Fluid Control Express

General Purpose Solenoid and Pneumatically Actuated Valves Shipped Within 24 Hours

Parker

ENGINEERING YOUR SUCCESS.

Parker Safety Guide for Selecting and Using Fluid Control Division Products including Valves, Assemblies and Related Accessories

WARNING: **Failure or improper selection or improper use of Parker Fluid Control Division Products, including valves, assemblies or related accessories ("Products") can cause death, personal injury and property damage. Possible consequences of failure or improper selection or improper use of these Products include but are not limited to:**

- Gas leakage leading to explosion or rupture of a pressure vessel.
- Leakage or other release of toxic or otherwise hazardous liquids or gases.
- Unintended or mistimed cycling or motion of machine members, or failure of machine members to cycle.
- Sudden moving or falling objects.
- Work piece or component parts being thrown off at high speeds.
- Failure of a device to function properly. For example, failure to clamp or unclamp an associated item or device.
- Electrical shorts, burns, burn out of equipment or fires.

Before selecting or using any of these Products, it is important that you read and follow the instructions below.

1.0 GENERAL INSTRUCTIONS

1.1. **Scope:** This safety guide is designed to cover general guidelines on the selection, installation, operation, and maintenance of these Products. This safety guide is a supplement to and is to be used with the specific Parker publication for the valve, assembly or related accessory being considered for use. Parker publications are available at www.parker.com or by calling 1-800-CPARKER.

1.2. **Fail-Safe:** All Products can and do fail without warning for many reasons. Design all systems in a fail-safe mode so that failure of the Products will not endanger persons or property.

1.3 Distribution: Provide a copy of this safety guide to each person that is responsible for installation, operation, and maintenance of these Products. Do not select or use these Products without thoroughly reading and understanding this safety guide as well as the specific Parker publications for the Products considered or selected.

1.4 User Responsibility: Due to the wide variety of operating conditions and applications for these Products, Parker and its distributors do not represent or warrant that any particular Parker Fluid Control Product is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a Product. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the Product;
- Assuring that the user's requirements are met and that the application presents no health or safety hazards;
- Providing all appropriate health and safety warnings on the equipment on which the Products are used; and
- Assuring compliance with all applicable government and industry standards.

1.5 Additional Questions: Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the Product being considered or used, or call 1-800-CPARKER, or go to www.parker.com for telephone numbers of the appropriate technical service department.

Table of Contents

About Fluid Control Express Ship

Parker FCD knows timing is key. That's why we developed the **Fluid Control Express Ship Program**, to meet your specific time-critical requirements with our best in class products - *all available within 24 hours for quantities of 10 pieces or less*.

Our **Express Ship Program** includes solenoid and pneumatically actuated valves. They are available as full valves assemblies or as modular pressure vessels with separate coil options that include DIN and Conduit in NEMA, 4X, 7 and 9 classifications.

Use our TOMSPAVE guide and worksheet to make selecting valves easy. Or if you need additional assistance, browse the Services section starting on page 7, where you'll find how you can **Live Chat with an Engineer** or use the **Online Product Selector tool**.

With superior testing for quality and performance, along with a vast number of Parker tools and support programs, we provide a customer-centric culture to put our product offerings in alignment with your business needs.

Our **Express Ship Program** is just one of the ways Parker FCD is working to help you focus on your operational needs to work smarter, faster and achieve optimal ROI.

That's why when you purchase our valve products, you don't just buy from Parker, you partner with Parker.

Fluid Control Division
1 800 825 8305
www.parker.com/fcd

This is Parker Fluid Control Division.

We are the Parker Fluid Control Division, (FCD) of North America headquartered in New Britain, CT and are part of the Automation Group of Parker Hannifin Corporation. Along with our Madison, MS facility, we design, manufacture and support a full line of valves, electrical components, value added assemblies and manifolds.

Our primary product offerings are solenoid and pneumatically actuated valves used for motion and flow control. Our product lines include Skinner®, Gold Ring™, the 3000 Series, 204/304 Series, Angle Body and Sinclair Collins.

Let's make creative and innovative ideas flow more freely.

Fluid Control Express products are available for same day shipping with our commitment to you of quality, support and impeccable customer service.

Process Control
- Valve Actuation
- Oil & Gas
- Chemical Processing
- Pharmaceutical

Commercial Equipment
- Medical Equipment
- Water Purification
- Sterilizers
- Welding

Food & Beverage
- Coffee Machines
- Beverage Dispensing
- Water Dispensing

Transportation
- Trucks, Bus & Coach
- Trains
- Marine
- Agriculture

Oil & Gas
- Valve Actuation
- Petro and Chemical Processing
- Emergency Exhaust

Industrial & Automation
- Compressors
- Blow Molding
- Textile

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A Valve For Any Application.

2-Way and 3-Way Valves

4-Way Valves

Electrical Coils

Sinclair Collins

Fluid Control Division Product Offering

Process Valves

Angle Body Valves

Steam Valves

Solenoid Valve Manifolds

A Message from the General Manager

With a long history of providing innovative fluid and motion control solutions as well as premier customer service, Parker Fluid Control Division (FCD) is a world-wide leader in solenoid valve technology with a broad variety of products designed for today's demanding markets and applications.

At Parker, we continually expand and improve our products and services to better serve the market. We offer premier service technologies, including Parker Winovation custom solutions and the latest in rapid prototyping. These technologies combined with USA regional and Global marketplace support make Parker FCD your single source for motion and fluid control products.

Our division headquarters in New Britain, Connecticut and manufacturing facility in Madison, Mississippi provide precision-engineered solutions for products, materials and processes, with state-of-the-art development, testing and performance technology.

Knowing that uptime and productivity are major drivers in your business success, we proudly present our Fluid Control Express Ship Program offering Parker's best-in-class valve products and services

Parker Fluid Control Division - The Market Leader.

Backed by nearly 100 years of Parker technology innovation, our history of designing and manufacturing valves allows us to offer a wide variety of products, from general purpose fluid and motion control valves - to industry and application specific products.

We offer a comprehensive line of valve assemblies ranging from miniature direct acting valves to large piloted and actuated globe valves available in 2-way, 3-way and 4-way configurations.

With world-wide production facilities, we provide Global Divisional Product Support.

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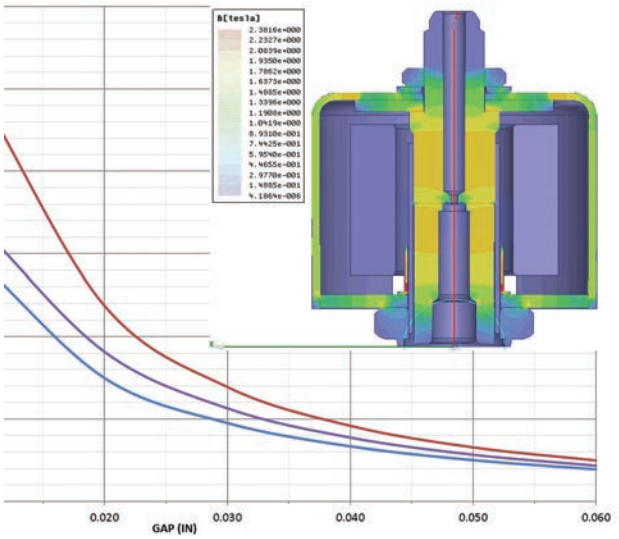
www.parker.com/fcd

The Motion and Fluid Control Supplier of Choice.

With a strong commitment to engineering, we stand behind our valves with quality assurance and support.

With valve sizes from 1/8" to 2" and operating pressures of 0 to 4500 psi, we offer the largest variety of general flow and motion control products for your industry specific applications.

Complete Design, Production and Testing.

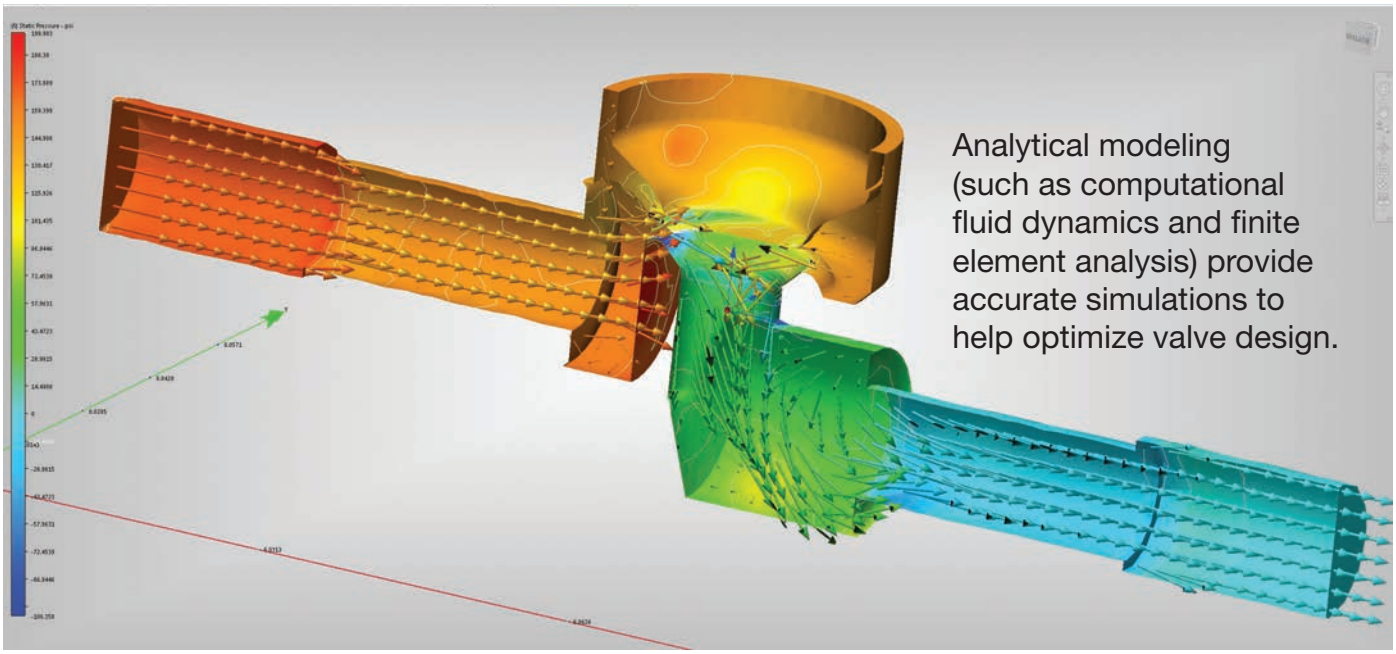


Our engineering team is focused on designing the right product for your application. Using the latest design software along with years of valve knowledge, our team is capable of providing custom solutions to meet your unique demands.

Putting designs to the test, our world class development and test capabilities provide our customers with product dependability and longevity.

In the field or in our advanced development and test facilities, Parker is unsurpassed in both technical knowledge and testing capabilities.

With the latest in technology and state-of-the art materials our performance test labs are capable of determining baseline engineering properties and design requirements.



Analytical modeling (such as computational fluid dynamics and finite element analysis) provide accurate simulations to help optimize valve design.

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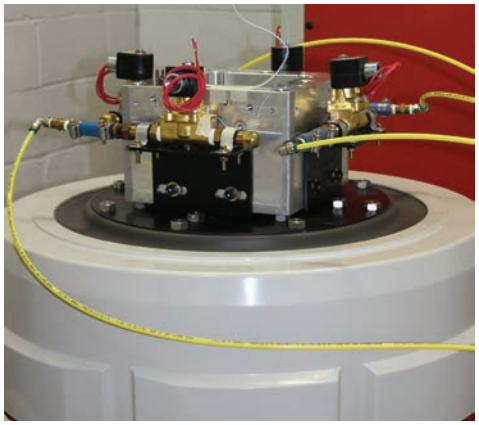
Quality and Performance You Can Trust.

At Parker Fluid Control Division, we simulate application and environmental conditions encountered every day, both common and complex, to assure that the integrity of our products meet your needs.

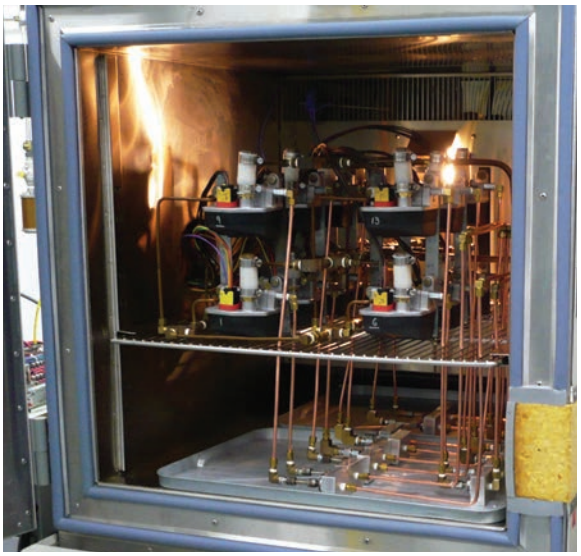
Our complete, in-house testing capabilities assures that the materials in our designs are engineered to withstand the extremes of heavy duty applications and environments.



From Shaker table testing to help us better understand real world environmental vibration conditions, to End of Line testing to ensure non-failure in valve operation, we deliver performance.

Validation & performance testing is our ongoing commitment to you.

Want to know how a valve will perform out in the field? Our Environmental Chambers accurately replicate real environment conditions and perform reliable design validation, assuring our customers that our products will meet and exceed their application demands.



Easy to do business with.

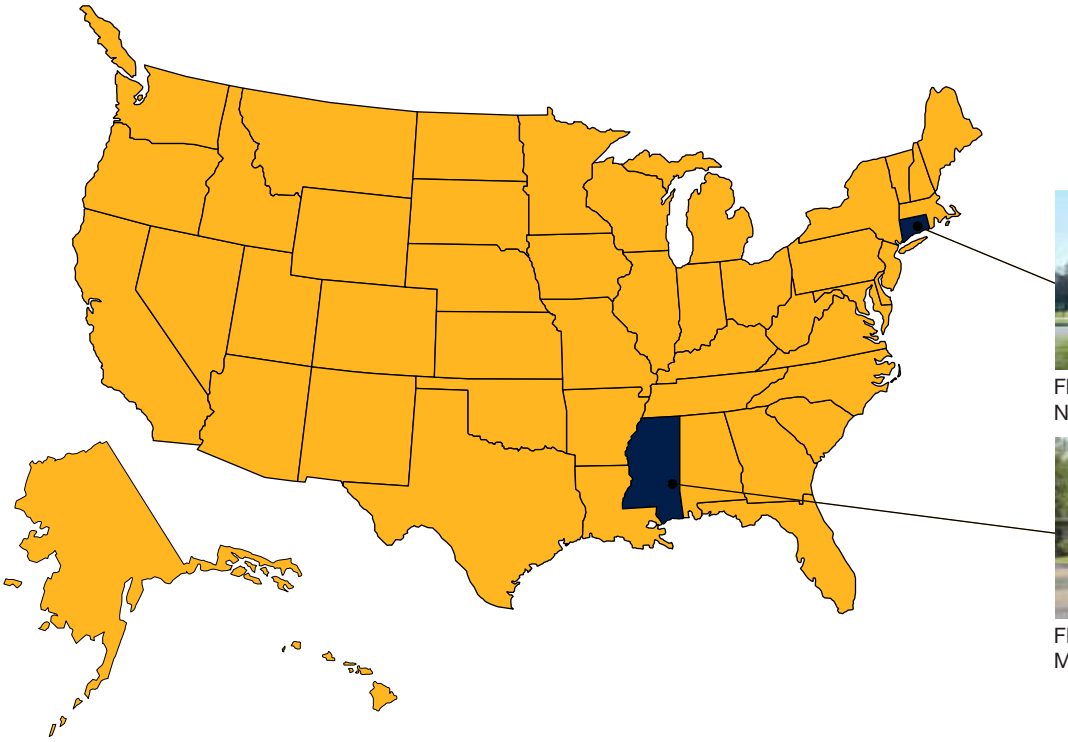
Live Chat saves you time with quick response.

LIVE HELP Ask An Engineer

With our ASK AN ENGINEER Live Help located on parker.com/fcd, you can get immediate answers on any product, with just the click of a button. Live Help is just one of the ways we accommodate our customers before, during and after a purchase.

Made in the USA - Serving the World

From coast to coast, we have an extensive network to support your local needs.



Fluid Control Division Headquarters, New Britain, CT.

Fluid Control Division Facility, Madison, MS.

How to Contact Us – Nationwide

For Customer Service or Tech Support:
1-800-825-8305

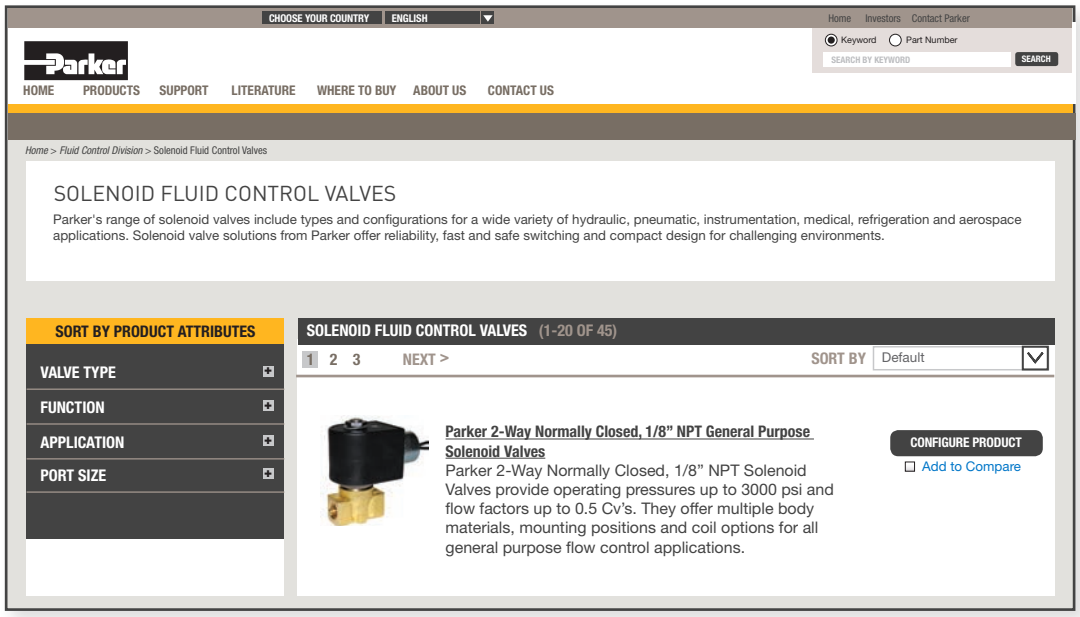
To Reach Sales by Email:
parkerfcd_sales@parker.com

Continuously developing ways to serve you.

Online Product Selector

FCD's Online Product Selector offers over 3000 products, including solenoid and pneumatically actuated valves. From 1/8" to 2" valves, FCD's online tool helps you quickly browse and compare product families to help you easily find what you need.

Visit www.parker.com/FCD to find the exact part number you need.

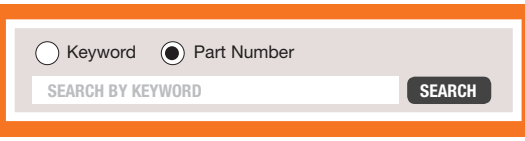


Use our filters to narrow down your search.

Use filters to browse our 2-way, 3-way or 4-way solenoid valve families, or search for Angle Body, Sinclair Collins Process Control valves.

Know your part number?

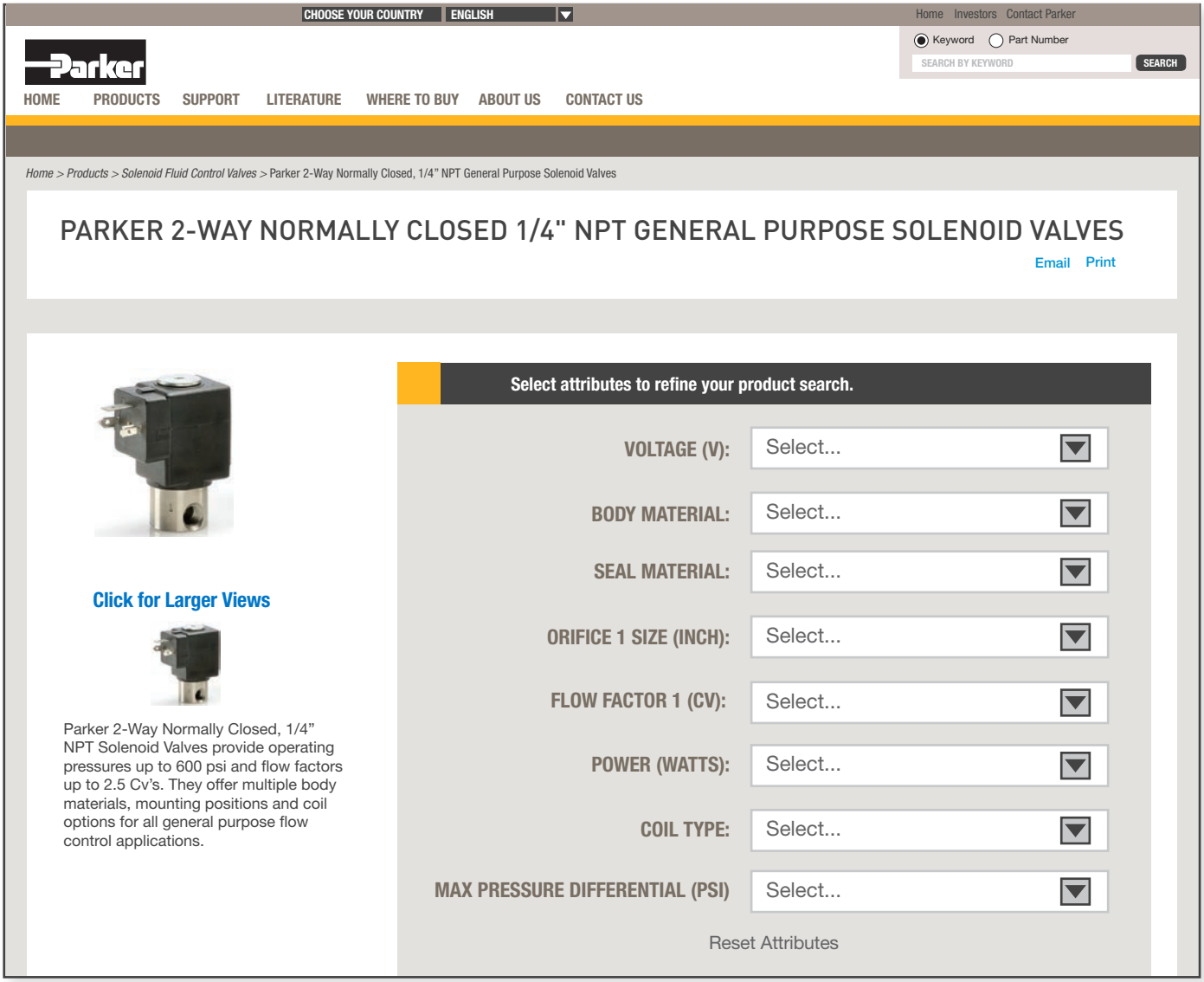
Type it into the search box



Evolving to meet industry specifications.

Valve Attribute Selection Process

To configure a complete valve assembly and find a part number online, use the drop-down attribute menus.



Visit us at www.parker.com/FCD to find the exact part number you need.

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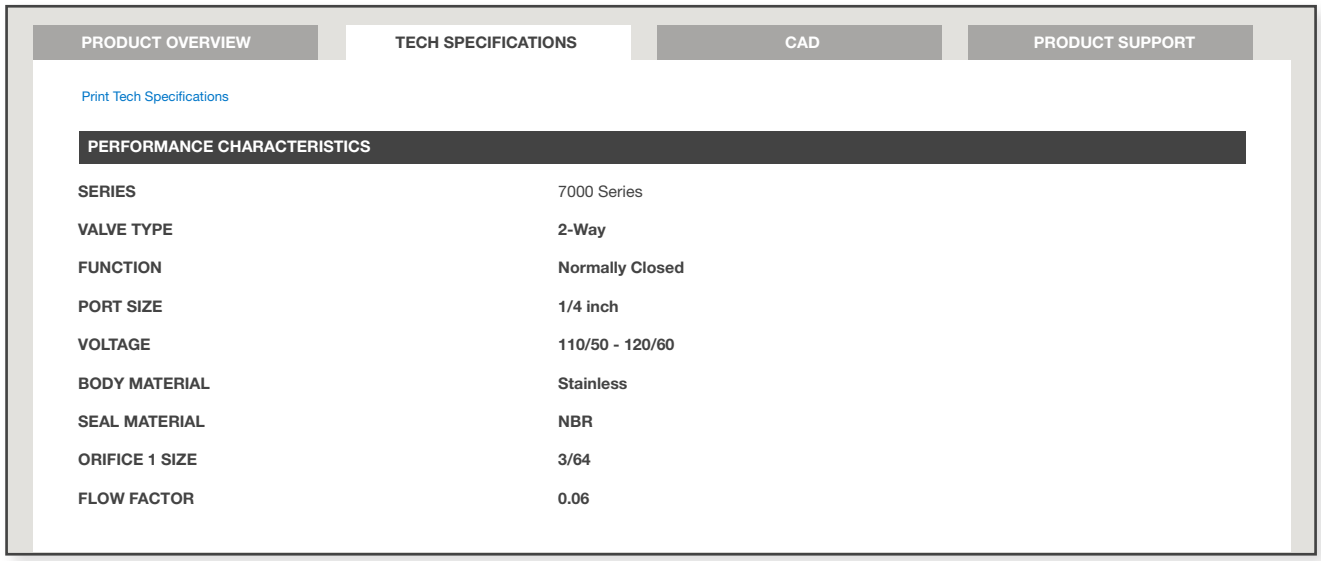
www.parker.com/fcd

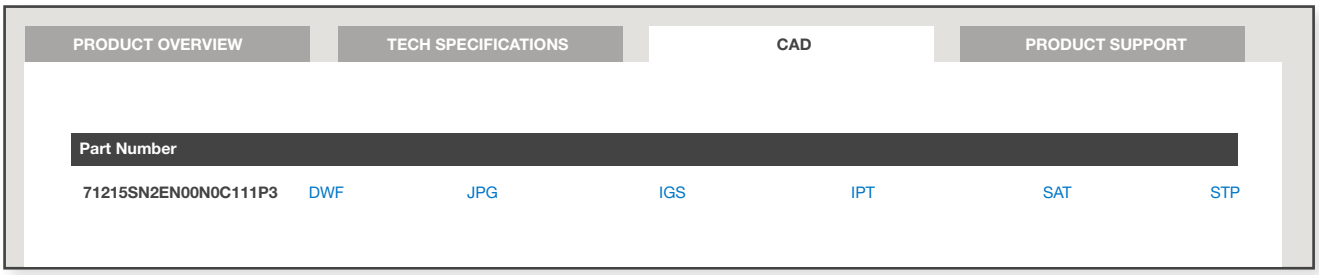
Everything you need to know.

Get Product Specifications



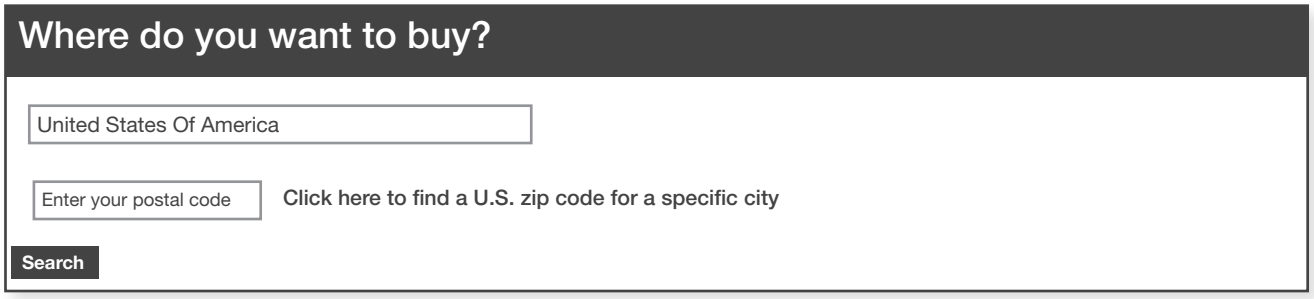
Access CAD and Installation Operations Manuals

Parker FCD online provides you with access to CAD drawings and Installation/Operation Manuals to help you accomplish more – saving you time and valuable resources that impact your bottom line.



Find Out Where to Buy

Locate a Fluid Control Division Distributor.



T

TYPE

Select the valve type for your application, 2, 3 or 4 way.

How many flow paths do you need? Will the media require one flow outlet, or as many as three or four outlets?

For multi-flow outlets, consider our 209 cartridge valves with one of our standard manifolds for simplified, cost-effective mounting, see page 25.

O

OPERATION

Normally Open, Normally Closed, Universal.

How do you want the valve to function when energized—closed or open? Will the valve be used in a vacuum or high pressure application?

Not all valves are designed for all applications. If you need a valve that opens and closes without electricity, consider our Angle Body or Sinclair Collins K Series valves found on page 24.

M

MEDIA

Select media of your application: air, liquids, gases or light oil.

Is the media a harsh or abrasive solution? Will the media be used at higher temperature?

Parker valves are constructed from materials to handle water, inert air, and gasses at a range of temperatures.

We offer seal materials such as FKM, NBR, EPDM and PTFE that can handle temperatures up to 353° F.

To learn more about media compatibility, see pages 28-29.

S

SIZE

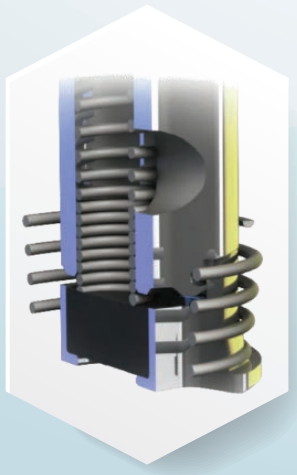
Choose your port size from 1/8" to 2".

Our standard offering includes NPT ports from 1/8" to 2" to allow you the ability to deliver the correct Cv for your application flow capacity.

Valve size depends on the flow rate required.

Parker valves are tested and rated by the U.S. standard for Cv, and adhere to NPT, (National Pipe Thread) standards for accurate sizing and precise flow.

With sizes from 1/8" to 2" NPT, we have the right valve for any flow rate.



P — PRESSURE

From 0 to 4500 psi, what inlet pressure is required?

Will the media flow slowly in a low pressure stream at the outlet, or will it need to flow quickly with stronger force?

Parker offers a large selection of quick ship valves with pressure rates from 0 psi to 1500 psi.

To learn more about pressure differential in Direct Acting and Pilot Operated valves, see schematic diagrams on pages 30-31.

A — AMBIENT TEMPERATURE

Max temperature allowed for this environment.

Depending on where the valve is installed, the ambient temperature of an environment can effect the overall performance of a valve and coil assembly.

With coils that meet the National Electrical Manufacturers Association (NEMA) standards, to work in environments with ambient temperatures up to 356° F, Parker Fluid Control Division has you covered. To ensure that the coil you select meets your temperature needs, see page 27. Then select your coil from the chart on pages 32-33.

V — VOLTAGE

Does the application require AC or DC?

Will the coil be used in a hazardous location or with explosive media such as gas?

Parker offers AC and DC voltage coils, available with ½" NPT conduit and 18" leads or DIN connections.

Available voltages are 24/60, 120/60-110/50, 240/60-220/50, 12 VDC and 24 VDC.

For hazardous locations, there are UL/CSA Hazardous Location NEMA 7/9 coils and also ATEX/ IECEx coils available.

E — EXTRAS

What else can we help you with?

Extra Quick-Ship items include replacement coils, manifolds, manual override options and repair kits.

For custom engineered solutions call 1-800-825-8305 or chat with us online.

LIVE HELP **Ask An Engineer**

Search over 3000 products with our online search tool to find the exact valve you need.

www.parker.com/fcd

How To Order

Order your complete valve assembly by calling 1-800-825-8305.

2-Way Normally Closed, Direct Acting - Stainless Steel

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Voltage	Power	Part Number Pressure Vessel and Complete Valve	Coil Cha
	NPT	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F			Watt		
	1/8	3/64	0.06	0	950	*	950	240	FKM	-	8.5	20CC02EV4	9
	1/8	1/16	0.10	0	625	*	625	240	FKM	-	8.5	20CC02GV4	9
	1/8	3/32	0.22	0	320	*	320	240	FKM	-	8.5	20CC02LV4	9
	1/8	7/64	0.28	0	245	*	245	240	FKM	-	8.5	20CC02MV4	9
	1/8	1/8	0.32	0	175	*	175	240	FKM	-	8.5	20CC02PV4	9
	1/8	5/32	0.38	0	100	*	100	240	FKM	-	8.5	20CC02QV4	9
AC													
	1/4	3/64	0.06	0	450	450	450	185	NBR	-	10	71215SN2EN00	7
	1/4	1/16	0.10	0	350	350	350	185	NBR	-	10	71215SN2GN00	7
	1/4	3/32	0.18	0	275	275	275	185	NBR	-	10	71215SN2KN00	7
	1/4	1/8	0.28	0	200	200	200	185	NBR	-	10	71215SN2MN00	7
	1/4	5/32	0.40	0	110	110	110	185	NBR	-	10	71215SN2QN00	7
	1/4	5/32	0.40	0	150	150	150	185	NBR	-	22	71215SN2QN00	8
	1/4	3/16	0.50	0	80	80	80	185	NBR	-	10	71215SN2SN00	7

* If the pressure vessel part number does not list complete assemblies below it, order valve and coil separately.

Get it shipped to you within 24 hours!

Step 1
Select your pressure vessel*

Step 2
Select your coil from the appropriate coil chart.

Done
Order your complete valve assembly by locating a distributor near you at www.parker.com/fcd and choose the WHERE TO BUY tab.

Order Valve + Coil Separately

Pressure Vessel
Use TOMSPAVE Chart on page 34

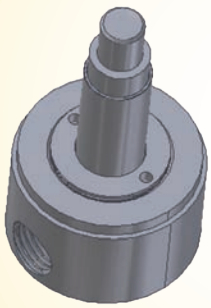
- **T.** Select Valve Type*
- **O.** Select Operation
- **M.** Verify Media Compatibility
- **S.** Choose Port Size
- **P.** Confirm Operating Pressure Differential
- **A.** Verify Ambient Temperature
- **V.** Choose Voltage
- **E.** Choose Extras

Coil Types
Use Coil Charts on pages 32-33

1. Select Coil**
2. Select Voltage:
   - 12 VDC
   - 24 VDC
   - 24/60
   - 120/60 - 110/50
   - 240/60 - 220/50
3. Select Connection Type

Example:

Pressure Vessel Part Number **71215SN2EN00** + Coil Part Number **C111P3**



= Complete valve assembly part number
71215SN2EN00N0C111P3

* The pressure vessel and solenoid coil are boxed separately for you to assemble.
** The stated wattage represents a nominal value. The actual wattage may vary depending on coil/pressure vessel selection.

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2-Way Normally Closed, Direct Acting - Brass

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Voltage	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F			Watt		
AC	1/8	3/64	0.05	0	500	500	500	100	NBR	120/60 - 110/50	6	3121BBN1EN00RRT1J1P3	*
	1/8	1/16	0.09	0	300	300	300	100	NBR	120/60 - 110/50	6	3121BBN1GN00RRT1J1P3	*
	1/8	1/16	0.09	0	300	300	300	100	NBR	120/60 - 110/50	6	3121BBN1GN00N0M1S1P3	*
	1/8	3/32	0.18	0	175	175	175	100	NBR	120/60 - 110/50	6	3121BBN1LN00RRT1J1P3	*
	1/8	1/8	0.24	0	100	100	100	100	NBR	120/60 - 110/50	6	3121BBN1NN00RRT1J1P3	*
	1/8	1/8	0.24	0	100	100	100	100	NBR	120/60 - 110/50	6	3121BBN1NN00N0M1S1P3	*
	1/4	1/8	0.31	0	365	365	365	165	PCTFE	-	10	7121KBN2NF00	7
	1/4	1/8	0.31	0	145	145	145	185	FKM	-	10	7121KBN2NV00	7
	1/4	5/32	0.52	0	120	120	120	185	FKM	-	10	7121KBN2QV00	7
	1/4	13/64	0.76	0	80	80	80	185	FKM	-	10	7121KBN2SV00	7
DC	1/8	3/64	0.05	0	500	500	500	100	NBR	24 VDC	6	3121BBN1EN00RRT1J1C2	*
	1/8	1/16	0.09	0	300	300	300	100	NBR	24 VDC	6	3121BBN1GN00RRT1J1C2	*
	1/8	1/16	0.09	0	300	300	300	100	NBR	24 VDC	6	3121BBN1GN00N0M1S1C2	*
	1/8	3/32	0.18	0	175	175	175	100	NBR	24 VDC	6	3121BBN1LN00RRT1J1C2	*
	1/8	1/8	0.24	0	100	100	100	100	NBR	24 VDC	6	3121BBN1NN00RRT1J1C2	*
	1/8	1/8	0.24	0	100	100	100	100	NBR	24 VDC	6	3121BBN1NN00N0M1S1C2	*
	1/4	1/8	0.31	0	205	205	205	165	PCTFE	-	22	7121KBN2NF00	8
	1/4	1/8	0.31	0	125	125	125	185	FKM	-	10	7121KBN2NV00	7
	1/4	5/32	0.52	0	60	60	60	185	FKM	-	10	7121KBN2QV00	7
	1/4	13/64	0.76	0	30	30	30	185	FKM	-	10	7121KBN2SV00	7

** Only available as complete valve assembly*

2-Way Normally Open, Direct Acting - Brass

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Voltage	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F			Watt		
AC	1/4	3/32	0.17	0	300	250	230	180	NBR	-	11	04F20O1106ACF	4
	1/4	3/32	0.21	0	175	175	175	165	PCTFE	-	10	7122KBN2LF00	7
	1/4	9/32	0.96	0	30	25	20	180	NBR	-	11	04F20O2118ACF	4
DC	1/4	3/32	0.21	0	175	175	175	165	PCTFE	-	10	7122KBN2LF00	7

2-Way Normally Closed, Direct Acting - Stainless Steel

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Voltage	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F			Watt		
AC	1/8	3/64	0.06	0	950	*	950	240	FKM	-	8.5	20CC02EV4	9
	1/8	1/16	0.10	0	625	*	625	240	FKM	-	8.5	20CC02GV4	9
	1/8	3/32	0.22	0	320	*	320	240	FKM	-	8.5	20CC02LV4	9
	1/8	7/64	0.28	0	245	*	245	240	FKM	-	8.5	20CC02MV4	9
	1/8	1/8	0.32	0	175	*	175	240	FKM	-	8.5	20CC02PV4	9
	1/8	5/32	0.38	0	100	*	100	240	FKM	-	8.5	20CC02QV4	9
	1/4	3/64	0.06	0	450	450	450	185	NBR	-	10	71215SN2EN00	7
	1/4	1/16	0.10	0	350	350	350	185	NBR	-	10	71215SN2GN00	7
	1/4	3/32	0.18	0	275	275	275	185	NBR	-	10	71215SN2KN00	7
	1/4	1/8	0.28	0	200	200	200	185	NBR	-	10	71215SN2MN00	7
	1/4	5/32	0.40	0	150	150	150	185	NBR	-	22	71215SN2QN00	8
	1/4	5/32	0.40	0	110	110	110	185	NBR	-	10	71215SN2QN00	7
	1/4	3/16	0.50	0	80	80	80	185	NBR	-	10	71215SN2SN00	7
DC	1/8	3/64	0.06	0	390	*	390	240	FKM	-	8	20CC02EV4	9
	1/8	1/16	0.10	0	255	*	255	240	FKM	-	8	20CC02GV4	9
	1/8	3/32	0.22	0	130	*	130	240	FKM	-	8	20CC02LV4	9
	1/8	7/64	0.28	0	100	*	100	240	FKM	-	8	20CC02MV4	9
	1/8	1/8	0.32	0	60	*	60	240	FKM	-	8	20CC02PV4	9
	1/8	5/32	0.38	0	30	*	30	240	FKM	-	8	20CC02QV4	9
	1/4	3/64	0.06	0	450	450	450	185	NBR	-	10	71215SN2EN00	7
	1/4	1/16	0.10	0	350	350	350	185	NBR	-	10	71215SN2GN00	7
	1/4	3/32	0.18	0	275	275	275	185	NBR	-	10	71215SN2KN00	7
	1/4	1/8	0.28	0	200	200	200	185	NBR	-	22	71215SN2MN00	8
	1/4	1/8	0.28	0	150	150	150	185	NBR	-	10	71215SN2MN00	7
	1/4	5/32	0.40	0	130	130	130	185	NBR	-	22	71215SN2QN00	8
	1/4	5/32	0.40	0	60	60	60	185	NBR	-	10	71215SN2QN00	7

** Consult Factory*

2-Way Normally Open, Direct Acting - Stainless Steel

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Voltage	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F			Watt		
AC	1/8	3/64	0.06	0	230	*	230	240	FKM	-	10	20CF02EV4	9
	1/8	3/32	0.20	0	80	*	80	240	FKM	-	10	20CF02LV4	9
	1/4	3/32	0.15	0	250	250	250	185	NBR	-	10	71295SN2KNJ1	7
DC	1/8	3/64	0.06	0	230	*	230	240	FKM	-	8	20CF02EV4	9
	1/8	3/32	0.20	0	80	*	80	240	FKM	-	8	20CF02LV4	9
	1/4	3/32	0.15	0	250	250	250	185	NBR	-	10	71295SN2KNJ1	7

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2-Way Normally Closed, Internally Pilot Operated & Direct Lift - Brass

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
	1/4	1/4	0.76	5	1500	1500	1500	210	PTFE	10	73216BN2MT00*	7
	1/4	1/4	0.76	5	300	300	300	185	NBR	10	73212BN2MN00	7
	1/4	11/32	1.2	5	300	300	300	180	NBR	6	04F25C2122CAF	1
	1/4	7/16	2.0	3	150	150	150	185	NBR	10	7321KBN2RN00	7
	3/8	7/16	2.5	3	150	150	150	185	NBR	10	7321KBN3SN00	7
	3/8	5/8	3.0	5	200	135	135	180	NBR	6	06F22C2140AAF	1
	3/8	5/8	3.0	0	150	150	150	180	NBR	11	06F23C2140ACF	4
	1/2	1/2	2.8	5	300	300	300	185	NBR	10	73212BN4TN00	7
	1/2	5/8	4.0	5	200	135	135	180	NBR	6	08F22C2140AAF	1
	1/2	5/8	4.0	0	150	150	150	180	NBR	11	08F23C2140ACF	4
	1/2	19/32	4.4	0	230	230	230	185	NBR	10	7221GBN4VN00	7
AC												
	3/4	19/32	5.5	0	230	230	230	185	NBR	10	7221GBN51N00	7
	3/4	3/4	5.0	0	150	150	150	180	NBR	11	12F23C2148ACF	4
	3/4	3/4	5.0	5	125	125	125	180	NBR	6	12F22C2148AAF	1
	1	1	11.7	0	230	230	230	185	FKM	10	7221GBN64V00	7
	1	1	12.5	5	230	230	230	185	NBR	10	7321GBN64N00	7
	1	1	13.0	5	150	150	100	180	NBR	6	16F24C2164AAF	1
	1 1/4	1 1/8	15.0	5	150	150	100	180	NBR	6	20F24C2172AAF	1
	1 1/2	1 1/4	22.5	5	150	150	100	180	NBR	6	24F24C2180AAF	1
	2	1 9/16	38.6	5	230	230	230	185	NBR	10	7321GBN99N00	7

** PTFE Seals: Allowable seat leakage is 50 cc/min on air and inert gas at rated pressure.*

2-Way Normally Closed, Internally Pilot Operated & Direct Lift - Brass

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
DC	1/4	1/4	0.76	5	300	300	300	185	NBR	10	73212BN2MN00	7
	1/4	11/32	1.2	5	275	275	275	150	NBR	11.5	04F25C2122C3F	6
	1/4	7/16	2.0	3	150	150	150	185	NBR	22	7321KBN2RN00	8
	3/8	7/16	2.5	3	150	150	150	185	NBR	22	7321KBN3SN00	8
	3/8	5/8	3.0	5	125	100	100	150	NBR	11.5	06F22C2140A3F	6
	3/8	5/8	3.0	0	40	40	-	150	NBR	11.5	06F23C2140A3F	6
	1/2	1/2	2.8	5	300	300	300	185	NBR	10	73212BN4TN00	7
	1/2	5/8	4.0	5	150	150	150	185	NBR	10	73218BN4UN00	7
	1/2	5/8	4.0	5	125	100	100	150	NBR	11.5	08F22C2140A3F	6
	1/2	19/32	4.4	0	100	100	100	185	NBR	22	7221GBN4VN00	8
	1/2	5/8	4.0	0	40	40	-	150	NBR	11.5	08F23C2140A3F	6
	3/4	3/4	5.0	5	150	150	150	185	NBR	10	73218BN5VN00	7
	3/4	3/4	5.0	5	100	90	75	180	NBR	11.5	12F22C2148A3F	6
	3/4	19/32	5.5	0	100	100	100	185	NBR	22	7221GBN51N00	8
	3/4	3/4	5.0	5	40	40	-	150	NBR	11.5	12F23C2148A3F	6
	1	1	12.5	5	230	230	230	185	NBR	10	7321GBN64N00	7
	1	1	13.0	5	125	125	125	150	NBR	11.5	16F24C2164A3F	6
	1	1	11.7	0	100	100	100	185	FKM	22	7221GBN64V00	8
	1 1/4	1 1/8	15.0	5	125	125	125	150	NBR	11.5	20F24C2172A3F	6
	1 1/2	1 1/4	22.5	5	125	125	125	150	NBR	11.5	24F24C2180A3F	6
	2	1 9/16	38.6	5	200	200	200	185	NBR	10	7321GBN99N00	7

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2-Way Normally Closed, Direct Lift - Stainless Steel

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
AC	1/2	5/8	4.0	0	150	150	150	180	NBR	11	08F23C6140ACF	4
	1/2	5/8	4.0	0	150	100	100	100	FKM	10	72218RN4UV00	7
	3/4	3/4	5.0	0	150	150	150	180	NBR	11	12F23C6148ACF	4
DC	1/2	5/8	4.0	0	40	40	40	185	FKM	22	72218RN4UV00	8

2-Way Normally Open, Direct Lift - Stainless Steel

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
AC	1/2	1/2	4.0	0	125	125	125	185	FKM	22	72228RN4UV00	8
DC	1/2	1/2	4.0	0	125	125	125	185	FKM	22	72228RN4UV00	8

2-Way Normally Open, Direct Lift - Brass

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
AC	1/2	5/8	4.0	0	150	150	150	180	NBR	11	08F23O2140ACF	4
	3/4	3/4	5.5	0	150	150	150	180	NBR	11	12F23O2148ACF	4
DC	1/2	5/8	4.0	0	125	125	80	150	NBR	11.5	08F23O2140A3F	6

2-Way Normally Closed, Direct Acting - Lead Free Brass, for Steam Service*

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi		Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	Cv	Min	Steam	°F		Watt		
AC	1/2	1/2	3.6	1	125	353	PTFE	11	08FS5CL432ACH	10
	3/4	3/4	7.4	1	125	353	PTFE	11	12FS5CL448ACH	10
	1	1	12.2	1	125	353	PTFE	11	16FS5CL464ACH	10

** High pressure steam valves require Class H coils only from reference coil chart.*

3-Way Normally Closed, Direct Acting - Brass

	Port Size	Inlet Orifice Dia	Exhaust Orifice Dia	Inlet Flow Factor	Exhaust Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	inch	Cv	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
A C	1/8	3/64	3/64	0.05	0.05	0	200	200	200	180	NBR	6	02F30C1103AAF	1
	1/4	1/16	1/16	0.08	0.08	0	125	125	125	180	NBR	6	04F30C2104AAF	1
	1/4	5/64	3/32	0.17	0.24	0	150	150	150	185	FKM	10	7131KBN2JV00	7
	1/4	5/64	1/8	0.17	0.31	0	150	150	150	185	FKM	10	7131TBN2JV00	7
	1/4	3/32	9/64	0.24	0.38	0	110	110	110	185	FKM	10	7131TBN2LV00	7
D C	1/4	5/64	3/32	0.17	0.24	0	150	150	150	185	FKM	10	7131KBN2JV00	7
	1/4	5/64	1/8	0.17	0.31	0	150	150	150	185	FKM	10	7131TBN2JV00	7
	1/4	3/32	9/64	0.24	0.38	0	110	110	110	185	FKM	10	7131TBN2LV00	7

3-Way Normally Open, Direct Acting - Brass

	Port Size	Inlet Orifice Dia	Exhaust Orifice Dia	Inlet Flow Factor	Exhaust Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	inch	Cv	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
AC	1/4	5/32	1/8	0.31	0.41	0	150	150	150	185	FKM	22	7132TBN2NV00	8

3-Way Universal, Direct Acting - Brass

	Port Size	Inlet Orifice Dia	Exhaust Orifice Dia	Inlet Flow Factor	Exhaust Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	inch	Cv	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
AC	1/4	5/64	5/64	0.17	0.17	0	100	100	100	185	FKM	10	7133TBN2JV00	7
DC	1/4	5/64	5/64	0.17	0.17	0	100	100	100	185	FKM	10	7133TBN2JV00	7

3-Way Normally Closed, Pilot Operated - Brass

	Port Size	Inlet Orifice Dia	Exhaust Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
AC	1/4	1/4	1/4	1.2	30	150	-	-	167	NBR	10	73317BN2PN00	7
	3/8	3/8	-	2.1	10	180	180	180	185	NBR	10	73312BN3RNJ0	7
	1/2	1/2	-	3.6	10	180	180	180	185	NBR	10	73312BN4UNJ0	7
	3/4	3/4	-	7.3	10	180	180	180	185	NBR	10	73312BN52NJ0	7
DC	1/4	1/4	1/4	1.2	30	150	-	-	167	NBR	10	73317BN2PN00	7
	3/8	3/8	-	2.1	10	180	180	180	185	NBR	10	73312BN3RNJ0	7
	1/2	1/2	-	3.6	10	180	180	180	185	NBR	10	73312BN4UNJ0	7
	3/4	3/4	-	7.3	10	180	180	180	185	NBR	10	73312BN52NJ0	7

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3-Way Normally Closed, Direct Acting - Stainless Steel

	Port Size	Inlet Orifice Dia	Exhaust Orifice Dia	Inlet Flow Factor	Exhaust Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	inch	Cv	Cv	Min	Air, Liquids & Gases	Water	Light Oil	°F		Watt		
AC	1/4	3/64	1/16	0.062	0.095	0	250	250	250	185	NBR	10	71315SN2ENJ1	7
	1/4	1/16	1/16	0.110	0.095	0	200	200	200	185	NBR	10	71315SN2GNJ1	7
	1/4	3/32	3/32	0.170	0.170	0	125	125	125	185	NBR	10	71315SN2KNJ1	7
	1/4	1/8	3/32	0.230	0.170	0	90	90	90	185	NBR	10	71315SN2MNJ1	7
DC	1/4	3/64	1/16	0.062	0.095	0	250	250	250	185	NBR	10	71315SN2ENJ1	7
	1/4	1/16	1/16	0.110	0.095	0	200	200	200	185	NBR	10	71315SN2GNJ1	7
	1/4	3/32	3/32	0.170	0.170	0	125	125	125	185	NBR	10	71315SN2KNJ1	7
	1/4	1/8	3/32	0.230	0.170	0	90	90	90	185	NBR	10	71315SN2MNJ1	7

3-Way Normally Open, Direct Acting - Stainless Steel

	Port Size	Inlet Orifice Dia	Exhaust Orifice Dia	Inlet Flow Factor	Exhaust Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	inch	Cv	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
AC	1/4	3/64	1/16	0.052	0.10	0	250	250	250	185	NBR	10	71395SN2ENJ1	7
	1/4	1/16	1/8	0.100	0.28	0	150	150	150	185	NBR	10	71395SN2GNJ1	7
DC	1/4	3/64	1/16	0.052	0.10	0	250	250	250	185	NBR	10	71395SN2ENJ1	7

3-Way Universal, Direct Acting - Stainless Steel

	Port Size	Inlet Orifice Dia	Exhaust Orifice Dia	Inlet Flow Factor	Exhaust Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	inch	Cv	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
AC	1/8	3/64	3/64	0.050	0.050	0	150	*	150	240	FKM	10	30CU02EV4	9
	1/8	1/16	1/16	0.090	0.100	0	100	*	100	240	FKM	10	30CU02GV4	9
	1/4	1/32	1/32	0.024	0.024	0	400	400	400	185	NBR	10	71335SN2ANJ1	7
	1/4	3/64	3/64	0.052	0.052	0	180	180	180	185	NBR	10	71335SN2ENJ1	7
	1/4	1/16	1/16	0.095	0.095	0	115	115	115	185	NBR	10	71335SN2GNJ1	7
	1/4	3/32	3/32	0.170	0.170	0	80	80	80	185	NBR	10	71335SN2KNJ1	7
DC	1/8	1/32	1/32	0.020	0.020	0	200	*	200	240	FKM	8	30CU02AV4	9
	1/8	1/16	1/16	0.090	0.100	0	100	*	100	240	FKM	10	30CU02GV4	9
	1/4	1/32	1/32	0.024	0.024	0	400	400	400	185	NBR	10	71335SN2ANJ1	7
	1/4	3/64	3/64	0.052	0.052	0	180	180	180	185	NBR	10	71335SN2ENJ1	7
	1/4	1/16	1/16	0.095	0.095	0	115	115	115	185	NBR	10	71335SN2GNJ1	7
	1/4	3/32	3/32	0.170	0.170	0	80	80	80	185	NBR	10	71335SN2KNJ1	7

** Consult Factory*

4-Way 2 Position Piped Single Solenoid - Aluminum

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
AC	1/4	1/4	1.0	30	150	-	-	167	NBR	10	73419AN2NNM0 *	7
	1/4	1/4	1.0	30	150	-	-	167	NBR	10	73419AN2NN00	7
DC	1/4	1/4	1.0	30	150	-	-	167	NBR	10	73419AN2NNM0 *	7
	1/4	1/4	1.0	30	150	-	-	167	NBR	10	73419AN2NN00	7

** Valve with Locking Manual Override*

4-Way 2 Position Piped Single Solenoid - Brass

	Port Size	Inlet Orifice Dia	Exhaust Orifice Dia	Inlet Flow Factor	Exhaust Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	inch	Cv	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
AC	1/4	1/16	3/32	0.09	0.09	10	150	150	150	180	NBR	11	04F48S2106ACF	4
	1/4	1/4	1/4	1.20	1.20	30	150	-	-	167	NBR	10	73417BN2PN00	7
DC	1/4	1/4	1/4	1.20	1.20	30	150	-	-	167	NBR	10	73417BN2PN00	7

** Valve with Locking Manual Override.*

4-Way 2 Position Direct Mount (NAMUR) Single Solenoid - Aluminum Locking Manual Override Standard

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
AC	1/4	0.27	1.2	37	150	-	-	122	FKM	*	U341N03	11, 12
	1/4	0.27	1.2	37	150	-	-	122	FKM	*	U341N05 **	11, 12
DC	1/4	0.27	1.2	37	150	-	-	122	FKM	*	U341N03	11, 12
	1/4	0.27	1.2	37	150	-	-	122	FKM	*	U341N05 **	11, 12

** Refer to Coil Charts 11 and 12, ** Valve can function as 3-way or 4-way depending on the position of the conversion plate.*

4-Way 3 Position Direct Mount (NAMUR) Double Solenoid - Aluminum Locking Manual Override Standard

	Port Size	Orifice Dia	Flow Factor	Operating Pressure Differential (MOPD) psi				Max. Media Temp	Seal	Power	Part Number Pressure Vessel and Complete Valve	Coil Chart
	NPT	inch	Cv	Min	Air, Inert Gas	Water	Light Oil	°F		Watt		
AC	1/4	0.27	1.2	45	150	-	-	122	FKM	*	U342N03	11, 12
DC	1/4	0.27	1.2	45	150	-	-	122	FKM	*	U342N03	11, 12

** Refer to Coil Charts 11 and 12.*

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PA Series - 2-Way, Normally Closed Valves Flow Direction Over Seat for Air, Inert Gases and Steam

Valve Size	Port Size	Body Material	Orifice		Actuator Dia	Actuator Port	Operating Pressure Air, Inert Gas	Operating Pressure Steam	Minimum Pilot Pressure	Part Number Complete Valve	Net Weight
inch	NPT		inch	Cv	inch	BSP	psi	psi	psi		lbs
3/8	3/8	316L	0.51	5.5	1.26	1/8	0 - 232	0-130	65 - 87	PA10C1N3R032S *	1.4
1/2	1/2	316L	0.51	5.5	1.26	1/8	0 - 232	0-130	65 - 87	PA15C1N4R032S *	1.4
1/2	1/2	316L	0.51	5.5	1.97	1/8	0 - 232	0 - 130	44	PA15S1N4R050S	2.3
1/2	1/2	304	0.51	5.5	1.97	1/8	0 - 232	0 - 130	44	PA15S1N4S050A	1.8
3/4	3/4	316L	0.59	6.3	1.26	1/8	0 - 203	0-130	65 - 87	PA20C1N5R032S *	1.6
3/4	3/4	316L	0.71	10.5	1.97	1/8	0 - 232	0 - 130	44 - 58	PA20S1N5R050S	2.3
3/4	3/4	304	0.71	10.5	1.97	1/8	0 - 232	0 - 130	44 - 58	PA20S1N5S050A	2.0
1	1	316L	0.94	18.7	2.48	1/8	0 - 232	0 - 130	44 - 50	PA25S1N6R063S	4.5
1	1	304	0.94	18.7	2.48	1/8	0 - 232	0 - 130	44-58	PA25S1N6S063A	3.6

** Compact Valve Series*

PA Series - 2-Way, Normally Closed Valves - Anti Water-Hammer Flow Direction Under Seat for Air, Inert Gases and Liquids

Valve Size	Port Size	Body Material	Orifice		Actuator Dia	Actuator Port	Operating Pressure Air, Inert Gas	Operating Pressure Steam	Minimum Pilot Pressure	Part Number Complete Valve	Net Weight
inch	NPT		inch	Cv	inch	BSP	PSI	psi	psi		lbs
3/8	3/8	316L	0.51	5.5	1.26	1/8	0 - 87	0 - 87	73 - 87	PA10C2N3R032S *	1.4
3/8	3/8	316L	0.51	5.5	1.97	1/8	0 - 232	0 - 232	66	PA10SAN3R050S	2.2
1/2	1/2	316L	0.51	5.5	1.26	1/8	0 - 87	0 - 87	73 - 87	PA15C2N4R032S *	1.4
1/2	1/2	3016L	0.51	5.5	1.97	1/8	0 - 232	0 - 232	66	PA15SAN4R050S	2.3
1/2	1/2	304	0.51	5.5	1.97	1/8	0 - 232	0 - 232	66	PA15SAN4S050A	1.8
3/4	3/4	316L	0.59	6.3	1.26	1/8	0 - 58	0 - 58	73 - 87	PA20C2N5R032S *	1.8
3/4	3/4	316L	0.71	10.5	1.97	1/8	0 - 145	0 - 145	66	PA20SAN5R050S	2.3
3/4	3/4	304	0.71	10.5	1.97	1/8	0 - 145	0 - 145	66	PA20SAN5S050A	2.0
1	1	316L	0.94	18.7	2.48	1/8	0 - 116	0 - 116	66	PA25SAN6R063S	4.5
1	1	304	0.94	18.7	2.48	1/8	0 - 116	0 - 116	66	PA25SAN6S063A	3.6

** Compact Valve Series*

3-Way Normally Closed, Direct Acting Banjo - Aluminum*

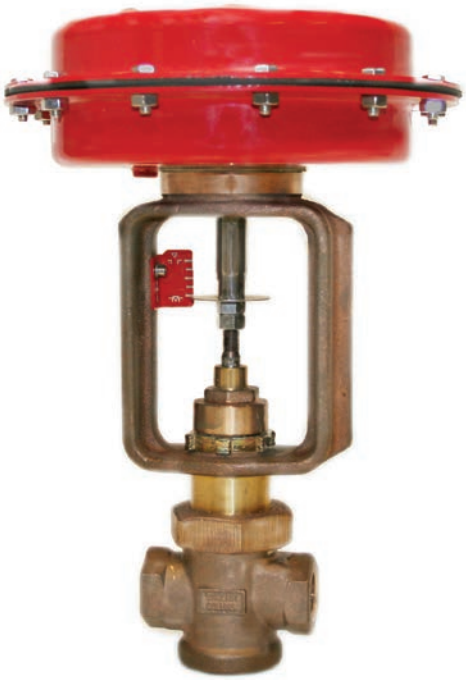
	Actuator Enclsoure Port	Port Size	Inlet Orifice Dia	Exhaust Orifice Dia	Inlet Flow Factor	Exhaust Flow Factor	Operating Pressure Differential (MOPD) psi		Max. Media Temp	Seal	Voltage	Power	Part Number Pressure Vessel and Complete Valve
	BSP	NPT	inch	inch	Cv	Cv	Min	Air, Inert Gas	°F			Watt	
AC	G 1/8	1/8	1.6	1.6	0.05	0.05	0	150	185	FKM	120/60 - 110/50	8.1	U131B01NDAF
	G 1/4	1/8	1.6	1.6	0.05	0.05	0	150	185	FKM	120/60 - 110/50	8.1	U131B02NDAF
DC	G 1/8	1/8	1.6	1.6	0.05	0.05	0	150	185	FKM	24 VDC	5.9	U131B01NDAB
	G 1/4	1/8	1.6	1.6	0.05	0.05	0	150	185	FKM	24 VDC	5.9	U131B02NDAB

** Complete valve assembly mounts directly to actuator port on PA Series Angle Body Valves. Includes Din Form "B" coil and strain relief connector.*

K Series - 2-Way Normally Closed, Modulating Control Valves

Port Size	Body Material	Orifice Dia		Plug Trim	Actuator Port	Max. Operating Pressure			Pilot Control Pressure Range	Part Number Complete Valve	Net Weight
						Air, Inert Gas	Liquids	Steam			
NPT		inch	Cv		NPT	psi	psi	psi	psi*		lbs
1/2	Bronze	0.84	6.0	Equal	1/4	0 - 250	0 - 250	0 - 250	3 - 15	K01-22012000	22
1/2	316 SS	0.84	6.0	Equal	1/4	0 - 250	0 - 250	0 - 250	3 - 15	K21-22112000	22
3/4	Bronze	0.84	8.0	Equal	1/4	0 - 250	0 - 250	0 - 250	3 - 15	K01-32013000	22
1	Bronze	1.06	13.0	Equal	1/4	0 - 190	0 - 190	0 - 190	3 - 15	K01-42014000	23
1	316 SS	1.06	13.0	Equal	1/4	0 - 190	0 - 190	0 - 190	3 - 15	K21-42114000	23

** Pilot Control Pressure range will depend on factory calibration of operating pressure (190 psi & 250 psi shown are maximum values).*



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Options

2-Way Normally Closed, Manifolds*

Material	Part Number	Stations
303 Stainless Steel	4C202	2
	4C203	3
	4C204	4
	4C206	6
	4C208	8
6061-T6 Aluminum	4A202	2
	4A203	3
	4A204	4
	4A206	6
	4A208	8

** Only sold modularly*

2-Way Normally Closed, Solenoid Cartridge Valves*

English Units						Metric Units			
Orifice (in)	Cv	MOPD AC (psi)	MOPD DC (psi)	Pressure Vessel Number	Coil Chart	Orifice (mm)	Kv	MOPD AC (bar)	MOPD DC (bar)
3/64	0.06	950	390	209CL5EV4	9	1.2	0.05	65	27
1/16	0.10	625	255	209CL5GV4	9	1.6	0.09	43	17.5
3/32	0.22	320	130	209CL5LV4	9	2.4	0.19	22	9
7/64	0.28	245	100	209CL5MV4	9	2.7	0.24	17	7
1/8	0.32	175	60	209CL5PV4	9	3.2	0.28	12	4
5/32	0.38	100	30	209CL5QV4	9	4.0	0.33	7	2

For applications including air, inert gas and light oils
**Only sold modularly*

DIN Connectors

DIN – 1/2" Conduit Plug
ELECD2 (Single)
Gasket Included

DIN – Cable Gland Plug
ELECD1 (Single)
Gasket Included

Repair Kits

2-Way Valves

Pressure Vessel	Kit	Pressure Vessel	Kit	Pressure Vessel	Kit
04F20O1106ACF	04F20O1106ACFR	20CC02LV4	4R001	7121KBN2QV00	7KK04
04F20O2118ACF	04F20O2118ACFR	20CC02MV4	4R001	7121KBN2SV00	7KK04
04F25C2122C3F	04F25C2122C3FR	20CC02PV4	4R001	7121KBN44V00	7KK05
04F25C2122CAF	04F25C2122CAFR	20CC02QV4	4R001	7122KBN2LF00	7KK06
04F48S2106ACF	04F48S2106ACFR	20CF02EV4	4R002	71295SN2KNJ1	7K514
06F22C2140A3F	06F22C2140A3FR	20CF02LV4	4R002	72218BN5VE00	7K804
06F22C2140AAF	06F22C2140AAFR	20F24C2172A3F	20F24C2172A3FR	72218RN4UV00	7K803
06F23C2140ACF	06F23C2140ACFR	20F24C2172AAF	20F24C2172AAFR	7221GBN4VN00	7KG03
08F22C2140A3F	08F22C2140A3FR	24F24C2180A3F	24F24C2180A3FR	7221GBN51N00	7KG03
08F22C2140AAF	08F22C2140AAFR	24F24C2180AAF	24F24C2180AAFR	7221GBN64E00	7KG02
08F23C2140ACF	08F23C2140ACFR	71215SN1MN00	7K502	7221GBN64N00	7KG05
08F23C6140ACF	08F23C6140ACFR	71215SN21N00	7K538	7221GBN64V00	7KG18
08F23O2140A3F	08F23O2140A3FR	71215SN2EN00	7K502	72228RN4UV00	7K808
08F23O2140ACF	08F23O2140ACFR	71215SN2GN00	7K502	73212BN2MN00	7K201
12F22C2148A3F	12F22C2148A3FR	71215SN2KN00	7K502	73212BN4TN00	7K209
12F22C2148AAF	12F22C2148AAFR	71215SN2MN00	7K502	73216BN2MT00	7K601
12F23C2148ACF	12F23C2148ACFR	71215SN2QN00	7K538	73218BN4UN00	7K815
12F23C6148ACF	12F23C6148ACFR	71215SN2SN00	7K538	73218BN5VN00	7K816
12F23O2148ACF	12F23O2148ACFR	71215SN2VN00	7K538	7321GBN64N00	7KG08
16F24C2164A3F	16F24C2164A3FR	71215SN33N00	7K510	7321GBN99N00	7KG10
16F24C2164AAF	16F24C2164AAFR	7121KBN1NF00	7KK01	7321KBN2RN00	7KK12
20CC02EV4	4R001	7121KBN2NF00	7KK01	7321KBN3SN00	7KK12
20CC02GV4	4R001	7121KBN2NV00	7KK03		

3-Way Valves

Pressure Vessel	Kit	Pressure Vessel	Kit	Pressure Vessel	Kit
30CC02EV4	4R002	71315SN2KNJ1	7K516	7133TBN2JV00	7KT03
30CC02GV4	4R002	71315SN2MNJ1	7K516	71395SN2ENJ1	7K525
30CC02MV4	4R002	7131KBN2JV00	7KK08	71395SN2GNJ1	7K525
30CF02EV4	4R003	7131TBN2JV00	7KT05	73312BN3RNJ0	7K215
30CU02EV4	4R004	7131TBN2LV00	7KT05	73312BN4UNJ0	7K216
30CU02GV4	4R004	71335SN2ANJ1	7K522	73312BN52NJ0	7K217
71315SN1GNJ1	7K516	71335SN2ENJ1	7K522	73317BN2PN00	7K701
71315SN2ENJ1	7K516	71335SN2GNJ1	7K522		

Steam Valves

Pressure Vessel	Kit	Pressure Vessel	Kit
08FS3C2340ACF	08FS3C2340ACFR	12FS5C2448ACH	12FS5C2448ACHR
08FS5C2432ACH	08FS5C2432ACHR	16FS5C2464ACH	16FS5C2464ACHR
12FS3C2348ACF	12FS3C2348ACFR	24FS4C2380AAF	24FS4C2380AAFR

4-Way Valves

Pressure Vessel	Kit
73417BN2PN00	7K701
73419AN2NN00	7K901
73419AN2NNM0	7K901

Technical References

Figure A – Coil Compatibility Chart

	Total Coil Temperatures													
Voltage	AC						DC				AC or DC			AC	DC
NEMA Coil Class	F		H		F	H	F	H	F	H	F	H	H	F	F
	155°C (311°F)		180°C (356°F)		155°C (311°F)	180°C (356°F)	155°C (311°F)	180°C (356°F)	155°C (311°F)	180°C (356°F)	155°C (311°F)	180°C (356°F)	180°C (356°F)	155°C (311°F)	155°C (311°F)
Grey bars represent NEMA temperature limits of Class H (180°C) or Class F (155°C) constructions.					115°C (239°F)		110°C (223°F)		106°C (223°F)		115°C (239°F)		135°C (243°F)		
Gold bars represent temperature of an energized coil when continuously energized at room temperature. *Assumes fluid (media) temperature does not exceed 180°F.*	85°C (185°F)	90°C (194°F)	85°C (185°F)	90°C (194°F)										83°C (181°F)	88°C (190°F)
	This line represents room temperature of 25°C (77°F).														
Nominal Watt Rating	6	11	6	11	10.2 or 16		9.5		11.5		10		22	8.5	8
Coil Chart	1, 4, 5, 6, 10										7		8	9	9
Product Type	Gold Ring										Skinner				

Increased Room (Ambient) Example: A customer wishes to use an FCD valve 22 Watt H coil, in an ambient environment of 40°C and wants to know if a 200°F (93°C) fluid (media) will be safe. 1. Subtract normal 25°C ambient from desired 40°C, which results in a 15°C increase. Then add to 'energized coil temperature' of 135°C, which results in a 150°C 'energized coil temperature'. 2. NEMA H limit of 180°C minus new 'energized coil temperature' of 150°C, leaves 30°C available for increased fluid (media) temperature.
3. Media temperature of 180°F is 82°C, desired temperature of 200°F is 93°C; increase in fluid temperature is 11°C. (Step 3 shows 30°C is available).
4. Conclusion: Ambient temperature of 40°C and fluid of 93°C are acceptable.

Temperature

Just as fluid (media) temperatures affect valve body material; ambient environment and power input temperatures affect solenoid coils.

Temperature rise due to power input varies with coil design. Ambient temperature also helps determine the class of coil required for specific valve applications. When ambient temperature is greater than 25°C (77°F), add the difference of ambient and 25°C (77°F) to the energized coil temperature shown in the chart above (Figure A).

Higher media temperatures should be considered only when media temperature is greater than 180°F. Do not exceed the maximum temperature limit for the valve. Add the difference of your fluid temperature and 180°F to the energized coil temperature shown the chart above.

AC/DC Voltage Range

All coils used in Parker FCD valves are designed for continuous duty, except where noted. They can remain energized continuously without damage from overheating or mechanical failure. AC and DC voltage ratings (nominal) and normal operating ranges as shown in the chart above are standard.

Coils are available as either Class "F" or Class "H", and are constructed in accordance with UL, IEEE, NEMA and other accepted standards unless otherwise noted.

Coil Construction

Parker FCD coils are molded and constructed in accordance with UL, IEEE, NEMA and other accepted standards, and are 100% tested.

Testing

All Parker FCD solenoid valves are 100% tested. Coil insulation systems must satisfy performance standards set by the National Electrical Manufacturers Association (NEMA) and tested by UL.

Electrical components of AC and DC coils are tested in accordance with ASTM D2307-78 and become a recognized component under UL 1446.

The procedure produces data for an evaluation which concludes, a coil with 20,000 hours continuous operation will perform within the same specifications of a zero time coil (new coil).

Technical References

Fluid Compatibility

Fluids	Metals							Elastomers and Plastics+										
					Stainless Steel													
	Aluminum	Brass	Copper	Silver	18-8 302 303 304 305	316	430F	EPDM	FKM	NBR	Nylon	PCTFE	PSF Polysulfone	Ruby	PFPM	CR	PTFE	Noryl
Acetic Acid 8%	S	NR	NR	S	S	S	S	S	NR	NR	S	S	S	S	S	S	S	S
Acetone	S	S	S	S	S	S	S	S	NR	NR	S	S	NR	S	S	NR	S	NR
Acetylene, Dry	S	S	NR	S	S	S	S	S	S	S	S	S	NR	U	S	NR	S	U
Air, Lubricated 120°C (248°F)	S	S	S	S	S	S	S	NR	S	NR	NR	S	NR	S	S	NR	S	S
Air, Lubricated 82°C (180°F)	S	S	S	S	S	S	S	NR	S	S	S	S	S	S	S	NR	S	S
Air, Unlubricated 120°C (248°F)	S	S	S	S	S	S	S	NR	S	NR	NR	S	NR	S	S	NR	S	S
Air, Unlubricated 82°C (180°F)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Alcohol, Ethyl (Ethanol)	F	F	F	S	F	F	F	S	NR	S	NR	S	U	S	S	S	S	F
Alcohol, Ethyl (Methanol)	T	F	F	S	S	S	NR	S	NR	S	S	S	U	S	S	S	S	F
Ammonia Gas, Anhydrous 20	S	NR	NR	F	S	S	S	S	NR	F	F	S	S	S	S	S	S	S
Argon	S	S	S	S	S	S	S	U	S	S	U	S	U	U	S	S	S	U
Beer	S	U	F	S	S	S	S	U	S	S	U	S	U	S	U	U	S	S
Benzene	S	S	S	S	S	S	S	NR	S	NR	S	S	NR	S	S	NR	S	NR
Boric Acid	NR	NR	F	S	S	S	S	NR	S	NR	S	S	T	S	S	S	S	S
Citric Acid 10%	NR	NR	NR	S	S	S	S	S	S	S	S	S	T	S	S	S	S	S
Cod Liver Oil	S	S	U	S	S	S	S	S	S	S	S	S	S	S	U	NR	S	U
Coffie	S	S	U	S	S	S	S	S	S	S	S	S	S	S	U	S	S	U
Diesel Fuel	S	S	S	S	S	S	S	NR	S	T	S	S	S	S	S	NR	S	NR
Ethylene Glycol (Antifreeze)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Freon 12	S	S	S	S	S	S	S	NR	U	S	S	S	S	S	NR	S	S	NR
Freon 22	S	S	S	S	S	S	S	U	NR	NR	S	S	S	S	S	S	S	NR
Fuel Oil	S	S	F	S	S	S	S	NR	S	T	S	S	S	S	S	NR	S	S
Gasoline, Leaded	S	S	S	S	S	S	S	NR	S	S	S	S	U	S	S	NR	S	NR
Gasoline, Unleaded	S	S	S	S	S	S	S	NR	S	NR	S	S	U	S	S	NR	S	NR
Helium	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Hydraulic Fluids - Fire Resistant Cellulube, Phosphate Ester	S	S	S	S	S	S	S	S	NR	NR	S	S	S	S	U	U	S	U
Pydraul	S	S	S	S	S	S	S	NR	S	NR	S	S	S	S	U	NR	S	U
Skydrol	S	S	S	S	S	S	S	S	NR	NR	S	S	S	S	U	U	S	NR
Petroleum	S	S	S	S	S	S	S	NR	S	S	S	S	S	S	U	NR	S	NR
Jet Fuel	S	S	S	S	S	S	S	NR	S	T	S	U	U	S	S	NR	S	NR
Kerosene	S	S	S	S	S	S	S	NR	S	S	S	S	S	S	S	NR	S	NR
Ketones	T	T	U	U	T	S	T	S	NR	NR	S	T	NR	U	S	NR	S	NR
Lard (Animal Fat)	S	S	T	S	S	S	S	F	S	S	S	U	U	U	S	NR	S	U
Lead Acetate	NR	NR	NR	F	NR	NR	NR	S	T	NR	S	S	U	U	S	NR	S	F
Linseed Oil	T	NR	NR	S	S	S	S	NR	S	S	S	U	S	U	S	NR	S	S
Lime & Water	NR	NR	NR	U	NR	NR	NR	S	S	S	S	S	U	U	S	S	S	U
Lubricating Oil	S	S	S	S	S	S	S	NR	S	S	S	S	S	S	S	NR	S	T
Methane	S	S	S	S	S	S	S	NR	S	S	S	S	S	S	S	NR	S	U
Methanol Alcohol-Methyl	S	S	NR	U	S	S	NR	S	NR	S	NR	S	S	S	S	T	S	T
Methyl Ethyl Ketone (MEK)	S	S	S	S	F	S	F	S	NR	NR	S	S	S	S	S	NR	S	NR
Mineral Spirits	S	S	S	S	S	S	S	NR	S	S	U	U	U	U	NR	NR	S	T
Motor Oil	S	S	S	S	S	S	S	NR	S	S	T	S	U	U	NR	T	S	S
Naphtha	S	S	S	S	S	S	S	NR	S	NR	S	S	S	S	S	NR	S	NR
Natural Gas	S	S	S	S	S	S	S	NR	S	S	T	U	U	U	S	S	S	U
Nickle Nitrate	NR	NR	NR	U	T	NR	NR	S	S	T	S	U	U	U	S	T	S	S

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Technical References

Fluid Compatibility

Fluids	Metals							Elastomers and Plastics+										
					Stainless Steel													
	Aluminum	Brass	Copper	Silver	18-8 302 303 304 305	316	430F	EPDM	FKM	NBR	Nylon	PCTFE	PSF Polysulfone	Ruby	PFPM	CR	PTFE	Noryl
Nitrobenzene	T	NR	T	U	NR	S	NR	T	NR	NR	NR	T	U	U	S	NR	S	NR
Nitrogen	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Nitrous Oxide	NR	NR	S	U	T	T	T	T	T	S	NR	S	U	U	S	T	S	U
n-Octyl Alcohol	U	U	U	U	U	U	U	S	T	T	U	U	U	U	S	T	S	U
Olive Oil	S	S	U	U	S	S	NR	NR	S	S	T	U	U	U	S	NR	S	S
Oxygen	S	S	S	S	S	S	S	S	S	NR	NR	S	NR	U	S	S	S	S
Ozone	T	U	U	U	T	S	T	T	T	NR	NR	S	U	U	S	NR	S	U
Perchloroethylene	S	F	F	S	F	S	F	NR	S	NR	S	S	NR	U	NR	NR	S	NR
n-Propyl Acetone	U	U	U	U	U	U	U	S	NR	NR	U	U	U	U	S	NR	S	U
Propyl Alcohol	S	S	NR	U	S	T	S	T	S	T	NR	U	U	U	S	T	S	U
Pyridine	NR	NR	NR	U	S	S	NR	NR	NR	NR	NR	S	U	U	S	NR	S	T
Pyrolube	U	U	U	U	U	U	U	NR	S	NR	U	U	U	U	U	NR	U	U
Quick Silver	U	U	U	U	U	U	U	S	S	S	T	U	U	U	U	S	S	U
Red Oil	U	U	U	U	U	U	U	NR	T	S	T	U	U	U	S	NR	S	U
Rust Inhibitors	U	U	U	U	U	U	U	U	S	S	U	U	U	U	U	NR	U	U
Shellac	S	S	S	U	S	S	S	S	S	S	S	U	U	U	S	NR	S	U
Silicone Oil	S	S	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S
Sodium Phosphates	NR	T	S	S	T	T	NR	T	T	S	NR	S	U	U	S	T	S	S
Steam 148°C (298°F)	U	S	S	S	S	S	S	S	NR	NR	NR	S	NR	U	U	NR	S	S
Steam 180°C (356°F)	NR	S	S	S	S	S	S	NR	NR	NR	NR	NR	NR	U	U	NR	S	Y
Stoddard Solvent	S	S	S	U	S	S	S	NR	S	S	T	S	U	U	S	NR	S	NR
Sucrose Solution	U	U	NR	U	S	S	S	S	S	S	T	U	U	U	S	T	S	S
Sulfur	S	NR	NR	U	T	T	T	S	S	NR	T	S	U	U	S	U	S	S
Sulfur Hexaflouride	S	S	S	S	S	S	S	S	NR	NR	T	U	U	U	T	S	S	U
Toluene	S	S	S	S	S	S	S	NR	S	NR	S	S	NR	U	S	NR	S	NR
Trichloroethylene	T	NR	T	U	T	T	T	NR	T	NR	NR	NR	U	S	S	NR	S	NR
Trimethylpentane	U	U	U	U	U	U	U	NR	S	S	T	U	U	U	S	NR	S	U
Trisodium Phosphate	NR	NR	NR	F	T	T	T	S	S	F	T	S	U	U	S	F	S	S
Turpentine	S	S	S	S	S	S	S	NR	F	S	S	S	U	U	S	NR	S	S
Urea	T	U	U	S	S	F	U	T	T	T	T	U	U	U	U	T	S	S
Varnish	S	T	S	U	S	S	S	NR	S	T	T	S	U	U	S	NR	S	U
Vegetable Oil	S	S	S	U	S	S	S	NR	S	S	S	S	U	U	U	NR	S	U
Vinegar	T	NR	NR	S	T	S	T	T	NR	T	NR	S	U	U	U	T	S	S
Water, Boiler Feed	S	T	T	S	S	S	S	U	T	S	T	S	U	S	S	NR	S	U
Water, Deionized, Distilled	S	T	T	S	S	S	S/T	S	S	T	S	S	S	S	S	NR	S	S
Water, Fresh <82°C (180°F)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	NR	S	S
Water, Fresh <100°C (212°F)	T	S	S	S	S	S	S	S	S	NR	S	S	S	S	S	NR	S	S
Water, Return Condensate	S	T	T	S	S	S	S	S	T	S	T	S	U	S	S	NR	S	U
Water, Sea/Salt	NR	NR	F	S	T	S	NR	S	S	S	S	S	S	S	S	NR	S	S
Whiskey	NR	T	NR	U	S	S	NR	S	S	S	S	S	U	U	S	S	S	S
Wine	NR	NR	NR	U	S	S	T	S	S	S	S	S	U	U	S	S	S	S
Xylene	S	S	S	S	S	S	S	NR	S	NR	S	S	NR	S	S	NR	S	NR
Zinc Chloride	NR	NR	NR	F	NR	NR	NR	S	S	S	T	S	U	U	S	S	S	S
Zinc Sulfate	NR	NR	NR	S	T	T	NR	S	S	T	U	T	U	U	S	T	S	S

Note: Please read the introduction section before using this chart. The following data should be used as a guide, and not as a final recommendation. When flammable gas applications are being considered, consult Fluid Control Division.

***T** = Test to Verify; **F** = Fair; **U** = No Data Available, Unknown Compatibility; **NR** = Not Recommended Unless Media are at 100% Concentration and at Room Temperature.*

Technical References

Introduction

Parker valves are highly engineered products that can be used in a variety of diverse applications. In addition to operational functionality, it is important to consider safety, reliability and media compatibility suitable for the operating environment to select the best product for a given application. This section provides a brief overview of the components and functional varieties of both solenoid and pneumatically actuated valves available from Parker FCD.

Operation

Solenoid valves are electrically operated devices used to control flow. They are used for the remote on/off or directional control of liquids, gases and steam.

Solenoid valves consist of two main elements: 1) An electrical coil in the solenoid, and 2) A valve body or pressure vessel. The solenoid is the electromagnetic unit that powers the opening or closing of the valve. The valve is the pressure containing unit that acts to shut off or open media flow. When the solenoid is energized by an electrical signal, current flow results in the buildup of a magnetic field. This field attracts a moveable plunger in the valve.

Physical movement of the plunger opens or closes a valve orifice which gives the valve on/off or directional control of media.

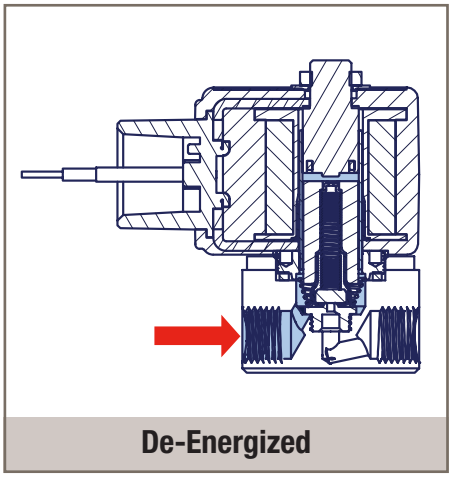
In general, solenoid valves are constructed to be: 1) Normally-Closed or 2) Normally-Open. Both designations refer to action of the valve on flow when the solenoid is not energized.

Additionally, there are Universal or (Multi-purpose) valves that can be either Normally Open or Normally Closed, depending on the port connection.

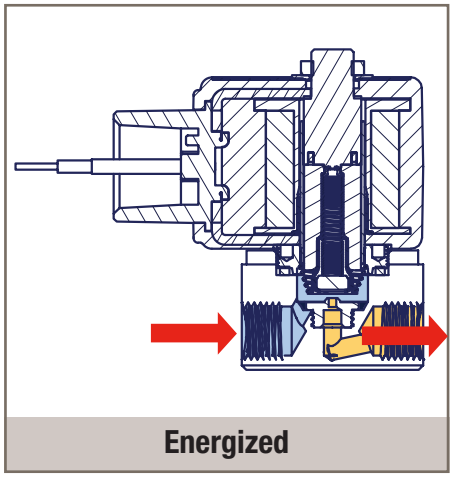
The most common type of solenoid valve is Direct Acting.

The following schematics are generic drawings to show operation and functional types of valves and are not specific to any part number.

In this **Direct-Acting Normally Closed valve**, the plunger is in direct contact with the body main orifice, and opens or closes the orifice.



De-Energized



Energized

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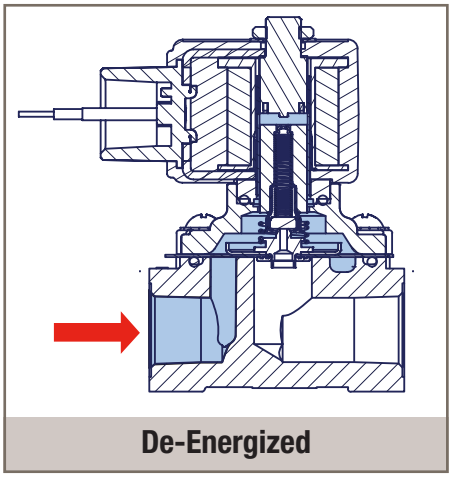
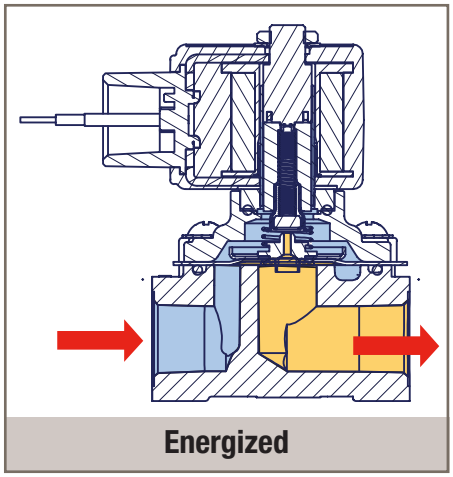
Technical References

Pilot Operated valves are typically used to control higher flow.

In this **Pilot-Operated Normally Closed valve**, the main orifice is not directly controlled by the plunger, but by a diaphragm or piston. Pilot operated valves contain both a pilot and a bleed orifice and may require a minimum operating pressure differential to ensure proper operation.



De-Energized



Energized

General Data-Solenoid Coils

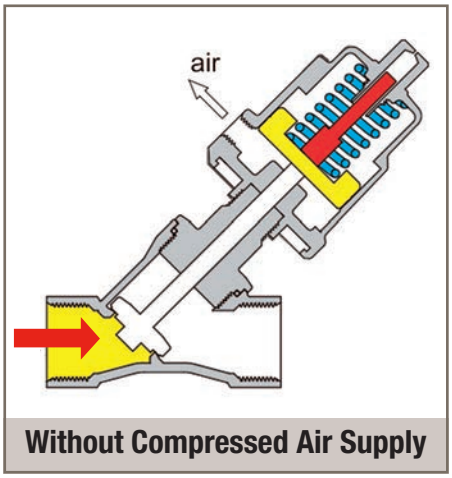
All coils used in Parker solenoid valves are designed for continuous duty except where noted. For AC, inrush current occurs at the moment the solenoid is energized. The continuous current after inrush is holding current. DC solenoids have no inrush. Typical amp ratings for DC are determined by dividing DC watts by DC voltage.

Pneumatically Actuated valves operate through compressed air instead of electricity.

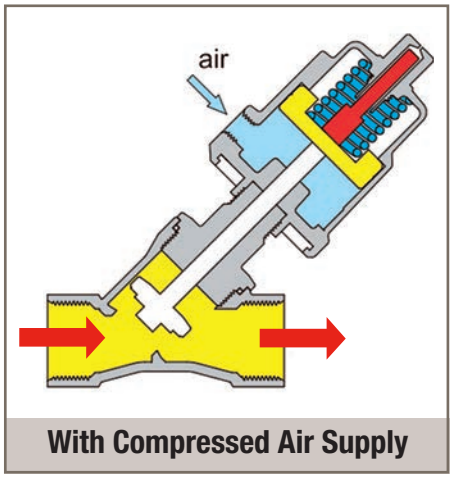
Pneumatically Actuated valves

Pneumatically actuated valves utilize compressed air to drive a piston to mechanically open or close.

They are exceptionally durable valves that can be used in a wide variety of applications. Our Parker Angle Body and Sinclair Collins valves fall into this category.



Without Compressed Air Supply



With Compressed Air Supply

Normally Closed example.

Coil Charts

Please refer to the coil chart number within the catalog to find the correct coil in the chart below.

Gold Ring™	Voltage	1/2" NPT Conduit*	DIN 43650A/ISO4400
CHART 1 6 watts, Class F	24/60 120/60-110/50 240/60-220/50	AF4C01 AF4C05 AF4C15	- AFPH05 AFPH15

Gold Ring™	Voltage	1/2" NPT Conduit*	DIN 43650A/ISO4400
CHART 4 11 watts, Class F	24/60 120/60-110/50 240/60-220/50	CF4C01 CF4C05 CF4C15	- CFPH05 CFPH15
CHART 5 16 watts, Class F	24/60 120/60-110/50 240/60-220/50	DF4C01 DF4C05 DF4C15	- DFPH05 DFPH15
CHART 6 11.5 watts, Class F	12VDC 24VDC	3F4C75 3F4C80	3FPH75 3FPH80

Gold Ring™	Voltage	1/2" NPT Conduit*	DIN 43650A/ISO4400
CHART 10 11 watts, Class H	24/60 120/60-110/50 240/60-220/50	CH4C01 CH4C05 CH4C15	CHPH01 CHPH01 CHPH15

High Flow Namur and Banjo Pilot Valve	Voltage	Power Watt	1/2" NPT Conduit****	DIN 43650B/ISO6952
CHART 11 Class F	24/60 120/60-110/50 240/60-230/50 12 VDC 24VDC	6.9 8.1 9.2 5.4 5.9	- - - - -	ND1E ND1F ND1G ND1A ND1B
CHART 12 Class F	24/60 120/60-110/50 240/60-220/50	6.8 6.7 4.5 4.6	NH1C NH1D NH1A NH1B	- - - -

* 18" Lead Wires, NEMA 1, 2, 3, 4, 4X

** Hazardous location valve approval (for factory assembled valves): Class I, Div 1 & 2, Groups A, B, C, D; Class II, Div 1 & 2, Groups E, F, G; Temperature Code T3C
Hazardous location coil approval (for coils purchased individually): Class I, Div 1 & 2, Groups A, B, C, D; Class II, Div 1 & 2, Group E; Temperature Code T3A

*** 8.5 Watt For 2 - Way Normally Closed AC

**** Protection Class: IP65, FM and CSA approvals for Class I, Div. 1 & 2, Groups A, B, C, D; Class II, Groups E, F, G; Class III, Meets Class 1 Zone 1, Ex m II T4

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Coil Charts

Please refer to the coil chart number within the catalog to find the correct coil in the chart below.

Skinner®	Voltage	1/2" NPT Conduit*	DIN 43650A/ISO4400	Hazardous**
CHART 7 10 watts, Class F	24/60 120/60-110/50 240/60-220/50 12VDC 24VDC	C111B2 C111P3 C111Q3 C111C1 C111C2	D100B2 D100P3 D100Q3 D100C1 D100C2	- H111P3 H111Q3 H111C1 H111C2
CHART 7 10 watts, Class H	120/60-110/50 240/60-220/50 12VDC 24VDC	C222P3 C222Q3 C222C1 C222C2	- - - -	H222P3 H222Q3 - H222C2
CHART 8 22 watts, Class H	120/60-110/50 12VDC 24 VDC	C322P3 C322C1 C322C2	- - -	H322P3 H322C1 H322C2

Skinner®	Voltage	1/2" NPT Conduit*	DIN 43650A/ISO4400	18" Leads	1/4" Tab
CHART 9 AC 10 watts*** DC 8 watts Class F Integrated	24/60 120/60-110/50 240/60-220/50 12VDC 24VDC	C4E C4F C4G C4A C4B	- - - - -	B4E B4F B4G B4A B4B	- - - - -
CHART 9 AC 10 watts*** DC 8 watts Class H Integrated	24/60 120/60-110/50 240/60-220/50 12VDC 24VDC	- - - - -	D6E D6F D6G D6A D6B	- - - - -	- - - - -
CHART 9 AC 10 watts DC 8 watts Open Frame Class F	24/60 120/60, 110/50 240/60, 220/50 12VDC 24VDC	- - - - -	- - - - -	L2E L2F L2G L2A L2B	T2E T2F T2G T2A T2B

* 18" Lead Wires, NEMA 1, 2, 3, 4, 4X

** Hazardous location valve approval (for factory assembled valves): Class I, Div 1 & 2, Groups A, B, C, D; Class II, Div 1 & 2, Groups E, F, G; Temperature Code T3C
Hazardous location coil approval (for coils purchased individually): Class I, Div 1 & 2, Groups A, B, C, D; Class II, Div 1 & 2, Group E; Temperature Code T3A

*** 8.5 Watt For 2 - Way Normally Closed AC

**** Protection Class: IP65, FM and CSA approvals for Class I, Div. 1 & 2, Groups A, B, C, D; Class II, Groups E, F, G; Class III, Meets Class 1 Zone 1, Ex m II T4

Parker Hannifin Corporation
Fluid Control Division

Application Worksheet

Distributor:

Salesperson:

Type
2-WAY | 3-WAY | 4-WAY

Operation
N/C | N/O | UNIVERSAL

Media
AIR | WATER | STEAM | OTHER

Size
NPT | FLOW RATE WITH UNITS | CV

Pressure
INLET MAX. | ADDITIONAL INFO

Ambient
TEMP °F | ENVIRONMENT | HAZARDOUS | OTHER

Voltage
VOLTS | AC/DC

Extras

Parker Hannifin Corporation
Fluid Control Division

Application Worksheet

Distributor:

Salesperson:

Type
2-WAY | 3-WAY | 4-WAY

Operation
N/C | N/O | UNIVERSAL

Media
AIR | WATER | STEAM | OTHER

Size
NPT | FLOW RATE WITH UNITS | CV

Pressure
INLET MAX. | ADDITIONAL INFO

Ambient
TEMP °F | ENVIRONMENT | HAZARDOUS | OTHER

Voltage
VOLTS | AC/DC

Extras

To use our Online Product Selector, visit www.parker.com/fcd and click on the Products tab.

WARNING – USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

The product described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

1.0 GENERAL INSTRUCTIONS

1.1. Scope: This safety guide is designed to cover general guidelines on the selection, installation, operation, and maintenance of these Products. This safety guide is a supplement to and is to be used with the specific Parker publication for the valve, assembly or related accessory being considered for use. Parker publications are available at www.parker.com or by calling 1-800-CPARKER.

1.2. Fail-Safe: All Products can and do fail without warning for many reasons. Design all systems in a fail-safe mode so that failure of the Products will not endanger persons or property.

1.3 Distribution: Provide a copy of this safety guide to each person that is responsible for installation, operation, and maintenance of these Products. Do not select or use these Products without thoroughly reading and understanding this safety guide as well as the specific Parker publications for the Products considered or selected.

1.4 User Responsibility: Due to the wide variety of operating conditions and applications for these Products, Parker and its distributors do not represent or warrant that any particular Parker Fluid Control Product is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a Product. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the Product;
- Assuring that the user's requirements are met and that the application presents no health or safety hazards;
- Providing all appropriate health and safety warnings on the equipment on which the Products are used; and
- Assuring compliance with all applicable government and industry standards.

1.5 Additional Questions: Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the Product being considered or used, or call 1-800-CPARKER, or go to www.parker.com for telephone numbers of the appropriate technical service department.

2.0 PRODUCT SELECTION INSTRUCTIONS

2.1 Selection: Consult the specific Parker Fluid Control publication for the Product being considered for use. Confirm the choice of Product with Parker Fluid Control's technical consultants prior to placing orders for the Product or installing and using the Product.

2.2 Chemical Compatibility: Elastomer seal material used in the Products must be properly selected based on compatibility with the gases, liquids or additives being conveyed in the Product. Any exposure to non-compatible gases, liquids or additives may result in failure or degradation of the seals and leakage from the Product. Such failure or degradation could happen immediately or at any time over the life of the Product.

3.0 PRODUCT ASSEMBLY AND INSTALLATION INSTRUCTIONS

3.1 Inspection: Prior to assembly, all components must be checked for correct style, part number, and physical properties such as size or the presence of physical damage. Do NOT use any component that displays any signs of nonconformance.

3.1.1 A careful examination of the Unit Valve and Unit Solenoid must be performed. If you purchase a Unit Valve and a Unit Solenoid, be sure that the last two digits of the Unit Valve match the first two digits of the Unit Solenoid. If they do not match then do not install.

3.1.2 Check nameplate for correct catalog number, pressure, voltage and service. Do not install if unsuitable.

3.1.3 Valves to be installed in Hazardous Locations must be outfitted with Hazardous Location coils only. Verify nameplate data and coil part number before installing the valve.

3.2 Product Assembly: Do not assemble, install or use a Parker Fluid Control Division Product in any end use or application that exceeds the specified operating parameters as listed by Parker such as but not limited to, pressure, voltage and frequency, and medium. Do not mix components or solenoids from a Parker valve with valves or solenoids from another manufacturer. Do not mix components or solenoids from one Parker valve with components or solenoids from another Parker valve.

3.2.1 Threaded Connections: Proper procedures for the application of tape or liquid pipe sealant or thread compound must be followed so these contaminants do not enter the Product.
3.2.2 Sweating or Brazing: Products requiring the sweating or brazing of pipe connections must have precautions taken to protect the internal product components from excessive heat during the sweating or brazing operation. Follow the directions in the specific Parker Fluid Control Division publication for the Product in question.
3.2.3 Mounting: Check the specific Parker Fluid Control Division publication for the Product in question for limitations on mounting prior to mounting the Product.
3.2.4 Electrical Connection: Turn off electrical power before connecting or disconnecting the Product to the power source. Wiring must comply with local and national electrical codes.
3.2.5 Voltage: Some coils contain solid state components that can be damaged by voltage spikes, transient voltage, over temperature, over voltage, or improper assembly. To protect against premature failure, please read the instructions in the specific Parker Fluid Control Division publication for the Product in question.
3.2.6 Port Connection: Parker Product operating parameters assume that the user connects the fluid to the proper inlet, outlet and exhaust ports. Connecting to the wrong ports may result in a complete failure or degraded performance. Use caution when applying and activating the fluid connection. Take the necessary precautions to protect personnel and property from injury and damage when turning on the fluid to the Product. Make sure the voltage is in the correct state (on or off) to control the applied pressure as required for the application in question.
3.2.7 Screw Terminal Coil and Terminal Box Assembly: When the DIN or screw terminal coils are used with the terminal box assembly, be sure to apply a wrench to the wrench flats on the conduit hub when installing electrical conduit.
3.2.8 Pressure: Turn off line pressure and bleed off trapped pressure from the lines before installing, removing or disassembling the Product.

4.0 PRODUCT AND SYSTEM OPERATION INSTRUCTIONS

4.1 Pressure Differential: Pressure differential dependent Products require a minimum pressure differential to operate properly. Make sure the chosen Product is sized properly for the application to maintain the required pressure differential across the Product.
4.2 System Check-out: Once installed, the Product installation must be tested to insure proper operation and that no external leakage exists. All safety equipment must be in place including but not limited to safety glasses, helmets, ear protection, splash guards, coveralls and any shields on the equipment. All air entrapment must be eliminated and the system pressurized to the maximum system pressure (at or below the Product maximum working pressure) and checked for proper function and freedom from leaks. Personnel must stay out of potentially hazardous areas while testing and using.

5.0 PRODUCT MAINTENANCE AND REPLACEMENT INSTRUCTIONS

5.1 Maintenance: Even with proper selection and installation, Product life or performance may be significantly reduced without a continuing maintenance program. The severity of the application, risk potential from a possible Product failure, and experience with any Product failures in the application or in similar applications should determine the frequency of the inspection and the replacement for the Products so that Products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at minimum, must include instructions 5.1.1 through 5.1.3.
5.1.1 Product Lubrication and Filtration: Almost all products require filtration. Consult the specific Parker Fluid Control Division publication for the Product in question. Note, too, that some Products require lubrication or filtration or both as a regular maintenance item due to the nature of the application's environment. Consult the specific Fluid Control Division publication for the Product in question to determine this. Other Products, such as proportional valves, do not require any maintenance if the fluid is properly filtered. If a failure should occur, then these proportional valves should not be repaired but replaced.
5.1.2 Cleaning: Do not expose plastic or elastomeric materials to any type of commercial cleaning fluid. Parts should be cleaned with a mild soap and water solution.
5.1.3 Fluid Spills: Necessary precautions should be taken during maintenance to avoid exposing personnel or the surrounding area to any spilled fluid if the fluid is regulated, harmful, or damaging when exposed to or in contact with personnel or the surrounding environment.
5.2 Service and Repair:
5.2.1 General: Do not repair Products unless the specific Fluid Control Division publication for the Product in question allows this procedure. Not all Products can be safely repaired in the field. Repair and replacement must be in accordance with the specific Parker Fluid Control Division publication for the Product in question and any Parker replacement kit instructions.
5.2.2 Replacement Parts: If you purchase any replacement parts they must be original equipment manufactured by Parker Fluid Control Division.
5.2.3 Lock-Out / Tag-Out: Follow all lock-out and tag-out procedures before undertaking service or repairs. This includes de-energizing all electrical, fluid and mechanical energy sources.
5.2.4 Hazardous Location Coils - When replacing coils, Products equipped with Hazardous Location coils must use Hazardous Location replacement coils only. Verify nameplate data and coil part number before installing the replacement coil.

OFFER OF SALE – PARKER FLUID CONTROL DIVISION

1. Definitions. As used herein, the following terms have the meanings indicated.

Buyer:	means any customer receiving a Quote for Products from Seller.
Goods:	means any tangible part, system or component to be supplied by the Seller.
Products:	means the Goods, Services and/or Software as described in a Quote provided by the Seller.
Quote:	means the offer or proposal made by Seller to Buyer for the supply of Products.
Seller:	means Parker-Hannifin Corporation, including all divisions and businesses thereof.
Services:	means any services to be supplied by the Seller.
Software:	means any software related to the Products, whether embedded or separately downloaded.
Terms:	means the terms and conditions of this Offer of Sale or any newer version of the same as published by Seller electronically at www.parker.com/saleterms.

2. Terms. All sales of Products by Seller are contingent upon, and will be governed by, these Terms and, these Terms are incorporated into any Quote provided by Seller to any Buyer. Buyer's order for any Products whether communicated to Seller verbally, in writing, by electronic date interface or other electronic commerce, shall constitute acceptance of these Terms. Seller objects to any contrary or additional terms or conditions of Buyer. Reference in Seller's order acknowledgement to Buyer's purchase order or purchase order number shall in no way constitute an acceptance of any of Buyer's terms of purchase. No modification to these Terms will be binding on Seller unless agreed to in writing and signed by an authorized representative of Seller.

3. Price; Payment. The Products set forth in Seller's Quote are offered for sale at the prices indicated in Seller's Quote. Unless otherwise specifically stated in Seller's Quote, prices are valid for thirty (30) days and do not include any sales, use, or other taxes or duties. Seller reserves the right to modify prices at any time to adjust for any raw material price fluctuations. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). All sales are contingent upon credit approval and payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified in the Quote). Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month or the maximum allowable rate under applicable law.

4. Shipment; Delivery; Title and Risk of Loss. All delivery dates are approximate. Seller is not responsible for damages resulting from any delay. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the shipment carrier at Seller's facility. Unless otherwise agreed, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective indicated shipping date will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.

5. Warranty. The warranty related to the Products is as follows: (i) Goods are warranted against defects in material or workmanship for a period of twenty four (24) months from the date of shipment or 2,000 hours of use, whichever occurs first; Exception to this is the Angle Body Valve line and the FTS Pump system which have twelve (12) months warranty (ii) Services shall be performed in accordance with generally accepted practices and using the degree of care and skill that is ordinarily exercised and customary in the field to which the Services pertain and are warranted for a period of six (6) months from the completion of the Services by Seller; and (iii) Software is only warranted to perform in accordance with applicable specifications provided by Seller to Buyer for ninety (90) days from the date of delivery or, when downloaded by a Buyer or end-user, from the date of the initial download. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer:

DISCLAIMER OF WARRANTY: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE SOFTWARE IS ERROR-FREE OR FAULT-TOLERANT, OR THAT BUYER'S USE THEREOF WILL BE SECURE OR UNINTERRUPTED. BUYER AGREES AND ACKNOWLEDGES THAT UNLESS OTHERWISE AUTHORIZED IN WRITING BY SELLER THE SOFTWARE SHALL NOT BE USED IN CONNECTION WITH HAZARDOUS OR HIGH RISK ACTIVITIES OR ENVIRONMENTS. EXCEPT AS EXPRESSLY STATED HEREIN, ALL PRODUCTS ARE PROVIDED "AS IS".

6. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to the Seller within ten (10) days of delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the non-conformance is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

7. LIMITATION OF LIABILITY. IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE THE NON-CONFORMING PRODUCT, RE-PERFORM THE SERVICES, OR REFUND THE PURCHASE PRICE PAID WITHIN A REASONABLE PERIOD OF TIME. **IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS**

OFFER OF SALE – PARKER FLUID CONTROL DIVISION

THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, NON-COMPLETION OF SERVICES, USE, LOSS OF USE OF, OR INABILITY TO USE THE PRODUCTS OR ANY PART THEREOF, LOSS OF DATA, IDENTITY, PRIVACY, OR CONFIDENTIALITY, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCTS.

8. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which are or become Buyer's property, will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the Products manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Special Tooling. Special Tooling includes but is not limited to tooling, jigs, fixtures and associated manufacturing equipment acquired or necessary to manufacture Products. A tooling charge may be imposed for any Special Tooling. Such Special Tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in Special Tooling belonging to Seller that is utilized in the manufacture of the Products, even if such Special Tooling has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any Special Tooling or other property in its sole discretion at any time.

10. Security Interest. To secure payment of all sums due, Seller retains a security interest in all Products delivered to Buyer and, Buyer's acceptance of these Terms is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.

11. User Responsibility. The Buyer through its own analysis and testing, is solely responsible for making the final selection of the Products and assuring that all performance, endurance, maintenance, safety and warning requirements of the application of the Products are met. The Buyer must analyze all aspects of the application and follow applicable industry standards, specifications, and other technical information provided with the Product. If Seller provides Product options based upon data or specifications provided by the Buyer, the Buyer is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products. In the event the Buyer is not the end-user, Buyer will ensure such end-user complies with this paragraph.

12. Use of Products, Indemnity by Buyer. Buyer shall comply with all instructions, guides and specifications provided by Seller with the Products. **Unauthorized Uses**. If Buyer uses or resells the Products for any uses prohibited in Seller's instructions, guides or specifications, or Buyer otherwise fails to comply with Seller's instructions, guides and specifications, Buyer acknowledges that any such use, resale, or non-compliance is at Buyer's sole risk. Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, intellectual property infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, application, design, specification or other misuse of Products provided by Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, tooling, equipment, plans, drawings, designs or specifications or other information or things furnished by Buyer; (d) damage to the Products from an external cause, repair or attempted repair by anyone other than Seller, failure to follow instructions, guides and specifications provided by Seller, use with goods not provided by Seller, or opening, modifying, deconstructing or tampering with the Products for any reason; or (e) Buyer's failure to comply with these Terms. Seller shall not indemnify Buyer under any circumstance except as otherwise provided in these Terms.

13. Cancellations and Changes. Buyer may not cancel or modify any order for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller, at any time, may change Product features, specifications, designs and availability.

14. Limitation on Assignment. Buyer may not assign its rights or obligations without the prior written consent of Seller.

15. Force Majeure. Seller does not assume the risk and is not liable for delay or failure to perform any of Seller's obligations by reason of events or circumstances beyond its reasonable control ("Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

16. Waiver and Severability. Failure to enforce any provision of these Terms will not invalidate that provision; nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of these Terms by legislation or other rule of law shall not invalidate any other provision herein and, the remaining provisions will remain in full force and effect.

17. Termination. Seller may terminate any agreement governed by or arising from these Terms for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate, in writing, if Buyer: (a) breaches any provision of these Terms (b) appoints a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or one if filed by a third party (d) makes an assignment for the benefit of creditors; or (e) dissolves its business or liquidates all or a majority of its assets.

18. Ownership of Software. Seller retains ownership of all Software supplied to Buyer hereunder. In no event shall Buyer obtain any greater right in and to the Software than a

right in the nature of a license limited to the use thereof and subject to compliance with any other terms provided with the Software.

19. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights ("Intellectual Property Rights") except as provided in this Section. Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on a third party claim that one or more of the Products sold hereunder infringes the Intellectual Property Rights of a third party in the country of delivery of the Products by the Seller to the Buyer. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of any such claim, and Seller having sole control over the defense of the claim including all negotiations for settlement or compromise. If one or more Products sold hereunder is subject to such a claim, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Products, replace or modify the Products so as to render them non-infringing, or offer to accept return of the Products and refund the purchase price less a reasonable allowance for depreciation. Seller has no obligation or liability for any claim of infringement: (i) arising from information provided by Buyer; or (ii) directed to any Products provided hereunder for which the designs are specified in whole or part by Buyer; or (iii) resulting from the modification, combination or use in a system of any Products provided hereunder. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for such claims of infringement of Intellectual Property Rights.

20. Governing Law. These Terms and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to the sale and delivery of the Products.

21. Entire Agreement. These Terms, along with the terms set forth in the main body of any Quote, forms the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. In the event of a conflict between any term set forth in the main body of a Quote and these Terms, the terms set forth in the main body of the Quote shall prevail. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter shall have no effect. These Terms may not be modified unless in writing and signed by an authorized representative of Seller.

22. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards, including those of the United States of America, and the country or countries in which Buyer may operate, including without limitation the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act"), U.S. and E.U. export control and sanctions laws ("Export Laws"), the U.S. Food Drug and Cosmetic Act ("FDCA"), and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), each as currently amended. Buyer agrees to indemnify, defend, and hold harmless Seller from the consequences of any violation of such laws, regulations and standards by Buyer, its employees or agents. Buyer acknowledges that it is familiar with all applicable provisions of the FCPA, the Anti-Kickback Act, Export Laws, the FDCA and the FDA and certifies that Buyer will adhere to the requirements thereof and not take any action that would make Seller violate such requirements. Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly, to any governmental official, foreign political party or official thereof, candidate for foreign political office, or commercial entity or person, for any improper purpose, including the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller. Buyer further represents and agrees that it will not receive, use, service, transfer or ship any Product from Seller in a manner or for a purpose that violates Export Laws or would cause Seller to be in violation of Export Laws.

Notes

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