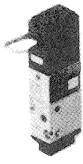
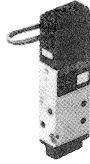
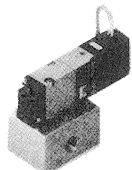
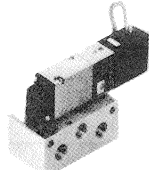
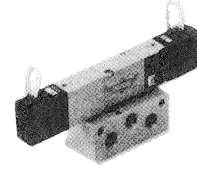


# H110 SERIES BASIC MODELS AND CONFIGURATIONS

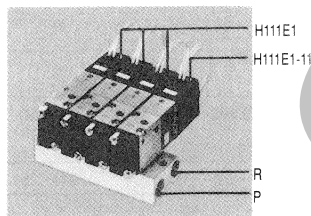
## SINGLE UNIT – IN-LINE AND SUBBASE MOUNTED

| 2-, 3-way                                                                         | 4-way                                                                             |                                                                                     |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                                                                   | In-line mounted                                                                   |                                                                                     |
| Normally closed (N/C) or normally open (N/O)<br>Single solenoid only              | 2 position<br>Single or double solenoid                                           | 3 position                                                                          |
|  |  |    |
| H111E1 series                                                                     | H110-4E1 (-4E2)                                                                   | H113-4E2-13<br>H113-4E2-14                                                          |
|                                                                                   | Subbase mounted <sup>Note</sup>                                                   |                                                                                     |
| Normally closed (N/C)                                                             | 2 position                                                                        | 3 position                                                                          |
|  |  |  |
| HA111E1                                                                           | HA110-4E1<br>HA110-4E2                                                            | HA113-4E2-13<br>HA113-4E2-14                                                        |

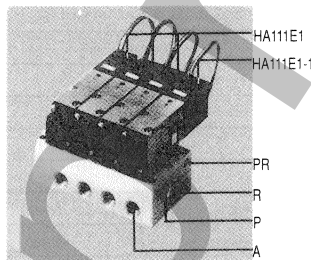
OTE: Valves are mounted to HA111-25 and HA110-25 subbases. Subbases are not available for H110 (3-way) series.

## MULTIPLE UNITS – MANIFOLD MOUNTED

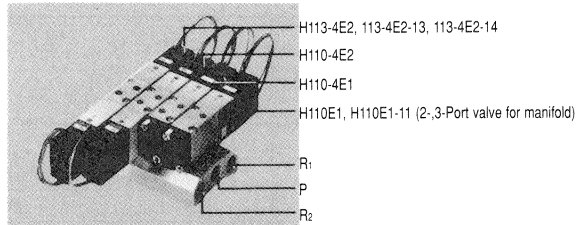
H111M□ F – use with H111 valves



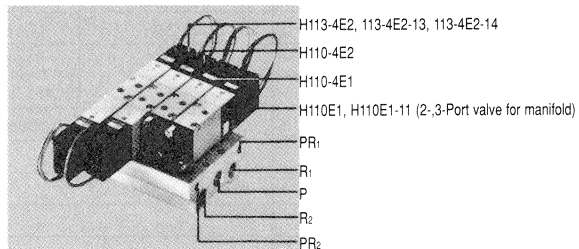
H111M□ A – use with HA111 valves



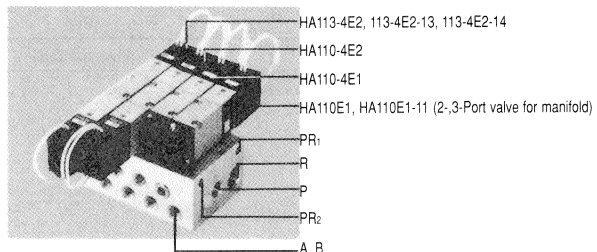
H110M□ F – use with H110, H110-4, H113-4 valves



H110M□ FE – use with H110, H110-4, H113-4 valves



H110M□ A – use with HA110, HA110-4, HA113-4 valves



# LIST OF SPECIFICATIONS

## MODEL AND VALVE FUNCTIONS

| Item                | In-line and manifold type     | Basic model                                                      |                            |                 |
|---------------------|-------------------------------|------------------------------------------------------------------|----------------------------|-----------------|
|                     |                               | H111E1<br>H110E1                                                 | H110-4E1<br>H110-4E2       | H113-4E2        |
|                     | Manifold or subbase type only | HA111E1<br>HA110E1                                               | HA110-4E1<br>HA110-4E2     | HA113-4E2       |
| Number of positions |                               | 2 position                                                       |                            | 3 position      |
| Number of ports     |                               | 2- and 3-way                                                     | 4-way                      |                 |
| Valve function      |                               | Normally closed (N/C standard)<br>and normally open (N/O option) | Single and double solenoid | Double solenoid |

NOTE: H110E1 and HA110E1 cannot be used as in-line valves. Use as manifold mount only.

## SPECIFICATIONS

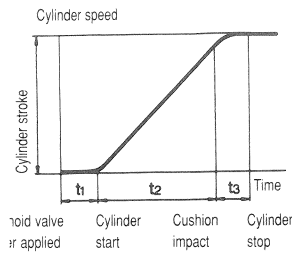
| Item                                              | In-line and manifold type     | Basic model             |                        |             |
|---------------------------------------------------|-------------------------------|-------------------------|------------------------|-------------|
|                                                   |                               | H111E1<br>H110E1        | H110-4E1<br>H110-4E2   | H113-4E2    |
|                                                   | Manifold or subbase type only | HA111E1<br>HA110E1      | HA110-4E1<br>HA110-4E2 | HA113-4E2   |
| Media                                             |                               | Air                     |                        |             |
| Type of operation                                 |                               | Indirect acting         |                        |             |
| Flow – C <sub>v</sub>                             |                               | .23                     |                        | .21         |
| Ports                                             |                               | 10-32 UNF               |                        |             |
| Lubrication                                       |                               | None required           |                        |             |
| Pressure range psig (kgf/cm <sup>2</sup> )        |                               | 20 ~ 100 (1.5 ~ 7)      |                        |             |
| Response time – ms<br>(ON/OFF)                    | 12VDC, 24VDC                  | below 15/20             | below 15/25            | below 15/30 |
|                                                   | 120VAC, 240VAC                | below 15/15             | below 15/15            | below 15/20 |
| Maximum operation frequency – c/s                 |                               | 5                       |                        |             |
| Minimum time to energize (ms)                     |                               | –                       | 50 (E2 only)           | –           |
| Temperature range (atmosphere or media) – °F (°C) |                               | 40 ~ 122 (5 ~ 50)       |                        |             |
| Impact resistance – G                             |                               | 140 (axle direction 30) |                        | 30          |
| Mounting direction                                |                               | Any                     |                        |             |

## SOLENOID SPECIFICATIONS

| Voltage                                       |                                     | 12VDC                            | 24VDC       | 24VAC          |     | 120VAC              |    | 240VAC    |    |
|-----------------------------------------------|-------------------------------------|----------------------------------|-------------|----------------|-----|---------------------|----|-----------|----|
| Model                                         |                                     | Surge protector – flywheel diode |             | Shading system |     |                     |    |           |    |
| Voltage Range                                 |                                     | 10.8 ~ 13.2                      | 21.6 ~ 26.4 | 21.6 ~ 26.4    |     | 90 ~ 132            |    | 180 ~ 264 |    |
| Current value<br>(Rated voltage applied)      | Frequency Hz                        | –                                | –           | 50             | 60  | 50                  | 60 | 50        | 60 |
|                                               | Starting power – mA                 | –                                | –           | 145            | 130 | 44                  | 40 | 22        | 20 |
|                                               | Holding power – mA <sup>NOTE1</sup> | 130 (140)                        | 65 (75)     | 85             | 70  | 32                  | 26 | 16        | 13 |
| Power consumption <sup>NOTE1</sup>            |                                     | 1.6 (1.7)                        | 1.6 (1.8)   | –              | –   | –                   | –  | –         | –  |
| Leak rate (maximum allowed) – mA              |                                     | 8                                | 4           | 8              |     | 4                   |    | 2         |    |
| Temperature rise (at rated voltage) – °F (°C) |                                     | below 77° (25°)                  |             |                |     | Less than 95° (35°) |    |           |    |
| Insulation                                    |                                     | Type B                           |             |                |     |                     |    |           |    |
| Insulation tolerance – MΩ                     |                                     | Over 100                         |             |                |     |                     |    |           |    |
| Lead wire: length                             | Standard                            | Grommet 12" (300mm)              |             |                |     |                     |    |           |    |
|                                               | Options                             | Plug connector                   |             |                |     |                     |    |           |    |
| Lead wire: color                              |                                     | Brown/Black                      | Red/Black   | Black          |     | Yellow              |    | White     |    |
| LED indicator (option) color                  |                                     | Red                              |             | –              |     | Yellow              |    | Green     |    |
| Surge suppression                             |                                     | Flywheel diode                   |             | –              |     |                     |    |           |    |

NOTE 1: Number in ( ) indicates solenoid with LED indicator.

## CYLINDER SPEED



In order to obtain required time for cylinder to make one stroke, add cylinder's delay time  $t_1$  (delay time between activating valve and actual starting time of cylinder) to the time  $t_2$  at the maximum speed. If there is a cushion time, add the cushion time. General cushion time  $t_3$  is around 0.2 seconds.

### H110-4E1, H113-4E2

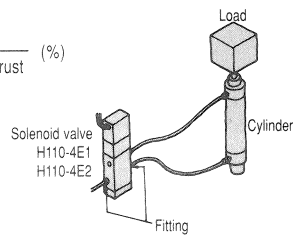
#### Measurement requirements

Air pressure: 71 psig (5 kgf/cm<sup>2</sup>)

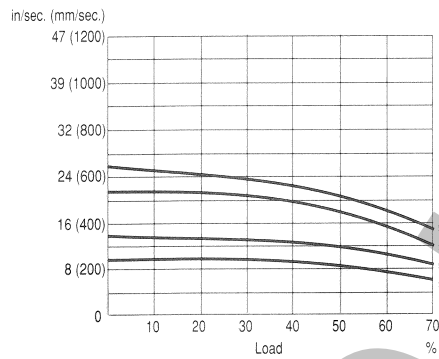
1/4" I.D. tubing x 35" long

Load ratio =  $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$  (%)

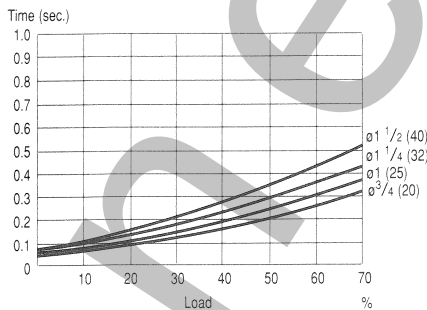
Cylinder stroke: 6 in.



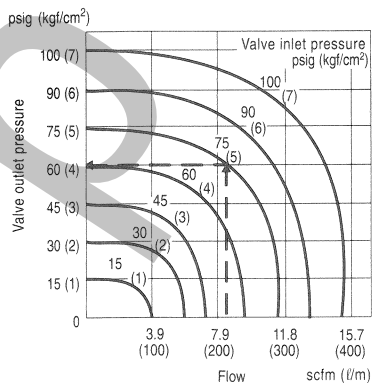
#### Maximum operating speed



#### Delay time



#### Flow



### HA110-4E1, HA113-4E2

#### Measurement requirements

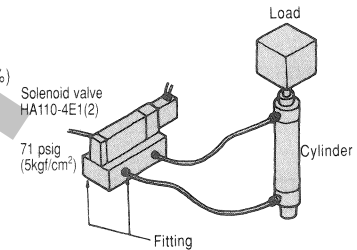
• Mounted to H110-25

• Air pressure: 71 psig (5 kgf/cm<sup>2</sup>)

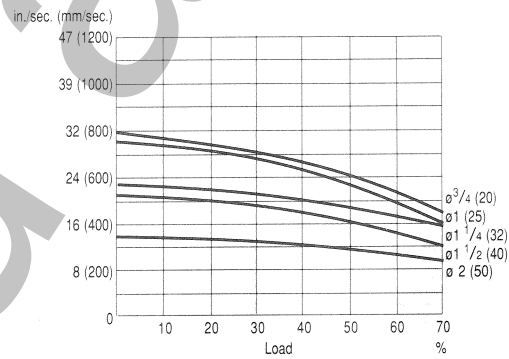
• 1/4" I.D. tubing x 35" long

• Load ratio =  $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$  (%)

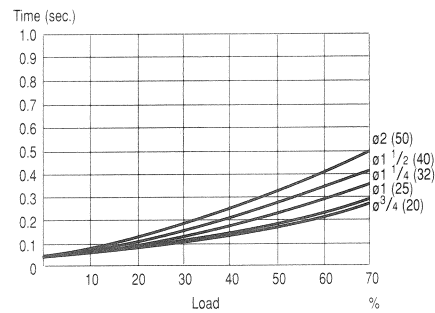
• Cylinder stroke: 6 in.



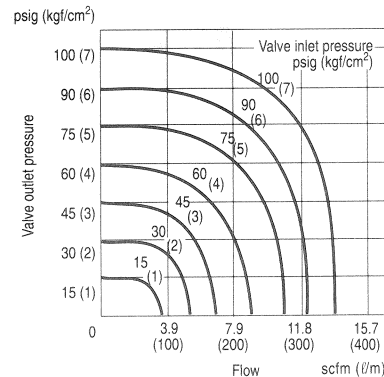
#### Maximum operating speed



#### Delay time



#### Flow



# HOW TO ORDER

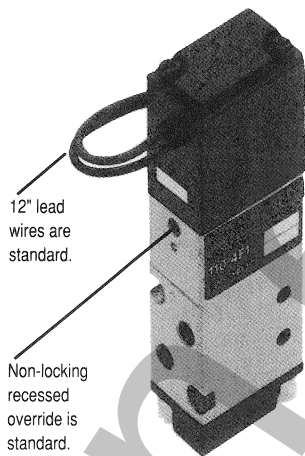
## VALVES

| Description                          |                            | Model     | ORDERING CODE |               |          |     |            |             |                 |  | Manual<br>override | Electrical<br>Connection | Voltage |
|--------------------------------------|----------------------------|-----------|---------------|---------------|----------|-----|------------|-------------|-----------------|--|--------------------|--------------------------|---------|
|                                      |                            |           | Options       |               |          |     |            |             |                 |  |                    |                          |         |
|                                      |                            |           | 2-way         | Norm.<br>Open | Function |     | 3 position | Open center | Pressure center |  |                    |                          |         |
|                                      |                            |           |               |               |          |     |            |             |                 |  |                    |                          |         |
| In-line or<br>F-type manifold        | 2 or 3 port                | H111E1    | -2            | -11           |          |     |            |             |                 |  |                    |                          |         |
|                                      | 5 port<br>Single solenoid  | H110-4E1  |               |               |          |     |            |             |                 |  |                    |                          |         |
|                                      | 5 port<br>Double solenoid  | H110-4E2  |               |               |          |     |            |             |                 |  |                    |                          |         |
|                                      | 5 port<br>3-position       | H113-4E2  |               |               |          | -13 | -14        |             |                 |  |                    |                          |         |
| Single subbase or<br>A-type manifold | 2 or 3 port                | HA111E1   | -2            | -11           |          |     |            |             |                 |  |                    |                          |         |
|                                      | 5 port<br>Single solenoid  | HA110-4E1 |               |               |          |     |            |             |                 |  |                    |                          |         |
|                                      | 5 port<br>Double solenoid  | HA110-4E2 |               |               |          |     |            |             |                 |  |                    |                          |         |
|                                      | 5 port<br>3-position       | HA113-4E2 |               |               |          | -13 | -14        |             |                 |  |                    |                          |         |
| Manifold<br>mount only               | H110M□F, FE<br>2 or 3 port | H110E1    | -2            | -11           |          |     |            |             |                 |  |                    |                          |         |
|                                      | H110M□A<br>2 or 3 port     | HA110E1   |               |               |          |     |            |             |                 |  |                    |                          |         |

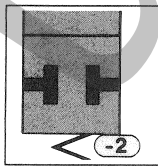
12VDC  
24VDC

120VAC  
240VAC  
24VAC<sup>Note</sup>

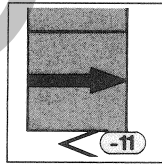
NOTE: 24VAC with lead wires and no LED only.



3-port  
options:

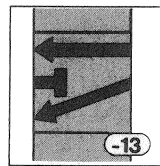


2-way  
(3-way std.)

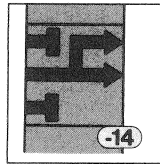


Normally open  
(Normally closed-std.)

3-position options:  
Block center std.  
Order code: Blank

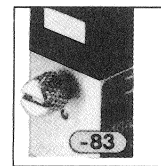


Exhaust center



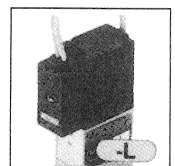
Pressure center

Override  
Non-locking  
recessed std.



Locking

Electrical:  
Grommet with 12"  
lead wires std.  
Order code: Blank



Grommet with  
LED and surge  
protection

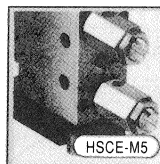


Plug-in with  
LED and surge  
protection NOTE

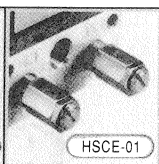
## ACCESSORIES

3 port valves are 3-way, normally  
closed standard.

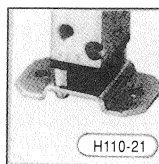
3 position 4-way valves have all ports  
blocked in the center position as  
standard.



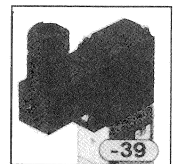
10-32 UNF exhaust  
flow control.



1/8" NPT exhaust  
flow control.



Mtg. base: single  
solenoid only.



DIN-style plug-in  
(LED not available)

NOTE: Standard wire length  
is 12" (300mm). Specify -PSL-L3  
for 108" (3000mm) lead wires.

# HOW TO ORDER

## MANIFOLDS AND SINGLE STATION SUBBASES

- and 3-way valve manifolds

| Model number | Description                                             |
|--------------|---------------------------------------------------------|
| H111M□ F     | Select 2 – 20 stations (□), accepts H111 series valves  |
| H111M□ A     | Select 2 – 20 stations (□), accepts HA111 series valves |

-, 3- and 4-way valve manifolds

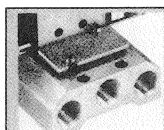
| Model number              | Description                                             |
|---------------------------|---------------------------------------------------------|
| H110M□ F                  | Select 2 – 20 stations (□), accepts H110 series valves  |
| H110M□ FE <sup>NOTE</sup> | Select 2 – 20 stations (□), accepts H110 series valves  |
| H110M□ A                  | Select 2 – 20 stations (□), accepts HA110 series valves |

single station subbases

| Model number | Description                                    |
|--------------|------------------------------------------------|
| HA111-25     | Subbase accepts HA111E1 3-way valves           |
| HA110-25     | Accepts HA110-4E1 (2) & HA113-4E2 4-way valves |

NOTE: FE has captured pilot exhaust.

## ACCESSORIES



Block-off plates:  
 H111MF-BP: for H111M□ F  
 H111MA-BP: for H111M□ A  
 H110MF-BP: for H110M□ F  
 H110MA-BP: for H110M□ FE & H110M□ A

## PORT INFORMATION

### SINGLE VALVE PORT INFORMATION

| Model                                  | Port     | Specifications | Port diameter |
|----------------------------------------|----------|----------------|---------------|
| H111E1, (H110E1 <sup>NOTE 1</sup> )    | Standard | Female thread  | 10-32 UNF     |
| H110-4E1, H110-4E2, H113-4E2           | Standard | Female thread  | 10-32 UNF     |
| HA110-25 <sup>NOTE 2</sup><br>HA111-25 | P        | Female thread  | 1/8 NPT       |
|                                        | A, B     |                |               |
|                                        | R        |                |               |
|                                        | PR       | Female thread  | 10-32 UNF     |

NOTE 1: H110E1 is for manifold installation only. Cannot be used as stand alone valve.

NOTE 2: Single station subbase for manifold mounted valves.

### MANIFOLD PIPING OUTLET DIAMETER

| Manifold model       | Port | Location | Port dimensions |
|----------------------|------|----------|-----------------|
| H111M□ F<br>H110M□ F | P    | Manifold | 1/8 NPT         |
|                      | A, B | Valve    | 10-32           |
|                      | R    | Manifold | 1/8 NPT         |
| H110M□ FE            | P    | Manifold | 1/8 NPT         |
|                      | A, B | Valve    | 10-32           |
|                      | R    | Manifold | 1/8 NPT         |
|                      | PR   |          | 10-32 UNF       |
| H111M□ A<br>H110M□ A | P    | Manifold | 1/8 NPT         |
|                      | A, B |          | 1/8 NPT         |
|                      | R    |          | 1/4 NPT         |
|                      | PR   |          | 10-32 UNF       |

## WEIGHT

### SOLENOID VALVE WEIGHT oz. (gf)

| Basic model | Weight    |
|-------------|-----------|
| H111E1      | 2.6 (75)  |
| H110E1      | 2.8 (80)  |
| H110-4E1    | 2.8 (80)  |
| H110-4E2    | 4.6 (130) |
| H113-4E2    | 5.1 (145) |
| HA111E1     | 2.8 (80)  |
| HA110E1     | 3.0 (85)  |
| HA110-4E1   | 3.0 (85)  |
| HA110-4E2   | 4.8 (135) |
| HA113-4E2   | 5.3 (150) |
| HA111-25    | 3.0 (85)  |
| HA110-25    | 3.4 (95)  |

### MANIFOLD WEIGHT oz. (gf)

| Manifold model | Weight calculation for each unit mounting (n = number) | Block-off plate |
|----------------|--------------------------------------------------------|-----------------|
| H111M□ F       | {0.5 (15) x n + 1.1 (30)}                              | 0.18 (5)        |
| H111M□ A       | {1.6 (45) x n + 1.6 (45)}                              | 0.35 (10)       |
| H110M□ F       | {0.7 (20) x n + 1.1 (30)}                              | 0.21 (6)        |
| H110M□ FE      | {1.4 (40) x n + 1.8 (50)}                              | 0.39 (11)       |
| H110M□ A       | {2.1 (60) x n + 2.1 (60)}                              |                 |

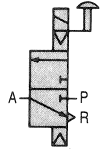
# OPERATING PRINCIPLE

## 3-WAY

H111E1

Unactuated

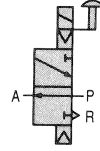
Normally closed (N/C)



H111E1-11

Unactuated

Normally open (N/O)

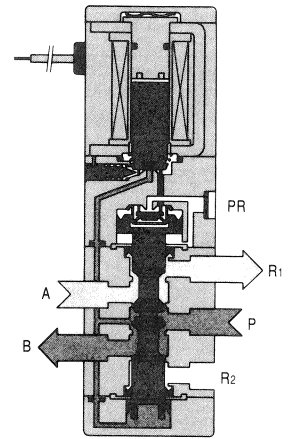
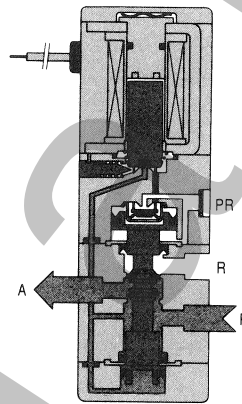
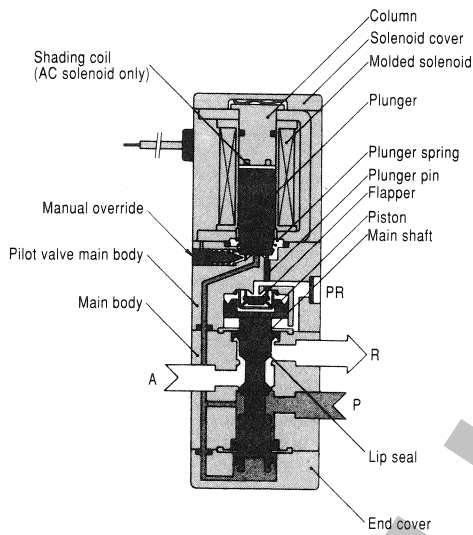
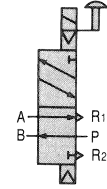


## 4-WAY, 2-POSITION

H110-4E1

Unactuated

Single solenoid



## MATERIALS OF MAIN PARTS

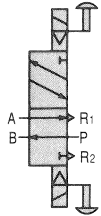
| Item     | Parts           | Materials                 |
|----------|-----------------|---------------------------|
| Valve    | Body            | Aluminum (anodized)       |
|          | Stem            |                           |
|          | Lip seal        | Buna                      |
|          | Flapper         |                           |
|          | Mounting base   | Soft steel (zinc plated)  |
|          | Subbase         | Aluminum (anodized)       |
|          | Plunger         | Electromagnetic stainless |
| Manifold | Column          |                           |
|          | Body            | Aluminum (anodized)       |
|          | Block-off plate | Steel (nickel plated)     |
|          | Seal            | Buna                      |

4-WAY,  
3-POSITION

H110-4E2

2 actuated

Double solenoid

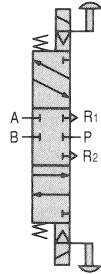


4-WAY,  
3-POSITION

H113-4E2

Unactuated

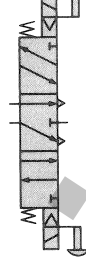
Closed center



H113-4E2-13

Unactuated

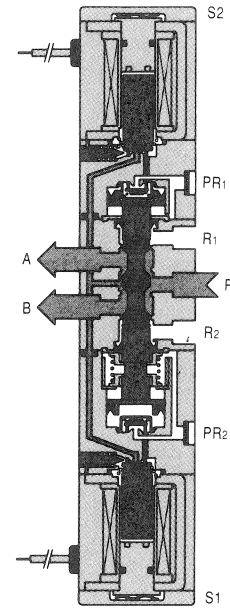
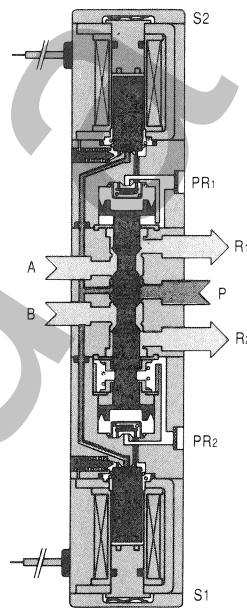
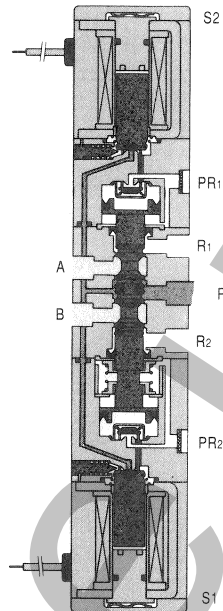
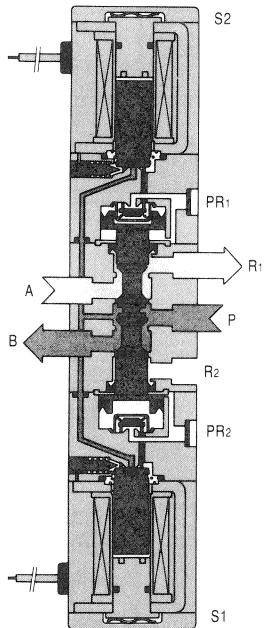
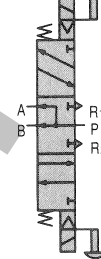
Open center



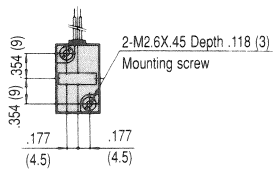
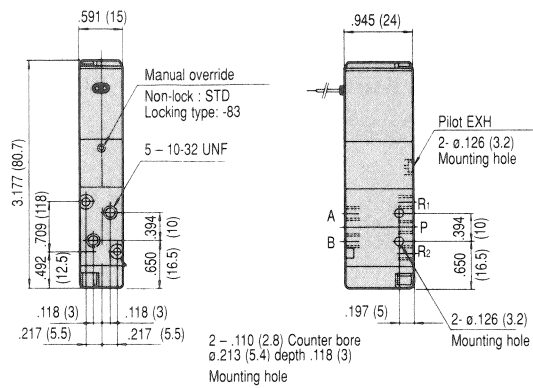
H113-4E2-14

Unactuated

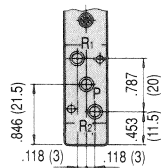
Pressure center



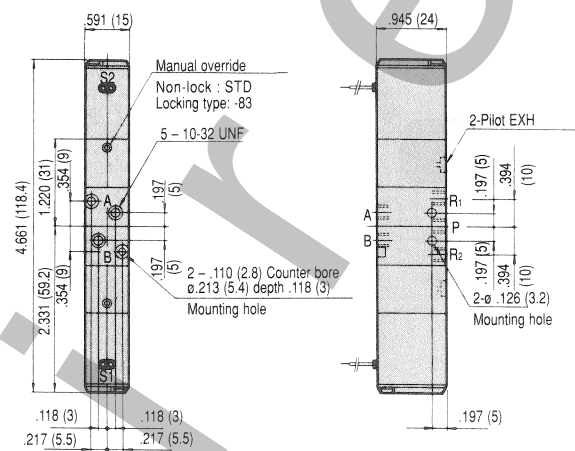
1110-4E1



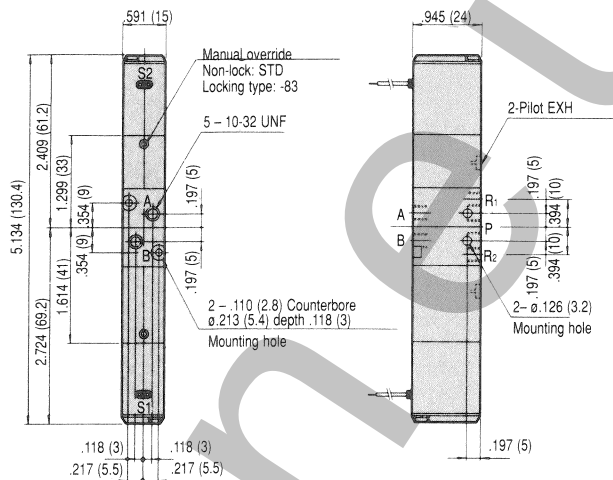
View from A



H110-4E2

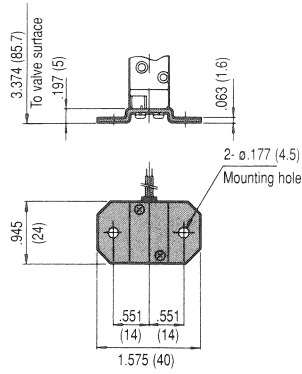


1113-4E2



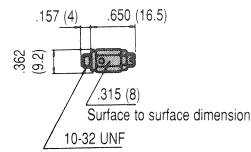
## ADDITIONAL PARTS (sold separately)

Mounting base: H110-21

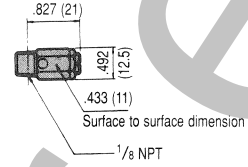


Flow control

In-line: HSCE-M5

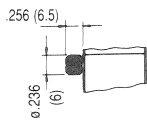


Subbase: HSCE-01

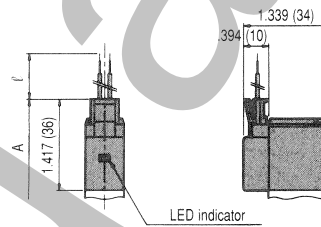


## CONNECTOR OPTIONS

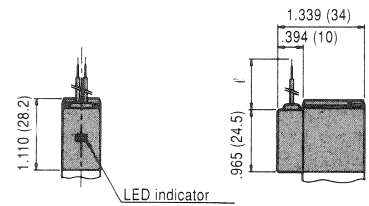
Locking manual override: (-83)



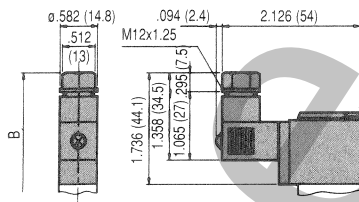
Straight connector solenoid: (-PSL)



Grommet with LED: (-L)



DIN connector solenoid: (-39)



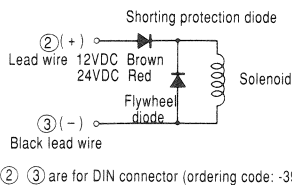
| Type                             | Body length with connector – in. (mm) |               | Measurement                     |
|----------------------------------|---------------------------------------|---------------|---------------------------------|
|                                  | A                                     | B             |                                 |
| H111E1, HA111E1, w/HA111-25      | 3.248 (82.5)                          | 3.567 (90.6)  | Length to valve end             |
| H110-4E1                         | 3.484 (88.5)                          | 3.803 (96.6)  |                                 |
| HA110-4E1, w/HA110-25            | 3.720 (94.5)                          | 4.039 (102.6) |                                 |
| HA110-4E2, HA110-4E2, w/HA110-25 | 5.276 (134)                           | 5.913 (150.2) | Length to opposite solenoid end |
| H113-4E2, HA113-4E2, w/HA110-25  | 5.748 (146)                           | 6.386 (162.2) |                                 |

# HANDLING CAUTIONS AND GENERAL ITEMS

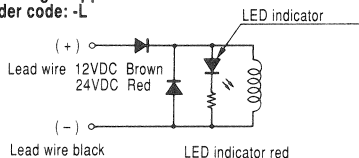
## SOLENOIDS

### INTERNAL CIRCUIT – DC

#### STD. Solenoid (Surge protection)

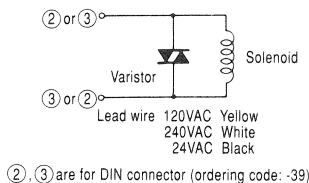


#### Solenoid with LED indicator with surge suppression Order code: -L

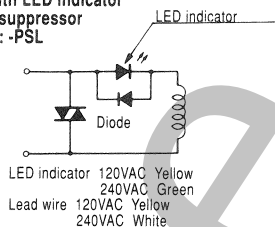


### INTERNAL CIRCUIT – AC

#### STD. Solenoid (Surge protection)



#### Solenoid with LED indicator with surge suppressor Order code: -PSL

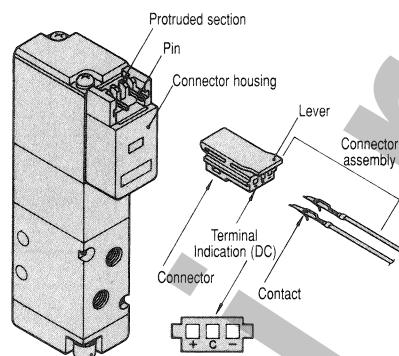


## CAUTIONS

1. Shorting will not occur to the 24VDC solenoid even if the wrong polarity is applied. However, the solenoid valve with surge suppression will not operate. Also the indicator on the valve with the LED indicator will not light.
2. If there is a current leakage in the circuit, improper operation, such as the valve not returning to the proper position, will occur. Make sure to operate the valve well within the limit of current leakage. If a leakage larger than the limit occurs, please consult factory.
3. Double solenoid: Do not apply power to both solenoids simultaneously. The valves may be put into a neutral state.
4. The AC solenoids contain diodes. Therefore, when a number of solenoid valves are connected together, make sure to connect the same color lead wires.

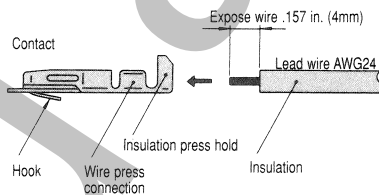
## PLUG CONNECTOR

To plug in, push connector until the lever clips into place. To take plug out, press lever and pull out.



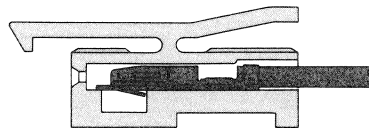
## LEAD WIRE AND CONTACT ASSEMBLY

Remove insulation from the lead wire and expose for 0.157" (4). Insert wire into contact and bend down press holds.



## CONTACT INSERTION AND DISASSEMBLY

Insert contact into square hole of connector until the hook engages. Pull lightly to assure the assembly. Push hook up with small screwdriver from side of connector to disassemble.



## CAUTIONS

1. Do not pull lead wire too hard.
2. Make sure pins on the connector housing are straight before inserting the connector.
3. Use appropriate tool to attach contact on lead wires.

## DIN CONNECTOR

High performance in contamination and environmental protection. Lead wire self stripping system.



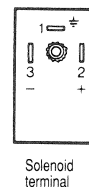
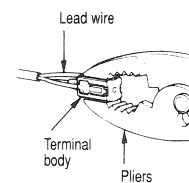
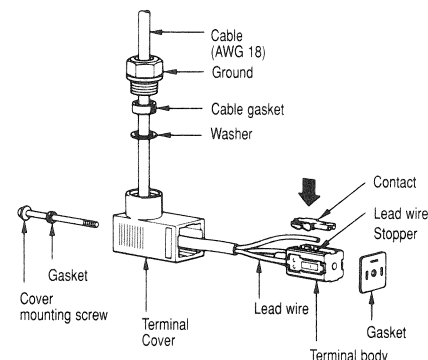
Indicate -39 option in valve order code.

Surge suppressors are equipped as standard feature.

LED indicator cannot be used.

Solenoid w/DIN connector:

No need to strip lead wire. Insert lead wire into terminal body until seated with stopper and press down with pliers to ensure positive connection with the contact.



## LED INDICATOR

Confirm presence of current at coil of grommet type (12" lead wires) with LED.



Indicate -L in plug connector option.

Surge suppressors are equipped as standard feature.

## MANUAL OVERRIDE

### NON-LOCKING

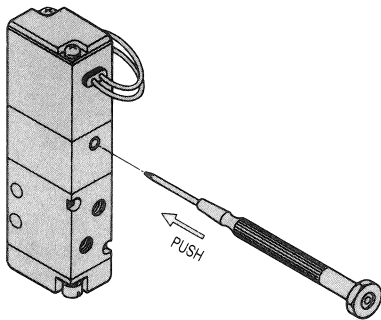
Actuate valve by fully depressing manual override with small tool. Valve remains actuated until manual override is released. Upon release, valve spring returns valve to normal position.

### LOCKING

Use a small tool to push in and turn manual override more than 45° to actuate. Override remains in either direction.

Spring force will return override to normal position when override is turned past the locking position.

If override is not turned to actuate, it may be operated like a non-locking override merely by depressing.



Cautions:

- Since these valves are indirect acting, manual override will not actuate unless air is applied to IN port.
- Do not use a sharp instrument to operate the override as it may damage the button.
- Take care to release locking override before resuming normal operation.

## MANIFOLD

### PIPING

Ports P and R are located at both ends of the manifold. Piping direction can be determined according to mounting location. Ports at one end of the manifold are temporarily plugged during shipping. Remove plugs and reseal with sealing agent.

### BLOCK-OFF PLATE

Use Block-Off Plate to close stations when they are not in use. Order code is H111M□ -BP or H110M□ -BP).

Cautions:

1. For P port piping, make sure to select fitting sizes to fit the manifold connecting pipe dimensions. Actuators may not operate properly if there is insufficient flow and/or pressure due to improper piping.
2. When installing fittings or mufflers in R port, make sure that exhaust remains unrestricted. Restriction of exhaust may cause actuators to operate erratically. Consider using R ports at both ends of manifold to enhance exhaust.
3. When several manifold valves are to be operated simultaneously, connect supply air to both ends of manifold. Also exhaust through both ends of manifold. This ensures adequate supply and exhaust capacity.

## POINTS TO BE CONSIDERED

### INSTALLATION

1. Mount valves in any direction. However, mount valves perpendicular to significant shock or vibration.
2. Location near water, oil, or in excessively dusty conditions requires adequate solenoid housing protection to prevent solenoid actuator contamination. Also consider the installation of breather/muffler in exhaust ports to prevent foreign objects from entering valves.
3. Before installing fittings and tubing, blow all foreign material from them. If using a sealant, take extra care that sealant does not enter valve causing potential malfunction and/or leaks.
4. When valves are installed in tight enclosures, consider the possibility of heat build-up. Ensure adequate ventilation.
5. Valves with A or B ports open to atmosphere will not operate properly.

## AIR SOURCE

1. Use compressed air or inert gas in accordance with the pressure rating in the specifications.
2. Compressed air should be clean and uncontaminated. When in doubt, install an air filter with filtering capacity of 40 microns. Periodically remove and clean or replace filter element.
3. For optimum performance, use largest possible tubing size and minimum tubing length.

## LUBRICATION

No externally applied lubrication is required. However, when dry air is used (air that does not contain water or oil), use of a turbine oil (ISO VG32) or equivalent is recommended. Thin or low viscosity oils (spindle oil, machine oil, etc.) do not provide a good residual film of lubrication, thus should not be used.

## AIR QUALITY

These valves cannot be used when media or ambient conditions contain organic solvents, phosphoric acid, ester type machine oil, sulfuric acid gas, or other acids.

## 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 the warning could result in **SERIOUS, EVEN FATAL, PERSONAL INJURY.**

# BASIC MODELS AND CONFIGURATIONS – H010, H040

## VALVES

### DIRECT ACTING, IN-LINE

H010 Series – 2- and 3-way

Normally Closed (N/C)



H010E1

### SUB-BASE TYPE

### INDIRECT ACTING

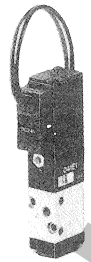
H040 Series – 2- and 3-way

(N/C)



H041E1

(N/O)



H041E1-11

H040 Series – 4-way

2 position

Single solenoid



H040-4E1

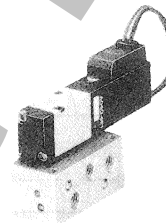
Double solenoid



H040-4E2

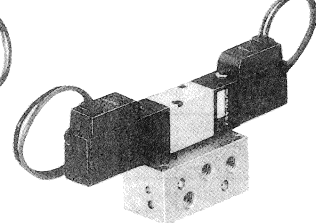
2 position

Single solenoid



HA040-4E1

Double solenoid



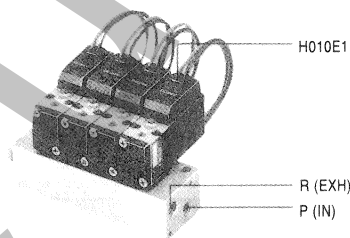
HA040-4E2

## MANIFOLDS

### 2- AND 3-WAY MINIATURE MANIFOLD

H010 Series

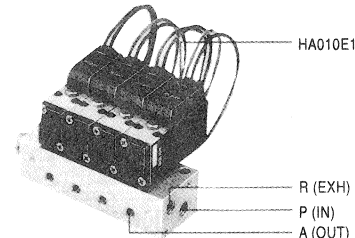
H010M□F – F type manifolds have common inlet and common exhaust ports.



H010E1

R (EXH)  
P (IN)

H010M□A – A type manifolds have all ports contained in the manifold.



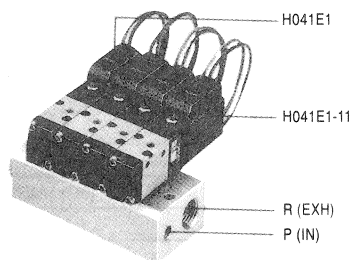
HA010E1

R (EXH)  
P (IN)  
A (OUT)

### 2- AND 3-WAY SMALL MANIFOLD

H041 Series

H041M□F – F type manifolds have common inlet and common exhaust ports.

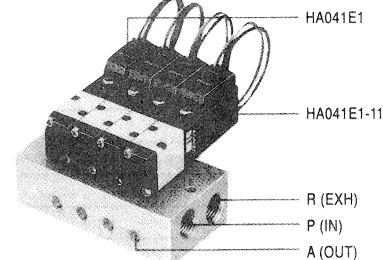


H041E1

H041E1-11

R (EXH)  
P (IN)

H041M□A – A type manifolds have inlet, exhaust, and cylinder ports in manifold.



HA041E1

HA041E1-11

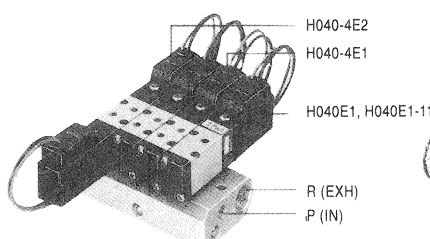
R (EXH)  
P (IN)  
A (OUT)

H041M manifolds accommodate 2- and 3-way valves.

### 2-, 3-, AND 4-WAY SMALL MANIFOLD

H040 Series

H040M□F – F type manifolds have common inlet and common exhaust ports.



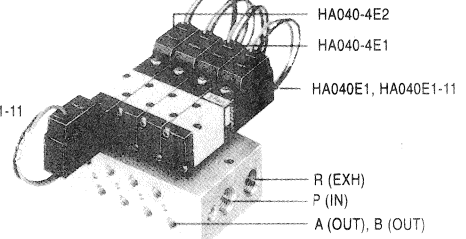
H040-4E2

H040-4E1

H040E1, H040E1-11

R (EXH)  
P (IN)

H040M□A – A type manifolds have inlet, exhaust, and cylinder ports in manifold.



HA040-4E2

HA040-4E1

HA040E1, HA040E1-11

R (EXH)  
P (IN)  
A (OUT), B (OUT)

2- and 3-way valves for manifold mounting only.

H040M series manifolds accommodate 2-, 3- and 4-way valves in any combination.

# LIST OF SPECIFICATIONS – SOLENOID VALVES H010

## BASIC MODEL AND VALVE FUNCTIONS

| Item                | Model                       |                         |                                               |
|---------------------|-----------------------------|-------------------------|-----------------------------------------------|
|                     | In-line and F type manifold | H010E1                  | HV010E1                                       |
|                     | A type manifold             | HA010E1 <sup>NOTE</sup> | HAV010E1                                      |
| Number of positions |                             | 2 position              | 2 position                                    |
| Style               |                             | 2- or 3-way             | 2- or 3-way                                   |
| Valve functions     |                             | Normally closed only    | Normally open<br>or<br>Vacuum normally closed |

NOTE: HA010E1 is for A type manifold only.

## SPECIFICATIONS

| Item                                                                        | Model                                                                                                                                                                         |           |
|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|                                                                             | In-line and F type manifold                                                                                                                                                   | H010E1    |
|                                                                             | A type manifold                                                                                                                                                               | HA010E1   |
| Media                                                                       | Air (HV010E1 - Vacuum)                                                                                                                                                        |           |
| Type of operation                                                           | Direct acting                                                                                                                                                                 |           |
| Effective area - in. <sup>2</sup> (mm <sup>2</sup> ) [Cv] <sup>NOTE 1</sup> | P → A 3.1 x 10 <sup>-4</sup> in. <sup>2</sup> (0.2mm <sup>2</sup> ) [0.01] In to cyl<br>A → R 4.7 x 10 <sup>-4</sup> in. <sup>2</sup> (0.3mm <sup>2</sup> ) [0.02] Cyl to exh |           |
| Port threads <sup>NOTE 2</sup>                                              | M3x0.5                                                                                                                                                                        |           |
| Lubrication                                                                 | Not required                                                                                                                                                                  |           |
| Pressure range psi (kgf/cm <sup>2</sup> )                                   | 0 ~ 100 psi (0 ~ 7) <sup>NOTE 4</sup>                                                                                                                                         |           |
| Proof pressure psi (kgf/cm <sup>2</sup> )                                   | 150 (10.5)                                                                                                                                                                    |           |
| Response time <sup>NOTE 3</sup><br>ON/OFF ms                                | DC5V, DC12V                                                                                                                                                                   | Below 4/8 |
|                                                                             | DC6V, DC24V                                                                                                                                                                   | Below 4/8 |
| Maximum cycles/second                                                       | 5                                                                                                                                                                             |           |
| Ambient range of operating temperature °F (°C)                              | 40 ~ 120 (5 ~ 50)                                                                                                                                                             |           |
| Shock resistance G                                                          | 140 (60 in direction of stem)                                                                                                                                                 |           |
| Mounting direction                                                          | Unrestricted                                                                                                                                                                  |           |

NOTE 1: Please refer to Effective Area chart on page 9 for details.

NOTE 2: Please refer to Port Dimensions chart on page 9.

NOTE 3: Value with air pressure at 70 psi (5 kgf/cm<sup>2</sup>).

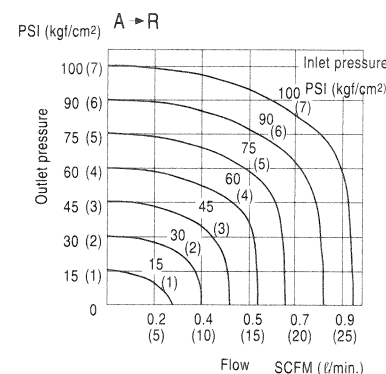
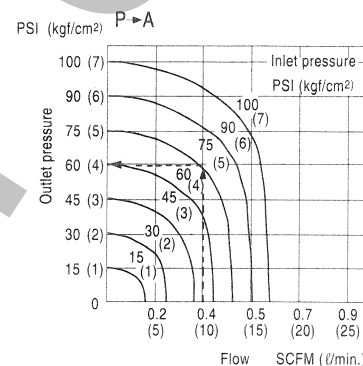
NOTE 4: H(A)V010E1 Max. vacuum is 28" HG.

## ELECTRICAL SPECIFICATIONS CHART

| Item                                 | Voltage                                                                    |                                    |                     |                     |
|--------------------------------------|----------------------------------------------------------------------------|------------------------------------|---------------------|---------------------|
|                                      | 5 VDC                                                                      | 6 VDC                              | 12 VDC              | 24 VDC              |
| Method                               | Flywheel diode incorporated for transient suppression                      |                                    |                     |                     |
| Voltage range (% of rated voltage)   | 4.5 ~ 5.5 (± 10%)                                                          | 5.4 ~ 6.6 (± 10%)                  | 10.8 ~ 13.2 (± 10%) | 21.6 ~ 26.4 (± 10%) |
| Current mA                           | Standard                                                                   | 325 (1.6W)                         | 270 (1.6W)          | 130 (1.6W)          |
|                                      | With LED                                                                   | 335 (1.7W)                         | 280 (1.7W)          | 140 (1.7W)          |
| Maximum allowable current leakage mA | 30                                                                         | 25                                 | 15                  | 5                   |
| Heat rise °F (°C)                    | 95° (35°) {Add 10% to rated voltage at ambient temperatures of 122° (50°)} |                                    |                     |                     |
| Insulation resistance MΩ             | Over 100                                                                   |                                    |                     |                     |
| Connector and lead wire length       | Standard                                                                   | Grommet type 12 in. (300mm)        |                     |                     |
|                                      | Option                                                                     | Plug connector type 12 in. (300mm) |                     |                     |
| Lead wire colors                     | Green (+) Black (-)                                                        | Blue (+) Black (-)                 | Brown (+) Black (-) | Red (+) Black (-)   |
| LED indicator                        | Red                                                                        |                                    |                     |                     |
| Surge suppression                    | Flywheel diode                                                             |                                    |                     |                     |

## HOW TO READ THE GRAPH

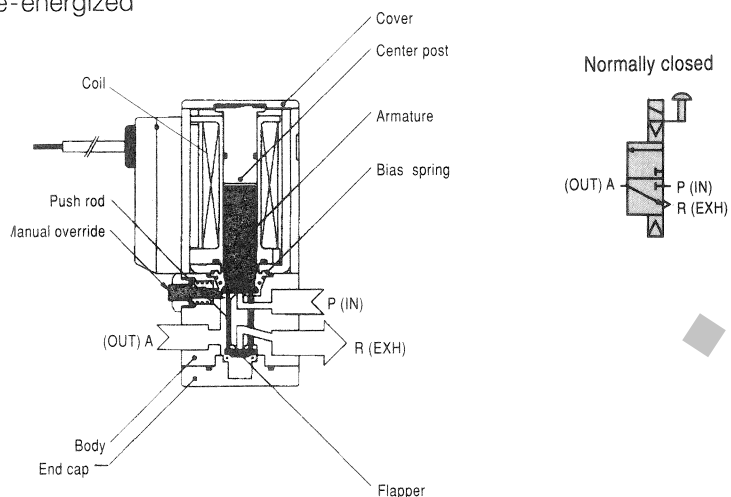
If input pressure is 70 psi and flow is 0.4 cfm, value output pressure is 57 psi.



## OPERATION PRINCIPLE AND NAME OF PARTS

### H010E1

De-energized



### EFFECTIVE AREA [Cv] $\text{in.}^2$ ( $\text{mm}^2$ )

| Model      | Standard valve                                                                                                                                                       | Notes               |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| H(V)010E1  | P $\rightarrow$ A $3.1 \times 10^{-4} \text{ in.}^2$ (0.2 $\text{cm}^2$ ) [0.01]<br>A $\rightarrow$ R $4.7 \times 10^{-4} \text{ in.}^2$ (0.3 $\text{cm}^2$ ) [0.01] | Use F type manifold |
| H(V)A010E1 | P $\rightarrow$ A $3.1 \times 10^{-4} \text{ in.}^2$ (0.2 $\text{cm}^2$ ) [0.01]<br>A $\rightarrow$ R $4.7 \times 10^{-4} \text{ in.}^2$ (0.3 $\text{cm}^2$ ) [0.01] | Use A type manifold |

### PORT DIMENSIONS

| Model     | Ports   | Type   | Port dimension |
|-----------|---------|--------|----------------|
| H(V)010E1 | P, A, R | Female | M3x0.5         |

No sub-base plumbing.

### VALVE WEIGHTS $\text{oz. (gf)}$

| Model      | Weight per unit |
|------------|-----------------|
| H(V)010E1  | 0.63 (18)       |
| H(V)A010E1 | 0.63 (18)       |

### MANIFOLD CONNECTION PORT DIMENSIONS

| Manifold model | Port | Component | Dimensions |
|----------------|------|-----------|------------|
| H010M□ F       | P    | Manifold  | 10-32 UNF  |
|                | A    | Valve     | M3x0.5     |
|                | R    | Manifold  | 10-32 UNF  |
| H010M□ A       | P    | Manifold  | 10-32 UNF  |
|                | A    |           | M3x0.5     |
|                | R    |           | 10-32 UNF  |

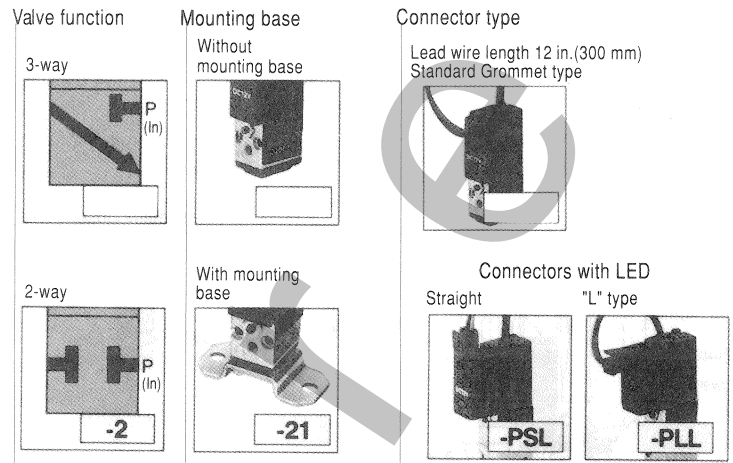
### MANIFOLD WEIGHTS $\text{oz. (gf)}$

| Type     | Weight calculation of each station<br>(n = station) | Block off<br>plate |
|----------|-----------------------------------------------------|--------------------|
| H010M□ F | $(2.33 (6.6) \times n) + 3.17 (9)$                  | 0.07 (2)           |
| H010M□ A | $(2.33 (6.6) \times n) + 3.17 (9)$                  | 0.07 (2)           |

### MATERIALS OF MAIN PARTS

|          | Part            | Material                         |
|----------|-----------------|----------------------------------|
| Valve    | Body            | Aluminum                         |
|          | Flapper         | Buna                             |
|          | Armature        | Electro magnetic stainless steel |
|          | Center post     |                                  |
|          | Mounting base   | Steel (zinc plated)              |
| Manifold | Manifold        | Aluminum                         |
|          | Block off plate | Steel (nickel plated)            |
|          | Gasket          | Buna                             |

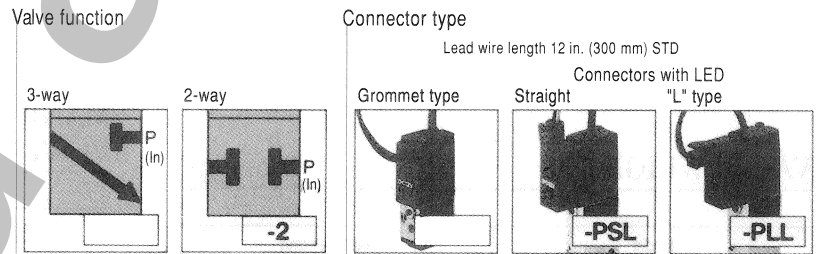
## H010 NOMENCLATURE



## SOLENOID

|                                          | Model             |    |     |              | Voltage                      |
|------------------------------------------|-------------------|----|-----|--------------|------------------------------|
| Use with "F" type manifold, 2- and 3-way | H(V)010E1         | -2 | -21 | -PSL<br>-PLL | 5 VDC 12 VDC<br>6 VDC 24 VDC |
| Use with "A" type manifold, 2- and 3-way | HA(V)010E1 NOTE 1 | -2 |     |              |                              |

NOTE 1: Not to be used as stand-alone valve.



## MANIFOLD

| Manifold model | Number of stations | Station | Type                          | Voltage     |    |      |               |
|----------------|--------------------|---------|-------------------------------|-------------|----|------|---------------|
| H010M          | 2                  | F       | stn. <input type="checkbox"/> | -H(V)010E1  | -2 | -PSL | 5 VDC, 12 VDC |
|                | 20                 | A       | stn. <input type="checkbox"/> | -HA(V)010E1 | -2 | -PLL | 6 VDC, 24 VDC |

Valves mount from left  
with operator away.

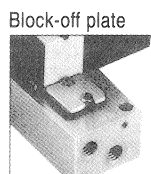
Specify valve type for each station.  
Station with block off plate use BP.

## ADDITIONAL COMPONENTS (sold separately)

## MADE TO ORDER



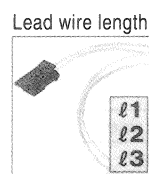
For in-line valve.



H010 M **F** -BP

F — For "F" type.  
A — For "A" type manifolds.

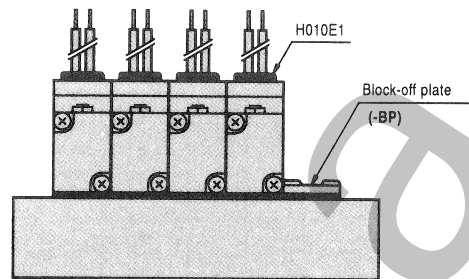
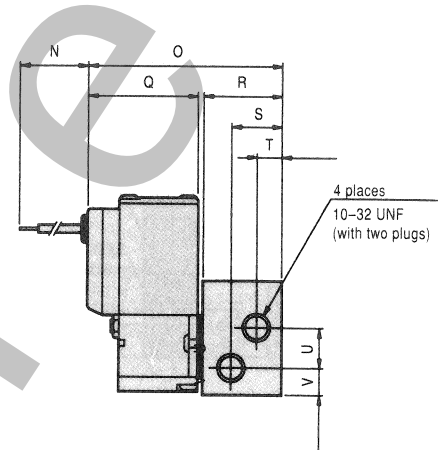
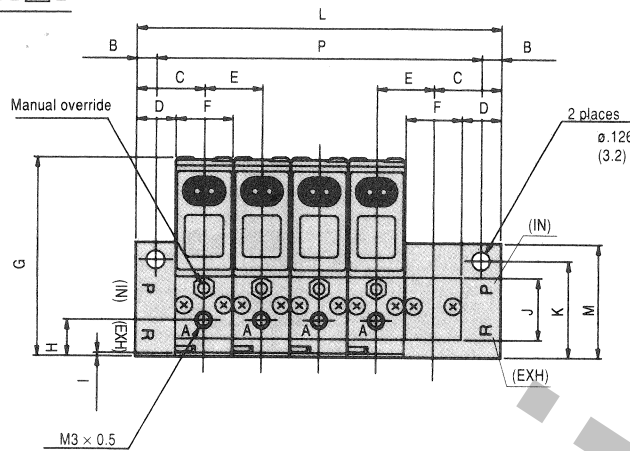
H010 - For H010 Manifolds.



For plug connector.  
Length in. (mm) l1=36 (1000)  
l2=72 (2000)  
l3=108 (3000)

# MANIFOLD DIMENSIONS

H010M□F



## “F” TYPE MANIFOLD DIMENSIONS BY UNIT

in. (mm)

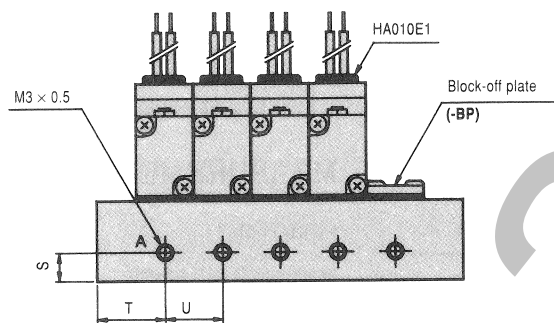
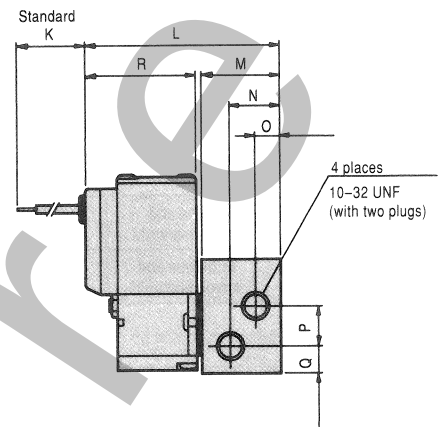
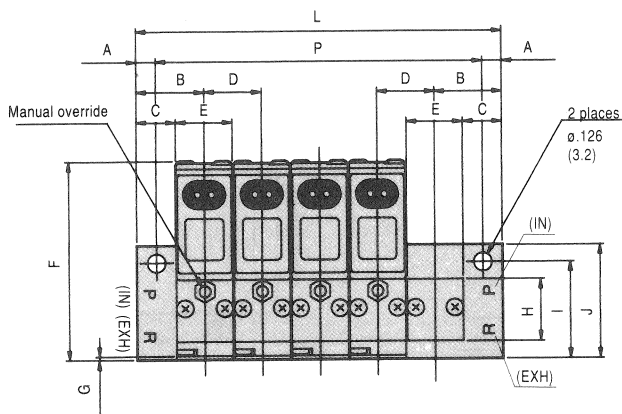
| Model    | L             | P             | Model    | L             | P             |
|----------|---------------|---------------|----------|---------------|---------------|
| H010M2F  | 1.346 (34.2)  | 1.071 (27.2)  | H010M12F | 5.362 (136.2) | 5.087 (129.2) |
| H010M3F  | 1.748 (44.4)  | 1.472 (37.4)  | H010M13F | 5.764 (146.4) | 5.488 (139.4) |
| H010M4F  | 2.150 (54.6)  | 1.874 (47.6)  | H010M14F | 6.165 (156.6) | 5.890 (149.6) |
| H010M5F  | 2.709 (68.8)  | 2.276 (57.8)  | H010M15F | 6.567 (166.8) | 6.291 (159.8) |
| H010M6F  | 2.953 (75)    | 2.677 (68)    | H010M16F | 6.968 (177)   | 6.693 (170)   |
| H010M7F  | 3.354 (85.2)  | 3.079 (78.2)  | H010M17F | 7.370 (187.2) | 7.094 (180.2) |
| H010M8F  | 3.756 (95.4)  | 3.480 (88.4)  | H010M18F | 7.764 (197.2) | 7.496 (190.4) |
| H010M9F  | 4.157 (105.6) | 3.882 (98.6)  | H010M19F | 8.173 (207.6) | 7.898 (200.6) |
| H010M10F | 4.559 (115.8) | 4.283 (108.8) | H010M20F | 8.575 (217.8) | 8.299 (210.8) |
| H010M11F | 4.961 (126)   | 4.685 (119)   | -        | -             | -             |

## DRAWING DIMENSIONS

in. (mm)

| B              | C             | D              | E               | F              | G               | H              | I              | J             | K             | M             | N           | O               | Q               |
|----------------|---------------|----------------|-----------------|----------------|-----------------|----------------|----------------|---------------|---------------|---------------|-------------|-----------------|-----------------|
| 0.138<br>(3.5) | 0.472<br>(12) | 0.276<br>(7)   | 0.402<br>(10.2) | 0.394<br>(10)  | 1.374<br>(34.9) | 0.252<br>(6.4) | 0.024<br>(0.6) | 0.433<br>(11) | 0.669<br>(17) | 0.787<br>(20) | 12<br>(300) | 1.362<br>(34.6) | 0.772<br>(19.6) |
| R              | S             | T              | U               | V              |                 |                |                |               |               |               |             |                 |                 |
| 0.551<br>(14)  | 0.354<br>(9)  | 0.177<br>(4.5) | 0.280<br>(7.1)  | 0.185<br>(4.7) |                 |                |                |               |               |               |             |                 |                 |

H010M□A



# “A” TYPE MANIFOLD DIMENSIONS BY UNIT

in. (mm)

| Model    | L             | P             | Model    | L             | P             |
|----------|---------------|---------------|----------|---------------|---------------|
| H010M2A  | 1.346 (34.2)  | 1.071 (27.2)  | H010M12A | 5.362 (136.2) | 5.087 (129.2) |
| H010M3A  | 1.748 (44.4)  | 1.472 (37.4)  | H010M13A | 5.764 (146.4) | 5.488 (139.4) |
| H010M4A  | 2.150 (54.6)  | 1.874 (47.6)  | H010M14A | 6.165 (156.6) | 5.890 (149.6) |
| H010M5A  | 2.709 (68.8)  | 2.276 (57.8)  | H010M15A | 6.567 (166.8) | 6.291 (159.8) |
| H010M6A  | 2.953 (75)    | 2.677 (68)    | H010M16A | 6.968 (177)   | 6.693 (170)   |
| H010M7A  | 3.354 (85.2)  | 3.079 (78.2)  | H010M17A | 7.370 (187.2) | 7.094 (180.2) |
| H010M8A  | 3.756 (95.4)  | 3.480 (88.4)  | H010M18A | 7.764 (197.2) | 7.496 (190.4) |
| H010M9A  | 4.157 (105.6) | 3.882 (98.6)  | H010M19A | 8.173 (207.6) | 7.898 (200.6) |
| H010M10A | 4.559 (115.8) | 4.283 (108.8) | H010M20A | 8.575 (217.8) | 8.299 (210.8) |
| H010M11A | 4.961 (126)   | 4.685 (119)   | -        | -             | -             |

## DRAWING DIMENSIONS

in. (mm)

| A              | B             | C            | D               | E             | F               | G              | H             | I             | J             | K           | L               | M             | N            |
|----------------|---------------|--------------|-----------------|---------------|-----------------|----------------|---------------|---------------|---------------|-------------|-----------------|---------------|--------------|
| 0.138<br>(3.5) | 0.472<br>(12) | 0.276<br>(7) | 0.402<br>(10.2) | 0.394<br>(10) | 1.374<br>(34.9) | 0.024<br>(0.6) | 0.433<br>(11) | 0.669<br>(17) | 0.787<br>(20) | 12<br>(300) | 1.362<br>(34.6) | 0.551<br>(14) | 0.354<br>(9) |

| O              | P              | Q              | R               | S            | T             | U               |
|----------------|----------------|----------------|-----------------|--------------|---------------|-----------------|
| 0.177<br>(4.5) | 0.280<br>(7.1) | 0.185<br>(4.7) | 0.772<br>(19.6) | 0.197<br>(5) | 0.472<br>(12) | 0.402<br>(10.2) |

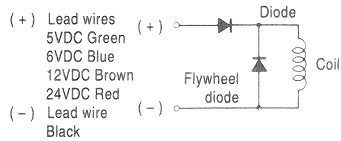
# PROPER HANDLING AND PRECAUTIONS

## SOLENOID

### INTERNAL CIRCUIT

#### STANDARD SOLENOID

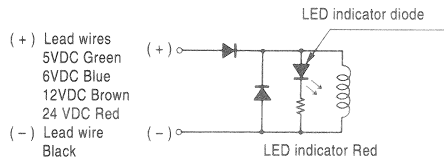
(Transient suppression incorporated)



#### SOLENOID WITH LED INDICATOR

(Transient suppression)

Order No. -PSL, -PLL

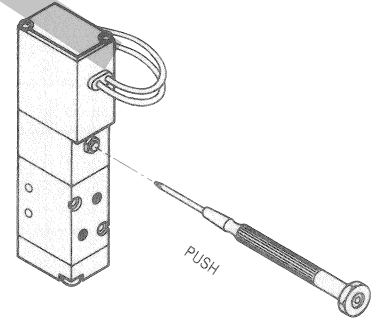


### CAUTIONS

1. Do not apply megger across lead wires.
2. Valve is polarity protected.
3. If current leakage within the circuit exceeds the recommended allowable quantity, the solenoid may not drop out. This malfunction is demonstrated by the valve not returning to the "home" position when de-energized (single solenoid).
4. Do not energize double solenoids simultaneously. The valve may midshift.

## MANUAL OVERRIDE OPERATION

Push the button all the way down, using a fine-tipped instrument. While pushing the button, the single solenoid valve will enter into the energized position. It will return to the "home" position when released. For the double solenoid, when the push button at the S<sub>1</sub> (S<sub>2</sub>) side is pushed, it will switch to the same condition as with the S<sub>1</sub> (S<sub>2</sub>) energized position. The valve will remain in that position even after the button is released. To return, operate the push button at the opposite end of the valve S<sub>2</sub> (S<sub>1</sub>).



### CAUTIONS

1. The H040 series is indirect acting type. Therefore, the body of the valve will not operate when pushing the manual override button unless minimum air pressure is supplied to the P-port.
2. Do not use a sharp tipped instrument to operate the manual override button. It may damage the button.

## MANIFOLD

### PIPING

Ports P and R are located at both ends of the manifold. Piping direction can be determined according to the mounting location. Ports at one end of the manifold are temporarily plugged during shipping. Remove plugs and reseal with sealing agent.

### BLOCK OFF PLATE

Use Block Off Plate to close stations when they are not in use. See charts on page 16 for proper model.

### CAUTIONS

1. For P port piping, make sure to select fitting sizes to fit the manifold connecting pipe dimensions. Actuators may not operate properly if there is insufficient flow and/or pressure due to improper piping.
2. When installing fittings or mufflers to R port, make sure that exhaust remains unrestricted. Restriction of exhaust may cause actuators to operate erratically. Consider using R ports at both ends of manifold to enhance exhaust.
3. When several manifold valves are to be operated simultaneously, connect supply air to both ends of manifold. Also exhaust through both ends of manifold. This ensures adequate supply and exhaust capacity.

## POINTS TO BE CONSIDERED

### INSTALLATION

1. Mount valves in any direction. However, mount valves perpendicular to significant shock or vibration.
2. Location near water, oil, or in excessively dusty conditions requires adequate solenoid housing protection to prevent solenoid actuator contamination. Also consider the installation of breather/muffler in exhaust ports to prevent foreign objects from entering valves.
3. Before installing fittings and tubing, blow all foreign material from them. If using a sealant, take extra care that sealant does not enter valve causing potential malfunction and/or leaks.
4. When valves are installed in tight enclosures, consider the possibility of heat build up. Ensure adequate ventilation.
5. Valves with A or B ports open to atmosphere will not operate properly.

### AIR SOURCE

1. Use compressed air or inert gas in accordance with the pressure rating in the specifications.
2. Compressed air should be clean and uncontaminated. When in doubt, install an air filter with filtering capacity of 40 microns. Periodically remove and clean or replace filter element.
3. For optimum performance, use largest possible tubing size and minimum tubing length.

### LUBRICATION

No externally applied lubrication is required. However, when dry air is used (air that does not contain water or oil), use of a turbine SAE 20 oil (ISO VG32) or equivalent is recommended. Thin or low viscosity oils (spindle oil, machine oil, etc.) do not provide a good residual film of lubrication, thus should not be used.

### AIR QUALITY

These valves cannot be used when media or ambient conditions contain organic solvents, phosphoric acid, ester type machine oil, sulfuric acid gas, or other acids.

Specifications subject to change without notice.

# BASIC MODELS AND CONFIGURATIONS – H010, H040

## VALVES

### DIRECT ACTING, IN-LINE

H010 Series – 2- and 3-way

Normally Closed (N/C)



H010E1

### SUB-BASE TYPE

### INDIRECT ACTING

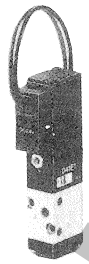
H040 Series – 2- and 3-way

(N/C)



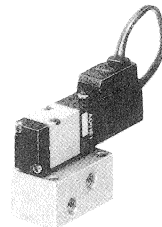
H041E1

(N/O)



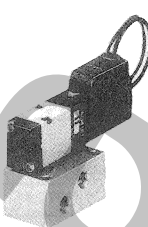
H041E1-11

(N/C)



HA041E1

(N/O)



HA041E1-11

H040 Series – 4-way

2 position

Single solenoid



H040-4E1

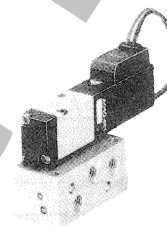
Double solenoid



H040-4E2

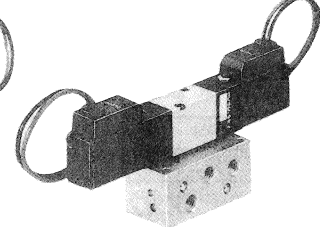
2 position

Single solenoid



HA040-4E1

Double solenoid



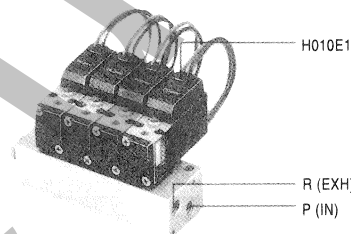
HA040-4E2

## MANIFOLDS

### 2- AND 3-WAY MINIATURE MANIFOLD

H010 Series

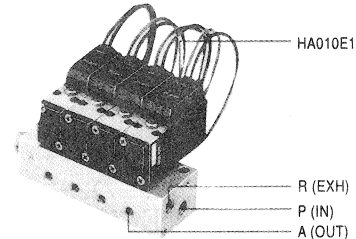
H010M□F – F type manifolds have common inlet and common exhaust ports.



H010E1

R (EXH)  
P (IN)

H010M□A – A type manifolds have all ports contained in the manifold.



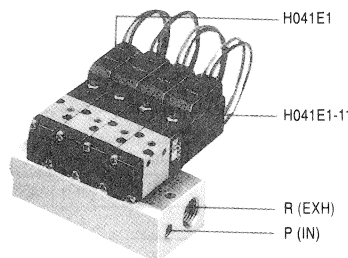
HA010E1

R (EXH)  
P (IN)  
A (OUT)

### 2- AND 3-WAY SMALL MANIFOLD

H041 Series

H041M□F – F type manifolds have common inlet and common exhaust ports.

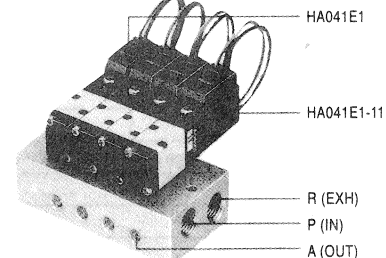


H041E1

H041E1-11

R (EXH)  
P (IN)

H041M□A – A type manifolds have inlet, exhaust, and cylinder ports in manifold.



HA041E1

HA041E1-11

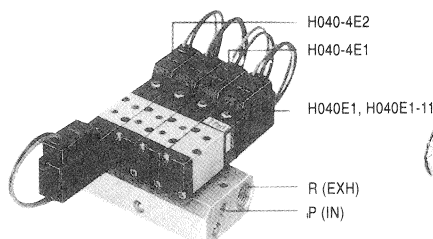
R (EXH)  
P (IN)  
A (OUT)

H041M manifolds accommodate 2- and 3-way valves.

### 2-, 3-, AND 4-WAY SMALL MANIFOLD

H040 Series

H040M□F – F type manifolds have common inlet and common exhaust ports.



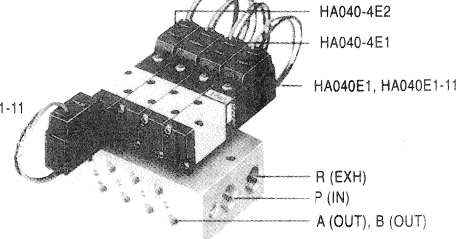
H040-4E2

H040-4E1

H040E1, H040E1-11

R (EXH)  
P (IN)

H040M□A – A type manifolds have inlet, exhaust, and cylinder ports in manifold.



HA040-4E2

HA040-4E1

HA040E1, HA040E1-11

R (EXH)  
P (IN)  
A (OUT), B (OUT)

2- and 3-way valves for manifold mounting only.

H040M series manifolds accommodate 2-, 3- and 4-way valves in any combination.

# LIST OF SPECIFICATIONS MICRO SOLENOID VALVES SERIES H040

## BASIC MODELS AND VALVE FUNCTIONS

| Item                | Model                           |                                    |                    |                    |
|---------------------|---------------------------------|------------------------------------|--------------------|--------------------|
|                     | In-line and<br>F type manifold  | H041E1<br>H040E1                   | H040-4E1           | H040-4E2           |
|                     | Sub-base and<br>A type manifold | HA041E1<br>HA040E1 <sup>NOTE</sup> | HA040-4E1          | HA040-4E2          |
| Number of positions | 2 positions                     |                                    |                    |                    |
| Number of ports     | 2- and 3-way                    |                                    | 4-way              |                    |
| Valve functions     | N/C standard<br>N/O optional    |                                    | Single<br>solenoid | Double<br>solenoid |

NOTE: See pages 11 and 12 for option specifications and order code. H040E1 and HA040E1 are the 2- and 3-way valves to be mounted on the 2, 3 and 5 port combination manifolds only. They cannot be used in-line. If the 2- and 3-way valve is used, use H041E1 and HA041E1 with sub-base.

## SPECIFICATIONS

| Item                                                                      | Model                           |                               |           |           |
|---------------------------------------------------------------------------|---------------------------------|-------------------------------|-----------|-----------|
|                                                                           | In-line and<br>F type manifold  | H041E1<br>(H040E1)            | H040-4E1  | H040-4E2  |
|                                                                           | Sub-base and<br>A type manifold | HA041E1<br>(HA040E1)          | HA040-4E1 | HA040-4E2 |
| Media                                                                     |                                 | Air                           |           |           |
| Type of operation                                                         |                                 | Indirect acting               |           |           |
| Effective area in. <sup>2</sup> (mm <sup>2</sup> ) [Cv] <sup>NOTE 1</sup> |                                 | .002 (1.5) [0.08]             |           |           |
| Port threads <sup>NOTE 2</sup>                                            |                                 | M3x0.5                        |           |           |
| Lubrication                                                               |                                 | Not required                  |           |           |
| Pressure range psi (kgf/cm <sup>2</sup> )                                 |                                 | 28.5 ~ 100 psi (2 ~ 7)        |           |           |
| Proof pressure psi (kgf/cm <sup>2</sup> )                                 |                                 | 150 (10.5)                    |           |           |
| Response time <sup>NOTE 3</sup><br>ON/OFF ms                              | DC5V, DC12V                     | Below 12/15                   |           | 12        |
|                                                                           | DC6V, DC24V                     |                               |           |           |
| Maximum cycles/second                                                     |                                 | 5                             |           |           |
| Ambient range of operating<br>temperature °F (°C)                         |                                 | 41 ~ 122 (5 ~ 50)             |           |           |
| Shock resistance G                                                        |                                 | 140 (60 in direction of stem) |           |           |
| Mounting direction                                                        |                                 | Unrestricted                  |           |           |

NOTE 1: Please refer to Effective Area chart on page 15 for details.

NOTE 2: Please refer to Port Dimensions chart on page 15.

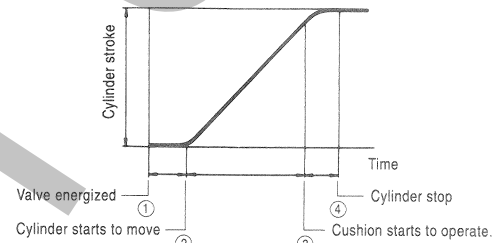
NOTE 3: Value with air pressure at 70 psi (5 kgf/cm<sup>2</sup>). Value of H040-4E2 is with pressure opposite the coil energized.

## ELECTRICAL SPECIFICATIONS CHART

| Item                                    | Voltage                                           |                                                      |                           |                           |
|-----------------------------------------|---------------------------------------------------|------------------------------------------------------|---------------------------|---------------------------|
|                                         | 5 VDC                                             | 6 VDC                                                | 12 VDC                    | 24 VDC                    |
| Type                                    | Flywheel diode incorporated for surge suppression |                                                      |                           |                           |
| Voltage range VDC                       | 4.5 ~ 5.5<br>(5 ± 10%)                            | 5.4 ~ 6.6<br>(6 ± 10%)                               | 10.8 ~ 13.2<br>(12 ± 10%) | 21.6 ~ 26.4<br>(24 ± 10%) |
| Current mA                              | Standard                                          | 120 (0.6W)                                           | 105 (0.6W)                | 55 (0.7W)                 |
|                                         | With LED                                          | 130 (0.65W)                                          | 115 (0.7W)                | 65 (0.8W)                 |
| Maximum allowable current<br>leakage mA | 10                                                | 7                                                    | 5                         | 2                         |
| Heat rise °F (°C)                       | 68° (20°)                                         |                                                      |                           |                           |
| Insulation resistance MΩ                | Over 100                                          |                                                      |                           |                           |
| Connector and<br>lead wire length       | Standard                                          | Grommet type 12 in. (300mm)                          |                           |                           |
|                                         | Option                                            | Plug connector type 12 in. (300mm) <sup>NOTE 4</sup> |                           |                           |
| Lead wire colors                        | Green (+) Black (-)                               | Blue (+) Black (-)                                   | Brown (+) Black (-)       | Red (+) Black (-)         |
| LED indicator                           | Red                                               |                                                      |                           |                           |
| Surge suppression                       | Flywheel diode                                    |                                                      |                           |                           |

NOTE 4: Please refer to page 12 for made-to-order information.

## HOW TO FIGURE STROKE TIME (CYLINDER SPEED)



- To obtain stroke speed, add t1 to t2. t1 is the lag time of coil energizing point 1 to when the cylinder begins to move point 2. t2 is the maximum speed zone of cylinder moving to its fullest position at point 3.
- If a cushion is incorporated, add t3 to the sum of t1 and t2. Point 3 now becomes the point where the cushion begins to take effect. Point 4 is the end of stroke when cushion is incorporated.

## MEASUREMENT CONDITIONS

### H040-4E1

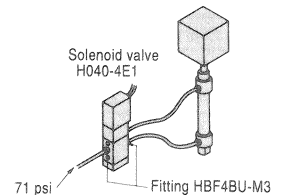
Air pressure: 71 psi (5 kgf/cm<sup>2</sup>)

Tubing I.D. and length: ø .098 in. (2.5mm) x 39.370 in. (1000mm)

Fitting: HBF4BU-M3

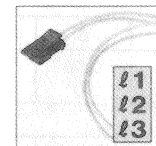
Load ratio =  $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$  (%)

Examples for ø 3/8 in. nominal (ø 10mm actual) bore, ø 5/8 in. nominal (ø 16mm actual) bore, the stroke is 2.362 in. (60mm).  
For ø 3/4 in. nominal (ø 20mm actual), ø 1 1/4 in. nominal (ø 32mm actual) bore, the stroke is 3.397 in. (100mm).



## MADE TO ORDER

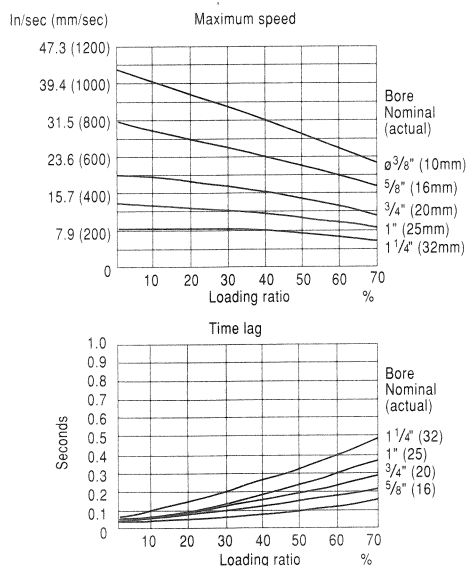
Plug model number



For plug connector only.  
Length in. (mm) (1=36 (1000)  
2=72 (2000)  
3=108 (3000)

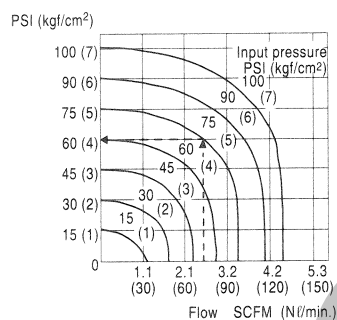
## CYLINDER SPEED

## H040 Series



## AIR FLOW

## H041 - H040 Series

EFFECTIVE AREA [Cv] in.<sup>2</sup> (mm<sup>2</sup>)

| Model                                          | Standard            | Notes                                                                                                                                                                                                             |
|------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| H041E1<br>[H040E1]<br>H040-4E1<br>H040-4E2     | .002 (1.5)<br>[.08] | When HT53-M3M fittings are used in P, A and B ports, valves become .001 (.75) [.001 (.04)].<br>When HT53-M3M fittings are used in the A and B ports of "F" type manifold, valves become .001 (.80), [.001 (.05)]. |
| HA041E1<br>[HA040E1]<br>HA040-4E1<br>HA040-4E2 | .002 (1.5)<br>[.08] | When HT54-M5M fittings are in the P, A, and B ports of "A" type manifold, valves become .002 (1.30), [.001 (.07)].                                                                                                |

## VALVE PORT DIMENSIONS

| Model                                      | Port       | Type          | Dimensions |
|--------------------------------------------|------------|---------------|------------|
| H041E1<br>(H040E1) <sup>NOTE</sup>         | P, A, R    | Female thread | M3x0.5     |
| H040-4E1<br>H040-4E2                       | P, A, B, R | Female thread | M3x0.5     |
| HA041E1-25<br>HA040-4E1-25<br>HA040-4E2-25 | P          | Female thread | 10-32 UNF  |
|                                            | A, B       |               |            |
|                                            | R          |               |            |
|                                            | PR         |               |            |

NOTE: H040-4E1 is to be used on manifolds only. Use H041E1 for in-line service.

MANIFOLD CONNECTION  
PORT DIMENSIONS

| Manifold model     | Port | Component | Dimensions |
|--------------------|------|-----------|------------|
| H041M□F<br>H040M□F | P    | Manifold  | 10-32 UNF  |
|                    | A, B | Valve     | M3x0.5     |
|                    | R    | Manifold  | 1/8 NPT    |
| H041M□A<br>H040M□A | P    | Manifold  | 1/8 NPT    |
|                    | A, B | Manifold  | 10-32 UNF  |
|                    | R    | Manifold  | 1/8 NPT    |

## VALVE WEIGHTS oz. (gf)

| Model     | Weight per unit |
|-----------|-----------------|
| H041E1    | 0.81 (23)       |
| H040E1    | 0.88 (25)       |
| H040-4E1  | 0.88 (25)       |
| H040-4E2  | 1.48 (42)       |
| HA041E1   | 0.85 (24)*      |
| HA040E1   | 0.88 (25)       |
| HA040-4E1 | 0.88 (25)**     |
| HA040-4E2 | 1.48 (42)**     |

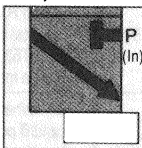
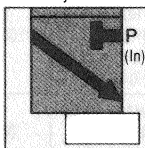
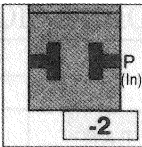
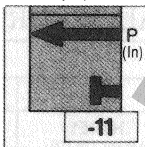
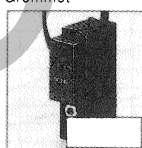
\* Add .60 oz. (13 gf) for sub-base weight, code 25.

\*\* Add .81 oz. (23 gf) for sub-base weight, code 25.

## MANIFOLD WEIGHT oz. (gf)

| Type    | Weight calculation of each station<br>(n = number of stations) | Block-off<br>plate |
|---------|----------------------------------------------------------------|--------------------|
| H041M□F | {0.36 (10.1) x n} + 0.53 (14.9)                                | 0.07 (2)           |
| H041M□A | {0.43 (12.3) x n} + 0.67 (19)                                  | 0.11 (3)           |
| H040M□F | {0.31 (8.8) x n} + 0.52 (14.8)                                 | 0.11 (3)           |
| H040M□A | {0.63 (17.8) x n} + 1.35 (38.2)                                | 0.14 (4)           |

# H040 SERIES ORDERING NOMENCLATURE

|                                                                   |                                                  | 2- and 3-way<br>Valve Function |                                                                                   | 2- and 3-way<br>Valve Function |                                                                                   | Connector type                                  |                                                                                     |
|-------------------------------------------------------------------|--------------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------|
|                                                                   |                                                  | 3-way                          |  | Normally closed                |  | Standard lead wire<br>length of 12 in. (300 mm) |                                                                                     |
|                                                                   |                                                  | 2-way                          |  | Normally open                  |  | Grommet                                         |  |
|                                                                   |                                                  |                                |                                                                                   |                                |                                                                                   | Straight connector<br>with LED                  |  |
|                                                                   |                                                  |                                |                                                                                   |                                |                                                                                   | "L" type connector<br>with LED                  |  |
|                                                                   |                                                  | Model                          |                                                                                   |                                |                                                                                   | Voltage                                         |                                                                                     |
| In-line<br>Valve                                                  | 2- and 3-way                                     | H040E1                         | -2                                                                                | -11                            | -PSL<br>-PLL                                                                      | 5 VDC<br>6 VDC<br>12 VDC<br>24 VDC              |                                                                                     |
|                                                                   | 4-way<br>Single solenoid                         | H040-4E1                       |                                                                                   |                                |                                                                                   |                                                 |                                                                                     |
|                                                                   | 4-way<br>Double solenoid                         | H040-4E2                       |                                                                                   |                                |                                                                                   |                                                 |                                                                                     |
|                                                                   |                                                  | HA040-4E2                      |                                                                                   |                                |                                                                                   |                                                 |                                                                                     |
| Sub-base<br>Mounted                                               | 2- and 3-way                                     | HA041E1                        | -2                                                                                | -11                            | -PSL<br>-PLL                                                                      | 5 VDC<br>6 VDC<br>12 VDC<br>24 VDC              |                                                                                     |
|                                                                   | 4-way<br>Single solenoid                         | HA040-4E1                      |                                                                                   |                                |                                                                                   |                                                 |                                                                                     |
|                                                                   | 4-way<br>Double solenoid                         | HA040-4E2                      |                                                                                   |                                |                                                                                   |                                                 |                                                                                     |
| * 2-, 3-, and 4-way<br>manifolds for using<br>3- and 4-way valves | H040M <input type="checkbox"/> F<br>2- and 3-way | H040E1                         | -2                                                                                | -11                            | -PSL<br>-PLL                                                                      | 5 VDC, 6 VDC<br>12 VDC, 24 VDC                  |                                                                                     |
|                                                                   | H040M <input type="checkbox"/> A<br>2- and 3-way | HA040E1                        | -2                                                                                | -11                            |                                                                                   |                                                 |                                                                                     |

\* NOTE: This series cannot be used without manifold.

## OPTIONAL PARTS (AVAILABLE SEPARATELY)

### Mufflers



For in-line valves.



For sub-base.

### Block-off plates



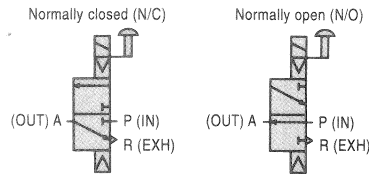
H040 M F -BP

F- For "F" type manifold.  
A- For "A" type manifold.

H041- H041M only.  
H040- H040M only.

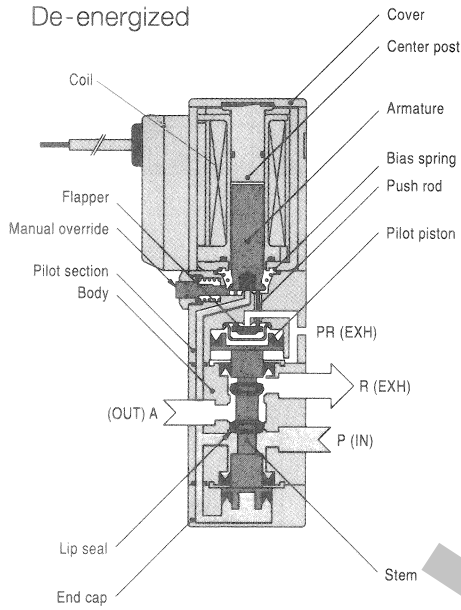
### 3 WAYS

#### H041E1



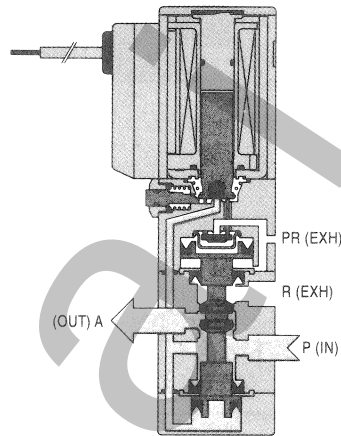
#### H041E1

De-energized



#### H041E1-11

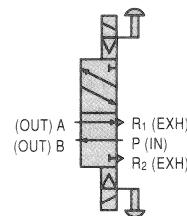
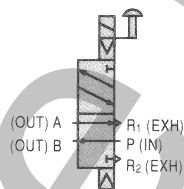
De-energized



### MATERIALS OF MAIN PARTS

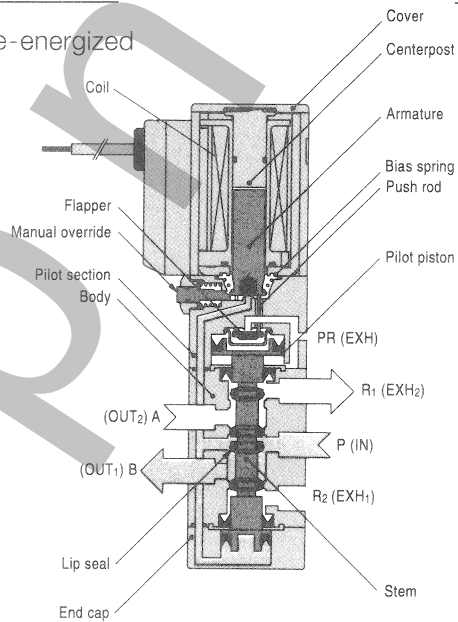
| Part     |                 | Material            |
|----------|-----------------|---------------------|
| Valve    | Body            | Aluminum            |
|          | Stem            |                     |
|          | Lip seal        | Buna N              |
|          | Flapper         |                     |
|          | Mounting base   | Zinc plated steel   |
|          | Sub-base        | Aluminum            |
|          | Armature        | Electro magnetic    |
| Manifold | Center post     | Stainless steel     |
|          | Body            | Aluminum            |
|          | Block-off plate | Nickel plated steel |
|          | Seal            | Buna N              |

### 4 WAYS

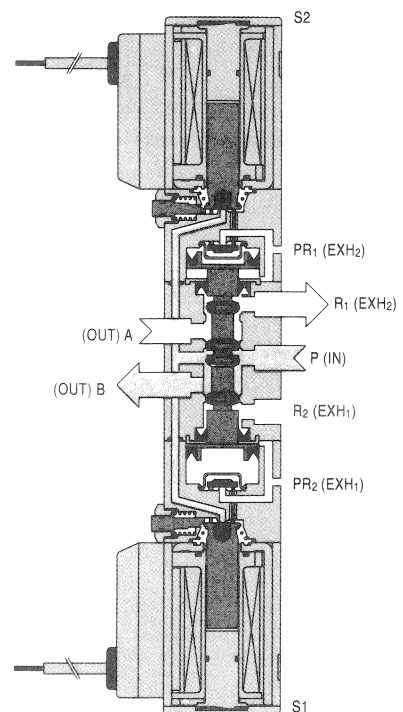


#### H040-4E1

De-energized

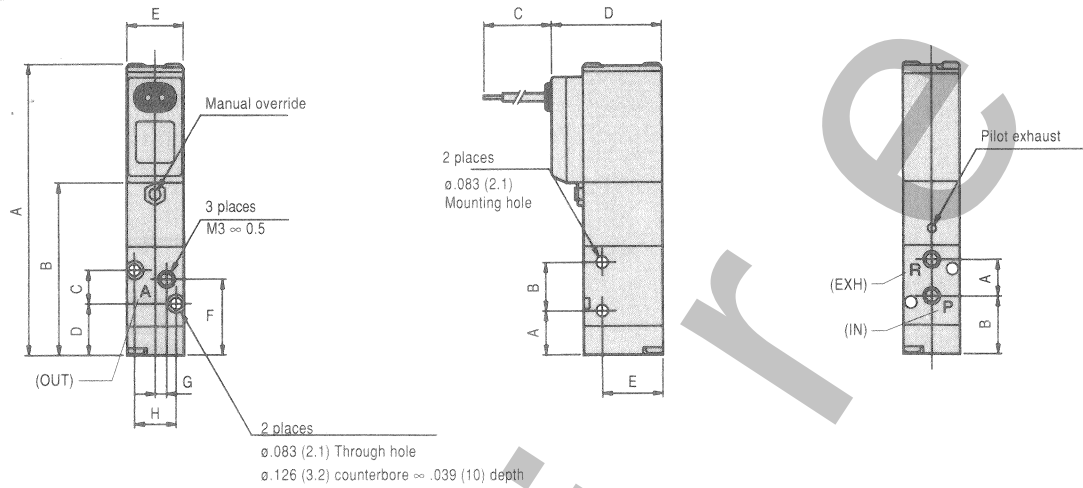


#### H040-4E2



## 2- AND 3-WAY VALVE SERIES – in. (mm)

### H041E1

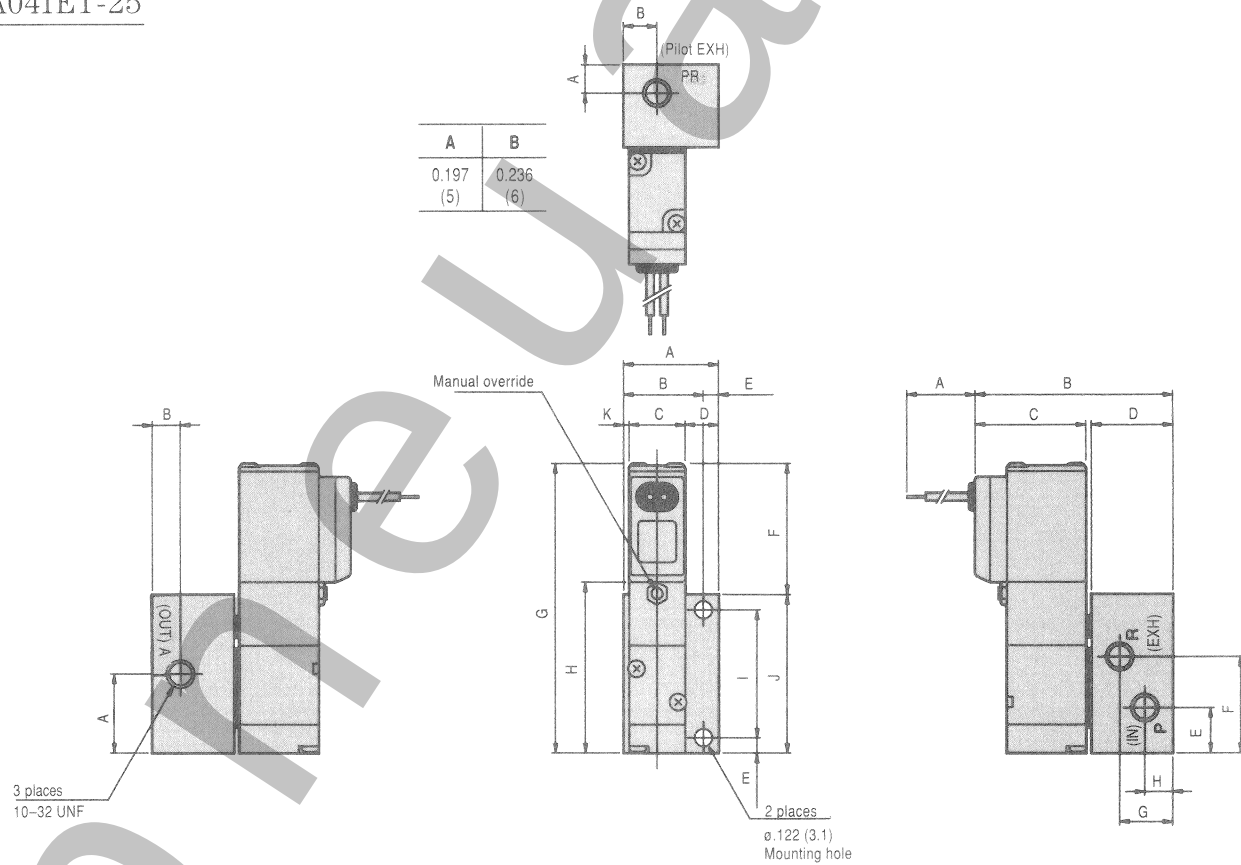


### DIMENSIONS – in. (mm)

| A               | B               | C              | D            | E             | F               |
|-----------------|-----------------|----------------|--------------|---------------|-----------------|
| 2.012<br>(51.1) | 1.189<br>(30.2) | 0.232<br>(5.9) | 0.354<br>(9) | 0.394<br>(10) | 0.534<br>(13.3) |

| A              | B              | C           | D               | E                | G             | H            | A              | B               |
|----------------|----------------|-------------|-----------------|------------------|---------------|--------------|----------------|-----------------|
| 0.303<br>(7.7) | 0.335<br>(8.5) | 12<br>(300) | 0.772<br>(19.6) | 0.423<br>(10.75) | .078<br>(2.0) | .29<br>(7.4) | 0.251<br>(6.4) | 0.398<br>(10.1) |

### HA041E1-25



| A             | B            |
|---------------|--------------|
| 0.551<br>(14) | 0.197<br>(5) |

| A             | B               | C             | D            | E              | F               |
|---------------|-----------------|---------------|--------------|----------------|-----------------|
| 0.669<br>(17) | 0.563<br>(14.3) | 0.394<br>(10) | 0.236<br>(6) | 0.106<br>(2.7) | 0.909<br>(23.1) |

| G             | H               | I               | J             | K            |
|---------------|-----------------|-----------------|---------------|--------------|
| 2.0<br>(50.8) | 1.189<br>(30.2) | 0.890<br>(22.6) | 1.102<br>(28) | 0.039<br>(1) |

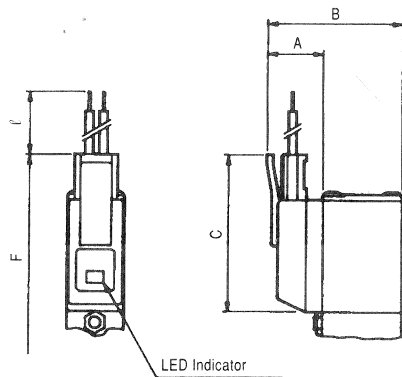
| A           | B               | C               | D               |
|-------------|-----------------|-----------------|-----------------|
| 12<br>(300) | 1.382<br>(35.1) | 0.772<br>(19.6) | 0.571<br>(14.5) |

| E            | F             | G              | H            |
|--------------|---------------|----------------|--------------|
| 0.315<br>(8) | 0.669<br>(17) | 0.374<br>(9.5) | 0.197<br>(5) |

Valve mounting screws to manifolds  
and subbases: M2xL16

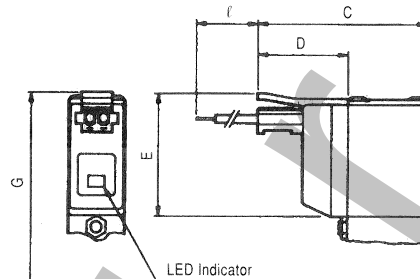
## OPTIONS

Solenoid with straight connector – PSL



| A             | B             | C               |
|---------------|---------------|-----------------|
| 0.394<br>(10) | 1.024<br>(26) | 1.083<br>(27.5) |

Solenoid with “L” connector – PLL

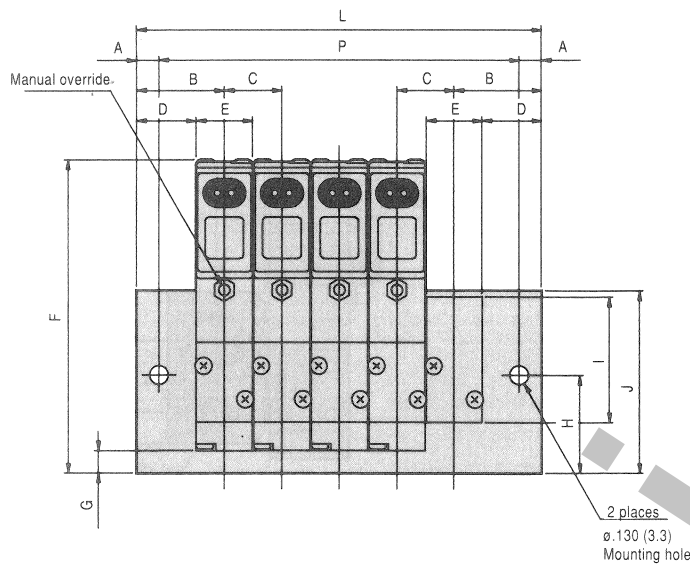


| C             | D             | E               |
|---------------|---------------|-----------------|
| 1.181<br>(30) | 0.630<br>(16) | 0.846<br>(21.5) |

## DIMENSIONS

| Valve                  | F            | G            | f (Lead wire length)                                                                      | Notes                                                       |
|------------------------|--------------|--------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| H041E1, HA041E1-25     | 2.271 (57.7) | 2.035 (51.7) | -PSL -PLL: 12 (300) Made to order:<br>£1 – 36 (1000)<br>£2 – 72 (2000)<br>£3 – 108 (3000) | Whole lengths to valve end or sub-base end                  |
| H040-4E1               | 2.417 (61.4) | 2.181 (55.4) |                                                                                           |                                                             |
| HA040-4E1-25           | 2.562 (65.1) | 2.326 (59.1) |                                                                                           |                                                             |
| H040-4E2, HA040-4E2-25 | 3.747 (95.2) | 3.275 (83.2) |                                                                                           | Whole length from the solenoid end to opposite end of valve |

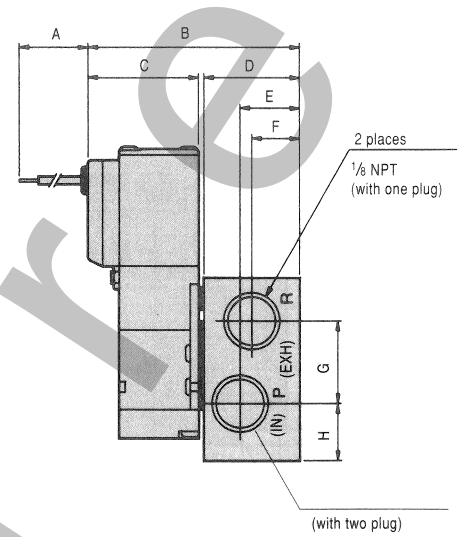
# H041M□A



| A              | B               | C               | D               | E             |
|----------------|-----------------|-----------------|-----------------|---------------|
| 0.157<br>(4.0) | 0.614<br>(15.6) | 0.402<br>(10.2) | 0.417<br>(10.6) | 0.394<br>(10) |

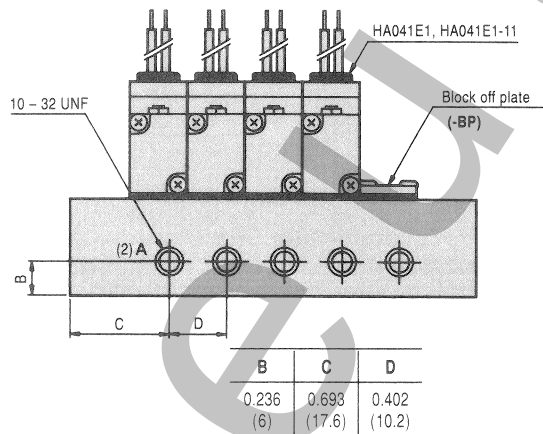
| F               | G              | H               | I             | J             |
|-----------------|----------------|-----------------|---------------|---------------|
| 2.165<br>(55.0) | 0.154<br>(3.9) | 0.677<br>(17.2) | 0.866<br>(22) | 1.259<br>(32) |



| A           | B               | C               | D             |
|-------------|-----------------|-----------------|---------------|
| 12<br>(300) | 1.481<br>(37.6) | 0.772<br>(19.6) | 0.669<br>(17) |

| E               | F              | G               | H             |
|-----------------|----------------|-----------------|---------------|
| 0.417<br>(10.6) | 0.335<br>(8.5) | 0.571<br>(14.5) | 0.394<br>(10) |



| B            | C               | D               |
|--------------|-----------------|-----------------|
| 0.236<br>(6) | 0.693<br>(17.6) | 0.402<br>(10.2) |

## “A” TYPE MANIFOLD DIMENSIONS BY UNIT in. (mm)

| Model     | L             | P             | Model     | L             | P             |
|-----------|---------------|---------------|-----------|---------------|---------------|
| HA041M2A  | 1.630 (41.4)  | 1.315 (33.4)  | HA041M12A | 5.644 (143.4) | 5.330 (135.4) |
| HA041M3A  | 2.031 (51.6)  | 1.716 (43.6)  | HA041M13A | 6.046 (153.6) | 5.731 (145.6) |
| HA041M4A  | 2.433 (61.8)  | 2.118 (53.8)  | HA041M14A | 6.447 (163.8) | 6.133 (155.8) |
| HA041M5A  | 2.834 (72)    | 2.519 (64)    | HA041M15A | 6.849 (174)   | 6.534 (166)   |
| HA041M6A  | 3.236 (82.2)  | 2.921 (74.2)  | HA041M16A | 7.250 (184.2) | 6.940 (176.2) |
| HA041M7A  | 3.637 (92.4)  | 3.322 (84.4)  | HA041M17A | 7.652 (194.4) | 7.337 (186.4) |
| HA041M8A  | 4.039 (102.6) | 3.734 (94.6)  | HA041M18A | 8.053 (204.6) | 7.739 (196.6) |
| HA041M9A  | 4.440 (112.8) | 4.125 (104.8) | HA041M19A | 8.455 (214.8) | 8.140 (206.8) |
| HA041M10A | 4.841 (123)   | 4.527 (115)   | HA041M20A | 8.856 (225)   | 8.541 (217)   |
| HA041M11A | 5.243 (133.2) | 4.928 (125.2) | -         | -             | -             |

Valve mounting screws to manifolds  
and subbases: M2xL16

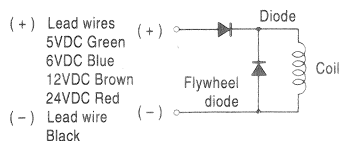
# PROPER HANDLING AND PRECAUTIONS

## SOLENOID

### INTERNAL CIRCUIT

#### STANDARD SOLENOID

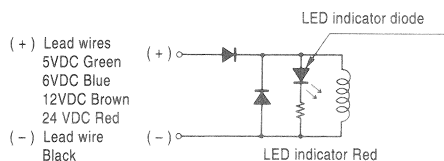
(Transient suppression incorporated)



#### SOLENOID WITH LED INDICATOR

(Transient suppression)

Order No. -PSL, -PLL

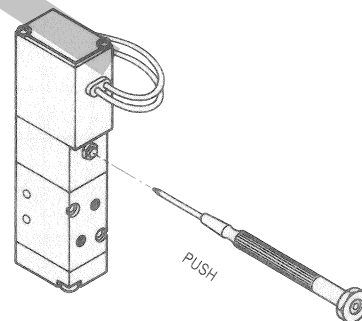


### CAUTIONS

1. Do not apply megger across lead wires.
2. Valve is polarity protected.
3. If current leakage within the circuit exceeds the recommended allowable quantity, the solenoid may not drop out. This malfunction is demonstrated by the valve not returning to the "home" position when de-energized (single solenoid).
4. Do not energize double solenoids simultaneously. The valve may midshift.

### MANUAL OVERRIDE OPERATION

Push the button all the way down, using a fine-tipped instrument. While pushing the button, the single solenoid valve will enter into the energized position. It will return to the "home" position when released. For the double solenoid, when the push button at the S<sub>1</sub> (S<sub>2</sub>) side is pushed, it will switch to the same condition as with the S<sub>1</sub> (S<sub>2</sub>) energized position. The valve will remain in that position even after the button is released. To return, operate the push button at the opposite end of the valve S<sub>2</sub> (S<sub>1</sub>).



### CAUTIONS

1. The H040 series is indirect acting type. Therefore, the body of the valve will not operate when pushing the manual override button unless minimum air pressure is supplied to the P-port.
2. Do not use a sharp tipped instrument to operate the manual override button. It may damage the button.

## MANIFOLD

### PIPING

Ports P and R are located at both ends of the manifold. Piping direction can be determined according to the mounting location. Ports at one end of the manifold are temporarily plugged during shipping. Remove plugs and reseal with sealing agent.

### BLOCK OFF PLATE

Use Block Off Plate to close stations when they are not in use. See charts on page 16 for proper model.

### CAUTIONS

1. For P port piping, make sure to select fitting sizes to fit the manifold connecting pipe dimensions. Actuators may not operate properly if there is insufficient flow and/or pressure due to improper piping.
2. When installing fittings or mufflers to R port, make sure that exhaust remains unrestricted. Restriction of exhaust may cause actuators to operate erratically. Consider using R ports at both ends of manifold to enhance exhaust.
3. When several manifold valves are to be operated simultaneously, connect supply air to both ends of manifold. Also exhaust through both ends of manifold. This ensures adequate supply and exhaust capacity.

## POINTS TO BE CONSIDERED

### INSTALLATION

1. Mount valves in any direction. However, mount valves perpendicular to significant shock or vibration.
2. Location near water, oil, or in excessively dusty conditions requires adequate solenoid housing protection to prevent solenoid actuator contamination. Also consider the installation of breather/muffler in exhaust ports to prevent foreign objects from entering valves.
3. Before installing fittings and tubing, blow all foreign material from them. If using a sealant, take extra care that sealant does not enter valve causing potential malfunction and/or leaks.
4. When valves are installed in tight enclosures, consider the possibility of heat build up. Ensure adequate ventilation.
5. Valves with A or B ports open to atmosphere will not operate properly.

### AIR SOURCE

1. Use compressed air or inert gas in accordance with the pressure rating in the specifications.
2. Compressed air should be clean and uncontaminated. When in doubt, install an air filter with filtering capacity of 40 microns. Periodically remove and clean or replace filter element.
3. For optimum performance, use largest possible tubing size and minimum tubing length.

### LUBRICATION

No externally applied lubrication is required. However, when dry air is used (air that does not contain water or oil), use of a turbine SAE 20 oil (ISO VG32) or equivalent is recommended. Thin or low viscosity oils (spindle oil, machine oil, etc.) do not provide a good residual film of lubrication, thus should not be used.

### AIR QUALITY

These valves cannot be used when media or ambient conditions contain organic solvents, phosphoric acid, ester type machine oil, sulfuric acid gas, or other acids.

Specifications subject to change without notice.