310/410 Series
Solenoid Valves

Humphrey®

310/410 Solenoid Valves

The 310/410 series is a remarkably adaptable system of 3-way and 4-way, single solenoid, 1/8-inch ported air valves. Small size, light weight, and low power make them ideal for today's down-sized, energy efficient equipment.

They have great mounting versatility too. With in-line, stacking, and subbase manifold mounting, they have what it takes to adapt to virtually any application. You can even combine 3-way and 4-way valves in the same stack or subbase manifold.

All models feature a direct-acting molded coil and Class B insulation system for temperatures from 32° to 125° F (0° to 50° C). The poppet design has been field-proven through years of reliable service in thousands of demanding applications worldwide.

Four-way models are available with integral dual flow controls that eliminate the need, expense, labor, and plumbing costs of externally applied flow controls.

An optional DIN-type plug-in connector provides fast, easy, and secure solderless electrical connections. A conduit connection is also available for in-line models.

The valves come equipped with a non-locking manual override. The valves can also be ordered without an override.

Humphrey 310/410 valves. Quality. Reliability. Performance. And attractive international styling that compliments the appearance of your finished product.

Humphrey is a Class A user of MRP-11.

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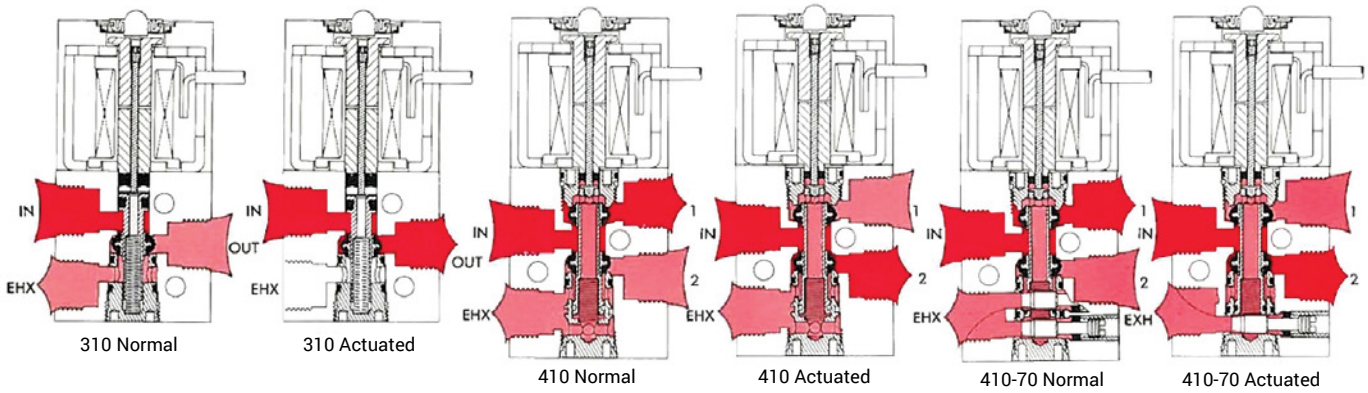
FEATURES	ADVANTAGES	BENEFITS
Designed for rigorous applications	Tolerant of many ambient/media conditions.	Reliable.
Small size/light weight	Reduced size and weight of control valves in your finished product.	Lower material cost; lower shipping cost; less floor space in final setting.
Poppet design	Needs no lubrication. Tolerates impure media.	Performs in adverse conditions.
Humphrey solenoid design	Field-proven in thousands of applications.	Proven performance.



Molded coil and electronic override seal	Both internal and external resistance to solenoid contamination.	Reliable.
Positive stop of solenoid armature	Prevents excessive impact and poppet overtravel.	Long product cycle life.
Short stroke	Fast response.	Rapid cycling.
Integral flow controls on model 410-70	Permits individual control of each exhaust in common exhaust port.	Eliminates need, cost, and plumbing of external flow controls
Pressure balanced	Permits connection of pressure to any port.	Great versatility.
Consistent effective surface areas	Same flow from IN to OUT and from OUT to EXH ports.	Uniform flow in all modes of use.
Universal mounting bracket	One bracket adapts to all 310/410 models.	Efficient, versatile and reduced inventory.
Attractive valve appearance	Complements appearance of your product.	Contemporary, trim look.
Stacking and subbase mounting permits centralized location of control valves	Simplified plumbing..	Reduced installation and maintenance costs.
Stacking units and subbase manifolds can be subassembled and placed in finished product as a complete, single control package	Simplified installation.	Saves time and labor of installing valves individually.
Multi-port models SMP and SBMP-1 have additional IN and EXH ports	Allows combination of NC and NO 3-ways, or various pressures on same manifold assembly.	Design flexibility.

HUMPHREY 310/410 SERIES SOLENOID VALVES

TECHNICAL SECTION

MEDIA/PRESSURE

310/410 valves are designed for use with compressed air or inert gases from 0 to 125 psig (8.5 bar). 410 valves are also rated for vacuum service from 0 to 28" Hg. 310 models can be used with vacuum from 0 to 28" Hg. if ordered with the "V" prefix, i.e., V310, VS310, or VM310.

Media should be cleaned and uncontaminated. When in doubt, install a filter with filtering capacity of 40 microns. Periodically remove and clean or replace filter element. Consult factory if using any other media.

LUBRICATION

310/410 valves are pre-lubed and can be operated without air line lubrication to an estimated life of 20 million cycles, depending on application. If air pistons/cylinders or other devices require lubrication, ensure that lubricating oils are chemically compatible with Buna N elastomers and are of sufficient viscosity to assure adequate lubrication. Thin or low viscosity oils (spindle oil, machine oil, etc.) do not provide a good residual film of lubrication.

PLUMBING

310/410 valves are direct acting. When used with vacuum or low pressure, use largest possible tubing size and minimum tubing length for optimum performance.

Before connecting fittings and tubing, blow all foreign material from these components. If using a sealant, take extra care that sealant does not enter valves. This can potentially cause malfunction and/or leakage.

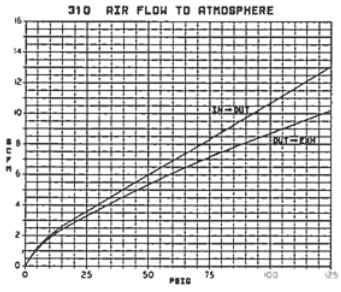
310/410 in-line valves are available for mounting to custom-made manifolds by specifying the Code 23 option (special mounting holes). Consult factory.

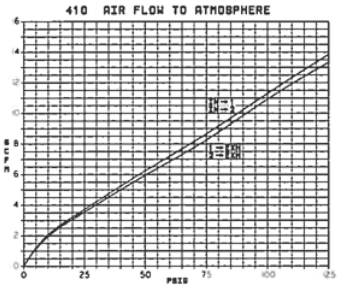
FLOW RATES/C_V

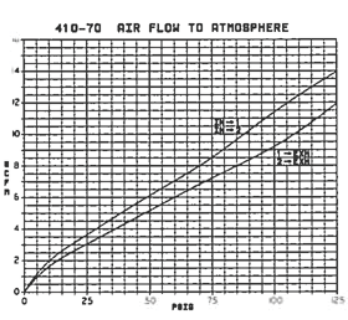
Humphrey recommends "fill/exhaust times," which are related to various chamber sizes, as the best method for calculating total valve and device (specifically, cylinder) response time. Humphrey recognizes the industry's use of flow coefficient C_V as a comparison standard.

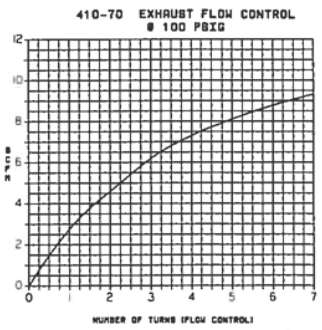
Consequently, Humphrey offers three types of flow data. The National Fluid Power Association's standards for C_V, the scfm flow rate determined by flowing to atmosphere, and Humphrey's preferred "fill/exhaust times."

Model	C_V	SCFM @100 psig	Fill time (sec) (0 to 90 psig) chamber (cu. in.)			Exhaust time (sec) (100 to 10 psig) chamber (cu. in.)		
			1	10	100	1	10	100
310	.167	10.0	.020	.20	2.00	.032	.32	3.20
410	.167	10.0	.020	.20	2.00	.032	.32	3.20
410-70	.167	10.0	.020	.20	2.00	.032	.32	3.20

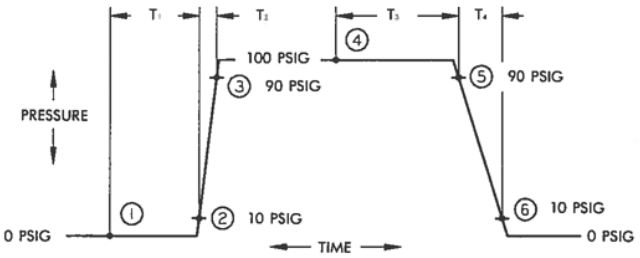








RESPONSE TIMES



IDENTIFICATION OF RESPONSE TIME AREAS

T_1 times are measured from point **1** (valve energization) to point **2** (10% of supply pressure detected at valve outlet port).

T_2 times are measured from point **2** (detection of outlet pressure) to point **3** (90% of supply pressure).

T_3 times are measured from point **4** (valve de-energization) to point **5** (10% of supply pressure exhausted from outlet port).

T_4 times are measured from point **5** (detection of pressure drop) to point **6** (90% of supply pressure exhausted).

AC/DC VOLTAGES

Coil voltage	T_1	T_2	T_3	T_4
DC	0.010 sec.	0.001 sec.	0.005 sec.	0.002 sec.
AC	0.010 sec.	0.001 sec.	0.018 sec.	0.002 sec.

Measured at 70° F (21° C) with 100% voltage and 100 psig supply. Times shown are nominal performance of valves tested.

EXAMPLE OF HOW TO CALCULATE FILL/EXHAUST TIMES

Model 310, 24 VDC — One Air Line (⅛-inch I.D. x 36-inch long)
100 psig supply — Air Cylinder (1.062-inch bore x 4-inch stroke)
Volume = 0.785 x Diameter squared x stroke or length

	Cylinder Volume	= 3.54 cubic inches
	Air Line Volume	= 0.44 cubic inches
	Total Circuit Volume	= 3.98 or 4 cubic inches
T_1	Time to energize valve	= 0.010 sec.
	Time to fill 4 cubic inches 40% of 0.6 sec. for 10 cubic inches	= 0.080 sec.
T_3	Time to de-energize valve	= 0.005 sec.
	Time to exhaust 4 cubic inches 40% of 1 sec. for 10 cubic inches	= 0.128 sec.
	Total Cycle Time	= 0.223 sec.*

*Although this result is not exact, it is sufficient for most application needs and provides a simple, straightforward system.

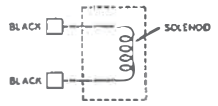
ELECTRICAL SPECIFICATION CHART

Voltage	Resistance (Ohms)	Current (Milliamps)
12VDC	36	333
24VDC	144	167
24VAC	100	223
100VAC	2100	47
120VAC	2880	41
200VAC	8400	24
240VAC	12100	20

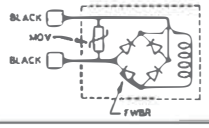
- All coils are standard with 24-inch black lead wires. Optional 72-inch lead wires are available.
- All AC coils are rated for 50/60 Hertz.
- All coils conform to Class B insulation systems.
- Resistance and current are nominal values.
- Valve assemblies are "hi-pot" tested at 1750 VAC for one second.
- Ensure proper voltage supply per voltage label rating, +10%, –15% for AC or DC voltages.

SOLENOID CIRCUIT SCHEMATICS

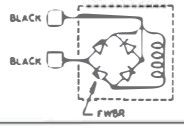
DC Coil Circuit



AC Coil–MOV Option



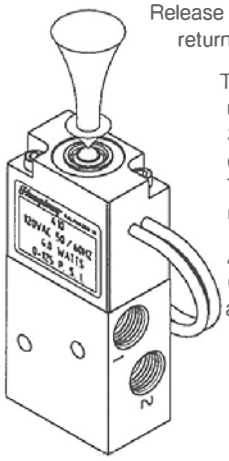
AC Coil Circuit



MANUAL OVERRIDE

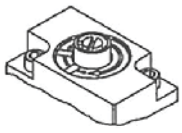
Push button/spring return manual override is standard. Manual override is located on top of coil.

Push red button shifts armature which actuates valve's main stem. Release of manual force permits valve spring to return valve to normal position.



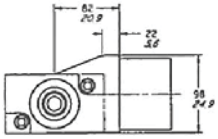
These valves are also available without manual override; specify Code 87 (example: 310-87 24VDC). On valves without manual override, a solid disk is installed on the coil. This replaces the punched disk which is used on valves with manual override.

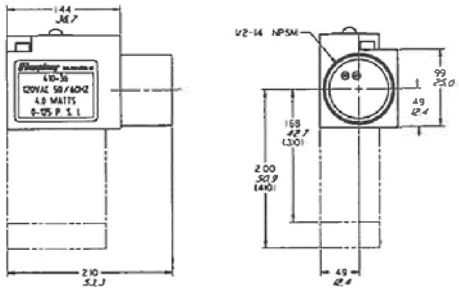
A locking manual override is optional; specify Code 81 (example: 310-81 100VAC). To actuate valve, turn override screw clockwise to "On " position. Valve remains actuated until screw is returned to "Off" position by turning counterclockwise.



CONDUIT CONNECTOR

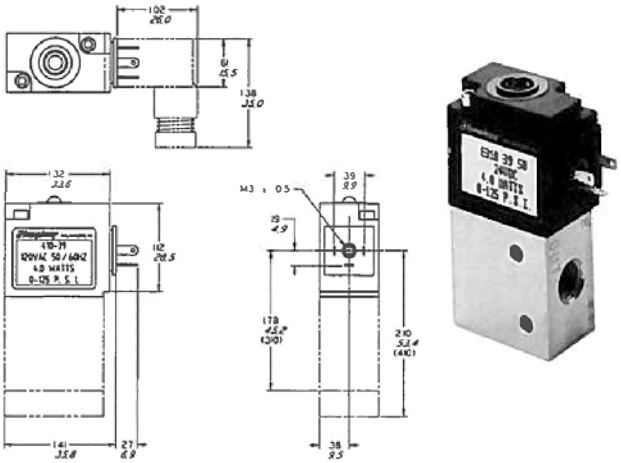
Conduit connector for closed wiring systems. Available on all in-line models. The connector option (Code 36) features a steel conduit insert molded into the valve coil. Order example: 310-36 24VDC.





CODE 39

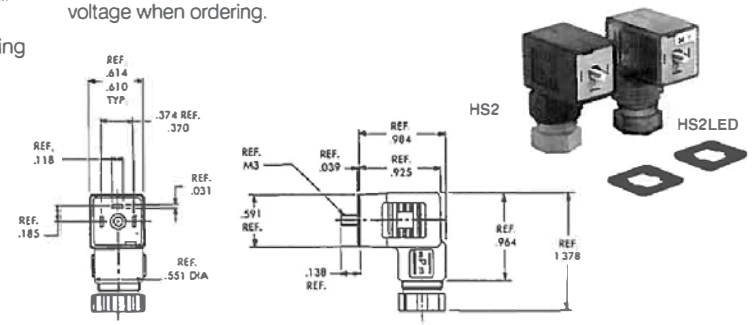
Humphrey Code 39 is an optional plug-in DIN-type connector that conforms to international standards. It provides simplicity, convenience, and fast, easy electrical installation. Available for all 310/410 series valves, this connector accepts screw-in sockets, which form a secure solderless electrical connection.



SOCKETS (Order separately)

Model HS2. This socket is available for all 310/410 series valves. Color is black.

Model HS2LED. This socket is available for valves with 12VDC and 24VDC. Has indicator light and is housed in clear plastic. Specify voltage when ordering.



HUMPHREY 310/410 SERIES INLINE SOLENOID VALVES

GENERAL INFORMATION

DESCRIPTION

310

A ⅛-inch ported, 3-way, single solenoid, 2-position/spring return, Normally Open or Normally Closed, general purpose air valve. Additionally, model 310 can be used as a diverter valve by connecting the supply pressure to the OUT port; and as a two pressure selector by connecting the supply pressures to the IN and EXH ports.

410

A ⅛-inch ported, 4-way, single solenoid, 2-position/spring return general purpose air valve, capable of being used in a variety of 2-, 3- and 4-way functions. Model 410-70 offers built-in dual flow controls.

PORT IDENTIFICATION

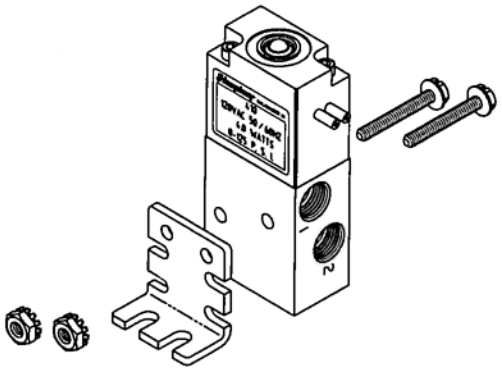
IN	Pressure Supply port.
OUT	Delivery port for model 310.
1	Normally Open Delivery port for model 410.
2	Normally Closed Delivery port for model 410.
EXH	Exhaust port, vent to atmosphere.

INSTALLATION

CAUTION: Compressed air is powerful and may be dangerous. Before attempting to remove a component from an air line or system, **always** disconnect the supply air and thoroughly exhaust the line or system. **Never** attempt to construct, operate, or service anything using compressed air unless you have been properly trained to do so. Failure to heed this warning could result in SERIOUS, EVEN FATAL, PERSONAL INJURY.

Valves can be mounted in any position in most environments, in keeping with the specifications. 310/410 valves feature a Class B insulation system and molded coil for ambient temperatures from 32° to 125° F (0° to 50° C).

Valves should be mounted using the .159" (4.04mm) diameter side mounting holes and #6 (M3.5) mounting screws. The optional 8-288A mounting bracket kit consists of a bracket, two #6-32 screws, and two captive lockwasher nuts. Mounting bracket adapts to any 310/410 valve on either side of valve.



USE AS A 3-WAY

310

Model 310 is a 2-position, 3-way valve and thus is ready for 3-way use. For Normally Closed use, connect supply to IN (OUT is the cylinder port). For Normally Open use, connect supply to EXH (OUT is the cylinder port; IN is the exhaust port).

410

Model 410 is a 2-position, 4-way valve, but can be used as a 3-way: Plug port 1 for use as a Normally Closed 3-way; plug port 2 for use as a Normally Open 3-way. Use ⅛ NPT plugs.

USE AS A 2-WAY

310

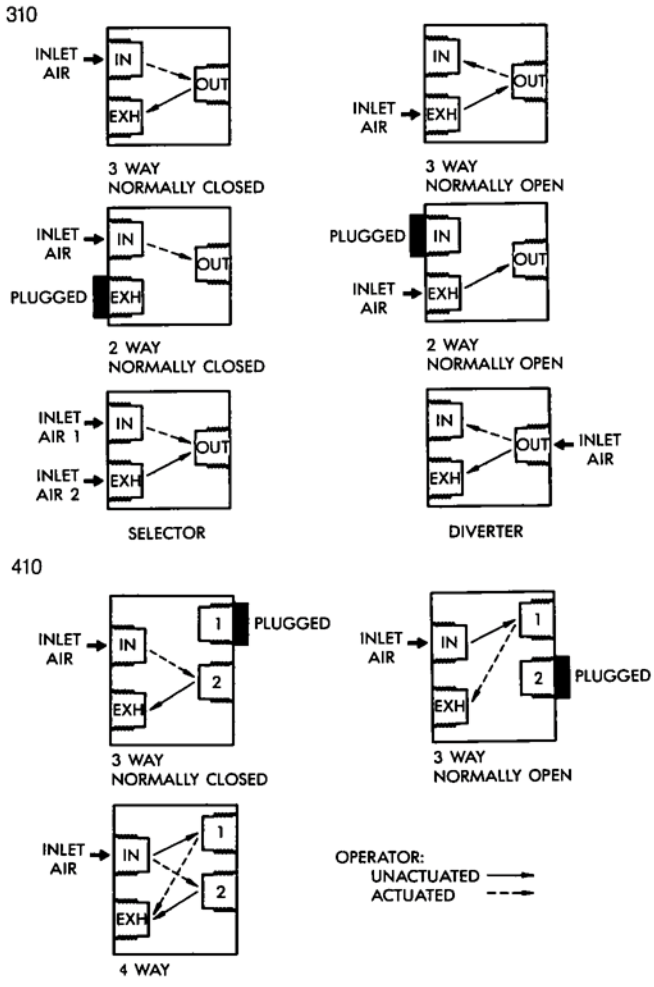
Model 310 can be used as a 2-way by plugging the EXH (exhaust) port.

410

Model 410 can be used as a 2-way by plugging the EXH (exhaust) port and port 1 for Normally Closed, or port 2 for Normally Open.

PORTING DIAGRAMS

The 310/410 balanced poppet design allows the valve to function in a variety of pneumatic porting configurations. Typical porting diagrams are outlined below.



METRIC PORTS/DIMENSIONS

Although these valves are produced using the inch system, all drawings show the metric equivalent in millimeters (indicated by slanted numbers).

All port connectors are available in metric sizes. The pipe ports are available in 1/8 BSP taper.

Specify metric port threads by using letter *E* as a model number prefix. Example: *E410* has metric size ports.

FLOW CONTROL OPTION (CODE 70)

Model 410-70 is equipped with integral dual flow controls. Clockwise rotation of each flow control screw reduces exhaust flow from the respective port. Flow control screw number 1 controls exhaust flow from Delivery port 1. Flow control screw number 2 controls exhaust flow from Delivery port 2. Each flow control screw takes seven full turns from fully closed to fully open, providing an excellent flow control range.

PACKAGING

Individual valves are packaged for cleanliness in 4x6 1/2-inch sealed plastic bags and shipped as individual units in corrugated cardboard boxes.

Customers purchasing large valve quantities may prefer to reduce unpackaging costs by ordering in bulk quantities.

TROUBLESHOOTING

If valve fails to function when electrical power is supplied:

1. Check valve function using manual override. If valve functions by manual actuation, proceed to steps 2 and 3. If valve does not function, proceed to step 4. For valves without manual override, proceed to steps 2 and 3.

2. Check line voltage to determine compliance with valve electrical rating.

3. Check valve for inoperable (open) coil, measuring milliamps per Electrical Specification Chart.

4. Check that air supply has been delivered in adequate volume and pressure for proper functioning of the device. Ensure that there are no blockages due to air line contamination or defective/blocked fittings.

WARRANTY

All valves have a one year warranty from date of manufacture. This warranty includes repair and/or replacement at no charge should the product be deemed defective due to workmanship and/or material. (See detailed Product Warranty in Humphrey's General Valve Catalog.)

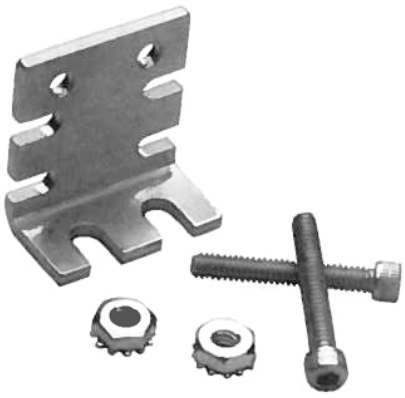
SPECIFICATIONS

310/410 Models	
Media	Air or inert gas
Pressure range	0-125 psig (0-8.5 bar) 0-28" Hg vacuum (prefix "V" 3-way and all 4-way models)
Ambient temperature range	32 to 125°F (0 to 50°C)
Coil temperature rise (any voltage)	81°F (45°C)
Power consumption	4 watts (DC); 5.0 watts (AC)
Response time (on/off)	.012/.010 (DC), .012/.020 (AC) sec.
Voltage tolerance	Plus 10%, minus 15% of rated voltage
Coil voltages	12VDC, 24VDC, 24VAC, 100VAC, 120VAC, 200VAC, 240VAC
SCFM @ 100 psig	>10
C_V	.167
Fill/exhaust time @ 100 psig (7.0 bar)	1 cu. in. .020/.032 sec. 10 cu. in. .20/.32 sec. 100 cu. in. 2.00/3.20 sec.
Leak rate (max. allowed)	4cc/minute @ 100 psig
Type of operation	Direct solenoid
Effective area	Model 310 .0069-inch^2 Model 410 .0064-inch^2
Stroke	.015-inch
Maximum cycle rate (cycles/min.)	2700 (DC), 1875 (AC)
Lubrication	None required, factory pre-lubed
Filtration	40 Micron recommended
Weight	Model 310 .26 lbs. (116 gms.) Model 410 .28 lbs. (128 gms.) Model 410-70 .28 lbs. (128 gms.)
Materials	Brass, Buna N, aluminum, stainless steel, acetal

310 SOLENOID VALVES

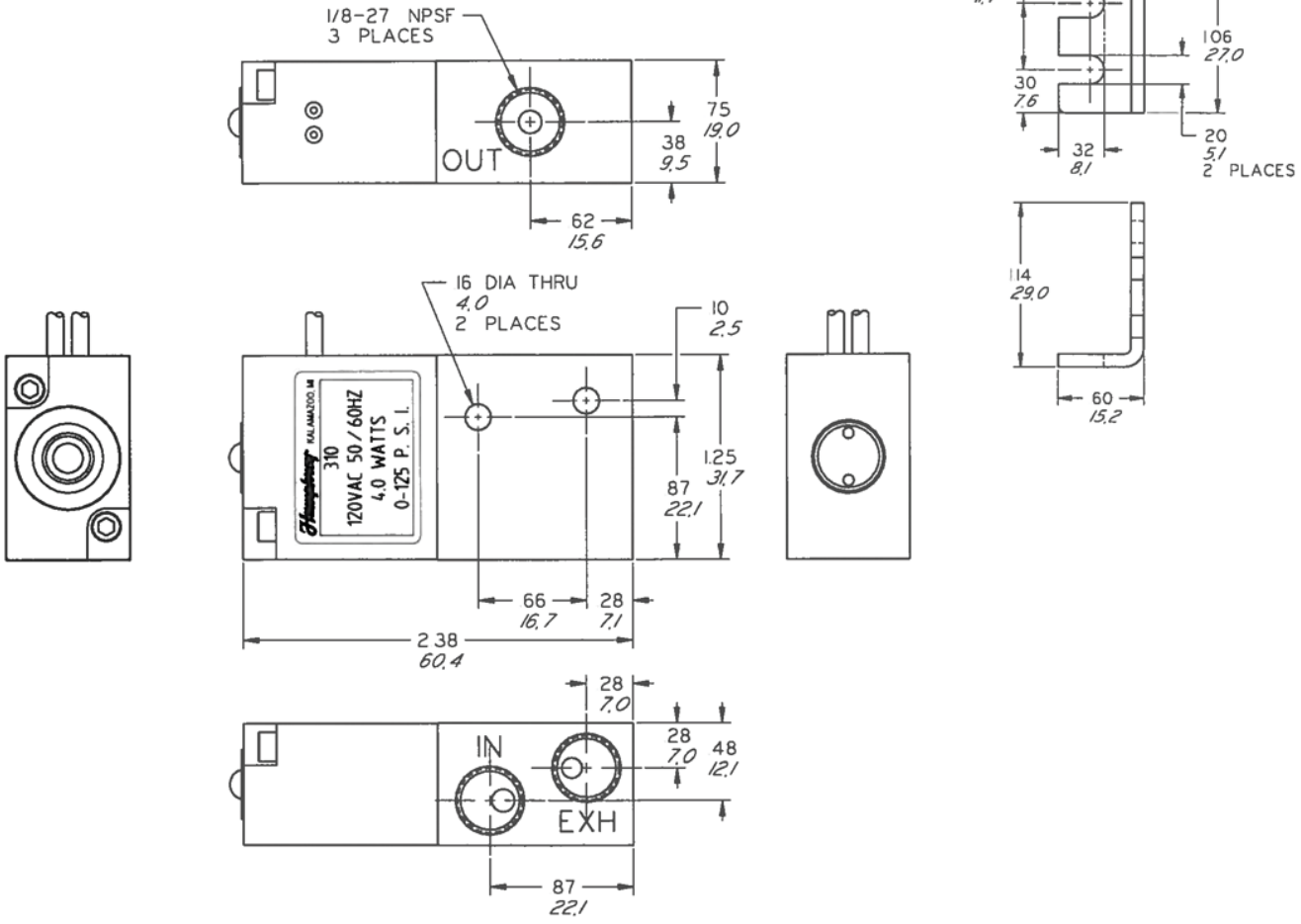
310

- 3-way
- 2-position, spring return
- Direct acting, single solenoid
- Continuous duty coil
- Three 1/8-27 NPSF ports (IN, OUT, EXH)
- Non-locking manual override
- 24-inch lead wires
- Specify model V310 for vacuum from 0" to 28" Hg.



8-288A MOUNTING BRACKET

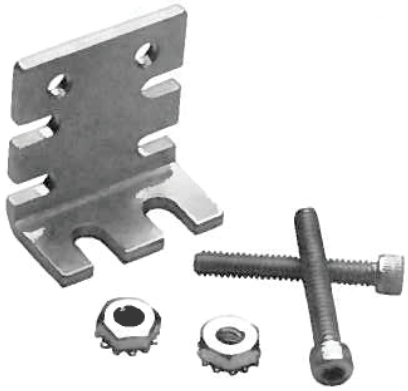
A convenient, optional plated steel mounting bracket kit is designed for use with both 3-way and 4-way valves. This kit consists of a bracket, two #6-32 screws, and two captive lockwasher nuts. Screws are plated steel, 1-inch (25.4mm) long.



410 SOLENOID VALVES

410

- 4-way, Normally Open/Normally Closed
- 2-position, spring return
- Direct acting, single solenoid
- Continuous duty coil
- Four 1/8-27 NPSF ports: IN, Delivery ports 1 & 2, and single exhaust port (EXH)
- Non-locking manual override
- 24-inch lead wires



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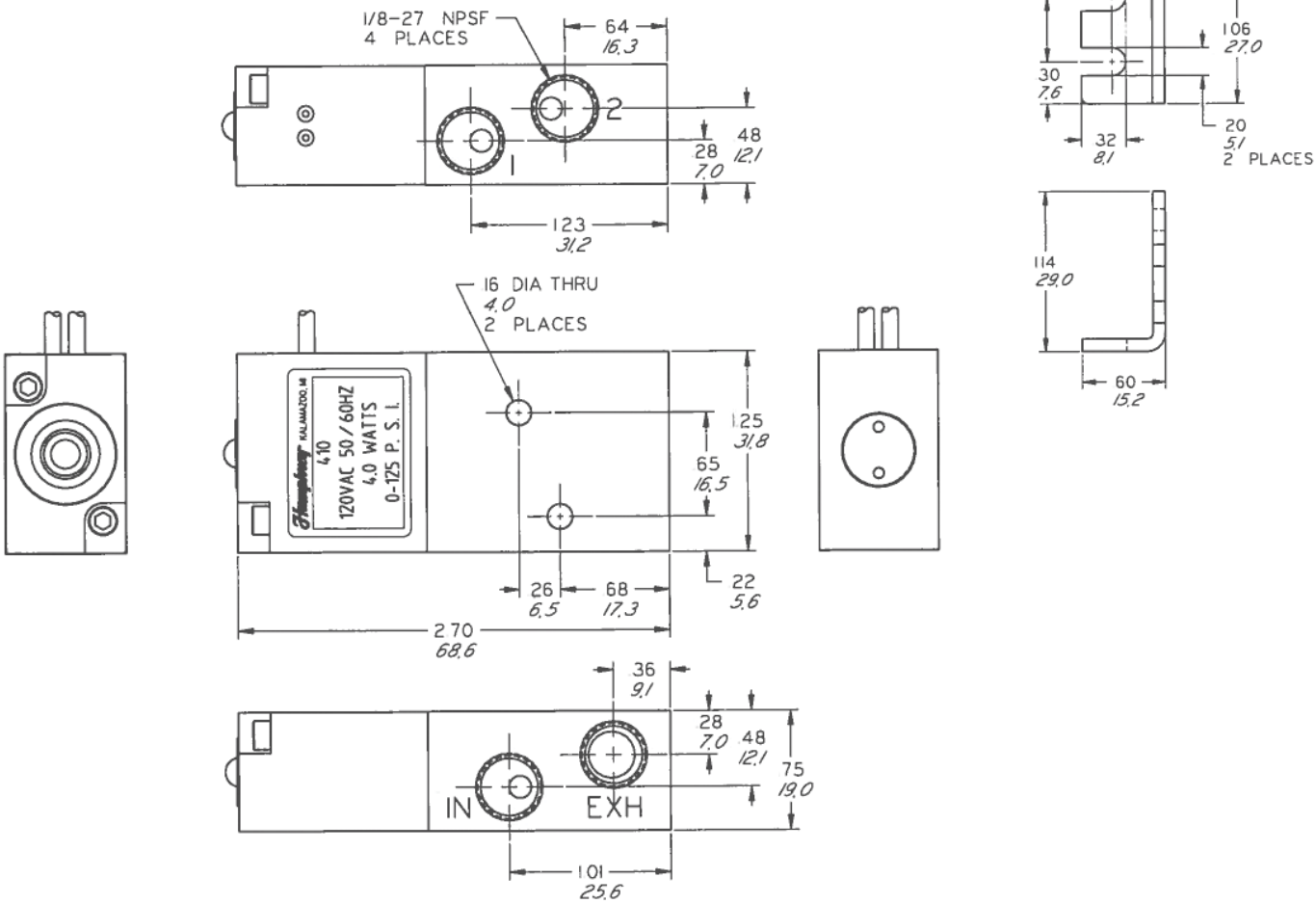
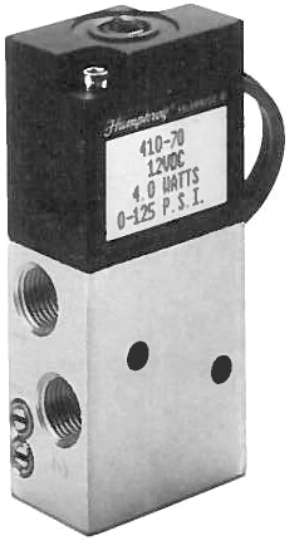
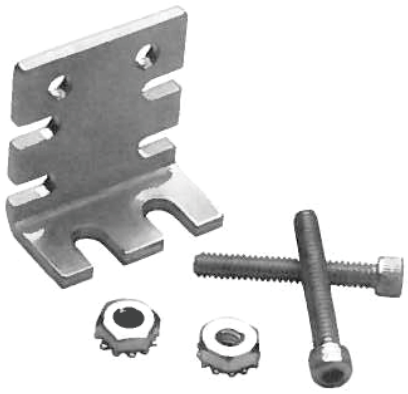


410-70 SOLENOID VALVES



410-70

- 4-way, Normally Open/Normally Closed
- 2-position, spring return
- Direct acting, single solenoid
- Continuous duty coil
- Four 1/8-27 NPSF ports: IN, Delivery ports 1 & 2, and single exhaust port (EXH)
- Individual flow controls for each Delivery port exhaust
- Non-locking manual override
- 24-inch lead wires



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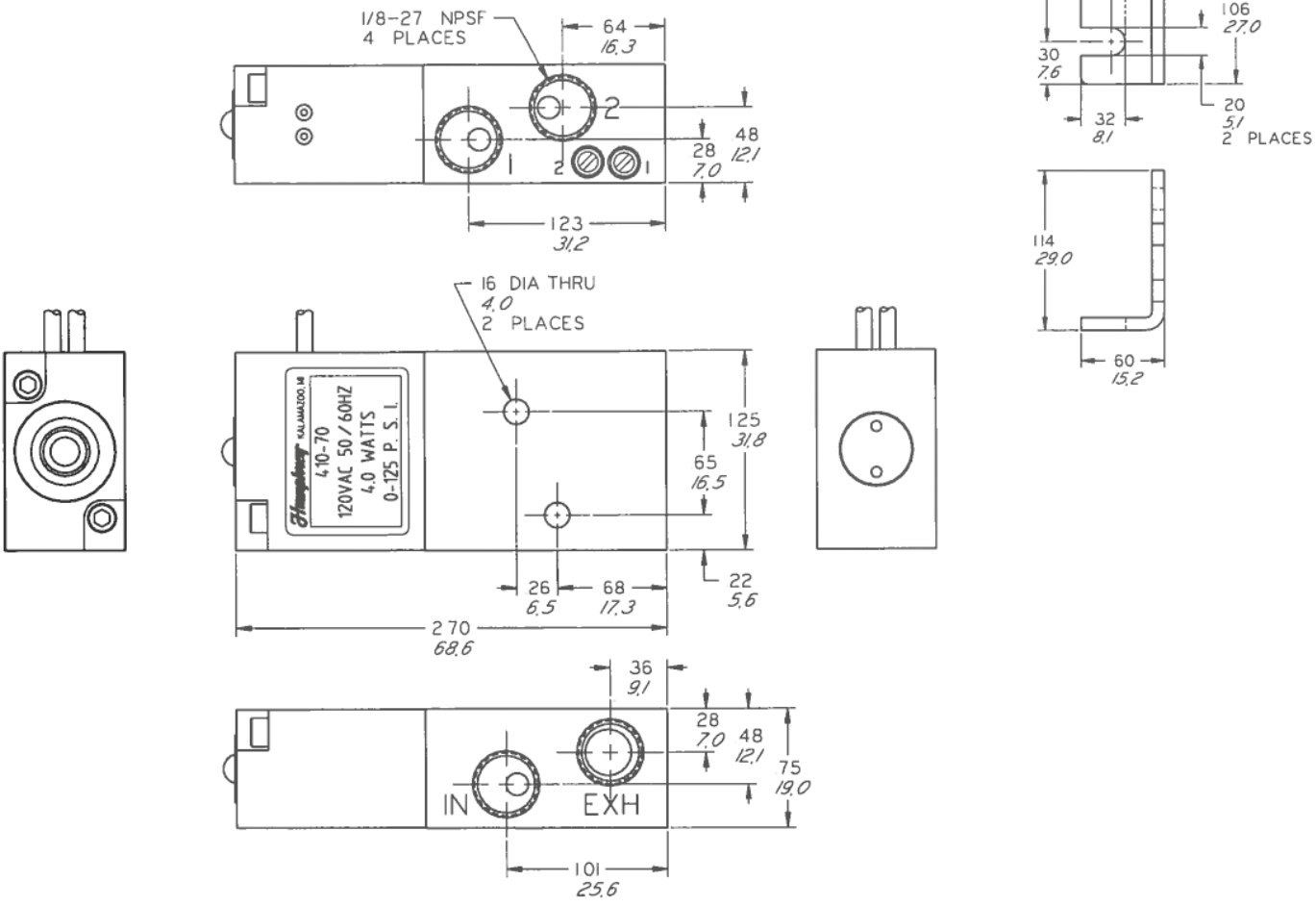
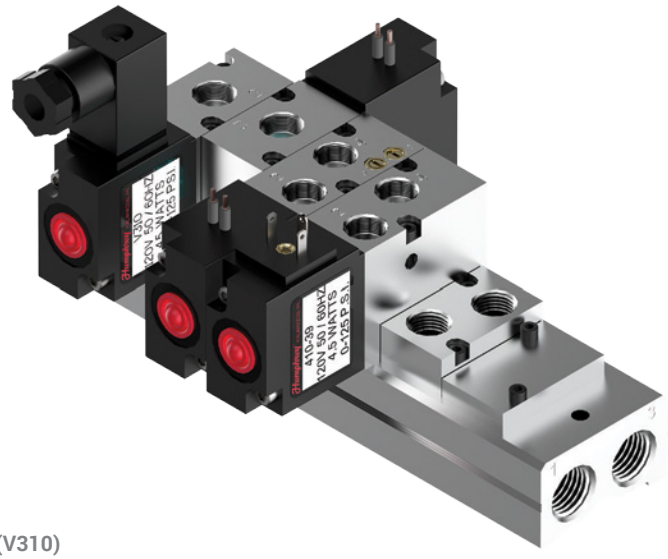


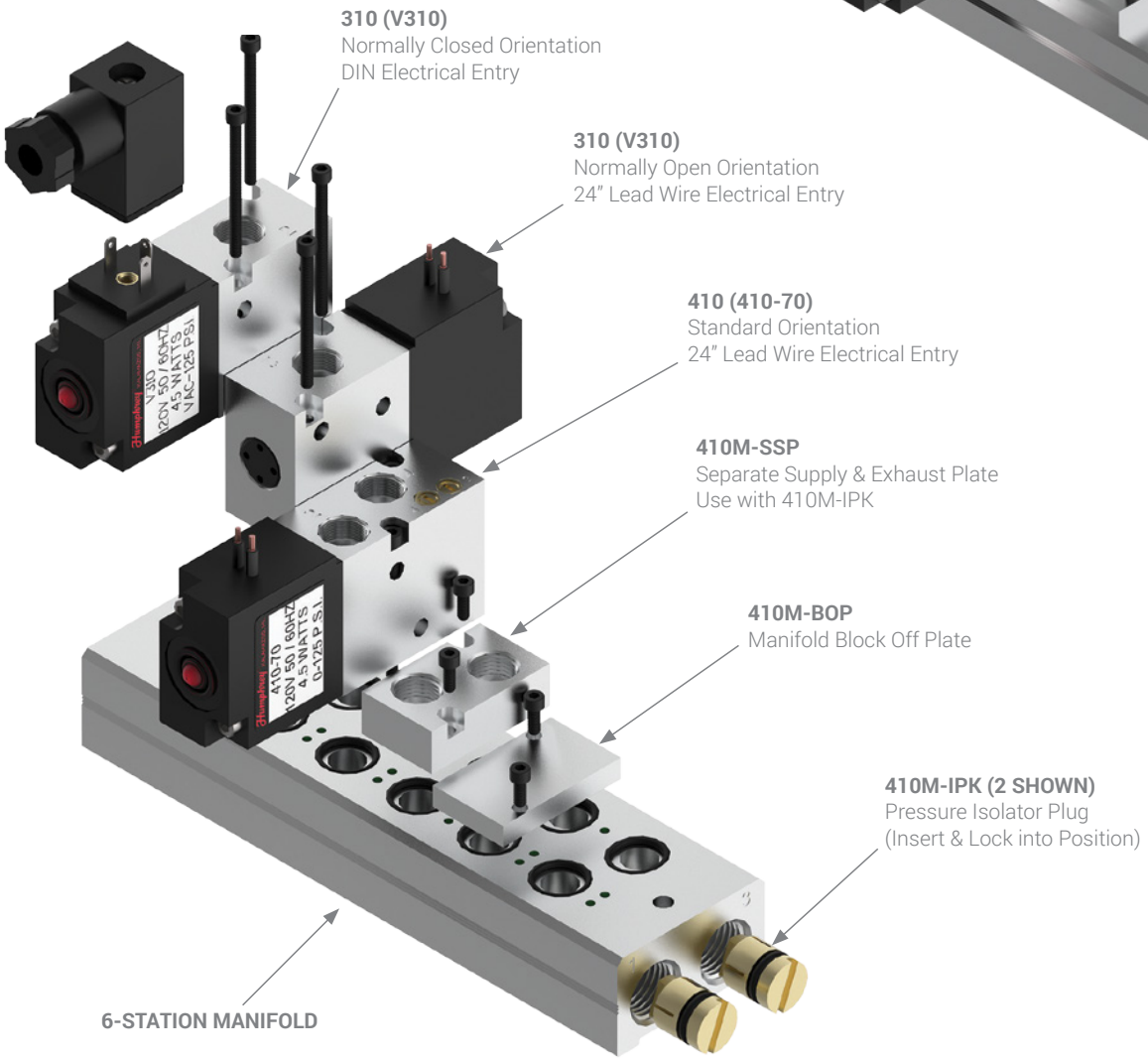
410M SERIES MANIFOLDS

Humphrey's 310 and 410 Body Ported Inline Valves include through holes for mounting to 410M manifolds. Manifold accepts valves with lead wire or DIN type electrical entry.

410M Manifolds are low profile, cost effective, and ideal for OEM applications. Manifolds are shipped with valve gaskets and screws.

3-port valves may be oriented on the manifold as normally closed or normally open function.





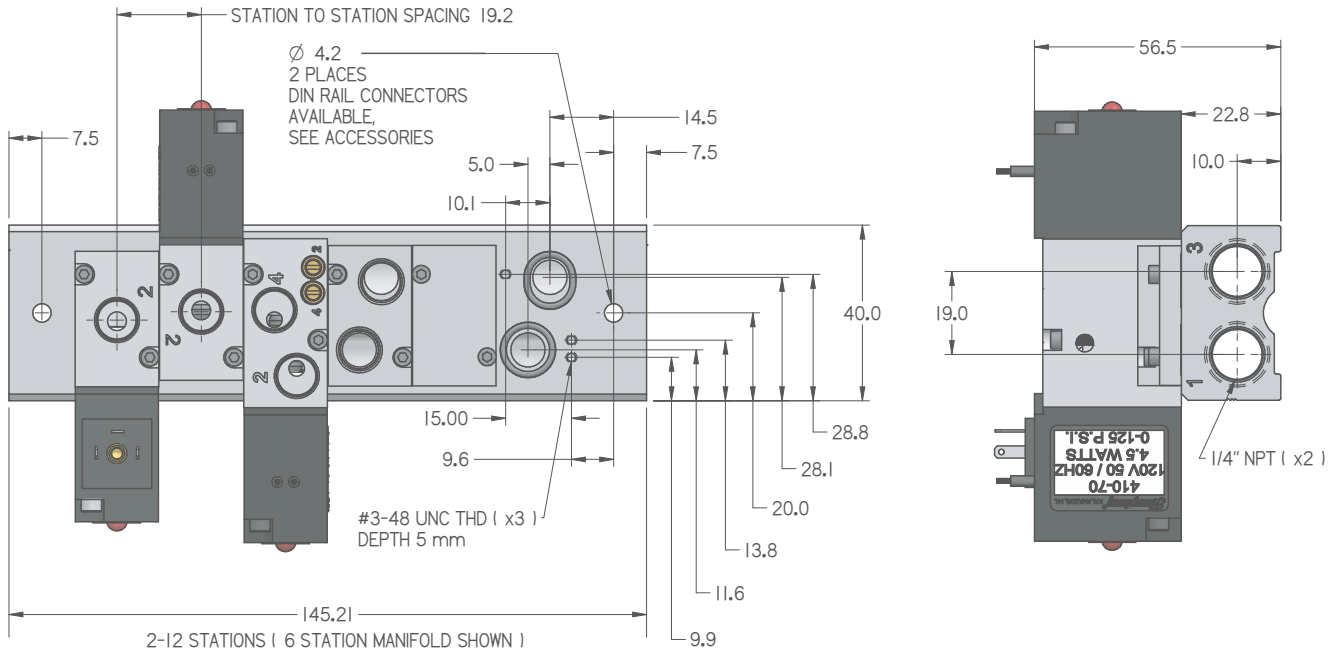
- Standard Model 310 and 410 Inline valves incorporate 0.11" diameter, counterbored mounting holes, permitting mounting of inline valves to the 410M manifold.
- Manifolds are available in 2, 4, 6, 8 or 12 station lengths and furnished with a 410M-VMK (Valve Mounting Kit/two "O" rings and two screws) per station. Consult factory for other manifold lengths.
- Manifold galley stamped 1 is common media supply port. Galley stamped 3 is common vent/exhaust port. Isolator plug 410M-IPK option permits isolation of galleys for separation of pressure/media/exhaust.
- Three-way valve Model 310 mounting orientation to manifold determines normally closed (NC) or normally open (NO) function.

  Note: Valve port 1 is located nearest to valve's solenoid/coil.

410M SERIES MANIFOLDS

DIMENSIONS

- Dimensions in Millimeters (mm)
- Material: Aluminum Alloy 6065 TS Extrusion (Anodized)



ACCESSORIES

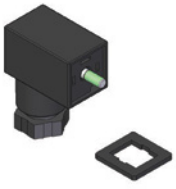
VALVE MOUNTING KIT 410M-VMK
Mounting screws and O-ring seals. Two (2) each furnished with each manifold station. Order separately as Model 410M-VMK.

MANIFOLD STATION BLOCK-OFF PLATE 410M-BOP
Anodized aluminum plate furnished with Buna O-ring seals (2) and black oxide coated steel screws (2).

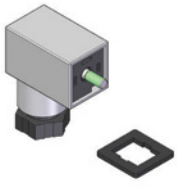
SEPARATE AIR SUPPLY PLATE 410M-SSP
Anodized aluminum plate furnished with Buna O-ring seals (2) and black oxide coated steels crews (2).

DIN RAIL CONNECTORS DRC
Kit includes(2) clips and (2) screws

PIPE PLUGS
Available for unused ports.
1/8 pipe (P/N 130-31)
1/4 pipe (P/N 130-15)

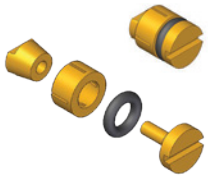


HS2

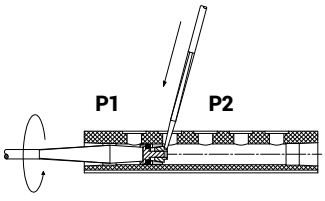


HS2LED-(VOLTAGE)

ELECTRICAL SOCKETS
Sockets for Code 39 DIN electrical entry available with LED (HS2LED-voltage) or without (HS2) indicator light. See website for details.



ISOLATOR PLUG 410M-IPK
Materials: Brass, Synthetic rubber



ISOLATOR PLUG INSTALLATION

- For application requiring two different pressures or pressure and vacuum.
- Insert plug into gallery, and when oriented, tighten crew to compress plug, forcing O-ring against gallery wall.
- Torque screw to 15-20 Kg/cm. Be careful not to over torque the screw.

ORDER INFORMATION

310/410 Series Inline Body Ported Valves
1/8-inch ports, 2-way, 3-way, 4-way

VALVES

Model NOTE 2	Option Description										Voltage
	Two-Way NOTE 1	With Mounting Bracket NOTE 1	Conduit Connector (24"ends)	DIN-Type Connector	Flow Controls	Locking Manual Override	No Manual Override	72" Lead Wires	Rotated Coil (180°)	Fluorocarbon Seals	
	Option Code										
	2	21	36	39	70	81	87	LL	RC	VAI	
310 3-way, Inline	SP	SP	SP	SP	NA	SP	SP	SP	SP	SP	12 VDC 24 VDC 24/50/60 100/50//60 120/50/60 200/50/60 240/50/60
V310 Vacuum 3-way, Inline											
410 4-way, Inline	NA				SP						

NOTE: Standard valves are furnished with 24" flying lead wires and a non-locking manual override.
NOTE 1: 1/8" plug for 2-way and code 21 mounting bracket are furnished unattached to the valve.
NOTE 2: To specify metric ports, add an "E" prefix (i.e. E310 or EV310).

N/C = No charge
NA = Not available
STD = Standard
SP = Specify; Additional charge for this option

ACCESSORIES

Model	Description
8-288A	Universal mounting bracket
130-31	1/8" pipe plug
HS2	DIN receptacle for use with code 39 connector
HS2LED	Lighted DIN receptacle for use with code 39 connector. Specify: 12V, 24V or 120V

HOW TO ORDER

Starting with Model Number, specify options in order from left to right.

Examples: Model 310-2-21-LL 12VDC

2-Way Operation	(310-2)
Mounting Bracket	(310-2-21)
72" Flying Leads	(310-2-21-LL)
Voltage 12VDC	(310-2-21-LL 12VDC)

Model 410-21-70-87 120/50/60

Mounting Bracket	(410-21)
Flow Controls	(410-21-70)
No Manual Override	(410-21-70-87)
Voltage 120/50/60	(410-21-70-87 120/50/60)

310 and 410 Body Ported Inline Valves include through holes for mounting to 410M manifolds. Manifolds accept valves with standard lead wire or optional DIN type electrical entry. See page 11.

Model	Number of Stations (2 thru 12)
410M	____

Order Example: 410M6

HUMPHREY S310/S410 SERIES STACKING SOLENOID VALVES

TECHNICAL SECTION

Refer to page 4 for additional general product information.

GENERAL INFORMATION

DESCRIPTION

S310

A 3-way, single solenoid, 2-position/spring return, Normally Open or Normally Closed, general purpose air valve, with one 1/8-inch external body outlet port, marked OUT.

VS310

Same as 310 but specifically for vacuum service. See Media/ Pressure on page 4 for additional information.

S410

A 4-way Normally Open/Normally Closed, single solenoid, 2-position/spring return, general purpose air valve, with two 1/8-inch external body outlet ports marked 1 and 2.

SMP410

Like S410, but has Multi-Pressure capability. Valve has four 1/8-inch external body ports marked IN, EXH, 1 and 2. Model SMP410 is used to introduce an alternate pressure into a given assembly of valves operating at a different pressure. It is also used to supply additional air and/or exhaust capability to a stacking assembly of valves.

S410-70

Like S410, but offers the advantage of dual built-in flow controls.

PORT IDENTIFICATION

IN	Pressure Supply Port.
OUT	Delivery port for model S310.
1	Normally Open Delivery port for model S410/-70.
2	Normally Closed Delivery port for model S410/-70.
EXH	Exhaust port, vent to atmosphere.

INSTALLATION

CAUTION: Compressed air is powerful and may be dangerous. Before attempting to remove a component from an air line or system, **always** disconnect the supply air and thoroughly exhaust the line or system. **Never** attempt to construct, operate, or service anything using compressed air unless you have been properly trained to do so. Failure to heed this warning could result in SERIOUS, EVEN FATAL, PERSONAL INJURY.

Valves can be mounted in any position in most environments, in keeping with the specifications. All models feature a Class B insulation system and molded coil for ambient temperatures from 32° to 125° F (0° to 50° C).

The stacking assembly is mounted using the 0.22 slotted mounting lugs in the End Plates and #10 screws. Four mounting lugs provided for mounting the assembly in two different planes.

When using hardened steel bolts to mount the stacking assembly, it is recommended that a flat washer be used between the screw head and the mounting lug.

For simplicity, when mixing valves with different functions on the same stacking assembly, consider locating valves of one common function on one end of the assembly. Use a Port Isolator to separate the last valve of a common function from other valves in the stack, then mix/match valves of other functions at the opposite end of the assembly.

USE AS A 3-WAY

S310

Model S310 is a 2-position, 3-way valve and thus is ready for 3-way use. Use either Normally Open, Normally Closed, or as a Selector or Diverter.

Normally Closed: Connect supply pressure to IN port of End Plate Assembly or valve.

Normally Open: Connect supply pressure to EXH port of End Plate Assembly or valve (IN becomes exhaust).

Selector: Connect pressure #1 to IN port of End Plate Assembly or valve. Connect pressure #2 to EXH port of End Plate Assembly or valve. OUT is common.

Diverter: Connect pressure to OUT port of valve. Diverter ports are IN and EXH ports in End Plate Assembly or valve.

S410

These 2-position 4-way valves can be used as a 3-way by plugging one of the two Delivery ports. Such use of a 4-way valve as a 3-way can simplify porting/pressurizing the stack of valves when combinations of 3-way NC, 3-way NO, and 4-way valves are used.

The Humphrey 1/8-27 NPTF Port Plug #130-31 can be used to accomplish the following:

Normally Closed 3-way: Plug Delivery port 1.

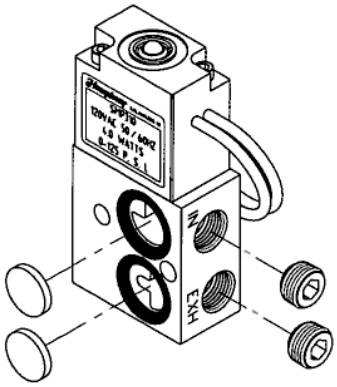
Normally Open 3-way: Plug Delivery port 2.

USE AS A 2-WAY

All of these valves can also be used as 2-way valves by isolating and/or plugging various ports.

S310

This 2-position, 3-way valve can be used either as a Normally Closed or Normally Open 2-way valve.



The Humphrey Port Isolator Kit #40-900A and the 1/8-27 NPTF Port Plug #130-31 can be used to accomplish the following:

Normally Closed 2-way: Isolate non-threaded port located furthest from the valve coil with one Port Isolator; connect supply pressure to IN in the End Plate Assembly.

Normally Open 2-way: Isolate non-threaded port located nearest the valve coil with one Port Isolator; connect supply pressure to EXH in the End Plate Assembly.

S410

This 2-position, 4-way valve can be used either as a Normally Closed or Normally Open 2-way valve.

Normally Closed 2-way: Isolate valve exhaust port (non-threaded port adjacent to Delivery port 2) with Port Isolator. Plug valve Delivery port 1.

Normally Open 2-way: Isolate valve exhaust port (non-threaded port adjacent to Delivery port 2) with Port Isolator. Plug valve Delivery port 2.

MULTI-PRESSURE

Valves with prefix letters SMP can be used to create multiple pressures on the same valve assembly.

SMP410

This 4-way valve can be used to introduce a separate pressure to a stack of valves. If the valve is not located adjacent to an End Plate Assembly, isolate the valve's non-threaded side ports with four Port Isolators. Connect the separate supply to valve IN port.

MULTI-PRESSURE, ALTERNATE METHOD

Locate valve(s) for separate pressure on one end of assembly, plugging the two side ports (those interfacing with the alternate pressure source) of the last valve to separate it from those operating at another pressure.

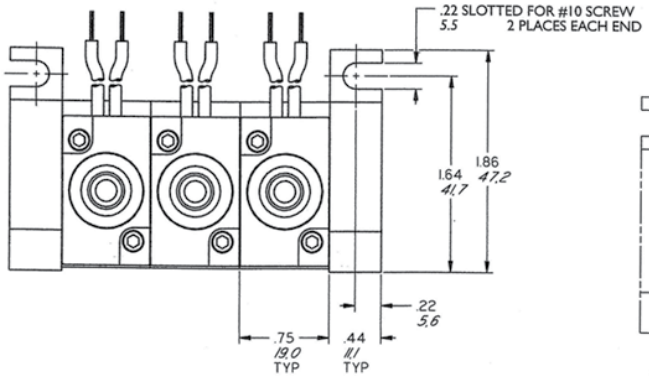
Connect separate pressure to End Plate Assembly. In this configuration, part of the assembly carries one pressure, the other part of the assembly carries another pressure.

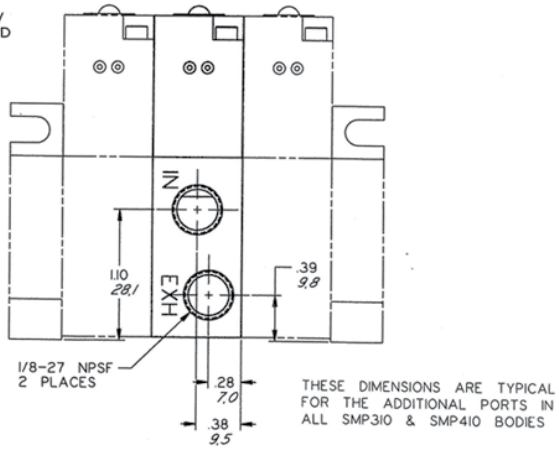
S310 SOLENOID VALVES

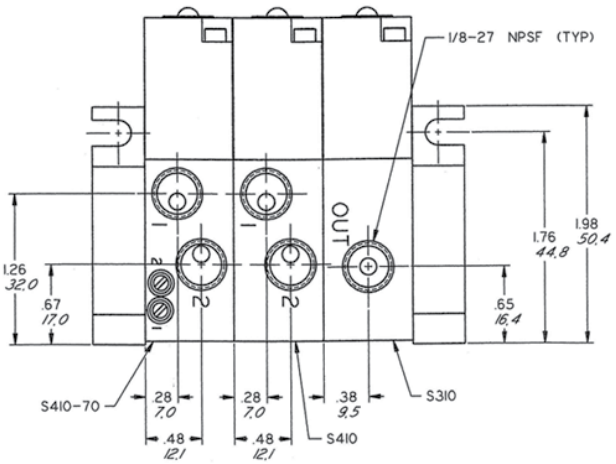
*U.L. recognized

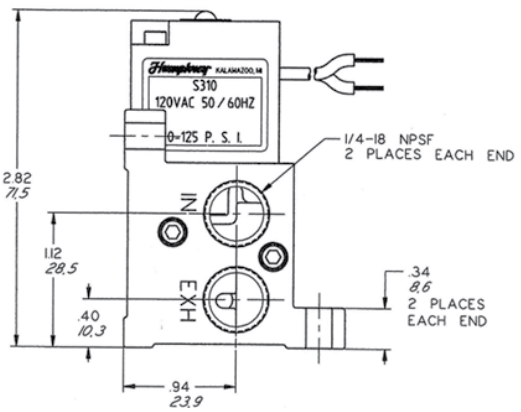
S310

- 3-way
- 2-position, spring return
- Direct acting, single solenoid
- Continuous duty coil
- Non-locking manual override
- 24-inch lead wires
- One 1/8-27 NPSF Delivery port (OUT)
- One 8-90A Mounting Kit, consisting of two threaded spacers and two o-rings, supplied per valve.
- Specify model VS310 for vacuum from 0" to 28" Hg.









S410/SMP410 SOLENOID VALVES

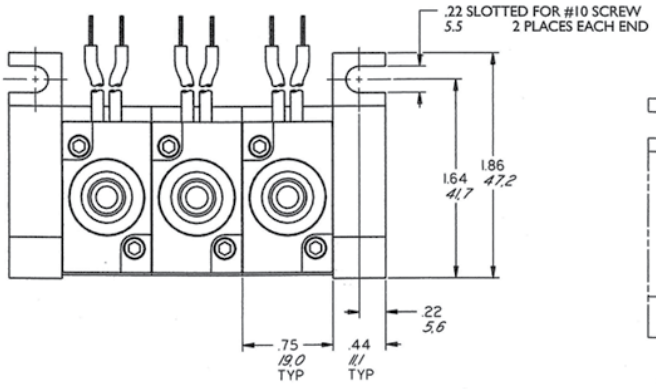
*U.L. recognized

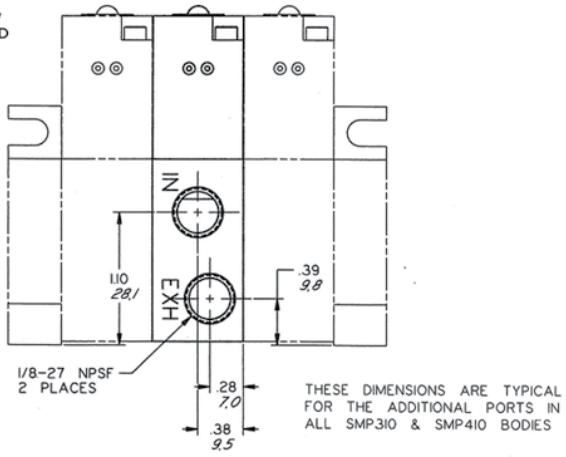
S410

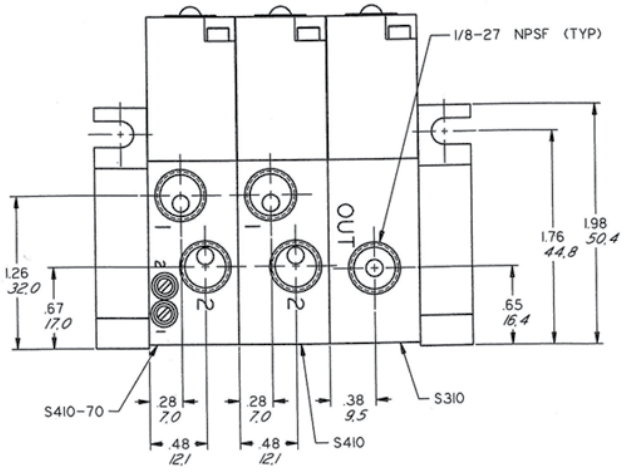
- 4-way, Normally Open/Normally Closed
- 2-position, spring return
- Direct acting, single solenoid
- Continuous duty coil
- Non-locking manual override
- 24-inch lead wires
- Two 1/8-27 NPSF Delivery ports 1 and 2
- One 8-90A Mounting Kit, consisting of two threaded spacers and two o-rings, supplied per valve

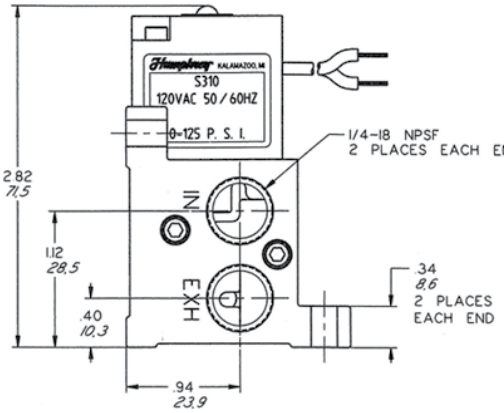
SMP410

- 4-way, Normally Open/Normally Closed
- Multi-Pressure capability (external body ports)
- 2-position, spring return
- Direct acting, single solenoid
- Continuous duty coil
- Non-locking manual override
- 24-inch lead wires
- Four 1/8-27 NPSF ports (IN, Delivery ports 1 and 2, EXH)
- One 8-90A Mounting Kit, consisting of two threaded spacers and two o-rings, supplied per valve





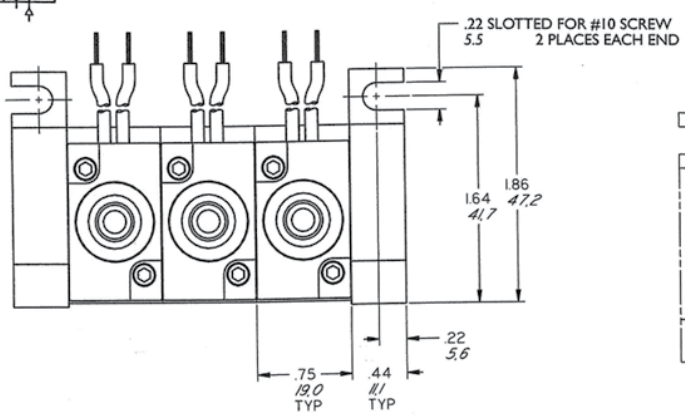


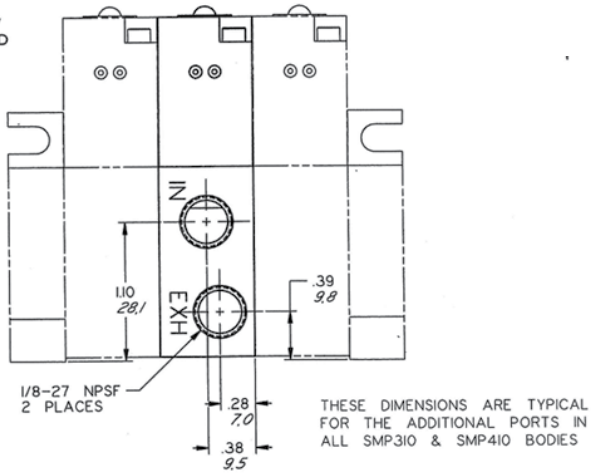


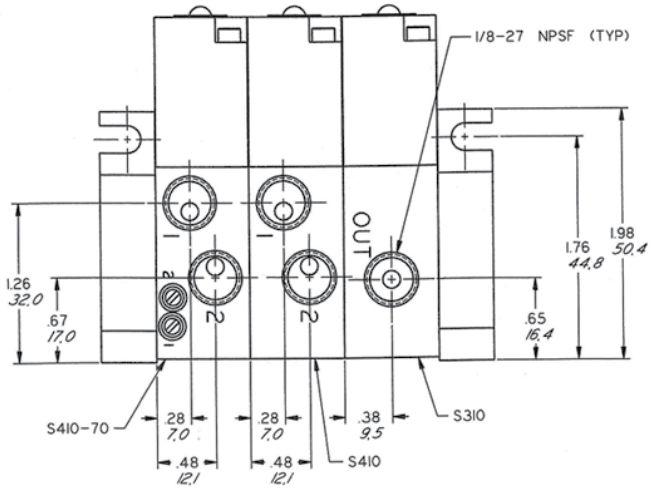
S410-70 SOLENOID VALVES

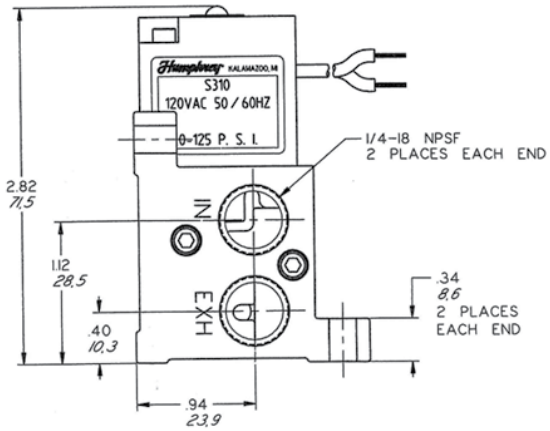
S410-70

- 4-way, Normally Open/Normally Closed
- 2-position, spring return
- Direct acting, single solenoid
- Continuous duty coil
- Individual flow controls for each Delivery port exhaust
- Non-locking manual override
- 24-inch lead wires
- Two 1/8-27 NPSF Delivery ports 1 and 2
- One 8-90A Mounting Kit, consisting of two threaded spacers and two o-rings, supplied per valve





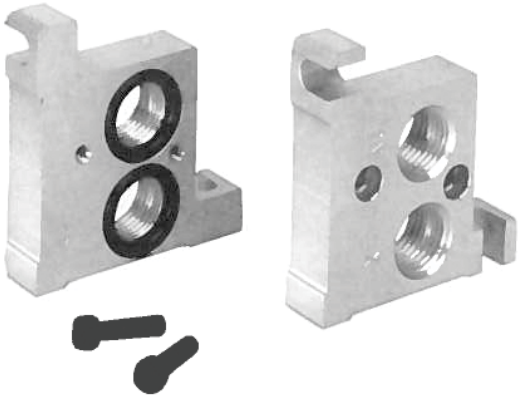




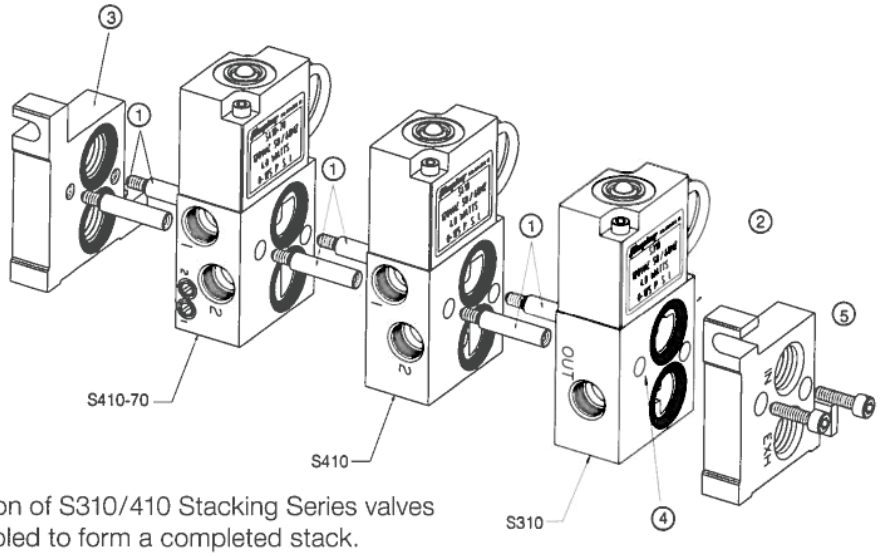
HUMPHREY VALVE AND END PLATE ASSEMBLIES

END PLATE ASSEMBLY PART NUMBER 7-900A

The End Plate Assembly, which consists of two end plates and fastening accessories, is mounted on each end of a completed assembly of valves. It also provides a method of mounting an assembled stack of valves.



STACKING ASSEMBLY INSTRUCTIONS



Any combination of S310/410 Stacking Series valves can be assembled to form a completed stack.

If stack consists of a large number of valves or if several valves are to be actuated simultaneously, SMP-type valves can be used to feed additional supply air to the stack, and to provide additional exhaust capacity.

S310/410 Series valves can be ordered completely factory-assembled, ready for installation in your equipment. Consult factory for details.

TO ASSEMBLE A STACK OF VALVES

1. Hand tighten each set of threaded spacers (two supplied per valve) into units of equal length.

2. Ensure that o-ring seals (supplied) are placed in valve ports having o-ring grooves.

3. Place o-ring seals (two supplied) into End Plate possessing o-ring grooves, and thread spacers into this End Plate.

4. Assemble valves onto spacers using valve through-holes.

5. Secure entire assembly with 1/2-inch screws (supplied with End Plate) and tighten to 8 lb.•in. with 7/64-inch hex drive wrench (not supplied).

ORDER INFORMATION

S310/S410 Series Stackable Valves
1/8-inch ports, 3-way, 4-way

VALVES

Model	Option Description							Voltage
	DIN-Type Connector	Flow Controls	Locking Manual Override	No Manual Override	72" Lead Wires	Rotated Coil (180°)	Fluorocarbon Seals	
	Option Code							
	39	70	81	87	LL	RC	VAI	
S310 3-way, stackable	SP	NA	SP	SP	SP	SP	SP	12 VDC 24 VDC 24/50/60 100/50//60 120/50/60 200/50/60 240/50/60
SMP410 4-way, stackable								
S410 4-way, stackable		SP						

NOTE: Standard valves are furnished with 24" flying lead wires and a non-locking manual override.
To specify metric ports, add an "E" prefix (i.e. E310 or EV310).

N/C = No charge
NA = Not available
STD = Standard
SP = Specify; Additional charge for this option

ACCESSORIES

Model	Description
7-900A	Endplate assembly (two end plates, two screws, two o-rings).
8-90A	Mounting kit (two spacers, two o-rings).
40-900A	Port Isolator kit (two port isolators).
130-31	Port plug (one 1/8-27 NPTF port plug).
HS2	DIN receptacle lor use with code 39 connector.
HS2LED	Lighted DIN receptacle for use with code 39 connector. Specify: 12V, 24V or 120V

HOW TO ORDER

Starting with Model Number, specify options in order from left to right.

Examples: Model S310-LL 12VDC
Long Leads 72" (S310-LL)
Voltage 12VDC (S310-LL 12VDC)

Model S410-70-87 120/50/60
Flow Controls (S410- 70)
Without Manual Override (S410-70-87)
Voltage 120/50/60 (8410-70-87 120/50/60)

HUMPHREY M310/M410 SERIES
SUBBASE MOUNTED SOLENOID VALVES

TECHNICAL SECTION

Refer to page 4 for additional general product information.

GENERAL INFORMATION

DESCRIPTION

M310

A 3-way, single solenoid, 2-position/spring return, Normally Open or Normally Closed, general purpose air valve.

VM310

Same as M310 but specifically for vacuum service. See Media/ Pressure on page 4 for additional information.

M410

A 4-way Normally Open/Normally Closed, single solenoid, 2-position/spring return, general purpose air valve.

M410-70

Like M410, but offers the advantage of dual built-in flow controls.

SB-1

Subbase with two 1/8-inch outlet ports, marked 1 and 2.

SBMP-1

Subbase with Multi-Pressure capability. Model SBMP-1 has four 1/8-inch external body ports marked IN, EXH, 1 and 2. This subbase is used to introduce an alternate pressure into a given assembly of valves operating at a different pressure. It is also used to supply additional air and/or exhaust capability to a subbase mounted assembly of valves.

PORT IDENTIFICATION

IN	Pressure Supply port
1	Normally Open Delivery port*
2	Normally Closed Delivery port**
EXH	Exhaust port, vent to atmosphere

*Port #1 is not functional when using valve Model M310.
**Port #2 is also the Delivery port when using Model 310.

INSTALLATION

CAUTION: Compressed air is powerful and may be dangerous. Before attempting to remove a component from an air line or system, **always** disconnect the supply air and thoroughly exhaust the line or system. **Never** attempt to construct, operate, or service anything using compressed air unless you have been properly trained to do so. Failure to heed this warning could result in SERIOUS, EVEN FATAL, PERSONAL INJURY.

Any combination of M310/410 subbase mounted valves can be assembled to form a completed manifold.

If manifold consists of a large number of valves or if several valves are to be actuated simultaneously, SBMP-1 subbases can be used to feed additional supply air to the manifold, and to provide additional exhaust capacity.

M310/410 Series valves and subbases (or subbases themselves) can be ordered completely factory-assembled, ready for installation in your equipment. Consult factory for details.

Valves can be mounted in any position in most environments, in keeping with the specifications. All models feature a Class B insulation system and molded coil for ambient temperatures from 32° to 125° F (0° to 50° C).

The subbase manifold assembly is mounted using the slotted mounting hole in each End Cap, and #10 socket head cap screws or fillister head screws. One mounting hole is provided in each End Cap for mounting the finished assembly.

For simplicity, when mixing valves with different functions on the same subbase manifold, consider locating valves of one common function on one end of the assembly. Use Port Isolators to separate the last valve of a common function from other valves in the assembly, then mix/match valves of other functions at the opposite end of the assembly.

USE AS A 3-WAY

M310

Model M310 is a 2-position, 3-way valve and thus is ready for 3-way use. Use either Normally Open, Normally Closed, or as a Selector or Diverter.

The Humphrey 1/8-27 NPTF Port Plug #130-31 can be used to accomplish the following.

Normally Open: Connect supply pressure to EXH. Port 2 is delivery port. IN is exhaust port.

Normally Closed: Connect supply pressure to IN. Port 2 is delivery port. EXH is exhaust port.

NOTE: Port #1 is not functional when using valve Model M310.

Selector: Connect pressure #1 to IN port.
Connect pressure #2 to EXH port.
Delivery port 2 is common.

Diverter: Connect pressure to Delivery port 2.
Diverting Delivery ports are IN and EXH.

M410/M410-70

These 2-position 4-way valves can be used as 3-ways by plugging one of the two Delivery ports. Such use of a 4-way as a 3-way can simplify porting/pressurizing the subbase manifold when combinations of 3-way NC, 3-way NO, and 4-way valves are used.

The Humphrey 1/8-27 NPTF Port Plug #130-31 can be used to accomplish the following:

Normally Closed 3-way: Plug Delivery port 1.

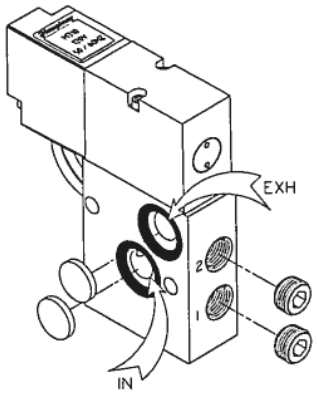
Normally Open 3-way: Plug Delivery port 2.

USE AS A 2-WAY

All of these valves can also be used as 2-way valves by isolating and/or plugging various ports. Port 2 is always the delivery port.

M310

This 2-position, 3-way valve can be used either as a Normally Closed or Normally Open 2-way valve.



The Humphrey Port Isolator Kit #40-900A and the 1/8-27 NPTF Port Plug #130-31 can be used to accomplish the following:

Normally Closed 2-way: When all valves on a subbase assembly are to be used as Normally Closed 2-ways: Use Port Isolators to isolate internal subbase EXH ports. (Internal EXH ports correspond with EXH ports in End Caps.) Also plug external EXH ports when using the Model SBMP-1 subbase, and the appropriate End Cap EXH port. Connect supply pressure to IN.

When one or more valves in a multi-valve assembly are to be used as Normally Closed 2-ways in a subbase assembly consisting of mixed valve functions, locate them on one end of the assembly. Use Port Isolators to isolate the internal subbase EXH ports. Also plug external EXH ports when using the Model SBMP-1 subbase, and the appropriate End Cap EXH port. Separate the subbase on the last Normally Closed 2-way valve from valves of another function by using Port Isolators. Connect supply pressure to IN.

Normally Open 2-way: When all valves on the subbase assembly are to be used as Normally Open 2-ways: Use Port Isolators to isolate internal subbase IN ports. (Internal IN ports correspond with IN ports in End Caps.) Also plug external IN ports when using the Model SBMP-1 subbase, and the appropriate End Cap IN port. Connect supply to EXH.

When one or more valves are to be used as Normally Open 2-ways in a subbase assembly consisting of mixed valve functions, locate them on one end of the assembly. Use Port Isolators to isolate the internal subbase IN ports. Also plug external IN ports when using the Model SBMP-1 subbase, and the appropriate End Cap IN port. Separate the subbase on the last Normally Open 2-way valve from valves of another function by using Port Isolators. Connect supply pressure to EXH for these valves.

M410

This 2-position, 4-way valve can be used either as a Normally Closed or Normally Open 2-way valve.

Normally Closed 2-way: Plug #1 Delivery port. Use a Port Isolator to plug internal subbase EXH port. (Internal EXH port corresponds with EXH port in End Cap.) Also plug external EXH port when using the Model SBMP-1 subbase, and the appropriate End Cap EXH port. Connect supply pressure to IN.

Normally Open 2-way: Plug #2 Delivery port. Use a Port Isolator to plug internal subbase IN port. (Internal IN port corresponds with IN port in End Cap.) Also plug external IN port when using the Model SBMP-1 subbase, and the appropriate End Cap IN port. Connect supply pressure in EXH.

MULTI-PRESSURE

Model SBMP-1 subbases can be used to create multiple pressures on a common subbase assembly. Use Port Isolators to isolate the subbase to be used with a separate pressure.

M310

Connect supply pressure to the IN port of the individual subbase for a Normally Closed 3-way.

Connect supply pressure to the EXH port of the individual subbase for a Normally Open 3-way. IN port of the subbase becomes the exhaust port.

M410

Isolate the subbase and connect supply pressure to the IN port of the subbase.

MULTI-PRESSURE, ALTERNATE METHOD

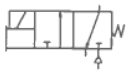
Locate subbase(s) for separate pressure on one end of assembly. Use Port Isolators to plug the internal side ports (those interfacing with the alternate pressure source) of the last subbase to separate it from those operating at another pressure.

Connect separate pressure to End Cap. In this configuration, part of the assembly operates on one pressure, the other part operates on another pressure.

M310/M410 VALVES AND SUBBASES

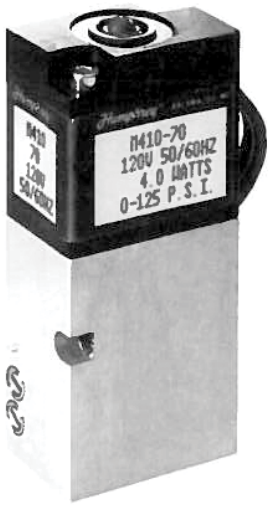
M310

- 3-way
- 2-position, spring return
- Direct acting, single solenoid
- Continuous duty coil
- Non-locking manual override
- 24-inch lead wires
- Three 1/8-27 NPSF ports: In, Out, and Exhaust
- Two #3-48 x 1.25 socket head cap screws to mount valve to subbase, and four o-ring valve/ subbase seals
- Specify Model VM310 for vacuum from 0" to 28" Hg.



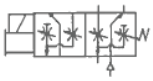
M410

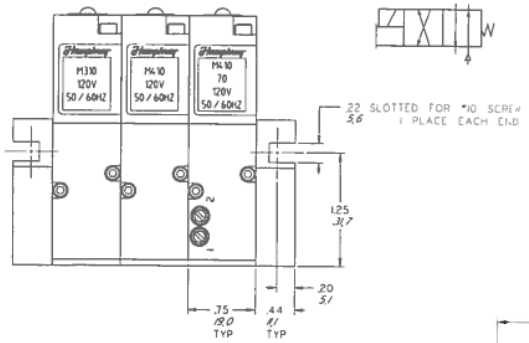
- 4-way, Normally Open/Normally Closed
- 2-position, spring return
- Direct acting, single solenoid
- Continuous duty coil
- Non-locking manual override
- 24-inch lead wires
- Four internal ports: In, Delivery ports 1 & 2, Exhaust
- Screws and o-rings are same as M310

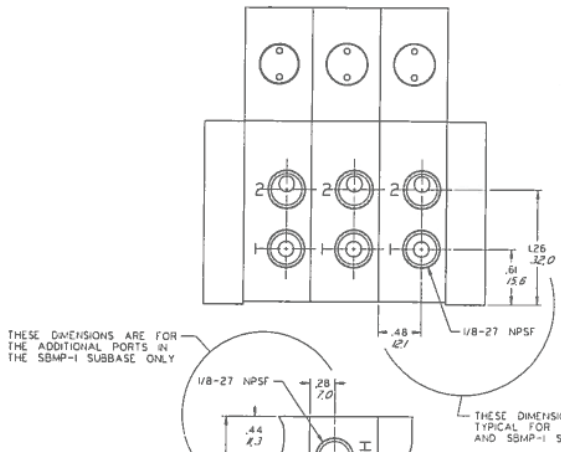


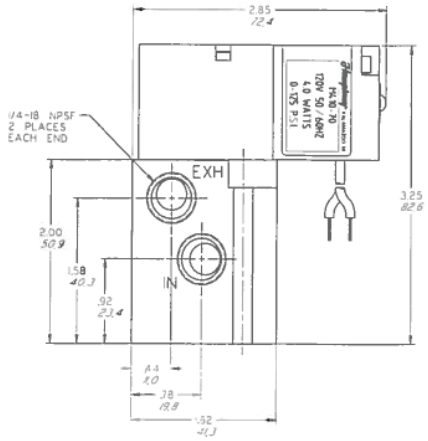
M410-70

- 4-way, Normally Open/Normally Closed
- 2-position, spring return
- Direct acting, single solenoid
- Continuous duty coil
- Individual flow controls for each Delivery port exhaust
- Non-locking manual override
- 24-inch lead wires
- Four internal ports: In, Delivery ports 1 & 2, Exhaust
- Screws and o-rings are same as M310









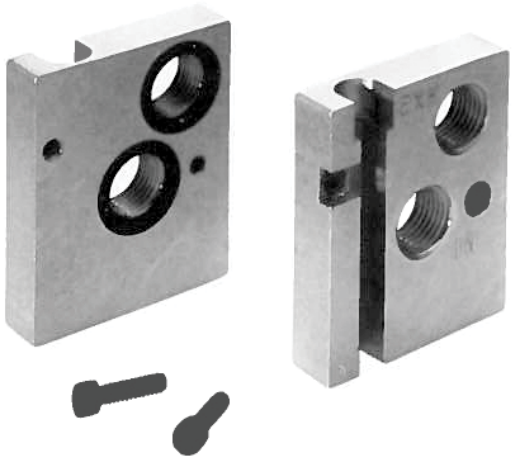
MANIFOLD END PLATE ASSEMBLIES

SB-1

- Subbase accepts any M310/410 Series valve
- Two delivery ports, marked 1 & 2
  Port 1 is Normally Open, Port 2 is Normally Closed
- Two tie rod spacers, and two o-rings for inter-subbase seal

SBMP-1

- Subbase accepts any M310/410 Series valve
- Four ports: Two delivery ports marked 1 & 2 (Port 1 is Normally Open, Port 2 is Normally Closed); plus one separate IN, and one separate EXH port
- Two tie rod spacers, and two o-rings for inter-subbase seal



END PLATE ASSEMBLY PART NUMBER 7-900A

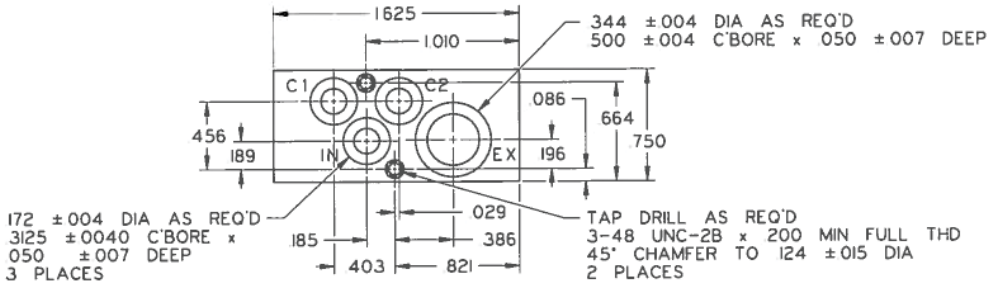
The End Plate Assembly, which consists of two sub-base end caps and fastening accessories, is mounted on each end of a completed subbase valve assembly. Tighten screws to 8 lb.•in. of torque. Two slotted holes provide a method of mounting a subbase assembly. Includes two o-rings to seal subbase to end cap, and two #6-32 x .5 socket head cap screws to secure tie rod spacers.

BLOCK-OFF PLATE

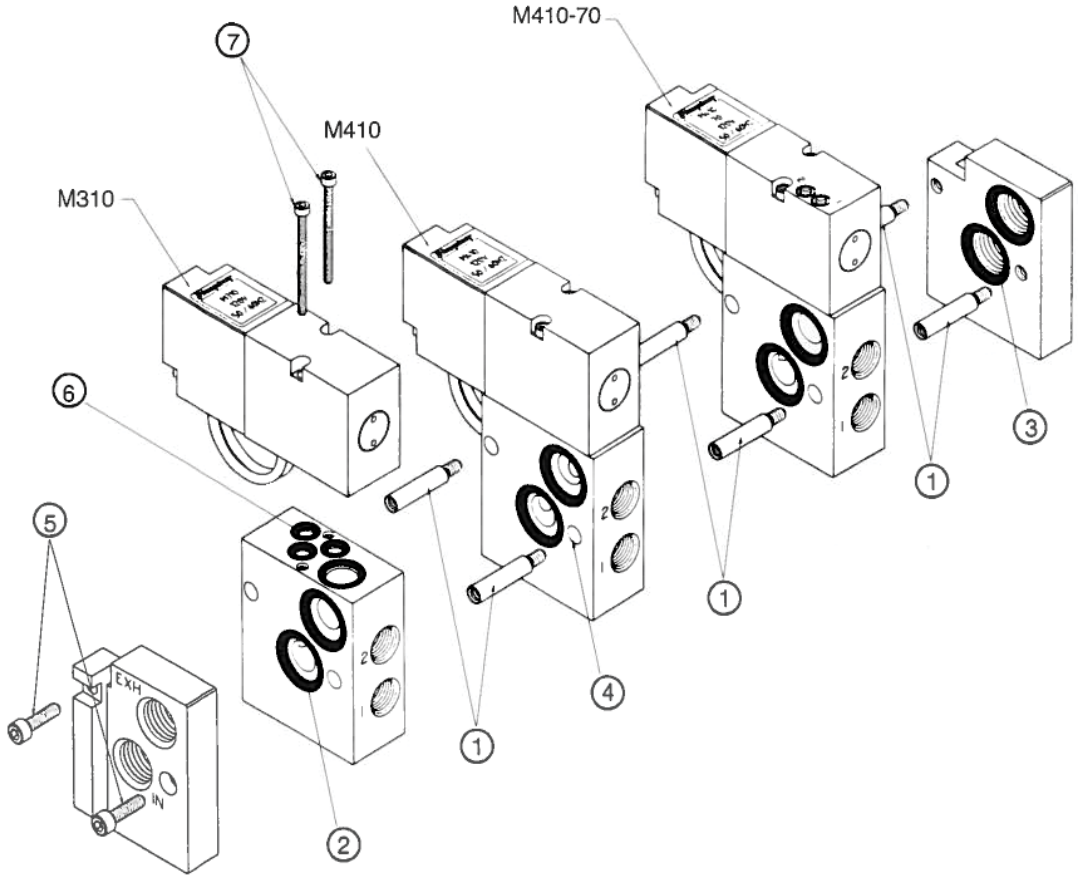
Model 8-310A anodized aluminum block-off plate is used to suspend the use of any SB-1 or SBMP-1 subbase. It can also be used to permit future valve additions related to machine options. Supplied with screws and o-rings to mate with subbase.

PORTING FOOTPRINT

Model 310, M410, and M410-70 valves can be mounted to your equipment or to special manifolds using the dimensional data shown below.



MANIFOLD ASSEMBLY INSTRUCTIONS



TO ASSEMBLE A VALVE MANIFOLD

1. Hand tighten each set of threaded spacers (two supplied per subbase) into units of equal length.

2. Ensure that o-ring seals (supplied) are placed in subbase side ports having o-ring grooves.

3. Place o-ring seals (two supplied) into End Cap possessing o-ring grooves, and thread spacers into this End Cap.

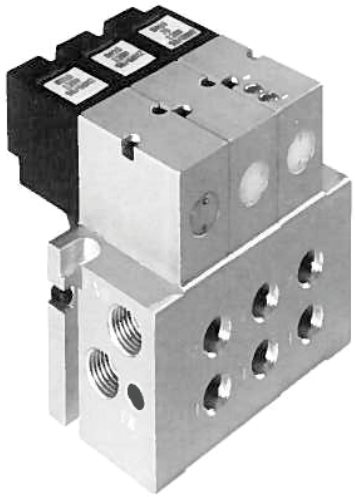
4. Assemble subbases onto spacers using subbase through-holes.

5. Secure entire assembly with #6-32 x .50-inch screws (supplied with End Caps) and tighten with 7/64-inch hex drive wrench (not supplied).

6. Place o-rings (four per subbase, supplied with valve) onto the valve mounting surface on the sub-bases. (Light weight grease assists in maintaining o-ring position during assembly.)

7. Mount valves to subbase assembly with #3-48 x 1.25 socket head cap screws supplied with valve. Use 2 lb.•in. of torque.

NOTE: Coils face away from subbase Delivery ports.



ORDER INFORMATION

M310/M410 Series Subbase Mounted Valves
1/8-inch ports, 3-way, 4-way

VALVES

Model	Option Description							Voltage
	DIN-Type Connector	Flow Controls	Locking Manual Override	No Manual Override	72" Lead Wires	Rotated Coil (180°)	Fluorocarbon Seals	
	Option Code							
	39	70	81	87	LL	RC	VAI	
M310 3-way, subbase mounting	SP	NA	SP	SP	SP	SP	SP	12 VDC 24 VDC 24/50/60 100/50//60 120/50/60 200/50/60 240/50/60
M310 vacuum 3-way,subbase mounting								
M410 4-way, subbase mounting		SP						

NOTE: Standard valves are furnished with 24" flying lead wires and a non-locking manual override.

N/C = No charge
NA = Not available
STD = Standard
SP = Specify; Additional charge for this option

ACCESSORIES

Model	Description
SB-1*	Subbase with two delivery ports. 8-90A Mounting Kit supplied.
SBMP-1*	Subbase wilh two delivery ports, and one IN and one EXH port. 8-90A Mounting Kit supplied.
7-100A*	End Cap Kit (two subbase EndCaps, two o-rings, and two screws)
8-90A	Mounting Kit (two spacers, two o-rings).
8-I00A	Valve Mounting Kit (two screws, four o-rings).
28-650A	Spade connector for use wilh terminals on Code 39 DIN-type coils.
40-900A	Port Isolator Kit (two port isolators).
HS2	DIN receptacle for use with Code 39 connector.
HS2L	Lighted DIN receptacle for use with code 39 connector. Specify: 12V, 24V or 120V

* To specify metric ports, add an "E" prefix (i.e. ESB-I or E7-100A).

HOW TO ORDER

Starting with Model Number, specify options in order from left to right.

Examples: Model M310-LL 12VDC
Long Leads 72" (M310-LL)
Voltage 12VDC (M310-LL 12VDC)

Model M410-21-70-87 120/50/60
Flow Controls (M410-70)
Without Manual Override (M410-70-87)
Voltage 120/50/60 (M410-70-87 120/50/60)

M310 and M410 Subbase Mounted Valves are available with solid manifolds, Series SM. Manifold accept valves with standard lead wire or optional DIN type electrical entry.

Model	Number of Stations (2 thru 12)
SM	____

Order Example: SM4

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