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# Title: 315/415 Solenoid Valves

## ISO Date: July 28, 2004

**Don't Take Chances**

Compressed air is an extremely powerful medium. Always take maximum precautions when handling any component of a compressed air system. **Never** attempt to construct, replace, operate or service any component of a compressed air system unless you have been specifically and properly trained to do so. **Always** disconnect the supply air and exhaust the air system before attempting to remove or service a component of that system Failure to heed these warnings could result in SERIOUS, EVEN FATAL, PERSONAL INJURY.

**Design And Specifications**

The design and specifications and other product information contained in this catalog is for general reference purposes based upon customary and usual manufacturing standards and product applications. However, it is difficult to predict or to anticipate the functioning or suitability of the product for any particular application or use. Therefore, nothing herein shall be deemed a representation or warranty of the product design or specifications and Buyer shall have the responsibility for investigating and testing the product in any particular application or use and all risks attendant in such use.

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1-800-477-8707
Kalamazoo MI 49003
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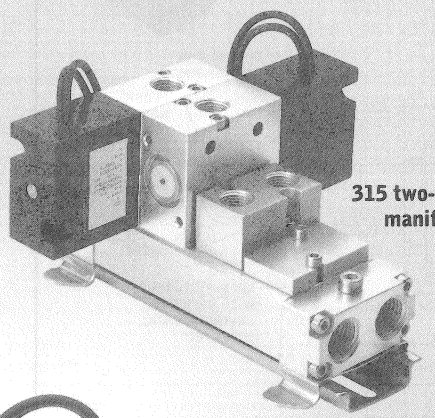
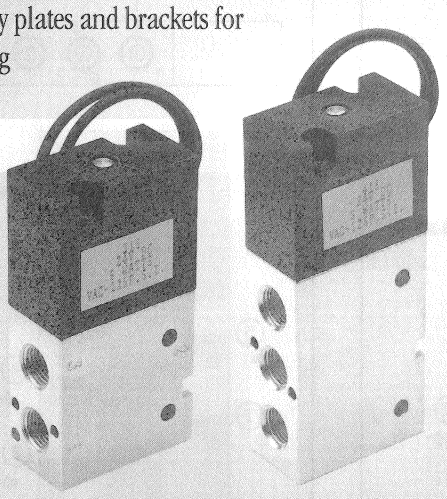
Humphrey®

# 315/415 Series Direct-Acting Solenoid Valves



315 two-gallery manifold

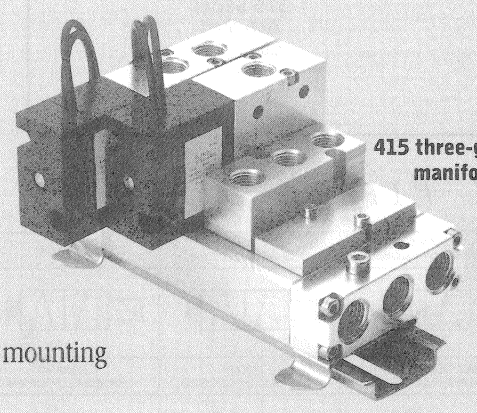
- Low profile, high density two-gallery manifolds
- Accepts 315 Series 3-way valves
- Valves can be mounted for Normally Closed or Normally Open operation
- Options include block off plates, isolator plugs, separate air supply plates and brackets for DIN rail mounting



315 Series Valve

415 Series Valve

- Direct-acting solenoid
- New patent pending self-energizing seal
- 0.42 $C_V$ flow rate (ANSI (NFPA) T3.21.3 - 1990)
- Rated from 28"Hg to 125 psig
- NEMA 4 rated (IP-65)
- Compact size (19mm width)
- Low power consumption (5 watts)
- 1/8" NPSF ports
- Same body used for inline and manifold mounting

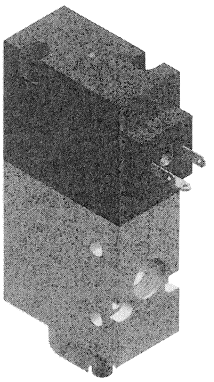


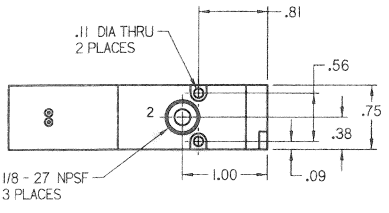
415 three-gallery manifold

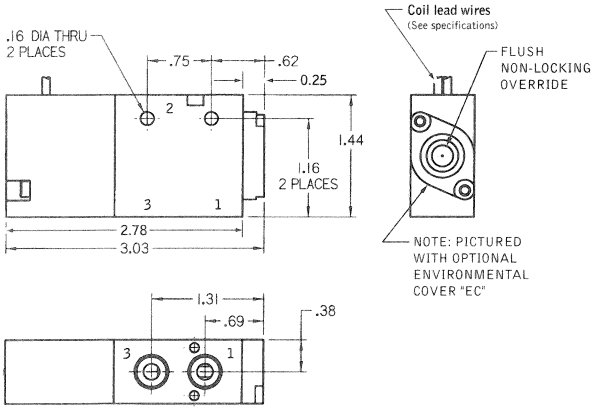
- Low profile, high density three-gallery manifolds
- Common pressure / Individual exhaust ports
- Accepts 415 Series 5-port, 4-way valves
- Also accepts 315 Series 3-way valves
- Valves can be mounted for N.C./N.O. operation
- Options include block off plates, isolator plugs, separate air supply plates and brackets for DIN rail mounting

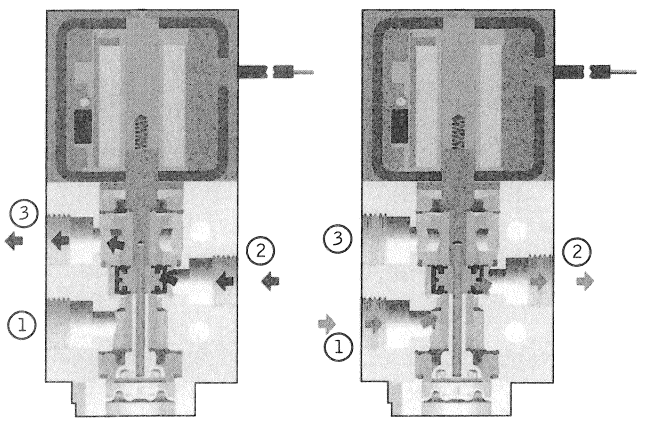
# 315/415 Series Valves

## 315 Series





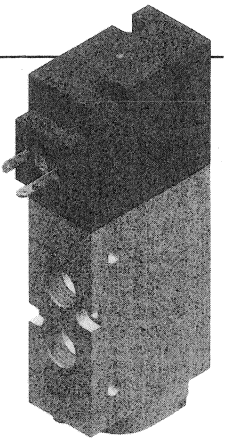



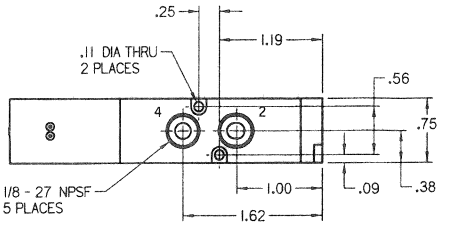



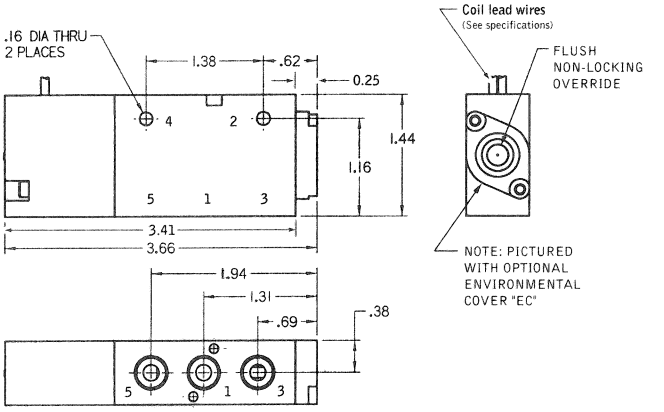
315 Series
Normal
Condition

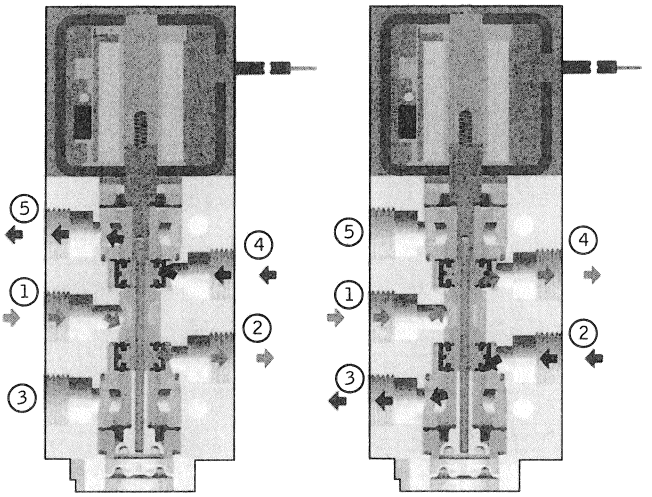
315 Series
Actuated
Condition

## 415 Series





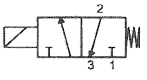
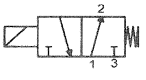
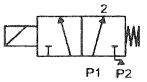
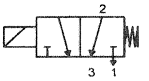
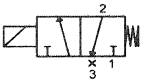
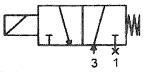
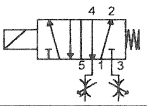
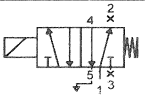
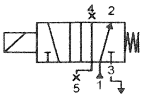



415 Series
Normal
Condition

415 Series
Actuated
Condition

## ANSI Piping Diagrams

| SERIES | 3-WAY NORMALLY CLOSED | 3-WAY NORMALLY OPEN | SELECTOR | DIVERTER | 2 WAY N.C. | 2 WAY N.O. |
|---|---|---|---|---|---|---|
| 315 |  |  |  |  |  |  |
| | 4-WAY DIRECTIONAL W/ SPEED CONTROL | 3 WAY NORMALLY CLOSED | 3 WAY NORMALLY OPEN | | | |
| 415 |  |  |  | | | |

# 15/415 SPECIFICATIONS

| tures: | Line Mounted | Line Mount ( 2 & 3 - Gallery Bar Stock Manifold) |
|---|---|---|
| . Sizes | 315 1/8" NPSF<br>415 1/8" NPSF | 1/4" NPSF Inlet & Exhausts |
| . Identifications | 315 Valve:<br>Pressure = 1; Cylinder= 2; Exhaust= 3;<br>415 Valve: Pressure = 1;<br>Cylinder = 2; Cylinder = 4;<br>Exhausts Ports = 3 & 5 | 315 Manifold:<br>Pressure= 1; Exhaust = 3;<br><br>415 Manifold:<br>Pressure = 1; Exhaust = 3;<br>Exhaust = 5 |
| ANSI (NFPA) T3.21.3 - 1990) | 0.42 | |
| M @ 100 psig | > 20 | |
| xhaust Time 0 - 90 psi | 1 cu.in. (.028 / .025 sec.)<br>10 cu.in. (.19 / .23 sec.)<br>100 cu.in.( 1.3 / 1.9 sec.) | |
| age Tolerance | Plus 10%, minus 15%<br>of rated voltage | |
| ifold Type | 315 Series, 415 Series: Fixed Length Bar Stock<br>( 2 -12 Stations ) (Tap 1/4" NPSF) | |
| wich Speed Control | 315: N/A | 415: Yes |
| Temperature Rise voltage) | 95° F | |
| itable Coil | Yes - Field Adjustable 180° | |
| e Function | 315: Multi-purpose<br>2-Position / 3 -Way | 415: 2-Position /<br>5-Ported / 4 - Way |
| ual Override | Flush Non-Locking | |
| trical Connections | 22 AWG Black Cross Linked Polyethylene insulated lead wire 7 x 30 stranded/tinned copper conductor; 125° C / 600 V. UL Style 3173,3271, CSA Type CL 1251. & DIN 43650C 15mm style connector | |
| ication | None required | |
| ages | 12VDC, 24VDC, 24 50/60, 120 50/60, 240 50/60 | |

| Features: | Line Mounted | Line Mount ( 2 & 3 - Gallery Bar Stock Manifold) |
|---|---|---|
| Power Consumption (AC/DC) | 5 Watts | |
| Stroke (inches) | 315 / 415: 0.022 (nominal) | |
| Surge Suppression | TSD - Option Code 50 | |
| Weight | 315: .315 lbs. (5.04 oz)<br>415: .390 lbs. (6.24oz) | |
| Agency Approvals | Consult Factory | |
| Type of Operation | Direct Acting Solenoid | |
| Coil | General Purpose Class B, continuous duty rated, encapsulated. | |
| Mounting Position | Any | |
| Media | Air, Inert Gases | |
| Pressure Range | 28" Hg Vacuum to 125 psig | |
| Filtration | 40 Micron recommended | |
| Response Time ON/OFF (Sec.) | 315: 0.020 / 0.008 (DC)<br>415: 0.020 / 0.021 (AC) | |
| Effective Area (Sq. In.) | 0.0123 | |
| Maximum Cycle Rate (CPM) | 2142 (DC); 1463 (AC) | |
| Materials | Buna-N, Brass, Anodized Aluminum, optional fluoroelastomer | |
| Ambient Temp Range | 32° F to 125° F | |
| Leak Rate (max.) | 4 cc/minute @ 100psig | |
| Package Rating | NEMA 4 (IP-65) | |
| Dimensions (inches) | 315 Series: .75 x 1.44 x 3.03<br>415 Series: .75 x 1.44 x 3.66 | |
| Coil Testing | All valves are "HiPot" tested between coil windings and coil frame | |
| DIN Connector Specification | Micro Mini 9mm | |
| DIN Rail Mounting (35mm) | | 315: Yes<br>415: Yes |

## FLOW RATES / $C_v$

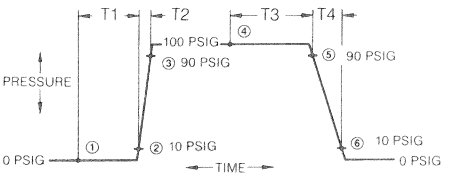
lumphrey recommends "fill/exhaust" times which are related to arious chamber sizes, as the best method for calculating total valve nd device (i.e., cylinder) response time. Humphrey recognizes the ıdustry's use of flow coefficient $C_v$ as a comparison standard.

Consequently, Humphrey offers three types of flow data. he National Fluid Power Association's (NFPA) standards for $C_v$, ıe SCFM flow rate determined by flowing to atmosphere, and lumphrey's preferred "fill/exhaust times."

| lodel | $C_v$ | 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 |
| 15 | 0.42 | >20 | .028 | .19 | 1.3 | .025 | .23 | 1.9 |
| 15 | 0.42 | >20 | .028 | .19 | 1.3 | .025 | .23 | 1.9 |

## RESPONSE TIMES

**Identification of response time areas**




**T1** times are measured from point (1) (coil energized) to point (2) (10% of supply pressure).

**T2** times are measured from point(2) (detection of outlet pressure) to point (3) (90% of supply pressure).

**T3** times are measured from point (4) (coil de-energization) to point (5) (10% of supply pressure exhausted from outlet port).

**T4** times are measured from point (5) (detection of pressure drop) to point (6) (90% of supply pressure exhausted )

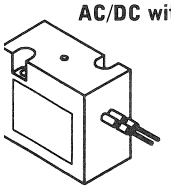
**AC/DC Voltages**
(Same for both 315 & 415 Series Valves)

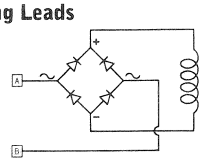
| Voltage | T1 | T2 | T3 | T4 |
|---|---|---|---|---|
| AC | .018 | .002 | .018 | .003 |
| DC | .018 | .002 | .005 | .003 |

Time in seconds (nominal)

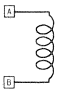
## SOLENOID CIRCUIT SCHEMATICS

**AC/DC with Flying Leads**



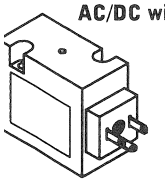


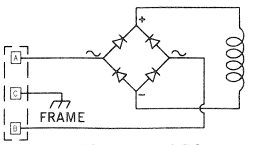
AC / CODE 50 DC



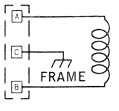
DC

**AC/DC with DIN Connector**






AC / CODE 50 DC



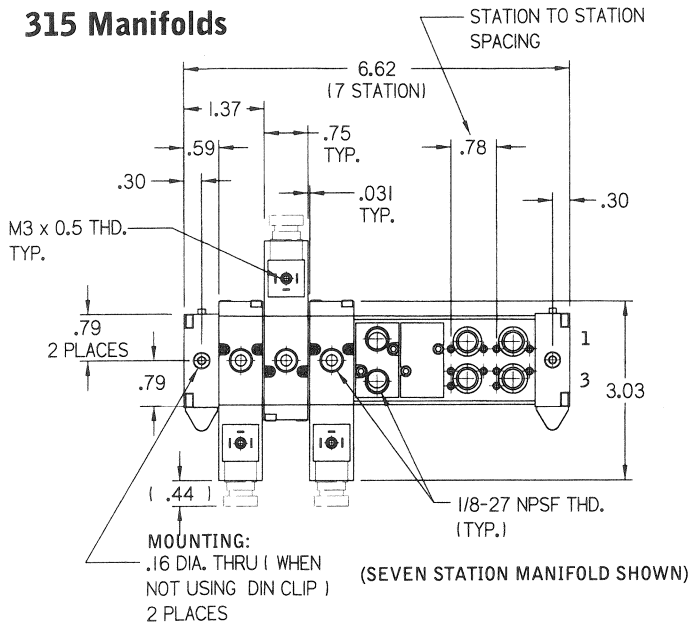

DC

## ELECTRICAL SPECIFICATIONS

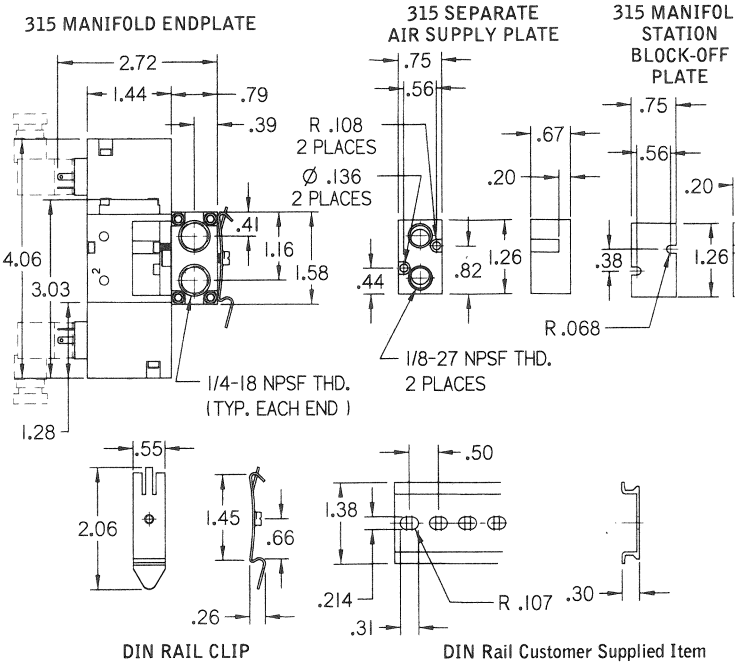
| Voltage | Resistance (Ohms) +/- 10% | Current (Milliamps) |
|---|---|---|
| 12VDC | 28.8 Ω | 420 mA |
| 24VDC | 115.2 Ω | 210 mA |
| 24 50/60 | 80.0 Ω | 282 mA |
| 120 50/60 | 2420.0 Ω | 47 mA |
| 240 50/60 | 9680.0 Ω | 23 mA |

- All coils come standard with 24-inch black lead wires.
- Optional 72-inch lead wires are available Option Code ( LL ).
- Optional DIN connectors (Option Code 39)
- All AC coils are rated for 50/60 Hertz.
- All coils utilize Class B insulation materials.
- Resistance and current are nominal values.
- Valves are "HiPot" tested
- Ensure proper voltage supply per voltage label rating, +10% / -15% for AC or DC voltages.

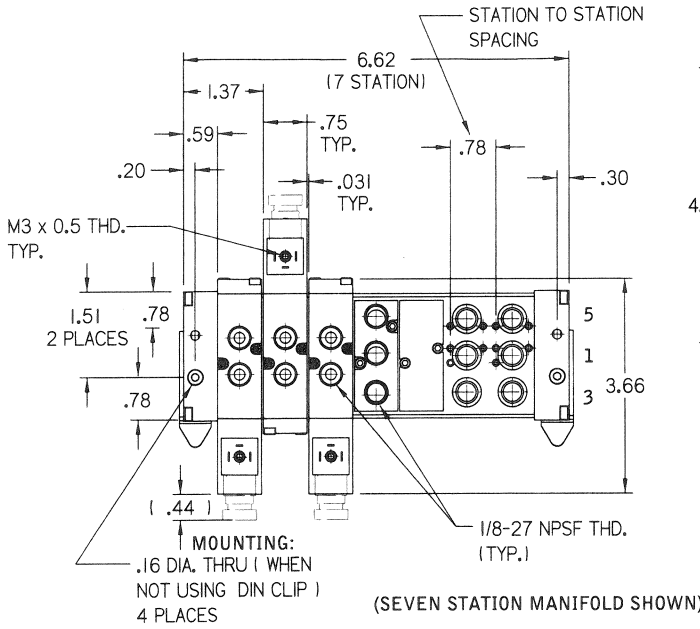
## 315 Manifolds



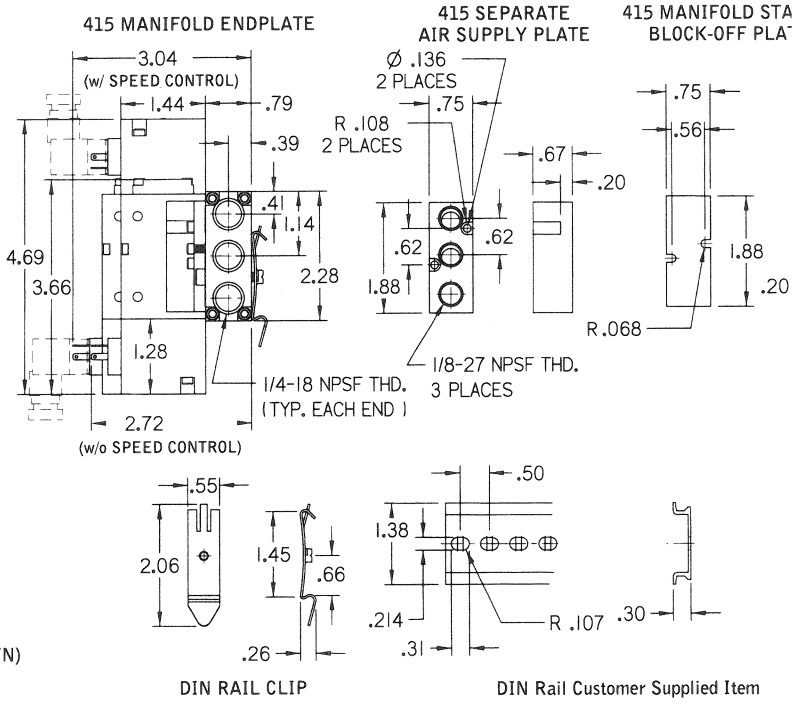

(SEVEN STATION MANIFOLD SHOWN)



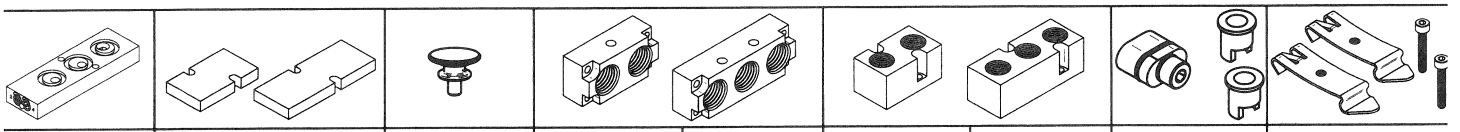

## 415 Manifolds




(SEVEN STATION MANIFOLD SHOWN)




## ACCESSORIES



**Speed Control: 415-SC**
(includes (2) screws and (3) o-ring seals)

**Manifold Station Block-off Plates: 315-BOP; 415-BOP**

**Manifold Plug**
(For use with 315 Series valves when mounted on a 415 Series manifold):
**40062-1; 40062-5**
(bag of five)

**315 Manifold End Plate: 315M-EP**
(includes (2) end plates, (8) screws and (4) o-ring seals)

**415 Manifold End Plate: 415M-EP**
(includes (2) end plates, (8) screws and (6) o-ring seals)

**315 Separate Air Supply Plate: 315-SSP**
(includes (2) screws and (2) o-ring seals)

**415 Separate Air Supply Plate: 415-SSP**
(includes (2) screws and (3) o-ring seals)

**Isolator Plug: DP**
(For applications requiring two different pressures, or pressure and vacuum. Refer to Multi-pressure Manifolds section for further information and considerations.)

**DIN Rail Clip: DRC**
(kit includes (2) clips and (2) screws)

**Valve Mounting Kits: 315-MK** (includes (2) screws and (2) o-ring seals; **415-MK** (includes (2) screws and (3) o-ring seals)

# HOW TO ORDER

## How to Order Valves

**NOTE:** Standard valves are furnished with 24-inch flying leads and a push, non-locking manual override. Option codes marked STD and NA are not used as part of the model number when ordering. OS indicates that the Option must be ordered separately and is not used as part of the Model Number.

NA = Not available
OS = Order separately, additional charge for this option
STD = Standard
SP = Specify, additional charge for this option

A 1/8 inch pipe plug is included with each valve unit when ordering Option Code #2.

| Model* | Option Code | | | | | | | | Specify Voltage |
|---|---|---|---|---|---|---|---|---|---|
| | 2-way | with Mounting Bracket | 72" Leads | DIN Connection | DC Surge Suppression | No Manual Override | Environ-mental Cover | Rotate Coil 180° from Standard** | |
| 315 | 2 | 21 | LL | 39 | 50 | 87 | EC | RC | 12VDC<br>24VDC<br>24 50/60<br>120 50/60<br>240 50/60 |
| 415 | SP<br>NA | SP | SP | SP | SP | SP | SP | SP | |

Standard Valve Order Example: Model 315-21-39-EC-120 50/60

** Coil is field-adjustable 180°, or may be ordered from factory, rotated.

**DIN Connector (Socket) Options**

| | |
|---|---|
| Model HS-2 | DIN connector (only) for use with Option Code 39 |
| Model HS2 LED | DIN connector with LED for use with Option Code 39 (12V, 24V, 120 VAC; specify voltage.) |
| Model HS2-CLL | Molded (6) ft. cable and assembly for use with Option Code 39 (DIN Connector). |

Note: DIN Connector Options must be ordered separately.

## SANDWICH SPEED CONTROL

Speed control sandwich mounts between the 415 Series valve unit and manifold assembly. The Speed Control is intended to be used for the metering of the compressed air flow from cylinder to exhaust (i.e., Port 2 - 3 and Port 4 - 5). For optimal access to the adjustment screws, we recommend that the adjustment screws be positioned on the same end as the valve unit's manual override.

Note: Since the Speed Control unit is symmetrical, it can be positioned on the same end as the solenoid.

## How to Order Manifolds

### 315 Manifold

| | |
|---|---|
| Manifold type | 2-gallery, fixed length bar stock (2- 12 stations) |
| Tap | 1/4" NPSF |
| Port Identification | Pressure = 1<br>Exhaust = 3 |

**Model / 315 Series**

| | |
|---|---|
| 315M-2 | 315M-8 |
| 315M-3 | 315M-9 |
| 315M-4 | 315M-10 |
| 315M-5 | 315M-11 |
| 315M-6 | 315M-12 |
| 315M-7 | |

Example: 315 Series 2 Station Manifold; Order: 315M-2

### 415 Manifold

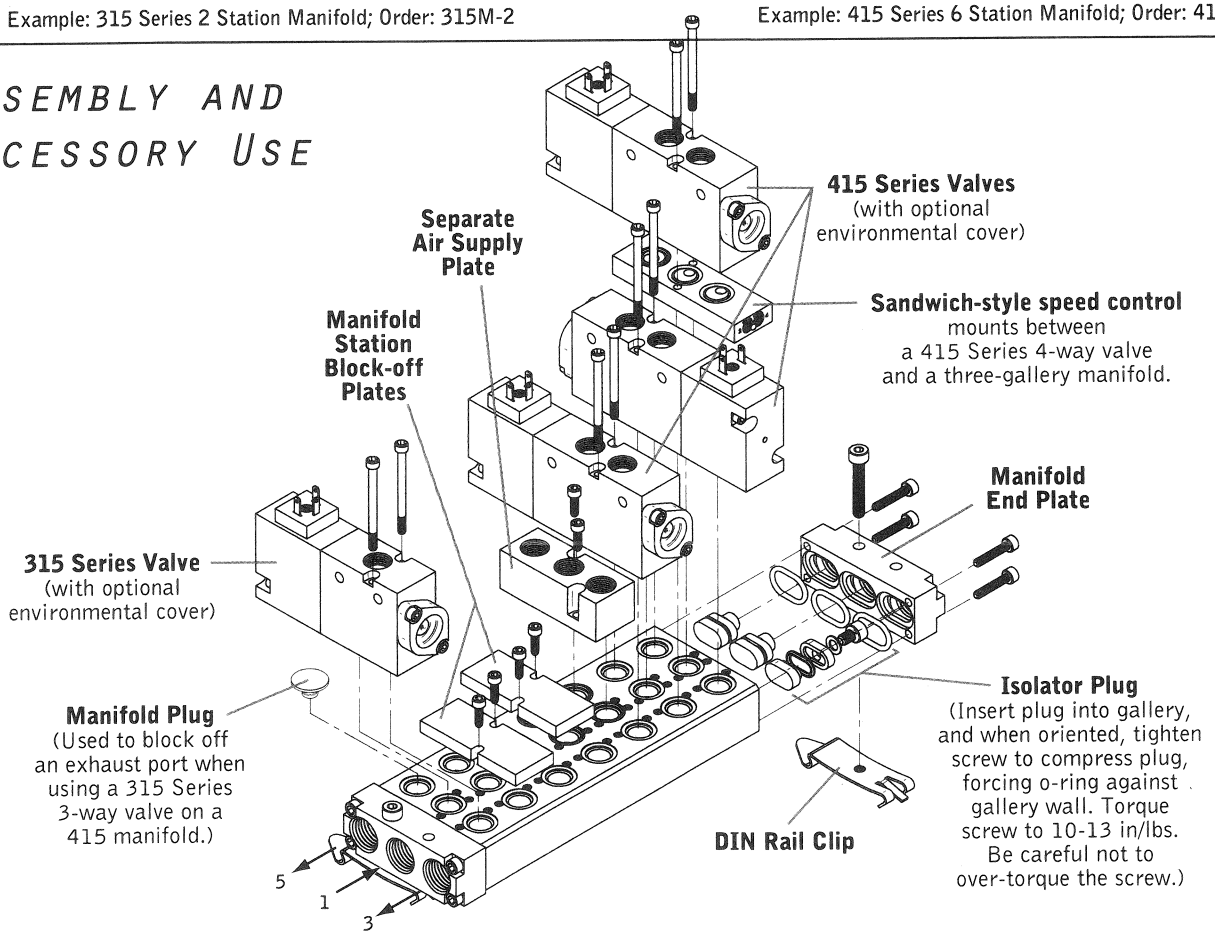
| | |
|---|---|
| Manifold type | 3-gallery, fixed length bar stock (2- 12 stations) |
| Tap | 1/4" NPSF |
| Port Identification | Pressure = 1<br>Exhaust = 3 & 5 |

**Model / 415 Series**

| | |
|---|---|
| 415M-2 | 415M-8 |
| 415M-3 | 415M-9 |
| 415M-4 | 415M-10 |
| 415M-5 | 415M-11 |
| 415M-6 | 415M-12 |
| 415M-7 | |

Example: 415 Series 6 Station Manifold; Order: 415M-6

# ASSEMBLY AND ACCESSORY USE



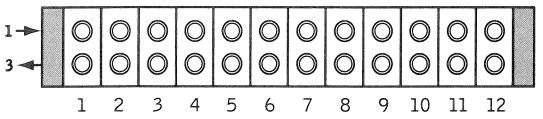
## COPY AND FAX

To Your Local Humphrey Distributor

To make it easier for you to obtain a quote on a completed valve/manifold assembly, please copy this form, fill in the appropriate part numbers for each station desired and fax it to your local Humphrey distributor.

# VALVE/MANIFOLD ASSEMBLY REQUEST

## 315 Manifold




Please circle the number of stations desired on the drawing above. For each station having a valve, please indicate the **complete** Part No., including option codes and voltage, and whether you want the valve to be Normally Open or Normally Closed.

For stations without valves, please specify under Accessory Part No. whether you want a Manifold Station Block-off Plate or a Separate Air Supply Plate. If you wish to isolate the manifold into two separate sections, please specify below where the Isolator Plugs should be.

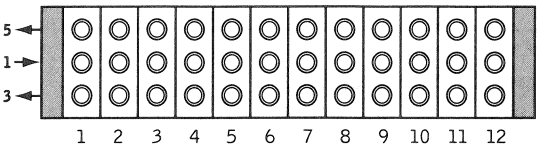
| | Valve Part No. | Voltage | Valve Orientation | | Accessories Part No. |
|---|---|---|---|---|---|
| Station 1: | _____ | ( ) | [ ] N.O. | [ ] N.C. | _____ |
| Station 2: | _____ | ( ) | [ ] N.O. | [ ] N.C. | _____ |
| Station 3: | _____ | ( ) | [ ] N.O. | [ ] N.C. | _____ |
| Station 4: | _____ | ( ) | [ ] N.O. | [ ] N.C. | _____ |
| Station 5: | _____ | ( ) | [ ] N.O. | [ ] N.C. | _____ |
| Station 6: | _____ | ( ) | [ ] N.O. | [ ] N.C. | _____ |
| Station 7: | _____ | ( ) | [ ] N.O. | [ ] N.C. | _____ |
| Station 8: | _____ | ( ) | [ ] N.O. | [ ] N.C. | _____ |
| Station 9: | _____ | ( ) | [ ] N.O. | [ ] N.C. | _____ |
| Station 10: | _____ | ( ) | [ ] N.O. | [ ] N.C. | _____ |
| Station 11: | _____ | ( ) | [ ] N.O. | [ ] N.C. | _____ |
| Station 12: | _____ | ( ) | [ ] N.O. | [ ] N.C. | _____ |

[ ] Isolator Plug(s) (Part No.) _____ GALLERY 1 between Station ___ and Station ____.
(Part No.) _____ GALLERY 3 between Station ___ and Station ____.

[ ] DIN rail clip

## 415 Manifold

Top (T)




Bottom (B)

Please circle the number of stations desired on the drawing above. For each station having a valve, please indicate the **complete** Part No., including option codes and voltage, and any accessories, such as a Sandwich Speed Control or Block-off Plate.

When using a **315 Series valve on a 415 Series manifold**, please **indicate** whether you want the valve to be **Normally Open** or **Normally Closed**. Note; you also must order a Manifold Plug.

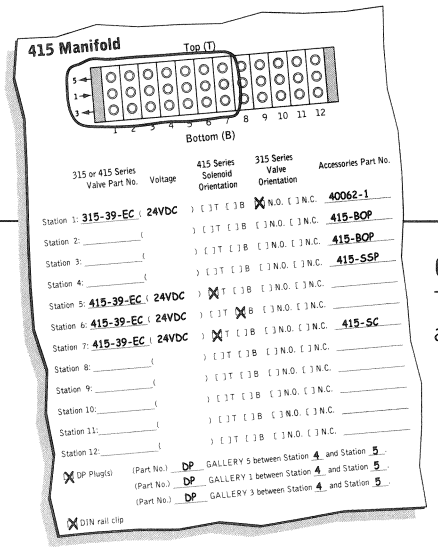
For stations without valves, please specify under Accessory Part No. whether you want a Manifold Station Block-off Plate or a Separate Air Supply Plate. If you wish to isolate the manifold into two separate sections, please specify below where the Isolator Plugs should be.

| | 315 or 415 Series Valve Part No. | Voltage | 415 Series Solenoid Orientation | 315 Series Valve Orientation | | Accessories Part No. |
|---|---|---|---|---|---|---|
| Station 1: | _____ | ( ) | [ ] T | [ ] B | [ ] N.O. [ ] N.C. | _____ |
| Station 2: | _____ | ( ) | [ ] T | [ ] B | [ ] N.O. [ ] N.C. | _____ |
| Station 3: | _____ | ( ) | [ ] T | [ ] B | [ ] N.O. [ ] N.C. | _____ |
| Station 4: | _____ | ( ) | [ ] T | [ ] B | [ ] N.O. [ ] N.C. | _____ |
| Station 5: | _____ | ( ) | [ ] T | [ ] B | [ ] N.O. [ ] N.C. | _____ |
| Station 6: | _____ | ( ) | [ ] T | [ ] B | [ ] N.O. [ ] N.C. | _____ |
| Station 7: | _____ | ( ) | [ ] T | [ ] B | [ ] N.O. [ ] N.C. | _____ |
| Station 8: | _____ | ( ) | [ ] T | [ ] B | [ ] N.O. [ ] N.C. | _____ |
| Station 9: | _____ | ( ) | [ ] T | [ ] B | [ ] N.O. [ ] N.C. | _____ |
| Station 10: | _____ | ( ) | [ ] T | [ ] B | [ ] N.O. [ ] N.C. | _____ |
| Station 11: | _____ | ( ) | [ ] T | [ ] B | [ ] N.O. [ ] N.C. | _____ |
| Station 12: | _____ | ( ) | [ ] T | [ ] B | [ ] N.O. [ ] N.C. | _____ |

[ ] DP Plug(s) (Part No.) _____ GALLERY 5 between Station ___ and Station ____.
(Part No.) _____ GALLERY 1 between Station ___ and Station ____.
(Part No.) _____ GALLERY 3 between Station ___ and Station ____.

[ ] DIN rail clip

Indicate Pressure Port (when using 315) [ ] 1 [ ] 3 [ ] 5




### Order Example

This is an example of an order for a seven-station manifold assembly, based on the exploded drawing on the previous page.

## roubleshooting

valve fails to function when electrical power is supplied:

Check valve function using manual override. If valve nctions by manual actuation, proceed to steps 2 and 3. valve does not function, proceed to step 4. For valves ithout manual override, proceed to steps 2 and 3.

Check line voltage and compliance with valve electrical .ting.

Check valve for inoperable (open) coil, measuring milliamps :r Electrical Specifications Chart.

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

## lounting Valves and Accessories to Manifolds

15 & 415 Series Valves: When mounting valves to manifold, ısure that a o-ring seal is properly located in each cavity of e manifold prior to mounting a valve unit. By rotating the 15 Series valve (180°), it can be converted from a 3-way ormally-Closed to 3-way Normally-Open function. Using rews furnished, tighten to 10-13 inch-pounds of torque. e careful not to over-torque the screws.

## ccessories

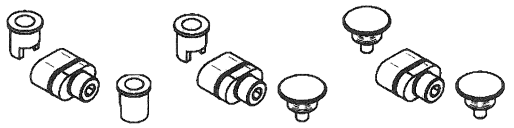
hen installing the 415 Series Speed Control (# 415 SC ), ke extra care to ensure that the o-rings are installed between e valve and speed control and speed control and manifold ock.

When connecting the Separate Air Supply (# 315-SSP or 15-SSP) and/or Block-off Plate (# 315-BOP, 415-BOP), to ; manifold, install a o-ring in each cavity of the manifold prior mounting the accessory item. Using screws furnished, tighten 10-13 inch-pounds of torque. Be careful not to over torque e screws. Appropriate o-rings and mounting screws are rnished with each accessory item.

## lulti-pressure Manifolds

) create a dual pressure (DP) manifold. Install the Isolator ug (DP) in-between the appropriate valve stations. See ustration on page 80e.

The accessory Isolator Plug (DP) has been pressure-tested well beyond the rated limits of the valves, manifold and other cessory components. As such, it should remain fully nctional in normal dual pressure or pressure/vacuum ıplications when all components are used within their rated nits. Humphrey Products cannot warrant the satisfactory rformance of the Isolator Plug (DP) when any components e subjected to extreme environmental conditions such as cessive vibration, wide temperature variations, or other nditions beyond the control of Humphrey Products that ight result in migration, leakage or failure of the Isolator ug. Please determine the suitability of this product for your tended application prior to ordering and use.



DP DP2 DP3

## Installation

Valves can be mounted in any position in most environments, in keeping with the specifications. 315/415 valves feature a Class B insulation system and molded coil for ambient temperatures from 32° F to 125°F (0° to 50° C).

Valves can be mounted by using the mounting holes provided. A DIN rail mounting clip is also available for manifolds. To order the DIN Rail Clip specify the DRC option code. Kit includes two clips and screws.

## Lubrication

Humphrey 315/415 Series valves can be operated with or without air line lubrication, depending on the application. If air cylinders or other devices require lubrication, ensure that the lubricating oils are chemically compatible with BUNA-N elastomers and are of sufficient viscosity to assure adequate lubrication. The equivalent to turbine oil Class 1 (ISO VG32) is recommended. Avoid using thin or low viscosity oils (spindle oil, machine oil, etc.) since they do not provide a good residual film of lubrication.

## Media / Pressure / Filtration

Humphrey 315/415 Series valves are designed for use with compressed air or inert gases from vacuum service (28"Hg) to 125 psig. Media should be inert gas and/or clean, dry air. When in doubt, install a filter with filtering capacity of 40 microns or less. Periodically, remove and clean or replace filter element. Consult factory if using other media.

## Rotating the Solenoid (180 degrees)

Humphrey 315/415 Series valves are designed to allow the end-user to rotate the coil 180 degrees, by the removal of two screws and then simply rotating the coil into position. Prior to rotating the coil, be sure that the supply pressure has been disconnected and properly vented from the valve prior to attempting this conversion. Be careful not to mis-align the gasket or internal spring when tightening the solenoid. Mis-alignment can prevent proper operation and/or shorten the life of the valve. Caution should be taken when doing this in the field.

## 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.)

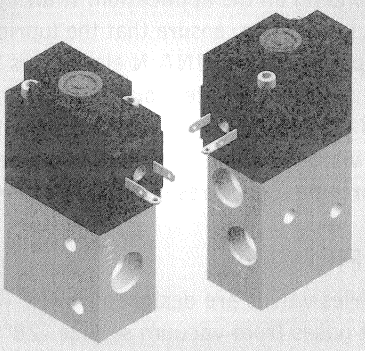
## Caution!

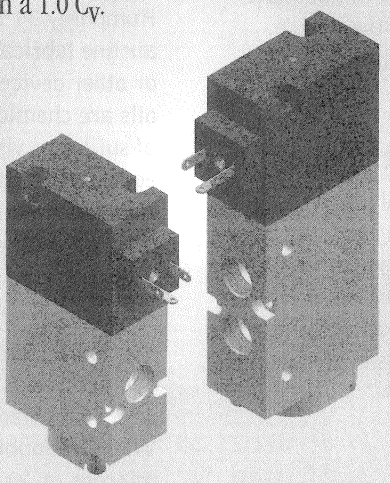
Compressed air is powerful and may be dangerous. Before attempting to remove or service a component from an air line or system, always disconnect the supply air and thoroughly exhaust the line or system. Never attempt to construct, operate, or service anything using compressed air unless you have been properly trained to do so. Failure to heed this warning could result in PROPERTY DAMAGE AND/OR SERIOUS, EVEN FATAL, PERSONAL INJURY. See additional warning on page 252.

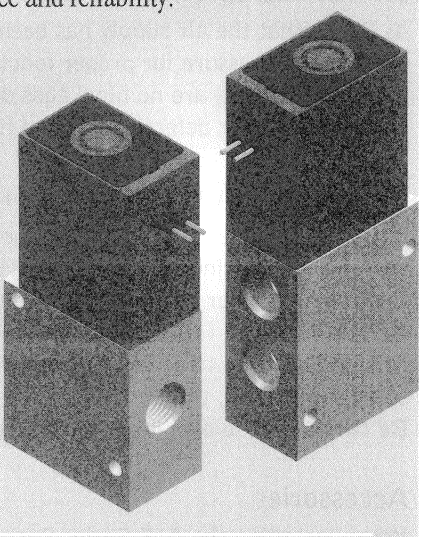
# More Options for Size, Flow and Flexibility

Humphrey now offers you more options for your applications. Our family of direct-acting pneumatic valves gives you a broad range of choices -- from the compact 310/410 Series with a .12 $C_V$, to the new compact, high performance 315/415 Series with a .42 $C_V$, up to the powerful 320/420 Series with a 1.0 $C_V$.

All valves are two-position, direct-acting single solenoid valves with a spring return. They can be used as Normally Open, Normally Closed or as a diverter. And all are designed and engineered for performance and reliability.







## 310/410 SERIES

### 310 Series
- Multi-purpose 3-way
- Three 1/8" ports
- 0.12 $C_V$
- 4.5 watts power consumption
- Can be used on same manifold with 410 Series valves

### 410 Series
- Multi-purpose 4-way
- Four 1/8" ports
- 0.14 $C_V$
- 4.5 watts power consumption
- Optional integral dual flow controls

## 315/415 SERIES

### 315 Series
- Multi-purpose 3-way
- Three 1/8" ports
- 0.42 $C_V$
- 5.0 watts power consumption
- Can be used on same manifold with 415 Series valves

### 415 Series
- Multi-purpose 4-way
- Five 1/8" ports
- 0.42 $C_V$
- 5.0 watts power consumption
- Optional sandwich-style speed control

## 320/420 SERIES

### 320 Series
- Multi-purpose 3-way
- Three 1/4" ports
- 1.0 $C_V$
- 8.0 watts power consumption

### 420 Series
- Multi-purpose 4-way
- Four 1/4" ports
- 1.0 $C_V$
- 8.0 watts power consumption

Humphrey®

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