Directional Control Valves
4D02

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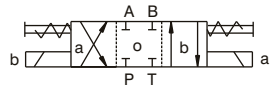
VELJAN model V4D02 direct operated Directional Control valves conform to NFPA D05, NG 10 (CETOP 05) standard interface. These are subplate and manifold mounted and can be used in conjunction with stack valve system. The valve mounting interface and electrical connection methods conform to international standards CETOP, ISO, DIN. The coils used in the wet pin design solenoids are available in A.C. and D.C. voltages and are continuously rated. Precise guide for all types of spools is achieved by uniquely designed five annuli body. Spools are interchangeable and no selective assembly is necessary.

Example:



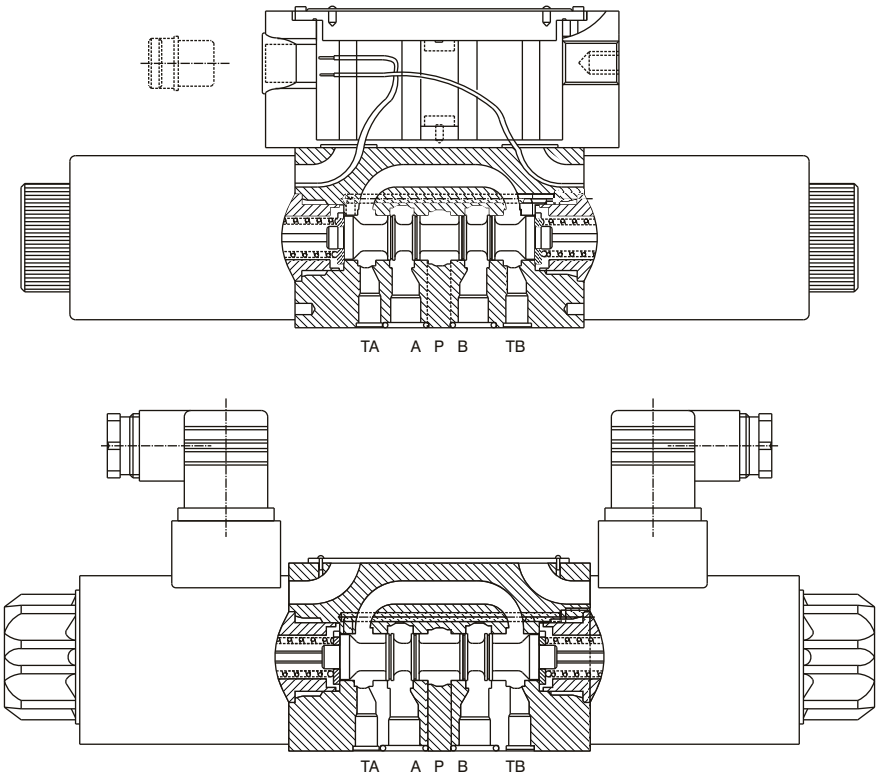
Features

- Extremely low pressure drop at high flow rates due to optimised flow paths in body & spool design.
- Compact five annuli body design.
- Mounting configuration according to CETOP R35H, ISO 4401 and DIN 24340
- Wide variety of spool types including detent.
- Interchangeability of spools & bodies due to high precision manufacturing processes.
- Actuated by electrical / hydraulic / pneumatic / cam or lever mechanism.
- Wide range of A.C. and D.C. coil voltages are available both with or without manual override.
- Low electrical power consumption (48 W)
- Change of solenoid coil is fast and simple without risk of oil leakage.
- Solenoid coil can be positioned at 90° intervals with respect to body .
- Electrical connection by standard 3 pin connector according to DIN 43650, ISO 4400 or with wire box.
- Optional plug-in connector with LED display are available.
- Soft shifting version by use of an orifice is optional.
- Every valve is factory tested prior to despatch.

OPERATION

The Directional Control valve 4D02 consists of a body, spool and either one or two actuators depending upon the application. The spool is shifted by the action of electrical solenoid, mechanical, hydraulic, pneumatic, cam or lever actuator mechanism. Spool movement allows oil under pressure from port P to flow to either port A or B, and subsequently connect the other port to tank. On de-energizing the actuator, the spool is returned to the center position or offset position. Manual operation of spool is possible using the optional manual override system.

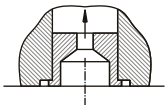
Brad Harrison or
(Optional) Cannon
14S Connector



DC

Orifice

Depending on the operating conditions flow from the valve can be limited by using orifice plug at port P. Consult model code for orifice sizes.



Characteristics

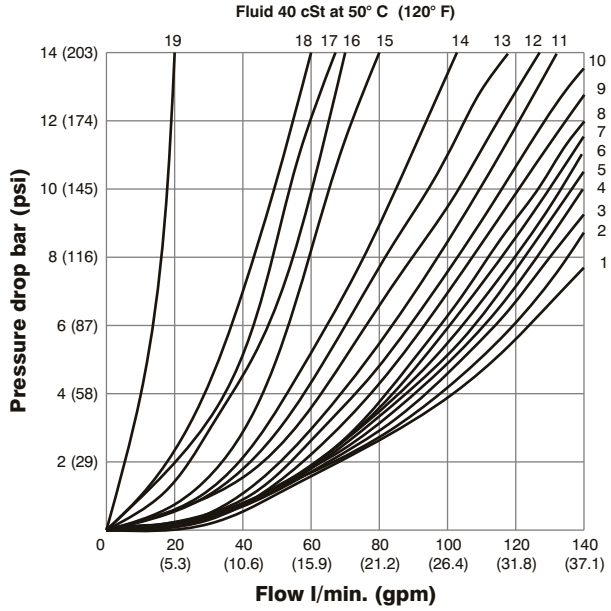
Design	Sliding spool valve
Type of Mounting	Subplate
Mounting Position	Optional but horizontal recommended
Ambient temperature range	0....120°F (-18 ....+50°C)
Operating Pressure(P,A,B)	315 bar (4550 psi)
Permissible pressure (T)	up to 210 bar (3000 psi) (DC solenoids) up to 140 bar (2000 psi) (AC solenoids)
Max. flow	37,0 GPM(140 l/min.) (see diagram - Pressure drop curves)
Fluid	Mineral oil according to DIN 51524 and 51525
Viscosity range	10....650 cSt optimum 30 cSt
Fluid temperature range	0....176°F(-18....+80°C)
Contamination level	Max. permissible contamination level according to NAS 1638 Class 8 (Class 9 for 15 Micron and smaller or ISO 17/14)

SOLENOID CHARACTERISTICS

	A.C	D.C.
Nominal Voltage	see ordering code	see ordering code
Power Input	39 W	38 W
Holding Power	94 VA	-
Inrush Power	660 VA	-
Permissible Voltage difference	+10 to -20 %	+/- 10 %
Maximum coil temperature	135 °C (275° F)	105 °C (220° F)
Relative Operating Period	100 %	100 %
Type of Protection	IP 65	IP 65
Insulation Class	H	F
Cycle (1/H)	14400	14400

PRESSURE DROP

Performance data given is typical and can be influenced by application.

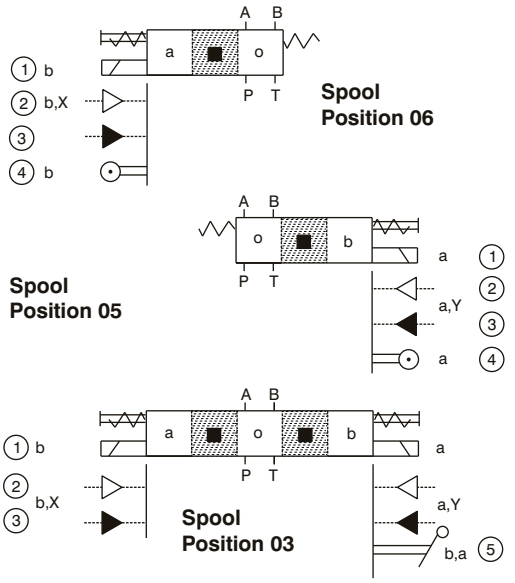


Spool Type	Flow Direction				O-Position					b-pos.	a-pos.
	P-A	P-B	A-T	B-T	P-T	P-A	P-B	A-T	B-T	P-A	P-B
01	1	1	4	10	14						
02	3	3	4	7				19	19		
03	3	3	5	8							
07	12	12	7	13	13						
08	3	3	3	6				17	18		
09	3	3	4	6					17		
10	3	3	3	9				16			
11	5	5	9	11							
12	4	4	5								
46	1	1	10	9							
51	5	5		11							
55	9	6	6							12	
56	7	7		12							13
72	4	6	4								
OM	3	3	9	7							
OT	6	11	10			15		13	13		
AR	12	5					15	11	11		

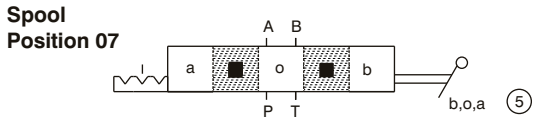
DC

SPOOL POSITIONS

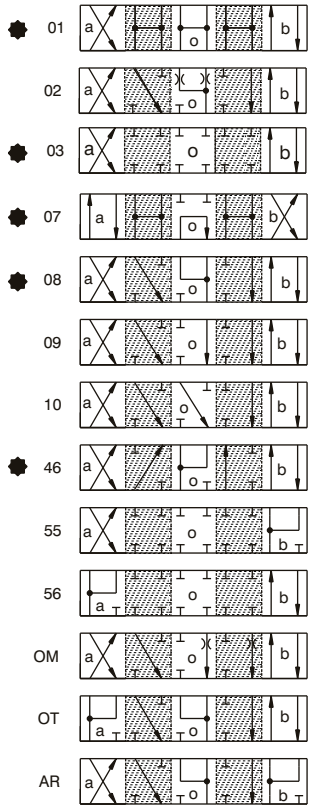
Spring Centered



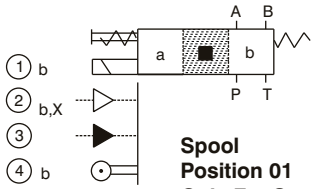
3 Position Detent

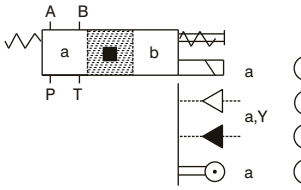


Spool Types Caps



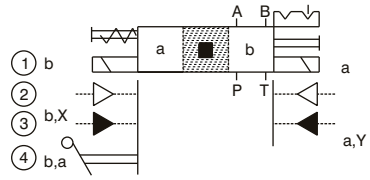
Spring Offset

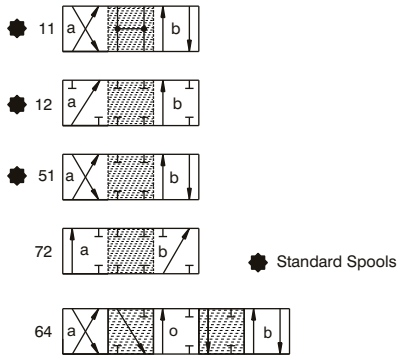




1. solenoid operation
2. pneumatic operation
3. Hydraulic operation
4. Cam operation
5. lever operation

2 Position Detent





Transfer position only.

DC

ORDERING CODE

**V4D02 - 3 2 02 - 03 01 - B1 W07 - ** ** **

Series

Cetop 05

Body

3 = Standard body

D = Soft shift Option G3
with DC-solenoid operation

M = Spool Type 07,12,64,65,72
with AC & DC solenoid operation

Control

1 = 1 Solenoid

2 = 2 Solenoids

4 = Lever Operated

5 = Cam Operated

* 7 = 2 solenoids, 2 pos. detents

D = Pneumatic operation, one-sided

E = Pneumatic operation, both sides

* F = Pneumatic operation, both sides
(2 pos. detents)

* (Only for Spool 11, 12, 51)

Spool Type

Refer to page No. 4

Spool Position

01=2(a,b),Spring offset pos. "b"; activated to "a"

02=2(a,b),Spring offset pos. "a"; activated to "b"

03=3(a,o,b),Spring centered pos. "o"

05=2(o,b),Spring centered pos "o"; activated to "b"

06=2(o,a),Spring centered pos. "o"; activated to "a"

07=3 pos. detents (for control 4 only)

09=2 pos. detents (for controls 7 , F & 4)

End Cap

01 = for controls 1,D

02 = for control 2, 7, E & F

04 = for control 4 & 5

05 = for control 4 & spool position 07 & 09

Design Letter

Seal Class

1 = NBR-seals (Standard)

4 = EPDM-seals (Viton)

5 = FPM-seals (Viton)

Solenoid Voltage

W01 = 115V/60CY AC GOR = 12V DC

W02 = 230V/60CY AC GOQ = 24V DC

W06 = 115V/50 CY Ac[1)] GOD = 27 V DC

W07 = 230V/50 CY AC for DIN connector only.

Valve Accessories / Modifications

16 = Orifice 1.6 mm dia in P-port

20 = Orifice 2.0 mm dia in P-port

25 = Orifice 2.5 mm dia in P-port

32 = Tube cartridge without manual override

52 = tube cartridge with manual override and rubber cover

C9 = 24 V DC Solenoid coil with 36 W

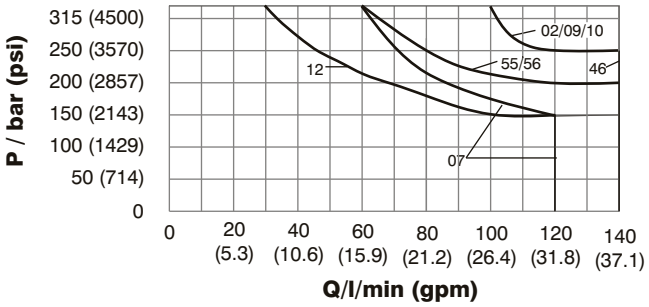
G3 = Soft shift version with 0.8 mm orifice in channel-Z (only body type D with DC).

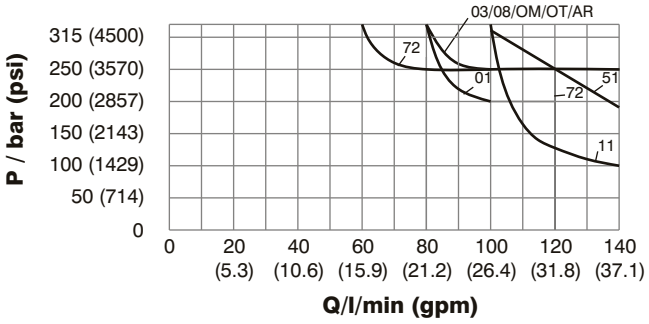
51 = Plug in connector, manual override & Indicator Lamps

DC

FUNCTIONAL LIMITS

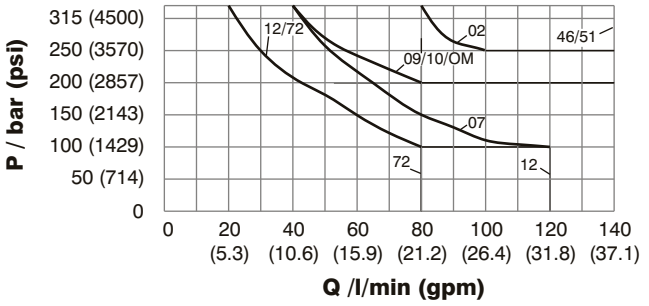
Valve with DC Solenoid(s)

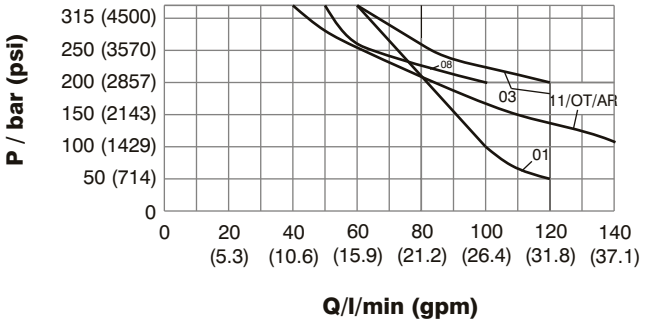




This functional limits have been obtained with warm solenoid condition and at 10 undervoltage from the selected nominal value. All flow data given is considered for 2 flow directions (eg. P to A and simultaneously from B to T). For single flow direction only (4-Way-Valve used as a 3-Way-Valve) the permissible flow must be reduced by as much as 25....30 in comparison to the data shown.

Valve with AC Solenoid(s)

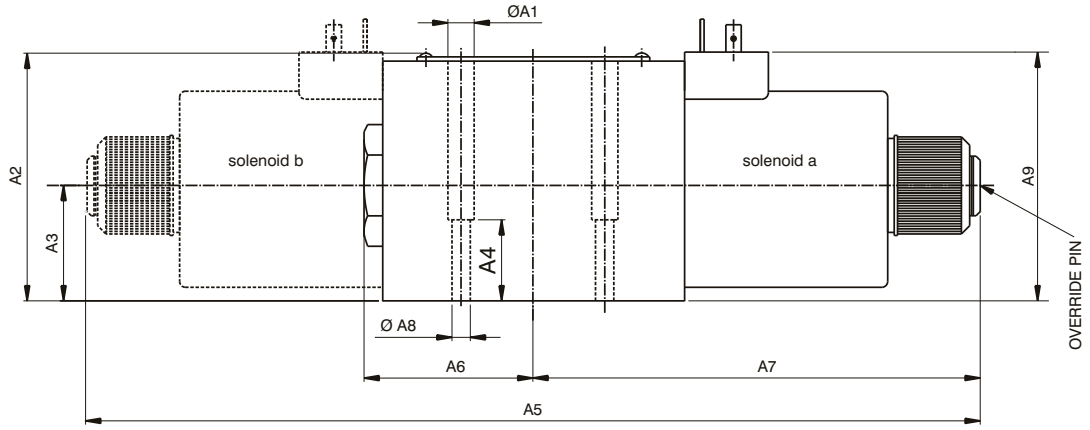


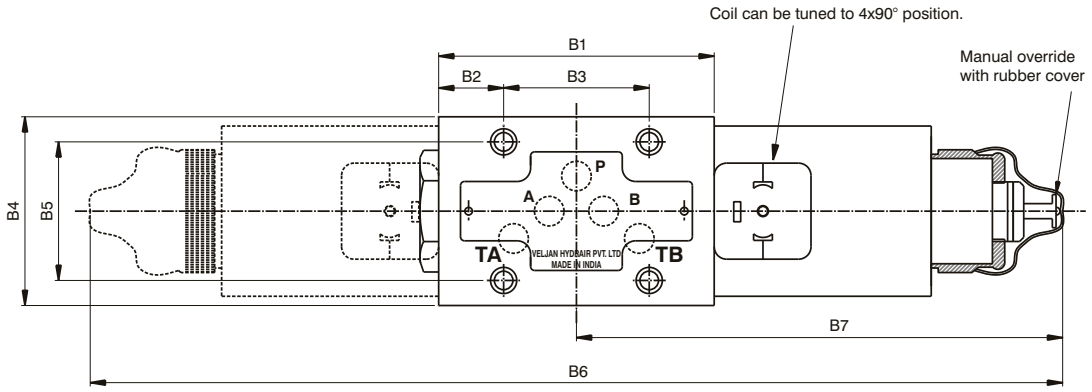


If the performance characteristics outlined above do not meet your particular requirements, please contact your local Veljan office.

1 & 2 - SOLENOID DC OPERATED VERSIONS, 3 PIN CONNECTOR

Weight	
Single solenoid	11,4lbs (5,2 Kg)
Double solenoid	14,5lbs (6,6 Kg)





Dimension		
	inch	mm
ØA1	0.41	10.5
A2	3.27	83
A3	1.54	39
A4	1.18	30
A5	12.80	325.2
A6	2.22	56.5
A7	6.40	162.6
ØA8	0.26	6.6
A9	3.26	82.9

Dimension		
	inch	mm
B1	4.02	102
B2	0.94	24
B3	2.13	54
B4	2.76	70
B5	1.81	46
B6	14.57	370
B7	7.28	185

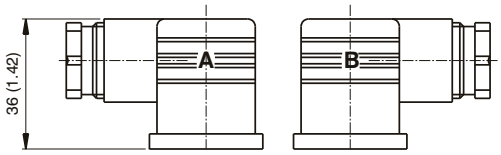
Port Functions:

P=Pressure

TA,TB=Tank

A+B=User

Plug-in connectors according to ISO 4400

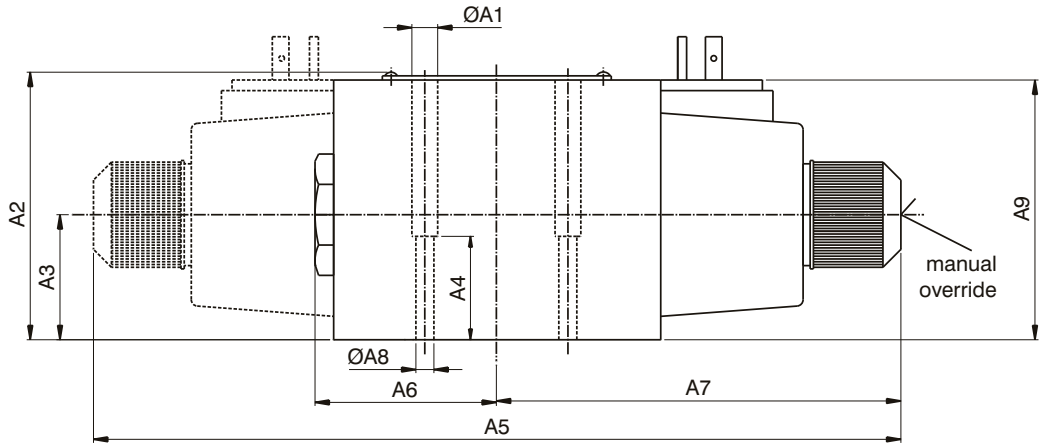


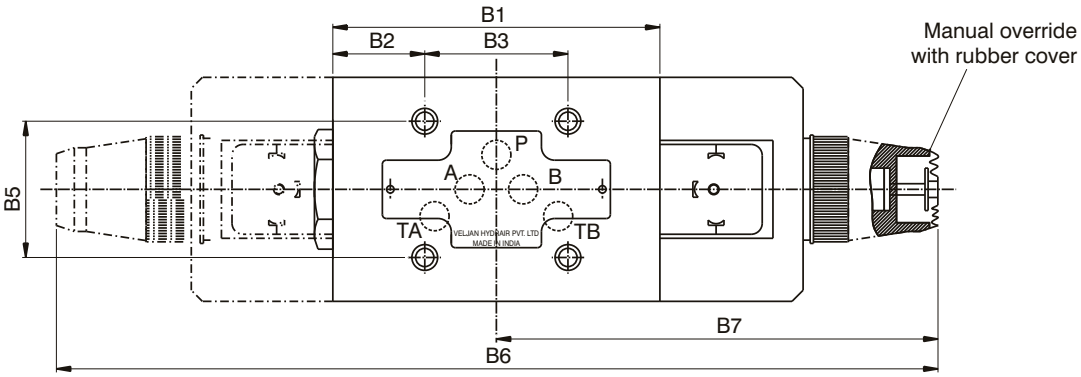
Versions	ISO 4400	A-Side	B-Side
Standard<250	PG11	V 167-01007-8	V 167-01008-8
with LED (red) 15 ... 30V		V 167-01100-8	V 167-01101-8
with bridge rectifier 12 ... 250V		V 167-01076-8	V 167-01014-8

DC

1 & 2 SOLENOID AC OPERATED VERSIONS, 3 PIN CONNECTOR

Weight	
Single solenoid	9,7 lbs (4,4 Kg)
Double solenoid	11,4 lbs (5,2 Kg)





DC

Dimension		
	inch	mm
ØA1	0.41	10.5
A2	3.27	83
A3	1.54	39
A4	1.18	30
A5	9.84	250
A6	2.22	56.5
A7	4.92	125
ØA8	0.26	6.6
A9	3.18	80.7

Dimension		
	inch	mm
B1	4.02	102
B2	0.94	24
B3	2.13	54
B4	2.76	70
B5	1.81	46
B6	11.57	294
B7	5.79	147

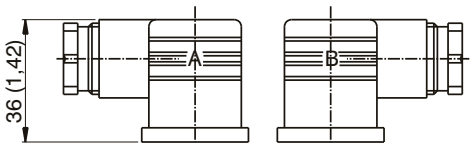
Port Functions:

P=Pressure

TA,TB=Tank

A+B=User

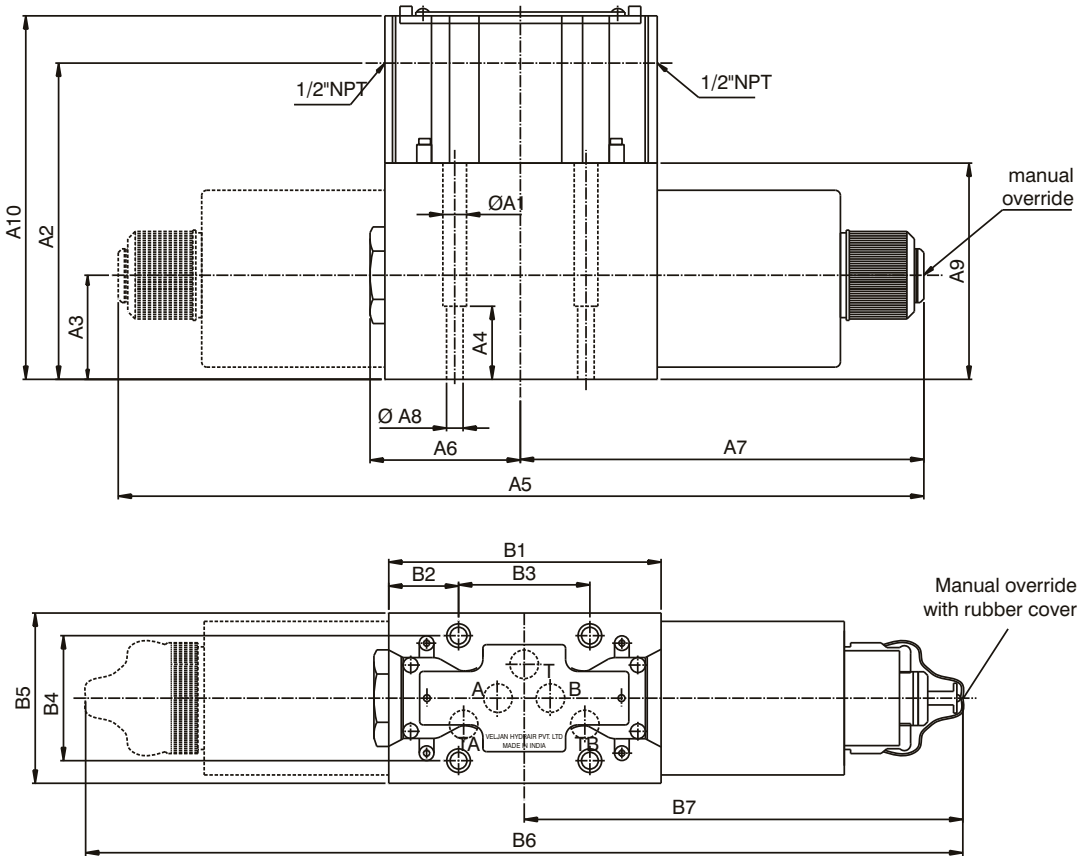
Plug-in connectors according to ISO 4400



Versions	ISO 4400	A-Side	B-Side
Standard<250	PG11	V 167-01007-8	V 167-01008-8
with LED (red) 15 ... 30V		V 167-01100-8	V 167-01101-8
with bridge rectifier 12 ... 250V		V 167-01076-8	V 167-01014-8

1 & 2 SOLENOID DC OPERATED VERSIONS, WIRING BOX

Weight	
Single solenoid	12,4 lbs (5,6 Kg)
Double solenoid	15,5 lbs (7,0 Kg)



Dimension		
	inch	mm
ØA1	0.41	10.5
A2	4.37	111
A3	1.54	39
A4	1.18	30
A5	12.81	325.2
A6	2.23	56.5
A7	6.41	162.6
ØA8	0.26	6.6
A9	3.19	81.0
A10	5.24	133

Dimension		
	inch	mm
B1	4.02	102
B2	0.95	24
B3	2.13	54
B4	1.81	46
B5	2.76	70
B6	14.58	370
B7	7.29	185

Port Functions:

P=Pressure

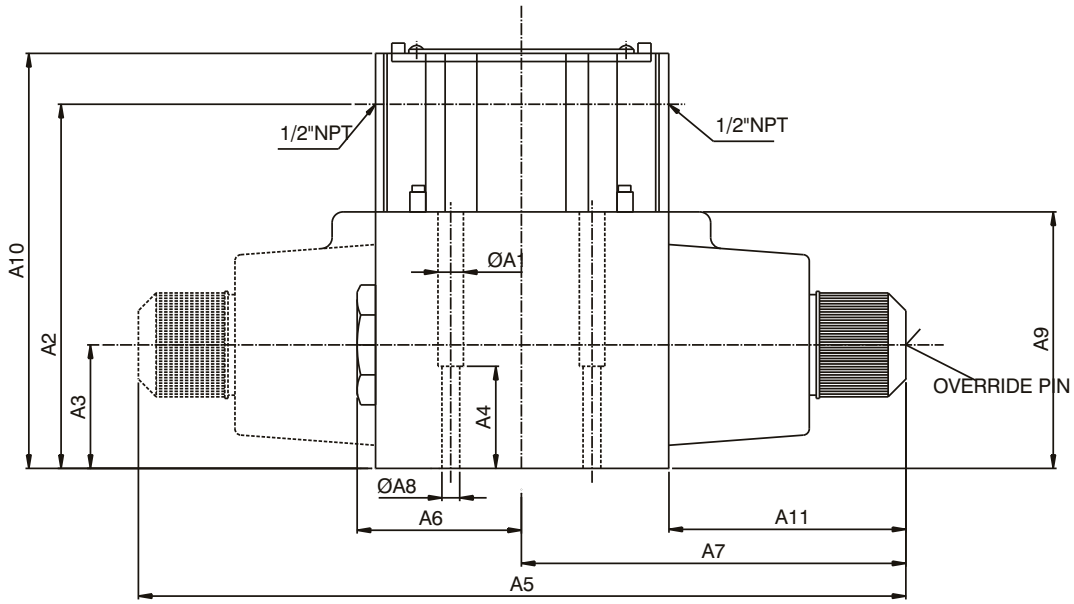
TA,TB=Tank

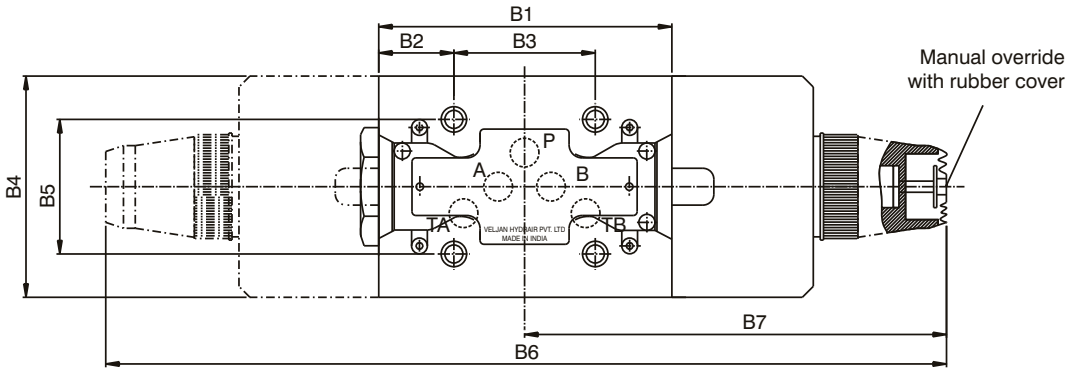
A+B=User

DC

1 & 2 - SOLENOID AC OPERATED VERSIONS, WIRING BOX

Weight	
Single solenoid	10,7 lbs (4,9 Kg)
Double solenoid	12,4 lbs (5,6 Kg)





Dimension		
	inch	mm
ØA1	0.41	10.5
A2	4.37	111
A3	1.54	39
A4	1.18	30
A5	9.85	250
A6	2.23	56.5
A7	4.92	125
ØA8	0.26	6.6
A9	3.19	81.0
A10	5.24	133
A11	2.91	74

Dimension		
	inch	mm
B1	4.02	102
B2	0.95	24
B3	2.13	54
B4	1.81	70
B5	2.76	46
B6	14.58	294
B7	7.29	147

Port Functions:

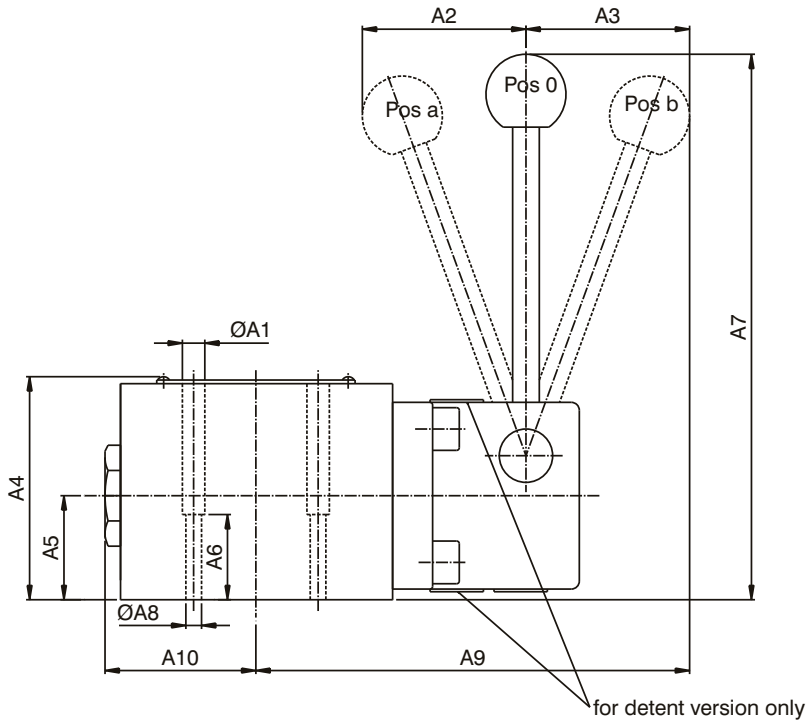
P=Pressure

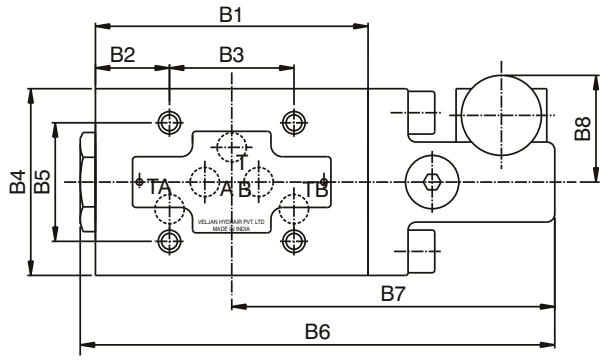
TA,TB=Tank

A+B=User

LEVER OPERATED VERSION

		Applicable for spool numbers
Functional Limits (at 315 bar / 4500 psi)	31,7 GPM (120 l/min)	01, 03, 08
	26,4 GPM (100 l/min)	07, 11, 51
	15,9 GPM (60 l/min)	12
Operating force	30 Newtons (6,7 lbs)	
Max. Tank Pressure	160 bar (2300 psi)	
Weight	11,4 lbs (5,2 kg)	





Dimension		
	inch	mm
ØA1	0.41	10.5
A2	2.32	59
A3	2.32	59
A4	3.27	83
A5	1.54	39
A6	1.18	30
A7	7.46	189.5
ØA8	0.26	6.6
A9	6.30	160
A10	2.22	56.5

Dimension		
	inch	mm
B1	4.02	102
B2	0.94	24
B3	2.13	54
B4	2.76	70
B5	1.81	46
B6	6.99	177.5
B7	4.76	121
B8	1.57	40

Port Functions:

P=Pressure

TA,TB=Tank

A+B=User

DC

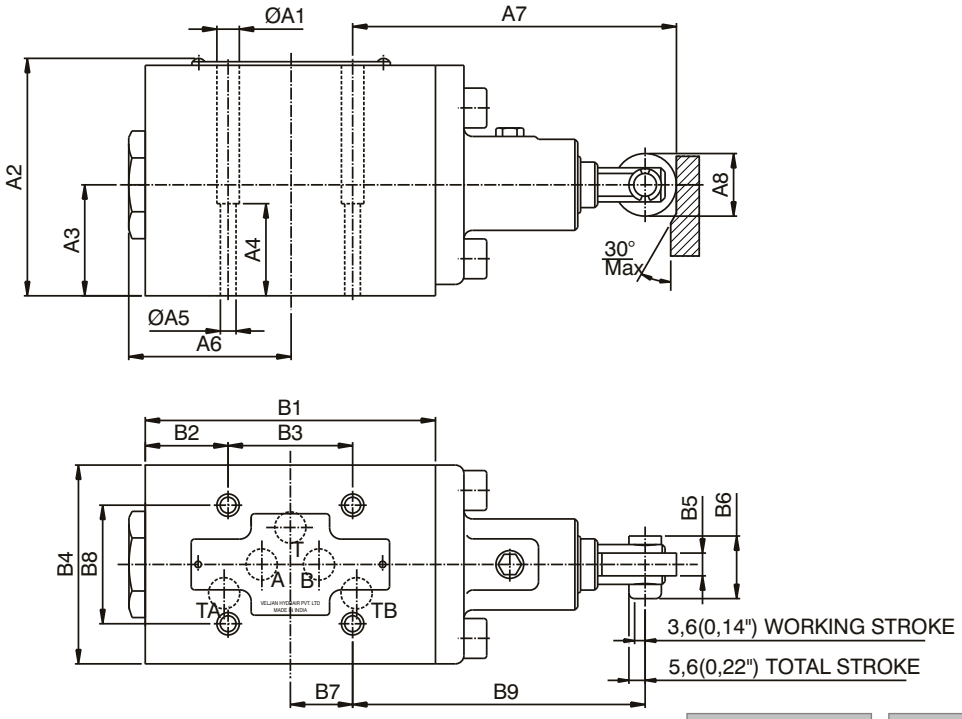
CAM OPERATED VERSION

		Applicable for spool numbers
Functional Limits (at 315 bar /4500psi)	31,7 GPM (120 l/min)	01, 03, 08
	26,4 GPM (100 l/min.)	07, 11, 12, 51
Weight	9,7 lbs (4,4 Kg)	
Max.Tank pressure	160 bar (2300psi)	

- **Operating force F(N)**[1)]

Operating pressure	At tank pressure 0 bar (0 psi)			At tank pressure 60 bar (858 psi)		
	neutral	working stroke	total stroke	neutral	working stroke	total stroke
100 bar (1430 psi)	80 N (18 lbs)	215 N (48 lbs)	360 N (81 lbs)	155 N (35 lbs)	290 N (65 lbs)	435 N (98 lbs)
200 bar (2860 psi)	80 N (18 lbs)	255 N (57 lbs)	360 N (81 lbs)	155 N (35 lbs)	330 N (74 lbs)	435 N (98 lbs)
315 bar (4500 psi)	80 N (18 lbs)	295 N (66 lbs)	360 N (81 lbs)	155 N (35 lbs)	370 N (83 lbs)	435 N (98 lbs)

1) depending on operating and tank pressure at max. flow



Dimension	inch	mm
ØA1	0.41	10.5
A2	3.27	83
A3	1.54	39
A4	1.18	30
ØA5	0.26	6.6
A6	2.22	56.5
A7	4.29	109
A8	0.87	22

Dimension	inch	mm
B1	4.02	102
B2	0.95	24
B3	2.13	54
B4	2.76	70
B5	0.31	8
B6	0.87	22
B7	1.06	27
B8	1.81	46
B9	3.86	98

Port Functions:

P=Pressure

TA,TB=Tank

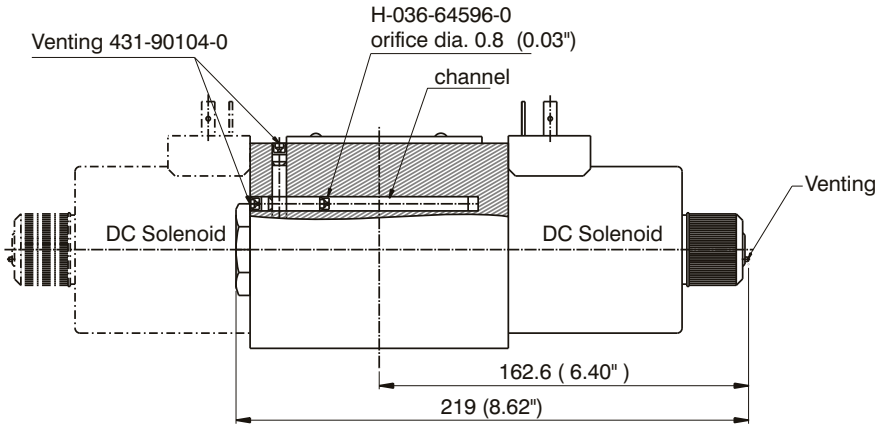
A+B=User

SOFT SHIFT VERSION, OPTION G3

VELJAN make CETOP 5 soft shift version (option G3) has special solenoids that permit a multiple increase of standard spool response time.

Option G3 provides:

- Reduced pressure shocks in venting operations.
- Reduced system noise during spool transition.
- Increased lifetime of the valve and system.



DC

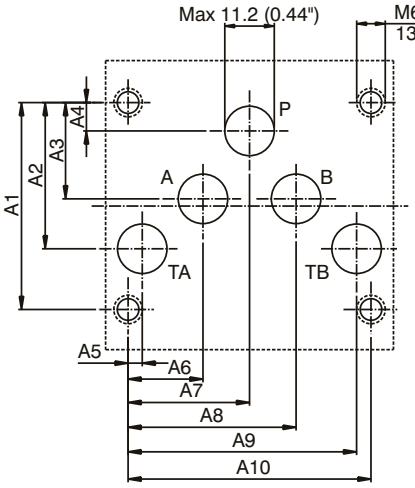
Notes:

With body option "D" and "Soft Shift", the flow rating of the valve is reduced by approximately 25 of the nominal value.

Ensure that channel Z is filled with oil at all times. For this the valve is equipped with venting screws.

Valve to be properly vented during initial installation and after service.

MOUNTING CONFIGURATION (ACCORDING TO CETOP, ISO AND DIN)



Dimensions	in	mm
A1	1.81	46.0
A2	1.28	32.5
A3	0.84	21.4
A4	0.25	6.3
A5	0.13	3.2
A6	0.66	16.7
A7	1.06	27.0
A8	1.47	37.3
A9	2.00	50.8
A10	2.13	54.0

Block mounting face

Flatness 0.01 mm / 100 mm length
Surface finish $\sqrt{^{0.8}}$

For valves ordered without subplate, mounting screws must be ordered separately.

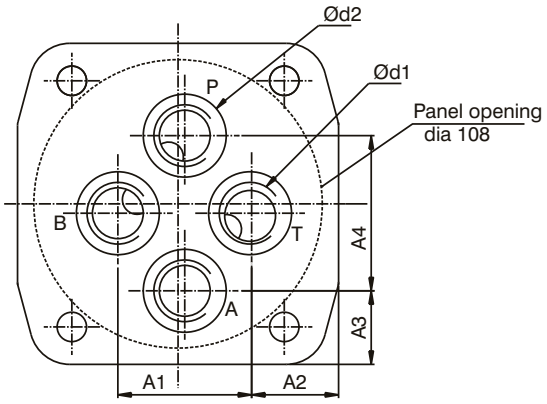
4-Mounting screws	Order-No.
M6 x 40, DIN 912; 12.9	V361-08244-8
or	
1/4"-20UNC x 1 ½" (SAE)	V358-12200

Torque 15 Nm

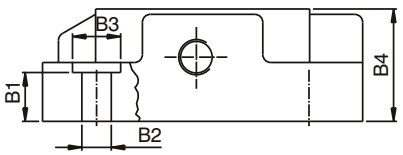
SUBPLATES

() dimensions in brackets are for 3/4" subplate

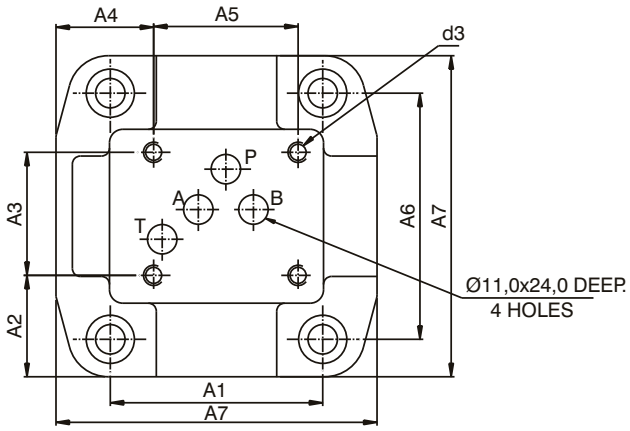
Dimensions	in	mm
A1	1.96 (2.2)	50 (56)
A2	1.27 (1.12)	32.5 (28.5)
A3	1.08 (1.0)	27.5 (25.5)
A4	2.28 (2.52)	58 (64.0)



Dimensions	in	mm
B1	0.83	21.0
B2	Ø0.43	Ø11.0
B3	Ø0.70	Ø18.0
B4	1.65	42.0



Dimensions	in	mm
A1	3.12	79.4
A2	1.49	37.9
A3	1.81	46.0
A4	1.43	36.5
A5	2.12	54.0
A6	3.62	92.0
A7	4.72	120.0



Model no.	Order no.	Weight	d1 (A,B,P,T)	d2	Thread for mount. screws d3
VSS-B-08-G 138	VS26-34192	6.6 lbs (3 kg)	G ½"	Ø31x1.0	M6 x 15 dp.
VSS-B-12-G 138	VS26-34193	6.6 lbs (3 kg)	G 3/4"	Ø33x1.5	