



# GC Valves

A DEMA Company

SPECIALISTS IN FLUID CONTROL

## VALVE SELECTION INFORMATION & ENGINEERING GUIDE



# GC VALVES PRODUCT LINE



Series	Media	Connection	Function	Orifice Range	Pressure Range	Max Fluid Temp	Cv Range	Approvals	Valve Body	Seal Materials
S30	Water, Air & neutral gases, Light Oil, Steam	1/8"-3/8" NPT	NC, NO, 3-WAY	1/32"-3/8"	0-2400 PSI	366° F	.03-1.3	UL, SP, UL, CE	304	Nitrile, FKM, GFLT, EPDM, PTFE, FFKM, Rulon
S31	Water, Air & neutral gases, Light Oil, Steam	1/8"-3/8" NPT	NC, NO, 3-WAY	1/32"-3/8"	0-2000 PSI	366° F	.03-1.3	UL, SP, UL, CE	304	Nitrile, FKM, GFLT, EPDM, PTFE, FFKM, Rulon
S33	Water, Air & neutral gases, Light Oil, Steam	1/8"-1/4" NPT	3-WAY	1/16"-11/64"	0-200 PSI	295° F	.09-.38	UL, SP, UL, CE	304	Nitrile, FKM, EPDM
SC91	Water, Air & neutral gases, Light Oil, Steam	10-32"-1/4" NPT	NC, NO, 3-WAY	1.0mm-3.0mm	0-580 PSI	366° F	0.035-0.280	UL, SP, UL, CE	316	Nitrile, FKM, EPDM, PTFE, FFKM
SC31	Water, Air & neutral gases, Light Oil, Steam	1/8"-1/4" NPT	NC, NO	3.0mm	0-580 PSI	176° F	0.280	UL, SP, UL, CE	Nylon	Nitrile, FKM, EPDM, PTFE, FFKM
SC41	Water, Air & neutral gases, Light Oil, Steam	1/4" NPT	NC, NO, 3-WAY	0.5mm-4.0mm	0-2030 PSI	366° F	0.011-0.350	UL, SP, UL, CE	304	Nitrile, FKM, EPDM, PTFE, FFKM
S40	Water, Air & neutral gases, Light Oil, Steam	1/4"-1/2" NPT	NC, NO	3/8"	0-300 PSI	366° F	0.8-1.5	UL, SP, UL, CE	304	Nitrile, FKM, EPDM, PTFE
H40	Water, Air & neutral gases, Light Oil, Steam	1/4"-1/2" NPT	NC, NO	3/8"	0-2200 PSI	366° F	0.8-1.5	UL, SP, UL, CE	304	FKM, PTFE
SP31	Water, Air & neutral gases, Light Oil, Steam	3/4"-2" NPT	NC, NO	27mm-55mm	5-150 PSI	122° F	2.4 - 41	UL, SP, UL, CE	Nylon	NR
SP91	Water, Air & neutral gases, Light Oil, Steam	1/2"-1" NPT	NC, NO	12mm-27mm	8-200 PSI	266° F	4.5 - 12	UL, SP, UL, CE	304	Nitrile, FKM, EPDM

## KEY

### MEDIA

- Water
- Air & neutral gases
- Light Oil

- Slightly Aggressive media
- Aggressive media
- Steam













### FUNCTION

- NC – 2-way Normally Closed
- NO – 2-way Normally Open
- 3-way – Normally Closed, Normally Open, Diverting, Universal, or Free Exhaust

### VALVE BODY

- Brass
- Nylon
- 316 Stainless Steel
- PVC
- 304 Stainless Steel
- Lead-Free Brass

Series	Media	Connection	Function	Orifice Range	Pressure Range	Max Fluid Temp	Cv Range	Approvals	Valve Body	Seal Materials
 S20		3/8"-1 1/2" NPT	NC, NO	5/8"-1 1/4"	0-140PSI	295° F	4.3-25			Nitrile, FKM, GFLT, EPDM
 S21		3/8"-2" NPT	NC, NO	5/8"-1 1/4"	4-200 PSI	295° F	4.3-28			Nitrile, FKM, GFLT, EPDM
 S21 HP		3/8"-2" NPT	NC, NO	5/8"-1-1/2"	4-250 PSI	366° F	4.3-29			Nitrile, PTFE
 H21		3/8"-3/4" NPT	NC, NO	5/8-3/4"	10-1400 PSI	230° F	3.3-5.1			FKM, PTFE
 S27		1"-2" NPT	NC, NO	1"-1 1/4"	0-125 PSI	295° F	13-27			Nitrile, FKM, GFLT, EPDM
 S71		3/8"-2" NPT	NC, NO	3/8"-2"	7-225 PSI	295° F	4.5-48			Nitrile, FKM, EPDM
 NS20		3/8"-1 1/2" NPT	NC, NO	5/8"-1 1/4"	0-100 PSI	295° F	4.3-25			EPDM
 NS21		3/8"- 2" NPT	NC, NO	5/8"-1 1/4"	4-150 PSI	295° F	4.3-28			EPDM
 NS30		1/8"-3/8" NPT	NC, NO	1/32"-3/8"	0-2400 PSI	295° F	.03-1.3			EPDM
 NS31		1/8"-3/8" NPT	NC, NO	1/32"-3/8"	0-2000 PSI	295° F	.03-1.3			EPDM
 NS71		3/8"- 2" NPT	NC, NO	3/8"-2"	7-225 PSI	295° F	4.5-48			EPDM

KEY		
<b>MEDIA</b>	<b>FUNCTION</b>	<b>VALVE BODY</b>
 Water	 Slightly Aggressive media	 Brass
 Air & neutral gases	 Aggressive media	 Nylon
 Light Oil	 Steam	 316 Stainless Steel
	NC – 2-way Normally Closed	 PVC
	NO – 2-way Normally Open	 304 Stainless Steel
	3-way – Normally Closed, Normally Open, Diverting, Universal, or Free Exhaust	 Lead-Free Brass

































GC Valves offers solenoid valve manifolds and assemblies for dispensing and sampling industrial and scientific gases and liquids.

## Industrial and High Performance Solenoid Valve Manifolds

- Standard body material: Brass, Stainless Steel
- Optional materials: Aluminum, PVC, other thermoplastics, plating available
- Uses proven operators and valve components
- Typical pipe sizes include 1/8" to 3/4" NPT
- Reverse manifolds, normally open operator, and metering options available



GC Valves provides a complete line of general purpose solenoid manifolds with customization options available to meet your specific requirements. Our manifolds are intended for a wide variety of applications at standard pressures and flow rates. Manifold valves can be rated up to 2400 PSI and can be made to withstand the harshest fluid media. Our world class designs are proven to cycle up to 5 million cycles.

Series	Media	Connection	Function	Orifice Range	Pressure Range	Max Fluid Temp	Cv Range	Approvals	Valve Body	Seal Materials
 SC9M		1/8" - 1/4" NPT	NC, NO, 3-WAY	1.0mm-3.0mm	0-580 PSI	366° F	0.035-0.280			Nitrile, FKM, EPDM, PTFE, FFKM
 SC4M		1/4" - 3/8" NPT	NC, NO, 3-WAY	0.5mm-4.0mm	0-2030 PSI	366° F	0.011-0.350			Nitrile, FKM, EPDM, PTFE, FFKM
 M30		1/8" - 3/8" NPT	NC, NO, 3-WAY	1/32" - 3/8"	0-2400 PSI	366° F	.03-1.3			Nitrile, FKM, GFLT, EPDM, PTFE, FFKM, Rulon
 M31		1/8" - 3/8" NPT	NC, NO, 3-WAY	1/32" - 3/8"	0-2000 PSI	366° F	.03-1.3			Nitrile, FKM, GFLT, EPDM, PTFE, FFKM, Rulon
 M40		1/4" - 1/2" NPT	NC, NO	3/8"	0-300 PSI	366° F	0.8-1.5			Nitrile, FKM, EPDM, PTFE
 MH40		1/4" - 1/2" NPT	NC, NO	3/8"	0-2200 PSI	366° F	0.8-1.5			FKM, PTFE
 M20		3/8" - 3/4" NPT	3-WAY	3/4"	0-140 PSI	295° F	6.7			Nitrile, FKM, EPDM
 M21		3/8" - 3/4" NPT	3-WAY	3/4"	4-200 PSI	295° F	6.7			Nitrile, FKM, EPDM

## How To Select A Solenoid Valve

We offer a wide variety of General Purpose Solenoid Valves from which to choose. To select the valve that best suits your application, determine the following:

### Valve Type and Operating Mode

Available configurations include:

**2-Way Normally Closed** - Two pipe connections (inlet and outlet) and one orifice to provide On-Off control. Valve is open when energized, closed when de-energized.

**2-Way Normally Open** - Two pipe connections (inlet and outlet) and one orifice to provide On-Off control. Valve is closed when energized, open when de-energized.

**3-Way Normally Closed** - Three pipe connections (one always open to one of the other two) and two orifices (one always open and one always closed) to regulate the direction of media flow. When energized, the flow is from the inlet port through the cylinder port; When de-energized, the flow is from the cylinder port through the exhaust port.

**3-Way Normally Open** - Three pipe connections (one always open to one of the other two) and two orifices (one always open and one always closed) to regulate the direction of media flow. When de-energized, the flow is from the inlet port through the cylinder port. When energized, the flow is from the cylinder port through the exhaust port.

**3-Way Universal, Diverting & Selecting** - Three pipe connections (one always open to one of the other two) and two orifices (one always open and one always closed) to regulate the direction of media flow. Valves can be installed to provide either normally closed (open when energized, closed when de-energized) or normally open (closed when energized, open when de-energized) operation. The valve can also be connected to select one of two flow media or to divert media flow from one port to another.

### Pipe Connections

Pipe connections (ports) are openings that conduct the flow of the controlled media in and out of the valve. Factors influencing the selection of pipe sizes are the system's existing or designed pipe connection sizes and the flow requirements (Cv) of the application.

### Cv Factor

Cv is the amount of water at standard conditions (60°F, specific gravity = 1) in GPM (gallons per minute) which

will pass through the valve with a one psi (pound per square inch) pressure drop across the valve in the full open position. The appropriate Cv will determine which combination of pipe and orifice sizes will be required for the application. Refer to the "VALVE SIZING" and "Cv Factor" sections for additional information.

### Operating Temperature

Sealing materials, coil class, body materials, and duty cycle all influence the valve's temperature capabilities. Operating temperature is determined by a combination of media and ambient temperatures.

### Flow Media

Flow media is the substance being controlled by the valve. The media's temperature, pressure, and concentration will determine the type of body and sealing materials required for the application.

### Power Requirements

Voltage and Cycles (Hertz) will usually be determined by the system's existing power specifications. VA is a measure of the solenoid's power consumption. The "inrush" VA rating is the maximum initial surge of current required to energize the coil, while "holding" VA is a lesser current required to hold the valve in its energized position. In either case, the solenoid's amperage is determined by dividing the VA rating by the applied voltage. Inrush and holding currents are identical for DC solenoids, and the rating is given in watts (watts DC = volts x amperes).

### Minimum Operating Pressure Differential

The minimum system pressure differential required to operate the valve and maintain it in the open position. MinOPD applies pilot-operated solenoid valves where system pressure is used assist operation when the solenoid is energized. Direct acting or zero differential valves do not require a minimum operating pressure.

### Maximum Operating Pressure Differential

The maximum operating pressure differential is the maximum difference in pressure (measured in psi or bar) between the inlet and the outlet valve ports. Factors influencing the maximum operating pressure rating include the pipe connection sizes, orifice size(s), and design of construction.



The following information is transcribed from the requirements of **NEMA** and the **American Institute of Electrical Engineers** covering various classifications of the Underwriters' Laboratories. These requirements are listed for reference purposes only. They are taken from the requirements of the approval associations or engineering groups. They are not necessarily an indication of what should be sold in the way of control apparatus. GC Valves does not supply all types of enclosures on all valves designs. (Contact GC Valves Customer Service for specific combinations.)

## NEMA Enclosure Types

In non-hazardous locations, the specific enclosure types, their applications, and the environmental conditions they are designed to protect against, when completely and properly installed, are as follows:

**Type 1** - Enclosures constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment and to provide a degree of protection against falling dirt.

**Type 4** - Enclosures constructed for either indoor or outdoor use to provide a degree of protection against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, and hose-directed water; and that will be undamaged by the external formation of ice on the enclosure.

**Type 4X** - Enclosures constructed for either indoor or outdoor use to provide a degree of protection against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, hose-directed water, and corrosion; and that will be undamaged by the external formation of ice on the enclosure.

## NEMA 7 & 9 Refers to Indoor Hazardous Locations - Air-break Equipment

**Class I** Refers to locations in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

**Group C** - Acetaldehyde, Cyclopropane, Diethyl Ether, Ethylene, Isoprene, & Unsymmetrical Dimethyl

**Group D** - A wide range of gases and vapors including gasoline, propane, natural gas, methanol, acetone, butane, benzene, octanes, toluene, and xylenes

**Class II** Refers to locations which are hazardous because of the presence of combustible dust.

**Group E** - Atmospheres containing combustible metal dust

**Group F** - Atmospheres containing carbon black, coal or coke dust

**Group G** - Atmospheres containing flour, starch, or grain dust

**Class I** and **Class II** also have the following designations:

**Division 1** refers to hazardous gases or dust that exist continuously

**Division 2** refers to hazardous gases or dust that do not normally exist but may exist due to equipment failure etc.

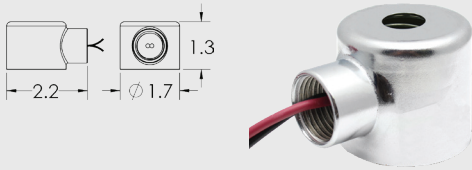
**Our explosion proof housings are not approved for:**

"Group A" Acetylene

"Group B" Butadiene, Ethylene Oxide, Hydrogen, Gases containing more than 30% Hydrogen, and Propylene Oxide.

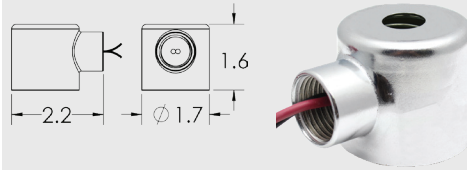
# COIL HOUSING OPTIONS

**S3 A**



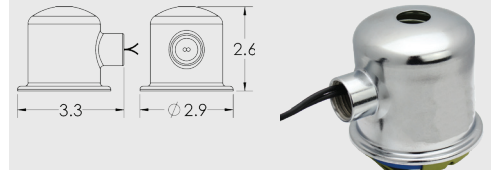
NEMA 1, Metallic Housing, 24" Lead Wires, 1/2" NPT Conduit Hub

**S4 A**



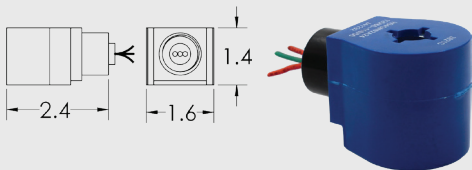
NEMA 1, Metallic Housing, 24" Lead Wires, 1/2" NPT Conduit Hub

**S5 A**



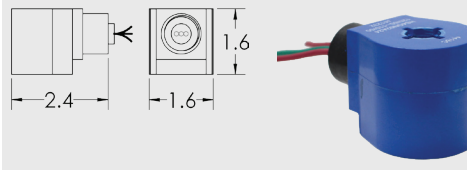
NEMA 1, Metallic Housing, 24" Lead Wires, 1/2" NPT Conduit Hub

**S3 G**



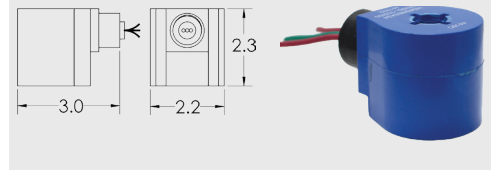
NEMA 4/4X, IP65, Fully Encapsulated, 24" Lead Wires, 1/2" NPT Conduit Hub

**S4 G**



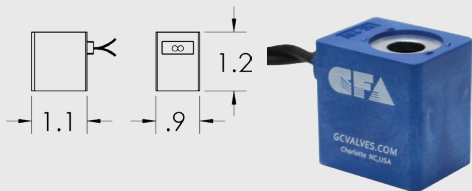
NEMA 4/4X, IP65, Fully Encapsulated, 24" Lead Wires, 1/2" NPT Conduit Hub

**S5 G**



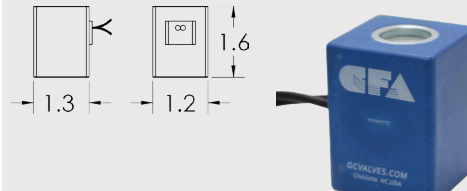
NEMA 4/4X, IP65, Fully Encapsulated, 24" Lead Wires, 1/2" NPT Conduit Hub

**C9 G**



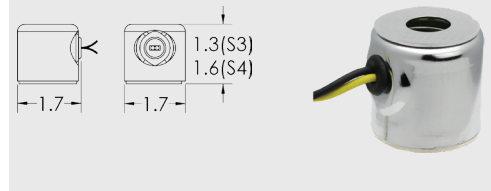
IP65, Fully Encapsulated, 18" Lead Wires

**C4 G**



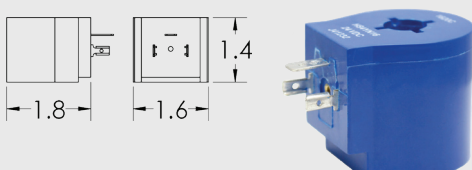
IP65, Fully Encapsulated, 18" Lead Wires

**S3/S4 B**



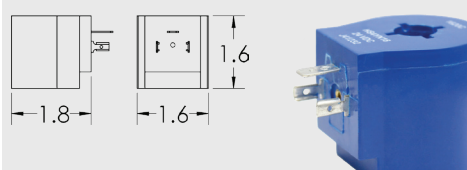
Metallic Housing with Grommet, 24" Lead Wires

**S3 Y**



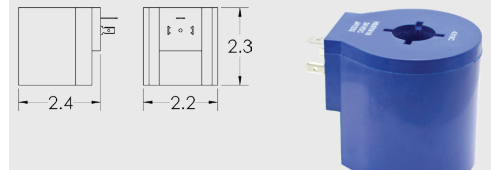
NEMA 4, IP65, Fully Encapsulated, Form A

**S4 Y**



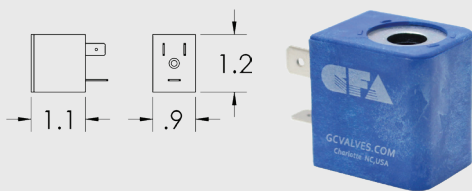
NEMA 4, IP65, Fully Encapsulated, Form A

**S5 Y**



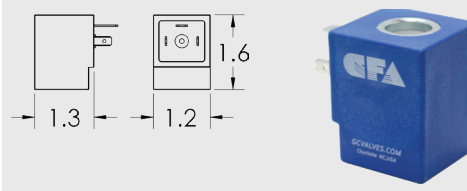
NEMA 4, IP65, Fully Encapsulated, Form A

**C9 Y**



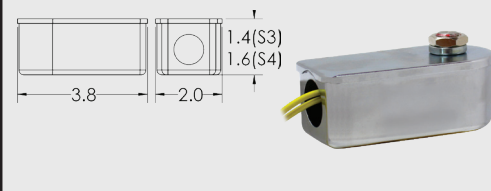
IP65, Fully Encapsulated, Form B

**C4 Y**



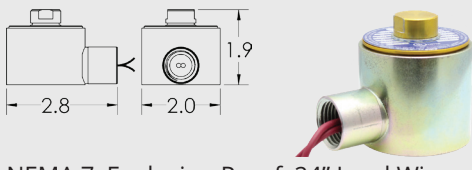
IP65, Fully Encapsulated, Form A

**S3/S4 S**



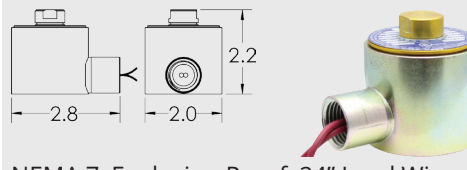
One 1/2" Conduit Knockout, 24" Lead Wires

**S3 X**



NEMA 7, Explosion Proof, 24" Lead Wires, 1/2" NPT Conduit Hub, Class I & II, Groups C, D, E, F, & G, Division 1 & 2

**S4 X**



NEMA 7, Explosion Proof, 24" Lead Wires, 1/2" NPT Conduit Hub, Class I & II, Groups C, D, E, F, & G, Division 1 & 2

**S3/S4 U**



Two 1/2" Conduit Knockouts, 24" Lead Wires

# GC VALVES NOMENCLATURE



VALVE SERIES	OPERATING MODE	COIL HOUSING	COIL CLASS	COIL VOLTAGE	SEAT   SHADING RING	BODY MATERIAL	PIPE SIZE	2-WAY ORIFICE*	SUFFIX
S20	1 - 2 WAY NC	A - Metal Conduit	F	01 - 24 VAC/60HZ	A - FFKM   Silver	1 - 316 SS	A - 1/8"	C1 - 1/32"	A - Angle Body
S21	2 - 2 WAY NO	B - Grommet	H	02 - 110 VAC/50HZ	C - EPDM   Copper	2 - 303 SS	B - 1/4"	C3 - 3/64"	B - SS Split Washer
S27	3 - 3 WAY NC	F - DIN w/ C-4010		120 VAC/60HZ	E - EPDM   Silver	3 - 303 SS	C - 3/8"	C5 - 1/16"	C - CE Declaration
S30	4 - 3 WAY NO	G - 1/2" Conduit		03 - 208 VAC/60HZ	F - EPDM + Sant	4 - Brass	D - 1/2"	C7 - 5/64"	D - Mounting Bracket
S31	5 - 3 WAY	NEMA 4X		04 - 240 VAC/60HZ	Copper	5 - Brass	E - 3/4"	C9 - 3/32"	E - CSA Certification
S33	Diverting	P - Open Frame with		220 VAC/50HZ	G - GFLT   Silver	6 - Aluminum	F - 1"	D3 - 7/64"	F - Metering
S40	6 - 3 WAY	Leads		14 - 6 VDC	J - Nitrile   Silver	7 - 316 SS	G - 1-1/4"	D5 - 1/8"	G - Gold Plated Plunger and Tube Head
S71	Universal	S - Long Junction BOX		15 - 12 VDC	K - FKM   Copper (S21)	8 - Brass	H - 1-1/2"	D7 - 5/32"	
H21	7 - 3 WAY FREE	U - Rain Tight Metal		16 - 24 VDC	K - PTFE   Silver	9 - Brass	J - 2"	E1 - 3/16"	K - Mounting Bracket
H40	Exhaust	Conduit		18 - 120 VDC	(S30, S31, S40)	P - Nylon		E7 - 1/4"	L - Latching
M20		W - Rain Tight Metal		24 - 24 VAC/50-60HZ	L - FKM   Silver			F1 - 9/32"	M - Manual Override
M21		Conduit		33 - 48 VDC	N - Nitrile   Copper			F5 - 3/8"	N - Cleaned for Oxygen Service
NS20		X - Explosion Proof		45 - 12 VDC 14W	R - Rulon   Silver			G1 - 1/2"	
NS21		NEMA 7/9		46 - 24 VDC 14W	S - PTFE   Copper			G4 - 5/8"	NP - Gaseous CO2
NS30		Y - DIN		74 - 74 VDC	T - PTFE   Copper			G5 - 3/4"	P - Nickel Plating
NS31					V - FKM   Copper			G7 - 15/16"	S - UL Safety Rated
NS71					Z - PTFE + FKM   Copper			G9 - 1"	T - TimeSaver Conn
NT20								J1 - 1-1/8"	W - Submersible
NT21								J2 - 1-1/4"	Z1 - 48" Coil Leads
T20								J5 - 1-1/2"	Z2 - 36" Coil Leads
T21								J7 - 2"	Z5 - Liquid CO2
								10 - 10mm	

Contact GC Valves to verify model numbers and feature compatibility

\*3-way orifices refer to catalog or price list

# CFA NOMENCLATURE

VALVE SERIES*	# OF STATIONS	OPERATING MODE	COIL TYPE	COIL VOLTAGE	SEAL MATERIAL	BODY/OPERATOR MATERIAL	PIPE SIZE	ORIFICE	SUFFIX
SC3	1 station	1 - 2 WAY NC	YN - DIN	02 - 120 VAC	A - FFKM	A - Aluminum w/ SS	A - 1/8"	B0 - 0.5mm	A - Angle Body
SP3	2 station	2 - 2 WAY NO	GN - Lead Wires	03 - 208 VAC	C - EPDM	B - Brass w/ Brass	B - 1/4"	A0 - 0.8mm	B - Flow Control
SC4	3 station	3 - 3 WAY NC		04 - 220 VAC	K - PEEK	C - SS w/ Brass	C - 3/8"	A1 - 1.0mm	C - MO + Flow
SP4	4 station	4 - 3 WAY NO		05 - 240 VAC	M - Mixed	D - SS w/ SS	D - 1/2"	A2 - 1.2mm	F - Metering
SC9	5 station	5 - 3 WAY Diverting		15 - 12 VDC	N - Nitrile	E - Brass SLM	E - 3/4"	A3 - 1.6mm	M - Manual Override
SP9	6 station	6 - 3 WAY Universal		16 - 24 VDC	O - Neoprene	F - SS SLM	F - 1"	A4 - 2.0mm	N - Sonic Cleaned
TP3		7 - 3 WAY NC w/ Top Adapter		24 - 24 VAC	P - Polyurethane	G - Plastic Diaphragm	G - 1-1/4"	A5 - 2.4mm	P - Plated
		8 - Latching		43 - 12 VDC 6W	R - Rulon	H - Plastic Diaphragm	H - 1-1/2"	A6 - 3.0mm	R - Reverse
				44 - 24 VDC 6W	T - PTFE	I - Plastic, Nylon	J - 2"	A7 - 4.0mm	T - Top Adapter
				45 - 12 VDC 8W	V - FKM	J - Brass Diaphragm	K - 3/8" x 1/2"	A8 - 5.0mm	
				46 - 24 VDC 8W	X - Silicon	K - Brass w/ SS operator	L - 1/2" x 3/8"	A9 - 6.0mm	
				47 - 12 VDC 10W		L - SS Diaphragm	T - 3/8" x 1/4"	G1 - 1/2"	
				48 - 24 VDC 10W		P - PVC	Z - 1/4" x 1/8"	G5 - 3/4"	
				49 - 12 VDC 12W		R - Brass Round (C9 only)	U - 10/32	G9 - 1.0"	
				50 - 24 VDC 12W		S - SS Round (C9 & C4)		J2 - 1.25"	
								J5 - 1.5"	

Contact GC Valves to verify model numbers and feature compatibility



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