

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	

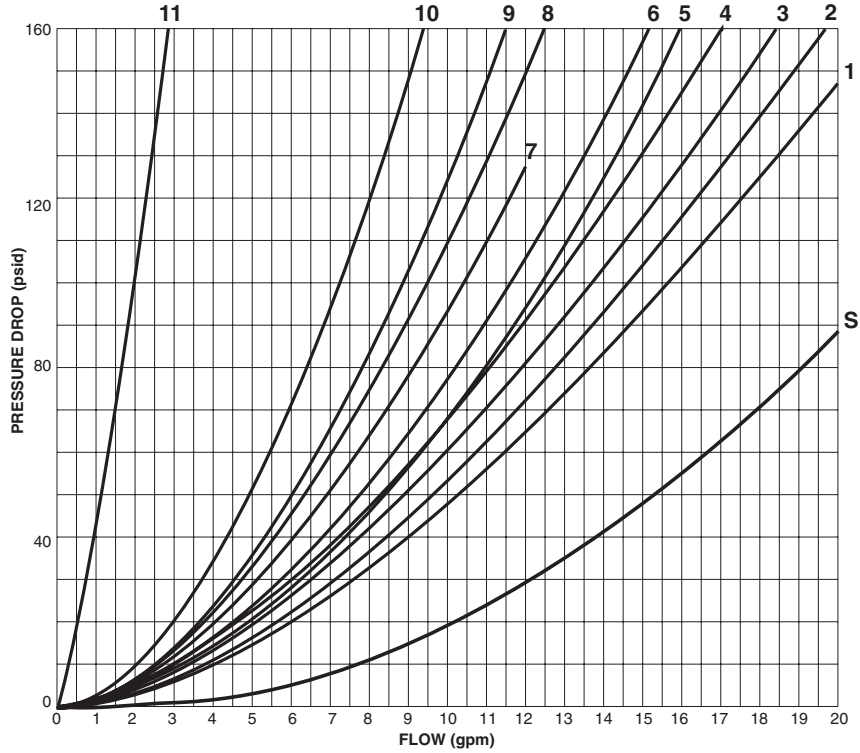
* 2000 psi (138 bar) maximum on valves with solenoid codes 37 and 68.

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 (ΔP) will be approximately $\Delta P_1 = \Delta P (G_1/G)$.

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)						

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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

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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

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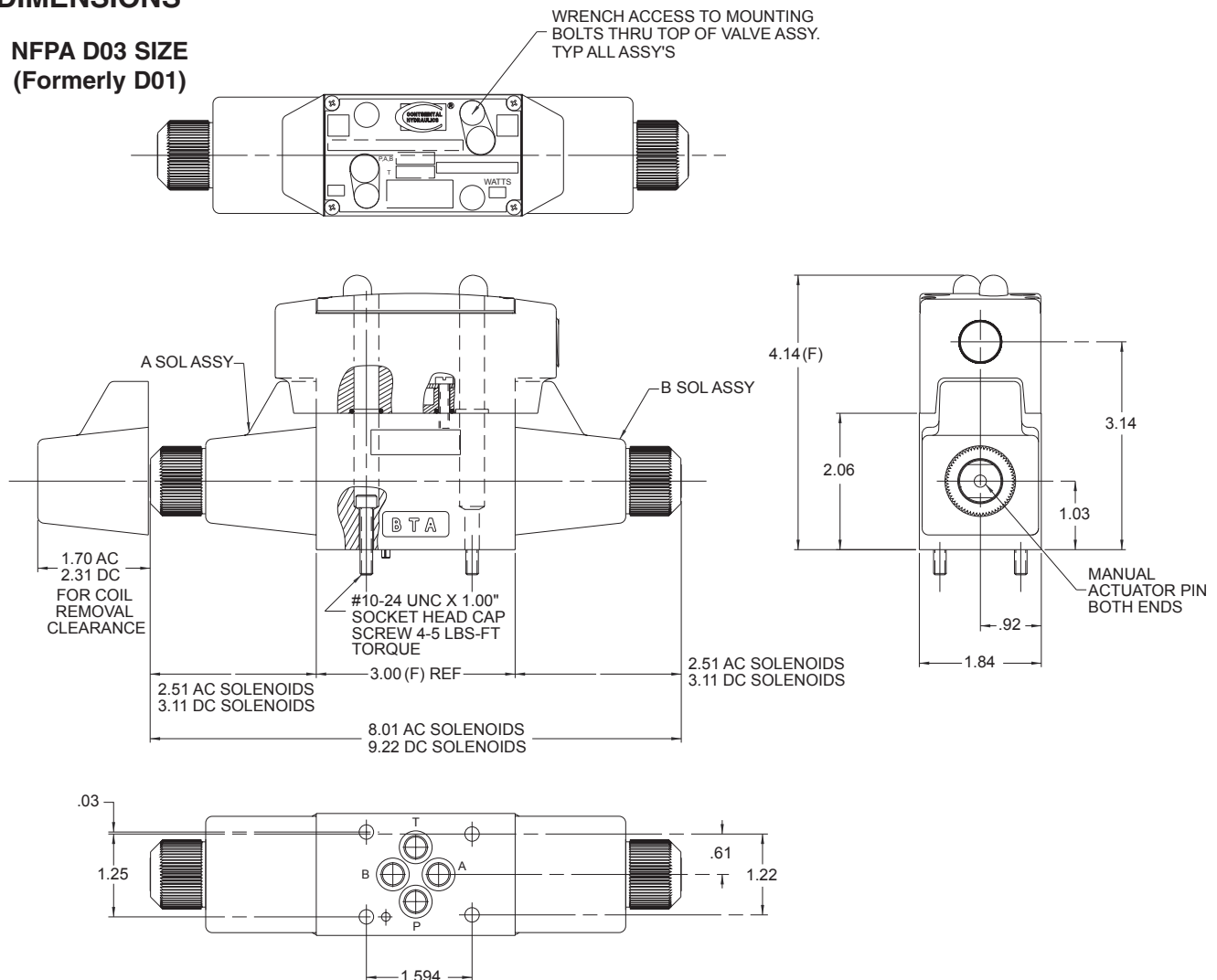


TYPICAL ELECTRICAL CHARACTERISTICS

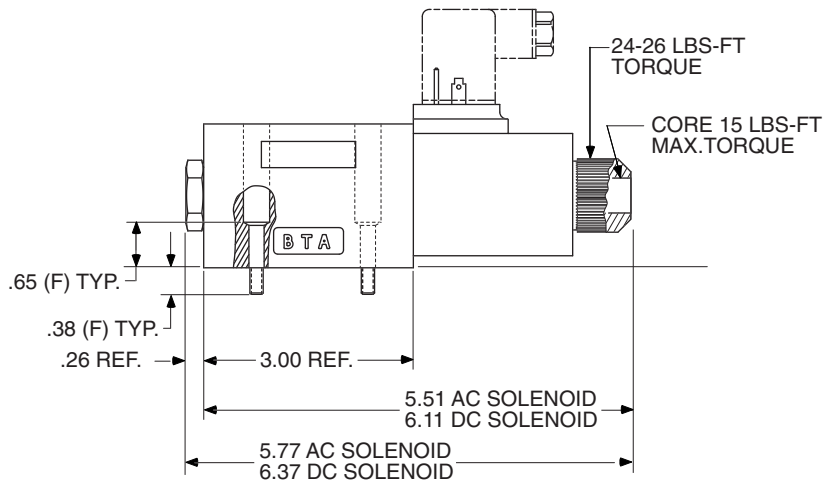
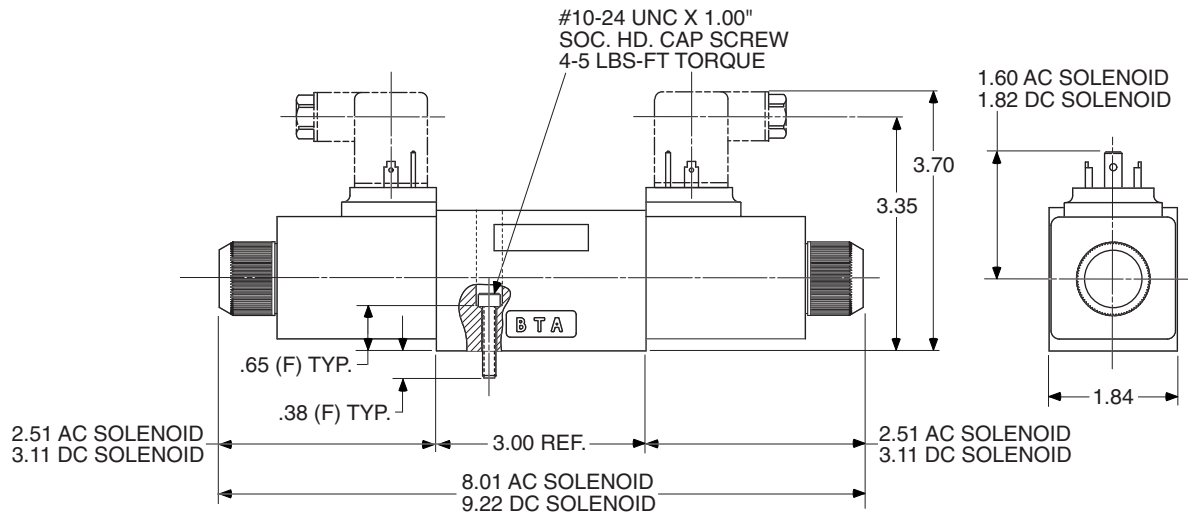
SOLENOID CODE	VOLTAGE & FREQUENCY	VOLTAGE LIMITS	INRUSH CURRENT (AMPS)	HOLDING CURRENT	HOLDING CURRENT MIN. VOLT.	HOLDING POWER
	VOLTS - Hz.	MIN. - MAX.	MAX.	(AMP)	(AMP)	(WATTS)
33L, 60L	120 - 60	108 - 126	2.10	.49	.39	24
	110 - 50	99 - 116		.58	.45	26
34L, 61L	240 - 60	216 - 252	1.10	.24	.19	24
	220 - 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



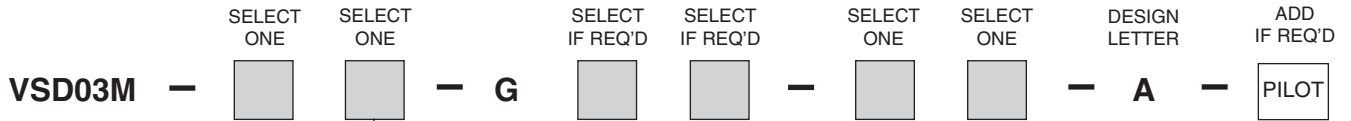
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ORDERING INFORMATION



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

- * 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