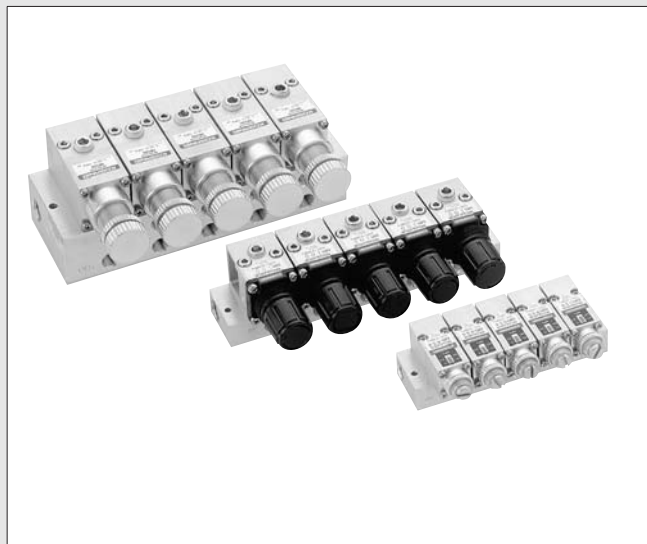


# KOGANEI

## ACCESSORIES GENERAL CATALOG

AIR TREATMENT, AUXILIARY, VACUUM,  
AND FLUORORESIN PRODUCTS

MANIFOLD REGULATORS



## MANIFOLD REGULATORS CONTENTS

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**Caution**

Before use, be sure to read the “Safety Precautions” on p. 49.

## Flexible and centralized control of supply pressure

# Manifold Regulators

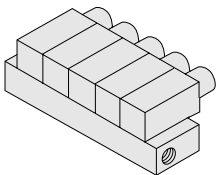
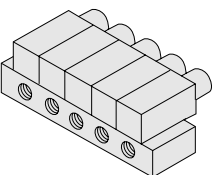
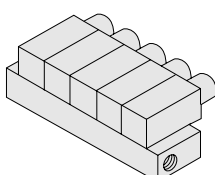
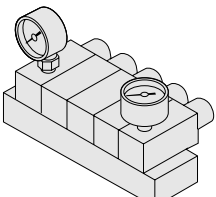
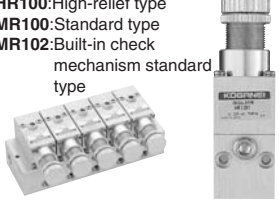
The Manifold Regulator offers adjustment and confirmation of supply pressure at a single location.

Moreover, a new high-relief type has been added to the R100 series, further expanding functional capabilities. P port piping is available in two types, a port collective type and an individual station type, selected according to flow rate and primary pressure conditions.

In addition, such options as the built-in check mechanism type, the compact pressure gauge, as well as the non-ion specification, offer flexible response to every application.

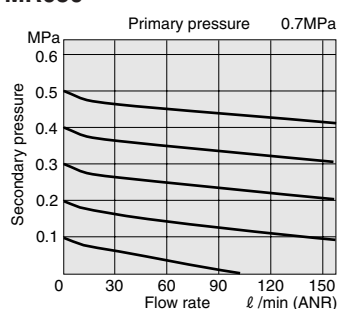
### Basic models and configurations of manifold regulators

- The high-relief type manifold (R100M□H□) can be mounted in combination with the standard regulator.
- The standard type regulator is also a relief type.

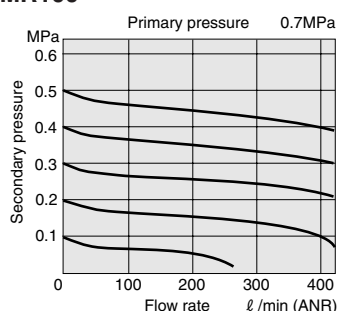
|                    |                  | A type manifold:<br>P port collective type                                        | B type manifold:<br>P port individual station type                                | Mounting regulator                                                                                                                                                                       | Option:<br>Pressure gauge                                                                                                                                                                      |
|--------------------|------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>R050 series</b> |                  |  |  |                                                                                                        |                                                                                                             |
|                    |                  | R050M□A                                                                           | R050M□B                                                                           | MR050: Standard type<br>MR052: Built-in check mechanism standard type<br>                            |                                                                                                           |
| <b>R100 series</b> | Standard type    | R100M□A                                                                           | R100M□B                                                                           | MR100: Standard type<br>MR102: Built-in check mechanism standard type<br>                            | -GA: Bottom piping $\phi 20 \times 1 \text{ MPa}$<br>(Order code for the pressure gauge only: G1-20A)<br> |
|                    | High-relief type | R100M□HA                                                                          | R100M□HB                                                                          | HR100: High-relief type<br>MR100: Standard type<br>MR102: Built-in check mechanism standard type<br> | -GD: Back piping $\phi 20 \times 1 \text{ MPa}$<br>(Order code for the pressure gauge only: G1-20D)<br>   |

## Flow Rate Characteristics

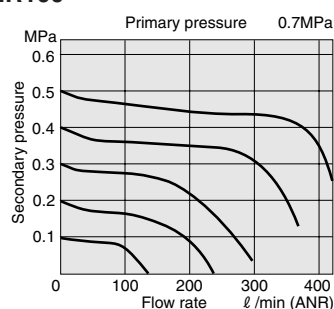
### MR050



### MR100



### HR100

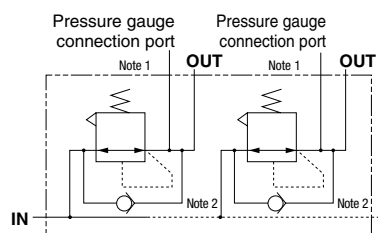


1MPa = 145psi.  
1  $\ell / \text{min}$  = 0.0353ft<sup>3</sup>/min.

## Symbols

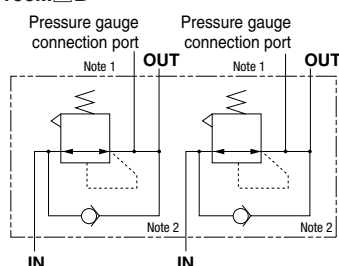
### ●Standard type

P port collective type: **R050M□A, R100M□A**



Notes: 1.The R050 series does not have a pressure gauge connection port.  
2. The check mechanism is available in MR052 and MR102 only.

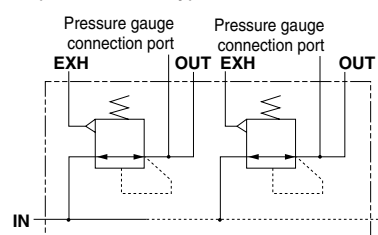
Individual station type: **R050M□B, R100M□B**



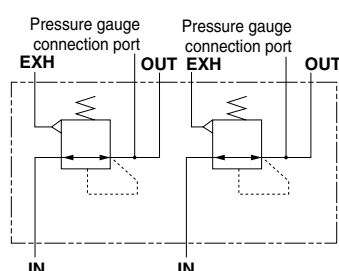
Notes: 1.The R050 series does not have a pressure gauge connection port.  
2. The check mechanism is available in MR052 and MR102 only.

### ●High-relief type

P port collective type: **R100M□HA**



Individual station type: **R100M□HB**



## Specifications

| Model                       | Standard type            | MR050           | MR100                                               | —                          |
|-----------------------------|--------------------------|-----------------|-----------------------------------------------------|----------------------------|
|                             | Built-in check mechanism | MR052           | MR102                                               | —                          |
|                             | High-relief type         | —               | —                                                   | HR100                      |
| Item                        |                          |                 |                                                     |                            |
| Media                       | Air                      |                 |                                                     |                            |
| Operation method            | Piston type              |                 | Diaphragm type                                      |                            |
| Port size <sup>Note</sup>   | Rc                       | 1/8             | 1/8, 1/4                                            |                            |
| Pressure setting range      | MPa [psi.]               | 0.05~0.5 [7~73] | 0.05~0.7 [7~102]                                    |                            |
| Relief starting pressure    | MPa [psi.]               | —               | —                                                   | Setting pressure +0.03 [4] |
| Maximum operating pressure  | MPa [psi.]               | 0.7 [102]       | 0.9 [131]                                           | 0.93 [135]                 |
| Proof pressure              | MPa [psi.]               | 1.03 [149]      | 1.32 [191]                                          | 1.47 [213]                 |
| Operating temperature range | °C [°F]                  | 5~60 [41~140]   |                                                     |                            |
| Options                     | Pressure gauge           | —               | With G1-20A (bottom piping) or G1-20D (back piping) |                            |

Note: See the table of port size, for details

## Port size

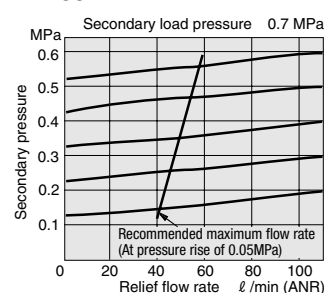
| Model    | Ports                          | Location of piping connection | Port size |
|----------|--------------------------------|-------------------------------|-----------|
| R050M□A  | IN                             | Manifold (collective)         | Rc1/8     |
|          | OUT                            | Manifold                      |           |
| R050M□B  | IN                             | Manifold                      | Rc1/8     |
|          | OUT                            | Manifold                      |           |
| R100M□A  | IN                             | Manifold (collective)         | Rc1/4     |
|          | OUT                            | Manifold                      | Rc1/8     |
|          | Pressure gauge connection port | Regulator body                |           |
| R100M□B  | IN                             | Manifold                      | Rc1/8     |
|          | OUT                            | Manifold                      |           |
|          | Pressure gauge connection port | Regulator body                |           |
| R100M□HA | IN                             | Manifold (collective)         | Rc1/4     |
|          | OUT                            | Manifold                      | Rc1/8     |
|          | EXH (relief)                   | Manifold                      |           |
|          | Pressure gauge connection port | Regulator body                |           |
| R100M□HB | IN                             | Manifold                      | Rc1/8     |
|          | OUT                            | Manifold                      |           |
|          | EXH (relief)                   | Manifold                      |           |
|          | Pressure gauge connection port | Regulator body                |           |

## Mass

| Model              | Manifold mass calculation<br>(n=No. of units) | Mounted regulator |                |             | Pressure gauge (Optional) |            | Block-off plate |
|--------------------|-----------------------------------------------|-------------------|----------------|-------------|---------------------------|------------|-----------------|
|                    |                                               | MR050<br>MR052    | MR100<br>MR102 | HR100       | -GA20                     | -GD20      |                 |
|                    |                                               |                   |                |             |                           |            |                 |
| R050M□A, R050M□B   | $(24 \times n) + 20$<br>[0.053 × n + 0.044]   | 40 [0.088]        | —              | —           | —                         | —          | 3 [0.007]       |
| R100M□A, R100M□B   | $(36 \times n) + 30$<br>[0.079 × n + 0.066]   | —                 | 82 [0.181]     | —           | 37 [0.082]                | 33 [0.073] | 5 [0.011]       |
| R100M□HA, R100M□HB | $(124 \times n) + 102$<br>[0.273 × n + 0.225] | —                 | 82 [0.181]     | 134 [0.295] | 37 [0.082]                | 33 [0.073] | 10 [0.022]      |

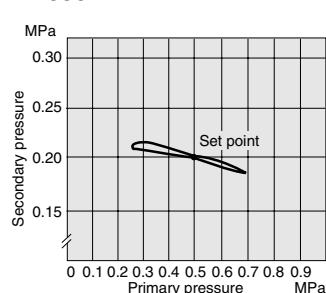
## Relief Flow Rate Characteristics

### HR100

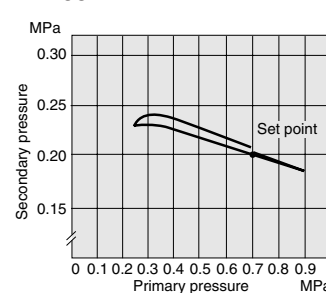


## Pressure Characteristics

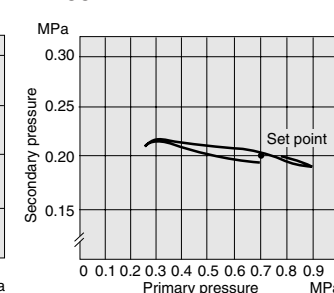
### MR050



### MR100



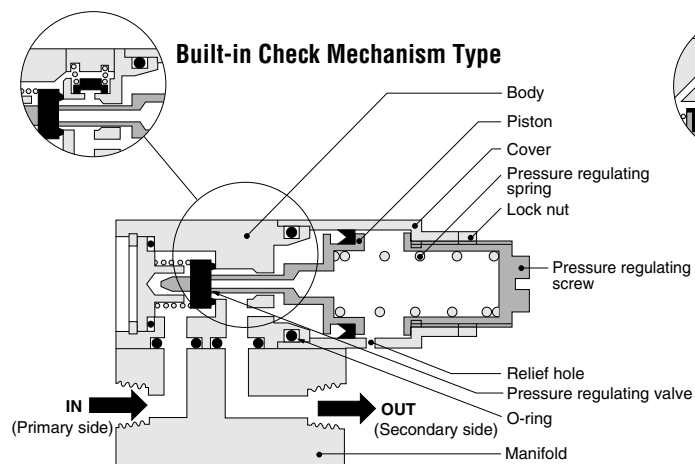
### HR100



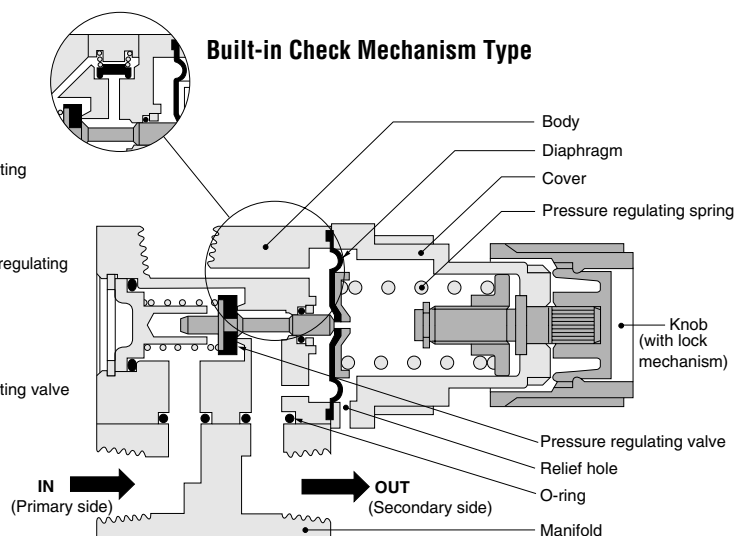
1MPa = 145psi. 1 l/min = 0.0353ft<sup>3</sup>/min.

## Inner Construction

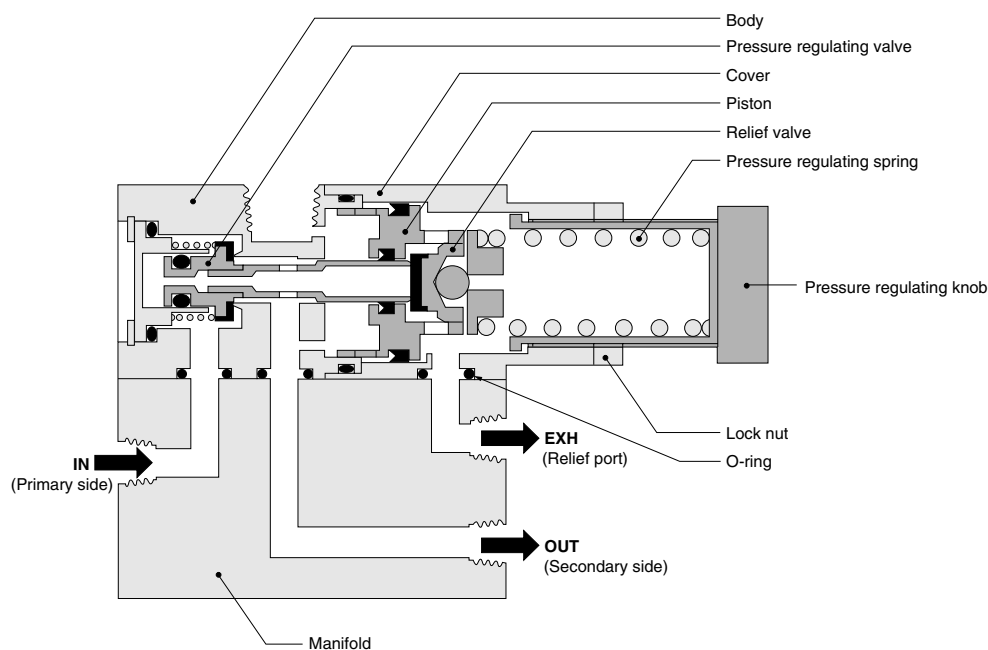
### ● MR050 ● MR052



### ● MR100 ● MR102



### ● HR100



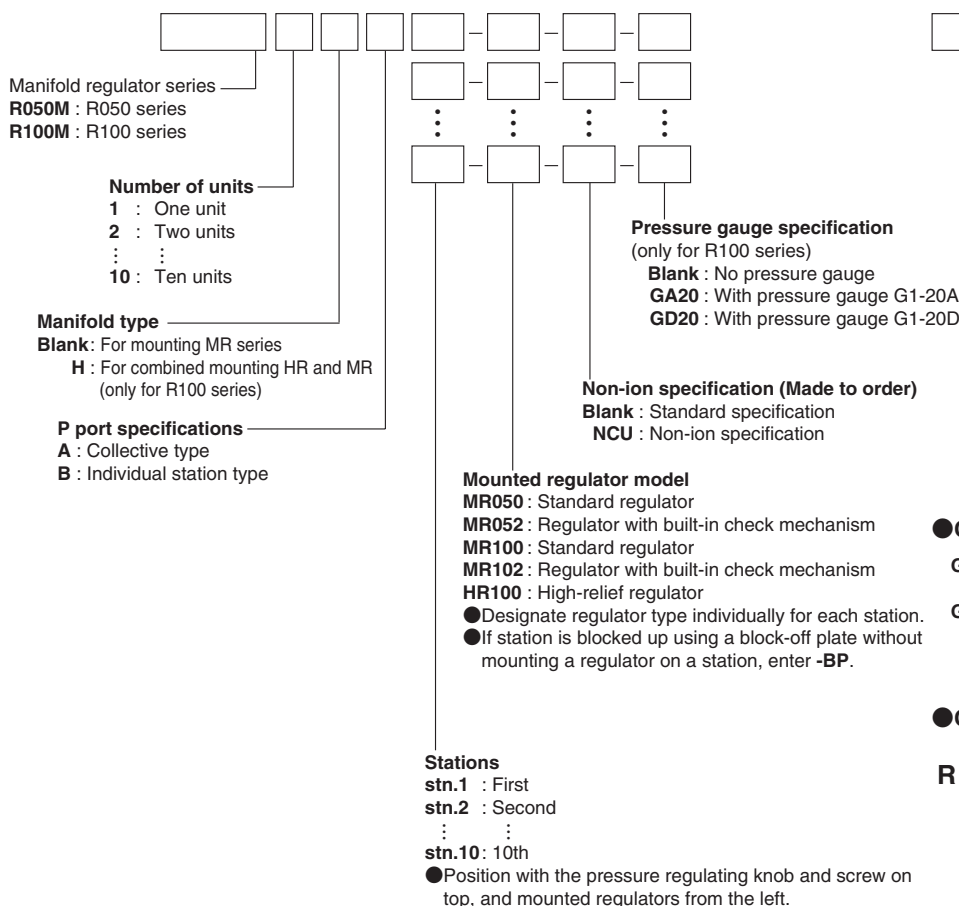
## Major Parts and Materials

| Item                               | Model | MR050                     | MR100                  | HR100                     | Non-ion specification                             |
|------------------------------------|-------|---------------------------|------------------------|---------------------------|---------------------------------------------------|
| Body                               |       | Aluminum alloy (anodized) | Aluminum die-casting   | Aluminum alloy (anodized) | ←                                                 |
| Pressure regulating screw          |       | Brass                     | —                      | —                         | Brass (Electroless nickel plated)                 |
| Knob                               |       | —                         | Plastic (POM)          | —                         | ←                                                 |
| Pressure regulating knob           |       | —                         | —                      | Aluminum alloy (anodized) | ←                                                 |
| Cover                              |       | Aluminum alloy (anodized) | —                      | Brass                     | Brass (Electroless nickel plated)                 |
| Bonnet                             |       | —                         | Plastic (PBT)          | —                         | ←                                                 |
| Piston                             |       | Aluminum alloy (anodized) | —                      | Aluminum alloy (anodized) | ←                                                 |
| Diaphragm                          |       | —                         | Synthetic rubber (NBR) | —                         | ←                                                 |
| Pressure regulating spring         |       | —                         | Piano wire (chromated) | —                         | ←                                                 |
| Seal                               |       | —                         | Synthetic rubber (NBR) | —                         | ←                                                 |
| Pressure regulating valve assembly |       | —                         | —                      | Brass                     | Aluminum alloy, brass (Electroless nickel plated) |
| Manifold                           | Body  | Aluminum alloy (anodized) |                        |                           | ←                                                 |
|                                    | Seal  | Synthetic rubber (NBR)    |                        |                           | ←                                                 |

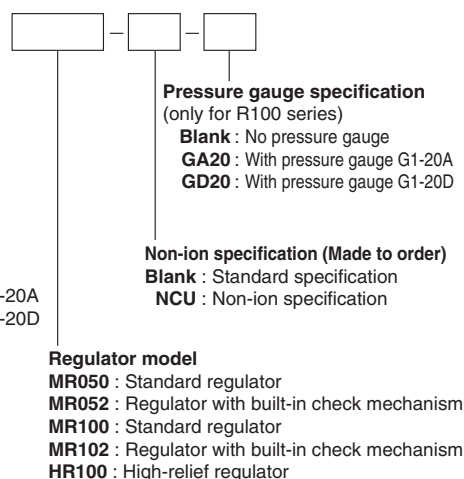
Remark: The non-ion specification is made to order.

## Order Codes

### ●Order codes for manifold regulators



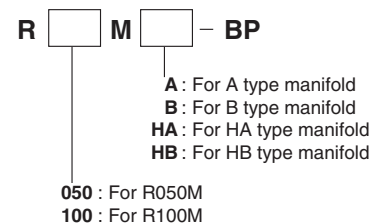
### ●Order codes for regulator only



### ●Order codes for pressure gauges only

**G1-20A** : A type (bottom piping,  
 $\phi 20 \times 1 \text{ MPa}$  [145psi.])  
**G1-20D** : D type (back piping,  
 $\phi 20 \times 1 \text{ MPa}$  [145psi.])

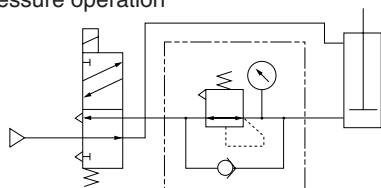
### ●Order codes for block-off plates only



## Application Examples

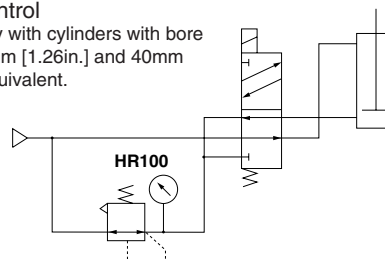
### ●When using standard types with built-in check mechanism (MR052, MR102)

#### ●Differential pressure operation



#### ●Speed control

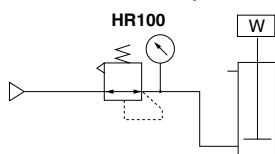
Usable only with cylinders with bore size of 32mm [1.26in.] and 40mm [1.57in.] equivalent.



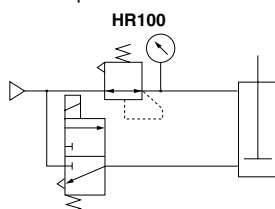
### ●High-relief type (HR100)

For one HR100 unit, use a cylinder with bore size of 32mm and stroke of 200mm or less.

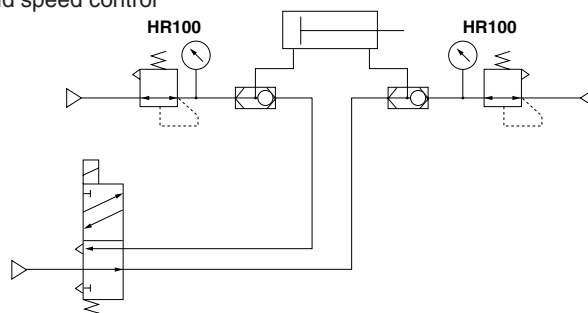
#### ●Balancer, tension control, or compressed pressure control



#### ●Differential pressure operation

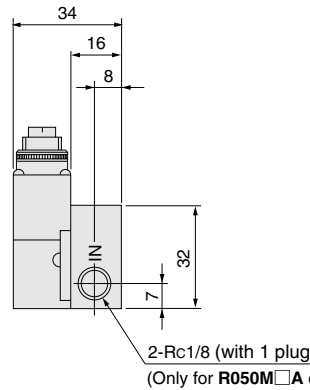
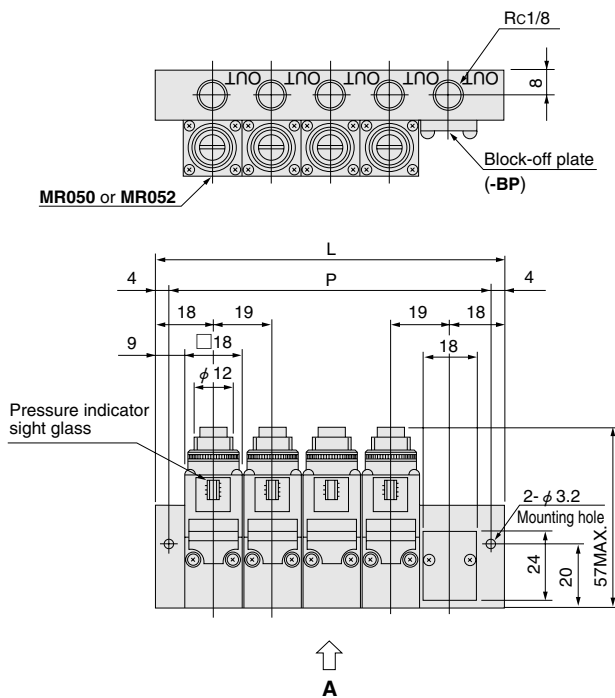


#### ●Rapid speed control



Note: As the high-relief type HR100 has a relief starting pressure of about 0.03MPa [4psi.], it cannot be used for high-precision control.

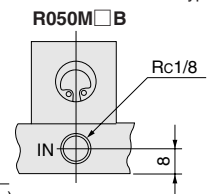
● R050M□A  
● R050M□B



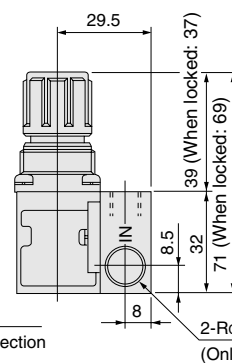
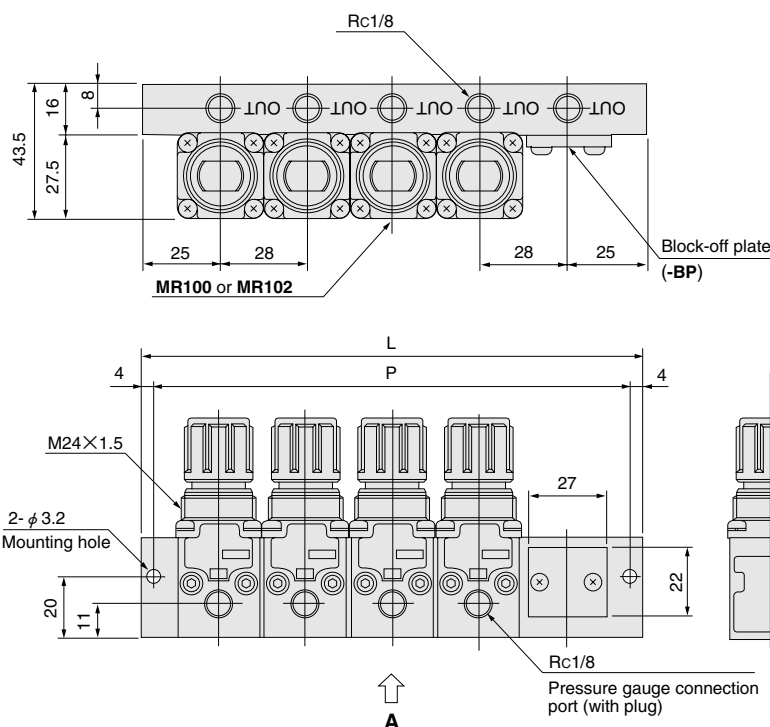
Unit dimensions

| Model              | P   | L   |
|--------------------|-----|-----|
| R050M1A, R050M1B   | 28  | 36  |
| R050M2A, R050M2B   | 47  | 55  |
| R050M3A, R050M3B   | 66  | 74  |
| R050M4A, R050M4B   | 85  | 93  |
| R050M5A, R050M5B   | 104 | 112 |
| R050M6A, R050M6B   | 123 | 131 |
| R050M7A, R050M7B   | 142 | 150 |
| R050M8A, R050M8B   | 161 | 169 |
| R050M9A, R050M9B   | 180 | 188 |
| R050M10A, R050M10B | 199 | 207 |

〈Viewed from A〉  
In the case of individual station type



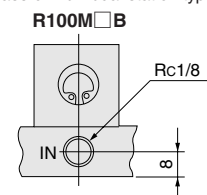
● R100M□A  
● R100M□B



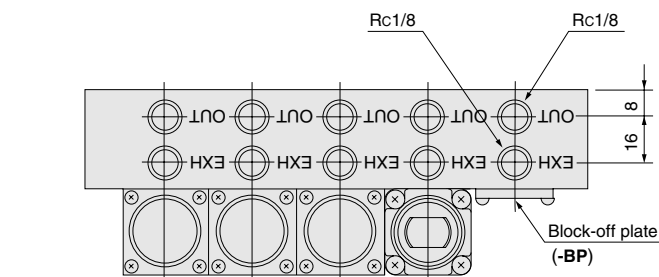
Unit dimensions

| Model              | P   | L   |
|--------------------|-----|-----|
| R100M1A, R100M1B   | 42  | 50  |
| R100M2A, R100M2B   | 70  | 78  |
| R100M3A, R100M3B   | 98  | 106 |
| R100M4A, R100M4B   | 126 | 134 |
| R100M5A, R100M5B   | 154 | 162 |
| R100M6A, R100M6B   | 182 | 190 |
| R100M7A, R100M7B   | 210 | 218 |
| R100M8A, R100M8B   | 238 | 246 |
| R100M9A, R100M9B   | 266 | 274 |
| R100M10A, R100M10B | 294 | 302 |

〈Viewed from A〉  
In the case of individual station type

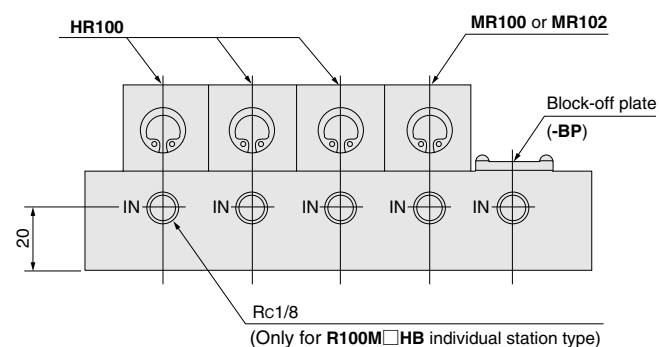
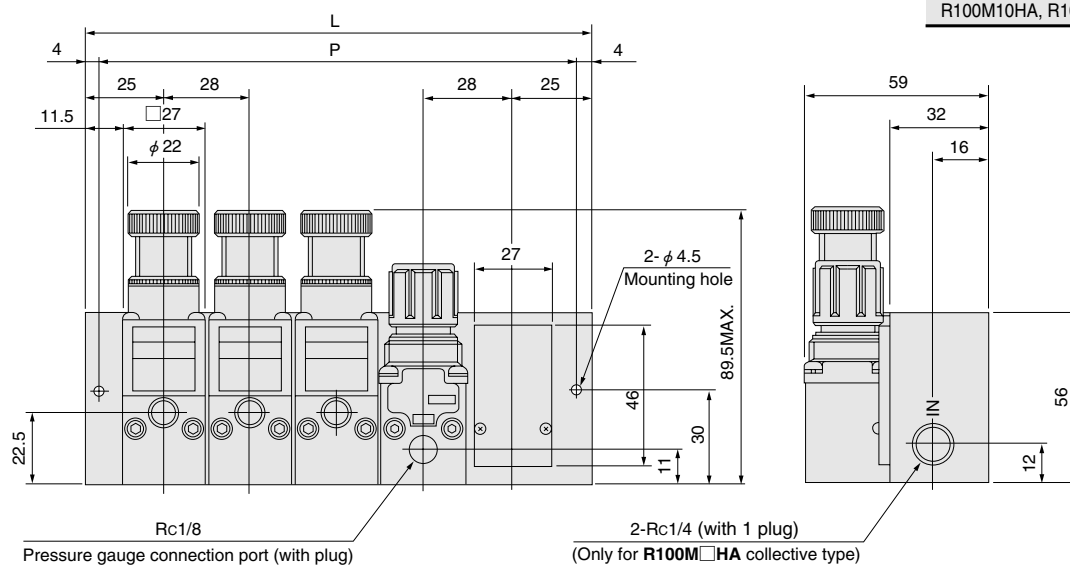


● R100M□HA  
 ● R100M□HB

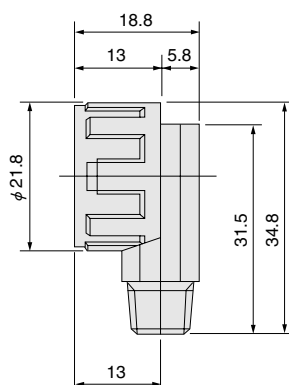
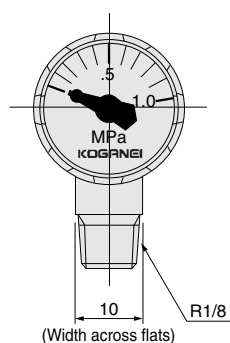


### Unit dimensions

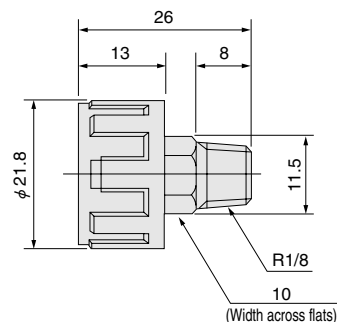
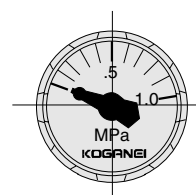
| Model                | P   | L   |
|----------------------|-----|-----|
| R100M1HA, R100M1HB   | 42  | 50  |
| R100M2HA, R100M2HB   | 70  | 78  |
| R100M3HA, R100M3HB   | 98  | 106 |
| R100M4HA, R100M4HB   | 126 | 134 |
| R100M5HA, R100M5HB   | 154 | 162 |
| R100M6HA, R100M6HB   | 182 | 190 |
| R100M7HA, R100M7HB   | 210 | 218 |
| R100M8HA, R100M8HB   | 238 | 246 |
| R100M9HA, R100M9HB   | 266 | 274 |
| R100M10HA, R100M10HB | 294 | 302 |



### ● Pressure gauge G1-20A



### G1-20D



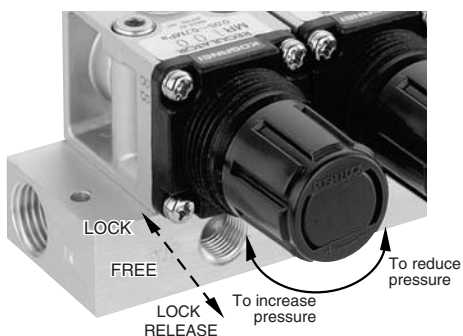
Remark: The compact pressure gauge uses a spiral Bourdon tube. A number of scale plates are provided to compensate for the precision of the spiral Bourdon tube. Comparison of two or more scale plates creates a scale angle difference from 0° to 45°.

## Handling Instructions and Precautions

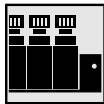


### Pressure regulating

1. Install a pressure gauge to regulate pressure. In the R050 series, there is a pressure indicator sight glass. Use it to measure as a guide.
2. To regulate the pressure in the MR100 and MR102, pull out the knob firmly. Turning it to the right (clockwise) to increase the pressure, and to the left (counterclockwise) to reduce the pressure. After regulating pressure, push the knob back into the body and lock it in place.



**Caution:** The high-relief type HR100 has a relief starting pressure of about 0.03MPa [4psi.], this prevents use for high-precision control.



### Manifold

#### Piping

1. Always thoroughly blow off (use compressed air) the piping before connecting it to the valve. Entering chips, sealing tape, rust, etc., generated during piping work could result in air leaks or other defective operation.
2. When using the P port collective type, use P port piping of sufficiently large size, and supply air from the P ports on both sides as much as possible.
3. The high-relief type cannot use the R (relief) port under choked conditions. Also, if installing piping or a muffler, keep the exhaust resistance as low as possible. For the R (relief) port piping, use a tube of at least  $\phi 6 \times 4$  (when collective exhaust for two or more units, then  $\phi 10 \times 8$  or larger). Use a tube as short as possible. Avoid using a tube of length 2m [6.6ft.] or more.

**Caution:** When mounting the pressure gauge, use a wrench to tighten the hexagonal portion of the piping connection port, and avoid applying any force to the gauge.

#### Block-off plate

Use a block-off plate  
(Order Code: **R050M□-BP**, **R100M□-BP**) to block the stations that are not being used.



### General precautions

#### Media

1. Use air for the media. For the use of any other media, consult us.
2. Use clean air that does not contain deteriorated compressor oil or other contaminants. Install an air filter (with filtration of a minimum  $40\mu\text{m}$ ) close to the valve to eliminate any airline collected liquid or dust. Moreover, clean the air filter at regular intervals.

#### Lubrication

While the system can be used without lubrication, if lubricating the actuators etc. is required, use Turbine Oil Class 1 (ISO VG32) or equivalent.  
Avoid using spindle oil or machine oil.

#### Atmosphere

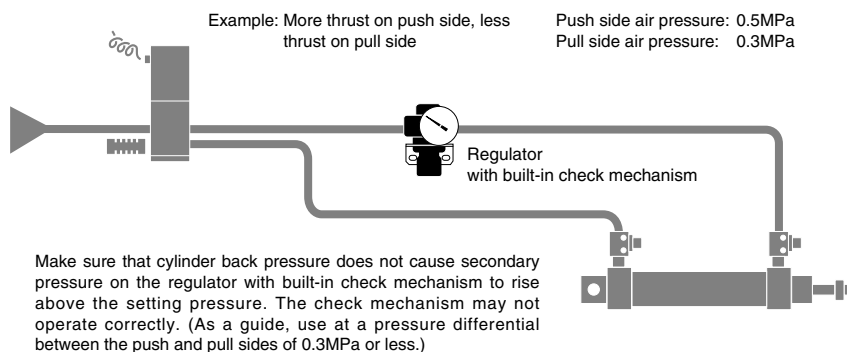
1. The product cannot be used when the media or the ambient atmosphere contains any of the substances listed below.  
Solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, or acids, etc.
2. If using in locations subject to dripping water or oil, etc., or to large amounts of dust, use something to cover and protect the unit.

## System Upgrade Using a Regulator with Built-In Check Mechanism

The regulator with built-in check mechanism is equipped with a built-in check valve that opens when the primary pressure falls off, causing the pressure balance to break and simultaneously opening the main valve to relieve the secondary pressure to the primary side.

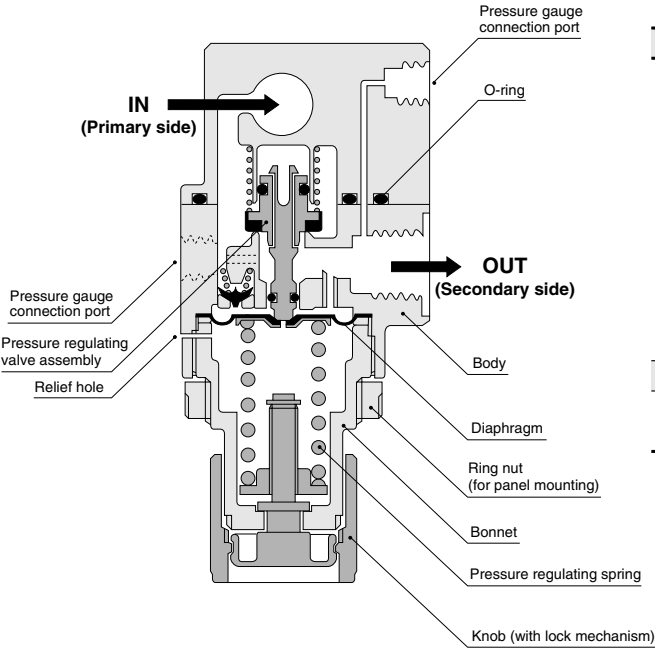
### Changing push side and pull side thrust

The thrust on an air cylinder's push side and pull side can be changed easily. Cylinders can be operated at low pressure on the side where thrust is not required, allowing reduction of air consumption.





# Inner Construction

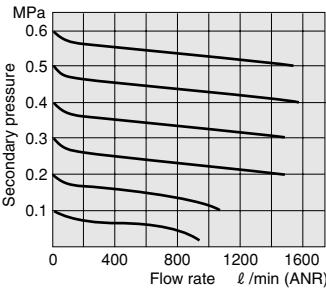


# Mass

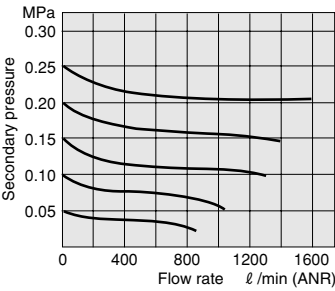
|                           |       | kg [lb]       |             |             |             |
|---------------------------|-------|---------------|-------------|-------------|-------------|
| Item                      | Model | R300M□AT      | R300M□ADT   | R300M□AS    | R300M□ADS   |
| Number of manifold units  | 1     | 0.58 [1.28]   | 0.74 [1.63] | 0.36 [0.79] | 0.52 [1.15] |
|                           | 2     | 0.84 [1.85]   | 1.00 [2.21] | 0.61 [1.35] | 0.77 [1.70] |
|                           | 3     | 1.10 [2.43]   | 1.26 [2.78] | 0.87 [1.92] | 1.03 [2.27] |
|                           | 4     | 1.34 [2.95]   | 1.52 [3.35] | 1.13 [2.49] | 1.29 [2.84] |
|                           | 5     | 1.62 [3.57]   | 1.78 [3.92] | 1.39 [3.06] | 1.55 [3.42] |
|                           | 6     | 1.87 [4.12]   | 2.11 [4.65] | 1.65 [3.64] | 1.89 [4.17] |
|                           | 7     | 2.13 [4.70]   | 2.46 [5.42] | 1.91 [4.21] | 2.23 [4.92] |
|                           | 8     | 2.39 [5.27]   | 2.71 [5.98] | 2.17 [4.78] | 2.49 [5.49] |
|                           | 9     | 2.65 [5.84]   | 2.97 [6.55] | 2.43 [5.36] | 2.75 [6.06] |
|                           | 10    | 2.91 [6.42]   | 3.23 [7.12] | 2.69 [5.93] | 3.01 [6.64] |
| MR30□ (single unit)       |       | 0.20 [0.44]   |             |             |             |
| Pressure gauge (Optional) |       | 0.007 [0.015] |             |             |             |
|                           |       | 0.007 [0.015] |             |             |             |

# Flow Rate Characteristics

## MR302



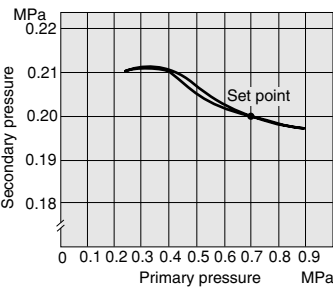
## MR303



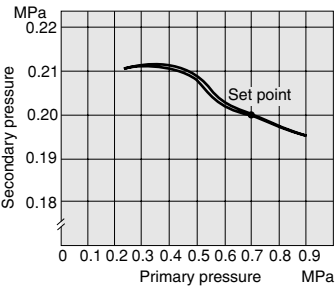
Remark: Graphs show flow rate characteristics when the primary pressure is fixed at 0.7MPa [102psi].  
 1MPa = 145psi. 1 ℓ/min = 0.0353ft<sup>3</sup>/min.

# Pressure Characteristics

## MR302



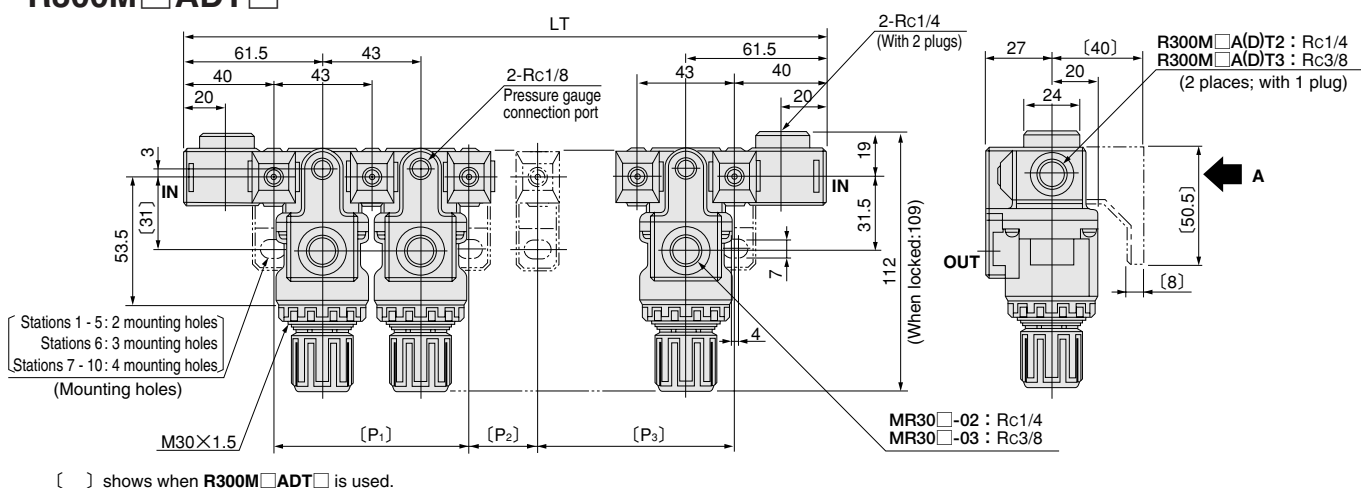
## MR303



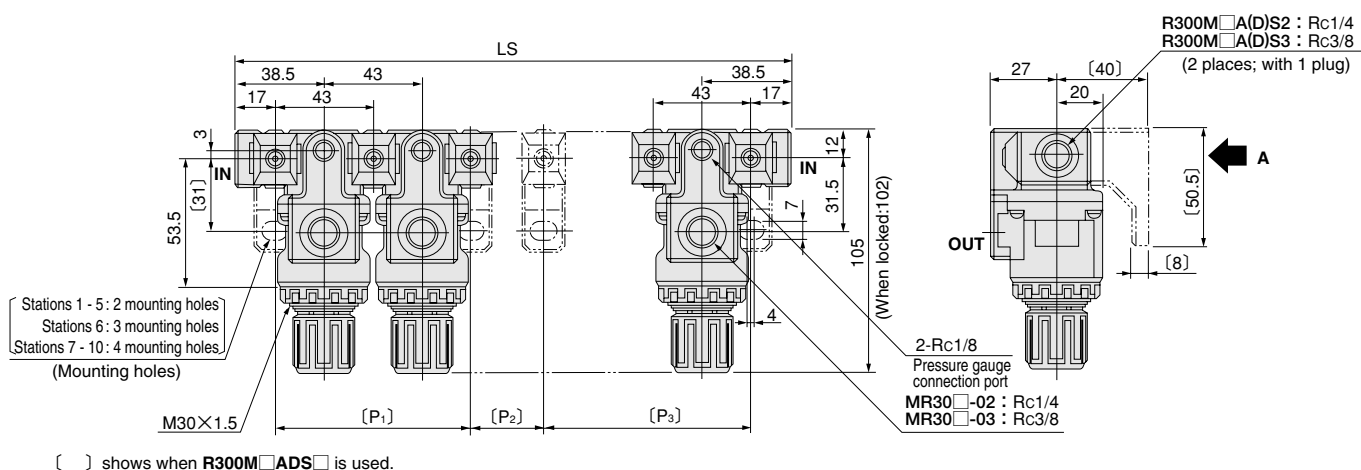
1MPa = 145psi.

## Dimensions of Manifold Regulators (mm)

R300M□AT□  
R300M□ADT□

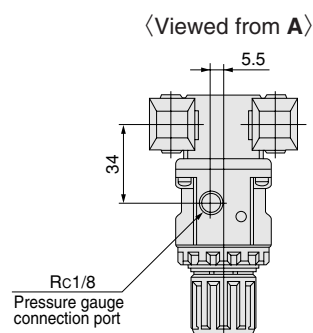


R300M□AS□  
R300M□ADS□



### Unit dimensions

| No. of units | Code | LT  | LS  | P <sub>1</sub> | P <sub>2</sub> | P <sub>3</sub> |
|--------------|------|-----|-----|----------------|----------------|----------------|
| 1            |      | 123 | 77  | —              | —              | —              |
| 2            |      | 166 | 120 | —              | —              | —              |
| 3            |      | 209 | 163 | —              | —              | —              |
| 4            |      | 252 | 206 | —              | —              | —              |
| 5            |      | 295 | 249 | —              | —              | —              |
| 6            |      | 338 | 292 | 129            | —              | 129            |
| 7            |      | 381 | 335 | 86             | 129            | 86             |
| 8            |      | 424 | 378 | 86             | 172            | 86             |
| 9            |      | 467 | 421 | 129            | 129            | 129            |
| 10           |      | 510 | 464 | 129            | 172            | 129            |





### Filter Regulator, Regulator, Precision Regulator, Manifold Regulator, and High-relief Regulator

#### Mounting and piping

##### ● General overview for regulators

In regulator configurations (with the exception of types with built-in check mechanism), the OUT port (secondary) pressure may not be exhausted to the IN port (primary) side even when the IN port pressure is 0MPa. To ensure that exhaust is performed, either use a type with built-in check mechanism, or install a check valve alongside. If a regulator with built-in check mechanism installed after the solenoid valve for cylinder pressure adjustment performed, make sure that cylinder back pressure does not cause secondary pressure on the regulator with built-in check mechanism to rise above the set pressure. The check mechanism may not operate correctly. (As a guide, use at a pressure differential between the push and pull sides of 0.3MPa or less.)

Also, because regulator (with the exception of the High-relief Regulator) relief ports are smaller than the diameter of the piping port, they may not be able to respond to sudden increases in pressure on the OUT port (secondary) side. For situations where pressures can rise sharply due to a force being applied to the cylinder externally, either use a High-relief Regulator or set the relief valve to OUT.

##### ● Precision Regulator

1. If mounting the Precision Regulator as a single unit, use a bracket (optional). A ring nut for panel mounting can also be used.
2. When piping to the Precision Regulator, position the piping so that the air supply side connects to the IN port and the actuator side connects to the OUT port. To prevent the fitting on the OUT port side from interfering with the damper tube, use piping with inner diameter at least 3mm [0.12in.] or more.



- Cautions:**
1. The regulator cannot be used with the IN port and the OUT port in the opposite positions.
  2. When mounting a fitting on the OUT port, be careful to avoid damaging the damper tube. In addition, avoid using a plug or a fitting with too small inner diameter in the OUT port. Bending the damper tube or blocking the hole could damage the precision regulator function, preventing accurate regulating pressure.
  3. Avoid a mounting position that blocks the relief hole. Blocking the relief hole could prevent regulating pressure.

##### ● Manifold Regulator

1. Use sufficiently large IN port piping, and supply via the IN ports at both manifold ends as much as possible. Moreover, when using five or more units on a manifold, mount a T module somewhere in the middle of the units, and supply via the IN ports in at least three different locations.
2. To stabilize secondary pressure, ensure a sufficiently large pressure differential (0.3MPa [44psi.] MIN.) between the IN port pressure and OUT port pressure.

##### ● High-relief Regulator

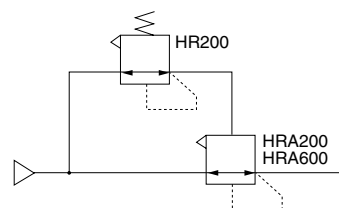
1. The High-relief Regulator's IN port (primary side) is on the top surface of the body, where the arrow ► mark is located.
2. The High-relief Regulator can be mounted as a module with any equipment in the air preparation Multi Series. Module formation and equipment compatibility for HR200 and HRA200 is the same as the 150 series, and for HR600 and HRA600, the same as the 600 series.
3. For single unit mounting, use brackets (order code :-B). A ring nut for panel mounting can also be used.
4. When mounting a pressure gauge, never grab the pressure gauge body for tightening. Always use a wrench on the square section around the connection port to tighten.
5. When mounting a muffler or exhaust filter on the EXH port, use the following table to select the type.

| Model           | Recommended muffler, exhaust filter |
|-----------------|-------------------------------------|
| HR200<br>HRA200 | KM-22, KM-23<br>EF300, EF600, EF800 |
| HR600<br>HRA600 | KM-31<br>EF300, EF600, EF800        |

For details, see p.549 and 552.

6. While any mounting direction is acceptable, mounting with the EXH port pointing straight up could result in noisy operation. In this case, change the pressure setting, increase the exhaust volume, or perform some other preventive measures.
7. If using a mounting ring to mount the regulator, use a mounting torque of 980.7N·cm [86.7in·lbf] or less.

- Cautions:**
1. Avoid operating methods that involve setting a valve on the primary side of the High-relief Regulator and repeatedly switching the primary pressure.
  2. If mounting a muffler, etc., on the EXH port, use a tightening torque for HR200 and HRA200 of 294.2N·cm [26.0in·lbf] or less, and for HR600 and HRA600, 490.3N·cm [43.4in·lbf] or less. When mounting, always use a wrench on the hexagonal section of the exhaust plug. Avoid using steel piping to connect the EXH port.
  3. In the external pilot type, exhausting primary pressure while supplying pilot air could cause damage to the diaphragm. For this reason, exhaust the primary side of the regulator that controls pilot pressure, and the primary side of the external pilot type at the same time.



4. To avoid interfering with the piping volume, select a regulator with a large relief flow rate for the pilot regulator to be used for the external pilot type. In addition, do not allow the pilot air piping length to exceed the values shown in the table below.

| O.D × I. D.mm [in.] | Piping length m [ft.] |
|---------------------|-----------------------|
| 4×2 [0.157×0.079]   | 2 [6.6]               |
| 6×4 [0.236×0.157]   | 20 [65.6]             |
| 8×6 [0.315×0.236]   | 50 [164]              |

### Pressure regulation

**Caution:** Perform the setting while checking the primary pressure and secondary pressure gauge displays. Rotating the knob too far could cause damage to the internal parts. Be particularly careful not to rotate it too far during depressurization, since time is required for relief.

#### ● Filter Regulator, Regulator, Manifold Regulator

Perform pressure regulation by pulling out the knob firmly. Rotating it to the right (clockwise direction) increases the pressure, and rotating to the left (counterclockwise direction) reduces the pressure. After regulating pressure, push the knob back into the body and lock it in place.

**Cautions:** 1. Do not attempt to rotate the knob while in the locked position.  
2. In the FR150 and R150 series, vibration noise can occur when the pressure differential between the primary pressure and setting pressure is large (0.7MPa [102psi.] or more). In this situation, reduce the pressure differential (0.5MPa [73psi.] or less).

#### ● Precision Regulator, High-relief Regulator

Perform regulating pressure by pulling out the knob firmly. Rotating it to the right (clockwise direction) increases the pressure, and rotating to the left (counterclockwise direction) reduces the pressure. After regulating pressure, push the knob back into the body and lock it in place.



**Remark:** When regulating pressure, connect a pressure gauge of a class JIS 1.5 or equivalent to the Precision Regulator's pressure gauge connection port (Rc1/4).

**Cautions:** 1. To maintain accurate pressure adjustment conditions while locked, the Precision Regulator knob includes a free (neutral) state between the lock state and pressure adjustment state. To switch between the regulating pressure and lock states, pull the knob firmly out or push it in until a clicking sound shows that it has firmly arrived in the lock state or pressure adjustment state.  
2. The Precision Regulator is a bleed type, which means that a slight amount of air constantly bleeds out of the bleed hole while the secondary side is undergoing pressure adjustment. This is a normal situation.  
3. The internal pilot type uses a metal contact seal on the pilot regulator portion that causes it to bleed a slight amount of air. This is a normal situation.



### Residual Pressure Exhaust Valve

#### Mounting and piping

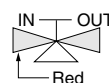
1. When mounting the Residual Pressure Exhaust Valve as a single unit, use either a mounting thread on the R port side or a bracket (optional). If using steel piping, the piping itself can serve as a support.
2. Connect the piping for the Residual Pressure Exhaust Valve so that the P port is on the primary (media) side and the A port is on the mechanical device side. If using as a 2-port valve, use a Rc1/4 plug to block the R port.

**Cautions:** 1. The unit cannot be used with the P port and A port in reversed positions.  
2. If using in locations subject to dripping water, dripping oil, etc., or to large amounts of dust, use something to cover and protect the unit.

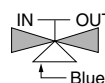
#### Switching valves

To switch between air supply or exhaust, rotate the knob by 90 degrees. Rotation to the left (counterclockwise direction) switches to the air supply state, while rotating to the right (clockwise direction) switches to the exhaust state. As there is no neutral position (where the P port air would return back to A or R), slowly rotating the knob can slowly increase the supply or exhaust volume. To determine the current valve state, check a display window on the side of the knob.

#### Air supply



#### Exhaust



**Caution:** After switching the knob firmly by 90 degrees, always check that it is locked in place.



### General precautions

1. Always thoroughly blow off (use compressed air) the tubing before piping. Entering chips, sealing tape, rust, etc., generated during piping work could result in air leaks or other defective operation.
2. Use clean air for the media. Install an air filter (with filtration of a minimum 5 $\mu$ m). For the use of any other media, consult us.
3. The product cannot be used when the media or the ambient atmosphere contains any of the substances listed below.  
Organic solvents, phosphoric acid ester type hydraulic oil, sulphur dioxide, chlorine gas, acids, or alkali.
4. If using in locations subject to dripping water, dripping oil, etc., or to large amounts of dust, use something to cover and protect the unit.