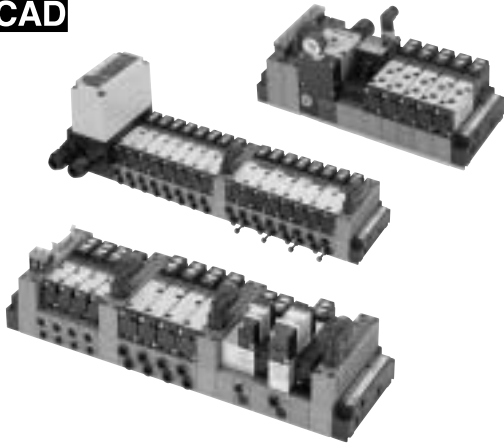




CAD drawing data catalog  
is available.



# KOGANEI

## VALVES GENERAL CATALOG

# FM-SOLID MANIFOLD X88M series INDEX

FM-SOLID MANIFOLD X88M SERIES

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**Caution**

Before use, be sure to read the "Safety Precautions" on p. 31.

A New Era in Manifolds

# FM-SOLID MANIFOLD

## X88M series

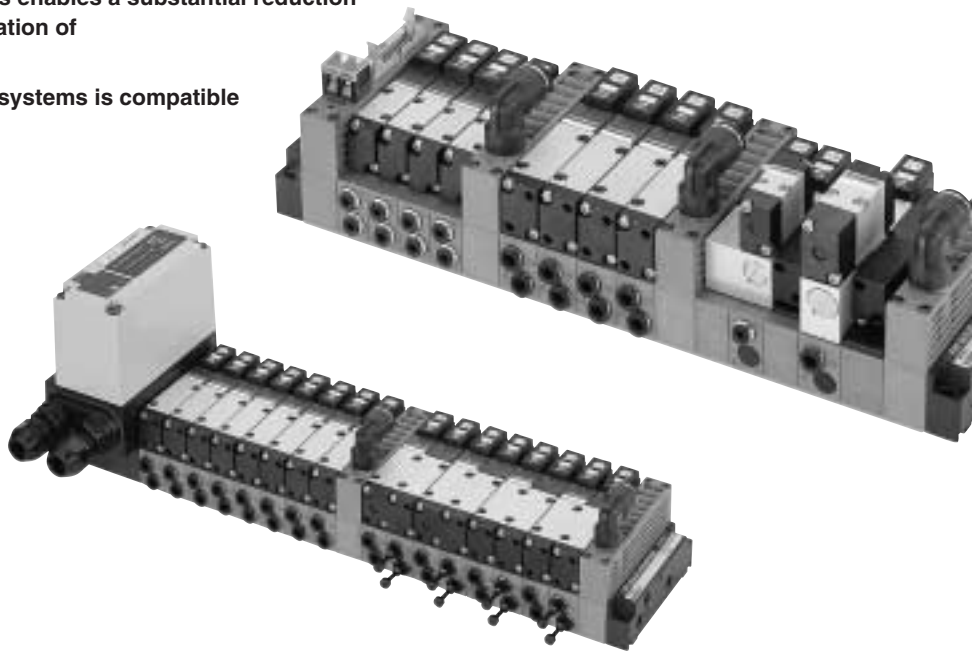
### *Koganei proposes a new solution for pneumatic control systems.*

Today's production lines are experiencing rapid evolution toward more systematic and automated line configurations.

In response to this situation, Koganei offers "an integrated pneumatic world" of components.

One example is the FM-SOLID MANIFOLD, which "modularizes" the functions of the valves, wiring, piping, air preparation, vacuum, serial transmission and so on. You can build a system to meet your production line requirements by selecting and combining the most suitable modules. This enables a substantial reduction in design work and cost due to the high integration of the modules and space saving installation.

Koganei's new solution for pneumatic control systems is compatible with every requirement on the production site.



What is the integrated pneumatic world?

## INTEGRATION

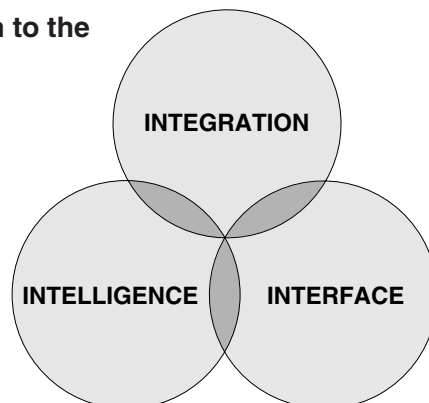
You can construct pneumatic systems without paying extra attention to the connections between various pneumatic components.

## INTELLIGENCE

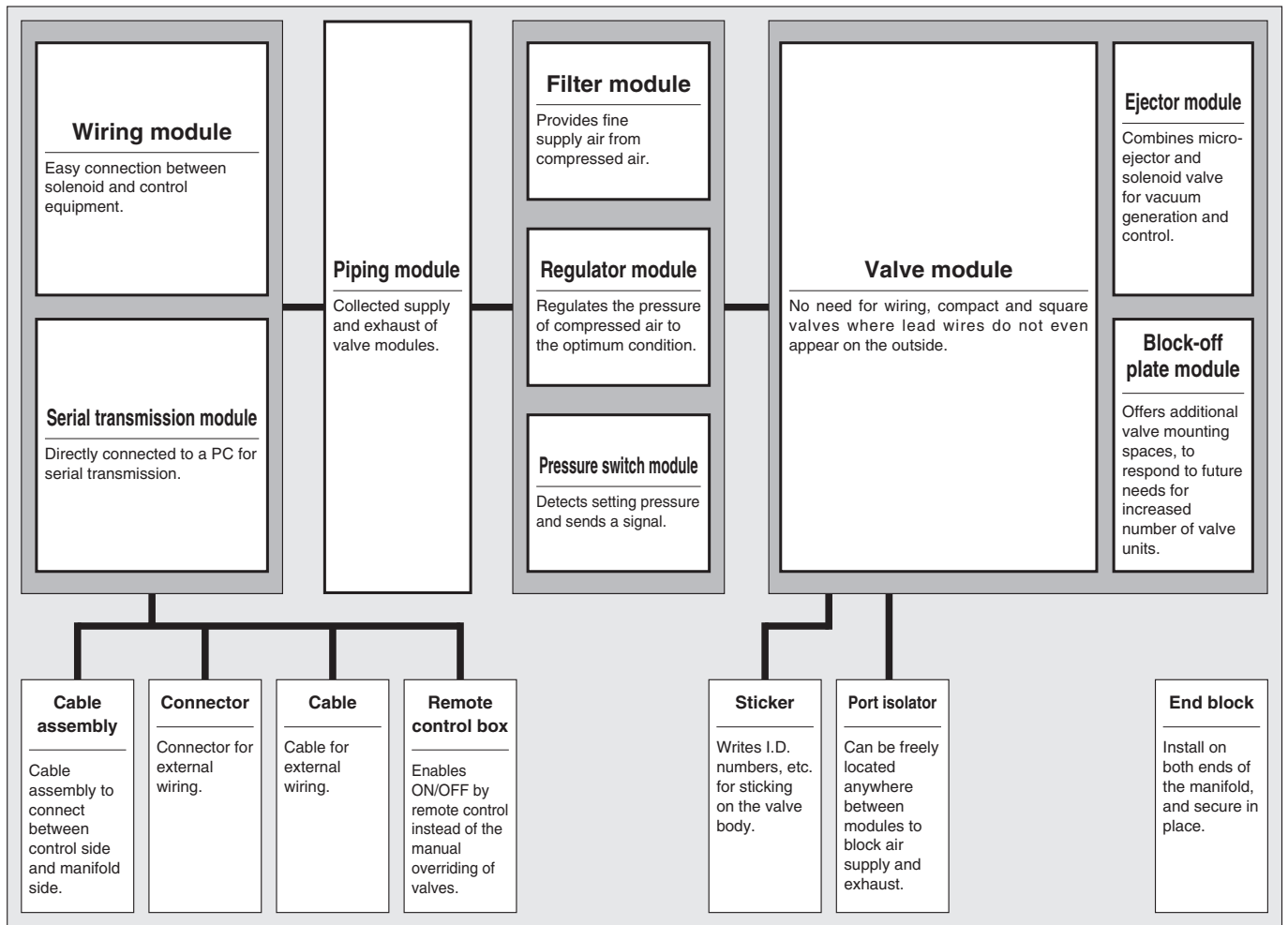
Due to the improved functions of each component, you can decentralize controlling units.

## INTERFACE

You can easily connect various control equipment and peripheral devices.



## Module Configuration Outline

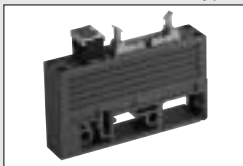


# FM-SOLID MANIFOLD X88M series

## Module Configuration

### Wiring modules, p.441

Flat cable connector type



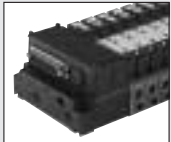
Terminal block type



D-sub connector type



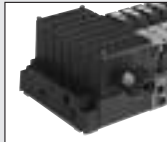
D-sub connector, side connection specification (both R and L mounting)



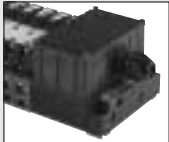
Wiring bushing connection type (left side type)



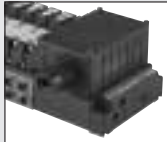
Wiring bushing connection type (lower left side type)



Wiring bushing connection type (right side type)



Wiring bushing connection type (lower right side type)



### Serial transmission modules, p.448

For OMRON PCs



For Mitsubishi Electric PCs



For Fuji Electric FA Components & Systems PCs



For SHARP PCs



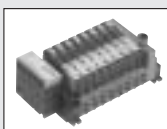
For Hitachi PCs



For Matsushita Electric Works PCs



### Compact serial transmission system, p.450



For OMRON SYSBUS Wire System  
 For OMRON CompoBus/S  
 For OMRON B7A Link Terminal  
 For Mitsubishi Electric MELSECNET/mini-S3  
 For Mitsubishi Electric MELSEC I/O LINK

For Mitsubishi Electric CC-Link

For Fuji Electric FA Components & Systems T Link Mini

For NKE, KURODA PRECISION INDUSTRIES UNI-WIRE® System

For SUNX S-LINK

For KEYENCE KZ-R

For KOYO ELECTRONICS INDUSTRIES SA Bus

※UNI-WIRE® System is a serial parallel transmission system developed jointly by NKE and KURODA PRECISION INDUSTRIES.



For OMRON CompoBus/D

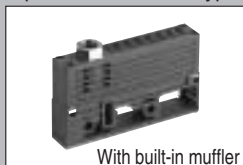
### Piping modules, p.454

Built-in quick fitting type



With built-in muffler

P port female thread type



With built-in muffler

All port female thread type



All port female thread type, side piping specification



### Air preparation modules, p.457

Filter module

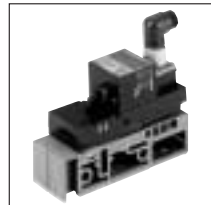


Regulator module

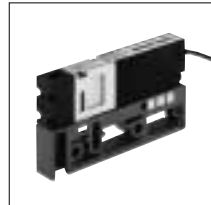


Pressure switch module

Electronic type



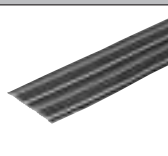
Mechanical type



Cable assembly, p.1039



Connector, p.1040

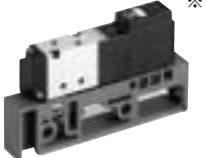
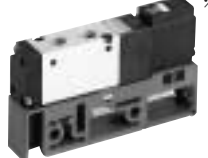


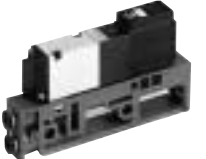
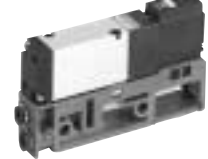






Cable, p.1040



Remote control box, p.1041

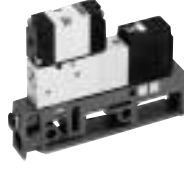

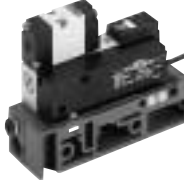
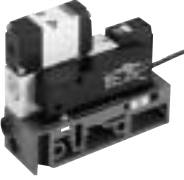


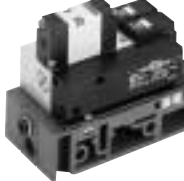

## Valve modules (5-port, 3-port), p.460

|                    | Solenoid valves 110 series<br>(width 15mm [0.591in.])  | Solenoid valves 180 series<br>(width 18mm [0.709in.])  |
|--------------------|--|--|
| Direct piping type | Single solenoid  ※  | Single solenoid  ※  |
|                    | Twin solenoid       | Twin solenoid       |
| Base piping type   | Single solenoid  ※ | Single solenoid  ※ |
|                    | Twin solenoid     | Twin solenoid     |
|                    | Tandem solenoid   | Tandem solenoid   |

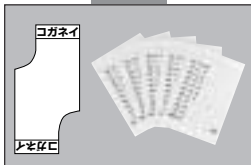
※: 3-port specification is available.

● Voltage: DC12V, DC24V, AC100V, AC200V

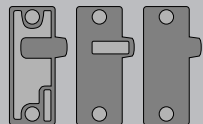
## Ejector modules, p.476

|   | ME05 type   | ME07 type  |
|---|---|--|
| Solenoid valve for control                      | Without vacuum switch                       | Without vacuum switch                       |
|   | With solenoid switch<br>With vacuum switch  | With solenoid switch<br>With vacuum switch  |
| Solenoid valves for control and vacuum breaking | Without vacuum switch                      | Without vacuum switch                      |
|   | With vacuum switch                        | With vacuum switch                        |

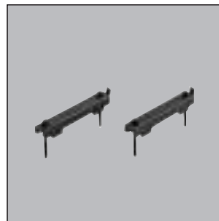
## Block-off plate modules p.481



Sticker, p.433



1 (P), 3, 5(R) port all port block type  
1 (P) port block type  
3, 5(R) port block type



Port isolator, p.433  
DIN rail mounting bracket, p.433

End block module type



End block piping type



With DIN rail mounting bracket type



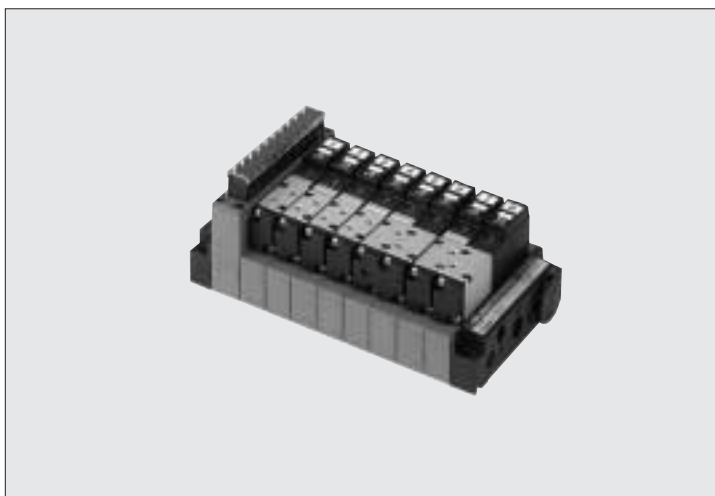
End blocks, p.483

# Examples of FM-SOLID MANIFOLD X88M Configuration

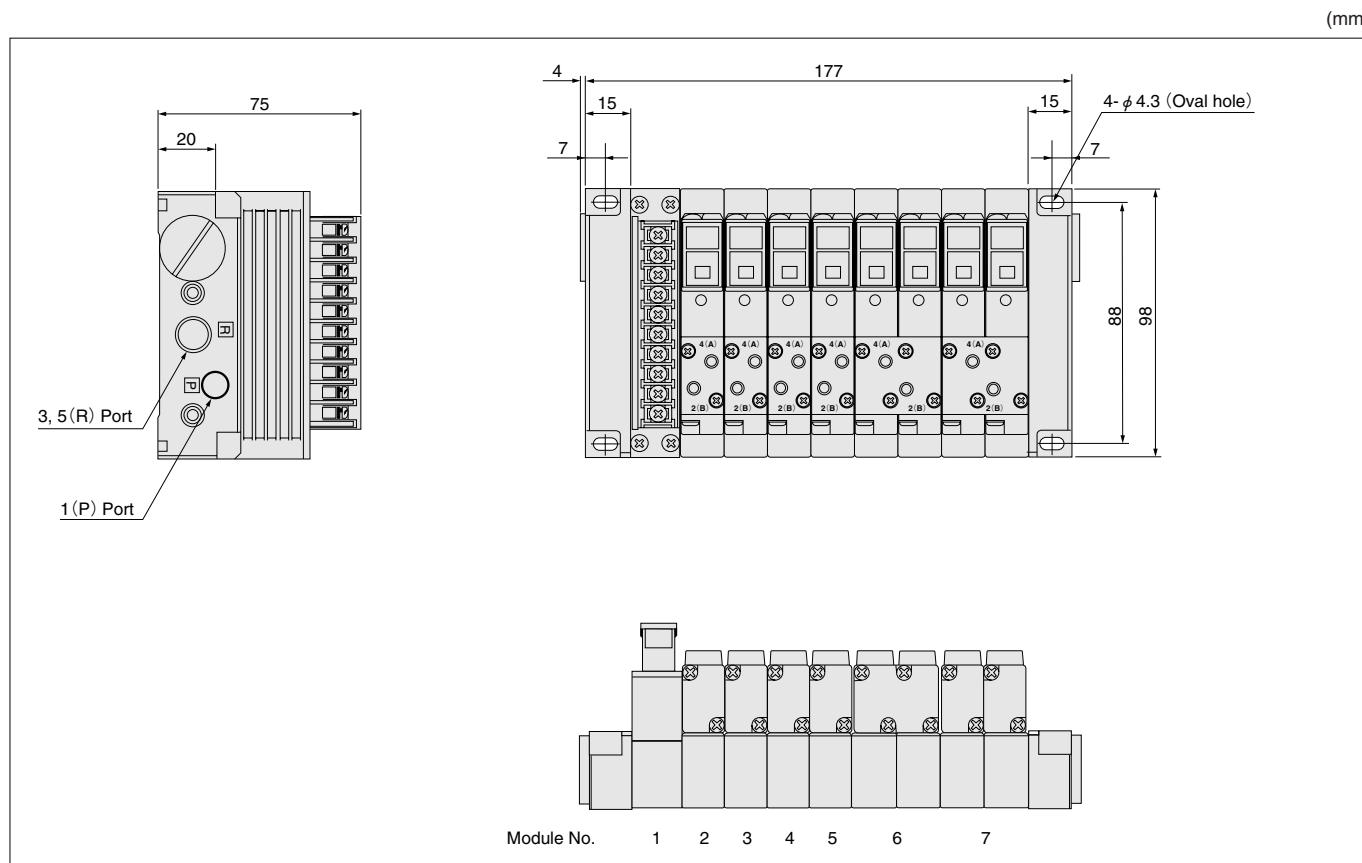
## (Configuration Example 1) Simple, Wire-Saving Type

### Features

- Using end block piping achieves space efficiencies.
- Uses a terminal block type wiring module capable of responding to manifolds with up to 8 solenoids.



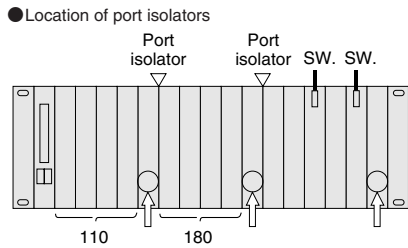
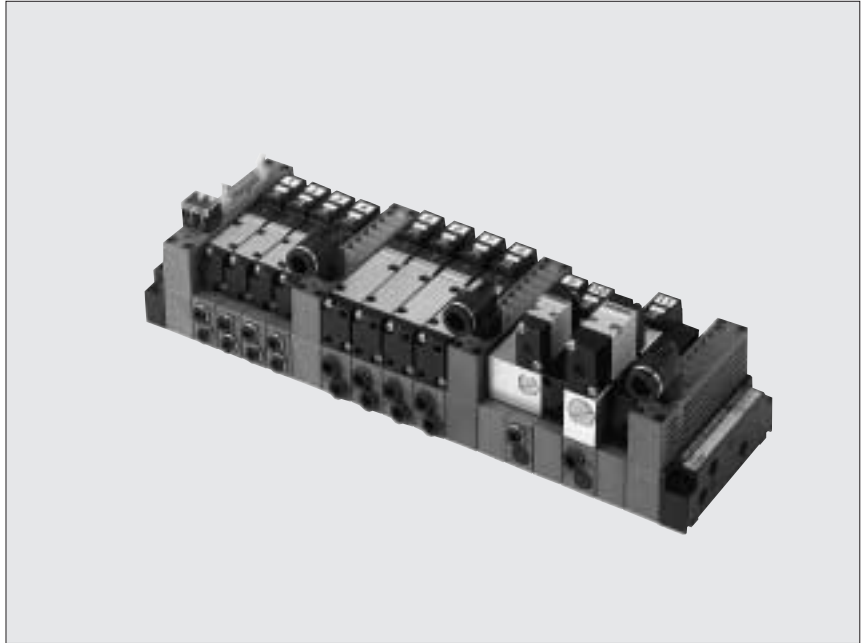
Order code: **X88M-ED** No.1-FMC-T100  
 No.2~5-FMX110-4E1  
 No.6-FMX110-4KE2  
 No.7-FMX113-4KE2



## (Configuration Example 2) 110, 180 and Ejector Combination Mounting Type

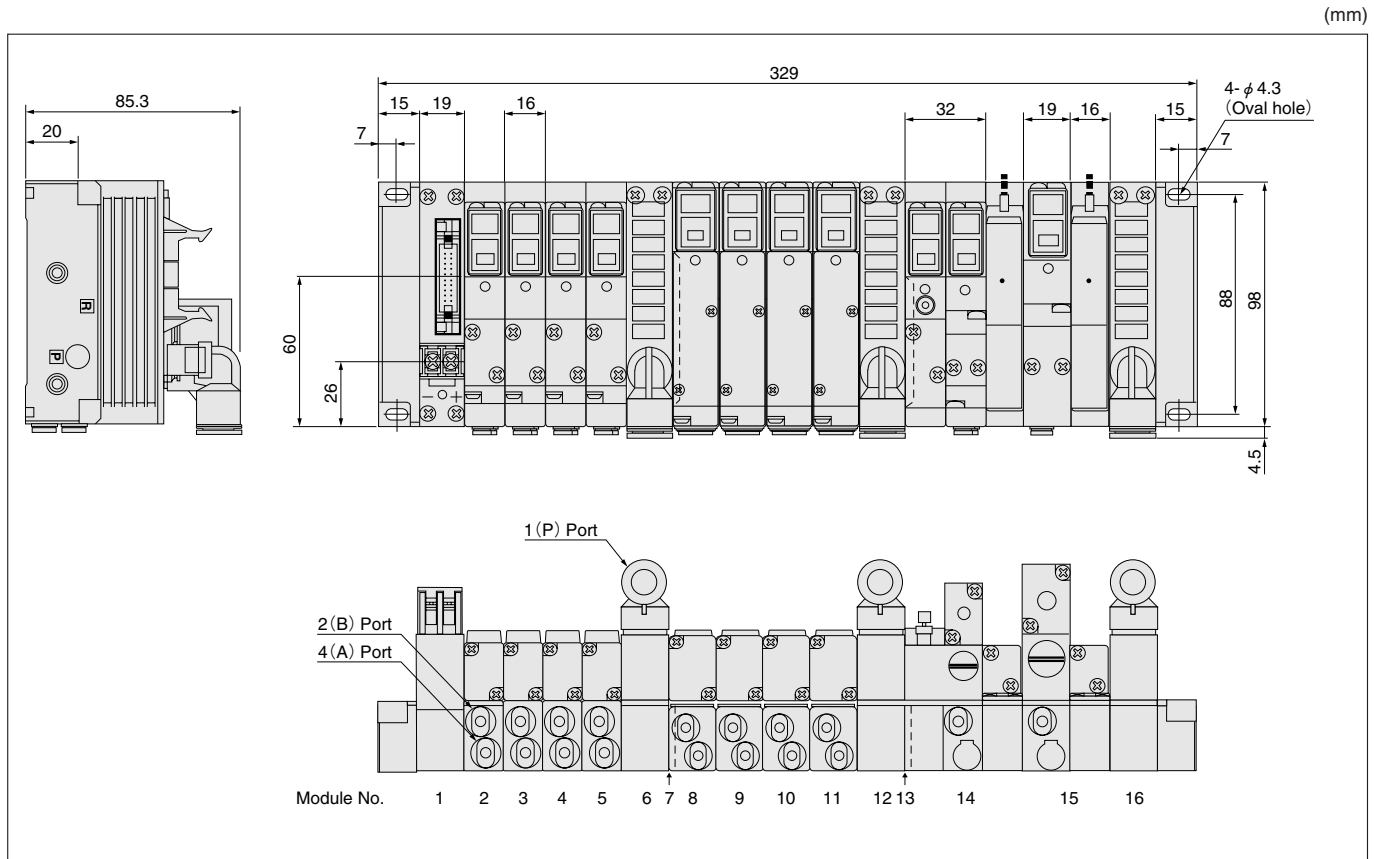
### Features

- Collective wiring for operation signals of valves (110 and 180) and ejectors.
- Using port isolators for the air supply/exhaust between the valves and ejectors, makes individual air supply/exhaust possible, and ensures steady operations of the ejector.
- The vacuum switch sensor signal can be extracted individually.



Order code: **X88M** No.1-FMC-F200  
 No.2~5-FMW110-4E1-J4S  
 No.6-FMP-FJ10L  
 No.7-FMB-A (port isolator)  
 No.8~11-FMW180-4E1-J6S  
 No.12-FMP-FJ10L  
 No.13-FMB-A (port isolator)  
 No.14-FMJ05E2-J4S-E  
 No.15-FMJ07E1-J6S-E  
 No.16-FMP-FJ10L

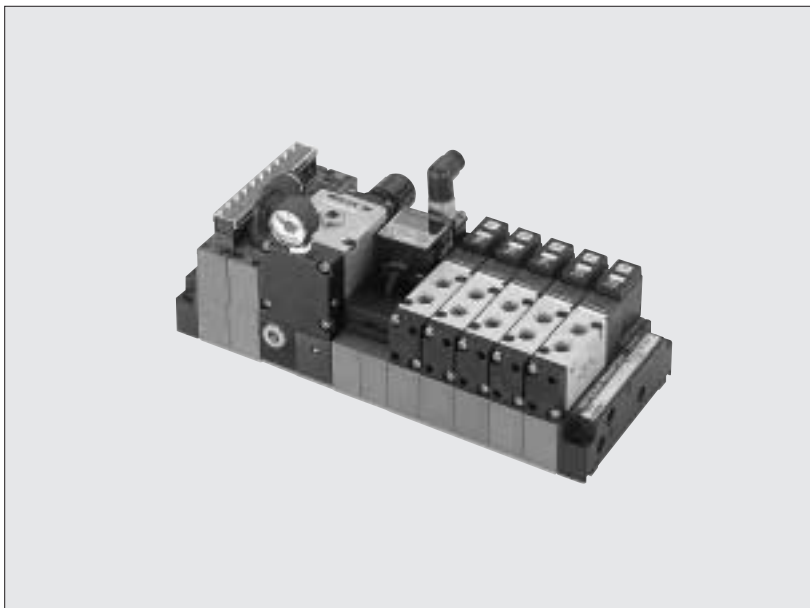
FM-SOLID MANIFOLD X88M SERIES



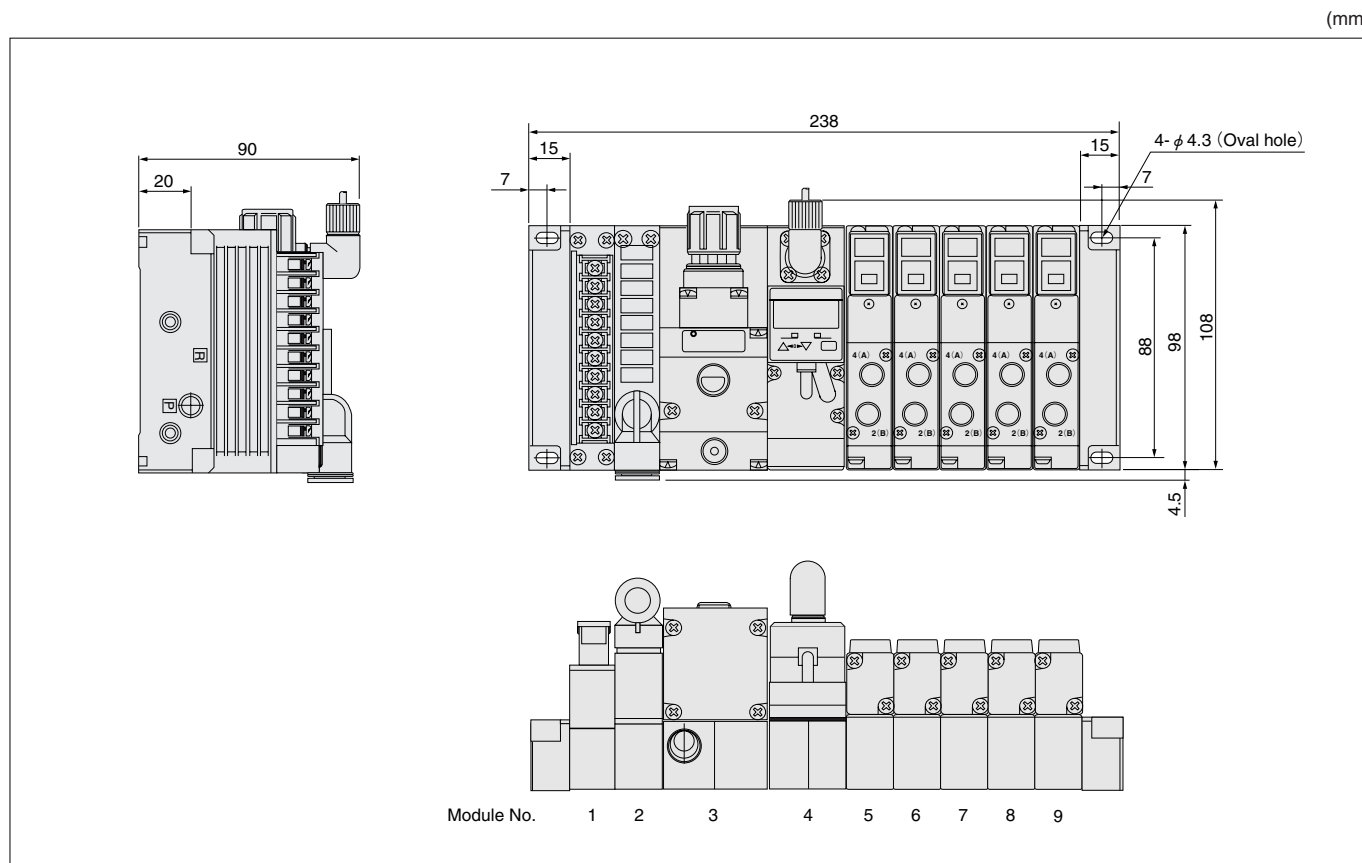
### (Configuration Example 3) Pressure Monitoring Type with Mounting Regulator

#### Features

- Mounting a regulator adjusts compressed air to the optimum pressurized air.
- A sensor with digital pressure gauge monitors the air pressure.



Order code: X88M No.1-FMC-T100  
 No.2-FMP-FJ10L  
 No.3-FMR200-GA20  
 No.4-FMS220-PL  
 No.5~9-FMX180-4E1

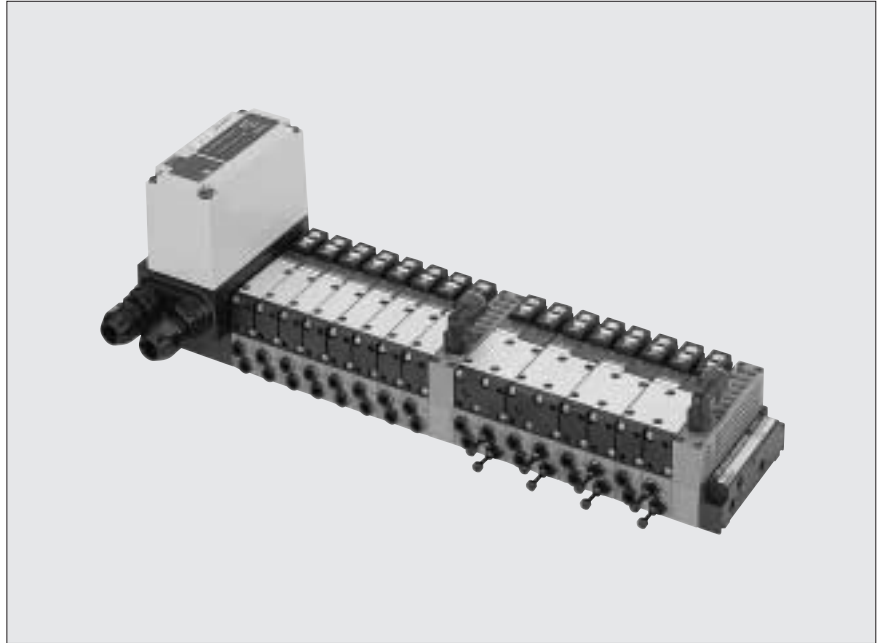




## (Configuration Example 4) Wiring-Saving Type with Serial Transmission

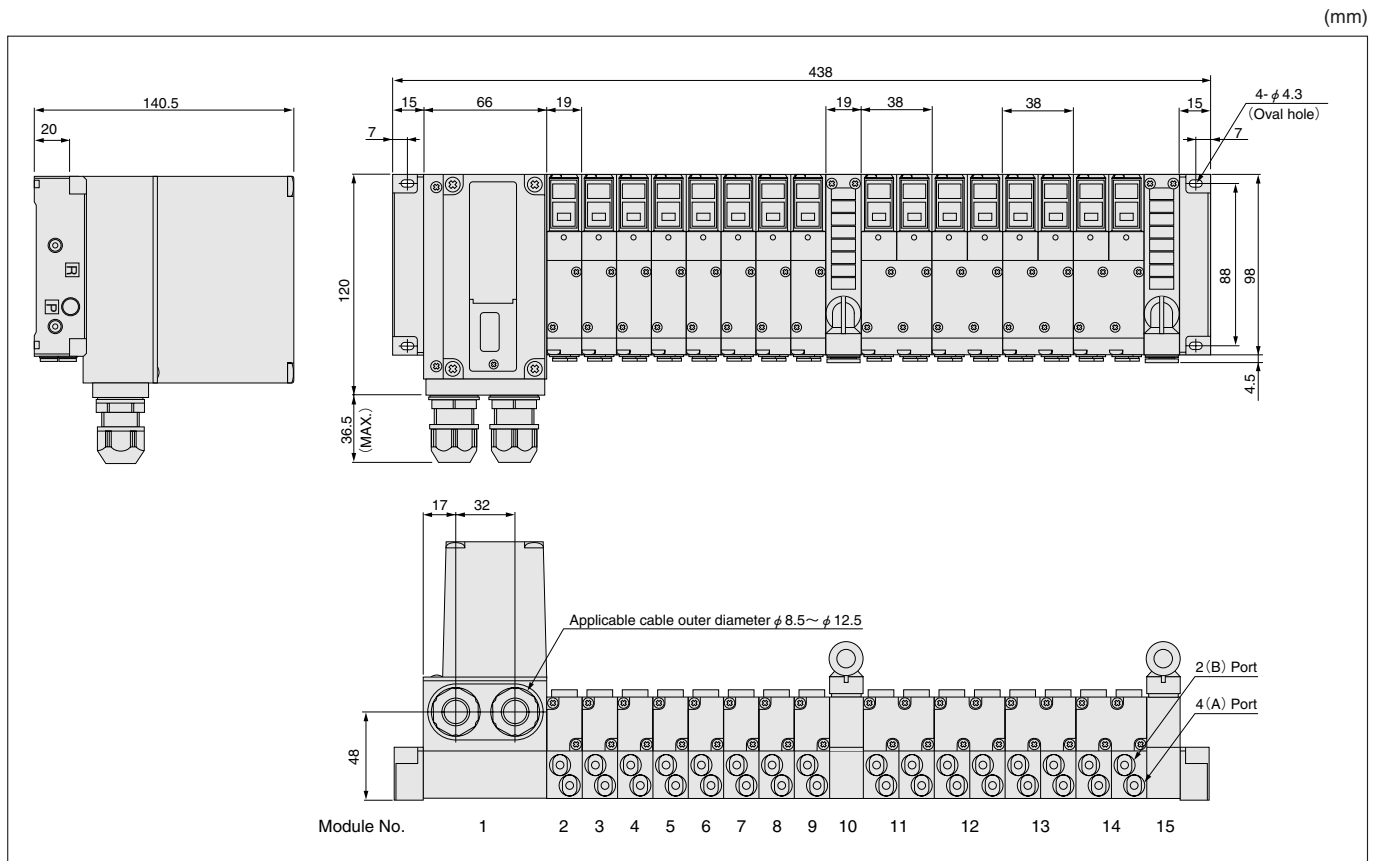
### Features

- Mounts a serial transmission module, to greatly reduce wiring man-hours and to offer easy maintenance.
- Multiple installation of piping modules serves to prevent pressure drops due to simultaneous operation of valves.



Order code: X88M No.1-FMT-OR  
 No.2~9-FMW180-4E1-J6S  
 No.10-FMP-FJ10L  
 No.11,12-FMW180-4KE2-J6S  
 No.13,14-FMW183-4KE2-J6S  
 No.15-FMP-FJ10L

FM-SOLID MANIFOLD X88M SERIES



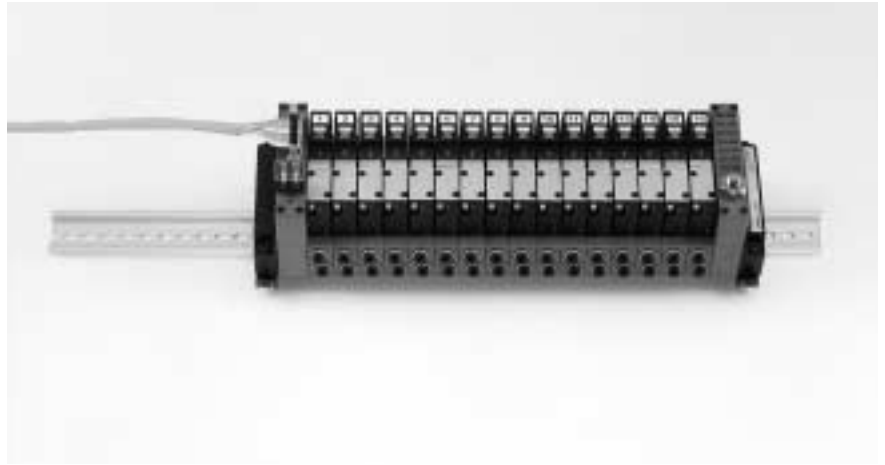
## (Configuration Example 5) Dual-use Type for Parallel and Serial Transmission

### Features

- Uses the same manifold to conform to either parallel transmission or serial transmission.
- Installs 0.7W specification valves (as a special order).
- Mounting onto a DIN rail simplifies mounting of remote I/O stations and other equipment.

### Precautions for making order

- For the wiring module, select FMC-F201.
- The solenoid valve for the manifold should be a low current specification of DC24V (0.7W with LED). Specify the valve module type by adding "-001W." However, "-001W" is not required for the tandem solenoid valve (FMY□).
- Purchase both the cable type G79- and transmission terminal type G-71-OD16 (DC24V) from OMRON separately.



Order code: X88M-DN No.1-FMC-F201  
No.2~17-FMW110-4E1-J4S-001W  
No.18-FMP-FR02

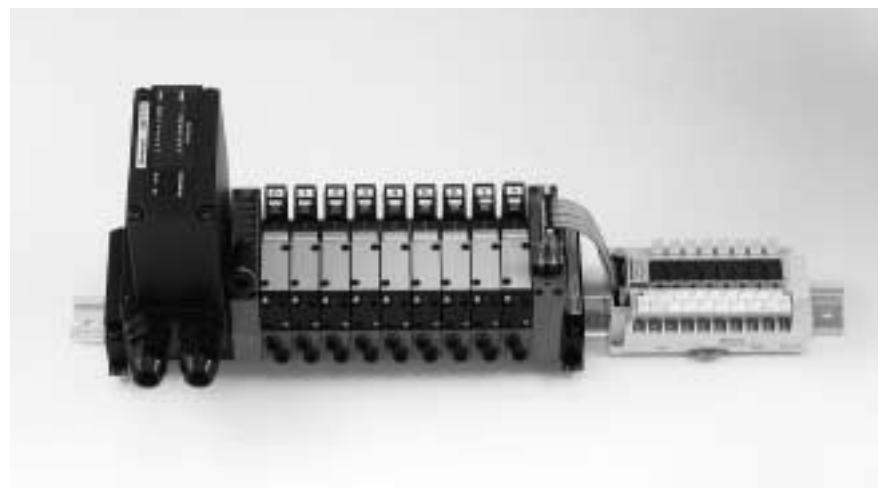
## (Configuration Example 6) Wiring Branch Type for Operating Other Valves, Relays, etc.

### Features

- Branching the serial transmission module's 16 operating signals to the outside of the manifold enables the operations of other devices to achieve the effective use of contact points.
- Can also operate devices by using the parallel transmission module.
- Wiring modules on the branch side can also be selected.

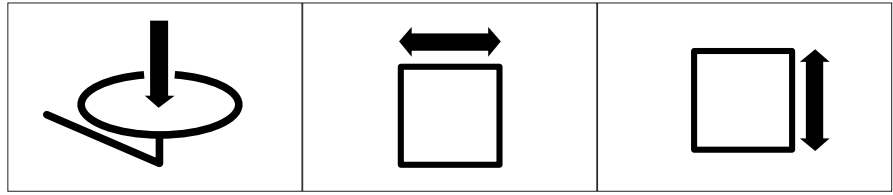
### Precautions for making order

- A wiring branch manifold requires a special order. Consult us.
- For external devices, purchase Matsushita Electric Works' relay (PC relay terminal AY112402, etc.), or OMRON's relay terminal (I/O relay terminal G7TC-OC08, etc.).



Order code: X88M-DN No.1-FMT-□  
No.2-FMC-FJ10L  
No.3~11-FMW180-4E1-J6S  
No.12-FMC-F201-13W

# Module Mass and Dimensions



| Module type                       | Item                        | Mass g [oz.]           | Width mm [in.] | Height mm [in.] |
|-----------------------------------|-----------------------------|------------------------|----------------|-----------------|
| Wiring module                     | FMC-F20□                    | 95 [3.35]              | 19 [0.75]      | 75 [2.95]       |
|                                   | FMC-D250-□                  | 95 [3.35]              | 19 [0.75]      | 75 [2.95]       |
|                                   | FMC-E250-□                  | 210 [7.41]             | 38 [1.50]      | 58 [2.28]       |
|                                   | FMC-T100                    | 100 [3.53]             | 19 [0.75]      | 75 [2.95]       |
|                                   | FMC-T180-□                  | 435 [15.34]            | 57 [2.24]      | 69 [2.72]       |
| Serial transmission module        | FMT-□                       | 1195 [42.15]           | 66 [2.60]      | 140.5 [5.531]   |
| Compact serial transmission block | YS101□/YS102□               | 80/65 [2.82/2.29]      | 30.6 [1.205]   | 66.9 [2.634]    |
|                                   | YS111□,YS121□,YS161□,YS171□ | 105 [3.70]             | 30.6 [1.205]   | 66.9 [2.634]    |
|                                   | YS181□,YS1A1□,YS1A2□        | 105 [3.70]             | 30.6 [1.205]   | 66.9 [2.634]    |
|                                   | YS131□,YS132□,YS1B1□        | 100 [3.53]             | 30.6 [1.205]   | 66.9 [2.634]    |
|                                   | YS141□/YS142□               | 85/70 [3.00/2.47]      | 30.6 [1.205]   | 66.9 [2.634]    |
|                                   | YS151□/YS152□               | 70/67 [2.47/2.36]      | 30.6 [1.205]   | 66.9 [2.634]    |
| Piping module                     | FMP-FJ8S                    | 95 [3.35]              | 19 [0.75]      | 65.4 [2.575]    |
|                                   | FMP-FJ8L                    | 110 [3.88]             | 19 [0.75]      | 72.5 [2.854]    |
|                                   | FMP-FJ10S                   | 100 [3.53]             | 19 [0.75]      | 73 [2.87]       |
|                                   | FMP-FJ10L                   | 115 [4.06]             | 19 [0.75]      | 85.3 [3.358]    |
|                                   | FMP-FR01                    | 95 [3.35]              | 19 [0.75]      | 79.8 [3.142]    |
|                                   | FMP-FR02                    | 95 [3.35]              | 19 [0.75]      | 63 [2.48]       |
|                                   | FMP-PR02S                   | 150 [5.29]             | 19 [0.75]      | 56 [2.20]       |
|                                   | FMP-PR02L                   | 150 [5.29]             | 19 [0.75]      | 56 [2.20]       |
| Air preparation module            | FMF200                      | 330 [11.64]            | 43 [1.69]      | 67 [2.64]       |
|                                   | FMR200                      | 450 [15.87]            | 43 [1.69]      | 72 [2.83]       |
|                                   | FMR200-GA20                 | 460 [16.23]            | 43 [1.69]      | 72 [2.83]       |
|                                   | FMR200-GD20                 | 460 [16.23]            | 43 [1.69]      | 72 [2.83]       |
|                                   | FMS220-□                    | 150 [5.29]             | 32 [1.26]      | 66.5 [2.618]    |
|                                   | FMS11□                      | 120 [4.23]             | 16 [0.63]      | 55.8 [2.197]    |
| Valve module                      | FMX110E1                    | 110 [3.88]             | 16 [0.63]      | 58.5 [2.303]    |
|                                   | FMX110-4E1                  | 110 [3.88]             | 16 [0.63]      | 58.5 [2.303]    |
|                                   | FMX110-4KE2                 | 230 [8.11]             | 32 [1.26]      | 58.5 [2.303]    |
|                                   | FMX113-4KE2                 | 230 [8.11]             | 32 [1.26]      | 58.5 [2.303]    |
|                                   | FMX180E1                    | 150 [5.29]             | 19 [0.75]      | 60 [2.36]       |
|                                   | FMX180-4E1                  | 150 [5.29]             | 19 [0.75]      | 60 [2.36]       |
|                                   | FMX180-4KE2                 | 310 [10.93]            | 38 [1.50]      | 60 [2.36]       |
|                                   | FMX183-4KE2                 | 310 [10.93]            | 38 [1.50]      | 60 [2.36]       |
|                                   | FMW110E1                    | 120/135 [4.23/4.76]※   | 16 [0.63]      | 58.5 [2.303]    |
|                                   | FMW110-4E1                  | 120/135 [4.23/4.76]※   | 16 [0.63]      | 58.5 [2.303]    |
|                                   | FMW110-4KE2                 | 250/280 [8.82/9.88]※   | 32 [1.26]      | 58.5 [2.303]    |
|                                   | FMW113-4KE2                 | 250/280 [8.82/9.88]※   | 32 [1.26]      | 58.5 [2.303]    |
|                                   | FMW180E1                    | 160/175 [5.64/6.17]※   | 19 [0.75]      | 60 [2.36]       |
|                                   | FMW180-4E1                  | 160/175 [5.64/6.17]※   | 19 [0.75]      | 60 [2.36]       |
|                                   | FMW180-4KE2                 | 330/360 [11.64/12.70]※ | 38 [1.50]      | 60 [2.36]       |
|                                   | FMW183-4KE2                 | 330/360 [11.64/12.70]※ | 38 [1.50]      | 60 [2.36]       |
|                                   | FMY110-4ME2                 | 148/164 [5.22/5.78]※   | 16 [0.63]      | 63 [2.48]       |
|                                   | FMY113-4ME2                 | 158/174 [5.57/6.14]※   | 16 [0.63]      | 63 [2.48]       |
| FMY180-4ME2                       | 183/199 [6.46/7.02]※        | 19 [0.75]              | 63 [2.48]      |                 |
| FMY183-4ME2                       | 198/214 [6.98/7.55]※        | 19 [0.75]              | 63 [2.48]      |                 |
| Ejector module                    | FMJ05E1-□                   | 170 [6.00]             | 16 [0.63]      | 78 [3.07]       |
|                                   | FMJ05E1-□-E                 | 270 [9.52]             | 32 [1.26]      | 78 [3.07]       |
|                                   | FMJ05E2-□                   | 300 [10.58]            | 32 [1.26]      | 78 [3.07]       |
|                                   | FMJ05E2-□-E                 | 400 [14.11]            | 48 [1.89]      | 78 [3.07]       |
|                                   | FMJ07E1-□                   | 235 [8.29]             | 19 [0.75]      | 84 [3.31]       |
|                                   | FMJ07E1-□-E                 | 335 [11.82]            | 35 [1.38]      | 84 [3.31]       |
|                                   | FMJ07E2-□                   | 415 [14.64]            | 38 [1.50]      | 84 [3.31]       |
|                                   | FMJ07E2-□-E                 | 515 [18.17]            | 54 [2.13]      | 84 [3.31]       |
| Block-off plate module            | FMX110-BP                   | 50 [1.76]              | 16 [0.63]      | 30.5 [1.201]    |
|                                   | FMX180-BP                   | 80 [2.82]              | 19 [0.75]      | 33 [1.30]       |
|                                   | FMW110-BP                   | 60/75 [2.12/2.65]※     | 16 [0.63]      | 30.5 [1.201]    |
|                                   | FMW180-BP                   | 90/105 [3.17/3.70]※    | 19 [0.75]      | 33 [1.30]       |
|                                   | FMY110-BP                   | 58/74 [2.05/2.61]※     | 16 [0.63]      | 30.5 [1.201]    |
|                                   | FMY180-BP                   | 88/104 [3.10/3.67]※    | 19 [0.75]      | 33 [1.30]       |
| End block module                  | X88M                        | 140 [4.94]             | 15 [0.59]      | 29 [1.14]       |
|                                   | X88M-ED                     | 145 [5.11]             | 15 [0.59]      | 29 [1.14]       |
|                                   | X88M-DN                     | 280 [9.88]             | 15 [0.59]      | 38 [1.50]       |

Remark: Heights are with the end block attached.

※: For -J6S/-J6U

# Manifold Order Codes

## Order Codes

| Manifold basic model | End block type                                  | Mounting type                       | Common terminal wiring | Module No.  | Module model         |
|----------------------|---|-------------------------------------|------------------------|-------------|----------------------|
| <b>X88M</b>          | <b>-ED</b>                                      | <b>-DN</b>                          | <b>-CM</b>             | <b>No.1</b> | <b>FMC-F200...</b>   |
|                      | ↓   | ↓                                   | ↓                      | <b>No.2</b> | <b>FMJ05E1...</b>    |
|                      | End block module type (1 set of right & left)   | End block mounting type             | Positive common        | ⋮           | ⋮                    |
|                      |   |                                     |                        | <b>No.n</b> | <b>FMX110-4E1...</b> |
|                      | <b>Blank</b>                                    | <b>Blank</b>                        | <b>Blank</b>           |             |                      |
|                      | End block piping type (1 set of right and left) | With DIN rail mounting bracket type | Negative common        |             |                      |
|                      |   |                                     |                        |             |                      |
|                      | <b>-ED</b>                                      | <b>-DN</b>                          | <b>-CM</b>             |             |                      |

- Select from the wiring modules, piping modules, air preparation modules, valve modules, or ejector modules.
- One sticker is provided for each manifold.
- When combining 2 or more terminal block type wiring modules (FMC-T100) side by side, the wiring space for each terminal block becomes tight. Depending on the wiring types and conditions, each wiring group's crimped terminals or lead wires could interfere with other terminal blocks, and it could be difficult to achieve an orderly wiring. When using multiple wiring modules, therefore, carefully study the designated locations of each module to ensure that they do not come in contact with each other. In addition, if the total number using I/O requires 9 to 16 terminals, we recommend using the wiring module type with wiring bushing connection specifications (FMC-T180).

## FM-SOLID MANIFOLD X88M Series Basic Specifications

| Item   | Manifold basic model              | X88M  |
|--|-----------------------------------|---|
| Media  |                                   | Air   |
| Operating pressure range                           | MPa {kgf/cm <sup>2</sup> } [psi.] | 0.15~0.7 {1.5~7.1} [22~102]   |
| Proof pressure                                     | MPa {kgf/cm <sup>2</sup> } [psi.] | 1.05 {10.7} [152]   |
| Operating temperature range (atmosphere and media) | °C [°F]                           | 5~50 [41~122]   |
| Wiring type  |                                   | Collective wiring type with wiring module<br>(Flat cable connector type, D-sub connector type, Terminal block type) |
| End block  |                                   | End block module type/End block piping type   |
| Manifold mounting type                             |                                   | Direct mounting type/DIN rail mounting type   |
| Common terminal wiring                             |                                   | Positive common/Negative common   |

### Order codes for additional parts (To be ordered separately)

- DIN rail mounting bracket (1 set)
  - Sticker for solenoid top surface (1 set of 5 sheets)
  - Sticker for valve top surface (1 set of 10 sheets)
- X881-DN**    **X882-01** (For FMX, FMW)    **CR55** (For solenoid valves 110 series)  
**CR56** (For solenoid valves 180 series)

### About a port isolator

Use of a port isolator at an intermediate position on the manifold and installing a piping module to an individual group makes the use of 2 or 3 different pressures possible, and prevents exhaust interference from the main exhaust. When ordering, enter a port isolator as 1 module.

#### Port isolator type

| Type         | Function                          |
|--------------|-----------------------------------|
| <b>FMB-A</b> | 1(P), 3, 5(R) port all port block |
| <b>FMB-P</b> | 1(P) port block                   |
| <b>FMB-R</b> | 3, 5(R) port block                |

※ Although port isolators can be installed into modules at any location, they cannot be disassembled to change the position after shipping.

# Manifold Order Codes (With Compact Serial Transmission Block)

## Order Codes

| Manifold basic model | Compact serial transmission block |                   | End block type | Mounting type | Module No.  | Module model          |
|----------------------|-----------------------------------|-------------------|----------------|---------------|-------------|-----------------------|
|                      | Manufacturer's specification      | Mounting location |                |               |             |                       |
| <b>X88MS1</b>        | -                                 | -                 | - <b>ED</b> -  | - <b>DN</b>   | <b>No.1</b> | <b>FMY110-4ME2...</b> |
|                      |                                   |                   |                |               | ⋮           | ⋮                     |
|                      |                                   |                   |                |               | <b>No.n</b> |                       |

**Blank:** End block mounting type  
**DN:** With DIN rail mounting bracket type  
**Blank:** End block module type  
**ED:** End block piping type<sup>Note</sup>  
**L:** Left side mounting  
**R:** Right side mounting

- 01 : For UNI-WIRE System (16 outputs)
- 02 : For UNI-WIRE System (8 outputs)
- 11 : For Mitsubishi Electric MELSECNET/mini-S3
- 21 : For OMRON SYSBUS Wire System
- 31 : For OMRON B7A Link Terminal (standard)
- 32 : For OMRON B7A Link Terminal (high speed)
- 41 : For KOYO ELECTRONICS INDUSTRIES SA Bus (16 outputs)
- 42 : For KOYO ELECTRONICS INDUSTRIES SA Bus (8 outputs)
- 51 : For SUNX S-LINK (16 outputs)
- 52 : For SUNX S-LINK (8 outputs)
- 61 : For Mitsubishi Electric MELSEC I/O LINK
- 71 : For Fuji Electric FA Components & Systems T Link Mini
- 81 : For KEYENCE KZ-R
- A1 : For OMRON CompoBus/S (16 outputs)
- A2 : For OMRON CompoBus/S (8 outputs)
- B1 : For Mitsubishi Electric CC-Link

Note: End block piping is not possible from the side of the serial transmission block mounting location. This means that end block piping is only possible on the side opposite to the transmission block.

FM-SOLID MANIFOLD X88M SERIES

### Order codes for compact serial transmission block only

**YS1** [ ] [ ]

**L:** Left side mounting  
**R:** Right side mounting

- 01 : For UNI-WIRE System (16 outputs)
- 02 : For UNI-WIRE System (8 outputs)
- 11 : For Mitsubishi Electric MELSECNET/mini-S3
- 21 : For OMRON SYSBUS Wire System
- 31 : For OMRON B7A Link Terminal (standard)
- 32 : For OMRON B7A Link Terminal (high speed)
- 41 : For KOYO ELECTRONICS INDUSTRIES SA Bus (16 outputs)
- 42 : For KOYO ELECTRONICS INDUSTRIES SA Bus (8 outputs)
- 51 : For SUNX S-LINK (16 outputs)
- 52 : For SUNX S-LINK (8 outputs)
- 61 : For Mitsubishi Electric MELSEC I/O LINK
- 71 : For Fuji Electric FA Components & Systems T Link Mini
- 81 : For KEYENCE KZ-R
- A1 : For OMRON CompoBus/S (16 outputs)
- A2 : For OMRON CompoBus/S (8 outputs)
- B1 : For Mitsubishi Electric CC-Link

### Order code for dedicated cable for S-LINK only

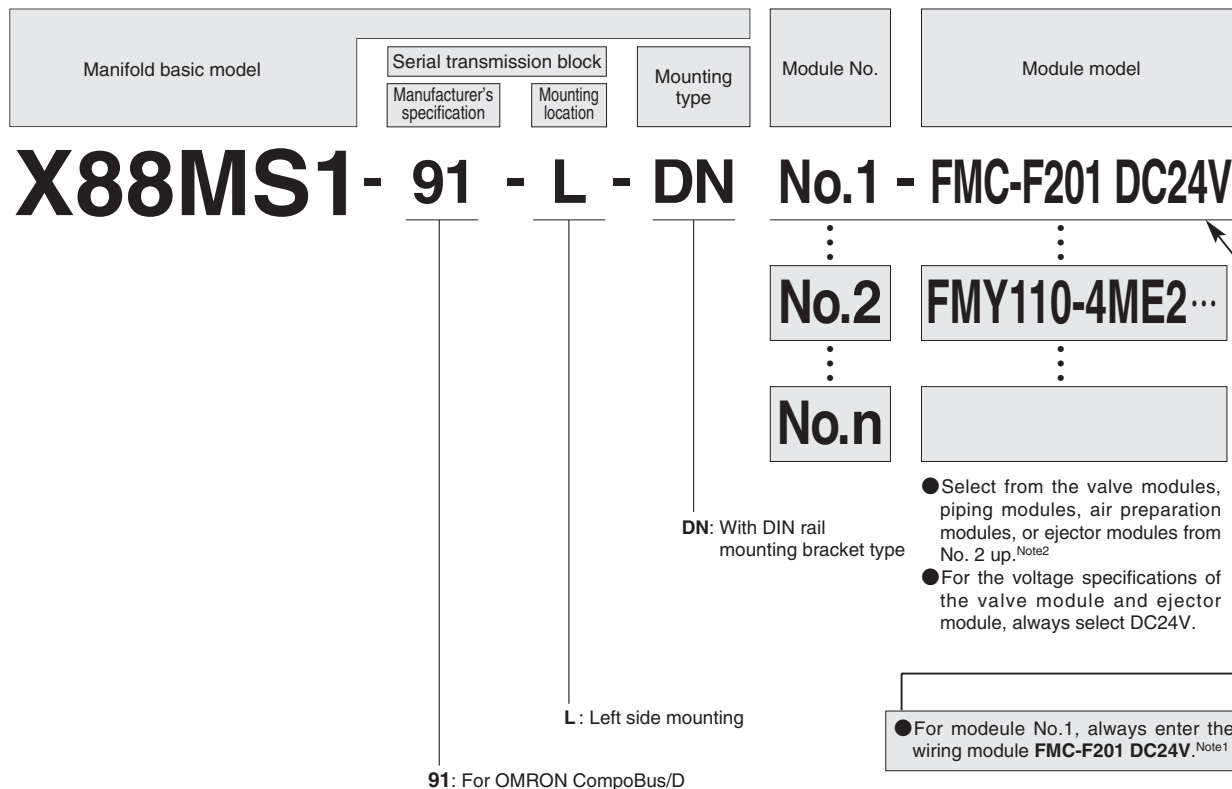


**YS151-KB2**  
(Cable length: 2000mm [79in.])

※Order them for maintenance use only.  
Internal wiring and mounting screws, etc. are not included.

# Manifold Order Codes (With Serial Transmission Block)

## Order Codes for Serial Transmission System for OMRON CompoBus/D



Notes: 1. Since the shape and wiring configuration for OMRON CompoBus/D differ from those of other serial transmission types, a wiring module is required as module No.1. For module No.1, always enter the wiring module **FMC-F201 DC24V**.

2. The end block is an end block module type only, and no end block piping type is available. Therefore, always select the piping module in the case.

### ■ Order code for serial transmission block only

**YS391**

**91:** For OMRON CompoBus/D

※ Order it for maintenance use only.  
Mounting screws, etc. are not included.

## Precautions for System Configuration

### Manifold configuration

- The number of the modules should be a total of 20 or less.
- When a voltage drop is considered to be possible, such as when a multiple number of valves are operated simultaneously on a multi-unit manifold (11 or more on the 110 series, and 5 or more on the 180 series), or for high cycle applications, install a piping module at an intermediate position of the manifold. For details, see the piping module precautions on p.494.
- Combination mounting of the 110 and 180 series is acceptable.

### Piping

When not designating an end block piping type (-ED), select a piping module.

### Common wiring

When the PC side is positive common, select -CM (negative common) for the manifold's common terminal wiring.

### Voltage

Some voltages may not be applicable, depending on the module.

Table of corresponding voltages

| Module              |                        | Voltage, numbers |       |        |        | No. of compatible solenoid <sup>Note</sup> |    |
|---------------------|------------------------|------------------|-------|--------|--------|--|----|
|                     |                        | DC12V            | DC24V | AC100V | AC200V |  |    |
| Wiring              | Parallel wiring        | FMC-F20□         | ○     | ○      | ×      | ×  | 16 |
|                     |                        | FMC-D250         | ○     | ○      | ○      | ×  |    |
|                     |                        | FMC-E250         | ○     | ○      | ○      | ○  |    |
|                     |                        | FMC-T100         | ○     | ○      | ○      | ○  | 8  |
|                     |                        | FMC-T180         | ○     | ○      | ○      | ○  | 16 |
| Serial transmission | Serial transmission    | FMT-□            | ×     | ○      | ×      | ×  | 16 |
| Air preparation     | Pressure switch module | FMS11□           | ○     | ○      | ×      | ×  | —  |
|                     |                        | FMS220           | ○     | ○      | ×      | ×  |    |
| Ejector             |                        | FMJ□             | ○     | ○      | ○      | ○  | —  |

Note: If this exceeds 16 solenoids, consult us.

### Arrangement

Depending on the module, mounting of it is not possible at some locations.

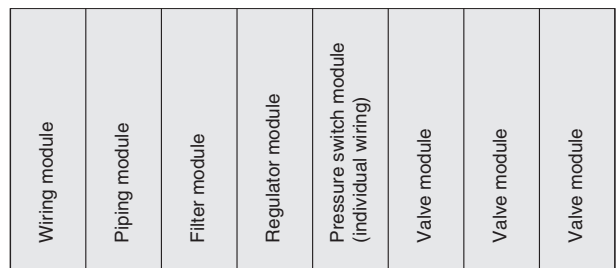
| Installed location | Module | Wiring |       |       |       | Serial transmission | Piping              | Air preparation <sup>Note 2</sup> | Valve | Ejector |
|--------------------|--------|--------|-------|-------|-------|---------------------|---------------------|-----------------------------------|-------|---------|
|                    |        | FMC    |       |       |       |                     |                     |                                   |       |         |
|                    |        | -F20□  | -D250 | -E250 | -T100 |                     |                     |                                   |       |         |
| Left side          |        | ○      | ○     | ○     | ○     | ○                   | ○                   | △                                 | ○     | ○       |
| Middle             |        | ○      | ○     | ×     | ○     | ×                   | ○ <sup>Note 1</sup> | △                                 | ○     | ○       |
| Right side         |        | ○      | ○     | ○     | ○     | ○                   | ○                   | ×                                 | ○     | ○       |

- Notes: 1. Intermediate positioning is not allowed for FMP-PR02L. 2. For details, see the following precautions on air preparation.
- ... Can be mounted anywhere
  - △... Depends on the mounting sequence
  - ×... Mounting not allowed

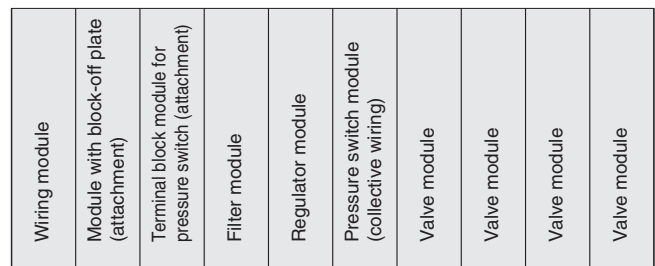
### Air preparation

Because the filter and regulator have installing directions, always order in the sequence shown in diagrams ① and ② below. The module installing sequence is unchanged even if 1 pc. of the filter module, regulator module, or pressure switch module is mounted, or if 2 pcs. of them are mounted. When mounting the collective wiring type pressure switch module, however, install a terminal block module and block-off plate module after the wiring module as attachments for the pressure switch module, as shown in diagram ② below.

- ① When mounting the filter module, regulator module, and pressure switch module (individual wiring type)



- ② When mounting the filter module, regulator module, and pressure switch module (collective wiring type)



Note: When using a module with collective wiring type (plug-in) pressure switches, a terminal block module for pressure switches is also required. In this case, a module with a block-off plate is mounted as an attachment to the space between the wiring module for the solenoid valves and the terminal block module for the pressure switch. Since these 2 attachment modules are accessory items, there is no need to enter the module number when placing orders.

### Exhaust interference

There is a rare possibility of exhaust interference occurring when a multiple number of valves are operating simultaneously, or a 3-port valve has been mounted in combination, or when all port female thread-type piping is used and the exhaust port is connected to the outside. In that case, see the piping module precautions on p.494.

# Module Order Codes

## Wiring Module Order Codes

| Wiring connection specification  | Wiring module basic type       | Wiring basic type              | Mounting threads for<br>D-sub connector<br>M2.6 thread : <b>-M2.6</b><br>M3 thread : <b>-M3</b><br>#4-40-UNC thread : <b>-UNC</b> | Wiring outlet direction<br>Left side type : <b>-L</b><br>Right side type : <b>-R</b><br>Lower left side type : <b>-LS</b><br>Lower right side type : <b>-RS</b> | Voltage  |
|----------------------------------|--------------------------------|--------------------------------|---|---|--|
| Flat cable connector             | <b>FMC</b>                     | <b>-F200</b>                   |   |   | <b>DC12V</b><br><b>DC24V</b>                         |
|                                  |                                | <b>-F201</b> <sup>Note 1</sup> |   |   |  |
| D-sub connector                  |                                | <b>-D250</b>                   | <b>-M2.6,-M3,-UNC</b> <sup>Note 4</sup>   |   | <b>DC12V</b><br><b>DC24V</b><br><b>AC100V</b>        |
| D-sub connector, side connection |                                | <b>-E250</b> <sup>Note 2</sup> |   |   |  |
| Terminal block                   |                                | <b>-T100</b>                   |   |   | <b>DC12V,DC24V</b><br><b>AC100V</b><br><b>AC200V</b> |
| Wiring bushing connection        | <b>-T180</b> <sup>Note 3</sup> |                                |   | <b>-L,-R,-LS,RS</b> <sup>Note 5</sup>   |  |

- Notes: 1. -F200 and -F201 differ only in the pin locations. For details, see p.442.  
 2. When supplying power externally, connect power supply lines to the terminals (with M3 screws) inside the box.  
 3. Wiring is performed using the terminals inside the box, while the cable passes through a wiring bushing to the outside.  
 (Applicable cable outer diameter:  $\phi$  8.5 [0.335in.]~  $\phi$  12.5 [0.492in.] )  
 4. When using a cable assembly, select -M2.6.  
 5. Cannot be mounted in an intermediate position.  
 Remark: For wiring module specifications, see p.441.

## Serial Transmission Module Order Codes

| Serial transmission module basic model | Manufacture's name<br>For OMRON : <b>-OR</b><br>For Mitsubishi Electric : <b>-MB</b><br>For Fuji Electric FA Components & Systems : <b>-FJ</b><br>For SHARP : <b>-SP</b><br>For Hitachi : <b>-HT</b><br>For Matsushita Electric Works : <b>-MS</b> | Order code for serial transmission block only<br>(For purchase of single units only)   |
|--|--|--|
| <b>FMT</b>                             | <b>-OR,-MB,-FJ</b><br><b>-SP,-HT,-MS</b>   | ● For OMRON      ● For Mitsubishi Electric      ● For Fuji Electric FA Components & Systems<br><b>F1T-OR</b> <b>F1T-MB</b> <b>F1T-FJ</b><br>● For SHARP      ● For Hitachi      ● For Matsushita Electric Works<br><b>F1T-SP</b> <b>F1T-HT</b> <b>F1T-MS</b> |

※ Order them for maintenance use only.  
 The wiring base and manifold base cannot be ordered separately.

## Piping Module Order Codes

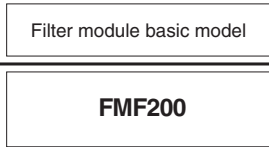
| Piping module basic type | Port specification<br>1(P) port built-in quick fitting type<br>(with built-in muffler on 3, 5(R) port) : <b>-FJ</b><br>1(P) port female thread type<br>(with built-in muffler on 3, 5(R) port) : <b>-FR</b><br>All port female thread type : <b>-PR</b> | Fitting specification<br>Straight quick fitting for $\phi$ 8 tube : <b>8S</b><br>Elbow quick fitting for $\phi$ 8 tube : <b>8L</b><br>Straight quick fitting for $\phi$ 10 tube : <b>10S</b><br>Elbow quick fitting for $\phi$ 10 tube : <b>10L</b> | P port size<br>Rc1/8 : <b>01</b><br>Rc1/4 : <b>02</b> | Piping direction<br>Upper piping : <b>S</b><br>Side piping : <b>L</b> |
|--------------------------|---|---|---|---|
| <b>FMP</b>               | <b>-FJ</b>  | <b>8S,8L,10S,10L</b>  |   |   |
|                          | <b>-FR</b>  |   | <b>01,02</b>  |   |
|                          | <b>-PR</b>  |   | <b>02</b>   | <b>S,L</b>  |

Remark: For piping module specifications, see p.454.



# Air Preparation Module Order Codes

## Filter module



Remark: For the filter module specifications, see p.457, and for the precautions, see p.486.

## Regulator module

Pressure gauge specification  
 Without pressure gauge : **Blank**  
 With 1MPa [145psi.] specification  $\phi$ 20 [0.79in.] pressure gauge (bottom piping) : **-GA20**  
 With 1MPa [145psi.] specification  $\phi$ 20 [0.79in.] pressure gauge (back piping) : **-GD20**



Remark: For the regulator module specifications, see p.457, and for the precautions, see p.487.

## Pressure switch module

(Electronic type pressure switch module)

Wiring type  
 Plug-in type : **Blank** (collective wiring type)  
 Terminal block (FMC-T100), block-off plate module are included.  
 With straight connector : **-PS** (individual wiring type)  
 With elbow connector : **-PL** (individual wiring type)



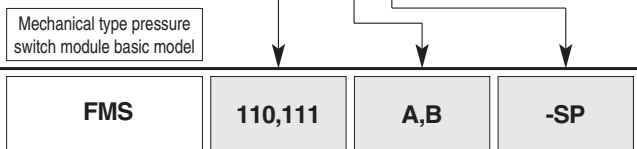
Remark: For the electronic type pressure switch module specifications, see p.457, and for the precautions, see p.488~492.

(Mechanical type pressure switch module)

Contact type  
 Reed switch type (2-lead wires) : **110**  
 Solid state type (3-lead wires) : **111**

Wiring type  
 Plug-in type : **Blank** (collective wiring type)  
 Terminal block (FMC-T100), block-off plate module included.  
 Lead wire type : **A** (individual wiring type) Lead wire length 1000mm [39in.].  
 : **B** (individual wiring type) Lead wire length 3000mm [118in.].

Shield plate  
 Without shield plate : **Blank**  
 With shield plate : **-SP**



Remark: For the mechanical type pressure switch module specifications, see p.457, and for the precautions, see p.491~492.

## Order code for filter block only

**F1F200**

## Order code for filter element only

**F3F-01**

## Order codes for regulator block only

**F1R200 -**

Pressure gauge specification  
**Blank** : Without pressure gauge  
**GA20** : With 1MPa [145psi.] specification  $\phi$  20 [0.79in.] pressure gauge (bottom piping)  
**GD20** : With 1MPa [145psi.] specification  $\phi$  20 [0.79in.] pressure gauge (back piping)

Regulator block basic model

## Order codes for electronic type pressure switch block only

**F1S220 -**

Electronic type pressure switch block basic model

Wiring type※  
 Collective wiring type : **Blank** (plug-in type)  
 Individual wiring type : **PS** : With straight connector (connector type) **PL** : With elbow connector

※For orders of the switch block only, the terminal block and block-off plate modules are not included.

## Order codes for mechanical type pressure switch block only

**F1S**   -

Mechanical type pressure switch block basic model

Shield plate  
**Blank** : Without shield plate  
**-SP** : With shield plate

Wiring type  
 Collective wiring type : **Blank**※ (plug-in type)  
 Individual wiring type : **A** : lead wire length 1000mm [39in.] (lead wire type) **B** : lead wire length 3000mm [118in.]

Contact type  
**110** : Reed switch type (2-lead wires)  
**111** : Solid state type (3-lead wires)

※For orders of the switch block only, the terminal block and block-off plate modules are not included.

# Valve Module Order Codes

|   |            | 2-, 3-port valve<br>Number of ports<br>3-port : <b>Blank</b><br>2-port : <b>-2</b> | 2-, 3-port valve<br>Valve function<br>Normally closed (NC) : <b>Blank</b><br>Normally open (NO) : <b>-11</b> | 3-position valve<br>Valve function<br>Closed center : <b>Blank</b><br>Exhaust center : <b>-13</b><br>Pressure center : <b>-14</b> | Valve A, B port<br>Port specification<br>Female thread : <b>Blank</b><br>φ 4 quick fitting : <b>-J4</b><br>φ 6 quick fitting : <b>-J6</b> | Module base 4(A), 2(B) ports<br>Port specification<br>φ 4 straight quick fitting : <b>-J4S</b><br>φ 6 straight quick fitting : <b>-J6S</b><br>φ 4 elbow quick fitting : <b>-J4U</b><br>φ 6 elbow quick fitting : <b>-J6U</b><br>M8 female thread type : <b>-M8M</b> | Manual override<br>Non-locking type : <b>Blank</b><br>Locking type : <b>-81</b><br>Locking protruding type : <b>-83</b><br>Locking type manual lever : <b>-84</b> |
|---|------------|--|--|---|---|---|---|
|   |            | Valve module basic model   | Basic valve model  |   |   |   | Voltage   |
| Direct piping type module                 | <b>FMX</b> | 110E1  | -2   | -11   | <b>-J4</b><br><b>-J6</b>  |   | <b>-83</b>  |
|   |            | 110-4E1  |  |   |   |   |   |
|   |            | 110-4KE2   |  |   |   |   |   |
|   |            | 113-4KE2   |  | -13,-14   |   |   |   |
|   |            | 180E1  | -2   | -11   |   |   |   |
|   |            | 180-4E1  |  |   |   |   |   |
|   |            | 180-4KE2   |  |   |   |   |   |
|   |            | 183-4KE2   |  | -13,-14   |   |   |   |
| Base piping type module                   | <b>FMW</b> | 110E1  | -2   | -11   | <b>-J4S,J6S</b><br><b>-J4U,-J6U</b><br><b>-M8M</b>  |   | <b>-83</b>  |
|   |            | 110-4E1  |  |   |   |   |   |
|   |            | 110-4KE2   |  |   |   |   |   |
|   |            | 113-4KE2   |  | -13,-14   |   |   |   |
|   |            | 180E1  | -2   | -11   |   |   |   |
|   |            | 180-4E1  |  |   |   |   |   |
|   |            | 180-4KE2   |  |   |   |   |   |
|   |            | 183-4KE2   |  | -13,-14   |   |   |   |
| Base piping type module (tandem solenoid) | <b>FMY</b> | 110-4ME2   |  |   | <b>-J4S, J6S</b><br><b>-J4U, -J6U</b> <sup>Note 3</sup><br><b>-M8M</b>  |   | <b>-81</b> <sup>Note 4</sup><br><b>-83</b><br><b>-84</b>  |
|   |            | 113-4ME2   |  | -13,-14   |   |   |   |
|   |            | 180-4ME2   |  |   |   |   |   |
|   |            | 183-4ME2   |  | -13,-14   |   |   |   |

Notes: 1. The AC100V type is compatible with the wiring modules FMC-D250,-E250,-T100, and -T180 only.

2. The AC200V type is compatible with the wiring modules FMC-T100 and -T180 only.

3. The 3-position valve cannot be mounted on the valve modules with -J4U and -J6U.

4. For the tandem solenoid valve, always select one of the 3 manual override options. Note that the non-locking type is not available for the tandem solenoid.

Remark: For valve module specifications, see p.460.

## Order codes for valve single unit

● Direct piping type valve

**F1X**

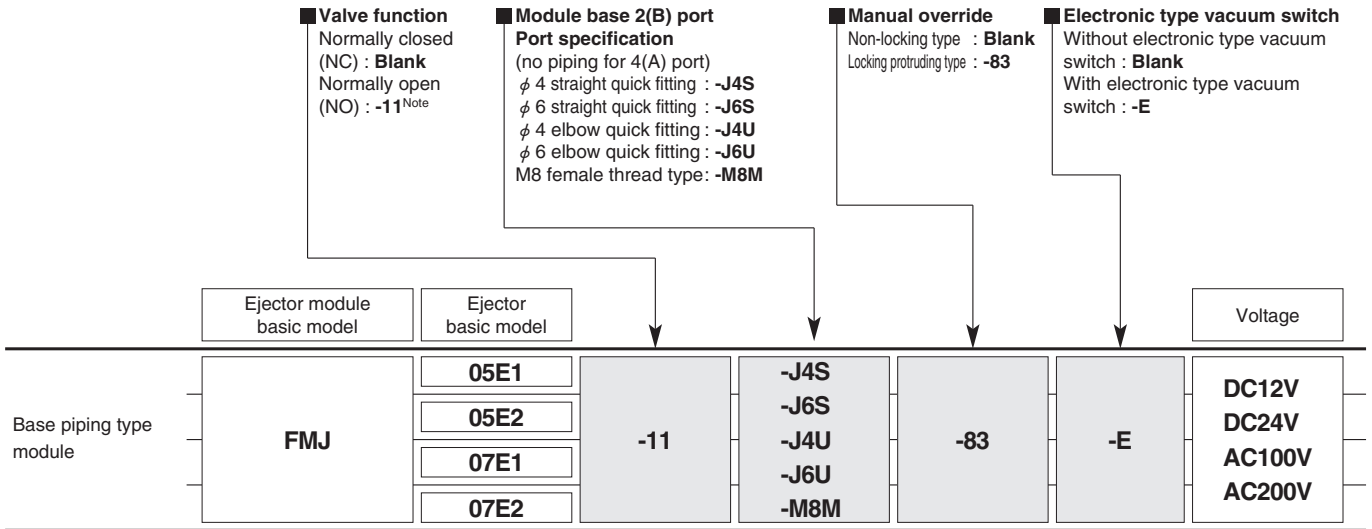
● Base piping type valve

**F1W**

● Base piping type valve (tandem solenoid valve)

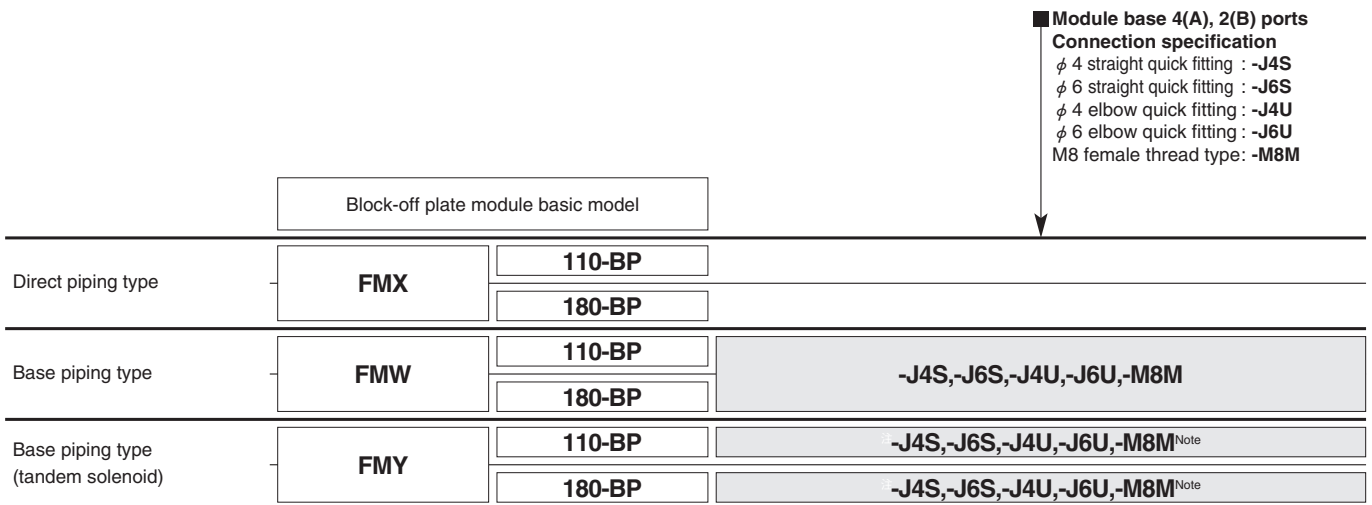
**F1Y**

## Ejector Module Order Codes



Note: The normally open type is only available with the supply air control solenoid valve. The vacuum breaking air control solenoid valve is normally closed.  
 Remarks : 1. Replacement filters are provided as additional parts (to be ordered separately. Order code : **ME05MA, ME07MA-F**). Replace them periodically.  
 2. The ejector module is the base piping type only. A direct piping type module is not available.  
 3. For ejector module specifications, see p.476.

## Block-off Plate Module Order Codes



Remark: Although **FMW** and **FMY** are the same base piping type, their valve modules are incompatible because of different plug-in shapes. Care must be exercised when ordering block-off plate modules for the future addition of valves.

Note: The 3-position valve cannot be mounted on the block-off plate module with **-J4U** and **-J6U**.

### Order codes for block-off plate only

● For solenoid valves 110 series

**F1X110-BP (for FMX)**

**F1W110-BP (for FMW, FMY)**

● For solenoid valves 180 series

**F1X180-BP (for FMX)**

**F1W180-BP (for FMW, FMY)**

# FM-SOLID MANIFOLD X88M SERIES

## Wiring Modules

### Features

Achieves space savings and enables lower costs by reducing wiring man-hours.

#### Flat cable connector

A 20-pin flat cable connector can accommodate up to 16 solenoids.

Two types of pin locations are available for the wiring.

Various kinds of cables and connectors are also provided to simplify wiring connections.

#### D-sub connector type

A 25-pin D-sub connector can accommodate up to 16 solenoids.

Various kinds of cables and connectors are also provided to simplify wiring connections.

#### D-sub connector, side connection specification

Can be connected on either the right or left side, to save on height in the connector portion and improve space efficiency.

A 25-pin D-sub connector can accommodate up to 16 solenoids.

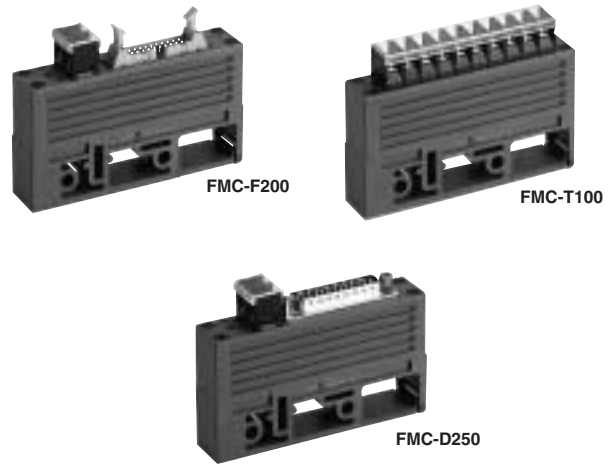
#### Terminal block type

A terminal block with 10 terminals can accommodate up to 8 solenoids.

#### Wiring bushing connection type

Wiring outlets can be selected in any of 4 directions, for increased flexibility in wiring work.

An 18-terminal terminal block can accommodate up to 16 solenoids.



## Wiring Module Specifications

| Model  | Wiring connection specification      | Remarks  |
|--|--------------------------------------|--|
| FMC-F200<br>FMC-F201                                   | Flat cable connector type            | Made by Sumitomo 3M<br>Box type with long clip<br>Part number: 3428-5002LCSC   |
| FMC-D250-M2.6<br>FMC-D250-M3<br>FMC-D250-UNC           | D-sub connector type <sup>Note</sup> | Made by Japan Aviation Electronics Industry<br>Part number: DBU-25P-FO<br>Mounting threads for D-sub connector<br>-M2.6: M2.6 thread<br>-M3: M3 thread<br>-UNC: #4-40-UNC thread |
| FMC-E250-M2.6<br>FMC-E250-M3<br>FMC-E250-UNC           |                                      |  |
| FMC-T100   | Terminal block type                  | Terminal block thread: M3  |
| FMC-T180-L<br>FMC-T180-R<br>FMC-T180-LR<br>FMC-T180-RS | Wiring bushing type                  | Terminal block thread: M3  |

Note: While a shell is not provided on the socket side, it can be used regardless of manufacturer's types, only if the number of pins is 25. Care must be exercised with selection of the shell mounting screws, however.

Application example: For FMC-E250-M2.6, products made by  
Japan Aviation Electronics Industry  
Socket model: DB-25S-N  
Shell model: DB-C2-J9

## Module Mass

g [oz.]

| Model      | Mass        |
|------------|-------------|
| FMC-F200□  | 95 [3.35]   |
| FMC-D250-□ | 95 [3.35]   |
| FMC-E250-□ | 210 [7.41]  |
| FMC-T100   | 100 [3.53]  |
| FMC-T180-□ | 435 [15.34] |

## Details of Wiring Specifications

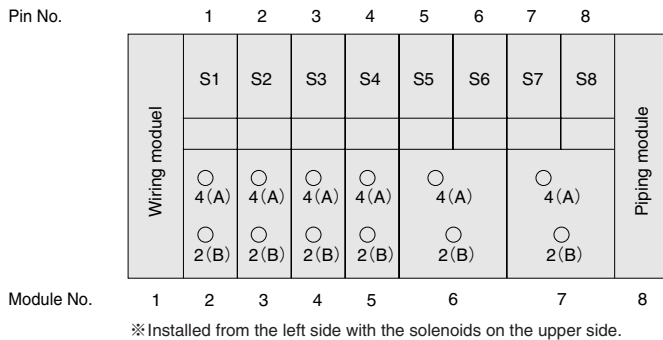
### Number of Solenoids Which Can Be Connected to a Wiring Module (Possible Number of Connections)

(1 solenoid for 4E1 type, and 2 solenoids for 4KE2 type)

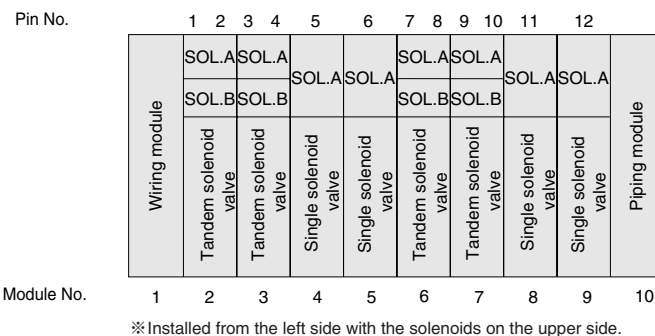
| Piping module model | Number of solenoids | Number of pins (terminals) |
|---------------------|---------------------|----------------------------|
| FMC-F200            | 16                  | 20 pins                    |
| FMC-F201            |                     |                            |
| FMC-D250-M2.6       | 16                  | 25 pins                    |
| FMC-D250-M3         |                     |                            |
| FMC-D250-UNC        |                     |                            |
| FMC-E250-M2.6       | 16                  | 25 pins                    |
| FMC-E250-M3         |                     |                            |
| FMC-E250-UNC        |                     |                            |
| FMC-T100            | 8                   | 10 terminals               |
| FMC-T180-L          | 16                  | 18 terminals               |
| FMC-T180-R          |                     |                            |
| FMC-T180-LS         |                     |                            |
| FMC-T180-RS         |                     |                            |

### Solenoid Layout

● For combination mounting with twin solenoid valves



● For combination mounting with tandem solenoid valves



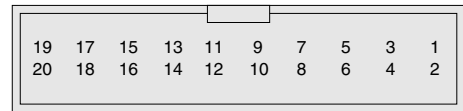
Note: Two terminals are allocated for the block-off plate module for the tandem solenoid, just like the tandem solenoid valves.

### Wiring Module Pin (Terminal) Locations

#### ① FMC-F200

Flat cable connector

Triangle mark

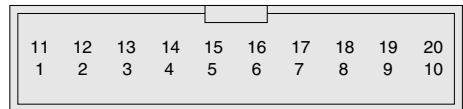


1~16 : Control pins  
17, 18 : (-) pins (short-circuited within module)  
19, 20 : (+) pins (short-circuited within module)

#### ② FMC-F201

Flat cable connector

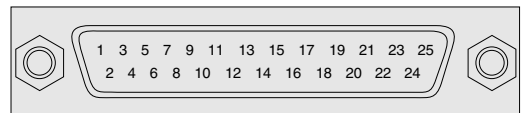
Triangle mark



1~8 : Control pins  
11~18 : Control pins  
9, 19 : (-) pins (short-circuited within module)  
10, 20 : (+) pins (short-circuited within module)

#### ③ FMC-D250-□, FMC-E250-□

D-sub connector



1~16 : Control pins  
20, 21, 22 : (-) pins (short-circuited within module)  
23, 24, 25 : (+) pins (short-circuited within module)

Notes: 1. The above pin numbers are assigned based on the solenoid valve wiring sequence for the sake of convenience.  
2. The D-sub connector differs from the pin locations and numbers (marked) defined in JIS X5101 for the data circuit-terminating equipment (DCE). Caution should be exercised.

The flat cable connector and D-sub connector pin locations can be adapted to specifications other than those listed above.

#### ④ FMC-T100

Terminal block Solenoid side



1~8 : Control terminals  
9, 10 : Common terminals (short-circuited within module)

#### ⑤ FMC-T180-□

Terminal block

● FMC-T180-L, FMC-T180-LS

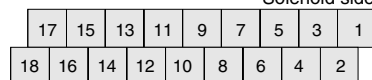
Solenoid side



1~16 : Control terminals  
17, 18 : Common terminals (short-circuited within module)

● FMC-T180-R, FMC-T180-RS

Solenoid side



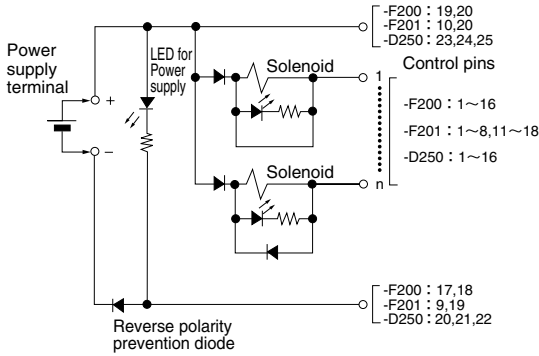
1~16 : Control terminals  
17, 18 : Common terminals (short-circuited within module)

In the standard type, positive polarity is common. Designation of -CM results in negative polarity common.

# Detailed Diagram of Solenoid Wiring System

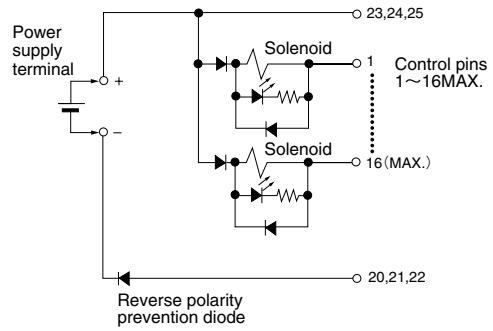
FMC-F200, -F201 (Flat cable connector type, DC12, 24V)  
 FMC-D250-□ (D-sub connector type, DC12, 24V)

## ● Positive common (standard)

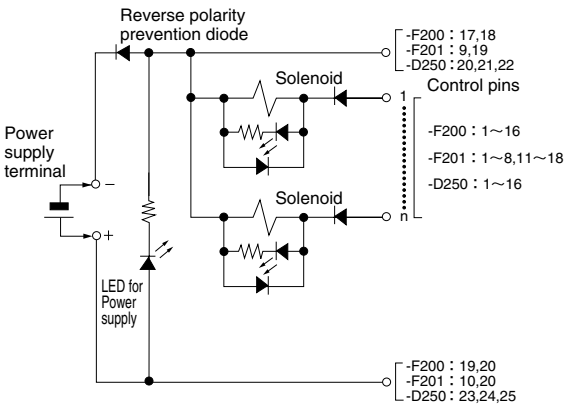


FMC-E250-□ (D-sub connector type, DC12, 24V)

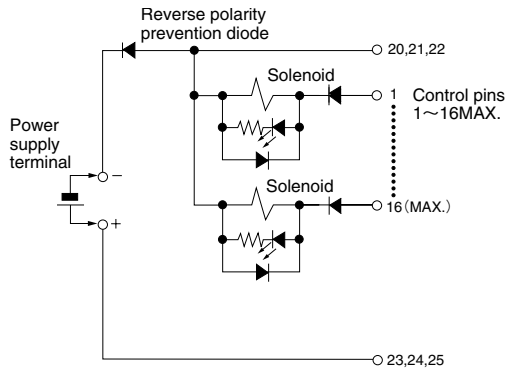
## ● Positive common (standard)



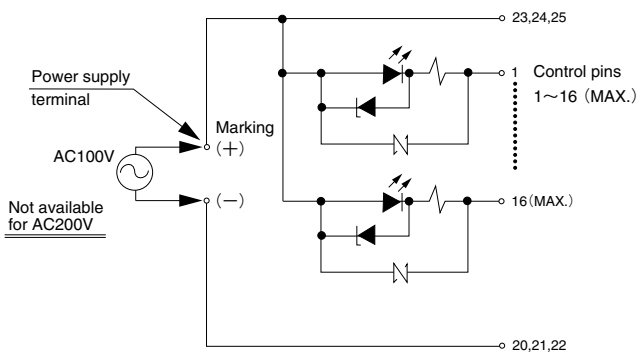
## ● Negative common (-CM)



## ● Negative common (-CM)



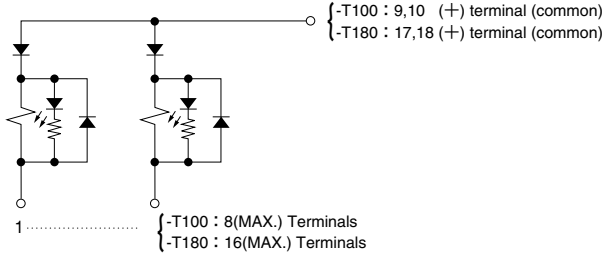
FMC-D250-□, -E250-□ (D-sub connector type, AC100V)



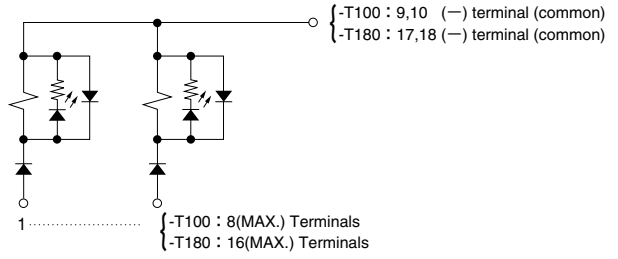
※ An LED indicator circuit is not provided for the FMC-E250.

**FMC-T100, -T180-□** (Terminal block type, DC12, 24V)

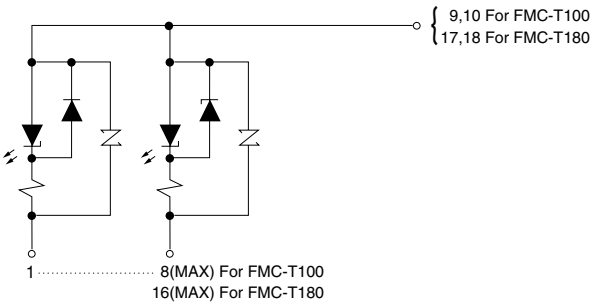
● **Positive common (standard)**



● **Negative common (-CM)**

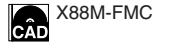


**FMC-T100, -T180-□** (Terminal block type, AC100,200V)



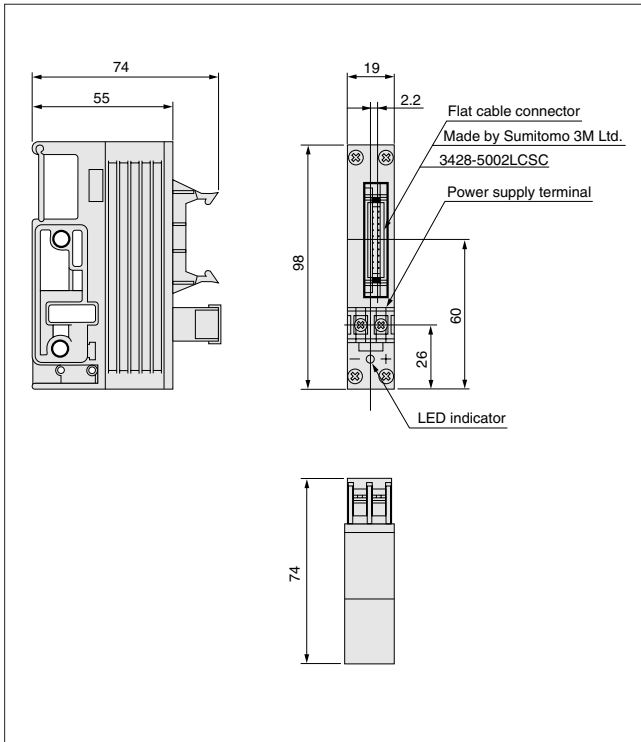
# FMC Dimensions of Wiring Module (mm)

※ Height with end block attached is +1mm  
[0.039in.] longer than indicated below.



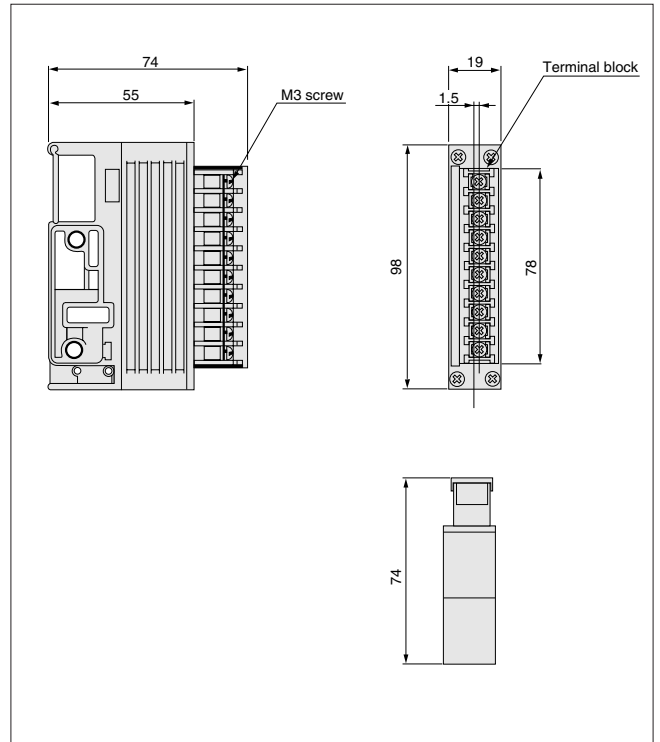
## Flat cable connector type

### FMC-F200, FMC-F201



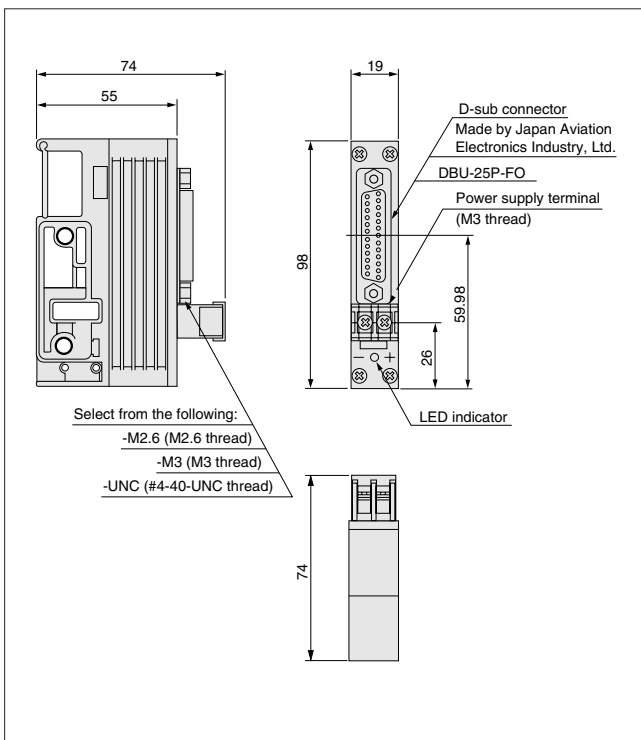
## Terminal block type

### FMC-T100



## D-sub connector type

### FMC-D250-□



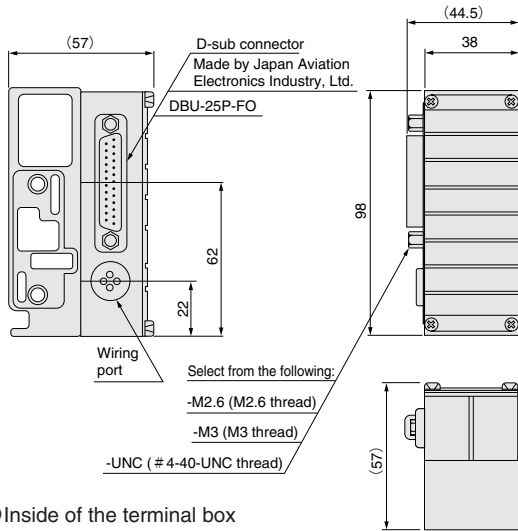


※ Height with end block attached is +1 mm [0.039in.] longer than indicated below.

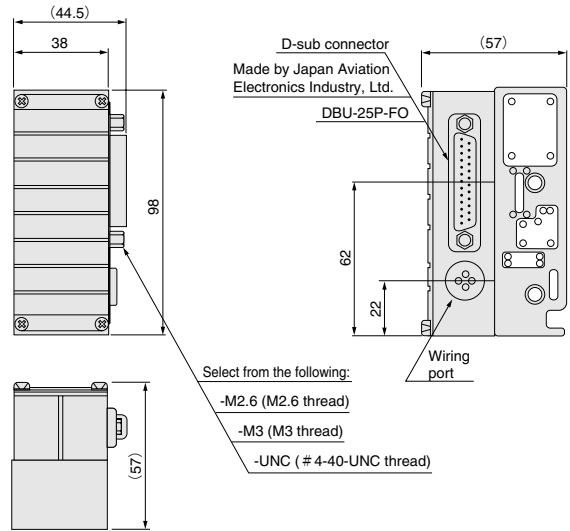
**D-sub connector, side connection specification**

**FMC-E250-□**

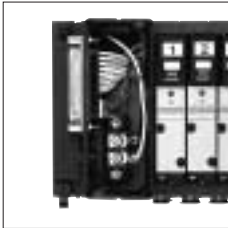
● For left side mounting



● For right side mounting

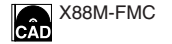


● Inside of the terminal box



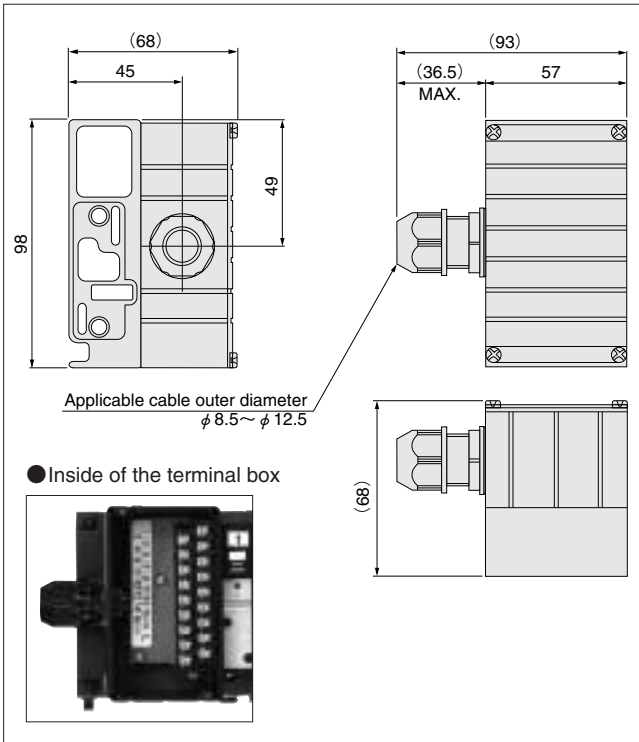
# FMC Dimensions of Wiring Module (mm)

※ Height with end block attached is +1mm  
[0.039in.] longer than indicated below.



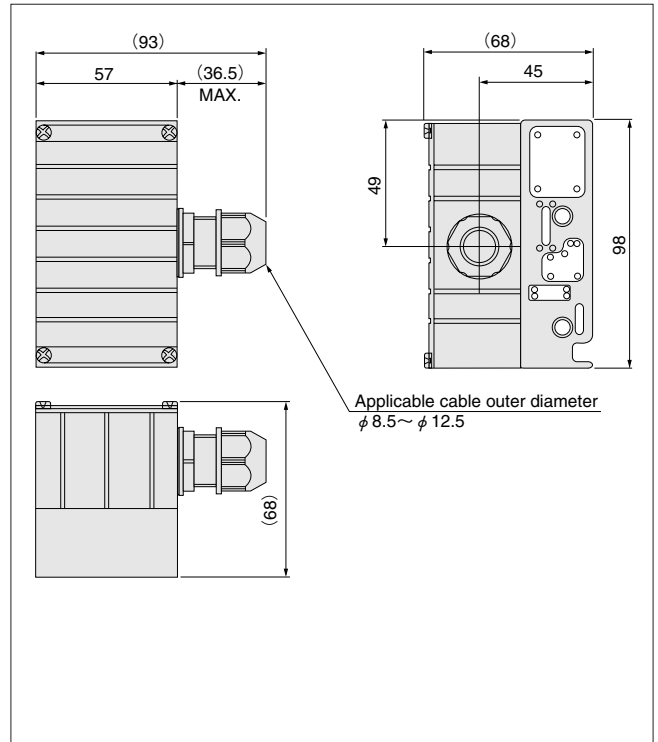
## Wiring bushing connection type (left side type)

### FMC-T180-L



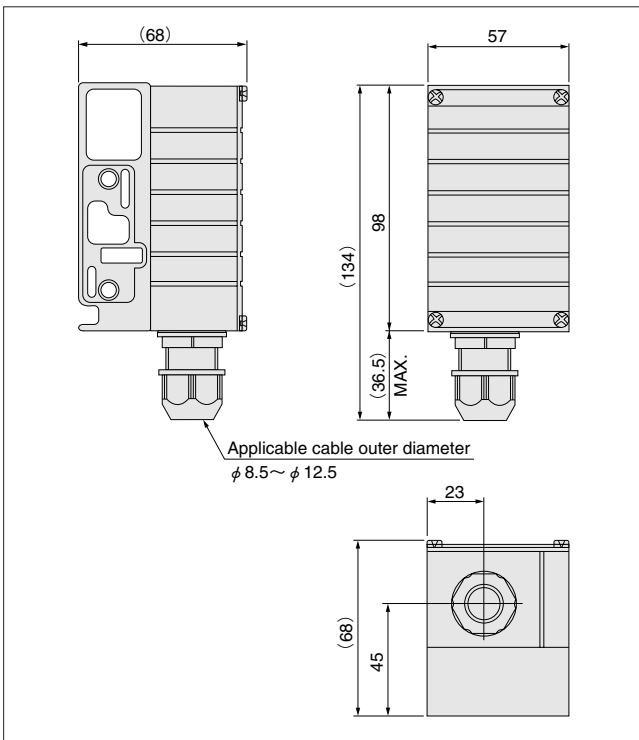
## Wiring bushing connection type (right side type)

### FMC-T180-R



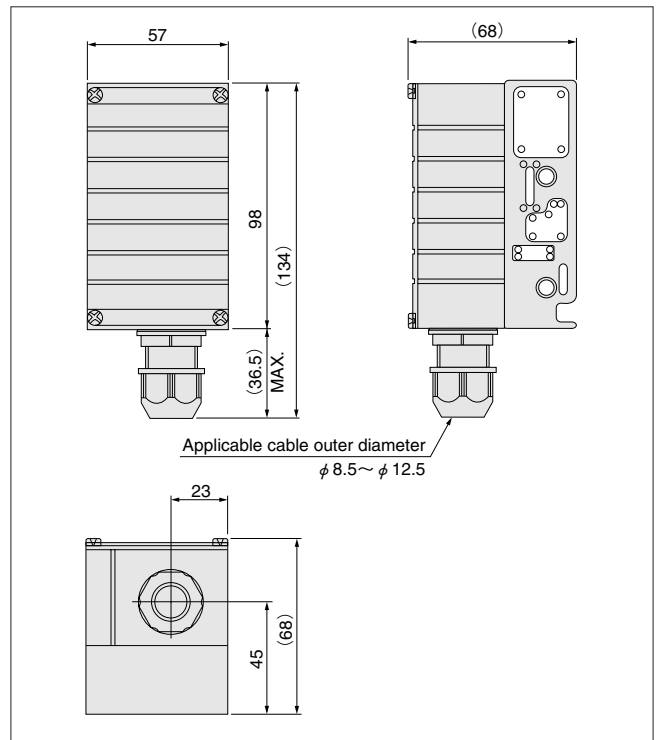
## Wiring bushing connection type (lower left side type)

### FMC-T180-LS



## Wiring bushing connection type (lower right side type)

### FMC-T180-RS



# FM-SOLID MANIFOLD X88M SERIES

## Serial Transmission Modules

### Features

- One cable directly connects the PC's (Programmable Controller) remote I/O main station and the remote I/O sub-station for the dedicated use of manifold solenoid valves.
- Direct transmission from the PC main station achieves great reductions in wiring man-hours, and fewer breakdown free operation due to the wrong wiring or breakage in the wiring. It also reduces maintenance work, and enables quick response to system changes.
- Decentralized control from the PC is allowed, achieving large wiring savings and reduced costs when long-distance or centralized control is required.
- We assemble and deliver serial transmission blocks and various other modules required for various manufacturers' PCs, according to orders received.

### Manufacture's name/serial transmission system

#### For OMRON SYSBUS Wire System

Related materials : User's manual, document No. **HV007**

#### For Mitsubishi Electric MELSECNET/MINI-S3

Related materials : User's manual, document No. **HV006**

#### For Fuji Electric FA Components & Systems T Link Mini

Related materials : User's manual, document No. **HV012**

#### For SHARP Satellite I/O Link

Related materials : User's manual, document No. **V107**

#### For Hitachi Remote I/O System

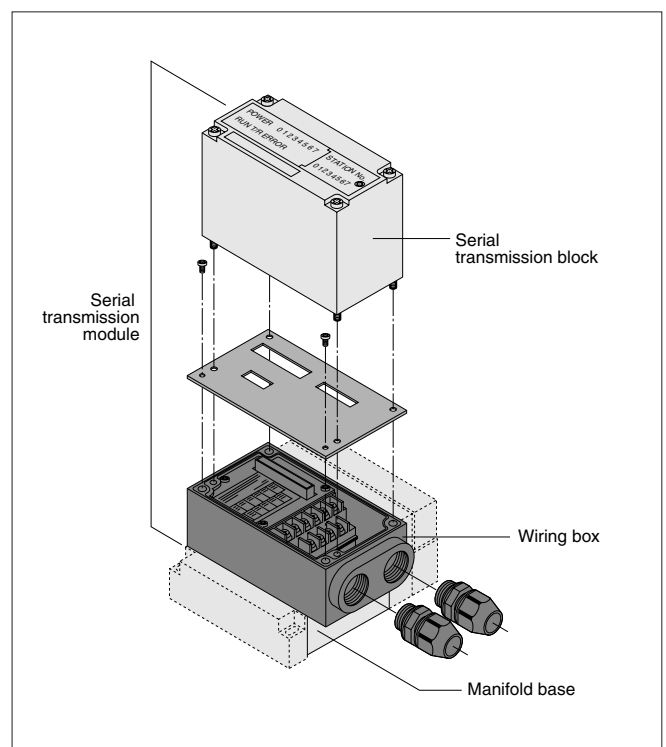
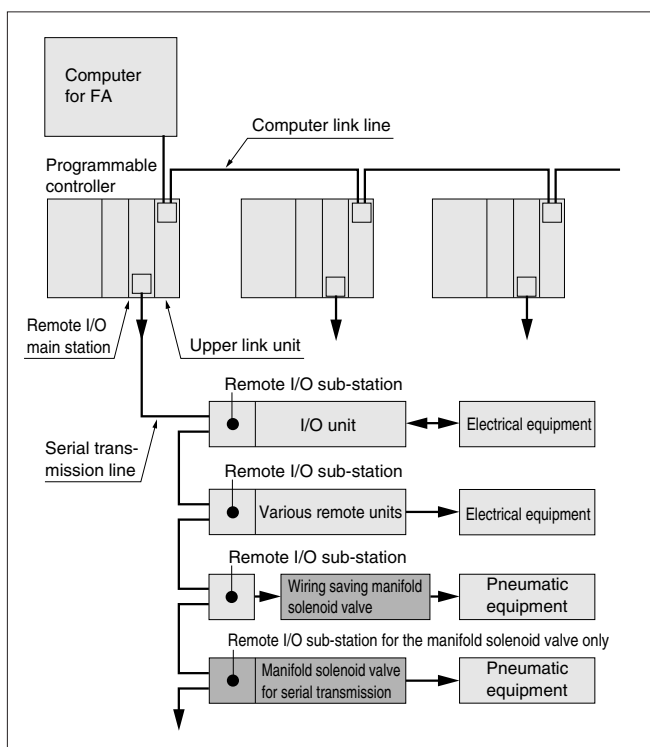
Related materials : User's manual, document No. **V108**

#### For Matsushita Electric Works MEWNET-F

Related materials : User's manual, document No. **V109**

### The serial transmission system is.....

- One cable directly connects the PC's (Programmable Controller) remote I/O main station and the remote I/O sub-station for the dedicated use of manifold solenoid valves.



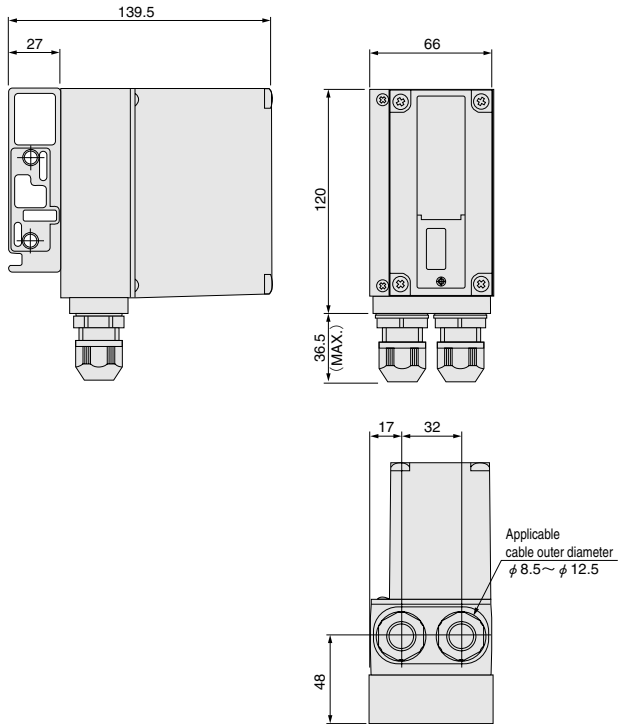
## Dimensions of Serial Transmission Module (mm)

※ Height with end block attached is +1mm  
[0.039in.] longer than indicated below.

### Serial transmission module

FMT-

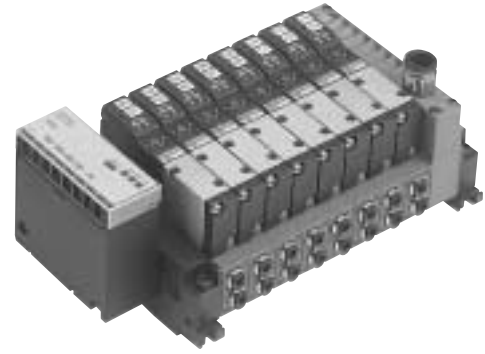
- All manufacturers' serial transmission modules have the same dimensions.
- Mounting positions are only at the right end or left end of the manifold.



# FM-SOLID MANIFOLD X88M SERIES Compact Serial Transmission System

## Features

A manifold with a compact serial transmission block, corresponding to each manufacturer's serial transmission system.



For OMRON SYSBUS Wire System

For OMRON CompoBus/S

For OMRON CompoBus/D Note

For OMRON B7A Link Terminal

For NKE,  
KURODA PRECISION INDUSTRIES UNI-WIRE® System

For SUNX S-LINK

For Mitsubishi Electric MELSECNET/MINI-S3

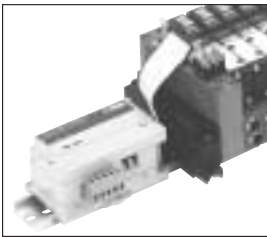
For Mitsubishi Electric MELSEC I/O LINK

For Mitsubishi Electric CC-Link

For Fuji Electric FA Components & Systems T Link Mini

For KEYENCE KZ-R

For KOYO ELECTRONICS INDUSTRIES SA Bus



Note: OMRON's remote I/O adapter-type **DRT1-OD16X** is used in the serial transmission block for OMRON's CompoBus/D. For details, see OMRON's catalog, user's manual, etc.

Remarks : 1. The UNI-WIRE® System is a serial parallel transmission system developed jointly by NKE and KURODA PRECISION INDUSTRIES.

2. For details of each system, see each manufacturer's catalog, user's manual, etc.

3. For details on handling the corresponding manifolds, see the corresponding Koganei user's manuals.

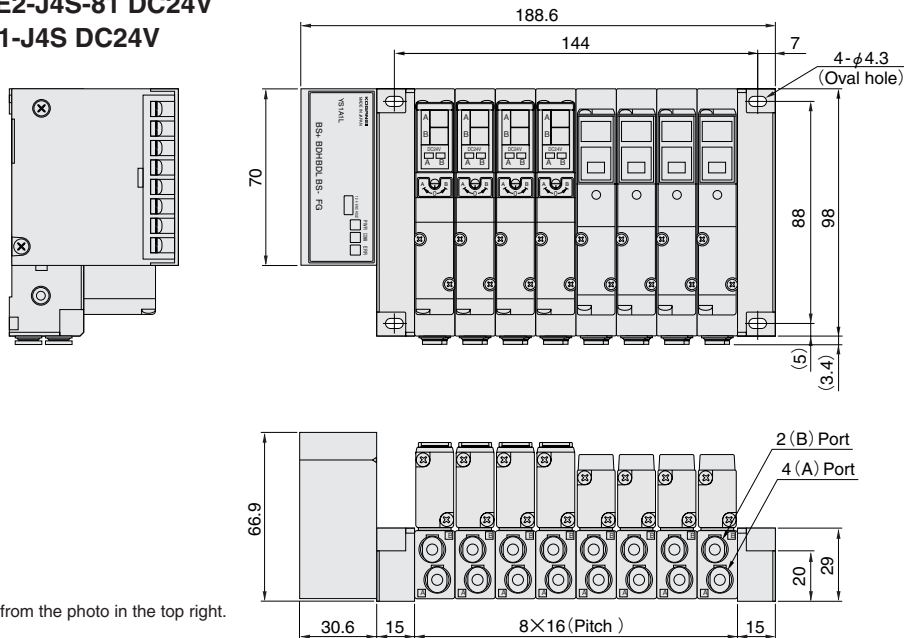
## Example of Manifold Configuration for Compact Serial Transmission System (mm)

### Configuration Example 1

#### X88MS1-A1-L-ED

No.1~4-FMY110-4ME2-J4S-81 DC24V

No.5~8-FMW110-4E1-J4S DC24V



※ This configuration example differs from the photo in the top right.

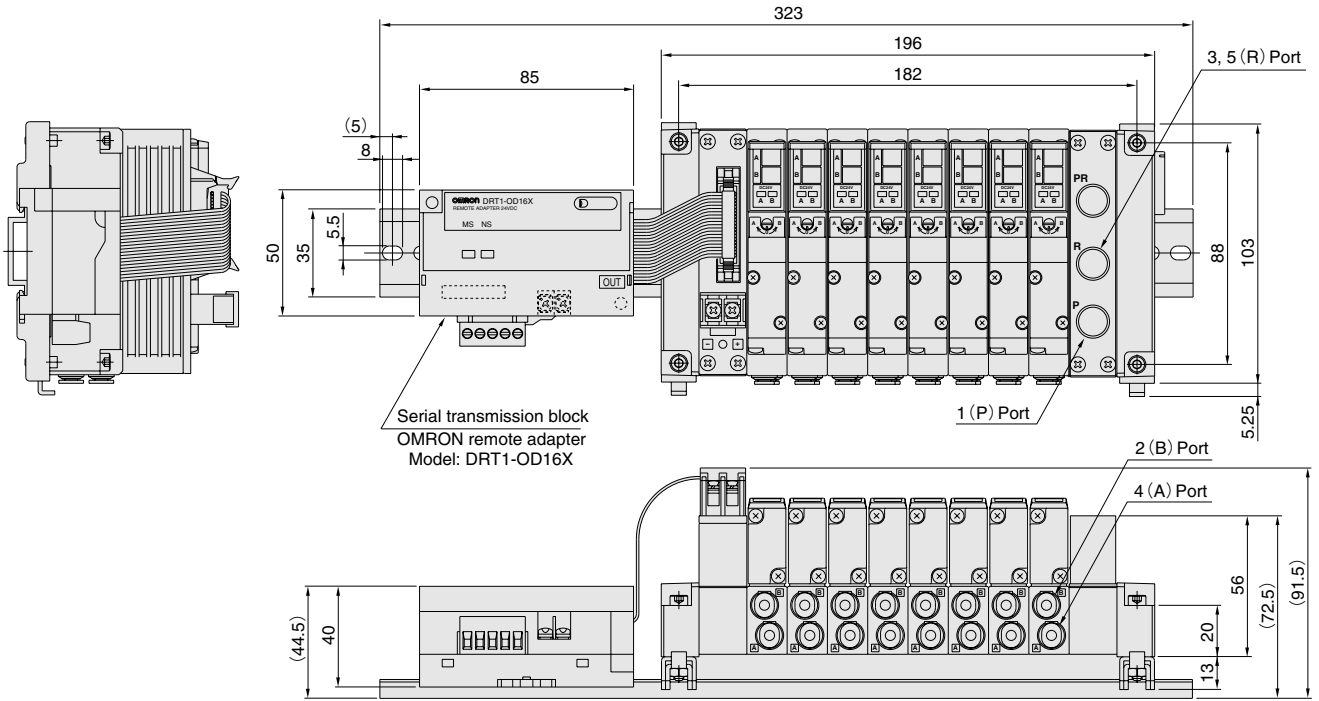
Configuration Example 2 For CompoBus/D

**X88MS1-91-L-DN**

No.1-FMC-F201 DC24V

No.2~9-FMY110-4ME2-J4S-81 DC24V

No.10-FMP-PR02S



# Compact Serial Transmission System Specifications

## General Specifications

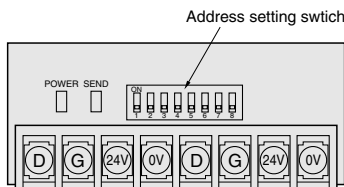
|                             |  |
|-----------------------------|--|
| Voltage                     | DC24V ±10%   |
| Operating temperature range | 5~50°C [41~122°F]                                    |
| Vibration resistance        | 49.0m/s <sup>2</sup> {5.0G} (Conforms to JIS C 0911) |
| Shock resistance            | 98.1m/s <sup>2</sup> {10.0G} (Conforms to JIS C0912) |

● For details of specifications, see the user's manuals (see below).

## Compact Serial Transmission Block, Terminal Block (LED) Names

### ● For UNI-WIRE® System

Transmission block specification: -01 (16 outputs), -02 (8 outputs)



#### LED indicator

| Indicator | Description  |
|-----------|--|
| POWER     | <ul style="list-style-type: none"> <li>Lights up when power is turned on</li> <li>Flashes during voltage drops or when over current (a short circuit)</li> </ul> |
| SEND      | <ul style="list-style-type: none"> <li>Flashes during normal transmission</li> <li>Lights up or shuts off during faulty transmission</li> </ul>                  |

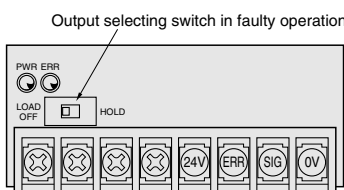
#### Remarks

※ The UNI-WIRE® System is a serial parallel transmission system developed jointly by NKE and KURODA PRECISION INDUSTRIES. For details of the UNI-WIRE System, see the NKE or KURODA PRECISION INDUSTRIES catalog, user's manual, etc.

- Number of outputs per block  
16 solenoids (transmission block specification: -01)  
8 solenoids (transmission block specification: -02)
- Related materials: User's manual, document No. HV005

### ● For OMRON B7A Link Terminal

Transmission block specification: -31 (standard type), -32 (high speed type)



#### LED indicator

| Indicator | Description                          |
|-----------|--------------------------------------|
| PWR       | Lights up when power is turned on    |
| ERR       | Lights up during faulty transmission |

#### Remarks

- Connection method: 1 to 1

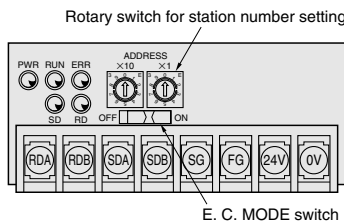
| (Transmission block spec.) | Standard type (-31) | High speed type (-32) |
|----------------------------|---------------------|-----------------------|
| Transmission delay time    | Max.31ms            | Max.5ms               |
| Transmission distance      | Max.500m            | Max.100m              |

※ For details of the B7A Link Terminal, see the OMRON catalog, user's manual, etc.

- Number of outputs per block  
Maximum of 16 solenoids
- Error output specifications  
Output mode: NPN open collector  
Rated load voltage: DC24V  
Output current: Sink current MAX. 40mA
- Related materials: User's manual, document No. HV008

### ● For Mitsubishi Electric MELSECNET/mini-S3

Transmission block specification: -11



#### LED indicator

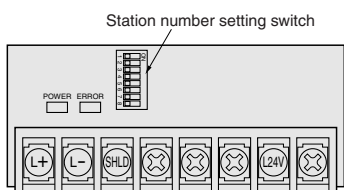
| Indicator | Description  |
|-----------|--|
| PWR       | Lights up when power is turned on  |
| RUN       | Lights up for normal data communication with master station                    |
| SD        | Flashes during sending data  |
| RD        | Flashes during receiving data  |
| ERR       | Lights up when data receiving error occurs, shuts off for normal communication |

#### Remarks

- Master station: MELSEC-A series  
AJ71PT32-S3, AJ71T32-S3, A2CCPU/A2CJCPU, A1SJ71PT32-S3, link sub-stations up to a maximum of 64 stations, and link I/O numbers up to a maximum of 512.
- ※ For details, see the Mitsubishi Electric's sequencer MELSEC-A series catalog, user's manual, etc.
- Number of outputs per block  
Maximum of 16 solenoids
- ※ Since the block is equivalent to 2 stations, if sub-stations are entirely composed of the blocks, the maximum becomes 32 units.
- Related materials: User's manual, document No. HV006

### ● For KOYO ELECTRONICS INDUSTRIES SA Bus

Transmission block specification: -41 (16 outputs), -42 (8 outputs)



#### LED indicator

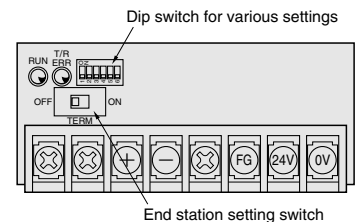
| Indicator | Description  |
|-----------|--|
| Power     | Lights up when power is turned on                    |
| Error     | Lights up during faulty transmission or other faults |

#### Remarks

- ※ For details of the SA Bus system, see the KOYO ELECTRONICS INDUSTRIES catalog, user's manual, etc.
- Number of outputs per block  
16 solenoids (transmission block specification: -41)  
8 solenoids (transmission block specification: -42)
- Related materials: User's manual, document No. HV009

### ● For OMRON SYSBUS Wire System

Transmission block specification: -21



#### LED indicator

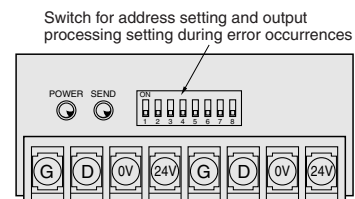
| Indicator | Description  |
|-----------|--|
| RUN       | Lights up when transmission is normal, and the PC is in operations mode or monitor mode  |
| T/R ERR   | <ul style="list-style-type: none"> <li>Flashes during normal transmission</li> <li>Lights up during standby or faulty transmission</li> <li>Shuts off during faults (during watchdog timer fault)</li> </ul> |

#### Remarks

- Master station unit: SYSMAC-C (CV) series  
C200H-RM201, C500-RM201
- ※ For details, see the OMRON's programmable controller SYSMAC C(CV) series catalog, user's manual, etc.
- Number of outputs per block  
Maximum of 16 solenoids
- Related materials: User's manual, document No. HV007

### ● For SUNX S-LINK

Transmission block specification: -51 (16 outputs), -52 (8 outputs)



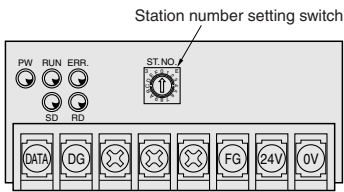
#### LED indicator

| Indicator | Description   |
|-----------|---|
| POWER     | Lights up when power is turned on   |
| SEND      | <ul style="list-style-type: none"> <li>Flashes during normal transmission</li> <li>Lights up or shuts off during faulty transmission</li> </ul> |

#### Remarks

- ※ For details of the S-LINK System, see the SUNX catalog, user's manual, etc.
- Number of outputs per block  
16 solenoids (transmission block specification: -51)  
8 solenoids (transmission block specification: -52)
- Related materials: User's manual, document No. HV010

● For Mitsubishi Electric MELSEC I/O LINK  
Transmission block specification: -61



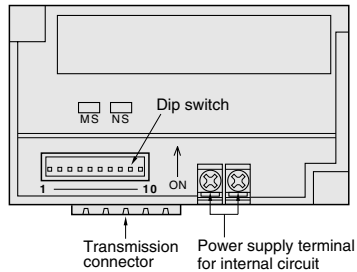
LED indicator

| Indicator | Description   |
|-----------|---|
| PW        | •Lights up when power is turned on                                    |
| RUN       | •Lights up when receiving data transmitted from master unit is normal |
| SD        | •Lights up during sending data to master unit                         |
| RD        | •Lights up during receiving data from master unit                     |
| ERR.      | •Lights up when faulty data transmitted from master unit              |

Remarks

- 16 remote I/O unit connection stations, for a maximum of 128 inputs/outputs
- ※ For details, see Mitsubishi Electric's sequencer catalog, user's manual, etc.
- Number of outputs per block  
Maximum of 16 solenoids
- ※ Since the block is equivalent to 4 stations, if sub-stations are entirely composed of the blocks, a maximum of 4 units can be connected to 1 master unit.
- Related materials: User's manual, document No. HV011

● For OMRON CompoBus/D  
Transmission block specification: -91



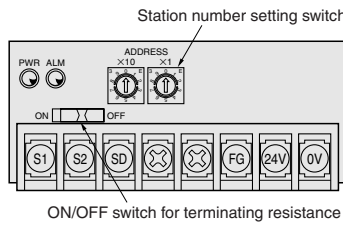
LED indicator

| Indicator | State     | Color | Description                         |
|-----------|-----------|-------|-------------------------------------|
| MS        | Lights up | Green | •Normal state                       |
|           | Flashing  |       | •No setting state                   |
|           | Lights up | Red   | •Serious breakdown                  |
|           | Flashing  |       | •Minor breakdown                    |
|           | Shuts off | —     | •No power supply                    |
| NS        | Lights up | Green | •Communication connection completed |
|           | Flashing  |       | •No communication connection        |
|           | Lights up | Red   | •Serious communication fault        |
|           | Flashing  |       | •Minor communication fault          |
|           | Shuts off | —     | •No power supply                    |

Remarks

- ※ For details of the CompoBus/D, see the OMRON catalog, user's manual, etc.
- The transmission block is OMRON's remote adaptor-type **DRT1-OD16X**. For details about handling, see OMRON's user's manual.
- Number of outputs per block  
Maximum of 16 solenoids
- Related materials: User's manual, document No. HV014

● For Fuji Electric FA Components & Systems T Link Mini  
Transmission block specification: -71



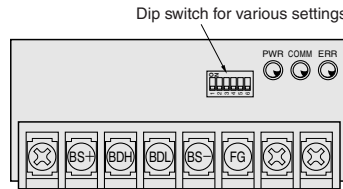
LED indicator

| Indicator | Description                           |
|-----------|---------------------------------------|
| PWR       | •Lights up when power is turned on    |
| ALM       | •Lights up during faulty transmission |

Remarks

- ※ For details of the T Link Mini, see the Fuji Electric FA Components & Systems catalog, user's manual, etc.
- Number of outputs per block  
Maximum of 16 solenoids
- Related materials: User's manual, document No. HV012

● For OMRON CompoBus/S  
Transmission block specification: -A1 (16 outputs), -A2 (8 outputs)



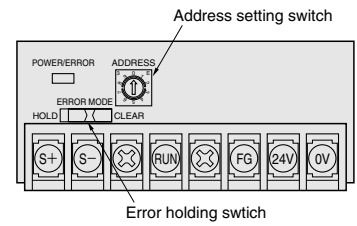
LED indicator

| Indicator | State     | Color  | Description                              |
|-----------|-----------|--------|--|
| PWR       | Lights up | Green  | •During power supply                     |
|           | Shuts off |        | •Power not supplied                      |
| COMM      | Lights up | Yellow | •During normal communication             |
|           | Shuts off |        | •Communication fault, or standby         |
| ERR       | Lights up | Red    | •Communication fault occurred            |
|           | Shuts off |        | •During normal communication, or standby |

Remarks

- ※ For details of the CompoBus/S, see the OMRON catalog, user's manual, etc.
- Number of outputs per block  
16 solenoids (transmission block specification: -A1)  
8 solenoids (transmission block specification: -A2)
- Related materials: User's manual, document No. HV015

● For KEYENCE KZ-R  
Transmission block specification: -81



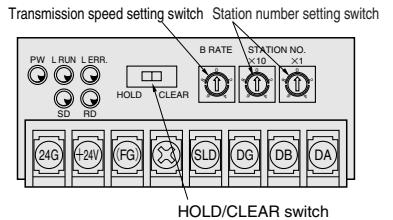
LED indicator

| Indicator       | Description  |
|-----------------|--|
| POWER/<br>ERROR | •Green: Lights up for normal communications state  |
|                 | •Orange: Lights up when communications state is poor (can also light up when address settings are incorrect) |
|                 | •Red: Lights up during faulty operation, or when transmission is cut off                                     |

Remarks

- ※ For details of the KZ-R, see the KEYENCE catalog, user's manual, etc.
- Number of outputs per block  
Maximum of 16 solenoids
- Related materials: User's manual, document No. HV013

● For Mitsubishi Electric CC-Link  
Transmission block specification: -B1



LED indicator

| Indicator | Description   |
|-----------|---|
| PW        | •Lights up when power is turned on  |
| L RUN     | •Lights up when normal data is received from master station   |
| SD        | •Lights up during sending data  |
| RD        | •Lights up during receiving data  |
| L ERR.    | •Lights up during transmission errors, and shuts off when time is over<br>Lights up during station number setting error or transmission speed setting error |

Remarks

- ※ For details of the CC-Link, see the Mitsubishi Electric catalog, user's manual, etc.
- Number of outputs per block  
16 solenoids (transmission block specification: -B1)
- ※ Since the block occupies 1 station, if remote I/O stations are entirely composed of the blocks, a maximum of 64 units can be connected to 1 master station.
- Related materials: User's manual, document No. HV016

■ For about specifications and handling details, see the above-listed user's manuals (document Nos. HV005~HV016).



# FM-SOLID MANIFOLD X88M SERIES

## Piping Modules

### Features

Selectable according to piping requirements, for reducing of piping work, and for easier maintenance.

### Built-in quick fitting type

The 1(P) port offers 4 types of built-in quick fittings, straight and elbow types for both  $\phi 8$  and  $\phi 10$  tubes. The 3, 5(R) port is equipped with a built-in muffler.

### Port female thread type

The 1(P) port has an Rc1/8 or Rc1/4 female thread.  
The 3, 5(R) port has a built-in muffler.

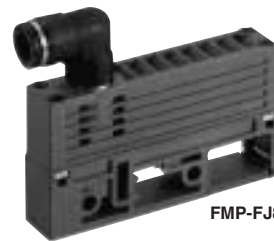
### All port female thread type

The 1(P) port and 3, 5(R) port have Rc1/4 female threads.

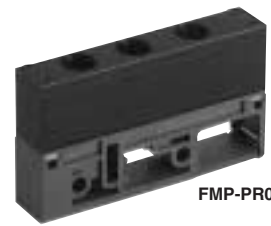
### All port female thread type, side piping specification

Can select right side or left side piping, for increased flexibility of piping direction and greater space savings.

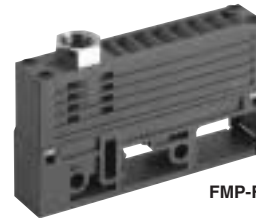
The 1(P) port and 3, 5(R) port have Rc1/4 female threads.



FMP-FJ8L



FMP-PR02S



FMP-FR02

## Piping Module Specifications

| Model     | 1(P) port specification                        | 3, 5(R) port specification                        |
|-----------|--|---|
| FMP-FJ8S  | With straight quick fitting for $\phi 8$ tube  | With built-in muffler<br>(exhausts to atmosphere) |
| FMP-FJ8L  | With elbow quick fitting for $\phi 8$ tube     |   |
| FMP-FJ10S | With straight quick fitting for $\phi 10$ tube |   |
| FMP-FJ10L | With elbow quick fitting for $\phi 10$ tube    |   |
| FMP-FR01  | Rc1/8 (female thread specification)            | Rc1/4 (female thread specification)               |
| FMP-FR02  | Rc1/4 (female thread specification)            |   |
| FMP-PR02S | Rc1/4 (female thread specification)            | Rc1/4 (female thread specification)               |
| FMP-PR02L | Rc1/4 (female thread specification)            | Rc1/4 (female thread specification)               |

## Module Mass

g [oz.]

| Model     | Mass       |
|-----------|------------|
| FMP-FJ8S  | 95 [3.35]  |
| FMP-FJ8L  | 110 [3.88] |
| FMP-FJ10S | 100 [3.53] |
| FMP-FJ10L | 115 [4.06] |
| FMP-FR01  | 95 [3.35]  |
| FMP-FR02  | 95 [3.35]  |
| FMP-PR02S | 150 [5.29] |
| FMP-PR02L | 150 [5.29] |

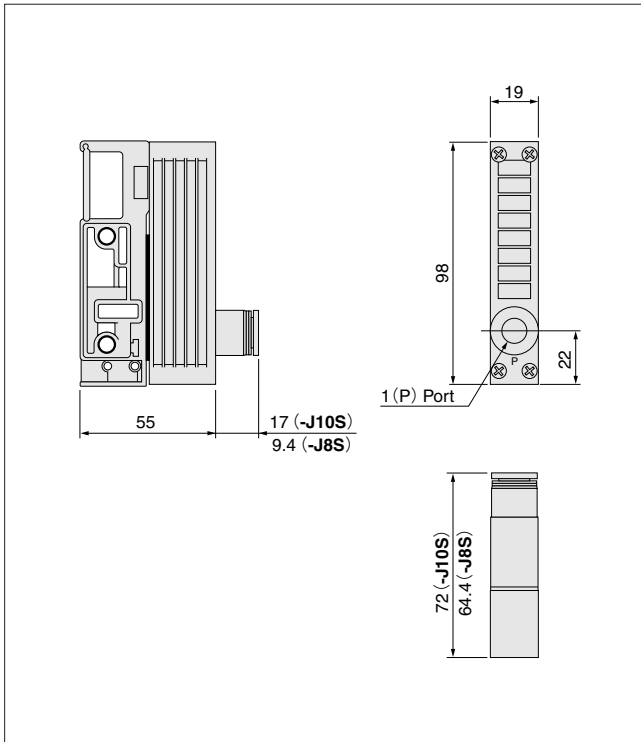
# FMP Dimensions of Piping Module (mm)

※Height with end block attached is +1mm [0.039in.] longer than indicated below.

CAD X88M-FP1  
X88M-FP2

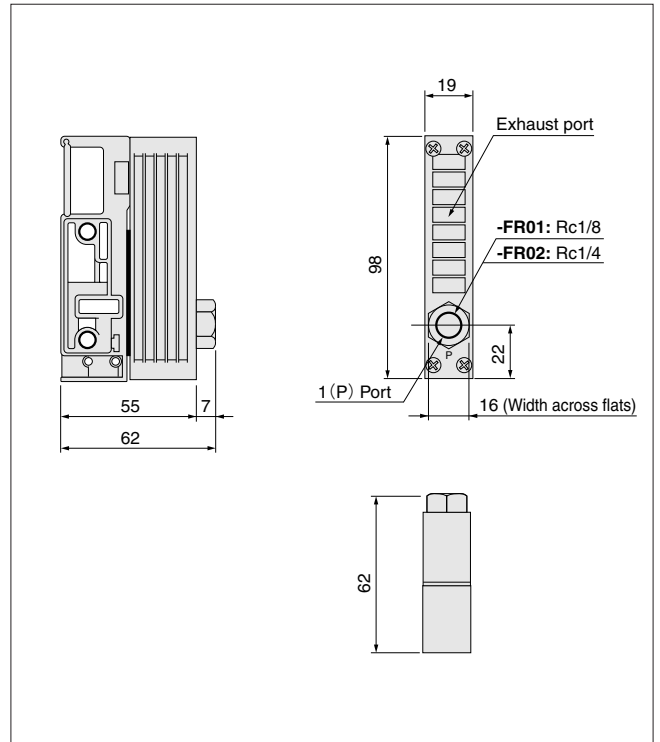
## Built-in straight quick fitting type

### FMP-FJ8S, FMP-FJ10S



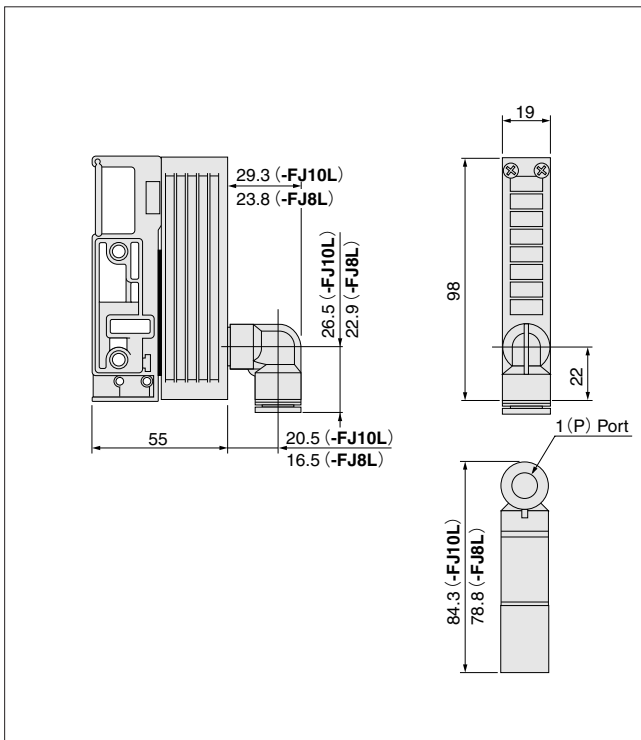
## 1(P) port female thread type

### FMP-FR01, FMP-FR02



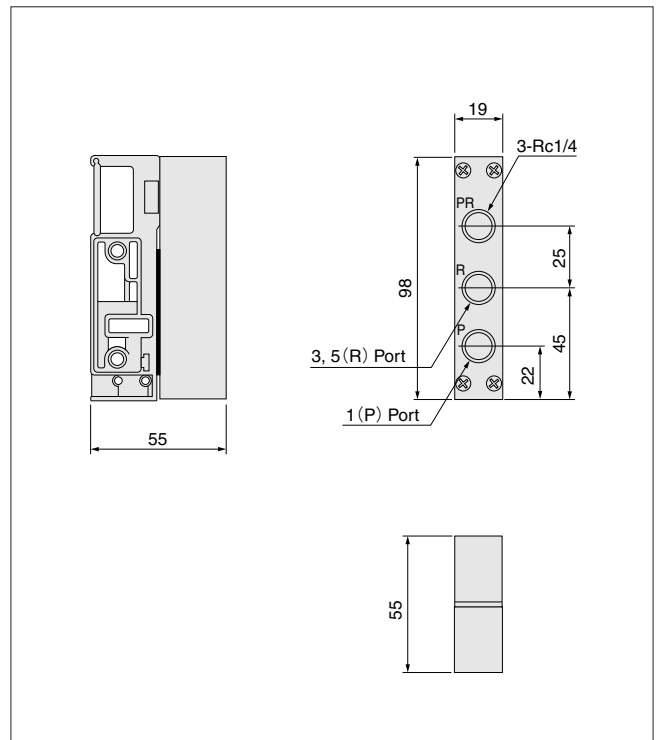
## Built-in elbow quick fitting type

### FMP-FJ8L, FMP-FJ10L



## All port female thread type

### FMP-PR02S

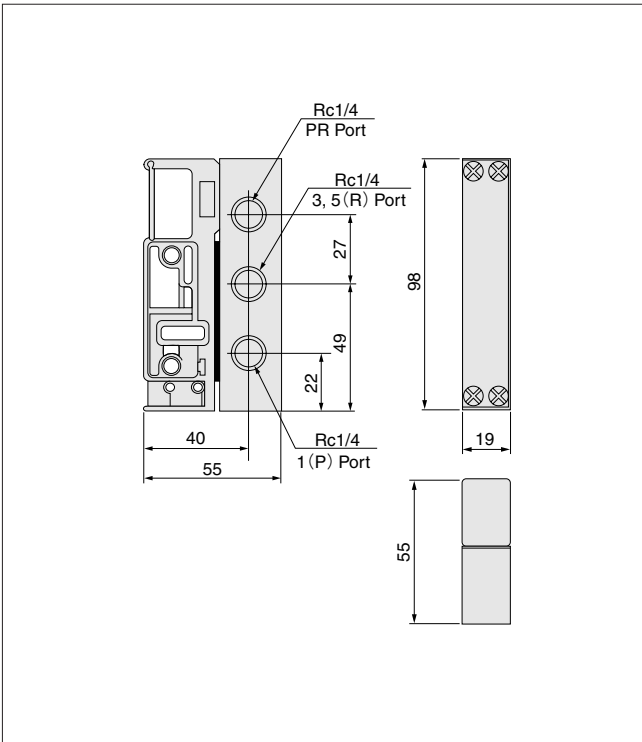


※ Height with end block attached is +1 mm [0.039in.] longer than indicated below.

CAD X88M-FP1

All port female thread type, side piping specification

FMP-PR02L



FM-SOLID MANIFOLD X88M SERIES

# FM-SOLID MANIFOLD X88M SERIES

## Air Preparation Modules

### Features

Achieves even greater space savings and integration, from air preparation to pressure control.

### Filter module

Filtration is 5  $\mu\text{m}$ . Maximum flow rate of 800  $\ell/\text{min}$  [28.2  $\text{ft}^3/\text{min}$ .] (ANR). The P port has an Rc1/4 female thread.

### Regulator module

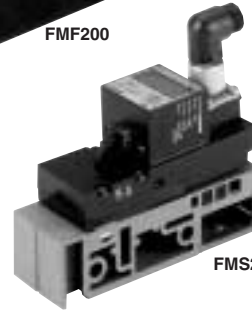
The pressure regulating range is 0.15~0.7MPa [22~102psi.]. The P port has an Rc1/4 female thread. The pressure gauge has 1MPa [145psi.] and 10 $\text{kgf}/\text{cm}^2$  [142psi.] specifications for both the bottom and back piping, for 4 types of ranges.



FMF200



FMR200



FMS220-PL

### Electronic type pressure switch module

Mounts the digital pressure gauge GS520 equivalent to allow pressure setting while reading the display. The wiring type includes both a plug-in type and connector type.

### Mechanical type pressure switch module

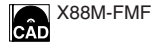
The pressure gauge connection port size for the mechanical type pressure switch is Rc1/8. The wiring type includes both a plug-in type and connector type.

## Air Preparation Module Specifications

| Item                        | Module model  | FMF200   | FMR200                                     | Pressure switch  |  |  |
|-----------------------------|---|--|--|--|--|--|
|                             |   |  |  | FMS220-□ (electronic type)   | FMS110□ (mechanical type)                              | FMS111□ (mechanical type)                        |
| Manifold basic model        | X88M  |  |  |  |  |  |
| Connection method           | Stack lot type  |  |  |  |  |  |
| Manifold mounting type      | Direct mounting type/DIN rail mounting  |  |  |  |  |  |
| Port location               | 1 place for body, 1 place for base, P port installed (Rc1/4)  |  |  | —  |  |  |
| Media                       | Air   |  |  |  |  |  |
| Operating temperature range | $^{\circ}\text{C}$ [ $^{\circ}\text{F}$ ] 5~50 [41~122]   |  |  |  |  |  |
| Maximum operating pressure  | MPa { $\text{kgf}/\text{cm}^2$ [psi.]} 0.7 {7.1} [102]  |  |  |  |  |  |
| Pressure regulating range   | MPa { $\text{kgf}/\text{cm}^2$ [psi.]} — 0.15~0.7 {1.5~7.1} [22~102] 0~1.0 {0~10.2} [0~145] 0.1~0.5 {1.0~5.1} [15~73] |  |  |  |  |  |
| Maximum flow rate           | $\ell/\text{min}$ [ $\text{ft}^3/\text{min}$ .] (ANR) 800 [28.2] 900 [31.8] —   |  |  |  |  |  |
| Filtration                  | $\mu\text{m}$ 5 —   |  |  |  |  |  |
| Proof pressure              | MPa { $\text{kgf}/\text{cm}^2$ [psi.]} 1.05 {10.7} [152]  |  |  |  |  |  |
| Pressure sensing method     | —   |  | Diaphragm                                  | Semiconductor sensor   | Diaphragm  |  |
| Contact type                | —   |  | —  | Solid state type   | Reed switch type                                       | Solid state type                                 |
| Response differential       | —   |  | —  | 0.001 {0.01} [0.15]  | Reed switch type: 0.08 {0.8} [11.6]                    | Solid state type: 0.02 {0.2} [2.9]               |
| Wiring type                 | —   |  | —  | (1) Collective wiring type (plug-in type)<br>(2) Individual wiring type (lead wire type, connector type) |  |  |
| Solenoid specifications     | Operation type  | —  |  | NPN transistor, open collector   | —  |  |
|                             | Supply voltage  | —  |  | DC12~24 $\pm$ 10%<br>Ripple P-P 10%  | Reed switch type:<br>DC10~28V (load voltage)           | Solid state type:<br>DC4.5~28V                   |
|                             | Load current  | —  |  | —  | Reed switch type: 5~40mA                               | Solid state type: MAX.100mA                      |
|                             | Current consumption   | —  |  | 50mA or below  | —  | Solid state type: MAX.10mA<br>(when ON at DC24V) |
|                             | Output capacity   | —  |  | DC30V, 100mA MAX.  | —  |  |
|                             | Internal voltage drop   | —  |  | MAX.0.4V at 16mA<br>MAX.1V at 100mA  | Reed switch type:<br>MAX.2.1V                          | Solid state type:<br>MAX.0.5V                    |
|                             | Insulation resistance   | —  |  | Over 50M $\Omega$<br>(at DC500V megger)  | 100M $\Omega$<br>(at DC500V megger)                    |  |
|                             | Operation indicator   | —  |  | LED indicator lights up when power is ON   |  |  |
|                             | Leakage current   | —  |  | —  | Solid state type: MAX.50 $\mu\text{A}$                 |  |
|                             | Lead wire   | —  |  | 0.15mm <sup>2</sup><br>Oil resistant cabtyre cable   | Reed switch type:<br>PVC0.25Q $\times$ 2 leads         | Solid state type:<br>PVC0.25Q $\times$ 3 leads   |
| Contact protection          | —   |  | Not required                               | Reed switch type: required   | Solid state type: not required                         |  |
| Remarks                     | (1) Any mounting direction<br>(2) Moisture not separated<br>(3) Strainer function only                                | (1) With residual exhaust function<br>(2) Relief function with large flow rate | Equivalent to digital pressure gauge GS520 | Reed switch type:<br>Equivalent to sensor switch CS11T   | Solid state type:<br>Equivalent to sensor switch ZC153 |  |

# FMF Dimensions of Filter Module (mm)

# FMR Dimensions of Regulator Module (mm)

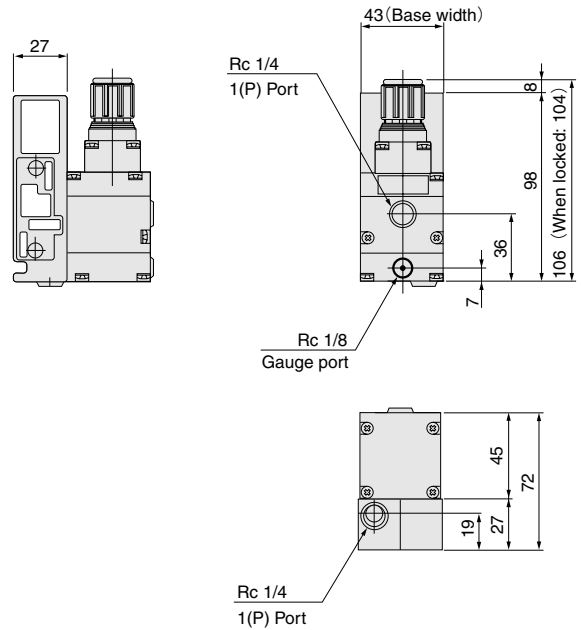
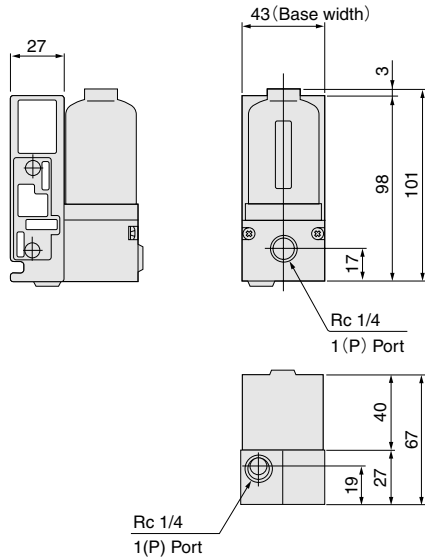


## Filter module FMF200

## Regulator module FMR200

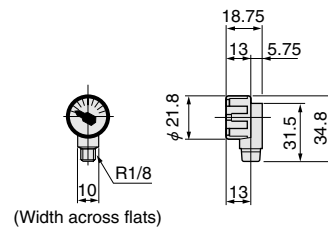
Note: Because it has an installation positional sequence, always pay attention to the module mounting sequence. For details, see p.436.

Note: Because it has an installation positional sequence, always pay attention to the module mounting sequence. For details, see p.436.

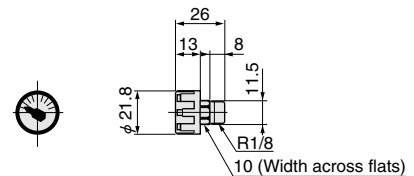


※ Height with end block attached is +1mm [0.039in.] longer than indicated below.

●  $\phi$  20 pressure gauge (with bottom piping) : GA20 (1MPa specification)



●  $\phi$  20 pressure gauge (with back piping) : GD20 (1MPa specification)



FM-SOLID MANIFOLD X88M SERIES

### Filter Module Mass

g [oz.]

| Model  | Mass        |
|--------|-------------|
| FMF200 | 330 [11.64] |

### Regulator Module Mass

g [oz.]

| Model       | Mass        |
|-------------|-------------|
| FMR200      | 450 [15.87] |
| FMR200-GA20 | 460 [16.23] |
| FMR200-GD20 | 460 [16.23] |

### Pressure Switch Module Mass

g [oz.]

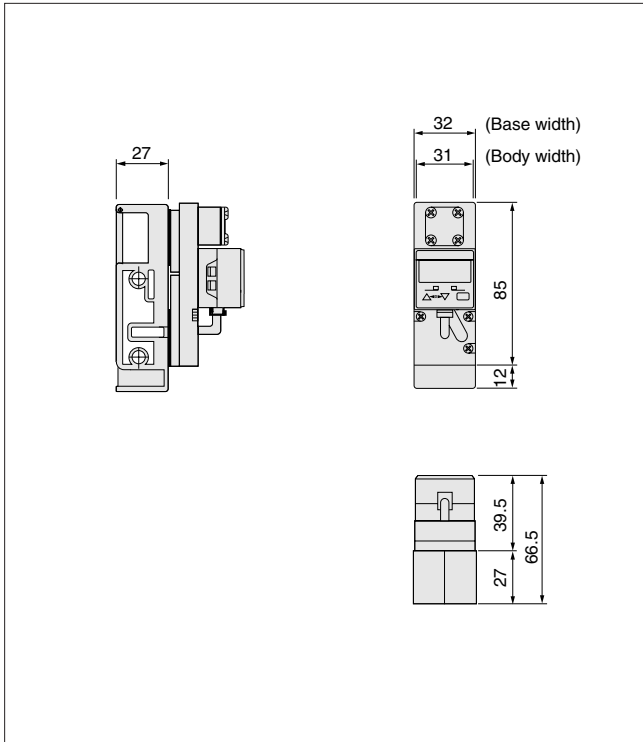
| Model    | Pressure switch type | Mass       |
|----------|----------------------|------------|
| FMS220-□ | Electronic type      | 150 [5.29] |
| FMS110□  | Mechanical type      | 120 [4.23] |
| FMS111□  |                      |            |

# FMS Dimensions of Pressure Switch Module (mm)

※Height with end block attached is +1mm [0.039in.] longer than indicated below.

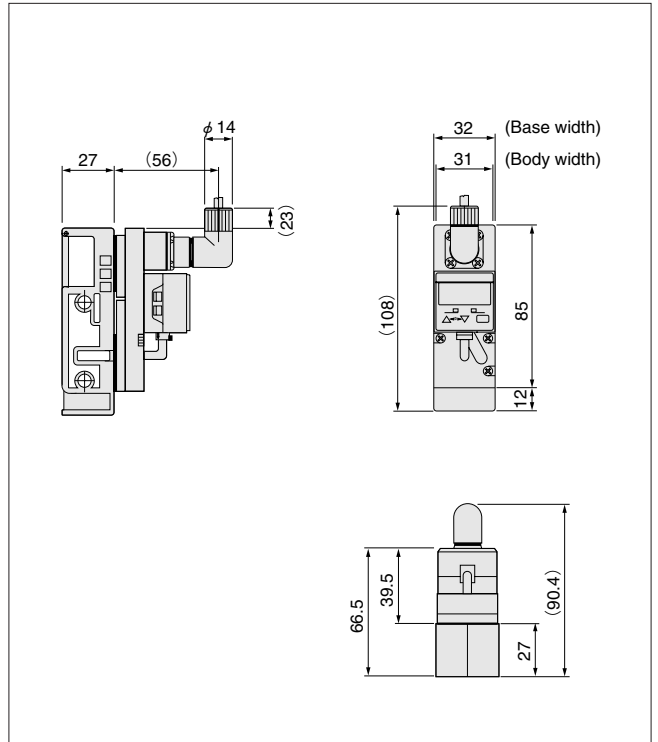
## Electronic type pressure switch module

### FMS220 (Collective wiring type)



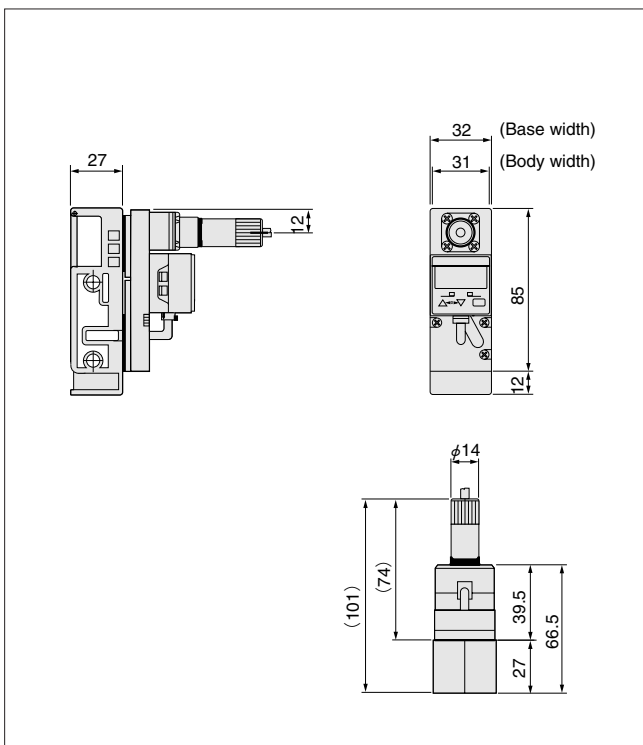
## Electronic type pressure switch module with elbow connector

### FMS220-PL (Individual wiring type)



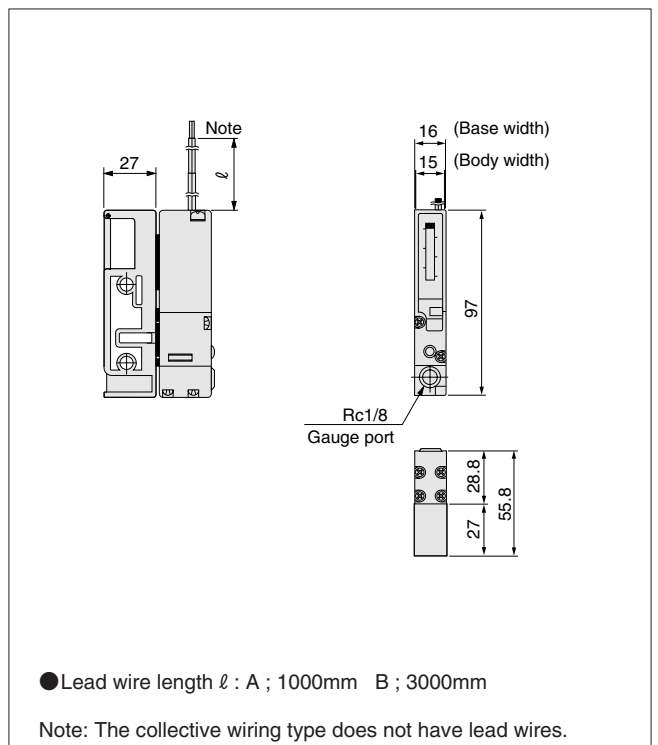
## Electronic type pressure switch module with straight connector

### FMS220-PS (Individual wiring type)



## Mechanical type pressure switch module

### FMS110□ (Reed switch type), FMS111□ (Solid state type)



# FM-SOLID MANIFOLD X88M SERIES

## Valve Modules

### Features

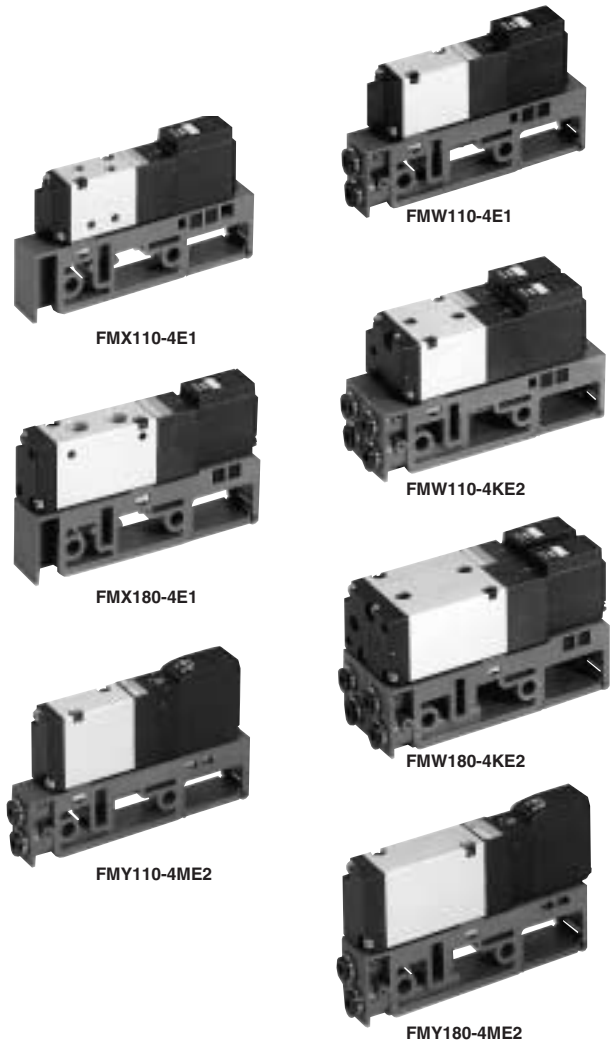
Reliable solenoid valves 110 and 180 series have been converted to valve type modules with their specifications unchanged. In addition, by using single-footprint mounting of combined 2-unit solenoids in one body, a tandem solenoid valve with a standard single station mounting area has been newly added to the product range. All are plug-in types with compact appearances, to achieve even greater space savings.

### Direct piping type (Single solenoid, twin solenoid)

The  $\phi 4$  and  $\phi 6$  quick fitting types can be selected for the valve 4(A) and 2(B) ports.

### Base piping type (Single solenoid, twin solenoid, tandem solenoid)

The 4(A), 2(B) ports on the module base offer a range of 4 types of quick fittings with straight and elbow types for both  $\phi 4$  and  $\phi 6$  tubes, and of an M8M female thread type.



FM-SOLID MANIFOLD X88M SERIES

## Valve Module Specifications

### Basic Models and Valve Functions

|                               |                    |   |   |  |
|-------------------------------|--------------------|---|---|--|
| Solenoid valves<br>110 series | Direct piping type | FMX110E1  | FMX110-4E1<br>FMX110-4KE2                             | FMX113-4KE2  |
|                               | Base piping type   | FMW110E1  | FMW110-4E1<br>FMW110-4KE2<br>FMY110-4ME2              | FMW113-4KE2<br>FMY113-4ME2   |
| Solenoid valves<br>180 series | Direct piping type | FMX180E1  | FMX180-4E1<br>FMX180-4KE2                             | FMX183-4KE2  |
|                               | Base piping type   | FMW180E1  | FMW180-4E1<br>FMW180-4KE2<br>FMY180-4ME2              | FMW183-4KE2<br>FMY183-4ME2   |
| Number of positions           |                    | 2 positions   |   | 3 positions  |
| Number of ports               |                    | 2, 3 ports  |   | 5 ports  |
| Valve function                |                    | Normally closed (NC, standard) or<br>Normally open (NO, optional) | Single solenoid, Twin solenoid, or<br>Tandem solenoid | Closed center (standard), or Exhaust center<br>(optional), Pressure center (optional),<br>Twin solenoid, Tandem solenoid |

Remarks: For optional specifications and order codes, see p. 439.

### Symbols

| 3-port               |                            | 5-port                   |  |  |  |  |
|----------------------|----------------------------|--------------------------|--|--|--|--|
| 2-position           |                            | 3-position               |  |  | 3-position   |  |
| NC                   | NO                         | Single solenoid          | Twin solenoid<br>Tandem solenoid                         | Closed center  | Exhaust center   | Pressure center  |
|                      |                            |                          |  |  |  |  |
| FM□110E1<br>FM□180E1 | FM□110E1-11<br>FM□180E1-11 | FM□110-4E1<br>FM□180-4E1 | FM□110-4KE2<br>FM□110-4ME2<br>FM□180-4KE2<br>FM□180-4ME2 | FM□113-4KE2<br>FM□113-4ME2<br>FM□183-4KE2<br>FM□183-4ME2 | FM□113-4KE2-13<br>FM□113-4ME2-13<br>FM□183-4KE2-13<br>FM□183-4ME2-13 | FM□113-4KE2-14<br>FM□113-4ME2-14<br>FM□183-4KE2-14<br>FM□183-4ME2-14 |

## Specifications

| Solenoid valve model                               |                                   | 110 series                                    |   |  | 180 series                                    |  |  |
|--|-----------------------------------|---|---|--|---|--|--|
| Basic model  | Direct piping type                | FMX110E1                                      | FMX110-4E1<br>FMX110-4KE2                                       | FMX113-4KE2                                  | FMX180E1                                      | FMX180-4E1<br>FMX180-4KE2                | FMX183-4KE2                                  |
|  | Base piping type                  | FMW110E1                                      | FMW110-4E1<br>FMW110-4KE2<br>FMY110-4ME2                        | FMW113-4KE2<br>FMY113-4ME2                   | FMW180E1                                      | FMW180-4E1<br>FMW180-4KE2<br>FMY180-4ME2 | FMW183-4KE2<br>FMY183-4ME2                   |
| Item   |                                   |   |   |  |   |  |  |
| Media  |                                   | Air   |   |  |   |  |  |
| Operation type                                     |                                   | Internal pilot type                           |   |  |   |  |  |
| Effective area [Cv] <sup>Note 1</sup>              | mm <sup>2</sup>                   | 4.2 [0.23]<br>(FMY110-4ME2 only: 4.0 [0.22])  |   | 3.8 [0.21]<br>(FMY113-4ME2 only: 3.6 [0.22]) | 10.2 [0.57]<br>(FMY180-4ME2 only: 8.2 [0.46]) |  | 9.0 [0.50]<br>(FMY183-4ME2 only: 8.2 [0.46]) |
| Port size <sup>Note 2</sup>                        |                                   | M5×0.8<br>(FMY11□-4ME2 only: M8×0.75)         |   |  | Rc 1/8<br>(FMY18□-4ME2 only: M8×0.75)         |  |  |
| Lubrication  |                                   | Not required                                  |   |  |   |  |  |
| Operating pressure range                           | MPa {kgf/cm <sup>2</sup> } [psi.] | 0.15~0.7 {1.5~7.1} [22~102]                   |   |  |   |  |  |
| Proof pressure                                     | MPa {kgf/cm <sup>2</sup> } [psi.] | 1.05 {10.7} [152]                             |   |  |   |  |  |
| Response time <sup>Note 3</sup><br>ON/OFF          | ms                                | DC12V, DC24V                                  | 15/25 or below<br>15/25 [20] (15)<br>or below <sup>Note 4</sup> | 15/30 or below                               | 15/20 or below                                | 15/25 [20] or below                      | 15/35 [15/40]<br>or below <sup>Note 4</sup>  |
|  |                                   | AC100V, AC200V                                | 15/15 or below  | 15/15 [15] or below                          | 15/20 or below                                | 15/15 or below                           | 15/15 [15] or below                          |
| Maximum operating frequency                        | Hz                                | 5   |   |  |   |  |  |
| Minimum time to energize for self holding          | m/s                               | —   | 50 <sup>Note 5</sup>  | —  | —   | 50 <sup>Note 5</sup>                     | —  |
| Operating temperature range (atmosphere and media) | °C [°F]                           | 5~50 [41~122]                                 |   |  |   |  |  |
| Shock resistance                                   | m/s <sup>2</sup> {G}              | 1373.0 {140.0} (Axial direction 294.2 {30.0}) |   | 294.2 {30.0}                                 | 1373.0 {140.0} (Axial direction 294.2 {30.0}) |  | 294.2 {30.0}                                 |
| Mounting direction                                 |                                   | Any   |   |  |   |  |  |

Notes: 1. For details, see the effective area on p.462.

2. For details, see the port size table below.

3. Values when air pressure is 0.5MPa{5.1kgf/cm<sup>2</sup>} [73psi.]. Values in brackets [ ] for □110-4KE2, □180-4KE2 are switching time from the opposite position, while the values for □113-4KE2, □183-4KE2, FMY113-4ME2 and FMY183-4ME2 are those of all ports block valves, switching from the neutral position.

4. Figures in parentheses ( ) are for the tandem solenoid valve.

5. For double solenoids.

## Port Size

| Basic model        |  | Port specification           |                       | Port size                      |
|--------------------|--|------------------------------|-----------------------|--------------------------------|
| Direct piping type | FMX110E1<br>FMX110-4E1<br>FMX110-4KE2<br>FMX113-4KE2                               | Standard                     | Female thread         | M5×0.8                         |
|                    |  | Optional*                    | -J4*                  | Quick fitting for φ 4          |
|                    | -J6*   |                              | Quick fitting for φ 6 |                                |
| Base piping type   | FMW110E1<br>FMW110-4E1<br>FMW110-4KE2<br>FMW113-4KE2<br>FMY110-4ME2<br>FMY180-4ME2 | Specifications for selection | -J4S                  | Straight quick fitting for φ 4 |
|                    |  |                              | -J6S                  | Straight quick fitting for φ 6 |
|                    |  |                              | -J4U                  | Elbow quick fitting for φ 4    |
|                    |  |                              | -J6U                  | Elbow quick fitting for φ 6    |
|                    |  |                              | -M8M                  | M8×0.75 female thread          |
| Direct piping type | FMX180E1<br>FMX180-4E1<br>FMX180-4KE2<br>FMX183-4KE2                               | Standard                     | Female thread         | Rc 1/8                         |
|                    |  | Optional                     | -J4                   | Quick fitting for φ 4          |
|                    | -J6  |                              | Quick fitting for φ 6 |                                |
| Base piping type   | FMW180E1<br>FMW180-4E1<br>FMW180-4KE2<br>FMW183-4KE2                               | Specifications for selection | -J4S                  | Straight quick fitting for φ 4 |
|                    |  |                              | -J6S                  | Straight quick fitting for φ 6 |
|                    |  |                              | -J4U                  | Elbow quick fitting for φ 4    |
|                    |  |                              | -J6U                  | Elbow quick fitting for φ 6    |
|                    |  |                              | -M8M                  | M8×0.75 female thread          |
| Base piping type   | FMY113-4ME2<br>FMY183-4ME2   | Specifications for selection | -J4S                  | Straight quick fitting for φ 4 |
|                    |  |                              | -J6S                  | Straight quick fitting for φ 6 |
|                    |  |                              | -M8M                  | M8×0.75 female thread          |

\*: For models with quick fittings, the pilot exhaust is not collected in the manifold, but exhausted to the atmosphere.



## Solenoid Specifications

| Rated voltage                                 |            | DC12V  | DC24V                 | AC100V                | AC200V   |   |
|---|------------|--|-----------------------|-----------------------|--|---|
| Type  |            | Flywheel diode incorporated/surge absorption transistor*, both for surge suppression |                       | Shading type          |  |   |
| Operating voltage range                       |            | V  | 10.8~13.2<br>(12±10%) | 21.6~26.4<br>(24±10%) | 90~132<br>(100 <sup>+32%</sup> <sub>-10%</sub> ) | 180~264<br>(200 <sup>+32%</sup> <sub>-10%</sub> ) |
| Current<br>(when rated<br>voltage is applied) | Frequency  | Hz   | —                     | —                     | 50   | 60  |
|   | Starting   | mA (r.m.s)   | —                     | —                     | 36   | 32  |
|   | Energizing | mA (r.m.s)   | 140 (1.7W)            | 75(1.8W)/50* (1.2W)   | 24   | 20  |
| Maximum allowable leakage current             |            | mA   | 8                     | 4/2*                  | 4  | 2   |
| Insulation resistance                         |            | MΩ   | Over 100              |                       |  |   |
| Wiring type                                   |            | Plug-in type   |                       |                       |  |   |
| Color of LED indicator                        |            | Red  |                       | Yellow                | Green  |   |
| Surge suppression (as standard)               |            | Flywheel diode/surge absorption transistor*  |                       | Varistor              |  |   |

\* Values are for the tandem solenoid valve, and DC24V only.

## Effective Area [Cv]

mm<sup>2</sup>

| Solenoid valve model | Basic model  | Standard (Single valve) | Built-in quick fitting                 | Remarks  |
|----------------------|--|-------------------------|--|--|
| 110 series           | FMX110E1<br>FMX110-4E1<br>FMX110-4KE2                | 4.2<br>[0.23]           | -J4 : 3.6 [0.20]<br>-J6 : 4.0 [0.22]   | <ul style="list-style-type: none"> <li>● Attaching TS4-M5 to the 1(P), 4(A), and 2(B) ports gives the value 1.8.</li> <li>● When large flow rates are required, we recommend the φ 6 quick fitting.</li> </ul> |
|                      | FMX113-4KE2  | 3.8 [0.21]              | -J4 : 3.4 [0.18]<br>-J6 : 3.6 [0.20]   |  |
|                      | FMW110E1<br>FMW110-4E1<br>FMW110-4KE2<br>FMY110-4ME2 | 4.0<br>[0.22]           | -J4□ : 3.6 [0.20]<br>-J6□ : 4.0 [0.22] | ● When mounted on a manifold.  |
|                      | FMW113-4KE2  | 3.8 [0.21]              |  |  |
|                      | FMY113-4ME2  | 3.6 [0.20]              |  |  |
| 180 series           | FMX180E1<br>FMX180-4E1<br>FMX180-4KE2                | 10.2<br>[0.57]          | -J4 : 4.4 [0.24]<br>-J6 : 9.6 [0.53]   | <ul style="list-style-type: none"> <li>● Attaching TS6-01 to the 1(P), 4(A), and 2(B) ports gives the value 9.2.</li> <li>● When large flow rates are required, we recommend the φ 6 quick fitting.</li> </ul> |
|                      | FMX183-4KE2  | 9.0<br>[0.50]           | -J4 : 4.4 [0.24]<br>-J6 : 8.5 [0.47]   |  |
|                      | FMW180E1<br>FMW180-4E1<br>FMW180-4KE2<br>FMY180-4ME2 | 8.2<br>[0.46]           | -J4□ : 4.4 [0.24]<br>-J6□ : 7.9 [0.44] | ● When mounted on a manifold.  |
|                      | FMW183-4KE2  | 9.0 [0.50]              |  |  |
|                      | FMY183-4ME2  | 8.2 [0.46]              |  |  |

## Module Mass

g [oz.]

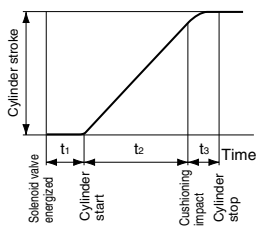
| Model              | Mass        |
|--------------------|-------------|
| <b>FMX110E1</b>    | 110 [3.88]  |
| <b>FMX110-4E1</b>  | 110 [3.88]  |
| <b>FMX110-4KE2</b> | 230 [8.11]  |
| <b>FMX113-4KE2</b> | 230 [8.11]  |
| <b>FMX180E1</b>    | 150 [5.29]  |
| <b>FMX180-4E1</b>  | 150 [5.29]  |
| <b>FMX180-4KE2</b> | 310 [10.93] |
| <b>FMX183-4KE2</b> | 310 [10.93] |

g [oz.]

| Model              | Body mass   | Mass with quick fitting added |             |             |             |             |
|--------------------|-------------|-------------------------------|-------------|-------------|-------------|-------------|
|                    |             | <b>-J4S</b>                   | <b>-J6S</b> | <b>-J4U</b> | <b>-J6U</b> | <b>-M8M</b> |
| <b>FMW110E1</b>    | 110 [3.88]  | 122 [4.30]                    | 118 [4.16]  | 132 [4.66]  | 134 [4.73]  | 122 [4.30]  |
| <b>FMW110-4E1</b>  | 110 [3.88]  | 122 [4.30]                    | 118 [4.16]  | 132 [4.66]  | 134 [4.73]  | 122 [4.30]  |
| <b>FMW110-4KE2</b> | 230 [8.11]  | 254 [8.96]                    | 246 [8.68]  | 274 [9.66]  | 278 [9.81]  | 254 [8.96]  |
| <b>FMW113-4KE2</b> | 230 [8.11]  | 254 [8.96]                    | 246 [8.68]  | 274 [9.66]  | 278 [9.81]  | 254 [8.96]  |
| <b>FMY110-4ME2</b> | 140 [4.94]  | 152 [5.36]                    | 148 [5.22]  | 162 [5.71]  | 164 [5.78]  | 152 [5.36]  |
| <b>FMY113-4ME2</b> | 150 [5.29]  | 162 [5.71]                    | 158 [5.57]  | —           | —           | 162 [5.71]  |
| <b>FMW180E1</b>    | 150 [5.29]  | 162 [5.71]                    | 158 [5.57]  | 172 [6.07]  | 174 [6.14]  | 162 [5.71]  |
| <b>FMW180-4E1</b>  | 150 [5.29]  | 162 [5.71]                    | 158 [5.57]  | 172 [6.07]  | 174 [6.14]  | 162 [5.71]  |
| <b>FMW180-4KE2</b> | 310 [10.93] | 334 [11.78]                   | 326 [11.50] | 354 [12.49] | 358 [12.63] | 334 [11.78] |
| <b>FMW183-4KE2</b> | 310 [10.93] | 334 [11.78]                   | 326 [11.50] | 354 [12.49] | 358 [12.63] | 334 [11.78] |
| <b>FMY180-4ME2</b> | 175 [6.17]  | 187 [6.60]                    | 183 [6.46]  | 197 [6.95]  | 199 [7.02]  | 187 [6.60]  |
| <b>FMY183-4ME2</b> | 190 [6.70]  | 202 [7.13]                    | 198 [6.98]  | —           | —           | 202 [7.13]  |

# 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 the solenoid valve and actual starting of the cylinder), to the cylinder's max. speed operating time  $t_2$ .

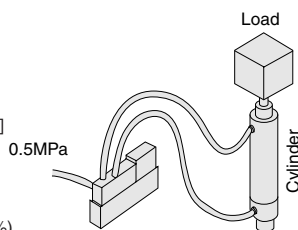
When a cushion is used, add the cushioning time  $t_3$ , to the above calculation. The standard cushioning time  $t_3$  is approximately 0.2 seconds.

# Solenoid Valves 110 Series

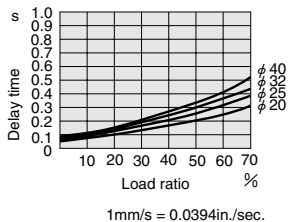
**FMX110-4E1**  
**FMX110-4KE2**  
**FMX113-4KE2**

### Measurement conditions

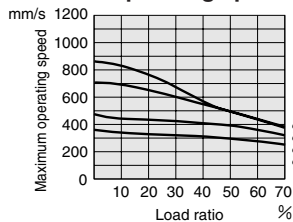
- Air pressure: 0.5MPa [5.1kgf/cm<sup>2</sup>] [73psi.]
- Piping inner diameter and length:  $\phi$  2.5 [0.10in.] $\times$ 1000mm [39in.]
- Fitting: Quick fitting TS4-M5
- Load ratio =  $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$  (%)
- Cylinder stroke: 150mm [5.91in.]



### Delay time



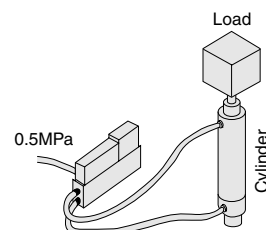
### Maximum operating speed



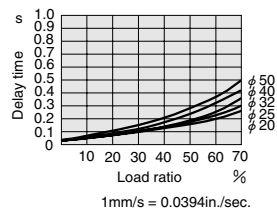
**FMW110-4E1**  
**FMW110-4KE2**  
**FMW113-4KE2**  
**FMY110-4ME2**  
**FMY113-4ME2**

### Measurement conditions

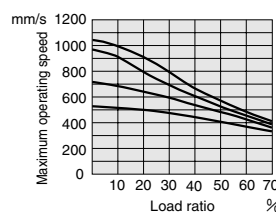
- Air pressure: 0.5MPa [5.1kgf/cm<sup>2</sup>] [73psi.]
- Piping inner diameter and length:  $\phi$  4 [0.16in.] $\times$ 1000mm [39in.]
- Fitting: Quick fitting (-J6S)
- Load ratio =  $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$  (%)
- Cylinder stroke: 150mm [5.91in.]



### Delay time



### Maximum operating speed

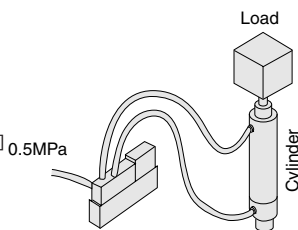


# Solenoid Valves 180 Series

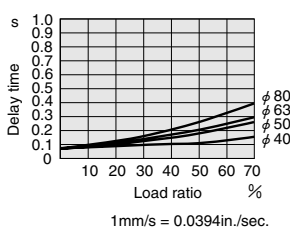
**FMX180-4E1**  
**FMX180-4KE2**  
**FMX183-4KE2**

### Measurement conditions

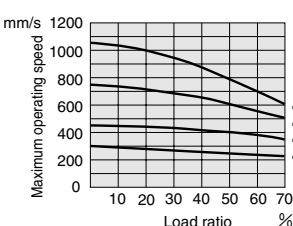
- Air pressure: 0.5MPa [5.1kgf/cm<sup>2</sup>] [73psi.]
- Piping inner diameter and length:  $\phi$  6 [0.24in.] $\times$ 1000mm [39in.]
- Fitting: Quick fitting TS8-01
- Load ratio =  $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$  (%)
- Cylinder stroke: 300mm [11.81in.]



### Delay time



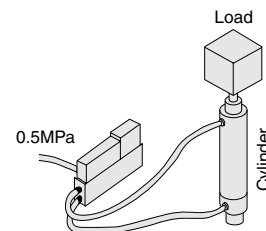
### Maximum operating speed



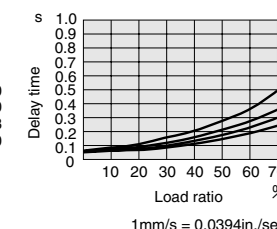
**FMW180-4E1**  
**FMW180-4KE2**  
**FMW183-4KE2**  
**FMY180-4ME2**  
**FMY183-4ME2**

### Measurement conditions

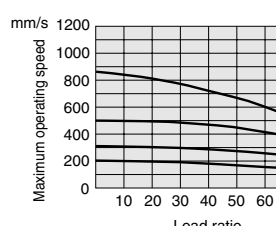
- Air pressure: 0.5MPa [5.1kgf/cm<sup>2</sup>] [73psi.]
- Piping inner diameter and length:  $\phi$  4 [0.16in.] $\times$ 1000mm [39in.]
- Fitting: Quick fitting (-J6S)
- Load ratio =  $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$  (%)
- Cylinder stroke: 300mm [11.81in.]



### Delay time

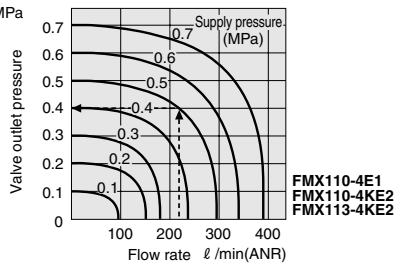


### Maximum operating speed



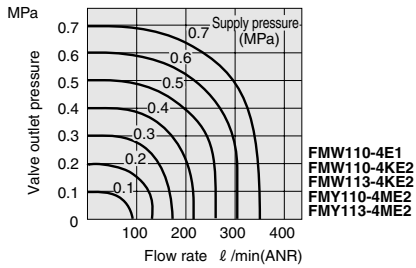
# Flow Rate

## Solenoid valves 110 series



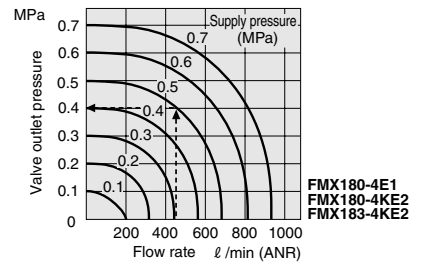
### How to read the graph

When the supply pressure is 0.5MPa [73psi.] and flow rate is 210 l /min [7.41ft<sup>3</sup>/min.] (ANR), the valve outlet pressure becomes 0.4MPa [58psi.].



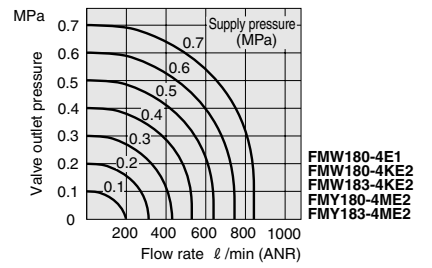
1MPa = 145psi., 1 l /min = 0.0353ft.<sup>3</sup>/min.

## Solenoid valves 180 series



### How to read the graph

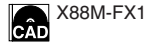
When the supply pressure is 0.5MPa [73psi.] and flow rate is 460 l /min [16.24ft<sup>3</sup>/min.] (ANR), the valve outlet pressure becomes 0.4MPa [58psi.].



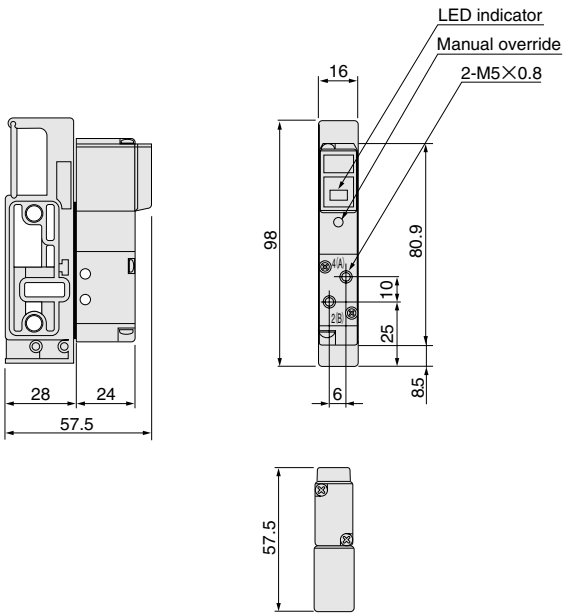
1MPa = 145psi., 1 l /min = 0.0353ft.<sup>3</sup>/min.

# FMX Dimensions of Direct Piping Type Valve Module (mm)

※Height with end block attached is +1mm  
[0.039in.] longer than indicated below.

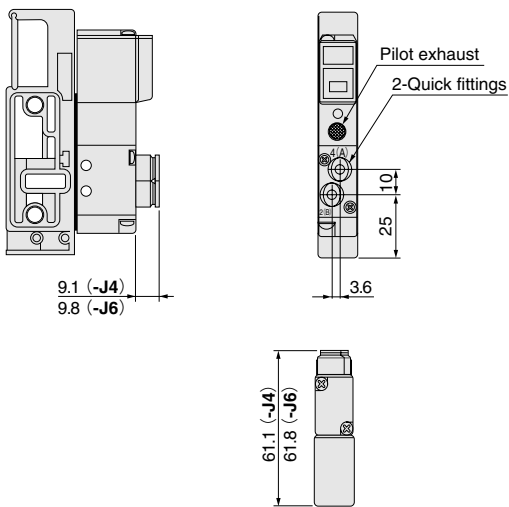


## Single solenoid valve FMX110E1, FMX110-4E1



Note: In the case of FMX110E1, 4(A) port only.

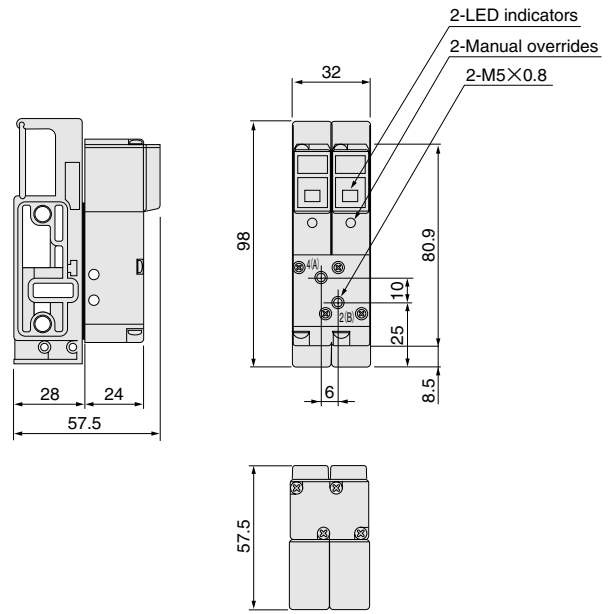
- With quick fittings: -J4 (Built-in straight fittings for  $\phi$  4 tube)
- J6 (Built-in straight fittings for  $\phi$  6 tube)



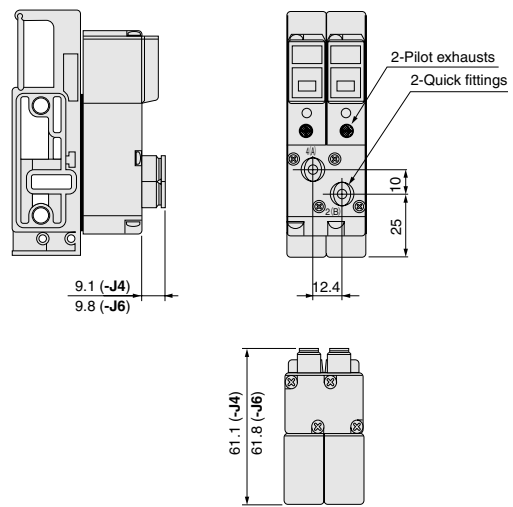
Quick fitting model  $\phi$  4 : TSK4-M8M  
 $\phi$  6 : TSK6-M8M

Note: In the case of FMX110E1, 4(A) port only.

## Twin solenoid valve FMX110-4KE2, FMX113-4KE2



- With quick fittings: -J4 (Built-in straight fittings for  $\phi$  4 tube)
- J6 (Built-in straight fittings for  $\phi$  6 tube)

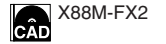


Quick fitting model  $\phi$  4 : TSK4-M8M  
 $\phi$  6 : TSK6-M8M

FM-SOLID MANIFOLD X88M SERIES

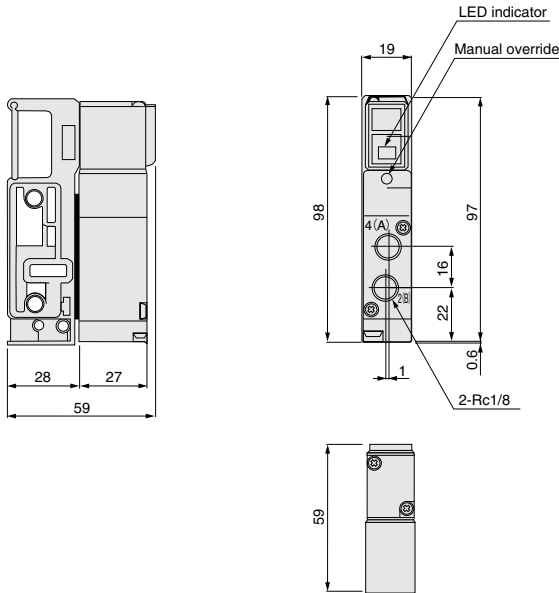
# FMX Dimensions of Direct Piping Type Valve Module (mm)

※Height with end block attached is +1mm [0.039in.] longer than indicated below.



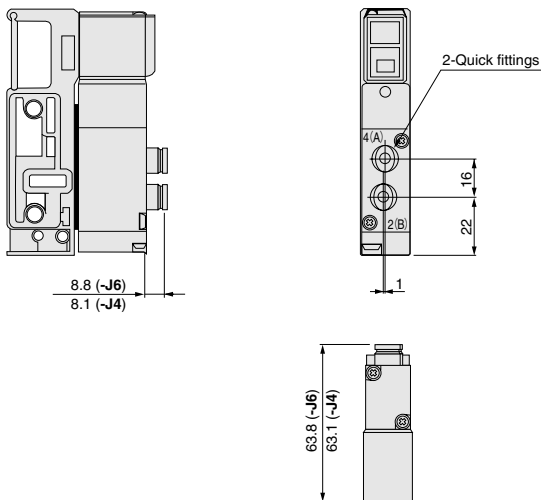
## Single solenoid valve

### FMX180E1, FMX180-4E1



Note: In the case of FMX180E1, 4(A) port only.

- With quick fittings: -J4 (Built-in straight fittings for  $\phi$  4 tube)
- J6 (Built-in straight fittings for  $\phi$  6 tube)

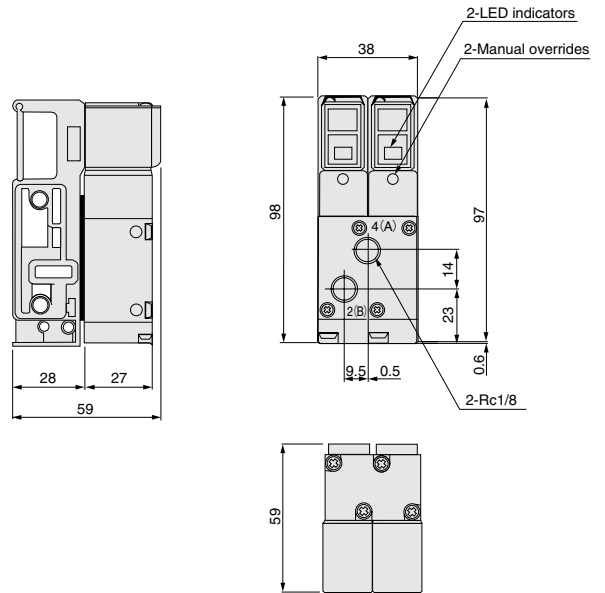


Quick fitting model  $\phi$  4 : TSK4-M8M  
 $\phi$  6 : TSK6-M8M

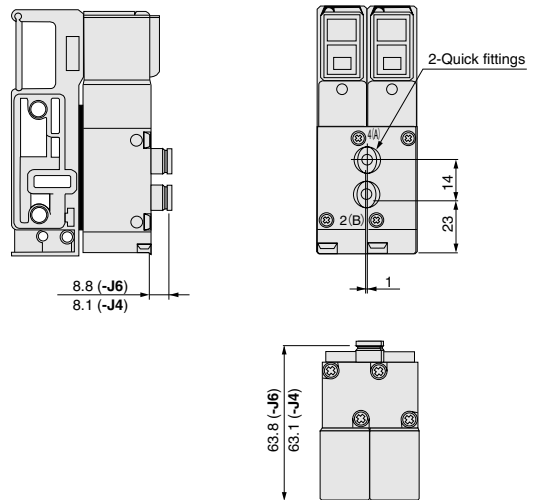
Note: In the case of FMX180E1, 4(A) port only.

## Twin solenoid valve

### FMX180-4KE2, FMX183-4KE2



- With quick fittings: -J4 (Built-in straight fittings for  $\phi$  4 tube)
- J6 (Built-in straight fittings for  $\phi$  6 tube)

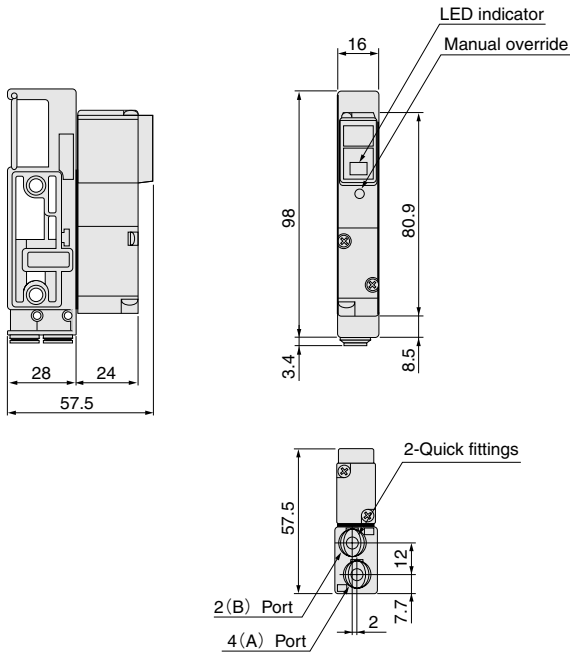


Quick fitting model  $\phi$  4 : TSK4-M8M  
 $\phi$  6 : TSK6-M8M

## Single solenoid valve

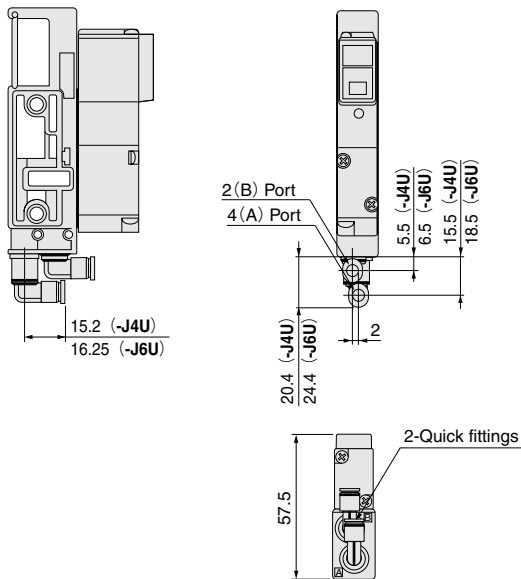
### FMW110E1, FMW110-4E1

- With quick fittings: **-J4S** (Built-in straight fittings for  $\phi$  4 tube)  
**-J6S** (Built-in straight fittings for  $\phi$  6 tube)



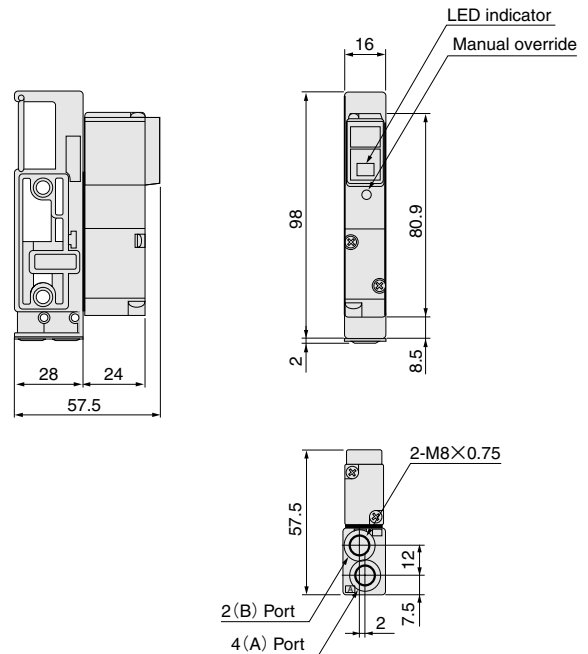
Note: For FMW110E1, the 2(B) port is plugged, while for FMW110E1-11, the 4(A) port is plugged ( $\phi$  4: **UP-4**,  $\phi$  6: **UP-6**).

- With elbow quick fittings: **-J4U** (Built-in elbow fittings for  $\phi$  4 tube)  
**-J6U** (Built-in elbow fittings for  $\phi$  6 tube)



Note: For FMW110E1, the 2(B) port is plugged, while for FMW110E1-11, the 4(A) port is plugged ( $\phi$  4: **UP-4**,  $\phi$  6: **UP-6**).

- M8 female thread type: **-M8M**

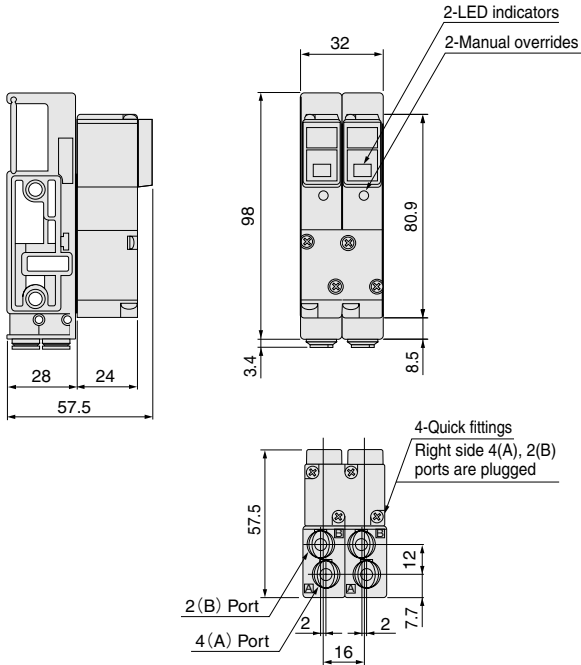


Note: For FMW110E1, the 2(B) port is plugged, while for FMW110E1-11, the 4(A) port is plugged (M8: **PF-M8M**).

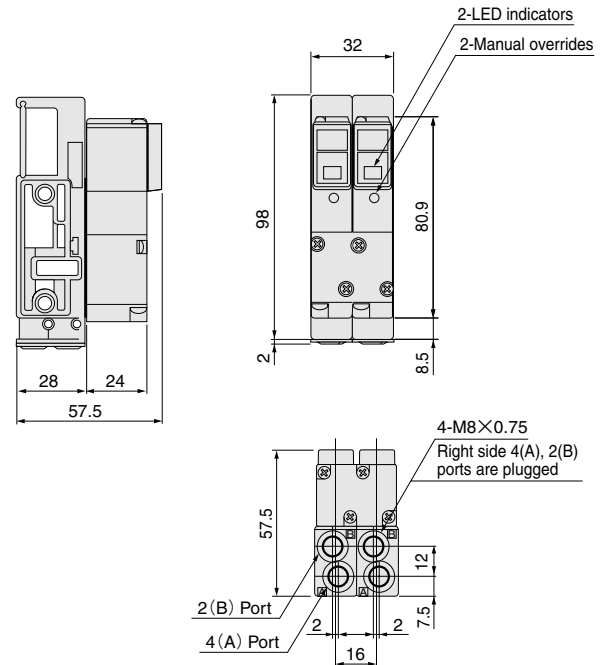
## Twin solenoid valve

### FMW110-4KE2, FMW113-4KE2

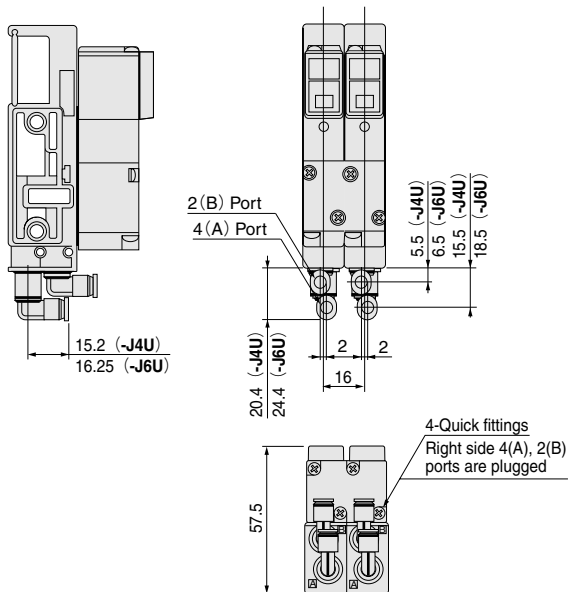
- With quick fittings: **-J4S** (Built-in straight fittings for  $\phi$  4 tube)  
**-J6S** (Built-in straight fittings for  $\phi$  6 tube)



- M8 female thread type: **-M8M**



- With elbow quick fittings: **-J4U** (Built-in elbow fittings for  $\phi$  4 tube)  
**-J6U** (Built-in elbow fittings for  $\phi$  6 tube)

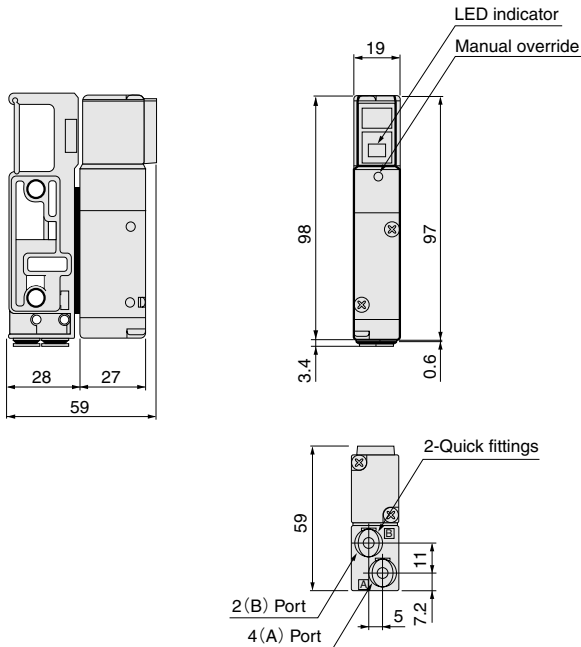




Single solenoid valve

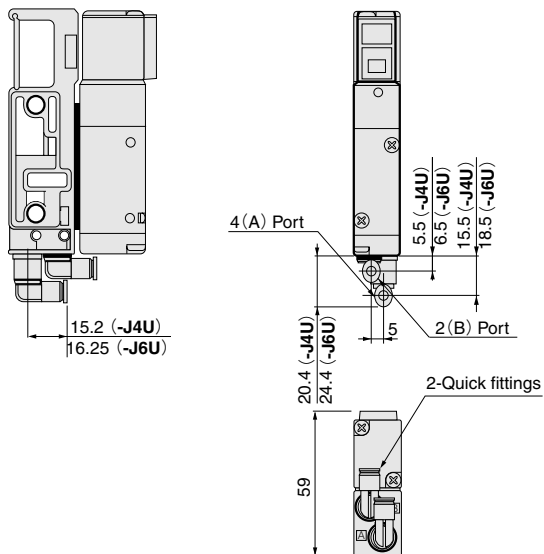
FMW180E1, FMW180-4E1

- With quick fittings: **-J4S** (Built-in straight fittings for  $\phi$  4 tube)  
**-J6S** (Built-in straight fittings for  $\phi$  6 tube)



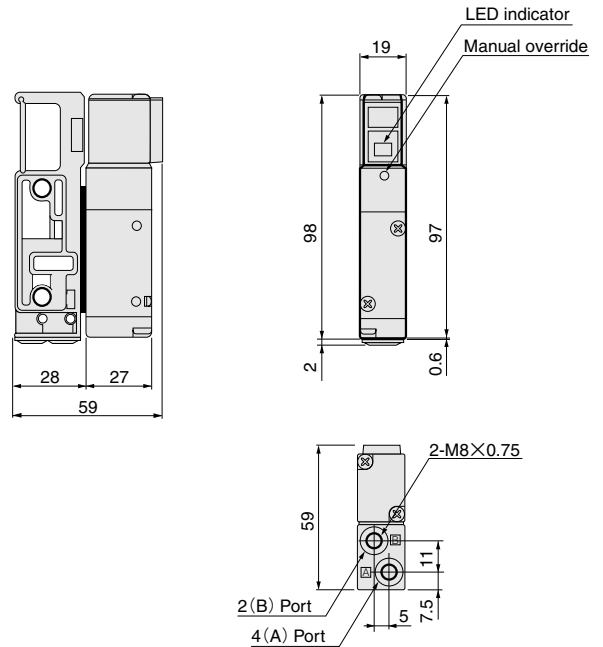
Note: For FMW180E1, the 2(B) port is plugged, while for FMW180E1-11, the 4(A) port is plugged ( $\phi$  4: **UP-4**,  $\phi$  6: **UP-6**).

- With elbow quick fittings: **-J4U** (Built-in elbow fittings for  $\phi$  4 tube)  
**-J6U** (Built-in elbow fittings for  $\phi$  6 tube)



Note: For FMW180E1, the 2(B) port is plugged, while for FMW180E1-11, the 4(A) port is plugged ( $\phi$  4: **UP-4**,  $\phi$  6: **UP-6**).

- M8 female thread type: **-M8M**

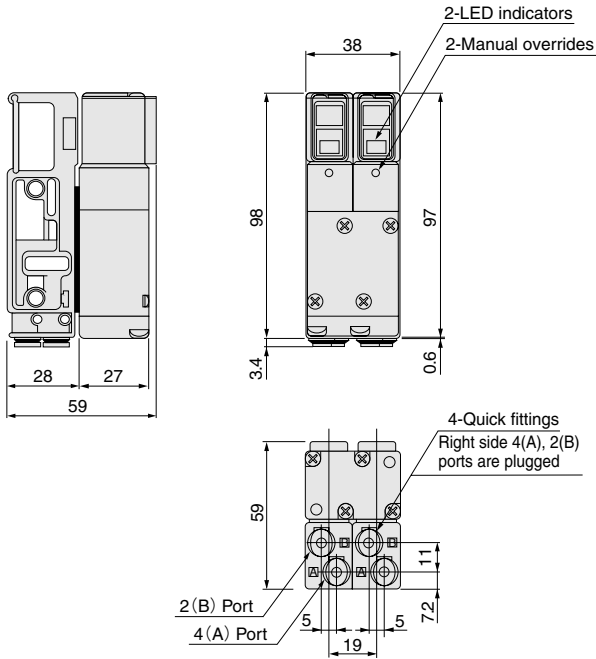


Note: For FMW180E1, the 2(B) port is plugged, while for FMW180E1-11, the 4(A) port is plugged (M8: **PF-M8M**).

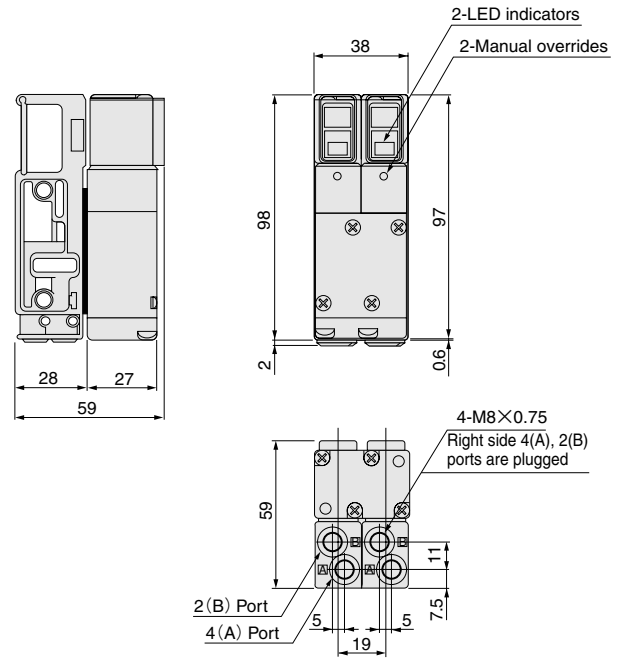
## Twin solenoid valve

### FMW180-4KE2, FMW183-4KE2

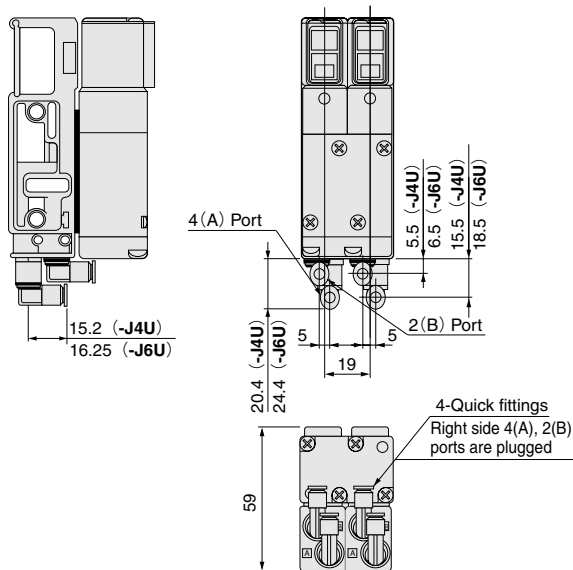
- With quick fittings: **-J4S** (Built-in straight fittings for  $\phi$  4 tube)  
**-J6S** (Built-in straight fittings for  $\phi$  6 tube)



- M8 female thread type: **-M8M**

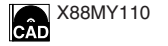


- With elbow quick fittings: **-J4U** (Built-in elbow fittings for  $\phi$  4 tube)  
**-J6U** (Built-in elbow fittings for  $\phi$  6 tube)



# FM-Y Dimensions of Base Piping Type Valve Module (mm)

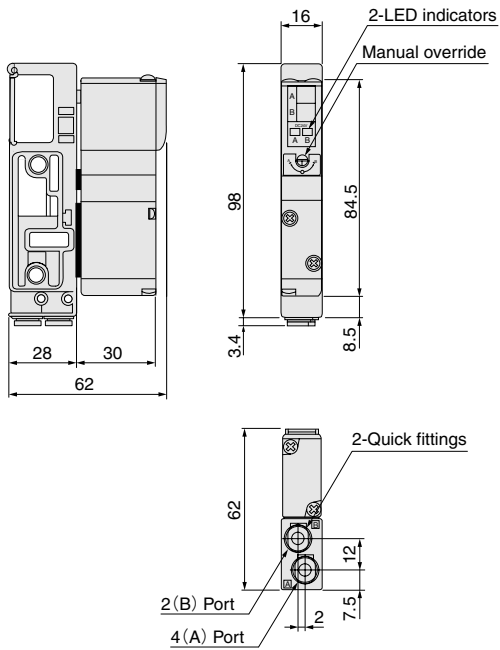
※Height with end block attached is +1mm  
[0.039in.] longer than indicated below.



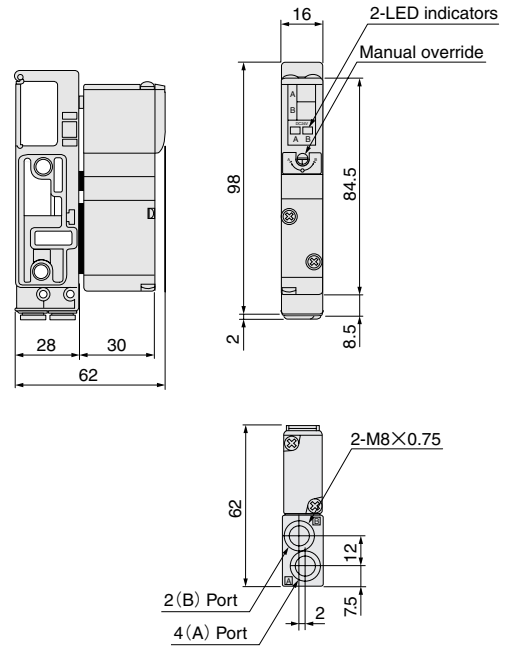
## Tandem solenoid valve

### FM-Y110-4ME2

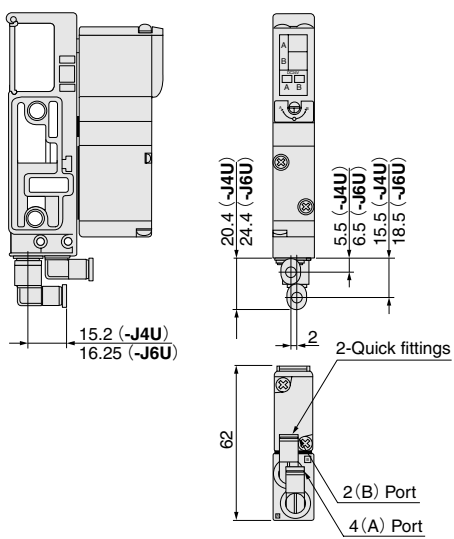
- With quick fittings: **-J4S** (Built-in straight fittings for  $\phi$  4 tube)  
**-J6S** (Built-in straight fittings for  $\phi$  6 tube)



- M8 female thread type: **-M8M**

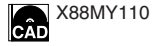


- With elbow quick fittings: **-J4U** (Built-in elbow fittings for  $\phi$  4 tube)  
**-J6U** (Built-in elbow fittings for  $\phi$  6 tube)



# FMY Dimensions of Base Piping Type Valve Module (mm)

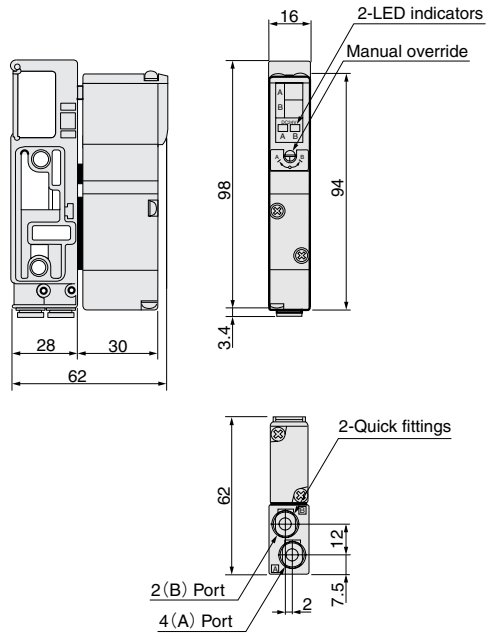
※Height with end block attached is +1mm  
[0.039in.] longer than indicated below.



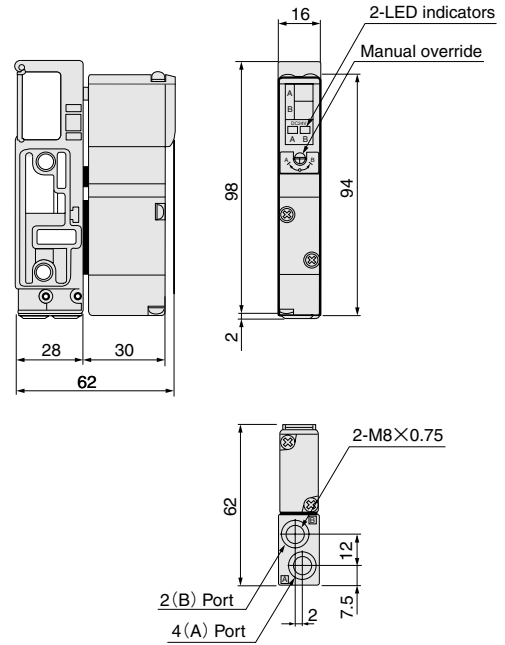
## Tandem solenoid valve

### FMY113-4ME2

- With quick fittings: -J4S (Built-in straight fittings for  $\phi$  4 tube)  
-J6S (Built-in straight fittings for  $\phi$  6 tube)



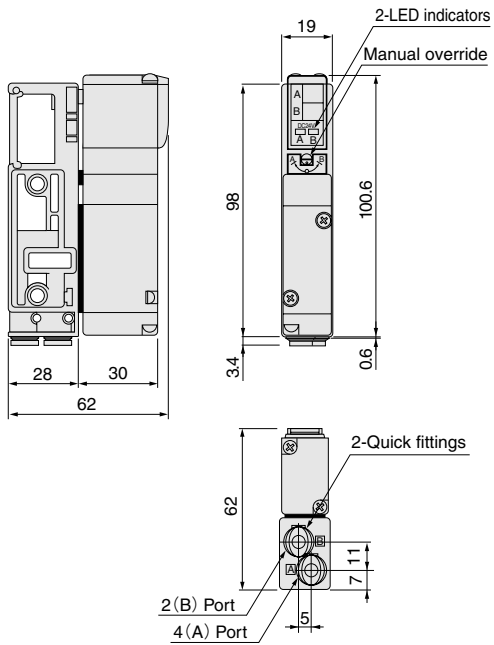
- M8 female thread type: -M8M



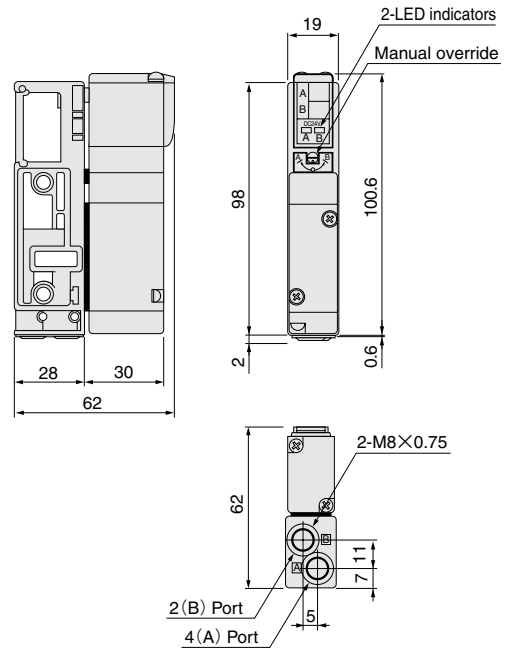
Tandem solenoid valve

**FMY180-4ME2**

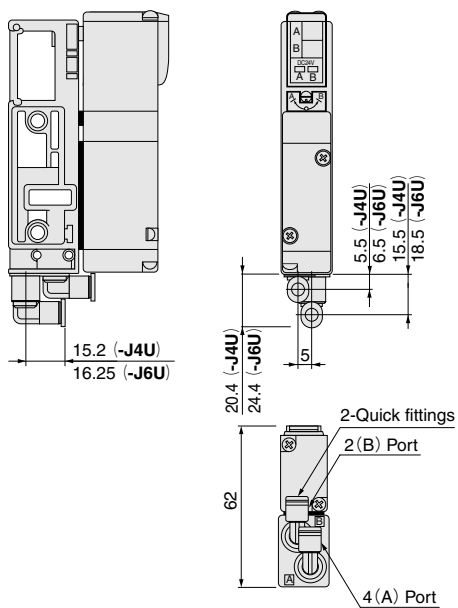
- With quick fittings: -J4S (Built-in straight fittings for  $\phi$  4 tube)  
-J6S (Built-in straight fittings for  $\phi$  6 tube)



- M8 female thread type: -M8M

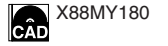


- With elbow quick fittings: -J4U (Built-in elbow fittings for  $\phi$  4 tube)  
-J6U (Built-in elbow fittings for  $\phi$  6 tube)



# FMY Dimensions of Base Piping Type Valve Module (mm)

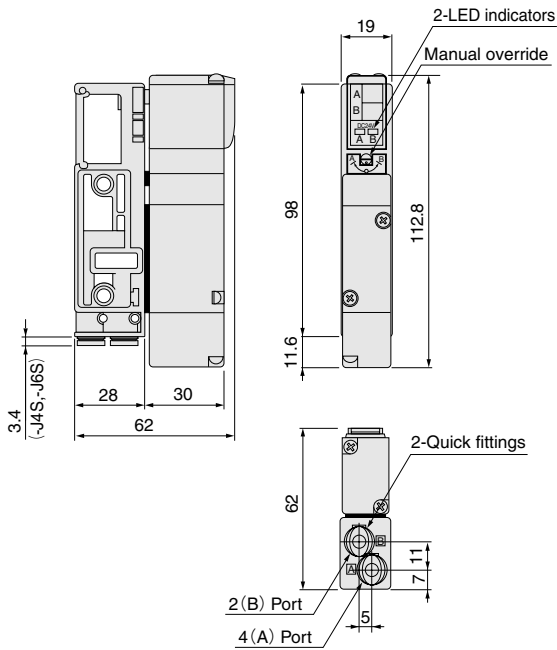
※Height with end block attached is +1mm  
[0.039in.] longer than indicated below.



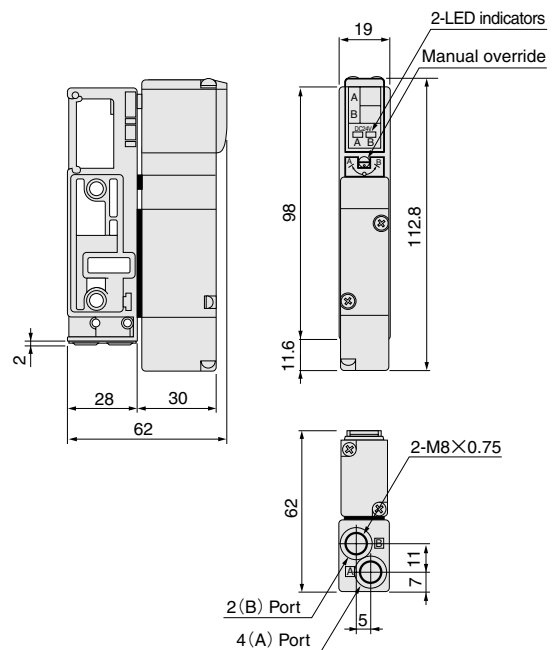
## Tandem solenoid valve

### FMY183-4ME2

- With quick fittings: -J4S (Built-in straight fittings for  $\phi$  4 tube)  
-J6S (Built-in straight fittings for  $\phi$  6 tube)



- M8 female thread type: -M8M



# FM-SOLID MANIFOLD X88M SERIES

## Ejector Modules

### Features

The micro ejector ME05 and ME07 series are integrated with modules to enable combination mounting with valves, collecting of wires and piping, and compact integration of vacuum generation and control functions.

All models are powerful, with built-in filters, nozzle diameters of 0.5mm [0.020in.] (ME05) and 0.7mm [0.028in.] (ME07), and a maximum vacuum rating of -650mmHg [-25.6in.Hg] (air pressure 86.7kPa [12.6psi]).

### Ejector module with single solenoid valve

The 2(B) port can be used with 4 types of quick fittings, including a straight type and elbow type for each of the  $\phi$  4 and  $\phi$  6 tubes, and a M8 female thread.

### Ejector module with twin solenoid valves

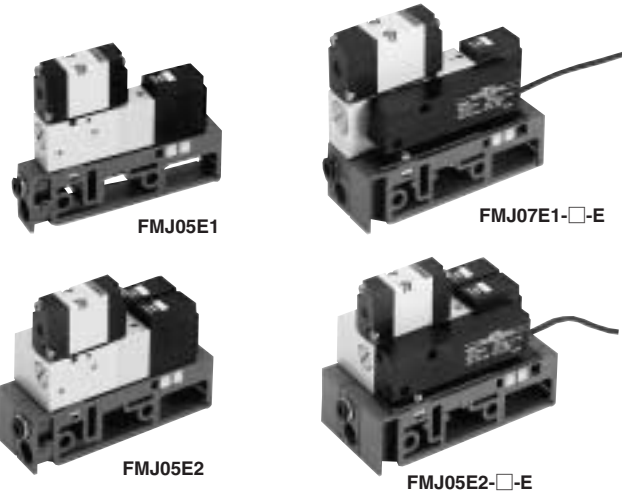
Mounts a vacuum breaking air control solenoid valve for easier vacuum breaks and releasing vacuum picked up workpieces.

The 2(B) port can be used with 4 types of quick fittings, including a straight type and elbow type for each of the  $\phi$  4 and  $\phi$  6 tubes, and a M8 female thread.

### With vacuum switch

The pressure adjusting range is -101.3~10.1kPa {-760.0~75.8mmHg} [-29.921~2.984in.Hg].

Offers easy control of vacuum levels, confirmation of the presence or absence of workpieces, and picking up or releasing of them.



## Ejector Module Specifications

| Item   | Basic model                          | FMJ05E1/E2                | FMJ07E1/E2   |
|--|--------------------------------------|---------------------------|--------------|
|  | Media                                |                           | Air          |
| Operating pressure range                           | MPa {kgf/cm <sup>2</sup> } [psi.]    | 0.1~0.6 {1.0~6.1} [15~87] |              |
| Proof pressure                                     | MPa {kgf/cm <sup>2</sup> } [psi.]    | 1.05 {10.7} [152]         |              |
| Operating temperature range (atmosphere and media) | °C [°F]                              | 5~50 [41~122]             |              |
| Nozzle diameter                                    | mm [in.]                             | 0.5 [0.020]               | 0.7 [0.028]  |
| Maximum vacuum <sup>Note</sup>                     | KPa {mmHg} [in.Hg]                   | -86.7 {-650.3} [-25.60]   |              |
| Flow rate of vacuum <sup>Note</sup>                | ℓ/min [ft. <sup>3</sup> /min.] (ANR) | 6.3 [0.222]               | 12.5 [0.441] |
| Compressed air consumption <sup>Note</sup>         | ℓ/min [ft. <sup>3</sup> /min.] (ANR) | 11.5 [0.406]              | 23.0 [0.812] |
| Lubrication  |                                      | Prohibited                |              |
| Filtration   | μm                                   | 30                        |              |
| Mounting direction                                 |                                      | Any                       |              |

Note: Values when air pressure 0.5MPa {5.1kgf/cm<sup>2</sup>} [73psi.]. For details, see the General Catalog of Air Treatment, Auxiliary, Vacuum.

### Module Mass

g [oz.]

| Model       | Mass <sup>Note</sup> |
|-------------|----------------------|
| FMJ05E1-□   | 165 [5.82]           |
| FMJ05E1-□-E | 265 [9.35]           |
| FMJ05E2-□   | 295 [10.41]          |
| FMJ05E2-□-E | 390 [13.76]          |
| FMJ07E1-□   | 230 [8.11]           |
| FMJ07E1-□-E | 330 [11.64]          |
| FMJ07E2-□   | 410 [14.46]          |
| FMJ07E2-□-E | 510 [17.99]          |

Note: Additional mass can vary from 4 to 12g [0.14~0.42oz.], depending on the selected quick fitting.

## Electronic Type Vacuum Switch

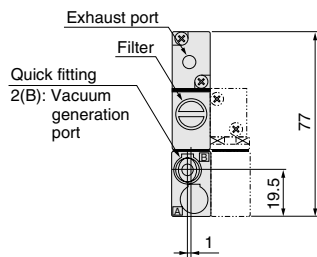
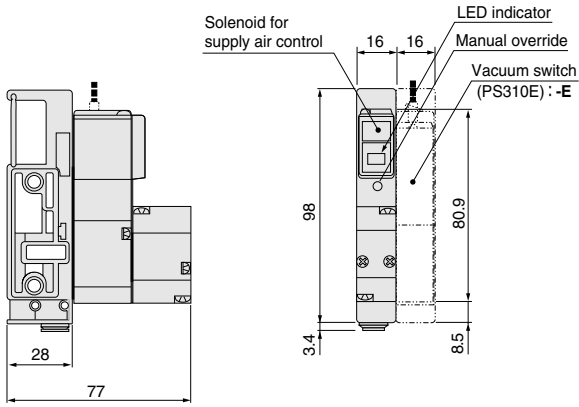
| Item                                  | Model                             | PS310E  |
|---------------------------------------|-----------------------------------|---|
| Media                                 |                                   | Air or non-corrosive gas  |
| Operating temperature range           | °C [°F]                           | -10~60 [14~140] (non freezing)  |
| Operating humidity range              | %RH                               | 35~95   |
| Operating pressure range              | KPa {mmHg} [in.Hg]                | -101.3~0 (-760.0~0) [-29.921~0]   |
| Proof pressure                        | MPa {kgf/cm <sup>2</sup> } [psi.] | 0.2 {2.0} [29]  |
| Pressure adjusting range              | KPa {mmHg} [in.Hg]                | -101.3~10.1 (-760.0~75.8) [-29.921~2.984]   |
| Response differential <sup>Note</sup> | %                                 | 2~9   |
| Repeatability                         |                                   | Max.±3%FS (0~50°C [32~122°F])   |
| Electrical specifications             | Operation type                    | NPN open collector output, NO type. (Output ON below the set pressure)  |
|                                       | Operating voltage range           | DCV 12~24±10% (Ripple Vp-p Max.10%)   |
|                                       | Open/close capacity               | DC30V, 100mA or below<br>(Internal voltage drop:<br>Max. 1V at load current 100mA,<br>Max. 0.4V at load current 16mA) |
|                                       | Consumption current               | mA 20 or below  |
|                                       | Insulation resistance             | MΩ Over 100<br>(DC500V megger, between every charging portion and case)   |
| Mechanical characteristics            | Surge suppression                 | Zener diode (as standard)   |
|                                       | Shock resistance                  | m/s <sup>2</sup> [G] 490.3 {50.0}   |
| Operation indicator                   |                                   | LED indicator lights up when power is ON  |
| Lead wire                             |                                   | PVC 0.14SQ X 3 leads (Black, blue, brown) X 500mm   |
| Mounting direction                    |                                   | Any   |
| Materials (Body cover)                |                                   | Plastic   |

Note: Values when set pressure is -86.7KPa {-650.3mmHg} [-25.60in.Hg].

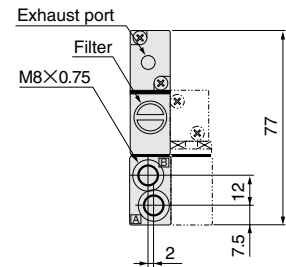
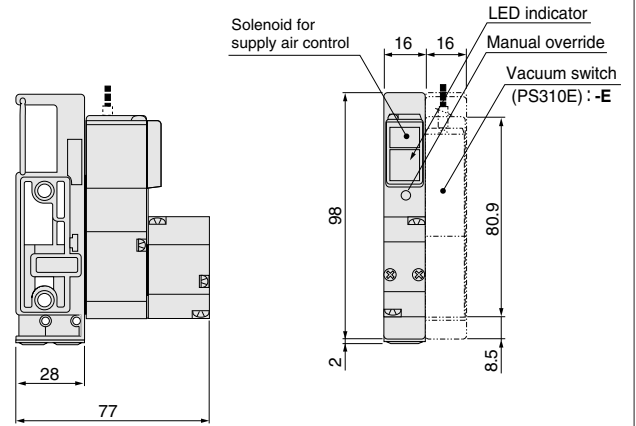
## Ejector with single solenoid valve

### FMJ05E1

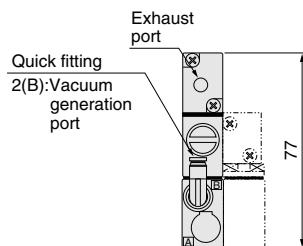
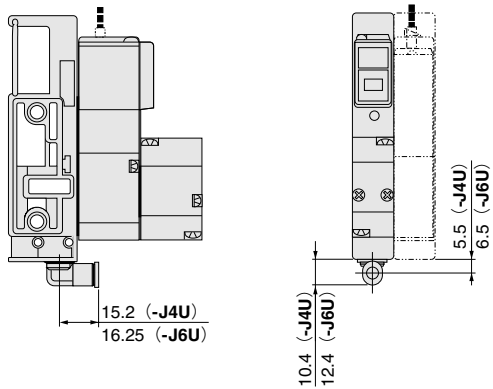
- With quick fitting: **-J4S** (Built-in straight fitting for  $\phi$  4 tube)  
**-J6S** (Built-in straight fitting for  $\phi$  6 tube)



- M8 female thread type: **-M8M**



- With elbow quick fitting: **-J4U** (Built-in elbow fitting for  $\phi$  4 tube)  
**-J6U** (Built-in elbow fitting for  $\phi$  6 tube)

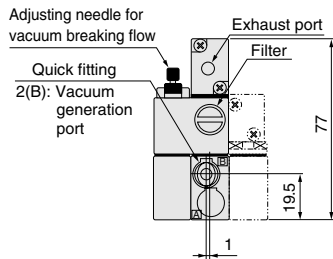
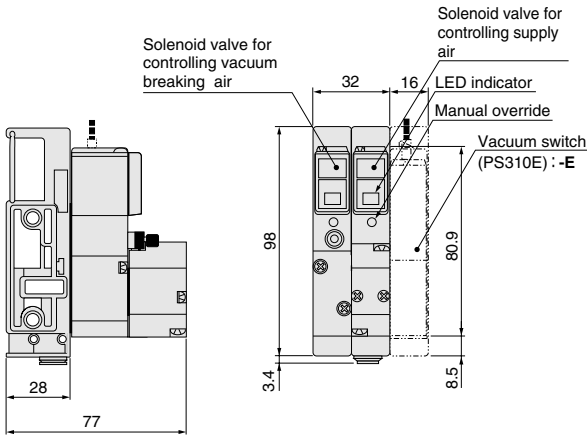




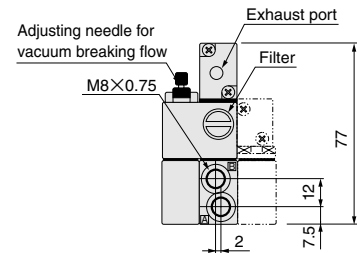
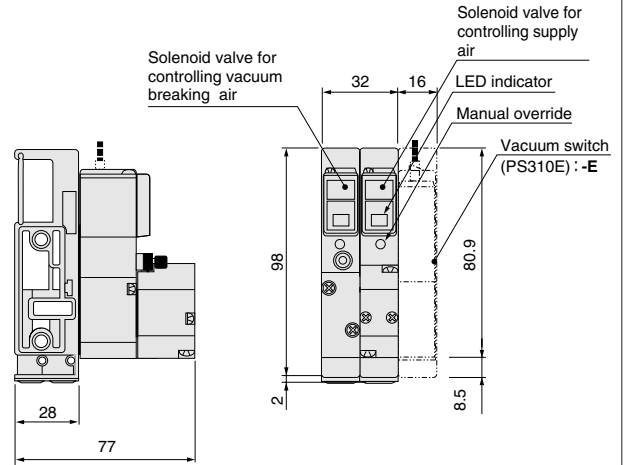
Ejector with twin solenoid valve

FMJ05E2

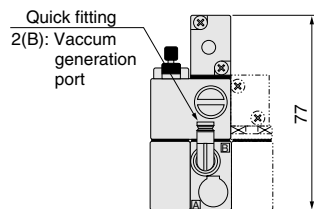
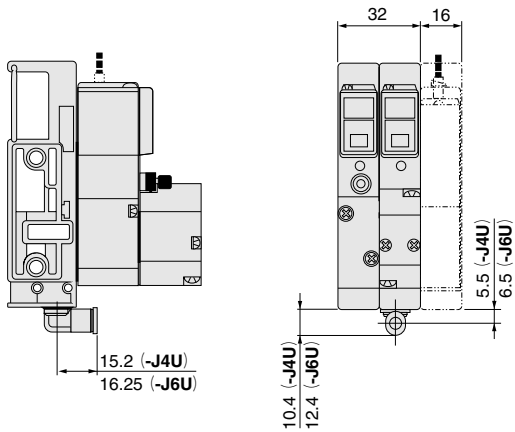
- With quick fitting: -J4S (Built-in straight fitting for  $\phi$  4 tube)  
-J6S (Built-in straight fitting for  $\phi$  6 tube)



- M8 female thread type: -M8M



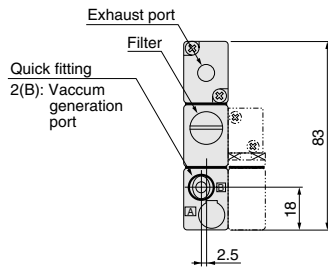
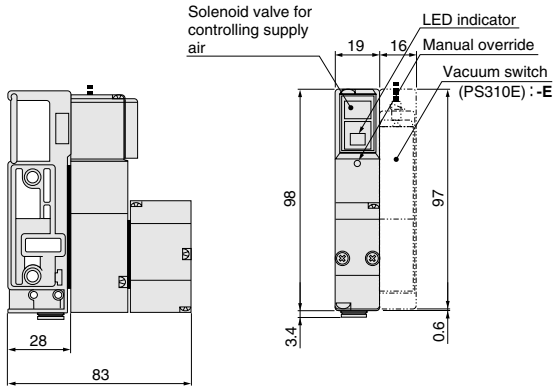
- With elbow quick fitting: -J4U (Built-in elbow fitting for  $\phi$  4 tube)  
-J6U (Built-in elbow fitting for  $\phi$  6 tube)



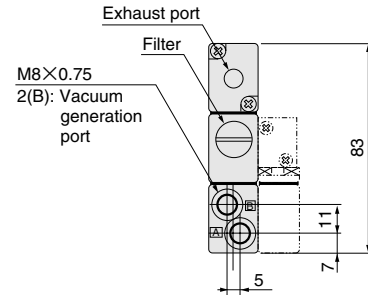
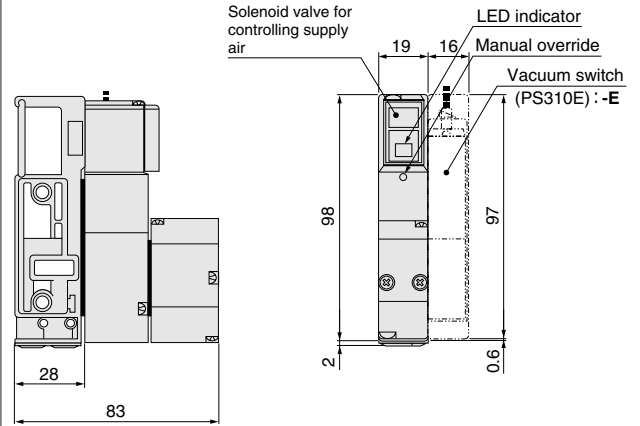
## Ejector with single solenoid valve

### FMJ07E1

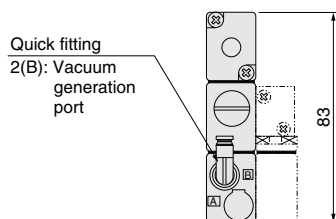
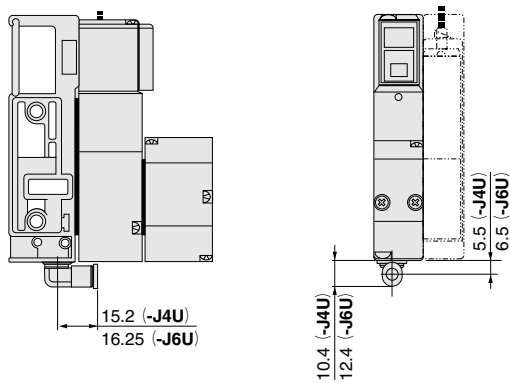
- With quick fitting: **-J4S** (Built-in straight fitting for  $\phi$  4 tube)  
**-J6S** (Built-in straight fitting for  $\phi$  6 tube)



- M8 female thread type: **-M8M**



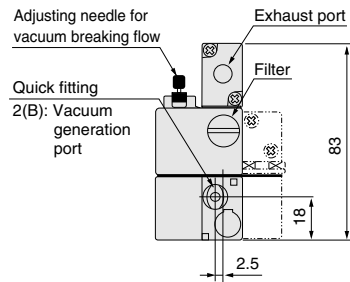
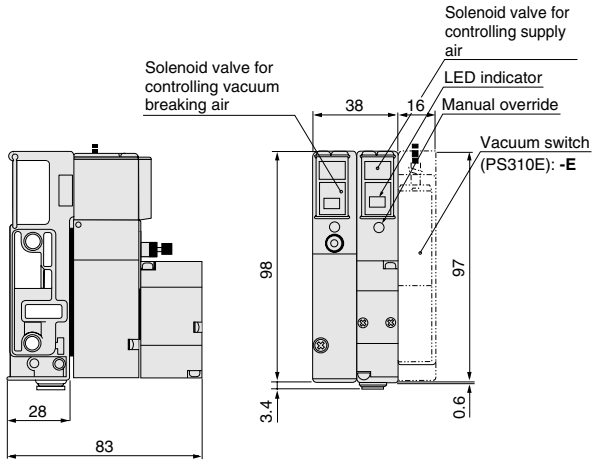
- With elbow quick fitting: **-J4U** (Built-in elbow fitting for  $\phi$  4 tube)  
**-J6U** (Built-in elbow fitting for  $\phi$  6 tube)



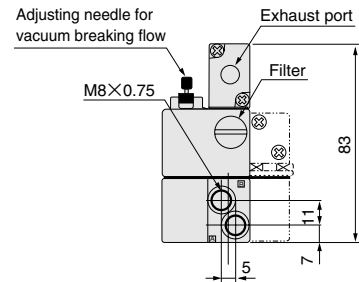
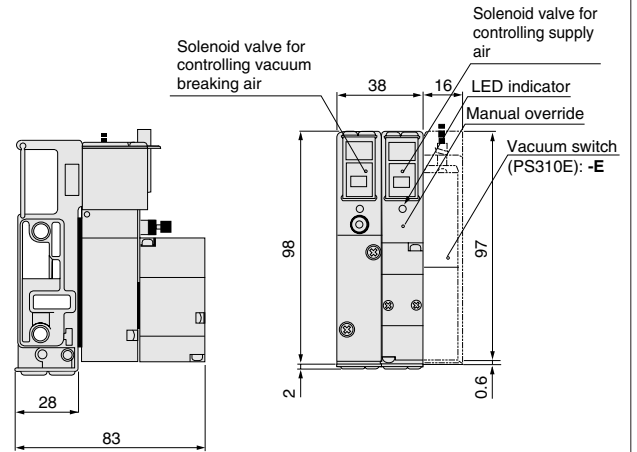
Ejector with twin solenoid valve

FMJ07E2

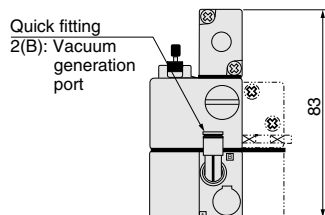
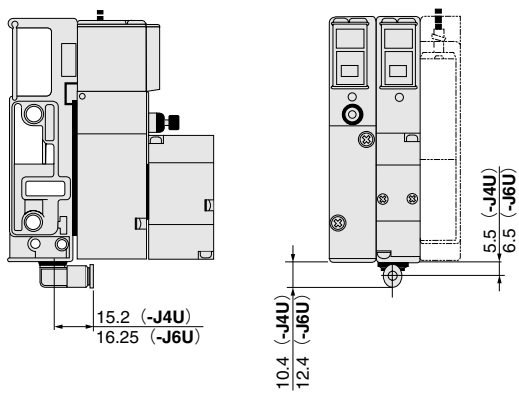
- With quick fitting: -J4S (Built-in straight fitting for  $\phi$  4 tube)  
-J6S (Built-in straight fitting for  $\phi$  6 tube)



- M8 female thread type: -M8M



- With elbow quick fitting: -J4U (Built-in elbow fitting for  $\phi$  4 tube)  
-J6U (Built-in elbow fitting for  $\phi$  6 tube)

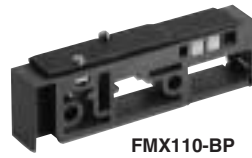


# FM-SOLID MANIFOLD X88M SERIES

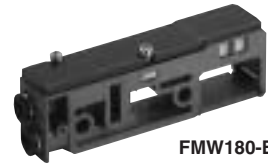
## Block-off Plate Modules

### Features

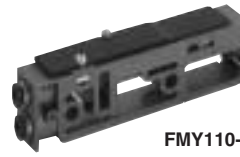
Offers an additional valve mounting space, to provide for the future installation of add-on valves.



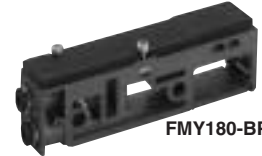
FMX110-BP



FMW180-BP



FMY110-BP



FMY180-BP

### Block-off Plate Module Mass

#### Module Mass

g [oz.]

| Model     | Mass      |
|-----------|-----------|
| FMX110-BP | 50 [1.76] |
| FMX180-BP | 80 [2.82] |

g [oz.]

| Model      | Body mass | Mass with quick fitting added |           |            |            |           |
|------------|-----------|-------------------------------|-----------|------------|------------|-----------|
|            |           | -J4S                          | -J6S      | -J4U       | -J6U       | -M8M      |
| FMW110-BP  | 50 [1.76] | 62 [2.19]                     | 58 [2.05] | 72 [2.54]  | 74 [2.61]  | 62 [2.19] |
| FMW180-BP  | 80 [2.82] | 92 [3.25]                     | 88 [3.10] | 102 [3.60] | 104 [3.67] | 92 [3.25] |
| FMY110-BP  | 50 [1.76] | 62 [2.19]                     | 58 [2.05] | 72 [2.54]  | 74 [2.61]  | 62 [2.19] |
| FMY180-BP* | 80 [2.82] | 92 [3.25]                     | 88 [3.10] | 102 [3.60] | 104 [3.67] | 92 [3.25] |

※The 3-position valve cannot be mounted on block-off plate modules with elbow quick fittings (-J4U, -J6U).

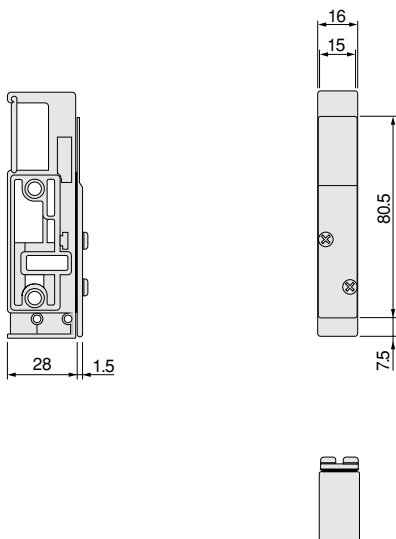
### Dimensions of Block-off Plate Module (mm)

※Height with end block attached is +1mm [0.039in.] longer than indicated below.

#### For 110 series

#### FMX110-BP, FMW110-BP

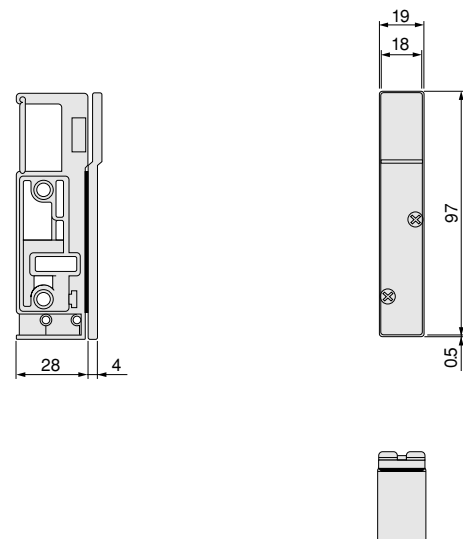
●Drawing shows the FMX110-BP.



#### For 180 series

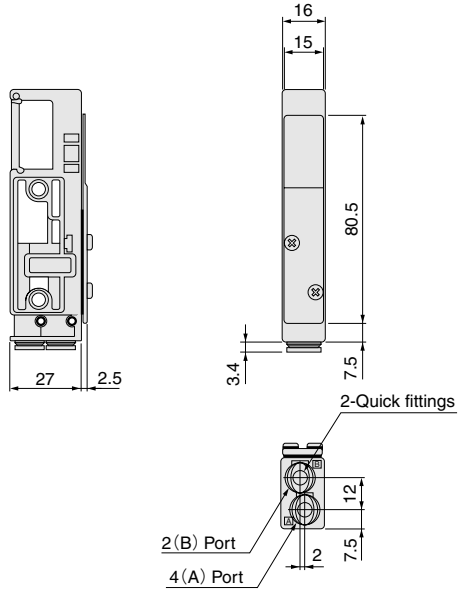
#### FMX180-BP, FMW180-BP

●Drawing shows the FMX180-BP.



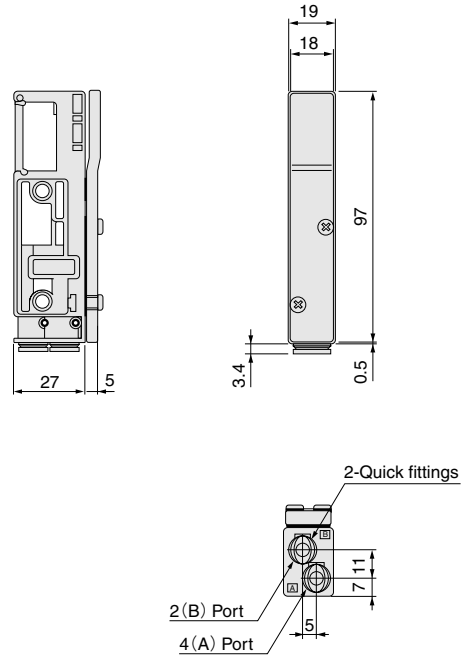
**For 110 series**  
**FMY110-BP**

●Drawing shows the FMY110-BP-J4S.



**For 180 series**  
**FMY180-BP**

●Drawing shows the FMY180-BP-J4S.

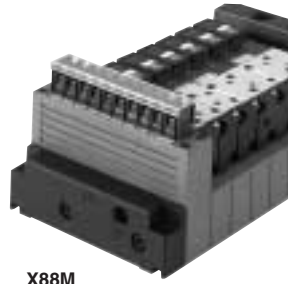


# FM-SOLID MANIFOLD X88M SERIES

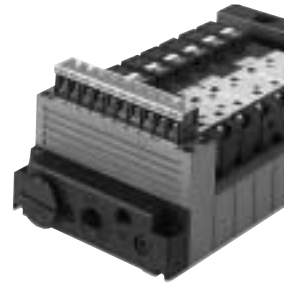
## End Blocks

### Features

- End block piping types are also in the product range.
- Three types offer minimum installation space.
- End blocks with DIN rail mounting brackets are also available as an option.



X88M



X88M-ED



X88M-DN

### End Block Mass

#### Module Mass

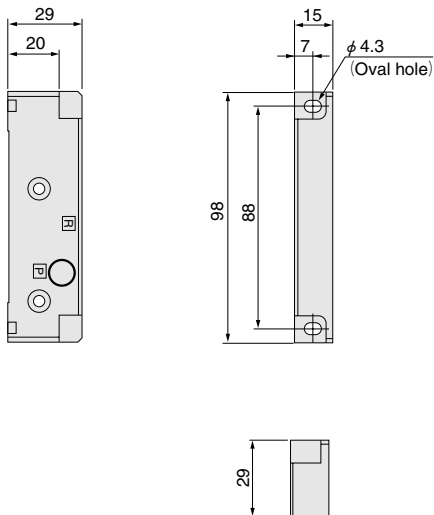
g [oz.]

| Model   | Mass       |
|---------|------------|
| X88M    | 140 [4.94] |
| X88M-ED | 145 [5.11] |
| X88M-DN | 280 [9.88] |

**End block module type**

**X88M (right and left) 1 set**

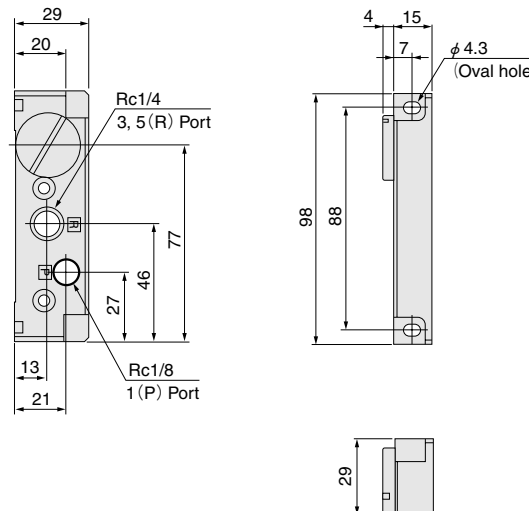
- The drawing shows a left-side end block with the solenoid on the upper side of the case.
- The right-side end block with the solenoid on the upper side of the case is right-left symmetrical to the left-side end block in dimensions, location of mounting holes, locations of piping ports, etc.



**End block piping type**

**X88M-ED (right and left) 1 set**

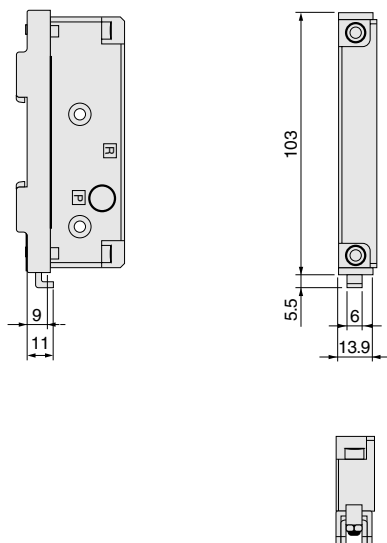
- The drawing shows a left-side end block with the solenoid on the upper side of the case.
- The right-side end block with the solenoid on the upper side of the case is right-left symmetrical to the left-side end block in dimensions, location of mounting holes, locations of piping ports, etc.



**With DIN rail mounting bracket type**

**X88M-DN (right and left) 1 set**

- The drawing shows a left-side end block with the solenoid on the upper side of the case.
- The right-side end block with the solenoid on the upper side of the case is right-left symmetrical to the left-side end block in dimensions, location of mounting holes, locations of piping ports, etc.



# Handling Instructions and Precautions

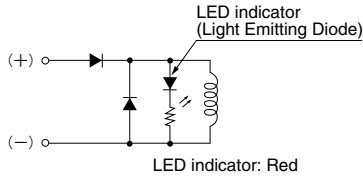


## Solenoid

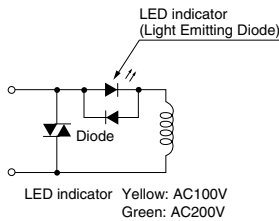
### Internal circuit

#### Standard solenoid

##### ●DC12V, DC24V

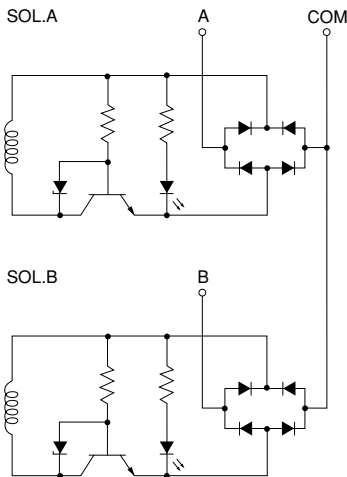


##### ●AC100V, AC200V



#### Tandem solenoid

##### ●DC24V



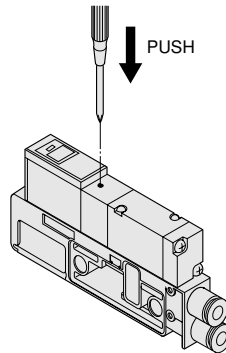
- Cautions:**
1. Do not apply megger between the pins.
  2. The DC12V and DC24V solenoids will not short circuit even if the wrong polarity is applied, but the valve will not operate.
  3. For a twin solenoid, avoid energizing both solenoids simultaneously. The valve could enter the neutral position.
  4. 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.
  5. Since the tandem solenoid valve (DC24V specifications) does not have any polarity, it can be used with either positive or negative common.



## Manual override

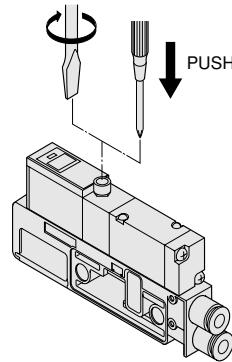
### Non-locking type

To operate the manual override, use an object with a fine tip to press it all the way down. For single solenoid, the 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 twin solenoid, pressing the manual override on the 12 (S1) side switches the 12 (S1) to enter the energized position, and the unit remains in that position 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).



### Locking protruding type

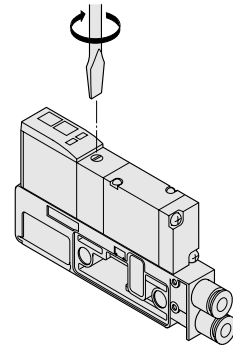
To lock the manual override, use a small screwdriver to turn the adjusting knob several times in the clockwise direction to push the manual override all the way down. When locked, turning the adjusting knob several times in the counterclockwise direction releases a spring on the manual override, returns 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 when in the energized position as long as the manual override is pushed down, and returns to the normal position upon release.



- Cautions:**
1. The 110, 180 series valves are internal pilot type solenoid valves; the manual override cannot switch the main valve without air supplied from the 1(P) port.
  2. Always release the lock on 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.

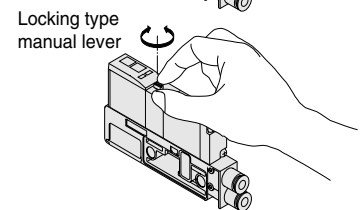
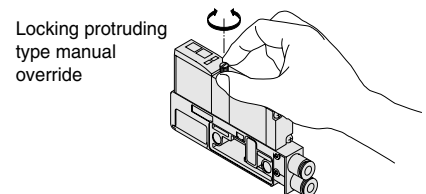
### Locking type (Tandem solenoid)

To lock the locking-type manual override, use a small screwdriver to push the manual override in all the way down, 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 must be exercised to avoid excessive turning of the manual override, which could damage it.



### Locking protruding type, locking type manual lever

To lock the locking protruding type manual override or locking type manual lever, use either a small screwdriver or your fingertips to push the manual override (manual lever) in all the way down, 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 (manual lever) 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 (manual lever) to the 0 position. A spring mechanism returns the manual override (manual lever) to its normal position, and the lock is released. Care must be exercised to avoid excessive turning of the manual override (manual lever), which could damage it.



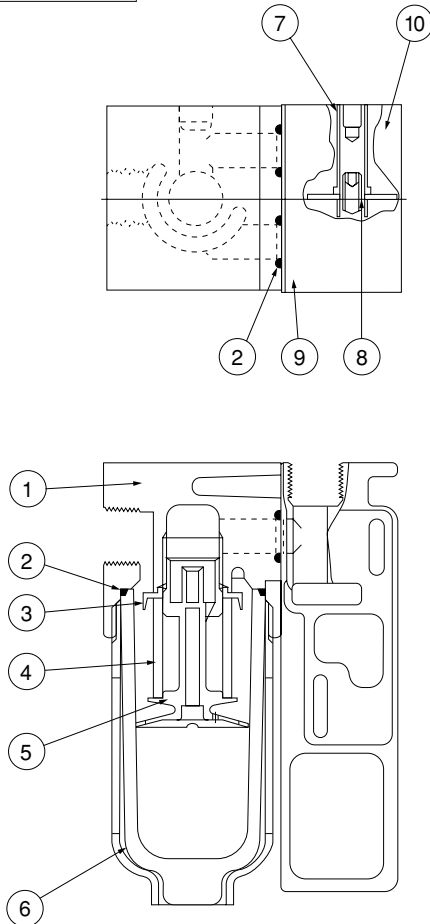
- Cautions:**
1. The 110, 180 series valves are pilot type solenoid valves; the manual override cannot switch the main valve without air supplied from the 1(P) port.
  2. Always release the lock on the locking type and locking protruding type manual override, and locking type manual lever before commencing normal operation.





## Filter module

### Inner construction



### Major parts and materials

| No. | Parts           | Materials              |
|-----|-----------------|------------------------|
| ①   | Body            | ADC                    |
| ②   | O-ring          | Synthetic rubber (NBR) |
| ③   | Element holder  | Plastic                |
| ④   | Filter element  | Plastic                |
| ⑤   | Baffle          | Plastic                |
| ⑥   | Bowl            | Plastic                |
| ⑦   | Connecting rod  | —                      |
| ⑧   | Pressure plate  | —                      |
| ⑨   | Filter base (L) | Aluminum alloy         |
| ⑩   | Filter base (R) |                        |

### Mounting and piping

1. As with the FM-SOLID MANIFOLD, any mounting direction is acceptable.
2. Air supply piping ports (Rc1/4) are provided in two places, the filter body and the manifold base, for versatile application in accordance with supplying flow rate and piping direction requirements.
3. Always flush out the piping interior before commencing piping work.
4. The air supply connection ports are temporarily closed with plugs. Remove the plug once from the port that is not used in piping, and attach it again after applying a sealing agent.

### Media

The filter module is an in-line filter developed especially for the FM-SOLID MANIFOLD. Unlike a conventional filter, it has no drain function. Use clean air containing no deteriorated compressor oil, collected liquid, and dust, etc.

### Bowl and bowl guard

1. Do not apply excessive force or shocks to the bowl, which is made of polycarbonate. Also, avoid using the bowl in an atmosphere containing organic solvents, etc.
2. When installing or removing the bowl and bowl guard, always exhaust the air first.
3. The bowl and bowl guard are connected by a thread. Rotate the bowl guard for installation and removal.
4. To assemble the bowl and bowl guard, set an O-ring on the filter body.
5. Use a neutral detergent to clean the bowl.

### Filter element Order code: (F3F-01)

1. Clean the filter element periodically (every 3~6 months).
2. Blow the filter element with compressed air to clean it.
3. To remove the filter element, first remove the baffle (threaded type) and both will come off.
4. To mount the filter element, assemble in the following order: ① element holder, ② element, and ③ baffle, and tighten until the element is secured in place. Tighten by hand until it is firmly secured. Any further tightening torque could damage the filter.

Note: Make sure to remove any dust found in the interior of the element. If not, the dust might be flushed out to the secondary side of the filter.

### Others

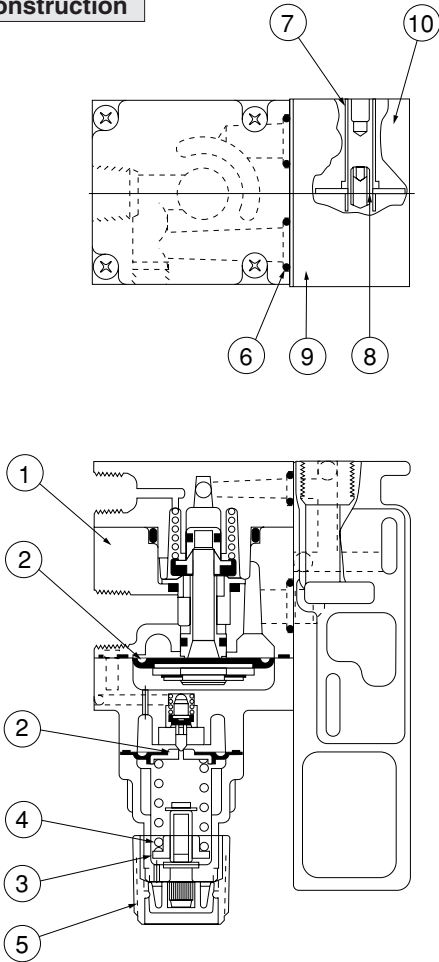
If using a piping module for air supply, the piping module is required to be installed on the primary side of the filter module.

# Handling Instructions and Precautions



Regulator module

**Inner construction**



**Major parts and materials**

| No. | Parts                      | Materials              |
|-----|----------------------------|------------------------|
| ①   | Body                       | ADC                    |
| ②   | Diaphragm                  | Synthetic rubber (NBR) |
| ③   | Bonnet                     | Plastic                |
| ④   | Pressure regulating spring | SWPB                   |
| ⑤   | Knob                       | Plastic                |
| ⑥   | O-ring                     | Synthetic rubber (NBR) |
| ⑦   | Connecting rod             | —                      |
| ⑧   | Pressure plate             | —                      |
| ⑨   | Regulator base (L)         | Aluminum alloy         |
| ⑩   | Regulator base (R)         |                        |

**Mounting and piping**

1. As with the FM-SOLID MANIFOLD, any mounting direction is acceptable.
2. Air supply piping ports (Rc1/4) are provided in two places, the regulator body and the manifold base, for versatile application in accordance with supplying flow rate and piping direction requirements.
3. Always flush out the piping interior before commencing piping work.
4. The air supply connection ports are temporarily closed with plugs. Remove the plug once from the port that is not used in piping, and attach it again after applying sealing agent.

**Media**

Use clean air containing no deteriorated compressor oil, collected liquid, and dust, etc.

**Lubrication**

The product can be used without lubrication, however, when the actuator requires lubrication, use Turbine Oil Class 1 (ISO VG32) or the equivalent. Avoid using spindle oil or machine oil.

**Pressure regulation**

1. To regulate the pressure, pull the knob out firmly, and turn it to the right (clockwise) to increase the pressure, and to the left (counterclockwise) to reduce the pressure. After pressure regulation, push the knob down into the body and lock it in place.
2. To stabilize pressure on the secondary side, set the pressure difference between the supply side and regulating side at 0.2 MPa {2kgf/cm<sup>2</sup>} [29psi.] or more.

Note: The regulator module is an internal pilot type regulator specially made for the FM-SOLID MANIFOLD. The regulator in the pilot portion uses a metal seat that bleeds slightly during pressure regulation. This is normal and not a problem for operations.

**Mounting pressure gauges**

1. Two types of pressure gauges are available as options for the regulator module. Use them as applications require.
2. For mounting, screw in the pressure gauge connector (R1/8) to the gauge port (Rc1/8) on the regulator body. Always use a wrench on the hexagonal part of the pressure gauge connector to tighten. Tightening torque  
 ●-GA20, -GD20 (φ20 pressure gauge) Max. -294.2N·cm {30kgf·cm} [26.0in·lbf]
3. When not using a pressure gauge, screw in the provided plug after applying sealing agent to the port.

**Others**

1. When using a piping module for air supply, install the piping module on the primary side of the regulator module.
2. Avoid operation of the pressure switch (ON, OFF) on the primary side of the regulator module, as it shortens the life of the regulator.
3. Since the regulator module uses a normally bleeding type of pilot regulator, a cut-off of air supply from the primary side automatically causes a loss of balance with the secondary side, and residual pressure is exhausted.

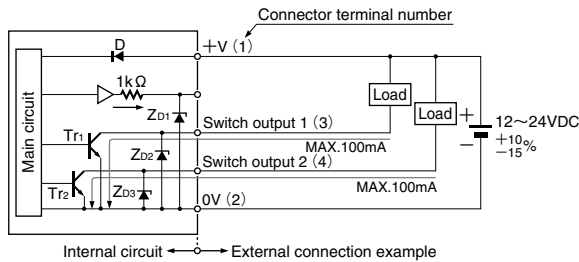


## Electronic type pressure switch module (for individual wiring type)

### Input/output circuit (for individual wiring connector type)

※ For plug-in type, see p.492.

#### Circuit diagrams



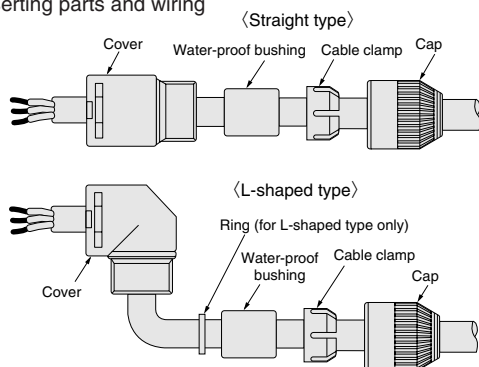
#### Wiring

Perform wiring work with attention to the power supply polarity and connector terminal numbers. The numbers in parentheses ( ) in the above circuit diagram show the terminal numbers. For connector handling precautions, follow the procedure below:

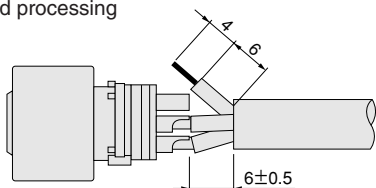
※ Connector: OMRON XS2 sensor I/O connector

#### Assembling procedure

##### (1) Inserting parts and wiring



##### (2) Cable end processing

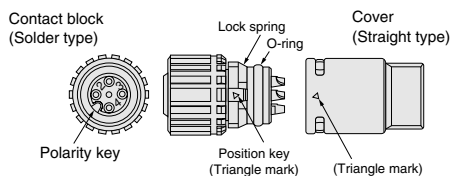


● Pre-solder the lead wires and terminals, and then firmly solder them in place.

● When the cable dimension after soldering exceeds 6.5mm [0.256in.], the protective structure cannot perform properly.

##### (3) Assembly

Align the triangle mark on the contact block position key with the triangle mark on the cover, and insert the cover into the contact block. When using an L type cover, the relationship between the insert surface side polarity key position and the cable out direction is determined by the position where the position key is inserted into the cover (settings in 90° intervals are possible). To insert it, push in strongly until the position key cannot be seen from the case side surface.



#### Precautions

1. Tighten the cap by hand (tightening torque: 39.2~49.0 N·cm {4~5kgf·cm} [3.5~4.3in·lbf]. Use of pliers, etc., could cause damage. Insufficient tightening could lead to failure to maintain the protective structure, and to gradual loosening from vibration.
2. Always cut the power before inserting or pulling out the connector.

#### Others

- Notes:
1. Check the power supply fluctuations to ensure that the power, voltage, and inputs do not exceed rated levels.
  2. When using a switching regulator for the power supply, always provide a Frame Ground (FG) terminal.
  3. Avoid transient states (about 50ms) when turning on the power supply.
  4. Use clean air containing no deteriorated compressor oil, collected liquid, and dust, etc.
  5. Use within the rated pressure range (MAX. 0.7MPa [102psi]).
  6. Care must be exercised to avoid incorrect wiring.
  7. Do not apply excessive force to the power supply cable and connector.
  8. Since the outer diameter of the applicable cable for the connector is  $\phi 4$  [0.16in.], use a cable outer diameter range of  $\phi 3$  [0.12in.]~ $\phi 5$  [0.20in.].

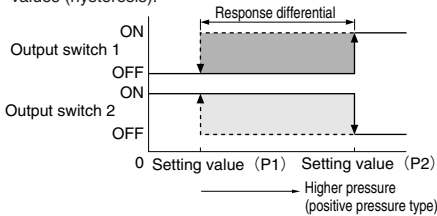
# Handling Instructions and Precautions

## Handling instructions and precautions

● Four output modes offer flexible control.

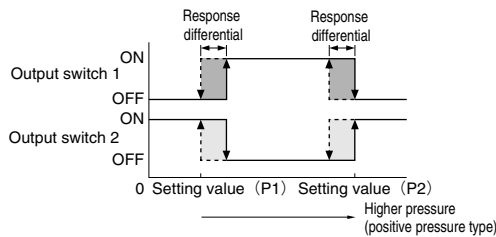
### 1 Hysteresis mode

Enables freely setting the switch output response differential by setting values (hysteresis).



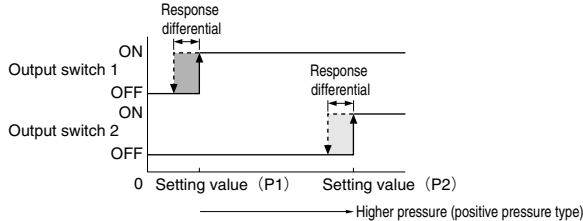
### 2 Window comparator mode

Enables switching of output ON and OFF within the setting pressure range .



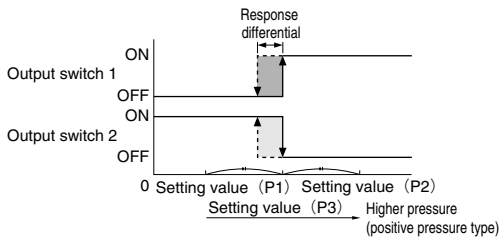
### 3 2-output mode

Versatile applications such as detection of different types of work, control and warning.



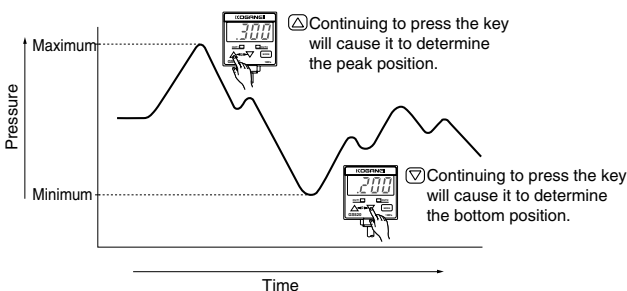
### 4 Automatic sensitivity setting mode

All you need to do is to store the pressure values of Good items and NG items at the site, then the switch sets the value automatically.

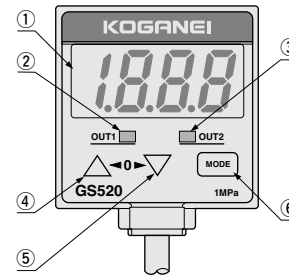


● Enables peak hold and bottom hold displays.

Displays both the peak value (maximum value) and bottom value (minimum value) of the pressure fluctuation. Convenient when necessary to examine pressure variations or required to know pressure setting values as a guide.



## Major parts and materials



| Parts   | Function  |
|---|---|
| ① 3 1/2 digits LED display (Red)                  | Displays the detected pressure value, as well as the setting contents, errors and key protect contents.   |
| ② Switch output 1 Operation display lamp (Orange) | Switch output 1 lights up when ON.  |
| ③ Switch output 2 Operation display lamp (Green)  | Switch output 2 lights up when ON.  |
| ④ Setting value UP key (△)                        | <ul style="list-style-type: none"> <li>In the initial setting mode, each pressing of the key successively displays the possible setting digits.</li> <li>Regarding setting values 1 and 2 in the setting mode, pressing the key changes the setting value to the high pressure side.</li> <li>In the detection mode, continuously pressing the key for 4 or more seconds gives the peak hold display.</li> </ul>  |
| ⑤ Setting value DOWN key (▽)                      | <ul style="list-style-type: none"> <li>In the initial setting mode, each pressing of the key successively displays the possible setting conditions.</li> <li>Regarding setting values 1 and 2 in the setting mode, pressing the key changes the setting value to the low pressure side.</li> <li>In the detection mode, continuously pressing the key for 4 or more seconds gives the bottom hold display.</li> </ul>                                     |
| ⑥ Mode change key (MODE)                          | <ul style="list-style-type: none"> <li>Each pressing of the key switches among the detection mode, set value 1 (P1) setting mode, and set value 2 (P2) setting mode.</li> <li>In the detection mode, continuously pressing the key for about 3 seconds sets or cancel the key protect function.</li> <li>In the detection mode, pressing the mode switch key while pressing the setting value UP key (△) switches to the Initial setting mode.</li> </ul> |

## Error indication

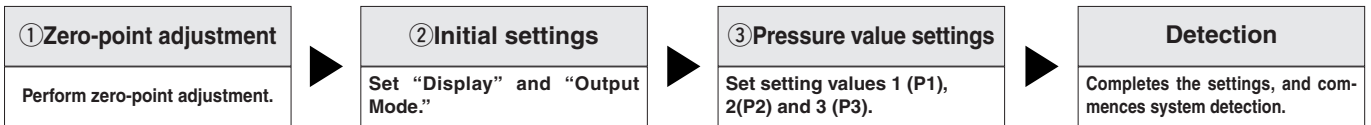
When an error occurs, take the following measures.

| Error indication | Details  | Processing   |
|------------------|--|--|
|                  | Load has short-circuited, and excessive current is experienced.                              | Cut the power, and then check the load.  |
|                  | Pressure is applied during zero-point adjustment.  | Return the pressure port applied pressure to atmospheric pressure, and then perform zero-point adjustment again. |
|                  | Applied pressure exceeds the upper limit of the displayed pressure range.                    | Restore the applied pressure to the rated pressure range.  |
|                  | Applied pressure exceeds the lower limit (reverse pressure) of the displayed pressure range. |  |

## Setting

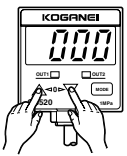
- When key protect has been set, always cancel key protect before operating the keys.  
[For the operating procedure, see the “About the key protect function.”]
- Setting value 1 (P1) and setting value 2 (P2) can be used in all output modes.
- Setting value 2 (P2) is designed to be set only at a higher pressure than setting value 1 (P1).
- Setting value 3 (P3) is automatically set at an intermediate value between setting value 1 (P1) and setting value 2 (P2) (when using the automatic sensitivity setting mode to set the pressure).
- Although the setting conditions are filed and saved in EEPROM, caution should be exercised as EEPROM has a limited life, and writing to files is guaranteed only up to 100,000 times.

### Setting procedure



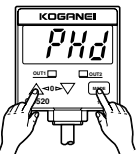
#### ① Zero-point adjustment

- Adjust the pressure value display to “zero” when the pressure port is open.
- Detection mode is set automatically when the power is turned on.
- Set the applied pressure to the pressure port to atmospheric pressure (not pressurized), and simultaneously press the  $\Delta$  and  $\nabla$  keys continuously.
- When  $000$  is displayed, release the buttons. Zero-point adjustment is complete and the system returns to detection mode.

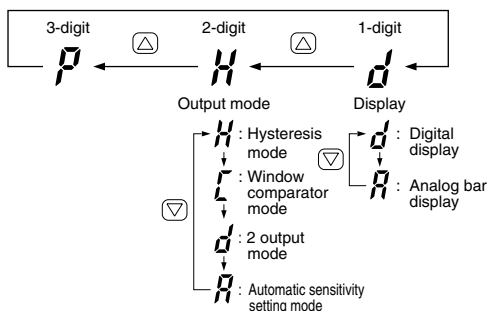


#### ② Initial settings

- Set the pressure “Display” and the switch output to “Output Mode.”
- Keep pressing the  $\Delta$  key in output mode and press the MODE key.
  - The LED displays the initial setting items.
  - When using for the first time,  $PHd$  is displayed.
- The LED displays the acceptable setting in flashing digits.
- Each pressing of the  $\Delta$  key switches the digit, while each pressing of the  $\nabla$  key switches the setting conditions.



Using  $\Delta$  key to switch



#### ③ Pressure value settings

When the output mode is set to hysteresis mode ( $H$ ), window comparator mode ( $L$ ), or 2 output mode ( $d$ ).

- Set the switch output to “Setting Value 1 (P1)” and “Setting Value 2(P2).”
- In detection mode, press the MODE key to reach the setting value 1 (P1) setting mode.
- Use the  $\Delta$  and  $\nabla$  keys to set the setting value 1 (P1).
- After setting, press the MODE key to reach the setting value 2 (P2) setting mode.
- Use the  $\Delta$  and  $\nabla$  keys to set the setting value 2 (P2).
- After setting, press the MODE key to reach detection mode.



When the output mode is set to the automatic sensitivity setting mode ( $R$ ).

- Set the switch output to “Setting Value 1 (P1),” “Setting Value 2(P2),” and “Setting Value 3 (P3).”
- In detection mode, press the MODE key to reach the setting value 1 (P1) setting mode.
- Within the allowable range of the required pressure, select the pressure state closest to the atmospheric pressure side, and then press the  $\nabla$  key to set the setting value 1 (P1).
- After setting, press the MODE key to reach the setting value 2 (P2) setting mode.
- Within the allowable range of the required pressure, select the pressure state closest to the high pressure side, and then press the  $\Delta$  key to set the setting value 2(P2).
- After setting, press the MODE key to reach the setting value 3 (P3) setting mode.
- Check the setting value 3 (P3), which was automatically set. If correction is required, use the  $\Delta$  and  $\nabla$  keys to set the setting value 3 (P3).
- After checking and setting, press the MODE key to reach detection mode.

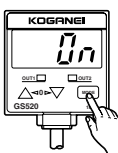


- The automatically set setting value 3 (P3) can be manually corrected to some value in between the setting value 1 (P1) and setting value 2 (P2).

## About the key protect function

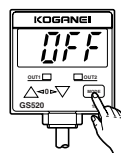
- The key protect function disables key operation to ensure that conditions in each of the setting modes cannot be changed by mistake.

### Setting key protect



- In detection mode, keep pressing the MODE key for about 3 seconds, and then quickly release the key when  $0n$  is displayed.  
(• Key protect is set, and the system returns to the detection mode.)

### Canceling key protect



- In detection mode, keep pressing the MODE key for about 3 seconds, and then quickly release the key when  $0FF$  is displayed.  
(• Key protect is canceled, and the system returns to the detection mode.)

# Handling Instructions and Precautions



## Mechanical type pressure switch module (for individual wiring type)

### Mounting

1. As with the FM-SOLID MANIFOLD, any mounting direction is acceptable.
2. Avoid mounting in locations subject to strong vibrations.
3. Avoid mounting in locations subject to strong external magnetic fields.

### Media

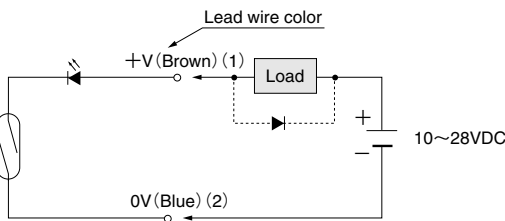
Use clean air containing no deteriorated compressor oil, collected liquid, and dust, etc.

### Atmosphere

Do not use media or an environment containing any of the following substances: Organic solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, acids, etc.

### Wiring

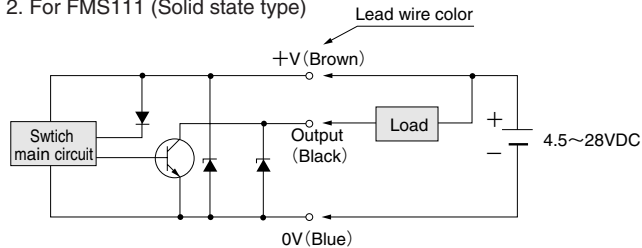
1. For FMS110 (Reed switch type)



- The system has no built-in contact protection circuit. Therefore, always take contact protection countermeasures when inductive loads or capacitive surges occur.

※ For the electrical specifications and contact protection circuits, etc., see the sensor switch items in the Actuators General Catalog.

2. For FMS111 (Solid state type)



- Electric noise causing erratic operation could be a problem for contacts with TTL, C-MOS, etc. In this case, connect a CR filter circuit to the black lead wire.

- For inductive loads, we recommend the use of a protective diode for surge suppression.

※ For the electrical specifications and contact protection circuits, etc., see the sensor switch items in the Actuators General Catalog.

3. Common for both types

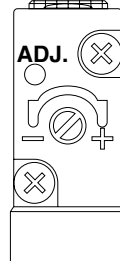
- Pay attention to the lead wire color (polarity) when connecting wires. Incorrect connections can result in erroneous operation or damage.

- Do not apply strong force or excessive bending moment to the lead wires.

- When the LED is ON, a red indicator lamp lights up.

### Pressure regulation

1. Turning the pressure regulation screw to the right changes the pressure setting to higher pressure, and turning to the left to lower pressure.



Pressure regulation screw

2. The indicator shows the OFF pressure setting point. When changing from a higher to a lower pressure setting, the OFF signal appears at the setting pressure (the red LED shuts off).  
 ※ The ON point is where pressure is shifted to the low pressure side by the response differential.
3. Remember that the indicator can be used as a guide. For precise pressure settings, always use a pressure gauge, and check the switch settings by switching back and forth when setting.
4. Switching the pressure settings back and forth 2~3 times will improve the setting accuracy.

### Others

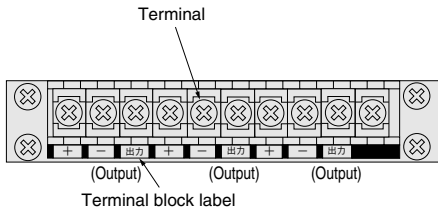
1. Because the module uses a magnetically sensitive sensor switch, avoid using it in locations subject to strong external magnetic fields, or near power lines and other large electrical current flows.
  2. When connecting a pressure gauge to the gauge port (Rc1/8), the **G1-20DPL**※ type can be used (requires the quick fitting **TS6-01**). Note, however, that it cannot be used in modules in which the height from the adjoining module base exceeds 50mm [1.97in.].
  3. Additions or deletions cannot be made while the shield plate is in use.
  4. When using it with a shield plate, the pressure switch can be adjacently mounted.
- ※ For details of **G1-20DPL**, see the General Catalog of Air Treatment, Auxiliary, Vacuum.



## Electronic and mechanical type pressure switch module (for collective wiring type)

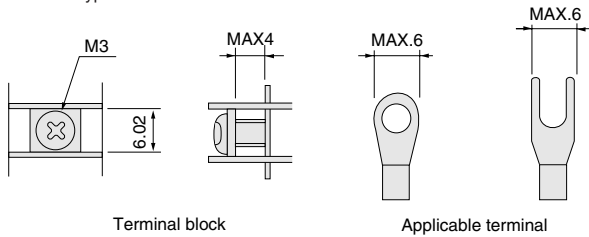
The wiring from the pressure switches is all connected to a supplied terminal block module.

### Major functions and part names of the terminal block



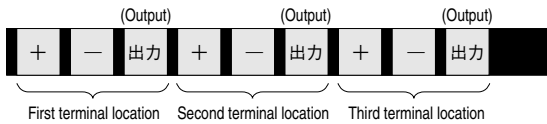
#### 1. 10-pin terminal block with M3 thread

Note: The terminals should be 6mm [0.24in.] or less for both the round-type terminals and Y-type terminals.



#### 2. Terminal location (Terminal block label)

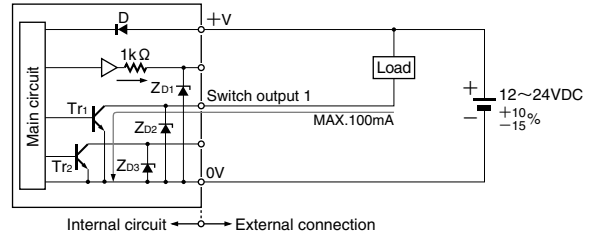
Terminal location of pressure switch module up to 3 units.



Note: Combination mounting of up to 3 plug-in type pressure switch modules can be wired to a single terminal block module.

### Circuit diagrams

#### 1. Electronic type pressure switch (for collective wiring type)

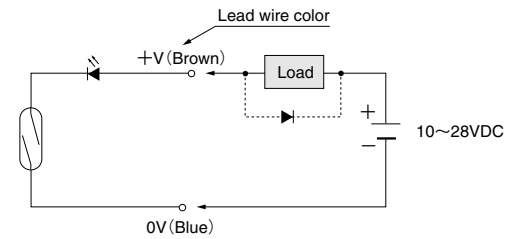


Pay attention to the power supply polarity and the terminal block's terminal numbers for wiring connections.

Only output 1 is available for FMS220 (collective wiring type (plug-in type)).

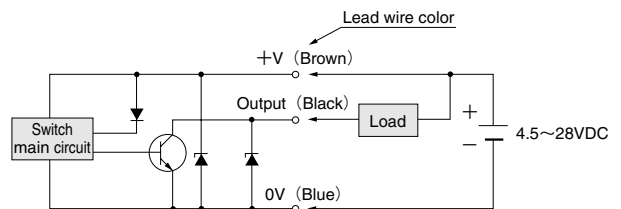
#### 2. Mechanical type pressure switch

##### ● Reed switch type (2-lead wires)



Pay attention to the power supply polarity and the terminal block's terminal numbers for wiring connections.

##### ● Solid state type (3-lead wires)



Pay attention to the power supply polarity and terminal block sequence for wiring connections.

# Handling Instructions and Precautions



## Air preparation module Other information and data

### Maximum flow rate of FMR200 regulator module

When using a regulator module to supply air to valve modules, the number of valves used could lead to insufficient air supply pressure and flow rates, resulting in erratic valve operation or insufficient actuator output. See the table below when determining the number of regulator modules:

| Solenoid valve model | Number of valves <sup>Note</sup> |
|----------------------|----------------------------------|
| 110 series           | 10                               |
| 180 series           | 4                                |

Note: The valve number means the number of valves that can simultaneously supply air to the secondary side with a single regulator module.

Since the number of valves shown above is equivalent to the number of piping modules used, the number of piping modules also equals the number of regulator modules.

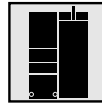
### Cylinder size and speed at the maximum flow rate (reference data)

Conditions

- Primary pressure : 0.7MPa [102psi.] (constant)
- Secondary pressure : 0.5MPa [73psi.] (regulated at regulator module)
- Valve used : 180 series (direct piping type)
- Filter used : FMF200 filter module
- Piping module used : FMP-FJ10S
- Tube used between a valve and cylinder : N8-B-1000mm [39in.]

| Bore size mm [in.]                                  | φ 25 [0.984] | φ 32 [1.260] | φ 40 [1.575] | φ 50 [1.969] | φ 63 [2.480] |
|---|--------------|--------------|--------------|--------------|--------------|
| Usable number <sup>Note 1</sup>                     | (10)         | (6)          | 4            | 2            | 1            |
| Cylinder speed <sup>Note 2</sup><br>mm/s [in./sec.] | 500 [19.7]   | 500 [19.7]   | 500 [19.7]   | 500 [19.7]   | 500 [19.7]   |

Notes: 1. The usable number refers to the number of cylinders that can be simultaneously operated by a single regulator module.  
2. Cylinder speed is the actual value measured in the above conditions.



## Ejector module

### General precautions

The **FMJ05/07E2** ejector module differs from the conventional type of **ME05/07-E2** series ejector, in that it does not have a built-in check valve. As a result, switching off the air supply solenoid valve sets the V port side to the atmospheric pressure level, as in the E1 type.

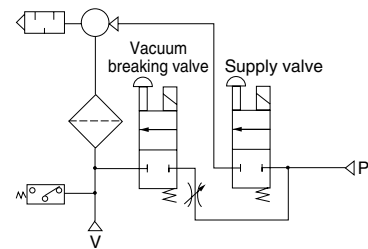
When countermeasures must be taken to keep vacuum within a volume chamber, or to prevent workpieces from falling during power failure, etc., always take sufficient precautions before use.

The vacuum breaking valves (with twin valves) are particularly effective for workpieces that need to be picked off more positively and quickly.

Replacement filters are also available (order code: **ME05MA-F**, **ME07MA-F**). Replace the filter on a periodic basis.

For specifications with a built-in check valve, consult us.

FMJ□□E2 Symbol





# Important Precautions

## Mounting

1. While any mounting direction is allowed, avoid mountings that twist the manifold.
2. When connecting piping to manifolds or other devices, flush the tubes completely by blowing compressed air before piping. If metal chips, sealing tape, or rust generated during piping work enters, it may cause a malfunction such as an air leakage.
3. When mounting a valve unit inside the control panels, or when the operation requires long energizing periods, consider providing heat radiation.
4. The valve module cannot be operated with the 4(A), 2(B) ports open to the atmosphere.

## Atmosphere

Avoid using it in the locations and environment listed below, as it could result in malfunction of the valve.

If use in such conditions is unavoidable, always provide a cover or other adequate protective measures.

- ① Location affected by strong vibration or impact
- ② Location with temperature exceeding the 5~50°C [41~122°F] range
- ③ Location with large change in temperature and dew condensation
- ④ Location exposed to direct sunlight
- ⑤ Location with atmosphere containing organic solvents, phosphate acid ester type hydraulic oil, sulphur dioxide, chlorine gas, or other acids
- ⑥ Location directly exposed to water drops and oil drops.
- ⑦ Environment where the valve body is subject to dew condensation
- ⑧ Location where the valve body is directly exposed to metal chips, dust particulate, etc.

## Media

1. Use air for the media. For the use of any other media, consult us.
2. Air used for the cylinder should be clean air that contains no deteriorated compressor oil, etc. Install an air filter (filtration of 40 μm or less) near the valve to remove collected liquid or dust. In addition, drain the air filter periodically.
3. Use the manifold without lubrication as much as possible. When the actuator requires lubrication, use Turbine Oil Class 1 (ISO VG32) or the equivalent. Avoid using spindle oil or machine oil.

## Piping

1. For the 1(P) port piping, use a size that matches the manifold's piping connection port. Insufficient flow rate or pressure could result in defective valve operation or in insufficient actuator output.
2. When installing piping or mufflers to the 3, 5(R) port, ensure minimum exhaust resistance.
3. On rare occasions, exhaust gas can interfere with other valves and actuators. In this situation, either install piping modules at both ends for exhaust, or install port isolators at an intermediate location to isolate the exhaust air, and separate the exhaust in combination with a piping module.
4. When a multiple number of valves are operated simultaneously on a multi-station manifold, or in high-frequency application, install piping modules on both ends, and supply air from the 1(P) port and exhaust it from the 3, 5(R) port.

## Wiring

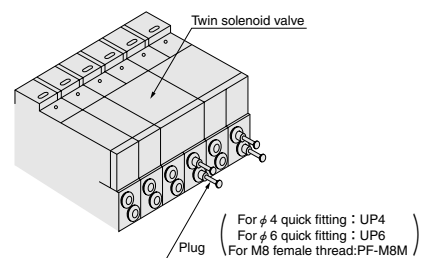
1. Confirm positive common or negative common.
2. Firmly insert connectors and tighten screws.
3. Confirm the polarity of the power supply and pin locations, and connect correctly. (For details, see the wiring module page.)

## Valve module

When mounting solenoid valves 110, 180 series, the solenoid is a plug-in type and valve modules are already connected to the wiring modules by wiring, so that there is no need for wiring at each station.

◆ **Precautions for use of the twin solenoid valve**  
When using the base piping type twin solenoid valve (FMW110-4KE2, FMW113-4KE2, FMW180-4KE2, FMW183-4KE2), use with plugs inserted in the 4(A) and 2(B) ports (quick fitting) on the right side ports (see the illustration below).

Note that the twin solenoid valve occupies 2 stations of the single solenoid valve base, which means that valve replacement on the base is possible.



## Piping module

Piping modules are divided into 2 types, a port type and a built-in muffler type.

In addition, the use of air supply and exhaust, and using multiple units, makes the module also be used as a piping branch.

### ◆ Piping in an embedded port

When the air supply port in the built-in muffler type has a female thread specification (FMP-FR01, -FR02), use a wrench on the port's hexagonal portion to secure it in place while piping.

### ◆ Precautions

While air supply and exhaust for the valve module are performed by using this piping module, the number of valves in use could lead to air supply pressure and flow rate shortages, resulting in defective valve operation or in insufficient actuator output. See the table below when determining the required number of piping modules.

Number of valves that can operate with a single piping module

| Solenoid valve model | Number of valves* |
|----------------------|-------------------|
| 110 series           | Max.10            |
| 180 series           | Max.4             |

\*: Number of valves does not refer to the valves that could be mounted on a single manifold. It is the number of valves that enables to supply of air simultaneously to a secondary side by using a single piping module.

(Example) When ten 180 series solenoid valves are mounted on a single manifold, and 6 of those valves are in simultaneous operation, use 2 piping modules.

(Example) When ten 180 series solenoid valves are mounted on a single manifold, and 3 of those valves are in simultaneous operation, use 1 piping module.

# Important Precautions

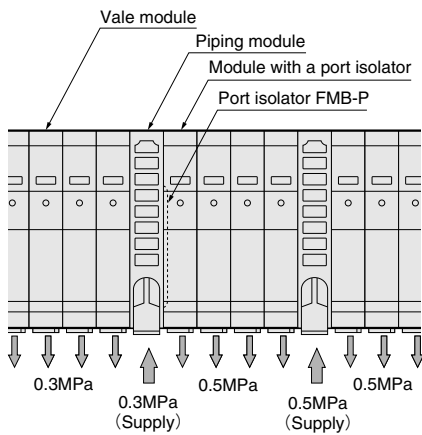
## Port isolator

The following 3 types of port isolators are available:

| Purposes                     | Model |
|------------------------------|-------|
| Block supply air             | FMB-P |
| Block exhaust air            | FMB-R |
| Block supply and exhaust air | FMB-A |

### ◆Precautions

- Confirm a marking label on the bottom of the manifold for port isolator locations. (Because the port isolators are assembled inside the manifold base, the outward appearance and dimensions do not change.)
- While a port isolator can be installed in any location required on each module, its position cannot be changed after shipping.
- The port isolator is located on the left side of the designated module (solenoid on top). Therefore, it blocks the air for that portion (see the diagram).



## Example of system configuration

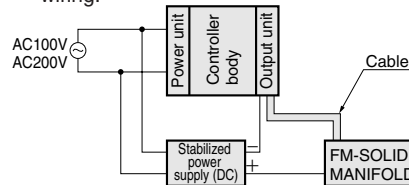
When the controller is negative common, the manifold side should be positive common. And when the controller is positive common, the manifold side should be negative common.

In this system configuration example, the controller side is always negative common type (and the manifold side is positive common type).

### ■When the output unit requires no power supply.

<A system that uses a cable to transmit control voltage only>

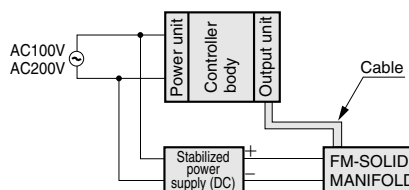
- The power supply connection terminal (Fcc, D-sub connector type) uses positive polarity wiring only, with the negative polarity left open as a dead terminal.
- Since the terminal block type's common is a positive polarity, use it as shown for wiring:



### ■When the output unit requires a power supply

#### Method ①

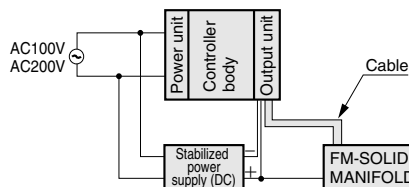
- Connect positive and negative power supply to the power supply connection terminal, and supply power to the output unit through the connection cable's positive and negative lines.
- Can be shared with the same cable as the control voltage.



Note: The terminal block type uses the procedure shown below.

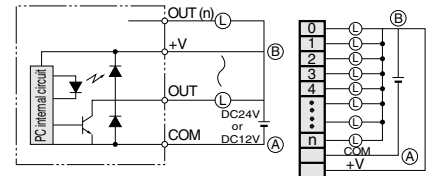
#### Method ②

- Supply power to the output unit, and connect a positive line to the manifold side.
- Leave the negative polarity as a dead terminal.
- For the terminal block type, connect the positive line to the common.

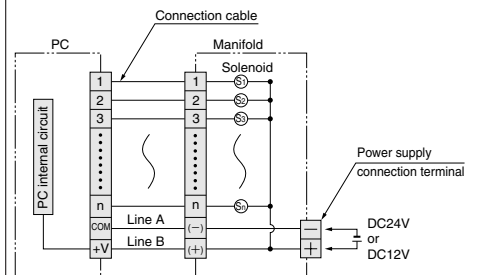


## How to use the power supply connection terminal

Power supply terminal blocks (power supply connection terminals) are provided for the FMC-F200, -D250, -E250 units. In output units where power supply from the output is required for the internal circuits (see the diagram), power lines can be connected to the same cable, in the same way as load (solenoid) lines.



### ■Connection diagram between PC and manifold (connector)



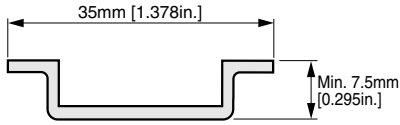
Line A : COM (0V or negative) line

Line B : +V line

|     | FMC-F200 | FMC-F201 | FMC-D250 | FMC-E250 |
|-----|----------|----------|----------|----------|
| (-) | 17, 18   | 9, 19    | 20,21,22 | 20,21,22 |
| (+) | 19, 20   | 10, 20   | 23,24,25 | 23,24,25 |

### Mounting onto a DIN rail

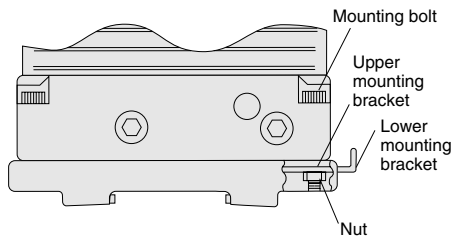
When mounting the manifold onto a DIN rail, follow the procedure shown below.  
Applicable DIN rail : Equivalent to DIN standard (EN50022)



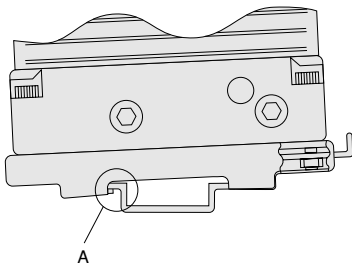
### Mounting procedure

The DIN rail mounting bracket is composed of an upper and lower two-part construction.

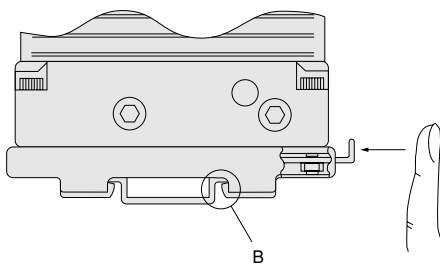
- Loosen the end block mounting bolts beforehand (2 pcs. for each block).
- Loosen the nut until just before it separates from the bolt.



- Tilt the manifold and latch one side of the lower hook (area A) onto the DIN rail edge.



- Set the manifold parallel to the DIN rail, and slide the lower bracket so that the other hook (area B) also latches onto the DIN rail. Leave it loose as it slides, and then alternately tighten the mounting bolts.



- Completion

### Removing procedure

When removing, follow the reverse mounting procedure for easy removal.

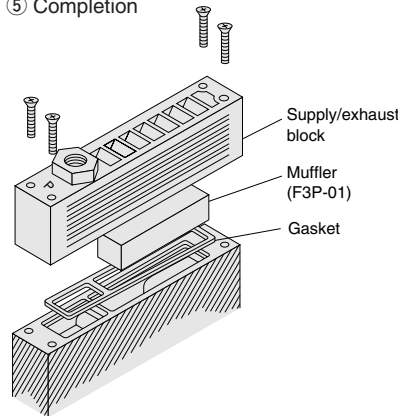
### Replacement of muffler

For replacement of the muffler when using the built-in muffler type piping module (FMP-F□), follow the procedure shown below.

Order code for muffler only: **F3P-01**

### Replacing procedure

- Remove the mounting screws (4 pcs.) securing the air supply/exhaust block.
- Remove the muffler to be replaced. (At this time, take caution to avoid losing the gasket.)
- Attach the gasket to the seat of the base, and insert the new muffler until it reaches the bottom of the groove.
- Set the air supply/exhaust block in the normal position ①, and tighten the mounting screws. (Tightening torque: 58.8N·cm {6kgf·cm} [5.2in·lbf])
- Completion



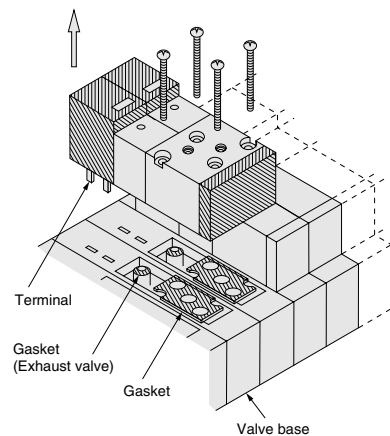
### Replacement of valves

#### Removing procedure

Remove the 2 mounting screws (4 pcs. for the twin solenoid), and lift in the direction shown by the arrow (see the illustration). Because the solenoid is a plug-in type, moving it in any other direction than that indicated by the arrow could damage the terminals.

#### Mounting procedure

Mount new gaskets on the valve. Then, set the solenoid terminal into the insert opening, and tighten the mounting screws. (Tightening torque: 110 series: 44.1N·cm {4.5kgf·cm} [3.9in·lbf], 180 series: 68.6N·cm {7kgf·cm} [6.4in·lbf])



(The illustration is for the twin solenoid valve.)

### Adding on modules

If disassembling this manifold for the purpose of adding units, etc., the gaskets and internal wiring could be damaged, or during re-assembly the gasket could be caught in the gap, or the wiring could become defective, etc. For this reason, avoid disassembly or re-assembly after delivery. (The manifold is checked before shipping for energizing, air leaks, etc.)

However, if you must add units to the manifold for some reason, consult us.