KOGANEI

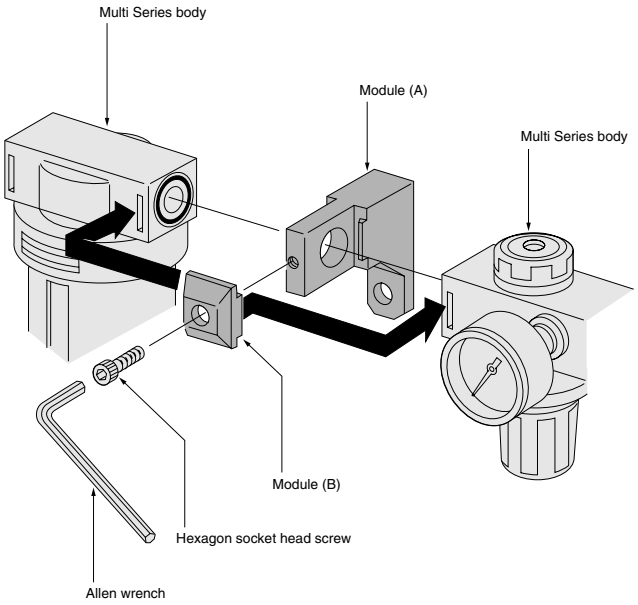
Air Treatment

F.R.L. MULTI SERIES

INSTRUCTION MANUAL Ver.1.0

Module

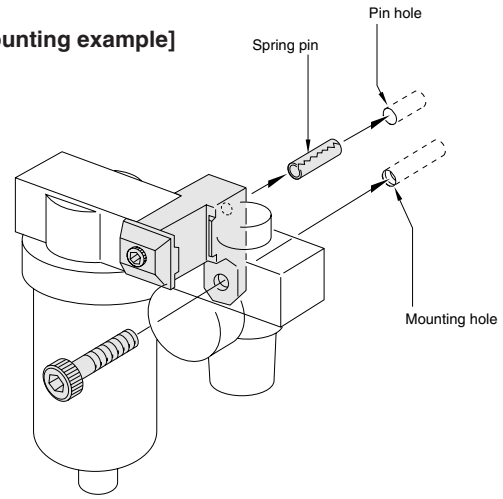
Installation



1. On all Multi Series equipment, the side displaying an arrow ▶mark on the top of the body indicates the IN port (primary side).
2. Align convex section of modules (A) and (B) in the grooves of the Multi Series body, and use a hexagon socket head screw to tighten and secure them in place.

Cautions: 1. For the module types applicable to each Multi Series type, see p.91.
2. The Multi Series modules should not be allowed to sag when mounted. As there is a possibility that they will sag under the weight of connections of steel piping or other heavy piping, always connect module brackets to both ends of the modules before mounting.
3. There is only one mounting hole when mounting a module using one of either 8-15D or 8-30D onto a mechanical device, causing an unstable installation. Use the spring pin supplied to prevent the unit from rotating. The pin hole here is ϕ 4.6 with a depth of 6.
4. Assemble the T module so that the piping port faces upward.

[Mounting example]



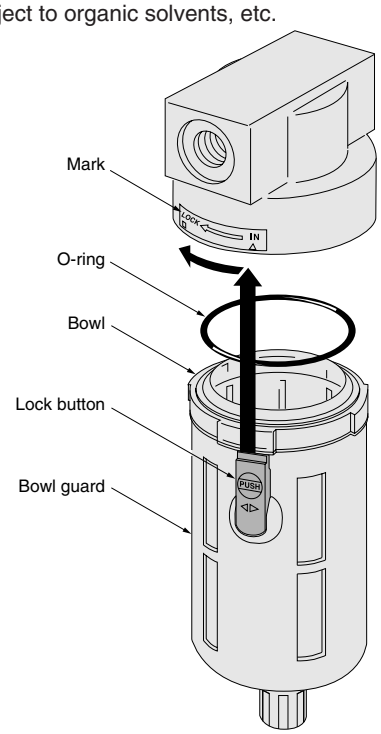
Filter Regulator, Filter, and Lubricator

Mounting and piping

Mount in a vertical position, with the piping connections on the top and the drain port on the bottom.

Bowl

Because the bowl is made of polycarbonate, avoid subjecting it to excessive force or shocks. Also, do not use it in atmospheres subject to organic solvents, etc.



●Removing the bowl

While pushing down on the red lock button, rotate the bowl and bowl guard to the right (the direction opposite to the arrow mark) until it is aligned to the IN mark, then remove the bowl and bowl guard from the body.

●Mounting the bowl

1. Align the bowl and bowl guard to the convex section along their rims, and set the bowl into the bowl guard.
2. Align the lock button to the IN mark, and insert into the body. While pressing the bowl against the body, rotate it to the left (the direction shown by the arrow mark) until it reaches the LOCK position, and secure in place.

Cautions: 1. Always shut off the media before removing or mounting the bowl.
2. Set the O-ring onto the body, and then mount the bowl and bowl guard.
3. The bowl for the 150 series is a screw-in type. For removal or mounting, manually rotate the bowl or bowl guard.
4. Use a neutral detergent to clean the bowl.

Filter

1. Drain the collected liquid from the air filter on a periodic basis.
2. To clean the air filter element, remove the element and blow it off with compressed air, etc.

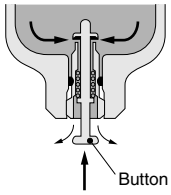
Drain cock

●Push type

150 series

(Air filter Standard
Lubricator Order code: **-D**)

Pressing the button opens the drain port, and the collected liquid is expelled.

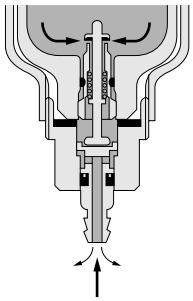


●Push type with fitting

150 series

(Air filter Order code: **-BG-F1**
Lubricator Order code: **-BG-F2**)

Pushing the fitting upward opens the drain port, and the collected liquid is expelled.

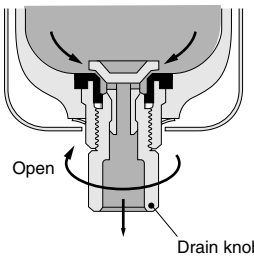


●Screw type

300-600 series

(Air filter Standard
Lubricator Order code: **-D**)

Rotating the drain knob to the left opens the drain port, and the collected liquid is expelled.

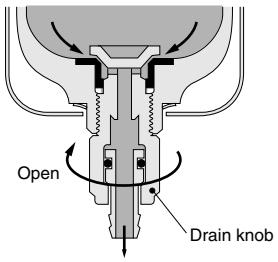


●Screw type with fitting

300-600 series

(Air filter Order code: **-F1**
Lubricator Order code: **-F2**)

Rotating the drain knob to the left opens the drain port, and the collected liquid is expelled.



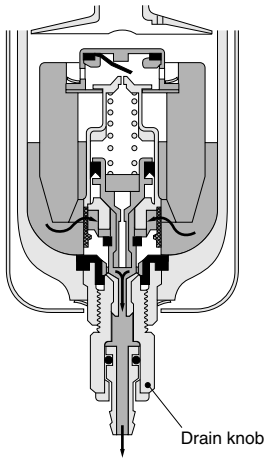
Caution: The drain knob should be operated using the fingertips.

●Auto drain type

300-600 series

(Air filter Order code: **-A**)

When a certain volume of colledted liquid has accumulated, or when the pressure inside the bowl has fallen to less than 0.02MPa [3psi.], the collected liquid is automatically expelled. The collected liquid may also be expelled manually by turning the drain knob to the left.



Cautions: 1. In the auto drain, air is exhausted from the drain port until the supply pressure reaches 0.15MPa [22psi.]. This is normal, and even rotating the drain knob in this situation will not prevent the air from bleeding out.
(If the time required for the supply pressure to rise to 0.15MPa [22psi.] seems too long, consult us.)

2. The drain knob should be operated using the fingertips.

3. If attaching a tube to the fitting, use a nylon tube with inner diameter of 6mm. Do not let the tube bend in the area near the fitting connection.

4. The fitting can be rotated freely in any direction. As a result, the tube does not need to be removed even when manually draining the collected liquid.

Lubrication

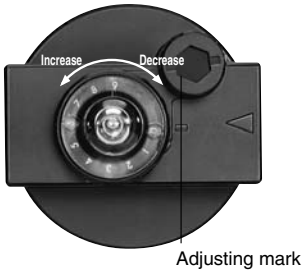
1. Use Turbine Oil Class 1 (ISO VG32) or an equivalent for lubrication. Avoid using spindle oil or machine oil.

2. For lubrication, use an Allen wrench to remove the plug from the lubrication port, and supply oil until the bowl is 80% filled.

Caution: Even though lubrication can be carried while supplying compressed air for the L300 and L600, lubrication cannot be carried while supplying compressed air for the L150.

Oil drip-rate adjustment

Rotating the lubricator dial to the left increases the oil drip-rate. Use the adjustment marks on the body and the numbers on the dial to adjust the oil drip-rate.



Cautions: 1. While the dial can be rotated continuously to the right, the rate of change for the oil dripping volume does not correspond to the numbers on the dial.

2. The numbers on the dial represent rough oil drip-rate, not the number of droplets.

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

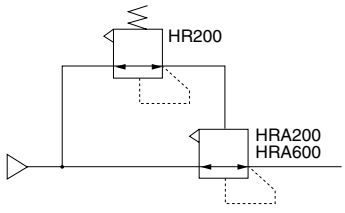
1. The High-relief Regulator's IN port (primary side) is on the top surface of the body, where the arrow ▶ mark is located.
2. The High-relief Regulator can be mounted as a module with any equipment in the air preparation Multi Series. Module formation and equipment compatibility for HR200 and HRA200 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 **HRA200**	**KM-22, KM-23** **EF300, EF600, EF800**
HR600 **HRA600**	**KM-31** **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.

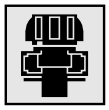
Cautions: 1. Do not attempt to rotate the knob while in the locked position.
2. In the FR150 and R150 series, vibration noise can occur when the pressure differential between the primary pressure and setting pressure is large (0.7MPa [102psi.] or more). In this situation, reduce the pressure differential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

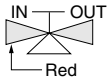
1. When mounting the Residual Pressure Exhaust Valve as a single unit, use either a mounting thread on the R port side or a bracket (optional). If using steel piping, the piping itself can serve as a support.
2. Connect the piping for the Residual Pressure Exhaust Valve so that the P port is on the primary (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.

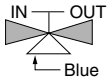
Switching valves

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

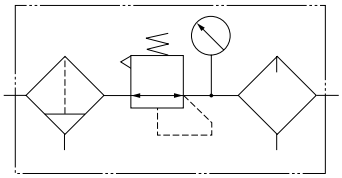
1. Always thoroughly blow off (use compressed air) the tubing before piping. Entering chips, sealing tape, rust, etc., generated during piping work could result in air leaks or other defective operation.
2. Use clean air for the media. Install an air filter (with filtration of a minimum 5μm). For the 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, phosphorate 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.

F.R.L. COMBINATIONS

C150, C200, C300, C400, C600

- An easy-mounting and easy-maintenance modular type.
- Many combinations of body sizes and port sizes.
- Full range of accessories and options with priority on performance.

Symbol



Specifications

Item \ Model		C150	C200	C300	C400	C600
Media		Air				
Port size	Rc	1/8, 1/4	1/4	1/4, 3/8	1/4, 3/8	1/4, 3/8, 1/2
Filtration rating	μm	5				
Pressure setting range	MPa [psi.]	0.05～0.83 [7～120]				
Maximum operating pressure	MPa [psi.]	0.93 [135]				
Proof pressure	MPa [psi.]	1.47 [213]				
Operating temperature range (atmosphere and media)	°C [°F]	5～60 [41～140]				
Air filter drain capacity	cc [in^3]	15 [0.92]	55 [3.36]		90 [5.49]	
Oil capacity for lubricator	cc [in^3]	25 [1.53]	85 [5.19]		160 [9.76]	
Recommended lubrication		Turbine oil Class 1 [ISO VG32] or equivalents.				
Mass (with pressure gauge) kg [lb]	Standard	0.70 [1.54] (0.72 [1.59])Note	1.16 [2.56]	1.20 [2.65]	1.43 [3.15]	1.51 [3.33]
	Auto drain type	—	1.19 [2.62]	1.23 [2.71]	1.46 [3.22]	1.54 [3.40]
Materials	Body	Aluminum die-casting	Aluminum die-casting Zinc die-casting	Zinc die-casting	Aluminum die-casting Zinc die-casting	Aluminum die-casting
	Bowl	Polycarbonate				
Models of components	Air filter	F150	F300	F300	F600	F600
	Regulator	R150	R150	R300	R300	R600
	Lubricator	L150	L300	L300	L600	L600
Standard attachments	Bracket	D module				
	Air filter	Push type drain cock	Screw type drain cock, bowl guard			
	Regulator	Pressure gauge G1-40 (ϕ 40×1MPa [145psi.])				
	Lubricator	—	Bowl guard			

Note: Figure in parentheses ( ) shows mass with bowl guard.

Order Codes

C □ — □ — □ — □ — □ — □ — □

F.R.L. Combination

Body model
150
200
300
400
600

Non-ion specification
Blank — Standard specification
NCU — Non-ion specification

Port size Rc

1/8	1/4	3/8	1/2
01	**02**		
	02		
	02	**03**	
	02	**03**	
	02	**03**	**04**

Bowl guard Note 1
Blank — No bowl guard
BG — With bowl guard

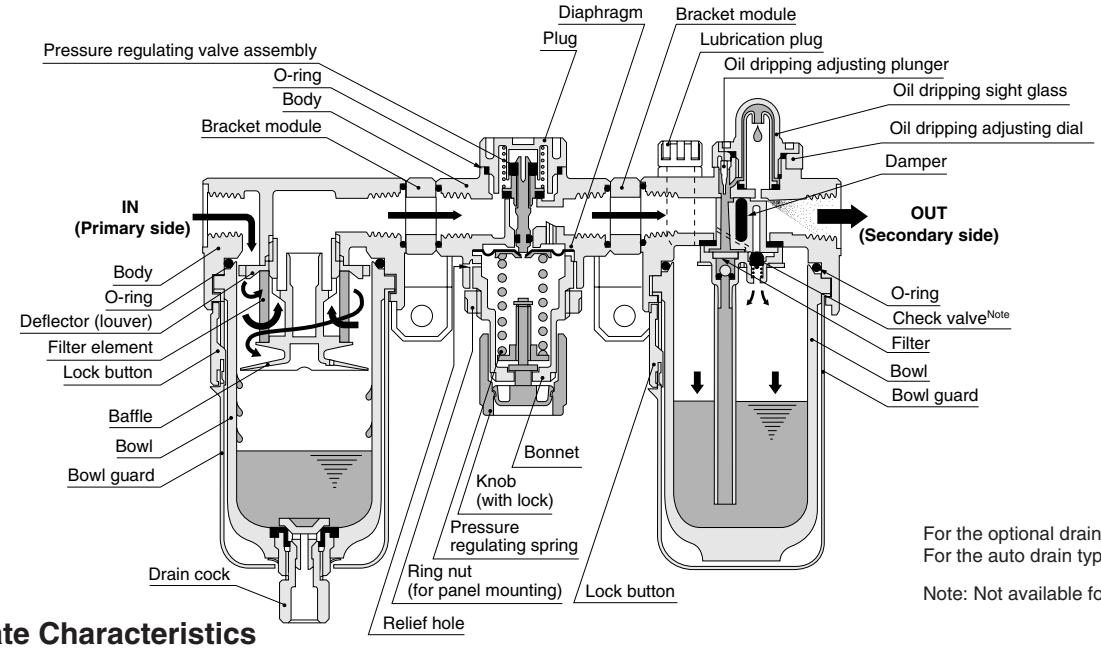
Air filter drain cock specification
Blank — Push or screw type drain cock
F1 — Drain cock with fitting (Standard for auto drain type)Note 2
A — Auto drain type drain cock (Not available for C150)

Pressure gauge specification
Blank — Standard specification 1MPa [145psi.]Note 3
G3 — Low pressure specification 0.3MPa [44psi.]Note 3
E2 — Pressure gauge with electronic switchesNote 3 (1MPa [145psi.])

Lubricator drain cock specification
Blank — No drain cock
D — Push or screw type drain cock
F2 — Drain cock with fittingNote 2

Notes: 1. For **C150** only. Standard for all models other than **C150**.
2. Available only for **C150** with **-BG** (bowl guard).
3. For the specifications and dimensions for the pressure gauge, and pressure gauge with electronic switches, see p.172 and 177～181.

Inner Construction

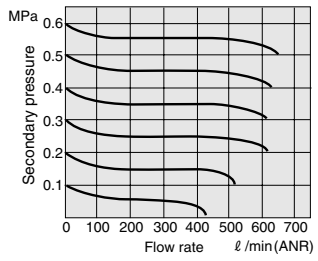


For the optional drain cock, see p.98.
For the auto drain type Note, see p.73.

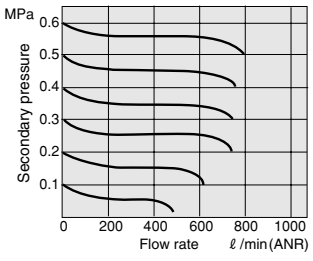
Note: Not available for C150.

Flow Rate Characteristics

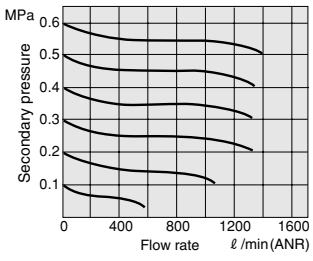
C150



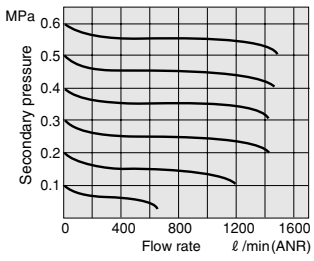
C200



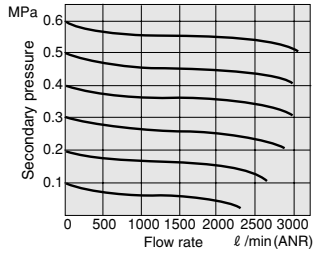
C300



C400



C600

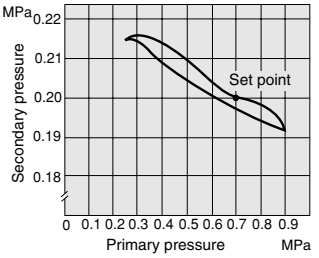


Remark: Graphs show flow rate characteristics when the primary pressure is fixed at 0.7MPa [102psi.].

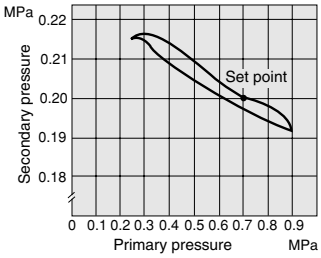
1MPa=145psi. 1ℓ/min=0.0353ft³/min.

Pressure Characteristics

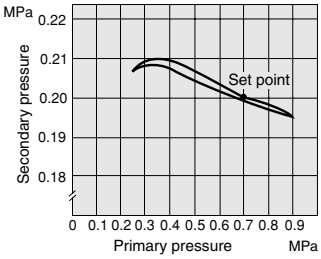
C150



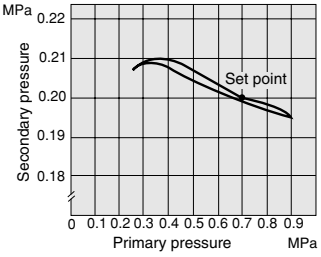
C200



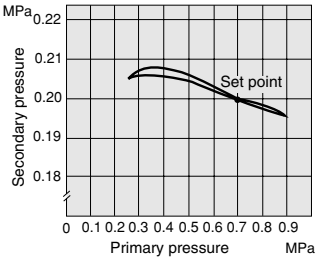
C300



C400



C600

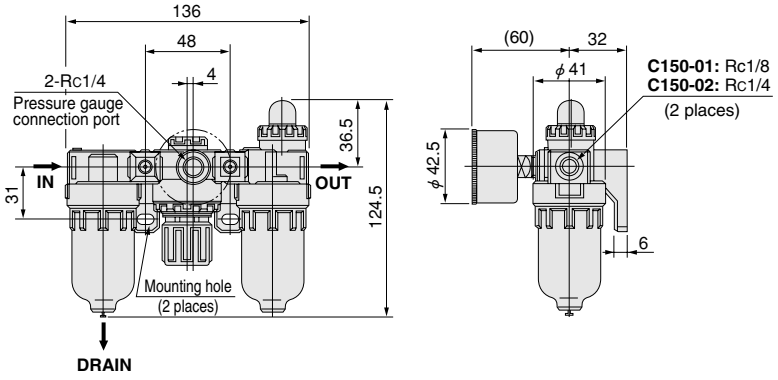


1MPa=145psi. 1ℓ/min=0.0353ft³/min.

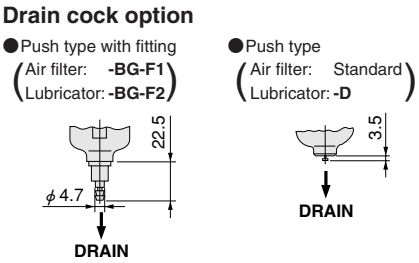
Dimensions of F.R.L. Combinations (mm)

C150

C150

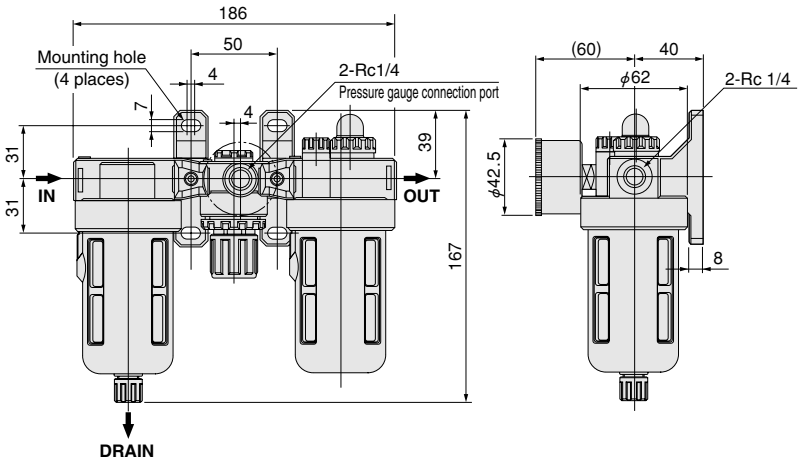


Drain cock option

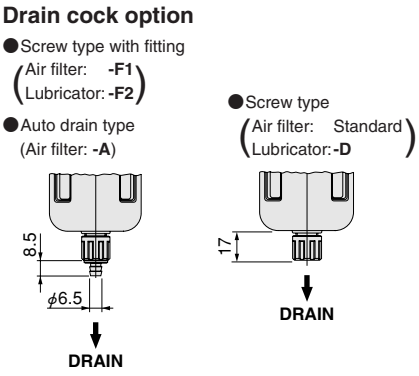


C200

C200

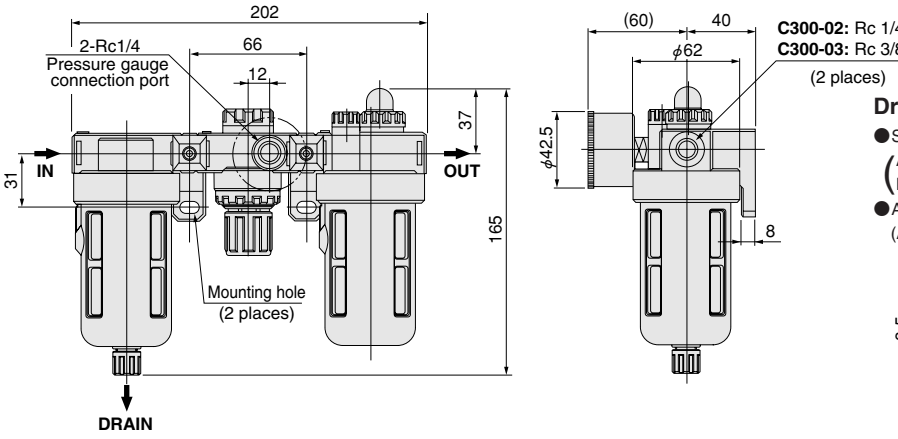


Drain cock option

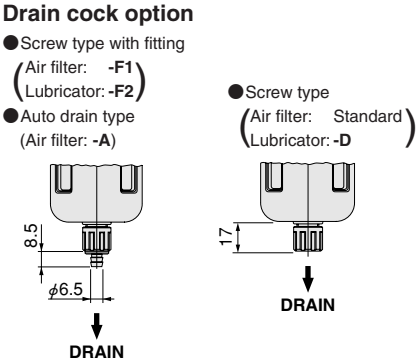


C300

C300

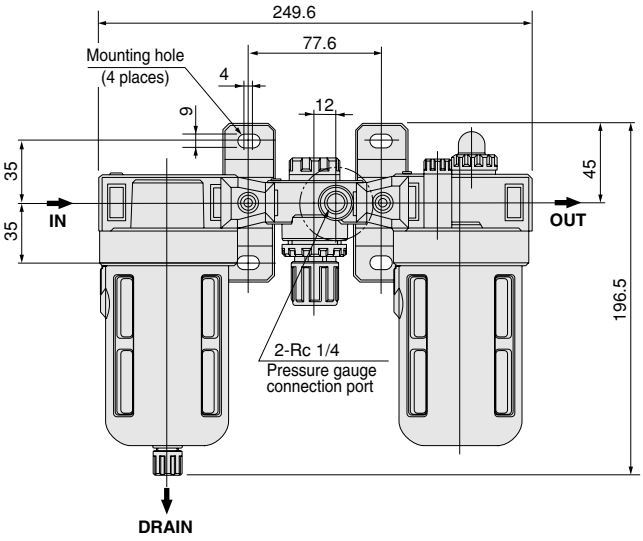


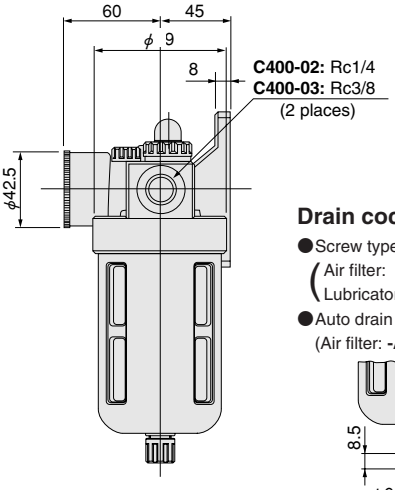
Drain cock option



C400

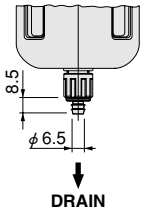
C400



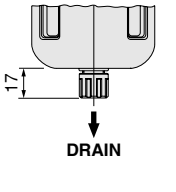


Drain cock option

- Screw type with fitting
  (Air filter: **-F1**, Lubricator: **-F2**)
- Auto drain type
  (Air filter: **-A**)

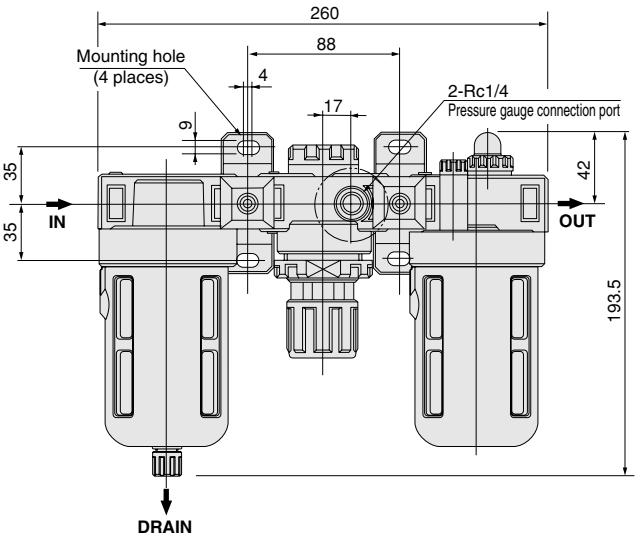


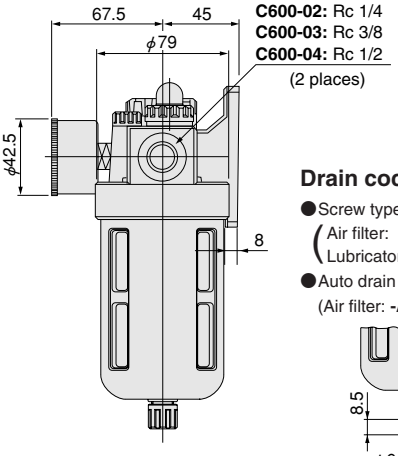
- Screw type
  (Air filter: Standard, Lubricator: **-D**)



C600

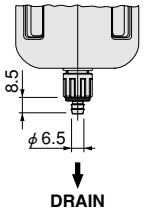
C600



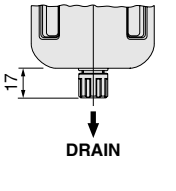


Drain cock option

- Screw type with fitting
  (Air filter: **-F1**, Lubricator: **-F2**)
- Auto drain type
  (Air filter: **-A**)

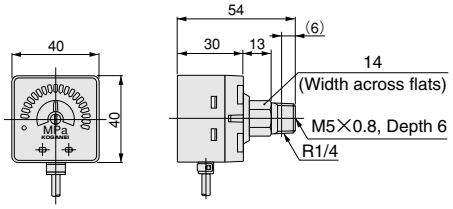


- Screw type
  (Air filter: Standard, Lubricator: **-D**)



Option

- Pressure gauge with electronic switches: **-E2**



FILTER REGULATORS

FR150, FR300, FR600

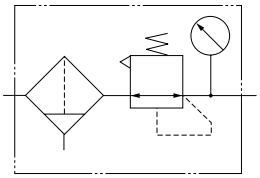
- A 5μm air filter and a small regulator are combined into a compact body.
- Pressure gauge with preset marker is standard equipment.
- Model for low pressure and model with built-in check mechanism also incorporated into the series.
- Drain cock with fitting, and auto drain type drain cock, are optional.

Specifications

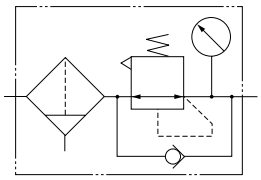
Item \ Model		FR150	FR300	FR600
	Standard type	FR150	FR300	FR600
	Low pressure type	FR151	FR301	FR601
	Built-in check mechanism type	FR152	FR302	FR602
Media		Air		
Port size	Rc	1/8, 1/4	1/4, 3/8	1/4, 3/8, 1/2
Filtration rating	μm	5		
Pressure setting range MPa [psi.]	Standard and built-in check mechanism types	0.05～0.83 [7～120]		
	Low pressure type	0.05～0.25 [7～36]		
Maximum operating pressure MPa [psi.]		0.93 [135]		
Proof pressure MPa [psi.]		1.47 [213]		
Operating temperature range (atmosphere and media) ℃ [°F]		5～60 [41～140]		
Drain capacity cc [in³]		15 [0.92]	55 [3.36]	90 [5.49]
Mass (with pressure gauge) kg [lb]	Standard	0.28 [0.62] (0.29 [0.64]) Note	0.46 [1.01]	0.60 [1.32]
	Auto drain type	—	0.49 [1.08]	0.64 [1.41]
Materials	Body	Aluminum die-casting	Zinc die-casting	Aluminum die-casting
	Bowl	Polycarbonate		
Standard attachments	Standard and built-in check mechanism types	Bracket, push type drain cock	Bracket, screw type drain cock, bowl guard	
		Pressure gauge G1-40 (ϕ 40×1MPa [145psi.])		
	Low pressure type	Bracket, push type drain cock	Bracket, screw type drain cock, bowl guard	
		Pressure gauge G3-40 (ϕ 40×0.3MPa [44psi.])		

Note: Figure in parentheses ( ) shows mass with bowl guard.

Symbols



- Standard type
- Low pressure type



- Built-in check mechanism type

Order Codes

FR □ — □ — □ — □ — □ — □

Non-ion specification
Blank — Standard specification
NCU — Non-ion specification

Body model	Port size Rc 1/8	1/4	3/8	1/2	
150	01	02			Standard type
300		02	03		
600		02	03	04	
151	01	02			Low pressure type
301		02	03		
601		02	03	04	
152	01	02			Built-in check mechanism type
302		02	03		
602		02	03	04	

Filter regulator

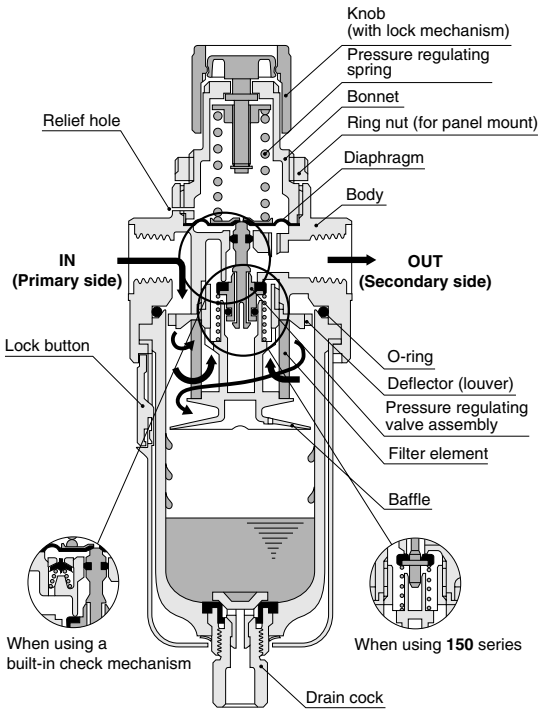
Bowl guard Note 1
Blank — No bowl guard
BG — With bowl guard

Drain cock specification
Blank — Push or screw type drain cock
F1 — Drain cock with fitting Note 2 (Standard for auto drain type)
A — Auto drain type drain cock (Not available for C150)

Pressure gauge specification
Blank — Standard specification Note 3 1MPa [145psi.]
G3 — Low pressure specification Note 3 0.3MPa [44psi.] (Standard for low pressure type)
E2 — Pressure gauge with electronic switch Note 3 (1MPa [145psi.])

Notes: 1. For **FR150** only. Standard for all models other than **FR150**.
2. Available only for **FR150** with **-BG** (bowl guard).
3. For the specifications and dimensions for the pressure gauge, and pressure gauge with electronic switches, see p.172 and 177～181.

Inner Construction

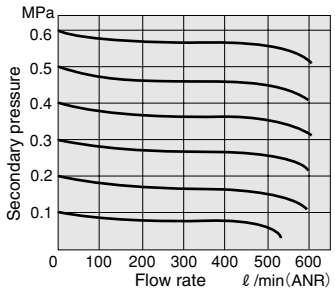


Remarks: For the optional drain cock, see p.98.
For the auto drain type, see p.73.
For the check mechanism function, see p.74.

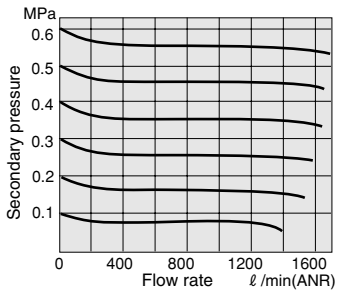
Flow Rate Characteristics

Standard and built-in check mechanism types

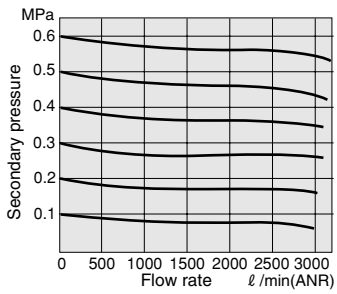
FR150, FR152



FR300, FR302

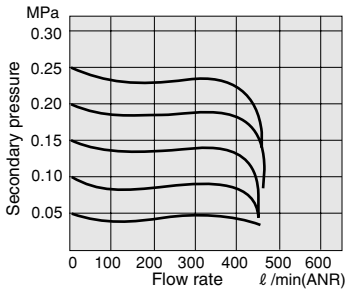


FR600, FR602

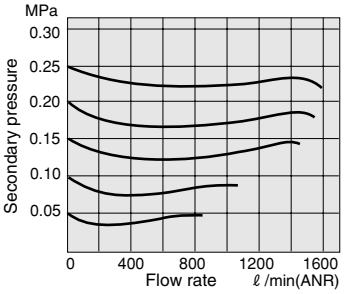


Low pressure type

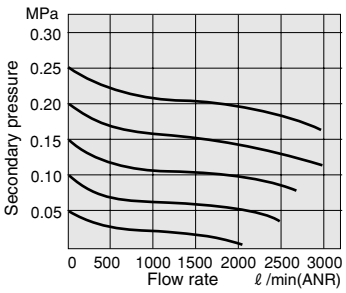
FR151



FR301



FR601



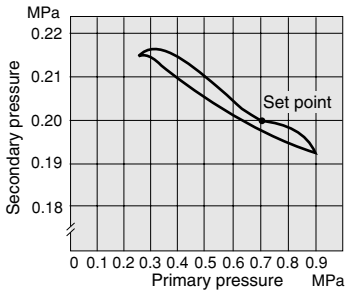
Remark: Graphs show flow rate characteristics when the primary pressure is fixed at 0.7MPa [102psi.].

Pressure Characteristics

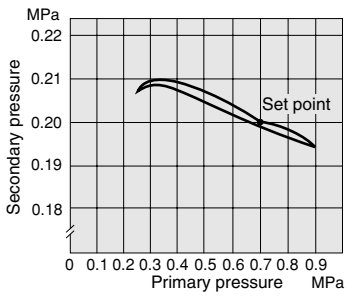
1MPa = 145psi. 1 ℓ/min = 0.0353ft³/min.

Standard and built-in check mechanism types

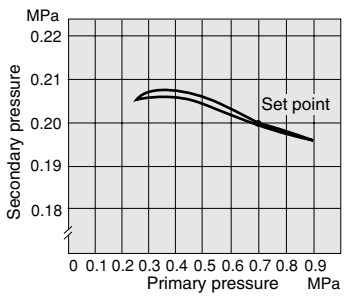
FR150, FR152



FR300, FR302

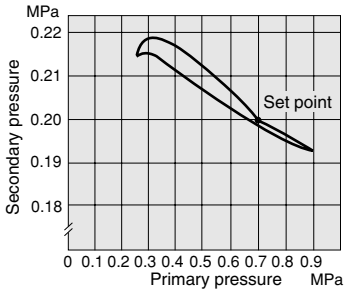


FR600, FR602

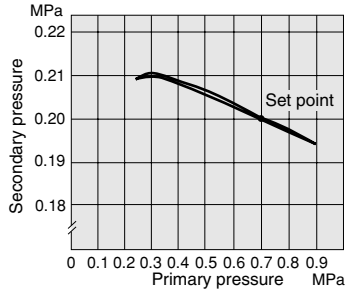


Low pressure type

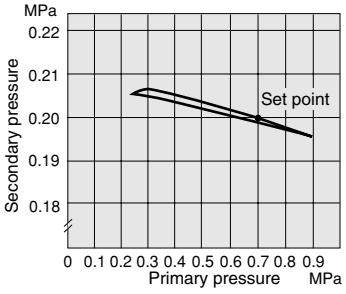
FR151



FR301



FR601

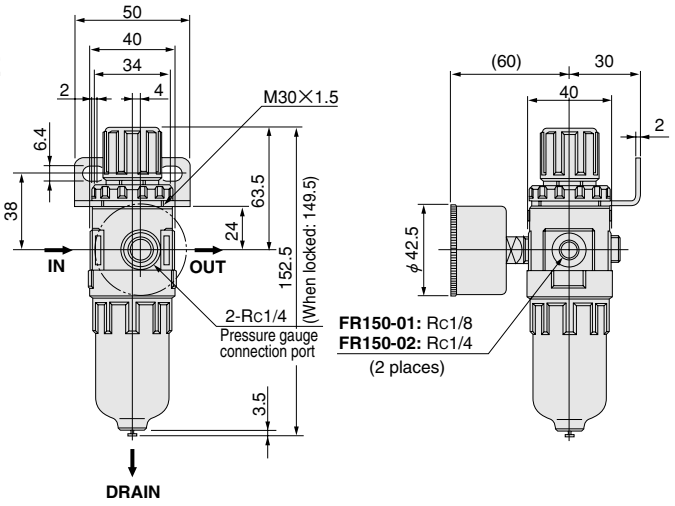


1MPa = 145psi.

Dimensions of Filter Regulators (mm)

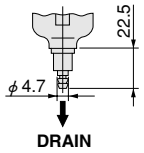
FR150
FR151
FR152

FR150



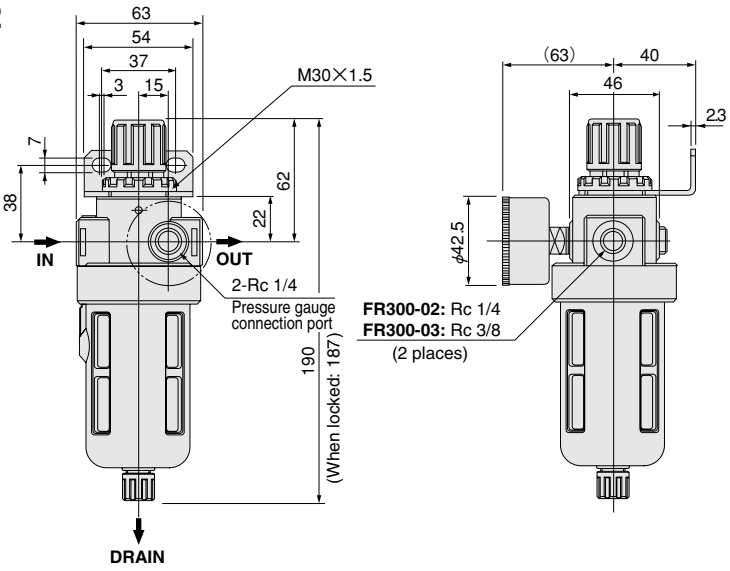
Drain cock option

●Push type with fitting: **-BG-F1**



FR300
FR301
FR302

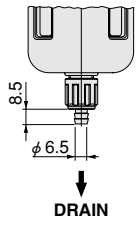
FR300



Drain cock option

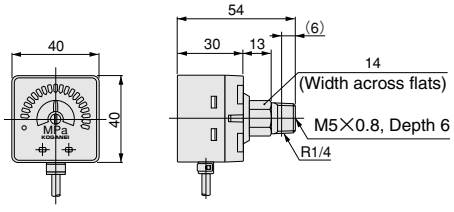
●Screw type with fitting: **-F1**

●Auto drain type: **-A**

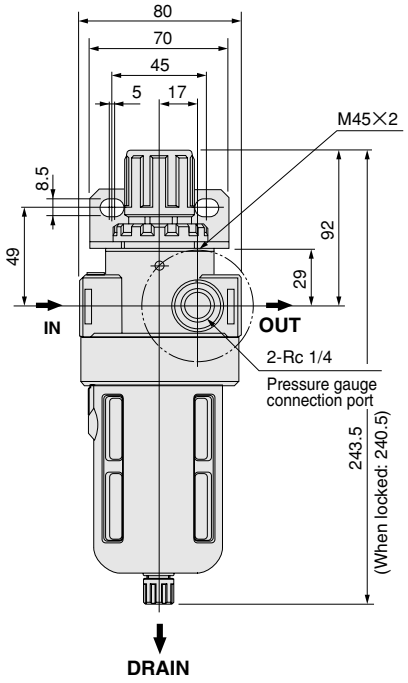


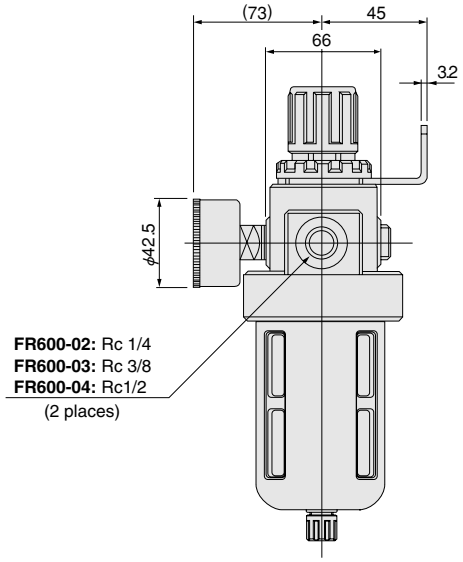
Options

●Pressure gauge with electronic switches: **-E2**



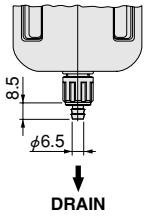
FR600
FR601
FR602





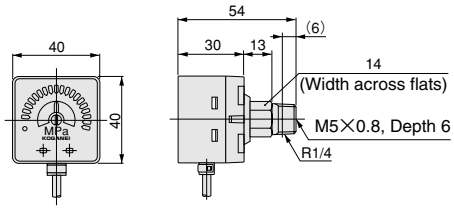
Drain cock option

- Screw type with fitting: **-F1**
- Auto drain type: **-A**



Options

- Pressure gauge with electronic switches: **-E2**



AIR FILTERS

F150, F300, F600

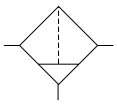
- A 5μm element minimizes pressure loss.
- Easy to attach and remove click-on bowl.
- Drain cock with fitting, and auto drain type drain cock, are optional.

Specifications

Item \ Model		F150	F300	F600
Media		Air		
Port size	Rc	1/8, 1/4	1/4, 3/8	1/4, 3/8, 1/2
Filtration rating	μm	5		
Maximum operating pressure	MPa [psi.]	0.93 [135]		
Proof pressure	MPa [psi.]	1.47 [213]		
Operating temperature range (atmosphere and media)	℃ [°F]	5～60 [41～140]		
Drain capacity	cc [in.^{3}]	15 [0.92]	55 [3.36]	90 [5.49]
Mass kg [lb]	Standard	0.14 [0.31] (0.15 [0.33]) Note	0.33 [0.73]	0.38 [0.84]
	Auto drain type	—	0.36 [0.79]	0.41 [0.90]
Materials	Body	Aluminum die-casting	Zinc die-casting	Aluminum die-casting
	Bowl	Polycarbonate		
Standard attachments		Push type drain cock	Screw type drain cock, bowl guard	

Note: Figure in parentheses ( ) shows mass with bowl guard.

Symbol



Order Codes

F — ☐ — ☐ — ☐ — ☐ — ☐ — ☐

Non-ion specification
Blank — Standard specification
NCU — Non-ion specification

Bowl guard Note 1
Blank — No bowl guard
BG — With bowl guard

Bracket
Blank — No bracket
B — With bracket Note 3

Body model / **Port size Rc**

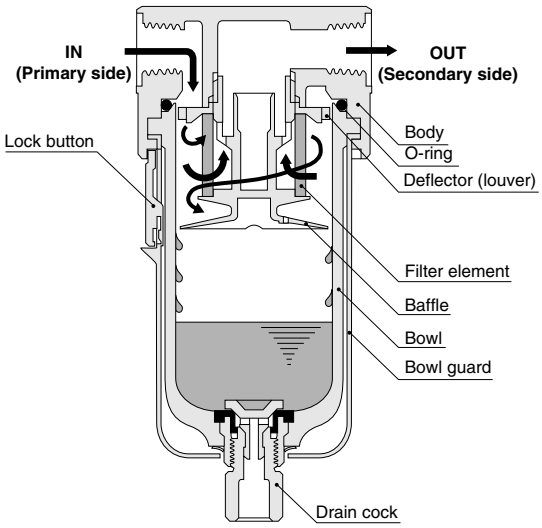
Body model	1/8	1/4	3/8	1/2
150		**01**	**02**	
300			**02**	**03**
600			**02**	**03** **04**

Drain cock specification
Blank — Push or screw type drain cock
F1 — Drain cock with fitting Note 2 (Standard for auto drain type)
A — Auto drain type drain cock (Not available for C150)

Air filter

Notes: 1. For **FR150** only. Standard for all models other than **FR150**.
2. Available only for **FR150** with **-BG** (bowl guard).
3. For the bracket order codes and dimensions, see p.95～96.

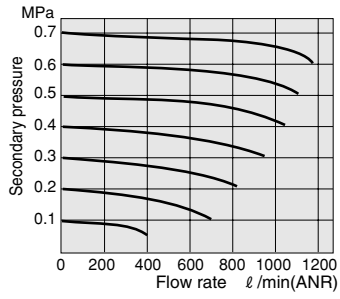
Inner Construction



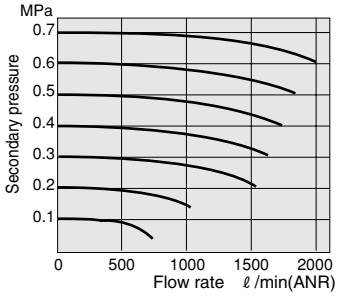
For the optional drain cock, see p.98.
For the auto drain type, see p.73.

Flow Rate Characteristics

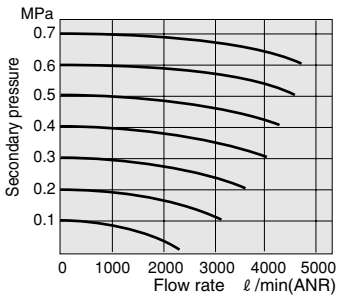
F150



F300



F600

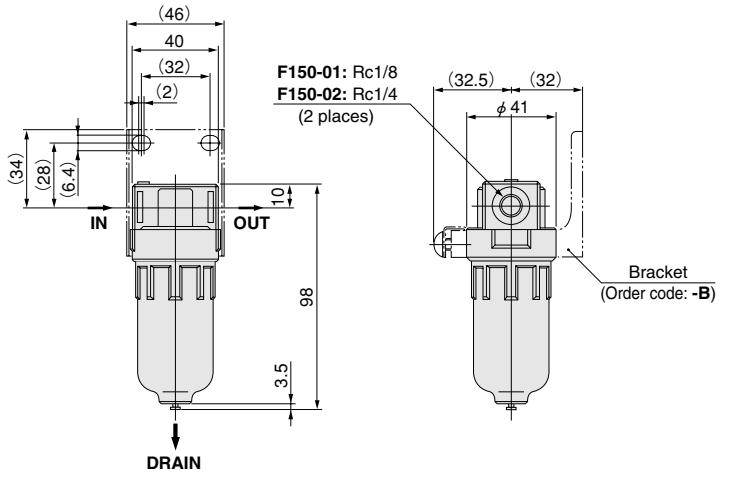


1MPa = 145psi.
1 ℓ/min = 0.0353ft^3/min.

Dimensions of Air Filters (mm)

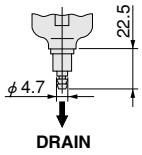
F150

F150



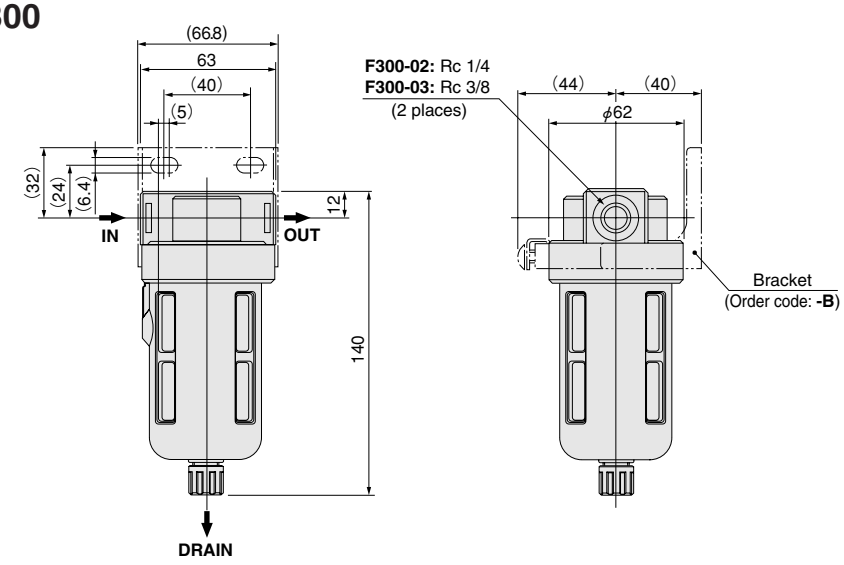
Drain cock option

●Push type with fitting: **-BG-F1**



F300

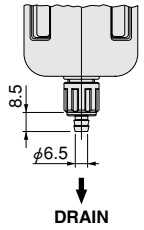
F300



Drain cock option

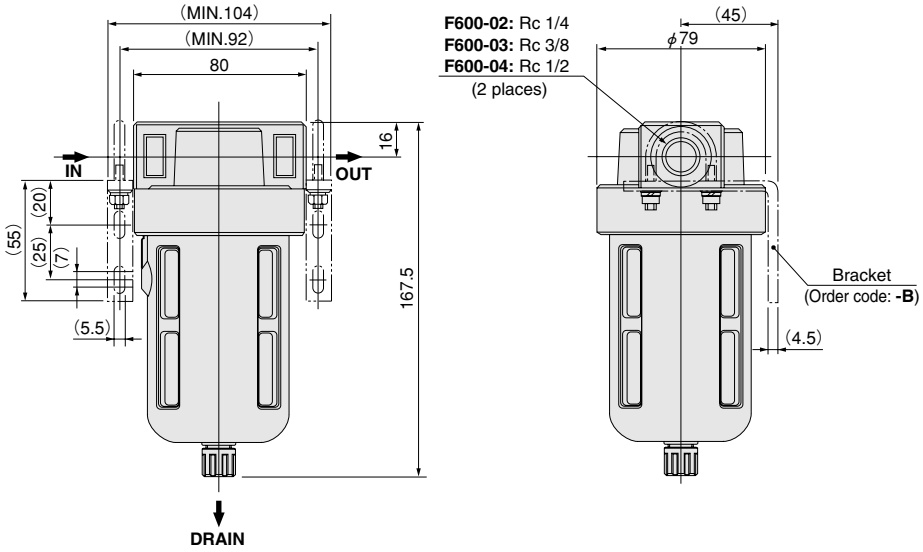
●Screw type with fitting: **-F1**

●Auto drain type: **-A**



F600

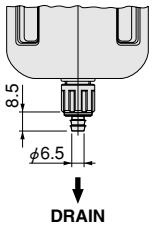
F600



Drain cock option

●Screw type with fitting: **-F1**

●Auto drain type: **-A**

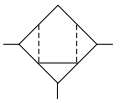


MIST FILTERS

MF300, MF400, MF600

- A 0.3μm element eliminates particles and oil.
- Easy to attach and remove click-on bowl.
- Cartridge type element simplifies maintenance.
- Drain cock with fitting, and auto drain type drain cock, are optional.

Symbol



Specifications

Item \ Model		MF300	MF400[Note 1]	MF600
Media		Air		
Port size	Rc	1/4, 3/8	1/4, 3/8, 1/2	1/4, 3/8, 1/2
Filtering particle diameter	μm	0.3		
Filtering efficiency	%	99.9		
Volume of processed air[Note 2]	ℓ/min [ft³/min] (ANR)	300 [10.6]	750 [26.5]	1500 [53.0]
Maximum operating pressure	MPa [psi.]	0.93 [135]		
Proof pressure	MPa [psi.]	1.47 [213]		
Operating temperature range (atmosphere and media)	˚C [˚F]	5～60 [41～140]		
Drain capacity	cc [in.³]	35 [2.14]	65 [3.97]	90 [5.49]
Mass kg [lb]	Standard	0.41 [0.90]	0.45 [0.99]	0.78 [1.72]
	Auto drain type	0.51 [1.12]	0.79 [1.74]	0.81 [1.79]
Materials	Body	Zinc die-casting	Aluminum die-casting	
	Bowl	Polycarbonate		
	Element type	E-30M	E-40M	E-60M
Standard attachments		Screw type drain cock, bowl guard		

Notes: 1. The MF400 body size is the same as the 600 series.
2. Values are for air pressure of 0.7MPa [102psi.].

Order Codes

MF □ — □ — □ — □ — □

Bracket
Blank — No bracket
B — With bracket[Note2]

Non-ion specification
Blank — Standard specification
NCU — Non-ion specification

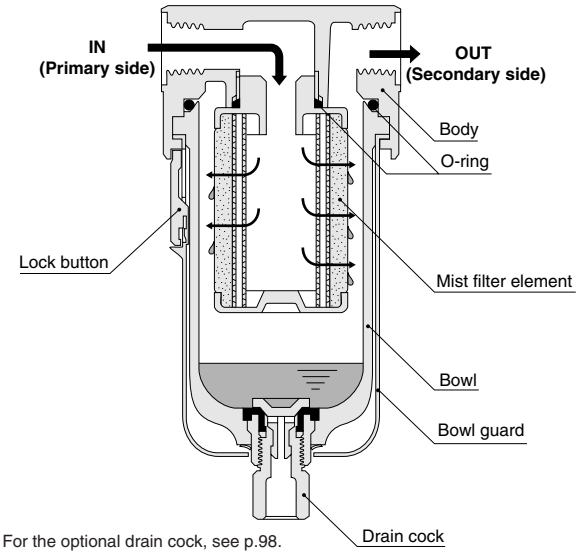
Drain cock specification
Blank — Screw type drain cock
F1 — Drain cock with fitting (Standard for auto drain type)
A — Auto drain type drain cook[Note1]

Body model	Port size Rc 1/4	3/8	1/2
300		02	03
400		02	03 04
600		02	03 04

Mist filter

Notes: 1. The auto drain type drain cock for the **MF300 and MF400** is a manufacturer option.
2. For the bracket order codes and dimensions, see p.95～96.

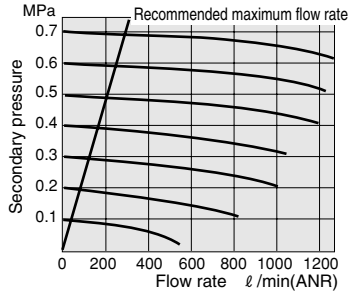
Inner Construction



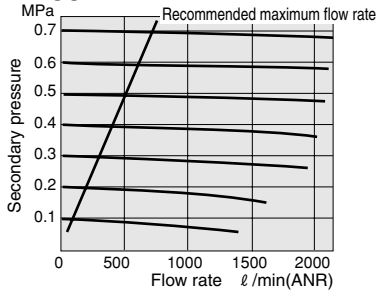
For the optional drain cock, see p.98.
For the auto drain type, see p.73.

Flow Rate Characteristics

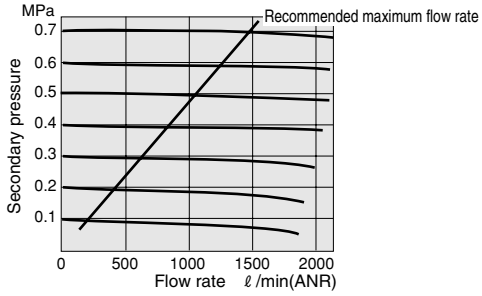
MF300



MF400



MF600

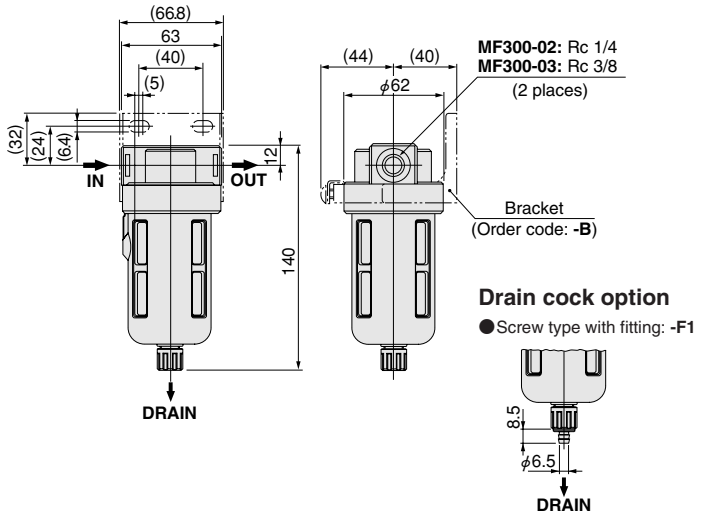


1MPa = 145psi.
1 ℓ/min = 0.0353ft³/min.

Dimensions of Mist Filters (mm)

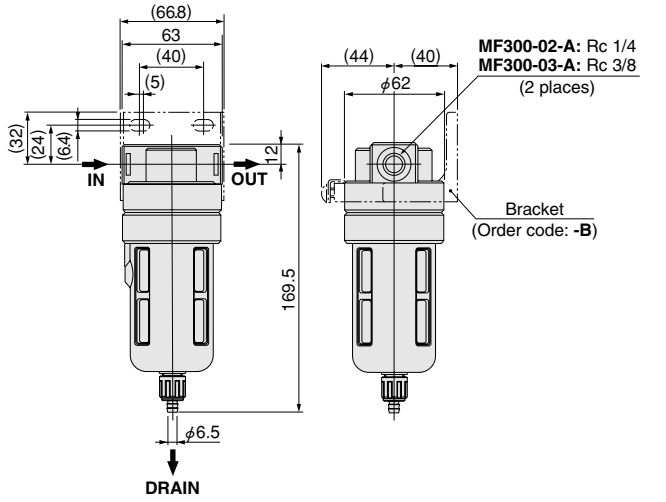
MF300

MF300



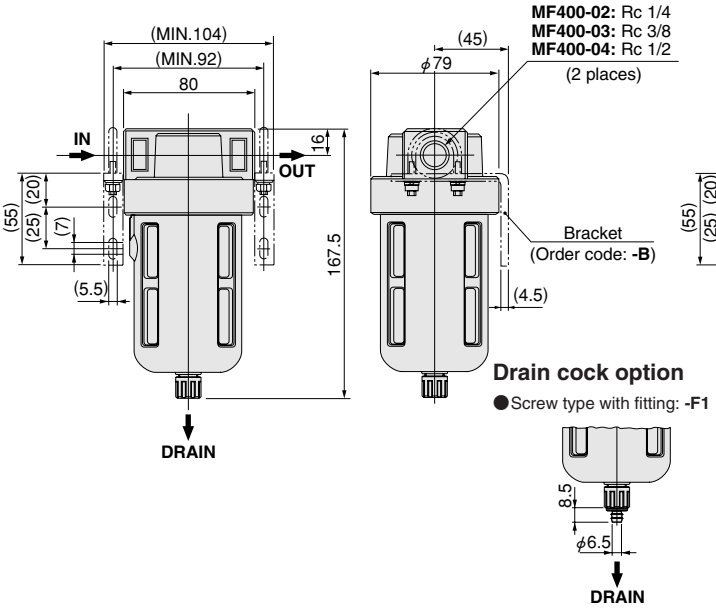
MF300-A

MF300-A



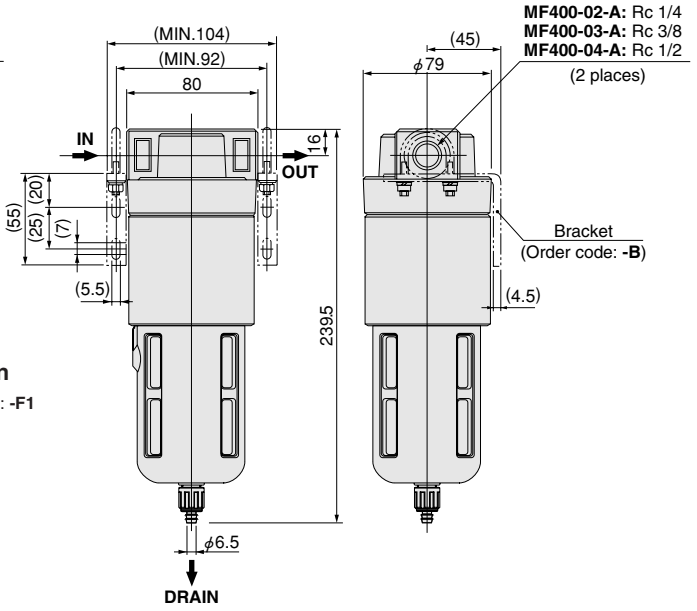
MF400

MF400



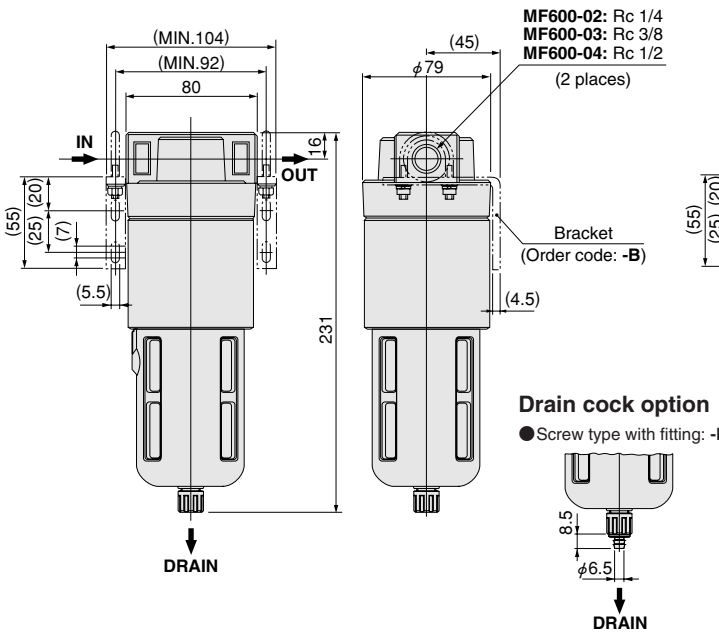
MF400-A

MF400-A



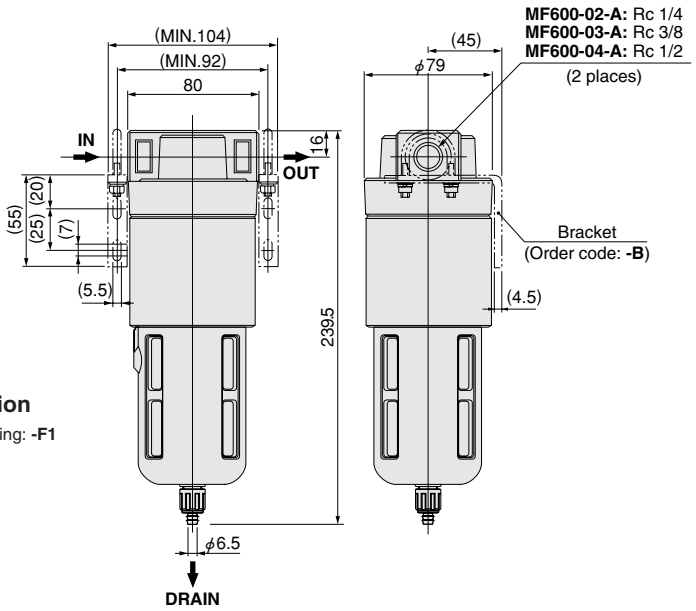
MF600

MF600



MF600-A

MF600



MICRO MIST FILTERS

MMF150, MMF300, MMF400

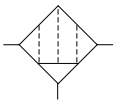
- A 0.01μm element eliminates fine particles and oil, protecting the equipment against breakdowns.
- Easy to attach and remove click-on bowl.
- Cartridge type element simplifies maintenance.
- Drain cock with fitting, and auto drain type drain cock, are optional.

Specifications

Item \ Model		MMF150[Note 1]	MMF300[Note 1]	MMF400[Note 1]
Media		Air		
Port size	Rc	1/4, 3/8	1/4, 3/8, 1/2	1/4, 3/8, 1/2
Filtering particle diameter	μm	0.01		
Filtering efficiency	%	99.9999		
Volume of processed air[Note 2]	ℓ/min [ft³/min] (ANR)	150 [5.3]	300 [10.6]	750 [26.5]
Maximum operating pressure	MPa [psi.]	0.93 [135]		
Proof pressure	MPa [psi.]	1.47 [213]		
Operating temperature range (atmosphere and media)	˚C [˚F]	5～60 [41～140]		
Drain capacity	cc [in.³]	35 [2.14]	65 [3.97]	90 [5.49]
Mass kg [lb]	Standard	0.41 [0.90]	0.45 [0.99]	0.78 [1.72]
	Auto drain type	0.51 [1.12]	0.79 [1.74]	0.81 [1.79]
Materials	Body	Zinc die-casting	Aluminum die-casting	
	Bowl	Polycarbonate		
	Element type	E-15MM	E-30MM	E-40MM
Standard attachments		Screw type drain cock, bowl guard		

Notes: 1. The body size of the MMF150 is the same as the body size of the 300 series, while the body sizes of the MMF300 and the MMF400 are the sames as the 600 series.
2. Values are for air pressure of 0.7MPa [102psi.].

Symbol



Order Codes

MMF □ — □ — □ — □ — □

Non-ion specification
Blank — Standard specification
NCU — Non-ion specification

Bracket
Blank — No bracket
B — With bracket[Note2]

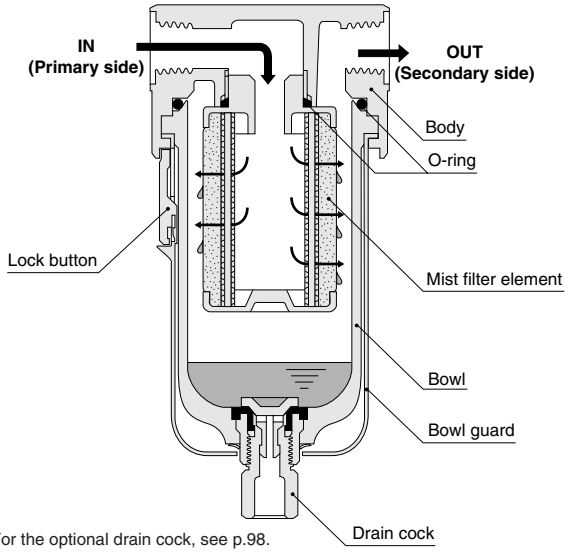
Drain cock specification
Blank — Screw type drain cock
F1 — Drain cock with fitting (Standard for auto drain type)
A — Auto drain type drain cock[Note1]

Body model	Port size Rc 1/4	3/8	1/2
150		02	03
300		02	03 04
400		02	03 04

Micro mist filter

Notes: 1. The auto drain type drain cock for the **MF150** and **MMF300** is a manufacturer option.
2. For the bracket order codes and dimensions, see p.95～96.

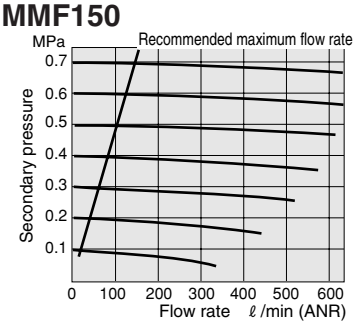
Inner Construction



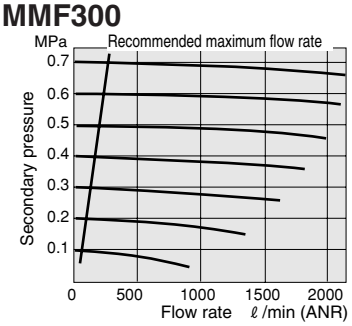
For the optional drain cock, see p.98.
For the auto drain type, see p.73.

Flow Rate Characteristics

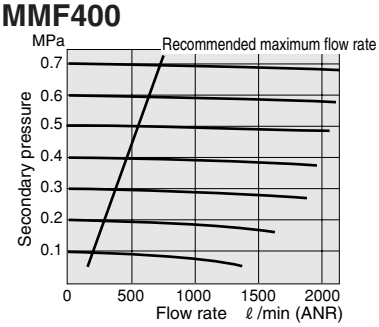
MMF150



MMF300



MMF400

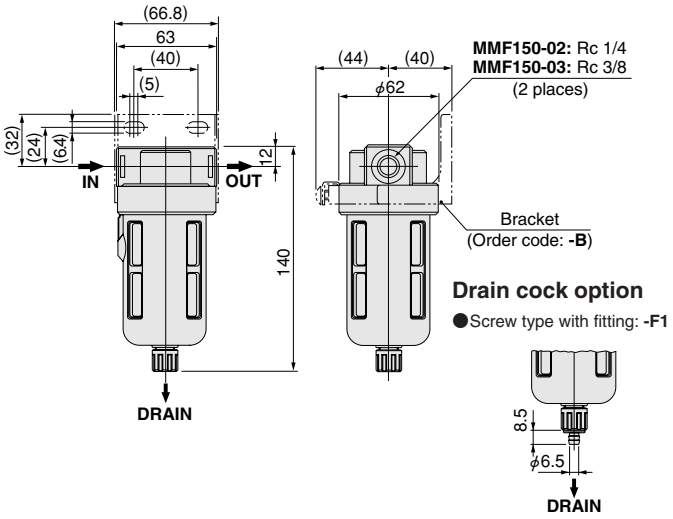


1MPa = 145psi.
1 ℓ/min = 0.0353ft³/min.

Dimensions of Micro Mist Filters (mm)

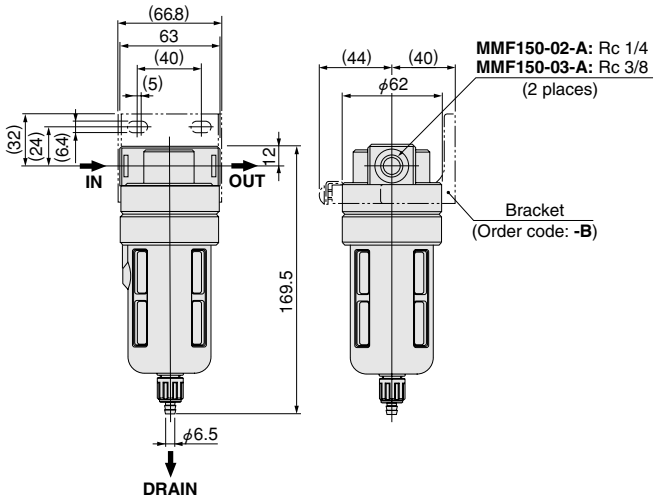
MMF150

MF300



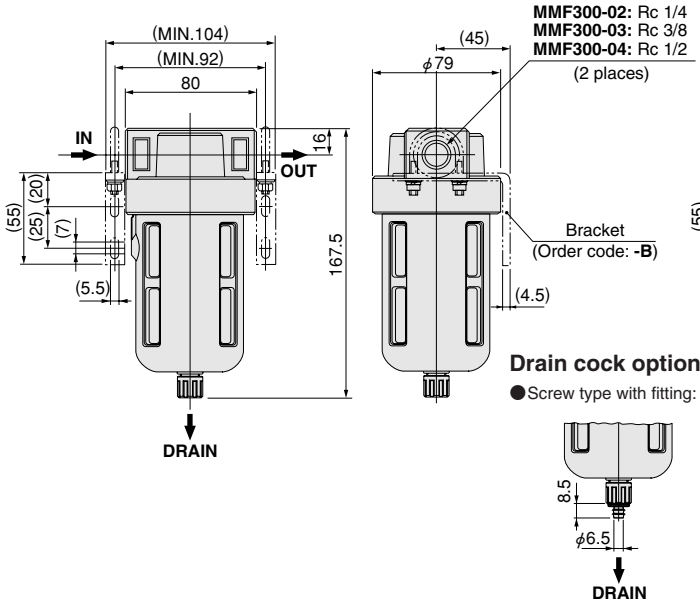
MMF150-A

MF300-A



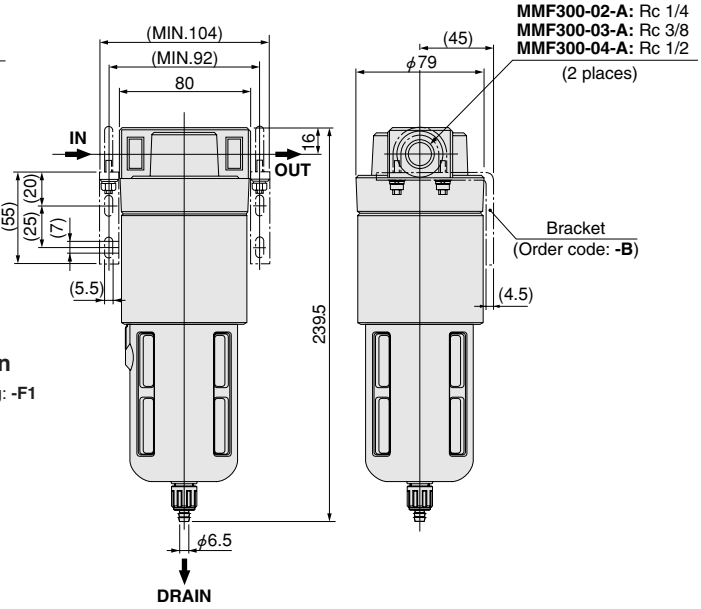
MMF300

MF400



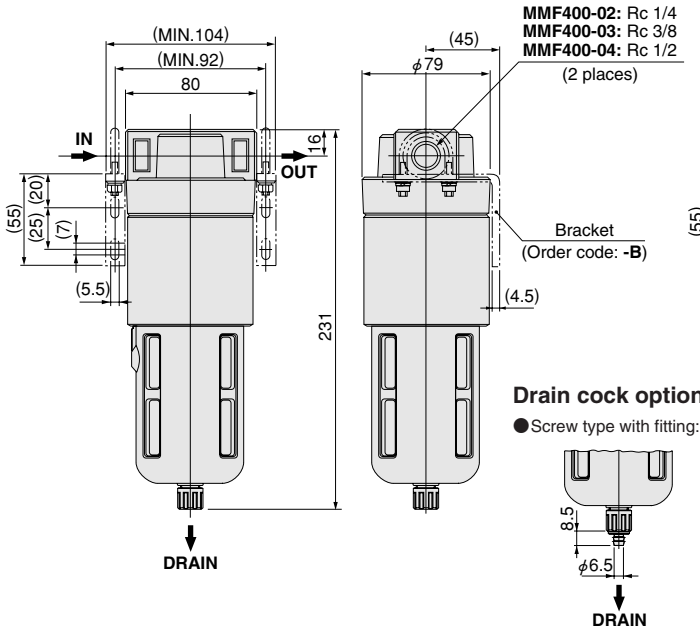
MMF300-A

MF400-A



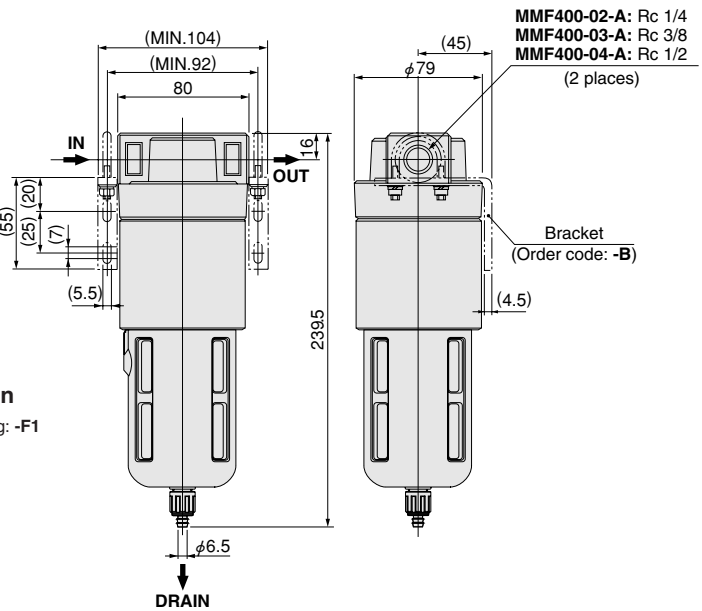
MMF400

MF600



MMF400-A

MF600



AUTO DRAINS

AD300, AD600

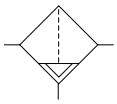
- Automatically drains any liquid collected inside the bowl.
- Automatically drains any liquid when pressure is lost inside the bowl.
- The drain cock is equipped with a fitting to prevent dirtying of surrounding equipment.
- Collected liquid can also be discharged manually.

Specifications

Device type		Auto drain type	Remark
F.R.L. Combinations	C150	—	Auto drain not available
	C200	**AD300**	Dealer option
	C300		
	C400	**AD600**	
	C600		
Filter regulators	FR150	—	Auto drain not available
	FR300	**AD300**	Dealer option
	FR600	**AD600**	
Air filters	F150	—	Auto drain not available
	F300	**AD300**	Dealer option
	F600	**AD600**	
Mist filters	MF300	**AD300**	Manufacturer option[Note]
	MF400	**AD600**	
	MF600		Dealer option
Micro mist filters	MMF150	**AD300**	Manufacturer option[Note]
	MMF300	**AD600**	
	MMF400		Dealer option
Drain filters	DF300	**AD300**	Manufacturer option[Note]
	DF600	**AD600**	
	DF900		Dealer option

Note: Models without auto drain have different body shapes. For this reason, they cannot be converted to auto drain type even if the bowl assembly is replaced.

Symbol



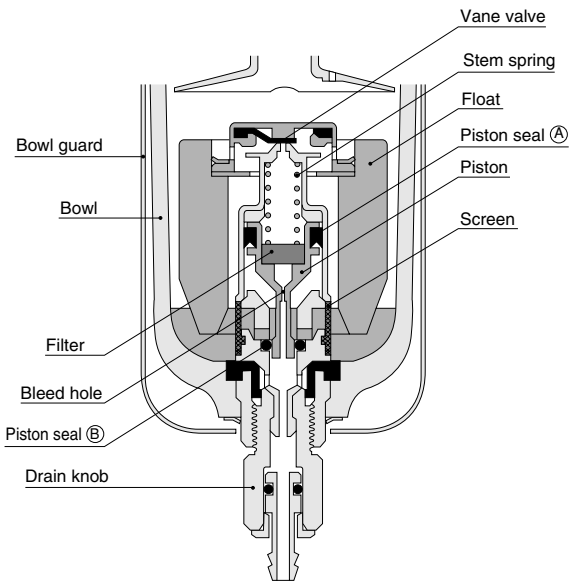
Order Codes

AD □

Body size
300 —— For 300 series
600 —— For 600 series

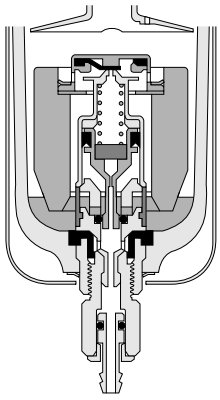
Auto drain type drain cock assembly
(with bowl and bowl guard)

Inner Construction

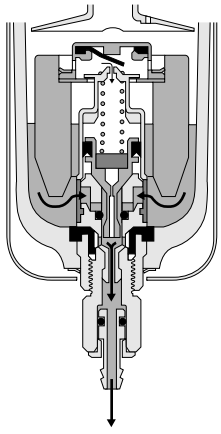


Remark: Air is released from the drain port until the supply pressure rises to 0.15MPa [22psi.]. In this situation, even rotating the drain knob will not prevent the air from bleeding out.

Condition of collected liquid



Condition of draining liquid



Operation principles

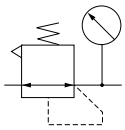
When liquid collects inside the bowl, the float rises and opens up the vane valve. Air brought to the top of the piston forces the piston downward, opening up the bottom of the piston and expelling liquid that has passed through the screen. As the liquid is drained out, the float falls, closing the vane valve. Air at the top of the piston is released through a bleed hole, and air pushes up on the piston from the bottom, returning the unit to the normal state.
If pressure inside the bowl is lost, the stem spring pushes down on the piston to drain out all of the liquid. After the liquid has been drained out, the air inside the bowl is also released.

REGULATORS

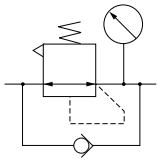
R150, R300, R600

- Compact size achieves stable pressure regulation and large flow rate.
- Push lock type regulator knob for light, smooth pressure regulation.
- Pressure gauge with preset marker is standard equipment.
- Model for low pressure and model with built-in check mechanism also incorporated into the series.

Symbols



●Standard type
●Low pressure type



●Built-in check mechanism type

Specifications

Item \ Model		Standard type	R150	R300	R600
		Low pressure type	R151	R301	R601
		Built-in check mechanism type	R152	R302	R602
Media			Air		
Port size		Rc	1/8, 1/4	1/4, 3/8	1/4, 3/8, 1/2
Pressure setting range MPa [psi.]		Standard and built-in check mechanism types	0.05～0.83 [7～120]		
		Low pressure type	0.05～0.25 [7～36]		
Maximum operating pressure MPa [psi.]			0.93 [135]		
Proof pressure MPa [psi.]			1.47 [213]		
Operating temperature range (atmosphere and media) ℃ [°F]			5～60 [41～140]		
Lubrication			Not required		
Mass (with pressure gauge) kg [lb.]			0.20 [0.44]	0.23 [0.51]	0.32 [0.71]
Materials			Aluminum die-casting	Zinc die-casting	Aluminum die-casting
Standard attachments		Standard and built-in check mechanism types	Bracket and pressure gauge G1-40 (ϕ 40×1MPa [145psi.])		
		Low pressure type	Bracket and pressure gauge G3-40 (ϕ 40×0.3MPa [44psi.])		

Order Codes

R □ — □ — □ — □

Pressure gauge specification
Blank — Standard specification[Note] 1MPa [145psi.]
G3 — Low pressure specification[Note] 0.3MPa [44psi.] (Standard for low pressure type)
E2 — Pressure gauge with electronic switches [Note] (1MPa [145psi.])

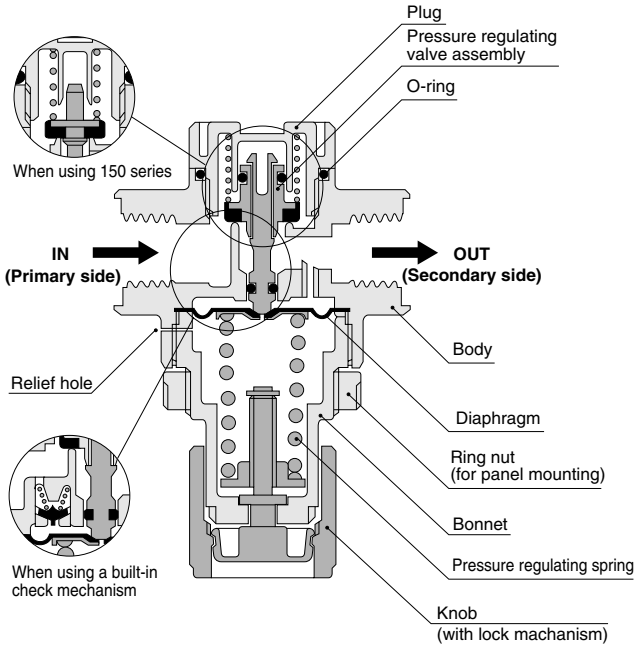
Non-ion specification
Blank — Standard specification
NCU — Non-ion specification

Body model	Port size Rc 1/8	1/4	3/8	1/2	
150		01	02		Standard type
300			02	03	
600			02	03	04
151		01	02		Low pressure type
301			02	03	
601			02	03	04
152		01	02		Built-in check mechanism type
302			02	03	
602			02	03	04

Regulator

Note: For the specifications and dimensions for the pressure gauge, and pressure gauge with electronic switches, see p.172 and 177～181.

Inner Construction



System Upgrade Using a Regulator with Built-in Check Mechanism

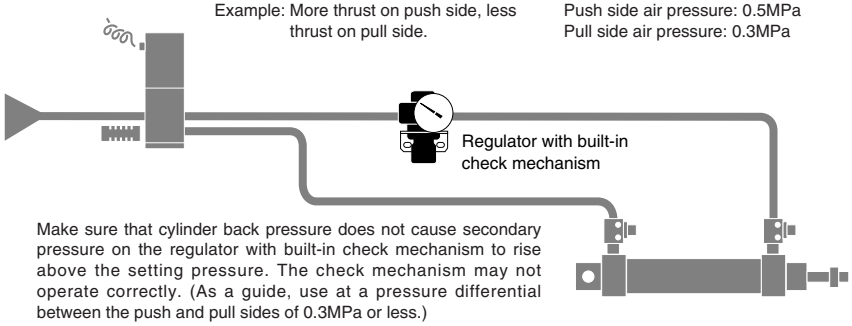
The regulator with built-in check mechanism is equipped with a built-in check valve that opens up when the primary pressure falls off, causing the pressure balance to collapse and simultaneously opening up the main valve to relieve the secondary pressure to the primary side.

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.

Example: More thrust on push side, less thrust on pull side.

Push side air pressure: 0.5MPa
Pull side air pressure: 0.3MPa

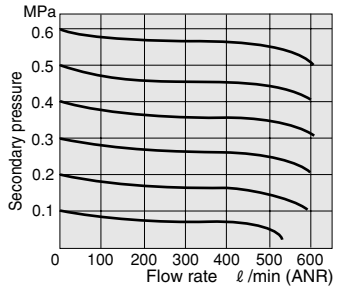


Make sure that cylinder back pressure does not cause secondary pressure on the regulator with built-in check mechanism to rise above the setting pressure. The check mechanism may not operate correctly. (As a guide, use at a pressure differential between the push and pull sides of 0.3MPa or less.)

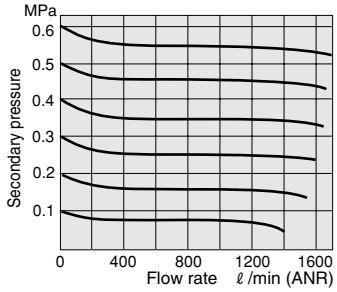
Flow Rate Characteristics

Standard and built-in check mechanism types

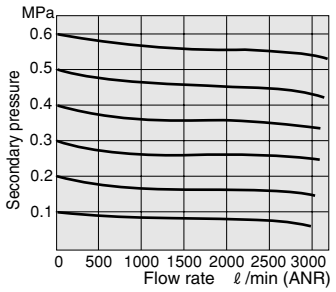
R150, R152



R300, R302

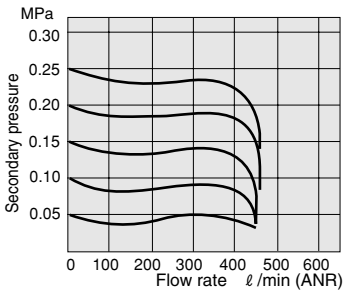


R600, R602

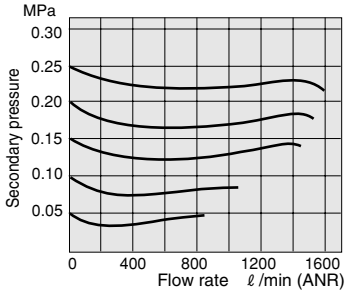


Low pressure type

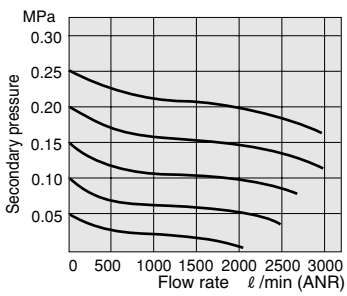
R151



R301



R601



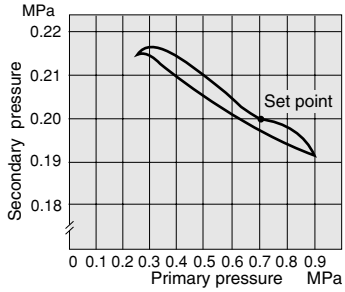
Remark: Graphs show flow rate characteristics when the primary pressure is fixed at 0.7MPa [102psi.].

1MPa = 145psi. 1 ℓ/min = 0.0353ft³/min.

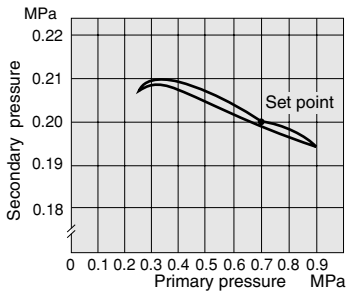
Pressure Characteristics

Standard and built-in check mechanism types

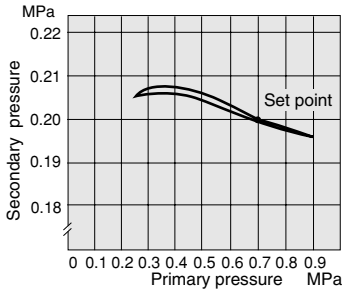
R150, R152



R300, R302

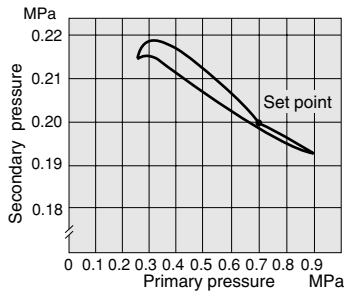


R600, R602

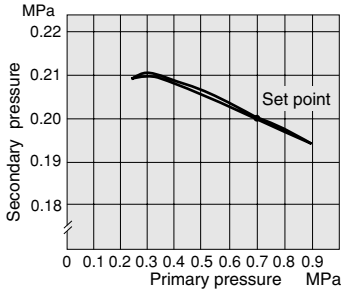


Low pressure type

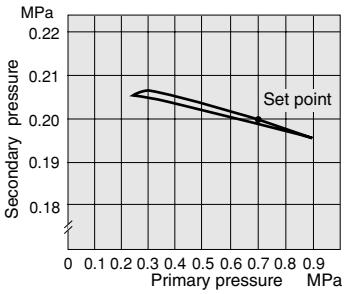
R151



R301



R601

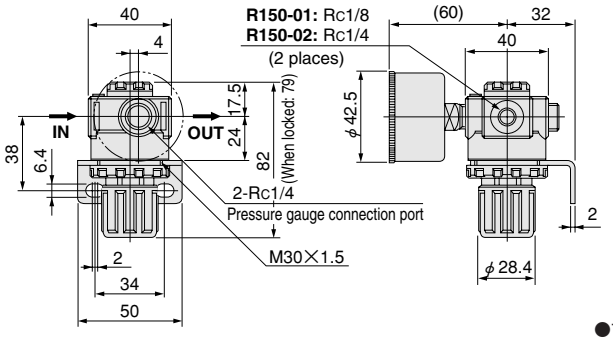


1MPa = 145psi. 1 ℓ/min = 0.0353ft³/min.

Dimensions of Regulators (mm)

R150
R151
R152

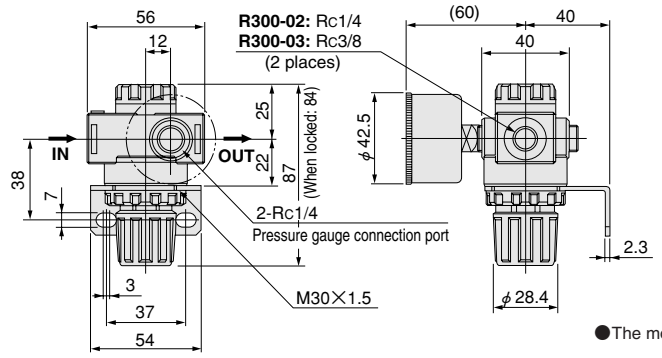
R150



●The mounting hole for mounting the regulator on a panel, etc. is ϕ30.5.

R300
R301
R302

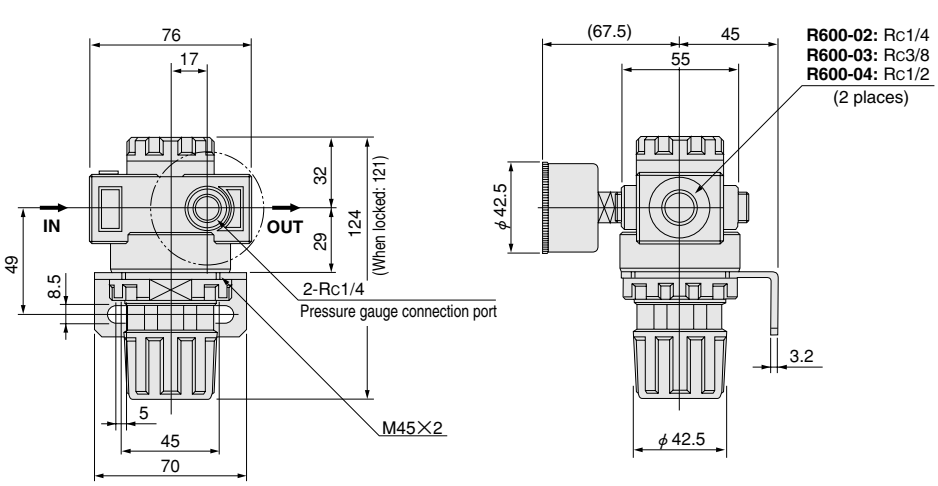
R300



●The mounting hole for mounting the regulator on a panel, etc. is ϕ30.5.

R600
R601
R602

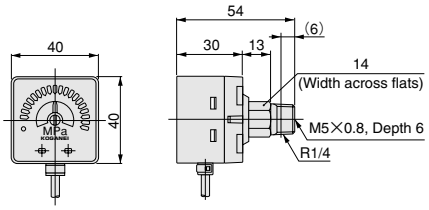
R600



●The mounting hole for mounting the regulator on a panel, etc. is ϕ45.

Options

●Pressure gauge with electronic switches: **-E2**

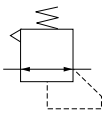


PRECISION REGULATOR

PR200

- Single diaphragm type achieves high-precision pressure regulation in a compact size.
- Push lock type regulator knob for light, smooth pressure regulation.

Symbol



Specifications

Item \ Model		PR200
Media		Air
Port size	Rc	1/4
Sensitivity	MPa [psi.]	0.001 [0.15]
Pressure setting range	MPa [psi.]	0.005～0.25 [0.7～36]
Maximum operating pressure	MPa [psi.]	0.73 [106]
Proof pressure	MPa [psi.]	1.03 [149]
Operating temperature range (atmosphere and media)	˚C [˚F]	5～60 [41～140]
Air consumption[Note]	ℓ /min [ft³/min] (ANR)	5 [0.18]
Lubrication		Not required
Mass	kg [lb.]	0.29 [0.64]
Materials		Aluminum die-casting

Note: Values are at secondary air pressure 0.25MPa [36psi.].

Order Codes

PR200 — □ — □

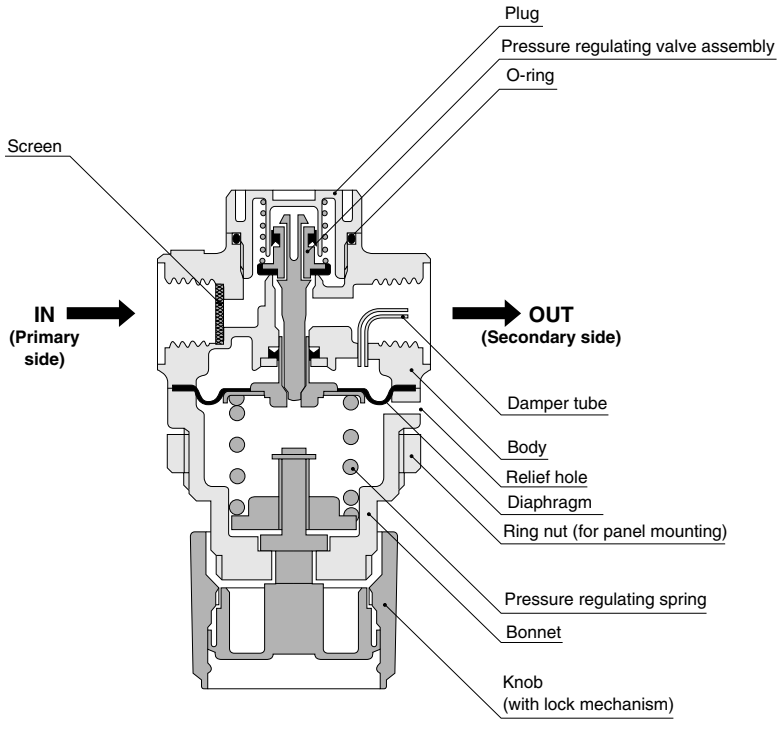
Bracket
Blank — No bracket
B — With bracket

Pressure gauge specification
Blank — No pressure gauge
G3P — With small precision pressure gauge (0.3MPa [44psi.])[Note 1]
G3PS — With small precision pressure gauge (with throttle valve) (0.3MPa [44psi.])
G3 — With pressure gauge[Note 2] (0.3MPa [44psi.])
E2 — With pressure gauge with electronic switches[Note 3] (1MPa [145psi.])
E21 — With pressure gauge with electronic switches[Note 3] (100kPa [14.5psi.])

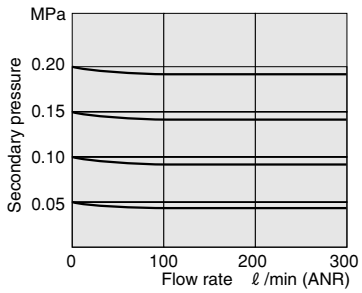
Precision regulator

Notes: 1. For details about the **G3P** small precision pressure gauge, see p.174.
2. For details about the **G3** pressure gauge, see p.172.
3. For specifications and dimensions of the pressure gauge with electronic switches, see p.177～181.

Inner Construction



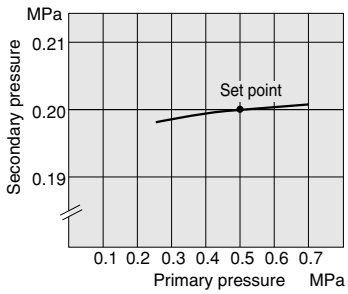
Flow Rate Characteristics



Remark: Graph shows flow rate characteristics when the primary pressure is fixed at 0.7MPa [102psi.].

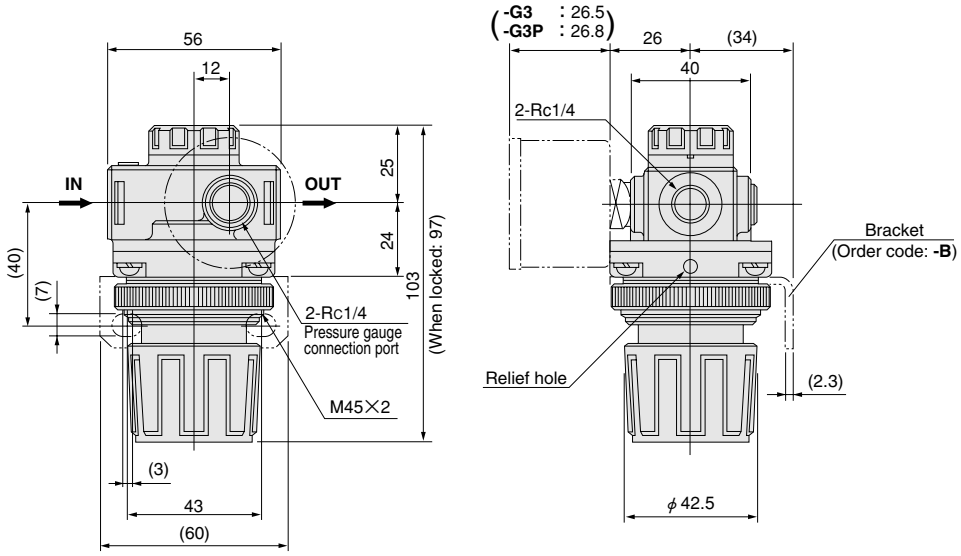
1MPa = 145psi. 1 ℓ/min = 0.0353ft³/min.

Pressure Characteristics



Dimensions of Precision Regulator (mm)

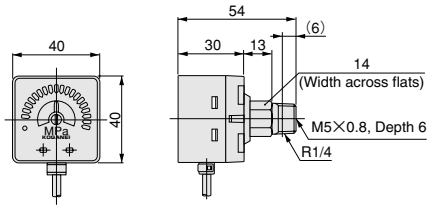
PR200



Note: The mounting hole for attaching the regulator on a panel, etc. is ϕ46. A panel thickness of 1.5～6mm is required for mounting. Use the ring nuts provided to mount.

Options

●Pressure gauge with electronic switches: **-E2, -E21**



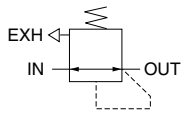
HIGH-RELIEF REGULATORS

Internal Pilot Type and External Pilot Type

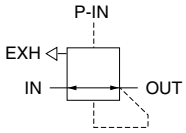
- Uses the air pilot type (diaphragm indirect operation type).
- Quick response even when secondary pressure fluctuations are large.
- Stable pressure regulation and large exhaust flow rate in a compact body.
- Can form modules with all Multi Series components.

Symbols

Internal pilot



External pilot



Specifications

Item \ Model		HR200	HR600	HRA200	HRA600
Media		Air			
Port size	Rc	1/8, 1/4	3/8, 1/2	1/8, 1/4	3/8, 1/2
Pressure setting range	MPa [psi.]	0.05～0.7 [7～102]			
Relief starting pressure	MPa [psi.]	Max. 0.02 [3]			
Maximum operating pressure	MPa [psi.]	0.9 [131]			
Proof pressure	MPa [psi.]	1.5 [218]			
Operating temperature range (atmosphere and media)	˚C [˚F]	5～60 [41～140]			
Air consumption	ℓ/min [ft³/min.] (ANR)	Max. 5 [0.18]			
Mass kg [lb]	Body	0.19 [0.42]	0.42 [0.93]	0.15 [0.33]	0.38 [0.84]
	Pressure gauge	0.09 [0.20]			
Materials		Aluminum die-casting			

Order Codes

HR □ □ — □ — □ — □ — □

Pilot specification
Blank — Internal pilot
A — External pilot

Body model
200 — **01 02**
600 — **03 04**

Port size Rc
1/8 1/4 3/8 1/2

High-relief regulator

Non-ion specification
Blank — Standard specification
NCU — Non-ion specification

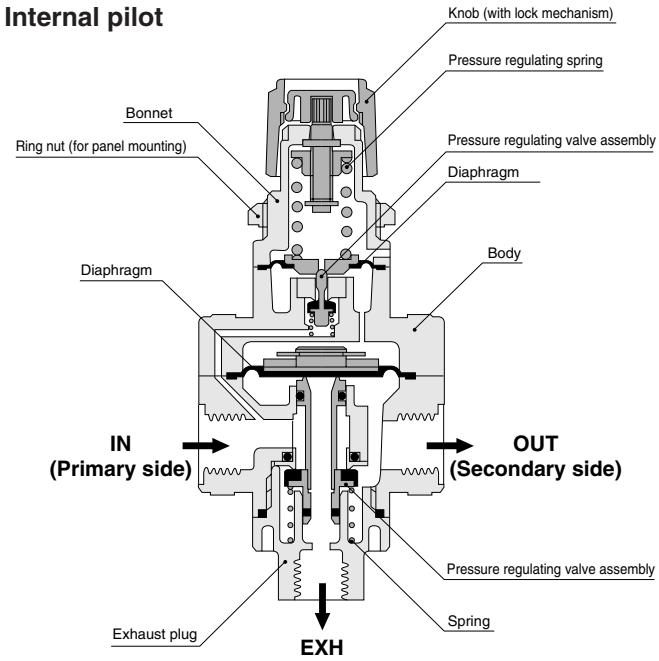
Pressure gauge specification
Blank — No pressure gauge
G1 — With pressure gauge (1MPa [145psi.])[Note1]
G3 — With pressure gauge (0.3MPa [44psi.])[Note1]
E2 — With pressure gauge with electronic switches[Note1] (1MPa [145psi.])

Bracket
Blank — No bracket
B — With bracket[Note1]

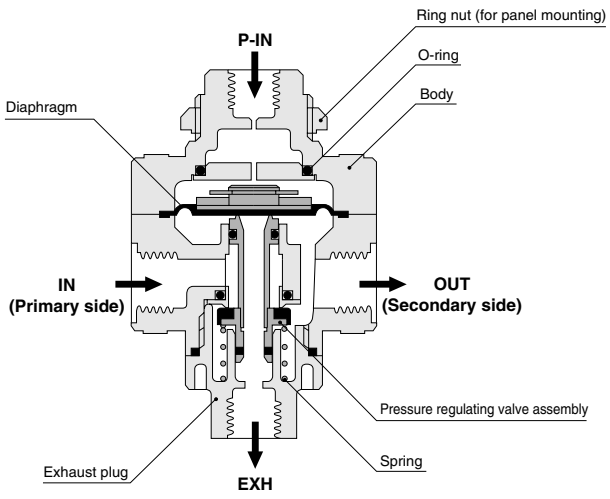
Notes: 1. For the specifications and dimensions for the pressure gauge, and pressure gauge with electronic switches, see p.172 and 177～181.
2. For the bracket order codes and dimensions, see p.95～96.

Inner Construction

Internal pilot



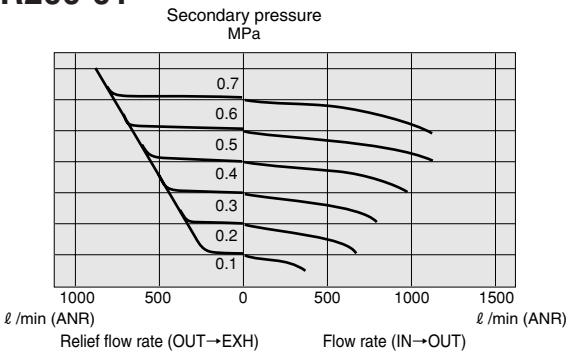
External pilot



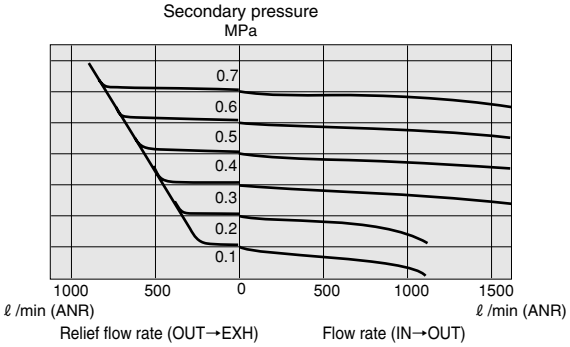
Flow Rate Characteristics and Relief Characteristics

Internal pilot

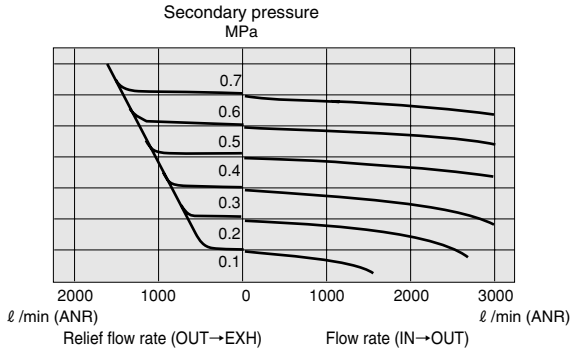
HR200-01



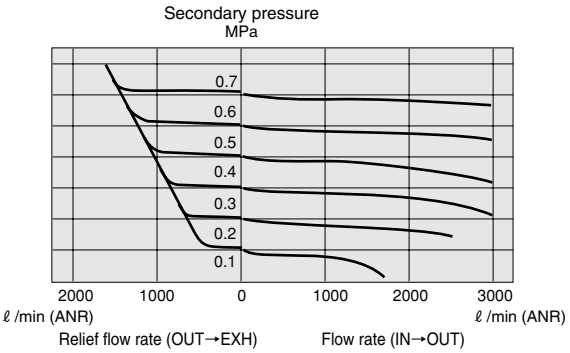
HR200-02



HR600-03

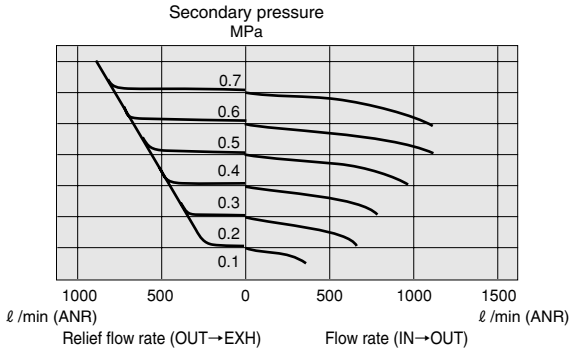


HR600-04

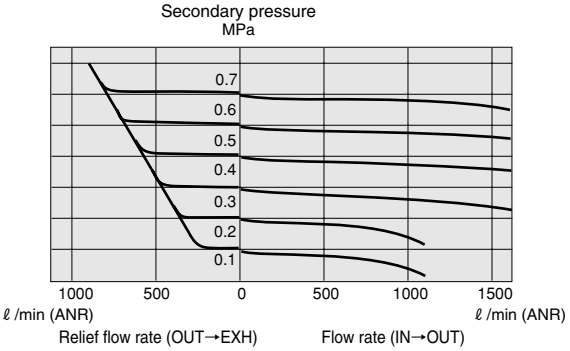


External pilot

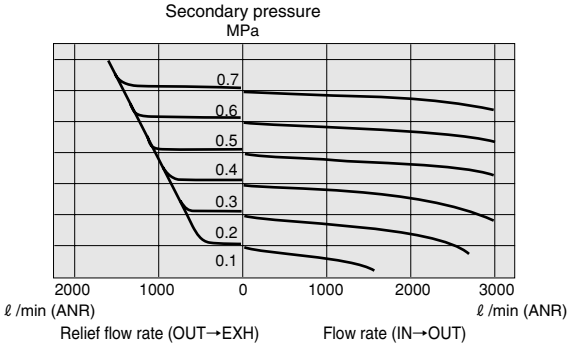
HRA200-01



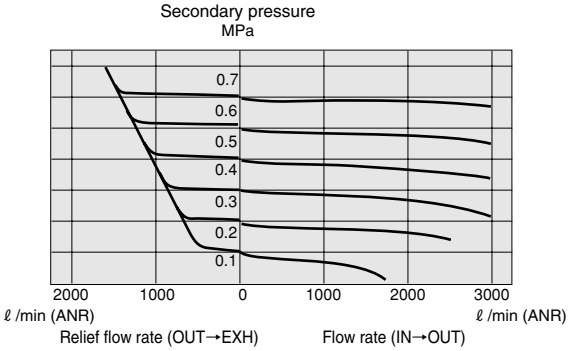
HRA200-02



HRA600-03



HRA600-04



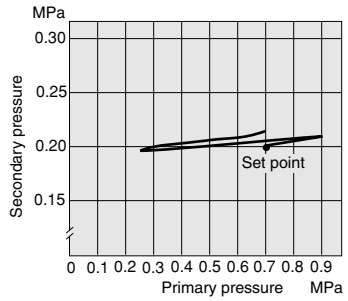
Remarks: 1. Graphs show flow rate characteristics when the primary pressure is fixed at 0.7MPa [102psi.].
2. The right side of each graph shows the air flow rate from primary side to secondary side, while the left side shows the relief (exhaust) flow rate from the secondary side to EXH.

1MPa = 145psi. 1 ℓ/min = 0.0353ft³/min.

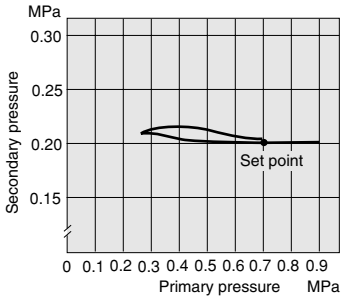
Pressure Characteristics

Internal pilot

HR200

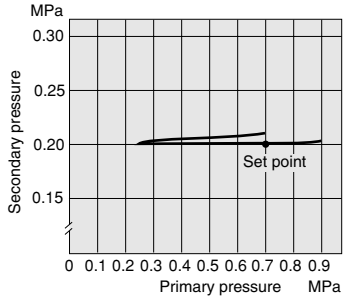


HR600

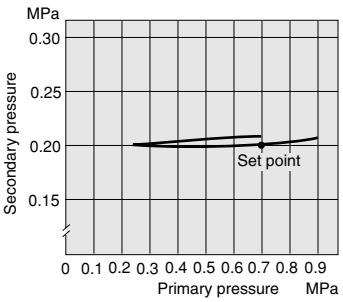


External pilot

HRA200



HRA600



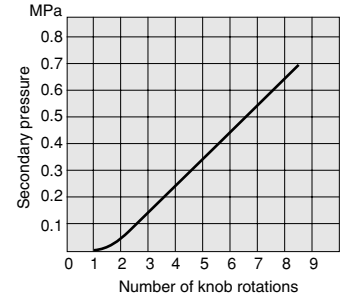
Remark: While the pressure characteristics shown are for a single unit, they may also be affected by the pilot regulator characteristics.

1MPa = 145psi.

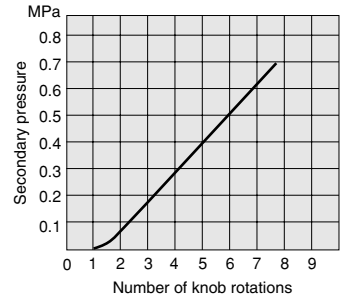
Pressure Setting Characteristics

Internal pilot

HR200



HR600

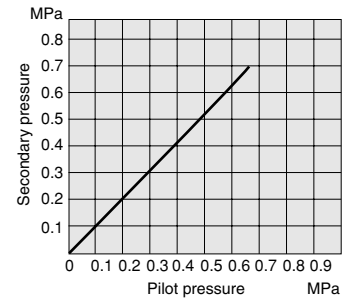


Remarks: 1. Graphs show flow rate characteristics when the primary pressure is fixed at 0.9MPa [131psi.].
2. The number of knob rotations is zero when the knob is rotated counterclockwise all the way.

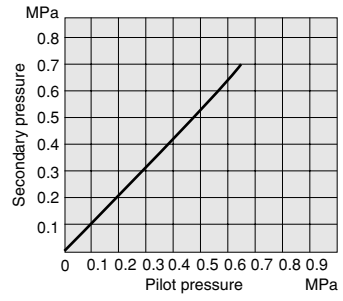
1MPa = 145psi.

External pilot

HRA200



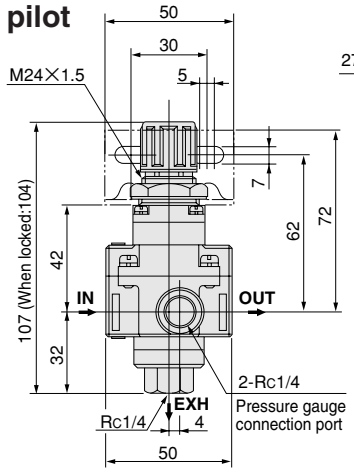
HRA600

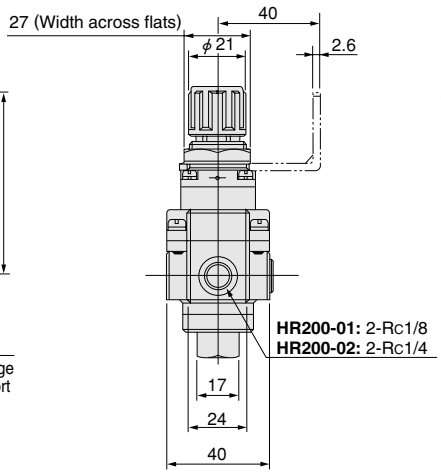


Dimensions of High-relief Regulators (mm)

Internal pilot

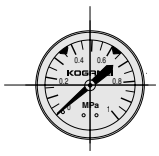
HR200

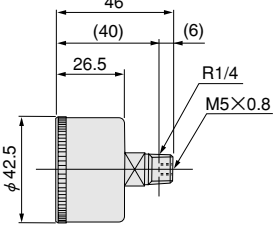




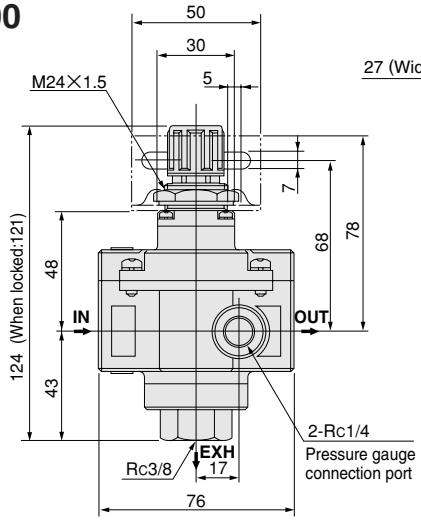
Options

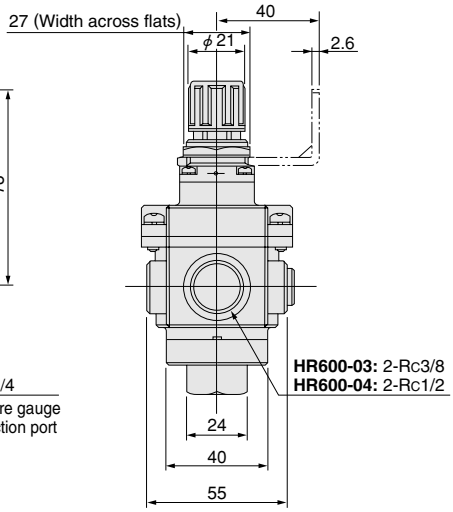
●Pressure gauge: **-G1, -G3**





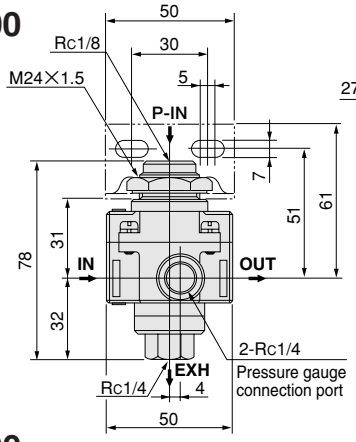
HR600

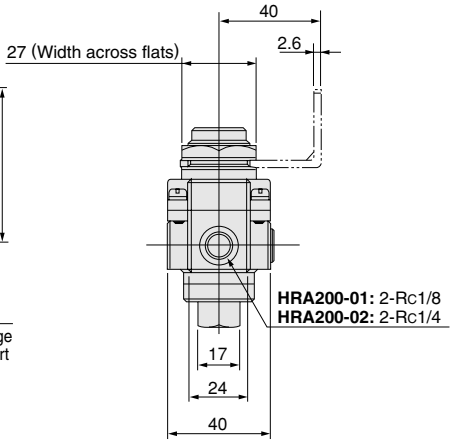




External pilot

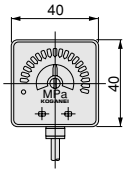
HRA200

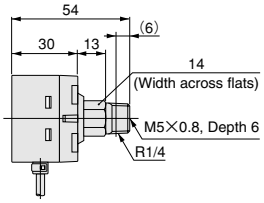




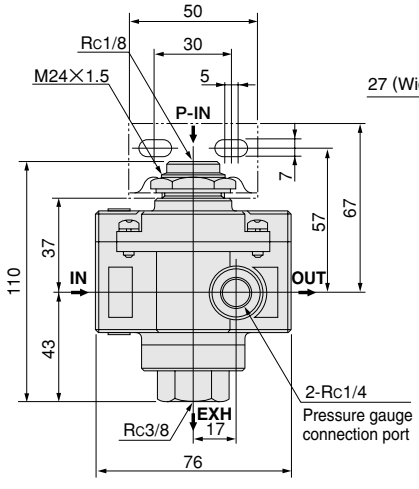
Options

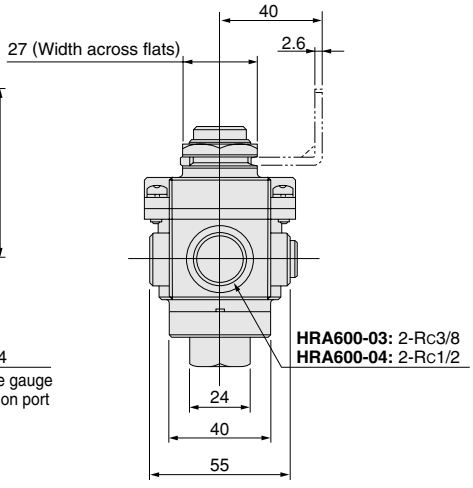
●Pressure gauges with electronic switches: **-E2**





HRA600





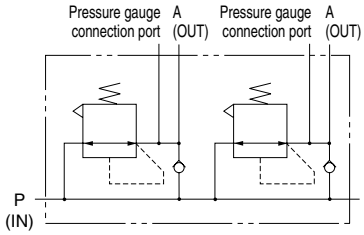
Remark: The mounting hole for attaching the high-relief regulator on a panel, etc. is ϕ 24.5.

MANIFOLD REGULATORS

R300M□A

- Regulation of supply pressure can be checked at a single location for all lines.
- Stable pressure regulation and large exhaust flow rate in a compact body.
- Push lock type regulator knob for light, smooth pressure regulation.

Symbol



Specifications

Item \ Model		MR302	MR303 (low pressure)
Media		Air	
Port size	Rc	1/4, 3/8	
Pressure setting range	MPa [psi.]	0.05～0.83 [7～120]	0.05～0.25 [7～36]
Maximum operating pressure	MPa [psi.]	0.93 [135]	
Proof pressure	MPa [psi.]	1.47 [213]	
Operating temperature range (atmosphere and media)	˚C [˚F]	5～60 [41～140]	
Lubrication		Not required	
Materials		Aluminum die-casting	
Check mechanism		As standard	

Order Codes

R300M □ **A** □ □ — □ — □ — □ — □

IN port collective type

Number of units
1 — One unit
2 — Two units
⋮ ⋮
10 — Ten units

Manifold regulator R300 series

IN port specification, bracket
T — With T module
DT — With T module bracket-combined use
S — S adapter
DS — With S adapter bracket-combined use

IN port
Port size
2 — Rc 1/4
3 — Rc 3/8

Non-ion specification
Blank — Standard specification
NCU — Non-ion specification

OUT port
Port size
02 — Rc 1/4
03 — Rc 3/8

Mounted regulator model
MR302 — Built-in check mechanism
MR303 — Built-in check mechanism for low pressure

Station
stn.1 — First station
stn.2 — Second station
⋮ ⋮
stn.10 — 10th station
Regulator mounting location from the left, with the OUT port faces forward.

Pressure gauge specifications
Blank — No pressure gauge
GA20 — φ 20 A type (bottom piping) 1MPa [145psi.] specification[Note2]
GD20 — φ 20 D type (back side piping) 1MPa [145psi.] specification[Note2]

Order codes for regulators only[Note1]

□ — □ — □ — □

Pressure gauge specification
Blank — No pressure gauge
GA20 — φ 20 A type (bottom piping) 1MPa [145psi.] specification[Note2]
GD20 — φ 20 D type (back side piping) 1MPa [145psi.] specification[Note2]

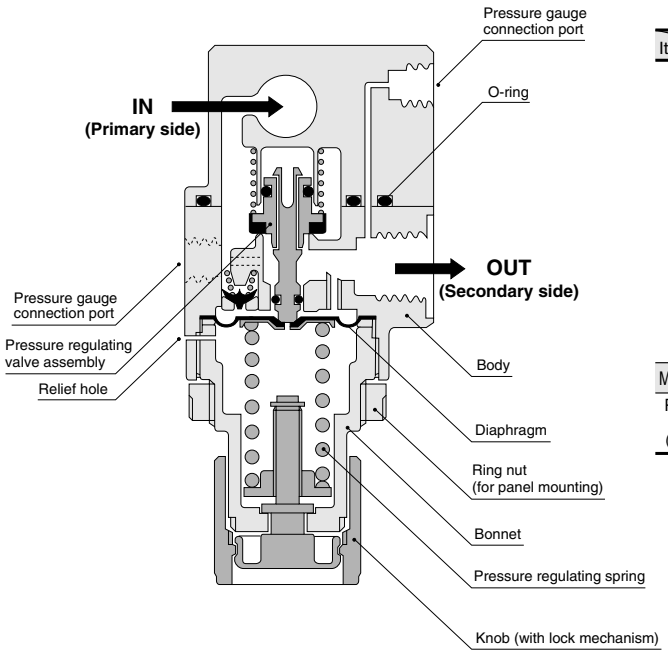
OUT port
Port size
02 — Rc 1/4
03 — Rc 3/8

Non-ion specification
Blank — Standard specification
NCU — Non-ion specification

Regulator model
MR302 — Built-in check mechanism
MR303 — Built-in check mechanism for low pressure

Notes: 1. Cannot be used as a single unit.
The bracket modules are required for additional units, order separately.
2. For the pressure gauge specifications, order codes, and dimensions, see p.171.

Inner Construction



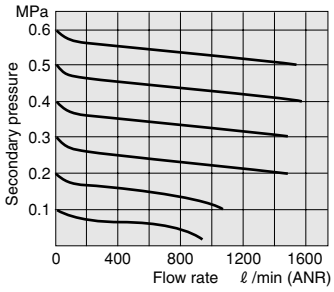
Mass

kg [lb]

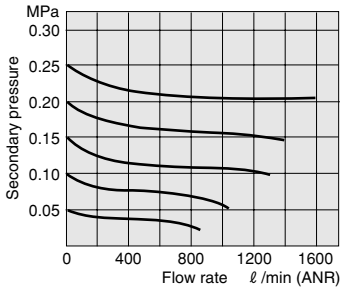
Item	Model	R300M□AT	R300M□ADT	R300M□AS	R300M□ADS
Number of manifold units	1	0.58 [1.28]	0.74 [1.63]	0.36 [0.79]	0.52 [1.15]
	2	0.84 [1.85]	1.00 [2.21]	0.61 [1.35]	0.77 [1.70]
	3	1.10 [2.43]	1.26 [2.78]	0.87 [1.92]	1.03 [2.27]
	4	1.34 [2.95]	1.52 [3.35]	1.13 [2.49]	1.29 [2.84]
	5	1.62 [3.57]	1.78 [3.92]	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)	-GA20	0.007 [0.015]			
	-GD20	0.007 [0.015]			

Flow Rate Characteristics

MR302



MR303

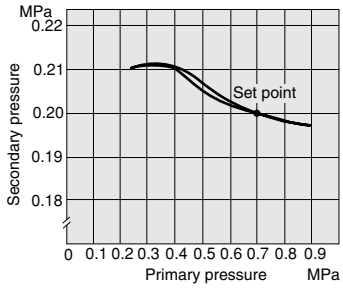


Remark: Graphs show flow rate characteristics when the primary pressure is fixed at 0.7MPa [102psi.].

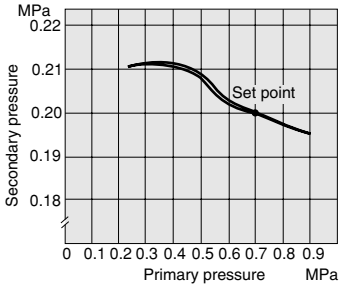
1MPa = 145psi. 1 ℓ/min = 0.0353ft³/min.

Pressure Characteristics

MR302



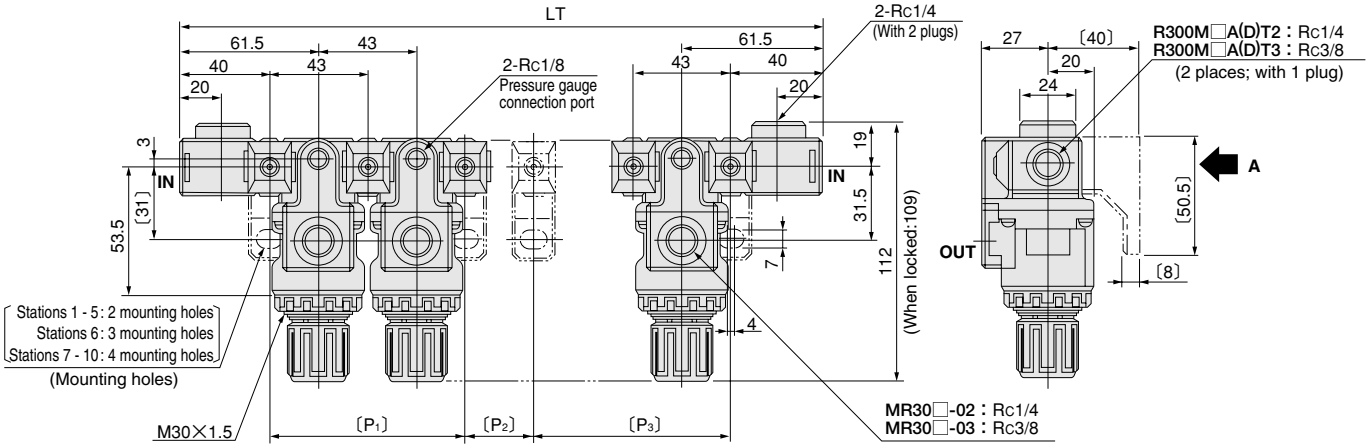
MR303



1MPa = 145psi.

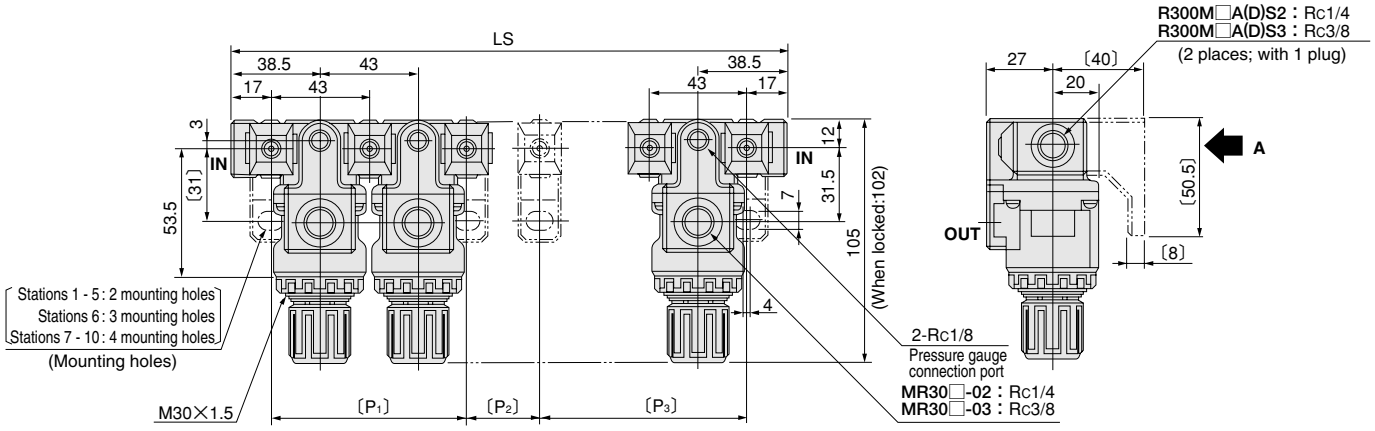
Dimensions of Manifold Regulators (mm)

R300M□AT□
R300M□ADT□



〔 〕shows when **R300M□ADT□** is used.

R300M□AS□
R300M□ADS□

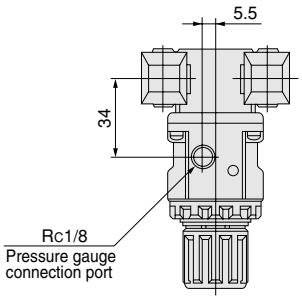


〔 〕shows when **R300M□ADS□** is used.

Unit dimensions

No. of units \ Code	LT	LS	P1	P2	P3
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

〈Viewed from **A**〉



LUBRICATORS

L150, L300, L600

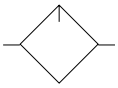
- Constant lubrication even with varied flow rates or pressure.
- Scaled dial ensures easy droplet regulation.
- Easy to attach and remove click-on bowl.
- Micro lubricator also included in model series. Assures steady lubrication even in long piping.
- Drain cock, and drain cock with fitting, are optional.

Specifications

Item \ Model		Standard	L150	L300	L600
		Micro lubricator	—	L301	L601
Media			Air		
Port size		Rc	1/8, 1/4	1/4, 3/8	1/4, 3/8, 1/2
Maximum operating pressure		MPa [psi.]	0.93 [135]		
Proof pressure		MPa [psi.]	1.47 [213]		
Operating temperature range (atmosphere and media)		°C [°F]	5～60 [41～140]		
Oil capacity		cc [in.^{3}]	25 [1.5]	85 [5.2]	160 [9.8]
Recommended lubrication			Turbine oil Class 1 [ISO VG32] or equivalent		
Mass		kg [lb.]	0.17 [0.37] (0.18 [0.40]) Note	0.36 [0.79]	0.42 [0.93]
Materials	Body		Aluminum die-casting	Zinc die-casting	Aluminum die-casting
	Bowl		Polycarbonate		
Standard attachments			—	Bowl guard	

Note: Figure in parentheses ( ) shows mass with bowl guard.

Symbol



Order Codes

L ☐ — ☐ — ☐ — ☐ — ☐ — ☐

Non-ion specification
Blank — Standard specification
NCU — Non-ion specification

Bowl guard Note 1
Blank — No bowl guard
BG — With bowl guard

Bracket
Blank — No bracket
B — With bracket Note3

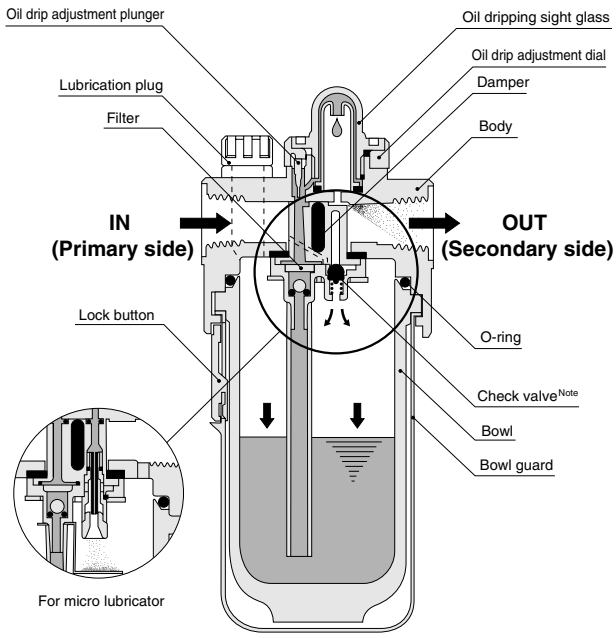
Drain cock specification
Blank — No drain cock
D — Push or screw type drain cock
F2 — Drain cock with fitting Note2

Body model	Port size Rc 1/8	1/4	3/8	1/2	
150	01	02			Standard
300		02	03		Standard
600		02	03	04	Standard
301		02	03		Micro lubricator
601		02	03	04	Micro lubricator

Lubricator

Notes: 1. For **L150** only. Standard specification for all models other than **L150**.
2. Available for **L150** as "With bowl guard: **-BG**" only.
3. For the bracket order codes and dimensions, see p.95～96.

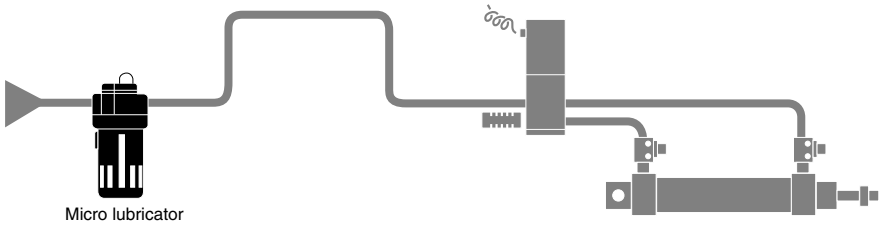
Inner Construction



Note: Not available for L150.

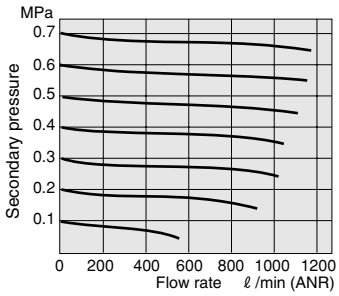
Micro Lubricator for System Upgrade

The micro lubricator uses a pipe and nozzle to generate an oil mist inside the bowl, and supplies only the most finely microscopic mist to the OUT side.
The micro mist rides easily on the air flow, to ensure faster, more assured lubrication supply. This method is effective even when the piping distance to the actuator is unusually far or is subject to complex twists and turns, or when the actuator is mounted in a high position.

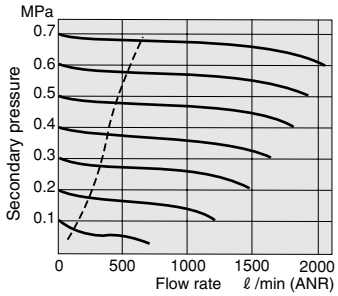


Flow Rate Characteristics

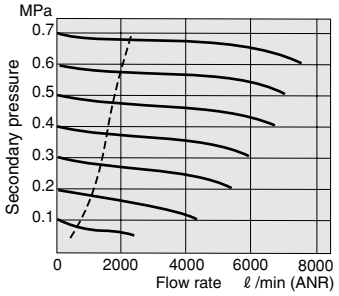
L150



L300



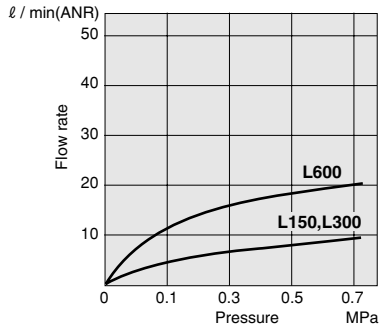
L600



1MPa = 145psi.
1 ℓ/min = 0.0353ft³/min.

Note: The dotted line shows the smallest flow rate of micro lubricator allowed. A micro mist cannot be formed below this flow rate.
Always select a product with a flow rate that exceeds this dotted line.

Minimum Flow Rate for Dripping Oil

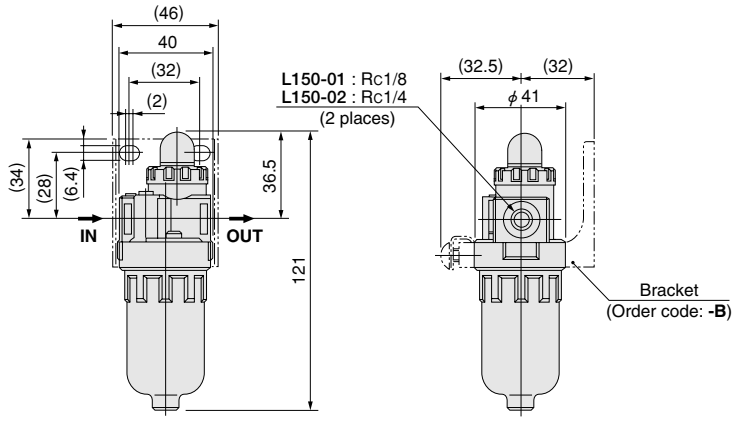


1MPa = 145psi. 1 ℓ/min = 0.0353ft³/min.

Dimensions of Lubricators (mm)

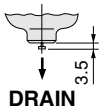
L150

L150

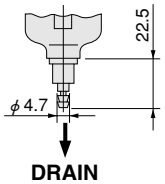


Optional drain cocks

●Push type :**-D**

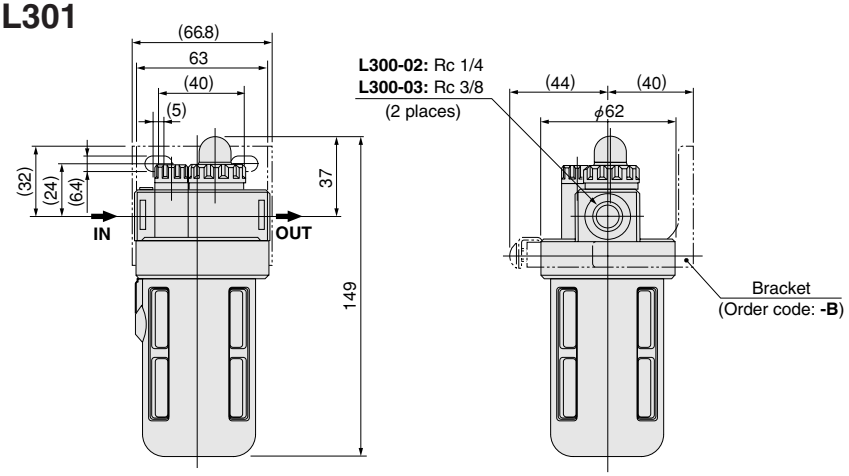


●Push type with fitting :**-BG-F2**



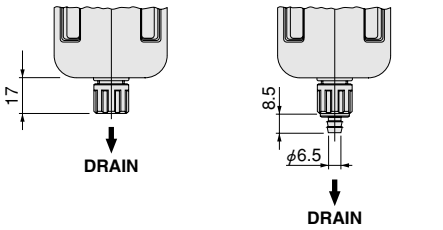
L300
L301

L300



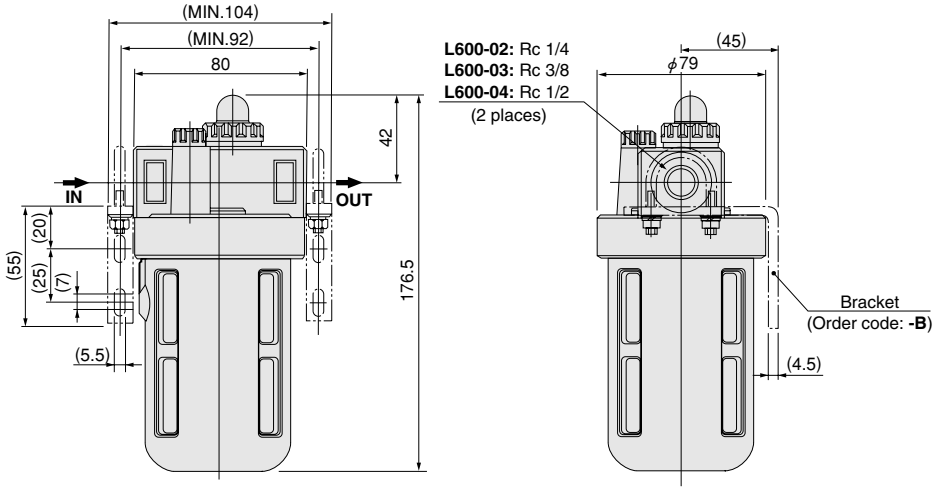
Optional drain cocks

●Screw type: **-D** ●Screw type with fitting: **-F2**



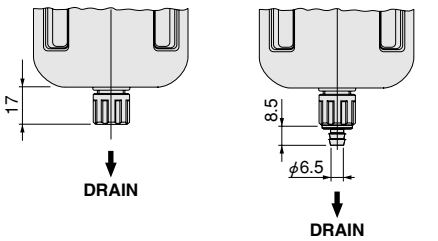
L600
L601

L600



Optional drain cocks

●Screw type: **-D** ●Screw type with fitting: **-F2**

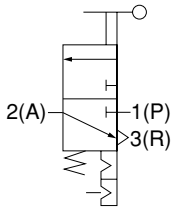


RESIDUAL PRESSURE EXHAUST VALVES

300V, 600V

- Absence of a neutral position ensures safe and sure switching between air supply and exhaust.
- The exhaust port employs an orifice for restraining sudden exhaust.

Symbol



Specifications

Item \ Model		300V-01	300V-02	300V-03	600V-04
Media		Air			
Operation type		Manual knob type			
Number of positions, number of ports		2 positions, 3 ports			
Effective area mm² 〔Cv〕	P, A	15 〔0.83〕	27 〔1.50〕	40 〔2.22〕	55 〔3.06〕
	R	10 〔0.56〕			
Port size Rc	P, A	1/8	1/4	3/8	1/2
	R	1/4			
Operating pressure range MPa [psi.]		0～0.9 [0～131]			
Proof pressure MPa [psi.]		1.32 [191]			
Operating temperature range (atmosphere and media) °C [°F]		5～60 [41～140]			
Mounting direction		Any			
Lubrication		Not required			
Mass kg [lb.]		0.22 [0.49]	0.21 [0.46]	0.20 [0.44]	0.25 [0.55]
Materials	Body	Aluminum die-casting			
	Knob	Plastic			
Knob operation force N·cm [in·lbf]		69 [6.1]			
Knob operation angle		90°			

Order Codes

□ **V** — □ — □ — □

Residual pressure exhaust valve

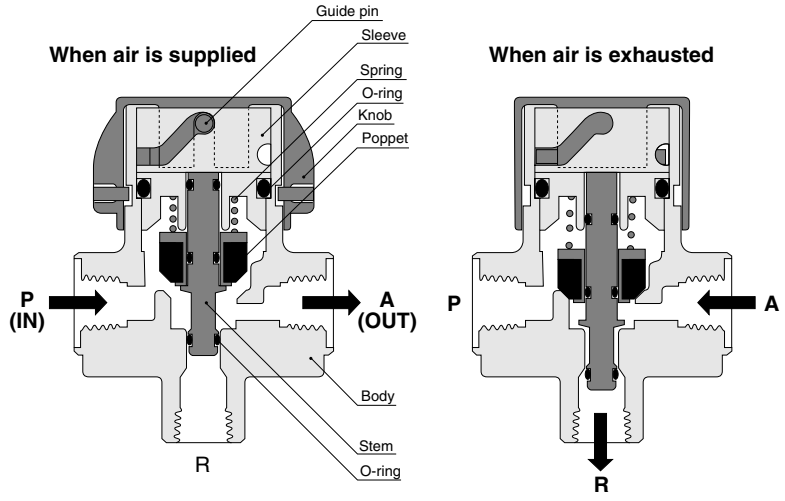
Non-ion specification
Blank — Standard specification
NCU — Non-ion specification

Bracket
Blank — No bracket
B — With bracket[Note]

Body model	Port size Rc 1/8	1/4	3/8	1/2
300	01	02	03	
600				04

Note: For the bracket order codes and dimensions, see p.95～96.

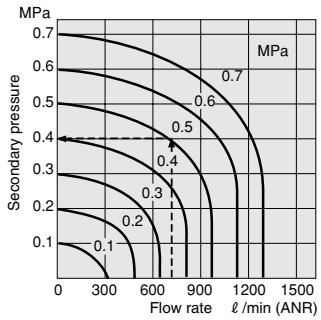
Inner Construction



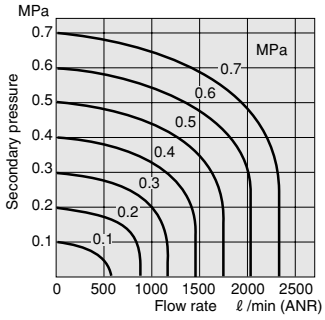
Flow Rate Characteristics

Supply air flow rate

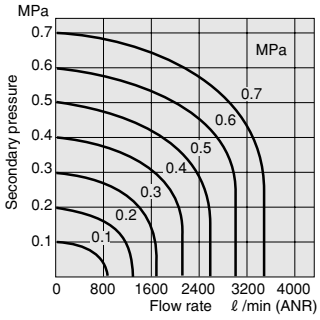
300V-01



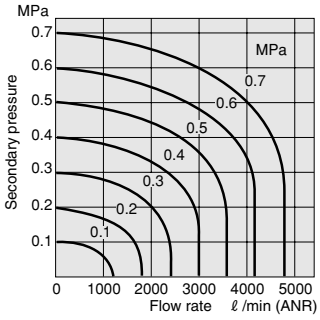
300V-02



300V-03



600V-04



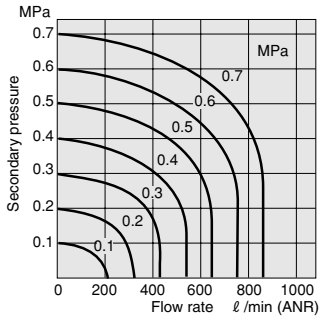
1MPa = 145psi. 1 ℓ/min = 0.0353ft³/min.

How to read the graph

When supply pressure is 0.5MPa [73psi.] and flow rate is 720 ℓ/min [25.4ft³/min.] (ANR), the valve delivery pressure becomes 0.4MPa [58psi.].

Exhaust flow rate

300V-□, 600V-04

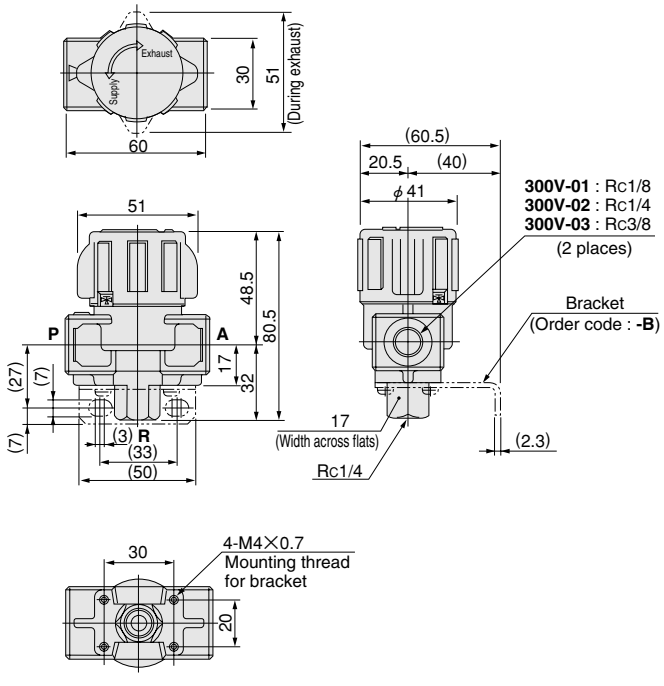


1MPa = 145psi. 1 ℓ/min = 0.0353ft³/min.

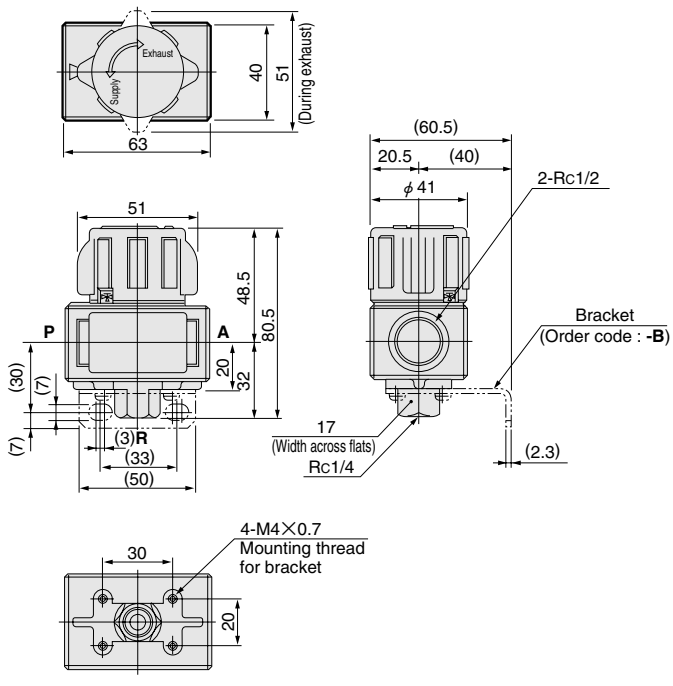
Dimensions of Residual Pressure Exhaust Valves (mm)

EX-VAL

300V



600V



MODULES AND ADAPTERS

- F module is a connector facilitating combinations of Multi Series equipment of the same body size.
- D module offers a mounting bracket function.
- T module provides branch piping at desired locations.
- S adapter allows easy installation and removal of equipment without disturbing the piping.
- Standard can be used as NCU specification.

Model List

For 150, 300 and 600 series

Module, adapter / Body size	F module	D module	T module		S adapter	
	F (For modules only)	**D** (Brackets for combined use)	**T** (Branch piping)	**DT** (Brackets for combined use with branch piping)	**S** (Port connection)	**DS** (Brackets for combined use with piping connection)
15 (For 150 series)	Multi Series ⇨ ⇦ Multi Series **8-15F**	Multi Series ⇨ ⇦ Multi Series **8-15D**	Connection port ⇩ Connection port ⇨ Multi Series **8-15T□**	Connection port ⇩ Connection port ⇨ Multi Series **8-15DT□**	Connection port ⇨ Multi Series **8-15S□**	Connection port ⇨ Multi Series **8-15DS□**
30 (For 300 series)	**8-30F**	**8-30D**	**8-30T□**	**8-30DT□**	**8-30S□**	**8-30DS□**
60 (For 600 series)	**8-60F**	**8-60D**	**8-60T□**	**8-60DT□**	**8-60S□**	**8-60DS□**

Remark: Material is zinc die-casting.

For connections between different sizes

Module / Body size	D module
	D (Brackets for combined use)
20 (For connecting 150 and 300 series)	For **300** series ⇨ ⇦ For **150** series **8-20D**
40 (For connecting 300 and 600 series)	For **600** series ⇨ ⇦ For **300** series **8-40D**

Order Codes

8 — □ □ □

Module and adapter
- **F** —— F module
- **D** —— D module for bracket-combined use
- **T** —— T module
- **DT** —— T module for bracket-combined use
- **S** —— S adapter
- **DS** —— S adapter for bracket-combined use

Port size[Note 2] **Rc**

1/8	1/4	3/8	1/2	Applicable body size
1	**2**			150
	2	**3**		300
	2[Note 3]	**3**	**4**	600

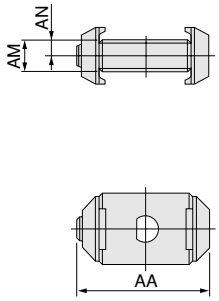
Body size
- **15** —— For 150 series, HR200 and HRA200
- **20** —— For connecting 150 and 300 series[Note 1]
- **30** —— For 300 series
- **40** —— For connecting 300 and 600 series[Note 1]
- **60** —— For 600 series, HR600 and HRA600

Notes: 1. Used only with D module.
2. Not available in F module or D module.
3. Used only with S adapter and DS adapter.

For details about equipment combinations, see p.58.

Dimensions of F Modules (mm)

FRL-MOD□



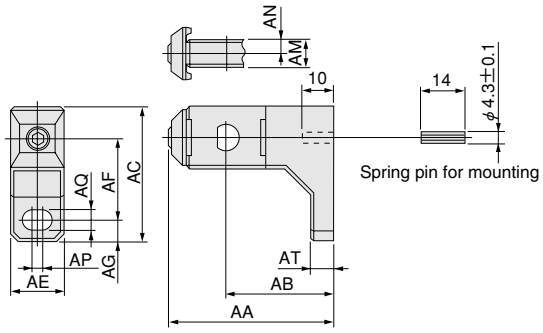
Type \ Code	AA	AC	AE	AM	AN	Mass g
8-15F	36	20	17.4	8	4	38
8-30F	42	24	19.4	10	5	63
8-60F	56.5	30	31	12	6	150

Note: When assembling with other equipment, add the AM dimensions to the total.

Dimensions of D Modules (mm)

8-15D
8-30D

FRL-MOD□



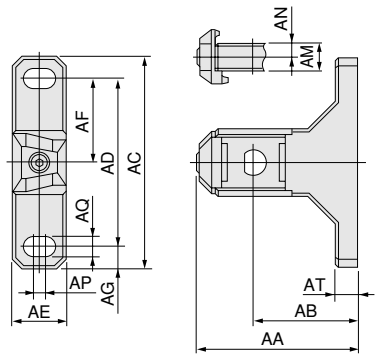
Model \ Code	AA	AB	AC	AE	AF	AG	AM	AN	AP
8-15D	50.5	32	49	17.4	31	8	8	4	4
8-30D	61.5	40	50.5	19.4	31	8	10	5	4

Model \ Code	AQ	AT	Mass g
8-15D	7	6	84
8-30D	7	8	137

Note: When assembling with other equipment, add the AM dimensions to the total.

8-20D
8-40D

FRL-MOD□

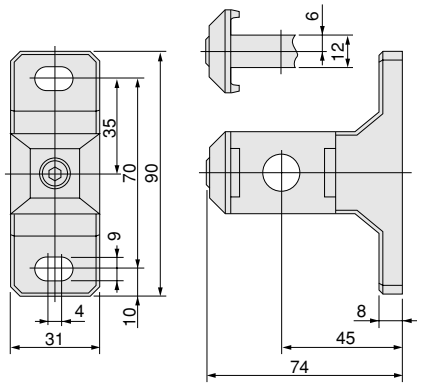


Model \ Code	AA	AB	AC	AD	AE	AF	AG	AM	AN	AP
8-20D	61.5	40	78	62	19.4	31	8	10	5	4
8-40D	74	45	90	70	31	35	10	16.8	6	4

Model \ Code	AQ	AT	Mass g
8-20D	7	8	141
8-40D	9	8	300

Note: When assembling with other equipment, add the AM dimensions to the total.

8-60D



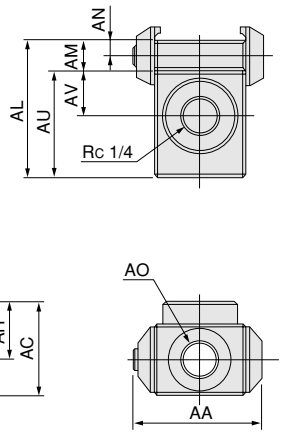
Mass: 260 g

Note: When assembling with other equipment, add 12mm to the total.

Dimensions of T Modules (mm)

FRL-MOD□

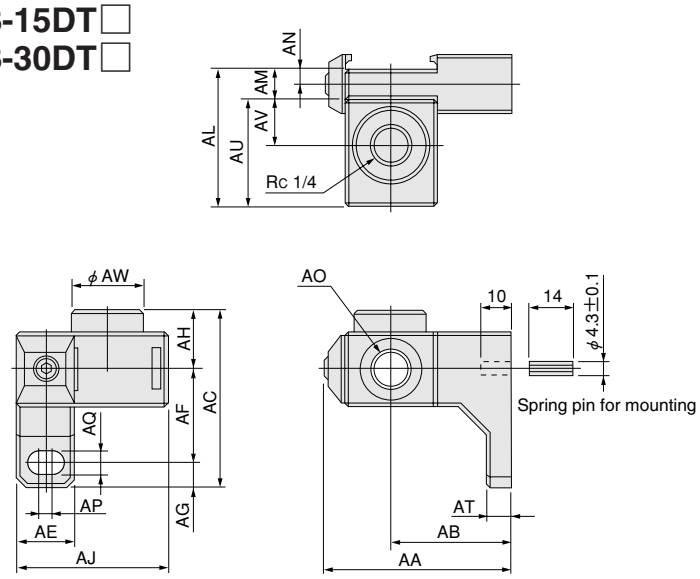
8-15T□
8-30T□
8-60T□



Model \ Code	AA	AC	AH	AJ	AL	AM	AN	AO	AU	AV	AW	Mass g
8-15T1	36	27	17	43.5	39	8	4	Rc1/8	31	13	20	116
8-15T2	36	27	17	43.5	39	8	4	Rc1/4	31	13	20	110
8-30T2	42	31	19	49.5	45	10	5	Rc1/4	35	15	24	196
8-30T3	42	31	19	49.5	45	10	5	Rc3/8	35	15	24	181
8-60T3	56.5	40	24	66.5	57	12	6	Rc3/8	45	19	32	271
8-60T4	56.5	40	24	66.5	57	12	6	Rc1/2	45	19	32	264

Note: When assembling with other equipment, add the AL dimensions to the total.

8-15DT□
8-30DT□



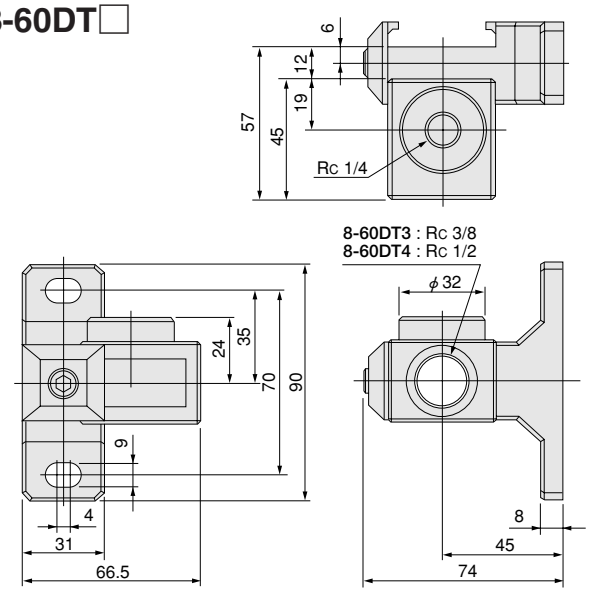
Model \ Code	AA	AB	AC	AE	AF	AG	AH	AJ	AL
8-15DT1	50.5	32	56	17.4	31	8	17	44	39
8-15DT2	50.5	32	56	17.4	31	8	17	44	39
8-30DT2	61.5	40	58	19.4	31	8	19	50	45
8-30DT3	61.5	40	58	19.4	31	8	19	50	45

Model \ Code	AM	AN	AO	AP	AQ	AT	AU	AV	AW
8-15DT1	8	4	Rc1/8	4	7	6	31	13	20
8-15DT2	8	4	Rc1/4	4	7	6	31	13	20
8-30DT2	10	5	Rc1/4	4	7	8	35	15	24
8-30DT3	10	5	Rc3/8	4	7	8	35	15	24

Model \ Code	Mass g
8-15DT1	161
8-15DT2	155
8-30DT2	273
8-30DT3	257

Note: When assembling with other equipment, add the AL dimensions to the total.

8-60DT□



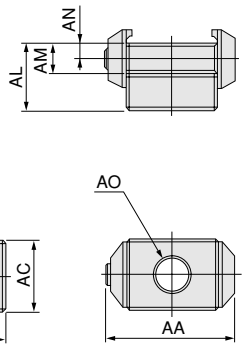
Mass
8-60DT3: 385g
8-60DT4: 375g

Note: When assembling with other equipment, add 57mm to the total.

Dimensions of S Adapters (mm)

FRL-MOD□

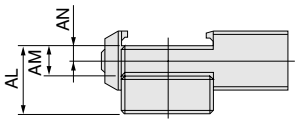
8-15S□
8-30S□
8-60S□

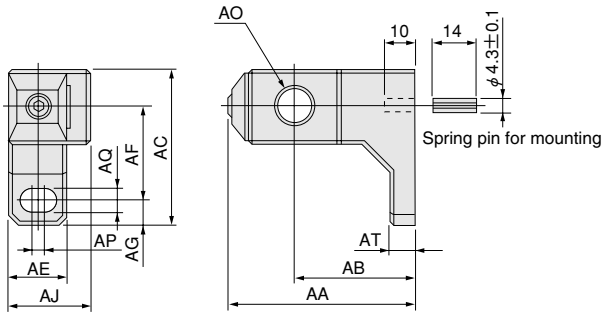


Model \ Code	AA	AC	AJ	AL	AM	AN	AO	Mass g
8-15S1	36	20	24.5	20	8	4	Rc1/8	51
8-15S2	36	20	24.5	20	8	4	Rc1/4	49
8-30S2	42	24	26.5	22	10	5	Rc1/4	81
8-30S3	42	24	26.5	22	10	5	Rc3/8	78
8-60S2	56.5	32	37.5	28	12	6	Rc1/4	190
8-60S3	56.5	32	37.5	28	12	6	Rc3/8	187
8-60S4	56.5	32	37.5	28	12	6	Rc1/2	183

Note: When assembling with other equipment, add the AL dimensions to the total.

8-15DS□
8-30DS□



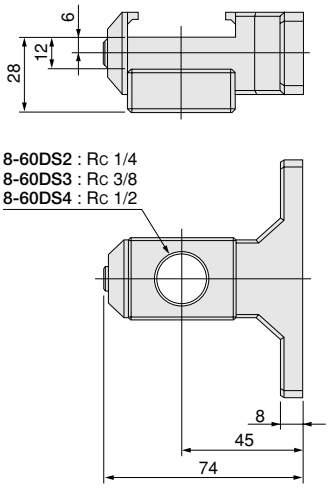


Model \ Code	AA	AB	AC	AE	AF	AG	AJ	AL	AM	AN	AO	AP	AQ	AT
8-15DS1	50.5	32	49	18	31	8	25	20	8	4	Rc1/8	4	7	6
8-15DS2	50.5	32	49	18	31	8	25	20	8	4	Rc1/4	4	7	6
8-30DS2	61.5	40	51	20	31	8	27	22	10	5	Rc1/4	4	7	8
8-30DS3	61.5	40	51	20	31	8	27	22	10	5	Rc3/8	4	7	8

Model \ Code	Mass g
8-15DS1	96
8-15DS2	94
8-30DS2	155
8-30DS3	150

Note: When assembling with other equipment, add the AL dimensions to the total.

8-60DS□



Mass
8-60DS2: 302g
8-60DS3: 299g
8-60DS4: 295g

Note: When assembling with other equipment, add 28mm to the total.

BRACKETS

Bracket Models and Applicable Components

Components type		Bracket model	Remark
F.R.L. combinations	C150	**8-15D**	D module for bracket-combined use, standard equipment
	C200	**8-20D**	
	C300	**8-30D**	
	C400	**8-40D**	
	C600	**8-60D**	
Filter regulators	FR150	**8-15 (8-15A)**	Standard equipment
	FR300	**8-30 (8-30A, 8-60B)**Note2	
	FR600	**8-65 (8-60B)**Note2	
Air filters	F150	**8-15A**	Body supporting type, optional
	F300	**8-30A (8-60B)**Note2	
	F600	**8-60B**	Piping supporting type, optional
Mist filters	MF300	**8-30A (8-60B)**Note2	Body supporting type, optional
	MF400	**8-60B**Note2	Piping supporting type, optional
	MF600		
Micro mist filters	MMF150	**8-30A (8-60B)**Note2	Body supporting type, optional
	MMF300	**8-60B**Note2	Piping supporting type, optional
	MMF400		
Regulators	R150	**8-15**	Standard equipment
	R300	**8-30 (8-60B)**Note2	
	R600	**8-65 (8-60B)**Note2	
Precision regulator	PR200	**8-21Z**	Body supporting type, optional
High-relief regulators	HR200	**8-22Z**	Body supporting type, optional
	HR600		
	HRA200		
	HRA600		
Manifold regulators	MR300	**8-30D**	D module for bracket-combined use, optional
Lubricators	L150	**8-15A**	Body supporting type, optional
	L300	**8-30A (8-60B)**Note2	
	L600	**8-60B**Note2	Piping supporting type, optional
Residual pressure exhaust valves	300V	**8-31C**	Body supporting type, optional
	600V		

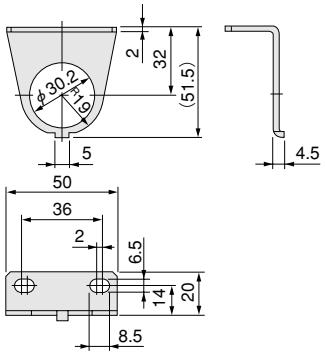
Notes: 1. Models in parentheses ( ) are non-standard, but are acceptable for use.
2. Pipe supporting type brackets (8-60B) are sold in a set of two brackets.

Dimensions of Brackets (mm)

FRL-BR

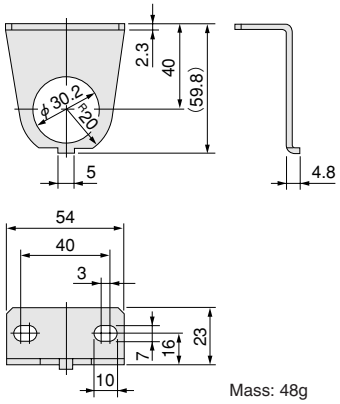
For Filter Regulator and Regulator

8-15



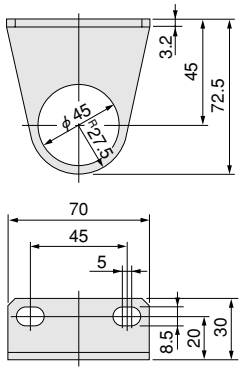
Mass: 31g

8-30



Mass: 48g

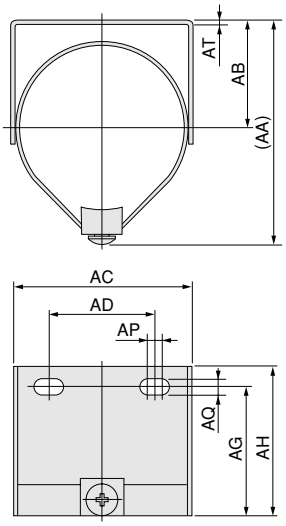
8-65



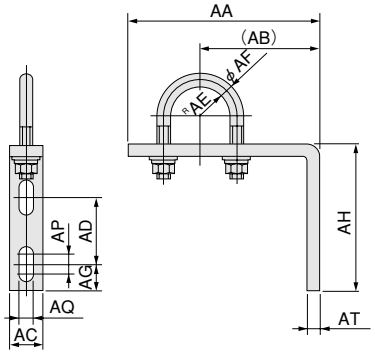
Mass: 69g

For Air Filter, Mist Filter, Micro Mist Filter, and Lubricator

FRL-BR



Mass
8-15A: 60g
8-30A: 80g



Mass: 107g

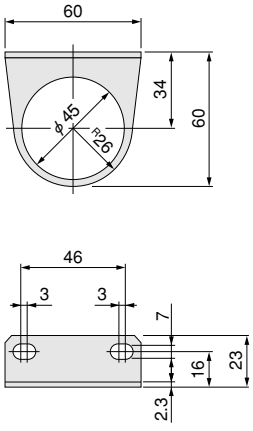
Model \ Code	AA	AB	AC	AD	AG	AH	AP	AQ	AT
8-15A	64	32	46	32	50	56	2	6.4	1.2
8-30A	84	40	66.8	40	48	56	5	6.4	1.2

Model \ Code	AA	AB	AC	AD	AE	AF	AG	AH	AP	AQ	AT
8-60B	72	45	12	25	11	5	10	55	7	5.5	4.5

Note: Pipe supporting type brackets (8-60B) are sold in a set of two brackets.

For Precision Regulator

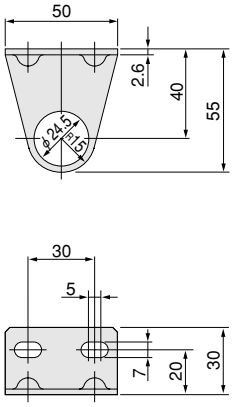
8-21Z



Mass: 42g

For High-relief Regulator

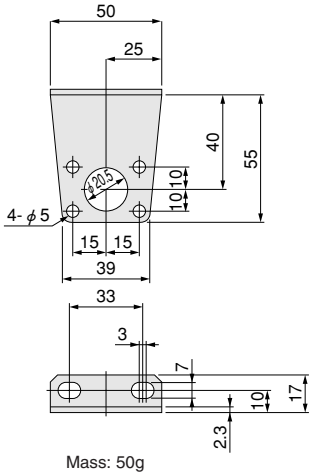
8-22Z



Mass: 52g

For Residual Pressure Exhaust Valve

8-31C



Mass: 50g