

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 ^{Note}									
	LN650	8-65S						8-65S	8-90M ^{Note}									
	LN651	8-65DS						8-65DS										
900 series	FN900							8-65F	8-90ND				8-65F	8-90ND				
	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 ^{Note}				8-65DT	8-90R ^{Note}				8-90R ^{Note}						
	LN901	8-65S	8-90M ^{Note}				8-65S	8-90M ^{Note}				8-90M ^{Note}						
	LN902	8-65DS						8-65DS										
	MF800							8-90ND	8-90R ^{Note}				8-65F	8-90ND				
	MF1000	8-65T	8-90R ^{Note}				8-90DT	8-90M ^{Note}				8-65T	8-90DT					
	MMF600	8-65S		8-90M ^{Note}				8-90DS				8-65S	8-90DS					
MMF800																		

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

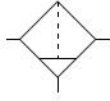
For 650, 900 series

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

AIR FILTERS

FN650, FN900, FN901

Symbol

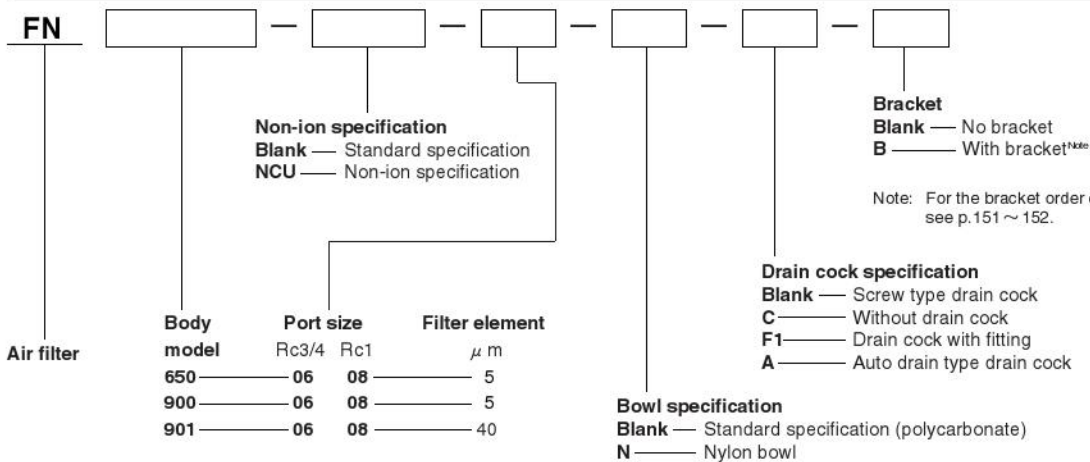


F.R.L. LARGE FLOW SERIES

Specifications

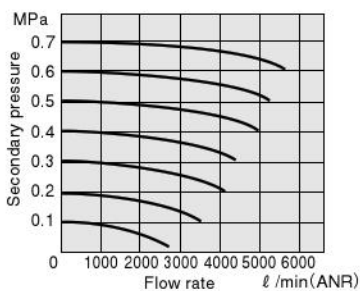
Item	Series		650 series		900 series	
	Type	Model	Standard		40 μ m type	
			FN650		FN900	
Media	Air or non-corrosive gas					
Port size	Rc	3/4, 1				
Filtration rating	μ m	5				40
Max. operating pressure	MPa [psi.]	0.97 [141]				
Proof pressure	MPa [psi.]	1.47 [213]				
Max. processed flow rate	ℓ /min [(ft ³ /min) (ANR)]	3000 [106]		6000 [212]		
Operating temperature range	$^{\circ}$ C [$^{\circ}$ F]	5~60 [41~140]				
Drain capacity	cc [in. ³]	90 [5.5]		130 [7.9]		
Mass	kg [lb]	Standard	0.58 [1.28]		1.11 [2.45]	
		Auto drain type	0.61 [1.35]		1.14 [2.51]	
Materials	Body	Aluminum die-casting				
	Skirt part	—				
	Bowl	Polycarbonate				
	Element	PE	PP			
Standard attachments	Bowl guard, screw type drain cock					

Order Codes

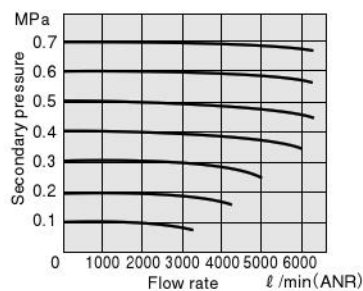


Flow Rate Characteristics

FN650

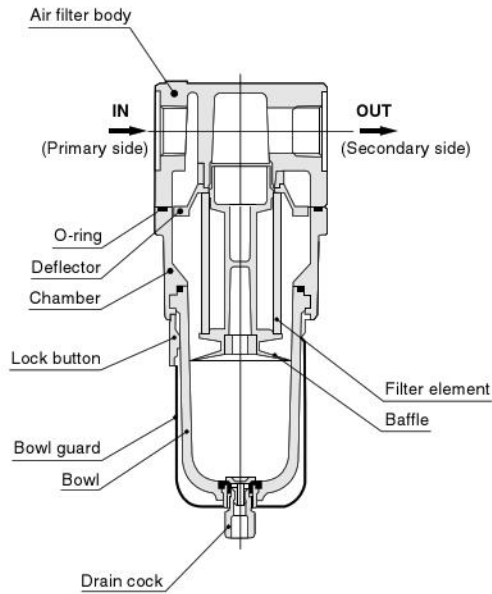


FN900
FN901

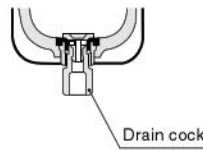


1MPa = 145psi. 1ℓ/min = 0.0353ft³/min.

Inner Construction



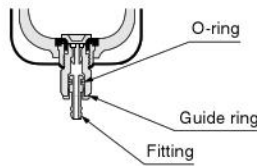
● Screw type drain cock



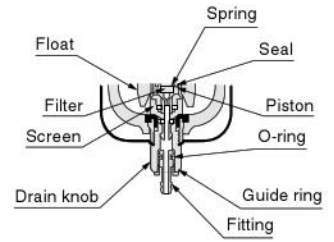
● Without drain cock



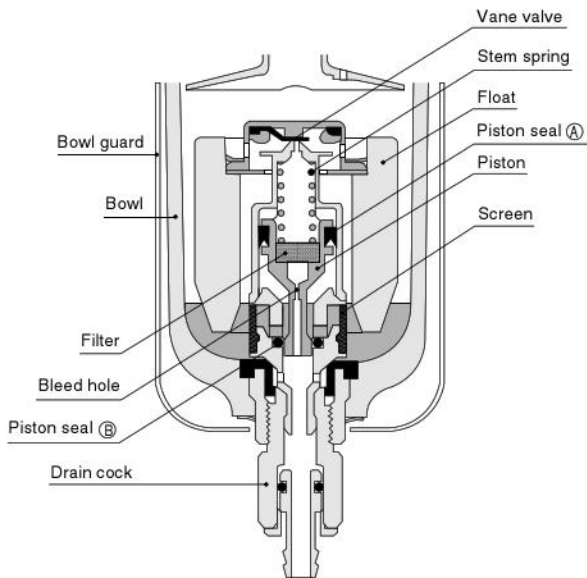
● Drain cock with fitting



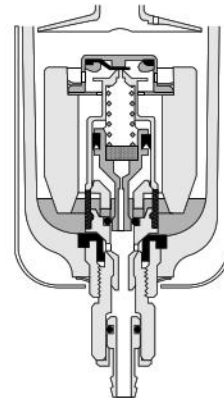
● Auto drain type drain cock



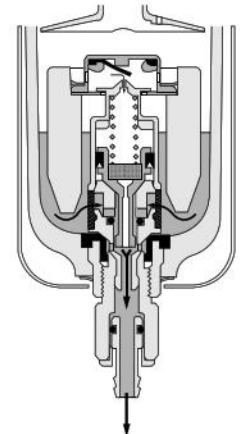
Inner Construction of Auto Drain



Condition of collected liquid



Condition of draining liquid



Operation principles

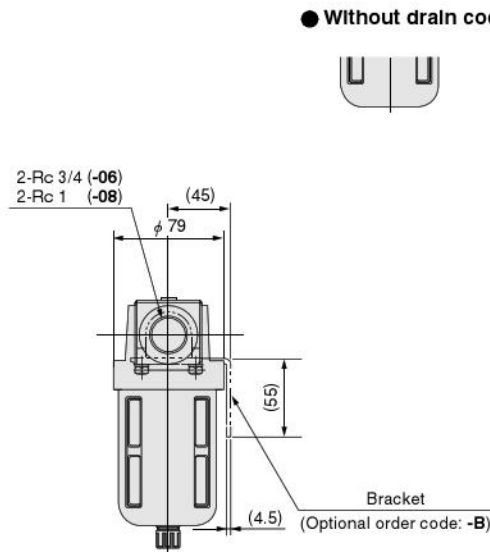
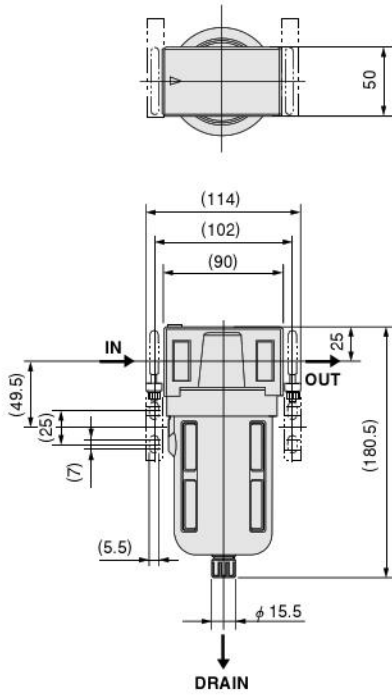
When liquid collects inside the bowl, the float rises and opens up the vane valve. Air brought to the top of the piston forces the piston downward, opening up the bottom of the piston and expelling liquid that has passed through the screen. As the liquid is drained out, the float falls, closing the vane 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 exhausted.

Remark: Air is exhausted 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.

Dimensions of Air Filters (mm)

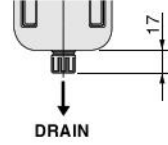
FN650



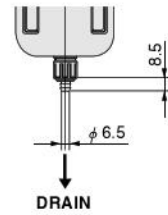
● Without drain cock



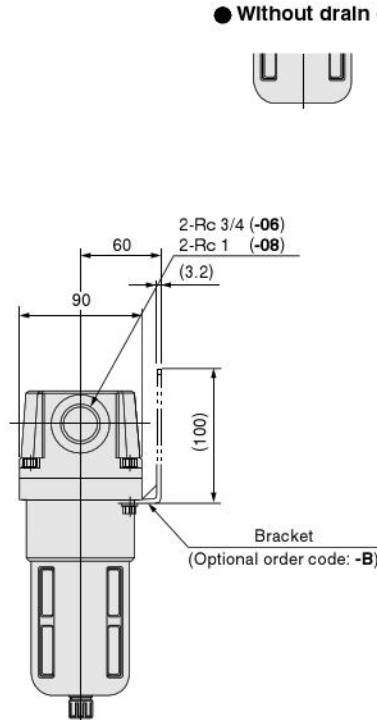
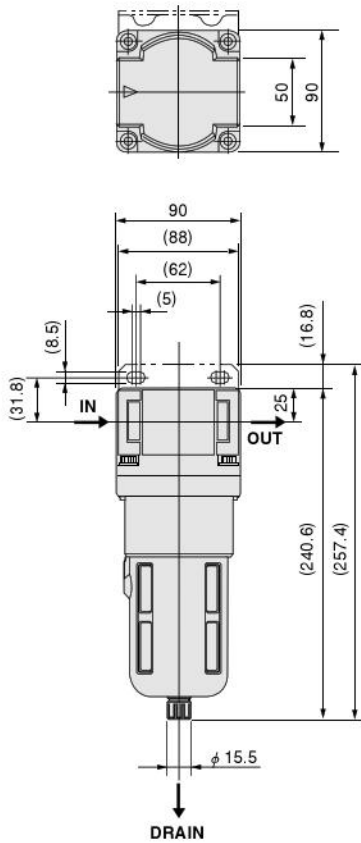
● Screw type drain cock



● Drain cock with fitting
● Auto drain type drain cock



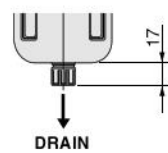
FN900 FN901



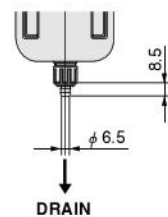
● Without drain cock



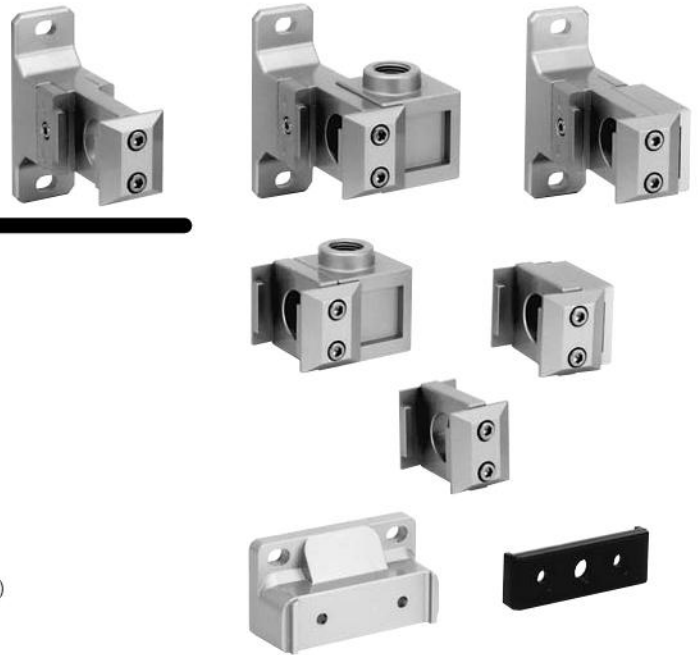
● Screw type drain cock



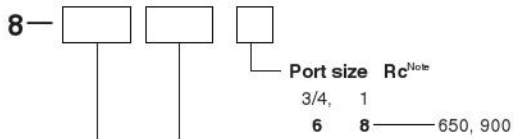
● Drain cock with fitting
● Auto drain type drain cock



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

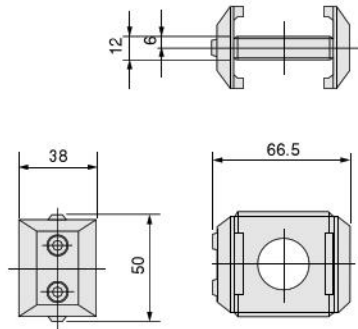
Modules and adapters	F module	D module	T module	
	F	ND	T	DT
Body size	 (For modules only)	 (Brackets for combined use)	 (Branch piping)	 (Brackets for combined use with branch piping)
65	8-65F ● Applicable model FN650 RN650, RN651, RN652 LN650, LN651 FN900, FN901 LN900, LN901, LN902	8-65ND ● Applicable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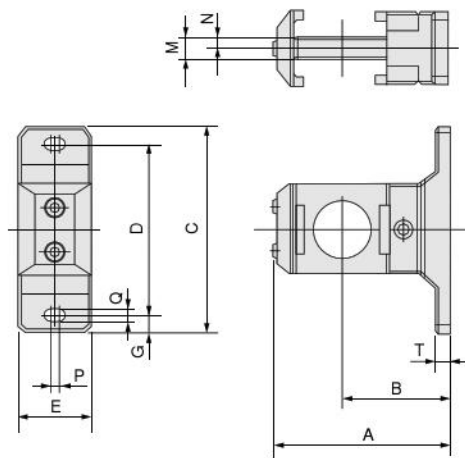


Dimensions of D Module for Bracket-combined Use (mm)

● 8-65ND

● 8-90ND

CAD Frl_mod

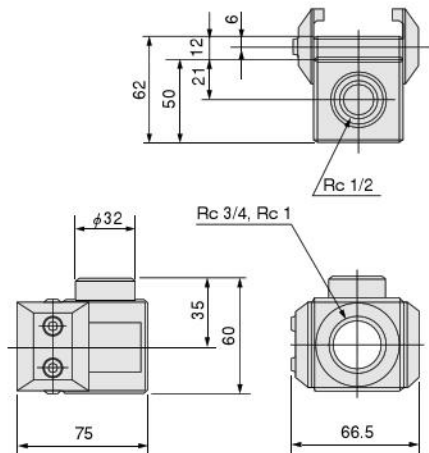


Model	A	B	C	D	E	G	M	N	P	Q	T
8-65ND	94	60	110	90	38	10	12	6	4	9	8
8-90ND	111	77	110	90	38	10	12	6	4	9	7

Dimensions of T Module (mm)

● 8-65T

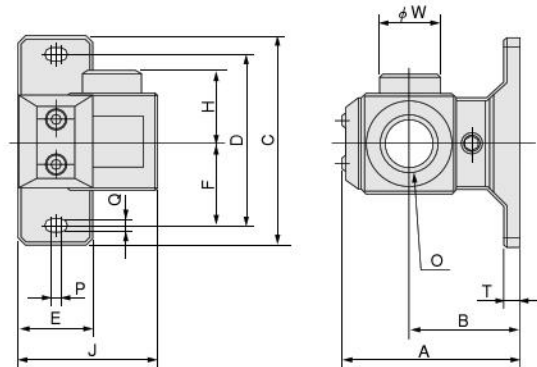
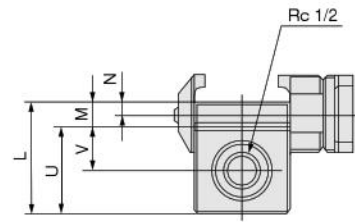
CAD Frl_mod



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

- 8-65DT
- 8-90DT

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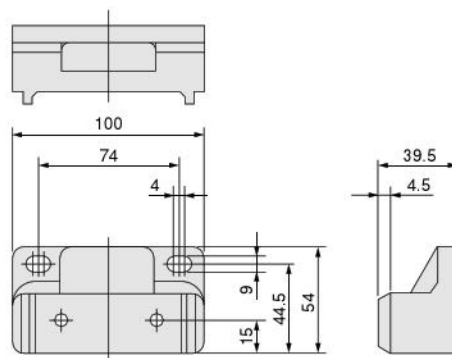


Model	A	B	C	D	E	F	H	J	L	M	N	O	P	Q	T	U	V	φW
8-65DT	94	60	110	90	38	45	35	75	62	12	6	Rc3/4 Rc1	4	9	8	50	21	32
8-90DT	111	77	110	90	38	45	35	75	62	12	6	Rc3/4 Rc1	4	9	7	50	21	32

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

- 8-90R

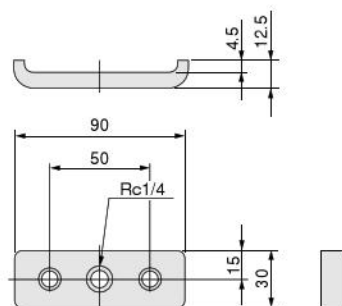
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Dimensions of Piping Supporting Type M Module (mm)

- 8-90M

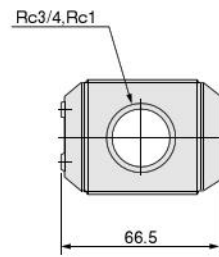
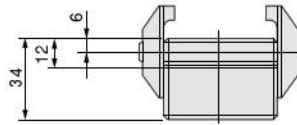
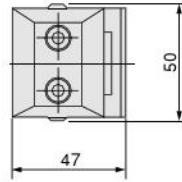
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Dimensions of S Adapter (mm)

● 8-65S

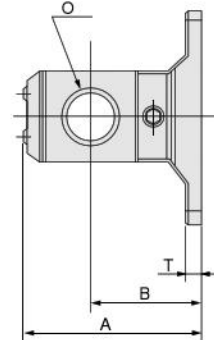
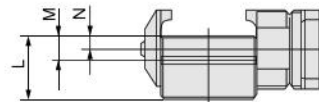
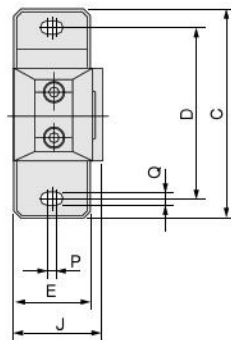
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Dimensions of S Adapter Module (mm)

● 8-65DS
● 8-90DS

CAD Frl_mod5



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 ^{Note}	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 ^{Note}	Piping supporting type, optional
	LN900	8-90A	Body supporting type, optional

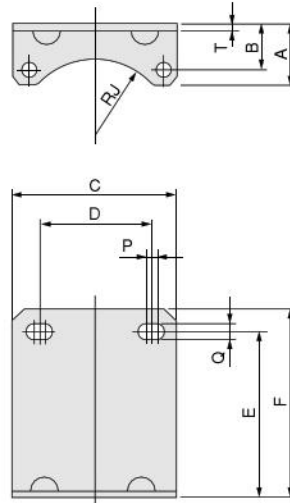
Note: Pipe supporting type brackets (8-65B) are sold in a set of two brackets.

Dimensions of Brackets (mm)

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

● 8-80A

● 8-90A



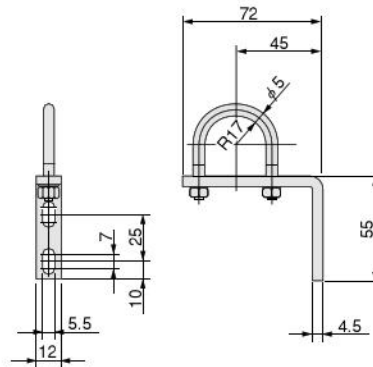
Model	A	B	C	D	E	F	RJ	P	Q	T	Applicable model
8-80A	50	32	108	80	70	80	47	5	8.5	3.2	MF800, MF1000, MMF600, MMF800
8-90A	31	23	88	62	90	100	42	5	8.5	3.2	FN900, FN901, LN900, LN901, LN902

■ For air filters and lubricators

● 8-65B Note



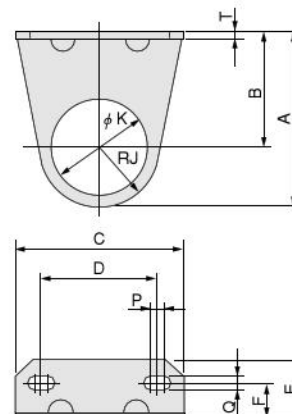
Note: Pipe supporting type brackets (8-65B) are sold in a set of two brackets.



■ For regulators

● 8-65

● 8-90



Model	A	B	C	D	E	F	RJ	φK	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

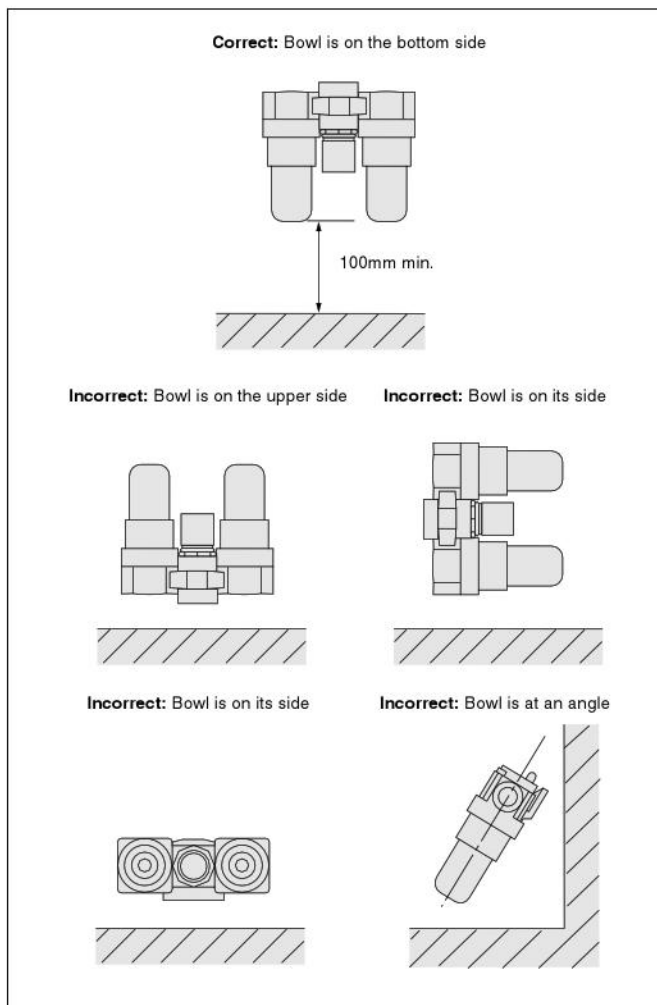
1. Install in locations where the ambient temperature is between 5 ~ 60°C [41 ~ 140°F].
2. The product cannot be used when the media or the ambient atmosphere contains any of the substances listed below.
Organic solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, acids, or alkali, etc.
3. Avoid installation in locations subject to vibrations greater than 9.8m/s² [1G].

Mounting method

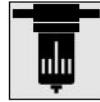
Mount in a vertical position, with the piping connections on the top and the bowl on the bottom.

(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.



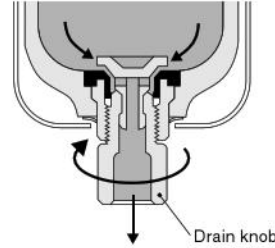
Air Filter and Lubricator

Drain cock

● Screw type

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

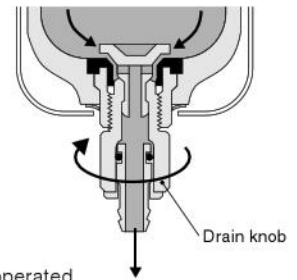
Rotating the drain knob to the left opens the drain port, and the collected liquid is expelled.



● 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.

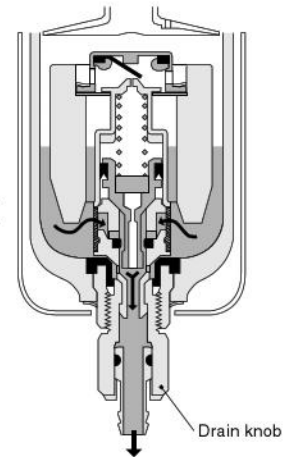


Caution: The drain knob should be operated using fingertips.

● 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.