

## Combinations

### ● 650 series combination



### ● 750 series combination



### ● 900 series combination



## Filters and Mist Filters



### ● Options

- Non-ion specification
- Bowl specification:  
Nylon bowls
- Drain cock specification:  
Drain cock with fitting  
Auto drain type drain cock

## Modules

D module for bracket-  
combined use



R module



## Regulators



RN650  
RN651  
RN652



RN900  
RN902

### ● Options

Pressure gauge with built-in switch



Pressure gauge



Pressure gauge  
for low pressure



Digital pressure  
gauge with built-in  
sensor



Embedded pressure  
gauge

## Modules

D module for bracket-  
combined use



R module



## Lubricators



LN650  
LN651



LN900  
LN901  
LN902

### ● Options

- Non-ion specification
- Lubricator specification:
  - Micro lubricator
  - Machine lubricator
- Bowl specification:
  - Nylon bowls
- Drain cock specification:
  - Drain cock with fitting
  - Screw type drain cock




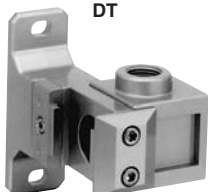



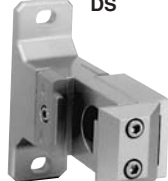
## List of Equipment Combination

Body size		650 series						900 series										
Model		FN650	RN650	RN651	RN652	LN650	LN651	FN900	FN901	RN900	RN902	LN900	LN901	LN902	MF800	MF1000	MMF600	MMF800
650 series	FN650	8-65F	8-90ND				8-65F	8-90ND				8-65F	8-90ND					
	RN650	8-65ND	8-90DT				8-65ND	8-90DT				8-65T	8-90DT					
	RN651	8-65T	8-90DS				8-65T	8-90DS				8-65S	8-90DS					
	RN652	8-65DT				8-65DT		8-90R <sup>Note</sup>										
	LN650	8-65S				8-65S		8-90M <sup>Note</sup>										
	LN651	8-65DS				8-65DS												
900 series	FN900																	
	FN901	8-65F	8-90ND				8-65F	8-90ND				8-65F	8-90ND					
	RN900	8-65ND	8-90DT				8-65ND	8-90DT				8-65T	8-90DT					
	RN902	8-65T	8-90DS				8-65T	8-90DS				8-65S	8-90DS					
	LN900	8-65DT	8-90R <sup>Note</sup>				8-65DT	8-90R <sup>Note</sup>				8-90R <sup>Note</sup>						
	LN901	8-65S	8-90M <sup>Note</sup>				8-65S	8-90M <sup>Note</sup>				8-90M <sup>Note</sup>						
	LN902	8-65DS				8-65DS												
	MF800																	
	MF1000	8-65F	8-90ND				8-90ND	8-90R <sup>Note</sup>				8-65F	8-90ND					
	MMF600	8-65T	8-90R <sup>Note</sup>				8-90DT	8-90M <sup>Note</sup>				8-65T	8-90DT					
MMF800	8-65S	8-90M <sup>Note</sup>				8-90DS					8-65S	8-90DS						

Note: Only for RN900 and RN902. For connection with RN900 or RN902, modules other than 8-90R and 8-90M cannot be used. These also cannot be used to connect modules other than RN900 and RN902 to each other.

## List of Module Adapter Types

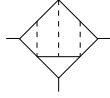
For 650, 900 series

Module and adapter	F module	D module	T module	
	F	ND	T	DT
Body size	 (For modules only)	 (Brackets for combined use)	 (Branch piping)	 (Brackets for combined use with branch piping)
65 (650 series)	8-65F	8-65ND	8-65T	8-65DT
90 (900 series)		8-90ND		8-90DT
Modules and adapters	R module	M module	S adapter	
	R	M	S	DS
Body size	 (For regulator only)	 (For supporting regulator piping only)	 (Port connection)	 (Brackets for combined use with piping connection)
65 (650 series)	—	—	8-65S	8-65DS
90 (900 series)	8-90R	8-90M		8-90DS

# MICRO MIST FILTERS

## MMF600, MMF800

### Symbol



### Specifications

Item	Model	MMF600	MMF800
Media		Air	
Port size	Rc	1/2, 3/4, 1	
Filtering particle diameter	$\mu\text{m}$	0.01	
Filtering efficiency	%	99.9	
Volume of processed air <sup>Note</sup>	$\ell/\text{min}$ [ft <sup>3</sup> /min] (ANR)	3000 [106]	5000 [177]
Max. operating pressure	MPa [psi.]	0.97 [141] (Auto drain type: 0.15~0.97 [22~141])	
Proof pressure	MPa [psi.]	1.47 [213]	
Operating temperature range (atmosphere and media)	$^{\circ}\text{C}$ [ $^{\circ}\text{F}$ ]	5~60 [41~140]	
Drain capacity	cc [in. <sup>3</sup> ]	160 [9.8]	
Mass	kg [lb]	Standard	2.05 [4.52]
		Auto drain type	2.08 [4.59]
Materials		Aluminum die-casting	
		Reinforced glass	
	Element type	E-60MM	E-80MM
Standard attachments		Screw type drain cock	

Note: This is the recommended maximum flow rate when the air pressure is 0.69MPa [100psi.].

### Order Codes

**MMF**    -    -    -    -   

**Bracket**  
 Blank — No bracket  
 B — With bracket<sup>Note</sup>

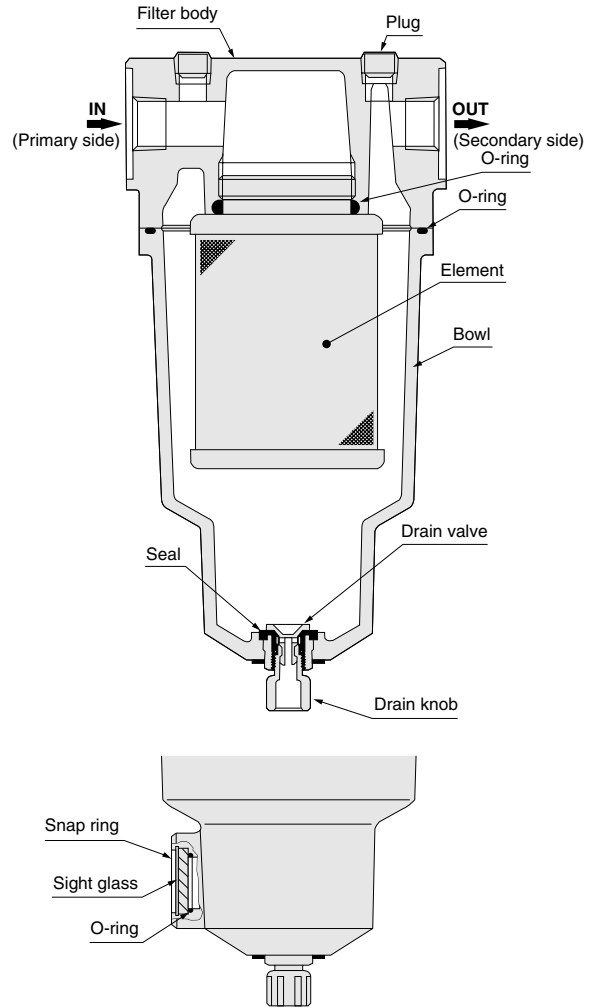
Note: For the bracket order codes and dimensions, see p.151~152.

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

Body model	Port size		
	Rc1/2	Rc3/4	Rc1
600	04	06	08
800	04	06	08

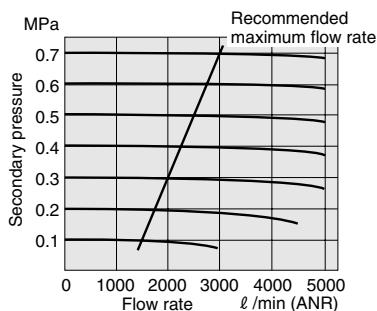
Micro mist filter

### Inner Construction

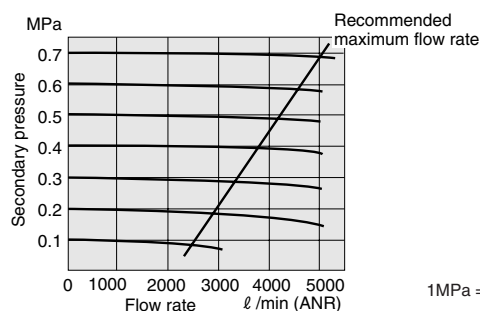


### Flow Rate Characteristics

#### MMF600



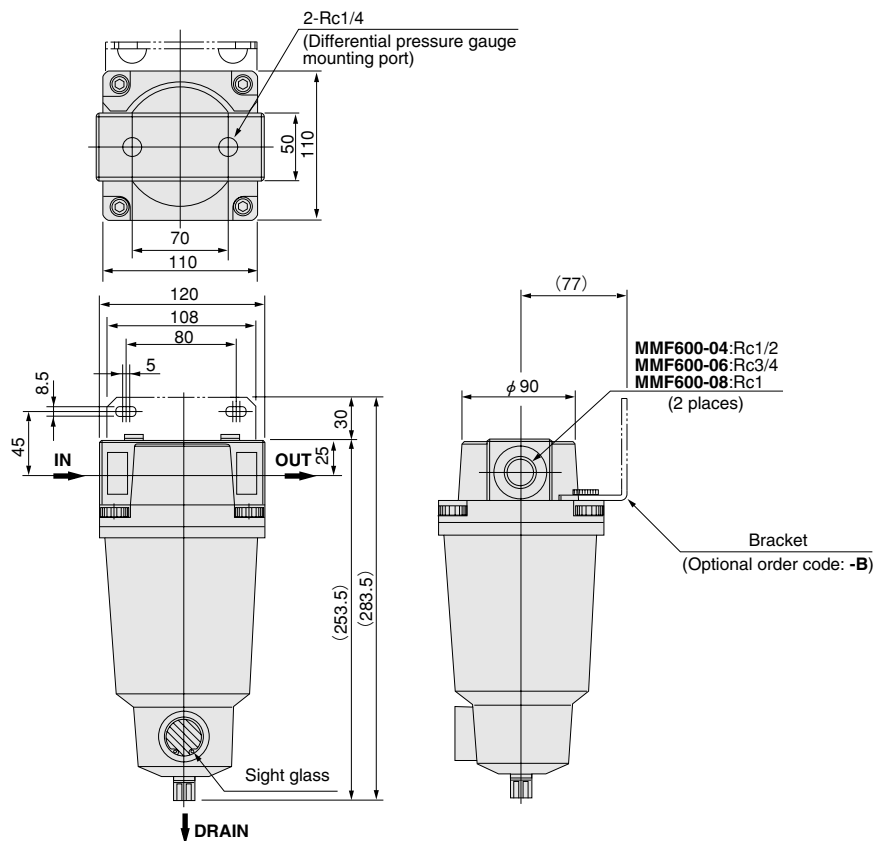
#### MMF800



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

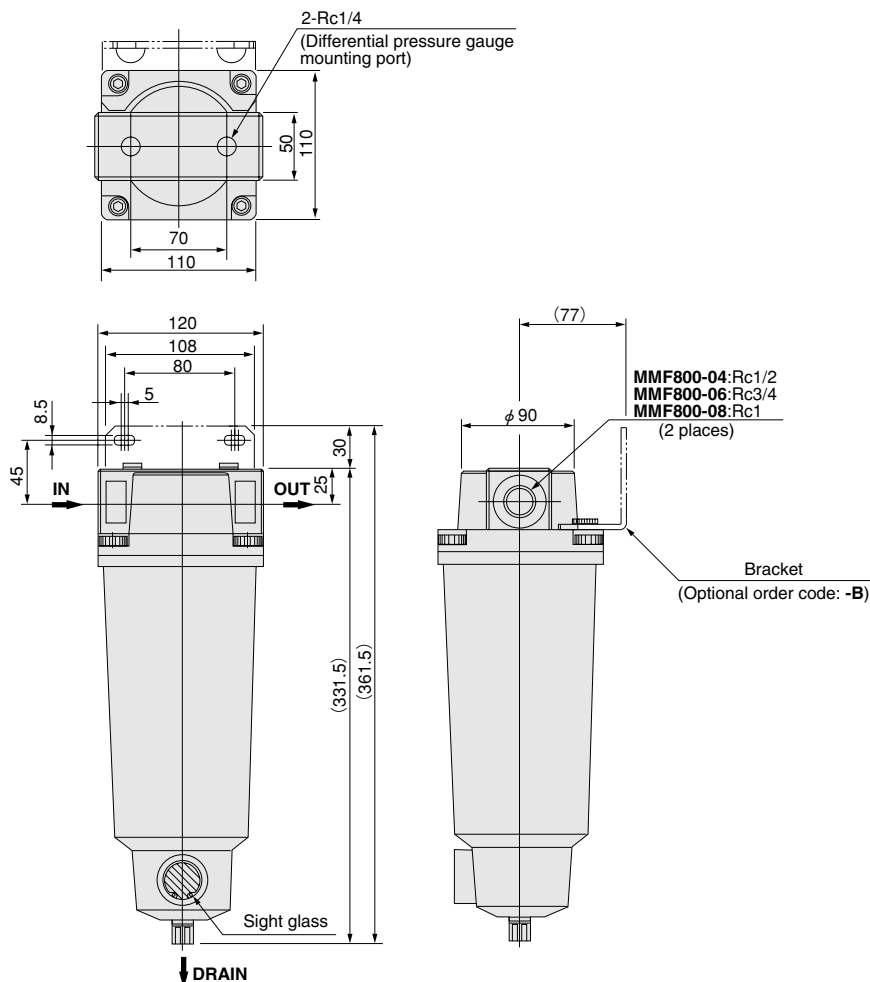
# Dimensions of Micro Mist Filters (mm)

## MMF600

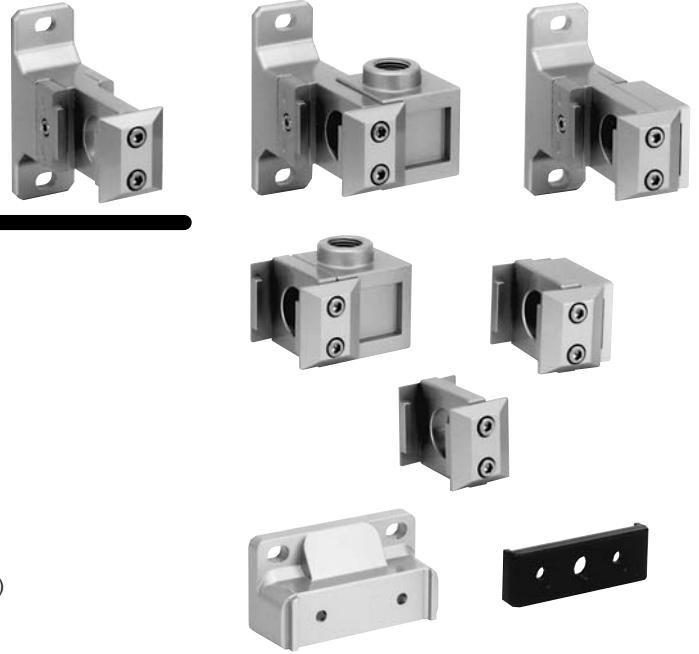


F.R.L. LARGE FLOW SERIES

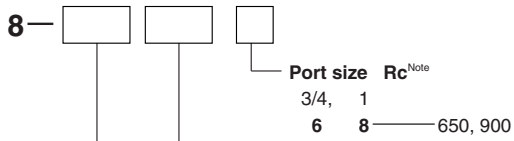
## MMF800



# MODULES AND ADAPTERS



## Order Codes



### Module and adapter









- F — F module
- ND — D module for bracket-combined use
- T — T module
- DT — T module for bracket-combined use
- R — R module (For regulator only)
- M — Piping supporting type M module (For regulator only)
- S — S adapter
- DS — S adapter module

### Body size

- 65 — For 650 series
- 90 — For 900 series

Note: Port size selection is not allowed for F module (F), D module for bracket-combined use (ND), R module (R), and piping supporting type M module (M).

## Model List

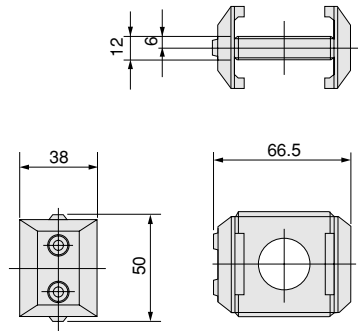
Modules and adapters	F module	D module	T module	
	F	ND	T	DT
Body size	 (For modules only)	 (Brackets for combined use)	 (Branch piping)	 (Brackets for combined use with branch piping)
65	<b>8-65F</b> ● Applicable model FN650 RN650, RN651, RN652 LN650, LN651 FN900, FN901 LN900, LN901, LN902	<b>8-65ND</b> ● Applicable model CN650, CY650, CN750 FN650 RN650, RN651, RN652 LN650, LN651 FN900, FN901, LN900, LN901, LN902	<b>8-65T</b> ● Applicable model FN650 RN650, RN651, RN652 LN650, LN651 FN900, FN901 LN900, LN901, LN902	<b>8-65DT</b> ● Applicable model FN650 RN650, RN651, RN652 LN650, LN651 FN900, FN901 LN900, LN901, LN902
90		<b>8-90ND</b> ● Applicable model CZ650 MF800, MF1000 MMF600, MMF800		<b>8-90DT</b> ● Applicable model MF800, MF1000 MMF600, MMF800
Modules and adapters	R module	M module	S adapter	
	R	M	S	DS
Body size	 (For regulator only)	 (For supporting regulator piping only)	 (Port connection)	 (Brackets for combined use with piping connection)
65	—	—	<b>8-65S</b> ● Applicable model FN650 RN650, RN651, RN652 LN650, LN651 FN900, FN901 LN900, LN901, LN902	<b>8-65DS</b> ● Applicable model FN650 RN650, RN651, RN652 LN650, LN651 FN900, FN901 LN900, LN901, LN902
90	<b>8-90R</b> ● Applicable model CN900 CY900 CZ900 RN900, RN902	<b>8-90M</b> ● Applicable model RN900, RN902		<b>8-90DS</b> ● Applicable model MF800, MF1000 MMF600, MMF800

Remark: The applicable models shown in the tables are typical examples. For details, see p.125.

## Dimensions of F Module (mm)

● 8-65F

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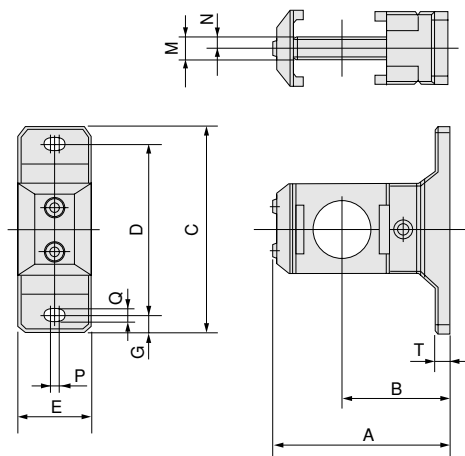


## Dimensions of D Module for Bracket-combined Use (mm)

● 8-65ND

● 8-90ND

CAD Frl\_mod

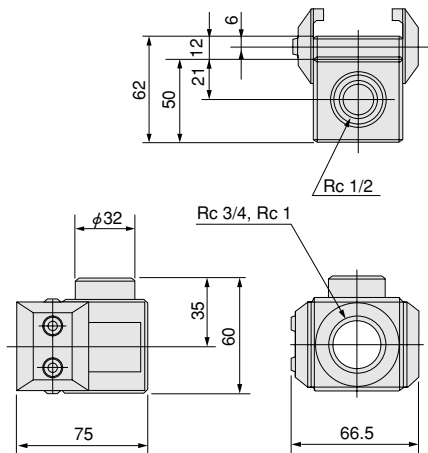


Model	A	B	C	D	E	G	M	N	P	Q	T
8-65ND	94	60	110	90	38	10	12	6	4	9	8
8-90ND	111	77	110	90	38	10	12	6	4	9	7

## Dimensions of T Module (mm)

● 8-65T

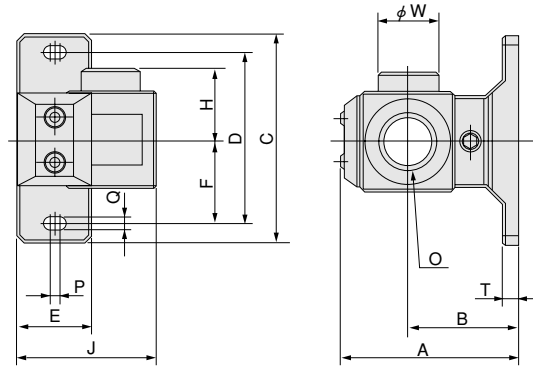
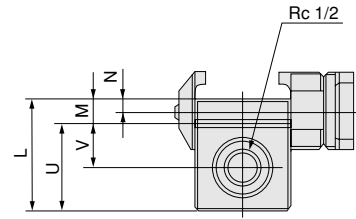
CAD Frl\_mod



## Dimensions of T Module for Bracket-combined Use (mm)

- 8-65DT
- 8-90DT

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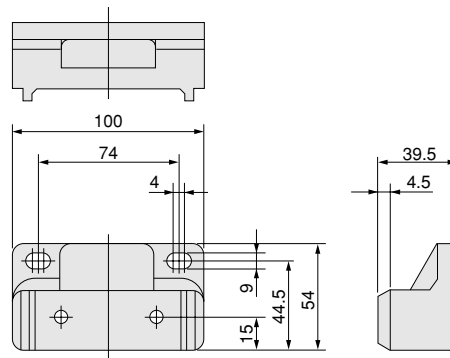


Model	A	B	C	D	E	F	H	J	L	M	N	O	P	Q	T	U	V	φ W
8-65DT	94	60	110	90	38	45	35	75	62	12	6	Rc3/4 Rc1	4	9	8	50	21	32
8-90DT	111	77	110	90	38	45	35	75	62	12	6	Rc3/4 Rc1	4	9	7	50	21	32

## Dimensions of R Module (For Regulator Only) (mm)

- 8-90R

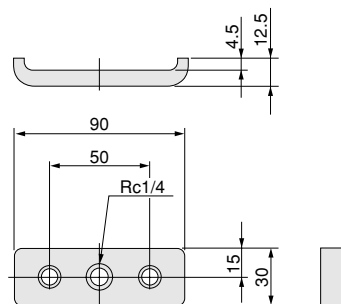
CAD FrL\_mod6



## Dimensions of Piping Supporting Type M Module (mm)

- 8-90M

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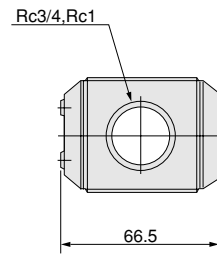
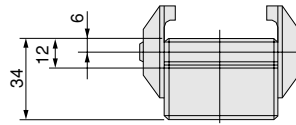
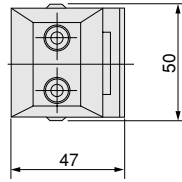




## Dimensions of S Adapter (mm)

● 8-65S

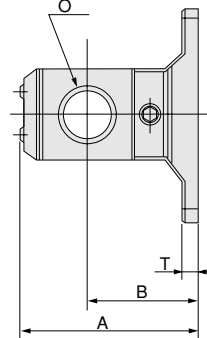
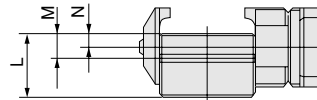
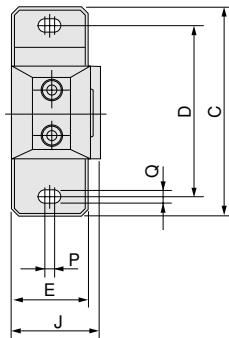
CAD Frl\_mod5



## Dimensions of S Adapter Module (mm)

● 8-65DS   
● 8-90DS

CAD Frl\_mod



Model	A	B	C	D	E	J	L	M	N	O	P	Q	T
8-65DS	94	60	110	90	38	47	34	12	6	Rc3/4 Rc1	4	9	8
8-90DS	111	77	110	90	38	47	34	12	6	Rc3/4 Rc1	4	9	7

# BRACKETS



## Bracket Models and Applicable Component

Component type		Bracket model	Remark
Air filters	FN650	8-65B <sup>Note</sup>	Piping supporting type, optional
	FN900	8-90A	Body supporting type, optional
Mist filters	MF800	8-80A	Body supporting type, optional
	MF1000		
Micro mist filters	MMF600	8-80A	Body supporting type, optional
	MMF800		
Regulators	RN650	8-65	Standard
	RN900	8-90	
Lubricators	LN650	8-65B <sup>Note</sup>	Piping supporting type, optional
	LN900	8-90A	Body supporting type, optional

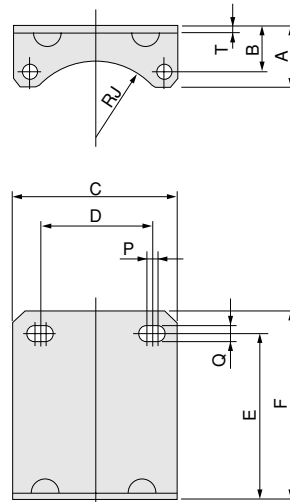
Note: Pipe supporting type brackets (8-65B) are sold in a set of two brackets.

## Dimensions of Brackets (mm)

■ For air filters, mist filters, micro mist filters, and lubricators

● 8-80A

● 8-90A



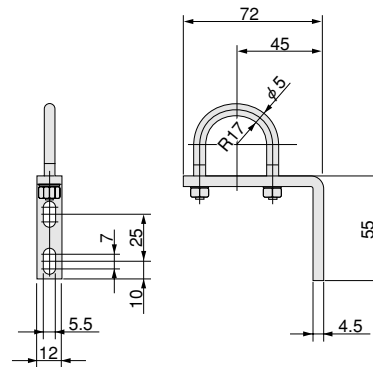
Model	A	B	C	D	E	F	RJ	P	Q	T	Applicable model
8-80A	50	32	108	80	70	80	47	5	8.5	3.2	MF800, MF1000, MMF600, MMF800
8-90A	31	23	88	62	90	100	42	5	8.5	3.2	FN900, FN901, LN900, LN901, LN902

■ For air filters and lubricators

● 8-65B<sup>Note</sup>



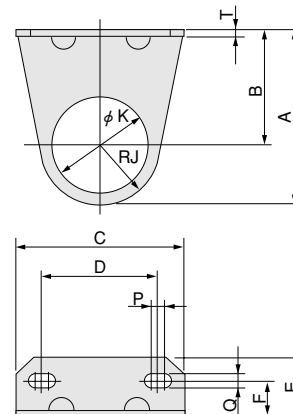
Note: Pipe supporting type brackets (8-65B) are sold in a set of two brackets.



■ For regulators

● 8-65

● 8-90



Model	A	B	C	D	E	F	RJ	φ K	P	Q	T	Applicable model
8-65	72.5	45	70	45	30	20	27.5	45	5	8.5	3.2	RN650, RN651, RN652
8-90	91	60	86	60	30	20	31	52.5	5	8.5	3.2	RN900, RN902

# Handling Instructions and Precautions



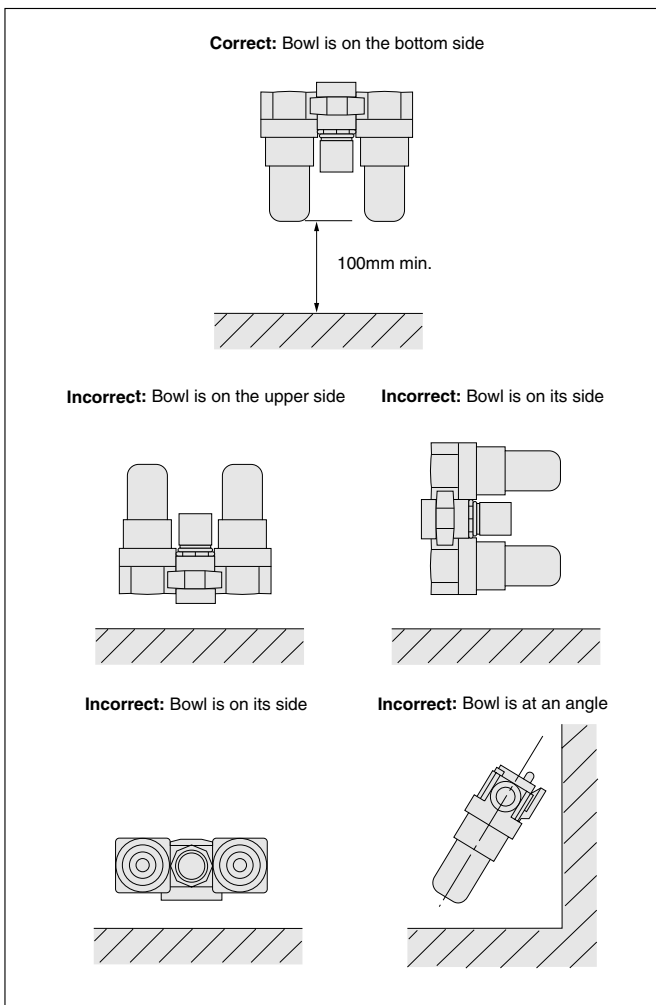
## F.R.L. Combinations

### Installation location

1. Install in locations where the ambient temperature is between 5~60°C [41~140°F].
2. The product cannot be used when the media or the ambient atmosphere contains any of the substances listed below.  
Organic solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, acids, or alkali, etc.
3. Avoid installation in locations subject to vibrations greater than 9.8m/s<sup>2</sup> [1G].

### Mounting method

Mount in a vertical position, with the piping connections on the top and the bowl on the bottom.  
(If using regulators as single units, any mounting direction is acceptable.)  
Leave enough space underneath the bowl to allow easy access for draining collected liquid, and replacement of the filter element.



- Notes:
1. Do not perform any machining on the body of the unit before or during mounting work. Its functions could be damaged.
  2. Use air for the media.
  3. Do not allow operating pressure to exceed a maximum of 0.97MPa [141psi].
  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.



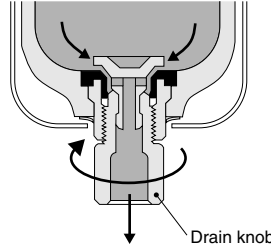
## Air Filter and Lubricator

### Drain cock

#### ● Screw type

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

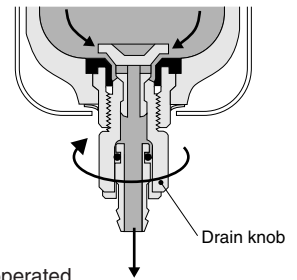
Rotating the drain knob to the left opens the drain port, and the collected liquid is expelled.



#### ● With fitting

(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.

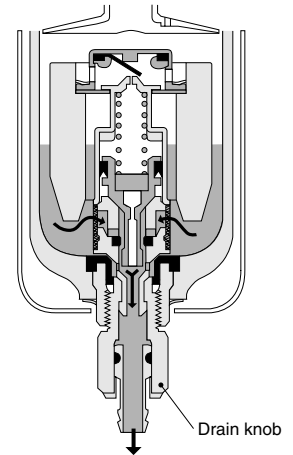


**Caution:** The drain knob should be operated using fingertips.

#### ● Auto drain type

(Air filter Order code: -A)

When a certain volume of collected 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.



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 fingertips.
3. If attaching a tube to the fitting, use a nylon tube with inner diameter of 6mm [0.236in.]. 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.

When placing orders for replacement of pressure gauges, see the table below.

Model	Optional order code	Sold separately	Module sold separately
650 750	G1A	G1-40	—
	GS1A	GS1-50-DL	
	GS1B	GS1-50-AL	
	GS1C	GS1-50-DL-T	
900	GS1D	GS1-50-AL-T	8-90M (with bolt)
	G1A	G1-40	
	GS1A	GS1-50-DL	
	GS1B	GS1-50-AL	
	GS1C	GS1-50-DL-T	
	GS1D	GSS1-50-AL-T	

Remark: If switching between G1A and GS1□, module (8-90M) is not required.