



Catalog PowerFlow™ Directional Control Valves



*Precision directional control
for any hydraulic system.*

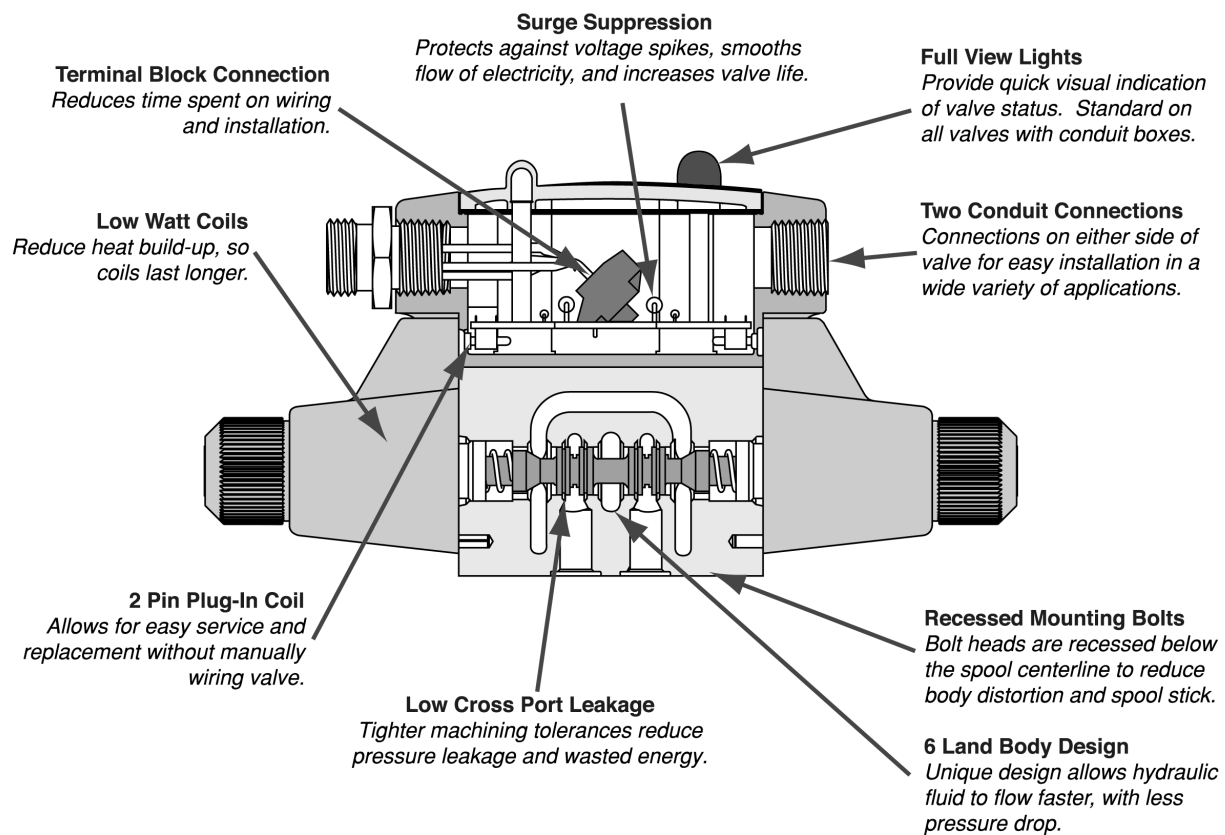
What Makes PowrFlow™ Directional Control Valves Your Best Buy?

Value. PowrFlow™ Directional Control Valves are built to work harder, and last longer. They're 100% tested, and come with an exclusive 3 year warranty against defects in material and workmanship.

For long term reliability, and optimum performance, PowrFlow™ Directional Control Valves are your best value.

- 5000 PSI Rated
- 3000 PSI Tank Port Rating
- Flow Rates to 20 GPM
- Viton Seals Standard
- 12 Interchangeable Spool Options

PowrFlow™ Directional Control Valves VSD03M Series



Precision Directional Control for Any Hydraulic System

PowrFlow™ Directional Control valves are used in a wide variety of applications. They are available in DIN styles, and are CE and CSA approved. The standard mounting conforms to NFPA, ANSI and ISO standards.

Use PowrFlow™ Directional control Valves For:

- Machine Tool Indexing
- Feeding and Motion Control Devices
- Mobile and Stationary Lift Equipment
- Tipping Equipment
- Compactors
- Wood Product Handling Equipment
- Concrete and Block Work Movers
- Off Highway Equipment
- Food Processing Machinery
- And More

DIRECTIONAL CONTROL VALVES

MODEL SERIES	OPERATED	SIZE -NFPA/ISO	PAGE NO.
VSD03M	SOLENOID ACTUATED, DIRECT OPERATED	D03/03	4 - 11
VS5M Anti-Shock	SOLENOID ACTUATED, DIRECT OPERATED	D03/03	12 - 16
VS12M	SOLENOID ACTUATED, DIRECT OPERATED	D05/05	17 - 21
VS12M Anti-Shock	SOLENOID ACTUATED, DIRECT OPERATED	D05/05	22 - 25
VSD08M	SOLENOID ACTUATED, PILOT OPERATED	D08/08	26 - 32
VSD10M	SOLENOID ACTUATED, PILOT OPERATED	D10/10	33 - 37
VMD03M	LEVER ACTUATED, MANUALLY OPERATED	D03/03	38 - 43
VM12M	LEVER ACTUATED, MANUALLY OPERATED	D05/05	44 - 47
VAD03M	AIR ACTUATED, DIRECT OPERATED	D03/03	48 - 53
VA12M	AIR ACTUATED, DIRECT OPERATED	D05/05	54 - 57
VAD08M	AIR ACTUATED, PILOT OPERATED	D08/08	58 - 62
VC12M	CAM ACTUATED, DIRECT OPERATED	D05/05	63 - 65

HAZARDOUS DUTY DIRECTIONAL CONTROL VALVES

MODEL SERIES	OPERATED	SIZE -NFPA/ISO	PAGE NO.
VS5M	SOLENOID ACTUATED, DIRECT OPERATED	D03/03	66 - 70
VS12M	SOLENOID ACTUATED, DIRECT OPERATED	D05/05	66 - 70
VS50M	SOLENOID ACTUATED, PILOT OPERATED	D08/08	66 - 70
DVS50M	SOLENOID ACTUATED, PILOT OPERATED	D08/08	66 - 70

**HAZARDOUS DUTY DIRECTIONAL CONTROL VALVES
WITH EXPLOSION-PROOF SOLENOIDS**

MODEL SERIES	OPERATED	SIZE -NFPA/ISO	PAGE NO.
VSD03M	SOLENOID ACTUATED, DIRECT OPERATED	D03/03	71 - 75

DeACCELATROL® VALVE

MODEL SERIES	OPERATED	SIZE -NFPA/ISO	PAGE NO.
DVS50M	SOLENOID ACTUATED, PILOT OPERATED	D08/08	76 - 81

ENERGY ISOLATION VALVE

MODEL SERIES	OPERATED	PAGE NO.
VS100L	SOLENOID ACTUATED, PILOT OPERATED	82- 85

VALVE ACCESSORIES

DESCRIPTION	PAGE NO.
MECHANICAL ACCESSORIES -- FOR PILOTED DIRECTIONAL CONTROL VALVES	86- 87
ELECTRICAL ACCESSORIES -- FOR PILOTED DIRECTIONAL CONTROL VALVES	88- 89
ELECTRICAL ACCESSORIES -- FOR VSD03M and VSD08M VALVES	90
PILOT OR DRAIN CONVERSION -- FOR PILOTED DIRECTIONAL CONTROL VALVES	91

MOUNTING SURFACES

DESCRIPTION	PAGE NO.
DO5 and D05	92
DO8 and D10	93
VALVE BOLT KITS	94

TERMINOLOGY AND GENERAL SPECIFICATIONS



FEATURES

SOLENOID ACTUATED

- CSA certified (D03, D05, D08 sizes).
- CE approved (D03, D05, D0 8 and D10 sizes).
- Wet armature solenoids:
 - 2-pin plug-in coils or DIN (D03, D05, D10 sizes).
 - Lead wires or DIN connectors (D05).
 - Solenoid failures greatly reduced.
 - Standard and low amp coils available.
 - High temperature elements are isolated from direct human contact.
 - No oil leakage into electrical cavity.
 - Fast and easy solenoid replacement.
 - Continuous duty-rated coils.
- No dynamic seals eliminate external oil leakages.
- Electrical quick disconnects as factory installed or field installed options.
- 3- and 5-pin sealed connectors per ANSI recommended standard B93.55M-1981.
- Built-in lights, terminals and surge suppressor (D03, D08, D10 sizes).
- Large wiring cavity options for wire to wire connections. (D05)
- Access to mounting bolts without entering electrical box.
- Mounting bolt heads are below spool centerline to prevent body distortion and spool stick.

CAM ACTUATED

- VC12M cam follower may be positioned perpendicular or parallel to mounting surface.
- Bronze bearing push-rod for increased life.
- Urethane wiper eliminates contamination from actuator.
- Internal actuator parts are electro-filmed to resist corrosion.

LEVER ACTUATED

- Lever boot keeps contaminants from linkage.
- Lever connects directly to spool for positive hold.
- Detent option for positive hold.
- Internal actuator parts are electro-filmed to resist corrosion.

AIR ACTUATED

- Wide operating range of air pilot pressure.
- Urethane sealing gland on air piston permits very low air flow rates.
- Excellent control of spool shift rate.
- Air operator internal parts are electro-filmed to resist corrosion.

GENERAL SPECIFICATIONS

RECOMMENDED FLUID

- Petroleum.
- Water-based fluids (not more than 40% water).
- Most phosphate esters.
- Other fluids are acceptable, but special O-rings may be required.
- Viton seals are standard.

FLUID TEMPERATURE RANGE

Fluid temperature up to 200° F. will not appreciably affect valve performance, however, from a safety standpoint, temperatures above 130° F. are not recommended.

RECOMMENDED OPERATING VISCOSITY

80 to 350 SUS.

FLUID OPERATING VISCOSITY

Acceptable start-up viscosity to 1500 SUS. Minimum viscosity to 30 SUS.

FILTRATION

ISO 18/16/13.

MOUNTING POSITION

Optional; horizontal preferred.

NFPA FLOW PATH/ACTUATING PATTERN

SOLENOID, AIR AND OIL ACTUATED:

Actuating operator (a) — connects flow to cylinder port A.

Actuating operator (b) — connects flow to cylinder port B.

CAM ACTUATED:

Activated — connects flow to cylinder port B.

Released — connects flow to cylinder port A.

LEVER ACTUATED:

Push— connects flow to cylinder port A.

Pull — connects flow to cylinder port B.

NOTE:

The NFPA flow path/actuating pattern is reversed for Spools Code L.

GENERAL INFORMATION

VALVE OPERATION

Spring centered and spring offset valve types will be spring positioned unless actuated continuously. Detented, no spring valves may be actuated momentarily. When the operator is deactivated, the spool will remain shifted provided there is no severe shock, vibration, or pressure transients.

PRESSURE SURGES

Pressure surges in a common tank line serving these and other valves can be large enough to cause inadvertent shifting of these valves. This is particularly critical in no-spring detented type valves. Separate tank lines may be necessary. Maximum pressure rating on solenoid operated valve tank ports includes surges.

SILTING

Any sliding spool valve, if held shifted under pressure for long periods of time, may stick and not spring return due to fluid residue formation. The valve should be cycled periodically to prevent this from happening.

RESPONSE TIME

Response times of air actuated valves are dependent on air flow rate and pressure supplied to the operator. Response times of hydraulic actuated valves will vary with pilot line diameter and length, pilot pressure, pilot control valve shift time, pilot oil flow rate, and fluid viscosity.

VSD03M

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED



NFPA SIZE D03



DESCRIPTION

As a valve spool shifts, the spool lands cross over the valve body ports. This can produce instantaneous high flow rates.

TYPICAL PERFORMANCE SPECIFICATIONS

Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

MAXIMUM FLOW RATE - (up to)		20 gpm	76 lpm
MAXIMUM OPERATING PRESSURE	P, A, B Ports*	5000 psi	345 bar
	T Port	3000 psi	207 bar
MAXIMUM CYCLE RATE	AC Solenoids	up to 400 cpm	
	DC Solenoids	up to 300 cpm	
MOUNTING SURFACE		ANSI/B93.7M - 1986 D03 ISO 4401 Size 03	
WEIGHT	Single Actuator	3.2 lbs.	1.45 kg
	Double Actuator	3.9 lbs.	1.77 kg
SPOOL CODES AVAILABLE		SEE CHART	

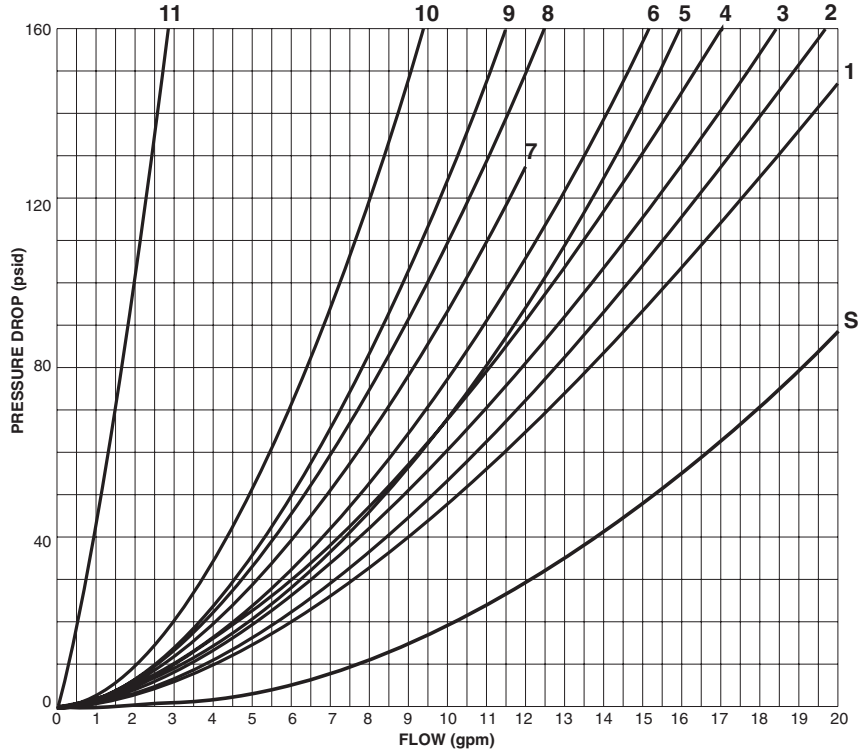
* 2000 psi (138 bar) maximum on valves with solenoid codes 37 and 68.

All pressure drops shown on this page are based on 100 SUS fluid viscosity, and 0.87 specific gravity. See the chart below for other viscosities.

Fluid	CS	14.5	20.5	32	43	54	65	76	86
Viscosities	SUS	75	100	150	200	250	300	350	400
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41

For any other specific gravity (G_1) the pressure drop ($?P$) will be approximately $?P_1 = ?P (G_1/G)$.

TYPICAL PRESSURE DROP



FLOW PATH ? P CURVES

SPOOL TYPE	FLOW CURVE NUMBER						
	SPOOL SHIFTED				SPOOL CENTERED		
	P to A	B to T	P to B	A to T	P to A or B	A or B to T	P to T
A	5	4	5	4	N/A	N/A	N/A
A Code 1 & 2	4	4	4	4	N/A	N/A	N/A
B	1	4	1	4	1	3	3
B Code 1 & 2	3	1	3	1	3	3	4
E	5	2	5	4	N/A	9	N/A
F	5	1	5	1	N/A	8	N/A
F Code 68	9	1	9	1	N/A	8	N/A
F1	5	4	5	4	N/A	11	N/A
G	2	5	2	5	5	N/A	N/A
H	2	6	5	2	N/A	N/A	5
J	5	5	3	5	10	N/A	N/A
K	5	4	5	2	N/A	9	N/A
L	6	7	6	7	N/A	N/A	9
N	3	5	5	5	10	N/A	N/A
Q	5	2	2	6	N/A	N/A	5
Subplate	S (Full Circuit)						

VSD03M

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED



SPOOL DESCRIPTION

CODE	SYMBOL	SPOOL FUNCTION	CENTER POSITION	CROSSOVER
A			All ports blocked	All ports blocked
B			All ports open	All ports open
E			P & A blocked B to T	All ports blocked, or P & A blocked, B to T
F			P blocked A & B to T	P blocked A or B to T
F1			P blocked A & B restricted to T	P blocked A or B restricted to T
G			P to A & B T blocked	P to A or B T & A or B blocked
H			P to A & T B blocked	All ports open
J			P to B A & T blocked	All ports blocked, or P to B, A & T blocked
K			P & B blocked A to T	All ports blocked, or P & B blocked, A to T
L			P to T A & B blocked	All ports open, restricted
N			P to A B & T blocked	All ports blocked, or P to A, B & T blocked
Q			P to B & T A blocked	All ports open

MAXIMUM FLOW

ALL SOLENOIDS EXCEPT CODE 39 AND 68

	FUNCTION CODE	A		B		F		F1		G		L		E - K		J & N		H & Q	
		AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC
(lpm) (70 bar) @ gpm 1000 psi	1	(53) 14	(45) 12	(60) 16	(45) 12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2	(60) 16	(49) 13	(64) 17	(46) 12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3, 5	(76) 20	(68) 18	(49) 13	(38) 10	(49) 13	(57) 15	(49) 13	(57) 15	(72) 19	(72) 19	(38) 10	(45) 12	(49) 13	(49) 13	(57) 15	(53) 14	(19) 5	(23) 6
(lpm) (138 bar) @ gpm 2000 psi	1	(53) 14	(42) 11	(53) 14	(34) 9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2	(60) 16	(45) 12	(64) 17	(49) 13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3, 5	(76) 20	(68) 18	(49) 13	(38) 10	(49) 13	(57) 15	(49) 13	(57) 15	(72) 19	(72) 19	(38) 10	(45) 12	(49) 13	(49) 13	(57) 15	(45) 12	(15) 4	(23) 6
(lpm) (207 bar) @ gpm 3000 psi	1	(53) 14	(38) 10	(53) 14	(19) 5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2	(60) 16	(45) 12	(64) 17	(34) 9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3, 5	(76) 20	(64) 17	(45) 12	(30) 8	(45) 11*	(45) 12	(45) 11*	(38) 10	(72) 19	(72) 19	(38) 10	(45) 12	(45) 12	(42) 11	(53) 14	(45) 12	(11) 3	(15) 4
(lpm) (276 bar) @ gpm 4000 psi	1	(53) 14	(38) 10	(53) 14	(11) 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2	(60) 16	(42) 11	(60) 16	(23) 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3, 5	(76) 20	(64) 17	(42) 11	(26) 7	(15) 4†	N/A	(15) 4†	N/A	(72) 19	(72) 19	(19) 5	(38) 10	(30) 8	(30) 8	(53) 14	(45) 12	(11) 3	(11) 3
(lpm) (345 bar) @ gpm 5000 psi	1	(53) 14	(38) 10	(49) 13	(11) 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2	(60) 16	(38) 10	(60) 16	(15) 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3, 5	(76) 20	(57) 15	(42) 11	(26) 7	N/A	N/A	N/A	N/A	(72) 19	(72) 19	(15) 4	(19) 5	(15) 4	(15) 4	(53) 14	(45) 12	(7.6) 2	(11) 3

N/A Not available in this configuration.

* 100% rated voltage required.

† 3500 psi maximum and 100% voltage required.

NOTE: Test voltage was 90% of rated voltage unless specified otherwise.

Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

MAXIMUM FLOW

SOLENOID CODES 39 AND 68 ONLY

	FUNCTION CODE	A	B	F	G	L
(lpm) (34 bar) @ gpm 500 psi	1	(30) 8	(30) 8	N/A	N/A	N/A
	2	(38) 10	(45) 12	N/A	N/A	N/A
	3, 5	(38) 10	(38) 10	(38) 10	(34) 9	(19) 5
(lpm) (69 bar) @ gpm 1000 psi	1	(26) 7	(26) 7	N/A	N/A	N/A
	2	(38) 10	(45) 12	N/A	N/A	N/A
	3, 5	(38) 10	(38) 10	(38) 10	(34) 9	(19) 5
(lpm) (103 bar) @ gpm 1500 psi	1	(26) 7	(26) 7	N/A	N/A	N/A
	2	(38) 10	(38) 10	N/A	N/A	N/A
	3, 5	(38) 10	(26) 7	(38) 10	(26) 7	(19) 5
(lpm) (138 bar) @ gpm 2000 psi	1	(26) 7	(26) 7	N/A	N/A	N/A
	2	(38) 10	(38) 10	N/A	N/A	N/A
	3, 5	(15) 4	(26) 7	(15) 4	(19) 5	(19) 5

VSD03M

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED

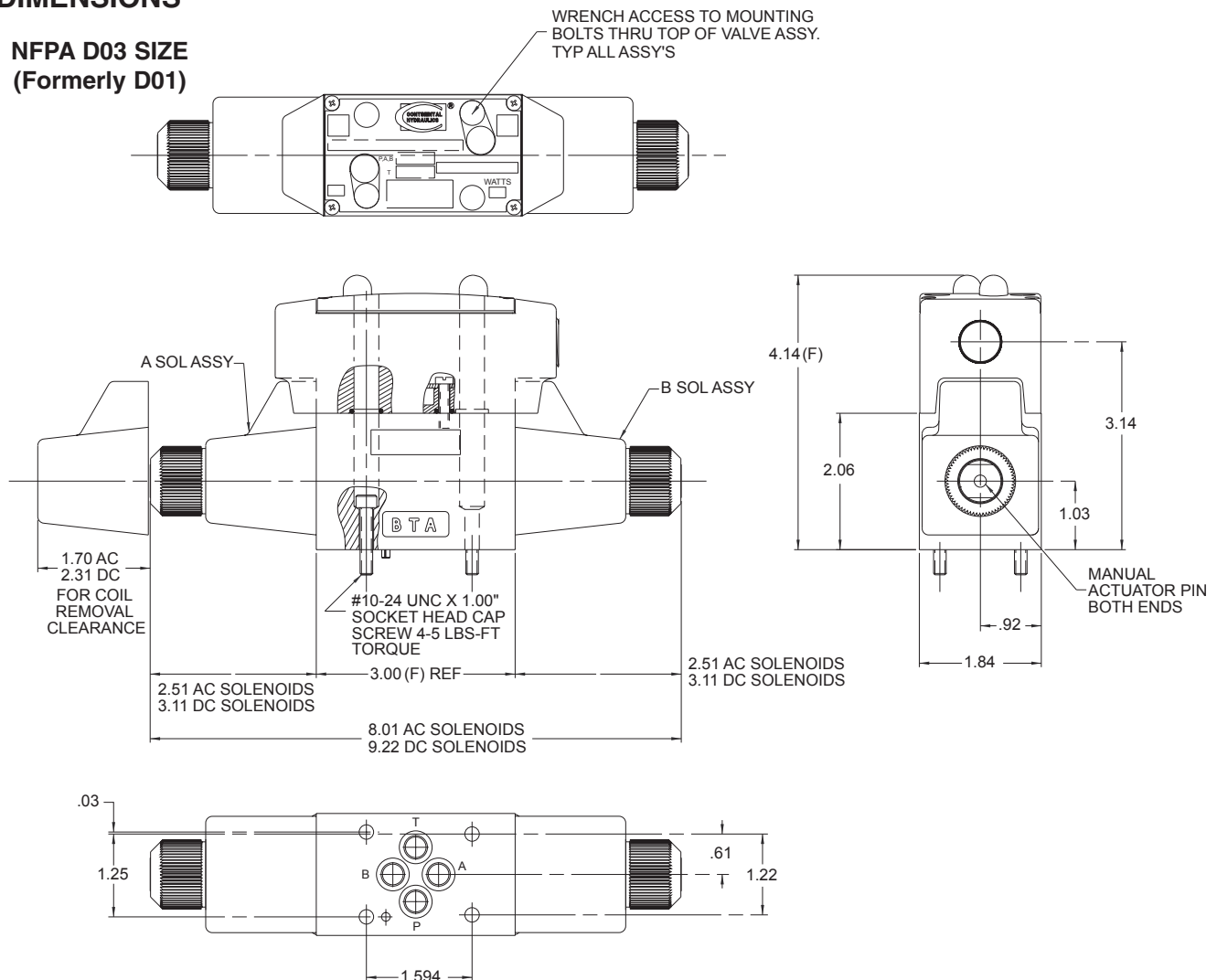


TYPICAL ELECTRICAL CHARACTERISTICS

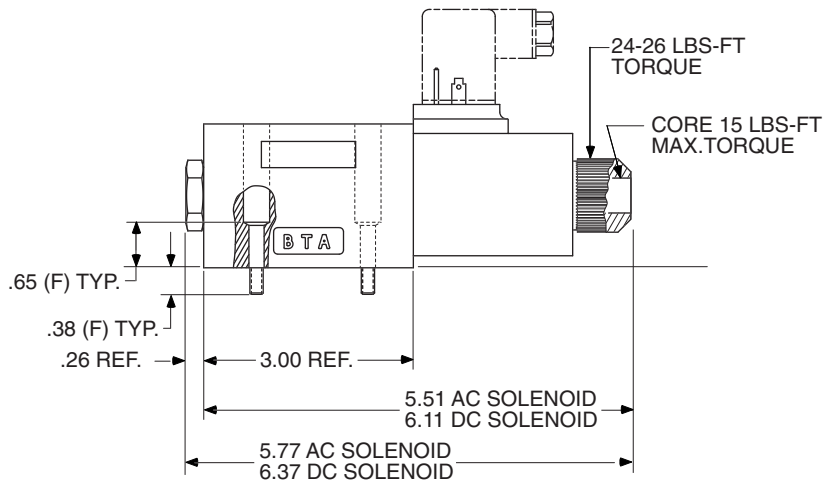
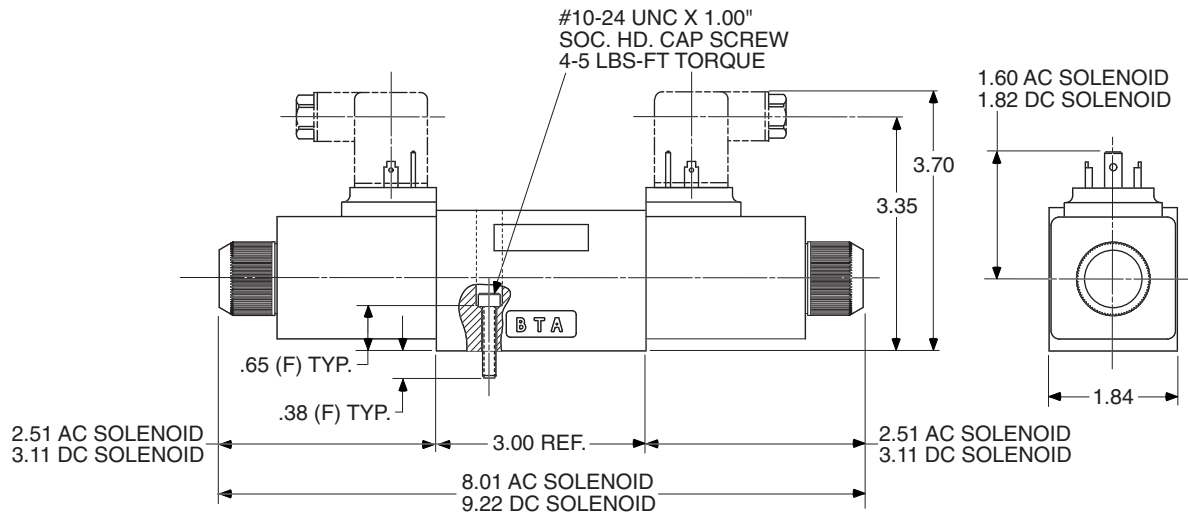
SOLENOID CODE	VOLTAGE & FREQUENCY	VOLTAGE LIMITS	INRUSH CURRENT (AMPS)	HOLDING CURRENT	HOLDING CURRENT MIN. VOLT.	HOLDING POWER
	VOLTS - Hz.	MIN. - MAX.	MAX.	(AMP)	(AMP)	(WATTS)
33L, 60L	120 - 60	108 - 126	2.10	.49	.39	24
	110 - 50	99 - 116		.58	.45	26
34L, 61L	240 - 60	216 - 252	1.10	.24	.19	24
	220 - 50	198 - 231		.29	.22	26
39L, 68L	120 - 60	108 - 132	1.10	.19	.15	10
	110 - 50	99 - 121		.21	.17	10
42L, 70L	24 DC	21 - 26	1.00	1.00	.88	24
44L, 75L	12 DC	10 - 13	2.00	2.00	1.67	24

DIMENSIONS

NFPA D03 SIZE
(Formerly D01)



DIN CONNECTIONS



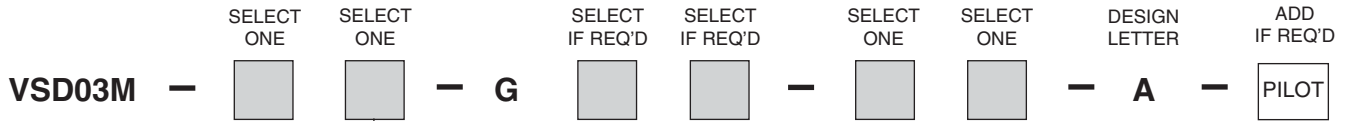
VSD03M

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED



ORDERING INFORMATION



CODE	OPTION
1	Single operator • 2 position Spring offset
2	Double operator • 2 position Detented (No spring)
3*	Double operator • 3 position Spring centered
5*	Single operator • 2 position Spring centered
6	Single operator • 2 position Spring offset

- * Operator identification reversed on "L" spool:
- VSD03M-3L: "A" solenoid on "A" port end, "B" solenoid on "B" port end.
 - VSD03M-5L: "A" solenoid on "A" port end.
 - VSD03M-5L-R: "B" solenoid on "B" port end.

SPOOLS

CODE
REFER TO PAGE 6 FOR SPOOL AVAILABILITY

SEALS

CODE
VITON SEALS STANDARD

MECHANICAL OPTIONS

CODE	DESCRIPTION
OMIT	SINGLE SOLENOID "A" PORT END
R	SINGLE SOLENOID "B" PORT END
M	RIVET MOUNTING
V	STEEL OVERRIDE PIN
Z*	MANUAL OVERRIDE FOR SINGLE SOLENOID VALVE
WD	WASHDOWN

* Available with single solenoid valves only.

ELECTRICAL OPTIONS

CODE	DESCRIPTION
OMIT	DIN STYLE SOLENOIDS
B	TOP ELECT. CONN. BOX W/TERMINAL POSTS, LIGHTS AND SURGE SUPPRESSOR
B3A*†	TOP ELECT. CONN. BOX W/3 PIN MALE MINI RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "A" PORT END
B3H*†	TOP ELECT. CONN. BOX W/4 PIN MALE MINI RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "B" PORT END
B4**	TOP ELECT. CONN. BOX W/4 PIN MALE MICRO RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "A" PORT END
B4**	TOP ELECT. CONN. BOX W/4 PIN MALE MICRO RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "B" PORT END
B5A*	TOP ELECT. CONN. BOX W/5 PIN MALE MINI RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "A" PORT END
B5H*	TOP ELECT. CONN. BOX W/5 PIN MALE MINI RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "B" PORT END
HD	HAZARDOUS DUTY TOP ELECT. CONN. BOX CLASS II GROUPS E, F, & G

SOLENOID MFG.

CODE	DESCRIPTION
L	LISK

SOLENOID

CODE	VOLTAGE
WITH DIN 43650 ELECTRICAL CONNECTIONS	
33	120/110V 60/50 Hz
34	240/220 V 60/50 Hz
35	280/240 V 60/50 Hz
39	120/110V 60/50 Hz (LOW FORCE)
42	24 VDC
44	12 VDC
WITH 2 PIN CONNECTIONS	
52	240/220V 60/50 Hz HAZARDOUS LOCATION
60	120/110 V 60/50 Hz
61	240/220 V 60/50 Hz
68	120/110 V 60/50 Hz (LOW AMP, LOW FORCE)
70	24 VDC
75	12 VDC

NOTE: Solenoids not CSA approved.

TYPICAL ORDERING CODE:
VSD03M-3A-G-33L-A

- * Connector conforms to ANSI/B93.55M - 1981.
- ** Available with DC solenoid valves only.
- † Available with single solenoid valves only.



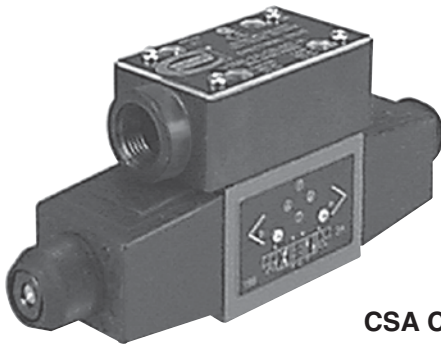
COMPETITIVE CROSSOVER GUIDE

This Crossover Guide compares performance and specifications of solenoid operated NFPA D03 mounting directional control valves. The information in this guide is the most recent available, either from printed catalogs, or the internet. Items with the “N/A” notation have no available information from either source.

Specifications	Continental	Atos	Bosch	Denison	Nachi	Parker	Rexroth	Vickers
Model Series	VSD03M	DH*	081WV	A4D01	SS	D1VW	4WE6	DG4V
Maximum Pressure	5000	4640	4600	5000	4570	5000	5100	5000
Maximum Tank Pressure	3000	1450	1500	2000	2290	1500	2300	1500
Maximum Tank Pressure - Option	3000	2320	3000	3000	N/A	3000	N/A	3000
Temperature Range (Degrees F.)	0 to 200	0 to 158	0 to 120	0 to 120	41 to 140	N/A	0 to 122	0 to 149
Spools Available	12	17	11	14	7	21	9	8
Maximum Flow Rate (gpm)	20	11	23	20	17.2	22	21	21
Pressure Drop @ 10 gpm	130	175	100	120	150	140	120	175
Solenoids Available	9	9	112	9	19	10	15	6
Electrical Connections	3	3	3	4	2	4	4	5
Antishock / Softshift	Option	Option	N/A	Option	Option	Option	Option	Option
Hazardous Duty Location	Option	Option	N/A	Option	N/A	Option	N/A	Option
Explosion Proof Location	Option	Option	N/A	Option	N/A	Option	N/A	N/A
Drip Proof Environment	Option	N/A	Option	N/A	N/A	Option	N/A	Option
Weight - Single Solenoid	3.25	N/A	3.1	3.8	3.1	3.0	3.2	3.5
Weight - Double Solenoid	4.0	N/A	4.2	4.4	4.0	3.5	4.3	4.5
120 VAC / 60Hz								
Inrush Amperage	2.1	4.6	1.5	2.2	1.7	1.9	1.8	2.2
Holding Amperage	0.40	0.42	0.54	0.65	0.36	0.49	0.42	0.40
Holding Wattage	21	N/A	30	31	22	25	30	30
Solenoid Shift Time (ms)	12	20 to 45	10	20	10 to 20	13	10 to 20	18
Spring Return Time (ms)	15	20 to 80	50	18	20 to 30	20	15 to 40	32
Theoretical Cycling (Hz)	18.5	4 to 12	8.3	13.1	10 to 16	15.1	8.3 to 2	10
Actual Cycling (Hz)	6.67	2	0.5	2	5	N/A	2	N/A
24 VDC								
Solenoid Shift Time (ms)	35	20 to 45	20 to 60	46	10 to 20	32	25 to 45	60
Spring Return Time (ms)	30	20 to 80	10 to 60	27	20 to 30	40	10 to 25	40
Theoretical Cycling (Hz)	7.7	4 to 12.5	4.2 to 16.6	6.8	10 to 16	6.9	7.1 to 1	5
Actual Cycling (Hz)	5	2	0.5	4.4	5	N/A	4.2	N/A
Other Criteria								
Buna-N	Option	Option	N/A	Option	Option	Option	Option	Option
Viton	Standard	Option	Standard	Option	Option	Option	Standard	Option
Neoprene	Option	Option	N/A	Option	N/A	Option	N/A	N/A
EPR	Option	Option	N/A	Option	N/A	Option	N/A	N/A
CSA Approved	Yes	N/A	Yes	N/A	Option	Yes	N/A	N/A
ETL or UL Listed	Yes	N/A	N/A	N/A	N/A	Yes	N/A	N/A
CE Approved	Yes	N/A	N/A	N/A	N/A	Yes	N/A	N/A
Indicator Lights	Standard	Option	Option	Option	Standard	Option	Option	Option
100% Testing	Yes	N/A	N/A	Yes	N/A	N/A	N/A	N/A
Low Watt Option	Yes	N/A	N/A	N/A	Option	Yes	N/A	Option
Surge Suppression	Standard	N/A	N/A	N/A	Option	Option	N/A	N/A

VS5M ANTI-SHOCK DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED

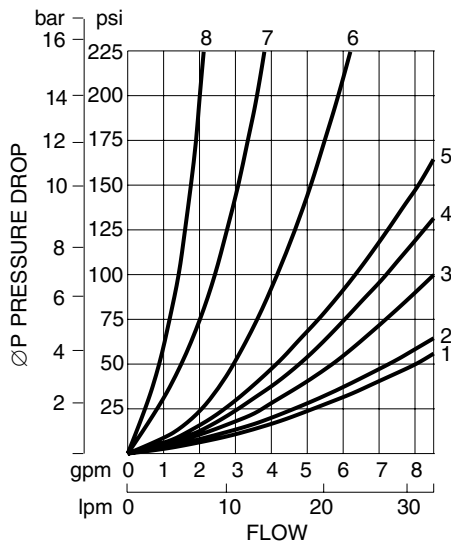


CSA Certified

DESCRIPTION

As the valve spool shifts, the spool lands cross over the valve body ports. This can produce high instantaneous flow rates. The anti-shock valve provides a slow spool movement; slower than that of a standard directional valve. This results in reduction or elimination of hydraulic system shock produced by the spool movement and high flow rates.

TYPICAL PRESSURE DROP CURVES



FLOW PATH ΔP CURVES

SPOOL TYPE	FLOW CURVE NUMBER			
	SPOOL SHIFTED		SPOOL CENTERED	
	P to A or B	A or B to T	A or B to T	P to T
A	2	1	N/A	N/A
A2C	6	6	N/A	N/A
B2	2	1	N/A	7
F1	2	1	8	N/A
L	5	4	N/A	3

TYPICAL PERFORMANCE SPECIFICATIONS

Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

NOMINAL FLOW RATE @ 3500 PSI		5 gpm	19 lpm
MAXIMUM FLOW RATE		SEE CHART	
MAXIMUM OPERATING PRESSURE	P, A, B Ports	4600 psi	315 bar
	T Port (includes surges)	1500 psi	105 bar
INTERNAL LEAKAGE (1-port) 3500 psi 100 SUS		9 cipm	148 mlpm
		23 cipm	380 mlpm
MAXIMUM CYCLE RATE*	Option S1	60 cpm	
	Option S2	50 cpm	
TIMING SPOOL SHIFT*	Option S1	60 cpm	
	Option S2	50 cpm	
MOUNTING SURFACE		ANSI/B93.7-1986 - D08 ISO 4401 - SIZE 08	
WEIGHT	Single Actuator	31 LBS.	14 kg
	Double Actuator	32 lbs.	14.5 kg
SPOOL CODES AVAILABLE		A, A2C, B2, F1, L	


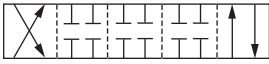

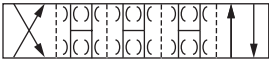



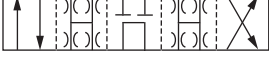
* Timing for spool shift is dependent on fluid viscosity.

All pressure drops shown on this data page are based on 100 SUS fluid viscosity and 0.87 specific gravity. See the chart below for other viscosities.

Fluid Viscosities	CS	14.5	20.5	32	43	54	65	76	86
	SUS	75	100	150	200	250	300	350	400
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41

For any other specific gravity (G1) the pressure drop (ΔP) will be approximately ΔP1 = ΔP (G1/G).

SPOOL DESCRIPTION

CODE	SYMBOL	SPOOL FUNCTION	CENTER POSITION	CROSSOVER
A A1C A2C			All ports blocked	All ports blocked
B1 B2			All ports open, restricted	All ports open, restricted
F			P blocked A & B restricted to T	P blocked A or B restricted to T
L L3			P to T A & B blocked	All ports open, restricted

MAXIMUM FLOW

SPOOL AND TIMING CODE

	FUNCTION CODE	S1										S2			
		A		A2C		B2		F1		L		A		L	
		AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC
(lpm) (70 bar)	1	(23) 6	(23) 6	N/A	N/A	(19) 5	(23) 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
@ gpm 1000 psi	3, 5	(27) 7	(27) 7	(15) 4	(23) 6	N/A	N/A	(23) 6	(30) 8	(23) 6	(23) 6	N/A	(23) 6	N/A	(19) 5
(lpm) (140 bar)	1	(19) 5	(23) 6	N/A	N/A	(19) 5	(23) 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
@ gpm 2000 psi	3, 5	(23) 6	(23) 6	(15) 4	(19) 5	N/A	N/A	(19) 5*	(30) 8	(19) 5	(15) 4	N/A	(23) 6	N/A	(15) 4
(lpm) 210 bar)	1	(15) 4	(23) 6	N/A	N/A	(19) 5	(23) 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
@ gpm 3000 psi	3, 5	(19) 5	(19) 5	(15) 4	(15) 4	N/A	N/A	(15) 4*	(30) 8	(15) 4	(12) 3	N/A	(19) 5	N/A	(12) 3

N/A Valve is not available in this configuration.

* 95% of rated voltage required at pressure above 2000 psi.

VS5M ANTI-SHOCK DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED

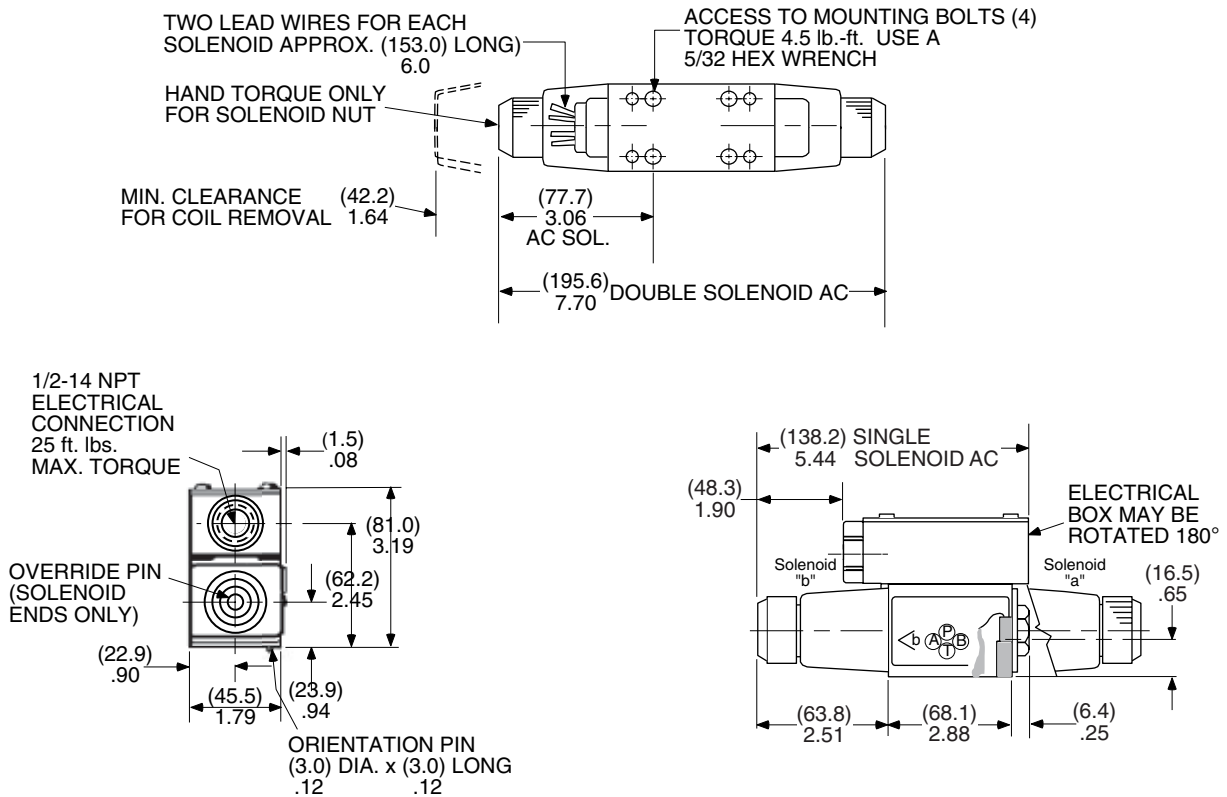


TYPICAL ELECTRICAL CHARACTERISTICS

SOLENOID CODE		VOLTAGE & FREQUENCY	VOLTAGE LIMITS	RESISTANCE	INRUSH CURRENT (AMPS)	HOLDING CURRENT	HOLDING POWER
LEAD WIRE	DIN CONN.	VOLTS - Hz.	MIN. - MAX.	OHMS	MAX.	(AMP)	(WATTS)
60L	33L	120 - 60	108 - 126	36.5	2.10	.40	21
		110 - 50	99 - 116			.43	21
61L	34L	240 - 60	216 - 252	145.0	1.10	.21	22
		220 - 50	198 - 231			.25	22
70L	42L	24 DC	21 - 26	24.0	1.00	1.00	24
75L	44L	12 DC	10 - 13	6.3	2.00	2.00	24

NFPA D03 SIZE
(Formerly D01)
FOR INTERFACE PATTERN,
SEE MOUNTING SURFACE
SECTION

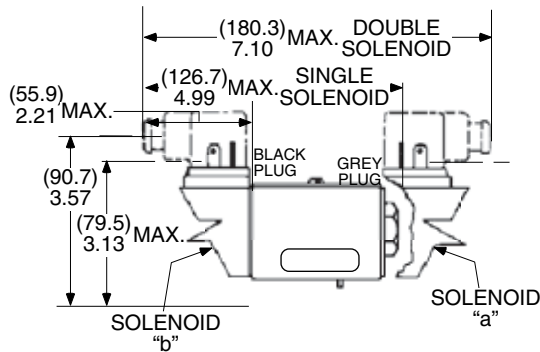
DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES



DIMENSIONS SHOWN IN: (MILLIMETERS)
 INCHES

CODES 33L, 34L, 42L & 44L

Solenoid with DIN 43650/ISO 4400 (form A) connector(s).



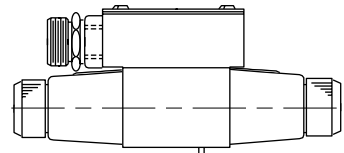
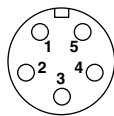
NOTES:

1. No electrical box required
2. Order connectors separately.

CODE B5H

Quick disconnect for single or double solenoids.
 Top electrical box with sealed 5-pin male receptacle.

PIN NO.	WIRE NO.	GOES TO:
1	1	SOL. B
2	2	SOL. A
3	(GREEN)	GROUND
4	4	SOL. A
5	5	SOL. B

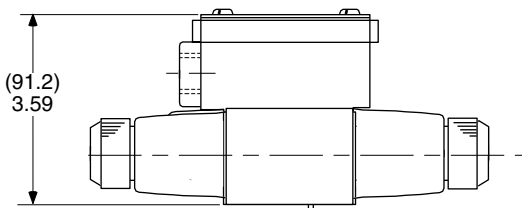


NOTE:

Connector meets ANSI recommended standard B93.55M-1981.

CODES L1 & L2

Solenoid indicator lights.



NOTE:

Top electrical box is required.

VS5M ANTI-SHOCK DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED



ORDERING INFORMATION

VS5M — — — **G** — — — — — —

BASIC VALVE

4-WAY DIRECTIONAL CONTROL VALVE

SOLENOID ACTIVATED

D03 SUBPLATE MOUNTING

4600 PSI MAXIMUM OPERATING PRESSURE

SPOOLS

CODE
REFER TO PAGE 13 FOR SPOOL AVAILABILITY

SEALS

CODE
VITON SEALS STANDARD

ELECTRICAL OPTIONS

CODE	DESCRIPTION
LEAD WIRE CONNECTIONS	
B	TOP ELECTRICAL BOX WITHOUT TERMINAL POSTS
	BT TOP ELECTRICAL BOX WITH TERMINALS AND GROUND
B5H	TOP ELECTRICAL BOX WITH 5 PIN MALE RECEPTACLE FOR 1 OR 2 SOLENOIDS

SOLENOID*

CODE	VOLTAGE
LEAD WIRE CONNECTIONS	
60L	110/120 V
	50/60 Hz
61L	220/240 V
	50/60 Hz
70L	24 VDC
75L	12 VDC
SOLENOID(S) WITH DIN 43650/ISO 4400 (FORM A) CONNECTIONS	
33L	110/120 V
	50/60 Hz
34L	220/240 V
	50/60 Hz
42L	24 VDC
44L	12 VDC

* Available on Codes 3 and 5 with DC solenoids only.

TIMING*

CODE	OPTION
S1	50 - 150 MS
S2**	100 - 300 MS (DC Only)

* Timing is dependent on fluid viscosity.
** Available on Codes 3 and 5 with DC solenoids only.

MECHANICAL OPTIONS

CODE	DESCRIPTION
OMIT	NONE
R	SINGLE SOLENOID REVERSE ASSEMBLY SOLENOID "A" SUPPLIED
WD	WASHDOWN

SOLENOID INDICATOR LIGHTS

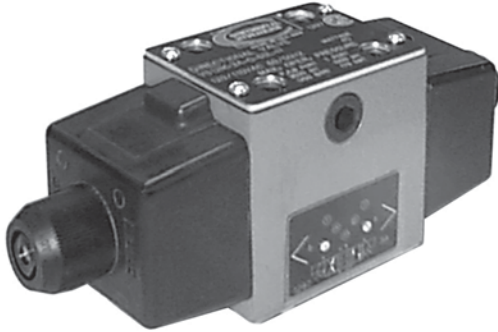
CODE	DESCRIPTION
LEAD WIRE CONNECTIONS	
OMIT	NOT REQUIRED
L1	SINGLE SOLENOID INDICATOR
	110/120 V
	50/60 Hz
	12 VDC
L2	DOUBLE SOLENOID INDICATOR
	110/120 V
	50/60 Hz
	12 VDC
	24 VDC

FUNCTION

CODE	OPTION
1	Single actuator • 2 position Spring offset
3	Double actuator • 3 position Spring centered
5	Single actuator • 2 position Spring centered

TYPICAL ORDERING CODE: **VS5M-1A-GS1B-60L**

NFPA SIZE D05



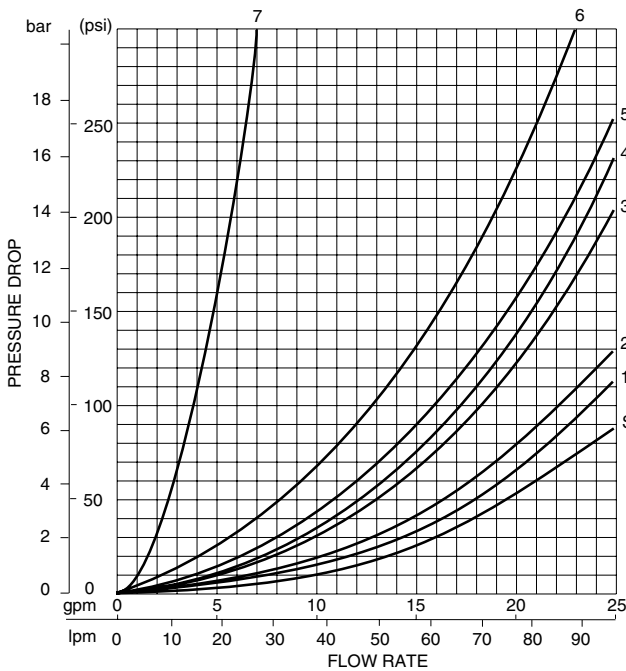
CSA CERTIFIED

TYPICAL PERFORMANCE SPECIFICATIONS

Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

NOMINAL FLOW RATE*	18 gpm	68 lpm	
MAXIMUM FLOW RATE**	SEE CHART		
MAXIMUM OPERATING PRESSURE*	P, A, B Ports	3500 psi	250 bar
	T Port (includes surges)	1000 psi	70 bar
INTERNAL LEAKAGE	(1-port) 3500 psi 100 SUS	5.2 cipm	85 mlpm
MAXIMUM CYCLE RATE	400 cpm -- AC		
	300 cpm -- DC		
MOUNTING SURFACE	ANSI/B93.7-1986 - D08 ISO 4401 - SIZE 08		
WEIGHT	Single Actuator	8.75 LBS.	3.9 kg
	Double Actuator	9.75 lbs.	4.4 kg
SPOOL CODES AVAILABLE	A, B, E, F, F1, G, K, L		

TYPICAL PRESSURE DROP CURVES



* Flow and pressure rates apply to all valves except those with Code 68L coils. Limitations with Code 68L coils are:
 ** Maximum flow with Code 68L solenoids:
 VS12M-1F, 1G, 2* -- 12 gpm max. @ 1000 psi
 VS12M-3F -- 10 gpm max. @ 1500 psi
 VS12M-3L -- 8 gpm max. @ 1500 psi
 VS12M-3L -- 12 gpm max. @ 1000 psi
 All others -- 12 gpm max. @ 1500 psi
 Code 68L recommended start-up viscosity -- 40 to 1000 SUS;
 40 to 1500 SUS for all others.
 Spools = 12 gpm.

All pressure drops shown on this data page are based on 100 SUS fluid viscosity and 0.87 specific gravity. See the chart below for other viscosities.

Fluid	CS	14.5	20.5	32	43	54	65	76	86
Viscosities	SUS	75	100	150	200	250	300	350	400
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41

For any other specific gravity (G_1) the pressure drop ($?P$) will be approximately $?P_1 = ?P (G_1/G)$

FLOW PATH ?P CURVES

SPOOL TYPE	FLOW CURVE NUMBERS							
	SPOOL SHIFTED			SPOOL CENTERED				
	P to A OR B	B to T	A to T	P to A OR B	A to T	B to T	P to T	
A	3	2	1	N/A	N/A	N/A	N/A	
B	4	2	1	N/A	N/A	N/A	5	
E	3	2	1	N/A	N/A	6	N/A	
F	3	2	1	N/A	2	5	N/A	
F1	3	2	1	N/A	7	7	N/A	
G	2	2	1	4	N/A	N/A	N/A	
K	3	2	1	N/A	6	N/A	N/A	
L	6	6	5	N/A	N/A	N/A	4	
SUBPLATE	S (FULL CIRCUIT)							

VS12M

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED



MAXIMUM FLOW*

SPOOL CODE

	FUNCTION CODE	SPOOL CODE													
		A		B		F		F1		G		L		E - K	
		AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC
(lpm) (70 bar) @ gpm 1000 psi	1	(84) 22	(51) 15	(76) 20	(46) 12	(95) 25	(57) 15	(95) 25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2	(95) 25	(95) 25	(95) 25	(76) 20	(95) 25	(95) 25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3, 5	(95) 25	(95) 25	(76) 20	(68) 18	(95) 25	(95) 25	(95) 25	(95) 25	(95) 25	(95) 25	(76) 20	(57) 15	(84) 22	(84) 22
(lpm) (140 bar) @ gpm 2000 psi	1	(84) 22	(57) 15	(76) 20	(57) 15	(95) 25	(46) 12	(95) 25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2	(95) 25	(95) 25	(95) 25	(76) 20	(95) 25	(95) 25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3, 5	(95) 25	(95) 25	(76) 20	(68) 18	(95) 25	(95) 25	(95) 25	(95) 25	(57) 15	(57) 15	(57) 15	(46) 12	(84) 22	(84) 22
(lpm) (210 bar) @ gpm 3000 psi	1	(84) 22	(57) 15	(76) 20	(57) 15	(76) 20	(30) 8	(76) 20	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2	(95) 25	(95) 25	(95) 25	(76) 20	(95) 25	(95) 25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3, 5	(95) 25	(95) 25	(76) 20	(68) 18	(76) 20	(76) 20	(38) 10	(38) 10	(57) 15	(57) 15	(48) 12	(30) 8	(76) 20	(76) 20

NOTE: Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

* Maximum flow with Code 68L solenoids:

VS12M-1F, 1G, 2* -- 12 gpm maximum @ 1000 psi

VS12M-3F -- 10 gpm maximum @ 1500 psi

VS12M-3L -- 8 gpm maximum @ 1500 psi

VS12M-3L -- 12 gpm maximum @ 1000 psi maximum

All others -- 12 gpm maximum @ 1500 psi maximum

N/A Valve is not available in this configuration.

SPOOL DESCRIPTION

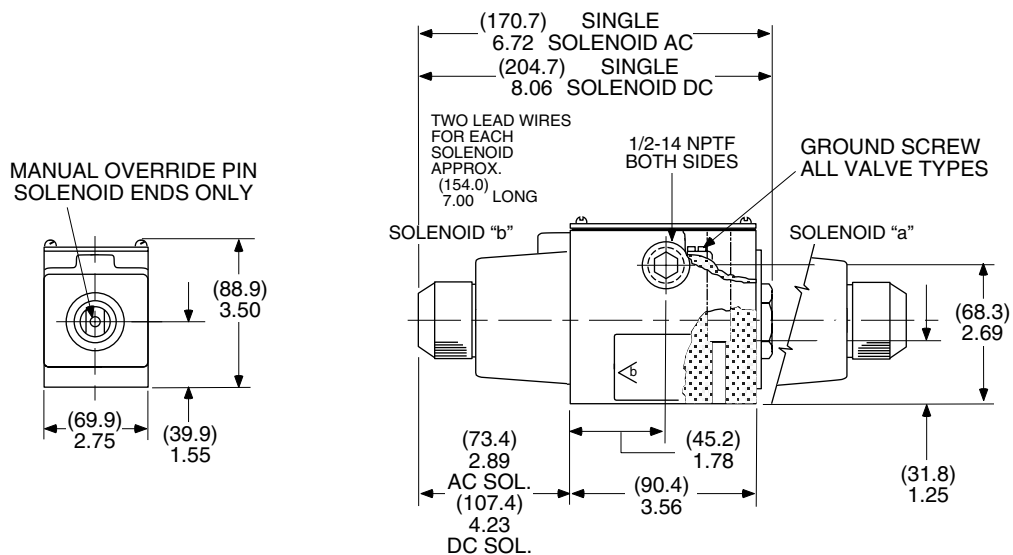
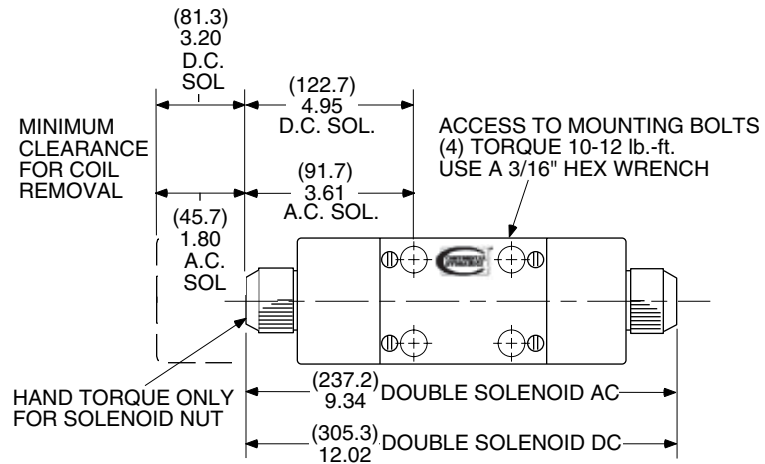
CODE	SYMBOL	SPOOL FUNCTION	CENTER POSITION	CROSSOVER
A			All ports blocked	All ports blocked
B			All ports open, restricted	All ports open, restricted
E			P & A blocked B to T	All ports blocked, or P & A blocked and B to T
F			P blocked A & B to T	P blocked A or B to T
F1			P blocked A & B restricted to T	P blocked A or B restricted to T
G			P to A & B T blocked	P to A or B T & A or B blocked
K			P & B blocked A to T	All ports blocked, or P & B blocked and A to T
L			P to T A & B blocked	All ports open, restricted

TYPICAL ELECTRICAL & RESPONSE TIME

SOLENOID CODE		VOLTAGE & FREQUENCY	VOLTAGE LIMITS	RESISTANCE	INRUSH CURRENT (AMPS)	HOLDING CURRENT	HOLDING POWER	RESPONSE TIME (MILLISECONDS)	
LEAD WIRE	DIN CONN.	VOLTS - Hz.	MIN. - MAX.	OHMS	MAX.	(AMP)	(WATTS)	SOLENOID	SPRING
60L	33L	120 - 60	108 - 126	9.7	5.00	.91	45	12	15
		110 - 50	99 - 116		6.20	1.10	43	14	15
68L	39L	120 - 60	108 - 132	16.4	3.70	.38	22	14	16
		110 - 50	99 - 121		3.75	.42	21	16	18
61L	34L	240 - 60	216 - 252	38.0	2.90	.48	45	12	15
		220 - 50	198 - 231		3.00	.53	43	14	15
N/A	35L	280 - 60	252 - 297	45.9	2.65	.41	45	12	15
		240 - 50	216 - 252		2.80	.47	43	14	15
70L	42L	24 DC	21 - 26	13.1	1.80	1.80	44	35	35
75L	44L	12 DC	10 - 13	3.3	3.60	3.60	44	35	35

DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES

NFPA D05 SIZE
(Formerly D02)
FOR INTERFACE PATTERN,
SEE MOUNTING SURFACE
SECTION



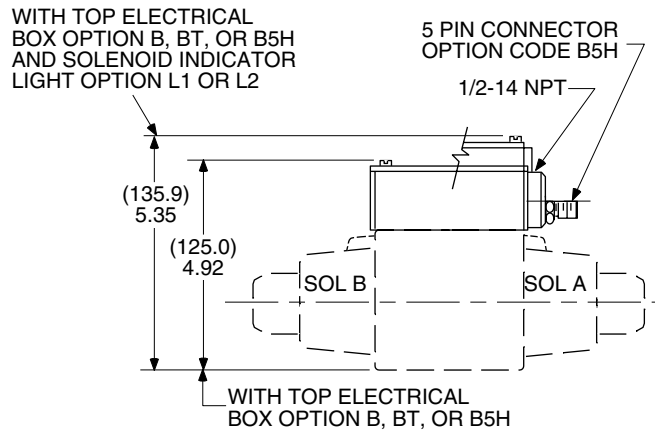
VS12M

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED



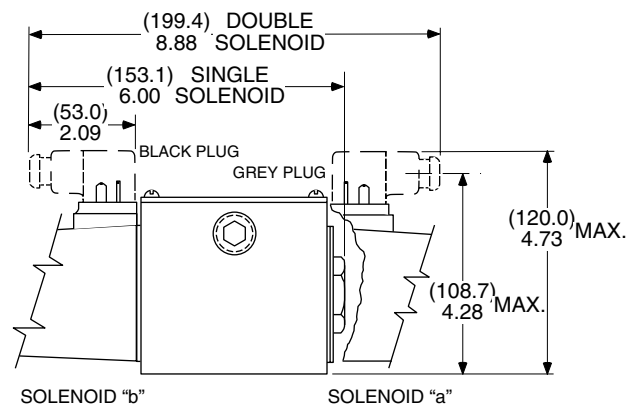
CODES B, BT, B5H, L1, L2



- NOTES:**
1. Electrical box is not required for light option.
 2. Electrical box may be rotated 180°.
 3. 5 pin quick disconnect meets ANSI recommended standard B93.55M-1981.

CODES 33L THROUGH 44L

Solenoids with DIN 43650/ISO 4400 (form A Connector(s)).



- NOTE:** 1. Order connectors separately.

ORDERING INFORMATION

VS12M — — — — — **G**

BASIC VALVE
4-WAY DIRECTIONAL CONTROL VALVE
SOLENOID ACTIVATED
D05 SUBPLATE MOUNTING
12 GPM NOMINAL FLOW
3500 PSI MAXIMUM OPERATING PRESSURE

SPOOLS

CODE	DESCRIPTION
	REFER TO PAGE 18 FOR SPOOL AVAILABILITY

SEALS

CODE	DESCRIPTION
	VITON SEALS STANDARD






ELECTRICAL OPTIONS

CODE	DESCRIPTION
LEAD WIRE CONNECTIONS	
OMIT	WITHOUT TOP ELECTRICAL BOX
B	ELECTRICAL BOX WITHOUT TOP TERMINAL POSTS
BT	ELECTRICAL BOX WITH TOP TERMINALS AND GROUND
B5H	ELECTRICAL BOX WITH TOP 5 PIN MALE RECEPTACLE FOR 1 OR 2 SOLENOIDS

SOLENOID*

CODE	VOLTAGE
LEAD WIRE CONNECTIONS	
60L	110/120 V 50/60 Hz
61L	220/240 V 50/60 Hz
68L	110/120 V 50/60 Hz (LOW AMPS)
70L	24 VDC
75L	12 VDC
SOLENOID(S) WITH DIN 43650/ISO 4400 (FORM A) CONNECTIONS	
33L	110/120 V 50/60 Hz
34L	220/240 V 50/60 Hz
35L	240/280 V 50/60 Hz
39L	220/240 V 50/60 Hz (LOW AMPS)
42L	24 VDC
44L	12 VDC

FUNCTION

CODE	OPTION
1	 Single actuator • 2 position Spring offset
2	 Double actuator • 3 position No spring, detented
3	 Double actuator • 3 position Spring centered
5	 Single actuator • 2 position Spring centered
6	 Single actuator • 2 position Spring offset, energize to center

MECHANICAL OPTIONS

CODE	DESCRIPTION
OMIT	NONE
R	SINGLE SOLENOID REVERSE ASSEMBLY SOLENOID "A" SUPPLIED

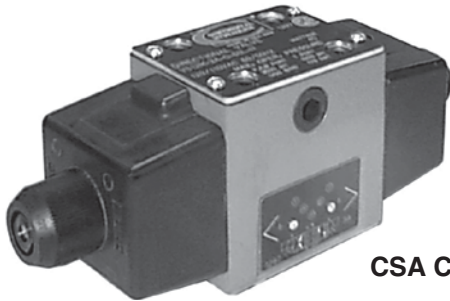
SOLENOID INDICATOR LIGHTS

CODE	DESCRIPTION
LEAD WIRE CONNECTIONS	
OMIT	NOT REQUIRED
L1	SINGLE SOLENOID INDICATOR
	110/120 V 50/60 Hz
	12 VDC
	24 VDC
L2	DOUBLE SOLENOID INDICATOR
	110/120 V 50/60 Hz
	12 VDC
	24 VDC

TYPICAL ORDERING CODE: **VS12M-1A-GBL1-60L**

VS12M ANTI-SHOCK DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED

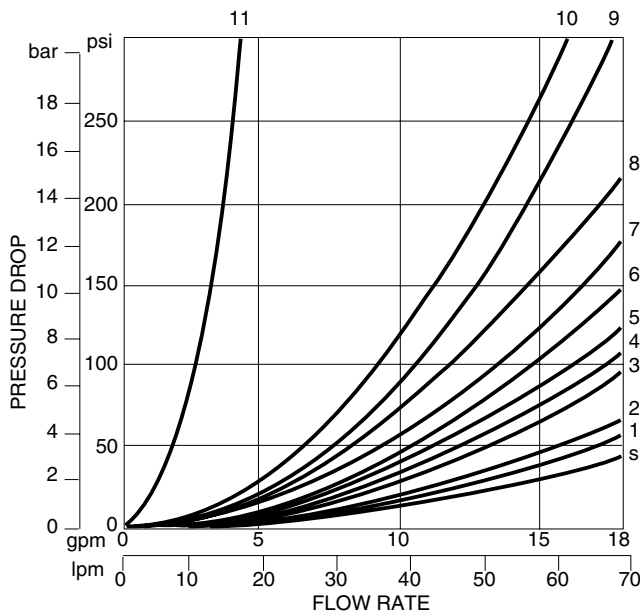


CSA Certified

DESCRIPTION

As a valve spool shifts, the spool lands cross over the valve body ports. This can produce high instantaneous flow rates. The anti-shock valve provides a slow spool movement; slower than that of a standard directional valve. This results in reduction or elimination of hydraulic system shock produced by spool movement and high flow rates.

TYPICAL PRESSURE DROP



TYPICAL PERFORMANCE SPECIFICATIONS

Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

NOMINAL FLOW RATE @ 3500 PSI		12 gpm	46 lpm
MAXIMUM FLOW RATE		SEE CHART	
MAXIMUM OPERATING PRESSURE	P, A, B Ports	3500 psi	241 bar
	T Port (includes surges)	1000 psi	70 bar
INTERNAL LEAKAGE	(1-port) 3500 psi 100 SUS	5.2 cipm	85 mlpm
MAXIMUM CYCLE RATE*	Option S2	60 cpm	
	Option S3	15 cpm	
TIMING SPOOL SHIFT*	Option S2	100 - 200 MS	
	Option S3	300 - 600 MS	
MOUNTING SURFACE		ANSI/B93.7M-1986 - D05 ISO 4401 - SIZE 05	
WEIGHT	Single Actuator	8.75 LBS.	3.9 kg
	Double Actuator	9.75 lbs.	4.4 kg
SPOOL CODES AVAILABLE		A, A1C, A2C, B1, B2, F1, L, L3	

* Timing for spool shift is dependent on fluid viscosity.

All pressure drops shown on this data page are based on 100 SUS fluid viscosity and 0.87 specific gravity. Refer to the chart below for other viscosities.

Fluid Viscosities	CS	14.5	20.5	32	43	54	65	76	86
	SUS	75	100	150	200	250	300	350	400
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41

For any other specific gravity (G_1) the pressure drop (?P) will be approximately $?P_1 = ?P (G_1/G)$.

FLOW PATH ?P CURVES

SPOOL TYPE	FLOW CURVE NUMBERS				
	SPOOL SHIFTED		SPOOL CENTERED		
	P to A or B	B to T	A to T	A or B to T	P to T
A	3	2	1	N/A	N/A
A1C	4	4	4	N/A	N/A
A2C	8	8	8	N/A	N/A
B1	3	2	1	SEE NOTES	
B2	3	2	1	SEE NOTES	
F1	3	2	1	11	N/A
L	7	7	5	N/A	4
L3	8	10	9	N/A	6
SUBPLATE	S (FULL CIRCUIT)				

- NOTES:
- B* spool selection is determined by pump flow. Improper selection can result in continued shock or actuator jumping.
 - The B1 spool is rated at 2000 psid at cross-over condition with 18 gpm flow: (P to T, A & B blocked).
 - The B2 spool is rated at 2000 psi drop at cross-over condition with 12 gpm flow (P to T, A & B blocked). Consult the factory for other flow sized B spools.

TYPICAL ELECTRICAL CHARACTERISTICS

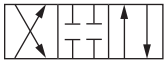
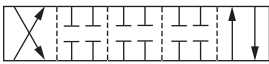
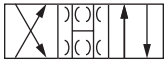
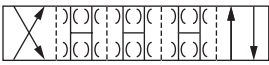



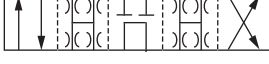
SOLENOID CODE		VOLTAGE & FREQUENCY	VOLTAGE LIMITS	RESISTANCE ±10%	INRUSH CURRENT MAXIMUM	HOLDING CURRENT	HOLDING POWER
LEAD WIRE	DIN CONN.	VOLTS - Hz.	MIN. - MAX.	OHMS	(AMPS)	(AMPS)	(WATTS)
60L	33L	120 - 60	108 - 126	9.7	5.00	.91	45
		110 - 50	99 - 116		6.20	1.10	43
61L	34L	240 - 60	216 - 252	38.0	2.90	.48	45
		220 - 50	198 - 231		3.00	.53	43
70L	42L	24 DC	21 - 26	13.1	1.80	1.80	44
75L	44L	12 DC	10 - 13	3.3	3.60	3.60	44

MAXIMUM FLOW

	FUNCTION CODE	S2														S3							
		A		A1C		A2C		B1*		B2*		F1**		L		L3		A		F1		L	
		AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC
(lpm) (70 bar) @ gpm 1000 psi	1 3, 5	(68) 18	(38) 10	N/A	N/A	N/A	N/A	(68) 18	(68) 18	(68) 18	(68) 18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
(lpm) (140 bar) @ gpm 2000 psi	1 3, 5	(57) 15	(30) 8	N/A	N/A	N/A	N/A	(57) 15	(38) 10	(57) 15	(57) 15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
(lpm) (210 bar) @ gpm 3000 psi	1 3, 5	(46) 12	(23) 6	N/A	N/A	N/A	N/A	(38) 10	(38) 10	(46) 12	(46) 12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		(38) 10	(68) 18	N/A	N/A	(38) 10	(30) 8	N/A	N/A	N/A	N/A	(30) 8	(68) 18	(38) 10	(38) 10	(19) 5	N/A	(46) 12	(68) 18	(30) 8	N/A	(30) 8	N/A

NOTE: Performance is measured on a four-way circuit (full circuits with cylinder ports looped together @ 90% voltage, 100% SUS of viscosity and warm solenoids). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.
* VS12M-1A valve with blocked crossover spool not recommended for anti-shock valves. "B" spools with open crossover should be used on offset valves.
VS12M-1B* valves: "B" spool selection is determined by pump flow.
- B1 Spool Rating: 2000 psi pressure drop @ crossover condition with 18 gpm flow (flow P to T with A & B ports blocked).
- B2 Spool Rating: 2000 psi pressure drop @ crossover condition with 12 gpm flow (flow P to T with A & B ports blocked).
** Maximum recommended flow on the F1 spool (when using AC solenoids), will be the same as VS12M-3A valve when used @ 95% rated voltage.
N/A Valve is not available in this configuration.

SPOOL DESCRIPTION

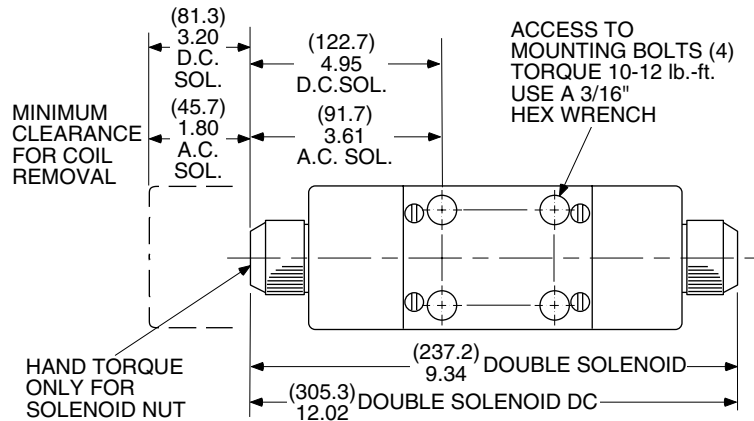
CODE	SYMBOL	SPOOL FUNCTION	CENTER POSITION	CROSSOVER
A A1C A2C			All ports blocked	All ports blocked
B1 B2			All ports open, restricted	All ports open, restricted
F			P blocked A & B restricted to T	P blocked A or B restricted to T
L L3			P to T A & B blocked	All ports open, restricted

VS12M ANTI-SHOCK DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED

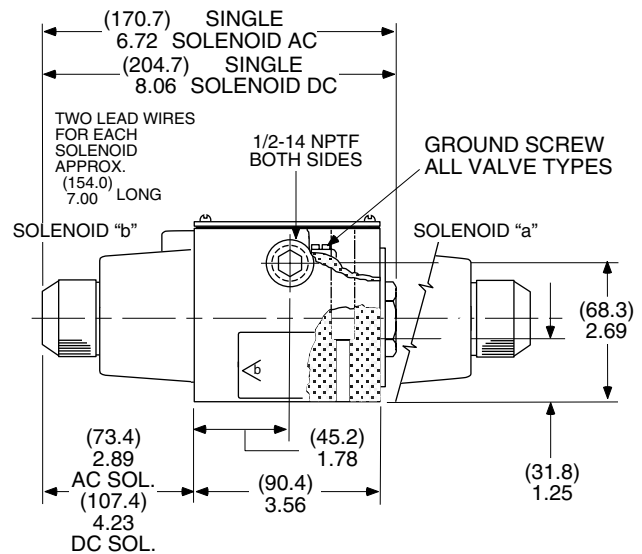
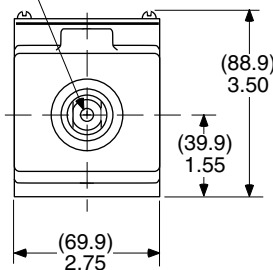


DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES



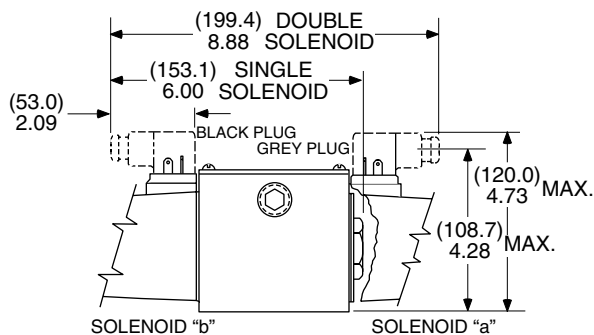
SEE MOUNTING
SURFACE SECTION FOR
NFPA D05 SIZE
INTERFACE PATTERN

MANUAL
OVERRIDE
PIN SOLENOID
ENDS ONLY



CODES 33L THROUGH 44L

Solenoid(s) with DIN 43650/ISO4400 (form A) connectors.

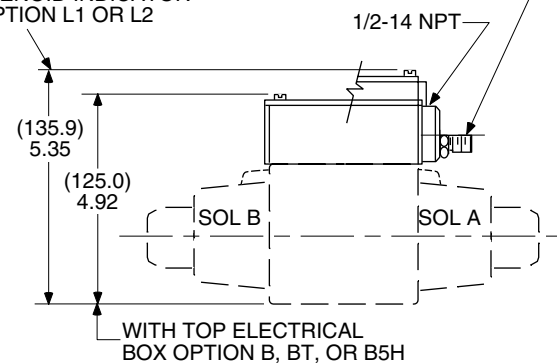


NOTE: Order connectors separately.

CODES B, BT, B5H, L1 & L2

WITH TOP ELECTRICAL
BOX OPTION B, BT, OR B5H
AND SOLENOID INDICATOR
LIGHT OPTION L1 OR L2

5 PIN CONNECTOR
OPTION CODE B5H



NOTES:

1. Electrical box is not required for light option.
2. Electrical box may be rotated 180°.
3. 5-pin quick disconnect meets ANSI recommended standard B93.55M - 1981.

ORDERING INFORMATION

VS12M — — — **G** — — — — — —

BASIC VALVE
 4-WAY DIRECTIONAL CONTROL VALVE
 SOLENOID ACTIVATED
 D05 SUBPLATE MOUNTING
 3500 PSI MAXIMUM OPERATING PRESSURE

SPOOLS
CODE
 REFER TO PAGE 23 FOR SPOOL AVAILABILITY

SEALS
CODE
 VITON SEALS STANDARD

TIMING*

CODE	OPTION
S2**	100 - 200 MS
S3	300 - 600 MS

* Timing is dependent on fluid viscosity.
 ** Function Code 1 is only available with Timing Code S2.

ELECTRICAL OPTIONS

CODE	DESCRIPTION
LEAD WIRE CONNECTIONS	
OMIT	WITHOUT TOP ELECTRICAL BOX
B	TOP ELECTRICAL BOX WITHOUT TERMINAL POSTS
BT	TOP ELECTRICAL BOX WITH TERMINALS AND GROUND
B5H	TOP ELECTRICAL BOX WITH 5 PIN MALE RECEPTACLE FOR 1 OR 2 SOLENOIDS

SOLENOID

CODE	VOLTAGE
LEAD WIRE CONNECTIONS	
60L	110/120 V 50/60 Hz
61L	220/240 V 50/60 Hz
70L	24 VDC
75L	12 VDC
SOLENOID(S) WITH DIN 43650/ISO 4400 (FORM A) CONNECTIONS	
33L	110/120 V 50/60 Hz
34L	220/240 V 50/60 Hz
42L	24 VDC
44L	12 VDC

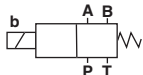


SOLENOID INDICATOR LIGHTS

CODE	DESCRIPTION
LEAD WIRE CONNECTIONS	
OMIT	NOT REQUIRED
L1	SINGLE SOLENOID INDICATOR
	110/120 V 50/60 Hz
	12 VDC 24 VDC
L2	DOUBLE SOLENOID INDICATOR
	110/120 V 50/60 Hz
	12 VDC 24 VDC

MECHANICAL OPTIONS

CODE	DESCRIPTION
OMIT	NONE
R	SINGLE SOLENOID REVERSE ASSEMBLY SOLENOID "A" SUPPLIED

FUNCTION

CODE	OPTION
1*	 Single actuator • 2 position Spring offset
3	 Double actuator • 3 position Spring centered
5	 Single actuator • 2 position Spring centered

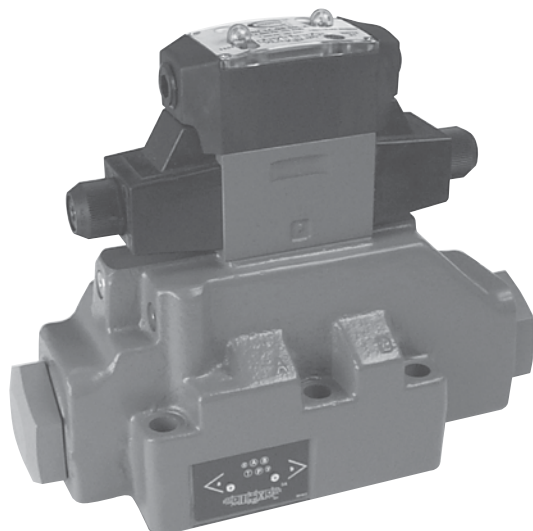
* Function Code 1 is available with Timing Code S2 only.

TYPICAL ORDERING CODE: **VS12M-3A-GS2-60L**

VSD08M

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, PILOT OPERATED



DESCRIPTION

The valves are used in applications requiring high flow rates. Typical flow rates range from 50 to 125 gpm.

TYPICAL PERFORMANCE SPECIFICATIONS

FLOW CAPACITY	Nominal	50 gpm	190 lpm
	Maximum	125 gpm	473 lpm
MAXIMUM OPERATING PRESSURES	P, A, B, X Ports	5000 psi	345 bar
	T w/ext. drain	3000 psi	210 bar
	T w/int. drain	1500 psi	103 bar
	Y port	1500 psi	103 bar
MINIMUM OIL PILOT PRESSURE		70 psi	4.8 bar
MAIN SPOOL DISPLACEMENT	Offset to Offset	1.23 cu. in.	20 ml
	Center to Offset	0.62 cu. in.	10 ml
MAXIMUM CYCLE RATE		up to 300 cpm	
MOUNTING SURFACE		ANSI/B93.7-1986 - D08 ISO 4401 - SIZE 08	
WEIGHT	Single Actuator	33 lbs.	15 kg
	Double Actuator	34 lbs.	15.4 kg
SPOOL CODES AVAILABLE		SEE CHART	

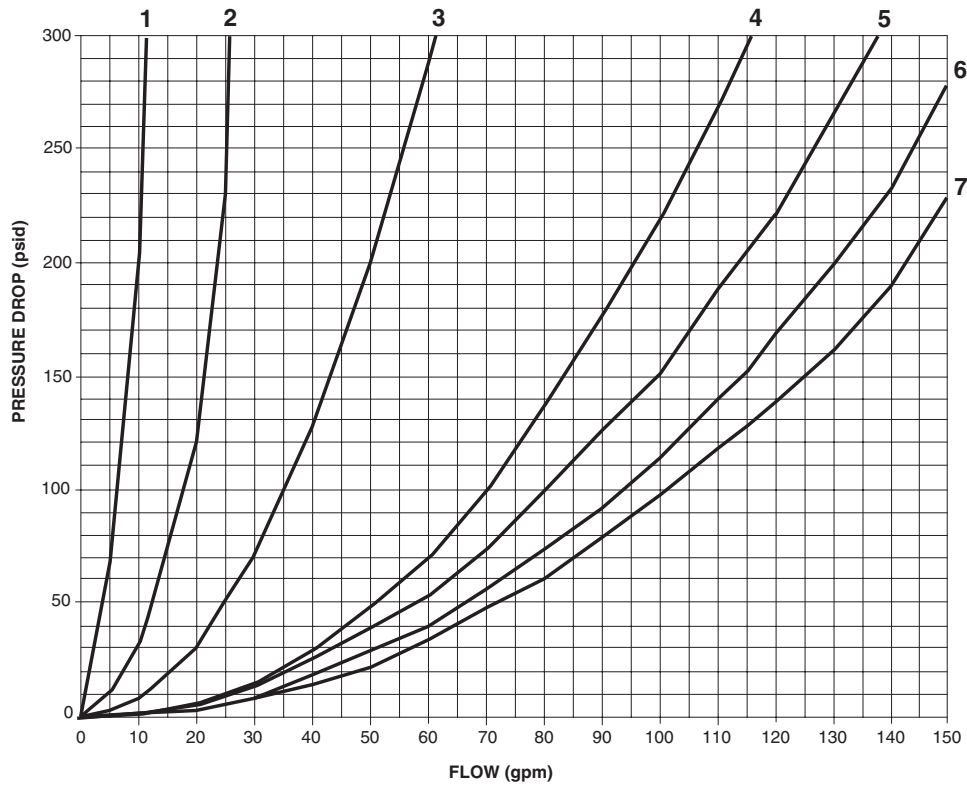
Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

All pressure drops shown on this page are based on 100 SUS fluid viscosity, and 0.87 specific gravity. See the chart below for other viscosities

Fluid	CS	14.5	20.5	32	43	54	65	76	86
Viscosities	SUS	75	100	150	200	250	300	350	400
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41

For any other specific gravity (G_1), the pressure drop ($?P$) will be will be approximately $?P_1 = ?P (G_1/G)$.

TYPICAL PRESSURE DROP CURVES



FLOW PATH ?P CURVES

SPOOL TYPE	FLOW CURVE NUMBERS								
	SPOOL SHIFTED				SPOOL CENTERED				
	P to A	P to B	A to T	B to T	P to A	P to B	A to T	B to T	P to T
A	7	7	6	6	N/A	N/A	N/A	N/A	N/A
A2	7	7	3	3	N/A	N/A	N/A	N/A	N/A
A3	7	7	2	2	N/A	N/A	N/A	N/A	N/A
B	7	7	6	6	N/A	N/A	N/A	N/A	5
F	7	7	6	6	N/A	N/A	5	5	N/A
F1	7	7	6	6	N/A	N/A	1	1	N/A
F2	7	7	3	3	N/A	N/A	1	1	N/A
F3	7	7	2	2	N/A	N/A	1	1	N/A
G	7	7	6	6	4	4	N/A	N/A	N/A
J	7	7	6	6	N/A	4	N/A	N/A	N/A
K	7	7	6	6	N/A	N/A	5	N/A	N/A
L	5	5	5	5	N/A	N/A	N/A	N/A	4

VSD08M

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, PILOT OPERATED



TYPICAL RESPONSE TIME

NOTE: Shift times are from initial electrical signal to the solenoid to positions indicated in the tabulations below.

SOLENOID CODE	PILOT PRESSURE psi / bar	STANDARD RESPONSE TIME				FASTER RESPONSE TIMES*				Spring Return Spool Position as Indicated Below			
		AC Sol	DC Sol	AC Sol	DC Sol	AC Sol	DC Sol	AC Sol	DC Sol	AC Sol	DC Sol	AC Sol	DC Sol
1		Spool Shifted (offset to offset)		Spool Shifted (offset to offset)		Spool Shifted (offset to offset)		Spool Shifted (offset to offset)		Spool Spring Return (offset to offset)		Spool Return Time to Center	
	500 / 35	225 ms	290 ms	125 ms	180 ms					150 ms		85 ms	
	1000 / 70	150 ms	200 ms	80 ms	120 ms	*	*	*	*	105 ms		60 ms	
	2000 / 140	100 ms	140 ms	50 ms	90 ms					75 ms		40 ms	
	3000 / 210	75 ms	115 ms	40 ms	80 ms					60 ms		35 ms	
2		Spool Shifted (offset to offset)		Spool Shift to Flow (crack) Opposite Cylinder Port		Spool Shifted (offset to offset)		Spool Shift to Flow (crack) Opposite Cylinder Port		No Springs			
	500 / 35	160 ms	220 ms	95 ms	150 ms								
	1000 / 70	110 ms	160 ms	70 ms	120 ms	*	*	*	*				
	2000 / 140	75 ms	120 ms	50 ms	90 ms								
	3000 / 210	60 ms	100 ms	40 ms	80 ms								
3, 5		Spool Shifted (center to offset)		Spool Shift to Flow (crack)		Spool Shifted (center to offset)		Spool Shift to Flow (crack)		Spool Return to Center Position			
	500 / 35	135 ms	200 ms	15-20 ms	55-60 ms	65 ms				70 ms	90 ms		
	1000 / 70	85 ms	140 ms	15-20 ms	55-60 ms	40 ms	*	*	*	70 ms	90 ms		
	2000 / 140	50 ms	100 ms	15-20 ms	55-60 ms	*				75 ms	90 ms		
	3000 / 210	40 ms	80 ms	15-20 ms	55-60 ms					70 ms	90 ms		
6		Spool Shifted (offset to center)				Spool Shifted (offset to center)				Spool Return (center to offset)			
	500 / 35	115 ms	180 ms							125 ms			
	1000 / 70	75 ms	130 ms			*	*	*	*	100 ms			
	2000 / 140	50 ms	90 ms							80 ms			
	3000 / 210	40 ms	80 ms							70 ms			

***NOTE:** Faster response times may be accomplished by the removal of the orifice plug in the pressure line. It is NOT RECOMMENDED for pilot pressures to exceed 2000 psi (140 bar) because of high-pressure transients in the drain line during shifting.

INTERNAL LEAKAGE PER SEALING LAND

PRESSURE (psi)	500	1000	1500	2500	3500	4500	5000
LEAKAGE (cipm)	4	9	16	29	44	-	-

NOTES: Leakage measured with fluid viscosity of 100 SUS.
Leakage at different viscosity is approximately proportional to ratio of viscosity being used and 100 SUS oil.

TYPICAL ELECTRICAL INFORMATION

SOLENOID CODE	VOLTAGE & FREQUENCY	VOLTAGE LIMITS	INRUSH CURRENT (AMPS)	HOLDING CURRENT	HOLDING CURRENT MIN. VOLT.	HOLDING POWER
	VOLTS - Hz.	MIN. - MAX.	MAX.	(AMP)	(AMP)	(WATTS)
33L, 60L	120 - 60	108 - 126	2.10	.49	.39	24
	110 - 50	99 - 116		.58	.45	26
34L, 61L	240 - 60	216 - 252	1.10	.24	.19	24
	220 - 50	198 - 231		.29	.22	26
39L, 68L	120 - 60	108 - 132	1.10	.19	.15	10
	110 - 50	99 - 121		.21	.17	10
42L, 70L	24 DC	21 - 26	1.00	1.00	.88	24
44L, 75L	12 DC	10 - 13	2.00	2.00	1.67	24

SPOOL DESCRIPTION

SPOOL TYPE	SPOOL SYMBOL	
A	A Port End	B Port End
A2 A3	A Port End	B Port End
AC A1C A2C A40C	A Port End	B Port End
B	A Port End	B Port End
E	A Port End	B Port End
F	A Port End	B Port End
F1 F2 F3	A Port End	B Port End
FC F1C F2C	A Port End	B Port End
G	A Port End	B Port End
K	A Port End	B Port End
L	A Port End	B Port End

VSD08M

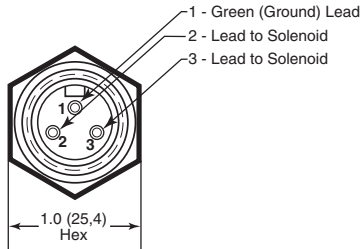
DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, PILOT OPERATED

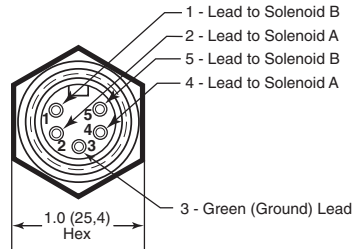


DIMENSIONS

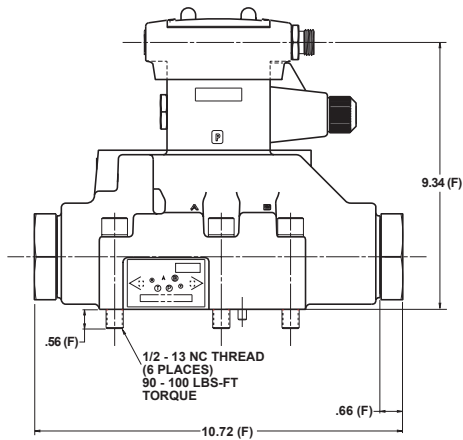
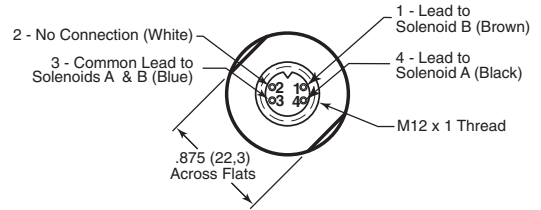
Three Pin Connector, Codes B3A, B3H
Use with single solenoid valve



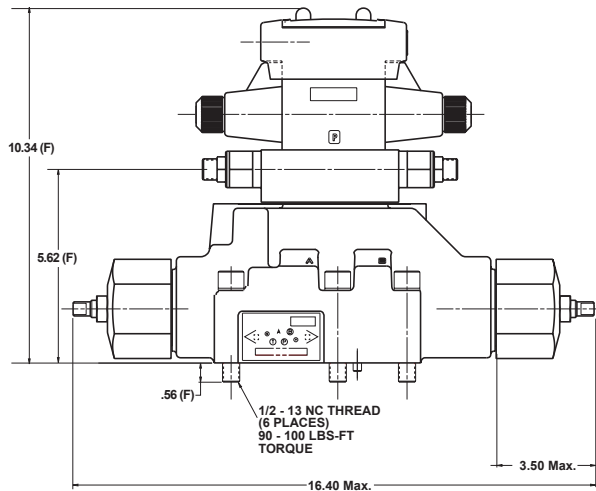
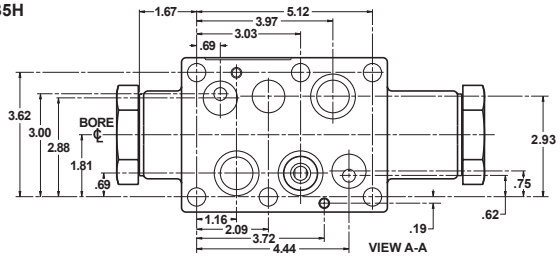
Five Pin Connector, Codes B5A, B5H
Use with single or double solenoid valve



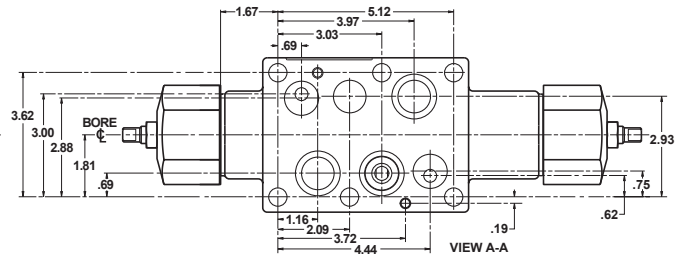
Four Pin Micro-Connector, Codes B4, B4A
Use with single or double solenoid valve
Available with 2-pin DC coils only



B3A
B3H
B4
B4A
B5A
B5H



VSD08M - ** - JJ



VSD08M

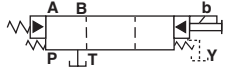
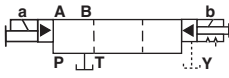
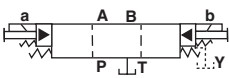
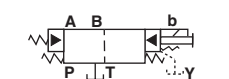
DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, PILOT OPERATED



ORDERING INFORMATION

VSD08M — — — G — — — — — — L — A

CODE	SYMBOL
1	 <p>Single operator • 2 position Spring offset</p>
2	 <p>Double operator • 2 position Detented pilot (No spring)</p>
3*	 <p>Double operator • 3 position Spring centered</p>
5*	 <p>Single operator • 2 position Spring centered</p>

* Operator identification reversed on "L" spool.

SPOOLS

CODE
REFER TO PAGE 29 FOR SPOOL AVAILABILITY

SEALS

CODE
VITON SEALS STANDARD

ELECTRICAL OPTIONS

CODE	DESCRIPTION
OMIT	DIN STYLE SOLENOIDS
B	TOP ELECT. CONN. BOX W/TERMINAL POSTS, LIGHTS AND SURGE SUPPRESSOR
B3A*	TOP ELECT. CONN. BOX W/3 PIN MALE MINI RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "A" PORT END
B3H*	TOP ELECT. CONN. BOX W/3 PIN MALE MINI RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "B" PORT END
B4A**	TOP ELECT. CONN. BOXW/4 PIN MALE MICRO RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "A" PORT END
B4**	TOP ELECT. CONN. BOXW/4 PIN MALE MICRO RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "B" PORT END
B5A*	TOP ELECT. CONN. BOX W/5 PIN MALE MINI RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "A" PORT END
B5H*	TOP ELECT. CONN. BOX W/5 PIN MALE MINI RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "B" PORT END

SOLENOID MFG.

CODE	DESCRIPTION
L	LISK

SOLENOID

CODE	VOLTAGE
WITH DIN 43650 ELECTRICAL CONNECTIONS	
33	120/110V 60/50 Hz
34	240/220 V 60/50 Hz
42	24 VDC
44	12 VDC
WITH 2 PIN CONNECTIONS	
60	120/110 V 60/50 Hz
61	240/220 V 60/50 Hz
68	120/110 V 60/50 Hz (LOW AMP, LOW FORCE)
70	24 VDC
75	12 VDC

MECHANICAL OPTIONS

CODE	DESCRIPTION
70C*	CHECK VALVE "P" PORT 70 PSI CRACK PRESSURE
JJ	STROKE ADJUSTMENT
KK	ADJUSTABLE PILOT CHOKES
R**	REVERSE MODULE (USE STANDARD PILOT MANUAL)
Z	OVERRIDE FOR SINGLE SOLENOID VALVE
JA	SINGLE STROKE ADJUSTMENT "A" PORT END
JB	SINGLE STROKE ADJUSTMENT "B" PORT END
V	PILOT WITH STEEL OVERRIDE PINS
WD	WASHDOWN

PILOT - DRAIN LOCATION

CODE	PILOT PRESSURE	DRAIN
1*	INTERNAL	EXTERNAL
2	EXTERNAL	EXTERNAL
3*	INTERNAL	INTERNAL
4	EXTERNAL	INTERNAL

* 70C Mechanical Option may be used to insure adequate pilot pressure to fully shift spool on internal pilot pressure valves with open center spools ("B" and "L" spools only).

* 70C Mechanical Option may be used to insure adequate pilot pressure to fully shift spool on internal pilot pressure valves with open center spools ("B" and "L" spools only).

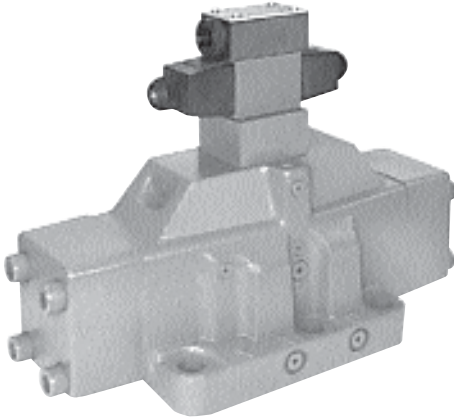
** Available with single solenoid valves codes only.

* Connector conforms to ANSI/B93.55M - 1981.

** Available with codes 70 & 75 only.

TYPICAL ORDERING CODE:
VSD08M-G-L-A

NFPA SIZE D10



TYPICAL PERFORMANCE SPECIFICATIONS

Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

FLOW CAPACITY	Nominal	200 gpm	757 lpm
	Maximum	290 gpm	1100 lpm
MAXIMUM OPERATING PRESSURES*	P, A, B, X Ports	5000 psi	350 bar
	T w/ext. drain	3000 psi	210 bar
	T w/int. drain	3000 psi	210 bar
	Y port	3000 psi	210 bar
MINIMUM PILOT PRESSURE	Spools A, F, F1	150 psi	10 bar
	Spool L	75 psi	5 bar
MAXIMUM CYCLE RATE	200 cpm		
MOUNTING SURFACE	ANSI/B93.7M-1986 - D10 ISO 4401 - SIZE 10		
WEIGHT	Single Actuator	94 lbs.	42.6 kg
	Double Actuator	95 lbs.	43.1 kg
SPOOL CODES AVAILABLE	A, F, F1, L		

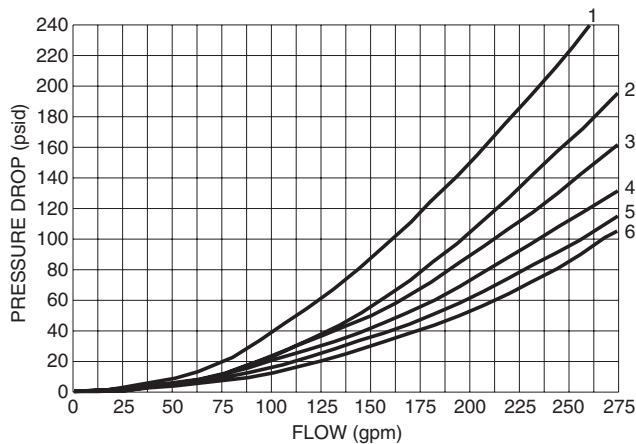
* T ports include surges.

All pressure drops shown on this data page are based on 100 SUS fluid viscosity and 0.87 specific gravity. See the chart below for other viscosities.

Fluid	CS	14.5	20.5	32	43	54	65	76	86
Viscosities	SUS	75	100	150	200	250	300	350	400
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41

For any other specific gravity (G_1) the pressure drop (?P) will be approximately $?P_1 = ?P (G_1/G)$.

TYPICAL PRESSURE DROP CURVES



MAXIMUM FLOW

@ 145 psi (10 bar) Pilot Pressure

VALVE MODEL		PSI (bar)				
CODE	SPOOL	1000 (69)	2000 (138)	3000 (207)	4000 (276)	5000 (345)
1	A	290 gpm	285 gpm	270 gpm	220 gpm	200 gpm
2	A, F, F1	290 gpm	285 gpm	270 gpm	220 gpm	200 gpm
3, 5	A, F, F1	290 gpm	285 gpm	270 gpm	220 gpm	200 gpm
3, 5	L	250 gpm	235 gpm	225 gpm	200 gpm	175 gpm

VSD10M DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, PILOT OPERATED



SPOOL DESCRIPTION

CODE	SYMBOL	SPOOL FUNCTION	CENTER POSITION	CROSSOVER
A			All ports blocked	All ports blocked
F			P blocked A & B to T	P blocked A or B to T
F1			P blocked A & B restricted to T	P blocked A or B restricted to T
L*			P to T A & B blocked	All ports open, restricted

* Check valve may be required to ensure adequate pilot pressure to shift spool on internal pilot valves (Code 1 or 3) with open center spools (Code L).

NOTE: Code L spool available on Code 3 and 5 valves only.
Code F and F1 spools are not available on Code 1 valves.

TYPICAL ELECTRICAL CHARACTERISTICS

SOLENOID CODE		VOLTAGE & FREQUENCY	VOLTAGE LIMITS	RESISTANCE	INRUSH CURRENT (AMPS)	HOLDING CURRENT	HOLDING POWER
LEAD WIRE	DIN CONN.	VOLTS - Hz.	MIN. - MAX.	OHMS	MAX.	(AMP)	(WATTS)
60L	33L	120 - 60	108 - 126	36.5	2.10	.49	24
		110 - 50	99 - 116			.58	26
61L	34L	240 - 60	216 - 252	145.0	1.10	.24	24
		220 - 50	198 - 231			.29	26
70L	42L	24 DC	21 - 26	24.0	1.00	1.00	24
75L	44L	12 DC	10 - 13	6.3	2.00	2.00	24

TYPICAL RESPONSE TIME

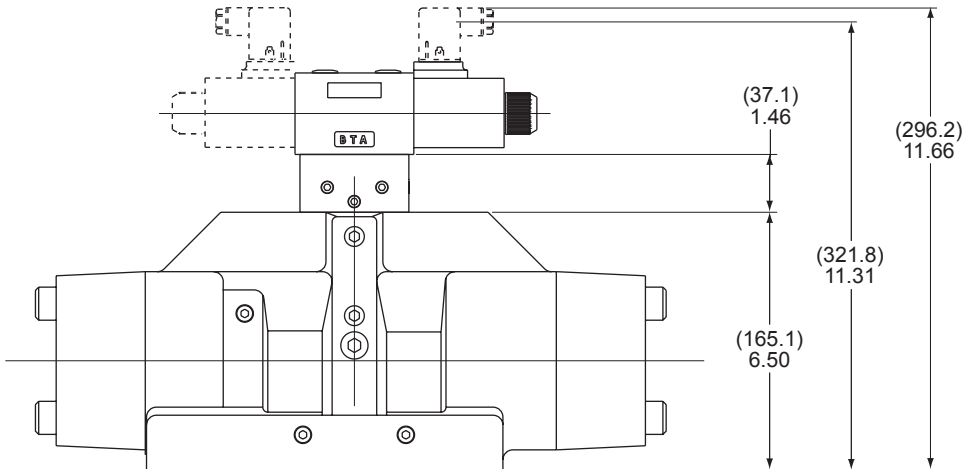
The following chart provides response times for standard spring centered models with various pilot pressures and A.C. solenoids.

PILOT PRESSURE (PSI)	SOLENOID ENERGIZED CENTER to "A" or "B" PORT (MS)	SPRING RETURN "A" or "B" to CENTER
500	60	100
1000	45	110
2000	42	125
3000	40	135

NOTE: The above response times are without restriction in the drain line. D.C. solenoid valve response times will be approximately double those charted above for A.C. solenoids.

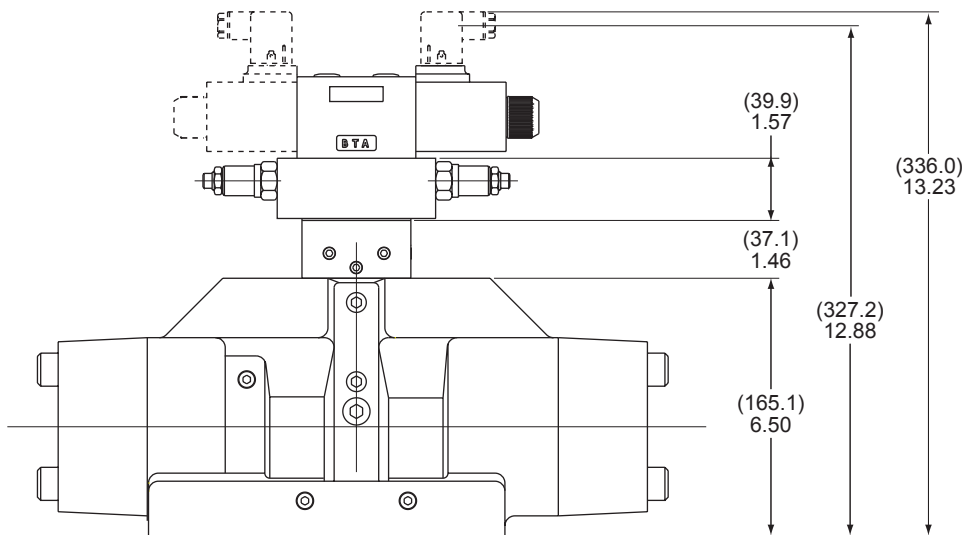
DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES

DINN COILS



CODE KK

Adjustable Pilot Chokes•



NOTE: 5 pin quick disconnect meets
ANSI recommended standard B93.55M - 1981.

VSD10M

DIRECTIONAL CONTROL VALVE

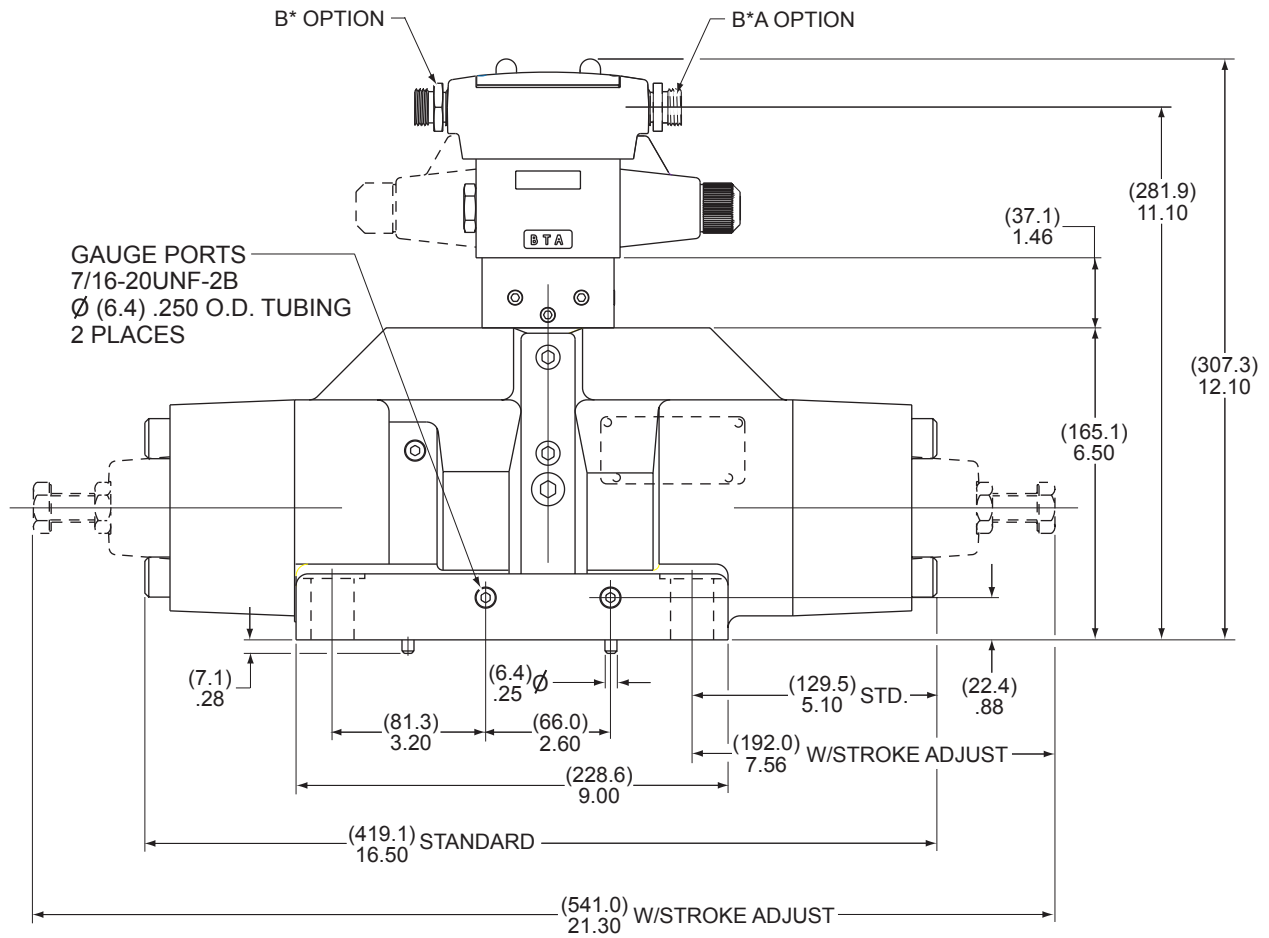
SOLENOID ACTUATED, PILOT OPERATED



DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES

CODE JJ

Adjustable Stroke Controls



VSD10M

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, PILOT OPERATED

ORDERING INFORMATION

VSD10M — — — **G** — — — — —

BASIC VALVE
4-WAY DIRECTIONAL CONTROL VALVE
SOLENOID ACTIVATED
D03 SUBPLATE MOUNTING
5000 PSI MAXIMUM OPERATING PRESSURE

SPOOLS
SELECT ONE

CODE
REFER TO PAGE 34 FOR SPOOL AVAILABILITY

SEALS
SELECT ONE

CODE
VITON SEALS STANDARD

ELECTRICAL OPTIONS
SELECT ONE
SELECT ONE
SELECT ONE

CODE	DESCRIPTION
OMIT††	DIN STYLE SOLENOIDS
B	TOP ELECT. CONN. BOX W/TERMINAL POSTS, LIGHTS AND SURGE SUPPRESSOR
B3A†	TOP ELECT. CONN. BOX W/3 PIN MALE MINI RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "A" PORT END
B3H†	TOP ELECT. CONN. BOX W/3 PIN MALE MINI RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "B" PORT END
B4A**	TOP ELECT. CONN. BOXW/4 PIN MALE MICRO RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "A" PORT END
B4**	TOP ELECT. CONN. BOXW/4 PIN MALE MICRO RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "B" PORT END
B5A*	TOP ELECT. CONN. BOX W/5 PIN MALE MINI RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "A" PORT END
B5H*	TOP ELECT. CONN. BOX W/5 PIN MALE MINI RECEPTACLE, LIGHTS & SURGE SUPPRESSOR CONNECTOR ON "B" PORT END
WD	WASHDOWN

SOLENOID MFG.
SELECT ONE
SELECT ONE

CODE	DESCRIPTION
L	LISK

SOLENOID

CODE	VOLTAGE
DIN 43650 ELECT. CONNECTIONS	
33	110/120 V 50/60 Hz
34	220/240 V 50/60 Hz
42	24 VDC
44	12 VDC
2 PIN CONNECTIONS	
60	110/120 V 50/60 Hz
61	220/240 V 50/60 Hz
70	24 VDC
75	12 VDC

MECHANICAL OPTIONS

CODE	DESCRIPTION
JJ	STROKE ADJUSTMENT BOTH ENDS
KK	ADJUSTABLE PILOT CHOKES

PILOT - DRAIN LOCATION

CODE	PILOT PRESSURE	DRAIN
1	INTERNAL	EXTERNAL
2	EXTERNAL	EXTERNAL
3	INTERNAL	INTERNAL
4	EXTERNAL	INTERNAL

FUNCTION

CODE	OPTION
1	 Single operator • 2 position Spring offset
2	 Double operator • 2 position Detented pilots (No spring)
3	 Double operator • 3 position Spring centered
5	 Single operator • 2 position Spring centered

* Connector conforms to ANSI/B93.55M - 1981.
** Available with DC solenoid valves only.
† Available with single solenoid valves only.
†† Omit electrical options for solenoid codes 33, 34, 42 and 44.

TYPICAL ORDERING CODE: **VSD10M-3A-G1B-60L**

VMD03M

DIRECTIONAL CONTROL VALVES

LEVER ACTUATED, MANUALLY OPERATED



TYPICAL PERFORMANCE SPECIFICATIONS

Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

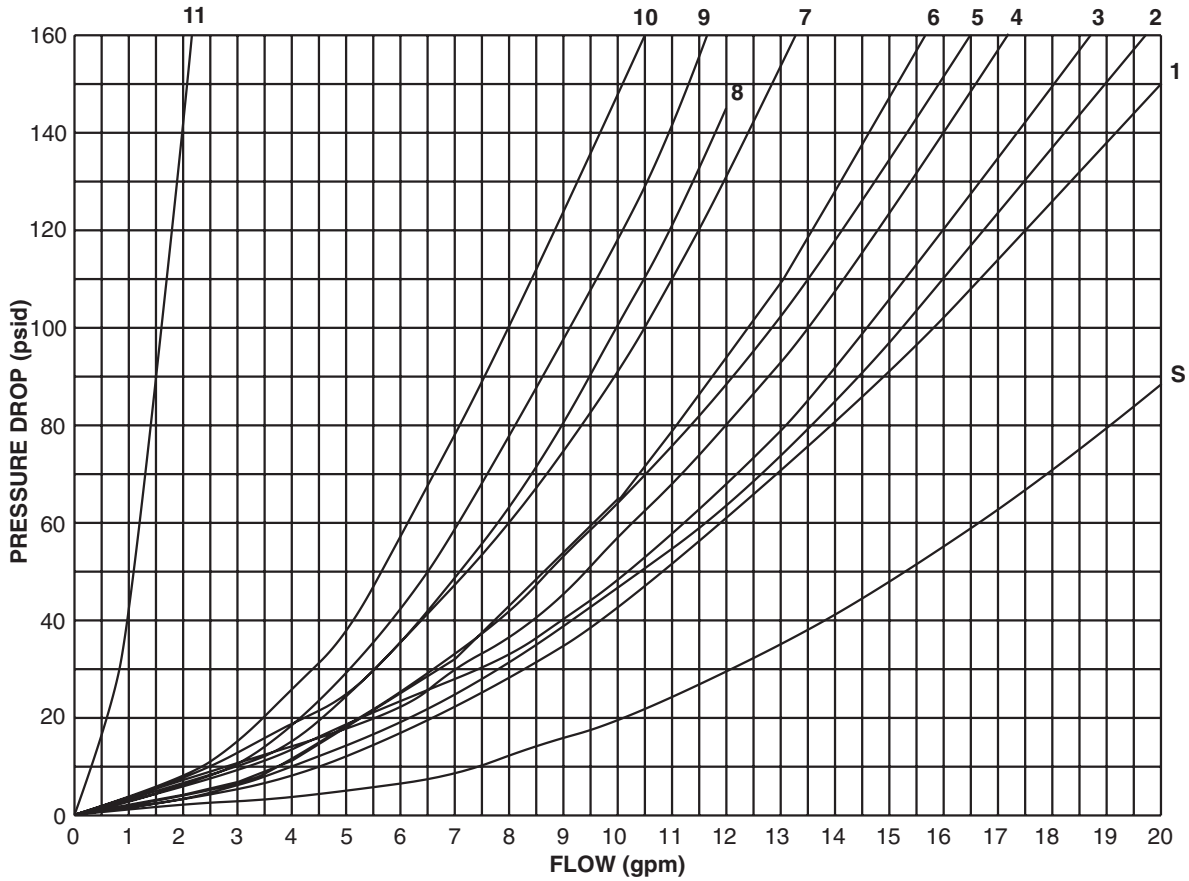
FLOW CAPACITY - (up to)		18 gpm	68 lpm
MAXIMUM OPERATING PRESSURE	P, A, B Ports	5000 psi	345 bar
	T Port	1000 psi	70 bar
MINIMUM PILOT PRESSURE		70 psi	5 bar
LEVER FORCE AT MAXIMUM PRESSURE		10.0 lbs.	4.5 kg
MOUNTING SURFACE		ANSI/B93.7M - 1986 D03 ISO 4401 Size 03	
WEIGHT		3.4 lbs.	1.5 kg
SPOOL CODES AVAILABLE		SEE CHART	

All pressure drops shown on this page are based on 100 SUS fluid viscosity, and 0.87 specific gravity. See the chart below for other viscosities.

Fluid	CS	14.5	20.5	32	43	54	65	76	86
Viscosities	SUS	75	100	150	200	250	300	350	400
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41

For any other specific gravity (G_1) the pressure drop ($?P$) will be approximately $?P_1 = ?P (G_1/G)$.

TYPICAL PRESSURE DROP CURVES



PRESSURE DROP CURVE CHART

SPOOL TYPE	FLOW CURVE NUMBER						
	SPOOL SHIFTED				SPOOL CENTERED		
	P to A	B to T	P to B	A to T	P to A or B	A or B to T	P to T
A	4	4	4	4	N/A	N/A	N/A
B	2	4	2	4	5	6	5
F	5	1	5	1	N/A	10	N/A
F1	5	4	5	4	N/A	11	N/A
G	3	6	3	6	7	N/A	N/A
L	8	8	8	8	N/A	N/A	9
Subplate	S (Full Circuit)						

VMD03M

DIRECTIONAL CONTROL VALVES

LEVER ACTUATED, MANUALLY OPERATED



MAXIMUM RECOMMENDED FLOW

		SPOOL CODE					
		FUNCTION CODE	A	B	F	G*	L**
(lpm) @ gpm	(70 bar) 1000 psi	1	(68) 18	(42) 11	N/A	N/A	N/A
		2	(68) 18	(61) 16	(61) 16	N/A	(38) 10
		3, 5	(68) 18	(61) 16	(61) 16	(68) 18	(38) 10
(lpm) @ gpm	(140 bar) 2000 psi	1	(68) 18	(38) 10	N/A	N/A	N/A
		2	(68) 18	(61) 16	(61) 16	N/A	(38) 10
		3, 5	(68) 18	(61) 16†	(61) 16	(68) 18	(38) 10
(lpm) @ gpm	(210 bar) 3000 psi	1	(68) 18	(34) 9	N/A	N/A	N/A
		2	(68) 18	(61) 16	(61) 16	N/A	(38) 10
		3, 5	(68) 18	(61) 16†	(53) 14†	(61) 16	(34) 9
(lpm) @ gpm	(276 bar) 4000 psi	1	(68) 18	(26) 7	N/A	N/A	N/A
		2	(68) 18	(61) 16	(61) 16	N/A	(34) 9
		3, 5	(68) 18	(61) 16†	(45) 12†	(53) 14†	(26) 7
(lpm) @ gpm	(345 bar) 5000 psi	1	(68) 18	(26) 7	N/A	N/A	N/A
		2	(68) 18	(61) 16	(61) 16	N/A	(15) 4
		3, 5	(68) 18	(53) 14†	(45) 12†	(45) 12†	(34) 9

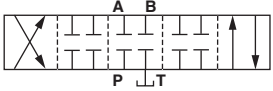
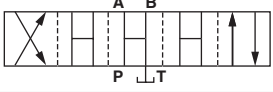
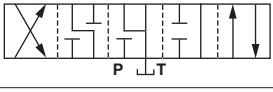
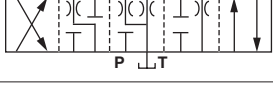
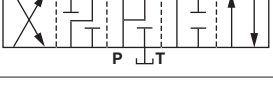
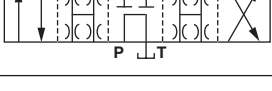
N/A Not Available.

* "G" spool available on code 3 valves only.

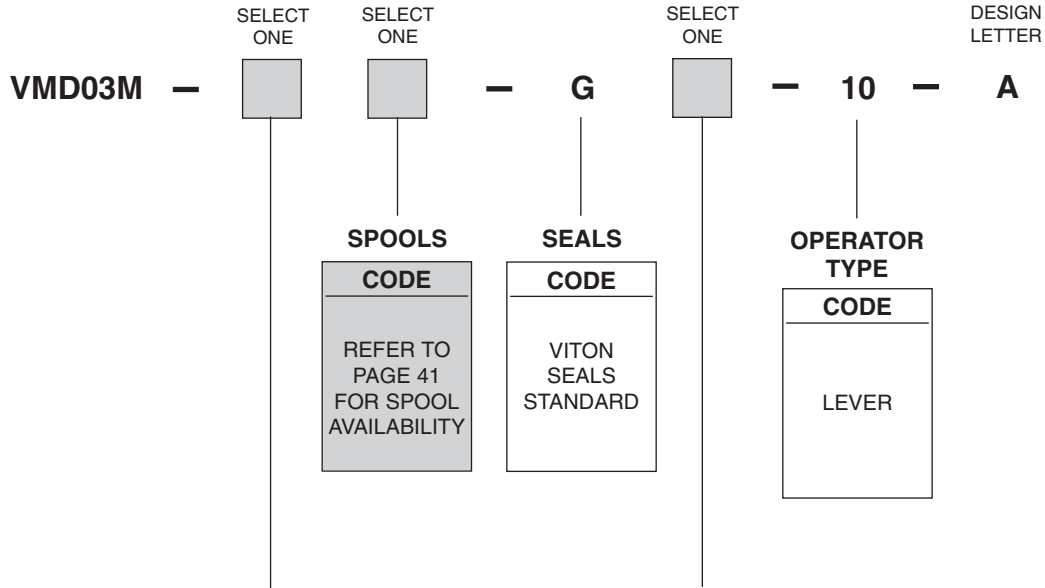
** "L" spool available on codes 3 and 4 valves only.

† 11 gpm with 1000 psi tank pressure.

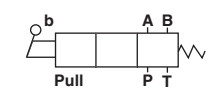
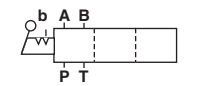
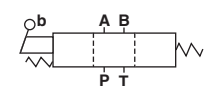
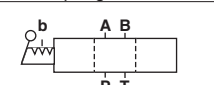
SPOOL DESCRIPTION

SPOOL TYPE	SPOOL SYMBOL		
A	PULL		PUSH
B	PULL		PUSH
F	PULL		PUSH
F1	PULL		PUSH
G	PULL		PUSH
L	PULL		PUSH

ORDERING INFORMATION



FUNCTION

CODE	OPTION
1	 <p style="text-align: center;">2 position spring offset</p>
2	 <p style="text-align: center;">• 2 position detented, no spring</p>
3	 <p style="text-align: center;">3 position spring centered</p>
4	 <p style="text-align: center;">3 position detented, spring centered</p>

MECHANICAL OPTIONS

CODE	DESCRIPTION
OMIT	SINGLE SOLENOID "A" PORT END
R	SINGLE SOLENOID "B" PORT END

TYPICAL ORDERING CODE: **VMD03M-3A-G-10-A**

VM12M DIRECTIONAL CONTROL VALVES

LEVER ACTUATED, MANUALLY OPERATED



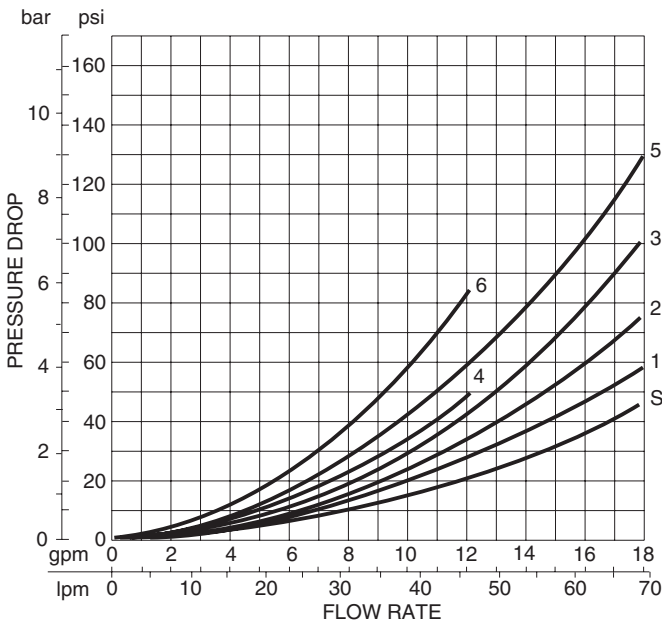
NFPA SIZE D05

TYPICAL PERFORMANCE SPECIFICATIONS

Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

NOMINAL FLOW RATE	@ 3500 psi	12 gpm	46 lpm
MAXIMUM FLOW RATE		25 gpm	95 lpm
MAXIMUM OPERATING PRESSURE	P, A, B Ports	3500 psi	250 bar
	T Port	1000 psi	70 bar
INTERNAL LEAKAGE	(1-port) 3500 psi 100 SUS	5.2 cipm	85 mlpm
MOUNTING SURFACE		ANSI/B93.7M-1986 - D05 ISO 4401 - SIZE 05	
LEVER FORCE AT MAXIMUM PRESSURE		4 lbs.	1.8 kg
WEIGHT		10 lbs.	4.5 kg
SPOOL CODES AVAILABLE		A, B, F, L	

TYPICAL PRESSURE DROP CURVES



All pressure drops shown on this data page are based on 100 SUS fluid viscosity and 0.87 specific gravity. See the chart below for other viscosities.

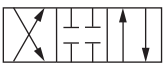
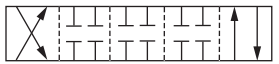

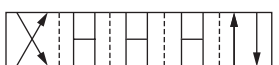

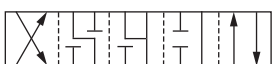

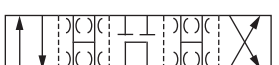
Fluid	CS	14.5	20.5	32	43	54	65	76	86
Viscosities	SUS	75	100	150	200	250	300	350	400
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41

For any other specific gravity (G_1) the pressure drop (Δ)P will be approximately $\Delta P_1 = \Delta P G_1/G$.

FLOW PATH Δ P CURVES

SPOOL TYPE	FLOW CURVE NUMBER					
	SPOOL SHIFTED			SPOOL CENTERED		
	P to A or B	B to T	A to T	A to T	B to T	P to T
A	3	2	1	N/A	N/A	N/A
B	4	2	1	N/A	N/A	5
F	3	2	1	2	5	N/A
L	6	6	5	N/A	N/A	4
Subplate	S (FULL CIRCUIT)					

SPOOL DESCRIPTION

CODE	SYMBOL	SPOOL FUNCTION	CENTER POSITION	CROSSOVER
A			All ports blocked	All ports blocked
B			All ports open	All ports open
F			P blocked A & B to T	P blocked A or B to T
L			P to T A & B blocked	All ports open, restricted

MAXIMUM FLOW

		FUNCTION CODE	SPOOL CODE			
			A	B	F	L
(lpm) (70 bar) @ gpm 1000 psi	1	(83) 22	(45) 12	(95) 25	N/A	
	2	(95) 25	(45) 12	(95) 25	N/A	
	3	(95) 25	(45) 12	(95) 25	(23) 6	
	4	(95) 25	(45) 12	(95) 25	(23) 6	
(lpm) (140 bar) @ gpm 2000 psi	1	(83) 22	(45) 12	(95) 25	N/A	
	2	(95) 25	(45) 12	(95) 25	N/A	
	3	(95) 25	(45) 12	(95) 25	(23) 6	
	4	(95) 25	(45) 12	(95) 25	(23) 6	
(lpm) (210 bar) @ gpm 3000 psi	1	(83) 22	(45) 12	(76) 20	N/A	
	2	(95) 25	(45) 12	(95) 25	N/A	
	3	(95) 25	(45) 12	(76) 20	(23) 6	
	4	(95) 25	(45) 12	(95) 25	(19) 5	

N/A Not available.

VM12M

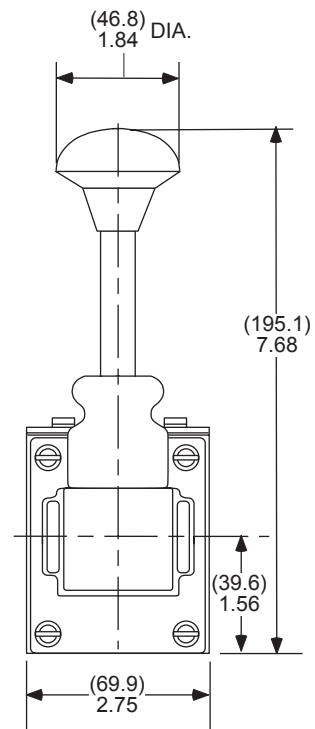
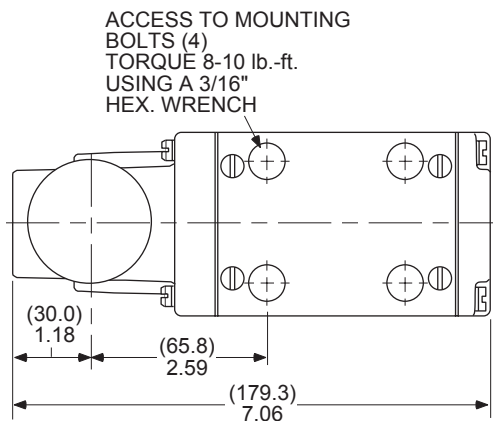
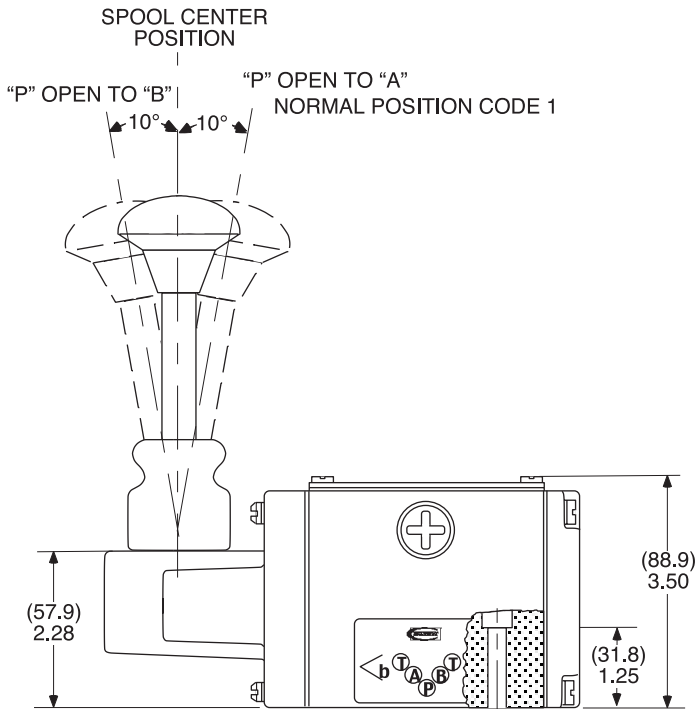
DIRECTIONAL CONTROL VALVES

LEVER ACTUATED, MANUALLY OPERATED

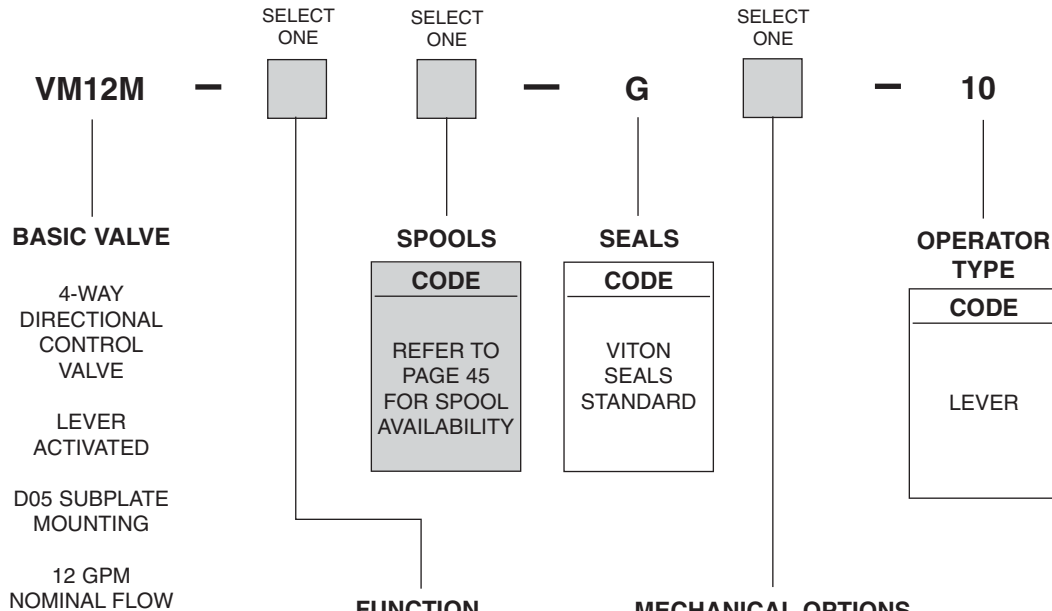


NFPA D05 SIZE
FOR INTERFACE PATTERN, SEE
MOUNTING SURFACE SECTION.

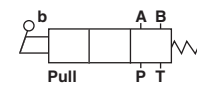
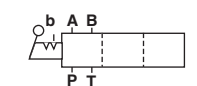
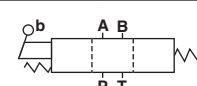
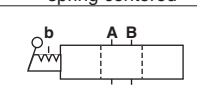
DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES



ORDERING INFORMATION



FUNCTION

CODE	OPTION
1	 <p>2 position spring offset</p>
2	 <p>2 position no spring, detented</p>
3	 <p>3 position spring centered</p>
4	 <p>3 position detented, all positions</p>

MECHANICAL OPTIONS

CODE	DESCRIPTION
OMIT	NONE
X*	2 POSITION

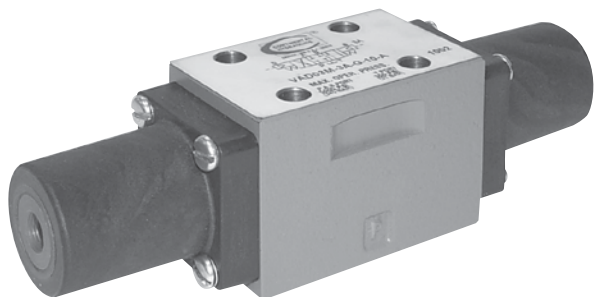
* For use on Code 4 valves only.
 2 positions: Center & Offset
 P to A & B to T.

TYPICAL ORDERING CODE: **VM12M-1A-G-10**

VAD03M

DIRECTIONAL CONTROL VALVES

AIR ACTUATED, DIRECT OPERATED



TYPICAL PERFORMANCE SPECIFICATIONS

MAXIMUM FLOW RATE - (up to)		15 gpm	57 lpm
MAXIMUM OPERATING PRESSURE	P, A, B Ports	5000 psi	345 bar
	T Port	300 psi	21 bar
PILOT PRESSURE	Recommended Max.	150 psi	10.5 bar
	Minimum	50 psi	3.5 bar
ACTUATOR DISPLACEMENT	Offset to Offset	0.15 cu.in.	2.5 ml
	Center to Offset	0.08 cu. in.	1.25 ml
MAXIMUM CYCLE RATE		300 cpm	
MOUNTING SURFACE		ANSI/B93.7M - 1986 D03 ISO 4401 Size 03	
WEIGHT	Single Actuator	3.0 lbs.	1.35 kg
	Double Actuator	3.4 lbs.	1.56 kg
SPOOL CODES AVAILABLE		A, B F, G, L	

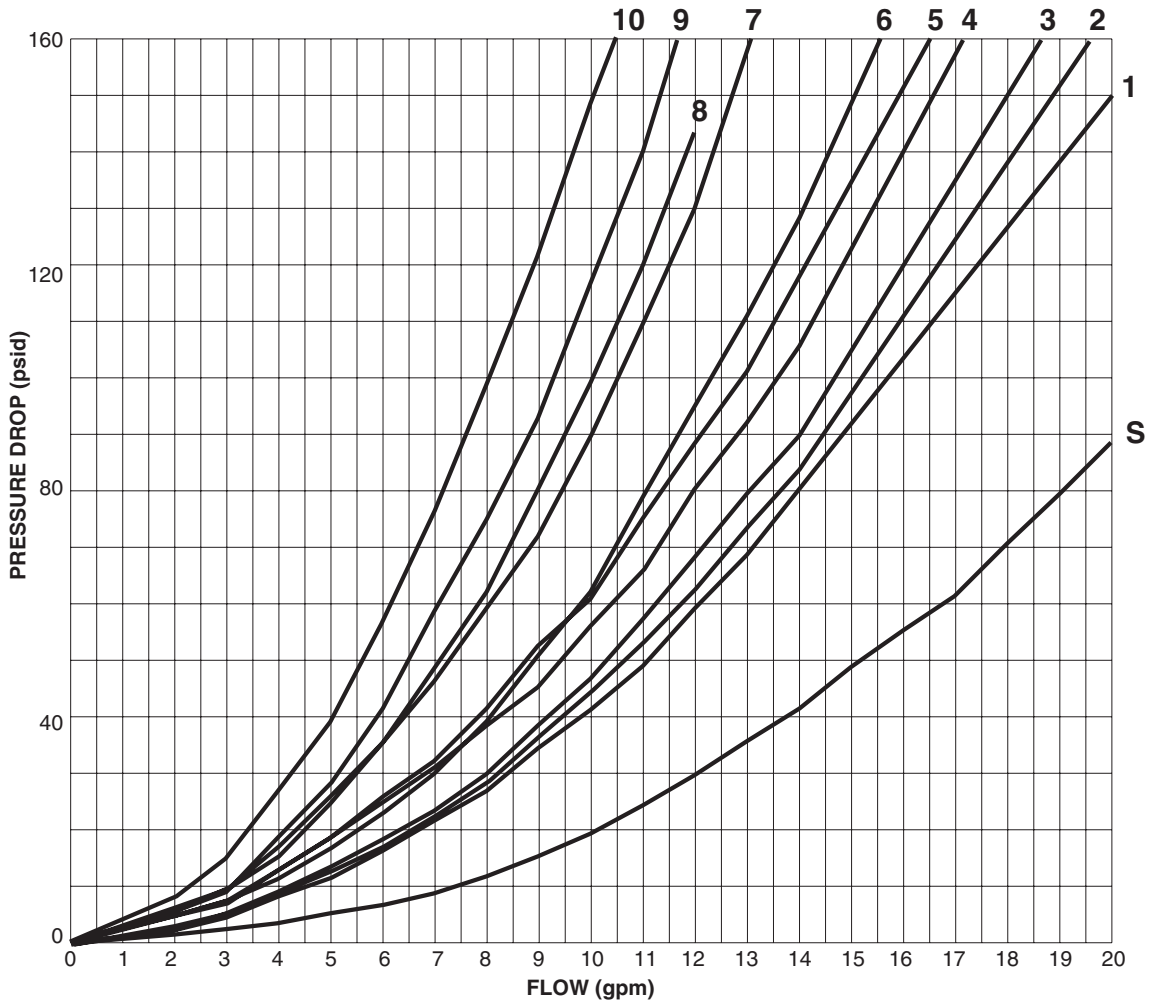
Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

All pressure drops shown on this data page are based on 100 SUS fluid viscosity and 0.87 specific gravity. See the chart below for other viscosities.

Fluid	CS	14.5	20.5	32	43	54	65	76	86
Viscosities	SUS	75	100	150	200	250	300	350	400
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41

For any other specific gravity (G_1) the pressure drop (? P) will be approximately $?P_1 = ?P (G_1/G)$.

TYPICAL PRESSURE DROP CURVES



FLOW PATH ?P CURVES

SPOOL TYPE	FLOW CURVE NUMBER						
	SPOOL SHIFTED				SPOOL CENTERED		
	P to A	B to T	P to B	A to T	P to A or B	A or B to T	P to T
A	4	4	4	4	N/A	N/A	N/A
A Code 1 & 2	4	4	4	4	N/A	N/A	N/A
B	2	4	2	4	5	6	5
B Code 1 & 2	3	2	3	2	5	6	5
F	5	1	5	1	N/A	10	N/A
G	3	6	3	6	7	N/A	N/A
L	8	8	8	8	N/A	N/A	9
Subplate	S (Full Circuit)						

VAD03M

DIRECTIONAL CONTROL VALVES

AIR ACTUATED, DIRECT OPERATED



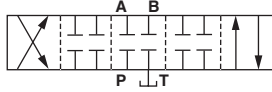
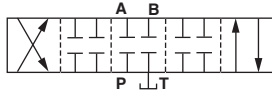
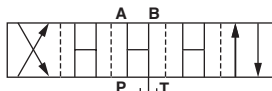
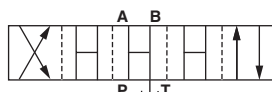
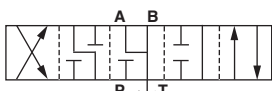
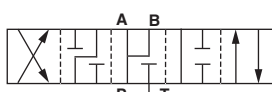
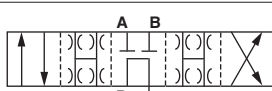
MAXIMUM FLOW*

		FUNCTION CODE	SPOOL CODE				
			A	B	F	G	L
(lpm) @ 105 bar gpm 1500 psi	1	(49) 13	(34) 9	N/A	N/A	N/A	
	2	(57) 15	(57) 15	N/A	N/A	N/A	
	3, 5	(57) 15	(57) 15	(57) 15	(49) 13	(34) 9	
(lpm) @ 210 bar gpm 3000 psi	1	(34) 13	(34) 9	N/A	N/A	N/A	
	2	(57) 15	(57) 15	N/A	N/A	N/A	
	3, 5	(57) 15	(57) 15	(38) 10	(49) 13	(34) 9	
(lpm) @ 345 bar gpm 5000 psi	1	(49) 13	(34) 9	N/A	N/A	N/A	
	2	(57) 15	(57) 15	N/A	N/A	N/A	
	3, 5	(45) 12	(45) 12	(19) 5	(49) 13	(38) 9	

N/A Not Available.

* Performance measured on a four-way circuit with cylinder ports looped together with 50 psi pilot pressure, measured @ 100 SUS oil viscosity.

SPOOL DESCRIPTION

SPOOL TYPE	SPOOL SYMBOL		
A	b Port		a Port
A Code 1 and 2	b Port		a Port
B	b Port		a Port
B Code 1 and 2	b Port		a Port
F	b Port		a Port
G	b Port		a Port
L	b Port		a Port

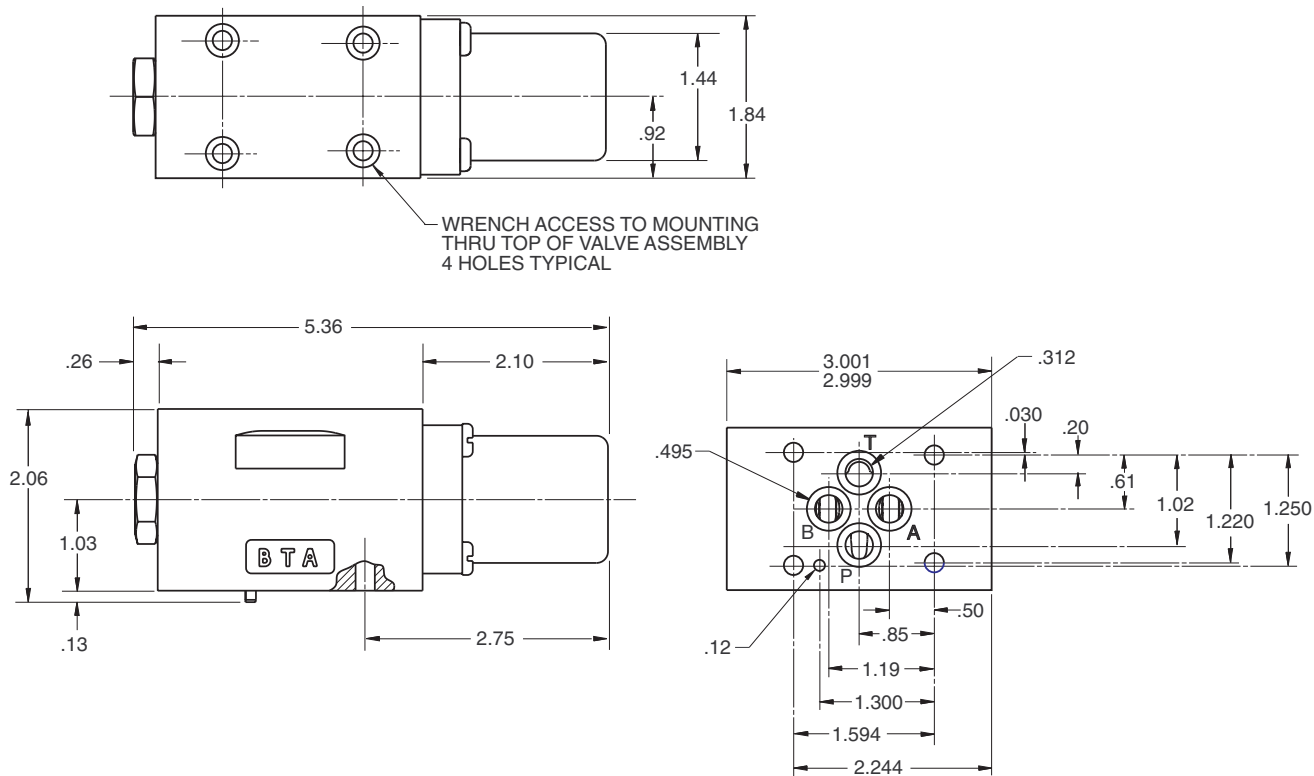
VAD03M

DIRECTIONAL CONTROL VALVES

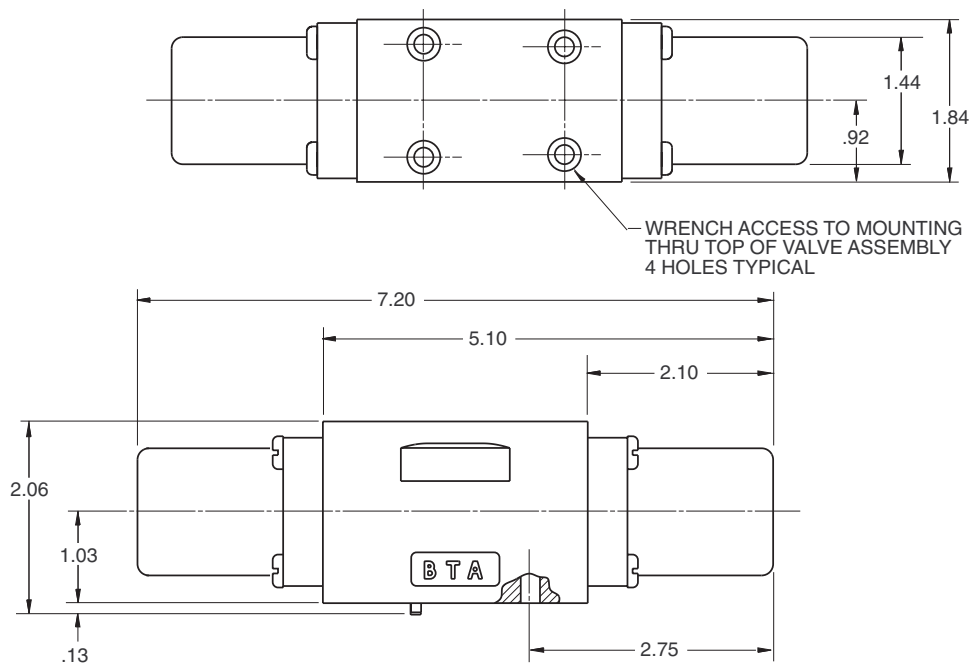
AIR ACTUATED, DIRECT OPERATED



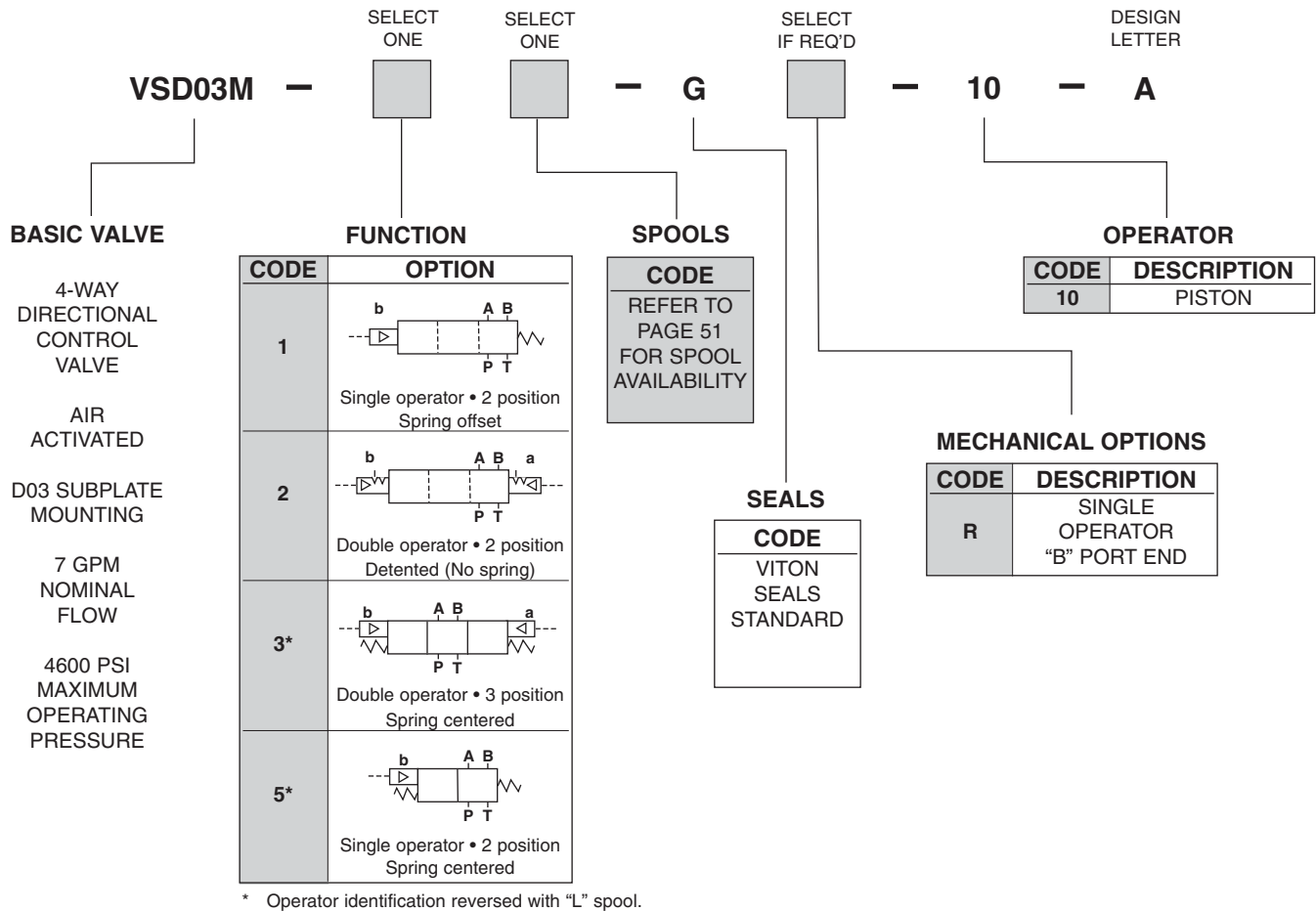
DIMENSIONS: MODELS VAD03M-1 & VAD03M-5



DIMENSIONS: MODELS VAD03M-2 & VAD03M-3



ORDERING INFORMATION



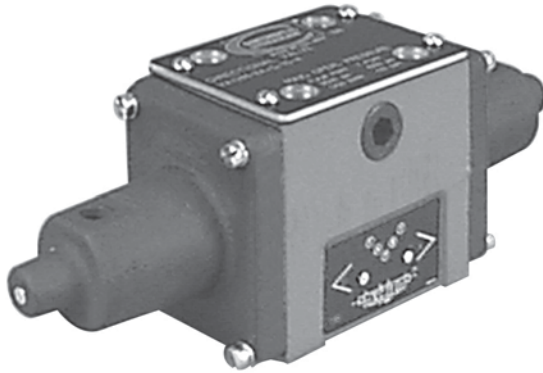
TYPICAL ORDERING CODE: **VAD03M-1A-G-10**

VA12M DIRECTIONAL CONTROL VALVES

AIR ACTUATED, DIRECT OPERATED



NFPA SIZE D05

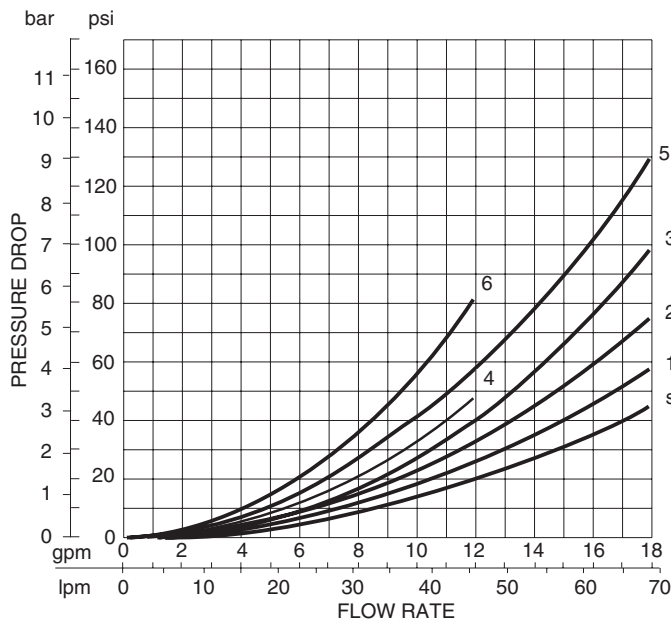


TYPICAL PERFORMANCE SPECIFICATIONS

Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

NOMINAL FLOW RATE @ 3500 PSI		12 gpm	46 lpm
MAXIMUM FLOW RATE		SEE CHART	
MAXIMUM OPERATING PRESSURE	P, A, B Ports	3500 psi	250 bar
	T Port	1000 psi	70 bar
INTERNAL LEAKAGE	(1-port) 3500 psi 100 SUS	5.2 cipm	85 mlpm
PILOT PRESSURE	Recommended Maximum	100 psi	6.9 bar
	Minimum	40 psi	2.9 bar
ACTUATOR DISPLACEMENT	Offset to Offset	0.54 cu. in.	8.8 ml
	Center to Offset	0.27 cu. in.	4.4 ml
MAXIMUM CYCLE RATE		160 cpm	
MOUNTING SURFACE		ANSI/B93.7M-1986 - D05 ISO 4401 - SIZE 05	
WEIGHT	Single Actuator	9 lbs..	4.1 kg
	Double Actuator	10 lbs..	4.5 kg
SPOOL CODES AVAILABLE		A, B, F, L	

TYPICAL PRESSURE DROP CURVES



All pressure drops shown on this data page are based on 100 SUS fluid viscosity and 0.87 specific gravity. See the chart below for other viscosities.

Fluid Viscosities	CS	14.5	20.5	32	43	54	65	76	86
	SUS	75	100	150	200	250	300	350	400
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41

For any other specific gravity (G_1) the pressure drop (?P) will be approximately $?P_1 = ?P (G_1/G)$.

FLOW PATH ?P CURVES

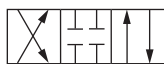
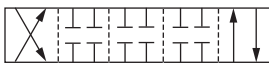





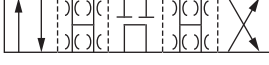
SPOOL TYPE	FLOW CURVE NUMBER					
	SPOOL SHIFTED			SPOOL CENTERED		
	P to A or B	B to T	A to T	A to T	B to T	P to T
A	3	2	1	N/A	N/A	N/A
B	2	1	1	2	2	4
F	3	2	1	2	5	N/A
L	6	6	5	N/A	N/A	4
Subplate	S (FULL CIRCUIT)					

MAXIMUM FLOW

		FUNCTION CODE	SPOOL CODE			
			A	B	F	L
(lpm) (70 bar) @ gpm 1000 psi	1	(68) 18	(68) 18	(68) 18	N/A	
	2	(68) 18	(68) 18	(68) 18	N/A	
	3, 5	(68) 18	(68) 18	(68) 18	(68) 18	
(lpm) (140 bar) @ gpm 2000 psi	1	(57) 15	(57) 15	(57) 15	N/A	
	2	(57) 15	(57) 15	(57) 15	N/A	
	3, 5	(57) 15	(57) 15	(57) 15	(57) 15	
(lpm) (210 bar) @ gpm 3000 psi	1	(45) 12	(45) 12	(45) 12	N/A	
	2	(45) 12	(45) 12	(45) 12	N/A	
	3, 5	(45) 12	(45) 12	(45) 12	(45) 12	

N/A Not available.

SPOOL DESCRIPTION

CODE	SYMBOL	SPOOL FUNCTION	CENTER POSITION	CROSSOVER
A			All ports blocked	All ports blocked
B			All ports open	All ports open
F			P blocked A & B to T	P blocked A or B to T
L			P to T A & B blocked	All ports open, restricted

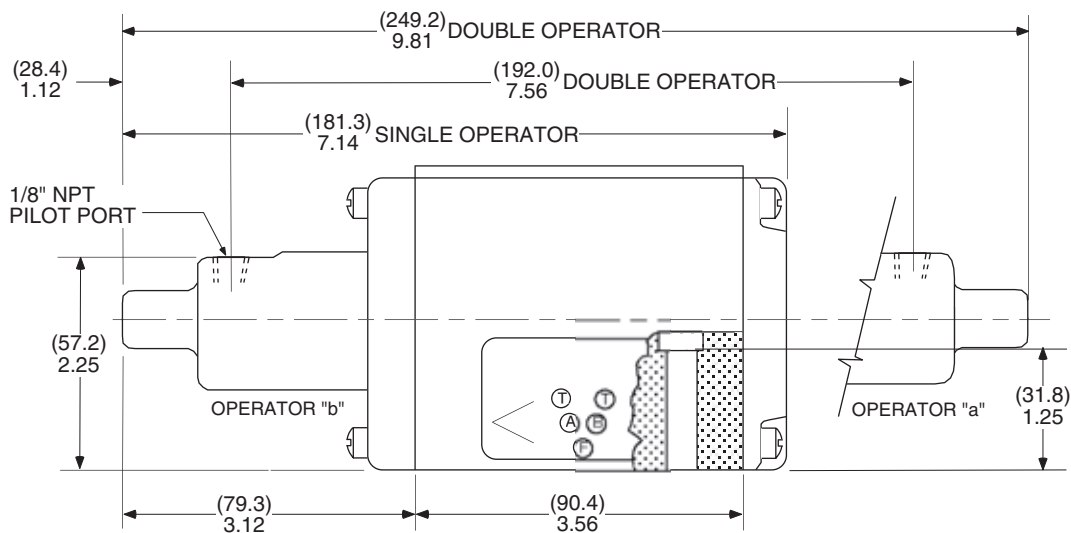
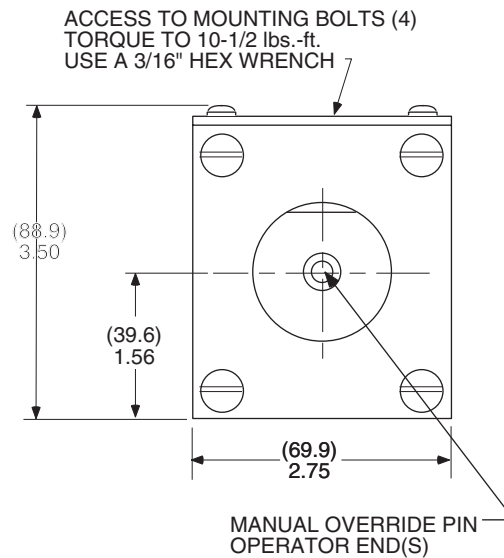
VA12M DIRECTIONAL CONTROL VALVES

AIR ACTUATED, DIRECT OPERATED

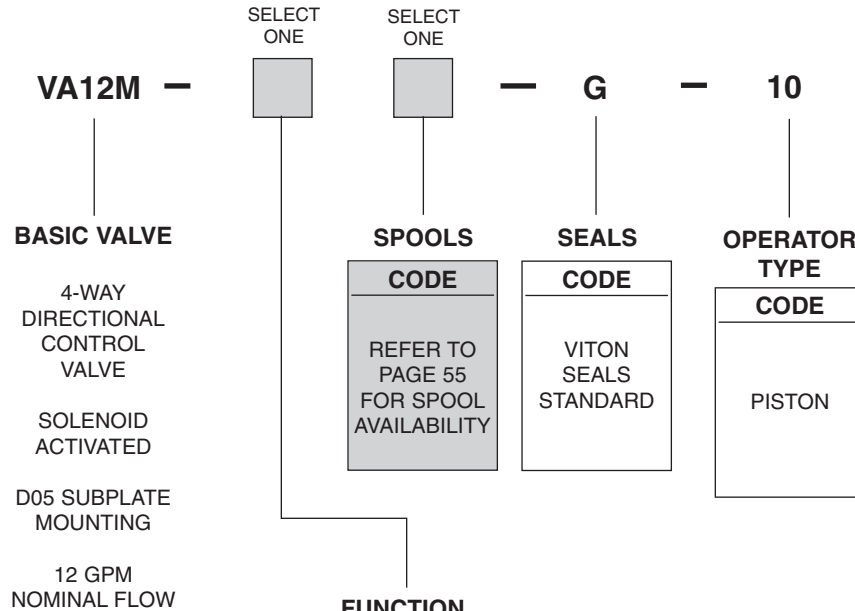


NFPA D05 SIZE
FOR INTERFACE
PATTERN, SEE
MOUNTING SURFACE
SECTION

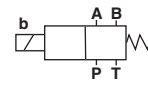
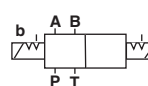
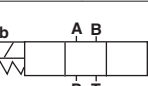
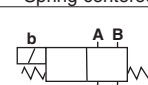
DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES



ORDERING INFORMATION



FUNCTION

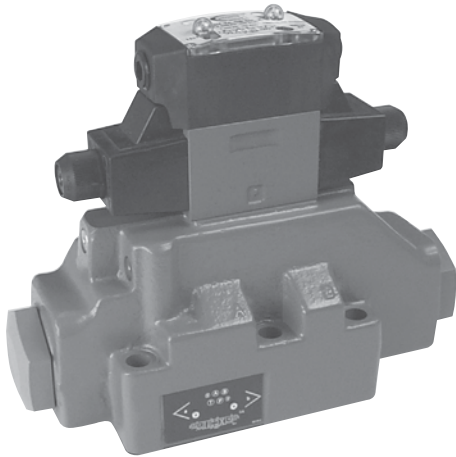
CODE	OPTION
1	 <p>Single actuator • 2 position Spring offset</p>
2	 <p>Double actuator • 3 position No spring, detented</p>
3	 <p>Double actuator • 3 position Spring centered</p>
5	 <p>Single actuator • 2 position Spring centered</p>

TYPICAL ORDERING CODE: **VA12M-1A-G-10**

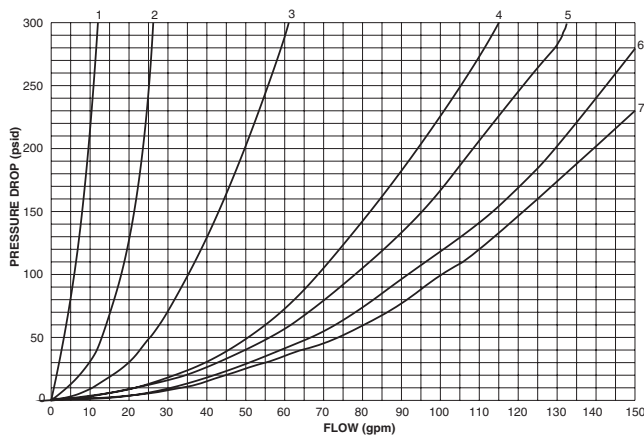
VAD08M

DIRECTIONAL CONTROL VALVES

AIR ACTUATED, PILOT OPERATED



TYPICAL PRESSURE DROP CURVES



FLOW PATH ?P CURVES

SPOOL TYPE	FLOW CURVE NUMBERS									
	SPOOL SHIFTED					SPOOL CENTERED				
	P to A	P to B	A to T	B to T	P to A	P to B	A to T	B to T	P to T	
A	7	7	6	6	N/A	N/A	N/A	N/A	N/A	
A2	7	7	3	3	N/A	N/A	N/A	N/A	N/A	
A3	7	7	2	2	N/A	N/A	N/A	N/A	N/A	
B	7	7	6	6	N/A	N/A	N/A	N/A	5	
F	7	7	6	6	N/A	N/A	5	5	N/A	
F1	7	7	6	6	N/A	N/A	1	1	N/A	
F2	7	7	3	3	N/A	N/A	1	1	N/A	
F3	7	7	2	2	N/A	N/A	1	1	N/A	
G	7	7	6	6	4	4	N/A	N/A	N/A	
K	7	7	6	6	N/A	N/A	5	N/A	N/A	
L	5	5	5	5	N/A	N/A	N/A	N/A	4	

INTERNAL LEAKAGE PER SEALING LAND

PRESSURE (psi)	500	1000	1500	2500	3500	4500	5000
LEAKAGE (cipm)	4	9	16	29	44	—	—

NOTES: Leakage measured with fluid viscosity of 100 SUS.
Leakage at different viscosity is approximately proportional to ratio of viscosity being used and 100 SUS oil.

TYPICAL PERFORMANCE SPECIFICATIONS

Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

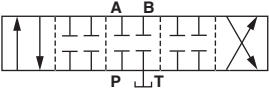
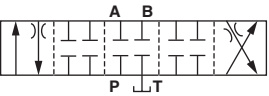
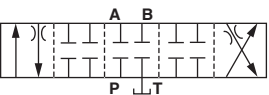
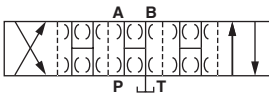
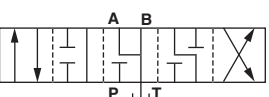
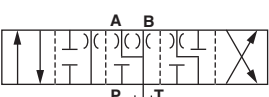
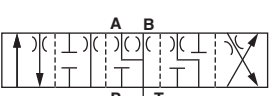
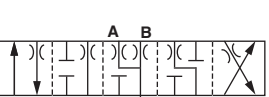
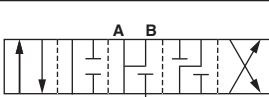
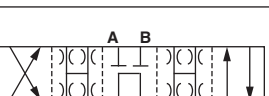
FLOW CAPACITY	Nominal	50 gpm	190 lpm
	Maximum	125 gpm	473 lpm
MAXIMUM OPERATING PRESSURES	P, A, B, X Ports	5000 psi	345 bar
	T w/ext. drain	3000 psi	207 bar
	T w/int. drain	300 psi	21 bar
	Y port	3000 psi	207 bar
MINIMUM OIL PILOT PRESSURE		70 psi	4.8 bar
MAIN SPOOL DISPLACEMENT	Offset to Offset	1.23 cu. in.	20 ml
	Center to Offset	0.62 cu. in.	10 ml
INTERNAL: LEAKAGE (PER SEALING LAND) 100 SUS	1000 psi	9 cipm	148 mlpm
	2000 psi	23 cipm	380 mlpm
	3000 psi	37 cipm	600 mlpm
	3500 psi	44 cipm	720 mlpm
AIR PILOT PRESSURE	Maximum	150 psi	10 bar
	Minimum	50 psi	3.5 bar
MAXIMUM CYCLE RATE		300 cpm	
MOUNTING SURFACE		ANSI/B93.7-1986 - D08 ISO 4401 - SIZE 08	
WEIGHT	Single Actuator	31 lbs.	14 kg
	Double Actuator	32 lbs.	14.5 kg
SPOOL CODES AVAILABLE		SEE CHART	

All pressure drops shown on this data page are based on 100 SUS fluid viscosity and 0.87 specific gravity. See the chart below for other viscosities.

Fluid Viscosities	CS	14.5	20.5	32	43	54	65	76	86
	SUS	75	100	150	200	250	300	350	400
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41

For any other specific gravity (G_1) the pressure drop (?P) will be approximately $?P_1 = ?P (G_1/G)$.

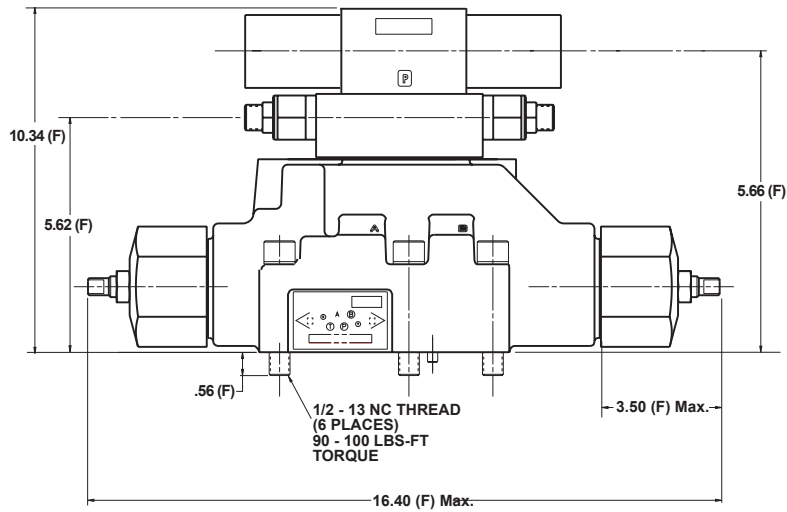
SPOOL CONFIGURATION

SPOOL TYPE	SPOOL SYMBOL		
A	A Port End		B Port End
A2	A Port End		B Port End
A3	A Port End		B Port End
B	A Port End		B Port End
F	A Port End		B Port End
F1	A Port End		B Port End
F2	A Port End		B Port End
F3	A Port End		B Port End
G	A Port End		B Port End
L	A Port End		B Port End

NFPA D08 SIZE
 FOR INTERFACE PATTERN,
 SEE MOUNTING SURFACE
 SECTION

DIMENSIONS SHOWN IN: (MILLIMETERS)
 INCHES

Codes JJ, JA, JB and KK



NOTE:

* Meter out flow control provides soft shift to centering position.

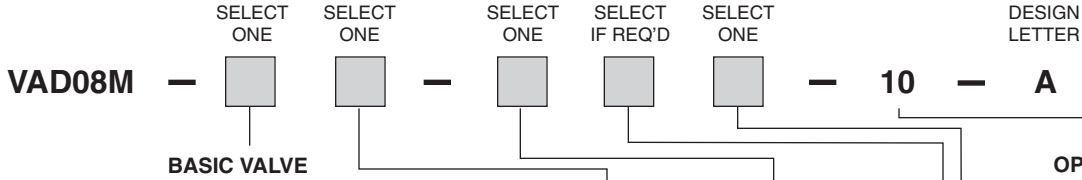
VAD08M

DIRECTIONAL CONTROL VALVES

AIR ACTUATED, PILOT OPERATED



ORDERING INFORMATION



CODE	DESCRIPTION	SYMBOL	SPOOL AVAILABLE
1	SINGLE OPERATOR 2 POSITION SPRING OFFSET		ALL SPOOLS EXCEPT G & L
2	DOUBLE OPERATOR 2 POSITION DETENT PILOTS (NO SPRING)		ALL SPOOLS EXCEPT G & L
3*	DOUBLE OPERATOR 3 POSITION SPRING CENTERED		ALL SPOOLS
5*	SINGLE OPERATOR 2 POSITION SPRING CENTERED		ALL SPOOLS

CODE	DESCRIPTION
G	VITON

CODE	DESCRIPTION
10	AIR OPERATOR (40 TO 150 PSI AIR PRESSURE)

CODE	PILOT PRESSURE	DRAIN
1*	INTERNAL	EXTERNAL
2	EXTERNAL	EXTERNAL
3*	INTERNAL	INTERNAL
4	INTERNAL	INTERNAL

* 70C Mechanical option may be used to insure adequate pilot pressure to fully shift spool on internal pilot pressure valves with open center spools ("B" and "L" spools).

* Operator identification reversed with "L" spool.

SPOOL

CODE	SYMBOL	CODE	SYMBOL
A*		F1*	
A2**		F2**	
A3***		F3***	
B* †		G*	
F*		L* † ‡	

* Rated @ 50 gpm flow; 125 gpm max. recommended flow.

** Rated @ 25 gpm flow; 50 max. gpm recommended flow.

*** Rated @ 12 gpm flow; 25 max.

† 70C Mechanical option may be used to insure adequate pilot pressure to fully shift spool on internal pilot pressure valves with open center spools ("B" and "L" spools).

‡ Operator I.D. reversed with "L" spool.

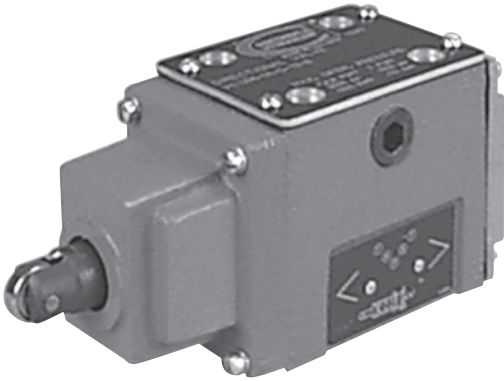
MECHANICAL

CODE	DESCRIPTION
JJ*	STROKE ADJUSTMENT BOTH ENDS
KK	ADJUSTMENT PILOTS BOTH ENDS
70C**	CHECK VALVE "P" PORT; 70 PSI CRACK PRESSURE
JA	SINGLE STROKE ADJUSTMENT "A" PORT END
JB	SINGLE STROKE ADJUSTMENT "B" PORT END
R	REVERSE MODULE (USE STANDARD PILOT)

* Not available with basic valve code no. 5.

** 70C Mechanical option may be used to insure adequate pilot pressure to fully shift spool on internal pilot pressure valves with open center spools ("B" and "L" spools).

NFPA SIZE D05

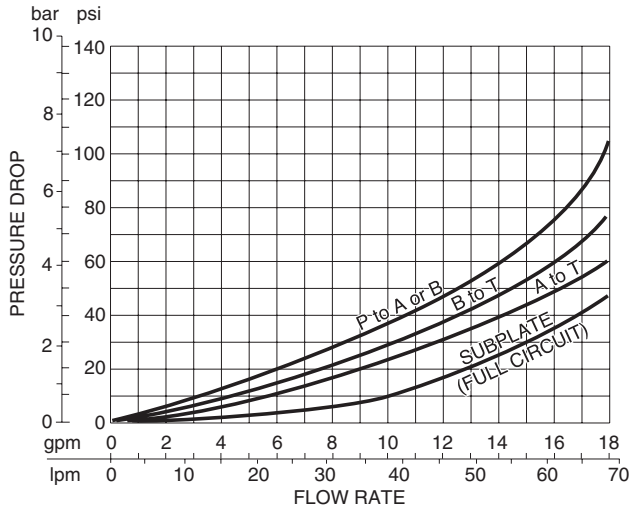


TYPICAL PERFORMANCE SPECIFICATIONS

Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half circuit) is used, i.e. A or B port plugged.

NOMINAL FLOW RATE	12 gpm	46 lpm	
MAXIMUM FLOW RATE	25 gpm	95 lpm	
MAXIMUM OPERATING PRESSURE	P, A, B Ports	3500 psi	250 bar
	T Port	1000 psi	70 bar
INTERNAL LEAKAGE	(1-port) 3500 psi 100 SUS	5.2 cipm	85 mlpm
MAXIMUM CYCLE RATE	500 cpm		
MOUNTING SURFACE	ANSI/B93.7M-1986 - D05 ISO 4401 - SIZE 05		
CAM FORCE AT MAXIMUM PRESSURE	9.5 lbs.	4.3 kg	
	10 lbs.	4.5 kg	
WEIGHT	10 lbs.	4.5 kg	
SPOOL CODES AVAILABLE	A		

TYPICAL PRESSURE DROP CURVES

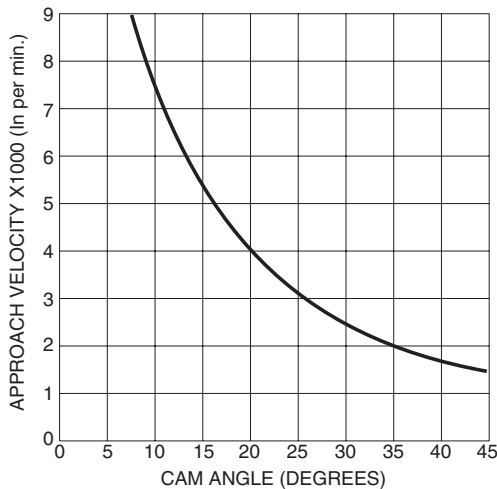


All pressure drops shown on this data page are based on 100 SUS fluid viscosity and 0.87 specific gravity. See the chart below for other viscosities.

Fluid	CS	14.5	20.5	32	43	54	65	76	86
Viscosities	SUS	75	100	150	200	250	300	350	400
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41

For any other specific gravity (G_1) the pressure drop $?P$ will be approximately $?P_1 = ?P (G_1/G)$.

MAXIMUM CAM APPROACH VELOCITY



VC12M

DIRECTIONAL CONTROL VALVES

CAM ACTUATED, DIRECT OPERATED



SPOOL DESCRIPTION

CODE	SYMBOL	SPOOL FUNCTION	CENTER POSITION	CROSSOVER
A			All ports blocked	All ports blocked

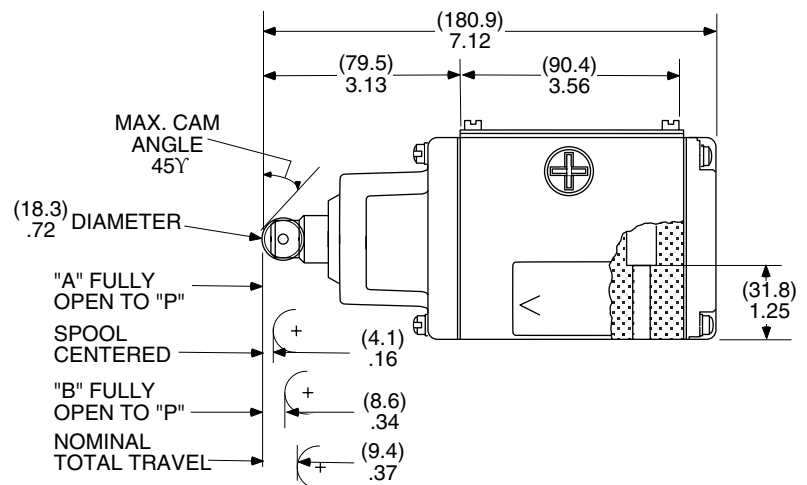
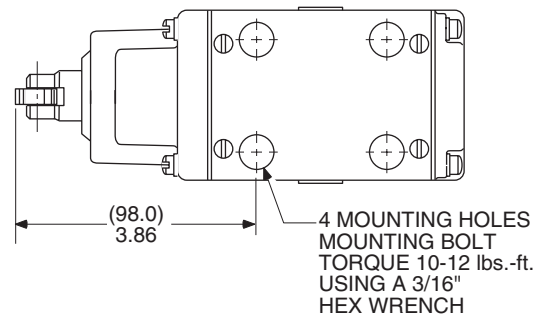
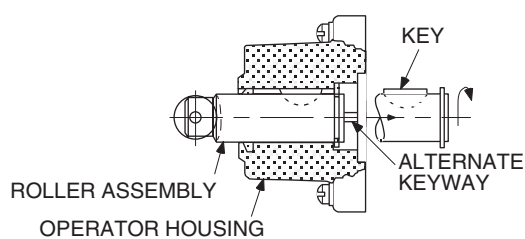
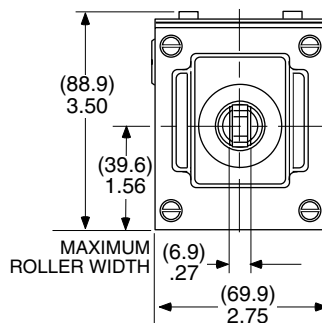
NFPA D05 SIZE

DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES

FOR INTERFACE PATTERN,
SEE MOUNTING SURFACE

"B" OPERATOR

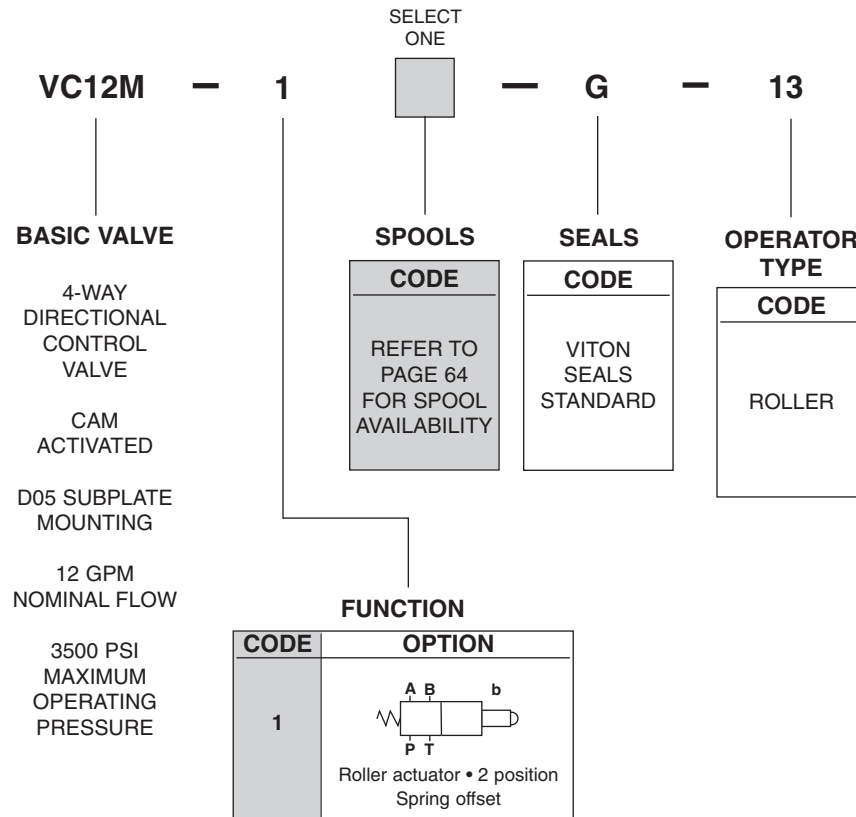
SECTION



To position cam roller parallel to mounting surface:

1. Remove actuator assembly from valve body (4 screws).
2. Slide roller assembly back, rotate 90°, align key with alternate keyway in housing, and re-insert roller assembly.
3. Reassemble operator to valve body.

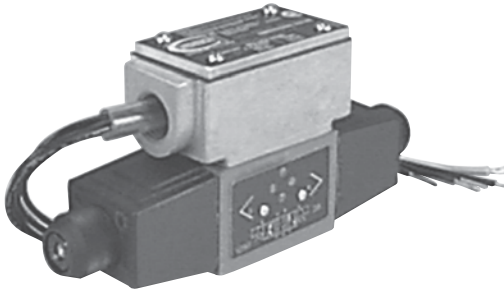
ORDERING INFORMATION



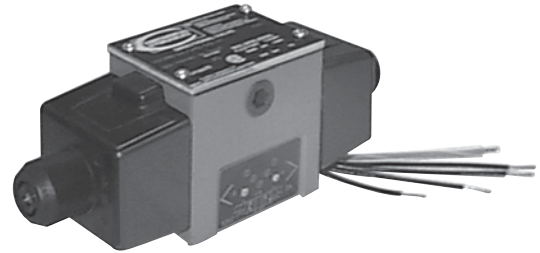
TYPICAL ORDERING CODE: **VC12M-1A-G-13**

VS5M, VS12M, VS50M & DVS50M HAZARDOUS DUTY DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OR PILOT OPERATED



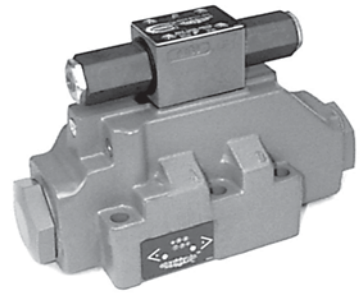
NFPA SIZE D03



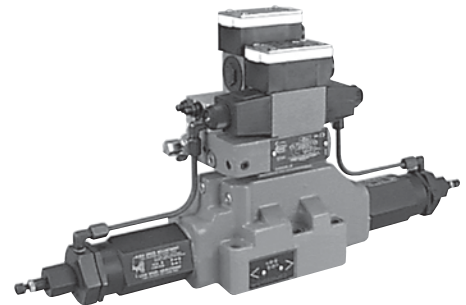
NFPA SIZE D05

VALVE FEATURES

- 24" long lead wires.
- Ground terminal located in wiring cavity.
- Electrical certification in accordance with **CSA STD. C22.2 No. 25-1966 for use in Class II; groups E, F, & G hazardous locations.**
- May be used in locations as defined in the National Electrical Code Class II; Div. 1 & 2; Groups E, F, & G. Designed in accordance with ANSI/NEMA ICS6110.26 Type 9 standards. (Combustible dust environments, i.e. metallic, coal, grain).
- CSA Certified (Canadian Std.Assn.).
- Same performance curves and specifications as VS5M, VS12M, VS50M or DVS50M valves unless noted below.
- These valves are not field-repairable.



NFPA SIZE D08



DeAccelatrol
NFPA SIZE D08

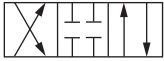
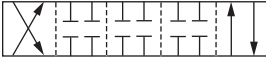
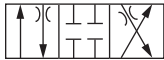
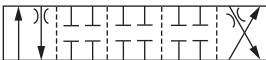

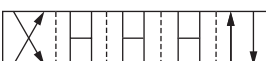

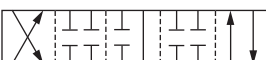

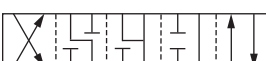



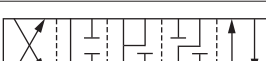

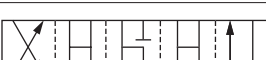

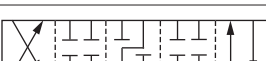

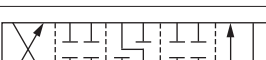

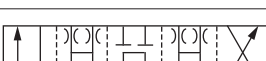




TYPICAL ELECTRICAL & RESPONSE TIME

SOLENOID CODE* 50L (110/120V 50/60 Hz)	VOLTAGE & FREQUENCY	VOLTAGE LIMITS	INRUSH CURRENT (AMPS)	HOLDING CURRENT	HOLDING POWER	RESPONSE TIME (MILLISECONDS)	
						VOLTS - Hz.	MIN. - MAX.
VS5M	120 - 60	108 - 126	2.50	.56	28	12	15
	110 - 50	99 - 116		.69	31	14	15
VS12M	120 - 60	108 - 126	5.00	.91	45	12	15
	110 - 50	99 - 116	6.20	1.10	43	12	15
VS50M, DVS50M	120 - 60	108 - 126	2.50	.56	28	SEE RESPONSE DATA FOR VS50M OR DVS50M VALVES	
	110 - 50	99 - 116		.69	31		

* Consult factory on other voltages:

- VS5M, CS50M; 240V AC, 60HA, 28 WATT; 12 & 24V DC, 24 WATT.
- VS12M; 240V AC, 60 HZ, 45 WATT; 12 & 24VV DC, 44WATT.

SPOOL DESCRIPTION

CODE	SYMBOL	SPOOL FUNCTION	CENTER POSITION	CROSSOVER
A			All ports blocked	All ports blocked
A2			All ports blocked	All ports blocked
B			All ports open	All ports open
E			P & A blocked B to T	All ports blocked
F			P blocked A & B to T	P blocked A or B to T
F1			P blocked A & B restricted to T	P blocked A or B restricted to T
G*			P to A or B T & A or B blocked	P to A or B T & A or B blocked
H			P to A & T B blocked	All ports open
J			P to B A & T blocked	All ports blocked
K			P to B blocked A to T	All ports blocked
L			P to T A & B blocked	All ports open, restricted
N			P to A B & T blocked	All ports blocked
Q			P to B & T A blocked	All ports open

* VS50M G spool available for quantity orders only. Consult factory for price and delivery.

NOTES: Code G or L available on Codes 3 and 5 valves only.
Code F1 available on Codes 1, 3 and 5 valves only.
Code B not available on Code 1 with D.C. solenoids.

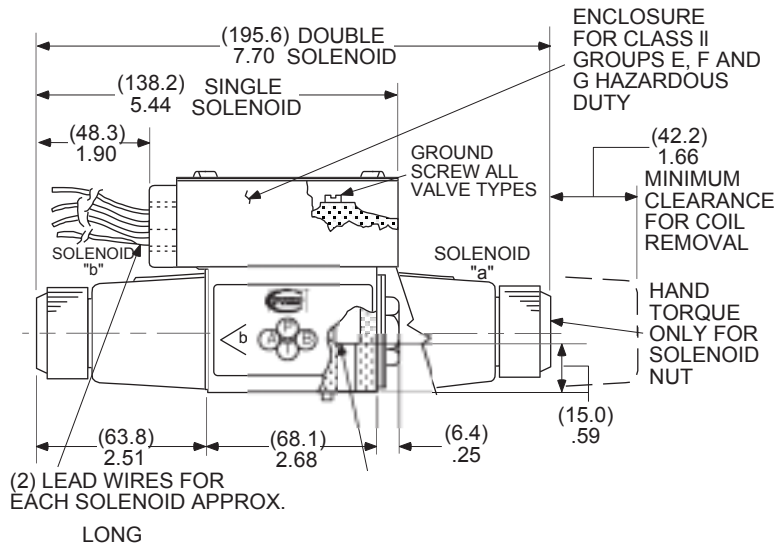
VS5M, VS12M, VS50M & DVS50M HAZARDOUS DUTY DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OR PILOT OPERATED

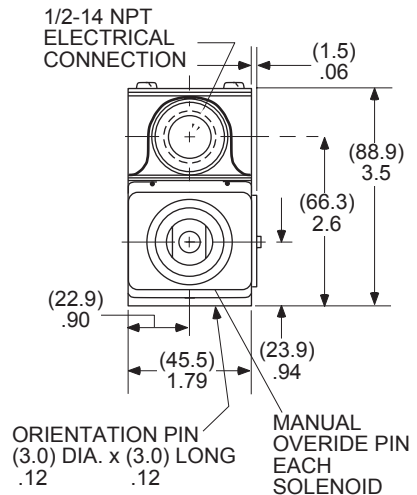


VS5M VALVES AC SOLENOIDS (SINGLE & DOUBLE)

DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES



NFPA D03 SIZE
SEE MOUNTING SURFACES SECTION FOR INTERFACE PATTERN



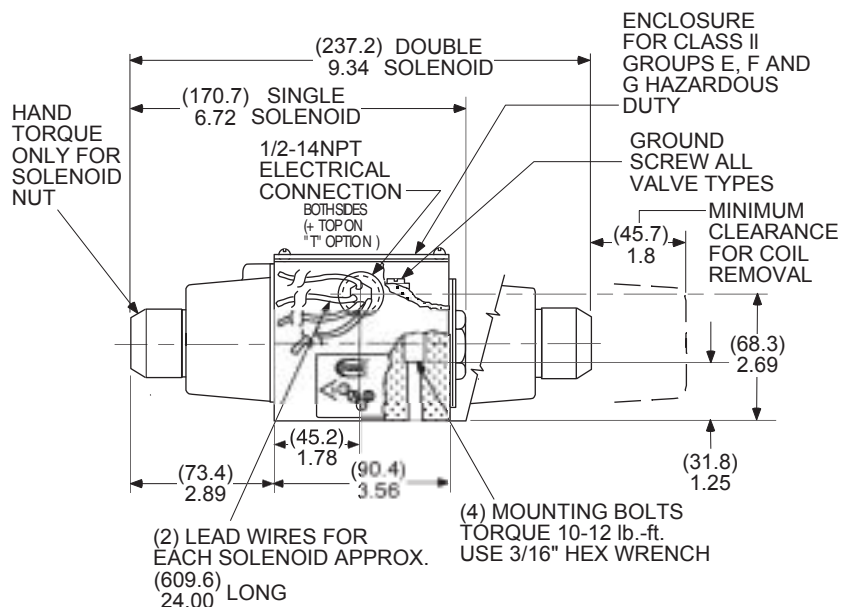
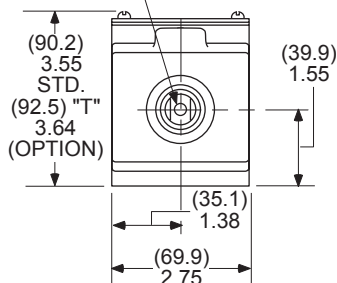
VS12M VALVES

NFPA D05 SIZE
SEE MOUNTING SURFACES SECTION FOR INTERFACE PATTERN

NOTE: "T" OPTION ENABLES MANIFOLD MOUNTING

CONNECTION CENTERED ON NAMEPLATE

MANUAL OVERRIDE PIN, EACH SOLENOID



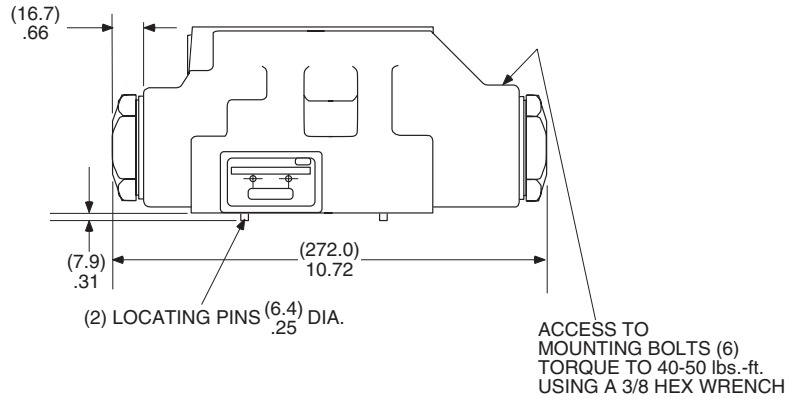
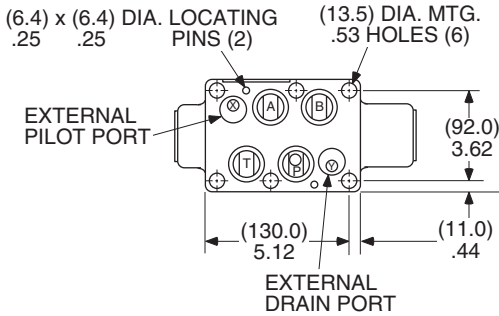
VS5M, VS12M, VS50M & DVS50M HAZARDOUS DUTY DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OR PILOT OPERATED

VS50M VALVE

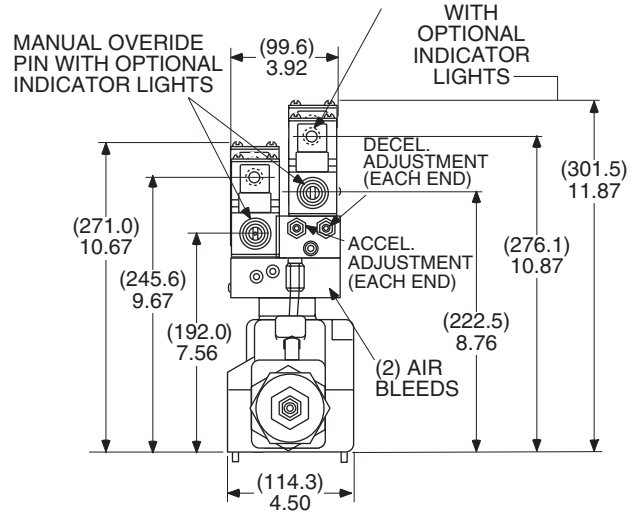
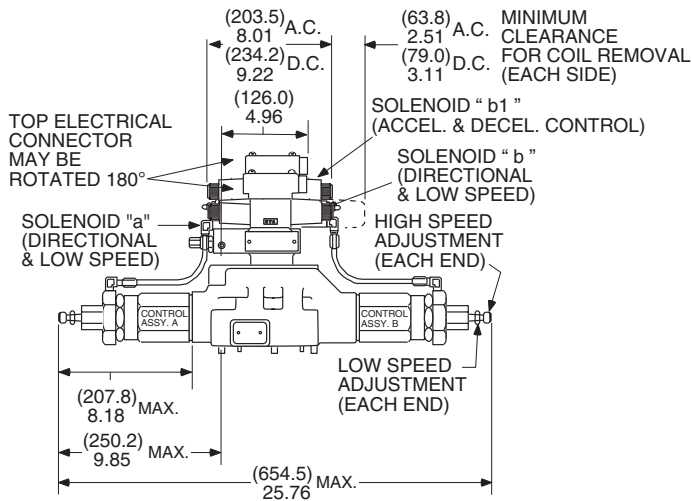
DIMENSIONS SHOWN IN: (MILLIMETERS)
 INCHES

NFPA D08 SIZE
 SEE MOUNTING
 SURFACES SECTION FOR
 INTERFACE PATTERN

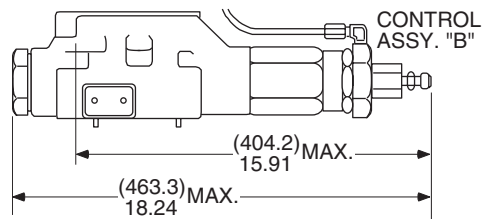
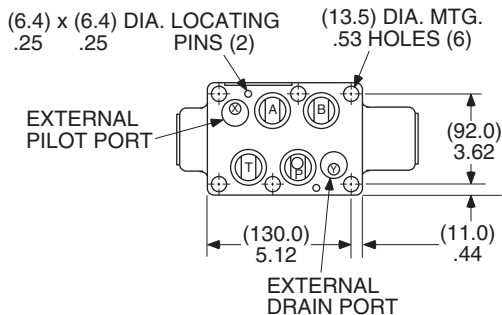


DVS50M VALVES

NFPA D08 SIZE
 SEE MOUNTING
 SURFACES SECTION FOR
 INTERFACE PATTERN



CODES 5 & 8



VS5M, VS12M, VS50M & DVS50M HAZARDOUS DUTY DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OR PILOT OPERATED



ORDERING INFORMATION

VS M - - G HD - 50L

SELECT ONE SELECT ONE SELECT ONE SELECT ONE SELECT ONE SELECT ONE

SIZE

CODE	DESCRIPTION
5	NOMINAL 7 GPM
12	NOMINAL 12 GPM
50	NOMINAL 50 GPM

PILOT - DRAIN LOCATION

CODE	PILOT PRESSURE	DRAIN
1*	INTERNAL	EXTERNAL
2	EXTERNAL	EXTERNAL
3*	INTERNAL	INTERNAL
4	EXTERNAL	INTERNAL

ELECTRICAL OPTIONS

CODE	OPTION
OMIT	NONE
T	TOP CONNECTION FOR VS12M

FUNCTION

CODE	OPTION
1	 Single actuator • 2 position Spring offset
2	 Double actuator • 3 position No spring, detented
3	 Double actuator • 3 position Spring centered
5	 Single actuator • 2 position Spring centered
6	 Single actuator • 2 position Spring offset, energize to center

SPOOLS

AVAILABLE CODES				
	VS5M	VS12M	VS50M	
	A	A	A	F
	B	B	A2	F1
	F	F	B	
	A	A	A	F
	B	B	A2	F1
	F	F	B	
	ALL SPOOLS	A B F F1	G K L	A F F1 G L
	ALL SPOOLS	A B F F1	G K L	F1 G L
	N/A	A B F F1		N/A

MECHANICAL OPTIONS

CODE	OPTION
OMIT	NONE
R	SINGLE SOLENOID REVERSE ASS'Y. SOLENOID "A" SUPPLIED
JJ*	ADJUST PILOT CHOKES BOTH ENDS
KK*	ADJUST PILOT CHOKES BOTH ENDS
70C*†	CHECK VALVE "P" PORT 70 PSI CRACK PRESSURE

* Available on VS50M only.
† Check valve may be required on VS50M only to ensure adequate pilot pressure to shift spool on internal pilot valve (Code1 or 3) with open center spools (Codes B and L).

ORDERING INFORMATION:

VS5M-2A-GHD-50L

VS12M-5F1-GRHD-50L

VS50M-3F1-GKK1HD-50L

VSD03M

DIRECTIONAL CONTROL VALVES WITH EXPLOSION-PROOF SOLENOIDS

NFPA SIZE D03

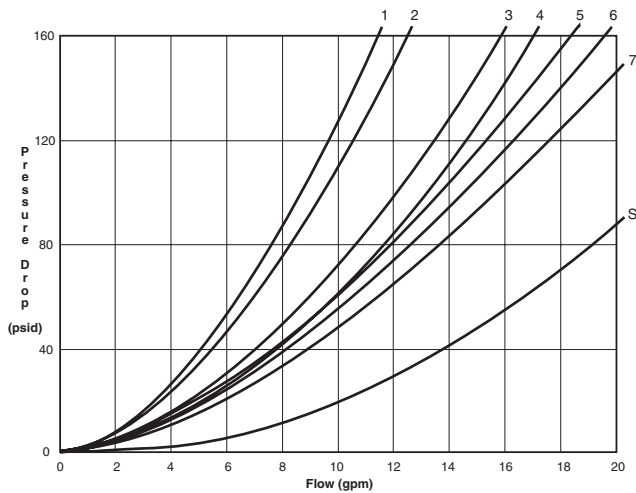


TYPICAL PERFORMANCE SPECIFICATIONS

Performance is measured on a four-way circuit (full circuit). Performance may be reduced from that shown if a three-way circuit (half-circuit) is used, i.e. A or B port plugged.

FLOW RATE - (up to)		20 gpm	76 lpm
MAXIMUM OPERATING PRESSURE	P, A, B Ports	5000 psi	345 bar
	T Port (Includes surges)	1000 psi	69 bar
MAXIMUM CYCLE RATE	AC Solenoids	400 cpm	
	DC Solenoids	300 cpm	
MOUNTING SURFACE	NFPA/T3.5.1M R1-1984 (D03) (Formerly D01) ANSI/B93.7M - 1986 - D03 ISO 4401 - SIZE 05		
WEIGHT	Single Actuator	8.3 lbs.	3.76 kg
	Double Actuator	14.1 lbs.	6.40 kg
SPOOL CODES AVAILABLE	SEE CHART		

TYPICAL PRESSURE DROP CURVES



LSK SOLENOIDS ARE:

- Class I Groups C & D
- Class II Groups E, F & G (Both Division I & 2)
- Temperature Code No. T3C
- CSA Certified LR 49650-1
- UL Listed; File No. E71190 (N)
- Recognized by U.S. Coast Guard
- Registered by Lloyd's Register of Shipping

All pressure drops shown on this data page are based on 100 SUS fluid viscosity and 0.87 specific gravity. See the chart below for other viscosities.

Fluid	CS	14.5	20.5	32	43	54	65	76	86
Viscosities	SUS	75	100	150	200	250	300	350	400
Multiplier		0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41

For any other specific gravity (G1) the pressure drop (?P) will be approximately ?P1 = ?P (G1/G).

VSD03M

DIRECTIONAL CONTROL VALVES

WITH EXPLOSION-PROOF SOLENOIDS



FLOW PATH ?P CURVES

SPOOL TYPE	FLOW CURVE NUMBER				
	SPOOL SHIFTED		SPOOL CENTERED		
	P to A or B	A or B to T	P to A or B	A or B to T	P to T
A	5	4	N/A	N/A	N/A
A Code 1 & 2	2	2	N/A	N/A	N/A
B	1	4	1	3	3
B Code 1 & 2	2	1	3	3	4
F	5	1	N/A	6	N/A
L	3	5	N/A	N/A	7

SPOOL DESCRIPTION

CODE	SYMBOL	SPOOL FUNCTION	CENTER POSITION	CROSSOVER
A			All ports blocked	All ports blocked
B			All ports open	All ports open
F			P blocked A & B to T	P blocked A or B to T
L			P to T A & B blocked	All ports open, restricted

NOTE: Consult the factory for other spool configurations.

TYPICAL ELECTRICAL & RESPONSE TIME

SOLENOID CODE NO.	RATED VOLTAGE & FREQUENCY (VOLTS - Hz.)	ACCEPTABLE VOLTAGE (MIN. - MAX.)	MAXIMUM INRUSH CURRENT (AMP)	HOLDING CURRENT & RATED VOLTAGE (AMP)	HOLDING CURRENT & MINIMUM ACCEPTABLE VOLTAGE	HOLDING POWER & RATED VOLTAGE (WATTS)
80L	120 - 60	108 - 126	2.2	.58	.38	27
87L	24 DC	21 - 26	1.37	1.37	1.20	33
88L	12 DC	10 - 13	2.75	2.75	2.29	33

VSD03M

DIRECTIONAL CONTROL VALVES WITH EXPLOSION-PROOF SOLENOIDS

MAXIMUM FLOW**

SPOOL CODE

	FUNCTION CODE	A		B		F*		L	
		AC	DC	AC	DC	AC	DC	AC	DC
(lpm) (70 bar) @ gpm 1000 psi	1	(49) 13	(49) 13	(60) 16	(45) 12	N/A	N/A	N/A	N/A
	2	(57) 15	(49) 13	(64) 17	(49) 13	N/A	N/A	N/A	N/A
	3, 5	(76) 20	(68) 18	(49) 13	(38) 10	(49) 13	(45) 12	N/A	N/A
(lpm) (140 bar) @ gpm 2000 psi	1	(42) 11	(42) 11	(53) 14	(34) 9	N/A	N/A	N/A	N/A
	2	(53) 14	(45) 12	(64) 17	(49) 13	N/A	N/A	N/A	N/A
	3, 5	(76) 20	(68) 18	(49) 13	(38) 10	(49) 13	(38) 10	N/A	N/A
(lpm) (210 bar) @ gpm 3000 psi	1	(42) 11	(42) 11	(49) 13	(19) 5	N/A	N/A	N/A	N/A
	2	(49) 13	(45) 12	(64) 17	(34) 9	N/A	N/A	N/A	N/A
	3, 5	(76) 20	(64) 17	(45) 12	(38) 10	(45) 12	(23) 6	N/A	N/A
(lpm) (276 bar) @ gpm 4000 psi	1	(42) 11	(42) 11	(49) 13	(11) 3	N/A	N/A	N/A	N/A
	2	(49) 13	(42) 11	(60) 16	(23) 6	N/A	N/A	N/A	N/A
	3, 5	(68) 18	(64) 17	(42) 11	(26) 7	(15) 4	N/A	N/A	N/A
(lpm) (345 bar) @ gpm 5000 psi	1	(42) 11	(42) 11	(45) 12	(11) 3	N/A	N/A	N/A	N/A
	2	(49) 13	(38) 10	(60) 16	(15) 4	N/A	N/A	N/A	N/A
	3, 5	(68) 18	(57) 15	(38) 10	(11) 3	N/A	N/A	N/A	N/A

N/A Not Available. * "F" spool pilot valve may be used up to 5000 psi.

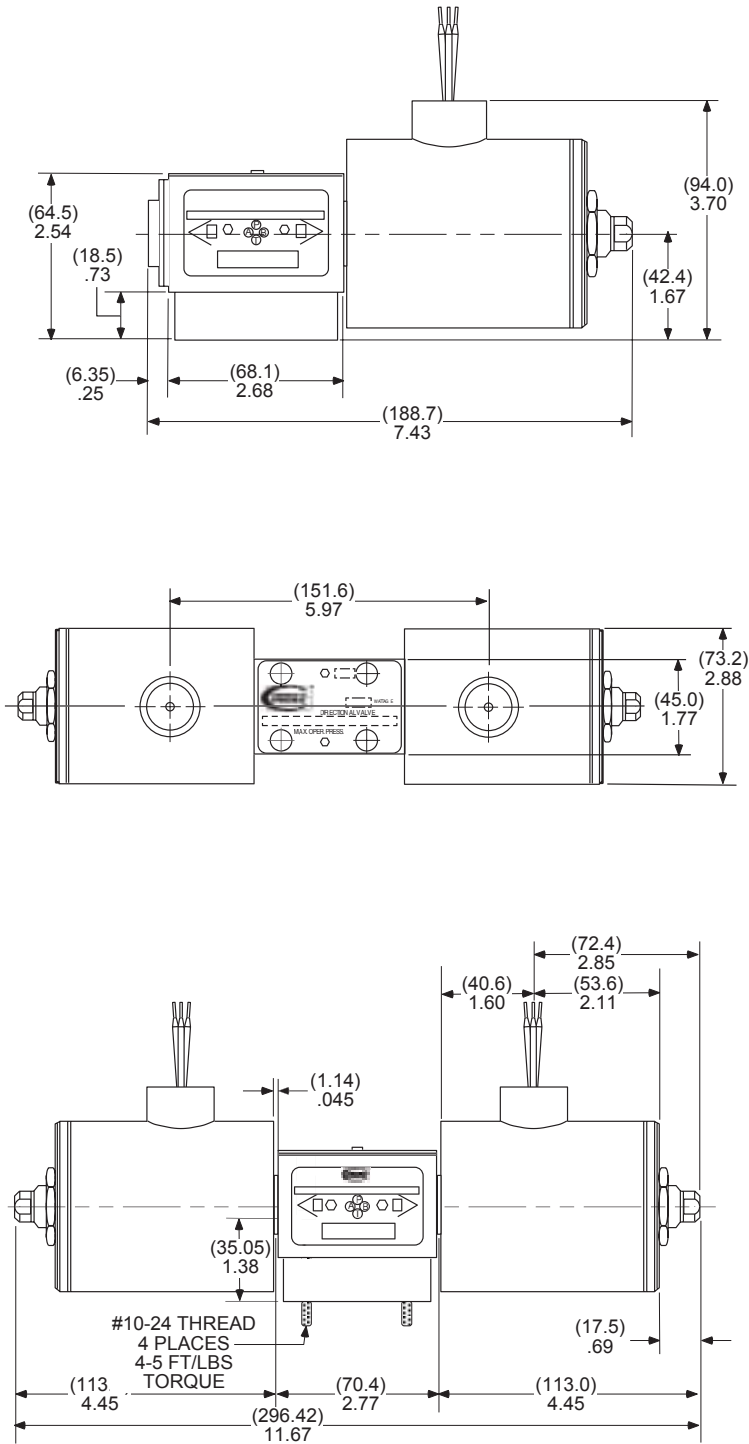
** Performance measured on a four-way circuit (full circuit) with cylinder ports looped together @ 90% voltage for AC & DC solenoids measured @ 100 SUS oil viscosity & warm solenoids. Performance may be reduced from that shown with one flow direction as in the case when "A" or "B" port is plugged (half circuit).

VSD03M DIRECTIONAL CONTROL VALVES WITH EXPLOSION-PROOF SOLENOIDS



DIMENSIONS

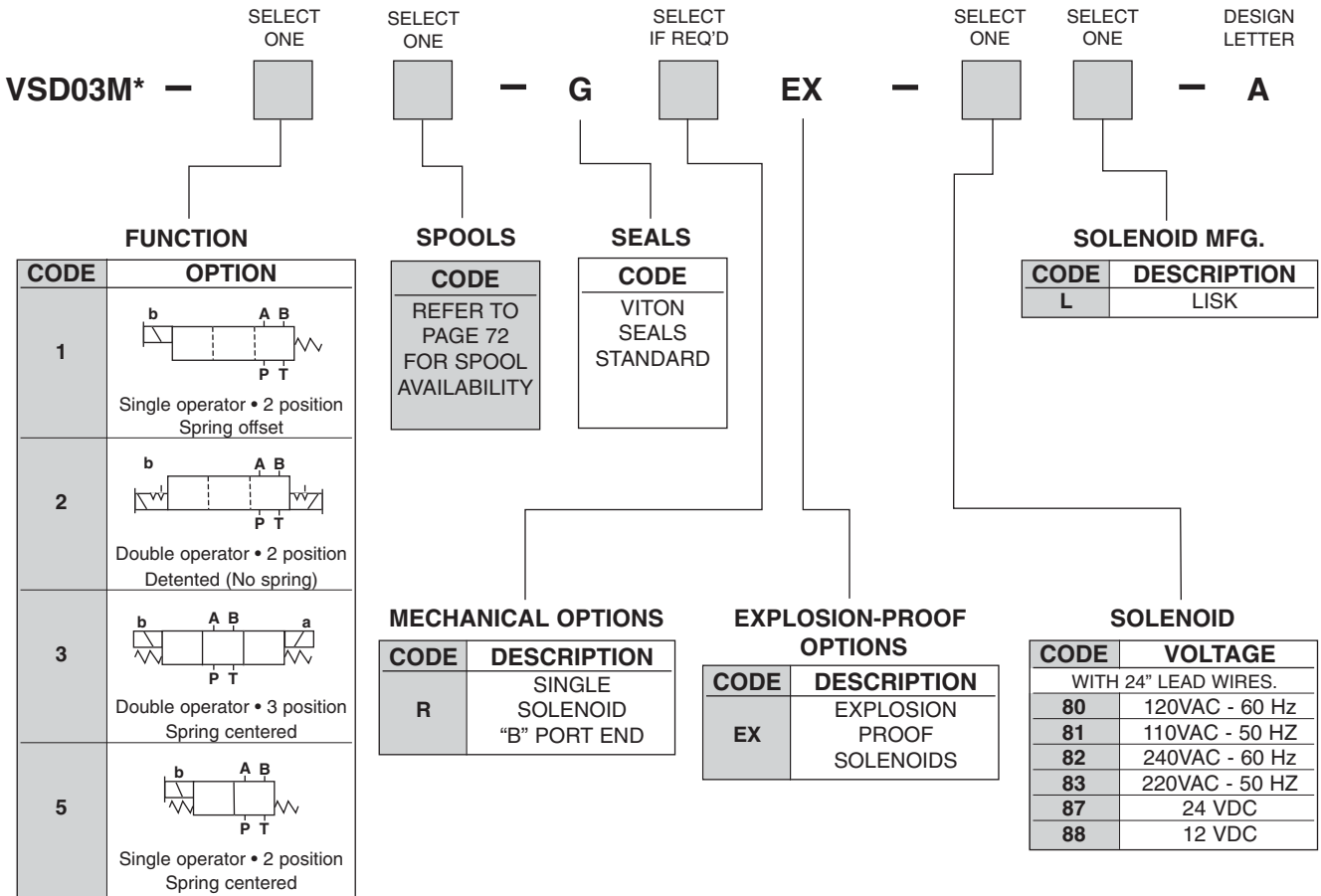
DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES



VSD03M

DIRECTIONAL CONTROL VALVES WITH EXPLOSION-PROOF SOLENOIDS

ORDERING INFORMATION



* **PLEASE NOTE:**
 The complete VSD03M valve assembly is not CSA or UL certified.
 However, the Lisk solenoid valves are certified.

TYPICAL ORDERING CODE: **VSD03M-3A-GEX-80L-A**

DVS50M

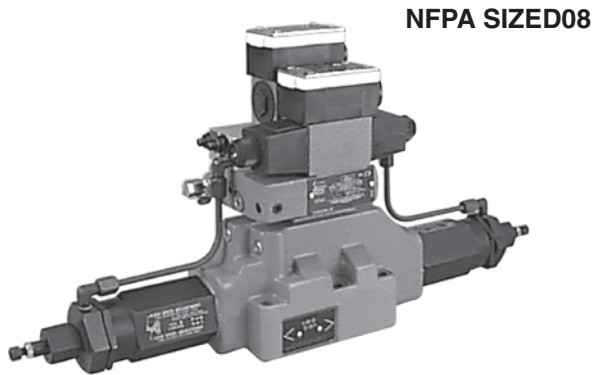
*DeACCELATROL® VALVE

SOLENOID ACTUATED, PILOT OPERATED



* U.S. Patent No. 3,213,886

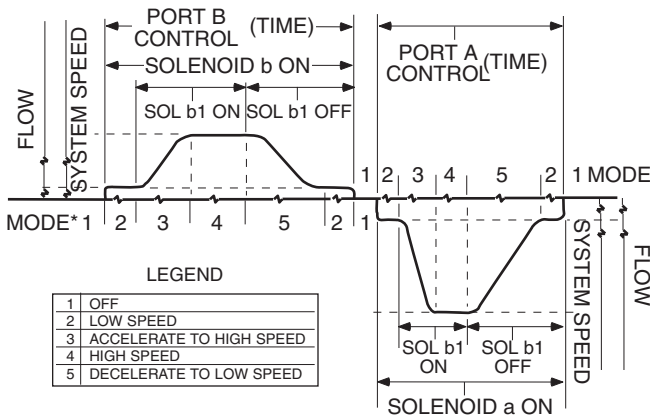
ACCEL./DECEL. HIGH/LOW SPEED MOTION CONTROL VALVE



NFPA SIZED08

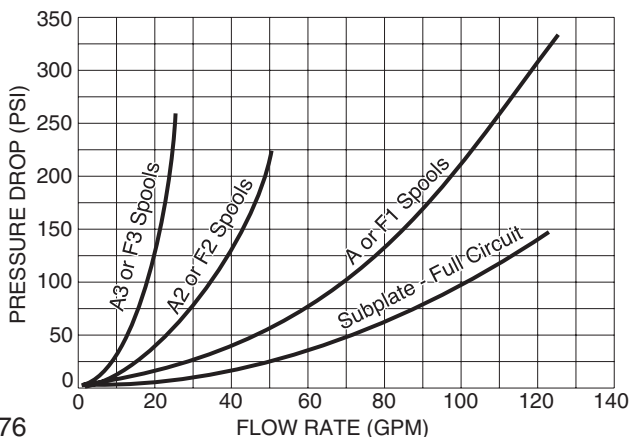
CSA CERTIFIED

TIME/FLOW CONTROL CYCLE



PRESSURE DROP CURVE

Typical Valve Pressure Drop:
P to (A or B) to (B or A) to T (Full circuit).
Fluid Viscosity: 100 SUS @ 120° F, .87 specific gravity.



TYPICAL PERFORMANCE SPECIFICATIONS

FLOW RANGES	Nominal Maximum	12-50 gpm	45-190 lpm
		25-125 gpm	95-474 lpm
MAXIMUM OPERATING PRESSURES	P, A, B & X Ports	3500 psi	250 bar
	T PORT**	3000 psi	210 bar
	Y Port (drain)	100 psi	7 bar
MINIMUM PILOT SUPPLY PRESSURE		250 psi	17 bar
MAXIMUM CYCLE RATE		110 cpm	
MOUNTING SURFACE		ANSI/B93.7M-1986 - D08 ISO 4401 - SIZE 08	
WEIGHT	Code 3	50 lbs.	22.7 kg
	Code 5 or 8	45 lbs.	20.6 kg

** With external drain configuration; include surges.

All pressure drops shown on this data page are based on 100 SUS fluid viscosity and 0.87 specific gravity.

Fluid Viscosities	CS	14.5	20.5	32	43	54	65	76	86
SUS	75	100	150	200	250	300	350	400	
Multiplier	0.93	1.00	1.11	1.19	1.26	1.32	1.37	1.41	

For any other specific gravity (G_1) the pressure drop ($?P$) will be approximately $?P_1 = ?P (G_1/G)$.

GENERAL SPECIFICATIONS

Recommended Fluid

Petroleum base, water base and most phosphate esters (other fluids are acceptable, but special O-rings may be required).

Fluid Temperature Range

Fluid temperatures up to 200° F will not appreciably affect valve performance, however, from a safety standpoint, temperatures above 130° F are not recommended. The valve is not temperature immune; constant temperatures should be held during operation.

Recommended Operating Viscosity

80 to 350 SUS.

Fluid Operating Viscosity Range

Acceptable start-up viscosity to 2000 SUS.

Minimum viscosity to 30 SUS.

Filtration

ISO 18/25 (25 micron).

Mounting Position

Optional; horizontal preferred.

O-Rings

Viton standard.

NFPA Flow Path / Actuating Pattern

Actuating operator "a"--connects flow to cylinder port "A".

Actuating operator "b"--connects flow to cylinder port "B".



DVS50M DeACCELATROL® VALVES

SOLENOID ACTUATED, PILOT OPERATED

SPOOL DESCRIPTION

RATED FLOW (GPM)			5	3	7	1	6	2	4	SPOOL CENTER POSITION 1	SPOOL CROSSOVER POSITION 6 and 7	SPOOL LOW SPEED POSITION 2 and 3	SPOOL HIGH SPEED POSITION 4 and 5
			High Speed	Low Speed	Crossover	Center Pos.	Crossover	Low Speed	High Speed				
CODE	NOM.	MAX.	Diagram										
A	50	125	[Diagram: P to A/B, B/A to T]							All ports blocked			
A2	25	50	[Diagram: P to A/B, B/A to T]										
A3	12	25	[Diagram: P to A/B, B/A to T]										
F1	50	125	[Diagram: P blocked, A & B to T]							P blocked A & B restricted to T	P, A or B blocked B or A restricted to T	P to A or B B or A restricted to T	
F2	25	50	[Diagram: P blocked, A & B to T]										
F3	12	25	[Diagram: P blocked, A & B to T]										

TYPICAL MINIMAL RESPONSE TIME INFORMATION

PILOT PRESSURE (psi)	RESPONSE TIME (Milliseconds)	
	Accelerate*	Decelerate
200	350	180

* Acceleration time is influenced by pump and/or motor response times. Acceleration and deceleration is adjustable up to 60 seconds.

Minimum response time for the valve is determined with the chokes wide open to accelerate from zero to maximum flow, and decelerate from maximum flow to zero flow. Fluid viscosity 100 SUS @ 120° F. Response time for spring centering the valve is 70 milliseconds.

NOTE: For faster response times, pilot pressure must be increased. Consult the factory.

TYPICAL ELECTRICAL & RESPONSE TIME

SOLENOID CODE	VOLTAGE & FREQUENCY	VOLTAGE LIMITS	RESISTANCE	INRUSH CURRENT (AMPS)	HOLDING CURRENT	HOLDING CURRENT MIN. VOLT.	HOLDING POWER
	VOLTS - Hz.	MIN. - MAX.		OHMS	MAX.	(AMP)	(AMP)
33L, 60L	120 - 60	108 - 126	36.5	2.10	.49	.39	24
	110 - 50	99 - 116			.58	.45	26
34L, 61L	240 - 60	216 - 252	75.0	1.10	.24	.19	24
	220 - 50	198 - 231			.29	.22	26
39L, 68L*	120 - 60	108 - 132	145.0	1.10	.19	.15	10
	110 - 50	99 - 121			.21	.17	10
42L, 70L	24 DC	21 - 26	24.0	1.00	1.00	.88	24
44L, 75L	12 DC	10 - 13	6.3	2.00	2.00	1.67	24

* Code 68L valves (low amp force) may not shift on high viscosity (low temperature) fluids. Maximum 1000 SUS start-up recommended.

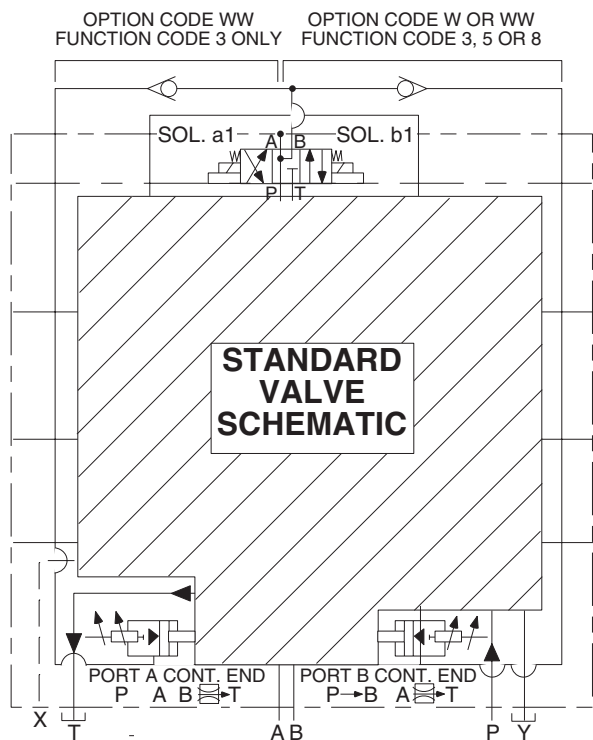
DVS50M

DeACCELATROL® VALVE

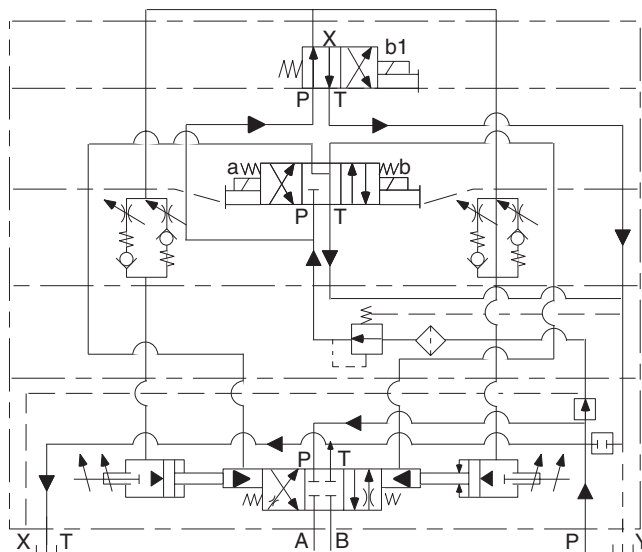
SOLENOID ACTUATED, PILOT OPERATED



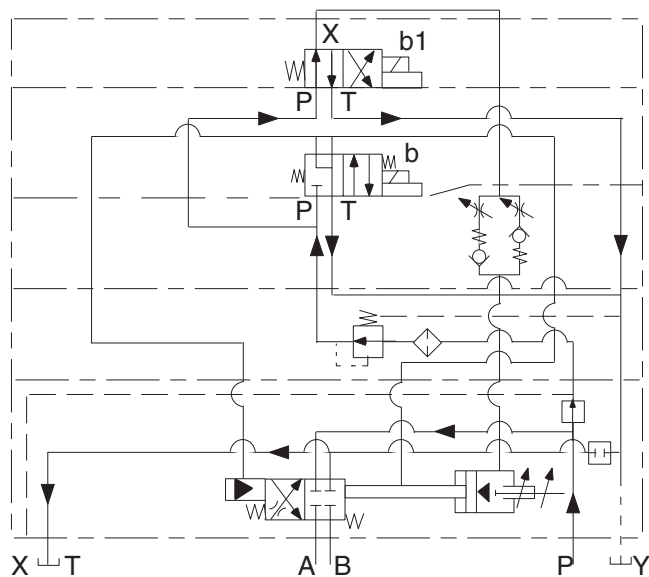
WARM-UP CIRCUIT SCHEMATIC



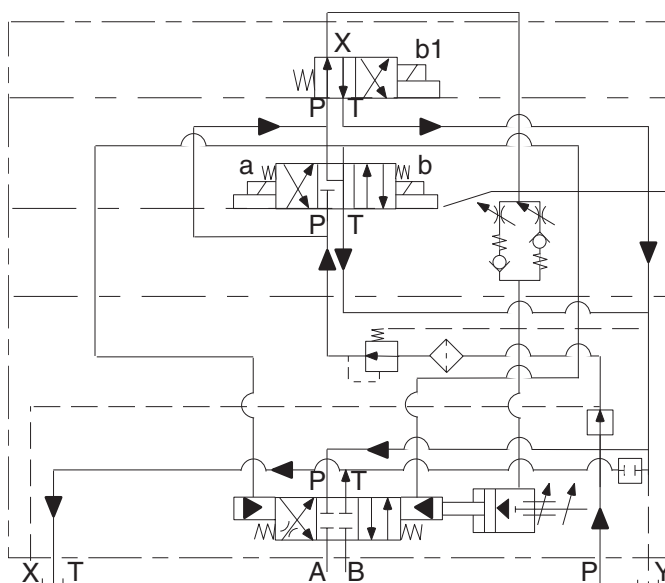
Schematics (do not indicate construction) CODE 3



CODE 5



CODE 8



CONSIDERATIONS FOR WARM-UP CIRCUITS

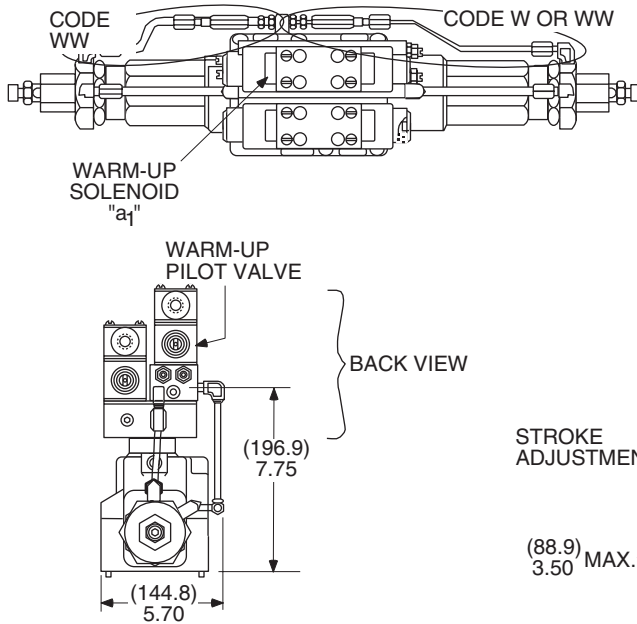
The DeAccelatro® valve is not temperature immune. Changes in valve response time can be expected as system fluid viscosities are altered by changes in fluid temperature. The warm-up circuit is used to pre-warm the valve and the circuit solenoid should be actuated when the hydraulic system is run prior to running the machine. This brings the fluid and valve up to operating temperature.

NOTE: Field installable warm-up circuit kits are available. See Valve Accessories section.

DIMENSIONS SHOWN IN: (MILLIMETERS)
 INCHES

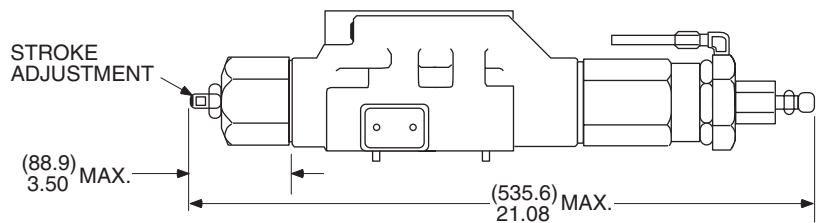
CODE W & WW

Warm-Up Circuit Options



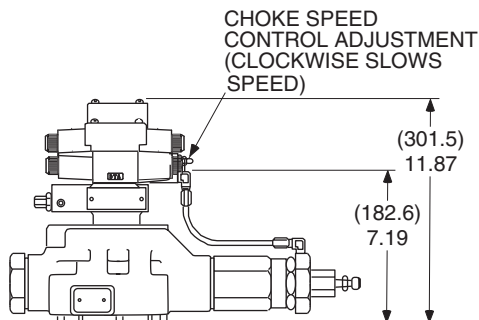
CODE J

Adjustable Stroke Option
 (w/Code 8 Valve only)



CODE K

Adjustable Choke Option
 (w/Code 8 Valve only)



DVS50M

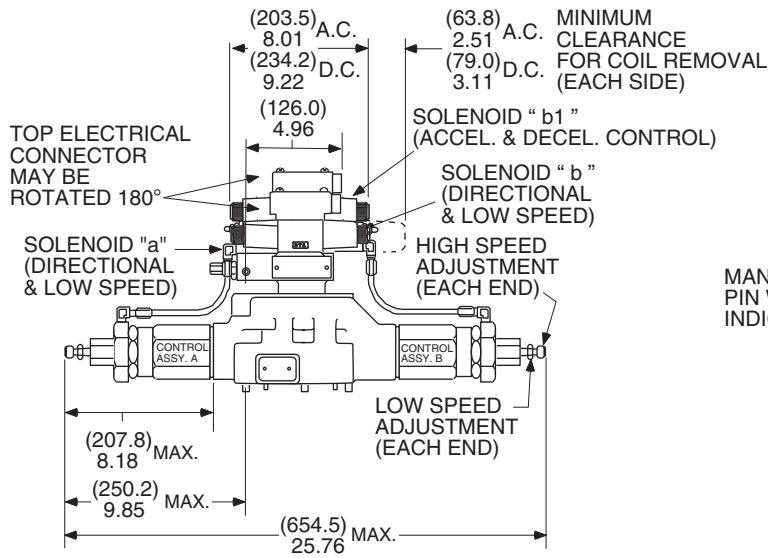
DeACCELATROL[®] VALVE

SOLENOID ACTUATED, PILOT OPERATED

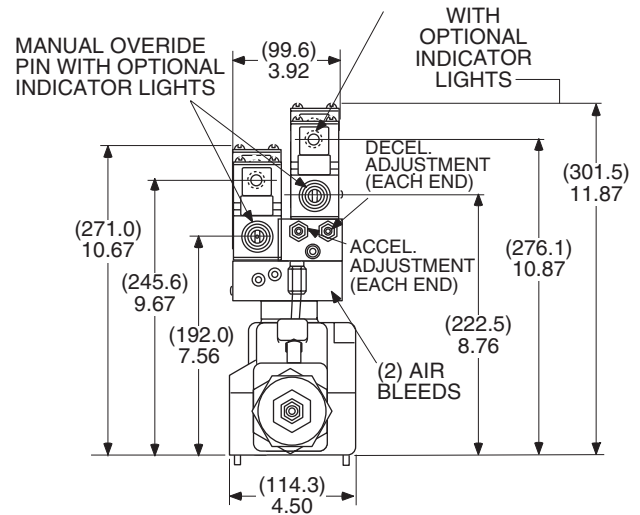


NFPA D08 SIZE
FOR INTERFACE PATTERN,
SEE MOUNTING SURFACE
SECTION

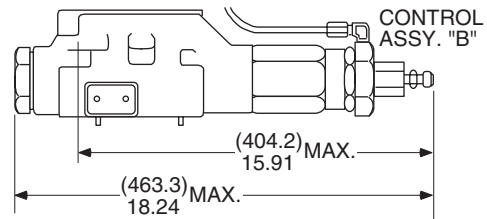
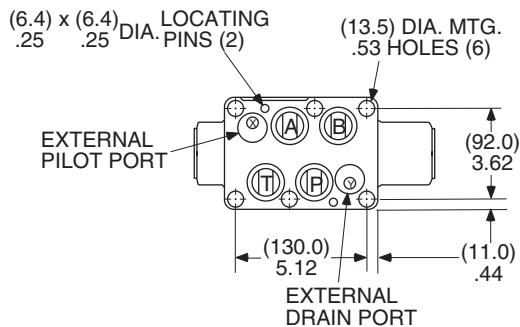
DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES



CODE B OR CODE BT	1/2-14NPT ELECTRICAL CONNECTION 2 OR 3 PLACES
CODE B5H	5 PIN SEALED CONNECTOR FOR 1 OR 2 SOLENOIDS
25 FT./LBS MAX. TORQUE	



CODES 5 & 8



ORDERING INFORMATION

DVS50M — — — **G** — — — — — — —

FUNCTION

CODE	DESCRIPTION
3	ACCELERATION/ DECELERATION CONTROL ON BOTH A & B PORTS
5	ACCELERATION/ DECELERATION CENTER TO 1 SIDE ONLY, "B" SOLENOID
8	ACCELERATION/ DECELERATION "B" SOLENOID ONLY, SNAP ACTION SOLENOID "A"

SPOOLS

CODE
REFER TO PAGE 77 FOR SPOOL AVAILABILITY

ELECTRICAL OPTIONS

CODE	DESCRIPTION
LEAD WIRE CONNECTIONS	
B	TOP ELECTRICAL BOX W/O TERMINAL POSTS
BT	TOP ELECTRICAL BOX WITH TERMINALS AND GROUND
B5H	TOP ELECTRICAL BOX WITH 5-PIN MALE RECEPTACLE FOR 1 OR 2 SOLENOIDS
DIN 43650 CONNECTIONS	
OMIT	NOT AVAILABLE WITH DIN CONNECTIONS

SOLENOID INDICATOR LIGHTS

CODE	DESCRIPTION
LEAD WIRE CONNECTIONS	
L3	BASIC CODES 3 and 8 CODE 5 WITH WARM-UP 110/120 V
L5	BASIC CODE 5 110/120 V 50/60 Hz
L6	CODES 3 and 8 WITH WARM-UP 110/120 V 50/60 Hz
DIN 43650 CONNECTIONS	
OMIT	NOT AVAILABLE WITH DIN CONNECTORS

BASIC VALVE

- 5-POSITION MOTION CONTROL
- DIRECTIONAL/ ACCELERATION
- D08 SUBPLATE MOUNTING
- 0-125 GPM FLOW RANGE
- 3500 PSI MAXIMUM OPERATING PRESSURE

SEALS

CODE
VITON SEALS STANDARD

MECHANICAL OPTIONS

CODE	OPTION	USED ON
J	ADJUST STROKE "A" PORT	CODE 8
K	ADJUST CHOKE "A" PORT	CODE 8
W	WARM-UP CIRCUIT	CODE 5 & 8
WW	WARM-UP CIRCUIT	CODE 3
Z*	MANUAL OVERRIDE	ALL

* On single solenoid valve, spring offset plug end.

PILOT/DRAIN*

CODE	OPTION
1	INTERNAL PILOT EXTERNAL DRAIN
2	EXTERNAL PILOT EXTERNAL DRAIN

* Internal drain not recommended. If used, back pressure in the "tank" line may cause sudden changes in "ACCEL" and/or "DECEL" rates.

SOLENOID

CODE	VOLTAGE
LEAD WIRE CONNECTIONS	
60L	110/120 V 50/60 Hz
61L	220/240 V 50/60 Hz
68L	110/120 V 50/60 Hz (LOW AMPS)
70L	24 VDC
75L	12 VDC
DIN 43650 CONNECTIONS	
33L	110/120 V 50/60 Hz
34L	220/240 V 50/60 Hz
35L	240/280 V 50/60 Hz
42L	24 VDC
44L	12 VDC

TYPICAL ORDERING CODE: **DVS50M-3A2-G1B-68L**

VS100L

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, PILOT OPERATED



(CODE HA SHOWN)

DESCRIPTION

O.S.H.A. has mandated lockout procedures on machinery requiring maintenance. This valve is referred to as an "Energy Isolating Device". In the blocked position, flow is shut off at the inlet port and the outlet ports are bled back to the tank. The valve is line-mounted for ease of installation on existing machinery. In the de-energized (or blocked) position, the "T" bar is inserted to hold the valve in the blocked position. Up to eight padlocks may be inserted to ensure that energy cannot pass through the valve until all locks are removed. The valve is available with optional pneumatic blocking capabilities.

GENERAL SPECIFICATIONS

RECOMMENDED OPERATING VISCOSITY

80 to 350 SUS.

FLUID OPERATING VISCOSITY

Acceptable start-up viscosity to 1500 SUS.

Minimum viscosity to 40 SUS.

FILTRATION

ISO 18/15 (25 microns).

MOUNTING POSITION

Optional: horizontal preferred.

RECOMMENDED FLUID

Petroleum, water-based fluids (not more than 40% water) and most phosphate esters (other fluids are acceptable, but special O-rings may be required). Viton seals are standard.

FLUID TEMPERATURE RANGE

Fluid temperatures up to 200° F. will not appreciably affect valve performance; however, from a safety standpoint, temperatures above 130° F. are not recommended.

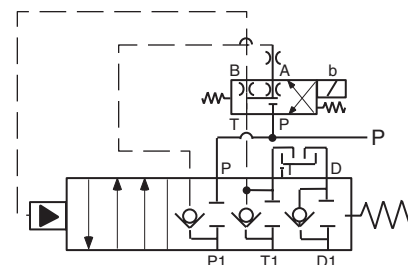
TYPICAL ELECTRICAL CHARACTERISTICS

SOLENOID CODE		VOLTAGE & FREQUENCY	ACCEPTABLE VOLTAGE	CURRENT (AMPS)	INRUSH HOLDING CURRENT	HOLDING POWER
LEAD WIRE	DIN CONN.	VOLTS - Hz.	(MIN./MAX.)	MAX.	(AMP)	(WATTS)
60L	33L	120 - 60	108/126	2.10	.49	24
		110 - 50	99/116		.58	26
61L	34L	240 - 60	216/252	1.10	.24	24
		220 - 50	198/231		.29	26
68L	39L	120 - 60	108/132	1.10	.19	10
		110 - 50	99/121		.21	10
70L	42L	24 DC	21/26	1.00	1.00	24
75L	44L	12 DC	10/13	2.00	2.00	24

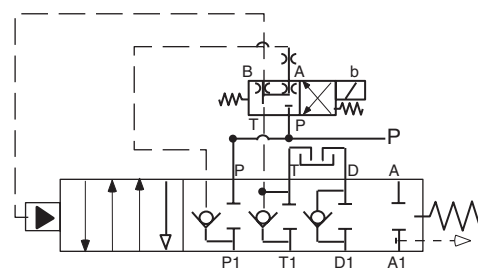
TYPICAL PERFORMANCE SPECIFICATIONS

FLOW CAPACITY	P, T Ports	100 gpm	380 lpm
	D Port	40 gpm	135 lpm
MAXIMUM PILOT PRESSURE	P Port	2000 psi	140 bar
	A & D Ports	1000 psi	70 bar
	T Port	30 psi	2 bar
MAXIMUM OPERATING PRESSURES (including surges)	P Port	2000 psi	140 bar
	A & D ports (static)	1000 psi	70 bar
	T Port	30 psi	2 bar
MINIMUM OIL PILOT PRESSURE		400 psi	28 bar
MAXIMUM CYCLE RATE		60 cpm	
RESPONSE		< 500 ms	
INTERNAL LEAKAGE (De-energized) 100 SUS	P to P1	< 1 cipm	< 16 mlpm
	P to T1	80 cipm	1300 mlpm
	P to P1	< 1 cipm	< 16 mlpm
	P to T1	200 cipm	3300 mlpm
WEIGHT	Code H	54 lbs.	24.5 kg
	Code HA	72 lbs.	32.7 kg

CODE H



CODE HA



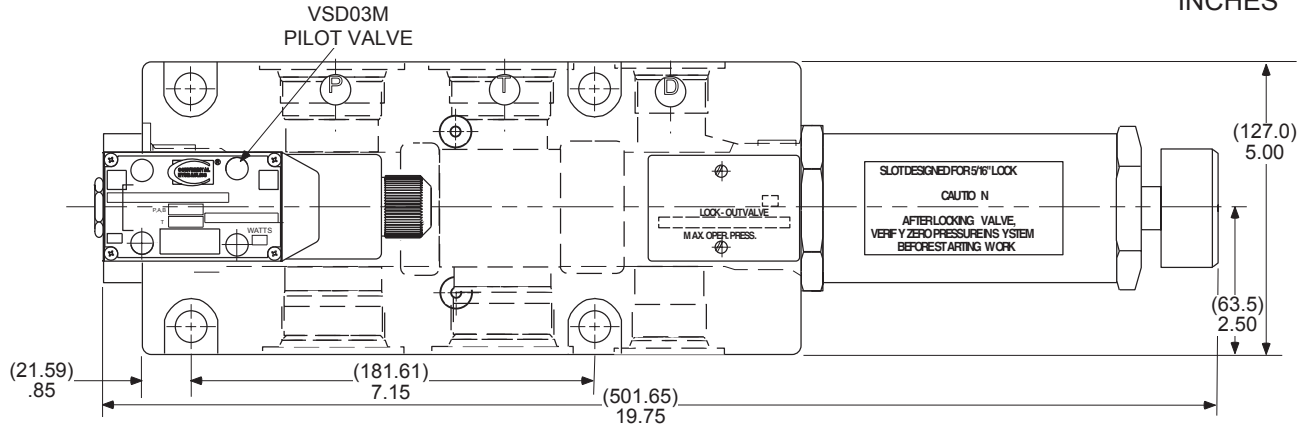
VS100L

DIRECTIONAL CONTROL VALVES

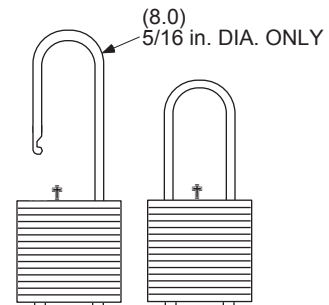
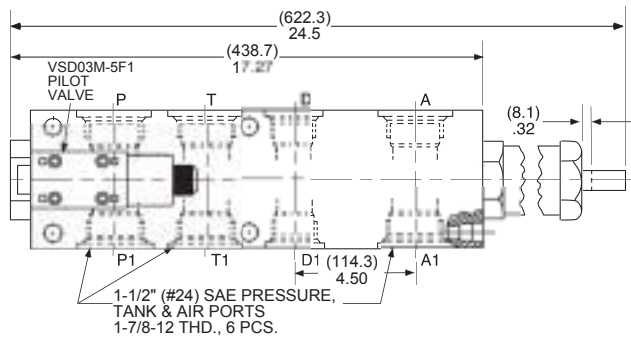
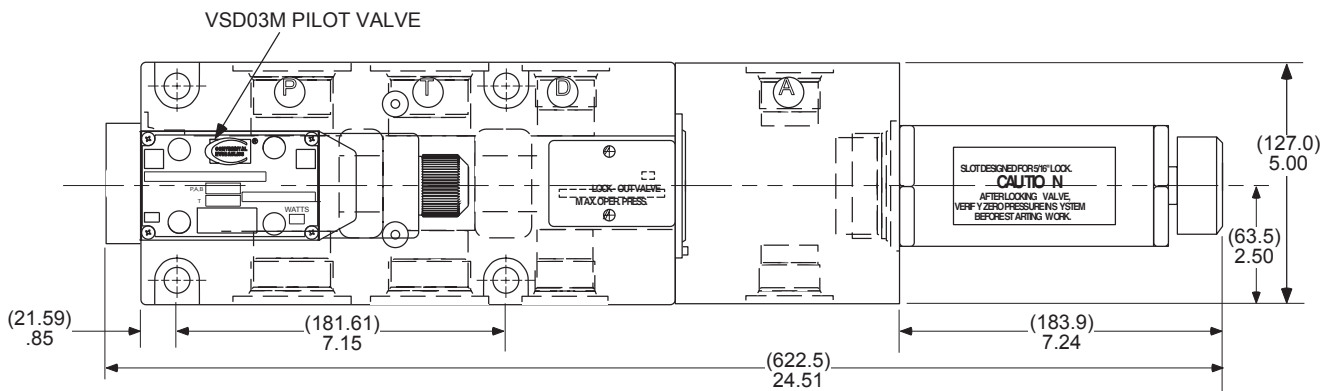
SOLENOID ACTUATED, PILOT OPERATED

CODE H

DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES



CODE HA



WHEN 2 OR 3 LOCKS ARE USED, IT IS SUGGESTED THAT THEY NOT BE COMMON "KEYED"

NOTE: RECOMMENDED MOUNTING BOLT TORQUE 50± LBS./FT.

VS100L

DIRECTIONAL CONTROL VALVES

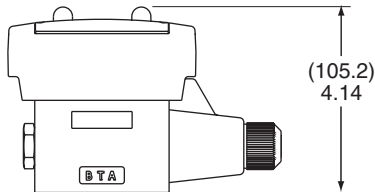
SOLENOID ACTUATED, PILOT OPERATED



PILOT VALVES ARE CSA CERTIFIED

CODE 1

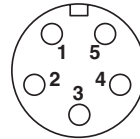
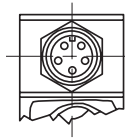
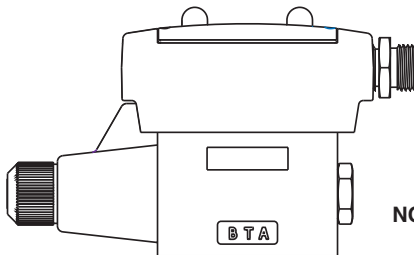
SOLENOID INDICATOR LIGHT



NOTE: TOP ELECTRICAL BOX REQUIRED.

CODE B5H

QUICK DISCONNECT TOP
ELECTRICAL BOX WITH SEALED
5-PIN MALE RECEPTACLE

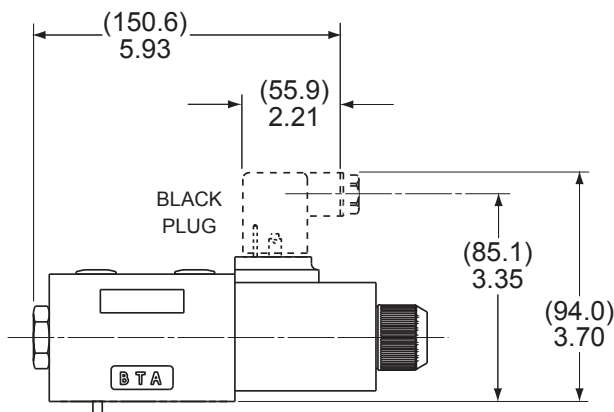


PIN NO.	WIRE NO.	GOES TO:
1	1	SOL. B
2	2	SOL. A
3	GREEN	GROUND
4	4	SOL. A
5	5	SOL. B

NOTE:

CONNECTOR MEETS ANSI RECOMMENDED
STANDARD B93.55M - 1981.

CODES 33L THROUGH 44L



NOTES:

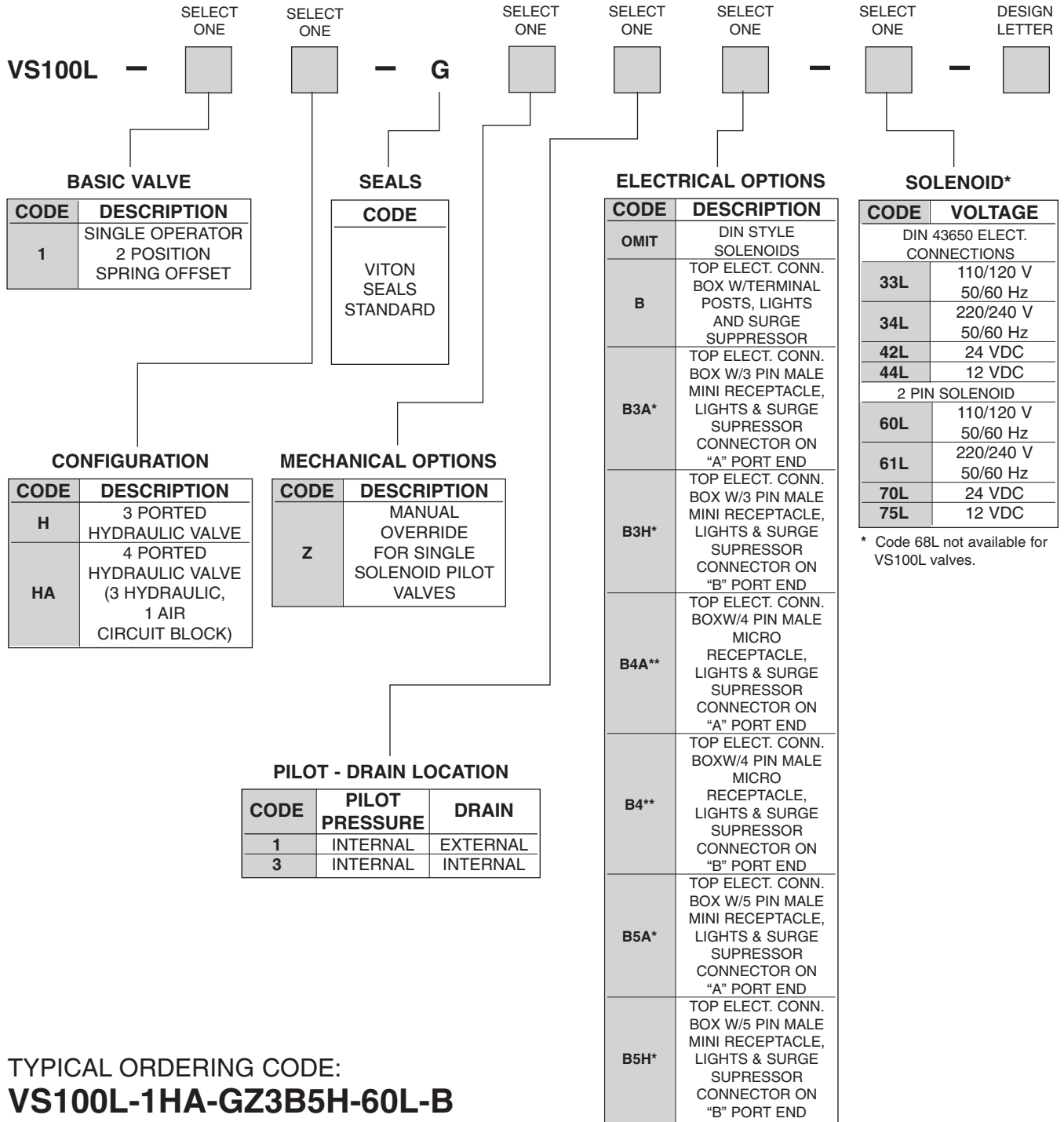
1. NO ELECTRICAL BOX REQUIRED.
2. ORDER CONNECTORS SEPARATELY.

VS100L

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, PILOT OPERATED

ORDERING INFORMATION



* Connector conforms to ANSI/B93.55M - 1981.
 ** Available with DC solenoid valves only.
NOTE: All codes available on solenoid operated valves with 2 pin solenoids.
 Code 68L not available for VS100L valves.

MECHANICAL ACCESSORIES

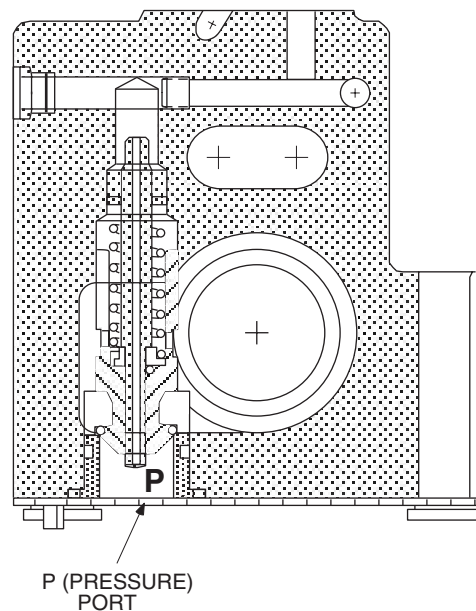
FOR PILOTED DIRECTIONAL CONTROL VALVES



BACK PRESSURE VALVE

This valve is used with B & L spool valves where pilot system pressure may drop below the 70 psi required for pilot operation.

NFPA SIZE D08

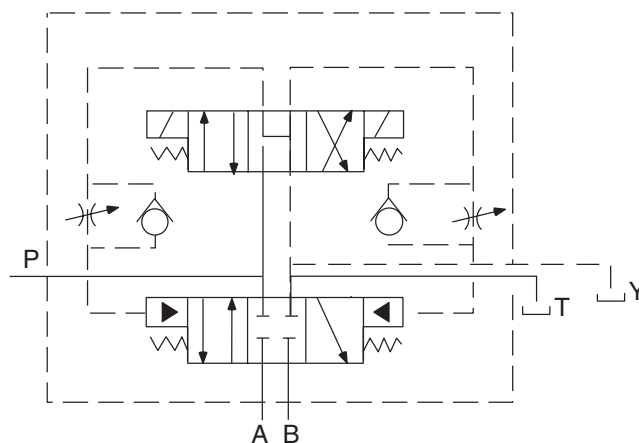
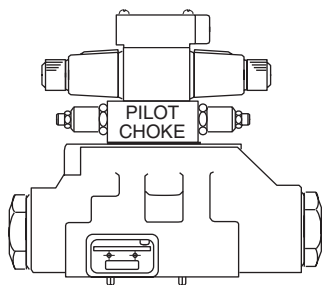


ORDERING INFORMATION: VMA — 5F — 2

Kit includes: (1) Check Assembly
(1) Seat
(1) Viton O-ring
Weight: 0.25 lbs.(0.1 kg.)

ADJUSTABLE PILOT CHOKES

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 the center position on 3-position valves. Consult with Continental for other metering configurations.



NOTE: Kit includes choke valve, Viton seals and bolt kit.

ORDERING INFORMATION:

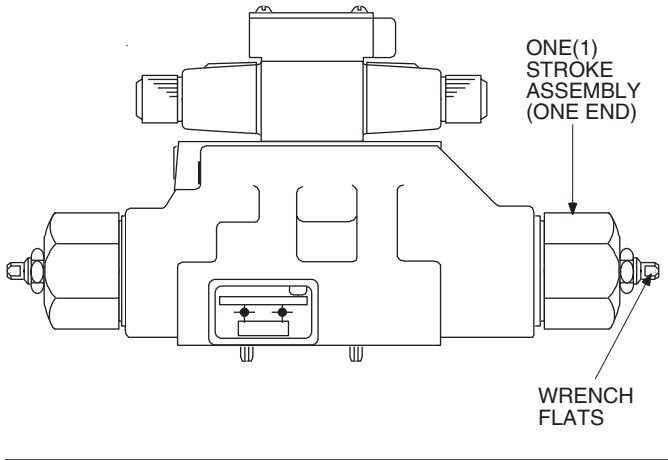
VMA — 5 CC2

NOTE: CAN BE USED ON D08 & D10 SIZED VALVES.

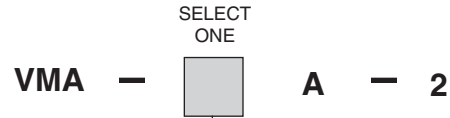
ADJUSTABLE STROKE CONTROL

This modification controls the flow of oil through the valve by limiting spool movement. It is used in hydraulic systems to govern the speed of system components.

The kit includes: (1) Stroke assembly with Viton seals (one end only).

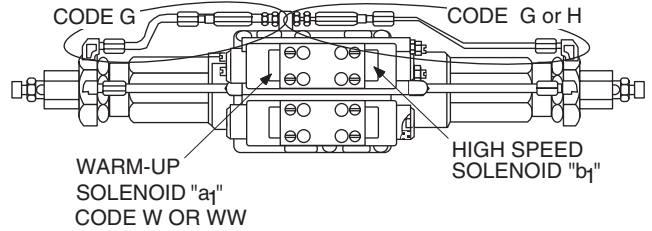


ORDERING INFORMATION



CODE	NFPA SIZE VALVE	WEIGHT (lbs./kg)
5	D08	2.5 / 1.1
7	D10	11.0 / 5.0

DIMENSIONS SHOWN IN: MILLIMETERS)
(INCHES



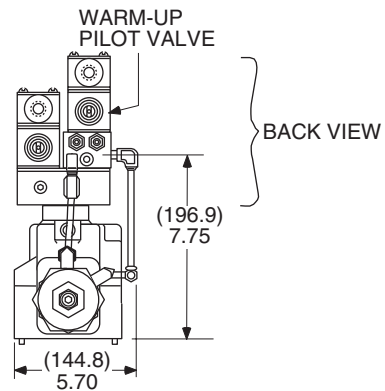
DVS50M (DeACCELATROL VALVE) WARM-UP KITS

Considerations for Warm-Up Circuits

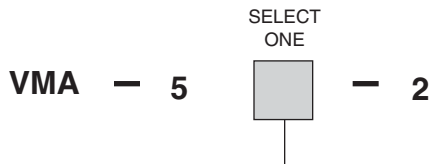
The DeAccelatro valve is not temperature immune. Valve response time is altered as system fluid temperature changes. The warm-up circuit solenoid should be actuated when the hydraulic system is run prior to running the machine. This brings the fluid and valve up to operating temperature.

Field installable kits include: (1) Check valve(s) 2 psi; (2) All required piping and fittings.

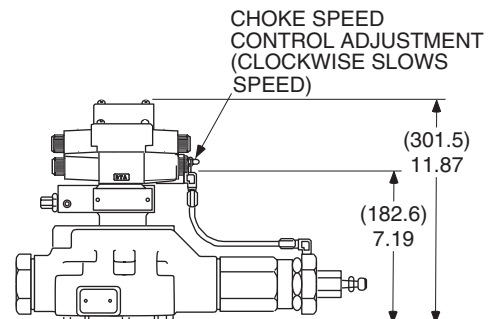
NOTE: Order or convert pilot valve to Model VS5M — 3G —***—***.



ORDERING INFORMATION



CODE	NFPA SIZE VALVE	WEIGHT (lbs./kg)
G	DOUBLE OPERATOR CODE 3 VALVE	2.0 / 0.9
H	SINGLE OPERATOR CODE 5 OR 8 VALVE	1.3 / 0.6



ELECTRICAL ACCESSORIES

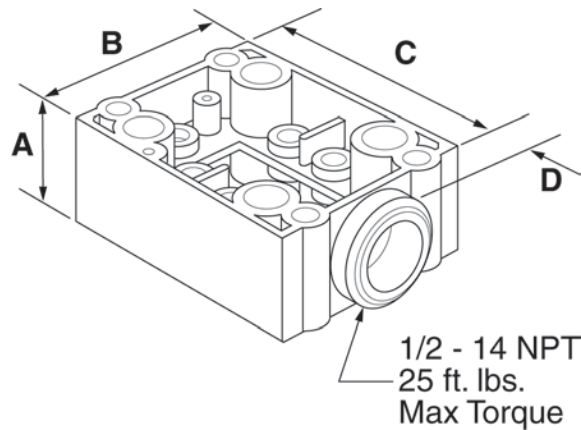
FOR PILOTED DIRECTIONAL CONTROL VALVES



TOP ELECTRICAL BOX

INCLUDES GASKET & MOUNTING SCREWS

MODEL SIZE	A	B	C	D
CODE 1	(30.5) 1.20	(46.5) 1.83	(81.8) 3.22	(9.9) .39
CODE 2	(35.0) 1.38	(69.9) 2.75	(95.3) 3.75	(6.4) .25

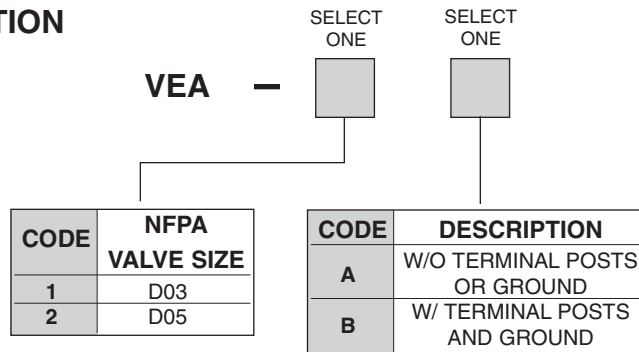


WEIGHT

1/2 -14NPT
25 ft. lbs. max. torque

SIZE	LBS. / kg
D03	0.30 / 0.14
D05	0.54 / 0.24

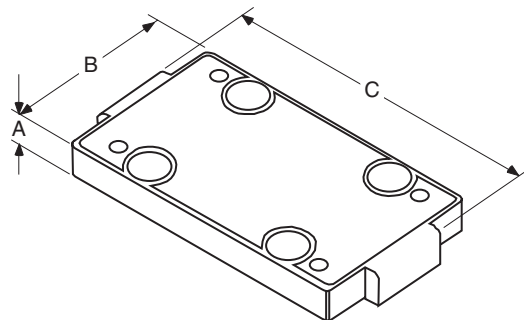
ORDERING INFORMATION



SOLENOID INDICATOR LIGHT

INCLUDES GASKET & MOUNTING SCREWS

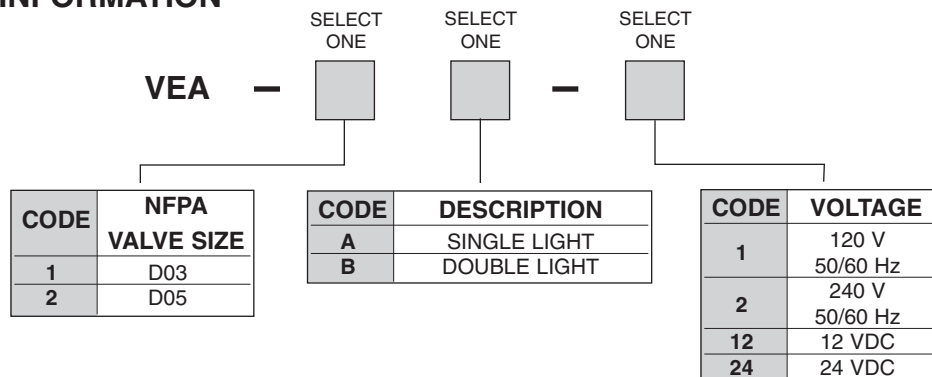
MODEL SIZE	A	B	C
CODE 1	(9.7) .38	(46.7) 1.84	(89.9) 3.54
CODE 2	(10.2) .40	(70.1) 2.76	(106.2) 4.18



SIZE	LBS. / kg
D03	0.11 / 0.05
D05	0.20 / 0.09

LED display indicates energized solenoid and simplifies troubleshooting.

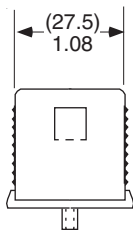
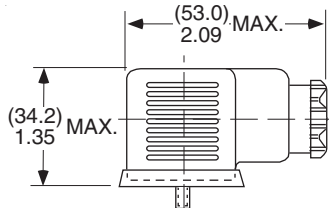
ORDERING INFORMATION



DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES

DIN 43650/ISO 4400 (FORM A) 90° CONNECTOR

FOR USE WITH SOLENOID CODES 33L THROUGH 44L



WEIGHT: 0.09 lbs. / 0.04 kg

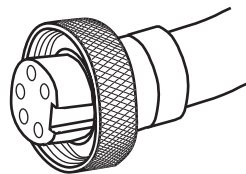
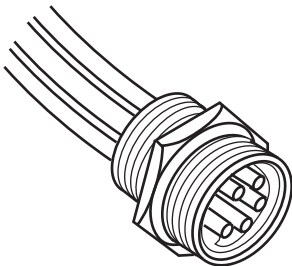
ORDERING INFORMATION

VEA - 3 SELECT ONE

CODE	DESCRIPTION
E	GREY CONNECTOR USED WITH SOLENOID "A"
F	BLACK CONNECTOR USED WITH SOLENOID "B"

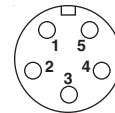
QUICK DISCONNECT FOR SINGLE OR DOUBLE SOLENOID VALVES

5 PIN SEALED CONNECTOR MEETS
ANSI STANDARD B93.55M - 1981.



Weight: 1.41 lbs. / 0.64 kg

MALE RECEPTACLE
12-14 NPT MTG. THD.
Precut leads with ring terminals



PIN NO.	WIRE NO.	GOES TO:
1	1	SOL. B
2	2	SOL. A
3	GREEN	GROUND
4	4	SOL. A
5	5	SOL. B

ORDERING INFORMATION

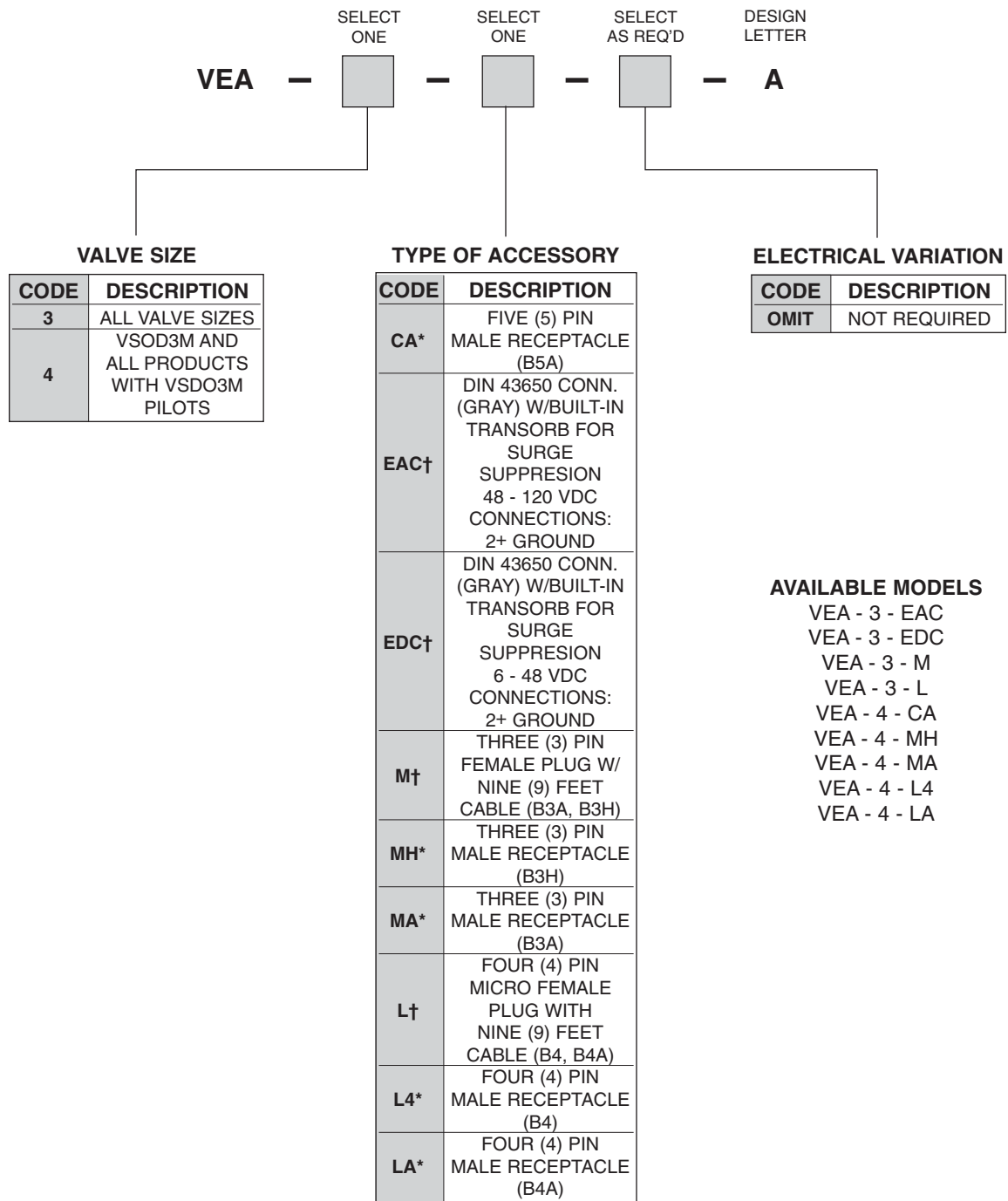
VEA - SELECT ONE

CODE	NFPA VALVE SIZE	DESCRIPTION
1C	D03 or D05	MALE
3D	D03 or D05	FEMALE
1BC	D03	FIELD CONVERSION KIT
2BC	D05	FIELD CONVERSION KIT

ELECTRICAL ACCESSORIES

FOR VSD03M and VSD08M VALVES

ORDERING INFORMATION



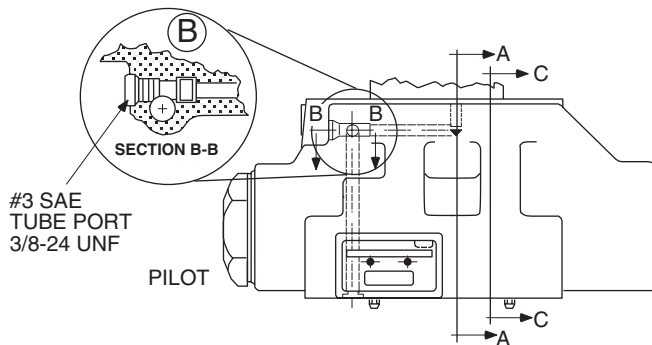
* Available with valve size code 4.
† Available with valve size code 3.

PILOT OR DRAIN CONVERSION

FOR PILOTED DIRECTIONAL CONTROL VALVES

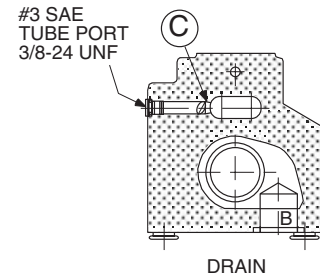
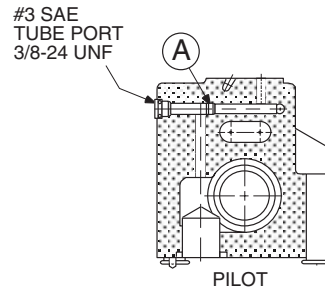
VSD08M, VAD08M, DVS50M & ED08M PILOT & DRAIN

Converting the pilot or drain to either internal or external mode may be done as follows:



SECTION A-A

SECTION C-C



When internal pilot and/or drain is used, the corresponding “x” and “y” ports in the subplate must be plugged. Pilot pressure, whether internal or external, must be at least 70 psi (5 bar) greater than the pressure at the tank “T” line. It may be desirable to use external pilot when system pressure is subject to wide fluctuations. An external drain must be used when an “open” center (B) or tandem center (L) spool is used. An external drain is also recommended when using pilot chokes.

NOTE:

Pilot supply pressure on a DVS50M, whether internal or external, must always be at least 250 psi (17 bar). An internal drain is not recommended on a DVS50M or ED08M. Consult the factory.

CODE	PILOT & DRAIN LOCATION	VSD10M			DVS50M, VA50M & ED08M		
		PILOT		DRAIN	PILOT		DRAIN
		A	B	C	A	B	C
1	Internal pilot pressure External drain	O	R	B	O	B	B
2	External pilot pressure External drain	R	B	B	B	O	B
3	Internal pilot pressure Internal drain	O	R	O	O	B	O
4	External pilot pressure Internal drain	R	B	O	B	O	O

B = Blocked 1/16" NPT Pipe Plug
R = Restricted 1/16" NPT Pipe Plug w/0.70 Dia. Orifice
O = Open No Plug

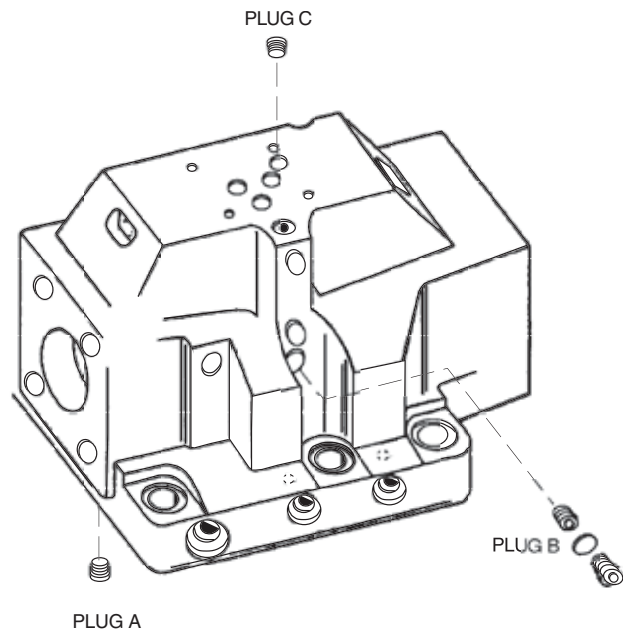
NOTE: Plug “A” is located in the “X” port.

VSD10M PILOT & DRAIN

Converting the pilot or drain to either internal or external mode may be done as follows:

CODE	PILOT & DRAIN LOCATION	VSD10M		
		PILOT		DRAIN
		A	B	C
1	Internal pilot pressure External drain	O	R	B
2	External pilot pressure External drain	R	B	B
3	Internal pilot pressure Internal drain	O	R	O
4	External pilot pressure Internal drain	R	B	O

B = Blocked 1/8" NPT Pipe Plug
R = Restricted 1/8" NPT Pipe Plug w/.125 Dia. Orifice
O = Open No Plug



MOUNTING SURFACES

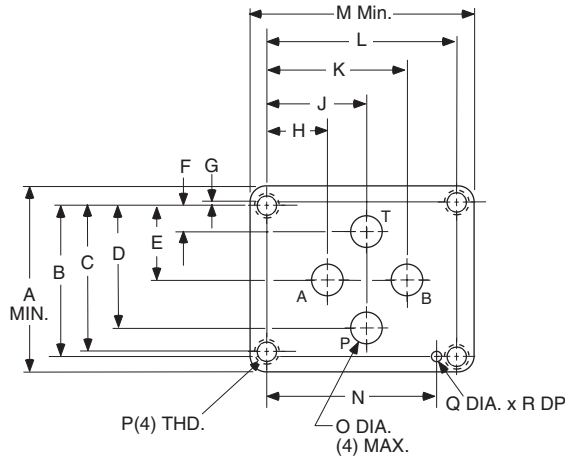
DIMENSIONS: Mounting surfaces must be flat within 0.1 mm per 100 mm (.0004 in. per 4.0 in.) and N8 63AA finish.

NOTES: A = Cylinder Port B = Cylinder Port T = Tank Port
P = Pressure Port X = Pilot Port Y = Drain Port

D03 MOUNTING SURFACE

Conforms to ANSI/B93.7-M-1986, ISO 4401 SIZE 03

DIMENSIONS SHOWN IN: (MILLIMETERS)
INCHES

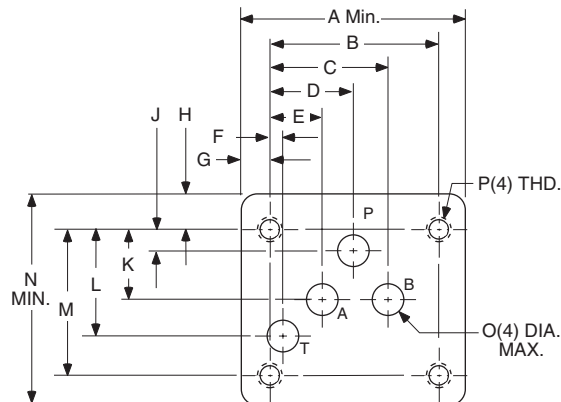


DIMENSIONS

	mm	INCH	mm	INCH	mm	INCH	
A	43.0	1.70	G	.075	0.03	N	33.0 1.30
B	31.8	1.2	H	12.7	0.50	O	6.3 0.25
C	31.0	1.22	J	21.5	0.85	P	10-24UNC-2B
D	25.9	1.02	K	30.2	1.19	Q	4.0 .16
E	15.5	0.61	L	40.5	1.594	R	4.0 .16
F	5.1	0.20	M	51.0	2.00		

D05 MOUNTING SURFACE

Conforms to ANSI/B93.7-M-1986, ISO 4401 SIZE 05



DIMENSIONS

	mm	INCH	mm	INCH	mm	INCH	
A	72.1	2.84	F	3.2	0.13	L	32.5 1.28
B	54.0	2.13	G	9.1	0.36	M	46.0 1.81
C	37.3	1.47	H	11.2	0.44	N	57.9 2.28
D	27.0	1.06	J	6.4	0.25	O	11.2 0.44
E	16.7	0.66	K	21.4	0.844	P	1/4-20 UNC

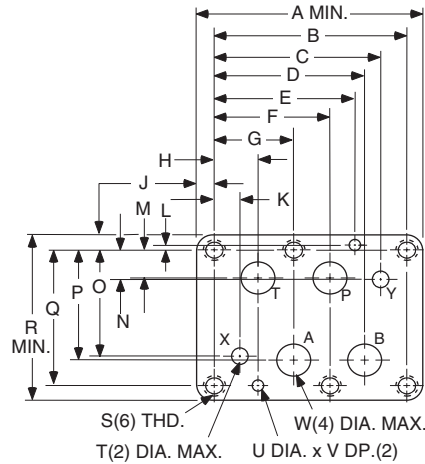
DIMENSIONS: Mounting surfaces must be flat within 0.1 mm per 100 mm (.0004 in. per 4.0 in.) and N8 63AA finish.

NOTES: A = Cylinder Port B = Cylinder Port T = Tank Port
 P = Pressure Port X = Pilot Port Y = Drain Port

D08 MOUNTING SURFACE

Conforms to ANSI/B93.7-M-1986, ISO 4401 SIZE 08

DIMENSIONS SHOWN IN: (MILLIMETERS)
 INCHES

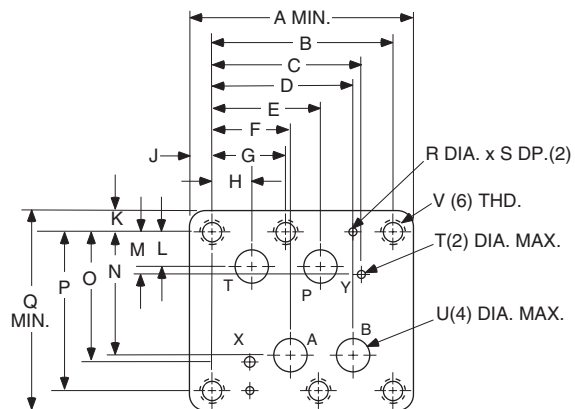


DIMENSIONS

	mm	INCH		mm	INCH		mm	INCH
A	154.0	6.00	J	11.1	0.44	R	116.0	4.57
B	130.2	5.13	K	17.5	0.69	S	1/2-13 UNC	
C	112.7	4.44	L	4.8	0.19	T	11.2	0.44
D	100.8	3.97	M	17.5	0.69	U	7.5	.28
E	94.5	3.719	N	19.0	0.75	V	9.7	0.38
F	77.0	3.03	O	73.0	2.8	W	23.4	0.92
G	53.2	2.09	P	74.6	2.93			
H	29.4	1.16	Q	92.1	3.63			

D010 MOUNTING SURFACE

Conforms to ANSI/B93.7-M-1986, ISO 4401 SIZE 10

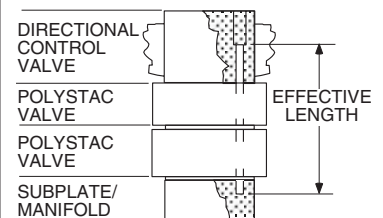
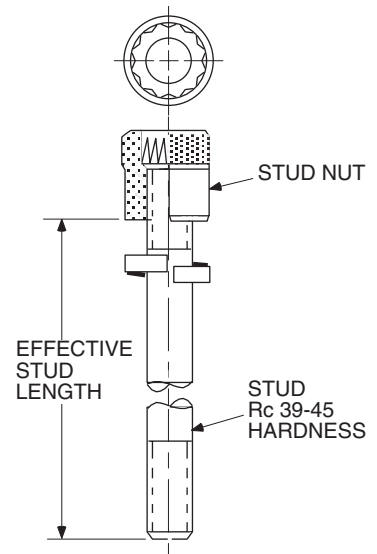
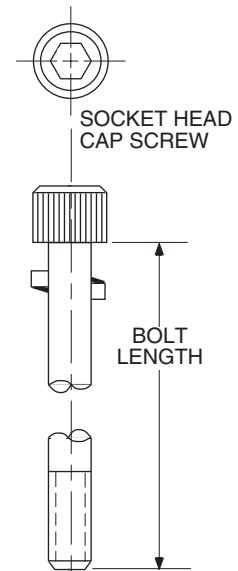


DIMENSIONS

	mm	INCH		mm	INCH		mm	INCH
A	230.1	9.06	H	41.3	1.63	P	158.8	6.25
B	190.5	7.50	J	19.0	0.75	Q	198.9	7.83
C	168.4	6.63	K	19.0	0.75	R	7.1	0.28
D	147.6	5.81	L	35.1	1.38	S	9.7	.38
E	114.3	4.50	M	44.5	1.75	T	11.2	0.44
F	82.6	3.25	N	123.8	4.88	U	32.0	1.25
G	76.2	3.00	O	130.2	5.13	V	3/4-10 UNC	

VALVE BOLT KITS

DIRECTIONAL VALVE	VALVE STACK	ORDER CODE	TYPE	LENGTH	EFFECTIVE LENGTH	WEIGHT lbs. (kg)
V*5M NFFPA D03 KIT: (4) #10-24NC Fasteners (4) #10 Lockwashers	Directional Valve	BD03-100	Bolt	(25.4) 1.00	(25.4) 1.00	0.05 (0.02)
	Valve+(1)(40.0) Polystac	BD03-250	Bolt	(63.8) 2.50	(63.8) 2.50	0.8 (0.04)
	Valve+(2)(40.0) Polystac	BD03-4125	Bolt	(104.8) 4.125	(104.8) 4.125	0.18 (0.08)
	Valve+(3)(40.0) Polystac	BD03-575	Bolt	(146.0) 5.75	(146.0) 5.75	0.23 (0.10)
	Valve+(2)(40.0) Polystac	BD03-460	Stud	(117.3) 4.60	(106.4) 4.19	0.18 (0.08)
	Valve+(3)(40.0) Polystac	BD03-616	Stud	(157.1) 6.16	(146.0) 5.75	0.23 (0.10)
V*12M NFFPA D05 KIT: (4) 1/4-20NC Fasteners (4) 1/4 Lockwashers	Directional Valve	BD05-175	Bolt	(44.6) 1.75	(44.6) 1.75	0.11 (0.05)
	Valve+(1)(55.0) Polystac	BD05-400	Bolt	(102.0) 4.00	(102.0) 4.00	0.24 (0.10)
	Valve+(2)(55.0) Polystac	BD05-6125	Bolt	(155.6) 6.125	(155.6) 6.12	0.44 (0.20)
	Valve+(3)(55.0) Polystac	BD05-825	Bolt	(209.6) 8.25	(209.6) 8.25	0.55 (0.25)
	Valve+(2)(55.0) Polystac	BD05-667	Stud	(170.1) 6.67	(155.2) 6.11	0.44 (0.20)
	Valve+(3)(55.0) Polystac	BD05-884	Stud	(225.4) 8.84	(210.3) 8.28	0.55 (0.25)
V*50M DVS50M NFFPA D08 KIT: (6) 1/2-13NC Fasteners (6) 1/2 Lockwashers	DVS50M - DeAccelatro	BD08-275	Bolt	(70.1) 2.75	(70.1) 2.75	1.25 (0.57)
	Directional Valve	BD08-275	Bolt	(70.1) 2.75	(70.1) 2.75	1.25 (0.57)
	Valve+(1)(88.9) Polystac	BD08-625	Bolt	(159.4) 6.25	(159.4) 6.25	2.25 (1.02)
	Valve+(1)(101.6) Polystac	BD08-675	Bolt	(172.1) 6.75	(172.1) 6.75	2.40 (1.13)
	Valve+(2)(88.9) Polystac	BD08-9625	Bolt	(244.5) 9.625	(244.5) 9.625	3.75 (1.70)
	Valve+(1)(88.9)+(1)(101.6) Polystac	BD08-1020	Bolt	(260.0) 10.25	(260.0) 10.25	4.00 (1.81)
	Valve+(2)(101.6) Polystac	BD08-1080	Bolt	(273.0) 10.75	(273.0) 10.75	4.13 (1.87)
	Valve+(2)(88.9) Polystac	BD08-1025	Stud	(261.4) 10.25	(247.6) 9.75	3.75 (1.70)
	Valve+(1)(88.9)+(1)(101.6) Polystac	BD08-1075	Stud	(274.1) 10.75	(261.4) 10.25	4.00 (1.81)
	Valve+(1)(101.6) Polystac	BD08-1125	Stud	(286.9) 11.25	(174.1) 10.75	4.13 (1.87)
V*100M NFFPA D10 KIT: (6) 3/4-10NC Fasteners (6) 3/4 Lockwashers	Directional Valve	BD10-250	Bolt	(63.8) 2.50	(63.8) 2.50	2.63 (1.19)
	VALVE					
F12M NFFPA 2F06 KIT: (6) 5/16-18NC Fasteners (6) 5/16 Lockwashers	Flow Control	B2F08-225	Bolt	(57.8) 2.25	(57.8) 2.25	0.25 (0.11)



Exclusive 3 Year Warranty

Continental Hydraulics Division warrants all directional control valves supplied by Continental Hydraulics against defects in material and workmanship under normal use and service for three years from the date of shipment.

This warranty does not cover ordinary wear and tear, abuse, misuse, overloading, altered products, use of improper fluid, or use of materials not of Continental Hydraulics manufacture or supply.

Continental Hydraulics' obligation under this warranty is limited to repair or replacement F.O.B. Continental Hydraulics plant, or credit for defective parts at Continental Hydraulics option. The buyer must give Continental Hydraulics prompt written notice of the defect(s). Continental Hydraulics may require inspection of the product to confirm the defect(s). The buyer agrees that repair, replacement or credit at Continental Hydraulics' option is the exclusive remedy under this contract.

Continental Hydraulics assumes no liability for possible patent infringements when its products are used in combination with other elements or structures.

All sales are made with the understanding that there are no warranties, expressed or implied, other than warranties contained in this agreement. Continental Hydraulics does not warrant any product for merchantability or fitness for a particular application or purpose. The buyer will not be entitled to consequential damages in the event of breach of this contract by Continental Hydraulics.

About Continental Hydraulics

Continental Hydraulics grew from the need for highly reliable fluid power components. Because existing hydraulic components couldn't meet the performance and reliability standards of DoAll saws, Continental Machines began to manufacture pumps, valves and power units. As the reputation for these components spread, so did the demand. Continental Hydraulics Division was formed in 1962 to design, manufacture and sell reliable hydraulic components around the world.

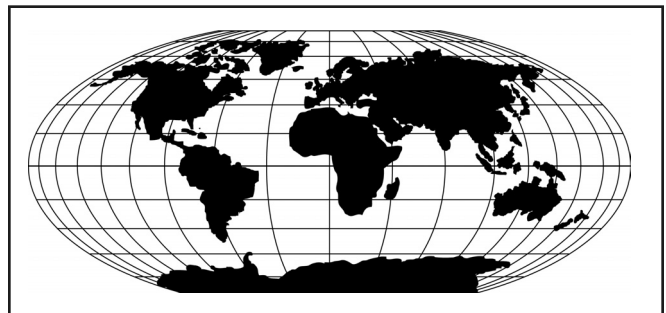
Today, whenever reliable, precise hydraulic power is required, Continental Hydraulics products meet the need. They're found in applications as diverse as machine tools, plastic molding machines, marine auxiliary power controls and deck handling equipment, heavy construction, oil field and farm equipment and foundry mold handling equipment.

Continental products are born in an extensive research and design facility. Every product - every new design undergoes extensive laboratory evaluation. Then field testing insures that the product or design meets or exceeds high standards for performance and service life.

Reliability also comes from our modern automated production facilities. Sophisticated in-process quality control and 100% product testing maintain our rigid quality standards in each and every product.

Continental Hydraulics Distributors are located in every major industrial region in North America, and throughout the world.. They provide assistance in selecting components and developing systems. They also provide a readily available supply of products, parts, after-sale service and training. If you have special design requirements, Continental Hydraulics Regional Managers can recommend special products to meet your specific design or performance criteria.

We believe that Continental Hydraulics products are the finest you can buy. We encourage you to ask your Continental Distributor for a list of references in your area. Check our reputation for performance, reliability, delivery and service. Find out why people who buy Continental stay with Continental.



Why settle for “close enough” when you need hydraulics?

Continental Hydraulics offers a complete line of products to meet your need for reliable, precise fluid power. In addition to the Directional Control Valves shown in this catalog, Continental also offers vane and piston pumps, a full line of cartridge valves, integrated hydraulic circuits, and hydraulic power units.

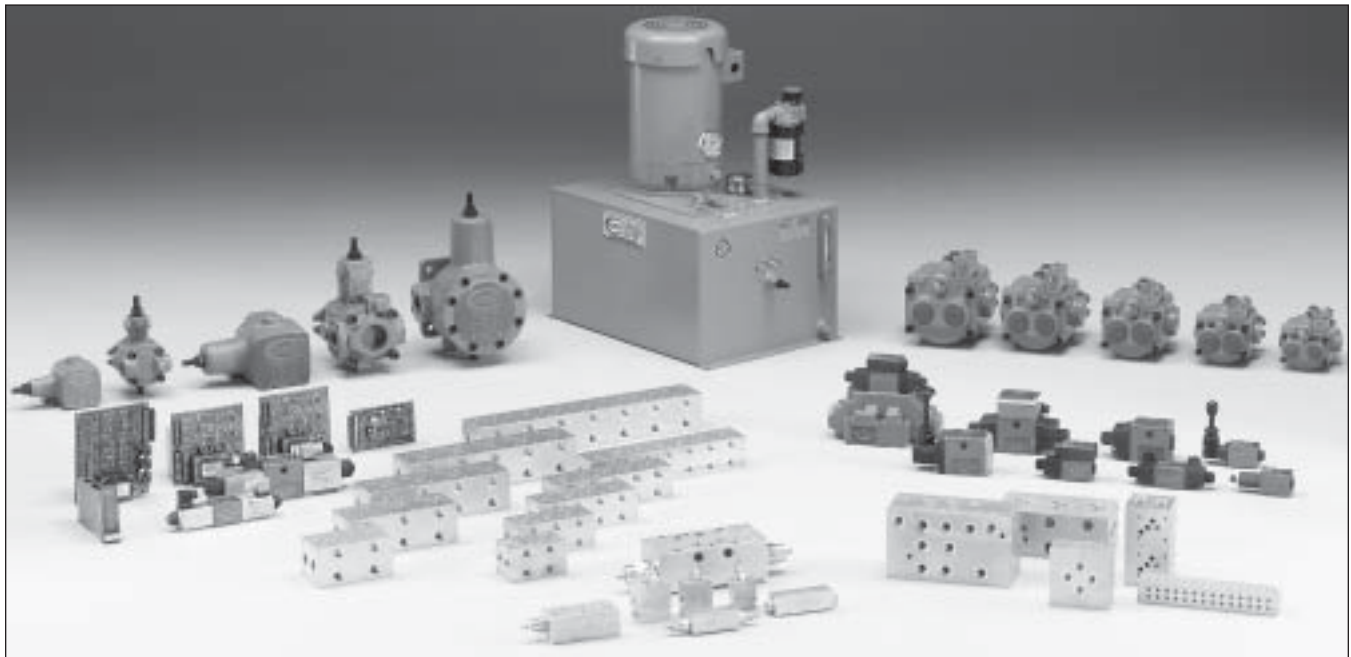
Continental's products are used in diverse applications such as plastic molding machinery, machine tools, pulp and paper machines, marine auxiliary power controls and deck handling equipment, and masonry product production equipment.

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Whether you need a complete hydraulic power supply or a single directional control valve, come to Continental.



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