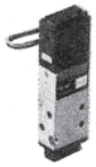
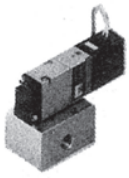
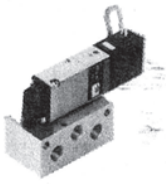
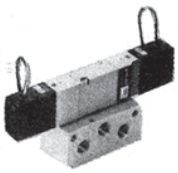
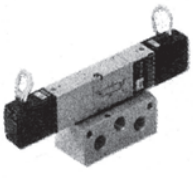
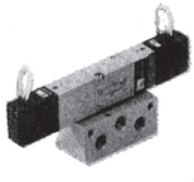
H110 SERIES BASIC MODELS AND CONFIGURATIONS

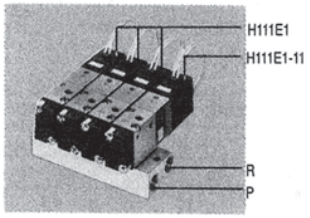
SINGLE UNIT – IN-LINE AND SUBBASE MOUNTED

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

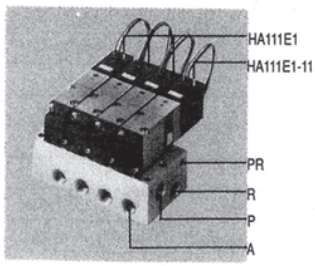
NOTE: Valves are mounted to HA111-25 and HA110-25 subbases. Subbases are not available for H110 (3-way) series.

MULTIPLE UNITS – MANIFOLD MOUNTED

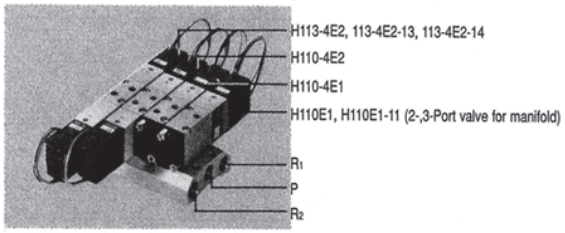
H111M☐F – use with H111 valves



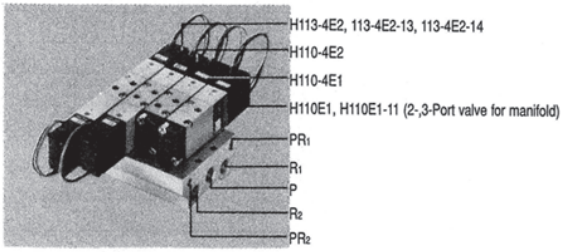
H111M☐A – use with HA111 valves



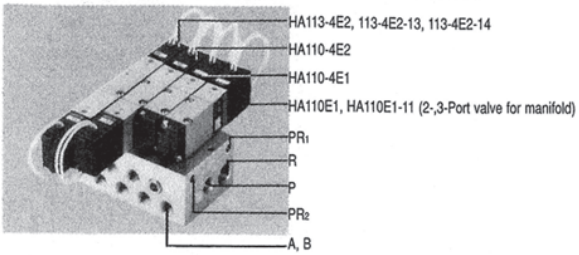
H110M☐F – use with H110, H110-4, H113-4 valves



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 H110E1	H110-4E1 H110-4E2	H113-4E2
	Manifold or subbase type only	HA111E1 HA110E1	HA110-4E1 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) 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

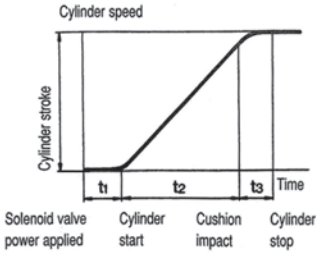
Item		In-line and manifold type	Basic model		
			H111E1 H110E1	H110-4E1 H110-4E2	H113-4E2
		Manifold or subbase type only	HA111E1 HA110E1	HA110-4E1 HA110-4E2	HA113-4E2
Media			Air		
Type of operation			Indirect acting		
Flow – C_v			.23		.21
Ports			10-32 UNF		
Lubrication			None required		
Pressure range psig (kgf/cm^2)			20 ~ 100 (1.5 ~ 7)		
Response time – ms (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 (Rated voltage applied)	Frequency Hz	–	–	50	60	50	60	50	60
	Starting power – mA	–	–	145	130	44	40	22	20
	Holding power – mA[NOTE1]	130 (140)	65 (75)	85	70	32	26	16	13
Power consumption[NOTE1]		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

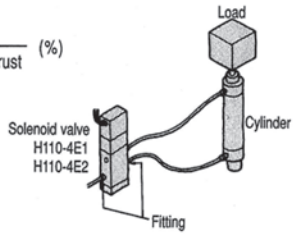


In order to obtain required time for cylinder to make one stroke, add cylinder's delay time t_1 (delay time between activating valve and actual starting time of cylinder) to the time t_2 at the maximum speed. If there is a cushion time, add the cushion time. General cushion time t_3 is around 0.2 seconds.

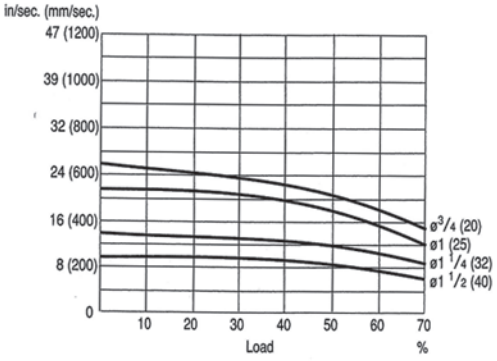
H110-4E1, H113-4E2

Measurement requirements

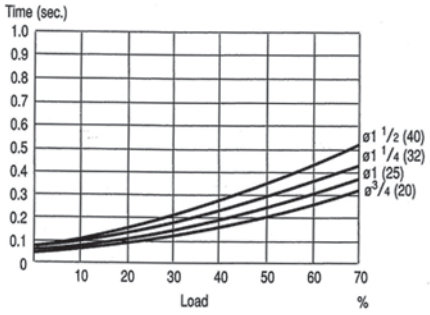
- Air pressure: 71 psig (5 kgf/cm²)
- 1/4" I.D. tubing x 35" long
- Load ratio = $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$ (%)
- Cylinder stroke: 6 in.



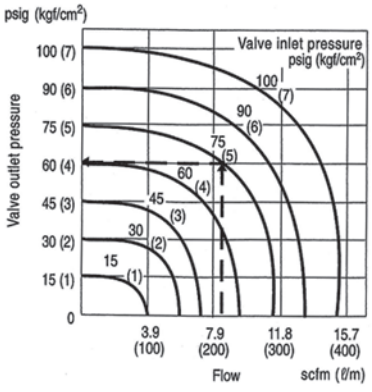
Maximum operating speed



Delay time



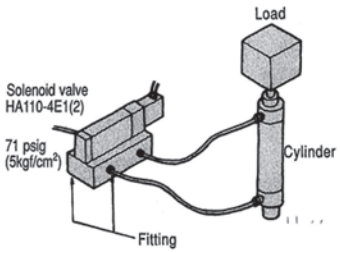
Flow



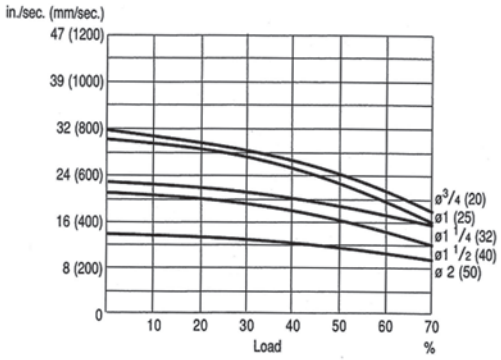
HA110-4E1, HA113-4E2

Measurement requirements

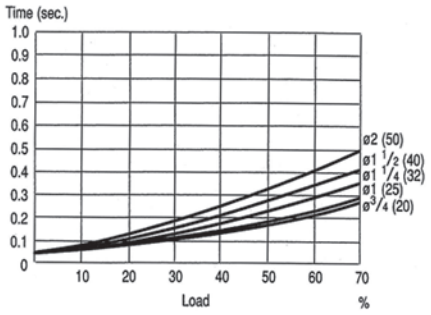
- Mounted to H110-25
- Air pressure: 71 psig (5 kgf/cm²)
- 1/4" I.D. tubing x 35" long
- Load ratio = $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$ (%)
- Cylinder stroke: 6 in.



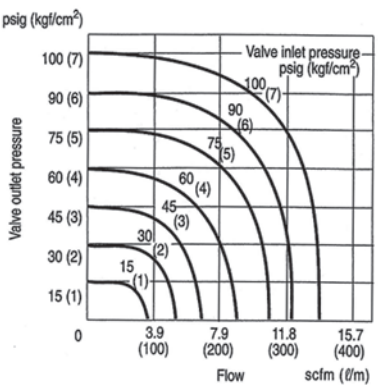
Maximum operating speed



Delay time



Flow

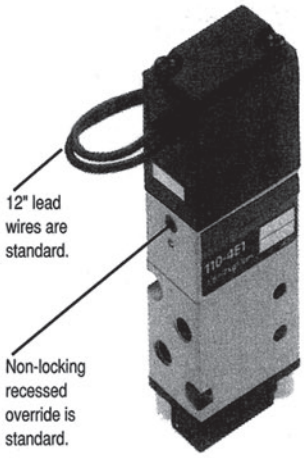


HOW TO ORDER

VALVES

Description		ORDERING CODE Model	Options: Function: 2-way	Norm. Open	3 position: Open center	3 position: Pressure center	Manual override	Electrical Connection	Voltage
In-line or F-type manifold	2 or 3 port	H111E1	–2	–11			–83	-L -PSL -39	12VDC 24VDC 120VAC 240VAC 24VAC[Note]
	5 port Single solenoid	H110-4E1							
	5 port Double solenoid	H110-4E2							
	5 port 3-position	H113-4E2			–13	–14			
Single subbase or A-type manifold	2 or 3 port	HA111E1	–2	–11					
	5 port Single solenoid	HA110-4E1							
	5 port Double solenoid	HA110-4E2							
	5 port 3-position	HA113-4E2			–13	–14			
Manifold mount only	H110M□F, FE 2 or 3 port	H110E1	–2	–11					
	H110M□A 2 or 3 port	HA110E1							

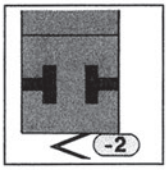
NOTE: 24VAC with lead wires and no LED only.



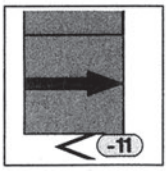
3 port valves are 3-way, normally closed standard.

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

3-port options:

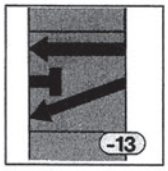


2-way (3-way std.)

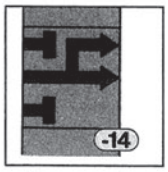


Normally open (Normally closed-std.)

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

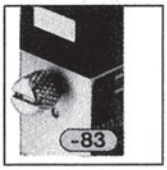


Exhaust center



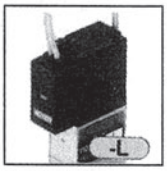
Pressure center

Override Non-locking recessed std.



Locking

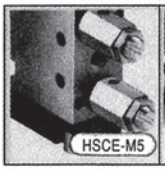
Electrical: Grommet with 12" lead wires std. Order code: Blank



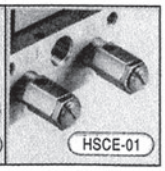
Grommet with LED and surge protection

Plug-in with LED and surge protection [NOTE]

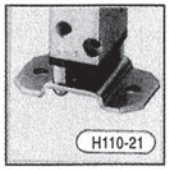
ACCESSORIES



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

2- 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

2-, 3- and 4-way valve manifolds

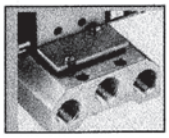
Model number	Description
H110M☐F	Select 2 – 20 stations (☐), accepts H110 series valves
H110M☐FE[NOTE]	Select 2 – 20 stations (☐), accepts H110 series valves
H110M☐A	Select 2 – 20 stations (☐), accepts HA110 series valves

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[NOTE 1])	Standard	Female thread	10-32 UNF
H110-4E1, H110-4E2, H113-4E2	Standard	Female thread	10-32 UNF
HA110-25[NOTE 2] 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 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 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)}	

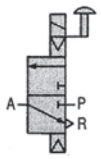
OPERATING PRINCIPLE

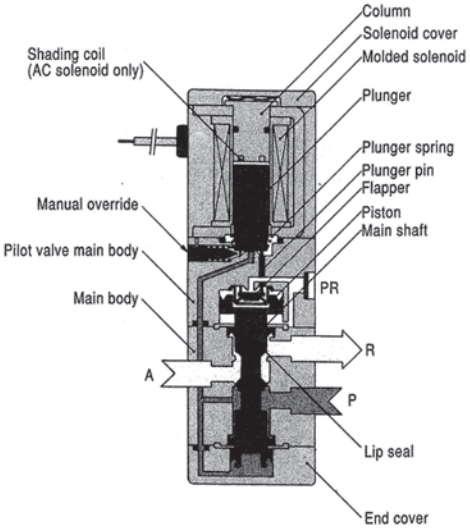
3-WAY

H111E1

Unactuated

Normally closed (N/C)

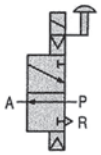


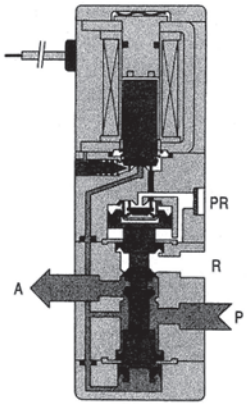


H111E1-11

Unactuated

Normally open (N/O)



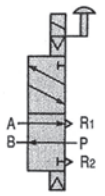


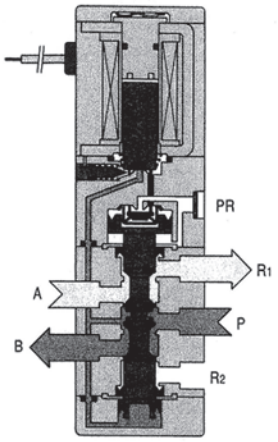
4-WAY, 2-POSITION

H110-4E1

Unactuated

Single solenoid





MATERIALS OF MAIN PARTS

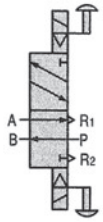
Item	Parts	Materials
Valve	Body	Aluminum (anodized)
	Stem	
	Lip seal	Buna
	Flapper	
	Mounting base	Soft steel (zinc plated)
	Subbase	Aluminum (anodized)
	Plunger	Electromagnetic stainless
	Column	
Manifold	Body	Aluminum (anodized)
	Block-off plate	Steel (nickel plated)
	Seal	Buna

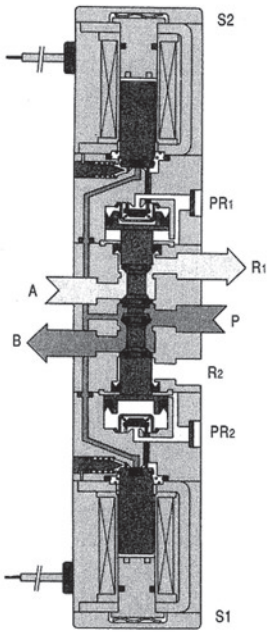
4-WAY, 2-POSITION

H110-4E2

S2 actuated

Double solenoid



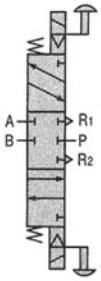


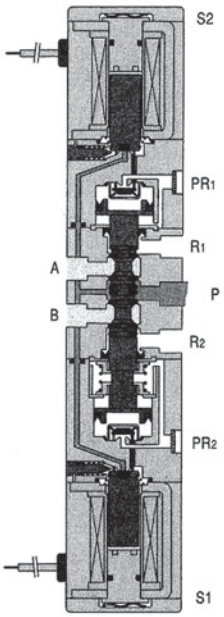
4-WAY, 3-POSITION

H113-4E2

Unactuated

Closed center

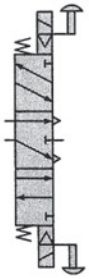


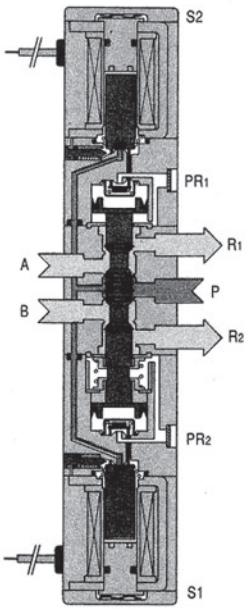


H113-4E2-13

Unactuated

Open center

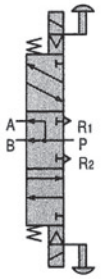


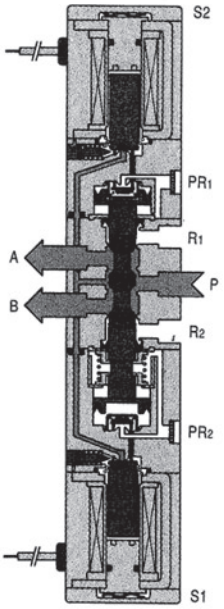


H113-4E2-14

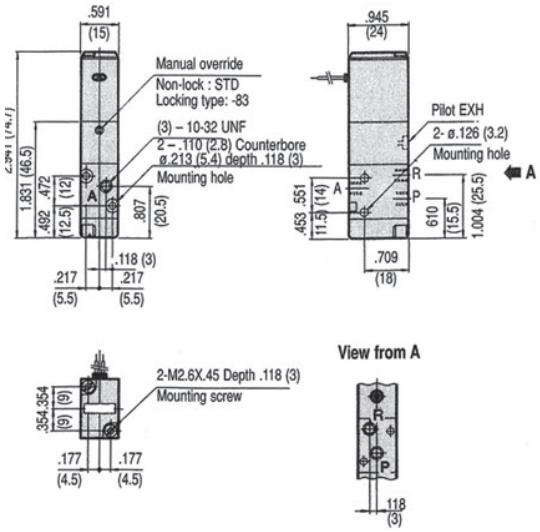
Unactuated

Pressure center

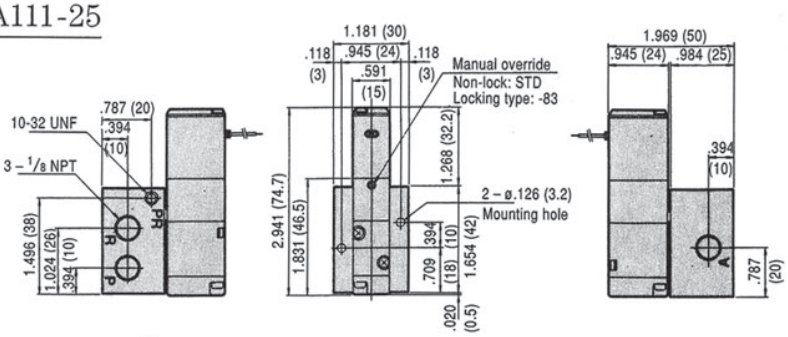




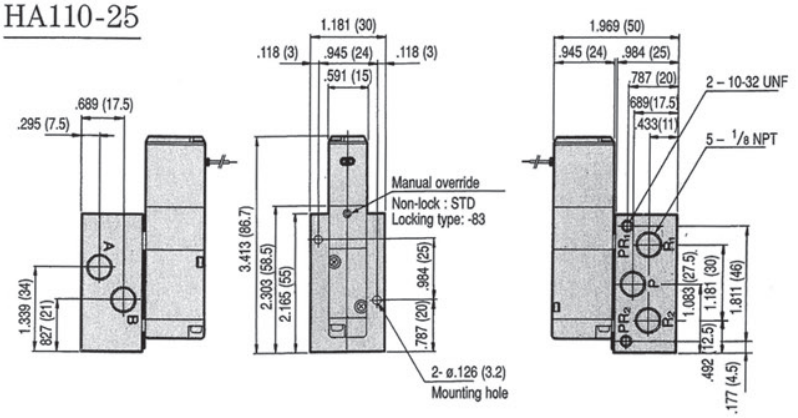
H111E1



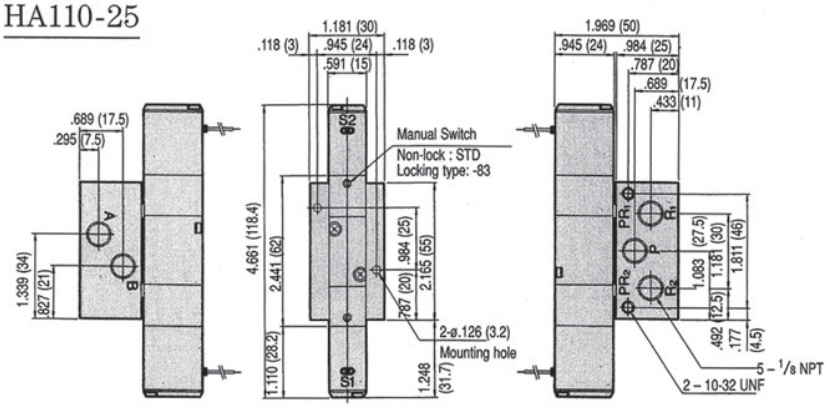
HA111E1 & HA111-25



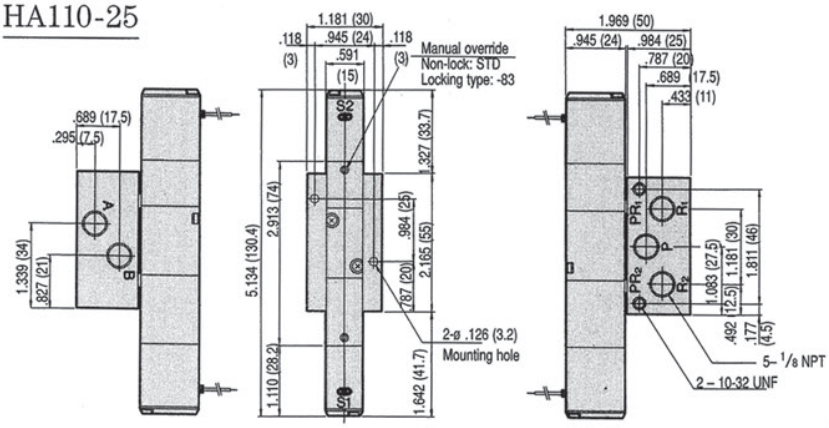
HA110-4E1 & HA110-25



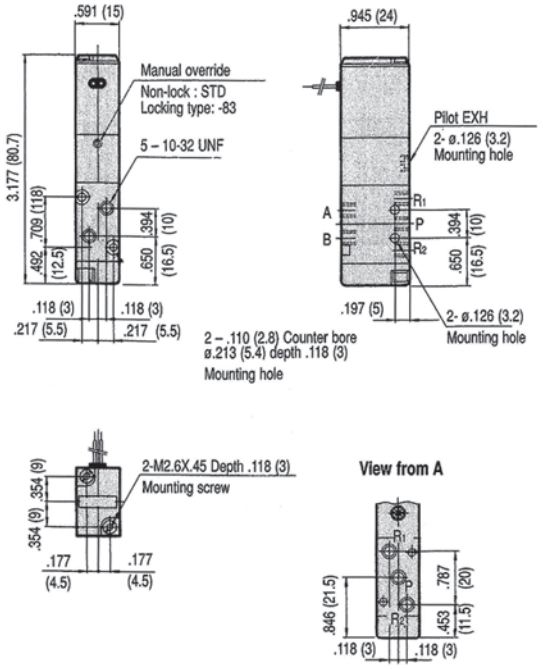
HA110-4E2 & HA110-25



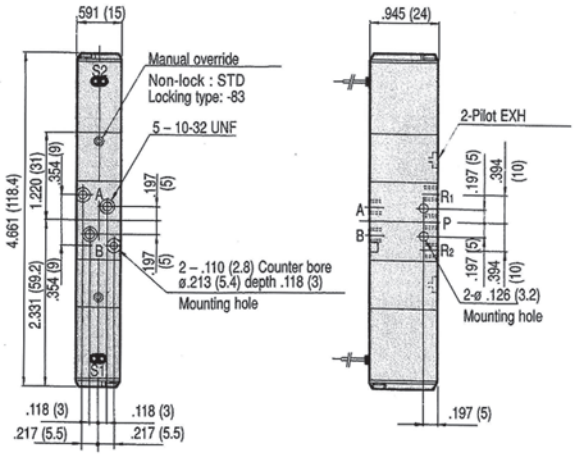
HA113-4E2 & HA110-25



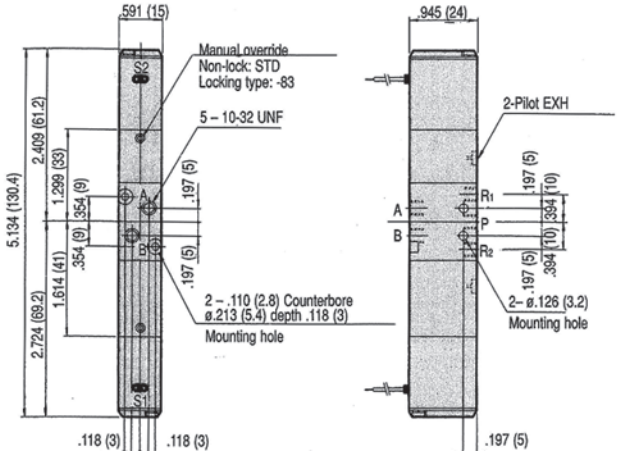
H110-4E1



H110-4E2

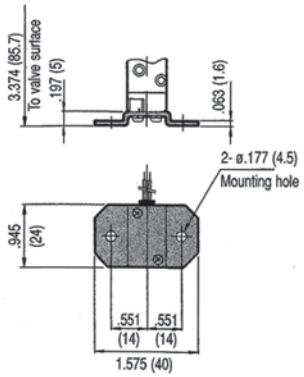


H113-4E2



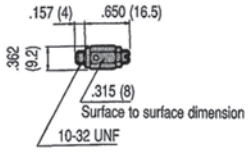
ADDITIONAL PARTS (sold separately)

Mounting base: H110-21

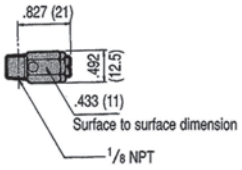


Flow control

In-line: HSCE-M5

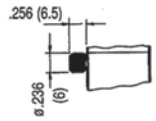


Subbase: HSCE-01

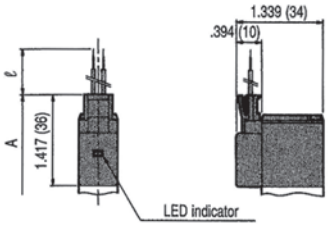


CONNECTOR OPTIONS

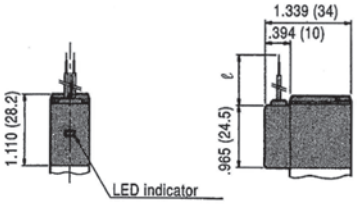
Locking manual override: (-83)



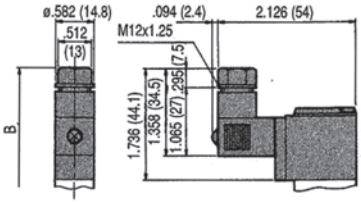
Straight connector solenoid: (-PSL)



Grommet with LED: (-L)

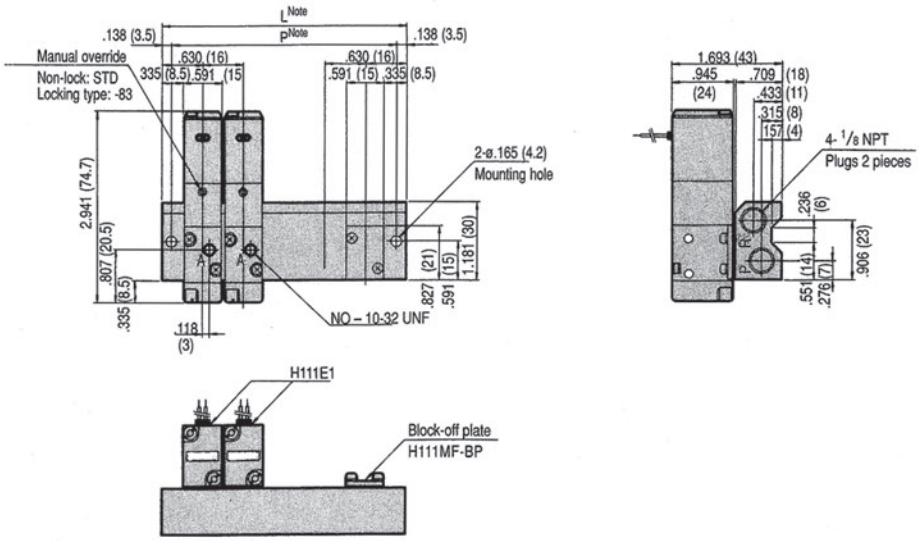


DIN connector solenoid: (-39)



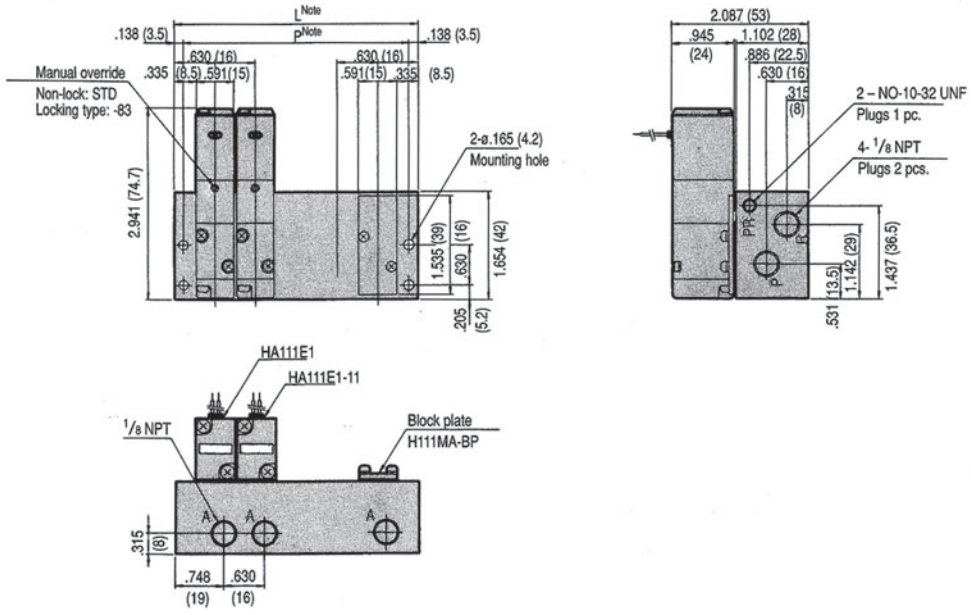
Type	Body length with connector – in. (mm)		Measurement
	A	B	
H111E1, HA111E1, w/HA111-25	3.248 (82.5)	3.567 (90.6)	Length to valve end
H110-4E1	3.484 (88.5)	3.803 (96.6)	
HA110-4E1, w/HA110-25	3.720 (94.5)	4.039 (102.6)	
HA110-4E2, HA110-4E2, w/HA110-25	5.276 (134)	5.913 (150.2)	Length to opposite solenoid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

H111M□F



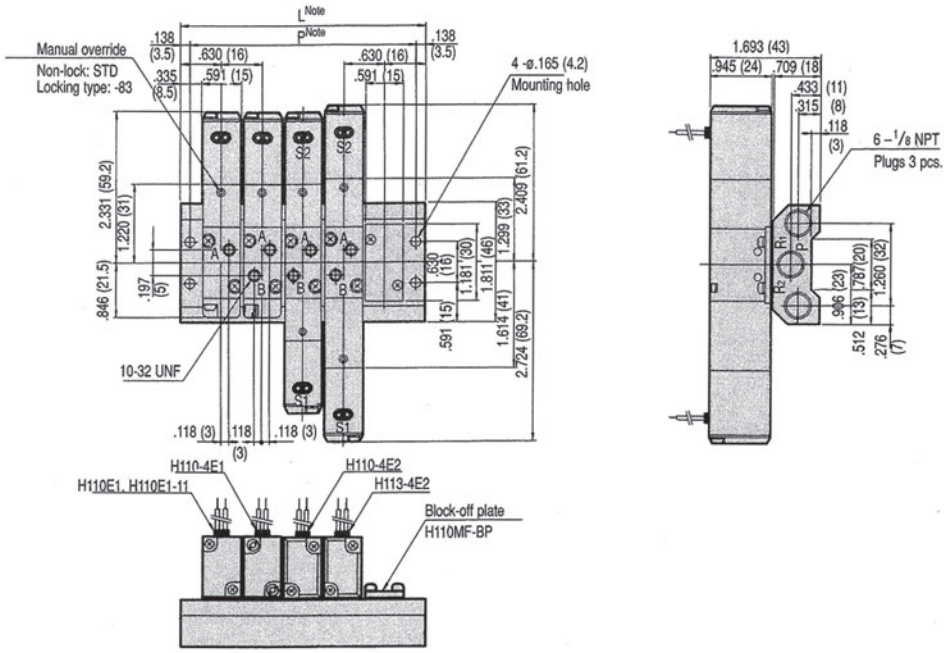
NOTE: L = 1.890 (48) and P = 1.614 (41) for a 2 station manifold. Add 0.630 (16) for each station over 2 [(example: for a 6 station manifold, add 2.520 (64), or L = 4.410 (112) and P = 4.134 (105)].

H111M□A

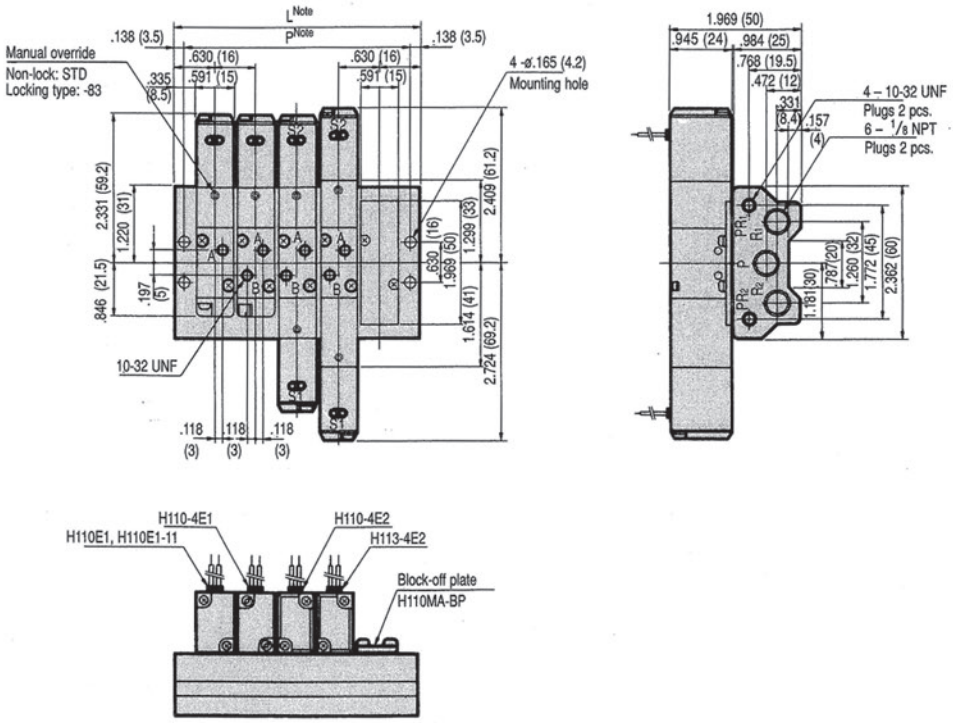


NOTE: L = 1.890 (48) and P = 1.614 (41) for a 2 station manifold. Add 0.630 (16) for each station over 2 [(example: for a 6 station manifold, add 2.520 (64), or L = 4.410 (112) and P = 4.134 (105)].

H110M□F

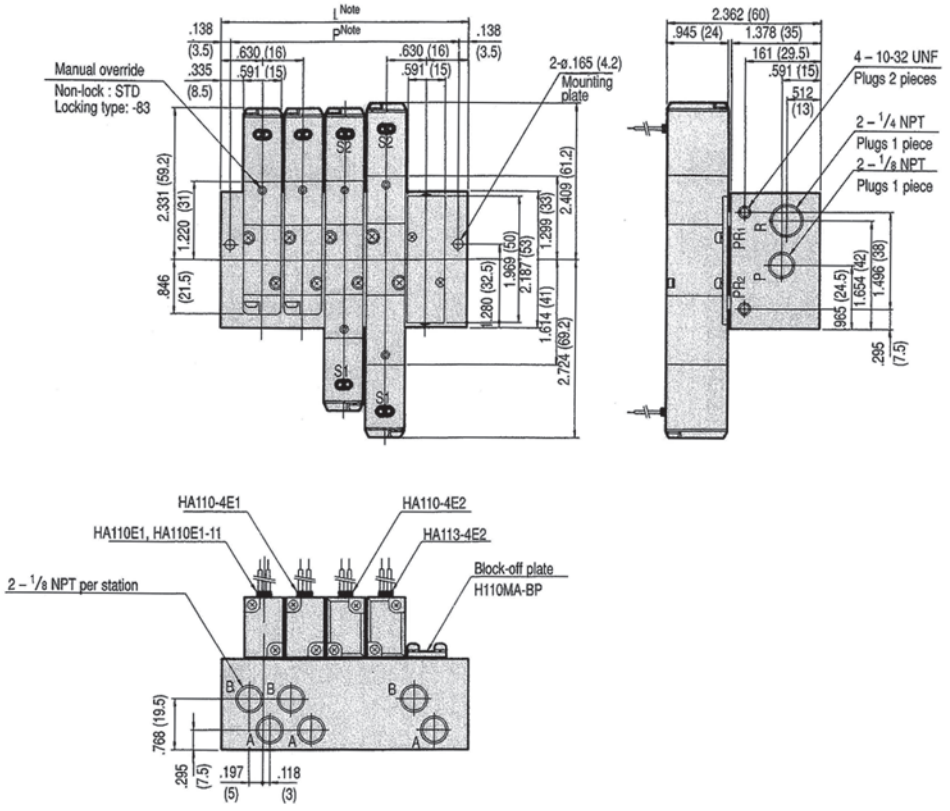


H110M□FE



NOTE: L = 1.890 (48) and P = 1.614 (41) for a 2 station manifold. Add 0.630 (16) for each station over 2
[(example: for a 6 station manifold, add 2.520 (64), or L = 4.410 (112) and P = 4.134 (105)].

H110M□A



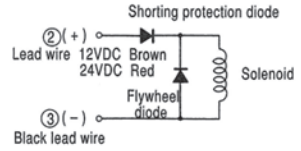
NOTE: L = 1.890 (48) and P = 1.614 (41) for a 2 station manifold. Add 0.630 (16) for each station over 2 [(example: for a 6 station manifold, add 2.520 (64), or L = 4.410 (112) and P = 4.134 (105)].

HANDLING CAUTIONS AND GENERAL ITEMS

SOLENOIDS

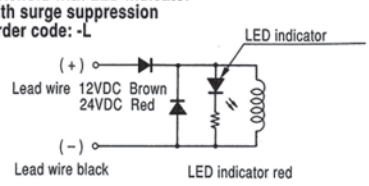
INTERNAL CIRCUIT – DC

STD. Solenoid (Surge protection)



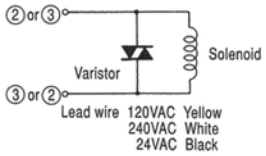
②③are for DIN connector (ordering code: -39)

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



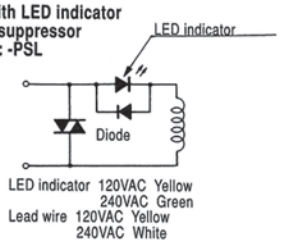
INTERNAL CIRCUIT – AC

STD. Solenoid (Surge protection)



②,③are for DIN connector (ordering code: -39)

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.

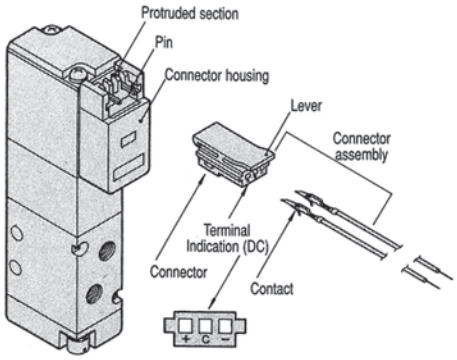
2. If there is a current leakage in the circuit, improper operation, such as the valve not returning to the proper position, will occur. Make sure to operate the valve well within the limit of current leakage. If a leakage larger than the limit occurs, please consult factory.

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.

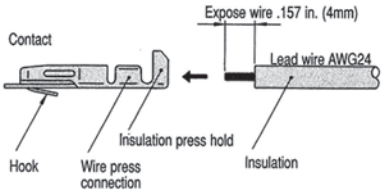
PLUG CONNECTOR

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



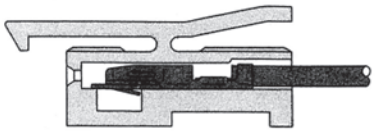
LEAD WIRE AND CONTACT ASSEMBLY

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.

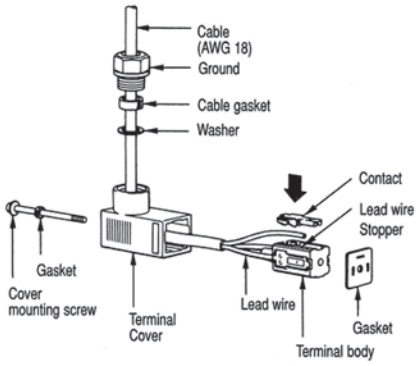
Indicate –39 option in valve order code.

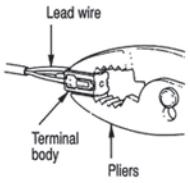
Surge suppressors are equipped as standard feature.

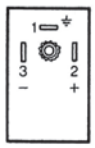
LED indicator cannot be used.

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.







Solenoid terminal

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

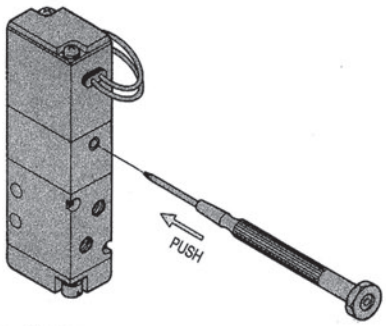
Actuate valve by fully depressing manual override with small tool. Valve remains actuated until manual override is released. Upon release, valve spring returns valve to normal position.

LOCKING

Use a small tool to push in and turn manual override more than 45° to actuate. Override turns 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:

1. Since these valves are indirect acting, manual override will not actuate unless air is supplied to IN port.

2. Do not use a sharp instrument to operate the override as it may damage the button.

3. 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.