Before use, be sure to read the “Safety Precautions” on p. 31.
Reliability & Versatile Applications

Solenoid Valves 110 Series

The 110 series Solenoid Valves, which achieve highly reliable, powerful, and low current basic performance in a compact, thin body, offer a simple and flexible standard type, and a full-option type with advanced maintenance features, to become still more user-friendly.

Standard type

Its clean lines emphasize basic performance, for low-cost and versatile applications.

- With a varistor for the AC type, and a flywheel diode for the DC type, the solenoid is equipped with excellent surge suppression measures.
- Equipped with an easy-to-handle plug connector for fast wiring installation and removal. Available in a straight type and L type, both are equipped with LED indicators for easy confirmation of operations.
- A manual override (non-locking type) is standard equipment and offers easy adjustment during assembly and maintenance. A fingertip-operable protruding-type manual override (locking type) is also available as an option.

F type manifold

Direct piping type valves can be mounted directly on this manifold. An FE type manifold enabling collected pilot exhaust through its PR port is also available.

- Built-in quick fittings offer one-touch simple tube installation and removal. Moreover, an effective area of 4.0mm² (Cv: 0.22) enables even more powerful applications.
- For the delivery port quick fittings, select from ø 4 or ø 6 fittings for each station in accordance with actuator size.

Full-option type

Greatly improves piping and wiring work efficiency, for excellent applications in assembly, adjustment, and maintenance.

- The common terminal pre-wired plug connector type frees technicians from tedious common terminal wiring work. Crossover wires are used to connect the common terminals, so that a single common wire is sufficient even for a manifold with many stations.
- Piping to the pilot exhaust ports is also possible to keep the control box interior and working environment from becoming contaminated. The built-in check mechanism prevents exhaust interference.

AJ type manifold

Combines all ports into a manifold base. Quick fittings are built into the delivery ports (4(A), 2(B)), allowing easy assembly and maintenance in a confined space.

- The common terminal pre-wired plug connector type frees technicians from tedious common terminal wiring work. Crossover wires are used to connect the common terminals, so that a single common wire is sufficient even for a manifold with many stations.
- Piping to the pilot exhaust ports is also possible to keep the control box interior and working environment from becoming contaminated. The built-in check mechanism prevents exhaust interference.
Twin Solenoid Valve

Ensures the functions of the conventional double solenoid type, but in a much shorter length, while simple wiring enables correct connections with a sequencer. Moreover, it is capable of being installed on a conventional manifold to occupy space for two stations.

Tandem Solenoid Valve

Retains the performance specifications of the 110 series while realizing a two-unit combination solenoid in the space of a single station. Achieves a compact outer appearance for the manifold and still more space savings.

PC Board Manifold 110 Series

Secures ease of use by using a printed circuit board with a connector for quick wiring connection to control devices. This simplified wiring method greatly reduces wiring work and the need for tools.
### 110 Series Basic Models and Configuration

#### Single unit

<table>
<thead>
<tr>
<th>2-, 3-port</th>
<th>5-port</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct piping</strong></td>
<td><strong>Sub-base piping</strong></td>
</tr>
<tr>
<td>Normally closed (NC)</td>
<td>Normally closed (NC)</td>
</tr>
<tr>
<td>Normally open (NO)</td>
<td>Normally open (NO)</td>
</tr>
<tr>
<td><img src="image1" alt="Image 1" /></td>
<td><img src="image2" alt="Image 2" /></td>
</tr>
<tr>
<td><img src="image3" alt="Image 3" /></td>
<td><img src="image4" alt="Image 4" /></td>
</tr>
<tr>
<td><strong>111E1</strong></td>
<td><strong>111E1-11</strong></td>
</tr>
<tr>
<td><strong>110E1</strong></td>
<td><strong>110E1-11</strong></td>
</tr>
<tr>
<td><strong>110-4E1</strong></td>
<td><strong>110-4E2</strong></td>
</tr>
<tr>
<td><strong>113-4E2</strong></td>
<td><strong>113-4E2-13</strong></td>
</tr>
<tr>
<td><strong>113-4E2-14</strong></td>
<td><strong>113-4E2-14</strong></td>
</tr>
</tbody>
</table>

*Notes: 1. 110E1 and A110E1 are dedicated valves for manifolds with combination mounting of 2-, 3-, 5-port valves. They cannot be used as single units. For single unit applications, use 111E1 or A111E1-25.*

*2. They are dedicated twin solenoid valves for manifolds with combination mounting of 2-, 3-, 5-port valves. They cannot be used as single units.*
### Manifold

<table>
<thead>
<tr>
<th>Small sized manifold for 2-, 3-port valves</th>
<th>Manifold for combination mounting of 2-, 3-, 5-port valves</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>111M □ F</strong> — F type (1(P), 3(R)) manifold</td>
<td><strong>110M □ F</strong> — F type (1(P), 3(R2), 5(R1)) manifold</td>
</tr>
<tr>
<td><img src="image1" alt="Diagram of 111M □ F" /></td>
<td><img src="image2" alt="Diagram of 110M □ F" /></td>
</tr>
<tr>
<td><img src="image3" alt="Diagram of 111M □ A" /> — A type (all ports) manifold</td>
<td><strong>110M □ FE</strong> — FE type (1(P), 3(R2), 5(R1), PR) manifold</td>
</tr>
<tr>
<td><img src="image4" alt="Diagram of 111M □ AJ" /> — AJ type (all ports, with quick fittings) manifold</td>
<td><strong>110M □ AJ</strong> — AJ type (all ports, with quick fittings) manifold</td>
</tr>
</tbody>
</table>

**Note** — FE type (1(P), 3(R2), 5(R1), PR) manifold

Valves with built-in quick fittings cannot be mounted.

Valves with built-in quick fittings cannot be mounted.

Valves with built-in quick fittings cannot be mounted.

Valves with built-in quick fittings cannot be mounted.
Basic Models and Valve Functions

<table>
<thead>
<tr>
<th>Basic model</th>
<th>Direct piping, F, FE type manifolds</th>
<th>Sub-base piping, A, AJ type manifolds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>111E1 (110E1)</td>
<td>A111E1 (A110E1)</td>
</tr>
<tr>
<td></td>
<td>110-4E1 110-4E2</td>
<td>A110-4E1 A110-4EME</td>
</tr>
<tr>
<td></td>
<td>110-4KE2</td>
<td>A110-4KE2 A110-4ME2</td>
</tr>
<tr>
<td></td>
<td>113-4E2</td>
<td>A113-4E2 A113-4ME2</td>
</tr>
<tr>
<td></td>
<td>113-4KE2</td>
<td>A113-4KE2</td>
</tr>
</tbody>
</table>

Number of positions: 2 positions
Number of ports: 2, 3 ports
Valve function: Normally closed (NC, standard) or Normally open (NO, optional)

- Single solenoid
- Double solenoid
- Twin solenoid
- Closed center (standard), Exhaust center (optional), Pressure center (optional), or Tandem solenoid

Note: The 110E1, A110E1, 110-4KE2, and 110-4ME2 are dedicated valves for manifolds with combination mounting of 2-, 3-, 5-port valves. They cannot be used as single units. When using 2-,3-port valves as single units, use 111E1 or A111E1-25.

Specifications

<table>
<thead>
<tr>
<th>Basic model</th>
<th>Direct piping, F, FE type manifolds</th>
<th>Sub-base piping, A, AJ type manifolds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>111E1 (110E1)</td>
<td>A111E1 (A110E1)</td>
</tr>
<tr>
<td></td>
<td>110-4E1 110-4E2</td>
<td>A110-4E1 A110-4EME</td>
</tr>
<tr>
<td></td>
<td>110-4KE2</td>
<td>A110-4KE2 A110-4ME2</td>
</tr>
<tr>
<td></td>
<td>113-4E2</td>
<td>A113-4E2 A113-4ME2</td>
</tr>
<tr>
<td></td>
<td>113-4KE2</td>
<td>A113-4KE2</td>
</tr>
</tbody>
</table>

Media: Air
Operation type: Internal pilot type
Effective area (Cv) mm²: 4.2 (0.23) 4.0 (0.22) 3.8 (0.21) 3.6 (0.2)
Port size mm: 5.0 X 0.8
Lubrication: Not required
Operating pressure range: 0.15 to 0.7 MPa (1.5 to 7.1 kgf/cm²)
Proof pressure: 1.05 MPa (10.7 kgf/cm²)
Response time: 15/25 or below 15/25 (20) or below 15 or below 15/30 or below
Maximum operating frequency: 5 Hz
Minimum time to energize for self holding: 50 ms
Operating temperature range (°C): -15 to 125
Shock resistance: 1373.0 (140.0) (Axial direction 294.2 (30.0))
Mounting direction: Any

Notes:
1. For details, see the effective area on p. 298.
2. For details, see the port size on p. 298.
3. Values when air pressure is 0.5 MPa [5.1 kgf/cm²] [73 psi]. Values in brackets () for 110-4E2, 110-4KE2, and 110-4ME2 are when switching from the opposite position, while the values for 113-4E2, 113-4KE2, and A113-4ME2 are those of the closed center valve, when switching from the neutral position.

Solenoid Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Rated voltage</th>
<th>DC12V</th>
<th>DC24V</th>
<th>AC100V</th>
<th>AC200V</th>
<th>DC24V (Tandem solenoid)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flywheel diode incorporated for surge suppression</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shading type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Built-in surge absorption transistor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Operating voltage range: 10.8 to 13.2 V (12 ± 10%)
21.6 to 26.4 V (24 ± 10%)
90 to 132 V (100 ± 10%)
180 to 264 V (200 ± 10%)
21.6 ± 26.4 V (24 ± 10%)

Current (when rated voltage is applied): 130 (1.6W) (with LED indicator)
65 (1.6W) (15W) (with LED indicator)
24 20 12 10 50 (1.2W)

Allowable leakage current mA: 8 4 4 2 2
Insulation resistance MΩ: Over 100

Wiring type and lead wire length:
Standard: Grommet type: 300mm [11.8in.]
Optional: Plug connector type: 300mm [11.8in.]
Note: See made to order on p.315～316.

Color of lead wire:
Brown (+)
Black (−)
Red (+)
Black (−)
Yellow
White
Red (SA), Black (COM)
White (SB)

Color of LED indicator:
Red
Yellow
Green
Red

Surge suppression (as standard):
Flywheel diode
Varistor
Surge absorption transistor

Remark: For optional specifications and order codes, see p.300～302.

Note: The 110E1, A110E1, 110-4KE2, and 110-4ME2 are dedicated valves for manifolds with combination mounting of 2-, 3-, 5-port valves. They cannot be used as single units. When using 2-,3-port valves as single units, use 111E1 or A111E1-25.
### Manifold Model

<table>
<thead>
<tr>
<th>Model</th>
<th>Standard (Single valve)</th>
<th>Built-in quick fittings</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>111E1</td>
<td>4.2 (0.23)</td>
<td>-J41: 3.6 (0.20)</td>
<td></td>
</tr>
<tr>
<td>110-4E1</td>
<td>3.8 (0.21)</td>
<td>-J61: 3.6 (0.20)</td>
<td></td>
</tr>
<tr>
<td>110-4KE2</td>
<td>3.8 (0.21)</td>
<td>-J60: 4.0 (0.22)</td>
<td></td>
</tr>
<tr>
<td>113-4E2</td>
<td>4.0 (0.22)</td>
<td>-J41: 3.6 (0.20)</td>
<td></td>
</tr>
<tr>
<td>113-4KE2</td>
<td>4.0 (0.22)</td>
<td>-J61: 3.6 (0.20)</td>
<td></td>
</tr>
</tbody>
</table>

Note: The delivery port is the 2(A) for 111E1, A111E1.

### Solenoid Valve Port Size

<table>
<thead>
<tr>
<th>Basic model</th>
<th>Port specification</th>
<th>Port size</th>
</tr>
</thead>
<tbody>
<tr>
<td>111E1</td>
<td>Standard Female thread</td>
<td>M5×0.8</td>
</tr>
<tr>
<td>A111E1</td>
<td>Optional -J41 Quick fitting for φ 4, for 2(A) (4A) port only</td>
<td></td>
</tr>
<tr>
<td>A111E1</td>
<td>Optional -J42 Quick fitting for φ 4, for 1(P), 2(A) ports</td>
<td></td>
</tr>
<tr>
<td>A111E1</td>
<td>Optional -J61 Quick fitting for φ 6, for 2(A) (4A) port only</td>
<td></td>
</tr>
<tr>
<td>A111E1</td>
<td>Optional -J62 Quick fitting for φ 6, for 1(P), 2(A) ports</td>
<td></td>
</tr>
<tr>
<td>110-4E1</td>
<td>Standard Female thread</td>
<td>M5×0.8</td>
</tr>
<tr>
<td>110-4KE2</td>
<td>Optional -J41 Quick fitting for φ 4, for 2(A) (4A) port only</td>
<td></td>
</tr>
<tr>
<td>110-4KE2</td>
<td>Optional -J42 Quick fitting for φ 4, for 1(P), 2(A) ports</td>
<td></td>
</tr>
<tr>
<td>113-4KE2</td>
<td>Optional -J61 Quick fitting for φ 6, for 2(A) (4A) port only</td>
<td></td>
</tr>
<tr>
<td>113-4KE2</td>
<td>Optional -J62 Quick fitting for φ 6, for 1(P), 2(A) ports</td>
<td></td>
</tr>
</tbody>
</table>

Note: 1. The delivery port is the 2(A) for 111E1, A111E1-25.
2. Since 110E1 is for manifold use only, piping to the 1(P) port with a fitting is not possible.

### Manifold Connection Port Size

<table>
<thead>
<tr>
<th>Model</th>
<th>Port Location of piping ports</th>
<th>Port size</th>
</tr>
</thead>
<tbody>
<tr>
<td>111M</td>
<td>1(P) Manifold</td>
<td>Rc1/8</td>
</tr>
<tr>
<td>110M</td>
<td>4(A), 2(B) Valve</td>
<td>M5×0.8</td>
</tr>
<tr>
<td>110M</td>
<td>3(R), 3(R2), 5(R1) Manifold</td>
<td>Rc1/8</td>
</tr>
<tr>
<td>110M</td>
<td>1(P) Manifold</td>
<td>Rc1/8</td>
</tr>
<tr>
<td>110M</td>
<td>4(A), 2(B) Valve</td>
<td>M5×0.8</td>
</tr>
<tr>
<td>110M</td>
<td>3(R), 3, 5(R) Manifold</td>
<td>Rc1/8</td>
</tr>
<tr>
<td>110M</td>
<td>4(A), 2(B) Valve</td>
<td>Rc1/8</td>
</tr>
<tr>
<td>110M</td>
<td>3(R), 3, 5(R) Manifold</td>
<td>Rc1/8</td>
</tr>
</tbody>
</table>

Notes: 1. The delivery port is the 2(A) for 111M, A111M-A, and A111M-AJ.
2. When the mounting valve is a female thread specification, the ports are this size. For the built-in quick fitting types, quick fittings for φ 4 or φ 6 are installed.

### Solenoid Valve Mass

<table>
<thead>
<tr>
<th>Basic model</th>
<th>Mass [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td>111E1</td>
<td>75 [2.65]</td>
</tr>
<tr>
<td>110E1</td>
<td>80 [2.82]</td>
</tr>
<tr>
<td>110-4E1</td>
<td>125 [4.41]</td>
</tr>
<tr>
<td>110-4KE2</td>
<td>175 [6.17]</td>
</tr>
<tr>
<td>113-4E2</td>
<td>145 [5.11]</td>
</tr>
<tr>
<td>113-4KE2</td>
<td>165 [5.82]</td>
</tr>
<tr>
<td>A111E1</td>
<td>80 [2.83] (180 [6.35])</td>
</tr>
<tr>
<td>A110-4E1</td>
<td>85 [3.00] (180 [6.35])</td>
</tr>
<tr>
<td>A110-4KE2</td>
<td>180 [6.35]</td>
</tr>
<tr>
<td>A110-4ME2</td>
<td>110 [3.84] (205 [7.23])</td>
</tr>
<tr>
<td>A113-4E2</td>
<td>150 [5.39] (245 [8.64])</td>
</tr>
<tr>
<td>A113-4KE2</td>
<td>170 [6.00]</td>
</tr>
<tr>
<td>A113-4ME2</td>
<td>120 [4.23] (215 [7.88])</td>
</tr>
</tbody>
</table>

Remark: Figures in parentheses ( ) are the mass with sub-base: 25
■ Cylinder Operating Speed

**How to obtain cylinder speed**

To obtain the time required for the cylinder to complete 1 stroke, add cylinder’s delay time $t_1$ (time between energizing of solenoid valve and actual starting of the cylinder), to the cylinder’s max. speed operating time $t_b$.

When a cushion is used, add the cushioning time $t_3$, to the above calculation. The standard cushioning time $t_3$ is approximately 0.2 seconds.

**110-4E1 113-4E2**

- **Measurement conditions**
  - Air pressure: 0.5MPa [5.1kgf/cm$^2$] [73psi.]
  - Piping inner diameter and length: $4 [0.16in.] 	imes 1000mm [39in.]$
  - Fitting: Quick fitting TS4-M5
  - Load ratio = Cylinder theoretical thrust (%)
  - Cylinder stroke: 150mm [5.91in.]

**Maximum operating speed**

\[
\begin{array}{c|cccccccccc}
\text{Load ratio} & 10 & 20 & 30 & 40 & 50 & 60 & 70 \\
\hline
\text{Cyl. max. speed (mm/s)} & 20 & 40 & 60 & 80 & 100 & 120 & 140 & 160 & 180 & 200
\end{array}
\]

\[
1\text{mm/s} = 0.0394\text{in./sec.}
\]

**Delay time**

\[
\begin{array}{c|cccccccccc}
\text{Load ratio} & 10 & 20 & 30 & 40 & 50 & 60 & 70 \\
\hline
\text{Delay (s)} & 0.1 & 0.2 & 0.3 & 0.4 & 0.5 & 0.6 & 0.7 & 0.8 & 0.9 & 1.0
\end{array}
\]

**A110-4E1-25 A113-4E2-25**

- **Measurement conditions**
  - Air pressure: 0.5MPa [5.1kgf/cm$^2$] [73psi.]
  - Piping inner diameter and length: $4 [0.16in.] 	imes 1000mm [39in.]$
  - Fitting: Quick fitting TS6-01
  - Load ratio = Cylinder theoretical thrust (%)
  - Cylinder stroke: 150mm [5.91in.]

**Maximum operating speed**

\[
\begin{array}{c|cccccccccccc}
\text{Load ratio} & 10 & 20 & 30 & 40 & 50 & 60 & 70 \\
\hline
\text{Cyl. max. speed (mm/s)} & 20 & 40 & 60 & 80 & 100 & 120 & 140 & 160 & 180 & 200 & 220 & 240 & 260 & 280 & 300 & 320 & 340 & 360 & 380 & 400
\end{array}
\]

\[
1\text{mm/s} = 0.0394\text{in./sec.}
\]

**Delay time**

\[
\begin{array}{c|cccccccccccc}
\text{Load ratio} & 10 & 20 & 30 & 40 & 50 & 60 & 70 \\
\hline
\text{Delay (s)} & 0.1 & 0.2 & 0.3 & 0.4 & 0.5 & 0.6 & 0.7 & 0.8 & 0.9 & 1.0
\end{array}
\]

**A110-4ME2 A113-4ME2**

- **Measurement conditions**
  - Air pressure: 0.5MPa [5.1kgf/cm$^2$] [73psi.]
  - Piping inner diameter and length: $4 [0.16in.] 	imes 1000mm [39in.]$
  - Fitting: Quick fitting TS4-01
  - Load ratio = Cylinder theoretical thrust (%)
  - Cylinder stroke: 150mm [5.91in.]

**Maximum operating speed**

\[
\begin{array}{c|cccccccccccc}
\text{Load ratio} & 10 & 20 & 30 & 40 & 50 & 60 & 70 \\
\hline
\text{Cyl. max. speed (mm/s)} & 20 & 40 & 60 & 80 & 100 & 120 & 140 & 160 & 180 & 200 & 220 & 240 & 260 & 280 & 300 & 320 & 340 & 360 & 380 & 400
\end{array}
\]

\[
1\text{mm/s} = 0.0394\text{in./sec.}
\]

**Delay time**

\[
\begin{array}{c|cccccccccccc}
\text{Load ratio} & 10 & 20 & 30 & 40 & 50 & 60 & 70 \\
\hline
\text{Delay (s)} & 0.1 & 0.2 & 0.3 & 0.4 & 0.5 & 0.6 & 0.7 & 0.8 & 0.9 & 1.0
\end{array}
\]

■ Flow Rate

**How to read the graph**

When the supply pressure is 0.5MPa [73psi.] and the flow rate is 180 $\text{L} / \text{min}$ [6.35ft$^3$/min.] (ANR), the valve outlet pressure becomes 0.4MPa [58psi.].
### 110 Series Tandem Solenoid Valve Order Codes

#### Solenoid valves

**3-position valve**
- Valve function: Blank, -13, -14
  - Closed center: Blank
  - Exhaust center: -13
  - Pressure center: -14

**Sub-base**
- Without sub-base: Blank
- With sub-base: -25

**Manual override**
- Locking type: -81
- Locking protruding type: -83
- Locking manual lever type: -84

**Wiring type**
- Straight connector: -PSL
- L connector: -PLL

<table>
<thead>
<tr>
<th>Basic model</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A110-4ME2</td>
<td>-25</td>
</tr>
<tr>
<td>A113-4ME2</td>
<td>-13, -14</td>
</tr>
</tbody>
</table>

Note: They cannot be used as single units.

Always select one from each group.

#### Manifold

**3-position valve**
- Valve function: Blank, -13, -14
  - Closed center: Blank
  - Exhaust center: -13
  - Pressure center: -14

**Manual override**
- Locking type: -81
- Locking protruding type: -83
- Locking manual lever type: -84

**Wiring type**
- Straight connector: -PSL
- L connector: -PLL

<table>
<thead>
<tr>
<th>Manifold model</th>
<th>Station</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>110M</td>
<td>A AJ</td>
<td>-25 -13, -14 -81 -83 -84 -PLL DC24V</td>
</tr>
</tbody>
</table>

- Valve mounting location from the left-hand side when facing the 4(A), 2(B) ports.
- Specify the valve model for each station.
- Enter -BP when closing a station with a block-off plate without mounting a valve.
- Always select one from each group.
- For the AJ type manifold only, specify either of the two.

#### Options

**Wiring type**
- Straight connector with LED indicator: -PSL
- L connector with LED indicator: -PLL

**Manual override**
- Locking type: -81
- Locking protruding type: -83
- Locking manual lever type: -84

**AJ type manifold**
- Quick fitting for 4 tube: -J4
- Quick fitting for 6 tube: -J6

Select the tube size for each station.

#### Additional Parts (To be ordered separately)

- Speed controller
- Muffler
- Block-off plate

#### Made to Order

- Lead wire length
  - For plug connector
  - Length: -1L: 1000 [39 in.], -3L: 3000 [118 in.]

**Sub-base piping**

**5-port double solenoid**

**5-port 3-position**

For sub-base piping 110 MA-BP 110 – For 110M

*Always select one from each group.*

* Single solenoid, double solenoid, twin solenoid, and tandem solenoid valves can be mounted together on the manifold.*
110 Series Solenoid Valve, Air-piloted Valve Order Codes

### 2-, 3-port valve
- **Number of ports**: 3-port
- **Valve function**: Normally closed (NC)
- **Sub-base**: Blank

### 2-, 3-port valve
- **Valve function**: Normally open (NO)
- **Sub-base**: Exhaust center

### 3-position valve
- **Valve function**: Closed center
- **Sub-base**: Without sub-base

### Port fitting specifications
- **Female thread**: Blank
- **2(A) port of 111E1**: Quick fitting for ø4 tube
- **1(P), 2(A) ports of 111E1**: Quick fitting for ø6 tube

### Manual override
- **Non-locking type**: Blank
- **Locking protruding type**: Blank
- **Straight connector with LED indicator**: Blank
- **L connector with LED indicator**: Blank

### Wiring type
- **DC12V**: Blank
- **DC24V**: Blank
- **AC100V**: Blank
- **AC200V**: Blank

### Voltage
- **-83**: Blank

### 2-, 3-port valve
- **Order Code**: 111E1
- **Blank**: -2
- **-11**: -11

### 2-, 3-port valve
- **Order Code**: 110-4E1
- **Blank**: -2
- **-11**: -11

### 2-, 3-port valve
- **Order Code**: A111E1
- **Blank**: -2
- **-11**: -11

### 2-, 3-port valve
- **Order Code**: 110-4E2
- **Blank**: -2
- **-11**: -11

### 2-, 3-port valve
- **Order Code**: 113-4E2
- **Blank**: -2
- **-11**: -11

### 2-, 3-port valve
- **Order Code**: A113-4E2
- **Blank**: -2
- **-11**: -11

### 2-, 3-port valve
- **Order Code**: 110-4KE2
- **Blank**: -2
- **-11**: -11

### 2-, 3-port valve
- **Order Code**: 110E1
- **Blank**: -2
- **-11**: -11

### 2-, 3-port valve
- **Order Code**: A110E1
- **Blank**: -2
- **-11**: -11

### 2-, 3-port valve
- **Order Code**: A110-4KE2
- **Blank**: -2
- **-11**: -11

### 2-, 3-port valve
- **Order Code**: A113-4KE2
- **Blank**: -2
- **-11**: -11

### Direct piping
- **Order Code**: 110-4A
- **Blank**: -2
- **-11**: -11

### Direct piping
- **Order Code**: 110-4A2
- **Blank**: -2
- **-11**: -11

### Sub-base piping
- **Order Code**: A110-4A
- **Blank**: -2
- **-11**: -11

### Sub-base piping
- **Order Code**: A110-4A2
- **Blank**: -2
- **-11**: -11

### Additional Parts (To be ordered separately)
- **Speed controller**
- **Muffler**
- **Mounting base**
- **Block-off plate**

### Notes:
1. They cannot be used as single units.
2. The port fittings are for ø4: TSK4-M8M, and for ø6: TSK6-M8M.
3. Side mounting of valve is not possible when -J41, -J42, -J43, -J61, -J62, or -J63 is selected, because in these cases there are no mounting holes on the valve side surface.
4. Mounting on the manifold only is possible when -J42 or -J62 is selected for the 110-4E2 or 113-4E2, because in these cases they do not have mounting holes.
## 110 Series Manifold Order Codes

### 2- or 3-port valve
- **Number of ports**: 2, 3
- **Valve function**:
  - Normally closed (NC)
  - Normally open (NO)

### 2-position valve
- **Port fitting specifications**:
  - Female thread: -J4, -J6
  - Quick fitting for 4 tube: -J61, -J62

### Manual override
- **Wiring type**: 300mm [11.8 in.] standard.

### Manifold Connection port
- Quick fittings for 4 tube
- Quick fittings for 6 tube

### Notes:
1. Since the PR port on the port fitting type valves is located on the opposite side with LED indicator.
2. Fitting used for port fitting specifications, made to order.

### 110 Series Manifold Order Codes

#### 2- or 3-port valve

<table>
<thead>
<tr>
<th>Station</th>
<th>Basic model</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>F stn.</td>
<td>-111E1 -2 -11</td>
<td>DC12V AC200V</td>
</tr>
<tr>
<td>A stn.</td>
<td>-A111E1 -2 -11</td>
<td>~J4 ~J1</td>
</tr>
<tr>
<td>A stn.</td>
<td>-10E1 -2 -11</td>
<td>~J4 ~J1</td>
</tr>
<tr>
<td>FE stn.</td>
<td>-110E1 -2 -11</td>
<td>~J4 ~J1</td>
</tr>
<tr>
<td>F stn.</td>
<td>-110-4E1 -2 -11</td>
<td>DC12V AC200V</td>
</tr>
<tr>
<td>F stn.</td>
<td>-110-4E2 -11</td>
<td>DC12V AC200V</td>
</tr>
<tr>
<td>F stn.</td>
<td>-110-4KE2 -11</td>
<td>DC12V AC200V</td>
</tr>
<tr>
<td>F stn.</td>
<td>-113-4E2 -13 -14</td>
<td>DC12V AC200V</td>
</tr>
<tr>
<td>F stn.</td>
<td>-113-4KE2 -13 -14</td>
<td>DC12V AC200V</td>
</tr>
<tr>
<td>A stn.</td>
<td>-110-4A -12 -11</td>
<td>-J4 -J6</td>
</tr>
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<td>-110-4A2 -12 -11</td>
<td>-J4 -J6</td>
</tr>
<tr>
<td>A stn.</td>
<td>-110-4E1 -12 -11</td>
<td>-J4 -J6</td>
</tr>
<tr>
<td>A stn.</td>
<td>-110-4E2 -11</td>
<td>-J4 -J6</td>
</tr>
<tr>
<td>A stn.</td>
<td>-110-4KE2 -11</td>
<td>-J4 -J6</td>
</tr>
<tr>
<td>A stn.</td>
<td>-113-4E2 -13 -14</td>
<td>-J4 -J6</td>
</tr>
<tr>
<td>A stn.</td>
<td>-113-4KE2 -13 -14</td>
<td>-J4 -J6</td>
</tr>
<tr>
<td>A stn.</td>
<td>-A113-4E1 -2 -11</td>
<td>-J4 -J6</td>
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<tr>
<td>A stn.</td>
<td>-A113-4E2 -13 -14</td>
<td>-J4 -J6</td>
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<tr>
<td>A stn.</td>
<td>-A113-4KE2 -13 -14</td>
<td>-J4 -J6</td>
</tr>
</tbody>
</table>

### Made to Order
The 110 series includes made to order items of various kinds for further system development.
For details, see p.315～317.
Operating Principles and Symbols

### 3-port

**111E1**
- Normally closed (NC)
- Normally open (NO)

**111E1-11**
- De-energized

**Major Parts and Materials**

<table>
<thead>
<tr>
<th>Parts</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td>Aluminum alloy (anodized)</td>
</tr>
<tr>
<td>Stem</td>
<td>Lip seal Synthetic rubber</td>
</tr>
<tr>
<td>Flapper</td>
<td>Sub-base Aluminum alloy (anodized)</td>
</tr>
<tr>
<td>Mounting base</td>
<td>Plunger Magnetic stainless steel</td>
</tr>
<tr>
<td>Column</td>
<td>Manifold Body Aluminum alloy (anodized)</td>
</tr>
<tr>
<td>Block-off plate</td>
<td>Seal Synthetic rubber</td>
</tr>
</tbody>
</table>

**Single solenoid**

**Double solenoid**

**Twin solenoid**

**5-port, 2-position**

**De-energized**

**5-port, 3-position**

**Closed center**

**De-energized**

**De-energized condition after energizing solenoid 12(S1)**

**De-energized condition after energizing solenoid 12(S1)**
Dimensions of Solenoid Valve, 2-, 3-port (mm)

**111E1**

- Manual override
- Non-locking type: Standard
- Locking protruding type: -83

- Mounting hole: 2-M2.6 X 0.45
- Countersink ø 4 Depth 3
- Mounting thread: 3-M5 X 0.8

- Mounting base: 110-21

**A111E1-25**

- Manual override
- Non-locking type: Standard

- Locking protruding type: -83

- Mounting hole: 2- ø 3.2

**Additional Parts (To be ordered separately)**

- Mounting base: **110-21**
- Muffler: **110-MUFF**
- Speed controller: **110-SC**

**Mounting base**

- 110-BASE

**Muffler**

- KM-05
- KM-11

**Speed controller**

- SCE-M5
- SCE-01

For direct piping:

- KM-05

For sub-base piping:

- KM-11
- SCE-M5
- SCE-01

For options and made to order, see p.306.

**Exhaust center**

113-4E2-13

113-4KE2-13

**Pressure center**

113-4E2-14

113-4KE2-14

For options and made to order, see p.306.
Dimensions of Solenoid Valve 5-port, 2-, 3-position (mm)

110-4E1

Approximately 20

Manual override
Non-locking type: Standard
Locking protruding type: -03

5-M5 X 0.8

2-φ 2.8 Counterbore
5.4 Depth 3
Mounting hole

A110-4E1-25

Approximately 30

Manual override
Non-locking type: Standard
Locking protruding type: -03

5-Rc1/8

2-M5 X 0.8

2-φ 3.2
Mounting hole

110-4E2

Approximately 20

Manual override
Non-locking type: Standard
Locking protruding type: -03

5-M5 X 0.8

2-φ 2.8 Counterbore
5.4 Depth 3
Mounting hole

A110-4E2-25

Approximately 30

Manual override
Non-locking type: Standard
Locking protruding type: -03

5-Rc1/8

2-M5 X 0.8

2-φ 3.2
Mounting hole

113-4E2

Approximately 20

Manual override
Non-locking type: Standard
Locking protruding type: -03

5-M5 X 0.8

2-φ 2.8 Counterbore
5.4 Depth 3
Mounting hole

A113-4E2-25

Approximately 30

Manual override
Non-locking type: Standard
Locking protruding type: -03

5-Rc1/8

2-M5 X 0.8

2-φ 3.2
Mounting hole
### Additional Parts (To be ordered separately)

- **Mounting base**: 110-21
- **Muffler**: 110-MUFF
- **Speed controller**: 110-SC

**Remarks**
- For direct piping: KM-05
- For sub-base piping: KM-11
- For direct piping: SCE-M5
- For sub-base piping: SCE-01

### Options

- **With quick fittings (2-, 3-port):**
  - -J41 (For 4 tube, 2(A) or 4(A) port with fittings)
  - -J42 (For 4 tube, 1(P), 2(A) ports with fittings)
  - -J61 (For 6 tube, 2(A) or 4(A) port with fittings)
  - -J62 (For 6 tube, 1(P), 2(A) ports with fittings)

  The drawing shows the -J42 specification.

- **With quick fittings (5-port):**
  - -J42 (For 4 tube, 4(A), 2(B) ports with fittings)
  - -J43 (For 4 tube, 1(P), 4(A), 2(B) ports with fittings)
  - -J62 (For 6 tube, 4(A), 2(B) ports with fittings)
  - -J63 (For 6 tube, 1(P), 4(A), 2(B) ports with fittings)

  The drawing shows the -J43 specification.

- **Locking protruding type manual override**: -83
- **With quick fittings (2-, 3-port):**
  - -J41, -J42: 8.8
  - -J61, -J62: 9.5

- **Solenoid with DIN connector**: -39
- **Solenoid with straight connector**: -PSL
- **Solenoid with L connector**: -PLL
- **Solenoid with LED indicator**: -L
- **Built-in interface unit**: -FA

**Note**: PR is on the side with the A port.

### Made to Order

- **Solenoid with DIN connector**: -39
- **Solenoid with LED indicator**: -L
- **Built-in interface unit**: -FA

**Remark**: Valves with quick fittings do not have 2-3.2 side mounting holes. Moreover, the quick fittings are the following types:

- TSK4-M8 (for 4 tube), TSK6-M8 (for 6 tube)

**Dimensions (mm)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Code</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>D'</th>
<th>( \ell ) (lead wire length)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>111E1, A111E1-25</td>
<td>82.5, 75.5</td>
<td>90.6</td>
<td>77</td>
<td>77.2</td>
<td>-PSL,-PLL: 300</td>
<td>Overall length to the end of the valve or sub-base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>110-4E1</td>
<td>88.5</td>
<td>81.5</td>
<td>96.6</td>
<td>83</td>
<td>83.2</td>
<td>Made to order</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A110-4E1-25</td>
<td>94.5</td>
<td>87.5</td>
<td>102.6</td>
<td>89</td>
<td>89.2</td>
<td>-1L: 1000</td>
<td>Overall length to the end of the opposite side solenoid</td>
<td></td>
</tr>
<tr>
<td>110-4E2, A110-4E2-25</td>
<td>134</td>
<td>120</td>
<td>150.2</td>
<td>123</td>
<td>123.4</td>
<td>-3L: 3000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>113-4E2, A113-4E2-25</td>
<td>146</td>
<td>132</td>
<td>162.2</td>
<td>135</td>
<td>135.4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dimensions of Tandem Solenoid Valve 5-port, 2-position (mm)

**A110-4ME2-25-PSL**

**A110-4ME2-25-PLL**

### Options

- Locking protruding type: -83
- Locking manual lever type: -84
Dimensions of Tandem Solenoid Valve 5-port, 3-position (mm)

A113-4ME2-25-PSL

A113-4ME2-25-PLL

Options

- Locking protruding type: -83
- Locking manual lever type: -84
### Dimensions of Manifold for 2-, 3-port Valves (mm)

#### 111M□F

**Unit dimensions**

<table>
<thead>
<tr>
<th>Model</th>
<th>L</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>111MCF</td>
<td>48</td>
<td>41</td>
</tr>
<tr>
<td>3F</td>
<td>64</td>
<td>57</td>
</tr>
<tr>
<td>4F</td>
<td>80</td>
<td>73</td>
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<tr>
<td>5F</td>
<td>96</td>
<td>89</td>
</tr>
<tr>
<td>6F</td>
<td>112</td>
<td>105</td>
</tr>
<tr>
<td>7F</td>
<td>128</td>
<td>121</td>
</tr>
<tr>
<td>8F</td>
<td>144</td>
<td>137</td>
</tr>
<tr>
<td>9F</td>
<td>160</td>
<td>153</td>
</tr>
<tr>
<td>10F</td>
<td>176</td>
<td>169</td>
</tr>
<tr>
<td>11F</td>
<td>192</td>
<td>185</td>
</tr>
<tr>
<td>12F</td>
<td>208</td>
<td>201</td>
</tr>
<tr>
<td>13F</td>
<td>224</td>
<td>217</td>
</tr>
<tr>
<td>14F</td>
<td>240</td>
<td>233</td>
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<tr>
<td>15F</td>
<td>256</td>
<td>249</td>
</tr>
<tr>
<td>16F</td>
<td>272</td>
<td>265</td>
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<tr>
<td>17F</td>
<td>288</td>
<td>281</td>
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<tr>
<td>18F</td>
<td>304</td>
<td>297</td>
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<tr>
<td>19F</td>
<td>320</td>
<td>313</td>
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<tr>
<td>20F</td>
<td>336</td>
<td>329</td>
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</table>

#### 111M□A

**Unit dimensions**

<table>
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<tr>
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<th>L</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>111M2A</td>
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<tr>
<td>3A</td>
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<td>5A</td>
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<td>6A</td>
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<td>320</td>
<td>313</td>
</tr>
<tr>
<td>20A</td>
<td>336</td>
<td>329</td>
</tr>
</tbody>
</table>
**Options**

- With quick fitting (2-, 3-port):
  - J41 (For 4 tube, 2(A) or 4(A) port with fitting)
  - J61 (For 6 tube, 2(A) or 4(A) port with fitting)

Note: PR is on the A port side.

- With quick fittings (5-port):
  - J42 (For 4 tube, 4(A), 2(B) ports with fittings)
  - J62 (For 6 tube, 4(A), 2(B) ports with fittings)

Note: PR is on the side with the 4(A), 2(B) ports.

**Remark:** Valves with quick fittings do not have 2- φ3.2 side mounting holes. Moreover, the quick fittings are the following types:

- TSK4-M8M (for 4 tube), TSK6-M8M (for 6 tube)

**Unit dimensions**

<table>
<thead>
<tr>
<th>Model</th>
<th>L</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>111M2AJ</td>
<td>48</td>
<td>41</td>
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<tr>
<td>3AJ</td>
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</tr>
<tr>
<td>9AJ</td>
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<td>10AJ</td>
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<td>320</td>
<td>313</td>
</tr>
<tr>
<td>20AJ</td>
<td>336</td>
<td>329</td>
</tr>
</tbody>
</table>

**Made to Order**

- Solenoid with DIN connector: -39

**Other options**

- Solenoid with straight connector: -PSL
- Solenoid with L connector: -PLL
- Built-in interface unit: -FA
- Quick fitting
- Block-off plate (BP)

**Notes:**

- PR is on the A port side.
- Locking protruding type manual override: -83
- With quick fittings (5-port):
  - J42 (For 4 tube, 4(A), 2(B) ports with fittings)
  - J62 (For 6 tube, 4(A), 2(B) ports with fittings)

**Remark:** All models include a locknut on the side with the 4(A), 2(B) ports.
**Dimensions of Manifold for Combination Mounting of 2-, 3-, 5-port Valves (mm)**

### 110M F

**Unit dimensions**

<table>
<thead>
<tr>
<th>Model</th>
<th>L</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>110M2F</td>
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<tr>
<td>3F</td>
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**Example of combination mounting with twin solenoid valves**

### 110M FE

**Unit dimensions**

<table>
<thead>
<tr>
<th>Model</th>
<th>L</th>
<th>P</th>
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<tr>
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<tr>
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For options and made to order, see p.310.
For options and made to order, see p.310.
Dimensions of Manifold for Combination Mounting of Tandem Solenoid and 2-, 3-, 5-port Valves (mm)

110M□A

Unit dimensions

<table>
<thead>
<tr>
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<tbody>
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110M□AJ

Unit dimensions

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<td>313</td>
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<tr>
<td>20A</td>
<td>336</td>
<td>329</td>
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</tbody>
</table>
Made to Order
The 110 series Solenoid Valves include a variety of made to order solenoids for application in a wider range of control and wiring types.

Plug connector

- Straight connector with LED indicator
  - Without lead wire
  - Connector and contacts included

- L connector with LED indicator
  - Without lead wire
  - Connector and contacts included

When ordering, enter -PSLN or -PSLL in place of the normal option code for the wiring type.

DIN connector

A compact connector that is highly resistant to dust and water splashes. Employs a self-stripping method that eliminates the need for de-sheathing the lead wire.

- When ordering, enter -39 in place of the normal option code for the wiring type.
- A varistor for surge suppression is also equipped.
  (For the AC100V and AC200V only. For DC12V and DC24V, a flywheel diode for surge suppression is installed as standard equipment.)
- LED indicator is not available.

Wiring instructions

- Solenoid with DIN connector
  When de-sheathing (only the outer sheath of the cabtyre), pay attention to the lead wire direction. The cover will be easily mounted when the lead wire on the outer side of the terminal cover is set about 8mm [0.31in.] longer than the inner side.
  Without stripping off the sheath, insert the lead until it contacts the lead wire stopper on the terminal body, and then place the contact from the upper side. Then use pliers to press the lead wire further to ensure that the contact is firmly touching the core wire.

- LED indicator
  The LED indicator for confirmation of operation is also available without a plug connector. This creates a clean monoblock look with a compact cover.

When ordering, enter -L in place of the normal option code for the wiring type.
- A varistor for surge suppression is also equipped.
  (For the AC100V and AC200V only. For the DC12V and DC24V, a flywheel diode for surge suppression is installed as standard equipment.)
Includes an interface unit with a photo transistor. Can be directly controlled by a microcomputer and logic chip, and is equipped with full electric noise countermeasures and LED indicators.

- When ordering, enter -FA in place of the normal option code for the wiring type.
- Cannot be ordered in combination with any other solenoid option.
- Rated voltages for the solenoid are AC100V and AC200V only.

**Block diagram**

The interface unit is a triac with a photo coupler. Applying DC5V to the input terminals when AC power is applied on the solenoid side causes the LED inside the unit to light up, turns on the triac, and energizes the solenoid. At this time, an LED indicator turns on. When the input side voltage reaches 0V, the LED inside the unit shuts off, the triac is turned off, and the solenoid is de-energized. At this time, the LED indicator is turned off.

With a built-in zero-cross circuit, the zero-cross voltage is used to turn off the LED indicator is turned off.

The operation and return times of the interface unit are 10ms or less.

5. The operation and return times of the interface unit are 10ms or less with a 50Hz AC power supply, and 8ms or less with a 60Hz AC power supply.

---

### Solenoid Specifications for Valve with Built-in Interface Unit

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
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<tbody>
<tr>
<td>Rated voltage</td>
<td>AC V</td>
</tr>
<tr>
<td>Voltage range</td>
<td>100</td>
</tr>
<tr>
<td>Current</td>
<td>mA</td>
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<tr>
<td>Leakage</td>
<td>mΩ</td>
</tr>
<tr>
<td>Surge</td>
<td>V</td>
</tr>
<tr>
<td>Color of lead wire</td>
<td></td>
</tr>
<tr>
<td>Color of LED indicator</td>
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</table>

**Wiring instructions**

1. Separate the input side and solenoid side lead wires by color. Never apply AC power/6VDC or more to the input side.
2. Ensure that voltage ripple on the input side remains within the range shown below.
3. Even when a wrong polarity is applied to the input side, a built-in diode for protection against reverse polarity eliminates any worry about short circuiting. The valve will not operate, however.
4. A varistor and condenser are built-in in the solenoid power supply side, for protection circuit against external surge voltages. As a result, there is a 0.3mA leakage current in AC100V, and a 0.6mA leakage current in AC200V.
5. The operation and return times of the interface unit are 10ms or less with a 50Hz AC power supply, and 8ms or less with a 60Hz AC power supply.
Air-piloted valves 110 series

The ideal air valve for master valves or pilot valves for total pneumatic control.

### Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Basic model</th>
<th>Port size</th>
<th>Media</th>
<th>Operation type</th>
<th>Number of positions and ports</th>
<th>Effective area (cm²)</th>
<th>Note 1</th>
<th>Pilot line length L m (ft.)</th>
<th>Note 2</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>110-4A</td>
<td>110-4A2</td>
<td>A110-4A</td>
<td>A110-4A2</td>
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<tr>
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<td>Pilot line length L m (ft.)</td>
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#### Operating conditions

- Minimum Pilot Pressure
  - F type manifold
    - P, R manifold piping
      - 4(A), 2(B)
        - 3(P), 3(R2), 5(R1)
      - 3(P), 3(R2), 5(R1)
    - 4(A), 2(B) valve piping
      - 1(P), 3(R2), 5(R1)
      - 3(P), 3(R2), 5(R1)
    - All ports manifold piping
      - 1(P), 3(R2), 5(R1)
      - 3(P), 3(R2), 5(R1)
  - A type manifold
    - All ports manifold piping
      - 1(P), 3(R2), 5(R1)

#### Manifold Specifications and Port Size

<table>
<thead>
<tr>
<th>Manifold model</th>
<th>Specifications</th>
<th>Port</th>
<th>Port size</th>
</tr>
</thead>
<tbody>
<tr>
<td>F type</td>
<td>P, R manifold piping</td>
<td>Rct1/8</td>
<td>M5×0.8 or quick fitting (Valve order code: -J42)</td>
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<tr>
<td></td>
<td>4(A), 2(B)</td>
<td>Rct1/8</td>
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<tr>
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<td>3(P), 3(R2), 5(R1)</td>
<td>Rct1/8</td>
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<tr>
<td>A type</td>
<td>All ports manifold piping</td>
<td>Rct1/8</td>
<td></td>
</tr>
<tr>
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<td>4(A), 2(B)</td>
<td>Rct1/8</td>
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<tr>
<td></td>
<td>3, 5(R)</td>
<td>Rct1/4</td>
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<tr>
<td>AJ type</td>
<td>A, B ports built-in quick fittings</td>
<td>Rct1/8</td>
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<td>All ports manifold piping</td>
<td>Rct1/4</td>
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<td>-J4</td>
<td>Quick fitting for ø 4 tube</td>
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<td>3, 5(R)</td>
<td>-J6</td>
<td>Quick fitting for ø 6 tube</td>
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</table>

#### Minimum Pilot Pressure

- MPa [kgf/cm²] [psi.]
  - F type manifold
    - 110-4A
      - 0.15 (1.5) [22]
      - 0.3 (3.0) [44]
      - 0.5 (5.1) [73]
      - 0.7 (7.1) [102]
    - 110-4A2
      - 0.08 (0.8) [12]
      - 0.10 (1.0) [15]
      - 0.12 (1.2) [17]
      - 0.14 (1.4) [20]

#### Required Time for Switching

<table>
<thead>
<tr>
<th>Model</th>
<th>Operation</th>
<th>Pilot line length L m [ft.]</th>
</tr>
</thead>
<tbody>
<tr>
<td>110-4A</td>
<td>ON</td>
<td>0.06, 0.14, 0.26, 0.63, 2.30, 6.54</td>
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<tr>
<td></td>
<td>OFF</td>
<td>0.12, 0.33, 0.67, 1.65, 6.30, 19.50</td>
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<tr>
<td>A110-4A2</td>
<td>ON</td>
<td>0.07, 0.16, 0.29, 0.70, 2.66, 7.40</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
<td></td>
</tr>
</tbody>
</table>

For direct piping, F type manifold

For direct piping, A, AJ type manifold

For sub-base, A, AJ type manifold

For sub-base, A, AJ type manifold

Note 1: For details, see the effective area.

Note 2: For details, see the port size.

### Remarks

- Attaching TS4-40 to the 1(P), 4(A), 2(B) ports gives the value 5 (at 0°C).
- In the F type manifold, attaching TS4-40 to the 4(A) or 2(B) ports gives the value 2 (at 0°C).
- When large flow rates are required, we recommend the built-in quick fitting.

#### Manifold Mass

<table>
<thead>
<tr>
<th>Manifold model</th>
<th>Mass calculation of each unit (number of units)</th>
<th>Mounting valve</th>
<th>g [oz.]</th>
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</thead>
<tbody>
<tr>
<td>F type</td>
<td>(33X4+16) (7.0X1X16)</td>
<td>110-4A</td>
<td>40 [1.41]</td>
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<td>(45X4+16)</td>
<td>110-4A2</td>
<td>45 [1.59]</td>
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<td>(45X4+16)</td>
<td>A110-4A</td>
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<td>(45X4+16)</td>
<td>A110-4A2</td>
<td></td>
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<tr>
<td>A type</td>
<td>(23X4+16)</td>
<td></td>
<td>45 [1.59]</td>
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<td></td>
<td>(23X4+16)</td>
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<td>50 [1.76]</td>
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</tbody>
</table>

#### Minimum Pilot Pressure

- MPa [kgf/cm²] [psi.]
  - Model 110-4A
    - 0.15 (1.5) [22]
    - 0.3 (3.0) [44]
    - 0.5 (5.1) [73]
    - 0.7 (7.1) [102]
  - Model 110-4A2
    - 0.08 (0.8) [12]
    - 0.10 (1.0) [15]
    - 0.12 (1.2) [17]
    - 0.14 (1.4) [20]

Calculation example: The mass of 110M 10F str.1~5 110-4A, str.6~10 110-4A2 becomes (20X10)+30+40X5)+45X5)=655g [23.10 oz.]

For optional specifications and order codes, see p.301~302.
Cylinder Operating Speed and Flow Rate

**110-4A**

- **Measurement conditions**
  - Air pressure: 0.5MPa (5.1kgf/cm²) [73psi]
  - Piping inner diameter and length: 4 [0.16in.]
  - Cylinder stroke: 150mm [5.91in.]
  - Cylinder theoretical thrust (%)
  - Load ratio = Cylinder theoretical thrust (%)

- **Maximum operating speed**

- **Load**
  - Load ratio = Cylinder theoretical thrust (%)
  - Cylinder stroke: 150mm [5.91in.]

- **Flow rate**

**A110-4A-25**

- **Measurement conditions**
  - Air pressure: 0.5MPa (5.1kgf/cm²) [73psi]
  - Piping inner diameter and length: 4 [0.16in.]
  - Cylinder stroke: 150mm [5.91in.]

- **Maximum operating speed**

- **Load**
  - Load ratio = Cylinder theoretical thrust (%)

**Flow rate**

**How to read the graph**

When the supply pressure is 0.5MPa [73psi] and the flow rate is 210 R/min [7.41ft³/min], the valve outlet pressure becomes 0.4 MPa [58psi].

---

**Operating Principles and Major Parts**

**5-port, 2-position**

**110-4A**

- **Normal state**
  - Body
  - Stem
  - Pilot connection port
  - Piston

- **Operating state**
  - Body
  - Stem

**110-4A2**

- **Condition with pilot air applied to 12(PB), and then released**
  - Body
  - Stem

---

**Major Parts and Materials**

<table>
<thead>
<tr>
<th>Parts</th>
<th>Materials</th>
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</thead>
<tbody>
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<td>Body</td>
<td>Aluminum alloy</td>
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<tr>
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<td>(anodized)</td>
</tr>
<tr>
<td>Stem</td>
<td>Mild steel</td>
</tr>
<tr>
<td>Lip seal</td>
<td>Synthetic rubber</td>
</tr>
<tr>
<td>Mounting base</td>
<td>Zinc plated</td>
</tr>
<tr>
<td>Sub-base</td>
<td>Aluminum alloy</td>
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<tr>
<td></td>
<td>(anodized)</td>
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</table>
### Options

**Mounting base:** -21

**With quick fittings:**
- **-J42** (For 4 tube, 4(A), 2(B) ports with fittings)
- **-J43** (For 4 tube, 1(P), 4(A), 2(B) ports with fittings)
- **-J62** (For 6 tube, 4(A), 2(B) ports with fittings)
- **-J63** (For 6 tube, 1(P), 4(A), 2(B) ports with fittings)

The drawing shows the **-J43** specification.

**Speed controller:** -70

**Muffler:** -75
Dimensions of Air-piloted 5-port, 2-position Valve (mm)

Options

- Sub-base: -25
- Speed controller: -70
Handling Instructions and Precautions

**Solenoid**

**Internal circuit**

**DC12V, DC24V**

**Standard solenoid (Surge suppression)**

<table>
<thead>
<tr>
<th>Lead wire: DC12V: Brown</th>
<th>DC24V: Red</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flywheel diode</td>
<td></td>
</tr>
</tbody>
</table>

Order code: (Surge suppression)

Solenoid with LED indicator

Order code: -PSL, -PLL

**AC100V, AC200V**

**Standard solenoid (Surge suppression)**

<table>
<thead>
<tr>
<th>Lead wire</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC100V: Yellow</td>
<td>DC12V: Brown</td>
</tr>
<tr>
<td>AC200V: White</td>
<td>DC24V: Red</td>
</tr>
</tbody>
</table>

Order code: -PML, -PLL

Solenoid with LED indicator

Order code: -PSL, -PLL

**DC24V**

**Tandem solenoid**

- **Order code:** -39
  - ①: COM
  - ②: LED indicator
  - ③: Solenoid

Cautions:
1. Do not apply megger between the lead wires.
2. The DC solenoid will not short circuit even if the wrong polarity is applied, but the valve will not operate.
3. Leakage current inside the circuit could result in failure of the solenoid valve to return, or in other erratic operation. Always use it within the range of the allowable leakage current. If circuit conditions, etc. cause the leakage current to exceed the allowable leakage current, consult us.
4. For double solenoid and twin solenoid, avoid energizing both solenoids simultaneously. The valve could fall into a neutral position.

**Plug connector**

**Attaching and removing plug connector**

Use fingers to insert the connector into the pin, push it in until the lever claw latches onto the protruded section of the connector housing, and complete the connection.

To remove the connector, squeeze the lever along with the connector, lift the lever claw up from the protruded section of the connector housing, and pull it out.

Cautions: 1. Do not pull hard on the lead wire. It could result in defective contacts, breaking wires, etc.
2. If the pin is bent, use a small screwdriver, etc. to gently straighten out the pin, and then complete the connection to the plug connector.

**Common terminal pre-wired plug connector**

1. **Pre-wired common terminal at DC positive side or AC.**

Order code: -CPSL

With straight connector: -CPLL

2. **Pre-wired common terminal at DC negative side**

Order code: -CMLL

With L connector: -CMLL

- **CROSSOVER TERMINAL**
  - **Order code**
  - With straight connector
  - With L connector
  - **Color**

Cautions:
1. The diagrams show the straight connector configuration.
   While the connector’s orientation is different in the case of the L connector, in every case the first COM lead wire comes from the last station’s mounted valve.
2. Since the COM terminal is connected to a crossover terminal inside the connector housing, the connector cannot be switched between a positive common and a negative common by changing the connectors.

321
**Manual override**

**Non-locking type**

To operate the manual override, press it all the way down. The single solenoid valve works the same as when in the energized state as long as the manual override is pushed down, and returns to the normal position upon release.

For the double solenoid and twin solenoid valves, pressing the manual override on the 12(S1) side switches the 12(S1) to enter the energized position, and the unit remains in that state even after the manual override is released. To return it to the normal position, operate the manual override on the 14(S2) side. This is the same for the solenoid 14(S2).

[Image of manual override with illustration showing the 110 series.]

**Locking protruding type**

Use a small screwdriver to turn the adjusting knob several times in the clockwise direction, and lock the manual override in place. When locked, turning the adjusting knob several times in the counterclockwise direction releases a spring on the manual override, returns it to the normal position, and releases the lock.

For the locking protruding type, when the adjusting knob is not turned, this type acts just like the non-locking type, like the valve is the energized position as long as the manual override is pushed down, and it returns to the normal position upon release.

[Image of locking protruding type manual override with illustration showing the 110 series.]

**Locking type (Tandem solenoid)**

To lock the locking type manual override, use a small screwdriver to push down the manual override in all the way, then set the 0 position as the reference point and turn it in the clockwise direction as far as position A. This achieves the same conditions as when the 14(SA) side is energized, and the manual override is locked in place. For the 12(SB) side, turn it in the counterclockwise direction as far as position B. To release the lock, return the manual override to the 0 position. A spring mechanism returns the manual override to its normal position, and the lock is released. Care should be taken to avoid excessive turning of the manual override, which could damage it.

[Image of locking type manual override with illustration showing the 110 series.]

**Cautions:**

1. The 110 series valves are internal pilot type solenoid valves. As a result, the manual override cannot switch the main valve without air supplied from the 1(P) port.
2. Always release the lock of the locking protruding type manual override before commencing normal operation.
3. Do not attempt to operate the manual override with a pin or other object having an extremely fine tip. It could damage the manual override button.
4. Do not turn the adjusting knob more than needed. It could result in defective operation.

**Mounting base 110-21**

When installing a mounting base to the valve, always use the provided screws. The recommended tightening torque for the screws is 49N·cm (5kgf·cm) [4.3in-lbf].

**Mounting valves on manifold**

When mounting valves on manifold, apply the recommended tightening torque of 39.2N·cm (4kgf·cm) [3.5in-lbf] for the valve mounting screws.
**PC Board Manifold 110 Series Specifications**

### Manifold Basic Models and Specifications

<table>
<thead>
<tr>
<th>Basic model</th>
<th>Manifold function</th>
<th>Number of units</th>
<th>All port manifolds</th>
<th>All port manifolds with quick fittings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>110M8FP</td>
<td>2 stations</td>
<td>110M8AP</td>
<td>110M8APJ</td>
</tr>
<tr>
<td>2-, 3-port</td>
<td>110-4E1</td>
<td>16 stations</td>
<td>110M16FP</td>
<td>110M16AP</td>
</tr>
<tr>
<td>5-port, single solenoid</td>
<td>110-4E1</td>
<td></td>
<td>110M16AP</td>
<td>110M16APJ</td>
</tr>
<tr>
<td>5-port, double solenoid</td>
<td>110-4K2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-port, 3-position</td>
<td>113-4E2</td>
<td></td>
<td>113-4K2</td>
<td></td>
</tr>
<tr>
<td>110M16FP</td>
<td>113-4KE2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>113-4E2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>113-4K2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Type of mounting valve**
- Connector for flat cable (AWG 28) [Note1]: With short clip (standard)
- Wiring type: Connector for flat cable (AWG 28) [Note1]: With short clip (standard)
- Common wiring: Positive common (standard)
- Shock resistance: mA [oz.] 590 [20.81]
- Red
- Location of piping port: Note 1: With short clip (standard)
- Port 110-4E2
- A110-4KE2
- Port 110E1
- 113-4E2

**Solenoid Specifications**

**Solenoid Valve Specifications**

<table>
<thead>
<tr>
<th>Item</th>
<th>110E1</th>
<th>110-4E1</th>
<th>110-4E2</th>
<th>110-4KE2</th>
<th>113-4E2</th>
<th>113-4KE2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>Air</td>
<td>Air</td>
<td>Air</td>
<td>Air</td>
<td>Air</td>
<td>Air</td>
</tr>
<tr>
<td>Operation type</td>
<td>Internal pilot type</td>
<td>Internal pilot type</td>
<td>Internal pilot type</td>
<td>Internal pilot type</td>
<td>Internal pilot type</td>
<td>Internal pilot type</td>
</tr>
<tr>
<td>Effective area (Cv)</td>
<td>mm²</td>
<td>4.2 (0.23)</td>
<td>3.8 (0.21)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lubrication</td>
<td>Not required</td>
<td>Not required</td>
<td>Not required</td>
<td>Not required</td>
<td>Not required</td>
<td>Not required</td>
</tr>
<tr>
<td>Operating pressure range MPa/kgf/cm² [psi.]</td>
<td>0.15 ~ 0.7 (1.5 ~ 7.1) [22 ~ 102]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proof pressure MPa/kgf/cm² [psi.]</td>
<td>1.05 (10.7) [152]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time ON/OFF ms</td>
<td>15/20 or below</td>
<td>20 or below</td>
<td>15/30 or below</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum operating frequency Hz</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum time to energy for self holding ms</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**How to read the graph**
When the supply pressure is 0.5 MPa [73 psi] and the flow rate is 210 l/min [7.41 ft³/min] (ANR), the valve outlet pressure becomes 0.4 MPa [58 psi].

**Flow Rate**

<table>
<thead>
<tr>
<th>Pressure (MPa)</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow rate (l/min)</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
<td>600</td>
</tr>
</tbody>
</table>

**Manifold Connection Port Size**

<table>
<thead>
<tr>
<th>Manifold model</th>
<th>Port Location of piping port</th>
<th>Port size</th>
</tr>
</thead>
<tbody>
<tr>
<td>110M8FP</td>
<td>4(A), 2(B) Valve</td>
<td>M5 × 0.8</td>
</tr>
<tr>
<td>110M8AP</td>
<td>3, 5(R)</td>
<td>M5 × 0.8</td>
</tr>
<tr>
<td>110M8JAP</td>
<td>4(A), 2(B) Quick fitting</td>
<td>M5 × 0.8</td>
</tr>
</tbody>
</table>

**Mass**

<table>
<thead>
<tr>
<th>Manifold model</th>
<th>Manifold mass</th>
<th>Mounting valve mass</th>
<th>Block-off plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>110M8FP</td>
<td>240 (8.47)</td>
<td>80 [2.82]</td>
<td>6 [0.21]</td>
</tr>
<tr>
<td>110M8AP</td>
<td>450 (15.87)</td>
<td>85 [2.82]</td>
<td>145 [5.11]</td>
</tr>
<tr>
<td>110M8JAP</td>
<td>590 (20.81)</td>
<td>85 [2.82]</td>
<td>145 [5.11]</td>
</tr>
<tr>
<td>110M16FP</td>
<td>1120 (39.51)</td>
<td>85 [2.82]</td>
<td>145 [5.11]</td>
</tr>
<tr>
<td>110M16AP</td>
<td>1160 (39.51)</td>
<td>85 [2.82]</td>
<td>145 [5.11]</td>
</tr>
<tr>
<td>110M16JAP</td>
<td>1360 (45.99)</td>
<td>85 [2.82]</td>
<td>145 [5.11]</td>
</tr>
</tbody>
</table>

**Specifications of Connector for Flat Cable**

<table>
<thead>
<tr>
<th>Order code</th>
<th>Header</th>
<th>Socket Note</th>
<th>Strain relief Note</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blank</td>
<td>Welded type, with short clip (Part number: 5922-5002SCS)</td>
<td>Open end type, with nose (Part number: 7910-6500SCS)</td>
<td>MIL-C-83503 conformity (made by Sumitomo 3M Ltd.)</td>
<td></td>
</tr>
<tr>
<td>-LC</td>
<td>Welded type, with long clip (Part number: 5922-5002LSCS)</td>
<td>Included (Part number: 3458-7910)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# PC Board Manifold 110 Series Order Codes

## Common wiring
- **Positive common**
- **Negative common**

## Connector
- With short clip
- With long clip

## 2-, 3-port valve
- **Number of ports**
- **Valve function**
- **Pressure center**
- **Exhaust center**

## 3-position valve
- **Valve function**
- **Pressure center**

## Port fitting specifications
- **Quick fittings for # 4 tube**
- **Quick fittings for # 6 tube**

## Manual override
- **Non-locking type**
- **Locking protruding type**

## Wiring type
- **Straight connector with LED indicator**

### 110M
- **PC board manifold for combination mounting of 2-, 3-, 5-port valves**

### 110E1
- **Block-off plate**

### 110-4E1
- **SOLENOID VALVES 110 SERIES**

### 110-4E2
- **Connects to 4(A) port**
- **Mounting position from the left-hand side when facing the 4(A), 2(B) ports.**
- **Since the twin solenoid valve requires 2 stations per valve to mount, the second station (solenoid S1 side) should be blank.**
- **When selecting 110-4E2 or 113-4E2, always enter -BP for the next station.**

### 110-4KE2
- **Mounting position from the left-hand side when facing the 4(A), 2(B) ports.**
- **Since the twin solenoid valve requires 2 stations per valve to mount, the second station (solenoid S1 side) should be blank.**
- **When selecting 110-4E2 or 113-4E2, always enter -BP for the next station.**

### 113-4E2
- **Mounting position from the left-hand side when facing the 4(A), 2(B) ports.**
- **Since the twin solenoid valve requires 2 stations per valve to mount, the second station (solenoid S1 side) should be blank.**
- **When selecting 110-4E2 or 113-4E2, always enter -BP for the next station.**

### 113-4KE2
- **Mounting position from the left-hand side when facing the 4(A), 2(B) ports.**
- **Since the twin solenoid valve requires 2 stations per valve to mount, the second station (solenoid S1 side) should be blank.**
- **When selecting 110-4E2 or 113-4E2, always enter -BP for the next station.**

### Additional Parts (To be ordered separately)
- **Block-off plate**
- **AJP type manifold**

### Made to Order
- **Block-off plate**
- **AJP type manifold**

---

**Remark:**
- **110E1 is 3-port, and normally closed (NC) as the standard.**
- **For 113-4E2, a closed center is standard.**
- **Specify the valve model for each station.**
- **Enter -BP when closing a station with a block-off plate without mounting a valve.**
- **110-4E2 and 113-4E2 cannot be used for the last station.**
- **When mounting 110-4E2 or 113-4E2, always enter -BP for the next station.**
Options

- Locking protruding type manual override: -83
- With quick fittings: -J41 (A port with fitting)
  -J42 (A, B ports with fittings)

The drawing shows the -J42 specification.

Note: PR is on the side with the 4(A), 2(B) ports.
Dimensions (mm)

110M8AP
110M16AP

Unit dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>L</th>
<th>P</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>110M8AP</td>
<td>144</td>
<td>137</td>
<td>108</td>
</tr>
<tr>
<td>110M16AP</td>
<td>272</td>
<td>265</td>
<td>236</td>
</tr>
</tbody>
</table>

Option dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short clip</td>
<td>12.5</td>
</tr>
<tr>
<td>Long clip</td>
<td>15.5</td>
</tr>
</tbody>
</table>

Option

- Locking protruding type manual override: -83
Dimensions (mm)

110M8AJP
110M16AJP

Unit dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>L</th>
<th>P</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>110M8AJP</td>
<td>144</td>
<td>137</td>
<td>108</td>
</tr>
<tr>
<td>110M16AJP</td>
<td>272</td>
<td>265</td>
<td>236</td>
</tr>
</tbody>
</table>

Option dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short clip</td>
<td>12.5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Long clip</td>
<td>15.5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Quick fitting for 4 tube</td>
<td>—</td>
<td>6.8</td>
<td>16.7</td>
</tr>
<tr>
<td>Quick fitting for 6 tube</td>
<td>—</td>
<td>7.5</td>
<td>21.1</td>
</tr>
</tbody>
</table>

Option

- Locking protruding type manual override: -83

Connector for flat cable
With short clip: Standard
With long clip: -LC
Handling Instructions and Precautions
(PC Board Manifold)

Solenoid

Circuit configurations

- For positive common type (standard)
  Operation example

- For negative common type (optional: -CM)
  Operation example

Correspondence to sequencer
Output module is negative common type.

Correspondence to sequencer
Output module is positive common type.

Plug connector

Attaching and removing plug connector

Use fingers to insert the connector into the pin, push it in until the lever claw latches onto the protruded section of the connector housing, and complete the connection.

To remove the connector, squeeze the lever along with the connector, lift the lever claw up from the protruded section of the connector housing, and pull it out.

Cautions:
1. Do not pull hard on the lead wire. It could result in defective contacts, breaking wires, etc.
2. If the pin is bent, use a small screwdriver, etc. to gently straighten out the pin, and then complete the connection to the plug connector.

Connector for flat cable

Dedicated lead wire for PC board assembly

Manifold

Print circuit board

Avoid using in the locations listed below, as it may result in deterioration of the print circuit board or a short circuit in the wiring. If use in such conditions is unavoidable, always provide a cover or other adequate protective measures.

1. Locations subject to high levels of dust or oil mists
2. Locations subject to salt, corrosive gases, or conductive particles
3. Locations directly subject to condensation, direct sunlight, or other weather effects

Combination mounting for different type of valves

In the 110 series manifold for combination mounting of 2-, 3-, 5-port, and the PC board manifold for combination mounting of 2-, 3-, 5-port, single solenoids can be mounted together with double solenoids, or with twin solenoids, and a total number of up to 8 or 16 solenoids can be mounted.

In this case, observe the following precautions:
1. Always use a block-off plate (-BP) to close the next right station (the side with the higher numbered station) of the double solenoid valve mounting station.
2. When using block-off plates (-BP) for some reason other than item 1, place them together on the higher numbered stations side.
3. Connector pin numbers are allocated to stations in order from the left end of the manifold. For a double solenoid mounting, the upper pins are allocated to 14(S2) and the lower ones to 12(S1), with the upper 14(S2) numbers being the smaller pin numbers. And for a twin solenoid mounting, the left side is allocated to 14(S2) and the right side allocated to 12(S1), with the left side 14(S2) numbers being the smaller pin numbers.

Example of 4 single solenoid valves and 2 double solenoid valves installation on an 8 unit manifold:

Example of 3 single solenoid valves and 2 double solenoid valves installation on an 8 unit manifold:

Remark: The standard is positive common wiring. Negative common wiring is optional (-CM).