

# Fluororesin Products Pure Process Series



## Fluororesin Products

# Pure Process Series

Among various plastic materials, fluororesin exhibits particularly superior chemical resistance, heat resistance, low friction, electrical insulation, low tackiness, weather resistance, and other features. This superior material is fabricated using micro-machining technology for PTFE products, and Koganei's independently developed injection molding method for PFA products, all under Koganei's rigorous quality control. These products are used in the semiconductor, liquid crystal, and other electronics sectors, as well as in chemicals, food products, medical equipment, chemical plants, and a wide variety of other industrial sectors.

## Fluororesin Valve Series



- Compact series line-up suitable for control of small chemical flows now offers even more variety.
- In addition to diverse piping specifications and valve functions, the line-up offers a wide selection of options, such as automatic flow adjustment.

- Air operated valves
- Suck back valves
- Air operated valves with suck back
- Solenoid valve
- Check valve
- Drain valves

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## Fluororesin H Series Fittings



- Simple construction eliminates the need for dedicated tools. Ease of operation during piping is boosted dramatically.
- Tapered seal type offers superior pressure resistance, sealing ability, and heat resistance.

- Straight type
- Elbow type
- T type
- Reducing type

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# Fluororesin Tube Series



- Size variations for the field-proven fluororesin tube have expanded.
- The high-grade HG tube and NE tube that demonstrates effectiveness against anti-static charges, have been added to the line-up.

- PFA tubes
- PFA-HG tubes
- PFA-NE tubes
- BT tubes
- RPL tubes

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### Caution

Before use, always read the "Safety Precautions" on p. 3, 48, 60

Before selecting and using products, please read all the Safety Precautions carefully to ensure proper product use. The Safety Precautions shown below are to help you use the product safely and correctly, and to prevent injury or damage to you, other people, and assets beforehand.

Follow the Safety Precautions for: ISO4414 (Pneumatic fluid power—Recommendations for the application of equipment to transmission and control systems), JIS B 8370 (Pneumatic system regulations).

**The directions are ranked according to degree of potential danger or damage: “DANGER!”, “WARNING!”, “CAUTION!” and “ATTENTION!”**

 <b>DANGER</b>	Expresses situations that can be clearly predicted as dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
 <b>WARNING</b>	Expresses situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
 <b>CAUTION</b>	Expresses situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in light or semi-serious injury. It could also result in damage or destruction of assets.
 <b>ATTENTION</b>	While there is little chance of injury, this content refers to points that should be observed for appropriate use of the product.

- **This product was designed and manufactured as parts for use in General Industrial Machinery.**
- In the selection and handling of equipment, the system designer or other person with fully adequate knowledge and experience should always read the Safety Precautions, Catalog, User’s Manual and other literature before commencing operation. Making mistakes in handling is dangerous.
- After reading the Instruction Manual, Catalog, etc., always place them where they can be easily available for reference to users of this product.
- If transferring or lending the product to another person, always attach the Instruction Manual, Catalog, etc., to the product where they are easily visible, to ensure that the new user can use the product safely and properly.
- The danger, warning, and caution items listed under these “Safety Precautions” do not cover all possible cases. Read the Catalog and User’s Manual carefully, and always keep safety first.

 **DANGER**

- Do not use for the purposes listed below:
  1. Medical equipment related to maintenance or management of human lives or bodies.
  2. Mechanical devices or equipment designed for the purpose of moving or transporting people.
  3. Critical safety components in mechanical devices.
 This product has not been planned or designed for purposes that require advanced stages of safety. It could cause injury to human life.
- Do not use solenoid valves in locations with or near dangerous substances such as flammable or ignitable substances. The products are not explosion-proof. They could ignite or burst into flames.
- Do not allow flammable gases or ignitable chemicals to flow the solenoid valves. Moreover, do not use the solenoid valve in atmospheres containing flammable gases. There is a chance of explosion or ignition.
- Persons who use a pacemaker, etc., should keep a distance of at least one meter [3.28ft.] away from the solenoid valve. There is a possibility that the pacemaker will malfunction due to the strong magnet built into the solenoid valve.
- Do not use any media other than those shown in the specifications table. Use of non-specified media could lead to early shutdown of function or a sudden drop in performance, and result in a reduced operating life. Media leakage on the outside of the product could pose a risk to human life.
- When using chemicals, always check compatibility with the structural materials of the product before use. Use of incompatible media could lead to early shutdown of function or a sudden drop in performance, and result in a reduced operating life. Fluid leakage on the outside of the product could pose a risk to human life.
- When attaching the product, always ensure that it is securely mounted in place. Dropping or falling the product or improper operation could result in injury.
- While the product is in operation, avoid touching it with your hands or otherwise approaching too close. In addition, do not make any adjustments to the interior or to the attached mechanisms (manual override, connecting and disconnecting of wiring connectors, disconnection or connection of piping

- tubes or plugs, or adjustment of mounting locations) while in operation. The chemicals could leak out, possibly resulting in injury.
- Do not splash water on the product. Spraying it with water, washing it, or using it underwater could result in malfunction of the product leading to injury, electric shocks, fires, etc.
- Never attempt to remodel the product. It could result in abnormal operation leading to injury, electric shocks, fires, etc.
- Never attempt inappropriate disassembly, assembly or repair of the product relating to basic construction, or to its performance or to functions. It could result in injury, electric shocks, fires, etc.

 **WARNING**

- Do not use the product in excess of its specification range. Such use could result in product breakdowns, function stop or damage or drastically reduce the operating life.
- Before supplying chemicals, gases, or pilot air to the product, and before beginning operation, check that the piping is connected correctly. Careless supply of chemicals, gases, or pilot air could result in chemicals, etc. flowing to an unintended location or leaking out, and causing injury.
- For repairs, inspections, maintenance, replacement, or any other operations related to the product (particularly when the media used are chemicals), check that the chemicals have been completely drained from inside of the equipment, and that pilot air has been shut off and pressure inside the piping completely released. Neglecting this check could lead to leaks of chemicals, etc., that could cause injury.
- When installing a fluororesin fitting, always perform a leak test before supplying chemicals or gases through it, to check that there are no leaks, and then start passing the media. Neglecting this check could lead to leaks of chemicals, etc., that could cause injury.
- Do not pull on tubes that are connected to the fittings. The tube(s) could pull out, leaking chemicals or gases.
- When using fittings and tubes, always use compatible screw sizes and tube sizes. Use of incompatible sizes could lead to leaks or disconnections.
- Always check the Catalog etc. to ensure that solenoid valve

wiring and piping is installed correctly. Errors in wiring and piping could lead to abnormal operation.

- Do not use the solenoid valves or the wiring to control them, at locations close to power lines where large electrical currents are flowing, or in locations subject to strong magnetic fields or power surges. Such applications could lead to unintended operation.
- Do not install solenoid valves inside control panels. Heat inside the control panels could cause leakage on the piping or other areas.
- When energizing the solenoid valve for long periods, provide heat radiation measures to ensure that ambient temperature of the solenoid valve always remain within the specified temperature range. When energizing the unit for long periods, consult us.
- The solenoid valve could generate surge voltage and electromagnetic waves when the switch is turned off, affecting the operations of surrounding equipment. Use solenoids with surge suppression, or take countermeasures in the electrical circuits for surges or electromagnetic waves.
- Always shut off the power when performing wiring work. Leaving the power on could result in electric shocks.
- After completing wiring work, always check to ensure that no wiring connection errors exist before turning on the power.
- Apply the specified voltage to the solenoid. Using the wrong voltage level will prevent the solenoid from performing its function, and could lead to breakage or burning damage of the product itself.
- Avoid scratching the solenoid valve lead wires. Letting the lead wires be subject to scratching, excessive bending, pulling, rolling up, or being placed under heavy objects or squeezed between two objects, may result in current leaks or defective continuity that lead to fires, electric shocks, or abnormal operation.
- Do not touch terminals and miscellaneous switches, etc., while the solenoid valve is powered on. There is a possibility of electric shocks and abnormal operation.
- Design devices so as to ensure safety even when equipment shuts down due to emergency stops, power outages, or other system problems, to prevent damage to the devices or personal injury.
- In the first operation after the equipment has been idle for 48 hours or more, or has been in storage, there is a possibility that contacting parts have been stuck, resulting in equipment operation delays or sudden movements. For these first operations, always run a test operation before use to confirm that the movement is normal.
- In low frequency use (more than 30 days between uses), there is a possibility that contacting parts have been stuck, resulting in equipment operation delays or sudden movements that could lead to personal injury. Run a test operation at least once every 30 days to confirm that movement is normal.
- Do not sit on the product, place your foot on it, or place other objects on it. Accidents such as falling and tripping over could result in injury. Dropping the product may result in injury, or also damage or break the product resulting in abnormal or erratic operation, or runaway, etc.
- Do not allow the product to be thrown into fire. The product could explode and/or release toxic gases.



## CAUTION

- Do not use in locations that are subject to direct sunlight (ultraviolet rays), in locations with high temperatures or high humidity, in locations subject to dust, salt, or iron powder, or when the media or ambient atmosphere include components that are incompatible with the product structural materials. It could lead to early shutdown of function or a sudden degradation of performance, and result in a reduced operating life. For the material, see the Major Parts and Materials.
- When mounting the product, leave room for adequate working space around it. Failure to ensure adequate working space will make it more difficult to conduct daily inspections or maintenance, which could eventually lead to system shutdown or damage to the product.
- For installing or transporting heavy products, use a lift, supporting tool, or several people, to provide firm support, and proceed with due caution to ensure personal safety.

- Always post an “operations in progress” sign for installations, adjustments, or other operations, to avoid accidental supply of chemicals, gases, pilot air, or electrical power, etc. Accidental supplying of chemicals, gases, pilot air, or electrical power, etc., could result in injury to operators due to sudden movement of the product, or to electrical shocks.
- Do not bring floppy disks or magnetic media, etc., within one meter [3.28ft.] of the product. There is the possibility that the data on the floppy disks will be destroyed due to the magnetism of the magnet.
- Do not use the solenoid valve in locations subject to large electrical currents or magnetic fields. It could result in erratic operation.
- If leakage current is occurring in the control circuit, there is a possibility of the product performing an unintended operation. Take measures against leakage current in the control circuit, to ensure that the leakage current value does not exceed the allowed range in the product specifications.
- Do not block the product’s breathing holes. Pressure changes occur due to changes in volume during operation. Blocking the breathing holes destroys the pressure balance, and could cause failure of the intended operation, equipment damage, or personal injury.



## ATTENTION

- When considering the possibility of using this product in situations or environments not specifically noted in the Catalog or User’s Manual, or in applications where safety is an important requirement, such as in an airplane facility, combustion equipment, leisure equipment, safety equipment and other places where human life or assets may be greatly affected, take adequate safety precautions such as application with enough margins for ratings and performance or fail-safe measures. Be sure to consult us with such applications.
- The properties of fluororesin products mean that they may sometimes not be used with certain acid, alkaline or toxic fluids due to penetration or permeation. For use in such applications, consult us.
- Always check the Catalog and other reference materials for product wiring and piping.
- Use protective covers, etc., to ensure that the operating parts of mechanical devices, etc., are isolated and do not come into direct contact with human bodies.
- When handling the product, wear protective gloves, safety glasses, safety boots, etc. to keep safety.
- When the product can no longer be used, or is no longer necessary, dispose of it appropriately as industrial waste.
- Fluororesin products can show deterioration in performance or function as operating span lengthens. Perform daily inspections of fluororesin products, to check that they satisfy the required functions for the system, and to prevent accidents.
- For inquiries about the product, consult your nearest Koganei sales office or Koganei overseas department. The address and telephone number is shown on the back cover of this catalog.

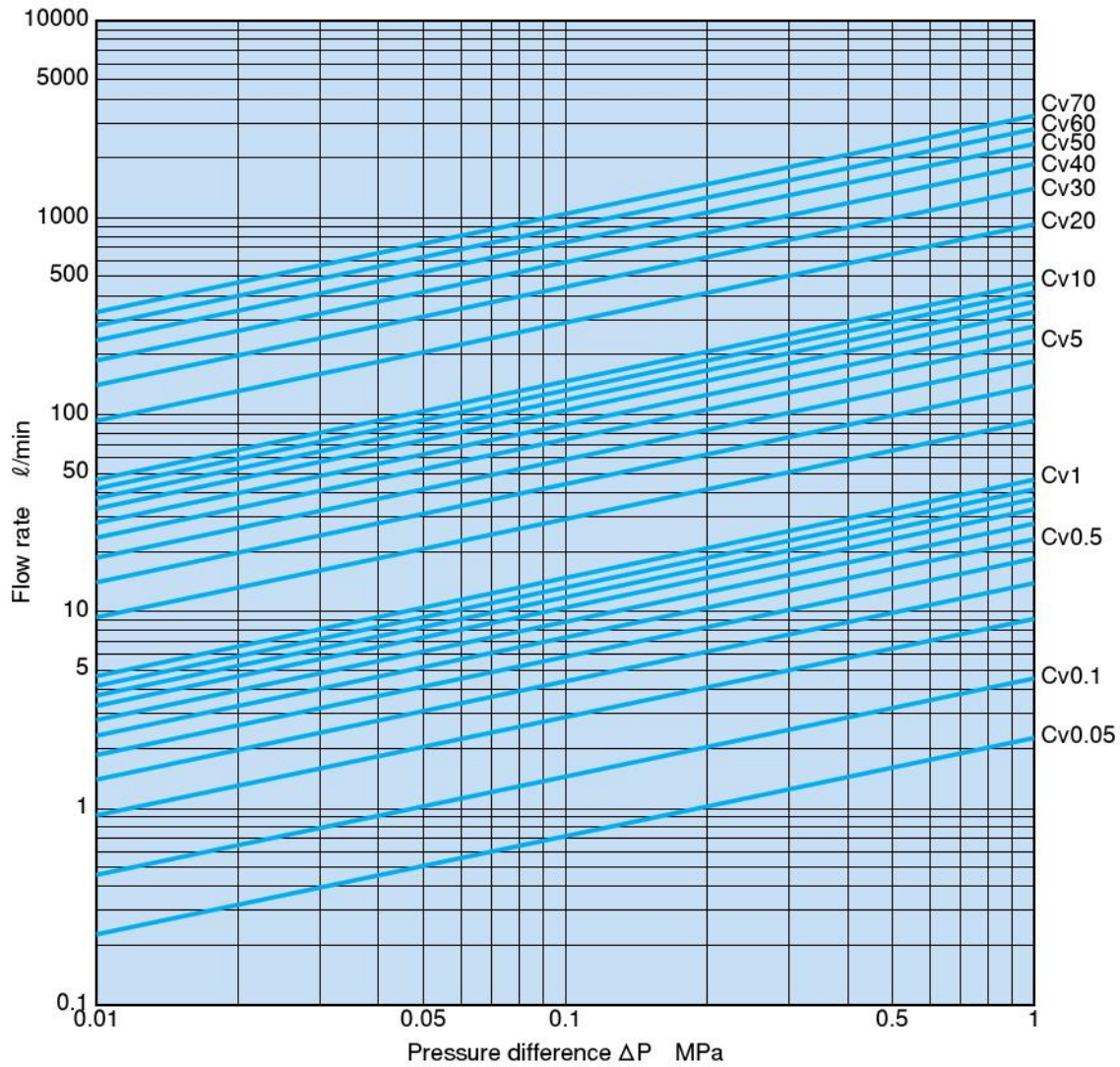


## OTHERS

- Always observe the following items.
  1. When using this product in fluid system or pneumatic systems for pilot, always use genuine KOGANEI parts or compatible parts (recommended parts). When conducting maintenance and repairs, always use genuine KOGANEI parts or compatible parts (recommended parts). Always observe the required methods and procedure.
  2. Never attempt inappropriate disassembly or assembly of the product relating to basic construction, or to its performance or to functions.

Koganei cannot be responsible if these items are not properly observed.

**Water: Flow rate conversion graph**



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

Note: The pressure difference ΔP in the graph shows the pressure difference between the primary (upstream) gauge pressure P1 and secondary (downstream) gauge pressure P2.  
ΔP=P1-P2 (MPa)

**Flow rate equation** (in the equation, pressures Ph and PI show absolute pressure)

$$Q = 45.62Cv \frac{\sqrt{Ph - PI}}{\sqrt{G}}$$

Q: Flow rate l/min  
Cv: Flow rate coefficient  
Ph: Primary (upstream) absolute pressure (Mpa)  
PI: Secondary (downstream) absolute pressure (Mpa)  
G: Specific gravity (for water, this equals 1)

**How to use the graph**

When there is no diagram for the valve flow rate coefficient (Cv) in the above graph:

Multiply the Cv of the valve being used to the flow rate at Cv = 1 read out from the graph to calculate the flow.

Example: At Cv = 1, value read out from the graph:

Q=20 l/min [0.706ft<sup>3</sup>/min.] for the desired pressure difference

When flow rate coefficient for the valve being used is

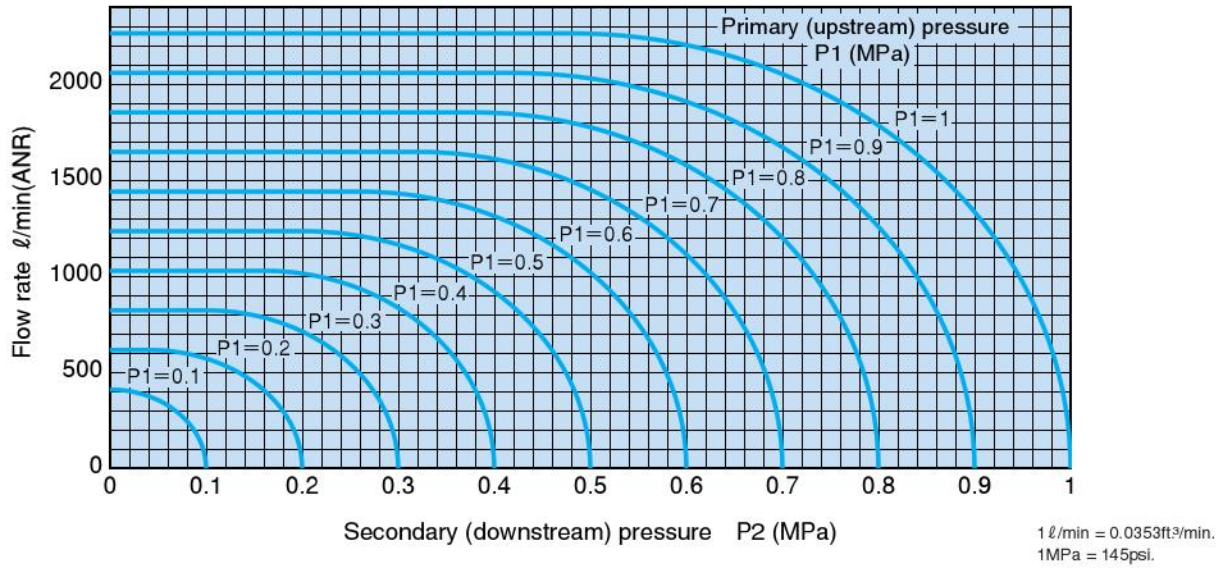
Cv = 0.31

Seeking flow rate = Q×Cv=20×0.31= 6.2 l/min [0.219ft<sup>3</sup>/min.]

$$Q' = 0.1338Cv \frac{\sqrt{Ph' - PI'}}{\sqrt{G}}$$

Q': Flow rate ft<sup>3</sup>/min.  
Cv: Flow rate coefficient  
Ph': Primary (upstream) absolute pressure (psi.)  
PI': Secondary (downstream) absolute pressure (psi.)  
G: Specific gravity (for water, this equals 1)

**Air: Flow rate conversion graph Cv=1**



Note: Pressures P1 and P2 in the graph show the gauge pressure (MPa).

**Flow rate equation**

(in the equation, pressures Ph and Pl show absolute pressure)

1) When  $P_l / P_h > 0.5283$

$$Q = 4119 C_v \frac{\sqrt{(P_h - P_l) P_l}}{\sqrt{G}}$$

2) When  $P_l / P_h \leq 0.5283$

$$Q = 2056 C_v P_h \frac{1}{\sqrt{G}}$$

- Q: Flow rate l/min (ANR)
- Cv: Flow rate coefficient
- Ph: Primary (upstream) absolute pressure (Mpa)
- Pl: Secondary (downstream) absolute pressure (Mpa)
- G: Specific gravity (conversion specific gravity, when air is 1)

**How to use the graph**

The above graph shows the flow rate when the flow rate coefficient Cv = 1.

When Cv ≠ 1, multiply the Cv of the valve being used to the flow rate read out from the graph to calculate the flow.

Example: Value read out from the graph:

Q = 500 l/min [17.7 ft³/min.] (ANR) for the desired P1 and P2

When flow rate coefficient for the valve being used is Cv = 0.31

Seeking flow rate = Q × Cv = 500 × 0.31 = 155 l/min [5.47 ft³/min.] (ANR)

1) When  $P_l' / P_h' > 0.5283$

$$Q' = 1.0 C_v \frac{\sqrt{(P_h' - P_l') P_l'}}{\sqrt{G}}$$

2) When  $P_l' / P_h' \leq 0.5283$

$$Q' = 0.5 C_v P_h' \frac{1}{\sqrt{G}}$$

- Q': Flow rate ft³/min. (ANR)
- Cv: Flow rate coefficient
- Ph': Primary (upstream) absolute pressure (psi.)
- Pl': Secondary (downstream) absolute pressure (psi.)
- G: Specific gravity (conversion specific gravity, when air is 1)

# Fluororesin Valve Series

## Air Operated Diaphragm Type 2-port Valves



- Compact series line-up, suitable for control of small flow rate of chemicals, now offers even more variety.
- For the valve body materials, select from PFA, PTFE, and SUS.
- In addition to the highly reliable Koganei H series fitting, a monoblock Flowell 60 series fitting integrated type has been added to the product range. Now, other manufacturers fittings are available to suit various applications.
- A flow rate adjustment mechanism employing a differential screw method to enable micro flow rate adjustment can be selected as an option.

## Air Operated Diaphragm Type 3-port Valves



- Compact series line-up, suitable for control of small flow rate of chemicals, now offers even more variety.
- For the valve body materials, select from PFA, PTFE, and SUS.
- In addition to the highly reliable Koganei H series fitting, a monoblock Flowell 60 series fitting integrated type has been added to the product range. Now, other manufacturers fittings are available to suit various applications.
- Can be used as either a divider valve or selector valve by only changing the piping direction.



## Air Operated Valves with Suck Back



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- The highly reliable diaphragm-type 2-port valve is combined with a suck back valve to achieve space savings. Ease of use is improved through opposite-position piping ports.
- A low sliding resistance type enabling fine adjustment is also available.
- For the valve body materials, select from PFA, PTFE, and SUS.
- In addition to the highly reliable Koganei H series fitting, a monoblock Flowell 60 series fitting integrated type has been added to the product range. Now, other manufacturers fittings are available to suit various applications.
- A flow rate adjustment mechanism employing a differential screw method to enable micro flow rate adjustment can be selected as an option.

## Solenoid Valve



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- The highly reliable compact solenoid used in the pneumatic solenoid valves is combined with fluororesin valve technology. Energizing the solenoid enables easy control of chemicals even in locations without a pilot air supply.
- The square, compact design achieves space savings, and is suitable for control of micro flow rate chemicals.

## Check Valve



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- Compact and lightweight unit prevents fluid leakage.
- A choice of different seal materials is available, depending on the media used.

## High Viscosity Specification Valves



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- New high viscosity specification valves are now added to our line-up of field-proven air operated valves with suck back.
- Improved valve airtightness boosts reliability during both positive pressure and vacuum, and enables the valves to control discharges of high viscosity chemicals. Employs a special construction that prevents micro-bubbles due to inlet vacuum from growing during suck back operation.

## Large Flow Series, Drain Valve Series



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- Air operated valve (Diaphragm type, bellows type)
- Check valve
- Drain valve (2-port, 3-port)

## Suck Back Valves



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- Use in combination with an air operated valve easily prevents dripping of chemicals.
- Adjustment of the suck back volume is easy using an adjusting screw.

## Valve with Dual Flow Rate Switching Mechanism



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- Allows switching between 2 stages of flow rate in a single valve. Flow rates can be switched easily without making a complex circuit.
- A highly reliable diaphragm valve construction ensures high durability.

## Other Related Equipment



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- PTFE ejector
- PTFE needle valve
- PTFE, PFA lever valves
- Speed controller for pilot air control

# Valve Selection Guides Note 1

Type	Basic model	Page	Orifice mm [in.]	Suck back volume cm <sup>3</sup> [in. <sup>3</sup> ]	Operating pressure MPa [psi.]	Valve function <small>Note 2</small>	Body material	Solvent-resistant specification	Female thread piping		With H series fitting <small>Note 3</small> -F□							
									M6×1	Rc1/8	Rc1/4	φ3	φ4	φ6	φ8	φ10	1/8 (φ3.17)	
Air operated diaphragm type 2-port valve	F-AV030	13	1 [0.039]	—	0.2 [29]	C	PTFE	●	●			●	●				●	
	F-AV050 *	14	1.6 [0.063]	—	0.2 [29]	C	PTFE	—	●			●	●				●	
	F-AV070 *	15	1.8 [0.071]	—	0.2 [29]	C	PTFE	—		●		●					●	
	F-AV070	16	2 [0.079]	—	0.5 [73]	C, O, D	PTFE	●		●								
	F-AV100	17	2.5 [0.098]	—	0.5 [73]	C, O, D	PTFE	●		●			●					
	F-AV125	18	4 [0.157]	—	0.5 [73]	C, O, D	PTFE	●		●			●					
	F-AV250	19	6, 8 [0.236, 0.315]	—	0.5 [73]	C, O, D	PTFE	●			●			●	●			
	F-AVP070	20	2 [0.079]	—	0.5 [73]	C, O, D	PFA	●				●						●
	F-AVP125	21	4 [0.157]	—	0.5 [73]	C, O, D	PFA	●										
	F-AVP250	22	8 [0.315]	—	0.5 [73]	C, O, D	PFA	●						●	●			
Air operated diaphragm type 3-port valve	F-DAV070	23	2 [0.079]	—	0.5 [73]	C, R, D	PTFE	●		●								
	F-DAV125	24	4 [0.157]	—	0.5 [73]	C, R, D	PTFE	●		●								
	F-DAV250	25	6 [0.236]	—	0.5 [73]	C, R, D	PTFE	●			●							
	F-DAVP070	26	2 [0.079]	—	0.5 [73]	C, R, D	PFA	●				●						●
	F-DAVP125	27	3.2 [0.126]	—	0.5 [73]	C, R, D	PFA	●					●					
	F-DAVP250	28	8 [0.315]	—	0.5 [73]	C, R, D	PFA	●							●			
Suck back valve	F-SV070	29	—	0.045 [0.00275]	0.3 [44]	C, D	PTFE	●		●								
	F-SV125	30	—	0.25 [0.0153]	0.3 [44]	C, D	PTFE	●		●								
	F-SV250	31	—	0.40 [0.0244]	0.3 [44]	C, D	PTFE	●			●							
Air operated valve with suck back diaphragm type	F-SAV070 *	32	1.8 [0.071]	0.04 [0.0024]	0.2 [29]	C	PTFE	—		●			●					●
	F-SAV070	33	2 [0.079]	0.045 [0.00275]	0.3 [44]	C	PTFE	●		●			●					●
	F-SAV100	34	2.5 [0.098]	0.25 [0.0153]	0.3 [44]	C, D	PTFE	●		●			●					
	F-SAV125	35	4 [0.157]	0.25 [0.0153]	0.3 [44]	C, D	PTFE	●		●			●					
	F-SAV250	36	6 [0.236]	0.40 [0.0244]	0.3 [44]	C, D	PTFE	●			●			●	●			
	F-SAVP070	37	2 [0.079]	0.045 [0.00275]	0.3 [44]	C	PFA	●										
	F-SAVP125	38	4 [0.157]	0.25 [0.0153]	0.3 [44]	C, D	PFA	●										
Solenoid valve diaphragm type 2-port valve	F-EV120	39	3 [0.118]	—	0.15 [22]	C	PTFE	—		●								
Check valve	F-C250	40	(4mm <sup>2</sup> )	—	0.9 [131]	C	PTFE	—			●							

Notes: 1. For specification details, see the page of each product.

2. For valve functions, "C" means normally closed, "O" means normally open, "D" means double acting type, and "R" means one side normally closed and the other side normally open.

3. For the tube sizes applicable to the H series fittings, see p. 17.

4. For the Flowell 60 series special fittings, see p. 11.

5. For items with flow rate adjustment, the square mark ■ shows the differential screw type, and the circle mark ● shows the conventional screw type. For features of the differential screw type, see p. 12.

6. When SUS specification is selected for the valve body material, the fitting specification cannot be selected.

7. The star mark ★ shows the low sliding resistance diaphragm type. A speed controller can be used for fine open/close control.

8. For the triangle mark ▲, which shows the features with bypass flow rate adjustment (made to order), see p. 12.

9. For details of asterisk ※ specifications, consult us.

Piping specification															With flow rate adjustment -Q1 <sup>Note 5</sup>	With special functions (Made to order)			Body materials SUS specification -S <sup>Note 6</sup>	
With Flowell 60 series standard fitting -L□												Flowell 60 series special size <sup>Note 4</sup>				With bypass flow rate adjustment <sup>Note 8</sup>	With pillar fitting	With reducing H fitting		
	1/4 (φ6.35)	3/8 (φ9.52)	φ3×φ2	φ4×φ2	φ4×φ3	φ6×φ4	φ8×φ6	φ10×φ8	φ3.17×φ1.59	φ6.35×φ3.96 φ6.35×φ4.35	φ9.52×φ6.35	φ9.52×φ7.52	For φ4×φ3 only	For φ3.17×φ2.17 only	For φ6.35×φ4.35 only					
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		●											●	●		●	—	※	※	●
														●		■	—	—	—	—
															●	■	—	—	—	—
																—	—	※	※	※
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## Handling Instructions and Precautions



### Mounting

#### Mounting

1. While any mounting direction is acceptable, for the F-SV, F-SAV, F-SAVP series, a vertical mounting that positions the OUT port facing upward is recommended. This will allow easy removal of air bubbles generated inside the valve or entrained from outside.
2. To mount the product, examine the external dimensions and then firmly secure it in place.

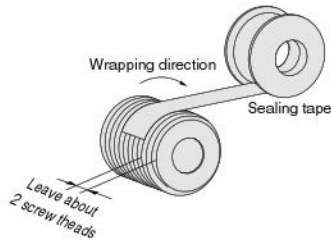
#### Media

For pilot air, use clean air that has been passed through an air filter with a filtration rating of  $5\ \mu\text{m}$  or less to eliminate collected liquid and solid particles.

#### Valve piping

##### ●Piping for thread portion

1. PTFE sealing tape is required, even when fluororesin fittings are used. Always use it to fill in gaps in the threads to prevent leakage.
2. Before piping, perform air blowing (flushing) or cleaning to completely remove solid particles and other foreign objects from the piping interior.  
Entering of foreign objects into the valve could result in leakage at the valve seat. In the cases in which there is the possibility of foreign objects entering, install a filter on the valve primary side.
3. When screwing fittings, exercise caution to ensure that machining chips of piping threads, etc., do not enter to the valve interior.
4. Wrap PTFE sealing tape around the thread portion so that 1.5 to 2 screw threads remain visible. This will probably require 3 to 4 wrappings, but the number of wrappings can be adjusted to match the thread variation.
5. For the tightening torque, see the tables below. (The tightening torque is required to be raised or lowered depending on the operating pressure and on the machined accuracy of the threads.)



Tightening torque for piping

Port size Rc	PFA, PTFE fitting (N·m) [ft·lbf]
1/8	0.4~0.7 [0.30~0.52]
1/4	0.5~0.8 [0.37~0.59]
3/8	1.0~1.5 [0.74~1.11]
1/2	1.5~2.0 [1.11~1.48]
3/4	2.0~2.5 [1.48~1.84]

Tightening torque for  
pilot connection port

Port size	N·m [ft·lbf]
M5	0.4~0.6 [0.30~0.44]
Rc1/8	0.4~0.7 [0.44~0.52]

##### ●Metal fittings

1. The use of metal fittings directly onto a PTFE valve body can result in the fitting threads cutting the screw threads on the valve body, resulting in damage to the thread portion and allowing foreign objects to enter into the valve interior. When using metal fittings, always take caution in their selection and installation.
2. When using metal fittings on a PTFE valve body, do not use fittings with threads coated with sealant.

##### ●H series fittings

1. While the applicable tube sizes are based on outer diameters, some tubes cannot be used because of their tube thickness. See the table on p.47, "Applicable tube sizes/tolerances," when making a selection.
2. See p.48, "Tube installing procedure," and install it in accordance with those instructions.

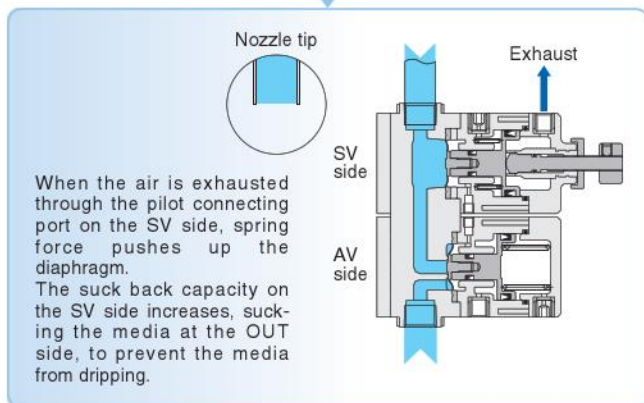
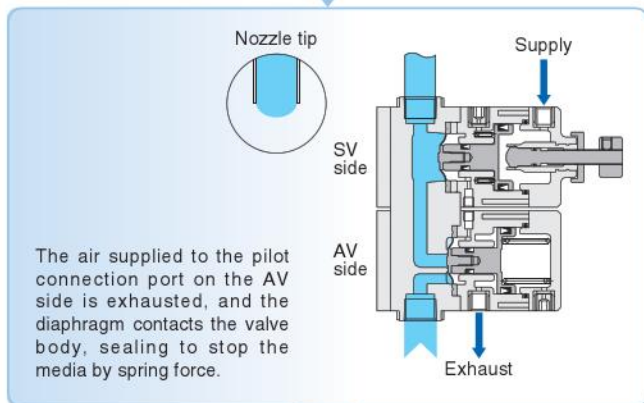
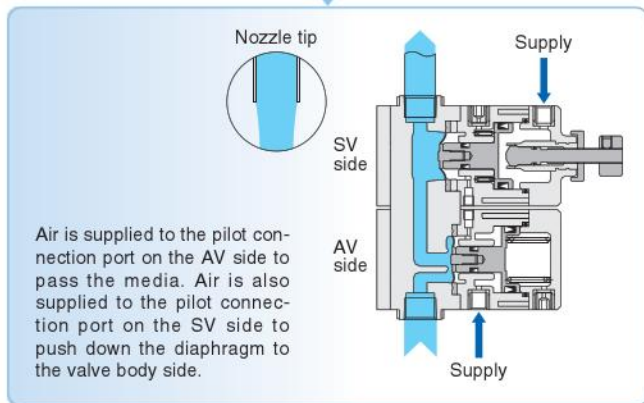
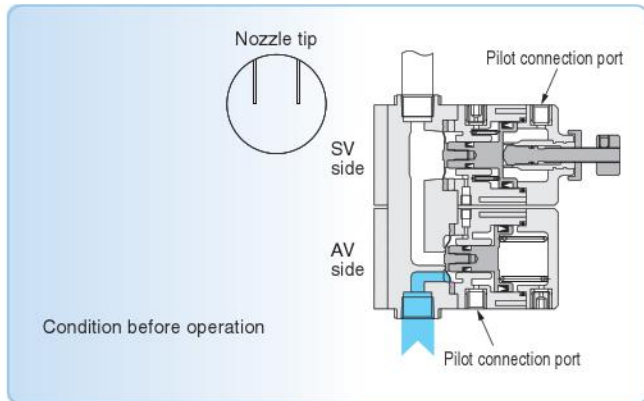
##### ●Flowell 60 series fittings

1. These fittings are flare seal type fittings. See the latest Flowell's catalog and user's manual to properly perform the installation.
2. Regarding the special fitting sizes, dedicated tools for flare processing of the tubes are required in special sizes. Check and ask Flowell for selection and installation.

#### Application

1. For nitrogen gas, air, or other gases, there is a possibility of leakage of  $1\text{cm}^3/\text{min}$  [ $0.061\text{in.}^3/\text{min.}$ ] (at standard air pressure) or less occurring at the valve seat.
2. For the diaphragm type with flow rate adjustment, diaphragm vibrations may occur, depending on the application conditions. In this case, recheck the piping, flow rate, and pressure.
3. The diaphragm type and bellows type may be subjected to water hammering. In the cases in which entraining air bubbles or other problems occur, use a speed controller, etc., to adjust the open/close speed. When the situation does not improve, recheck the piping, flow rate, and pressure.
4. Valve series products are packaged in a clean room. Exercise caution in regard to location, etc. when opening the packages, and handling the products.

## Operating principles of single acting type -C



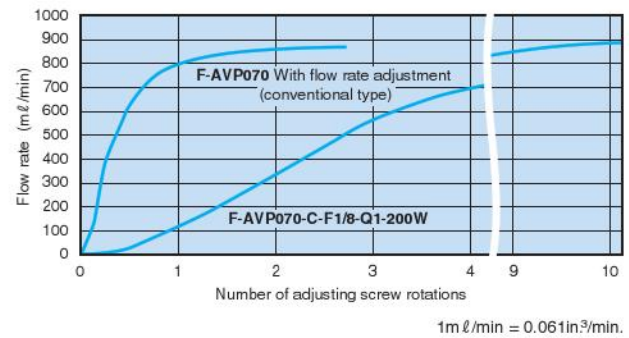
## Micro flow rate adjustment type (differential screw type)

- Uses a differential screw for the flow rate adjustment mechanism. The adjusting screw mildly changes the flow rate, enabling easy micro adjustment of the flow rate.
- Flow rate stability on micro flow rate setting is improved.
- The flow rate adjustment range is wide, allowing adjustment all the way from micro flow volume to full flow rate using one valve.

### Comparison of flow rate characteristics

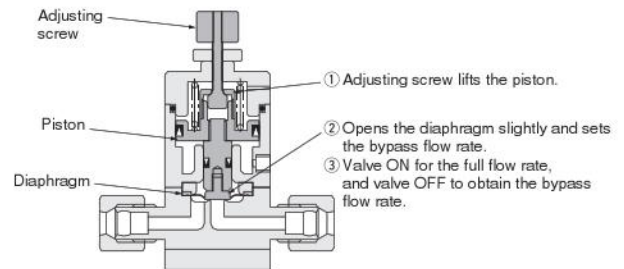
(Media: Water, Differential pressure: 0.1 MPa [15psi.])

F-AVP070 (Orifice:  $\phi 2$ ) comparison



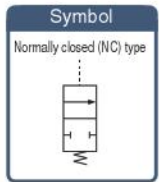
## With bypass flow rate adjustment (made to order)

- Restricting the stroke of the diaphragm in closing direction sets the bypass flow rate.
- Compared to conventional bypass flow rate mechanisms, this product provides a more compact valve.
- There is no bypass flow passage, and no residual liquid area.

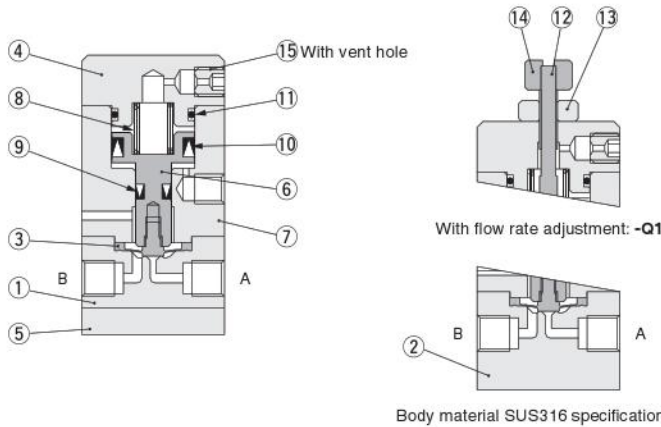


**Air Operated Valve**  
Diaphragm type  
2-port valve

**F-AV030-100W**



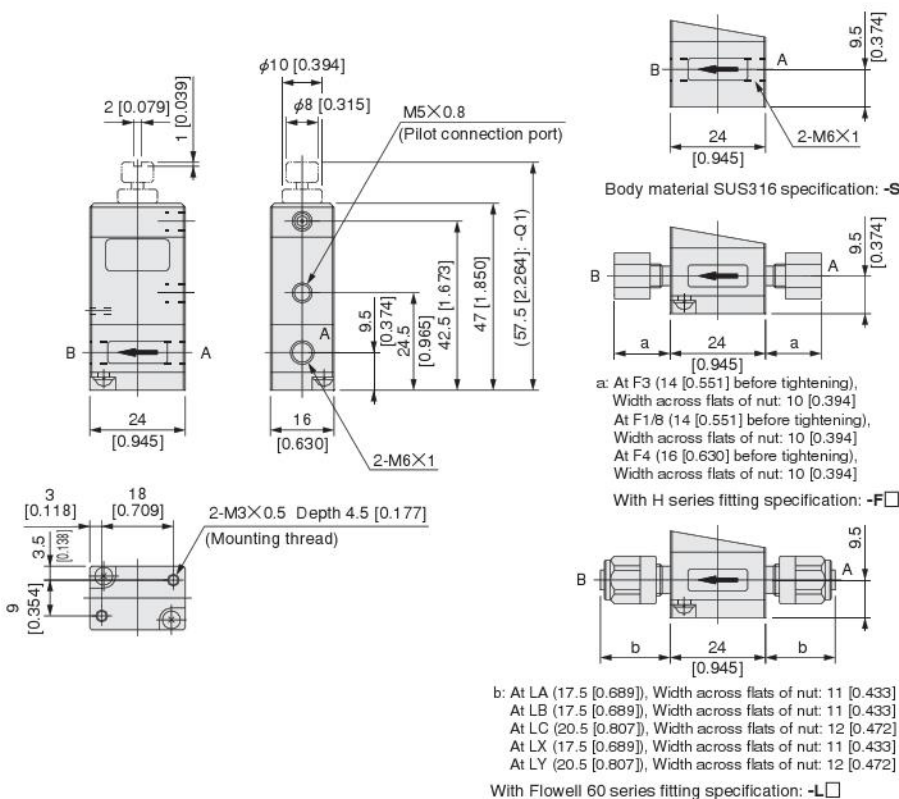
**Inner Construction and Materials**



No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	Aluminum alloy
⑤	Plate	Aluminum alloy
⑥	Piston	SUS304
⑦	Cylinder tube	Aluminum alloy
⑧	Spring	SUS304-WPB

No.	Parts	Materials
⑨	Seal	FKM
⑩	Seal	FKM
⑪	O-ring	FKM
⑫	Adjusting screw	SUS304
⑬	Nut	SUS304
⑭	Nut	SUS304
⑮	Set screw	SUS304

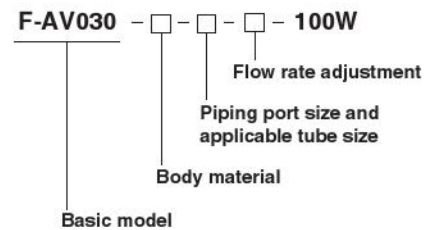
**Dimensions mm [in.]**



**Specifications**

Model		F-AV030-100W
Item		
Media		Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range °C [°F]	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range MPa (kgf/cm <sup>2</sup> ) [psi.]	A→B	0~0.2 [0~2.0] [0~29]
	B→A	0~0.1 [0~1.0] [0~15]
Pilot pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0.3~0.5 [3.1~5.1] [44~73]
Back pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0~0.1 [0~1.0] [0~15]
Proof pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		1 [10.2] [145]
Orifice (Cv)	mm	1 [0.02]
Pilot connection port size		M5 × 0.8
Leakage at valve seat cm <sup>3</sup> /min [in. <sup>3</sup> /min.]		0 [0] (When the media is water)
Operating frequency c.p.m		30 or less
Mounting direction		Any

**Order Codes**



**Body material** <sup>Note 1</sup>  
Blank: PTFE  
S: SUS316

**Piping port size and applicable tube size**  
Blank: M6 × 1  
H series fitting  
F3 : Connecting tube outer diameter φ 3  
F1/8 : Connecting tube outer diameter φ 1/8 (φ 3.17)  
F4 : Connecting tube outer diameter φ 4

Flowell 60 series fitting <sup>Note 2</sup>  
Standard fitting  
LA: Connecting tube diameter φ 3 × φ 2  
LB: Connecting tube diameter φ 3.17 × φ 1.59  
LC: Shared connecting tube diameters φ 4 × φ 2 and φ 4 × φ 3  
Special fitting  
LX: Connecting tube diameter φ 3.17 × φ 2.17 only  
LY: Connecting tube diameter φ 4 × φ 3 only

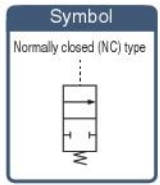
**Flow rate adjustment**  
Blank: None  
Q1: With flow rate adjustment

**Valve function**  
Normally closed (NC) is only available.

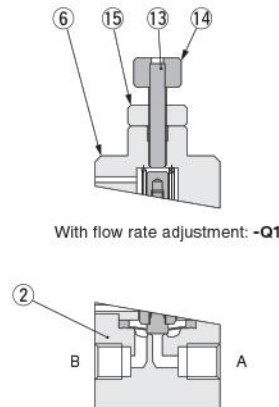
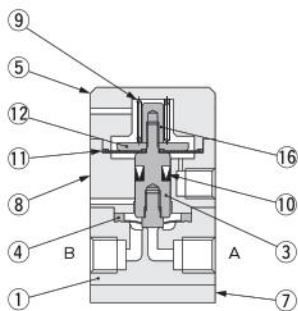
Notes: 1. When the selected body material is **-S**, with-fitting specification cannot be selected.  
2. For the Flowell 60 series special fittings, a mounting tool is also a special type.  
Do not use the standard mounting tool.

**Air Operated Valve**  
Low sliding resistance diaphragm type  
2-port valve

**F-AV050-100W**



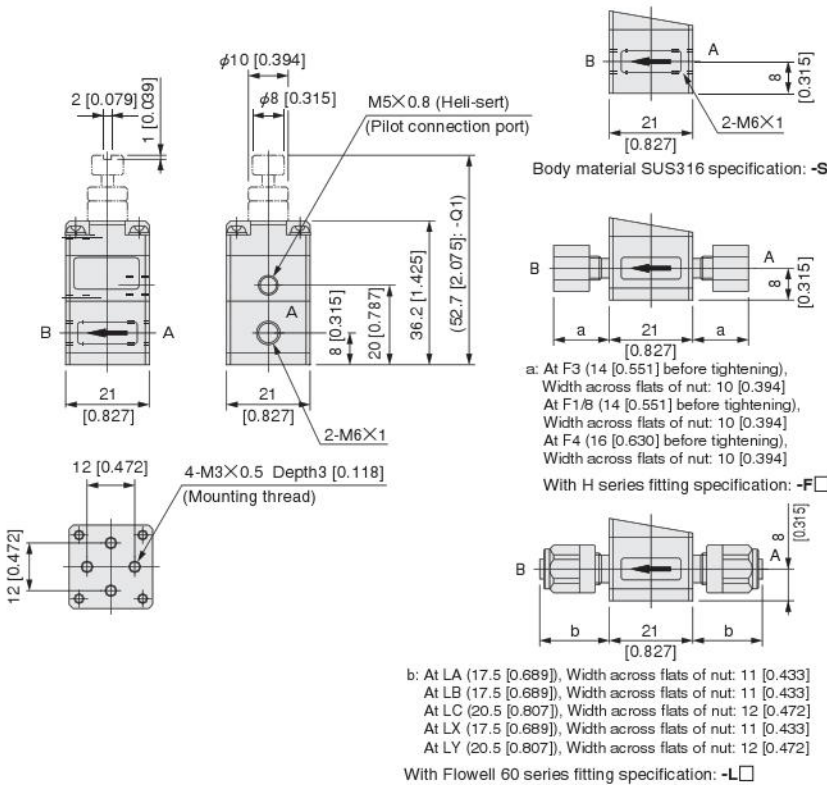
**Inner Construction and Materials**



No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Stem	SUS304
④	Diaphragm	PTFE
⑤	Cover	C-PVC
⑥	Cover	SUS304
⑦	Plate	SUS304
⑧	Cylinder tube	C-PVC

No.	Parts	Materials
⑨	Spring	SUS304-WPB
⑩	Seal	FKM
⑪	Diaphragm	FKM
⑫	Washer	SUS304
⑬	Adjusting screw	SUS304
⑭	Nut	SUS304
⑮	Nut	SUS304
⑯	Nut	SUS304

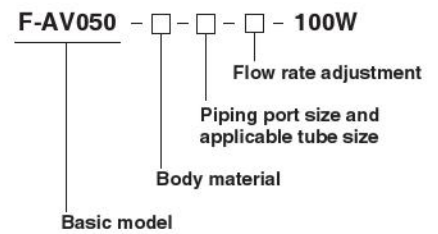
**Dimensions mm [in.]**



**Specifications**

Model		F-AV050-100W
Item		
Media		Pure water, chemicals, air, Nz
Operating temp. range °C [°F]	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range MPa (kgf/cm²) [psi.]	A→B	0~0.2 [0~2.0] [0~29]
	B→A	0~0.1 [0~1.0] [0~15]
Pilot pressure MPa (kgf/cm²) [psi.]		0.3~0.5 [3.1~5.1] [44~73]
Back pressure MPa (kgf/cm²) [psi.]		0~0.1 [0~1.0] [0~15]
Proof pressure MPa (kgf/cm²) [psi.]		1 [10.2] [145]
Orifice (Cv)	mm	1.6 [0.04]
Pilot connection port size		M5 × 0.8
Leakage at valve seat cm³/min [in³/min.]		0 [0] (When the media is water)
Operating frequency	c.p.m	30 or less
Mounting direction		Any

**Order Codes**



**Body material** <sup>Note 1</sup>  
Blank: PTFE  
S: SUS316

**Piping port size and applicable tube size**  
Blank: M6 × 1  
H series fitting  
F3 : Connecting tube outer diameter φ 3  
F1/8 : Connecting tube outer diameter φ 1/8 (φ 3.17)  
F4 : Connecting tube outer diameter φ 4

Flowell 60 series fitting <sup>Note 2</sup>  
Standard fitting  
LA: Connecting tube diameter φ 3 × φ 2  
LB: Connecting tube diameter φ 3.17 × φ 1.59  
LC: Shared connecting tube diameters φ 4 × φ 2 and φ 4 × φ 3  
Special fitting  
LX: Connecting tube diameter φ 3.17 × φ 2.17 only  
LY: Connecting tube diameter φ 4 × φ 3 only

**Flow rate adjustment** <sup>Note 3</sup>  
Blank: None  
Q1: With flow rate adjustment

**Valve function**  
Normally closed (NC) is only available.

Notes: 1. When the selected body material is -S, with-fitting specification cannot be selected.  
2. For the Flowell 60 series special fittings, a mounting tool is also a special type.  
Do not use the standard mounting tool.  
3. Exercise caution, as the flow rate adjusting screw will come off, if rotated more than necessary.

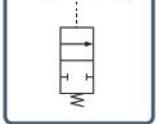
# Air Operated Valve

Low sliding resistance diaphragm type  
2-port valve

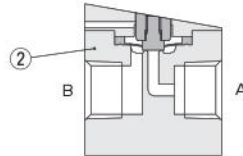
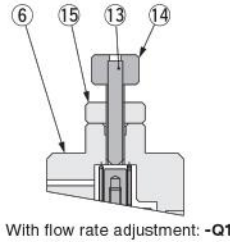
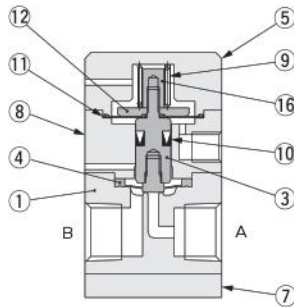
# F-AV070-100W

Symbol

Normally closed (NC) type



## Inner Construction and Materials

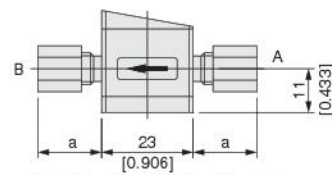
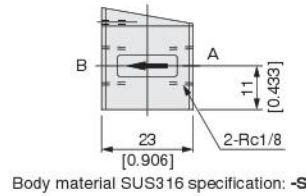
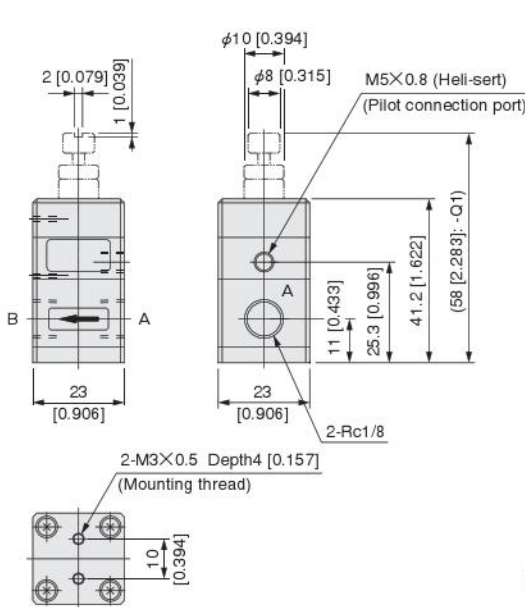


Body material SUS316 specification: **-S**

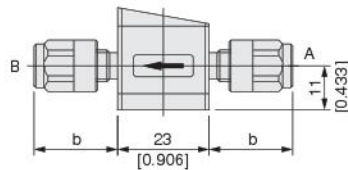
No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Stem	SUS304
④	Diaphragm	PTFE
⑤	Cover	C-PVC
⑥	Cover	SUS304
⑦	Plate	SUS304
⑧	Cylinder tube	C-PVC

No.	Parts	Materials
⑨	Spring	SUS304-WPB
⑩	Seal	FKM
⑪	Diaphragm	FKM
⑫	Washer	SUS304
⑬	Adjusting screw	SUS304
⑭	Nut	SUS304
⑮	Nut	SUS304
⑯	Nut	SUS304

## Dimensions mm [in.]



With H series fitting specification: **-F□**



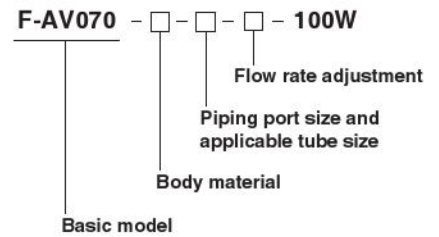
b: At LB (17.5 [0.689]), Width across flats of nut: 11 [0.433]  
 At LC (20.5 [0.807]), Width across flats of nut: 12 [0.472]  
 At LX (17.5 [0.689]), Width across flats of nut: 11 [0.433]  
 At LY (20.5 [0.807]), Width across flats of nut: 12 [0.472]

With Flowell 60 series fitting specification: **-L□**

## Specifications

Model		F-AV070-100W
Item		
Media		Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range °C [°F]	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range MPa (kgf/cm <sup>2</sup> ) [psi.]	A→B	0~0.2 [0~2.0] [0~29]
	B→A	0~0.1 [0~1.0] [0~15]
Pilot pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0.3~0.5 [3.1~5.1] [44~73]
Back pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0~0.1 [0~1.0] [0~15]
Proof pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		1 [10.2] [145]
Orifice (Cv)	mm	1.8 [0.06]
Pilot connection port size		M5 × 0.8
Leakage at valve seat cm <sup>3</sup> /min [in. <sup>3</sup> /min.]		0 [0] (When the media is water)
Operating frequency c.p.m		30 or less
Mounting direction		Any

## Order Codes



Body material <sup>Note 1</sup>

Blank: PTFE  
**S**: SUS316

Piping port size and applicable tube size

Blank: Rc1/8

H series fitting

**F1/8**: Connecting tube outer diameter  $\phi$  1/8 ( $\phi$  3.17)

**F4**: Connecting tube outer diameter  $\phi$  4

Flowell 60 series fitting <sup>Note 2</sup>

Standard fitting

**LB**: Connecting tube diameter  $\phi$  3.17 ×  $\phi$  1.59

**LC**: Shared connecting tube diameters  $\phi$  4 ×  $\phi$  2 and  $\phi$  4 ×  $\phi$  3

Special fitting

**LX**: Connecting tube diameter  $\phi$  3.17 ×  $\phi$  2.17 only

**LY**: Connecting tube diameter  $\phi$  4 ×  $\phi$  3 only

Flow rate adjustment <sup>Note 3</sup>

Blank: None

**Q1**: With flow rate adjustment

Valve function

Normally closed (NC) is only available.

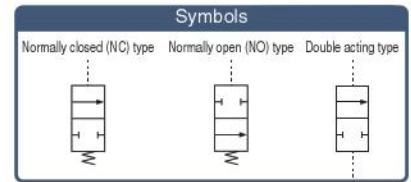
- Notes: 1. When the selected body material is **-S**, with-fitting specification cannot be selected.  
 2. For the Flowell 60 series special fittings, a mounting tool is also a special type. Do not use the standard mounting tool.  
 3. Exercise caution, as the flow rate adjusting screw will come off, if rotated more than necessary.



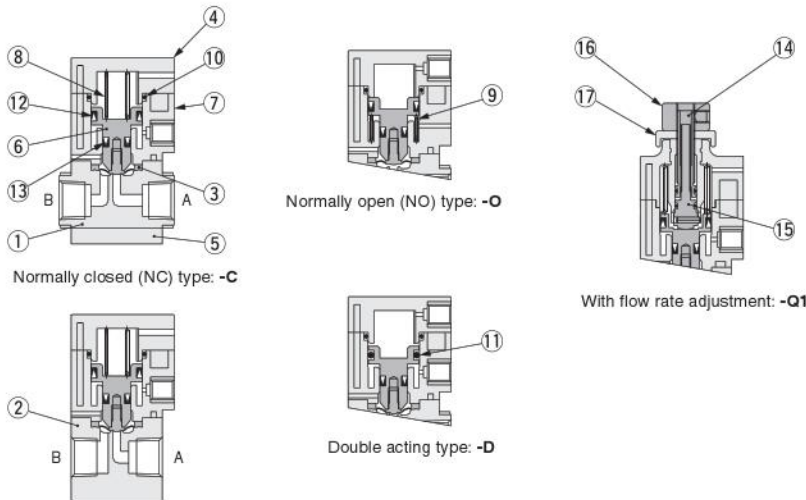
# Air Operated Valve

Diaphragm type  
2-port valve

## F-AV070-200W



### Inner Construction and Materials

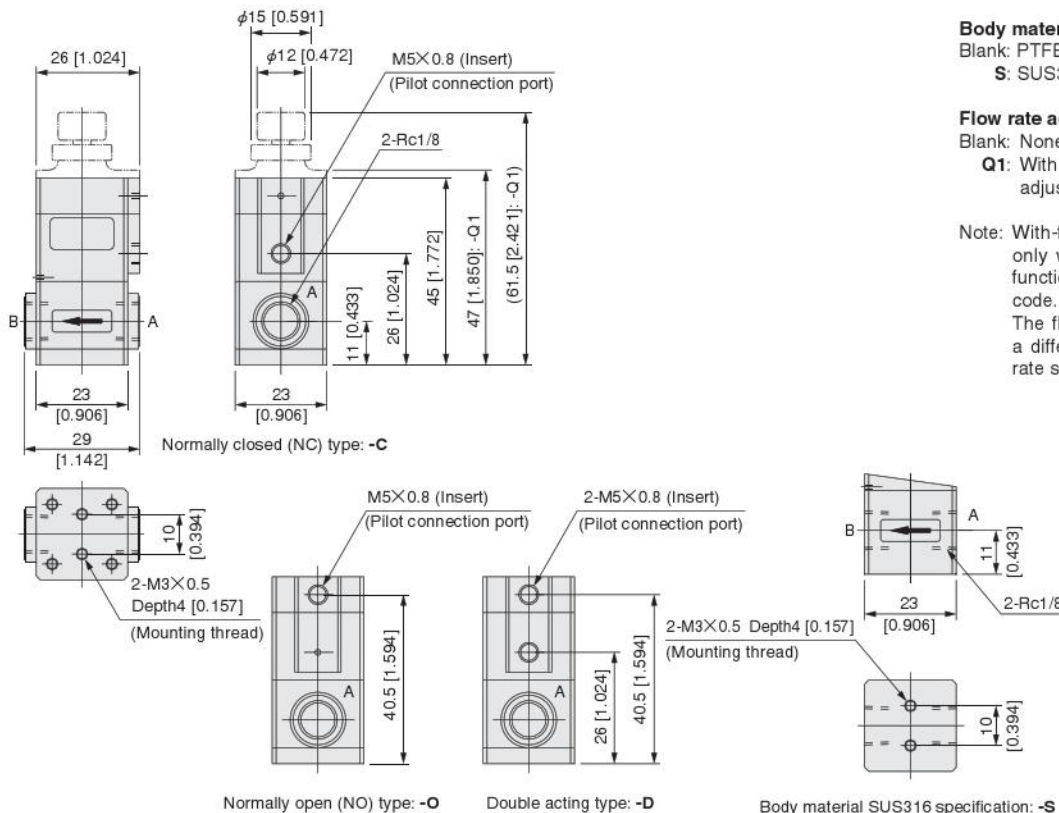


Body material SUS316 specification: -S

No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	SUS304
⑥	Piston	SUS304
⑧	Spring	SUS304-WPB
⑨	Spring	SUS304-WPB

No.	Parts	Materials
⑩	O-ring	FKM
⑪	O-ring	FKM
⑫	Seal	FKM
⑬	Seal	FKM
⑭	Adjusting screw	SUS304
⑮	Adjusting screw	SUS304
⑯	Nut	SUS304
⑰	Nut	SUS304

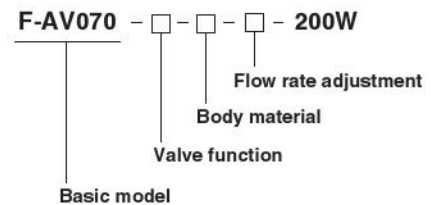
### Dimensions mm [in.]



### Specifications

Model		F-AV070-200W
Item	Media	Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range °C [°F]	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range MPa (kgf/cm <sup>2</sup> ) [psi.]	A→B	0~0.5 [0~5.1] [0~73]
	B→A	0~0.3 [0~3.1] [0~44]
Pilot pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0.3~0.5 [3.1~5.1] [44~73]
Back pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0~0.3 [0~3.1] [0~44]
Proof pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		1 [10.2] [145]
Orifice (Cv)	mm	2 (0.1)
Pilot connection port size		M5 X 0.8
Leakage at valve seat cm <sup>3</sup> /min [in <sup>3</sup> /min.]		0 [0] (When the media is water)
Operating frequency c.p.m		30 or less
Mounting direction		Any

### Order Codes



#### Valve function

- C: Normally closed (NC) type
- O: Normally open (NO) type
- D: Double acting type

#### Body material

- Blank: PTFE
- S: SUS316

#### Flow rate adjustment <sup>Note</sup>

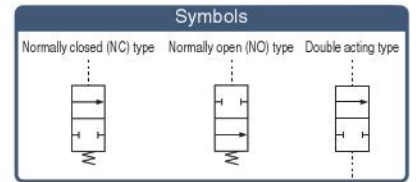
- Blank: None
- Q1: With flow rate adjustment (Micro flow rate adjustment type)

Note: With-flow-rate-adjustment -Q1 can be set only with the normally closed (NC) valve function -C. Enter "C" for the valve function code.

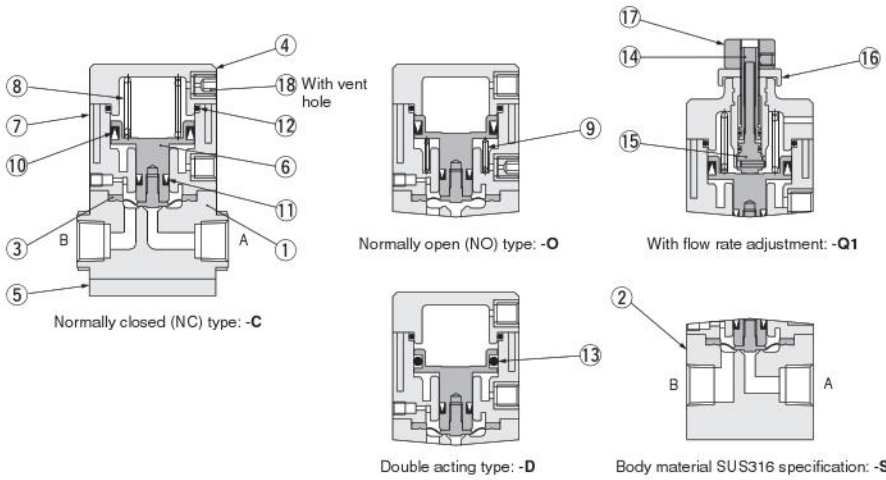
The flow rate adjustment mechanism uses a differential screw method for easier flow rate setting.

**Air Operated Valve**  
Diaphragm type  
2-port valve

**F-AV100-200W**



**Inner Construction and Materials**



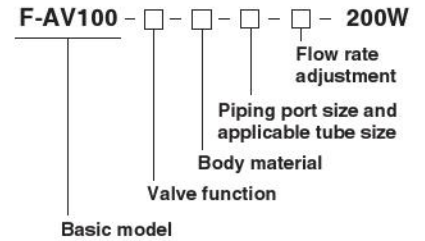
No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	SUS304
⑥	Piston	SUS304
⑦	Cylinder tube	PPS
⑧	Spring	SUS304-WPB
⑨	Spring	SUS304-WPB
⑩	Seal	FKM

No.	Parts	Materials
⑪	Seal	FKM
⑫	O-ring	FKM
⑬	O-ring	FKM
⑭	Adjusting screw	SUS304
⑮	Adjusting screw	SUS304
⑯	Nut	SUS304
⑰	Nut	SUS304
⑱	Set screw	SUS304

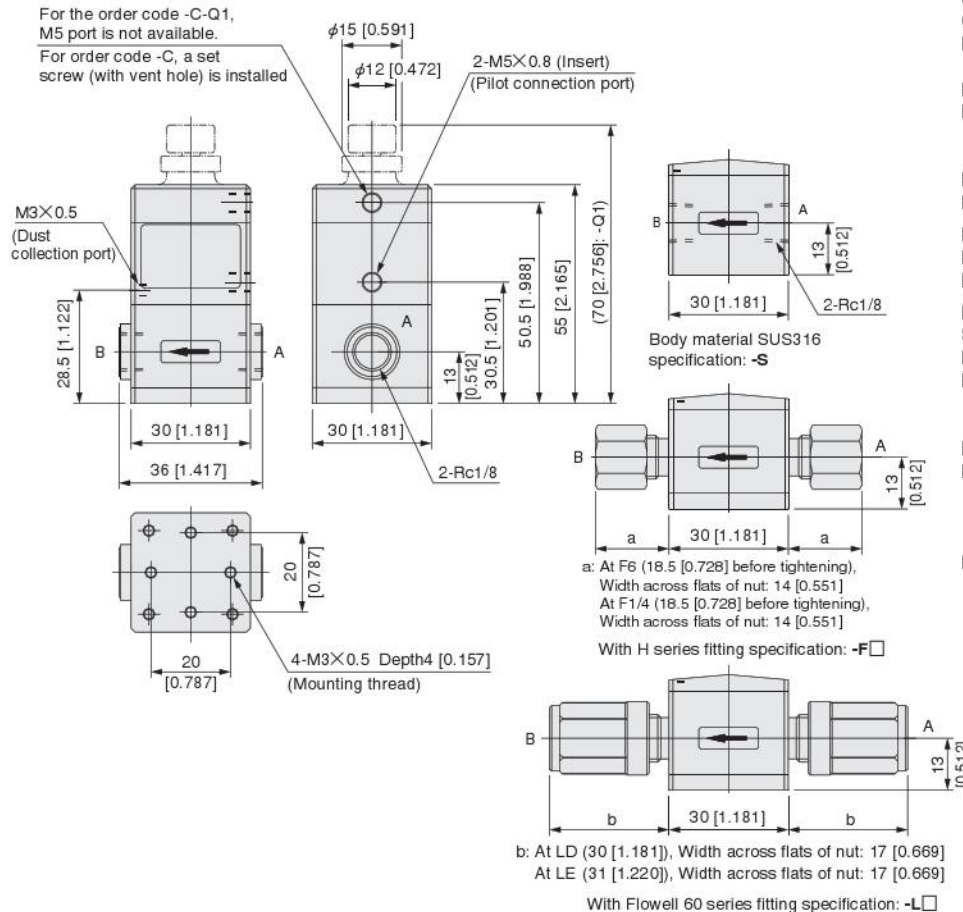
**Specifications**

Model		F-AV100-200W
Item		
Media		Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range °C [°F]	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range MPa (kgf/cm <sup>2</sup> ) [psi.]	A→B	0~0.5 (0~5.1) [0~73]
	B→A	0~0.3 (0~3.1) [0~44]
Pilot pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0.3~0.5 (3.1~5.1) [44~73]
Back pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0~0.3 (0~3.1) [0~44]
Proof pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		1 [10.2] [145]
Orifice (Cv)	mm	2.5 (0.15)
Pilot connection port size		M5 × 0.8
Leakage at valve seat cm <sup>3</sup> /min [in. <sup>3</sup> /min.]		0 [0] (When the media is water)
Operating frequency c.p.m		30 or less
Mounting direction		Any

**Order Codes**



**Dimensions mm [in.]**



**Valve function**

- C: Normally closed (NC) type
- O: Normally open (NO) type
- D: Double acting type

**Body material**

- Blank: PTFE
- S: SUS316

**Piping port size and applicable tube size**

- Blank: Rc1/8
- H series fitting
- F6 : Connecting tube outer diameter φ 6
- F1/4 : Connecting tube outer diameter φ 1/4 (φ 6.35)
- Flowell 60 series fitting
- Standard fitting
- LD: Connecting tube diameter φ 6 × φ 4
- LE: Shared connecting tube diameters φ 6.35 × φ 3.96 and φ 6.35 × φ 4.35

**Flow rate adjustment** <sup>Note 2</sup>

- Blank: None
- Q1: With flow rate adjustment (Micro flow rate adjustment type)

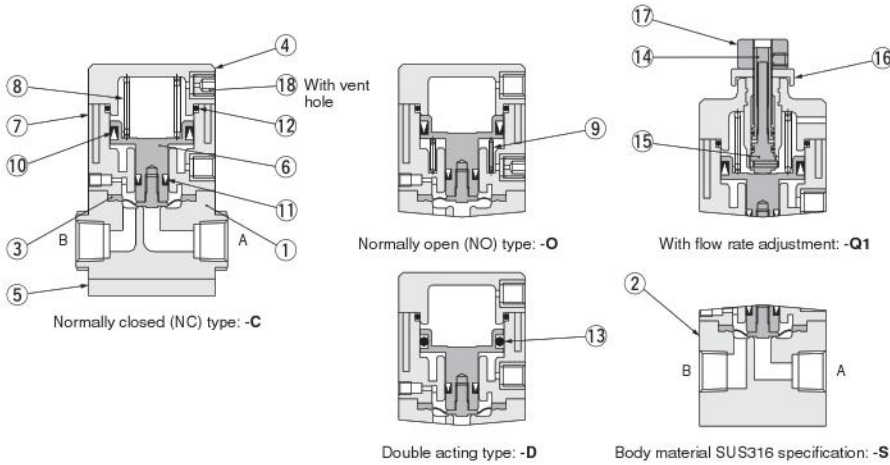
- Notes: 1. When the selected body material is -S, with-fitting specification cannot be selected.  
2. The flow rate adjustment mechanism uses a differential screw method for easier flow rate setting.

# Air Operated Valve

Diaphragm type  
2-port valve

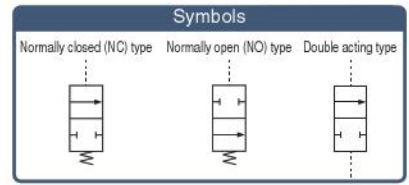
## F-AV125-200W

### Inner Construction and Materials



No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	SUS304
⑥	Piston	SUS304
⑦	Cylinder tube	PPS
⑧	Spring	SUS304-WPB
⑨	Spring	SUS304-WPB
⑩	Seal	FKM

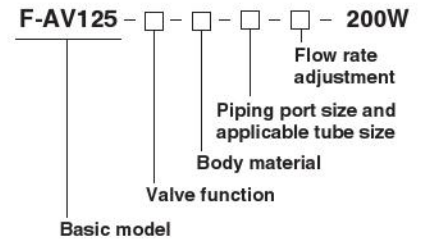
No.	Parts	Materials
⑪	Seal	FKM
⑫	O-ring	FKM
⑬	O-ring	FKM
⑭	Adjusting screw	SUS304
⑮	Adjusting screw	SUS304
⑯	Nut	SUS304
⑰	Nut	SUS304
⑱	Set screw	SUS304



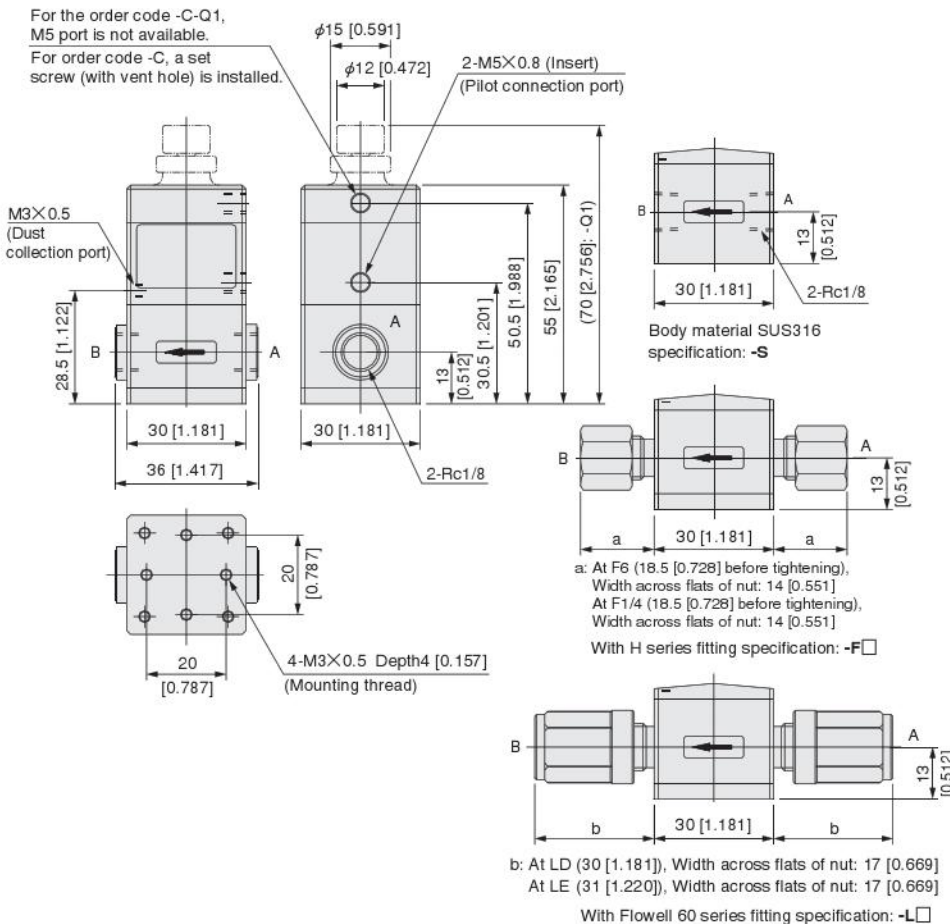
### Specifications

Model		F-AV125-200W
Item	Media	Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range	A→B	0~0.5 [0~5.1] [0~7.3]
	B→A	0~0.3 [0~3.1] [0~4.4]
Pilot pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0.3~0.5 [3.1~5.1] [44~73]
Back pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~4.4]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Orifice (Cv)	mm	4 [0.31]
Pilot connection port size		M5 × 0.8
Leakage at valve seat		0 [0]
	cm <sup>3</sup> /min [in. <sup>3</sup> /min.]	(When the media is water)
Operating frequency	c.p.m	30 or less
Mounting direction		Any

### Order Codes



### Dimensions mm [in.]



#### Valve function

- C: Normally closed (NC) type
- O: Normally open (NO) type
- D: Double acting type

#### Body material

- Blank: PTFE
- S: SUS316

#### Piping port size and applicable tube size

Blank: Rc1/8

#### H series fitting

- F6 : Connecting tube outer diameter φ 6
- F1/4 : Connecting tube outer diameter φ 1/4 (φ 6.35)

#### Flowell 60 series fitting

#### Standard fitting

- LD: Connecting tube diameter φ 6 × φ 4
- LE: Shared connecting tube diameters φ 6.35 × φ 3.96 and φ 6.35 × φ 4.35

#### Flow rate adjustment <sup>Note 2</sup>

Blank: None

- Q1: With flow rate adjustment (Micro flow rate adjustment type)

Notes: 1. When the selected body material is -S, with-fitting specification cannot be selected.

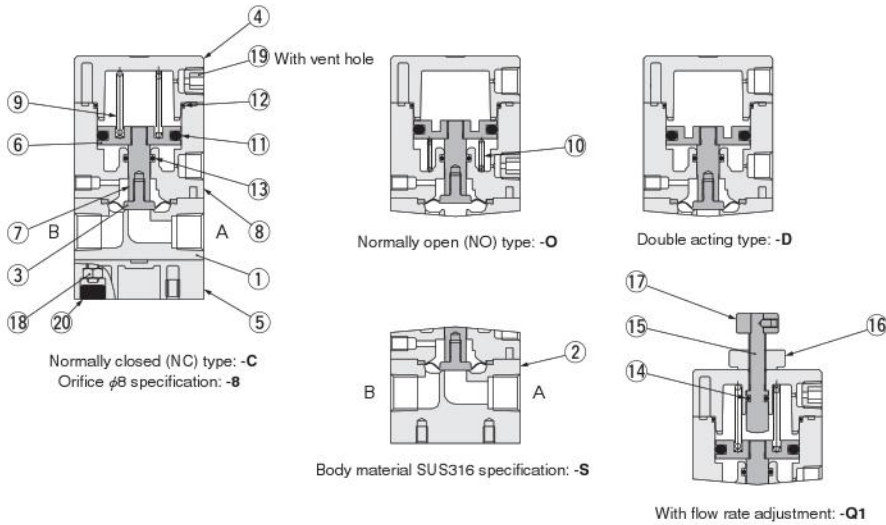
2. The flow rate adjustment mechanism uses a differential screw method for easier flow rate setting.

# Air Operated Valve

Diaphragm type  
2-port valve

# F-AV250-200W

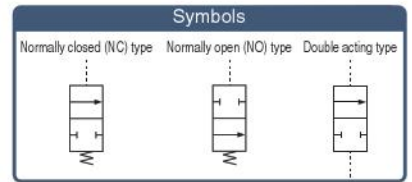
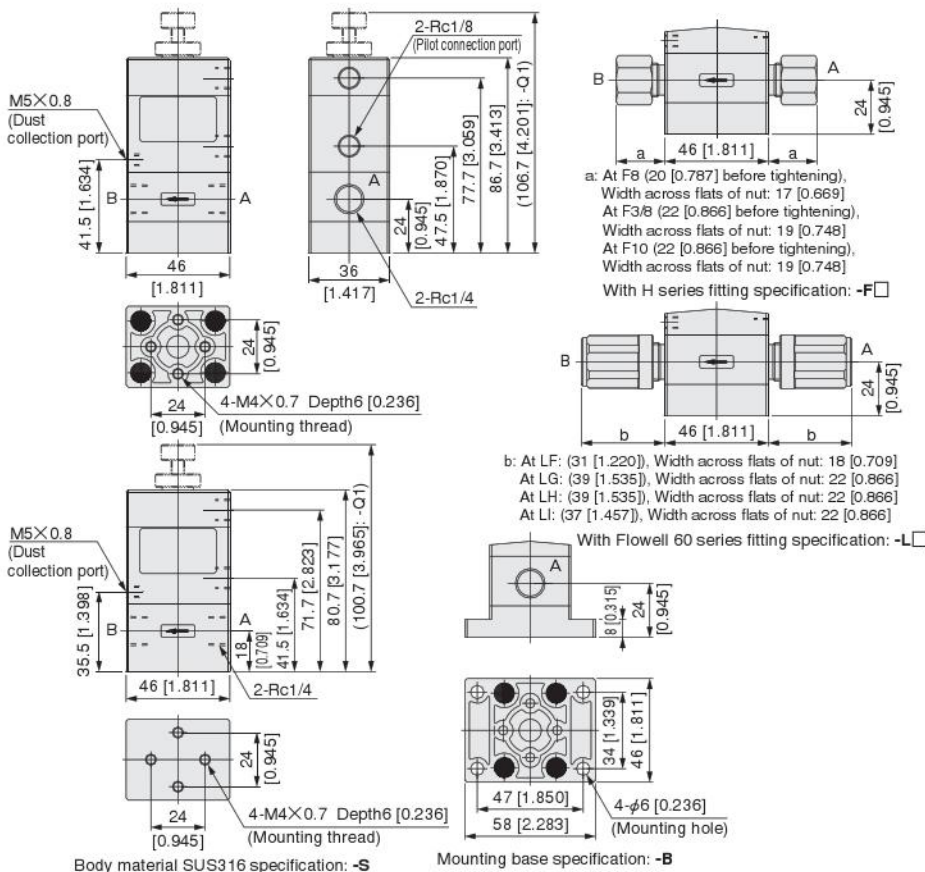
## Inner Construction and Materials



No.	Parts	Materials
①	Body	PTFE/PFA <sup>Note 2</sup>
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	PPS
⑥	Piston	SUS304
⑦	Piston rod	SUS304
⑧	Cylinder tube	PPS
⑨	Spring	SUS304-WPB
⑩	Spring	SUS304-WPB

No.	Parts	Materials
⑪	Seal	FKM
⑫	O-ring	FKM
⑬	O-ring	FKM
⑭	O-ring	FKM
⑮	Adjusting screw	SUS304
⑯	Nut	SUS304
⑰	Nut	SUS304
⑱	Nut	SUS304
⑲	Plug	VECTRA
⑳	Cap	FKM

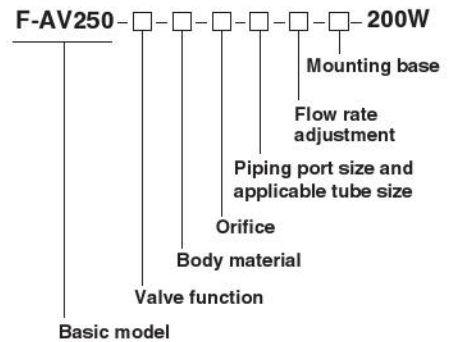
## Dimensions mm [in.]



## Specifications

Model		F-AV250-200W
Item		
Media		Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range °C [°F]	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range MPa (kgf/cm <sup>2</sup> ) [psi.]	A→B	0~0.5 [0~5.1] [0~73]
	B→A	0~0.3 [0~3.1] [0~44]
Pilot pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0.3~0.5 [3.1~5.1] [44~73]
Back pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0~0.3 [0~3.1] [0~44]
Proof pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		1 [10.2] [145]
Orifice (Cv)		6 [0.6] or 8 [1.2]
Pilot connection port size		Rc1/8
Leakage at valve seat cm <sup>3</sup> /min [in. <sup>3</sup> /min.]		0 [0] (When the media is water)
Operating frequency c.p.m		30 or less
Mounting direction		Any

## Order Codes



### Valve function

C: Normally closed (NC) type  
O: Normally open (NO) type  
D: Double acting type

**Body material**<sup>Note 1</sup>  
Blank: PTFE/PFA<sup>Note 2</sup>  
S: SUS316

**Orifice**<sup>Note 2</sup>  
Blank: 6mm [0.236in.]  
8: 8mm [0.315in.]

**Piping port size and applicable tube size**  
Blank: Rc1/4

H series fitting  
F8 : Connecting tube outer diameter  $\phi$  8  
F3/8 : Connecting tube outer diameter  $\phi$  3/8 ( $\phi$  9.52)  
F10 : Connecting tube outer diameter  $\phi$  10

Flowell 60 series fitting  
Standard fitting  
LF : Connecting tube diameter  $\phi$  8  $\times$   $\phi$  6  
LG : Connecting tube diameter  $\phi$  9.52  $\times$   $\phi$  6.35  
LH : Connecting tube diameter  $\phi$  9.52  $\times$   $\phi$  7.52  
LI : Connecting tube diameter  $\phi$  10  $\times$   $\phi$  8

**Flow rate adjustment**  
Blank: None  
Q1: With flow rate adjustment

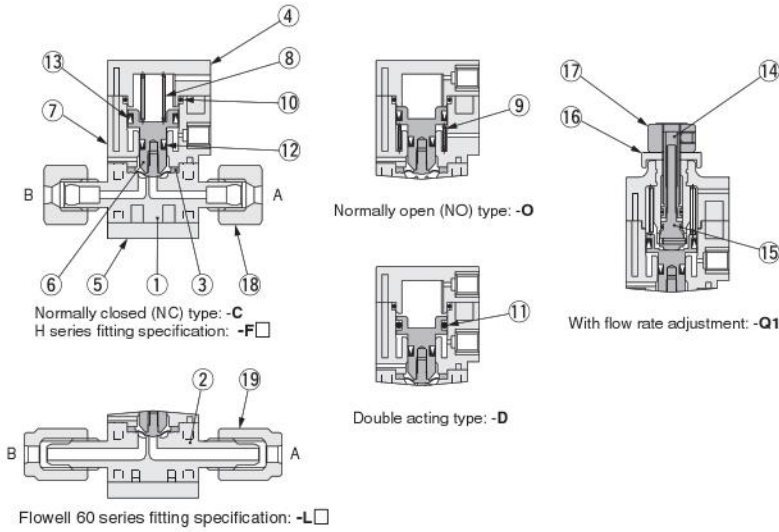
**Mounting base**  
Blank: Bottom mounting type  
B: With mounting base

Notes: 1. When the selected body material is -S, with-fitting specification and with-mounting-base cannot be selected.  
2. When the H series fitting is selected with an orifice of  $\phi$  8 [0.315in.], the body material is PFA.

**Air Operated Valve**  
Diaphragm type  
2-port valve

**F-AVP070-200W**

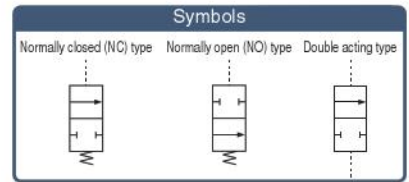
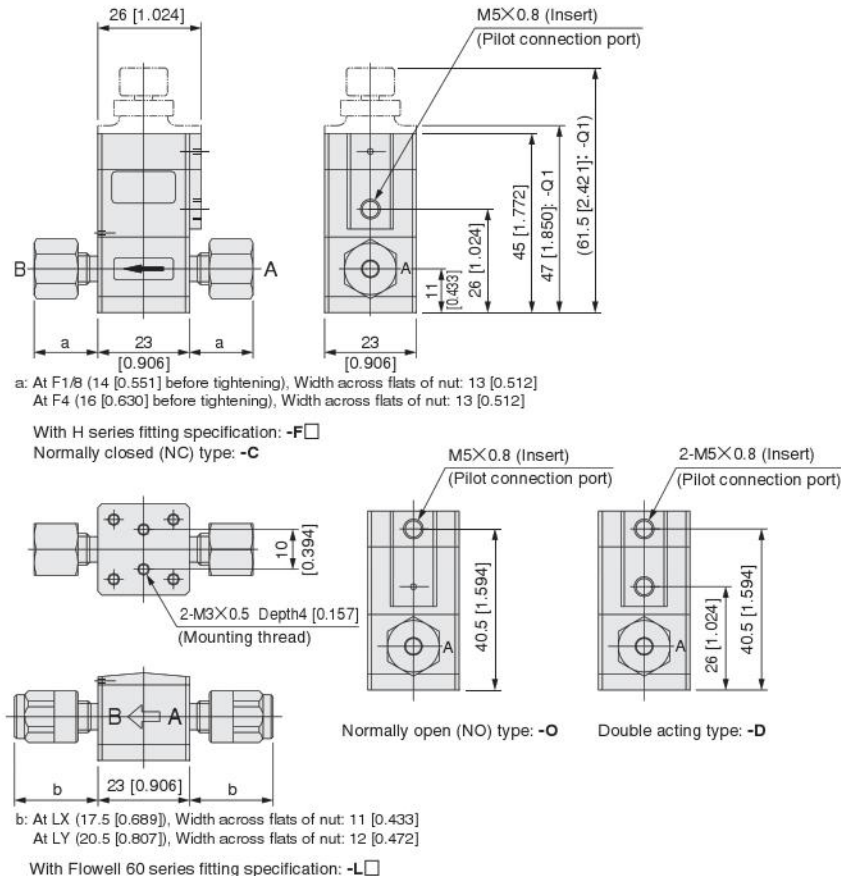
**Inner Construction and Materials**



No.	Parts	Materials
①	Body	PFA
②	Body	PFA
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	SUS304
⑥	Piston	SUS304
⑦	Cylinder tube	PPS
⑧	Spring	SUS304-WPB
⑨	Spring	SUS304-WPB
⑩	O-ring	FKM

No.	Parts	Materials
⑪	O-ring	FKM
⑫	Seal	FKM
⑬	Seal	FKM
⑭	Adjusting screw	SUS304
⑮	Adjusting screw	SUS304
⑯	Nut	SUS304
⑰	Nut	SUS304
⑱	Nut	PFA

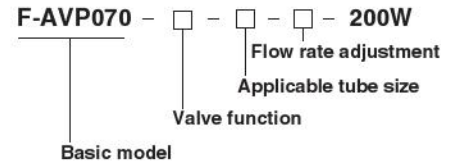
**Dimensions mm [in.]**



**Specifications**

Model		F-AVP070-200W
Item	Media	Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range °C [°F]	Media	5~80 [41~176]
	Atmosphere	0~60 [32~140]
Operating pressure range MPa (kgf/cm <sup>2</sup> ) [psi.]	A→B	0~0.5 [0~5.1] [0~73]
	B→A	0~0.3 [0~3.1] [0~44]
Pilot pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0.3~0.5 [3.1~5.1] [44~73]
Back pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0~0.3 [0~3.1] [0~44]
Proof pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		1 [10.2] [145]
Orifice (Cv)	mm	2 (0.1)
Pilot connection port size		M5 X 0.8
Leakage at valve seat cm <sup>3</sup> /min [in. <sup>3</sup> /min.]		0 [0] (When the media is water)
Operating frequency	c.p.m	30 or less
Mounting direction		Any

**Order Codes**



**Valve function**

- C: Normally closed (NC) type
- O: Normally open (NO) type
- D: Double acting type

**Applicable tube size**

- H series fitting
- F1/8: Connecting tube outer diameter  $\phi$  1/8 ( $\phi$  3.17)
- F4: Connecting tube outer diameter  $\phi$  4

Flowell 60 series fitting <sup>Note 1</sup>

Special fitting

LX: Connecting tube diameter  $\phi$  3.17 X  $\phi$  2.17 only

LY: Connecting tube diameter  $\phi$  4 X  $\phi$  3 only

**Flow rate adjustment <sup>Note 2</sup>**

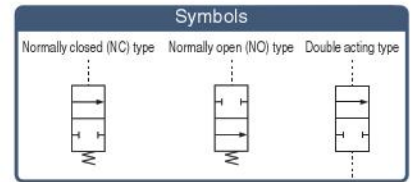
Blank: None

Q1: With flow rate adjustment (Micro flow rate adjustment type)

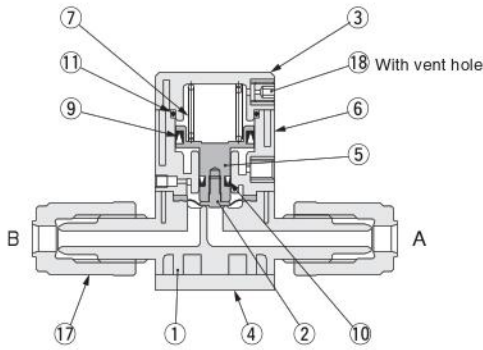
- Notes:
- For the Flowell 60 series special fittings, a mounting tool is also a special type. Do not use the standard mounting tool.
  - With-flow-rate-adjustment -Q1 can be set only with the normally closed (NC) valve function -C. Enter "C" for the valve function code. The flow rate adjustment mechanism uses a differential screw method for easier flow rate setting.

**Air Operated Valve**  
Diaphragm type  
2-port valve

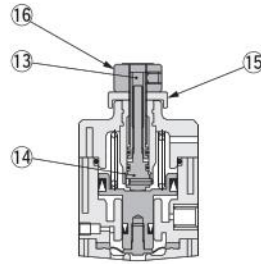
**F-AVP125-200W**



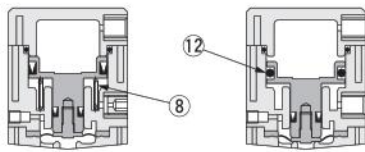
**Inner Construction and Materials**



Normally closed (NC) type: -C



Normally closed (NC) type with flow rate adjustment: -C-Q1

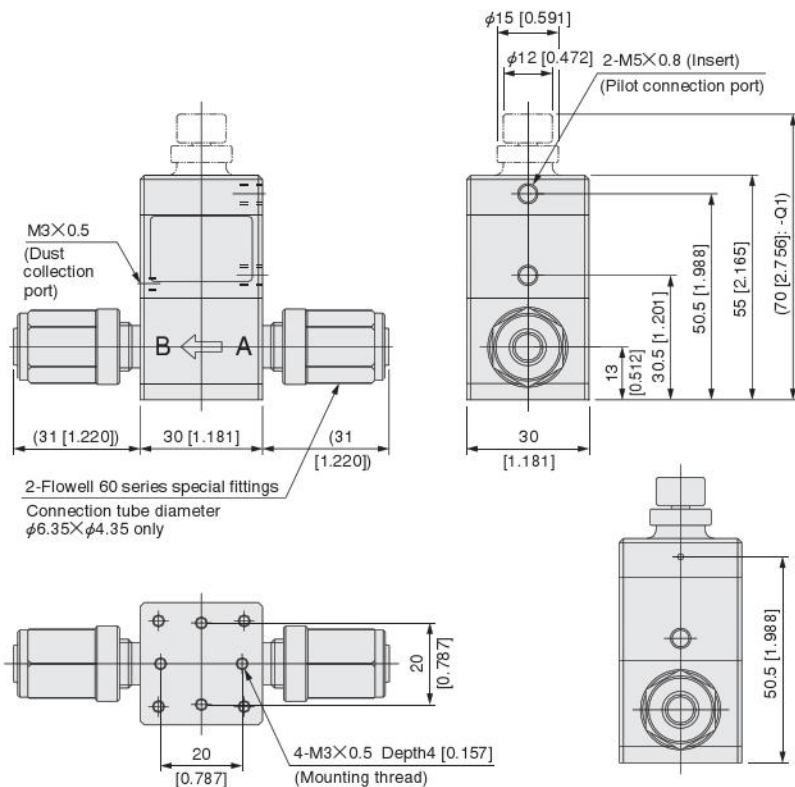


Normally open (NO) type: -O Double acting type: -D

No.	Parts	Materials
①	Body	PFA
②	Diaphragm	PTFE
③	Cover	PPS
④	Plate	SUS304
⑤	Piston	SUS304
⑥	Cylinder tube	PPS
⑦	Spring	SUS304-WPB
⑧	Spring	SUS304-WPB
⑨	Seal	FKM
⑩	Seal	FKM

No.	Parts	Materials
⑪	O-ring	FKM
⑫	O-ring	FKM
⑬	Adjusting screw	SUS304
⑭	Adjusting screw	SUS304
⑮	Nut	SUS304
⑯	Nut	SUS304
⑰	Nut	PFA
⑱	Set screw	SUS304

**Dimensions mm [in.]**

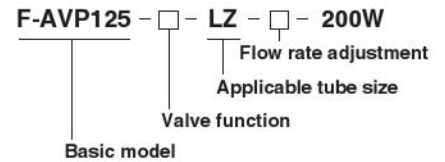


Normally closed (NC) type with flow rate adjustment: -C-Q1

**Specifications**

Model		F-AVP125-200W
Item	Media	Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range °C [°F]	Media	5~80 [41~176]
	Atmosphere	0~60 [32~140]
Operating pressure range MPa (kgf/cm <sup>2</sup> ) [psi.]	A→B	0~0.5 [0~5.1] [0~73]
	B→A	0~0.3 [0~3.1] [0~44]
Pilot pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0.3~0.5 [3.1~5.1] [44~73]
Back pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0~0.3 [0~3.1] [0~44]
Proof pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		1 [10.2] [145]
Orifice (Cv)	mm	4 [0.31]
Pilot connection port size		M5 × 0.8
Leakage at valve seat cm <sup>3</sup> /min [in. <sup>3</sup> /min.]		0 [0] (When the media is water)
Operating frequency c.p.m		30 or less
Mounting direction		Any

**Order Codes**



**Valve function** <sup>Note 1</sup>

- C: Normally closed (NC) type
- O: Normally open (NO) type
- D: Double acting type

**Applicable tube size**

Flowell 60 series fitting <sup>Note 2</sup>

Special fitting

LZ: Fitting tube diameter  $\phi 6.35 \times \phi 4.35$  only

**Flow rate adjustment** <sup>Note 3</sup>

Blank: None

Q1: With flow rate adjustment (Micro flow rate adjustment type)

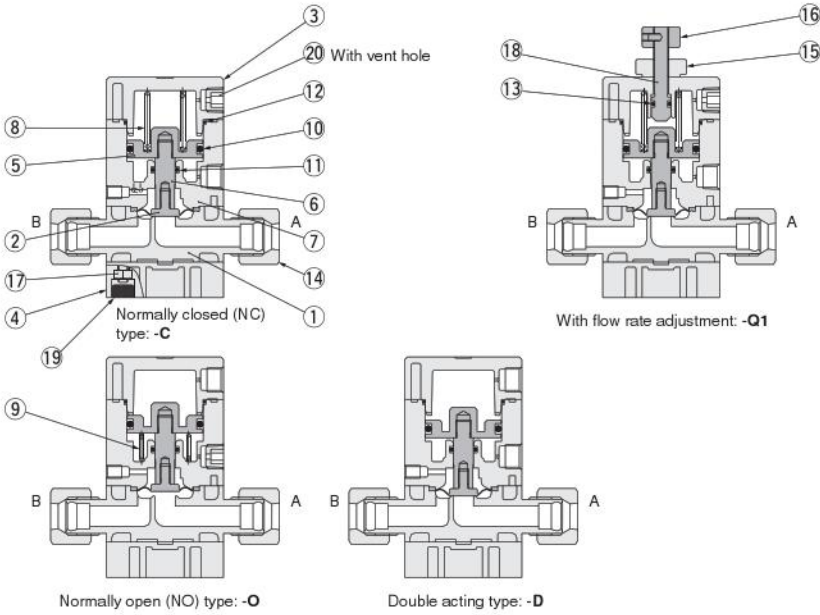
- Notes:
- For the normally closed (NC) valve, a set screw with vent hole is installed at the operating port on the normally open (NO) side, and for the normally open (NO) valve, the set screw with vent hole is installed at the operating port on the normally closed (NC) side.
  - This product comes with Flowell 60 series fittings. The fittings are special sizes. The mounting tool is also a special type. Do not use the standard mounting tool.
  - The flow rate adjustment mechanism uses a differential screw method for easier flow rate setting. In the case of normally closed (NC) valves with flow rate adjustment, there is no pilot connection port on the normally open (NO) side.

# Air Operated Valve

Diaphragm type  
2-port valve

# F-AVP250-200W

## Inner Construction and Materials

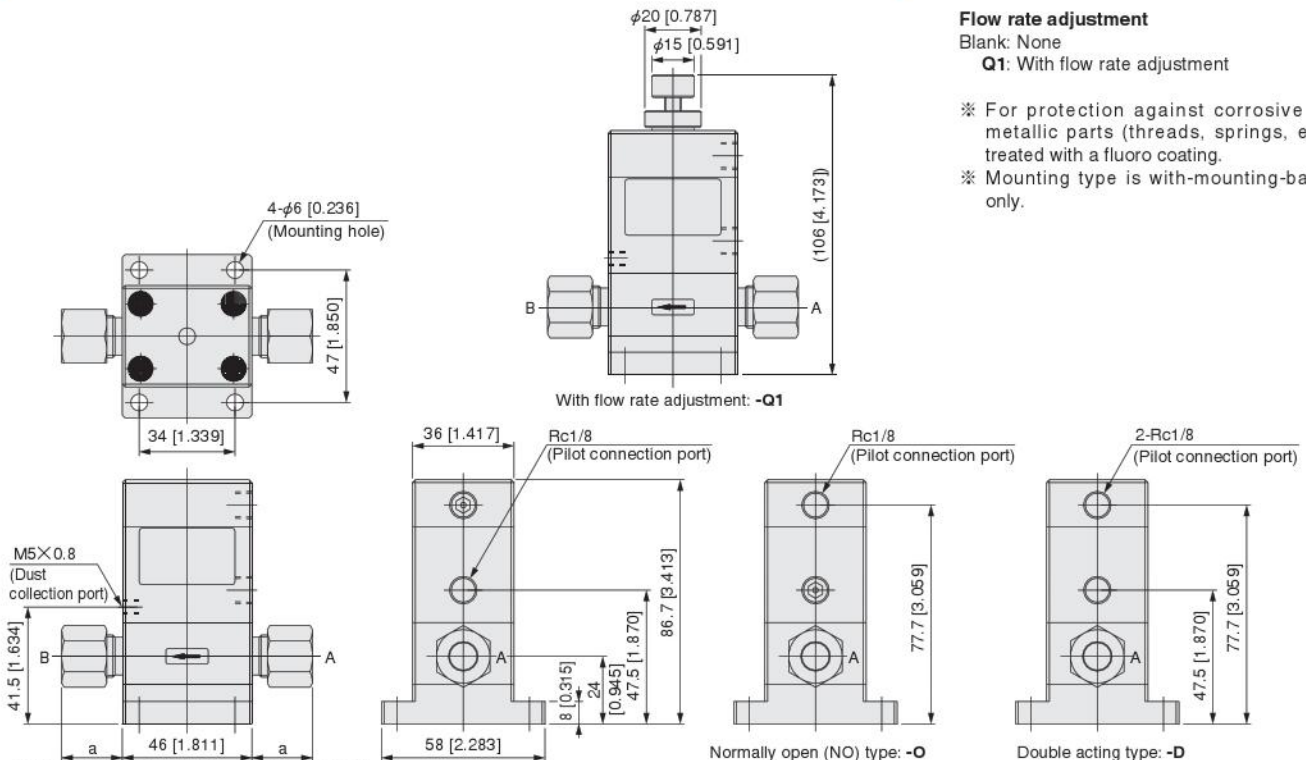


No.	Parts	Materials
①	Body	PFA
②	Diaphragm	PTFE
③	Cover	PPS
④	Plate	PPS
⑤	Piston	—
⑥	Piston rod	—
⑦	Cylinder tube	PPS
⑧	Spring	SUS304-WPB <sup>Note</sup>
⑨	Spring	SUS304-WPB <sup>Note</sup>
⑩	O-ring	FKM

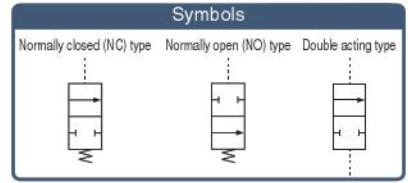
No.	Parts	Materials
⑪	O-ring	FKM
⑫	O-ring	FKM
⑬	O-ring	FKM
⑭	Nut	PFA
⑮	Nut	PP
⑯	Nut	PP
⑰	Nut	SUS304 <sup>Note</sup>
⑱	Adjusting screw	—
⑲	Cap	FKM
⑳	Plug	VECTRA

Note: Fluoro coated

## Dimensions mm [in.]



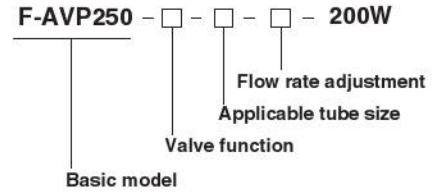
a: At F8 (20 [0.787] before tightening), Width across flats of nut: 17 [0.669]  
At F38 (22 [0.866] before tightening), Width across flats of nut: 19 [0.748]  
At F10 (22 [0.866] before tightening), Width across flats of nut: 19 [0.748]  
With H series fitting specification



## Specifications

Model		F-AVP250-200W
Item	Media	Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range	A→B	0~0.5 [0~5.1] [0~73]
	B→A	0~0.3 [0~3.1] [0~44]
Pilot pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0.3~0.5 [3.1~5.1] [44~73]
Back pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Orifice (Cv)	mm	8 [1.2]
Pilot connection port size		Rc1/8
Leakage at valve seat		0 [0]
	cm <sup>3</sup> /min [in <sup>3</sup> /min.]	(When the media is water)
Operating frequency	c.p.m	30 or less
Mounting direction		Any

## Order Codes



### Valve function

- C: Normally closed (NC) type
- O: Normally open (NO) type
- D: Double acting type

### Applicable tube size

- H series fitting
- F8 : Connecting tube outer diameter φ8
- F3/8 : Connecting tube outer diameter φ3/8 (φ9.52)
- F10 : Connecting tube outer diameter φ10

### Flow rate adjustment

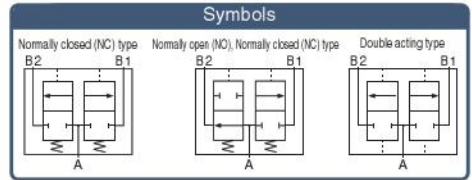
- Blank: None
- Q1: With flow rate adjustment

- \* For protection against corrosive media, metallic parts (threads, springs, etc.) are treated with a fluoro coating.
- \* Mounting type is with-mounting-base type only.

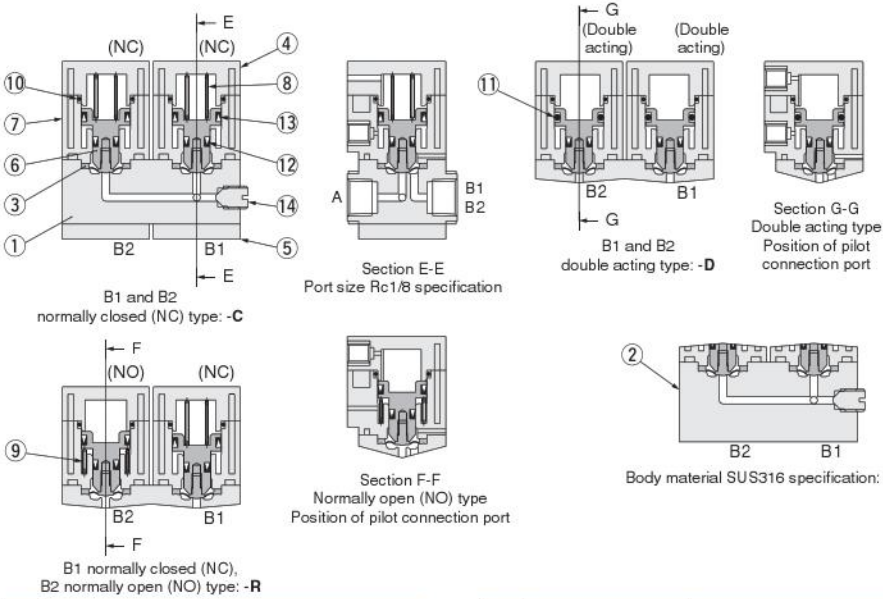
# Air Operated Valve

Diaphragm type  
3-port valve

## F-DAV070-200W



### Inner Construction and Materials



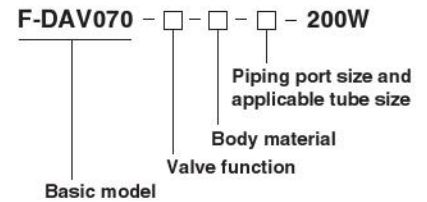
No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	SUS304
⑥	Piston	SUS304
⑦	Cylinder tube	PPS

No.	Parts	Materials
⑧	Spring	SUS304-WPB
⑨	Spring	SUS304-WPB
⑩	O-ring	FKM
⑪	O-ring	FKM
⑫	Seal	FKM
⑬	Seal	FKM
⑭	Plug	CTFE

### Specifications

Model		F-DAV070-200W
Media		Pure water, chemicals, air, Nz
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range	A→B	0~0.5 [0~5.1] [0~73]
	B→A	0~0.3 [0~3.1] [0~44]
Pilot pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0.3~0.5 [3.1~5.1] [44~73]
Back pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Orifice (Cv)	mm	2 [0.1]
Pilot connection port size		M5 × 0.8
Leakage at valve seat	cm <sup>3</sup> /min [in. <sup>3</sup> /min.]	0 [0] (When the media is water)
Operating frequency	c.p.m	30 or less
Mounting direction		Any

### Order Codes



#### Valve function <sup>Note 1</sup>

- C: B1 and B2 normally closed (NC) type
- R: B1 normally closed (NC), B2 normally open (NO) type
- D: B1 and B2 double acting type

#### Body material <sup>Note 2</sup>

- Blank: PTFE
- S: SUS316

#### Piping port size and applicable tube size

Blank: Rc1/8

#### Flowell 60 series fitting <sup>Note 3</sup>

- Standard fitting
- LB: Connecting tube diameter  $\phi 3.17 \times \phi 1.59$
- LC: Shared connecting tube diameters  $\phi 4 \times \phi 2$  and  $\phi 4 \times \phi 3$
- Special fitting
- LX: Connecting tube diameter  $\phi 3.17 \times \phi 2.17$  only
- LY: Connecting tube diameter  $\phi 4 \times \phi 3$  only

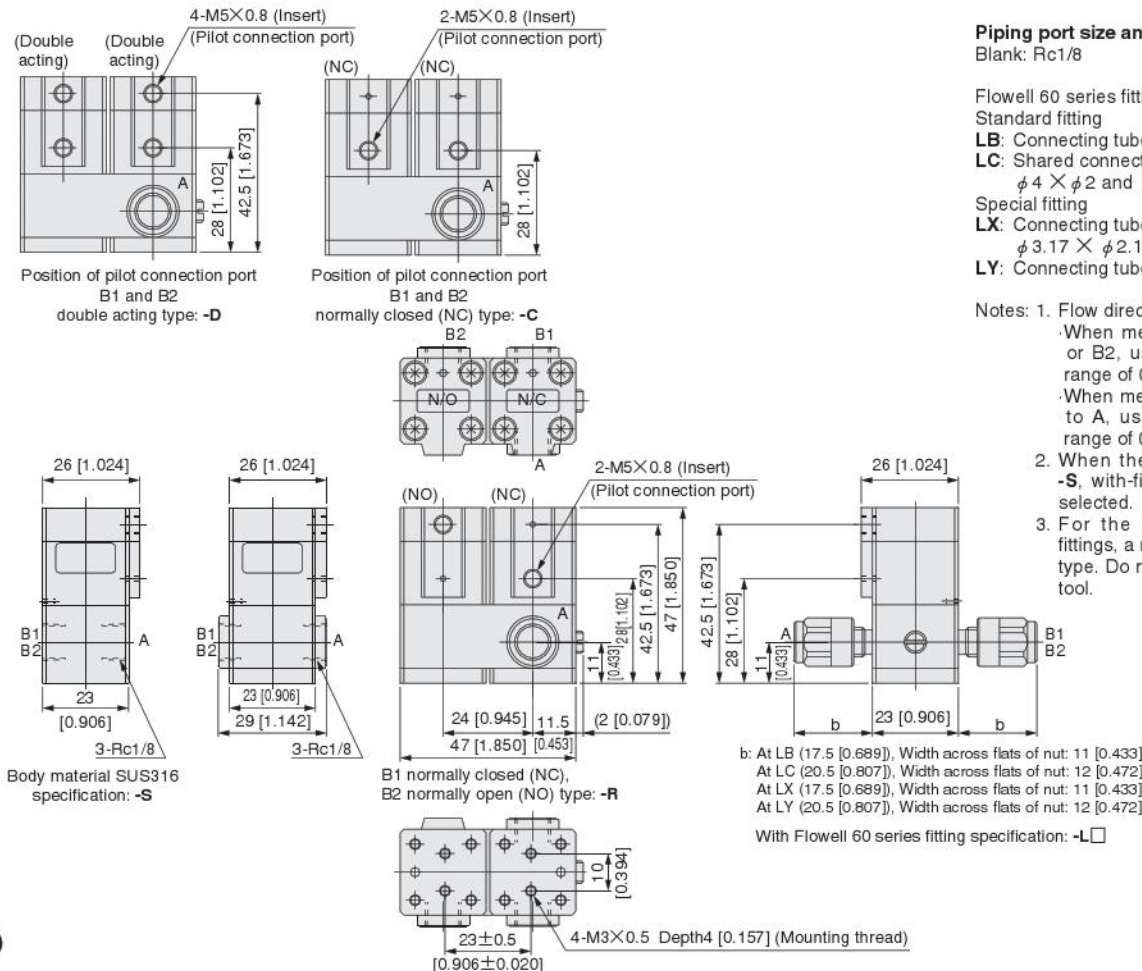
#### Notes: 1. Flow directions for media

- When media flow direction is A to B1 or B2, use at an operating pressure range of 0 ~ 0.5MPa [0 ~ 73psi.].
- When media flow direction is B1 or B2 to A, use at an operating pressure range of 0 ~ 0.3MPa [0 ~ 44psi.].

2. When the selected body material is -S, with-fitting specification cannot be selected.

3. For the Flowell 60 series special fittings, a mounting tool is also a special tool. Do not use the standard mounting tool.

### Dimensions mm [in.]



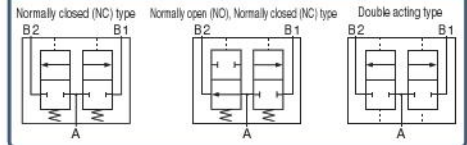


# Air Operated Valve

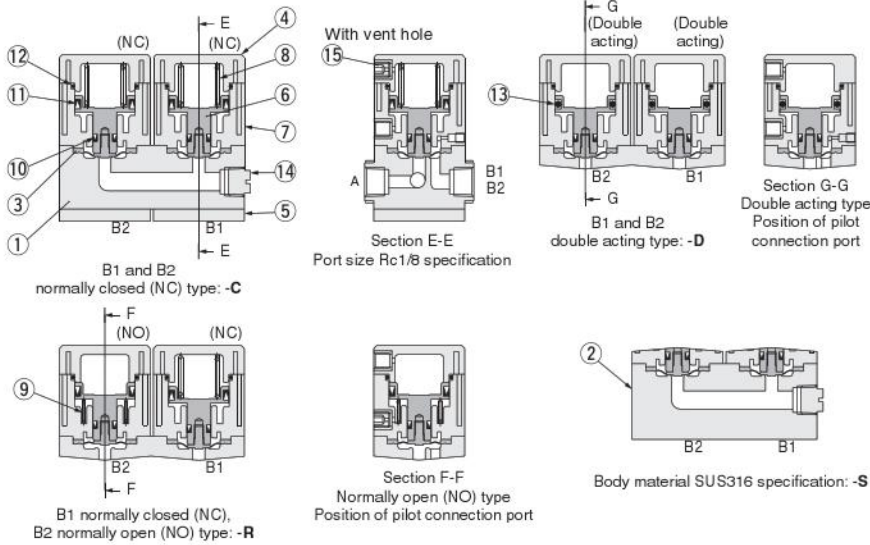
Diaphragm type  
3-port valve

# F-DAV125-200W

### Symbols



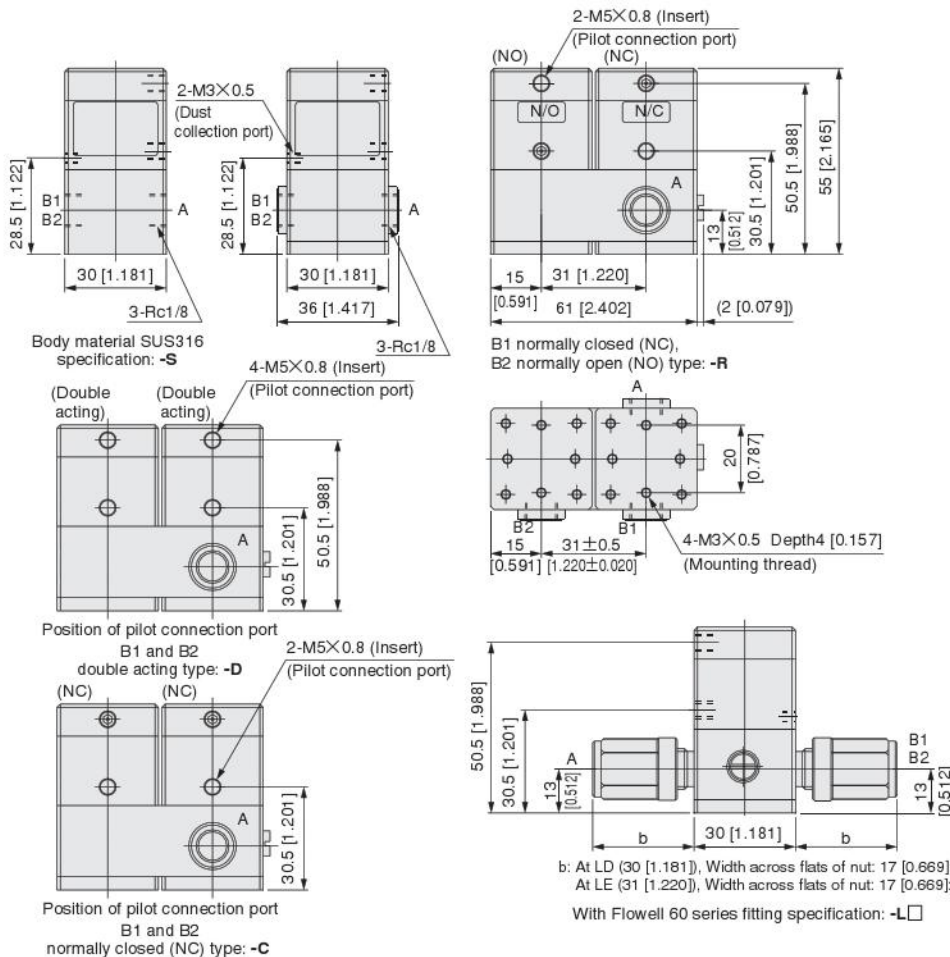
## Inner Construction and Materials



No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	SUS304
⑥	Piston	SUS304
⑦	Cylinder tube	PPS
⑧	Spring	SUS304-WPB

No.	Parts	Materials
⑨	Spring	SUS304-WPB
⑩	Seal	FKM
⑪	Seal	FKM
⑫	O-ring	FKM
⑬	O-ring	FKM
⑭	Plug	CTFE
⑮	Set screw	SUS304

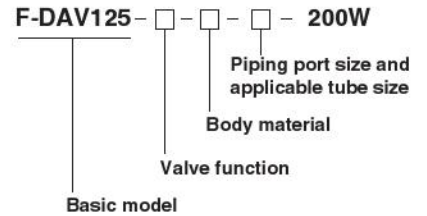
## Dimensions mm [in.]



## Specifications

Item	Model	F-DAV125-200W
Media		Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range °C [°F]	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range MPa [kgf/cm <sup>2</sup> ] [psi.]	A→B	0~0.5 [0~5.1] [0~73]
	B→A	0~0.3 [0~3.1] [0~44]
Pilot pressure MPa [kgf/cm <sup>2</sup> ] [psi.]		0.3~0.5 [3.1~5.1] [44~73]
Back pressure MPa [kgf/cm <sup>2</sup> ] [psi.]		0~0.3 [0~3.1] [0~44]
Proof pressure MPa [kgf/cm <sup>2</sup> ] [psi.]		1 [10.2] [145]
Orifice (Cv)	mm	4 [0.31]
Pilot connection port size		M5 X 0.8
Leakage at valve seat cm <sup>3</sup> /min [in. <sup>3</sup> /min.]		0 [0] (When the media is water)
Operating frequency c.p.m		30 or less
Mounting direction		Any

## Order Codes



### Valve function <sup>Note 1</sup>

- C: B1 and B2 normally closed (NC) type
- R: B1 normally closed (NC), B2 normally open (NO) type
- D: B1 and B2 double acting type

### Body material <sup>Note 2</sup>

- Blank: PTFE
- S: SUS316

### Piping port size and applicable tube size

Blank: Rc1/8

Flowell 60 series fitting

Standard fitting

LD: Connecting tube diameter  $\phi 6 \times \phi 4$

LE: Shared connecting tube diameters  $\phi 6.35 \times \phi 3.96$  and  $\phi 6.35 \times \phi 4.35$

### Notes: 1. Flow directions for media

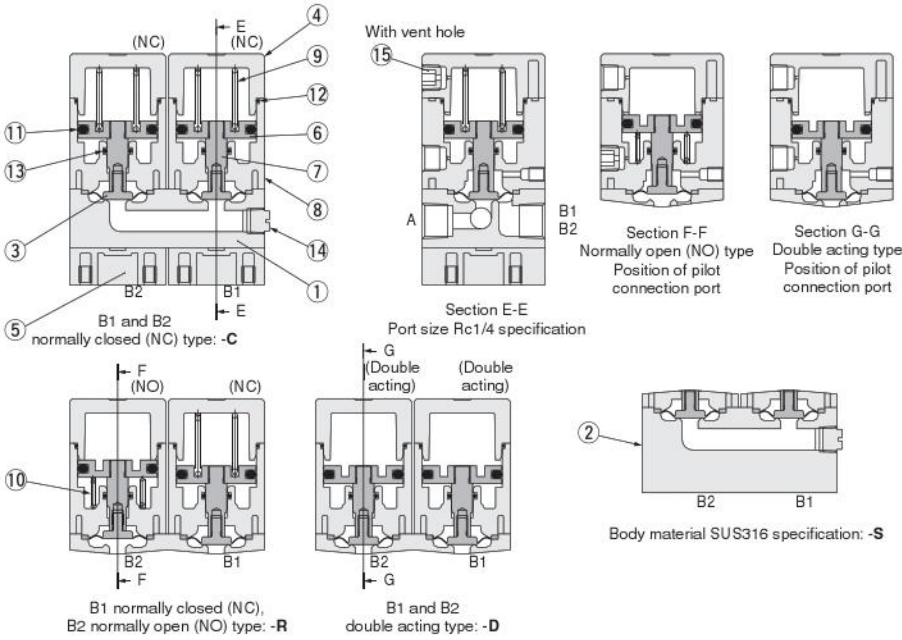
- When media flow direction is A to B1 or B2, use at an operating pressure range of 0 ~ 0.5MPa [0 ~ 73psi.].
  - When media flow direction is B1 or B2 to A, use at an operating pressure range of 0 ~ 0.3MPa [0 ~ 44psi.].
2. When the selected body material is -S, with-fitting specification cannot be selected.

# Air Operated Valve

Diaphragm type  
3-port valve

# F-DAV250-200W

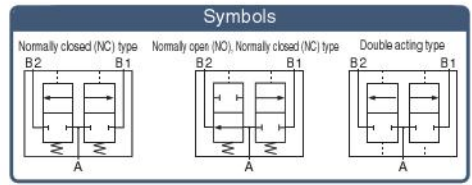
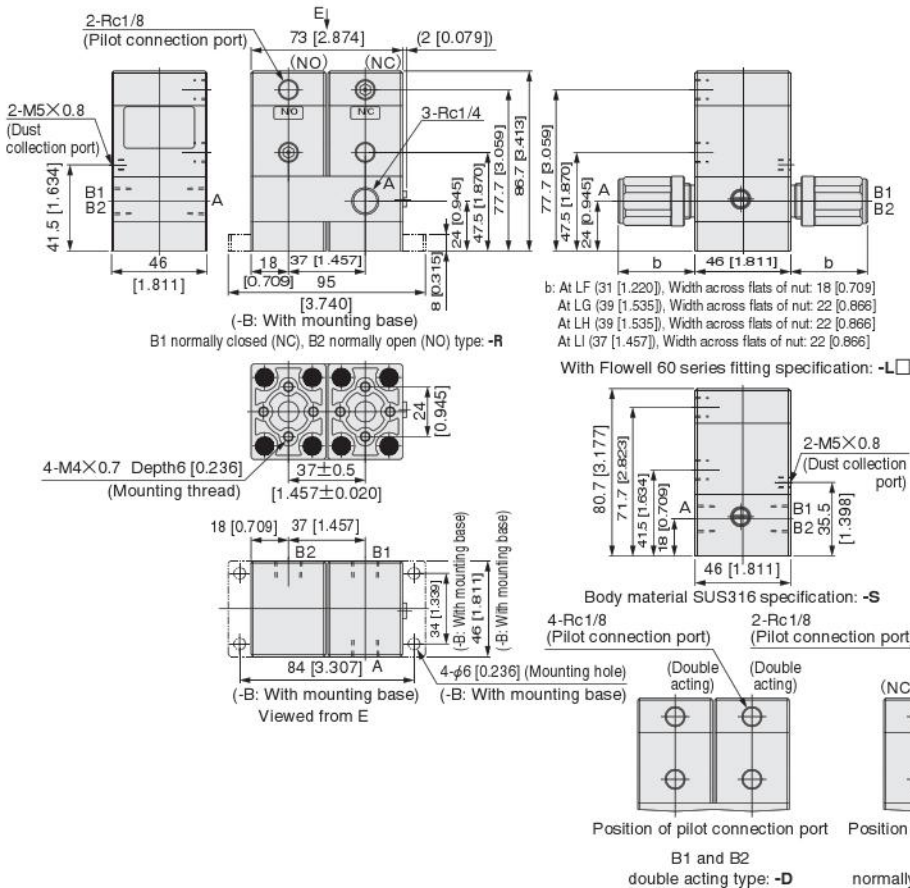
## Inner Construction and Materials



No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	PPS
⑥	Piston	SUS304
⑦	Piston rod	SUS304
⑧	Cylinder tube	PPS

No.	Parts	Materials
⑨	Spring	SUS304-WPB
⑩	Spring	SUS304-WPB
⑪	Seal	FKM
⑫	O-ring	FKM
⑬	O-ring	FKM
⑭	Plug	CTFE
⑮	Plug	VECTRA

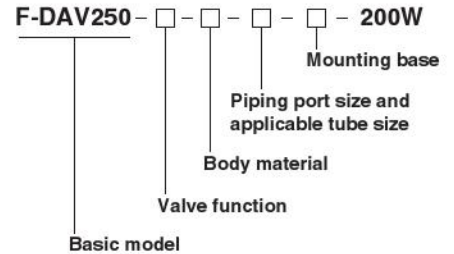
## Dimensions mm [in.]



## Specifications

Model		F-DAV250-200W
Item	Media	Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range	A→B	0~0.5 [0~5.1] [0~73]
	B→A	0~0.3 [0~3.1] [0~44]
Pilot pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0.3~0.5 [3.1~5.1] [44~73]
Back pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Orifice (Cv)	mm	6 [0.6]
Pilot connection port size		Rc1/8
Leakage at valve seat		0 [0]
	cm <sup>3</sup> /min [in. <sup>3</sup> /min.]	(When the media is water)
Operating frequency	c.p.m	30 or less
Mounting direction		Any

## Order Codes



**Valve function** <sup>Note 1</sup>  
**C:** B1 and B2 normally closed (NC) type  
**R:** B1 normally closed (NC), B2 normally open (NO) type  
**D:** B1 and B2 double acting type

**Body material** <sup>Note 2</sup>  
 Blank: PTFE  
**S:** SUS316

**Piping port size and applicable tube size**  
 Blank: Rc1/4  
 Flowwell 60 series fitting  
 Standard fitting  
**LF:** Connecting tube diameter  $\phi 8 \times \phi 6$   
**LG:** Connecting tube diameter  $\phi 9.52 \times \phi 6.35$   
**LH:** Connecting tube diameter  $\phi 9.52 \times \phi 7.52$   
**LI:** Connecting tube diameter  $\phi 10 \times \phi 8$

**Mounting base**  
 Blank: Bottom mounting type  
**B:** With mounting base

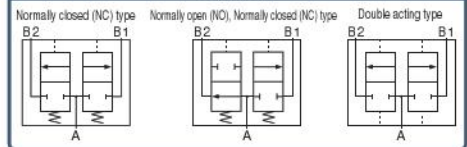
Notes: 1. Flow directions for media  
 · When media flow direction is A to B1 or B2, use at an operating pressure range of 0 ~ 0.5MPa [0 ~ 73psi].  
 · When media flow direction is B1 or B2 to A, use at an operating pressure range of 0 ~ 0.3MPa [0 ~ 44psi].  
 2. When the selected body material is **-S**, with-fitting specification cannot be selected.

# Air Operated Valve

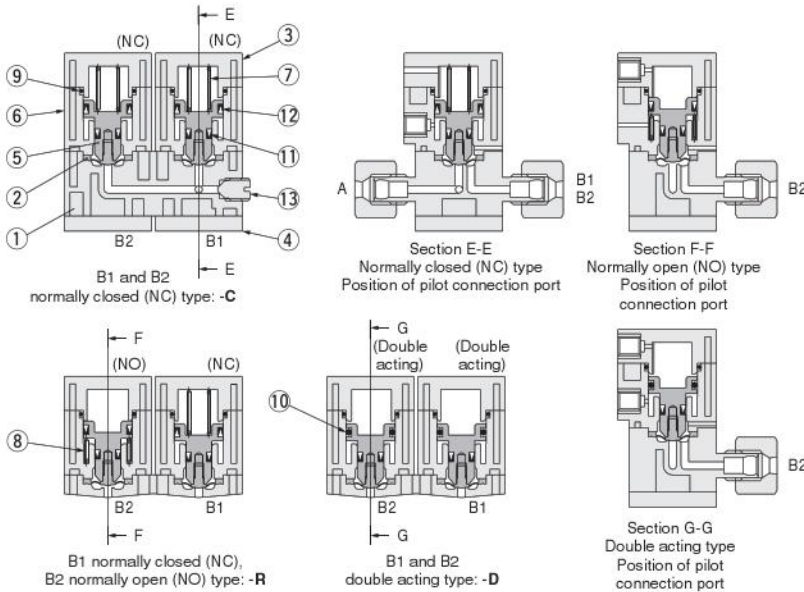
Diaphragm type  
3-port valve

# F-DAVP070-200W

### Symbols



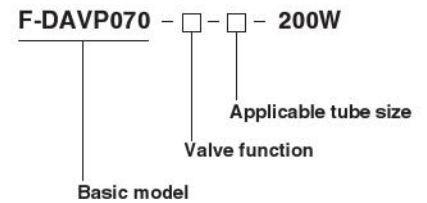
## Inner Construction and Materials



## Specifications

Model		F-DAVP070-200W
Item	Media	Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range °C [°F]	Media	5~80 [41~176]
	Atmosphere	0~50 [32~122]
Operating pressure range MPa [kgf/cm <sup>2</sup> ] [psi.]	A→B	0~0.5 [0~5.1] [0~73]
	B→A	0~0.3 [0~3.1] [0~44]
Pilot pressure MPa [kgf/cm <sup>2</sup> ] [psi.]		0.3~0.5 [3.1~5.1] [44~73]
Back pressure MPa [kgf/cm <sup>2</sup> ] [psi.]		0~0.3 [0~3.1] [0~44]
Proof pressure MPa [kgf/cm <sup>2</sup> ] [psi.]		1 [10.2] [145]
Orifice (Cv)	mm	2 (0.1)
Pilot connection port size		M5 × 0.8
Leakage at valve seat cm <sup>3</sup> /min [in. <sup>3</sup> /min.]		0 [0] (When the media is water)
Operating frequency	c.p.m	30 or less
Mounting direction		Any

## Order Codes



### Valve function<sup>Note</sup>

- C: B1 and B2 normally closed (NC) type
- R: B1 normally closed (NC), B2 normally open (NO) type
- D: B1 and B2 double acting type

### Applicable tube size

- H series fitting
- F1/8: Connecting tube outer diameter φ 1/8 (φ 3.17)
- F4: Connecting tube outer diameter φ 4

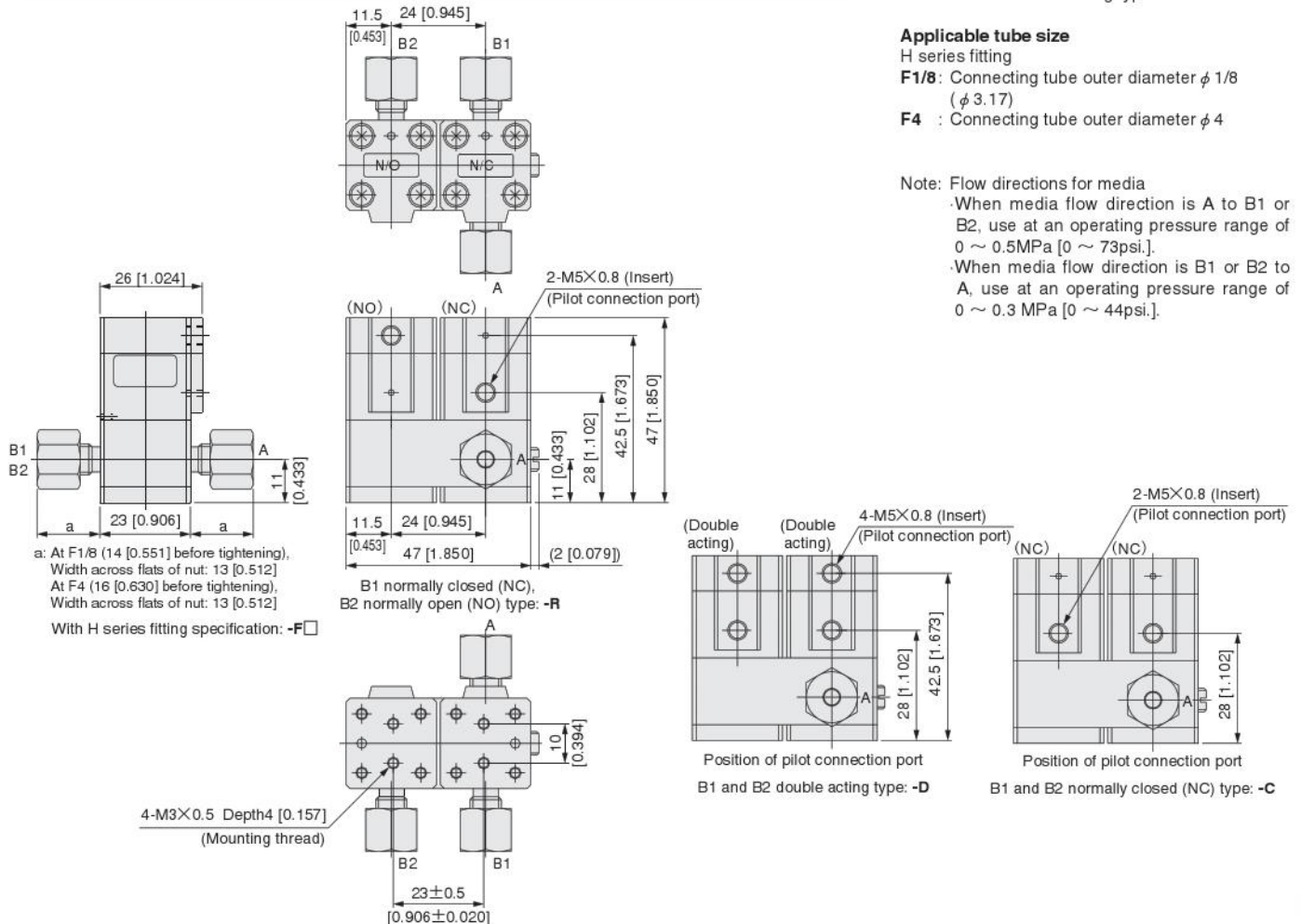
### Note: Flow directions for media

- When media flow direction is A to B1 or B2, use at an operating pressure range of 0 ~ 0.5MPa [0 ~ 73psi.].
- When media flow direction is B1 or B2 to A, use at an operating pressure range of 0 ~ 0.3 MPa [0 ~ 44psi.].

No.	Parts	Materials
①	Body	PFA
②	Diaphragm	PTFE
③	Cover	PPS
④	Plate	SUS304
⑤	Piston	SUS304
⑥	Cylinder tube	PPS
⑦	Spring	SUS304-WPB

No.	Parts	Materials
⑧	Spring	SUS304-WPB
⑨	O-ring	FKM
⑩	O-ring	FKM
⑪	Seal	FKM
⑫	Seal	FKM
⑬	Plug	CTFE

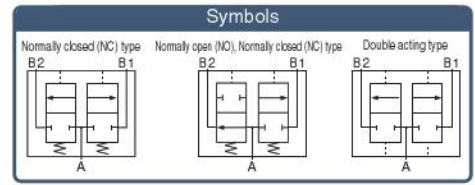
## Dimensions mm [in.]



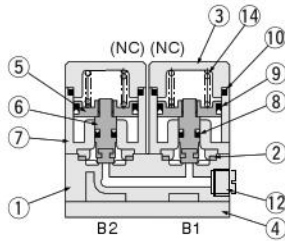
# Air Operated Valve

Diaphragm type  
3-port type

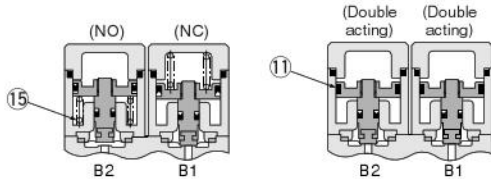
# F-DAVP125



## Inner Construction and Materials



B1 and B2 normally closed (NC) type: **-C**



B1 normally closed (NC), B2 normally open (NO) type: **-R**

B1 and B2 double acting type: **-D**

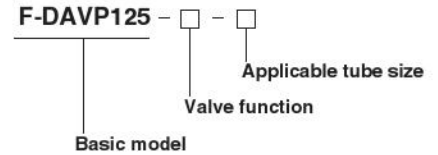
No.	Parts	Materials
①	Body	PFA
②	Diaphragm	PTFE
③	Cover	VECTRA
④	Plate	SUS304
⑤	Piston	SUS304
⑥	Piston rod	SUS304
⑦	Cylinder tube	VECTRA
⑧	Seal	FKM

No.	Parts	Materials
⑨	Seal	FKM
⑩	O-ring	FKM
⑪	O-ring	FKM
⑫	Plug	CTFE
⑬	Nut	PFA
⑭	Spring	SUS304-WPB
⑮	Spring	SUS304-WPB
⑯	Set screw	SUS304

## Specifications

Model		F-DAVP125
Item		
Media		Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range	A→B	0~0.5 [0~5.1] [0~73]
	B→A	0~0.3 [0~3.1] [0~44]
Pilot pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0.3~0.5 [3.1~5.1] [44~73]
Back pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Orifice (Cv)	mm	3.2 [0.25]
Pilot connection port size		M5 × 0.8
Leakage at valve seat		0 [0]
	cm <sup>3</sup> /min [in. <sup>3</sup> /min.]	(When the media is water)
Operating frequency	c.p.m	30 or less
Mounting direction		Any

## Order Codes



### Valve function

- C:** B1 and B2 normally closed (NC) type
- R:** B1 normally closed (NC), B2 normally open (NO) type
- D:** B1 and B2 double acting type

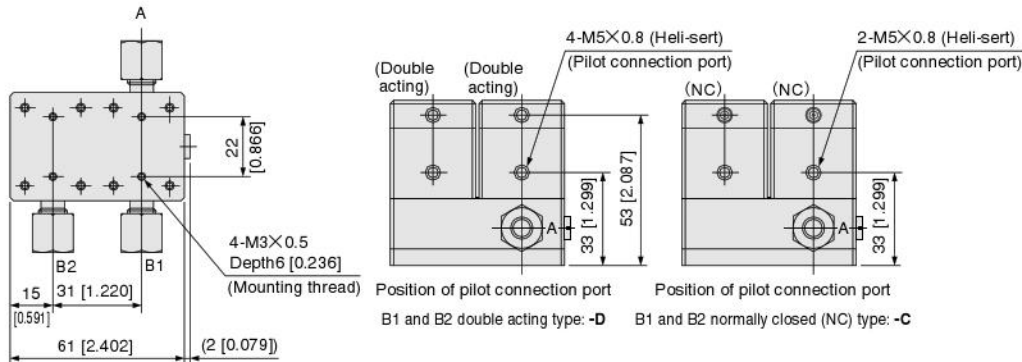
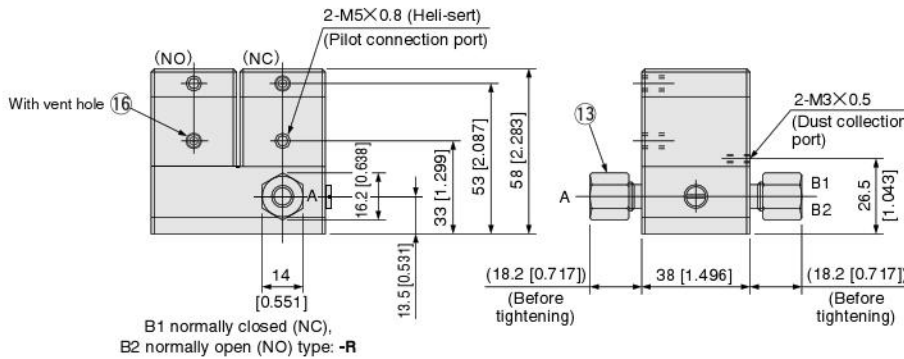
### Applicable tube size

- H series fitting
- F6 :** Connecting tube outer diameter  $\phi$  6
- F1/4 :** Connecting tube outer diameter  $\phi$  1/4 ( $\phi$  6.35)

### Note: Flow directions for media

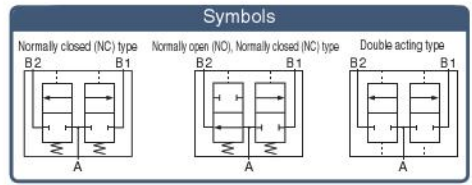
- When media flow direction is A to B1 or B2, use at an operating pressure range of 0 ~ 0.5MPa [0 ~ 73psi].
- When media flow direction is B1 or B2 to A, use at an operating pressure range of 0 ~ 0.3 MPa [0 ~ 44psi].

## Dimensions mm [in.]

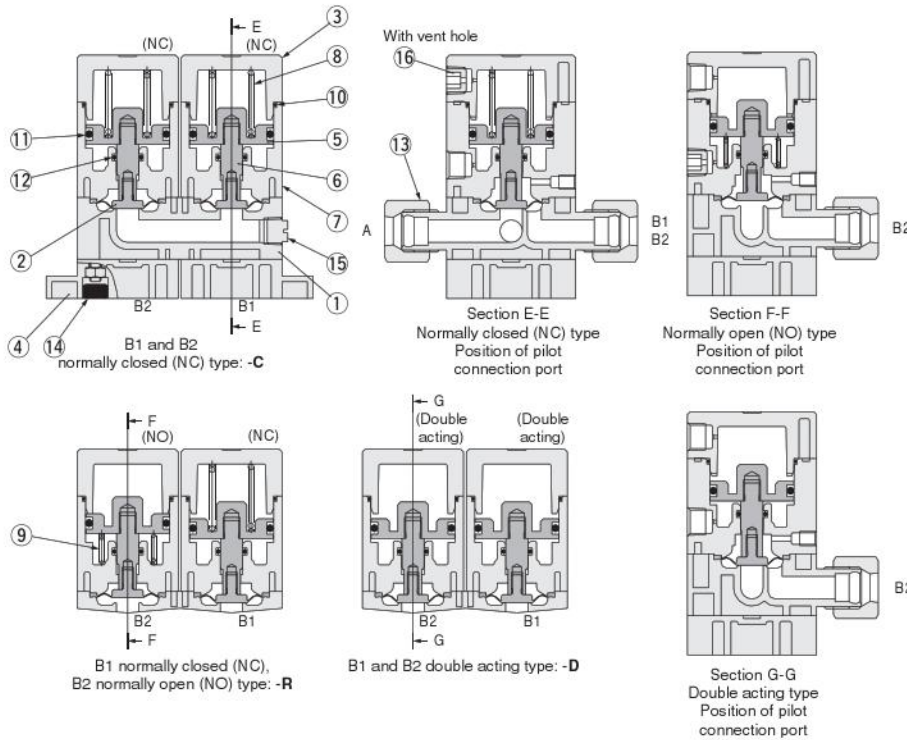


**Air Operated Valve**  
Diaphragm type  
3-port type

**F-DAVP250-200W**



**Inner Construction and Materials**

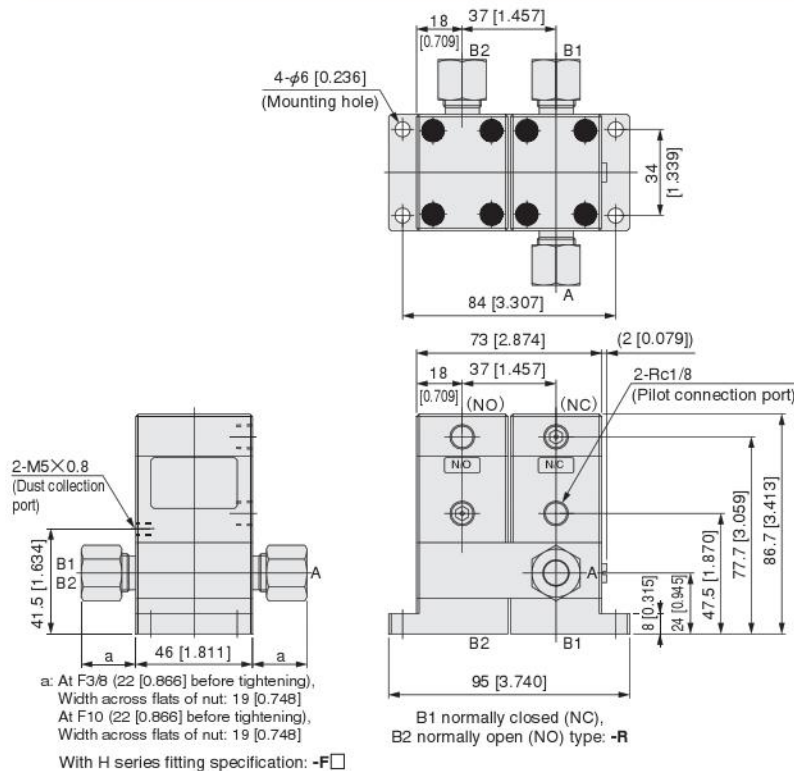


No.	Parts	Materials
①	Body	PFA
②	Diaphragm	PTFE
③	Cover	PPS
④	Plate	PPS
⑤	Piston	PEEK
⑥	Piston rod	PEEK
⑦	Cylinder tube	PPS
⑧	Spring	SUS304-WPB <sup>Note</sup>

Note: Fluoro coated

No.	Parts	Materials
⑨	Spring	SUS304-WPB <sup>Note</sup>
⑩	O-ring	FKM
⑪	O-ring	FKM
⑫	O-ring	FKM
⑬	Nut	PFA
⑭	Cap	FKM
⑮	Plug	CTFE
⑯	Plug	VECTRA

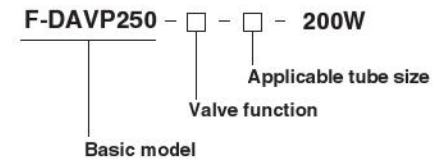
**Dimensions mm [in.]**



**Specifications**

Model		F-DAVP250-200W
Item	Media	Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range °C [°F]	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range MPa (kgf/cm <sup>2</sup> ) [psi.]	A→B	0~0.5 [0~5.1] [0~73]
	B→A	0~0.3 [0~3.1] [0~44]
Pilot pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0.3~0.5 [3.1~5.1] [44~73]
Back pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0~0.3 [0~3.1] [0~44]
Proof pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		1 [10.2] [145]
Orifice (Cv)	mm	8 (1.2)
Pilot connection port size		Rc1/8
Leakage at valve seat cm <sup>3</sup> /min [in. <sup>3</sup> /min.]		0 [0] (When the media is water)
Operating frequency	c.p.m	30 or less
Mounting direction		Any

**Order Codes**



**Valve function** <sup>Note</sup>

- C: B1 and B2 normally closed (NC) type
- R: B1 normally closed (NC), B2 normally open (NO) type
- D: B1 and B2 double acting type

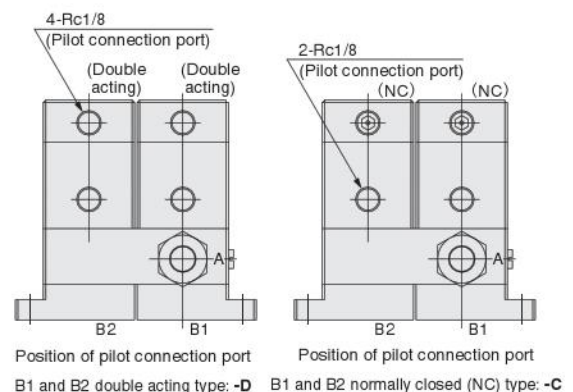
**Applicable tube size**

- H series fitting
- F3/8: Connecting tube outer diameter φ 3/8 (φ 9.52)
- F10: Connecting tube outer diameter φ 10

Note: Flow directions for media

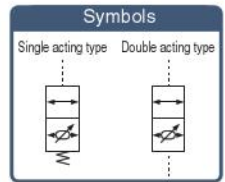
- When media flow direction is A to B1 or B2, use at an operating pressure range of 0 ~ 0.5MPa [0 ~ 73psi.].
- When media flow direction is B1 or B2 to A, use at an operating pressure range of 0 ~ 0.3 MPa [0 ~ 44psi.].

※ As protection against corrosive media, metallic parts (threads, springs, etc.) are treated with a fluoro coating.

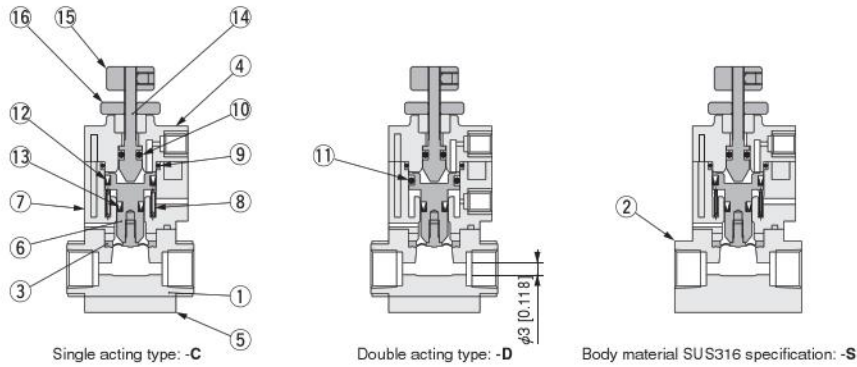


# Suck Back Valve

# F-SV070-200W



## Inner Construction and Materials



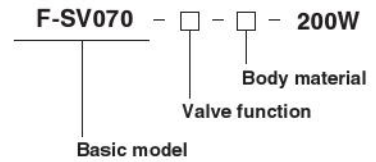
No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	SUS304
⑥	Piston	SUS304
⑦	Cylinder tube	PPS
⑧	Spring	SUS304-WPB

No.	Parts	Materials
⑨	O-ring	FKM
⑩	O-ring	FKM
⑪	O-ring	FKM
⑫	Seal	FKM
⑬	Seal	FKM
⑭	Adjusting screw	SUS304
⑮	Nut	SUS304
⑯	Nut	SUS304

## Specifications

Model		F-SV070-200W
Media		Pure water, chemicals
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range		0~0.3 [0~3.1] [0~44]
Pilot pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0.3~0.5 [3.1~5.1] [44~73]
	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Maximum suck back volume		cm <sup>3</sup> [in. <sup>3</sup> ] 0.045 [0.00275]
Connection port size	Pilot	M5 × 0.8
	Main	Rc 1/8
Recommended mounting direction		Vertical mounting with port facing upward

## Order Codes



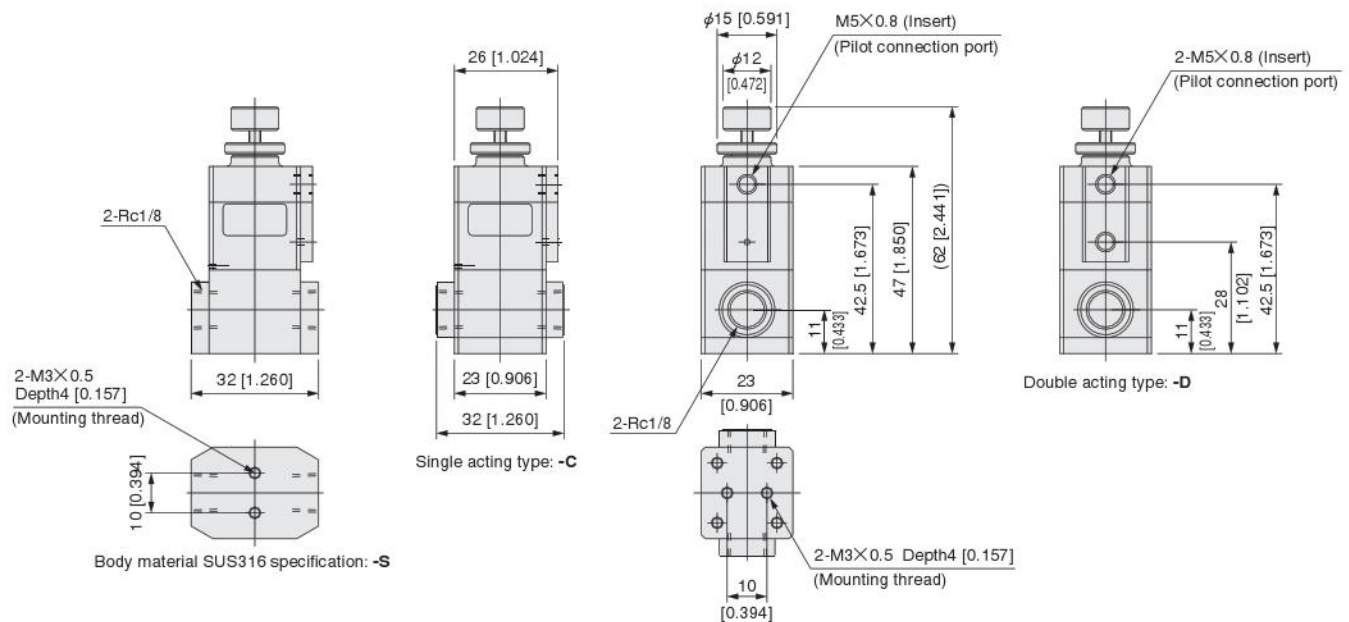
### Valve function

C: Single acting type  
D: Double acting type

### Body material

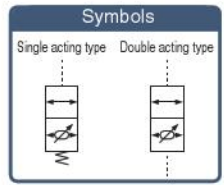
Blank: PTFE  
S: SUS316

## Dimensions mm [in.]

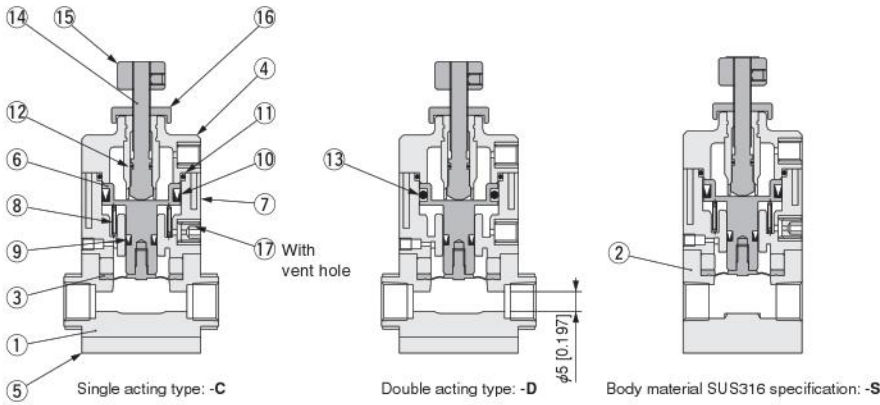


# Suck Back Valve

# F-SV125-200W



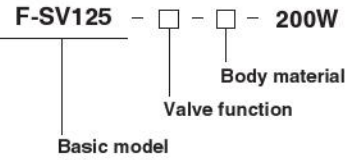
## Inner Construction and Materials



## Specifications

Model		F-SV125-200W
Item	Media	Pure water, chemicals
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
	Pilot pressure	0.3~0.5 [3.1~5.1] [44~73]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Maximum suck back volume	cm <sup>3</sup> [in. <sup>3</sup> ]	0.25 [0.0153]
Connection port size	Pilot	M5 X 0.8
	Main	Rc 1/8
Recommended mounting direction	Vertical mounting with port facing upward	

## Order Codes



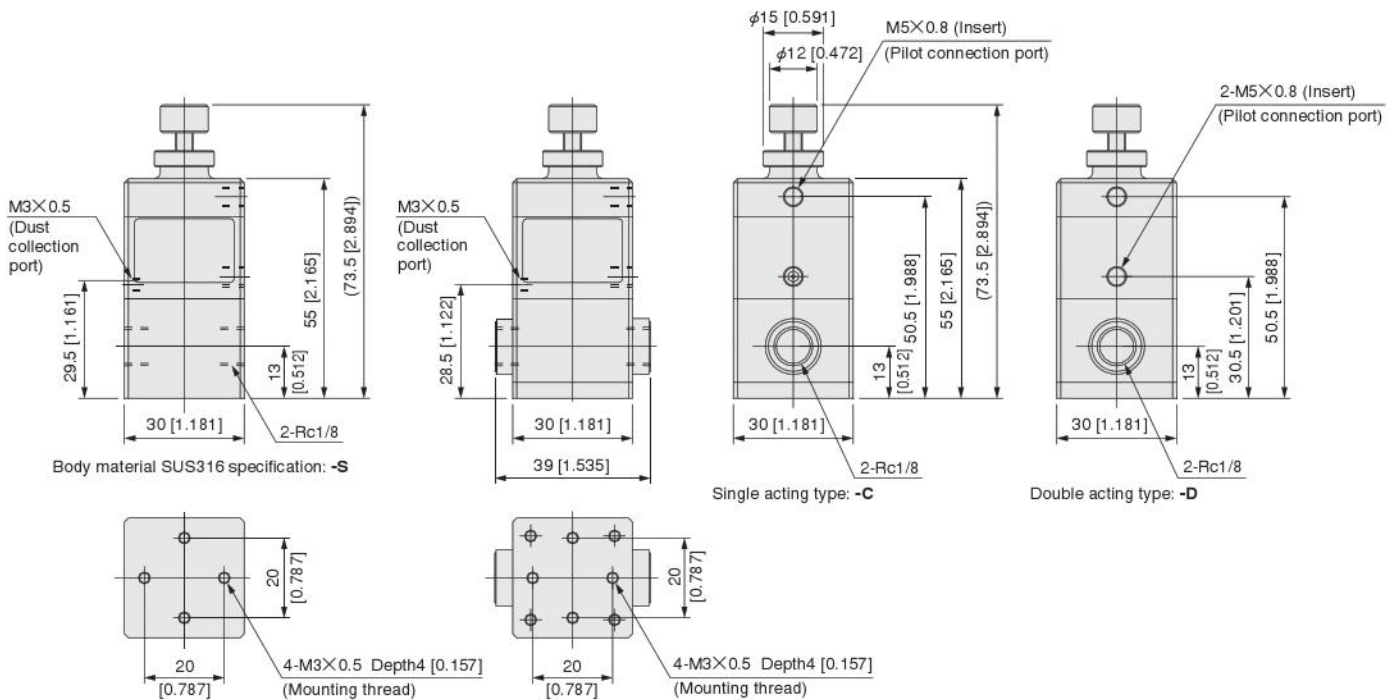
**Valve function**  
 C: Single acting type  
 D: Double acting type

**Body material**  
 Blank: PTFE  
 S: SUS316

No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	SUS304
⑥	Piston	SUS304
⑦	Cylinder tube	PPS
⑧	Spring	SUS304-WPB
⑨	Seal	FKM

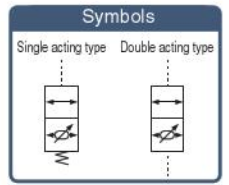
No.	Parts	Materials
⑩	Seal	FKM
⑪	O-ring	FKM
⑫	O-ring	FKM
⑬	O-ring	FKM
⑭	Adjusting screw	SUS304
⑮	Nut	SUS304
⑯	Nut	SUS304
⑰	Set screw	SUS304

## Dimensions mm [in.]

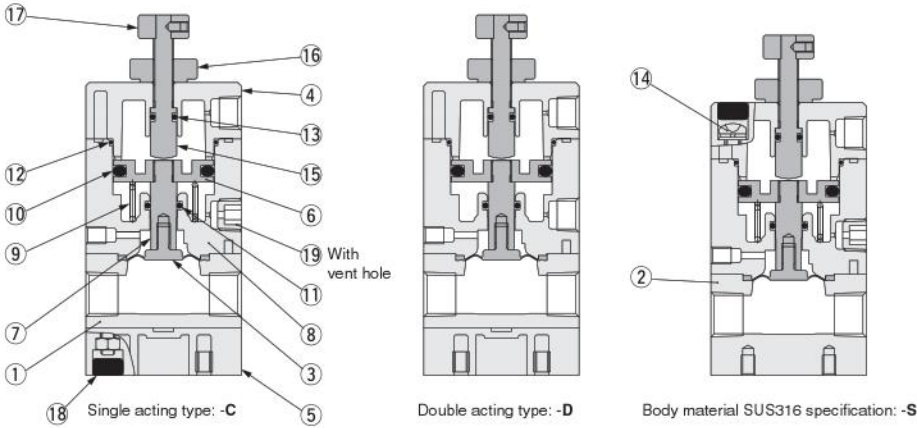


# Suck Back Valve

# F-SV250-200W



## Inner Construction and Materials



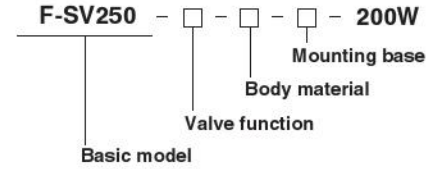
No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	PPS
⑥	Piston	SUS304
⑦	Piston rod	SUS304
⑧	Cylinder tube	PPS
⑨	Spring	SUS304-WPB
⑩	Seal	FKM

No.	Parts	Materials
⑪	O-ring	FKM
⑫	O-ring	FKM
⑬	O-ring	FKM
⑭	Screw	SUS304
⑮	Adjusting screw	SUS304
⑯	Nut	SUS304
⑰	Nut	SUS304
⑱	Cap	FKM
⑲	Plug	VECTRA

## Specifications

Model		F-SV250-200W
Item	Media	Pure water, chemicals
Operating temp. range °C [°F]	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range MPa [kgf/cm <sup>2</sup> ] [psi.]		0~0.3 [0~3.1] [0~44]
Pilot pressure MPa [kgf/cm <sup>2</sup> ] [psi.]		0.3~0.5 [3.1~5.1] [44~73]
Proof pressure MPa [kgf/cm <sup>2</sup> ] [psi.]		1 [10.2] [145]
Maximum suck back volume cm <sup>3</sup> [in. <sup>3</sup> ]		0.40 [0.0244]
Connection port size	Pilot	Rc 1/8
	Main	Rc 1/4
Recommended mounting direction		Vertical mounting with port facing upward

## Order Codes



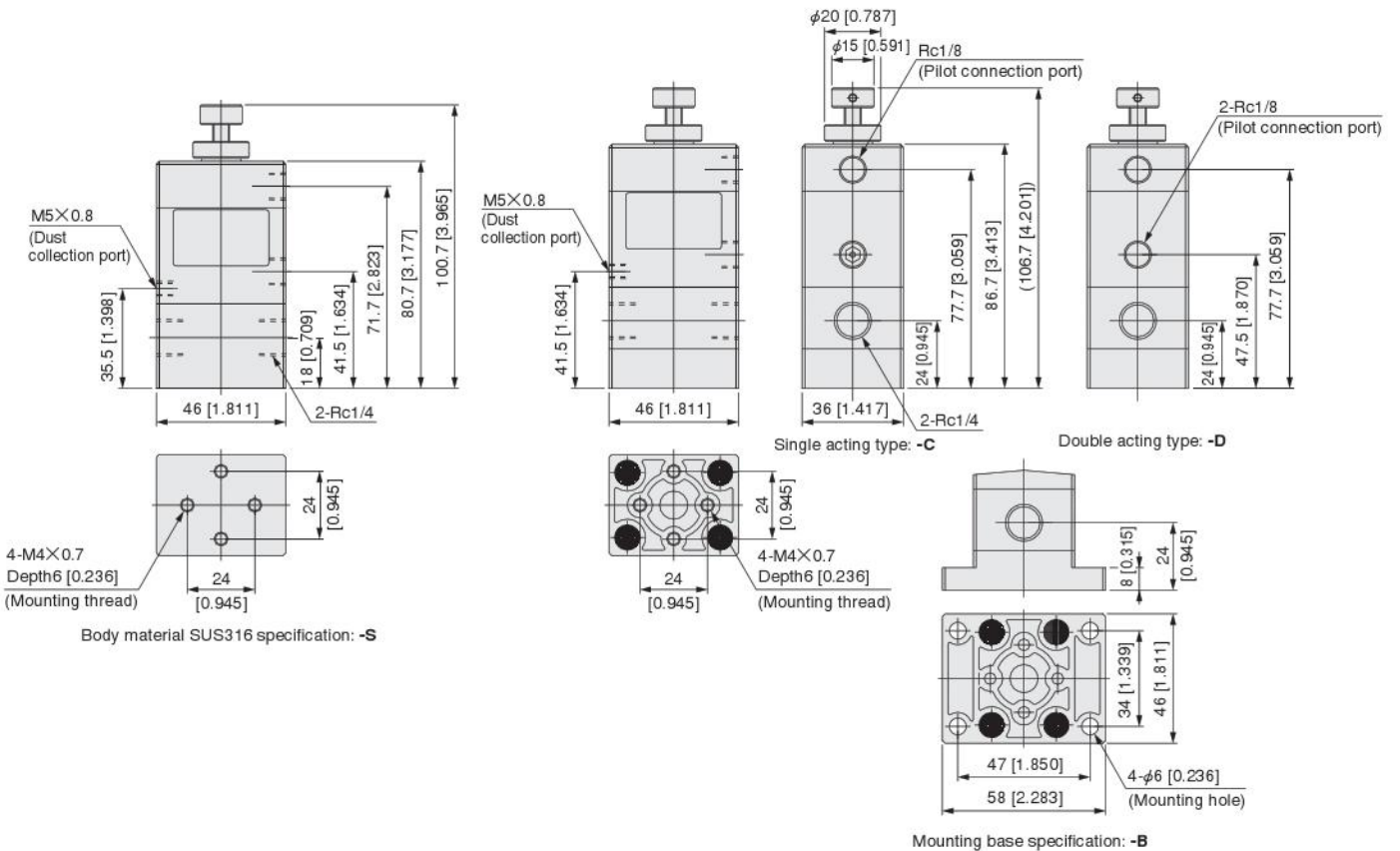
**Valve function**  
 C: Single acting type  
 D: Double acting type

**Body material** <sup>Note</sup>  
 Blank: PTFE  
 S: SUS316

**Mounting base**  
 Blank: Bottom mounting type  
 B: With mounting base

**Note:** When the selected body material is -S, with-mounting-base specification cannot be selected.

## Dimensions mm [in.]

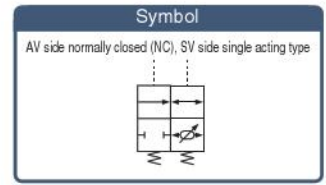




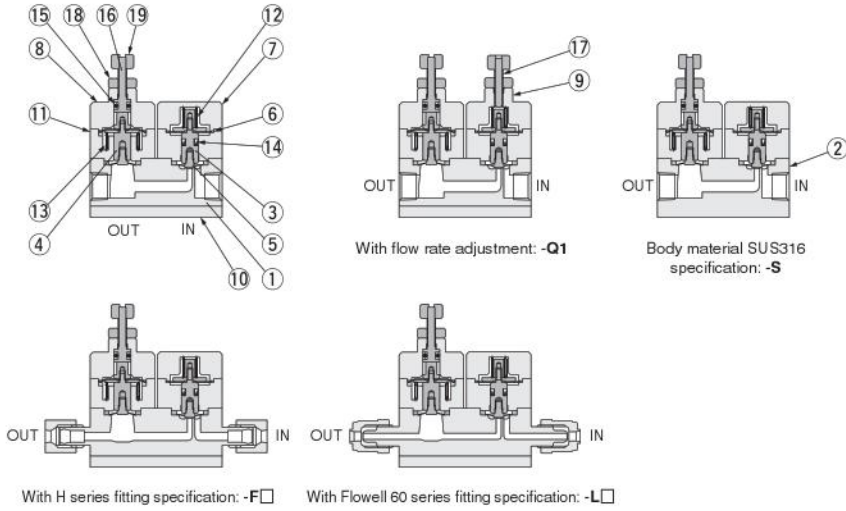
# Air Operated Valve with Suck Back

Low sliding resistance  
diaphragm type

# F-SAV070-100W



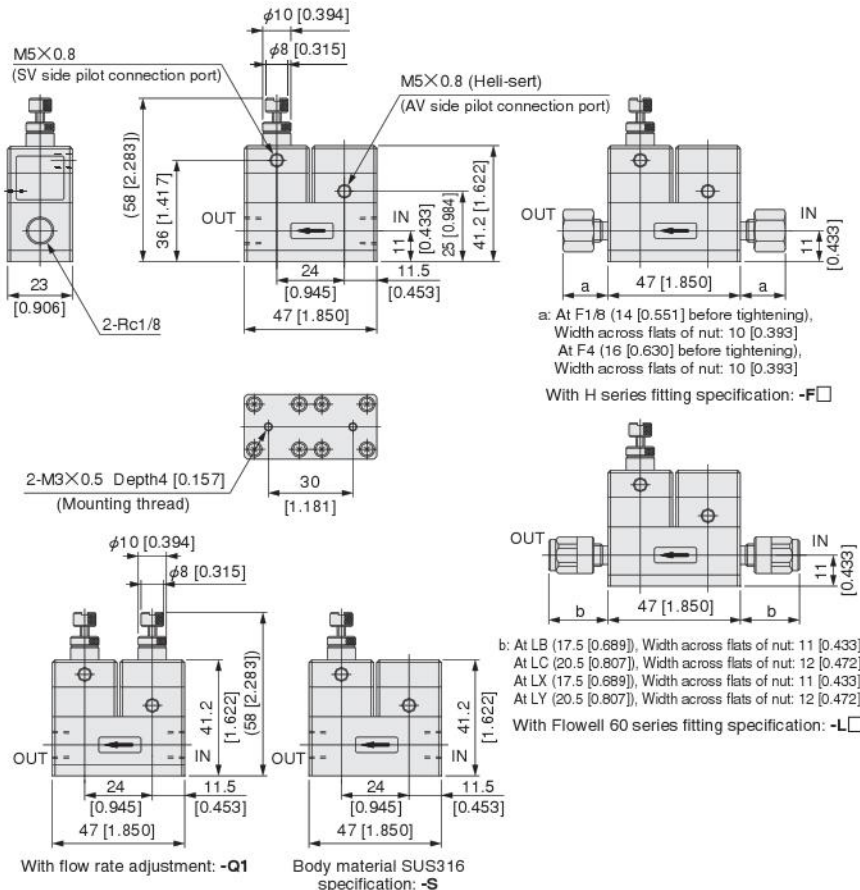
## Inner Construction and Materials



No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Stem	SUS304
④	Stem	SUS304
⑤	Diaphragm	PTFE
⑥	Diaphragm	FKM
⑦	Cover	C-PVC
⑧	Cover	SUS304
⑨	Cover	SUS304
⑩	Plate	SUS304

No.	Parts	Materials
⑪	Tube	C-PVC
⑫	Spring	SUS304-WPB
⑬	Spring	SUS304-WPB
⑭	Seal	FKM
⑮	O-ring	FKM
⑯	Adjusting screw	SUS304
⑰	Adjusting screw	SUS304
⑱	Nut	SUS304
⑲	Knob	SUS304

## Dimensions mm [in.]

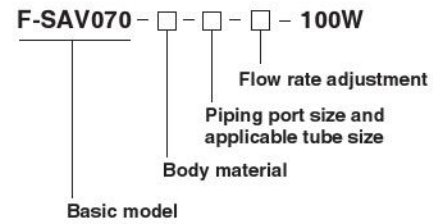


## Specifications

Model		F-SAV070-100W
Media		Pure water, chemicals
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.2 [0~2.0] [0~29]
	Pilot pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]
Back pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.2 [0~2.0] [0~29]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Orifice [Cv]	mm	1.8 [0.06]
Pilot connection port size		M5 × 0.8
Leakage at valve seat	cm <sup>3</sup> /min [in. <sup>3</sup> /min.]	0 [0] (When the media is water)
Maximum suck back volume	cm <sup>3</sup> [in. <sup>3</sup> ]	0.04 [0.0024]
Recommended mounting direction		Vertical mounting with port facing upward <sup>Note</sup>

Note: Mount the valve with the arrow mark on the label on the valve body side pointing upward.

## Order Codes



### Body material <sup>Note 1</sup>

Blank: PTFE  
S: SUS316

### Piping port size and applicable tube size

Blank: Rc1/8

H series fitting

**F1/8**: Connecting tube outer diameter φ1/8 (φ3.17)

**F4**: Connecting tube outer diameter φ4

Flowell 60 series fitting <sup>Note 2</sup>

Standard fitting

**LB**: Connecting tube diameter φ3.17 × φ1.59

**LC**: Shared connecting tube diameters

φ4 × φ2 and φ4 × φ3

Special fitting

**LX**: Connecting tube diameter

φ3.17 × φ2.17 only

**LY**: Connecting tube diameter φ4 × φ3 only

### Flow rate adjustment <sup>Note 3</sup>

Blank: None

**Q1**: With flow rate adjustment

### Valve function

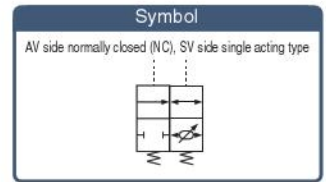
Only AV side normally closed (NC), SV side single acting type is available.

- Notes:
- When the selected body material is -S, with-fitting specification cannot be selected.
  - For the Flowell 60 series special fittings, a mounting tool is also a special type.  
Do not use the standard mounting tool.
  - Exercise caution as the flow rate adjusting screw will come off, if rotated more than necessary.

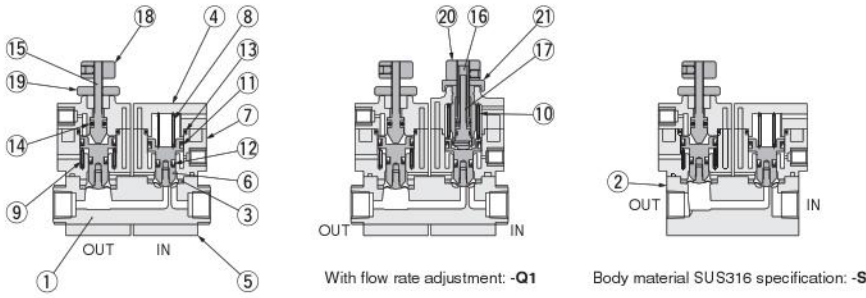
# Air Operated Valve with Suck Back

Diaphragm type

# F-SAV070-200W



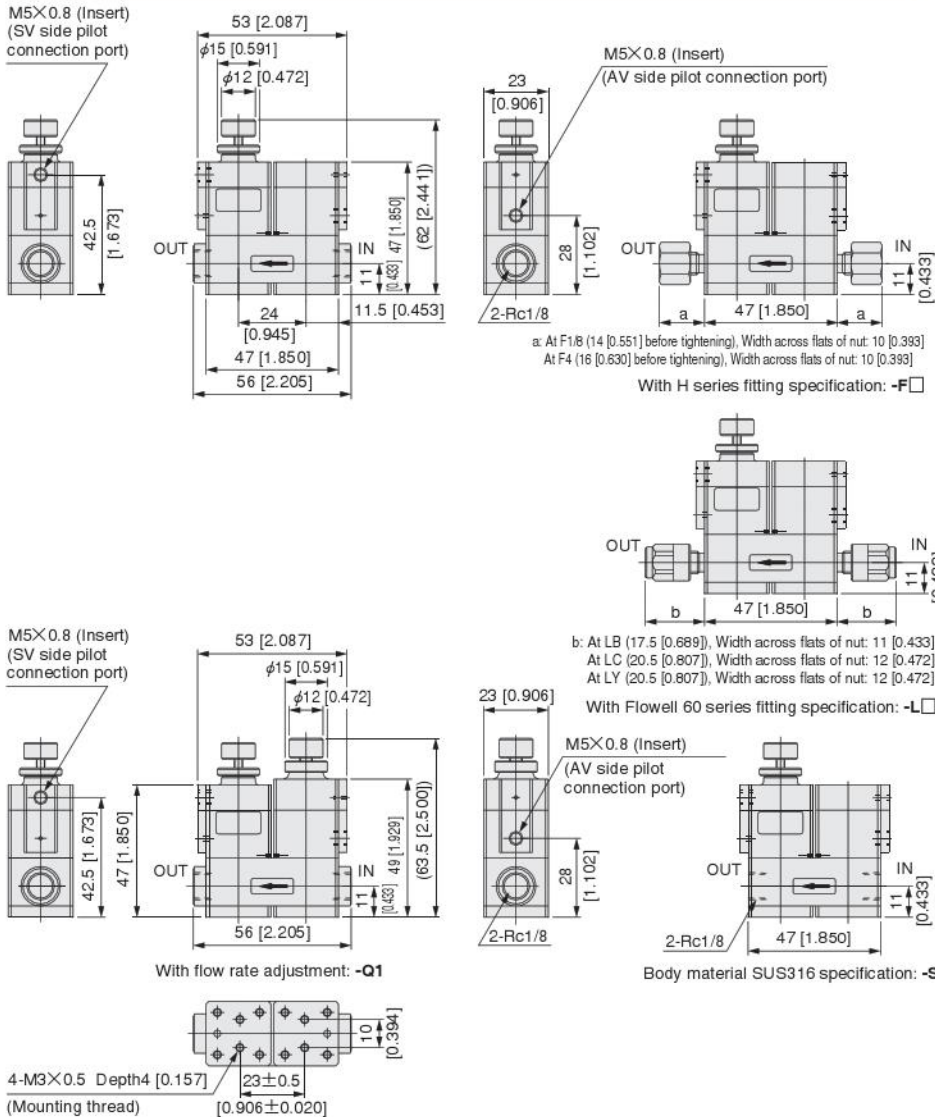
## Inner Construction and Materials



No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	SUS304
⑥	Piston	SUS304
⑦	Cylinder tube	PPS
⑧	Spring	SUS304-WPB
⑨	Spring	SUS304-WPB
⑩	Spring	SUS304-WPB
⑪	Seal	FKM

No.	Parts	Materials
⑫	Seal	FKM
⑬	O-ring	FKM
⑭	O-ring	FKM
⑮	Adjusting screw	SUS304
⑯	Adjusting screw	SUS304
⑰	Adjusting screw	SUS304
⑱	Nut	SUS304
⑲	Nut	SUS304
⑲	Nut	SUS304
⑲	Nut	SUS304
⑲	Nut	SUS304
⑲	Nut	SUS304

## Dimensions mm [in.]

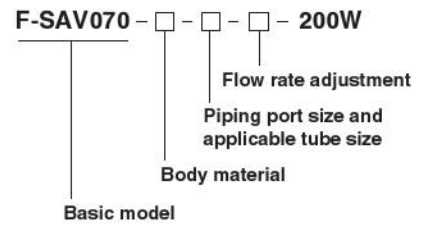


## Specifications

Model		F-SAV070-200W
Item		
Media		Pure water, chemicals
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
Pilot pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0.3~0.5 [3.1~5.1] [44~73]
Back pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Orifice (Cv)	mm	2 [0.1]
Pilot connection port size		M5 X 0.8
Leakage at valve seat		0 [0]
	cm <sup>3</sup> /min [in. <sup>3</sup> /min.]	(When the media is water)
Maximum suck back volume	cm <sup>3</sup> [in. <sup>3</sup> ]	0.045 [0.00275]
Recommended mounting direction		Vertical mounting with port facing upward <sup>Note</sup>

Note: Mount the valve with the arrow mark on the label on the valve body side pointing upward.

## Order Codes



### Body material <sup>Note 1</sup>

Blank: PTFE  
S: SUS316

### Piping port size and applicable tube size

Blank: Rc1/8

H series fitting

**F1/8**: Connecting tube outer diameter  $\phi$  1/8 ( $\phi$  3.17)

**F4**: Connecting tube outer diameter  $\phi$  4

Flowell 60 series fitting <sup>Note 2</sup>

Standard fitting

**LB**: Connecting tube diameter  $\phi$  3.17 X  $\phi$  1.59

**LC**: Shared connecting tube diameters  $\phi$  4 X  $\phi$  2 and  $\phi$  4 X  $\phi$  3

Special fitting

**LY**: Connecting tube diameter  $\phi$  4 X  $\phi$  3 only

### Flow rate adjustment <sup>Note 3</sup>

Blank: None

**Q1**: With flow rate adjustment (Micro flow rate adjustment type)

### Valve function

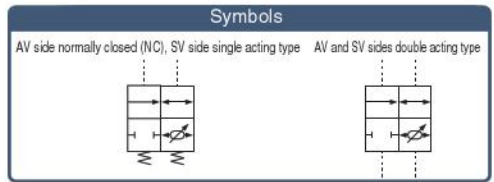
Only AV side normally closed (NC), SV side single acting type is available.

- Notes: 1. When the selected body material is **-S**, with-fitting specification cannot be selected.  
2. For the Flowell 60 series special fittings, a mounting tool is also a special type. Do not use the standard mounting tool.  
3. The flow rate adjustment mechanism uses a differential screw method for easier flow rate setting.

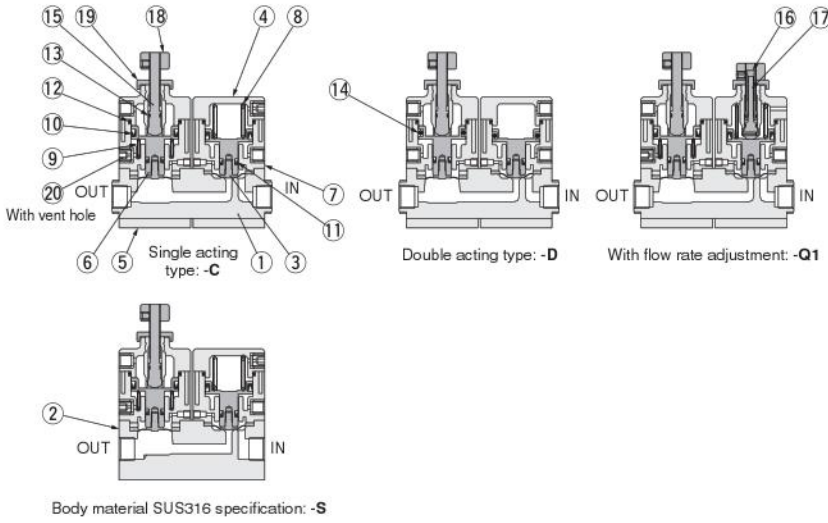
# Air Operated Valve with Suck Back

Diaphragm type

# F-SAV100-200W



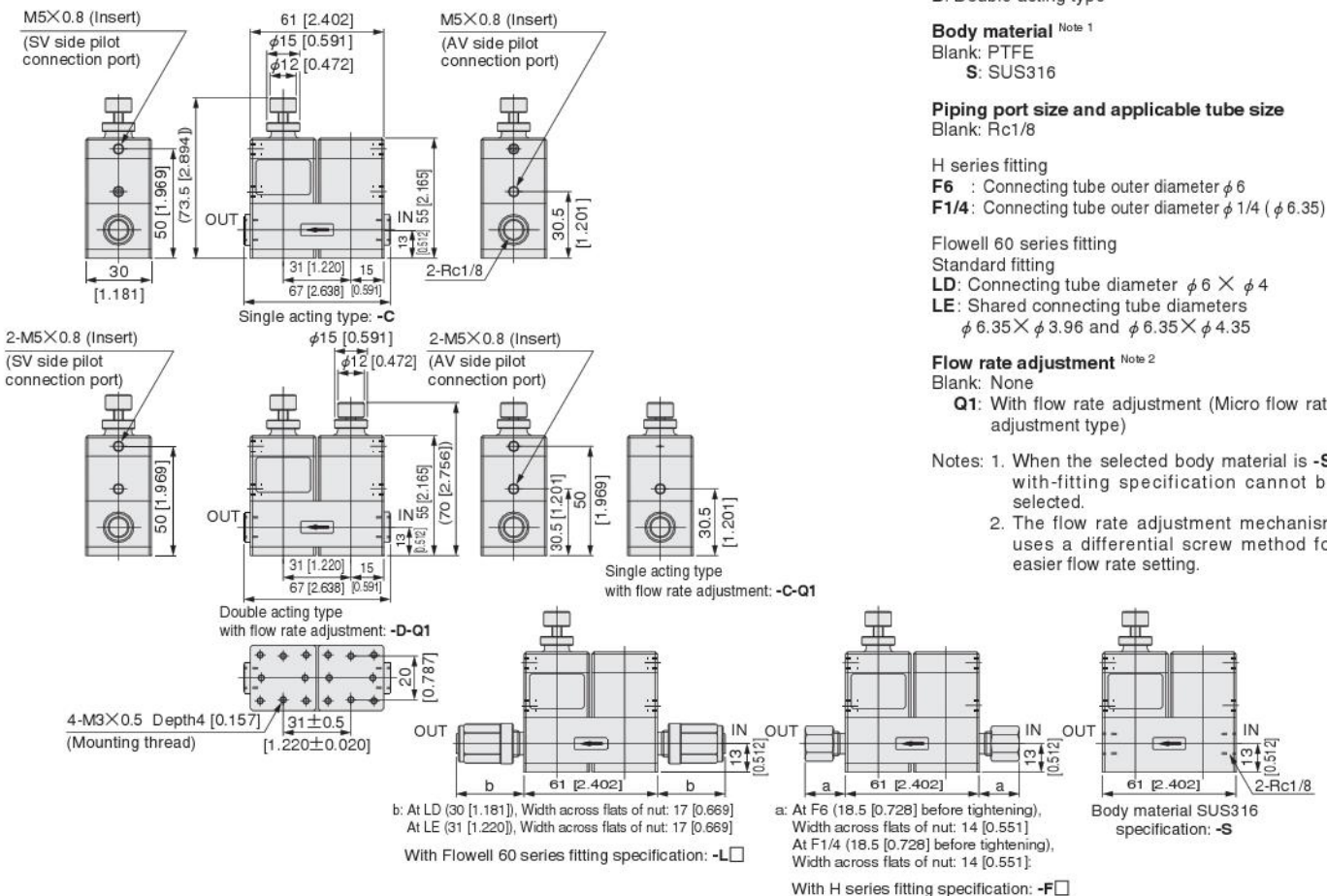
## Inner Construction and Materials



No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	SUS304
⑥	Piston	SUS304
⑦	Cylinder tube	PPS
⑧	Spring	SUS304-WPB
⑨	Spring	SUS304-WPB
⑩	Seal	FKM

No.	Parts	Materials
⑪	Seal	FKM
⑫	O-ring	FKM
⑬	O-ring	FKM
⑭	O-ring	FKM
⑮	Adjusting screw	SUS304
⑯	Adjusting screw	SUS304
⑰	Adjusting screw	SUS304
⑱	Nut	SUS304
⑲	Nut	SUS304
⑳	Set screw	SUS304

## Dimensions mm [in.]

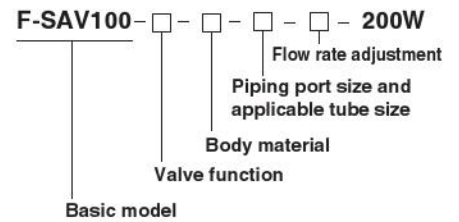


## Specifications

Model		F-SAV100-200W
Item		
Media		Pure water, chemicals
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
	Pilot pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]
Back pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Orifice [Cv]	mm	2.5 (0.15)
Pilot connection port size		M5 × 0.8
Leakage at valve seat	cm <sup>3</sup> /min [in. <sup>3</sup> /min.]	0 [0] (When the media is water)
Maximum suck back volume	cm <sup>3</sup> [in. <sup>3</sup> ]	0.25 [0.0153]
Recommended mounting direction		Vertical mounting with port facing upward <sup>Note</sup>

Note: Mount the valve with the arrow mark on the label on the valve body side pointing upward.

## Order Codes



### Valve function

- C: Single acting type (AV side normally closed (NC), SV side single acting type)
- D: Double acting type

### Body material <sup>Note 1</sup>

- Blank: PTFE
- S: SUS316

### Piping port size and applicable tube size

Blank: Rc1/8

### H series fitting

- F6 : Connecting tube outer diameter φ 6
- F1/4: Connecting tube outer diameter φ 1/4 (φ 6.35)

### Flowell 60 series fitting

- Standard fitting
- LD: Connecting tube diameter φ 6 × φ 4
- LE: Shared connecting tube diameters φ 6.35 × φ 3.96 and φ 6.35 × φ 4.35

### Flow rate adjustment <sup>Note 2</sup>

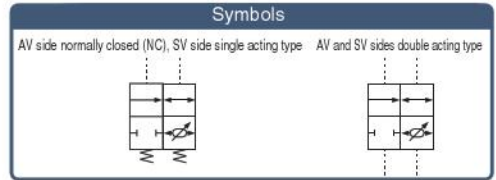
- Blank: None
- Q1: With flow rate adjustment (Micro flow rate adjustment type)

- Notes: 1. When the selected body material is -S, with-fitting specification cannot be selected.
2. The flow rate adjustment mechanism uses a differential screw method for easier flow rate setting.

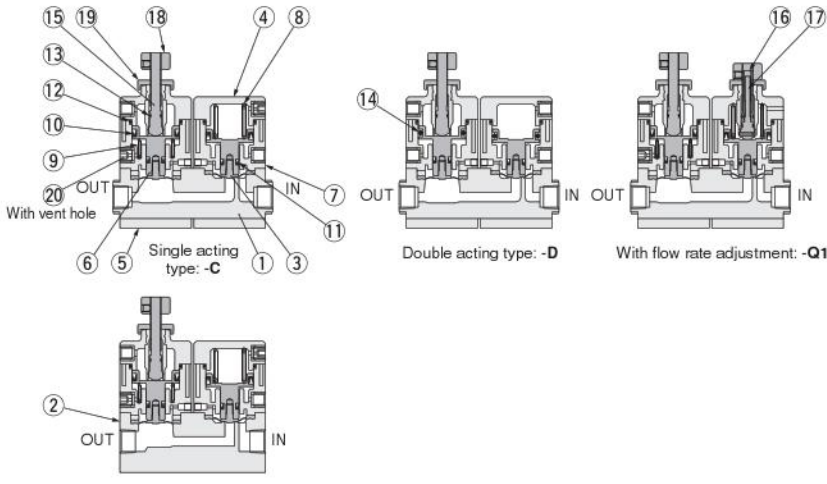
# Air Operated Valve with Suck Back

Diaphragm type

## F-SAV125-200W



### Inner Construction and Materials

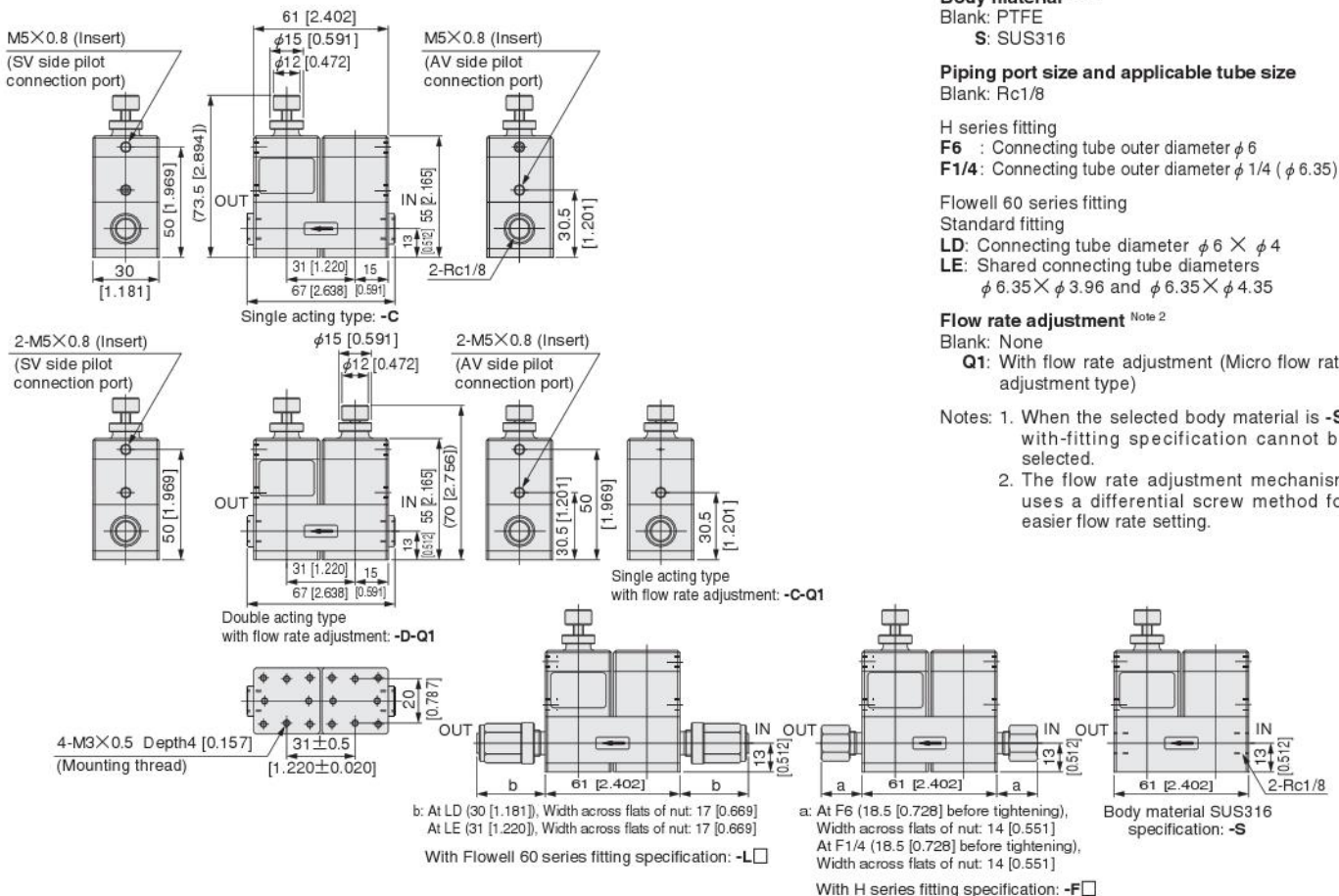


Body material SUS316 specification: -S

No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	SUS304
⑥	Piston	SUS304
⑦	Cylinder tube	PPS
⑧	Spring	SUS304-WPB
⑨	Spring	SUS304-WPB
⑩	Seal	FKM

No.	Parts	Materials
⑪	Seal	FKM
⑫	O-ring	FKM
⑬	O-ring	FKM
⑭	O-ring	FKM
⑮	Adjusting screw	SUS304
⑯	Adjusting screw	SUS304
⑰	Adjusting screw	SUS304
⑱	Nut	SUS304
⑲	Nut	SUS304
⑳	Set screw	SUS304

### Dimensions mm [in.]

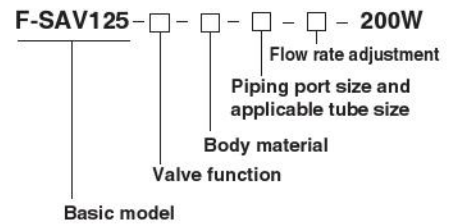


### Specifications

Model		F-SAV125-200W
Item		
Media		Pure water, chemicals
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
	Pilot pressure	0.3~0.5 [3.1~5.1] [44~73]
Back pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Orifice (Cv)	mm	4 [0.31]
Pilot connection port size		M5 × 0.8
Leakage at valve seat	cm <sup>3</sup> /min [in. <sup>3</sup> /min.]	0 [0] (When the media is water)
Maximum suck back volume	cm <sup>3</sup> [in. <sup>3</sup> ]	0.25 [0.0153]
Recommended mounting direction		Vertical mounting with port facing upward <sup>Note</sup>

Note: Mount the valve with the arrow mark on the label on the valve body side pointing upward.

### Order Codes



#### Valve function

C: Single acting type (AV side normally closed (NC), SV side single acting type)  
D: Double acting type

#### Body material<sup>Note 1</sup>

Blank: PTFE  
S: SUS316

#### Piping port size and applicable tube size

Blank: Rc1/8

H series fitting

F6 : Connecting tube outer diameter φ 6

F1/4: Connecting tube outer diameter φ 1/4 (φ 6.35)

Flowell 60 series fitting

Standard fitting

LD: Connecting tube diameter φ 6 × φ 4

LE: Shared connecting tube diameters φ 6.35 × φ 3.96 and φ 6.35 × φ 4.35

#### Flow rate adjustment<sup>Note 2</sup>

Blank: None

Q1: With flow rate adjustment (Micro flow rate adjustment type)

Notes: 1. When the selected body material is -S, with-fitting specification cannot be selected.

2. The flow rate adjustment mechanism uses a differential screw method for easier flow rate setting.

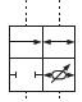
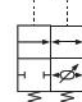
# Air Operated Valve with Suck Back

Diaphragm type

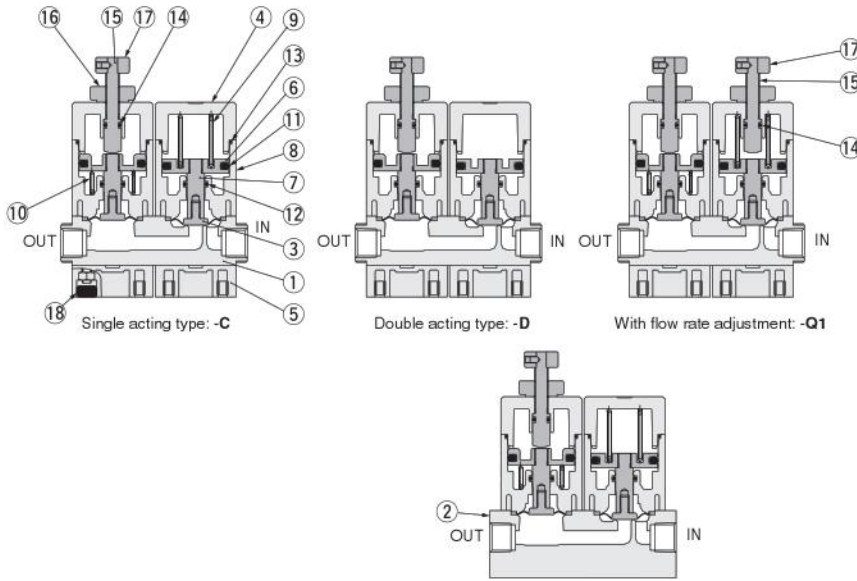
## F-SAV250-200W

### Symbols

AV side normally closed (NC), SV side single acting type AV and SV sides double acting type



## Inner Construction and Materials

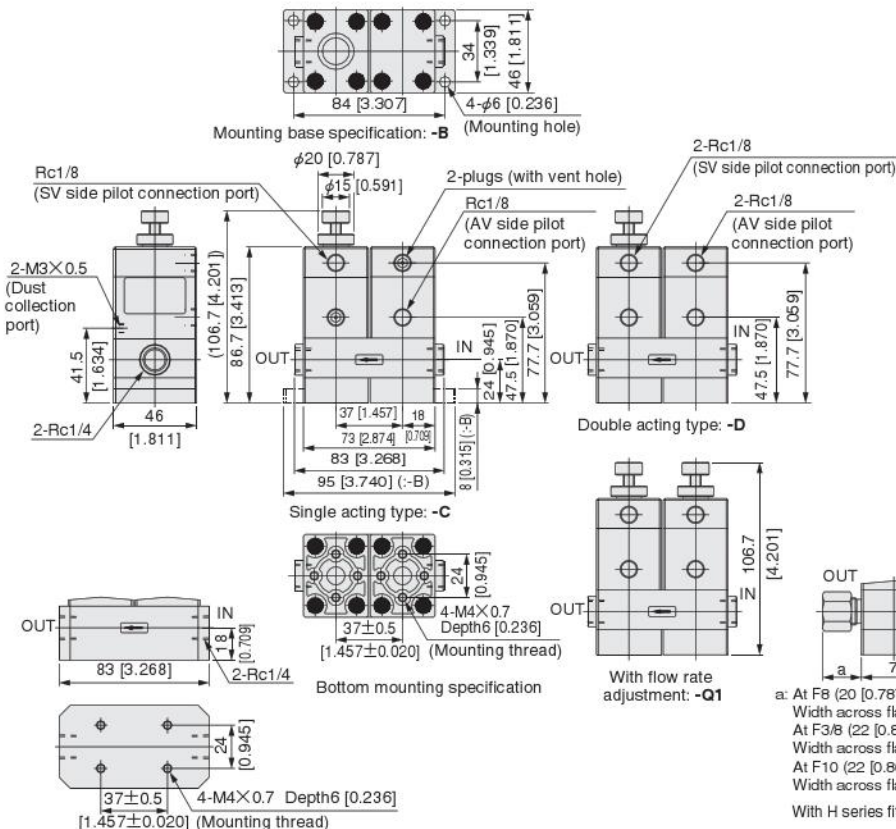


Body material SUS316 specification: -S

No.	Parts	Materials
①	Body	PTFE
②	Body	SUS316
③	Diaphragm	PTFE
④	Cover	PPS
⑤	Plate	PPS
⑥	Piston	SUS304
⑦	Piston rod	SUS304
⑧	Cylinder tube	PPS
⑨	Spring	SUS304-WPB

No.	Parts	Materials
⑩	Spring	SUS304-WPB
⑪	Seal	FKM
⑫	O-ring	FKM
⑬	O-ring	FKM
⑭	O-ring	FKM
⑮	Adjusting screw	SUS304
⑯	Nut	SUS304
⑰	Nut	SUS304
⑱	Cap	FKM

## Dimensions mm [in.]



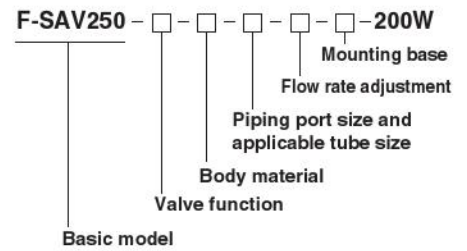
Body material SUS316 specification: -S

## Specifications

Model		F-SAV250-200W
Item	Media	Pure water, chemicals
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
	Pilot pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]
Back pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Orifice [Cv]	mm	6 (0.6)
Pilot connection port size		Rc 1/8
Leakage at valve seat	cm <sup>3</sup> /min [in. <sup>3</sup> /min.]	0 [0] (When the media is water)
Maximum suck back volume	cm <sup>3</sup> [in. <sup>3</sup> ]	0.4 [0.024]
Recommended mounting direction		Vertical mounting with port facing upward <sup>Note</sup>

Note: Mount the valve with the arrow mark on the label on the valve body side pointing upward.

## Order Codes



### Valve function

C: Single acting type (AV side normally closed (NC), SV side single acting type)  
D: Double acting type

### Body material <sup>Note</sup>

Blank: PTFE  
S: SUS316

### Piping port size and applicable tube size

Blank: Rc1/4

### H series fitting

F8 : Connecting tube outer diameter  $\phi 8$   
F3/8 : Connecting tube outer diameter  $\phi 3/8$  ( $\phi 9.52$ )  
F10 : Connecting tube outer diameter  $\phi 10$

### Flowell 60 series fitting

### Standard fitting

LF : Connecting tube diameter  $\phi 8 \times \phi 6$   
LG : Connecting tube diameter  $\phi 9.52 \times \phi 6.35$   
LH : Connecting tube diameter  $\phi 9.52 \times \phi 7.52$   
LI : Connecting tube diameter  $\phi 10 \times \phi 8$

### Flow rate adjustment

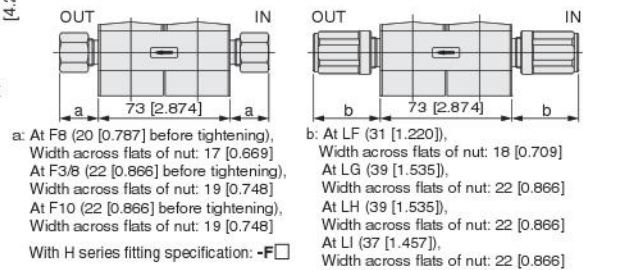
Blank: None

Q1: With flow rate adjustment

### Mounting base

Blank: Bottom mounting type  
B: With mounting base

Note: When the selected body material is -S, with-fitting specification cannot be selected.



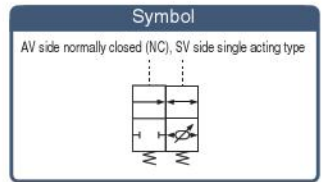
a: At F8 (20 [0.787] before tightening), Width across flats of nut: 17 [0.669]  
At F3/8 (22 [0.866] before tightening), Width across flats of nut: 19 [0.748]  
At F10 (22 [0.866] before tightening), Width across flats of nut: 19 [0.748]  
With H series fitting specification: -F□

b: At LF (31 [1.220]), Width across flats of nut: 18 [0.709]  
At LG (39 [1.535]), Width across flats of nut: 22 [0.866]  
At LH (39 [1.535]), Width across flats of nut: 22 [0.866]  
At LI (37 [1.457]), Width across flats of nut: 22 [0.866]  
With Flowell 60 series fitting specification: -L□

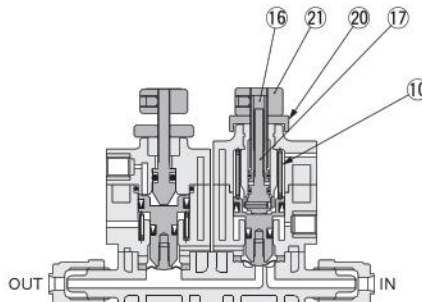
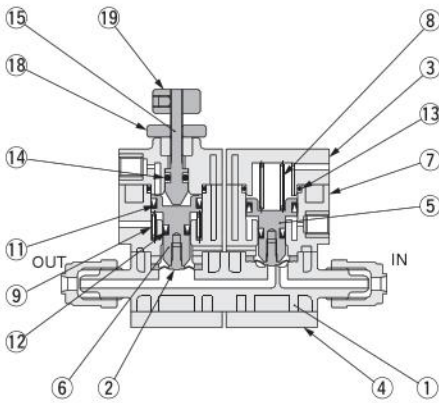
# Air Operated Valve with Suck Back

Diaphragm type

## F-SAVP070-200W



### Inner Construction and Materials



With flow rate adjustment: -Q1

No.	Parts	Materials
①	Body	PFA
②	Diaphragm	PTFE
③	Cover	PPS
④	Plate	SUS304
⑤	Piston	SUS304
⑥	Piston	SUS304
⑦	Cylinder tube	PPS
⑧	Spring	SUS304-WPB
⑨	Spring	SUS304-WPB
⑩	Spring	SUS304-WPB
⑪	Seal	FKM

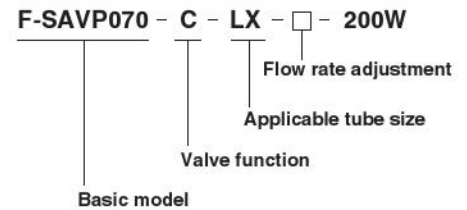
No.	Parts	Materials
⑫	Seal	FKM
⑬	O-ring	FKM
⑭	O-ring	FKM
⑮	Adjusting screw	SUS304
⑯	Adjusting screw	SUS304
⑰	Adjusting screw	SUS304
⑱	Nut	SUS304
⑲	Nut	SUS304
⑳	Nut	SUS304
㉑	Nut	SUS304

### Specifications

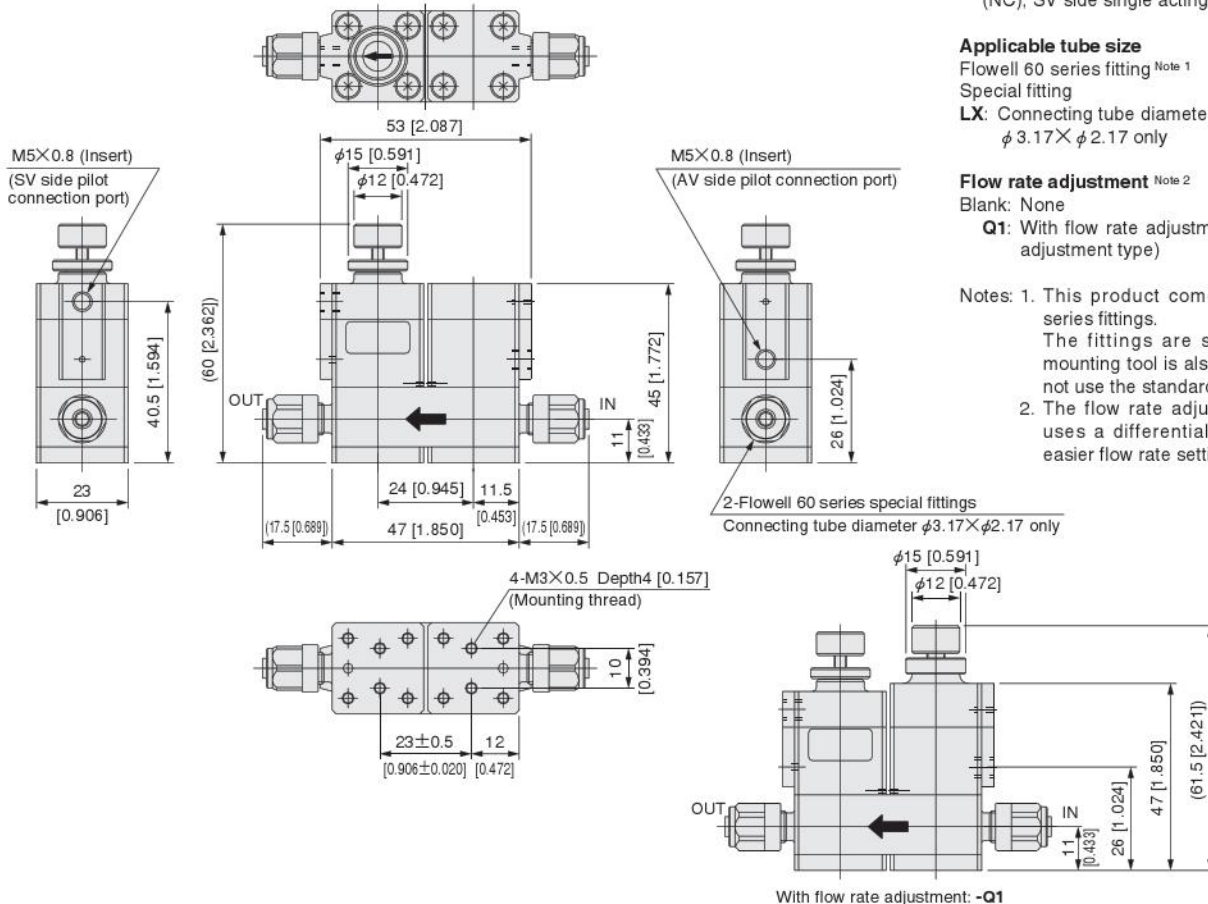
Model		F-SAVP070-200W
Item		
Media		Pure water, chemicals
Operating temp. range	Media	5~80 [41~176]
	Atmosphere	0~60 [32~140]
Operating pressure range	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
Pilot pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0.3~0.5 [3.1~5.1] [44~73]
Back pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Orifice (Cv)	mm	2 [0.1]
Pilot connection port size		M5 × 0.8
Leakage at valve seat	cm <sup>3</sup> /min [in. <sup>3</sup> /min.]	0 [0] (When the media is water)
Maximum suck back volume	cm <sup>3</sup> [in. <sup>3</sup> ]	0.045 [0.00275]
Recommended mounting direction		Vertical mounting with port facing upward <sup>Note</sup>

Note: Mount the valve with the arrow mark on the label on the valve body side pointing upward.

### Order Codes



### Dimensions mm [in.]



#### Valve function

C: Single acting type (AV side normally closed (NC), SV side single acting type)

#### Applicable tube size

Flowell 60 series fitting<sup>Note 1</sup>  
Special fitting

LX: Connecting tube diameter  
 $\phi 3.17 \times \phi 2.17$  only

#### Flow rate adjustment<sup>Note 2</sup>

Blank: None

Q1: With flow rate adjustment (Micro flow rate adjustment type)

Notes: 1. This product comes with Flowell 60 series fittings.

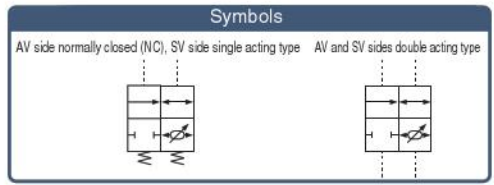
The fittings are special sizes. The mounting tool is also a special type. Do not use the standard mounting tool.

2. The flow rate adjustment mechanism uses a differential screw method for easier flow rate setting.

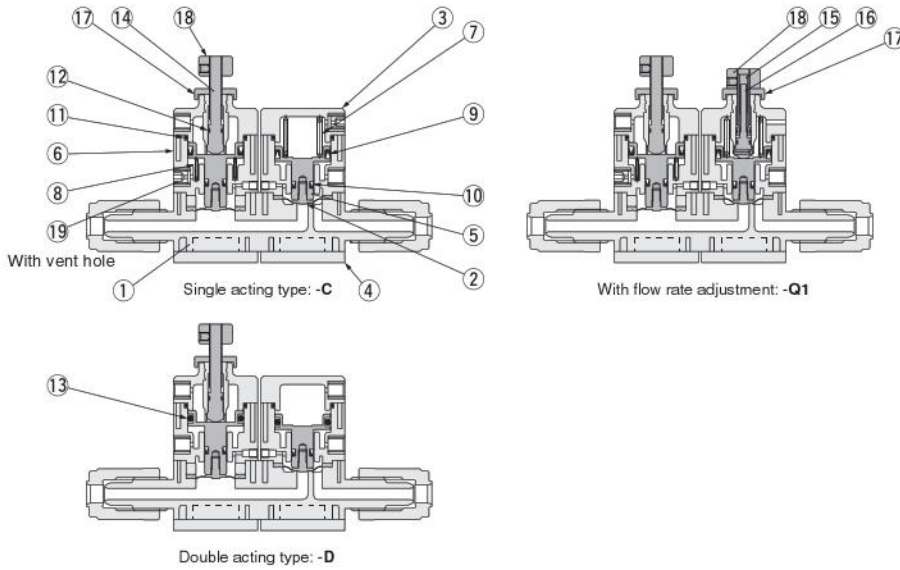
# Air Operated Valve with Suck Back

Diaphragm type

## F-SAVP125-200W



### Inner Construction and Materials

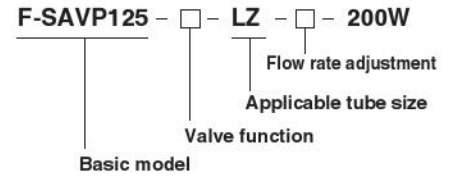


### Specifications

Model		F-SAVP125-200W
Media		Pure water, chemicals
Operating temp. range	Media	5~80 [41~176]
	Atmosphere	0~60 [32~140]
Operating pressure range		0~0.3 [0~3.1] [0~44]
	MPa [kgf/cm <sup>2</sup> ] [psi.]	
Pilot pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0.3~0.5 [3.1~5.1] [44~73]
Back pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Orifice [Cv]	mm	4 [0.31]
Pilot connection port size		M5 X 0.8
Leakage at valve seat	cm <sup>3</sup> /min [in <sup>3</sup> /min.]	0 [0] (When the media is water)
Maximum suck back volume	cm <sup>3</sup> [in <sup>3</sup> ]	0.25 [0.0153]
Recommended mounting direction		Vertical mounting with port facing upward <sup>Note</sup>

Note: Mount the valve with the arrow mark on the label on the valve body side pointing upward.

### Order Codes



#### Valve function

C: Single acting type (AV side normally closed (NC), SV side single acting type)

D: Double acting type

#### Applicable tube size

Flowell 60 series fitting<sup>Note 1</sup>

Special fitting

LZ: Connecting tube diameter of  $\phi 6.35 \times \phi 4.35$  only

#### Flow rate adjustment<sup>Note 2</sup>

Blank: None

Q1: With flow rate adjustment (Micro flow rate adjustment type)

Notes: 1. This product comes with Flowell 60 series fittings.

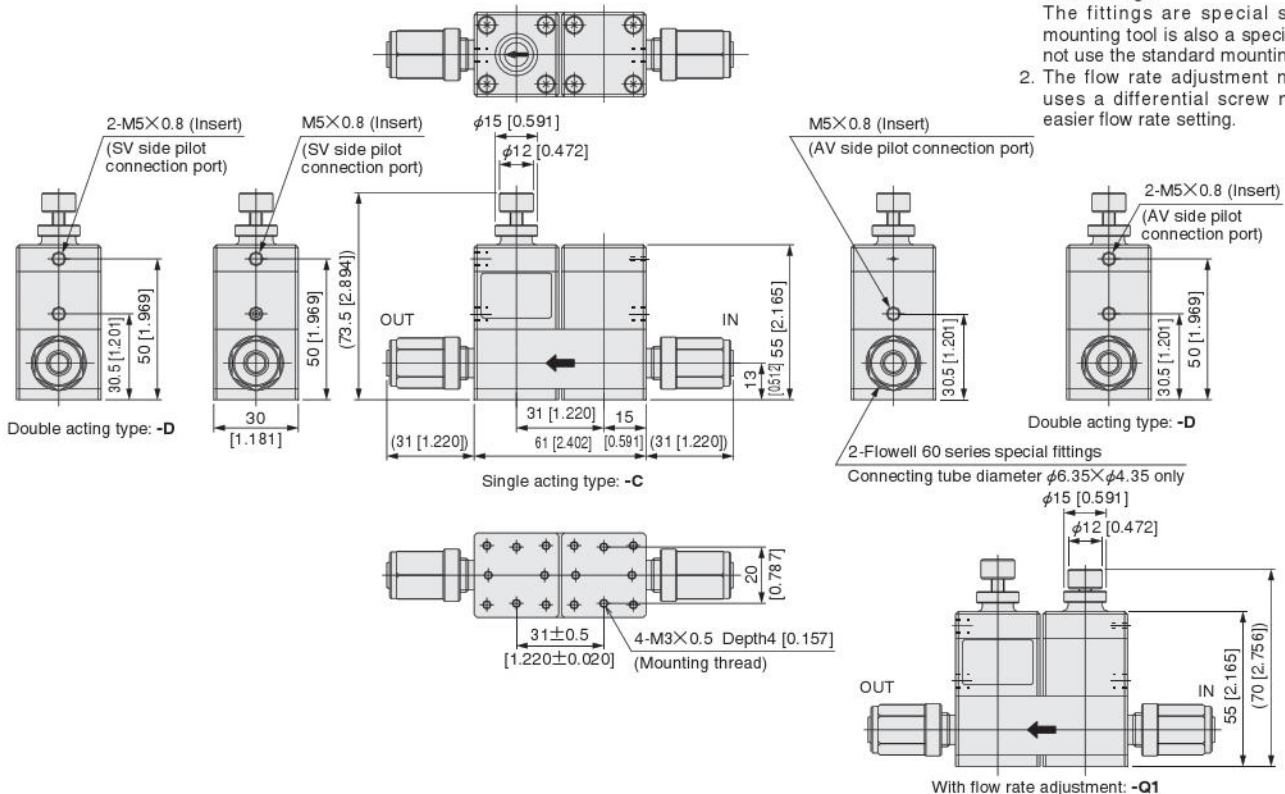
The fittings are special sizes. The mounting tool is also a special type. Do not use the standard mounting tool.

2. The flow rate adjustment mechanism uses a differential screw method for easier flow rate setting.

No.	Parts	Materials
①	Body	PFA
②	Diaphragm	PTFE
③	Cover	PPS
④	Plate	SUS304
⑤	Piston	SUS304
⑥	Cylinder tube	PPS
⑦	Spring	SUS304-WPB
⑧	Spring	SUS304-WPB
⑨	Seal	FKM
⑩	Seal	FKM

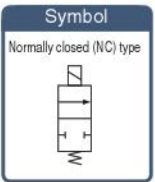
No.	Parts	Materials
⑪	O-ring	FKM
⑫	O-ring	FKM
⑬	O-ring	FKM
⑭	Adjusting screw	SUS304
⑮	Adjusting screw	SUS304
⑯	Adjusting screw	SUS304
⑰	Nut	SUS304
⑱	Nut	SUS304
⑲	Set screw	SUS304

### Dimensions mm [in.]

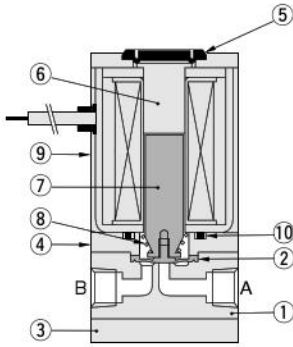


**Solenoid Valve**  
Diaphragm type  
2-port valve

**F-EV120**



**Inner Construction and Materials**



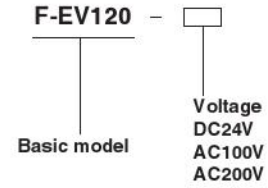
No.	Parts	Materials
①	Body	PTFE
②	Diaphragm	PTFE
③	Plate	Aluminum alloy (black anodized)
④	Adapter	Aluminum alloy (black anodized)
⑤	Cap <small>Note</small>	
⑥	Column	
⑦	Plunger	
⑧	Spring	
⑨	Solenoid	
⑩	O-ring	

Note: The No.5 cap is not a manual override.  
Pushing this cap will not switch the functions.

**Specifications**

Model		F-EV120
Media		Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range °C [°F]	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range MPa (kgf/cm <sup>2</sup> ) [psi.]	A→B	0~0.15 [0~1.5] [0~21.8]
	B→A	0~0.03 [0~0.3] [0~4.4]
Back pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		0~0.03 [0~0.3] [0~4.4]
Proof pressure MPa (kgf/cm <sup>2</sup> ) [psi.]		1 [10.2] [145]
Orifice [Cv]		3 [0.21]
Connection port size		Rc1/8
Leakage at valve seat cm <sup>3</sup> /min [in <sup>3</sup> /min.]		0 [0] (When the media is water)
Operating frequency c.p.m		30 or less
Mounting direction		Any
Mass kg [lb.]		0.25 [0.55]

**Order Codes**

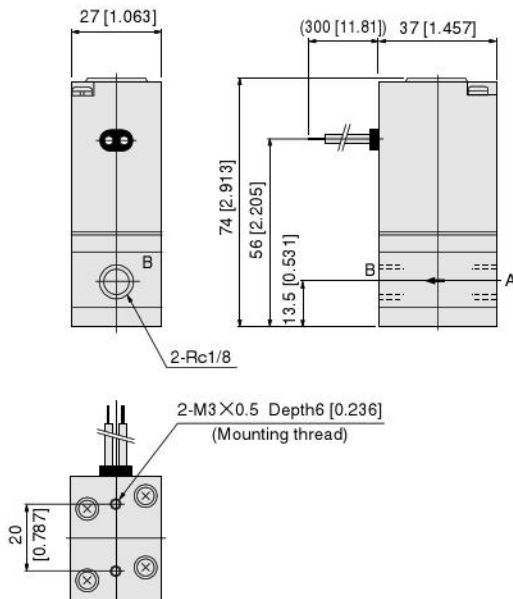


Note: The grommet type is the only available wiring type for the solenoid.

**Solenoid Specifications**

Model		F-EV120				
Item	Solenoid rating	Flywheel				
		DC24V	AC100V		AC200V	
Type		Flywheel diode incorporated for surge suppression	Flywheel			
Operating voltage range V		21.6~26.4 (24±10%)	90~110 (100±10%)	180~220 (200±10%)		
Current (When rated voltage is applied)	Frequency Hz	—	50	60	50	60
	Energizing mA	420	160	150	70	65
Allowable leakage current mA		30	15		7	
Insulation resistance MΩ		10				
Lead wire length mm [in.]		300 [11.8]				
Color of lead wire		Red (+), Black (-)	Yellow, Black		White, Black	
Surge suppression		Flywheel diode				

**Dimensions mm [in.]**





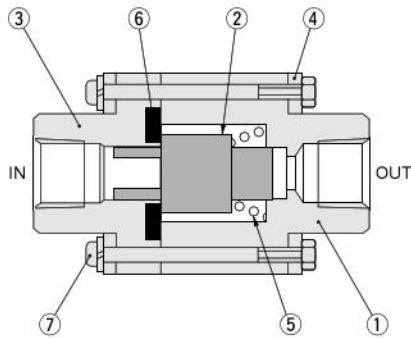
# Check Valve

# F-C250

Symbol



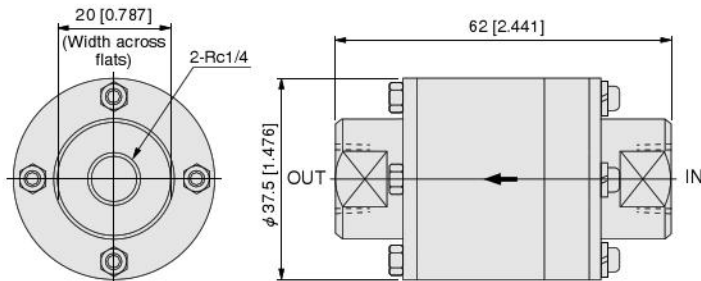
## Inner Construction and Materials



No.	Parts	Materials
①	Body	PTFE
②	Stem	PTFE
③	Cover with port	PTFE
④	Retainer	SUS304
⑤	Spring	SUS304-WPB <small>Note</small>
⑥	Seal	(NBR, FKM, Si, EP)
⑦	Screw	SUS304

Note: Fluoro coated

## Dimensions mm [in.]

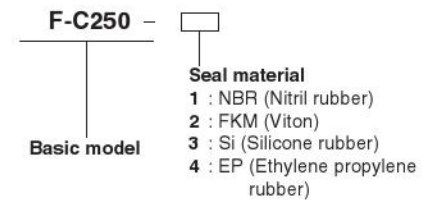


## Specifications

Model		F-C250
Item		
Media <small>Note</small>		Pure water, air, N <sub>2</sub>
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range	MPa [kgf/cm <sup>2</sup> ] [psi.]	0.07~0.9 [0.7~9.2] [10.2~131]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Effective area (Cv)	mm <sup>2</sup>	14 [0.72]
Connection port size	Rc	1/4
Mounting direction		Any
Mass	kg [lb.]	0.12 [0.26]

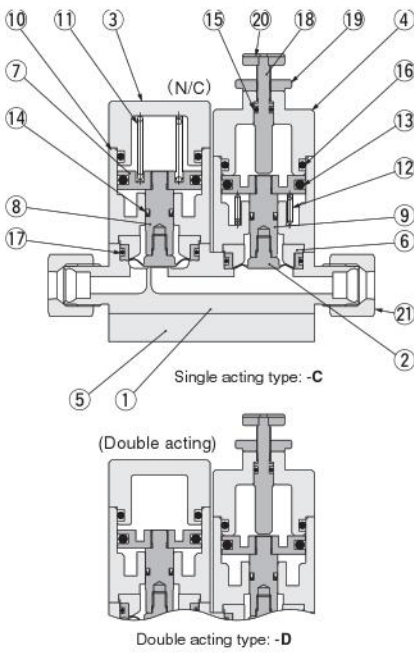
Note: Can be used with media of viscosity 40cp or less. When planning to use the product with corrosive media, consult us.

## Order Codes

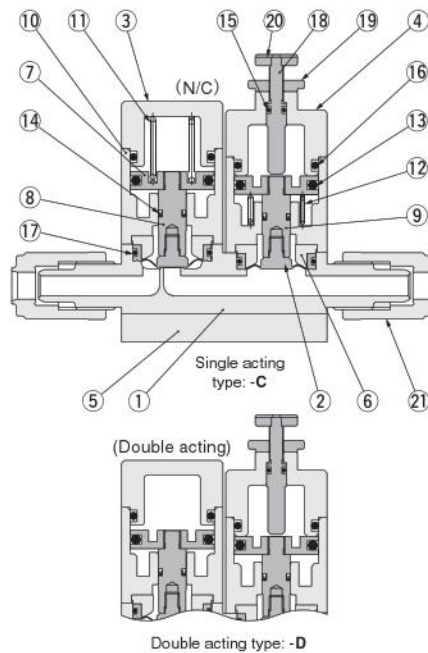


**Inner Construction and Materials**

● **F-SAV250-10W**



● **F-SAV250-18W**

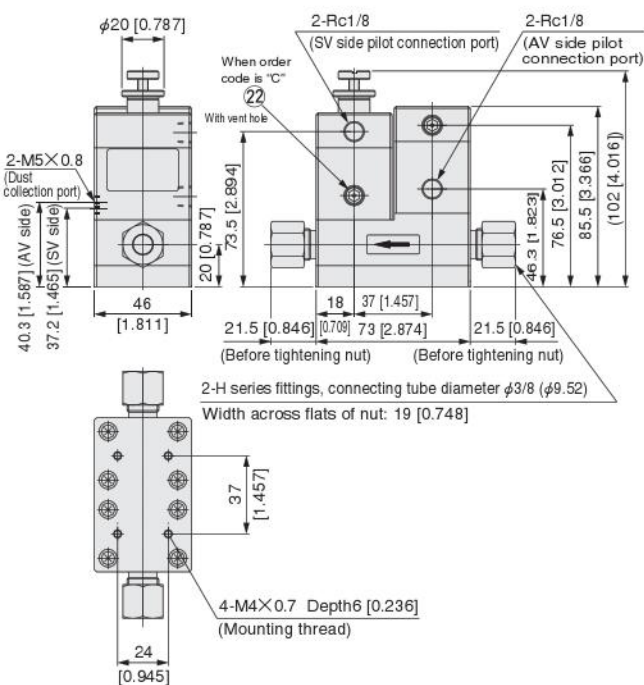


No.	Parts	Materials
①	Body	PTFE
②	Diaphragm	PTFE
③	Cover	C-PVC
④	Cover	SUS304
⑤	Plate	C-PVC
⑥	Guide washer	SUS304
⑦	Piston	SUS304
⑧	Piston rod	SUS304
⑨	Piston rod	SUS304
⑩	Cylinder tube	C-PVC
⑪	Spring	SUS304-WPB

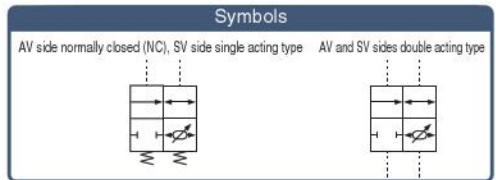
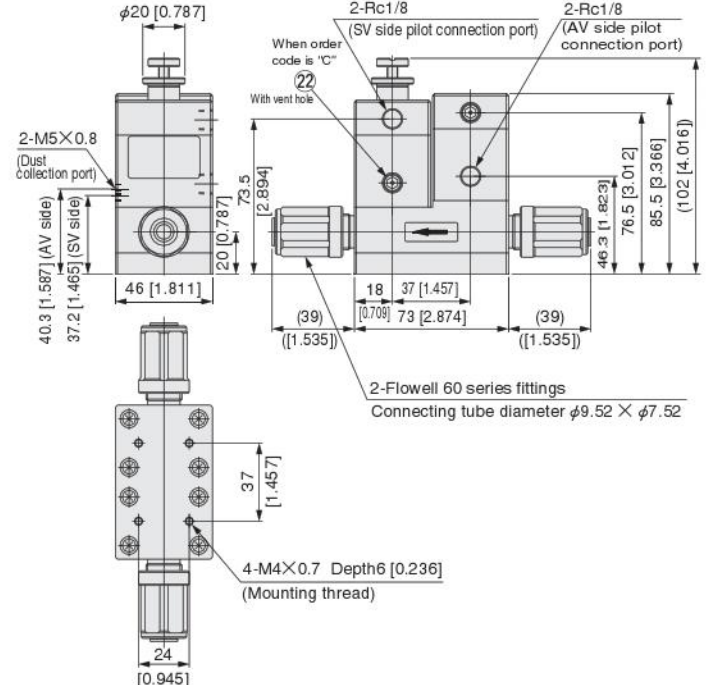
No.	Parts	Materials
⑫	Spring	SUS304-WPB
⑬	Seal	FKM
⑭	Seal	FKM
⑮	O-ring	FKM
⑯	O-ring	FKM
⑰	O-ring	FKM
⑱	Adjusting screw	SUS304
⑲	Lock nut	SUS304
⑳	Nut	SUS304
㉑	Nut	PFA
㉒	Plug	VECTRA

**Dimensions mm [in.]**

● **F-SAV250-10W**



● **F-SAV250-18W**



**Specifications**

Model		F-SAV250-10W F-SAV250-18W
Item		
Media		Pure water, chemicals
Operating temp. range	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.2 [0~2.0] [0~29]
Pilot pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0.3~0.5 [3.1~5.1] [44~73]
Back pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.3 [0~3.1] [0~44]
Proof pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	1 [10.2] [145]
Orifice (Cv)	mm	6 (0.6)
Pilot connection port size		Rc 1/8
Leakage at valve seat	cm <sup>3</sup> /min [in. <sup>3</sup> /min.]	0 [0] (When the media is water)
Maximum suck back volume	cm <sup>3</sup> [in. <sup>3</sup> ]	0.5 [0.031]
Recommended mounting direction		Vertical mounting with port facing upward <sup>Note</sup>

Note: Mount the valve with the arrow mark on the label on the valve body side pointing upward.

**Order Codes**

● **With H series fitting**

F-SAV250 - [ ] - 10W

Valve function

Basic model

Valve function

- C: Single acting type (AV side normally closed (NC), SV side single acting type)
- D: Double acting type

● **With Flowell 60 series fitting**

F-SAV250 - [ ] - 18W

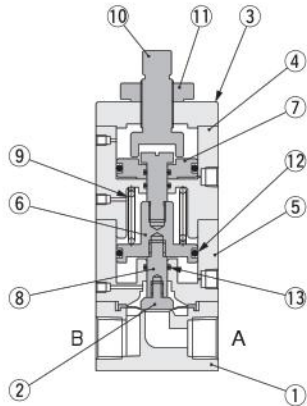
Valve function

Basic model

Valve function

- C: Single acting type (AV side normally closed (NC), SV side single acting type)
- D: Double acting type

**Inner Construction and Materials**



No.	Parts	Materials
①	Body	SUS316
②	Diaphragm	PTFE
③	Cover	Aluminum alloy
④	Cylinder tube	Aluminum alloy
⑤	Cylinder tube	Aluminum alloy
⑥	Piston	SUS304
⑦	Piston	SUS304

No.	Parts	Materials
⑧	Piston rod	SUS304
⑨	Spring	SUS304-WPB
⑩	Adjusting screw	SUS304
⑪	Lock nut	SUS304
⑫	O-ring	FKM
⑬	O-ring	FKM

Note: SUS304, PTFE, or PFE is available as the valve body material.  
 For details of order codes and specifications, consult us.

**Specifications**

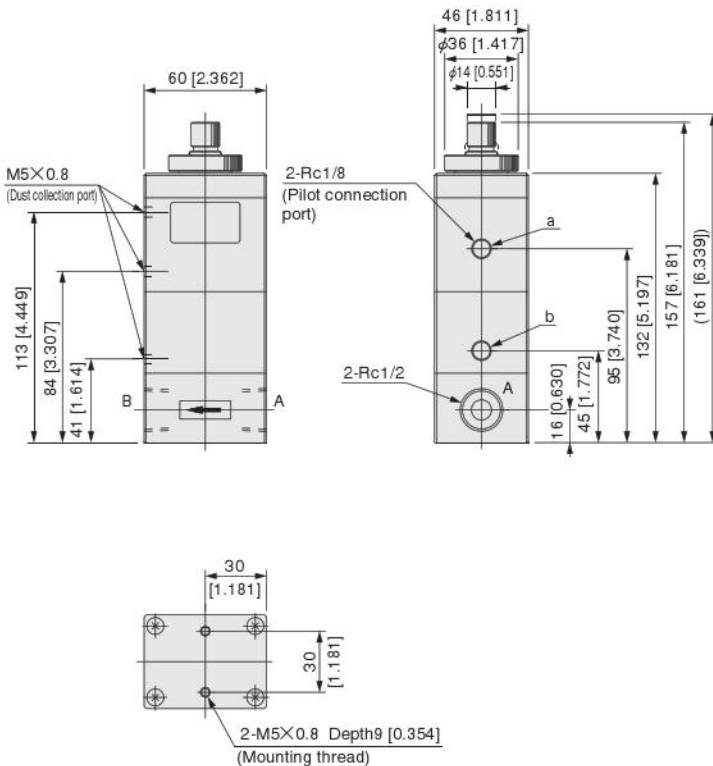
Model		F-AV500-12W
Item		
Media		Pure water, chemicals, air, N <sub>2</sub>
Operating temp. range °C [°F]	Media	5~60 [41~140]
	Atmosphere	0~50 [32~122]
Operating pressure range MPa [kgf/cm <sup>2</sup> ] [psi.]	A→B	0~0.5 [0~5.1] [0~73]
	B→A	0~0.3 [0~3.1] [0~44]
Pilot pressure MPa [kgf/cm <sup>2</sup> ] [psi.]		0.35~0.5 [3.6~5.1] [50.8~73]
Back pressure MPa [kgf/cm <sup>2</sup> ] [psi.]		0~0.3 [0~3.1] [0~44]
Proof pressure MPa [kgf/cm <sup>2</sup> ] [psi.]		1.5 [15.3] [218]
Orifice [Cv]	mm	12 [2.3]
Pilot connection port size		Rc 1/8
Leakage at valve seat cm <sup>3</sup> /min [in <sup>3</sup> /min.]		0 [0] (When the media is water)
Operating frequency c.p.m		30 or less
Mounting direction		Any

**Order Code**

**F-AV500 - 12W**

Basic model

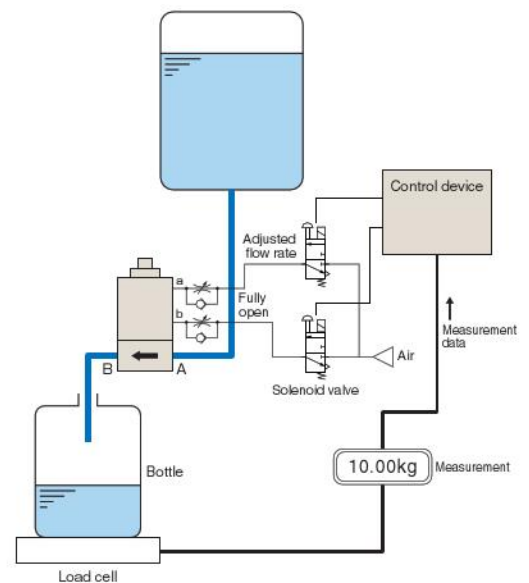
**Dimensions mm [in.]**



**Features**

A single valve switches between 2 flow rates. It is easy to operate and does not require complex circuitry. Switching is possible between the maximum flow rate and an adjusted flow rate, and this function is best demonstrated when accurate filling is needed for bottle filling processes, etc.

**Application example (bottle filling process)**



- When air is supplied to port **a**, the adjusted flow rate is obtained (the flow rate is set by the adjusting screw).
- When air is supplied to port **b**, the maximum flow rate is obtained.
- When air is not supplied to either port **a** or **b**, the B port is closed (NC).

# Large Flow Series

● For details of order codes and specifications, consult us.

Air Operated Valve

## F-AVB400~1000

Bellows type 2-port valve

Model	Operating temperature range °C [°F]		Operating pressure range MPa (kgf/cm <sup>2</sup> ) [psi.]		Orifice mm [Cv]	Port size	
	Media	Atmosphere	A→B	B→A		Main	Operating port
F-AVB400	5~60 [41~140]	0~50 [32~122]	0~0.44 {0~4.5}	0~0.03 {0~0.3}	10 [1.8]	Rc3/8	Rc1/8
F-AVB500			[0~63.8]		[0~4.4]	12 [2.5]	
F-AVB600			0~0.2 {0~2.0}	0~0.02 {0~0.2}	16 [6.5]	Rc3/4	
F-AVB750			[0~29]		20 [7.0]	Rc1	
F-AVB1000				25 [11.0]			

● For details of order codes and specifications, consult us.



Air Operated Valve

## F-AVP500, 750

Diaphragm type 2-port valve

Model	Operating temperature range °C [°F]		Operating pressure range MPa (kgf/cm <sup>2</sup> ) [psi.]		Orifice mm [Cv]	Port size	
	Media	Atmosphere	A→B	B→A		Main	Operating port
F-AVP500	5~60 [41~140]	0~50 [32~122]	0~0.5 {0~5.1}	0~0.3 {0~3.1}	12 <sup>Note 2</sup> [2.5]	Outer dia. 1/2" tube	Rc1/8
F-AVP750	(5~100 [41~212] <sup>Note 1</sup> )		[0~73]		[0~44]		

● For details of order codes and specifications, consult us.

Notes: 1. For medium temperature specifications

2. Valve seat orifice



Check Valve

## F-C375, 500

Model	Operating temperature range °C [°F]		Operating pressure range MPa (kgf/cm <sup>2</sup> ) [psi.]	Effective area mm <sup>2</sup> [Cv]	Port size
	Media	Atmosphere			
F-C375	5~60 [41~140]	0~50 [32~122]	0.07~0.9 {0.7~9.2}	74 [3.7]	Rc3/8
F-C500			[10.2~131]		Rc1/2

● For details of order codes and specifications, consult us.



# Drain Valve Series

● For details of order codes and specifications, consult us.

Drain Valve Union Type (2-port, 3-port)

## F-AVE1000~4000

Model	Operating temperature range °C [°F]		Operating pressure range MPa (kg/cm <sup>2</sup> ) [psi.]	Orifice mm	Port size	
	Media	Atmosphere			Main	Operating port
F-AVE1000	5~40 [41~104]	5~40 [41~104]	0~0.02 {0~0.2} [0~2.9]	25	25A	Rc1/8
F-AVE1500				30	32A	
F-AVE2000				40	40A	
F-AVE2500				50	50A	
F-AVE3000				65	65A	
F-AVE4000				78	75A	
				100	100A	

Body material: PVC, PP  
O-ring material: FKM, EPDM, perfluorinated rubber. Other types of O-ring materials are also available upon request.

● For details of order codes and specifications, consult us.



Drain Valve Flange Type (2-port)

## F-AVE4000, 5000, 6000

Model	Operating temperature range °C [°F]		Operating pressure range MPa (kg/cm <sup>2</sup> ) [psi.]	Orifice mm	Port size	
	Media	Atmosphere			Main	Operating port
F-AVE4000	5~40 [41~104]	5~40 [41~104]	0~0.02 {0~0.2} [0~2.9]	100	100A	Rc1/8
F-AVE5000				125	125A	
F-AVE6000				150	150A	

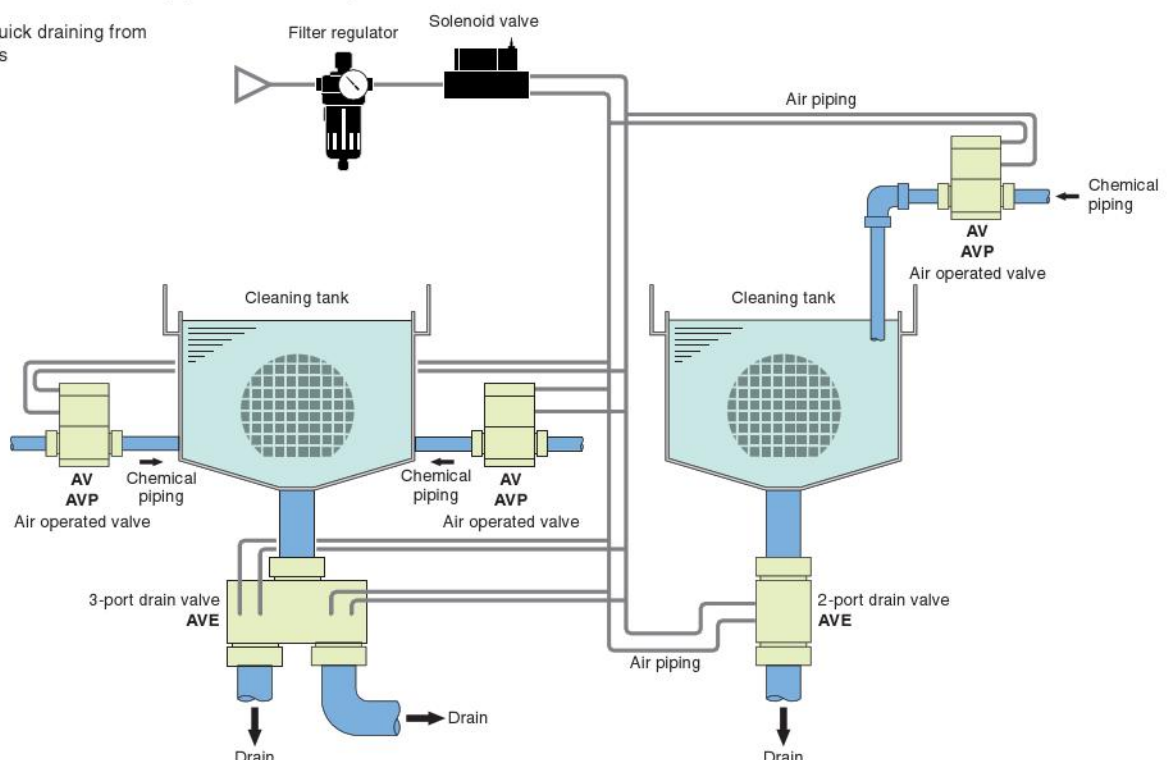
Body material: PVC, PP  
O-ring material: FKM, EPDM, perfluorinated rubber. Other types of O-ring materials are also available upon request.

● For details of order codes and specifications, consult us.



### Drain valve (2-port, 3-port) application example

Suitable for quick draining from cleaning tanks



# Other Related Products

## PTFE Ejector

Suitable for suction of corrosive gases



## PTFE Needle Valve

Suitable for adjustment of flow rate from shut down to micro flow



## PTFE, PFA Lever Valves

Manual lever ensures easy opening and closing.



Speed Controller for Pilot Air Control

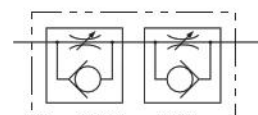
## TSC-60W



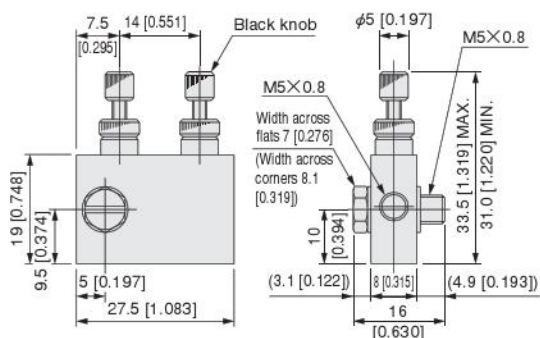
### Specifications

Item	Model	TSC-60W
Media		Air
Operating pressure range	MPa [kgf/cm <sup>2</sup> ] [psi.]	0~0.9 [0~9.2] [0~131]
Operating temperature range	°C [°F]	5~60 [41~140]
Cracking pressure	MPa [kgf/cm <sup>2</sup> ] [psi.]	0.05 [0.51] [7.3]
Description		Both directions adjustment speed controller
		Low flow rate type
		Special piping direction
		Black knob on one side

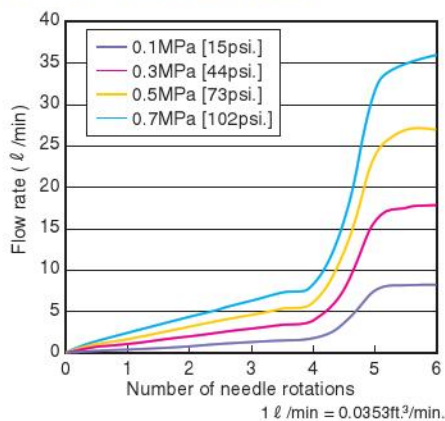
### Symbol



### Dimensions mm [in.]



### Flow rate characteristics





# Fluororesin H Series Fittings

Koganei has developed these high-quality, high-performance fittings using various technologies and know-how gained over the years through our manufacturing of pneumatic systems equipment.

## Features

### In chemical resistance...

The main body is made of PTFE, while the union nut is made of PFA injection material (some models are PTFE), for superior chemical resistance, making it the optimum choice for use in semiconductors, liquid crystals, biotechnology, medical products, etc. industries.

### In shape and performance...

The simple construction, consisting of just the fitting main body and a union nut, is an extremely compact unit that ensures compactness and high performance alongside special seal surface shapes.

### In heating resistance...

Sealing performance never degrades even after completion of heating cycles ranging from 150°C [302°F] back down to room temperature, ensuring stable, worry-free performance.

### In sealing performance...

Uses a special sealing construction to achieve high sealing performance.



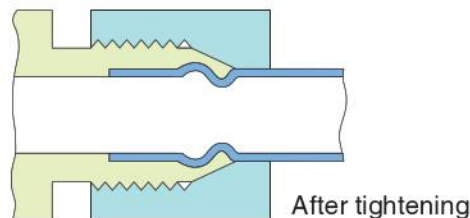
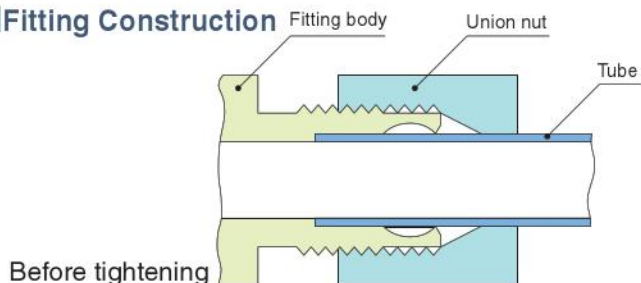
### In pressure proofing...

High pressure proof under continuous operating pressure of 1MPa [145psi.] at room-temperature (for a diameter of 10mm or less).

### During mounting...

Obtains the specified performance merely by inserting a tube into the nut set in the fitting until it rests against the inside of the fitting body, and then tightening the nut.

## Fitting Construction



## Specifications

Seal type: Tapered seal type

Continuous operating temperature: -15°~+150°C [5°~302°F]

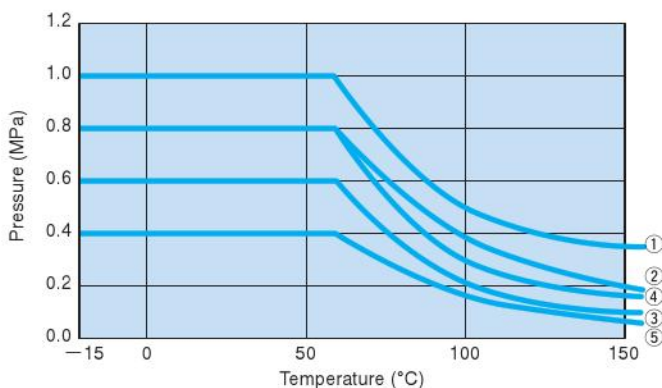
Materials: Body—PTFE

: Union nut

Diameter: 12mm [0.472in.] or less — PFA

Diameter: 16mm [0.630in.] or more — PTFE

## Recommended operating temperatures and pressure ranges



$$1\text{MPa} = 145\text{psi.}$$

$$F = \frac{9}{5}C + 32$$

	Fitting size	
	mm	Inch
	3	1/8
	4	
①	6	1/4
	8	
	10	3/8
②	12	1/2
③	16	
④	19	3/4
⑤	25	4/4

### Caution

The numerical values at left are based on Koganei test results. Note that conditions may vary from practical applications. For this reason, careful evaluation before use is recommended.

## Applicable Tube Materials

PTFE, PFA, FEP, and other fluororesin tubes

## Applicable Tube Sizes/Tolerances

Fitting size	Tube size	Outer diameter mm [in.]		Thickness mm [in.]			
	Outer dia. X Inner dia.	Basic dimension	Tolerance	Basic dimension	Tolerance		
mm	3	3×2	3.0 [0.118]	±0.20 [±0.0079]	0.5 [0.020]	±0.10 [±0.0039]	
		4×2	4.0 [0.157]		1.0 [0.039]	±0.10 [±0.0039]	
	4	4×3	4.0 [0.157]		0.5 [0.020]	±0.10 [±0.0039]	
		6×3	6.0 [0.236]		1.5 [0.059]	±0.20 [±0.0079]	
	6	6×4	6.0 [0.236]		1.0 [0.039]	±0.10 [±0.0039]	
		8×5	8.0 [0.315]		1.5 [0.059]	±0.20 [±0.0079]	
	8	8×6	8.0 [0.315]		1.0 [0.039]	±0.10 [±0.0039]	
		10×7	10.0 [0.394]		1.5 [0.059]	±0.20 [±0.0079]	
	10	10×8	10.0 [0.394]		1.0 [0.039]	±0.10 [±0.0039]	
		12×9	12.0 [0.472]		±0.30 [±0.0118]	1.5 [0.059]	±0.20 [±0.0079]
	12	12×10	12.0 [0.472]			1.0 [0.039]	±0.10 [±0.0039]
		16	16×13			16.0 [0.630]	1.5 [0.059]
16×14	16.0 [0.630]		1.0 [0.039]	±0.10 [±0.0039]			
19	19×16	19.0 [0.748]	±0.40 [±0.0157]	1.5 [0.059]		±0.15 [±0.0059]	
	19×17	19.0 [0.748]		1.0 [0.039]		±0.10 [±0.0039]	
25	25×22	25.0 [0.984]	1.5 [0.059]	±0.15 [±0.0059]			
	25×23	25.0 [0.984]	1.0 [0.039]	±0.10 [±0.0039]			
Inch	1/8	3.17×1.59	3.17 [0.1248]	±0.20 [±0.0079]		0.79 [0.0311]	±0.15 [±0.0059]
		3.17×2.17	3.17 [0.1248]			0.5 [0.020]	±0.06 [±0.0024]
	1/4	6.35×3.17	6.35 [0.2500]			1.59 [0.0626]	±0.20 [±0.0079]
		6.35×3.96	6.35 [0.2500]			1.2 [0.047]	
	3/8	6.35×4.35	6.35 [0.2500]		1.0 [0.039]	±0.20 [±0.0079]	
		9.52×6.35	9.52 [0.3748]		1.59 [0.0626]		
	1/2	9.52×7.52	9.52 [0.3748]		1.0 [0.039]	±0.30 [±0.0118]	
		12.7×9.52	12.7 [0.5000]		1.59 [0.0626]		
	3/4	12.7×10.7	12.7 [0.5000]		1.0 [0.039]	±0.40 [±0.0157]	
		19.05×15.88	19.05 [0.7500]		1.59 [0.0626]		
	4/4	25.40×22.22	25.40 [1.0000]		1.59 [0.0626]		



## Fluororesin H Series Fittings, Safety Precautions

### Warning

This product is a fluororesin product. To maintain its performance and ensure safe use, strictly observe the following precautions:

1. Do not use for any purposes other than those listed in the catalog, etc.
2. Never use in contact with human tissue or fluids, etc.
3. Never ingest (accidental swallowing, etc.) products into the human body.
4. Do not use at temperatures in excess of the maximum operating temperature specified in the catalog.
5. Processing at temperatures above the maximum operating temperature can generate cracked fluorine gases. For this reason, always provide sufficient ventilation, and take measures to avoid inhaling the cracked gas.
6. When discarding, use the processes detailed in the waste management and public cleaning law.  
Do not incinerate the discarded product. If, however, incineration must be performed, always do it at an incineration facility equipped with neutralizing agents and other suitable disposal equipment.

### Precautions for Product Handling

To avoid deteriorating the performance of this product, read and understand the precautions listed below before use:

1. All technical data in this catalog (items expressing product capabilities) are values obtained in actual testing, or are reference values, and are not intended to be guaranteed values.  
Careful investigation of the planned usage is recommended before use.
2. Careful investigation is particularly necessary for fluids that are strongly acidic, alkaline, or toxic. For such uses, consult us.
3. Due to properties of the material, there is a risk of repeated loads, excessive concentrated loads, or bending loads, having an effect on durability. For such uses, perform careful investigation before use.
4. While self-lubrication is a property of fluororesins, abrasive action is also progressive.  
For application in locations where repeated wear occurs, periodic replacement of the product is recommended.
5. Due to fluororesin characteristics, the fluid can penetrate or permeate the material, depending on the operating environment.  
In addition, because of the risk of product hardening or changes in dimensions, perform careful investigation before use.
6. Some products can be manufactured at specifications not listed in this catalog. In these cases, the products are available within a certain reasonable range of cost and delivery deadlines.
7. If some detail is not clear in the above items or elsewhere, consult us.

## Handling Instructions and Precautions



### Mounting

#### Tube installing procedure

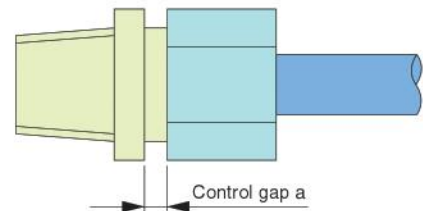
1. Cutting tubes  
Use a tube cutter, and cut at right angles to the length direction.
2. Inserting tubes
  - With the union nut set into the fitting body, insert the tube into the nut.
  - Insert the tube until it reaches the shoulder at the back of the fitting body.
3. Tightening the union nut
  - Lightly finger tighten the union nut.
  - Use a wrench or other tool to tighten the union nut, and tighten until the control gap  $a$  is within the "Control gap  $a$  dimensions at the time of initial tightening" range.
  - ※ See the "Control gap  $a$  dimensions at the time of initial tightening" table below.
  - When tightening fittings for tube outer diameter sizes of 19 and 25 (3/4, 4/4), manually push the union nut toward the fitting body while tightening.
  - ※ Tightening without pushing down on the union nut could result in crushed screw threads on the fitting body.

#### ●Control gap $a$ dimensions at the time of initial tightening

mm	
Fitting size	Control gap $a^*$ mm [in.]
3	2.0~1.5 [0.079~0.059]
4	2.0~1.5 [0.079~0.059]
6	2.6~2.1 [0.102~0.083]
8	2.6~2.1 [0.102~0.083]
10	2.6~2.1 [0.102~0.083]
12	2.6~2.1 [0.102~0.083]
16	3.0~2.5 [0.118~0.098]
19	3.0~2.5 [0.118~0.098]
25	3.0~2.5 [0.118~0.098]

Inch	
Fitting size	Control gap $a^*$ mm [in.]
1/8	2.0~1.5 [0.079~0.059]
1/4	2.6~2.1 [0.102~0.083]
3/8	2.6~2.1 [0.102~0.083]
1/2	2.6~2.1 [0.102~0.083]
3/4	3.0~2.5 [0.118~0.098]
4/4	3.0~2.5 [0.118~0.098]

※ The control gap  $a$  dimension at the time of initial tightening is determined to be at the point where the main body threads disappear.



- ① Further tightening is acceptable only in the cases where the nut may become loosened and leakage may occur, due to stress relaxation characteristics of the plastic, and to operating conditions.
- ② Tighten about 1/4 extra turn.
- ③ The upper limit of further tightening is about from 1/2 to 3/4 extra turns.

#### ●Reuse of product

Since the sealing function of the fitting will be degraded after one use, product reuse cannot obtain the same level of sealing performance as a new product.

Since the sealing performance degradation compared with a new product will vary depending on the application conditions and the amount of time used, perform a careful investigation before reuse.

#### ●Piping connections to valves

For details, see p. 11, Valve piping.

## Fitting Types and Parts

### ● Tube and Female Thread Piping

**F-H-MC-□-M6**

Male connector M6 thread



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**F-H-MC**

Male connector



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**F-H-MCT**

Male connector through



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**F-H-ME**

Male elbow



Page 51

**F-H-MBT**

Male branch tee



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**F-H-MRT**

Male run tee



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### ● Tube and Male Thread Piping

**F-H-FC**

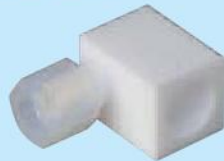
Female connector



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**F-H-FE**

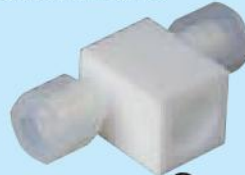
Female elbow



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**F-H-FBT**

Female branch tee



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**F-H-FRT**

Female run tee



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### ● Tube and Tube Piping

**F-H-U**

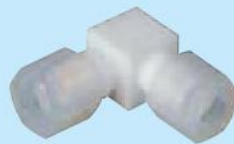
Union



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**F-H-UE**

Union elbow



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**F-H-UT**

Union tee



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**F-H-PU**

Panel union



Page 56

**F-H-RU**

Reducing union



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**F-H-RUE**

Reducing union elbow



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### ● Other parts

**F-H-UN**

Union nut



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**F-H-K**

Nipple



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**F-H-PG**

Plug



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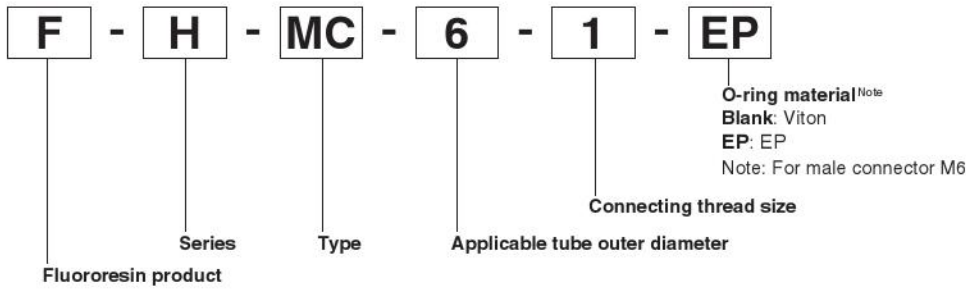
**F-H-BT**

Block off tube



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## Order Codes



● To order, make a selection on the dimensions table, and enter the model code.

※ All connecting thread sizes are available in NPT thread specifications and G thread (PF thread) specifications. Be sure to enter "N" or "F" before the connecting thread size number. "N" for NPT thread, and "F" for G thread.

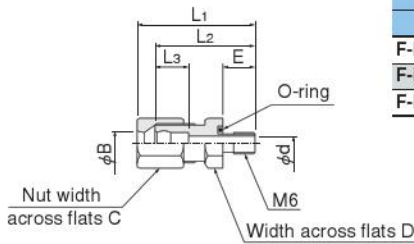
Example: **F-H-MC-6-N1**

Example: **F-H-MC-6-F1**

## Dimensions (mm)

### F-H-MC-□-M6 (-EP)

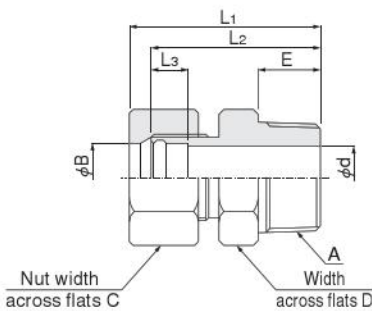
Male connector M6 thread



Model	Tube outer dia.	φ B	C	D	E	L <sub>1</sub>		L <sub>2</sub>	L <sub>3</sub>	φ d
						Before tightening	After tightening			
F-H-MC-3-M6(-EP)	3	3.5	13	13	4.5	26.5	23.5	22.5	8	2
F-H-MC-4-M6(-EP)	4	4.5	13	13	4.5	28.5	25.5	23.5	9	2
F-H-MC-6-M6(-EP)	6	6.5	14	14	4.5	31.5	28.1	26.5	11.4	2

## F-H-MC

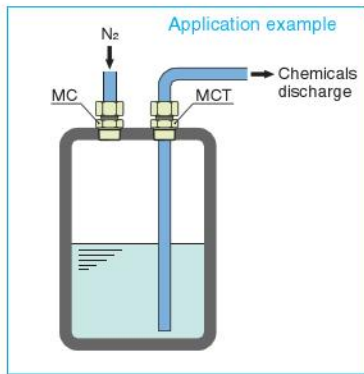
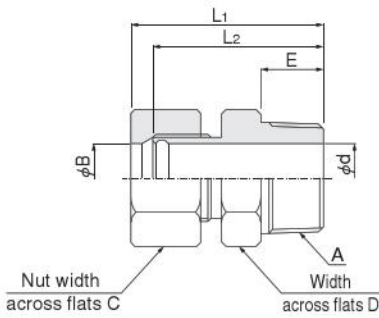
Male connector



Model		Tube outer dia.		A	φ B		C	D	E	L <sub>1</sub>		L <sub>2</sub>	L <sub>3</sub>	φ d	
mm	Inch	mm	Inch	R size	mm	Inch				Before tightening	After tightening				
F-H-MC-3-1	F-H-MC-1/8-1	3	1/8	1/8	3.5	3.7	13	13	9	28	25	24	8	2	
F-H-MC-3-2	F-H-MC-1/8-2			1/4						32	29				28
F-H-MC-4-1	—	4	—	1/8	4.5	—	13	13	9	31	28	26	9	3	
F-H-MC-4-2	—			1/4						35	32				30
F-H-MC-6-1	F-H-MC-1/4-1	6	1/4	1/8	6.5	6.9	14	14	14	9	33	29.6	9.4	4	
F-H-MC-6-2	F-H-MC-1/4-2			1/4						13	37	33.6			32
F-H-MC-6-3	F-H-MC-1/4-3			3/8						13	37	33.6			32
F-H-MC-6-4	F-H-MC-1/4-4			1/2						17	41	37.6			36
F-H-MC-8-1	—	8	—	1/8	8.5	—	17	17	14	9	35	31.6	9.4	6	
F-H-MC-8-2	—			1/4						13	39	35.6			34
F-H-MC-8-3	—			3/8						13	39	35.6			34
F-H-MC-8-4	—			1/2						17	43	39.6			38
F-H-MC-10-2	F-H-MC-3/8-2	10	3/8	1/4	10.5	10	19	19	13	43	39.1	36.5	9.4	8	
F-H-MC-10-3	F-H-MC-3/8-3			3/8						43	39.1	36.5			
F-H-MC-10-4	F-H-MC-3/8-4	1/2	17	47	43.1	40.5	22	19	13	45	41.1	38.5	9.4	8	
F-H-MC-12-2	F-H-MC-1/2-2	1/4	19	45	41.1	38.5									
F-H-MC-12-3	F-H-MC-1/2-3	3/8	12	1/2	12.5	13.2	22	19	13	45	41.1	38.5	9.4	8	
F-H-MC-12-4	F-H-MC-1/2-4	1/2	17	49	45.1	42.5	22	19	13	45	41.1	38.5	9.4	8	
F-H-MC-16-4	—	16	—	1/2	16.5	—	30	30	17	52.5	47.5	44.5	11	14	
F-H-MC-16-6	—			3/4						17	55	50			47
F-H-MC-16-8	—			1						19	59	54			51
F-H-MC-19-4	F-H-MC-3/4-4			1/2						17	58.5	51.5			48.5
F-H-MC-19-6	F-H-MC-3/4-6	3/4	19	3/4	19.5	19.5	36	30	17	61	54	51	13	16	
F-H-MC-19-8	F-H-MC-3/4-8	1	19	1	19.5	19.5	36	30	17	61	54	51	13	16	
F-H-MC-25-8	F-H-MC-4/4-8	1	25	1	25.5	25.9	46	36	19	68	61	58	13	22	

# F-H-MCT

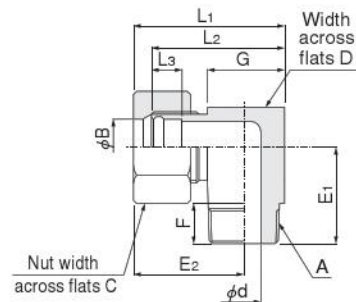
Male connector through



Model		Tube outer dia.		A	φ B		C	D	E	L <sub>1</sub>		L <sub>2</sub>	φ d	
mm	Inch	mm	Inch	R size	mm	Inch				Before tightening	After tightening		mm	Inch
F-H-MCT-3-1	F-H-MCT-1/8-1	3	1/8	1/8	3.5	3.7	13	13	9	28	25	24	3.2	3.4
F-H-MCT-3-2	F-H-MCT-1/8-2			1/4				14	13	32	29	28		
F-H-MCT-4-1	—	4	—	1/8	4.5	—	13	13	9	31	28	26	4.1	—
F-H-MCT-4-2				1/4				14	13	35	32	30		
F-H-MCT-6-1	F-H-MCT-1/4-1	6	1/4	1/8	6.5	6.9	14	14	9	33	29.6	28	6	6.4
F-H-MCT-6-2	F-H-MCT-1/4-2			1/4				14	13	37	33.6	32		
F-H-MCT-6-3	F-H-MCT-1/4-3			3/8				19	13	37	33.6	32		
F-H-MCT-6-4	F-H-MCT-1/4-4			1/2				22	17	41	37.6	36		
F-H-MCT-8-1	—	8	—	1/8	8.5	—	17	14	9	35	31.6	30	8	—
F-H-MCT-8-2				1/4				14	13	39	35.6	34		
F-H-MCT-8-3				3/8				19	13	39	35.6	34		
F-H-MCT-8-4				1/2				22	17	43	39.6	38		
F-H-MCT-10-2	F-H-MCT-3/8-2	10	3/8	1/4	10.5	10	19	17	13	43	39.1	36.5	10	9.4
F-H-MCT-10-3	F-H-MCT-3/8-3			3/8				19	13	43	39.1	36.5		
F-H-MCT-10-4	F-H-MCT-3/8-4	10	3/8	1/2	10.5	10	19	22	17	47	43.1	40.5	10	9.4
F-H-MCT-12-2	F-H-MCT-1/2-2			1/4				19	13	45	41.1	38.5		
F-H-MCT-12-3	F-H-MCT-1/2-3	12	1/2	3/8	12.5	13.2	22	19	13	45	41.1	38.5	12	12.7
F-H-MCT-12-4	F-H-MCT-1/2-4			1/2				22	17	49	45.1	42.5		
F-H-MCT-16-4	—	16	—	1/2	16.5	—	30	24	17	52.5	47.5	44.5	16	—
F-H-MCT-16-6				3/4				30	17	55	50	47		
F-H-MCT-16-8				1				36	19	59	54	51		
F-H-MCT-19-4				F-H-MCT-3/4-4				1/2	30	17	58.5	51.5		
F-H-MCT-19-6	F-H-MCT-3/4-6	19	3/4	3/4	19.5	19.5	36	30	17	61	54	51	19	19
F-H-MCT-19-8	F-H-MCT-3/4-8			1				36	19	65	58	55		
F-H-MCT-25-8	F-H-MCT-4/4-8	25	1	1	25.5	25.9	46	36	19	68	61	58	25	25.4

# F-H-ME

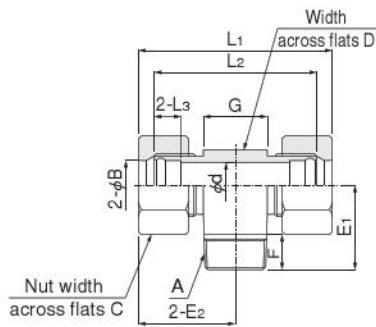
Male elbow



Model		Tube outer dia.		A	φ B		C	D	E <sub>1</sub>	E <sub>2</sub>		F	G	L <sub>1</sub>		L <sub>2</sub>	L <sub>3</sub>	φ d
mm	Inch	mm	Inch	R size	mm	Inch				Before tightening	After tightening			mm	Inch			
F-H-ME-3-1	F-H-ME-1/8-1	3	1/8	1/8	3.5	3.7	13	11	16.5	19.5	16.5	9	11	25	22	21	8	2
F-H-ME-3-2	F-H-ME-1/8-2			1/4				15	20.5	21.5	18.5	13	15	29	26	25		
F-H-ME-4-1	—	4	—	1/8	4.5	—	13	11	16.5	21.5	18.5	9	11	27	24	22	9	3
F-H-ME-4-2				1/4				15	20.5	23.5	20.5	13	15	31	28	26		
F-H-ME-6-1	F-H-ME-1/4-1	6	1/4	1/8	6.5	6.9	14	14	17.5	26	22.6	9	14	33	29.6	28	9.4	4
F-H-ME-6-2	F-H-ME-1/4-2			1/4				14	21.5	26	22.6	13	14	33	29.6	28		
F-H-ME-6-3	F-H-ME-1/4-3			3/8				19	21.5	28.5	25.1	13	19	38	34.6	33		
F-H-ME-6-4	F-H-ME-1/4-4			1/2				22	25.5	30	26.6	17	22	41	37.6	36		
F-H-ME-8-1	—	8	—	1/8	8.5	—	17	14	18.5	27	23.6	9	14	34	30.6	29	9.4	4
F-H-ME-8-2				1/4				14	22.5	27	23.6	13	14	34	30.6	29		
F-H-ME-8-3				3/8				19	22.5	29.5	26.1	13	19	39	35.6	34		
F-H-ME-8-4				1/2				22	26.5	31	27.6	17	22	42	38.6	37		
F-H-ME-10-2	F-H-ME-3/8-2	10	3/8	1/4	10.5	10	19	17	24	31	27.1	13	17	39.5	35.6	33	9.4	8
F-H-ME-10-3	F-H-ME-3/8-3			3/8				19	24	32	28.1	13	19	41.5	37.6	35		
F-H-ME-10-4	F-H-ME-3/8-4	10	3/8	1/2	10.5	10	19	22	29	33.5	29.6	17	22	44.5	40.6	38	9.4	8
F-H-ME-12-2	F-H-ME-1/2-2			1/4				19	26	33	29.1	13	19	42.5	38.6	36		
F-H-ME-12-3	F-H-ME-1/2-3	12	1/2	3/8	12.5	13.2	22	19	26	33	29.1	13	19	42.5	38.6	36	9.4	10
F-H-ME-12-4	F-H-ME-1/2-4			1/2				22	30	34.5	30.6	17	22	45.5	41.6	39		
F-H-ME-16-4	—	16	—	1/2	16.5	—	30	24	35	40	35	17	24	52	47	44	11	14
F-H-ME-16-6				3/4				30	35	43	38	17	30	58	53	50		
F-H-ME-16-8				1				36	37	46	41	19	36	64	59	56		
F-H-ME-19-4				F-H-ME-3/4-4				1/2	30	38	47.5	40.5	17	27	61	54		
F-H-ME-19-6	F-H-ME-3/4-6	19	3/4	3/4	19.5	19.5	36	30	38	49	42	17	30	64	57	54	13	16
F-H-ME-19-8	F-H-ME-3/4-8			1				36	40	52	45	19	36	70	63	60		
F-H-ME-25-8	F-H-ME-4/4-8	25	1	1	25.5	25.9	46	36	46	55	48	19	36	73	66	63	13	22

# F-H-MBT

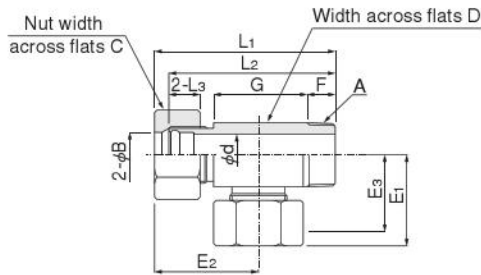
Male branch tee



Model		Tube outer dia.		A	φ B		C	D	E <sub>1</sub>	E <sub>2</sub>		F	G	L <sub>1</sub>		L <sub>2</sub>	L <sub>3</sub>	φ d		
mm	Inch	mm	Inch	R size	mm	Inch				Before tightening	After tightening			Before tightening	After tightening					
F-H-MBT-3-1	F-H-MBT-1/8-1	3	1/8	1/8	3.5	3.7	13	11	16.5	19.5	16.5	9	11	39	33	31	8	2		
F-H-MBT-3-2	F-H-MBT-1/8-2			1/4						21	18			14	42				36	34
F-H-MBT-4-1	—	4	—	1/8	4.5	—	13	11	16.5	21.5	18.5	9	11	43	37	33	9	3		
F-H-MBT-4-2	—			1/4						23	20			13	46				40	36
F-H-MBT-6-1	F-H-MBT-1/4-1	6	1/4	1/8	6.5	6.9	14	14	17.5	26	22.6	9	14	52	45.2	42	9.4	4		
F-H-MBT-6-2	F-H-MBT-1/4-2			1/4						26	22.6			13	52				45.2	42
F-H-MBT-6-3	F-H-MBT-1/4-3			3/8						28.5	25.1			13	57				50.2	47
F-H-MBT-6-4	F-H-MBT-1/4-4			1/2						30	26.6			17	60				53.2	50
F-H-MBT-8-1	—	8	—	1/8	8.5	—	17	14	18.5	27	23.6	9	14	54	47.2	44	9.4	4		
F-H-MBT-8-2	—			1/4						27	23.6			13	54				47.2	44
F-H-MBT-8-3	—			3/8						29.5	26.1			13	59				52.2	49
F-H-MBT-8-4	—			1/2						31	27.6			17	62				55.2	52
F-H-MBT-10-2	F-H-MBT-3/8-2	10	3/8	1/4	10.5	10	19	19	24	31	27.1	13	17	62	54.2	49	9.4	8		
F-H-MBT-10-3	F-H-MBT-3/8-3			3/8						32	28.1			13	64				56.2	51
F-H-MBT-10-4	F-H-MBT-3/8-4			1/2						33.5	29.6			17	67				59.2	54
F-H-MBT-12-2	F-H-MBT-1/2-2	12	1/2	1/4	12.5	13.2	22	19	26	33	29.1	13	19	66	58.2	53	9.4	8		
F-H-MBT-12-3	F-H-MBT-1/2-3			3/8						33	29.1			13	66				58.2	53
F-H-MBT-12-4	F-H-MBT-1/2-4	1/2	34.5	30.6	17	69	61.2	56												
F-H-MBT-16-4	—	16	—	1/2	16.5	—	30	24	35	40	35	17	24	80	70	64	11	14		
F-H-MBT-16-6	—			3/4						43	38			18	86				76	70
F-H-MBT-16-8	—			1						46	41			19	92				82	76
F-H-MBT-19-4	F-H-MBT-3/4-4	19	3/4	1/2	19.5	19.5	36	30	38	47.5	40.5	17	27	95	81	75	13	16		
F-H-MBT-19-6	F-H-MBT-3/4-6			3/4						49	42			18	98				84	78
F-H-MBT-19-8	F-H-MBT-3/4-8			1						52	45			19	104				90	84
F-H-MBT-25-8	F-H-MBT-4/4-8			1						25.5	25.9			46	36				47	55

# F-H-MRT

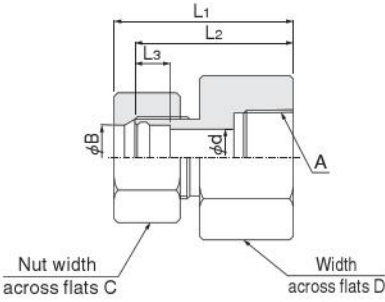
Male run tee



Model		Tube outer dia.		A	φ B		C	D	E <sub>1</sub>		E <sub>2</sub>		E <sub>3</sub>	F	G	L <sub>1</sub>		L <sub>2</sub>	L <sub>3</sub>	φ d				
mm	Inch	mm	Inch	R size	mm	Inch			Before tightening	After tightening	Before tightening	After tightening				Before tightening	After tightening							
F-H-MRT-3-1	F-H-MRT-1/8-1	3	1/8	1/8	3.5	3.7	13	11	21.5	18.5	21.5	18.5	17.5	9	15	38	35	34	8	2				
F-H-MRT-3-2	F-H-MRT-1/8-2			1/4												21.5	18.5				15	42	39	38
F-H-MRT-4-1	—	4	—	1/8	4.5	—	13	11	23.5	20.5	23.5	20.5	18.5	9	15	40	37	35	9	3				
F-H-MRT-4-2	—			1/4												25.5	22.5				20.5	13	44	41
F-H-MRT-6-1	F-H-MRT-1/4-1	6	1/4	1/8	6.5	6.9	14	14	26	22.6	27.5	24.1	21	9	17	45	41.6	40	9.4	4				
F-H-MRT-6-2	F-H-MRT-1/4-2			1/4												26	22.6				14	50	46.6	45
F-H-MRT-6-3	F-H-MRT-1/4-3			3/8												28.5	25.1				14	50	46.6	45
F-H-MRT-6-4	F-H-MRT-1/4-4			1/2												30	26.6				30	55	51.6	50
F-H-MRT-8-1	—	8	—	1/8	8.5	—	17	14	27.5	24.1	29.5	26.1	22.5	9	19	48	44.6	43	9.4	4				
F-H-MRT-8-2	—			1/4												27	23.6				14	52	48.6	47
F-H-MRT-8-3	—			3/8												29.5	26.1				13	52	48.6	47
F-H-MRT-8-4	—			1/2												31	27.6				17	56	52.6	51
F-H-MRT-10-2	F-H-MRT-3/8-2	10	3/8	1/4	10.5	10	19	17	31	27.1	33.5	29.6	24.5	13	22	57.5	53.6	51	9.4	8				
F-H-MRT-10-3	F-H-MRT-3/8-3			3/8												32	28.1				13	57.5	53.6	51
F-H-MRT-10-4	F-H-MRT-3/8-4			1/2												33.5	29.6				17	61.5	57.6	55
F-H-MRT-12-2	F-H-MRT-1/2-2	12	1/2	1/4	12.5	13.2	22	19	33	29.1	36.5	32.6	26.5	13	26	62.5	58.6	56	9.4	8				
F-H-MRT-12-3	F-H-MRT-1/2-3			3/8												33	29.1				13	62.5	58.6	56
F-H-MRT-12-4	F-H-MRT-1/2-4	1/2	34.5	30.6	17	66.5	62.6	60																
F-H-MRT-16-4	—	16	—	1/2	16.5	—	30	24	40.5	35.5	47	42	32.5	17	36	81	76	73	11	14				
F-H-MRT-16-6	—			3/4												43	38				18	82	77	74
F-H-MRT-16-8	—			1												46	41				19	84	79	76
F-H-MRT-19-4	F-H-MRT-3/4-4	19	3/4	1/2	19.5	19.5	36	30	49	42	55	48	39	17	42	93	86	83	13	16				
F-H-MRT-19-6	F-H-MRT-3/4-6			3/4												49	42				18	94	87	84
F-H-MRT-19-8	F-H-MRT-3/4-8			1												52	45				19	95	88	85
F-H-MRT-25-8	F-H-MRT-4/4-8			1												25.5	25.9				46	36	55	48

# F-H-FC

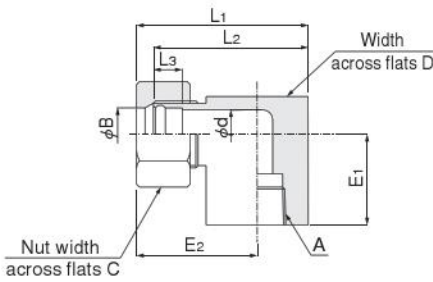
Female connector



Model		Tube outer dia.		A	φ B		C	D	L1		L2	L3	φ d
mm	Inch	mm	Inch	R size	mm	Inch			Before tightening	After tightening			
F-H-FC-3-1	F-H-FC-1/8-1	3	1/8	1/8	3.5	3.7	13	17	29	26	25	8	2
F-H-FC-3-2	F-H-FC-1/8-2			1/4				19	34	31	30		
F-H-FC-4-1	—	4	—	1/8	4.5	—	13	17	32	29	27	9	3
F-H-FC-4-2				1/4				19	37	34	32		
F-H-FC-6-1	F-H-FC-1/4-1	6	1/4	1/8	6.5	6.9	14	17	34	30.6	29	9.4	4
F-H-FC-6-2	F-H-FC-1/4-2			1/4				19	38	34.6	33		
F-H-FC-6-3	F-H-FC-1/4-3			3/8				24	38	34.6	33		
F-H-FC-6-4	F-H-FC-1/4-4			1/2				30	42	38.6	37		
F-H-FC-8-1	—	8	—	1/8	8.5	—	17	17	35	31.6	30	9.4	6
F-H-FC-8-2				1/4				19	40	36.6	35		
F-H-FC-8-3				3/8				24	40	36.6	35		
F-H-FC-8-4				1/2				30	44	40.6	39		
F-H-FC-10-2	F-H-FC-3/8-2	10	3/8	1/4	10.5	10	19	19	41.5	37.6	35	9.4	8
F-H-FC-10-3	F-H-FC-3/8-3			3/8				24	41.5	37.6	35		
F-H-FC-10-4	F-H-FC-3/8-4			1/2				30	45.5	41.6	39		
F-H-FC-12-2	F-H-FC-1/2-2	12	1/2	1/4	12.5	13.2	22	19	43.5	39.6	37	9.4	10
F-H-FC-12-3	F-H-FC-1/2-3			3/8				24	43.5	39.6	37		
F-H-FC-12-4	F-H-FC-1/2-4			1/2				30	48	44.1	41.5		
F-H-FC-16-4	—	16	—	1/2	16.5	—	30	30	52	47	44	11	14
F-H-FC-16-6				3/4				41	56	51	48		
F-H-FC-16-8				1				46	58	53	50		
F-H-FC-19-4				F-H-FC-3/4-4				1/2	30	58	51		
F-H-FC-19-6	F-H-FC-3/4-6	19	3/4	3/4	19.5	19.5	36	41	62	55	52	13	16
F-H-FC-19-8	F-H-FC-3/4-8			1				46	64	57	54		
F-H-FC-25-8	F-H-FC-4/4-8			1				25.5	25.9	46	46		

# F-H-FE

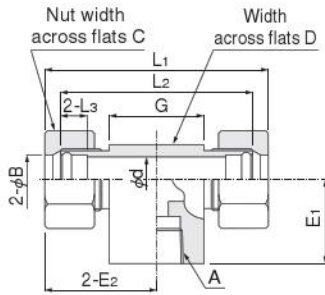
Female elbow



Model		Tube outer dia.		A	φ B		C	D	E1	E2		L1		L2	L3	φ d
mm	Inch	mm	Inch	R size	mm	Inch				Before tightening	After tightening	Before tightening	After tightening			
F-H-FE-3-1	F-H-FE-1/8-1	3	1/8	1/8	3.5	3.7	13	17	17.5	22.5	19.5	31	28	27	8	2
F-H-FE-3-2	F-H-FE-1/8-2			1/4				19	19.5	23.5	20.5	33	30	29		
F-H-FE-4-1	—	4	—	1/8	4.5	—	13	17	17.5	24.5	21.5	33	30	28	9	3
F-H-FE-4-2				1/4				19	19.5	25.5	22.5	35	32	30		
F-H-FE-6-1	F-H-FE-1/4-1	6	1/4	1/8	6.5	6.9	14	17	17.5	27.5	24.1	36	32.6	31	9.4	4
F-H-FE-6-2	F-H-FE-1/4-2			1/4				19	19.5	28.5	25.1	38	34.6	33		
F-H-FE-6-3	F-H-FE-1/4-3			3/8				24	19.5	31	27.6	43	39.6	38		
F-H-FE-6-4	F-H-FE-1/4-4			1/2				30	24.5	34	30.6	49	45.6	44		
F-H-FE-8-1	—	8	—	1/8	8.5	—	17	17	18.5	28.5	25.1	37	33.6	32	9.4	6
F-H-FE-8-2				1/4				19	20.5	29	25.6	38	34.6	33		
F-H-FE-8-3				3/8				24	20.5	31.5	28.1	43	39.6	38		
F-H-FE-8-4				1/2				30	25.5	35	31.6	50	46.6	45		
F-H-FE-10-2	F-H-FE-3/8-2	10	3/8	1/4	10.5	10	19	19	21.5	32	28.1	41.5	37.6	35	9.4	8
F-H-FE-10-3	F-H-FE-3/8-3			3/8				24	21.5	34.5	30.6	46.5	42.6	40		
F-H-FE-10-4	F-H-FE-3/8-4			1/2				30	26.5	37.5	33.6	52.5	48.6	46		
F-H-FE-12-2	F-H-FE-1/2-2	12	1/2	1/4	12.5	13.2	22	19	22.5	33	29.1	42.5	38.6	36	9.4	10
F-H-FE-12-3	F-H-FE-1/2-3			3/8				24	22.5	35.5	31.6	47.5	43.6	41		
F-H-FE-12-4	F-H-FE-1/2-4			1/2				24	27.5	38.5	34.6	53.5	49.6	47		
F-H-FE-16-4	—	16	—	1/2	16.5	—	30	30	35	43	38	58	53	50	11	14
F-H-FE-16-6				3/4				41	39	48.5	43.5	69	64	61		
F-H-FE-16-8				1				46	41	51	46	74	69	66		
F-H-FE-19-4				F-H-FE-3/4-4				1/2	30	37	49	42	64	57		
F-H-FE-19-6	F-H-FE-3/4-6	19	3/4	3/4	19.5	19.5	36	41	41	54.5	47.5	75	68	65	13	16
F-H-FE-19-8	F-H-FE-3/4-8			1				46	43	57	50	80	73	70		
F-H-FE-25-8	F-H-FE-4/4-8			1				25.5	25.9	46	46	45	60	53		

# F-H-FBT

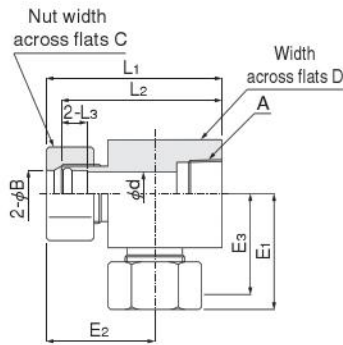
Female branch tee



Model		Tube outer dia.		A	φ B		C	D	E <sub>1</sub>	E <sub>2</sub>		G	L <sub>1</sub>		L <sub>2</sub>	L <sub>3</sub>	φ d
mm	Inch	mm	Inch	R size	mm	Inch				Before tightening	After tightening		Before tightening	After tightening			
F-H-FBT-3-1	F-H-FBT-1/8-1	3	1/8	1/8	3.5	3.7	13	17	17.5	22.5	19.5	17	45	39	37	8	2
F-H-FBT-3-2	F-H-FBT-1/8-2			1/4				19	19.5	23.5	20.5	19	47	41	39		
F-H-FBT-4-1	—	4	—	1/8	4.5	—	13	17	17.5	24.5	21.5	17	49	43	39	9	3
F-H-FBT-4-2	—			1/4				19	19.5	25.5	22.5	19	51	45	41		
F-H-FBT-6-1	F-H-FBT-1/4-1	6	1/4	1/8	6.5	6.9	14	17	17.5	27.5	24.1	17	55	48.2	45	9.4	4
F-H-FBT-6-2	F-H-FBT-1/4-2			1/4				17	19.5	28.5	25.1	19	57	50.2	47		
F-H-FBT-6-3	F-H-FBT-1/4-3			3/8				24	19.5	31	27.6	24	62	55.2	52		
F-H-FBT-6-4	F-H-FBT-1/4-4			1/2				30	24.5	34	30.6	30	68	61.2	58		
F-H-FBT-8-1	—	8	—	1/8	8.5	—	17	17	18.5	28.5	25.1	17	57	50.2	47	9.4	6
F-H-FBT-8-2	—			1/4				19	20.5	29.5	26.1	19	59	52.2	49		
F-H-FBT-8-3	—			3/8				24	20.5	32	28.6	24	64	57.2	54		
F-H-FBT-8-4	—			1/2				30	25.5	35	31.6	30	70	63.2	60		
F-H-FBT-10-2	F-H-FBT-3/8-2	10	3/8	1/4	10.5	10	19	19	21.5	32	28.1	19	64	56.2	51	9.4	8
F-H-FBT-10-3	F-H-FBT-3/8-3			3/8				24	21.5	34.5	30.6	24	69	61.2	56		
F-H-FBT-10-4	F-H-FBT-3/8-4			1/2				30	26.5	37.5	33.6	30	75	67.2	62		
F-H-FBT-12-2	F-H-FBT-1/2-2	12	1/2	1/4	12.5	13.2	22	19	22.5	33	29.1	19	66	58.2	53	9.4	10
F-H-FBT-12-3	F-H-FBT-1/2-3			3/8				24	22.5	35.5	31.6	24	71	63.2	58		
F-H-FBT-12-4	F-H-FBT-1/2-4			1/2				30	27.5	38.5	34.6	30	77	69.2	64		
F-H-FBT-16-4	—	16	—	1/2	16.5	—	30	30	35	43	38	30	86	76	70	11	14
F-H-FBT-16-6	—			3/4				41	39	48.5	43.5	41	97	87	81		
F-H-FBT-16-8	—			1				46	41	51	46	46	102	92	86		
F-H-FBT-19-4	F-H-FBT-3/4-4	19	3/4	1/2	19.5	19.5	36	30	37	49	42	30	98	84	78	13	16
F-H-FBT-19-6	F-H-FBT-3/4-6			3/4				41	41	54.5	47.5	41	109	95	89		
F-H-FBT-19-8	F-H-FBT-3/4-8			1				46	43	57	50	46	114	100	94		
F-H-FBT-25-8	F-H-FBT-4/4-8	25	1	1	25.5	25.9	46	46	45	60	53	46	120	106	100	13	22

# F-H-FRT

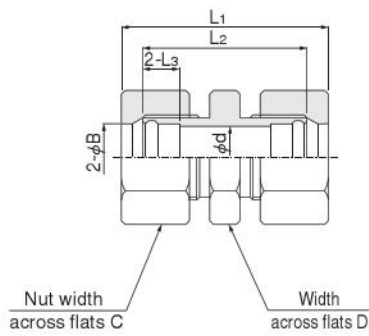
Female run tee



Model		Tube outer dia.		A	φ B		C	D	E <sub>1</sub>		E <sub>2</sub>		E <sub>3</sub>	L <sub>1</sub>		L <sub>2</sub>	L <sub>3</sub>	φ d
mm	Inch	mm	Inch	R size	mm	Inch			Before tightening	After tightening	Before tightening	After tightening		Before tightening	After tightening			
F-H-FRT-3-1	F-H-FRT-1/8-1	3	1/8	1/8	3.5	3.7	13	17	22.5	19.5	21.5	18.5	18.5	38	35	34	8	2
F-H-FRT-3-2	F-H-FRT-1/8-2			1/4				19	23.5	20.5			19.5	40	37	36		
F-H-FRT-4-1	—	4	—	1/8	4.5	—	13	17	24.5	21.5	23.5	20.5	19.5	41	38	36	9	3
F-H-FRT-4-2	—			1/4				19	25.5	22.5			20.5	43	40	38		
F-H-FRT-6-1	F-H-FRT-1/4-1	6	1/4	1/8	6.5	6.9	14	17	27.5	24.1	27.5	24.1	22.5	45	41.6	40	9.4	4
F-H-FRT-6-2	F-H-FRT-1/4-2			1/4				19	28.5	25.1			23.5	46	42.6	41		
F-H-FRT-6-3	F-H-FRT-1/4-3			3/8				24	31	27.6			26	46	42.6	41		
F-H-FRT-6-4	F-H-FRT-1/4-4			1/2				30	34	30.6			29	51	47.6	46		
F-H-FRT-8-1	—	8	—	1/8	8.5	—	17	17	28.5	25.1	29.5	26.1	23.5	48	44.6	43	9.4	6
F-H-FRT-8-2	—			1/4				19	29.5	26.1			24.5	50	46.6	45		
F-H-FRT-8-3	—			3/8				24	32	28.6			27	50	46.6	45		
F-H-FRT-8-4	—			1/2				30	35	31.6			30	55	51.6	50		
F-H-FRT-10-2	F-H-FRT-3/8-2	10	3/8	1/4	10.5	10	19	19	32	28.1	33.5	29.6	25.5	54.5	50.6	48	9.4	8
F-H-FRT-10-3	F-H-FRT-3/8-3			3/8				24	34.5	30.6			28	54.5	50.6	48		
F-H-FRT-10-4	F-H-FRT-3/8-4			1/2				30	37.5	33.6			31	59.5	55.6	53		
F-H-FRT-12-2	F-H-FRT-1/2-2	12	1/2	1/4	12.5	13.2	22	19	33.5	29.6	37	33.1	27	59.5	55.6	53	9.4	10
F-H-FRT-12-3	F-H-FRT-1/2-3			3/8				24	35.5	31.6			29	59.5	55.6	53		
F-H-FRT-12-4	F-H-FRT-1/2-4			1/2				30	38.5	34.6			32	64.5	60.6	58		
F-H-FRT-16-4	—	16	—	1/2	16.5	—	30	30	43	38	46	41	35	79	74	71	11	14
F-H-FRT-16-6	—			3/4				41	48.5	43.5			41	83	78	75		
F-H-FRT-16-8	—			1				46	49	44			41	85	80	77		
F-H-FRT-19-4	F-H-FRT-3/4-4	19	3/4	1/2	19.5	19.5	36	30	49	42	55	48	39	88	81	78	13	16
F-H-FRT-19-6	F-H-FRT-3/4-6			3/4				41	54.5	47.5			44.5	92	85	82		
F-H-FRT-19-8	F-H-FRT-3/4-8			1				46	57	50			47	94	87	84		
F-H-FRT-25-8	F-H-FRT-4/4-8	25	1	1	25.5	25.9	46	46	60	53	64	57	50	109	102	99	13	22

# F-H-U

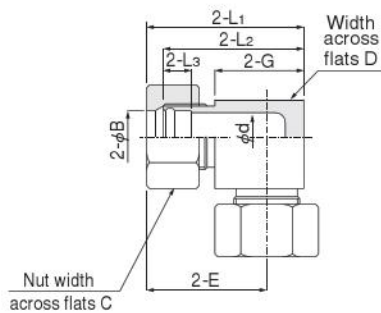
Union



Model		Tube outer dia.		φ B		C	D	L <sub>1</sub>		L <sub>2</sub>	L <sub>3</sub>	φ d
mm	Inch	mm	Inch	mm	Inch			Before tightening	After tightening			
F-H-U-3	F-H-U-1/8	3	1/8	3.5	3.7	13	10	38	32	30	8	2
F-H-U-4	—	4	—	4.5	—	13	10	44	38	34	9	3
F-H-U-6	F-H-U-1/4	6	1/4	6.5	6.9	14	14	45	38.2	35	9.4	4
F-H-U-8	—	8	—	8.5	—	17	14	49	42.2	39	9.4	6
F-H-U-10	F-H-U-3/8	10	3/8	10.5	10	19	17	52.5	44.7	39.5	9.4	8
F-H-U-12	F-H-U-1/2	12	1/2	12.5	13.2	22	19	56.5	48.7	43.5	9.4	10
F-H-U-16	—	16	—	16.5	—	30	24	64	54	48	11	14
F-H-U-19	F-H-U-3/4	19	3/4	19.5	19.5	36	30	78	64	58	13	16
F-H-U-25	F-H-U-4/4	25	1	25.5	25.9	46	36	86	72	66	13	22

# F-H-UE

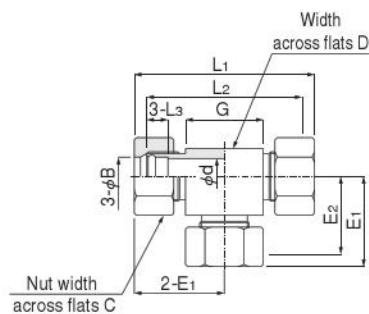
Union elbow



Model		Tube outer dia.		φ B		C	D	E		G	L <sub>1</sub>		L <sub>2</sub>	L <sub>3</sub>	φ d
mm	Inch	mm	Inch	mm	Inch			Before tightening	After tightening		Before tightening	After tightening			
F-H-UE-3	F-H-UE-1/8	3	1/8	3.5	3.7	13	10	24	21	15	29	26	25	8	2
F-H-UE-4	—	4	—	4.5	—	13	10	23.5	20.5	12.5	28.5	25.5	23.5	9	3
F-H-UE-6	F-H-UE-1/4	6	1/4	6.5	6.9	14	14	26.5	23.1	14	33	29.6	28	9.4	4
F-H-UE-8	—	8	—	8.5	—	17	14	30	26.6	17	37	33.6	32	9.4	6
F-H-UE-10	F-H-UE-3/8	10	3/8	10.5	10	19	17	33	29.1	19	41.5	37.6	35	9.4	8
F-H-UE-12	F-H-UE-1/2	12	1/2	12.5	13.2	22	19	37	33.1	23	46.5	42.6	40	9.4	10
F-H-UE-16	—	16	—	16.5	—	30	24	45	40	29.5	57.5	52.5	49.5	11	14
F-H-UE-19	F-H-UE-3/4	19	3/4	19.5	19.5	36	30	55	48	36	70	63	60	13	16
F-H-UE-25	F-H-UE-4/4	25	1	25.5	25.9	46	36	64	57	45	82	75	72	13	22

# F-H-UT

Union tee

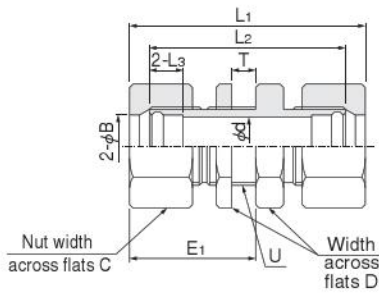


Model		Tube outer dia.		φ B		C	D	E <sub>1</sub>		E <sub>2</sub>	G	L <sub>1</sub>		L <sub>2</sub>	L <sub>3</sub>	φ d
mm	Inch	mm	Inch	mm	Inch			Before tightening	After tightening			Before tightening	After tightening			
F-H-UT-3	F-H-UT-1/8	3	1/8	3.5	3.7	13	10	21.5	18.5	17.5	15	43	37	35	8	2
F-H-UT-4	—	4	—	4.5	—	13	10	23.5	20.5	18.5	15	47	41	37	9	3
F-H-UT-6	F-H-UT-1/4	6	1/4	6.5	6.9	14	14	26.5	23.1	21.5	15	53	46.2	43	9.4	4
F-H-UT-8	—	8	—	8.5	—	17	14	30	26.6	25	20	60	53.2	50	9.4	6
F-H-UT-10	F-H-UT-3/8	10	3/8	10.5	10	19	19	33	29.1	26.5	21	66	58.2	53	9.4	8
F-H-UT-12	F-H-UT-1/2	12	1/2	12.5	13.2	22	19	37	33.1	30.5	27	74	66.2	61	9.4	10
F-H-UT-16	—	16	—	16.5	—	30	24	45	40	37	34	90	80	74	11	14
F-H-UT-19	F-H-UT-3/4	19	3/4	19.5	19.5	36	30	54	47	44	40	108	94	88	13	16
F-H-UT-25	F-H-UT-4/4	25	1	25.5	25.9	46	36	64	57	54	54	128	114	108	13	22



# F-H-PU

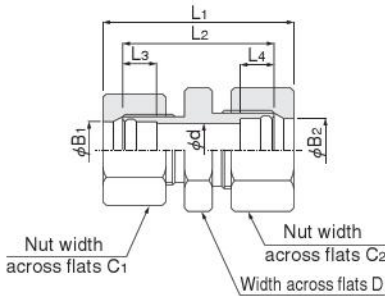
Panel union



Model		Tube outer dia.		φ B		C	D	Max. panel thickness T	L1		L2	E1		U	L3	φ d
mm	Inch	mm	Inch	mm	Inch				Before tightening	After tightening		Before tightening	After tightening			
F-H-PU-3	F-H-PU-1/8	3	1/8	3.5	3.7	13	13	7	49	43	41	31	25	M6	8	2
F-H-PU-4	—	4	—	4.5	—	13	13	7	51	47	43	32	28	M8	9	3
F-H-PU-6	F-H-PU-1/4	6	1/4	6.5	6.9	14	14	7	59	52.2	49	37	30.2	M11	9.4	4
F-H-PU-8	—	8	—	8.5	—	17	17	7	61	54.2	51	38	31.2	M13	9.4	6
F-H-PU-10	F-H-PU-3/8	10	3/8	10.5	10	19	19	6	66.8	59	53.8	41.4	33.6	M15	9.4	8
F-H-PU-12	F-H-PU-1/2	12	1/2	12.5	13.2	22	22	6	68.4	60.6	55.4	42.4	34.6	M17	9.4	10
F-H-PU-16	—	16	—	16.5	—	30	30	7	75.6	65.6	59.6	47.8	37.8	M23	11	14
F-H-PU-19	F-H-PU-3/4	19	3/4	19.5	19.5	36	36	7	90	76	70	56	42	M28	13	16
F-H-PU-25	F-H-PU-4/4	25	1	25.5	25.9	46	46	7	97.8	83.8	77.8	61	47	M34	13	22

# F-H-RU

Reducing union



Model	Tube outer dia.	φ B1	φ B2	C1	C2	D	L1		L2	L3	L4	φ d
							Before tightening	After tightening				
F-H-RU-3-6	3-6	3.5	6.5	13	14	14	40	33.6	31	8	9.4	2
F-H-RU-4-6	4-6	4.5	6.5	13	14	14	42	35.6	32	9	9.4	3
F-H-RU-6-8	6-8	6.5	8.5	14	17	14	48	41.2	38	9.4	9.4	4
F-H-RU-6-10	6-10	6.5	10.5	14	19	17	49	41.7	37.5	9.4	9.4	4
F-H-RU-8-10	8-10	8.5	10.5	17	19	17	50	42.7	38.5	9.4	9.4	6
F-H-RU-10-12	10-12	10.5	12.5	19	22	19	55.3	47.5	42.5	9.4	9.4	8
F-H-RU-12-16	12-16	12.5	16.5	22	30	24	60.5	51.6	45	9.4	11	10
F-H-RU-12-19	12-19	12.5	19.5	22	36	30	68.5	57.6	51	9.4	13	10
F-H-RU-16-19	16-19	16.5	19.5	30	36	30	72	60	54	11	13	14
F-H-RU-19-25	19-25	19.5	25.5	36	46	36	83	69	63	13	13	16

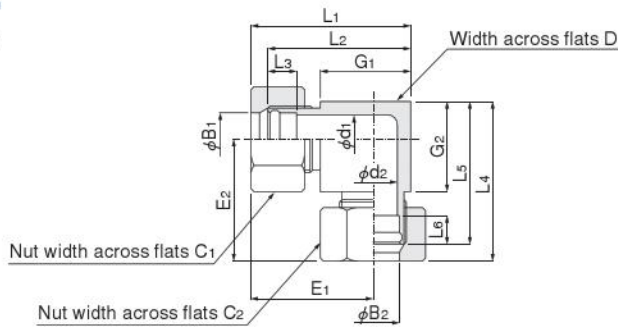
Model	Tube outer dia.	φ B1	φ B2	C1	C2	D	L1		L2	L3	L4	φ d
							Before tightening	After tightening				
F-H-RU-1/8-1/4	1/8-1/4	3.7	6.9	13	14	14	40	33.6	31	8	9.4	2
F-H-RU-1/4-3/8	1/4-3/8	6.9	10	14	19	17	49	41.7	37.5	9.4	9.4	4
F-H-RU-3/8-1/2	3/8-1/2	10	13.2	19	22	19	55.3	47.5	42.5	9.4	9.4	8
F-H-RU-1/2-3/4	1/2-3/4	13.2	19.5	22	36	30	68.5	57.6	51	9.4	13	10
F-H-RU-3/4-4/4	3/4-4/4	19.5	25.9	36	46	36	83	69	63	13	13	16

Model	Tube outer dia.	φ B1	φ B2	C1	C2	D	L1		L2	L3	L4	φ d
							Before tightening	After tightening				
F-H-RU-3-1/8	3-1/8	3.5	3.7	13	13	10	38	32	30	8	8	2
F-H-RU-4-1/8	4-1/8	4.5	3.7	13	13	10	42	36	33	9	8	3
F-H-RU-6-1/4	6-1/4	6.5	6.9	14	14	14	45	38.2	35	9.4	9.4	4
F-H-RU-8-1/4	8-1/4	8.5	6.9	17	14	14	48	41.2	38	9.4	9.4	4
F-H-RU-10-3/8	10-3/8	10.5	10	19	19	17	52.5	44.7	39.5	9.4	9.4	8
F-H-RU-12-1/2	12-1/2	12.5	13.2	22	22	19	56.5	48.7	43.5	9.4	9.4	10
F-H-RU-16-1/2	16-1/2	16.5	13.2	30	22	24	59.5	50.6	45	11	9.4	10
F-H-RU-19-3/4	19-3/4	19.5	19.5	36	36	30	78	64	58	13	13	16
F-H-RU-25-4/4	25-4/4	25.5	25.9	46	46	36	86	72	66	13	13	22

## Dimensions (mm)

# F-H-RUE

Reducing union elbow



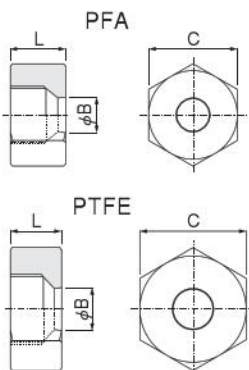
Model	Tube outer dia.	$\phi B_1$	$\phi B_2$	C1	C2	D	L1		L2	L3	L4		L5	L6	G1	G2	E1		E2		$\phi d_1$	$\phi d_2$
							Before tightening	After tightening			Before tightening	After tightening					Before tightening	After tightening				
F-H-RUE-3-6	3-6	3.5	6.5	13	14	14	29	26	25	8	33	29.6	28	9.4	15	14	24	21	26.5	23.1	2	4
F-H-RUE-4-6	4-6	4.5	6.5	13	14	14	28.5	25.5	23.5	9	33	29.6	28	9.4	12.5	14	23.5	20.5	26.5	23.1	3	4
F-H-RUE-6-8	6-8	6.5	8.5	14	17	14	33	29.6	28	9.4	37	33.6	32	9.4	14	17	26.5	23.1	30	26.6	4	6
F-H-RUE-6-10	6-10	6.5	10.5	14	19	17	33	29.6	28	9.4	41.5	37.6	35	9.4	14	19	26.5	23.1	33	29.1	4	8
F-H-RUE-8-10	8-10	8.5	10.5	17	19	17	37	33.6	32	9.4	41.5	37.6	35	9.4	17	19	30	26.6	33	29.1	6	8
F-H-RUE-10-12	10-12	10.5	12.5	19	22	19	41.5	37.6	35	9.4	46.5	42.6	40	9.4	19	23	33	29.1	37	33.1	8	10
F-H-RUE-12-16	12-16	12.5	16.5	22	30	24	46.5	42.6	40	9.4	57.5	52.5	49.5	11	23	29.5	37	33.1	45	40	10	14
F-H-RUE-12-19	12-19	12.5	19.5	22	36	30	46.5	42.6	40	9.4	70	63	60	13	23	36	37	33.1	55	48	10	16
F-H-RUE-16-19	16-19	16.5	19.5	30	36	30	57.5	52.5	49.5	11	70	63	60	13	29.5	36	45	40	55	48	14	16
F-H-RUE-19-25	19-25	19.5	25.5	36	46	36	70	63	60	13	82	75	72	13	36	45	55	48	64	57	16	22

Model	Tube outer dia.	$\phi B_1$	$\phi B_2$	C1	C2	D	L1		L2	L3	L4		L5	L6	G1	G2	E1		E2		$\phi d_1$	$\phi d_2$
							Before tightening	After tightening			Before tightening	After tightening					Before tightening	After tightening				
F-H-RUE-1/8-1/4	1/8-1/4	3.7	6.9	13	14	14	29	26	25	8	33	29.6	28	9.4	15	14	24	21	26.5	23.1	2	4
F-H-RUE-1/4-3/8	1/4-3/8	6.9	10	14	19	17	33	29.6	28	9.4	41.5	37.6	35	9.4	14	19	26.5	23.1	33	29.1	4	8
F-H-RUE-3/8-1/2	3/8-1/2	10	13.2	19	22	19	41.5	37.6	35	9.4	46.5	42.6	40	9.4	19	23	33	29.1	37	33.1	8	10
F-H-RUE-1/2-3/4	1/2-3/4	13.2	19.5	22	36	30	46.5	42.6	40	9.4	70	63	60	13	23	36	37	33.1	55	48	10	16
F-H-RUE-3/4-4/4	3/4-4/4	19.5	25.9	36	46	36	70	63	60	13	82	75	72	13	36	45	55	48	64	57	16	22

Model	Tube outer dia.	$\phi B_1$	$\phi B_2$	C1	C2	D	L1		L2	L3	L4		L5	L6	G1	G2	E1		E2		$\phi d_1$	$\phi d_2$
							Before tightening	After tightening			Before tightening	After tightening					Before tightening	After tightening				
F-H-RUE-3-1/8	3-1/8	3.5	3.7	13	13	10	29	26	25	8	29	26	25	8	15	15	24	21	24	21	2	2
F-H-RUE-4-1/8	4-1/8	4.5	3.7	13	13	10	28.5	25.5	23.5	9	29	26	25	8	12.5	15	23.5	20.5	24	21	3	2
F-H-RUE-6-1/4	6-1/4	6.5	6.9	14	14	14	33	29.6	28	9.4	33	29.6	28	9.4	14	14	26.5	23.1	26.5	23.1	4	4
F-H-RUE-8-1/4	8-1/4	8.5	6.9	17	14	14	37	33.6	32	9.4	33	29.6	28	9.4	17	14	30	26.6	26.5	23.1	6	4
F-H-RUE-10-3/8	10-3/8	10.5	10	19	19	17	41.5	37.6	35	9.4	41.5	37.6	35	9.4	19	19	33	29.1	33	29.1	8	8
F-H-RUE-12-1/2	12-1/2	12.5	13.2	22	22	19	46.5	42.6	40	9.4	46.5	42.6	40	9.4	23	23	37	33.1	37	33.1	10	10
F-H-RUE-16-1/2	16-1/2	16.5	13.2	30	22	24	57.5	52.5	49.5	11	46.5	42.6	40	9.4	29.5	23	45	40	37	33.1	14	10
F-H-RUE-19-3/4	19-3/4	19.5	19.5	36	36	30	70	63	60	13	70	63	60	13	36	36	55	48	55	48	16	16
F-H-RUE-25-4/4	25-4/4	25.5	25.9	46	46	36	82	75	72	13	82	75	72	13	45	45	64	57	64	57	22	22

# F-H-UN

Union nut

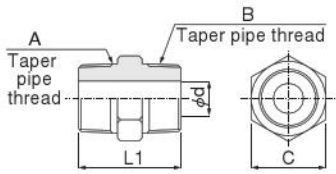


Model		Tube outer dia.		$\phi B$		L	C	Materials
mm	Inch	mm	Inch	mm	Inch			
F-H-UN-3	F-H-UN-1/8	3	1/8	3.5	3.7	9	13	PFA
F-H-UN-4	—	4	—	4.5	—	11	13	
F-H-UN-6	F-H-UN-1/4	6	1/4	6.5	6.9	13	14	
F-H-UN-8	—	8	—	8.5	—	14	17	
F-H-UN-10	F-H-UN-3/8	10	3/8	10.5	10	16	19	PTFE
F-H-UN-12	F-H-UN-1/2	12	1/2	12.5	13.2	17	22	
F-H-UN-16	—	16	—	16.5	—	20	30	
F-H-UN-19	F-H-UN-3/4	19	3/4	19.5	19.5	24	36	
F-H-UN-25	F-H-UN-4/4	25	1	25.5	25.9	27	46	

## Dimensions (mm)

### F-H-K

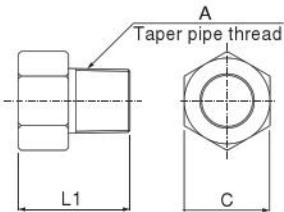
Nipple



Model	A	B	L <sub>1</sub>	C	φ d
	R size	R size			
F-H-K-1	1/8	1/8	24	13	5
F-H-K-2	1/4	1/4	32	17	6
F-H-K-3	3/8	3/8	32	19	8
F-H-K-4	1/2	1/2	42	24	10
F-H-K-6	3/4	3/4	48	30	16
F-H-K-8	1	1	50	36	22
F-H-K-1-2	1/8	1/4	28	17	5
F-H-K-1-3	1/8	3/8	28	19	5
F-H-K-1-4	1/8	1/2	34	24	5
F-H-K-2-3	1/4	3/8	32	19	6
F-H-K-2-4	1/4	1/2	38	24	6
F-H-K-3-4	3/8	1/2	38	24	8

### F-H-PG

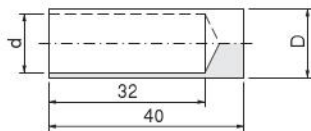
Plug



Model	A	L <sub>1</sub>	C
	R size		
F-H-PG-1	1/8	17	13
F-H-PG-2	1/4	23	17
F-H-PG-3	3/8	26	19
F-H-PG-4	1/2	30	24
F-H-PG-6	3/4	32	30
F-H-PG-8	1	33	36

### F-H-BT

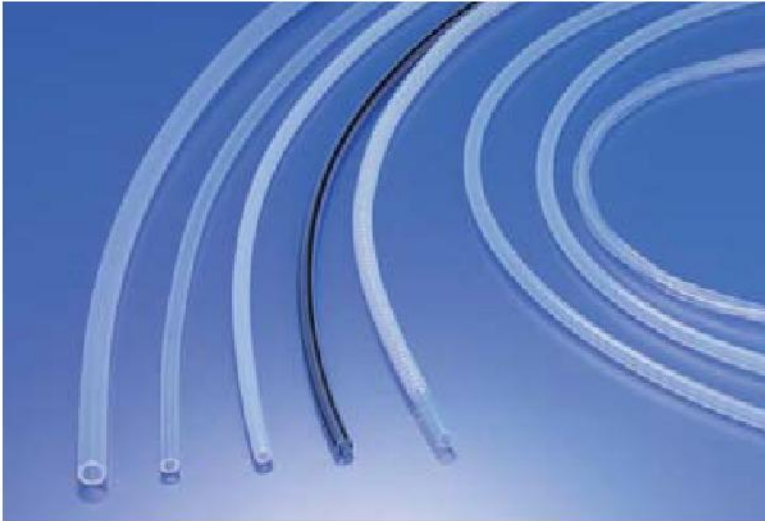
Block off tube



Model	mm	
	φ D	φ d
F-H-BT-6	6	4
F-H-BT-8	8	6
F-H-BT-10	10	8
F-H-BT-12	12	10
F-H-BT-16	16	14
F-H-BT-19	19	17
F-H-BT-25	25	23

Model	Inch	
	φ D	φ d
F-H-BT-1/8	3.18	2
F-H-BT-1/4	6.35	4
F-H-BT-3/8	9.53	7.5
F-H-BT-1/2	12.7	10.5
F-H-BT-3/4	19	17
F-H-BT-4/4	25.4	22

# Fluororesin Tube Series



Koganei uses our own independently developed advanced molding technology, in a clean environment, to manufacture all kinds of high-quality fluororesin tubes. These can be used in semiconductors, liquid crystals, and other areas in the electronics sector, in biotechnology, in the medical and food-products sector, in fine chemicals, and in other advanced sectors, as well as in petrochemicals, and in a wide range of general industrial applications.

※ Because it is impossible to cover all possible uses or operation environment conditions, features, applications, specifications, data, etc., are relegated to "Reference" in the catalog. Read and understand the tube series safety precautions on p. 59 before use.

**Caution:** The fluororesin tube series cannot be used with quick fittings.

## Fluororesin Tube Features and Application Examples (Reference)

### Chemical resistance

**Features**  
Withstands virtually all corrosive fluids available on the market, including strong acids, alkalis, and solvents.  
(Exceptions include fused alkaline metals, high-temperature fluorine gas, etc.)

- Applications**
- Highly corrosive waste fluid line
  - Protective sheathing for wiring

### Operating temperature range

**Features**  
Usable over a broad temperature range, from  $-40^{\circ}\sim 260^{\circ}\text{C}$  [ $-40^{\circ}\sim 500^{\circ}\text{F}$ ] (PFA, PTFE).

- Applications**
- Acid and alkali cleaning lines in plating plants
  - Steam transfer line
  - Fuel transfer lines in aircraft, automobiles, etc.
- ※ For applications under  $-40^{\circ}\text{C}$  [ $-40^{\circ}\text{F}$ ], consult us.

### Non-tackiness (low friction)

**Features**  
High level of non-tackiness means even highly viscous fluids flow virtually without sticking.

- Applications**
- Urethane foam chemical liquid transfer line
  - Paint transfer line
  - Transfer of sticky powders
  - Transfer of adhesives or sticky substances
  - Sheathing for pipes, rollers, etc.

### Purity

**Features**  
Contains no plasticizers or additives. In addition, it elutes extremely small amounts of impurities into the media.

- Applications**
- Transfer line for high-purity chemicals used in semiconductors
  - Transfer of ultra-pure water
  - Juice manufacturing processes
  - Medical product and food-product manufacturing processes
  - Transfer line for clean air
  - Tubes for liquid and gas analyzers

### Electrical insulation

**Features**  
Exhibits excellent insulation properties, and is stable over a wide range of temperatures and frequencies.

- Applications**
- Tubes for electrical sheathing
  - Cooling tubes for electrical equipment, power units, etc.
  - Insulation for lead wires and heaters
  - Insulation sheathing for wiring

### Weather resistance

**Features**  
Exhibits superior weather resistance, and does not degrade (deteriorate) over time.

- Applications**
- Applications in which tube replacement should be avoided
  - Applications near coastlines subject to severe salt damage or ultraviolet radiation

# Fluororesin Tube Series, Safety Precautions



## Warning

This product is a fluororesin product. To maintain its performance and ensure safe use, strictly observe the following precautions:

1. Do not use for any purposes other than those listed in the catalog, etc.
2. Never use in contact with human tissue or fluids, etc.
3. Never ingest (accidental swallowing, etc.) products into the human body.
4. Do not use at temperatures in excess of the maximum operating temperature specified in the catalog.
5. Processing at temperatures above the maximum operating temperature can generate cracked fluorine gases. For this reason, always provide sufficient ventilation, and take measures to avoid inhaling the cracked gas.
6. When discarding, use the processes detailed in the waste management and public cleaning law.  
Do not incinerate the discarded product. If, however, incineration must be performed, always do it at an incineration facility equipped with neutralizing agents and other suitable disposal equipment.

## Precautions for Product Handling

To avoid deteriorating the performance of this product, read and understand the precautions listed below before use:

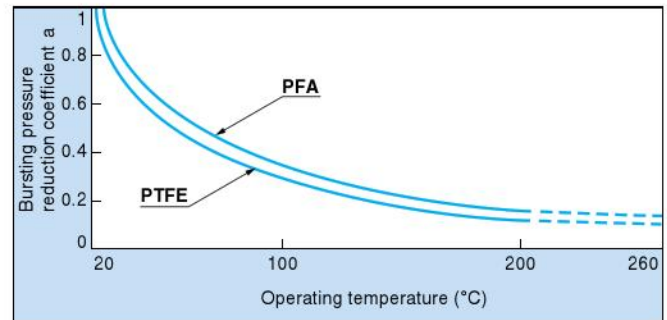
1. All technical data in this catalog (items expressing product capabilities) are values obtained in actual testing, or are reference values, and are not intended to be guaranteed values.  
Careful investigation of the planned usage is recommended before use.
2. Careful investigation is particularly necessary for fluids that are strongly acidic, alkaline, or toxic. For such uses, consult us.
3. Due to properties of the material, there is a risk of repeated loads, excessive concentrated loads, or bending loads, having an effect on durability. For such uses, perform careful investigation before use.
4. While self-lubrication is a property of fluororesins, abrasive action is also progressive.  
For application in locations where repeated wear occurs, periodic replacement of the product is recommended.
5. Due to fluororesin characteristics, the fluid can penetrate or permeate the material, depending on the operating environment.  
In addition, because of the risk of product hardening or changes in dimensions, perform careful investigation before use.
6. Some products can be manufactured at specifications not listed in this catalog. In these cases, the products are available within a certain reasonable range of cost and delivery deadlines.
7. If some detail is not clear in the above items or elsewhere, consult us.

## Maximum Tube Operating Pressure (Reference)

Use at or less than the  $P_{U.T}$  pressure obtained in the below equation:

$$P_{U.T} = S \times a \times P_{R.T}$$

- $P_{U.T}$ : Maximum operating pressure at operating temperature
- $S$ : Safety factor (1/3 to 1/5)  
※ Use a safety factor of 1/3 to 1/5, depending on the type of media (gas or liquid), degree of risk, and presence of impact pressure.
- $a$ : Bursting pressure reduction coefficient  
※ In the diagram at right, read the bursting pressure reduction coefficient for the operating temperature of the tube material.
- $P_{R.T}$ : Tube bursting pressure at room temperature



$$F = \frac{9}{5}C + 32$$

## Tube Size and Flow Rate (Reference)

The relationship between the flow rate, flow velocity, and inner diameter of the tube is found as in the below equation:

$$\pi \left( \frac{\text{Tube inner diameter}}{2} \right)^2 [\text{cm}^2] = \frac{\text{Flow rate} [\text{cm}^3/\text{s}]}{\text{Flow velocity} [\text{cm}/\text{s}]}$$

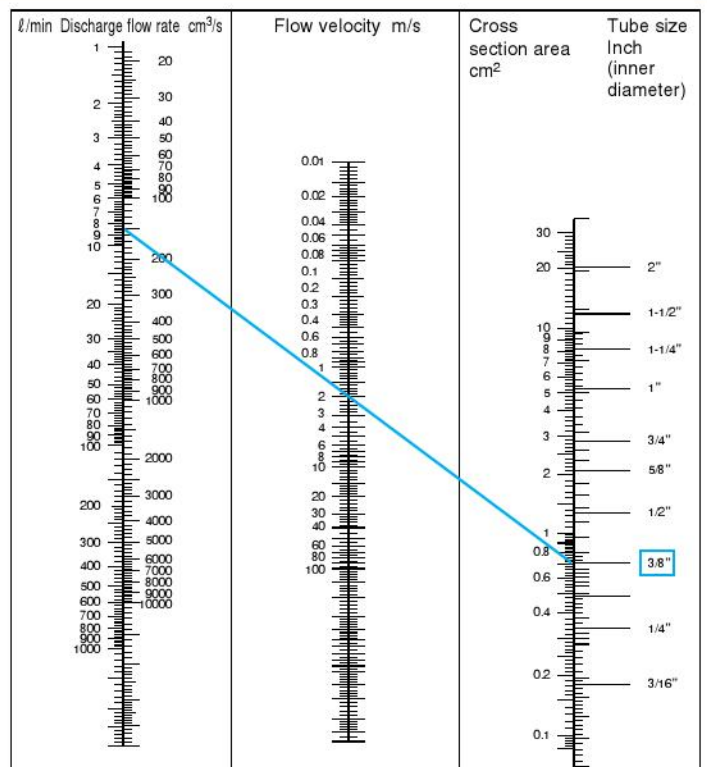
$$\pi \left( \frac{\text{Tube inner diameter}}{2} \right)^2 [\text{in}^2] = \frac{\text{Flow rate} [\text{in}^3/\text{sec.}]}{\text{Flow velocity} [\text{in}./\text{sec.}]}$$

For a graphic expression of this relationship, a nomograph can be used to determine the relationship between the tube size and flow rate.

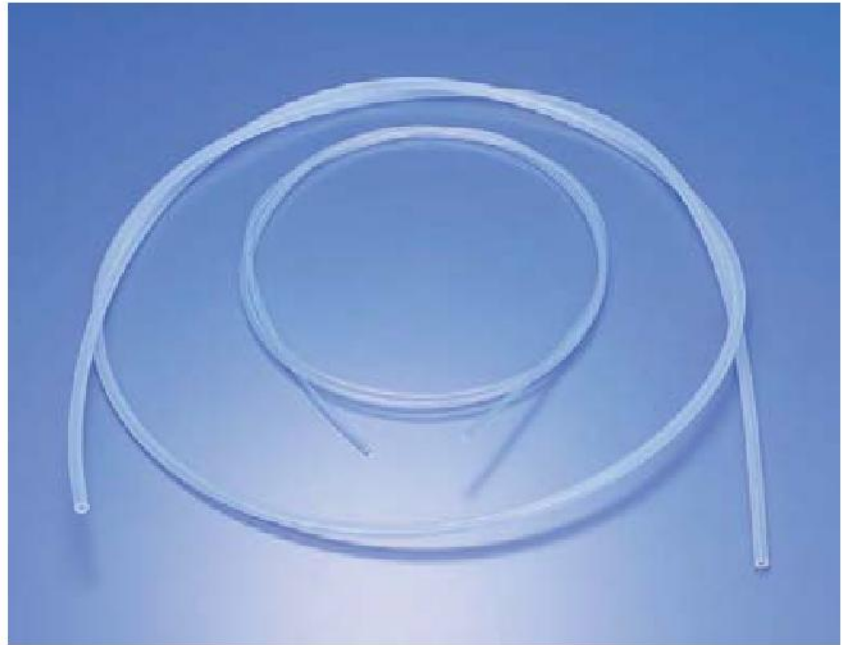
- How to determine the required tube size for pure water flowing at 150  $\text{cm}^3/\text{s}$ , and a flow velocity of 2m/s  
On the left side of the graph, use a discharge flow rate point of 150  $\text{cm}^3/\text{s}$ , and in the center, use the 2m/s flow velocity point. Draw a straight line through those two points, and then beyond to the right side of the graph, to intersect with the point showing the tube size, or in this case, a tube inner diameter of 3/8".

1ℓ/min = 0.0353ft<sup>3</sup>/min.  
1 $\text{cm}^3/\text{s}$  = 0.061in<sup>3</sup>/sec.  
1m/s = 3.28ft./sec. = 39.37in./sec.  
1 $\text{cm}^2$  = 0.155in<sup>2</sup>

## Nomograph



The **F-9003-PFA** tubes employ **PFA**, the most superior material among the fluororesins, and are molded by melting resin extrusion molding. With its superior chemical resistance, heat resistance, weather resistance, and electrical characteristics, it is the most suitable piping for all kinds of chemicals.



### Features

- Chemically inert, it can withstand virtually any chemical products.
- With little fluid permeability, it is suitable for hoses for chlorine gas and other halogen gases.
- A combination of strength and flexibility ensures strong resistance to bending fatigue.
- Offers superior low wear and non-tackiness characteristics.
- Electrical characteristics are extremely stable.
- Superior weather resistance ensures long-term durability in outdoor applications.
- Excellent transparency allows monitoring of fluids inside.

### Specifications (Reference)

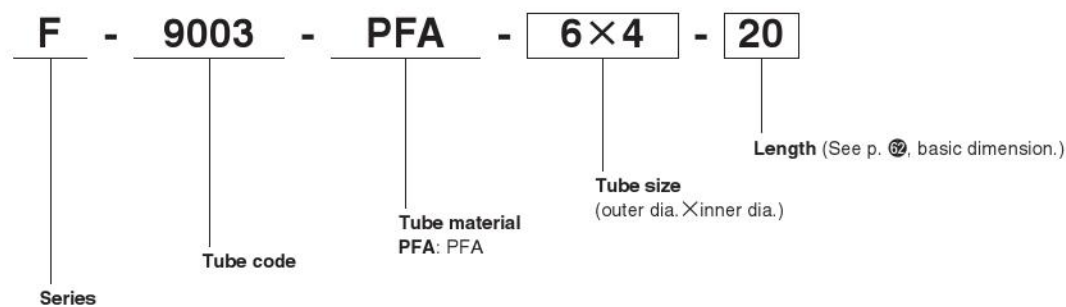
- Maximum operating temperature: 260°C [500°F]
- Maximum operating pressure: See p. 60, "Maximum Tube Operating Pressure."

### Applications

- Piping, etc., inside equipment capable of handling all kinds of chemicals, pure water, or ultra-pure water.

※ Manufacturing available in straight type (1m, 2m, and 3m lengths). Consult us.  
 ※ Manufacturing also available in fluororesin PTFE. Consult us.

### Order Codes



Caution: The fluororesin tube series cannot be used with quick fittings.

## PFA Tubes Standard Dimensions/Bursting Pressure at Room Temperature and Minimum Bending Radius

### mm size

Size <sup>Note 1</sup>	Outer diameter mm [in.]		Thickness mm [in.]		Length (m)		Bursting pressure at room temperature <sup>Note 2</sup> MPa [psi.]	Minimum bending radius <sup>Note 2</sup> mm [in.]	
	Outer dia. x Inner dia.	Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension			Tolerance
3x 2	3.0 [0.118]	±0.10 [±0.0039]	±0.10 [±0.0039]	0.5 [0.020]	±0.06 [±0.0024]	10, 20, 50, 100 200	+1% 0	5.7 [827]	15 [0.6]
4x 2	4.0 [0.157]			1.0 [0.039]	±0.10 [±0.0039]			8.8 [1276]	15 [0.6]
4x 3	4.0 [0.157]			0.5 [0.020]	±0.06 [±0.0024]			4.1 [595]	20 [0.8]
△ 5x 3	5.0 [0.197]			1.0 [0.039]	±0.10 [±0.0039]			6.9 [1001]	20 [0.8]
△ 5x 4	5.0 [0.197]			0.5 [0.020]	±0.06 [±0.0024]			3.2 [464]	25 [1.0]
6x 4	6.0 [0.236]			1.0 [0.039]	±0.10 [±0.0039]			5.7 [827]	25 [1.0]
△ 6x 5	6.0 [0.236]			0.5 [0.020]	±0.06 [±0.0024]			2.7 [392]	35 [1.4]
△ 7x 5	7.0 [0.276]			1.0 [0.039]	±0.10 [±0.0039]			4.8 [696]	40 [1.6]
△ 7x 6	7.0 [0.276]			0.5 [0.020]	±0.06 [±0.0024]			2.2 [319]	50 [2.0]
8x 6	8.0 [0.315]			1.0 [0.039]	±0.10 [±0.0039]			4.1 [595]	50 [2.0]
△ 8x 7	8.0 [0.315]			0.5 [0.020]	±0.06 [±0.0024]	2.0 [290]	65 [2.6]		
△ 9x 7	9.0 [0.354]			1.0 [0.039]	±0.10 [±0.0039]	3.6 [522]	60 [2.4]		
△ 9x 8	9.0 [0.354]			0.5 [0.020]	±0.06 [±0.0024]	1.7 [247]	80 [3.1]		
10x 8	10.0 [0.394]			1.0 [0.039]	±0.10 [±0.0039]	3.2 [464]	80 [3.1]		
△ 10x 9	10.0 [0.394]			0.5 [0.020]	±0.06 [±0.0024]	1.5 [218]	105 [4.1]		
△ 11x 9	11.0 [0.433]			1.0 [0.039]	±0.10 [±0.0039]	2.9 [421]	100 [3.9]		
12x10	12.0 [0.472]			1.0 [0.039]	±0.10 [±0.0039]	2.7 [392]	130 [5.1]		
△ 12x11	12.0 [0.472]			0.5 [0.020]	±0.06 [±0.0024]	1.4 [203]	170 [6.7]		
△ 13x10	13.0 [0.512]			1.5 [0.059]	±0.15 [±0.0059]	3.8 [551]	75 [3.0]		
△ 13x11	13.0 [0.512]			1.0 [0.039]	±0.10 [±0.0039]	2.4 [348]	155 [6.1]		
△ 14x12	14.0 [0.551]	1.0 [0.039]	±0.10 [±0.0039]	2.2 [319]	190 [7.5]				
△ 15x12	15.0 [0.591]	1.5 [0.059]	±0.15 [±0.0059]	3.2 [464]	105 [4.1]				
△ 15x13	15.0 [0.591]	1.0 [0.039]	±0.10 [±0.0039]	2.1 [305]	210 [8.3]				
16x13	16.0 [0.630]	1.5 [0.059]	±0.15 [±0.0059]	3.0 [435]	125 [4.9]				
16x14	16.0 [0.630]	1.0 [0.039]	±0.10 [±0.0039]	2.0 [290]	145 [5.7]				
△ 17x15	17.0 [0.669]	1.0 [0.039]	±0.10 [±0.0039]	1.8 [261]	290 [11.4]				
△ 18x15	18.0 [0.709]	1.5 [0.059]	±0.15 [±0.0059]	2.7 [392]	170 [6.7]				
△ 18x16	18.0 [0.709]	1.0 [0.039]	±0.10 [±0.0039]	1.7 [247]	340 [13.4]				
19x16	19.0 [0.748]	1.5 [0.059]	±0.15 [±0.0059]	2.5 [363]	200 [7.9]				
19x17	19.0 [0.748]	1.0 [0.039]	±0.10 [±0.0039]	1.6 [232]	400 [15.7]				
△ 21x18	21.0 [0.827]	1.5 [0.059]	±0.15 [±0.0059]	2.2 [319]	250 [9.8]				
△ 22x19	22.0 [0.866]	1.5 [0.059]	±0.15 [±0.0059]	100	2.1 [305]	280 [11.0]			
△ 22x20	22.0 [0.866]	1.0 [0.039]	±0.10 [±0.0039]	10, 20, 50	1.4 [203]	560 [22.0]			
25x22	25.0 [0.984]	1.5 [0.059]	±0.15 [±0.0059]	100	1.9 [276]	370 [14.6]			
25x23	25.0 [0.984]	1.0 [0.039]	±0.10 [±0.0039]	100	1.3 [189]	740 [29.1]			

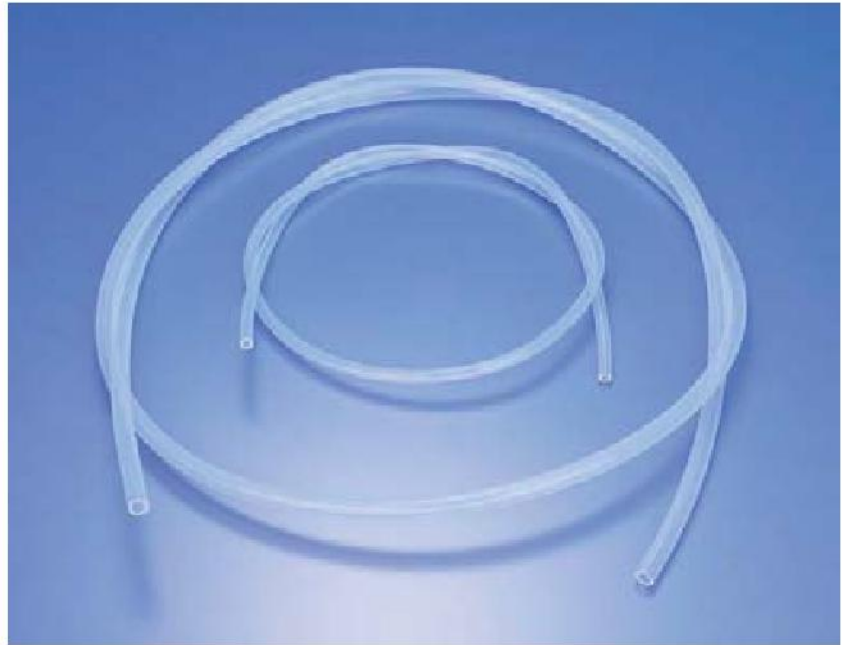
Notes: 1. Sizes shown by the triangle mark △ cannot be used with H series fittings. 10m = 32.8ft.  
2. The above figures are reference values, and cannot be considered to be specified values.

### Inch size

Size	Outer diameter mm [in.]		Thickness mm [in.]		Length (m)		Bursting pressure at room temperature <sup>Note 2</sup> MPa [psi.]	Minimum bending radius <sup>Note 2</sup> mm [in.]	
	Outer dia. x Inner dia.	Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension			Tolerance
3.17x 1.59	3.17 [0.1248]	±0.10 [±0.0039]	±0.10 [±0.0039]	0.79 [0.0311]	±0.10 [±0.0039]	10, 20, 50, 100, 200	+1% 0	8.8 [1276]	15 [0.6]
6.35x 3.17	6.35 [0.2500]			1.59 [0.0626]	±0.15 [±0.0059]			8.8 [1276]	20 [0.8]
6.35x 3.96	6.35 [0.2500]			1.20 [0.0472]	±0.12 [±0.0047]	6.5 [943]		20 [0.8]	
6.35x 4.35	6.35 [0.2500]			1.00 [0.0394]	±0.10 [±0.0039]	5.3 [769]		30 [1.2]	
9.52x 6.35	9.52 [0.3748]	±0.12 [±0.0047]	±0.12 [±0.0047]	1.59 [0.0626]	±0.15 [±0.0059]	10, 20, 50, 100	+1% 0	5.7 [827]	40 [1.6]
9.52x 7.52	9.52 [0.3748]			1.00 [0.0394]	±0.10 [±0.0039]			3.4 [493]	70 [2.8]
12.70x 9.52	12.70 [0.5000]			1.59 [0.0626]	±0.15 [±0.0059]	4.1 [595]		75 [3.0]	
12.70x10.70	12.70 [0.5000]			1.00 [0.0394]	±0.10 [±0.0039]	2.5 [363]		150 [5.9]	
19.05x15.88	19.05 [0.7500]	±0.15 [±0.0059]	±0.15 [±0.0059]	1.59 [0.0626]	±0.15 [±0.0059]	10, 20, 50	+1% 0	2.6 [377]	200 [7.9]
25.40x22.22	25.40 [1.0000]			1.59 [0.0626]	±0.15 [±0.0059]	2.0 [290]		370 [14.6]	

Note: The above figures are reference values, and cannot be considered to be specified values. 10m = 32.8ft.

The F-9003-PFA-HG tubes are PFA tubes that use a NEW PFA-type material with a low level of elution of fluorine ions, having a smooth tube internal surface obtained by controlling the high degree of polymerization (microcrystalline of spherulite) of PFA. Suitable for applications in the semiconductor and liquid crystal industrial sectors with demand for ultra-clean conditions.



### Features

The following features are achieved in addition to the performance of conventional PFA tubes:

The tube interior surface is smooth ( $R_t = 0.2 \mu\text{m}$ ).

- Reduced residual particulates and chemicals
  - Reduced cleaning time
  - Reduced chemical solution penetration volume, due to reduced tube internal surface area
  - Improved transparency
  - Improved dielectric strength
- Uses NEW PFA type material.
- Reduced elution of fluorine ions
  - Improved stress crack resistance in stressed environments (i.e., sulfuric acid hydrogen peroxide, fuming sulfuric acid, etc.)

### Specifications (Reference)

- Maximum operating temperature: 260°C [500°F]
- Maximum operating pressure: Same as PFA tubes. See p.60, "Maximum Tube Operating Pressure."

### Characteristics

#### Metal ion elution results

Item	Elution weight $\mu\text{g}$ [n oz.]
K	<0.02 [0.71]
Na	<0.01 [0.35]
Ca	<0.01 [0.35]
Al	<0.02 [0.71]
Cr	<0.01 [0.35]
Ni	<0.01 [0.35]
FE	<0.02 [0.71]
Cu	<0.01 [0.35]

※ Analysis method:

1. Cut a sample PFA-HG tube (outer diameter  $\phi 12 \times$  inner diameter  $\phi 10$ ) 1m [3.28ft.] in length, clean the cut surface, and then wash with pure water.
2. Fill the sample tube with about 70mℓ [4.27in.<sup>3</sup>] (tube length: 900mm [35.4in.]) of hydrofluoric acid, and perform an elution test at room temperature for 6 days.
3. After completion of the elution test, evaporate the elution solution, add nitric acid to the effluent, then reduce it with pure water, and make a determination of the elements included in the elution solution by frameless atomic absorption spectrophotometry.

※ The above figures are measurement values, and cannot be considered to be specified values.

#### Comparison of PFA tube internal surface roughness

	Unit	PFA-HG tube	Company A product	Company B product	PFA tube
Surface roughness ( $R_t$ )	( $\mu\text{m}$ )	0.2	0.8	0.8	0.8

Note: ※ The above figures are measurement values, and cannot be considered to be specified values.

※  $R_t = R_{\text{max}}$

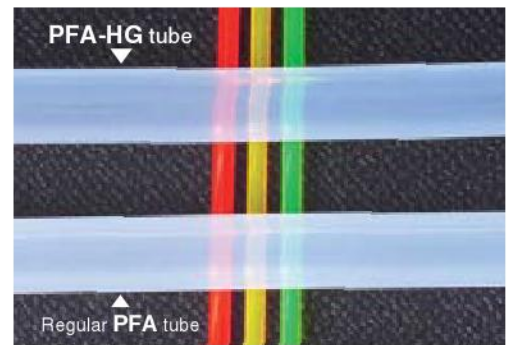
※ The Company A and Company B products are conventional PFA tubes.

#### Fluorine ion elution results

	Unit	PFA-HG tube	Regular PFA tube
Elution concentration	(ppm)	1.6	4.2

※ Analysis method:

1. Cut up a tube (outer diameter  $\phi 25.4 \times$  inner diameter  $\phi 22.2$ ) into pellets.
2. Soak the tube test sample in 20mℓ [1.22in.<sup>3</sup>] extract. Leave at room temperature for 24 hours, and then use fluorine ion measurement equipment (Expandable Ion Analyzer EA940, made by Orion Research) to measure the fluorine ion concentration (contents ratio of the extract: water, methanol, TISAB (II) = 1:1:2).



※ Photo shows transparency comparison between regular PFA tubes and PFA-HG tubes (comparison by Koganei).



## PFA-HG Tubes Standard Dimensions/Bursting Pressure at Room Temperature and Minimum Bending Radius

### mm size

Size Outer dia. × Inner dia.	Outer diameter mm [in.]		Thickness mm [in.]		Length (m)		Bursting pressure at room temperature <sup>Note</sup> MPa [psi.]	Minimum bending radius <sup>Note</sup> mm [in.]	
	Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension	Tolerance			
3×2	3.0 [0.118]	±0.10 [±0.0039]	0.5 [0.020]	±0.06 [±0.0024]	10, 20, 50,	+1% 0	5.7 [827]	15 [0.6]	
4×2	4.0 [0.157]		1.0 [0.039]	±0.10 [±0.0039]			100, 200	8.8 [1276]	15 [0.6]
4×3	4.0 [0.157]		0.5 [0.020]	±0.06 [±0.0024]			10, 20, 50,	4.1 [595]	20 [0.8]
6×4	6.0 [0.236]		1.0 [0.039]	±0.10 [±0.0039]			100	5.7 [827]	25 [1.0]
8×6	8.0 [0.315]		1.0 [0.039]	±0.10 [±0.0039]	10, 20, 50, 100		4.1 [595]	50 [2.0]	
10×8	10.0 [0.394]		1.0 [0.039]	±0.10 [±0.0039]			3.2 [464]	80 [3.1]	
12×10	12.0 [0.472]		1.0 [0.039]	±0.10 [±0.0039]			2.7 [392]	130 [5.1]	
19×16	19.0 [0.748]		±0.12 [±0.0047]	1.5 [0.059]	±0.15 [±0.0059]		10, 20, 50	2.5 [363]	200 [7.9]
25×22	25.0 [0.984]		±0.15 [±0.0059]	1.5 [0.059]	±0.15 [±0.0059]			1.9 [276]	370 [14.6]

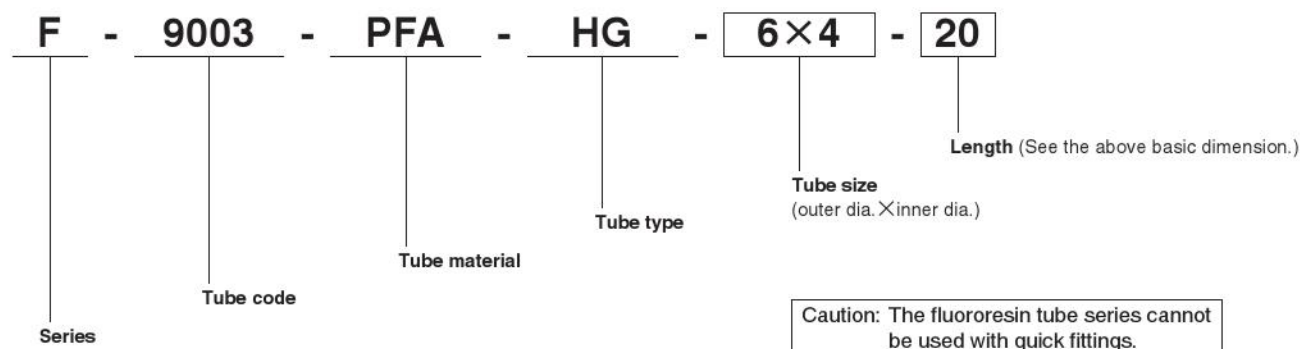
Note: The above figures are reference values, and cannot be considered to be specified values. 10m = 32.8ft.

### Inch size

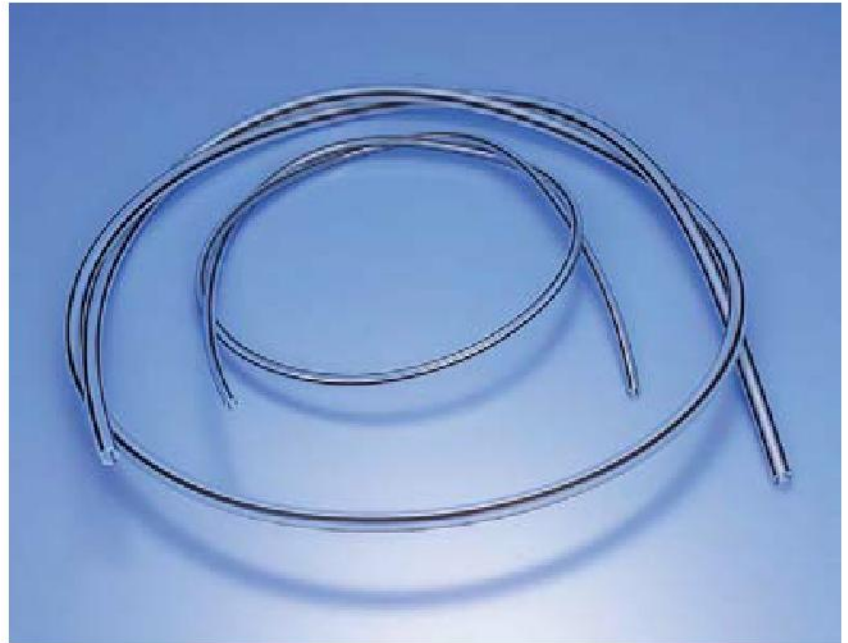
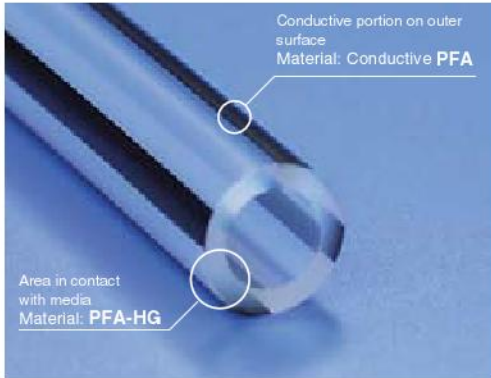
Size Outer dia. × Inner dia.	Outer diameter mm [in.]		Thickness mm [in.]		Length (m)		Bursting pressure at room temperature <sup>Note</sup> MPa [psi.]	Minimum bending radius <sup>Note</sup> mm [in.]	
	Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension	Tolerance			
3.17×2.17	3.17 [0.1248]	±0.10 [±0.0039]	0.50 [0.0197]	±0.06 [±0.0024]	10, 20, 50,	+1% 0	5.3 [769]	15 [0.6]	
6.35×3.96	6.35 [0.2500]		1.20 [0.0472]	±0.12 [±0.0047]			100, 200	6.5 [943]	20 [0.8]
6.35×4.35	6.35 [0.2500]		1.00 [0.0394]	±0.10 [±0.0039]			10, 20, 50,	5.7 [769]	30 [1.2]
9.52×6.35	9.52 [0.3748]	±0.12 [±0.0047]	1.59 [0.0626]	±0.15 [±0.0059]	100		5.7 [827]	40 [1.6]	
9.52×7.52	9.52 [0.3748]		1.00 [0.0394]	±0.10 [±0.0039]	10, 20, 50, 100		3.4 [493]	70 [2.8]	
12.70×9.52	12.70 [0.5000]		1.59 [0.0626]	±0.15 [±0.0059]			4.1 [595]	75 [3.0]	
19.05×15.88	19.05 [0.7500]	±0.15 [±0.0059]	1.59 [0.0626]	±0.15 [±0.0059]	10, 20, 50		2.6 [377]	200 [7.9]	
25.40×22.22	25.40 [1.0000]		1.59 [0.0626]	±0.15 [±0.0059]			2.0 [290]	370 [14.6]	

Note: The above figures are reference values, and cannot be considered to be specified values. 10m = 32.8ft.

### Order Code



The F-9003-NE tubes incorporate striped conductive PFA areas onto the outer surface of Koganei's PFA-HG tubes. The shielding effect of the conductive PFA is suitable for the prevention of accidental fires that could occur when flammable gas atmospheres spark fire onto the outer surface of the tubes.



### Features

- Prevents sparks that could lead to fire risk.
- Prevents breakage of tube insulation due to electrical discharges from insulated atmosphere.
- No concerns about corrosion compared to metallic wires or meshes, etc.

### Characteristics

#### Volume resistivity

Materials	Volume resistivity ( $\Omega$ -cm [ $\Omega$ -in.]
Conductive PFA	$5.3 \times 10^2$ [ $2.09 \times 10^2$ ]
PFA-HG	$> 10^{18}$ [ $3.94 \times 10^{17}$ ]

- Sample:  $\phi 6.35 \times \phi 4.35$
- Measurement method: Conforms to JIS K 7194.

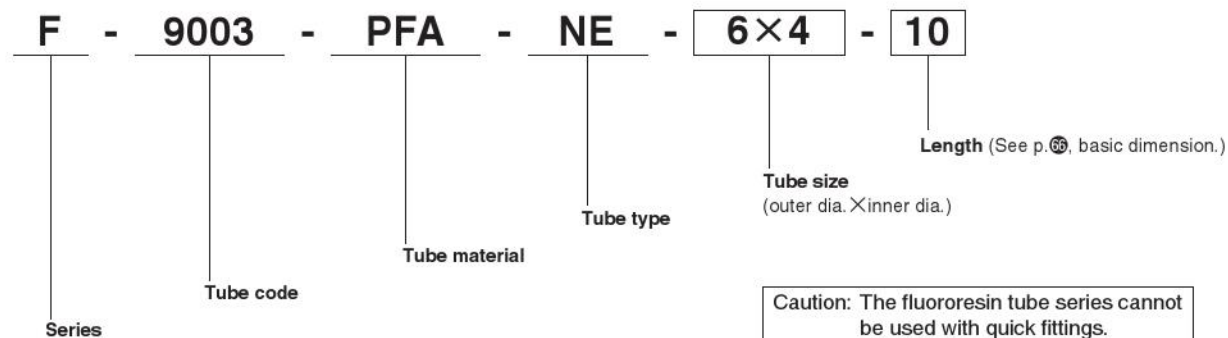
#### Static charges removal characteristics

Unit: KV

Tube type	1m [3.3ft.] length tube: center	15m [49.2ft.] length tube: center	15m [49.2ft.] length tube: end
PFA-NE tube	0.5~0.7	0.5~0.7	0.5~0.7
PFA-HG tube	>2.0 (Measurement limit)	—	—

- Sample:  $\phi 6.35 \times \phi 4.35$ , Lengths: 1m [3.3ft.], 15m [49.2ft.]
- Measurement method: Ground one end, and rub across 20cm [7.9in.] in the center or opposite end of the sample with non-fiber paper 50 times, and then measure the surface potential of that section.
- According to the "Static Electricity Safety Guidelines" (issued by the Technology Institution of Industrial Safety), as a control index for static charges in non-conductors for prevention of explosions and fires, the static potential is regulated at 5KV or less when the minimum ignition energy of a flammable substance is at 0.1 to 1.0mJ range (equivalent to toluene or other solvents).

### Order Codes



### Precautions for Use

- The F-9003-NE is a tube that requires grounding. Always ensure tubes are grounded when in use. For grounding, Koganei's dedicated conductive Ground Strap is available.



**Ground Strap**  
Order code: F-9021  
Sales unit: 1 bag  
(100 pcs.)

# PFA-NE Tubes Standard Dimensions/Bursting Pressure at Room Temperature and Minimum Bending Radius

## mm size

Size Outer dia. × Inner dia.	Outer diameter mm [in.]		Thickness mm [in.]		Conductive portion thickness mm [in.]		Conductive portion width mm [in.]		Number of stripes	Length (m)		Bursting pressure at room temperature <sup>Note</sup> MPa [psi.]	Minimum bending radius <sup>Note</sup> mm [in.]	
	Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension	Tolerance		Basic dimension	Tolerance			
3×2	3.0	[0.118]	+0.15 -0.10 [+0.0059] [-0.0039]	0.50	±0.07	0.03	$\begin{matrix} +0.04 \\ -0.01 \\ [+0.0016] \\ [-0.0004] \end{matrix}$	0.6	±0.3	4	10 50 100	+1% 0	5.7 [827]	15 [0.6]
4×2	4.0	[0.157]		1.00	±0.07	0.06	$\begin{matrix} +0.06 \\ -0.03 \\ [+0.0024] \\ [-0.0012] \end{matrix}$	0.8	±0.3				8.8 [1276]	15 [0.6]
4×3	4.0	[0.157]		0.50	±0.07	0.03	$\begin{matrix} +0.04 \\ -0.01 \\ [+0.0016] \\ [-0.0004] \end{matrix}$	0.8	±0.3				4.1 [595]	20 [0.8]
6×4	6.0	[0.236]		1.00	±0.07	0.06	$\begin{matrix} +0.06 \\ -0.03 \\ [+0.0024] \\ [-0.0012] \end{matrix}$	1.4	±0.4				5.7 [827]	25 [1.0]
8×6	8.0	[0.315]		1.00	±0.07	0.06	$\begin{matrix} +0.06 \\ -0.03 \\ [+0.0024] \\ [-0.0012] \end{matrix}$	1.8	±0.4				4.1 [595]	50 [2.0]
10×8	10.0	[0.394]		1.00	±0.07	0.06	$\begin{matrix} +0.06 \\ -0.03 \\ [+0.0024] \\ [-0.0012] \end{matrix}$	2.3	±0.4				3.2 [464]	80 [3.1]
12×10	12.0	[0.472]		1.00	±0.07	0.06	$\begin{matrix} +0.06 \\ -0.03 \\ [+0.0024] \\ [-0.0012] \end{matrix}$	2.6	±0.6				2.7 [392]	130 [5.1]
19×16	19.0	[0.748]	+0.25 -0.10 [+0.0098] [-0.0039]	1.50	±0.12	0.06	$\begin{matrix} +0.06 \\ -0.03 \\ [+0.0024] \\ [-0.0012] \end{matrix}$	3.8	±0.8	8	10 50		2.5 [363]	200 [7.9]
25×22	25.0	[0.984]		1.50	±0.12	0.06	$\begin{matrix} +0.06 \\ -0.03 \\ [+0.0024] \\ [-0.0012] \end{matrix}$	4.9	±0.8				1.9 [276]	370 [14.6]

Note: The above figures are reference values, and cannot be considered to be specified values.

10m = 32.8ft.

## Inch size

Size Outer dia. × Inner dia.	Outer diameter mm [in.]		Thickness mm [in.]		Conductive portion thickness mm [in.]		Conductive portion width mm [in.]		Number of stripes	Length (m)		Bursting pressure at room temperature <sup>Note</sup> MPa [psi.]	Minimum bending radius <sup>Note</sup> mm [in.]	
	Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension	Tolerance		Basic dimension	Tolerance			
3.17×2.17	3.17	[0.1248]	+0.15 -0.10 [+0.0059] [-0.0039]	0.50	±0.07	0.03	$\begin{matrix} +0.04 \\ -0.01 \\ [+0.0016] \\ [-0.0004] \end{matrix}$	0.8	±0.3	4	10 50 100	+1% 0	5.3 [769]	15 [0.6]
6.35×4.35	6.35	[0.2500]		1.00	±0.07	0.06	$\begin{matrix} +0.06 \\ -0.03 \\ [+0.0024] \\ [-0.0012] \end{matrix}$	1.5	±0.4				5.3 [769]	30 [1.2]
9.52×6.35	9.52	[0.3748]		1.59	±0.12	0.06	$\begin{matrix} +0.06 \\ -0.03 \\ [+0.0024] \\ [-0.0012] \end{matrix}$	2.4	±0.4				5.7 [827]	40 [1.6]
9.52×7.52	9.52	[0.3748]		1.00	±0.07	0.06	$\begin{matrix} +0.06 \\ -0.03 \\ [+0.0024] \\ [-0.0012] \end{matrix}$	2.2	±0.4				3.4 [493]	70 [2.8]
12.70×9.52	12.70	[0.5000]	+0.25 -0.10 [+0.0098] [-0.0039]	1.59	±0.12	0.06	$\begin{matrix} +0.06 \\ -0.03 \\ [+0.0024] \\ [-0.0012] \end{matrix}$	2.6	±0.6	8	10 50		4.1 [595]	75 [3.0]
19.05×15.88	19.05	[0.7500]		1.59	±0.12	0.06	$\begin{matrix} +0.06 \\ -0.03 \\ [+0.0024] \\ [-0.0012] \end{matrix}$	3.8	±0.8				2.6 [377]	200 [7.9]
25.40×22.22	25.40	[1.0000]		1.59	±0.12	0.06	$\begin{matrix} +0.06 \\ -0.03 \\ [+0.0024] \\ [-0.0012] \end{matrix}$	4.9	±0.8				2.0 [290]	370 [14.6]

Note: The above figures are reference values, and cannot be considered to be specified values.

10m = 32.8ft.

## F-9021 Ground Strap Handling Instructions

### 1. Product

- The Ground Strap is a tie strap for PFA-NE tubing, providing heat and chemical resistance due to employment of polypropylene, and also providing the anti-static charge function.
- Can be used to bundle PFA-NE tubes up to an outer diameter of  $\phi$  19.05 (3/4B size). It enables removal of static charges on the outer surfaces of the tubes by grounding.

### 2. Specifications

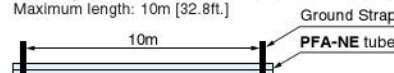
- Size: 6W × 195L (Bundling portion length: 88L, Hole for M3 grounding screw:  $\phi$  3.5 × 1 place)
- Material: Polypropylene with carbon
- Operating temperature range: -40°~85°C [-40°~185°F]
- Chemical resistance: Acid: good, Alkaline: excellent, Organic solvent: good
- Volume resistivity (material):  $10^3\Omega \cdot \text{cm}$
- Surface resistivity (material):  $10^4\sim 5\Omega \cdot \text{cm}$
- Applicable tube sizes: Up to  $\phi$  19.05 (3/4B size)

### 3. Product Inspections and checks

- When the product is delivered, check the following characteristics:
- Quantity and outward appearance (Molding failure: mottles, sink, burning, deformation)
  - Can tubes be smoothly inserted and secured while tying tubes? If you find a smaller quantity and/or damage to the product, immediately contact us.

### 4. Mounting span of the Ground Straps

- Mounting span of the Ground Straps (maximum span)  
Maximum length: 10m [32.8ft.]



- Number of Ground Straps that can be overlaid for grounding:  
Maximum of 10 pcs.



- Number of tubes that can be bundled together when connecting several tubes tied by Ground Straps for grounding: Maximum of 10 pcs.



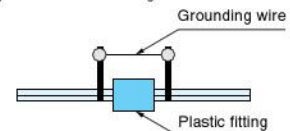
Note: The mounting span of the Ground Straps, which is based on the Static Electricity Safety Guidelines (Ministry of Labour, Research Institute of Industrial Safety), uses a leakage resistance of 100MQ or less as the basis for restricting the surface electrical potential of major flammable materials to the minimum ignition energy or less.

### 5. Mounting method

- Use a  $\phi$  3.5 [0.138in.] hole for M3 screws to install as shown below:
- Use an M3 screw to directly secure the Ground Strap to a metal box, etc., or attach a ground lead to the box to enable a grounding connection via the metal box.



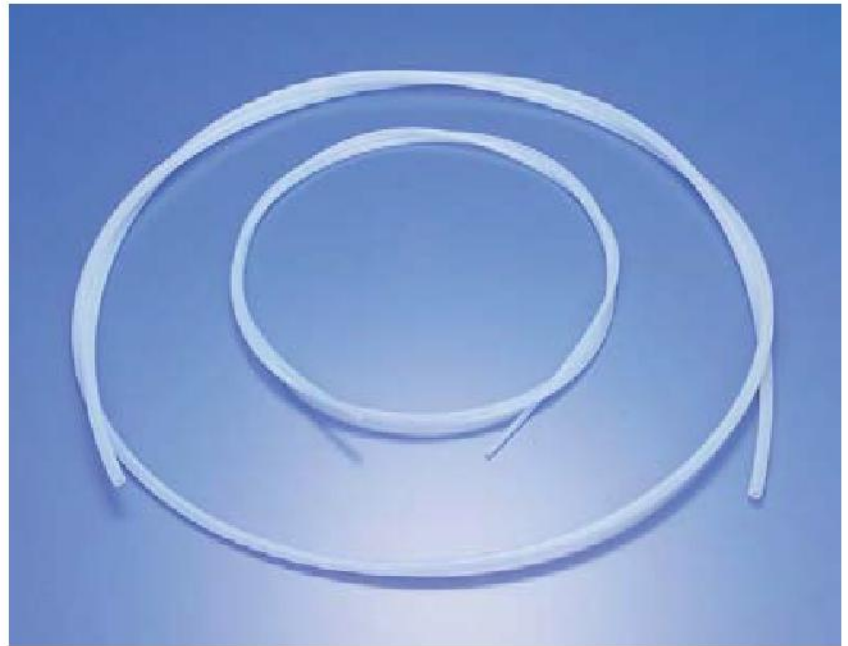
- When using insulation type plastic fittings, use Ground Straps with  $\phi$  3.5 [0.138in.] holes to connect 2 Ground Straps placed on both sides of the fitting with a grounding wire. When using metallic fittings, a Ground Strap is not required, since grounding can be performed directly from the metal fitting.



### 6. Precautions for safety use

- After attaching the Ground Strap, check that there is no looseness.
- After the Ground Strap has been grounded, use a volt-ohm-millammeter, etc., to check for proper grounding with leakage resistance of 100 $\Omega$  or less.
- If the leakage resistance is not adequate even after the Ground Strap has been grounded, wrap the PFA-NE tube with conductive tape (aluminum tape, etc.), and then tie the tubes with the Ground Strap.
- In the cases in which Ground Strap chemical resistance is suspected because of spattering chemicals, soaking in chemicals, etc., it is recommended that a detailed investigation into the planned application be performed beforehand.

The F-9003-BT fluororesin BT tubes are a thick type of fluororesin PTFE tube with superior flexibility and transparency. With a small bending radius that prevents buckling or crushing, this tube is convenient for piping in tight spaces, while its thickness and transparency ensure safety and check monitoring on interior flows.



**Features**

- A small bending radius prevents buckling or crushing even if sharply bent.
- Allows checks on interior media flows.
- Resists virtually all chemical products.
- Superior non-tackiness makes cleaning easy.

**Specifications (Reference)**

- Maximum operating temperature: 260°C [500°F]
- Maximum operating pressure: See p.60, "Maximum Tube Operating Pressure."

**F-9003-BT Tubes Standard Dimensions/Bursting Pressure at Room Temperature and Minimum Bending Radius**

**mm size**

Size	Outer diameter mm	Inner diameter mm	Outer diameter mm [in.]		Thickness mm [in.]		Length (m)		Bursting pressure at room temperature <sup>Note</sup> MPa [psi]	Minimum bending radius <sup>Note</sup> mm [in.]
			Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension	Tolerance		
4A	4	2	4 [0.157]	±0.10 [±0.0039]	1.0 [0.039]	±0.10 [±0.0039]	10	+2%	11.8 [1711]	10 [0.4]
6A	6	3	6 [0.236]		1.5 [0.059]					
8A	8	5	8 [0.315]		1.5 [0.059]	±0.15 [±0.0059]	20	0	7.4 [1073]	25 [1.0]
10A	10	7	10 [0.394]		1.5 [0.059]					
12A	12	9	12 [0.412]	±0.15 [±0.0059]	1.5 [0.059]	30		5.0 [725]	40 [1.6]	
									3.9 [566]	55 [2.2]

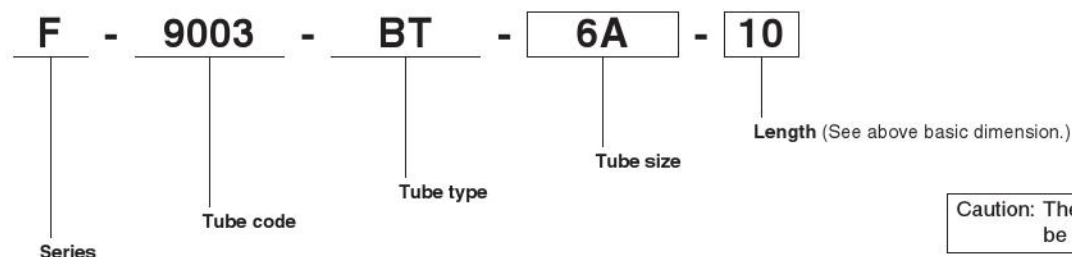
Note: The above figures are reference values, and cannot be considered to be specified values. 10m = 32.8ft.

**Inch size**

Size	Outer diameter mm	Inner diameter mm	Outer diameter mm [in.]		Thickness mm [in.]		Length (m)		Bursting pressure at room temperature <sup>Note</sup> MPa [psi]	Minimum bending radius <sup>Note</sup> mm [in.]
			Basic dimension	Tolerance	Basic dimension	Tolerance	Basic dimension	Tolerance		
1/8B	3.17	1.59	3.17 [0.1248]	±0.10 [±0.0039]	0.79 [0.0311]	±0.10 [±0.0039]	10	+2%	11.7 [1697]	5 [0.2]
1/4B	6.35	3.17	6.35 [0.2500]		1.59 [0.0626]					
3/8B	9.52	6.35	9.52 [0.3748]		1.59 [0.0626]	±0.15 [±0.0059]	20	0	9.8 [1421]	10 [0.4]
1/2B	12.70	9.52	12.70 [0.5000]		1.59 [0.0626]					
				±0.15 [±0.0059]	1.59 [0.0626]	30		3.0 [435]	30 [1.2]	
									4.0 [580]	55 [2.2]

Note: The above figures are reference values, and cannot be considered to be specified values. 10m = 32.8ft.

**Order Code**



Caution: The fluororesin tube series cannot be used with quick fittings.

The F-9003-RPL tubes are PTFE tubes equipped with a helical groove. Endowed with extreme flexibility, they offer a small bending radius, as well as excellent low friction and non-tackiness. The result is a tube with low fluid pressure loss, and a low chance for fluid adherence to the inner surface of the tube.

In addition, the tube's resistance to bending fatigue has been improved greatly over the properties of the F-9003-PL conventional pliable tube.



**Features**

- Resistance to bending fatigue

**Specifications (Reference)**

- Material: PTFE
- Maximum operating temperature: See the table at the bottom of this page.
- Maximum operating pressure: See the table at the bottom of this page.

**F-9003-RPL Tubes Standard Dimensions/Bursting Pressure at Room Temperature and Minimum Bending Radius**

**Inner diameter basis tube (I)**

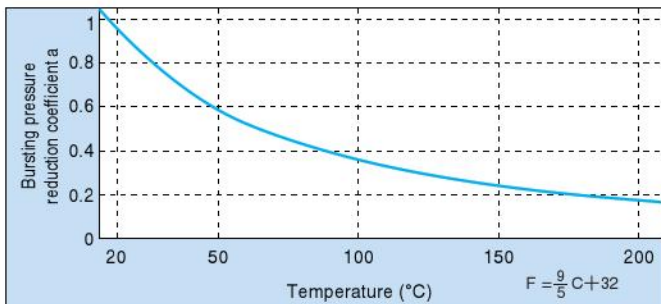
Size	Inner diameter at end mm [in.]	Helical outer dia. mm [in.]	Bursting pressure at room temperature MPa [psi.]	Minimum bending radius mm [in.]	Available length m [ft.]
6A	6 [0.236]	8.5 [0.335]	1.8 [261]	6.0 [0.24]	3.0 [9.8]
8A	8 [0.315]	10.5 [0.413]	1.4 [203]	7.0 [0.28]	3.0 [9.8]
10A	10 [0.394]	13.0 [0.512]	1.0 [145]	10.0 [0.39]	3.0 [9.8]
12A	12 [0.472]	16.0 [0.630]	0.9 [131]	15.0 [0.59]	3.0 [9.8]
1/4B	6.4 [0.252]	8.5 [0.335]	1.8 [261]	6.0 [0.24]	3.0 [9.8]
3/8B	9.5 [0.374]	13.0 [0.512]	1.0 [145]	10.0 [0.39]	3.0 [9.8]
1/2B	12.7 [0.500]	16.0 [0.630]	0.9 [131]	15.0 [0.59]	3.0 [9.8]

**Outer diameter basis tube (O)**

Size	Inner diameter at end mm [in.]	Helical outer dia. mm [in.]	Bursting pressure at room temperature MPa [psi.]	Minimum bending radius mm [in.]	Available length m [ft.]
6A	6 [0.236]	8.5 [0.335]	1.8 [261]	6.0 [0.24]	3.0 [9.8]
8A	8 [0.315]	9.5 [0.374]	1.6 [232]	7.0 [0.28]	3.0 [9.8]
10A	10 [0.394]	12.0 [0.472]	1.3 [189]	9.0 [0.35]	3.0 [9.8]
12A	12 [0.472]	14.5 [0.571]	1.0 [145]	10.0 [0.39]	3.0 [9.8]
1/4B	6.4 [0.252]	8.5 [0.335]	1.8 [261]	6.0 [0.24]	3.0 [9.8]
3/8B	9.5 [0.374]	12.0 [0.472]	1.3 [189]	9.0 [0.35]	3.0 [9.8]
1/2B	12.7 [0.500]	14.5 [0.571]	1.0 [145]	10.0 [0.39]	3.0 [9.8]

※ The dimensions shown above are standard values. For items with lengths of 3m [9.8ft.] or more, consult us separately.  
 ※ The above figures are measurement values, and cannot be considered to be specified values.

**Maximum Tube Operating Pressure (Reference)**



Use the product at pressures at or below the  $P_{U.T}$  determined in the below equation:

$$P_{U.T} = S \times a \times P_{R.T}$$

- **S** : Safety factor (take safety factor of 1/3 to 1/5 or more.)
- **a** : Bursting pressure reduction coefficient for the operating temperature, read from the diagram at left
- **P<sub>R.T</sub>** : Tube bursting pressure at room temperature

**Caution:** Set the operating temperature upper limit at 200°C [392°F]. This is a design data based on actual test values, and is not intended to be guaranteed values. Use this data as reference data when selecting a product. For determination of actual use, careful evaluation is recommended before use.

## Tube Types

Depending on application, there are 2 types of end dimensions available, the inner diameter basis (I) and the outer diameter basis (O).

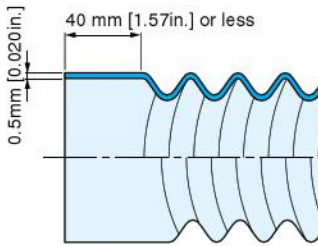
### Inner diameter basis tube (I)

Use this type when using pipes, etc., inserting inside the tube to form joints. Glass, metal, or plastic pipes can be used as joints.

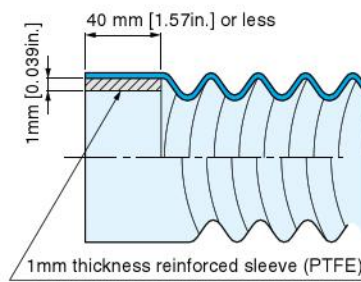
### Outer diameter basis tube (O)

Use this type when using tube fittings, etc. The shape of the end is available in 3 different types, depending on applications. When using the fluororesin tube fitting, use types B or C.

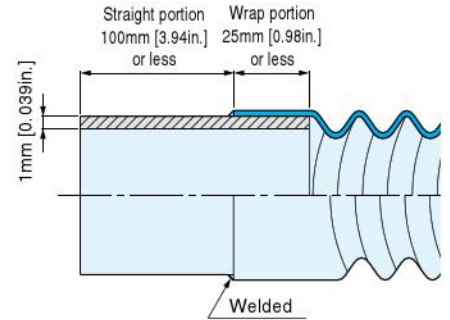
#### ● Type A straight on both ends



#### ● Type B with reinforced sleeves on both ends



#### ● Type C with welded straight portions on both ends



## Order Codes

**F - 9003 - RPL - O - 1/4B - 3000 - C - 25 - S100**

**Type C straight portion length**  
**S10**: 10mm [0.39in.]  
**S100**: 100mm [3.94in.]  
 (5mm units, selection for Type C only.  
 Enter the code "S" before the length.)

**Straight portion length (Types A and B)**  
**10**: 10mm [0.39in.]  
**40**: 40mm [1.57in.]  
 (Unit: 5mm)

**Wrap portion length (Type C)**  
**10**: 10mm [0.39in.]  
**25**: 25mm [0.98in.]  
 (Unit: 5mm)

**Straight portion type**  
**A**: Type A (straight on both ends)  
**B**: Type B (with reinforced sleeves on both ends)  
**C**: Type C (with welded straight portions on both ends)

**Overall length**  
**100**: 100mm [3.94in.]  
**3000**: 3000mm [118.1in.]  
 (Units in 10mm increments up to 500mm, and in 100mm increments above 500mm)

#### Tube size

Size	Dia. at end mm [in.]
6A	6 [0.236]
8A	8 [0.315]
10A	10 [0.394]
12A	12 [0.472]
1/4B	6.4 [0.252]
3/8B	9.5 [0.374]
1/2B	12.7 [0.500]

**Inner/outer diameter basis for straight portion**  
**O**: Outer diameter basis  
**I**: Inner diameter basis  
 (selection for Type A only)

**Tube type**  
**RPL**: pliable tube

**Tube code**

**Series**

**Caution: The fluororesin tube series cannot be used with quick fittings.**

# Limited Warranty

KOGANEI CORP. warrants its products to be free from defects in material and workmanship subject to the following provisions.

**Warranty Period** The warranty period is 180 days from the date of delivery.

**Koganei Responsibility** If a defect in material or workmanship is found during the warranty period, KOGANEI CORP. will replace any part proved defective under normal use free of charge and will provide the service necessary to replace such a part.

**Limitations**

- This warranty is in lieu of all other warranties, expressed or implied, and is limited to the original cost of the product and shall not include any transportation fee, the cost of installation or any liability for direct, indirect or consequential damage or delay resulting from the defects.

- KOGANEI CORP. shall in no way be liable or responsible for injuries or damage to persons or property arising out of the use or operation of the manufacturer's product.

- This warranty shall be void if the engineered safety devices are removed, made inoperative or not periodically checked for proper functioning.

- Any operation beyond the rated capacity, any improper use or application, or any improper installation of the product, or any substitution upon it with parts not furnished or approved by KOGANEI CORP., shall void this warranty.

- This warranty covers only such items supplied by KOGANEI CORP. The products of other manufacturers are covered only by such warranties made by those original manufacturers, even though such items may have been included as the components.

The specifications are subject to change without notice.

# Koganei also handles many related items. Please feel free to consult us.

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## Pump Controller



ISO9001  
ISO14001



- ISO 9001 certified offices are Main Office, Komagane Plant, and Sales Offices.
- ISO 14001 certified offices are Main Office, and Komagane Plant.

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