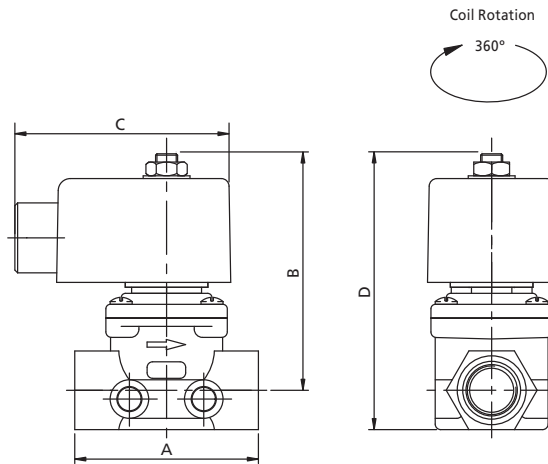
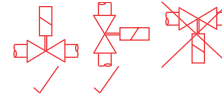


UGB Series — 2/2 Normally Closed



Preferred Valve Mounting Options



Dimensions

Port size	A	B	C	D
1/4"	2 1/4"	3"	3"	3 5/8"
3/8"	2 1/4"	3"	3"	3 5/8"
1/2"	2 1/4"	3"	3"	3 5/8"
3/4"	3 3/8"	3 9/16"	2 9/16"	4 1/4"
1"	4 3/8"	3 9/16"	2 9/16"	4 7/16"

Dimensions given in inches

Solenoid enclosures



S4 Type enclosure protection class IP50

External material: Pressed steel powder coated
 Electrical entry: 1/2" NPT metal conduit hub with 18" leads
 (NEMA 2 equivalent protection class)
 Winding Insulation: Class H

Main Valve Assembly

Model	Valve Body Conn. Size	Conn. Type	Operation	Orifice (mm)	Body Material	Seals	Style
34	UGB	B 1/4"	3 NPT	1 AUTO	Z Default	3 Aluminium	A Nitrile
	C 3/8"						
	D 1/2"						
	E 3/4"						
	F 1"						
34	•	3	1	Z	3	A	1

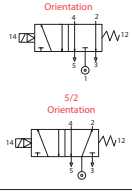
Coil options

Enclosure	Voltage / Frequency	Electrical connection	Approval
2	H1 24 V / 60 Hz	9 1/2" NPT	1 UL
	H2 120 V / 60 Hz (1/4" to 1/2" only)		
	H5 120 V / 60 Hz (1/4" to 1" only)		
2	••	9	1

Product coding example:

34B31Z3A1-2H291: UGB Series
 1/4" NPT, Auto, brass body, Nitrile seals, 120 V / 60 Hz, 1/2" NPT electrical connection, UL.

Namur Series – 3/2, 5/2 Universal

Specifications	
Mode of Operation	Normally Closed, energise to open 
Media	Air
Body Material	Anodised Aluminium
Flange Tube	Brass
Plunger and top stop	Stainless Steel
Springs	Stainless Steel
Seal Material	Nitrile (BunaN) (Std)
Electrical Characteristics	
Coil Voltage DC (=)	24 V
Coil Voltage AC 60 Hz (-)	120 V
Voltage Tolerance	+10% or -10%
Duty Cycle	100% ED
Electrical Connection Options	9mm din connector (NEMA 4 equivalent protection class)
Coil Insulation	Class F
Power Rating	5 Watts

Features and Benefits

- Zero pressure rated
- Ideal for in-line system service and repair
- Manual Override
- Low power LED Light
- Dual Coil option
- Exd and Exia compatible
- Max cycle frequency 5/sec



Port size	Cv	Kv	OPD (psi)		P. Max psi	Weight (lbs)
			AC Voltages	DC Voltages		
¼"	1.4	1.2	36-150	36-150	72.5	0.4

Options Available

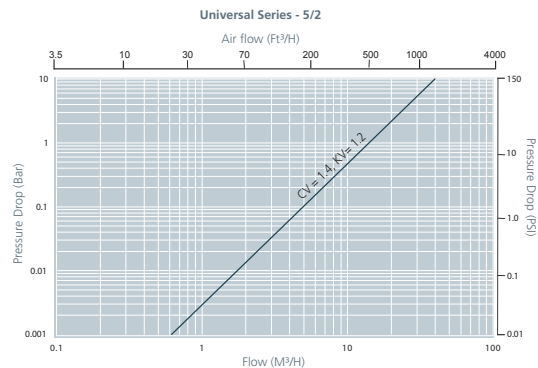
Solenoid Enclosure	
Protection Class	
EExd T6 (NEMA 6 equivalent)	See separate datasheet
EExd T4 (NEMA 6 equivalent)	

Seal Material ¹ and Media Temp. Range	Ambient Temperature Range	
	Min	Max
Nitrile (14 °F to +176 °F)	14 °F	122 °F

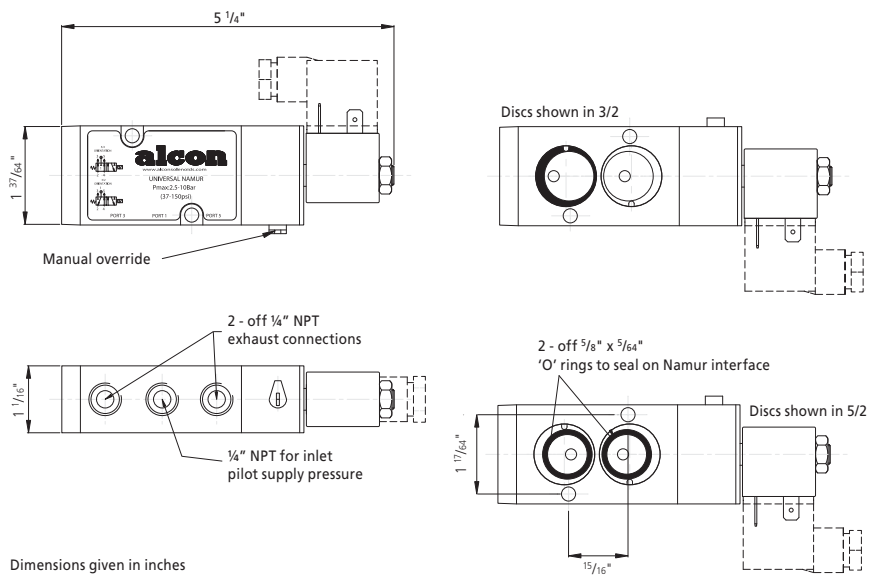
1 See corrosion reference guide and sealing solutions for material compatibility.

How to use the flow chart

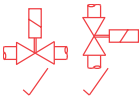
1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on where the two points intersect select the most appropriate model.



Namur Series – 3/2, 5/2 Universal



Preferred Valve Mounting Options



Solenoid enclosures



S7 enclosure protection class IP65 (NEMA 4 equivalent)

External material: Nylon
Electrical connection: DIN Plug to ISO 4400
Winding: Insulation Class F
Conforms to IP65 when correct plug seal gasket is fitted.

Main Valve Assembly

Model		Size		Connection Type		Operation		Orifice (mm)		Body Material		Seals		Style	
65	Namur	B	¼"	3	NPT	2	MANUAL OVERRIDE	Z	Default	3	Aluminium	A	Nitrile	1	Standard
65	B	3	2	Z	3	A	1								

1 Not needed for DC option

Coil options

Enclosure		Voltage / Frequency		Electrical connection		Approval	
1	Weather Proof IP65 (NEMA 4)	QY	120 V / 60 Hz	1	Din plug 9mm	8'	Non UL
		R1	24 VDC				
1		••		1		8	

Product coding example:

65B32Z3A1-1QY18:
Namur, IP65 (NEMA 4 equivalent), 1/4" NPT, manual override, Aluminium body, Nitrile seals, 120 V / 60 Hz, electrical connection 9 mm DIN.

Namur Series Exd & Exia – 3/2, 5/2 Universal

Specifications	
Mode of Operation	
Media	Air
Body Material	Anodised Aluminium
Flange Tube	Brass
Plunger and top stop	Stainless Steel
Springs	Stainless Steel
Seal Material	Nitrile (BunaN) (Std)
Electrical Characteristics	
Coil Voltage DC (=)	12 V, 24 V
Coil Voltage AC 60 Hz (~)	24 V, 120 V
Voltage Tolerance	+10% or -10%
Duty Cycle	100% ED
Protection Class (Exd)	II 2 G Ex d IIC T4 Tamb (-58 °F to + 158 °F) (NEMA 6 equivalent) II 2 G Ex d IIC T6 Tamb (-58 °F to + 104°F) (NEMA 6 equivalent) Class 1 Zone 1 Groups IIA, IIB, IIC gases
Protection Class (Exia)	Exia IIC T6 (-40 °F to + 122 °F) (NEMA 4 equivalent)
Electrical Connection (Exd)	½" NPT Port (Std)
Electrical Connection (Exia)	PG9 via Din Plug connector
Coil Insulation	Class F
Power Rating (Exd)	5 Watts
Power Rating (Exia)	1.6 Watts

Features and Benefits

- Zero pressure rated
- Ideal for in-line system service and repair
- Choice of valve body material seals
- Manual Override
- Low power LED Light
- Dual Coil option
- Exd, Exia compatible
- CSA approval (for Exd only)
- Max cycle frequency 5/sec



Port size	Cv	Kv	OPD (PSI)		P. Max Bar	Protection Class	Weight (lbs) excluding Solenoid
			AC Voltages	DC Voltages			
¼"	1.4	1.2	36-150	36-150	72.5	Exd	0.4

Options Available

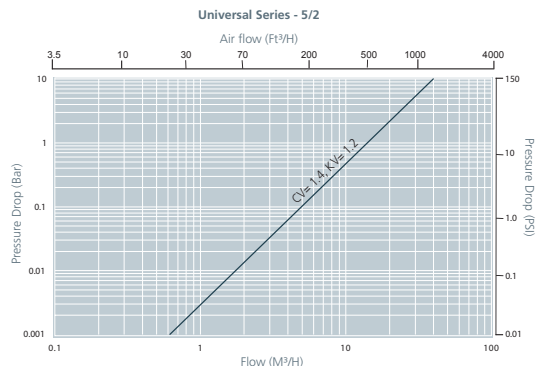
Solenoid Enclosure		
Protection Class	Electrical Entry	Enclosure Material
EExd T6 (NEMA 6 equivalent)	½" NPT conduit (std) M20 X1.5 conduit (option)	Aluminium
EExd T4 (NEMA 6 equivalent)		
Exia	9 mm DIN connector	Thermoset resin Weather Proof (NEMA 4 equivalent)

Seal Material ¹ and Media Temp. Range	Ambient Temperature Range			
	Min	Max (T6)	Max (T4)	Max (Exia)
Nitrile (14 °F to +176 °F)	14 °F	104 °F	158 °F	122 °F

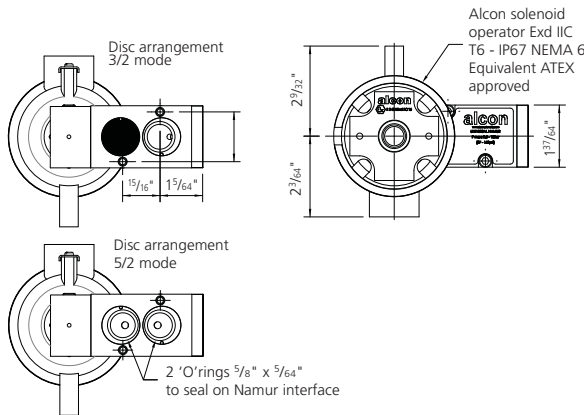
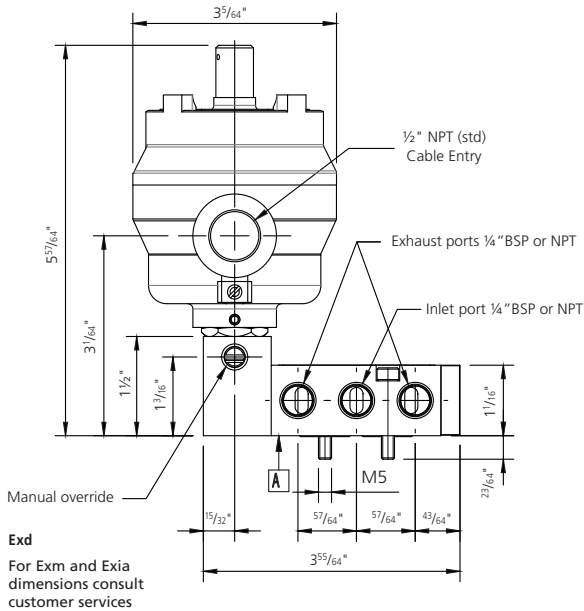
1 See corrosion reference guide and sealing solutions for material compatibility.

How to use the flow chart

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on where the two points intersect select the most appropriate model.



Namur Series Exd & Exia – 3/2, 5/2 Universal



For Exia option use product code 65B3Z3AE-1QJ1.
For all other coding options see below:

Main Valve Assembly

Model		Size		Conn. Type		Operation		Orifice (mm)		Body Material		Seals		Style	
65	Namur	8	¼"	3	NPT	2	Manual Override	Z	Default	3	Aluminium	A	Nitrile	3	Exd

Coil options

Enclosure	Voltage / Frequency	Electrical connection	Approval
9 Exd Aluminium	F1 24 VDC F4 12 VDC H1 24 V / 60 Hz H2 120 V / 60 Hz	9 1/2" NPT	9 Atex T6 K Atex T4
9	••	9	•

Product coding example:

65B3Z3A13-9H299:
Namur Exd 1/4" NPT, manual override, Aluminium body, Nitrile seals 120 / 60 Hz 1/2" NPT electrical connection T6.

Solenoid enclosures



Exd S4 type enclosure

Power consumption: Holding 19 VA, 12 V to 230 V 50 / 60 Hz.
14.5 W, 12 V to 212 VDC

External material: Powder coated aluminium or 316 st.st. enclosure with st.st. nameplate

Electrical entry: 1/2" NPT conduit entry (standard)

Protection Class: II 2 G Exd IIC T6 for ambient temp -58 °F to +104 °F

Optional: II 2 G Exd IIC T4 for ambient temp -58 °F to +158 °F

Weight: 1.8 lbs Aluminium or 3.3 lbs - Stainless Steel

CSA approval

Alcon flame proof enclosures are suitable for the following areas / gases:

Zones 1 & 2
Class 1 Division 1
Class 1 Division 2

Groups: IIA, IIB, IIC gases



Intrinsically safe enclosure (ATEX approved)

External material: Thermoset resin

Electrical connection: PG9 via DIN plug connector Din 43650-A

Max power consumption: Exia 1.6 Watts DC.

Winding: Insulation Class F

Protection class: Exia IIC T6, ATEX approved for ambient temperatures -40 °F to + 122 °F

CONVERSIONS

Capacity & flow rate

Multiply number of	by	to obtain	Cubic metres/ hour	Litres /sec	Litres /min	Cubic metres/sec (cumeq)	UK gpm	US gpm	Cubic ft/sec (cusec)	Water	
										UK ton/h	tonne/h
1 m³/h			1	0.278	16.66	0.000278	3.666	4.4	0.00981	0.982	1
1 l/s			3.6	1	60	0.001	13.2	15.83	0.00353	3.528	3.6
1 l/m			0.06	0.0167	1	1.66x10-5	0.2199	0.264	0.000588	0.059	0.06
1 m³/s			3600	1000	60,000	1	13,200	15,800	35,315	3532	3600
1 UK gpm			0.272	0.0757	4.546	0.000757	1	1.2	0.002267	0.268	0.272
1 US gpm			0.227	0.0632	3.785	0.000063	0.833	1	0.002233	0.223	0.227
1 ft³/s			101.9	28.32	1698	0.0283	374	449	1	100	101.9
1 UK ton/h			1.02	0.283	17	0.000283	3.73	4.48	0.01	1	1.02
1 tonne/h			1.005	0.278	16.7	0.000278	3.666	4.41	0.0098	0.98	1

Volumetric rate of flow

Multiply number of	by	to obtain	Litres /sec	Litres /min	Cubic metres/ hour	Cubic ft/ hour	Cubic ft/ min	Imperial Gallons/min	U.S. Gallons/min	U.S. Barrels/day
Litres per sec			1	60	3.6	127.1	21.19	13.2	15.85	543.4
Litres per min			0.1667	1	0.06	2.119	0.03532	0.22	0.2642	9.057
Cubic metres per hour			0.2778	16.67	1	35.31	0.5886	3.666	4.403	150.9
Cubic Feet per hour			0.007865	0.4719	0.02832	1	0.01667	0.1038	0.1247	4.275
Cubic Feet per min			0.4719	28.32	1.6999	60	1	6.229	7.481	256.5
Imperial Gallons per min			0.07577	4.546	0.2727	9.633	0.1606	1	1.201	41.17
U.S. Gallons per min			0.06309	3.785	0.2271	8.021	0.1337	0.8327	1	34.29
U.S. Barrels per day			0.00184	0.1104	0.0006624	0.2339	0.0003899	0.02428	0.02917	1

1 MGD = 189.4 m³/h 1 scfm = 1.699 Nm³/h

Temperature

To convert from	To Fahrenheit	To Celcius	To Kelvin
Fahrenheit (F)	F	(F-32) * 5/9	(F-32) * 5/9 + 273.15
Celcius (C)	(C*9/5) + 32	C	C + 273.16
Kelvin (K)	(K - 273.15) * 9/5 + 32	K - 273.15	K

Pressure

Multiply number of	by	to obtain	bar	psi (lbf/in²)	Cm water (39.2 °F, 4 °C)	Inch of water (39.2 °F, 4 °C)	Foot of water (39.2 °F, 4 °C)	Kilopascal (kPa)
Bar			1	14.503 77	1019.74	401.474	33.456 2	100
Psi (lbf/in2)			0.068 947 57	1	70.308 9	27.680 7	2.306 73	6.894 757
Cm water (39.2 °F, 4 °C)			0.000 980 638	0.014 223 0	1	0.393 701	0.032 808 4	0.098 063 8
Inch of water (39.2 °F, 4 °C)			0.002 490 82	0.036 123 3	2.54	1	0.083 333 4	0.249 082
Foot of water (39.2 °F, 4 °C)			0.029 889 8	0.433 515	30.48	12.021 3	1	2988 98
Kilopascal (kPa)			0.01	0.145 037 7	10.197 4	4.014 74	0.334 562	1

CORROSION REFERENCE GUIDE

This chart is for general recommendation only. When ordering valves for corrosive duty application details are to be given, particularly media, % concentration, temperature and ambient temperature. For additional support please contact us.

Material	Valve Body					Seals				Notes
	Alum	Brass	Brz	CI	Stainless	Nitrile	EPDM	Viton	PTFE	
Acetic Acid 10%	NR	NR	NR	NR	•	NR	•	NR	•	1
Acetone	•	•	•	•	•	NR	•	NR	•	
Acetylene	NR	•	•	NR	•	NR	•	•	•	1
Air	•	•	•	•	•	•	•	•	•	
Ammonia Gas Anhydrous 20%	NR	NR	NR	•	•	NR	•	NR	•	
Argon Gas	•	•	•	NR	•	NR	•	•	•	
Beer	NR	NR	NR	NR	•	•	•	•	NR	
Benzene	•	•	•	NR	•	NR	NR	•	•	
Bromine (Liquid)	NR	NR	NR	NR	NR	NR	NR	•	NR	1
Butane	•	•	•	•	•	•	NR	•	•	
Carbon Dioxide (Gas)	•	•	•	•	•	•	•	•	•	
Carbon Dioxide (Liquid)	NR	NR	NR	NR	•	NR	NR	NR	•	
Carbon Tetrachloride (Dry)	NR	•	•	NR	•	NR	NR	•	•	
Carbonated Water	NR	NR	NR	NR	•	•	•	NR	•	
Caustic Soda 30%	NR	NR	NR	NR	•	NR	•	NR	•	
Chrome Acid 20% - 20C	NR	NR	NR	NR	•	NR	NR	•	•	
Chlorine Gas (Dry)	NR	NR	NR	NR	NR	NR	NR	•	•	1
Chlorine Liquid	NR	NR	NR	NR	NR	NR	NR	•	•	1
Chlorine in Water	NR	•	•	NR	•	•	•	NR	•	2
Coke Oven Gas	•	NR	NR	•	•	•	NR	NR	•	
Coolant	NR	•	•	NR	•	•	NR	•	•	
Creosote	•	NR	NR	NR	•	NR	NR	•	•	
Crude Oil	•	NR	NR	NR	•	•	NR	•	•	
De-ionized Water	NR	NR	NR	NR	•	•	•	•	•	
De-mineralised Water	NR	NR	NR	NR	•	•	•	•	•	
Detergents	NR	•	•	NR	•	•	•	•	•	
Diesel Oil	•	•	•	•	•	•	NR	•	•	
Distilled Water	NR	•	•	NR	•	•	•	•	•	
Ethyl Alcohol	NR	•	•	NR	•	•	•	•	•	
Ethylene Glycol	•	•	•	NR	•	•	•	•	•	
Ethylene Oxide	NR	NR	NR	NR	•	NR	NR	NR	NR	1
Food Products	NR	NR	NR	NR	•	•	NR	•	NR	
Freon 12	NR	•	•	•	•	NR	NR	NR	•	
Freon 22	NR	NR	NR	NR	•	NR	NR	NR	•	
Freon Solvents	NR	•	•	NR	•	•	NR	NR	•	
Fuel Oil	•	•	•	NR	•	•	NR	•	•	
Gasoline	NR	•	•	NR	•	NR	NR	•	•	
Helium	•	•	•	NR	•	•	•	•	•	
Hydraulic Fluids	NR	•	•	NR	•	NR	NR	•	•	
Hydrochloric Acid	NR	NR	NR	NR	NR	NR	NR	NR	•	1
Hydrogen Gas	•	•	•	•	•	•	•	•	•	3
Hydrogen Sulphide (dry)	NR	NR	NR	NR	•	NR	•	•	•	
Jet Fuel	•	NR	NR	NR	•	•	NR	•	•	
Kerosene	•	•	•	•	•	•	NR	•	•	

Notes:

1. Non-standard materials of construction are required.
2. Chlorine must not exceed 5 parts per million.

3. Alcon is required to provide industry standard degreasing, cleaning and individual packaging with appropriate label.

• = Recommended

NR = Not Recommended

CORROSION REFERENCE GUIDE

This chart is for general recommendation only. When ordering valves for corrosive duty application details are to be given, particularly media, % concentration, temperature and ambient temperature. For additional support please contact us.

Material	Valve Body					Seals				Notes
	Alum	Brass	Brz	CI	Stainless	Nitrile	EPDM	Viton	PTFE	
LPG	•	•	•	NR	•	•	NR	•	•	
Lubricating Oil	•	•	•	•	•	NR	•	•	•	
Methane Gas	•	•	•	•	•	•	NR	•	•	
Methyl Alcohol	NR	•	•	•	•	•	•	•	•	
Mineral Oil	•	•	•	•	•	•	NR	•	•	
Natural Gas	•	•	•	•	•	•	•	•	•	
Natural Gas Liquid	NR	•	•	NR	•	NR	NR	NR	•	3
Nitric Acid 50% 20C	NR	NR	NR	NR	•	NR	NR	•	•	
Nitrogen gas	•	•	•	•	•	•	•	•	•	
Nitrogen Liquid	NR	•	•	NR	•	NR	NR	NR	•	3
Nitrous Oxide	NR	NR	NR	NR	•	NR	•	NR	•	
Oxygen Gas	NR	•	•	NR	•	NR	NR	•	•	3
Oxygen Liquid	•	•	•	NR	•	NR	NR	NR	•	3
Paraffin	•	•	•	NR	•	•	•	•	•	
Perchlrenthylene 20C	NR	•	•	NR	•	NR	NR	•	•	
Phosperic Acid 30%	NR	NR	NR	•	NR	NR	•	•	•	1
Photographic solution	NR	NR	NR	NR	NR	NR	NR	NR	•	1
Potable water	NR	•	•	NR	•	•	•	•	•	
Potassium Sulphate	NR	NR	NR	•	•	•	•	•	•	
Propane	•	•	•	NR	•	•	NR	•	•	
Salt Water	NR	NR	•	NR	•	•	•	•	•	1
Sea Water	NR	NR	•	NR	•	•	•	•	•	1
Soapy Water	NR	•	•	NR	•	•	NR	•	•	
Sodium Hydroxide 70%	NR	NR	NR	NR	•	NR	•	•	•	
Sodium Hypochorite 5%	NR	NR	NR	NR	•	NR	•	•	•	
Steam 0 - 50 psi	NR	•	•	NR	•	NR	•	NR	•	
Steam 0 - 125 psi	NR	•	•	NR	•	NR	NR	NR	•	
Steam Condensate	NR	•	•	NR	•	NR	•	NR	•	
Sulphur Dioxide	NR	NR	NR	NR	•	NR	•	NR	•	
Sulphuric Acid 40%	NR	NR	NR	NR	NR	•	•	•	•	1
Sulphurous Acid 5% - 20C	NR	NR	NR	NR	NR	NR	NR	•	•	1
Toluene	•	•	•	NR	•	NR	NR	NR	•	
Town Gas	•	•	•	•	•	•	NR	•	•	
Trichlorethylene (Dry)	NR	NR	NR	NR	•	NR	NR	•	•	
Turpentine	•	•	•	NR	•	•	NR	•	•	
Vegetable Oil	NR	NR	NR	NR	•	•	NR	•	•	
Vinegar	NR	NR	NR	NR	•	NR	•	NR	•	1
Water (mains)	NR	•	•	•	•	•	•	•	•	
Water 80 - 120 °C	NR	•	•	NR	•	NR	•	•	•	
Water 120 - 150 °C	NR	•	•	NR	•	NR	NR	•	•	
Water 150 - 180 °C	NR	•	•	NR	•	NR	NR	NR	•	
Water boiler feed	NR	NR	NR	NR	•	•	•	NR	•	
Water/Glycol Solutions	NR	•	•	NR	•	NR	•	•	•	
White Spirit	•	•	•	•	•	NR	NR	•	•	

Notes:

1. Non-standard materials of construction are required.
2. Chlorine must not exceed 5 parts per million.

3. Alcon is required to provide industry standard degreasing, cleaning and individual packaging with appropriate label.

• = Recommended

NR = Not Recommended

VISCOSITY REFERENCE GUIDE

Redwood 1 (Seconds)	Redwood 11 (Seconds)	Saybolt Universal SSU (Seconds)	Saybolt Fural (Seconds)	Engler (Degrees)	Kinematic (Centistokes)
30	-	-	-	1.05	1.5
32	-	34	-	1.15	2.5
34	-	37	-	1.25	3.4
36	-	40	-	1.3	4.2
38	-	42	-	1.4	5
40	-	45	-	1.45	5.7
45	-	50	-	1.6	7.5
50	-	57	-	1.8	9.4
55	-	62	-	1.9	11
60	-	68	-	2.1	12.6
65	-	74	-	2.2	14.2
70	-	79	-	2.4	15.5
75	-	85	-	2.6	17
80	-	92	-	2.7	18.6
85	-	98	-	2.9	20
90	-	103	-	3	21.3
95	-	109	-	3.2	22.8
100	-	115	15	3.4	24.1
110	-	125	16	3.7	26.7
120	-	137	17	4	29.2
130	-	148	18	4.3	31.7
140	-	160	20	4.6	34.2
150	-	171	21	4.9	36.8
160	-	183	22	5.2	39
180	-	205	24	5.9	44
200	-	228	26	6.5	49
225	-	256	28	7.3	55
250	-	285	31	8.1	62
275	-	313	34	8.9	68
300	-	342	37	9.8	74
325	34	370	40	10.6	80
350	36	399	42	11.4	86
375	38	428	45	12.2	93
400	41	456	48	13	99
450	46	513	53	14.7	111
500	51	570	59	16.3	124
550	56	628	65	17.9	136
600	61	684	71	19.5	148
700	71	799	82	22.8	173
800	81	912	94	26.1	198
900	91	1025	105	29.3	222
1000	100	1142	117	32.6	247
1100	110	1257	128	35.9	272
1200	120	1368	140	39	296
1400	140	1599	163	46	346
1600	160	1825	186	52	395
1800	180	2050	209	59	444
2000	200	2280	232	65	493
2200	220	2510	255	72	534
2400	240	2735	278	78	592
2600	260	2965	302	85	642
2800	280	3190	325	91	691
3000	300	3420	348	98	741
3500	350	3990	406	114	864
4000	400	4560	464	130	987
4500	450	5140	522	147	1112
5000	500	5700	580	163	1235
5500	550	6280	639	179	1359
6000	600	6840	696	195	1482
6500	650	7415	754	212	1605
7000	700	7990	814	228	1730
7500	750	8550	869	244	1850
8000	800	9120	928	261	1957



COPPER WINDING TEMPERATURE CLASSIFICATION

Insulation systems are arranged in order of their insulation level and classified by a letter symbol or by a numerical value.

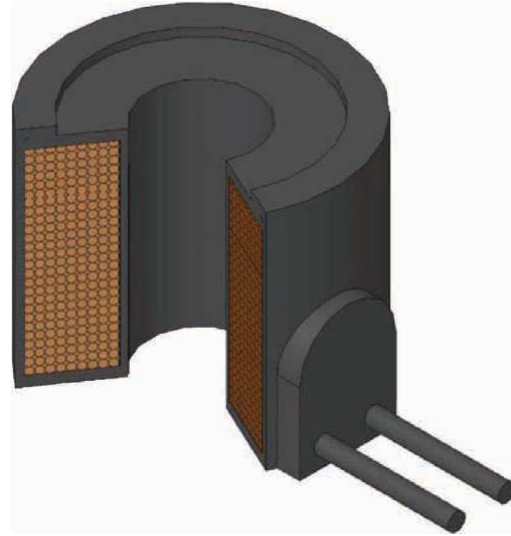
The numerical value relates to the temperature classification of the insulation system.

The temperature classification indicates the maximum (hot-spot) temperature at which the insulation system can be operated for normal expected service life.

In general, all materials used in a given insulation system should be rated for temperatures equal to, or exceeding, the temperature classification of the system.

Features and Benefits

- Zero pressure rated
- Ideal for in-line system service and repair
- Choice of valve body material seals
- Manual Override
- Low power LED Light
- Dual Coil option
- Exd, Exia and Exm compatible
- Max cycle frequency 5/sec



Insulation Systems*	Temperature Classification
Class A Class 105	105 °C / 221 °F
Class E** Class 120	120 °C / 248 °F
Class B Class 130	130 °C / 266 °F
Class F Class 155	155 °C / 311 °F
Class H Class 180	180 °C / 356 °F
Class N Class 200	200 °C / 392 °F

* IEEE Std.117.

** Used in European equipment

METALS

Ag (silver)

Silver is a soft, malleable metal with a characteristic sheen. It has the highest thermal and electrical conductivity of all metals. Alcon provide shading coil material for stainless steel valves in silver.

Al (aluminium)

Derived from the Latin ALUMEN for ALUM (Potassium aluminium sulphate). A lightweight material that offers high strength and rigidity along with good corrosion resistance and heat dissipation. Alcon provide die-cast bodies, solenoid enclosures and shading coils made from aluminium.

Cu (copper)

Copper is an important engineering material since it is widely used in its pure state and also in alloys with other metals. In its pure state it is the most important material in the electrical industry. It has high electrical conductivity and corrosion resistance and is easy to fabricate. It has reasonable tensile strength, controllable annealing properties and general soldering and joining characteristics. Alcon provide as standard shading rings produced from Copper.

CU Sn (bronze)

Bronze alloys consist of copper and tin primarily and these can be known as "tin bronzes". Since phosphorus is usually added to these alloys as a deoxidising agent during casting, the tin bronzes are commercially known as "phosphor bronzes". These alloys possess desirable properties such as high strength, wear resistance, and good sea water resistance. Alcon provide bodies from bronze.

Cu Zn (brass)

Brass is probably the best known of the "yellow metals" and it is produced in a wide variety of forms with many different characteristics and attributes. It is a basic alloy of copper and zinc and it finds many engineering applications. Alcon provide forged bodies from brass this forging brass has a composition of 58% copper, 2% lead and 40% zinc.

Fe CrNi 300 Series Stainless Steel (18-8) Austenitic

303 Stainless Steel is essentially low-carbon steel to which chromium has been added. It is the addition of chromium, in amounts of 18%, that adds strength and gives stainless steel its unique 'stainless', corrosion-resisting properties. The corrosion resistance, as well as other useful properties of the steel, is enhanced by the addition of other elements such as 8% nickel. Alcon provide flange tubes, bodies & springs in 300 series stainless steel.

316 Stainless Steel

316 Stainless Steel is essentially low-carbon steel to which chromium has been added. It is the addition of chromium, in amounts of 18%, that adds strength and gives stainless steel its unique 'stainless', corrosion-resisting properties. The corrosion resistance, as well as other useful properties of the steel, is enhanced by the addition of other elements such as 12% nickel. Alcon provide valve bodies flange tubes and coil enclosures in 316L series stainless steel.

430F & 430FR Magnetic Stainless Steel

Type 430F is a solenoid grade stainless steel that has the best magnetic properties and lowest residual magnetism. Type 430FR stainless, used for corrosive service for many years, also offers improved wear resistance, higher electrical resistivity and increased hardness. Alcon's plunger and top stop materials are produced using the 430F series. Basic composition 18% chromium, remainder iron.

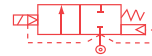


MODES OF OPERATION

2/2 N/C Normally Closed



*Solenoid Operated
Direct Acting*



*Solenoid
Pilot Operated*

2 way, normally closed, energise to open, on/off operation (de-energise to close), with one inlet and one outlet connection. There are 2 types of valve operation – Direct Acting and Pilot Operated.

- Direct Acting – The coil supplies all the power to open the valve and the valve will operate from zero pressure.
- Pilot Operated – this can either be diaphragm or piston operated. These valves have a pilot hole which is opened/closed by the coil acting upon a plunger and diaphragm or piston used to control the main Orifice (mm). The operation relies on the media pressure difference between the inlet and outlet and a minimum operating pressure is required to operate these valves unless stated as zero.

2/2 N/O Normally Open



*Solenoid
Direct Acting*



*Solenoid
Pilot Operated*

2 way, normally open, energise to close, de-energise to open, with one inlet and one outlet connection. Can be either direct acting or pilot operated.

3/2 N/C Normally Closed



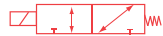
Valve open when energised, closed when de-energised. This valve operates on the same principle as the 2/2 N/C version except the valve has 3 connections, 2 orifices, one permanently open, one permanently closed. The use of these are for operation of actuators for large valves where single cylinder spring return system is employed.

3/2 N/O Normally Open



Valve open when de-energised, closed when energised.

3/2 UNI Universal



Valve may be used as normally closed, normally open or diversion/selector valve.

5/2



These valves are available in 2 forms;

- Single Solenoid – 2 position, spool and sleeve type, which is based on an air pilot return mechanism. When de-energised, the valve allows one inlet and one outlet to be connected, exhausting the other inlet/outlet connection through an exhaust port. On energisation, the action reverses.
- Dual Solenoid Valves – these spool and sleeve type solenoid valves are momentary contact type. When one coil is energised, one inlet is connected to one outlet, with the other inlet/outlet connection connected to an exhaust port, when the coil is de-energised and other coil energised, the action is reversed.

These valves are for use on double acting cylinder applications.

MODES OF OPERATION

2/2 N/C Normally Closed Pneumatic



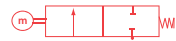
2 way, normally closed, pressurise to open, de-pressurise to close with the aid of a return spring, having one inlet and one outlet connection. Can be direct acting air operated against a return spring. Note: These valves are operated via a 3 way solenoid valve which is always required.

2/2 N/O Normally Open Pneumatic



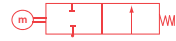
2 way, normally open, pressurise to close, de-pressurise to open with the aid of a return spring, having one inlet and one outlet connection. Can be direct acting air operated against a return spring. Note: These valves are operated via a 3 way solenoid valve which is always required

2/2 N/C Normally Closed Motorised



2 way, normally closed, energise to open – (slow opening) de-energise to close – (quick closing) with one inlet and one outlet connection. Motor driven against a return spring.

2/2 N/O Normally Open Motorised



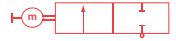
2 way, normally open, energise to close – (slow closing) de-energise to open – (quick opening).

2/2 N/C Normally Closed Manual Reset (Solenoid)



These valves operate on the same principle as 2/2 N/C direct acting version except – once the coil is energised the valve will not open until manually opened by either a lever or push reset device.

2/2 N/C Normally Closed Manual Reset (Motorised)



The operation is similar to 2/2 N/C Normally Closed Manual Reset (Solenoid) except, once the motor is energised the valve will not open till a manual reset/relay button is operated, either remote or integral to the actuator. General use is for both manual reset or safety systems where knowledge of an electrical failure is required.

PROTECTION CLASS, IP RATINGS & HAZARDOUS AREAS

Enclosure Protection - Non Hazardous locations, Comparison of American Nema classification & European CENELEC IP classification

Nema type & relevant tests	Description	Equivalent degree of protection
1	General purpose - indoor	IP30
2	Drip proof - indoor	IP32
3	Dust and rain tight - outdoor	IP54
3R	Rain proof - outdoor	IP54
4	Water tight and dust tight - indoor and outdoor	IP65
4X	Water tight, dust tight and corrosion resistant - indoor and outdoor	IP65
6	Submersible, water tight and dust tight - indoor and outdoor	IP67
12	Industrial use, dust tight and drip proof - indoor	IP52
13	Oil tight and dust tight - indoor	IP55

IP No.	First number - protection again solids	Second number - protection against liquids
0	No protection	No protection
1	Protected against solid objects over 50mm Ø	Protected against vertically falling drops of water
2	Protected against solid objects over 12mm Ø	Protected against direct sprays up to 15° from vertical
3	Protected against solid objects over 2.5mm Ø	Protected against direct sprays up to 60° from vertical
4	Protected against solid objects over 1mm Ø	Protected against direct sprays from all directions limited ingress permitted.
5	Protected against dust-limited ingress permitted	Protected against low pressure jets from all directions limited ingress permitted
6	Totally protected against dust	Protected against strong jets from all directions limited ingress permitted
7		Protected against effects of immersion from 15cm - 1m
8		Protected against long periods of immersion under pressure

International Standards - Temperature classification

IEC 79-8 & CENELEC		American NEC	
Class	Max. surface temp (°C)	Class	Max. surface temp (°C)
T1	450	T1	450
T2	300	T2	300
		T2A	280
		T2B	260
		T2C	230
T3	200	T2D	215
		T3	200
		T3B	165
T4	135	T3C	160
		T4	135
T5	100	T4A	120
		T5	100
T6	85	T6	85

Zones & divisions - Define the likelihood of the hazard being present in potentially explosive concentrations

USA & CANADA		USA & CANADA	
Hazardous continuously present (>1000 hrs / year)	Zone 0	Division 1	Hazard likely to be present: N.B. where the hazard is continuously present, electrical apparatus is avoided if possible.
Hazard likely to be present	Zone 1		
Hazard unlikely to be present: typically only for short periods or under fault conditions (<10 Hrs/year)	Zone 2	Division 2	Hazard unlikely to be present - likely to be confined. An area adjacent to a Division 1 area.
Fully defined in BS5345 and IEC 79-10 (Guideline figures)			Fully described in Article 500 of the National Electrical Code.

SEALING SOLUTIONS

Nitrile (BunaN) (NBR)

Trade Names:

Chemigum Hycar (Zeo (Goodyear)n Chemical), Ny Syn (Copolymer), Paracril (Uniroyal), Krynac (Polysar), PerNitrilen (Mobay)

This is the most widely used O-Ring elastomer. It has excellent resistance to petroleum products. Excellent compression set, tear and abrasion resistance. Suitable for air, oil, water, acetylene, kerosene, lime solutions, liquefied petroleum gases and turpentine.

- Nitrile / BunaN is Alcon's preferred sealing solution unless otherwise stated.
- Alcon recommends that Nitrile is used within the temperature range of -10 °C to +80 °C (14 °F to 176 °F).
- Please note Nitrile is not recommended for highly aromatic petroleum / gasoline's or acids.

EPDM (EPR or EPDM)

Excellent resistance to weathering and ozone, water and steam, with good performance in castor and some phosphate ester based fluids and poor on petroleum / gasoline. It's low and high temperature capabilities are good, having excellent resistance to set with good resilience, this low compression set provides a suitable solution for steam sealing. EPDM is suitable for temperatures above the Nitrile range. Ethylene-propylene is generally suitable for most photographic solutions as well as numerous chemical solutions. EPDM has served to replace the formerly used butyl.

- Alcon recommends that EPDM is used within the temperature range of -50 °C to +120 °C (-58 °F to +248 °F).
- Please note EPDM should NEVER be used in contact with mineral based fluids or DI ester based lubricants, due to excessive swell and deterioration. When lubrication is required silicone grease or fluids should be used.

*VITON (FPM FLUOROELASTOMER)

It has high temperature capabilities, excellent resistance to hydraulic oils, petrol and many other chemicals. Viton O-Rings are used in automobile and other mechanical devices requiring maximum resistance to elevated temperature and to many functional fluids. Viton is a fluorocarbon elastomer. Primarily developed for handling hydrocarbons such as jet fuels, gasoline's, solvent, etc., which normally caused detrimental swelling to NBR. Viton has a high temperature range similar to ethylene propylene but is more resistant to "dry heat". Viton has a rather wide range of chemical compatibility.

- Alcon recommends that Viton is used within the temperature range of -20 °C to +150 °C (-4 °F to +302 °F).

*Viton is a registered trademark of Du-Pont

* PTFE / TEFLON

PTFE is a fluorocarbon resin known as a disc sealing material solution where all other synthetic materials have failed. Rulon is a form of Teflon having fillers which have been added for improved mechanical properties. Teflon with fillers are considered more of a plastic than a resilient-type material. They are virtually unattacked by any fluid. PTFE provides sealing solutions for cryogenic and steam applications.

Alcon recommends that PTFE is used within the temperature range of -200 °C to +180 °C (-328 °F to + 356 °F).

*TEFLON is a registered trademark of Du-Pont.

It must be noted that PTFE sealing will allow slight let-by.

Silicone

This elastomer provides high and low temperature solutions under certain conditions for numerous applications (it must be noted that silicone is not suitable for steam applications). It can handle hydrogen peroxide and some acid solutions. Silicone's retention of properties at high temperatures is superior to other elastic materials.

Alcon recommends that Silicone is used within the temperature range of -65 °C to +250 °C (-85 °F to +482 °F).

It must be noted that Silicone has poor tensile strength, tear resistance and abrasion resistance.

Neoprene

Neoprene is commonly used for refrigeration systems sealing as an external seal. Suitable for alcohol, mild acids, water, air, ammonia, argon gas and other gases.

Alcon recommends that Neoprene is used within the temperature range of -20 °C to +90 °C (-4 °F to +194 °F).

Consideration

Although Alcon state a temperature range for it's elastomers, limitations are also dependent on their specific function within the valve. An example of this would be with a diaphragm and an O-Ring at a low temperature, both will stiffen, however, the sealing capabilities of the diaphragm will be reduced but the O-Ring, of similar material, which stiffens at low temperature may still perform its sealing function. Alcon recommend that temperatures down to -20 °C (-4 °F) can be considered tolerable. Elastomers such as low temperature EPDM must be selected for use below this temperature along with the application. These can extend the low limit to approximately minus -40 °C (-40 °F) depending on specific usage. Generally the upper temperature limit for elastomers is +100 °C (212 °F). Viton and EPDM can support higher temperatures up to +150 °C depending upon application. When applications arise that are below or above the temperature capabilities of Alcon's elastomers we can provide PTFE / PCTFE sealing solutions. These unique chemical-resistant materials can be used from -200 °C to +180 °C (-328 °F to +356 °F) when used considering specific design constraints.



Solenoid Enclosures

S4 Type Enclosure

Protection Class IP50

External Material: Pressed steel Powder Coated
Electrical Connection: 1/2"NPT conduit hub with 18" leads
(NEMA 2 equivalent protection class)
Winding insulation Class H



S7 Type Enclosure

Protection Class IP65

Material: Nylon
Electrical Connection: DIN Plug to ISO 4400
Standard Enclosure for 5/2, Universal Namur Valves
Winding insulation Class F
This enclosure conforms to IP65 when correct plug seal gasket is fitted.



Solenoid Enclosures



Explosion-proof / Weatherproof.

Enclosure S4 Type Exd ATEX or IECEx / CSA / uCSAs approved.

Intended for use in potentially explosive atmospheres Directive 94/9/EC.

Compliance with essential health and safety requirements EN60529 (IP67), EN50018 and EN50014

Features

- Special purpose solenoid valves are used for controlling gases or liquids where a potentially explosive gas/air mixture is present in the atmosphere for long periods or likely to occur in normal operation
- Alcon flameproof enclosures are suitable for hazardous areas Zone 1 and Zone 2, for the control of Group IIA, IIB, IIC gases.

Applications

- Valves configured for Hazardous Areas
- User to consult all applicable codes, such as N.E.C., EU directive 99/92/EC, for definitions, performance and safety requirements associated with Hazardous Area Classification, Apparatus Group, Zones, Division and Temperature Classification.

Protection Class: II 2 G Exd IIC T6 for ambient temperatures -58 °F to +104 °F

Optional: II 2 G Exd IIC T4 for ambient temperatures -58 °F to +158 °F

Weatherproof to IP67 Certificate No:

Sira 03ATEX1319 (ATEX)

IECEx CSA070002 (IECEx)

1676463 (CSA uCSAs)

Technical Specification

Power Consumption: Holding – 19 VA, 12 V to 230 V
50 / 60 Hz. 14.5 W, 12 V to 212 VDC

Material: Powder coated Aluminium or 316 St. St enclosure with St. St nameplate

Electrical Entry: M20 x 1.5 or ½" NPT Conduit Entry

Applicable to the following types:
21, ACD, ACP, 31, GB



Solenoid Enclosures



Intrinsically Safe Enclosures (ATEX approved)

Complies with EN 50 014: EN 50 020 A1 and A2

Protection Class: Exia IIC T6, ATEX approved for ambient temperatures -40 °F to + 122 °F

Maximum valve media temperature of 158 °F

Weatherproof to IP65 Certificate No:

PTB 02 ATEX 2154

Technical Specification

Winding insulation Class F

Rated Voltage: 24 VDC with typical 300 Ohm zener barrier

Max Power Consumption: Exia 1.6 Watts DC Exia

Material: Thermoset resin

Electrical Entry: PG9 via Din Plug Connector
Din 43650-A

Applicable to the following types:
(5/2), UNIVERSAL NAMUR

Glossary

Glossary of Terms

Flow Data

Unless otherwise stated, Alcon solenoid valves are catalogued with respect to flow: Kv m³/hr, or lbs/hr.

Individual flow charts are illustrated in the catalogue for each type of Alcon valve describing the most

common application - air, water, gas or steam.

Where Kv is defined as - The flow of water through a valve at 20° C in m³/hr at a pressure drop of 1bar. The dimensions of Kv values can be transposed by means of following factors:

$$C_v = 1.16 \times K_v$$

$$K_v = 0.853 \times C_v$$

Where C_v is defined as - US Gallons/Minute water with a pressure drop of 1 PSI

Pressure Ratings

OPD (Operating Pressure Differential Range)

The differential pressure range between the inlet and outlet ports at which the valve can safely operate.

Catalogue figures represent tests carried out at +/- 10% of rated voltage in a 20 °C ambient.

P. Max

The maximum pressure the valve can withstand without causing damage to the components

Zero Pressure Rated (refer to OPD)

When the lower value of OPD is zero, the valve will operate without pressure differential.

Otherwise this value represents the minimum pressure differential required to operate the valve.

Mounting

Preferred mounting arrangements are noted below

- 1) Solenoid vertical and uppermost; valve to be fitted to horizontal pipe with solenoid vertical.
 - 2) Solenoid horizontal or vertical above pipe; valve suitable for horizontal or vertical pipe providing solenoid is horizontal or vertical above the flow line.
- For all liquid applications, the use of a pipeline strainer provided by others, is recommended.
 - All Alcon valves are permanently stamped with directional flow arrows or port numbering indicating proper flow direction.

Valves must be installed in accordance with these markings for proper functionality.

Water Hammer Protection

It is advised that where high flow rates are encountered, an accumulator/anti-knock/damper device should be installed immediately upstream of the solenoid valve.

Cat No.

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for ordering part numbers.

Pipe Connection

NPT

Temperature Relationship

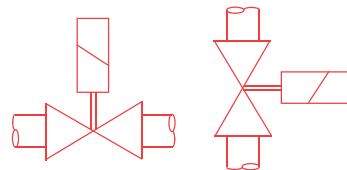
If a valve is energised for long periods, this causes a temperature rise in the coil. Applications whereby a high ambient and high temperature media exist can be reviewed with the manufacturer to ensure combined temperatures do not exceed valve operational parameters.

Duty and Protection Class

Alcon Solenoid Valves have coils suitable for continuous duty (100% ED). The normal voltage tolerance is +/- 10%

Response Time

Response times are results based on energising the solenoid valve on air @ 20 °C (+68 °F) until the outlet pressure reaches a specific percentage of the maximum flow. Response times will vary depending upon electrical supply, fluid being processed and differential pressure.





EFFSEN AUTOMATION
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