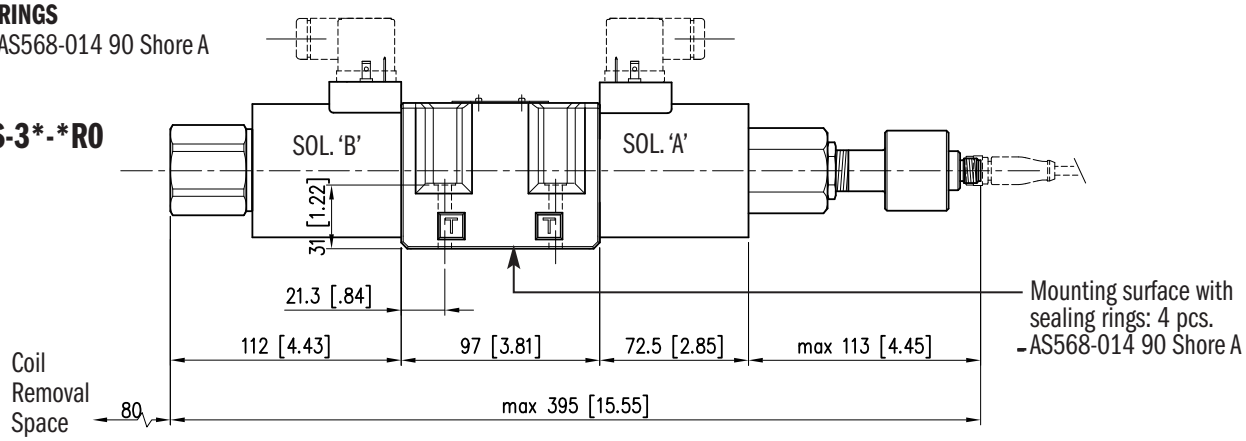
THREAD OF MOUNTING HOLE
1/4-20 UNC-2B x 0.60

FASTENING
4 bolts - 1/4-20 UNC 2B X 1 5/8

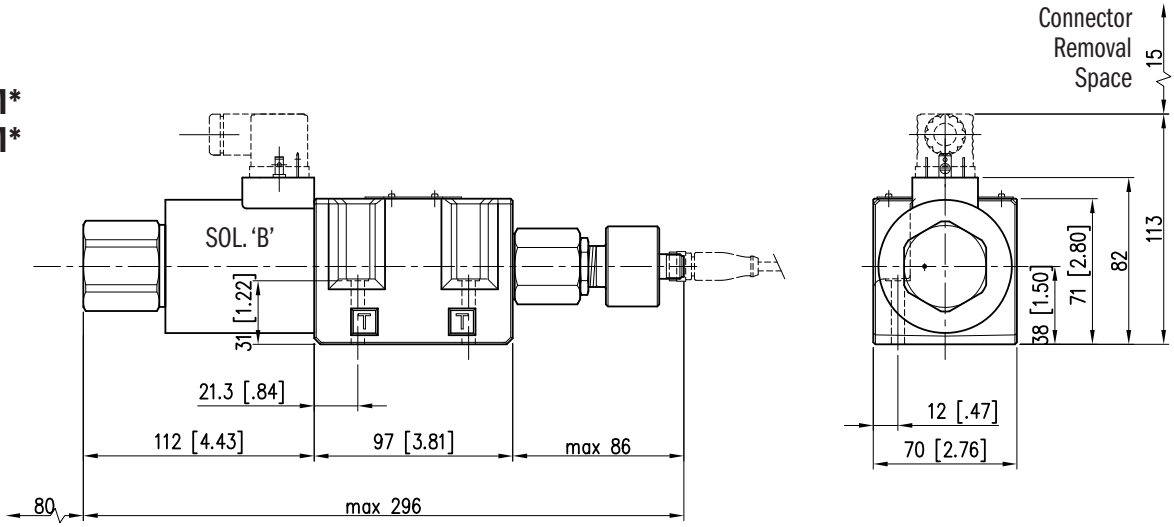
TIGHTENING TORQUE
6 lbf-ft (8 Nm)

SEALING RINGS
5 O-rings AS568-014 90 Shore A

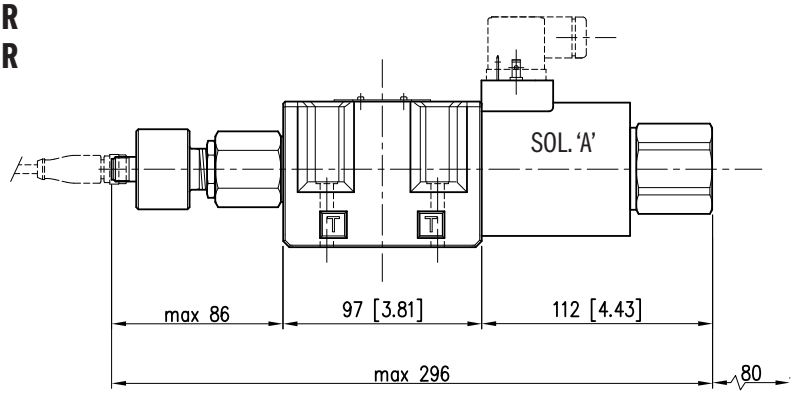
VSD05S-3*-*R0



VSD05S-1*-*M*
VSD05S-5*-*M*



VSD05S-1*-*M*-R
VSD05S-5*-*M*-R
Reverse mode



IDENTIFICATION CODE - MONITORED - PILOT OPERATED

VSD ☐ **S-** ☐ ☐ **-** ☐ ☐ **-** ☐ ☐ ☐ **-** ☐ **-** ☐ — DESIGN LETTER

SOLENOID OPERATED | SPOOL POSITION MONITORED

SOLENOIDS
see codes on page 25

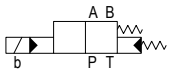
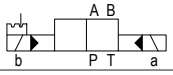
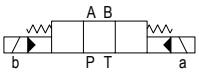
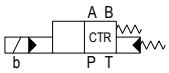
SIZE	
05A	NFPA D05 alt. A
05B	NFPA D05 alt. B
07	NFPA D07
08	NFPA D08
10	NFPA D10

SEAL	
A	Buna (STD)
G	Viton

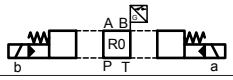
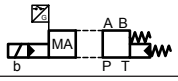
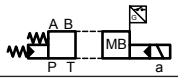
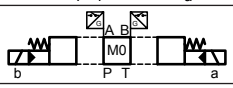
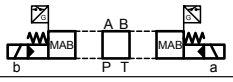
MECHANICAL OPTIONS OMIT IF NOT REQUIRED	
R	Reverse Mode Sol. A supplied
KK	Adjustable pilot Chokes

INTERNAL PILOT OPTIONS available only with pilot/drain 1 and 3 (OMIT IF NOT REQUIRED)	
Z	PILOT PRESSURE REDUCER Mandatory when pressure is higher than 3000 psi (210 bar) Not available for D05
C70	Check valve on P port Cracking pressure: 70 psi (5 bar) Available for D07 and D08 sizes only

PILOT / DRAIN	
1	Internal Pilot, External Drain (not availbale with L spools)
2	External Pilot, External Drain
3	Internal Pilot, Internal Drain (not availbale with L spools)
4	External Pilot, Internal Drain

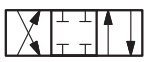
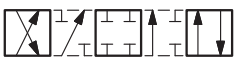
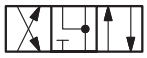
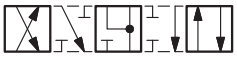
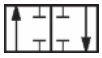
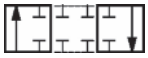
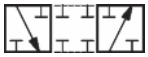
FUNCTION	
1	 Single operator, 2 Position Spring Offset
2	 Dual operator, 2 Position Detent (no Spring)
3	 Dual operator, 3 Position Spring Centered
5	 Single operator, 2 Position Spring Centered

VSD10S is available in function code 3 only

SWITCH OPTIONS		
CODE	CONTROLLED POSITION	FUNCTION SYMBOL
R0	Monitor "Center" condition, Dual Solenoid Valve	
MA	Monitor "A" condition, Single Solenoid Valve	
MB	Monitor "B" condition, Single Solenoid Valve	
M0	Monitor "Center" condition, Dual Switch	
MAB	Monitor both "A" and "B" shifted condition, Dual Switch	

NOTE: See pages 11 and 12 for available Function and Spool

TYPICAL ORDERING CODE:
VSD07S-1A-AMB-2-D24K1-A

SPOOLS					
NAME	**SYMBOL**	**FUNCTION**	**CENTER POSITION**	**CROSSOVER**	**FUNCTION MATCHING**
A			All ports blocked	P →B or P →A T blocked	1, 3, 5 (D10 only 3)
F			P blocked and A →T or B →T	P blocked and A →T or B →T	3
L			P →T A and B blocked	All ports open, restricted	3
U			-	All ports blocked	1
U-R			-	All ports blocked	1-*R

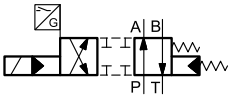
VSD10S available with A and L spools and Monitor Switch option R0 and M0 only

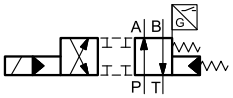
SPRING OFFSET FUNCTION AND SPOOL CODE VALVES

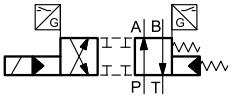
CODE 1 (B solenoid supplied) - Single solenoid, 2 position, spring offset

Function / Spool code | Sensor code **MA** | Sensor code **MB** | Sensor code **MAB**

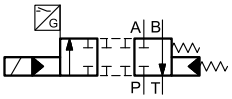
1A

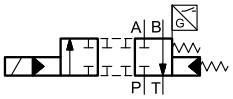


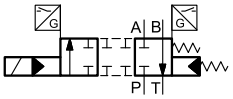




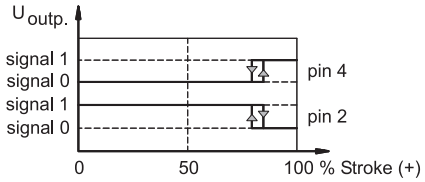
1U



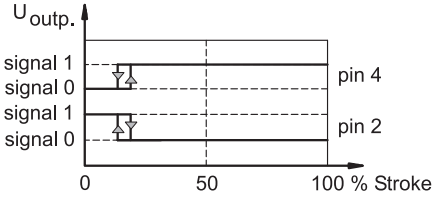




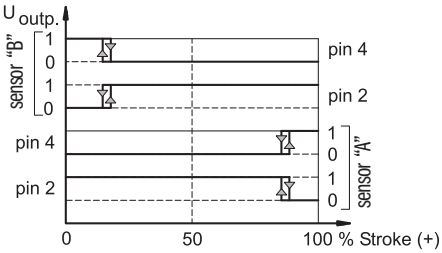
Energized position monitored with one positioning sensor



De-energized position monitored with one positioning sensor



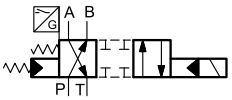
De-energized position monitored on side A
Energized position monitored on side B

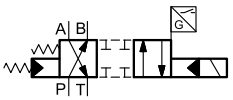


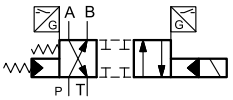
CODE 1 with code R option (A solenoid supplied) - Single solenoid, 2 position, spring offset

Function / Spool code | Sensor code **MA** | Sensor code **MB** | Sensor code **MAB**

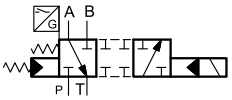
1A-R

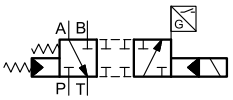


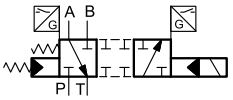




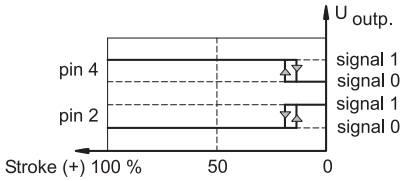
1U-R



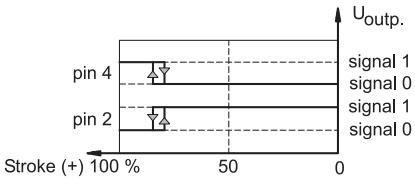




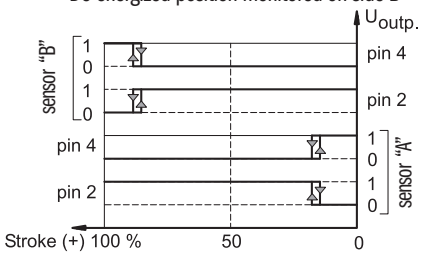
De-energized position monitored with one positioning sensor



Energized position monitored with one positioning sensor



Energized position monitored on side A
De-energized position monitored on side B

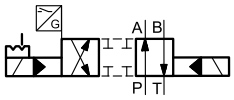


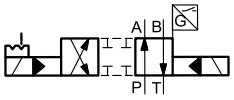
TWO POSITION DETENT FUNCTION AND SPOOL CODE VALVES

CODE 2 - 2 solenoid, 2 position, mechanical detent

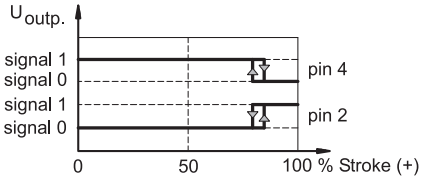
Function / Spool code | Sensor code **MA** | Sensor code **MB**

2A

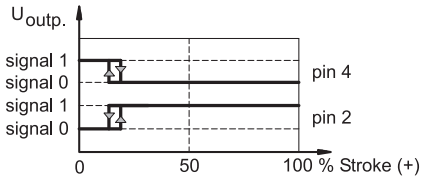




Position "a" monitored with one positioning sensor



Position "b" monitored with one positioning sensor

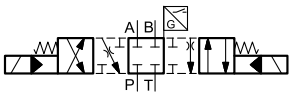


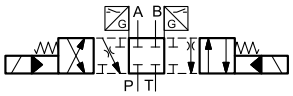
SPRING CENTERED FUNCTION AND SPOOL CODE VALVES

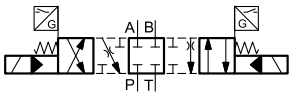
CODE 3 - Double solenoid, 3 position, spring centered

Function/Spool code | Sensor code **RO** | Sensor code **MO** | Sensor code **MAB**

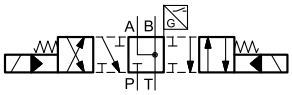
3A

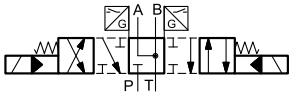


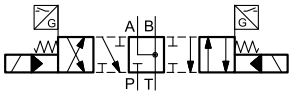




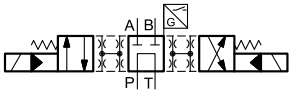
3F

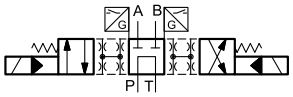


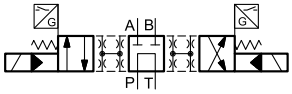




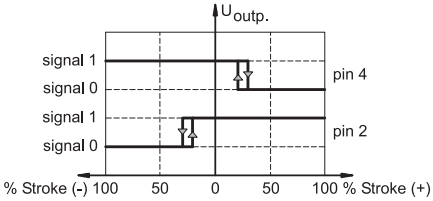
3L



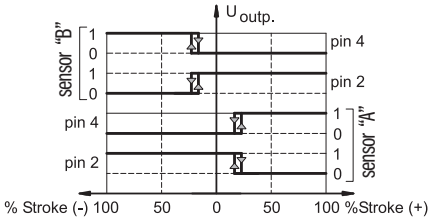




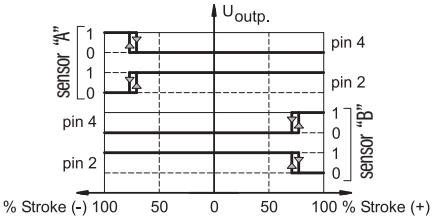
Central position monitored with one positioning sensor



De-energized position monitored by two positioning sensor



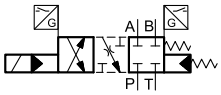
Both external positions monitored by two positioning sensors



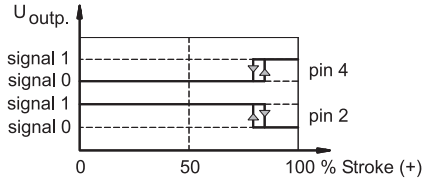
CODE 5 (B solenoid supplied) - Single solenoid, 2 position, spring centered

Function / Spool code | Sensor code **MA** | Sensor code **MB** | Sensor code **MAB**

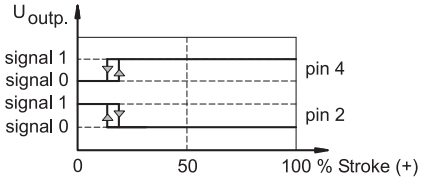
5A



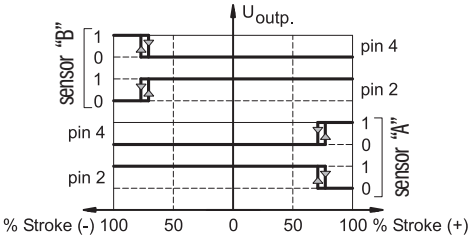
Energized position monitored with one positioning sensor



De-energized position monitored with one positioning sensor



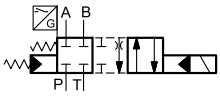
De-energized position monitored on side A
Energized position monitored on side B

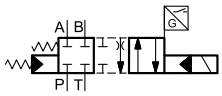


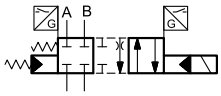
CODE 5 with code R option (A solenoid supplied) - Single solenoid, 2 position, spring centered

Function / Spool code | Sensor code **MA** | Sensor code **MB** | Sensor code **MAB**

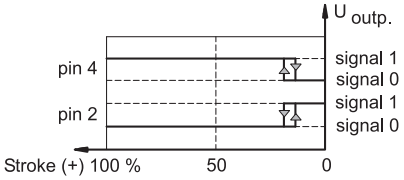
5A-R



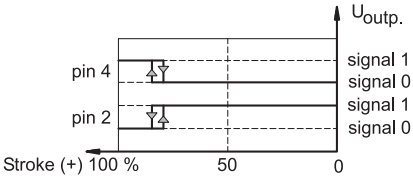




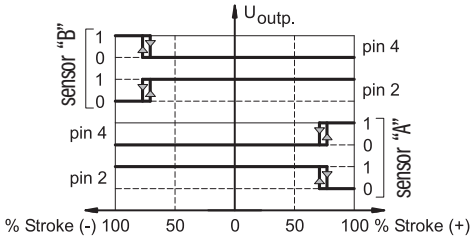
De-energized position monitored with one positioning sensor



Energized position monitored with one positioning sensor



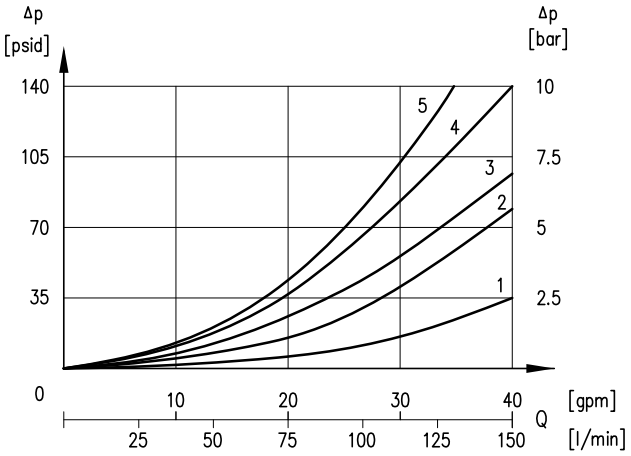
Energized position monitored on side A
De-energized position monitored on side B



PRESSURE DROPS Δp-Q - PILOT OPERATED VALVES

(OBTAINED WITH VISCOSITY OF 170 SUS (36 cSt) AT 122°F (50°C)

VSD05*S



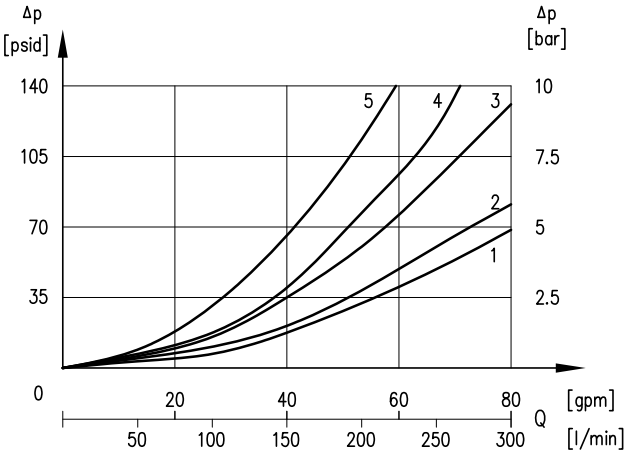
SPOOL	FLOW CURVE NUMBER				
	P→A	P→B	A→T	B→T	P→T
3A, 5A, 3F	4	4	1	1	-
3L	5	5	2	3	5
1A	4	4	1	1	-
U, U-*R	3	3	1	1	-
2A	4	4	1	1	-

For pressure drops of the 3F spool in center position, refer to curve 4.

NOTES:

1. The values indicated in the graphs are relevant to the standard solenoid valve, with D24K1 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.

VSD07S



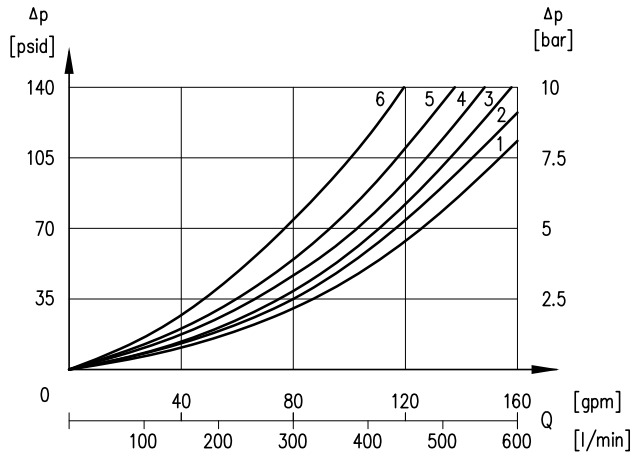
SPOOL	FLOW CURVE NUMBER				
	P→A	P→B	A→T	B→T	P→T
3A, 5A	1	1	3	4	-
3F	1	1	4	4	-
3L	2	2	4	5	4
1A	1	1	3	4	-
2A	1	1	3	4	-
1U, 1U-R	3	3	3	4	-

For pressure drops of the 3F spool in center position, refer to curve 4.

PRESSURE DROPS Δp-Q - PILOT OPERATED VALVES

(OBTAINED WITH VISCOSITY OF 170 SUS (36 cSt) AT 122°F (50°C)

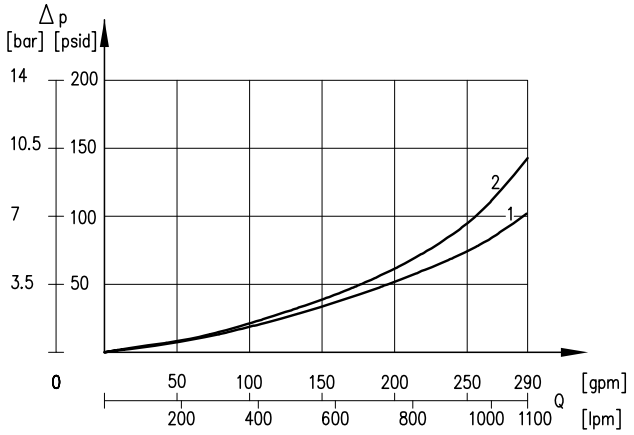
VSD08S



SPOOL	FLOW CURVE NUMBER				
	P→A	P→B	A→T	B→T	P→T
3A, 5A	2	2	3	3	-
3F	2	2	2	1	-
3L	4	4	3	5	6
1U, 1U-R	5	5	5	5	-
1A	2	2	3	3	-
2A	2	2	3	3	-

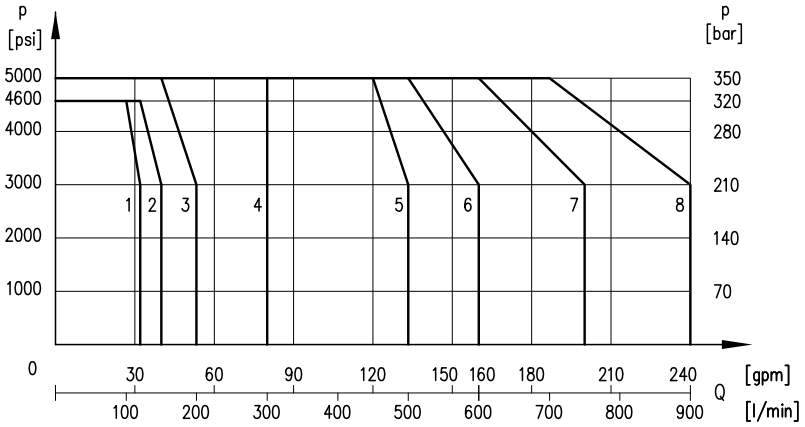
For pressure drops for the 3F spool in center position refer to curve 4

VSD10S



SPOOL	FLOW CURVE NUMBER				
	P→A	P→B	A→T	B→T	P→T
3A	1	1	1	1	-
3L	2	2	2	2	-

PERFORMANCE CURVES



SPOOL	D05*	D07	D08	D10
A, F	2	4	6	8
L, U	1	3	5	7

RESPONSE TIMES

The values shown below refer to a solenoid valve working with piloting pressure of 1,450 PSI (100 bar), with mineral oil at a temperature of 122°F (50°C), at viscosity of 36 cSt and with PA and BT connections. The energizing and de-energizing times are obtained at the pressure variation which occurs on the lines.

SIZE	ENERGIZING [ms]		DE-ENERGIZING [ms]	
	FUNCTION 1,5	FUNCTION 3	FUNCTION 1,5	FUNCTION 3
D05*	60	50	50	40
D07	75	60	60	45
D08	100	70	80	50
D10	-	100	-	140

OVERALL AND MOUNTING DIMENSIONS FOR VSD05*S

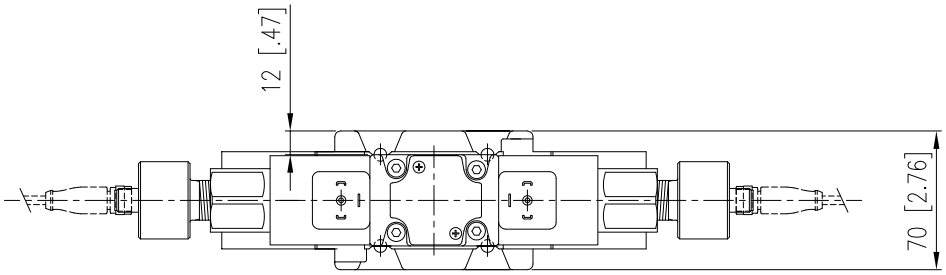
Dimensions in mm [IN]

THREAD OF MOUNTING HOLE
1/4 - 20 UNC-2B x 0.60

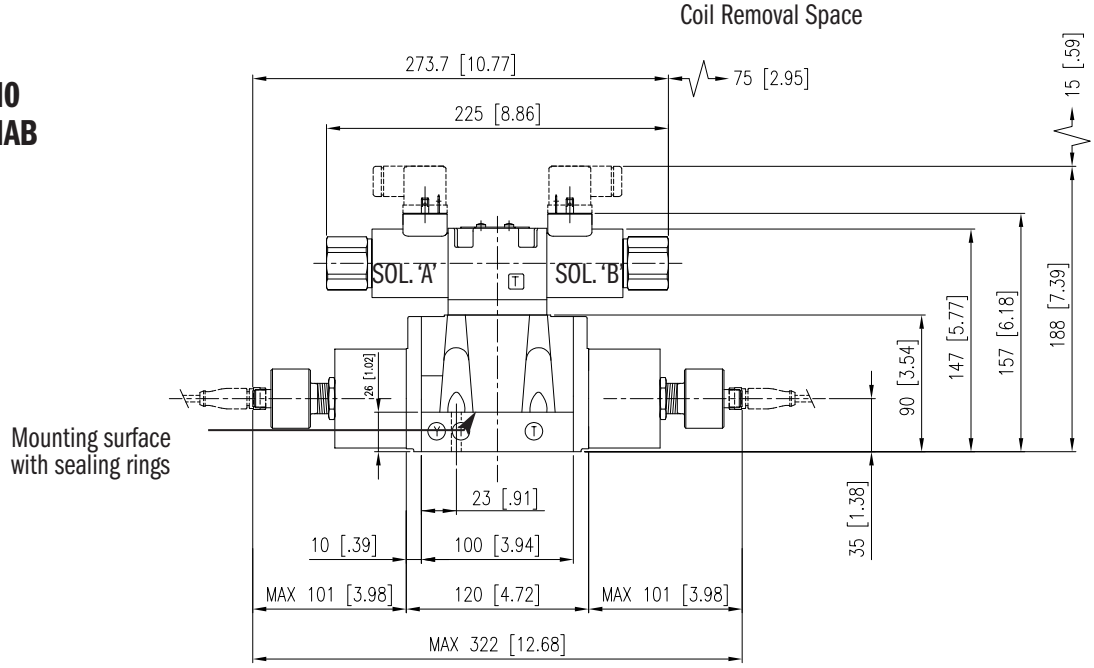
FASTENING
4 bolts - 1/4 - 20 UNC-2B X 1 1/2
Grade 8 or stronger

TIGHTENING TORQUE
6 lbf-ft (8 Nm)

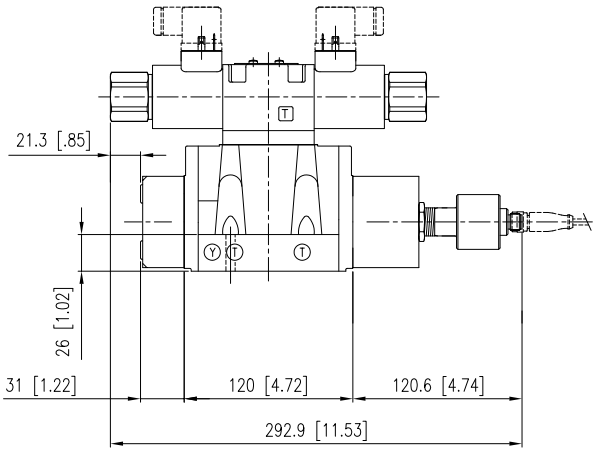
SEALING RINGS
5 O-rings AS568-014 90 Shore A
2 O-rings AS568-012 90 Shore A



VSD05*S-3*-*M0
VSD05*S-3*-*MAB



VSD05*S-3*-*R0



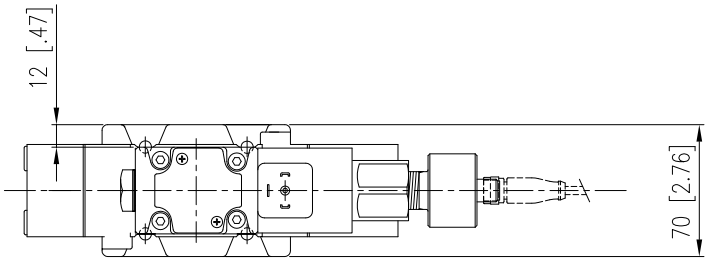
OVERALL AND MOUNTING DIMENSIONS FOR VSD05*S

THREAD OF MOUNTING HOLE
1/4 - 20 UNC-2B x 0.60

FASTENING
4 bolts - 1/4 - 20 UNC-2B X 1 1/2
Grade 8 or stronger

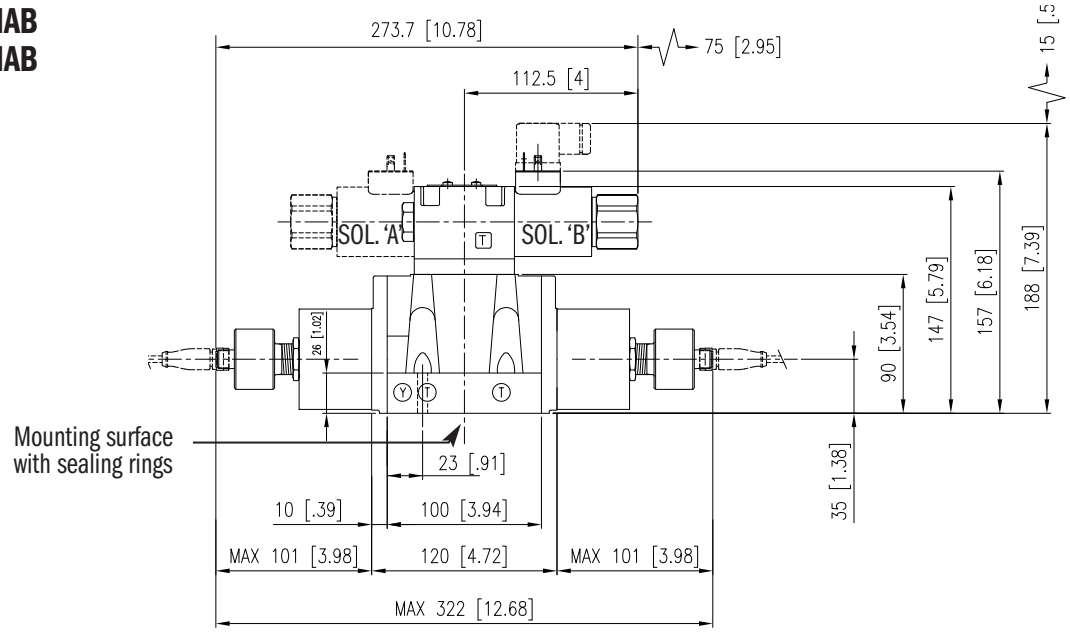
TIGHTENING TORQUE
6 lbf-ft (8 Nm)

SEALING RINGS
5 O-rings AS568-014 90 Shore A
2 O-rings AS568-012 90 Shore A

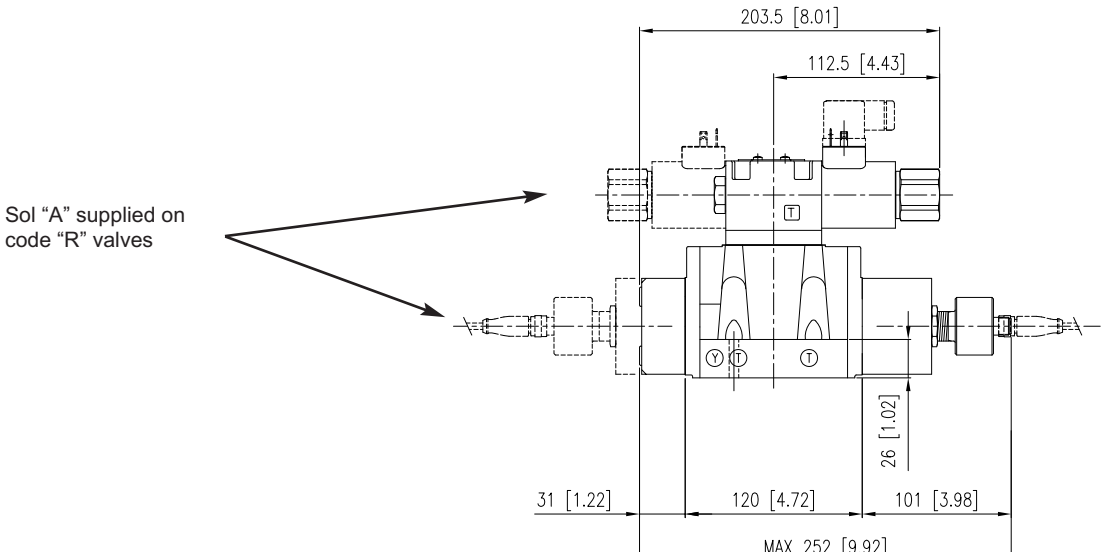


Coil Removal Space

VSD05*S-1*-*MAB
VSD05*S-5*-*MAB



VSD05*S-1*-*MA or MB
VSD05*S-5*-*MA or MB



OVERALL AND MOUNTING DIMENSIONS FOR VSD07S

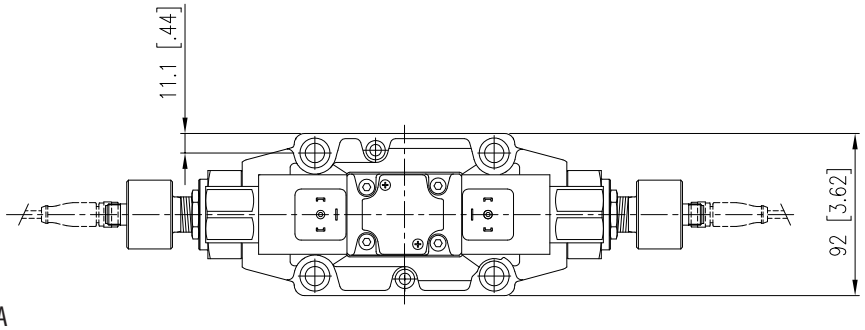
THREAD OF MOUNTING HOLE
1/4 - 20 UNC-2B x 0.50
3/8 - 16 UNC-2B x 0.90

FASTENING
2 bolts - 1/4 - 20 UNC-2B X 2
Grade 8 or stronger
4 bolts - 3/8 - 16 UNC-2B X 2 1/2
Grade 8 or stronger

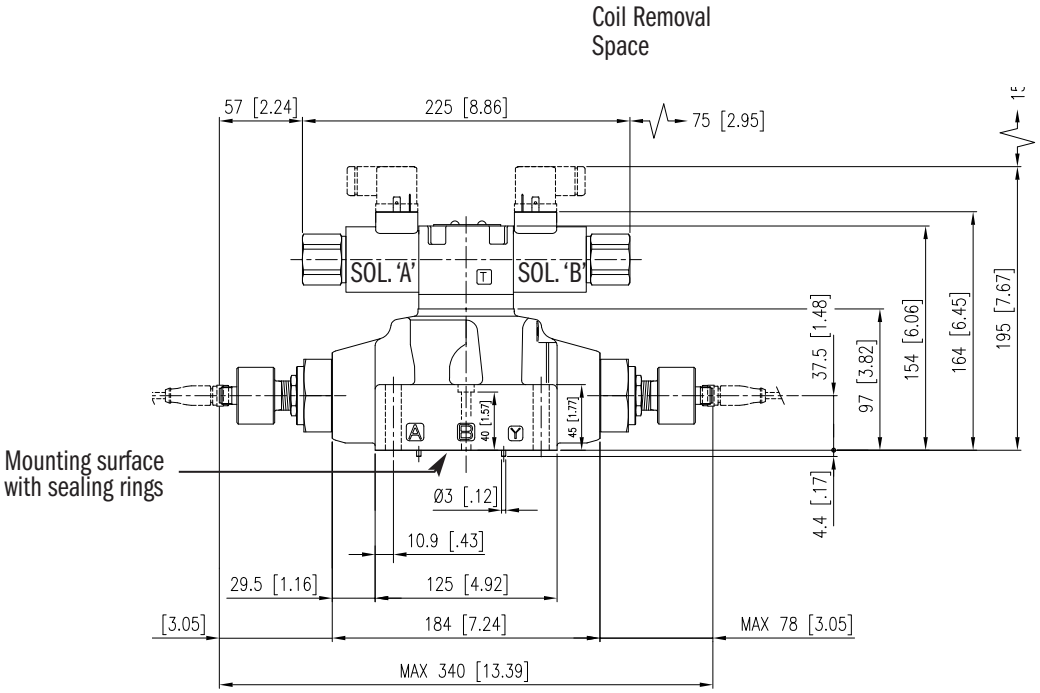
TIGHTENING TORQUE
1/4 - 20 UNC-2B: 6 lbf-ft (8 Nm)
3/8 - 16 UNC-2B: 30 lbf-ft (40 Nm)

SEALING RINGS
4 O-rings 22.22 mm ID x 2.62 mm CS90 Shore 90A
2 O-rings AS568-013 90 Shore A

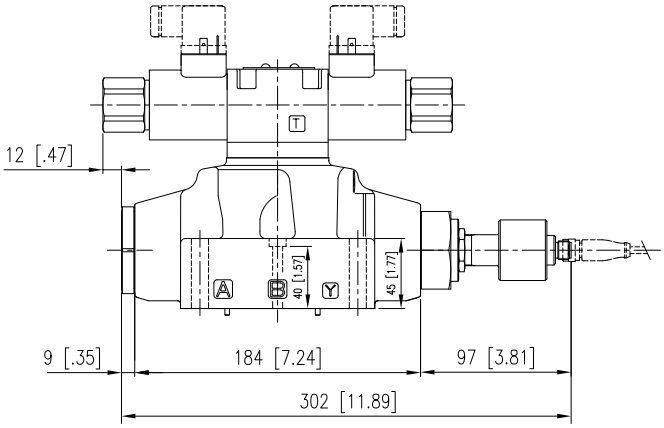
Dimensions in mm [IN]



VSD07S-3*-*M0
VSD07S-3*-*MAB



VSD07S-3*-*R0*



OVERALL AND MOUNTING DIMENSIONS FOR VSD07S

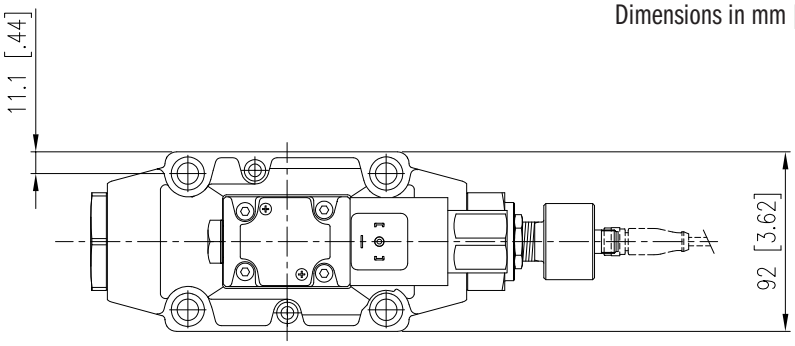
THREAD OF MOUNTING HOLE
1/4 - 20 UNC-2B x 0.50
3/8 - 16 UNC-2B x 0.90

FASTENING
2 bolts - 1/4 - 20 UNC-2B X 2
Grade 8 or stronger
4 bolts - 3/8 - 16 UNC-2B X 2 1/2
Grade 8 or stronger

TIGHTENING TORQUE
1/4 - 20 UNC-2B: 6 lbf-ft (8 Nm)
3/8 - 16 UNC-2B: 30 lbf-ft (40 Nm)

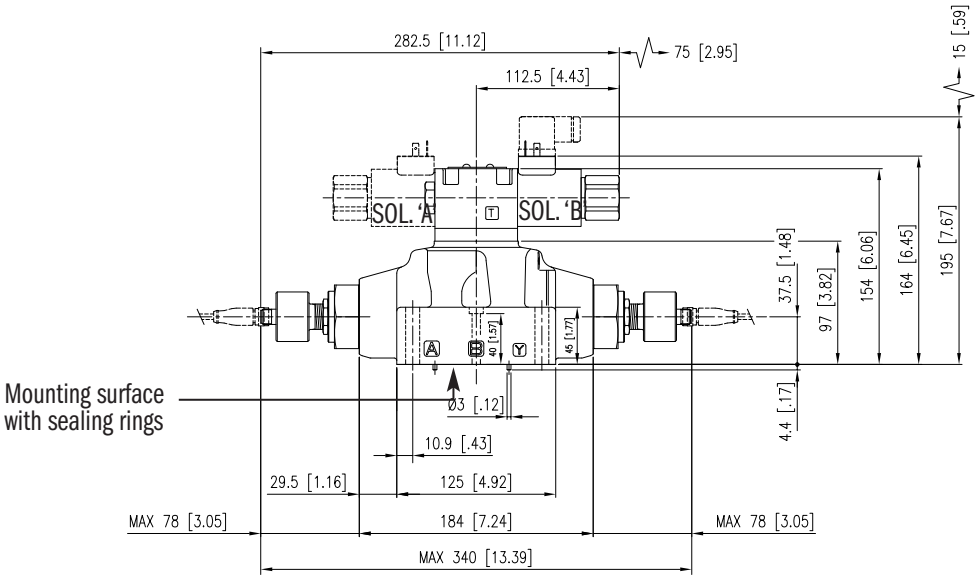
SEALING RINGS
4 O-rings 22.22 mm ID x 2.62 mm CS90 Shore 90A
2 O-rings AS568-013 90 Shore A

Dimensions in mm [IN]

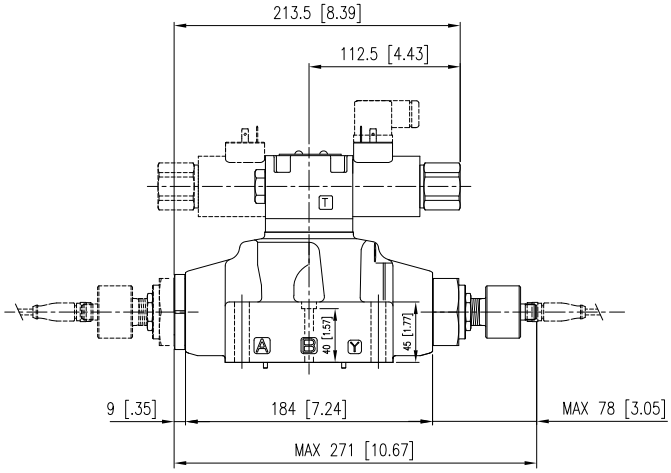


Coil Removal Space

VSD07S-1*-*MAB
VSD07S-5*-*MAB



VSD07S-1*-*MA
VSD07S-5*-*MB



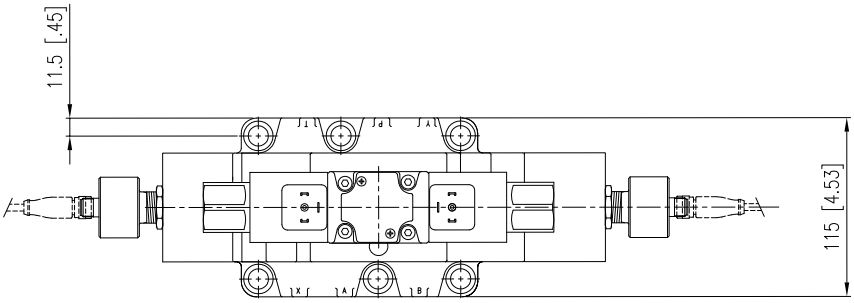
OVERALL AND MOUNTING DIMENSIONS FOR VSD08S

THREAD OF MOUNTING HOLE
1/2 - 13 UNC x 1.00

FASTENING
6 bolts - 1/2 - 20 UNC X 2 1/2
Grade 8 or stronger

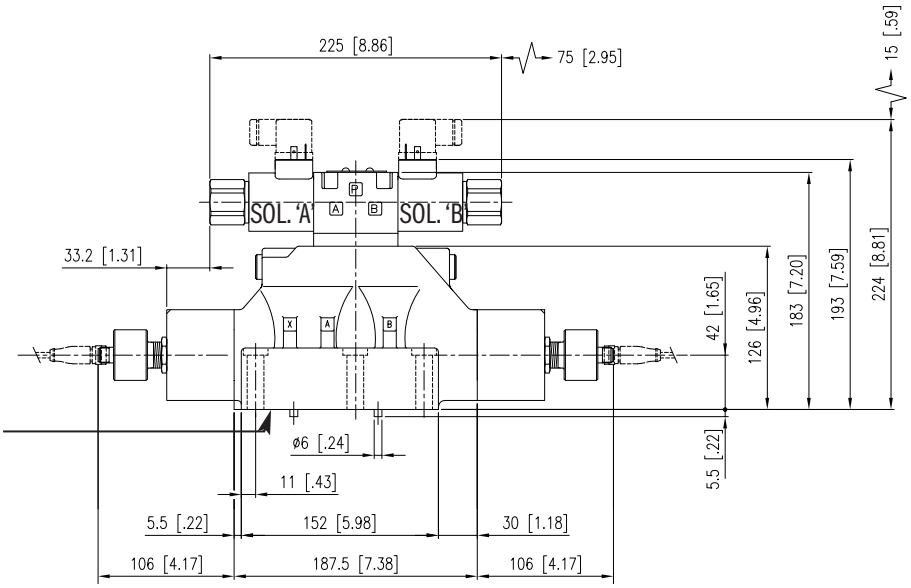
TIGHTENING TORQUE
90 to 100 lbf-ft (122 to 136 Nm)

SEALING RINGS
4 O-rings AS568-123 90 Shore A
2 O-rings AS568-117 90 Shore A

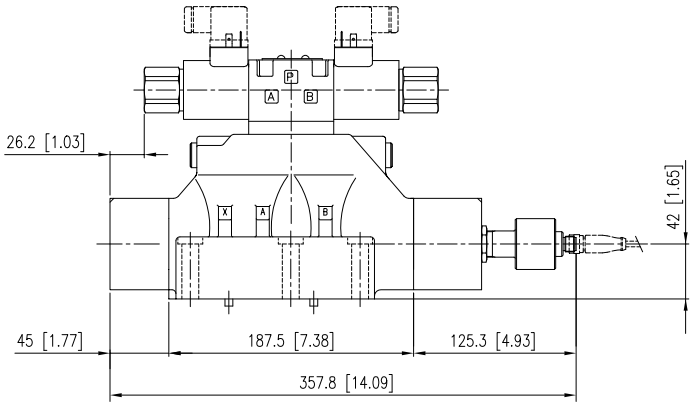


Coil Removal Space

VSD08S-3*-*M0
VSD08S-3*-*MAB



VSD08S-3*-*R0



OVERALL AND MOUNTING DIMENSIONS FOR VSD08S

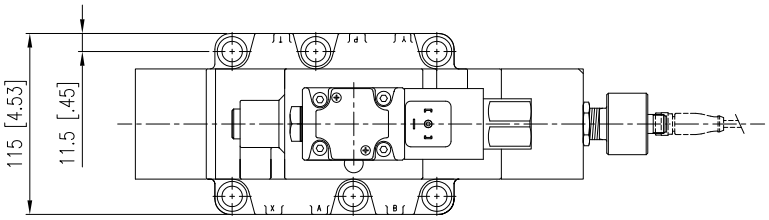
THREAD OF MOUNTING HOLE
1/2 - 13 UNC x 1.00

FASTENING
6 bolts - 1/2 - 20 UNC X 2 1/2
Grade 8 or stronger

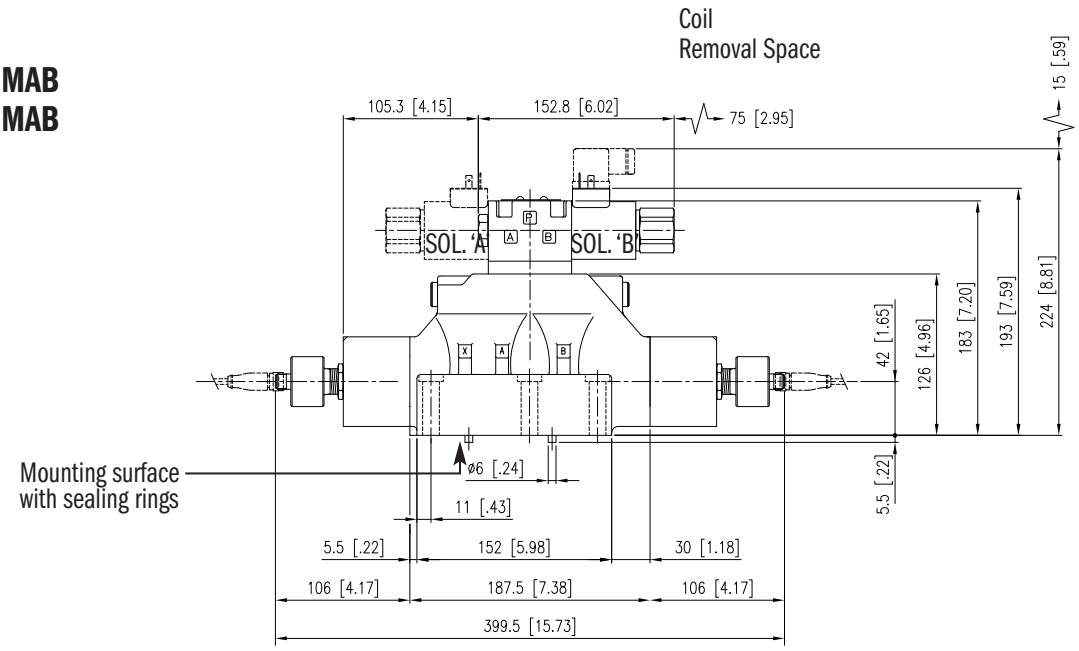
TIGHTENING TORQUE
90 to 100 lbf-ft (122 to 136 Nm)

SEALING RINGS
4 O-rings AS568-123 90 Shore A
2 O-rings AS568-117 90 Shore A

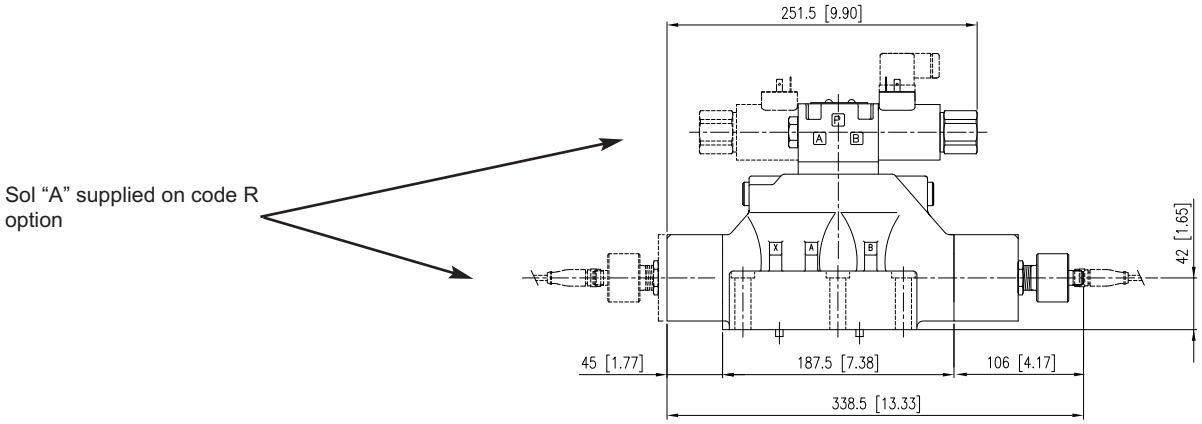
Dimensions in mm [IN]



VSD08S-1*-*MAB
VSD08S-5*-*MAB

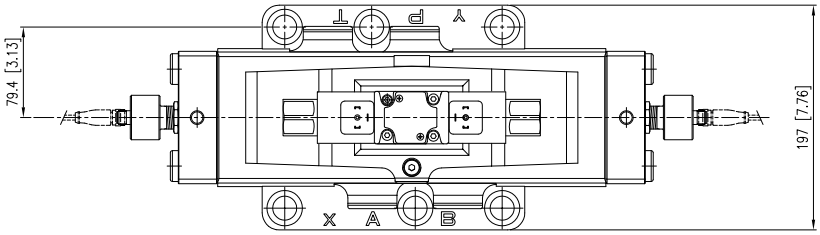


VSD08S-1*-*MA
VSD08S-5*-*MB



OVERALL AND MOUNTING DIMENSIONS FOR VSD10S

Dimensions in mm [IN]



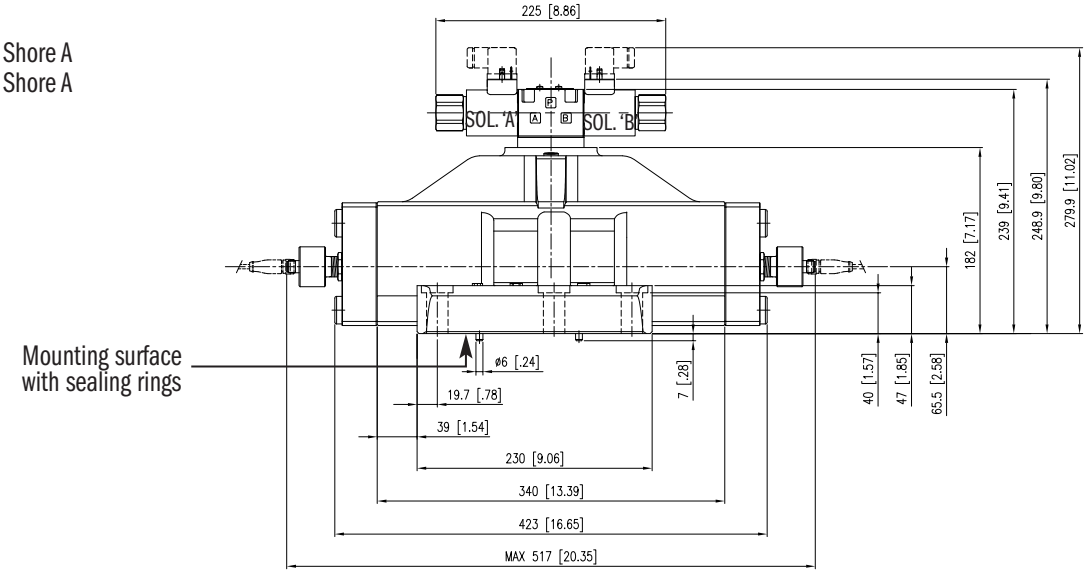
THREAD OF MOUNTING HOLE
3/4 - 10 UNC-2B x 1.60

FASTENING
6 bolts - 3/4 - 20 UNC-3A X 2 3/4
Grade 8 or stronger or higher strength

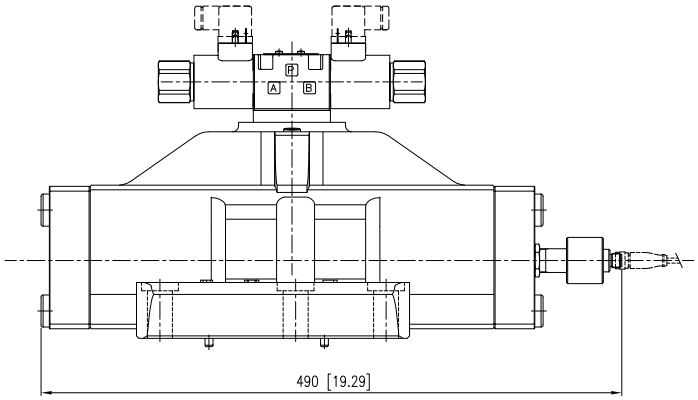
TIGHTENING TORQUE
240 lbf-ft (325 Nm)
415 lbf-ft (565 Nm) High strength

SEALING RINGS
4 O-rings AS568-222 90 Shore A
2 O-rings AS568-117 90 Shore A

VSD10S-3*-*M0



VSD10S-3*-R0



POSITIONING SENSOR

ELECTRICAL CHARACTERISTICS

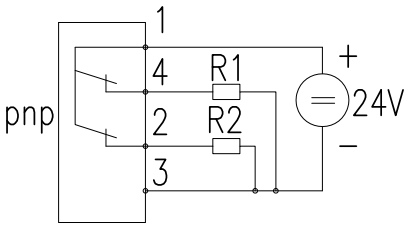
CONNECTION VOLTAGE	VDC	20 - 32
CURRENT CONSUMPTION	A	0.4
MAX OUTPUT LOAD	mA	400
OUTPUT		2 PNP
ELECTRIC PROTECTION		polarity inversion short circuit
HYSTERESIS	mm	≤ 0.1
RANGE TEMPERATURE		-13 to +176 °F / -25 to +80 °C
PROTECTION AGAINST ATMOSPHERIC AGENTS Note 1		IP65
EMC ELECTROMAGNETIC COMPABILITY (EMC) Note 2		In compliance with 2014/30/EU
LOW VOLTAGE		In compliance with 2014/35/EU

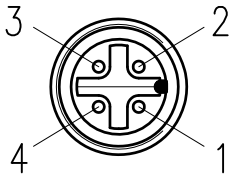
NOTE 1: The IP65 protection degree is intended for the whole valve. It is guaranteed only with valve and connectors correctly connected and installed

NOTE 2: In order to further reduce the emissions, use of type H connector is recommended. These prevents voltage peaks on opening of the coil supply electrical circuit (see catalogue 49 000)

WIRING DIAGRAM

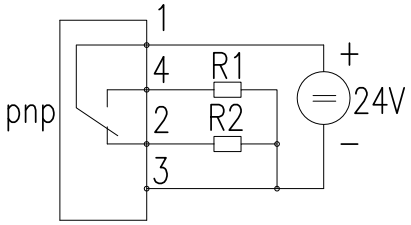
R0 TYPE

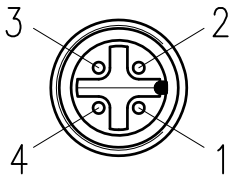




PIN	CONTACT ASSIGNMENT
1	+24 VDC (supply)
2	NC (normally close)
3	0 V
4	NC (normally closed)

M* TYPE





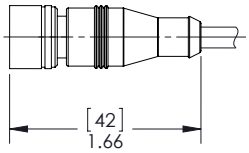
PIN	CONTACT ASSIGNMENT
1	+24 VDC (supply)
2	NC (normally close)
3	0 V
4	NO (normally open)

NOTE: M0, MAB version have two positioning sensors. Please consider that the wiring diagram shown must be done for each sensor.

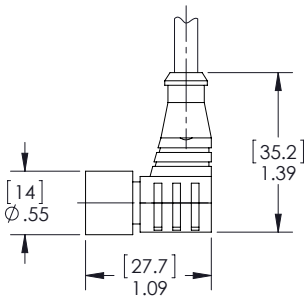
SENSOR CONNECTORS

The female connectors for position switches can be ordered separately, specifing the description here below, depending on the desired type.

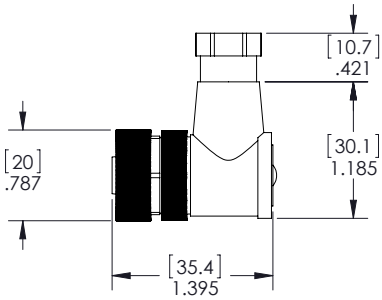
STRAIGHT CONNECTOR, FEMALE M12, 4 PIN, MOLDED CABLE, PRE-WIRED
VEA-3P4C-A
Protection class: IP67
Non shielded
Cable: with 4 conductors 22 AWG - length 5 m - ∅5.2 mm
Cable material: PVC
Max rated voltage: 250 V
Without LED.



ANGLED CONNECTOR, FEMALE M12, 4 PIN, MOLDED CABLE, PRE-WIRED
VEA-3P4C-90-A
Protection class: IP67
Non shielded
Cable: with 4 conductors 22 AWG - length 5 m - ∅5.2 mm
Cable material: PVC
Max rated voltage: 250 V
Without LED.



ANGLED CONNECTOR, FEMALE M12, UNASSEMBLED
Circular connector with screw locking; strain relief by means of clamping cage.
VEA-3P4-90-A
Protection class: IP67
Non shielded
Conductor size: 18 AWG max
Cable gland: PG7 - suitable cables: 4-6 mm^2
Case material: polyamide (nylon)
Without LED.



SOLENOIDS

Listed below the types of solenoids available and the numbers to be added in the solenoid box on page 3 or 8.

PLUG-IN TERMINAL SOLENOID DIN 43650

This solenoid has three terminal poles. Use bi-polar connectors that meet ISO 4400 / DIN 43650 (EN 175301-803). Protection against atmospheric agents: IP65.

VSD03S & VSD05S - DIRECT OPERATED

SIZE	DIN CONNECTOR CODE	VOLTAGE & FREQUENCY [VOLT - HERTZ]	VOLTAGE LIMITS [MIN - MAX]	RESISTANCE ±10% [OHM]	INRUSH CURRENT [A]	HOLDING CURRENT [A]	HOLDING POWER [W]
D03	D24K1	24 V DC	22.8 - 25.2	18.6	1.29	1.29	31
	D12K1	12 V DC	11.4 - 12.6	4.4	2.72	2.72	32.7
D05	D24K1	24 V DC	22.8 - 25.2	12	2	2	48
	D12K1	12 V DC	11.4 - 12.6	3.2	3.75	3.75	45

VSD05#S, VSD07S, VSD08S, VSD10S - PILOT OPERATED

SIZE	DIN CONNECTOR CODE	VOLTAGE & FREQUENCY [VOLT - HERTZ]	VOLTAGE LIMITS [MIN - MAX]	RESISTANCE ±10% [OHM]	INRUSH CURRENT [A]	HOLDING CURRENT [A]	HOLDING POWER [W]
D05A, D05B, D07, D08, D10	D24K1	24 V DC	22.8 - 25.2	18.6	1.29	1.29	31
	D12K1	12 V DC	11.4 - 12.6	4.4	2.72	2.72	32.7

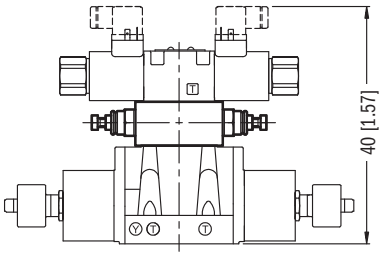
MECHANICAL OPTIONS

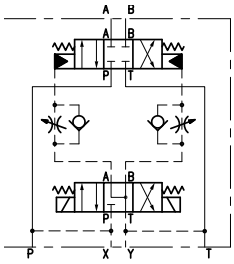
ADJUSTABLE PILOT CHOKES (KK)

Hydraulic shock may occur when stopping or reversing flow. This can be reduced and controlled by lowering the spool shift velocity. The chokes operate by metering out (returning) on all 2 position valves, and when going to center position on 3-position valves.

To request this option add the letters “KK” in the Mechanical Option Box in the identification code.

Consult with Continental Hydraulics for other metering configurations.





PILOT AND DRAIN CONFIGURATION

The VSD*S valves are available with four pilot/drain configurations: internal/internal, internal/external, external/internal and external/external.

When internal pilot and/or drain are used, the corresponding 'x' and 'y' ports in the manifold must be plugged. Pilot pressure must be at least 70 psi (5 bar) greater than the pressure in the 'T' line.

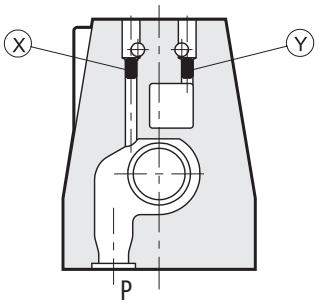
It may be desirable to use external pilot when system pressure is subject to wide flucuations. It is required to use external pilot or internal pilot with a pressure reducing valve when system pressure exceeds 3000 psi (210 bar) for the VSD05*S and VSD07S.

CODE	DESIGN	Pilot (X)	Drain (Y)
1	Internal Pilot / External Drain	□	■
2	External Pilot / External Drain	■	■
3	Internal Pilot / Internal Drain	□	□
4	External Pilot / Internal Drain	■	□

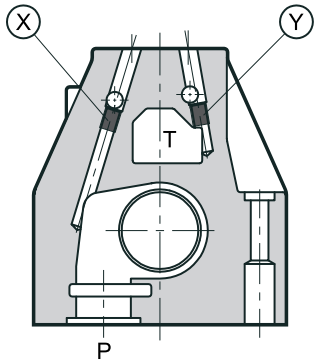
■ Plugged □ Unplugged

PLUG MOUNTING

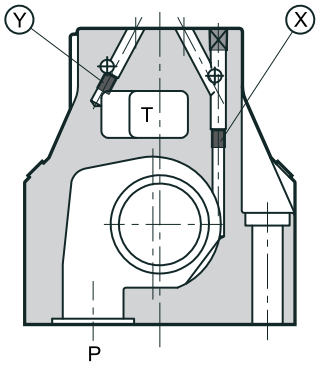
VSD05*S



VSD07S



VSD08S



VSD10S

PLUG SIZE

VSD05*S	M5x6 mm
VSD07S	M6x8 mm
VSD08S	M6x8 mm
VSD10S	M6x8 mm

INTERNAL PILOT OPTIONS

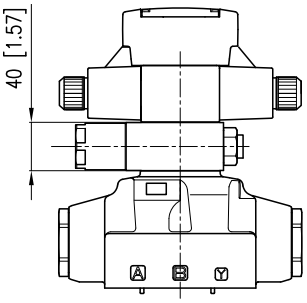
PRESSURE REDUCING (Z)

THE PRESSURE REDUCING MODULE IS DESIGNED TO PROTECT THE VALVE FROM PILOT PRESSURES EXCEEDING 3000 PSI (210 BAR).

When the system pressure exceeds 3000 psi (210 bar) the use of the version with external pilot is mandatory, or alternatively, the version with optional Z internal pilot.

The pressure reducer has fixed adjustment of 430 psi (30 bar). This device is not available for the VSD05*S.

To request this option add the letter "Z" into the internal pilot option box, in the identification code.



BACK PRESSURE VALVE (C70)

The back pressure valve is for valves with internal pilot and B or L spool types where system pressure may drop below the 70 psi (5 bar) required for pilot operation.

This device is available only for VSD07S and VSD08S.

NOTE: The back pressure valve can't be used as check because it doesn't assure the seal.

To request this option add the letters 'C70' in the internal pilot options box, in the identification code.

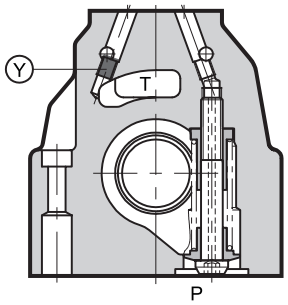
The backpressure valve is also available as a field conversion kit and can be easily mounted in the P port of the main control valve.

The kit includes 1 check assembly and related seals.

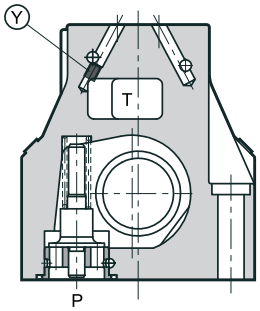
USE THE CODE BELOW TO ORDER THE KIT.

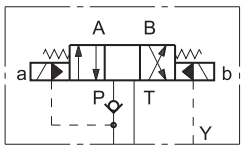
VALVE SERIES	SEAL MATERIAL	ORDERING NUMBER
VSD07S	Buna N	VMA-4F1-A
	Viton	VMA-4F2-A
VSD08S	Buna N	NA
	Viton	NA

VSD07S



VSD08S





MOUNTING SURFACES

ALL THE MOUNTING SURFACES REFER TO NFPA T3.5.1 R2-2002 AND ISO 4401:2005 STANDARDS.

The mounting surface standards recommends metric coarse threads. However, subplates are commercially available with UNC threads. Select a bolt size that matches the threads in the mounting surface.

Dimensional tolerances are ± 0.1 mm (0.004”) for bolt and pin location; ± 0.2 mm (0.008”) for the other quotes.

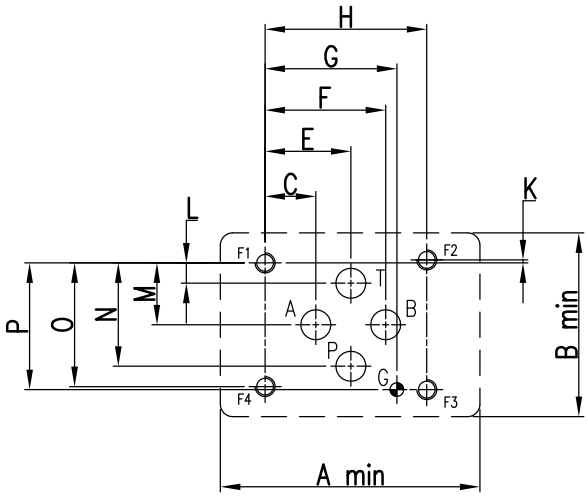
The minimum depth of the blind hole G where required is 8 mm (0.31 in).

D03

	MM	INCH
P, A, B, T MAX	∅ 7.0	∅ 0.276
G MAX	∅ 4.0	∅ 0.16
MOUNTING BOLT THREAD SIZE	M5	10-24 UNC 2B

	MM	INCH
A	51.0	2.00
B	43.0	1.70
C	12.7	0.50
E	21.5	0.85
F	30.2	1.19
G	33.0	1.30
H	40.5	1.594

	MM	INCH
K	0.75	0.03
L	5.10	0.20
M	15.5	0.61
N	25.9	1.02
O	31.0	1.22
P	31.8	1.25

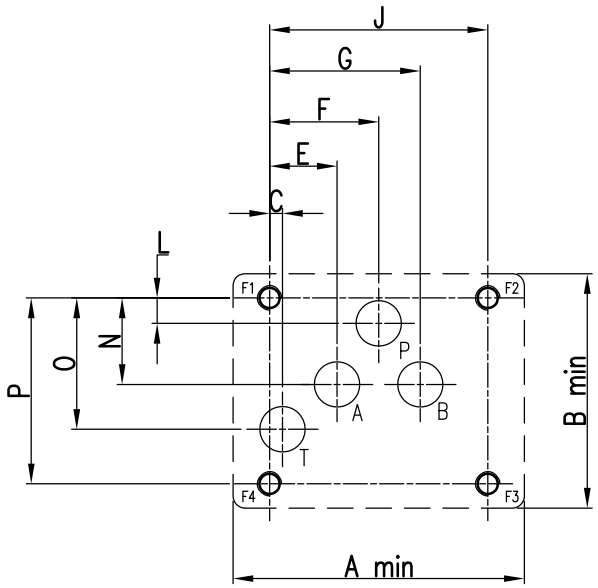


D05

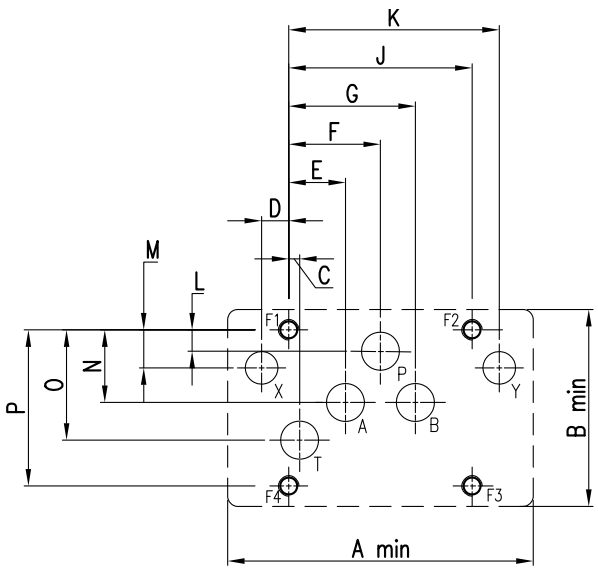
	MM	INCH
P, A, B, T MAX	Ø 11.2	Ø 0.44
MOUNTNG BOLT THREAD SIZE	M6	1/4 - 20 UNC

	MM	INCH
A	72.0	2.84
B	58.0	2.28
C	3.20	0.126
E	16.7	0.66
F	27.0	1.06
G	37.3	1.47

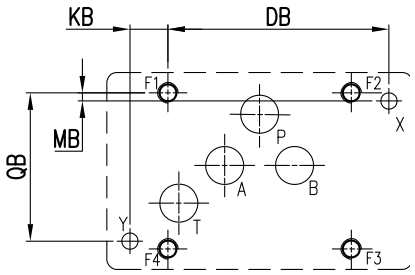
	MM	INCH
J	54.0	2.125
L	6.30	0.25
N	21.4	0.84
O	32.5	1.28
P	46.0	1.812



D05 - ALTERNATIVE A



D05 - ALTERNATIVE B



PORT FUNCTION:

P = PRESSURE PORT
T = TANK PORT
A = FIRST CYLINDER PORT
X = PILOT PORT
B = SECOND CYLINDER PORT
Y = DRAIN PORT

	MM	INCH
P, A, B, T MAX	Ø 11.2	Ø 0.44
X, Y ALT. A	Ø 6.30	Ø 0.25
X, Y ALT. B	Ø 4.80	Ø 0.19
MOUNTNG BOLT THREAD SIZE	M6	1/4 - 20 UNC

	MM	INCH
A	90.0	3.54
B	58.0	2.28
C	3.20	0.126
D	8.00	0.31
E	16.7	0.66
F	27.0	1.06
G	37.3	1.47

	MM	INCH
J	54.0	2.125
K	62.0	2.44
L	6.30	0.25
M	11.2	0.44
N	21.4	0.84
O	32.5	1.28
P	46.0	1.812

	MM	INCH
DB	65.1	2.563
KB	11.2	0.44
MB	2.40	0.09
QB	43.7	1.72

NOTES:

NFPA D05 and ISO 4401-05 indicates different diameters for X and Y holes:

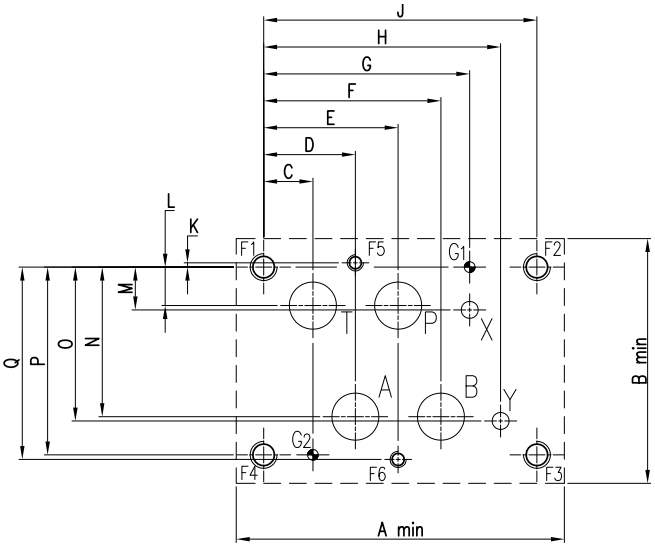
NFPA: Ø 9.6 max in D05 alt A
Ø 4.8 max in D05 alt B
ISO: Ø 6.3 max both

D07

	MM	INCH
P, A, B, T MAX	Ø 17.5	Ø 0.69
X, Y MAX	Ø 6.30	Ø 0.25
G MAX	Ø 4.00	Ø 0.16
MOUNTING BOLT THREAD SIZE F1 - F4	M10	3/8 - 16 UNC
MOUNTING BOLT THREAD SIZE F5 - F6	M6	1/4 - 20 UNC

	MM	INCH
A	122.0	4.80
B	91.0	3.58
C	18.3	0.72
D	34.1	1.342
E	50.0	1.97
F	65.9	2.60
G	76.6	3.016
H	88.1	3.47

	MM	INCH
J	101.6	4.00
K	1.60	0.063
L	14.3	0.56
M	15.9	0.626
N	55.6	2.19
O	57.2	2.25
P	69.9	2.75
Q	71.5	2.815

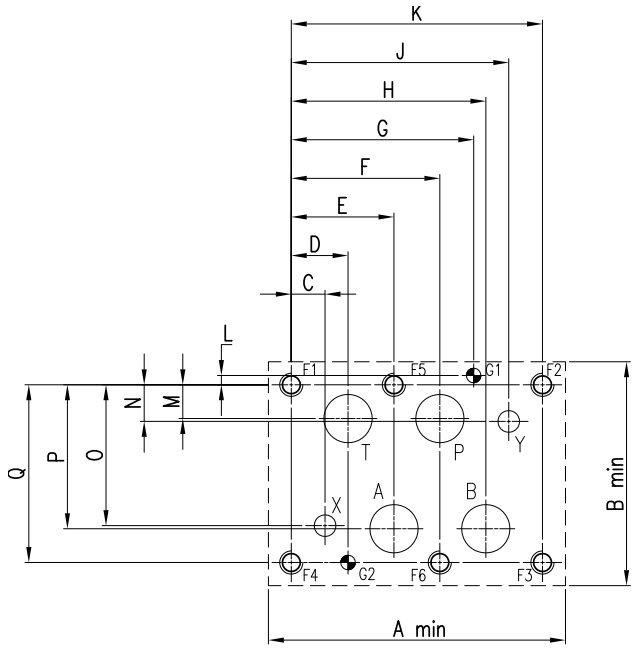


D08

	MM	INCH
P, A, B, T MAX	Ø 25.0	Ø 0.98
X, Y MAX	Ø 11.2	Ø 0.44
G MAX	Ø 7.50	Ø 0.30
MOUNTING BOLT THREAD SIZE	M12	1/2 - 13 UNC

	MM	INCH
A	154.0	6.00
B	116.0	4.57
C	17.5	0.69
D	29.4	1.157
E	53.2	2.09
F	77.0	3.03
G	94.5	3.719
H	100.8	3.97

	MM	INCH
J	112.7	4.44
K	130.2	5.125
L	4.80	0.187
M	17.5	0.69
N	19.0	0.75
O	73.0	2.874
P	74.6	2.93
Q	92.1	3.625

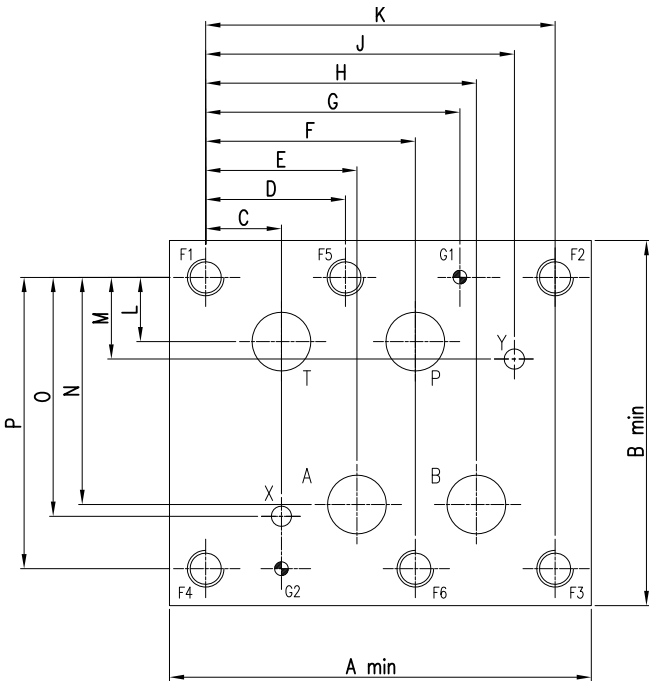


D10

	MM	INCH
P, A, B, T MAX	Ø 32	Ø 1.25
X, Y MAX	Ø 11.2	Ø .44
G MAX	Ø 7.5	Ø .295
MOUNTING BOLT THREAD SIZE	M20	3/4 - 10 UNC

	MM	INCH
A	230.0	9.06
B	199.0	7.83
C	41.3	1.63
D	76.2	3.00
E	82.5	3.25
F	114.3	4.50
G	138.6	5.457
H	147.6	5.81

	MM	INCH
J	168.3	6.63
K	190.5	7.50
L	35.0	1.38
M	44.5	1.75
N	123.8	4.87
O	130.2	5.13
P	158.8	6.25



APPLICATION DATA

FLUIDS

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 (ΔP) will be approx. ΔP1 = ΔP (G1/G). See the chart for other viscosities.

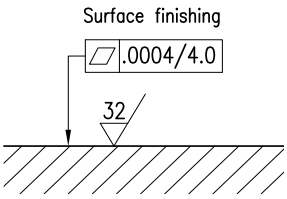
FLUID VISCOSITIES	Cst	10	14.5	32	36	43	54	65	76	86	108	216	324	400
	SUS	60	75	150	170	200	250	300	350	400	500	1000	1500	1900
MULTIPIER		0.77	0.81	0.97	1.00	1.04	1.10	1.15	1.20	1.24	1.31	1.56	1.72	1.83

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 degrees 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 degrees F are not recommended.

RANGE TEMPERATURES:	Ambient	- 4 to +122°F	-20 to +50°C
	Fluid	- 4 to +176°F	-20 to +80°C
FLUID VISCOSITY	Range	60 - 1900 SUS	10 - 400 cSt
	Recommended	120 SUS	25 cSt
FLUID CONTAMINATION		ISO 4406:1999 Class 20/18/15	

INSTALLATION

The configurations with centering and offset springs can be mounted in any position without impairing correct operation; instead, those without springs and with mechanical detent must be mounted with the longitudinal axis horizontal.
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.



BOLT KITS

D03 SIZE	BD03-125	Valve Only	1008406
D05 SIZE	BD05 -163	Valve Only	1013160
D05* SIZE	BD05H -150	Valve Only	1009397
D07 SIZE	BD07 - 250	Valve Only	1009400
D08 SIZE	BD08 - 275	Valve Only	1009401
D10 SIZE	BD10 - 275	Valve Only	1013038

SEAL KIT

D03 SIZE	Buna Seal Kit	1016815
	Viton Seal Kit	1016816
D05 SIZE	Buna Seal Kit	1016817
	Viton Seal Kit	1016818
D05* SIZE	Buna Seal Kit	1013966
	Viton Seal Kit	1013967
D07 SIZE	Buna Seal Kit	1013968
	Viton Seal Kit	1013969
D08 SIZE	Buna Seal Kit	1016819
	Viton Seal Kit	1016820
D10 SIZE	Buna Seal Kit	1013972
	Viton Seal Kit	1013973

SUBPLATES

D05 alt. A SIZE	AD05JESPS16S	Aluminium	SAE-16	351716AJ
	DD05JESPS16S	Ductile	SAE-16	351716AK
D07 SIZE	AD07SPS016S	Aluminium	SAE-16	1013039AB
	DD07SPS016S	Ductile	SAE-16	1013039AC
D08 SIZE	AD08SPS020S	Aluminium	SAE-20	265803AP
	DD08SPS020S	Ductile	SAE-20	265803AL
D10 SIZE	AD10SPS032S	Aluminium	SAE-32	1013040AB
	DD10SPS032S	Ductile	SAE-32	1013040AC

NOTES:
1. Max pressure for aluminum subplates: 3000 psi (210 bar)
2. Max pressure for ductile subplates: 5000 psi (350 bar)
3. Always verify subplate port size is proper for the application

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