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Notes

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Fluid Control Division
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Direct Mount NAMUR

3/2, 3-Way — 5/2, 4-Way
Direct Acting and Pilot Operated Valves
1/4" - 1/2" NPT



General Description:

The NAMUR mounting interface for direct mount pilot valves has become widely popular around the world. Parker's Direct Mount NAMUR valves meet that global need and are supplied with the necessary mounting hardware and seals as standard to ensure proper mounting, interface sealing and valve function. These valves can be converted between 3-way and 4-way operation by using Parker's patented mounting conversion plate which is unique in the industry. (See Conversion Plate Kit on P. C22)

Installation
Valves can be mounted in any position. The preferred orientation is with the coil vertical and upright

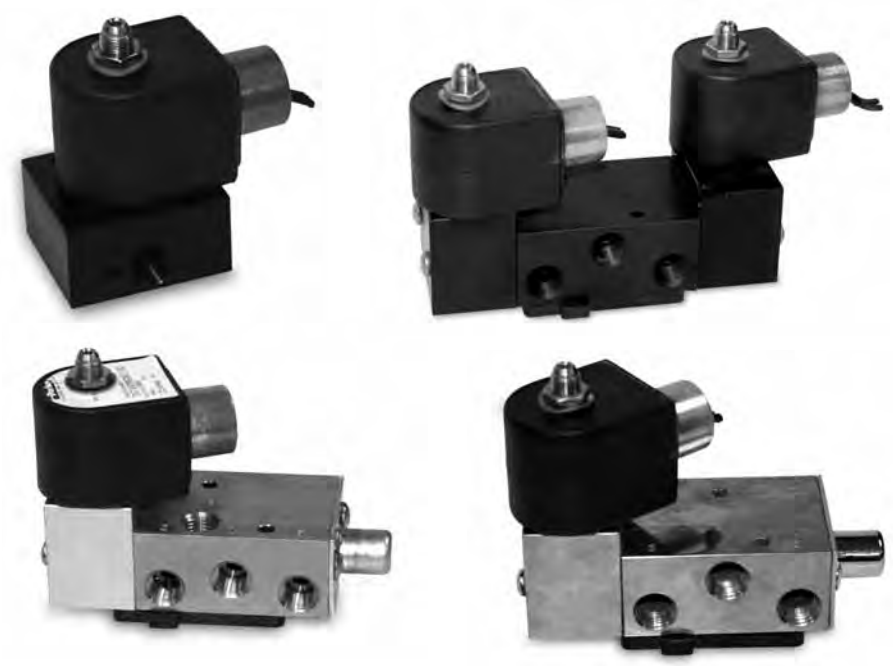
Standard Materials of Construction
Please refer to page C22.

Compatible Fluids
Lubricated Air and Inert Gases.

Use of non-lubricated gaseous media can affect valve life.

Electrical Characteristics:

Standard Voltages:
AC –24/60
120/60–110/50
240/60–220/50
DC –12, 24 & 120
For other voltages – consult factory



Coil Classification:
Class F standard
Class H available

Agency Approvals:
Standard valves with NEMA Type 4X or explosion proof solenoid enclosures are UL Listed and CSA Certified. For additional details, consult factory.

SIL-3 Capable (Models 73417xxx, 73477xxx). See certificate on page F20 in Technical Section of this catalog.

Please refer to page C22 for details.

Minimum Ambient Temperature
-40° F (Dew point must be more than 7° F below ambient temp.

Maximum Ambient Temperature
167° F

Applications:

- Pilot valve actuation of larger control valves
- Oil and gas applications including off-shore installations
- Double acting cylinder control requiring direct pilot mount valves
- Air Vises
- Air Motors
- Damper Control

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3/2 3-Way 2 Position-Single Solenoid-NAMUR Direct Mount - Aluminum

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI		Watt	Max. Fluid Temp. °F	Seal	Pressure Vessel	Reference	
			Min.	Air Inert Gas					Coil	Valve
1/4	3/32	0.17	0	150	10	167	NBR	71315AKDKN00	7	C12

3/2 or 5/2, 3- or 4-Way 2 Position - Single Solenoid - NAMUR Direct Mount - Aluminum

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI		Watt	Max. Fluid Temp. °F	Seal	Pressure Vessel Number without Manual Override	Pressure Vessel Number with Locking Manual Override	Pressure Vessel Number with Momentary Manual Override	Reference	
			Min.	Air Inert Gas							Coil	Valve
AC/DC TECHNICAL SPECIFICATIONS												
1/4	11/64	0.55	30	150	10	167	NBR	73417AKDKN00	73417AKDKNM0	73417AKDKN7A	7	C13
1/4	11/64	0.55	30	150	1.5	150	NBR	73417AKDKN00	73417AKDKNM0	73417AKDKN7A	11	C13
1/4	11/64	0.55	30	150	0.6	150	NBR	73417AKDKN90	-	-	12	C13
1/4	1/4	1.20	30	150	10	167	NBR	73417AKDPN00	73417AKDPNM0	73417AKDPN7A	7	C13
1/4	1/4	1.20	30	150	1.5	150	NBR	73417AKDPN00	73417AKDPNM0	73417AKDPN7A	11	C13
1/4	1/4	1.20	30	150	0.6	150	NBR	73417AKDPN90	-	-	12	C13

3/2 or 5/2, 3- or 4-Way 2 Position - Dual Solenoid - NAMUR Direct Mount - Aluminum

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI		Watt	Max. Fluid Temp. °F	Seal	Pressure Vessel Number without Manual Override	Pressure Vessel Number with Locking Manual Override	Pressure Vessel Number with Momentary Manual Override	Reference	
			Min.	Air Inert Gas							Coil	Valve
AC/DC TECHNICAL SPECIFICATIONS												
1/4	11/64	0.55	30	150	10	167	NBR	73477AKDKN00	73477AKDKNM0	73477AKDKN7A	7	C14
1/4	11/64	0.55	30	150	1.5	150	NBR	73477AKDKN00	73477AKDKNM0	73477AKDKN7A	11	C14
1/4	11/64	0.55	30	150	0.6	150	NBR	73477AKDKN90	-	-	12	C14
1/4	1/4	1.20	30	150	10	167	NBR	73477AKDPN00	73477AKDPNM0	73477AKDPN7A	7	C14
1/4	1/4	1.20	30	150	1.5	150	NBR	73477AKDPN00	73477AKDPNM0	73477AKDPN7A	11	C14
1/4	1/4	1.20	30	150	0.6	150	NBR	73477AKDPN90	-	-	12	C14

3/2 or 5/2, 3- or 4-Way 2 Position - Single Solenoid - NAMUR Direct Mount - Brass

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI		Watt	Max. Fluid Temp. °F	Seal	Pressure Vessel Number without Manual Override	Pressure Vessel Number with Locking Manual Override	Pressure Vessel Number with Momentary Manual Override	Reference	
			Min.	Air Inert Gas							Coil	Valve
AC/DC TECHNICAL SPECIFICATIONS												
1/4	1/4	1.20	30	150	1.5	150	NBR	73417BKDPN00	73417BKDPNM0	73417BKDPN7A	11	C13
1/4	1/4	1.20	30	150	10	167	NBR	73417BKDPN00	73417BKDPNM0	73417BKDPN7A	7	C13

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3/2 or 5/2, 3- or 4 - Way 2 Position - Dual Solenoid - NAMUR Direct Mount - Brass

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI		Watt	Max. Fluid Temp. °F	Seal	Pressure Vessel Number without Manual Override	Pressure Vessel Number with Locking Manual Override	Pressure Vessel Number with Momentary Manual Override	Reference	
			Min.	Air Inert Gas							Coil	Valve
AC/DC TECHNICAL SPECIFICATIONS												
1/4	1/4	1.20	30	150	1.5	150	NBR	73477BKDPN00	73477BKDPNM0	73477BKDPN7A	11	C14
1/4	1/4	1.20	30	150	10	167	NBR	73477BKDPN00	73477BKDPNM0	73477BKDPN7A	7	C14

3/2 or 5/2, 3- or 4-Way 2 Position - Single Solenoid - NAMUR Direct Mount - Stainless Steel

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI		Watt	Max. Fluid Temp. °F	Seal	Pressure Vessel Number without Manual Override	Pressure Vessel Number with Locking Manual Override	Pressure Vessel Number with Momentary Manual Override	Reference	
			Min.	Air Inert Gas							Coil	Valve
AC/DC TECHNICAL SPECIFICATIONS												
1/4	11/64	0.55	30	150	1.5	150	NBR	73417VKDKN00	73417VKDKNM0	73417VKDKN7A	11	C13
1/4	11/64	0.55	30	150	10	167	NBR	73417VKDKN00	73417VKDKNM0	73417VKDKN7A	7	C13
1/4	1/4	1.20	30	150	1.5	150	NBR	73417VKDPN00	73417VKDPNM0	73417VKDPN7A	11	C13
1/4	1/4	1.20	30	150	10	167	NBR	73417VKDPN00	73417VKDPNM0	73417VKDPN7A	7	C13

3/2 or 5/2, 3- or 4-Way 2 Position - Dual Solenoid - NAMUR Direct Mount - Stainless Steel

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI		Watt	Max. Fluid Temp. °F	Seal	Pressure Vessel Number without Manual Override	Pressure Vessel Number with Locking Manual Override	Pressure Vessel Number with Momentary Manual Override	Reference	
			Min.	Air Inert Gas							Coil	Valve
AC/DC TECHNICAL SPECIFICATIONS												
1/4	11/64	0.55	30	150	1.5	150	NBR	73477VKDKN00	73477VKDKNM0	73477VKDKN7A	11	C14
1/4	11/64	0.55	30	150	10	167	NBR	73477VKDKN00	73477VKDKNM0	73477VKDKN7A	7	C14
1/4	1/4	1.20	30	150	1.5	150	NBR	73477VKDPN00	73477VKDPNM0	73477VKDPN7A	11	C14
1/4	1/4	1.20	30	150	10	167	NBR	73477VKDPN00	73477VKDPNM0	73477VKDPN7A	7	C14

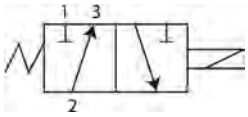
3/2 or 5/2, 3- or 4-Way 2 Position - Single Solenoid - NAMUR Direct Mount - Brass - External Pilot*

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI		Watt	Max. Fluid Temp. °F	Seal	Pressure Vessel Number without Manual Override	Pressure Vessel Number with Locking Manual Override	Pressure Vessel Number with Momentary Manual Override	Reference	
			Min.	Air Inert Gas							Coil	Valve
AC/DC TECHNICAL SPECIFICATIONS												
1/4	1/4	1.20	0	150	1.5	150	NBR	74417BKDPN00	-	-	11	C15
1/4	1/4	1.20	0	150	10	167	NBR	74417BKDPN00	-	-	7	C15

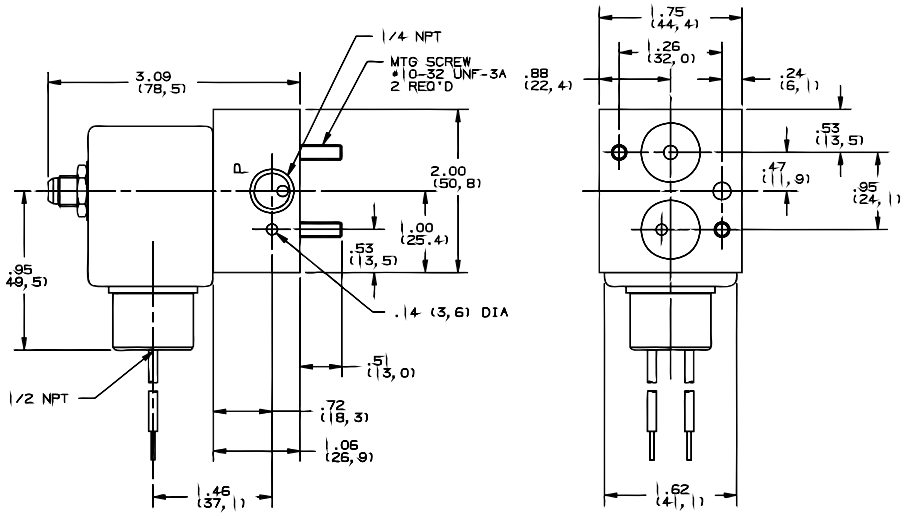
* External pilot pressure to operate valve must be 30-150 PSI.

Valve Reference C12



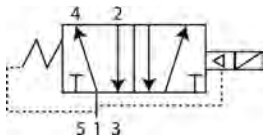


3-Way Normally Closed
Port Identification:
1- Pressure/2 - Cylinder/3 - Exhaust

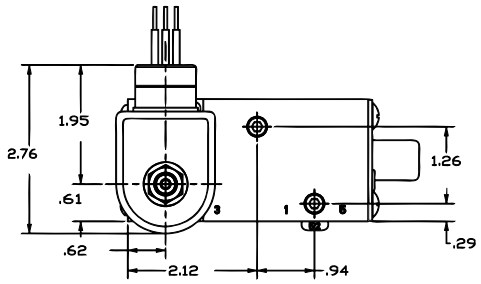


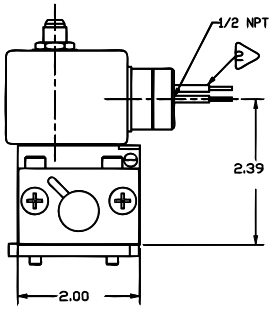
Valve Reference C13

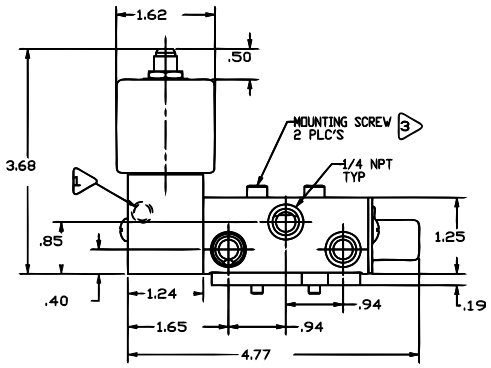


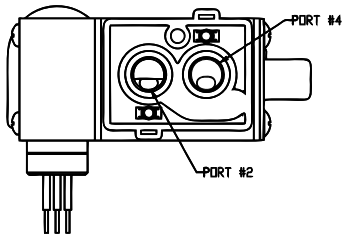


5/2, 4-Way 2 Position Single Solenoid
Port Identification:
1- Pressure/2, 4 - Cylinder/3, 5 - Exhaust





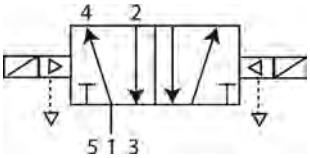




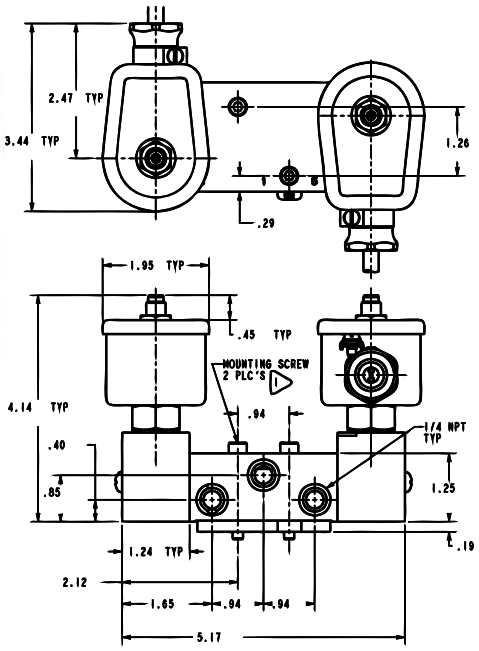
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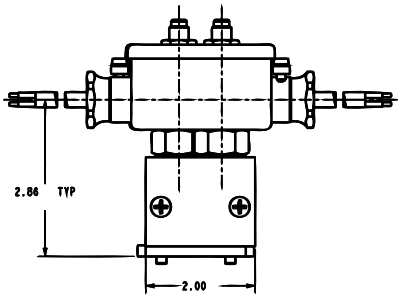
Valve Reference C14

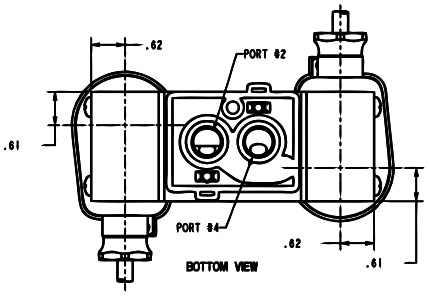




5/2, 4-Way 2 Position Dual Solenoid
Port Identification:
1- Pressure/2, 4 - Cylinder/3, 5 - Exhaust



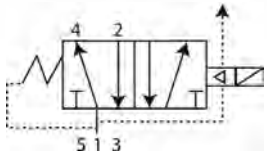




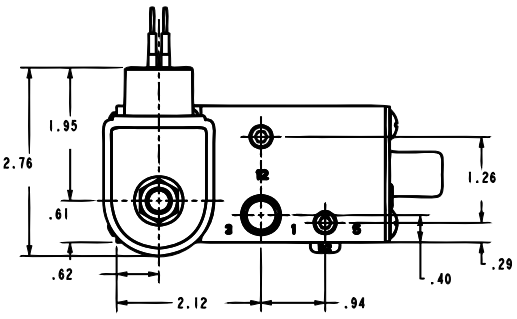
4-Way

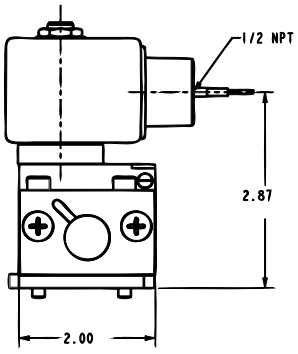
Valve Reference C15

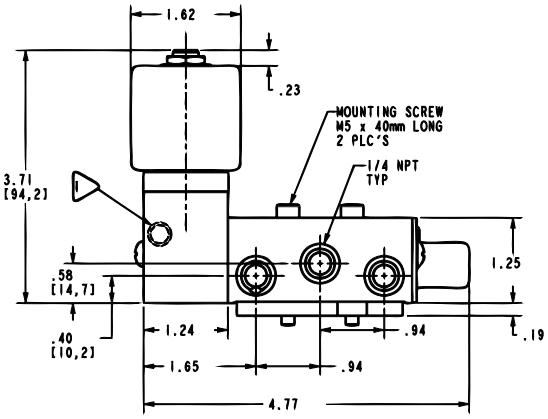


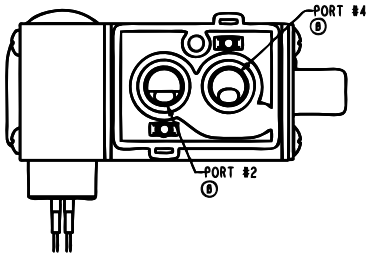


5/2, 4-Way 2 Position Single Solenoid
Port Identification:
1- Pressure/2, 4 - Cylinder/3, 5 - Exhaust







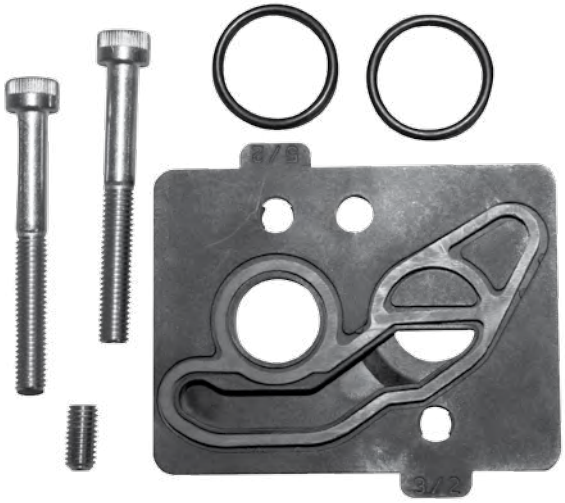


4-Way Pilot Direct Mount Materials of Construction**

Product*	Watt	Type	Port Size	Body	Sleeve Tube	Sleeve Stop	Sleeve Flange	"Plunger Blank"	Plunger Spring	Shading Ring	Max. Ambient Temp.
71315AK	10	3WNC	NAMUR	Alum	304ss	430FR	430F	430FR	19-8SS	Copper	167°F
73417AK	10	3/2-5/2	1/4	Alum	304SS	430FR	430F	430FR	18-8SS	Copper	167°F
73417BK	10	3/2-5/2	1/4	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	167°F
73417VK	10	3/2-5/2	1/4	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	167°F
73477AK	10	3/2-5/2	1/4	Alum	304SS	430FR	430F	430FR	18-8SS	Copper	167°F
73477BK	10	3/2-5/2	1/4	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	167°F

* Shows first 7 digits of pressure vessel part number.
** Maximum ambient temperature shown is the rating when valve is operating at the maximum fluid temperature as shown in the product sections for each of the valves in this catalog.

Parker's 3-way/4-way Conversion Mounting Plate Kit



This conversion mounting kit, unique in the industry, allows a common valve to be installed and used in either a 3-way or 4-way function.

Available with U.S., or Metric mounting screws. Consult factory for the specific kit number that meets your requirements.

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Specialty Service

Valve Portfolio



General Description:

Parker Fluid Control Division offers a wide variety of products for many Specialty Applications**.**

In this section:

- Manifold mounted miniature cartridge valves
- MB 3-way miniature - plastic
- Dry operator 2-way
- Hot water and steam valves
- Intrinsically safe series
- Manual reset / 3-way
- Hydraulic 2-way & 3-way
- Magnelatch® coil option
- Fuel dispensing valves
- Fuel selector manifold
- CNG valves
- Timer drain valves



Parker's solenoid valves have been sold in many markets for more than 60 years. Over that time, the offering has continually expanded to become a very extensive family of valves for both general purpose and special purpose applications.

This section details Fluid Control Division's special purpose line of valves. These valves were developed from years of experience in these specialty markets along with a thorough understanding of the unique needs required to ensure optimal performance.

The valves in this section have NPT threads as standard, or specialty flange configurations and are equipped with coils and housings when needed that are designed to meet the National Electric Code in the US and Canadian standards. Most all of these valves are UL listed and CSA certified.

Consult factory for further details.

Specialty Contents

Manifold mounted miniature cartridge valves 2-Way & 3-Way D3

MB 3-Way miniature - plastic D9

Dry operator 2-Way D13

Hot water & steam valves D17

Intrinsically safe series D35

Manual reset / 3-Way valves D53

Hydraulic 2-Way & 3-Way D57

Magnelatch® coil option D63

Fuel dispensing valves D67

Fuel selector manifold D71

CNG valves D73

Timer drain valves D75

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Manifold Mounted Miniature Cartridge Valves

2-Way & 3-Way Direct Acting Miniature Cartridge Valves



General Description:

The manifold mounted miniature Cartridge Valve is offered in two- and three-way models with a stainless steel body. It offers a space-saving approach, with no manifold orifices to machine or press in, since the orifice is integral to the cartridge valve. Ultimately, less machining means lower manifold costs.

These cartridge valves come fully assembled with no loose parts – the sleeve, plunger, spring and orifice are pressed together as one unit.

Installation

Valves can be mounted in any position. The preferred orientation is with the coil vertical and upright.

Standard Materials of Construction

Please refer to page D8.

Compatible Fluids

Lubricated Air, Inert Gases, Water, Light Oil (300 SSU) and additional fluids compatible with materials of construction.

Use of non-lubricated gaseous media can affect valve life.



Specialty

Electrical Characteristics:

Standard Voltages:
AC –24/60
120/60–110/50
240/60–220/50
DC –12, 24
For other voltages – consult factory

Coil Classification:

Class F standard
Class H available

AC & DC coils are interchangeable on the same pressure vessel.

Agency Approvals:
Standard valves with NEMA 4X are C-UL-US Listed or Recognized. For additional details, consult factory.

Maximum Ambient Temperature
135°F (AC)/125°F (DC)

In absence of moisture, applications at temps as low as -20°F are possible. Please refer to page D8 for details.

Applications:

- Analyzers and diagnostic equipment
- Medical and dental equipment
- Beverage dispensing and vending machines
- Humidification and misting equipment
- Pneumatic positioning
- Automatic dispensing equipment
- Irrigation equipment
- Instrumentation panels
- Lubrication equipment
- Refrigerant reclaim
- Automotive diagnostics/service

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2-Way Small Direct Acting - Normally Closed - Stainless Steel

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI					Max. Media Temp. °F	Seal	Pressure Vessel Number	Reference	
			Min.	Air, Inert Gas	Water	Light Oil	Watt				Coil	Valve
AC TECHNICAL SPECIFICATIONS CONTINUED												
1/8	3/64	0.06	0	950	950	950	8.5	240	FKM	209CL5EV4	9	D1
1/8	1/16	0.10	0	625	625	625	8.5	240	FKM	209CL5GV4	9	D1
1/8	5/64	0.15	0	450	450	450	8.5	240	FKM	209CL5JV4	9	D1
1/8	3/32	0.22	0	320	320	320	8.5	240	FKM	209CL5LV4	9	D1
1/8	7/64	0.28	0	245	245	245	8.5	240	FKM	209CL5MV4	9	D1
1/8	1/8	0.32	0	175	175	175	8.5	240	FKM	209CL5PV4	9	D1
1/8	5/32	0.38	0	100	100	100	8.5	240	FKM	209CL5QV4	9	D1
DC TECHNICAL SPECIFICATIONS CONTINUED												
1/8	3/64	0.06	0	390	390	390	8	240	FKM	209CL5EV4	9	D1
1/8	1/16	0.10	0	255	255	255	8	240	FKM	209CL5GV4	9	D1
1/8	5/64	0.15	0	180	180	180	8	240	FKM	209CL5JV4	9	D1
1/8	3/32	0.22	0	130	130	130	8	240	FKM	209CL5LV4	9	D1
1/8	7/64	0.28	0	100	100	100	8	240	FKM	209CL5MV4	9	D1
1/8	1/8	0.32	0	60	60	60	8	240	FKM	209CL5PV4	9	D1
1/8	5/32	0.38	0	30	30	30	8	240	FKM	209CL5QV4	9	D1

2-Way Small Direct Acting - Normally Open - Stainless Steel

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI					Max. Media Temp. °F	Seal	Pressure Vessel Number	Reference	
			Min.	Air, Inert Gas	Water	Light Oil	Watt				Coil	Valve
AC TECHNICAL SPECIFICATIONS CONTINUED												
1/8	1/32	0.02	0	375	375	375	10	240	FKM	209FL5AV4	9	D2
1/8	3/64	0.06	0	230	230	230	10	240	FKM	209FL5EV4	9	D2
1/8	1/16	0.10	0	150	150	150	10	240	FKM	209FL5GV4	9	D2
1/8	5/64	0.14	0	105	105	105	10	240	FKM	209FL5JV4	9	D2
1/8	3/32	0.20	0	80	80	80	10	240	FKM	209FL5LV4	9	D2
DC TECHNICAL SPECIFICATIONS CONTINUED												
1/8	1/32	0.02	0	375	375	375	8	240	FKM	209FL5AV4	9	D2
1/8	3/64	0.06	0	230	230	230	8	240	FKM	209FL5EV4	9	D2
1/8	1/16	0.10	0	150	150	150	8	240	FKM	209FL5GV4	9	D2
1/8	5/64	0.14	0	105	105	105	8	240	FKM	209FL5JV4	9	D2
1/8	3/32	0.20	0	80	80	80	8	240	FKM	209FL5LV4	9	D2

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3-Way Small Direct Acting - Normally Closed - Stainless Steel

Port Size NPT	Orifice Size In.		Flow Factor Cv		Operating Pressure Differential (MOPD) PSI					Max. Media Temp. °F	Seal	Pressure Vessel Number	Reference	
	In	Exh.	In	Exh.	Min.	Air, Inert Gas	Water	Light Oil	Watt				Coil	Valve
AC TECHNICAL SPECIFICATIONS														
1/8	1/32	1/32	0.02	0.02	0	250	250	250	10	240	FKM	309CL5AV4	9	D2
1/8	3/64	3/64	0.05	0.05	0	200	200	200	10	240	FKM	309CL5EV4	9	D2
1/8	1/16	1/16	0.09	0.10	0	130	130	130	10	240	FKM	309CL5GV4	9	D2
1/8	5/64	5/64	0.15	0.14	0	90	90	90	10	240	FKM	309CL5JV4	9	D2
1/8	3/32	3/32	0.19	0.20	0	75	75	75	10	240	FKM	309CL5LV4	9	D2
1/8	7/64	3/32	0.25	0.20	0	50	50	50	10	240	FKM	309CL5MV4	9	D2
1/8	1/8	3/32	0.32	0.20	0	40	40	40	10	240	FKM	309CL5PV4	9	D2
1/8	5/32	3/32	0.38	0.20	0	25	25	25	10	240	FKM	309CL5QV4	9	D2
DC TECHNICAL SPECIFICATIONS														
1/8	1/32	1/32	0.02	0.02	0	250	250	250	8	240	FKM	309CL5AV4	9	D2
1/8	3/64	3/64	0.05	0.05	0	200	200	200	8	240	FKM	309CL5EV4	9	D2
1/8	1/16	1/16	0.09	0.10	0	130	130	130	8	240	FKM	309CL5GV4	9	D2
1/8	5/64	5/64	0.15	0.14	0	90	90	90	8	240	FKM	309CL5JV4	9	D2
1/8	3/32	3/32	0.19	0.20	0	75	75	75	8	240	FKM	309CL5LV4	9	D2
1/8	7/64	3/32	0.25	0.20	0	50	50	50	8	240	FKM	309CL5MV4	9	D2
1/8	1/8	3/32	0.32	0.20	0	40	40	40	8	240	FKM	309CL5PV4	9	D2
1/8	5/32	3/32	0.38	0.20	0	25	25	25	8	240	FKM	309CL5QV4	9	D2

3-Way Small Direct Acting - Normally Open - Stainless Steel

Port Size NPT	Orifice Size In.		Flow Factor Cv		Operating Pressure Differential (MOPD) PSI					Max. Media Temp. °F	Seal	Pressure Vessel Number	Reference	
	In	Exh.	In	Exh.	Min.	Air, Inert Gas	Water	Light Oil	Watt				Coil	Valve
AC TECHNICAL SPECIFICATIONS														
1/8	1/32	1/32	0.02	0.02	0	375	375	375	10	240	FKM	309FL5AV4	9	D2
1/8	3/64	3/64	0.05	0.05	0	230	230	230	10	240	FKM	309FL5EV4	9	D2
1/8	1/16	1/16	0.10	0.09	0	150	150	150	10	240	FKM	309FL5GV4	9	D2
1/8	5/64	5/64	0.14	0.15	0	105	105	105	10	240	FKM	309FL5JV4	9	D2
1/8	3/32	3/32	0.20	0.19	0	80	80	80	10	240	FKM	309FL5LV4	9	D2
DC TECHNICAL SPECIFICATIONS														
1/8	1/32	1/32	0.02	0.02	0	375	375	375	8	240	FKM	309FL5AV4	9	D2
1/8	3/64	3/64	0.05	0.05	0	230	230	230	8	240	FKM	309FL5EV4	9	D2
1/8	1/16	1/16	0.10	0.09	0	150	150	150	8	240	FKM	309FL5GV4	9	D2
1/8	5/64	5/64	0.14	0.15	0	105	105	105	8	240	FKM	309FL5JV4	9	D2
1/8	3/32	3/32	0.20	0.19	0	80	80	80	8	240	FKM	309FL5LV4	9	D2

3-Way Small Direct Acting - Universal - Stainless Steel

Port Size NPT	Orifice Size In.		Flow Factor Cv		Operating Pressure Differential (MOPD) PSI					Max. Media Temp. °F	Seal	Pressure Vessel Number	Reference	
	In	Exh.	In	Exh.	Min.	Air, Inert Gas	Water	Light Oil	Watt				Coil	Valve
AC TECHNICAL SPECIFICATIONS														
1/8	1/32	1/32	0.020	0.020	0	200	200	200	10	240	FKM	309UL5AV4	9	230
1/8	3/64	3/64	0.050	0.050	0	150	150	150	10	240	FKM	309UL5EV4	9	230
1/8	1/16	1/16	0.090	0.100	0	100	100	100	10	240	FKM	309UL5GV4	9	230
1/8	5/64	5/64	0.150	0.140	0	70	70	70	10	240	FKM	309UL5JV4	9	230
1/8	3/32	3/32	0.190	0.200	0	50	50	50	10	240	FKM	309UL5LV4	9	230
1/8	7/64	3/32	0.250	0.200	0	40	40	40	10	240	FKM	309UL5MV4	9	230
1/8	1/8	3/32	0.320	0.200	0	30	30	30	10	240	FKM	309UL5PV4	9	230
1/8	5/32	3/32	0.380	0.200	0	20	20	20	10	240	FKM	309UL5QV4	9	230
DC TECHNICAL SPECIFICATIONS														
1/8	1/32	1/32	0.020	0.020	0	200	200	200	8	240	FKM	309UL5AV4	9	230
1/8	3/64	3/64	0.050	0.050	0	150	150	150	8	240	FKM	309UL5EV4	9	230
1/8	1/16	1/16	0.090	0.100	0	100	100	100	8	240	FKM	309UL5GV4	9	230
1/8	5/64	5/64	0.150	0.140	0	70	70	70	8	240	FKM	309UL5JV4	9	230
1/8	3/32	3/32	0.190	0.200	0	50	50	50	8	240	FKM	309UL5LV4	9	230
1/8	7/64	3/32	0.250	0.200	0	40	40	40	8	240	FKM	309UL5MV4	9	230
1/8	1/8	3/32	0.320	0.200	0	30	30	30	8	240	FKM	309UL5PV4	9	230
1/8	5/32	3/32	0.380	0.200	0	20	20	20	8	240	FKM	309UL5QV4	9	230

Port Marking Arrangement

Function		over seat body flow	under seat body flow	sleeve
2-Way normally closed	Marking Function	2 inlet	1 outlet	-
2-Way normally open	Marking Function	2 inlet	-	3 outlet

Port Marking Arrangement

Function		over seat body flow	under seat body flow	sleeve
3-Way normally closed	Marking Function	2 outlet	1 inlet	3 exhaust
3-Way normally open	Marking Function	2 outlet	1 exhaust	3 inlet
3-Way universal	Marking Function	2 common	1 NC	3 NO

Product Features:

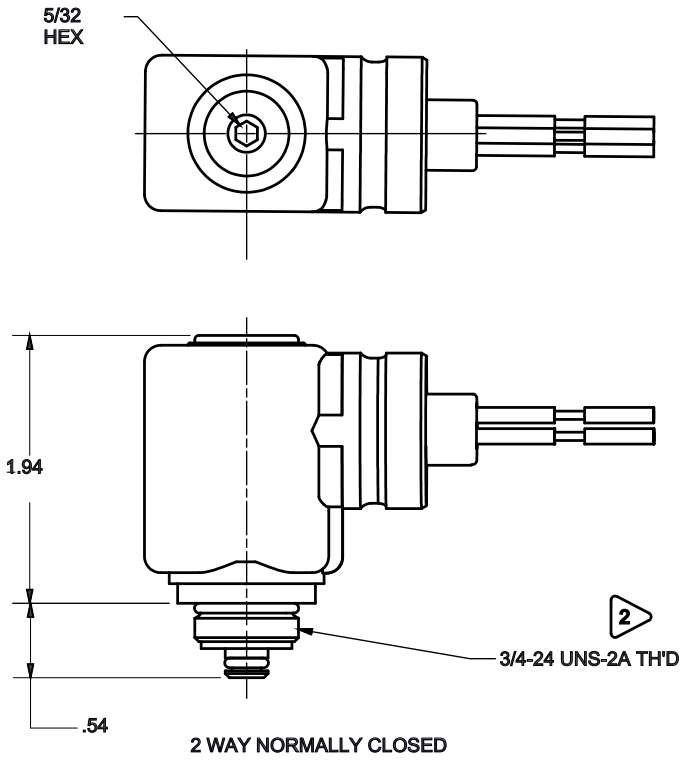
- Space saving approach
- Less manifold machining means lower manifold cost
- No manifold orifices to machine or press in
- Cartridge valves are 100% tested
- Easy to assemble and disassemble with a 5/32" hex wrench to a torque of 25-35 in-lbs.
- Available with all coil options from Chart 9 in coil section.

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Valve Reference D1



2-Way Normally Closed (209CLxx)

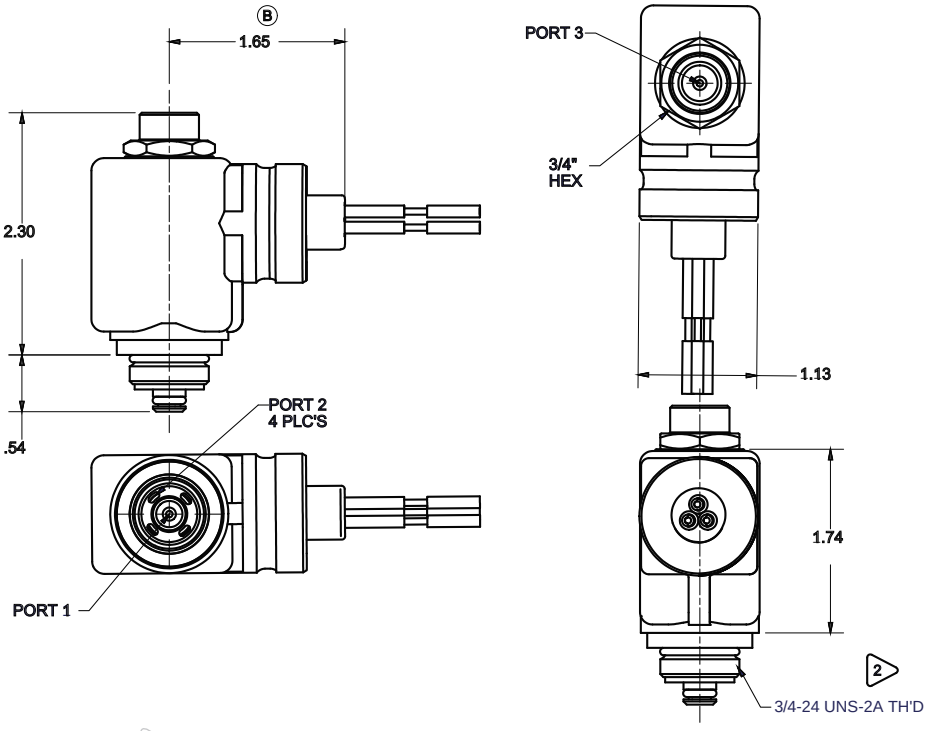


2 Manifold cavity for 3/4-24 UNS-2B thread per VMR-0462 (See page D8)

Valve Reference D2



2-Way Normally Open (209FLxx)
3-Way Normally Closed (309CLxx)
3-Way Normally Open (309FLxx)
3-Way Universal (309ULxx)



2 Manifold cavity for 3/4-24 UNS-2B thread per VMR-0462 (See page D8)

Specialty

2-Way Miniature Direct Acting Cartridge Mounted Valve Materials of Construction**

Product*	Wattage	Type	Sleeve Port Size	Body	Sleeve Tube	Sleeve Stop	Sleeve Flange	"Plunger Blank"	Plunger Spring	Shading Ring	Max. Ambient Temp.
209CL5	8.5 (AC)	2WNC	-	303SS	304SS	430FR	430FR	430FR	18-8SS	Copper	135°F
209CL5	8 (DC)	2WNC	-	303SS	304SS	430FR	430FR	430FR	18-8SS	Copper	125°F
209FL5	10 (AC)	2WNC	1/8	303SS	304SS	430FR	430FR	430FR	18-8SS	Copper	135°F
209FL5	8 (DC)	2WNC	1/8	303SS	304SS	430FR	430FR	430FR	18-8SS	Copper	125°F

* Shows the first 6 digits of the pressure vessel part number.
** Maximum ambient temperature shown is the rating when valve is operating at the maximum fluid temperature as shown in the product sections for each of the valves in this catalog.

3-Way Miniature Direct Acting Cartridge Mounted Valve Materials of Construction**

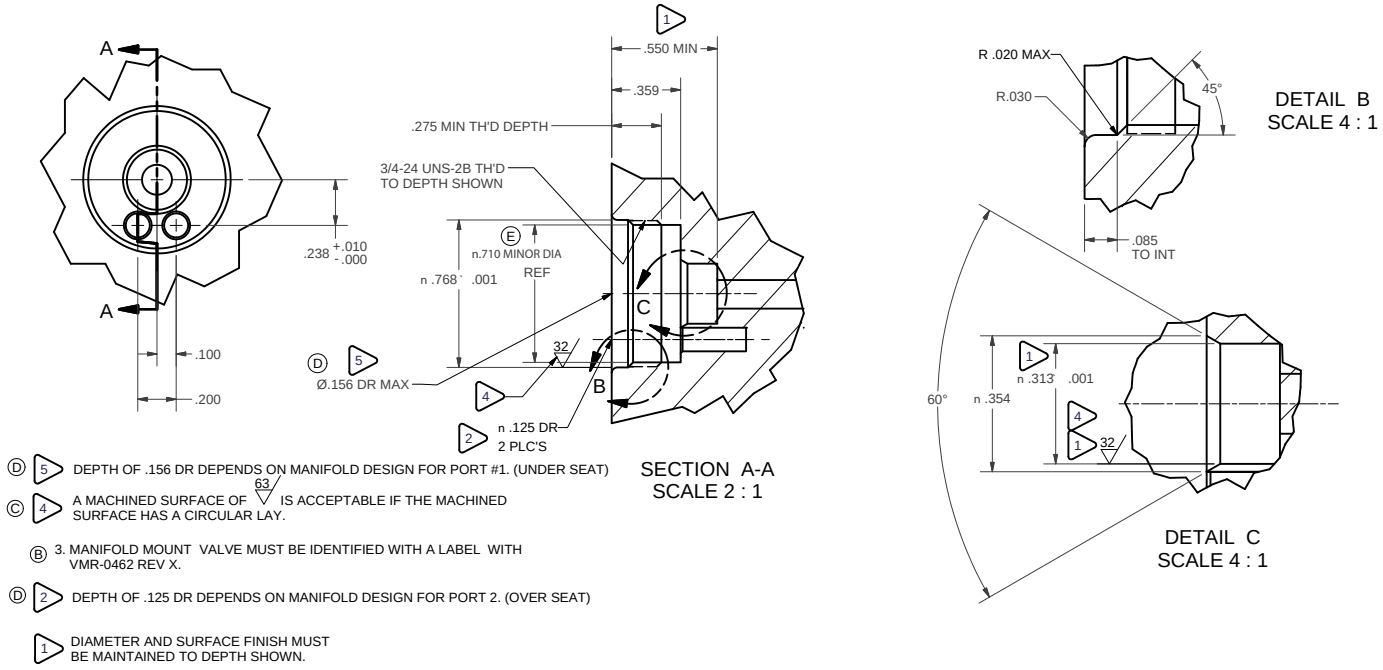
Product*	Watt	Type	Sleeve Port Size	Body	Sleeve Tube	Sleeve Stop	Sleeve Flange	"Plunger Blank"	Plunger Spring	Shading Ring	Max. Ambient Temp.
309CL5	10 (AC)	3WNC	1/8	303SS	304SS	430FR	430FR	430FR	18-8SS	Copper	135°F
309CL5	8 (DC)	3WNC	1/8	303SS	304SS	430FR	430FR	430FR	18-8SS	Copper	125°F
309FL5	10 (AC)	3WNO	1/8	303SS	304SS	430FR	430FR	430FR	18-8SS	Copper	135°F
309FL5	8 (DC)	3WNO	1/8	303SS	304SS	430FR	430FR	430FR	18-8SS	Copper	125°F
309UL5	10 (AC)	3WU	1/8	303SS	304SS	430FR	430FR	430FR	18-8SS	Copper	135°F
309UL5	8 (DC)	3WU	1/8	303SS	304SS	430FR	430FR	430FR	18-8SS	Copper	125°F

* Shows the first 6 digits of the pressure vessel part number.
** Maximum ambient temperature shown is the rating when valve is operating at the maximum fluid temperature as shown in the product sections for each of the valves in this catalog.

Specialty

VMR-0462

Cavity Dimensional Drawing



(D) 5 DEPTH OF .156 DR DEPENDS ON MANIFOLD DESIGN FOR PORT #1. (UNDER SEAT)

(C) 4 A MACHINED SURFACE OF 63 IS ACCEPTABLE IF THE MACHINED SURFACE HAS A CIRCULAR LAY.

(B) 3. MANIFOLD MOUNT VALVE MUST BE IDENTIFIED WITH A LABEL WITH VMR-0462 REV X.

(D) 2 DEPTH OF .125 DR DEPENDS ON MANIFOLD DESIGN FOR PORT 2. (OVER SEAT)

1 DIAMETER AND SURFACE FINISH MUST BE MAINTAINED TO DEPTH SHOWN.

Warning: Please contact factory for the latest version of this cavity drawing before proceeding with any manifold machining.

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3-Way MB (Mini B)

Direct Acting Valves - Miniature

#10-32 Ports, 1/8 NPT & Manifolded

Plastic Body Valves/Zinc Manifold Base



General Description:



MB Series valves are designed for the actuation of small air cylinders and clamps, and are suited for applications requiring low air flow.

For manifolding, 2 or 3 station bases are offered. Manifolds can be bolted together to provide the desired banking combination.

The valves are direct acting, multipurpose valves with all ports in the body. The valve body is molded from plastic, while the internal parts are nylon, polyester and stainless steel. The valves will operate at up to 150 PSI, consuming only 4 watts per coil on AC operation, 5 watts per coil on DC.

Functional design flexibility is assured given the wide variety of available valve configurations. The listed accessories enable the user to customize MB Series valves as 2-way normally open or normally closed by plugging one port; 3-way normally open, normally closed or directional control.

Installation
Valves can be mounted in any position. The preferred orientation is with the coil vertical and upright.

Compatible Fluids
Lubricated air, non-lubricated air, and inert gases compatible with materials of construction.

Standard Materials of Construction
- Body—plastic
- Seals—NBR
- Sleeve—stainless steel (305)
- Plunger—stainless steel (430FR)
- Stop—stainless steel (430FR)
- Spring—stainless (17-7PH)
- Shading ring—copper (AC valves only)
- Manifold base—zinc

Operating Speed
- Up to 1000 cycles per minute

Coil Classification
- Class A Taped, leaded coil standard

Response Time (approximate):
AC: 3-12 ms to open
5-16 ms to close
DC: 8-14 ms to open
5-15 ms to close

Electrical Characteristics:

Voltages
- AC—24/60, 120/60, 240/60
- DC—12, 24 &120

Power Consumption
- 4 watts AC per coil
- 5 watts DC per coil

Maximum allowable internal seat leakage is 3 SCCM @125 psi.

No allowable external leakage.

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3-Way Direct Acting Valves

Port Size	Orifice Diameter		Cv Factor		Operating Pressure (PSI)		Wattage		Class A Tapped Leaded Coil	Valve Ref.
	NC Port	NO Port	NC Port	NO Port	Minimum	Maximum	AC	DC		
#10-32 Ports	3/64	3/64	0.032	0.028	0	150	4	5	MBD002	D3
Manifold Mounted	3/64	3/64	0.032	0.028	0	150	4	5	MBD005	D4

Valve Accessories

Accessories	Contents	Part Number	Valve Reference
2-Station Manifold Base Kit (for mounting 2 valves)	4 Port plugs 4 No. 5 self tapping screws	MB-60-S001	--
3-Station Manifold Base Kit (for mounting 3 valves)	5 Port plugs 6 No. 5 self tapping screws	MB-60-S002	--
Manifold Interface Kit (connects 2 manifold bases)	1 No. 8 screw 2 ”O” rings	MB-60-S003	--
Manifold Blank Station Kit (for sealing an unused station)	1 Plate 2 ”O” rings 2 Screws	MB-60-S004	--
2-Station Manifold Base const. ref. 234	1 MB-01-003 manifold block 2 V1-31-254 nuts assembled	MB-60-S005	D5
3-Station Manifold Base const. ref. 234	1 MB-01-004 manifold block 2 V1-31-254 nuts assembled	MB-60-S006	D5

Specialty

Ordering Instructions for Multiple Station Manifolds

Step 1: Determine the number of valve stations required. This will equal the number of subbase valves to order (MBD005).

Step 2: Select the combination of two and three-station manifolds that sum to equal the number of valve stations required (i.e. five stations total = one three-station and one two-station manifold).

Step 3: Choose the accessory kits required to complete the system and determine if you want the valves assembled to the manifolds at the factory.

Step 4: Specify the required voltage.

Example:

1. You have selected a valve which is to be manifolded.
2. Your system requires a five-station manifold (i.e. one three-station manifold attached to one two-station manifold).
3. You require the manifold bases and an interface kit. You decide to assemble the valves and manifolds. If they were to be assembled by the factory, there would be a price-add.
4. Your system is 120/60 watts AC: Your order should read:
   5-MBD005, 120/60
   1-MB-60-S001
   1-MB-60-S002
   1-MB-60-S003
   1-MB-60-S005
   1-MB-60-S006

Fig. 1

Voltage	24/60*	120/60	240/60*	12VDC	24VDC
Coil Code	AB215A	AB619A	AB820A	DC116A	DC218A
Coil Part Number*	CMB2230N18	CMB2238N18	CMB2240N18	CMB2231N18	CMB2234N18

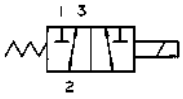
*When ordering a replacement coil, use Coil Part Number (not Coil Code)
Select the MB series pressure vessel number from above and follow with the coil/enclosure number based on voltage from Fig. 1. Example MBD005 for 120/60 becomes part number MBD005AB619A
*Not active - consult factory

AC Power Consumption			DC Power Consumption		
VA holding	VA inrush		12VDC	24VDC	120VDC
6.5	12.0		0.42	0.21	0.04

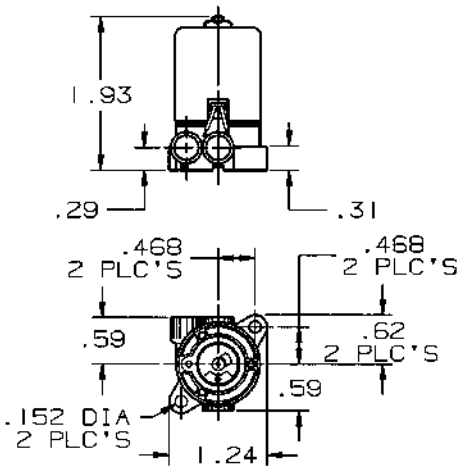
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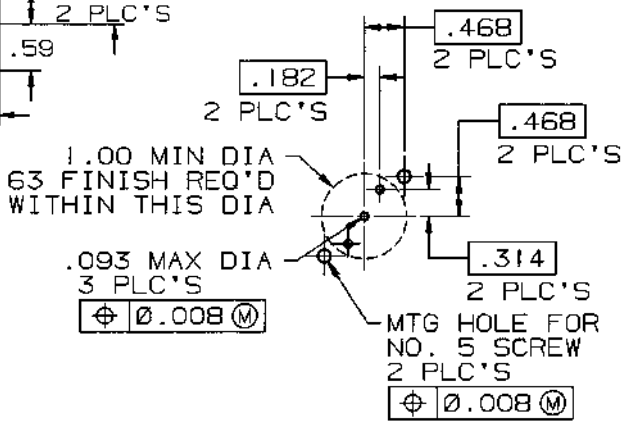
Valve Reference D3





3-Way Universal
Port Identification
1-NC / 2-COMMON / 3-NO

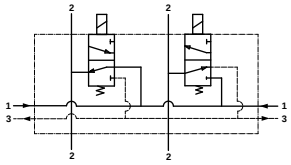




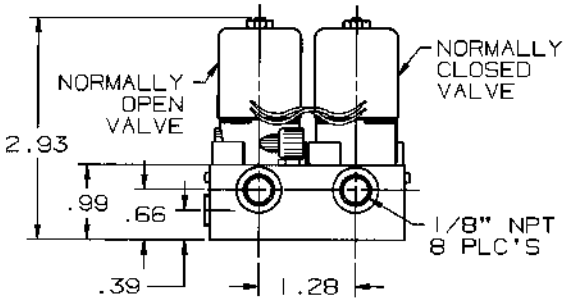
MANIFOLD MOUNTING SURFACE DIAGRAM

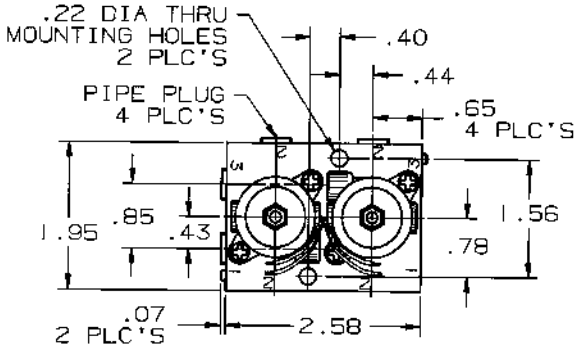
Valve Reference D4





3-way,
two station Universal



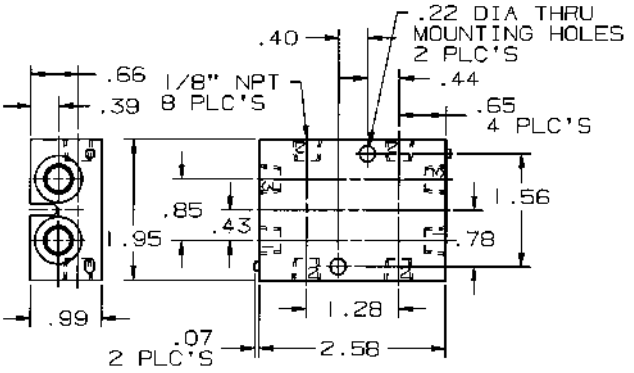


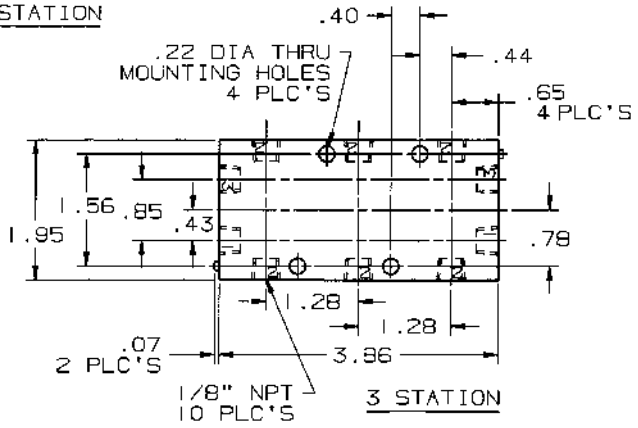
Specialty

Valve Reference D5



Zinc Manifold Base





Specialty

Notes

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2-Way Dry Operator

Direct Acting Valves
1/4" NPT & 3/8" Barb



General Description:

2-Way Dry Operator valves are specially designed for non-contaminating and corrosive applications. The valves assure absolute purity and inertness to corrosion when used with a broad range of fluids.

Dry Operator valves feature two basic construction innovations. The operator is physically isolated from the fluid by a diaphragm so only the seal and valve body come in contact with the fluid, and valve bodies of Noryl™ and Teflon™ provide the purity from contamination and resistance to corrosion many industries demand.

Installation
Valves can be mounted in any position. The preferred orientation is with the coil vertical and upright.

Compatible Fluids
Fluids compatible with diaphragm and body materials. See fluid compatibility chart in Technical Section of this catalog.



Specialty

Applications:

- Medical & Dental Equipment
- Chemical Dispensing
- Photo processing
- Instrumentation
- Hydroponics “nutrient dispensing”
- Food and beverage equipment

Mechanical Characteristics:

Standard Materials of Construction
- Body — Noryl™, Teflon™ (PTFE), Stainless Steel (303)
- Seals — PTFE and FKM as listed
- Sleeve Tube — Stainless Steel (304)
- Plunger — Stainless Steel (430FR)
- Stop — Stainless Steel (430FR)
- Springs — Stainless Steel (18-8)
- Shading Ring — Copper

Electrical Characteristics:

Agency Approvals
- UL and CSA approvals are available on valves with applicable coil/enclosure combinations.

Voltages
- AC — 24/60
  120/60–110/50
  240/60–220/50
- DC — 12, 24 & 120

(consult factory for other voltages)

Maximum Ambient Temperature
150°F

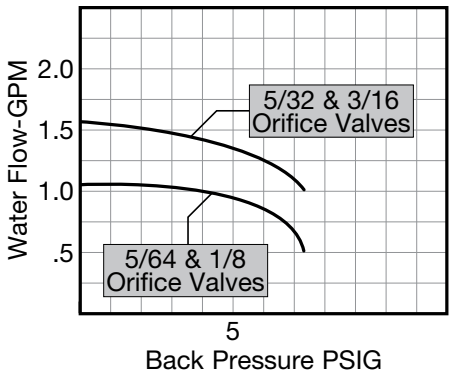
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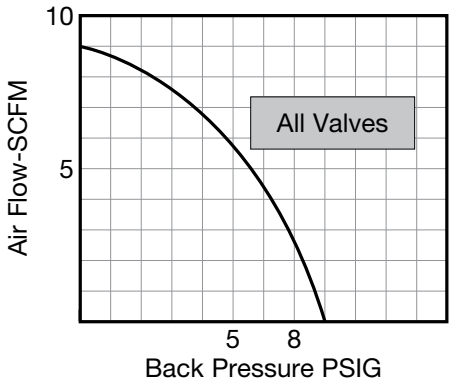
Important Application Information On Back Pressure Data

Dry operator valves require consideration of back pressure since the back pressure acts on a large area of the diaphragm. Excessive back pressure can keep the valves open on de-energization. The back pressure a standard valve can operate against depends on the orifice size, pressure differential and whether the media is a gas or liquid.

The following two charts provide a method to verify that the valve selected can meet the application back pressure requirements.

For applications involving back pressure that cannot be handled by catalog valves, please consult Parker Fluid Control Division.





Helpful Application Suggestions:

To keep the back pressure to a minimum, the downstream line should be as short as possible and be of the largest practical size. All restricting or flow controlling elements should be installed upstream.

Use of Back Pressure Charts:

To use the charts, it is necessary to know the flow and back pressure.

1. First calculate the flow in GPM for liquids or SCFM for gases from the flow charts in the Technical Information Section.
2. The back pressure is the downstream pressure in the system. A catalog valve may be used if the intersection of flow and back pressure is below the curve for its orifice size.

Direct Acting Noryl™** Valves — Normally Closed, 3/8" BARB, FKM Seals

Port Size NPT	Orifice Size in.	Cv Factor	Operating Pressure Differential (PSI)			Max. Fluid Temp. °F	Pressure Vessel Number	Reference	
			Min.	Maximum				Coil	Valve
				AC Ratings	DC Ratings				
				10 Watt	10 Watt				
3/8" BARB	5/32	0.35	0	35	35	140	71214LT3QV00	7	D8
3/8" BARB	3/16	0.47	0	20	20	140	71214LT3SV00	7	D8

Direct Acting Teflon™*** Valves — Normally Closed, 1/4" NPT, PTFE or FKM Seals

Port Size NPT	Orifice Size in.	Cv Factor	Operating Pressure Differential (PSI)			Max. Fluid Temp. °F	Pressure Vessel Number	Reference	
			Min.	Maximum				Coil	Valve
				AC Ratings	DC Ratings				
				10 Watt	10 Watt				
1/4" NPT	5/64	0.16	0	70	70	140	71214TN2KT00	7	D7
1/4" NPT	3/16	0.47	0	20	20	140	71214TN2SV00	7	D7
1/4" NPT	3/16	0.47	0	20	20	140	71214TN2ST00	7	D7

Direct Acting Stainless Steel Valves — Normally Closed, 1/4" NPT, PTFE Seals

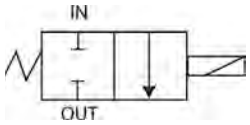
Port Size NPT	Orifice Size in.	Cv Factor	Operating Pressure Differential (PSI)			Max. Fluid Temp. °F	Pressure Vessel Number	Reference	
			Min.	Maximum				Coil	Valve
				AC Ratings	DC Ratings				
				10 Watt	10 Watt				
1/4" NPT	3/16	0.47	0	20	20	140	71214VN2ST00	7	D6

**Noryl™- G.E. Plastics (SABIC)
***Teflon™ - E.I. Dupont

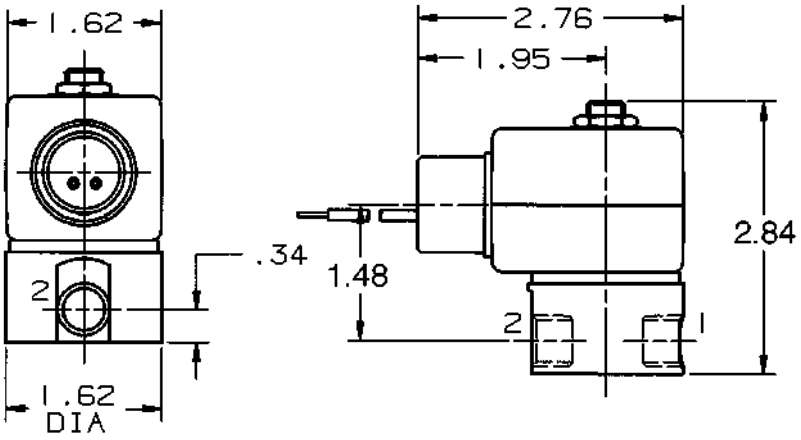
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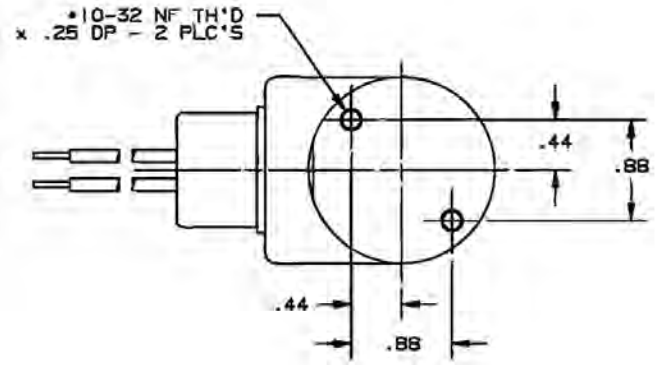
Valve Reference D6





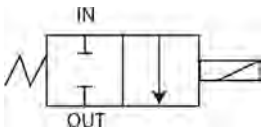
2-Way Normally Closed
Port Identification: 1-OUT/2-IN



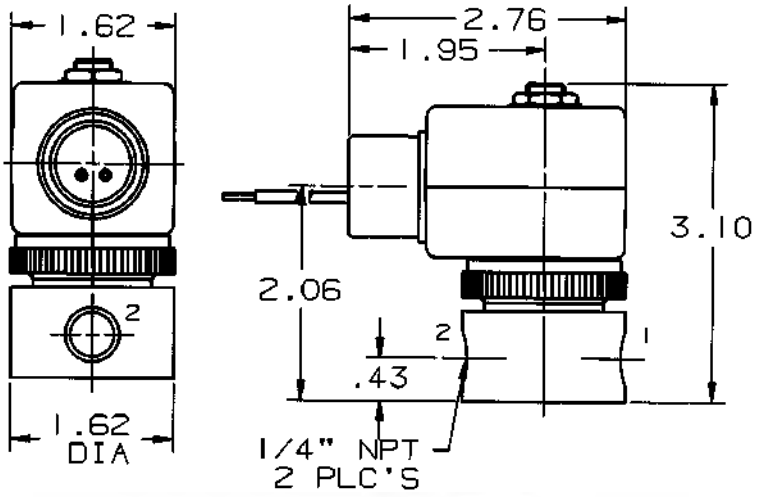


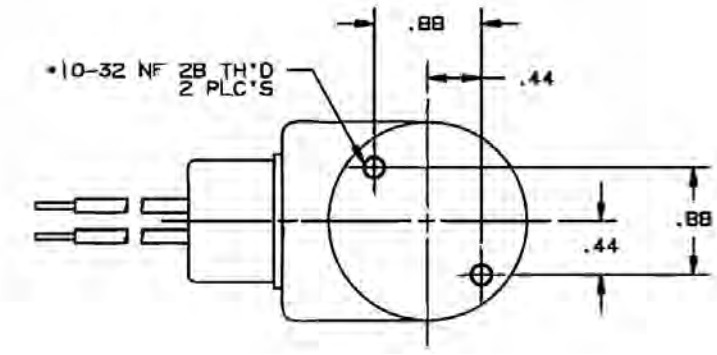
Valve Reference D7





2-Way Normally Closed
Port Identification: 1-OUT/2-IN

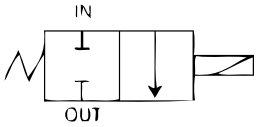




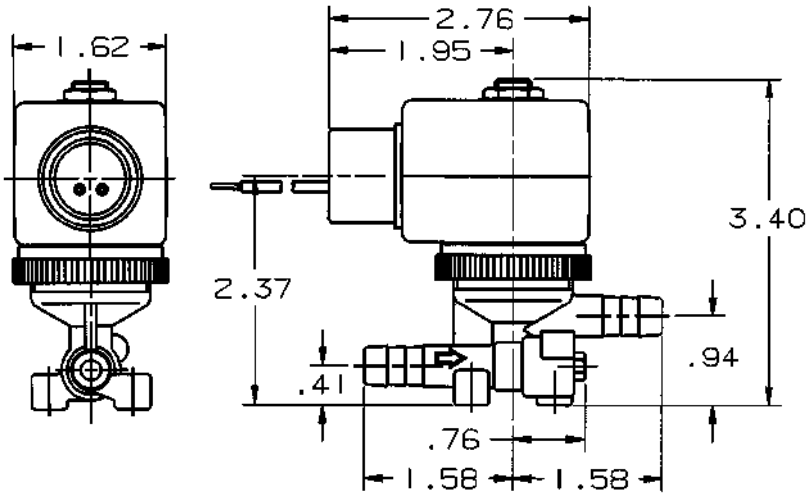
Specialty

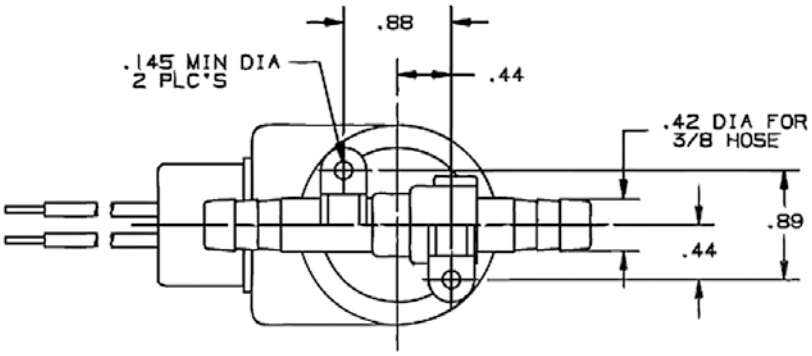
Valve Reference D8





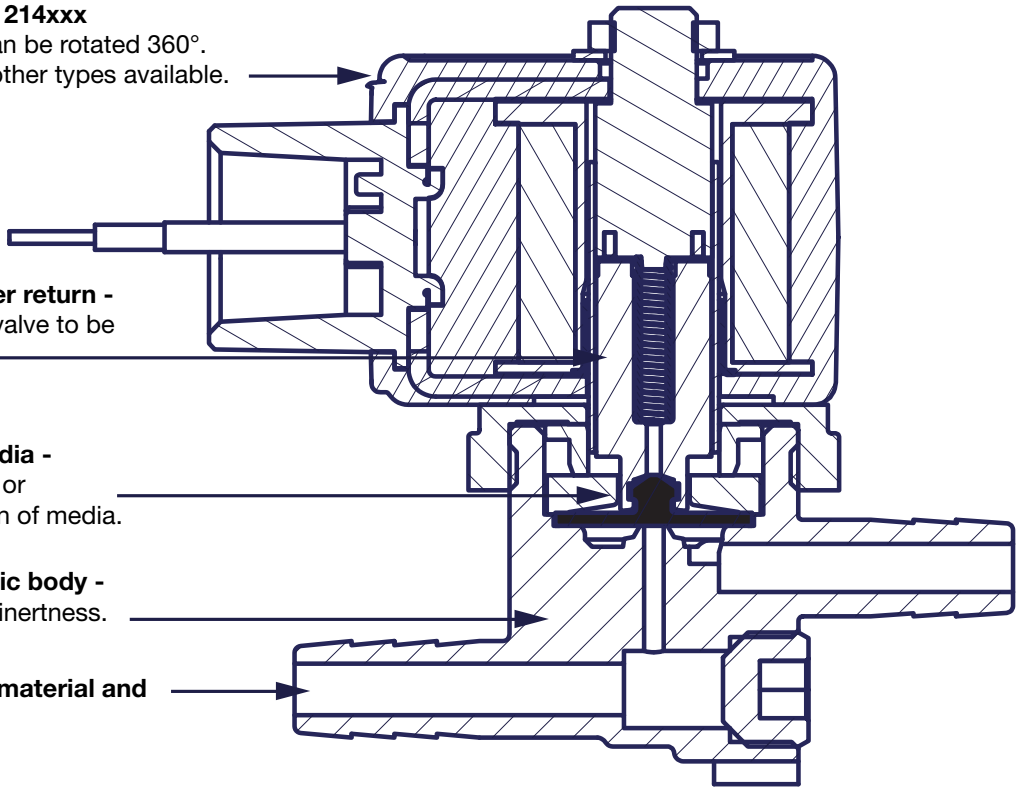
Port Identification:
Flow arrow on body indicates flow direction. Ports are not marked.





Specialty

Features of the 71214xxx
Coil Housing -- can be rotated 360°.
Wide selection of other types available.



Spring provides positive plunger return - made of stainless steel, permits valve to be mounted in any position

Operator is separated from media - provides resistance to corrosion or eliminates possible contamination of media.

Molded glass filled Noryl plastic body - provides strength and chemical inertness. Teflon™ also available.

Media is in contact with body material and synthetic diaphragm only.

Teflon is a trademark of E. I. DuPont

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2-Way Hot Water and Steam

Direct Acting & Pilot Operated Valves
1/4" - 1 1/2" NPT



General Description:

2-Way Hot Water and Steam valves are specifically designed to withstand harsh application conditions. Many designs include integral stainless steel main and pilot orifices.

Installation
Valves should be mounted vertical and upright.

Standard Materials of Construction
Please refer to page D33.

Compatible Fluids
Ideal for the control of hot water and steam in a variety of applications.



Specialty

Electrical Characteristics:

Standard Voltages:
AC –24/60
120/60–110/50
240/60–220/50
DC –12, 24 & 120
For other voltages – consult factory

Coil Classification:
Class F Standard
Class H Standard for media temperatures over 297°F

Note: Magnalatch coils are not available on steam valves.

Agency Approvals:
Standard valves with NEMA 4X or explosion psolenoid enclosures are UL Listed and CSA Certified. For additional details, consult factory.

Maximum Ambient Temperature
150° F

Please refer to Page D33 for details.

Applications:

- Industrial laundry machines
- Industrial dish washing machines
- Institutional cooking and food warming equipment
- Steam tables, steam cookers/kettles
- Sterilizers
- Dry cleaning equipment and steam irons
- Hospital equipment
- Steam presses
- Steam baths
- Autoclaves

2-Way Hot Water and Steam - Normally Closed - Brass

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI			Watt	Max. Media Temp. °F	Seal***	Pressure Vessel Number**	Reference	
			Min.	Hot Water	Steam					Coil	Valve
AC TECHNICAL SPECIFICATIONS											
1/4	13/64	0.76	0	100	-	10	210	EPDM	7121KBN2SE00	7	D21
1/4	13/64	0.76	0	-	40	10	285	EPDM	7121KBN2SES0	7	D21
1/4	7/16	2.00	3	150	-	10	210	EPDM	7321KBN2RE00	7	D22
1/4	7/16	2.00	3	-	45	10	293	EPDM	7321KBN2RES0	7	D22
3/8	7/16	2.50	3	150	-	10	210	EPDM	7321KBN3SE00	7	D22
3/8	5/8	3.00	0	150	50	11	300	EPDM	06FS3C2340ACF	4	D10
3/8	5/8	3.00	5	150	-	10	210	EPDM	73218BN3TE00	7	D20
3/8	5/8	3.00	0	100	-	10	210	EPDM	72218BN3TE00	7	D14
3/8	19/32	4.40	0	150	-	10	210	EPDM	7221GBN3VE00	7	D23
3/8	5/8	3.00	3	-	125	10	353	PTFE	73218BN3TTS0*	7	D20
3/8	1/2	3.00	1	-	125	11	353	PTFE	06FS5C2432ACH*	4	D9
3/8	1/2	3.00	1	-	80	11	320	PTFE	06FS5C2432ACF	4	D9
3/8	5/8	3.00	0	-	50	10	297	EPDM	72218BN3TES0	7	D14
3/8	5/8	3.00	5	-	50	10	297	EPDM	73218BN3TES0	7	D20
3/8	1/2	3.00	1	-	50	11	300	EPDM	06FS5C2332ACF	4	D9
3/8	19/32	4.40	0	-	45	10	293	EPDM	7221GBN3VES0	7	D23
1/2	7/16	3.00	3	150	-	10	210	EPDM	7321KBN4SE00	7	D22
1/2	5/8	4.00	5	150	-	10	210	EPDM	73218BN4UE00	7	D20
1/2	5/8	4.00	0	100	-	10	210	EPDM	72218BN4UE00	7	D14
1/2	19/32	4.40	0	150	-	10	210	EPDM	7221GBN4VE00	7	D23
1/2	5/8	4.00	0	150	50	11	300	EPDM	08FS3C2340ACF	4	D10
1/2	1/2	3.60	1	-	125	11	353	PTFE	08FS5C2432ACH*	4	D9
1/2	1/2	3.60	1	-	80	11	320	PTFE	08FS5C2432ACF	4	D9
1/2	1/2	3.60	1	-	50	11	300	EPDM	08FS5C2332ACF	4	D9
1/2	7/16	3.00	3	-	45	10	293	EPDM	7321KBN4SES0	7	D22
1/2	5/8	4.00	3		125	10	353	PTFE	73218BN4UTS0*	7	D20
1/2	5/8	4.00	0	-	50	10	297	EPDM	72218BN4UES0	7	D14
1/2	5/8	4.00	5	-	50	10	297	EPDM	73218BN4UES0	7	D20
1/2	19/32	4.40	0	-	45	10	293	EPDM	7221GBN4VES0	7	D23

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

**** Models xxS5xx have an integral stainless steel main orifice seat.**
Models 72218xxx & 7221Gxxx are direct lift and will open at zero pressure differential but not at full flow.

***** Valves with EPDM (Ethylene Propylene) elastomers are limited to pressure range shown (45 or 50 psi) AND temperature rating shown (293-300° F). Do not use on higher pressure steam with pressure reducing valve; this may result in superheated steam.**

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2-Way Hot Water and Steam - Normally Closed - Brass (Continued)

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI			Watt	Max. Media Temp. °F	Seal***	Pressure Vessel Number**	Reference	
			Min.	Hot Water	Steam					Coil	Valve
AC TECHNICAL SPECIFICATIONS											
3/4	3/4	5.00	5	150	-	10	210	EPDM	73218BN5VE00	7	D20
3/4	3/4	5.00	0	100	-	10	210	EPDM	72218BN5VE00	7	D14
3/4	19/32	5.50	0	150	-	10	210	EPDM	7221GBN51E00	7	D23
3/4	3/4	5.00	0	150	50	11	300	EPDM	12FS3C2348ACF	4	D11
3/4	5/8	4.50	3	-	125	10	353	PTFE	73218BN5VTS0*	7	D20
3/4	3/4	5.00	0	-	50	10	297	EPDM	72218BN5VES0	7	D14
3/4	3/4	5.00	5	-	50	10	297	EPDM	73218BN5VES0	7	D20
3/4	19/32	5.50	0	-	45	10	293	EPDM	7221GBN51ES0	7	D23
3/4	3/4	7.40	1	-	125	11	353	PTFE	12FS5C2448ACH*	4	D25
3/4	3/4	7.40	1	-	80	11	320	PTFE	12FS5C2448ACF	4	D25
3/4	3/4	7.40	1	-	50	11	300	EPDM	12FS5C2348ACF	4	D25
1	19/32	5.50	0	150	-	10	210	EPDM	7221GBN61E00	7	D23
1	1 1/16	13.50	5	125	-	10	210	EPDM	73218BN64E00	7	D16
1	1	11.70	0	150	-	10	210	EPDM	7221GBN64E00	7	D23
1	1	12.20	1	150	50	11	300	EPDM	16FS5C2364ACF	4	D12
1	19/32	5.50	0	-	45	10	293	EPDM	7221GBN61ES0	7	D23
1	1	11.70	0	-	45	10	293	EPDM	7221GBN64ES0	7	D23
1	1	12.20	1	-	125	11	353	PTFE	16FS5C2464ACH*	4	D12
1	1	12.20	1	-	80	11	320	PTFE	16FS5C2464ACF	4	D12
1	1 1/16	13.50	5	-	125	10	353	PTFE	73218BN64TS0*	7	D17
1	1 1/16	13.50	5	-	50	10	297	EPDM	73218BN64ES0	7	D16
1 1/4	1 1/8	15.00	5	125	-	10	210	EPDM	73218BN75E00	7	D16
1 1/4	1 1/8	15.00	5	150	50	6	300	EPDM	20FS4C2372AAF	1	D13
1 1/4	1 1/8	15.00	5	-	50	10	297	EPDM	73218BN75ES0	7	D16
1 1/4	1 1/8	16.00	5	-	125	10	353	PTFE	73218BN75TS0*	7	D17
1 1/2	1 1/4	22.50	5	125	-	10	210	EPDM	73218BN87E00	7	D19
1 1/2	1 1/2	22.50	5	150	50	6	300	EPDM	24FS4C2380AAF	1	D13
1 1/2	1 1/4	22.50	5	-	50	10	297	EPDM	73218BN87ES0	7	D19
1 1/2	1 1/4	22.50	5	-	125	10	353	PTFE	73218BN87TS0*	7	D19

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

**** Models xxS5xx have an integral stainless steel main orifice seat.**
Models 72218xxx & 7221Gxxx are direct lift and will open at zero pressure differential but not at full flow.

***** Valves with EPDM (Ethylene Propylene) elastomers are limited to pressure range shown (45 or 50 psi) AND temperature rating shown (293-300° F). Do not use on higher pressure steam with pressure reducing valve; this may result in superheated steam.**

2-Way Hot Water and Steam - Normally Closed - Brass (Continued)

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI			Watt	Max. Media Temp. °F	Seal***	Pressure Vessel Number**	Reference	
			Min.	Hot Water	Steam					Coil	Valve
DC TECHNICAL SPECIFICATIONS											
1/4	13/64	0.76	0	40	-	10	210	EPDM	7121KBN2SE00	7	D21
1/4	13/64	0.76	0	100	-	22	210	EPDM	7121KBN2SE00	8	D21
1/4	7/16	2.00	3	150	-	22	210	EPDM	7321KBN2RE00	8	D22
1/4	7/16	2.00	3	60	-	10	210	EPDM	7321KBN2RE00	7	D22
1/4	13/64	0.76	0	-	40	22	285	EPDM	7121KBN2SES0	8	D21
1/4	7/16	2.00	3	-	45	22	293	EPDM	7321KBN2RES0	8	D22
3/8	7/16	2.50	3	150	-	22	210	EPDM	7321KBN3SE00	8	D22
3/8	7/16	2.50	3	60	-	10	210	EPDM	7321KBN3SE00	7	D22
3/8	5/8	3.00	0	40	-	22	210	EPDM	72218BN3TE00	8	D14
3/8	5/8	3.00	0	100	-	11.5	150	EPDM	06F22C2340A3F	6	D10
3/8	5/8	3.00	5	150	-	10	210	EPDM	73218BN3TE00	7	D20
3/8	5/8	3.00	5	40	-	11.5	150	EPDM	06F23C2340A3F	6	D10
3/8	19/32	4.40	0	100	-	22	210	EPDM	7221GBN3VE00	8	D23
3/8	19/32	4.40	0	-	45	22	293	EPDM	7221GBN3VES0	8	D23
1/2	7/16	3.00	3	150	-	22	210	EPDM	7321KBN4SE00	8	D22
1/2	7/16	3.00	3	60	-	10	210	EPDM	7321KBN4SE00	7	D22
1/2	5/8	4.00	5	150	-	10	210	EPDM	73218BN4UE00	7	D20
1/2	5/8	4.00	0	100	-	11.5	150	EPDM	08F22C2340A3F	6	D10
1/2	5/8	4.00	5	40	-	11.5	150	EPDM	08F23C2340A3F	6	D10
1/2	5/8	4.00	0	40	-	22	210	EPDM	72218BN4UE00	8	D14
1/2	19/32	4.40	0	100	-	22	210	EPDM	7221GBN4VE00	8	D23
1/2	7/16	3.00	3	-	45	22	293	EPDM	7321KBN4SES0	8	D22
1/2	19/32	4.40	0	-	45	22	293	EPDM	7221GBN4VES0	8	D23
3/4	3/4	5.00	5	150	-	10	210	EPDM	73218BN5VE00	7	D20
3/4	3/4	5.00	0	100	-	11.5	150	EPDM	12F22C2348A3F	6	D11
3/4	3/4	5.00	5	40	-	11.5	150	EPDM	12F23C2348A3F	6	D11
3/4	3/4	5.00	0	40	-	22	210	EPDM	72218BN5VE00	8	D14
3/4	19/32	5.50	0	100	-	22	210	EPDM	7221GBN51E00	8	D23
3/4	19/32	5.50	0	-	45	22	293	EPDM	7221GBN51ES0	8	D23

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

**** Models xxS5xx have an integral stainless steel main orifice seat.**
Models 72218xxx & 7221Gxxx are direct lift and will open at zero pressure differential but not at full flow.

***** Valves with EPDM (Ethylene Propylene) elastomers are limited to pressure range shown (45 or 50 psi) AND temperature rating shown (293-300° F). Do not use on higher pressure steam with pressure reducing valve; this may result in superheated steam.**

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2-Way Hot Water and Steam - Normally Closed - Brass (Continued)

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI			Watt	Max. Media Temp. °F	Seal***	Pressure Vessel Number**	Reference	
			Min.	Hot Water	Steam					Coil	Valve
DC TECHNICAL SPECIFICATIONS											
1	19/32	5.50	0	100	-	22	210	EPDM	7221GBN61E00	8	D23
1	1	11.70	0	100	-	22	210	EPDM	7221GBN64E00	8	D23
1	1 1/16	13.50	5	125	-	10	210	EPDM	73218BN64E00	7	D16
1	19/32	5.50	0	-	45	22	293	EPDM	7221GBN61ES0	8	D23
1	1	11.70	0	-	45	22	293	EPDM	7221GBN64ES0	8	D23
1 1/4	1 1/8	15.00	5	125	-	10	210	EPDM	73218BN75E00	7	D16
1 1/2	1 1/4	22.50	5	125	-	10	210	EPDM	73218BN87E00	7	D19

2-Way Hot Water and Steam - Normally Closed - Stainless Steel

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI			Watt	Max. Media Temp. °F	Seal***	Pressure Vessel Number**	Reference	
			Min.	Hot Water	Steam					Coil	Valve
AC TECHNICAL SPECIFICATIONS											
1/4	5/32	0.52	0	-	110	11	344	PTFE	04FS0C3410ACH*	4	D24
3/8	5/8	3.00	0	100	-	10	210	EPDM	72218RN3TE00	7	D14
1/2	5/8	4.00	0	100	-	10	210	EPDM	72218RN4UE00	7	D14
1/2	5/8	4.00	0	-	50	10	297	EPDM	72218RN4UES0	7	D14
3/4	3/4	5.00	0	100	-	10	210	EPDM	72218RN5VE00	7	D14
3/4	3/4	5.00	0	-	50	10	297	EPDM	72218RN5VES0	7	D14
DC TECHNICAL SPECIFICATIONS											
3/8	5/8	3.00	0	40	-	22	210	EPDM	72218RN3TE00	8	D14
1/2	5/8	4.00	0	40	-	22	210	EPDM	72218RN4UE00	8	D14
3/4	3/4	5.00	0	40	-	22	210	EPDM	72218RN5VE00	8	D14

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

**** Models xxS5xx have an integral stainless steel main orifice seat.**
Models 72218xxx & 7221Gxxx are direct lift and will open at zero pressure differential but not at full flow.

***** Valves with EPDM (Ethylene Propylene) elastomers are limited to pressure range shown (45 or 50 psi) AND temperature rating shown (293-300° F). Do not use on higher pressure steam with pressure reducing valve; this may result in superheated steam.**

2-Way Hot Water and Steam - Normally Open - Brass

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI			Watt	Max. Media Temp. °F	Seal***	Pressure Vessel Number**	Reference	
			Min.	Hot Water	Steam					Coil	Valve
AC TECHNICAL SPECIFICATIONS											
3/8	5/8	3.0	0	125	-	22	210	EPDM	72228BN3TE00	8	D18
3/8	5/8	3.0	5	-	125	10	353	PTFE	73228BN3TTS0	7	D15
3/8	5/8	3.0	0	-	50	10	297	EPDM	72228BN3TES0	7	D18
1/2	5/8	4.0	0	125	-	22	210	EPDM	72228BN4UE00	8	D18
1/2	1/2	3.6	1	-	125	11	353	PTFE	08FS5O2432ACH*	4	D9
1/2	5/8	4.0	5	-	125	10	353	PTFE	73228BN4UTS0*	7	D15
1/2	5/8	4.0	0	-	50	10	297	EPDM	72228BN4UES0	7	D18
3/4	3/4	5.0	0	125	-	22	210	EPDM	72228BN5VE00	8	D18
3/4	3/4	5.0	0	-	50	10	297	EPDM	72228BN5VES0	7	D18
3/4	3/4	7.5	5	-	125	10	353	PTFE	73228BN52TS0*	7	D15
3/4	3/4	7.4	1	-	125	11	353	PTFE	12FS5O2448ACH*	4	D25
1	1 1/16	13.5	5	-	125	10	353	PTFE	73228BN64TS0*	7	D17
1 1/4	1 1/8	16.0	5	-	125	10	353	PTFE	73228BN75TS0*	7	D17
1 1/2	1 1/4	22.5	5	-	125	10	353	PTFE	73228BN87TS0*	7	D19
DC TECHNICAL SPECIFICATIONS											
3/8	5/8	3.0	0	125	-	22	210	EPDM	72228BN3TE00	8	D18
1/2	5/8	4.0	0	125	-	22	210	EPDM	72228BN4UE00	8	D18
3/4	3/4	5.0	0	125	-	22	210	EPDM	72228BN5VE00	8	D18

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

**** Models xxS5xx have an integral stainless steel main orifice seat.**
Models 72218xxx & 7221Gxxx are direct lift and will open at zero pressure differential but not at full flow.

***** Valves with EPDM (Ethylene Propylene) elastomers are limited to pressure range shown (45 or 50 psi) AND temperature rating shown (293-300° F). Do not use on higher pressure steam with pressure reducing valve; this may result in superheated steam.**

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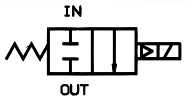
2-Way Hot Water and Steam - Normally Open - Stainless Steel

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI			Watt	Max. Media Temp. °F	Seal	Pressure Vessel Number*	Reference	
			Min.	Hot Water	Steam					Coil	Valve
AC TECHNICAL SPECIFICATIONS											
3/8	5/8	3.0	0	125	-	22	210	EPDM	72228RN3TE00	8	D18
1/2	5/8	4.0	0	125	-	22	210	EPDM	72228RN4UE00	8	D18
3/4	3/4	5.0	0	125	-	22	210	EPDM	72228RN5VE00	8	D18
DC TECHNICAL SPECIFICATIONS											
3/8	5/8	3.0	0	125	-	22	210	EPDM	72228RN3TE00	8	D18
1/2	5/8	4.0	0	125	-	22	210	EPDM	72228RN4UE00	8	D18
3/4	3/4	5.0	0	125	-	22	210	EPDM	72228RN5VE00	8	D18

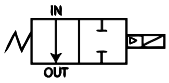
***Models 72228xxx is a direct lift and will open at zero pressure differential but not at full flow.**

Valve Reference D9

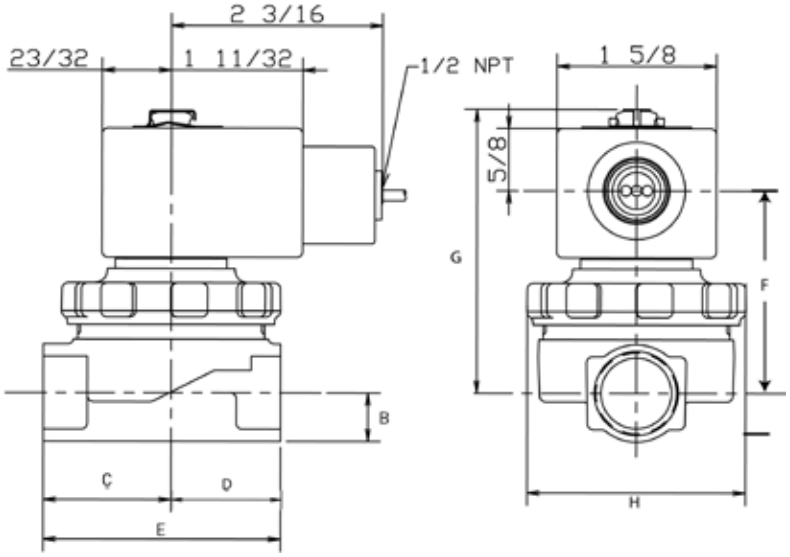




2-Way Normally Closed
06FS5Cxx, 08FS5Cxx



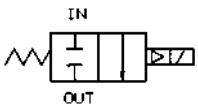
2-Way Normally Open
08FS5Oxx
Port Identification:
In-In/Out-Out



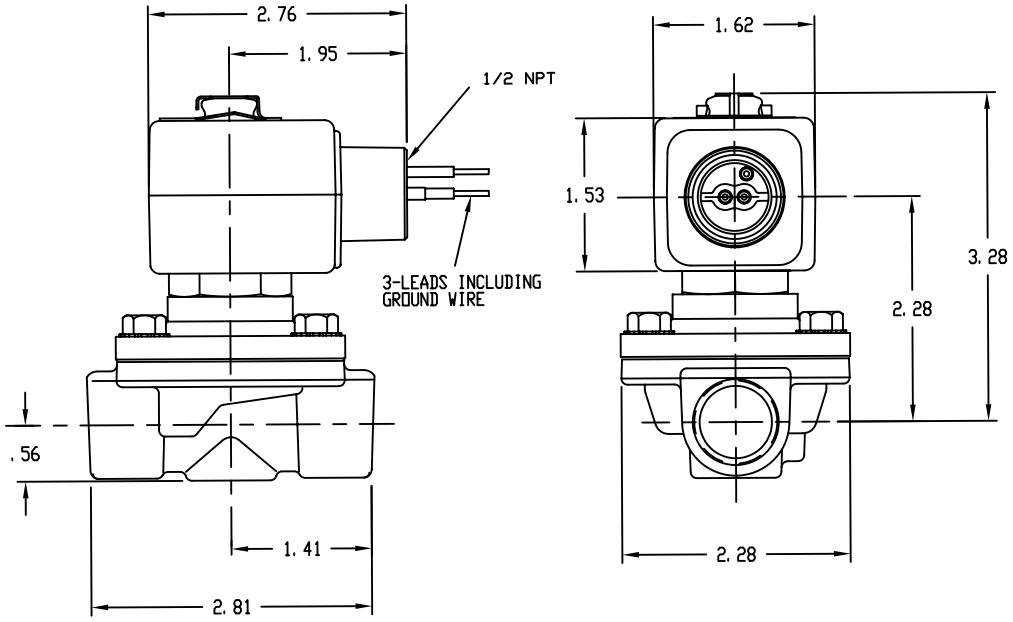
Valve	Dimensions						
	B	C	D	E	F	G	H
06FS5C2xxx 08FS5C2xxx	1/2	1 5/16	1 1/8	2 7/16	2 5/16	2 29/32	2 1/4
08FS5O2xxx	1/2	1 5/16	1 1/8	2 7/16	2 7/32	2 29/32	2 1/4

Valve Reference D10





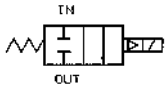
2-Way Normally Closed
Port Identification:
In-In/Out-Out



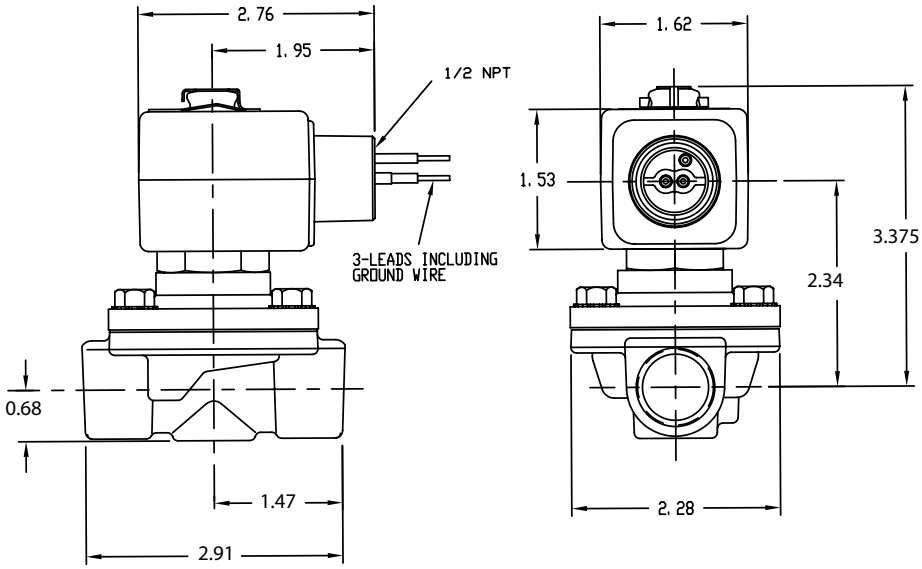
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Valve Reference D11



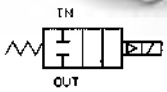


2-Way Normally Closed
Port Identification:
In-In/Out-Out

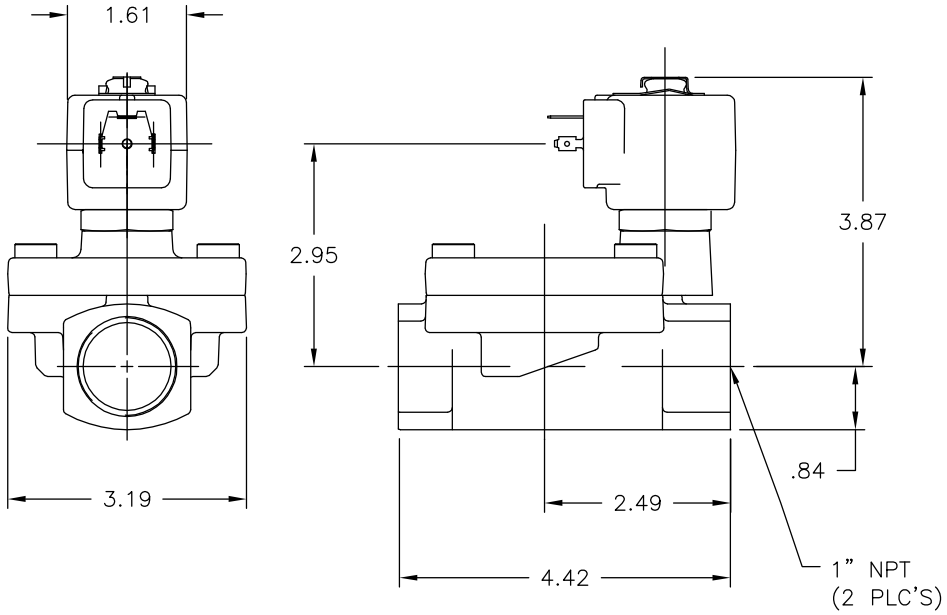


Valve Reference D12





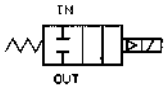
2-Way Normally Closed:
16F25Cxx
Port Identification:
In-In/Out-Out



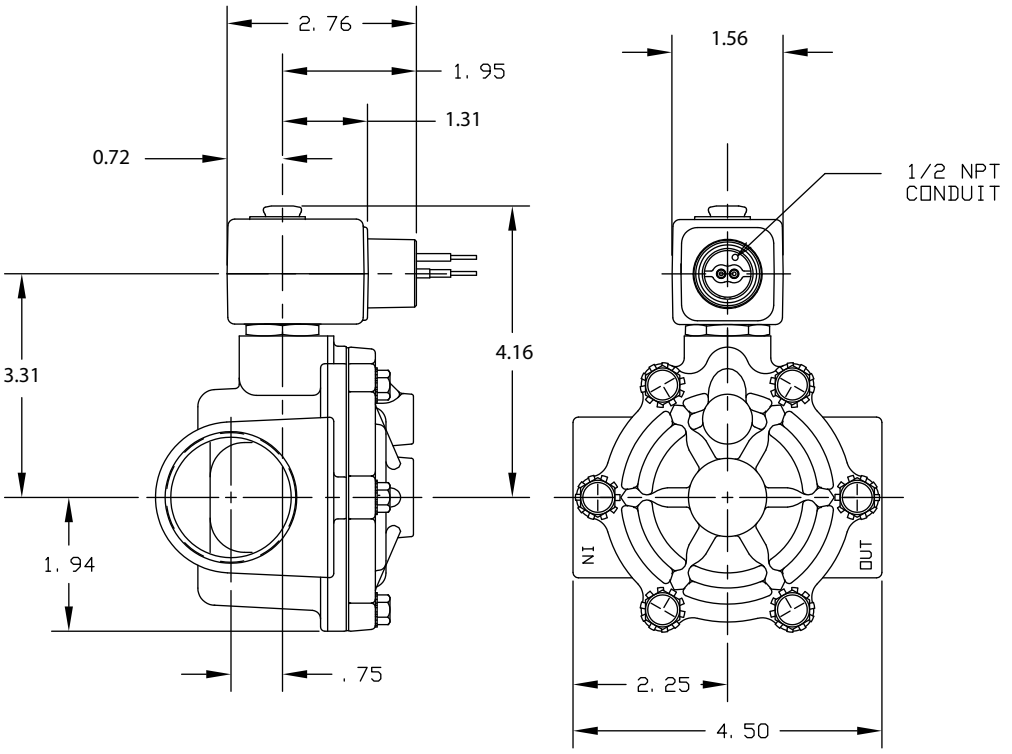
Specialty

Valve Reference D13



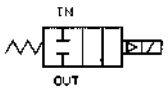


2-Way Normally Closed:
Port Identification:
In-In/Out-Out

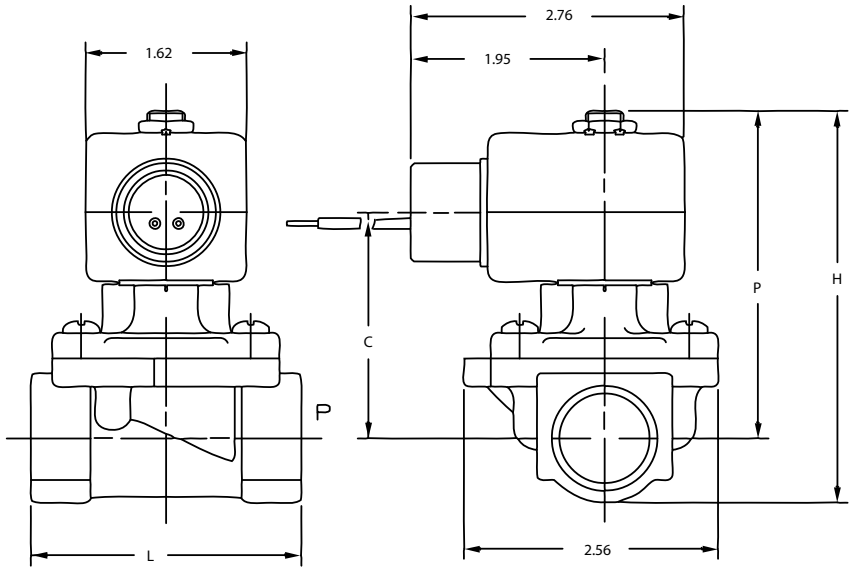


Valve Reference D14





2-Way Normally Closed
Port Identification:
P-IN/--OUT

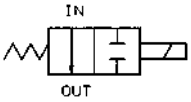


Valve	Dimensions			
	H	P	C	L
72218BN3TXXX 72218BN4UXXX	3.78	3.23	2.21	2.64
72218BN5VXXX 72218RN3TXXX 72218RN4UXXX 72218RN5VXXX	3.99	3.33	2.31	2.72

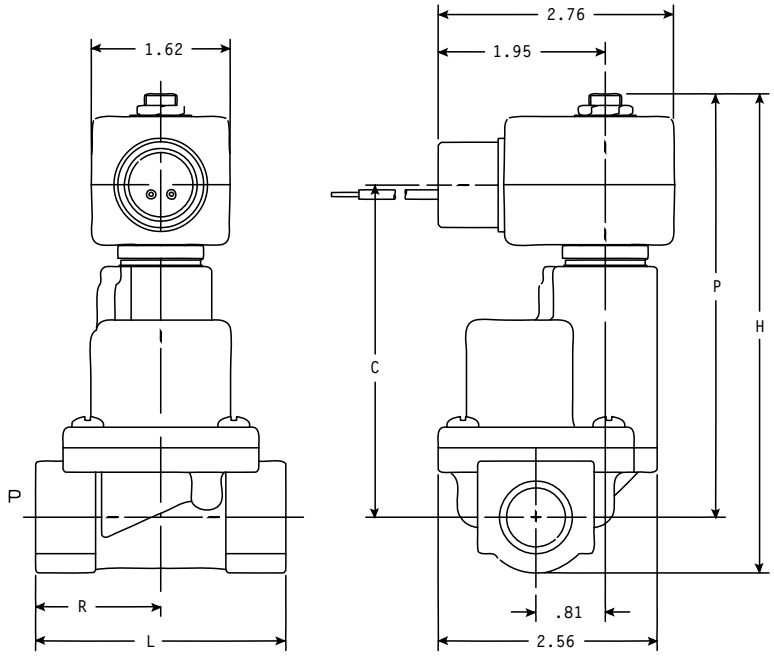
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Valve Reference D15





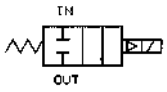
2-Way Normally Open:
Port Identification:
P-IN/--OUT



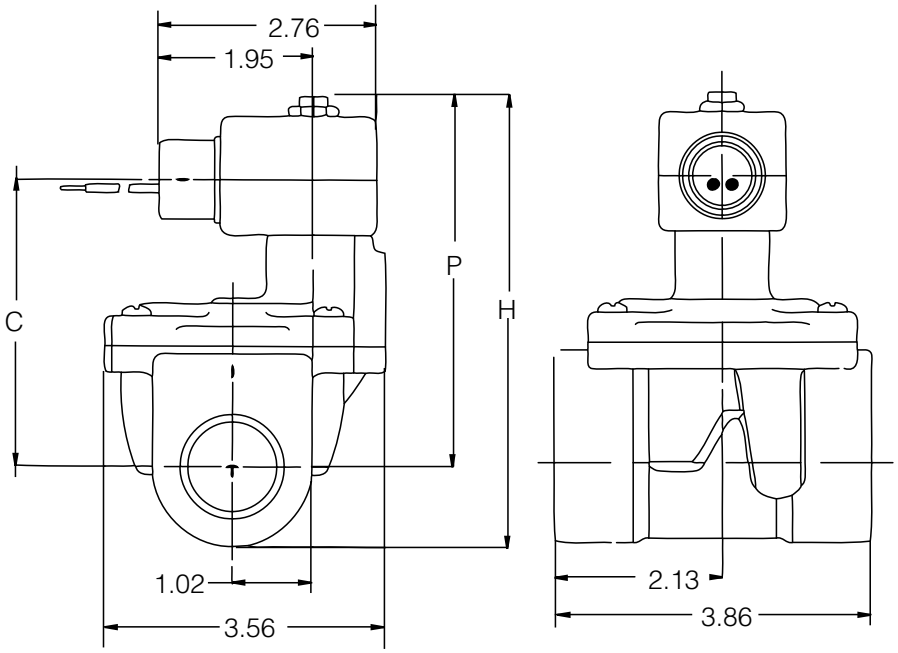
Valve	Dimensions				
	H	P	C	L	R
73228BN3TTS0	5.36	4.81	3.75	2.65	1.39
73228BN4UTS0	5.57	4.91	3.85	2.73	1.43
73228BN52TS0					

Valve Reference D16





2-Way Normally Closed
Port Identification:
P-IN/--OUT

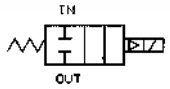


Valve	Dimensions					
	H	P	C	B	D	G
73218BN64Exx	4.56	3.70	2.38	5.58	3.96	2.94
73218BN75Exx	4.85	3.85	2.52	5.58	3.96	2.94

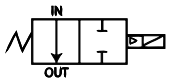
Specialty

Valve Reference D17

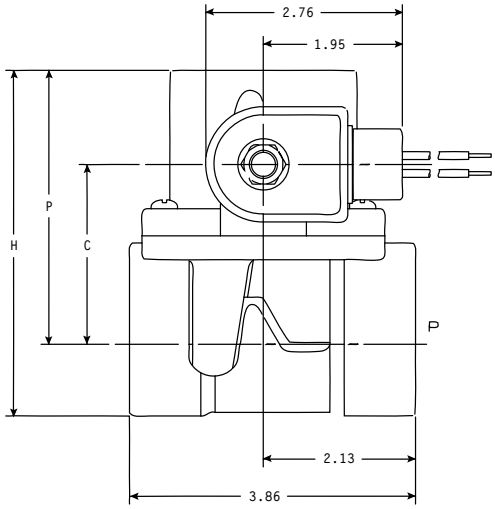


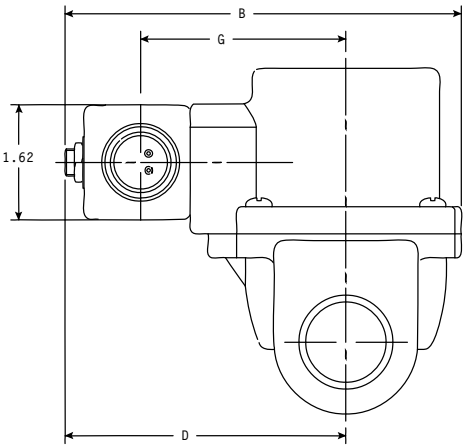


2-Way Normally Closed
73218



2-Way Normally Open:
73228
Port Identification:
P-IN/--OUT

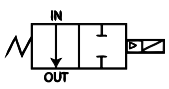




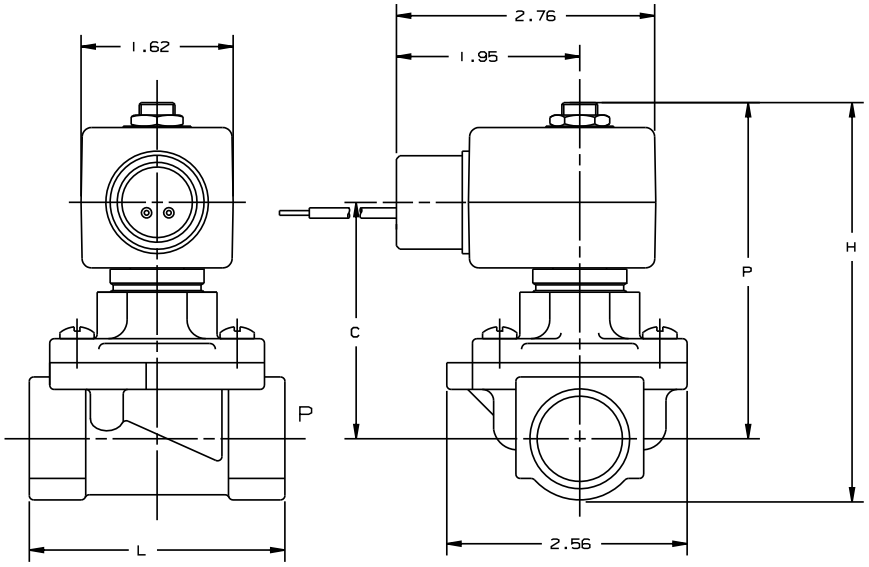
Valve	Dimensions					
	H	P	C	B	D	G
73228BN64TS0 73218BN64TS0	4.56	3.70	2.38	5.82	4.20	3.14
73228BN75TS0 73218BN75TS0	4.85	3.85	2.52	5.82	4.20	3.14

Valve Reference D18





2-Way Normally Open:
Port Identification:
P-IN/--OUT



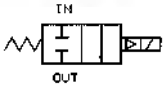
Valve	Dimensions			
	H	P	C	L
72228BN3TXXX 72228BN4UXXX 72228RN3TXXX 72228RN4UXXX	4.04	3.49	2.43	2.64
72228BN5VXXX 72228RN5VXXX	4.24	3.58	2.52	2.72

Specialty

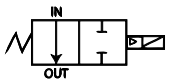
Parker Hannifin Corporation
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Valve Reference D19



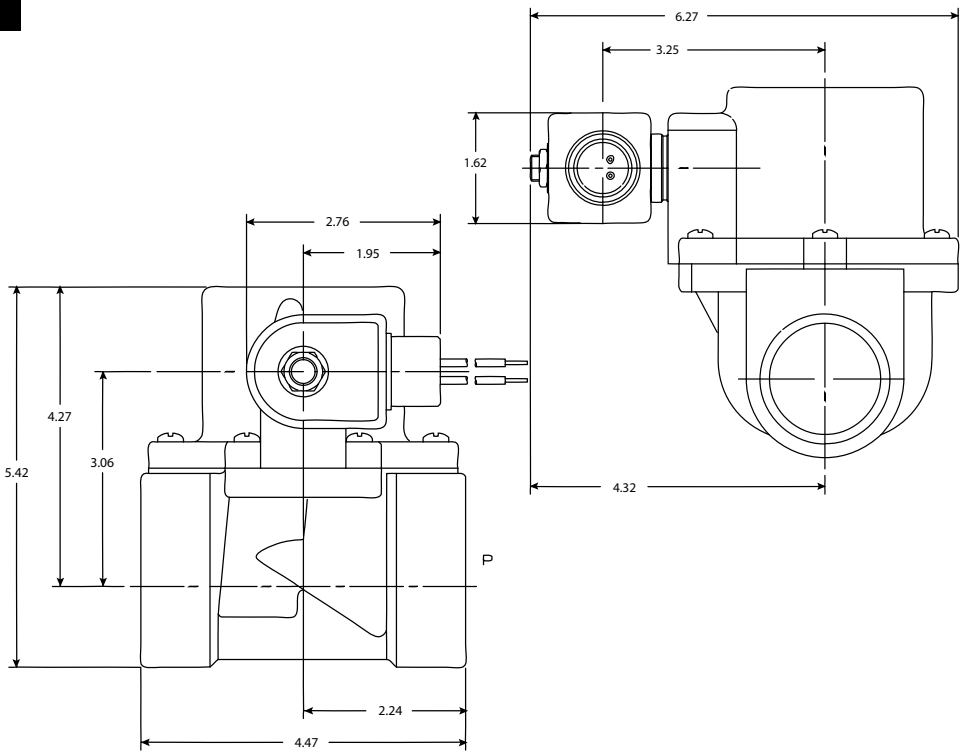


2-Way Normally Closed
73218BN87xx



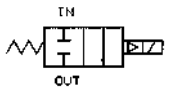
2-Way Normally Open:
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Port Identification:
P-IN/--OUT

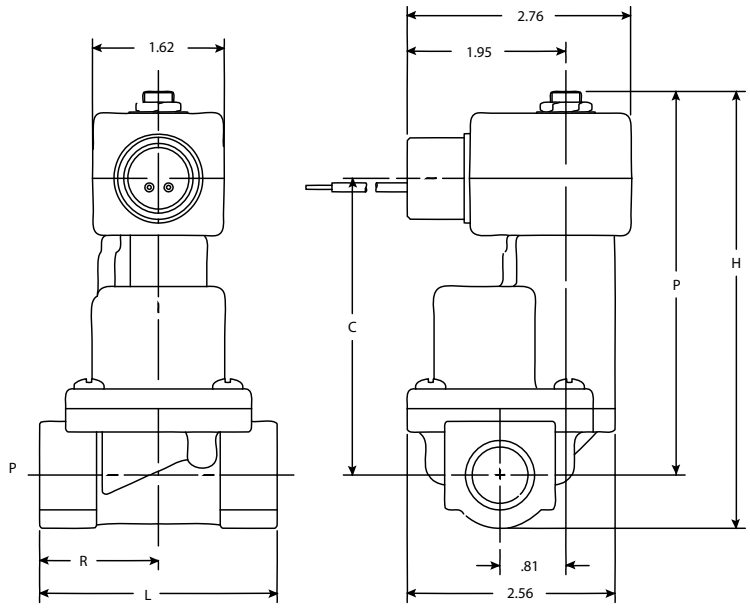


Valve Reference D20





2-Way Normally Closed
Port Identification:
P-IN/--OUT

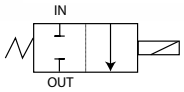


Valve	Dimensions				
	H	P	C	L	E
73218BN3TXXX 73218BN4UXXX	4.38	3.84	2.81	2.64	1.39
73218BN5VXXX	4.59	3.94	2.91	2.72	1.43

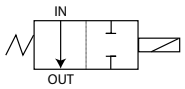
Specialty

Valve Reference D21



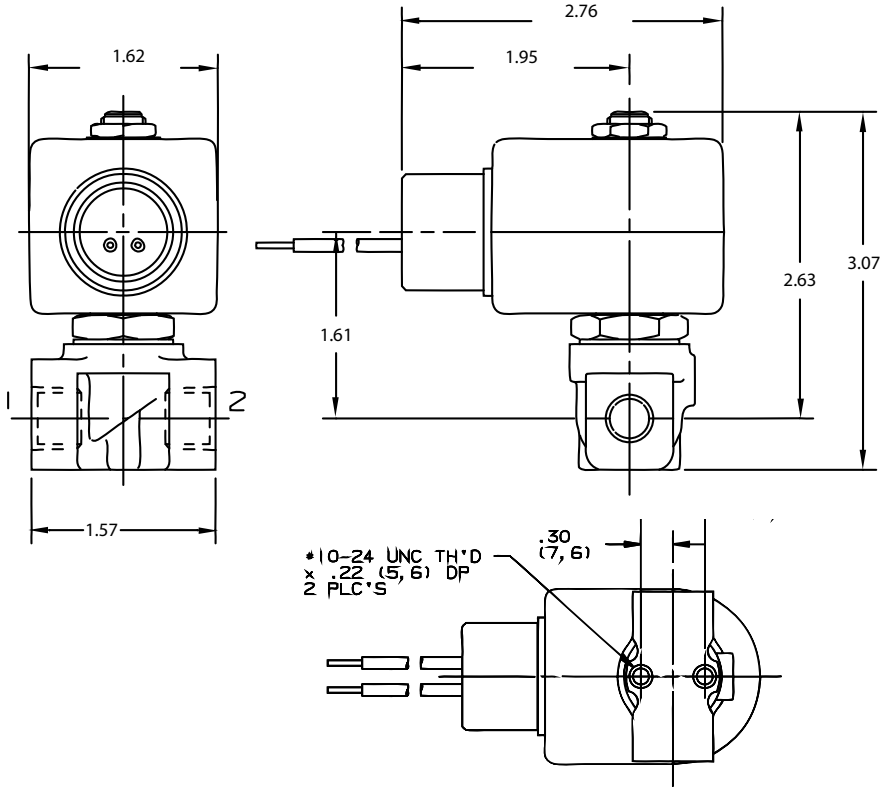


2-Way Normally Closed
7121KBNxx



2-Way Normally Open:
7122KBNxx

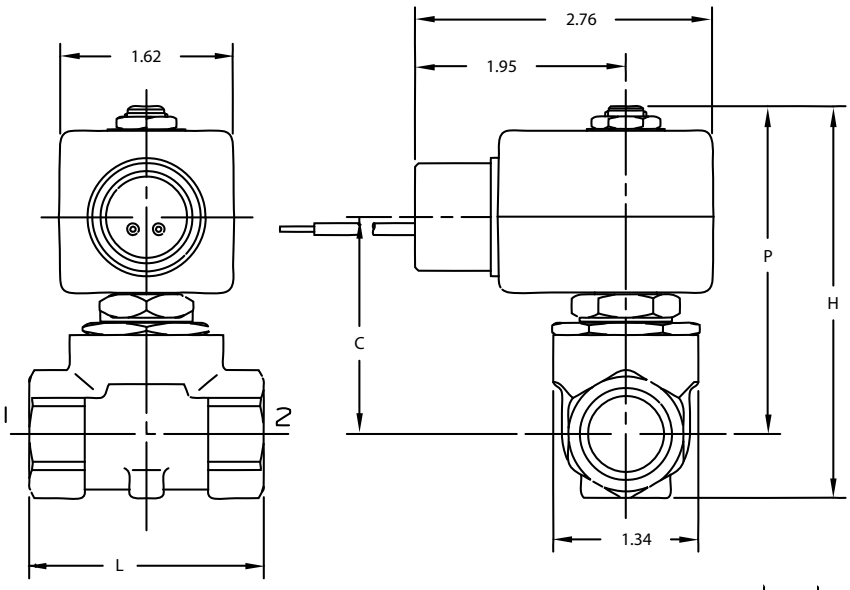
Port Identification:
1-IN/ 2-OUT



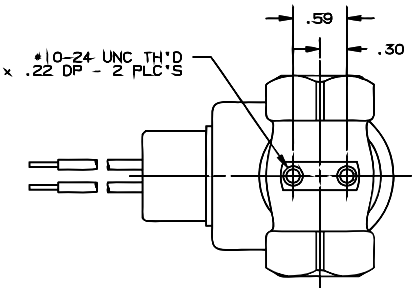
Valve Reference D22



2-Way Normally Closed
Port Identification
Flow arrow on body
indicates flow direction-
ports are not marked.



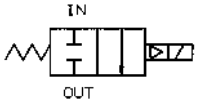
Valve	Dimensions			
	H	P	C	L
7121KBN44V00 7321KBN4SXXX	3.56	2.97	1.96	2.17
7321KBN2RXXX 7321KBN3SXXX	3.56	2.97	1.96	1.97



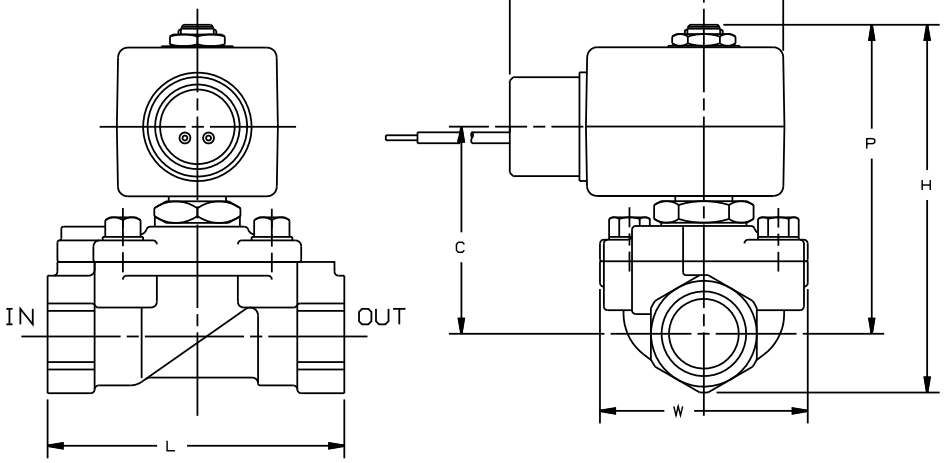
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Valve Reference D23





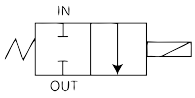
2-Way Normally Closed
Port Identification
Flow arrow on body
indicates flow direction.
Ports are not marked.



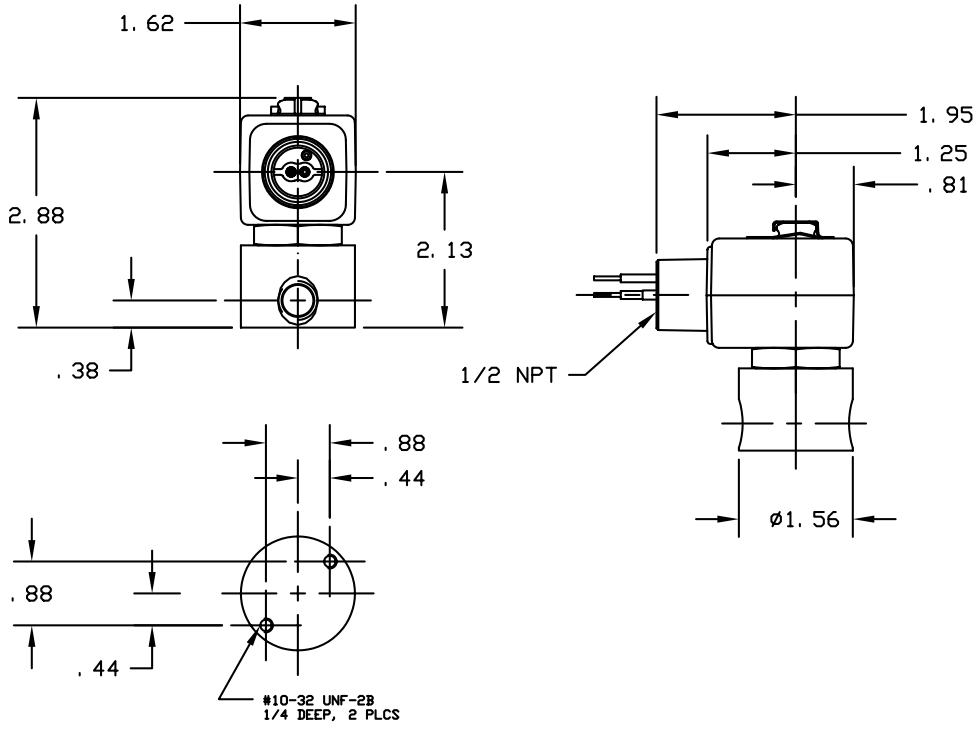
Valve	Dimensions				
	H	P	C	L	W
7221GBN3VXXX 7221GBN4VXXX	3.66	3.07	2.06	2.95	2.09
7221GBN51XXX	3.75	3.07	2.06	3.15	2.09
7221GBN61XXX	4.03	3.15	2.12	3.35	2.09
7221GBN64XXX	4.25	3.35	2.34	3.94	2.75

Valve Reference D24





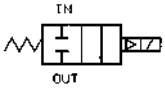
2-Way Normally Closed
Port Identification:
IN-IN/OUT-OUT



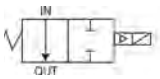
Specialty

Valve Reference D25

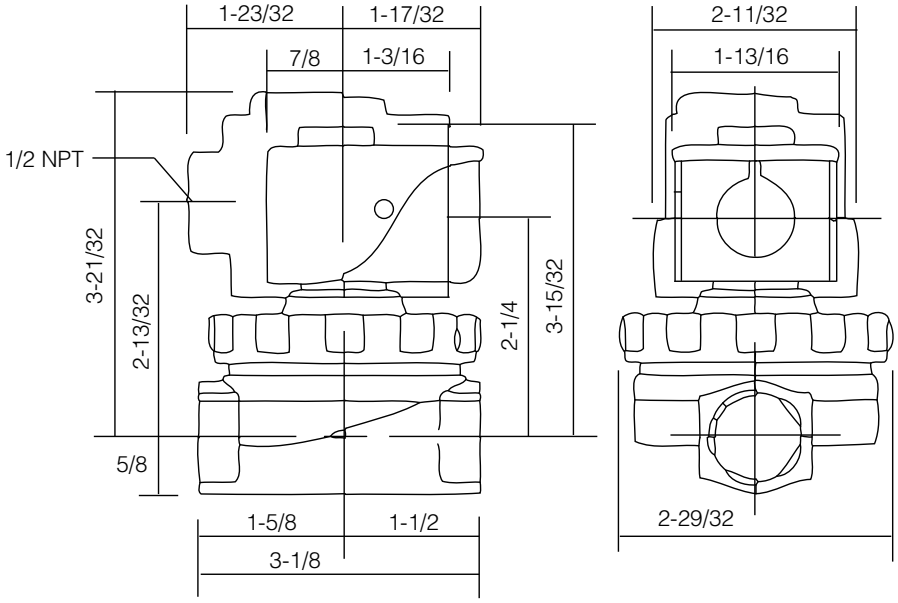




2-Way Normally Closed:
12FS25Cxx



2-Way Normally Open:
12FS25Oxx
Port Identification:
IN-IN/OUT-OUT



Valve	Dimensions							
	A	B	C	D	E	F	G	H
12FS5C2148ACF	3 5/8	1/2	1 5/16	1 1/8	2 7/16	2 5/16	3 5/16	2 1/4
12FS5O2148ACF	3 21/32	5/8	1 5/8	1 1/2	3 1/8	2 1/4	3 15/32	2 29/32

Specialty

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Fluid Control Division
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Two-Way 210°F Hot Water with EPDM seals - Materials of Construction**

Product*	Watt	Type	Port Size	Body	Sleeve Tube	Sleeve Stop	Sleeve Flange	"Plunger Blank"	Plunger Spring	Shading Ring	Max. Ambient Temp.
06F22C2	11.5	2WNC	3/8	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
06F23C2	11.5	2WNC	3/8	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
08F22C2	11.5	2WNC	1/2	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
08F23C2	11.5	2WNC	1/2	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
12F22C2	11.5	2WNC	3/4	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
12F23C2	11.5	2WNC	3/4	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
7121KBN	10	2WNC	1/4	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	150°F
7121KBN	22	2WNC	1/4	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	77°F
72218BN	10	2WNC	3/8 - 3/4	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	150°F
72218BN	22	2WNC	3/8 - 3/4	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	77°F
72218RN	10	2WNC	3/8 - 3/4	316SS	304SS	430FR	430F	430FR	18-8SS	Copper	150°F
72218RN	22	2WNC	3/8 - 3/4	316SS	304SS	430FR	430F	430FR	18-8SS	Copper	77°F
7221GBN	10	2WNC	3/8 - 1	Brass	304SS	430FR	430F	430FR	301SS	Copper	150°F
7221GBN	22	2WNC	3/8 - 1	Brass	304SS	430FR	430F	430FR	301SS	Copper	77°F
72228BN	10	2WNO	3/8 - 3/4	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	150°F
72228BN	22	2WNO	3/8 - 3/4	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	77°F
73218BN	10	2WNC	3/8 - 1½	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	150°F
73218BN	22	2WNC	3/8 - 1½	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	77°F
7321KBN	10	2WNC	1/4 - 1/2	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	150°F
7321KBN	22	2WNC	1/4 - 1/2	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	77°F
73228BN	10	2WNO	1/2 - 1½	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	150°F
73228BN	22	2WNO	1/2 - 1½	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	77°F

Two-Way High Pressure Steam with PTFE Seals - Materials of Construction**

Product*	Watt	Type	Port Size	Body	Sleeve Tube	Sleeve Stop	Sleeve Flange	"Plunger Blank"	Plunger Spring	Shading Ring	Max. Ambient Temp.
06FS5C2	11	2WNC	3/8	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	131°F
08FS5C2	11	2WNC	1/2	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	131°F
08FS5O2	11	2WNO	1/2	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	131°F
12FS5C2	11	2WNC	3/4	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	131°F
12FS5O2	11	2WNO	3/4	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	131°F
16FS5C2	11	2WNC	1	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	131°F
73218BN	10	2WNC	3/8 - 1½	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	77°F
73228BN	10	2WNO	1/2 - 1½	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	77°F

* Shows first 7 digits of pressure vessel

**Maximum ambient temperature shown is the rating when valve is operating at the maximum fluid temperature as shown in the product sections for each of the valves in this catalog.

Two-Way Low Pressure Steam with EPDM Seals - Materials of Construction**

Product*	Watt	Type	Port Size	Body	Sleeve Tube	Sleeve Stop	Sleeve Flange	"Plunger Blank"	Plunger Spring	Shading Ring	Max. Ambient Temp.
06FS3C2	11	2WNC	3/8	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
06FS5C2	11	2WNC	3/8	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	131°F
08FS3C2	11	2WNC	1/2	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
08FS5C2	11	2WNC	1/2	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	131°F
12FS3C2	11	2WNC	3/4	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
12FS5C2	11	2WNC	3/4	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	131°F
16FS5C2	11	2WNC	1	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	131°F
20FS4C2	6	2WNC	1¼	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
24FS4C2	6	2WNC	1½	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
7121KBN	10	2WNC	1/4	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	122°F
7121KBN	22	2WNC	1/4	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
72218BN	10	2WNC	3/8 - 3/4	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	122°F
72218BN	22	2WNC	3/8 - 3/4	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
72218RN	10	2WNC	3/8 - 3/4	316SS	305SS	430FR	12L14 Plated	430FR	302SS	Copper	122°F
72218RN	22	2WNC	3/8 - 3/4	316SS	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
7221GBN	10	2WNC	3/8 - 1	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	122°F
7221GBN	22	2WNC	3/8 - 1	Brass	305SS	430FR	12L14 Plated	430FR	302SS	Copper	77°F
72228BN	10	2WNO	3/8 - 3/4	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	122°F
72228BN	22	2WNO	3/8 - 3/4	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	77°F
73218BN	10	2WNC	3/8 - 1½	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	122°F
73218BN	22	2WNC	3/8 - 1½	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	77°F
7321KBN	10	2WNC	1/4 - 1/2	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	122°F
7321KBN	22	2WNC	1/4 - 1/2	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	77°F
73228BN	10	2WNO	1/2 - 1½	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	122°F
73228BN	22	2WNO	1/2 - 1½	Brass	304SS	430FR	430F	430FR	18-8SS	Copper	77°F

* Shows first 7 digits of pressure vessel

**Maximum ambient temperature shown is the rating when valve is operating at the maximum fluid temperature as shown in the product sections for each of the valves in this catalog.

Parker Hannifin Corporation
Fluid Control Division
1 800 825 8305 (1 800 Valve05)
www.parker.com/fcd

Intrinsically Safe Series

2-way, 3-way and 4-way Valves



General Description:

For hazardous and low-power power applications

Today, intrinsically safe systems and products are recommended, or in some cases compulsory, where the highest level of protection from explosion is required. They are also employed in applications that require low power.

A hazardous (classified) location is where fire or explosion hazards exist due to the presence of flammable gases or vapors, flammable liquids, combustible dust, or easily ignitable fibers or flyings.

Parker Fluid Control Division (FCD) has long served industry with innovative and safety related products. Our Intrinsically Safe solenoid valves have approvals for use in the United States and Canada in hazardous classifications for Classes I, II, III, Division 1 and 2, and in the United Kingdom for Division 0, 1 and 2. In Europe our valves are approved according to ATEX standards. All countries in Western Europe now follow common (ATEX) standards. All ATEX member countries should recognize apparatus which have been tested and certified by any ATEX member country.

What is an intrinsically safe system?
An intrinsically safe system is most often an assembly of approved intrinsically safe apparatus, associated apparatus, and interconnecting cables. Approved I.S. apparatus are devices that are incapable, during normal operation or under fault conditions, of causing explosive atmospheres to ignite by spark or thermal effect. Explosive atmospheres are mixtures of flammable or combustible material in air in ignitable concentrations.

Solenoid valves are examples of I.S. apparatus and must be approved for use in specific hazardous (classified) locations. Associated apparatus, such as safety barriers, are devices which affect the energy in the I.S. circuit and are relied upon to maintain intrinsic safety.

How does intrinsic safety apply to solenoid valves?
When related to solenoid valves, intrinsic safety means that the coil's current draw and resulting temperature is held to such a low level (by an approved safety barrier) that the valve no longer has the capability of igniting a mixture of flammable or combustible material, either during normal operation or under fault conditions.

When designed into an intrinsically safe system, FCD's Intrinsically Safe solenoid valves provide a number of significant performance advantages.

Low Power Consumption
FCD's Intrinsically Safe valves are rated at 24 VDC nominal, and are calibrated to operate at a minimum current draw as low as 29 milliamps (0.029 amps).

Low Temperature Rise
FCD Intrinsically Safe valve enclosures are designed to maintain a maximum outside surface temperature of less than 85°C. This meets the T6 classification assigned by Underwriters Laboratories Inc.

Variety of Mounting Possibilities
FCD Intrinsically Safe valves can be mounted in any position and still operate normally.

Media Compatibility
Intrinsically Safe FCD valves in 2-way constructions are suitable for use with oil, air, water, and inert gases. Our 3- and 4-way valves are suitable for use with air and inert gases only.

Watertight Construction
All Intrinsically Safe FCD coil enclosures are equivalent to NEMA Type 4X Watertight construction.

Note: See chart on page D51 for the allowable valve/coil combinations.

Intrinsically Safe

2-Way Direct Acting & Pilot Operated Valves

Mechanical Characteristics:

Standard Materials of Construction

- Body—Brass
- Seals—FKM, NBR
- Compatible Media
- Air, Inert Gas, Water and Lt. Oil (300 SSU)

Electrical Characteristics:

Based on coil selected. View the following coil and enclosure pages for detailed electrical information.

Miscellaneous:

For applications below 32°F, valves must be degreased. Consult Fluid Control Division prior to ordering.

Intrinsically Safe Solenoid Valves—Two-Position

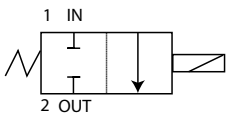
Port Size NPTF	Orifice Size	Valve Type	Flow Rate Cv	Operating Pressure Differential (PSI)	Min. Ambient Temp. °F/°C	Max. Fluid Temp. °F/°C	Valve Materials Seal/Body	Part Number	Valve Ref.	Coil Ref.
1/4"	3/64"	2W,NC	0.04	0-150	14/-10	165/75	FKM/Brass	U121K0490	D30	**
1/4"	1.2mm	2W,NC	0.06	0-100	14/-10	165/75	FKM/Brass	U121K0890	D30	**
1/4"	1.5mm	2W,NC	0.11	0-75	14/-10	165/75	FKM/Brass	U121K0690	D30	**
1/2"	5/8"	2W,NC	4.4	5-150	14/-10	165/75	FKM, NBR/Brass	U321H1590	D31	**
3/4"	3/4"	2W,NC	9.8	5-150	14/-10	165/75	FKM, NBR/Brass	U321G3690	D32	**
1 1/2"	1 9/16"	2W,NC	29.5	5-150	14/-10	165/75	FKM, NBR/Brass	U321G3990	D32	**
2"	1 9/16"	2W,NC	39.2	5-150	14/-10	165/75	FKM, NBR/Brass	U321G4090	D32	**

** For Coil Information, see page D48

Specialty

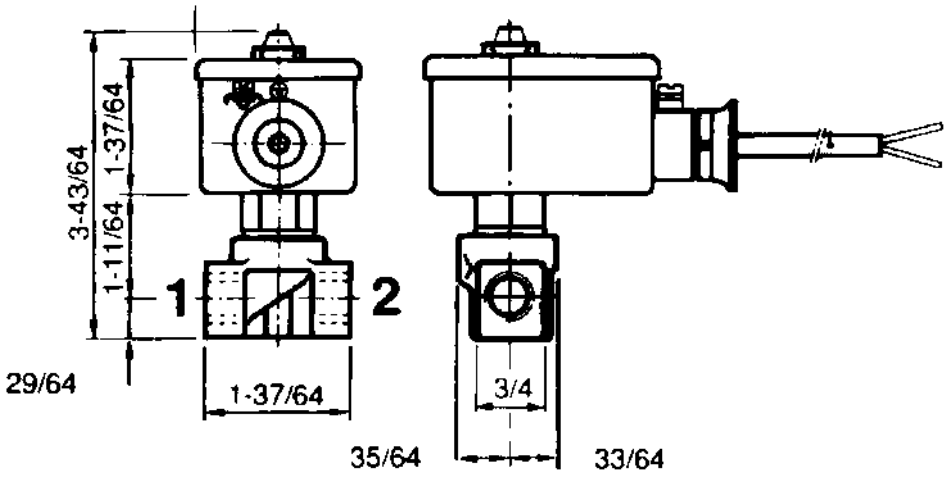
Valve Reference D30





2-Way Normally Closed

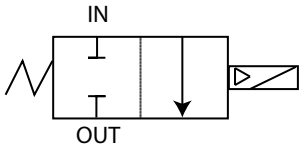
Port Idnetification:
1-In/2-Out



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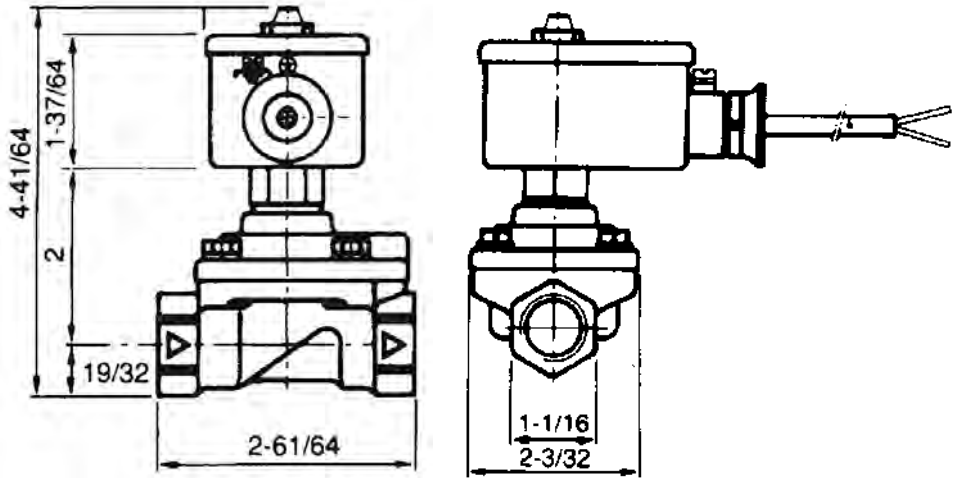
Valve Reference D31





2-Way Normally Closed

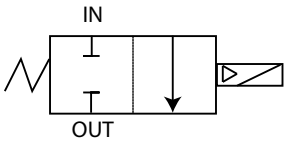
Port Identification:
Flow arrow on body indicates flow direction. Ports are not marked



Specialty

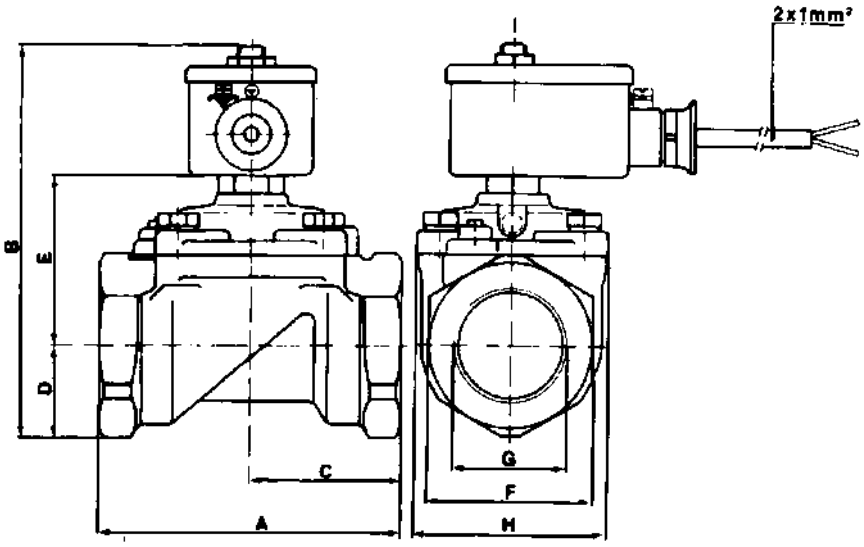
Valve Reference D32





2-Way Normally Closed

Port Identification:
Flow arrow on body indicates flow direction. Ports are not marked



Valve	Dimension							
	A	B	C	D	E	F	G	H
	IN	IN	IN	IN	IN	IN	NPT	IN
U321G3690	3-15/16"	5-5/16"	2"	7/8"	2-23/64"	1-5/8"	3/4"	2-3/4"
U321G3990	5-17/32"	6-7/32"	3"	1-9/32"	2-7/8"	2-3/8"	1-1/2"	3-1/16"
U321G4090	5-29/32"	6-25/32"	3-5/32"	1-21/32"	3-7/64"	3"	2"	3-1/16"

Intrinsically Safe

3-way Direct Acting, Pilot Operated and Manual Reset Valves

Mechanical Characteristics:

Standard Materials of Construction

- Body—Brass, Stainless Steel or Aluminum
- Seals—FKM, NBR

Compatible Fluids

- Air and inert gases

Electrical Characteristics:

Based on coil selected. View the following coil and enclosure pages for detailed electrical information.

Miscellaneous:

Sleeve Exhaust Adaptor

- U21-004 must be ordered separately.

For applications below 32°F, valves must be degreased. Consult Fluid Control Division prior to ordering.

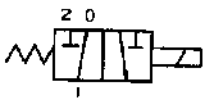
Intrinsically Safe Solenoid Valves - Two Position , 3-way - Normally Closed ***

Port Size NPT	Orifice Size	Cv Flow Factor	Operating Pressure Differential (PSI) Minimum	Operating Pressure Differential (PSI) Maximum	Min. Ambient Temp. °F	Max. Fluid Temp. °F	Valve Materials Seal/Body	Pressure Vessel Part Number	Valve Ref.	Coil Ref.
3-Way										
1/4"	5/128"	0.04	0	150	14	165	FKM/Brass	U131K0490	D33	**
1/4"	5/128"	0.04	0	150	14	165	FKM/316L S.S.	U131V5490	D34	**
1/4"	3/64"	0.06	0	150	14	165	FKM/Brass	U131K0890	D33	**
1/4"	1.5mm	0.11	0	75	14	165	FKM/Brass	U131K0690	D33	**
1/4"	13/64"	0.5	0	150	-13	165	NBR/S.Steel (316)	U133X5196*	D35	**
1/4"	9/32"	0.70	15	150	14	165	FKM, NBR/ Aluminum	U331B7490	D38	**
1/4"	1/4"	1.2	30	150	14	165	NBR/Brass	73317BN2PN90	D36	**
3-Way – 4.0 Cv Single Solenoid										
1/2"	5/8"	4.0	30	150	14	165	NBR/Brass	73317BN4UN90	D37	**
1/2"	5/8"	4.0	30	150	-40	165	NBR/Brass	73317BN4UN9C	D37	**
1/2"	5/8"	4.0	7	150	14	165	FKM, NBR/ Aluminum	U331L2190	D39	**
3-Way – Manual Reset Valve										
1/4"	13/64"	0.5	0	150	-13	165	FKM/S.Steel (316)	U033X5156*	D40	**

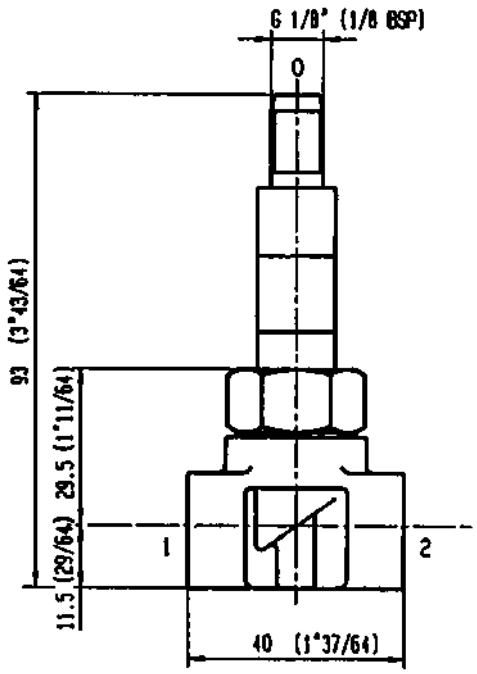
* U133X5196 and U033X5156: Consult factory for available coil/enclosure options.
** For Coil Information, see page D48
***U133X5196 is a 3-way, two position, Universal construction.

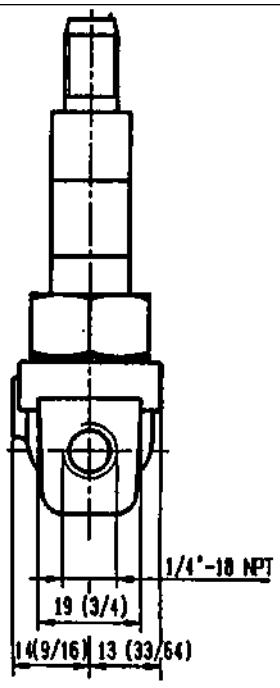
Valve Reference D33





3-Way Normally Closed
Port Identification:
1-Cylinder/2-Pressure/0-Exhaust



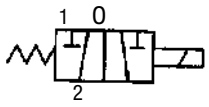


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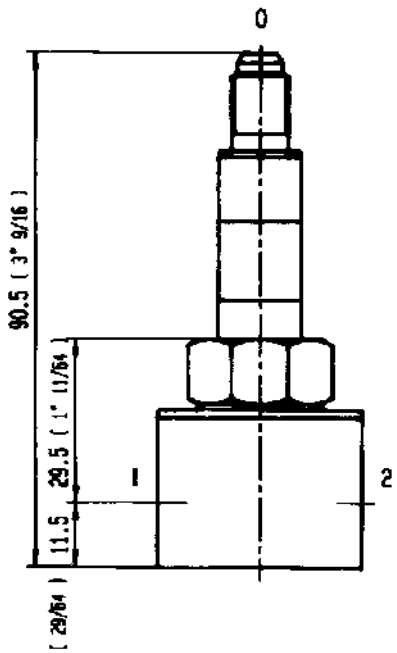
Specialty

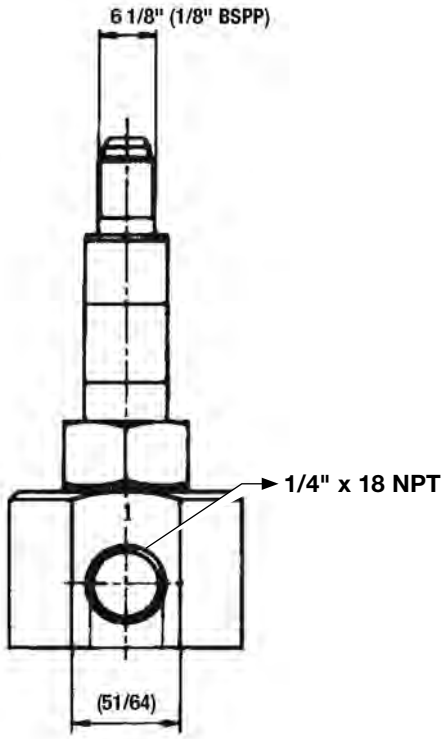
Valve Reference D34





3-Way Normally Closed
Port Identification:
1-Pressure/2-Cylinder/0-Exhaust

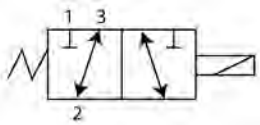




Specialty

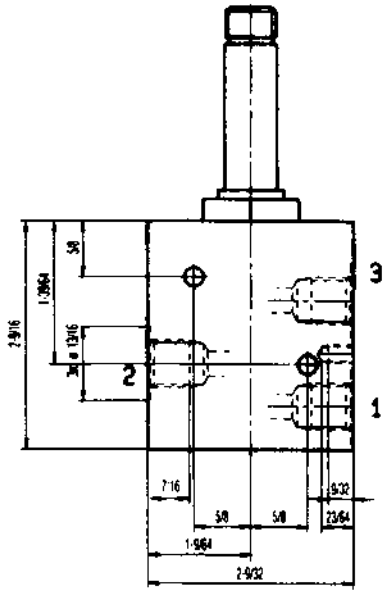
Valve Reference D35

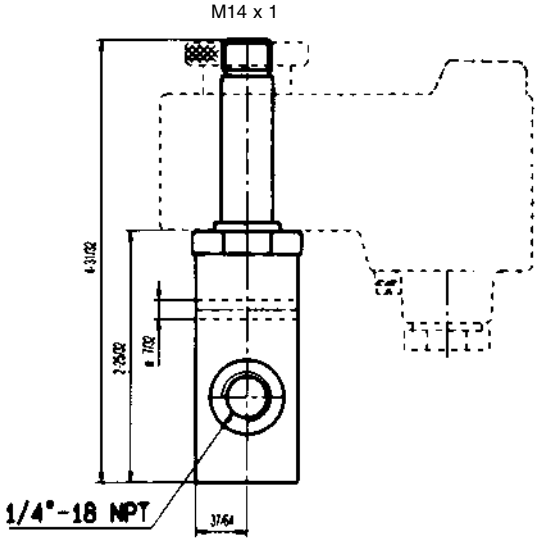




3-Way Universal

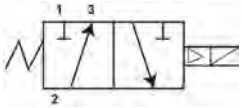
Port Identification:
1-Normally Closed/
2-Common/3-Normally Open



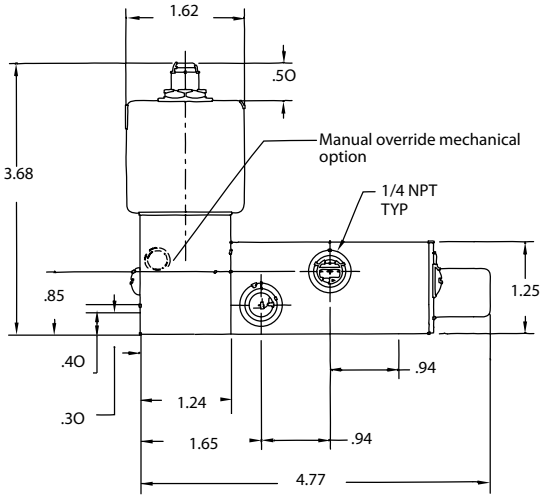


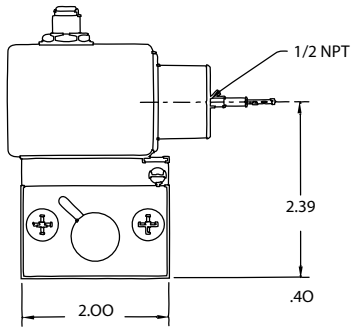
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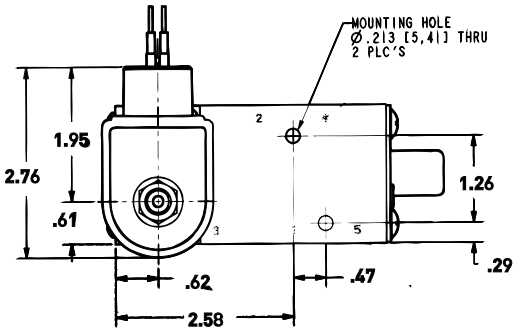


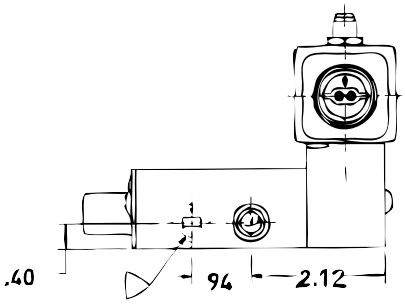


3-Way Normally Closed
Port Identification:
2-Cylinder/ 1-Pressure/ 3-Exhaust



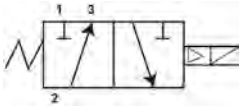




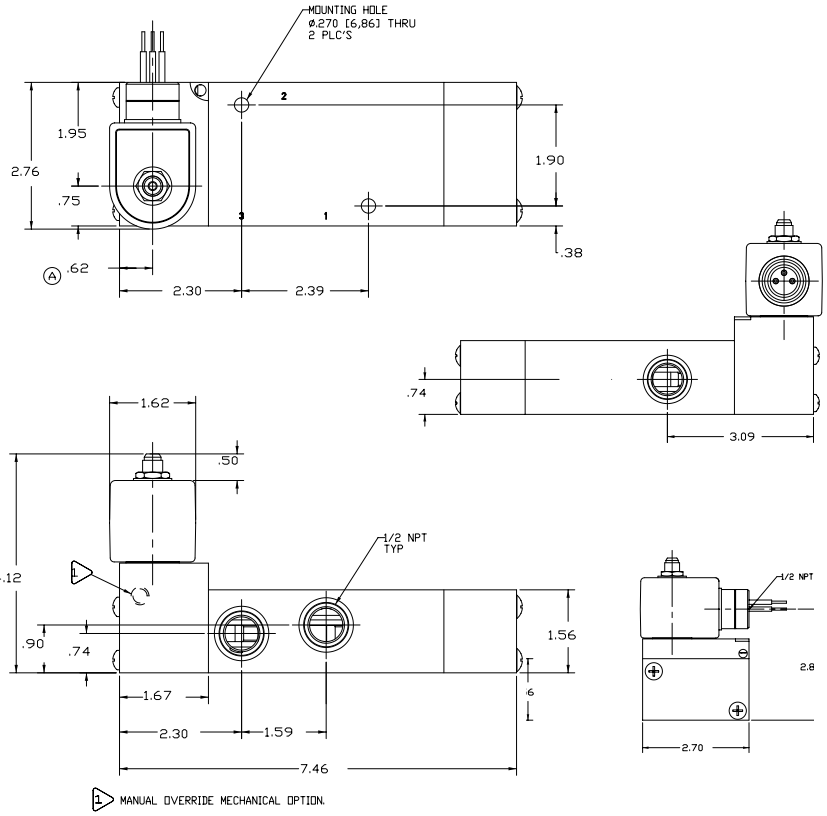


Valve Reference D37



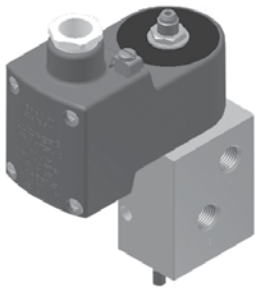


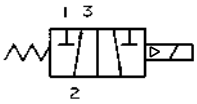
3-Way Normally Closed
Port Identification:
2-Cylinder / 1-Pressure/ 3-Exhaust



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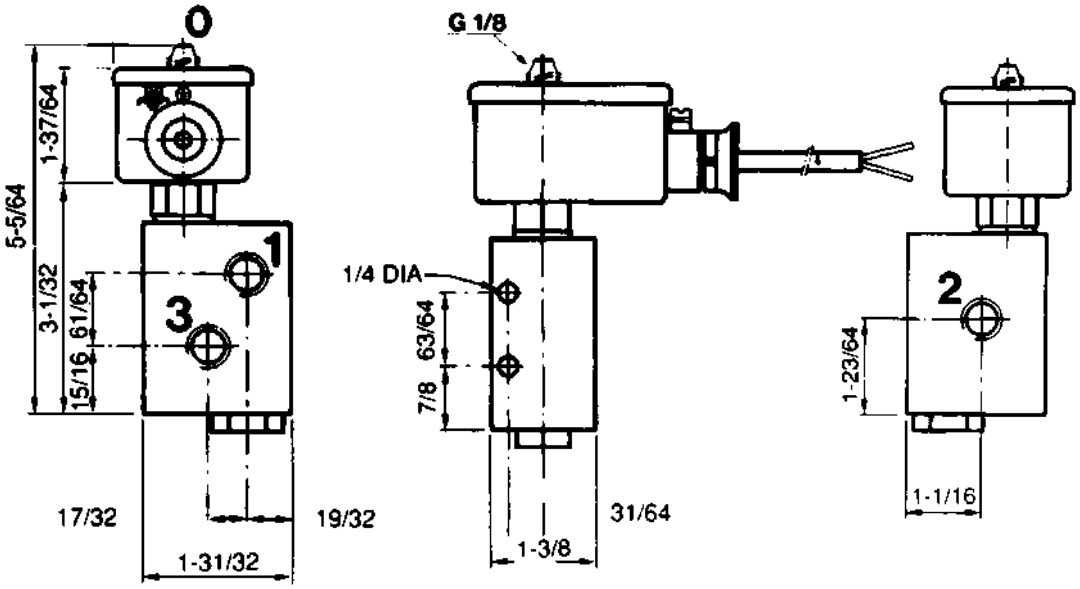
Valve Reference D38



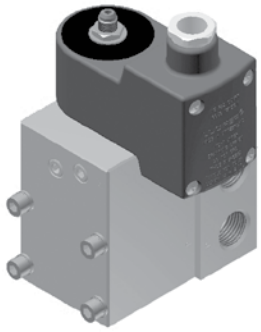


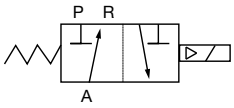
3-Way Normally Closed

Port Identification:
1- Pressure/2-Cylinder/3-Exhaust



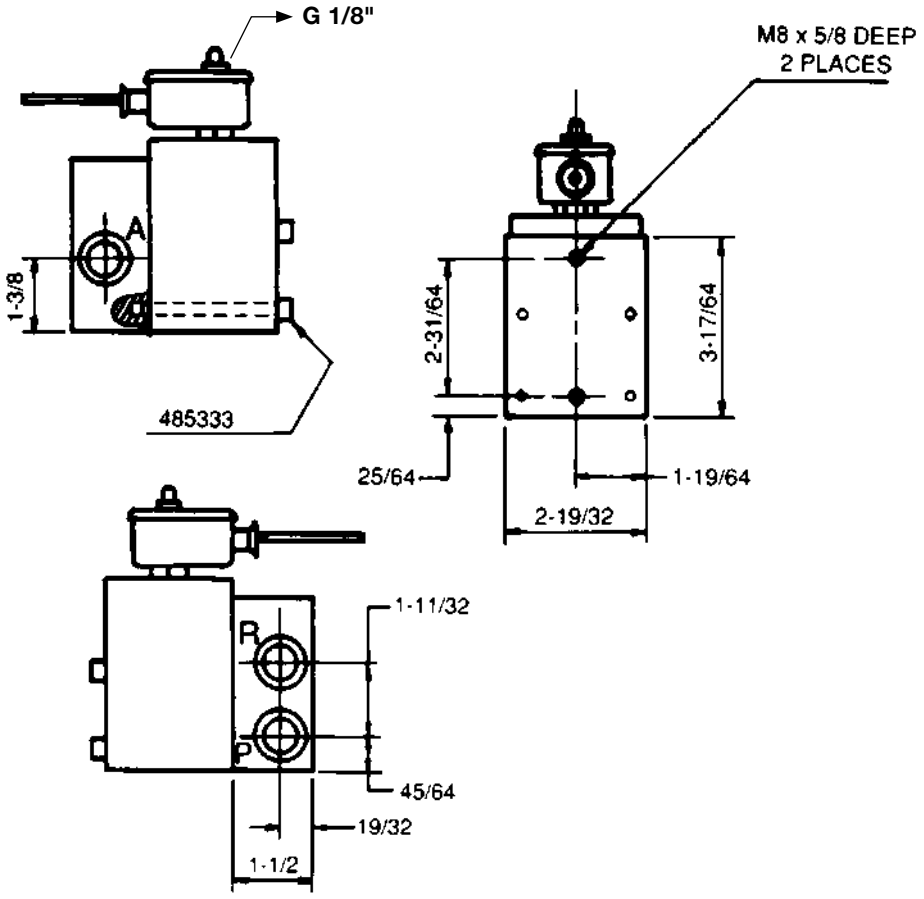
Valve Reference D39





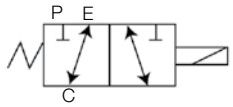
3-Way Normally Closed

Port Identification:
P-Pressure/A-Cylinder/R-Exhaust



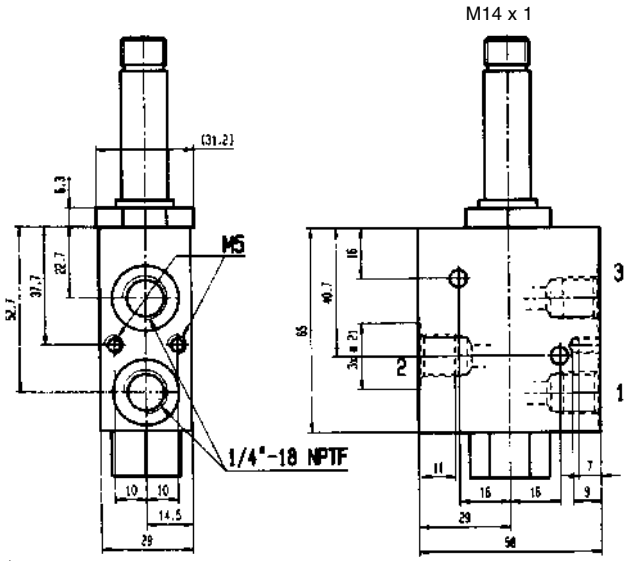
Valve Reference D40

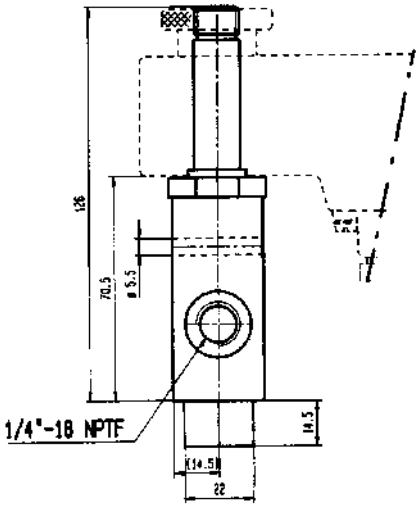




3-Way Universal

Port Identification:
P-Pressure/C-Cylinder/E-Exhaust





Note: Dimensions for the drawing are in millimeters.

Intrinsically Safe

4-way Piped and 3/4-way NAMUR Direct Mount Valves

Mechanical Characteristics:

Compatible Fluids

- Air and inert gases

Electrical Characteristics:

Based on coil selected. View the following coil and enclosure pages for detailed electrical information.

Specialty

Skinner Intrinsically Safe Solenoid Valves

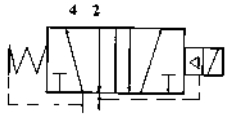
Port Size NPT	Orifice Size	Cv Flow Factor	Operating Pressure Differential (PSI)		Min. Ambient Temp. °F	Max. Fluid Temp. °F	Valve Materials Seal/Body	Pressure Vessel Part Number	Valve Ref.	Coil Ref.
			Minimum	Maximum						
4-Way										
1/4"	5/128"	0.04	0	150	14	167	NBR/Brass	73417BN2KN90	D41	**
1/4"	5/128"	0.04	0	150	14	167	NBR/303 S.S.	73417VN2KN90	D41	**
1/4"	3/64"	0.06	0	150	14	167	FKM-NBR/Alum.	U341B3490	D42	**
1/4"	13/64"	0.5	0	150	14	167	NBR/Brass	73417BN2PN90	D41	**
1/4"	5/16"	1.4	15	150	14	167	NBR/Zinc Alloy	U347L1190	D45	**
4-Way – 4.0 Cv Single Solenoid										
1/2"	5/8"	4.0	30	150	14	167	NBR/Brass	73417BN4UN90	D44	**
1/2"	5/8"	4.0	30	150	-14	167	NBR/Brass	73417BN4UN9C	D44	**
1/2"	9/16	4.0	7	150	14	167	FKM-NBR/Alum.	U341L2190	D43	**
4-Way – Double Solenoid										
1/4"	11/64"	0.55	30	150	14	167	NBR/303 S.S.	73477VN2KN90	D49	**
1/4"	1/4"	1.2	30	150	14	167	NBR/Brass	73477BN2PN90	D49	**
4-Way – 4.0 Cv Double Solenoid										
1/2"	5/8"	4.0	30	150	14	167	NBR/Brass	73477BN4UN90	D51	**
1/2"	5/8"	4.0	30	150	-14	167	NBR/Brass	73477BN4UN9C	D51	**
NAMUR 3/4-Way										
1/4"	11/64"	0.55	30	150	14	167	NBR/Brass	73417AKDKN90	D62	**
1/4"	1/4"	1.2	30	150	14	167	NBR/Brass	73417AKDPN90	D62	**
NAMUR 3/4-Way Double Solenoid										
1/4"	11/64"	0.55	30	150	14	167	NBR/Alum.	73477AKDKN90	D63	**
1/4"	1/4"	1.2	30	150	14	167	NBR/Alum.	73477AKDPN90	D63	**

** For Coil Information, see page D48

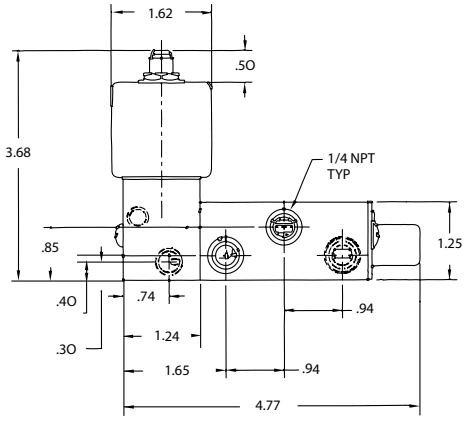
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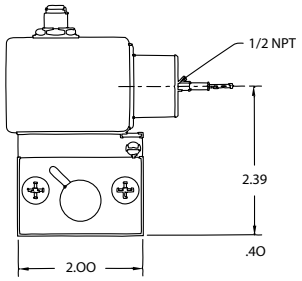
Valve Reference D41

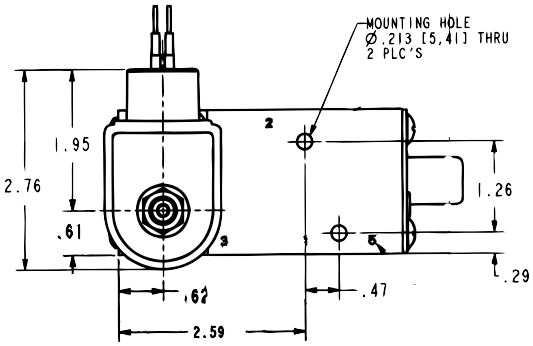


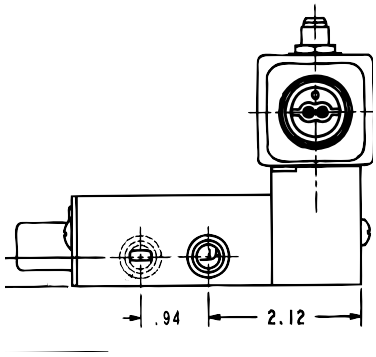


4-Way 2 position single solenoid
Port identification:
Press-1/Cyl - 2, 4/ EXH 3, 5





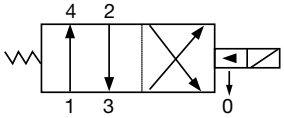




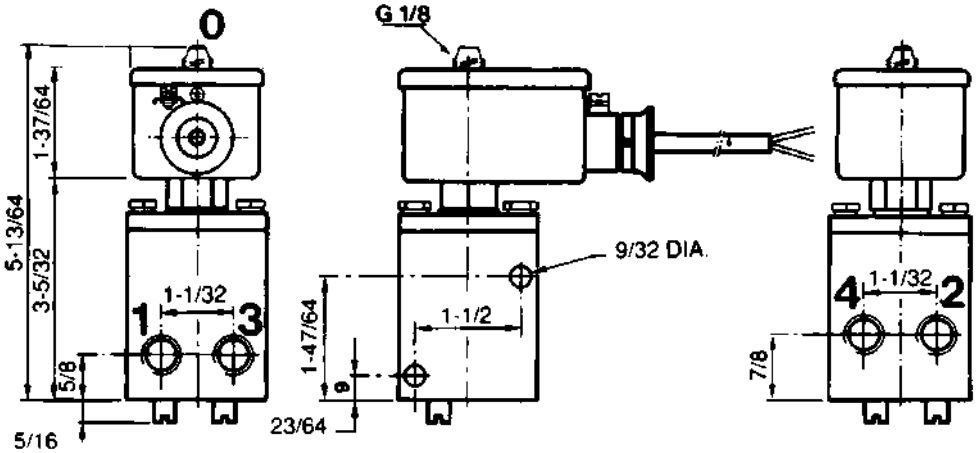
Specialty

Valve Reference D42



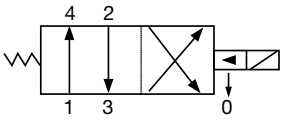


4/2 4-Way Two Position
Port Identification:
1-Pressure/2, 4-Cylinder/3-Exhaust



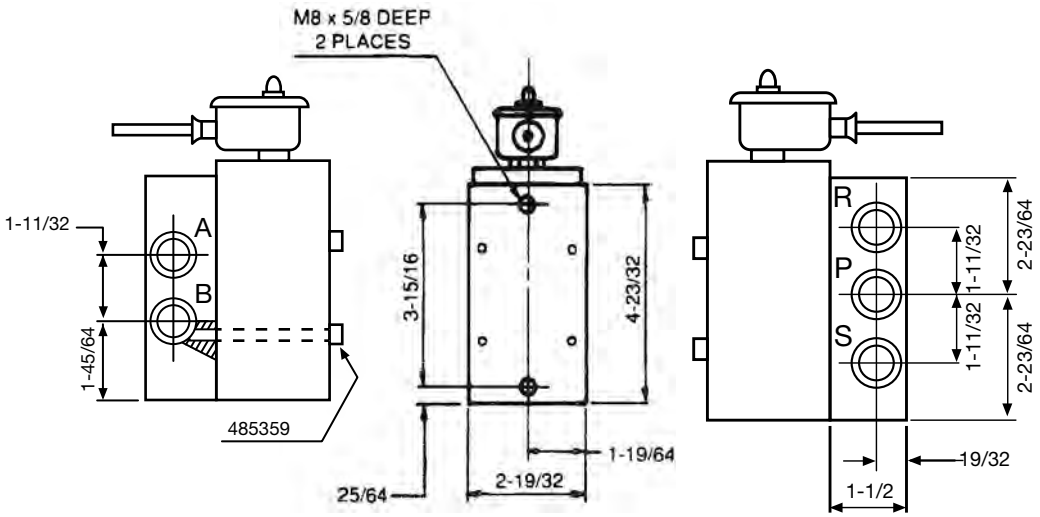
Valve Reference D43





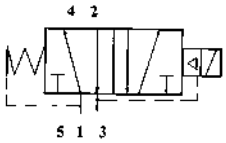
4/2 4-Way Two Position

Port Identification:
P-Pressure/B, A-Cylinder/S, R-Exhaust

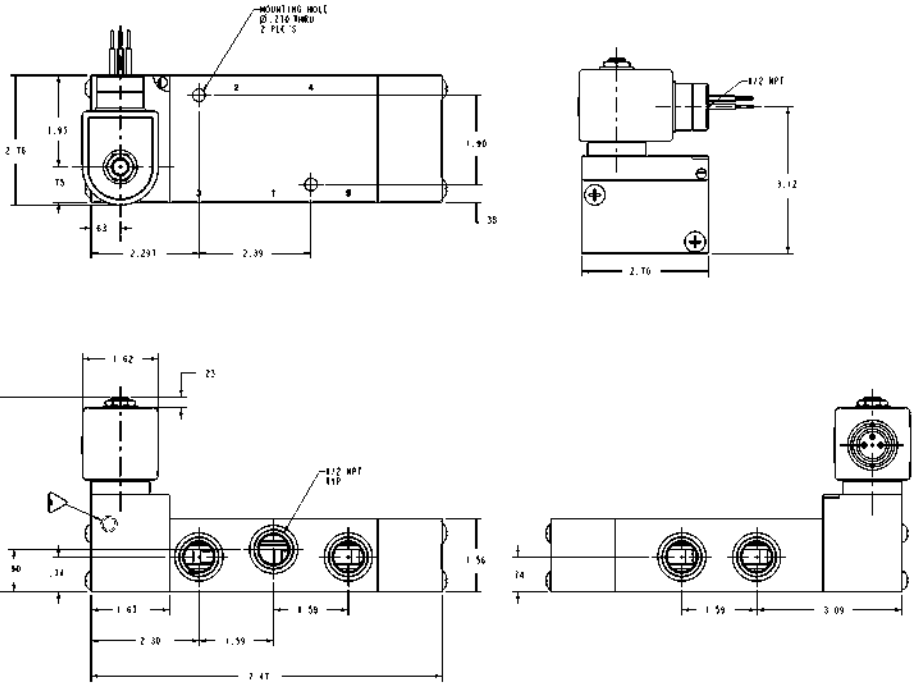


Valve Reference D44





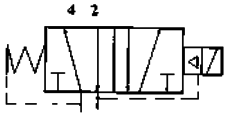
4-Way 2 position single solenoid
Port Identification:
Press-1/CYL-2,4/EXH 3,5



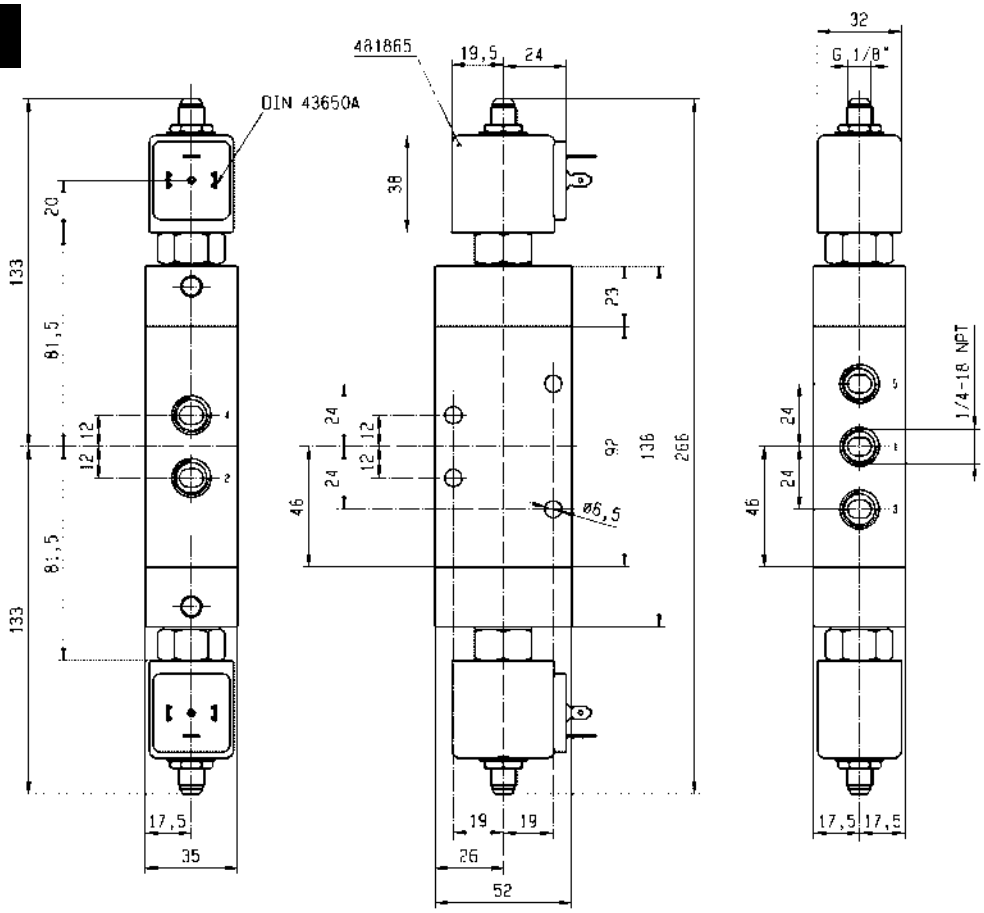
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Valve Reference D45



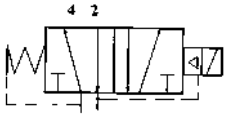


4-Way 2 position dual solenoid
Port Identification:
Press-1/CYL-2,4/EXH 3,5

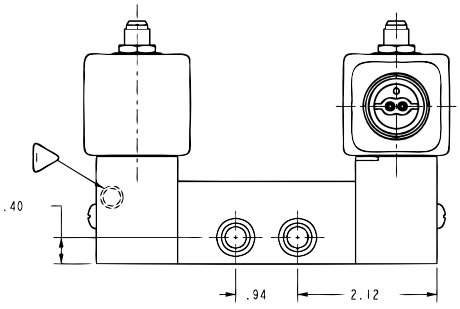


Valve Reference D49

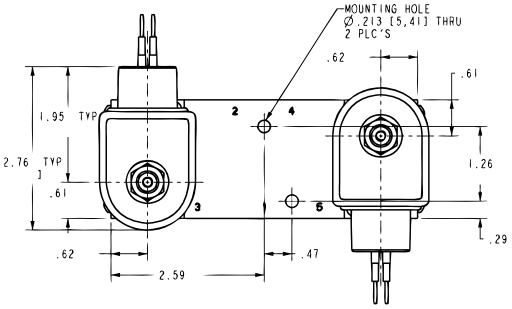


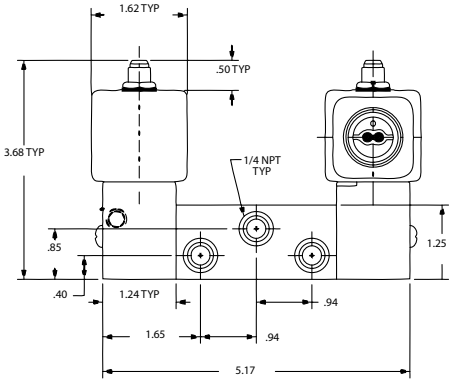


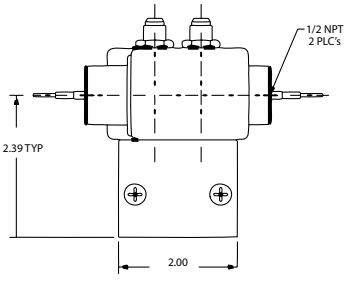
4-Way 2 position dual solenoid
Port Identification:
Press-1/CYL-2,4/EXH 3,5



1 Manual override mechanical option



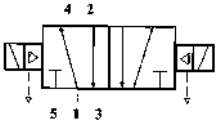




Specialty

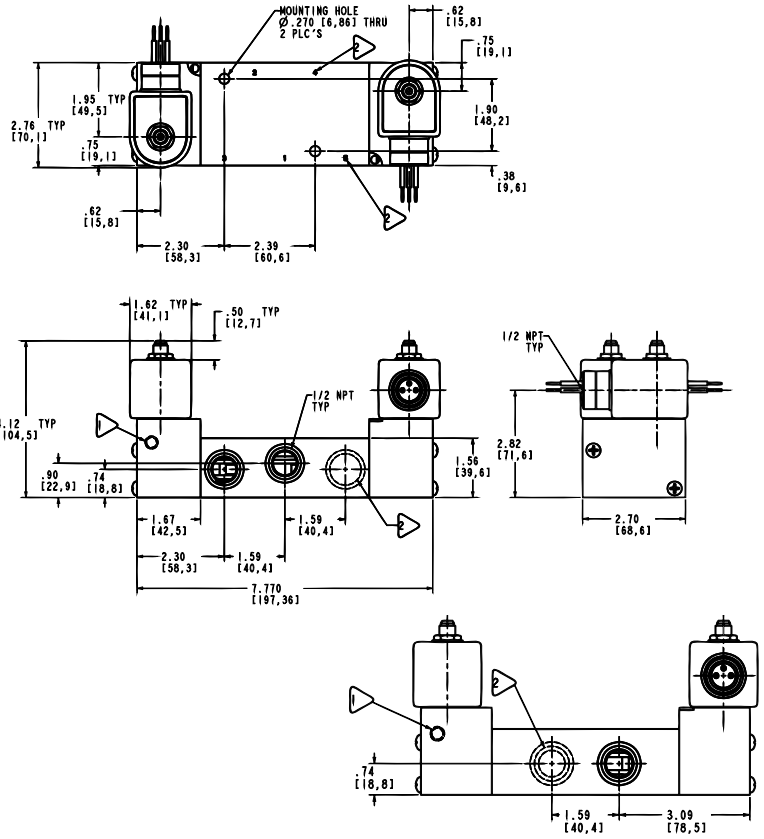
Valve Reference D51





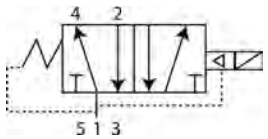
4-Way 2 position dual solenoid

Port Identification:
1-Pressure/2, 4-Cylinder/3, 5-Exhaust



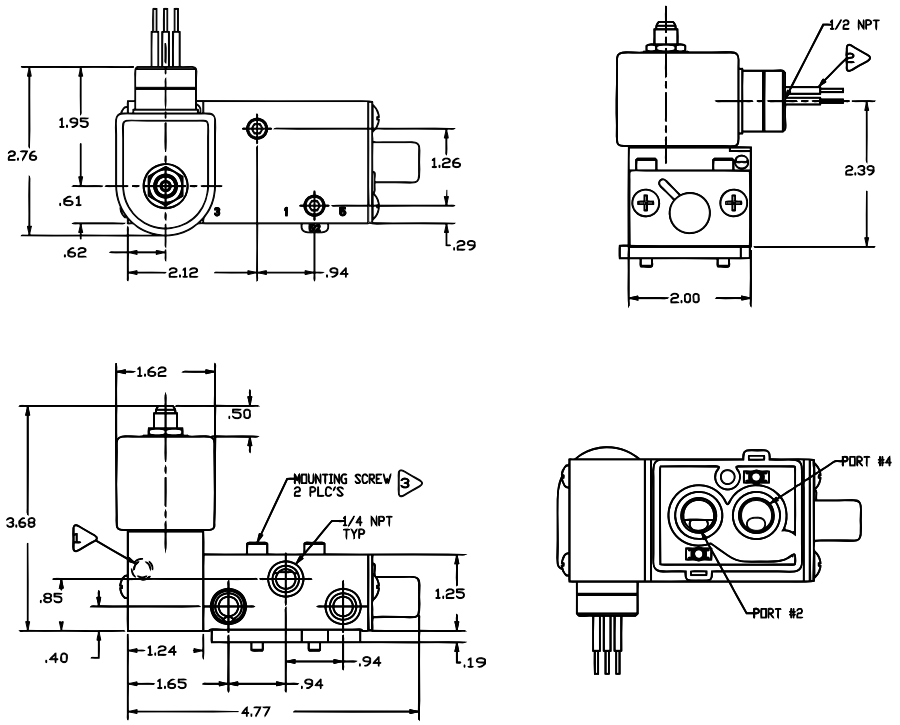
Valve Reference D62





5/2, 4-Way 2 Position Single Solenoid

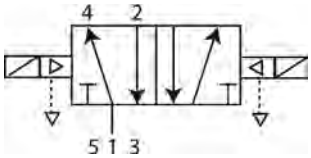
Port Identification:
1-Pressure/2, 4-Cylinder/3, 5-Exhaust



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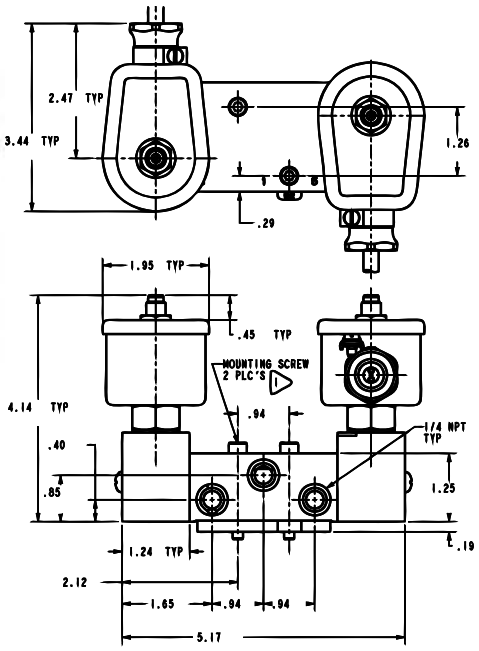
Valve Reference D63

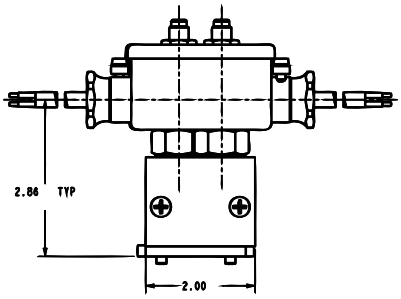


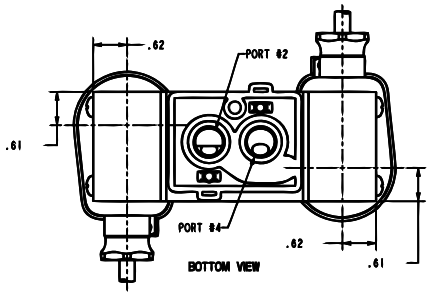


5/2, 4-Way 2 Position Dual Solenoid

Port Identification:
1-Pressure/2, 4-Cylinder/3, 5-Exhaust







Specialty

Intrinsically Safe

Coil and Enclosure Information

Important: The intrinsically safe supply circuit should have enough capacity in all environmental and system conditions to insure delivery of at least the minimum specified operating current of the coil. Be sure to include the internal coil resistance and the bridge rectifier resistance (where applicable) when calculating circuit parameters.

Splice Box Enclosure with Strain Relief Egress Specifications:

Protection Class
- IP 65 according to DIN 40050 and IEC 529 standards. Equivalent to NEMA 4 Watertight.

Construction
- Polyamid with fiberglass enclosure and cover.

Electrical Entry and Connections
- Cable entry through a blue cable gland M20 X 1.5. Screw terminals for leads 3 x 1.5mm. Additional ground connection possible with external screw terminal.

Enclosure
- Coil, printed circuit and other parts for I.S. specifications are completely encapsulated within the enclosure using epoxy material.

Dielectric Strength
- Greater than 500 V rms

Bridge Rectifier Resistance
- Less than 50 ohms at 29mA

Coil Internal Resistance
- 295 ohms at 20°C

Voltage
- 24 VDC nominal

Minimum Operating Current
- 29 milliamps

Coil Temperature Rise
- Less than 5°C

Maximum Enclosure Temperature
- <85°C (corresponding to T6 class) according to ATEX.

Ambient Temperature
- -13°F to + 149°F (-25°C to +65°C)

F.M. Entity Parameters
- Vmax = 30 volts
- Imax = 100 mA
- Ci = 0
- Li = 0 mH

Options
- 1/2" NPT Conduit Hub Adaptor. Order part number U22-001.

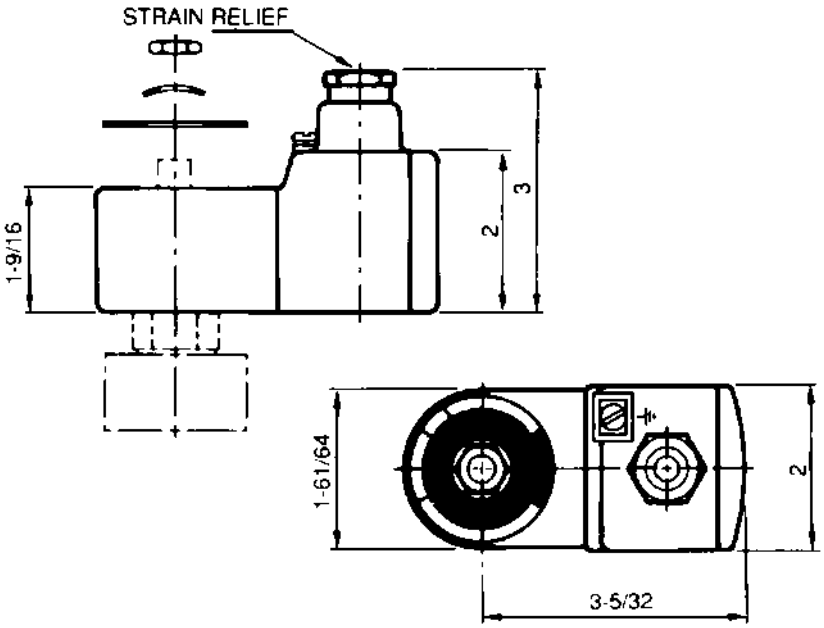
Electrical Parts

Reference Number	Approvals	Classification
490885	FM/CSA LCIE 02 ATEX 6024X	Class I, Div. 1, Groups A,B,C,D, Class II, Div. 1, Groups E,F,G Class III, Div. 1 tD A20 IP66 T80°C
488650.01	LCIE 02 ATEX 6066X	Ex ia IIC T6, tD A20 IP66 T80°C

Specialty

Valve Reference D46





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Intrinsically Safe

Coil and Enclosure Information

Potted Lead Wire Coil with Strain Relief Egress Specifications

Protection Class
- IP 67 according to DIN 40050 and IEC 529 standards. Equivalent to NEMA 4 Watertight.

Construction
- Epoxy coated metal enclosure and cover.

Electrical Entry and Connections
- Fixed and potted two core (2 x 1mm^2) blue connection cable of 2m length. Other cable lengths on request. Entry cable gland pg 11 (18.6mm) (DIN 46320). Additional ground connection possible with external screw terminal.

Enclosure
- Coil, welded lead connections, printed circuit and other parts for I.S. specifications are completely encapsulated within the enclosure using epoxy material.

Dielectric Strength
- Greater than 500 V rms

Bridge Rectifier Resistance
- Less than 50 ohms at 29mA

Coil Internal Resistance
- 295 ohms at 20°C

Voltage
- 24 VDC nominal

Minimum Operating Current
- 29 milliamps

Coil Temperature Rise
- Less than 5°C

Maximum Enclosure Temperature
- <85°C (corresponding to T6 class) according to ATEX.

Ambient Temperature
- -40°F to + 149°F (-40°C to +65°C)

F.M. Entity Parameters
- Vmax = 30 volts
- Imax = 100 mA
- Ci = 0
- Li = 0 mH

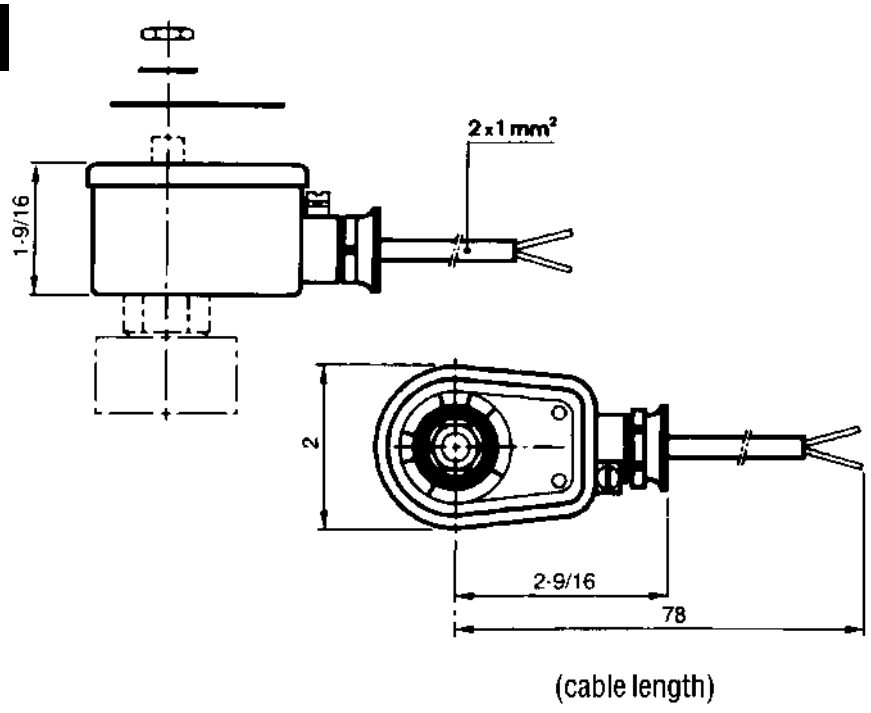
Options
- 1/2" NPT Conduit Hub Adaptor. Order part number U22-001.

Electrical Parts

Reference Number	Approvals	Classification
490890	FM/CSA LCIE 02 ATEX 6024X	Class I, Div. 1, Grps A,B,C,D Class II, Div. 1, Grps E,F,G Class III, Div. 1 tD A20 IP66 T80°C
488660.01	LCIE 02 ATEX 6024X	Ex ia IIC T6

Valve Reference D47





Intrinsically Safe

Coil and Enclosure Information

Splice Box Enclosure with Booster Circuit and Strain Relief Egress Specifications

Protection Class

- IP 65 according to DIN 40050 and IEC 529 standards. Equivalent to NEMA 4 Watertight.

Construction

- Polyamid with fiberglass enclosure and cover.

Electrical Entry and Connections

- Screw terminals within terminal box. Cable connection through M20x1.5 cable gland. Additional ground connection possible with external ground terminal.

Enclosure

- Coil, printed circuit and other parts for I.S. specifications are completely encapsulated within the enclosure using epoxy material.

Booster Circuits

- The electronic booster circuit consists of capacitor, diodes, thyristor and Zener diode.

Voltage

- Nominal: 24 VDC nominal
- Maximum: 28 VDC
- Minimum at Attraction: 21.6 VDC Circuit design must ensure that at least 21.6 VDC is available at the solenoid for proper operation.

Minimum Holding Current

- 60 mA

Coil Temperature Rise

- Less than 5°C

Maximum Enclosure Temperature

- <85°C (corresponding to T6 class) according to ATEX.

Ambient Temperature

- 13°F to + 140°F (-25°C to +60°C)

Required Time Delay for Renewed Valve Actuation after Booster Discharge

- Approximately 1-3 seconds at nominal voltage

Duty Cycle

- 100% solenoid duty

Options

- 1/2" NPT Conduit Hub Adaptor. Order part number U22-001.

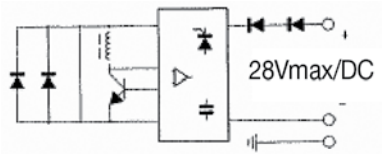
Electrical Parts

Reference Number	Approvals	Classification
495910	LCIE 03 ATEX 6464X	Ex ia IIC T6, T5, T4, Ex ia IIB T6, T5, T4, tD A20 IP67 T130°C/T95°C/T80°C

Specialty

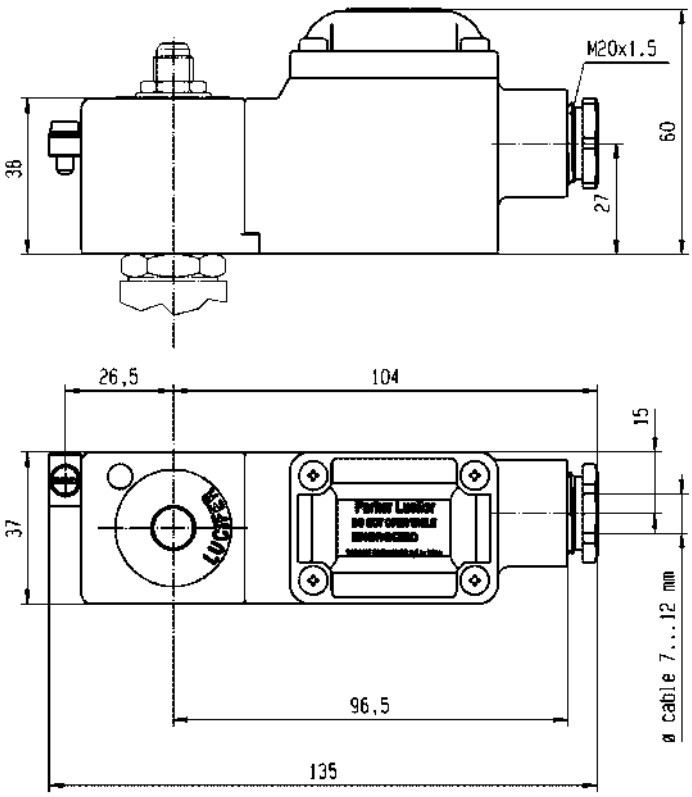
Valve Reference D48





Wiring Schematic for Booster Circuit

Note: Dimensions are shown in millimeters



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Intrinsically Safe

Valve ordering information

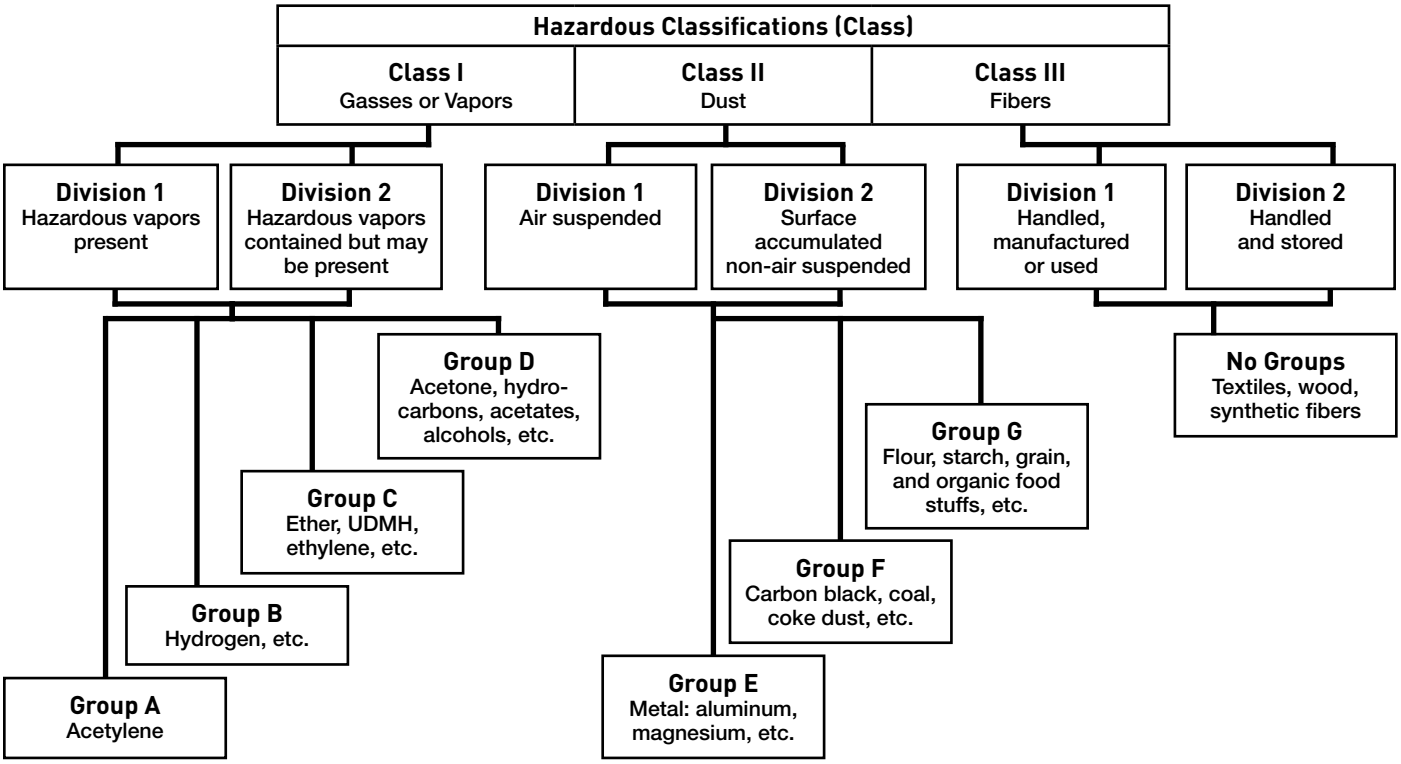
Pressure Vessel Part Number	Coil Part Numbers* and Descriptions				
	495910N7 **Ex ia II T6 IP67** **Ex tD A20 T80°C IP67** **28VDC max** **Encapsulated DIN Coil with Terminal Box & Cable Gland Connector with booster circuit**	**490885L8** **Ex ia IS I/II/III/1 ABCDEFG** **24VDC Nominal** **Coil with Splice Box and Strain Relief Egress, rectification diodes, 30VDC max, FM/CSA Cl1 Div 1, 3W**	**490890L8** **Ex ia IS I/II/III/1 ABCDEFG** **24VDC Nominal** **Potted Coil with Lead Wires and Strain Relief Egress 30VDC max FM/CSA Cl1 Div 1, 3W**	**48866001N7** **II 1 G-Ex ia IIC T6** **II 1 D -80°C 24VDC Nominal** **Potted Coil with Lead Wires and Strain Relief Egress 28VDC max 3W**	**48865001N7** **Ex ia IIC T6** **Ex tD A20 T80C IP66** **24VDC** **Nominal Coil with Splice Box and Strain Relief Egress 28VDC max 3W**
U121K0490	X	X	X	X	X
U121K0690	X	X	X	X	X
U121K0890	X	X	X	X	X
U131E0390	obsolete	obsolete	obsolete	obsolete	obsolete
U131K0490	X	X	X	X	X
U131K0690	obsolete	obsolete	obsolete	obsolete	obsolete
U131K0890	obsolete	obsolete	obsolete	obsolete	obsolete
U131V5490	X	X	X	X	X
U321G3690	X	X	X	X	X
U321G3990	X	X	X	X	X
U321G4090	X	X	X	X	X
U321H1590	X	X	X	X	X
U331B7490	X	X	X	X	X
U331L2190	X	X	X	X	X
U341B3490	X	X	X	X	X
U341L2190	X	X	X	X	X
U347L1190	X	X	X	X	X

*Coil Part Numbers ending in 'N7' are ATEX and those ending in 'L8' are FM/CSA listed
*Drop the first two digits ('49' or '48') of the coil part number and add to Pressure Vessel Part Number to create the complete valve part number (i.e. U121K0490 with coil 495910N7 becomes U121K04905910N7)

Note: For U133X5196 and U033X5196, consult factory for available coils and enclosures

Hazardous (Classified) Locations

(In accordance with Article 500, National Electrical Code-1984)



Hazardous Atmosphere Classifications

Typical Gasses in Atmosphere Class I	UK and ATEX (BS5501: Part 1 EN 50 014)	US National Electrical Code Group
Ethane, propane, butane, pentane, hexane, heptane, octane , nonane, decane, acetic acid, acetone, methanol, toluene, ethyl acetate	IIA	Group D
Ethylene, Coke, oven gas, dimethyl ether, diehyl ether, ethylene oxide	IIB	Group C
Hydrogen	IIC	Group B
Carbon Disulphide		No Classification
Acetylene		Group A
Ethyl Nitrate		No Classification
Typical Dusts in Atmosphere Class I	**UK and ATEX**	**US National Electrical Code Group**
Metal	No Classification	Group E
Carbon/Coal	No Classification	Group F
Grain	No Classification	Group G

Surface Temp/Agency Code Cross Reference

Maximum Surface Temperature	US Standard (U. L.)		ATEX
450°C	T1		T1
300°C	T2	T2a - 280°C T2b - 260°C T2c - 230°C T2d - 215°C	T2
200°C	T3	T3a - 180°C T3b - 165°C T3c - 160°C	T3
135°C	T4	T4a - 120°C	T4
100°C	T5	T5	T5
85°C	T6	T6	T6

Hazardous Area Classifications

Description	US	ATEX
An explosive atmosphere is continuously present	Division I	Zone 0
An explosive atmosphere is intermittently present during normal operations	Division I	Zone 1
An explosive atmosphere is present during abnormal conditions	Division II	Zone 2

Note: These charts are provided for reference only. Consult the U.S. National Electrical Code or rating agencies such as Factory Mutual or Underwriter's Laboratories for specific details.

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3-Way Manual Reset

Direct Acting & Pilot Operated Valves



General Description:



3-Way Manual Reset solenoid valves are designed to start and stop the flow of media as the result of an electrical signal. This can be a problem in some power outage situations were the valve must remain in the no voltage supplied position until the system is manually restarted. Manual reset valves have an added safety device to address this issue. When the manual reset device is triggered, the valve remains in the at rest position until the reset mechanism is manually latched.

Pilot operated versions require minimum operating pressure differential for proper operation.

Installation:
Valves can be mounted in any position.

Specialty

Mechanical Characteristics:

Standard Materials of Construction
- Body — brass or stainless steel (430)
- Seals — NBR or FKM seals as listed
- Sleeve tube — stainless steel (303 or 304)
- Plunger — stainless steel (430FR)
- Shading ring — copper
- Stop — stainless steel (430FR)
- Springs — stainless steel (18-8)
- Pilot orifice — stainless steel (303)

Compatible Fluids
- Depending on the valve used, most common media including air, inert gases or petroleum products.
- Hydraulic Fluids

Electrical Characteristics:

Voltages
- AC — 120/60–110/50
  240/60–220/50
- DC — 12, 24 & 120

Power Consumption
- 10, 22 watts

Agency Approvals
- cUL listed.

Maximum Ambient Temperature
149°F

Applications:
- Pilot control on process valves
- Fluid “circuit breakers” requiring manual intervention to reset after being tripped (safety feature).

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3-Way Direct Acting Stainless Steel Valves — Normally Closed, NBR or FKM Seals

Port Size NPT	Orifice Size In.		Flow Factor Cv		Operating Pressure Differential (PSI)					No-Voltage Release Pressure Vessel Number	Valve		
					Min.*	Maximum					Coil		Ref.
						AC Ratings		DC Ratings					
	In	Exh.	In	Exh.		10 Watt	22 Watt	10 Watt	22 Watt		AC	DC	
1/4"	3/64	3/32	0.062	0.17	0	200			200	70315SN2EVVR	7	8	D51
1/4"	1/16	3/32	0.11	0.17	0	150			150	70315SN2GVVR	7	8	D51
1/4"	3/32	3/32	0.17	0.17	0	90			90	70315SN2KVVR	7	8	D51

3-Way Pilot Operated - Brass Valves — Normally Closed or NBR Seals

Port Size NPT	Orifice Size in.	Cv Factor	Operating Pressure Differential (PSI)					No-Voltage Release Pressure Vessel Number	Valve		
			Min.*	Maximum					Coil		Ref.
				AC Ratings		DC Ratings					
				10 Watt	22 Watt	10 Watt	22 Watt		AC	DC	
1/2"	1/2	3.6	10	180			180	70312BN4UNVR	7	8	D51

* Pilot operated valves require the minimum pressure differential specified for proper valve operation.

3-Way Direct Acting Brass Valves — Universal All-Ports-In-Body, FKM Seals

Port Size NPT	Orifice Size In.		Flow Factor Cv		Operating Pressure Differential (PSI)					No-Voltage Release Pressure Vessel Number	Valve		
					Min.*	Maximum					Coil		Ref
						AC Ratings		DC Ratings					
	In	Exh.	In	Exh.		10 Watt	22 Watt	10 Watt	22 Watt		AC	DC	
1/4"	5/64	5/64	0.14	0.14	0	100			100	7033TBN2JVVR	7	8	D51
1/4"	1/8	1/8	0.23	0.23	0	50			50	7033TBN2NVVR	7	8	D51

3-Way Direct Acting 316L Stainless Steel Valves — Intrinsically Safe, NBR Seals

Port Size NPT	Orifice Size in.	Cv Factor	Operating Pressure Differential (PSI)					No-Voltage Release Pressure Vessel Number	Valve	
			Min.*	Maximum					Coil	Ref.
				AC Ratings		DC Ratings				
				10 Watt	22 Watt	10 Watt	22 Watt			
1/4"	3/16	0.53	0	145			145	U033X5156*	*	D40

*Consult factory for available coil/enclosure options.

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Principles of Operation

No Voltage release models

3-Way Normally Closed Valves

These valve types can only be actuated (opened) when the coil is energized and the hand lever is manually moved downward to the latched valve-open position. If the coil is not energized, the mechanism will not become latched in this position, as soon as the hand lever is released, it will return to the unlatched valve-closed position. The hand lever mechanism can only be engaged when the coil is energized. When the solenoid coil is de-energized, the handle and the mechanism are automatically tripped at the valve is returned to its original normally closed, unlatched position.

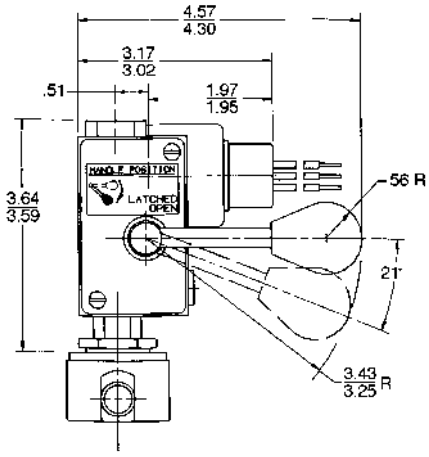
3-way Normally Open Valves

The principles of operation for normally open valves are identical to the normally closed version except the valve's de-energized position is normally open.

Valve Reference D51

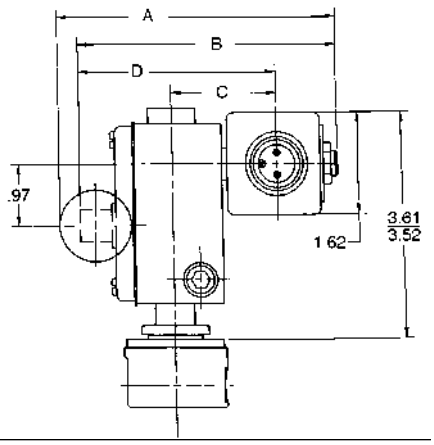


3-Way Normally Closed



Dimensions apply to
Manual Reset feature only.

Dimension	No-Voltage Release	Electrically Tripped
A	4.64	4.40
B	4.31	4.07
C	1.79	1.59
D	3.26	3.06



Specialty

Valve Specifications

70312, 70315, 7033T Part Numbers		U033 Part Numbers Intrinsically Safe Valves
Valve Function	Multipurpose or Normally Closed	Multipurpose
Port Size	¼" NPT or ½" NPT	¼" NPT
Body Material	Brass or Stainless Steel	Stainless Steel
Seal Material	FKM or NBR	FKM
Coil Temperature Rating	Class F or Class H	Not Applicable
Power Consumption	10 Watt for AC or 22 Watt for DC	3 Watt
Voltage	120/60 - 110/50, 24 VDC	24 – 28 VDC
Coil Enclosure	½" Conduit for Hazardous Locations	Splice Box Enclosure with Strain Relief
Maximum Fluid Temperature	180°F	167°F
Max Ambient Temperature	104°F	149°F

Notes

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2-Way & 3-Way Hydraulic

Direct Acting Valves
1/8" NPT



General Description:

2-Way & 3-Way hydraulic direct acting valves are specifically designed for use in hydraulic systems. These valves are spool type valves that can withstand a static pressure up to 3000 PSI. All internal parts are compatible with most hydraulic fluids.

Installation
Valves can be mounted in any position. Preferred orientation is with the coil vertical and upright.

Standard Materials of Construction
- Body—Stainless Steel (430F)
- Seals—Metal
- Flange Seal—NBR
- Sleeve Tube—Stainless Steel (304)
- Plunger—Stainless Steel (430FR)
- Stop—Stainless Steel (430FR)
- Springs—Stainless Steel (18-8)
- Shading Ring—Copper
- Spool—Stainless Steel (17-4PH)

Compatible Fluids
- Hydraulic Fluids



Specialty

Electrical Characteristics:

Voltages
- AC—24/60
  120/60–110/50
  240/60–220/50
- DC—12, 24 & 120

Power Consumption
- 10, 14, 21 watts

Coil Classification
- Class F Standard
- Class H available (71211, 71221, 71331)
- Class B Coils Standard on (A11, A12, A13, A15, A16)

Agency Approvals
- UL and CSA approvals are available on valves with applicable coil/enclosure combinations. (Models 71211, 71221 and 71331 only)
- Models A11, A12, A13, A15 & A16 do not carry any agency approvals

Maximum Ambient Temperature
- 185°F

Maximum Allowable Leakage
- Maximum Allowable Internal Seat Leakage at 70° F with MIL-H-5606 oil is 80cc/min at 1000 PSI. (Models 71211, 71221 and 71331)
- Maximum Allowable Internal Seat Leakage at 70° F with MIL-H-5606 oil is 295cc/min at 3000 PSI. (Models A11, A12, A13, A15, A16)
- External — None (All models)

Applications:

- Hydraulic Cylinders
- Lift Trucks
- Machine Tools
- Sky Cranes
- Hydraulic Door Openers

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2-Way High Pressure Hydraulic Valves - Normally Closed - Stainless Steel

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI					Max. Media Temp. °F	Seal	Pressure Vessel Number	Reference	
			Min.	Max. Static Pressure (PSI)	Max. Diff Pressure (PSI)	Max. Flow (GPM)	Watt				Coil	Valve
AC TECHNICAL SPECIFICATIONS												
1/8	3/32	0.15	0	3000	3000	8.5	21	185	Metal	A12LB13002	*	D28
1/8	7/64	0.21	0	1000	900	6.5	10	185	Metal	71211SN1MM00	7	D26
DC TECHNICAL SPECIFICATIONS												
1/8	3/32	0.15	0	3000	3000	8.5	14	185	Metal	A126LB13001	*	D28
1/8	7/64	0.21	0	1000	900	6.5	10	185	Metal	71211SN1MM00	7	D26

2-Way High Pressure Hydraulic Valves - Normally Open - Stainless Steel

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI					Max. Media Temp. °F	Seal	Pressure Vessel Number	Reference	
			Min.	Max. Static Pressure (PSI)	Max. Diff Pressure (PSI)	Max. Flow (GPM)	Watt				Coil	Valve
AC TECHNICAL SPECIFICATIONS												
1/8	3/32	0.15	0	3000	3000	9.0	21	185	Metal	A11LB13002	*	D28
1/8	7/64	0.21	0	1000	700	5.7	10	185	Metal	71221SN1MM00	7	D26
DC TECHNICAL SPECIFICATIONS												
1/8	3/32	0.15	0	3000	3000	9.0	14	185	Metal	A116LB13001	*	D28
1/8	7/64	0.21	0	1000	700	5.7	10	185	Metal	71221SN1MM00	7	D26

3-Way High Pressure Hydraulic Valves - Normally Closed - Stainless Steel

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI					Max. Media Temp. °F	Seal	Pressure Vessel Number	Reference	
			Min.	Max. Static Pressure (PSI)	Max. Diff Pressure (PSI)	Max. Flow (GPM)	Watt				Coil	Valve
AC TECHNICAL SPECIFICATIONS												
1/8	3/32	0.15	0	3000	1000	5.7	21	185	Metal	A13LB13002	*	D29
1/8	3/32	0.15	0	3000	2000	7.0	21	185	Metal	A13LB13002	*	D29
DC TECHNICAL SPECIFICATIONS												
1/8	3/32	0.15	0	3000	1000	5.7	14	185	Metal	A136LB13001	*	D29
1/8	3/32	0.15	0	3000	2000	7.0	14	185	Metal	A136LB13001	*	D29

* For coil information see chart on bottom of the next page.

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3-Way High Pressure Hydraulic Valves - Normally Open - Stainless Steel

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI					Max. Media Temp. °F	Seal	Pressure Vessel Number	Reference	
			Min.	Max. Static Pressure (PSI)	Max. Diff Pressure (PSI)	Max. Flow (GPM)	Watt				Coil	Valve
AC TECHNICAL SPECIFICATIONS												
1/8	3/32	0.15	0	3000	3000	9.0	21	185	Metal	A15LB13002	*	D29
1/8	3/32	0.15	0	3000	3000	8.5	21	185	Metal	A15LB13002	*	D29
DC TECHNICAL SPECIFICATIONS												
1/8	3/32	0.15	0	3000	3000	9.0	14	185	Metal	A156LB13001	*	D29
1/8	3/32	0.15	0	3000	3000	8.5	14	185	Metal	A156LB13001	*	D29

3-Way High Pressure Hydraulic Valves - Directional Control - Stainless Steel

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI					Max. Media Temp. °F	Seal	Pressure Vessel Number	Reference	
			Min.	Max. Static Pressure (PSI)	Max. Diff Pressure (PSI)	Max. Flow (GPM)	Watt				Coil	Valve
AC TECHNICAL SPECIFICATIONS												
1/8	3/32	0.15	0	3000	2000	7.0	21	185	Metal	A16LB13002	*	D29
1/8	3/32	0.15	0	3000	2000	7.0	21	185	Metal	A16LB13002	*	D29
DC TECHNICAL SPECIFICATIONS												
1/8	3/32	0.15	0	3000	1000	7.0	14	185	Metal	A166LB13001	*	D29
1/8	3/32	0.15	0	3000	2000	7.0	14	185	Metal	A166LB13001	*	D29

3-Way High Pressure Hydraulic Valves - Universal - Stainless Steel

Port Size NPT	Orifice Size in.	Flow Factor Cv	Operating Pressure Differential (MOPD) PSI					Max. Media Temp. °F	Seal	Pressure Vessel Number	Reference	
			Min.	Max. Static Pressure (PSI)	Max. Diff. Pressure (PSI)	Max. Flow (GPM)	Watt				Coil	Valve
AC TECHNICAL SPECIFICATIONS												
1/8	7/64	0.21	0	1000	See Table 1 (Top of next page)		10	185	Metal	71331SN1MM00	7	D27
DC TECHNICAL SPECIFICATIONS												
1/8	7/64	0.21	0	1000	See Table 1 (Top of next page)		10	185	Metal	71331SN1MM00	7	D27

Figure 1*

Voltage	**24/60**	**120/60**	**240/60**	**12VDC**	**24VDC**
Coil Code	AB2A44	AB6A46	AB8A48	DC1A22	DC2A23
Coil Part Number*	AB720S24	AB728S24	AB731S24	A7724F24	A7727F24

*When ordering a replacement coil, use Coil Part Number (not Coil Code)

*Select the Series A pressure vessel model number as shown above and follow with the appropriate coil/enclosure part number based or required voltage from Fig. 1
Example A15LB13002 for 120/60 becomes part number A15LB13002AB6A46
Example A166LB13001 for 12VDC becomes part number A166LB13001DC1A22

Table 1:
3-Way High Pressure Hydraulic Valves (Series A)
Maximum Permissible Flow & Pressure Differentials

Valve Function	Flow Path	Maximum Pressure Differential (PSI)	Maximum Flow (GPM)
3-Way Normally Closed	Port 1 to Port 2	1000	5.7
	Port 2 to Port 3	1000	7.0
3-Way Normally Open	Port 3 to Port 2	3000	9.0
	Port 2 to Port 1	3000	8.5
3-Way Universal (Directional)	Port 2 to Port 3	2000	7.0
	Port 2 to Port 1	2000	7.0

Flow Limits
The spool in A10 Series valves will fail to shift when the flow exceeds the maximum rated value. Each catalog listing indicates the flow and pressure drop for which these valves will operate without malfunction.

The static pressure listed for each valve will not adversely affect valve operation as long as the rated flows and pressure differentials are not exceeded. The maximum flows (GPM) and pressure differentials (PSI) are based on Mil-H-5606A hydraulic oil at 80°F.

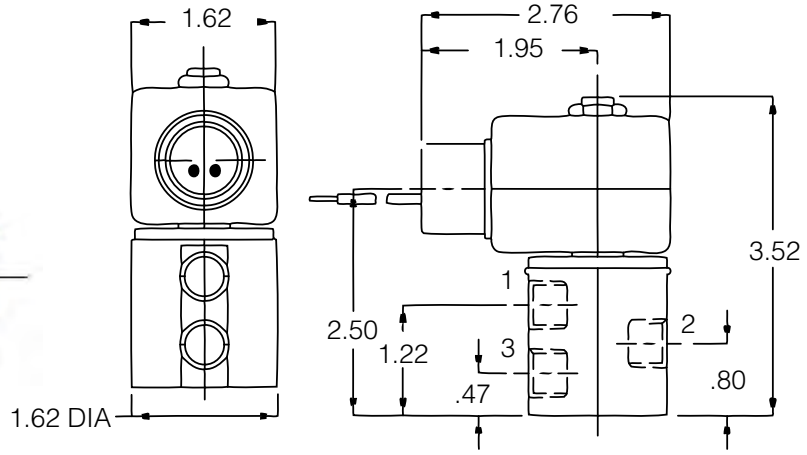
Response Times: AC = Approximately 4-8 ms to open or close
DC = Approximately 15-30 ms to open, 15-25 ms to close.
Operating Speed: Up to 300 cycles per minute

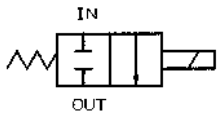
Valve Reference D26



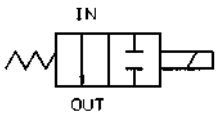
Port Identification:

71211	71221
1-IN	1-Plug
2-OUT	2-OUT
3-Plug	3-IN

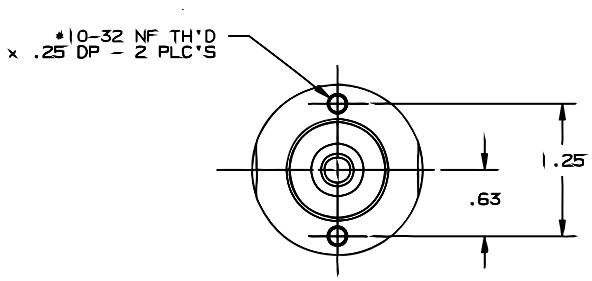




71211
2-Way Normally Closed



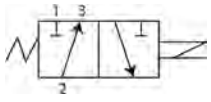
71221
2-Way Normally Open



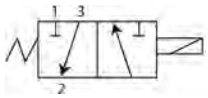
Parker Hannifin Corporation
Fluid Control Division
1 800 825 8305 (1 800 Valve05)
www.parker.com/fcd

Valve Reference D27

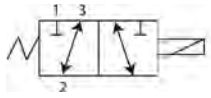




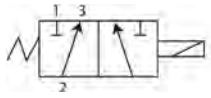
3-Way Normally Closed



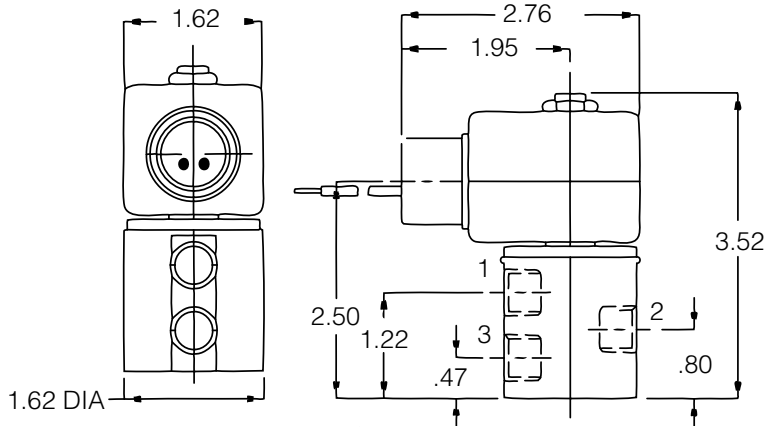
3-Way Normally Open

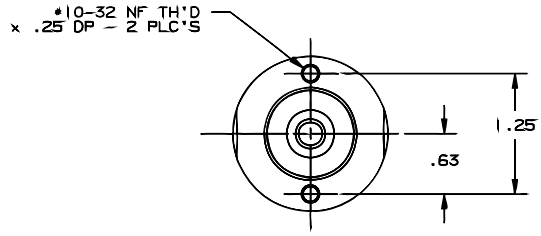


3-Way Universal



3-Way Diverting



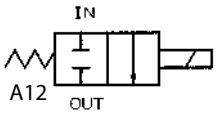


Port Identification:				
	NC	NO	Universal	Directional Control
1	Pressure	Exhaust	NC	NC
2	Cylinder	Cylinder	Cylinder	IN
3	Pressure	Pressure	NO	NO

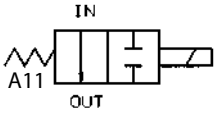
Specialty

Valve Reference D28

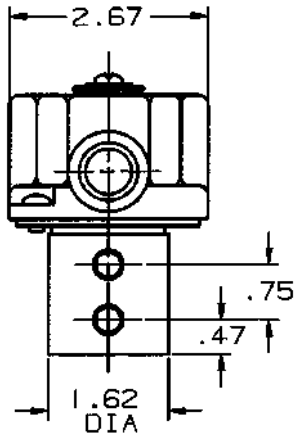


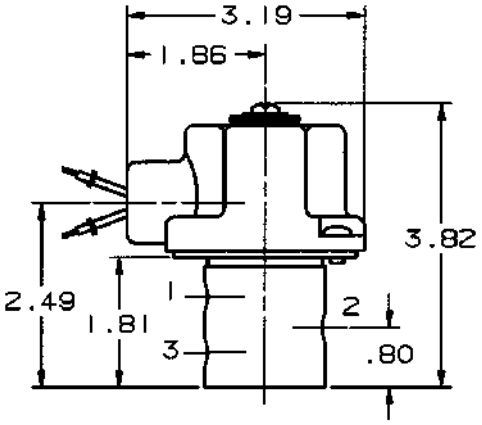


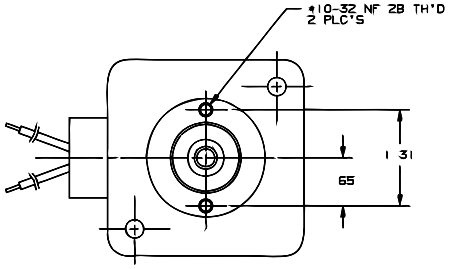
2-Way Normally Closed



2-Way Normally Open



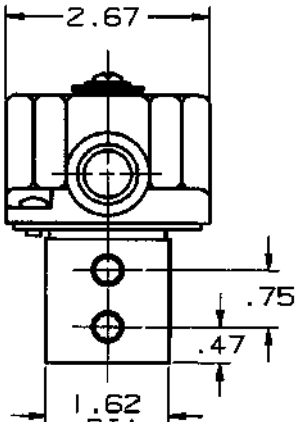


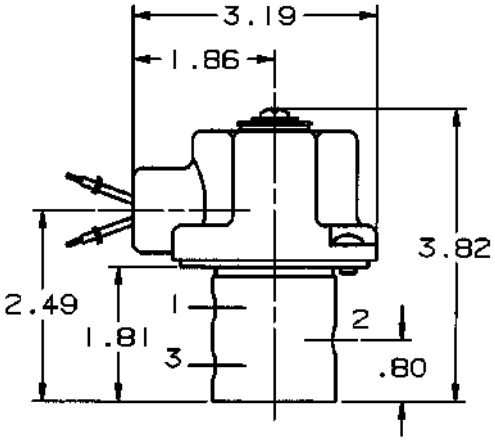


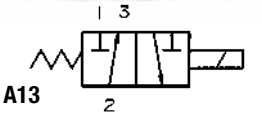
Port Identification	
A11	A12
1-plugged	1-IN
2-OUT	2-OUT
3-IN	3-Plugged

Valve Reference D29

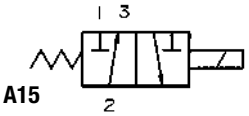




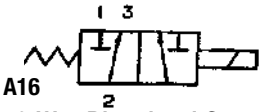




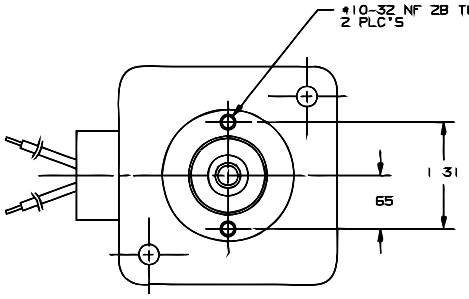
A13
3-Way Normally Closed



A15
3-Way Normally Open



A16
3-Way Directional Control



Port Identification		
A13	**A15**	**A16**
1-IN	**1-Exhaust**	**1-Normally Closed**
2-Cylinder	**2-Cylinder**	**2-In**
3-Exhaust	**3-IN**	**3-Normally Open**

Notes

Parker Hannifin Corporation
Fluid Control Division
1 800 825 8305 (1 800 Valve05)
www.parker.com/fcd

Magnelatch® Coil Option

Magnelatch® coil option eliminates power consumption and heat rise



General Description:

Solenoid valves are typically operated by an on/off coil that remains on, generates heat, and consumes power while operating. Power consumption can be a problem for continuous duty applications.

Parker Fluid Control Division offers a no power solution for your non-safety shut-off applications. This solution is the Magnelatch® coil option. This coil option is offered on the products in this section.

The Magnelatch® operator contains a permanent magnet that is shifted on (latched) or off (released) by a momentary electrical current pulse of approximately twenty milliseconds (.02 seconds).

The conventional solenoid valve is in one of two positions – off or de-energized, or on – energized. The Magnelatch® requires no continuous power thus the term latch position is used for on and release position for off. Valves with Magnelatch coils remain in their last energized position and do not return to their de-energized position in the event of a power outage.

Magnelatch coils are not available on valves for steam service.

Valves with Magnelatch coils have the same pressure rating as that valve with a 10 watt coil.



Applications:

Instrumentation
No heat build up – eliminates constant calibrations and permits confinement and compactness.

Can be used with such sensors as thermistors and thermocouples.

Machine Tools
Operates with simple switches and eliminates holding relays and relayed circuitry required to sequence and position operations.

Remote Control Equipment
pulsing circuitry, low power consumption permit the use of Magnelatch® coils in many custom operations. Operation can be controlled by radio frequency or mechanical timer, etc.

Other Applications
- Medical equipment
- Transportation products
- Material handling equipment
- Solar panels
- Pilot valve on control valve (3-Way)
- Single acting Cylinder Actuation (3-way)
- Natural gas service

Wiring Circuits

Leads/Wires	Description
2	For use with standard duty DC power source

Pulse Coils - Current Draw

Latch	Release
12v DC Latch 2.10 amps.	Release 1.95 amps.

Pulse DC Operation

Minimum pulse for Latching is 10 milliseconds.
Minimum pulse for Releasing is 25 milliseconds.

Maximum “ON” time is 5 minutes with minimum “OFF” time 40 minutes. If the “ON” time is of a shorter duration, the “OFF” time would be shorter proportionally.

2-Way Direct Acting Normally Closed Stainless Steel

Port Size NPT	Orifice Size in.		Cv Flow Factor		Operating Pressure		Max. Fluid Temp. °F	Seal	DC Watt	Voltage	Wire	Enclosure	Pressure Vessel Number
	IN	Exhaust	IN	Exhaust	Min.	Air, Inert Gas							
DC													
1/8	3/64	N/A	0.06	N/A	0	450	185	NBR	18	24VDC	2	Grommet	71215SN1ENP6M2J011C2

3-Way Direct Acting Normally Closed Stainless Steel

Port Size NPT	Orifice Size in.		Cv Flow Factor		Operating Pressure (PSI)		Max. Fluid Temp. °F	Seal	DC Watt	Voltage	Wire	Enclosure	Pressure Vessel Number
	IN	Exhaust	IN	Exhaust	Min.	Air, Inert Gas, Water, Light Oil							
1/8	3/64	1/16	0.06	0.09	0	250	185	FKM	18	24VDC	2	Grommet	71315SN1EVJ1M2J011C2
1/4	3/64	1/16	0.06	0.09	0	250	185	NBR	18	12VDC	2	½" Conduit	71315SN2ENJ1M1J011C1
1/4	1/16	1/16	0.11	0.09	0	200	185	NBR	18	12VDC	2	½" Conduit	71315SN2GNJ1M1J011C1
1/4	3/32	3/32	0.17	0.17	0	125	185	NBR	18	12VDC	2	½" Conduit	71315SN2KNM5M1J011C1*
1/4	3/64	1/16	0.06	0.09	0	235	77	FKM	15	24VDC	3	Hazardous	X5RBM66890DC2A4K
1/4	1/16	1/16	0.11	0.09	0	100	77	NBR	16	12VDC	2	Hazardous	X53RBM2100DC1A9J
1/4	1/16	1/16	0.11	0.09	0	100	77	NBR	16	24VDC	2	Hazardous	X53RBM2100DC2A0K
1/4	1/8	3/32	0.23	0.17	0	50	77	NBR	16	12VDC	3	Hazardous	X5RBM64640DC1A3K

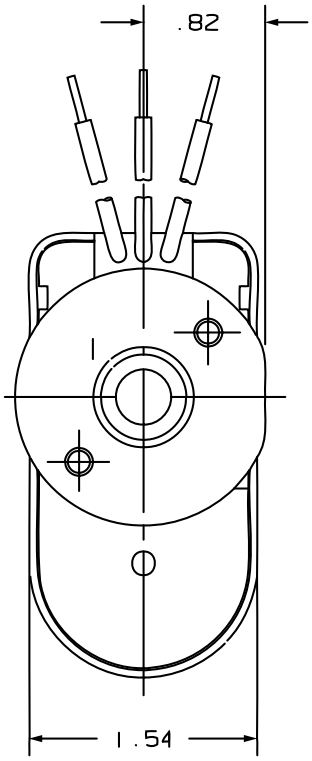
* Valve includes manual override as a standard feature

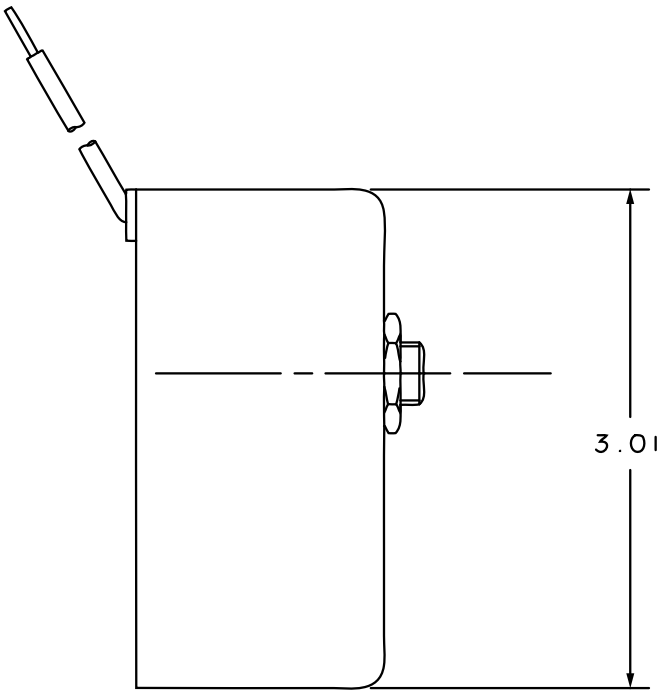
3-Way Direct Acting Universal Stainless Steel

Port Size NPT	Orifice Size in.		Cv Flow Factor		Operating Pressure		Max. Fluid Temp. °F	Seal	DC Watt	Voltage	Wire	Enclosure	Pressure Vessel Number
	N.C.	N.O.	N.C.	N.O.	Min.	Air, Inert Gas							
1/4	1/16	1/16	0.10	0.10	0	125	77	NBR	15	12VDC	3	Hazardous	X5RBM55740DC1A3K
1/4	1/16	1/16	0.10	0.10	0	125	77	NBR	15	24VDC	3	Hazardous	X5RBM55740DC2A4K
1/4	1/16	1/16	0.10	0.10	0	115	185	NBR	18	12VDC	3	½" Conduit	71335SN2GNJ1M1G011C1
1/4	3/32	3/32	0.17	0.17	0	80	185	NBR	18	12VDC	2	½" Conduit	71335SN2KNJ1M1J011C1

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www.parker.com/fcd

Valve Reference D52

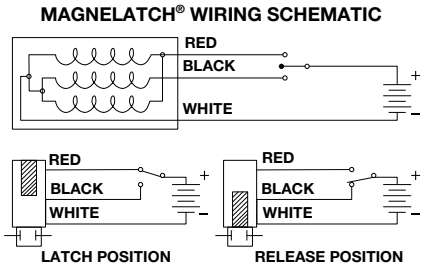




Note: Shown for coil/enclosure dimensional reference only.

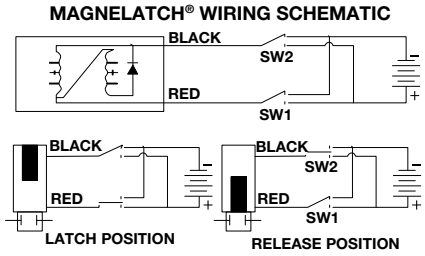
Coil Kits	Wire	DC Voltage
M1J011C1	2	12
M2G011C1	3	12
M2G011C2	3	24

3 wire - Pulse Power Source



AC voltage Magnelatch coils are available, although minimum order quantities may apply. Consult factory for further information.

2 wire - Standard Duty Power Source



Pulse DC Operation
Minimum pulse for Latching is 10 milliseconds. Minimum pulse for Releasing is 24 milliseconds

Maximum "ON" time is 5 minutes with minimum "OFF" time 40 minutes. If the "ON" time is of a shorter duration, the "OFF" time would be shorter proportionally.

Latch	Release
12VDC Latch 2.10 amps	Release 1.95 amps
24VDC Latch 1.22 amps	Release 1.21 amps

Voltage	Nominal Values Pulse Duration for Momentary Operation (Milliseconds)		Nominal Values Current Drain in Amperes	
	Latch	Release	Latch	Release
12VDC	10	12	1.40	.75
24VDC	10	25	0.710	0.380

Notes

Parker Hannifin Corporation
Fluid Control Division
1 800 825 8305 (1 800 Valve05)
www.parker.com/fcd

Dual-Flow Dispensing Valve

For the Fuel Dispensing Market



General Description:

Parker Fluid Control Division's Dual-Flow solenoid valves are designed to control two flow rates on command. The valves are actually two valves in one compact assembly using a single dual-wound coil.

The valves accurately dispense a predetermined amount of liquid by providing a high-flow (full-flow) for delivery of the bulk amount, and then switch to the low-flow mode to dispense the final amount required.

Installation:

Valves can be mounted in any position.



Specialty

Mechanical Characteristics:

Flow Sequence

Off-Low-High-Low-Off

Standard Materials of Construction:

- Body – Brass
- Seals – fluorocarbon (FKM)
- Sleeve – stainless steel
- Plunger – stainless steel (430 FR)
- Diaphragm – NBR
- Shading Ring – copper
- Springs – stainless steel

Enclosure

Explosion proof, 1/2" conduit, NEMA Type 7 (UL Class I, Groups C & D)

Electrical Characteristics:

Standard Voltages:

AC –120/60 110/50

DC & other voltages – consult factory

Power Consumption

- High flow - 15 watts
- Low flow - 8 watts

Agency Approvals

UL listed and CSA certified (ATEX and IECEx available upon request)

Coil Classification

Class F taped with 3 gasoline vapor resistant lead wires.

Applications:

- Fuel dispensing
  - Pre-pay
- Process industries (blending/mixing/batching)
  - Petrochemical
  - Refining
  - Food
  - Pharmaceutical

Maximum Ambient and Fluid Temperature

104°F

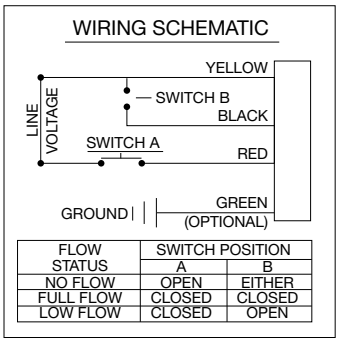
2-Way Normally Closed - XLG Fuel Dispensing - Brass

Port Size NPT	Orifice Size		Flow Factor Cv		Operating Pressure Differential PSI		Max. Media Temp. °F	Seal	Pressure Vessel Number	Reference	
	Full Flow	Low Flow	Full Flow	Low Flow	Min.	Max AC				Coil	Valve
3/4	3/4	3/32	5.5	0.17	5	50	140	FKM	XLG20600	*	D54
1	1-1/2	1/16	13	0.12	5	50	140	FKM	XLG201030	*	D61
1-1/2	1-1/4	1/16	21	0.12	5	50	140	FKM	XLG201530	*	D55

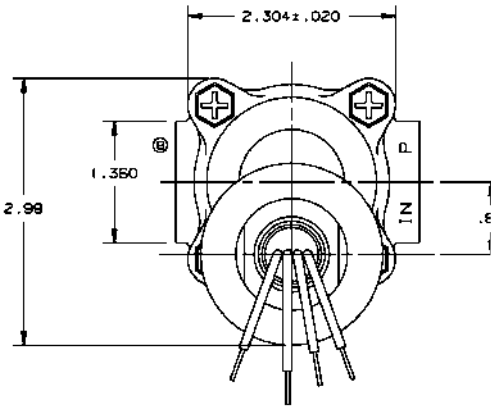
*Consult factory for coil/enclosure selection

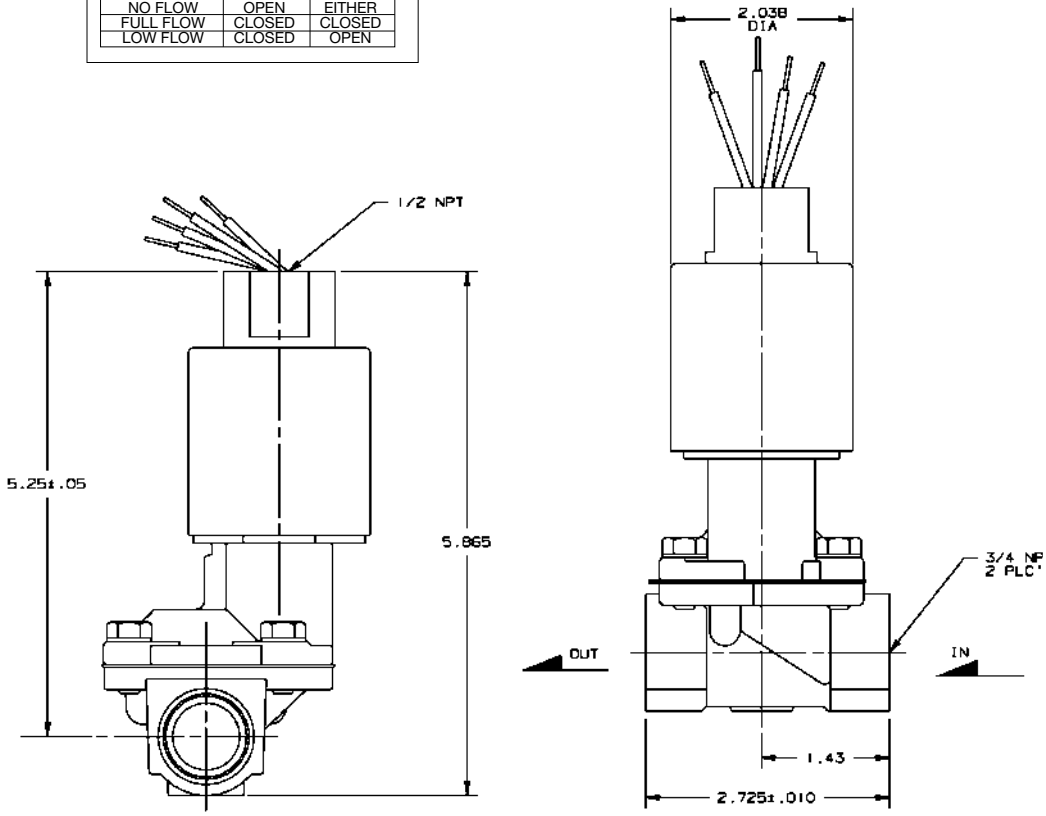
Valve Reference D54





FLOW STATUS	SWITCH POSITION	
	A	B
NO FLOW	OPEN	EITHER
FULL FLOW	CLOSED	CLOSED
LOW FLOW	CLOSED	OPEN



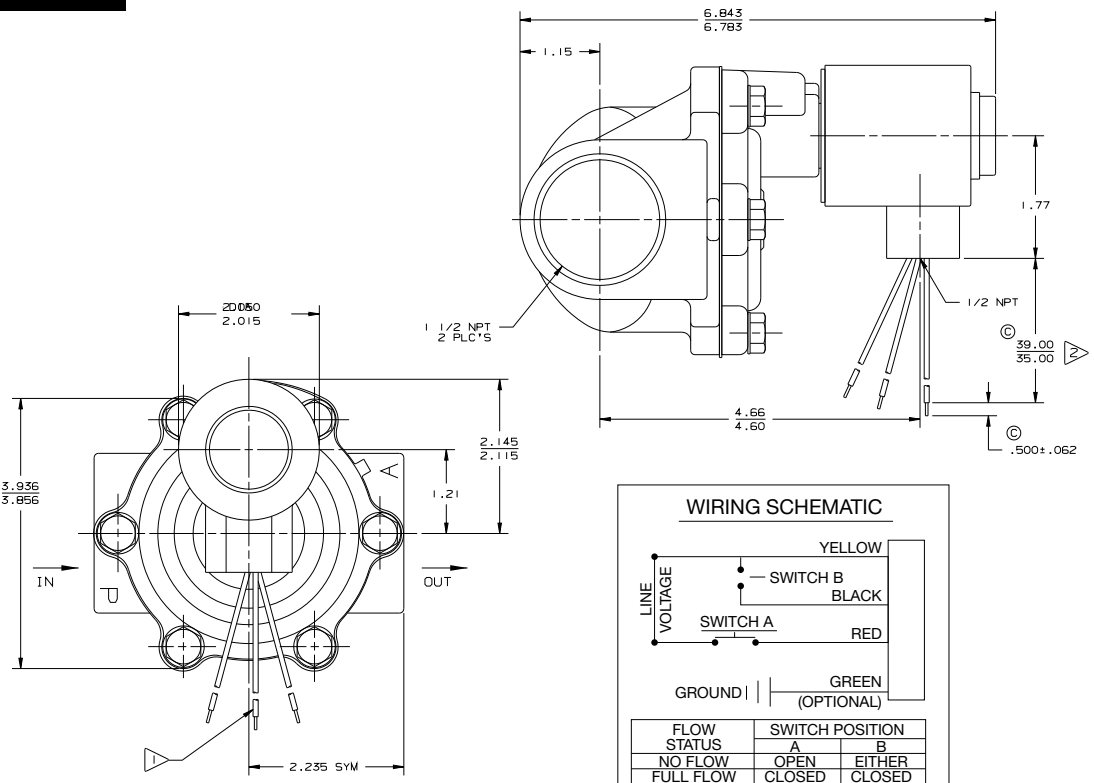


Specialty

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Valve Reference D55



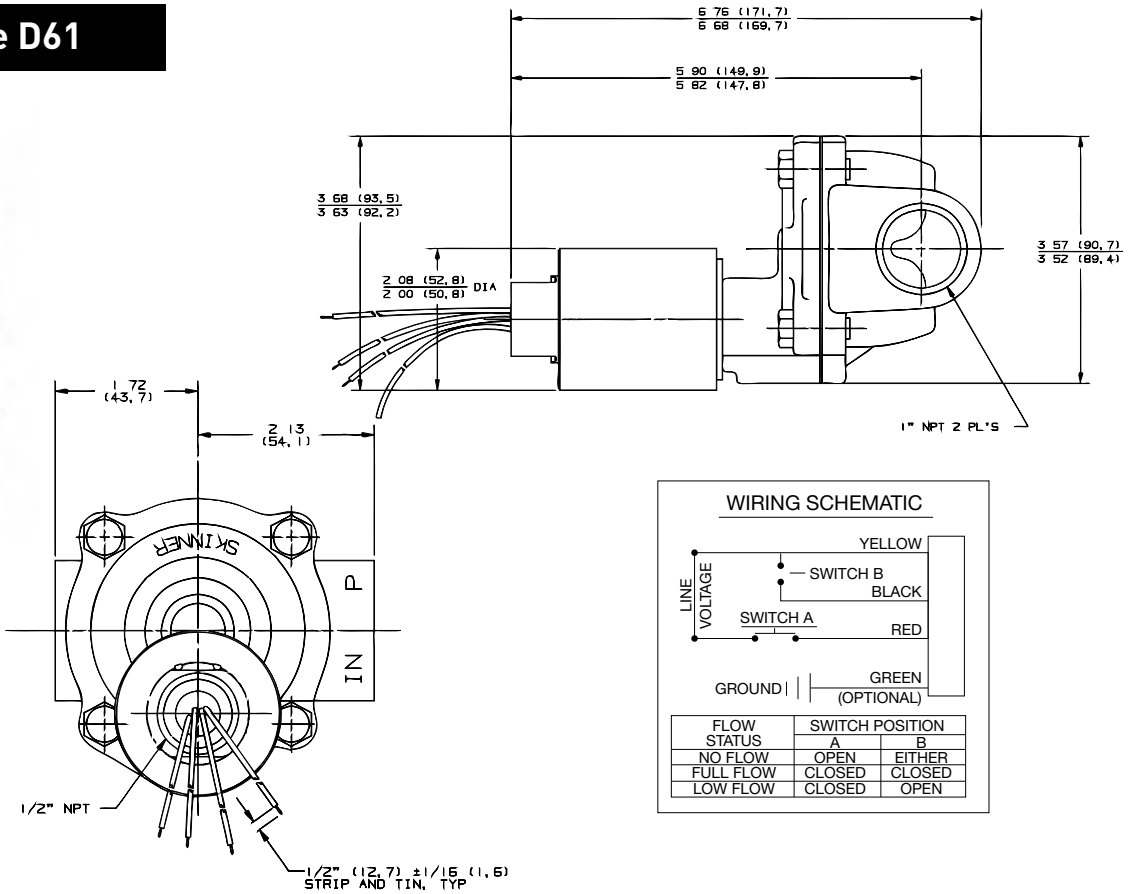


WIRING SCHEMATIC

FLOW STATUS	SWITCH POSITION	
	A	B
NO FLOW	OPEN	EITHER
FULL FLOW	CLOSED	CLOSED
LOW FLOW	CLOSED	OPEN

Valve Reference D61





WIRING SCHEMATIC

FLOW STATUS	SWITCH POSITION	
	A	B
NO FLOW	OPEN	EITHER
FULL FLOW	CLOSED	CLOSED
LOW FLOW	CLOSED	OPEN

Specialty

Notes

Parker Hannifin Corporation
Fluid Control Division
1 800 825 8305 (1 800 Valve05)
www.parker.com/fcd

Fuel Selector Manifolds

6 Port Manifold with Manual Override and 5 PSI Check Valve



General Description:

Parker Fluid Control's Fuel Selector Valve Manifolds are designed for electrically controlled remote tank selection in application with multiple diesel fuel tanks.

Unique in design, the Fuel Selector Valve Manifold permits continuous engine function during tank switching from a safe and convenient location.

These innovative manifold solutions include 2-way, normally closed solenoid operators that are rated for fuel safety shut-off and feature a manual operator (standard) for system operation during a power outage.

Installation:
Valves can be mounted in any position.

Standard Materials of construction:
Body – Anodized Aluminum
Seals – Fluorocarbon (FKM)
Sleeve – 300 Series Stainless
Plunger/Stop – 430 FR
Stem – Stainless Steel

Electrical Characteristics:

Standard Voltages
DC - 12, 24

Coil Classification:
Class F standard (10 watt)

Maximum Ambient Temperature:
176º F



Specialty

System Specifications:

- Six Port Diesel Manifolds
  - Four 2-Way normally closed operators ensure fuel shutoff and return flow.
  - 5 PSI (0.34 bar) check valve included with manifold to be installed between engine supply and return ports.

Applications:

- Marine/mobile applications
  - Multiple tank selection
  - Fuel polishing (marine)
- Power generation
  - Multiple tank selection

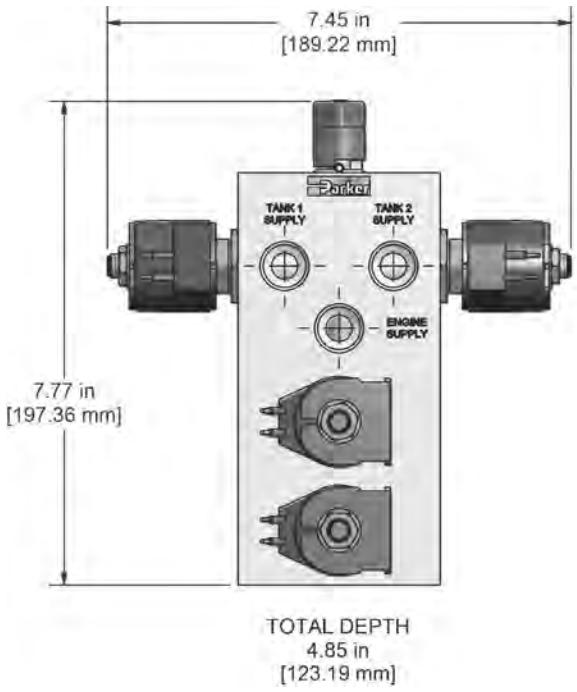
Mechanical Characteristics:

- Recommended Filtration: 150 micron (not included)
- Flow Capacity:
  - 180 GPH - 6 port diesel

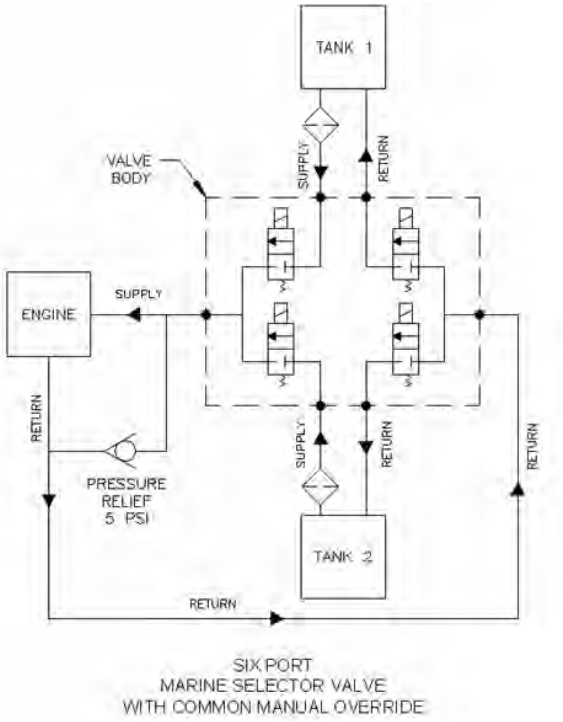
ENGINEERING YOUR SUCCESS.

ENGLISH UNITS						METRIC UNITS			
Port Size NPT	Orifice Size (in.)	Cv Factor	Operating Pressure Differential PSI		Complete Valve Number*	Orifice Size (mm)	Kv Factor (m^3/h)	Operating Pressure Differential (bar)	
			Min.	Max.				Min.	Max.
1/2	7/16	2.25	0	3	7121Z027F1J111xx	11.1	1.935	0	0.207

*In place of 'xx' in the part number, use 'C1' for 12VDC or 'C2' for 24VDC voltages.



Dimensional Drawings for the 6 port Fuel Selector Manifold



Schematic shows the ease of incorporating the Fuel Selector Manifold into your system

Maximum Ambient Temperature:
176ºF
Per ABYC H23 (Diesel Fuel Systems)
and ABYC H-24 (Gasoline Fuel Systems)
Maximum Fluid Temperature:
71ºC or 160ºF
Current Draw: .83A each coil

Power Consumption: 10 watts each coil
Coil: Molded Class F coil with 18" leads
Electrical Enclosure: External Yoke
Body Material: Aluminum
Seal Material: FKM

For equivalent 3 port versions of the valve. For gasoline service, please contact Parker Hannifin Fluid Control Division @ 1800-VALVE05.

Parker Hannifin Corporation
Fluid Control Division
1 800 825 8305 (1 800 Valve05)
www.parker.com/fcd

CNG Valve

High pressure and high flow valves
for compressed natural gas



General Description:

In an effort to be environmentally conscious, comply with government emission laws and decrease dependence on foreign oil, clean burning alterative fuels such as CNG (compressed natural gas) have become a viable solution. Parker Fluid Control Division is committed to providing system solutions for these and many other alternative fuel applications.

Parker Fluid Control Division is now pleased to offer the high pressure, high flow, low leakage CNG natural gas valve. This product is designed for integration into compressed natural gas fuel delivery systems (i.e. trucks, buses, & etc…) utilizing single and multi-tank applications.



Installation:
Valves can be mounted in any position. The preferred orientation is with the coil vertical and upright.

Standard Materials of Construction:
Body - Stainless steel (430F)
Seals - HNBR (7121Z033xxx)*
- Nylon (7121Z015xxx)
Plunger/Stop - Stainless steel (430F)
Spring - Stainless steel (17-7 PH)
Sleeve - Stainless steel (305)

*HNBR is a proprietary seal material

Electrical Characteristics:

Standard Voltages
DC - 12, 24

Coil Classification:
Class H standard

Maximum Ambient Temperature:
170° F

Current Drain:
- 1.6 amps (12VDC)
- 0.83 amps (24VDC)

Product Advantages:

- Valves range in flow for single and multi-tank systems
- Wide pressure range of 0-4500 PSI for working and maximum operating tank pressure
- Max Allowable Internal Seat Leakage
  - 7121Z033xxx - Bubble-tight from 0-4500 psi
  - 7121Z015xxx - <100 cc/min from 300-4500 psi

Note: Consult Factory for other CNG valves used in installations after the CNG is regulated to a much lower pressure.

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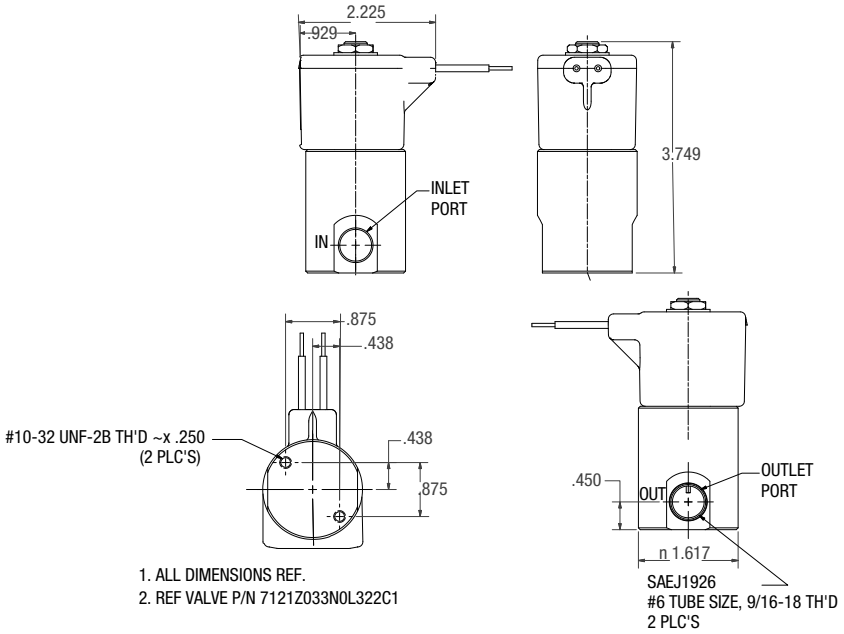
2-Way Normally Closed - Stainless Steel

Port Size	Orifice Size		Flow Factor Cv		Operating Pressure Differential PSI		Min. Media Temp. °F	Max. Media Temp. °F	Watt	Seal	Valve Assembly Part Number**	Reference	
	Pilot	Body	Pilot	Body	Min.	Compressed Natural Gas						Coil	Valve
SAE-6	.031	.109	.021	0.2	0	4500	-10	180	22	HBNR*	7121Z033NOL322xx	8	D58

*Proprietary Seal Material
** Replace "xx" at the end of the part number with "C1" for 12 VDC or "C2" for 24 VDC voltages.

Valve Reference D58





1. ALL DIMENSIONS REF.
2. REF VALVE P/N 7121Z033N0L322C1

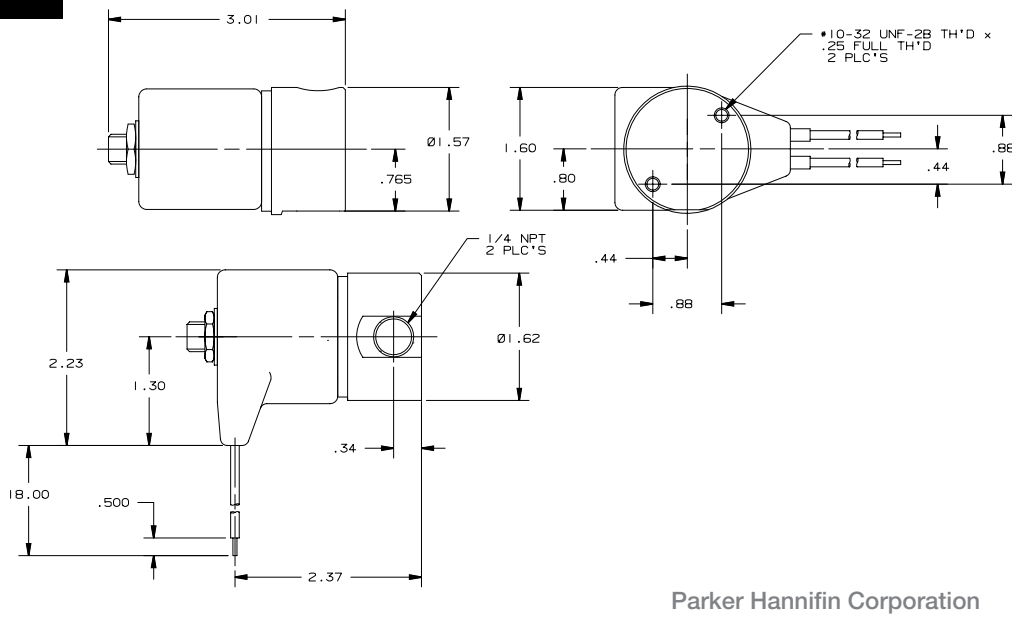
2-Way Normally Closed - Stainless Steel

Port Size NPT	Orifice Size	Flow Factor Cv	Operating Pressure Differential PSI		Min. Media Temp. °F	Max. Media Temp. °F	Watt	Seal	Valve Assembly Part Number**	Reference	
			Min.	Compressed Natural Gas						Coil	Valve
1/4	0.031	0.021	0	4500	-10	170	22	Nylon	7121Z015NOL322xx	8	D59

** Replace "xx" at the end of the part number with "C1" for 12 VDC or "C2" for 24 VDC voltages.

Valve Reference D59





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Specialty

Timer Drain Valves

For Compressed Air Systems



General Description:

Parker Fluid Control's Timer Drain Valves automatically eliminate condensate that has collected up in compressed air lines.

These timers can be used on a wide variety of our 2-way solenoid Normally Closed valves as well as 3-way valves for piloting our larger Angle Body control valve, using DIN 43650A / ISO 440 coils.

Timers are available to control both the duration and frequency of the valves energized period during which condensate is evacuated.

Installation:
Preferred orientation is with the coil vertical and upright.

Standard Materials of Construction:
Body – Brass
Seals – FKM
Plunger/Stop – Stainless steel (430F)
Sleeve – Stainless steel (304/305)
Springs – Stainless steel (18-8)
Shading Ring – Copper



Specialty

Electrical Characteristics:

Standard Voltages
AC –24-240/50-60Hz
DC –24-240 VDC

Coil Classification
Class F Standard
Class H Available

Agency Approvals
- UL listed and CSA certified
- Meets NEMA Type 4X requirements
- CE Certification

Maximum Ambient Temperature
- -23º F to 122°F for Timer
- See Product Page for Valve Temperature Range

Applications:
- Air Compressors
- Air Drying Systems
- Refrigerated Dryer Systems

Key Features:
- Selectable Timer Ranges for duration and frequency to precisely match contaminant load
  – 0.5 - 10 seconds ON
  – 0.5 - 45 minutes OFF
- Integral Strainer available to prevent contaminant from affecting valve operation
- Manual reset & test button
- LED's to indicate operation
- Rated for Continuous Duty

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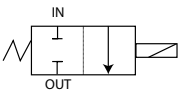
2-Way Pilot Operated Brass Timer Drain Valves – Normally Closed, FKM Seals

Port Size NPT	Orifice Size (inch)	CV Factor	Operating Pressure Differential (PSi) Min.*	Maximum AC Ratings 10 watt	Maximum DC Ratings 10 watt	Max. Fluid Temp. (F)	Pressure Vessel Number**
1/4"	7/16	1.75	3	150	60	210	7321KBN2NF00N0D1DMxx
1/4"	7/16	1.75	3	300	45	210	7321KBY61640N0D1DMxx
3/8"	7/16	2.5	3	300	45	210	7321KBY63200N0D1DMxx
1/2"	7/16	2.7	3	300	45	210	7321KBY6320AN0D1DMxx

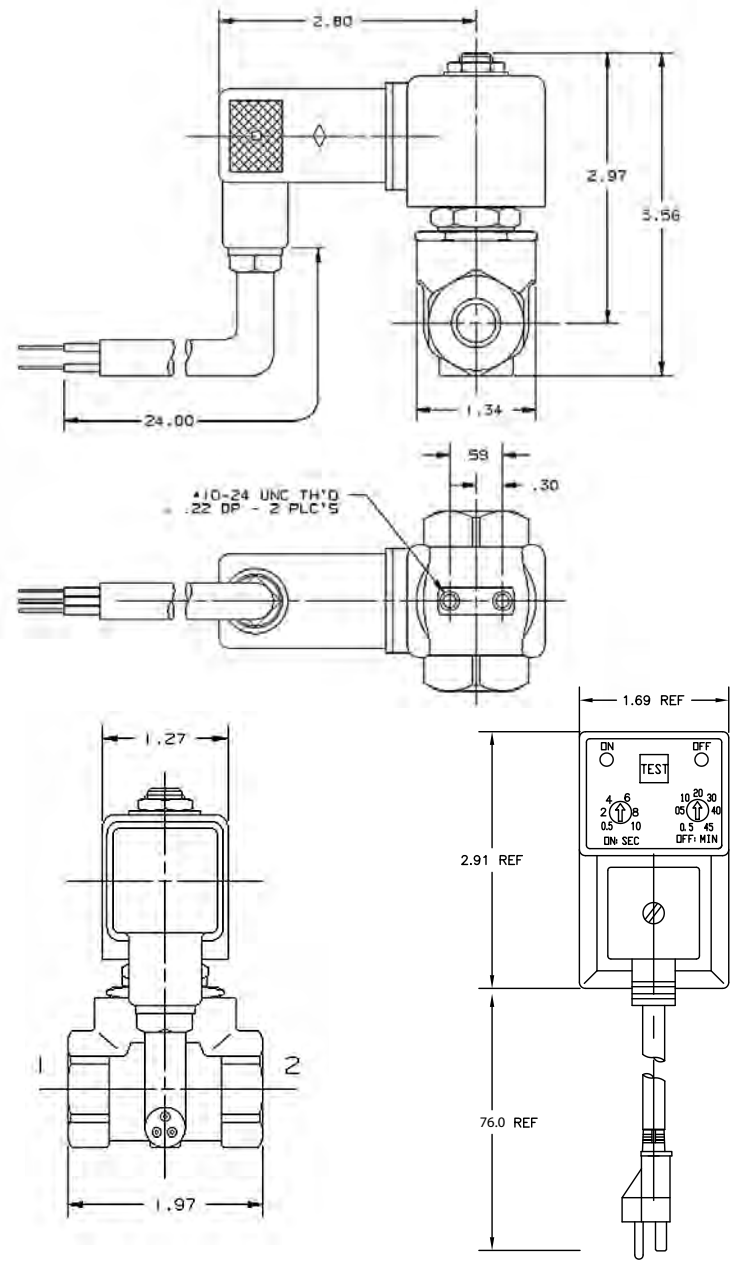
*Pilot operated valves require the minimum pressure differential specified for proper valve operation.
** Replace 'xx' at the end of part number with: 'B2' for 24/60, 'P3' for 120/60-110/50, 'Q3' for 240/60-220/50, 'C2' for 24VDC and 'B6' for 120VDC voltages.
Consult Factory for List pricing and minimum order quantities that may apply for certain voltages.

Valve Reference D60





2-Way Normally Closed
Port Identification:
Flow arrow on body
indicates flow direction.
Ports are not marked.



Specialty

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Coil Reference

Coil Portfolio and Solenoid Enclosures (Integrated Modular Coils and Replacement Coils for Non-integrated)



General Description:

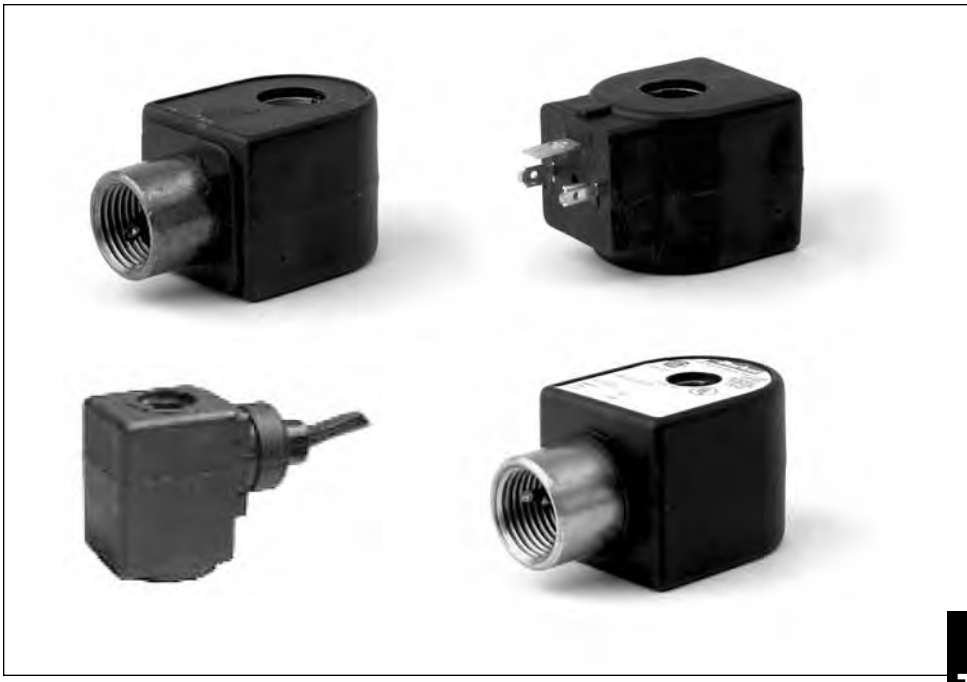
Solenoid Enclosure and Coil Information

Coils are electrical devices that produce magnetic flux when electrical power is applied to the windings. Surrounding the coil is the metal solenoid enclosure and frame. Together with the plunger and stop, it forms the magnetic circuit that operates the valve. Without the enclosure, the magnetic circuit is not complete. Without a complete magnetic circuit, the magnetic field is reduced and valve performance suffers. Depending on the coil voltage and power rating, the pressure rating of the valve can vary.

Solenoid enclosures come in a variety of constructions offering varying levels of protection against the elements and other forces. NEMA identifies the different enclosures as “Types” and NEC sets standards for their safety and performance.

Integrated coils have an epoxy or thermoplastic "over-molding" creating a one-piece coil/enclosure for modularity and protection from the environment.

The National Electrical Manufacturers Association (NEMA) recommends suitable materials and components to meet each enclosure type. The enclosures listed here will only meet the applicable NEMA recommendations when properly installed and operated to NEMA specifications and in accordance with the NEC.



Electrical Characteristics:

Standard Voltages:

AC –24/60
120/60 110/50
240/60 220/50
DC –12, 24 &120
For other Voltages – Consult Factory

Coil Classification:

Class F Standard
Class H Available

Agency Approvals:

Standard valves with NEMA Type 4X or Explosion Proof solenoid enclosures are UL Listed and CSA Certified. DIN coils are UL Recognized. For additional details, consult factory.

Optional coils feature ATEX and IECEx Approvals.

Ultra Low Power Coils (Coil Chart 12) are used on valves with a unique solenoid operator designed to keep current draw to a minimum, thus achieving the extremely low power consumption of 0.6 watts with no refresh time required for subsequent energization. These valves are ideally suited for use in automated control systems, applications where minimizing energy consumption is critical or where heat rise in the coil must be kept to a minimum. Due to the low power consumption, an increased number of solenoid valves can be driven from the same power source, reducing the overall installation cost.

Integrated Coil Offering

	Part Number	Type of Termination*	Voltage	Wattage	Class
CHART 1					
	AF4C01	1/2" NPT Conduit/18" Leads	24/60	6	F
	AF4C05		120/60, 110/50	6	F
	AF4C15		240/60, 220/50	6	F
	AH4C01	1/2" NPT Conduit/18" Leads	24/60	6	H
	AH4C05		120/60, 110/50	6	H
	AH4C15**		240/60, 220/50	6	H
	AFPH01	DIN 43650A/ISO 4400	24/60	6	F
	AFPH05		120/60, 110/50	6	F
	AFPH15**		240/60, 220/50	6	F
CHART 2					
	BF4C01	1/2" NPT Conduit/18" Leads	24/60	10.2	F
	BF4C05		120/60, 110/50	10.2	F
	BF4C15		240/60, 220/50	10.2	F
	BH4C01**	1/2" NPT Conduit/18" Leads	24/60	10.2	H
	BH4C05		120/60, 110/50	10.2	H
	BH4C15**		240/60, 220/50	10.2	H
	BFPH01**	DIN 43650A/ISO 4400	24/60	10.2	F
	BFPH05		120/60, 110/50	10.2	F
	BFPH15		240/60, 220/50	10.2	F
	BHPH01**	DIN 43650A/ISO 4400	24/60	10.2	H
	BHPH05		120/60, 110/50	10.2	H
	BHPH15		240/60, 220/50	10.2	H
CHART 3					
	1F4C75	1/2" NPT Conduit/18" Leads	12VDC	9.5	F
	1F4C80		24VDC	9.5	F
	1H4C75**	1/2" NPT Conduit/18" Leads	12VDC	9.5	H
	1H4C80**		24VDC	9.5	H
	1FPH75	DIN 43650A/ISO 4400	12VDC	9.5	F
	1FPH80		24VDC	9.5	F
	1HPH75**	DIN 43650A/ISO 4400	12VDC	9.5	H
	1HPH80		24VDC	9.5	H

* 1/2" NPT conduit and DIN coils offer NEMA Types 1, 2, 3, 4 and 4X protection with a suitable conduit installation or mating DIN connector and gasket.

** Not in list price book. Minimum order quantities may apply. Consult factory.

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Integrated Coil Offering

	Part Number	Type of Termination*	Voltage	Wattage	Class
CHART 4					
	CF4C01	1/2" NPT Conduit/18" Leads	24/60	11	F
	CF4C05		120/60, 110/50	11	F
	CF4C15		240/60, 220/50	11	F
	CH4C01	1/2" NPT Conduit/18" Leads	24/60	11	H
	CH4C05		120/60, 110/50	11	H
	CH4C15		240/60, 220/50	11	H
	CFPH01	DIN 43650A/ISO 4400	24/60	11	F
	CFPH05		120/60, 110/50	11	F
	CFPH15		240/60, 220/50	11	F
	CHPH01	DIN 43650A/ISO 4400	24/60	11	H
	CHPH05		120/60, 110/50	11	H
	CHPH15		240/60, 220/50	11	H
CHART 5					
	DF4C01	1/2" NPT Conduit/18" Leads	24/60	16	F
	DF4C05		120/60, 110/50	16	F
	DF4C15		240/60, 220/50	16	F
	DH4C01**	1/2" NPT Conduit/18" Leads	24/60	16	H
	DH4C05		120/60, 110/50	16	H
	DH4C15**		240/60, 220/50	16	H
	DFPH01	DIN 43650A/ISO 4400	24/60	16	F
	DFPH05		120/60, 110/50	16	F
	DFPH15		240/60, 220/50	16	F
	DHPH01**	DIN 43650A/ISO 4400	24/60	16	H
	DHPH05		120/60, 110/50	16	H
	DHPH15		240/60, 220/50	16	H

* 1/2" NPT conduit and DIN coils offer NEMA Types 1, 2, 3, 4 and 4X protection with a suitable conduit installation or mating DIN connector and gasket.

** Not in list price book. Minimum order quantities may apply. Consult factory.

Integrated Coil Offering

	Part Number	Type of Termination*	Voltage	Wattage	Class
CHART 6					
	3F4C75	1/2" NPT Conduit / 18" Leads	12VDC	11.5	F
	3F4C80		24VDC	11.5	F
	3H4C75**	1/2" NPT Conduit / 18" Leads	12VDC	11.5	H
	3H4C80		24VDC	11.5	H
	3FPH75	DIN 43650A/ISO 4400	12VDC	11.5	F
	3FPH80		24VDC	11.5	F
	3HPH75**	DIN 43650A/ISO 4400	12VDC	11.5	H
	3HPH80		24VDC	11.5	H

* 1/2" NPT conduit and DIN coils offer NEMA Types 1, 2, 3, 4 and 4X protection with a suitable conduit installation or mating DIN connector and gasket.
** Not in list price book. Minimum order quantities may apply. Consult factory.

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Additional Coil Options for Charts 1-6 (Below are replacement coils only; no enclosures except as noted)

	Part Number	Type of Termination	Voltage	Wattage	Class
	AFSB01	NEMA 1 Splice Box w/ 6" Leaded Coil	24/60	6	F
	AFSB05		120/60, 110/50	6	F
	AFSB15		240/60, 220/50	6	F
	BFSB01*	NEMA 1 Splice Box w/ 6" Leaded Coil	24/60	10.2	F
	BFSB05*		120/60, 110/50	10.2	F
	BFSB15*		240/60, 220/50	10.2	F
	CFSB01	NEMA 1 Splice Box w/ 6" Leaded Coil	24/60	11	F
	CFSB05		120/60, 110/50	11	F
	CFSB15		240/60, 220/50	11	F
	DFSB01*	NEMA 1 Splice Box w/ 6" Leaded Coil	24/60	16	F
	DFSB05		120/60, 110/50	16	F
	DFSB15*		240/60, 220/50	16	F
	1FSB75**	NEMA 1 Splice Box w/ 6" Leaded Coil	12 VDC	9.5	F
	1FSB80		24 VDC	9.5	F
	3FSB75	NEMA 1 Splice Box w/ 6" Leaded Coil	12 VDC	11.5	F
	3FSB80		24 VDC	11.5	F
	AFEC01*	18" Leaded Coil for NEMA 7/9 hazardous location enclosure	24/60	6	F
	AFEC05		120/60, 110/50	6	F
	AFEC15		240/60, 220/50	6	F
	BFEC01	18" Leaded Coil for NEMA 7/9 hazardous location enclosure	24/60	10.2	F
	BFEC05		120/60, 110/50	10.2	F
	BFEC15		240/60, 220/50	10.2	F
	CFEC01*	18" Leaded Coil for NEMA 7/9 hazardous location enclosure	24/60	11	F
	CFEC05		120/60, 110/50	11	F
	CFEC15		240/60, 220/50	11	F
	DFEC01*	18" Leaded Coil for NEMA 7/9 hazardous location enclosure	24/60	16	F
	DFEC05		120/60, 110/50	16	F
	DFEC15		240/60, 220/50	16	F
	1FEC75*	18" Leaded Coil for NEMA 7/9 hazardous location enclosure	12 VDC	9.5	F
	1FEC80		24 VDC	9.5	F
	3FEC75	18" Leaded Coil for NEMA 7/9 hazardous location enclosure	12 VDC	11.5	F
	3FEC80		24 VDC	11.5	F

* Not in list price book. Minimum order quantities may apply. Consult factory.

Additional Coil Options for Charts 1-6 Cont. (Below replacement coils only, no enclosures)



Part Number	Type of Termination	Voltage	Wattage	Class
AHEC01* AHEC05* AHEC15*	18" Leaded Coil for NEMA 7/9 hazardous location enclosure	24/60 120/60, 110/50 240/60, 220/50	6	H
BHEC01* BHEC05* BHEC15*	18" Leaded Coil for NEMA 7/9 hazardous location enclosure	24/60 120/60, 110/50 240/60, 220/50	10.2	H
CHEC01 CHEC05 CHEC15	18" Leaded Coil for NEMA 7/9 hazardous location enclosure	24/60 120/60, 110/50 240/60, 220/50	11	H
DHEC01 DHEC05 DHEC15	18" Leaded Coil for NEMA 7/9 hazardous location enclosure	24/60 120/60, 110/50 240/60, 220/50	16	H
IHEC75 IHEC80	18" Leaded Coil for NEMA 7/9 hazardous location enclosure	12 VDC 24 VDC	9.5	H
3HEC75 3HEC80	18" Leaded Coil for NEMA 7/9 hazardous location enclosure	12 VDC 24 VDC	11.5	H

* Not in list price book. Minimum order quantities may apply. Consult factory.

DIN Electrical Accessories for Charts 1-6



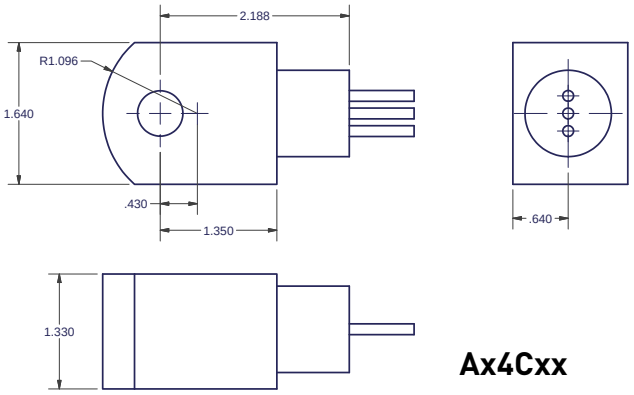
Part Number	Description
ELECD1	Cable Gland DIN Plug



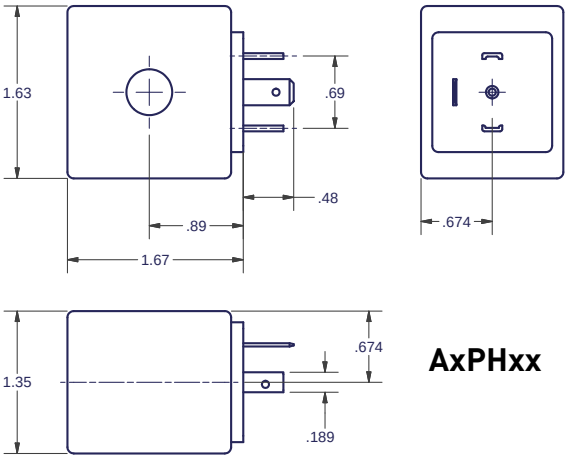
Part Number	Description
ELECD2	1/2" Conduit DIN Plug

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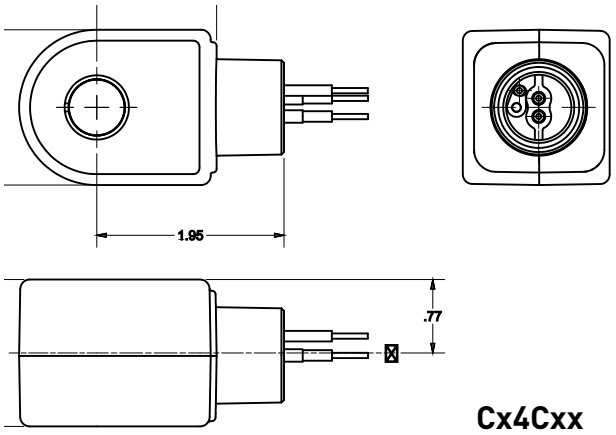
Coil Charts 1-6 Integrated Coil Dimensional Values



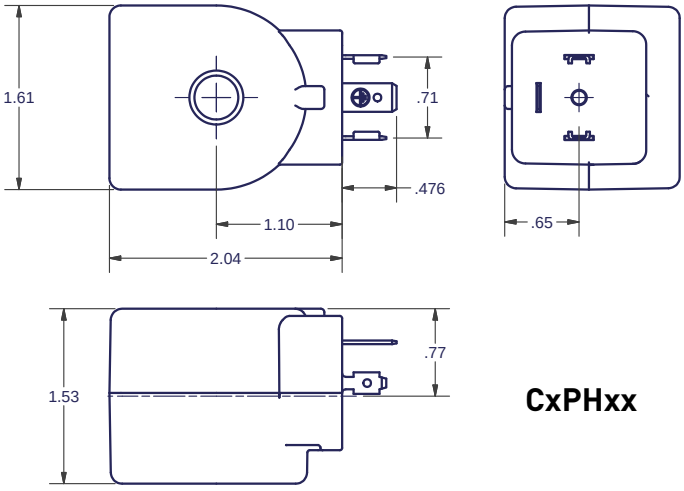
Ax4Cxx



AxPHxx



Cx4Cxx



CxPHxx

Valves using coil charts 1-6 (Gold Ring™ brand)
Part Numbering Information: Reference ONLY

1 & 2 Connection Size		3 Connection Type	4 Construction	5 Construction	6 Operation	7 Body Material	8 Trim	9 & 10 Orifice Size	11 Current Design Series Designations
02	1/8"	F Female Pipe Thread NPT	2 2-way	0 Direct Acting	C Normally Closed	1 Brass (Bar Stock)	1 NBR	Valve orifice diameter in 1/64-inch increments. Example: a 1/2-inch orifice diameter has an orifice size designation of 32.	
04	1/4"		3 3-way	2 Diaphragm Center pilot	O Normally Open	2 Brass (Forging)	2 FKM		
06	3/8"		4 4-way	3 Diaphragm Hung	U Universal	3 303 Stainless Steel (Bar)	3 EPDM		
08	1/2"		H Diaphragm, Hung	4 Diaphragm Offset pilot	S 4-Way Single Solenoid	5 Brass Nickel Plate	4 PTFE		
12	3/4"		5 Diaphragm, Pivoted Edge	5 Diaphragm Pivoted Edge		6 316 Stainless Steel (Cast)	5 Urethane		
16	1"		S Steam	6 Piston		7 Aluminum (Bar Stock)	6 CR		
20	1 1/4"			8 Piston piloted		8 316 Stainless Steel (Bar)	8 FDA EPR		
24	1 1/2"					9 Bronze (Cast)	9 Kalrez		
32	2"						D Delrin		
48	3"						K KEL F		

ALERT: Table is for interpreting product specifications only. Consult Parker Fluid Control Division for available combinations not shown in catalog.

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Valves using coil charts 1-6 (Gold Ring™ brand)

12 Coil Wattage AC (nominal)		12 Coil Wattage DC (normal)		13 Coil Class		14 Solenoid Enclosure		15 Coil Termination		16 & 17 Coil Voltage AC		16 & 17 Coil Voltage DC	
A	6 Watts	1	9.5 Watts	F	Standard (Class 155)	E	Explosion-Proof/ Watertight	C	18" Leads (Standard)	01	24/60	70	6
B	10.2 Watts	3	11.5 Watts	H	High Temperature (Class 180)	G	Type 1 Gen. Purpose	H	DIN	02	24/50	75	12
C	11 Watts					M	316 SS Explosion-Proof/ Watertight	K	Screw	05	110/50 120/60	80	24
D	16 Watts					O	Open Frame	S	Spade	10	208/60	90	120
						P	Epoxy Encapsulated			15	220/50 240/60	95	125
						S	Type 1 Splice Box			20	440/50 480/60		
						U	316 SS Explosion-Proof/ Watertight			41	24/60 rectified		
						W	Submersible Splice Box			42	120/60 rectified		
						Y	Explosion-Proof/ Watertight with Ground Lead			44	240/60 rectified		
						Z	Grounded M			51	120-240/60		
						4	Type 4, 4X			53	240-480/60		

ALERT: Table is for interpreting product specifications only. Consult Parker Fluid Control Division for available combinations not shown in this catalog.

Integrated Coil Offering

	Part Number	Type of Termination*	Voltage	Wattage	Class
CHART 7					
	C111B2	1/2" NPT Conduit / 18" Leads	24/60	10	F
	C111P3		120/60, 110/50		
	C111Q3		240/60, 220/50		
	C111C1		12VDC		
	C111C2		24VDC		
	C111C6		120VDC		
	C222B2	1/2" NPT Conduit / 18" Leads	24/60	10	H
	C222P3		120/60, 110/50		
	C222Q3		240/60, 220/50		
	C222C1		12VDC		
	C222C2		24VDC		
	C222C6		120VDC		
	D100B2	DIN 43650A/ISO 4400	24/60	10	F
	D100P3		120/60, 110/50		
	D100Q3		240/60, 220/50		
	D100C1		12VDC		
	D100C2		24VDC		
	D100C6**		120VDC		
	D200B2	DIN 43650A/ISO 4400	24/60	10	H
	D200P3		120/60, 110/50		
	D200Q3		240/60, 220/50		
	D200C1		12VDC		
	D200C2		24VDC		
	D200C6**		120VDC		

* 1/2" NPT conduit and DIN coils offer NEMA Types 1, 2, 3, 4 and 4X protection with a suitable conduit installation or mating DIN connector and gasket.
** Not in list price book. Minimum order quantities may apply. Consult factory.

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Integrated Coil Offering

	Part Number	Type of Termination	Voltage	Wattage	Class
CHART 7 (Continued)					
	L111B2	18" Leads	24/60	10	F
	L111P3		120/60, 110/50		
	L111Q3		240/60, 220/50		
	L111C1		12VDC		
	L111C2		24VDC		
	L111C6*		120VDC		
	L222B2*	18" Leads	24/60	10	H
	L222P3		120/60, 110/50		
	L222Q3		240/60, 220/50		
	L222C1		12VDC		
	L222C2		24VDC		
	L222C6		120VDC		
	T100B2*	1/4" Tab (spade)	24/60	10	F
	T100P3		120/60, 110/50		
	T100Q3		240/60, 220/50		
	T100C1		12VDC		
	T100C2*		24VDC		
	T100C6*		120VDC		
	S100B2*	Screw Terminal	24/60	10	F
	S100P3		120/60, 110/50		
	S100Q3		220/50, 240/60		
	S100C1*		12VDC		
	S100C2		24VDC		
	S100C6		120VDC		
	S200B2	Screw Terminal	24/60	10	H
	S200P3		120/60, 110/50		
	S200Q3*		240/60, 220/50		
	S200C1*		12VDC		
	S200C2*		24VDC		
	S200C6*		120VDC		

* Not in list price book. Minimum order quantities may apply. Consult factory

Integrated Coil Offering

	Part Number	Type of Termination*	Voltage	Wattage	Class
CHART 7 (Continued)					
	H111B2**	UL Hazardous Locations NEMA Type 7/9 w/ 18" Leaded Coil	24/60	10	F
	H111P3		120/160, 110/50		
	H111Q3		240/60, 220/50		
	H111C1		12VDC		
	H111C2		24VDC		
	H111C6**		120VDC		
	H222B2**	UL Hazardous Locations NEMA Type 7/9 w/ 18" Leaded Coil	24/60	10	H
	H222P3		120/60, 110/50		
	H222Q3		240/60, 220/50		
	H222C1**		12VDC		
	H222C2		24VDC		
	H222C6		120VDC		

* Hazardous location coil approvals: Class I, Div 1 & 2, Groups A, B, C, D; Class II, Div 1 & 2, Groups E,F,G; Class III, Div 1.

Additional Coil Options for Chart 7 (Below are replacement coils only, no enclosures)

	Part Number	Type of Termination	Voltage	Wattage	Class
	J111B2	Molded coil w/ 18" Leads	24/60	10	F
	J111P3		120/60, 110/50		
	J111Q3		240/60, 220/50		
	J111C1		12VDC		
	J111C2		24VDC		
	J111C6**		120VDC		
	J222B2**	Molded coil w/ 18" Leads	24/60	10	H
	J222P3		120/60, 220/50		
	J222Q3**		240/60, 220/50		
	J222C1		12VDC		
	J222C2**		24VDC		
	J222C6**		120VDC		

** Not in list price book. Minimum order quantities may apply. Consult factory.

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Integrated Coil Offering

	Part Number	Type of Termination*	Voltage	Wattage	Class
CHART 8					
	C322B2	1/2" NPT Conduit /18" Leads	24/60	22	H
	C322P3		120/60, 110/50		
	C322Q3		240/60, 220/50		
	C322C1		12VDC		
	C322C2		24VDC		
	C322C6**		120VDC		
	D300B2**	DIN 43650A/ISO 4400	24/60	22	H
	D300P3		120/60, 110/50		
	D300Q3		240/60, 220/50		
	D300C1		12VDC		
	D300C2		24VDC		
	D300C6**		120VDC		
	L322B2**	1/2" NPT Conduit /18" Leads	24/60	22	H
	L322P3		110/50, 120/60		
	L322Q3		220/50, 240/60		
	L322C1		12VDC		
	L322C2		24VDC		
	L322C6**		120VDC		
	S300B2**	Screw Terminal	24/60	22	H
	S300P3		120/60, 110/50		
	S300Q3**		240/60, 220/50		
	S300C1**		12VDC		
	S300C2**		24VDC		
	S300C6**		120VDC		

* 1/2" NPT conduit and DIN coils offer NEMA Types 1, 2, 3, 4 and 4X protection with a suitable conduit installation or mating DIN connector and gasket.

** Not in list price book. Minimum order quantities may apply. Consult factory.

Coil Options for Chart 8 cont. (Below replacement coils only, no enclosures)



Part Number	Type of Termination*	Voltage	Wattage	Class
H322B2	UL Hazardous Locations NEMA Type 7 & 9 w/ 18" Leaded Coil	24/60	22	H
H322P3		120/60, 110/50		
H322Q3		240/60, 220/50		
H322C1		12VDC		
H322C2		24VDC		
H322C6**		120VDC		

* Hazardous location coil approvals: Class I, Din I & 2, Groups A,B,C,D; Class II, Div 1 & 2, Groups E, F, G; Class IV, Div 1

** Not in list price book. Minimum order quantities may apply. Consult factory.

Additional Coil Options for Chart 8 (Below are replacement coils only, no enclosures)



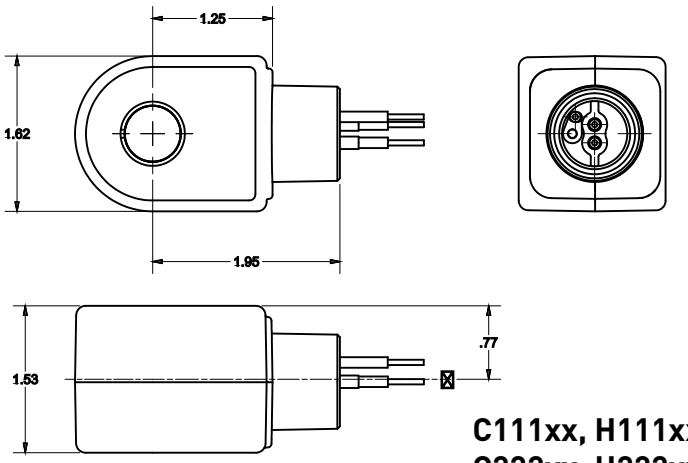
Part Number	Type of Termination	Voltage	Wattage	Class
J322B2**	Molded coil w/ 18" Leads	24/60	22	H
J322P3		120/60, 110/50		
J322Q3**		240/60, 220/50		
J322C1		12VDC		
J322C2		24VDC		
J322C6**		120VDC		

* Hazardous location coil approvals: Class I, Din I & 2, Groups A,B,C,D; Class II, Div 1 & 2, Groups E, F, G; Class IV, Div 1

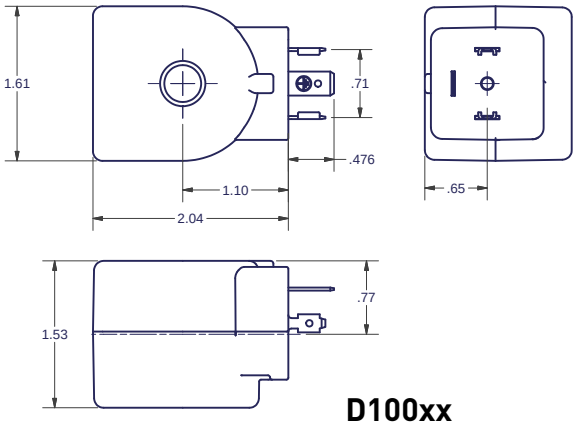
** Not in list price book. Minimum order quantities may apply. Consult factory.

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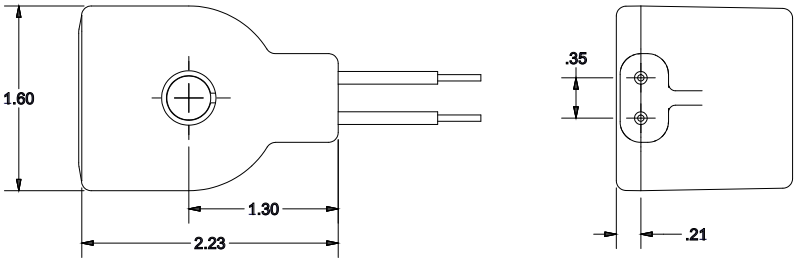
Coil Charts 7, 8, 10 & 11 Integrated Coil Dimensional Values

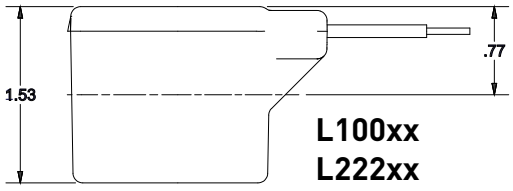


C111xx, H111xx,
C222xx, H222xx,
C322xx, H322xx

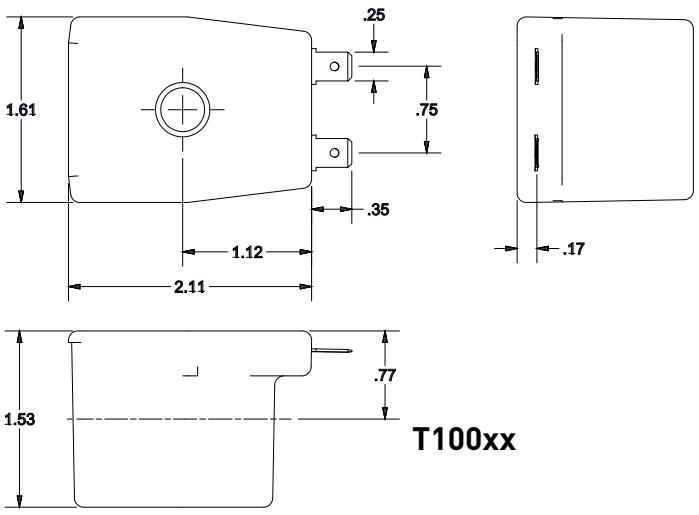


D100xx
D200xx
D300xx

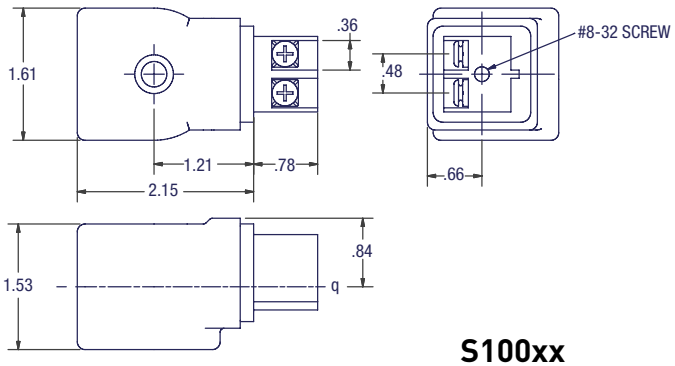




L100xx
L222xx
L322xx



T100xx



S100xx
S200xx
S300xx

Valves using coil charts 7, 8, 10, 11 & 12 (7000 Series Skinner™ Brand)
Part Numbering Information: Reference ONLY

1	2 Actuation	3 Functional Type	4 Flow Pattern	5 Family	6 Body Material	7 Threading Process Connection	8 Port Size (NPT)	9 Orifice Code	10 Seals/ Elastomers	11 & 12 Mechanical Options
7	0 Manual Reset	2 Two-Way	**2-Way Valves**	1	A Aluminum	A SAE	1 1/8"	A	C CR	00 No Option
	1 Direct Acting	3 Three-Way	1 Normally Closed	2	B Brass	E Male NPT	2 1/4"	B	E EPDM	7A Momentary Manual Override
	2 Direct Lift	4 Four-Way	2 Normally Open pressure in/out of body	3	L Noryl	F Flange	3 3/8"	C	F PCTFE	7C 7A + J1
	3 Pilot Operated Internal Pilot Supply		3 Multi/Dual purpose	4	M Zinc Die Cast	G BSP-Parallel	4 1/2"	D	K PFPM	7F Captured Exhaust Pilot
	4 Pilot Operated External Pilot Supply		9 Normally Open pressure in the body, pressure out the sleeve	5	R 316 SS	J Bib Fitting	5 3/4"	E	L Nylon	7G 7F + 7A
	5 Remote Pressure Operated		**3-Way Valves**	6	S 430F SS	K Direct Mount	6 1"	F	M Metal	7H 7F + MO
	6 Manual/Mech. Operated		1 Normally Closed	7	T Teflon	N NPT(Female Nat'l Pipe thread)	7 1 1/4" For K	G	N NBR	7M Plugged Manual Override
			2 Normally Open pressure in/out of body	8	V 303 SS	P NPTF	8 1 1/2"	H	R Ruby	A2 Silver Shading Ring
			3 Multi/Dual Purpose	9		R BSP-Taper	9 2"	J	T PTFE	CB Cylinder "B" normally open to pressure inlet
			8 Diverting	E		S Subbase Mounted	**For K in Pos. 7**	K	U PTFE	C0 4-Step Variable Closing
			9 Normally Open pressure in the sleeve, pressure out the body	F		T Barbed Fitting	D M5	L	V FKM	ET Electrically Tripped / Manual Reset
			4-Way Valves	G			E #10-24	M		J0 Pilot Exhaust Return Pipe
			1 2-position, single operator	K			F #10-32	N		J1 Exhaust Adaptor Nut
			2 3-position, dual operator center closed	L				P		M0 Manual Override
			3 3-position, dual operator center open	T				Q		M5 Manual Override w/Exhaust Adaptor (M0 + J1)
			4 3-position, dual operator center open	X				R		MC Manual Override w/Var. Closing
			6 2-position, dual operator bi-stable					S		MJ Manual Override w/Exhaust Return Pipe
			7 2-position, dual operator bi-stable, with latching					T		MR Manual Override w/Main Stream Metering
								U		N0 Cleaned for oxygen service
								V		R1 Mainstream Metering
								0 thru 9		S0 Steam Service Rated
										VR No Voltage Release / Manual Reset
										W0 Anti-Water Hammer (fixed)

ALERT: Table is for interpreting product specifications only. Consult Parker Fluid Control Division for available combinations not shown in this catalog.

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Valves using coil charts 7, 8, 10, 11 & 12 (7000 Series Skinner™ Brand)
Part Numbering Information: Reference ONLY

13 & 14 Enclosure	15 & 16 Coil Construction and Type	17 & 18 Terminations and Option Codes	19 & 20 Voltage
A0 7/8" Knockout	***Readily Available Integrated Coils***	00 Standard DIN, Screw, Tab Coils (no leads)	B2 24/60
B0 1/2" Conduit	C1 1/2" NPT Conduit, 10 Watt Class F, NEMA 4X	11 Class F Coils with 18" leads	C1 12VDC
F0 Yoke	C2 1/2" NPT Conduit, 10 Watt Class H, NEMA 4X	22 Class H Coils with 18" leads	C2 24VDC
G0 Water Tight	C3 1/2" NPT Conduit, 22 Watt Class H, NEMA 4X	GL C1,C2,C3 & H1,H2, H3 Coils with Ground lead	C4 48VDC
J0 Junction Box	C6 1/2" NPT Conduit, 1.5 Watt, Class F, NEMA 4X	D1 All DIN Coils with Cable Gland Connector	C6 120VDC
M1 Magnelatch 1/2" Conduit	C7 1/2" NPT Conduit, 0.6 Watt, Class F, NEMA 4X	D2 All DIN Coils with 1/2" Conduit Connector	P0* 24,50/60
M2 Magnelatch Grommet	D1 DIN, 10 Watt Class F	D4 D1,D2,D4 coils for timer assembly with fixed-off and adjustable on-time	P3 110/50-120/60
N0 Nut and Washer	D2 DIN, 10 Watt Class H		Q3 220/50-240/60
	D3 DIN, 22 Watt Class H	DB All DIN Coils with Terminal Box	Q8 440/50-480/6
	H1 1/2" NPT Conduit, 10 Watt Class F, NEMA 7, 9	TB S1,S2,S3 Coils with Terminal Box	2K 208/60
	H2 1/2" NPT Conduit, 10 Watt Class H, NEMA 7, 9	S1 Hazardous stainless steel yoke with 18" leads and ground lead	3N 125 VDC
	H3 1/2" NPT Conduit, 22 Watt Class H, NEMA 7, 9		***Fluxtron Coils****
	H7 1/2" NPT Conduit, 0.6 Watt, Class F, NEMA, 7, 9		2W 110-120,50/60
	Non-Integrated Coils		3W 220-240, 50/60
	L1 18" leads, 10 Watt Class F		C1 12 VDC
	L2 18" leads, 10 Watt Class H		C2 24 VDC
	L3 18" leads, 22 Watt Class H		C4 48 VDC
	S1 Screw Terminal, 10 Watt Class F		C6 120 VDC
	S2 Screw Terminal, 10 Watt Class H		P0 24/50-60
	S3 Screw Terminal, 22 Watt Class H		
	T1 1/4" Tab Terminal, 10 Watt Class F		
	Conventional Coils		
	J1 18" leads, 10 Watt Class F		
	J2 18" leads, 10 Watt Class H		
	J3 18" leads, 22 Watt Class H		
	Specialty Coils		
	F6 Fluxtron 4-wire, 1 Watt molded		
	J6 Fluxtron 2-wire, 1 Watt molded		
	J7 Fluxtron 2-wire, 2 watt		
	J0 Magnelatch 2-wire DC only		
	G0 Magnelatch 3-wire AC/DC (DC pulse)		

***Fluxtron Only**

ALERT: Table is for interpreting product specifications only. Consult Parker Fluid Control Division for available combinations not shown in this catalog.

Electrical Accessories for Charts 7-8

Various electrical accessories are available with 7000 series integrated coils. These accessories are available as individual pieces; see chart. To order a coil with the accessory attached, write the electrical option code in place of the last two digits of the coil code.

Coil Option Picture	Accessory Part #	Coil Option Code	Description	Coil Types	Coil Codes
	ELECD1	D1*	Cable Gland DIN Plug	DIN	D1D1, D2D1, D3D1
	ELECD2	D2*	1/2" Conduit DIN Plug	DIN	D1D2, D2D1, D3D2

* The plug comes complete with gasket.

Electrical Accessories for Charts 7-8

Option Picture	Option Code	Description	Coil Codes
	A0	Standard Connection, 7/8" knockout to accommodate strain relief, adapter or fittings for lead wires, NEMA Type 2	J111, J222,J322, F611, J611
	B0	1/2" Conduit Connection for attachment of conduit, 1/2" NPT fittings or BX cable, NEMA Type 2	F611, J611
	F0	Yoke for use where open enclosure is suitable (Does not carry any NEMA Type approvals)	F611, J611
	G0	Watertight, 1/2" conduit hub accommodating 1/2" NPT fittings or BX cable, NEMA Type 4x	F611, J611
	J0	Splice box, 7/8" knockout allowing for internal splice, NEMA Type 2	J111, J222, J322, F611,J611
	N0	Nut and Washer	All Integrated Coils

^ Meets NEMA 4, 4x when connected to a screw terminal or DIN Coil, as applicable. It is provided with a 1/2" NPT conduit thread and ground screw.

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International Electrotechnical Commission

About the IECEx

IECEx System Objective
The objective of the IECEx System is to facilitate international trade in equipment and services for use in explosive atmospheres, while maintaining the required level of safety:

- reduced testing and certification costs to manufacturer
- reduced time to market
- international confidence in the product assessment process
- one international database listing
- maintaining International Confidence in equipment and services covered by IECEx Certification

What is an Ex area?
Ex areas can be known by different names such as “Hazardous Locations”, “Hazardous Areas” “Explosive Atmospheres”, and the like and relate to areas where flammable liquids, vapours, gases or combustible dusts are likely to occur in quantities sufficient to cause a fire or explosion.

The modern day automation of industry has meant an increased need to use equipment in Ex areas. Such equipment is termed “Ex equipment”

1. The IECEx Certified Equipment Scheme
This IECEx Scheme is an International Certification Scheme covering product that meets the requirements of International Standards, e.g. IEC Standards prepared by TC 31.

The IECEx Certified Equipment Scheme provides both:

a) A single International Certificate of Conformity that requires manufacturers to successfully complete:-

- Testing and Assessment of samples for compliance with Standards
- Assessment and auditing of manufacturers premises
- On-going surveillance audits of manufacturers premises

or

b) A “fast-track” process for countries where regulations still require the issuing of national Ex Certificates or approval. This is achieved by way of global acceptance of IECEx equipment Test and Assessment Reports.

3. The Ex Mark of Conformity System
This IECEx System is an International Conformity System where a Mark of Conformity will be granted by approved IECEx certifiers (ExCBs) located in IECEx participating countries for equipment that is covered by an IECEx Certificate of Conformity and hence has been tested and manufactured under systems that are under ongoing surveillance by ExCBs.

It will help governments, safety regulators, and industry to have greater assurance that the equipment being operated or supplied for use in areas where flammable gases and vapours and combustible dusts (termed explosive atmospheres) are present, meet the world’s most respected and vigorous safety standards.

The Mark shall only be placed on products or on packaging and promotional material covered by a valid IECEx Certificate of Conformity issued in accordance with the IECEx System rules.

4. IECEx Certified Persons Scheme
This IECEx Scheme is an International Conformity Scheme that provides the global Ex industries with a single system for the assessment and qualification of persons meeting the competency prerequisites needed to properly implement the safety requirements based on the suite of IEC International Standards covering explosive atmospheres, e.g. the IEC 60079 series of standards.

The Certified Persons Scheme provides the international Ex industries with a qualification system that is transportable across borders.

IECEX Worldwide Member Countries

Australia	Brazil	Canada	China	Croatia
Czech Republic	Denmark	Finland	France	Germany
Hungary	India	Israel	Italy	Japan
Korea	Malaysia	Netherlands	New Zealand	Norway
Poland	Romania	Russia	Singapore	Slovenia
South Africa	Spain	Sweden	Switzerland	Turkey
United Kigndom	United Arab Emirates	United States		

Definitions (ref. IEC 60079-10)

2.1 Explosive gas environments
Mixture with air, under atmospheric conditions, of flammable substances in the form of gases, vapor, mists or dusts in which, after combustion has occurred, combustion spreads to the entire unburned mixture.

2.2 Hazardous areas
A hazardous area is an area in which an explosive gas environment is present, or may be expected to be present, in quantities such as to require special precautions for construction, installation and use of electrical apparatus.

2.3. Ingredients for an explosion
When combustible materials are mixed with air, an explosive mixture is produced. Danger of explosion therefore exists wherever these hazardous materials are handled: such a condition is to be found on the biggest chemical plant as well as at the smallest filling station.

Nowadays with the use of electronic and electrical instrumentation in process control, the risk of combustion by electrical energy has increased sharply.

To protect personnel and expensive equipment special precautions should be taken to prevent combustion of those dangerous substances. Conditions likely to ignite explosive mixtures are as follows:

- Electrical sparks and arcs produced when circuits are opened and closed (e.g. relay contacts)
- Conductors heated by passage of current or by faulty apparatus.
- Mechanical sparks; moving object hitting stationary object.
- Electrostatic sparks caused by charged components.
- Chemical action.
- Lightning strikes.
- Radio waves

2.4 Zones
The hazardous areas are classified in zones based on the frequency of the occurrence and the duration of an explosive gas environment as follows:

- Zone 0

An area in which an explosive gas environment is present continuously or is present for long periods Type of protection: ia - intrinsic Safety

- Zone 1

An area in which an explosive gas environment is likely to occur in normal operations. Type of protection: d - flameproof enclosure, e - increased safety, ib - intrinsic safety, m - encapsulation

- Zone 2

An area in which an explosive gas environment is not likely to occur and if it does occur it will exist for a short period only. Type of protection: n - protection (IEC 60079-15)

ATEX/IECEx General Information

Parker Fluid Control Division is pleased to announce the addition of several new ATEX coils designed for explosive atmospheres to comply with European directive 2014/34/EU and standards IEC / EN 60079 for gases and for dust. Coil marking complies with the updated standards. Declaration of Conformity documents for specific part numbers are provided with the electrical product and also provided upon request.

Background:

The ATEX directive is a European initiative undertaken to ensure the safety of products used in potentially explosive atmospheres. It is a European mandate that all products that could provide ignition to a potentially explosive atmosphere be produced to specific requirements, under controlled conditions, by a manufacturer certified compliant to the directive by an independent notification body. Certification requires approval of the entire quality management system to the requirements of ISO 9001 with additional requirements imposed for product verifications, testing and records thereof.

The International Electrotechnical Commission (IEC) is the global organization overseeing the development of international standards for electrical, electronic & related technologies. The IECEx scheme provides a means of International Certification for manufacturers of electrical equipment intended for explosive atmospheres thereby eliminating the need for multiple national certifications in all participating countries. Any recognized certified body can provide a product Certificate of Conformity stating the product design conforms to the relevant IEC standards and the product is manufactured under a quality plan assessed by an accepted certification body. The IECEx scheme is adopting the ATEX principles and this scheme is becoming internationally accepted.

Within North America, UL, FM, and Intertek are the accepted certification bodies (EXCB) and EX assessment & testing labs (EXTL)under the IECEx scheme. The United States has recently integrated both the zone and division system requirements into their respective installation codes. Specifically for the U.S., the National Electric Code Article 505 (NEC).

The Canadian Standards Association (CSA) has implemented the IEC system. All new installations follow the three-zone area classification while following the two-division system for existing facilities.

The introduction of zones area classifications in North America as an accepted alternative to divisions sees the introduction of the IECEx scheme and its continued acceptance on a global basis.

The European ATEX and global IECEx standards apply to hazardous environments from intrinsically safe apparatus to flameproof control systems to increased safety requirements.

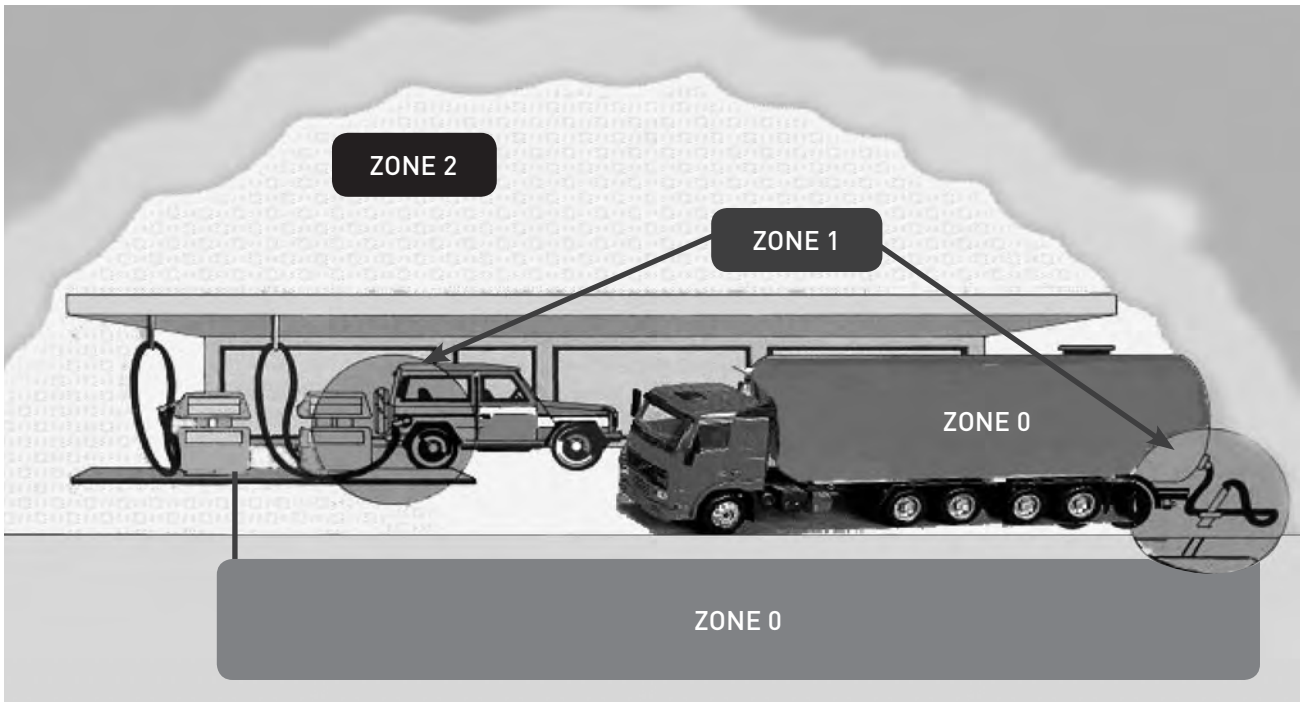
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Classification of Hazardous Location

Explosive Environment	Continuous Presence	Intermittent Presence (normal operation conditions)	Occasional Presence (abnormal operation)
IEC	Zone 0 (gas) Zone 20 (dust)	Zone 1 (gas) Zone 21 (dust)	Zone 2 (gas) Zone 22 (dust)
Europe	Zone 0 (gas) Zone 20 (dust)	Zone 1 (gas) Zone 21 (dust)	Zone 2 (gas) Zone 22 (dust)
Canada (CEC)* USA (NEC)**	CI. I Div.1 (gas) CI. II Div.1 (dust) CI. III Div.1 (fibres)	CI. I Div.1 (gas) CI. II Div.1 (dust) CI. III Div.1 (fibres)	CI. I Div. 2 (gas) CI. II Div. 2 (dust) CI. III Div. 2 (fibres)

* (CEC): Code Canadian d'Electricite ** (NEC): National Electrical Code

Example of Zones Division:



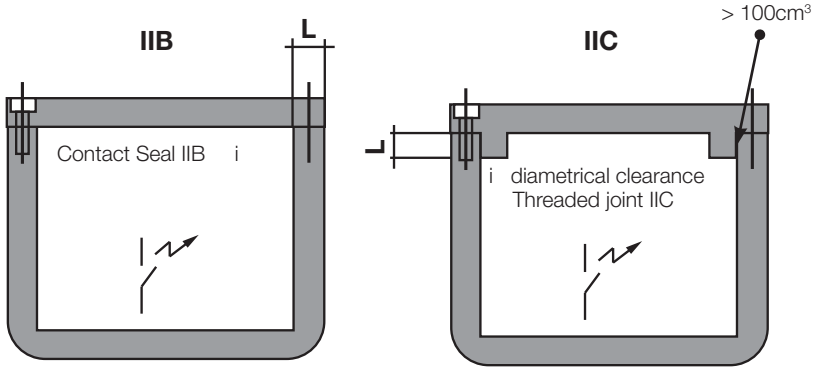
5 Types of Protection used by Parker

5.1 Flameproof enclosure

"d"

A type of protection where the parts that can ignite an explosive environment are placed in an enclosure which can withstand the pressure developed during an internal explosion of an explosive mixture and which prevents the transmission of the explosion to the explosive environment surrounding the enclosure.

Special Enclosure



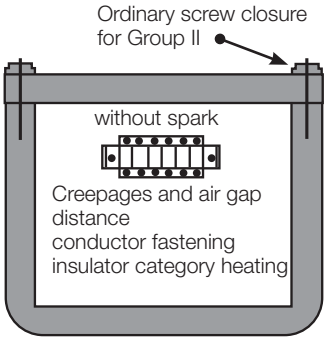
For volume > 2 dm³
Mini lenght L = 12.5 mm
Max gap i = 0.15 mm

For volume > 2 dm³
Mini lenght L = 25 mm
Max dia. clearance i = 0.15 mm

5.2 Increased Safety

"e"

Type of protection applied to electrical apparatus that does not produce arcs or sparks in normal service, in which additional measures are applied so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks.

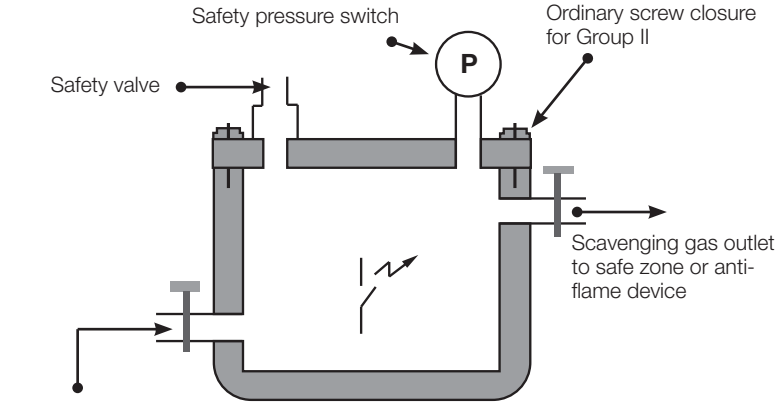


Tight envelope IP54

5.3 Pressurized Apparatus

"p"

A type of protection by which the entry of a surrounding environment into the enclosure of the electrical apparatus, is prevented by maintaining, inside the said enclosure, a protective gas at a higher pressure than that of the surrounding environment. The overpressure is maintained either with or without a continuous flow of the protective gas.



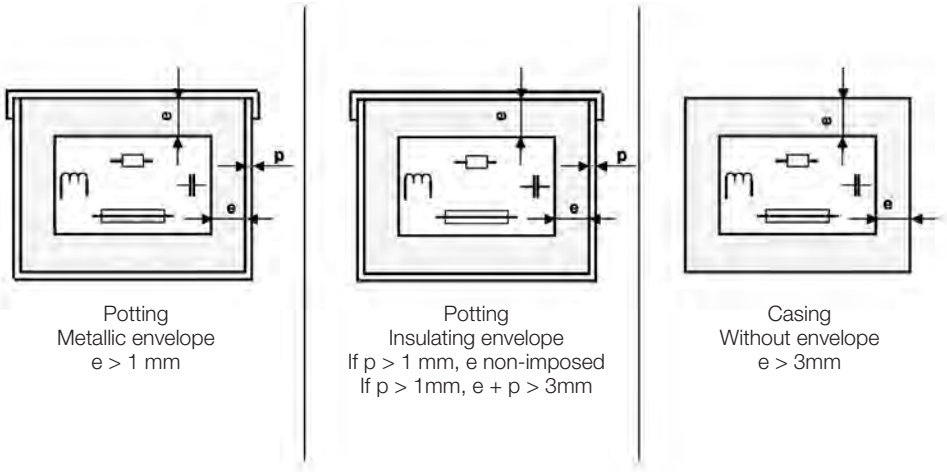
Tight envelope IP40

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5.4 Encapsulation

"m"

A type of protection in which the parts which could ignite an explosive environment by either sparking or heating are enclosed in a compound in such a way that this explosive environment cannot be ignited. (IEC60079-18)



Potting
Metallic envelope
e > 1 mm

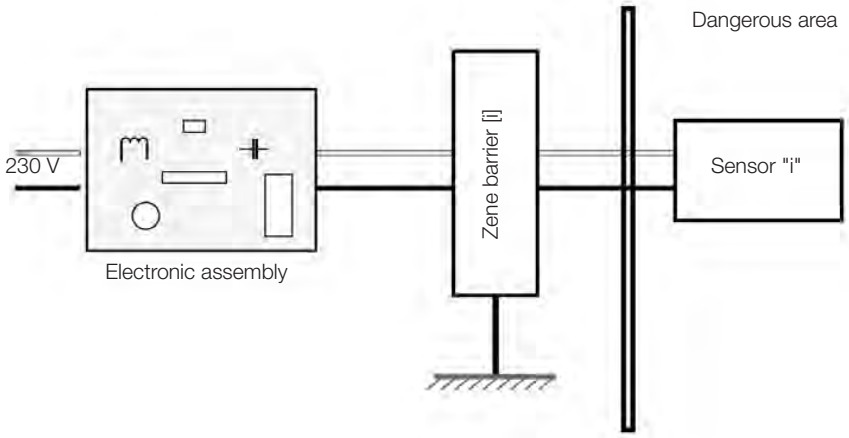
Potting
Insulating envelope
If p > 1 mm, e non-imposed
If p > 1mm, e + p > 3mm

Casing
Without envelope
e > 3mm

5.5 Intrinsic Safety

"i"

A circuit in which no spark or any thermal effect produced in the test conditions prescribed in the standard IEC60079-11 (which include normal operation and specified fault conditions) is capable of causing combustion of a given explosive environment.



Coil "T" Ratings

Temperature Classification	Maximum Allowable Surface Temperature	
	°C	°F
T1	450	842
T2	300	572
T3	200	392
T4	135	275
T5	100	212
T6	85	185

ATEX Explosion Proof Rated Coil Offering

Coil Code*	Wattage/ Cable Length	Protection/Temp. Class	Marking	Certificate of Conformity
HZ04xx	2w/3000mm	Ex mb IIC T6 Ex tb IIIC T80C	CE 0518 Ex II 2 G D	LCIE 02 ATEX 6019 X IECEx LCI 08.0026 X
HZ09xx	10w/3000mm	Ex db mb IIC T4/T5 Ex tb IIIC T130C/T95C	CE 0518 Ex II 2 G D	LCIE 02 ATEX 6009 X
HZ10xx	10w/3000mm	Ex mb IIC T4/T5 Ex tb IIIC T130C/T95C	CE 0518 Ex II 2 G D	LCIE 02 ATEX 6020 X IECEx LCI 08.0027 X
HZ11xx	22w/3000mm	Ex mb IIC T4/T5 Ex tb IIIC T130C/T95C	CE 0518 Ex II 2 G D	LCIE 02 ATEX 6020 X IECEx LCI 08.0027 X
HZ12xx	1.5w/3000mm	Ex mb IIC T6 Ex tb IIIC T80C	CE 0518 Ex II 2 G D	LCIE 02 ATEX 6021 X IECEx LCI 08.0028 X
HZ13xx	0.6w/3000mm	Ex mb IIC T6 Ex tb IIIC T80C	CE 0518 Ex II 2 G D	LCIE 02 ATEX 6021 X IECEx LCI 08.0028 X
VZ03xx (492190)	11w(AC), 9w(DC) / screw terminal	Ex eb mb IIC T3/T4 Ex tb IIIC T195C/T130C	CE 0081 Ex II 2 G D	LCIE 02 ATEX 6023 X IECEx LCI 06.0011 X
495900 (HZ95xx)	3w/screw terminal	Ex db mb IIC T4/T5/T6 Ex tb IIIC T130C/T95C/T80C	CE 0081 Ex II 2 G D	LCIE 03 ATEX 6451 X IECEx LCI 06.0004X
495905 (HZ96xx)	9w/screw terminal	Ex db mb IIC /T4 Ex tb IIIC T130C	CE 0081 Ex II 2 G D	LCIE 03 ATEX 6451 X IECEx LCI 06.0004X
496555	6w/screw terminal	Ex db mb IIC T4/T5/T6 Ex tb IIIC T130C/T95C/T80C	CE 0081 Ex II 2 G D	LCIE 07 ATEX 6075 X IECEx LCI 07.0014 X
496560	9w/screw terminal	Ex db mb IIC T4 Ex tb IIIC T130C	CE 0081 Ex II 2 G D	LCIE 07 ATEX 6075 X IECEx LCI 07.0014 X

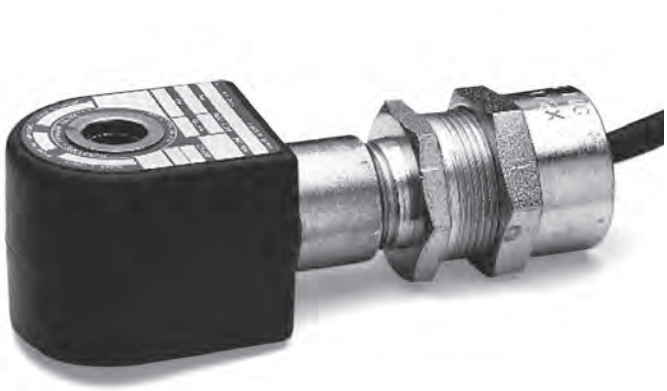
*For 24VDC use code C2 in place of xx.
For 120/60, use code P3 in place of xx.
For 240/60, 220/50 use code Q3 in place of xx.
For 230/50, use code F4 in place of xx.

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ATEX (IECEx) Coils



HZ04, HZ10, HZ11, HZ12, HZ13



HZ09



HZ95, HZ96



VZ03, 496555, 496560

EU DECLARATION OF CONFORMITY
DECLARATION DE CONFORMITE UE
EU KONFORMITÄTSERKLÄRUNG

Name: **Parker Hannifin Corporation, Fluid Control Division**
Address: **95 Edgewood Avenue**
City/State: **New Britain, CT 06051**

declare under our sole responsibility that the product:
déclarons sous notre seule responsabilité que le produit:
erkären in alleiniger Verantwortung, daß das Produkt:

Product Type (1) : Electro Valve…HZ04
Certified :

CE 0518 Ex II 2 G D } Ex mb IIC T6 / Ex tb IIIC T80°C } LCIE 02 ATEX 6019 X

(1) Name, type or model, lot, batch or serial number, possibly sources and numbers of items or further information.
(1) Nom, type ou modèle, No. de lot, d'échantillon ou de série, eventuellement sources et nombre d'exemplaires ou autres renseignements.
(1) Bezeichnung, Typ oder Modell, Los-, Chargen- oder Seriennummer, möglichst Herkunft und Stückzahl oder sonstige Angaben.

SAMPLE

to which this declaration relates is in conformity with the following standard(s) or other normative document(s):
Auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou autre(s) document(s) normatif(s):
auf das sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder normativen Dokument(en) übereinstimmt:

Harmonised Standards : EN 60079-0 (2012) A11 (2013), EN 60079-18 (2015) A1 (2017) and EN 60079-31 (2014)
The standards used for certification EN 60079-0 (2009), EN 60079-18 (2009), and EN 60079-31 (2009) are no longer harmonized. They have been compared to the current harmonized standards listed above, and no changes in the State of the Art apply to this product.

(if applicable) following the provisions of directive(s):
(le cas échéant) conformément aux dispositions de(s) directive(s):
(falls zutreffend) gemäß den Bestimmungen der Richtlinie(n):
ATEX 2014/34/EU – QA Notification No. SIRA 14ATEXM605
RoHS: 2011/65/EC

CE

EC Type Examination Certificate LCIE 02 ATEX 6019 X
Issued By (L.C.I.E.) Identification # 0081
Laboratorie Central Des Industries Electriques
33 Avenue du General Leclerc
FR-92260 Fontenay-aux-Roses cedex
France

Patrick McCotter
Division Quality Manager
Date: 8/23/18

The Product(s) described in this Declaration of Conformity comply with the following IEC Standards:

IEC 60079-0 (2017) IEC 60079-18 (2014) A1 (2017) IEC 60079-31 (2013) IECEx LCI 08.0026 X

Les spécifications mentionnées dans les catalogues Parker Skinner ainsi que toutes les mesures de préventions adéquates doivent être observées afin d'éviter tout accident durant la période d'installation et d'utilisation du produit. Cette garantie cesse si le client ou tierce personne entreprend des modifications ou réparation sans autorisation.

The data supplied in the Parker Skinner Catalogs are to be consulted, and pertinent accident prevention regulations are to be followed during product installation and use. Any unauthorized work performed on the product by the purchaser or by third parties can impair its function, and relieves us of all warranty claims and liability for any resulting damage.

Bei Einbau und Anwendung sind die Parker Skinner Katalogangaben sowie die einschlägigen Unfall-verhütungsvorschriften zu beachten. Ein unbefugter Eingriff durch den Käufer oder durch Dritte kann die Funktion beeinträchtigen und enthebt uns von jeglicher Gewährleistung und Haftung für jeden entstehenden Schaden.

Integrated Coil Offering

	Part Number	Type of Termination*	Voltage	Wattage		Class
				AC**	DC	
CHART 9						
	C4E	1/2" NPT Conduit w/ 18" Leads	24/60	10	8	F
	C4F		120/60, 110/50			
	C4G		240/60, 220/50			
	C4A		12VDC			
	C4B		24VDC			
	D6E	DIN 43650A/ISO 4400	24/60	10	8	H
	D6F		120/60, 110/50			
	D6G		240/60, 220/50			
	D6A		12VDC			
	D6B		24VDC			
	B4E	18" Leads	24/60	10	8	F
	B4F		120/60, 110/50			
	B4G		240/60, 220/50			
	B4A		12VDC			
	B4B		24VDC			
	C5E	1/2" NPT Conduit w/ 18" Leads	24/60	10	8	H
	C5F		120/60, 110/50			
	C5G		240/60, 220/50			
	C5A		12VDC			
	C5B		24VDC			

* 1/2" NPT conduit and DIN coils offer NEMA Types 1, 2, 3, 4 and 4X protection with a suitable conduit installation or mating DIN connector and gasket.
** 2-Way Normally Closed AC Valves are 8.5 Watts (20CCxx)

Electrical Accessories for Chart 9

Coil Option Picture	Accessory Part #	Coil Option Code	Description	Coil Types	Coil Codes
	ELECD1	D6x*	Cable Gland DIN Plug	DIN	D6E, D6F, D6G, D6A, D6B
	ELECD2	D6x*	1/2" Conduit DIN Plug	DIN	D6E, D6F, D6G, D6A, D6B

* The plug comes complete with gasket.

2-Way/3-Way Miniature and Manifold Mounted Valves Using Coil Chart 9
Part Numbering Information: Reference ONLY.

1 Service Type		2 Design Style		3 Body Material		4 Function		5 & 6 Port		7 Orifice Size	
2	2 Way	0	Direct Acting	B	Brass	C	Normally Closed	02	1/8" NPT	A	1/32
3	3 Way			C	303 Stainless	F	Normally Open	L5	3/4-24 Manifold Mount Cartridge	E	3/64
				9	Manifold Mount Cartridge	U	Universal	04	1/4" NPT	G	1/16
										J	5/64
										L	3/32
										M	7/64
										P	1/8
										Q	5/32

ALERT: Table is for interpreting product specifications only.

Consult Parker Fluid Control Division for avaliable combinations not shown in this catalog.

Viton™ is a Dupont Co. Trademark.
Teflon™ is a Dupont Co. Trademark.

Additional Coil Options for Charts 9 (Coils ordered will be assembled to the pressure vessel)

	Part Number	Type of Termination	Voltage	Wattage		Class
				AC*	DC	
	B2E	Grommet Housing w/ Taped Coil w/ 18" Leads	24/60	10	8	F
	B2F		120/60, 110/50			
	B2G		240/60, 220/50			
	B2A		12VDC			
	B2B		24VDC			
	L2E	Molded Coil with 18" Leads and Yoke	24/60Hz	10	8	F
	L2F		120/60, 110/50			
	L2G		240/60, 220/50			
	L2A		12VDC			
	L2B		24VDC			
	T2E	Molded Coil with 1/4" Tab and Yoke	24/60	10	8	F
	T2F		120/60, 110/50			
	T2G		240/60, 220/50			
	T2A		12VDC			
	T2B		24VDC			

* Wattage is 8.5 on all 2-Way, Normally Closed (20CCxx) AC valves

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2-Way/3-Way Miniature and Manifold Mounted Valves Using Coil Chart 9

8 Main Seal Material		9 Operator Size	10 & 11 Coil & Enclosure		12 Voltage		13 & 14 Optional & Special Features
V	FKM- Viton™ Fluoroelastomer	4 0.442 Dia.		**1.125" Integrated Modular Coils**	A	12VDC	Consult Factory
E	EPDM		B4	Integrated, class F, 18" leads, 3-wire	B	24VDC	
N	Nitrile NBR		B5	Integrated, class H, 18" leads, 3-wire	E	24/60	
T	Teflon™		C4	Integrated, 1/2" Conduit, class F, 18" leads, 3-wire	F	120/60; 110/50	
C	Neoprene		C5	Integrated, 1/2" Conduit, class H, 18" leads, 3-wire	G	240/60; 220/50	
			D6	Integrated, DIN 43650A class H			
				1.125" Standard Coils			
			B2	Leaded with metal enclosure, class F, 18" leads			
			L2	Molded leaded coil with Yoke,class F, 18" leads			
			T2	Molded 1/4" tab with Yoke, class F			

ALERT: Table is for interpreting product specifications only.

Consult Parker Fluid Control Division for avaliable combinations not shown in this catalog.

Viton™ is a Dupont Co. Trademark.
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Check out the 2-way and 3-way Manifold Mounted Miniature Cartridge valves in the Specialty section of this catalog.





Product Features

- Space saving approach
- Less manifold machining means lower manifold cost
- Cartridge valves are 100% tested 'C4' and 'C5' 1/2" NPT coils have a rotating conduit hub for easier installation
- No loose parts: sleeve, plunger, spring, orifice are pressed to gether as one unit
- Available with all coils/enclosures from Chart 9 above

Coil Information

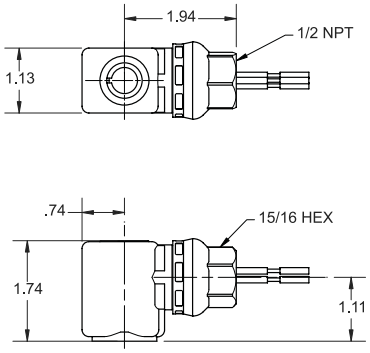
Encapsulated Watertight Designs. Available as Modular Coils or for Fully Assembled Valves.

Conduit Coil
Coil Code: C4*



Construction:
- Class F
- 18" lead wires
- Ground wire
- 1/2" NPT conduit hub
- NEMA 4X, IP65 protection

AC: 10 Watts ***except*** *2 Way*
Normally Closed is 8.5 Watts
DC: 8 Watts

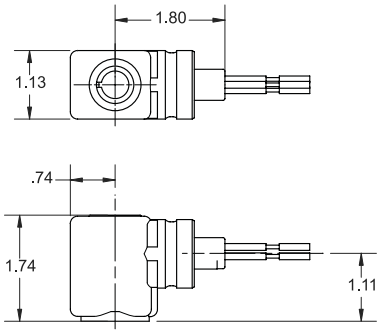


Leaded Coil
Coil Code: B4*



Construction:
- Class F
- 18" lead wires
- Ground wire

AC: 10 Watts ***except*** *2 Way*
Normally Closed is 8.5 Watts
DC: 8 Watts

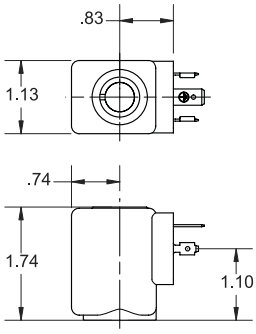


DIN Coil
Coil Code: D6*



Construction:
- Class H
- DIN 43650A/ISO 4400 configuration
- NEMA 4X, IP65 protection with a suitable plug and gasket

AC: 10 Watts ***except*** *2 Way*
Normally Closed is 8.5 Watts
DC: 8 Watts



Coil Information

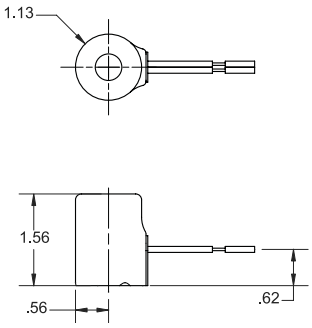
Conventional Coil & Enclosures for Fully Assembled Valves Only

Grommet Coil
Coil Code: B2*



Construction:
- Grommet enclosure
- Taped wrapped coil
- Class F
- 18" leads- 2 wire

AC: 7 Watts
DC: 8 Watts

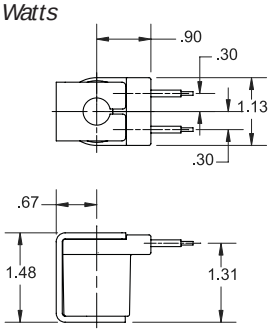


Leaded Coil
Coil Code: L2*



Construction:
- Open frame enclosure
- Molded leaded coil
- Class F
- 18" leads- 2 wire

AC: 10 Watts ***except*** *2 Way*
Normally Closed is 8.5 Watts
DC: 8 Watts

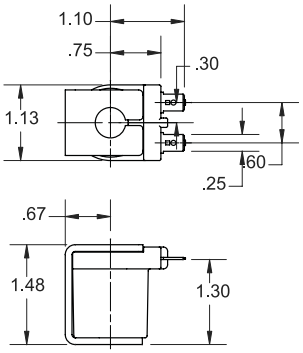


Tab Coil
Coil Code: T2*



Construction:
- Open frame enclosure
- 1/4" tab terminals
- Class F

AC: 10 Watts ***except*** *2 Way*
Normally Closed is 8.5 Watts
DC: 8 Watts



*** ADD VOLTAGE CODE: A= 12VDC B= 24VDC E= 24/60 F= 120/60, 110/50 G= 240/60, 220/50**

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Integrated Coil Offering

	Part Number	Type of Termination*	Voltage	Wattage	Class
CHART 10					
	C8GLB2***	1/2" NPT Conduit w/ 18" Leads	24/60	24	H
	C8GLP3		120/60, 110/50		
	C8GLQ3		240/60, 220/50		
	D800B2***	DIN 43650A/ISO 4400	24/60	24	H
	D800P3***		120/60, 110/50		
	D800Q3***		240/60, 220/50		
	H8GLB2	UL Hazardous Locations; NEMA Types 7 & 9 w/ 18" Leads**	24/60	24	H
	H8GLP3		120/60, 110/50		
	H8GLQ3		240/60, 220/50		

LOW POWER COILS

	Part Number	Type of Termination*	Voltage	Wattage	Class
CHART 11					
	H611C2***	UL Hazardous TYPE 7 & 9	24VDC	1.5	F

ULTRA LOW POWER COILS

	Part Number	Type of Termination*	Voltage	Wattage	Class
CHART 12					
	C711C2	1/2" NPT Conduit Type 4X	24VDC	0.6	F
	H711C2	UL Hazardous TYPE 7 & 9	24VDC	0.6	F

* 1/2" NPT conduit and DIN coils offer NEMA Types 1, 2, 3, 4 and 4X protection with a suitable conduit installation or mating DIN connector and gasket.

** Hazardous location coil approvals: Class I, Div 1 & 2, Groups A, B, C, D: Class II, Div 1 & 2, Groups E, F, G: Class III, Div I.

*** Not in list price book. Minimum order quantities may apply. Consult factory.

General Data-Solenoid Coils

Power and Voltage
All coils used in Parker FCD solenoid valves are designed for continuous duty except where noted. On AC, inrush current occurs at the moment the solenoid is energized. The continuous current after inrush is holding current. Typical AC current values are shown to the right. DC solenoids have no inrush. Typical amp ratings for DC are determined by dividing DC watts by DC voltage. All Parker FCD solenoid valves are tested to operate at 15% under-voltage and full pressure ratings. AC and DC voltage ratings (nominal) and normal operating ranges, as shown in the following table, are standard. For special voltages, consult the factory.

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 following table, are standard.

All coils used in Parker FCD solenoid valves are either Class “F” or Class “H” molded epoxy, and are constructed in accordance with UL, IEEE, NEMA and other accepted standards.

Holding and Inrush Current (Reference coil charts 1-5 in coil section)

Small, Direct-Acting 2-Way, 3-Way and 4-Way Series 20, 30, 35, 38, and 48 (1/8 to 3/8”)Watt Rating and Volt Amperage

Standard Coil Insulation Class	AC		
	Watts	VA Holding	VA Inrush
F	6	16	26
F	10.2	23	37
F	11	20	34
F	16	31	50

2-Way, Direct-Acting Series 20 (3/8 to 3/4”) Watt Rating and Volt Amperage

Standard Coil Insulation Class	AC		
	Watts	VA Holding	VA Inrush
F	6	16	36
F	11	20	61
F	16	31	88

Pilot 2-Way Series 22, 23, 24, 25, 26, 28, (3/8 to 1-1/2”) Watt Rating and Volt Amperage

Standard Coil Insulation Class	AC		
	Watts	VA Holding	VA Inrush
F (Offset Pilot)	6	16	26
F (Center Pilot)	6	16	34
F	11	20	53
F	16	31	76

AC		DC	
Normal Voltage Rating	Normal Operating Range	Normal Voltage Rating	Normal Operating Range
24	20-24	12	10.2-12.6
120	102-120	24	20-25
240	204-240	120	102-126

Current Drain
To determine approximate Holding or Inrush Current for 24/60, 120/60, 240/60 and 480/60 volts in amperes, divide the voltage into the "VA" indicated in the table on this page.

DC Inrush/Holding Current (Amperes)

Coil Type		12 Volt	24 Volt
10 Watt	**Integrated** **Conventional**	**0.81** **0.73**	**0.41** **0.39**
16 Watt	**DIN**	**1.3**	**0.64**
22 Watt	**Integrated**	**1.64** **1.85**	**0.83** **0.86**
8 Watt	**Integrated** **Conventional**	**0.67**	**0.33**
16 Watt	**DIN**	**1.3**	**0.64**

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AC Power Consumption (Reference Coil Charts 7–12 in Coil Section)

Valve Type	AC Power Consumption							
	10 Watt Integrated Coils		10 Watt Conventional Coils		13 Watt Integrated Coils		22 Watt Integrated Coils	
	VA Holding	VA Inrush	VA Holding	VA Inrush	VA Holding	VA Inrush	VA Holding	VA Inrush
71211, 71311, 71321, 71331, 71381, 71221	16	32	13	30	16	32	-	-
71214	16	29	14	27	16	29	-	-
71215 (3/64"-1/8" orifice), 73218	16	31	14	28	16	31	35	54
71215 (5/32"-5/16" orifice)	17	35	14	33	17	35	34	61
71215 (3/8" orifice)	16	36	14	34	16	36	34	63
71216, 73216	17	32	15	31	17	32	-	-
7121F	18	32	16	30	18	32	35	56
7121K (EPDM seals)	19	36	18	34	19	36	-	-
7121K (NBR, FKM seals 1/16"-1/8" orifice)	18	32	16	30	18	32	35	56
7121K (NBR, FKM seals 5/32"-1/4" orifice)	18	36	16	34	18	36	-	-
7121K (NBR, FKM seals 7/16" orifice)	18	37	16	35	18	37	35	65
7121V	19	36	19	36	19	36	39	66
71221	16	32	13	30	16	32	-	-
71225	20	32	18	30	20	32	-	-
7122K	20	32	17	30	20	32	-	-
71235, 71313, 71335, 71385, 71395, 73312	17	27	16	26	17	27	-	-
71295, 71315 (0.19"-0.25" orifice)	16	30	15	29	16	30	-	-
72218	17	41	15	38	17	41	-	-
7221G (NBR, FKM seals)	17	41	16	39	17	41	-	-
7221G (EPDM seals)	19	41	18	39	19	41	-	-
72228	20	46	18	43	20	46	47	80
73212 (1/4" orifice)	16	31	14	28	16	31	35	54
73212 (1/2"-1" orifice), 71315 (0.05"-0.11" orifice)	17	27	16	26	17	27	-	-
73217*, 73477*, 73317*	17	27	-	-	-	-	-	-
73218	16	31	14	28	16	31	35	54
7321G	18	32	16	30	18	32	35	56
7321H	18	32	16	30	18	32	35	56
7321K (EPDM seals)	19	41	18	39	19	41	-	-
7321K (NBR, FKM seals)	17	39	15	36	17	39	-	-
73222	20	32	18	30	20	32	-	-
73228	20	32	18	30	20	32	-	-
7322G	20	32	17	30	20	32	-	-
7322H	20	32	17	30	20	32	-	-
74232, 73322, 73383, 73419, 74332	17	27	16	26	17	27	-	-
7131E, 7341L	17	31	15	29	17	31	-	-
7131F, 7131K, 7133F, 7133K	17	31	15	29	17	31	-	-
7131K	17	31	15	29	17	31	-	-
7131T, 7132T, 7133T	17	35	16	33	17	35	-	-
70312 (N.V.R), 70315 (N.V.R.), 7033T (N.V.R.)	20	32	20	32	-	-	-	-
20CC (These are 8.5 Watt coils)	13	28	13	28	-	-	-	-
20CF, 30CC, 30CF, 30CU	17	25	17	25	-	-	-	-
71417 (These are 24 Watt coils)	38.3	76	-	-	-	-	-	-

* Available with 1.5 Watt coil also (2.1 VA holding and Inrush)

Degrees of Protection "IP" - IEC/EN 60529

Full enclosure protection is often required, either in the standards concerning "potentially explosive environments" or for other specific needs.

First figure indicates protection against dangerous access and foreign objects	Index	IP	Index	Second figure indiciates protection against water penetration
Non-protected	0		0	Non-protected
Protected against solid objects Ø 50 mm or more	1		1	
Protected against solid objects 12.5 mm or more	2		2	
Protected against solid objects 2.5 mm or more	3		3	
Protected against solid objects 1 mm or more	4	5 4	4	
Dust protected	5		5	
Dust-tight	6		6	
			7	Protected against immersion
			8	Protected aganst continuous immersion

Table 1:
Correlation between IP (IEC) and NEMA 250 standards

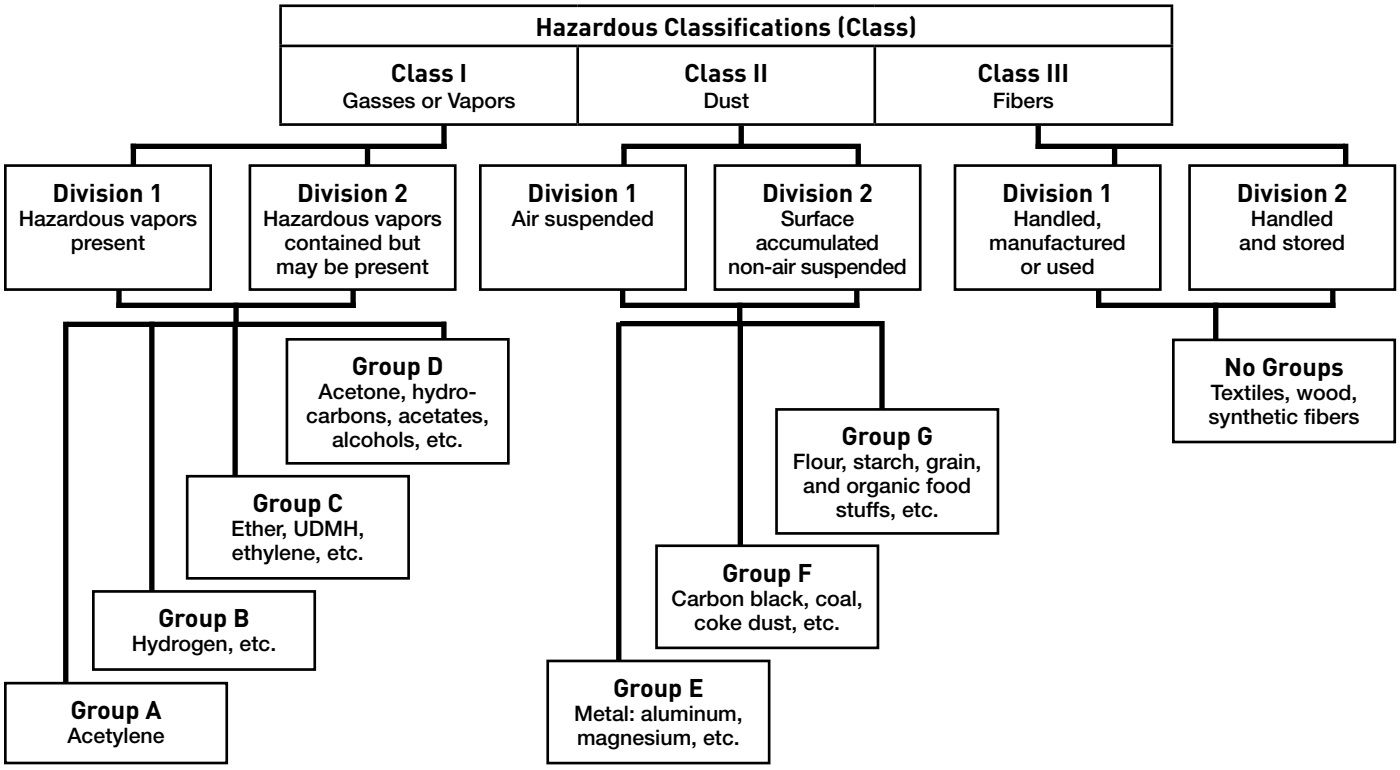
IP 10	NEMA 1
IP 11	NEMA 2
IP 14	NEMA 3R
IP 52	NEMA 5-12-12K
IP 54	NEMA 3-3S-13
IP 65	NEMA 4-4X
IP 67	NEMA 6- 6P

Note; The above correlation between NEMA Type and IP (IEC) is for REFERENCE ONLY.

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Hazardous (Classified) Locations

(In accordance with Article 500, National Electrical Code-1984)



Industrial Limits	Total Coil Temperatures													
	AC								DC				AC/DC	
NEMA Limits	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)
Class H	●													
Class F	●													
Temperature Margin for Higher Fluid or Ambient Temperature					115°C (239°F)				110°C (223°F)		106°C (223°F)		115°C (239°F)	135°C (243°F)
Energized Coil Temperatures in 25°C Ambient Temperatures	85°C (185°F)	90°C (194°F)	85°C (185°F)	90°C (194°F)										
Normal Room Temperature	●													
Nominal Watt Rating	6	11	6	11	10.2	16	10.2	16	9.5		11.5		10	10
Coil Class	F		H		F		H		F	H	F	H	F	H
Coil Chart	1 – 6												7	

Notes

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Technical Information

Introduction

Solenoid valves are highly engineered products that can be utilized in many diverse and unique applications. In addition to operational functionality, it is important to consider safety, reliability, media compatibility and suitability for the operating environment when selecting the best product for a given application. This section provides a brief overview of the components and functional varieties of solenoid valves available from Parker.

General Information

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. They do not regulate flow.

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 (acts to open or close) 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 build up of a magnetic field. The 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-Open, or ***2.)*** Normally-Closed. Both designations refer to action of the valve on flow when the solenoid is not energized. There would be, for example, no media flow through a normally closed valve until the solenoid is energized.

The most common types of solenoid actuated valves are: ***1.)*** Direct-Acting, and ***2.)*** Pilot-Operated. In a direct-acting valve, the plunger is in direct contact with the body main orifice, and opens or closes the orifice. In a pilot-operated valve, the main orifice is not directly controlled by the plunger, but by a diaphragm, piston or spool. Pilot operated valves contain both a pilot and a bleed orifice.

Operational Specifications

All solenoid valves are individually rated. Pilot-operated solenoid valves may also have an additional specification, ***Minimum Operating Pressure Differential (MOP***). This is the minimum system pressure differential required to operate the valve and maintain it in the open position. MOP applies only to pilot-operated solenoid valves where system pressure is used to lift the diaphragm off the seat (normally-closed) when the solenoid is energized. Direct-acting or hung-diaphragm valves do not require a minimum operating pressure.

There will be a pressure differential ΔP before the solenoid of a normally-closed valve is energized. Just after flow begins moving through the valve, the pressure differential may decrease. When sizing any normally-closed, normally-open, or universal solenoid valve, pressure differential before and after flow begins must be considered.

Solenoid valves are also rated for ***Maximum Fluid (media) Temperature*** due to temperature limitations of the various disc or diaphragm materials used in their construction.

Response Time, the time necessary for a fully open valve to fully close, or the time necessary for a fully closed valve to fully open, is affected by several factors including: electrical service, media, valve size, system pressure, pressure drop, and operating mode.

The following general response times (nominal) apply for air service using alternating current (AC).

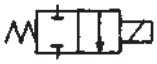
- **Large direct-acting valves (3/8 to 3/4-inch) 20 to 40 milliseconds**
- **Small Direct Acting Valves (1/8 to 1/4-inch) 5 to 10 milliseconds**
- **Small pilot (diaphragm) valves (3/8 to 3/4-inch) 15 to 50 milliseconds**
- **Large pilot (diaphragm) valves (1 to 3-inch) 50 to 75 milliseconds**

Viscous liquids have very little effect on response time on small direct-acting valves. However, on all other valves, viscous liquids may increase response time by 50 to 100 percent. DC operated solenoid valves will generally increase response time (relative to AC operated solenoids) by as much as 50 percent. Where response time is critical, consult your authorized local Fluid Control Division distributor.

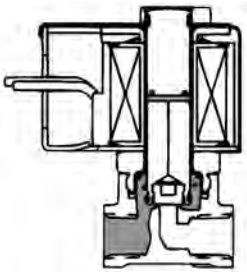
Two-Way Solenoid Valve Operation

Two-way solenoid valves have one inlet and one outlet connection with one main orifice and flow path. A normally closed valve is closed when the solenoid is de-energized, open when the solenoid is energized. A normally open valve is open when the solenoid is de-energized, closed when the solenoid is energized. Consideration should be given to the desired fail-safe condition of the valve when selecting the type of operation.

Operational Sequence: Direct-Acting Normally Closed

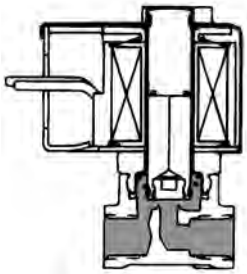


To Open: When the solenoid receives an electrical signal, a magnetic field is formed which attracts the plunger. The plunger lifts off the main orifice allowing flow through the valve.



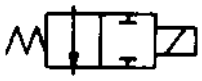
Normally Closed, De-Energized

To Close: When the solenoid is de-energized, it releases its hold on the plunger. The plunger drops and covers the main orifice.



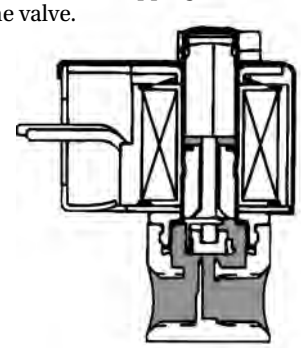
Normally Closed, Energized

Operational Sequence: Direct-Acting Normally Open



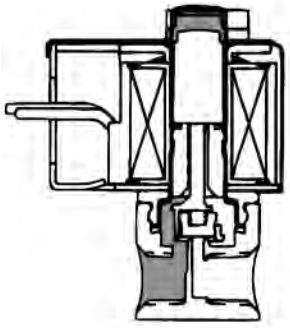
In a normally open valve, the sequence of operation is reversed from that of a normally closed valve. The main orifice is open when the solenoid is de-energized.

To Close: When the solenoid is energized, it attracts the plunger. The plunger covers the main orifice stopping media flow through the valve.

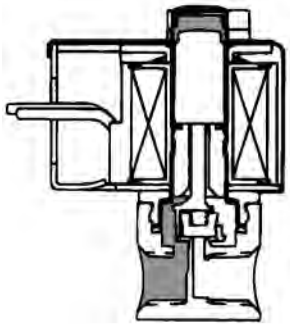


Normally Open, De-energized

To Open: When the solenoid is de-energized, it releases its hold on the plunger. The plunger uncovers the main orifice allowing flow through the valve.



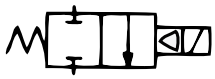
Normally Open, Energized



Normally Closed, Bi-Directional

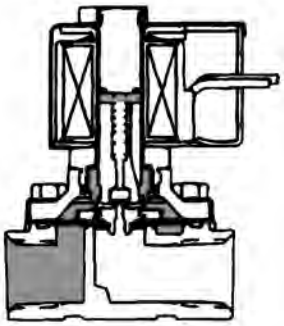
Allows for flow in either direction when energized. (De-energized shown)

Operational Sequence: Pilot-Operated Normally Closed



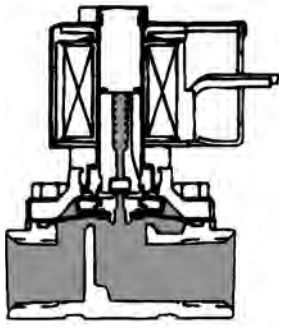
To Open: When the solenoid receives an electrical signal, a magnetic field is formed which attracts the plunger. The plunger covering the pilot orifice lifts off, causing system pressure (holding the diaphragm closed) to drop.

As system pressure on top of the diaphragm is reduced, full system pressure on the opposite side of the diaphragm acts to lift the diaphragm away from the main orifice, thus allowing full media flow through the valve. Since the bleed orifice is dimensionally smaller than the pilot orifice, system pressure cannot rebuild on top of the diaphragm as long as the pilot orifice remains open.



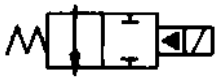
Normally Closed, De-Energized

To Close: When the solenoid is de-energized, it releases its hold on the plunger. The plunger drops and covers the main orifice. System pressure then builds up on top of the diaphragm through the bleed orifice, forcing the diaphragm down until it covers the main orifice and stops media flow through the valve.



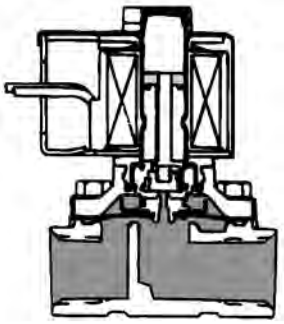
Normally Closed, Energized

Operational Sequence: Pilot-Operated Normally Open



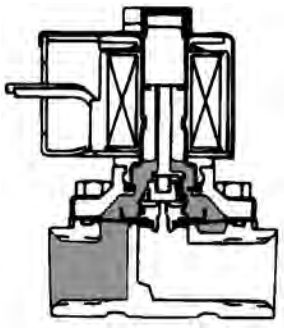
In a normally open valve, the sequence of operation is reversed from that of a normally closed valve. The main orifice is open when the solenoid is de-energized. All other relationships (e.g., the size relationship between the pilot and bleed orifice) still apply.

To Close: When the solenoid is energized, it attracts the plunger. The plunger covers the pilot orifice. System pressure then builds up on top of the diaphragm through the bleed orifice, forcing the diaphragm down until it covers the main orifice and stops media flow through the valve.



Normally Open, De-Energized

To Open: When the solenoid is de-energized, it releases its hold on the plunger. The plunger uncovers the pilot orifice causing system pressure holding the diaphragm closed to drop. As system pressure on top of the diaphragm is reduced, full system pressure on the opposite side of the diaphragm acts to lift the diaphragm away from the main orifice, thus allowing full media flow through the valve.



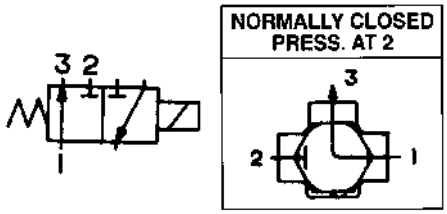
Normally Open, Energized

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Three-Way Solenoid Valve Operation

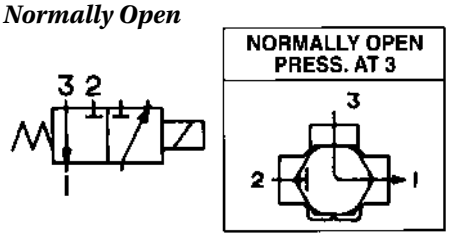
The difference between two-, three- and four-way solenoid valves lies in the construction of the valve body. Three-way valves have three connections and two main orifices. One orifice is always closed, the other always open. Which orifice is open, and which is closed, determines whether the valve is operationally normally open or normally closed.

Operational Sequence: Direct-Acting Normally Closed



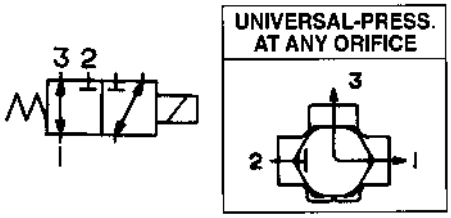
As with a normally closed, two-way valve, the system pressure orifice is closed when the solenoid is de-energized. The second orifice is open to whatever device it is connected to. When energized, the system pressure orifice is opened and the second orifice is closed. This allows system pressure to be applied to the device that was previously being exhausted through the second orifice (now closed).

Normally Open



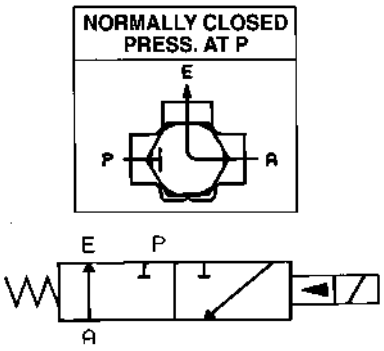
As with a normally open, two-way valve, the system pressure orifice is open when de-energized. The second orifice is closed to whatever device it is connected to. With the solenoid energized, the system pressure orifice is closed, the second orifice opened and the device exhausted.

Universal Construction



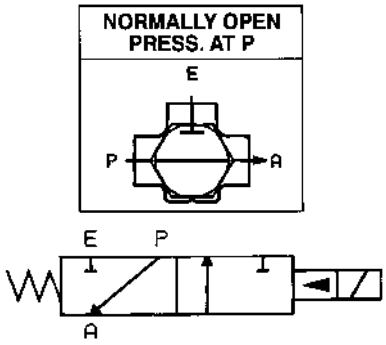
This type of three-way valve may be used in either the normally closed or normally open mode. It can be piped either way. The valve can be used to divert media flow from one outlet connection to the other, or to select one of two inlet flows.

Operational Sequence: Pilot-Operated Normally Closed



As with pilot-operated two-way valves, the plunger movement controls the pilot orifice which controls the pressure holding one of the diaphragms closed against the main orifice. As with direct-acting three-way valves, one orifice is closed when the other is open. When de-energized, flow is from the pressurized device to exhaust and the system pressure port is closed. When energized, flow is from the pressure port to the controlled device and the exhaust port is closed.

Normally Open

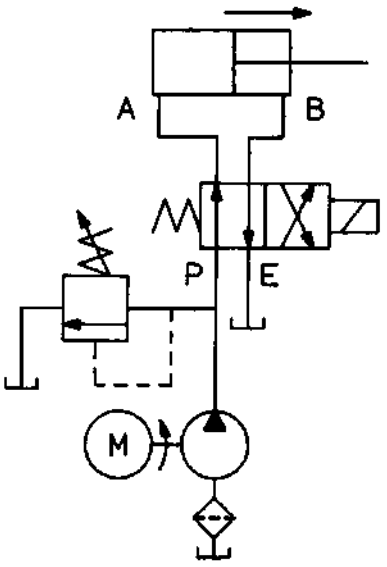


Four-Way Solenoid Valve Operation

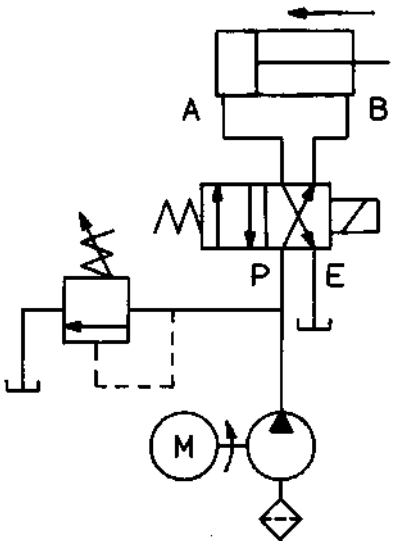
A four-way valve is generally used to operate double-acting cylinders vs. a three-way for single acting cylinders.

A double-acting cylinder has a port at either end of the cylinder body by which fluid can enter and exit. This allows the piston to be moved (propelled) in either direction (double-acting). To distinguish the ports on a double-acting cylinder, one is usually marked "A" and the other "B". A four-way solenoid valve acts to change the direction of fluid flow from the "A" port to the "B" port and, therefore, change direction of the cylinder.

In addition to the "A" and "B" cylinder ports, the four-way valve has a pressure and exhaust port. When de-energized, the pressure port is internally connected to the "A" cylinder port, and the "B" cylinder port is internally connected to the valve's exhaust port. Energizing the four-way valve reverses the system, routing the "A" port to exhaust and the "B" port to pressure. A minimum pressure drop is required for proper operation. Care should be taken not to restrict the exhaust port. Speed controls should be installed in cylinder lines.



De-Energized



Energized

General Data-Solenoid Coils

Power and Voltage

All coils used in Parker FCD solenoid valves are designed for continuous duty except where noted. On AC, inrush current occurs at the moment the solenoid is energized. The continuous current after inrush is holding current.

Typical AC current values are shown in the Coil Section of the catalog. DC solenoids have no inrush. Typical amp ratings for DC are determined by dividing DC watts by DC voltage. All Parker FCD solenoid valves are tested to operate at 15% under-voltage and full pressure ratings. AC and DC voltage ratings (nominal) and normal operating ranges, as shown in the following table, are standard. For special voltages, consult the factory.

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.

All coils used in Parker FCD solenoid valves are either Class "F" or Class "H" molded epoxy, and are constructed in accordance with UL, IEEE, NEMA and other accepted standards. unless otherwise noted

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 Under-writer's Laboratories.

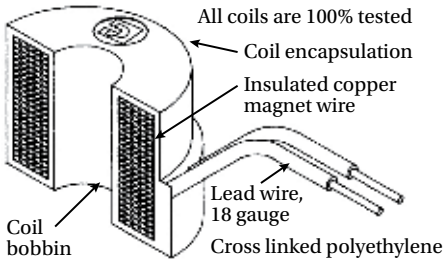
Electrical components of AC and DC coils are tested in accordance with ASTM D2307-78 and become a recognized component under U.L.1446.

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).

Coil Construction

Parker FCD coils are epoxy encapsulated. This compound is waterproof and impervious to oil, dust, moisture and most corrosive fumes and vapors.

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



Temperature

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

Temperature rise due to power input varies with coil design. Temperature rise due to power input and ambient temperature is directly additive and 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 table.

The effect of higher fluid temperatures needs to be considered only when fluid temperature is greater than 180°F. Do not exceed the catalog maximum temperature limitation for the valve. Add the difference of your fluid temperature and 180°F to the energized coil temperature shown in the table.

Use the "Saturated Steam Temperature Table" when working with saturated steam. Do not exceed the catalog maximum temperature limitation for the valve. Add the difference of steam temperature and 180°F to the energized coil temperature shown in the table.

Total of additional ambient and fluid or steam temperature to the energized coil temperature shown must not exceed the industrial limit of the coil class selected. Class "H" coil is required if total temperature exceeds "F" Class coil limits. Consult your Fluid Control Division authorized distributor if total temperature exceeds the "H" Class coil limit.

Maximum allowable fluid temperatures are listed for all valves in each section of the catalog.

Minimum allowable fluid temperature is 32° F if moisture is present. Otherwise, -40° F for direct acting valves with NBR seals, -10° F with FKM seals and -10° F for 71214.

Consult factory for confirmation of low fluid temperature limit for specific complete, part number.

Industrial Limits	Total Coil Temperatures													
	AC								DC				AC/DC	
NEMA Limits	155°C (311°F)		180°C (356°F)		155°C (311°F)		180°C (356°F)			180°C (356°F)		180°C (356°F)		180°C (356°F)
Class H														
Class F									155°C (311°F)		155°C (311°F)		155°C (311°F)	
Temperature Margin for Higher Fluid or Ambient Temperature														135°C (243°F)
					115°C (239°F)				110°C (223°F)		106°C (223°F)		115°C (239°F)	
Energized Coil Temperatures in 25°C Ambient Temperatures	85°C (185°F)	90°C (194°F)	85°C (185°F)	90°C (194°F)										
Normal Room Temperature														
Nominal Watt Rating	6	11	6	11	10.2	16	10.2	16	9.5		11.5		10	10
Coil Class	F		H		F		H		F	H	F	H	F	H
Coil Chart	1 – 6												7	

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Valve Sizing

Any given application requires proper sizing of the Parker FCD solenoid valve. If the valve selected is too small, flow conditions will not be met. If too large, system cost will be excessive. Parker FCD solenoid valves are tested and rated using the industry accepted Cv method. This method, used in both the U.S. and Europe, is both simple and accurate.

The correct size valve for an application can be determined by either using the engineered formulae shown below, or by using the curves and simplified formulae on the following pages.

Using Flow Formulas

Gases

If $P_2 > P$ critical

$$Q_m = C_v\sqrt{\frac{P_1\Delta P}{SG}} \times \sqrt{\frac{520^*}{T}}$$

If $P_2 < P$ critical

$$Q_m = C_v \frac{P_1}{\sqrt{2SG}} \times \sqrt{\frac{520^*}{T}}$$

Q_m = Rate of flow SCFM (Standard Cubic Feet per Minute) at 14.7 psia and 60 degrees F (standard conditions)

C_v = Flow coefficient

P_1 = Inlet pressure (PSI)

P_2 = Downstream pressure, psia

P critical is approximate 53% P1

ΔP = Pressure differential (PSI) (P_1-P_2)

SG = Specific gravity of gas, relative to air at 14.7 psi and 60 degrees F (standard conditions)

T = Absolute (degrees Rankin) temperature in degrees F. (460 + degrees F.)

Note*: 520 is 460°F + 60°F

Liquids

$$Q = C_v\sqrt{\frac{\Delta P}{SG}}$$

Q = Rate of flow, in gallons per minute

Cv = Flow coefficient

ΔP = Pressure differential (PSI) (P_1-P_2)

SG = Specific gravity relative to water at 60 degrees F

Steam

If $P_2 > P$ critical

$$W = 3C_v\sqrt{\frac{P_1\Delta P}{X}}$$

If $P_2 < P$ critical

$$W = 3C_v \frac{P_1}{\sqrt{2x}}$$

W = Rate of flow in pounds per hour

C_v = Flow coefficient

P^1 = Inlet pressure (PSI)

P_2 = Downstream pressure, psia

P critical is approximate 57% P_1

ΔP = Pressure differential (PSI) (P_1-P_2)

X = Quality of steam (Fraction Dry Steam)

Critical pressure has the following significance in the flow of compressible fluids (gases and steam) through valves. Assuming a fixed upstream pressure of P_1, an increase in flow is obtained as the downstream pressure P_2 is reduced below P_1. Continuing increases in flow are experienced until P2 is reduced to a critical value (P critical). When P_2 is reduced below P critical, no further increase in flow results. P critical can be expressed as a percentage of P_1 with approximate values (53% to 57%) given above.

Note: PSIA is absolute pressure which is gauge pressure plus atmospheric pressure (14.7 psi at sea level).

Definition of Symbols

C_v = Flow coefficient

Q_L = Liquid flow (GPM)

Q_g = Gas flow, standard cu-ft-hr (SCFH)

Q_s = Steam flow (lb./hr.)

P_1 = Inlet pressure (PSI)

P_2 = Outlet pressure (PSI)

ΔP = Pressure differential (PSI) (P1-P2)

K_L = Liquid flow curve factor

K_g = Gas flow curve factor

K_s = Steam flow curve factor

K_{sg} = Specific gravity factor

K_t = Temperature factor

There will be a pressure differential ΔP before the solenoid of a normally closed valve is energized. Just after flow begins moving through the valve, the pressure differential may decrease.

When sizing any normally closed, normally open, or universal solenoid valve, pressure differential before and after flow begins must be considered.

Curves to correct for specific gravity (Ksg) and temperature (K_t) are included. These curves apply to liquids and gases only, not saturated steam.

For liquids with viscosity in excess of 300 SSU, consult your Parker FCD authorized distributor or contact the factory.

The simple and easy to read flow curves for liquids, gases and steam will help in properly sizing valves.

There is a constant relationship between gas and saturated steam flow curves. The flow curve for gases can be used for steam by reading the Ks steam scale.

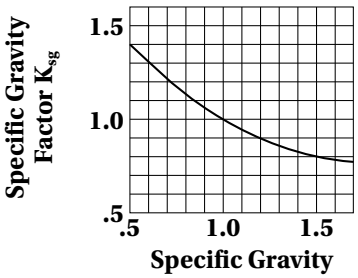
Specific gravity for various compounds are also included.

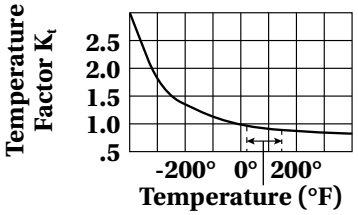
Basic Formulae Using Graphs

Liquid $C_v = \dfrac{Q_L}{K_L \times K_{sg}}$

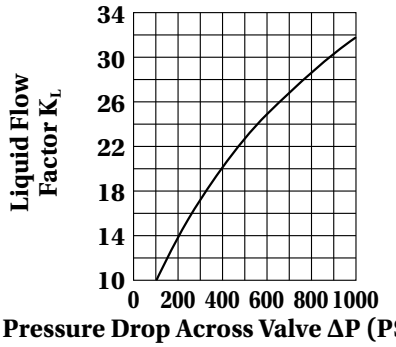
Steam $C_v = \dfrac{Q_s}{K_s}$

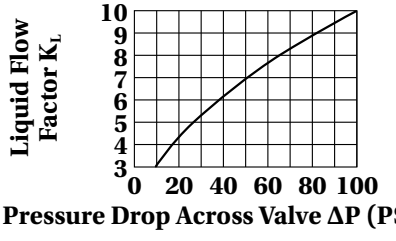
Gas $C_v = \dfrac{Q_G}{K_g \times K_{sg} \times K_t}$

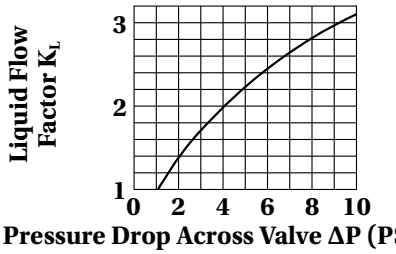




The correction for temperature in the range of 20°F to 150°F is very small, and, therefore, can be ignored in ordinary applications.

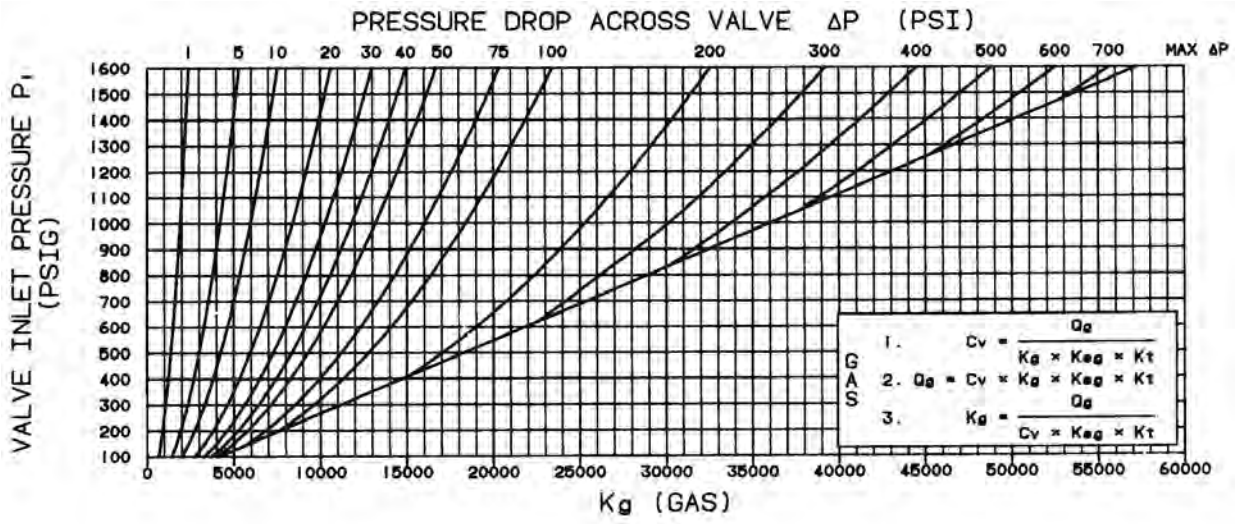


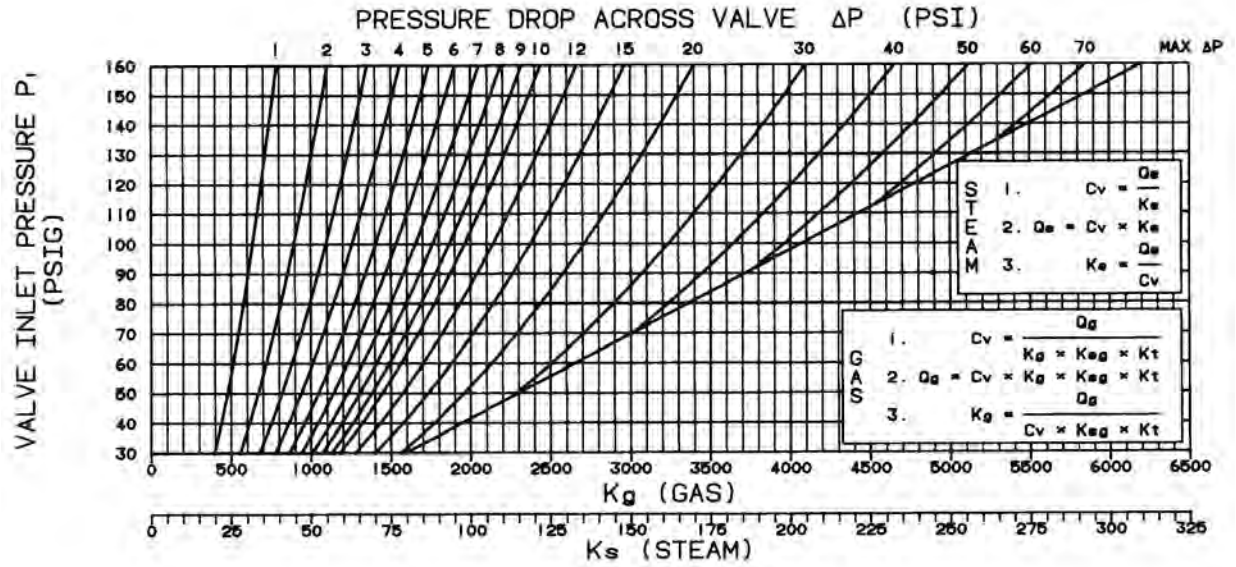


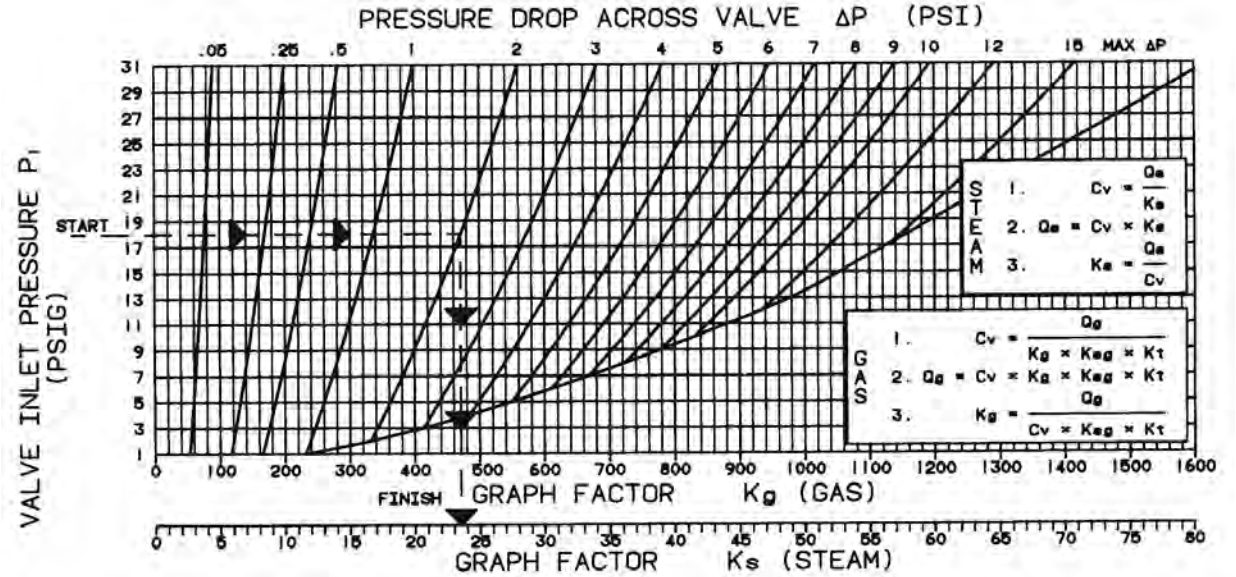


Technical Reference

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Sample Problems

Problem: Liquids

Determine Cv when the required flow is 30 GPM, media is light oil with a specific gravity of 0.82, inlet pressure (P_1) is 36 PSI and outlet pressure (P2) is 0 (ΔP = 36 PSI).

Solution

Use the formula:

$$C_v = \frac{Q_L}{K_L \times K_{sg}}$$

From the liquid flow curve using the pressure drop (36 PSI), read vertically up to the curve. Read horizontally to K_L= 6.

From the specific gravity curve using the specific gravity value (0.82), read vertically to the curve. Read horizontally to K_{sg}=1.1.

From the formula:

$$C_v = \frac{30\ (GPM)}{6 \times 1.1}$$

$$C_v = \frac{30}{6.6}$$

$$C_v = 4.5$$

Problem: Air and Gases

Determine Cv when the required flow is 700 SCFH, media is air (sg=1.0), inlet pressure (P_1) is 70 PSI, outlet pressure (P_2) is 55 PSI, ΔP (P_1 - P_2) = 15 PSI, and air is at 50°F.

Solution

Use the formula:

$$C_v = \frac{Q_g}{K_g \times K_{sg} \times K_t}$$

From the gas and steam flow curve using the inlet pressure (70 PSI), read horizontally to the curve for pressure drop (ΔP=15 PSI). Read vertically down to K_g = 2025.

Air at (50°F) falls into an area of the temperature correction curve where K_t is approximately 1 and can be ignored.

$$C_v = \frac{700}{2025 \times 1.0}$$

$$C_v = \frac{700}{2025}$$

$$C_v = 0.35$$

Steam

Determine Cv when the required flow is 30 lb./hr., media is saturated steam, inlet pressure (P_1) is 80 PSI, outlet pressure (P_2) is 60 PSI and ΔP (P_1 - P_2) is 20 PSI.

Solution

Use the formula:

$$C_v = \frac{Q_S}{K_S}$$

Remembering that the gas and steam flow curves have been combined, from the gas and steam flow curve using the inlet pressure value (80 PSI) read horizontally to the curve for the pressure drop (ΔP=20PSI). Read vertically down to K_S = 121.

From the formula:

$$C_v = \frac{30}{121}$$

$$C_v = 0.25$$

Formula Variations

The examples used here for liquids, gases, and steam show how to determine C_v. These same formulae can be transposed to determine other useful data once a specific value has been selected to meet the desired C_v (see formula variations table below).

Media	Known	Find	Formula	Curve
Liquids	C_V, ΔP, K_{sg}	Q_L	$Q_L = C_V \times K_L \times K_{sg}$	Liquids
	P_1, C_V, Q_g, K_{sg}	ΔP	$K_L = \frac{Q_L}{C_v \times K_{sg}}$	Liquids
	Apply K_L to the liquid factor curve with P_1 to find ΔP.			
Gases	C_V, K_g, K_{sg}, K_t	Q_g	Q_g, $C_V \times K_g \times K_{sg} \times K_t$	Gases
	P_1, C_V, Q_g, K_{sg}, K_t	ΔP	$K_g = \frac{Q_g}{C_v \times K_{sg} \times K_t}$	Gases
	Apply K_g to the gas factor curve with P_1 to find ΔP. After solving for P (pressure differential), a general rule of 2(ΔP) will equal the minimum pressure for a required flow.			
Steam*	C_V, ΔP	Q_s	$Q_s = C_V \times K_s$	Gases Steam Scale
	P_1, C_V, Q_s	ΔP	$K_s = \frac{Q_s}{C_v}$	Gases Steam Scale
	Apply K_s to the gas factor curve with P_1 to find ΔP.			

* In all cases, steam is considered saturated.

Specific Gravity for Liquids and Gases

	Liquid	Gas		Liquid	Gas
Acetic Acid, 10%	1.01	-	Liquid petroleum Gas (LPG)	0.06	2.067
Acetic Acid, Pure	1.06	-	Mercury	13.6	-
Acetone	0.79	-	Methane	0.50	0.554
Acetylene	0.60	0.91	Mineral Oil, USP	0.89	-
Alcohol Amyl	0.81	-	Motor Oil-SAE #10, etc.	0.89	-
Alcohol Ethyl (Ethanol)	0.79	-	Naptha	0.76	-
Alcohol Methyl (Methanol)	0.81	-	Natural Gas	0.55	0.554
Ammonia	0.93	0.596	Oxygen	1.15	1.105
Ammonium Nitrate	1.72	-	Perchloroethylene	1.50	-
Ammonium Phosphate	1.69	-	Petroleum Oils	0.89	-
Argon Gas	1.40	1.379	Potassium Sulfate	1.05	-
Beer	1.01	-	Prestone Anti-Freeze	1.03	-
Benzene Benzol (Benzene)	0.88	-	Propane	1.10	1.56
Butadiene (Gas)	0.65	2.00	Pydraul (Mansanto)	1.28	-
Butane (L.P. Gas)	0.60	2.067	Sodium Hydroxide (100%)	2.13	-
Carbon Dioxide Dry	-	1.53	Sodium Hydroxide (50%) (Caustic Soda)	1.45	-
Carbon Disulfide	1.26	-	Steam Condensate	1.00	0.62
Carbon Tetrachloride	1.59	-	Stoddards Solvent	0.80	-
Cellulube	0.91	-	Sulfuric Acid (10%)	1.08	-
Coffee	1.05	-	Toluene (Toluol)	0.87	-
Corn Oil	0.92	-	Transmission Fluid (Type A)	0.90	-
Cottonseed Oil	0.90	-	Trichloroethylene	1.36	-
Diesel Fuel	0.88	-	Turpentine	0.87	-
Distilled Water	1.00	0.62	Vegetable oils	0.92	-
Ethylene Glycol	1.11	-	Vinegar	1.01	-
Fatty Acids	0.92	-	Water		
Formaldehyde	0.82	-	Carbonated	1.00	0.62
Freon BF (Solvent)	1.57	-	Distilled	1.00	0.62
Freon MF (Solvent)	1.48	-	Fresh	1.01	0.65
Freon TF (Solvent)	1.57	-	Boiler Feed	1.00	0.62
Fuel Oils	0.88	-	Return Condensate	1.00	0.62
Gasoline	0.68	-	Brackish	1.02	0.67
Heptane (Liquid)	0.68	-	Sea	1.03	0.68
Hydraulic Oil	0.91	-			
Hydrogen	0.07	0.0696			
JP4-5 Fuel	0.79	-			
Kerosene	0.81	-			
Linseed Oil	0.94	-			

Saturated Steam Temperature Table

PSIA	PSIG	Temp. °F	Heat of Sat. Liquid (BTU/lb)	Latent Heat of Evap. (BTU/lb)	Total Heat of Steam (BTU/lb)
15	1	213	181.2	969.7	1150.9
20	5	227	196.2	960.1	1156.3
30	15	250	218.9	945.2	1164.1
40	25	267	236.1	933.6	1169.7
50	35	281	250.2	923.9	1174.1
60	45	292	262.2	915.4	1177.6
70	55	302	272.7	907.8	1180.5
80	65	312	282.1	900.9	1183.0
90	75	320	290.7	894.6	1185.3
100	85	327	298.5	888.6	1187.1
110	95	334	305.8	883.1	1188.9
120	105	341	312.6	877.8	1190.4
130	115	347	319.0	872.8	1191.8
140	125	353	325.0	868.0	1193.0
150	135	358	330.6	863.5	1194.1

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Fluid Compatibility

General Information

The following table lists many of the liquids and gases commonly considered for handling with solenoid valves. In some cases, specific limitations are listed, and in other cases, Parker FCD solenoid valves are not recommended. For media not listed in the tables, consult the factory for specific recommendations.

Trim Materials

Buna "N" (Nitrile) Symbol NBR

A soft synthetic compound, Buna "N" is the most widely used elastomer in industry today. Buna "N" is standard disc and diaphragm material in Parker FCD solenoid valves. It has excellent service characteristics for use with water, light oil and gas in a temperature range of (-10°F) to 180°F.

Ethylene Propylene Symbol EPDM

Introduced to the rubber industry in 1961, Ethylene Propylene is used primarily for applications involving hot water or steam service. It has excellent service characteristics for many liquids in a temperature range from (-10°F) to 300°F.

Viton* Symbol FKM

A soft fluoroelastomer, Viton was originally developed to handle hydrocarbons including gasoline, jet engine fuels and various solvents. It handles media in a broader temperature range than Ethylene Propylene. Its temperature range extends from (-10°F) to 350°F. Viton is also an ideal material for handling a wide range of chemical media.

Teflon* Symbol PTFE

Another fluorocarbon, Teflon is available as a solid material or combined with fillers. Teflon will withstand chemical attack from almost any fluid. Its temperature range extends from (-320°F) to 350°F. Because it is not easily fabricated and known to have cold flow characteristics, its applications are limited.

**** DuPont Co. Trademark***

Neoprene Symbol CR

Most elastomers are resistant to either petroleum lubricants or oxygen. Neoprene has limited resistance to both. Combining wide spectrum of resistance with a temperature range of (-10°F) to 180°F account for its use in many applications.

Urethane Symbol U

A synthetic compound, Urethane is widely used where high strength and abrasive resistance are required. Its temperature range is similar to Buna "N" (-10°F) to 160°F.

Guide to Media andMaterial Compatibility for Parker FCD Solenoid Valves

Key:

A = Aluminum[1]
AT = Acetal
BR = Brass
C = Copper
CE = Celcon
CR = Neoprene
EP = Ethylene Propylene
NBR = Buna "N"
R = Ruby
S = Silver
SS = Stainless Steel[2]
T = PTFE
U = Urethane
V = FKM
F = KEL-F (PCTFE)
K = Kalrez (PFPM)
DEL = Delrin

[1] Available by special order only.
[2] Stainless Steel 302, 303, 305, 316

Factors of temperature, pressure and concentration may render material compatibility unacceptable.

Fluid Compatibility Chart

The fluid compatibility charts on the next two pages are presented merely as a guide. This data has been compiled from available information obtained from laboratory tests. Actual valve applications may be more severe than the laboratory conditions, so the information presented here should be used as a guideline in choosing materials that are compatible with the fluid to be controlled and the ambient conditions of the installation. This information should by no means be used alone in determining the proper materials of construction of a valve. Please consult factory for further information if needed.

Seal Material Designations

ASTM Designation	Commercial Designations and/or Trade Names
NBR	Buna-N, Nitrile
EPDM	Ethylene Propylene
FKM	Fluorinated Hydrocarbon, Viton®
PCTFE	Kel-F
PTFE	Teflon®, Rulon®
PFPM	Kalrez
CR	Neoprene
U	Urethane
R	Ruby

Viton® and Teflon® are Registered Dupont Co. trademarks.
Rulon®AR is a Furon-Advanced Polymers Division trademark.

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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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.

Unit Conversion Charts

Fractional Conversions

mm	Inches	Decimal Inches
0.79	1/32	0.031
1.59	1/16	0.063
2.38	3/32	0.094
3.18	1/8	0.125
3.97	5/32	0.156
4.76	3/16	0.188
5.56	7/32	0.219
6.35	1/4	.0250
7.14	9/32	0.281
7.94	5/16	0.313
8.73	11/32	0.344
9.53	3/8	0.375
10.3	13/32	0.406
11.1	7/16	0.438
11.9	15/32	0.469
12.7	1/2	0.500
13.5	17/32	0.531
14.3	9/16	0.563
15.1	19/32	0.594
15.9	5/8	0.625
16.7	21/32	0.656
17.5	11/16	0.688
18.3	23/32	0.719
19.1	3/4	0.750
19.8	25/32	0.781
20.6	13/16	0.813
21.4	27/32	0.844
22.2	7/8	0.875
23.0	29/32	0.906
23.8	15/16	0.938
24.6	31/32	0.969
25.4	1	1.000

Measures

1 inch = 25.4mm
1 inch = 2.54cm
1 U.S. gal = 3.785 liters
1 Imperial gallon = 4.546 liters

Pressure

1 psi = 0.0703 Kg/square cm
1 psi = 27.73 inches water (@60/F)
1 psi = 2.036 inches of mercury (@32/F)
1 psi = 51.7 mm of mercury (@32/F)
1 psi = 0.0689 bar

Vacuum

1 torr = 1 mm mercury
1 micron = 0.001 torr

Volumetric Flow Rate

1 Cv = 14.28 Kv
1 gpm = 3.785 liters/min (U.S. gallon)
1 cfm = 28.317 liters/min
1 liter/min = 0.0353 cfm

Temperature

Degrees C = (Degrees F- 32) (5/9)
Degrees F = (Degrees C) (9/5) + 32

Torque

1 in lb. = 0.113 Nm
1 in lb. = 1.15 cm Kg

Glossary of Terms

Bleed Orifice - An internal orifice which controls the closing rate of a pilot operated solenoid valve. Also called the equalizer hole.

Bubbletight Sealing - Air leakage between the internal sealed ports of a valve in either the energized or de-energized position is undetectable in a 5 second soap bubble test. Equivalent to 2 cc/min.

Continuous Duty - A rating given to a valve that can be energized indefinitely without overheating or failure under normal operating conditions.

Cover - The upper half of a diaphragm type solenoid valve.

Current Drain - The amount of current (expressed in amperes) that flows through the coil of a solenoid valve when it is energized.

Cv Factor - The Cv factor of a valve is the quantity of 60°F water, expressed in gallons per minute, which flows through a valve with one PSI pressure drop. Cv values for Parker solenoid valves are indicated in the catalog listings in each section.

Cycle - A complete operation of a solenoid valve. For example: opening a normally closed valve and then closing it is one cycle.

Cycle Rate - The number of times a valve is capable of opening and closing its main orifice in a particular time interval.

Cycles Per Minute (CPM) - The number of times a valve is capable of opening and closing its main orifice in one minute.

Dead End Gas Service - A condition in which a valve is energized but has no cooling fluid flowing through it because of a dead end line (for example: a cylinder pressurized for a long period of time).

Diaphragm - An elastomeric or other material seal which covers the main orifice.

Disc - A material used in a plunger to seal an orifice.

Drip-proof - See NEMA classifications

Drip-tight - See NEMA classifications

Dust-tight - See NEMA classifications

Duty Cycle - The longest time that a valve is energized, followed by the shortest time that it is de-energized. Expressed in

$$\text{percent} = \frac{\text{on time}}{\text{on time + off time}} \times 100$$

Elastomer – Material having elastic properties. These materials are generally used for sealing purposes.

Electromagnet - Electrical part consisting of a copper windings (solenoid) which, with a magnetic yoke (armature), when electrical current flows through it, generates a magnetic flux attracting the plunger.

Explosion-Proof Construction - A solenoid valve constructed to meet the specifications of the appropriate approval agency for operation in hazardous locations. See also NEMA classifications.

Floating Top Seal - A plunger assembly construction in two-way normally open and three-way valves in which the top seal is moveable against a spring within the plunger. The purpose of this construction is to prevent seal swell or shrinkage due to fluid or temperature from interfering with valve operation. It also allows the spring to continue to move the seal against the valve seat in spite of wear.

Flow - The continuous movement of fluid caused by a pressure differential.

Flow Capacity -The amount of fluid a valve will pass under given temperature and pressure conditions in gallons per minute or cubic feet per minute as measured at the outport. Cv is a measure of flow capacity.

Flow-rate - The amount of fluid that passes a given point at a given period of time.

Flux Frame - The magnetic steel frame surrounding the coil which provides for efficient travel of magnetic flux. Also called magnetic frame assembly.

Flux-plate - A magnetic steel plate used in the magnetic circuit of a solenoid valve to help carry magnetic flux from the housing to the sleeve assembly.

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Hazardous Locations - As defined by Underwriter's Laboratories, Inc. most Parker explosion-proof valves are approved for use in the following hazardous locations: Class I, Group C and D, Class II, Group E, F and G. See also NEMA classifications.

Class I locations are those in which flammable gases or vapors are or may be present in the air in sufficient quantities to produce explosive or ignitable mixtures. Group C atmospheres contain: acetaldehyde, cyclopropane, diethyl ether, ethylene and isoprene. Group D atmospheres contain: gasoline, hexane, naphtha, benzene, alcohols, acetone, lacquer, solvent vapors and natural gas.

Class II locations are hazardous because of the presence of mixtures of combustible dust. Group E atmospheres contain metal dust including aluminum, magnesium, and their commercial alloys, and other metals of similarly hazardous characteristics. Group F atmospheres contain carbon black, coal or coke dust. Group G atmospheres contain flour, starch or grain dust.

Heat Rise - The difference between the temperature of the solenoid coil when energized and de-energized in a constant ambient temperature. As current flows through a coil, heat is generated. The coil temperature rises until the coil housing dissipates heat as fast as it is generated, and the temperature stays at a stabilized level.

Holding Current - The current flowing through the coil after it as stabilized, to hold the plunger in the energized position. Value is normally about ½ of inrush current.

Inrush Current – The current at the moment of energization of AC voltage coils. This current is of greater value than holding current due to low inductance at the moment of energization. Supply transformers should be sized using this value.

Insert - A material used in a plunger assembly to seal an orifice.

Insert Materials

BUNA-N - A soft synthetic rubber used as the standard insert material in valves having rubber inserts. Also known as nitrile.

Ethylene Propylene - A soft synthetic insert material used for water above 180°F and steam.

Delrin - A thermoplastic used in precision parts requiring high stiffness, low friction and excellent dimensional stability.

FKM - A soft synthetic insert material used for high temperature and with many fluids not handled by Buna-N. Standard seal material in several valve series.

Neoprene – A soft synthetic rubber used as an insert material on certain types of freons.

Nitrile -See Buna-N.

PCTFE- A synthetic material used for many semi corrosive and corrosive media. Also for high temperatures.

Ruby - A synthetic corundum (hard stone) with high hardness values and total inertia for all types of fluids. Working temperatures from -40° to +180°C

Rulon - A synthetic plastic material used for semi corrosive media.

Intermittent Duty Coil - A valve coil not designed for continuous duty but which will perform satisfactorily for a specified duty cycle.

Leakage, External - The leakage between the internal part of the valve and the external part of the valve. Parker valves are bubbletight.

Leakage, Internal - The leakage between the internal sealed ports of a valve in either the energized or de-energized position. Leakage rate is normally described in cc (cubic centimeters) per minute or as bubbletight.

Manual Override - A mechanical device that permits manual opening of normally closed valves or closing of normally opened valves.

Media – The fluid flowing through the valve.

Metering - A mechanical device that permits manual adjustment of fluid flowing through a valve. Often referred to as speed control.

NEMA - National Electrical Manufacturers Association. Recommends suitable materials and constructions to meet coil enclosure installation types.

NEMA Classifications (Enclosures)

Drip-proof - NEMA Type 2 enclosure must prevent failing moisture or dirt from interfering with operation.

Drip-tight - NEMA Type 2 enclosure must exclude falling liquids or solids.

Dust-tight - NEMA Type 5. Option EX meets this requirement.

General Purpose - NEMA Type 1 enclosure suitable for general purpose application indoors under normal atmospheric conditions.

Hazardous Locations - NEMA Type 7, 9, 9A explosion proof construction.

Submersible - NEMA Type 6.

Watertight - NEMA Type 4X.

Weather Resistant - NEMA Type 3.

Oxygen Service - Valves specified for use with oxygen are furnished free of any petroleum based oil. Special cleaning may be required and should be so specified.

Pilot Orifice - An internal orifice which controls opening characteristics of a pilot operated solenoid valve. In a pilot operated solenoid, the plunger covers the pilot orifice.

Plunger - Moveable portion of a solenoid valve operator which controls media flow.

Plunger Spring (or return spring) - Used to hold the MP in position and to return it to position after the action of the electromagnet.

Port - An opening or passageway for the inlet or outlet of fluid in a valve. The terminus of the port is threaded with National Pipe Threads (NPT) to accommodate line connection. A port designated with an NTPF port indicates one with dry seal threads.

Port, Cylinder - A port which provides a passage to or from an actuator. This port is a common port and in multi-purpose valves is called a common port.

Port, Exhaust - A port which provides a passage to the atmosphere or downstream piping.

Port, In - A port which provides a passage from the source of fluid.

Port, Out - The port where the fluid leaves the two-way valve.

Port, Normally Closed - The port that is closed to fluid flow when the valve is de-energized.

Port, Normally Open - The port that is open to fluid flow when the valve is de-energized.

Power Consumption - The number of watts a solenoid valve draws when it is energized.

Pressure - A force per unit area used as a propellant of air or fluid. Pressure is induced into a system by means of a pump, compressor or gravity. Absolute pressure is measured in pounds per square inch absolute (PSIA). Absolute pressure is the reference of pressure with atmospheric pressure used as a base (14.7 pounds per square inch absolute at sea level). (0 PSIG = 14.7 PSIA).

Pressure Definitions

Burst Pressure - The pressure that would cause the weakest section of the valve to fail and cause external leakage when pressure is reduced back to rated pressure. Dependent on the individual valve constructions. For most valves it is at least 5 times rated pressure. (This is a destructive test.) In some of the higher pressure valves (2000 PSI or more) the factor may be slightly lower. Consult factory.

Maximum Operating Pressure Differential (MOPD) - The maximum difference in between the pressure at an INlet port and the pressure at an OUTlet port at which a solenoid will operate, either to open or close one or more ports when energized or de-energized.

Minimum Operating Pressure (MOP) - The minimum pressure a pilot operated valve requires for proper operation.

Minimum Operating Pressure Differential - The minimum difference between the pressure at an INlet port and the pressure at an OUTlet port required for proper operation of the solenoid valve. The minimum operating pressure must be maintained throughout the operating cycle of pilot-operating valves to assure proper shifting from the closed position to the open position or vice-versa.
Note: Two- and three-way pilot-operated valves will start to move to their normal positions when the pressure falls below the minimum operating pressure.

Direct acting valves do not require a minimum pressure to operate.

Proof Pressure - The maximum pressure the valve may be exposed to without suffering any damage. It need not be operable at this pressure. For most valves it is at least 1½ times the rated pressure. (This is a non-destructive test).

Pressure Ratings

Extended Pressure Ratings - Are pressure ratings which can be extended beyond the Higher Than Standard Pressure Ratings by means of mechanical or electrical modifications.

When higher than standard or extended pressure ratings are to be employed, consideration must be given to the possible adverse effect on valve life, flow, and noise level.

Higher Than Standard Rating - Are pressure ratings which can be made available through minor changes on a solenoid valve. In most cases, this is possible only when UL approval is not a factor.

Safe Working Pressure - Twenty percent of the pressure which causes external leakage. The valve is not expected to operate at this pressure unless the MOPD is a value less than the SWP.

Standard Catalog Ratings - Are pressure ratings established to conform to Underwriter's Laboratories, Inc., and to do so under the most adverse conditions of pressure, low or high voltage, maximum heat rise, etc. The standard ratings listed in this catalog for most applications should be considered conservative.

Response Time - The length of time required for an operating mechanism of a valve to move from the fully closed to the fully open position, or vice versa. Response time will vary according to pressure, media, voltage and system. It also varies with the type of valve (direct operated or pilot operated). For specific valves consult factory with complete application details.

The following general response times (nominal) apply for air service using alternating current (AC).

- **Large direct-acting valves (3/8 to 3/4-inch) 20 to 40 milliseconds**
- **Small Direct Acting Valves (1/8 to 1/4-inch) 5 to 10 milliseconds**
- **Small pilot (diaphragm) valves (3/8 to 3/4-inch) 15 to 50 milliseconds**
- **Large pilot (diaphragm) valves (1 to 3-inch) 50 to 75 milliseconds**

Viscous liquids have very little effect on response time on small direct-acting valves. However, on all other valves, viscous liquids may increase response time by 50 to 100 percent. DC operated solenoid valves will generally increase response time (relative to AC operated solenoids) by as much as 50 percent. Where response time is critical, consult your authorized local Fluid Control Division distributor.

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Shading Ring - A single coil located in the stop in which a secondary flux wave is induced during AC current operation.

Sleeve - The stainless steel tube of the solenoid operator housing the plunger and stop, and over which the coil is positioned.

Solenoid - The electrical portion containing the coil and magnetic frame and/or enclosure.

Specific Gravity - The ratio of the density (mass of a unit volume) of a substance to the density of a reference substance. Normally the reference substance is water for liquids and air for gases.

Spring-Loaded - The term used to indicate that the valve has a plunger return spring. A spring-loaded plunger permits the valve to be mounted in any position without causing malfunction.

Standard Construction - The type of construction used in manufacturing valves listed in this catalog that have grommet or conduit electrical outlets not including explosion-proof type.

Stop - The stationary portion of the magnetic attractor inside the sleeve assembly.

Temperature Range - Parker valves are equipped with high quality coils suitable for continuous energization. If the normal ambient temperature of 25°C is continuously exceeded or if 40°C is occasionally exceeded, a higher class coil may be required depending on the fluid temperature, flow rate, duty cycle, other heat sinks and ventilation of the area.

The permissible coil temperature by the change of resistance method for standard coils is 110°C for Class A and 130°C for Class B.

Higher coil classes available are F 155°C and H 180°C.*

*Underwriter's Laboratories Inc. requires for listed valves that coil temperature stays lower than the stated limits. The limits are 120°C for Class B, 140°C for Class F and 160°C for Class H.

Ambient And Media Temperature Limitations

Minimum Media - If moisture is present 32°F, otherwise minus 40°F for poppet valves.

Maximum Media And Maximum Ambient - As listed in catalog for each valve.

Note: Ambient temperature and coil temperature rise are additive. Media temperature is not.

Valve Body - Main part of the pressure vessel with the process connections (fittings), seat and main pilot orifices.

Velocity - The speed at which fluid moves, expressed in terms of distance per time, such as feet per second.

Vibration And Shock - Most valves will resist 10G's or more. For V40 series valves, consult Parker.

Viscosity - The amount of resistance to flow. Specific for each media.

Port Marking (2-Way Valves) - A The table below indicates how the ports of 7000 Series solenoid valves are identified.

Valve Type	Port Marking	
	Inlet	Outlet
71211	1	2
71214 (Noryl Body)	**	*
71214 (Teflon, SS Body)	2	1
71215	2	1
71216B	P	A
71216S	2	1
7121F	1	2
7121K (1/8",1/4",3/8" ports)	1	2
7121K (1/2" port)	*	*
71221	3	2
71225	2	1
7122K	1	2
71235	**	**
71295	2	3
72218	P	-
7221G	*	*
72228	P	-
73212B (1/4" ports)	P	A
73212S (1/4" ports)	2	1
73412 (3/8", 1/2", 3/4" ports)	IN	OUT
73212 (1" ports)	P	A
73216B	P	A
73216S	2	-
73218	P	*
7321G	*	*
7321H	*	*
7321K	*	A
73222B (1/4" port)	P	1
73222S (1/4" ports)	2	OUT
73222 (3/8", 1/2",3/4" ports)	IN	A
73222 (1" ports)	P	-
73228	P	*
7322G	*	*
7322H	*	*
74232 (3/8",1/2",3/4" ports)	IN	OUT
74232 (1" ports)	P	A
75232 (3/8", 1/2",3/4" ports)	IN	OUT
75232 (1" ports)	P	A

* Flow arrow on body indicates flow direction-ports are not marked.
** Pressure can be applied at either port.
- Port(s) are not marked.
Valves can be normally closed or normally open, depending on piping - of external pilot.

Port Marking (3 & 4-Way Valves) - A The table below indicates how the ports of 7000 Series solenoid valves are identified.

Three-Way Valves: Normally Closed Valves

Valve Type	Port Identification		
	Pressure	Cylinder	Exhaust
71311	1	2	3
71313	1	2	3
71315	1	2	3
7131E	1	2	3
7131F	2	1	0
7131K	2	1	0
7131T	1	2	3
73312	1	2	3

Normally Open Valves

Valve Type	Port Identification		
	Pressure	Cylinder	Exhaust
71321	3	2	1
73322	3	2	1
7132T	3	2	1
71395	3	2	1

Multipurpose Valves

Valve Type	Port Identification
71331 71335 7133F 7133K 7133T 74332 75332	Pressure can be applied at either port.

Diverting Valves

Valve Type	Port Identification		
	N.C.	IN	N.O.
71381	1	2	3
71385	1	2	3
73382	1	2	3

4-Way Valves

Valve Type	Port Identification					ANSI symbol
	Pressure	Cyl. A	Exh. A	Cyl. B	Exh. B	
73419	P	A	EA	B	EB	14
75419	P	A	EA	B	EB	15
7341LAN	1	2	3	4	5	16
7341LMN	1	2	3	4	5	17

Technical Reference

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	Improper / No Voltage	Open / Shorted Coil	Faulty Electrical Circuit	Excessive Ambient / Media Temperature	Non-Compatible Media	Over Pressurization	Missing / Loose Solenoid Retainer	Incorrectly piped In System	Loose Body Assembly	Dirt In Valve / Media	Seat Erosion	Worn Disc	Worn Plunger / Tube / Pole Piece	Blocked Pilot Hole	Blocked Bleed Hole	Torn / Hole in Diaphragm	Inadequate Flow	Restricted Outlet	Restricted inlet
Fails to Close/ Shift	X	X	X		X	X		X		X			X		X	X		X	X
Fails to Open/ Shift	X	X	X		X	X				X			X	X		X	X	X	X
Internal Leakage					X					X	X	X	X		X	X			
External Leakage					X	X			X										
Excessive Noise/Hum	X		X			X	X			X			X						
Short Coil Life	X		X	X															
Failure Symptom*	**Series**																		
	Valve												**Pilot Operated Valves**				**High Flow 3 Way & 4 Way**		

*Partial list

Note: This check list is intended to serve as a preliminary guide to common valve failure troubleshooting, and is not intended to contain recommendations for proper solenoid valve or systems operation or design. For proper solenoid valve usage, follow manufacturer's recommendations. Improper system design may result in ineffective valve operation.

General Troubleshooting Discussion

Note 1) If the valve fails to operate because of a burn-out or shorted coil, the cause of the burn-out must be determined before the new unit solenoid, or coil for explosion-proof valves, is installed. Usually the cause is in the mechanical portion of the unit body, therefore, the entire solenoid valve must be inspected.

Note 2) If the coil has failed, a complete Parker FCD unit solenoid, or coil for explosion-proof valves, should be installed. Be sure to turn off all electrical power in the valve circuit prior to any disassembly.

Note 3) If the solution requires the replacement of a defective part or parts, a complete Parker FCD rebuild kit should be used. Be sure all parts in the rebuild kit are installed in the valve, not only the part or parts deemed defective. As this procedure requires opening the valve body (pressure vessel), be sure to bleed all system pressure to zero. If either the plunger tube assembly or the bonnet screws are loosened to relieve trapped valve pressure, do so carefully. Do not completely remove the plunger tube assembly or the cover screws until the bleeding is complete. Refer to the appropriate I & M Sheet for instructions.

Note 4) In most installations, after a solenoid valve has been energized for a short time, the solenoid housing will be hot to the touch. This is not an indication of a failure or possible failure. It is perfectly normal.

Note 5) Regardless of system size, water hammer must be considered and controlled to protect piping systems and solenoid valves from its effects. Water hammer occurs when the flow of a non-compressible fluid in a pipe is abruptly stopped. Water hammer is not always identified by noise and vibration. Examine diaphragms, plunger discs and other internal parts for tears, distortion and other damage. Replace internal parts with a rebuild kit and modify the piping system. Commercially available water hammer arresters range from flexible rubber hose, a simple extension pipe to a type of permanently sealed chamber.

Hints

1.) Never replace a burned-out coil or unit solenoid until the cause of the burn-out has been determined, ie: missing parts, plugged plunger tube, worn plunger, over voltage, etc.

2.) Before reassembly of valve body, if possible, flush out inlet to valve.

3.) Use a flat screwdriver placed on top of plunger tube to test magnetic circuit.

4.) If the cause of failure is the presence of foreign matter, install a strainer or filter in the upstream (inlet) side of the valve.

Symptoms

Five basic symptoms indicate a solenoid valve is not operating properly to specifications:

1.) Failure to operate (shift position) when energized.

2.) Failure to operate (shift position) when deenergized.

3.) Internal or external leakage.

4.) Erratic flow.

5.) Excessive solenoid noise when energized even though any of the above symptoms does not exist. (In some AC installations, a very slight hum may be noticeable and is normal.)

Agency Approvals

Most solenoid valves are approved by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA). Some FCD valves meet the requirements and are SIL3 capable, see sample certificates on the following pages.

Consult factory for additional details.

Vacuum

While many 2-Way direct acting/direct lift solenoid valves with elastomeric seals listed in this catalog can be used on vacuum, the standard 100% production leakage test does not ascertain that the valves are sufficiently tight for severe vacuum applications. We do, however, design, produce, and test many vacuum valves to meet specific OEM customer requirements. Therefore, we invite you to consult us for your vacuum valve applications.

Note: vacuum source should be connected to the outlet port for the proper operation.

Fluid Temperature Limitations

32°F Minimum Fluid Temperature if moisture is present. Otherwise minus 40°F for direct acting valves with NBR seals, minus 10°F with FKM seals. For exceptions, consult the factory.

Temperature Classifications

Temp. Class.	Maximum Allowable Surface Temperature	
	C	F
T1	450	842
T2	300	572
T3	200	392
T4	135	257
T5	100	212
T6	85	185

Types of Protection of Solenoids for Hazardous Environments

Standards are established by the European Committee for Electro-Technical Standards (ATEX). Degrees of Protection of electrical parts and operating temperatures are defined by various European standards.

The following chart show the Degree of Protection for the selected coils along with the maximum surface temperatures for each temperature code classification.

Types of Protection

Protection Class	Degree of Protection
IP-65	Protection against ingress of dust (dust proof) Protection against contact with internal parts Protection against a water jet from a nozzle from all directions
IP-67	Protection against ingress of dust (dust proof) Protection against contact with internal parts Protection against a water when the equipment is immersed in water under specific pressure and time conditions

Response Time

The response time of a solenoid valve depends on many factors such as voltage, frequency, pressure, media, temperature (including coil) and the type of valve. Variations in these factors can have a significant effect on the response time. The following tabulation lists the approximate response times for several different types of valves. The times given are for the valves to go from closed position to open or from open position to closed.

Valve Response Time AC* (on Air)

Valve Type	Response Time (milliseconds)
Direct Acting	4-15
Small Pilot Operated (Piston)	30-90
Large Pilot Operated (Piston)	100-150
Small Pilot Operated (Diaphragm)	30-60
Large Pilot Operated (Diaphragm)	60-160
Direct Lift (Diaphragm)	30-60

Operating Speed (Cycle Rates)

Operating speed is defined as the maximum number of cycles (On/Off) per minute that a solenoid valve is capable of completing. It is dependent upon the response time characteristics of the valve. Many of our small, short stroke, direct acting valves are capable of operating at rates over 2,000 cycles per minute. However, for normal operation lower cycle rates as shown are usually recommended.

Valve Operating Speed AC* (on Air)

Valve Type	Operating Speed (Cycles/min.)
Direct Acting	600
Small Pilot Operated (Piston)	400
Large Pilot Operated (Piston)	150
Small Pilot Operated (Diaphragm)	300
Large Pilot Operated (Diaphragm)	200
Direct Lift (Diaphragm)	200

***Response times and operating speeds for DC valves used on air or any valves used on liquids can be much greater than listed above. (As much as 50-100% greater in some cases). Consult Factory for exact operating specifications if response time and operating speed are critical to the application.**

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Certificate / Certificat
Zertifikat / 合格証

PAR 1101070 C001

exida hereby confirms that the:

7000 Series Solenoid Valves

Parker Hannifin Corporation
Fluid Control Division
New Britain, CT, USA

Have been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-7

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

PFH/PFD_{avg} and Architecture Constraints must be verified for each application

Safety Function:
The Solenoid Valve will move to the designed safe position when de-energized / energized within the specified safety time.

Application Restrictions:
The unit must be properly designed into a Safety Instrumented Function per the Safety Manual requirements.

The manufacturer may use the mark:

Revision 3.0 December 22, 2017
Surveillance Audit Due
January 1, 2021

Evaluating Assessor

Certifying Assessor

ANSI Accredited Program
ISO/IEC 17065
PRODUCT CERTIFICATION BODY
#1004

Certificate / Certificat
Zertifikat / 合格証

PAR 1101070 C002

exida hereby confirms that the:

7300 Series Solenoid Valves

Parker Hannifin Corporation
Fluid Control Division
New Britain, CT, USA

Have been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-7

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

PFH/PFD_{avg} and Architecture Constraints must be verified for each application

Safety Function:

The Solenoid Valve will move to the designed safe position when de-energized / energized within the specified safety time.

Application Restrictions:

The unit must be properly designed into a Safety Instrumented Function per the Safety Manual requirements.

The manufacturer may use the mark:

Revision 3.0 December 22, 2017
Surveillance Audit Due
January 1, 2021

Evaluating Assessor

Certifying Assessor

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ISO/IEC 17065
PRODUCT CERTIFICATION BODY
#1004

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Model No.	Mounting Bracket Ref. No.	Mounting Bracket P/N
02F20Oxxx 02F30Cxxx 02F30Oxxx 02F30Uxxx	A	KC99-003
06F25Cxxx 06F25Oxxx 08F25Cxxx 08F25Oxxx 06FS5Cxxx 06FS5Oxxx 08FS5Cxxx 08FS5Oxxx	B	MA99-007
04F20C2xx 04F20O2xx	C	KB99-007
04F30C1xx 04F30O1xx 04F30U1xx	D	AB99-002
06F22xxxx 08F22xxxx 12F22xxxx 06F23xxxx 08F23xxxx 12F23xxxx 08F20C2xx 12F20C2xx 08F20O2xx 12F20O2xx	E	MA99-014
20CC02xxx 20CF02xxx 30CC02xxx 30CF02xxx 30CU02xxx	F	4K007
73212BN3xx 73212BN4xx 73222BN3xx 73222BN4xx 74232BN3xx 74232BN4xx	G	MECHB2

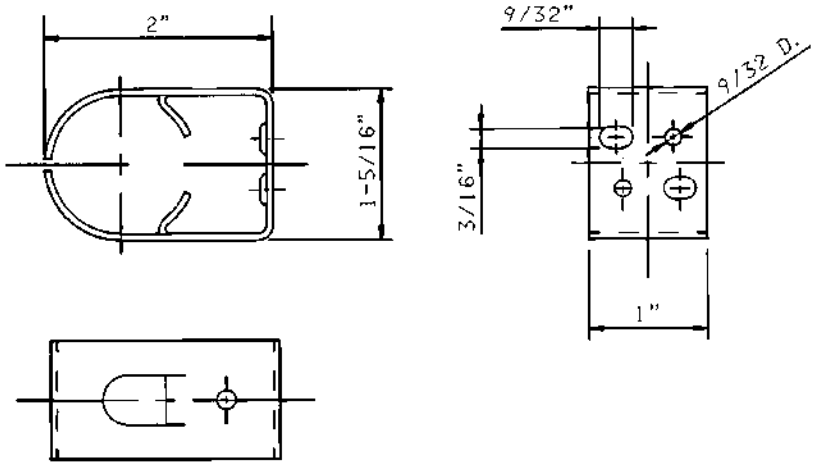
Model No.	Mounting Bracket Ref. No.	Mounting Bracket P/N
73218BN3xx 72218xN3xx 73218BN4xx 72218xN4xx 73218BN5xx 72218xN5xx 73218BN64xx 73218BN75xx 73218BN87xx 73228BN3xx 72228xN3xx 73222BN4xx 72228xN4xx 73228BN5xx 72228xN5xx 73228BN64xx 73228BN75xx 73228BN87xx	H	MECHB8
04F20C1xx 04F20O1xx 04F20C3xx 04F20O3xx	I	KB99-016
71214xxxxx 71215SNxxx 71225SNxxx 71235SNxxx 71295SNxxx 71315SNxxx 71335SNxxx 71385SNxxx 71395SNxxx 71216SNxxx	J	MECHB5

Mounting Bracket A

Part No. KC99-003

For the following valves:

Bracket is available as a standard feature with these valves.

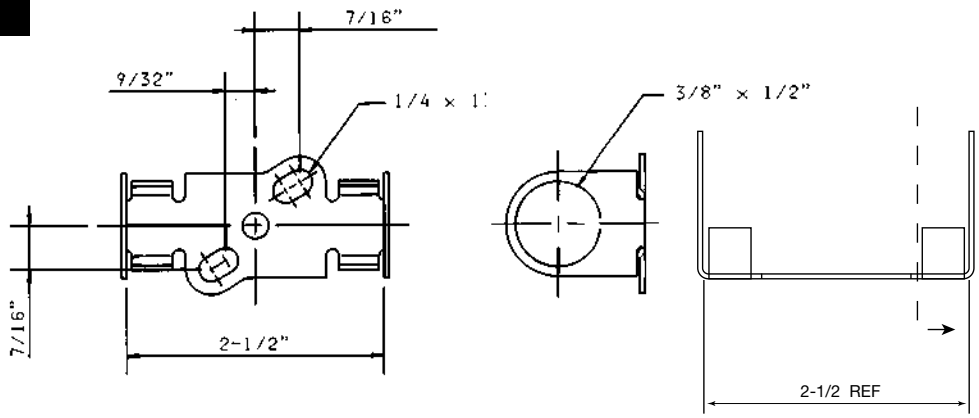


Mounting Bracket B

Part No. MA99-007

For the following valves:

Bracket is available as an option for these valves. Use a suffix "w" on complete part number.

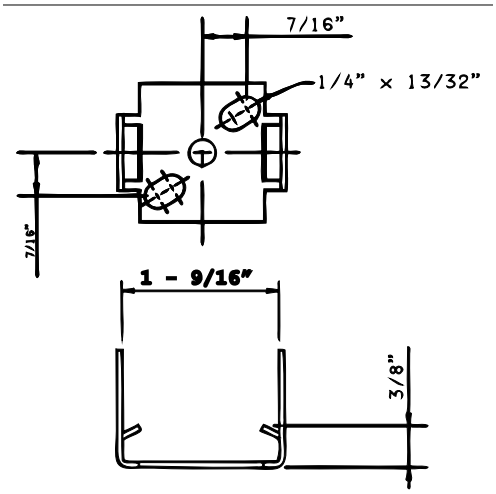


Mounting Bracket C

Part No. KB99-007

For the following valves:

Bracket is avaialble as an option for these valves. Use a suffix "w" on com.



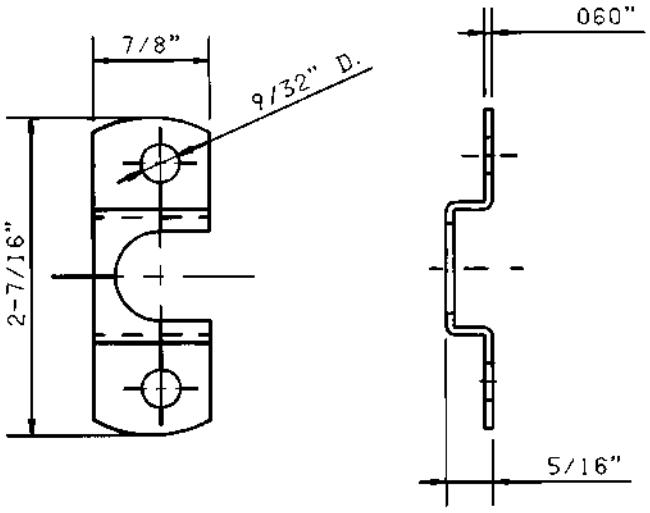
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Mounting Bracket D

Part No. AB99-002

For the following valves:

Bracket is available as a standard feature with these valves.

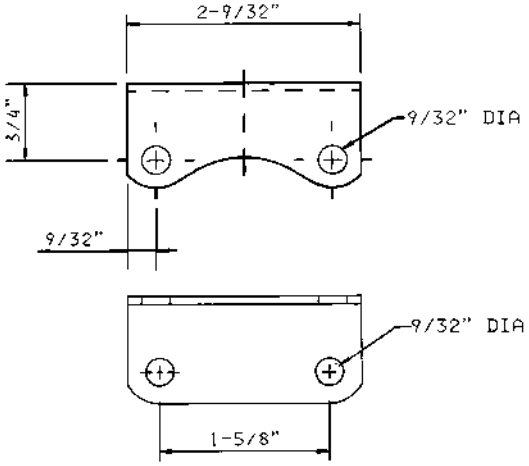


Mounting Bracket E

Part No. MA99-014

For the following Part Numbers:

Bracket is available as an option for these valves. Use a suffix "w" on the complete valve part number.

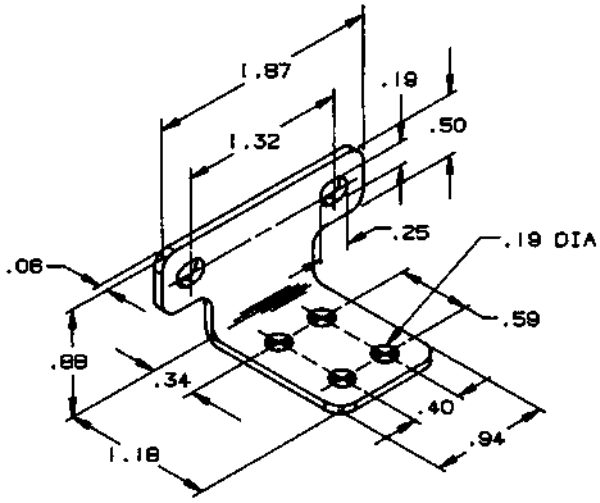


Mounting Bracket F

Part No. 4K007

For the following valves:

Bracket is available as an option.

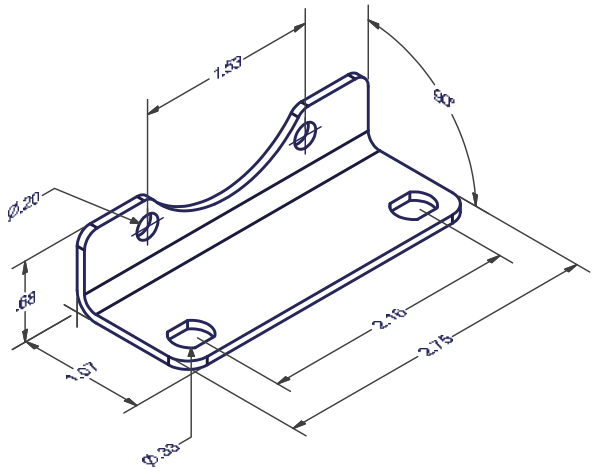


Technical Reference

Mounting Bracket G

Part No. Mech B2

For the following valves:

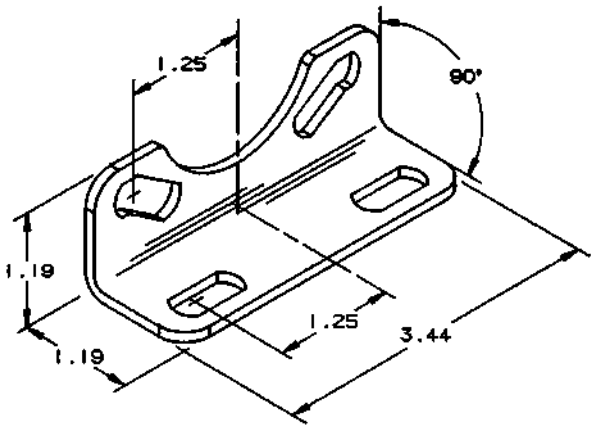


Mounting Bracket H

Part No. Mech B8

For the following valves:

Allows for a flexible side mounting option.



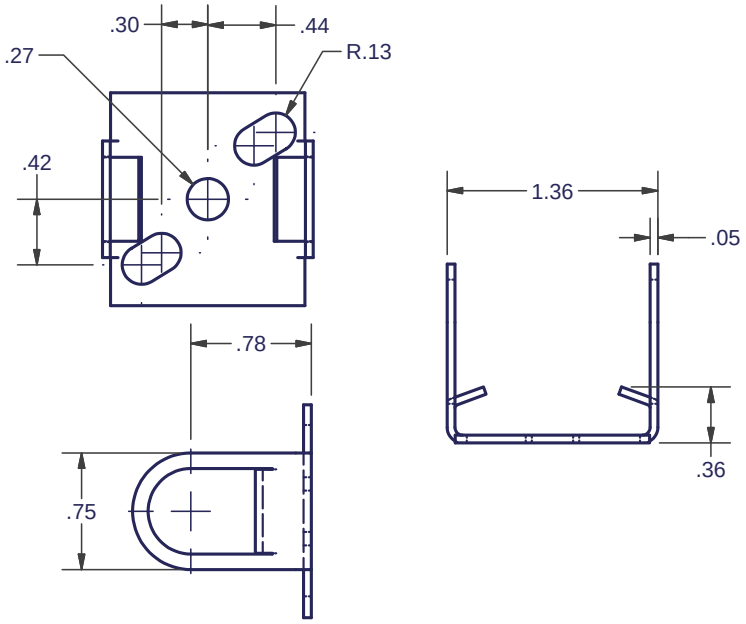
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Mounting Bracket I

Part No. KB99-016

For the following valves:

Bracket is available as an option on these valves. Use suffix "w" on complete valve part number.

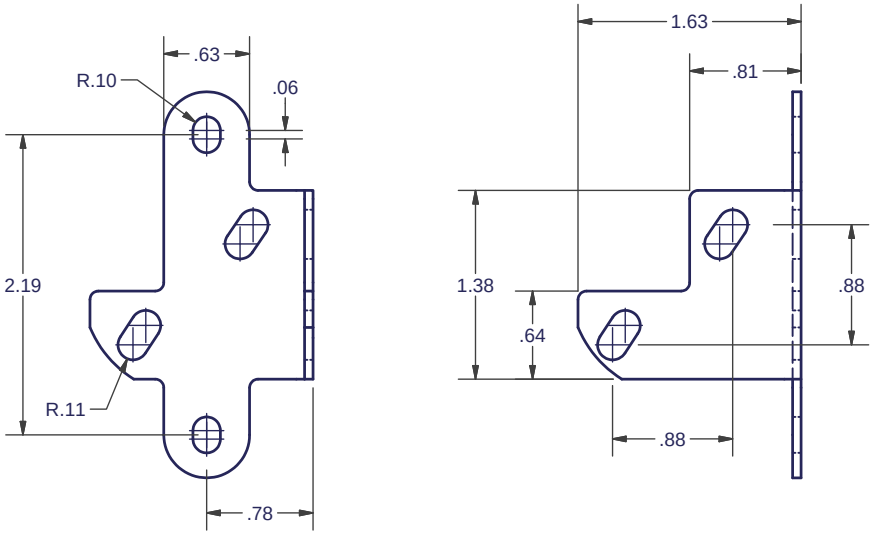


Mounting Bracket J

Part No. Mech B5

For the following valves:

Available as an option.



Technical Reference

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 isimportant 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.

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 anytime 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.

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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.

OPPORTUNITY DATA SHEET

TARGET ACCOUNT _____ DATE: _____

ADDRESS: _____

DISTRIBUTOR (if applicable) _____ TELEPHONE # _____

CONTACT: _____ TITLE _____ TELEPHONE #: _____

APPLICATION: _____

☐ NEW APPLICATION ☐ EXISTING APPLICATION TARGET PRICE: $ _____

CRITICAL DATES

FEASIBILITY; _____ SAMPLE DELIVERY: _____ QUOTATION: _____ PRODUCTION: _____

	INITIAL ORDER	**YEAR 1**	**YEAR 2**	**YEAR 3**
VOLUME (UNITS)				

TOTAL QUANTITY OF SOLENOID VALVES USED BY THIS COMPANY _____

PARKER'S SHARE: ____% COMPETITOR'S SHARE: _____ ____%

VALVE CURRENTLY USED: MANUFACTURER: _____ MODEL: _____

COMPANY'S MOTIVATION TO BUY PARKER VALVES (CHECK ONLY ONE)

☐ QUALITY ☐ COST REDUCTION ☐ DIST. SERVICE ☐ SECOND SOURCE

☐ PROBLEM WITH CURRENT SUPPLIER: _____

☐ OTHER: _____

Valve Type ☐ 2 Way ☐ 3 Way ☐ 4 Way

DE-ENERGIZED POSITION

☐ Normally Open ☐ Directional Control

☐ Normally Closed ☐ Multipurpose

PORT SIZE FLUID CONNECTION

_____ Inch NPT Other _____

ORIFICE DIAMETER

Inlet _____ **or CV** _____

Exhaust _____ **or CV** _____

FLOW RATE

Gases: _____ SCFM when inlet pressure is _____ PSIG and outlet pressure is _____ PSIG

Liquids _____ GPM when inlet pressure is _____ PSIG and outlet pressure is _____ PSIG

VOLTAGE

Min. _____ Max. _____ Nom. _____

☐ AC _____ HZ _____ ☐ DC _____

ELECTRICAL ENCLOSURE

☐ Standard Connection ☐ Conduit ☐ Explosion Proof

☐ Junction Box ☐ Grommet ☐ Watertight

Other _____

DUTY CYCLE

Continuous Duty: Energized more than 1 hour

Energized _____ hrs. De-Energized _____ hrs.

Intermittent Duty: Energized less than 1 hour

Max. Energized _____ Minutes

Min. De-Energized: _____ Minutes

CYCLING DATA

Operating Speed _____ **CPM**

VIBRATION AND SHOCK

☐ Not a Factor

☐ Vibration _____ CPS at _____ G's

☐ Shock _____ G's duration for _____ M. Sec.

Mounted in ☐ Vertical Plane ☐ Horizontal Plane

PRESSURE OR VACUUM

Maximum Static Pressure _____ PSI

Maximum Pressure Differential _____ PSI

Minimum Pressure Differential _____ PSI

Maximum Vacuum _____ PSI inches HG

FLUID BEING HANDLED

Description _____

If Gas ☐ lubricated ☐ Non-lubricated

Temperature Min. _____ F, Max. _____ F

Viscosity _____

(if over no. 10 SAE or 100 SSU at 100F)

ALLOWABLE INTERNAL LEAKAGE

☐ None ☐ _____ cc/min at _____ PSID

CURRENT DRAW LIMITATIONS

Max. Amps _____ Max. Watts _____

COIL TYPE

☐ Lead Wire _____ in. long _____ AWG

☐ Spade Terminal ☐ DIN

☐ Other _____

AMBIENT CONDITIONS

☐ Temperature Max _____ F Min. _____ F

☐ Spade Terminal ☐ DIN

☐ Other _____

LIFE EXPECTANCY

Total cycles per year _____ Number of Years _____

APPROVAL REQUIRED

☐ None ☐ UL Listed ☐ CSA ☐ CE ☐ Cenelec

☐ UL Component Recognition

☐ Other _____

NOTE: Agency approval charges may apply. Consult Factory.

Additional features desired _____

Completed by _____ _____ _____

Name Company Telephone DATASHET.DOC

Technical Reference

Parker Hannifin Corporation
Fluid Control Division
1 800 825 8305 (1 800 Valve05)
www.parker.com/fcd

Terms & Conditions of Sale

Offer Of Sale: The items described in this document are hereby offered for sale at prices to be established by Parker Hannifin Corporation, its subsidiaries and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Parker Hannifin Corporation, its subsidiary or an authorized distributor ("Seller"] verbally or in writing, shall constitute acceptance of this offer.

1. Terms and Conditions of Sale: All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment. The minimum order amount is $125.00 net, unless otherwise noted on the quotation .

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery. Shipments are made by common carrier. Any premium freight must be requested and paid for by the Buyer.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 2 years from the date of shipment to Buyer, or 2,000 hours of use, whichever expires first. Exception to this is the Angle Body Valve line has a 1 year warranty. THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTA TION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARIS. ING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEAL ING ARE HEREBY DISCLAIMED. NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.

5. Limitation Of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. 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 apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are 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. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). 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 an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'events of Force Majeure]. Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

PD4099 9/88 (Rev B)

Notes

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Fluid Control Division
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Parker's Motion & Control Technologies

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AEROSPACE

Key Markets

- Aircraft engines
- Business & general aviation
- Commercial transports
- Land-based weapons systems
- Military aircraft
- Missiles & launch vehicles
- Regional transports
- Unmanned aerial vehicles

Key Products

- Flight control systems & components
- Fluid conveyance systems
- Fluid metering delivery & atomization devices
- Fuel systems & components
- Hydraulic systems & components
- Inert nitrogen generating systems
- Pneumatic systems & components
- Wheels & brakes



CLIMATE CONTROL

Key Markets

- Agriculture
- Air conditioning
- Food, beverage & dairy
- Life sciences & medical
- Precision cooling
- Processing
- Transportation

Key Products

- CO^2 controls
- Electronic controllers
- Filter driers
- Hand shut-off valves
- Hose & fittings
- Pressure regulating valves
- Refrigerant distributors
- Safety relief valves
- Solenoid valves
- Thermostatic expansion valves



ELECTROMECHANICAL

Key Markets

- Aerospace
- Factory automation
- Food & beverage
- Life science & medical
- Machine tools
- Packaging machinery
- Paper machinery
- Plastics machinery & converting
- Primary metals
- Semiconductor & electronics
- Textile
- Wire & cable

Key Products

- AC/DC drives & systems
- Electric actuators
- Controllers
- Gantry robots
- Gearheads
- Human machine interfaces
- Industrial PCs
- Inverters
- Linear motors, slides and stages
- Precision stages
- Stepper motors
- Servo motors, drives & controls
- Structural extrusions



FILTRATION

Key Markets

- Food & beverage
- Industrial machinery
- Life sciences
- Marine
- Mobile equipment
- Oil & gas
- Power generation
- Process
- Transportation

Key Products

- Analytical gas generators
- Compressed air & gas filters
- Condition monitoring
- Engine air, fuel & oil filtration & systems
- Hydraulic, lubrication & coolant filters
- Process, chemical, water & microfiltration filters
- Nitrogen, hydrogen & zero air generators



FLUID & GAS HANDLING

Key Markets

- Aerospace
- Agriculture
- Bulk chemical handling
- Construction machinery
- Food & beverage
- Fuel & gas delivery
- Industrial machinery
- Mobile
- Oil & gas
- Transportation
- Welding

Key Products

- Brass fittings & valves
- Diagnostic equipment
- Fluid conveyance systems
- Industrial hose
- PTFE & PFA hose, tubing & plastic fittings
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects



HYDRAULICS

Key Markets

- Aerospace
- Aerial lift
- Agriculture
- Construction machinery
- Forestry
- Industrial machinery
- Mining
- Oil & gas
- Power generation & energy
- Truck hydraulics

Key Products

- Diagnostic equipment
- Hydraulic cylinders & accumulators
- Hydraulic motors & pumps
- Hydraulic systems
- Hydraulic valves & controls
- Power take-offs
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects



PNEUMATICS

Key Markets

- Aerospace
- Conveyor & material handling
- Factory automation
- Food & beverage
- Life science & medical
- Machine tools
- Packaging machinery
- Transportation & automotive

Key Products

- Air preparation
- Compact cylinders
- Field bus valve systems
- Grippers
- Guided cylinders
- Manifolds
- Miniature fluidics
- Pneumatic accessories
- Pneumatic actuators & grippers
- Pneumatic valves and controls
- Rodless cylinders
- Rotary actuators
- Tie rod cylinders
- Vacuum generators, cups & sensors



PROCESS CONTROL

Key Markets

- Chemical & refining
- Food, beverage & dairy
- Medical & dental
- Microelectronics
- Oil & gas
- Power generation

Key Products

- Analytical sample conditioning products & systems
- Fluoropolymer chemical delivery fittings, valves & pumps
- High purity gas delivery fittings, valves & regulators
- Instrumentation fittings, valves & regulators
- Medium pressure fittings & valves
- Process control manifolds



SEALING & SHIELDING

Key Markets

- Aerospace
- Chemical processing
- Consumer
- Energy, oil & gas
- Fluid power
- General industrial
- Information technology
- Life sciences
- Military
- Semiconductor
- Telecommunications
- Transportation

Key Products

- Dynamic seals
- Elastomeric o-rings
- EMI shielding
- Extruded & precision-cut, fabricated elastomeric seals
- Homogeneous & inserted elastomeric shapes
- High temperature metal seals
- Metal & plastic retained composite seals
- Thermal management

Parker

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