人と夢をつなぐクリーンテクノロジー

KOGANEI

http://www.koganei.co.jp

Catalog No.BK-C0047

NEW Products

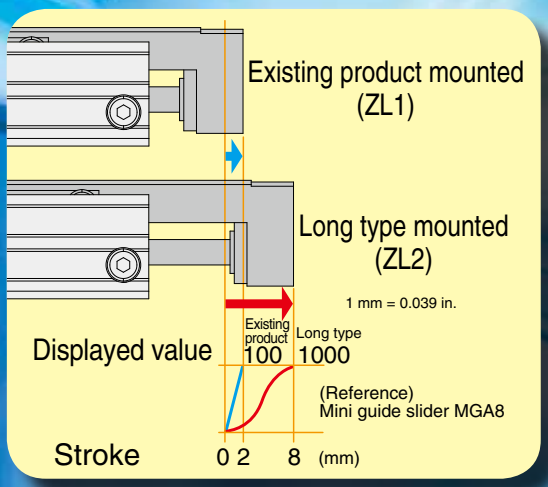
Linear Magnetic Sensor Controller Long Type

CE

Koganei brand

All products are RoHS directive compliant

Position of actuator operation is visible!



Expanded sensing range!

- **4-digit LED display**
  Green or red display color possible
- **Compatible actuators**
  Air hands and linear drive cylinders
- **Controller output specifications**
  4-point switching output is standard equipment
  Analog output (1 to 5 VDC) is standard equipment
- **European CE marking compliant**

Linear magnetic sensor controller
Long type

Environmentally friendly RoHS compliant product!

Converts position of actuator within the sensing range to numerical values.

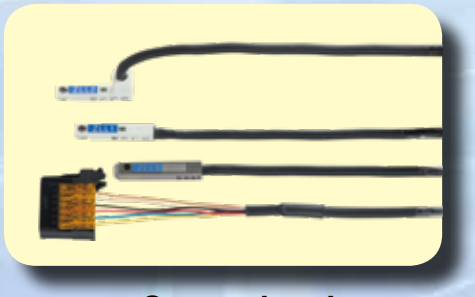
1. **Analog output (1 to 5 VDC) is standard equipment and detected position can be monitored from controller.**
2. **Four-point switching output makes it possible to detect position in measured range.**
3. **Compatible with wide range of Koganei actuators because sensor heads are same shape as ZE types and □4 types.**

NOTE For information about actuators on which the linear magnetic sensor controller can be mounted, refer to "List of Compatible Actuators" pages ❸ to ❹.

4-digit LED display
The display color can be changed to green or red.

Switch output display
Indicator color is red only.

Linear magnetic sensor controller Long type
ZL2 □ - □



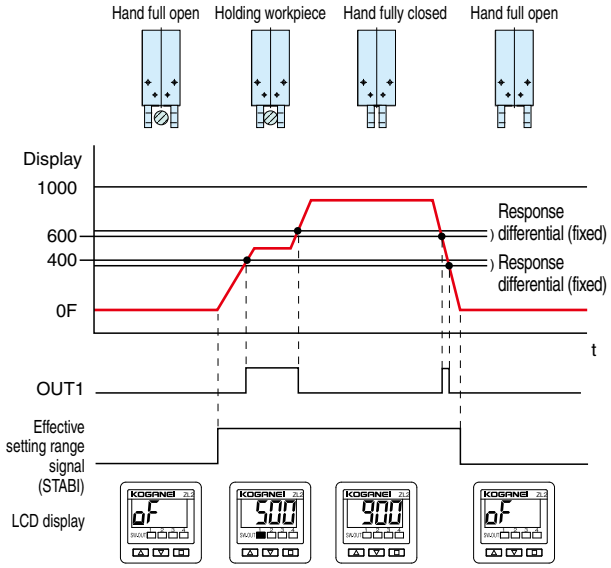
Sensor head
ZLL □ - □

Output mode

Window comparator mode

The ON range of each output can be set within the effective measuring range (sensor head ON range).
Response differential is fixed (2 digits)

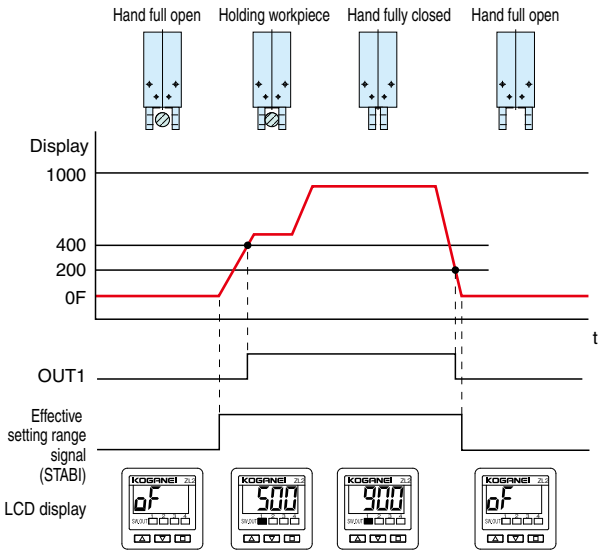
When the controller setting and sensor heat setting positions are as shown below.
OUT1 Threshold value setting Upper limit: 600 Lower limit: 400
Display when hand is full open: 900



Hysteresis mode

The ON position and OFF position each output can be set within the effective measuring range (sensor head ON range).

When the controller setting and sensor heat setting positions are as shown below.
OUT1 Threshold value setting Upper limit: 400 Lower limit: 200
Display when hand is full open: 900



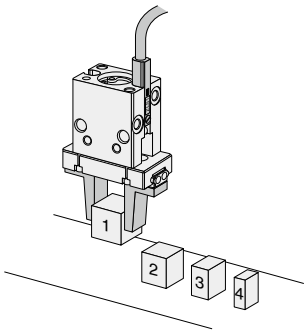
CAUTION: When the effective measuring range signal is OFF (outside the measuring range), OUT also becomes OFF.

Example of use

Normal reed switches are intended to sense the end position of the actuator's operation and the position where it stops in the middle; so their characteristic sensing range is narrow. While linear magnetic sensor controllers can be set to turn on at any point within the sensing range, which is because they convert the variations in the magnetic flux of the sensor magnets to numerical values. With the long types (ZL2), the sensing range is 3 times larger than existing product (ZL1) (in-house comparison).

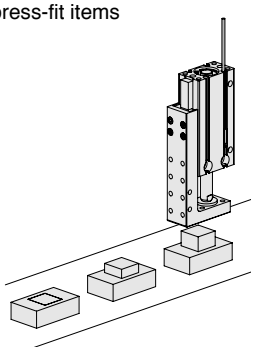
NOTE The sensing range varies depending on the mounted actuator.
Refer to "List of Compatible Actuators" on pages ❸ to ❹.

● Workpiece identification by 4-point switching output



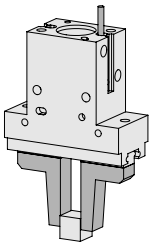
Given an air hand that needs to grasp 4 different sizes of workpieces, the sizes can be distinguished by setting the numerical value of the openness of the air hand, and then sending the switching output to the upper controller.

● Height check for press-fit items

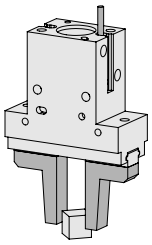


Determining the acceptance criteria for the height of the workpiece that is injected is possible because at the position that the cylinder presses on the top of the workpiece that is being injected, the sensed numerical values are sent as analog output to the upper controller. In addition, the injection position is converted to numerical values so the injection completed criteria can be set more precisely than usual.

● Determining state of grasp on workpiece



Normal



Abnormal

To grasp a particular workpiece, the air hand determines whether the workpiece is grasped in the normal orientation or if some foreign object is being clamped by sending analog output of the numerical value detected for the closure of the air hand to the upper controller.

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List of Compatible Actuators Air Cylinder (Reference Values)

<Effective range>
The effective ranges are the smallest values measured by Koganei. However, they should be treated as reference values because the effective ranges noted herein may not be achieved due to irregularities in the sensing magnets and the usage environment.

This is a list of typical models. Refer to the catalog for each air cylinder to select variations.

Units (mm [in.])

Typical model \ Cylinder bore size		4.5 [0.177]	6 [0.236]	8 [0.315]	10 [0.394]	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]	50 [1.969]	63 [2.480]	80 [3.150]	100 [3.9]	125 [4.9]
Basic Cylinders 	**BC** **BCSA** **BCTA** **BCD** **BCG**	-	* Because the embedded types (ZLL1 and ZLL2) cannot be supported. Contact us regarding different situations.						16 [0.630]	18 [0.709]	25 [0.984]	30 [1.181]	30 [1.181]	34 [1.339]	32 [1.260]	36 [1.417]
High multi cylinders  (Note 1)	**YMDA □ S**	-	8 [0.315]	-	9 [0.354]	-	12 [0.472]	14 [0.551]	-	-	-	-	-	-	-	-
Multi mount cylinders  (Note 2)	**BDA □ S** **BSA □ S** **BTA □ S** **BDAD □ S**	-	10 [0.394]	-	12 [0.472]	-	14 [0.551]	-	-	-	-	-	-	-	-	-
Knock cylinders  (Note 2)	**NDAS**	-	10 [0.394]	-	11 [0.433]	-	16 [0.630]	-	-	-	-	-	-	-	-	-
Pen cylinders  (Note 2)	**PBDA □ S** **PBSA □ S** **PBTA □ S**	-	8 [0.315]	-	9 [0.354]	-	11 [0.433]	-	-	-	-	-	-	-	-	-
Jig cylinder C 	**CDA □ S** **CSA □ S** **CTA □ S** **CCDA □ S** **CBDA □ S** **T-CDAS**	-	11 [0.433]	9 [0.354]	10 [0.394]	12 [0.472]	14 [0.551]	20 [0.787]	22 [0.866]	18 [0.709]	22 [0.866]	23 [0.906]	26 [1.024]	30 [1.181]	28 [1.102]	-
Twin rod cylinders 	**TBDA** **TBDAK** **TBDAM**	-	-	-	9 [0.354]	-	9 [0.354]	10 [0.394]	10 [0.394]	10 [0.394]	-	-	-	-	-	-
Jig cylinder with guide 	**SGDA** **SGDAY** **SGDAK □** **SGDAP □** **SGDAQ □**	-	11 [0.433]	10 [0.394]	10 [0.394]	12 [0.472]	14 [0.551]	20 [0.787]	22 [0.866]	18 [0.709]	22 [0.866]	24 [0.945]	26 [1.024]	-	-	-
Rod slider 	**ARS** **ARSZ** **ARSK**	-	9 [0.354]	-	9 [0.354]	-	10 [0.394]	10 [0.394]	11 [0.433]	-	-	-	-	-	-	-
Mini guide sliders 	**MGA □ S**	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	-	-	-	-	-	-	-	-
MINI GUIDE TA- 	**MGTS**	-	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	-	-	-	-	-	-	-	-

Note 1. There are limits to the mounting groove that can be used due to the orientation of the installed sensor head. For details, refer to “User’s Manual for the Linear Magnetic Sensor Controller, Long Type”.

Note 2. These cylinders are compatible with ZLL3. A separate sensor holder is needed for installation. Order a sensor holder that is suitable for the cylinder you are using. For details, refer to the catalog for each cylinder.

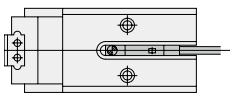
List of Compatible Actuators Air Hand (Reference Values)

This is a list of typical models. Refer to the catalog for each air hand to select variations.

Typical model		Bore	Full stroke detection or effective range mm [in.]	Guideline for sensor mounting position (±20 [0.787])	
				Sensed value when fully closed	Sensed value when fully opened
	**NHB □ PG** **NHB □ PGY** **NHB □ PGJ**	8 [0.315]	○	Against end of groove[Note 2]	
		10 [0.394]	○	320 [12.6]	680 [26.8]
		16 [0.630]	○	300 [11.8]	700 [27.6]
		20 [0.787]	○	230 [9.1]	770 [30.3]
		25 [0.984]	○	250 [9.8]	750 [29.5]
		32 [1.260]	○	200 [7.9]	800 [31.5]
		40 [1.575]	○	120 [4.7]	880 [34.6]
		50 [1.969]	○	100 [3.9]	900 [35.4]
	**NHBDPGL**	8 [0.315]	○	Against end of groove[Note 2]	
		10 [0.394]	○	150 [5.9]	850 [33.5]
		16 [0.630]	○	150 [5.9]	850 [33.5]
		20 [0.787]	○	100 [3.9]	900 [35.4]
	**NHB □ PA**	6 [0.236]	○	Against end of groove[Note 2]	
		10 [0.394]	○	380 [15.0]	620 [24.4]
		16 [0.630]	○	310 [12.2]	690 [27.2]
		20 [0.787]	○	250 [9.8]	750 [29.5]
		25 [0.984]	○	280 [11.0]	720 [28.3]
	NHB □ P	10 [0.394]	○	620 [24.4]	380 [15.0]
		16 [0.630]	○	690 [27.2]	310 [12.2]
		20 [0.787]	○	750 [29.5]	250 [9.8]
		25 [0.984]	○	720 [28.3]	280 [11.0]
	**NHB □ S**	8 [0.315]	○	400 [15.7]	600 [23.6]
		10 [0.394]	○	340 [13.4]	660 [26.0]
		16 [0.630]	○	310 [12.2]	690 [27.2]
		20 [0.787]	○	270 [10.6]	730 [28.7]
		25 [0.984]	○	300 [11.8]	700 [27.6]
	**NHBDSL** **NHBDSLG**	12 [0.472]	○	50 [1.969]	950 [37.4]
		16 [0.630]	○	70 [2.756]	930 [36.6]
		20 [0.787]	○	40 [1.575]	960 [37.8]
		25 [0.984]	○	50 [1.969]	950 [37.4]
	**NHE1D**	16 [0.630]	○	340 [13.4]	660 [26.0]
		20 [0.787]	○	280 [11.0]	720 [28.3]
		25 [0.984]	○	230 [9.1]	770 [30.3]
	**NHC1D**	10 [0.394]	○	480 [18.9]	700 [27.6]
		16 [0.630]	○	380 [15.0]	620 [24.4]
		20 [0.787]	○	330 [13.0]	670 [26.4]
		25 [0.984]	○	250 [9.8]	750 [29.5]
	**NHL1D**	8 [0.315]	○	Against end of groove[Note 2]	
		10 [0.394]	○	650 [25.6]	350 [13.8]
		16 [0.630]	○	400 [15.7]	200 [7.9]
		20 [0.787]	○	550 [21.7]	150 [5.9]
		25 [0.984]	○	650 [25.6]	150 [5.9]
	**AFDPG** **AFDPGL**	6 [0.236]	18 [0.709][Note 1]	* The effective ranges for AFDPG(L) shown to the left are typical values, so they are just reference values.	
		8 [0.315]	22 [0.866][Note 1]		
		12 [0.472]	28 [1.102][Note 1]		
		14 [0.551]	32 [1.260][Note 1]		
		18 [0.709]	26 [1.024][Note 1]		
		25 [0.984]	60 [2.362][Note 1]		

Note 1. Effective ranges indicate open-close strokes of both fingers.
AFDPGH has different piston diameters on left and right, so contact us regarding its use.

Note 2. Install sensor switches so they butt against the inner end of the groove on the air hand. (Refer to the diagram below)



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 assets beforehand.
ISO4414 (Pneumatic fluid power - Recommendations for the application of equipment to transmission and control systems),
Follow the Safety Precautions for: ISO4414 (Pneumatic fluid power-General rules and safety requirements for systems and their components), JIS B 8370 (Pneumatic fluid Power-General rules relating to systems regulations)

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

⚠ DANGER	Indicates 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.
⚠ WARNING	Indicates 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.
⚠ CAUTION	Indicates 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.
⚠ ATTENTION	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.

■ When selecting and handling equipment, the system designer or another person with sufficient knowledge and experience should always read the safety precautions, catalog, instruction manual and other literature before commencing operation. Making mistakes in handling is dangerous.
■ After reading the Owner's 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 Owner's 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 Owner's Manual carefully, and always keep safety first.
■ Only the controller (ZL2) is compliant with EMC directives. The sensor head (ZLL) cannot be used in environments with high magnetic fields.

⚠ DANGER

● Do not use for the applications 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.
● When mounting the product and workpiece, always firmly support and secure them in place. Dropping or falling the product or improper operation could result in injury.
● Never attempt to modify the product. It could result in abnormal operation leading to injury, electric shock, fire, etc.
● Never attempt inappropriate disassembly, assembly, or repair of the product relating to its basic inner construction, or to its performance or functions. It could result in injury, electric shock, fire, etc.
● Do not splash water on the product. Spraying water on the product, washing the product, or using the product under water creates the risk of malfunction, leading to injury, electric shock, fire, etc.
● Do not use the linear magnetic sensor controller or sensor head in locations where dangerous substances, such as flammable or ignitable substances, are present. These sensor controllers and sensor heads are not explosion-proof. It could ignite or burst into flames.
● Do not make any adjustments (connecting or disconnecting wiring connectors, mounting or positioning sensor heads, etc.) to mechanisms attached to the product while the product is operating. This could result in abnormal operation leading to injury.

⚠ WARNING

● Do not use the product in excess of its specification range. Doing so creates the risk of product breakdown, loss of function, or damage. It could also drastically reduce the operating life.
● Before supplying electricity to the device and before starting operation, always conduct a safety check of the area where the machine is operating. Unintentional supply of electricity creates the risk of electric shock or injury due to contact with moving parts.
● Do not touch anything where electrically charged parts are exposed, such as the terminals, while the electric power is on. There is a possibility of electric shock and abnormal operation.
● Do not throw the product into fire.
The product could explode and/or produce toxic gases.
● Do not sit on the product, place your feet on it, or place other objects on it. Accidents such as falling could result in injury. Dropping or toppling the product may result in injury, or it might also damage or break it, resulting in abnormal or erratic operation, runaway, etc.
● Before conducting maintenance, inspection, repair, replacement, or any other similar work, always completely cut off the electric power supply.
● Do not damage any cords, such as the lead wires of the sensor heads. Allowing the cords to be damaged, bent excessively, pulled, rolled up, placed under heavy objects or squeezed between two objects, may result in current leaks or defective continuity that will lead to fire, electric shock, or abnormal operation.
● Do not apply an external magnetic field to the controller and sensor head while the linear magnetic sensor controller is in operation. Unintended operations could damage equipment or cause injury.
● Use safety circuits or system designs to prevent damage to machinery or injury to personnel if the machine is shut down, such as due to emergency stop or electrical power failure.
● Avoid wiring parallel to or in the same conduit as power or high-voltage lines. The linear magnetic sensor controller may be affected by electric noise that results in erratic operation.
● Make sure that the polarity of wiring connections is correct.
The wrong polarity could result in damage to the linear magnetic sensor controller and sensor head.
● Installing two or more cylinders equipped with the sensor heads of linear magnetic sensor controllers in parallel could cause malfunctions, so separate the sensor heads by at least 40 mm [1.575 in.].

⚠ CAUTION

- Do not use the products in locations that are subject to direct sunlight (ultraviolet rays), dust, salt, iron powder, or high humidity. Also, do not use the products if the media and/or ambient atmosphere includes organic solvents, phosphate ester type hydraulic oil, sulfur dioxide gas, chlorine gas, or acids. Such uses could lead to loss of functions within a short period, sudden degradation in performance, or reduced operating life. For details on materials used in the product, refer to the names of materials in the specifications.
- When installing 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 and maintenance, which could eventually lead to system shutdown or damage to the product.
- Do not use the linear magnetic sensor controller or sensor head in locations subject to large electrical currents or strong magnetic fields. This could result in erratic operation.
- Do not scratch, dent, or deform the product by climbing on it, using it as a step, or placing objects on top of it. It could result in damaged or broken a product that results in operation shutdown or degraded performance.
- Always post a "Work in Progress" sign for installations, adjustments, or other operations, to avoid unintentional supplying of air or electrical power, etc. Unintended power supply can cause electric shock and sudden operation, creating the risk of personal injury.
- Do not pull on the cords of the lead wires, etc., of the linear magnetic sensor controller and sensor head, do not grab them when lifting or carrying the equipment, or place heavy objects or excessive loads on them. Such actions could result in current leaks or defective continuity that leads to fire, electric shock, or abnormal operation.
- Use only the sensor head specified for this product.
  Use of sensor heads other than those specified could lead to erratic operation of, or damage to, the product.
- When handling linear magnetic sensor controllers and sensor heads, do not apply excessive shocks (294.2 m/s^2 [30 G] or larger) by striking, dropping, or bumping against them. Even if their casing is undamaged, their inner parts may suffer breakdown, causing erratic operation.
- Avoid short circuiting the loads.
  Turning the switch output on while the load is short-circuited causes overcurrent, which will damage the linear magnetic sensor controller.
  Example of short-circuited load: The lead wire of a switch output is directly connected to the power supply.
- Tighten screws with a tightening torque of 0.2 N·m [0.148 ft·lbf] when mounting the sensor head.
  Over-tightening beyond the allowed tightening torque may damage the sensor head.
- Be sure to connect the sensor head and controller while the power is turned off. Connecting the sensor head while the power is supplied may cause erratic operation of the controller because of surge voltage, etc.

⚠ ATTENTION

- When considering the possibility of using this product in situations or environments not specifically noted in the Catalog or Instruction Manual, or in applications where safety is an important requirement, such as in an aircraft facility, combustion equipment, leisure equipment, safety equipment and other places where human life or assets may be greatly affected, use the product sufficiently within its specified ratings and performance and take adequate safety precautions, such as the use of fail-safes.
  Be sure to consult us with such applications.
- Always check the Catalog and other reference materials for product wiring and piping.
- Use a protective cover, etc., to ensure that people do not come into direct contact with the operating portion of mechanical devices, etc.
- Do not control in a way that would cause workpieces to fall during power failure.
  Take control measures so that they prevent the workpieces, etc., from falling during power failure or emergency stop of the mechanical devices.
- When handling the product, be sure to wear protective gloves, safety glasses, safety shoes, etc., to keep safe.
- When the product can no longer be used, or is no longer necessary, dispose of it appropriately as industrial waste.
- Pneumatic equipment can exhibit degraded performance and function over its operating life. Always conduct daily inspections of the pneumatic equipment, and confirm that all requisite system functions are satisfied, to prevent accidents from happening.
- For inquiries about the product, contact your nearest Koganei sales office or Koganei overseas department. The address and telephone number is shown on the back cover of this catalog.

⚠ Other

- Always observe the following items.
  1. When using this product in pneumatic systems, always use genuine Koganei parts or compatible parts (recommended parts). When doing maintenance or repairs, always use genuine Koganei parts or compatible parts (recommended parts). Always observe the required methods.
  2. Never inappropriately disassemble or assemble the product in relation to its basic construction, performance, or functions.

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

Handling Instructions and Precautions

General precautions

Wiring

1. When using a power supply with a commercially available switching regulator, be sure to connect a frame ground (F.G.) terminal.
2. Always connect a frame ground (F.G.) terminal when using devices that generate electrical noise, such as switching regulators and inverter motors, in the vicinity of the sensor mount position.
3. After completing wiring work, check to make sure that all connections are correct.

Other

1. Check fluctuations in the power source to confirm they do not exceed the ratings before turning on the power.
2. Avoid use during the transitional state (1 second) when the power is turned on.
3. Do not operate the keys using a needle or any other sharp instrument.

Warranty and General Disclaimer

1. Warranty Period
The warranty period for Koganei products is 1 year from the date of delivery.
* However, some products have a 2-year warranty; contact your nearest Koganei sales office or the Koganei overseas department for details.

2. Scope of Warranty and General Disclaimer

(1) When a product purchased from Koganei or from an authorized Koganei distributor or agent malfunctions during the warranty period in a way that is attributable to Koganei's responsibility, Koganei will repair or replace the product free of charge. Even if a product is still within the warranty period, its durability is determined by its operation cycles and other factors. Contact your nearest Koganei sales office or the Koganei overseas department for details.

(2) The Koganei product warranty covers individual products. Therefore, Koganei is not responsible for incidental losses (repair of this product, various expenses required for replacement, etc.) caused by breakdown, loss of function, or loss of performance of Koganei products.

(3) Koganei is not responsible for any losses or for any damages to other machinery caused by breakdown, loss of function, or loss of performance of Koganei products.

(4) Koganei is not responsible for any losses due to use or storage of the product in a way that is outside of the product specifications prescribed in Koganei catalogs and instruction manuals, and/or due to actions that violate the mounting, installation, adjustment, maintenance or other safety precautions.

(5) Koganei is not responsible for any losses caused by breakdown of the product due to factors outside the responsibility of Koganei, including but not limited to fire, natural disaster, the actions of third parties, and intentional actions or errors by the purchaser.

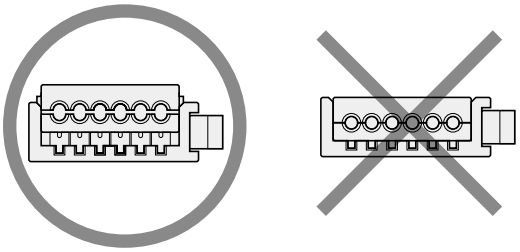
Mounting and Piping

Sensor head and connector connection overview

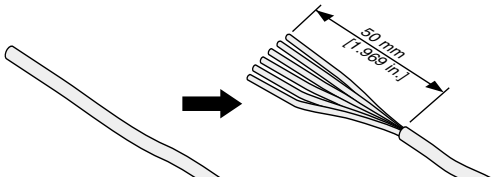
The **ZLL-□-□L** sensor head is provided to you with the mini plug wire mount plug connected to the sensor head unit. A special tool is required if you need to reconnect in order to adjust the length. Use the following procedure when reconnecting.

1. Be sure to use the mount plug and the special tool shown below when reconnecting.
6P mini clamp wire mount plug Model: **ZL-6M**
Special tool Model: **1729940-1**
Tyco Electronics Japan G.K.

2. Check to make sure that the connector cover (lead wire inlet) is sitting above the body of the connector. Note that a connector whose cover is even with the body of the connector cannot be used.

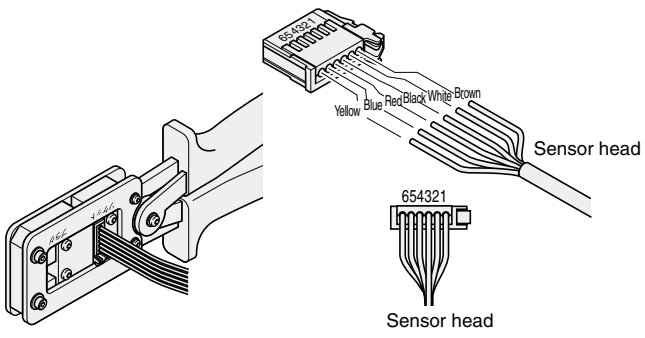


3. Cut the sensor head cable to the required length.
Strip the outer covering of the cable, 50 mm [1.969 in.] from the end, to expose the lead wires. Do not strip the insulation from the individual lead wires at this time.



4. Insert the lead wires into the connector cover holes in accordance with the information in the table below. Check to make sure the lead wires are fully inserted (wire goes in about 9 mm [0.354 in.]) as far as they will go by viewing the semi-transparent top cover of the connector.
Note that supplying power while connections are incorrect will damage the sensor head and controller.

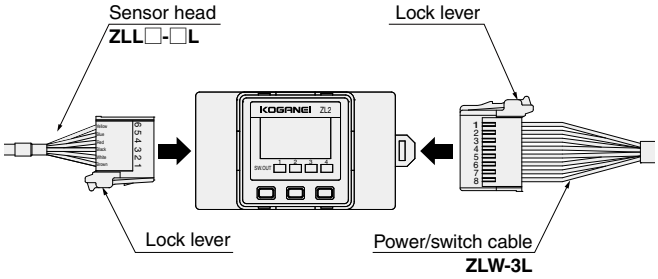
Connector side number	Signal name	Lead wire color
1	Sensor head voltage (+)	Sensor head brown lead
2	Sensor head voltage output A_IN	Sensor head white lead
3	Sensor head voltage output B_IN	Sensor head black lead
4	Indicator (LED) input	Sensor head red lead
5	GND	Sensor head blue lead
6	Sensor head voltage output C_IN	Sensor head yellow lead



5. Taking care not to allow the lead wires to come out of the connector, use the special tool (don't try to use any other tool) to squeeze the cover and body of the connector until the cover is pressed into the body.
Connection is complete when the cover is even with the connector body.

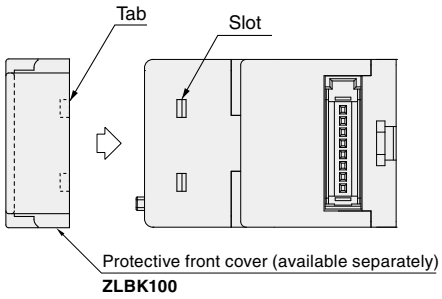
6. Double check to make sure that wiring is correct.

Attaching and detaching of the sensor head and power/switch cables

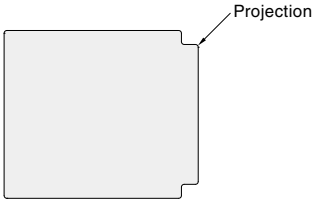


To attach the sensor head and the power/switch cables, position the lock levers as shown in the illustration above, and then insert until they lock into place with the controller side connectors. To disconnect, press the lock lever down as far as it will go as you pull the connector to unplug it. At this time, take care not to apply undue force to the lead wires.

Attaching the protective front cover



Attach the protective front cover so the tabs inside the cover enter the slots on the Linear Magnetic Sensor Controller.



* To remove the protective front cover, hook your finger on the projection on one side of the cover and remove it.

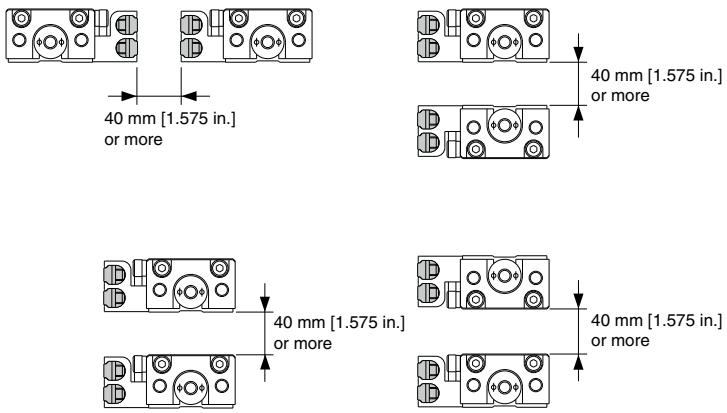
Sensor head installation precautions

1. After inserting the sensor head into the Air Hand or cylinder switch mounting groove (depending on which you are using) and move the sensor head to the suitable position, secure it in place with the fixing screw. Use a tightening torque of 0.2 N·m [0.148 ft·lbf] or less.

2. For information about the sensor head insertion direction, see the "Sensor switch mounting method" for the Air Hand or cylinder you are using.

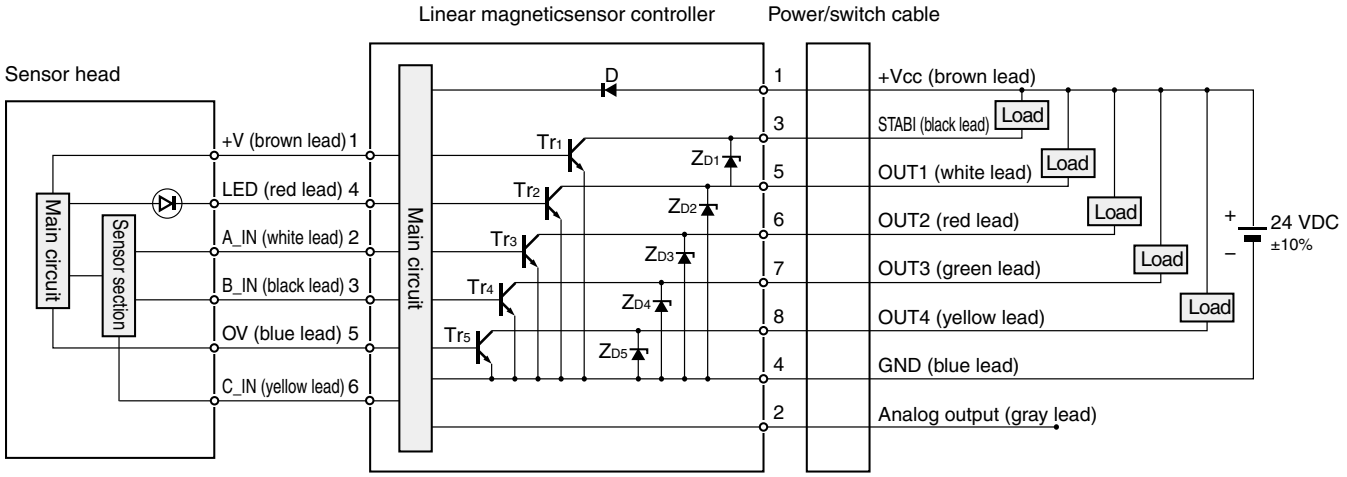
Installation Adjacent to Linear Magnetic Sensor Controller, Long Type

Using actuators in close proximity could cause malfunctions, so separate the sensor heads by at least 40 mm [1.575 in.].



(Reference: Mini guide sliders)

Inner Circuit Diagrams



Note: Note that extending the cable can cause a drop in voltage due to cable resistance.

Signal	D	: Power supply reverse-polarity protection diode
	Z_{D1}~ Z_{D5}	: Surge voltage absorption zener diode
	Tr_1~Tr_5	: NPN output transistors

Linear magnetic sensor controller

ZL2

Specifications

● Controller

Item \ Model	ZL2
Power supply voltage	24 VDC ±10%
Consumption current	50 mA max. (Not including supply power to sensor.)
Sensor input supply power and voltage	5 VDC
Sensor input maximum input voltage	3.0 V
Switch output method	NPN open collector output, 5 points
Load voltage	30 VDC
Load current	50 mA max.
Switch output volume repeatability	±1%F.S. ±1 digit Note
Internal voltage drop	0.3 V MAX. (When Ic = 5 mA)
Response time	5 ms MAX.
Operation indicator light	Lights red when each switch output is on.
Value display	1/1000 division display within effective measuring range(4 digits, 2-color display: red and green)
Analog output voltage range	DC1 to 5V within effective measuring range, DC0.8V outside effective measuring range (1kΩ output impedance)
Analog output repeatability	±1% of F.S (25℃±5℃ [77°F±9°F]) Note
Insulation resistance	100 MΩ MIN. (500 VDC Megger, between case and lead wire terminal)
Withstand voltage	500 VAC (50/60 Hz) in 1 minute (between case and lead wire terminal)
Shock resistance	294.2 m/s^2 [30 G] (non repetitive)
Ambient temperature	0 to 50℃ [32 to 122°F] (non-condensation, non-freezing)
Storage temperature range	-10 to 70℃ [14 to 158°F] (non-condensation, non-freezing)
Mass	40 g [1.411 oz]

Note: This performance excludes the mechanical looseness of a cylinder with a fixed magnet (standalone performance). In the case of a movable type cylinder whose magnet is not fixed, the movable part and repeatability are reduced.

● Sensor head

Item \ Model	ZLL□-□L
Power supply voltage	5 VDC±5%
Consumption current	20 mA max.
Mounting methods	Body embedded type (**ZLL1, ZLL2**), □4 type (**ZLL3**)
Operation indicator light	Red LED lights at optimal sensitivity position (Operation position can be changed by setting.)
Lead wire	Heat-resistant, oil-resistant vinyl sheath instrumentation cable ϕ2.8 [0.110] 6 core With 6P connectors
Insulation resistance	100 MΩ MIN. (500 VDC Megger, between case and lead wire terminal)
Withstand voltage	500 VAC (50/60 Hz) in 1 minute (between case and lead wire terminal)
Shock resistance	294.2 m/s^2 [30 G] (non repetitive)
Protective structure	IP67
Vibration resistance	88.3 m/s^2 [9 G] (Double amplitude: 1.5 mm [0.059 in.] 10 ~ 55 Hz)
Ambient temperature	0 to 50℃ [32 to 122°F] (non-condensation, non-freezing)
Storage temperature range	-10 to 70℃ [14 to 158°F] (non-condensation, non-freezing)
Mass	20 g [0.705 oz] (When 1L lead wire length is 1000 mm [39 in.].)

Connector number

● Sensor head

Connector side number	Signal name	Lead wire color
1	Sensor head voltage (+)	Sensor head brown lead
2	Sensor head voltage output A_IN	Sensor head white lead
3	Sensor head voltage output B_IN	Sensor head black lead
4	Indicator (LED) input	Sensor head red lead
5	GND	Sensor head blue lead
6	Sensor head voltage output C_IN	Sensor head yellow lead

● Power supply

Pin No.	Signal name	Lead wire color
1	Power supply voltage input (24 V)	Brown
2	Analog output (1 to 5V)	Gray
3	Effective measuring range signal output (STABI)	Black
4	GND	Blue
5	Switch output OUT1	White
6	Switch output OUT2	Red
7	Switch output OUT3	Green
8	Switch output OUT4	Yellow

Order Codes

ZL2 - □ - □ - □ - □

Sensor head cable length
1LK: 1000 mm [39 in.]
2LK: 2000 mm [79 in.]
3LK: 3000 mm [118 in.]
*Can only be input when a sensor head is selected

Sensor head shape
Blank: No sensor head
ZLL1 : **ZE**Horizontal type
ZLL2 : **ZE**Vertical type
ZLL3 : □ **4** type

Power supply/switching cable
Blank: No power supply/switching cable
3L : Power supply/switch 3 m [9.843 ft]

Protective front cover
Blank: No protective front cover
C: With protective front cover

Additional parts (available separately)

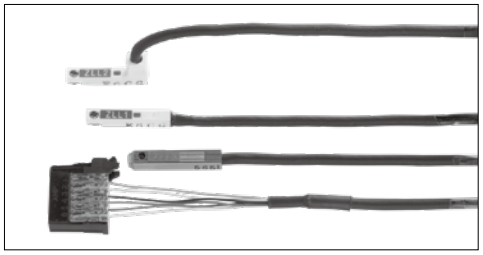
● Sensor head

ZLL □ - □

Cable length
1L: 1000 mm [39 in.]
2L: 2000 mm [79 in.]
3L: 3000 mm [118 in.]

Sensor head shape
1 : **ZE**Horizontal type
2 : **ZE**Vertical type
3 : □ **4** type

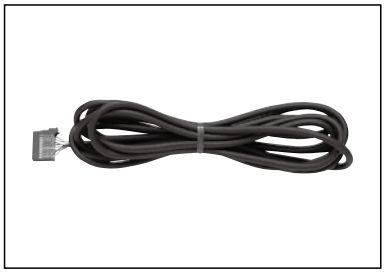
Sensor head for long detection type



* When purchasing a sensor head by itself, you need to set the sensor head parameters. (Refer to page 5 of the instruction manual that comes with the product.)

● Power supply/switching cable

ZLW-3L

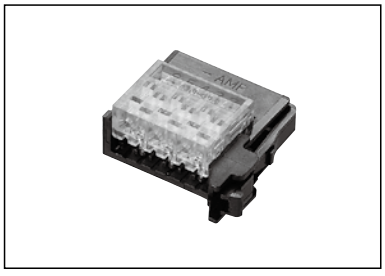


● Protective front cover

ZLBK100

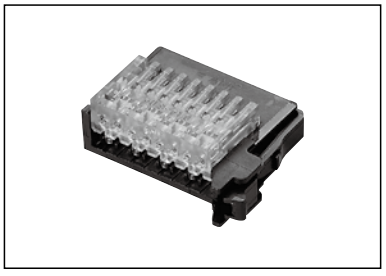
● Mini clamp wire mount plug, 6 P (for sensor head)

ZL-6M



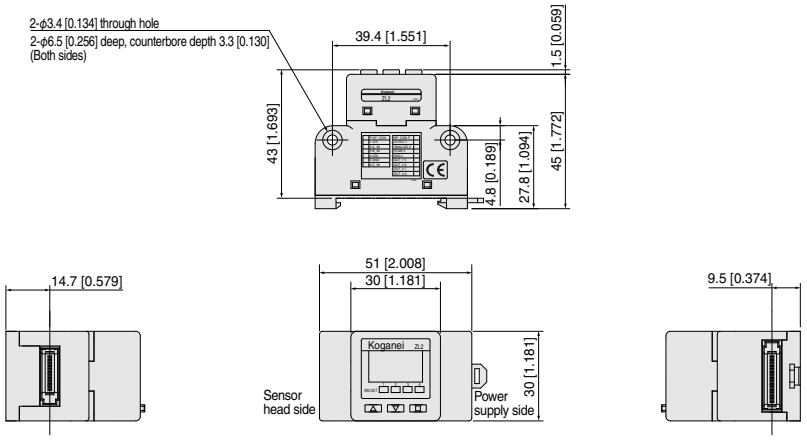
● Mini clamp wire mount plug, 8 P (for power supply/switching cable)

ZL-8M

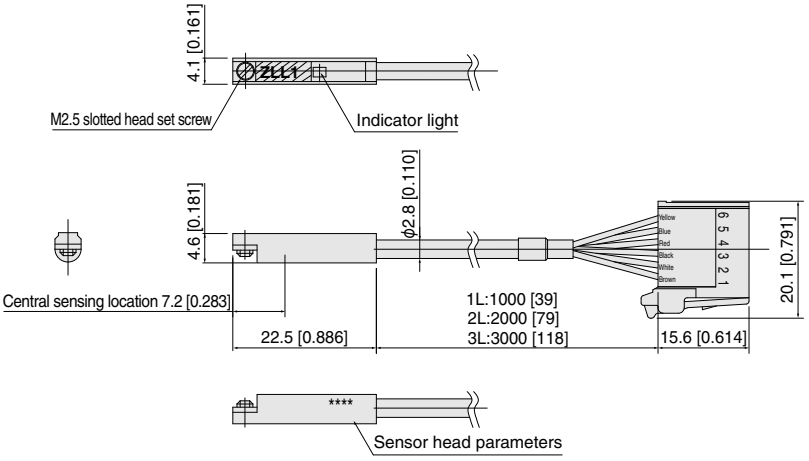


Dimensions (mm [in.])

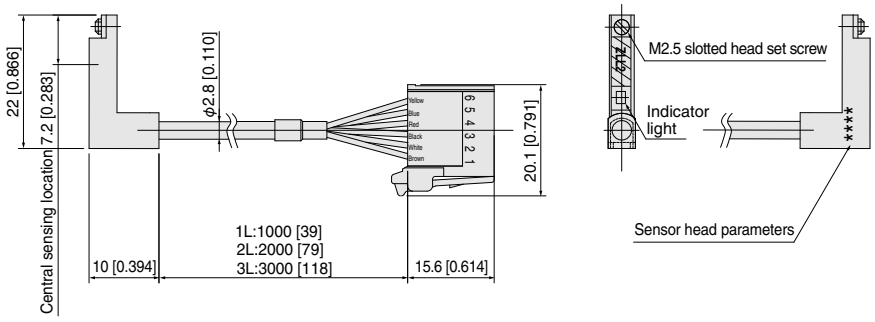
● ZL2-□-□(controller)



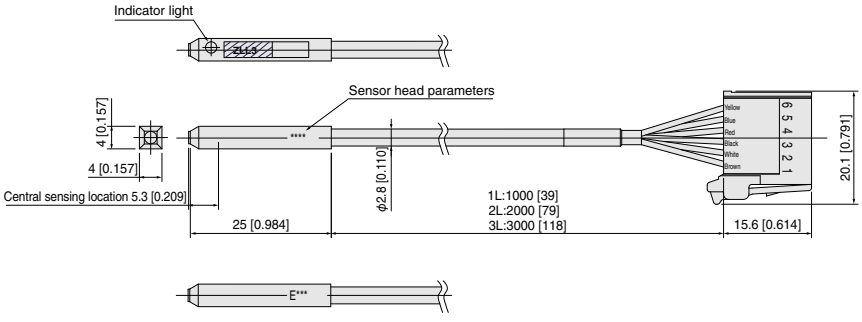
● ZLL1-□L (ZE Horizontal type)



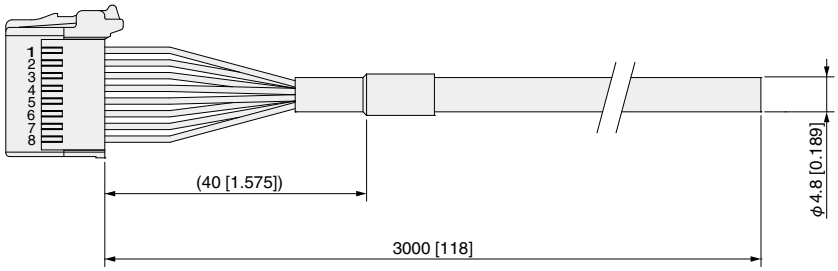
● ZLL2-□L (ZE Vertical type)



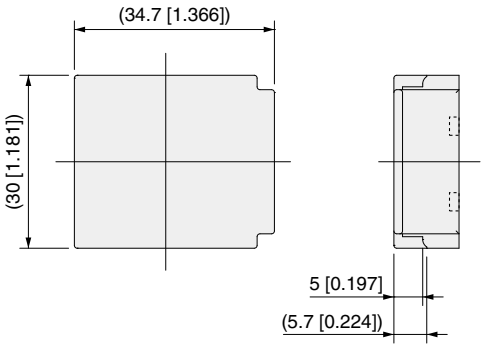
● ZLL3-□L (□4 type)



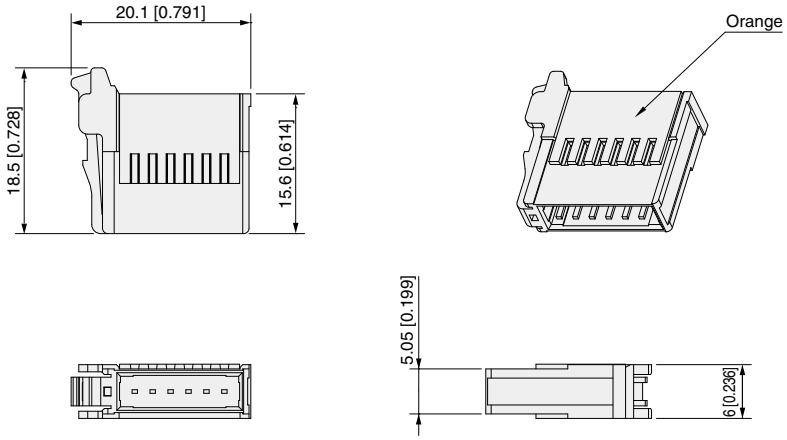
● **ZLW-3L** (power supply/switching cable)



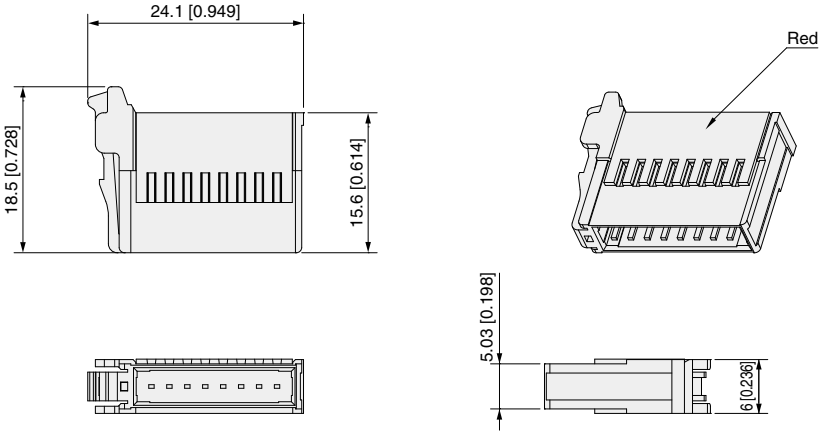
● **ZLBK100** (protective front cover)



● **ZL-6M** (mini clamp wire mount plug, 6 P, for sensor head)



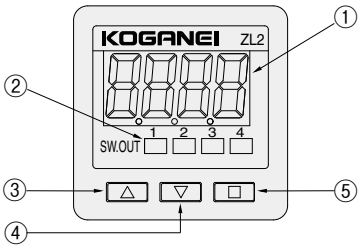
● **ZL-8M** (mini clamp wire mount plug, 8 P, for power supply/switching cable)



⚠ CAUTION

1. Incorrect wiring to the sensor head or power/switch cables creates the risk of damage to both the controller and sensor head. Confirm that wiring is correct before turning on power.
2. Record write conditions that were configured by writing them to flash memory. Note that flash memory has a limited life, and the number of rewrites is 10,000.

■ Nomenclature and functions



No.	Name	Description
①	Display	Shows effective measuring range %, setting details, error indicators.
②	Switch output indicators	Light when switch output is ON (CH1 to CH4).
③	UP key (△)	Use to increase a setting value.
④	DOWN key (▽)	Use to decrease a setting value.
⑤	MODE key (□)	Use when configuring settings.

* Regarding operation and setting procedures, refer to the instruction manual (M020961) and the User's Manual that come with the product.

MEMO

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.

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Catalog No. BK-E0007

NEW Products

iB Series

iB-Cyclone

PAT. PEND.

Introducing the high-speed cyclone type water separator!

Conceptual image of water separation

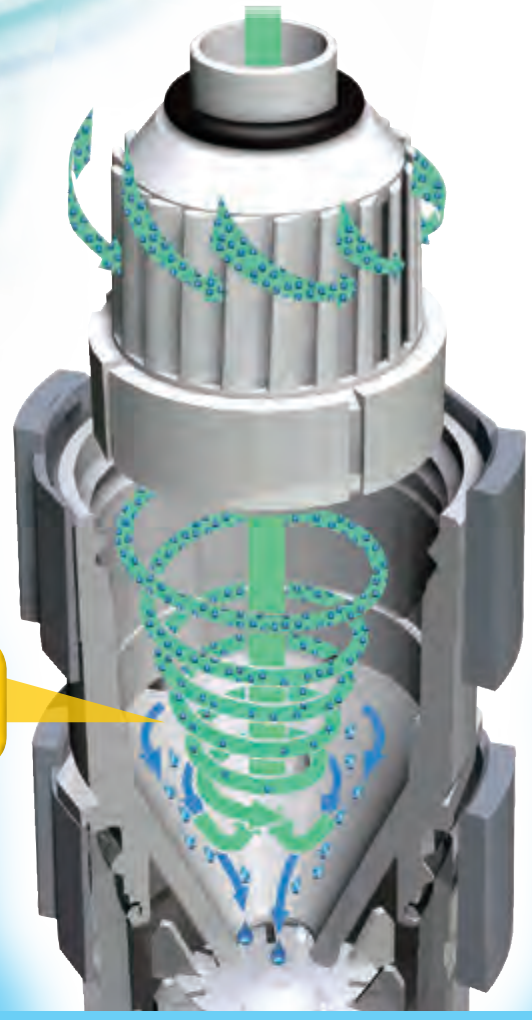
Products are RoHS compliant

iB Series

Introducing the high-speed cyclone type water separator!

iB-Cyclone

PAT. PEND.



Superior water separation performance

Half the size and over 99%[Note] water separation ratio compared to other devices. Note: According to Koganei measurement standards.

Cyclone system

High-speed cyclone water separator uses the power of centrifugal separation (patent pending).

Maintainability improved

Maintenance free because element is not used.
Select NO type or NC type auto drain.

Wide range of flow rates

Excellent water separation performance in a wide range of flow rates.

Compatible in a wide range of environments

Specifications for ozone resistance, NCU specifications (copper free) compatible as standard.

CAUTION Read the handling instructions and precautions on page ❺ before using this product.

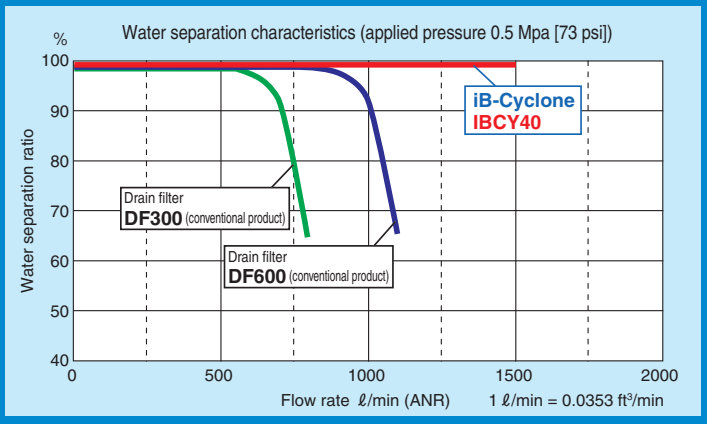
CAUTION Read the safety precautions on page ❸ before using this product.

User issues

- Having trouble removing water in piping
- Changing elements and other maintenance is difficult.

Koganei provides solutions to user problems with **iB-Cyclone**, which delivers new value.

The iB-Cyclone uses a high-speed cyclonic system to maintain water separation rates even if flow is increased. Separation performance is always steady from small to large flow rates.

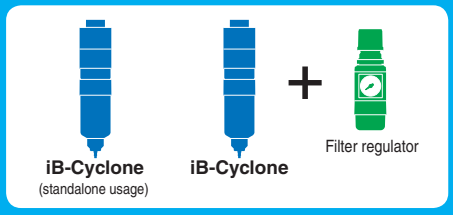


*Water separation compared with Koganei drain filter (reference).

iB-Cyclone application example

- Removing water in sub-lines and from various equipment
- Removing primary-side water from filters and regulators
- Pre-processing air supply going to membrane dryer
- Removing water from equipment extremities

※ Air used must be free from oil and solids for iB-Cyclone use.



Variations and Options

IBCY30

IBCY40

IBCY50

Auto drain type
NO (Normally open)
NC (Normally closed)

Drain cock with fitting

Bracket
8Z-CBK

Before selecting and using the products, please read all the Safety Precautions carefully to ensure proper product use.
The Safety Precautions described below are to help you use the product safely and correctly, and to prevent injury or damage to you, other people, and assets.
Always adhere to the following safety regulations: ISO4414 (Pneumatic fluid power - General rules and safety requirements for systems and their components) and JIS B 8370 (General rules relating to systems).

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

⚠ Warning	Indicates situations that can be clearly predicted as dangerous. Failure to avoid the situation creates the risk of death or serious injury. It could also result in damage or destruction of assets.
⚠ WARNING	Indicates situations that, while not immediately dangerous, could become dangerous. Failure to avoid the situation creates the risk of death or serious injury. It could also result in damage or destruction of assets.
⚠ CAUTION	Indicates situations that, while not immediately dangerous, could become dangerous. Failure to avoid the situation creates the risk of minor or semi-serious injury. It could also result in damage or destruction of assets.
⚠ ATTENTION	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 for use in general industrial machinery.

■ When selecting and handling equipment, the system designer or another person with sufficient knowledge and experience should always read the Safety Precautions, catalog, User's Manual and other literature before commencing operation. Improper handling is dangerous.

■ After reading the Instruction Manual, catalog, and other documentation, always store them in a location that allows easy availability for reference to users of this product.

■ Whenever transferring or lending the product to another person, always attach the catalog, instruction manual, and other information to the product where they are easily visible in order 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 contingencies. Read the catalog and instruction manual carefully, and always keep safety first.

⚠ Warning

- Do not use the product for the purposes listed below:
  1. Medical equipment related to maintenance or management of human lives or bodies.
  2. Machines 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 high levels of safety. Using the product in any of the ways described above creates the risk of loss of human life.
- Do not use the product in locations with or near dangerous substances such as flammable or ignitable substances. This product is not explosion-proof. Doing so creates the risk of ignition and fire.
- When mounting the product and workpiece, always firmly support and secure them in place. Falling, dropping, or abnormal operation of the product creates the risk of personal injury.
- Never attempt to modify the product. Abnormal operation can lead to injury.
- Never attempt inappropriate disassembly, assembly, or repair of the product relating to basic construction, or to its performance or functions. This can lead to injury, etc.
- While the product is in operation, avoid touching it with your hands or otherwise approaching too close except for specified operations. Also, do not attempt to make any adjustments to internal or attached mechanisms, or to perform any type of adjustment (disconnecting tubes or sealed plugs, adjustment of the product's mounting position, etc.) while the product is in operation.
  Falling, dropping, or abnormal operation of the product creates the risk of personal injury.

⚠ WARNING

- Because KOGANEI products are designed for use under a wide variety of conditions, decisions concerning conformance with a particular system should be made upon the careful evaluation of a person in charge of system design.
  Assurances concerning expected system performance and safety are the responsibility of the designer who decides system conformity. Be sure to use the latest catalogs and technical materials to study and evaluate specification details, to consider the possibility of machine breakdown, and to configure a system that ensures fail-safe safety and reliability.
- Do not use the product in excess of its specification range. Doing so creates the risk of product breakdown, loss of function, or damage. It could also drastically reduce operating life.
- Before supplying air to the device and before starting operation, always conduct a safety check of the area of machine operation. Unintentional supply of air creates the risk of injury due to contact with moving parts.
- Do not allow the product to be thrown into fire. Doing so creates the risk of explosion, resulting in the release of toxic gasses.
- Do not sit on the product, place your foot on it, or place other objects on it. Doing so creates the risk of injury due to tripping or the product tipping over or falling, resulting in product damage and abnormal, erratic, or runaway operation.
- Before conducting maintenance, inspection, repair, replacement, or any other similar procedure, always completely cut off all air connections and confirm that residual pressure inside the product or in piping connected to the product is atmospheric pressure. In particular, be aware that residual air will still be in the compressor or storage tank.
  The actuator may move abruptly if residual air pressure remains inside the piping, causing injury.
- Use safety circuits or create system designs that prevent damage to machinery or injury to personnel when the machine is shut down due to an emergency stop or electrical power failure.
- Always check the catalog and other reference materials for correct product piping. Improper piping creates the risk of abnormal operation of the actuator.
- When the device not used for long periods (over 30 days), it is possible that the contacting parts may have become stuck leading to slow operation or sudden movements, and it will creates the risk of injury. Check for proper operation a minimum of once every 30 days.
- Do not use the product at the beach in direct sunlight, near mercury lamp, or near equipment that generates ozone. Ozone causes rubber components to deteriorate resulting in reduced performance, or a limitation or stop of functions.
- Do not use any type of medium that is not specifically stipulated in the specifications. Using a non-specified medium could lead to short term loss of function, sudden degradation of performance, and a reduced operating life.
- In initial operations after the equipment has been idle for 48 hours or more, or has been in storage, there is a possibility that contacting parts may have become stuck, resulting in equipment operation delays or in sudden movements. Before these initial operations, always run a test to check that operating performance is normal.

- Do not use the product in locations that are subject to direct sunlight (ultraviolet rays); locations with high humidity and temperature, dust, salt, or iron powder. Do not use fluids in the product or use the product in an environment that includes corrosive fluids such as organic solvents, phosphate ester type hydraulic oil, sulfur dioxide, chlorine gas, acids, etc. It could lead to early shutdown of some functions, a sudden degradation of performance, and a reduced operating life. For information about materials, see Major Parts and Materials.
- Do not use in locations where there is a heat source nearby or that are subject to radiated heat.

⚠ CAUTION

- When mounting the product, leave room for adequate working space around it. Failure to do so will make it more difficult to conduct daily inspections or maintenance, which could eventually lead to system shutdown or damage to the product.
- Do not scratch, dent, or deform the product by climbing on it using it as a scaffold, or placing objects on top of it. Doing so creates the risk of damage to or breakage of the product, resulting in operational shutdown or degraded performance.
- Always be sure to post an “operation in progress” sign during installation, adjustment, or other operations, to avoid unintended air supply. Unintentional supplying of air can cause sudden operation and may result in injury.
- Use in extremely dry air under temperatures lower than -20 °C [-4 °F] may affect the quality of the lubricating oil used. This creates the risk of degraded performance, loss of function, or other problems.

⚠ ATTENTION

- When considering the possibility of using this product in situations or environments not specifically noted in the Catalog or Instruction Manual, or in applications where safety is an important requirement such as in an aircraft 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 the application with enough margins for ratings and performance or fail-safe measures. Be sure to consult us with such applications.
- Always check the catalog and other reference materials for product piping.
- Use a protective cover and other means to ensure that the operating parts of mechanical devices are isolated and do not come into direct contact with human bodies.
- Do not configure control of the system in a way that could cause workpieces to fall due to power failure.
  Configure control of the system to prevent workpieces, and other items from falling due to power failure or by emergency stop of mechanical devices.
- When handling the product, wear protective gloves, safety glasses, safety shoes etc.
- When the product can no longer be used or is no longer necessary, dispose of it appropriately as industrial waste.
- Pneumatic equipment can exhibit degraded performance and function over its operating life. Always conduct daily inspections of the pneumatic equipment, and confirm that all requisite system functions are satisfied, to prevent accidents from happening.
- For inquiries about the product, contact your nearest KOGANEI sales office or the KOGANEI overseas group. The addresses and telephone numbers are shown on the back cover of this catalog.

⚠ Other

- Always observe the following items.
  1. When using this product in pneumatic systems, 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 prescribed methods and procedures.
  2. Never attempt inappropriate disassembly or assembly of the product relating to basic configurations, or its performance or functions.

KOGANEI shall not be held responsible for any problems that occur as a result of these items not being properly observed.

Warranty and General Disclaimer

1. Warranty Period
KOGANEI warrants this product for a period of no more than 180 days after it is purchased.

2. Scope of Warranty and General Disclaimer

(1) The KOGANEI product warranty covers individual products. When a product purchased from KOGANEI or from an authorized KOGANEI dealer or KOGANEI distributor malfunctions during the warranty period in a way that is found to be attributable to KOGANEI responsibility, KOGANEI will repair or replace the product free of charge. Even if a product is still within the warranty period, its durability is determined by its operation cycles and other factors. Contact your nearest KOGANEI sales office or the KOGANEI overseas group for details.

(2) KOGANEI shall not be held responsible for any losses or for any damage to other machinery caused by breakdown, loss of function, or loss of performance of KOGANEI products.

(3) KOGANEI shall not be held responsible for any losses due to use or storage of the product in a way that is outside of the product specifications prescribed in KOGANEI catalogs and the instruction manual, and/or due to actions that violate the mounting, installation, adjustment, maintenance and other safety precautions.

(4) KOGANEI shall not be held responsible for any losses caused by breakdown of the product due to factors outside the responsibility of KOGANEI, including but not limited to fire, natural disaster, the actions of third parties, and intentional actions or errors by you.

General Precautions

1. Before performing piping work, thoroughly flush the inside of the pipes with compressed air.
   Machining chips, sealing tape, rust and other debris getting entered in during piping work may result in lowered performance and functionality or function stoppage.
2. This product cannot be used when the medium or ambient atmosphere includes any of the following substances:
   Organic solvents, phosphate ester type hydraulic oil, sulfur dioxide, chlorine gas, fluorine gas, ozone, acids, or other corrosive gasses.
3. The bowl material is polycarbonate. This product cannot be used in environments with the above gasses and fluids, nor threadlocking adhesive, leak detection fluid, hot water or where it may be exposed to them. This product cannot be used in direct ultra-violet light. See page ❽ for details.
4. Cover the unit or take other measures when using it in locations where it might be subject to excessive dust, dripping water, dripping oil, etc.
5. Do not exceed the specified volume of water for the product. The water droplets may splash into the secondary side. See page ❿ for information about separation characteristics.
6. If mist or condensation forms in the product, it may splash into the secondary side.

Operating environment and medium

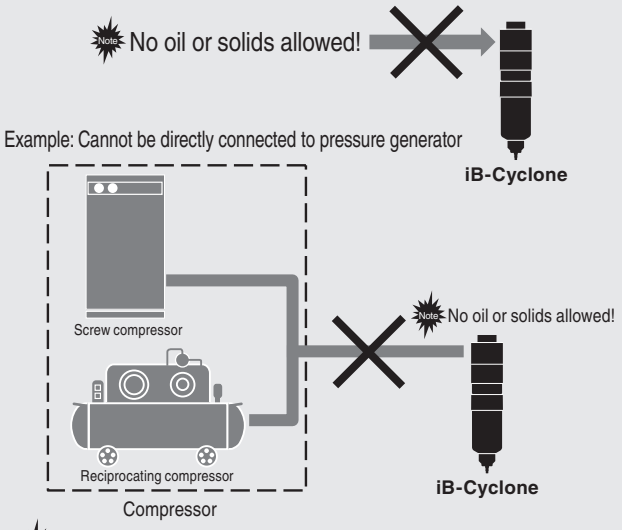
● Usable medium

1. Use cleaned air (filtered to below 40 μm) for the medium. If you are considering using something other than cleaned air, contact the nearest Koganei sales office or overseas department.
2. Air that is mixed with oil or solids cannot be used.

Note Using air that contains oil or solids may cause the product to stop functioning, may lower performance, or shorten the service life.

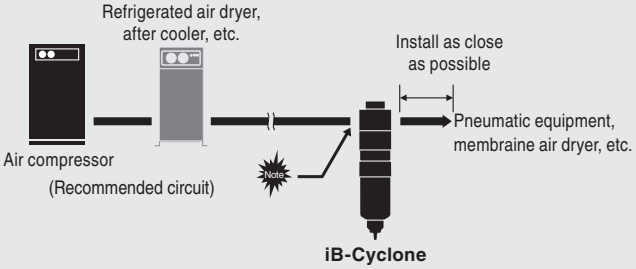
Mounting and Piping

⚠ CAUTION Air must be free from oil and solids before use.



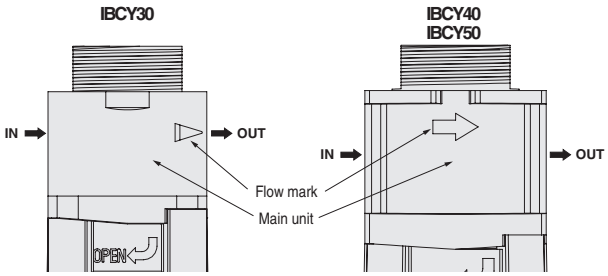
Note Perform sufficient countermeasures to remove oil and solids from air when using iB-Cyclone.
If countermeasures are not performed, the performance of the device will fall dramatically, air will leak, and it will not work well.

⚠ CAUTION iB-Cyclone cannot remove humidity.



Note
1. The iB-Cyclone is for removing water. Steam in pressurized air cannot be removed (dehumidifying cannot be done). Use a membrane air dryer or something on the secondary side if dehumidifying is needed.
2. Place a device to lower the supplying air from the ambient temperature, by using a refrigerated air dryer or after cooler in the air line so condensation does not occur in the secondary side of piping of the iB-Cyclone. Also, install the iB-Cyclone as close as to the using pneumatic equipment.

1. Install in a location where the air supply and the ambient temperature is under 60 °C [140 °F].
2. Install vertically so the piping connection portion is up and the drain outlet is down.
3. Allow enough space to easily do maintenance tasks, such as turning the guard button and attaching and removing the bowl.
4. Tighten the mounting ring to less than 3.0 N·m when installing the bracket.
5. Connect the piping so the air flows in the direction of the arrow (flow mark) on the product. The water removal function will be ineffective if the flow is reversed.



6. Do not place any weight of the product's piping or apply excessive torque on the product. When tightening the piping, hold the main unit and tighten it to the torque recommended in the diagram below.

Recommended tightening torque N·m [ft·lbf]

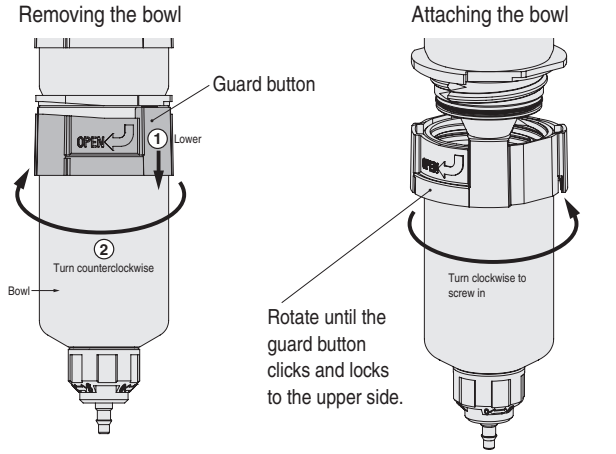
Connecting thread	1/8	1/4	3/8	1/2
Torque	7～9 [5.2～6.6]	12～14 [8.9～10.3]	22～24 [16.2～17.7]	28～30 [20.7～22.1]

7. Large moment and vibration are easily transmitted from steel or non-flexible piping, place a flexible hose between the product and the piping to prevent this from affecting the product.

● Periodic maintenance

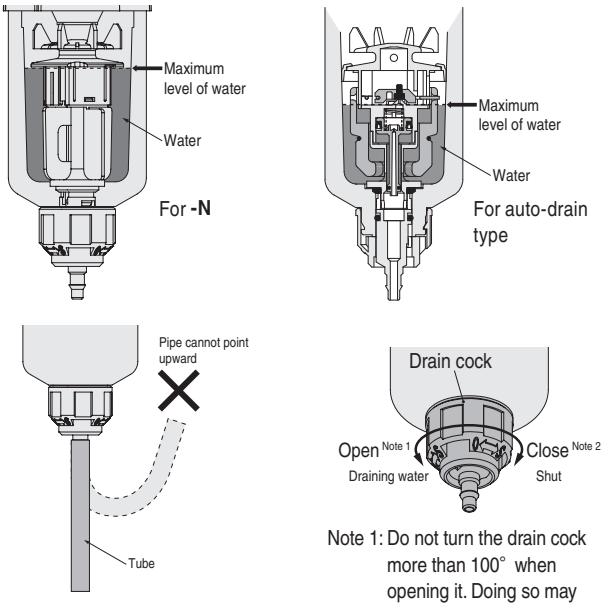
Bowl

1. Do periodic inspections to look for cracks, scratches, or other deterioration in the bowl (clear plastic part).
2. If you find any cracks, scratches, or other deterioration, replace the bowl with a new one, because it may cause a breakdown. See page ❾ for information about ordering bowls.
3. Replace the bowl with a new one if it becomes dirty or the transparency is reduced. To wash the bowl, use diluted household neutral detergent to wash it and then rinse it off with water.
4. Remove and replace the bowl as shown in the diagram below (release all pressure from inside the product before starting work).



Drain cock

1. If the volume of water is greater than that shown in the left side diagram below, the water removal function is greatly reduced. Be sure to drain before the water volume reaches the level shown in the left side diagram below. Turn the drain cock with your hand in the case.
2. A tube with an inner diameter of ϕ4 [0.157 in] can be attached to the drain cock. Make sure the drain cock is closed (locked) before attaching the tube. Do not allow tubing to become severely bent or twisted in the vicinity of the fitting. Lateral force may damage the fitting. Do not point the pipe upward and use a pipe that is under 5 m [16.4 ft].
3. If you are using the auto-drain type, the water that collects on the primary side is flushed all at once. If collected water exceeds the maximum level in the right of the diagram below, it could lead to a malfunction. Be careful that it does not exceed the maximum level.

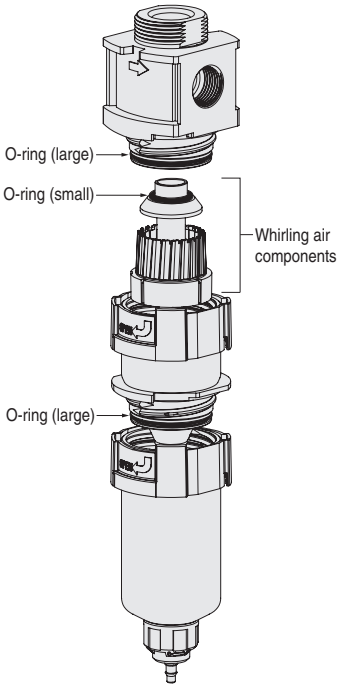


Note: Cut the end of the tube connected to the fitting straight across, and insert completely and securely as shown in the diagram. Also, after installing it, lightly pull it to confirm that it does not come out.

Note 1: Do not turn the drain cock more than 100° when opening it. Doing so may damage the drain cock.
2: When closing the drain cock, rotate it firmly until it clicks and locks.

Whirling air components

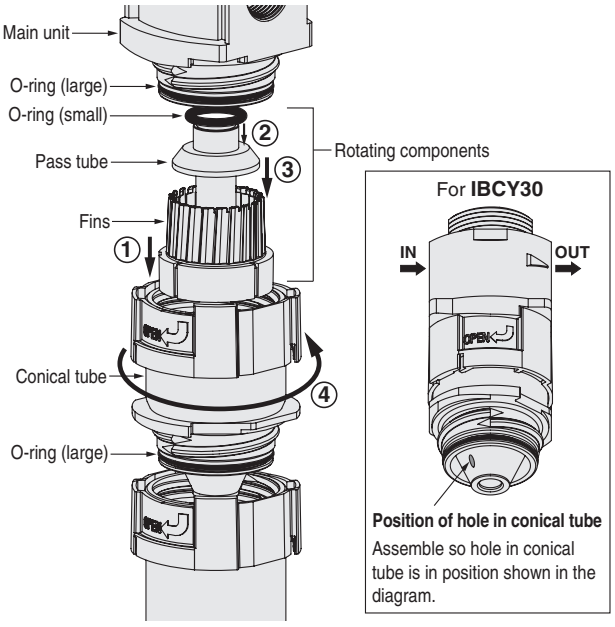
1. Dust collecting in the whirling air components reduces the separation function. If this happens, disassemble and wash the product to remove the dust as shown in the diagram below (release all pressure from inside the product before starting work).
2. Use a Seal Kit to replace the o-rings when reassembling the whirling air components. See page ❾ for information about ordering Seal Kits.



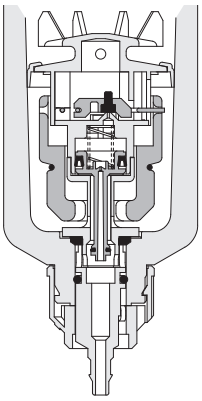
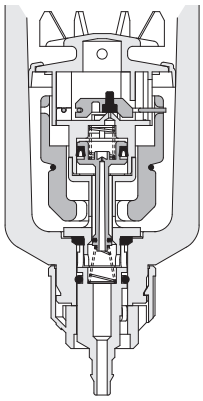
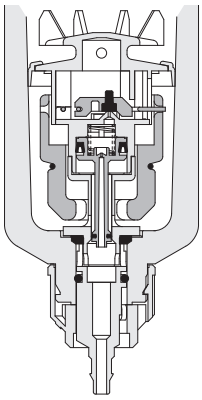
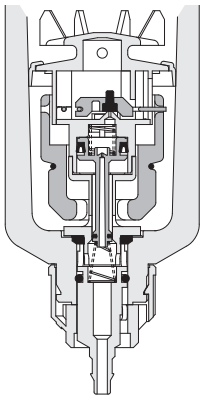
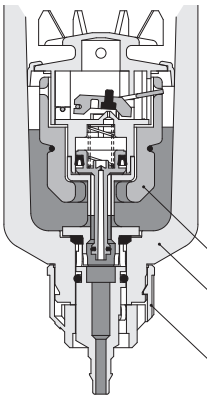
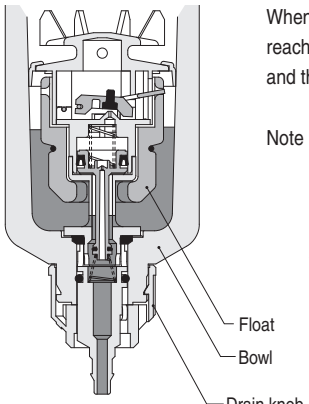
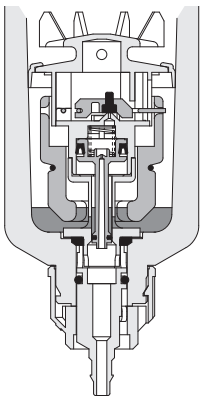
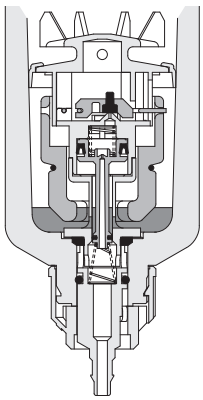
Assembly method

Reassemble according to the following procedure.

① Insert the fins into the conical tube and press them in with your hand.
② Attach a new o-ring (small) to the pass tube.
③ Fit the pass tube to the fins (fit it so it touches the seating of the fins).
④ Replace the two o-rings (large) and connect the conical tube to the main unit.



● Explanation of operation of auto drain system

State \ Type	NO type	NC type
Not pressurized	 Open When unpressurized, the water outlet opens and the water drains naturally.	 Close When unpressurized, the water outlet closes and the water cannot drain. Note: Water does not drain when unpressurized, if there is a lot of water even in an unpressurized (low pressure) condition, it may be necessary to drain the water by hand.
Pressurized	 Close Air and water will be discharged from the water outlet until the pressure exceeds the minimum operating pressure (0.15 MPa [22 psi]). The air and water will stop after stored pressure exceeds the minimum operating pressure. Note: A compressor with a small discharge volume may not reach full pressure, as there is exhaust air until the minimum operating pressure is exceeded.	 Close In the same way, when unpressurized, the water outlet closes and the water cannot drain.
Draining water	 Open When the level of water in the bowl reaches a specified level, the float lifts and the water automatically drains. Note: Water can be drained manually by turning the drain knob counterclockwise. See page ❻ for details.	 Open When the level of water in the bowl reaches a specified level, the float lifts and the water automatically drains. Note 1: Supply pressure is needed to operate the auto drain. A minimum of 0.15 MPa [22 psi] is needed for the supply pressure. 2: Water can be drained manually by turning the drain knob counterclockwise. See page ❻ for details.
Draining water completed	 Close When the water drains, the float lowers and the water outlet closes, and water stops draining.	 Close When the water drains, the float lowers and the water outlet closes, and water stops draining.

●About the chemical resistance of polycarbonate

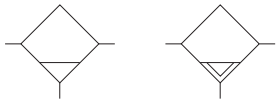
The chemicals in the following table degrade polycarbonate. They may damage the bowl and cause an accident. Do not allow the following chemicals into the compressed air or the environment around the product, do not allow them to contact the product. This does not mean that polycarbonate is chemically resistant to all chemicals not listed below.

Type	Classification	Chemical name	Application example
Inorganic compound	Acid	Hydrochloric acid, sulfuric acid, nitric acid, fluorine, phosphoric acid, chromic acid	Coating processing, acid degreasing, and pickling of metals
	Alkali	Caustic soda, caustic potash, hydrated lime, aqueous ammonia, sodium carbonate	Alkaline degreasing of metals
	Inorganic salt	Sodium sulfide, potassium nitrate, potassium dichromate, sodium nitrate	Dyes, rust inhibitor
Organic compounds	Aromatic hydrocarbons	Benzene, toluene, xylene, ethylbenzene, styrene	Paint thinner (benzene, toluene, xylene)
	Chlorinated aliphatic hydrocarbons	Methyl chloride, ethylene chloride, methylene chloride, acetylene chloride, chloroform, trichlene, tetrachloroethylene, carbon tetrachloride	Organic solvents for metal cleaning (trichlene, tetrachloroethylene, carbon tetrachloride)
	Chlorinated aromatic hydrocarbons	Chlorobenzene, dichlorobenzene, benzene hexachloride (BHC)	Agricultural chemicals
	Petroleum components	Solvent, naphtha, gasoline	Fuel
	Alcohol	Methyl alcohol, ethyl alcohol, cyclohexanol, benzyl alcohol	Anti-freezing agents
	Phenol	Carbolic acid, cresol, naphthol	Antiseptic solutions
	Ether	Methyl ether, methylethyl ether, ethyl ether	Brake fluid additive, detergent
	Ketones	Acetone, methyl ethyl ketone, cyclohexane, acetophenone	Cleaning solutions
	Carboxylic acid	Formic acid, acetic acid, butyl acid, acrylic acid, oxalic acid, phthalic acid	Dyes, aluminum processing solution (oxalic acid), paint base (phthalic acid)
	Phthalic acid ester	Dimethyl phthalate (DMP), diethyl phthalate (DEP), dibutyl phthalate (DBP), dioctyl phthalate (DOP)	Lubricants, synthetic hydraulic fluids, rust inhibitor additives, synthetic resin plasticizer
	Oxyacid	Glycolic acid, lactic acid, malic acid, citric acid, tartaric acid	Food preservatives, acidifiers
	Nitro compounds	Nitromethane, nitroethene, nitro ethylene, nitrobenzene	Paint medium, explosives
	Amine	Methylamine, dioctylamine, ethylamine, aniline, acetanilide	Brake fluid additive
	Nitrile	Acetonitrile, acrylonitrile, benzonitrile	Nitrile rubber materials

iB-Cyclone

IBCY30, IBCY40, IBCY50

Symbol



Auto drain type

Specifications

Item \ Model		IBCY30	IBCY40	IBCY50
Medium		Air (Air containing no oil or solids)		
Port size	Rc	1/8, 1/4	1/8, 1/4, 3/8	1/4, 3/8, 1/2
Maximum operating pressure	MPa [psi]	1.0 [145]		
Proof pressure	MPa [psi]	1.5 [218]		
Operating temperature range (ambient and medium)	℃ [°F]	0～60 [32～140]		
Water separation rate Note 1	%	99 or more		
Water collection volume (for **-N**)	mℓ	13	16	27
Maximum flow rate Note 2	ℓ /min [ft³/min] (ANR)	850 [30.0]	1500 [53.0]	2800 [98.8]
Materials used in major parts	Main unit	Die cast aluminum alloy		
	Bowl	Polycarbonate		
	Bracket	Steel plate (electroless nickel plated)		
Mass (standard product, maximum port size)	kg [oz]	0.15 [5.3]	0.20 [7.1]	0.30 [10.6]
Options		Bracket		

Note 1: According to Koganei measurement conditions.

2: Maximum flow rate in an environment with 0.5 MPa [73 psi] and 0.1 MPa [14.5 psi] pressure drop (maximum port size piping). Check the graphs of characteristics on each ⑩ page when making a decision.

Order Codes

IBCY □ – □ – □ – □

Bracket
Blank — No bracket
B — With bracket

Drain cock specifications
A — NO type auto drain drain cock
C — NC type auto drain drain cock
N — Drain cock with fitting

Main unit Model	Port size Rc1/8	Rc1/4	Rc3/8	Rc1/2
30	01	02		
40	01	02	03	
50		02	03	04

iB-Cyclone

Order codes for brackets only

8Z-CBK

∗Common to all body sizes

Maintenance parts

●Bowl assembly

BA-IBCY□-□

Drain cock specifications
A — NO type auto drain drain cock
C — NC type auto drain drain cock
N — Drain cock with fitting

Body size
30 — **for IBCY30**
40 — **for IBCY40**
50 — **for IBCY50**

∗If the body size is the same, you can purchase the bowl assembly and change the drain cock with another specification one.

Auto drain type

With fitting

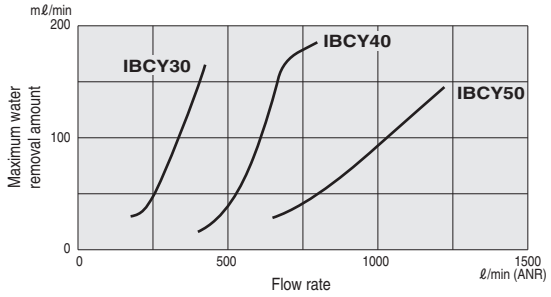
●Seal kit (o-ring (large) 2 pcs., o-ring (small) 1 pc.)

SRK-IBCY□

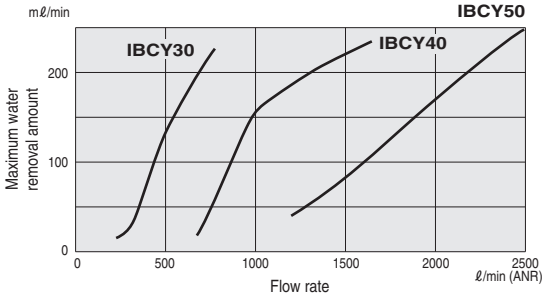
Body size
30 — **for IBCY30**
40 — **for IBCY40**
50 — **for IBCY50**

Separation characteristics

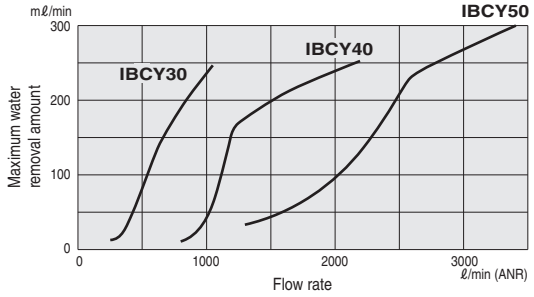
●0.1 MPa [15 psi]



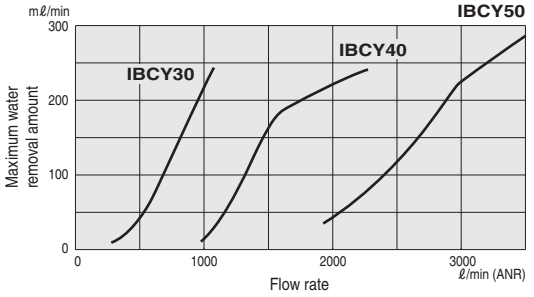
●0.3 MPa [44 psi]



●0.5 MPa [73 psi]



●0.7 MPa [102 psi]

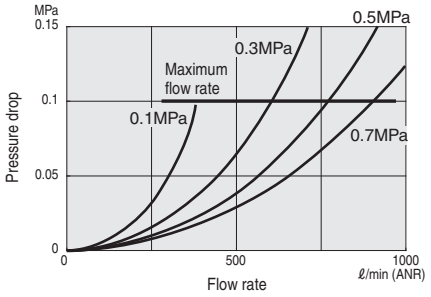


Note: The maximum amount of water removed from a volume of air in a process depends on the conditions of usage (this graph is not a guarantee). Use it as a guideline for your selection.

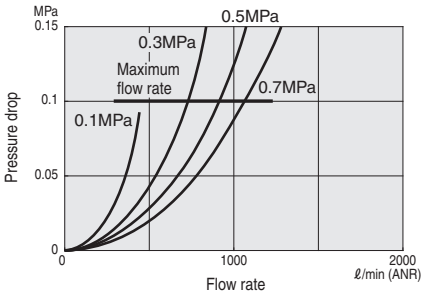
1 m ℓ /min = 3.53 x 10^{-5} ft^3/min,
1 ℓ /min = 0.0353 ft^3/min

Flow rate characteristics

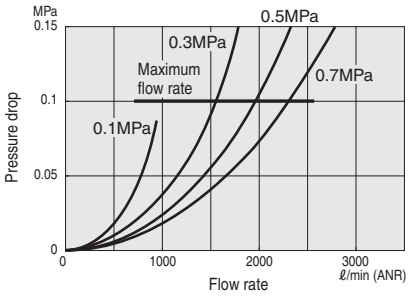
IBCY30-01



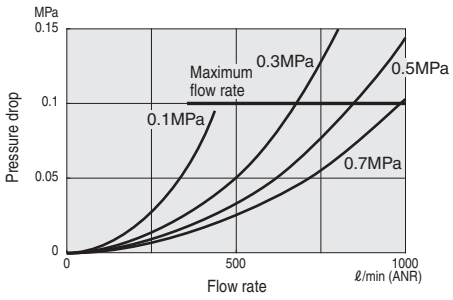
IBCY40-01



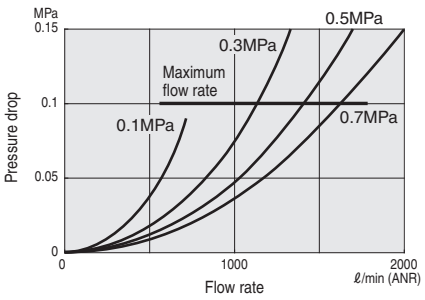
IBCY50-02



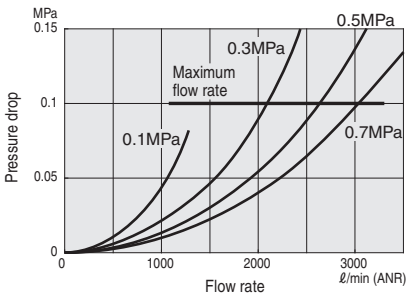
IBCY30-02



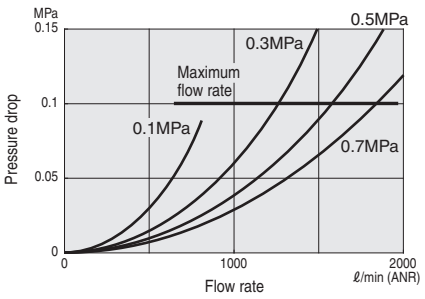
IBCY40-02



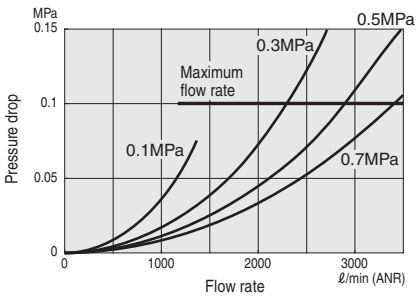
IBCY50-03



IBCY40-03

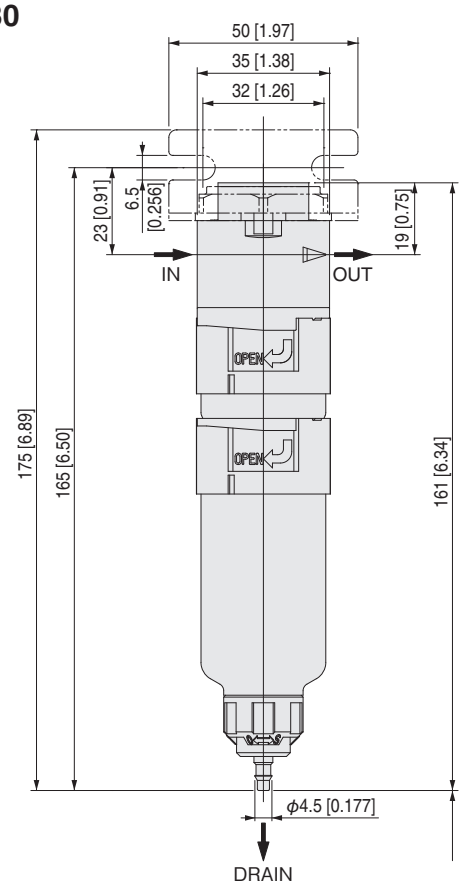


IBCY50-04

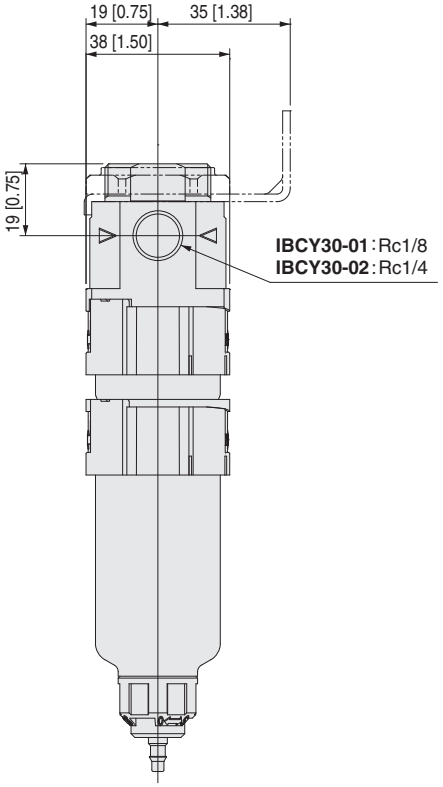


1 MPa = 145 psi
1 ℓ /min = 0.0353 ft^3/min

IBCY30

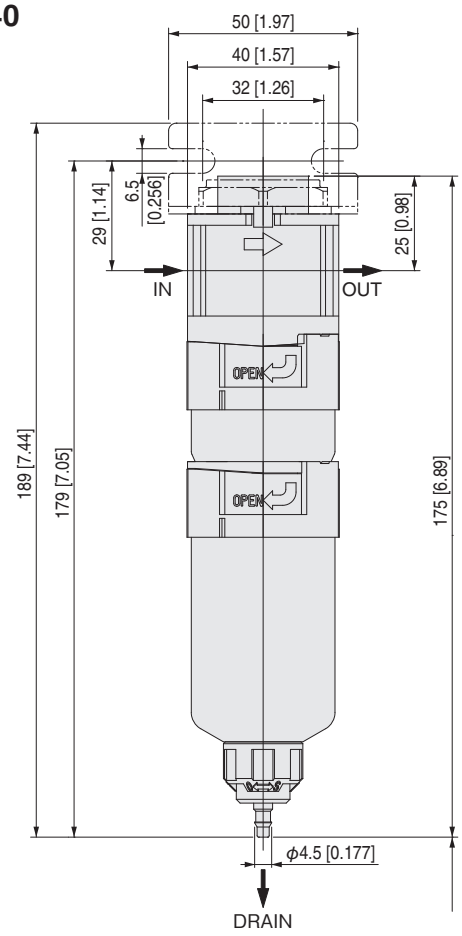


Maintenance space
30 [1.18] or over

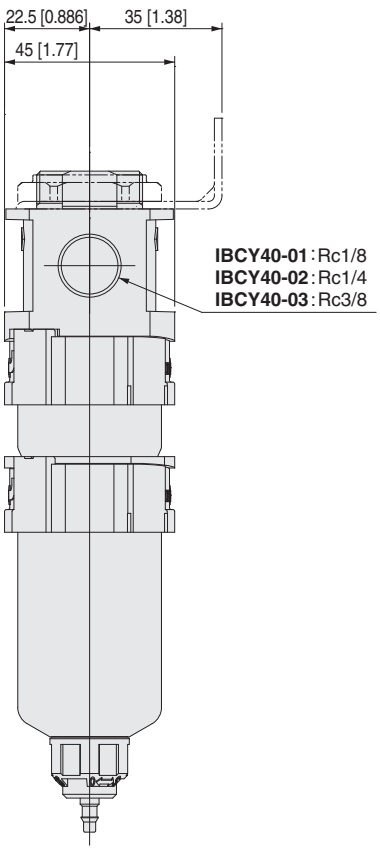


IBCY30-01 : Rc1/8
IBCY30-02 : Rc1/4

IBCY40

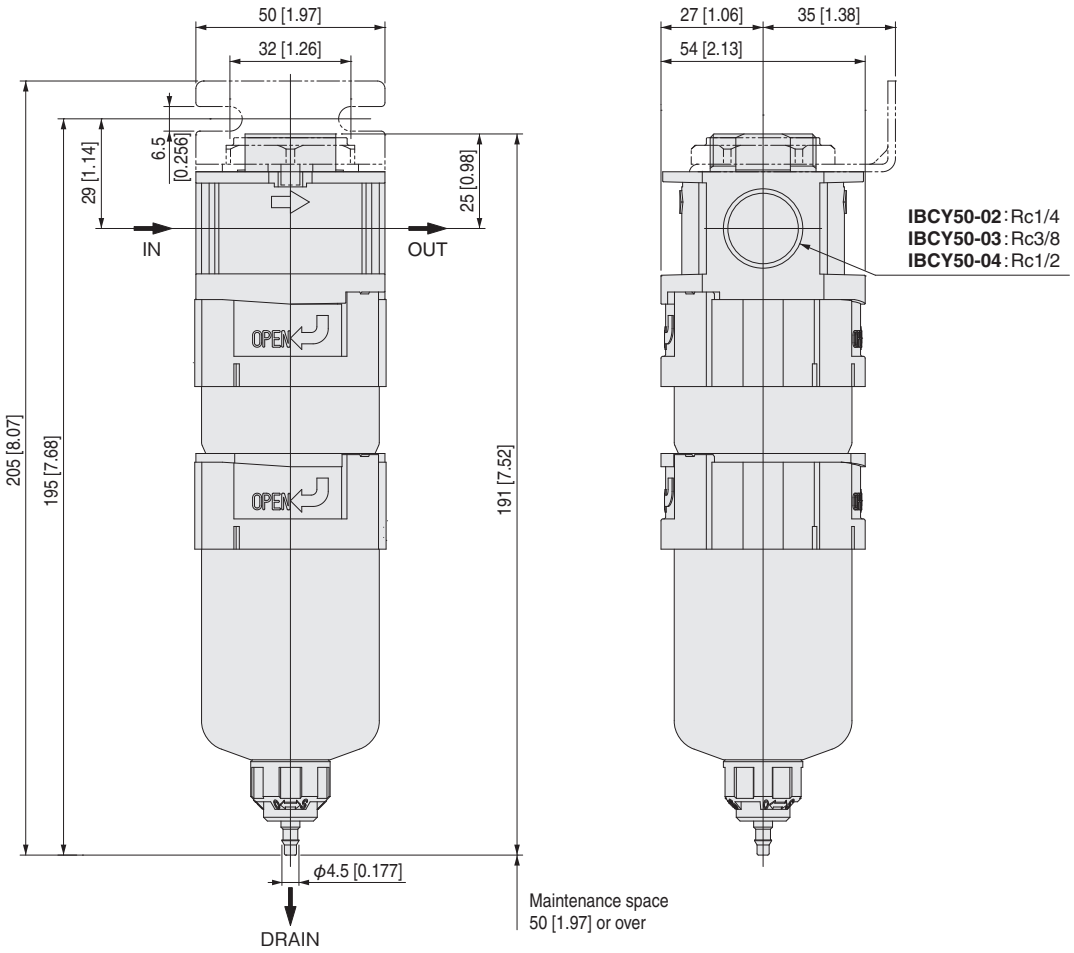


Maintenance space
40 [1.57] or over



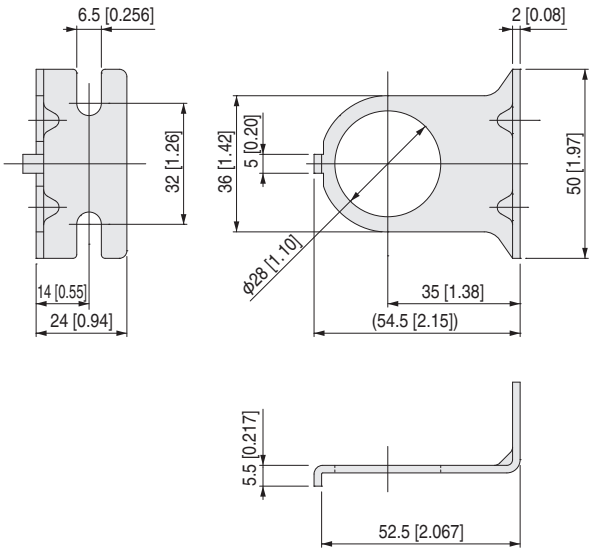
IBCY40-01 : Rc1/8
IBCY40-02 : Rc1/4
IBCY40-03 : Rc3/8

IBCY50

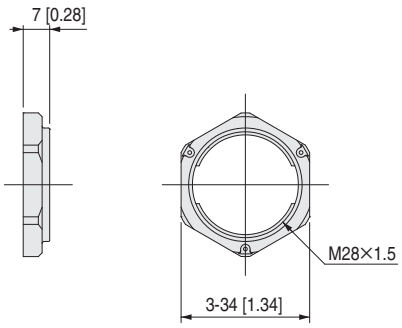


8Z-CBK

Bracket



Mounting ring



Memo

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.

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12/'12 30 AB

New release

Solenoid Valves F Series Easy Assembly Type Manifold

Easy Assembly Type

A new connector type manifold has been added to the F10/F15 series solenoid valves.

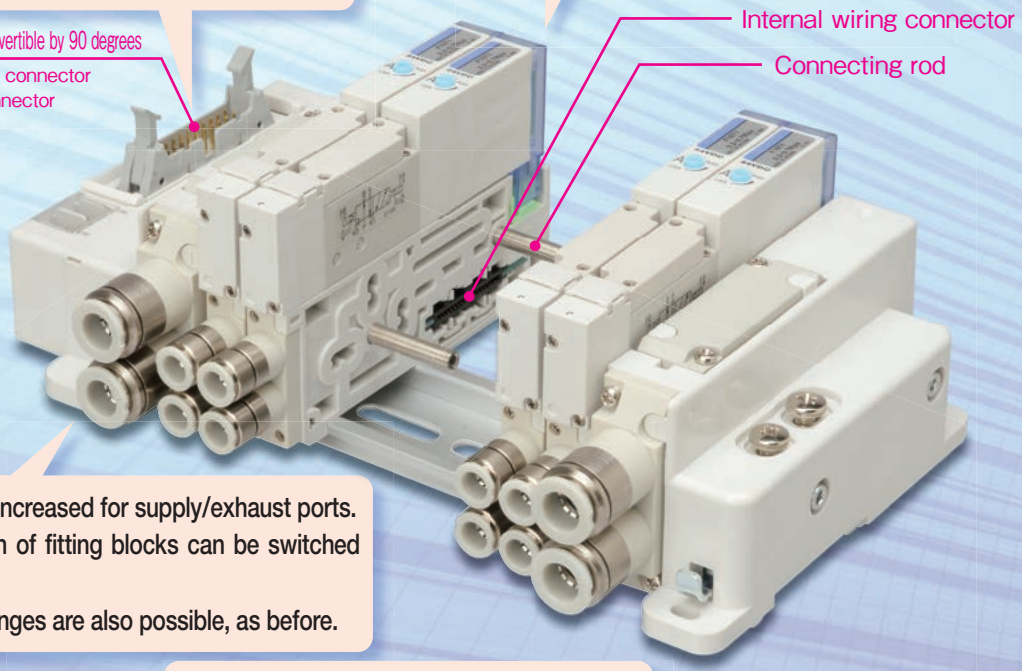
This allows for easy addition, removal, and assembly, as the internal wiring is connected simply by linking the manifold bases.

Direction conversion is possible without connector disassembly. A knob can be turned 90 degrees to change the direction of the wiring.

Patent pending

Direction convertible by 90 degrees
Flat cable connector
D-sub connector

Negative common specifications type can also be selected.



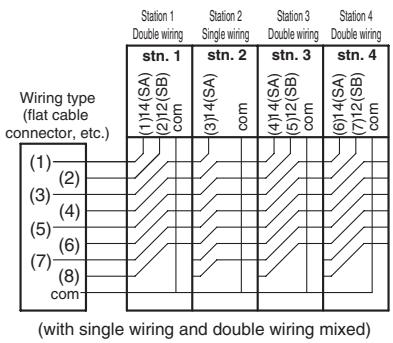
The degree of freedom has been increased for supply/exhaust ports. With one-side piping, the position of fitting blocks can be switched between left and right.
Base piping and direct piping changes are also possible, as before.

An optional stop valve can be selected for the non-plug-in type.

Connector wiring

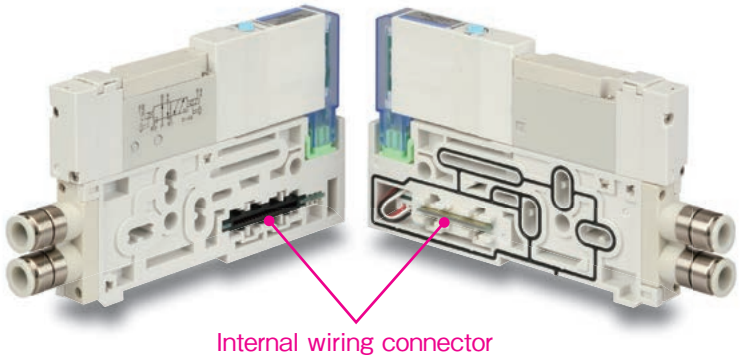
For both single wiring and double wiring, simply connecting a valve base assembly enables the valve signals on the wiring side to be assigned in order. No wiring work is required at all.

Internal wiring example



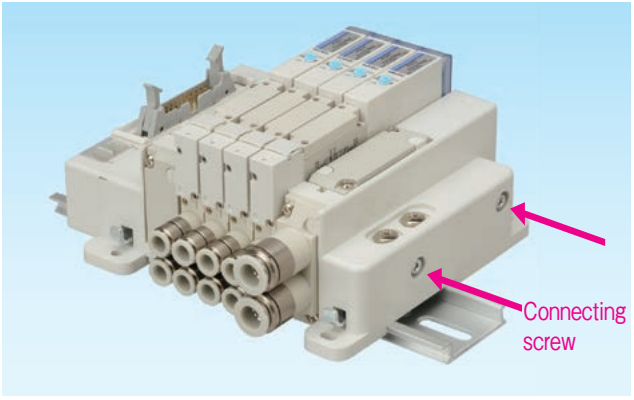
(with single wiring and double wiring mixed)

Internal wiring connectors

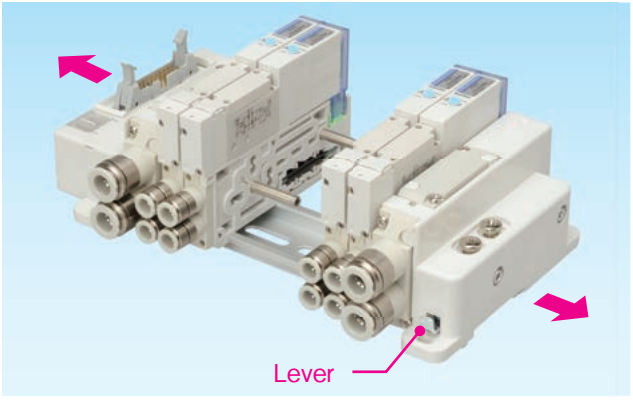


Method for adding and removing manifolds (see page 36 and page 37 for details)

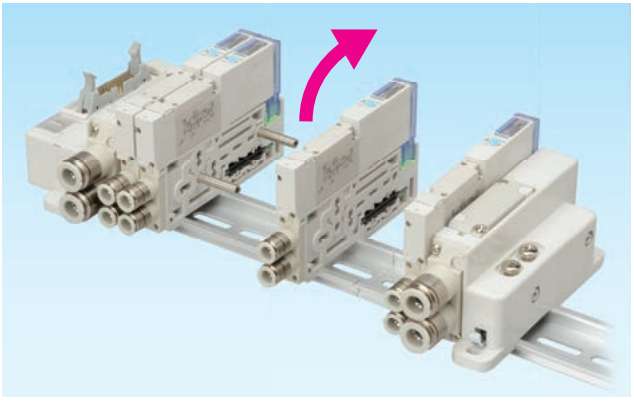
① Remove the connecting screw from the right end block. (If there is a DIN rail, loosen the DIN rail fixing screw.)



②Disassemble the manifold into two sides while pushing the lever on the DIN bracket. (only when there is a DIN bracket)



③ Remove the valve from the connecting rod.



④When adding:Install the connecting rod included with the valve to add, and insert the valve to add.

⑤When removing:Remove the valve, and switch the connecting rod to the new length.

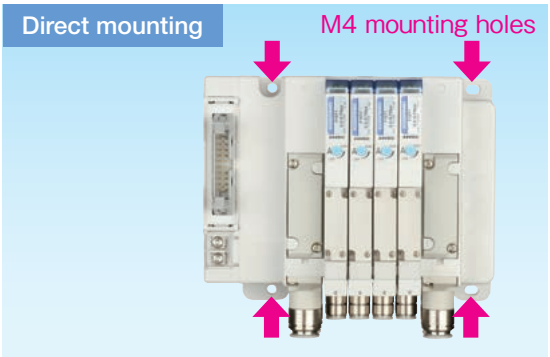
⑥Return the right end block to its original position and tighten the connecting screw. Then, tighten the DIN rail fixing screw.

Two installation methods available

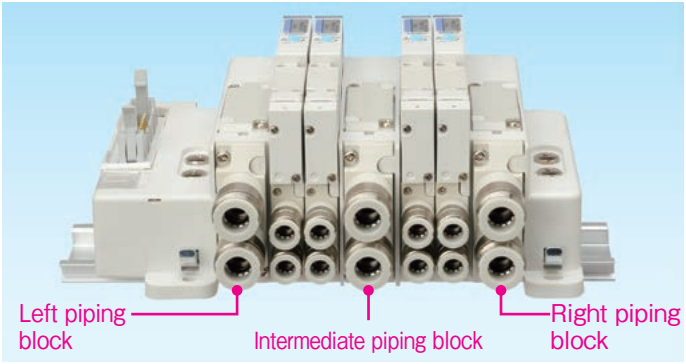
Select either DIN rail mounting or direct mounting (using the four main unit mounting holes).

DIN rail mounting

Direct mounting



The intermediate piping block can now be selected when ordering.



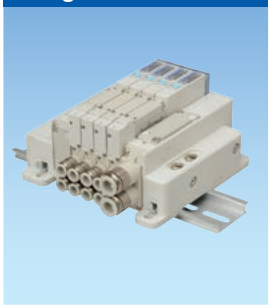
- Reduce risk of flow rate shortage.
- Three different air pressures can be supplied by using port isolators.

Easy Assembly Type Manifold Non-Plug-in Type (F10/F15)

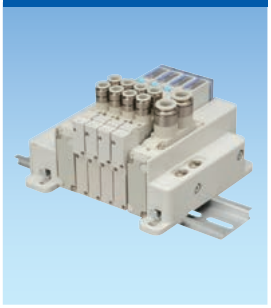
Enables easy addition or removal of manifold blocks. Direct mounting (mounting without DIN rail) is selectable.

F10 Series Order codes Page 98
F10 Series Dimensions Page 130
F15 Series Order codes Page 184
F15 Series Dimensions Page 216

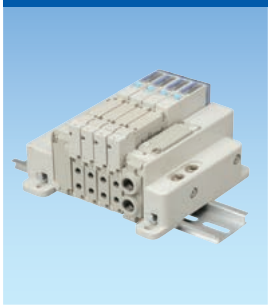
Manifold port with fitting block



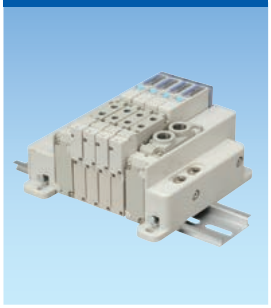
Valve port with fitting block



Manifold port with female thread block



Valve port with female thread block

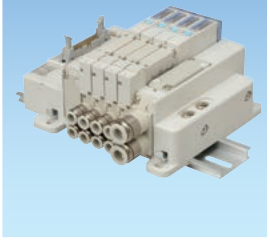


Easy Assembly Type Manifold Plug-in Type (F10/F15)

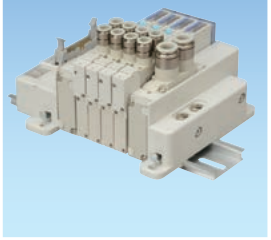
Manifold conforms to reducing wiring work, and enables easy addition or removal of manifold blocks.
Direct mounting (mounting without DIN rail) is selectable.
Combination use of five wiring specifications offers more effective wiring savings.

F10 Series Order codes Page 104
F10 Series Dimensions Page 132
F15 Series Order codes Page 190
F15 Series Dimensions Page 218

Manifold port with fitting block



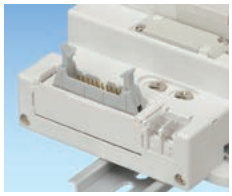
Valve port with fitting block



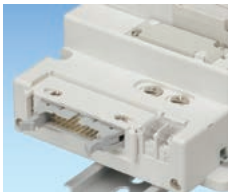
Manifold port with female thread block

Valve port with female thread block

Wiring Specifications(F10/F15)



Flat cable connectortop surface (vertical) wiring type Note

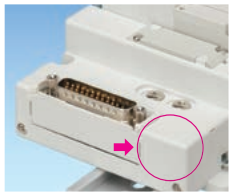


Flat cable connector side surface (horizontal) wiring type Note

D-sub connector top surface (vertical) wiring type Note

D-sub connector side surface (horizontal) wiring type Note

Terminal block



Photograph shows D-sub connector.

For the flat cable connector and D-sub connector, the no power supply terminal type is also available.

Note: You can easily change the connector direction.

Patent pending

Easy Assembly Type Manifold Serial Transmission Type (F10/F15)

- For CC-Link
- For CompoNet
- For DeviceNet
- For EtherCAT
- For EtherNet/IP

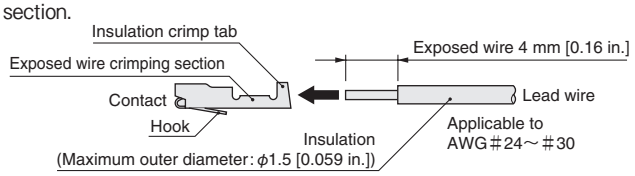
※For details, see p. 42-44.

F10 Series Order codes Page 110
F10 Series Dimensions Page 137
F15 Series Order codes Page 196
F15 Series Dimensions Page 223

For EtherCAT
For EtherNet/IP

4. Crimping of lead wire and contact

To crimp lead wires into contacts, strip off 4 mm [0.16 in.] of the insulation from the end of the lead wire, insert it into the contact, and crimp it. Be sure to avoid catching the insulation on the exposed wire crimping section.



Cautions: 1. Do not pull hard on the lead wire.
2. For crimping of lead wire and contact, always use a dedicated tool.
Contact: Model 706312-2MK Manufactured by Sumiko Tech, Inc.
Crimping tool: Model F1 (for 706312-2MK) Manufactured by Sumiko Tech, Inc.

5. Common connector assembly

Using a common connector assembly for solenoid valves for a manifold provides common wiring for all the solenoid valves and greatly reduces wiring work.
The common connector assembly types are determined by looking at them from the lead wire side; the right end one is A type, the left end one is C type, and all the others are B type (see the illustration below).

● **For positive common**

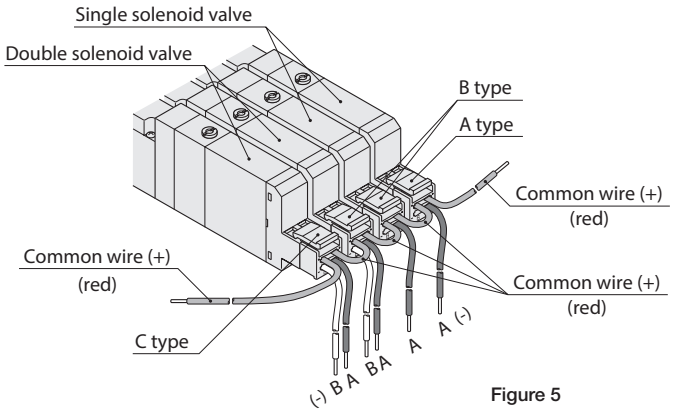


Figure 5

● **For negative common**

You can order the separately sold common connector assembly for use with negative common specification.

Note: Cannot be used with the conventional series (black coil).

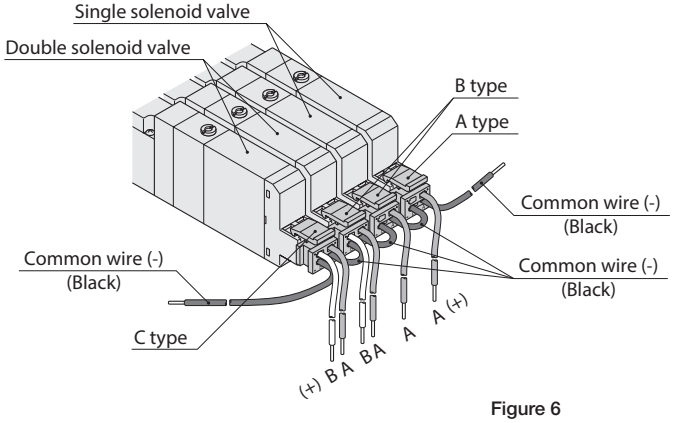
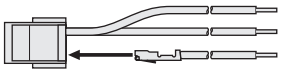


Figure 6

If ordering the common connector assembly, order from the common connector assemblies listed below.

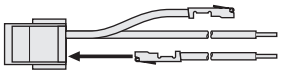
● **For positive common**

A type Model: JAZ-PA□※



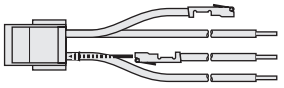
Red Common wire (+)
Black A side (−)
White B side (−) (Insert when using as a double solenoid)

B type Model: JAZ-PB□※



Red Common wire (+)
Black A side (−)
White B side (−) (Insert when using as a double solenoid)

C type Model: JAZ-PC□※



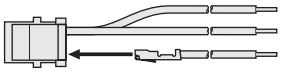
Red Common wire (+)
Black A side (−)
White B side (−) (Insert when using as a double solenoid)
Red Common wire (+)

Note: White lead wire is not available for **JAZ0-P□□**.

※ Lead wire length **Blank**: 300 mm [11.8 in.]
3: 3000 mm [118 in.]

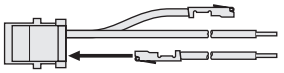
● **For negative common**

A type Model: JAZ-MA□※



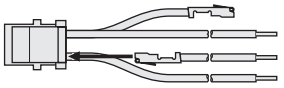
Black Common wire (−)
Rad A side (+)
White B side (+) (Insert when using as a double solenoid)

B type Model: JAZ-MB□※



Black Common wire (−)
Rad A side (+)
White B side (+) (Insert when using as a double solenoid)

C type Model: JAZ-MC□※



Black Common wire (−)
Rad A side (+)
White B side (+) (Insert when using as a double solenoid)
Black Common wire (−)

Single negative common plug connector unit
Model: JAZ-CM□※

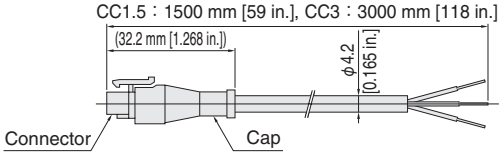
※ Lead wire length **Blank**: 300 mm [11.8 in.]
3: 3000 mm [118 in.]

6. Color identification for the positive common, negative common, single wiring, and double wiring on the easy assembly type manifold plug-in type

Color identification of specifications listed below is possible via a small window on the solenoid side of the valve base.

Blue: Positive common single wiring
Green: Positive common double wiring
Pink: Negative common single wiring
Gray: Negative common double wiring

7. Cabtyre cable



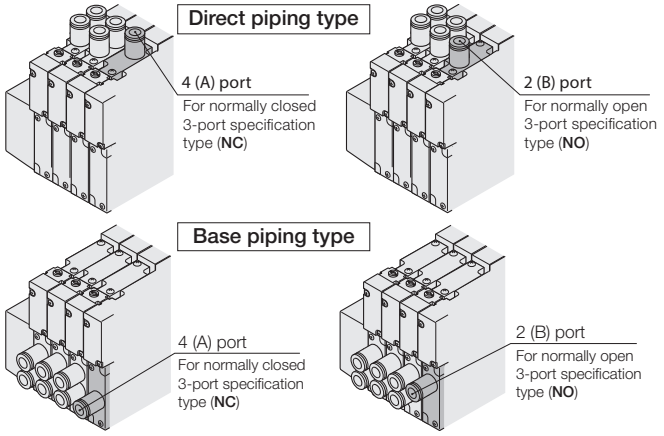
Caution: Exercise caution that this is not dust-proof and drip-proof specification.

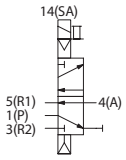
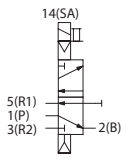
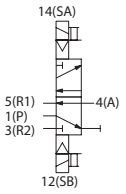
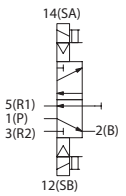
3-port valves

While the F series is a 5-port valve (excluding tandem 3-port valve), it can be used as a normally closed (NC) or normally open (NO) 3-port valve by plugging one of either outlet port 4(A) or 2(B). In this case, leave the exhaust ports 3(R2) and 5(R1) open for use. It can also be used as a double solenoid type 3-port valve.

When using a single use fitting block or female thread block for 3-port

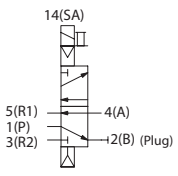
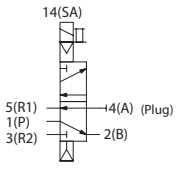
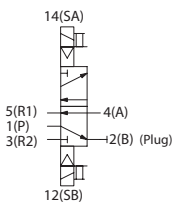
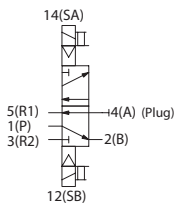
In the F10 and F15 series, a single use fitting block and female thread block for 3-port with one plugged port can be selected at the time of order. (Note: Not available for F18 series.)



Fitting type	- ※※ A	- ※※ B
Switching type	Normally closed (NC)	Normally open (NO)
For single solenoid setting		
For double solenoid setting		

When using a plug

The F10, F15, and F18 series can be used as either a normally closed (NC) or normally open (NO) 3-port valve by plugging either outlet port of 4(A) or 2(B).

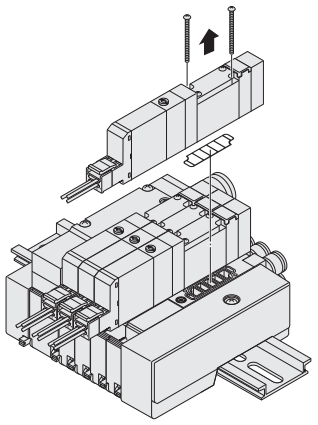
Plug position	When the 2(B) port is plugged	When the 4(A) port is plugged
Switching type	Normally closed (NC)	Normally open (NO)
For single solenoid setting		
For double solenoid setting		

Manifold

Attaching and removing valves

To remove the valve body from the sub-base or manifold, loosen the valve mounting screws (2 places), and lift it up in the direction of the arrow (see the illustration at right). To install it, reverse the above procedure. The recommended tightening torques for the valve mounting screws are as shown below.

※ Illustration shows the F10 series (split manifold).



N·cm [in·lbf]

Series	Recommended tightening torque
F10	17.6 [1.6]
F15	49.0 [4.3]
F18	49.0 [4.3]

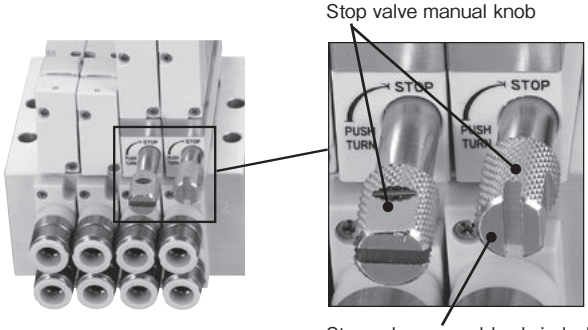
Precautions for using manifold

Observe the following precautions when using the split type, split type serial transmission type, easy assembly type and easy assembly type serial transmission type (except for the monoblock manifold and PC board manifold).

- When using the direct piping type manifold
  Avoid using valves at an operating frequency exceeding 2 Hz, as such use can result in heat-related breakdowns.
- When using the base piping type manifold
  When plugs have been attached on the 4(A) and/or 2(B) ports, avoid using valves at an operating frequency exceeding 2 Hz, as such use can result in heat-related breakdowns.

Stop valve usage procedure (F10, F15 series)

Mount a stop valve on a manifold to stop the air supply to valves on the individual station. For the operation procedure, use a small screwdriver or the hand to press down and rotate the stop valve manual knob clockwise 90 degrees to lock in place, shutting off the air supply. In the locked position, rotate the stop valve manual knob counterclockwise 90 degrees, and air pressure returns the stop valve manual knob to its original position, releasing the lock. Note that use of the stop valve reduces the flow rate volume by about 30%.



Cautions:
1. Do not disassemble the stop valve.
2. When using a stop valve to remove the valve, be careful of residual pressure in the affected station.
3. When using a stop valve to remove the valve, be aware that exhaust from other stations can be exhausted through the stop valve's exhaust hole. If this will cause a problem during use, when ordering the manifold, select the back pressure prevention valve (**-E1**).
4. To use a stop valve in combination with a back pressure prevention valve, select the combination when ordering the manifold. The back pressure prevention valve (**F1□Z-E1**) in additional parts cannot be installed after purchase.
5. Do not release the locked stop valve manual knob when valves have been removed by using the stop valve.

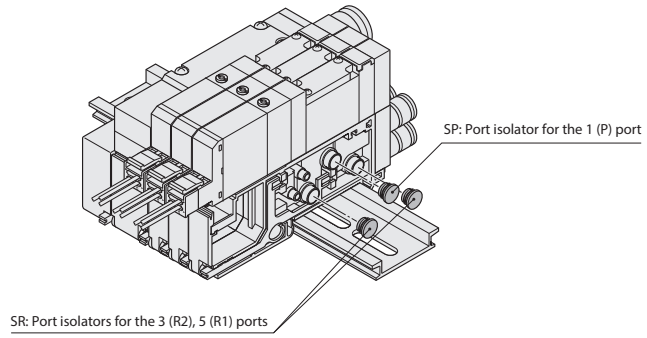
Port isolator

In the split manifold and the easy assembly type, installing port isolators to the 1(P), 3(R2) and 5(R1) ports between each station isolates the air path between stations equipped with port isolators and stations with smaller station numbers. However, a piping block must be placed on both ends.

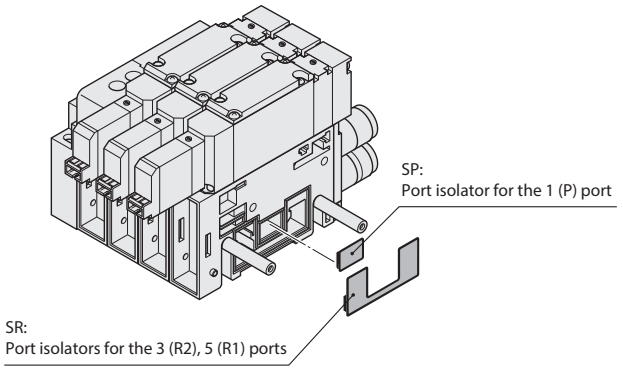
- ●Port isolator for the 1 (P) port — Can supply two different pressures
  - Model: Split manifold **F□Z-SP**
  - Easy assembly type **F□ZX-XSP**
- ●Port isolators for the 3 (R2), 5 (R1) ports — Can isolate exhaust air (prevents exhaust interference)
  - Model: Split manifold **F□Z-SR**
  - Easy assembly type **F□ZX-XSR**
- ●Port isolators for the 1 (P), 3 (R2), 5 (R1) ports — Can supply two different pressures, and can isolate exhaust air (prevents exhaust interference)
  - Model: Split manifold **F□Z-SA**
  - Easy assembly type **F□ZX-XSA**

※□ denotes valve size.

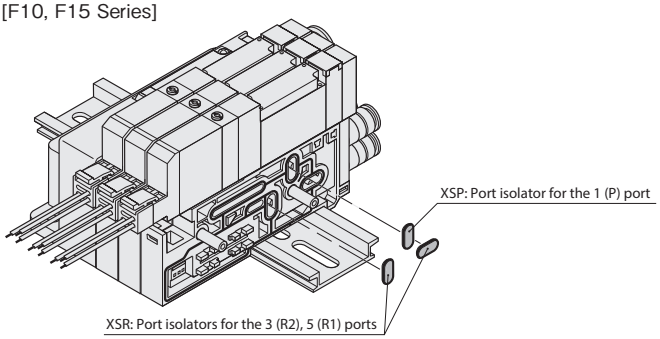
Split manifold
〔F10, F15 series〕



Split manifold
〔F18 series〕



Easy assembly type
[F10, F15 Series]



Caution: Installing port isolators requires the disassembly and re-assembly of manifolds. See the disassembly illustration, unit adding procedure, and cautions on p.30-37.
However, since the F18 series serial transmission compatible manifold cannot be disassembled, port isolators cannot be installed on it after purchase.

Precautions for the use of individual air supply and exhaust spacers

By mounting an individual air supply or exhaust spacer on the manifold, the air supply or exhaust can be operated individually on the unit. It is also effective in preventing erratic operation due to back pressure. Caution should be exercised when spacers are used, as the effective area is reduced by about 30%. If mounting additional spacers to an existing unit, observe the following items:

● Spacer mounting procedure (F10 split manifold, F10 and F15 easy assembly type)

① Loosen the valve mounting screws where the individual air supply or exhaust spacer will be installed, and remove the valve.
② Install the gaskets and exhaust valve provided with the individual air supply or exhaust spacer, and use the mounting screws provided to secure the valve on the manifold (see Fig. 7).

Remark: When attaching fittings to the F10 spacer, use the recommended fittings shown below:
TSH4-M5M, TSH4-M5, TSH6-M5M, TS4-M50, TS4-M5M

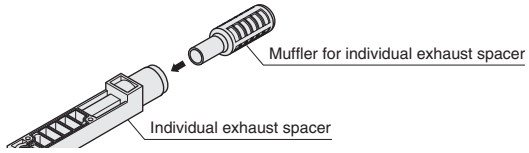
● Spacer mounting procedure (F15 and F18 split manifold)

① Loosen the valve mounting screws where the individual air supply or exhaust spacer will be installed, and remove the valve.
② Open the cover of the manifold, and pull out the plug-in connector in the near side direction (for the plug-in type) (see Fig. 8).
③ Insert the plug-in connector firmly into the connector attaching section of the individual air supply or exhaust spacer, and then close the cover, while watching to ensure that the lead wires are not caught by the cover (for the plug-in type) (see Fig. 9).
④ Attach the gasket and exhaust valve provided with the individual air supply or exhaust spacer, and use the mounting screws provided to mount the valve on the manifold.

Cautions: Locations where the spacers are mounted make the valve height higher by the height of the spacer (see the dimensions below).

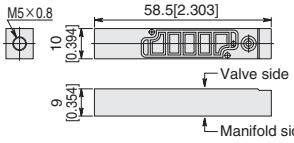
● Muffler for the individual exhaust spacer

A muffler for the individual exhaust spacer is available.
For dimensions, see p.129, 225, and 263.

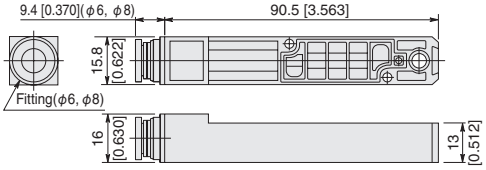


● Dimensions Unit: mm [in.]

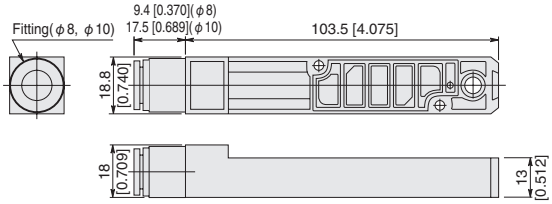
F10Z-N□□ (For F10 series) Mass 7 g [0.25 oz.]
F10ZX-XN□□ (For F10 easy assembly type)



F15Z-N□□ (For F15 series) Mass 26 g [0.92 oz.]
F15ZX-XN□□ (For F15 easy assembly type)



F18Z-N□□ (For F18 series) Mass 41 g [1.45 oz.]



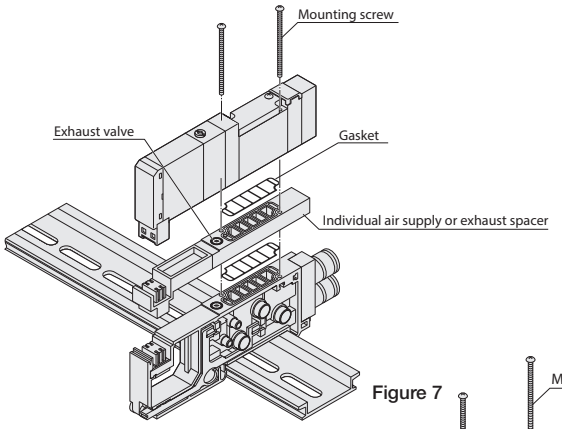


Figure 7

F10 series
(Illustration shows the split manifold plug-in type)
*The same applies for the F10 and F15 easy assembly type plug-in type.

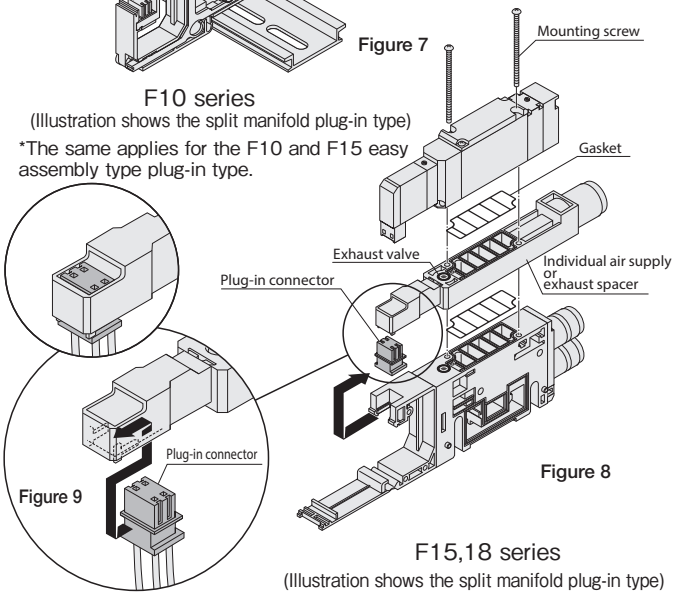
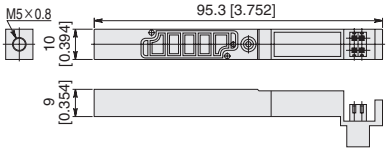


Figure 9

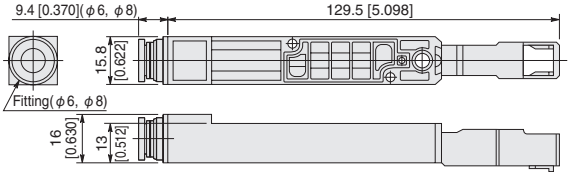
Figure 8

F15,18 series
(Illustration shows the split manifold plug-in type)

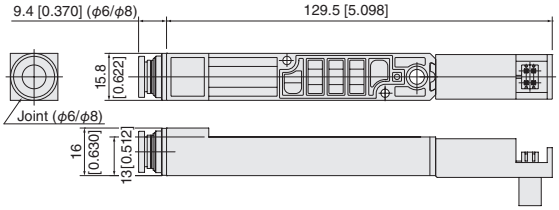
F10Z-P□□ (For F10 series) Mass 9 g [0.32 oz.]
F10ZX-XP□□ (For F10 easy assembly type)



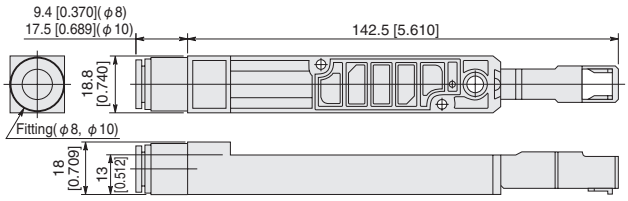
F15Z-P□□ (For F15 series) Mass 29 g [1.02 oz.]



F15ZX-XP□□ (For F15 easy assembly type) Mass 32 g [1.129 oz.]



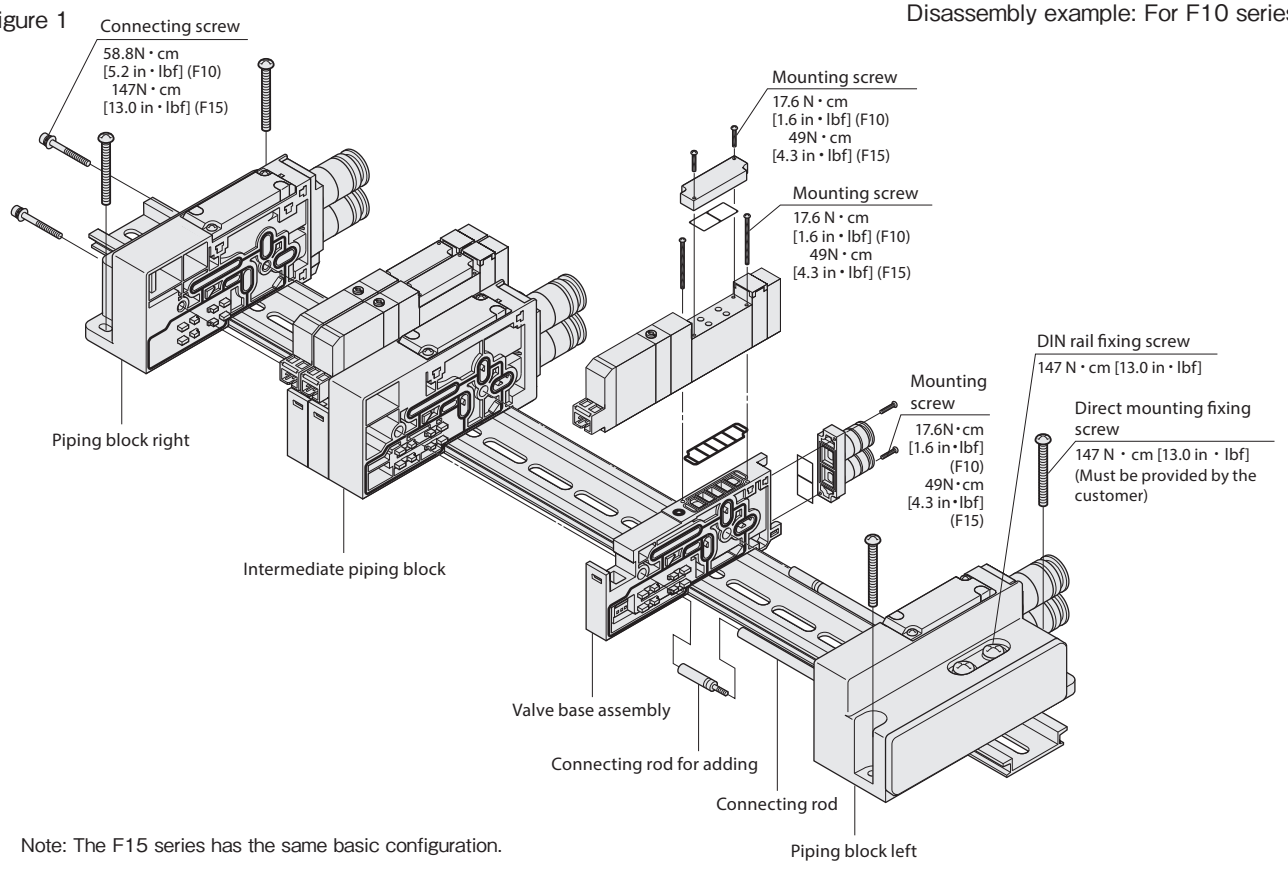
F18Z-P□□ (For F18 series) Mass 44 g [1.55 oz.]



F10 and F15 Series Disassembly Diagram of Easy Assembly Type Manifold Non-Plug-in Type

Figure 1

Disassembly example: For F10 series



Note: The F15 series has the same basic configuration.

Manifold Unit Adding Procedure (F10 and F15 Series Easy Assembly Type)

■Adding a valve base unit (use the same procedure for adding an intermediate piping block)

<When using a DIN rail>

① Loosen the DIN rail fixing screws (4 locations) on both sides of the piping block in advance, to a degree which enables the manifold to slide on the DIN rail. (see Fig.1)

② Loosen the connecting screws (two locations) on the right side of the piping block. (see Fig.2)

③ Divide the manifold in the location where the valve base unit will be added, and remove it from the connecting rod.

④ Install the connecting rod included with the valve base assembly to add to the connecting rod of the manifold.

⑤ Install the valve base assembly to add in the required location through the connecting rod, and enclose the valve base assembly on both sides.

⑥ Tighten the connecting screws (two locations) on the right side of the piping block.
Tightening torque: F10 58.8 N・cm [5.2 in・lbf]　F15 147 N・cm [13.0 in・lbf]

⑦ Confirm that the hook of the DIN rail mounting bracket is securely caught, and tighten the DIN rail fixing screws (4 locations). (see Fig.4) Tightening torque: 147 N・cm [13.0 in・lbf]

Note: Always follow the steps shown in Fig.3 when tightening the DIN rail fixing screws.

<For direct mounting>

① Loosen the connecting screws (2 locations) on the right side of the piping block. (see Fig.2)

② Divide the manifold in the location where the valve base unit will be added, and remove it from the connecting rod.

③ Install the connecting rod included with the valve base assembly to add to the connecting rod of the manifold.

④ Install the valve base assembly to add in the required location through the connecting rod, and enclose the valve base assembly on both sides.

⑤ Tighten the connecting screws (two locations) on the right side of the piping block.
Tightening torque: F10 58.8 N・cm [5.2 in・lbf]　F15 147 N・cm [13.0 in・lbf]

⑥ Tighten the fixing screws (provided by the customer).
Tightening torque: 74.5 N・cm [6.6 in・lbf] (for both the F10 and F15)

【Caution】

●Before supplying air to the manifold, always confirm that the tightening of the connecting screws.
Insufficient tightening is dangerous because it may cause air leaks or accidents.

Figure 2

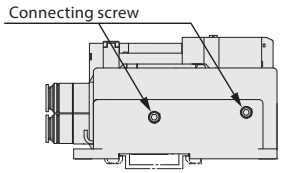
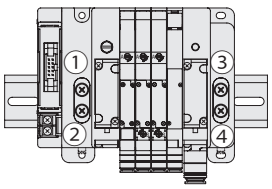
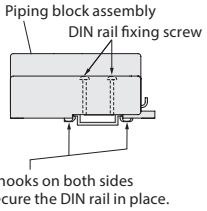


Figure 3

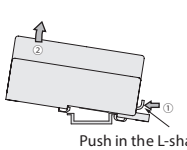


Tightening torque: 147 N・cm [13.0 in・lbf]

Figure 4



●Removing the piping block assembly from the DIN rail

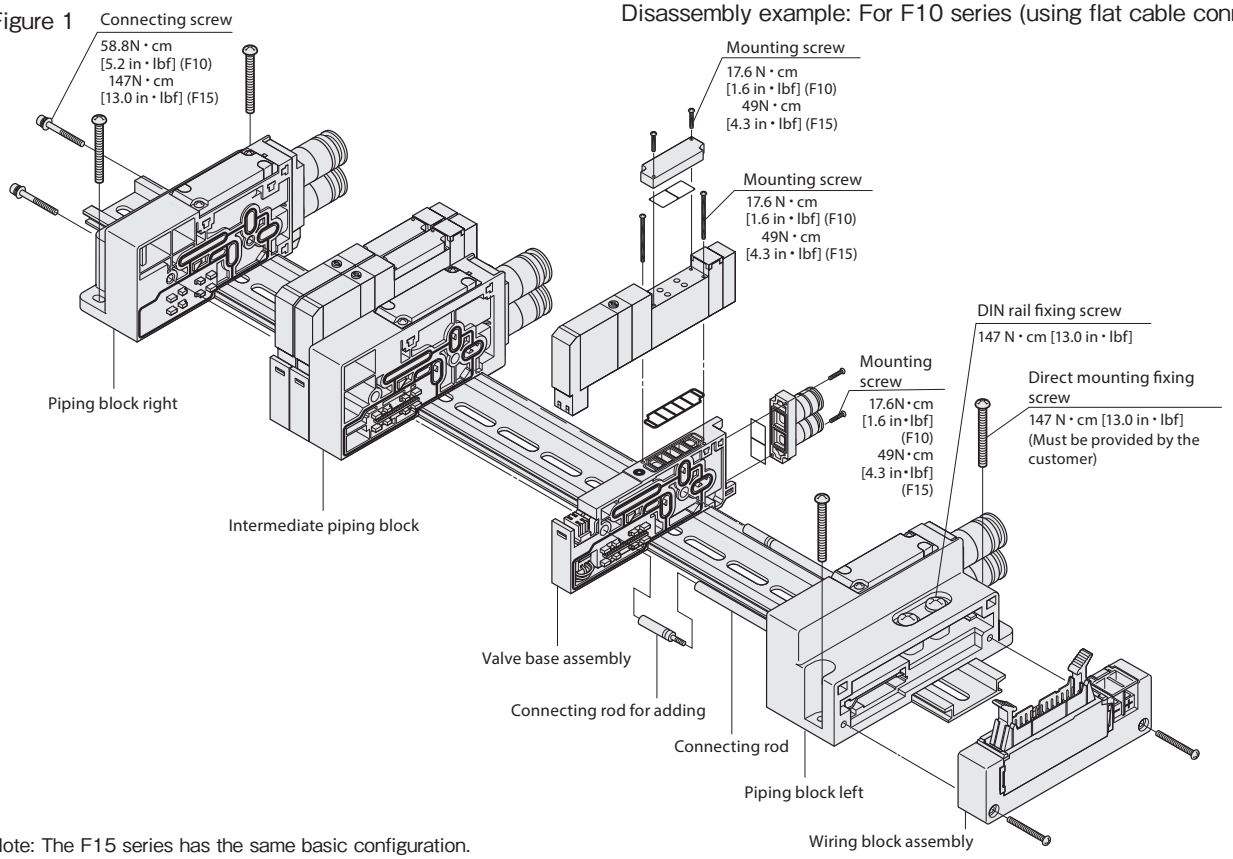


※To remove the piping block assembly from the DIN rail, loosen the DIN rail fixing screws, and push in the L-shaped fixture.

F10 and F15 Series Disassembly Diagram of Easy Assembly Type Manifold Plug-in Type

Figure 1

Disassembly example: For F10 series (using flat cable connector)



Note: The F15 series has the same basic configuration.

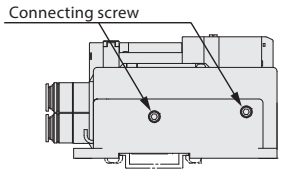
Manifold Unit Adding Procedure (F10 and F15 Series Easy Assembly Type)

■Adding a valve base unit (use the same procedure for adding an intermediate piping block)

<When using a DIN rail>

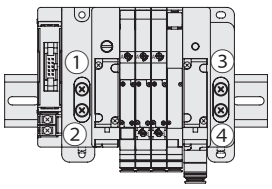
① Loosen the DIN rail fixing screws (4 locations) on both sides of the piping block in advance, to a degree which enables the manifold to slide on the DIN rail. (see Fig.1)
② Loosen the connecting screws (two locations) on the right side of the piping block. (see Fig.2)
③ Divide the manifold in the location where the valve base unit will be added, and remove it from the connecting rod.
④ Install the connecting rod included with the valve base assembly to add to the connecting rod of the manifold.
⑤ Install the valve base assembly to add in the required location through the connecting rod, and enclose the valve base assembly on both sides.
⑥ Tighten the connecting screws (two locations) on the right side of the piping block.
Tightening torque: F10 58.8 N・cm [5.2 in・lbf] F15 147 N・cm [13.0 in・lbf]
⑦ Confirm that the hook of the DIN rail mounting bracket is securely caught, and tighten the DIN rail fixing screws (4 locations). (see Fig.4) Tightening torque: 147 N・cm [13.0 in・lbf]

Figure 2



Note: Always follow the steps shown in Fig.3 when tightening the DIN rail fixing screws.

Figure 3

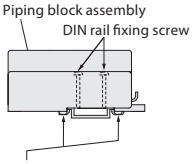


Tightening torque: 147 N・cm [13.0 in・lbf]

<For direct mounting>

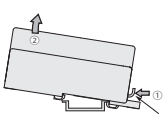
① Loosen the connecting screws (2 locations) on the right side of the piping block. (see Fig.2)
② Divide the manifold in the location where the valve base unit will be added, and remove it from the connecting rod.
③ Install the connecting rod included with the valve base assembly to add to the connecting rod of the manifold.
④ Install the valve base assembly to add in the required location through the connecting rod, and enclose the valve base assembly on both sides.
⑤ Tighten the connecting screws (two locations) on the right side of the piping block.
Tightening torque: F10 58.8 N・cm [5.2 in・lbf] F15 147 N・cm [13.0 in・lbf]
⑥ Always follow the steps shown in Fig.3 when tightening the fixing screws.

Figure 4



Use hooks on both sides to secure the DIN rail in place.

●Removing the piping block assembly from the DIN rail



Push in the L-shaped fixture

※To remove the piping block assembly from the DIN rail, loosen the DIN rail fixing screws, and push in the L-shaped fixture.

【Caution】

●Before supplying air to the manifold, always confirm that the tightening of the connecting screws. Insufficient tightening is dangerous because it may cause air leaks or accidents.

●When adding a valve base unit, be aware that the pin locations will change if it is not inserted in the final station.
The pin locations are the same for an intermediate piping block, regardless of the station.

F10 SERIES Specifications

Specifications

Basic Models and Valve Functions

Item \ Basic model	F10□T0	F10□T1 F10□T2	F10□T3 F10□T4 F10□T5	F10□TA F10□TB F10□TC
Number of positions	2 positions		3 positions	4 positions
Number of ports	5			Tandem 3-port
Valve function	Single solenoid only	Both single and double solenoid use	Closed center, Exhaust center, Pressure center	NC/NC, NO/NO, NC/NO

Remark: For the optional specifications and order codes, see p.44-71.

Specifications

Item \ Basic model		F10□T0 F10□T1 F10□T2	F10□T3 F10□T4 F10□T5	F10□TA F10□TB F10□TC	F10□T0G F10□T1G F10□T2G	F10□T3G F10□T4G F10□T5G	F10□T0V F10□T1V F10□T2V	F10□T3V
Media		Air						
Operation type		Internal pilot type			External pilot type (for positive pressure)		External pilot type (for vacuum)	
Flow rate characteristics	Sonic conductance C $dm^3/(s \cdot bar)$ Note1	0.97	0.93	0.75	0.97	0.93	0.97	0.93
	Effective area Note2 mm^2 (Cv)	4.8 (0.27)	4.6 (0.25)	3.7 (0.21)	4.8 (0.27)	4.6 (0.25)	4.8 (0.27)	4.6 (0.25)
Port size Note3		M5×0.8, 10-32UNF, dual use fitting for φ4 and φ6, Rc1/8, NPT1/8						
Lubrication		Not required						
Operating pressure range	Main valve	0.2～0.7 MPa [29～102 psi.]			0～0.7 MPa [0～102 psi.] Note4		−100 kPa～0.15 MPa [−29.53 in.Hg～22 psi.]	
	External pilot	——			0.2～0.7 MPa [29～102 psi.] Note4		0.2～0.7 MPa [29～102 psi.]	
Proof pressure	MPa [psi.]	1.05 [152]						
Response time Note5 ON/OFF ms	12VDC, 24VDC	15/15(20) or below	15/20 (25) or below	15/20 (25) or below	15/15 (20) or below	15/20 (25) or below	15/15 (20) or below	15/20 (25) or below
	100VAC	15/15 or below	15/20 or below	——	15/15 or below	15/20 or below	15/15 or below	15/20 or below
Maximum operating frequency	Hz	5						
Minimum time to energize for self holding Note6	ms	50	——		50	——	50	——
Operating temperature range (atmosphere and media)	℃ [°F]	5～50 [41～122]						
Shock resistance	m/s^2[G]	294.2 [30]						
Mounting direction		Any						

Notes: 1. For details, see the flow rate characteristics on p.108.
2. The effective area is a calculated value, and not a measured value.
3. For details, see the port size on p.107.
4. When the main valve pressure is 0.2～0.7 MPa [29～102 psi.], set the external pilot pressure to the main valve pressure or higher, and 0.7 MPa [102 psi.] or less.
5. Values when air pressure is 0.5 MPa [73 psi.]. For switching phase timing in the AC specification, add a maximum of 5 ms to the response time. The values for 2-position valves are those when used as a single solenoid, and the values for 3-position valves are those when switching from the neutral position of closed center. Values in parentheses ( ) are for low-current type.
6. When used as a double solenoid valve. Excludes **T0.**

Remark: Specification values are based on Koganei test standards.

Solenoid Specifications

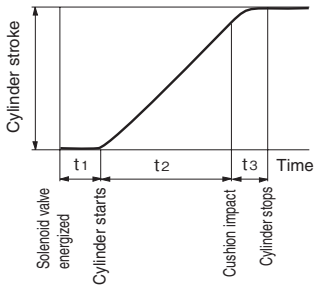
Item \ Rated voltage			12VDC	24VDC (Standard type)	24VDC (Low-current type)	100VAC		120VAC	
Voltage range		V	10.8～13.2 (12±10%)	21.6～26.4 (24±10%)	21.6～26.4 (24±10%)	90～110 (100±10%)		108～132 (120±10%)	
Rated frequency		Hz	—	—	—	50	60	50	60
Standard	Current (when rated voltage is applied)	mA (r.m.s)	33	17	—	8		8.3	
	Power consumption	W	0.4	0.4	—	0.8 VA		1 VA	
Low-current type	Current (when rated voltage is applied)	Starting mA	—	—	17	—		—	
		Holding mA			4.2				
	Power consumption	Starting W	—	—	0.4	—		—	
		Holding W			0.1				
	Starting time (standard)	ms	—	—	70	—		—	
Allowable leakage current		mA	2.0	1.0	1.0	1.0		1.0	
Type of insulation			Type B						
Insulation resistance Note1		MΩ	Over 100						
Color of LED indicator Note2			14(SA) : Red, 12(SB) : Green						
Surge suppression (as standard)			Surge absorption transistor		Flywheel diode	Bridge diode			

Notes: 1. Value at 500VDC megger.
2. The color of the **T0** indicator is red only.

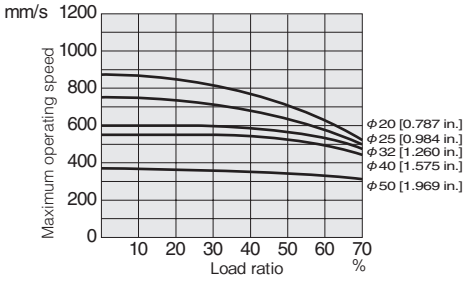
Remark: Specification values are based on Koganei test standards.

Cylinder Operating Speed

How to obtain cylinder speed



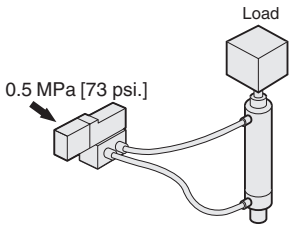
Maximum operating speed



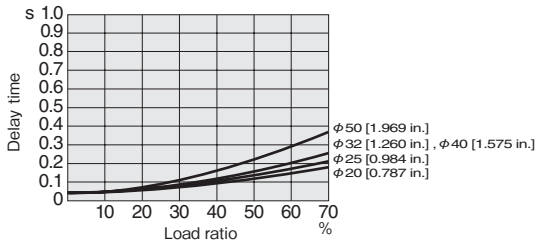
1 mm/s = 0.0394 in./sec.

Measuring conditions

- Air pressure : 0.5 MPa [73 psi.]
- Piping (outer diameter × inner diameter × length) : ϕ6 × ϕ4 × 1000 mm [39 in.]
- Fitting : Quick fitting TS6-01
- Load ratio = $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$ (%)
- Cylinder stroke : 150 mm [5.91 in.]

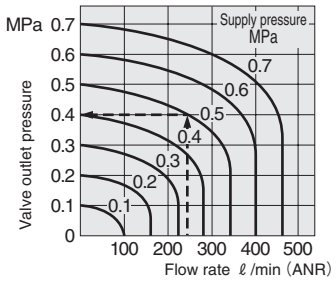


Delay time



Note: Delay time may vary according to the cylinder stroke.

Flow Rate



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

How to read the graph

When the supply pressure is 0.5 MPa [73 psi.] and flow rate is 240R/min [8.47 ft.^{3}/min.] (ANR), the valve outlet pressure becomes 0.4 MPa [58 psi.].

Piping connection diameter

Description/Piping specification		PR	X (P2)	4 (A), 2 (B)	1 (P), 3 (R2), 5 (R1), 3, 5 (R)
With sub-base		M5×0.8, 10-32UNF	M5×0.8, 10-32UNF	Rc1/8, NPT1/8	Rc1/8, NPT1/8
Single unit	With female thread block	—	—	M5×0.8, 10-32UNF	M5×0.8, 10-32UNF
	With dual use fitting block	—	—	Dual use fitting for ϕ4 and ϕ6	M5×0.8, 10-32UNF
	With single use fitting block	—	—	ϕ4 or ϕ6	M5×0.8, 10-32UNF
Manifold	Monoblock type with female thread block, and PC board type with female thread block	M5×0.8, 10-32UNF	M5×0.8, 10-32UNF	M5×0.8, 10-32UNF	Rc1/8, NPT1/8
	Monoblock type with fitting block, and PC board type with fitting block	M5×0.8, 10-32UNF	M5×0.8, 10-32UNF	Dual use fitting for ϕ4 and ϕ6	Rc1/8, NPT1/8
	Monoblock type with single use fitting block, and PC board type with single use fitting block	M5×0.8, 10-32UNF	M5×0.8, 10-32UNF	ϕ4 or ϕ6	Rc1/8, NPT1/8
	Split type with female thread block, and serial transmission type with female thread block	—	M5×0.8, 10-32UNF	M5×0.8, 10-32UNF	Rc1/4, NPT1/4
	Split type with fitting block, and serial transmission type with fitting block	—	M5×0.8, 10-32UNF	Dual use fitting for ϕ4 and ϕ6	Dual use fitting for ϕ8 and ϕ10
	Split type with single use fitting block, and serial transmission type with single use fitting block	—	M5×0.8, 10-32UNF	ϕ4 or ϕ6	Single use fitting for ϕ8 or ϕ10
	Easy assembly type with female thread block, and serial transmission type with female thread block	—	M5×0.8, 10-32UNF	M5×0.8, 10-32UNF	Rc1/8, NPT1/8
	Easy assembly type with fitting block, and serial transmission type with fitting block	—	M5×0.8, 10-32UNF	Dual use fitting for ϕ4 and ϕ6	Dual use fitting for ϕ6 and ϕ8
	Easy assembly type with single use fitting block, and serial transmission type with single use fitting block	—	M5×0.8, 10-32UNF	ϕ4 or ϕ6	Single use fitting for ϕ6 or ϕ8

Flow Rate Characteristics

● When used as a single unit

Basic model	1(P)→2(B)/1(P)→4(A)		2(B)→3(R2)/4(A)→5(R1)	
	Sonic conductance C $dm^3/(s \cdot bar)$	Critical pressure ratio b	Sonic conductance C $dm^3/(s \cdot bar)$	Critical pressure ratio b
F10□T0-A2 **F10□T1-A2** **F10□T2-A2**	0.85	0.14	0.85	0.26
F10□T3-A2 **F10□T4-A2** **F10□T5-A2**	0.82	0.13	0.82	0.29
F10□TA-A2 **F10□TB-A2** **F10□TC-A2**	0.68	0.30	0.69	0.30
F10□T0-F3 **F10□T1-F3** **F10□T2-F3**	0.73	0.29	0.58	0.47
F10□T3-F3 **F10□T4-F3** **F10□T5-F3**	0.69	0.26	0.57	0.46
F10□TA-F3 **F10□TB-F3** **F10□TC-F3**	0.61	0.28	0.54	0.44
F10□T0-F4 **F10□T1-F4** **F10□T2-F4**	0.54	0.39	0.53	0.37
F10□T3-F4 **F10□T4-F4** **F10□T5-F4**	0.53	0.43	0.51	0.34
F10□TA-F4 **F10□TB-F4** **F10□TC-F4**	0.50	0.32	0.50	0.30

Basic model	1(P)→2(B)/1(P)→4(A)		2(B)→3(R2)/4(A)→5(R1)	
	Sonic conductance C $dm^3/(s \cdot bar)$	Critical pressure ratio b	Sonic conductance C $dm^3/(s \cdot bar)$	Critical pressure ratio b
F10□T0-F5 **F10□T1-F5** **F10□T2-F5**	0.57	0.39	0.54	0.38
F10□T3-F5 **F10□T4-F5** **F10□T5-F5**	0.57	0.41	0.54	0.40
F10□TA-F5 **F10□TB-F5** **F10□TC-F5**	0.53	0.33	0.51	0.31
F10□T0-F6 **F10□T1-F6** **F10□T2-F6**	0.64	0.47	0.56	0.42
F10□T3-F6 **F10□T4-F6** **F10□T5-F6**	0.61	0.42	0.56	0.40
F10□TA-F6 **F10□TB-F6** **F10□TC-F6**	0.57	0.34	0.52	0.40

Note: For **-F4**, value assumes **TS6-M5M** is mounted on the piping port.

● When mounted on a manifold

Valve type \ Manifold model		Monoblock manifold F type **F10M□F (FP)**		Monoblock manifold A type **F10M□A (AP)**		Split manifold **F10M□N (P) (S)**		Easy assembly type manifold **F10M□XN (P) (S)**	
		1 (P) → 2 (B)/1 (P) → 4 (A)	2 (B) → 3 (R2)/4 (A) → 5 (R1)	1 (P) → 2 (B)/1 (P) → 4 (A)	2 (B) → 3 (R2)/4 (A) → 5 (R1)	1 (P) → 2 (B)/1 (P) → 4 (A)	2 (B) → 3 (R2)/4 (A) → 5 (R1)	1 (P) → 2 (B)/1 (P) → 4 (A)	2 (B) → 3 (R2)/4 (A) → 5 (R1)
		Sonic conductance C $dm^3/(s/bar)$		Sonic conductance C $dm^3/(s/bar)$		Sonic conductance C $dm^3/(s/bar)$		Sonic conductance C $dm^3/(s/bar)$	
F10□T0□ **F10□T1□** **F10□T2□**	Outlet port dual use fitting for ϕ4 and ϕ6 ※These are the cases of ϕ6.	0.84	0.82	0.75	0.76	0.97	0.93	1.06	1.00
F10□T3□ **F10□T4□** **F10□T5□**		0.83	0.78	0.73	0.72	0.93	0.89	0.99	0.95
F10□TA□ **F10□TB□** **F10□TC□**		0.70	0.70	0.64	0.66	0.75	0.73	0.82	0.84
F10□T0□ **F10□T1□** **F10□T2□**	Output port ϕ4 fitting	0.66	0.72	0.63	0.69	0.72	0.79	0.84	0.79
F10□T3□ **F10□T4□** **F10□T5□**		0.65	0.70	0.62	0.67	0.70	0.77	0.82	0.80
F10□TA□ **F10□TB□** **F10□TC□**		0.60	0.64	0.56	0.62	0.63	0.67	0.73	0.74
F10□T0□ **F10□T1□** **F10□T2□**	Output port ϕ6 fitting	0.72	0.81	0.67	0.73	0.80	0.83	0.88	0.86
F10□T3□ **F10□T4□** **F10□T5□**		0.71	0.73	0.66	0.69	0.78	0.80	0.84	0.85
F10□TA□ **F10□TB□** **F10□TC□**		0.64	0.66	0.58	0.63	0.68	0.69	0.72	0.75

Notes: 1. When the individual air supply spacer or the individual air exhaust spacer, the back pressure prevention valve, or the stop valve is used, sonic conductance decreases by about 30%.
2. For the flow rate characteristics of other outlet ports, consult us.

Remark: Specification values are based on Koganei test standards.

Mass

Single Valve Unit Mass

g [oz.]

F10□T□□	F10□T□□-A1	F10□T□□-A2	F10□T□□-FJ	F10□T□□-FJ5	F10□T□□-FJ6
Outlet portion None	Outlet portion With plate	Outlet portion With plate	Outlet portion With dual use fitting block	Outlet portion With ϕ4 fitting block	Outlet portion With ϕ6 fitting block
Inlet portion None	Inlet portion None	Inlet portion With A type sub-base	Inlet portion None	Inlet portion None	Inlet portion None
44 [1.55]	47 [1.66]	116 [4.09]	55 [1.94]	57 [2.01]	60 [2.12]

g [oz.]

F10□T□□-FM	F10□T□□-F3	F10□T□□-F4	F10□T□□-F5	F10□T□□-F6
Outlet portion With female thread block	Outlet portion With dual use fitting block	Outlet portion With female thread block	Outlet portion With ϕ4 fitting block	Outlet portion With ϕ6 fitting block
Inlet portion None	Inlet portion With female thread block	Inlet portion With female thread block	Inlet portion With female thread block	Inlet portion With female thread block
51 [1.80]	62 [2.19]	58 [2.05]	64 [2.26]	67 [2.36]

Basic Type **F10□T0** is 10 g [0.35 oz.] less than the mass shown above.

Monoblock Manifold Mass (single valve unit included)

g [oz.]

Monoblock manifold	Mass calculation of each unit			
	4(A), 2(B) ports outlet specifications			
	Female thread block	Dual use fitting block	ϕ4 fitting block	ϕ6 fitting block
A type	(97×n)+79 [(3.42×n)+2.79]	(101×n)+79 [(3.56×n)+2.79]	(103×n)+79 [(3.63×n)+2.79]	(106×n)+79 [(3.74×n)+2.79]
F type	(71×n)+57 [(2.50×n)+2.01]	(75×n)+57 [(2.65×n)+2.01]	(77×n)+57 [(2.72×n)+2.01]	(80×n)+57 [(2.82×n)+2.01]

g [oz.]

Monoblock manifold	Additional mass (wire-saving type)		
	Wiring specification		
	-F100N, -F101N	**-F200N, -F201N, -F260N**	**-D250N, -D251N**
A type	164+4n [5.78+0.14n]	166+4n [5.86+0.14n]	170+4n [6.00+0.14n]
F type	112+4n [3.95+0.14n]	114+4n [4.02+0.14n]	118+4n [4.16+0.14n]

Calculation example : **F10M8AM**

stn.1～stn.8 F10T1-A1-PS DC24V

(97×8)+79 = 855 g [30.16 oz.]

When mounting the block-off plate, subtract 50 g [1.76 oz] per unit from the above calculation result.

When mounting the **F10□T0** specification valve, subtract 10 g [0.35 oz.] per unit from the above calculation result.

PC Board Manifold Mass (single valve unit included)

g [oz.]

PC board manifold	Mass calculation of each unit				
	4(A), 2(B) ports outlet specifications				Circuit board and connector portion
	Female thread block	Dual use fitting block	ϕ4 fitting block	ϕ6 fitting block	
A type	(97×n)+79 [(3.42×n)+2.79]	(101×n)+79 [(3.56×n)+2.79]	(103×n)+79 [(3.63×n)+2.79]	(106×n)+79 [(3.74×n)+2.79]	(2×n)+29 [(0.07×n)+1.02]
F type	(76×n)+83 [(2.68×n)+2.93]	(80×n)+83 [(2.82×n)+2.93]	(82×n)+83 [(2.89×n)+2.93]	(85×n)+83 [(3.00×n)+2.93]	

Calculation example : **F10M8APM-F201-W**

stn.1～stn.8 F10T1-A1-PP DC24V

(97×8)+79+(2×8)+29=900 g [31.75 oz.]

When mounting the block-off plate, subtract 50 g [1.76 oz] per unit from the above calculation result.

When mounting the **F10□T0** specification valve, subtract 10 g [0.35 oz.] per unit from the above calculation result.

Optional Parts Mass

Stop valve (-STP): 29 g [023 oz.]

Mass of Split Manifold and Serial Transmission Type

Because the valve and manifold have the same output specifications, their mass is the same. The mass can only be changed by choosing a different type of inlet/outlet block.

Mass of Split Manifold Non-Plug-in Type (single valve unit included)

g [oz.]

Non-plug-in type	Mass calculation of each unit			
	4(A), 2(B) ports outlet specifications			
	Female thread block	Dual use fitting block	ϕ4 fitting block	ϕ6 fitting block
	(75×n)+120 [(2.65×n)+4.23]	(79×n)+120 [(2.79×n)+4.23]	(81×n)+120 [(2.86×n)+4.23]	(84×n)+120 [(2.96×n)+4.23]

g [oz.]

Additional mass			
Piping block specification			
Female thread block	Dual use fitting block	ϕ8 fitting block	ϕ10 fitting block
111 [3.92]	125 [4.41]	149 [5.26]	159 [5.61]

Calculation example : **F10M8N-MR**
stn.1～stn.8 F10T1-A1-PS DC24V
(75×8)+120+111=831 g [29.31 oz.]
When mounting the block-off plate, subtract 50 g [1.76 oz] per unit from the above calculation result.
When mounting the **F10□T0** specification valve, subtract 10 g [0.35 oz.] per unit from the above calculation result.

Mass of Split Manifold Plug-in Type/Serial Transmission Type (single valve unit included)

g [oz.]

Plug-in type Serial transmission compatible manifold	Mass calculation of each unit			
	4(A), 2(B) ports outlet specifications			
	Female thread block	Dual use fitting block	ϕ4 fitting block	ϕ6 fitting block
	(79×n)+120 [(2.79×n)+4.23]	(83×n)+120 [(2.93×n)+4.23]	(85×n)+120 [(3.00×n)+4.23]	(88×n)+120 [(3.10×n)+4.23]

g [oz.]

Additional mass			
Piping block specification			
Female thread block	Dual use fitting block	ϕ8 fitting block	ϕ10 fitting block
111 [3.92]	125 [4.41]	149 [5.26]	159 [5.61]

g [oz.]

Additional mass			
Wiring block specification			
-F100□□, -F101□□	**-F200□□, -F201□□, -F260□□**	**-D250□□, -D251□□**	**-T200**
32 [1.13]	34 [1.20]	39 [1.38]	110 [3.88]

g [oz.]

Additional mass			
Serial transmission block specification			
Stand-alone type	Integrated type	Integrated type (For EtherCAT)	Integrated type (For EtherNet/IP)
231 [8.15]	138 [4.87]	100 [3.53]	110 [3.88]

Calculation example : **F10M8PM-MR-F201 DC24V**
stn.1～stn.8 F10T1-A1 DC24V
(79×8)+120+111+34=897 g [31.64 oz.]
When mounting the block-off plate, subtract 50 g [1.76 oz] per unit from the above calculation result.
When mounting the **F10□T0** specification valve, subtract 10 g [0.35 oz.] per unit from the above calculation result.

Mass of Easy Assembly Type Manifold and Serial Transmission Type Manifold

Mass of Easy Assembly Type Manifold Non-Plug-in Type (single valve unit included)

g [oz.]

Mounting type	Mass calculation of each unit			
	Outlet port specifications			
	Female thread block	Dual use fitting block	ϕ4 fitting block	ϕ6 fitting block
No code	(83 x n) + 229 [(2.93 × n) + 8.078]	(87 x n) + 229 [(3.069 × n) + 8.078]	(89 x n) + 229 [(3.139 × n) + 8.078]	(92 x n) + 229 [(3.245 × n) + 8.078]
-DN	(83 x n) + 290 [(2.93 × n) + 10.229]	(87 x n) + 290 [(3.069 × n) + 10.229]	(89 x n) + 290 [(3.139 × n) + 10.229]	(92 x n) + 290 [(3.245 × n) + 10.229]
-DR	(85 x n) + 308 [(3.00 × n) + 10.864]	(89 x n) + 308 [(3.139 × n) + 10.864]	(91 x n) + 308 [(3.210 × n) + 10.864]	(94 x n) + 308 [(3.316 × n) + 10.864]

g [oz.]

Fitting specifications	Additional mass			
	Intake/exhaust outlet			
	Female thread block	Dual use fitting block	ϕ6 fitting block	ϕ8 fitting block
J□ M□	22 [0.776]	32 [1.129]	43 [1.517]	48 [1.693]
J□D MD□	26 [0.917]	46 [1.623]	68 [2.399]	78 [2.751]
J□T MT□	33 [1.164]	63 [2.222]	96 [3.386]	111 [3.92]

Calculation example: **F10M8XNJ-JR-DR DC24V**

stn.1 ～ 8 F10T1-A1-PS DC24V

(89 x 8) + 308 + 32 = 1052 g [37.11 oz.]

When mounting the block-off plate, subtract 50 g [1.76 oz.] per unit from the above calculation result.

When mounting the **F10□T0** specification valve, subtract 10 g [0.35 oz.] per unit from the above calculation result.

Mass of Easy Assembly Type Manifold Plug-in Type/Serial Transmission Type Manifold (single valve unit included)

g [oz.]

Mounting type	Mass calculation of each unit			
	Outlet port specifications			
	Female thread block	Dual use fitting block	ϕ4 fitting block	ϕ6 fitting block
No code	(86 x n) + 227 [(3.034 × n) + 8.007]	(90 x n) + 227 [(3.175 × n) + 8.007]	(92 x n) + 227 [(3.245 × n) + 8.007]	(95 x n) + 227 [(3.351 × n) + 8.007]
-DN	(86 x n) + 288 [(3.034 × n) + 10.159]]	(90 x n) + 288 [(3.175 × n) + 10.159]	(92 x n) + 288 [(3.245 × n) + 10.159]	(95 x n) + 288 [(3.351 × n) + 10.159]
-DR	(88 x n) + 310 [(3.104 × n) + 10.935]	(92 x n) + 310 [(3.245 × n) + 10.935]	(94 x n) + 310 [(3.316 × n) + 10.935]	(97 x n) + 310 [(3.422 × n) + 10.935]

g [oz.]

Fitting specifications	Additional mass			
	Intake/exhaust outlet			
	Female thread block	Dual use fitting block	ϕ6 fitting block	ϕ8 fitting block
J□ M□	22 [0.776]	32 [1.129]	43 [1.517]	48 [1.693]
J□D MD□	26 [0.917]	46 [1.623]	68 [2.399]	78 [2.751]
J□T MT□	31 [1.093]	61 [2.152]	94 [3.316]	109 [3.845]

g [oz.]

Additional mass			
Wiring block specifications			
-F100□□, -F101□□	**-F200□□, -F201□□, -F260□□**	**-D250□□, -D251□□**	**-T200**
36 [1.270]	38 [1.340]	43 [1.517]	116 [4.092]

g [oz.]

Additional mass		
Serial transmission block specifications (Monoblock)		
For CC-Link, DeviceNet, and CompoNet	For EtherCAT	For EtherNet/IP
138 [4.87]	100 [3.53]	110 [3.88]

Calculation example: **F10M8XPJ-JR-F201-DR DC24V**

stn.1 ～ 8 F10T1-A1 DC24V

(98 x 8) + 310 + 32 + 38 = 1116 g [39.37 oz.]

When mounting the block-off plate, subtract 50 g [1.76 oz.] per unit from the above calculation result.

When mounting the **F10□T0** specification valve, subtract 10 g [0.35 oz.] per unit from the above calculation result.

F10 Series Easy Assembly Type Manifold Non-Plug-in Type Order Codes

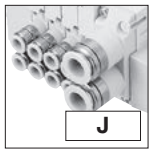
■ Valve size

F10M

10 mm [0.394 in.] width

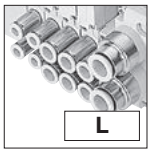
■ Manifold outlet specification

With dual use fitting blocks (base piping type)



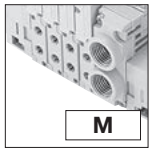
Outlet port fitting
F10: ϕ4, ϕ6

With selectable fittings (base piping type)



Outlet port should be selected in accordance with the manifold fitting specification.

With female thread blocks (base piping type)



Outlet port female thread
F10: M5 x 0.8

With plates (direct piping type)

■ Pilot specification

Blank
Internal pilot manifold

G
External pilot manifold

■ Piping block specification (air supply, exhaust and intermediate)

Fitting block
-JR: Dual use fitting, right-side mounting
-JL: Dual use fitting, left-side mounting
-JD: Dual use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ6, ϕ8

Female thread block
-MR: Female thread, right-side mounting
-ML: Female thread, left-side mounting
-MD: Female thread, both-side mounting
Female thread size (1(P), 3, 5(R) ports), Rc1/8

Female thread block
-MRH: Female thread, right-side mounting Note15
-MLH: Female thread, left-side mounting Note15
-MDH: Female thread, both-side mounting Note15
Female thread size (1(P), 3, 5(R) ports), NPT1/8

Single use fitting block
-J5R: Single use fitting, right-side mounting
-J5L: Single use fitting, left-side mounting
-J5D: Single use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ6
-J6R: Single use fitting, right-side mounting
-J6L: Single use fitting, left-side mounting
-J6D: Single use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ8

Intermediate piping block
-JT : Dual use fitting, both-side mounting, intermediate piping block, ϕ6, ϕ8
-J5T: Single use fitting, both-side mounting, intermediate piping block, ϕ6
-J6T: Single use fitting, both-side mounting, intermediate piping block, ϕ8
-MT : Female thread, both-side mounting, intermediate piping block, Rc1/8
-MTH: Female thread, both-side mounting, intermediate piping block NPT1/8 Note15

■ Mounting specification

Blank
Direct mounting

-DN
With DIN bracket (no rail)

-DR
With DIN bracket, with rail
Caution: For information on rails assembled and shipped, see pages 130 and 131.

Valve size	Valve units	Manifold type	Manifold outlet specification	Pilot specification	Piping block specification	Mounting specification
Manifold model						
Base piping type	**F10M**	**XN** (※Rc)	**J** **M**	**Blank** **G**	**-JR** **-JL** **-JD** **-MR** **-ML** **-MD** **-J5R** **-J5L** **-J5D** **-J6R** **-J6L** **-J6D** **-JT** **-J5T** **-J6T** **-MT**	**Blank** **-DN** **-DR**
Base piping type selectable fitting	**F10M**	**XN** (※Rc) **XNH** (※NPT) Only L or Blank is available in the inch female thread specification and the manifold outlet specification.	**L**	**Blank** **G**	**-JR** **-JL** **-JD** **-MR** **-ML** **-MD** **-MRH** Note15 **-MLH** Note15 **-MDH** Note15 **-J5R** **-J5L** **-J5D** **-J6R** **-J6L** **-J6D** **-JT** **-J5T** **-J6T** **-MT** **-MTH** Note15	**Blank** **-DN** **-DR**
Direct piping type	**F10M**	**XN** (※Rc) **XNH** (※NPT) Only L or Blank is available in the inch female thread specification and the manifold outlet specification.	**Blank**	**Blank** **G**	**-JR** **-JL** **-JD** **-MR** **-ML** **-MD** **-MRH** Note15 **-MLH** Note15 **-MDH** Note15 **-J5R** **-J5L** **-J5D** **-J6R** **-J6L** **-J6D** **-JT** **-J5T** **-J6T** **-MT** **-MTH** Note15	**Blank** **-DN** **-DR**

2 : : **21** Note1

Notes: 1. Up to 20 valves, with one intermediate piping block.
2. Valve mounting location is from the left, with the solenoid on top, and the 4(A), 2(B) ports side in front.
3. When the valve specification is **T1** or **T2**, the manual override lever is placed only on the **A** side.
4. When selecting **J**, **M**, or **L** (base piping type) for the manifold outlet specification, always enter **-A1** (with plate) for the valve outlet type.
5. Port isolators can be installed only when piping blocks are mounted on both sides. In addition, only 1 port isolator can be mounted in 1 manifold for **-XSA**, or 1 each port isolator for **-XSP** and **-XSR** for a total of 2 locations. When shipping, the designated port isolators are mounted between the designated station and the station to its immediate left (the next smaller stn. No.).

■ Valve type

T0: 2-position, for single solenoid only
T1: 2-position, single solenoid specification
T2: 2-position, double solenoid specification
T3: 3-position, closed center
T4: 3-position, exhaust center
T5: 3-position, pressure center
TA: Tandem 3-port (NC and NC)Note7
TB: Tandem 3-port (NO and NO)Note7
TC: Tandem 3-port (NC and NO)Note7

■ Operation type

Blank
Internal pilot typeNote5

G
External pilot typeNote6 (for positive pressure)
※No vacuum valve can be mounted.

■ Manual override

Manual override button

Manual override leverNote2

■ Valve outlet type

-A1 With plateNote4 (base piping type)

5-port specification

-FJ With dual use fitting block **F10**: ϕ4, ϕ6 (direct piping type)
-FJ5 With single use fitting block **F10**: ϕ4 (direct piping type)
-FJ6 With single use fitting block **F10**: ϕ6 (direct piping type)
-FM With female thread block **F10**: M5 x 0.8 (direct piping type)
-FMH With female thread blockNote15 (direct piping type) **F10**: 10-32UNF

3-port specification

-FJ5A With single use fitting block, normally closed (NC) (direct piping type) **F10**: ϕ4
-FJ5B With single use fitting block, normally open (NO) (direct piping type) **F10**: ϕ4
-FJ6A With single use fitting block, normally closed (NC) (direct piping type) **F10**: ϕ6
-FJ6B With single use fitting block, normally open (NO) (direct piping type) **F10**: ϕ6
-FMA With female thread block, normally closed (NC) (direct piping type) **F10**: M5 x 0.8
-FMAH With female thread block, normally closed (NC)Note15 (direct piping type) **F10**: 10-32UNF
-FMB With female thread block, normally open (NO) (direct piping type) **F10**: M5 x 0.8
-FMBH With female thread block, normally open (NO)Note15 (direct piping type) **F10**: 10-32UNF

Caution: The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.

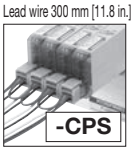
■ Wiring specificationNote12

S type plug connector
Without connector

S type plug connector
Lead wire 300 mm [11.8 in.]

-PS3
S type plug connector
Lead wire 3000 mm [118 in.]

Pre-wired positive common terminal
S type plug connector
Lead wire 300 mm [11.8 in.]



-CPS3
Pre-wired positive common terminal
S type plug connector
Lead wire 3000 mm [118 in.]

-MS
Pre-wired negative common terminal
S type plug connector
Lead wire 300 mm [11.8 in.]

-MS3
Pre-wired negative common terminal
S type plug connector
Lead wire 3000 mm [118 in.]

-CMS
Pre-wired negative common terminal
S type plug connector
Lead wire 300 mm [11.8 in.]

-CMS3
Pre-wired negative common terminal
S type plug connector
Lead wire 3000 mm [118 in.]

■ Manifold fitting specification

5-port specification

-J5 With single use fitting block **F10**: ϕ4 (base piping type)
-J6 With single use fitting block **F10**: ϕ6 (base piping type)
-M With female thread block **F10**: M5 x 0.8 (base piping type)
-MH With female thread blockNote15 (base piping type) **F10**: 10-32UNF

3-port specification

-J5A With single use fitting block, normally closed (NC) (base piping type) **F10**: ϕ4
-J5B With single use fitting block, normally open (NO) (base piping type) **F10**: ϕ4
-J6A With single use fitting block, normally closed (NC) (base piping type) **F10**: ϕ6
-J6B With single use fitting block, normally open (NO) (base piping type) **F10**: ϕ6
-MA With female thread block, normally closed (NC) (base piping type) **F10**: M5 x 0.8
-MAH With female thread block, normally closed (NC)Note15 (base piping type) **F10**: 10-32UNF
-MB With female thread block, normally open (NO) (base piping type) **F10**: M5 x 0.8
-MBH With female thread block, normally open (NO)Note15 (base piping type) **F10**: 10-32UNF

Caution: The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.

■ Port isolator

Blank: No port isolator
-XSP: For 1 (P) portNote4
-XSR: For 3 (R2), 5 (R1) portsNote4
-XSA: For 1 (P), 3 (R2), and 5(R1) portsNote4

■ Back pressure prevention valve

Blank
No back pressure prevention valve
-E2
With back pressure prevention valveNote8

■ Individual air supply and exhaust spacer

Blank: No spacer
-XNPM: Individual air supply spacer (with M5 female thread for F10)
-XNRM: Individual exhaust spacer (with M5 female thread for F10)
-STP : With stop valveNote5
See page 27 for details.

■ Valve size

F10 Standard type
F10L Low-current type

Station	Valve size	Valve specification	Operation type	IP Specifications	Manual override	Valve outlet type	Wiring specification	Manifold fitting specification	Back pressure prevention valve	Individual air supply, exhaust spacer and stop valve	Port isolator	Voltage
Mounting valve model												
stn. 1 ⋮ stn.□ Note2	F10 F10L	T0 TANote8 T1 TBNote8 T2 TCNote8 T3 T4 T5	BlankNote6 GNote7	Blank -P Note12	Blank -RNote3	-A1Note4	-PN -MS -PSNote12 -MS3 -PS3 -CMS -CPS -CMS3 -CPS3		Blank -E2Note9	Blank -XNPM -XNRM -STPNote6	Blank -XSPNote5 -XSRNote5 -XSANote5	DC24V DC12VNote10 AC100VNote11
	F10	XBPN (for block-off plate)								Blank -STPNote6		
When selecting the intermediate piping block, see page 100 when specifying it.												
stn. 1 ⋮ stn.□ Note2	F10 F10L	T0 TANote8 T1 TBNote8 T2 TCNote8 T3 T4 T5	BlankNote6 GNote7	Blank -P Note12	Blank -RNote3	-A1Note4	-PN -MS -PSNote12 -MS3 -PS3 -CMS -CPS -CMS3 -CPS3	-J5Note14 -J6Note14 -MNote14 -MHNote15 -J5ANote14 -J5BNote14 -J6ANote14 -J6BNote14 -MANote14 -MAHNote15 -MBNote14 -MBHNote15	Blank -E2Note9	Blank -XNPM -XNRM -STPNote6	Blank -XSPNote5 -XSRNote5 -XSANote5	DC24V DC12VNote10 AC100VNote11
	F10	XBPN (for block-off plate)								Blank -STPNote6		
When selecting the intermediate piping block, see page 100 when specifying it.												
stn. 1 ⋮ stn.□ Note2	F10 F10L	T0 TANote8 T1 TBNote8 T2 TCNote8 T3 T4 T5	BlankNote6 GNote7	Blank -P Note12	Blank -RNote3	-FJNote14 -FJ5Note14 -FJ6Note14 -FMNote14 -FMHNote15 -FJ5ANote14 -FJ5BNote14 -FJ6ANote14 -FJ6BNote14 -FMANote14 -FMAHNote15 -FMBNote14 -FMBHNote15	-PN -MS -PSNote12 -MS3 -PS3 -CMS -CPS -CMS3 -CPS3		Blank -E2Note9	Blank -XNPM -XNRM -STPNote6	Blank -XSPNote5 -XSRNote5 -XSANote5	DC24V DC12VNote10 AC100VNote11
	F10	XBPN (for block-off plate)								Blank -STPNote6		
When selecting the intermediate piping block, see page 100 when specifying it.												

Notes: 6. Cannot be mounted on the external pilot manifold. Only direct mounting is available.
7. Cannot be mounted on the internal pilot manifold.
8. Not available in external pilot type.
9. Not available with the individual exhaust spacer.
10. Not available in low-current type.
11. Not available in low-current type and tandem 3-port valves.
12. Wiring specifications of **-P**□ and **-CP**□, the **-M**□ and **-CM**□, positive common and negative common cannot be mounted together.
13. The IP65 protective structure around an electrical device that prevents the infiltration of solid foreign material and water from outside.
14. The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.
15. Can be selected only when the manifold type is **XNH**.

F10 Series Easy Assembly Type Manifold Non-Plug-in Type Order Codes

Intermediate piping block

(When mounting an intermediate piping block to the manifold, complete the following type and specify the station specified on page 99.)

F 10 ZX□ - □ - TN - □

Valve size
10: 10 mm
[0.394 in.] width

Pilot specification
Blank: Internal pilot
G: External pilot

Piping block Specification[Note]
PJ : With dual use fitting ϕ6, ϕ8
PJ5 : With single use fitting ϕ6
PJ6 : With single use fitting ϕ8
PM : With female thread Rc 1/8
PMH : WIth female thread NPT 1/8

Manifold type
TN: **For non-plug-in type**

Port isolator
Blank: No port isolator
XSP: Port isolator (1(P) port)
XSR: Port isolator (3(R2), 5(R1) ports)
XSA: Port isolator (1(P), 3(R2), and 5(R1) ports)

Note:See the following table for combinations of intermediate piping block port specifications and manifold piping block specifications.

Manifold piping specifications	Intermediate piping block
JT	PJ
J5T	PJ5
J6T	PJ6
MT	PM
MTH	PMH

F10 Series Easy Assembly Type Manifold Non-Plug-in Type Additional Parts Order Codes

Parts for manifold

F 10 ZX - □

Valve size
10: 10 mm [0.394 in.] width

Parts content
GS2: Gasket (gasket and exhaust valve)
GS3: Gasket (valve base side)
XSP: Port isolator (for 1(P) port)
XSR: Port isolator (for 3(R2), 5(R1) ports)
XSA: Port isolator (for 1(P), 3(R2), 5(R1) ports)
DN : DIN mounting bracket (one set of two)

Block-off plate (block-off plate, 2 mounting screws, and plug)

F 10 XBP N

Valve size
10: 10 mm [0.394 in.] width

For non-plug-in type

Back pressure prevention valve (2 pieces for split type, with dedicated gasket)

F 10 Z - E2

Valve size
10: 10 mm [0.394 in.] width

Individual air supply and exhaust spacer (Spacer for non-plug-in type, gasket, exhaust valve, and 2 mounting screws)

F 10 ZX - □

Valve size
10: 10 mm [0.394 in.] width

Specification
XNPM: Individual air supply spacer (with M5 female thread for F10)
XNRM: Individual exhaust spacer (with M5 female thread for F10)

※For details, see p.27.

Valve base assembly (valve base, gasket, and two connecting rods for adding)

F 10 ZX - □ *For use with both internal pilot and external pilot

Valve size
10: 10 mm [0.394 in.] width

Piping specifications
VJ : Dual use fitting valve base
VJ5 : Single use fitting valve base F10: ϕ4
VJ6 : Single diameter fitting valve base F10: ϕ6
VJ5A: 3-port specification normally closed, single use fitting valve base F10: ϕ4
VJ5B: 3-port specification normally open, single use fitting valve base F10: ϕ4
VJ6A: 3-port specification normally closed, single use fitting valve base F10: ϕ6
VJ6B: 3-port specification normally open, single use fitting valve base F10: ϕ6
VM : Female thread valve base F10: M5 x 0.8
VMA : 3-port specification normally closed, female thread valve base F10: M5 x 0.8
VMB : 3-port specification normally open, female thread valve base F10: M5 x 0.8
VMH : Female thread valve base F10:10-32UNF
VMAH : 3-port specification normally closed, female valve base F10:10-32UNF
VMBH : 3-port specification normally open, female valve base F10:10-32UNF
VP : Valve base plate

Piping block assembly (non-plug-in)

F 10 ZX□ - □ - □ - □ - □

Valve size
10: 10 mm [0.394 in.] width

Pilot specification
Blank: Internal pilot
G: External pilot

Port isolator Note2
Blank: No port isolator
XSP: Port isolator (1(P) port)
XSR: Port isolator (3(R2), 5(R1) ports)
XSA: Port isolator (1(P), 3(R2), and 5(R1) ports)

Mounting specification Note3
Blank: Without DIN bracket
DN: With DIN bracket

Manifold type
LN : Left side piping block (for non-plug-in type) without circuit board (with end lid)
RN : Right piping block, without circuit board
TN : Intermediate piping block (for non-plug-in type) without circuit board

Piping block Specification Note1
PJ : With dual use fitting ϕ6, ϕ8
PJ5: With single use fitting ϕ6
PJ6: With single use fitting ϕ8
PM : With female thread Rc 1/8
PMH : WIth female thread NPT 1/8
PP : Plate (without fitting)

Notes:1.The fitting of the piping block is included. One set of two connecting rods is also included for a LN and TN type manifold.
2.Port isolator selection only available when the piping block name is TN.
3.Only when the manifold type is LN or RN.

F10 Series Easy Assembly Type Manifold Non-Plug-in Type Additional Parts Order Codes

Muffler

KM - J □

Fitting size
6: Outer diameter ϕ6 (for piping block)
8: Outer diameter ϕ8 (for piping block)
(Sales unit: Set of 10 mufflers)

Connecting rod (1 set of 2)

F 10 ZX - □ - □

Valve size
10: 10 mm [0.394 in.] width

Number of units
01 ~ **20**: When type for valve base (RV) is selected
01: When type for left side piping block (RH) is selected
01: When type for intermediate piping block (RC) is selected

Specification
RV: For valve base
RH: For left piping block
RC: For intermediate piping block

DIN rail

DIN - □ (Unit:1)

Rail length
125: 125mm [4.921 in.]
⋮ (25 mm [0.984 in.] pitch)
525: 525mm [20.669 in.]

Connector-related order codes

JAZ - P - □ (for double use only)

Valve specification
For **T2 ,T3, T4, T5, TA, TB,** or **TC**

IP Specification

Connector specification
CP : Positive common, connector, lead wire length 300 mm [11.8 in.] (black, red, white, for total of 3 lead wires)
CP3 : Positive common, connector, lead wire length 3000 mm [118 in.] (black, red, white, for total of 3 lead wires)
PA : Positive common A type, lead wire length 300 mm [11.8 in.]※
PA3 : Positive common A type, lead wire length 3000 mm [118 in.]※
PB : Positive common B type, lead wire length 300 mm [11.8 in.]※
PB3 : Positive common B type, lead wire length 3000 mm [118 in.]※
PC : Positive common C type, lead wire length 300 mm [11.8 in.]※
PC3 : Positive common C type, lead wire length 3000 mm [118 in.]※
CM : Negative common, connector, lead wire length 300 mm [11.8 in.]※
CM3: Negative common, connector, lead wire length 3000 mm [118 in.]※
MA : Negative common A type, lead wire length 300 mm [11.8 in.]※
MA3: Negative common A type, lead wire length 3000 mm [118 in.]※
MB : Negative common B type, lead wire length 300 mm [11.8 in.]※
MB3: Negative common B type, lead wire length 3000 mm [118 in.]※
MC : Negative common C type, lead wire length 300 mm [11.8 in.]※
MC3: Negative common C type, lead wire length 3000 mm [118 in.]※
※A common connector assembly.

JAZ0 - P - □ (for single use only)

Valve specification
For **T0,** or **T1**

IP Specification

Connector specification
CP : Positive common, connector, lead wire length 300 mm [11.8 in.] (black, red, for total of 2 lead wires)
CP3 : Positive common, connector, lead wire length 3000 mm [118 in.] (black, red, for total of 2 lead wires)
PA : Positive common A type, lead wire length 300 mm [11.8 in.]※
PA3 : Positive common A type, lead wire length 3000 mm [118 in.]※
PB : Positive common B type, lead wire length 300 mm [11.8 in.]※
PB3 : Positive common B type, lead wire length 3000 mm [118 in.]※
PC : Positive common C type, lead wire length 300 mm [11.8 in.]※
PC3: Positive common C type, lead wire length 3000 mm [118 in.]※
CM : Negative common, connector, lead wire length 300 mm [11.8 in.]※
CM3: Negative common, connector, lead wire length 3000 mm [118 in.]※
MA : Negative common A type, lead wire length 300 mm [11.8 in.]※
MA3: Negative common A type, lead wire length 3000 mm [118 in.]※
MB : Negative common B type, lead wire length 300 mm [11.8 in.]※
MB3: Negative common B type, lead wire length 3000 mm [118 in.]※
MC : Negative common C type, lead wire length 300 mm [11.8 in.]※
MC3: Negative common C type, lead wire length 3000 mm [118 in.]※
※A common connector assembly.

Connector-related order codes ※For details, see p. 23.

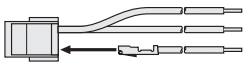
JAZ □ - □

Valve specification
Blank: For **T1, T2 ,T3, T4, T5, TA, TB,** or **TC**
0: For **T0**

Connector type
CP : Positive common, connector, lead wire length 300 mm [11.8 in.]
CP3 : Positive common, connector, lead wire length 3000 mm [118 in.]
CPN : Positive common, connector, no lead wire (with shorting bar and contact)
PA : Positive common A type, lead wire length 300 mm [11.8 in.]※
PA3 : Positive common A type, lead wire length 3000 mm [118 in.]※
PB : Positive common B type, lead wire length 300 mm [11.8 in.]※
PB3 : Positive common B type, lead wire length 3000 mm [118 in.]※
PC : Positive common C type, lead wire length 300 mm [11.8 in.]※
PC3 : Positive common C type, lead wire length 3000 mm [118 in.]※
CMN : Negative common, connector, no lead wire (with shorting bar and contact)
CM : Negative common, connector, lead wire length 300 mm [11.8 in.]※
CM3 : Negative common, connector, lead wire length 3000 mm [118 in.]※
MA : Negative common A type, lead wire length 300 mm [11.8 in.]※
MA3 : Negative common A type, lead wire length 3000 mm [118 in.]※
MB : Negative common B type, lead wire length 300 mm [11.8 in.]※
MB3 : Negative common B type, lead wire length 3000 mm [118 in.]※
MC : Negative common C type, lead wire length 300 mm [11.8 in.]※
MC3 : Negative common C type, lead wire length 3000 mm [118 in.]※

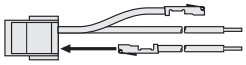
● Common connector assembly

A type: **JAZ-PA □**※



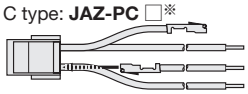
Red common wire (+)
Black A side (-)
White B side (-) (Insert when using as double solenoid)Note

B type: **JAZ-PB □**※



Red common wire (+)
Black A side (-)
White B side (-) (Insert when using as double solenoid)Note

C type: **JAZ-PC □**※



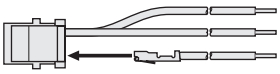
Red common wire (+)
Black A side (-)
White B side (-) (Insert when using as double solenoid)Note
Red common wire (+)

※ Lead wire length **Blank:** 300 mm [11.8 in.]
3: 3000 mm [118 in.]

Note: White lead wire is not available for **JAZ0-P□□**.

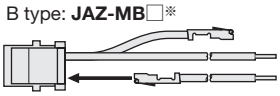
● For negative common

A type: **JAZ-MA□**※



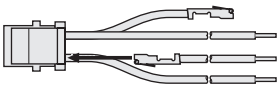
Black common wire (-)
Red A side (+)
White B side (+) (Insert when using as double solenoid)

B type: **JAZ-MB□**※



Black common wire (-)
Red A side (+)
White B side (+) (Insert when using as double solenoid)

C type: **JAZ-MC□**※



Black common wire (-)
Red A side (+)
White B side (+) (Insert when using as double solenoid)
Black common wire (-)

Single negative common plug connector unit
Type: **JAZ-CM□**※

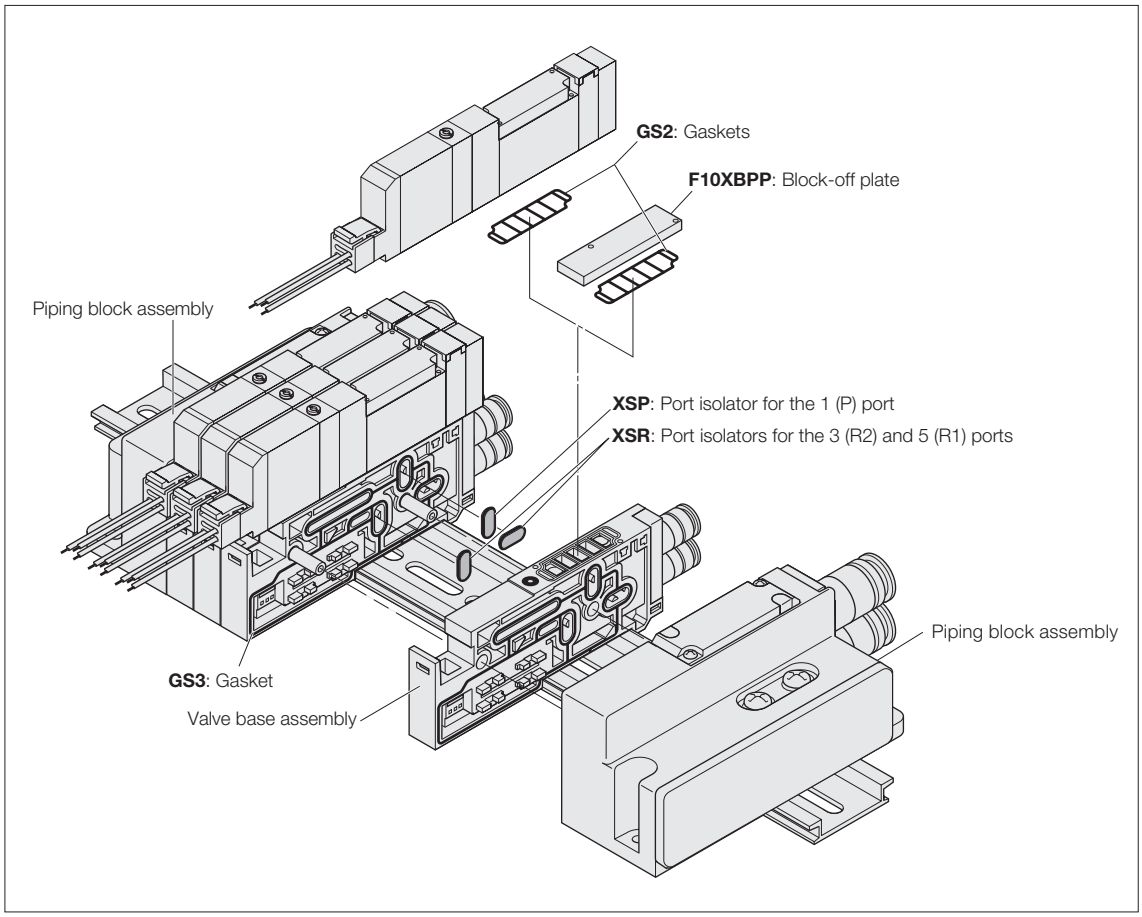
※ Lead wire length **Blank:** 300 mm [11.8 in.]
3: 3000 mm [118 in.]

FZ - □

Valve specification
For **T1, T2 ,T3, T4, T5, TA, TB,** or **TC**

Connector specification
CC1.5: Cabtyre cable, length 1500 mm [59 in.]※
CC3 : Cabtyre cable, length 3000 mm [118 in.]※

Notes:
1. When the valve specification is **T1**, select the **JAZ0-P- □** single dedicated type.
2. When switching between the single and double type (**T1**/**T2**), purchase and use a dedicated connector for single or double use (the number of seal holes in the lead wire differs for the single and double type).
3. There is no white lead wire for the **JAZ0-P- □** .
4. It is necessary to disassemble the connector to add a common connector assembly. Contact your nearest KOGANEI sales office.
5. For information on use in locations/atmospheres subject to substances other than water, such as organic solvents, cutting oil, or reagents, contact your nearest KOGANEI sales office.
6. For information on replacing the waterproof seal, contact your nearest KOGANEI sales office.



Manifold Order Code Example

(4 units of F10 Series)

F10M4XNJ-J6T-DR

stn.1 ～ 2 F10T0-A1-PS DC24V
stn.3 F10ZX-PJ6-TN
stn.4 F10T0-A1-PS DC24V

Note: This order code example has no relationship to the illustration above.

Precautions for Order Codes

●Orders for valves only

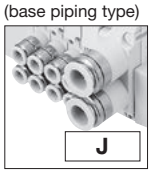
Place orders from "Single Valve Unit Order Codes" on p. 64.

However, **Blank**, **A2□**, **F3**, **F4□**, **F5**, **F6**, **F4A□**, **F4B□**, **F5A**, **F5B**, **F6A**, and **F6B** cannot be selected for the valve outlet type. And for the wiring specification, **Blank**, **PL**, and **PL3** cannot be selected. In addition, for common terminal wiring connections, separately order the common connector assemblies listed on the left.

F10 Series Easy Assembly Type Manifold Plug-in Type Order Codes

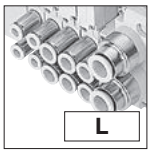
■ Manifold outlet specification

With dual use fitting blocks (base piping type)



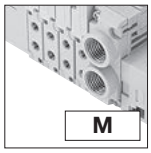
Outlet port fitting
F10: ϕ4, ϕ6

With selectable fittings (base piping type)



Outlet port should be selected in accordance with the manifold fitting specification.

With female thread blocks (base piping type)



Outlet port female thread
F10: M5 x 0.8

With plates (direct piping type)

■ Pilot type

Blank
Internal pilot manifold

G
External pilot manifold

■ Piping block specification (air supply and exhaust)

Fitting block
-JR: Dual use fitting, right-side mounting
-JL: Dual use fitting, left-side mounting
-JD: Dual use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ6, ϕ8

Female thread block
-MR: Female thread, right-side mounting
-ML: Female thread, left-side mounting
-MD: Female thread, both-side mounting
Female thread size (1(P), 3, 5(R) ports), Rc1/8

Female thread block
-MRH: Female thread, right-side mounting Note15
-MLH : Female thread, left-side mounting Note15
-MDH: Female thread,both-side mounting Note15
Female thread size (1(P), 3, 5(R) ports), NPT1/8

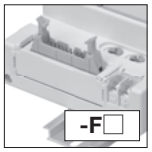
Single size fitting block
-J5R : Single use fitting, right-side mounting
-J5L : Single use fitting, left-side mounting
-J5D : Single use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ6
-J6R : Single use fitting, right-side mounting
-J6L : Single use fitting, left-side mounting
-J6D : Single use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ8

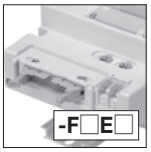
Intermediate piping block
-JT : Dual use fitting, both-side mounting, intermediate piping block ϕ6, ϕ8
-J5T : Single use fitting, both-side mounting, intermediate piping block ϕ6
-J6T : Single use fitting, both-side mounting, intermediate piping block ϕ8
-MT : Female thread, both-side mounting, intermediate piping block Rc1/8
-MTH : Female thread, both-side mounting, intermediate piping block NPT1/8 Note15

■ Wiring specification (wiring block)

※ All wiring blocks are mounted on the left.

Flat cable connector (with socket and strain relief)





<Connector top surface wiring>
-F100 : 10-pin
-F100N: 10-pin without power terminal
-F101 : 10-pin
-F101N: 10-pin without power terminal
-F200 : 20-pin
-F200N: 20-pin without power terminal
-F201 : 20-pin
-F201N: 20-pin without power terminal
-F260 : 26-pin
-F260N: 26-pin without power terminal

<Connector side surface wiring>
-F100E : 10-pin
-F100EN: 10-pin without power terminal
-F101E : 10-pin
-F101EN: 10-pin without power terminal
-F200E : 20-pin
-F200EN: 20-pin without power terminal
-F201E : 20-pin
-F201EN: 20-pin without power terminal
-F260E : 26-pin
-F260EN: 26-pin without power terminal

For details, see p. 47.

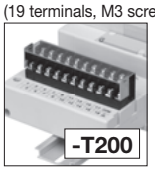
D-sub connector

<Connector top surface wiring> (M2.6 mounting screws)
-D250 : 25-pin Note14
-D250N : 25-pin without power terminal Note14
-D251 : 25-pin Note14
-D251N: 25-pin without power terminal Note14 (4-40 UNC mounting screws)
-D250U : 25-pin Note15
-D251U: 25-pin Note15
-D370NU : 37-pin without power terminal Note15

<Connector side surface wiring> (M2.6 mounting screws)
-D250E : 25-pin Note14
-D250EN: 25-pin without power terminal Note14
-D251E : 25-pin Note14
-D251EN: 25-pin without power terminal Note14 (4-40 UNC mounting screws)
-D250EU : 25-pin Note15
-D251EU: 25-pin Note15

For details, see p. 47-48.

Terminal block (19 terminals, M3 screws)



For details, see p.47, 48.

■ Wiring connection specification

Blank
Packed wiring:
Specification of the valve base is always in accordance with the mounted valve specifications.

-W
Double wiring:
Valve base is always double wiring, regardless of the specifications of the mounted valve.

■ Common specification

Blank: Positive common
-CM : Negative common

■ Mounting specification

Blank
Direct mounting

-DN
With DIN bracket (no rail)

-DR
With DIN bracket, with rail
Caution: For information on rails assembled and shipped, see pages 132 and 136.

■ Valve size

F10M 10 mm [0.394 in.] width

■ Valve size

F10 Standard type

F10L Low-current type

Valve size	Valve units	Manifold type	Manifold outlet specification	Pilot specification	Piping block specification	Wiring specification	Wiring connection specification	Common specification	Mounting specification	Voltage
Manifold model										
Base piping type	F10M	XP (※Rc)	J M	Blank G	-JR -J5R -JT -JL -J5L -J5T -JD -J5D -J6T -MR -J6R -MT -ML -J6L -MD -J6D	-F100 -F260 -F101E -D250E -F100N -F260N -F101EN -D250EN -F101 -D250 -F200E -D251E -F101N -D250N -F200EN -D251EN -F200 -D251 -F201E -T200 -F200N -D251N -F201EN -F201 -F100E -F260E -F201N -F100EN -F260EN	Blank -W	Blank -CM	Blank -DN -DR	DC24V DC12V Note2
Base piping type selectable fitting	F10M	2 : □ Note1	XP (※Rc) XPH (※NPT) Note13	L	Blank	-JR Note14 -MRH Note15 -J6L Note14 -JL Note14 -MLH Note15 -J5D Note14 -JD Note14 -MDH Note15 -J6D Note14 -MR Note14 -J5R Note14 -MTH Note15 -ML Note14 -J6R Note14 -MD Note14 -J5L Note14	-F100 -F260N -F100EN -D250E Note14 -F100N -D250 Note14 -F101E -D250EN Note14 -F101 -D250N Note14 -F101EN -D251E Note14 -F101N -D251 Note14 -F200E -D251EN Note14 -F200 -D251N Note14 -F200EN -D250EU Note15 -F200N -D250U Note15 -F201E -D251EU Note15 -F201 -D251U Note15 -F201EN -T200 -F201N -D370NU Note15 -F260E -F260 -F100E -F260EN	Blank -W	Blank -CM	Blank -DN -DR	DC24V DC12V Note2
Direct piping type				Blank	Blank G	-JR Note14 -MRH Note15 -J6L Note14 -JL Note14 -MLH Note15 -J5D Note14 -JD Note14 -MDH Note15 -J6D Note14 -MR Note14 -J5R Note14 -MTH Note15 -ML Note14 -J6R Note14 -MD Note14 -J5L Note14	-F100 -F260N -F100EN -D250E Note14 -F100N -D250 Note14 -F101E -D250EN Note14 -F101 -D250N Note14 -F101EN -D251E Note14 -F101N -D251 Note14 -F200E -D251EN Note14 -F200 -D251N Note14 -F200EN -D250EU Note15 -F200N -D250U Note15 -F201E -D251EU Note15 -F201 -D251U Note15 -F201EN -T200 -F201N -D370NU Note15 -F260E -F260 -F100E -F260EN	Blank -W	Blank -CM	Blank -DN -DR	DC24V DC12V Note2

Notes: 1. For the maximum number of units, see the table for maximum number of valve units by wiring specification, on p. 108.
2. Not available in low-current type.
3. Valve mounting location is from the left, with the solenoid on top, and the 4(A), 2(B) ports side in front.
4. When selecting **J**, **M**, or **L** (base piping type) for the manifold outlet specification, always enter **-A1** (with plate) for the valve outlet type.

Valve type

T0: 2-position, for single solenoid only
T1: 2-position, single solenoid specification
T2: 2-position, double solenoid specification
T3: 3-position, closed center
T4: 3-position, exhaust center
T5: 3-position, pressure center
TA: Tandem 3-port (NC and NC)Note10
TB: Tandem 3-port (NO and NO)Note10
TC: Tandem 3-port (NC and NO)Note10

Operation type

Blank
Internal pilot typeNote8

G
External pilot typeNote9
(for positive pressure)
※ No vacuum valve can be mounted.

Manual override

Manual override button

Manual override leverNote6

Valve type

-A1 With plateNote4 (base piping type)

5-port specification

-FJ With dual use fitting block (direct piping type) **F10**: ϕ4, ϕ6
-FJ5 With single use fitting block (direct piping type) **F10**: ϕ4
-FJ6 With single use fitting block (direct piping type) **F10**: ϕ6
-FM With female thread block (direct piping type) **F10**: M5 x 0.8
-FMH With female thread blockNote15 (direct piping type) **F10**: 10-32UNF

3-port specification

-FJ5A With single use fitting block, normally closed (NC) (direct piping type) **F10**: ϕ4
-FJ5B With single use fitting block, normally open (NO) (direct piping type) **F10**: ϕ4
-FJ6A With single use fitting block, normally closed (NC) (direct piping type) **F10**: ϕ6
-FJ6B With single use fitting block, normally open (NO) (direct piping type) **F10**: ϕ6
-FMA With female thread block, normally closed (NC) (direct piping type) **F10**: M5 x 0.8
-FMAH With female thread block, normally closed (NC)Note15 (direct piping type) **F10**: 10-32UNF
-FMB With female thread block, normally open (NO) (direct piping type) **F10**: M5 x 0.8
-FMBH With female thread block, normally open (NO)Note15 (direct piping type) **F10**: 10-32UNF

Caution: The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.

Manifold fitting specification

5-port specification

-J5 With single use fitting block (base piping type) **F10**: ϕ4
-J6 With single use fitting block (base piping type) **F10**: ϕ6
-M With female thread block (base piping type) **F10**: M5 x 0.8
-MH With female thread blockNote15 (base piping type) **F10**: 10-32UNF

3-port specification

-J5A With single use fitting block, normally closed (NC) (base piping type) **F10**: ϕ4
-J5B With single use fitting block, normally open (NO) (base piping type) **F10**: ϕ4
-J6A With single use fitting block, normally closed (NC) (base piping type) **F10**: ϕ6
-J6B With single use fitting block, normally open (NO) (base piping type) **F10**: ϕ6
-MA With female thread block, normally closed (NC) (base piping type) **F10**: M5 x 0.8
-MAH With female thread block, normally closed (NC)Note15 (base piping type) **F10**: 10-32UNF
-MB With female thread block, normally open (NO) (base piping type) **F10**: M5 x 0.8
-MBH With female thread block, normally open (NO)Note15 (base piping type) **F10**: 10-32UNF

Caution: The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.

Port isolator

Blank: No port isolator
-XSP: For 1(P) portNote7
-XSR: For 3(R2), 5(R1) portsNote7
-XSA: For 1(P), 3(R2), and 5(R1) portsNote7

Back pressure prevention valve

Blank
No back pressure prevention valve

-E2
With back pressure prevention valveNote11

Individual air supply and exhaust spacer

Blank: No spacer
-XPPM: Individual air supply spacer (with M5 female thread for F10)
-XPRM: Individual exhaust spacer (with M5 female thread for F10)

For details, see p.27.

Block-off plate wiring specification

Blank: Double wiring
-S: Single wiring

Station	Valve size	Valve specifications	Operation type	Manual override	Valve outlet type	Manifold fitting specification	Back pressure prevention valve	Individual air supply and exhaust spacer	Port isolator	Voltage / Block-off plate wiring specification
Valve type included										
stn. 1 ⋮ stn. □ Note3	F10 F10L	T0 T1 T2 T3 T4 T5 TA[Note10] TB[Note10] TC[Note10]	Blank[Note8] G[Note9]	Blank -R[Note6]	-A1[Note4]		Blank -E2[Note11]	Blank -XPPM -XPRM	Blank -XSP[Note7] -XSR[Note7] -XSA[Note7]	DC24V DC12V[Note2] / Blank -S
	F10	XBPP (for block-off plate)[Note5]								
When selecting the intermediate piping block, see page 106 when specifying it.										
stn. 1 ⋮ stn. □ Note3	F10 F10L	T0 T1 T2 T3 T4 T5 TA[Note10] TB[Note10] TC[Note10]	Blank[Note8] G[Note9]	Blank -R[Note6]	-A1[Note4]	-J5[Note12] -J6[Note12] -M[Note12] -MH[Note15] -J5A[Note12] -J5B[Note12] -J6A[Note12] -J6B[Note12] -MA[Note12] -MAH[Note15] -MB[Note12] -MBH[Note15]	Blank -E2[Note11]	Blank -XPPM -XPRM	Blank -XSP[Note7] -XSR[Note7] -XSA[Note7]	DC24V DC12V[Note2] / Blank -S
	F10	XBPP (for block-off plate)[Note5]								
When selecting the intermediate piping block, see page 106 when specifying it.										
stn. 1 ⋮ stn. □ Note3	F10 F10L	T0 T1 T2 T3 T4 T5 TA[Note10] TB[Note10] TC[Note10]	Blank[Note8] G[Note9]	Blank -R[Note6]	-FJ[Note12] -FJ5[Note12] -FJ6[Note12] -FM[Note12] -FMH[Note15] -FJ5A[Note12] -FJ5B[Note12] -FJ6A[Note12] -FJ6B[Note12] -FMA[Note12] -FMAH[Note15] -FMB[Note12] -FMBH[Note15]		Blank -E2[Note11]	Blank -XPPM -XPRM	Blank -XSP[Note7] -XSR[Note7] -XSA[Note7]	DC24V DC12V[Note2] / Blank -S
	F10	XBPP (for block-off plate)[Note5]								
When selecting the intermediate piping block, see page 106 when specifying it.										

Notes: 5. Select the block-off plate wiring in the block-off plate wiring connection specification.
6. When the valve specification is **T1** or **T2**, the manual override lever is placed only on the A side.
7. Port isolators can be installed only when piping blocks are mounted on both sides. In addition, only 1 port isolator can be mounted in 1 manifold for **-XSA**, or 1 each port isolator for **-XSP** and **-XSR** for a total of 2 locations. When shipping, the designated port isolators are mounted between the designated station and the station to its immediate left (the next smaller stn. No.).
8. Cannot be mounted on the external pilot manifold.
9. Cannot be mounted on the internal pilot manifold.
10. Not available in external pilot type.
11. Not available with the individual exhaust spacer.
12. The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.
13. Only L or Blank is available in the inch female thread specification and the manifold outlet specification.
14. Can be selected only when the manifold type is **XP**.
15. Can be selected only when the manifold type is **XPH**.

F10 Series Easy Assembly Type Manifold Plug-in Type Order Codes

Intermediate piping block

(When mounting an intermediate piping block to the manifold, complete the following type and specify the station specified on page 105.)

F 10 ZX□ - □ - TK - □

Valve size
10: 10 mm [0.394 in.] width

Pilot specification
Blank: Internal pilot
G: External pilot

Piping block Specification Note
PJ : With dual use fitting ϕ6, ϕ8
PJ5 : With single use fitting ϕ6
PJ6 : With single use fitting ϕ8
PM : With female thread Rc 1/8
PMH : WIth female thread NPT 1/8

Manifold type
TK: For plug-in type

Port isolator
Blank: Internal pilot
XSP: Port isolator (1(P) port)
XSR: Port isolator (3(R2), 5(R1) ports)
XSA: Port isolator (1(P), 3(R2), and 5(R1) ports)

Note:See the following table for combinations of intermediate piping block port specifications and manifold piping block specifications.

Manifold piping specifications	Intermediate piping block
JT	PJ
J5T	PJ5
J6T	PJ6
MT	PM
MTH	PMH

F10 Series Easy Assembly Type Manifold Plug-in Type Additional Parts Order Codes

Parts for manifold

F 10 ZX - □

Valve size
10: 10 mm [0.394 in.] width

Parts content
GS2: Gasket (gasket and exhaust valve)
GS3: Gasket (valve base side)
XSP: Port isolator (for 1(P) port)
XSR: Port isolator (for 3(R2), 5(R1) ports)
XSA: Port isolator (for 1(P), 3(R2), 5(R1) ports)
DN : DIN mounting bracket (1 set of 2)

Block-off plate (block-off plate, 2 mounting screws, and plug)

F 10 XBP P

Valve size
10: 10 mm [0.394 in.] width

For plug-in type

Valve base assembly (valve base, gasket, and 2 connecting rods for adding)

F 10 ZX - □ - □ - □ *For use with both internal pilot and external pilot

Valve size
10: 10 mm [0.394 in.] width

Common specification
Blank: For positive common
CM: For negative common

Wiring specification
S : For single wiring
W : For double wiring

Piping specifications
VJ : Dual use fitting valve base
VJ5 : Single use fitting valve base F10: ϕ4
VJ6 : Single diameter fitting valve base F10: ϕ6
VJ5A : 3-port specification normally closed, single use fitting valve base F10: ϕ4
VJ5B : 3-port specification normally open, single use fitting valve base F10: ϕ4
VJ6A : 3-port specification normally closed, single use fitting valve base F10: ϕ6
VJ6B : 3-port specification normally open, single use fitting valve base F10: ϕ6
VM : Female thread valve base F10: M5 x 0.8
VMA : 3-port specification normally closed, female thread valve base F10: M5 x 0.8
VMB : 3-port specification normally open, female thread valve base F10: M5 x 0.8
VMH : Female thread valve base F10:10-32UNF
VMAH : 3-port specification normally closed, female valve base F10:10-32UNF
VMBH : 3-port specification normally open, female valve base F10:10-32UNF
VP : Valve base plate

Back pressure prevention valve (2 pieces for split type, with dedicated gasket)

F 10 Z - E2

Valve size
10: 10 mm [0.394 in.] width

Individual air supply and exhaust spacer (Spacer for plug-in type, gasket, exhaust valve, and 2 mounting screws)

F 10 ZX - □

Valve size
10: 10 mm [0.394 in.] width

Specification
XPPM: Individual air supply spacer (with M5 female thread for F10)
XPRM: Individual exhaust spacer (with M5 female thread for F10)

※For details, see p.27.

Muffler

KM - J □

Fitting size
6: Outer diameter ϕ6 (for piping block)
8: Outer diameter ϕ8 (for piping block)
(Sales unit: Set of 10 mufflers)

DIN rail

DIN - □ (Unit:1)

Rail length
125: 125mm [4.921 in.]
⋮ (25 mm [0.984 in.] pitch)
525: 525mm [20.669 in.]

Piping block assembly (plug-in)

F 10 ZX□ - □ - □ - □ - □

Valve size
10: 10 mm [0.394 in.] width

Port isolator Note2
Blank: No port isolator
XSP: Port isolator (1(P) port)
XSR: Port isolator (3(R2), 5(R1) ports)
XSA: Port isolator (1(P), 3(R2), and 5(R1) ports)

Mounting specification Note3
Blank: Without DIN bracket
DN: With DIN bracket

Pilot specification
Blank: Internal pilot
G: External pilot

Manifold type
LK : Left side piping block (for plug-in type) with circuit board
RN : Right piping block, without circuit board
TK : Intermediate piping block (for plug-in type) with circuit board

Piping block Specification Note1
PJ : With dual use fitting ϕ6, ϕ8
PJ5: With single use fitting ϕ6
PJ6: With single use fitting ϕ8
PM : With female thread Rc 1/8
PMH : With female thread NPT 1/8
PP : Plate (without fitting)

Notes: 1.The fitting of the piping block is included. One set of two connecting rods is also included for a LN and TN type manifold.
2. Port isolator selection only available when the piping block name is TK.
3. Only when the manifold type is LK or RN.

F10 Series Easy Assembly Type Manifold Plug-in Type Additional Parts Order Codes

Connecting rod (1 set of 2)

F 10 ZX - □ - □

Valve size
10: 10 mm [0.394 in.] width

Number of units
01 ～ **20**: When type for valve base (RV) is selected
01: When type for left side piping block (RH) is selected
01: When type for intermediate piping block (RC) is selected

Specification
RV: For valve base
RH: For left piping block
RC: For intermediate piping block

Wiring block assembly (1 set)

FZX - □ - □

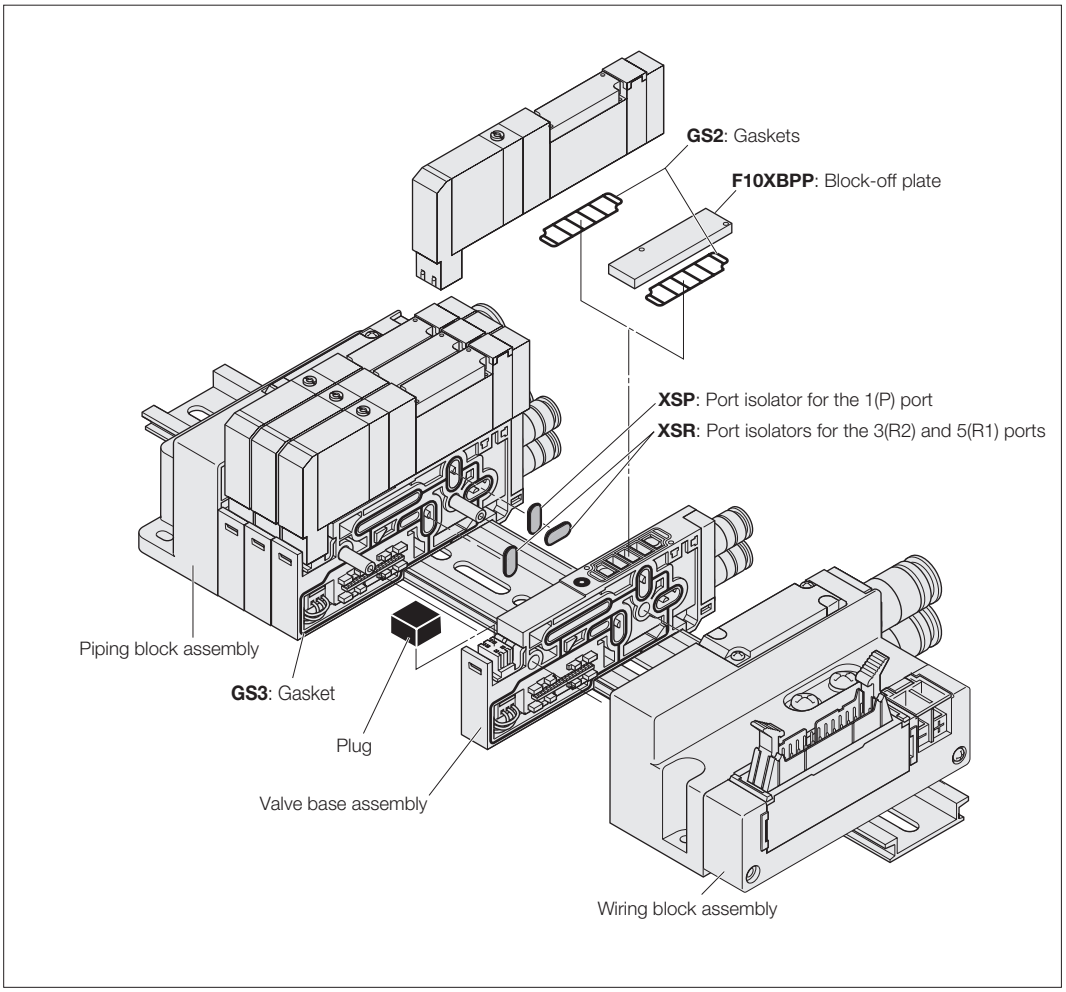
Common specification
Blank: Positive common
CM: Negative common

Wiring specification
F100 : Flat cable connector (DC specification)
F101 : Flat cable connector (DC specification)
F200 : Flat cable connector (DC specification)
F201 : Flat cable connector (DC specification)
F260 : Flat cable connector (DC specification)
D250 : D-sub connector (M2.6 screws)
D251 : D-sub connector (M2.6 screws)
F100N : Flat cable connector (DC specification), without power terminal
F101N : Flat cable connector (DC specification), without power terminal
F200N : Flat cable connector (DC specification), without power terminal
F201N : Flat cable connector (DC specification), without power terminal
F260N : Flat cable connector (DC specification), without power terminal
D250N : D-sub connector, without power terminal (M2.6 screws)
D251N : D-sub connector, without power terminal (M2.6 screws)
D250U : D-sub connector, (4-40UNC screws)
D250NU : D-sub connector, without power terminal (4-40UNC screws)
D251U : D-sub connector, (4-40UNC screws)
D251NU : D-sub connector, without power terminal (4-40UNC screws)
D370NU : D-sub connector, without power terminal (4-40UNC screws)
T200 : Terminal block, for left-side mounting

※ The above flat cable connectors and D-sub connectors can be switched between the top and side type.

■ Table for maximum number of valve units by wiring specification

Wiring specification	Max. outputs	Maximum number of units ※ Wiring connection specification: Packed wiring (Blank)	Maximum number of units ※ Wiring connection specification: Double wiring (**-W**)
F100 □ Flat cable (10P)	8	Varies depending on the number of mounted single solenoids, double solenoids, and block-off plates. The number of controlled solenoids should be designated as the maximum number of outputs or less. D370NU is a maxmum of 20 units.	4 units
F101 □ Flat cable (10P)	8		4 units
F200 □ Flat cable (20P)	16		8 units
F201 □ Flat cable (20P)	16		8 units
F260 □ Flat cable (26P)	20		10 units
D250 □ D-sub connector (25P)	16		8 units
D251 □ D-sub connector (25P)	20		10 units
D370NU D-sub connector (37P)	32		16 units
T200 Terminal block (19 terminals)	18		9 units



Manifold Order Code Example
(12 units of F10 Series)

F10M12XPL-J6T-F201-DR DC24V

stn.1 ～ 8 F10T1-A1-J5 DC24V
stn.9 F10ZX-PJ6-TK
stn.10 ～ 12 F10T1-A1-J5 DC24V

Note:This order code example has no relationship to the illustration above.

Precautions for Order Codes

● **Orders for valves only**

Place orders from “Single Valve Unit Order Codes” on p. 64.
However, **Blank**, **A2□, F3, F4□, F5, F6, F4A□, F4B□, F5A, F5B, F6A, or F6B** cannot be selected for the valve outlet type. For the wiring specification, **Blank** is the only selection.

● **Wiring connection specification**

Blank (packed wiring): Wiring is made in accordance with the mounted valve specifications.
-W (double wiring): Wiring is always for the double solenoid, regardless of the specifications of the mounted valve.

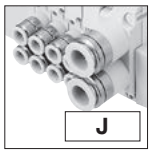
Caution

Single or double can also be selected as the block-off plate wiring specification separately from the manifold (valve) wiring specification.

F10 Series Easy Assembly Type Manifold Serial Transmission Type Order Codes

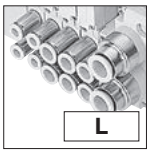
■ Manifold outlet specification

With dual use fitting blocks (base piping type)



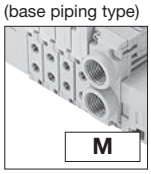
Outlet port fitting
F10: ϕ4/ϕ6

With selectable fittings (base piping type)



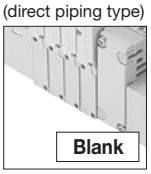
Outlet port should be selected in accordance with the manifold fitting specification.

With female thread blocks (base piping type)



Outlet port female thread
F10: M5 x 0.8

With plates (direct piping type)



■ Pilot specification

Blank
Internal pilot manifold

G
External pilot manifold

■ Piping block specification (air supply and exhaust)

Fitting block
-JR: Dual use fitting, right-side mounting
-JL: Dual use fitting, left-side mounting
-JD: Dual use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ6, ϕ8

Female thread block
-MR: Female thread, right-side mounting
-ML: Female thread, left-side mounting
-MD: Female thread, both-side mounting
Female thread size (1(P), 3, 5(R) ports), Rc1/8

Female thread block
-MRH: Female thread, right-side mounting Note13
-MLH: Female thread, left-side mounting Note13
-MDH: Female thread,both-side mounting Note13
Female thread size (1(P), 3, 5(R) ports), NPT1/8

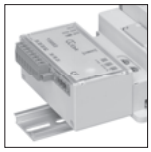
Single use fitting block
-J5R: Single use fitting, right-side mounting
-J5L: Single use fitting, left-side mounting
-J5D: Single use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ6

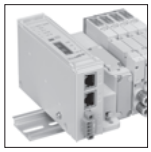
-J6R: Single use fitting, right-side mounting
-J6L: Single use fitting, left-side mounting
-J6D: Single use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ8

Intermediate piping block
-JT: Dual use fitting, both-side mounting, intermediate piping block ϕ6, ϕ8
-J5T: Single use fitting, both-side mounting, intermediate piping block ϕ6
-J6T: Single use fitting, both-side mounting, intermediate piping block ϕ8
-MT: Female thread, both-side mounting, intermediate piping block Rc1/8
-MTH: Female thread, both-side mounting, intermediate piping block NPT1/8 Note13

■ Transmission block specification

※ All transmission blocks are left-side mounting
※ These are the serial transmission block specifications compatible with each system.





●Block on the right photo is the case of B7A Link Terminal.
For details, see p. 41-44.

Integrated type
-B1: For CC-Link (16 outputs) Note2
-B3: For CC-Link (32 outputs) Note2
-D1: For DeviceNet (16 outputs)
-D3: For DeviceNet (32 outputs)
-H1: For CompoNet (16 outputs)
-K1: For EtherCAT (16 outputs)
-K3: For EtherCAT (32 outputs)
-M1: For EtherNet/IP (16 outputs) Note2
-M3: For EtherNet/IP (32 outputs) Note2

■ Wiring connection specification

Blank
Packed wiring: Specification of the valve base is always in accordance with the mounted valve specifications.

-W
Double wiring: Valve base is always double wiring, regardless of the specifications of the mounted valve.

■ Mounting specification

Blank
Direct mounting

-DN
With DIN bracket (no rail)

-DR
With DIN bracket, with rail
Caution: For information on rails assembled and shipped, see pages 137 and 138.

■ Valve size

F10 Standard type

F10L Low-current type

■ Valve size

F10M 10 mm [0.394 in.] width

Valve size	Valve units	Manifold type	Manifold outlet specification	Pilot specification	Piping block specification	Transmission block specification	Wiring connection specification	Mounting specification
Manifold type								
Base piping type	F10M	XS (※Rc)	J M	Blank G	-JR -J5R -JT -JL -J5L -J5T -JD -J5D -J6T -MR -J6R -MT -ML -J6L -MD -J6D	-B1 Note2 -D3 -K3 -B3 Note2 -H1 -M1 Note2 -D1 -K1 -M3 Note2	Blank -W	Blank -DN -DR
Base piping type selectable fitting		XS (※Rc) XSH (※NPT) Only L or Blank is available in the inch female thread specification and the manifold outlet specification.	L	Blank G	-JR -MLH Note13 -J6D -JL -MDH Note13 -JT -JD -J5R -J5T -MR -J5L -J6T -ML -J5D -MT -MD -J6R -MTH Note13 -MRH Note13 -J6L	-B1 Note2 -D3 -K3 -B3 Note2 -H1 -M1 Note2 -D1 -K1 -M3 Note2	Blank -W	Blank -DN -DR
Direct piping type	2 ・・・ □ Note1		Blank	Blank G	-JR -MLH Note13 -J6D -JL -MDH Note13 -JT -JD -J5R -J5T -MR -J5L -J6T -ML -J5D -MT -MD -J6R -MTH Note13 -MRH Note13 -J6L	-B1 Note2 -D3 -K3 -B3 Note2 -H1 -M1 Note2 -D1 -K1 -M3 Note2	Blank -W	Blank -DN -DR

Notes 1. To determine the maximum number of units, see the table for maximum number of valve units by transmission block specification, on p. 114.
2. Complies with the CE marking regulation.

■ Valve specification

T0 : 2-position, for single solenoid only
T1 : 2-position, single solenoid specification
T2 : 2-position, double solenoid specification
T3 : 3-position, closed center
T4 : 3-position, exhaust center
T5 : 3-position, pressure center
TA : Tandem 3-port (NC and NC)Note10
TB : Tandem 3-port (NO and NO)Note10
TC : Tandem 3-port (NC and NO)Note10

■ Operation type

Blank
Internal pilot typeNote8

G
External pilot typeNote9
(for positive pressure)
※ No vacuum valve can be mounted.

■ Manual override

Manual override button

Manual override leverNote6

■ Valve outlet type

-A1 With plateNote4 (base piping type)

5-port specification

-FJ	With dual use fitting block **F10**: ϕ4, ϕ6 (direct piping type)
-FJ5	With single use fitting block **F10**: ϕ4 (direct piping type)
-FJ6	With single use fitting block **F10**: ϕ6 (direct piping type)
-FM	With female thread block **F10**: M5 x 0.8 (direct piping type)
-FMH	With female thread blockNote13 (direct piping type) **F10**: 10-32UNF

3-port specification

-FJ5A	With single use fitting block, normally closed (NC) (direct piping type) **F10**: ϕ4
-FJ5B	With single use fitting block, normally open (NO) (direct piping type) **F10**: ϕ4
-FJ6A	With single use fitting block, normally closed (NC) (direct piping type) **F10**: ϕ6
-FJ6B	With single use fitting block, normally open (NO) (direct piping type) **F10**: ϕ6
-FMA	With female thread block, normally closed (NC) (direct piping type) **F10**: M5 x 0.8
-FMAH	With female thread block, normally closed (NC)Note13 (direct piping type) **F10**: 10-32UNF
-FMB	With female thread block, normally open (NO) (direct piping type) **F10**: M5 x 0.8
-FMBH	With female thread block, normally open (NO)Note13 (direct piping type) **F10**: 10-32UNF

Caution: The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.

■ Manifold fitting specification

5-port specification

-J5	With single use fitting block **F10**: ϕ4 (base piping type)
-J6	With single use fitting block **F10**: ϕ6 (base piping type)
-M	With female thread block **F10**: M5 x 0.8 (base piping type)
-MH	With female thread blockNote13 (base piping type) **F10**: 10-32UNF

3-port specification

-J5A	With single use fitting block, normally closed (NC) (base piping type) **F10**: ϕ4
-J5B	With single use fitting block, normally open (NO) (base piping type) **F10**: ϕ4
-J6A	With single use fitting block, normally closed (NC) (base piping type) **F10**: ϕ6
-J6B	With single use fitting block, normally open (NO) (base piping type) **F10**: ϕ6
-MA	With female thread block, normally closed (NC) (base piping type) **F10**: M5 x 0.8
-MAH	With female thread block, normally closed (NC)Note13 (base piping type) **F10**: 10-32UNF
-MB	With female thread block, normally open (NO) (base piping type) **F10**: M5 x 0.8
-MBH	With female thread block, normally open (NO)Note13 (base piping type) **F10**: 10-32UNF

Caution: The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.

■ Port isolator

Blank: No port isolator
-XSP: For 1 (P) portNote7
-XSR: For 3(R2), 5(R1) portsNote7
-XSA:For 1(P), 3(R2), and 5(R1)Note7

■ Back pressure prevention valve

Blank
No back pressure prevention valve

-E2
With back pressure prevention valveNote11

■ Individual air supply and exhaust spacer

Blank: Without spacer
-XPPM: Individual air supply spacer (with M5 female thread for F10)
-XPRM: Individual exhaust spacer (with M5 female thread for F10)

For details, see p.27.

■ Block-off plate wiring specification

Blank: Double wiring
-S: Single wiring

Station	Valve Size	Valve specification	Operation type	Manual override	Valve outlet type	Manifold fitting specification	Back pressure prevention valve	Individual air supply and exhaust spacer	Port isolator	Voltage / Block-off plate wiring specification
Mounting valve model										
stn. 1 ⋮ stn.□ Note3	F10 F10L	T0 T1 T2 T3 T4 T5 TANote10 TBNote10 TCNote10	BlankNote8 GNote9	Blank -RNote6	-A1Note4		Blank -E2Note11	Blank -XPPM -XPRM	Blank -XSPNote7 -XSRNote7 -XSANote7	DC24V Blank -S
	F10	XBPP (for block-off plate)Note3								
When selecting the intermediate piping block, see page 112 when specifying it.										
stn. 1 ⋮ stn.□ Note3	F10 F10L	T0 T1 T2 T3 T4 T5 TANote10 TBNote10 TCNote10	BlankNote8 GNote9	Blank -RNote6	-A1Note4	-J5Note12 -J6Note12 -MNote12 -MHNote13 -J5ANote12 -J5BNote12 -J6ANote12 -J6BNote12 -MANote12 -MAHNote13 -MBNote12 -MBHNote13	Blank -E2Note11	Blank -XPPM -XPRM	Blank -XSPNote7 -XSRNote7 -XSANote7	DC24V Blank -S
	F10	XBPP (for block-off plate)Note3								
When selecting the intermediate piping block, see page 112 when specifying it.										
stn. 1 ⋮ stn.□ Note3	F10 F10L	T0 T1 T2 T3 T4 T5 TANote10 TBNote10 TCNote10	BlankNote8 GNote9	Blank -RNote6	-FJNote12 -FJ5Note12 -FJ6Note12 -FMNote12 -FMHNote13 -FJ5ANote12 -FJ5BNote12 -FJ6ANote12 -FJ6BNote12 -FMANote12 -FMAHNote13 -FMBNote12 -FMBHNote13		Blank -E2Note11	Blank -XPPM -XPRM	Blank -XSPNote7 -XSRNote7 -XSANote7	DC24V Blank -S
	F10	XBPP (for block-off plate)Note5								
When selecting the intermediate piping block, see page 112 when specifying it.										

Notes: 3. Valve mounting location is from the left, with the solenoid on top, and the 4(A), 2(B) ports side in front.
4. When selecting **J**, **M**, or **L** (base piping type) for the manifold outlet specifications, always enter **-A1** (with plate) for the valve outlet type.
5. Single or double can also be selected as the block-off plate wiring specification separately from the manifold (valve) wiring specification.
6. When the valve specification is **T1** or **T2**, the manual override lever is placed only on the A side.
7. Port isolators can be installed only when piping blocks are mounted on both sides. In addition, only 1 port isolator can be mounted in 1 manifold for **-XSA**, or 1 each port isolator for **-XSP** and **-XSR** for a total of 2 locations. When shipping, the designated port isolators are mounted between the designated station and the station to its immediate left (the next smaller stn. No.).
8. Cannot be mounted on the external pilot manifold.
9. Cannot be mounted on the internal pilot manifold.
10. Not available in external pilot type.
11. Not available with the individual exhaust spacer.
12. The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.
13. Can be selected only when the manifold type is **XSH**.

F10 Series Easy Assembly Type Manifold Serial Transmission Type Order Codes

Intermediate piping block

(When mounting an intermediate piping block to the manifold, complete the following type and specify the station specified on page 111.)

F 10 ZX□ - □ - TK - □

Valve size
10: 10 mm
[0.394 in.] width

Pilot specification
Blank: Internal pilot
G: External pilot type

Piping block Specification Note
PJ : With dual use fitting ϕ6, ϕ8
PJ5 : With single use fitting ϕ6
PJ6 : With single use fitting ϕ8
PM : With female thread Rc 1/8
PMH : WIth female thread NPT 1/8

Manifold type
TK: Plug-in type, for serial transmission

Port isolator
Blank : Without split
XSP : Port isolator (1(P) port)
XSR : Port isolator (3(R2), 5(R1) ports)
XSA : Port isolator (1(P), 3(R2), and 5(R1) ports)

Note:See the following table for combinations of intermediate piping block port specifications and manifold piping block specifications.

Manifold piping specifications	Intermediate piping block
JT	PJ
J5T	PJ5
J6T	PJ6
MT	PM
MTH	PMH

F10 Series Easy Assembly Type Manifold Serial Transmission Type Additional Parts Order Codes

Parts for manifold

F 10 ZX - □

Valve size
10: 10 mm [0.394 in.] width

Parts content
GS2 : Gasket (gasket and exhaust valve)
GS3 : Gasket (valve base side)
XSP : Port isolator (for 1(P) port)
XSR : Port isolator (for 3(R2), 5(R1) ports)
XSA : Port isolator (for 1(P), 3(R2), 5(R1) ports)
DN : DIN mounting bracket (one set of two)

Block-off plate (block-off plate, 2 mounting screws, and plug)

F 10 XBPP

Valve size
10: 10 mm [0.394 in.] width

Back pressure prevention valve (2 units for split type, with dedicated gasket)

F 10 Z - E2

Valve size
10: 10 mm [0.394 in.] width

Individual air supply and exhaust spacer (Spacer for plug-in type, gasket, exhaust valve, and 2 mounting screws)

F 10 ZX - □

Valve size
10: 10 mm [0.394 in.] width

Specifications
XPPM: Individual air supply spacer (with M5 female thread for F10)
XPRM: Individual exhaust spacer (with M5 female thread for F10)

※For details, see p.27.

Valve base assembly (valve base, gasket, and 2 connecting rods for adding)

F 10 ZX - □ - □ - □ ※For use with both internal pilot and external pilot

Valve size
10: 10 mm [0.394 in.] width

Wiring specification
S : For single wiring
W : For double wiring

Common specification
Blank: For positive common

Piping specification
VJ : Dual use fitting valve base
VJ5 : Single use fitting valve base F10: ϕ4
VJ6 : Single diameter fitting valve base F10: ϕ6
VJ5A : 3-port specification normally closed, single use fitting valve base F10: ϕ4
VJ5B : 3-port specification normally open, single use fitting valve base F10: ϕ4
VJ6A : 3-port specification normally closed, single use fitting valve base F10: ϕ6
VJ6B : 3-port specification normally open, single use fitting valve base F10: ϕ6
VM : Female thread valve base F10: M5 x 0.8
VMA : 3-port specification normally closed, female thread valve base F10: M5 x 0.8
VMB : 3-port specification normally open, female thread valve base F10: M5 x 0.8
VMH : Female thread valve base F10:10-32UNF
VMAH : 3-port specification normally closed, female valve base F10:10-32UNF
VMBH : 3-port specification normally open, female valve base F10:10-32UNF
VP : Valve base plate

Muffler

KM - J □

Fitting size
6: Outer diameter ϕ6 (for piping block)
8: Outer diameter ϕ8 (for piping block)

DIN rail

DIN - □ (Unit:1)

Rail length
125: 125mm [4.921 in.]
⋮ (25 mm [0.984 in.] pitch)
525: 525mm [20.669 in.]

Connecting rod (1 set of 2)

F 10 ZX - □ - □

Valve size
10: 10 mm [0.394 in.] width

Number of units
01 ～ **20**: When type for valve base (RV) is selected
01 : When type for left side piping block (RH) is selected
01 : When type for intermediate piping block (RC) is selected

Specification
RV : For valve base
RH : For left piping block
RC : For intermediate piping block

Piping block assembly (plug-in)

F 10 ZX□ - □ - □ - □ - □

Valve size
10: 10 mm [0.394 in.] width

Pilot specification
Blank: Internal pilot
G: External pilot type

Piping block specification[Note1]
PJ : With dual use fitting ϕ6, ϕ8
PJ5: With single use fitting ϕ6
PJ6: With single use fitting ϕ8
PM : With female thread Rc 1/8
PMH : With female thread NPT 1/8
PP : Plate (without fitting)

Manifold type
LK : Left side piping block (for plug-in type) with circuit board
RN : Right piping block, without circuit board
TK : Intermediate piping block (for plug-in type) with circuit board

Port isolator[Note2]
Blank: No port isolator
XSP: Port isolator (1(P) port)
XSR: Port isolator (3(R2), 5(R1) ports)
XSA: Port isolator (1(P), 3(R2), and 5(R1) ports)

Mounting specification[Note3]
Blank: Without DIN bracket
DN: With DIN bracket

Notes: 1. The fitting of the piping block is included. One set of two connecting rods is also included for a LN and TN type manifold.
2. Port isolator selection only available when the piping block name is TK.
3. Only when the manifold type is LK or RN.

Serial transmission block (single unit)

YS6 □ (dedicated for manifold mounting)

Transmission block specification
B1: For CC-Link (16 outputs)
B3: For CC-Link (32 outputs)
D1: For DeviceNet (16 outputs)
D3: For DeviceNet (32 outputs)
H1: For CompoNet (16 outputs)

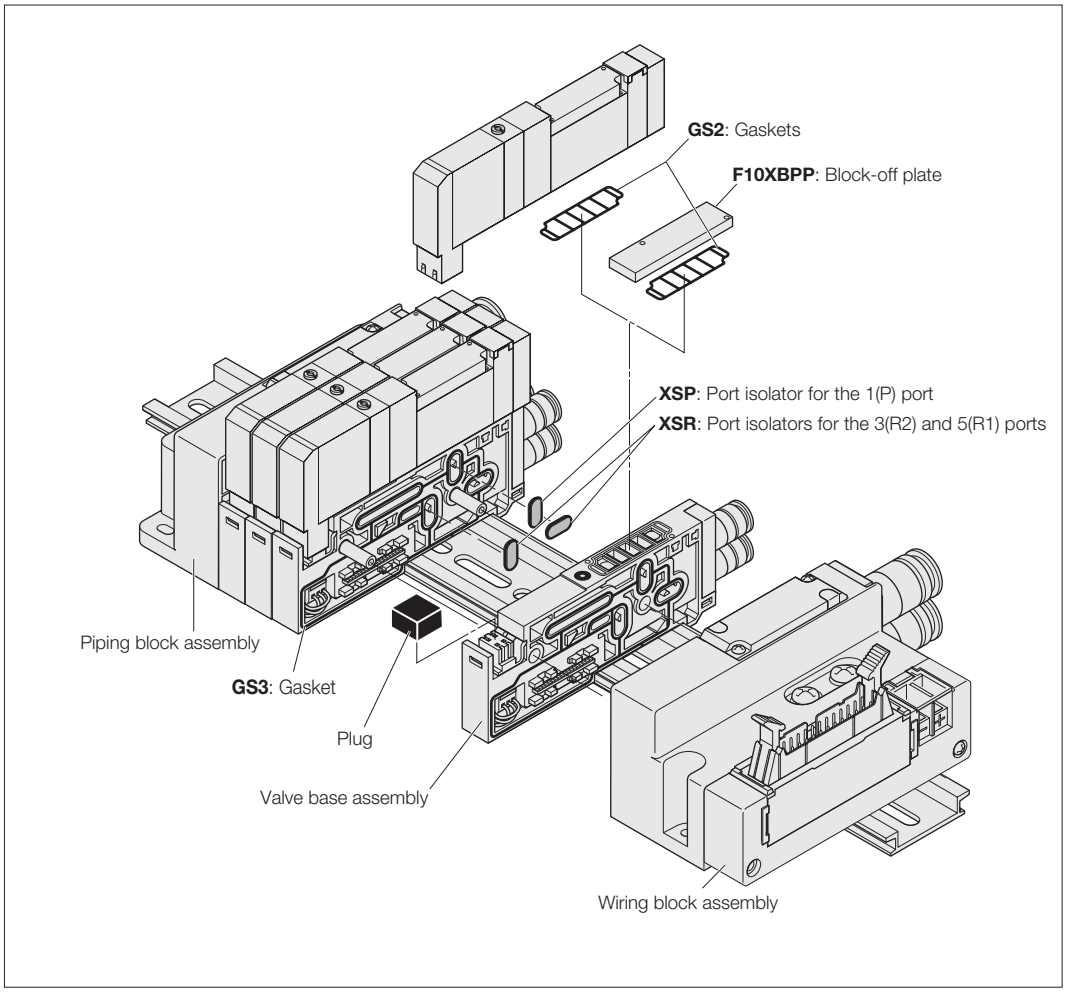
YS7 □ L (dedicated for manifold mounting)

Wiring position
L: Left-side mounting

Transmission block specification
K1: For EtherCAT (16 outputs)
K3: For EtherCAT (32 outputs)
M1: For EtherNet/IP (16 outputs)
M3: For EtherNet/IP (32 outputs)

■ Table for maximum number of valve units by transmission block specification

		Maximum number of units	
		Wiring connection specification	
Transmission block specifications	Max. outputs	Packed wiring (Blank)	Double wiring (**-W**)
-B1: For CC-Link (16 outputs)	16	Varies depending on the number of mounted single solenoids, double solenoids, and block-off plates. The number of controlled solenoids should be designated as the maximum number of outputs or less. **-B3**, **-D3**, **-K3**, and **-M3** are a maximum of 20 units.	8 units
-B3: For CC-Link (32 outputs)	32		16 units
-D1: For DeviceNet (16 outputs)	16		8 units
-D3: For DeviceNet (32 outputs)	32		16 units
-H1: For CompoNet (16 outputs)	16		8 units
-K1: For EtherCAT (16 outputs)	16		8 units
-K3: For EtherCAT (32 outputs)	32		16 units
-M1: For EtherNet/IP (16 outputs)	16		8 units
-M3: For EtherNet/IP (32 outputs)	32		16 units



Manifold Order Code Example
(8 units of F10 Series)

F10M8XSL-J5R-B1-W

stn.1 ～ 5 F10T0-A1-J5 DC24V
stn.6 ～ 7 F10T2-A1-J6 DC24V
stn.8 F10XBPP-J6

Note: This order code example has no relationship to the illustration above.

Precautions for Order Codes

● **Orders for valves only**
Place orders from "Single Valve Unit Order Codes" on p. 64.
However, **Blank**, **A2□, F3, F4□, F5, F6, F4A□, F4B□, F5A, F5B, F6A, or F6B** cannot be selected for the valve outlet type. For the wiring specification, **Blank** is the only selection.

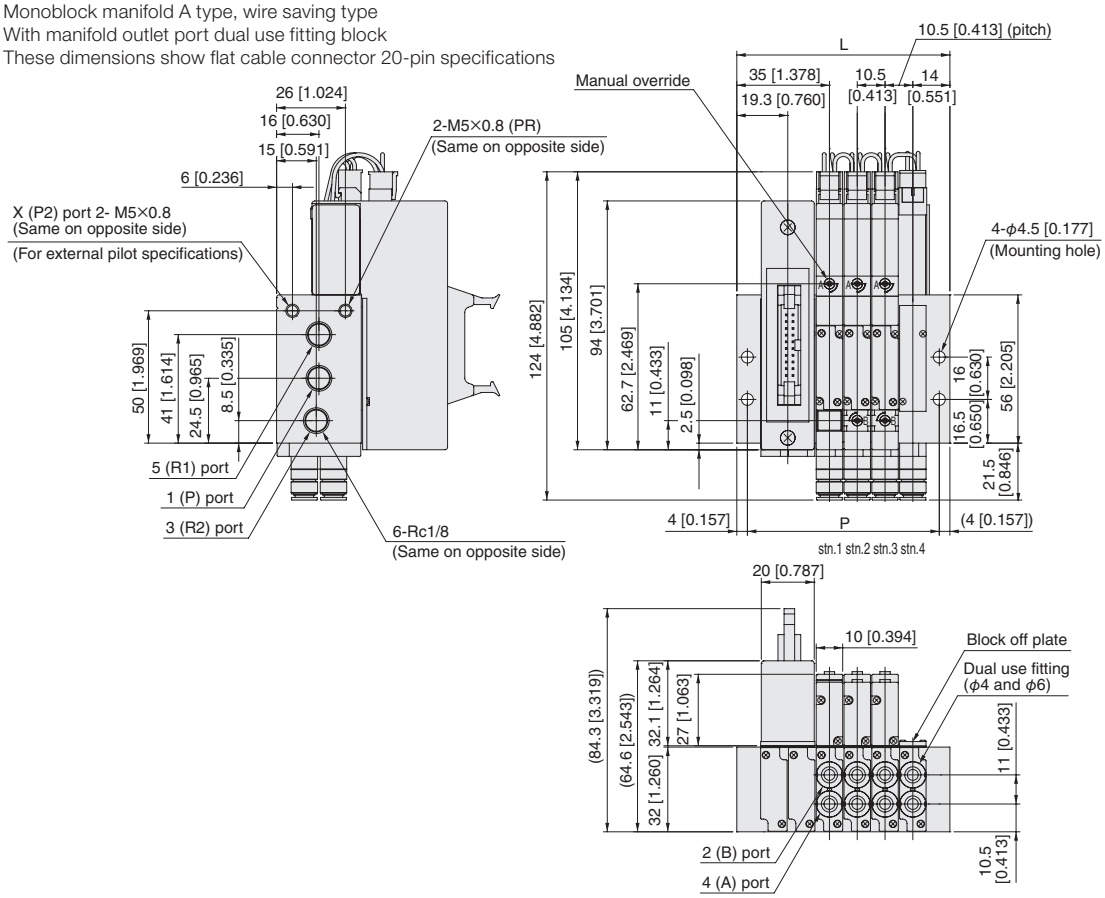
● **Wiring connection specification**
Blank (packed wiring): Wiring is made in accordance with the mounted valve specifications.
-W (double wiring): Wiring is always for the double solenoid, regardless of the specifications of the mounted valve.

Caution

Single or double can also be selected as the block-off plate wiring specification separately from the manifold (valve) wiring specification.

F10M Number of valves A J M L Pilot specifications (Base piping type)

Monoblock manifold A type, wire saving type
With manifold outlet port dual use fitting block
These dimensions show flat cable connector 20-pin specifications

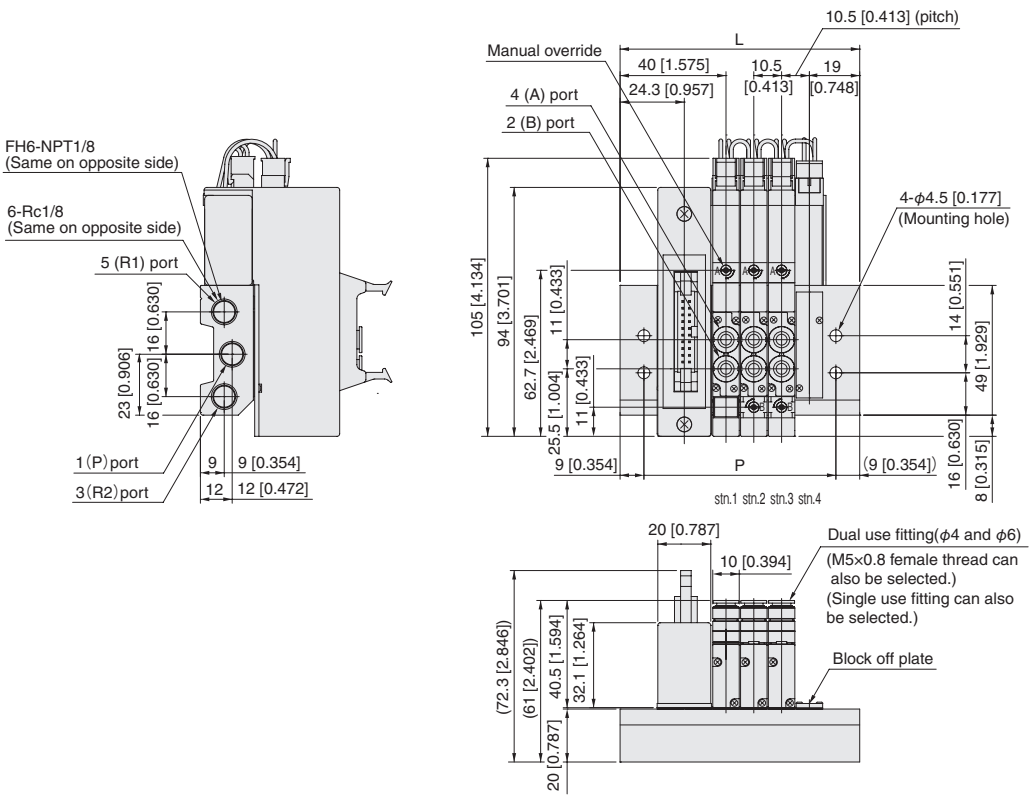


Unit dimensions

Number of units	L	P
2	59.5 [2.343]	51.5 [2.028]
3	70.0 [2.756]	62.0 [2.441]
4	80.5 [3.169]	72.5 [2.854]
5	91.0 [3.583]	83.0 [3.268]
6	101.5 [3.996]	93.5 [3.681]
7	112.0 [4.409]	104.0 [4.094]
8	122.5 [4.823]	114.5 [4.508]
9	133.0 [5.236]	125.0 [4.921]
10	143.5 [5.650]	135.5 [5.335]
11	154.0 [6.063]	146.0 [5.748]
12	164.5 [6.476]	156.5 [6.161]
13	175.0 [6.890]	167.0 [6.575]
14	185.5 [7.303]	177.5 [6.988]
15	196.0 [7.717]	188.0 [7.402]
16	206.5 [8.130]	198.5 [7.815]
17	217.0 [8.543]	209.0 [8.228]
18	227.5 [8.957]	219.5 [8.642]
19	238.0 [9.370]	230.0 [9.055]
20	248.5 [9.783]	240.5 [9.469]

F10M Number of valves F (Direct piping type)

Monoblock manifold F type, wire saving type
With manifold outlet port dual use fitting block
These dimensions show flat cable connector 20-pin specifications

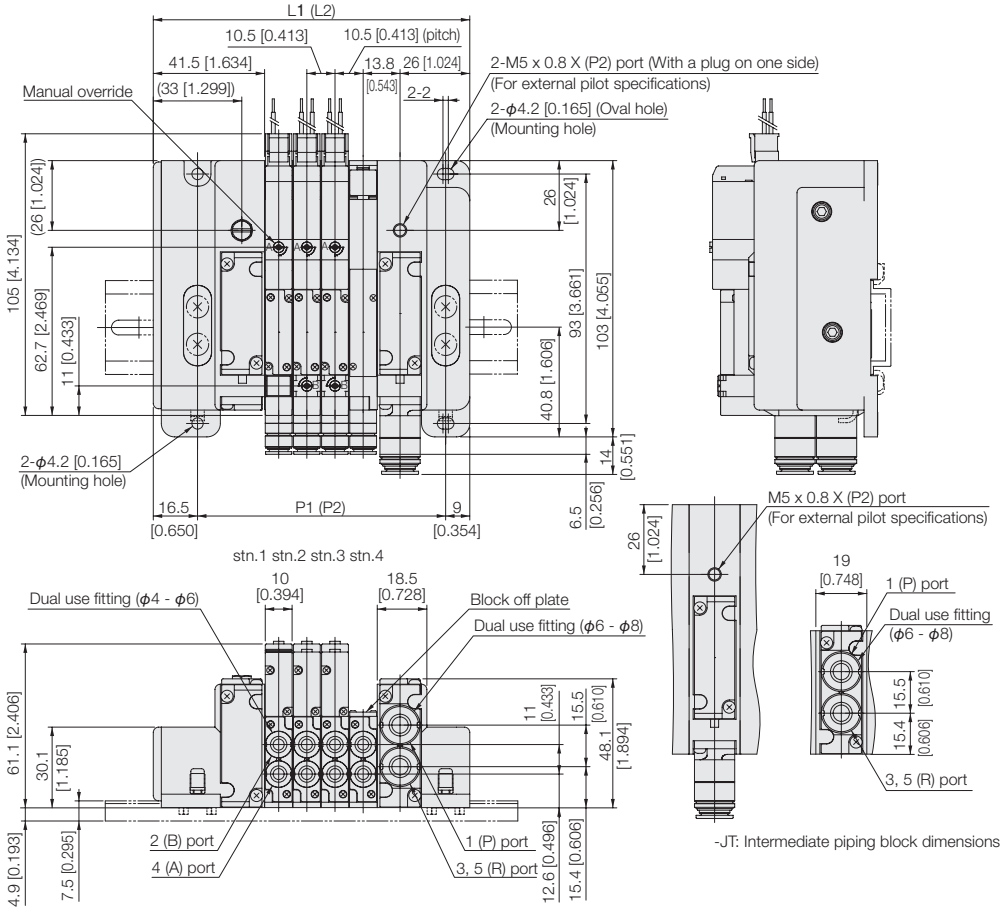


Unit dimensions

Number of units	L	P
2	69.5 [2.736]	51.5 [2.028]
3	80.0 [3.150]	62.0 [2.441]
4	90.5 [3.563]	72.5 [2.854]
5	101.0 [3.976]	83.0 [3.268]
6	111.5 [4.390]	93.5 [3.681]
7	122.0 [4.803]	104.0 [4.094]
8	132.5 [5.217]	114.5 [4.508]
9	143.0 [5.630]	125.0 [4.921]
10	153.5 [6.043]	135.5 [5.335]
11	164.0 [6.457]	146.0 [5.748]
12	174.5 [6.870]	156.5 [6.161]
13	185.0 [7.283]	167.0 [6.575]
14	195.5 [7.697]	177.5 [6.988]
15	206.0 [8.110]	188.0 [7.402]
16	216.5 [8.524]	198.5 [7.815]
17	227.0 [8.937]	209.0 [8.228]
18	237.5 [9.350]	219.5 [8.642]
19	248.0 [9.764]	230.0 [9.055]
20	258.5 [10.177]	240.5 [9.469]

F10M [Number of units] XN J/M/L [Pilot specifications] - [Piping block specification] (Base piping type)

With manifold outlet port dual use fitting block
S type plug connector



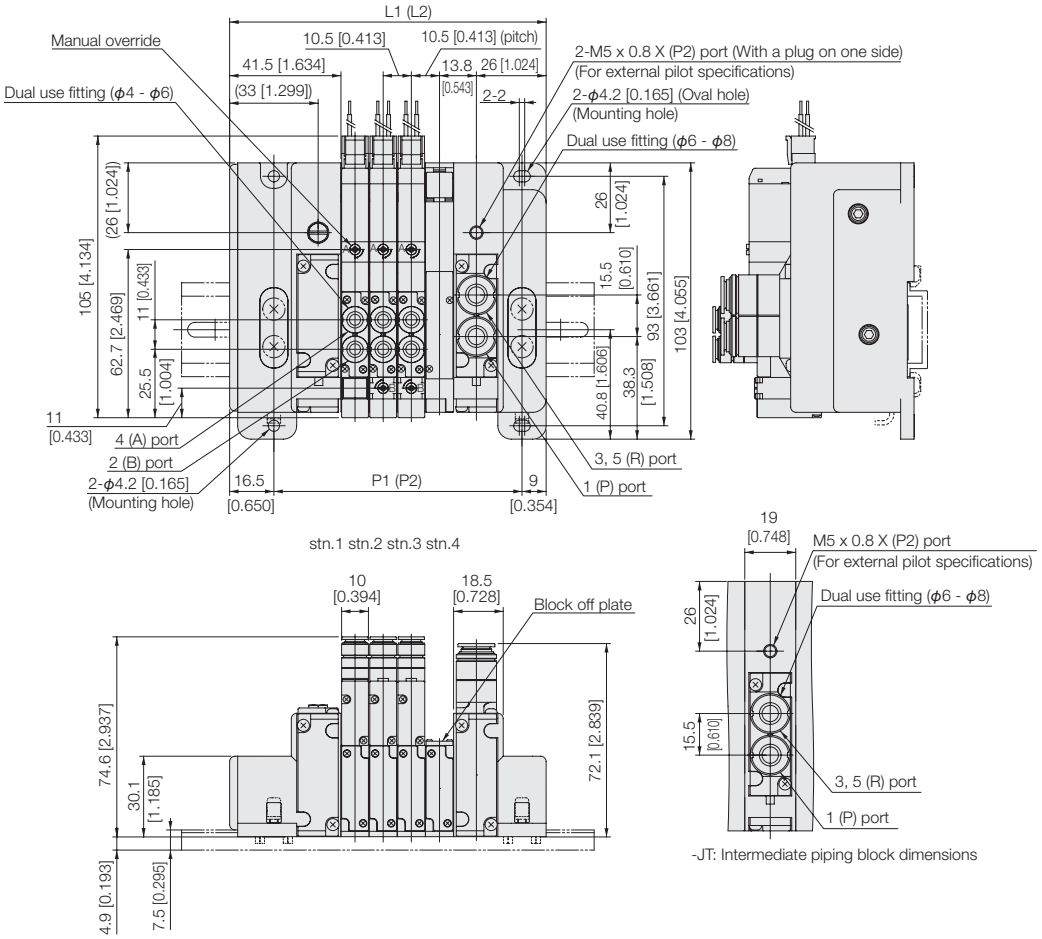
Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2 Note	P2 Note	Length of DIN rail Note
2	97.0 [3.819]	71.5 [2.815]	150 [5.906]	-	-	-
3	107.5 [4.232]	82.0 [3.228]	150 [5.906]	126.5 [4.980]	101.0 [3.976]	175 [6.890]
4	118.0 [4.646]	92.5 [3.642]	175 [6.890]	137.0 [5.394]	111.5 [4.390]	175 [6.890]
5	128.5 [5.059]	103.0 [4.055]	175 [6.890]	147.5 [5.807]	122.0 [4.803]	175 [6.890]
6	139.0 [5.472]	113.5 [4.469]	175 [6.890]	158.0 [6.220]	132.5 [5.217]	200 [7.874]
7	149.5 [5.886]	124.0 [4.882]	200 [7.874]	168.5 [6.634]	143.0 [5.630]	200 [7.874]
8	160.0 [6.299]	134.5 [5.295]	200 [7.874]	179.0 [7.047]	153.5 [6.043]	225 [8.858]
9	170.5 [6.713]	145.0 [5.709]	225 [8.858]	189.5 [7.461]	164.0 [6.457]	225 [8.858]
10	181.0 [7.126]	155.5 [6.122]	225 [8.858]	200.0 [7.874]	174.5 [6.870]	225 [8.858]
11	191.5 [7.539]	166.0 [6.535]	250 [9.843]	210.5 [8.287]	185.0 [7.283]	250 [9.843]
12	202.0 [7.953]	176.5 [6.949]	250 [9.843]	221.0 [8.701]	195.5 [7.697]	250 [9.843]
13	212.5 [8.366]	187.0 [7.362]	250 [9.843]	231.5 [9.114]	206.0 [8.110]	275 [10.827]
14	223.0 [8.780]	197.5 [7.776]	275 [10.827]	242.0 [9.528]	216.5 [8.524]	275 [10.827]
15	233.5 [9.193]	208.0 [8.189]	275 [10.827]	252.5 [9.941]	227.0 [8.937]	300 [11.811]
16	244.0 [9.606]	218.5 [8.602]	300 [11.811]	263.0 [10.354]	237.5 [9.350]	300 [11.811]
17	254.5 [10.020]	229.0 [9.016]	300 [11.811]	273.5 [10.768]	248.0 [9.764]	300 [11.811]
18	265.0 [10.433]	239.5 [9.429]	325 [12.795]	284.0 [11.181]	258.5 [10.177]	325 [12.795]
19	275.5 [10.846]	250.0 [9.843]	325 [12.795]	294.5 [11.594]	269.0 [10.591]	325 [12.795]
20	286.0 [11.260]	260.5 [10.256]	325 [12.795]	305.0 [12.008]	279.5 [11.004]	350 [13.780]
21	-	-	-	315.5 [12.421]	290.0 [11.417]	350 [13.780]

Note:When the J□T or MT piping block specification is selected.

F10M Number of units XN Pilot specifications - Piping block specification (Direct piping type)

With manifold outlet port dual use fitting block
S type plug connector



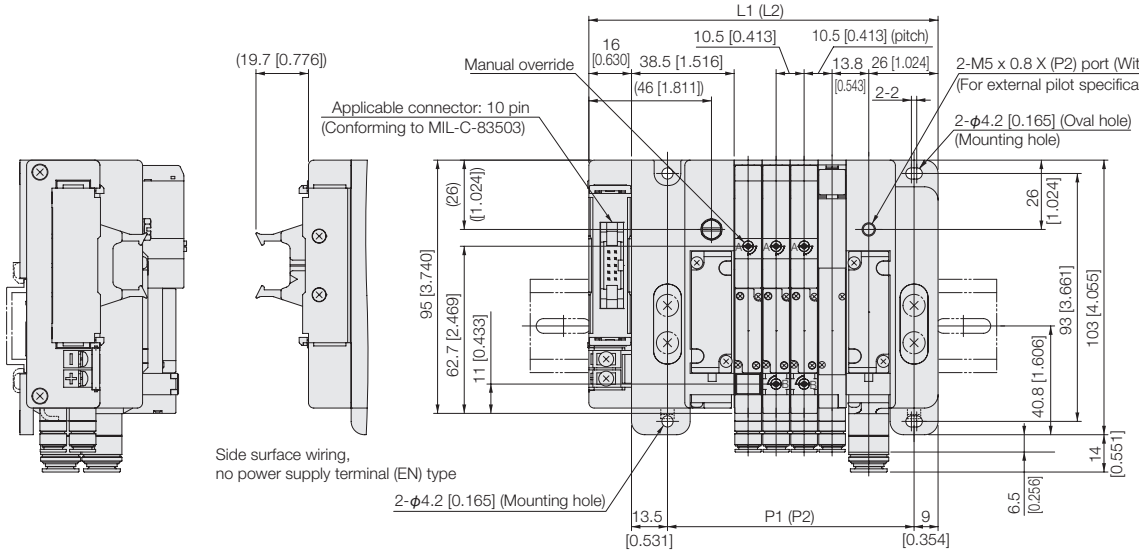
Unit dimensions

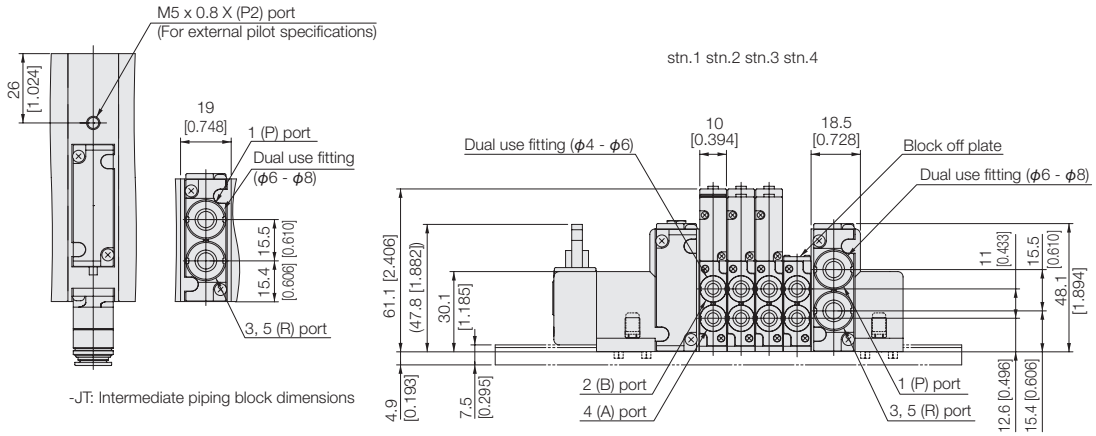
Number of units	L1	P1	Length of DIN rail	L2 Note	P2 Note	Length of DIN rail Note
2	97.0 [3.819]	71.5 [2.815]	150 [5.906]	-	-	-
3	107.5 [4.232]	82.0 [3.228]	150 [5.906]	126.5 [4.980]	101.0 [3.976]	175 [6.890]
4	118.0 [4.646]	92.5 [3.642]	175 [6.890]	137.0 [5.394]	111.5 [4.390]	175 [6.890]
5	128.5 [5.059]	103.0 [4.055]	175 [6.890]	147.5 [5.807]	122.0 [4.803]	175 [6.890]
6	139.0 [5.472]	113.5 [4.469]	175 [6.890]	158.0 [6.220]	132.5 [5.217]	200 [7.874]
7	149.5 [5.886]	124.0 [4.882]	200 [7.874]	168.5 [6.634]	143.0 [5.630]	200 [7.874]
8	160.0 [6.299]	134.5 [5.295]	200 [7.874]	179.0 [7.047]	153.5 [6.043]	225 [8.858]
9	170.5 [6.713]	145.0 [5.709]	225 [8.858]	189.5 [7.461]	164.0 [6.457]	225 [8.858]
10	181.0 [7.126]	155.5 [6.122]	225 [8.858]	200.0 [7.874]	174.5 [6.870]	225 [8.858]
11	191.5 [7.539]	166.0 [6.535]	250 [9.843]	210.5 [8.287]	185.0 [7.283]	250 [9.843]
12	202.0 [7.953]	176.5 [6.949]	250 [9.843]	221.0 [8.701]	195.5 [7.697]	250 [9.843]
13	212.5 [8.366]	187.0 [7.362]	250 [9.843]	231.5 [9.114]	206.0 [8.110]	275 [10.827]
14	223.0 [8.780]	197.5 [7.776]	275 [10.827]	242.0 [9.528]	216.5 [8.524]	275 [10.827]
15	233.5 [9.193]	208.0 [8.189]	275 [10.827]	252.5 [9.941]	227.0 [8.937]	300 [11.811]
16	244.0 [9.606]	218.5 [8.602]	300 [11.811]	263.0 [10.354]	237.5 [9.350]	300 [11.811]
17	254.5 [10.020]	229.0 [9.016]	300 [11.811]	273.5 [10.768]	248.0 [9.764]	300 [11.811]
18	265.0 [10.433]	239.5 [9.429]	325 [12.795]	284.0 [11.181]	258.5 [10.177]	325 [12.795]
19	275.5 [10.846]	250.0 [9.843]	325 [12.795]	294.5 [11.594]	269.0 [10.591]	325 [12.795]
20	286.0 [11.260]	260.5 [10.256]	325 [12.795]	305.0 [12.008]	279.5 [11.004]	350 [13.780]
21	-	-	-	315.5 [12.421]	290.0 [11.417]	350 [13.780]

Note:When the J□T or MT piping block specification is selected.

F10M Number of units XP J/M/L Pilot specifications (Base piping type)

With manifold outlet port dual use fitting block
Flat cable connector 10-pin specifications

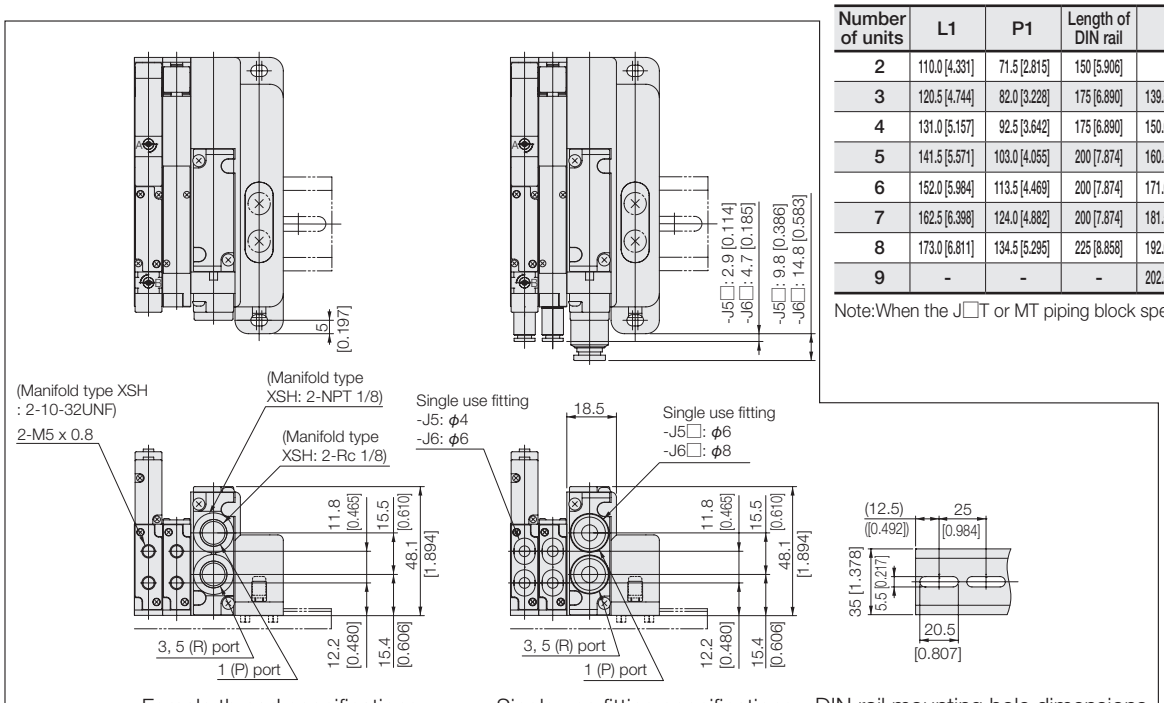




Unit dimensions

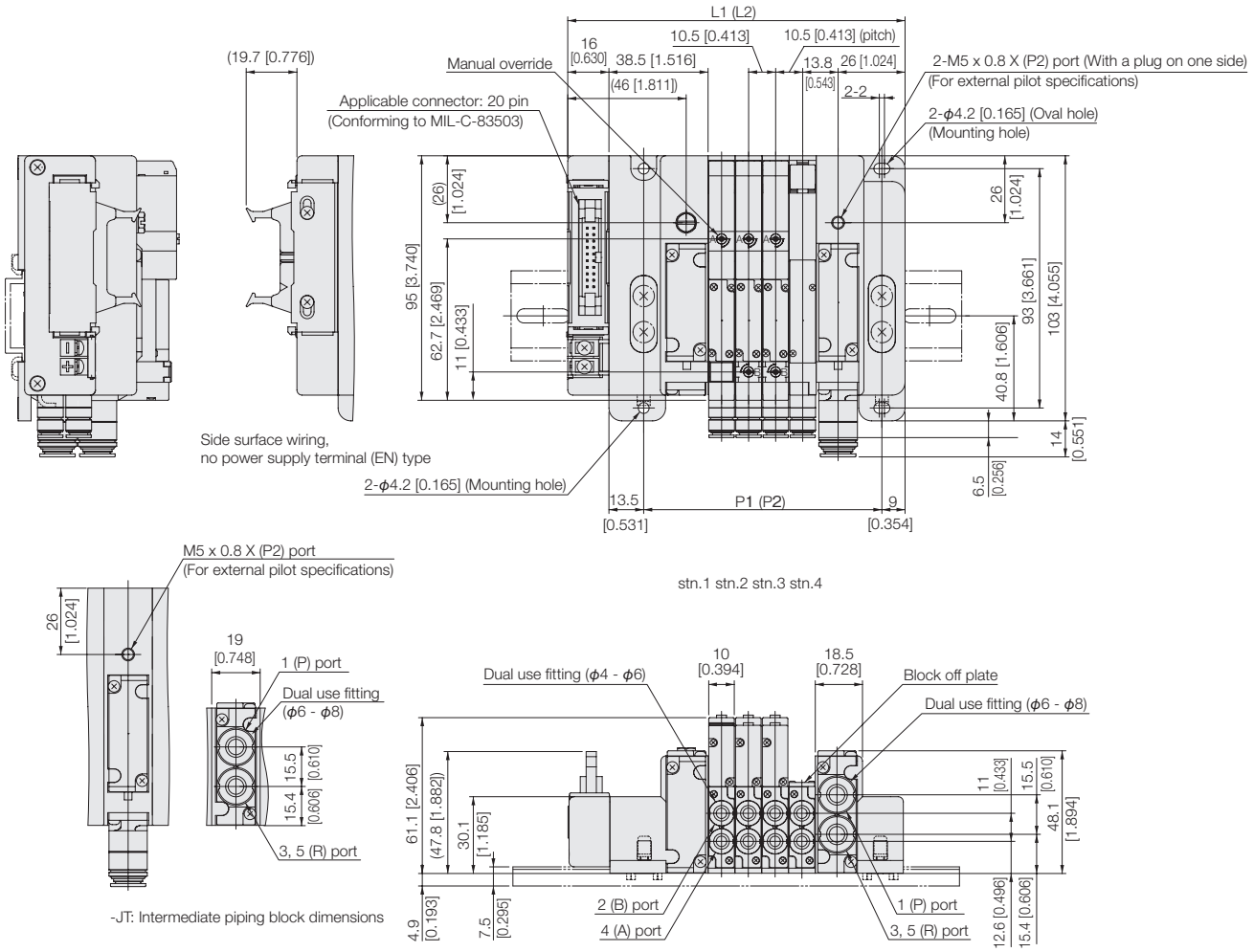
Number of units	L1	P1	Length of DIN rail	L2 Note	P2 Note	Length of DIN rail Note
2	110.0 [4.331]	71.5 [2.815]	150 [5.906]	-	-	-
3	120.5 [4.744]	82.0 [3.228]	175 [6.890]	139.5 [5.492]	101.0 [3.976]	175 [6.890]
4	131.0 [5.157]	92.5 [3.642]	175 [6.890]	150.0 [5.906]	111.5 [4.390]	175 [6.890]
5	141.5 [5.571]	103.0 [4.055]	200 [7.874]	160.5 [6.319]	122.0 [4.803]	200 [7.874]
6	152.0 [5.984]	113.5 [4.469]	200 [7.874]	171.0 [6.732]	132.5 [5.217]	200 [7.874]
7	162.5 [6.398]	124.0 [4.882]	200 [7.874]	181.5 [7.146]	143.0 [5.630]	225 [8.858]
8	173.0 [6.811]	134.5 [5.295]	225 [8.858]	192.0 [7.559]	153.5 [6.043]	225 [8.858]
9	-	-	-	202.5 [7.972]	164.0 [6.457]	250 [9.843]

Note:When the J□T or MT piping block specification is selected.



F10M [Number of units] XP J/M/L [Pilot specifications] (Base piping type)

With manifold outlet port dual use fitting block
Flat cable connector 20-pin specifications



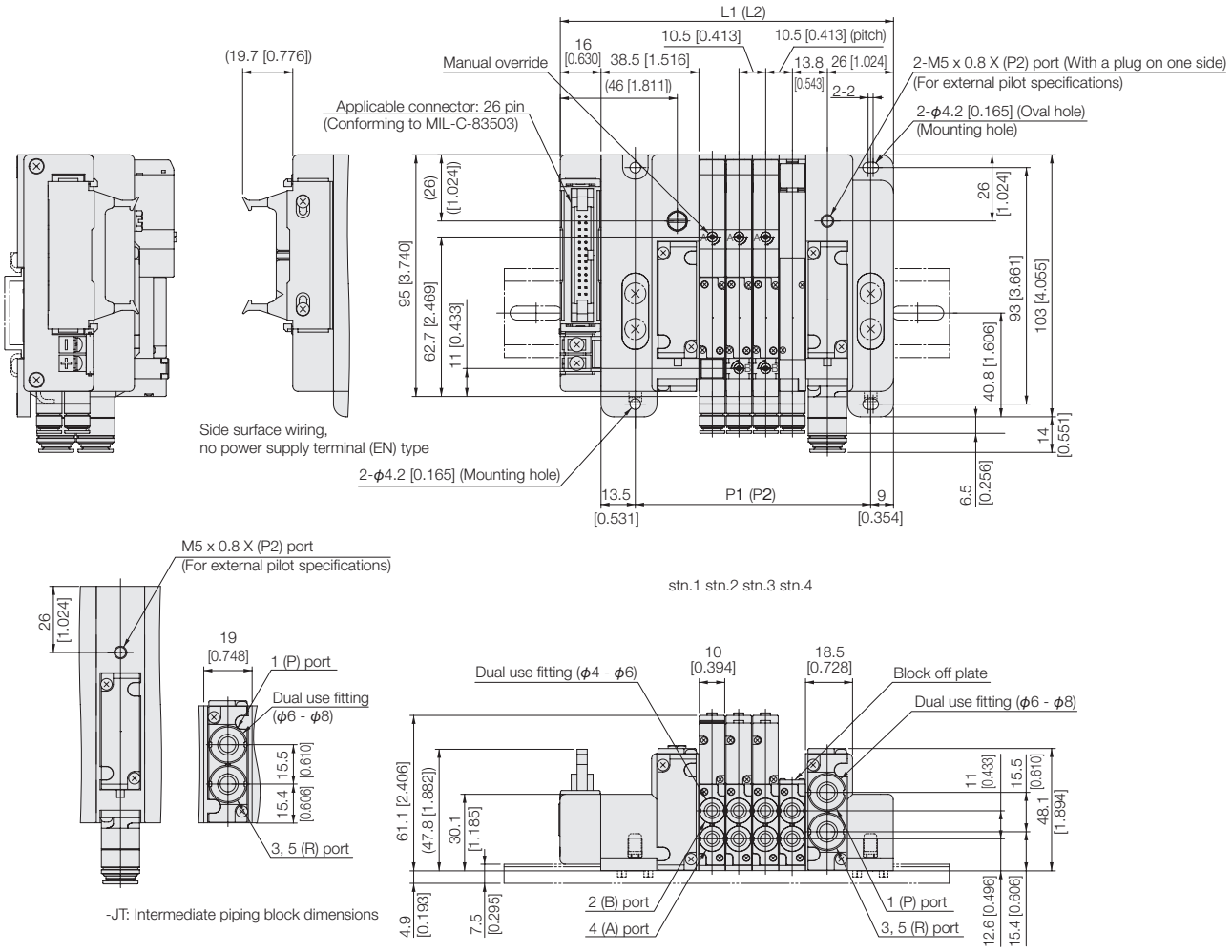
Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2 Note	P2 Note	Length of DIN rail Note
2	110.0 [4.331]	71.5 [2.815]	150 [5.906]	-	-	-
3	120.5 [4.744]	82.0 [3.228]	175 [6.890]	139.5 [5.492]	101.0 [3.976]	175 [6.890]
4	131.0 [5.157]	92.5 [3.642]	175 [6.890]	150.0 [5.906]	111.5 [4.390]	175 [6.890]
5	141.5 [5.571]	103.0 [4.055]	200 [7.874]	160.5 [6.319]	122.0 [4.803]	200 [7.874]
6	152.0 [5.984]	113.5 [4.469]	200 [7.874]	171.0 [6.732]	132.5 [5.217]	200 [7.874]
7	162.5 [6.398]	124.0 [4.882]	200 [7.874]	181.5 [7.146]	143.0 [5.630]	225 [8.858]
8	173.0 [6.811]	134.5 [5.295]	225 [8.858]	192.0 [7.559]	153.5 [6.043]	225 [8.858]
9	183.5 [7.224]	145.0 [5.709]	225 [8.858]	202.5 [7.972]	164.0 [6.457]	250 [9.843]
10	194.0 [7.638]	155.5 [6.122]	250 [9.843]	213.0 [8.386]	174.5 [6.870]	250 [9.843]
11	204.5 [8.051]	166.0 [6.535]	250 [9.843]	223.5 [8.799]	185.0 [7.283]	250 [9.843]
12	215.0 [8.465]	176.5 [6.949]	275 [10.827]	234.0 [9.213]	195.5 [7.697]	275 [10.827]
13	225.5 [8.878]	187.0 [7.362]	275 [10.827]	244.5 [9.626]	206.0 [8.110]	275 [10.827]
14	236.0 [9.291]	197.5 [7.776]	275 [10.827]	255.0 [10.039]	216.5 [8.524]	300 [11.811]
15	246.5 [9.705]	208.0 [8.189]	300 [11.811]	265.5 [10.453]	227.0 [8.937]	300 [11.811]
16	257.0 [10.118]	218.5 [8.602]	300 [11.811]	276.0 [10.866]	237.5 [9.350]	325 [12.795]
17	-	-	-	286.5 [11.280]	248.0 [9.764]	325 [12.795]

Note:When the J□T or MT piping block specification is selected.

F10M [Number of units] XP [J / M / L] [Pilot specifications] (Base piping type)

With manifold outlet port dual use fitting block
Flat cable connector 26-pin specifications



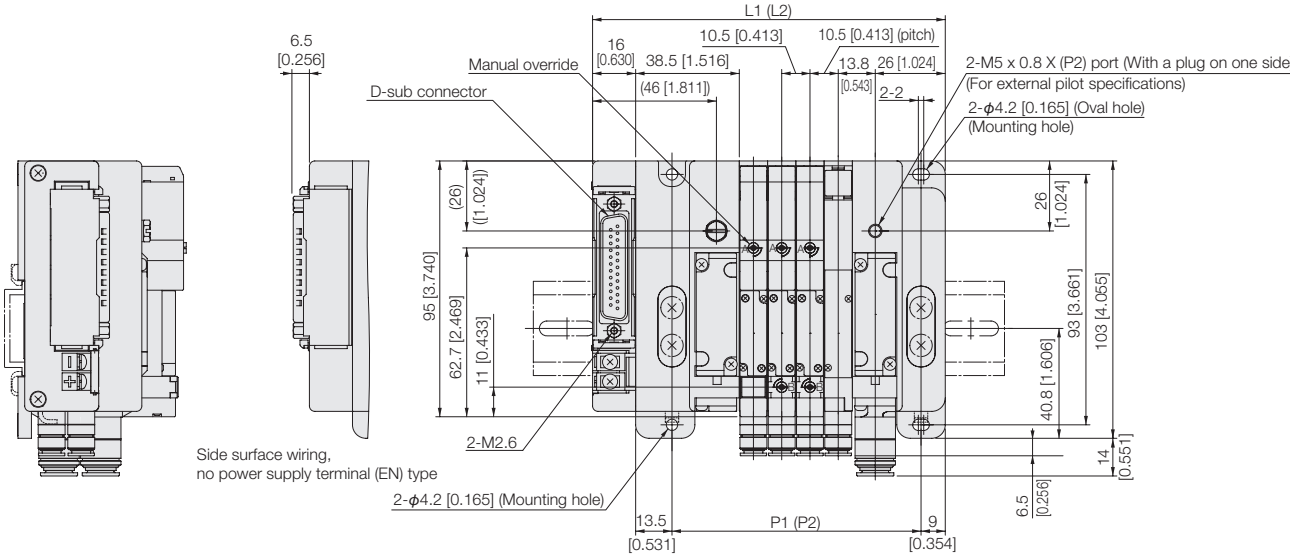
Unit dimensions

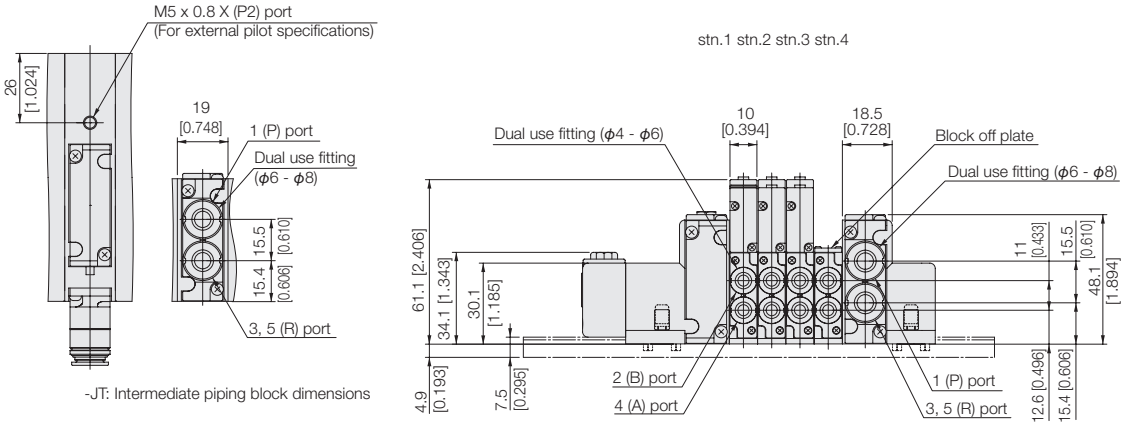
Number of units	L1	P1	Length of DIN rail	L2 Note	P2 Note	Length of DIN rail Note
2	110.0 [4.331]	71.5 [2.815]	150 [5.906]	-	-	-
3	120.5 [4.744]	82.0 [3.228]	175 [6.890]	139.5 [5.492]	101.0 [3.976]	175 [6.890]
4	131.0 [5.157]	92.5 [3.642]	175 [6.890]	150.0 [5.906]	111.5 [4.390]	175 [6.890]
5	141.5 [5.571]	103.0 [4.055]	200 [7.874]	160.5 [6.319]	122.0 [4.803]	200 [7.874]
6	152.0 [5.984]	113.5 [4.469]	200 [7.874]	171.0 [6.732]	132.5 [5.217]	200 [7.874]
7	162.5 [6.398]	124.0 [4.882]	200 [7.874]	181.5 [7.146]	143.0 [5.630]	225 [8.858]
8	173.0 [6.811]	134.5 [5.295]	225 [8.858]	192.0 [7.559]	153.5 [6.043]	225 [8.858]
9	183.5 [7.224]	145.0 [5.709]	225 [8.858]	202.5 [7.972]	164.0 [6.457]	250 [9.843]
10	194.0 [7.638]	155.5 [6.122]	250 [9.843]	213.0 [8.386]	174.5 [6.870]	250 [9.843]
11	204.5 [8.051]	166.0 [6.535]	250 [9.843]	223.5 [8.799]	185.0 [7.283]	250 [9.843]
12	215.0 [8.465]	176.5 [6.949]	275 [10.827]	234.0 [9.213]	195.5 [7.697]	275 [10.827]
13	225.5 [8.878]	187.0 [7.362]	275 [10.827]	244.5 [9.626]	206.0 [8.110]	275 [10.827]
14	236.0 [9.291]	197.5 [7.776]	275 [10.827]	255.0 [10.039]	216.5 [8.524]	300 [11.811]
15	246.5 [9.705]	208.0 [8.189]	300 [11.811]	265.5 [10.453]	227.0 [8.937]	300 [11.811]
16	257.0 [10.118]	218.5 [8.602]	300 [11.811]	276.0 [10.866]	237.5 [9.350]	325 [12.795]
17	267.5 [10.531]	229.0 [9.016]	325 [12.795]	286.5 [11.280]	248.0 [9.764]	325 [12.795]
18	278.0 [10.945]	239.5 [9.429]	325 [12.795]	297.0 [11.693]	258.5 [10.177]	325 [12.795]
19	288.5 [11.358]	250.0 [9.843]	325 [12.795]	307.5 [12.106]	269.0 [10.591]	350 [13.780]
20	299.0 [11.772]	260.5 [10.256]	350 [13.780]	318.0 [12.520]	279.5 [11.004]	350 [13.780]
21	-	-	-	328.5 [12.933]	290.0 [11.417]	375 [14.764]

Note:When the J□T or MT piping block specification is selected.

F10M [Number of units] XP [J/M/L] [Pilot specifications] (Base piping type)

With manifold outlet port dual use fitting block
D-sub connector 25-pin specifications





-JT: Intermediate piping block dimensions

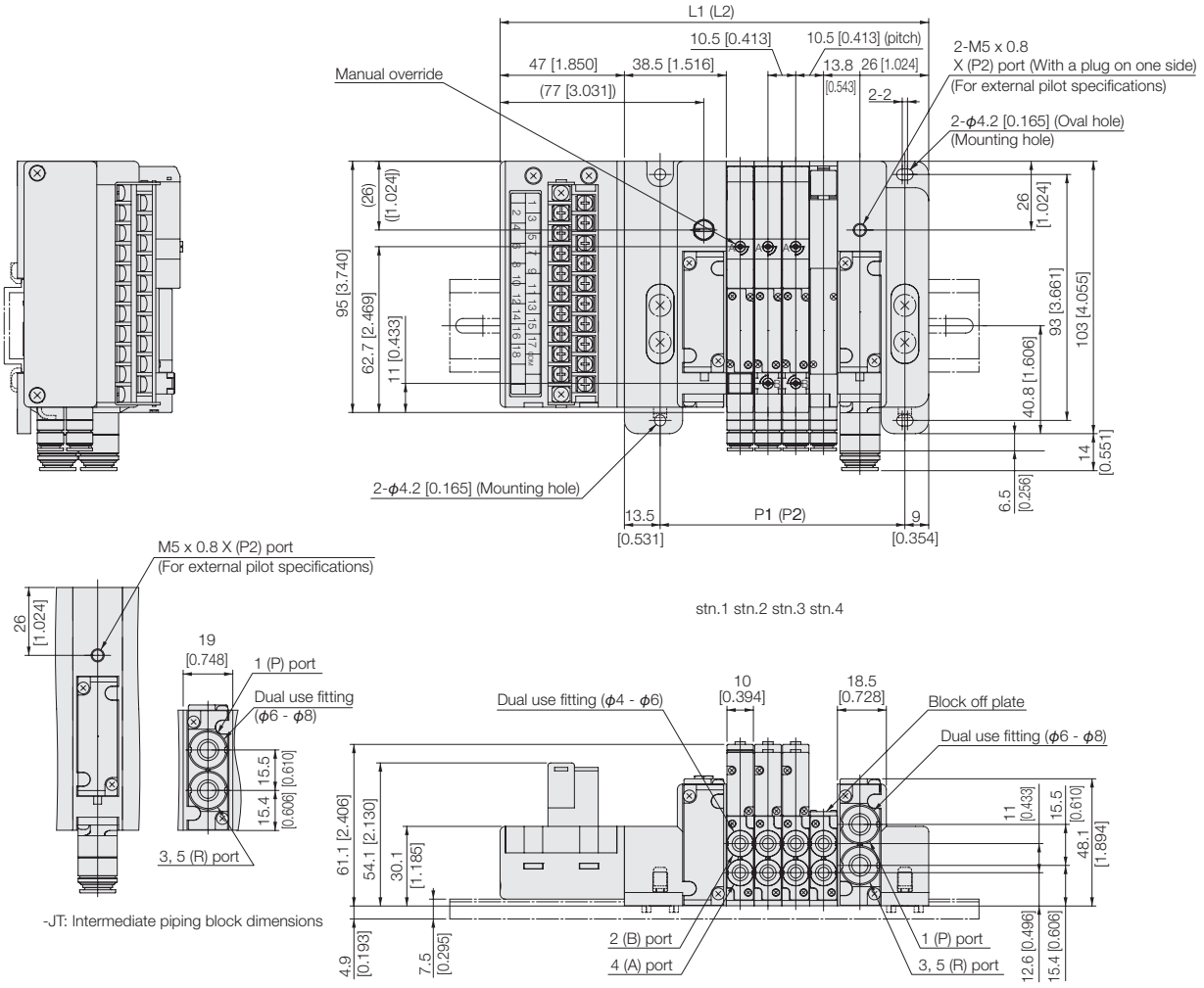
Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2 Note	P2 Note	Length of DIN rail Note
2	110.0 [4.331]	71.5 [2.815]	150 [5.906]	-	-	-
3	120.5 [4.744]	82.0 [3.228]	175 [6.890]	139.5 [5.492]	101.0 [3.976]	175 [6.890]
4	131.0 [5.157]	92.5 [3.642]	175 [6.890]	150.0 [5.906]	111.5 [4.390]	175 [6.890]
5	141.5 [5.571]	103.0 [4.055]	200 [7.874]	160.5 [6.319]	122.0 [4.803]	200 [7.874]
6	152.0 [5.984]	113.5 [4.469]	200 [7.874]	171.0 [6.732]	132.5 [5.217]	200 [7.874]
7	162.5 [6.398]	124.0 [4.882]	200 [7.874]	181.5 [7.146]	143.0 [5.630]	225 [8.858]
8	173.0 [6.811]	134.5 [5.295]	225 [8.858]	192.0 [7.559]	153.5 [6.043]	225 [8.858]
9	183.5 [7.224]	145.0 [5.709]	225 [8.858]	202.5 [7.972]	164.0 [6.457]	250 [9.843]
10	194.0 [7.638]	155.5 [6.122]	250 [9.843]	213.0 [8.386]	174.5 [6.870]	250 [9.843]
11	204.5 [8.051]	166.0 [6.535]	250 [9.843]	223.5 [8.799]	185.0 [7.283]	250 [9.843]
12	215.0 [8.465]	176.5 [6.949]	275 [10.827]	234.0 [9.213]	195.5 [7.697]	275 [10.827]
13	225.5 [8.878]	187.0 [7.362]	275 [10.827]	244.5 [9.626]	206.0 [8.110]	275 [10.827]
14	236.0 [9.291]	197.5 [7.776]	275 [10.827]	255.0 [10.039]	216.5 [8.524]	300 [11.811]
15	246.5 [9.705]	208.0 [8.189]	300 [11.811]	265.5 [10.453]	227.0 [8.937]	300 [11.811]
16	257.0 [10.118]	218.5 [8.602]	300 [11.811]	276.0 [10.866]	237.5 [9.350]	325 [12.795]
17	267.5 [10.531]	229.0 [9.016]	325 [12.795]	286.5 [11.280]	248.0 [9.764]	325 [12.795]
18	278.0 [10.945]	239.5 [9.429]	325 [12.795]	297.0 [11.693]	258.5 [10.177]	325 [12.795]
19	288.5 [11.358]	250.0 [9.843]	325 [12.795]	307.5 [12.106]	269.0 [10.591]	350 [13.780]
20	299.0 [11.772]	260.5 [10.256]	350 [13.780]	318.0 [12.520]	279.5 [11.004]	350 [13.780]
21	-	-	-	328.5 [12.933]	290.0 [11.417]	375 [14.764]

Note:When the J□T or MT piping block specification is selected.

F10M [Number of units] XP J/M/L [Pilot specifications] (Base piping type)

With manifold outlet port dual use fitting block
Terminal block type



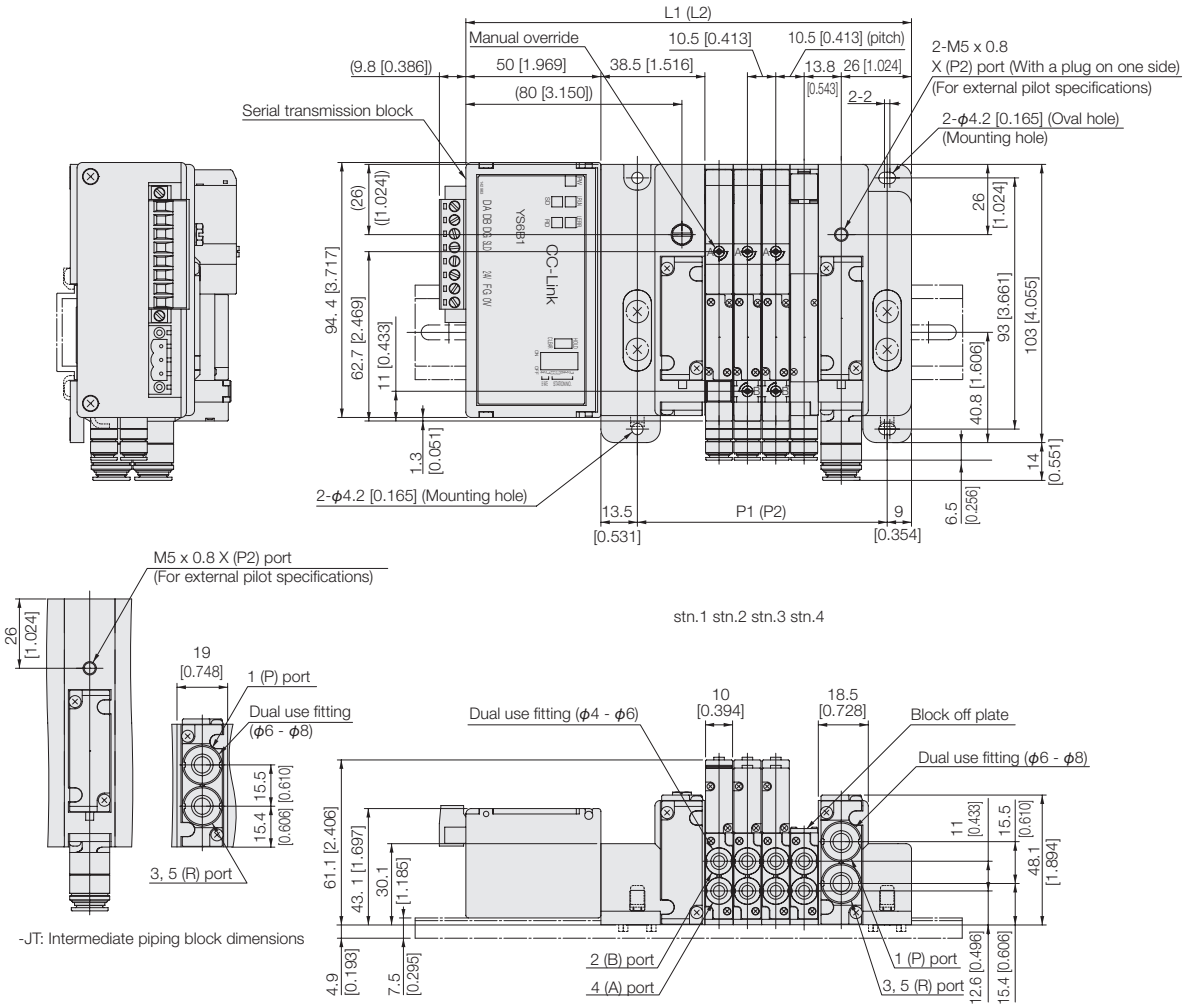
Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2 Note	P2 Note	Length of DIN rail Note
2	141.0 [5.551]	71.5 [2.815]	200 [7.874]	-	-	-
3	151.5 [5.965]	82.0 [3.228]	200 [7.874]	170.5 [6.713]	101.0 [3.976]	200 [7.874]
4	162.0 [6.378]	92.5 [3.642]	200 [7.874]	181.0 [7.126]	111.5 [4.390]	225 [8.858]
5	172.5 [6.791]	103.0 [4.055]	225 [8.858]	191.5 [7.539]	122.0 [4.803]	225 [8.858]
6	183.0 [7.205]	113.5 [4.469]	225 [8.858]	202.0 [7.953]	132.5 [5.217]	250 [9.843]
7	193.5 [7.618]	124.0 [4.882]	250 [9.843]	212.5 [8.366]	143.0 [5.630]	250 [9.843]
8	204.0 [8.032]	134.5 [5.295]	250 [9.843]	223.0 [8.780]	153.5 [6.043]	250 [9.843]
9	214.5 [8.445]	145.0 [5.709]	250 [9.843]	233.5 [9.193]	164.0 [6.457]	275 [10.827]
10	225.0 [8.858]	155.5 [6.122]	275 [10.827]	244.0 [9.606]	174.5 [6.870]	275 [10.827]
11	235.5 [9.272]	166.0 [6.535]	275 [10.827]	254.5 [10.020]	185.0 [7.283]	300 [11.811]
12	246.0 [9.685]	176.5 [6.949]	300 [11.811]	265.5 [10.453]	195.5 [7.697]	300 [11.811]
13	256.5 [10.098]	187.0 [7.362]	300 [11.811]	275.5 [10.846]	206.0 [8.110]	325 [12.795]
14	267.0 [10.512]	197.5 [7.776]	325 [12.795]	286.0 [11.260]	216.5 [8.524]	325 [12.795]
15	277.5 [10.925]	208.0 [8.189]	325 [12.795]	296.5 [11.673]	227.0 [8.937]	325 [12.795]
16	288.0 [11.339]	218.5 [8.602]	325 [12.795]	307.0 [12.087]	237.5 [9.350]	350 [13.780]
17	298.5 [11.752]	229.0 [9.016]	350 [13.780]	317.5 [12.500]	248.0 [9.764]	350 [13.780]
18	309.0 [12.165]	239.5 [9.429]	350 [13.780]	328.0 [12.913]	258.5 [10.177]	375 [14.764]
19	-	-	-	338.5 [13.327]	269.0 [10.591]	375 [14.764]

Note:When the J□T or MT piping block specification is selected.

F10M Number of units XS J/M/L Pilot specifications (Base piping type)

With manifold outlet port dual use fitting block
(Stand alone serial transmission block compatible manifold) *The figure shows CC-Link.



-JT: Intermediate piping block dimensions

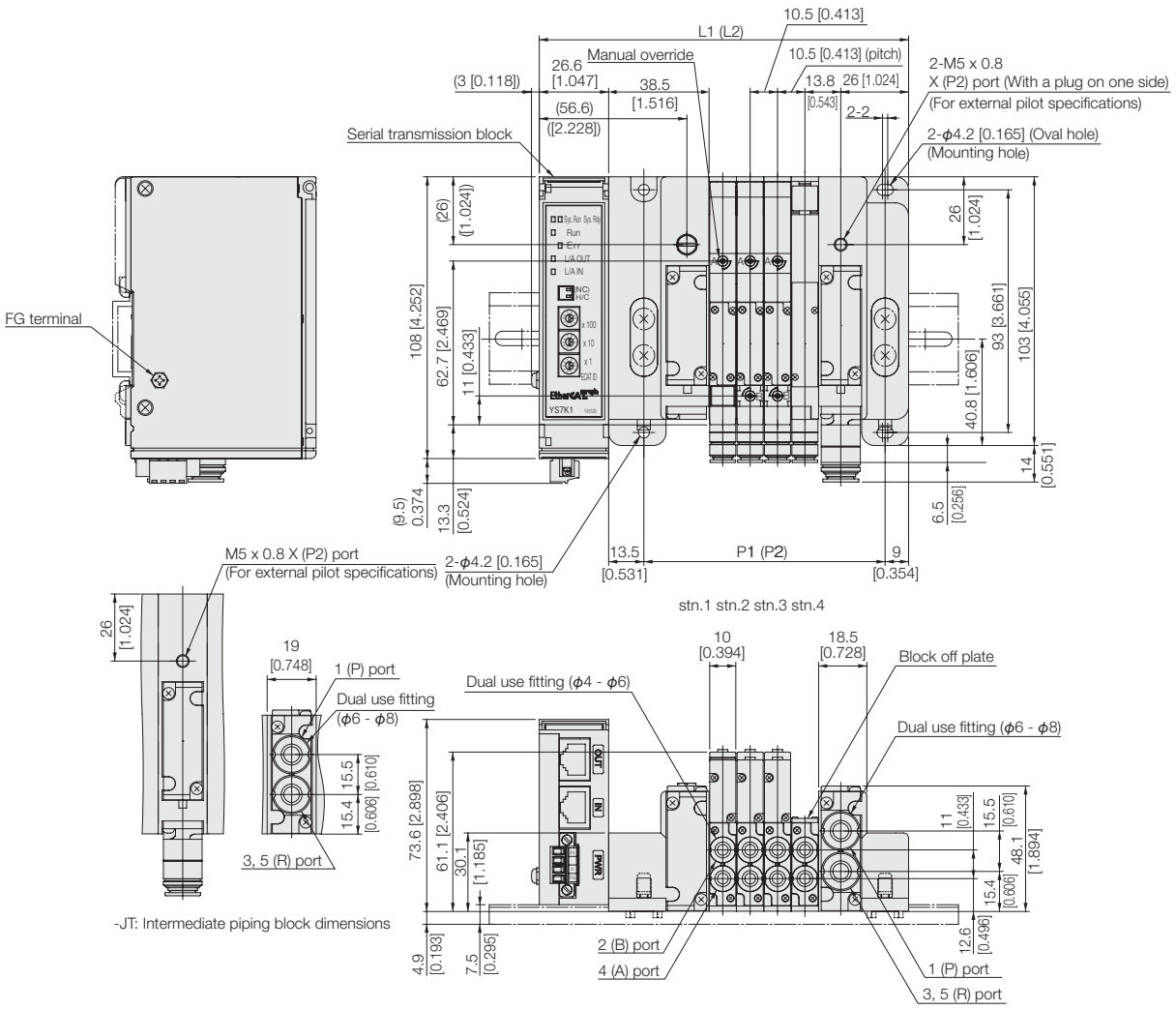
Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2 Note	P2 Note	Length of DIN rail Note
2	144.0 [5.669]	71.5 [2.815]	200 [7.874]	-	-	-
3	154.5 [6.083]	82.0 [3.228]	200 [7.874]	173.5 [6.831]	101.0 [3.976]	200 [7.874]
4	165.0 [6.496]	92.5 [3.642]	225 [8.858]	184.0 [7.244]	111.5 [4.390]	225 [8.858]
5	175.5 [6.909]	103.5 [4.075]	225 [8.858]	194.5 [7.657]	122.0 [4.803]	225 [8.858]
6	186.0 [7.323]	113.5 [4.469]	225 [8.858]	205.0 [8.071]	132.5 [5.217]	250 [9.843]
7	196.5 [7.736]	124.0 [4.882]	250 [9.843]	215.5 [8.484]	143.0 [5.630]	250 [9.843]
8	207.0 [8.150]	134.5 [5.295]	250 [9.843]	226.0 [8.898]	153.5 [6.043]	275 [10.827]
9	217.5 [8.563]	145.0 [5.709]	275 [10.827]	236.5 [9.311]	164.0 [6.457]	275 [10.827]
10	228.0 [8.976]	155.5 [6.122]	275 [10.827]	247.0 [9.724]	174.5 [6.870]	275 [10.827]
11	238.5 [9.390]	166.0 [6.535]	275 [10.827]	257.5 [10.138]	185.0 [7.283]	300 [11.811]
12	249.0 [9.803]	176.5 [6.949]	300 [11.811]	268.0 [10.551]	195.5 [7.697]	300 [11.811]
13	259.5 [10.217]	187.0 [7.362]	300 [11.811]	278.5 [10.965]	206.0 [8.110]	325 [12.795]
14	270.0 [10.630]	197.5 [7.776]	325 [12.795]	289.0 [11.378]	216.5 [8.524]	325 [12.795]
15	280.5 [11.043]	208.0 [8.189]	325 [12.795]	299.5 [11.791]	227.0 [8.937]	325 [12.795]
16	291.0 [11.457]	218.5 [8.602]	350 [13.780]	310.0 [12.205]	237.5 [9.350]	350 [13.780]
17	301.5 [11.870]	229.0 [9.016]	350 [13.780]	320.5 [12.618]	248.0 [9.764]	350 [13.780]
18	312.0 [12.283]	239.5 [9.429]	350 [13.780]	331.0 [13.031]	258.5 [10.177]	375 [14.764]
19	322.5 [12.697]	250.0 [9.843]	375 [14.764]	341.5 [13.445]	269.0 [10.591]	375 [14.764]
20	333.0 [13.110]	260.5 [10.256]	375 [14.764]	352.0 [13.858]	279.5 [11.004]	400 [15.748]
21	-	-	-	362.5 [14.272]	290.0 [11.417]	400 [15.748]

Note:When the J□T or MT piping block specification is selected.

F10M [Number of units] XS [J / M / L] [Pilot specifications] (Base piping type)

With manifold outlet port dual use fitting block
(EtherCAT/EtherNet/IP) *The figure shows EtherCAT.



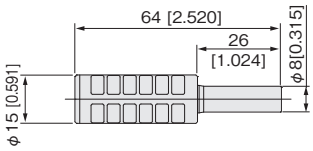
Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2 Note	P2 Note	Length of DIN rail Note
2	120.6 [4.748]	71.5 [2.815]	175 [6.890]	-	-	-
3	131.1 [5.161]	82.0 [3.228]	175 [6.890]	150.1 [5.909]	101.0 [3.976]	200 [7.874]
4	141.6 [5.575]	92.5 [3.642]	200 [7.874]	160.6 [6.323]	111.5 [4.390]	200 [7.874]
5	152.1 [5.988]	103.0 [4.055]	200 [7.874]	171.1 [6.736]	122.0 [4.803]	200 [7.874]
6	162.6 [6.402]	113.5 [4.469]	200 [7.874]	181.6 [7.150]	132.5 [5.217]	225 [8.858]
7	173.1 [6.815]	124.0 [4.882]	225 [8.858]	192.1 [7.563]	143.0 [5.630]	225 [8.858]
8	183.6 [7.228]	134.5 [5.295]	225 [8.858]	202.6 [7.976]	153.5 [6.043]	250 [9.843]
9	194.1 [7.642]	145.0 [5.709]	250 [9.843]	213.1 [8.390]	164.0 [6.457]	250 [9.843]
10	204.6 [8.055]	155.5 [6.122]	250 [9.843]	223.6 [8.803]	174.5 [6.870]	250 [9.843]
11	215.1 [8.469]	166.0 [6.535]	275 [10.827]	234.1 [9.217]	185.0 [7.283]	275 [10.827]
12	225.6 [8.882]	176.5 [6.949]	275 [10.827]	244.6 [9.630]	195.5 [7.697]	275 [10.827]
13	236.1 [9.295]	187.0 [7.362]	275 [10.827]	255.1 [10.043]	206.0 [8.110]	300 [11.811]
14	246.6 [9.709]	197.5 [7.776]	300 [11.811]	265.6 [10.457]	216.5 [8.524]	300 [11.811]
15	257.1 [10.122]	208.0 [8.189]	300 [11.811]	276.1 [10.870]	227.0 [8.937]	325 [12.795]
16	267.6 [10.535]	218.5 [8.602]	325 [12.795]	286.6 [11.283]	237.5 [9.350]	325 [12.795]
17	278.1 [10.949]	229.0 [9.016]	325 [12.795]	297.1 [11.697]	248.0 [9.764]	325 [12.795]
18	288.6 [11.362]	239.5 [9.429]	325 [12.795]	307.6 [12.110]	258.5 [10.177]	350 [13.780]
19	299.1 [11.776]	250.0 [9.843]	350 [13.780]	318.1 [12.524]	269.0 [10.591]	350 [13.780]
20	309.6 [12.189]	260.5 [10.256]	350 [13.780]	328.6 [12.937]	279.5 [11.004]	375 [14.764]
21	-	-	-	339.1 [13.350]	290.0 [11.417]	375 [14.764]

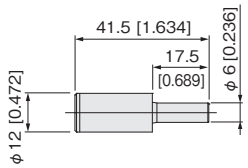
Note:When the J□T or MT piping block specification is selected.

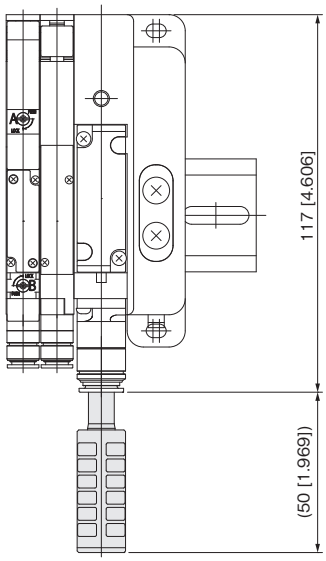
Additional Parts (available separately)

●Muffler: **KM-J8** [for both plug-in and non-plug-in]



●Muffler: **KM-J6**





F15 SERIES Specifications

Specifications

Basic Models and Valve Functions

Item \ Basic model	F15□T0	F15□T1 F15□T2	F15□T3 F15□T4 F15□T5	F15□TA F15□TB F15□TC
Number of positions	2 positions		3 positions	4 positions
Number of ports	5			Tandem 3-port
Valve function	Single solenoid only	Both single and double solenoid use	Closed center, Exhaust center, Pressure center	NC/NC, NO/NO, NC/NO

Remark: For the optional specifications and order codes, see p.44-71.

Specifications

Item \ Basic model		F15□T0 F15□T1 F15□T2	F15□T3 F15□T4 F15□T5	F15□TA F15□TB F15□TC	F15□T0G F15□T1G F15□T2G	F15□T3G F15□T4G F15□T5G	F15□T0V F15□T1V F15□T2V	F15□T3V
Media		Air						
Operation type		Internal pilot type			External pilot type (for positive pressure)		External pilot type (for vacuum)	
Flow rate characteristics	Sonic conductance C $dm^3/(s \cdot bar)$ Note1	2.05	2.05	1.60	2.05	2.05	2.05	2.05
	Effective area Note2 mm^2 〔Cv〕	10.3 〔0.57〕	10.3 〔0.57〕	8 〔0.44〕	10.3 〔0.57〕	10.3 〔0.57〕	10.3 〔0.57〕	10.3 〔0.57〕
Port size Note3		Dual use fitting for φ6 and φ8, Rc1/8, NPT1/8			M5×0.8,10-32UNF, dual use fitting for φ6 and φ8, Rc1/8, NTP1/8			
Lubrication		Not required						
Operating pressure range	Main valve	0.15～0.7 MPa [22～102 psi.]			0～0.7 MPa [0～102 psi.] Note4		– 100 kPa～0.15 MPa [– 29.53 in.Hg～22 psi.]	
	External pilot	——			0.2～0.7 MPa [29～102 psi.] Note4		0.2～0.7 MPa [29～102 psi.]	
Proof pressure	MPa [psi.]	1.05 [152]						
Response time Note5 ON/OFF ms	12VDC, 24VDC	20/25 (30) or below	15/45 (50) or below	20/30 (35) or below	20/25 (30) or below	15/45 (50) or below	20/25 (30) or below	15/45 (50) or below
	100VAC	20/25 or below	15/45 or below	——	20/25 or below	15/45 or below	20/25 or below	15/45 or below
Maximum operating frequency	Hz	5						
Minimum time to energize for self holding Note6	ms	50	——		50	——	50	——
Operating temperature range (atmosphere and media)	°C [°F]	5～50 [41～122]						
Shock resistance	m/s^2 [G]	294.2 [30] (245 [25]) Figure in parentheses is for when mounted on the split manifold.						
Mounting direction		Any						

Notes: 1. For details, see the flow rate characteristics on p.141.
2. The effective area is a calculated value, and not a measured value.
3. For details, see the port size on p.140.
4. When the main valve pressure is 0.2～0.7 MPa [29～102 psi.], set the external pilot pressure to the main valve pressure or higher, and to 0.7 MPa [102 psi.] or less.

Remark: Specification values are based on Koganei test standards.

Notes: 5. Values when air pressure is 0.5 MPa [73 psi.]. For switching phase timing in the AC specification, add a maximum of 5 ms to the response time. The values for 2-position valves are those when used as a single solenoid, and the values for 3-position valves are those when switching from the neutral position of closed center. Values in parentheses ( ) are for low-current type.
6. When used as a double solenoid valve. Excludes **T0**.

Solenoid Specifications

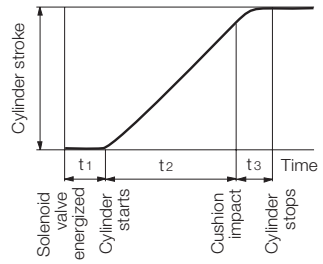
Item \ Rated voltage			12VDC	24VDC (Standard type)	24VDC (Low-current type)	100VAC		120VAC	
Voltage range		V	10.8～13.2 (12±10%)	21.6～26.4 (24±10%)	21.6～26.4 (24±10%)	90～110 (100±10%)		108～132 (120±10%)	
Rated frequency		Hz	—	—	—	50	60	50	60
Standard	Current (when rated voltage is applied)	mA (r.m.s)	33	17	—	8		8.3	
	Power consumption	W	0.4	0.4	—	0.8 VA		1 VA	
Low-current type	Current (when rated voltage is applied)	Starting mA	—	—	17	—		—	
		Holding mA			4.2				
	Power consumption	Starting W	—	—	0.4	—		—	
		Holding W			0.1				
	Starting time (standard)	ms	—	—	70	—		—	
Allowable leakage current		mA	2.0	1.0	1.0	1.0		1.0	
Type of insulation			Type B						
Insulation resistance Note 1		MΩ	Over 100						
Color of LED indicator Note2			14(SA) : Red, 12(SB) : Green						
Surge suppression (as standard)			Surge absorption transistor		Flywheel diode	Bridge diode			

Notes: 1. Value at 500VDC megger.
2. The color of the **T0** indicator is red only.

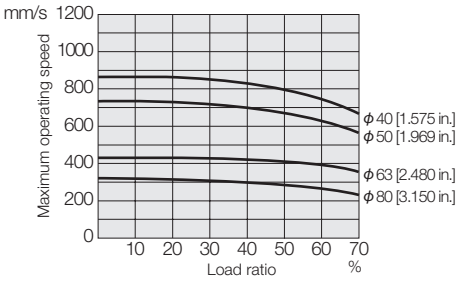
Remark: Specification values are based on Koganei test standards.

Cylinder operating speed

How to obtain cylinder speed

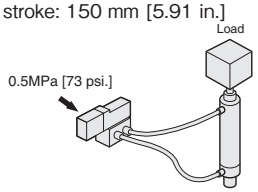


Maximum operating speed

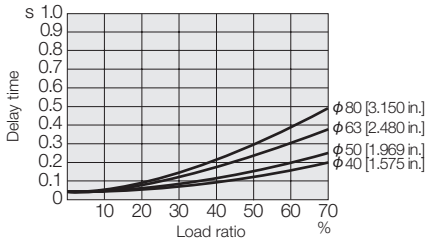


Measuring conditions

- Air pressure: 0.5 MPa [73 psi.]
- Piping (outer diameter x inner diameter x length): ϕ8 x ϕ6 x 1000 mm [39 in.]
- Fitting: Quick fitting TS8-01
- Load ratio = $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$ (%)
- Cylinder stroke: 150 mm [5.91 in.]

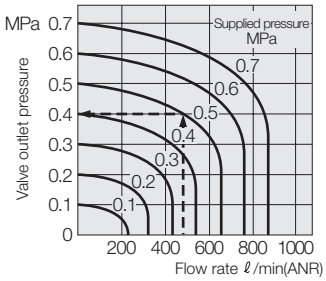


Delay time



Note: Delay time may vary according to the cylinder stroke.

Flow rate



How to read the graph
When the supply pressure is 0.5 MPa [73 psi.] and flow rate is 500R/min [17.7 ft.3/min.] (ANR), the valve outlet pressure becomes 0.4 MPa [58 psi.].

1 mm/s = 0.0394 in./sec.
1 MPa = 145 psi.
1 ℓ/min = 0.0353 ft.^{3}/min.

Port Size

Description/Piping specification		PR	X (P2)	4 (A), 2 (B)	1 (P), 3 (R2), 5 (R1), 3, 5 (R)
With sub-base		M5×0.8, 10-32UNF	M5×0.8, 10-32UNF	Rc1/8, NPT1/8	Rc1/8, NPT1/8
Single unit	With female thread block	–	–	Rc1/8, NPT1/8	Rc1/8, NPT1/8
	With dual use fitting block	–	–	Dual use fitting for ϕ6 and ϕ8	Rc1/8, NPT1/8
	With single use fitting block	–	–	ϕ6 or ϕ8	Rc1/8, NPT1/8
Manifold	Monoblock type with female thread block, and PC board type with female thread block	M5×0.8, 10-32UNF	M5×0.8, 10-32UNF	Rc1/8, NPT1/8	Rc1/4, NPT1/4
	Monoblock type with fitting block, and PC board type with fitting block	M5×0.8, 10-32UNF	M5×0.8, 10-32UNF	Dual use fitting for ϕ6 and ϕ8	Rc1/4, NPT1/4
	Monoblock type with single use fitting block, and PC board type with single use fitting block	M5×0.8, 10-32UNF	M5×0.8, 10-32UNF	ϕ6 or ϕ8	Rc1/4, NPT1/4
	Split type with female thread block, and serial transmission type with female thread block	–	M5×0.8, 10-32UNF	Rc1/8, NPT1/8	Rc1/4, NPT1/4
	Split type with fitting block, and serial transmission type with fitting block	–	M5×0.8, 10-32UNF	Dual use fitting for ϕ6 and ϕ8	Dual use fitting for ϕ8 and ϕ10
	Split type with single use fitting block, and serial transmission type with single use fitting block	–	M5×0.8, 10-32UNF	ϕ6 or ϕ8	Single use fitting for ϕ8 or ϕ10
	Easy assembly type with female thread block, and serial transmission type with female thread block	–	M5×0.8, 10-32UNF	Rc1/8, NPT1/8	Rc1/4, NPT1/4
	Easy assembly type with fitting block, and serial transmission type with fitting block	–	M5×0.8, 10-32UNF	Dual use fitting for ϕ6 and ϕ8	Dual use fitting for ϕ8 and ϕ10
	Easy assembly type with single use fitting block, and serial transmission type with single use fitting block	–	M5×0.8, 10-32UNF	ϕ6 or ϕ8	Single use fitting for ϕ8 or ϕ10

Specifications for DIN Connector (-39□) Type

Specifications

Remark: Specification values are the same as the Standard type, excluding the response time. See page 142.

Item \ Basic model	F15T0 F15T2	F15T3 F15T4 F15T5	F15T0G F15T2G	F15T3G F15T4G F15T5G	F15T0V F15T2V	F15T3V
Response time Note ON/OFF ms	20/30 or below	15/50 or below	20/30 or below	15/50 or below	20/30 or below	15/50 or below

Note: Values when air pressure is 0.5 MPa [73 psi.]. For switching phase timing in the AC specification, add a maximum of 5 ms to the response time. The values for 2-position valves are those when used as a single solenoid, and the values for 3-position valves are those when switching from the neutral position of closed center.

Solenoid Specifications for DIN Connector (-39□) Type

Item \ Rated voltage			12VDC	24VDC	120VAC		240VAC	
Voltage range		V	10.8～13.2 (12±10%)	21.6～26.4 (24±10%)	90～132		180～264	
Current	Frequency	Hz	—	—	50	60	50	60
	Starting	mA (r.m.s)	—	—	43	38	22	19
	Holding	mA (r.m.s)	140 (1.7W)	75 (1.8W)	29	24	14	12
Allowable leakage current		mA	8	4	4		2	
Insulation resistance Note		MΩ	Over 100					
Surge suppression (as standard)			Surge absorption transistor		Varistor		Varistor	

Note: Value at 500VDC megger.

Remark: Specification values are based on Koganei test standards.

Flow Rate Characteristics

● When used as a single unit

Basic model	1(P)→2(B)/1(P)→4(A)		2(B)→3(R2)/4(A)→5(R1)	
	Sonic conductance C $dm^3/(s \cdot bar)$	Critical pressure ratio b	Sonic conductance C $dm^3/(s \cdot bar)$	Critical pressure ratio b
F15□T0-A2 **F15□T1-A2** **F15□T2-A2**	1.76	0.25	1.72	0.26
F15□T3-A2 **F15□T4-A2** **F15□T5-A2**	1.78	0.25	1.72	0.24
F15□TA-A2 **F15□TB-A2** **F15□TC-A2**	1.53	0.26	1.61	0.23
F15□T0-F3 **F15□T1-F3** **F15□T2-F3**	1.80	0.25	1.71	0.29
F15□T3-F3 **F15□T4-F3** **F15□T5-F3**	1.81	0.23	1.61	0.27
F15□TA-F3 **F15□TB-F3** **F15□TC-F3**	1.57	0.28	1.57	0.24
F15□T0-F4 **F15□T1-F4** **F15□T2-F4**	1.83	0.30	1.62	0.33
F15□T3-F4 **F15□T4-F4** **F15□T5-F4**	1.57	0.36	1.51	0.25
F15□TA-F4 **F15□TB-F4** **F15□TC-F4**	1.54	0.31	1.55	0.27

Basic model	1(P)→2(B)/1(P)→4(A)		2(B)→3(R2)/4(A)→5(R1)	
	Sonic conductance C $dm^3/(s \cdot bar)$	Critical pressure ratio b	Sonic conductance C $dm^3/(s \cdot bar)$	Critical pressure ratio b
F15□T0-F5 **F15□T1-F5** **F15□T2-F5**	1.62	0.38	1.56	0.28
F15□T3-F5 **F15□T4-F5** **F15□T5-F5**	1.57	0.36	1.51	0.25
F15□TA-F5 **F15□TB-F5** **F15□TC-F5**	1.44	0.34	1.46	0.24
F15□T0-F6 **F15□T1-F6** **F15□T2-F6**	1.86	0.30	1.70	0.30
F15□T3-F6 **F15□T4-F6** **F15□T5-F6**	1.84	0.29	1.64	0.29
F15□TA-F6 **F15□TB-F6** **F15□TC-F6**	1.58	0.31	1.57	0.31

● When mounted on a manifold

Valve model \ Manifold model		Monoblock manifold F type **F15M□F (FP)**		Monoblock manifold A type **F15M□A (AP)**		Split manifold **F15M□N (P) (S)**		Easy assembly type manifold **F15M□XN (P) (S)**	
		1 (P) → 2 (B)/1 (P) → 4 (A)	2 (B) → 3 (R2)/4 (A) → 5 (R1)	1 (P) → 2 (B)/1 (P) → 4 (A)	2 (B) → 3 (R2)/4 (A) → 5 (R1)	1 (P) → 2 (B)/1 (P) → 4 (A)	2 (B) → 3 (R2)/4 (A) → 5 (R1)	1 (P) → 2 (B)/1 (P) → 4 (A)	2 (B) → 3 (R2)/4 (A) → 5 (R1)
		Sonic conductance C $dm^3/(s/bar)$		Sonic conductance C $dm^3/(s/bar)$		Sonic conductance C $dm^3/(s/bar)$		Sonic conductance C $dm^3/(s/bar)$	
F15□T0□ **F15□T1□** **F15□T2□**	Outlet port dual use fitting for ϕ6 and ϕ8 ※These are the cases of ϕ8.	1.72	1.56	1.56	1.46	2.01	1.84	2.00	1.90
F15□T3□ **F15□T4□** **F15□T5□**		1.72	1.53	1.57	1.43	2.02	1.78	2.14	1.79
F15□TA□ **F15□TB□** **F15□TC□**		1.48	1.47	1.38	1.34	1.57	1.61	1.46	1.56
F15□T0□ **F15□T1□** **F15□T2□**	Outlet port ϕ6 fitting	1.50	1.46	1.38	1.39	1.67	1.70	1.77	1.71
F15□T3□ **F15□T4□** **F15□T5□**		1.52	1.46	1.39	1.37	1.67	1.66	1.77	1.69
F15□TA□ **F15□TB□** **F15□TC□**		1.37	1.39	1.28	1.30	1.41	1.50	1.39	1.44
F15□T0□ **F15□T1□** **F15□T2□**	Outlet port ϕ8 fitting	1.73	1.56	1.60	1.47	2.05	1.83	1.98	1.92
F15□T3□ **F15□T4□** **F15□T5□**		1.72	1.54	1.60	1.45	2.05	1.78	2.11	1.68
F15□TA□ **F15□TB□** **F15□TC□**		1.49	1.48	1.39	1.36	1.58	1.60	1.47	1.55

Notes: 1. When the individual air supply spacer or the individual air exhaust spacer, the back pressure prevention valve, or the stop valve is used, sonic conductance decreases by about 30%.
2: For the flow rate characteristics of other outlet ports, consult us.

Remark: Specification values are based on Koganei test standards.

Mass

Single Valve Unit Mass

g [oz.]

F15□T□□	F15□T□□-A1	F15□T□□-A2	F15□T□□-FJ	F15□T□□-FJ5	F15□T□□-FJ6
Outlet portion None	Outlet portion With plate	Outlet portion With plate	Outlet portion With dual use fitting block	Outlet portion With ϕ6 fitting block	Outlet portion With ϕ8 fitting block
Inlet portion None	Inlet portion None	Inlet portion With A type sub-base	Inlet portion None	Inlet portion None	Inlet portion None
82 [2.89]	101 [3.56]	210 [7.41]	114 [4.02]	125 [4.41]	130 [4.59]

g [oz.]

F15□T□□-FM	F15□T□□-F3	F15□T□□-F4	F15□T□□-F5	F15□T□□-F6
Outlet portion With female thread block	Outlet portion With dual use fitting block	Outlet portion With female thread block	Outlet portion With ϕ6 fitting block	Outlet portion With ϕ8 fitting block
Inlet portion None	Inlet portion With female thread block	Inlet portion With female thread block	Inlet portion With female thread block	Inlet portion With female thread block
104 [3.67]	127 [4.48]	117 [4.13]	138 [4.87]	143 [5.04]

Basic Type **F15T0** is 13 g [0.46 oz.] less than the mass shown above.

Monoblock Manifold Mass (single valve unit included)

g [oz.]

Monoblock manifold	Mass calculation of each unit 4(A), 2(B) ports outlet specifications			
	Female thread block	Dual use fitting block	ϕ6 fitting block	ϕ8 fitting block
A type	(230×n)+128 [(8.11×n)+4.51]	(240×n)+128 [(8.47×n)+4.51]	(251×n)+128 [(8.85×n)+4.51]	(256×n)+128 [(9.03×n)+4.51]
F type	(156×n)+116 [(5.50×n)+4.09]	(166×n)+116 [(5.86×n)+4.09]	(177×n)+116 [(6.24×n)+4.09]	(182×n)+116 [(6.42×n)+4.09]

g [oz.]

Monoblock manifold	Additional mass (wire-saving type) Wiring specification		
	-F100N, -F101N	**-F200N, -F201N, -F260N**	**-D250N, -D251N**
A type	340+4n [11.99+0.14n]	342+4n [12.06+0.14n]	346+4n [12.20+0.14n]
F type	192+4n [6.77+0.14n]	194+4n [6.84+0.14n]	198+4n [6.98+0.14n]

Calculation example : **F15M8AM**
stn.1～stn.8 F15T1-A1-PS DC24V
(230×8)+128=1968 g [69.42 oz.]
When mounting the block-off plate, subtract 100 g [3.53 oz] per unit from the above calculation result.
When mounting the **F15□T0** specification valve, subtract 13 g [0.46 oz.] per unit from the above calculation result.

PC Board Manifold Mass (single valve unit included)

g [oz.]

PC board manifold	Mass calculation of each unit 4(A), 2(B) ports outlet specifications				Circuit board and connector portion
	Female thread block	Dual use fitting block	ϕ6 fitting block	ϕ8 fitting block	
A type	(230×n)+128 [(8.11×n)+4.51]	(240×n)+128 [(8.47×n)+4.51]	(251×n)+128 [(8.85×n)+4.51]	(256×n)+128 [(9.03×n)+4.51]	(2×n)+29 [(0.07×n)+1.02]
F type	(162×n)+121 [(5.71×n)+4.27]	(172×n)+121 [(6.07×n)+4.27]	(183×n)+121 [(6.46×n)+4.27]	(188×n)+121 [(6.63×n)+4.27]	

Calculation example : **F15M8APM-F201-W**
stn.1～stn.8 F15T1-A1-PP DC24V
(230×8)+128+(2×8)+29=2013 g [71.01 oz.]
When mounting the block-off plate, subtract 100 g [3.53 oz] per unit from the above calculation result.
When mounting the **F15□T0** specification valve, subtract 13 g [0.46 oz.] per unit from the above calculation result.

Optional Parts Mass

Stop valve (-STP): 50g [1.76 oz.]

Mass of Split Manifold and Serial Transmission Compatible Manifold

Because the valve and manifold have the same output specifications, their mass is the same. The mass can only be changed by choosing a different type of inlet/outlet block.

Mass of Split Manifold Non-Plug-in Type (single valve unit included)

g [oz.]

Non-plug-in type	Mass calculation of each unit			
	4(A), 2(B) ports outlet specifications			
	Female thread block	Dual use fitting block	φ6 fitting block	φ8 fitting block
	(173×n)+249 [(6.10×n)+8.78]	(183×n)+249 [(6.46×n)+8.78]	(194×n)+249 [(6.84×n)+8.78]	(199×n)+249 [(7.02×n)+8.78]

g [oz.]

Additional mass			
Piping block specification			
Female thread block	Dual use fitting block	φ8 fitting block	φ10 fitting block
153 [5.40]	167 [5.89]	191 [6.74]	201 [7.09]

Calculation example : **F15M8N-MR**
stn.1～stn.8 F15T1-A1-PS DC24V
(173×8)+249+153=1786 g [63.00 oz.]
When mounting the block-off plate, subtract 100 g [3.53 oz] per unit from the above calculation result.
When mounting the **F15□T0** specification valve, subtract 13 g [0.46 oz.] per unit from the above calculation result.

Mass of Split Manifold Plug-in Type/ Serial Transmission Type (single valve unit included)

g [oz.]

Plug-in type Serial transmission compatible manifold	Mass calculation of each unit			
	4(A), 2(B) ports outlet specifications			
	Female thread block	Dual use fitting block	φ6 fitting block	φ8 fitting block
	(177×n)+249 [(6.24×n)+8.78]	(187×n)+249 [(6.60×n)+8.78]	(198×n)+249 [(6.98×n)+8.78]	(203×n)+249 [(7.16×n)+8.78]

g [oz.]

Additional mass			
Piping block specification			
Female thread block	Dual use fitting block	φ8 fitting block	φ10 fitting block
153 [5.40]	167 [5.89]	191 [6.74]	201 [7.09]

g [oz.]

Additional mass				
Wiring block specification				
-F100□□, -F101□□	**-F200□□, -F201□□, -F260□□**	**-D250□□, -D251□□**	**-D370NU**	**-T200**
32 [1.13]	34 [1.20]	39 [1.38]	72 [2.54]	158 [5.57]

g [oz.]

Additional mass			
Serial transmission block specification			
Stand-alone type	Integrated type	Integrated type (For EtherCAT)	Integrated type (For EtherNet/IP)
231 [8.15]	138 [4.87]	100 [3.53]	110 [3.88]

Calculation example : **F15M8PM-MR-F201 DC24V**
stn.1～stn.8 F15T1-A1 DC24V
(177×8)+249+153+34=1852 g [65.33 oz.]
When mounting the block-off plate, subtract 100 g [3.53 oz] per unit from the above calculation result.
When mounting the **F15□T0** specification valve, subtract 13 g [0.46 oz.] per unit from the above calculation result.

Mass of Easy Assembly Type Manifold and Serial Transmission Type Manifold

Mass of Easy Assembly Type Manifold Non-Plug-in Type (single valve unit included)

g [oz.]

Mounting type	Mass calculation of each unit			
	Outlet port specifications			
	Female thread block	Dual use fitting block	ϕ6 fitting block	ϕ8 fitting block
No code	(186 x n) + 309 [(6.56×n) + 10.90]	(196 x n) + 309 [(6.91×n) + 10.90]	(207 x n) + 309 [(7.30×n) + 10.90]	(212 x n) + 309 [(7.48×n) + 10.90]
-DN	(186 x n) + 371 [(6.56×n) + 13.09]	(196 x n) + 371 [(6.91×n) + 13.09]	(207 x n) + 371 [(7.30×n) + 13.09]	(212 x n) + 371 [(7.48×n) + 13.09]
-DR	(189 x n) + 387 [(6.67×n) + 13.65]	(199 x n) + 387 [(7.02×n) + 13.65]	(210 x n) + 387 [(7.41×n) + 13.65]	(215 x n) + 387 [(7.58×n) + 13.65]

g [oz.]

Fitting specifications	Additional mass			
	Intake/exhaust outlet			
	Female thread block	Dual use fitting block	ϕ8 fitting block	ϕ10 fitting block
J□ M□	34 [1.20]	48 [1.70]	72 [2.54]	82 [2.90]
J□D MD□	44 [1.55]	72 [2.54]	120 [4.23]	140 [4.94]
J□T MT□	-25 [-0.88]	17 [0.60]	89 [3.14]	119 [4.20]

Calculation example: **F15M8XNJ-JR-DR DC24V**

stn.1 ～ 8 F15T1-A1-PS DC24V

(199 x 8) + 387 + 48 = 2027 g [71.50 oz.]

When mounting the block-off plate, subtract 100 g [3.53 oz.] per unit from the above calculation result.

When mounting the F15□T0 specification valve, subtract 13g [0.46 oz.] per unit from the above calculation result.

Mass of Easy Assembly Type Manifold Plug-in Type/Serial Transmission Type (single valve unit included)

g [oz.]

Mounting type	Mass calculation of each unit			
	Outlet port specifications			
	Female thread block	Dual use fitting block	ϕ6 fitting block	ϕ8 fitting block
No code	(189 x n) + 306 [(6.67×n) + 10.80]	(199 x n) + 306 [(7.02×n) + 10.80]	(210 x n) + 306 [(7.41×n) + 10.80]	(215 x n) + 306 [(7.58×n) + 10.80]
-DN	(189 x n) + 369 [(6.67×n) + 13.01]	(199 x n) + 369 [(7.02×n) + 13.01]	(210 x n) + 369 [(7.41×n) + 13.01]	(215 x n) + 369 [(7.58×n) + 13.01]
-DR	(192 x n) + 391 [(6.77×n) + 13.79]	(201 x n) + 391 [(7.09×n) + 13.79]	(213 x n) + 391 [(7.51×n) + 13.79]	(218 x n) + 391 [(7.69×n) + 13.79]

g [oz.]

Fitting specifications	Additional mass			
	Intake/exhaust outlet			
	Female thread block	Dual use fitting block	ϕ8 fitting block	ϕ10 fitting block
J□ M□	34 [1.20]	48 [1.70]	72 [2.54]	82 [2.90]
J□D MD□	44 [1.55]	72 [2.54]	120 [4.23]	140 [4.94]
J□T MT□	-27 [-0.95]	15 [0.53]	87 [3.07]	117 [4.13]

g [oz.]

Additional mass			
Wiring block specifications			
-F100□□, -F101□□	**-F200□□, -F201□□, -F260□□**	**-D250□□, -D251□□**	**-T200**
36 [1.27]	38 [1.34]	43 [1.52]	116 [4.09]

g [oz.]

Additional mass		
Serial transmission block specifications (Monoblock)		
For CC-Link, DeviceNet, and CompoNet	**For EtherCAT**	**For EtherNet/IP**
138 [4.87]	100 [3.53]	110 [3.88]

Calculation example: **F15M8XPJ-JR-F201-DR DC24V**

stn.1 ～ 8 F15T1-A1 DC24V

(201 x 8) + 391 + 48 + 38 = 2085 g [73.55 oz.]

When mounting the block-off plate, subtract 100g [3.53 oz.] per unit from the above calculation result.

When mounting the F10□T0 specification valve, subtract 13g [0.46 oz.] per unit from the above calculation result.

F15 Series Easy Assembly Type Manifold Non-Plug-in Type Order Codes

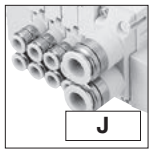
■ Valve size

F15M

15 mm [0.591 in.] width

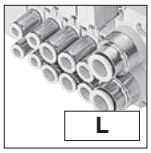
■ Manifold outlet specification

With dual use fitting blocks (base piping type)



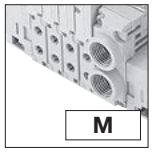
Outlet port fitting
F15: ϕ6, ϕ8

With selectable fittings (base piping type)



Outlet port should be selected in accordance with the manifold fitting specification.

With female thread blocks (base piping type)



Outlet port female thread
F15: Rc1/8

With plates (direct piping type)

■ Pilot specification

Blank

Internal pilot manifold

G

External pilot manifold

■ Piping block specification (air supply, exhaust and intermediate)

Fitting block
-JR: Dual use fitting, right-side mounting
-JL: Dual use fitting, left-side mounting
-JD: Dual use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ8, ϕ10

Female thread block
-MR: Female thread, right-side mounting
-ML: Female thread, left-side mounting
-MD: Female thread, both-side mounting
Female thread size (1(P), 3, 5(R) ports), Rc1/4

Female thread block
-MRH: Female thread, right-side mounting Note15
-MLH: Female thread, left-side mounting Note15
-MDH: Female thread,both-side mounting Note15
Female thread size (1(P), 3, 5(R) ports), NPT1/4

Single use fitting block
-J5R: Single use fitting, right-side mounting
-J5L: Single use fitting, left-side mounting
-J5D: Single use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ8
-J6R: Single use fitting, right-side mounting
-J6L: Single use fitting, left-side mounting
-J6D: Single use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ10

Intermediate piping block
-JT : Dual use fitting, both-side mounting, intermediate piping block, ϕ8, ϕ10
-J5T: Single use fitting, both-side mounting, intermediate piping block, ϕ8
-J6T: Single use fitting, both-side mounting, intermediate piping block, ϕ10
-MT : Female thread, both-side mounting, intermediate piping block mounting, Rc1/4
-MTH: Female thread, both-side mounting, intermediate piping block NPT1/4 Note15

■ Mounting specification

Blank

Direct mounting

-DN

With DIN bracket (no rail)

-DR

With DIN bracket, with rail
Caution: For information on rails assembled and shipped, see pages 130 and 131.

Valve size	Valve units	Manifold type	Manifold outlet specification	Pilot specification	Piping block specification	Mounting specification
Manifold model						
Base piping type	**F15M**	**XN** (※Rc)	**J** **M**	**Blank** **G**	**-JR** **-JL** **-JD** **-MR** **-ML** **-MD** **-J5R** **-J5L** **-J5D** **-J6R** **-J6L** **-J6D** **-JT** **-J5T** **-J6T** **-MT**	**Blank** **-DN** **-DR**
Base piping type selectable fitting		**XN** (※Rc) **XNH** (※NPT) Only L or Blank is available in the inch female thread specification and the manifold outlet specification.	**L**	**Blank** **G**	-JR -JL -JD -MR -ML -MD -MRH Note15 -MLH Note15 -MDH Note15 -J5R -J5L -J5D -J6R -J6L -J6D -JT -J5T -J6T -MT -MTH Note15	**Blank** **-DN** **-DR**
Direct piping type			**Blank**	**Blank** **G**	-JR -JL -JD -MR -ML -MD -MRH Note15 -MLH Note15 -MDH Note15 -J5R -J5L -J5D -J6R -J6L -J6D -JT -J5T -J6T -MT -MTH Note15	**Blank** **-DN** **-DR**

2
:
:
21 Note1

Notes:1.Up to 20 valves, with one intermediate piping block.
2.Valve mounting location is from the left, with the solenoid on top, and the 4(A), 2(B) ports side in front.
3.When the valve specification is **T1** or **T2**, the manual override lever is placed only on the **A** side.
4.When selecting **J**, **M**, or **L** (base piping type) for the manifold outlet specification, always enter **-A1** (with plate) for the valve outlet type.

■ Valve type

T0: 2-position, for single solenoid only
T1: 2-position, single solenoid specification
T2: 2-position, double solenoid specification
T3: 3-position, closed center
T4: 3-position, exhaust center
T5: 3-position, pressure center
TA: Tandem 3-port (NC and NC)Note8
TB: Tandem 3-port (NO and NO)Note8
TC: Tandem 3-port (NC and NO)Note8

■ Operation type

Blank
Internal pilot typeNote6

G
External pilot typeNote7 (for positive pressure)
※No vacuum valve can be mounted.

■ Manual override

Manual override button

Manual override leverNote3

■ Valve outlet type

-A1 With plateNote4 (base piping type)

5-port specification

-FJ With dual use fitting block **F15**: ϕ6, ϕ8 (direct piping type)
-FJ5 With single use fitting block **F15**: ϕ6 (direct piping type)
-FJ6 With single use fitting block **F15**: ϕ8 (direct piping type)
-FM With female thread block **F15**: Rc1/8 (direct piping type)
-FMH With female thread blockNote15 (direct piping type) **F15**: NPT1/8

3-port specification

-FJ5A With single use fitting block, normally closed (NC) (direct piping type) **F15**: ϕ6
-FJ5B With single use fitting block, normally open (NO) (direct piping type) **F15**: ϕ6
-FJ6A With single use fitting block, normally closed (NC) (direct piping type) **F15**: ϕ8
-FJ6B With single use fitting block, normally open (NO) (direct piping type) **F15**: ϕ8
-FMA With female thread block, normally closed (NC) (direct piping type) **F15**: Rc1/8
-FMAH With female thread block, normally closed (NC)Note15 (direct piping type) **F15**: NPT1/8
-FMB With female thread block, normally open (NO) (direct piping type) **F15**: Rc1/8
-FMBH With female thread block, normally open (NO)Note15 (direct piping type) **F15**: NPT1/8

Caution: The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.

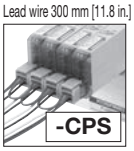
■ Wiring specificationNote12

S type plug connector
Without connector

S type plug connector
Lead wire 300 mm [11.8 in.]

-PS3
S type plug connector
Lead wire 3000 mm [118 in.]

Pre-wired positive common terminal
S type plug connector
Lead wire 300 mm [11.8 in.]



-CPS3
Pre-wired positive common terminal
S type plug connector
Lead wire 3000 mm [118 in.]

-MS
Pre-wired negative common terminal
S type plug connector
Lead wire 300 mm [11.8 in.]

-MS3
Pre-wired negative common terminal
S type plug connector
Lead wire 3000 mm [118 in.]

-CMS
Pre-wired negative common terminal
S type plug connector
Lead wire 300 mm [11.8 in.]

-CMS3
Pre-wired negative common terminal
S type plug connector
Lead wire 3000 mm [118 in.]

■ Manifold fitting specification

5-port specification

-J5 With single use fitting block **F15**: ϕ6 (base piping type)
-J6 With single use fitting block **F15**: ϕ8 (base piping type)
-M With female thread block **F15**: Rc1/8 (base piping type)
-MH With female thread blockNote15 (base piping type) **F15**: NPT1/8

3-port specification

-J5A With single use fitting block, normally closed (NC) (base piping type) **F15**: ϕ6
-J5B With single use fitting block, normally open (NO) (base piping type) **F15**: ϕ6
-J6A With single use fitting block, normally closed (NC) (base piping type) **F15**: ϕ8
-J6B With single use fitting block, normally open (NO) (base piping type) **F15**: ϕ8
-MA With female thread block, normally closed (NC) (base piping type) **F15**: Rc1/8
-MAH With female thread block, normally closed (NC)Note15 (base piping type) **F15**: NPT1/8
-MB With female thread block, normally open (NO) (base piping type) **F15**: Rc1/8
-MBH With female thread block, normally open (NO)Note15 (base piping type) **F15**: NPT1/8

Caution: The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.

■ Port isolator

Blank: No port isolator
-XSP: For 1 (P) portNote5
-XSR: For 3 (R2), 5 (R1) portsNote5
-XSA: For 1 (P), 3 (R2), and 5(R1) portsNote5

■ Back pressure prevention valve

Blank
No back pressure prevention valve
-E2
With back pressure prevention valveNote9

■ Individual air supply and exhaust spacer

Blank: No spacer
-XNP6 : Single intake spacer (with ϕ6 joint for F15)
-XNP8 : Single intake spacer (with ϕ8 joint for F15)
-XNR6 : Single exhaust spacer (with ϕ6 joint for F15)
-XNR8 : Single exhaust spacer (with ϕ8 joint for F15)
-STP : With stop valveNote6
See page 27 for details.

■ Valve size

F15 Standard type
F15L Low-current type

Station	Valve size	Valve specification	Operation type	IP Specifications	Manual override	Valve outlet type	Wiring specification	Manifold fitting specification	Back pressure prevention valve	Individual air supply, exhaust spacer and stop valve	Port isolator	Voltage
Mounting valve model												
stn. 1 ⋮ stn.□ Note2	F15 F15L	T0 TANote8 T1 TBNote8 T2 TCNote8 T3 T4 T5	BlankNote6 GNote7	Blank -P Note13	Blank -RNote3	-A1Note4	-PN -MS -PSNote12 -MS3 -PS3 -CMS -CPS -CMS3 -CPS3	Blank -E2Note9	Blank -XNP6 -XNR8 -XNP8 -STPNote6 -XNR6	Blank -XSPNote5 -XSRNote5 -XSANote5	DC24V DC12VNote10 AC100VNote11	
	F15	XBPN (for block-off plate)							Blank -STPNote6			
When selecting the intermediate piping block, see page 100 when specifying it.												
stn. 1 ⋮ stn.□ Note2	F15 F15L	T0 TANote8 T1 TBNote8 T2 TCNote8 T3 T4 T5	BlankNote6 GNote7	Blank -P Note13	Blank -RNote3	-A1Note4	-PN -MS -PSNote12 -MS3 -PS3 -CMS -CPS -CMS3 -CPS3	-J5Note14 -J6Note14 -MNote14 -MHNote15 -J5ANote14 -J5BNote14 -J6ANote14 -J6BNote14 -MANote14 -MAHNote15 -MBNote14 -MBHNote15	Blank -E2Note9	Blank -XNP6 -XNR8 -XNP8 -STPNote6 -XNR6	Blank -XSPNote5 -XSRNote5 -XSANote5	DC24V DC12VNote10 AC100VNote11	
	F15	XBPN (for block-off plate)							Blank -STPNote6			
When selecting the intermediate piping block, see page 100 when specifying it.												
stn. 1 ⋮ stn.□ Note2	F15 F15L	T0 TANote8 T1 TBNote8 T2 TCNote8 T3 T4 T5	BlankNote6 GNote7	Blank -P Note13	Blank -RNote3	-FJNote14 -FJ5Note14 -FJ6Note14 -FMNote14 -FMHNote15 -FJ5ANote14 -FJ5BNote14 -FJ6ANote14 -FJ6BNote14 -FMANote14 -FMAHNote15 -FMBNote14 -FMBHNote15	-PN -MS -PSNote12 -MS3 -PS3 -CMS -CPS -CMS3 -CPS3	Blank -E2Note9	Blank -XNP6 -XNR8 -XNP8 -STPNote6 -XNR6	Blank -XSPNote5 -XSRNote5 -XSANote5	DC24V DC12VNote10 AC100VNote11	
	F15	XBPN (for block-off plate)							Blank -STPNote6			
When selecting the intermediate piping block, see page 100 when specifying it.												

Notes:
5. Port isolators can be installed only when piping blocks are mounted on both sides. In addition, only 1 port isolator can be mounted in 1 manifold for **-XSA**, or 1 each port isolator for **-XSP** and **-XSR** for a total of 2 locations. When shipping, the designated port isolators are mounted between the designated station and the station to its immediate left (the next smaller stn. No.).
6. Cannot be mounted on the external pilot manifold. Only direct mounting is available.
7. Cannot be mounted on the internal pilot manifold.
8. Not available in external pilot type.
9. Not available with the individual exhaust spacer.
10. Not available in low-current type.
11. Not available in low-current type and tandem 3-port valves.
12. Wiring specifications of **-P**□and **-CP**□, the **-M**□ and **-CM**□, positive common and negative common cannot be mounted together.
13. The IP65 protective structure around an electrical device that prevents the infiltration of solid foreign material and water from outside.
14. The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.
15. Can be selected only when the manifold type is **XNH**.

F15 Series Easy Assembly Type Manifold Non-Plug-in Type Order Codes

Intermediate piping block

(When mounting an intermediate piping block to the manifold, complete the following type and specify the station specified on page 99.)

F 15 ZX□ - □ - TN - □

Valve size
15: 15 mm
[0.591 in.] width

Pilot specification
Blank: Internal pilot
G: External pilot

Piping block Specification[Note]
PJ : With dual use fitting ϕ8, ϕ10
PJ5 : With single use fitting ϕ8
PJ6 : With single use fitting ϕ10
PM : With female thread Rc 1/4
PMH : With female thread NPT 1/4

Manifold type
TN: **For non-plug-in type**

Port isolator
Blank: No port isolator
XSP: Port isolator (1(P) port)
XSR: Port isolator (3(R2), 5(R1) ports)
XSA: Port isolator (1(P), 3(R2), and 5(R1) ports)

Note:See the following table for combinations of intermediate piping block port specifications and manifold piping block specifications.

Manifold piping specifications	Intermediate piping block
JT	PJ
J5T	PJ5
J6T	PJ6
MT	PM
MTH	PMH

F15 Series Easy Assembly Type Manifold Non-Plug-in Type Additional Parts Order Codes

Parts for manifold

F 15 ZX - □

Valve size
15: 15 mm [0.591 in.] width

Parts content
GS2: Gasket (gasket and exhaust valve)
GS3: Gasket (valve base side)
XSP: Port isolator (for 1(P) port)
XSR: Port isolator (for 3(R2), 5(R1) ports)
XSA: Port isolator (for 1(P), 3(R2), 5(R1) ports)
DN : DIN mounting bracket (one set of two)

Block-off plate (block-off plate, 2 mounting screws, and plug)

F 15 XBP N

Valve size
15: 15 mm [0.591 in.] width

For non-plug-in type

Back pressure prevention valve (for divided type, two, with dedicated gasket)

F 15 Z - E2

Valve size
15: 15 mm [0.591 in.] width

Individual air supply and exhaust spacer (Spacer for non-plug-in type, gasket, exhaust valve, and 2 mounting screws)

F 15 ZX - □

Valve size
15: 15 mm [0.591 in.] width

Specification
XNPM: Individual air supply spacer (with M5 female thread for F15)
XNRM: Individual exhaust spacer (with M5 female thread for F15)

※For details, see p.27.

Valve base assembly (valve base, gasket, and 2 connecting rods for adding)

F 15 ZX - □ *For use with both internal pilot and external pilot

Valve size
15: 15 mm [0.591 in.] width

Piping specifications
VJ : Dual use fitting valve base
VJ5 : Single use fitting valve base F15: ϕ6
VJ6 : Single diameter fitting valve base F15: ϕ8
VJ5A: 3-port specification normally closed, single use fitting valve base F15: ϕ6
VJ5B: 3-port specification normally open, single use fitting valve base F15: ϕ6
VJ6A: 3-port specification normally closed, single use fitting valve base F15: ϕ8
VJ6B: 3-port specification normally open, single use fitting valve base F15: ϕ8
VM : Female thread valve base F15: Rc1/8
VMA : 3-port specification normally closed, female thread valve base F15: Rc1/8
VMB : 3-port specification normally open, female thread valve base F15: Rc1/8
VMH : Female thread valve base F15: NPT1/8
VMAH : 3-port specification normally closed, female thread valve base F15: NPT1/8
VMBH : 3-port specification normally open, female thread valve base F15: NPT1/8
VP : Valve base plate

Piping block assembly (non-plug-in)

F 15 ZX□ - □ - □ - □ - □

Valve size
15: 15 mm [0.591 in.] width

Port isolator Note2
Blank: No port isolator
XSP: Port isolator (1(P) port)
XSR: Port isolator (3(R2), 5(R1) ports)
XSA: Port isolator (1(P), 3(R2), and 5(R1) ports)

Mounting specification Note3
Blank: Without DIN bracket
DN: With DIN bracket

Pilot specification
Blank: Internal pilot
G: External pilot

Manifold type
LN : Left side piping block (for non-plug-in type) without circuit board (with end lid)
RN : Right piping block, without circuit board
TN : Intermediate piping block (for non-plug-in type) without circuit board

Piping block Specification Note1
PJ : With dual use fitting ϕ8, ϕ10
PJ5: With single use fitting ϕ8
PJ6: With single use fitting ϕ10
PM : With female thread Rc 1/4
PMH: With female thread NPT 1/4
PP : Plate (without fitting)

Notes:1.The fitting of the piping block is included. One set of two connecting rods is also included for a LN and TN type manifold.
2.Port isolator selection only available when the piping block name is TN.
3.Only when the manifold type is LN or RN.

F15 Series Easy Assembly Type Manifold Non-Plug-in Type Additional Parts Order Codes

Muffler

KM - J □

Fitting size
6: Outer diameter ϕ6 (for piping block)
8: Outer diameter ϕ8 (for piping block, for single exhaust spacer)
10: Outer diameter ϕ6 (for single exhaust spacer)
(Sales unit: Set of 10 mufflers)

Connecting rod (1 set of 2)

F 15 ZX - □ - □

Valve size
15: 15 mm [0.591 in.] width

Number of units
01 ~ **20**: When type for valve base (RV) is selected
01: When type for left side piping block (RH) is selected
01: When type for intermediate piping block (RC) is selected

Specification
RV: For valve base
RH: For left piping block
RC: For intermediate piping block

DIN rail

DIN -□ (Unit:1)

Rail length
125: 125mm [4.921 in.]
⋮ (25 mm [0.984 in.] pitch)
525: 525mm [20.669 in.]

Connector-related order codes

JAZ - P - □ (for double use only)

Valve specification
T2,T3,T4, T5,TA,TB,
For **TC**

IP Specification

Connector specification
CP : Positive common, connector, lead wire length 300 mm [11.8 in.] (black, red, white, for total of 3 lead wires)
CP3 : Positive common, connector, lead wire length 3000 mm [118 in.] (black, red, white, for total of 3 lead wires)
PA : Positive common A type, lead wire length 300 mm [11.8 in.]※
PA3 : Positive common A type, lead wire length 3000 mm [118 in.]※
PB : Positive common B type, lead wire length 300 mm [11.8 in.]※
PB3 : Positive common B type, lead wire length 3000 mm [118 in.]※
PC : Positive common C type, lead wire length 300 mm [11.8 in.]※
PC3 : Positive common C type, lead wire length 3000 mm [118 in.]※
CM : Negative common, connector lead wire length 300 mm [11.8 in.]※
CM3: Negative common, connector lead wire length 3000 mm [118 in.]※
MA : Negative common A type, lead wire length 300 mm [11.8 in.]※
MA3: Negative common A type, lead wire length 3000 mm [118 in.]※
MB : Negative common B type, lead wire length 300 mm [11.8 in.]※
MB3: Negative common B type, lead wire length 3000 mm [118 in.]※
MC : Negative common C type, lead wire length 300 mm [11.8 in.]※
MC3: Negative common C type, lead wire length 3000 mm [118 in.]※
※A common connector assembly.

JAZ0 - P - □ (for single use only)

Valve specification
For **T0/T1**

IP Specification

Connector specification
CP : Positive common, connector, lead wire length 300 mm [11.8 in.] (black, red, for total of 2 lead wires)
CP3 : Positive common, connector, lead wire length 3000 mm [118 in.] (black, red, for total of 2 lead wires)
PA : Positive common A type, lead wire length 300 mm [11.8 in.]※
PA3 : Positive common A type, lead wire length 3000 mm [118 in.]※
PB : Positive common B type, lead wire length 300 mm [11.8 in.]※
PB3 : Positive common B type, lead wire length 3000 mm [118 in.]※
PC : Positive common C type, lead wire length 300 mm [11.8 in.]※
PC3: Positive common C type, lead wire length 3000 mm [118 in.]※
CM : Negative common, connector lead wire length 300 mm [11.8 in.]※
CM3: Negative common, connector lead wire length 3000 mm [118 in.]※
MA : Negative common A type, lead wire length 300 mm [11.8 in.]※
MA3: Negative common A type, lead wire length 3000 mm [118 in.]※
MB : Negative common B type, lead wire length 300 mm [11.8 in.]※
MB3: Negative common B type, lead wire length 3000 mm [118 in.]※
MC : Negative common C type, lead wire length 300 mm [11.8 in.]※
MC3: Negative common C type, lead wire length 3000 mm [118 in.]※
※A common connector assembly.

Connector-related order codes ※For details, see p. 23.

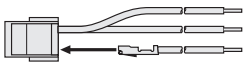
JAZ □- □

Valve specification
Blank:
T1, T2, T3 T4,T5,TA, For **TB/TC**
0: For **T0**

Connector type
CP : Positive common/connector, lead wire length 300 mm [11.8 in.]
CP3 : Positive common/connector, lead wire length 3000 mm [118 in.]
CPN : Positive common/connector, no lead wire (with shorting bar and contact)
PA : Positive common A type, lead wire length 300 mm [11.8 in.]※
PA3 : Positive common A type, lead wire length 3000 mm [118 in.]※
PB : Positive common B type, lead wire length 300 mm [11.8 in.]※
PB3 : Positive common B type, lead wire length 3000 mm [118 in.]※
PC : Positive common C type, lead wire length 300 mm [11.8 in.]※
PC3 : Positive common C type, lead wire length 3000 mm [118 in.]※
CMN : Negative commonconnector, no lead wire (with shorting bar and contact)
CM : Negative common, connector lead wire length 300 mm [11.8 in.]※
CM3 : Negative common, connector lead wire length 3000 mm [118 in.]※
MA : Negative common A type, lead wire length 300 mm [11.8 in.]※
MA3 : Negative common A type, lead wire length 3000 mm [118 in.]※
MB : Negative common B type, lead wire length 300 mm [11.8 in.]※
MB3 : Negative common B type, lead wire length 3000 mm [118 in.]※
MC : Negative common C type, lead wire length 300 mm [11.8 in.]※
MC3 : Negative common C type, lead wire length 3000 mm [118 in.]※

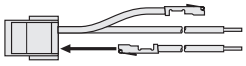
● Common connector assembly

A type: **JAZ-PA** □※



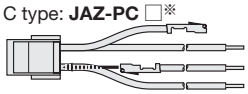
Red common wire (+)
Black A side (-)
White B side (-) (Insert when using as double solenoid)Note

B type: **JAZ-PB** □※



Red common wire (+)
Black A side (-)
White B side (-) (Insert when using as double solenoid)Note

C type: **JAZ-PC** □※



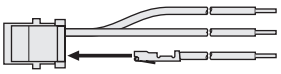
Red common wire (+)
Black A side (-)
White B side (-) (Insert when using as double solenoid)Note
Red common wire (+)

※ Lead wire length **Blank:** 300 mm [11.8 in.]
3: 3000 mm [118 in.]

Note: White lead wire is not available for **JAZ0-P□□**.

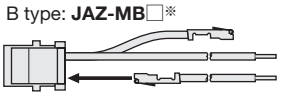
● For negative common

A type: **JAZ-MA**□※



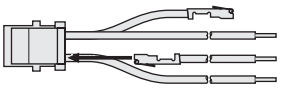
Black common wire (-)
Red A side (+)
White B side (+) (Insert when using as double solenoid)

B type: **JAZ-MB**□※



Black common wire (-)
Red A side (+)
White B side (+) (Insert when using as double solenoid)

C type: **JAZ-MC**□※



Black common wire (-)
Red A side (+)
White B side (+) (Insert when using as double solenoid)
Black common wire (-)

Single negative common plug connector unit
Type: **JAZ-CM**□※

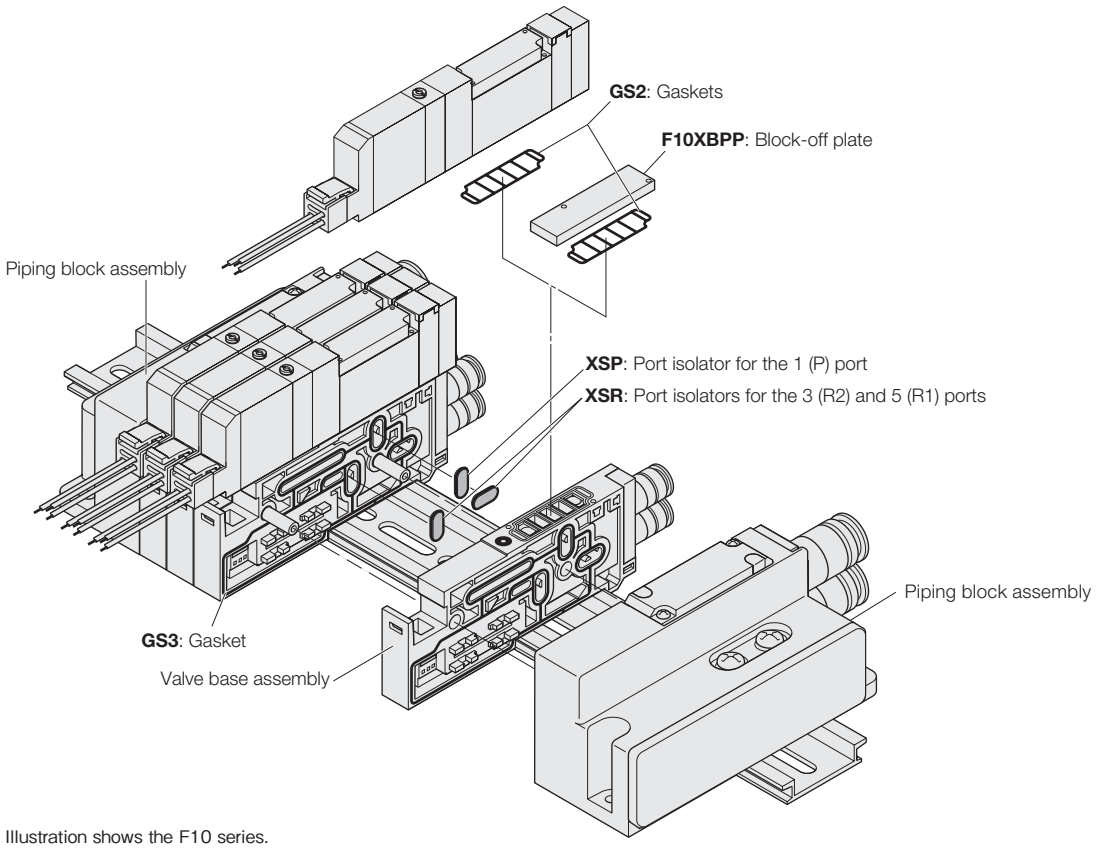
※ Lead wire length **Blank:** 300 mm [11.8 in.]
3: 3000 mm [118 in.]

FZ - □

Valve specification
T1,T2,T3
T4,T5,TA
For **TB/TC**

Connector specification
CC1.5: Cabtyre cable, length 1500 mm [59 in.]※
CC3 : Cabtyre cable, length 3000 mm [118 in.]※

Notes:
1. When the valve specification is **T1**, select the **JAZ0-P-** □ single dedicated type.
2. When switching between the single and double type (**T1**/**T2**), purchase and use a dedicated connector for single or double use (the number of seal holes in the lead wire differs for the single and double type).
3. There is no white lead wire for the **JAZ0-P-** □ .
4. It is necessary to disassemble the connector to add a common connector assembly. Contact your nearest KOGANEI sales office.
5. For information on use in locations/atmospheres subject to substances other than water, such as organic solvents, cutting oil, or reagents, contact your nearest KOGANEI sales office.
6. For information on replacing the waterproof seal, contact your nearest KOGANEI sales office.



※ Illustration shows the F10 series.

Manifold Order Code Example

(4 units of F15 Series)

F15M4XNJ-J6T-DR

stn.1 ～ 2 F15T0-A1-PS DC24V
stn.3 F15ZX-PJ6-TN
stn.4 F15T0-A1-PS DC24V

Note: This order code example has no relationship to the illustration above.

Precautions for Order Codes

●Orders for valves only

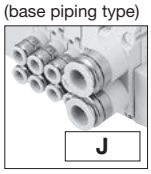
Place orders from "Single Valve Unit Order Codes" on p. 64.

However, **Blank**, **A2□**, **F3**, **F4□**, **F5**, **F6**, **F4A□**, **F4B□**, **F5A**, **F5B**, **F6A**, and **F6B** cannot be selected for the valve outlet type. And for the wiring specification, **Blank**, **PL**, and **PL3** cannot be selected. In addition, for common terminal wiring connections, separately order the common connector assemblies listed on the left.

F15 Series Easy Assembly Type Manifold Plug-in Type Order Codes

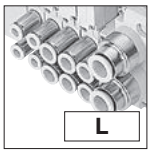
■ Manifold outlet specification

With dual use fitting blocks (base piping type)



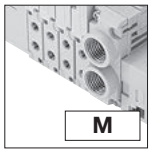
Outlet port fitting
F15: ϕ6, ϕ8

With selectable fittings (base piping type)



Outlet port should be selected in accordance with the manifold fitting specification.

With female thread blocks (base piping type)



Outlet port female thread
F15: Rc1/8

With plates (direct piping type)

■ Pilot type

Blank
Internal pilot manifold

G
External pilot manifold

■ Piping block specification (air supply and exhaust)

Fitting block
-JR: Dual use fitting, right-side mounting
-JL: Dual use fitting, left-side mounting
-JD: Dual use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ8, ϕ10

Female thread block
-MR: Female thread, right-side mounting
-ML: Female thread, left-side mounting
-MD: Female thread, both-side mounting
Female thread size (1(P), 3, 5(R) ports), Rc1/4

Female thread block
-MRH: Female thread, right-side mounting[Note15]
-MLH : Female thread, left-side mounting[Note15]
-MDH: Female thread,both-side mounting[Note15]
Female thread size (1(P), 3, 5(R) ports), NPT1/4

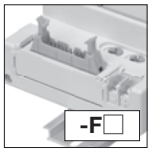
Single size fitting block
-J5R : Single use fitting, right-side mounting
-J5L : Single use fitting, left-side mounting
-J5D : Single use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ8
-J6R : Single use fitting, right-side mounting
-J6L : Single use fitting, left-side mounting
-J6D : Single use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ10

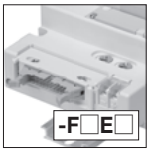
Intermediate piping block
-JT : Dual use fitting, both-side mounting, intermediate piping block ϕ8, ϕ10
-J5T : Single use fitting, both-side mounting, intermediate piping block ϕ8
-J6T : Single use fitting, both-side mounting, intermediate piping block ϕ10
-MT : Female thread, both-side mounting, intermediate piping block Rc1/4
-MTH : Female thread, both-side mounting, intermediate piping block NPT1/4[Note15]

■ Wiring specification (wiring block)

※ All wiring blocks are mounted on the left.

Flat cable connector (with socket and strain relief)





<Connector top surface wiring>
-F100 : 10-pin
-F100N: 10-pin without power terminal
-F101 : 10-pin
-F101N: 10-pin without power terminal
-F200 : 20-pin
-F200N: 20-pin without power terminal
-F201 : 20-pin
-F201N: 20-pin without power terminal
-F260 : 26-pin
-F260N: 26-pin without power terminal

<Connector side surface wiring>
-F100E : 10-pin
-F100EN: 10-pin without power terminal
-F101E : 10-pin
-F101EN: 10-pin without power terminal
-F200E : 20-pin
-F200EN: 20-pin without power terminal
-F201E : 20-pin
-F201EN: 20-pin without power terminal
-F260E : 26-pin
-F260EN: 26-pin without power terminal

For details, see p. 47.

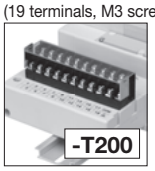
D-sub connector

<Connector top surface wiring> (M2.6 mounting screws)
-D250 : 25-pin[Note14]
-D250N : 25-pin without power terminal[Note14]
-D251 : 25-pin[Note14]
-D251N: 25-pin without power terminal[Note14] (4-40 UNC mounting screws)
-D250U : 25-pin[Note15]
-D251U: 25-pin[Note15]
-D370NU : 37-pin without power terminal[Note15]

<Connector side surface wiring> (M2.6 mounting screws)
-D250E : 25-pin[Note14]
-D250EN: 25-pin without power terminal[Note14]
-D251E : 25-pin[Note14]
-D251EN: 25-pin without power terminal[Note14] (4-40 UNC mounting screws)
-D250EU : 25-pin[Note15]
-D251EU: 25-pin[Note15]

For details, see p. 47-48.

Terminal block (19 terminals, M3 screws)



For details, see p.47, 48.

■ Wiring connection specification

Blank
Packed wiring:
Specification of the valve base is always in accordance with the mounted valve specifications.

-W
Double wiring:
Valve base is always double wiring, regardless of the specifications of the mounted valve.

■ Common specification

Blank: Positive common
-CM : Negative common

■ Mounting specification

Blank
Direct mounting

-DN
With DIN bracket (no rail)

-DR
With DIN bracket, with rail
Caution: For information on rails assembled and shipped, see pages 132 and 136.

■ Valve size

F15M 15 mm [0.591 in.] width

■ Valve size

F15 Standard type

F15L Low-current type

Valve size	Valve units	Manifold type	Manifold outlet specification	Pilot specification	Piping block specification	Wiring specification	Wiring connection specification	Common specification	Mounting specification	Voltage
Manifold model										
Base piping type	F15M	XP (※Rc)	J M	Blank G	-JR -J5R -JT -JL -J5L -J5T -JD -J5D -J6T -MR -J6R -MT -ML -J6L -MD -J6D	-F100 -F260 -F101E -D250E -F100N -F260N -F101EN -D250EN -F101 -D250 -F200E -D251E -F101N -D250N -F200EN -D251EN -F200 -D251 -F201E -T200 -F200N -D251N -F201EN -F201 -F100E -F260E -F201N -F100EN -F260EN	Blank -W	Blank -CM	Blank -DN -DR	DC24V DC12V[Note2]
Base piping type selectable fitting	F15M	2 : : □ Note1	L	Blank G	-JR[Note14] -MRH[Note15] -J6L[Note14] -JL[Note14] -MLH[Note15] -J5D[Note14] -JD[Note14] -MDH[Note15] -J6D[Note14] -MR[Note14] -J5R[Note14] -MTH[Note15] -ML[Note14] -J6R[Note14] -MD[Note14] -J5L[Note14]	-F100 -F260N -F100EN -D250E[Note14] -F100N -D250[Note14] -F101E -D250EN[Note14] -F101 -D250N[Note14] -F101EN -D251E[Note14] -F101N -D251[Note14] -F200E -D251EN[Note14] -F200 -D251N[Note14] -F200EN -D250EU[Note15] -F200N -D250U[Note15] -F201E -D251EU[Note15] -F201 -D251U[Note15] -F201EN -T200 -F201N -D370NU[Note15] -F260E -F260 -F100E -F260EN	Blank -W	Blank -CM	Blank -DN -DR	DC24V DC12V[Note2]
Direct piping type		XP (※Rc) XPH (※NPT) Note13	Blank	Blank G	-JR[Note14] -MRH[Note15] -J6L[Note14] -JL[Note14] -MLH[Note15] -J5D[Note14] -JD[Note14] -MDH[Note15] -J6D[Note14] -MR[Note14] -J5R[Note14] -MTH[Note15] -ML[Note14] -J6R[Note14] -MD[Note14] -J5L[Note14]	-F100 -F260N -F100EN -D250E[Note14] -F100N -D250[Note14] -F101E -D250EN[Note14] -F101 -D250N[Note14] -F101EN -D251E[Note14] -F101N -D251[Note14] -F200E -D251EN[Note14] -F200 -D251N[Note14] -F200EN -D250EU[Note15] -F200N -D250U[Note15] -F201E -D251EU[Note15] -F201 -D251U[Note15] -F201EN -T200 -F201N -D370NU[Note15] -F260E -F260 -F100E -F260EN	Blank -W	Blank -CM	Blank -DN -DR	DC24V DC12V[Note2]

Notes: 1. For the maximum number of units, see the table for maximum number of valve units by wiring specification, on p. 108.
2. Not available in low-current type.
3. Valve mounting location is from the left, with the solenoid on top, and the 4(A), 2(B) ports side in front.
4. When selecting **J**, **M**, or **L** (base piping type) for the manifold outlet specification, always enter **-A1** (with plate) for the valve outlet type.

Valve type

T0: 2-position, for single solenoid only
T1: 2-position, single solenoid specification
T2: 2-position, double solenoid specification
T3: 3-position, closed center
T4: 3-position, exhaust center
T5: 3-position, pressure center
TA: Tandem 3-port (NC and NC)Note10
TB: Tandem 3-port (NO and NO)Note10
TC: Tandem 3-port (NC and NO)Note10

Operation type

Blank
Internal pilot typeNote8

G
External pilot typeNote9
(for positive pressure)
※ No vacuum valve can be mounted.

Manual override

Manual override button

Manual override leverNote6

Valve type

-A1 With plateNote4 (base piping type)

5-port specification

-FJ With dual use fitting block for different diameter sizes (direct piping type) **F15**: ϕ6/ϕ8
-FJ5 With single use fitting block (direct piping type) **F15**: ϕ6
-FJ6 With single use fitting block (direct piping type) **F15**: ϕ8
-FM With female thread block (direct piping type) **F15**: Rc1/8
-FMH With female thread blockNote15 (direct piping type) **F15**: NPT1/8

3-port specification

-FJ5A With single use fitting block, normally closed (NC) (direct piping type) **F15**: ϕ6
-FJ5B With single use fitting block, normally open (NO) (direct piping type) **F15**: ϕ6
-FJ6A With single use fitting block, normally closed (NC) (direct piping type) **F15**: ϕ8
-FJ6B With single use fitting block, normally open (NO) (direct piping type) **F15**: ϕ8
-FMA With female thread block, normally closed (NC) (direct piping type) **F15**: Rc1/8
-FMAH With female thread block, normally closed (NC)Note15 (direct piping type) **F15**: NPT1/8
-FMB With female thread block, normally open (NO) (direct piping type) **F15**: Rc1/8
-FMBH With female thread block, normally open (NO)Note15 (direct piping type) **F15**: NPT1/8

Caution: The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.

Manifold fitting specification

5-port specification

-J5 With single use fitting block (base piping type) **F15**: ϕ6
-J6 With single use fitting block (base piping type) **F15**: ϕ8
-M With female thread block (base piping type) **F15**: Rc1/8
-MH With female thread blockNote15 (base piping type) **F15**: NPT1/8

3-port specification

-J5A With single use fitting block, normally closed (NC) (base piping type) **F15**: ϕ6
-J5B With single use fitting block, normally open (NO) (base piping type) **F15**: ϕ6
-J6A With single use fitting block, normally closed (NC) (base piping type) **F15**: ϕ8
-J6B With single use fitting block, normally open (NO) (base piping type) **F15**: ϕ8
-MA With female thread block, normally closed (NC) (base piping type) **F15**: Rc1/8
-MAH With female thread block, normally closed (NC)Note15 (base piping type) **F15**: NPT1/8
-MB With female thread block, normally open (NO) (base piping type) **F15**: Rc1/8
-MBH With female thread block, normally open (NO)Note15 (base piping type) **F15**: NPT1/8

Caution: The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.

Port isolator

Blank: No port isolator
-XSP: For 1(P) portNote7
-XSR: For 3(R2), 5(R1) portsNote7
-XSA: For 1(P), 3(R2), and 5(R1) portsNote7

Back pressure prevention valve

Blank
No back pressure prevention valve
-E2
With back pressure prevention valveNote11

Individual air supply and exhaust spacer

Blank: No spacer
-XPP6 : Single intake spacer (with ϕ6 joint for F15)
-XPP8 : Single intake spacer (with ϕ8 joint for F15)
-XPR6 : Single exhaust spacer (with ϕ6 joint for F15)
-XPR8 : Single exhaust spacer (with ϕ8 joint for F15)
For details, see p.27.

Block-off plate wiring specification

Blank: Double wiring
-S: Single wiring

Station	Valve size	Valve specifications	Operation type	Manual override	Valve outlet type	Manifold fitting specification	Back pressure prevention valve	Individual air supply and exhaust spacer	Port isolator	Voltage / Block-off plate wiring specification
Valve type included										
stn. 1 . . stn. □ Note3	F15 F15L	T0 T3 TA Note10 / T1 T4 TB Note10 / T2 T5 TC Note10	Blank Note8 / G Note9	Blank / -R Note6	-A1 Note4	Blank / -E2 Note11	Blank / -XPP6 -XPR6 / -XPP8 -XPR8	Blank / -XSP Note7 / -XSR Note7 / -XSA Note7	DC24V / DC12V Note2	
	F15	XBPP (for block-off plate)Note5								Blank -S
	When selecting the intermediate piping block, see page 106 when specifying it.									
stn. 1 . . stn. □ Note3	F15 F15L	T0 T3 TA Note10 / T1 T4 TB Note10 / T2 T5 TC Note10	Blank Note8 / G Note9	Blank / -R Note6	-A1 Note4	-J5 Note12 -J6A Note12 / -J6 Note12 -J6B Note12 / -M Note12 -MA Note12 / -MH Note15 -MAH Note15 / -J5A Note12 -MB Note12 / -J5B Note12 -MBH Note15	Blank / -E2 Note11	Blank / -XPP6 -XPR6 / -XPP8 -XPR8	Blank / -XSP Note7 / -XSR Note7 / -XSA Note7	DC24V / DC12V Note2	
	F15	XBPP (for block-off plate)Note5								Blank -S
	When selecting the intermediate piping block, see page 106 when specifying it.									
stn. 1 . . stn. □ Note3	F15 F15L	T0 T3 TA Note10 / T1 T4 TB Note10 / T2 T5 TC Note10	Blank Note8 / G Note9	Blank / -R Note6	-FJ Note12 -FJ6A Note12 / -FJ5 Note12 -FJ6B Note12 / -FJ6 Note12 -FMA Note12 / -FM Note12 -FMAH Note15 / -FMH Note15 -FMB Note12 / -FJ5A Note12 -FMBH Note15 / -FJ5B Note12	Blank / -E2 Note11	Blank / -XPP6 -XPR6 / -XPP8 -XPR8	Blank / -XSP Note7 / -XSR Note7 / -XSA Note7	DC24V / DC12V Note2	
	F15	XBPP (for block-off plate)Note5								Blank -S
	When selecting the intermediate piping block, see page 106 when specifying it.									

Notes: 5. Select the block-off plate wiring in the block-off plate wiring connection specification.
6. When the valve specification is **T1** or **T2**, the manual override lever is placed only on the A side.
7. Port isolators can be installed only when piping blocks are mounted on both sides. In addition, only 1 port isolator can be mounted in 1 manifold for **-XSA**, or 1 each port isolator for **-XSP** and **-XSR** for a total of 2 locations. When shipping, the designated port isolators are mounted between the designated station and the station to its immediate left (the next smaller stn. No.).
8. Cannot be mounted on the external pilot manifold.
9. Cannot be mounted on the internal pilot manifold.
10. Not available in external pilot type.
11. Not available with the individual exhaust spacer.
12. The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.
13. Only L or Blank is available in the inch female thread specification and the manifold outlet specification.
14. Can be selected only when the manifold type is **XP**.
15. Can be selected only when the manifold type is **XPH**.

F15 Series Easy Assembly Type Manifold Plug-in Type Order Codes

Intermediate piping block

(When mounting an intermediate piping block to the manifold, complete the following type and specify the station specified on page 105.)

F 15 ZX□ - □ - TK - □

Valve size
15: 15 mm [0.591 in.] width

Pilot specification
Blank: Internal pilot
G: External pilot

Piping block Specification[Note]
PJ : With dual use fitting ϕ8, ϕ10
PJ5 : With single use fitting ϕ8
PJ6 : With single use fitting ϕ10
PM : With female thread Rc 1/4
PMH : With female thread NPT 1/4

Manifold type
TK: For plug-in type

Port isolator
Blank: Internal pilot
XSP: Port isolator (1(P) port)
XSR: Port isolator (3(R2), 5(R1) ports)
XSA: Port isolator (1(P), 3(R2), and 5(R1) ports)

Note:See the following table for combinations of intermediate piping block port specifications and manifold piping block specifications.

Manifold piping specifications	Intermediate piping block
JT	PJ
J5T	PJ5
J6T	PJ6
MT	PM
MTH	PMH

F15 Series Easy Assembly Type Manifold Plug-in Type Additional Parts Order Codes

Parts for manifold

F 15 ZX - □

Valve size
15: 15 mm [0.591 in.] width

Parts content
GS2: Gasket (gasket and exhaust valve)
GS3: Gasket (valve base side)
XSP: Port isolator (for 1(P) port)
XSR: Port isolator (for 3(R2), 5(R1) ports)
XSA: Port isolator (for 1(P), 3(R2), 5(R1) ports)
DN : DIN mounting bracket (one set of two)

Block-off plate (block-off plate, 2 mounting screws, and plug)

F 15 XBP P

Valve size
15: 15 mm [0.591 in.] width

For plug-in type

Valve base assembly (valve base, gasket, and 2 connecting rods for adding)

F 15 ZX - □ - □ - □ *For use with both internal pilot and external pilot

Valve size
15: 15 mm [0.591 in.] width

Wiring specification
S : For single wiring
W : For double wiring

Common specification
Blank: For positive common
CM: For negative common

Piping specifications
VJ : Dual use fitting valve base
VJ5 : Single use fitting valve base F15: ϕ6
VJ6 : Single diameter fitting valve base F15: ϕ8
VJ5A : 3-port specification normally closed, single use fitting valve base F15: ϕ6
VJ5B : 3-port specification normally open, single use fitting valve base F15: ϕ6
VJ6A : 3-port specification normally closed, single use fitting valve base F15: ϕ8
VJ6B : 3-port specification normally open, single use fitting valve base F15: ϕ8
VM : Female thread valve base F15: Rc1/8
VMA : 3-port specification normally closed, female thread valve base F15: Rc1/8
VMB : 3-port specification normally open, female thread valve base F15: Rc1/8
VMH : Female thread valve base F15: NPT1/8
VMAH : 3-port specification normally closed, female thread valve base F15: NPT1/8
VMBH : 3-port specification normally open, female thread valve base F15: NPT1/8
VP : Valve base plate

Piping block assembly (plug-in)

F 15 ZX□ - □ - □ - □ - □

Valve size
15: 15 mm [0.591 in.] width

Pilot specification
Blank: Internal pilot
G: External pilot

Manifold type
LK : Left side piping block (for plug-in type) with circuit board
RN : Right piping block, without circuit board
TK : Intermediate piping block (for plug-in type) with circuit board

Piping block Specification Note1
PJ : With dual use fitting ϕ8, ϕ10
PJ5: With single use fitting ϕ8
PJ6: With single use fitting ϕ10
PM : With female thread Rc 1/4
PMH : With female thread NPT 1/4
PP : Plate (without fitting)

Port isolator Note2
Blank: No port isolator
XSP: Port isolator (1(P) port)
XSR: Port isolator (3(R2), 5(R1) ports)
XSA: Port isolator (1(P), 3(R2), and 5(R1) ports)

Mounting specification Note3
Blank: Without DIN bracket
DN: With DIN bracket

Back pressure prevention valve (2 pieces for split type, with dedicated gasket)

F 15 Z - E2

Valve size
15: 15 mm [0.591 in.] width

Individual air supply and exhaust spacer (Spacer for plug-in type, gasket, exhaust valve, and 2 mounting screws)

F 15 ZX - □

Valve size
15: 15 mm [0.591 in.] width

※For details, see p.27.

Specification
XPP6: Single intake spacer (with ϕ6 joint for F15)
XPP8: Single intake spacer (with ϕ8 joint for F15)
XPR6: Single exhaust spacer (with ϕ6 joint for F15)
XPR8: Single exhaust spacer (with ϕ8 joint for F15)

Muffler

KM - J □

Fitting size
6: Outer diameter ϕ6 (for piping block)
8: Outer diameter ϕ8 (for piping block)
10: Outer diameter ϕ10 (for piping block)
(Sales unit: Set of 10 mufflers)

DIN rail

DIN - □ (Unit:1)

Rail length
125: 125mm [4.921 in.]
⋮ (25 mm [0.984 in.] pitch)
525: 525mm [20.669 in.]

Notes: 1.The fitting of the piping block is included. One set of two connecting rods is also included for a LN and TN type manifold.
2. Port isolator selection only available when the piping block name is TK.
3. Only when the manifold type is LK or RN.

F15 Series Easy Assembly Type Manifold Plug-in Type Additional Parts Order Codes

Connecting rod (1 set of 2)

F 15 ZX - □ - □

Valve size
15: 15 mm [0.591 in.] width

Number of units
01 ～ **20**: When type for valve base (RV) is selected
01: When type for left side piping block (RH) is selected
01: When type for intermediate piping block (RC) is selected

Specification
RV: For valve base
RH: For left piping block
RC: For intermediate piping block

Wiring block assembly (1 set)

FZX - □ - □

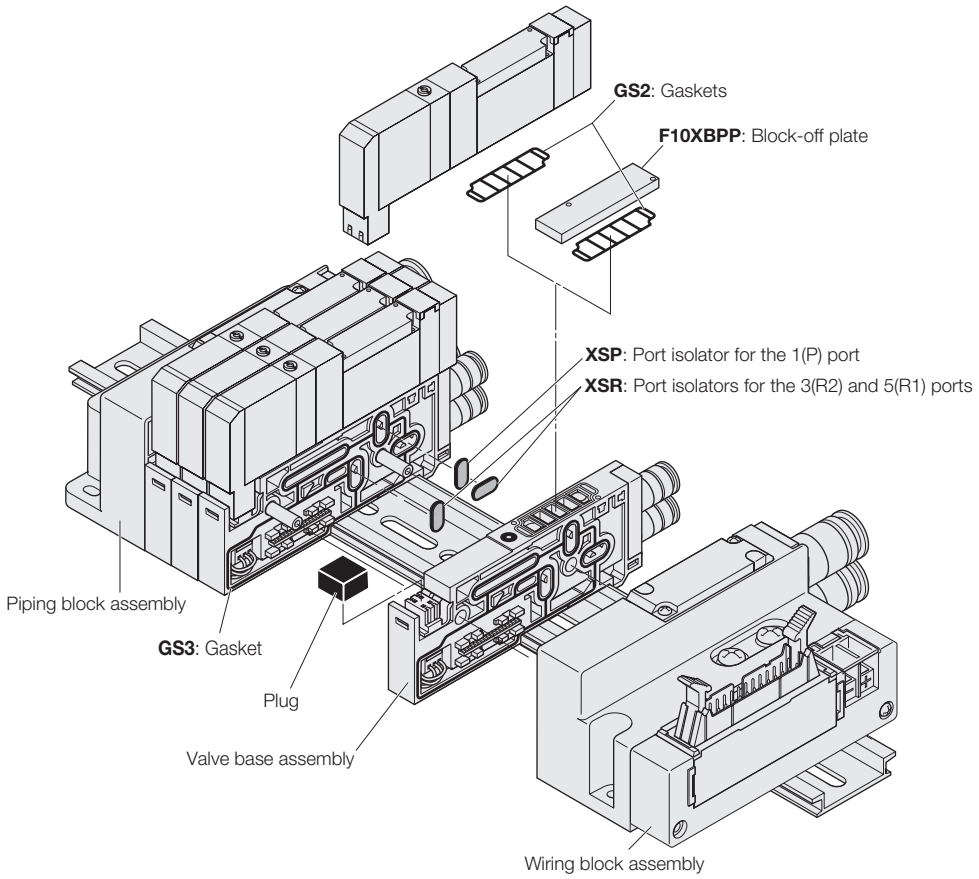
Common specification
Blank: Positive common
CM: Negative common

Wiring specification
F100 : Flat cable connector (DC specification)
F101 : Flat cable connector (DC specification)
F200 : Flat cable connector (DC specification)
F201 : Flat cable connector (DC specification)
F260 : Flat cable connector (DC specification)
D250 : D-sub connector (M2.6 screws)
D251 : D-sub connector (M2.6 screws)
F100N : Flat cable connector (DC specification), without power terminal
F101N : Flat cable connector (DC specification), without power terminal
F200N : Flat cable connector (DC specification), without power terminal
F201N : Flat cable connector (DC specification), without power terminal
F260N : Flat cable connector (DC specification), without power terminal
D250N : D-sub connector, without power terminal (M2.6 screws)
D251N : D-sub connector, without power terminal (M2.6 screws)
D250U : D-sub connector, (4-40UNC screws)
D250NU : D-sub connector, without power terminal (4-40UNC screws)
D251U : D-sub connector, (4-40UNC screws)
D251NU : D-sub connector, without power terminal (4-40UNC screws)
D370NU : D-sub connector, without power terminal (4-40UNC screws)
T200 : Terminal block, for left-side mounting

※ The above flat cable connectors and D-sub connectors can be switched between the top and side type.

■ Table for maximum number of valve units by wiring specification

Wiring specification	Max. outputs	Maximum number of units ※ Wiring connection specification: Packed wiring (Blank)	Maximum number of units ※ Wiring connection specification: Double wiring (-W)
F100 □ Flat cable (10P)	8	Varies depending on the number of mounted single solenoids, double solenoids, and block-off plates. The number of controlled solenoids should be designated as the maximum number of outputs or less. D370NU is a maxmum of 20 units.	4 units
F101 □ Flat cable (10P)	8		4 units
F200 □ Flat cable (20P)	16		8 units
F201 □ Flat cable (20P)	16		8 units
F260 □ Flat cable (26P)	20		10 units
D250 □ D-sub connector (25P)	16		8 units
D251 □ D-sub connector (25P)	20		10 units
D370NU D-sub connector (37P)	32		16 units
T200 Terminal block (19 terminals)	18		9 units



※ Illustration shows the F10 series.

Manifold Order Code Example

(12 units of F15 Series)

F15M12XPL-J6T-F201-DR DC24V

stn.1 ～ 8 F15T1-A1-J5 DC24V
stn.9 F15ZX-PJ6-TK
stn.10 ～ 12 F15T1-A1-J5 DC24V

Note:This order code example has no relationship to the illustration above.

Precautions for Order Codes

● **Orders for valves only**

Place orders from “Single Valve Unit Order Codes” on p. 64.
However, **Blank**, **A2□, F3, F4□, F5, F6, F4A□, F4B□, F5A, F5B, F6A, or F6B** cannot be selected for the valve outlet type. For the wiring specification, **Blank** is the only selection.

● **Wiring connection specification**

Blank (packed wiring): Wiring is made in accordance with the mounted valve specifications.
-W (double wiring): Wiring is always for the double solenoid, regardless of the specifications of the mounted valve.

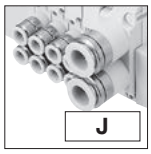
Caution

Single or double can also be selected as the block-off plate wiring specification separately from the manifold (valve) wiring specification.

F15 Series Easy Assembly Type Manifold Serial Transmission Type Order Codes

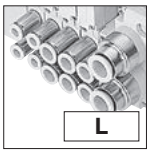
■ Manifold outlet specification

With dual use fitting blocks (base piping type)



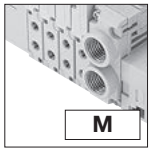
Outlet port fitting
F15: ϕ6/ϕ8

With selectable fittings (base piping type)



Outlet port should be selected in accordance with the manifold fitting specification.

With female thread blocks (base piping type)



Outlet port female thread
F15: Rc1/8

With plates (direct piping type)

■ Pilot specification

Blank
Internal pilot manifold

G
External pilot manifold

■ Piping block specification (air supply and exhaust)

Fitting block
-JR: Dual use fitting, right-side mounting
-JL: Dual use fitting, left-side mounting
-JD: Dual use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ8, ϕ10

Female thread block
-MR: Female thread, right-side mounting
-ML: Female thread, left-side mounting
-MD: Female thread, both-side mounting
Female thread size (1(P), 3, 5(R) ports), Rc1/4

Female thread block
-MRH: Female thread, right-side mounting[Note13]
-MLH: Female thread, left-side mounting[Note13]
-MDH: Female thread,both-side mounting[Note13]
Female thread size (1(P), 3, 5(R) ports), NPT1/4

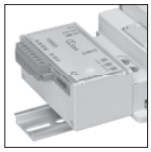
Single use fitting block
-J5R: Single use fitting, right-side mounting
-J5L: Single use fitting, left-side mounting
-J5D: Single use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ8

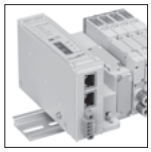
-J6R: Single use fitting, right-side mounting
-J6L: Single use fitting, left-side mounting
-J6D: Single use fitting, both-side mounting
Fitting size (1(P), 3, 5(R) ports), ϕ10

Intermediate piping block
-JT: Dual use fitting, both-side mounting, intermediate piping block ϕ8, ϕ10
-J5T: Single use fitting, both-side mounting, intermediate piping block ϕ8
-J6T: Single use fitting, both-side mounting, intermediate piping block ϕ10
-MT: Female thread, both-side mounting, intermediate piping block Rc1/4
-MTH: Female thread, both-side mounting, intermediate piping block NPT1/4[Note13]

■ Transmission block specification

※ All transmission blocks are left-side mounting
※ These are the serial transmission block specifications compatible with each system.





●Block on the right photo is the case of B7A Link Terminal.
For details, see p. 41-44.

Integrated type
-A1: For OMRON CompoBus/S (16 outputs)
-B1: For CC-Link (16 outputs)[Note2]
-B3: For CC-Link (32 outputs)[Note2]
-D1: For DeviceNet (16 outputs)
-D3: For DeviceNet (32 outputs)
-H1: For CompoNet (16 outputs)
-K1: For EtherCAT (16 outputs)
-K3: For EtherCAT (32 outputs)
-M1: For EtherNet/IP (16 outputs)[Note2]
-M3: For EtherNet/IP (32 outputs)[Note2]

■ Wiring connection specification

Blank
Packed wiring: Specification of the valve base is always in accordance with the mounted valve specifications.

-W
Double wiring: Valve base is always double wiring, regardless of the specifications of the mounted valve.

■ Mounting specification

Blank
Direct mounting

-DN
With DIN bracket (no rail)

-DR
With DIN bracket, with rail
Caution: For information on rails assembled and shipped, see pages 137 and 138.

■ Valve size

F15 Standard type

F15L Low-current type

■ Valve size

F15M 15 mm [0.591 in.] width

Valve size	Valve units	Manifold type	Manifold outlet specification	Pilot specification	Piping block specification	Transmission block specification	Wiring connection specification	Mounting specification
Manifold type								
Base piping type	F15M	XS (※Rc)	J M	Blank G	-JR -J5R -JT -JL -J5L -J5T -JD -J5D -J6T -MR -J6R -MT -ML -J6L -MD -J6D	-A1 -D3 -M1[Note2] -B1[Note2] -H1 -M3[Note2] -B3[Note2] -K1 -D1 -K3	Blank -W	Blank -DN -DR
Base piping type selectable fitting	F15M	XS (※Rc) XSH (※NPT) Only L or Blank is available in the inch female thread specification and the manifold outlet specification.	L	Blank G	-JR -MLH[Note13] -J6D -JL -MDH[Note13] -JT -JD -J5R -J5T -MR -J5L -J6T -ML -J5D -MT -MD -J6R -MTH[Note13] -MRH[Note13] -J6L	-A1 -D3 -M1[Note2] -B1[Note2] -H1 -M3[Note2] -B3[Note2] -K1 -D1 -K3	Blank -W	Blank -DN -DR
Direct piping type	F15M	XS (※Rc) XSH (※NPT) Only L or Blank is available in the inch female thread specification and the manifold outlet specification.	Blank	Blank G	-JR -MLH[Note13] -J6D -JL -MDH[Note13] -JT -JD -J5R -J5T -MR -J5L -J6T -ML -J5D -MT -MD -J6R -MTH[Note13] -MRH[Note13] -J6L	-A1 -D3 -M1[Note2] -B1[Note2] -H1 -M3[Note2] -B3[Note2] -K1 -D1 -K3	Blank -W	Blank -DN -DR

Valve units: 2 . . . □ Note1

Notes 1. To determine the maximum number of units, see the table for maximum number of valve units by transmission block specification, on p. 114.
2. Complies with the CE marking regulation.

■ Valve specification

T0 : 2-position, for single solenoid only
T1 : 2-position, single solenoid specification
T2 : 2-position, double solenoid specification
T3 : 3-position, closed center
T4 : 3-position, exhaust center
T5 : 3-position, pressure center
TA : Tandem 3-port (NC and NC)Note10
TB : Tandem 3-port (NO and NO)Note10
TC : Tandem 3-port (NC and NO)Note10

■ Operation type

Blank
Internal pilot typeNote8

G
External pilot typeNote9
(for positive pressure)
※ No vacuum valve can be mounted.

■ Manual override

Manual override button

Manual override leverNote6

■ Valve outlet type

-A1 With plateNote4 (base piping type)

5-port specification

-FJ	With dual use fitting block **F15**: ϕ6, ϕ8 (direct piping type)
-FJ5	With single use fitting block **F15**: ϕ6 (direct piping type)
-FJ6	With single use fitting block **F15**: ϕ8 (direct piping type)
-FM	With female thread block **F15**: Rc1/8 (direct piping type)
-FMH	With female thread blockNote13 **F15**: NPT1/8 (direct piping type)

3-port specification

-FJ5A	With single use fitting block, normally closed (NC) (direct piping type) **F15**: ϕ6
-FJ5B	With single use fitting block, normally open (NO) (direct piping type) **F15**: ϕ6
-FJ6A	With single use fitting block, normally closed (NC) (direct piping type) **F15**: ϕ8
-FJ6B	With single use fitting block, normally open (NO) (direct piping type) **F15**: ϕ8
-FMA	With female thread block, normally closed (NC) (direct piping type) **F15**: Rc1/8
-FMAH	With female thread block, normally closed (NC)Note13 (direct piping type) **F15**: NPT1/8
-FMB	With female thread block, normally open (NO) (direct piping type) **F15**: Rc1/8
-FMBH	With female thread block, normally open (NO)Note13 (direct piping type) **F15**: NPT1/8

Caution: The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.

■ Manifold fitting specification

5-port specification

-J5	With single use fitting block **F15**: ϕ6 (base piping type)
-J6	With single use fitting block **F15**: ϕ8 (base piping type)
-M	With female thread block **F15**: Rc1/8 (base piping type)
-MH	With female thread blockNote13 **F15**: NPT1/8 (base piping type)

3-port specification

-J5A	With single use fitting block, normally closed (NC) (base piping type) **F15**: ϕ6
-J5B	With single use fitting block, normally open (NO) (base piping type) **F15**: ϕ6
-J6A	With single use fitting block, normally closed (NC) (base piping type) **F15**: ϕ8
-J6B	With single use fitting block, normally open (NO) (base piping type) **F15**: ϕ8
-MA	With female thread block, normally closed (NC) (base piping type) **F15**: Rc1/8
-MAH	With female thread block, normally closed (NC)Note13 (base piping type) **F15**: NPT1/8
-MB	With female thread block, normally open (NO) (base piping type) **F15**: Rc1/8
-MBH	With female thread block, normally open (NO)Note13 (base piping type) **F15**: NPT1/8

Caution: The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.

■ Port isolator

Blank: No port isolator
-XSP: For 1 (P) portNote7
-XSR: For 3(R2), 5(R1) portsNote7
-XSA:For 1(P), 3(R2), and 5(R1)Note7

■ Back pressure prevention valve

Blank
No back pressure prevention valve

-E2
With back pressure prevention valveNote11

■ Individual air supply and exhaust spacer

Blank: Without spacer
-XPP6 : Single intake spacer (with ϕ6 joint for F15)
-XPP8 : Single intake spacer (with ϕ8 joint for F15)
-XPR6 : Single exhaust spacer (with ϕ6 joint for F15)
-XPR8 : Single exhaust spacer (with ϕ8 joint for F15)
For details, see p.27.

■ Block-off plate wiring specification

Blank: Double wiring
-S: Single wiring

Station	Valve Size	Valve specification	Operation type	Manual override	Valve outlet type	Manifold fitting specification	Back pressure prevention valve	Individual air supply and exhaust spacer	Port isolator	Voltage / Block-off plate wiring specification
Mounting valve model										
stn. 1 ⋮ stn.□ Note3	F15 F15L	T0 T1 T2 T3 T4 T5 TA Note10 TB Note10 TC Note10	Blank Note8 G Note9	Blank -R Note6	-A1 Note4		Blank -E2 Note11	Blank -XPP6 -XPP8 -XPR6 -XPR8	Blank -XSP Note7 -XSR Note7 -XSA Note7	DC24V / Blank -S
	F15	XBPP (for block-off plate)Note3								
	When selecting the intermediate piping block, see page 112 when specifying it.									
stn. 1 ⋮ stn.□ Note3	F15 F15L	T0 T1 T2 T3 T4 T5 TA Note10 TB Note10 TC Note10	Blank Note8 G Note9	Blank -R Note6	-A1 Note4	-J5 Note12 -J6 Note12 -M Note12 -MH Note13 -J5A Note12 -J5B Note12 -J6A Note12 -J6B Note12 -MA Note12 -MAH Note13 -MB Note12 -MBH Note13	Blank -E2 Note11	Blank -XPP6 -XPP8 -XPR6 -XPR8	Blank -XSP Note7 -XSR Note7 -XSA Note7	DC24V / Blank -S
	F15	XBPP (for block-off plate)Note3								
	When selecting the intermediate piping block, see page 112 when specifying it.									
stn. 1 ⋮ stn.□ Note3	F15 F15L	T0 T1 T2 T3 T4 T5 TA Note10 TB Note10 TC Note10	Blank Note8 G Note9	Blank -R Note6	-FJ Note12 -FJ5 Note12 -FJ6 Note12 -FM Note12 -FMH Note13 -FJ5A Note12 -FJ5B Note12 -FJ6A Note12 -FJ6B Note12 -FMA Note12 -FMAH Note13 -FMB Note12 -FMBH Note13		Blank -E2 Note11	Blank -XPP6 -XPP8 -XPR6 -XPR8	Blank -XSP Note7 -XSR Note7 -XSA Note7	DC24V / Blank -S
	F15	XBPP (for block-off plate)Note5								
	When selecting the intermediate piping block, see page 112 when specifying it.									

Notes: 3. Valve mounting location is from the left, with the solenoid on top, and the 4(A), 2(B) ports side in front.
4. When selecting **J**, **M**, or **L** (base piping type) for the manifold outlet specifications, always enter **-A1** (with plate) for the valve outlet type.
5. Single or double can also be selected as the block-off plate wiring specification separately from the manifold (valve) wiring specification.
6. When the valve specification is **T1** or **T2**, the manual override lever is placed only on the A side.
7. Port isolators can be installed only when piping blocks are mounted on both sides. In addition, only 1 port isolator can be mounted in 1 manifold for **-XSA**, or 1 each port isolator for **-XSP** and **-XSR** for a total of 2 locations. When shipping, the designated port isolators are mounted between the designated station and the station to its immediate left (the next smaller stn. No.).
8. Cannot be mounted on the external pilot manifold.
9. Cannot be mounted on the internal pilot manifold.
10. Not available in external pilot type.
11. Not available with the individual exhaust spacer.
12. The 3-port specifications are only available in the valve specification **T0**, **T1**, and **T2**.
13. Can be selected only when the manifold type is **XSH**.

F15 Series Easy Assembly Type Manifold Serial Transmission Type Order Codes

Intermediate piping block

(When mounting an intermediate piping block to the manifold, complete the following type and specify the station specified on page 111.)

F 15 ZX□ - □ - TK - □

Valve size
15: 15 mm
[0.591 in.] width

Pilot specification
Blank: Internal pilot
G: External pilot type

Piping block Specification[Note]
PJ : With dual use fitting ϕ8, ϕ10
PJ5 : With single use fitting ϕ8
PJ6 : With single use fitting ϕ10
PM : With female thread Rc 1/4
PMH : With female thread NPT 1/4

Manifold type
TK: Plug-in type, for serial transmission

Port isolator
Blank : Without split
XSP : Port isolator (1(P) port)
XSR : Port isolator (3(R2), 5(R1) ports)
XSA : Port isolator (1(P), 3(R2), and 5(R1) ports)

Note:See the following table for combinations of intermediate piping block port specifications and manifold piping block specifications.

Manifold piping specifications	Intermediate piping block
JT	PJ
J5T	PJ5
J6T	PJ6
MT	PM
MTH	PMH

F15 Series Easy Assembly Type Manifold Serial Transmission Type Additional Parts Order Codes

Parts for manifold

F 15 ZX - □

Valve size
15: 15 mm [0.591 in.] width

Parts content
GS2 : Gasket (gasket and exhaust valve)
GS3 : Gasket (valve base side)
XSP : Port isolator (for 1(P) port)
XSR : Port isolator (for 3(R2), 5(R1) ports)
XSA : Port isolator (for 1(P), 3(R2), 5(R1) ports)
DN : DIN mounting bracket (one set of two)

Block-off plate (block-off plate, 2 mounting screws, and plug)

F 15 XBPP

Valve size
15: 15 mm [0.591 in.] width

Back pressure prevention valve (2 units for split type, with dedicated gasket)

F 15 Z - E2

Valve size
15: 15 mm [0.591 in.] width

Individual air supply and exhaust spacer (Spacer for plug-in type, gasket, exhaust valve, and 2 mounting screws)

F 15 ZX - □

Valve size
15: 15 mm [0.591 in.] width

※For details, see p.27.

Specifications
XPP6: Single intake spacer (with ϕ6 joint for F15)
XPP8: Single intake spacer (with ϕ8 joint for F15)
XPR6: Single exhaust spacer (with ϕ6 joint for F15)
XPR8: Single exhaust spacer (with ϕ8 joint for F15)

Valve base assembly (valve base, gasket, and 2 connecting rods for adding)

F 15 ZX - □ - □ - □ ※For use with both internal pilot and external pilot

Valve size
15: 15 mm [0.591 in.] width

Wiring specification
S : For single wiring
W : For double wiring

Common specification
Blank: For positive common

Piping specification
VJ : Dual use fitting valve base
VJ5 : Single use fitting valve base F15: ϕ6
VJ6 : Single diameter fitting valve base F15: ϕ8
VJ5A : 3-port specification normally closed, single use fitting valve base F15: ϕ6
VJ5B : 3-port specification normally open, single use fitting valve base F15: ϕ6
VJ6A : 3-port specification normally closed, single use fitting valve base F15: ϕ8
VJ6B : 3-port specification normally open, single use fitting valve base F15: ϕ8
VM : Female thread valve base F15: Rc1/8
VMA : 3-port specification normally closed, female thread valve base F15: Rc1/8
VMB : 3-port specification normally open, female thread valve base F15: Rc1/8
VMH : Female thread valve base F15: NPT1/8
VMAH : 3-port specification normally closed, female thread valve base F15: NPT1/8
VMBH : 3-port specification normally open, female thread valve base F15: NPT1/8
VP : Valve base plate

Muffler

KM - J □

Fitting size
6: Outer diameter ϕ6 (for piping block)
8: Outer diameter ϕ8 (for piping block)
10: Outer diameter ϕ10 (for piping block)
(Sales unit: Set of 10 mufflers)

Connecting rod (1 set of 2)

F 15 ZX - □ - □

Valve size
15: 15 mm [0.591 in.] width

Specification
RV : For valve base
RH: For left piping block
RC: For intermediate piping block

Number of units
01 ～ **20**: When type for valve base (RV) is selected
01 : When type for left side piping block (RH) is selected
01 : When type for intermediate piping block (RC) is selected

Piping block assembly (plug-in)

F 15 ZX□ - □ - □ - □ - □

Valve size
15: 15 mm [0.591 in.] width

Pilot specification
Blank: Internal pilot
G: External pilot

Piping block Specification Note1
PJ : With dual use fitting ϕ8, ϕ10
PJ5: With single use fitting ϕ8
PJ6: With single use fitting ϕ10
PM : With female thread Rc 1/4
PMH : With female thread NPT 1/4
PP : Plate (without fitting)

Manifold type
LK : Left side piping block (for plug-in type) with circuit board
RN : Right piping block, without circuit board
TK : Intermediate piping block (for plug-in type) with circuit board

Port isolator Note2
Blank: No port isolator
XSP: Port isolator (1(P) port)
XSR: Port isolator (3(R2), 5(R1) ports)
XSA: Port isolator (1(P), 3(R2), and 5(R1) ports)

Mounting specification Note3
Blank: Without DIN bracket
DN: With DIN bracket

DIN rail

DIN - □ (Unit:1)

Rail length
125: 125mm [4.921 in.]
⋮ (25 mm [0.984 in.] pitch)
525: 525mm [20.669 in.]

Notes: 1. The fitting of the piping block is included. One set of two connecting rods is also included for a LN and TN type manifold.
2. Port isolator selection only available when the piping block name is TK.
3. Only when the manifold type is LK or RN.

Serial transmission block (single unit)

YS6 □ (dedicated for manifold mounting)

Transmission block specification
B1: For CC-Link (16 outputs)
B3: For CC-Link (32 outputs)
D1: For DeviceNet (16 outputs)
D3: For DeviceNet (32 outputs)
H1: For CompoNet (16 outputs)

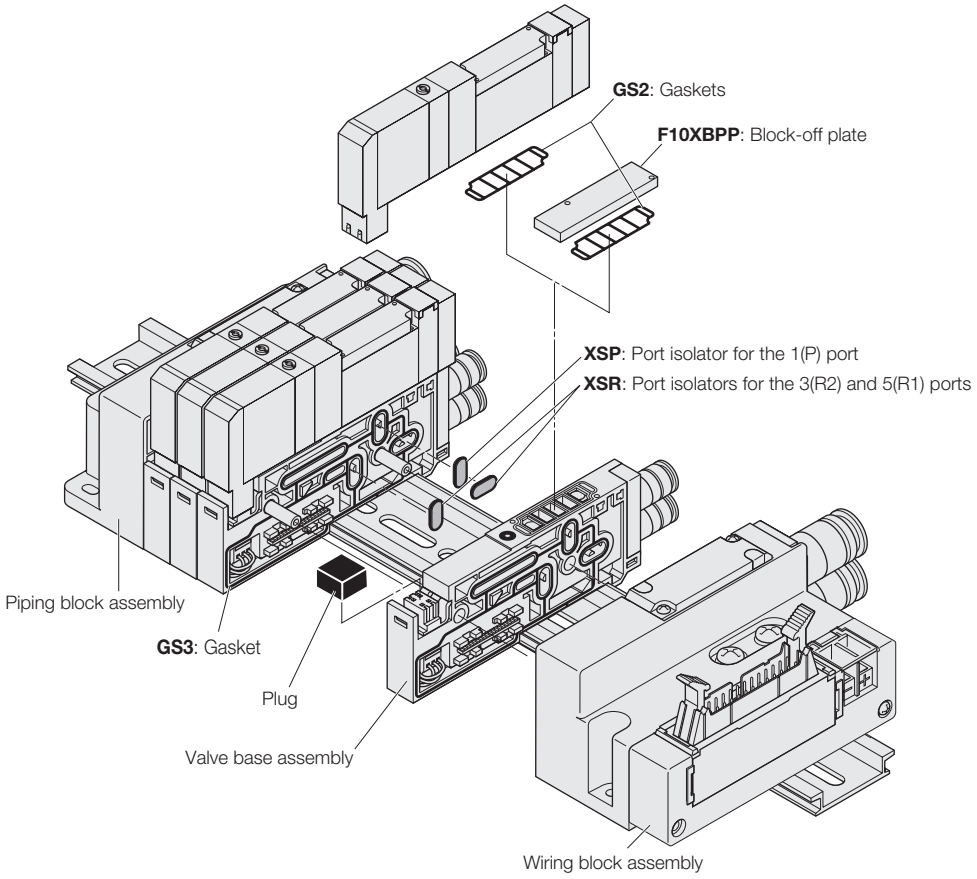
YS7 □ L (dedicated for manifold mounting)

Wiring position
L: Left-side mounting

Transmission block specification
K1: For EtherCAT (16 outputs)
K3: For EtherCAT (32 outputs)
M1: For EtherNet/IP (16 outputs)
M3: For EtherNet/IP (32 outputs)

■ Table for maximum number of valve units by transmission block specification

		Maximum number of units	
		Wiring connection specification	
Transmission block specifications	Max. outputs	Packed wiring (Blank)	Double wiring (**-W**)
-B1: For CC-Link (16 outputs)	16	Varies depending on the number of mounted single solenoids, double solenoids, and block-off plates. The number of controlled solenoids should be designated as the maximum number of outputs or less. **-B3**, **-D3**, **-K3**, and **-M3** are a maximum of 20 units.	8 units
-B3: For CC-Link (32 outputs)	32		16 units
-D1: For DeviceNet (16 outputs)	16		8 units
-D3: For DeviceNet (32 outputs)	32		16 units
-H1: For CompoNet (16 outputs)	16		8 units
-K1: For EtherCAT (16 outputs)	16		8 units
-K3: For EtherCAT (32 outputs)	32		16 units
-M1: For EtherNet/IP (16 outputs)	16		8 units
-M3: For EtherNet/IP (32 outputs)	32		16 units



*The illustration is of the F10 Series.

Manifold Order Code Example

(8 units of F15 Series)

F15M8XSL-J5R-B1-W

stn.1 ~ 5 F15T0-A1-J5 DC24V
stn.6 ~ 7 F15T2-A1-J6 DC24V
stn.8 F15XBPP-J6

Note: This order code example has no relationship to the illustration above.

Precautions for Order Codes

● **Orders for valves only**

Place orders from "Single Valve Unit Order Codes" on p. 64.
However, **Blank**, **A2□, F3, F4□, F5, F6, F4A□, F4B□, F5A, F5B, F6A, or F6B** cannot be selected for the valve outlet type. For the wiring specification, Blank is the only selection.

● **Wiring connection specification**

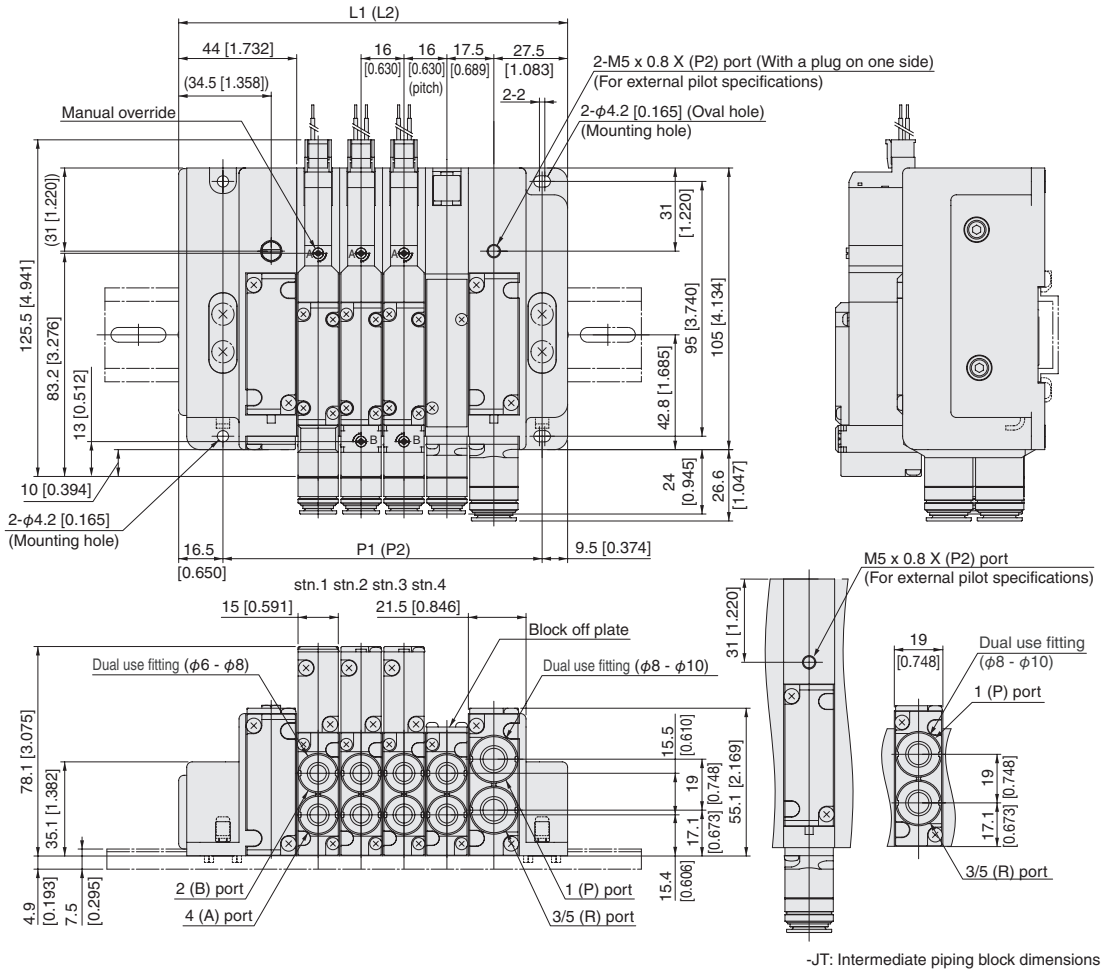
Blank (packed wiring): Wiring is made in accordance with the mounted valve specifications.
-W (double wiring): Wiring is always for the double solenoid, regardless of the specifications of the mounted valve.

Caution

Single or double can also be selected as the block-off plate wiring specification separately from the manifold (valve) wiring specification.

F15M [Number of units] XN J/M/L [Pilot specifications] - [Piping block specifications] (Base piping type)

With manifold outlet port dual use fitting block
S type plug connector



-JT: Intermediate piping block dimensions

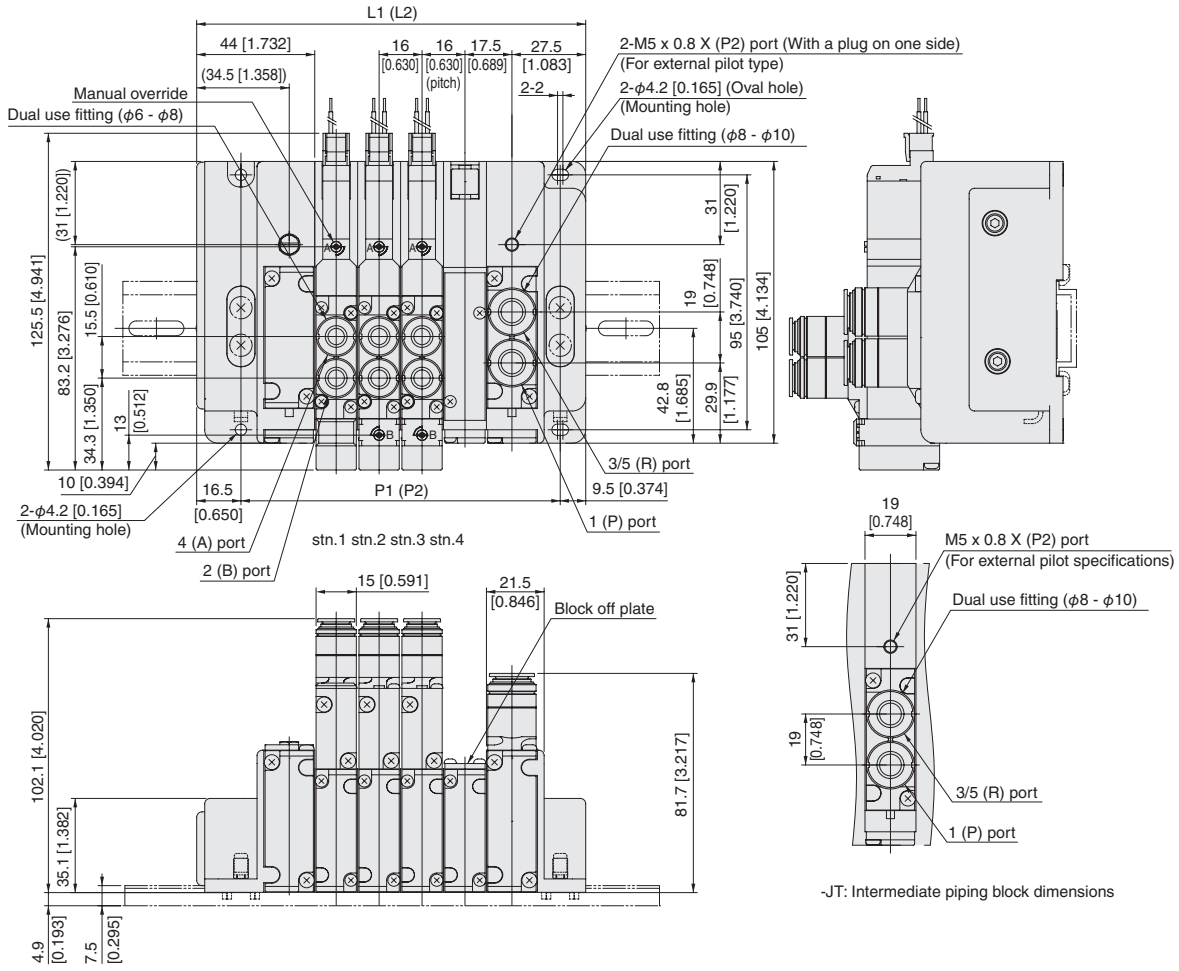
Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2*	P2*	Length of DIN rail Note
2	113 [4.449]	87 [3.425]	175 [6.890]	-	-	-
3	129 [5.079]	103 [4.055]	175 [6.890]	148 [5.827]	122 [4.803]	175 [6.890]
4	145 [5.709]	119 [4.685]	200 [7.874]	164 [6.457]	138 [5.433]	200 [7.874]
5	161 [6.339]	135 [5.315]	225 [8.858]	180 [7.087]	154 [6.063]	225 [8.858]
6	177 [6.969]	151 [5.945]	225 [8.858]	196 [7.717]	170 [6.693]	225 [8.858]
7	193 [7.598]	167 [6.575]	250 [9.843]	212 [8.346]	186 [7.323]	250 [9.843]
8	209 [8.228]	183 [7.205]	250 [9.843]	228 [8.976]	202 [7.953]	275 [10.827]
9	225 [8.858]	199 [7.835]	275 [10.827]	244 [9.606]	218 [8.583]	275 [10.827]
10	241 [9.488]	215 [8.465]	300 [11.811]	260 [10.236]	234 [9.213]	300 [11.811]
11	257 [10.118]	231 [9.094]	300 [11.811]	276 [10.866]	250 [9.843]	325 [12.795]
12	273 [10.748]	247 [9.724]	325 [12.795]	292 [11.496]	266 [10.472]	325 [12.795]
13	289 [11.378]	263 [10.354]	350 [13.780]	308 [12.126]	282 [11.102]	350 [13.780]
14	305 [12.008]	279 [10.984]	350 [13.780]	324 [12.756]	298 [11.732]	350 [13.780]
15	321 [12.638]	295 [11.614]	375 [14.764]	340 [13.386]	314 [12.362]	375 [14.764]
16	337 [13.268]	311 [12.244]	400 [15.748]	356 [14.016]	330 [12.992]	400 [15.748]
17	353 [13.898]	327 [12.874]	400 [15.748]	372 [14.646]	346 [13.622]	400 [15.748]
18	369 [14.528]	343 [13.504]	425 [16.732]	388 [15.276]	362 [14.252]	425 [16.732]
19	385 [15.157]	359 [14.134]	450 [17.717]	404 [15.906]	378 [14.882]	450 [17.717]
20	401 [15.787]	375 [14.764]	450 [17.717]	420 [16.535]	394 [15.512]	450 [17.717]
21	-	-	-	436 [17.165]	410 [16.142]	475 [18.701]

Note: When the J□T or MT piping block specifications is selected.

F15M Number of units XN Pilot specifications - Piping block specifications (Direct piping type)

With manifold outlet port dual use fitting block
S type plug connector



-JT: Intermediate piping block dimensions

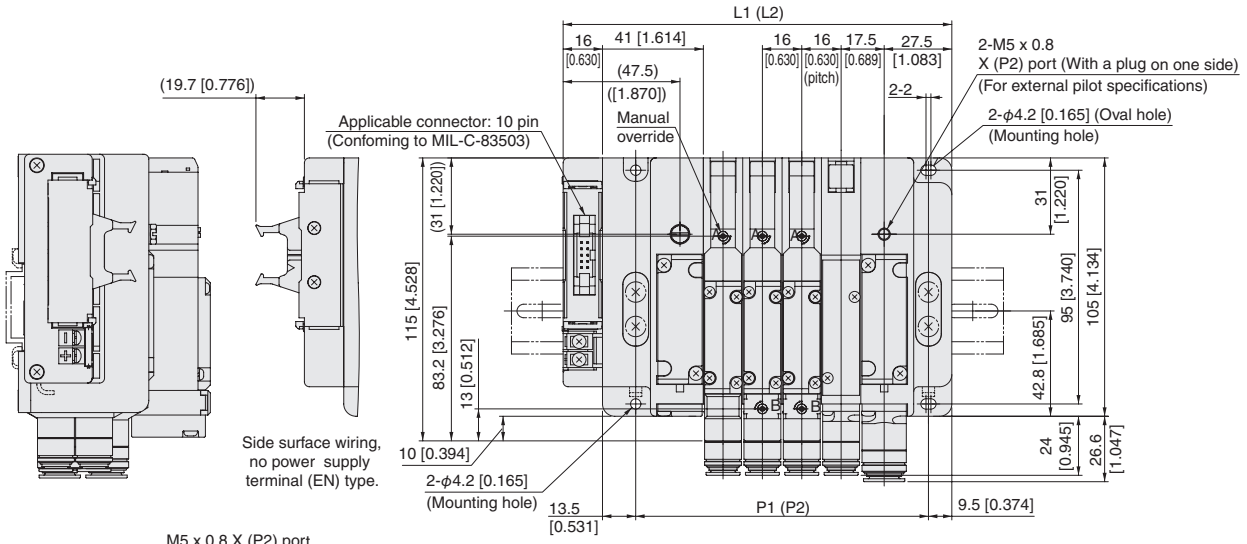
Unit dimensions

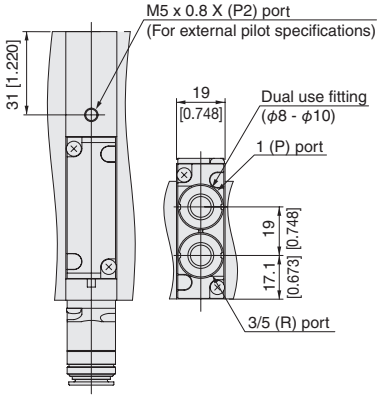
Number of units	L1	P1	Length of DIN rail	L2*	P2*	Length of DIN rail Note
2	113 [4.449]	87 [3.425]	175 [6.890]	-	-	-
3	129 [5.079]	103 [4.055]	175 [6.890]	148 [5.827]	122 [4.803]	175 [6.890]
4	145 [5.709]	119 [4.685]	200 [7.874]	164 [6.457]	138 [5.433]	200 [7.874]
5	161 [6.339]	135 [5.315]	225 [8.858]	180 [7.087]	154 [6.063]	225 [8.858]
6	177 [6.969]	151 [5.945]	225 [8.858]	196 [7.717]	170 [6.693]	225 [8.858]
7	193 [7.598]	167 [6.575]	250 [9.843]	212 [8.346]	186 [7.323]	250 [9.843]
8	209 [8.228]	183 [7.205]	250 [9.843]	228 [8.976]	202 [7.953]	275 [10.827]
9	225 [8.858]	199 [7.835]	275 [10.827]	244 [9.606]	218 [8.583]	275 [10.827]
10	241 [9.488]	215 [8.465]	300 [11.811]	260 [10.236]	234 [9.213]	300 [11.811]
11	257 [10.118]	231 [9.094]	300 [11.811]	276 [10.866]	250 [9.843]	325 [12.795]
12	273 [10.748]	247 [9.724]	325 [12.795]	292 [11.496]	266 [10.472]	325 [12.795]
13	289 [11.378]	263 [10.354]	350 [13.780]	308 [12.126]	282 [11.102]	350 [13.780]
14	305 [12.008]	279 [10.984]	350 [13.780]	324 [12.756]	298 [11.732]	350 [13.780]
15	321 [12.638]	295 [11.614]	375 [14.764]	340 [13.386]	314 [12.362]	375 [14.764]
16	337 [13.268]	311 [12.244]	400 [15.748]	356 [14.016]	330 [12.992]	400 [15.748]
17	353 [13.898]	327 [12.874]	400 [15.748]	372 [14.646]	346 [13.622]	400 [15.748]
18	369 [14.528]	343 [13.504]	425 [16.732]	388 [15.276]	362 [14.252]	425 [16.732]
19	385 [15.157]	359 [14.134]	450 [17.717]	404 [15.906]	378 [14.882]	450 [17.717]
20	401 [15.787]	375 [14.764]	450 [17.717]	420 [16.535]	394 [15.512]	450 [17.717]
21	-	-	-	436 [17.165]	410 [16.142]	475 [18.701]

Note: When the J□T or MT piping block specifications is selected.

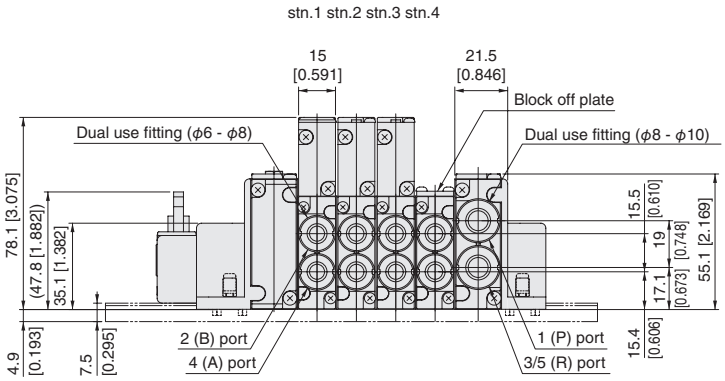
F15M [Number of units] XP J/M/L [Pilot specifications] (Base piping specifications)

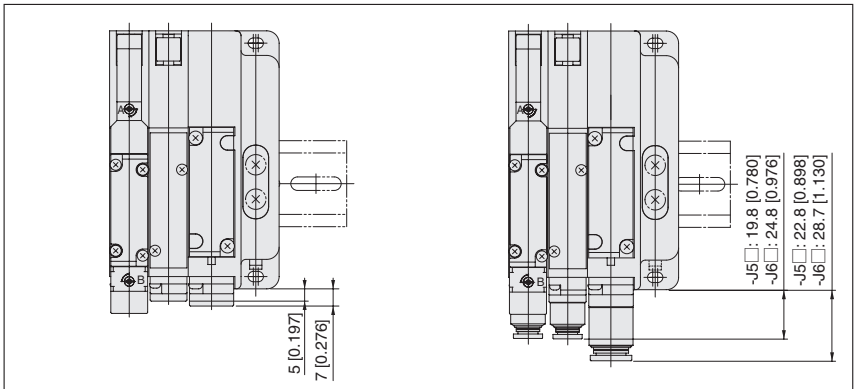
With manifold outlet port dual use fitting block
Flat cable connector 10-pin specifications





-JT: Intermediate piping block dimensions

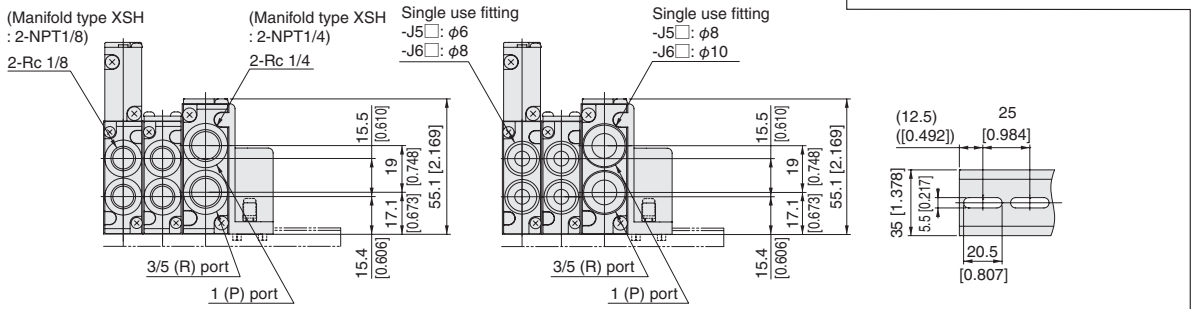




Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2*	P2*	Length of DIN rail Note
2	126 [4.961]	87 [3.425]	175 [6.890]	-	-	-
3	142 [5.591]	103 [4.055]	200 [7.874]	161 [6.339]	122 [4.803]	200 [7.874]
4	158 [6.220]	119 [4.685]	200 [7.874]	177 [6.969]	138 [5.433]	225 [8.858]
5	174 [6.850]	135 [5.315]	225 [8.858]	193 [7.598]	154 [6.063]	225 [8.858]
6	190 [7.480]	151 [5.945]	250 [9.843]	209 [8.228]	170 [6.693]	250 [9.843]
7	206 [8.110]	167 [6.575]	250 [9.843]	225 [8.858]	186 [7.323]	250 [9.843]
8	222 [8.740]	183 [7.205]	275 [10.827]	241 [9.488]	202 [7.953]	275 [10.827]
9	-	-	-	257 [10.118]	218 [8.583]	300 [11.811]

Note: When the J□T or MT piping block specifications is selected.



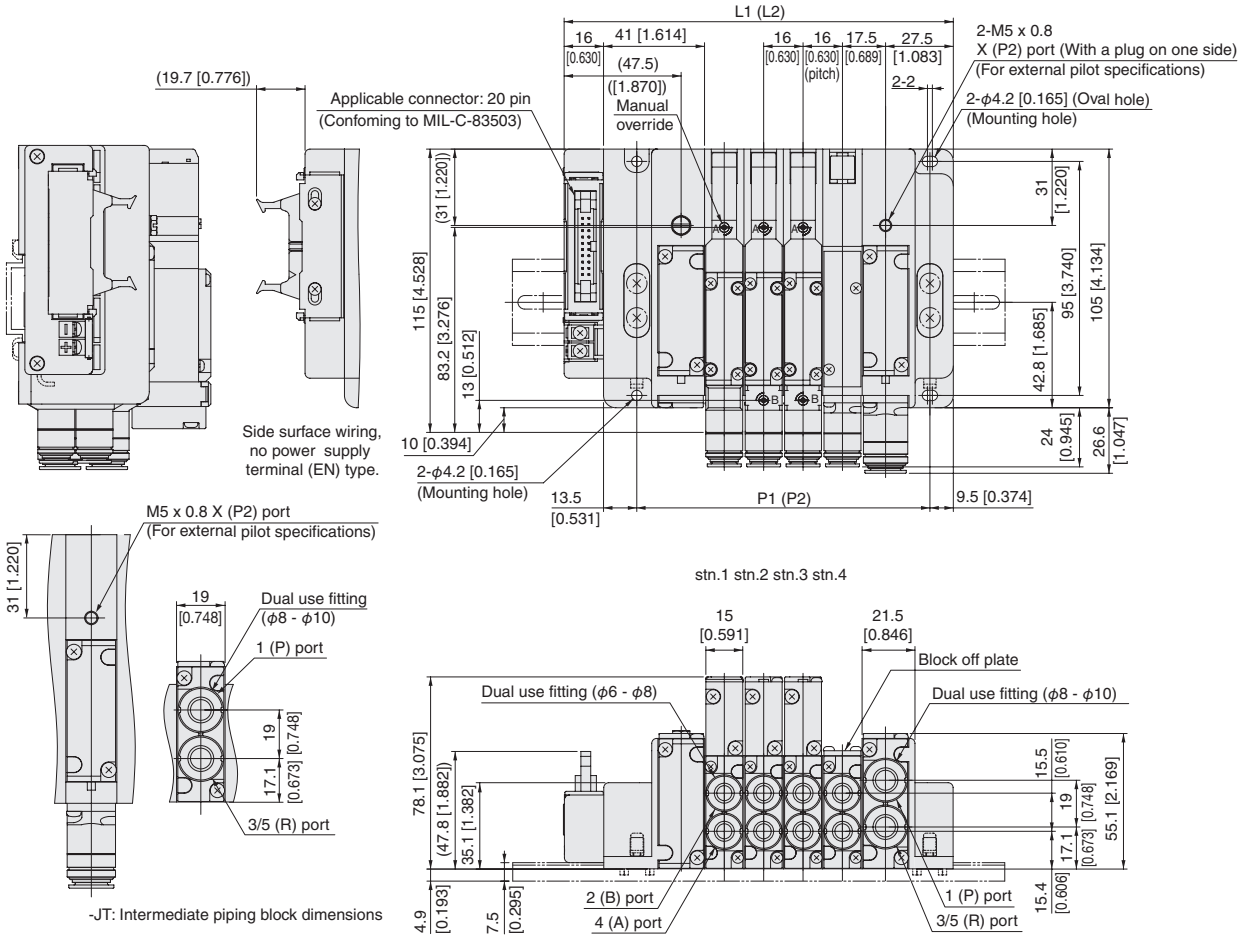
Female screw specifications

Single use fitting specifications

DIN rail mounting hole dimensions

F15M [Number of units] XP [J / M / L] [Pilot specifications] (Base piping specifications)

With manifold outlet port dual use fitting block
Flat cable connector 20-pin specifications



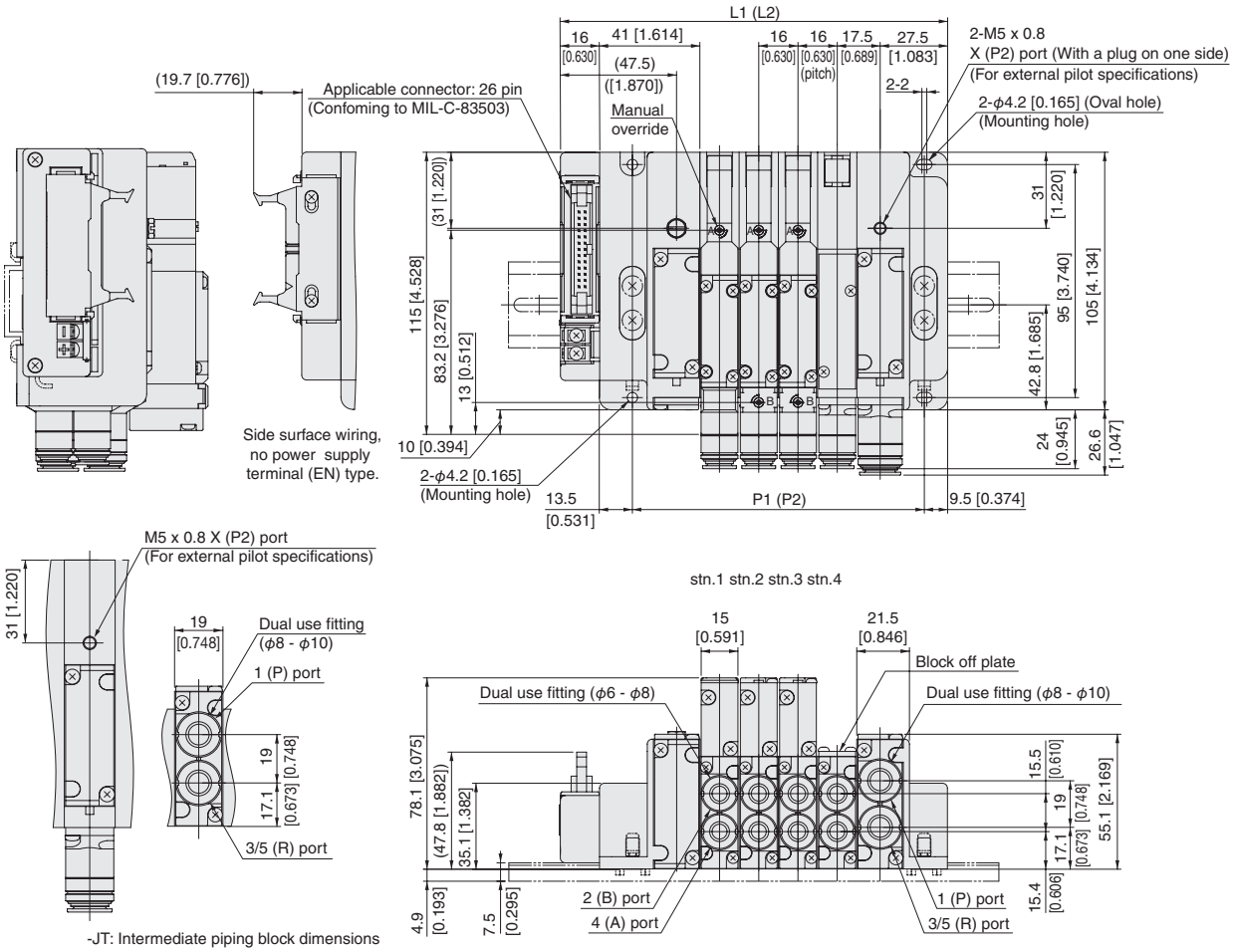
Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2*	P2*	Length of DIN rail Note
2	126 [4.961]	87 [3.425]	175 [6.890]	-	-	-
3	142 [5.591]	103 [4.055]	200 [7.874]	161 [6.339]	122 [4.803]	200 [7.874]
4	158 [6.220]	119 [4.685]	200 [7.874]	177 [6.969]	138 [5.433]	225 [8.858]
5	174 [6.850]	135 [5.315]	225 [8.858]	193 [7.598]	154 [6.063]	225 [8.858]
6	190 [7.480]	151 [5.945]	250 [9.843]	209 [8.228]	170 [6.693]	250 [9.843]
7	206 [8.110]	167 [6.575]	250 [9.843]	225 [8.858]	186 [7.323]	250 [9.843]
8	222 [8.740]	183 [7.205]	275 [10.827]	241 [9.488]	202 [7.953]	275 [10.827]
9	238 [9.370]	199 [7.835]	300 [11.811]	257 [10.118]	218 [8.583]	300 [11.811]
10	254 [10.000]	215 [8.465]	300 [11.811]	273 [10.748]	234 [9.213]	300 [11.811]
11	270 [10.630]	231 [9.094]	325 [12.795]	289 [11.378]	250 [9.843]	325 [12.795]
12	286 [11.260]	247 [9.724]	350 [13.780]	305 [12.008]	266 [10.472]	350 [13.780]
13	302 [11.890]	263 [10.354]	350 [13.780]	321 [12.638]	282 [11.102]	350 [13.780]
14	318 [12.520]	279 [10.984]	375 [14.764]	337 [13.268]	298 [11.732]	375 [14.764]
15	334 [13.150]	295 [11.614]	375 [14.764]	353 [13.898]	314 [12.362]	400 [15.748]
16	350 [13.780]	311 [12.244]	400 [15.748]	369 [14.528]	330 [12.992]	400 [15.748]
17	-	-	-	385 [15.157]	346 [13.622]	425 [16.732]

Note: When the J□T or MT piping block specifications is selected.

F15M [Number of units] XP J/M/L [Pilot specifications] (Base piping specifications)

With manifold outlet port dual use fitting block
Flat cable connector 26-pin specifications



-JT: Intermediate piping block dimensions

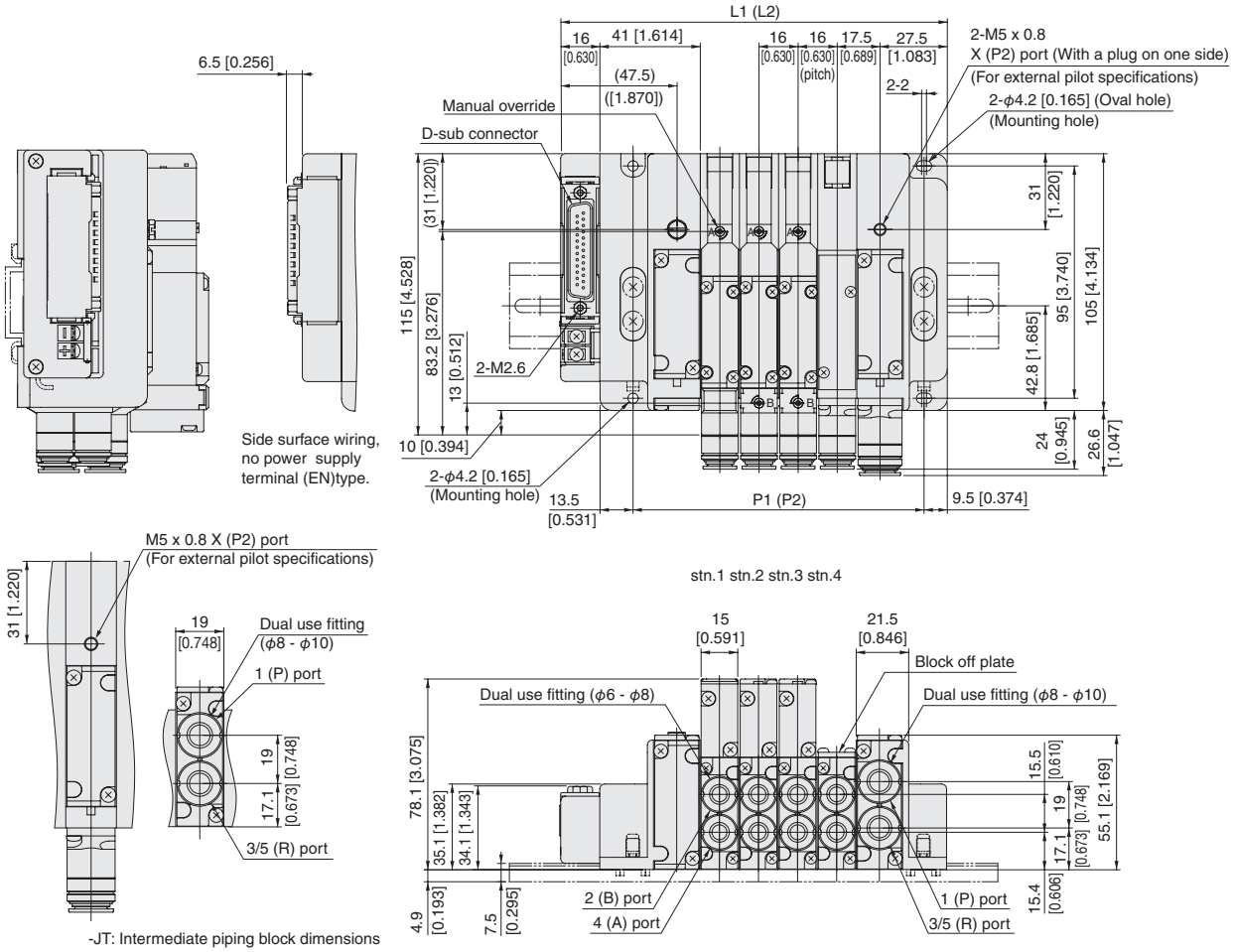
Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2*	P2*	Length of DIN rail Note
2	126 [4.961]	87 [3.425]	175 [6.890]	-	-	-
3	142 [5.591]	103 [4.055]	200 [7.874]	161 [6.339]	122 [4.803]	200 [7.874]
4	158 [6.220]	119 [4.685]	200 [7.874]	177 [6.969]	138 [5.433]	225 [8.858]
5	174 [6.850]	135 [5.315]	225 [8.858]	193 [7.598]	154 [6.063]	225 [8.858]
6	190 [7.480]	151 [5.945]	250 [9.843]	209 [8.228]	170 [6.693]	250 [9.843]
7	206 [8.110]	167 [6.575]	250 [9.843]	225 [8.858]	186 [7.323]	250 [9.843]
8	222 [8.740]	183 [7.205]	275 [10.827]	241 [9.488]	202 [7.953]	275 [10.827]
9	238 [9.370]	199 [7.835]	300 [11.811]	257 [10.118]	218 [8.583]	300 [11.811]
10	254 [10.000]	215 [8.465]	300 [11.811]	273 [10.748]	234 [9.213]	300 [11.811]
11	270 [10.630]	231 [9.094]	325 [12.795]	289 [11.378]	250 [9.843]	325 [12.795]
12	286 [11.260]	247 [9.724]	350 [13.780]	305 [12.008]	266 [10.472]	350 [13.780]
13	302 [11.890]	263 [10.354]	350 [13.780]	321 [12.638]	282 [11.102]	350 [13.780]
14	318 [12.520]	279 [10.984]	375 [14.764]	337 [13.268]	298 [11.732]	375 [14.764]
15	334 [13.150]	295 [11.614]	375 [14.764]	353 [13.898]	314 [12.362]	400 [15.748]
16	350 [13.780]	311 [12.244]	400 [15.748]	369 [14.528]	330 [12.992]	400 [15.748]
17	366 [14.409]	327 [12.874]	425 [16.732]	385 [15.157]	346 [13.622]	425 [16.732]
18	382 [15.039]	343 [13.504]	425 [16.732]	401 [15.787]	362 [14.252]	450 [17.717]
19	398 [15.669]	359 [14.134]	450 [17.717]	417 [16.417]	378 [14.882]	450 [17.717]
20	414 [16.299]	375 [14.764]	475 [18.701]	433 [17.047]	394 [15.512]	475 [18.701]
21	-	-	-	449 [17.677]	410 [16.142]	475 [18.701]

Note: When the J□T or MT piping block specifications is selected.

F15M [Number of units] XP J/M/L [Pilot specifications] (Base piping specifications)

With manifold outlet port dual use fitting block
Flat cable connector 26-pin specifications



-JT: Intermediate piping block dimensions

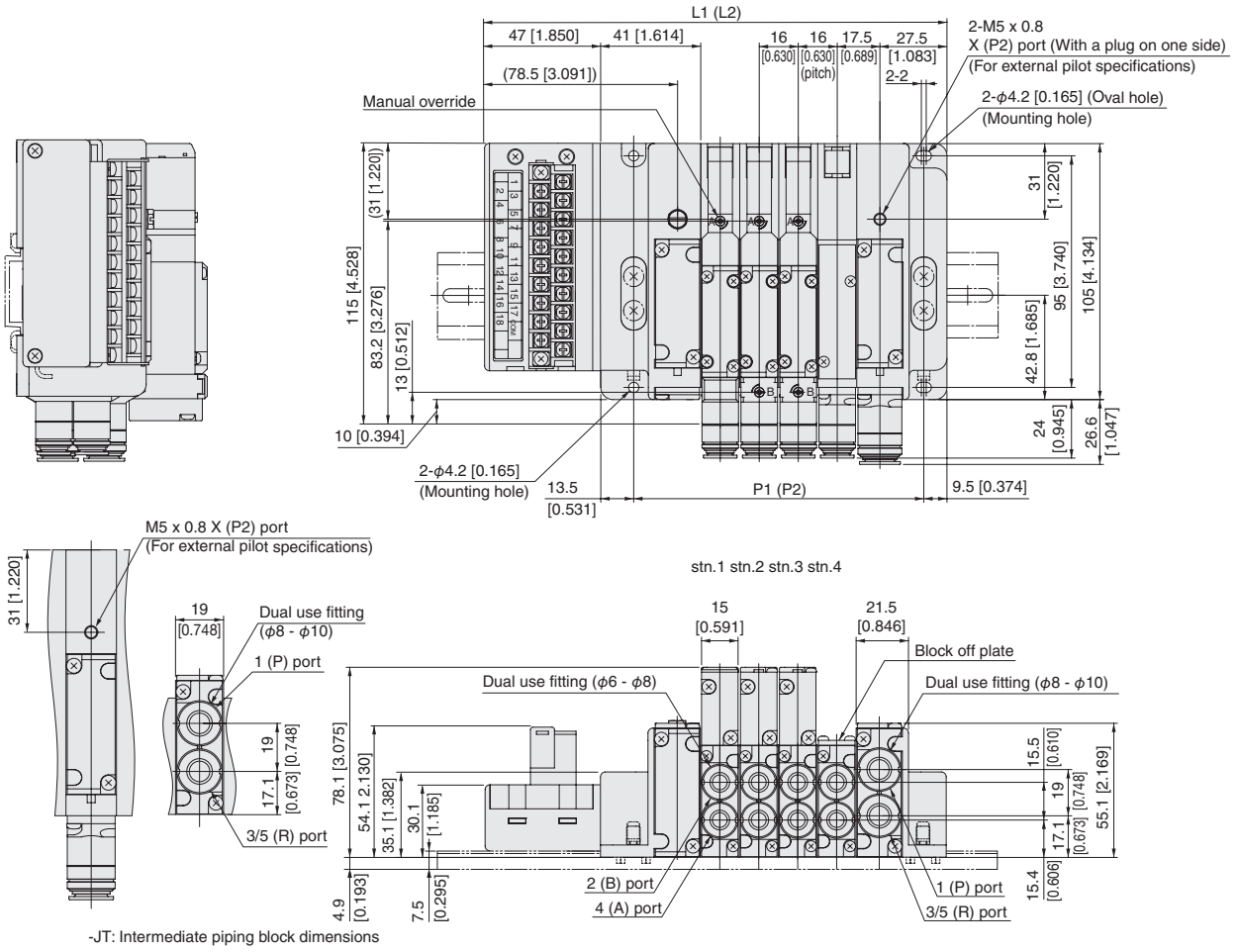
Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2*	P2*	Length of DIN rail Note
2	126 [4.961]	87 [3.425]	175 [6.890]	-	-	-
3	142 [5.591]	103 [4.055]	200 [7.874]	161 [6.339]	122 [4.803]	200 [7.874]
4	158 [6.220]	119 [4.685]	200 [7.874]	177 [6.969]	138 [5.433]	225 [8.858]
5	174 [6.850]	135 [5.315]	225 [8.858]	193 [7.598]	154 [6.063]	225 [8.858]
6	190 [7.480]	151 [5.945]	250 [9.843]	209 [8.228]	170 [6.693]	250 [9.843]
7	206 [8.110]	167 [6.575]	250 [9.843]	225 [8.858]	186 [7.323]	250 [9.843]
8	222 [8.740]	183 [7.205]	275 [10.827]	241 [9.488]	202 [7.953]	275 [10.827]
9	238 [9.370]	199 [7.835]	300 [11.811]	257 [10.118]	218 [8.583]	300 [11.811]
10	254 [10.000]	215 [8.465]	300 [11.811]	273 [10.748]	234 [9.213]	300 [11.811]
11	270 [10.630]	231 [9.094]	325 [12.795]	289 [11.378]	250 [9.843]	325 [12.795]
12	286 [11.260]	247 [9.724]	350 [13.780]	305 [12.008]	266 [10.472]	350 [13.780]
13	302 [11.890]	263 [10.354]	350 [13.780]	321 [12.638]	282 [11.102]	350 [13.780]
14	318 [12.520]	279 [10.984]	375 [14.764]	337 [13.268]	298 [11.732]	375 [14.764]
15	334 [13.150]	295 [11.614]	375 [14.764]	353 [13.898]	314 [12.362]	400 [15.748]
16	350 [13.780]	311 [12.244]	400 [15.748]	369 [14.528]	330 [12.992]	400 [15.748]
17	366 [14.409]	327 [12.874]	425 [16.732]	385 [15.157]	346 [13.622]	425 [16.732]
18	382 [15.039]	343 [13.504]	425 [16.732]	401 [15.787]	362 [14.252]	450 [17.717]
19	398 [15.669]	359 [14.134]	450 [17.717]	417 [16.417]	378 [14.882]	450 [17.717]
20	414 [16.299]	375 [14.764]	475 [18.701]	433 [17.047]	394 [15.512]	475 [18.701]
21	-	-	-	449 [17.677]	410 [16.142]	475 [18.701]

Note: When the J□T or MT piping block specifications is selected.

F15M [Number of units] XP J/M/L [Pilot specifications] (Base piping specifications)

With manifold outlet port dual use fitting blocks
Terminal block type



-JT: Intermediate piping block dimensions

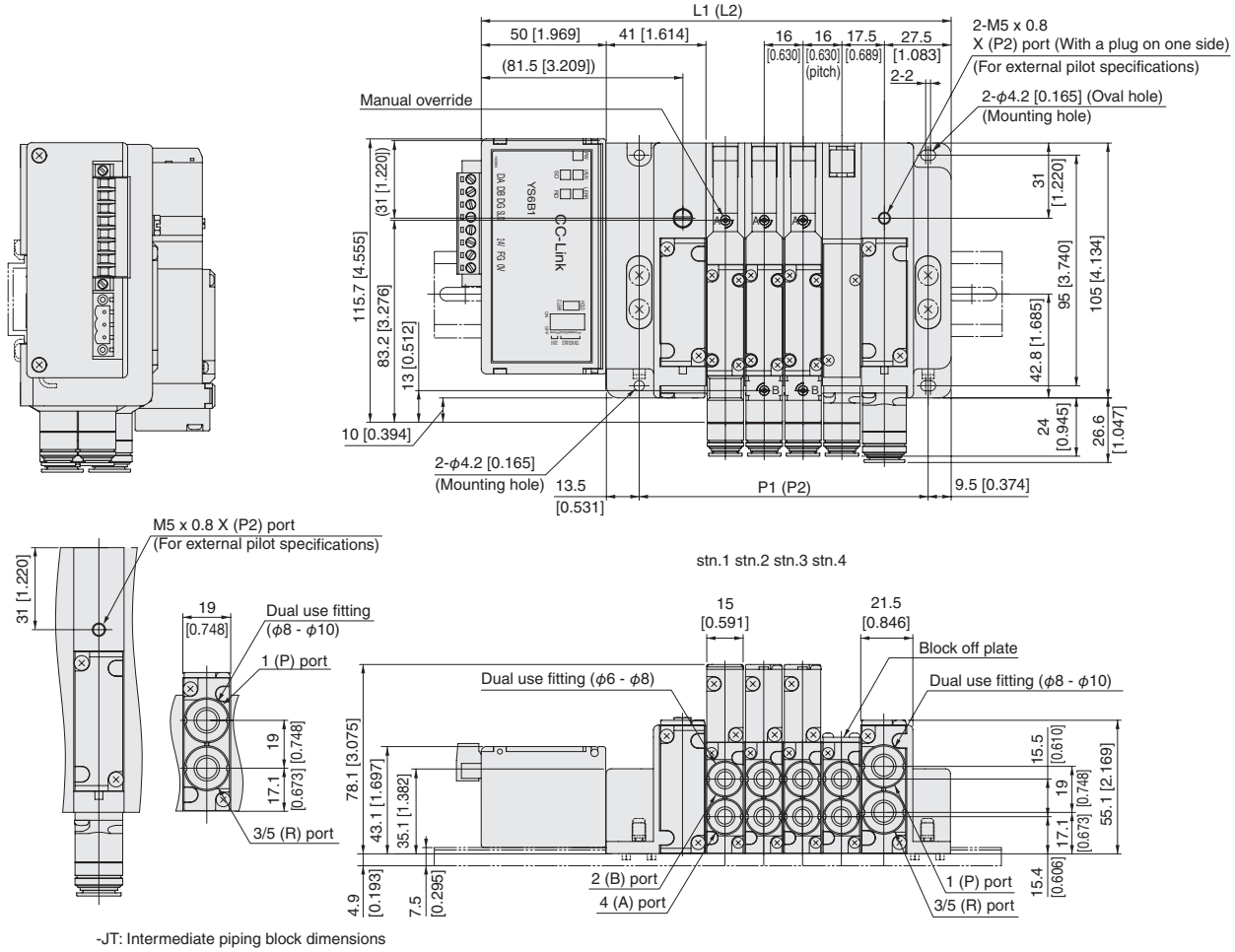
Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2*	P2*	Length of DIN rail Note
2	157 [6.181]	87 [3.425]	200 [7.874]	-	-	-
3	173 [6.811]	103 [4.055]	225 [8.858]	192 [7.559]	122 [4.803]	225 [8.858]
4	189 [7.441]	119 [4.685]	250 [9.843]	208 [8.189]	138 [5.433]	250 [9.843]
5	205 [8.071]	135 [5.315]	250 [9.843]	224 [8.819]	154 [6.063]	250 [9.843]
6	221 [8.701]	151 [5.945]	275 [10.827]	240 [9.449]	170 [6.693]	275 [10.827]
7	237 [9.331]	167 [6.575]	300 [11.811]	256 [10.079]	186 [7.323]	300 [11.811]
8	253 [9.961]	183 [7.205]	300 [11.811]	272 [10.709]	202 [7.953]	300 [11.811]
9	269 [10.591]	199 [7.835]	325 [12.795]	288 [11.339]	218 [8.583]	325 [12.795]
10	285 [11.220]	215 [8.465]	350 [13.780]	304 [11.969]	234 [9.213]	350 [13.780]
11	301 [11.850]	231 [9.094]	350 [13.780]	320 [12.598]	250 [9.843]	350 [13.780]
12	317 [12.480]	247 [9.724]	375 [14.764]	336 [13.228]	266 [10.472]	375 [14.764]
13	333 [13.110]	263 [10.354]	375 [14.764]	352 [13.858]	282 [11.102]	400 [15.748]
14	349 [13.740]	279 [10.984]	400 [15.748]	368 [14.488]	298 [11.732]	400 [15.748]
15	365 [14.370]	295 [11.614]	425 [16.732]	384 [15.118]	314 [12.362]	425 [16.732]
16	381 [15.000]	311 [12.244]	425 [16.732]	400 [15.748]	330 [12.992]	425 [16.732]
17	397 [15.630]	327 [12.874]	450 [17.717]	416 [16.378]	346 [13.622]	450 [17.717]
18	413 [16.260]	343 [13.504]	475 [18.701]	432 [17.008]	362 [14.252]	475 [18.701]
19	-	-	-	448 [17.638]	378 [14.882]	475 [18.701]

Note: When the J□T or MT piping block specifications is selected.

F15M [Number of units] XS J/M/L [Pilot specifications] (Base piping specifications)

With manifold outlet port dual use fitting block
(Stand alone serial transmission block compatible minifold) *The figure shows CC-Link.



-JT: Intermediate piping block dimensions

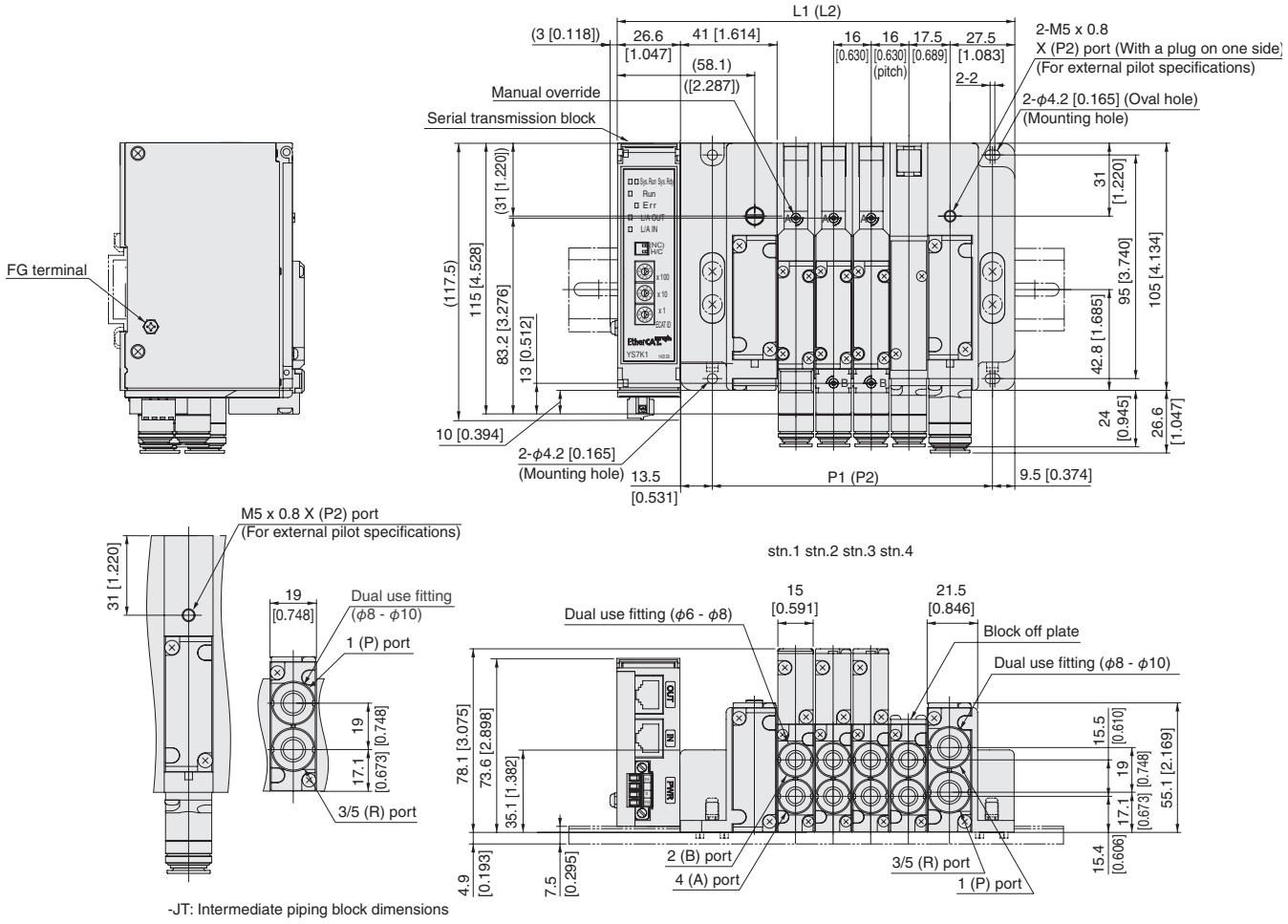
Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2*	P2*	Length of DIN rail Note
2	160 [6.299]	87 [3.425]	225 [8.858]	-	-	-
3	176 [6.929]	103 [4.055]	225 [8.858]	195 [7.677]	122 [4.803]	225 [8.858]
4	192 [7.559]	119 [4.685]	250 [9.843]	211 [8.307]	138 [5.433]	250 [9.843]
5	208 [8.189]	135 [5.315]	250 [9.843]	227 [8.937]	154 [6.063]	275 [10.827]
6	224 [8.819]	151 [5.945]	275 [10.827]	243 [9.567]	170 [6.693]	275 [10.827]
7	240 [9.449]	167 [6.575]	300 [11.811]	259 [10.197]	186 [7.323]	300 [11.811]
8	256 [10.079]	183 [7.205]	300 [11.811]	275 [10.827]	202 [7.953]	300 [11.811]
9	272 [10.709]	199 [7.835]	325 [12.795]	291 [11.457]	218 [8.583]	325 [12.795]
10	288 [11.339]	215 [8.465]	350 [13.780]	307 [12.087]	234 [9.213]	350 [13.780]
11	304 [11.969]	231 [9.094]	350 [13.780]	323 [12.717]	250 [9.843]	350 [13.780]
12	320 [12.598]	247 [9.724]	375 [14.764]	339 [13.346]	266 [10.472]	375 [14.764]
13	336 [13.228]	263 [10.354]	400 [15.748]	355 [13.976]	282 [11.102]	400 [15.748]
14	352 [13.858]	279 [10.984]	400 [15.748]	371 [14.606]	298 [11.732]	400 [15.748]
15	368 [14.488]	295 [11.614]	425 [16.732]	387 [15.236]	314 [12.362]	425 [16.732]
16	384 [15.118]	311 [12.244]	425 [16.732]	403 [15.866]	330 [12.992]	450 [17.717]
17	400 [15.748]	327 [12.874]	450 [17.717]	419 [16.496]	346 [13.622]	450 [17.717]
18	416 [16.378]	343 [13.504]	475 [18.701]	435 [17.126]	362 [14.252]	475 [18.701]
19	432 [17.008]	359 [14.134]	475 [18.701]	451 [17.756]	378 [14.882]	500 [19.685]
20	448 [17.638]	375 [14.764]	500 [19.685]	467 [18.386]	394 [15.512]	500 [19.685]
21	-	-	-	483 [19.016]	410 [16.142]	525 [20.669]

Note: When the J□T or MT piping block specifications is selected.

F15M [Number of units] XS J/M/L [Pilot specifications] (Base piping specifications)

With manifold outlet port dual use fitting block
<EtherCAT/EtherNet/IP>*The figure shows EtherCat.



-JT: Intermediate piping block dimensions

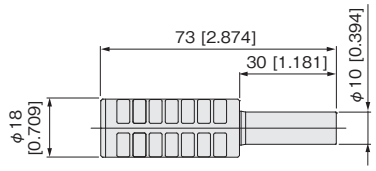
Unit dimensions

Number of units	L1	P1	Length of DIN rail	L2*	P2*	Length of DIN rail Note
2	136.6 [5.378]	87 [3.425]	200 [7.874]	-	-	-
3	152.6 [6.008]	103 [4.055]	200 [7.874]	171.6 [6.756]	122 [4.803]	200 [7.874]
4	168.6 [6.638]	119 [4.685]	225 [8.858]	187.6 [7.386]	138 [5.433]	225 [8.858]
5	184.6 [7.268]	135 [5.315]	250 [9.843]	203.6 [8.016]	154 [6.063]	250 [9.843]
6	200.6 [7.898]	151 [5.945]	250 [9.843]	219.6 [8.646]	170 [6.693]	250 [9.843]
7	216.6 [8.528]	167 [6.575]	275 [10.827]	235.6 [9.276]	186 [7.323]	275 [10.827]
8	232.6 [9.157]	183 [7.205]	275 [10.827]	251.6 [9.906]	202 [7.953]	300 [11.811]
9	248.6 [9.787]	199 [7.835]	300 [11.811]	267.6 [10.535]	218 [8.583]	300 [11.811]
10	264.6 [10.417]	215 [8.465]	325 [12.795]	283.6 [11.165]	234 [9.213]	325 [12.795]
11	280.6 [11.047]	231 [9.094]	325 [12.795]	299.6 [11.795]	250 [9.843]	325 [12.795]
12	296.6 [11.677]	247 [9.724]	350 [13.780]	315.6 [12.425]	266 [10.472]	350 [13.780]
13	312.6 [12.307]	263 [10.354]	375 [14.764]	331.6 [13.055]	282 [11.102]	375 [14.764]
14	328.6 [12.937]	279 [10.984]	375 [14.764]	347.6 [13.685]	298 [11.732]	375 [14.764]
15	344.6 [13.567]	295 [11.614]	400 [15.748]	363.6 [14.315]	314 [12.362]	400 [15.748]
16	360.6 [14.197]	311 [12.244]	425 [16.732]	379.6 [14.945]	330 [12.992]	425 [16.732]
17	376.6 [14.827]	327 [12.874]	425 [16.732]	395.6 [15.575]	346 [13.622]	425 [16.732]
18	392.6 [15.457]	343 [13.504]	450 [17.717]	411.6 [16.205]	362 [14.252]	450 [17.717]
19	408.6 [16.087]	359 [14.134]	450 [17.717]	427.6 [16.835]	378 [14.882]	475 [18.701]
20	424.6 [16.717]	375 [14.764]	475 [18.701]	443.6 [17.465]	394 [15.512]	475 [18.701]
21	-	-	-	459.6 [18.094]	410 [16.142]	500 [19.685]

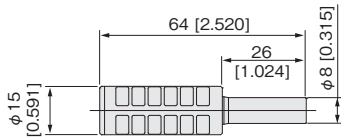
Note: When the J□T or MT piping block specifications is selected.

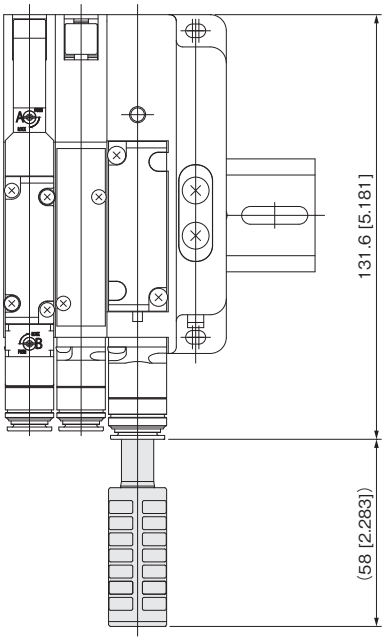
Additional parts (available separately)

●Muffler: **KM-J10** [for both plug-in and non-plug-in]



●Muffler: **KM-J8**





KOGANEI

http://www.koganei.co.jp

Catalog No. BK-A0006

NEW Products

iB Series

iB-Flow

PAT. PEND.

Koganei presents a new actuator controller!

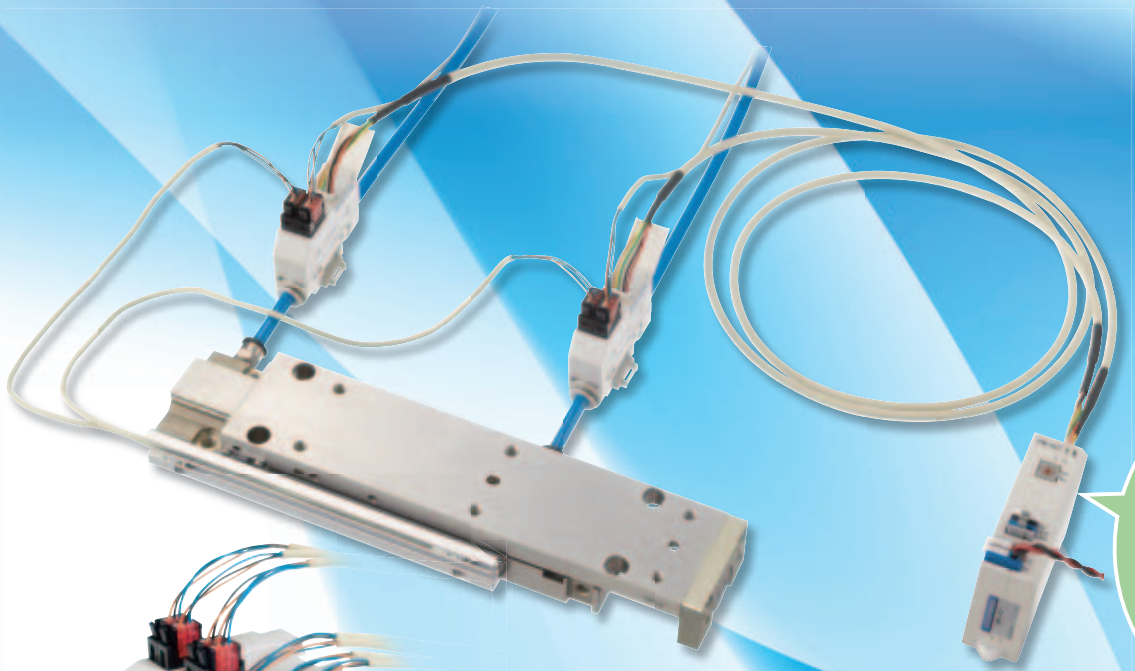
First in the industry

Takt Time Controller

Constantly monitors and corrects cylinder takt time automatically!

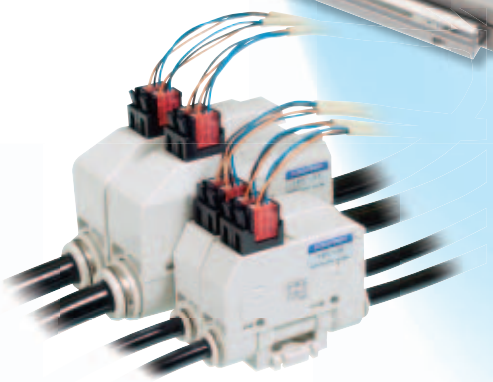
Takt Time Controller New release!

- Air cylinders can operate continuously at set takt time (operation time).
- Avoid equipment stoppage and eliminate adjustments due to variations in takt time.
- Monitoring errors helps predictive maintenance and quality stabilization.



Takt Time Controller

Connects up to 16 units!
<Daisy chain connection>



iB-Flow main unit

Setting device

Koganei Brand

All products are RoHS compliant

iB Series

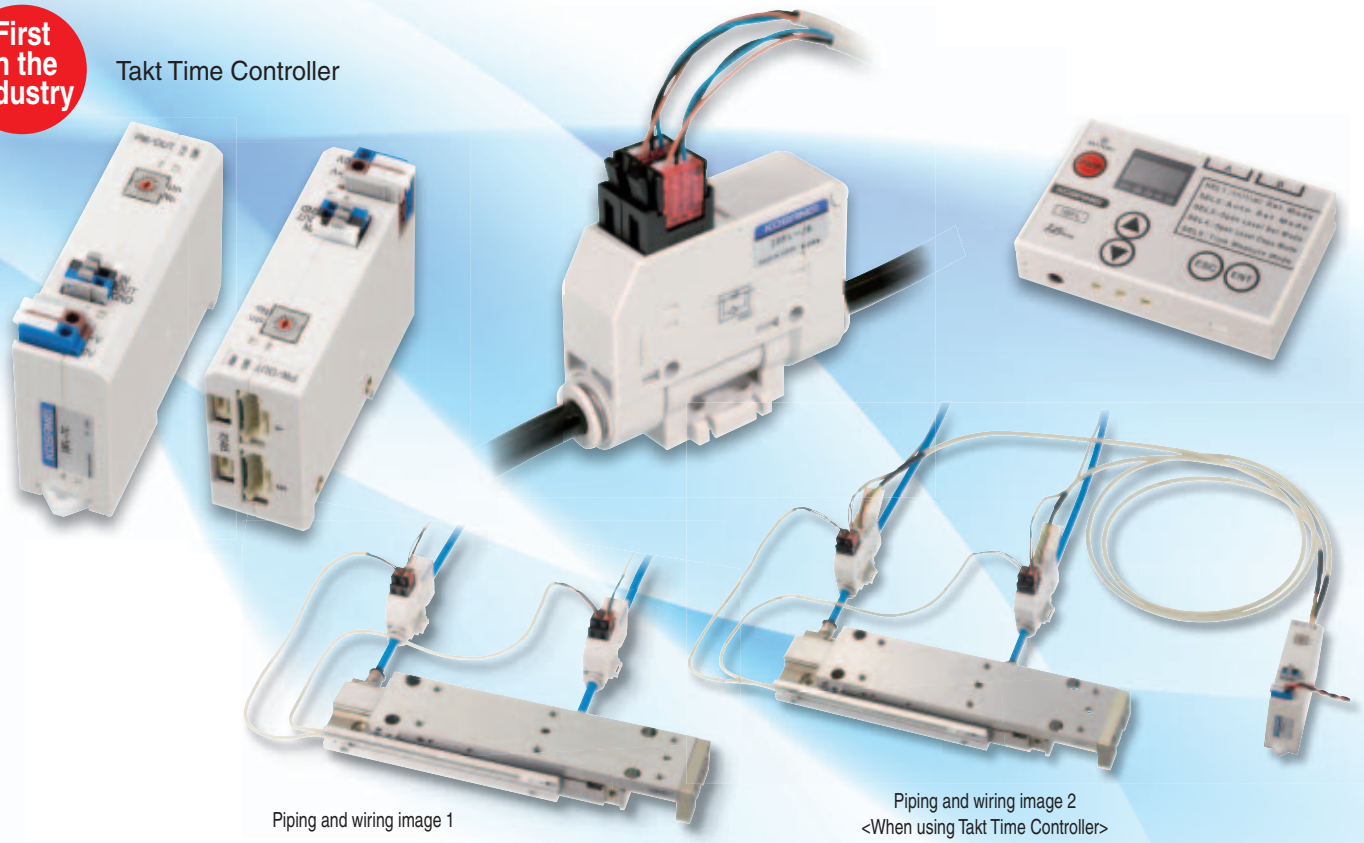
Digital Flow Controller

iB-Flow

PAT. PEND.

First in the industry

Takt Time Controller



Piping and wiring image 1

Piping and wiring image 2
<When using Takt Time Controller>

Automatic takt time corrections

Takt Time Controller constantly monitors and makes corrections.

First step leading to full automation in production lines.

Operation time observable

Digital setting of cylinder takt time (operation time).

Troublesome cylinder operation time adjustment is done automatically.

Safe lock mechanism

Safety mechanism prevents needle from loosening.

Digital needle opening control

Numeric setting of needle opening (0 to 100%).

Change from analog to digital makes flow rate setting easier and accurate.

iB-Flow application example

- Stable and assured predictive maintenance of air cylinder tact time
- Monitor air cylinder operating conditions in real time
- Air cylinder takt time adjustment
- Synchronous operation of multiple cylinders
- Precision flow adjustment during vacuum breaking
- Precision flow adjustment of ionizer
- Precision flow adjustment during air blow
- Precision flow adjustment during pin hole inspection of PET bottles

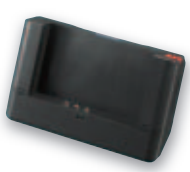
iB-Flow main unit	Takt Time Controller	Setting device	Battery unit

IBFL-J4C, **IBFL-J4** (ϕ4 type)
IBFL-J6C, **IBFL-J6** (ϕ6 type)
IBFL-J8 (ϕ8 type)

IBFL-J10 (ϕ10 type)
IBFL-J12 (ϕ12 type)

IBFL-TC

IBFL-S-□



IBFL-BT-□

Setting device mounted on battery unit.

CAUTION Read the safety precautions on page 7 before using this product.

User issues

- Equipment stoppage because of takt time (operation time) variations
- Time and work required to adjust variations
- Manual speed (flow rate) adjustment takes time
- Loose needle problems due to human and external factors

Cause 1 Variations in sliding resistance of equipment

Cause 2 Fluctuations in pressure

Cause 3 Changes due to aging of the cylinder itself

Real effect Takt time varies!

Problem solved by using iB-Flow main unit and setting device.

(only used when doing settings)

Improve productivity and predictive maintenance by combining iB-Flow main unit and the Takt Time Controller.

iB-Flow main unit | Takt Time Controller | Computer

Air cylinder takt time (operation time) control

Air cylinders can operate continuously at set takt time.

⇒ Takt Time Controller constantly monitors and makes corrections.

Real time monitoring

Cylinder operations can be monitored in real time by using the communication functions.

⇒ Air cylinder operation can be visualized through combination with touch panel.

Predicting the service life of pneumatic equipment

Malfunctions in pneumatic equipment can be predicted by monitoring variations in cylinder takt time (operation time).

⇒ Pinpoint deterioration in pneumatic equipment by monitoring number of corrections and number of errors.

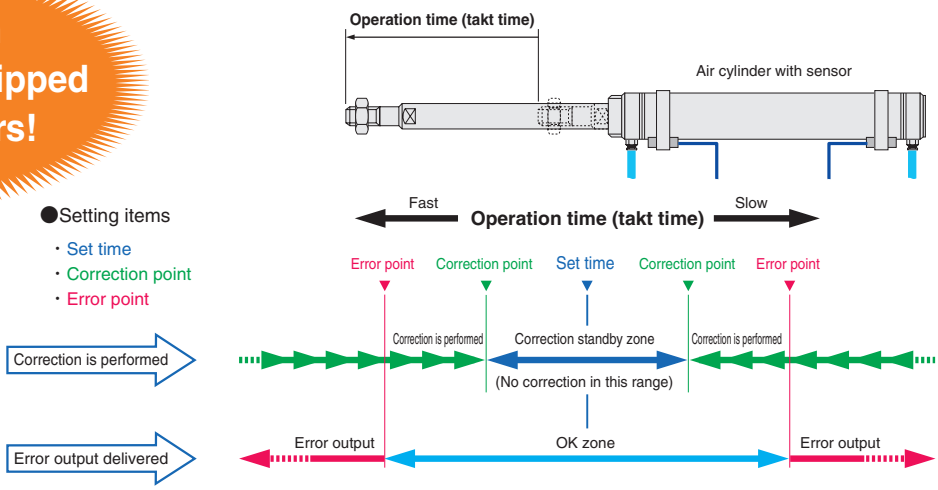
Centralized control

Possible to monitor multiple cylinders at one time.

⇒ Daisy chain of up to 16 units (RS485).

Works on all sensor equipped air cylinders!

<Diagram of Takt Time Controller auto corrections>



- Setting items
  - Set time
  - Correction point
  - Error point

Correction is performed

Error output delivered

See pages 3 and 4 for detailed connection examples and detailed explanations of the automatic corrections of the Takt Time Controller.

Takt Time Controller is used to control the cylinder takt time (operation time) automatically

In the past...

- Variations in pressure and cylinder's sliding resistance cause fluctuations in cylinder takt time that may stop equipment.
- Considering variations in cylinder takt time cannot improve the overall takt time of the equipment.
- Cylinder speed varies so an expensive electric robot had to be used.
- There was a lot of maintenance work because of the fluctuations in takt time.

Using the Takt Time Controller

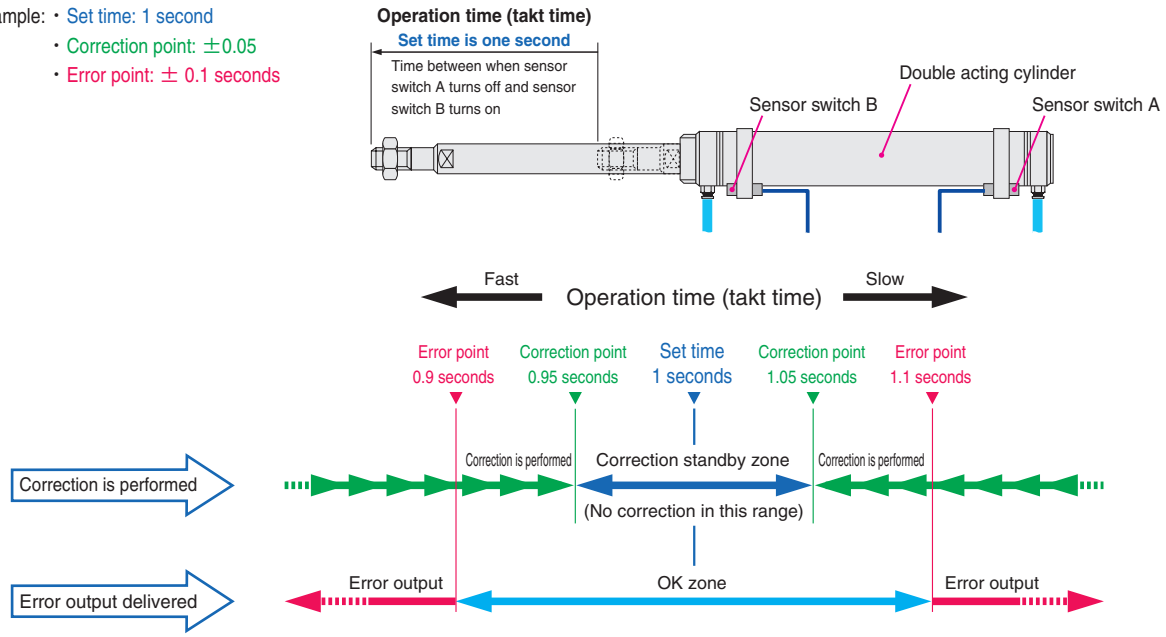
- Equipment operates smoothly because takt time is corrected automatically even if takt time varies due to variations of pressure and cylinder's sliding resistance.
- It is also possible to replace electric robots with air cylinders, depending on conditions, through monitoring and correcting takt time.
- It is possible to acquire information such as cylinder operating life, and other conditions by monitoring the takt time.
- It is possible to improve the overall takt time by stabilizing cylinder takt time.
- It is possible to reduce the number of equipment stops and greatly reduce maintenance by stabilizing takt time.
- It is possible to monitor takt time and error output on PLCs or computers by connecting multiple Takt Time Controllers (up to 16 units).

Theory of the Takt Time Controller's automatic correction

<Setting example> ※ In the following example, the operating time settings are in the push-side stroke, however, the same settings can be done in the pull-side stroke.

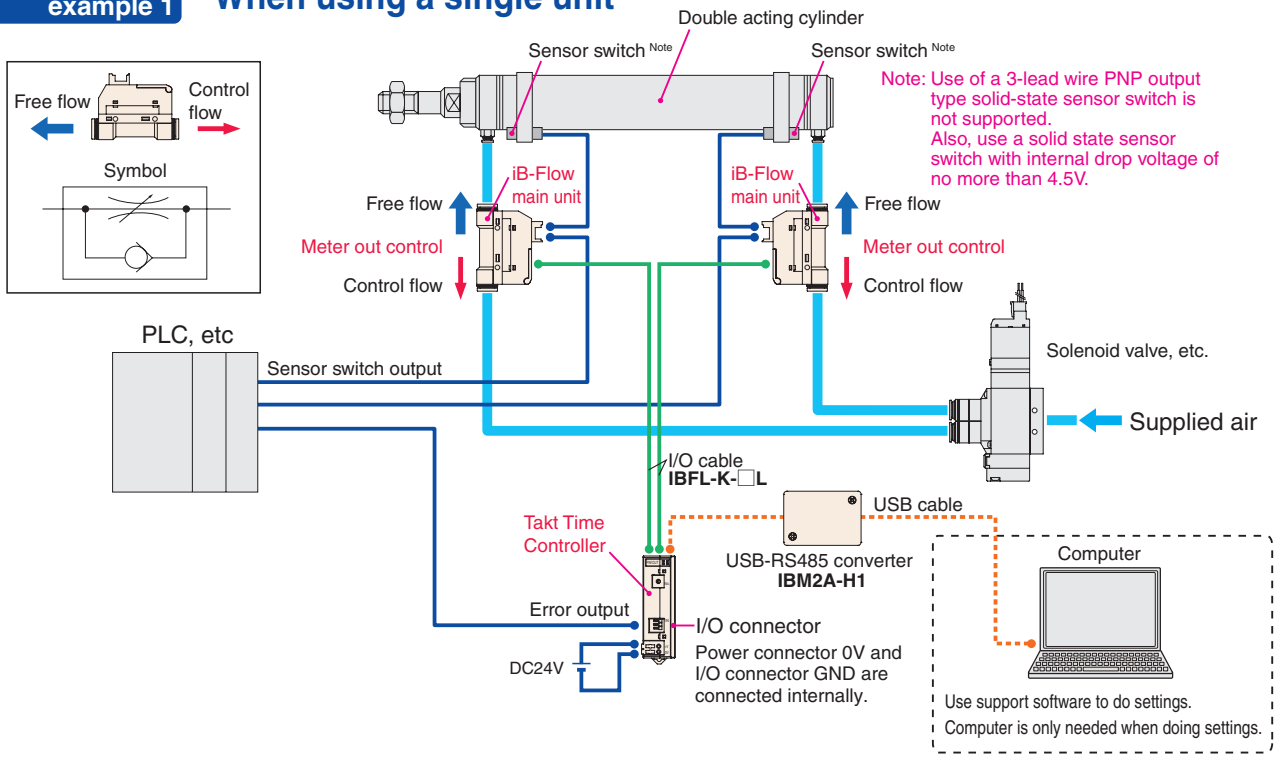
- Setting conditions in the operating time correction mode

Example: • Set time: 1 second
• Correction point: ±0.05
• Error point: ± 0.1 seconds

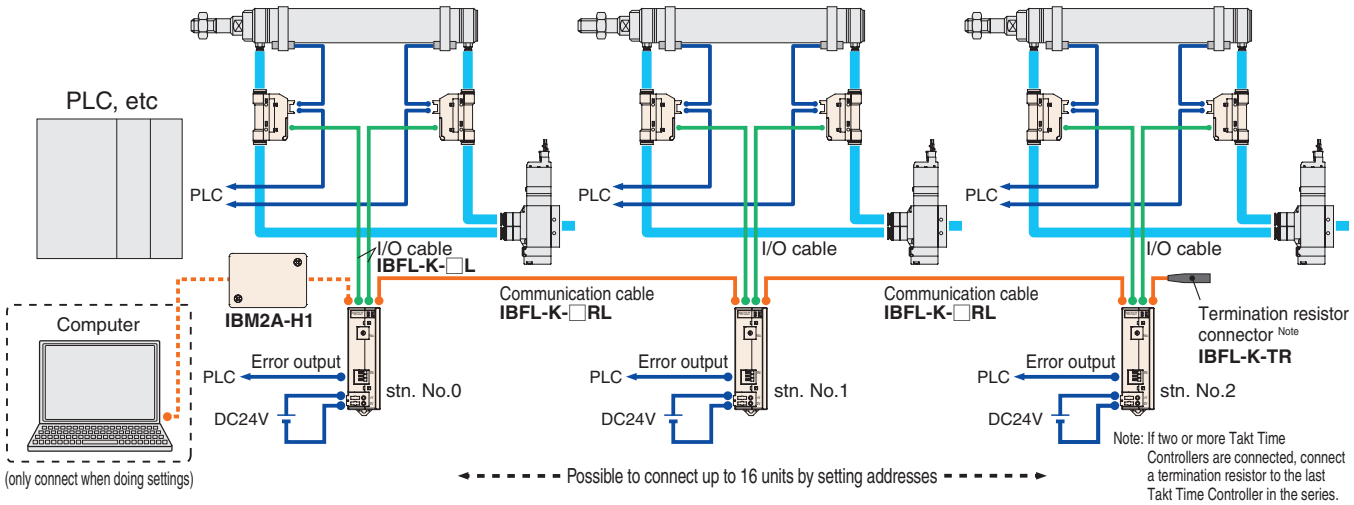


- The ON/OFF signals of the two sensor switches at either stroke end of the cylinder are sent via the iB-Flow main unit to the Takt Time Controller. The cylinder operating time is measured and monitoring is done constantly. If the operating time leaves the correction standby zone, the opening (throttling) of the iB-Flow main unit is adjusted a little at a time and continues correcting automatically until it returns to the correction standby zone.
- The operating time is measured at each stroke while correction is performed, if it is running fast, the iB-Flow main unit closes a little, or opens a little if it is slow. The number of corrections needed to return to correction standby mode depends on the operating conditions.
- Correction is not done while the operation time is within the correction point range (correction standby zone).
- Error output delivered when operation time exceeds error point, error output is cancelled when it returns to the OK zone.

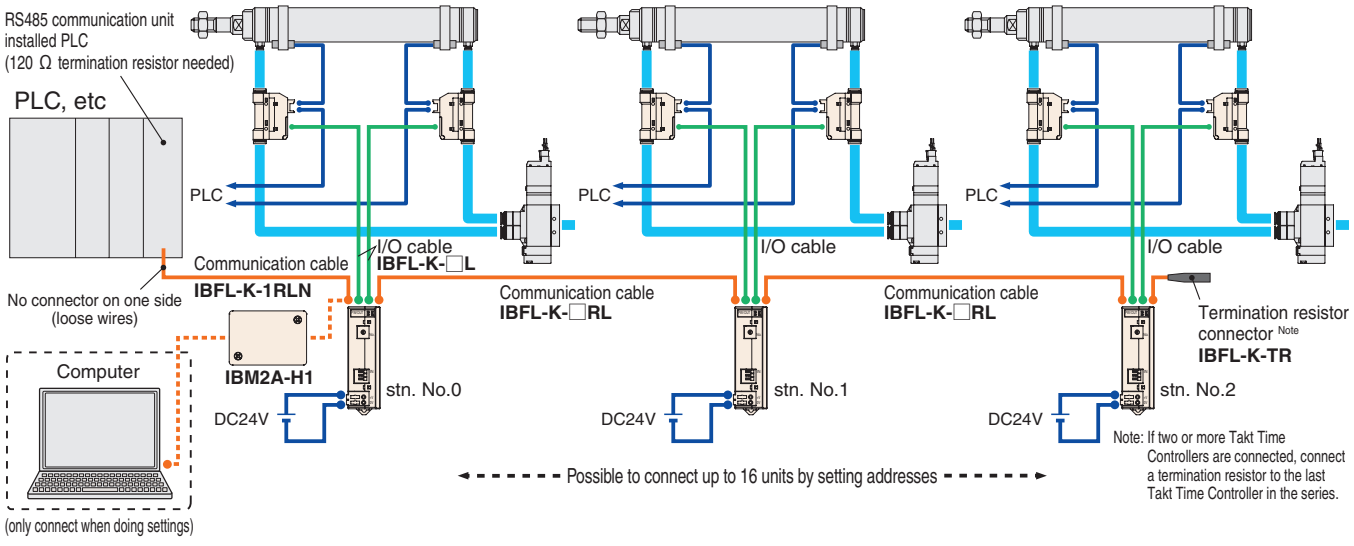
Application example 1 When using a single unit



Application example 2 When using multiple units (setting up multiple units using the communication function)



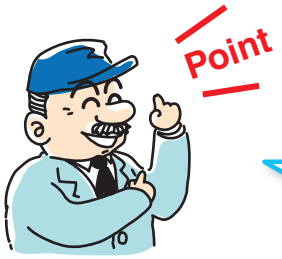
Application example 3 When using multiple units (monitoring takt time, error output, etc with RS485 compatible PLC)



Application example 1

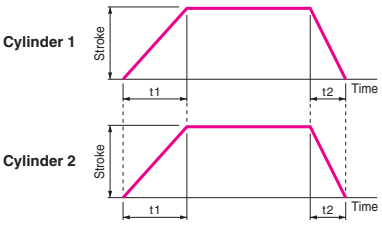
Auto adjustment of double acting cylinder operation time (cycle time)

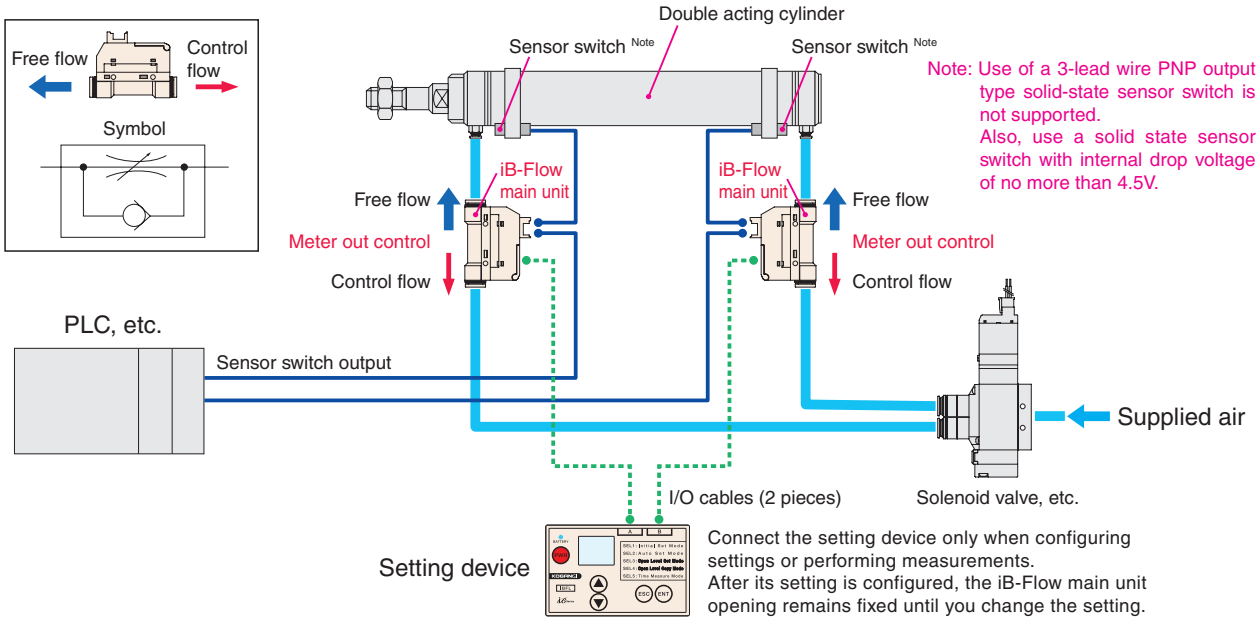
Auto Set Mode



- The ON/OFF signals of the sensor switches at either stroke end of the cylinder are sent via the iB-Flow main unit to the setting device. The cylinder operation time is measured and the needle opening (throttling ratio) is adjusted accordingly.
  1. Use an I/O cable to connect the setting device and iB-Flow main unit.
  2. Set the target times for the extended (push) side and the retracted (pull) side.
  3. If you perform a number of reciprocal cylinder operation cycles by manually operating the solenoid valve, the cylinder operation time will be measured. At the same time, the setting device will automatically adjust the iB-Flow main unit opening (throttling ratio) upwards or downwards until it approaches the target time. "End" will appear on the display when setting is complete.
  4. After setting of both the extended (push) side and retracted (pull) side is complete, disconnect the setting device to complete the setting procedure.

  ※ The product is adjusted to be within ±10% of the target time before being shipped from the factory, but this setting can be changed later.
- Speed adjustment is performed by measuring actual operating time, so differences between individual cylinders, piping distances, and other issues are not factors.
- This mode also can be used to synchronize the operation of multiple cylinders, etc.

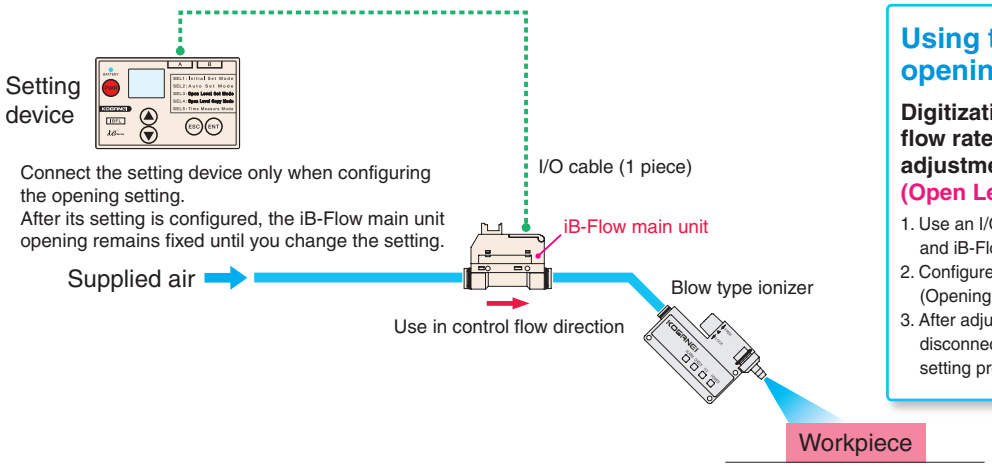




Application example 2

Flow rate adjustment for blow type ionizer

Open Level Set Mode



Using the iB-Flow main unit opening adjustment function

Digitization of ionized air blow's flow rate adjustment. Easy flow rate adjustment for different workpieces.
(Open Level Set Mode)

1. Use an I/O cable to connect the setting device and iB-Flow main unit.
2. Configure the target iB-Flow main unit opening. (Opening setting: 0 to 100%)
3. After adjusting the opening ("End" displayed), disconnect the setting device to complete the setting procedure.

Auto adjustment of double acting cylinder operation time

To adjust the cylinder speed, each numeric target operation time (takt time) for extending and retracting side is input into the setting device, and the speed is adjusted automatically.
Takt time management of a device is simple, which greatly reduces adjustment work.
Speed adjustment is performed by measuring actual operation time, so differences between individual cylinders, piping distances, and other issues are not factors.
※ For details, see the application example on page ❺.

Target time setting
Setting range: 0.05 to 30 seconds

(when using setting device)

Digital setting of adjusting flow rate (throttling)

The needle rotation for flow rate setting of previous models can be easily configured with the setting device by entering a value representing 0 to 100% opening ratio.
This greatly reduces adjustment work and the chance of adjustment error.
It also provides a high degree of repeatability, for optimum flow rate precision adjustment.
※ For details, see the application example on page ❺.

Opening setting
0 to 100%

(when using setting device)

Cylinder operation time measurement

Connecting the setting device to the iB-Flow main unit enables measurement of the cylinder operation time. This ability comes in handy when performing cylinder maintenance or when checking the device takt time.

Operating time display

※ Operating time measurement is performed in accordance with the ON/OFF signals of two sensor switches at either stroke end of the cylinder.

(when using setting device)

Safe lock mechanism

Even when the setting device is not connected to the iB-Flow main unit, the needle opening (throttling ratio) is mechanically stored internally by the iB-Flow main unit for worry-free operation.
There is no chance of inadvertent speed change (by flow rate) when the lock nut is tightened or of speed change by loosening nut as with previous models.

Once the needle opening is set, it is locked in place by an internal planetary gear.
Power supply is not required after setting.

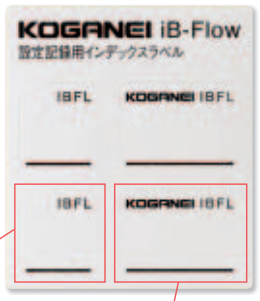
※ The setting device is required only for adjustment and operation time measurement. It does not normally need to be connected.

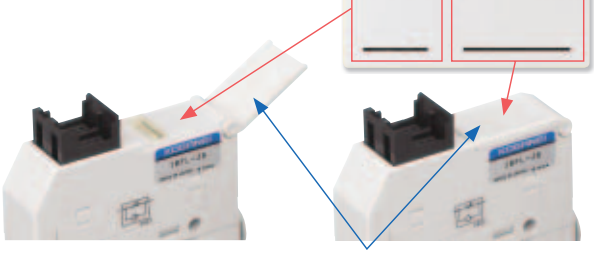
Setting device copy function for reduced work

The copy function of the setting device makes it possible to adjust an iB-Flow main unit mounted on another machine by transferring the numeric opening value from another unit.

Index labels, connector cover

The iB-Flow main unit comes with index labels.
The opening setting and operation time can be filled in on an index label, which is then affixed to the outside or inside of the body cover for reference during maintenance. Setting device connectors are also protected by a connector cover.





Connector cover protects connectors.

Battery unit

Mounting a setting device onto a battery unit allows use even when a power supply is not available.

Battery unit

Setting device

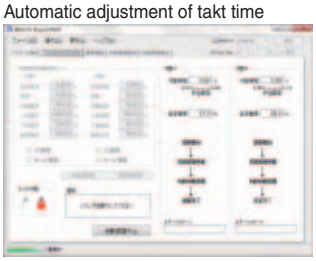
※ A setting device can be used without a battery unit. In that case, use of an AC adapter is required.
※ Charging of the battery unit is required. Use the AC adapter for charging.

Support software for Takt Time Controller

Takt Time Controller parameters settings and operation time settings are done using the support software (free).
※ Download the support software from our home page.

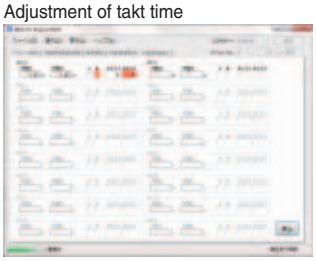
Parameter settings

Automatic adjustment of takt time



Opening adjustment

Adjustment of takt time



- Supported OS: Windows XP SP3, Windows Vista SP1 and later, and Windows 7
- Hardware: CPU Pentium 1 GHz or better, RAM 512 MB or better, monitor resolution SVGA (800 x 600) or better
- Required software: Microsoft .NET Framework 4

※ Windows is a registered trademark of Microsoft in the USA.

Always read these precautions carefully before use.

Before selecting and using the products, please read all the Safety Precautions carefully to ensure proper product use.
The Safety Precautions described below are to help you use the product safely and correctly, and to prevent injury or damage to you, other people, and assets.
Always be sure to comply with the following safety regulations: ISO4414 (Pneumatic fluid power - General rules and safety requirements for systems and their components) and JIS B 8370 (General rules relating to systems).

The directions are ranked according to degree of potential danger or damage: "DANGER", "WARNING", "CAUTION", and "ATTENTION".

⚠ DANGER	Indicates situations that can be clearly predicted as dangerous. Death or serious injury may result if the situation is not avoided. It could also result in damage or destruction of assets.
⚠ WARNING	Indicates situations that, while not immediately dangerous, could become dangerous. Death or serious injury may result if the situation is not avoided. It could also result in damage or destruction of assets.
⚠ CAUTION	Indicates situations that, while not immediately dangerous, could become dangerous. Failure to avoid the situation creates the risk of minor or semi-serious injury. It could also result in damage or destruction of assets.
⚠ ATTENTION	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 for use in general industrial machinery.
■ When selecting and handling equipment, the system designer or another person with sufficient knowledge and experience should always read the Safety Precautions, catalog, instruction manual, and other literature before commencing operation. Improper handling is dangerous.
■ After reading the instruction manual, catalog, and other documentation, always store them in a location that allows easy availability for reference to users of this product.
■ Whenever transferring or lending the product to another person, always attach the catalog, instruction manual, and other information to the product where they are easily visible in order 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 contingencies. Read the catalog and instruction manual carefully, and always keep safety first.

⚠ DANGER

- Do not use the product for the purposes listed below:
  1. Medical equipment related to maintenance or management of human lives or bodies.
  2. Machines 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 high levels of safety. Using the product in any of the ways described above creates the risk of loss of human life.
- Do not use the product in locations with or near dangerous substances such as flammable or ignitable substances. This product is not explosion-proof. Doing so creates the risk of ignition and fire.
- When mounting the product and workpiece, always make sure they are firmly supported and secured in place. Falling, dropping, or abnormal operation of the product creates the risk of personal injury.
- Persons using a pacemaker or other similar medical devices should maintain a distance of at least one meter [3.28 ft] away from the product. Getting too close to the product creates the risk of malfunction of a pacemaker due to the strong magnet built into the product.
- Never attempt to modify the product in any way. Doing so creates the risk of injury, electric shock, fire, etc.
- Never attempt inappropriate disassembly, assembly, or repair of the product relating to basic construction, or to its performance or functions. Doing so creates the risk of injury, electric shock, fire, etc.
- Do not allow water to splash on the product. Water spraying on the product, washing the product, or using the product under water creates the risk of malfunction, leading to injury, electric shock, fire, etc.
- While the product is in operation, avoid touching it with your hands or otherwise approaching too close. Also, do not attempt to make any adjustments to internal or attached mechanism, or to perform any type of adjustment (disconnecting tubes or sealed plugs, adjustment of the product's mounting position, etc.) while the product is in operation.
  Falling, dropping, or abnormal operation of the product creates the risk of personal injury.

⚠ WARNING

- Because KOGANEI products are designed for use under a wide variety of conditions, decisions concerning conformance with a particular system should be made upon the careful evaluation of person in charge of system design. Assurances concerning expected system performance and safety are the responsibility of the designer who decides system conformity. Be sure to use the latest catalogs and technical materials to study and evaluate specification details, to consider the possibility of machine breakdown, and to configure a system that ensures fail-safe safety and reliability.
- Do not use the product in excess of its specification ranges. Doing so creates the risk of product breakdown, loss of function, or damage. It could also drastically reduce the product's operating life.
- Be sure to fully implement shielding measures whenever using the product in the locations described below. Failure to do so creates the risk of abnormal operation, damage to machinery, or personal injury.
  1. Locations subject to large electric currents or strong magnetic fields
  2. Locations where static electricity and other noise are generated
  3. Locations that may be subject to radiation from radioactive emissions
- Before supplying air or electricity to the device and before starting operation, always conduct a safety check of the area where the machine is operating. Unintentional supply of air or electricity creates the risk of injury due to contact with moving parts.
- Do not touch terminals while power is turned on. Doing so creates the risk of electric shock and abnormal operation.
- Do not allow the product to be thrown into fire. Doing so creates the risk of explosion, resulting in the release of toxic gasses.
- Do not sit on the product, place your foot on it, or place other objects on it. Doing so creates the risk of injury due to tripping or the product tipping over, or dropping, resulting in product damage and abnormal, erratic or runaway operation.
- Before conducting maintenance, inspection, repair, replacement, or any other similar procedure, always completely cut off all air connections and confirm that residual pressure inside the product or in piping connected to the product is atmospheric pressure. In particular, be aware that

residual air will still be in the compressor or storage tank. The actuator may move abruptly if residual air pressure remains inside the piping, causing injury.

- Use safety circuits or design a system that prevents damage to machinery and personal injury when the machine is shut down due to an emergency stop or electrical power failure.
- Before performing any kind of wiring work, be sure to turn off power. Failure to do so creates the risk of electric shock.
- Do not allow lead wires and other cords to become damaged. Allowing a cord to become cut, bent excessively, pulled, rolled up, or squeezed between two objects creates the risk of current leaks or defective continuity that can lead to fire, electric shock, or abnormal operation.
- Never apply unnecessary force to connectors while power is supplied. Doing so creates the risk of personal injury, device damage, and electric shock due to abnormal machine operation.
- Always check the catalog and other reference materials for correct product wiring and piping. Improper wiring and piping creates the risk of abnormal operation of the actuator, etc.
- Do not use the AC adapter cable, or the power or signal wires that come with the product in areas where moving portions are present. Doing so creates the risk of the wires being cut.
- Do not use any type of medium that is not specifically stipulated in the specifications. Using a non-specified medium could lead to short term loss of function, sudden degradation of performance, and a reduced operating life.
- After completing wiring work, check to make sure that all connections are correct before turning on power.
- Do not use in locations that are subject to direct sunlight (ultraviolet rays); locations with high humidity and temperature, dust, salt, or iron particles; or in locations with fluids and/or ambient atmosphere that include organic solvents, phosphate ester type hydraulic oil, sulfur dioxide, chlorine gas, acids, etc.
  It could lead to early shutdown of some functions, a sudden degradation of performance, and a reduced operating life.

⚠ CAUTION

- This product uses sensitive electronic components. When handling the product, take care to avoid hitting or dropping it, allowing it to come into contact with other objects, or otherwise subjecting it to excessive impact. Even if the product appears undamaged, damage to internal components can cause abnormal operation.
- Use only the setting device and Takt Time Controller specified for this product. Use of a non-specified device creates the risk of product breakdown and runaway operation.
- Locate this product, the setting device, and Takt Time Controller in an area where there is little dust and dirt. Locating them in a location that is dusty and/or dirty creates the risk of malfunction or abnormal operation.
- When mounting the product, leave room for adequate working space around it. Failure to do so will make it more difficult to conduct daily inspections or maintenance, which could eventually lead to system shutdown or damage to the product.
- Do not scratch, dent, or deform the product by climbing on it, using it as a scaffold, or placing objects on top of it. Doing so creates the risk of damage to or breakage of the product, resulting in operational shutdown or degraded performance.
- Always post an “operations in progress” sign for installations, adjustments, or other operations, to avoid unintentional supplying of air or electrical power, etc. Unintended power or air supply can cause electric shock and sudden operation, creating the risk of personal injury.
- Do not bring any magnetic media or memory within one meter [3.28 ft] of the product. Doing so creates the risk of damage to data on the magnetic media due to magnetism.
- Use in extremely dry air under temperatures that exceed 20 degrees below zero Celsius [-4 °F] may affect the quality of the lubricating oil used. This creates the risk of degraded performance, loss of function, or other problems.
- For the medium, use clean air that does not include any oil or water.
- Product specifications allow for internal leakage. Do not use this product when zero internal leakage is required.
- Do not conduct insulation resistance tests and dielectric strength tests on the setting device or the Takt Time Controller.

⚠ ATTENTION

- Whenever considering use of this product in situations or environments not specifically noted in the catalog or instruction manual, or in applications where safety is an important requirement such as in aircraft facilities, combustion equipment, leisure equipment, safety equipment, and other places where human life or assets may be greatly affected, take adequate safety precautions such as allowing plenty of margin for ratings and performance, or fail-safe measures. Be sure to contact KOGANEI before use in such applications.
- When handling the product, wear protective gloves, safety glasses, safety shoes, and other protective clothing.
- When the product can no longer be used or is no longer necessary, dispose of it appropriately as industrial waste.
- Pneumatic equipment can exhibit degraded performance and function over its operating life. Always conduct daily inspections of the pneumatic equipment, and confirm that all requisite system functions are satisfied, to prevent accidents from happening.
- For inquiries about the product, consult your nearest Koganei sales office or Koganei overseas department. The addresses and telephone numbers are shown on the back cover of this catalog.

⚠ Other

- Always observe the following items.
  1. When using this product in pneumatic systems, 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 prescribed methods and procedures.
  2. Never attempt inappropriate disassembly or assembly of the product relating to basic construction, or its performance or functions.

KOGANEI shall not be held responsible for any problems that occur as a result of these items not being properly observed.

Warranty and General Disclaimer

1. Warranty Period
The warranty period for KOGANEI products is 180 days from the date of delivery.

2. Scope of Warranty and General Disclaimer

(1) The KOGANEI product warranty covers individual products. When a product purchased from KOGANEI or from an authorized KOGANEI distributor malfunctions during the warranty period in a way that is attributable to KOGANEI responsibility, KOGANEI will repair or replace the product free of charge. Even if a product is still within the warranty period, its durability is determined by its operation cycles and other factors. Contact your nearest KOGANEI sales office or the KOGANEI overseas department for details.

(2) KOGANEI shall not be held responsible for any losses or for any damage to other machinery caused by breakdown, loss of function, or loss of performance of KOGANEI products.

(3) KOGANEI shall not be held responsible for any losses due to use or storage of the product in a way that is outside of the product specifications prescribed in KOGANEI catalogs and the instruction manual, and/or due to actions that violate the mounting, installation, adjustment, maintenance and other safety precautions.

(4) KOGANEI shall not be held responsible for any losses caused by breakdown of the product due to factors outside the responsibility of KOGANEI, including but not limited to fire, natural disaster, the actions of third parties, and intentional actions or errors by you.

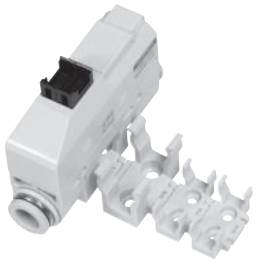
Installation

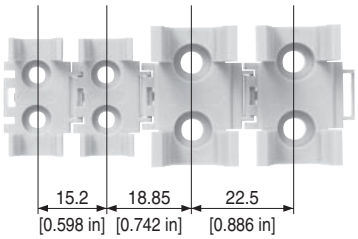
1. Though there are no restrictions on the installation direction, the unit should be installed where it will not be directly subjected to strong impact and/or vibration.
2. Screw tightening torque when using the iB-Flow main unit mounting holes or a bracket are 0.5 N·m [4.4 in·lbf] for an M3 screw and 1.0 N·m [8.9 in·lbf] for an M4 screw. Exceeding the specified tightening torque may damage the iB-Flow main unit, the bracket, etc.
3. Use in a location or environment like those described below should be avoided because doing so can cause the product to malfunction. If the product must be used in such a location or environment, be sure to provide a cover and take other adequate protection countermeasures.
   - Locations where the product may be directly exposed to water droplets, oil droplets, etc.
   - Environments where condensation is generated
   - Locations where the product may be directly exposed to machining chips, dust, etc.
4. Before performing piping work on the iB-Flow main unit, be sure to thoroughly flush the inside of the pipes with compressed air. Machining chips, sealing tape, rust and other debris getting in during piping work may result in air leaks, etc.
5. This product cannot be used in application where zero leakage is required. Use a separately available stop valve in this case.

Mounting bracket

Multiple iB-Flow mounting brackets can be connected in series. Even different size **(IBFL-MB, IBFL-LB)** brackets can be connected in series.

Note: There is looseness in a serial connection. When stable mounting is required, secure each bracket with screws.



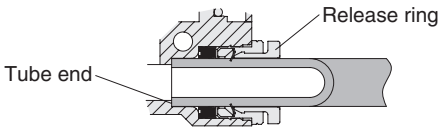


Tightening torque is 0.5 N·m [4.4 in·lbf] for M3 and 1.0 N·m [8.9 in·lbf] for M4.

Attaching and detaching tubing

Tubing installation precautions

① Cut the tubing so the cut cross section is at a right angle. Take care not to damage the outside surface of the tubing and not to cause the tubing to become oval shaped.
② When installing tubing, failure to insert the tubing all the way up to the tube end can cause leakage.



③ Following installation, check to make sure that the tubing cannot be pulled out.

Tubing removal precautions

① Before removing tubing, be sure to check to make sure that pressure inside the tubing is atmospheric pressure.
② Uniformly press the release ring inwards as far as it will go and then pull out the tubing. If you do not fully press in on the release ring, the tube may not come out, or the tubing may become scratched causing debris to be left inside the fitting.

Tube

Use of both nylon tubing and urethane tubing is supported. Nylon tube outside diameter precision should be within ±0.1 mm [0.004 in] (nominal) for nylon tubing and within ±0.15 mm [0.006 in] (nominal) for urethane tubing. Use tubing with ovality (difference between major axis and minor axis) within 0.2 mm [0.008 in]. Use of KOGANEI tubing is recommended.
Use of tubing that is not a KOGANEI genuine product or a compatible (recommended) product may result in tube disconnection, air leakage, or other problems. Be sure to check on tubing before building a pneumatic system.

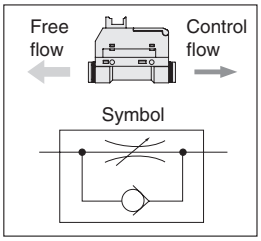
NOTE
1. Use tubing whose exterior is undamaged. If tubing becomes damaged after repeated use, cut off the damaged portion.
2. Do not allow tubing to become severely bent or twisted in the vicinity of a fitting. Such a condition creates the risk of air leakage. The table below shows minimum radius guidelines for nylon tubes and urethane tubes.
3. Do not use extremely soft tubing, which causes a severe drop in pull-out strength.

mm [in]

Tube size	Minimum bending radius	
	Nylon tube	Urethane tube
φ4 [0.157]	20 [0.79]	10 [0.39]
φ6 [0.236]	30 [1.18]	15 [0.59]
φ8 [0.315]	50 [1.97]	20 [0.79]
φ10 [0.394]	80 [3.15]	27 [1.06]
φ12 [0.472]	150 [5.91]	35 [1.38]

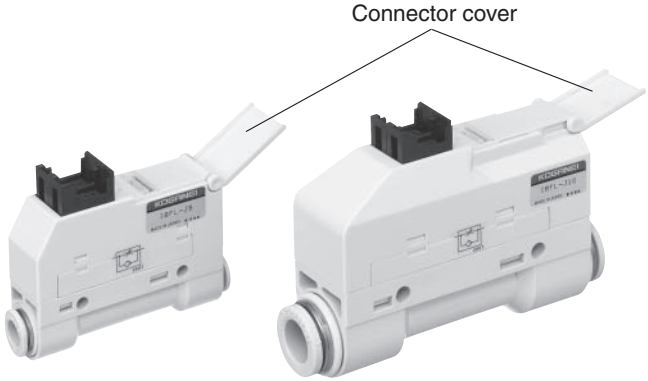
Air control direction

The iB-Flow main unit has an air flow direction. Control flow direction and free flow direction are as shown in the diagram below. Be sure to perform piping while in accordance with the diagram below and the product's symbol. Orienting the control direction wrongly creates the risk of personal injury and machine damage.



Opening and closing the connector cover

Setting device and Takt Time Controller connectors are protected by connector covers. When configuring settings, open the connector cover as shown in the photograph and then connect an I/O cable to the connector. Space is provided to affix one of the included index labels on the top surface of the connector cover or inside the connector cover. Index labels can be used for recording setting values or other information as required.

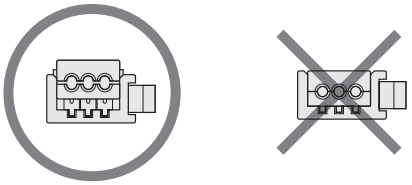


Connecting the sensor connector

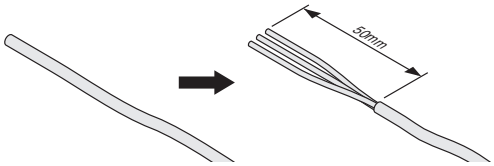
When adjusting and measuring of the double acting air cylinder operation time, the ON/OFF signals of the sensor switches at either stroke end of the cylinder must be sent to a setting device, Takt Time Controller, or PLC, etc. via the iB-Flow main unit.

Perform the following steps to connect the sensor switch lead wires and sensor connector mini clamp wire mount plugs (male).

1. Check to make sure that the connector cover (lead wire inlet) is sitting above the body of the connector. Note that a connector whose cover is even with the body of the connector cannot be used.



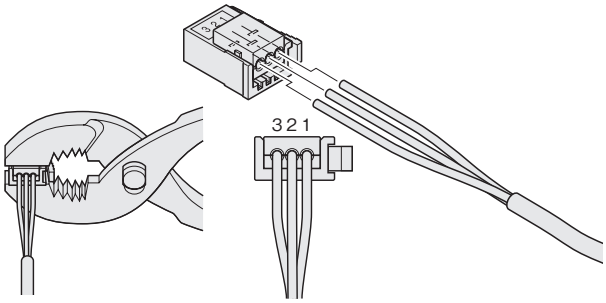
2. Cut the cable to the required length.
Strip the outer covering of the cable, 50 mm [2 in] from the end, to expose the lead wires. Do not strip the insulation from the individual lead wires at this time.



3. Insert the lead wires into the connector cover holes in accordance with the information in the table below. Check to make sure the lead wires are fully inserted as far as they will go by viewing the semi-transparent top cover of the connector. (Wire goes in about 9 mm [0.35 in].)
Note that supplying power while connections are incorrect will damage the control device and setting device you are using.

Connector side Pin No.	2-lead wire sensor switch		3-lead wire sensor switch	
	Signal name	Wire color	Signal name	Wire color
1	Not connected	—	+V	Brown
2	OUT	Brown	OUT	Black
3	0V	Blue	0V	Blue

NOTE Use of a 3-lead wire PNP output type solid-state sensor switch is not supported. Also, uses a solid state sensor switch with internal drop voltage of no more than 4.5V.



4. Taking care not to remove the lead wires from the connector, use pliers or some other type of hand tool to squeeze the cover and the connector body until the cover is pressed into the body.
Do not apply force in excess of 980.7 N [220 lbf].
Connection is complete when the cover is even with the connector body.

5. Double check to make sure that wiring is correct.

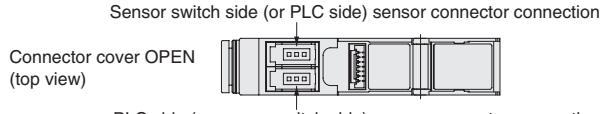
Note: Suitable wire diameter for mini clamp wire mount plug provided is AWG26-24, nominal cross section within 0.14 to 0.3 mm^2 [0.00022 to 0.00047 in^2], insulation outside diameter 0.8 to 1.0 mm [0.031 to 0.039 in].

Connecting and disconnecting a sensor connector and I/O cable

To attach the sensor connector and I/O cable, position the lock levers as shown in the photograph below, and then insert the iB-Flow main unit and setting device connectors until they lock into place. For disconnection, press down fully on the lock lever as you hold the connector and pull to disconnect. At this time, take care not to apply undue force to the lead wires. See page 11 regarding connecting and disconnecting the I/O cable to the Takt Time Controller.

iB-Flow body　　For the setting device

Since the connectors that connect the sensor connector (mini clamp wire mount plug) are linked internally, it makes no difference whether sensor switch side or PLC side wiring is used.



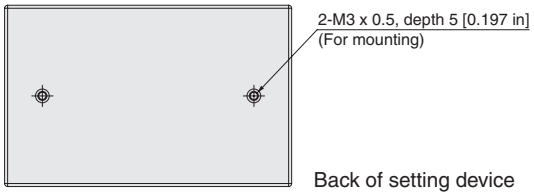
Mounting and removing a setting device on a battery unit

Mounting a setting device on a battery unit
① Release the stopper.
② Aligning the slit of the setting device with the battery unit guide, insert the setting device into the battery unit.
③ Press down on the setting device until it comes into contact with the stopper.

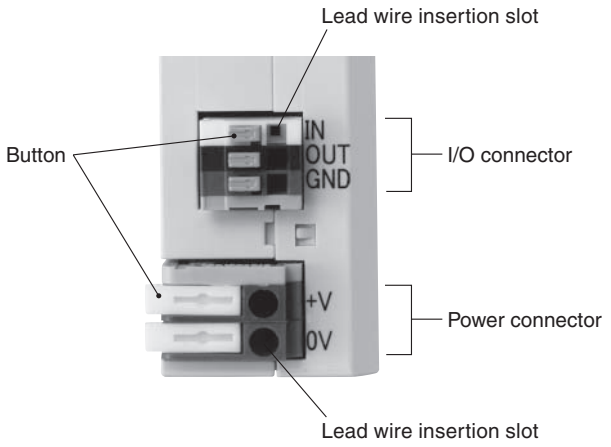
Removing a setting device from a battery unit
① Release the stopper and then remove the setting device from the battery unit.

Setting device mounting

When mounting a setting devices, use M3 × 0.5 screws, tightened to a torque of 0.5 N·m [4.4 in·lbf]. Exceeding the specified tightening torque may damage the setting device.



Takt Time Controller power and external I/O connections



Power connector

- Acceptable range of wire sizes
  Single wire: ϕ0.4 - ϕ1.2 mm [ϕ0.016 - ϕ0.047 in] (AWG26-16)
  Twisted wire: 0.2 - 0.75 mm^2 [0.00031 - 0.00116 in^2] (AWG24-20)
  Wire diameter ϕ0.18 [ϕ0.0071 in] or more
- Recommended tools
  Flat head screwdriver is recommended

I/O connector

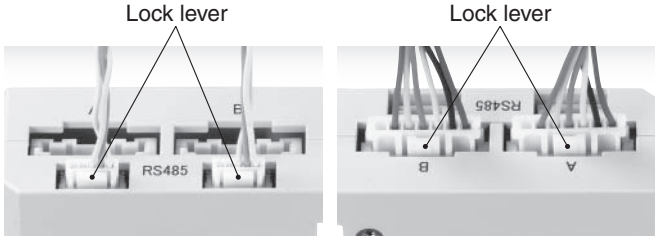
- Acceptable range of wire sizes
  Single wire: ϕ0.32 - ϕ0.65 mm [ϕ0.0126 - ϕ0.0256 in] (AWG28-22)
  Twisted wire: 0.08 - 0.32 mm^2 [0.00012 - 0.00050 in^2] (AWG28-22)
  Wire diameter ϕ0.12 [ϕ0.0047 in] or more
- Recommended tools
  Flat head screwdriver is recommended

NOTE

1. Note that only copper wire can be used for lead wire connections.
2. Turn off the power when connecting or disconnecting the lead wire.
3. Use only one lead wire for each insertion slot. Connecting two or more lead wires will cause malfunctions.
4. Press the button all the way down when connecting or disconnecting the lead wires.

Connecting and disconnecting Takt Time Controller's I/O and communication cables

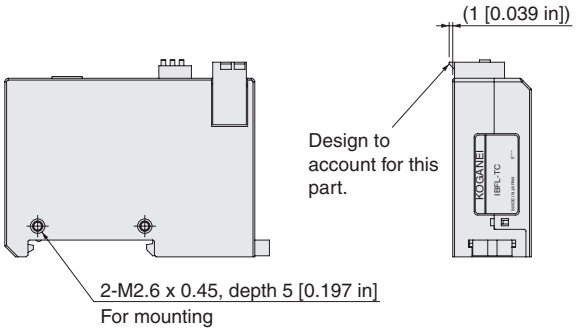
To attach the communication and I/O cables, position the lock levers as shown in the photograph below, and then insert the iB-Flow main unit and Takt Time Controller connectors until they lock into place. To disconnect, press down fully on the lock lever as you hold the connector and pull to disconnect. At this time, take care not to apply undue force to the lead wires.



Communication cable　　I/O cable

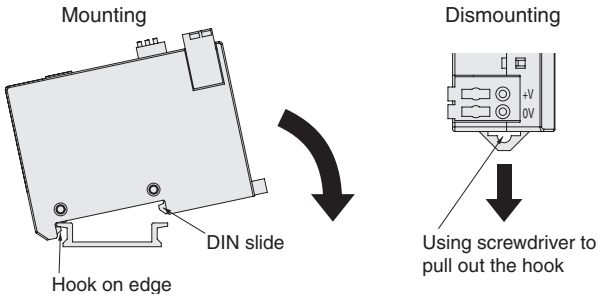
Mounting Takt Time Controller

When mounting a Takt Time Controller directly or on a bracket, use M2.6 × 0.45 screws, tightened to a torque of 0.32 N·m [2.83 in·lbf]. Exceeding the specified tightening torque may damage the Takt Time Controller.



DIN rail mounting

As shown in the diagram below, hook one side on the DIN rail, press the Takt Time Controller in the direction of the arrow until it clicks and locks on the DIN slide. To remove the Takt Time Controller from the DIN rail, insert a flat head screwdriver into the slot on the hook and pull the DIN slide hook.



Takt Time Controller address setting (stn. No. 0 to F)

Do not replicate addresses (stn. No.) when using RS485 communications.

About Takt Time Controller termination resistor

When using two or more Takt Time Controllers, set the termination resistor for the last end of the Takt Time Controller, and if necessary connect 120Ω (provided by customer) termination resistor to the RS485 communication unit of PLC etc.

Others

1. Incorrectly wiring the iB-Flow main unit, setting device, Takt Time Controller, and sensor switch cables will result in breakdown. Carefully check wiring before supplying power.
2. Setting values are written into and stored in flash memory built into the setting device and Takt Time Controller. Note that the number of flash memory rewrites is limited. The guaranteed number of rewrites is 10,000.
3. Never use a needle tip or any other sharp pointed object to perform key operations on the setting device.
4. The battery unit is not charged when shipped from the factory. Charge completely before use.
5. If the battery unit is not used for a long time, periodically charge it.
6. For speed adjustment, configure the setting within the actuator operating speed range. Use outside of the operating speed range creates the risk of actuator breakdown, loss of function, or damage. It could also drastically reduce operating life.

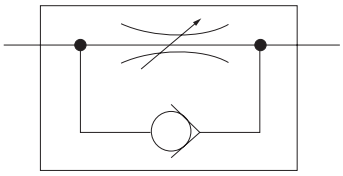
iB-Flow

Main unit

IBFL-J4□
IBFL-J6□
IBFL-J8

IBFL-J10
IBFL-J12

Symbol



Specifications

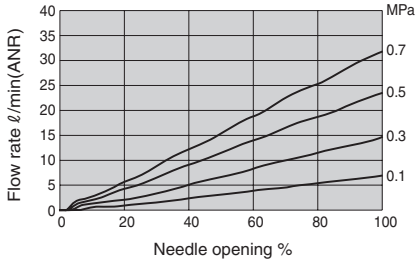
Item \ Model		IBFL-J4C	IBFL-J4	IBFL-J6C	IBFL-J6	IBFL-J8	IBFL-J10	IBFL-J12
Tube outer diameter	mm	φ4		φ6		φ8	φ10	φ12
Medium		Air						
Operating pressure range	MPa [psi]	0.1 to 0.7 [14.5 to 102]						
Proof pressure	MPa [psi]	1.05 [152]						
Operating temperature range	°C [°F]	0 to 40 [32 to 104]						
Dielectric strength		500VAC for one minute						
Insulation resistance		100 MΩ minimum at 500VDC Megger						
Mass	g [oz]	31 [1.09]				34 [1.20]	83 [2.93]	
Flow rate (at 0.5 MPa [73 psi]) ℓ/min [ft³/min] (ANR)	Free flow	180 [6.35]		410 [14.47]			830 [29.30]	
	Control flow	24 [0.85]	75 [2.65]	24 [0.85]	150 [5.30]		530 [18.71]	

Note: Four index labels and two mini clamp wire mount plugs are included.
Supported wire diameter: AWG26-24, nominal cross section within 0.14 to 0.3 mm² [0.00022 to 0.00047 in²], insulation outside diameter 0.8 to 1.0 mm [0.031 to 0.039 in].

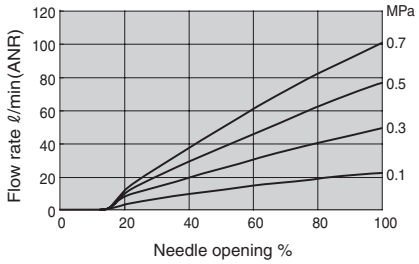
Note: Use a setting device that supports version 2.00 and later of the software when using **IBFL-J4C** or **IBFL-J6C**.

Flow rate characteristics

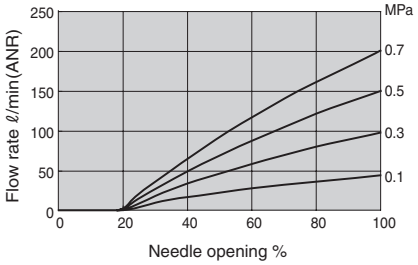
IBFL-J4C
IBFL-J6C



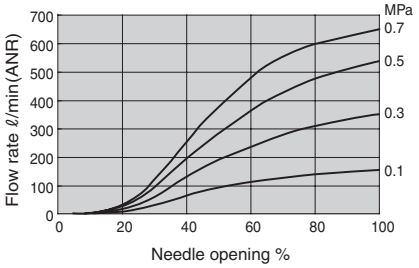
IBFL-J4



IBFL-J6
IBFL-J8



IBFL-J10
IBFL-J12



1 ℓ/min = 0.0353 ft³/min

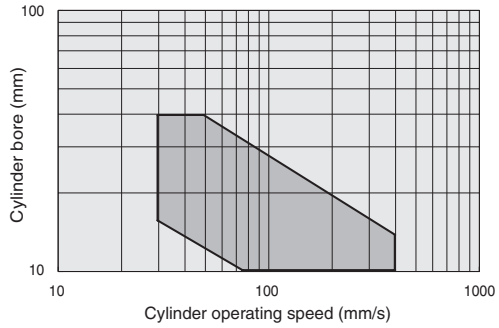
Note: Flow rate characteristics are in accordance with Koganei measurement conditions. Note that there are variations in flow rate characteristics due to individual product difference, as well as piping conditions and other usage conditions.

Range of adjustments to the cylinder's operation time in Auto Set Mode (for reference)

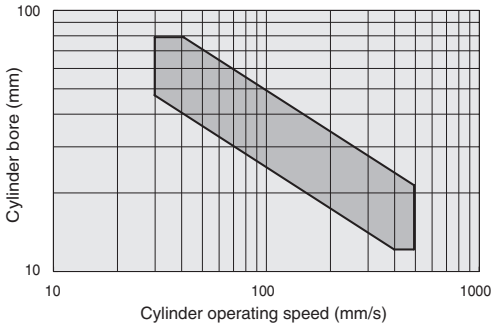
The range of possible automatic adjustment is indicated by the area inside the line.

Use the following formula and the size of your cylinder to make your selection.
[Cylinder operating speed (mm/s) = cylinder stroke (mm)/cylinder operation time (S)]

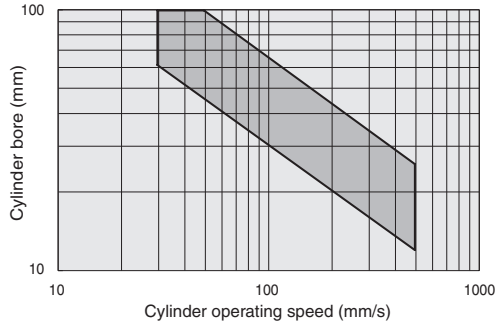
IBFL-J4C
IBFL-J6C



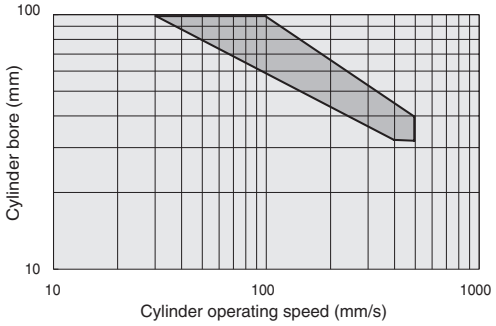
IBFL-J4



IBFL-J6
IBFL-J8



IBFL-J10
IBFL-J12



1 mm = 0.0394 in
1 mm/s = 0.0394 in/sec

Note: This selection graph was created based on results of measurements using Koganei Jig Cylinders C series.
Note that these may not be the limits depending on the operating conditions and the cylinder being used.

Setting device, battery unit

Specifications

Setting device

Item \ Model		IBFL-S
Power supply		Battery unit or special AC adapter (Input: 100 to 240VAC, 50/60 Hz Output: 15VDC 1.2 A)
Indicators	Setting display	LCD: 4 characters, 4 indicators 4-character display (letters or values: green) Operation indicator (indicator: red)
	BATTERY LED (red)	When using the battery unit, lights when battery capacity is low. Flashes when battery capacity is very low.
Setting input		Unit key settings (PWR, ▲, ▼, ESC, ENT)
Applicable sensor switches Note 1, Note 2		12 to 24VDC $^{+10\%}_{-5\%}$ Reed switch, solid-state sensor switch (2-lead wire, 3- lead wire: NPN output type)
I/O cable length		**-1L**: 1m [3.28 ft], **-3L**: 3m [9.84 ft]
Operating temperature range	˚C [˚F]	0 to 40 [32 to 104]
Storage temperature range	˚C [˚F]	–10 to 50 [14 to 122]
Operating humidity range	%RH	35 to 85 (non-condensation)
Vibration resistance	m/s^2 [G]	49.0 [5] (When directly installed to a device or mounting surface. Excluding battery unit.)
Shock resistance	m/s^2 [G]	98.1 [10] (When directly installed to a device or mounting surface. Excluding battery unit.)
Dielectric strength		500VAC for one minute
Insulation resistance		100 MΩ minimum at 500VDC Megger
Mass	g [oz]	70 [2.47] (Excluding cable)
Mounting methods		Direct mounting (M3 x 0.5, depth 5 mm [0.197 in], 2 locations)

Note 1: Use of a 3-lead wire PNP output type solid-state sensor switch is not supported.
2: Use a solid state sensor switch with internal drop voltage of no more than 4.5V.

Battery unit

Item \ Model		IBFL-BT
Power supply		Special AC adapter (Input: 100 to 240VAC, 50/60 Hz Output: 15VDC 1.2 A)
Indicator	CHARGE LED (red)	Charging: Lit Charging complete: Unlit
Operating temperature range	˚C [˚F]	0 to 40 [32 to 104]
Storage temperature range	˚C [˚F]	–10 to 50 [14 to 122] (Store at a temperature of –10 to 30˚C [14 to 86] when not charging for long periods.)
Operating humidity range	%RH	35 to 85 (non-condensation)
Shock resistance	m/s^2 [G]	98.1 [10]
Dielectric strength		500VAC for one minute
Insulation resistance		100 MΩ minimum at 500VDC Megger
Mass	g [oz]	350 [12.35] (Excluding setting device.)

Note: The battery unit is not charged when shipped from the factory. Charge completely before use.
For the number of cylinder setting when using a battery unit, use a value of 100 cylinders after a full charge as a guideline.
If the battery unit is not used for a long time, periodically charge it.

Takt Time Controller

Specifications

Takt Time Controller

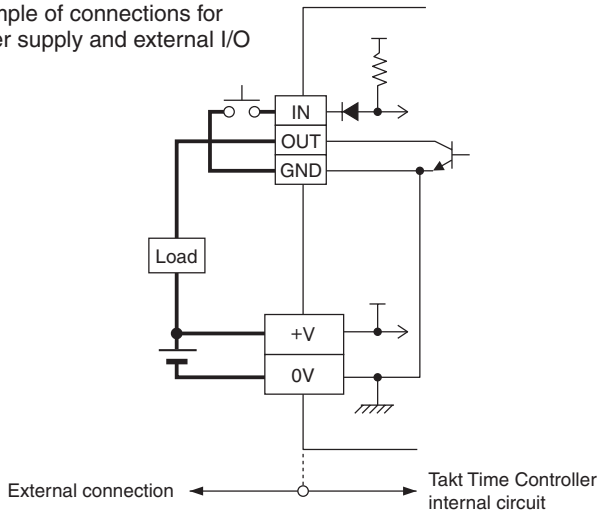
Item \ Model		IBFL-TC
Power supply	Voltage	12VDC to 24VDC ±10%
	Current consumption (at 24VDC supplied)	35 mA (no load) 140 mA max. (when 2 units of the main unit **IBFL-J4** (**C**), **-J6** (**C**), or **-J8** are connected) 240 mA max. (when 2 units of the main unit **IBFL-J10**, or **-J12** are connected)
Display settings	PW (green LED)	While power is on: Lights
	OUT (red LED)	When operation time error is output: On When over current error occurs: Flashes Note 1
	stn. No.	Address setting (0 to F)
External I/O	IN	Automatic correction ON Open Automatic correction OFF Shorted with GND (no voltage input)
	OUT	When operation time error is output: ON Load voltage: 30VDC max. Load current: 50 mA max. (over current protection function internally equipped) Output format: NPN open collector output
Communication	Connector a/b	Up to 16 RS485 communication units can be connected
Connection to iB-Flow main unit	Connector A/B	iB-Flow main unit connections (opening adjustment and sensor output acquisition)
Applicable sensor switches Note 2, Note 3		12 to 24VDC ±10% reed switch, solid state switch (2-lead wire, 3- lead wire: NPN output type)
I/O cable length		300 mm, 1000 mm, 3000 mm [0.98 ft, 3.28 ft, 9.84 ft]
Communication cable length		50 mm, 1000 mm, 3000 mm [0.16 ft, 3.28 ft, 9.84 ft], 1000 mm [3.28 ft] (no connector on one side, loose wires) Note 4
Operating temperature range	°C [°F]	0 to 40 [32 to 104]
Storage temperature range	°C [°F]	–10 to 50 [14 to 122]
Operating humidity range	%RH	35 to 85 (non-condensation)
Noise resistance		IEC61000-4-4, power line 1 kV (level 2), signal line (radiation) 1 kV (level 3)
Vibration resistance	m/s^2 [G]	49.0 [5] (at bracket mounted)
Shock resistance	m/s^2 [G]	98.1 [10] (at bracket mounted)
Insulation resistance		100 MΩ minimum at 500VDC
Dielectric strength		500 VAC 1 minute
Mass	g [oz]	48 [1.69] (controller only)
Mounting methods		Direct mount (M2.6 x 0.45, 5 [0.20 in] deep, 2 locations), DIN rail mount, specialized bracket

Notes 1: Turn the Takt Time Controller off and then on again to resolve over current errors.
2: Use of a 3-lead wire PNP output type solid-state sensor switch is not supported.
3: Use a solid state sensor switch with internal drop voltage of no more than 4.5V.
4: Use a 1000 mm [3.28 ft] cable with loose wires on one side to connect external devices (PLC etc.), that use RS485 communication, to the Takt Time Controller.

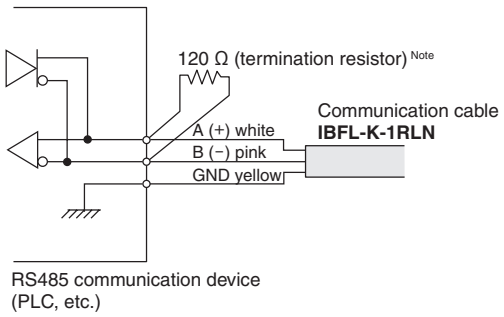
Note: Termination resistor connector (**IBFL-K-TR**) is needed to connect two or more Takt Time Controllers using RS485 communication.

Internal wiring diagrams and specifications (example of external connection)

Example of connections for power supply and external I/O



Example of connections for external device (RS485 compatible)



Note: Connect a 120Ω termination resistor (provided by customer) to RS485 communication units of PLC etc.

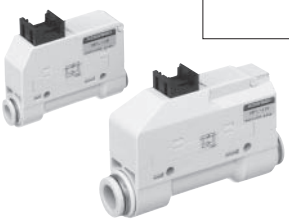
Order Codes

Main unit

IBFL - □ - □

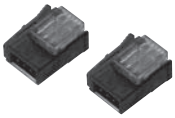
iB-Flow

Bracket
Blank: None
MB: With J4C, J6C, J4, J6, J8 bracket
LB: With J10, J12 bracket



Size (Tube outer diameter)
J4C: ϕ4 [0.157 in] low flow rate type
J6C: ϕ6 [0.236 in] low flow rate type
J4 : ϕ4 [0.157 in]
J6 : ϕ6 [0.236 in]
J8 : ϕ8 [0.315 in]
J10: ϕ10 [0.394 in]
J12: ϕ12 [0.472 in]

※ Two mini clamp wire mount plugs and four index labels are included on the iB-Flow main unit.



Setting device

IBFL-S - □ - □ - □

Setting device
for iB-Flow

AC adapter[Note 1]
Blank: None
AC: With AC adapter

I/O cables (sets of two)[Note 2]
Blank: None
1L: 1000 mm [3.28 ft] cable length
3L: 3000 mm [9.84 ft] cable length

Battery unit
Blank: None
BT: With battery unit

Note 1: An AC adapter or battery unit is required when using a setting device. An AC adapter is also required for charging a battery unit.
2: I/O cables come in sets of two. To order a single I/O cable, use the additional parts order code on page ⓲.

Takt Time Controller

IBFL-TC - □ - □ - □

Takt Time Controller
for iB-Flow

Bracket
Blank: None
BR: With bracket

Communication cable, connector
Blank : None
005RL: 50 mm [0.16 ft] cable length
1RL: 1000 mm [3.28 ft] cable length
3RL: 3000 mm [9.84 ft] cable length
1RLN: 1000 mm [3.28 ft] cable length, no connector on one side (loose wires)
TR: Termination resistor connector

I/O cables (sets of two)[Note 2]
Blank: None
03L: 300 mm [0.98 ft] cable length
1L: 1000 mm [3.28 ft] cable length
3L: 3000 mm [9.84 ft] cable length

Note 2: I/O cables come in sets of two. To order a single I/O cable, use the additional parts order code on page ⓲.

Order Codes

Additional Parts (available separately)

AC adapter

IBFL-AC

Rating
Input: 100 to 240VAC
50/60 Hz
Output: 15VDC 1.2 A

※ Can be used with a setting device and battery unit.

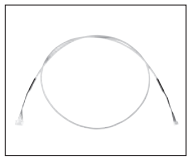
Battery unit

IBFL-BT-□

AC adapter Note
Blank: None
AC: With AC adapter

Note: The AC adapter is required for charging a battery unit.

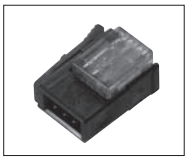
I/O cable (1 piece)



IBFL-K-□

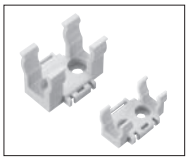
Cable length
03L: 300mm [0.98 ft]
1L: 1000 mm [3.28 ft]
3L: 3000 mm [9.84 ft]

Mini clamp wire mount plugs



FS1U-3M

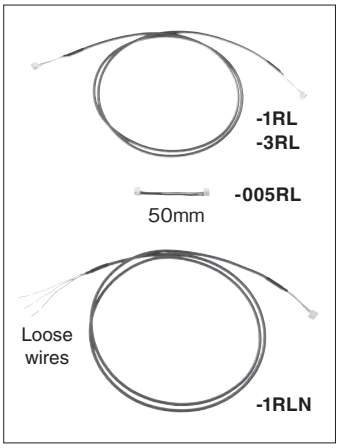
Bracket



IBFL-□

Bracket
MB: For J4C (ϕ4), J6C (ϕ6), J4 (ϕ4), J6 (ϕ6), J8 (ϕ8)
LB: For J10 (ϕ10), J12 (ϕ12)

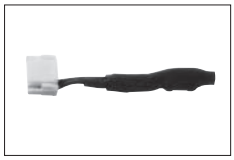
Communication cable (1 piece)



IBFL-K-□

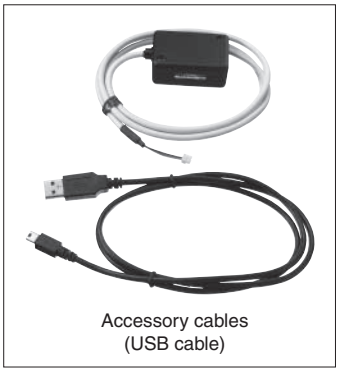
Cable length
005RL: 50 mm [0.16 ft]
1RL: 1000 mm [3.28 ft]
3RL: 3000 mm [9.84 ft]
1RLN: 1000 mm [3.28 ft], no connector on one side (loose wires)

Termination resistor connector



IBFL-K-TR

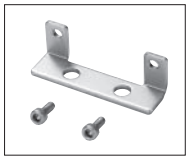
USB-RS485 converter



IBM2A-H1-□

Accessory cables
Blank: USB (mini-B) ⇔ USB (A) male
N: No accessory cable

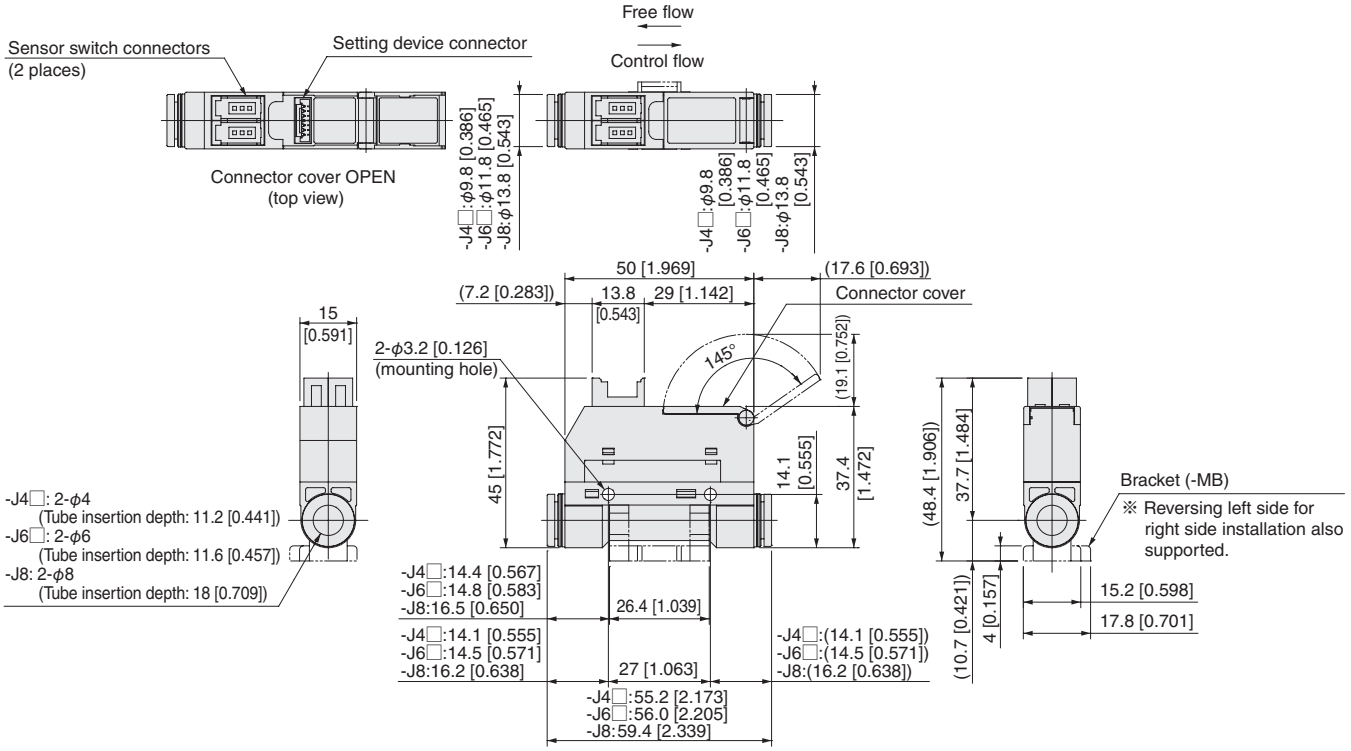
Bracket (for Takt Time Controller)



PSU-BR

iB-Flow main unit

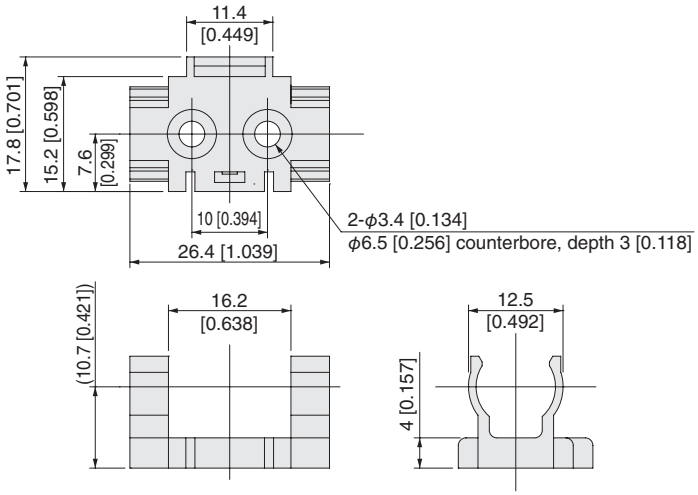
IBFL-J4□
IBFL-J6□
IBFL-J8



※ Two mini clamp wire mount plugs and four index labels are included on the iB-Flow main unit.

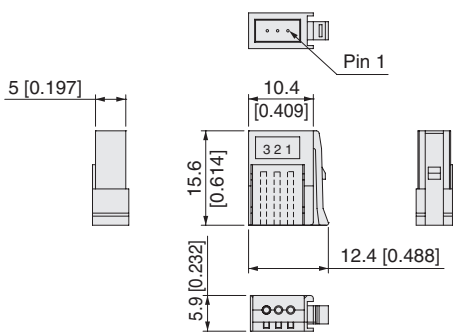
Bracket (**for IBFL-J4C, -J6C, -J4, -J6, -J8**)

IBFL-MB



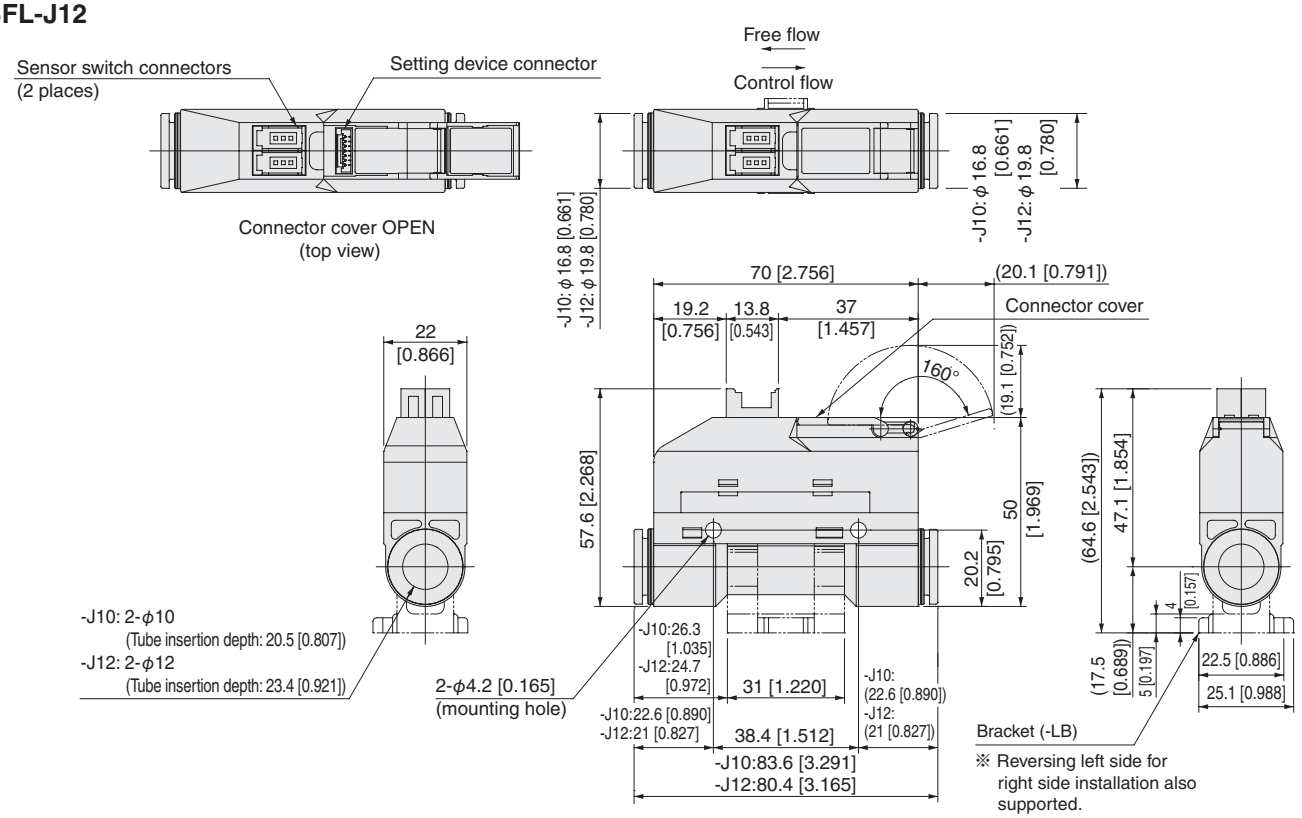
Mini clamp wire mount plug

FS1U-3M



iB-Flow main unit

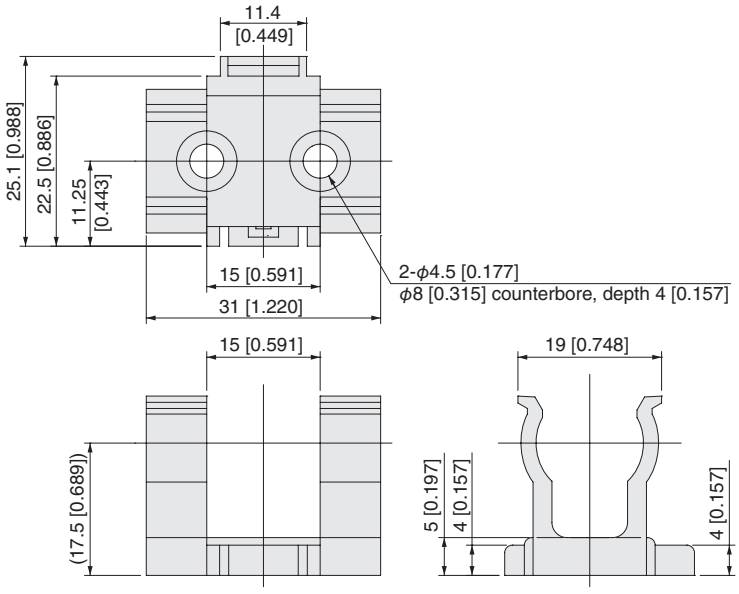
IBFL-J10
IBFL-J12



※ Two mini clamp wire mount plugs and four index labels are included on the iB-Flow main unit.

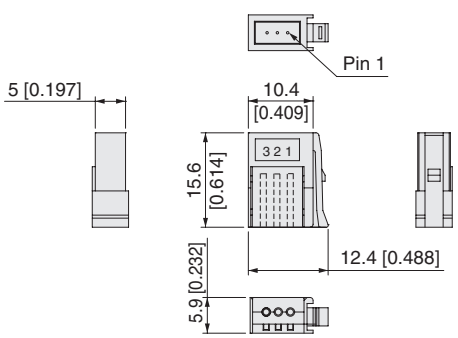
Bracket (**For IBFL-J10,-J12**)

IBFL-LB



Mini clamp wire mount plug

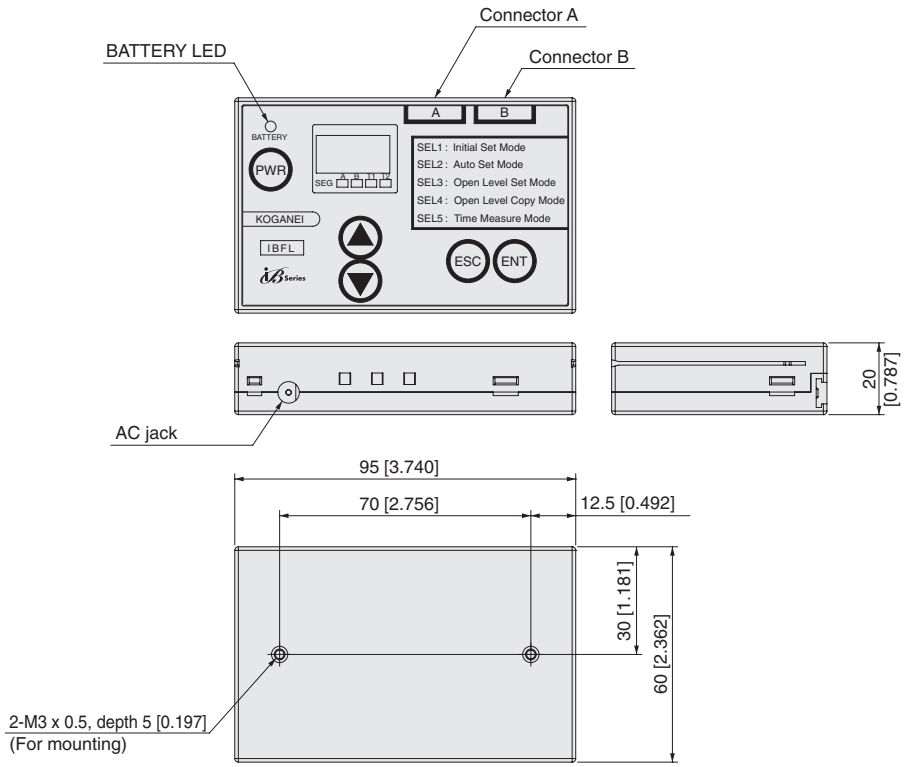
FS1U-3M



Dimensions mm [in]

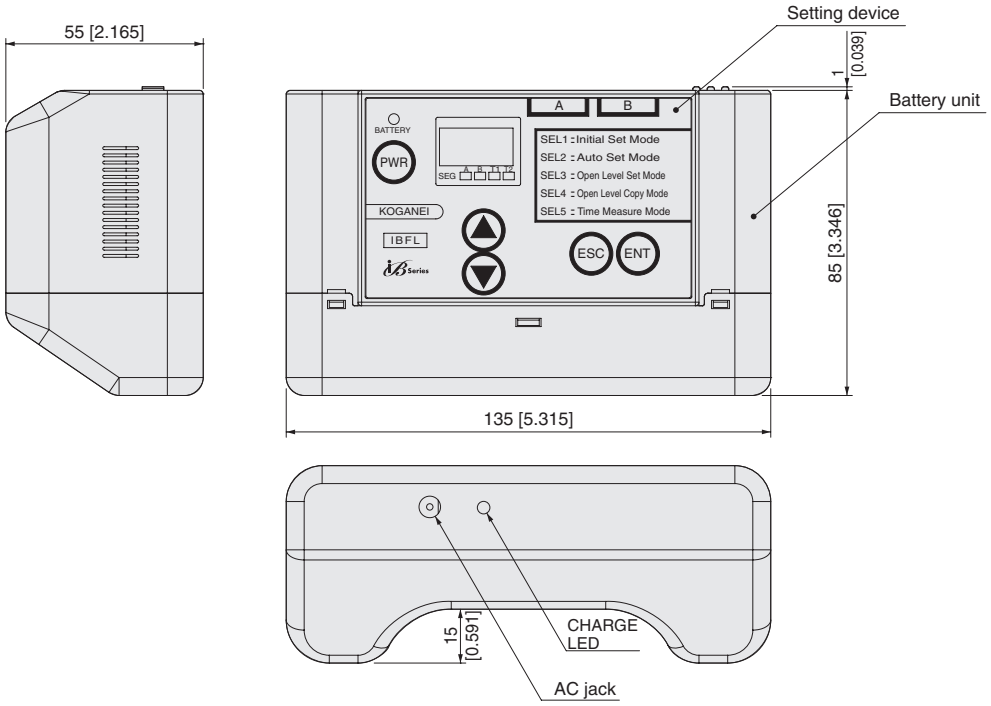
Setting device

IBFL-S



Battery unit (Drawing shows battery unit with setting device mounted.)

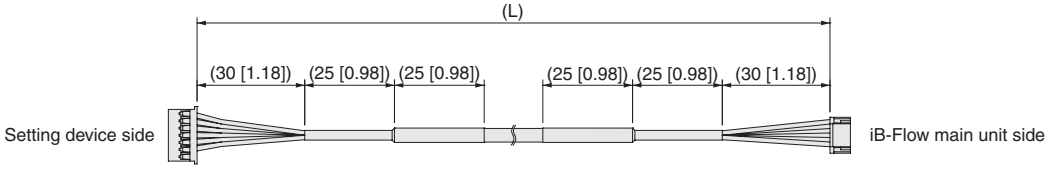
IBFL-BT



I/O cable (For iB-Flow main unit and setting device connection)

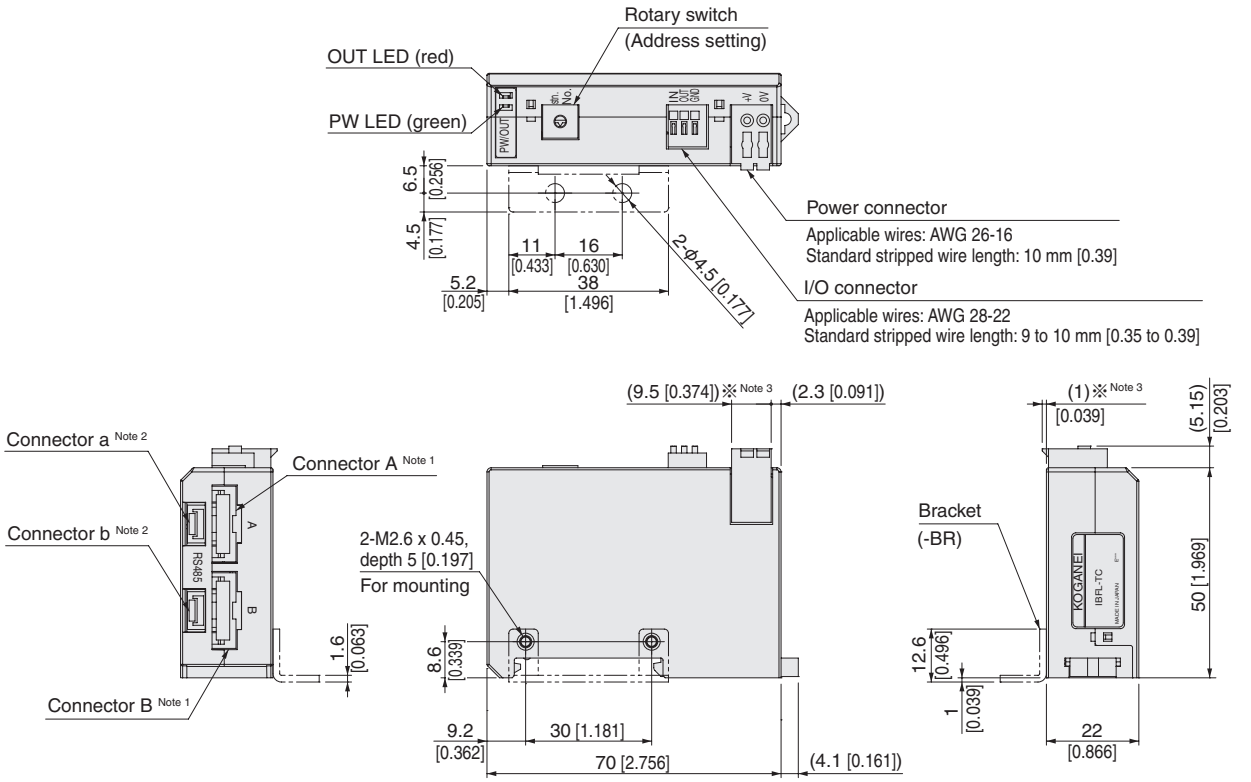
IBFL-K-□

Model	L
IBFL-K-1L	1000 [39.4]
IBFL-K-3L	3000 [118.1]



Takt Time Controller

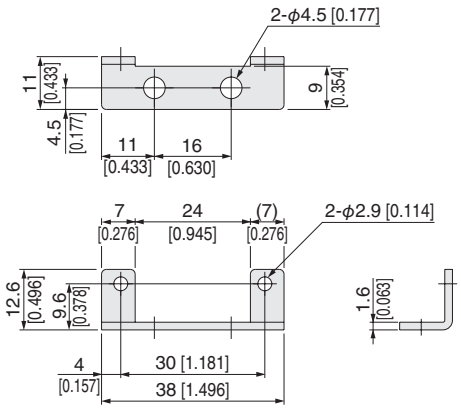
IBFL-TC



Note 1: Connector for connecting I/O cable to iB-Flow main unit.
2: Connectors to connect USB-RS485 converter, communication cable, and termination resistor.
Using connector a or b is the same.
3: Design installation to account for power connector ※ portion dimension when doing a direct installation of the controller.

Bracket (bracket for Takt Time Controller)

PSU-BR



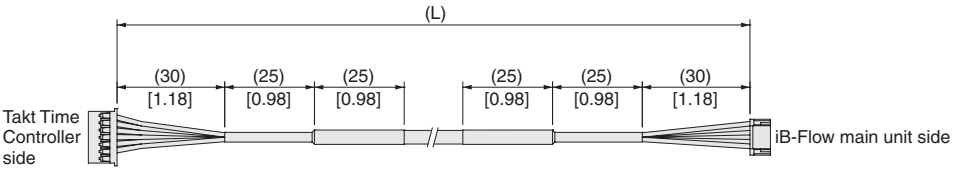
Hexagon socket head screw
M2.6 × 0.45, length 5 [0.20], 2 pcs. provided

Dimensions mm [in]

I/O cable (For iB-Flow main unit and Takt Time Controller connection)

IBFL-K-□

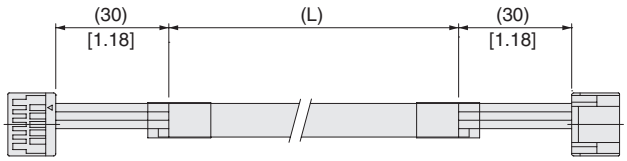
Model	L
IBFL-K-03L	300 [11.8]
IBFL-K-1L	1000 [39.4]
IBFL-K-3L	3000 [118]



Communication cable

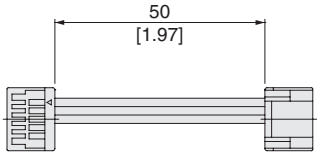
IBFL-K-□

Model	L
IBFL-K-1RL	1000 [39.4]
IBFL-K-3RL	3000 [118]



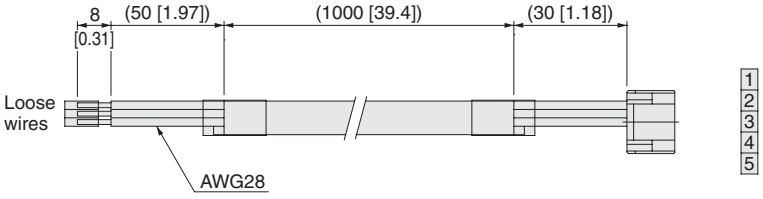
Communication cable

IBFL-K-005RL



Communication cable <no connector on one side (loose wires)>

IBFL-K-1RLN

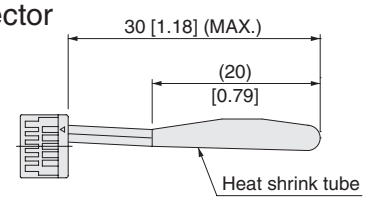


Connector terminal locations

No.	Name	Color
1	A	White
2	B	Pink
3	GND	Yellow
4		
5		

Termination resistor connector

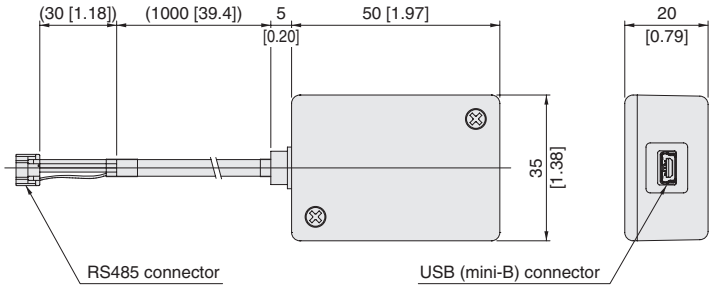
IBFL-K-TR

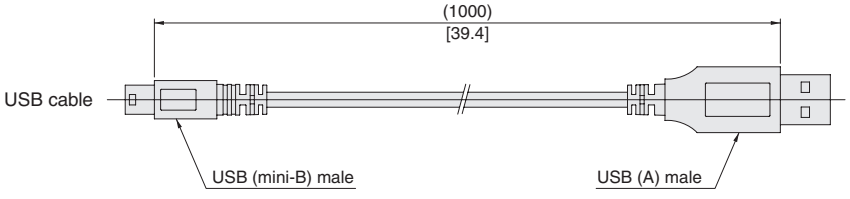


USB-RS485 converter

IBM2A-H1-□

Accessory cables
Blank: USB (mini-B) male ⇔ USB (A) male
N: No accessory cable





Memo

Memo

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.

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03/'12 30 ABAB

KOGANEI

No. BK-P029

http://www.koganei.co.jp

NEW Products

iB Series

iB-Flow

PAT. PEND.

Micro flow rate type

●Low-speed control of cylinders, and speed control of small-diameter cylinders are supported!

●Precise remote digital control of the micro flow rate is possible.

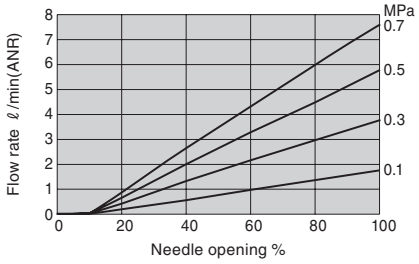
Specifications

Item \ Model		IBFL-J4M	IBFL-J6M
Tube outer diameter	mm	ø4	ø6
Medium		Air	
Operating pressure range	MPa [psi]	0.1 to 0.7 [14.5 to 102]	
Proof pressure	MPa [psi]	1.05 [152]	
Operating temperature range	°C [°F]	0 to 40 [32 to 104]	
Dielectric strength		500 VAC for one minute	
Insulation resistance		100 MΩ minimum at 500 VDC Megger	
Mass	g [oz]	34 [1.20]	
Flow rate (at 0.5 MPa [73 psi]) ℓ/min [ft³/min] (ANR)	Free flow	22 [0.78]	
	Control flow	5.5 [0.19]	

Note: Four index labels and two mini clamp wire mount plugs are included.
Supported wire diameter: AWG26-24, nominal cross section within 0.14 to 0.3 mm² [0.00022 to 0.00047 in²], insulation outside diameter 0.8 to 1.0 mm [0.031 to 0.039 in].
Note: Use a setting device that supports version 2.00 and later of the software.

Flow rate characteristics

IBFL-J4M
IBFL-J6M

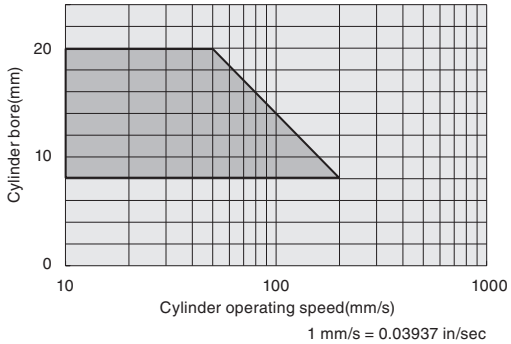


1 ℓ/min = 0.0353 ft³/min

Note: Flow rate characteristics are in accordance with Koganei measurement conditions. Note that there are variations in flow rate characteristics due to individual product difference, as well as piping conditions and other usage conditions.

Range of adjustments to the cylinder's operation time in Auto Set Mode (for reference)

The range of possible automatic adjustment is indicated by the area inside the line.
Use the following formula and the size of your cylinder to make your selection.
[Cylinder operating speed (mm/s) = cylinder stroke (mm)/cylinder operation time (s)]



1 mm/s = 0.03937 in/sec

IBFL-J4M
IBFL-J6M

Note 1:Contact us when using cylinders under ø6 because, the possible setting range varies according to conditions and the cylinder being used.
2:This selection graph was created based on results of measurements using Koganei Jig Cylinders C series and Basic Cylinders. Note that these may not be the limits depending on the operating conditions and the cylinder being used.

Order Codes

Main unit

IBFL - □ - □

iB-Flow

Bracket
Blank: None
MB: With J4M, J6M bracket

Size (Tube outer diameter)
J4M: ø4 micro flow rate type
J6M: ø6 micro flow rate type

About the control range

The micro flow rate type was added to the lineup for controlling low speed ranges, and small-diameter cylinders from ø8 to ø16.

Control range

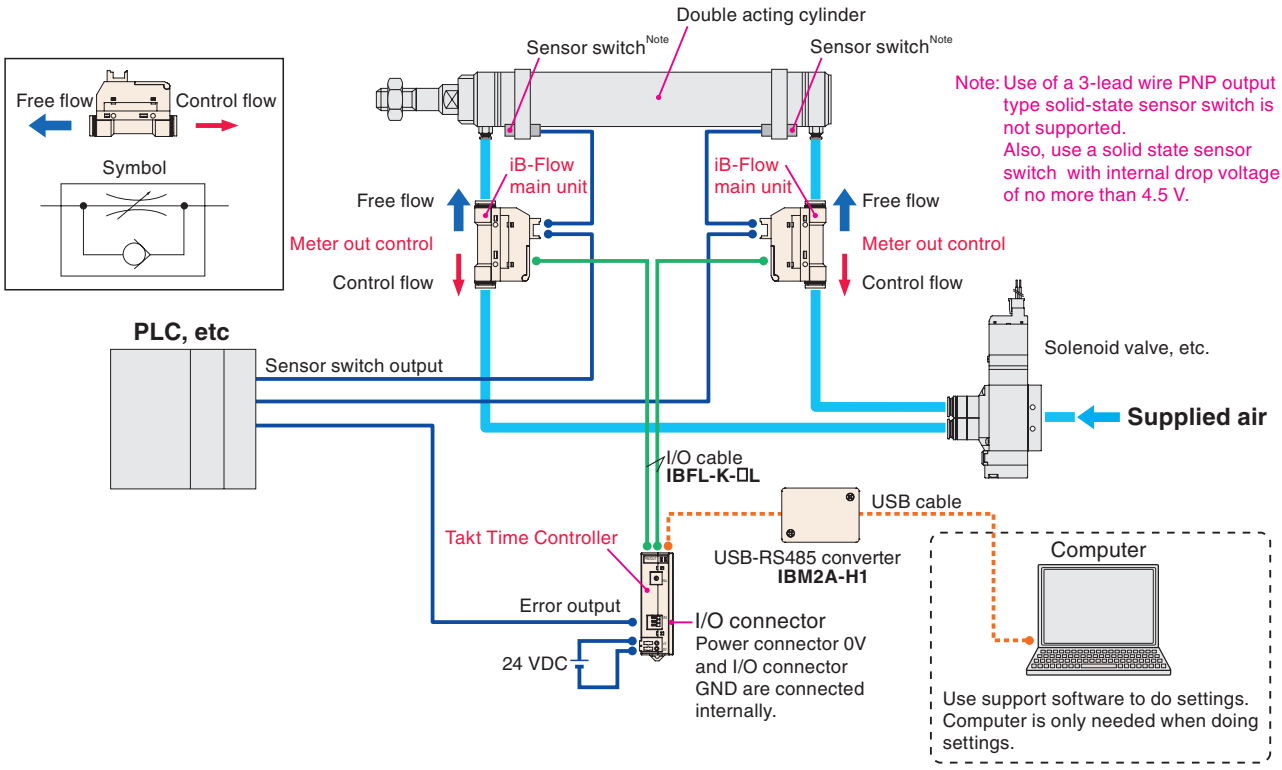
Control range of micro flow rate type: The and areas in the figure below.
Control range of low flow rate type: The and areas in the figure below.
Control range of standard type: The areas in the figure below.

Cylinder bore (mm)	Cylinder operating speed (mm/s) 1 mm/s = 0.03937 in/sec									
	30	40	50	60	75	100	150	200	300	400
ø8	Micro flow rate type									
ø10										
ø12										
ø16										
ø20										
ø25										
ø32	Low flow rate type						Standard type			
ø40										

Application example 1

Takt time controller is used to constantly monitor and correct cylinder takt time automatically.

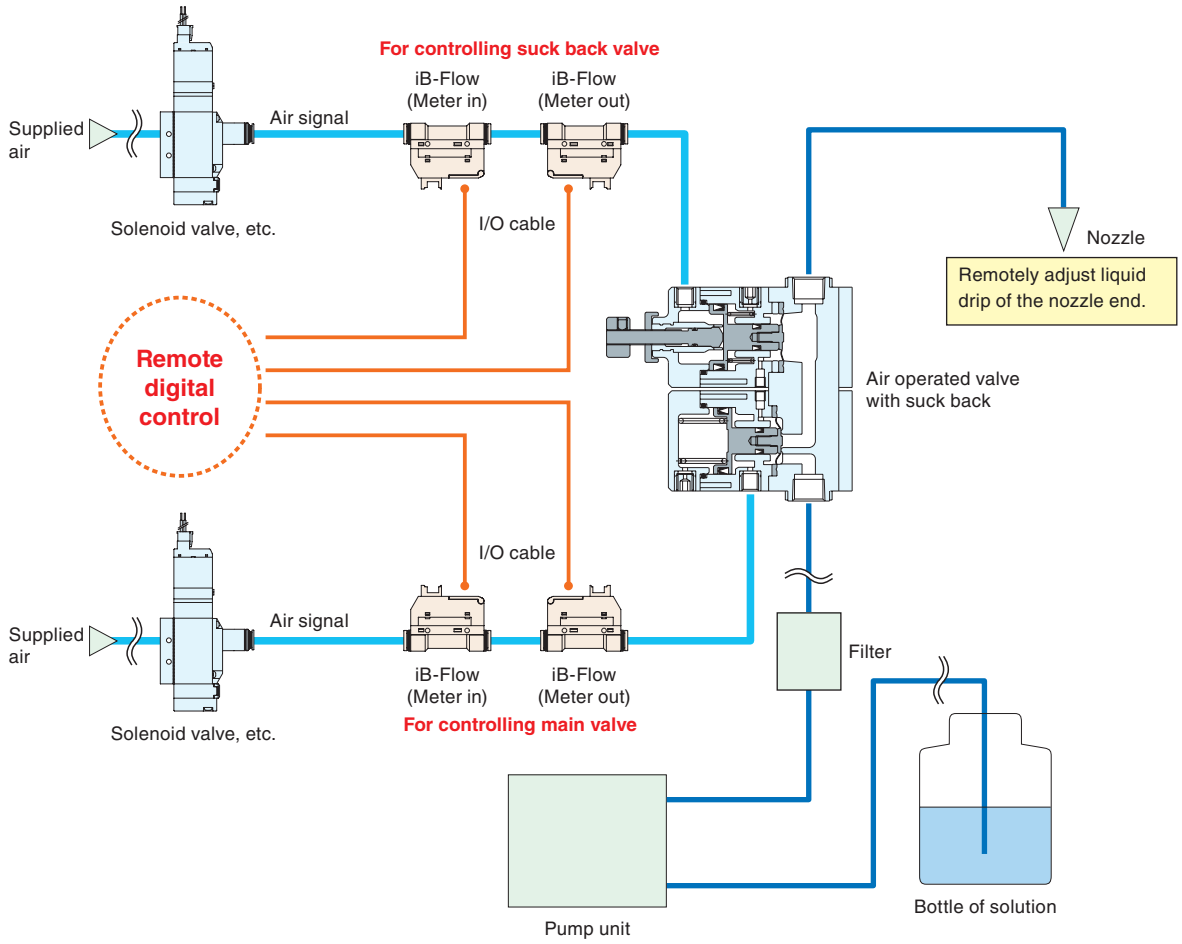
Air cylinders can operate continuously at set takt time.



Application example 2 (Front-end process of semiconductor fabrication)

Remote digital control of opening/closing speed for fluid control valves.

By enabling micro adjustment of the flow rate, it is possible to control air operated valves which require precise flow rate adjustment.



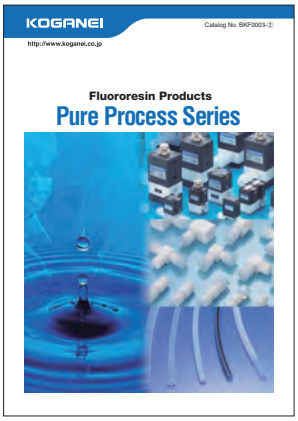
***Dimensions for the main unit are the same as for IBFL-J4□ and IBFL-J6□. See the following iB-Flow catalogs for dimensions and other operating information.**

CAUTION **Before use, be sure to read the "Safety Precautions" in the following iB-Flow catalog.**

Related catalogs

Constantly monitors and corrects cylinder takt time automatically.
iB-Flow Takt Time Controller.

iB-Flow
Catalog No. BK-A0006



Fluororesin Products
Pure Process Series

Pure Process Series
Catalog No. BKF0003-②

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.

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07/'14 05 ABAB

KOGANEI
http://www.koganei.co.jp

No.P405-②

NEW Products

Energy-saving for air blowing processes
Pulse blow series

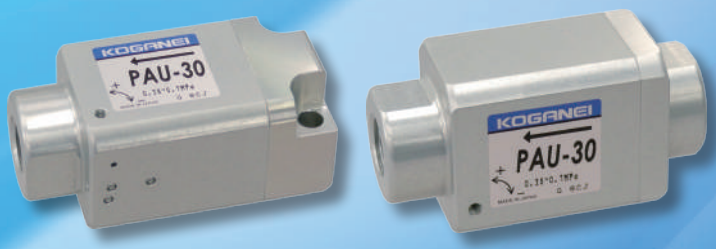
Compressed air is not for free!!

No electricity required!

Air consumption can be reduced nearly 50%

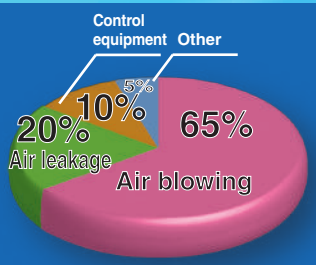
Generates pulse air without using electricity!

NEW Small-size pulse blow type



Pulse blow air gun PAG Series

Pulse blow unit PAU Series



Measures to reduce factory air consumption!

Air compressors are said to use about 20% of a factory's overall electric power. About 65% of that compressed air is usually consumed by blowing air. Pulse blow air gun can reduce the amount of compressed air consumption and help save energy.

World's first!

Pulse blow air gun

PAG Series

No electricity required!

Pulse air generator is built in

PAT. PEND.

Trimmer: Pulse frequency adjustment
Enables you to adjust the frequency with a flat blade screwdriver

Light weight design

194 g [6.84 oz]

* Main unit only

No electricity required

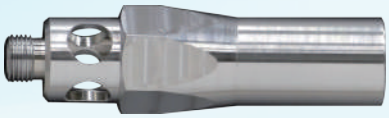
Valve built in

Pulsed air generation unit built in
You only need to connect compressed air

● Pulse blow flow rate guideline: 80 to 145 L/min [2.826 to 5.121 ft³/min]

Nozzle variations

Air amplifier nozzle



● The air volume is nearly 4.5 time larger (The flow consumption is the same as that of the standard nozzle ϕ 3 [0.118].)

● Standard nozzle orifice diameters
ϕ 2 mm [0.079 in.], ϕ 3 mm [0.118 in.], ϕ 4 mm [0.157 in.]

● Long nozzle (orifice diameter: ϕ 2.3 [0.091])
170 mm [6.693 in.],220 mm [8.661 in.]

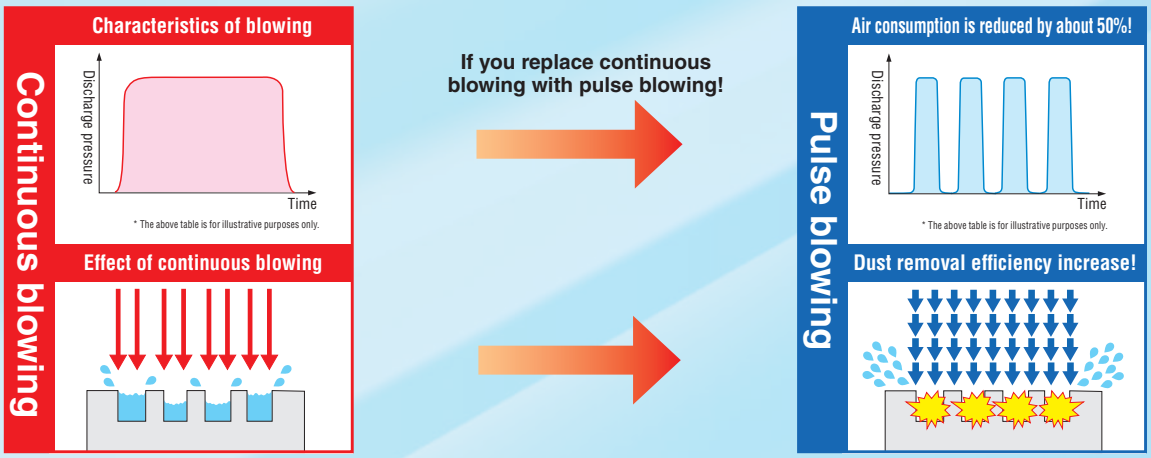
CO_2 reduction

We will help you in your CO_2 reduction activities (compressor electricity charge reduction).

	Pulse blow air gun Per PAG-2 unit	Standard Per PAU unit	Large flow rate type Per PAU-30 unit	Small-size type Per PAU-05 unit
Power kWh	2368 ➡ 1184	3068 ➡ 1534	7437 ➡ 3718	794 ➡ 397
CO_2 kg	1028 ➡ 514	1332 ➡ 666	3228 ➡ 1614	345 ➡ 172
Cost	Reduction of 5,960 yen/year	Reduction of 7,723 yen/year	Reduction of 18,718 yen/year	Reduction of 3,996 yen/year

Remarks: <<Conditions for the above calculations>> Daily operating hours: 2 hours, yearly operating days: 240 days, CO_2 emission factor (TEPCO value in 2020): 0.434kg-CO_2/kWh
Cost of compressed air per m³: 2.5 yen, * "Value for continuous blowing" ➡ "pulse blowing" according to our test conditions

Advantages of pulse blowing



More efficient dust removal!

It is said that pulse air blowing has higher dust removal efficiency than continuous air blowing because it applies impact to the dust removal target intermittently.

No electricity required!

Just attach a pulse blow unit to your air gun to use it as a pulse blow air gun

Small-size type PAU-05

● Pulse blow flow rate guideline: 10 to 55 L/min [0.353 to 1.943 ft³/min]

NEW

- **Small size, light weight**
  Entire length: 33.8 to 46.6 mm [1.331 to 1.835 in.], mass: 14 g [0.49 oz],15 g [0.53 oz]
- **Wide pipe variations** For details, refer to page ⑩ .
  IN piping: M5 internal thread, φ 4 [0.157] quick fitting, φ 6 [0.236] quick fitting, Rc1/8, R1/8, G1/8

-M5	-J4	-J6	-01A	-01B	-01C
(IN piping, M5 internal thread)	(IN piping, φ 4 quick fitting)	(IN piping, φ 6 quick fitting)	(IN piping, Rc1/8 internal thread)	(IN piping, R1/8 external thread)	(IN piping, G1/8 external thread)

Standard PAU

● Pulse blow flow rate guideline: 80 to 125 L/min [2.826 to 4.415 ft³/min]

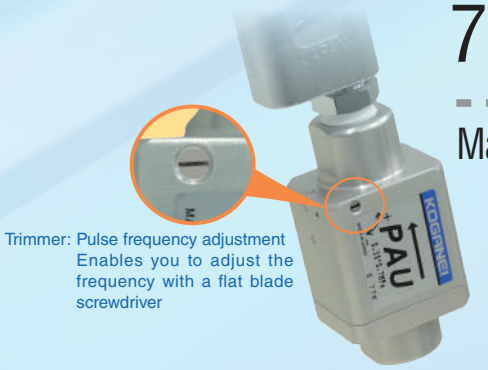
Light weight design

73 g [2.57 oz]

Main unit: Aluminum material

Mountable on a device

Can be mounted and used in air blowing processes by installing an additional mounting bracket.



Trimmer: Pulse frequency adjustment
Enables you to adjust the frequency with a flat blade screwdriver

Large flow rate type PAU-30

● Pulse blow flow rate guidelines: 160 to 270 L/min [5.651 to 9.536 ft³/min]

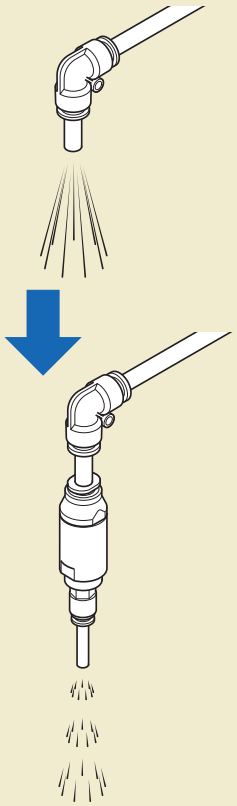
Direct mounting type

Double the flow rate!!

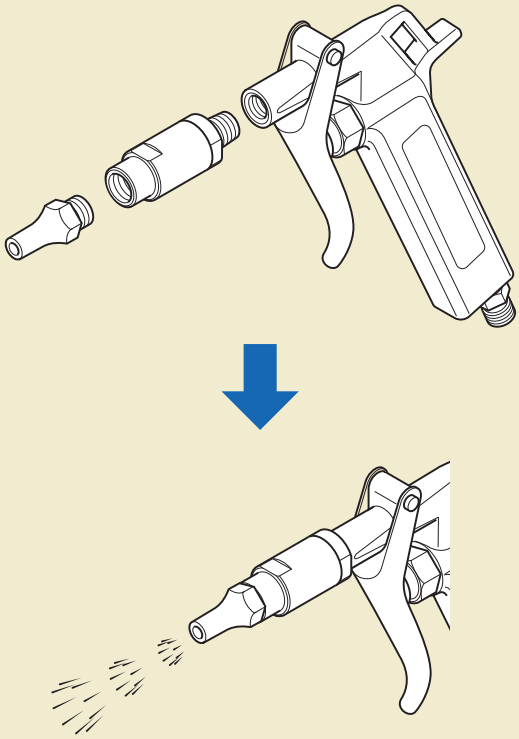
- **Doubled the flow rate for an improved performance of dust removal compared to PAU!**
- **Improved space economy by a volume of 130% (compared to PAU) despite giving 2 times the flow rate!**
- **Direct mounting makes it ideal for installation on your equipment! Brackets not required**

Applicable examples

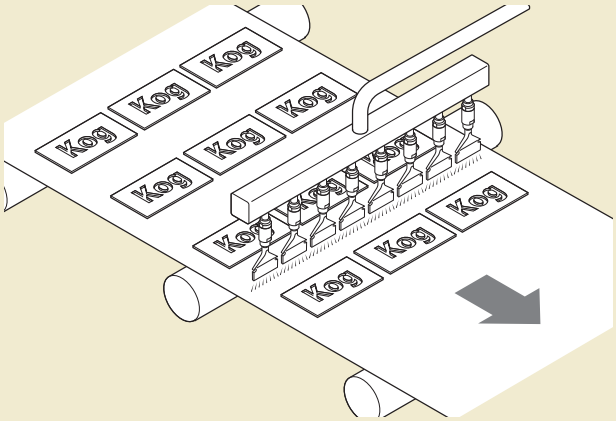
● Mount a small-size pulse blow unit at the tip of a piping tube.



● Mount a small-size pulse blow unit between an air gun and the tip of a nozzle.

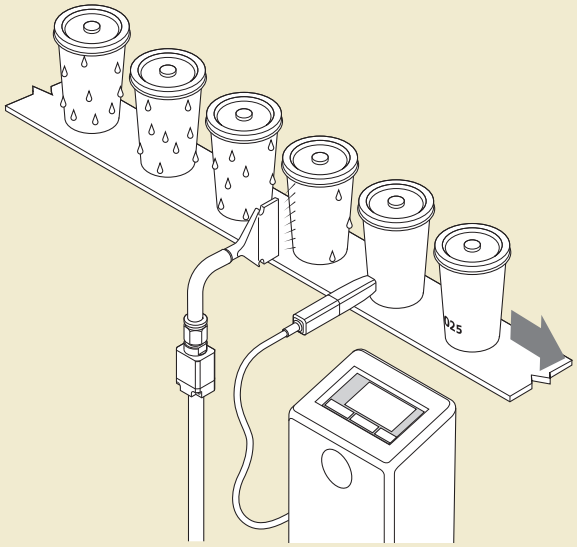


● To remove the dust adhering to the workpieces on a conveyor, mount multiple nozzle-attached small-size pulse blow units.

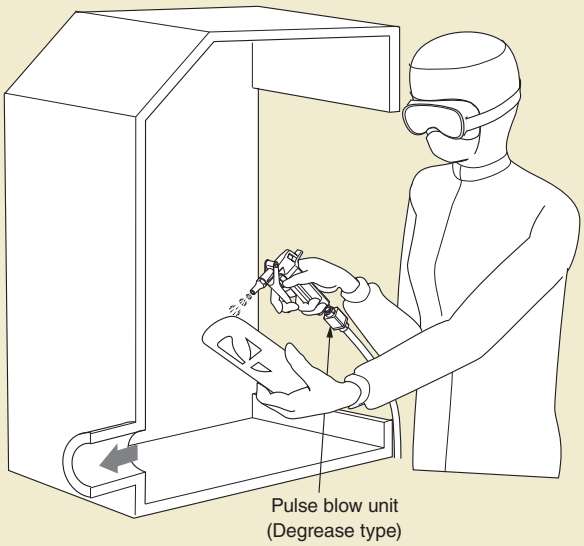


Applicable examples

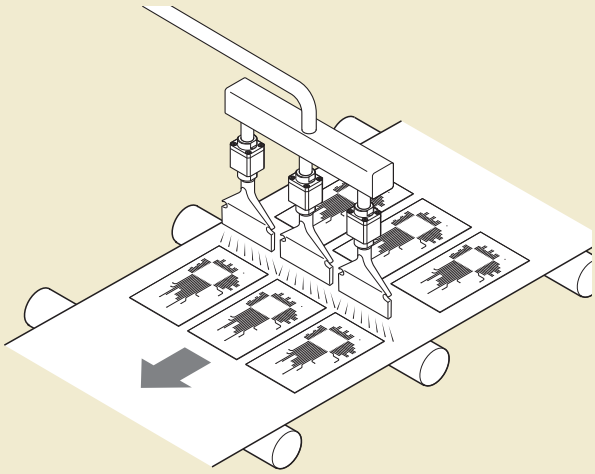
● To laser-print on workpieces on a conveyor after removing water drops adhering to them, use a nozzle-attached pulse blow unit.



● To remove the dust adhering to the workpieces in a clean box in a simple cleanroom, use a pulse blow unit-attached air gun.



● To remove the dust adhering to the workpieces on a conveyor, mount three nozzle-attached pulse blow units.



Pulse blow air gun

PAG Series

Specifications

Item \ Model		PAG - □
Medium		Air[Note 1]
Lubrication		No
Operating pressure range MPa [psi]		0.35 to 0.7 [51 to 102]
Operating temperature range °C [°F]		5 to 50 [41 to 122]
Pulse frequency Hz		5 to 15
Port size		Piping side: Rc1/4 Nozzle side: G1/8
Nozzle diameter[Note 2] mm [in.]		Standard nozzle: ϕ2 [0.079], ϕ3 [0.118], ϕ4 [0.157]/long nozzle: ϕ2.3 [0.091]/air amplifier nozzle: ϕ3 [0.118]
Mass g [oz]		194 [6.84] (main unit only)
Material	Main unit cover	PBT resin
	Lever	POM resin

Note 1: Air that is used should be clean air that contains no oil, solids, or other contaminants.
If drainage water, dust, and other contaminants get into the pulse blow air gun, they could cause defective operation.
Note 2: This product is equipped with a nozzle when shipped. Wrap sealing tape around the threads of the nozzle when assembling the product.
Note 3: This product uses grease internally.

Order codes

● Main unit

PAG- □

Nozzle diameter
N: No nozzle
2: ϕ 2 mm [0.079 in.] standard nozzle
3: ϕ 3 mm [0.118 in.] standard nozzle
4: ϕ 4 mm [0.157 in.] standard nozzle

● Additional parts (individual nozzles)

・Standard nozzle

PAGZ- □

Nozzle diameter
2: ϕ 2 mm [0.079 in.] standard nozzle
3: ϕ 3 mm [0.118 in.] standard nozzle
4: ϕ 4 mm [0.157 in.] standard nozzle

(Standard nozzle)

・Air amplifier nozzle (ϕ 3 mm [0.118 in.])

PAGZ-ZN3

(Air amplifier nozzle)

・Long nozzle

PAGZ-45× □

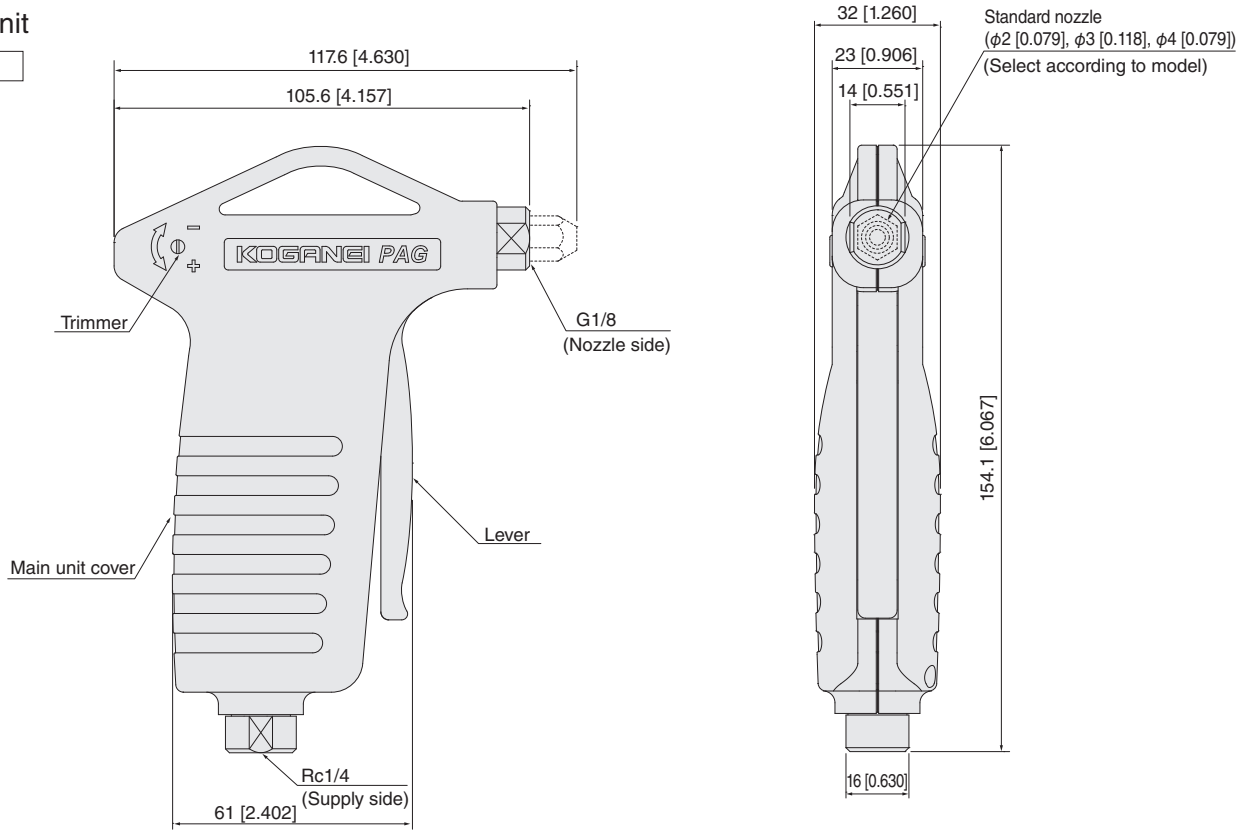
Nozzle length
150: ϕ 2.3 mm [0.091 in.] long nozzle with a length of 170 mm [6.693 in.]
200: ϕ 2.3 mm [0.091 in.] long nozzle with a length of 220 mm [8.661 in.]

(Long nozzle)

Dimensions (mm [in.])

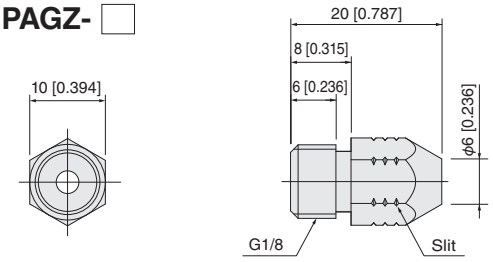
● Main unit

PAG-□



● Standard nozzle (identifier: number of slits)

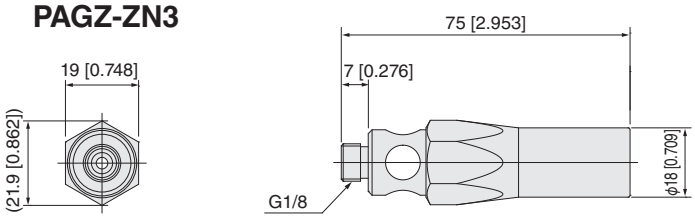
PAGZ-□



Number of slits	Nozzle diameter (mm [in.])
2	ϕ 2 [0.079]
3	ϕ 3 [0.118]
4	ϕ 4 [0.157]

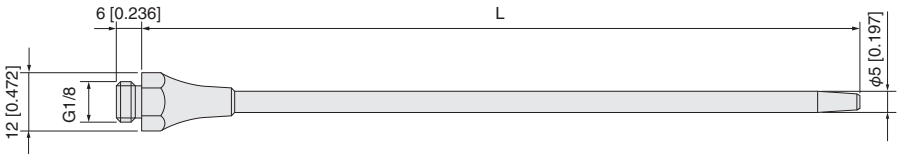
● Air amplifier nozzle

PAGZ-ZN3



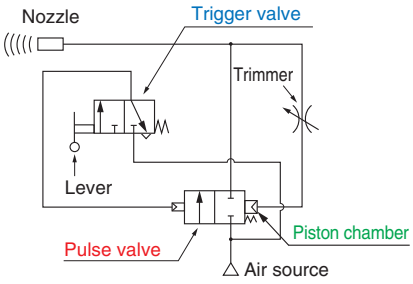
● Long nozzle

PAGZ-45×□



Model	L(mm [in.])
PAGZ-45×150	170 [6.693]
PAGZ-45×200	220 [8.661]

Operation principle



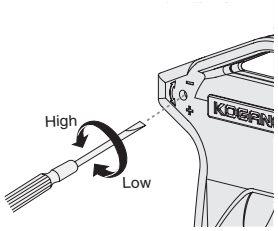
1. Pulling the lever sends a signal from the trigger valve to open the pulse valve.
2. The pulse valve opens, and air is output from the nozzle.
3. Some of the air that is output from the pulse valve goes through the trimmer to accumulate in the piston chamber.
4. When some air has accumulated, the pulse valve closes so that air output from the nozzle stops and at the same time the air in the piston chamber is exhausted.
5. A certain amount of air is exhausted from the piston chamber, the pulse valve opens again, and air is output from the nozzle.
   Steps 3 to 5 are then repeated. * The pulse frequency can be adjusted by using the trimmer.

Frequency adjustment method

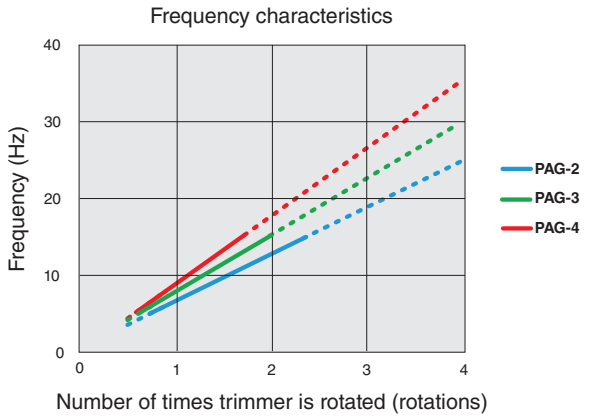
The pulse frequency can be adjusted by rotating the frequency adjustment trimmer, as shown in the figure at right.
Use a precision flat blade screwdriver for adjustments.

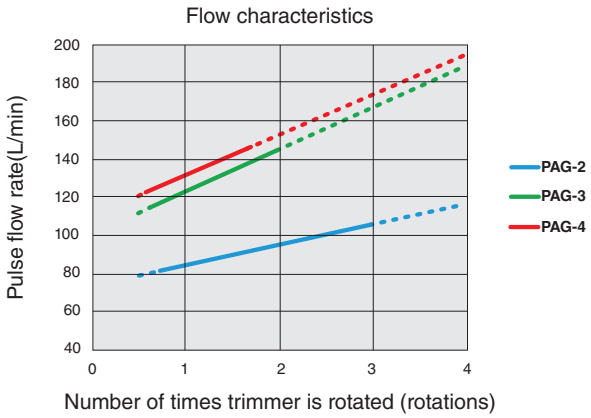
Toward + (counterclockwise): Increases frequency.
Toward - (clockwise): Decreases frequency.

Note: Turning the trimmer counterclockwise raises the frequency and turning it clockwise lowers the frequency. However, turning the trimmer further than needed, after fully opening or closing it, may damage component parts.



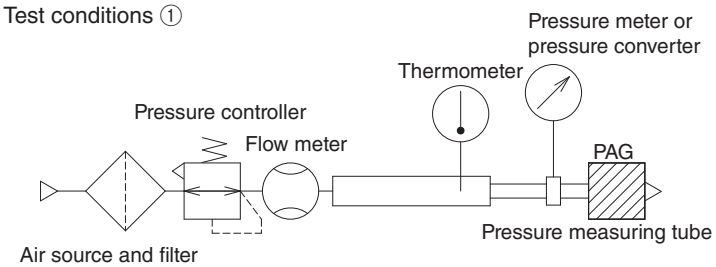
Characteristics of the frequency and flow according to the number of rotations of the trimmer (standard nozzle)





Note 1: According to our test conditions ① .
Note 2: The characteristics of the frequency and the flow vary depending on the piping conditions and the nozzle used.
Note 3: Use devices within the pulse frequency ranges (5 to 15 Hz) shown in the specification tables.
Note 4: Contact us regarding the long nozzle and air amplifier nozzle.

Test conditions ①

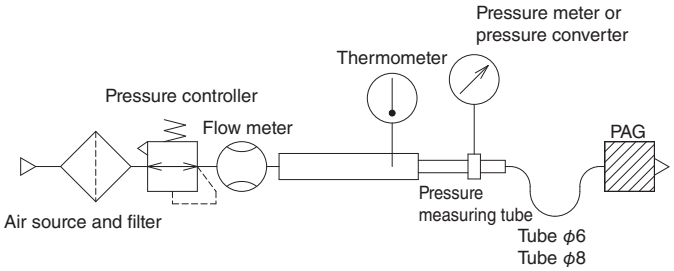


Operations according to piping conditions for pulse blow air guns (standard nozzle)

Operations may be unstable, depending on the piping conditions on the supply side. See the following table.

Model	Operating pressure	Tube ϕ 6 [0.236]			Tube ϕ 8 [0.315]		
		1000 mm [39.370 in.]	3000 mm [118.1 in.]	5000 mm [196.9 in.]	1000 mm [39.370 in.]	3000 mm [118.1 in.]	5000 mm [196.9 in.]
PAG-2	0.35 MPa [51 psi]	○	○	○	○	○	○
	0.5 MPa [73 psi]	○	○	○	○	○	○
	0.7 MPa [102 psi]	○	○	○	○	○	○
PAG-3	0.35 MPa [51 psi]	○	×	×	○	○	○
	0.5 MPa [73 psi]	○	×	×	○	○	○
	0.7 MPa [102 psi]	○	○	×	○	○	○
PAG-4	0.35 MPa [51 psi]	○	×	×	○	○	○
	0.5 MPa [73 psi]	○	×	×	○	○	○
	0.7 MPa [102 psi]	○	×	×	○	○	○

Test conditions ②



Note 1: ○ : Stable operations ×: Unstable operations (according to our test conditions ②)

Note 2: Operations will be unstable if the piping conditions cause pressure drops or insufficient flow.

Note 3: Contact us regarding the long nozzle and air amplifier nozzle.

Handling precautions

⚠ Warning

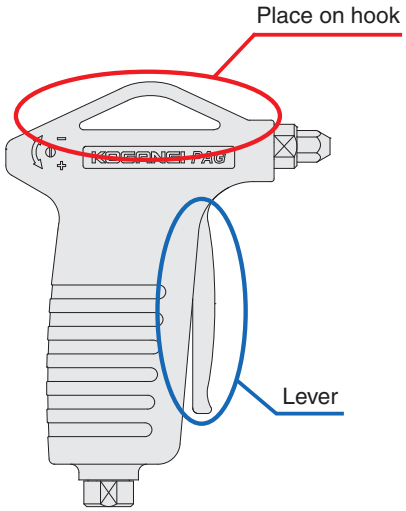
- Do not point the tip of the nozzle at a person.
- Use safety glasses and earplugs because blowing air could blow objects into people's eyes or cause hearing loss.
- Install a cutoff valve on the supply side to ensure safety in case of leaks or damage.

⚠ Caution

- Air containing oil or solids cannot be used. Use cleaned air for the medium (use a filter that has a filtration rating of 40 µm or less). If drainage water, dust, and other contaminants get into this product, they could cause defective operation.
- Pass the medium through a device, such as a freeze-type air dryer or after cooler, to lower the dew-point temperature of the medium to below the ambient temperature so condensation or frost does not occur when the products are blowing.
- Use this product within the pulse frequency ranges shown in the specification tables.
- This product operates on a balance of pressure, so supply enough pressure and volume to keep the pulse operation steady.
- Use a wrench to hold down the flat part of the product, and then tighten within the following torque ranges when piping the supply port and screwing the nozzle.

  Supply side recommended tightening torque: 7 to 9 N·m [61.957 to 79.659 in·lbf]
  Nozzle side recommended tightening torque: 4.5 to 6.5 N·m [39.830 to 57.532 in·lbf]

- Use tubing with an exterior that is not damaged. Do not allow tubing to become severely bent or twisted near the supply port. Doing so could cause air leakage.
- If you leave the product in a location where there is a lot of dust in the air or in a location where dust can be scattered, dust could get inside the product and cause defective operation.
- Do not subject the tip of the nozzle to excessive external force. Doing so could result in damage.
- Applying pressure from the nozzle side could cause defective operation or damage.
- Do not drop, step on, or dump the product. Doing so could result in damage.
- After using this product, put it on a hook or something to store it. Hooking it by the lever could cause defective operation or damage.



⚠ Caution * Read "Safety precautions" on the general catalog website before using this product.

Small-size pulse blow unit

PAU-05 Series

Specifications

Item \ Model and piping specifications		PAU-05- □					
		M5	J4	J6	01A	01B	01C
Medium		Air					
Operating pressure range MPa [psi]		0.2 to 0.5 [29 to 73]					
Pulse frequency Hz		20 ± 5 (when 0.5 MPa [73 psi] is applied)Note					
Operating temperature range °C [°F]		5 to 50 [41 to 122]					
Material		Main unit: Aluminum alloy IN port: Aluminum alloy (for -J4 and -J6, PBT)					
Mass g [oz]		14 [0.49]	14 [0.49]	14 [0.49]	15 [0.53]	15 [0.53]	15 [0.53]
Port size	IN port	M5x0.8	φ4 [0.157] fitting	φ6 [0.236] fitting	Rc1/8	R1/8	G1/8
	OUT port	M5x0.8	M5x0.8	Rc1/8	Rc1/8	Rc1/8	G1/8

Note 1: The frequency cannot be adjusted. This is the frequency of the pulses generated when 0.5 MPa [73 psi] is applied. For details, refer to "Characteristics of the frequency and flow according to pressure" on page ⑩ .

Note 2: Air that is used should be clean air that contains no oil, solids, or other contaminants.If drainage water, dust, and other contaminants get into the pulse blow unit, they could cause defective operation.

Note 3: This product uses grease internally.

Order codes

● Main unit

PAU-05- □

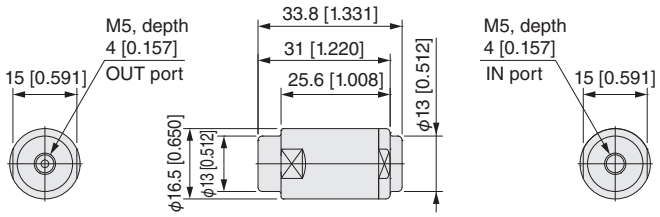
Port size

M5	: IN piping, M5 (internal thread)	OUT piping, M5 (internal thread)
J4	: IN piping, φ 4 [0.157] quick fitting	OUT piping, M5 (internal thread)
J6	: IN piping, φ 6 [0.236] quick fitting	OUT piping, Rc1/8
01A	: IN piping, Rc1/8	OUT piping, Rc1/8
01B	: IN piping, R1/8	OUT piping, Rc1/8
01C	: IN piping, G1/8 (external thread)	OUT piping, G1/8 (internal thread)

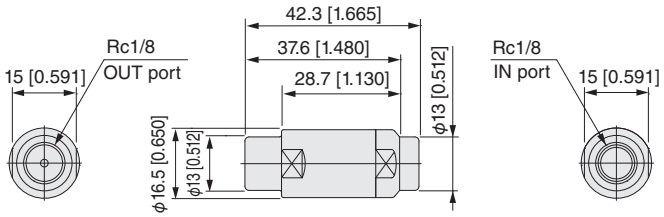
Remarks: No mounting brackets for securing are not supplied. If you want to secure the product, supply a mounting bracket for securing by yourself.
<<Recommended mounting bracket>>
● Akagi Co., Ltd. Resin band (color: light gray) CLIC standard
Model number: A10530-0284

Dimensions (mm [in.])

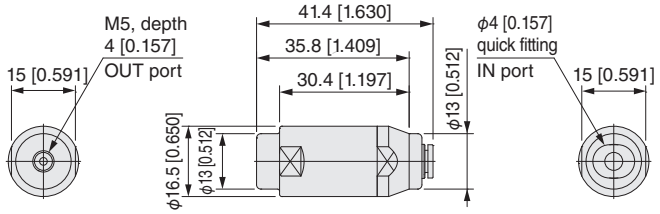
● PAU-05-M5



● PAU-05-01A



● PAU-05-J4



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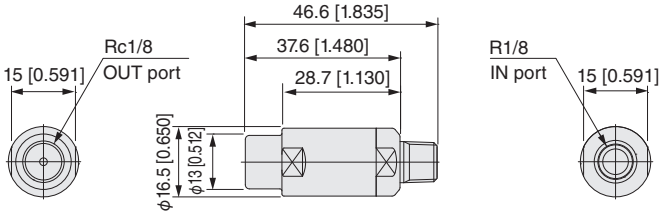
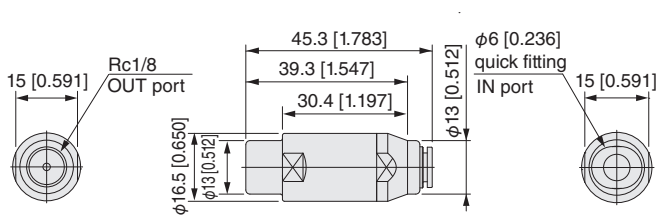
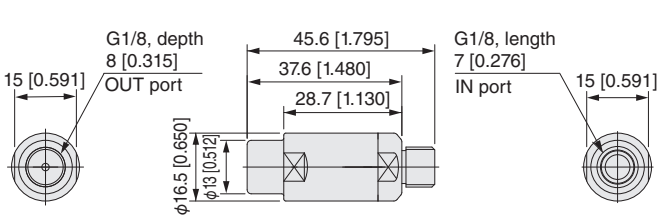


● PAU-05-J6



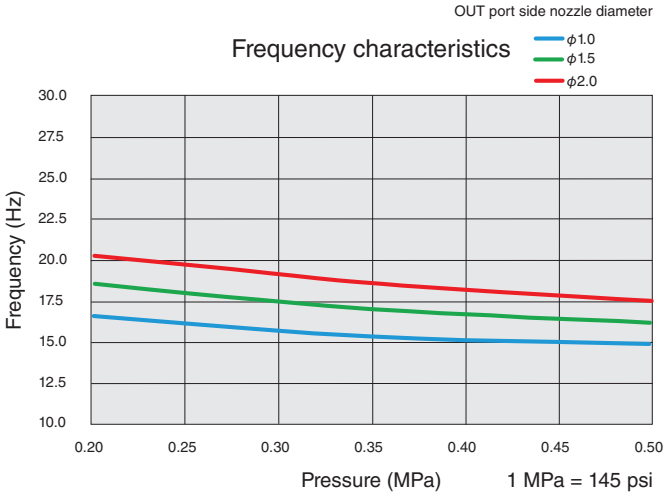
● PAU-05-01C

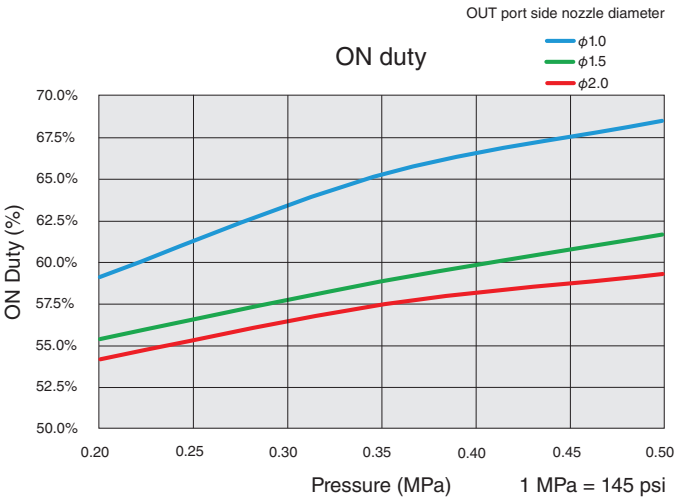


Appearance of IN piping and OUT piping

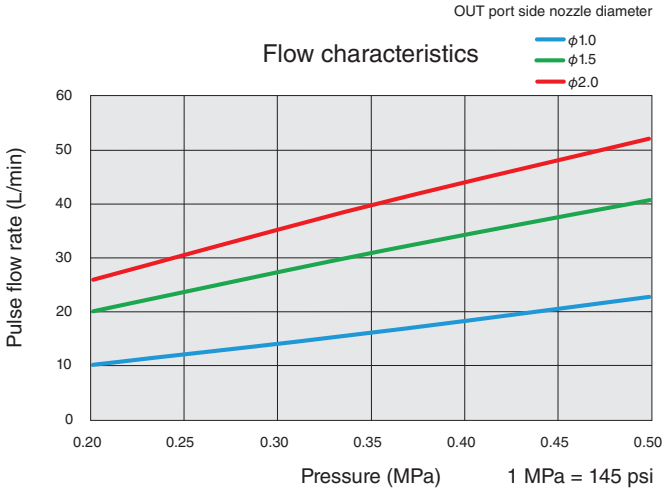
Piping \ Model	PAU-05-M5	PAU-05-J4	PAU-05-J6	PAU-05-01A	PAU-05-01B	PAU-05-01C
IN piping						
Port size	M5 (internal thread)	ϕ 4 [0.157] quick fitting	ϕ 6 [0.236] quick fitting	Rc1/8 (internal thread)	R1/8 (external thread)	G1/8 (external thread)
OUT piping						
Port size	M5 (internal thread)	M5 (internal thread)	Rc1/8 (internal thread)	Rc1/8 (internal thread)	Rc1/8 (internal thread)	G1/8 (internal thread)

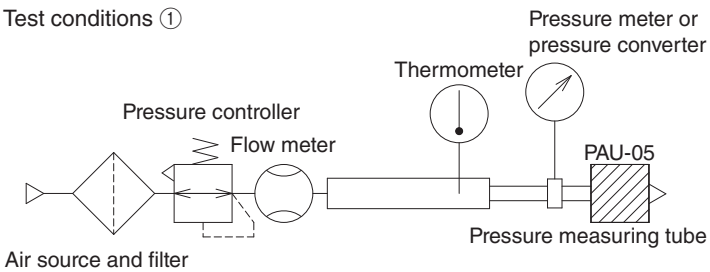
Characteristics of the frequency and flow according to pressure





<<Interpretation of the above graphs>>
When the pressure is 0.35 MPa [51 psi] and the nozzle diameter is ϕ 2 [0.079], the frequency is 19 Hz and the ON duty is 57.5%. The air reduction at this time is 42.5%.





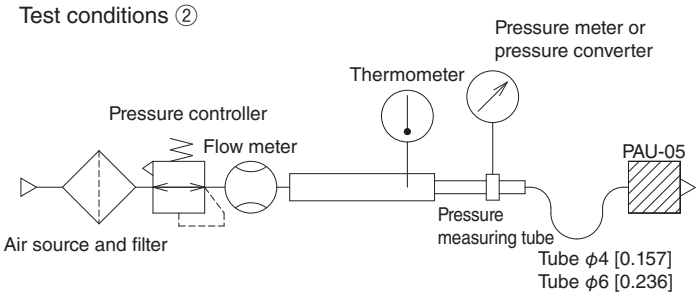
Note 1: According to our test conditions ① .
Note 2: The characteristics of the frequency and the flow vary depending on the piping conditions and the nozzle used.

Operations according to piping conditions for pulse blow units

Operations may be unstable, depending on the piping conditions on the IN port side. See the following table.

Nozzle diameter	Operating pressure	Tube ϕ 4 [0.157]			Tube ϕ 6 [0.236]		
		1000 mm [39.370 in.]	3000 mm [118.1 in.]	5000 mm [196.9 in.]	1000 mm [39.370 in.]	3000 mm [118.1 in.]	5000 mm [196.9 in.]
ϕ 1.0 [0.039]	0.20 MPa [29 psi]	○	○	○	○	○	○
	0.35 MPa [51 psi]	○	○	○	○	○	○
	0.50 MPa [73 psi]	○	○	○	○	○	○
ϕ 1.5 [0.059]	0.20 MPa [29 psi]	○	○	○	○	○	○
	0.35 MPa [51 psi]	○	○	○	○	○	○
	0.50 MPa [73 psi]	○	○	○	○	○	○
ϕ 2.0 [0.079]	0.20 MPa [29 psi]	○	○	×	○	○	○
	0.35 MPa [51 psi]	○	○	○	○	○	○
	0.50 MPa [73 psi]	○	○	○	○	○	○

Test conditions ②



Note 1: ○ : Stable operations ×: Unstable operations (according to our test conditions ②)

Note 2: Operations will be unstable if the piping conditions cause pressure drops or insufficient flow.

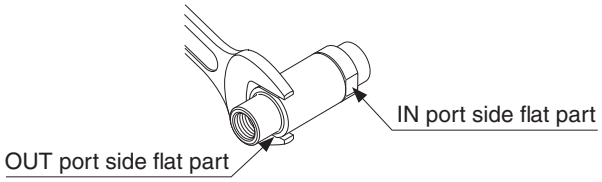
Handling precautions

⚠ Warning

- Use safety glasses and earplugs because blowing air could blow objects into people's eyes or cause hearing loss.
- Install a cutoff valve on the IN port side to ensure safety in case of leaks or damage.

⚠ Caution

- Air containing oil or solids cannot be used. Use cleaned air for the medium (use a filter that has a filtration rating of 40 µm or less). If drainage water, dust, and other contaminants get into this product, they could cause defective operation.
- Pass the medium through a device, such as a freeze-type air dryer or after cooler, to lower the dew-point temperature of the medium to below the ambient temperature so condensation or frost does not occur when the products are blowing.
- This product operates on a balance of pressure, so supply enough pressure and volume to keep the pulse operation steady.
- It is recommended to make a one-to-one connection between this product and an air blow gun or a nozzle.
- If you want to install this product apart from the cutoff valve and other parts, make sure that the distance does not exceed 3 m [9.840 ft] on the primary side if using a ϕ4 [0.157]×2.5 tube. On the secondary side, it is recommended to connect a nozzle directly.
- The piping work is as follows: Use a wrench to hold down the "IN port side flat part" when piping the IN port and the "OUT port side flat part" when piping the OUT port, and then tighten within the following torque range. Performing the piping work by using other flat parts could cause damage to the product.



Screw size	M5×0.8	Rc1/8, R1/8, G1/8
Recommended tightening torque N·m [in·lbf]	1 to 1.5 [8.851 to 13.277]	4.5 to 6.5 [39.830 to 57.532]

- Use tubing with an exterior that is not damaged. Do not allow tubing to become severely bent or twisted near the IN port. Doing so could cause air leakage.
- Do not mount this product on the secondary side of an electrostatic eliminator.Doing so will reduce the neutralization function of air blowing considerably.

⚠ Caution

* Read "Safety precautions" on the general catalog website before using this product.

Pulse blow unit

PAU Series

Specifications

Item		Model PAU
Medium		Air
Operating pressure range	MPa [psi]	0.35 to 0.7 [51 to 102]
Pulse frequency	Hz	5 to 15
Operating temperature range	°C [°F]	5 to 50 [41 to 122]
Mass	g [oz]	73 [2.57]
Material	Main unit	Aluminum alloy
	Bracket	Mild steel (nickel plated)
Port size		IN: Rc1/4
		OUT: G1/4

Note 1: Air that is used should be clean air that contains no oil, solids, or other contaminants.
If drainage water, dust, and other contaminants get into the pulse blow unit, they could cause defective operation.
Note 2: This product uses grease internally.

Order codes

● Main unit

PAU- □

Bracket
Blank: No bracket
21: With bracket (attached)

● Additional parts (sold separately)

Bracket (Two M3 screws attached)

PAUZ-21

* The projection-type trimmer type is also available.

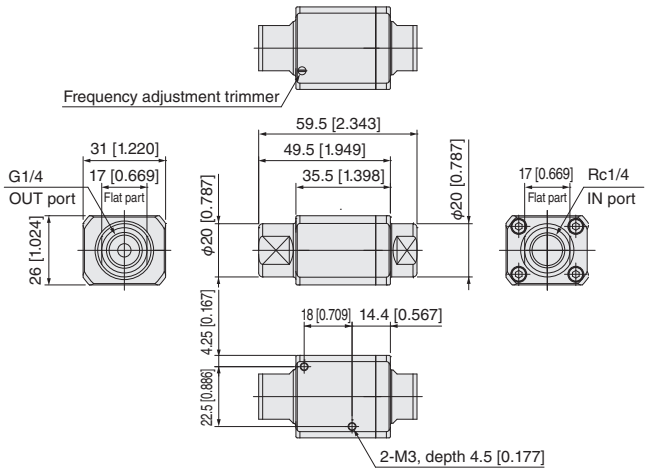
PAU- □ **-3W**

Bracket
Blank: No bracket
21: With bracket (attached)

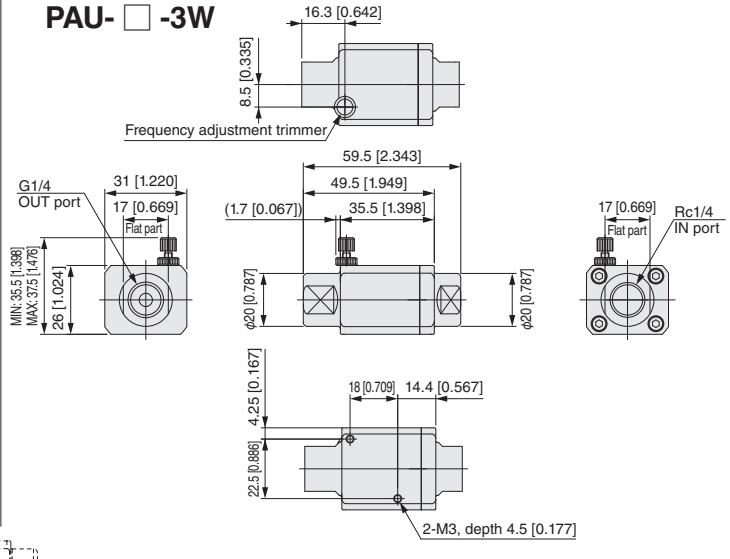
Dimensions (mm [in.])

● Main unit

PAU



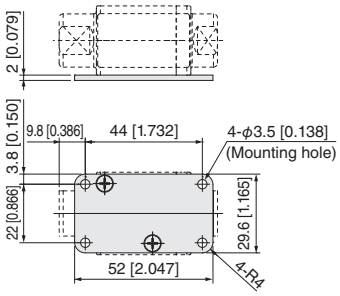
PAU- □ **-3W**



Additional parts (sold separately)

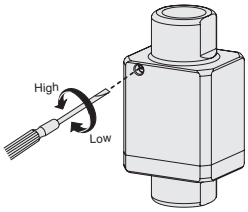
● Bracket

PAUZ-21



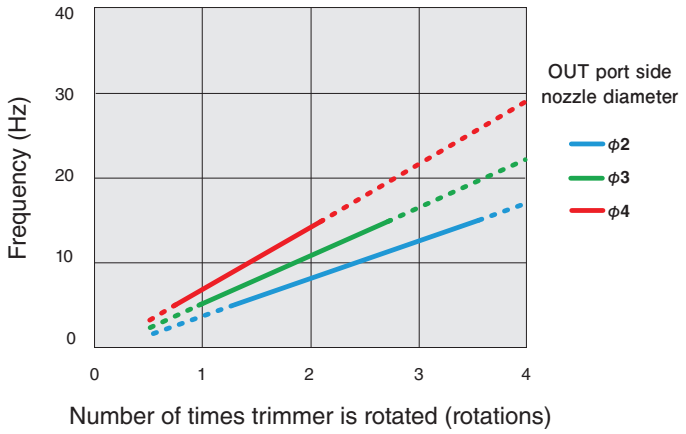
Frequency adjustment method

The pulse frequency can be adjusted by rotating the frequency adjustment trimmer, as shown in the figure at right.
Use a precision flat blade screwdriver for adjustments.
Turn it in the + direction (counterclockwise direction) to increase the frequency.
Turn it in the - direction (clockwise direction) to decrease the frequency.
Note: Turning the trimmer counterclockwise increases the frequency and turning it clockwise decreases the frequency. Turning the trimmer more than necessary after turning it fully clockwise or counterclockwise may damage the components.

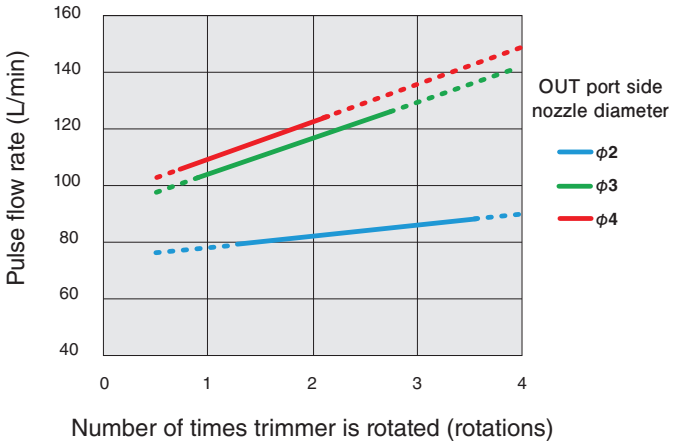


Characteristics of the frequency and flow according to the number of rotations of the trimmer

Frequency characteristics

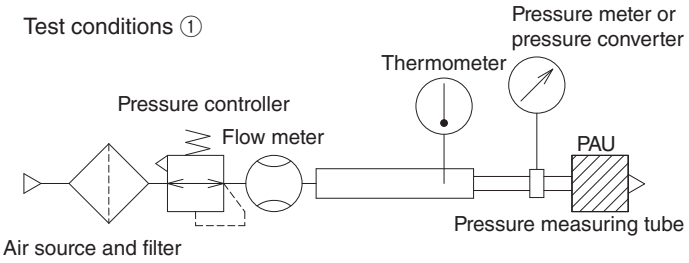


Flow characteristics



Note 1: According to our test conditions ① .
Note 2: The characteristics of the frequency and the flow vary depending on the piping conditions and the nozzle used.
Note 3: Use this product within the pulse frequency ranges shown in the specification tables (5 to 15 Hz).

Test conditions ①

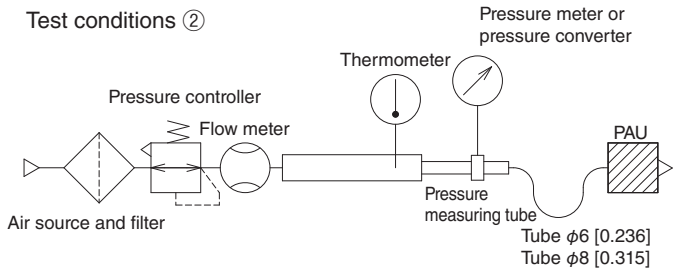


Operations according to piping conditions for pulse blow units

Operations may be unstable, depending on the piping conditions on the IN port side. See the following table.

Nozzle diameter	Operating pressure	Tube ϕ 6 [0.236]			Tube ϕ 8 [0.315]		
		1000 mm [39.370 in.]	3000 mm [118.1 in.]	5000 mm [196.9 in.]	1000 mm [39.370 in.]	3000 mm [118.1 in.]	5000 mm [196.9 in.]
ϕ 2 [0.079]	0.35 MPa [51 psi]	○	○	○	○	○	○
	0.5 MPa [73 psi]	○	○	○	○	○	○
	0.7 MPa [102 psi]	○	○	○	○	○	○
ϕ 3 [0.118]	0.35 MPa [51 psi]	○	○	×	○	○	○
	0.5 MPa [73 psi]	○	○	○	○	○	○
	0.7 MPa [102 psi]	○	○	○	○	○	○
ϕ 4 [0.157]	0.35 MPa [51 psi]	○	×	×	○	○	○
	0.5 MPa [73 psi]	○	×	×	○	○	○
	0.7 MPa [102 psi]	○	×	×	○	○	○

Test conditions ②



Note 1: ○ : Stable operations ×: Unstable operations (according to our test conditions ②)
Note 2: Operations will be unstable if the piping conditions cause pressure drops or insufficient flow.

Handling precautions

⚠ Warning

- Use safety glasses and earplugs because blowing air could blow objects into people's eyes or cause hearing loss.
- Install a cutoff valve on the IN port side to ensure safety in case of leaks or damage.

⚠ Caution

- Air containing oil or solids cannot be used. Use cleaned air for the medium (use a filter that has a filtration rating of 40 µm or less). If drainage water, dust, and other contaminants get into this product, they could cause defective operation.
- Pass the medium through a device, such as a freeze-type air dryer or after cooler, to lower the dew-point temperature of the medium to below the ambient temperature so condensation or frost does not occur when the products are blowing.
- Use this product within the pulse frequency ranges shown in the specification tables.
- This product operates on a balance of pressure, so supply enough pressure and volume to keep the pulse operation steady.
- It is recommended to make a one-to-one connection between this product and the air blow gun or a nozzle.
- If you want to install this product apart from the air blow gun or nozzle, a ϕ8 [0.315]×6 tube and a distance not exceeding 2 m [6.560 ft] are recommended.
- Use a wrench to hold down the flat part of the product, and then tighten within the following torque range when piping the IN port and the OUT port.

Recommended tightening torque N·m [in·lbf]	PAU
	7 to 9 [61.957 to 79.659]

- Use tubing with an exterior that is not damaged. Do not allow tubing to become severely bent or twisted near the IN port. Doing so could cause air leakage.
- Do not mount this product on the secondary side of an electrostatic eliminator.Doing so will reduce the neutralization function of air blowing considerably.

⚠ Caution * Read "Safety precautions" on the general catalog website before using this product.

Pulse blow unit

PAU Series
Large flow rate type

Specifications

Item \ Model		PAU-30-02 (-25)	PAU-30-03 (-25)
Medium		Air	
Operating pressure range MPa [psi]		0.35 to 0.7 [51 to 102]	
Pulse frequency Hz		5 to 15	
Operating temperature range °C [°F]		5 to 50 [41 to 122]	
Mass g [oz]		105 [3.70] (113 [3.99])	100 [3.53] (108 [3.81])
Material		Aluminum alloy	
Port size	IN	Rc1/4	Rc3/8
	OUT		

Note 1: Air that is used should be clean air that contains no oil, solids, or other contaminants.
If drainage water, dust, and other contaminants get into the pulse blow unit, they could cause defective operation.
Note 2: This product uses grease internally.

Order codes

● Main unit

PAU-30- □ - □

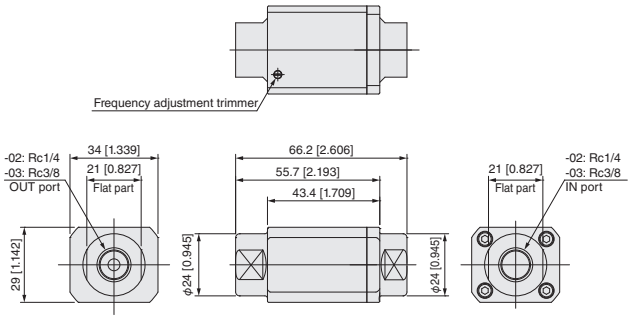
Direct mounting
Blank: No mounting holes or brackets
25: Direct mounting

Port size
02: Rc1/4 (for both IN and OUT)
03: Rc3/8 (for both IN and OUT)

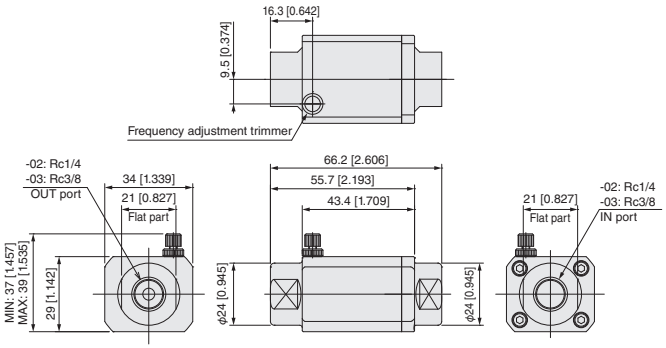
* The projection-type trimmer type is also available.
PAU-30- □ **-3W**
PAU-30- □ **-25-3W**

Dimensions (mm [in.])

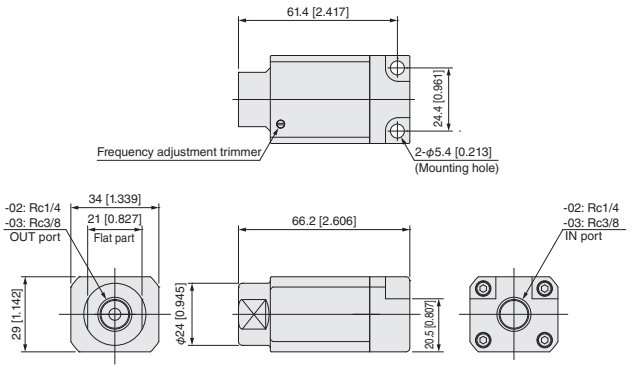
● Main unit
PAU-30- □



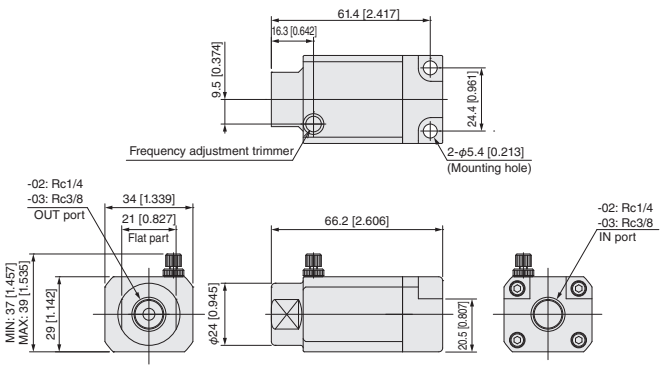
PAU-30- □ **-3W**



PAU-30- □ **-25**

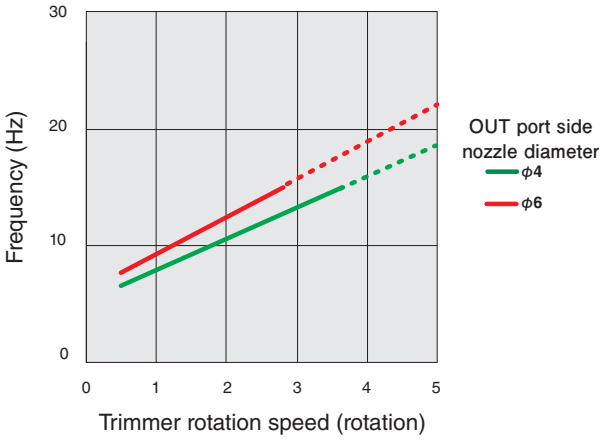


PAU-30- □ **-25-3W**

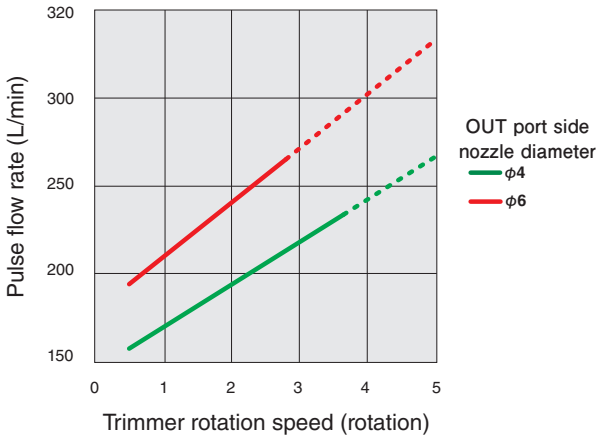


Characteristics of the frequency and flow according to the number of rotations of the trimmer

Frequency characteristics

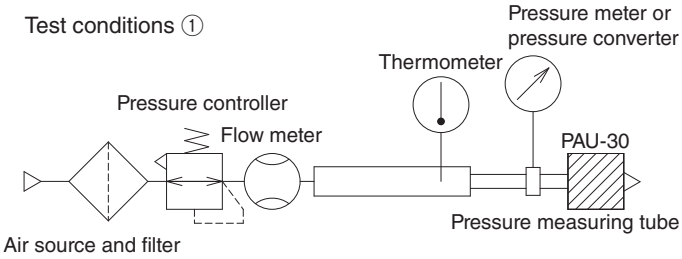


Flow characteristics



Note 1: According to our test conditions ① .
Note 2: The characteristics of the frequency and the flow vary depending on the piping conditions and the nozzle used.
Note 3: Use devices within the pulse frequency ranges (5 to 15 Hz) shown in the specification tables.

Test conditions ①

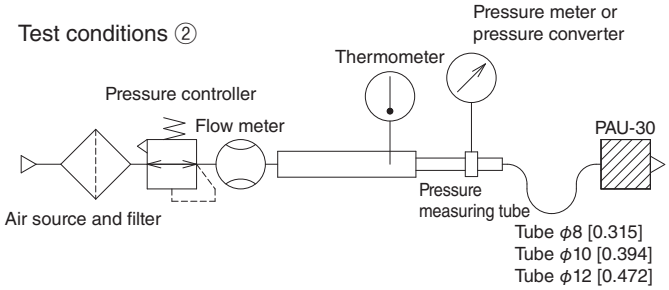


Operations according to piping conditions for pulse blow units

Operations may be unstable, depending on the piping conditions on the IN port side. See the following table.

Nozzle diameter	Operating pressure	Tube ϕ 8 [0.315]		Tube ϕ 10 [0.394]		Tube ϕ 12 [0.472]	
		1000 mm [39.370 in.]	5000 mm [196.9 in.]	1000 mm [39.370 in.]	5000 mm [196.9 in.]	1000 mm [39.370 in.]	5000 mm [196.9 in.]
ϕ 4 [0.157]	0.35 MPa [51 psi]	○	△	○	○	○	○
	0.5 MPa [73 psi]	○	△	○	○	○	○
	0.7 MPa [102 psi]	○	△	○	○	○	○
ϕ 6 [0.236]	0.35 MPa [51 psi]	○	△	○	△	○	○
	0.5 MPa [73 psi]	○	△	○	△	○	○
	0.7 MPa [102 psi]	○	△	○	△	○	○

Test conditions ②



Note 1: ○ : Stable operations △ : Minimum frequency of 5 to 10 Hz (according to our test conditions ②)
Note 2: Operations will be unstable if the piping conditions cause pressure drops or insufficient flow.

Handling precautions

⚠ Warning

- Use safety glasses and earplugs because blowing air could blow objects into people's eyes or cause hearing loss.
- Install a cutoff valve on the IN port side to ensure safety in case of leaks or damage.

⚠ Caution

- Air containing oil or solids cannot be used. Use cleaned air for the medium (use a filter that has a filtration rating of 40 µm or less). If drainage water, dust, and other contaminants get into this product, they could cause defective operation.
- Pass the medium through a device, such as a freeze-type air dryer or after cooler, to lower the dew-point temperature of the medium to below the ambient temperature so condensation or frost does not occur when the products are blowing.
- Use this product within the pulse frequency ranges shown in the specification tables.
- This product operates on a balance of pressure, so supply enough pressure and volume to keep the pulse operation steady.
- It is recommended to make a one-to-one connection between this product and the air blow gun or a nozzle.
- If you want to install this product apart from the air blow gun or nozzle, a ϕ8 [0.315]×6 tube and a distance not exceeding 2 m [6.560 ft] are recommended.
- For piping to the IN port or the OUT port, tighten within the torque range below.

	PAU-30-02 (-25)	PAU-30-03 (-25)
Recommended tightening torque N·m [in·lbf]	7 to 9 [61.957 to 79.659]	12.5 to 14.5 [110.6 to 128.3]

* Piping for both IN port side and OUT port side

- Use tubing with an exterior that is not damaged. Do not allow tubing to become severely bent or twisted near the IN port. Doing so could cause air leakage.
- Do not mount this product on the secondary side of an electrostatic eliminator.Doing so will reduce the neutralization function of air blowing considerably.

⚠ Caution

* Read "Safety precautions" on the general catalog website before using this product.

Special support

Common to all products in the PAU Series As of May 2022

Support that can be provided	PAU-05	PAU	PAU-30
Vaseline type	○	○	○
H1 grease type	○	○	○
Projection-type trimmer	-	○	○
Degrease type (Grease wiping-equivalent/fluorine type quick-drying lubricant application)	○	○	○
IN/OUT port Rc1/8	Standard type	○	○
Low-pressure type, OUT port Rc1/4	-	○	○

○ : Support can be provided -: Support cannot be provided

For the IN port and the OUT port, we can also offer the parallel pipe thread G type and the National Pipe Thread (NPT) type. For details, contact Koganei.

Memo

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.

URL http://www.koganei.co.jp

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KOGANEI

http://www.koganei.co.jp

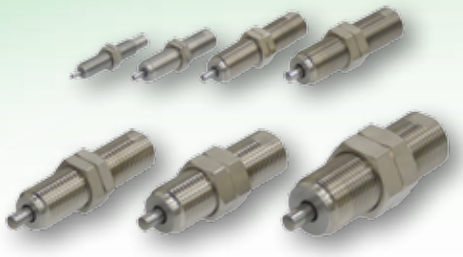
Catalog No.BK-A5047

NEW Products

Linear Orifice® Shock Absorber Series

NEW

KSHY Series
Side load resistant Linear Orifice® Shock Absorber



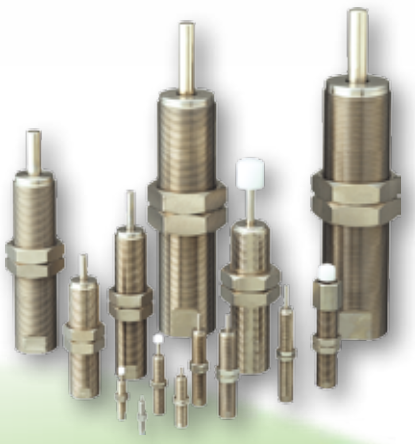
- No need for an angle of eccentricity adaptor
- Each size can withstand up to 10°
- Maximum of more than 2 million operation cycles!

* Specifications in inches are not available.

KSHP Series

Adjustment Type Shock Absorber

- Shortened takt time
- Uses NSF certifi ed H1 oil (non silicon)
- Maximum of more than 3million operation cycles!



KSHJ Series

Fixed type Shock Absorber

- 18 sizes and 132 models
- Supports a wide variety of impact masses
- Maximum of more than 2million operation cycles! (800,000 operation cycles for M30 and higher)

KSHC Series

Clean Room Specification Shock Absorber

- Low dust emissions and Class 5 equivalent (FED-STD Class 100 equivalent)
- Non silicon
- Maximum of more than 2million operation cycles!

The KSHY series eliminates concerns about
absorbing shocks from rotating loads!

Side load resistant Linear Orifice®
Shock Absorber NEW KSHY Series

* "Linear Orifice" is a registered trademark of Koganei Corporation.
* Specifications in inches are not available.

New release of our linear orifice models for shock absorbers with side load resistant!

This shock absorber lineup consists of 7 thread sizes from M6 to M20

Maximum of more than 2 million operation cycles!

The unique linear orifice structure, which is used in many applications, provides a long service life

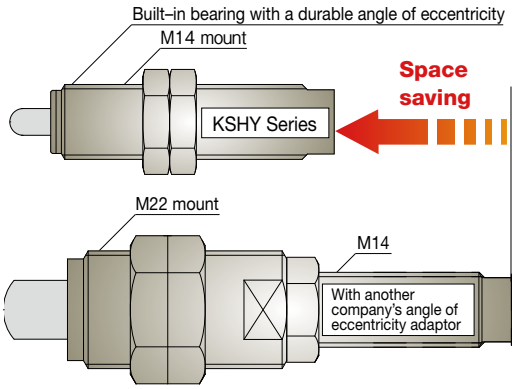
Cap can also be selected as an option

Compliant with H1 grade food equipment specifications!

Uses NSF H1 grade oil (non silicon).

Contributes to space saving!

Integrated a main unit and a side load bearing.
Can be used without an adaptor to handle rotary side load!



* Illustration

Since you do not need an adaptor, you can also save space with the mounting unit (screw hole)!

With cap

Wide range of variations
M6 to M20
7 sizes 132 models

With cap

KSHP series can solve the problems for users worried about fine tuning absorption of impacts!

Introducing the KSHP Series of Adjustment Type Linear Orifice® Shock Absorber

* "Linear Orifice" is a registered trademark of Koganei Corporation.

New release of our first adjustment type linear orifice models!

Shorten operation cycle times by adjusting the absorbing capacity of the end of strokes.

Possible to fine tune for both impact speed and load for proper shock absorption!

Our own construction makes fine tuning easy and **minimizes extreme changes** in shock absorbing capacity.

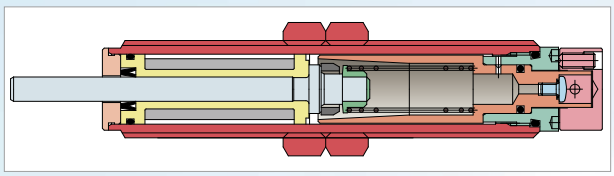
Maximum of more than 3 million operation cycles!

Linear orifice construction provides longer life.

* "M24" model 8 hundred thousand operation cycles.

Compliant with H1 grade food equipment specifications!

Uses NSF H1 grade oil (non silicon).



Scaled from 0 to 6
Numbers are easy to see and indelible

Set to 6 on the scale for maximum absorption
Set to 0 on the scale for minimum absorption

Adjusting knob

Can be rotated to the left or right

Red mark

Align the red mark to a value on the scale

Lock screw

Lock the adjusting knob in position by tightening the lock screw after completing adjustment (excluding KSHP6 and KSHP8)

For KSHP6 and KSHP8

Scaled from 0 to 6 (adjusting knob)

Set to 6 on the scale for maximum absorption
Set to 0 on the scale for minimum absorption

Key slot on body

Align a value on the scale to the key slot

Wide range of variations
M6 to M42
12 sizes 13 models

Wide range of variations
1/4-32 UNEF to 1 3/4-12UN
11 sizes 29 models

KSHP6×4 KSHP8×6 KSHP10×8 KSHP12×10 KSHP14×12 KSHP16×15 KSHP18×20 KSHP20×22 KSHP25×25 KSHP30×30 KSHP36×50 KSHP42×50

Shock absorbers designed by pneumatic cylinder engineers

Linear Orifice® Shock Absorber
KSHJ Series (fixed type)

A wealth of variations with sizes from M4 to M48
18 sizes and 132 models

A wealth of variations with sizes from 10-32UNF to 1 3/4-12UN
12 sizes and 92 models

Supports a wide variety of impact masses

Supports a wide range of impacting objects, from grams (g) with the M4 size to tons (t) with the M48 size.

Supports a wide variety of impact speeds

Supports maximum impact speeds of 0.8 m/s to 3 m/s.

Stopper nut not needed

Workpieces directly contact the end of the body, so there is no need for mounting a stopper nut. Mounting is easy and saves space.

Body is entirely threaded

Entire body is threaded to maximize the range of installation positions and also improve heat dissipation.

Note: Except for M4 and M6 (10-32UNF, 1/4-32UNEF) sizes.

Supports high cycle times

Reduces the time from impact to end of operation. Even if the workpiece mass and speed changes, our original linear orifice construction automatically adjusts to prevent wasted operation time. Combined with reduced vibration, this contributes to improved productivity.

Silent design

Reducing the impact value at collision decreases the noise at workpiece impact.

Short stroke type

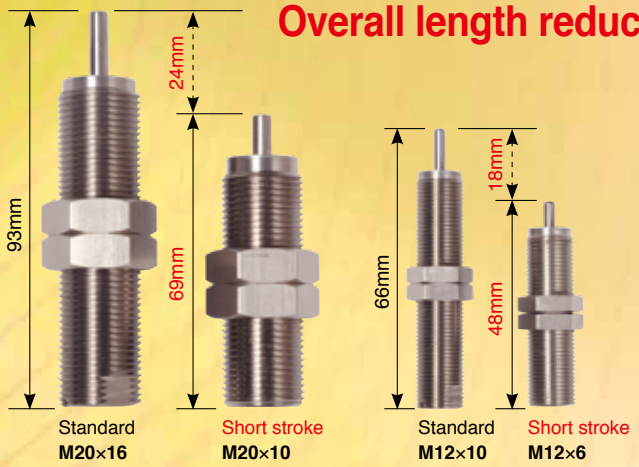
Perfect in low speed range for shock absorbing in limited spaces.

Long stroke type

Making the absorbing stroke longer allows for softer absorption of shocks.

short stroke type (with hexagon socket)!

Overall length reduced for shock absorbing in tight locations!



Up to 26% reduction in overall length compared to the same standard threaded body type (for M20). Excellent for absorbing shocks in tight locations as a stopper between 2 cylinder stroke ends because overall short length. Fine position adjustments are easy with more models available with hex sockets.

■List of KSHJ body thread sizes

[Specifications in mm]

Size	Model			Body thread size × pitch	
	Short stroke	Standard	Long stroke		
M4	—	**KSHJ4×3**	—	M4×0.5	—
M6	—	**KSHJ6×4**	**KSHJ6×6**	M6×0.75	—
M8	**KSHJ8×4**	**KSHJ8×5**	**KSHJ8×8**	M8×0.75	M8×1
M10	**KSHJ10×6**	**KSHJ10×10**	**KSHJ10×15**	M10×1	—
M12	**KSHJ12×6**	**KSHJ12×10**	—	M12×1	—
M14	**KSHJ14×8**	**KSHJ14×12**	—	M14×1.5	—
M16	**KSHJ16×8**	**KSHJ16×15**	—	M16×1.5	—
M18	—	**KSHJ18×16**	—	M18×1.5	—
M20	**KSHJ20×10**	**KSHJ20×16**	—	M20×1.5	—
M22	—	**KSHJ22×25**	—	M22×1.5	—
M25	—	**KSHJ25×25**	—	M25×1.5	M25×2
M27	—	**KSHJ27×25**	—	M27×1.5	M27×3
M30	—	**KSHJ30×30**	—	M30×1.5	—
M33	—	**KSHJ33×30**	—	M33×1.5	—
M36	—	**KSHJ36×50**	—	M36×1.5	—
M42	—	**KSHJ42×50**	**KSHJ42×70**	M42×1.5	—
M45	—	**KSHJ45×50**	—	M45×1.5	—
M48	—	**KSHJ48×50**	—	M48×2	—

[Specifications in inches]

Size	Model		
	Short stroke	Standard	Long stroke
10-32 UNF	—	**KSHJ4×3-F11**	—
1/4-32 UNEF	—	**KSHJ6×4-F11**	**KSHJ6×6-F11**
5/16-32 UNEF	**KSHJ8×4-F11**	**KSHJ8×5-F11**	**KSHJ8×8-F11**
3/8-32 UNEF	**KSHJ10×6-F11**	**KSHJ10×10-F11**	**KSHJ10×15-F11**
7/16-28 UNEF	**KSHJ11×6-F11**	**KSHJ11×10-F11**	**KSHJ11×15-F11**
1/2-20 UNF	**KSHJ12×6-F11**	**KSHJ12×10-F11**	—
9/16-18 UNF	**KSHJ14×8-F11**	**KSHJ14×12-F11**	—
3/4-16 UNF	—	**KSHJ18×16-F11**	—
1-12 UNF		**KSHJ25×25-F11**	—
1 1/4-12 UNF	—	**KSHJ30×30-F11**	—
1 3/8-12 UNF		**KSHJ36×50-F11**	—
1 3/4-12 UN	**KSHJ42×50-F11**	**KSHJ42×70-F11**	—

Low dust emissions | Softened shocks | Silicone–free

Shock Absorbers with Clean Specifications

Linear orifice type **KSHC series** (fixed type)

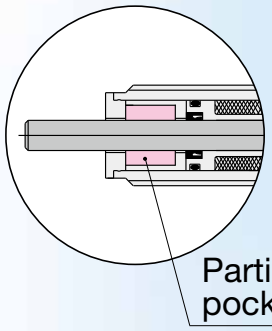
* "Linear Orifice" is a registered trademark of Koganei Corporation.

Low dust emissions

Capable of JIS/ISO Class 5 equivalent cleanliness (FED–STD Class 100 equivalent) calculated within a 0.1 µm particle. (Koganei standard)Note 1

A particle pocket structure is used to prevent the scattering of dust.

Note 1: Refer to page 59 for the Koganei standard.
2: Packaged in single layer packaging.



Softened shocks

These shock absorbers achieve their smooth shock absorption characteristics thanks to the linear orifice structure.
Reduces vibrations and shocks to bases and equipment.

Silicone–free

Silicone is not used in the hydraulic oil or plastic.

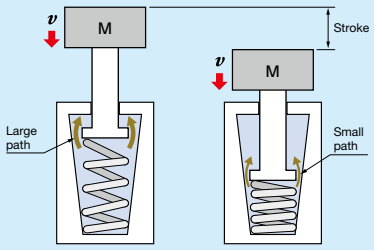
Wide range of variations
M4 to M25
9 sizes and 40 models

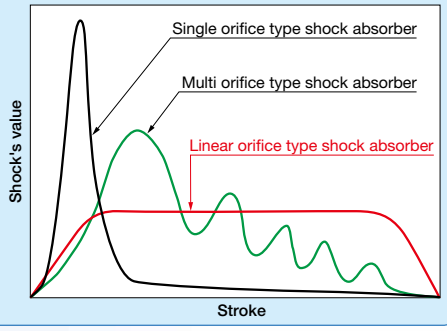
Wide range of variations
10-32 UNF to 1-12 UNF
9 sizes and 36 models

Linear orifices' long service life and softened shocks

These shock absorbers achieve their smooth shock absorption characteristics and a long service life thanks to the linear orifice structure that transforms the orifice linearly.
Since the linear orifice structure can increase the inner diameter of the shock absorbers without needing an inner tube, the shock absorbers demonstrate similar characteristics to shock absorbers one thread size larger, as well as reduce the vibrations and shocks to bases and equipment.

- **Principles of operation**
  The piston stroke squeezes the oil's flow path steplessly to softly absorb shocks.





List of linear orifice shock absorber products

[Specifications in mm]

Size	Basic mounting type KSHJ	Durable angle of eccentricity KSHY	Adjustable type KSHP	Clean specification KSHC	Options: Cap	Options: Stopper nut	Options: Side mount
M4×0.5	●			●			
M6×0.75	●	●	●	●			
M8×0.75	●	●	●	●			
M8×1	●	●	●	●			
M10×1	●	●	●	●			
M12×1	●	●	●	●			
M14×1.5	●	●	●	●			
M16×1.5	●	●	●	●			
M18×1.5	●		●				
M20×1.5	●	●	●	●			
M22×1.5	●						
M25×1.5	●		●	●			
M25×2	●						
M27×1.5	●						
M27×3	●						
M30×1.5	●		●				
M33×1.5	●						
M36×1.5	●		●				
M42×1.5	●		●				
M45×1.5	●						
M48×2	●						

Plastic cap

Rubber cap

* Only for KSHP 12 to 42

[Specifications in inches]

Size	Basic mounting type KSHJ	Adjustable type KSHP	Clean specification KSHC	Options: Cap	Options: Stopper nut
10-32 UNF	●		●		
1/4-32 UNEF	●	●	●		
5/16-32 UNEF	●	●	●		
3/8-32 UNEF	●	●	●		
7/16-28 UNEF	●	●	●		
1/2-20 UNF	●	●	●		
9/16-18 UNF	●	●	●		
3/4-16 UNF	●	●	●		
1-12 UNF	●	●	●		
1 1/4-12 UNF	●	●			
1 3/8-12 UNF	●	●			
1 3/4-12 UN	●	●			

Plastic cap

Rubber cap

* Only for KSHP 12 to 42

Safety Precautions (shock absorber)

Always read these precautions carefully before use.

Before selecting and using the products, please read all the “Safety Precautions” carefully to ensure proper product use.
The Safety Precautions described below are to help you use the product safely and correctly, and to prevent injury or damage to you, other people, and assets.
Be sure to observe these safety precautions together with the following safety regulations of ISO4414 (Pneumatic fluid power - General rules and safety requirements for systems and their components), and JIS B 8370 (General rules relating to systems).

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

⚠ DANGER	Indicates situations that can be clearly predicted as dangerous. Death or serious injury may result if the situation is not avoided. It could also result in damage or destruction of assets.
⚠ WARNING	Indicates situations that, while not immediately dangerous, could become dangerous. Death or serious injury may result if the situation is not avoided. It could also result in damage or destruction of assets.
⚠ CAUTION	Indicates situations that, while not immediately dangerous, could become dangerous. Failure to avoid the situation creates the risk of minor or semi-serious injury. It could also result in damage or destruction of assets.
⚠ ATTENTION	It could also result in damage or destruction of assets. appropriate use of the product.

■This product was designed and manufactured for use in general industrial machinery.

- ■ When selecting and handling equipment, the system designer or another person with sufficient knowledge and experience should always read the “Safety Precautions”, “catalog”, “instruction manual”, and other literature before commencing operation. Improper handling is dangerous.
- ■ After reading the instruction manual, catalog, and other documentation, always place them in a location that allows easy availability for reference to users of this product.
- ■ Whenever transferring or lending the product to another person, always attach the catalog, instruction manual, and other information to the product where they are easily visible in order 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 contingencies. Read the catalog and instruction manual carefully, and always keep safety first.

⚠ DANGER

- ● Do not use the product for the purposes listed below:
  1. Medical equipment related to maintenance or management of human lives or bodies.
  2. Machines 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 high levels of safety. Using the product in any of the ways described above creates the risk of loss of human life.
- ● Do not use the product in locations with or near dangerous substances such as flammable or ignitable substances. This product is not explosion-proof. It could ignite or burst into flames.
- ● When mounting the product and workpiece, always make sure they are firmly supported and secured in place. Ensure the mounting material is strong enough. If the product falls over, is dropped, or breaks, it may result in injury.
- ● Never attempt to modify the product in any way. Doing so can cause an abnormal operation and create the risk of injury, etc.
- ● Never attempt inappropriate disassembly, assembly or repair of the product relating to basic construction, or to its performance or to functions. This can lead to injury, etc.
- ● Do not splash water on the product. Spraying it with water, washing it, or using it under water could result in malfunction leading to injury, etc.
- ● While the product is in operation, avoid touching it with your hands or otherwise approaching too close. Also, do not mount shock absorbers or make adjustments while the equipment is in operation. The equipment may move suddenly, possibly resulting in injury.

⚠ WARNING

- ● Do not use the product in excess of its specification range. Doing so creates the risk of product breakdown, loss of function, or damage. It could also drastically reduce operating life.
- ● The small screw on the back end of the shock absorber should never be loosened or removed. Oil may leak out of the shock absorber leading to a loss of functionality and resulting in injury.
- ● When conducting any kind of operation for the product, such as maintenance, inspection, repair, or replacement, always turn off the air supply and power to the equipment and make sure that the equipment is completely stopped.
- ● When mounting the product, always follow the handling instructions and precautions. Also when mounting the product, before operation, check that the mounting nut is tightened and not loose and then operate the product. If the mounting nut is loose, etc., this will result in damage to the equipment and accidents.
- ● Do not allow the product to be thrown into fire. The product could explode, ignite, and/or release toxic gases.
- ● Do not apply a load to the product, or place other objects on it. It could lead to damaged or broken products that result in degraded performance, function stops, etc.
- ● If the product has not been used for over 30 days, it is possible that the contacting parts may have become stuck, leading to abnormal operation at impact. Check for proper operation a minimum of once every 30 days.
- ● Do not use the product at the beach in direct sunlight, near mercury lamps, or near equipment that generates ozone. Ozone causes rubber components to deteriorate resulting in reduced performance, or a limitation or stop of functions.

⚠ CAUTION

- ● Do not use in locations that are subject to direct sunlight (ultraviolet rays); locations with high humidity and temperature, dust, salt, or iron powder; or in locations with fluids and/or ambient atmosphere that include organic solvents, phosphate ester type hydraulic oil, sulfur dioxide, chlorine gas, acids, etc. It could lead to early shutdown of some functions, a sudden degradation of performance, and a reduced operating life. For information about materials, see Major Parts and Materials.
- ● When installing the product, be sure to allow adequate work space around it. Failure to do so will make it more difficult to conduct daily inspections or maintenance, which could eventually lead to system shutdown or damage to the product.
- ● When transporting or mounting a heavy product, firmly support the product using a lift or support, or use multiple people to ensure personal safety. Also, wear protective gloves and use safety shoes etc. for protection as necessary.
- ● Always post an “operations in progress” sign for installations, adjustments, or other operations, to avoid unintentional supplying of air or electrical power, etc. Unintentional supplying of air or electrical power can cause the equipment to operate and may result in injury.
- ● Never apply lubrication to the product sliding parts. This leads to changes in the physical properties and deterioration of the materials used, resulting in reduced functionality.
- ● Attempting to use the shock absorber with a cap over the specification range could result in damage to the cap or to its flying off and causing personal injury. Moreover, if cracks or fractures appear in the cap, replace it as quickly as possible.
- ● Always wash your hands thoroughly after touching the oil or grease used on the shock absorber. There is a danger that the grease or oil from your hands will get on the cigarette and burn, releasing toxic gases, as you smoke the cigarette.
- ● As a means to prevent vibration, do not use the product at a high frequency that exceeds the value in the catalog. It could drastically reduce the product’s operating life.
- ● When using the shock absorber, gradually increase the speed of the impact object. Suddenly increasing the speed when using the shock absorber may damage the device or injure someone.

⚠ ATTENTION

- Whenever considering use of this product in situations or environments not specifically noted in the catalog or instruction manual, or in applications where safety is an important requirement such as in aircraft equipment, combustion equipment, leisure equipment, safety equipment, and other places where human life or assets may be greatly affected, take adequate safety precautions such as allowing plenty of margin for ratings and performance, or fail-safe measures. Contact the sales department of Koganei regarding use in such applications.
- When the product can no longer be used, or is no longer necessary, dispose of it appropriately, according to the "Law Regarding the Disposal and Cleaning of Waste" or other local governmental rules and regulations, as industrial waste.
  Incinerating the special oil in the KSHC series (clean specification) or the KSHJ series (short stroke type) generates hazardous fluorine (HF), which is corrosive and toxic. Because of this, incineration must be done in an incinerator that has neutralizing equipment that can handle acids. For large amounts, ask a registered waste disposal company.
- The product can exhibit degraded performance and function over its operating life. Always conduct daily inspections and confirm that all requisite system functions are satisfied, to prevent accidents from happening.
- When handling the product, wear protective gloves, safety glasses, safety shoes, and other protective clothing.
- The maximum absorption in the specifications are for a normal temperature (20 to 25°C [68 to 77°F]). Be aware that performance and characteristics change depending on the operating temperature.
- The shock absorber's absorption capacity changes depending on the speed of the impacting object. Use the product within the ranges of the selection graphs.
- For inquiries about the product, consult your nearest Koganei sales office or Koganei Overseas Department. The addresses and telephone numbers are shown on the back cover of this catalog.

⚠ Other

- Always observe the following items.

1. When using this product in a system, use only genuine Koganei parts or equivalent (recommended) parts.
When conducting maintenance and repairs, always use genuine Koganei parts or compatible parts (recommended parts).
Always observe the prescribed methods and procedures.

2. Never attempt unauthorized disassembly or assembly of the product relating to its basic construction, its performance, or its functions.

Koganei shall not be held responsible for any problems that occur as a result of these items not being properly observed.

Warranty and General Disclaimer

1. Warranty Period
Koganei warrants this product for a period of no more than 1 year from delivery.
* However, some products have a 2-year warranty; contact your nearest Koganei sales office or the Koganei Technical Service Center for details.

2. Scope of Warranty and General Disclaimer

(1) When a product purchased from Koganei or from an authorized Koganei distributor malfunctions during the warranty period in a way that is found to be attributable to Koganei responsibility, Koganei will repair or replace the product free of charge. Even if a product is still within the warranty period, its durability is determined by its operation cycles and other factors. Contact your nearest Koganei sales office or the Koganei overseas department for details.

(2) The Koganei product warranty covers only the product itself. Therefore, Koganei is not responsible for incidental losses (repair of the product, various expenses required for replacement, etc.) caused by breakdown, loss of function, or loss of performance of Koganei products.

(3) Koganei shall not be held responsible for any losses or for any damage to other machinery caused by breakdown, loss of function, or loss of performance of Koganei products.

(4) Koganei shall not be held responsible for any losses due to use or storage of the product in a way that is outside of the product specifications prescribed in Koganei catalogs and the instruction manual, and/or due to actions that violate the mounting, installation, adjustment, maintenance and other safety precautions.

(5) Koganei shall not be held responsible for any losses caused by breakdown of the product due to factors outside the responsibility of Koganei, including but not limited to fire, natural disaster, the actions of third parties, and intentional actions or errors by you.

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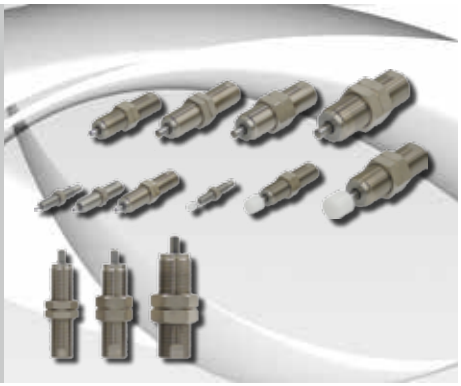
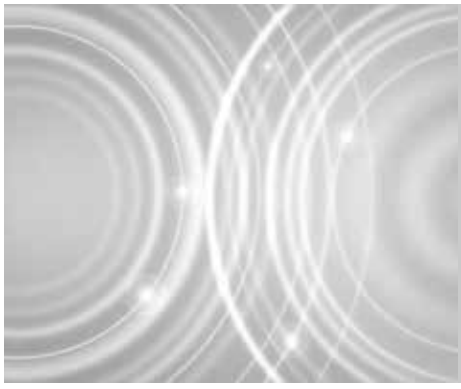




Linear Orifice® Shock Absorbers
KSHJ Series

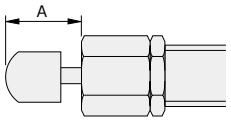
General precautions

Cover the unit when mounting it in locations where it might be subject to excessive dust, dripping water, dripping oil, etc. Dents, scratches, water, oil, or dust on the piston rod results in damage and decreases service life.

Mounting

1. Keep the angle of eccentricity, resulting from the load direction and the axis of the shock absorber, under the specified values on pages ⓱ to ⓳. If an eccentric load exceeding the specifications is applied, it could result in breakage or impaired returns. If there is concern that an eccentric load exceeding the specified values will be applied, install a guide, or similar mechanism.
2. Two or more shock absorbers can be mounted in parallel, to boost absorption capacity. In such an arrangement, however, be careful to ensure that the load is evenly distributed to each shock absorber.
3. To adjust the capacity with the stroke, adjust the stopper nut (-S) or add an external stopper.
4. If using with a cap, always mount a stopper nut (-S) or an external stopper to ensure that the cap is not subjected to loads at the stroke end. The stopper nut mounting position must not exceed the distance shown in the table below.
   You can use it without a stopper nut or external stopper, but over the long-term, the stop location changes due to cap deformation and wear.

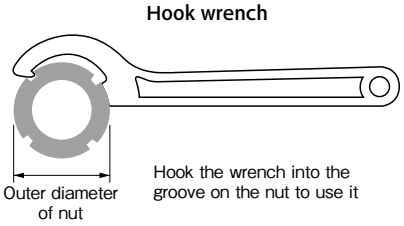
Model	A	
	mm	in
KSHJ4×3C-01,-02 (-F11)	3	0.12
KSHJ6×4C-01,-02 (-F11)	4	0.16
KSHJ6×6C-01,-02 (-F11)	6	0.24
KSHJ8×4C-01,-02,-11,-12 (-F11)	4	0.16
KSHJ8×5C-01,-11 (-F11)	5	0.20
KSHJ8×8C-01,-02,-11,-12 (-F11)	8	0.31
KSHJ10×6C-01,-02 (-F11)	6	0.24
KSHJ11×6C-F11-01,-02	—	0.24
KSHJ10×10C-01,-02 (-F11)	10	0.40
KSHJ11×10C-F11-01,-02	—	0.40
KSHJ10×15C-01,-03 (-F11)	15	0.60
KSHJ11×15C-F11-01,-03	—	0.60
KSHJ12×6C-01,02 (-F11)	6	0.24
KSHJ12×10C-01,-02 (-F11)	10	0.40
KSHJ14×8C-01,02 (-F11)	8	0.31
KSHJ14×12C-01,-02 (-F11)	12	0.47
KSHJ16×8C-01,-02	8	—
KSHJ16×15C-01,-02	15	—
KSHJ18×16C-01,-02 (-F11)	16	0.63
KSHJ20×10C-01,-02	10	—
KSHJ20×16C-01,-02	16	—
KSHJ22×25C-01,-02	25	—
KSHJ25×25C-01,-11,-12 (-F11)	25	0.98
KSHJ27×25C-01,-02,-11,-12	25	—
KSHJ30×30C-01,-02,-03 (-F11)	30	1.18
KSHJ33×30C-01,-02,-03	30	—
KSHJ36×50C-01,-02,-03 (-F11)	50	1.97
KSHJ42×50C-01,-02 (-F11)	50	1.97
KSHJ42×70C-01,-02 (-F11)	70	2.76
KSHJ45×50C-01,-02	50	—
KSHJ48×50C-01,-02	50	—



5. The small screw on the back end of the shock absorber should never be loosened or removed. Oil may leak out of the shock absorber leading to a loss of functionality and resulting in damage to the equipment and accidents.
6. When mounting the shock absorber, always use the following maximum tightening torque guidelines. Tightening using excessive force may result in damage.

Model	Maximum tightening torque	
	N・m	in・lbf
KSHJ4×3 (C)-01,-02 (-F11)	0.5	4.43
KSHJ6×4 (C)-01,-02 (-F11)	0.85	7.52
KSHJ6×6 (C)-01,-02 (-F11)	0.85	7.52
KSHJ8×4 (C)-01,-02,-11,-12 (-F11)	2.5	22.12
KSHJ8×5 (C)-01,-11 (-F11)	2.5	22.12
KSHJ8×8 (C)-01,-02,-11,-12 (-F11)	2.5	22.12
KSHJ10×6 (C)-01,-02 (-F11)	6.5	57.53
KSHJ11×6 (C)-01,-02	—	57.5
KSHJ10×10 (C)-01,-02 (-F11)	6.5	57.53
KSHJ11×10 (C)-01,-02	—	57.5
KSHJ10×15 (C)-01,-03 (-F11)	6.5	57.53
KSHJ11×15 (C)-01,-03	—	57.5
KSHJ12×6 (C)-01,02 (-F11)	8.0	70.80
KSHJ12×10 (C)-01,-02 (-F11)	8.0	70.80
KSHJ14×8 (C)-01,02 (-F11)	12.0	106.21
KSHJ14×12 (C)-01,-02 (-F11)	12.0	106.21
KSHJ16×8 (C)-01,-02	20.0	—
KSHJ16×15 (C)-01,-02	20.0	—
KSHJ18×16 (C)-01,-02 (-F11)	25.0	221.28
KSHJ20×10 (C)-01,-02	30.0	—
KSHJ20×16 (C)-01,-02	30.0	—
KSHJ22×25 (C)-01,-02	35.0	—
KSHJ25×25 (C)-01,-11,-12 (-F11)	42.0	371.74
KSHJ27×25 (C)-01,-02,-11,-12	42.0	—
KSHJ30×30 (C)-01,-02,-03 (-F11)	60.0	531.06
KSHJ33×30 (C)-01,-02,-03	60.0	—
KSHJ36×50 (C)-01,-02,-03 (-F11)	72.0	531.06
KSHJ42×50 (C)-01,-02 (-F11)	85.0	637.27
KSHJ42×70 (C)-01,-02 (-F11)	85.0	637.27
KSHJ45×50 (C)-01,-02	85.0	—
KSHJ48×50 (C)-01,-02	120.0	—

Note: The **KSHJ45×50(C)-01**, and **-02** use nominal number AN09 mounting nut prescribed in JIS B1554 (nuts for rolling bearings). Use a hook wrench (nominal 58 to 65 or 65 to 70) for tightening.



7. Ensure that the hardness of the surface directly impacting the piston rod of the shock absorber is over HRc40 hardness (excluding models with cap).
8. Be aware that performance and characteristics change depending on the operating temperature.

■ How to select shock absorbers

1. Confirm the thrust

Confirm the thrust that is used, and then check the prospective shock absorbers from the table of recommended cylinder bore sizes on page ⓭. If a shock absorber that is smaller than the recommended shock absorber is used, the shock absorber being used may be damaged in fewer operation cycles than is guaranteed.

2. Confirm the kinetic energy

Confirm Ⅰ and Ⅱ below, and then check pages ⓮ to ⓰ for the selection graphs for prospective shock absorbers from [1. Confirm the thrust]. (*)

Ⅰ Impact object mass: m [kg]

Ⅱ Impact speed: v [m/s]

Because " v " is the impact speed, not the average speed, when using a cylinder,

v = m [cylinder stroke] ÷ s [operating time] × 2

Select a model in which Ⅰ and Ⅱ fit within the range enclosed by the capacity curves.

If multiple models are applicable, use the model that is closest to both the capacity curves and the operating conditions. The further the model you select is from the capacity curves and the operating conditions, the slower it will tend to be.

3. Confirm other specifications

Confirm that such specifications as the maximum operating frequency, maximum absorption capacity per unit of time, angle of eccentricity, and operating temperature range are within the range for the shock absorber that you selected.

* The value for the kinetic energy, E, can be found by doing the following calculation. However, the shock absorber's capacity for absorption changes depending on the impact speed. When the shock absorber is doing low-speed operations, it has less drag than when it is doing high-speed operations.

The maximum absorption capacity that is noted in the specifications is reached only at the maximum impact speed.

Therefore, do not choose a shock absorber by comparing E to the maximum absorption capacity; confirm the capacity using the selection graph.

$$E = \frac{1}{2} mv^2$$

E: Kinetic energy (J)

m: Impact object mass [kg]

v: Impact speed (m/s)

Range in the selection graph

Vertical axis range :

Maximum impact speed ≧ v Impact speed (operating condition)

Horizontal axis range :

Shock absorber's maximum absorption capacity at the impact speed (v = m/s) ≧ E Kinetic energy (operating condition)

Calculating the thrust energy is not necessary because the size of the shock absorber is limited by the thrust in step 1.

■ Koganei's selectable content

You can also select equipment from Koganei's homepage.

Visit http://www.koganei.co.jp.

The results of selections using the method above may differ from the results of selections for the selectable content on our homepage. If this happens, please contact us.

■ Example of selecting a shock absorber

[Operating conditions]

①Bore size of the cylinder being used: ϕ16

②Cylinder stroke: 100 mm = 0.1 m

③Pressure applied to the cylinder: 0.6 MPa

④Cylinder's operating time: 0.4 s

⑤Impact object mass: 7 kg

1. Confirm the thrust

Either calculate or find the thrust in the cylinder thrust table on page ⓭.

The cylinder thrust based on ① and ③ is about 121 N.

Cylinder thrust	100.5N	<	120.6N	<	126N
Cylinder bore size	ϕ16		ϕ16		ϕ20
Applied pressure	0.5MPa		0.6MPa		0.4MPa

As mentioned above, although the cylinder being used is ϕ16, the pressure applied to the cylinder exceeds 0.5 MPa, so consider the ϕ20 cylinder (lower than 0.4 MPa) and check the table of recommended cylinder bore sizes on page ⓭.

The following are prospective models.

・KSHJ10×6 ・KSHJ10×10 ・KSHJ10×15
・KSHJ12×6 ・KSHJ12×10
・KSHJ14×8 ・KSHJ14×12
・KSHJ16×15

2. Confirm the kinetic energy

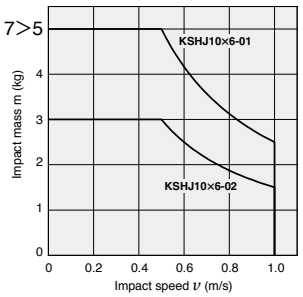
Ⅰ The impact object mass m = 7 kg from ⑤

Ⅱ Find the impact speed, v, from ② and ④.

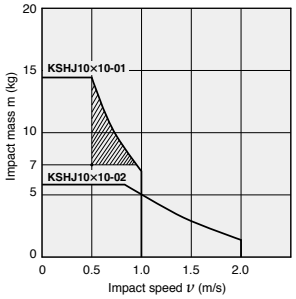
v = ② 0.1 m ÷ ④ 0.4 s × 2
= 0.5 m/s

According to the selection graphs on pages ⓮ to ⓰, the shock absorber with the optimum absorption capacity for operating conditions is KSHJ12×6-02.

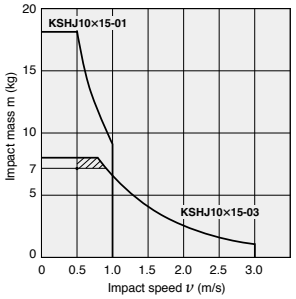
● KSHJ10×6 (with hexagon socket)



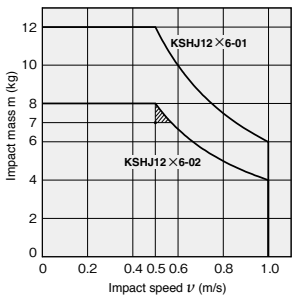
● KSHJ10×10



● KSHJ10×15



● KSHJ12×6 (with hexagon socket)



・KSHJ10×6 and 10×10-02 have an insufficient absorption capacity.
・KSHJ10×15-03, 12×6-01….KSHJ12×6-02 come closer to the operating conditions and capacity curves.
・The absorption capacities for all of the other shock absorbers are higher than that of KSHJ12×6-02, so they do not fall within the operating conditions and capacity curves.

3. Confirm other specifications

Verify that other operating conditions, such as the maximum operating frequency, maximum absorption capacity per unit of time, angle of eccentricity, and operating temperature range, are within the specified ranges for KSHJ12×6-02.

■Recommended cylinder bore size

Model \ Cylinder bore	φ4	φ6	φ8	φ10	φ12	φ16	φ20	φ25	φ32	φ40	φ50	φ63	φ80	φ100	φ125	φ140	φ160	φ180	φ200
KSHJ4×3 (-F11)	◇	◎	○																
KSHJ6×4 (-F11)		◇	◎	○															
KSHJ6×6 (-F11)		◇	◎	○															
KSHJ8×4 (-F11)(with hexagon socket)				◇	◎	◎	○												
KSHJ8×5 (-F11)			◇	◎	◎	○													
KSHJ8×8 (-F11)			◇	◎	◎	○													
KSHJ10×6 (-F11)(with hexagon socket)					◇	◎	◎	○											
KSHJ10×10 (-F11)				◇	◎	◎	○												
KSHJ10×15 (-F11)				◇	◎	◎	○												
KSHJ11×6-F11					◇	◎	◎	○											
KSHJ11×10-F11				◇	◎	◎	○												
KSHJ11×15-F11				◇	◎	◎	○												
KSHJ12×6 (-F11)(with hexagon socket)						◇	◎	◎	○										
KSHJ12×10 (-F11)					◇	◎	◎	○											
KSHJ14×8 (-F11)(with hexagon socket)							◇	◎	◎	○									
KSHJ14×12 (-F11)						◇	◎	◎	○										
KSHJ16×8 (with hexagon socket)								◇	◎	◎	○								
KSHJ16×15							◇	◎	◎	○									
KSHJ18×16 (-F11)								◇	◎	○									
KSHJ20×10 (with hexagon socket)									◇	◎	◎	○							
KSHJ20×16									◇	◎	○								
KSHJ22×25										◇	◎	○							
KSHJ25×25 (-F11)										◇	◎	◎	○						
KSHJ27×25										◇	◎	◎	○						
KSHJ30×30 (-F11)											◇	◎	◎	○					
KSHJ33×30											◇	◎	◎	○					
KSHJ36×50 (-F11)												◇	◎	◎	○	○			
KSHJ42×50 (-F11)												◇	◇	◎	◎	○	○		
KSHJ42×70 (-F11)												◇	◇	◎	◎	○	○		
KSHJ45×50												◇	◇	◎	◎	○	○		
KSHJ48×50													◇	◇	◎	◎	◎	○	○

◇ : 0.3 MPa or higher ◎ : 0.5 MPa or lower ○ : 0.4 MPa or lower

Note 1: If a shock absorber that is smaller than the recommended shock absorber is used, the shock absorber being used may be damaged in fewer operation cycles than the value that is guaranteed.

Note 2: KSHJ11×6, KSHJ11×10, and KSHJ11×15 have only inch specifications.

■ Cylinder thrust

N [lbf.]

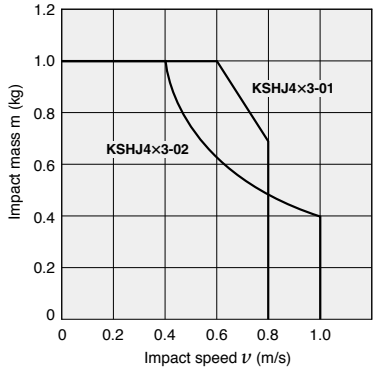
Bore size mm [in.]	Pressure area mm² [in.²]	Air pressure MPa [psi.]								
		0.1 [15]	**0.2 [29]**	**0.3 [44]**	**0.4 [58]**	**0.5 [73]**	**0.6 [87]**	**0.7 [102]**	**0.8 [116]**	**0.9 [131]**
φ4	12.9 [0.01]	1.3 [0.2]	2.5 [0.6]	3.8 [0.9]	5 [1.1]	6.3 [1.4]	7.5 [1.7]	8.8 [2.0]	10.1 [2.3]	11.3 [2.5]
φ6	28.3 [0.04]	2.8 [0.6]	5.7 [1.3]	8.5 [1.9]	11.3 [2.5]	14.1 [3.2]	17.0 [3.8]	19.8 [4.5]	22.6 [5.1]	25.4 [5.7]
φ8	50.3 [0.08	5 [1.1]	10.1 [2.3]	15.1 [3.4]	20.1 [4.5]	25.1 [5.6]	30.2 [6.8]	35.2 [7.9]	40.2 [9.0]	45.2 [10.2]
φ10	78.5 [0.12]	7.9 [1.8]	15.7 [3.5]	23.6 [5.3]	31.4 [7.1]	39.3 [8.8]	47.1 [10.6]	55 [12.4]	62.8 [14.1]	70.7 [15.9]
φ12	113 [0.18]	11.3 [2.5]	22.6 [5.1]	33.9 [7.6]	45.2 [10.2]	56.5 [12.7]	67.9 [15.3]	79.2 [17.8]	90.5 [20.3]	101.8 [22.9]
φ16	201 [0.31]	20.1 [4.5]	40.2 [9.0]	60.3 [13.6]	80.4 [18.1]	100.5 [22.6]	121 [27.2]	141 [31.7]	161 [36.2]	181 [40.7]
φ20	314 [0.49]	31.4 [7.1]	62.8 [14.1]	94.2 [21.2]	126 [28.3]	157 [35.3]	188 [42.3]	220 [49.5]	251 [56.4]	283 [63.7]
φ25	491 [0.76]	49.1 [11.0]	98.2 [22.1]	147 [33.0]	196 [44.1]	245 [55.1]	295 [66.3]	344 [77.3]	393 [88.3]	442 [99.4]
φ32	804 [1.25]	80.4 [18.1]	161 [36.2]	241 [54.2]	322 [72.4]	402 [90.4]	483 [108.6]	563 [126.6]	643 [144.6]	724 [162.8]
φ40	1257 [1.95]	126 [28.3]	251 [56.4]	377 [84.8]	503 [113.1]	628 [141.2]	754 [169.5]	880 [197.8]	1005 [225.9]	1131 [254.3]
φ50	1963 [3.04]	196 [44.1]	393 [40.1]	589 [132.4]	785 [176.5]	982 [220.8]	1178 [264.8]	1374 [308.9]	1571 [353.2]	1767 [397.2]
φ63	3117 [4.83]	312 [70.1]	623 [63.5]	935 [210.2]	1247 [280.3]	1559 [350.5]	1870 [420.4]	2182 [490.5]	2494 [560.7]	2806 [630.8]
φ80	5027 [7.80]	503 [113.1]	1005 [102.5]	1508 [339.0]	2011 [452.1]	2513 [564.9]	3016 [678.0]	3519 [791.1]	4021 [904.0]	4524 [1017.0]
φ100	7854 [12.17]	785 [176.5]	1571 [160.2]	2356 [529.6]	3142 [706.3]	3927 [882.8]	4712 [1059.3]	5498 [1236.0]	6283 [1412.5]	7069 [1589.2]
φ125	12272 [19.02]	1227 [275.8]	2454 [250.2]	3682 [827.7]	4909 [1103.6]	6136 [1379.4]	7363 [1655.3]	8590 [1931.1]	9817 [2206.9]	11045 [2483.0]
φ140	15394 [23.86]	1539 [346.0]	3079 [314.0]	4618 [1038.2]	6158 [1384.4]	7697 [1730.4]	9236 [2076.3]	10776 [2422.5]	12315 [2768.5]	13854 [3114.5]
φ160	20106 [31.16]	2011 [452.1]	4021 [904.0]	6032 [1356.0]	8042 [1808.0]	10053 [2260.0]	12064 [2712.1]	14074 [3164.0]	16085 [3616.1]	18096 [4068.1]
φ180	25447 [39.44]	2545 [572.1]	5089 [1144.1]	7634 [1716.2]	10179 [2288.3]	12723 [2860.2]	15268 [3432.4]	17813 [4004.5]	20358 [4576.7]	22902 [5148.6]
φ200	31416 [48.69]	3142 [706.4]	6283 [1412.5]	9425 [2118.8]	12566 [2824.9]	15708 [3531.3]	18850 [4237.6]	21991 [4943.8]	25133 [5650.1]	28274 [6356.3]

Cautions for using the selection graphs

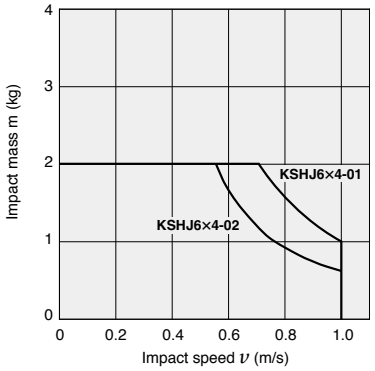
1. The selection graphs are calculated with a cylinder operating air pressure of 0.5 MPa.
2. The values in the selection graphs are for room temperature (20 to 25°). Be aware that performance and characteristics change depending on the operating temperature.
3. Select a shock absorber that is as close to, yet within, the capacity line(s).
4. You can select them on the Koganei home page. Go to http://www.koganei.co.jp
   The results of selections using our catalog may differ from the results of selections on our homepage.

■Selection graph

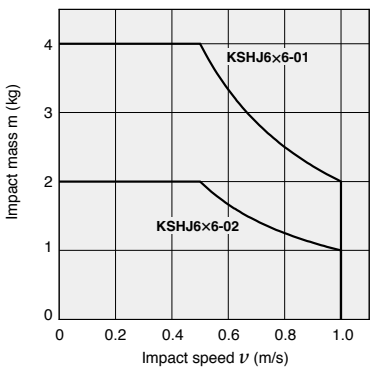
● KSHJ4×3(-F11)



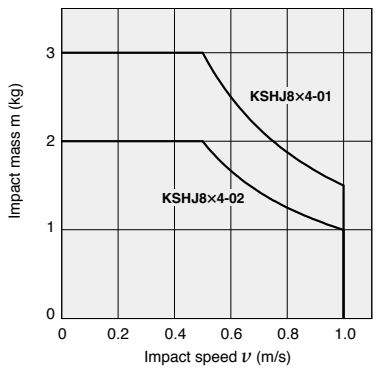
● KSHJ6×4(-F11)



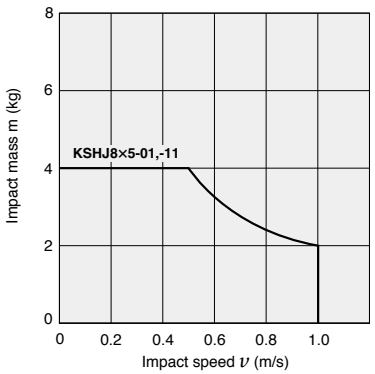
● KSHJ6×6(-F11)



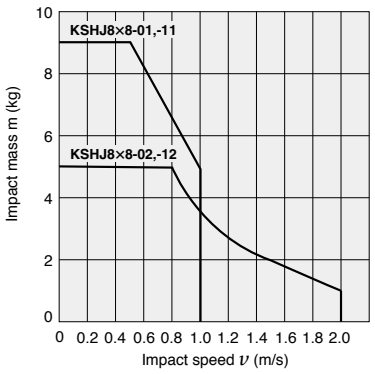
● KSHJ8×4(-F11)



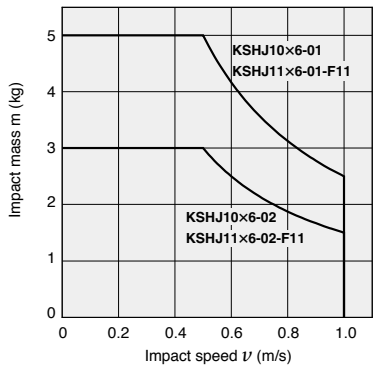
● KSHJ8×5(-F11)



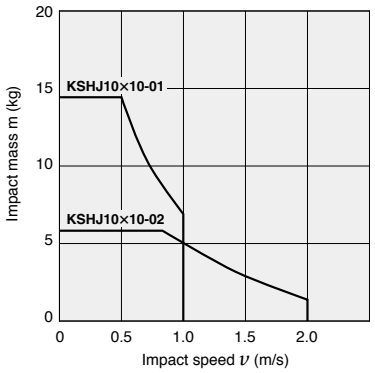
● KSHJ8×8(-F11)



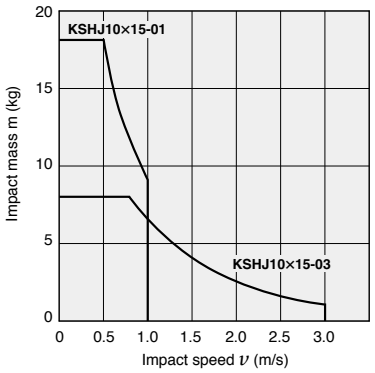
● KSHJ10×6(-F11)
● KSHJ11×6-F11



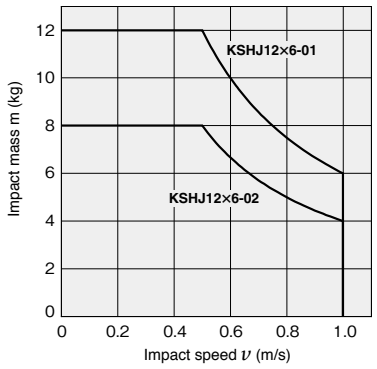
● KSHJ10×10(-F11)
● KSHJ11×10-F11



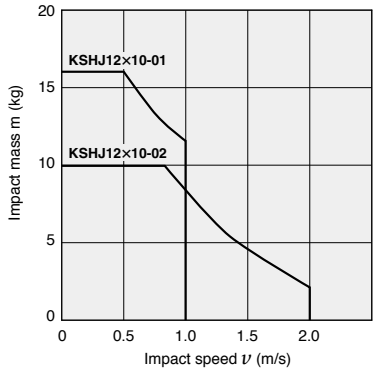
● KSHJ10×15(-F11)
● KSHJ11×15-F11



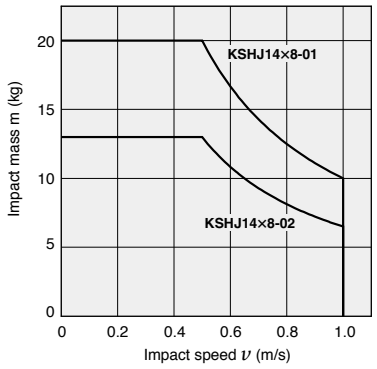
● KSHJ12×6(-F11)



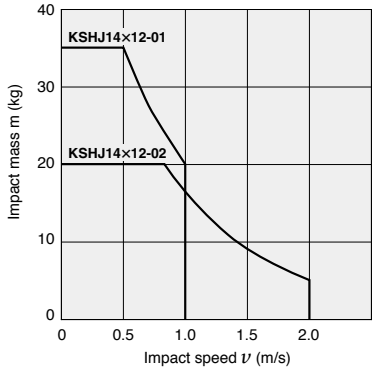
● KSHJ12×10(-F11)



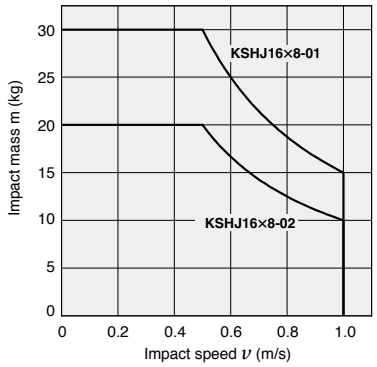
● KSHJ14×8(-F11)



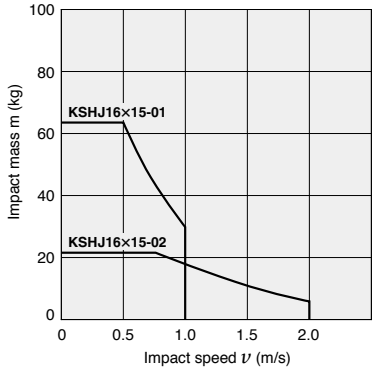
● KSHJ14×12(-F11)



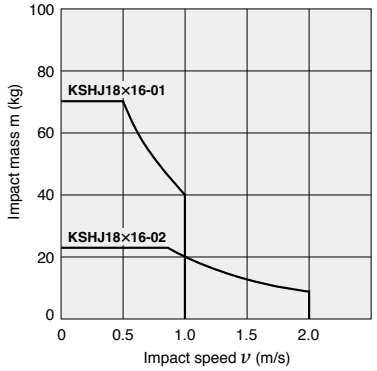
● KSHJ16×8



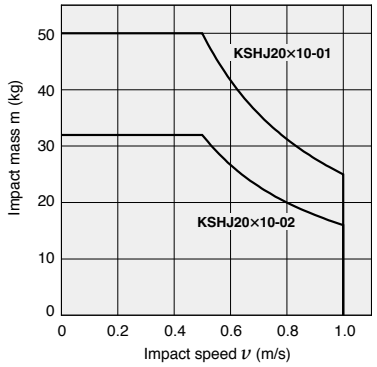
● KSHJ16×15



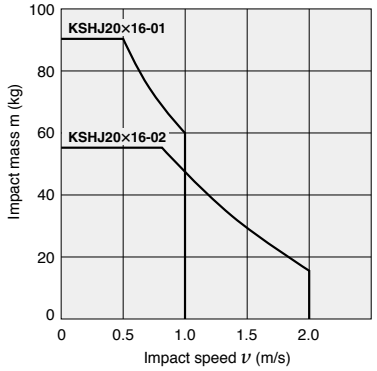
● KSHJ18×16(-F11)



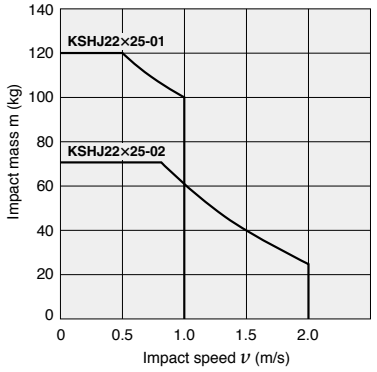
● KSHJ20×10



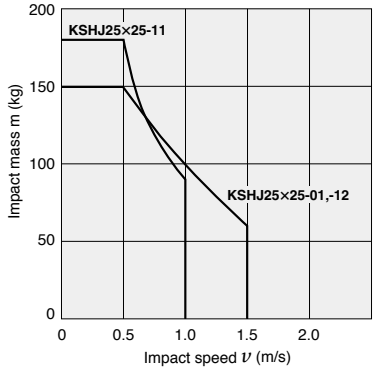
● KSHJ20×16



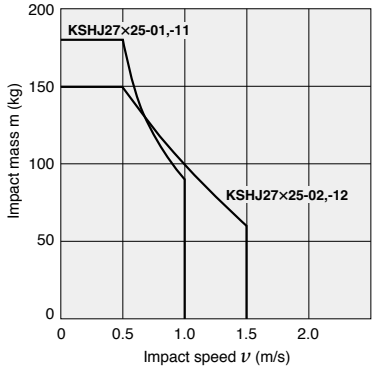
● KSHJ22×25



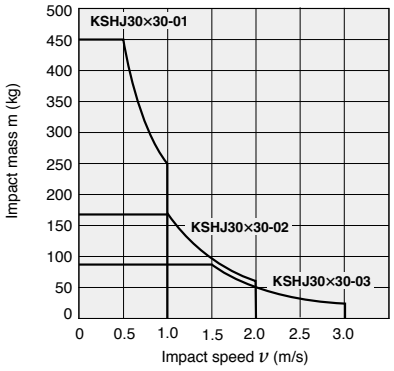
● KSHJ25×25(-F11)



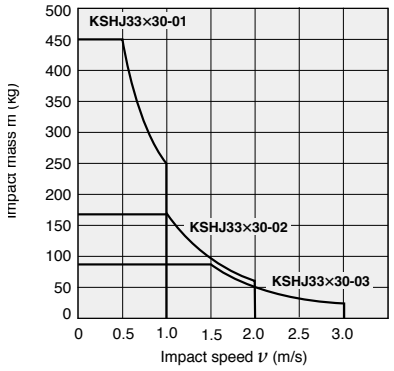
● KSHJ27×25



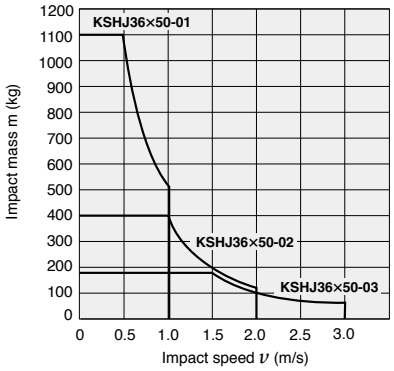
● **KSHJ30×30(-F11)**



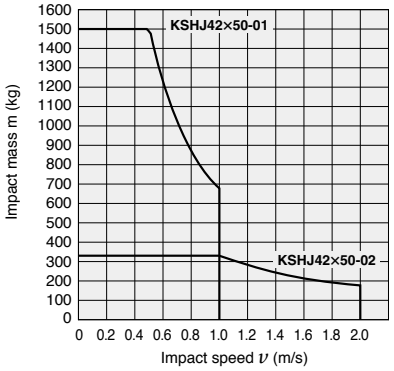
● **KSHJ33×30**



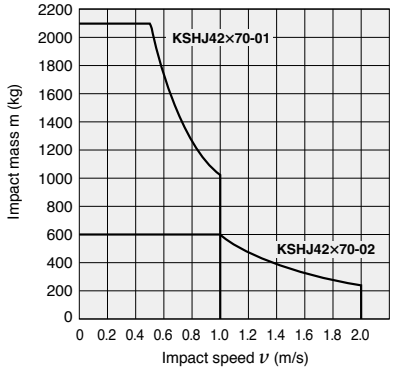
● **KSHJ36×50(-F11)**



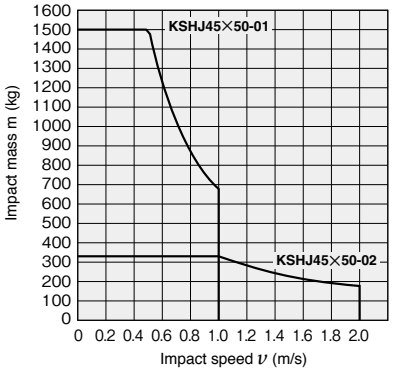
● **KSHJ42×50(-F11)**



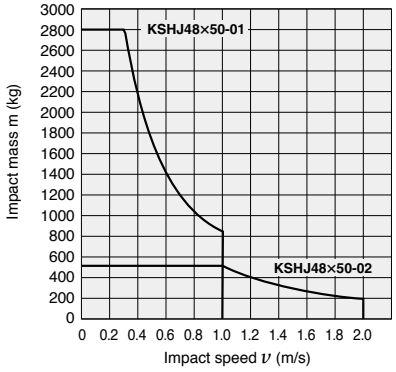
● **KSHJ42×70(-F11)**



● **KSHJ45×50**



● **KSHJ48×50**



Linear orifice shock absorber

KSHJ Series

Specifications

Item \ Model (in inches)	KSHJ4×3-01 (KSHJ4×3-01-F11)	KSHJ4×3-02 (KSHJ4×3-02-F11)	KSHJ6×4-01 (KSHJ6×4-01-F11)	KSHJ6×4-02 (KSHJ6×4-02-F11)	KSHJ6×6-01 (KSHJ6×6-01-F11)	KSHJ6×6-02 (KSHJ6×6-02-F11)
Maximum absorption capacity J(in.lbs)	0.3 (2.7)	0.2 (1.8)	0.5 (4.4)	0.3 (2.7)	1 (8.9)	0.5 (4.4)
Absorption stroke mm(in.)	3 (0.118)		4 (0.157)		6 (0.236)	
Impact speed range m/s(ft/s)	0.1 to 0.8 (0.33 to 2.62)	0.1 to 1 (0.33 to 3.28)	0.1 to 1 (0.33 to 3.28)		0.1 to 1 (0.33 to 3.28)	
Maximum operating cycle cycle/min	90				30	
Maximum absorption capacity per unit of time J/min (in.lbs/min)	10 (88.6)		20 (177.1)		15 (132.8)	
Spring return force[Note1] N	2		3		4	
Deflection angle	1° or less					
Operating temperature range[Note2] ℃(°F)	0 to 60 (32 to 140)					

Item \ Model (in inches)	KSHJ8×4-01, -11 (KSHJ8×4-01, -11-F11)	KSHJ8×4-02, -12 (KSHJ8×4-02, -12-F11)	KSHJ8×5-01, -11 (KSHJ8×5-01-F11)	KSHJ8×8-01, -11 (KSHJ8×8-01, -11-F11)	KSHJ8×8-02, -12 (KSHJ8×8-02,-12-F11)
Maximum absorption capacity J(in.lbs)	0.75 (6.6)	0.5 (4.4)	1 (8.9)	2 (17.7)	
Absorption stroke mm(in.)	4 (0.157)		5 (0.197)	8 (0.315)	
Impact speed range m/s(ft/s)	0.1 to 1 (0.33 to 3.28)		0.1 to 1 (0.33 to 3.28)	0.1 to 1 (0.33 to 3.28)	0.1 to 2 (0.33 to 6.56)
Maximum operating cycle cycle/min	60		90		
Maximum absorption capacity per unit of time J/min (in.lbs/min)	15 (132.8)		36 (318.8)	60 (531.4)	
Spring return force[Note1] N	6		6	8.6	
Deflection angle	1° or less				
Operating temperature range[Note2] ℃(°F)	0 to 60 (32 to 140)				

Item \ Model (in inches)	**KSHJ10×6-01 (KSHJ10×6-01-F11) (KSHJ11×6-01-F11)**	**KSHJ10×6-02 (KSHJ10×6-02-F11) (KSHJ11×6-02-F11)**	**KSHJ10×10-01 (KSHJ10×10-01-F11) (KSHJ11×10-01-F11)**	**KSHJ10×10-02 (KSHJ10×10-02-F11) (KSHJ11×10-02-F11)**	**KSHJ10×15-01 (KSHJ10×15-01-F11) (KSHJ11×15-01-F11)**	**KSHJ10×15-03 (KSHJ10×15-03-F11) (KSHJ11×15-02-F11)**
Maximum absorption capacity J(in.lbs)	1.25 (11.1)	0.75 (6.6)	3 (26.6)		5 (44.3)	6.5 (57.6)
Absorption stroke mm(in.)	6 (0.236)		10 (0.394)		15 (0.591)	
Impact speed range m/s(ft/s)	0.1 to 1 (0.33 to 3.28)		0.1 to 1 (0.33 to 3.28)	0.1 to 2 (0.33 to 6.56)	0.1 to 1 (0.33 to 3.28)	0.1 to 3 (0.33 to 9.84)
Maximum operating cycle cycle/min	60		90			
Maximum absorption capacity per unit of time J/min (in.lbs/min)	45 (398.5)		120 (1062.7)		200 (1771.2)	
Spring return force[Note1] N	8		8		9.8	
Deflection angle	1° or less					
Operating temperature range[Note2] ℃(°F)	0 to 60 (32 to 140)					

Item \ Model (in inches)	KSHJ12×6-01 (KSHJ12×6-01-F11)	KSHJ12×6-02 (KSHJ12×6-02-F11)	KSHJ12×10-01 (KSHJ12×10-01-F11)	KSHJ12×10-02 (KSHJ12×10-02-F11)	KSHJ14×8-01 (KSHJ14×8-01-F11)	KSHJ14×8-02 (KSHJ14×8-02-F11)
Maximum absorption capacity J(in.lbs)	3 (26.6)	2 (17.7)	6 (53.1)		5 (44.3)	3.25 (28.8)
Absorption stroke mm(in.)	6 (0.236)		10 (0.394)		8 (0.315)	
Impact speed range m/s(ft/s)	0.1 to 1 (0.33 to 3.28)		0.1 to 1 (0.33 to 3.28)	0.1 to 2 (0.33 to 6.56)	0.1 to 1 (0.33 to 3.28)	
Maximum operating cycle cycle/min	60					
Maximum absorption capacity per unit of time J/min (in.lbs/min)	80 (708.5)		220 (1948.3)		100 (885.6)	
Spring return force[Note1] N	8		7.6		12.5	
Deflection angle	1° or less					
Operating temperature range[Note2] ℃(°F)	0 to 60 (32 to 140)					

Note1: The spring return force is the force of the piston rod when it returns from a full stroke. It is not stable, so cannot be used as other than rod return.

Note2: The shock absorber's shock absorbing capacity fluctuates based on speed and ambient temperature. Use the product within the ranges of the selection graphs (impact mass, impact speed diagram) on pages ⓮ to ⓰.

Note3: KSHJ11 has only inch specifications.

* The maximum tightening torque of KSHJ11 is different from that of KSHJ10. See page ⓫ for details on the maximum tightening torque.

Specifications

Item \ Model (in inches)	KSHJ14×12-01 (KSHJ14×12-01-F11)	KSHJ14×12-02 (KSHJ14×12-02-F11)	KSHJ16×8-01	KSHJ16×8-02	KSHJ16×15-01	KSHJ16×15-02
Maximum absorption capacity J(in.lbs)	10 (88.6)		7.5	5	15	
Absorption stroke mm(in.)	12 (0.472)		8		15	
Impact speed range m/s(ft/s)	0.1 to 1 (0.33 to 3.28)	0.1 to 2 (0.33 to 6.56)	0.1 to 1		0.1 to 1	0.1 to 2
Maximum operating cycle cycle/min	60		40			
Maximum absorption capacity per unit of time J/min (in.lbs/min)	240 (2125.4)		130		280	
Spring return force[Note1] N	9.2		12.5		17.4	
Deflection angle	1° or less		3° or less			
Operating temperature range[Note2] ℃(℉)	0 to 60 (32 to 140)					

Item \ Model (in inches)	KSHJ18×16-01 (KSHJ18×16-01-F11)	KSHJ18×16-02 (KSHJ18×16-02-F11)	KSHJ20×10-01	KSHJ20×10-02	KSHJ20×16-01	KSHJ20×16-02
Maximum absorption capacity J(in.lbs)	20 (177.0)		12.5	8	30	
Absorption stroke mm(in.)	16 (0.630)		10		16	
Impact speed range m/s(ft/s)	0.1 to 1 (0.33 to 3.28)	0.1 to 2 (0.33 to 6.56)	0.1 to 1		0.1 to 1	0.1 to 2
Maximum operating cycle cycle/min	40				30	
Maximum absorption capacity per unit of time J/min (in.lbs/min)	320 (2833.9)		200		450	
Spring return force[Note1] N	22		15		22	
Deflection angle	3° or less					
Operating temperature range[Note2] ℃(℉)	0 to 60 (32 to 140)					

Item \ Model (in inches)	KSHJ22×25-01	KSHJ22×25-02	KSHJ25×25-01	KSHJ25×25-11 (KSHJ25×25-01-F11)	KSHJ25×25-12 (KSHJ25×25-02-F11)
Maximum absorption capacity J(in.lbs)	50		60 (531.0)		
Absorption stroke mm(in.)	25		25 (0.984)		
Impact speed range m/s(ft/s)	0.1 to 1	0.1 to 1	0.1 to 1.5	0.1 to 1 (0.33 to 3.28)	0.1 to 1.5 (0.33 to 4.92)
Maximum operating cycle cycle/min	30				
Maximum absorption capacity per unit of time J/min (in.lbs/min)	500		700	800 (7084.8)	
Spring return force[Note1] N	28.5				
Deflection angle	3° or less				
Operating temperature range[Note2] ℃(℉)	0 to 60 (32 to 140)				

Item \ Model (in inches)	KSHJ27×25-01,-11	KSHJ27×25-02,-12	KSHJ30×30-01 (KSHJ30×30-01-F11)	KSHJ30×30-02 (KSHJ30×30-02-F11)	KSHJ30×30-03 (KSHJ30×30-03-F11)
Maximum absorption capacity J(in.lbs)	60		140 (1239.1)		
Absorption stroke mm(in.)	25		30 (1.181)		
Impact speed range m/s(ft/s)	0.1 to 1	0.1 to 1.5	0.1 to 1 (0.33 to 3.28)	0.1 to 2 (0.33 to 6.56)	0.1 to 3 (0.33 to 9.84)
Maximum operating cycle cycle/min	30		20		
Maximum absorption capacity per unit of time J/min (in.lbs/min)	800		900 (7970.4)		
Spring return force[Note1] N	28.5		41.5		
Deflection angle	3° or less				
Operating temperature range[Note2] ℃(℉)	0 to 60 (32 to 140)				

Note1: The spring return force is the force of the piston rod when it returns from a full stroke. It is not stable, so cannot be used as other than rod return.

Note2: The shock absorber's shock absorbing capacity fluctuates based on speed and ambient temperature.
Use the product within the ranges of the selection graphs (impact mass, impact speed diagram) on pages ⓮ to ⓰.

Note3: KSHJ16×8, KSHJ16×15, KSHJ20×10, KSHJ20×16, KSHJ22×25, KSHJ27×25, KSHJ33×30, KSHJ45×50, and KSHJ48×50 do not have inch specifications.

Specifications

Item \ Model (in inches)	KSHJ33×30-01	KSHJ33×30-02	KSHJ33×30-03	KSHJ36×50-01 (KSHJ36×50-01-F11)	KSHJ36×50-02 (KSHJ36×50-02-F11)	KSHJ36×50-03 (KSHJ36×50-03-F11)
Maximum absorption capacity J(in.lbs)	140			300 (2655.2)		
Absorption stroke mm(in.)	30			50 (1.969)		
Impact speed range m/s(ft/s)	0.1 to 1	0.1 to 2	0.1 to 3	0.1 to 1 (0.33 to 3.28)	0.1 to 2 (0.33 to 6.56)	0.1 to 3 (0.33 to 9.84)
Maximum operating cycle cycle/min	20			20		
Maximum absorption capacity per unit of time J/min (in.lbs/min)	900			1800 (15940.8)		
Spring return force[Note1] N	41.5			66.5		
Deflection angle	3° or less					
Operating temperature range[Note2] ℃(℉)	0 to 60 (32 to 140)					

Item \ Model (in inches)	KSHJ42×50-01 (KSHJ42×50-01-F11)	KSHJ42×50-02 (KSHJ42×50-02-F11)	KSHJ42×70-01 (KSHJ42×70-01-F11)	KSHJ42×70-02 (KSHJ42×70-02-F11)
Maximum absorption capacity J(in.lbs)	400 (3540.3)		600 (5310.4)	
Absorption stroke mm(in.)	50 (1.969)		70 (2.756)	
Impact speed range m/s(ft/s)	0.1 to 1 (0.33 to 3.28)	0.1 to 2 (0.33 to 6.56)	0.1 to 1 (0.33 to 3.28)	0.1 to 2 (0.33 to 6.56)
Maximum operating cycle cycle/min	15		15	
Maximum absorption capacity per unit of time J/min (in.lbs/min)	2400 (21254.4)		2400 (21254.4)	
Spring return force[Note1] N	85.0		68.0	
Deflection angle	3° or less		1° or less	
Operating temperature range[Note2] ℃(℉)	0 to 60 (32 to 140)			

Item \ Model (in inches)	KSHJ45×50-01	KSHJ45×50-02	KSHJ48×50-01	KSHJ48×50-02
Maximum absorption capacity J(in.lbs)	400		500	
Absorption stroke mm(in.)	50		50	
Impact speed range m/s(ft/s)	0.1 to 1	0.1 to 2	0.1 to 1	0.1 to 2
Maximum operating cycle cycle/min	15		15	
Maximum absorption capacity per unit of time J/min (in.lbs/min)	2400		3000	
Spring return force[Note1] N	85.0		86.0	
Deflection angle	3° or less			
Operating temperature range[Note2] ℃(℉)	0 to 60			

Note1: The spring return force is the force of the piston rod when it returns from a full stroke. It is not stable, so cannot be used as other than rod return.

Note2: The shock absorber's shock absorbing capacity fluctuates based on speed and ambient temperature.
Use the product within the ranges of the selection graphs (impact mass, impact speed diagram) on pages ⓮ to ⓰.

Note3: KSHJ16×8, KSHJ16×15, KSHJ20×10, KSHJ20×16, KSHJ22×25, KSHJ27×25, KSHJ33×30, KSHJ45×50, KSHJ48×50 do not have inch specifications.

Mass

Specifications in mm

g

Model	Main unit[Note]	Additional mass	Additional parts' mass		
		With plastic cap	Mounting nut (1 ea.)	Stopper nut	Side mounting bracket
KSHJ4×3-01, -02	1.8	0.1	0.2	1	7
KSHJ6×4-01, -02	4	0.2	0.4	2	8
KSHJ6×6-01, -02	5	0.2	0.4	2	8
KSHJ8×4-01, -02, -11,-12 (with hexagon socket)	10	0.5	0.6(0.9)	4	12
KSHJ8×5-01, -11	10	0.5	0.6(0.9)	4	12
KSHJ8×8-01, -02, -11,-12	11.5	0.5	0.6(0.9)	4	12
KSHJ10×6-01, -02 (with hexagon socket)	21	0.6	1.2	7	15
KSHJ10×10-01, -02	22	0.6	1.2	7	15
KSHJ10×15-01, -03	28	0.6	1.2	7	15
KSHJ12×6-01, 02 (with hexagon socket)	31	1.2	1.9	8	22
KSHJ12×10-01, -02	37	1.2	1.9	8	22
KSHJ14×8-01, 02 (with hexagon socket)	55	1.4	4	15	41
KSHJ14×12-01, -02	58	1.4	4	15	41
KSHJ16×8-01, -02 (with hexagon socket)	73	1.4	6.6	28	65
KSHJ16×15-01, -02	83	1.4	6.6	28	65
KSHJ18×16-01, -02	113	3.0	8.8	37	100
KSHJ20×10-01, -02 (with hexagon socket)	131	3.0	12.2	55	110
KSHJ20×16-01, -02	156	3.0	12.2	55	110
KSHJ22×25-01, -02	233	7.0	18.2	82	390
KSHJ25×25-01	307	7.0	23	95	360
KSHJ25×25-11, -12	300	7.0	24.5	95	360
KSHJ27×25-01, -02	415	7.0	42	180	460
KSHJ27×25-11, -12	395	7.0	54	180	460
KSHJ30×30-01, -02, -03	520	50	32.5	140	455
KSHJ33×30-01, -02, -03	675	50	47.5	390	2800
KSHJ36×50-01, -02, -03	1070	110	95.5	330	2650
KSHJ42×50-01, -02	1310	110	93	320	2400
KSHJ42×70-01, -02	1500	110	93	320	2400
KSHJ45×50-01, -02	1610	110	123	420	3400
KSHJ48×50-01, -02	1830	210	100	400	3400

Calculation example: The mass of KSHJ10×10C-01-S-2 (with cap, stopper, and side mount) is

22 + 0.6 + 7 + 15 = 44.6g

Note: The weight of the main unit includes the weight of 2 mounting nuts.

Specifications in inches

oz

Model	Main unit[Note1]	Additional mass	Additional parts' mass	
		With plastic cap	Mounting nut (1 ea.)	Stopper nut
KSHJ4×3-01, -0 -F11	0.1	0.004	0.01	0.04
KSHJ6×4-01, -02 -F11	0.2	0.007	0.04	0.1
KSHJ6×6-01, -02 -F11	0.2	0.007	0.04	0.1
KSHJ8×4-01, -02, -11,-12 -F11	0.4	0.02	0.06	0.2
KSHJ8×5-01-F11	0.4	0.02	0.06	0.2
KSHJ8×8-01, -02, -11,-12 -F11	0.5	0.02	0.06	0.2
KSHJ10×6-01, -02 -F11	0.7	0.02	0.07	0.4
KSHJ10×10-01, -02 -F11	0.8	0.02	0.07	0.4
KSHJ10×15-01, -03 -F11	1.0	0.02	0.07	0.4
KSHJ11×6-01, -02 -F11[Note2]	1.0	0.02	0.09	0.4
KSHJ11×10-01, -02-F11[Note2]	1.2	0.02	0.09	0.4
KSHJ11×15-01, -03-F11[Note2]	1.4	0.02	0.09	0.4
KSHJ12×6-01, 02 -F11	1.3	0.04	0.1	0.5
KSHJ12×10-01, -02 -F11	1.5	0.04	0.1	0.5
KSHJ14×8-01, 02 -F11	2.2	0.05	0.2	0.7
KSHJ14×12-01, -02 -F11	2.2	0.05	0.2	0.7
KSHJ18×16-01, -02 -F11	4.8	0.1	0.4	2.5
KSHJ25×25-11, -12 -F11	11.3	0.2	1.2	4.4
KSHJ30×30-01, -02, -03 -F11	20.6	1.8	1.3	5.5
KSHJ36×50-01, -02, -03 -F11	33.9	3.9	3.0	9.8
KSHJ42×50-01, -02 -F11	51.5	3.9	3.4	10.8
KSHJ42×70-01, -02 -F11	59.6	3.9	3.4	10.8

Calculation example: The mass of KSHJ10×10C-01-S-2 (with cap and stopper) is

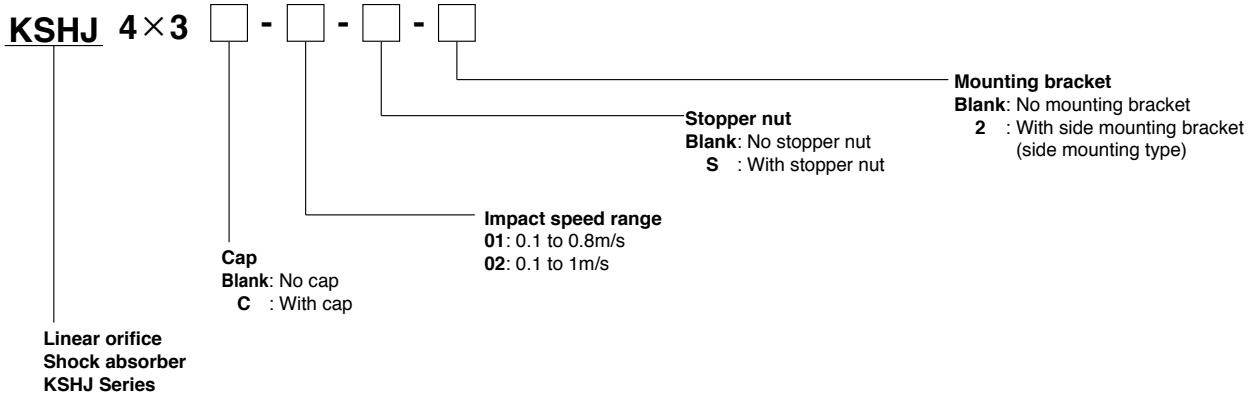
0.8 + 0.02 + 0.4 = 1.58oz

Note1: The weight of the main unit includes the weight of 2 mounting nuts.

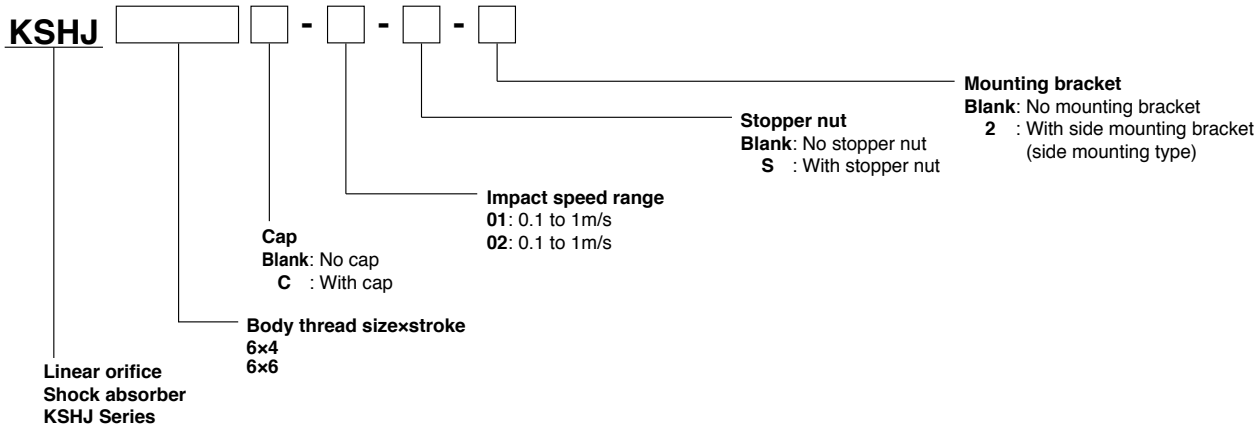
Note2: KSHJ11 has only inch specifications.

Order Codes (specifications in mm)

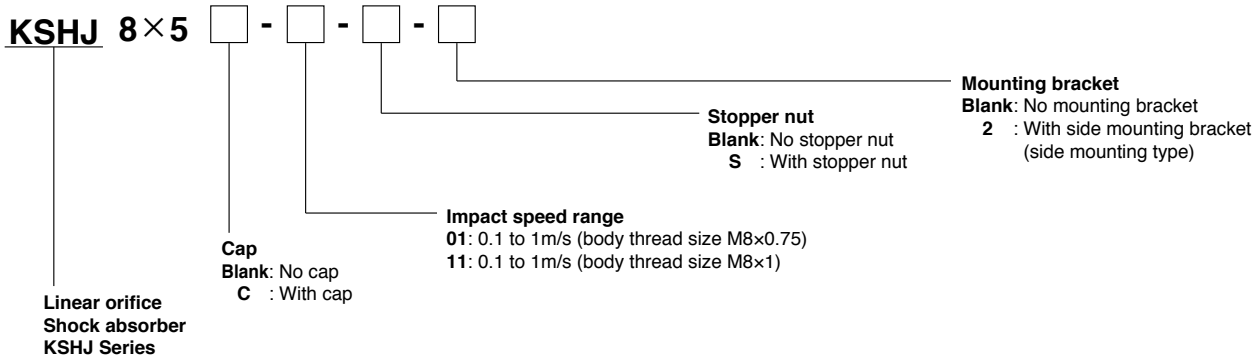
● **4×3**



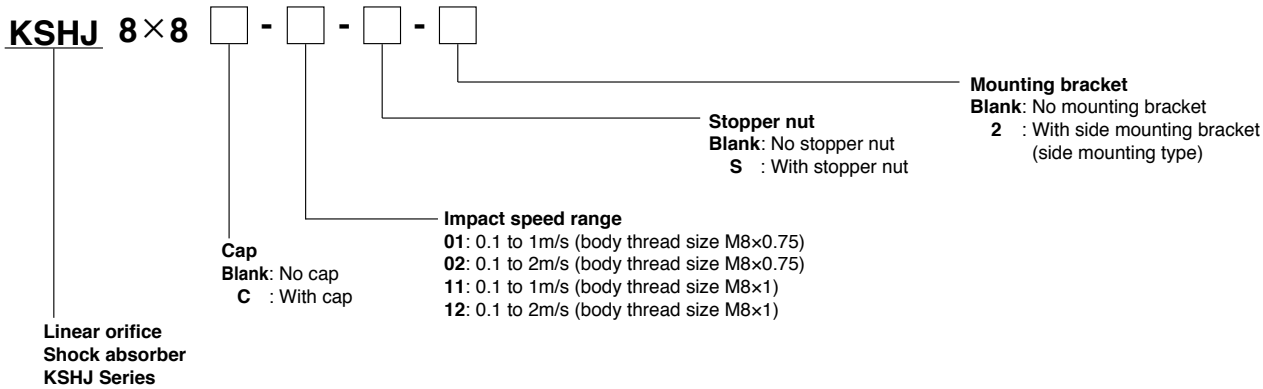
● **6×4**
6×6



● **8×5**



● **8×8**



Order Codes (specifications in mm)

● **10×15**

KSHJ **10×15** □ - □ - □ - □

Linear orifice Shock absorber KSHJ Series

Cap
Blank: No cap
C : With cap

Impact speed range
01: 0.1 to 1m/s
03: 0.1 to 3m/s

Stopper nut
Blank: No stopper nut
S : With stopper nut

Mounting bracket
Blank: No mounting bracket
2 : With side mounting bracket (side mounting type)

● **10×10**
12×10
14×12
16×15
18×16
20×16
22×25

KSHJ □ □ - □ - □ - □

Linear orifice Shock absorber KSHJ Series

Body thread size×stroke
10×10
12×10
14×12
16×15
18×16
20×16
22×25

Cap
Blank: No cap
C : With cap

Impact speed range
01: 0.1 to 1m/s
02: 0.1 to 2m/s

Stopper nut
Blank: No stopper nut
S : With stopper nut

Mounting bracket
Blank: No mounting bracket
2 : With side mounting bracket (side mounting type)

● **25×25**

KSHJ **25×25** □ - □ - □ - □

Linear orifice Shock absorber KSHJ Series

Cap
Blank: No cap
C : With cap

Impact speed range
01: 0.1 to 1.5m/s (body thread size M25×1.5)
11: 0.1 to 1m/s (body thread size M25×2)
12: 0.1 to 1.5m/s (body thread size M25×2)

Stopper nut
Blank: No stopper nut
S : With stopper nut

Mounting bracket
Blank: No mounting bracket
2 : With side mounting bracket (side mounting type)

● **27×25**

KSHJ **27×25** □ - □ - □ - □

Linear orifice Shock absorber KSHJ Series

Cap
Blank: No cap
C : With cap

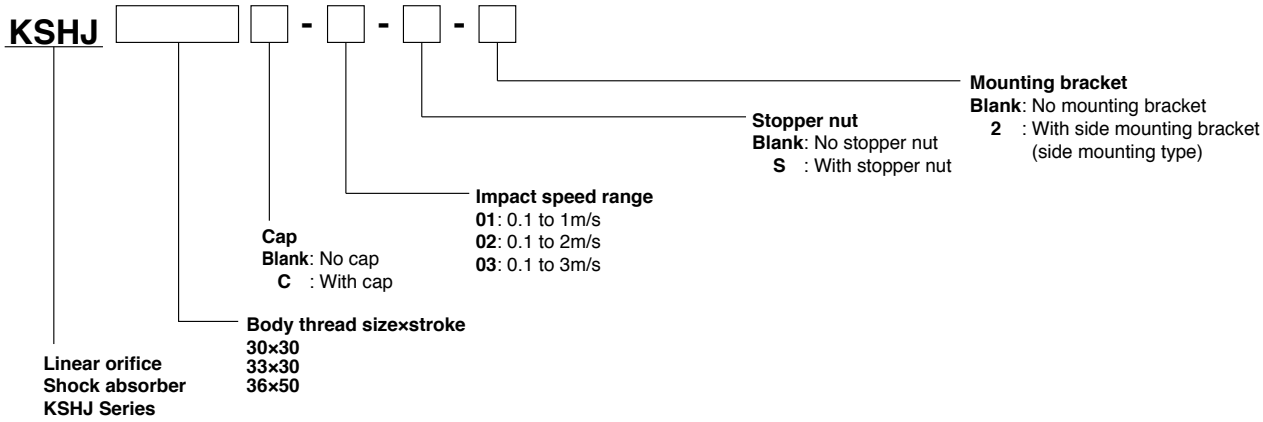
Impact speed range
01: 0.1 to 1m/s (body thread size M27×1.5)
02: 0.1 to 1.5m/s (body thread size M27×1.5)
11: 0.1 to 1m/s (body thread size M27×3)
12: 0.1 to 1.5m/s (body thread size M27×3)

Stopper nut
Blank: No stopper nut
S : With stopper nut

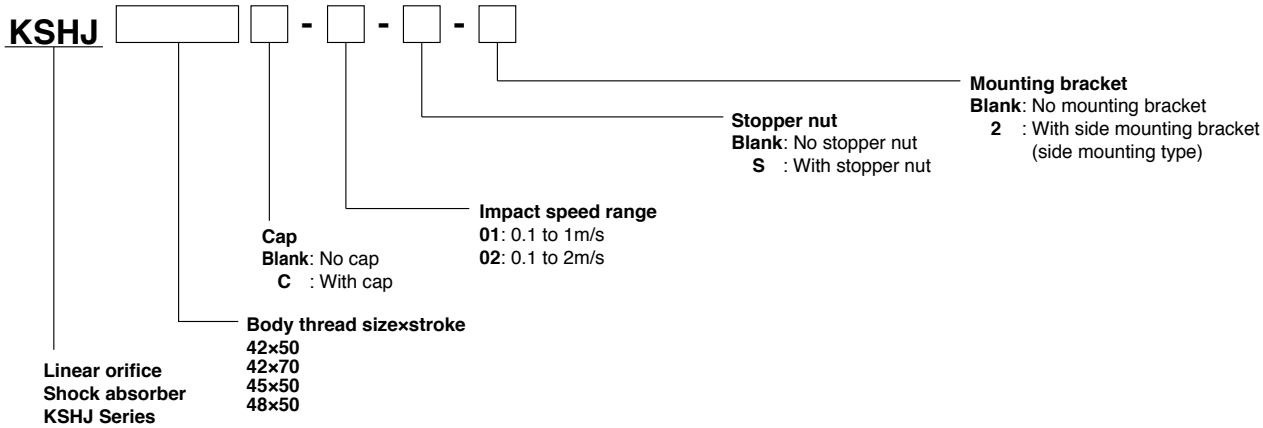
Mounting bracket
Blank: No mounting bracket
2 : With side mounting bracket (side mounting type)

Order Codes (specifications in mm)

- **30×30**
  33×30
  36×50

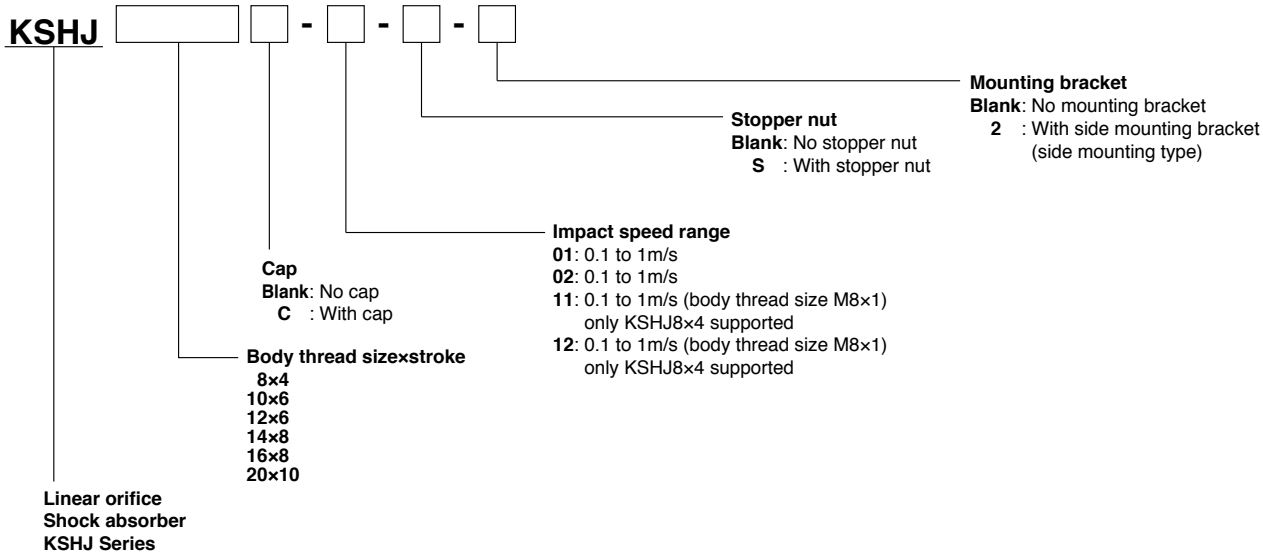


- **42×50**
  42×70
  45×50
  48×50



Short stroke type (with hexagon socket)

- **8×4**
  10×6
  12×6
  14×8
  16×8
  20×10



Order Codes (specifications in mm)

Additional Parts (no specifications in inches)

●Mounting nut (M4 to M20: 1 pack has 10 units / M22 to M48: 1 pack has 2 units) Note

N - KSH - M□

Thread size
- **4:** For KSHJ4
- **6:** For KSHJ6
- **8:** For KSHJ8(-01,02)
- **8-11:** For KSHJ8(-11,12)
- **10:** For KSHJ10
- **12:** For KSHJ12
- **14:** For KSHJ14
- **16:** For KSHJ16
- **18:** For KSHJ18
- **20:** For KSHJ20
- **22:** For KSHJ22
- **25:** For KSHJ25-01
- **25-11:** For KSHJ25(-11,12)
- **27:** For KSHJ27(-01,02)
- **27-11:** For KSHJ27(-11,12)
- **30:** For KSHJ30
- **33:** For KSHJ33
- **36:** For KSHJ36
- **42:** For KSHJ42
- **45:** For KSHJ45
- **48:** For KSHJ48

●Stopper nut

S - KSH - M□

Thread size
- **4:** For KSHJ4
- **6:** For KSHJ6
- **8:** For KSHJ8(-01,02)
- **8-11:** For KSHJ8(-11,12)
- **10:** For KSHJ10
- **12:** For KSHJ12
- **14:** For KSHJ14
- **16:** For KSHJ16
- **18:** For KSHJ18
- **20:** For KSHJ20
- **22:** For KSHJ22
- **25:** For KSHJ25-01
- **25-11:** For KSHJ25(-11,12)
- **27:** For KSHJ27(-01,02)
- **27-11:** For KSHJ27(-11,12)
- **30:** For KSHJ30
- **33:** For KSHJ33
- **36:** For KSHJ36
- **42:** For KSHJ42
- **45:** For KSHJ45
- **48:** For KSHJ48

●Side mounting bracket

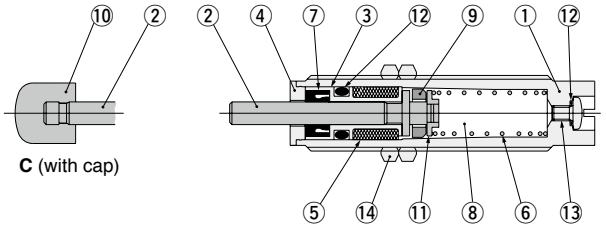
2 - KSH - M□

Thread size
- **4:** For KSHJ4
- **6:** For KSHJ6
- **8:** For KSHJ8(-01,02)
- **8-11:** For KSHJ8(-11,12)
- **10:** For KSHJ10
- **12:** For KSHJ12
- **14:** For KSHJ14
- **16:** For KSHJ16
- **18:** For KSHJ18
- **20:** For KSHJ20
- **22:** For KSHJ22
- **25:** For KSHJ25-01
- **25-11:** For KSHJ25(-11,12)
- **27:** For KSHJ27(-01,02)
- **27-11:** For KSHJ27(-11,12)
- **30:** For KSHJ30
- **33:** For KSHJ33
- **36:** For KSHJ36
- **42:** For KSHJ42
- **45:** For KSHJ45
- **48:** For KSHJ48

Note: The mounting nut for thread size M45 is nominal number AN09 prescribed in JIS B1554 (nuts for rolling bearings).
* For the dimension diagrams of the additional parts, see pages ⓬ to ⓭.
* The stopper nut and side mount are made from mild steel (nickel plated).

Inner Construction and Major Parts and Materials

●**M4** to **M27** size (10-32UNF to 1-12UNF) * The inch sizes are inside the ( ).



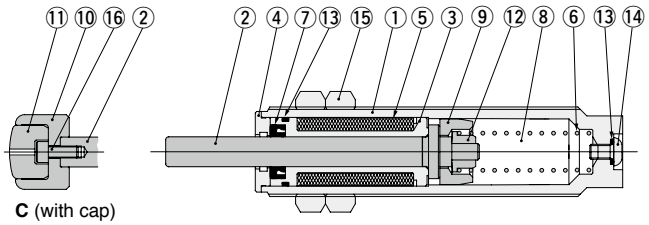
C (with cap)

Note: Some parts and interior shapes may vary depending on size.

No.	Name	Materials
①	Body[Note1]	Copper alloy (nickel plated)
②	Piston rod[Note2]	Steel (nickel plated)
③	Sleeve	Copper alloy
④	Plug	Stainless steel
⑤	Accumulator	Synthetic rubber
⑥	Spring	Spring steel
⑦	Rod seal	Synthetic rubber
⑧	Oil	Special oil
⑨	Piston ring	Copper alloy
⑩	Cap	Plastic (POM)
⑪	Collar[Note3]	Stainless steel, copper alloy
⑫	O-ring	Synthetic rubber
⑬	Screw[Note4]	Mild steel (zinc plated)
⑭	Mounting nut	Mild steel (nickel plated)

Note1: KSHJ4, 6, and 8×4 are stainless steel
2: KSHJ8, 10×10, and 12×10 are stainless steel
3: KSHJ6 and 8 are copper alloy
KSHJ10 and 12, and 14×12 are sintered metal
4: KSHJ4, 6, and 8 are nickel plated

●**M30** to **M48** size (1 1/4-12UNF to 1 3/4-12UN) * The inch sizes are inside the ( ).



C (with cap)

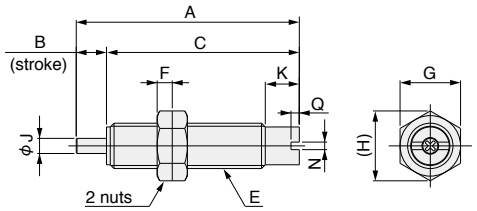
Note: Some parts and interior shapes may vary depending on size.

No.	Name	Materials
①	Body	Free-cutting steel (nickel plated)
②	Piston rod	Steel (nickel plated)
③	Sleeve	Copper alloy
④	Plug	Stainless steel
⑤	Accumulator	Synthetic rubber
⑥	Spring	Spring steel
⑦	Rod seal	Synthetic rubber
⑧	Oil	Special oil
⑨	Piston ring[Note]	Copper alloy
⑩	Metal cap	Stainless steel
⑪	Cap	Plastic (POM)
⑫	Collar	Stainless steel
⑬	O-ring	Synthetic rubber
⑭	Button head screw	Stainless steel
⑮	Mounting nut	Mild steel (nickel plated)
⑯	Hexagon socket head screw	Mild steel (nickel plated)

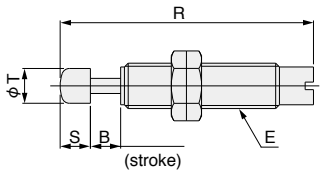
Note: KSHJ42, 45, and 48 are stainless steel

Dimensions (mm)

●No rod end cap: KSHJ4×3, KSHJ6×4, KSHJ6×6

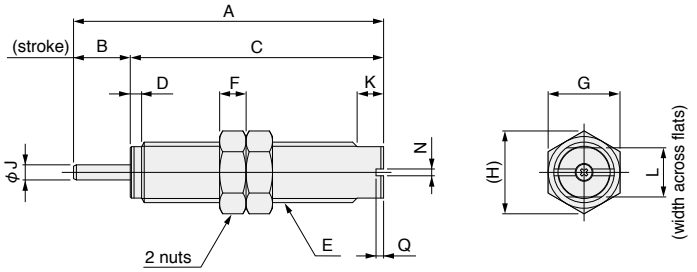


●With rod end cap: KSHJ4×3C, KSHJ6×4C
KSHJ6×6C

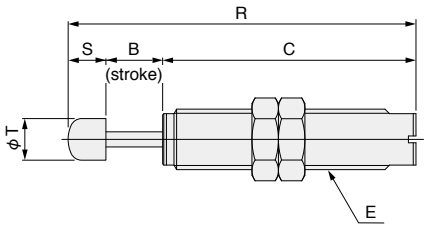


Model \ Symbol	A	B	C	E	F	G	H	J	K	N	Q	R	S	T
KSHJ4×3 (C)-01,-02	25	3	22	M4×0.5	2	5.5	6.4	1.2	3	1	1.1	28.5	3.5	3.2
KSHJ6×4 (C)-01,-02	29.5	4	25.5	M6×0.75	2	8	9.2	2	4.5	1	1	33.5	4	4.6
KSHJ6×6 (C)-01,-02	35.5	6	29.5	M6×0.75	2	8	9.2	2	5.5	1	1	39.5	4	4.6

●No rod end cap: KSHJ□×□-□

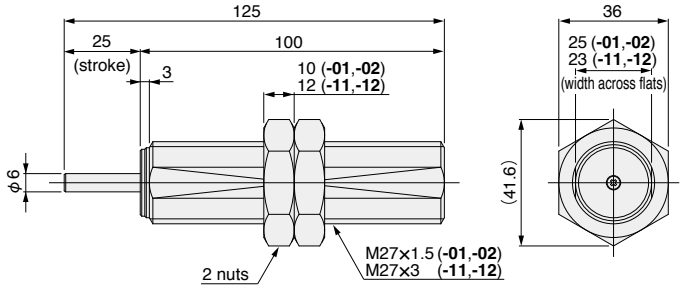


●With rod end cap: KSHJ□×□C-□

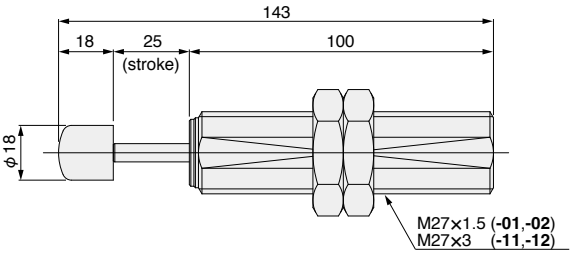


Model \ Symbol	A	B	C	D	E	F	G	H	J	K	L	N	Q	R	S	T
KSHJ8×5 (C)-01	37	5	32	1.2	M8×0.75	2	10	11.5	2.5	3	7	1.3	1.5	42	5	6.5
KSHJ8×5 (C)-11	37	5	32	1.2	M8×1	3	10	11.5	2.5	3	7	1.3	1.5	42	5	6.5
KSHJ8×8 (C)-01,-02	46	8	38	1.2	M8×0.75	2	10	11.5	2.5	3	7	1.3	1.5	51	5	6.5
KSHJ8×8 (C)-11,-12	46	8	38	1.2	M8×1	3	10	11.5	2.5	3	7	1.3	1.5	51	5	6.5
KSHJ10×10 (C)-01,-02	60	10	50	2	M10×1	3	12	13.9	3	5	8.5	1.3	1.5	68	8	8
KSHJ10×15 (C)-01,-03	77	15	62	2.3	M10×1	3	12	13.9	3	5	8.5	1.3	1.5	85	8	8
KSHJ12×10 (C)-01,-02	66	10	56	2	M12×1	4	14	16.2	3	5	10.5	1.3	1.5	76	10	10
KSHJ14×12 (C)-01,-02	72	12	60	2	M14×1.5	5	17	19.6	4	5	12	1.3	1.5	82	10	11
KSHJ16×15 (C)-01,-02	82	15	67	3	M16×1.5	7	19	21.9	4	7	13	1.8	2	92	10	11
KSHJ18×16 (C)-01,-02	88	16	72	3	M18×1.5	8	21	24.2	5	7	15	1.8	2	103	15	15
KSHJ20×16 (C)-01,-02	93	16	77	3	M20×1.5	8	24	27.7	5	7	17	1.8	2	108	15	15
KSHJ22×25 (C)-01,-02	125	25	100	3	M22×1.5	9	27	31.2	6	10	19	1.8	2	143	18	18
KSHJ25×25 (C)-01	125	25	100	3	M25×1.5	10	30	34.6	6	10	22	1.8	2	143	18	18
KSHJ25×25 (C)-11,-12	125	25	100	3	M25×2	10	30	34.6	6	10	22	1.8	2	143	18	18

●No rod end cap: KSHJ27×25-□

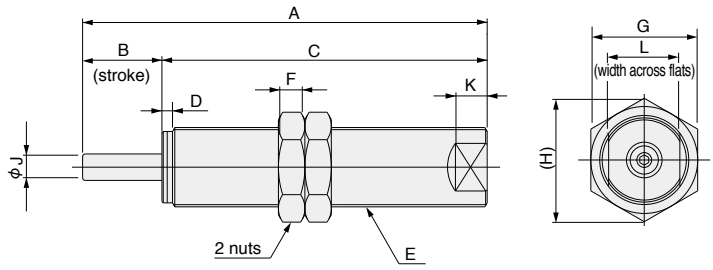


●With rod end cap: KSHJ27×25C-□

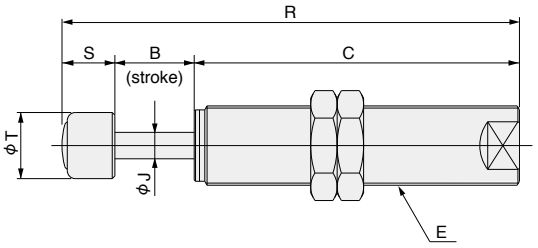


Dimensions (mm)

●No rod end cap: KSHJ□×□-□

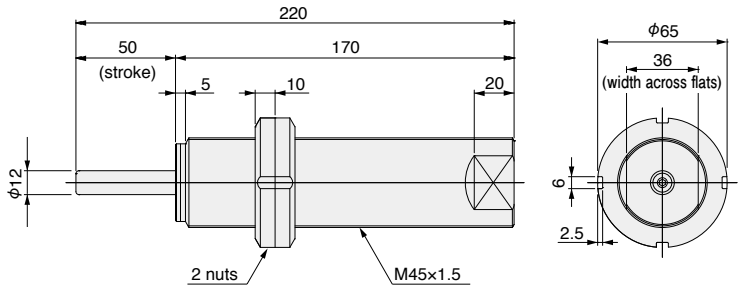


●With rod end cap: KSHJ□×□C-□

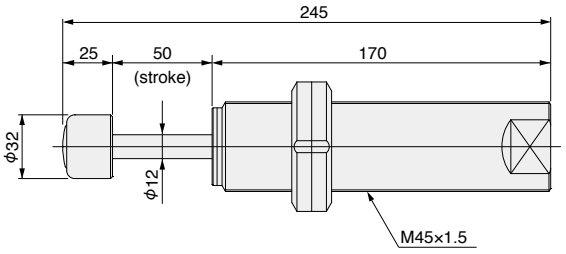


Model \ Symbol	A	B	C	D	E	F	G	H	J	K	L	R	S	T
KSHJ30×30 (C)-01,-02,-03	153	30	123	4	M30×1.5	10	36	41.6	10	12	24	173	20	25
KSHJ33×30 (C)-01,-02,-03	153	30	123	4	M33×1.5	10	41	47.3	10	12	27	173	20	25
KSHJ36×50 (C)-01,-02,-03	218	50	168	5	M36×1.5	15	46	53.1	12	15	30	243	25	32
KSHJ42×50 (C)-01,-02	220	50	170	5	M42×1.5	15	50	57.7	12	20	36	245	25	32
KSHJ42×70 (C)-01,-02	275	70	205	5	M42×1.5	15	50	57.7	12	20	36	300	25	32
KSHJ48×50 (C)-01,-02	230	50	180	6	M48×2	15	55	63.5	14	20	40	263	33	38

●No rod end cap: KSHJ45×50-01, -02

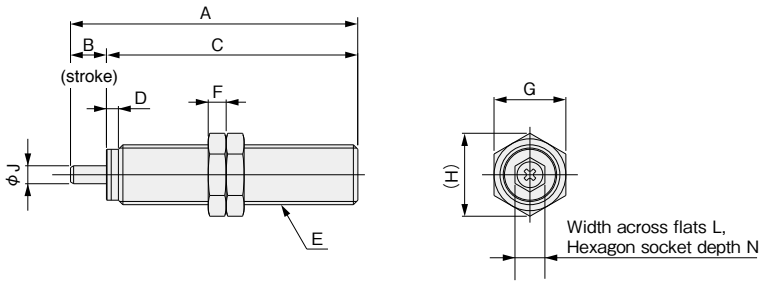


●With rod end cap: KSHJ45×50C-01, -02

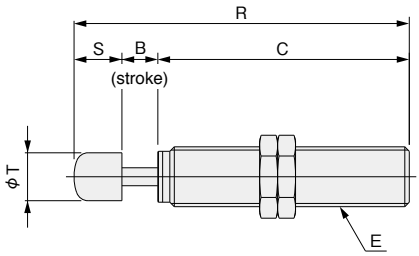


Short stroke type (with hexagon socket)

●No rod end cap: KSHJ□×□-□



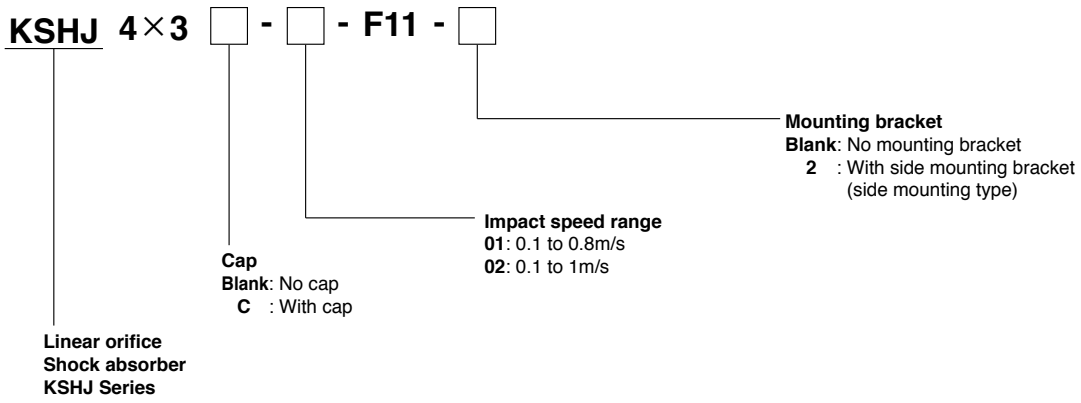
●With rod end cap: KSHJ□×□C-□



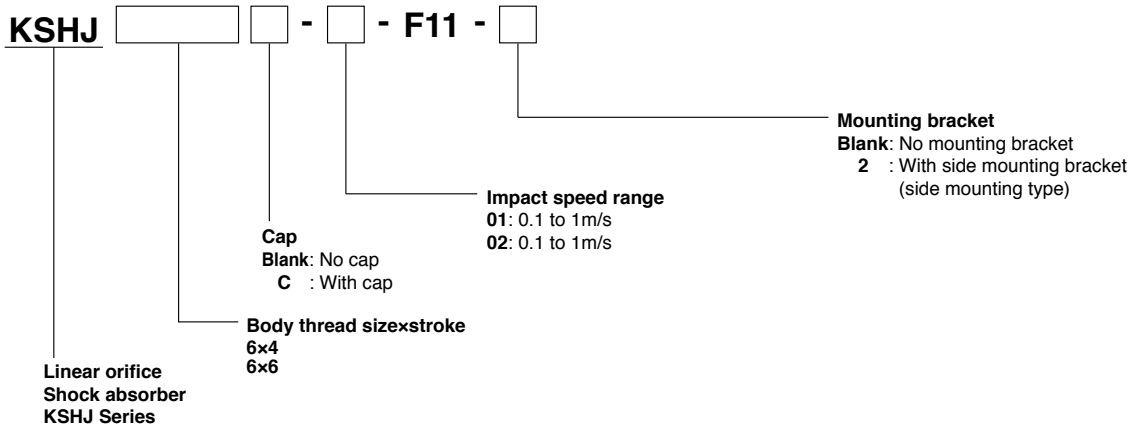
Model \ Symbol	A	B	C	D	E	F	G	H	J	L	N	R	S	T
KSHJ8×4 (C)-01,-02	37	4	33	2.2	M8×0.75	2	10	11.5	2.5	4	2	42	5	6.5
KSHJ8×4 (C)-11,-12	37	4	33	2.2	M8×1.0	3	10	11.5	2.5	4	2	42	5	6.5
KSHJ10×6 (C)-01,-02	48	6	42	2	M10×1	3	12	13.9	3	5	3	56	8	8
KSHJ12×6 (C)-01,-02	48	6	42	2	M12×1	4	14	16.2	3	6	3	58	10	10
KSHJ14×8 (C)-01,-02	61	8	53	2	M14×1.5	5	17	19.6	4	6	3	71	10	11
KSHJ16×8 (C)-01,-02	61	8	53	3	M16×1.5	7	19	21.9	4	6	4	71	10	11
KSHJ20×10 (C)-01,-02	69	10	59	3	M20×1.5	8	24	27.7	5	6	4	84	15	15

Order Codes (specifications in inches)

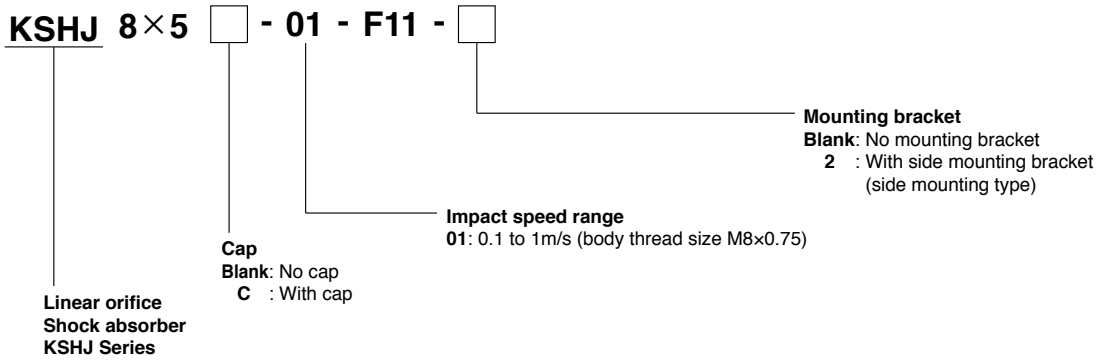
● 4×3



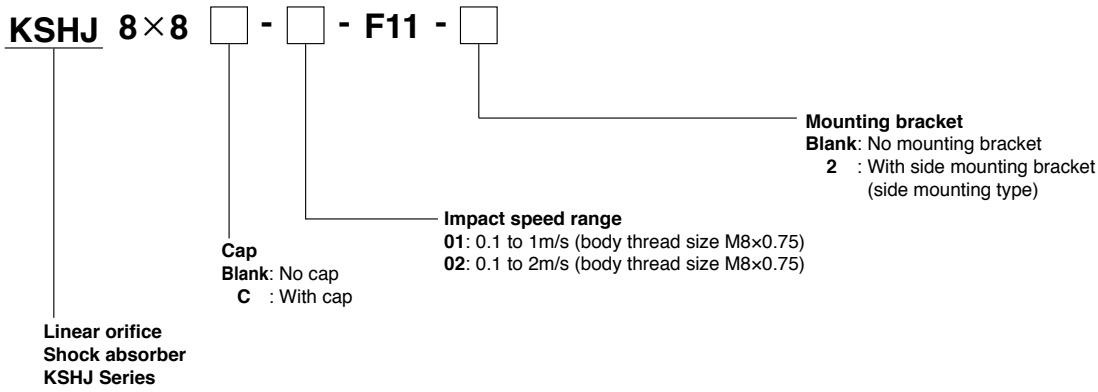
● 6×4
6×6



● 8×5



● 8×8



Order Codes (specifications in inches)

● **10×15**

KSHJ 10×15 □ - □ - F11 - □

Linear orifice
Shock absorber
KSHJ Series

Cap
Blank: No cap
C : With cap

Impact speed range
01: 0.1 to 1m/s
03: 0.1 to 3m/s

Mounting bracket
Blank: No mounting bracket
2 : With side mounting bracket (side mounting type)

● **10×10**
12×10
14×12
18×16

KSHJ □ □ - □ - F11 - □

Linear orifice
Shock absorber
KSHJ Series

Body thread size×stroke
10×10
12×10
14×12
18×16

Cap
Blank: No cap
C : With cap

Impact speed range
01: 0.1 to 1m/s
02: 0.1 to 2m/s

Mounting bracket
Blank: No mounting bracket
2 : With side mounting bracket (side mounting type)

● **25×25**

KSHJ 25×25 □ - □ - F11 - □

Linear orifice
Shock absorber
KSHJ Series

Cap
Blank: No cap
C : With cap

Impact speed range
01: 0.1 to 1.5m/s (body thread size M25×1.5)

Mounting bracket
Blank: No mounting bracket
2 : With side mounting bracket (side mounting type)

● **30×30**
36×50

KSHJ □ □ - □ - F11 - □

Linear orifice
Shock absorber
KSHJ Series

Body thread size×stroke
30×30
36×50

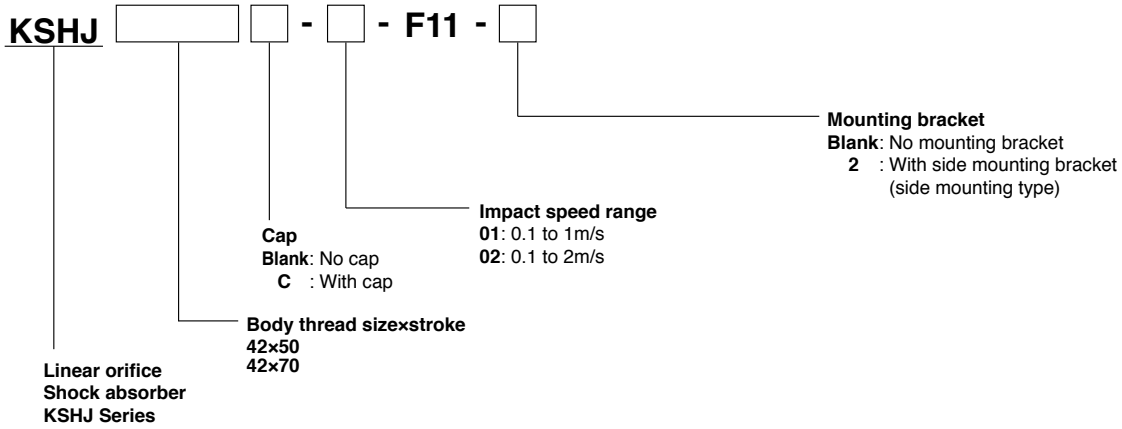
Cap
Blank: No cap
C : With cap

Impact speed range
01: 0.1 to 1m/s
02: 0.1 to 2m/s
03: 0.1 to 3m/s

Mounting bracket
Blank: No mounting bracket
2 : With side mounting bracket (side mounting type)

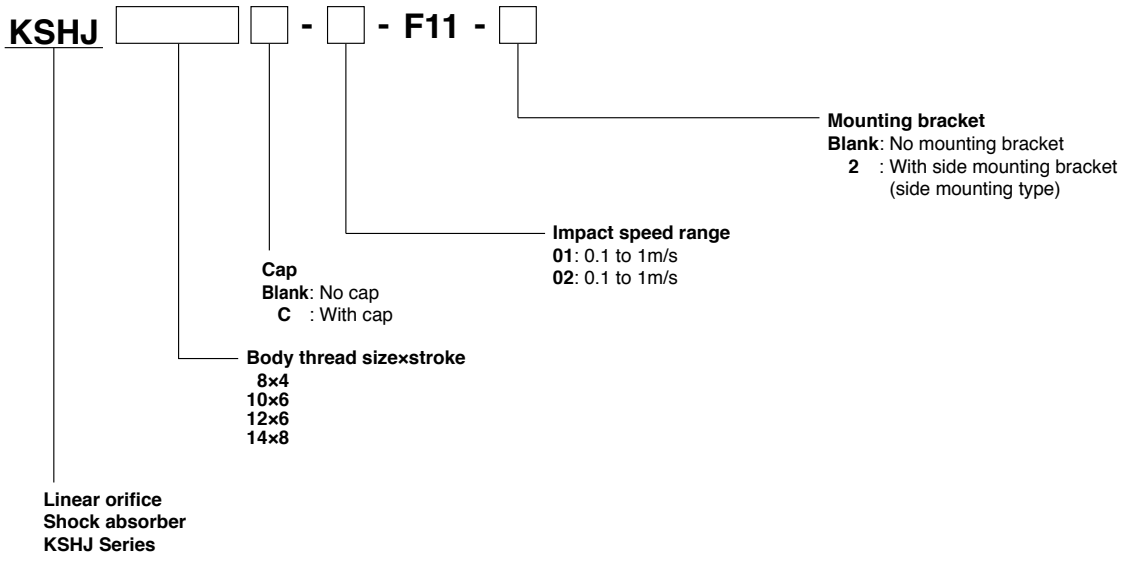
Order Codes (specifications in inches)

- **42×50**
  42×70



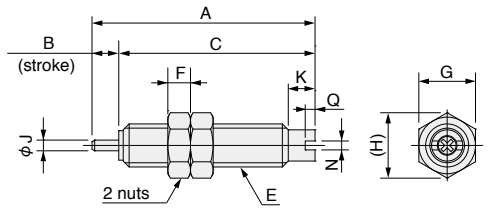
Short stroke type (with hexagon socket)

- **8×4**
  10×6
  12×6
  14×8

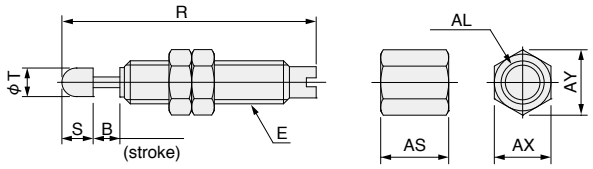


Dimensions (in)

●No rod end cap: KSHJ4×3, KSHJ6×4, KSHJ6×6



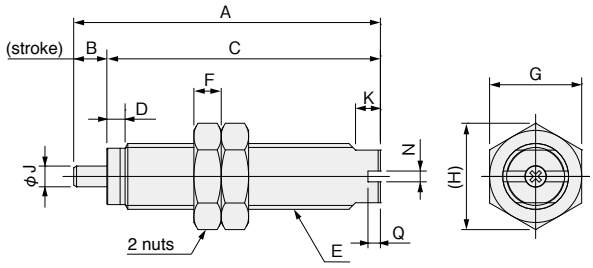
●With rod end cap: KSHJ4×3C, KSHJ6×4C
KSHJ6×6C



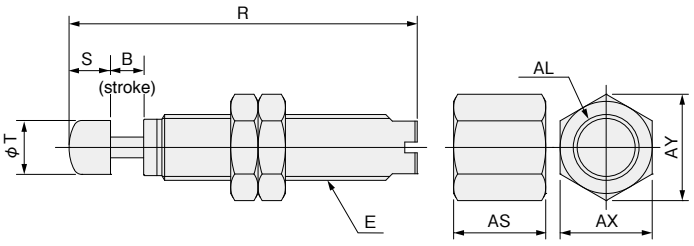
Model \ Symbol	A	B	C	E	F	G	H	J	K	N	Q	R	S
KSHJ4×3 (C)-01,-02-F11	0.984	0.118	0.866	#10-32 UNF	0.1	1/4	0.289	0.047	0.118	0.039	0.043	1.122	0.138
KSHJ6×4 (C)-01,-02-F11	1.161	0.157	1.004	1/4-32 UNEF	0.1	3/8	0.433	0.079	0.177	0.039	0.039	1.319	0.157
KSHJ6×6 (C)-01,-02-F11	1.398	0.236	1.161	1/4-32 UNEF	0.1	3/8	0.433	0.079	0.217	0.039	0.039	1.555	0.157

Model \ Symbol	T	AL	AS	AX	AY
KSHJ4×3 (C)-01,-02-F11	0.126	#10-32 UNF	0.3	1/4	0.289
KSHJ6×4 (C)-01,-02-F11	0.181	1/4-32 UNEF	0.4	3/8	0.433
KSHJ6×6 (C)-01,-02-F11	0.181	1/4-32 UNEF	0.4	3/8	0.433

●No rod end cap: KSHJ□×□-□



●With rod end cap: KSHJ□×□C-□

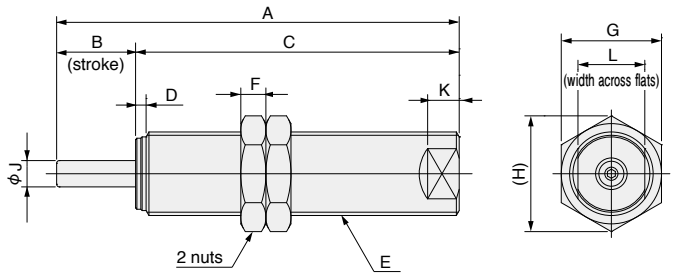


Model \ Symbol	A	B	C	D	E	F	G	H	J	K	N	Q	R
KSHJ8×4 (C)-01,-02-F11	1.457	0.157	1.299	0.087	5/16-32 UNEF	0.13	7/16	0.505	0.098	0.118	0.051	0.059	1.654
KSHJ8×5 (C)-01-F11	1.457	0.197	1.26	0.047	5/16-32 UNEF	0.13	7/16	0.505	0.098	0.118	0.051	0.059	1.654
KSHJ8×8 (C)-01,-02-F11	1.811	0.315	1.496	0.047	5/16-32 UNEF	0.13	7/16	0.505	0.098	0.118	0.051	0.059	2.008
KSHJ10×6 (C)-01,-02-F11	1.89	0.236	1.654	0.079	3/8-32 UNEF	0.13	1/2	0.577	0.118	0.197	0.051	0.059	2.205
KSHJ10×10 (C)-01,-02-F11	2.362	0.394	1.969	0.079	3/8-32 UNEF	0.13	1/2	0.577	0.118	0.197	0.051	0.059	2.677
KSHJ10×15 (C)-01,-03-F11	3.031	0.591	2.441	0.079	3/8-32 UNEF	0.13	1/2	0.577	0.118	0.197	0.051	0.059	3.346
KSHJ11×6 (C)-01,-02-F11	1.89	0.236	1.654	0.079	7/16-28 UNEF	0.15	9/16	0.65	0.118	0.197	0.051	0.059	2.205
KSHJ11×10 (C)-01,-02-F11	2.362	0.394	1.969	0.079	7/16-28 UNEF	0.15	9/16	0.65	0.118	0.197	0.051	0.059	2.677
KSHJ11×15 (C)-01,-03-F11	3.031	0.591	2.441	0.079	7/16-28 UNEF	0.15	9/16	0.65	0.118	0.197	0.051	0.059	3.346
KSHJ12×6 (C)-01,02-F11	1.89	0.236	1.654	0.079	1/2-20 UNF	0.15	5/8	0.722	0.118	0.197	0.051	0.059	2.283
KSHJ12×10 (C)-01,-02-F11	2.598	0.394	2.205	0.079	1/2-20 UNF	0.15	5/8	0.722	0.118	0.197	0.051	0.059	2.992
KSHJ14×8 (C)-01,02-F11	2.402	0.315	2.087	0.079	9/16-18 UNF	7/32	11/16	0.794	0.157	0.197	0.051	0.059	2.795
KSHJ14×12 (C)-01,-02-F11	2.835	0.472	2.362	0.079	9/16-18 UNF	7/32	11/16	0.794	0.157	0.197	0.051	0.059	3.228
KSHJ18×16 (C)-01,-02-F11	3.465	0.63	2.835	0.118	3/4-16 UNF	1/4	15/16	1.082	0.197	0.276	0.071	0.079	4.055
KSHJ25×25 (C)-01,-02-F11	4.921	0.984	3.937	0.118	1-12 UNF	3/8	1 1/4	1.443	0.236	0.394	0.071	0.079	5.63

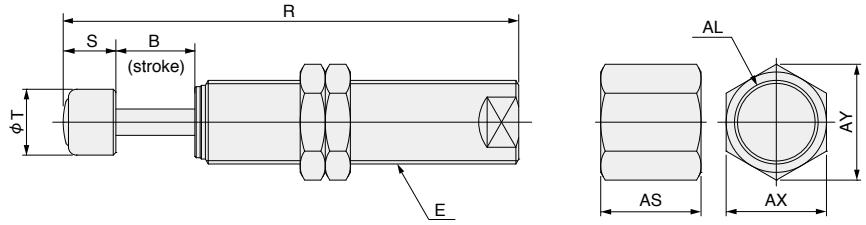
Model \ Symbol	S	T	AL	AS	AX	AY
KSHJ8×4 (C)-01,-02-F11	0.197	0.256	5/16-32 UNEF	7/16	7/16	0.505
KSHJ8×5 (C)-01-F11	0.197	0.256	5/16-32 UNEF	7/16	7/16	0.505
KSHJ8×8 (C)-01,-02-F11	0.197	0.256	5/16-32 UNEF	7/16	7/16	0.505
KSHJ10×6 (C)-01,-02-F11	0.315	0.315	3/8-32 UNEF	11/16	1/2	0.577
KSHJ10×10 (C)-01,-02-F11	0.315	0.315	3/8-32 UNEF	11/16	1/2	0.577
KSHJ10×15 (C)-01,-03-F11	0.315	0.315	3/8-32 UNEF	11/16	1/2	0.577
KSHJ11×6 (C)-01,-02-F11	0.315	0.315	7/16-28 UNEF	11/16	9/16	0.65
KSHJ11×10 (C)-01,-02-F11	0.315	0.315	7/16-28 UNEF	11/16	9/16	0.65
KSHJ11×15 (C)-01,-03-F11	0.315	0.315	7/16-28 UNEF	11/16	9/16	0.65
KSHJ12×6 (C)-01,02-F11	0.394	0.394	1/2-20 UNF	11/16	5/8	0.722
KSHJ12×10 (C)-01,-02-F11	0.394	0.394	1/2-20 UNF	11/16	5/8	0.722
KSHJ14×8 (C)-01,02-F11	0.394	0.433	9/16-18 UNF	3/4	11/16	0.794
KSHJ14×12 (C)-01,-02-F11	0.394	0.433	9/16-18 UNF	3/4	11/16	0.794
KSHJ18×16 (C)-01,-02-F11	0.591	0.591	3/4-16 UNF	11/2	15/16	1.082
KSHJ25×25 (C)-01,-02-F11	0.709	0.709	1-12 UNF	11/2	1 1/4	1.443

Dimensions (in)

●No rod end cap: KSHJ□×□-□



●With rod end cap: KSHJ□×□C-□



Model \ Symbol	A	B	C	D	E	F	G	H	J	K	L	R	S
KSHJ30×30 (C)-01,-02,-03-F11	6.024	1.181	4.843	0.157	1 1/4-12 UNF	3/8	1 1/2	1.732	0.394	0.472	1	6.811	0.787
KSHJ36×50 (C)-01,-02,-03-F11	8.583	1.969	6.614	0.197	1 3/8-12 UNF	5/8	1 11/16	1.948	0.472	0.591	1 1/8	9.567	0.984
KSHJ42×50 (C)-01,-02-F11	8.661	1.969	6.693	0.197	1 3/4-12 UN	5/8	2	2.309	0.472	0.787	1 1/2	9.646	0.984
KSHJ42×70 (C)-01,-02-F11	10.827	2.756	8.071	0.197	1 3/4-12 UN	5/8	2	2.309	0.472	0.787	1 1/2	11.811	0.984

Model \ Symbol	T	AL	AS	AX	AY
KSHJ30×30 (C)-01,-02,-03-F11	0.984	1 1/4-12 UNF	1 1/2	1 1/2	1.732
KSHJ36×50 (C)-01,-02,-03-F11	1.26	1 3/8-12 UNF	2	1 11/16	1.948
KSHJ42×50 (C)-01,-02-F11	1.26	1 3/4-12 UN	2	2	2.309
KSHJ42×70 (C)-01,-02-F11	1.26	1 3/4-12 UN	2	2	2.309

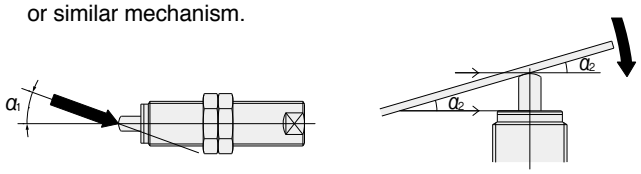
Side load resistant Linear Orifice® Shock Absorber
KSHY Series

General precautions

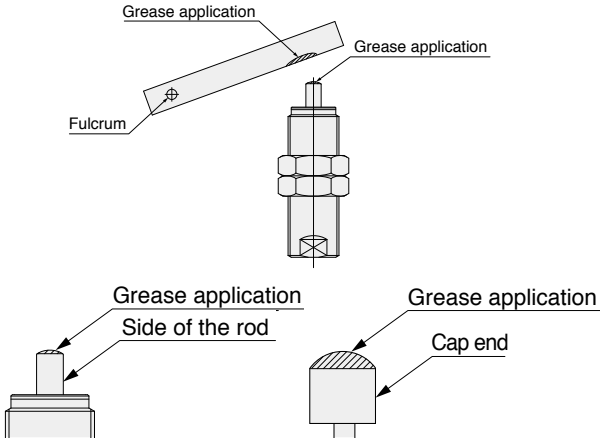
Cover the unit when mounting it in locations where it might be subject to excessive dust, dripping water, dripping oil, etc. Dents, scratches, water, oil, or dust on the piston rod results in damage and decreases service life.

Mounting

1. Keep the angle of eccentricity, resulting from the load direction and the axis of the shock absorber, under the specified values on page ㊸. If an eccentric load exceeding the specifications is applied, it could result in breakage or impaired returns. If there is concern that an eccentric load exceeding the specified values will be applied, install a guide, or similar mechanism.



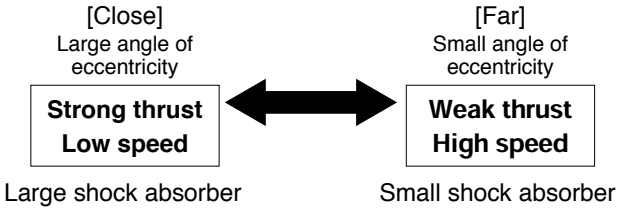
2. For swing impacts, the ends of the piston rod and the cap wear down due to the sliding between the contact area and the tip of the shock absorber. Although you can reduce wear by applying grease, observe the following precautions when applying grease.



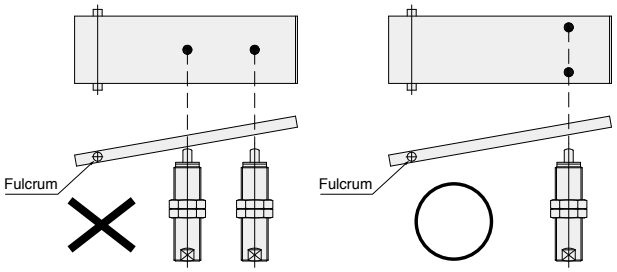
* Grease application: Apply a small amount and spread it thinly.
* Wipe off the grease if it gets stuck to the cap end or the side of the rod.
* If grease gets inside the body of the shock absorber and excessively increases its inner volume, the pressure inside the shock absorber will rise when absorbing an impact and cause damage due to the plug popping out, or other similar situations. Make sure not to apply grease excessively.

3. Ensure that the hardness of the surface directly impacting the piston rod of the shock absorber is over HRc40 hardness (excluding models with cap). We also recommend a surface roughness of Ry6.3 or less.

4. Angle of eccentricity specification shock absorbers can be used very effectively if they are mounted at a position far from the center of rotation. However, use shock absorbers with a thrust stronger than the returning force of the spring (return force of the piston rod).

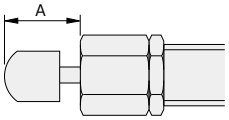


5. Two or more shock absorbers can be mounted in parallel, to boost absorption capacity. However, keep the distances from the center of rotation to each shock absorber equal. Also, have the load applied evenly between each shock absorber.



6. To adjust the capacity with the stroke, adjust the stopper nut (-S) or add an external stopper.

7. If using with a cap, always mount a stopper nut (-S) or an external stopper to ensure that the cap is not subjected to loads at the stroke end. Install the mounting position of the stopper nut such that A ≤ the stroke of the shock absorber. You can use it without a stopper nut or external stopper, but over the long-term, the stop location changes due to cap deformation and wear.



8. The small screw on the back end of the shock absorber should never be loosened or removed. Oil may leak out of the shock absorber leading to a loss of functionality and resulting in damage to the equipment and accidents.

9. When mounting the shock absorber, always use the following maximum tightening torque guidelines. Tightening using excessive force may result in damage.

Model	Maximum tightening torque
KSHY6 × 4 (C)-01,-02	0.85
KSHY8 × 5 (C)-01,-02,-11,-12	2.5
KSHY10 × 6 (C)-01,02	6.5
KSHY12 × 6 (C)-01,02	8.0
KSHY14 × 8 (C)-01,02	12.0
KSHY16 × 8 (C)-01,02	20.0
KSHY20 × 10 (C)-01,02	30.0

10. Be aware that performance and characteristics change depending on the operating temperature.

■ How to select durable angle of eccentricity shock absorbers

1. Confirm the thrust
   Choose a shock absorber from its allowable thrust.

2. Confirm the angle of eccentricity
   Confirm that the shock absorber selected in step 1 can be used under the allowable angle of eccentricity.

3. Confirm the absorption capacity
   Confirm that the absorption capacity of the shock absorber is sufficient.
   - 3-1. Confirm the impact speed
   - 3-2. Confirm the absorption capacity of the shock absorber
   - 3-3. Calculate the moment of inertia
   - 3-4. Calculate the kinetic energy

4. Confirm other specifications
   Confirm any specifications other than the angle of eccentricity and absorption capacity.

1. Confirm the thrust

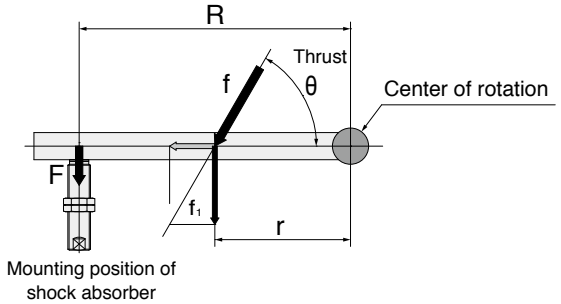
The thrust that is applied to the shock absorber (F) should be weaker than the allowable thrust. If a thrust stronger than the allowable thrust is used, the shock absorber may be damaged in fewer operation cycles than the guaranteed life. See page ㊸ for the values of allowable thrust.

● When using an rotating actuator

$F = T \div R$

T: Torque of the rotating actuator [N·m]
R: Shock absorber's mounting radius (the distance from the center of rotation to the shock absorber) [m]
F: Force at the point of distance Rm (thrust applied to the shock absorber) [N]

●When using a linear actuator



$f_1 = f \times \sin\theta$
$T = f_1 \times r = F \times R$
$F = (f \times \sin\theta \times r) \div R$

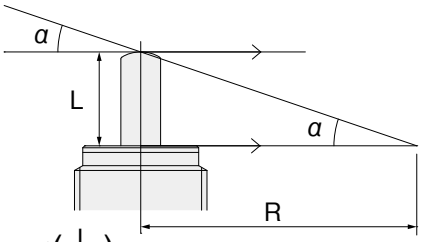
f : Thrust of linear actuator [N]
f_1: Force acting on the direction of rotation [N]
r : Mounting position of actuator's end [m]

If the value for F is greater than the allowable thrust, do the following countermeasures.
• Use a larger size shock absorber
• Make R, the mounting radius, larger

2. Confirm the angle of eccentricity

Confirm whether the approximate value for angle of eccentricity of the prospective shock absorbers may be less than 10°. Finally, you should check on the device's drawings since, in actuality, the angles for even the same radii may differ, depending on the shapes and the mounting methods.

If a workpiece is installed so that it contacts the plug of the shock absorber, in parallel, at the stroke end, its approximate angle of eccentricity and minimum mounting radius are as follows.
These are not the actual values because the rotating parts have some thickness.
These are reference values for when you are making a selection.



$10° \geqq \alpha = \tan^{-1}\left(\frac{L}{R}\right)$

L: Shock absorber's stroke [mm]
R: Shock absorber's mounting radius [mm]
α : Deflection angle [°]

Model	Stroke[mm]	Allowable angle of eccentricity	Minimum mounting radius [mm]
KSHY6 × 4 (C)	4	10° or less	22.7
KSHY8 × 5 (C)	5		28.4
KSHY10 × 6 (C)	6		34
KSHY12 × 6 (C)			
KSHY14 × 8 (C)	8		45.4
KSHY16 × 8 (C)			
KSHY20 × 10 (C)	10		56.7

If the allowable angle of eccentricity is exceeded, do the following countermeasures, and then do [1. Confirm the thrust] again.
• Make R, the mounting radius, larger
• Use a smaller size shock absorber

Continue on the next page →
3. Confirm the absorption capacity
4. Confirm other specifications

3. Confirm the absorption capacity

3-1. Confirm the impact speed

$$\text{Angular velocity } \omega \text{ [rad/s]} = \frac{\text{Swing angle [rad]}}{\text{Target swing time [s]}} \times 2^{\text{Note}}$$

Swing angle [°] $\times \pi \div 180$ = Swing angle [rad] ($90° \fallingdotseq 1.57$rad)

Velocity at the shock absorber's mounting position

V[m/s] $= R \times \omega \leqq$ Maximum impact speed (1 m/s)

Note: Because the impact speed, not the average speed, is needed, calculate with twice the value of this.

3-2. Confirm the absorption capacity of the shock absorber

If you are using the impact speed, V, found in step 3-1, confirm the exhibited absorption capacity of the shock absorber (e.g. [J]) on the selection graph on page ㊵. The maximum absorption capacity is reached only when used at the maximum impact speed. The absorption capacity of the shock absorber changes, depending on the operating speed, because the drag of the oil is strong when the flow rate is fast and weak when the flow rate is slow.

3-3. Calculate the moment of inertia

Find the moment of inertia for the impact object I [kg·m^2] to calculate the kinetic energy. If the impact object is rotating, you cannot make a selection by only using the impact object mass because the kinetic energy differs depending on the shape, even if the weight is the same. Calculate the approximate value by referring to the diagram for calculating the moment of inertia (pages ㊶ to ㊷).

3-4. Calculate the kinetic energy

Confirm that the kinetic energy of the impact object is less that the absorption capacity of the shock absorber.

$$\text{Kinetic energy of the impact object E [J]} = \frac{1}{2} I\omega^2 \leqq \text{Ex}$$

Calculating the thrust energy is not necessary because the shock absorber was selected from the allowable thrust in step 1. Assume that the absorption capacity = the allowable kinetic energy.

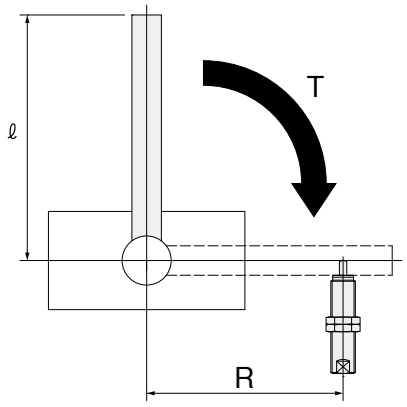
4. Confirm other specifications

Confirm such specifications as the maximum operating frequency, maximum absorption per unit of time, and operating temperature range.

Example selection 1: Using a rotary actuator

<Operating conditions>

When the impact object is a rod



① Torque of rotating actuator: T = 5[N·m]
② Absorber's mounting radius: R = 50[mm] = 0.05[m]
③ Impact object mass: m = 3[kg]
④ Length from the center of rotation to the end of the rod:
ℓ = 120[mm] = 0.12[m]
⑤ Angle of rotation: 90°
⑥ Target swing time: 0.5[s]

1. Confirm the thrust

Find the thrust, F, that is applied to the shock absorber.

F = T ÷ R

= ① 5[N・m] ÷ ② 0.05[m]

= 100[N]

Make a selection from a model (KSHY10 or higher) for an allowable thrust of 100 N or more.

(Refer to page ㊸ for specifications.)

2. Confirm the angle of eccentricity

Confirm whether the angle of eccentricity is less than the allowable angle of eccentricity (10°).

Assume that KSHY10×6 (body thread size: M10, stroke: 6 mm) is used.

$$\alpha = \tan^{-1}\left(\frac{L}{R}\right)$$

$$= \tan^{-1}\left(\frac{6[mm]}{② 50[mm]}\right)$$

≒6.84°<10°

3. Confirm the absorption capacity

3-1. Confirm the impact speed

Calculate the velocity at which the impact object impacts the shock absorber.

Swing angle [°] × π ÷ 180 = Swing angle [rad]

⑤ 90[°] × π ÷ 180≒1.57rad

$$\text{Angular velocity } \omega \text{ [rad/sec]} = \frac{\text{Swing angle [rad]}}{\text{Target swing time [s]}} \times 2$$

$$\omega = \frac{1.57[rad]}{⑥ 0.5[s]} \times 2$$

≒6.28[rad/s]

Velocity, V, of the shock absorber's mounting position [m/s]

= R × ω

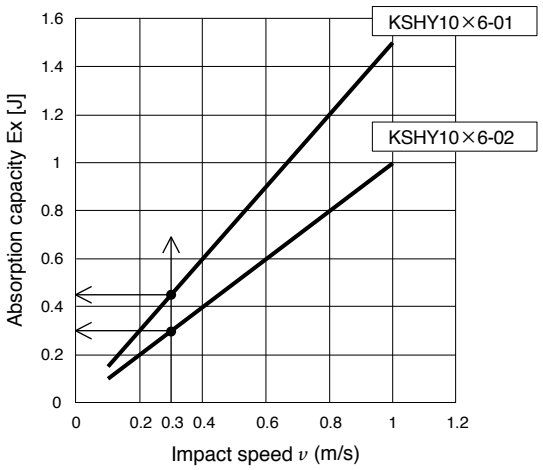
V = ② 0.05[m] × 6.28[rad/s]

≒0.31[m/s] < 1m/s

3-2. Confirm the absorption capacity of the shock absorber

Assume that you selected V = 0.31 m/s from the selection graph on page ㊵ and confirm the absorption capacity, Ex, that KSHY10×6 exhibits.

● **KSHY10×6**



Values for Ex:

KSHY10×6-01: Approx. 0.45 J

KSHY10×6-02: Approx. 0.3 J

3-3. Calculate the moment of inertia

Find the moment of inertia for the impact object I [kg·m²] to calculate the kinetic energy.

According to "Rod (end is the center of rotation)", the diagram for calculating the moment of inertia (pages ㊶ to ㊷):

$$I = \frac{m\ell^2}{3}$$

$$= \frac{③ 3[kg] \times ④ 0.12[m]^2}{3}$$

= 0.0144[kg・m²]

3-4. Calculate the kinetic energy

Calculate the kinetic energy of the impact object to confirm whether it is less than the absorption capacity of the shock absorber.

Kinetic energy of the impact object E [J] = $\frac{1}{2} I\omega^2$

$$E = \frac{1}{2} \times 0.0144[kg \cdot m^2] \times (6.28[rad/s])^2$$

= 0.28[J]

Values for Ex found in step 3-2:

KSHY10×6-01: Approx. 0.45 J

KSHY10×6-02: Approx. 0.3 J

The shock absorber with the optimum absorption capacity is KSHY10×6-02 because the smaller the gap between the values for E and Ex is, the lower the impact value and the shorter the operating time.

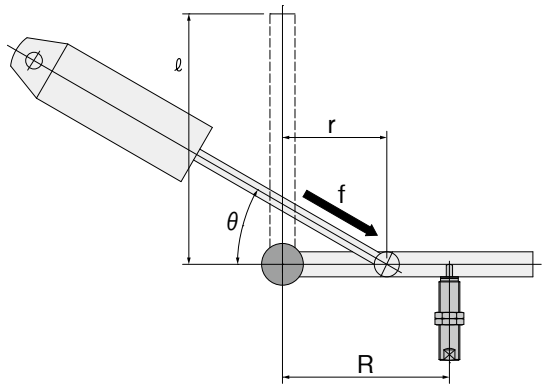
4. Confirm other specifications

Confirm that other operating conditions, such as the maximum operating frequency, maximum absorption capacity per unit of time, and operating temperature range, are within the specified ranges for KSHY10×6-02.

Example selection 2: Using an air cylinder

<Operating conditions>

When the impact object is a rod



① Cylinder thrust: Φ32(0.5MPa)→402[N]
② Cylinder thrust angle: $\theta = 30°$
③ Mounting position of cylinder's end: r = 30[mm] = 0.03[m]
④ Absorber's mounting radius: R = 50[mm] = 0.05[m]
⑤ Impact object mass: m = 3[kg]
⑥ Length from the center of rotation to the end of the rod: ℓ = 120[mm] = 0.12[m]
⑦ Swing angle: 90°
⑧ Target swing time: 0.5[s]

1. Confirm the thrust

Find the thrust, F, that is applied to the shock absorber.

$F = (f \times \sin\theta \times r) \div R$

= ① 402[N] × ② sin30° × ③ 0.03[m] ÷ ④ 0.05[m]

= 120.6[N]

Make a selection from a model (KSHY12 or higher) for an allowable thrust of 120.6 N or more.

(Refer to page ㊸ for specifications.)

2. Confirm the angle of eccentricity

Confirm whether the angle of eccentricity is less than the allowable angle of eccentricity (10°).

Assume that KSHY12×6 (body thread size: M12, stroke: 6 mm) is used.

$$\alpha = \tan^{-1}\left(\frac{L}{R}\right)$$

$$= \tan^{-1}\left(\frac{6[mm]}{④\ 50[mm]}\right)$$

≒6.84°<10°

3. Confirm the absorption capacity

3-1. Confirm the impact speed

Calculate the velocity at which the impact object impacts the shock absorber.

Swing angle [°] × π ÷ 180 = Swing angle [rad]

⑦ 90[°] × π ÷ 180≒1.57rad

$$\text{Angular velocity } \omega \text{ [rad/sec]} = \frac{\text{Swing angle [rad]}}{\text{Target swing time [s]}} \times 2$$

$$\omega = \frac{1.57[rad]}{⑧\ 0.5[s]} \times 2$$

≒6.28[rad/s]

Velocity, V, of the shock absorber's mounting position [m/s]

$= R \times \omega$

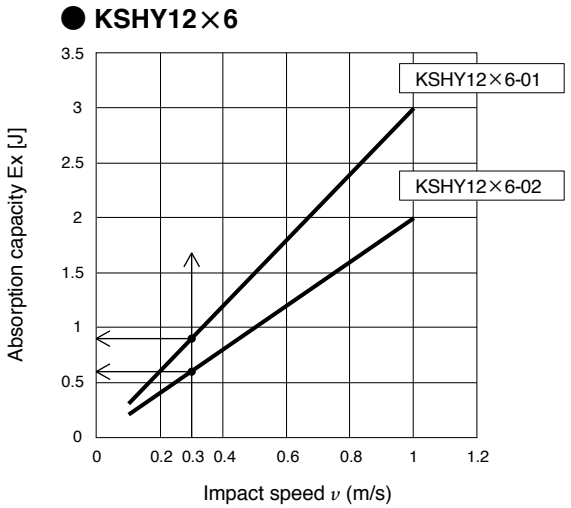
V = ④ 0.05[m] × 6.28[rad/s]

≒0.31[m/s] < 1m/s

3-2. Confirm the absorption capacity of the shock absorber

From the selection graph on page ㊵:

Assume that you selected V = 0.31 m/s and confirm the absorption capacity, Ex, that KSHY12×6 exhibits.



Values for Ex:

KSHY12×6-01: Approx. 0.9 J

KSHY12×6-02: Approx. 0.6 J

3-3. Calculate the moment of inertia

Find the moment of inertia for the impact object I [kg·m²] to calculate the kinetic energy.

According to "Rod (end is the center of rotation)", the diagram for calculating the moment of inertia (pages ㊶ to ㊷):

$$I = \frac{m\ell^2}{3}$$

$$= \frac{⑤\ 3[kg] \times ⑥\ 0.12[m]^2}{3}$$

$= 0.0144[kg \cdot m^2]$

3-4. Calculate the kinetic energy

Calculate the kinetic energy of the impact object to confirm whether it is less than the absorption capacity of the shock absorber.

Kinetic energy of the impact object E [J] = $\frac{1}{2} I \omega^2$

$E = \frac{1}{2} \times 0.0144[kg \cdot m^2] \times 6.28[rad/s]^2$

$= 0.28[\ J\ ]$

Values for Ex found in step 3-2:

KSHY12×6-01: Approx. 0.9 J

KSHY12×6-02: Approx. 0.6 J

The shock absorber with the optimum absorption capacity is KSHY12×6-02 because the smaller the gap between the values for E and Ex is, the lower the impact value and the shorter the operating time.

4. Confirm other specifications

Confirm that other operating conditions, such as the maximum operating frequency, maximum absorption capacity per unit of time, and operating temperature range, are within the specified ranges for KSHY12×6-02.

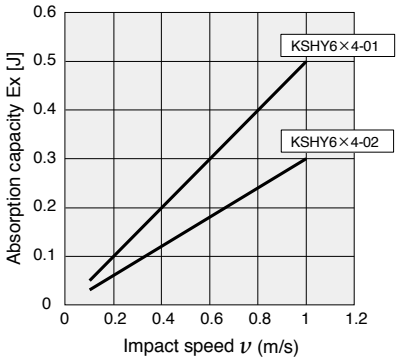
Selection guidelines

Cautions for using the selection graphs

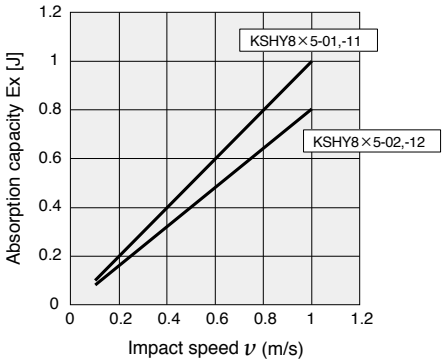
1. Use with an absorption capacity below the capacity curves.
2. The values in the selection graphs are for room temperature (20 to 25°). Be aware that performance and characteristics change depending on the operating temperature.

■Selection graph

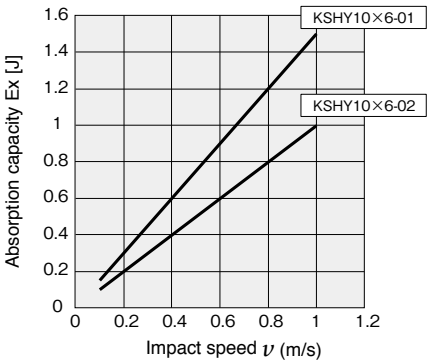
● KSHY6×4



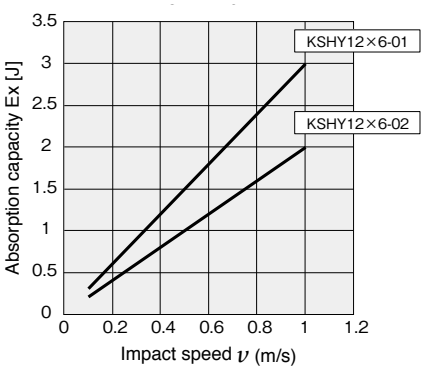
● KSHY8×5



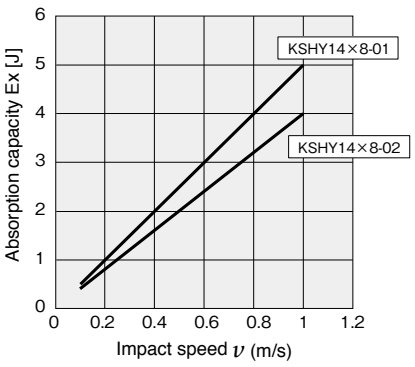
● KSHY10×6



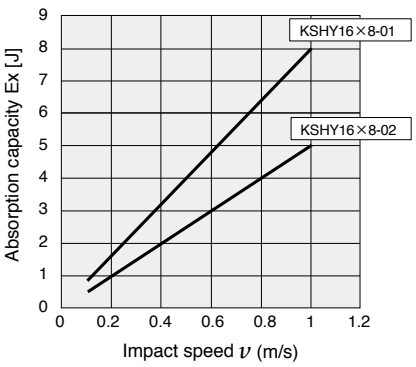
● KSHY12×6



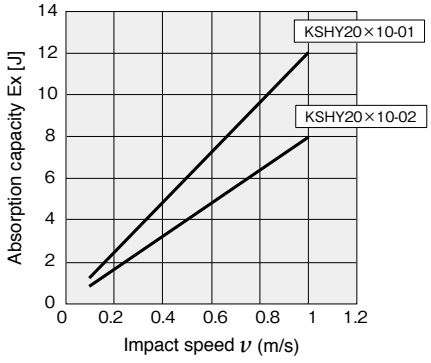
● KSHY14×8



● KSHY16×8



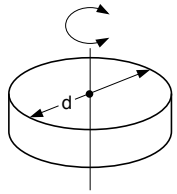
● KSHY20×10



■Diagram for calculating the moment of inertia

[When the rotation axis goes through the workpiece]

●Disk

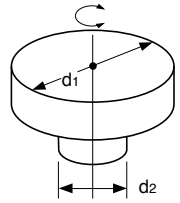


●Diameter d (m)
●Mass m (kg)

■Moment of inertia I [kg·m²]

$$I = \frac{md^2}{8}$$

●Stepped disk



●Diameter d_1 (m), d_2 (m)
●Mass $d_1$part m_1 (kg), $d_2$part m_2 (kg)

■Moment of inertia I [kg·m²]

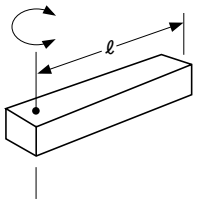
$$I = \frac{1}{8}(m_1 d_1^2 + m_2 d_2^2)$$

■Radius of rotation

$$\frac{d_1^2 + d_2^2}{8}$$

Remark: The d_2 part can be ignored if it is much smaller compared to the d_1 part.

●Rod (end is the center of rotation)

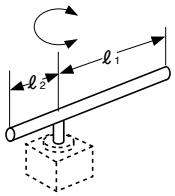


●Rod length ℓ (m)
●Mass m (kg)

■Moment of inertia I [kg·m²]

$$I = \frac{m\ell^2}{3}$$

●Fine rod

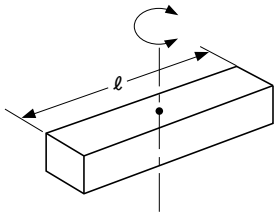


●Rod length ℓ_1 (m), ℓ_2 (m)
●Mass m_1(kg), m_2(kg)

■Moment of inertia I [kg·m²]

$$I = \frac{m_1 \cdot \ell_1^2}{3} + \frac{m_2 \cdot \ell_2^2}{3}$$

●Rod (center of gravity is the center of rotation)

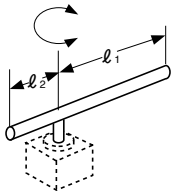


●Rod length ℓ (m)
●Mass m (kg)

■Moment of inertia I [kg·m²]

$$I = \frac{m\ell^2}{12}$$

●Thin, rectangular plate (rectangular parallelepiped)

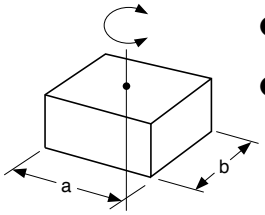


●Plate length a_1 (m), a_2 (m)
●Edge length b (m)
●Mass m_1 (kg), m_2(kg)

■Moment of inertia I [kg·m²]

$$I = \frac{m_1}{12}(4a_1^2 + b^2) + \frac{m_2}{12}(4a_2^2 + b^2)$$

●Rectangular parallelepiped

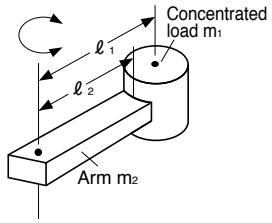


●Edge length a (m), b (m)
●Mass m (kg)

■Moment of inertia I [kg·m²]

$$I = \frac{m}{12}(a^2 + b^2)$$

●Concentrated load



●Shape of concentrated load
●Length to the concentrated load's center of gravity — ℓ_1 (m)
●Arm length — ℓ_2 (m)
●Mass of the concentrated load — m_1 (kg)
●Mass of the arm — m_2 (kg)

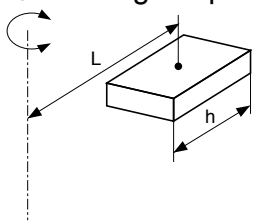
■Moment of inertia I [kg·m²]

$$I = m_1k^2 + m_1\ell_1^2 + \frac{m_2\ell_2^2}{3}$$

Radius of rotation: k^2 is calculated according to the shape of the concentrated load.
Remark: When m_2 is much smaller compared to m_1, it is okay to calculate $m_2 = 0$.

[When the rotation axis is off set from the workpiece]

●Rectangular parallelepiped



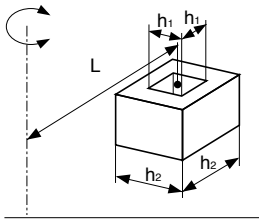
●Edge length — h (m)
●Distance from the rotation axis to the center of the load — L (m)
●Mass — m (kg)

■Moment of inertia I [kg·m²]

$$I = \frac{mh^2}{12} + mL^2$$

Remark: Same as for cube

●Hollow rectangular parallelepiped



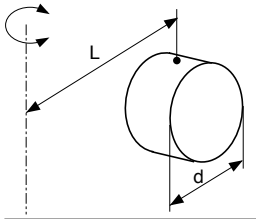
●Edge length — h_1 (m), h_2 (m)
●Distance from the rotation axis to the center of the load — L (m)
●Mass — m (kg)

■Moment of inertia I [kg·m²]

$$I = \frac{m}{12}(h_2^2 + h_1^2) + mL^2$$

Remark: Cross-section is a cube only

●Cylinder

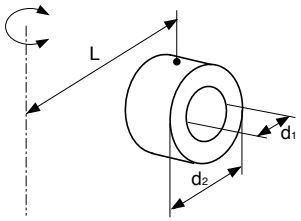


●Diameter — d (m)
●Distance from the rotation axis to the center of the load — L (m)
●Mass — m (kg)

■Moment of inertia I [kg·m²]

$$I = \frac{md^2}{16} + mL^2$$

●Hollow cylinder



●Diameter — d_1 (m), d_2 (m)
●Distance from the rotation axis to the center of the load — L (m)
●Mass — m (kg)

■Moment of inertia I [kg·m²]

$$I = \frac{m}{16}(d_2^2 + d_1^2) + mL^2$$

Linear orifice shock absorber

KSHY Series

Specifications

Item \ Model		KSHY6×4-01	KSHY6×4-02	KSHY8×5-01,-11	KSHY8×5-02,-12
Maximum absorption capacity	J	0.5	0.3	1	0.8
Stroke	mm	4		5	
Impact speed range	m/s	0.1 to 1.0			
Allowable thrust		27.5N or less		60.3N or less	
Maximum operating cycle	cycle/min	60			
Maximum absorption capacity per unit of time	J/min	18		36	
Spring return force[Note1]	N	3.5		6.5	
Deflection angle		10° or less			
Operating temperature range[Note2]	℃	0 to 60			

Item \ Model		KSHY10×6-01	KSHY10×6-02	KSHY12×6-01	KSHY12×6-02
Maximum absorption capacity	J	1.5	1	3	2
Stroke	mm	6			
Impact speed range	m/s	0.1 to 1.0			
Allowable thrust		100N or less		157N or less	
Maximum operating cycle	cycle/min	60			
Maximum absorption capacity per unit of time	J/min	45		80	
Spring return force[Note1]	N	8.5		15.5	
Deflection angle		10° or less			
Operating temperature range[Note2]	℃	0 to 60			

Item \ Model		KSHY14×8-01	KSHY14×8-02	KSHY16×8-01	KSHY16×8-02	KSHY20×10-01	KSHY20×10-02
Maximum absorption capacity	J	5	4	8	5	12	8
Stroke	mm	8		8		10	
Impact speed range	m/s	0.1 to 1.0					
Allowable thrust		245N or less		402N or less		628N or less	
Maximum operating cycle	cycle/min	60		40			
Maximum absorption capacity per unit of time	J/min	100		130		200	
Spring return force[Note1]	N	14.5		14.5		21.5	
Deflection angle		10° or less					
Operating temperature range[Note2]	℃	0 to 60					

Note 1: The spring return force cannot be used as a function because it is the return force of the piston rod at full stroke, making it unstable.

Note2: The shock absorbing capacity fluctuates based on speed and ambient temperature. Always use a product that is within the range shown by the solid lines in the graphs on pages 40.

Mass

g

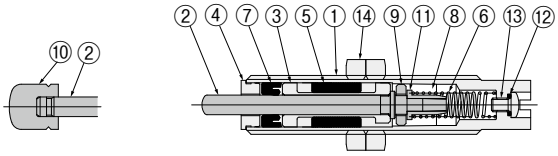
Model	Body[Note]	Additional mass	Additional parts' mass		
		With plastic cap	Mounting nut (1 ea.)	Stopper nut	Side mounting bracket
KSHY6×4-01, -02	4.5	0.2	0.4	2	8
KSHY8×5-01, -11	9	0.4	0.6(0.9)	4	12
KSHY10×6-01, -02	20.1	0.8	1.2	7	15
KSHY12×6-01, 02	32	1.3	1.9	8	22
KSHY14×8-01, 02	53	2.3	4	15	41
KSHY16×8-01, -02	70	2.3	6.6	28	65
KSHY20×10-01, -02	129	5	12.2	55	110

Calculation example: The mass of KSHY10×6C-01-S-2 (with cap, stopper, and side mount) is
20+1.3+7+15 = 43.3g

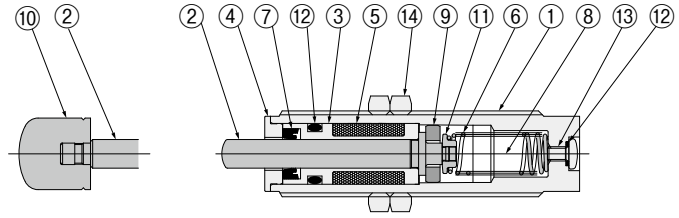
Note: The weight of the main unit includes the weight of 2 mounting nuts.

Inner Construction and Major Parts and Materials

●**KSHY6×4**



●**KSHY8 to 20**



No.	Name	Materials
①	Body[Note 1]	Copper alloy (nickel plated)
②	Piston rod[Note 2]	Stainless steel,
③	Sleeve	Copper alloy
④	Plug	Stainless steel
⑤	Accumulator	Synthetic rubber
⑥	Spring	Spring steel
⑦	Rod seal	Synthetic rubber
⑧	Oil	Special oil
⑨	Piston ring	Stainless steel,
⑩	Cap	Plastic (POM)
⑪	Collar [Note 3]	Stainless steel,
⑫	O-ring	Synthetic rubber
⑬	Screw [Note 4]	Mild steel (zinc plated)
⑭	Mounting nut	Mild steel (nickel plated)

Note1: KSHY6 and 8 are stainless steel
Note2: Shock absorbers with no caps undergo a quenching treatment.
Note3: KSHY6 and 8 are copper alloy
KSHY10 and 12 are sintered metal
Note4: KSHY6 and 8 are nickel plated

Order Codes

KSHY □ - □ - □ - □

Durable angle of eccentricity specification
Linear orifice Shock absorber
KSHY Series

Body thread size × stroke
6×4
8×5
10×6
12×6
14×8
16×8
20×10

Cap
Blank: No cap
C : With cap

Thread pitch and absorption capacity
01: For heavy loads
02: For light loads
11: For heavy loads with different thread pitches
12: For light loads with different thread pitches
(11 and 12 set to 8×5 only, M8×1)

Stopper nut
Blank: No stopper nut
S : With stopper nut

Mounting bracket
Blank: No mounting bracket
2 : With side mounting bracket
(side mounting type)

Additional Parts

●Mounting nut (1 pack has 10 units)

N - KSH - M □

Thread size
6: KSHY6
8: KSHY8
8-11: KSHY8-11
10: KSHY10
12: KSHY12
14: KSHY14
16: KSHY16
20: KSHY20

●Stopper nut

S - KSH - M □

Thread size
6: KSHY6
8: KSHY8
8-11: KSHY8-11
10: KSHY10
12: KSHY12
14: KSHY14
16: KSHY16
20: KSHY20

●Side mounting bracket

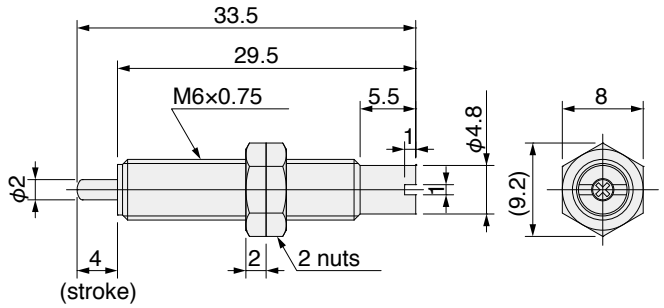
2 - KSH - M □

Thread size
6: KSHY6
8: KSHY8
8-11: KSHY8-11
10: KSHY10
12: KSHY12
14: KSHY14
16: KSHY16
20: KSHY20

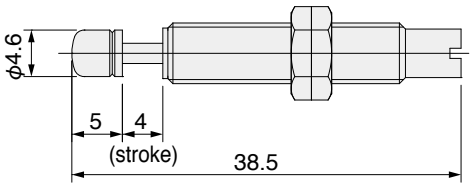
* For the dimension diagrams of the additional parts, see pages ⓬ to ⓭.
* The stopper nut and side mount are made from mild steel (nickel plated).

Dimensions (mm)

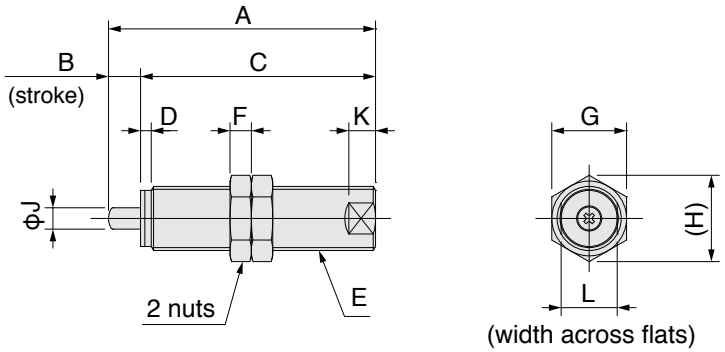
●**KSHY6×4-□**

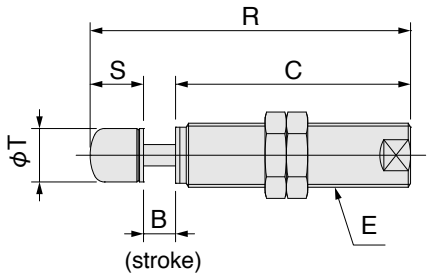


●**KSHY6×4C-□**



●**KSHY8 to 20**





Model \ Symbol	A	B	C	D	E	F	G	H	J	K	L	R	S	T
KSHY8 × 5 (C)-01,-02	36	5	31	1.2	M8×0.75	2	10	11.5	2.5	3	7	42	6	6.5
KSHY8 × 5 (C)-11,-12	36	5	31	1.2	M8×1	3	10	11.5	2.5	3	7	42	6	6.5
KSHY10 × 6 (C)-01,-02	46	6	40	2	M10×1	3	12	13.9	3	5	8.5	55	9	8
KSHY12 × 6 (C)-01,-02	50	6	44	2	M12×1	4	14	16.2	4	5	10.5	60	10	10
KSHY14 × 8 (C)-01,-02	61	8	53	2	M14×1.5	5	17	19.6	5	5	12	72	11	11
KSHY16 × 8 (C)-01,-02	61	8	53	3	M16×1.5	7	19	21.9	5	7	13	72	11	11
KSHY20 × 10 (C)-01,-02	69	10	59	3	M20×1.5	8	24	27.7	6	7	17	84	15	15

Adjustment Type Linear Orifice® Shock Absorber

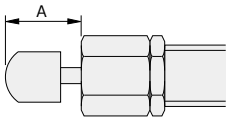
KSHP Series

General precautions

Cover the unit when mounting it in locations where it might be subject to excessive dust, dripping water, dripping oil, etc. Dents, scratches, water, oil, or dust on the piston rod results in damage and decreases service life.

Mounting

1. Keep the angle of eccentricity, resulting from the load direction and the axis of the shock absorber, under the specified values on page ㊿. If an eccentric load exceeding the specifications is applied, it could result in breakage or impaired returns. If there is concern that an eccentric load exceeding the specified values will be applied, install a guide, or similar mechanism.
2. You cannot mount two or more adjustable type shock absorbers in parallel to boost the absorption capacity (it is difficult to adjust the capacity evenly).
3. If using a shock absorber with a plastic or rubber cap, always mount a stopper nut (-S) or an external stopper to ensure that the cap is not subjected to loads at the stroke end. Install the stopper nut in a position such that A ≤ the stroke of the shock absorber. Furthermore, you can use a shock absorber that has a plastic cap without a stopper nut (-S) or external stopper, but, over the long-term, the stop location will change due to cap deformation and wear.



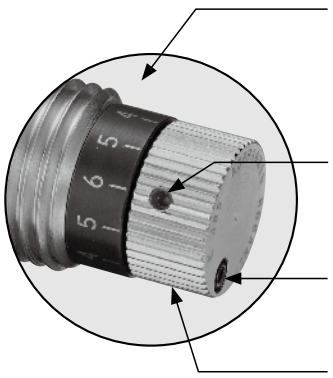
4. Rubber caps are consumable parts. The service life will vary depending on conditions of the application, replace these parts according to their condition.
5. If using a shock absorber with a rubber cap for lateral impacts, such as eccentric or swing impacts, note that the rubber cap may come off or be damaged.
6. When mounting the shock absorber, always use the following maximum tightening torque guidelines. Tightening using excessive force may result in damage.

Model	Maximum tightening torque	
	N・m	in・lbf
KSHP6×4 (C)(-F11)	0.85	7.523
KSHP8×6 (C)(-11)(-F11)	2.5	22.128
KSHP10×8 (C)(-F11)	6.5	57.532
KSHP11×8 (C)-F11	—	57.5
KSHP12×10 (C,R)(-F11)	8.0	70.808
KSHP14×12 (C,R)(-F11)	12.0	106.2
KSHP16×15 (C,R)	20.0	—
KSHP18×20 (C,R)(-F11)	25.0	221.3
KSHP20×22 (C,R)	30.0	—
KSHP25×25 (C,R)(-F11)	42.0	371.7
KSHP30×30 (C,R)(-F11)	60.0	531.1
KSHP36×50 (C,R)(-F11)	72.0	637.3
KSHP42×50 (C,R)(-F11)	85.0	752.3

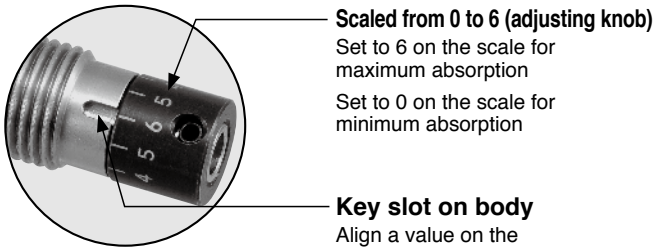
7. Ensure that the hardness of the surface directly impacting the piston rod of the shock absorber is over HRc40 hardness (excluding models with rubber or plastic caps).
8. Be aware that performance and characteristics change depending on the operating temperature.

Adjusting the shock absorbing capacity

1. For the **KSHP10** to **KSHP42** models, align the red mark on the adjusting knob to the 6 on the scale. For the **KSHP6** and **KSHP8** models, align the 6 on the scale to the key slot on the body.
2. For large impacts on collision or if a long time is required for a full stroke, reduce the value on the scale gradually.
3. Always tighten the lock screw to fix the knob in place after completing adjustment. (excluding **KSHP6** and **KSHP8**)

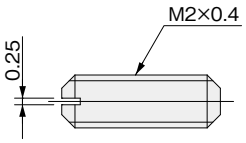


For **KSHP6** and **KSHP8**

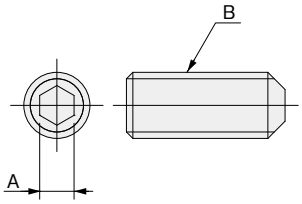


●Lock screw dimensions mm [in]

For **KSHP 10** to **14**



For **KSHP 16** to **42**



Model \ Symbol	A	B
KSHP16 to **18**	1.3	M2.5×0.45
KSHP20 to **42**	1.5	M3×0.5

■ How to select shock absorbers

1. Confirm the thrust

Confirm the thrust that is used, and then check the prospective shock absorbers from the table of recommended cylinder bore sizes on page ㊾. If a shock absorber that is smaller than the recommended shock absorber is used, the shock absorber being used may be damaged in fewer operation cycles than is guaranteed.

2. Confirm the kinetic energy

Confirm Ⅰ and Ⅱ below, and then check page ㊿ for the selection graphs for prospective shock absorbers from [1. Confirm the thrust]. (*)

Ⅰ Impact object mass: m [kg]

Ⅱ Impact speed: v [m/s]

Because " v " is the impact speed, not the average speed, when using a cylinder,

v = m [cylinder stroke] ÷ s [operating time] × 2

Select a model in which Ⅰ and Ⅱ fit within the range enclosed by the capacity curves.

If multiple models are applicable, use the model that is closest to both the capacity curves and the operating conditions. The further the model you select is from the capacity curves and the operating conditions, the slower it will tend to be.

3. Confirm other specifications

Confirm that such specifications as the maximum operating frequency, maximum absorption capacity per unit of time, angle of eccentricity, and operating temperature range are within the range for the shock absorber that you selected.

* The value for the kinetic energy, E, can be found by doing the following calculation. However, the shock absorber's capacity for absorption changes depending on the impact speed. When the shock absorber is doing low-speed operations, it has less drag than when it is doing high-speed operations.

The maximum absorption capacity that is noted in the specifications is reached only at the maximum impact speed.

Therefore, do not choose a shock absorber by comparing E to the maximum absorption capacity; confirm the capacity using the selection graph.

$$E = \frac{1}{2} mv^2$$

E: Kinetic energy (J)

m: Impact object mass [kg]

v: Impact speed (m/s)

Range in the selection graph

Vertical axis range :

Maximum impact speed ≧ v Impact speed (operating condition)

Horizontal axis range :

Shock absorber's maximum absorption capacity at the impact speed (v = m/s) ≧ E Kinetic energy (operating condition)

Calculating the thrust energy is not necessary because the size of the shock absorber is limited by the thrust in step 1.

■ Koganei's selectable content

You can also select equipment from Koganei's homepage.

Visit http://www.koganei.co.jp.

The results of selections using the method above may differ from the results of selections for the selectable content on our homepage. If this happens, please contact us.

■ Example of selecting a shock absorber

[Operating conditions]

①Bore size of the cylinder being used: ϕ16

②Cylinder stroke: 100 mm = 0.1 m

③Pressure applied to the cylinder: 0.6 MPa

④Cylinder's operating time: 0.4 s

⑤Impact object mass: 10 kg

1. Confirm the thrust

Either calculate or find the thrust in the cylinder thrust table on page ㊾.

The cylinder thrust based on ① and ③ is about 121 N.

Cylinder thrust	100.5N	<	120.6N	<	126N
Cylinder bore size	ϕ16		ϕ16		ϕ20
Applied pressure	0.5MPa		0.6MPa		0.4MPa

As mentioned above, although the cylinder being used is ϕ16, the pressure applied to the cylinder exceeds 0.5 MPa, so consider the ϕ20 cylinder (lower than 0.4 MPa) and check the table of recommended cylinder bore sizes on page ㊾.

The following are prospective models.

・KSHP10×8 ・KSHP12×10 ・KSHP14×12

・KSHP16×15 ・KSHP18×20 ・KSHP20×22

2. Confirm the kinetic energy

Ⅰ The impact object mass m = 10 kg from ⑤

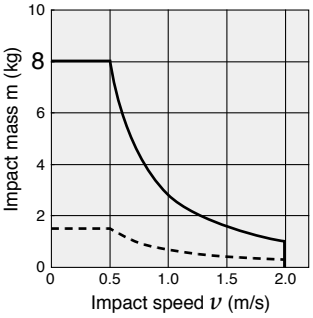
Ⅱ Find the impact speed, v, from ② and ④.

v = ② 0.1 m ÷ ④ 0.4 s × 2

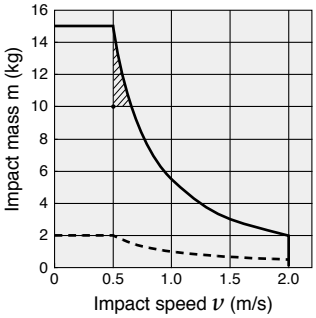
= 0.5 m/s

According to the selection graphs on page ㊹, the shock absorber with the optimum absorption capacity for operating conditions is KSHP12×10.

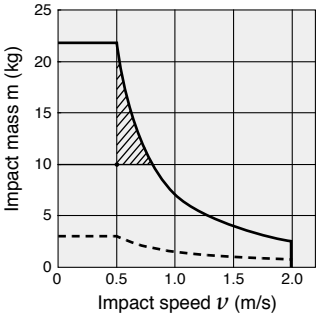
● KSHP10×8



● KSHP12×10



● KSHP14×12



・KSHP10×8 has an insufficient absorption capacity.

・The absorption capacities for all of the other shock absorbers are higher than that of KSHP12×10, so they do not fall within the operating conditions and capacity curves.

3. Confirm other specifications

Verify that other operating conditions, such as the maximum operating frequency, maximum absorption capacity per unit of time, angle of eccentricity, and operating temperature range, are within the specified ranges for KSHP12×10.

Selection Guidelines

■Recommended cylinder bore size

Model \ Cylinder bore	φ4	φ6	φ8	φ10	φ12	φ16	φ20	φ25	φ32	φ40	φ50	φ63	φ80	φ100	φ125
KSHP6×4 (-F11)	◇	◇	◎	◎	○										
KSHP8×6 (-11)(-F11)		◇	◇	◎	◎	○									
KSHP10×8 (-F11)			◇	◇	◎	◎	○								
KSHP11×8-F11			◇	◇	◎	◎	○								
KSHP12×10 (-F11)				◇	◇	◎	◎	○							
KSHP14×12 (-F11)					◇	◇	◎	◎	○						
KSHP16×15						◇	◇	◎	◎	○					
KSHP18×20 (-F11)							◇	◇	◎	○					
KSHP20×22							◇	◇	◎	◎	○				
KSHP25×25 (-F11)								◇	◇	◎	◎	○			
KSHP30×30 (-F11)									◇	◇	◎	◎	○		
KSHP36×50 (-F11)										◇	◇	◎	◎	○	
KSHP42×50 (-F11)											◇	◇	◎	◎	○

◇ : 0.3 MPa or higher ◎ : 0.5 MPa or lower ○ : 0.4 MPa or lower

Note 1: If a shock absorber that is smaller than the recommended shock absorber is used, the shock absorber being used may be damaged in fewer operation cycles than the value that is guaranteed.

Note 2: KSHP11×8 has only inch specifications.

■ Cylinder thrust

N [lbf.]

Bore size mm [in.]	Pressure area mm² [in.²]	Air pressure MPa [psi.]								
		0.1 [15]	**0.2 [29]**	**0.3 [44]**	**0.4 [58]**	**0.5 [73]**	**0.6 [87]**	**0.7 [102]**	**0.8 [116]**	**0.9 [131]**
φ4	12.6 [0.020]	1.3 [0.292]	2.5 [0.562]	3.8 [0.854]	5 [1.124]	6.3 [1.416]	7.5 [1.686]	8.8 [1.978]	10.1 [2.270]	11.3 [2.540]
φ6	28.3 [0.044]	2.8 [0.629]	5.7 [1.281]	8.5 [1.911]	11.3 [2.540]	14.1 [3.170]	17.0 [3.822]	19.8 [4.451]	22.6 [5.080]	25.4 [5.710]
φ8	50.3 [0.078]	5 [1.124]	10.1 [2.270]	15.1 [3.394]	20.1 [4.518]	25.1 [5.642]	30.2 [6.789]	35.2 [7.913]	40.2 [9.037]	45.2 [10.161]
φ10	78.5 [0.122]	7.9 [1.776]	15.7 [3.529]	23.6 [5.305]	31.4 [7.059]	39.3 [8.835]	47.1 [10.588]	55 [12.364]	62.8 [14.117]	70.7 [15.893]
φ12	113 [0.175]	11.3 [2.540]	22.6 [5.080]	33.9 [7.621]	45.2 [10.161]	56.5 [12.701]	67.9 [15.264]	79.2 [17.804]	90.5 [20.344]	101.8 [22.885]
φ16	201 [0.312]	20.1 [4.518]	40.2 [9.037]	60.3 [13.555]	80.4 [18.074]	100.5 [22.592]	121 [27.201]	141 [31.697]	161 [36.193]	181 [40.689]
φ20	314 [0.487]	31.4 [7.059]	62.8 [14.117]	94.2 [21.176]	126 [28.325]	157 [35.294]	188 [42.262]	220 [49.456]	251 [56.425]	283 [63.618]
φ25	491 [0.761]	49.1 [11.038]	98.2 [22.075]	147 [33.046]	196 [44.061]	245 [55.076]	295 [66.316]	344 [77.331]	393 [88.346]	442 [99.362]
φ32	804 [1.246]	80.4 [18.074]	161 [36.193]	241 [54.177]	322 [72.386]	402 [90.370]	483 [108.6]	563 [126.6]	643 [144.5]	724 [162.8]
φ40	1257 [1.948]	126 [28.325]	251 [56.425]	377 [84.750]	503 [113.1]	628 [141.2]	754 [169.5]	880 [197.8]	1005 [225.9]	1131 [254.2]
φ50	1963 [3.043]	196 [44.061]	393 [88.346]	589 [132.4]	785 [176.5]	982 [220.8]	1178 [264.8]	1374 [308.9]	1571 [353.2]	1767 [397.2]
φ63	3117 [4.831]	312 [70.138]	623 [140.1]	935 [210.2]	1247 [280.3]	1559 [350.5]	1870 [420.4]	2182 [490.5]	2494 [560.7]	2806 [630.8]
φ80	5027 [7.792]	503 [113.1]	1005 [225.9]	1508 [339.0]	2011 [452.1]	2513 [564.9]	3016 [678.0]	3519 [791.1]	4021 [903.9]	4524 [1017]
φ100	7854 [12.174]	785 [176.5]	1571 [353.2]	2356 [529.6]	3142 [706.3]	3927 [882.8]	4712 [1059]	5498 [1236]	6283 [1412]	7069 [1589]
φ125	12272 [19.022]	1227 [275.8]	2454 [551.7]	3682 [827.7]	4909 [1104]	6136 [1379]	7363 [1655]	8590 [1931]	9817 [2207]	11045 [2483]

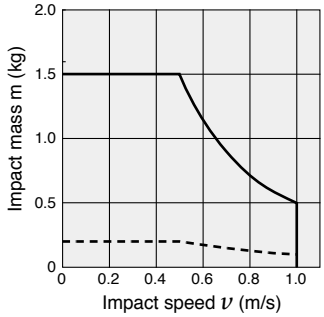
Cautions for using the selection graphs

1. The selection graphs are calculated with a cylinder operating air pressure of 0.5 MPa.
2. The values in the selection graphs are for room temperature (20 to 25°). Be aware that performance and characteristics change depending on the operating temperature.
3. Select a shock absorber that is as close to, yet within, the capacity line(s).
4. You can select them on the Koganei home page. Go to http://www.koganei.co.jp
   The results of selections using our catalog may differ from the results of selections on our homepage.

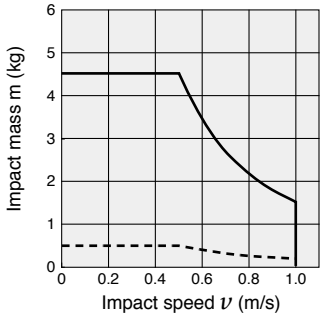
■Selection graph

——— Graph when calibrated to 6
- - - - - - - - Graph when calibrated to 0 (guideline)

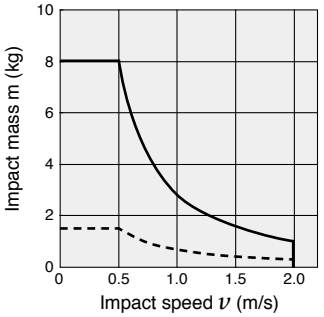
● KSHP6×4 (-F11)



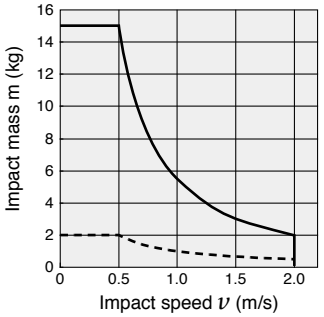
● KSHP8×6 (-F11)



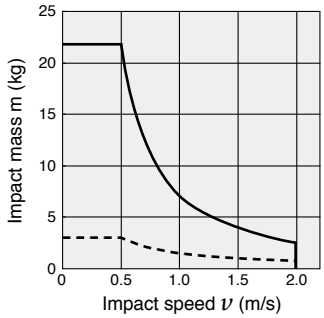
● KSHP10×8 (-F11)
● KSHP11×8-F11



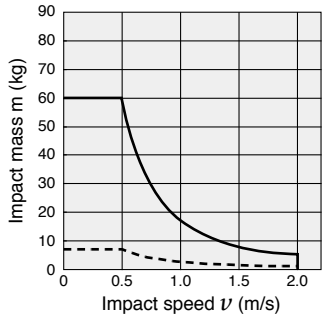
● KSHP12×10 (-F11)



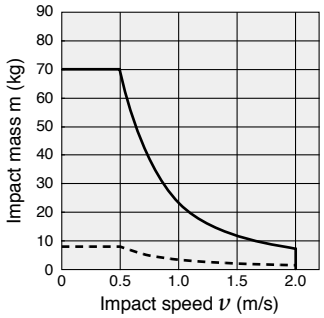
● KSHP14×12 (-F11)



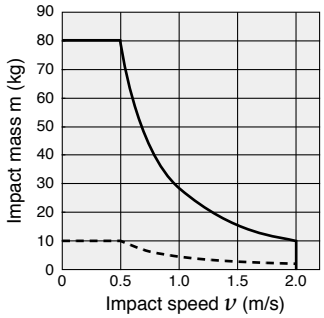
● KSHP16×15



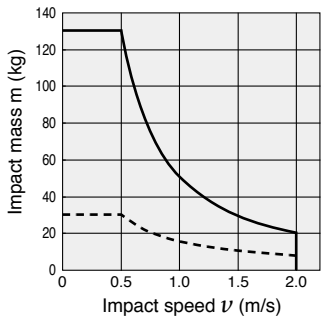
● KSHP18×20 (-F11)



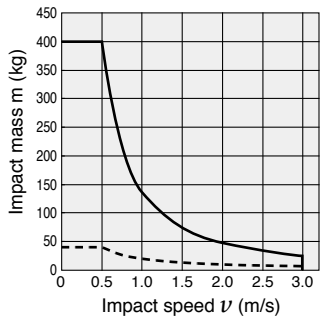
● KSHP20×22



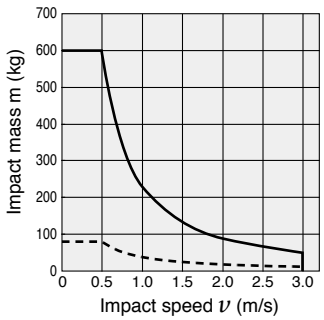
● KSHP25×25 (-F11)



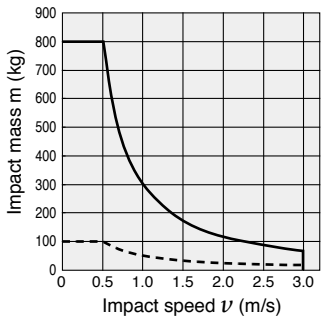
● KSHP30×30 (-F11)



● KSHP36×50 (-F11)

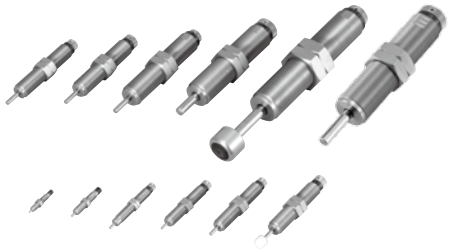


● KSHP42×50-F11



Linear orifice shock absorber

KSHP Series



Specifications

Item \ Model (in inches)	KSHP6×4 (KSHP6×4-F11)	KSHP8×6, KSHP8×6-11 (KSHP8×6-F11)
Maximum absorption capacity J(in.lbs)	0.25 (2.213)	0.75 (6.638)
Absorption stroke mm(in.)	4 (0.157)	6 (0.236)
Impact speed range m/s(ft/s)	0.1 to 1 (0.33 to 3.28)	
Maximum operating cycle cycle/min	50	
Maximum absorption capacity per unit of time J/min (in.lbs/min)	7.5 (66.4)	22.5 (199.3)
Spring return force[Note1] N	2.6	2.9
Deflection angle	1° or less	
Operating temperature range[Note2] ℃(°F)	0 to 60 (32 to 140)	

Item \ Model (in inches)	KSHP10×8 (KSHP10×8-F11, KSHP11×8-F11)	KSHP12×10 (KSHP12×10-F11)	KSHP14×12 (KSHP14×12-F11)
Maximum absorption capacity J(in.lbs)	2 (17.701)	4 (35.403)	5 (44.254)
Absorption stroke mm(in.)	8 (0.315)	10 (0.394)	12 (0.472)
Impact speed range m/s(ft/s)	0.1 to 2 (0.33 to 6.56)		
Maximum operating cycle cycle/min	50		
Maximum absorption capacity per unit of time J/min (in.lbs/min)	60 (531.4)	120 (1062.7)	150 (1328.4)
Spring return force[Note1] N	6.5	9.6	9.0
Deflection angle	1° or less		
Operating temperature range[Note2] ℃(°F)	0 to 60 (32 to 140)		

Item \ Model (in inches)	KSHP16×15	KSHP18×20 (KSHP18×20-F11)	KSHP20×22
Maximum absorption capacity J(in.lbs)	10	15 (132.8)	20
Absorption stroke mm(in.)	15	20 (0.787)	22
Impact speed range m/s(ft/s)	0.1 to 2 (0.33 to 6.56)		
Maximum operating cycle cycle/min	40		30
Maximum absorption capacity per unit of time J/min (in.lbs/min)	240	360 (3188.2)	360
Spring return force[Note1] N	20.5	23.0	18.4
Deflection angle	3° or less		
Operating temperature range[Note2] ℃(°F)	0 to 60 (32 to 140)		

Item \ Model (in inches)	KSHP25×25 (KSHP25×25-F11)	KSHP30×30 (KSHP30×30-F11)	KSHP36×50 (KSHP36×50-F11)
Maximum absorption capacity J(in.lbs)	40 (354.0)	110 (973.6)	200 (1770)
Absorption stroke mm(in.)	25 (0.984)	30 (1.181)	50 (1.969)
Impact speed range m/s(ft/s)	0.1 to 2 (0.33 to 6.56)	0.1 to 3 (0.33 to 9.84)	
Maximum operating cycle cycle/min	30	20	15
Maximum absorption capacity per unit of time J/min (in.lbs/min)	720 (6376.3)	1320 (11690)	1800 (15940.8)
Spring return force[Note1] N	32.3	42.3	65.8
Deflection angle	3° or less		
Operating temperature range[Note2] ℃(°F)	0 to 60 (32 to 140)		

Item \ Model (in inches)	KSHP42×50 (KSHP42×50-F11)
Maximum absorption capacity J(in.lbs)	300 (2655)
Absorption stroke mm(in.)	50 (1.969)
Impact speed range m/s(ft/s)	0.1 to 3 (0.33 to 9.84)
Maximum operating cycle cycle/min	10
Maximum absorption capacity per unit of time J/min (in.lbs/min)	2000 (17712.0)
Spring return force[Note1] N	64.2
Deflection angle	3° or less
Operating temperature range[Note2] ℃(°F)	0 to 60 (32 to 140)

Note1: The spring return force is the force of the piston rod when it returns from a full stroke. It is not stable, so cannot be used as other than rod return.

Note2: The shock absorber's shock absorbing capacity fluctuates based on speed and ambient temperature.
Use the product within the ranges of the selection graphs (impact mass, impact speed diagram) on page 50.

Note3: KSHP11 has only inch specifications.

* The maximum tightening torque of KSHP11 is different from that of KSHP10. See page 47 for details on the maximum tightening torque.

Note4: KSHP16×15 and KSHP20×22 do not have inch specifications.

Mass (Specifications in mm)

g

Model	Main unit[Note]	Additional mass		Additional parts' mass		
		With plastic cap	With rubber cap	Mounting nut (1 ea.)	Stopper nut	Side mounting bracket
KSHP6×4	5.1	0.2	—	0.4	2	8
KSHP8×6 (-11)	11.3(11.5)	0.5	—	0.6(0.9)	4	12
KSHP10×8	26.5	0.7	—	1.2	7	15
KSHP12×10	43.5	1.1	1.2	1.9	8	22
KSHP14×12	66.5	1.1	1.8	4.0	15	41
KSHP16×15	98.5	1.6	3.4	6.6	28	65
KSHP18×20	144	4.1	5.3	8.8	37	100
KSHP20×22	186	5.4	6.9	12.2	55	110
KSHP25×25	360	5.3	5.7	23.0	95	360
KSHP30×30	569	50	49	32.5	140	455
KSHP36×50	1130	110	109	95.5	330	2650
KSHP42×50	1515	110	109	93.0	320	2400

Calculation example: The mass of KSHP10×8C-S-2 (with cap, stopper, and side mount) is
26.5 + 0.7 + 7 + 15 = 49.2g

Note: The weight of the main unit includes the weight of 2 mounting nuts.

Order Codes (specifications in mm)

KSHP □ - □ - □ - □

Mounting bracket
Blank: No mounting bracket
2 : With side mounting bracket (side mounting type)

Stopper nut
Blank: No stopper nut
S : With stopper nut

Body thread size (selectable only for 8×6)
Blank: Body thread size M8×0.75
11 : Body thread size M8×1

Cap
Blank: No cap
C : With plastic cap
R : With rubber cap[Note]
Note: Rubber cap is not available with the **6×4**, **8×6**, and **10×8**.

Body thread size×stroke
6×4
8×6
10×8
12×10
14×12
16×15
18×20
20×22
25×25
30×30
36×50
42×50[Note]
Note: **KSHP42×50** is a built-to-order product. Contact us about turnaround times, prices, or other information.

Adjustment type linear orifice shock absorber KSHP series

Additional Parts (no specifications in inches)

●Rubber cap

R - KSH - M □

Thread size
12: For KSHP12
14: For KSHP14
16: For KSHP16
18: For KSHP18
20: For KSHP20
25: For KSHP25
30: For KSHP36
42: For KSHP42

●Mounting nut (M4 to M20: 1 pack has 10 units / M25 to M42: 1 pack has 2 units)

N - KSH - M □

Thread size
6: For KSHP6
8: For KSHP8
8-11: For KSHP8-11
10: For KSHP10
12: For KSHP12
14: For KSHP14
16: For KSHP16
18: For KSHP18
20: For KSHP20
25: For KSHP25
30: For KSHP30
36: For KSHP36
42: For KSHP42

●Stopper nut

S - KSH - M □

Thread size
6: For KSHP6
8: For KSHP8
8-11: For KSHP8-11
10: For KSHP10
12: For KSHP12
14: For KSHP14
16: For KSHP16
18: For KSHP18
20: For KSHP20
25: For KSHP25
30: For KSHP30
36: For KSHP36
42: For KSHP42

●Side mounting bracket

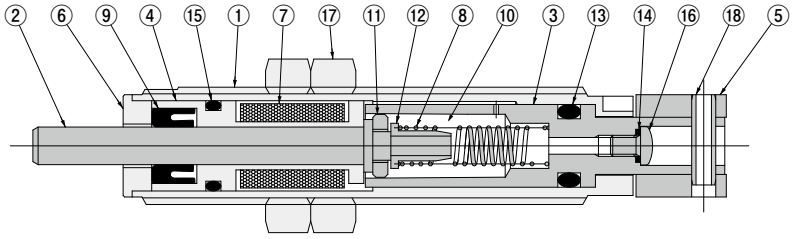
2 - KSH - M □

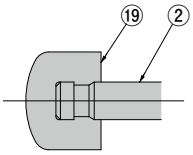
Thread size
6: For KSHP6
8: For KSHP8
8-11: For KSHP8-11
10: For KSHP10
12: For KSHP12
14: For KSHP14
16: For KSHP16
18: For KSHP18
20: For KSHP20
25: For KSHP25
30: For KSHP30
36: For KSHP36
42: For KSHP42

* For the dimension diagrams of the additional parts, see pages ⓬ to ⓭.
* The stopper nut and side mount are made from mild steel (nickel plated).

Inner Construction and Major Parts and Materials

●**M6**,**M8** size (11/4-32 UNEF, 5/16-32 UNEF **)** * The inch sizes are inside the ( ).



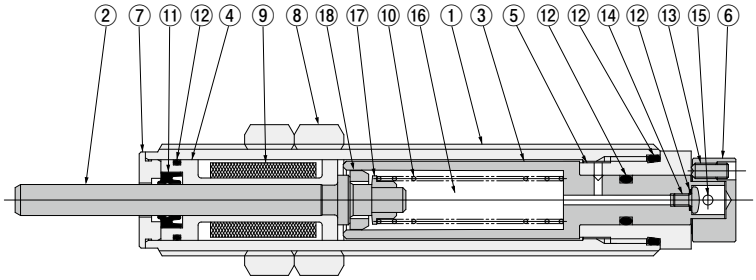


With plastic cap (C)

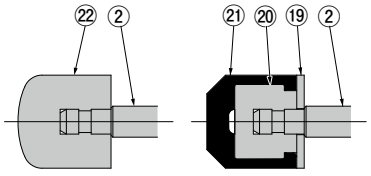
No	Name	Materials
①	Body	Stainless steel
②	Piston rod	Stainless steel
③	Inner tube	Stainless steel
④	Sleeve	Copper alloy
⑤	Adjusting knob	Copper alloy (black electroplated)
⑥	Plug	Stainless steel
⑦	Accumulator	Synthetic rubber
⑧	Spring	Spring steel
⑨	Rod seal	Synthetic rubber
⑩	Oil	Special oil (H1 compliant)
⑪	Piston ring	Copper alloy
⑫	Collar	Copper alloy
⑬	O-ring	Synthetic rubber
⑭	O-ring	Synthetic rubber
⑮	O-ring[Note]	Synthetic rubber
⑯	Screw	Mild steel (nickel plated)
⑰	Mounting nut	Mild steel (nickel plated)
⑱	Spring pin	Steel (oxide film)
⑲	Cap	Plastic (POM)

Note: Not available for KSHP6×4.

●**M10** to **M42** size (3/8-32 UNEF to 1 3/4-12 UN） * The inch sizes are inside the ( ).

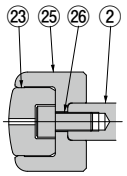


For KSHP 30 × 30 and KSHP 42 × 50

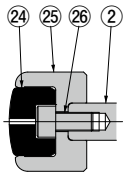


With plastic cap (C)

With rubber cap (R)



With plastic cap (C)



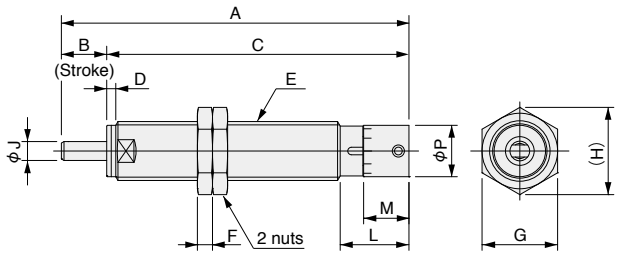
With rubber cap (R)

No.	Name	Materials
①	Body	Free-cutting steel (nickel plated)
②	Piston rod[Note1]	Steel (nickel plated)
③	Inner tube	Stainless steel
④	Sleeve	Copper alloy
⑤	Housing	Mild steel (black electroplated)
⑥	Adjusting knob	Copper alloy (nickel plated)
⑦	Plug	Stainless steel
⑧	Mounting nut	Mild steel (nickel plated)
⑨	Accumulator	Synthetic rubber
⑩	Spring	Spring steel
⑪	Rod seal	Synthetic rubber
⑫	O-ring	Synthetic rubber
⑬	Lock screw[Note2]	Steel (oxide film)
⑭	Screw[Note3]	Mild steel (zinc plated)
⑮	Spring pin	Steel (oxide film)
⑯	Oil	Special oil (H1 compliant)
⑰	Collar[Note4]	Stainless steel
⑱	Piston ring	Stainless steel
⑲	Washers[Note 5]	Stainless steel
⑳	Cap	Plastic (POM)
㉑	Rubber cap	Urethane rubber
㉒	Cap	Plastic (POM)
㉓	Cap	Plastic (POM)
㉔	Rubber cap	Urethane rubber
㉕	Metal cap	Stainless steel
㉖	Hexagon socket head screw	Stainless steel

Note 1: KSHP 10 to 12 are stainless steel
2: KSHP 10 to 14 are slotted lock screws.
3: KSHP 30 to 42 are stainless steel with button head screw
4: KSHP 10 are copper alloy and KSHP 12 to 14 are sintered metal
5: KSHP 18 to 20 only

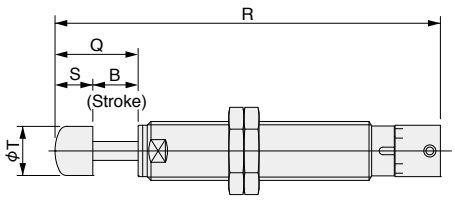
Dimensions (mm)

●No rod end cap: **KSHP□×□**



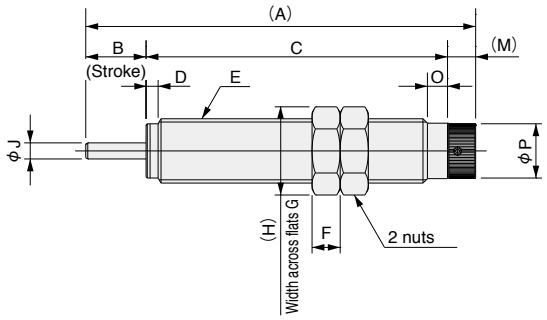
●With rod end cap

With plastic cap: **KSHP□×□C**



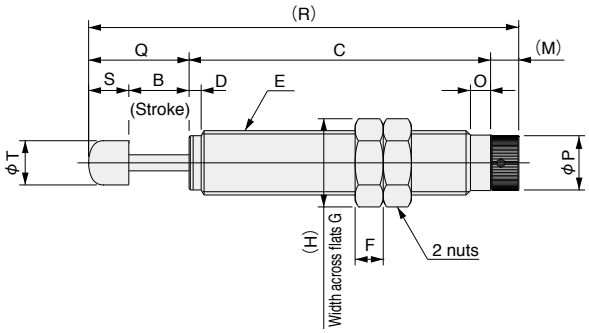
Model \ Symbol	A	B	C	D	E	F	G	H	J	L	M	P	Q	R	S	T
KSHP6×4 (C)	36	4	32	0.5	M6×0.75	2	8	9.2	2	6.5	5.4	5	8	40	4	4.6
KSHP8×6 (C)	46	6	40	1.2	M8×0.75	2	10	11.5	2.5	9	6	6.8	11	51	5	6.5
KSHP8×6 (C)-11	46	6	40	1.2	M8×1	3	10	11.5	2.5	9	6	6.8	11	51	5	6.5

●No rod end cap: **KSHP□×□**

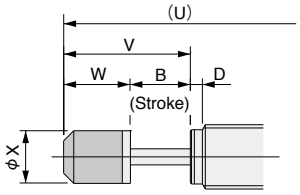


●With rod end cap

With plastic cap: **KSHP□×□C**

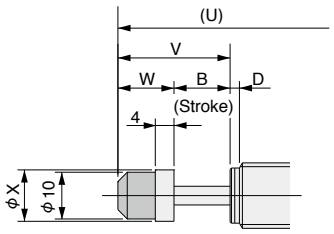


With rubber cap: **KSHP□×□R**



Note: Rubber cap is not available with the **KSHP10×8**

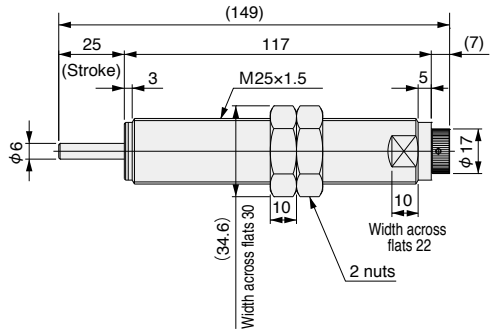
With rubber cap: For the **KSHP14×12R**



Model \ Symbol	A	B	C	D	E	F	G	H	J	M	O	P	Q	R	S	T	U	V	W	X
KSHP10×8 (C)	69	8	56	6	M10×1	3	12	13.9	3	5	4	8.7	16	77	8	8	–	–	–	–
KSHP12×10 (C,R)	75	10	60	2	M12×1	4	14	16.2	3	5	4	10.7	20	85	10	10	85	20	10	10
KSHP14×12 (C,R)	87	12	70	2	M14×1.5	5	17	19.6	4	5	4	10.7	22	97	10	11	99	24	12	11
KSHP16×15 (C,R)	97	15	75	3	M16×1.5	7	19	21.9	4	7	5	13.5	25	107	10	11	113.5	31.5	16.5	13
KSHP18×20 (C,R)	116	20	89	3	M18×1.5	8	21	24.2	5	7	5	13.5	35	131	15	15	131.7	35.7	15.7	15
KSHP20×22 (C,R)	121	22	92	3	M20×1.5	8	24	27.7	5	7	5	17	40	139	18	16	139.2	40.2	18.2	16

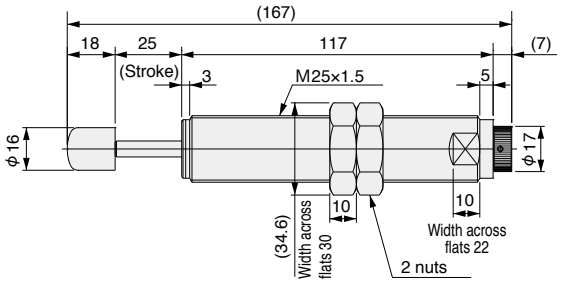
Dimensions (mm)

●No rod end cap: **KSHP25×25**

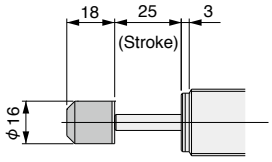


●With rod end cap

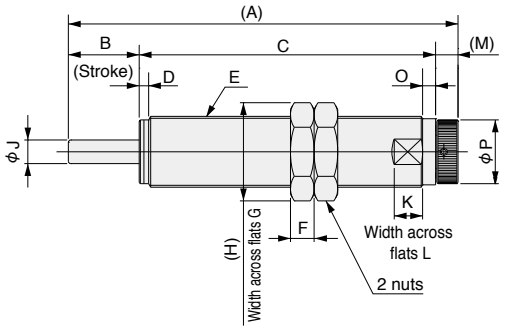
With plastic cap: **KSHP25×25C**



With rubber cap: **KSHP25×25R**

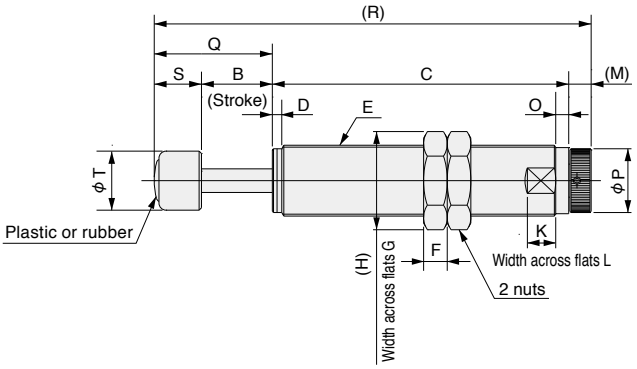


●No rod end cap: **KSHP□×□**



●With rod end cap

With plastic cap: **KSHP□×□C**
With rubber cap: **KSHP□×□R**



Model \ Symbol	A	B	C	D	E	F	G	H	J	K	L	M	O	P	Q	R	S	T
KSHP30×30 (C,R)	165	30	125.5	4	M30×1.5	10	36	41.6	10	12	28	9.5	5.5	27	50	185	20	25
KSHP36×50 (C,R)	229	50	169.5	5	M36×1.5	15	46	53.1	12	12	33	9.5	6	27	55	254	25	32
KSHP42×50 (C,R)	235.5	50	173	5	M42×1.5	15	50	57.7	12	20	38	12.5	7	38	75	260.5	25	32

Mass (Specifications in inches)

oz

Model	Main unit[Note1]	Additional mass		Additional parts' mass	
		With plastic cap	With rubber cap	Mounting nut (1 ea.)	Stopper nut
KSHP6×4 -F11	0.2	0.007	—	0.04	0.1
KSHP8×6 -11-F11	0.5	0.02	—	0.06	0.2
KSHP10×8 -F11	0.9	0.02	—	0.07	0.4
KSHP11×8 -F11	1.2	0.02	—	0.08	0.4
KSHP12×10 -F11	1.7	0.04	0.04	0.1	0.5
KSHP14×12 -F11	2.6	0.04	0.06	0.2	0.7
KSHP18×20 -F11	5.9	0.1	0.2	0.4	2.5
KSHP25×25 -F11	13.2	0.2	0.2	1.1	4.4
KSHP30×30 -F11	22.2	1.8	1.7	1.3	5.5
KSHP36×50 -F11	35.3	3.9	3.8	3.0	9.8
KSHP42×50 -F11	63.0	3.9	3.8	3.4	10.8

Calculation example: The mass of KSHP10×8C-S-2 (with cap and stopper) is

0.9 + 0.02 + 0.4 = 1.32oz

Note1: The weight of the main unit includes the weight of 2 mounting nuts.

Note2: KSHP11×8 has only inch specifications.

Order Codes (specifications in inches)

KSHP ☐ ☐ **- F11 -** ☐

Stopper nut
Blank: No stopper nut
S : With stopper nut

Cap
Blank: No cap
C : With plastic cap
R : With rubber cap[Note]
Note: Rubber cap is not available with the **6×4**, **8×6**, and **10×8**.

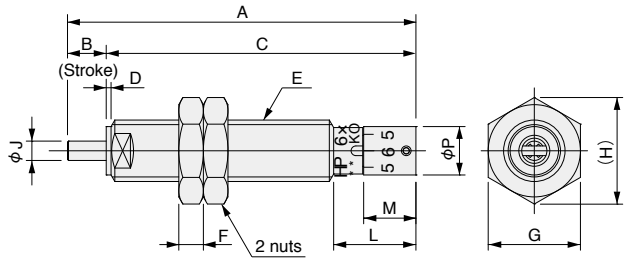
Body thread size×stroke
6×4
8×6
10×8
11×8
12×10
14×12
18×20
25×25
30×30
36×50
42×50[Note]

Adjustment type linear orifice shock absorber KSHP series

Note: **KSHP42×50** is a built-to-order product. Contact us about turnaround times, prices, or other information.

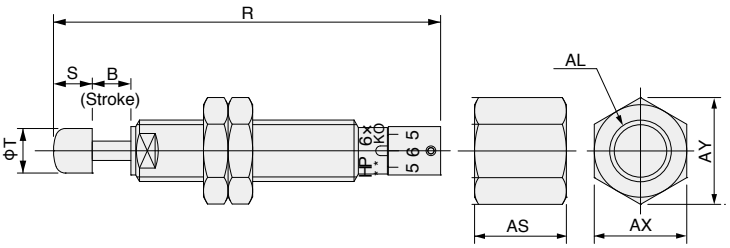
Dimensions (in)

●No rod end cap: **KSHP□×□**



●With rod end cap

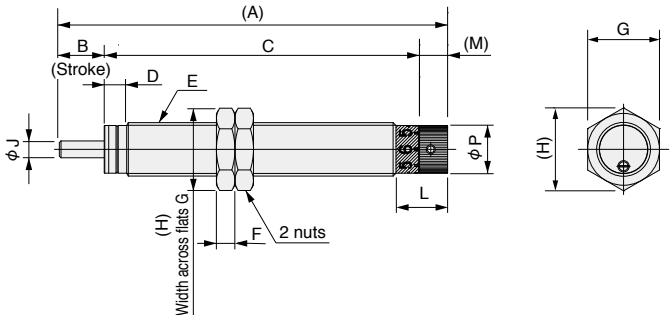
With plastic cap: **KSHP□×□C**



Model \ Symbol	A	B	C	D	E	F	G	H	J	L	M	P	R	S
KSHP6×4 (C)-F11	1.417	0.157	1.26	0.02	1/4-32 UNEF	0.1	3/8	0.433	0.079	0.335	0.213	0.197	1.575	0.157
KSHP8×6 (C)-F11	1.811	0.236	1.575	0.047	5/16-32 UNEF	0.13	7/16	0.505	0.098	0.358	0.236	0.268	2.008	0.197

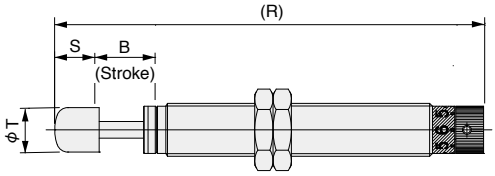
Model \ Symbol	T	AL	AS	AX	AY
KSHP6×4 (C)-F11	0.181	1/4-32 UNEF	0.4	3/8	0.433
KSHP8×6 (C)-F11	0.256	5/16-32 UNEF	7/16	7/16	0.505

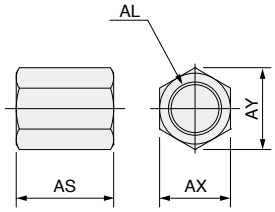
●No rod end cap: **KSHP□×□**



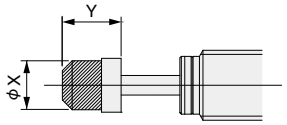
●With rod end cap

With plastic cap: **KSHP□×□C**





With rubber cap: **KSHP□×□R**



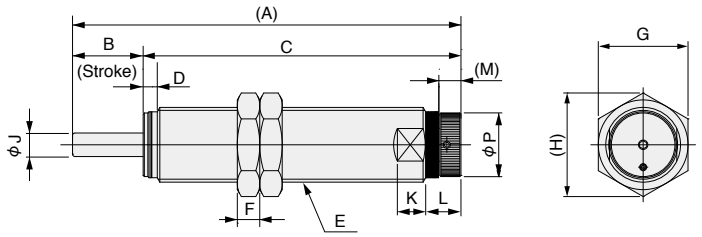
Note: Rubber cap is not available with the **KSHP10×8**, **KSHP11×8**

Model \ Symbol	A	B	C	D	E	F	G	H	J	L	M	P	R	S
KSHP10×8 (C)-F11	2.724	0.315	2.409	0.157	3/8-32 UNEF	0.13	1/2	0.577	0.118	0.362	0.197	0.335	3.039	0.315
KSHP11×8 (C)-F11	2.724	0.315	2.409	0.157	7/16-28 UNEF	0.15	9/16	0.65	0.118	0.362	0.197	0.343	3.039	0.315
KSHP12×10 (C,R)-F11	2.961	0.394	2.567	0.157	1/2-20 UNF	0.15	5/8	0.722	0.118	0.362	0.197	0.421	3.354	0.394
KSHP14×12 (C,R)-F11	3.433	0.472	2.961	0.157	9/16-18 UNF	7/32	11/16	0.794	0.157	0.362	0.197	0.421	3.827	0.394
KSHP18×20 (C,R)-F11	4.575	0.787	3.787	0.197	3/4-16 UNF	1/4	15/16	1.082	0.197	0.48	0.276	0.531	5.165	0.591
KSHP25×25 (C,R)-F11	5.874	0.984	4.89	0.197	1-12 UNF	3/8	1 1/4	1.443	0.236	0.48	0.276	0.669	6.583	0.709

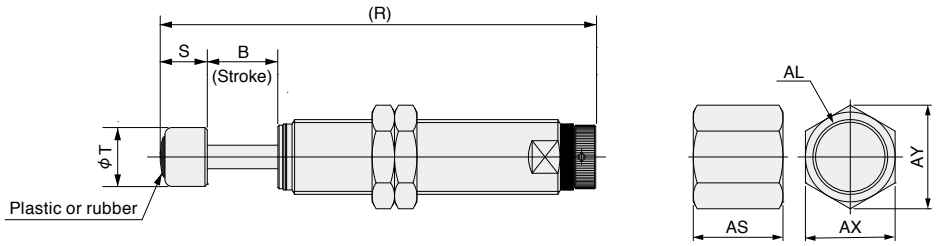
Model \ Symbol	T	X	Y	AL	AS	AX	AY
KSHP10×8 (C)-F11	0.315	–	–	3/8-32 UNEF	11/16	1/2	0.577
KSHP11×8 (C)-F11	0.315	–	–	7/16-28 UNEF	11/16	9/16	0.65
KSHP12×10 (C,R)-F11	0.394	0.394	0.394	1/2-20 UNF	11/16	5/8	0.722
KSHP14×12 (C,R)-F11	0.433	0.433	0.472	9/16-18 UNF	3/4	11/16	0.794
KSHP18×20 (C,R)-F11	0.591	0.591	0.618	3/4-16 UNF	1 1/2	15/16	1.082
KSHP25×25 (C,R)-F11	0.63	0.63	0.709	1-12 UNF	1 1/2	1 1/4	1.443

Dimensions (in)

●No rod end cap: **KSHP□×□**



●With rod end cap
With plastic cap: **KSHP□×□C**
With rubber cap: **KSHP□×□R**



Model \ Symbol	A	B	C	D	E	F	G	H	J	K	L	M	P	R	S
KSHP30×30 (C,R)-F11	6.496	1.181	5.315	0.236	1 1/4-12 UNF	3/8	1 1/2	1.732	0.394	0.472	0.591	0.354	1.063	7.283	0.787
KSHP36×50 (C,R)-F11	9.016	1.969	7.047	0.276	1 3/8-12 UNF	5/8	1 11/16	1.948	0.472	0.472	0.61	0.354	1.063	10	0.984
KSHP42×50 (C,R)-F11	9.272	1.969	7.303	0.276	1 3/4-12 UN	5/8	2	2.309	0.472	0.787	0.768	0.472	1.496	10.256	0.984

Model \ Symbol	T	AL	AS	AX	AY
KSHP30×30 (C,R)-F11	0.984	1 1/4-12 UNF	1 1/2	1 1/2	1.732
KSHP36×50 (C,R)-F11	1.26	1 3/8-12 UNF	2	1 11/16	1.948
KSHP42×50 (C,R)-F11	1.26	1 3/4-12 UN	2	2	2.309

Linear Orifice Type KSHC Series

Clean Room Specification Shock Absorbers

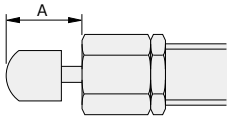
General precautions

Cover the unit when mounting it in locations where it might be subject to excessive dust, dripping water, dripping oil, etc. Dents, scratches, water, oil, or dust on the piston rod results in damage and decreases service life.

Mounting

1. Keep the angle of eccentricity, resulting from the load direction and the axis of the shock absorber, under the specified values on pages ⑥⑤ to ⑥⑥. If an eccentric load exceeding the specifications is applied, it could result in breakage or impaired returns. If there is concern that an eccentric load exceeding the specified values will be applied, install a guide, or similar mechanism.
2. Two or more shock absorbers can be mounted in parallel, to boost absorption capacity. In such an arrangement, however, be careful to ensure that the load is evenly distributed to each shock absorber.
3. To adjust the capacity with the stroke, adjust the stopper nut (-S) or add an external stopper.
4. If using with a cap, always mount a stopper nut (-S) or an external stopper to ensure that the cap is not subjected to loads at the stroke end. The stopper nut mounting position must not exceed the distance shown in the table below.
   You can use it without a stopper nut or external stopper, but over the long-term, the stop location changes due to cap deformation and wear.

Model	A	
	mm	in
CS-KSHC3×3C(-F11)	3	0.118
CS-KSHC4×4C(-F11)	4	0.157
CS-KSHC5×5C(-11)(-F11)	5	0.197
CS-KSHC6×8C(-F11)	8	0.315
CS-KSHC7×8C-F11	—	0.315
CS-KSHC8×8C(-F11)	8	0.315
CS-KSHC9×10C(-F11)	10	0.394
CS-KSHC11×15C(-F11)	15	0.591
CS-KSHC14×16C	16	0.630
CS-KSHC18×25C(-F11)	25	0.984



5. The small screw on the back end of the shock absorber should never be loosened or removed. Oil may leak out of the shock absorber leading to a loss of functionality and resulting in damage to the equipment and accidents.
6. When mounting the shock absorber, always use the following maximum tightening torque guidelines. Tightening using excessive force may result in damage.

Model	Maximum tightening torque	
	N・m	in・lbf
CS-KSHC3×3(C)(-F11)	0.5	4.426
CS-KSHC4×4(C)(-F11)	0.85	7.523
CS-KSHC5×5(C)(-11)(-F11)	2.5	22.128
CS-KSHC6×8(C)(-F11)	6.5	57.532
CS-KSHC7×8C-F11	—	57.5
CS-KSHC8×8(C)(-F11)	12.0	106.2
CS-KSHC9×10(C)(-F11)	12.0	106.2
CS-KSHC11×15(C)(-F11)	20.0	177.0
CS-KSHC14×16(C)	30.0	265.5
CS-KSHC18×25(C)(-F11)	42.0	371.7

7. Ensure that the hardness of the surface directly impacting the piston rod of the shock absorber is over HRc40 hardness (excluding models with cap).
8. Be aware that performance and characteristics change depending on the operating temperature.

■How to select shock absorbers

1. Confirm the thrust

Confirm the thrust that is used, and then check the prospective shock absorbers from the table of recommended cylinder bore sizes on page ㊸. If a shock absorber that is smaller than the recommended shock absorber is used, the shock absorber being used may be damaged in fewer operation cycles than is guaranteed.

2. Confirm the kinetic energy

Confirm I and II below, and then check page ㊹ for the selection graph for prospective shock absorbers from [1. Confirm the thrust]. (*)

Ⅰ Impact object mass: m [kg]

Ⅱ Impact speed: v [m/s]

Because " v " is the impact speed, not the average speed, when using a cylinder,

v = m [cylinder stroke] ÷ s [operating time] × 2

Select a model in which Ⅰ and Ⅱ fit within the range enclosed by the capacity curves.

If multiple models are applicable, use the model that is closest to both the capacity curves and the operating conditions. The further the model you select is from the capacity curves and the operating conditions, the slower it will tend to be.

3. Confirm other specifications

Confirm that such specifications as the maximum operating frequency, maximum absorption capacity per unit of time, angle of eccentricity, and operating temperature range are within the range for the shock absorber that you selected.

* The value for the kinetic energy, E, can be found by doing the following calculation. However, the shock absorber's capacity for absorption changes depending on the impact speed. When the shock absorber is doing low-speed operations, it has less drag than when it is doing high-speed operations.

The maximum absorption capacity that is noted in the specifications is reached only at the maximum impact speed.

Therefore, do not choose a shock absorber by comparing E to the maximum absorption capacity; confirm the capacity using the selection graph.

$$E=\frac{1}{2}mv^2$$

E : Kinetic energy (J)

m: Impact object mass [kg]

v : Impact speed (m/s)

Range in the selection graph

Vertical axis range :

Maximum impact speed ≧ v Impact speed (operating condition)

Horizontal axis range :

Shock absorber's maximum absorption capacity at the impact speed (v = m/s) ≧ E Kinetic energy (operating condition)

Calculating the thrust energy is not necessary because the size of the shock absorber is limited by the thrust in step 1.

■ Example of selecting a shock absorber

[Operating conditions]

①Bore size of the cylinder being used: ϕ16

②Cylinder stroke: 100 mm = 0.1 m

③Pressure applied to the cylinder: 0.6 MPa

④Cylinder's operating time: 0.4 s

⑤Impact object mass: 10 kg

1. Confirm the thrust

Either calculate or find the thrust in the cylinder thrust table on page ㊸.

The cylinder thrust based on ① and ③ is about 121 N.

Cylinder thrust	100.5N	<	120.6N	<	126N
Cylinder bore size	ϕ 16		ϕ 16		ϕ 20
Applied pressure	0.5MPa		0.6MPa		0.4MPa

As mentioned above, although the cylinder being used is ϕ16, the pressure applied to the cylinder exceeds 0.5 MPa, so consider the ϕ20 cylinder (lower than 0.4 MPa) and check the table of recommended cylinder bore sizes on page ㊸.

The following are prospective models.

- CS-KSHC6×8
- CS-KSHC8×8
- CS-KSHC9×10
- CS-KSHC11×15

2. Confirm the kinetic energy

Ⅰ The impact object mass m = 10 kg from ⑤

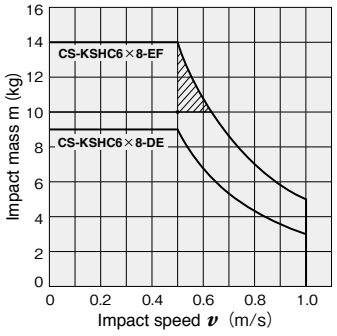
Ⅱ Find the impact speed, v, from ② and ④.

v = ② 0.1 m ÷ ④ 0.4 s ×2

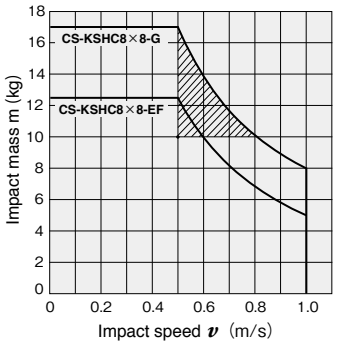
=0.5 m/s

According to the selection graph on page ㊹, the shock absorber with the optimum absorption capacity for operating conditions is CS-KSHC8×8-EF.

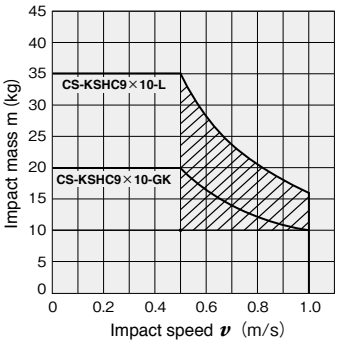
●CS-KSHC6×8



●CS-KSHC8×8



●CS-KSHC9×10



- CS-KSHC6×8-DE has an insufficient absorption capacity.
- The absorption capacities for all of the other shock absorbers are higher than that of CS-KSHC8×8-EF, so they do not fall within the operating conditions and capacity curves.

3. Confirm other specifications

Verify that other operating conditions, such as the maximum operating frequency, maximum absorption capacity per unit of time, angle of eccentricity, and operating temperature range, are within the specified ranges for CS-KSHC8×8-EF.

Selection guidelines

■Recommended cylinder bore size

Model \ Cylinder bore	ϕ 4	ϕ 6	ϕ 8	ϕ 10	ϕ 12	ϕ 16	ϕ 20	ϕ 25	ϕ 32	ϕ 40	ϕ 50	ϕ 63	ϕ 80	ϕ 100
CS-KSHC3×3(-F11)	◇	◎	◎	○										
CS-KSHC4×4(-F11)		◇	◎	○										
CS-KSHC5×5(-F11)			◇	◎	◎	○								
CS-KSHC6×8(-F11)				◇	◎	◎	○							
CS-KSHC7×8-F11					◎	◎	○							
CS-KSHC8×8(-F11)						◇	◎	○						
CS-KSHC9×10(-F11)						◇	◎	◎	○					
CS-KSHC11×15(-F11)							◇	◎	◎	○				
CS-KSHC14×16									◇	◎	◎	○		
CS-KSHC18×25(-F11)										◇	◎	◎	○	○

◇ : 0.3 MPa or higher ◎ : 0.5 MPa or lower ○ : 0.4 MPa or lower

Note1: If a shock absorber that is smaller than the recommended shock absorber is used, the shock absorber being used may be damaged in fewer operation cycles than the value that is guaranteed.

Note2: CS-KSHC7×8 has only inch specifications.

■Cylinder thrust

N [lbf.]

Bore size mm [in.]	Pressure area mm^2 [$in.^2$]	Air pressure MPa [psi.]								
		0.1 [15]	**0.2 [29]**	**0.3 [44]**	**0.4 [58]**	**0.5 [73]**	**0.6 [87]**	**0.7 [102]**	**0.8 [116]**	**0.9 [131]**
ϕ4	12.6 [0.020]	1.3 [0.292]	2.5 [0.562]	3.8 [0.854]	5 [1.124]	6.3 [1.416]	7.5 [1.686]	8.8 [1.978]	10.1 [2.270]	11.3 [2.540]
ϕ6	28.3 [0.044]	2.8 [0.629]	5.7 [1.281]	8.5 [1.911]	11.3 [2.540]	14.1 [3.170]	17.0 [3.822]	19.8 [4.451]	22.6 [5.080]	25.4 [5.710]
ϕ8	50.3 [0.078]	5 [1.124]	10.1 [2.270]	15.1 [3.394]	20.1 [4.518]	25.1 [5.642]	30.2 [6.789]	35.2 [7.913]	40.2 [9.037]	45.2 [10.161]
ϕ10	78.5 [0.122]	7.9 [1.776]	15.7 [3.529]	23.6 [5.305]	31.4 [7.059]	39.3 [8.835]	47.1 [10.588]	55 [12.364]	62.8 [14.117]	70.7 [15.893]
ϕ12	113 [0.175]	11.3 [2.540]	22.6 [5.080]	33.9 [7.621]	45.2 [10.161]	56.5 [12.701]	67.9 [15.264]	79.2 [17.804]	90.5 [20.344]	101.8 [22.885]
ϕ16	201 [0.312]	20.1 [4.518]	40.2 [9.037]	60.3 [13.555]	80.4 [18.074]	100.5 [22.592]	121 [27.201]	141 [31.697]	161 [36.193]	181 [40.689]
ϕ20	314 [0.487]	31.4 [7.059]	62.8 [14.117]	94.2 [21.176]	126 [28.325]	157 [35.294]	188 [42.262]	220 [49.456]	251 [56.425]	283 [63.618]
ϕ25	491 [0.761]	49.1 [11.038]	98.2 [22.075]	147 [33.046]	196 [44.061]	245 [55.076]	295 [66.316]	344 [77.331]	393 [88.346]	442 [99.362]
ϕ32	804 [1.246]	80.4 [18.074]	161 [36.193]	241 [54.177]	322 [72.386]	402 [90.370]	483 [108.6]	563 [126.6]	643 [144.5]	724 [162.8]
ϕ40	1257 [1.948]	126 [28.325]	251 [56.425]	377 [84.750]	503 [113.1]	628 [141.2]	754 [169.5]	880 [197.8]	1005 [225.9]	1131 [254.2]
ϕ50	1963 [3.043]	196 [44.061]	393 [88.346]	589 [132.4]	785 [176.5]	982 [220.8]	1178 [264.8]	1374 [308.9]	1571 [353.2]	1767 [397.2]
ϕ63	3117 [4.831]	312 [70.138]	623 [140.1]	935 [210.2]	1247 [280.3]	1559 [350.5]	1870 [420.4]	2182 [490.5]	2494 [560.7]	2806 [630.8]
ϕ80	5027 [7.792]	503 [113.1]	1005 [225.9]	1508 [339.0]	2011 [452.1]	2513 [564.9]	3016 [678.0]	3519 [791.1]	4021 [903.9]	4524 [1017]
ϕ100	7854 [1.217]	785 [176.5]	1571 [353.2]	2356 [529.6]	3142 [706.3]	3927 [882.8]	4712 [1059]	5498 [1236]	6283 [1412]	7069 [1589]

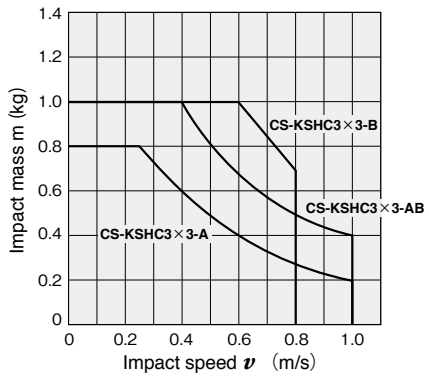
Selection guidelines

Cautions for using the selection graphs

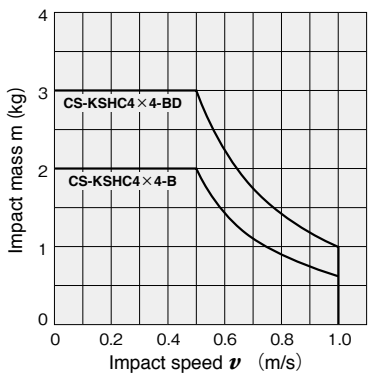
1. The selection graphs are calculated with a cylinder operating air pressure of 0.5 MPa.
2. The values in the selection graphs are for room temperature (20 to 25°). Be aware that performance and characteristics change depending on the operating temperature.
3. Select a shock absorber that is as close to, yet within, the capacity line(s).

■Selection graph

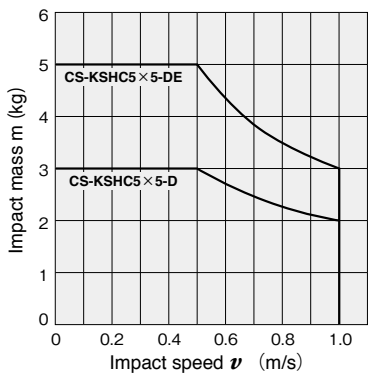
●CS-KSHC3×3 (-F11)



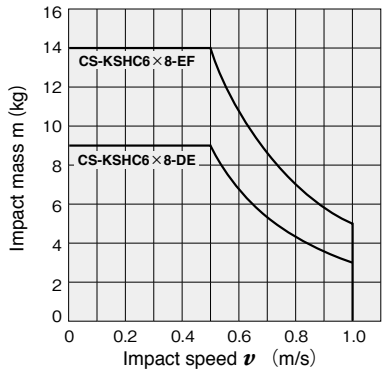
●CS-KSHC4×4 (-F11)



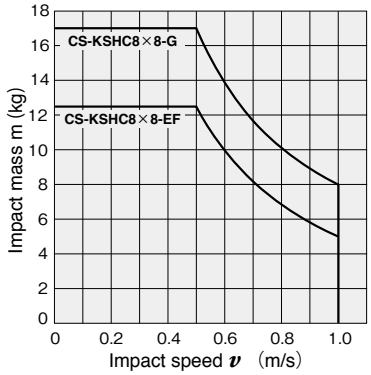
●CS-KSHC5×5 (-F11)



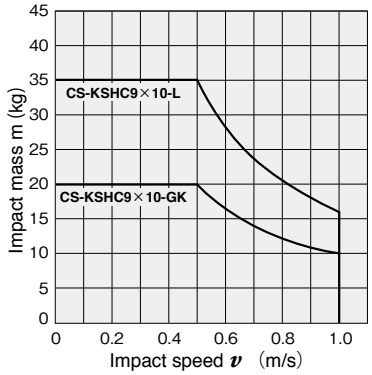
●CS-KSHC6×8 (-F11)
●CS-KSHC7×8-F11



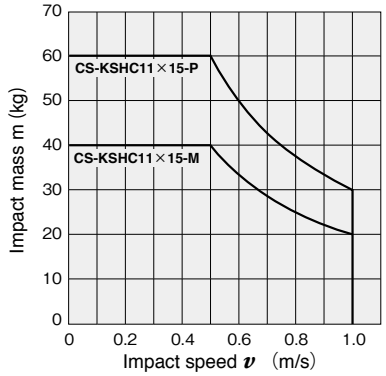
●CS-KSHC8×8 (-F11)



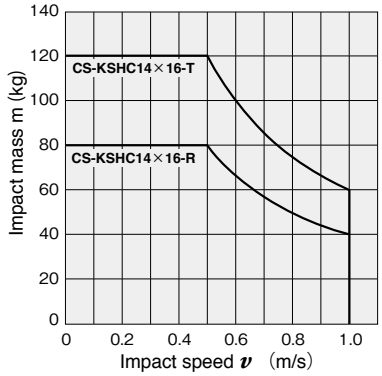
●CS-KSHC9×10 (-F11)



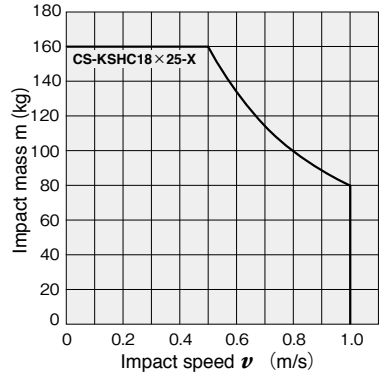
●CS-KSHC11×15 (-F11)



●CS-KSHC14×16



●CS-KSHC18×25 (-F11)



Clean room specifications

Shock absorber

Linear orifice type

KSHC Series

Specifications

Item \ Model (in inches)	CS-KSHC3×3-A (CS-KSHC3×3-A-F11)	CS-KSHC3×3-AB (CS-KSHC3×3-AB-F11)	CS-KSHC3×3-B (CS-KSHC3×3-B-F11)
Maximum absorption capacity J(in.lbs)	0.1 (0.885)	0.2 (1.770)	0.3 (2.655)
Absorption stroke mm(in.)	3 (0.118)		
Impact speed range m/s(ft/s)	0.1 to 1.0 (0.33 to 3.28)		0.1 to 0.8 (0.33 to 2.62)
Maximum operating cycle cycle/min	60		
Maximum absorption capacity per unit of time J/min (in.lbs/min)	10 (88.6)		
Spring return force[Note 1] N	2.0		
Deflection angle	1° or less		
Operating temperature range[Note 2] ℃(℉)	0 to 60 (32 to 140)		

Item \ Model (in inches)	CS-KSHC4×4-B (CS-KSHC4×4-B-F11)	CS-KSHC4×4-BD (CS-KSHC4×4-BD-F11)	CS-KSHC5×5-D-11 (CS-KSHC5×5-F11-D)	CS-KSHC5×5-DE-11 (CS-KSHC5×5-F11-DE)
Maximum absorption capacity J(in.lbs)	0.3 (2.655)	0.5 (4.425)	1.0 (8.851)	1.5 (13.276)
Absorption stroke mm(in.)	4 (0.157)		5 (0.197)	
Impact speed range m/s(ft/s)	0.1 to 1.0 (0.33 to 3.28)			
Maximum operating cycle cycle/min	60			
Maximum absorption capacity per unit of time J/min (in.lbs/min)	15 (132.8)		45 (398.5)	
Spring return force[Note 1] N	3.0		6.0	
Deflection angle	1° or less			
Operating temperature range[Note 2] ℃(℉)	0 to 60 (32 to 140)			

Item \ Model (in inches)	CS-KSHC6×8-DE (CS-KSHC6×8-DE-F11) (CS-KSHC7×8-F11)	CS-KSHC6×8-EF (CS-KSHC6×8-EF-F11) (CS-KSHC7×8-F11)	CS-KSHC8×8-EF (CS-KSHC8×8-EF-F11)	CS-KSHC8×8-G (CS-KSHC8×8-G-F11)
Maximum absorption capacity J(in.lbs)	1.5 (13.276)	2.5 (22.127)	2.5 (22.127)	4.0 (35.403)
Absorption stroke mm(in.)	8 (0.315)		8 (0.315)	
Impact speed range m/s(ft/s)	0.1 to 1.0 (0.33 to 3.28)			
Maximum operating cycle cycle/min	60			
Maximum absorption capacity per unit of time J/min (in.lbs/min)	75 (664.2)		120 (1062.7)	
Spring return force[Note 1] N	8.5			
Deflection angle	1° or less			
Operating temperature range[Note 2] ℃(℉)	0 to 60 (32 to 140)			

Item \ Model (in inches)	CS-KSHC9×10-GK (CS-KSHC9×10-GK-F11)	CS-KSHC9×10-L (CS-KSHC9×10-L-F11)	CS-KSHC11×15-M (CS-KSHC11×15-M-F11)	CS-KSHC11×15-P (CS-KSHC11×15-P-F11)
Maximum absorption capacity J(in.lbs)	5.0 (44.254)	8.0 (70.806)	10 (88.507)	15 (132.8)
Absorption stroke mm(in.)	10 (0.394)		15 (0.591)	
Impact speed range m/s(ft/s)	0.1 to 1.0 (0.33 to 3.28)			
Maximum operating cycle cycle/min	60		40	
Maximum absorption capacity per unit of time J/min (in.lbs/min)	240 (2125.4)		300 (2656.8)	
Spring return force[Note 1] N	8.5		18	
Deflection angle	1° or less			
Operating temperature range[Note 2] ℃(℉)	0 to 60 (32 to 140)			

Note1: The spring return force is the force of the piston rod when it returns from a full stroke. It is not stable, so cannot be used as other than rod return.

2: The shock absorbing capacity fluctuates based on speed and ambient temperature. Always use a product that is within the range shown by the solid lines in the graphs on pages 64.

* CS-KSHC7 has only inch specifications.

* The maximum tightening torque of CS-KSHC7 is different from that of CS-KSHC6. See page 61 for details on the maximum tightening torque.

Specifications

Item \ Model (in inches)	CS-KSHC14×16-R	CS-KSHC14×16-T	CS-KSHC18×25-X (CS-KSHC18×25-F11-X)
Maximum absorption capacity J(in.lbs)	20	30	40 (354.0)
Absorption stroke mm(in.)	16		25 (0.984)
Impact speed range m/s(ft/s)	0.1 to 1.0 (0.33 to 3.28)		
Maximum operating cycle cycle/min	40		
Maximum absorption capacity per unit of time J/min (in.lbs/min)	600		800 (7084.8)
Spring return force[Note 1] N	18.6		32
Deflection angle	1° or less		
Operating temperature range[Note 2] ℃(℉)	0 to 60 (32 to 140)		

*CS-KSHC14 does not have inch specifications.

Order Codes (specifications in mm)

CS – KSHC □ □ - □ - □

Clean specifications

Shock absorber Linear orifice type KSHC series

Piston diameter × absorption stroke

Cap
Blank: No cap
C : With plastic cap

Stopper nut
Blank: No stopper nut
S : With stopper nut

Maximum absorption capacity

Piston diameter × absorption stroke	Maximum absorption capacity
3×3	**A** : 0.1J
	AB : 0.2J
	B : 0.3J
4×4	**B** : 0.3J
	BD : 0.5J
5×5	**D** : 1.0J
	DE : 1.5J
6×8	**DE** : 1.5J
	EF : 2.5J
8×8	**EF** : 2.5J
	G : 4.0J
9×10	**GK** : 5.0J
	L : 8.0J
11×15	**M** : 10J
	P : 15J
14×16	**R** : 20J
	T : 30J
18×25	**X** : 40J

● CS-KSHC5×5 Order code for thread size M8×1

CS-KSHC5×5 □ - □ - □ - 11

Shape of rod end
Blank: No cap
C : With plastic cap

Maximum absorption capacity
D : 1.0J
DE: 1.5J

Stopper nut
Blank: No stopper nut
S : With stopper nut

Body thread size
11 : M8×1

Additional Parts (no specifications in inches)

●Stopper nut

S - KSH - M □

Thread size
4 : For CS-KSHC3×3
6 : For CS-KSHC4×4
8 : For CS-KSHC5×5
8-11: For CS-KSHC5×5-11
10 : For CS-KSHC6×8
12 : For CS-KSHC8×8
14 : For CS-KSHC9×10
16 : For CS-KSHC11×15
20 : For CS-KSHC14×16
25 : For CS-KSHC18×25

●Mounting nut (M4 to M20 : 1 pack has 10 pieces / M25 : 1 pack has 2 pieces)

N - KSH - M □

Thread size
4 : For CS-KSHC3×3
6 : For CS-KSHC4×4
8 : For CS-KSHC5×5
8-11: For CS-KSHC5×5-11
10 : For CS-KSHC6×8
12 : For CS-KSHC8×8
14 : For CS-KSHC9×10
16 : For CS-KSHC11×15
20 : For CS-KSHC14×16
25 : For CS-KSHC18×25

* For the dimension diagrams of the additional parts, see page ⑫.
* The stopper nut is made from mild steel (nickel plated).

Mass (specifications in mm)

g

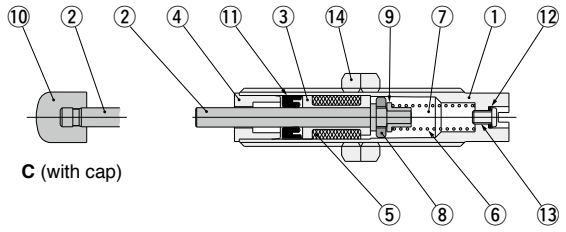
Model	Main unit[Note]	Additional mass	Additional parts' mass	
		With plastic cap	Mounting nut (1 ea.)	Stopper nut
CS-KSHC3×3	1.8	0.1	0.2	0.8
CS-KSHC4×4	4.8	0.1	0.4	2
CS-KSHC5×5-01,-11	9.2	0.3	0.6(0.9)	4
CS-KSHC6×8	21	1	1.2	7
CS-KSHC8×8	32	1	1.9	8
CS-KSHC9×10	58	2	4	15
CS-KSHC11×15	94	2	6.6	29
CS-KSHC14×16	172	3	12.2	50
CS-KSHC18×25	350	7	23	100

Calculation example: The mass of CS-KSHC6×8 (with cap and stopper) is
21 + 1 + 7 = 29g

Note: The weight of the main unit includes the weight of 2 mounting nuts.

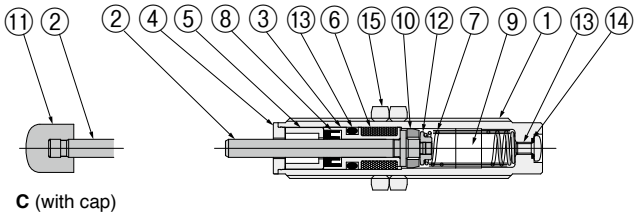
Inner Construction and Major Parts and Materials

●CS-KSHC3×3
●CS-KSHC4×4
●CS-KSHC5×5



C (with cap)

●CS-KSHC6×8
●CS-KSHC8×8
●CS-KSHC9×10



C (with cap)

●CS-KSHC11×15
●CS-KSHC14×16
●CS-KSHC18×25

Note: Depending on size, some part shapes and configurations may differ.

●CS-KSHC3×3, 4×4, 5×5

No.	Name	Materials
①	Body[Note 1]	Copper alloy (nickel plated)
②	Piston rod[Note 2]	Steel (nickel plated)
③	Sleeve	Copper alloy
④	Plug	Stainless steel
⑤	Accumulator	Synthetic rubber
⑥	Spring	Spring steel
⑦	Oil	Special oil
⑧	Piston ring	Copper alloy
⑨	Collar[Note 3]	Copper alloy
⑩	Cap	Plastic (POM)
⑪	Rod seal	Synthetic rubber
⑫	O-ring	Synthetic rubber
⑬	Screw	Mild steel (nickel plated)
⑭	Mounting nut[Note 4]	Mild steel (nickel plated)

Note1: CS-KSHC3, 4 are stainless steel
2: CS-KSHC5 is stainless steel
3: CS-KSHC3 is stainless steel
4: CS-KSHC3 is stainless steel

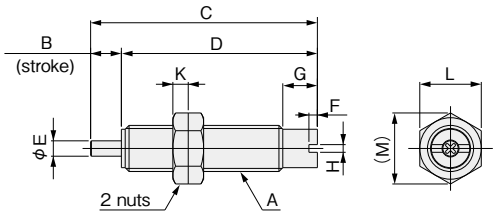
●CS-KSHC6×8, 8×8, 9×10, 11×15, 14×16, 18×25

No.	Name	Materials
①	Body	Copper alloy (nickel plated)
②	Piston rod[Note 1]	Steel (nickel plated)
③	Sleeve	Copper alloy
④	Plug	Stainless steel
⑤	Spacer	Stainless steel
⑥	Accumulator	Synthetic rubber
⑦	Spring	Spring steel
⑧	Rod seal	Synthetic rubber
⑨	Oil	Special oil
⑩	Piston ring	Copper alloy
⑪	Cap	Plastic (POM)
⑫	Collar[Note 2]	Sintered metal
⑬	O-ring	Synthetic rubber
⑭	Screw	Mild steel (zinc plated)
⑮	Mounting nut	Mild steel (nickel plated)

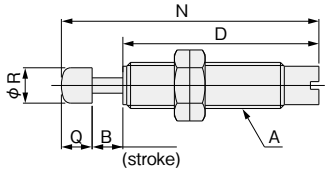
Note1: CS-KSHC6, 8 are stainless steel
2: CS-KSHC11, 14, 18 are stainless steel

Dimensions (mm)

● **No rod end cap: CS-KSHC3×3, CS-KSHC4×4**

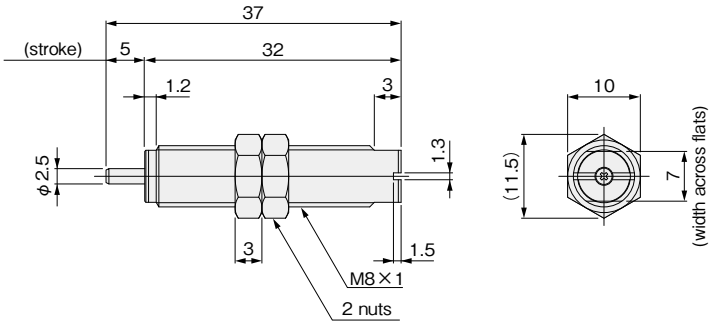


● **With rod end cap: CS-KSHC3×3C, CS-KSHC4×4C**

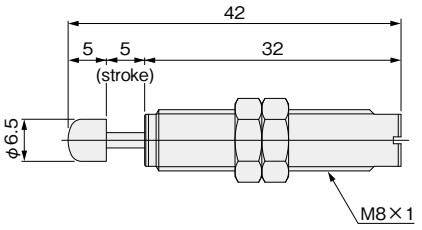


Model \ Symbol	A	B	C	D	E	F	G	H	K	L	M	N	Q	R
CS-KSHC3×3□	M4×0.5	3	25	22	1.2	1.1	3	1	2	5.5	6.4	28.5	3.5	3.2
CS-KSHC4×4□	M6×0.75	4	33.5	29.5	2	1	5.5	1	2	8	9.2	37.5	4	4.6

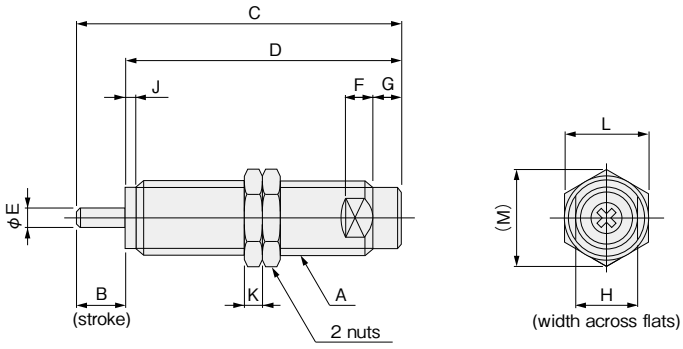
● **No rod end cap: CS-KSHC5×5-11**



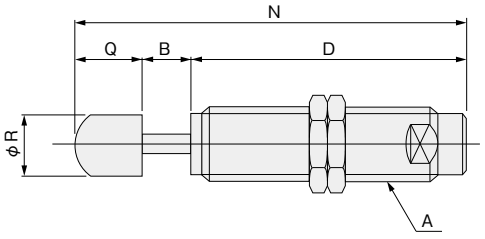
● **With rod end cap: CS-KSHC5×5C-11**



● **No rod end cap: CS-KSHC□×□**

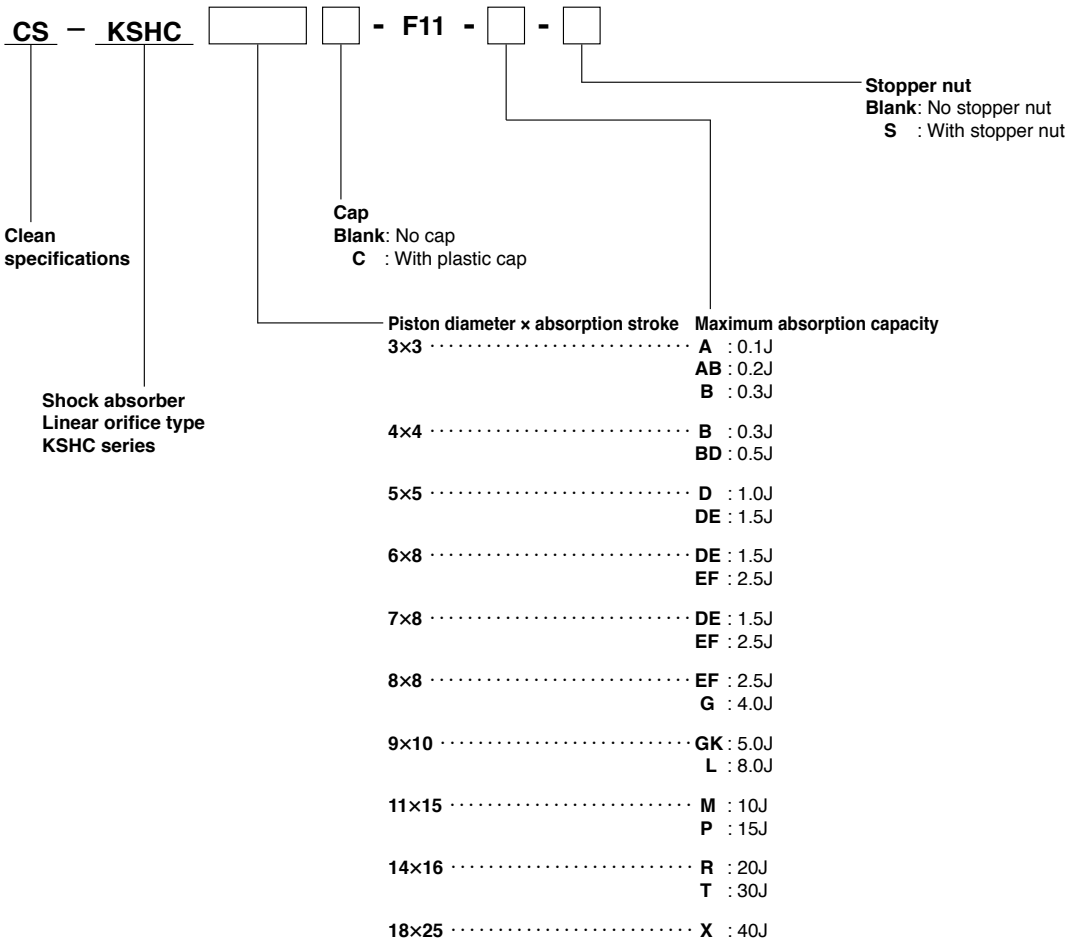


● **With rod end cap: CS-KSHC□×□C**



Model \ Symbol	A	B	C	D	E	F	G	H	J	K	L	M	N	Q	R
CS-KSHC5×5□	M8×0.75	5	36	31	2.5	3	5	7	1.2	2	10	11.5	41	5	6.5
CS-KSHC6×8□	M10×1	8	53	45	3	4	5	9	2	3	12	13.9	61	8	8
CS-KSHC8×8□	M12×1	8	53	45	3	5	5.5	11	2	4	14	16.2	63	10	10
CS-KSHC9×10□	M14×1.5	10	70	60	4	5	5.5	12	2	5	17	19.6	80	10	11
CS-KSHC11×15□	M16×1.5	15	87	72	4	5	6	14	3	7	19	21.9	97	10	11
CS-KSHC14×16□	M20×1.5	16	98	82	5	6	6	18	3	8	24	27.7	113	15	15
CS-KSHC18×25□	M25×1.5	25	135	110	6	7	6	23	3	10	30	34.6	153	18	18

Order Codes (specifications in inches)



Mass (specifications in inches)

oz

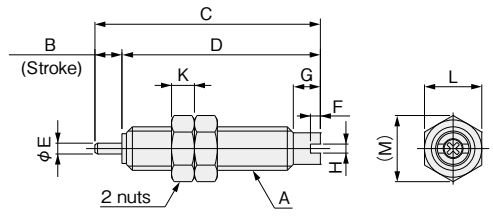
Model	Main unit[Note1]	Additional mass	Additional parts' mass	
		With plastic cap	Mounting nut (1 ea.)	Stopper nut
CS-KSHC3×3-F11	0.1	0.004	0.01	0.04
CS-KSHC4×4-F11	0.2	0.004	0.04	0.1
CS-KSHC5×5-F11-D,DE	0.4	0.01	0.06	0.2
CS-KSHC6×8-F11	0.7	0.04	0.07	0.4
CS-KSHC7×8-F11	1.0	0.04	0.09	0.4
CS-KSHC8×8-F11	1.3	0.04	0.1	0.5
CS-KSHC9×10-F11	2.2	0.07	0.2	0.7
CS-KSHC11×15-F11	5.1	0.07	0.4	2.5
CS-KSHC18×25-F11	12.7	0.2	1.1	4.8

Calculation example: The mass of CS-KSHC6×8 (with cap and stopper) is
0.7 + 0.04 + 0.4 = 1.14oz

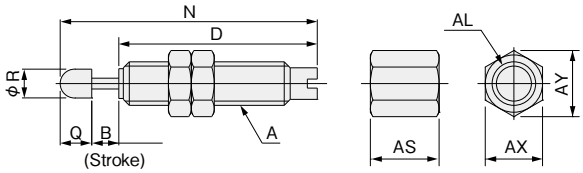
Note1: The weight of the main unit includes the weight of 2 mounting nuts.
Note2: CS-KSHC7×8 has only inch specifications.

Dimensions (in)

● **No rod end cap: CS-KSHC3×3,CS-KSHC4×4**



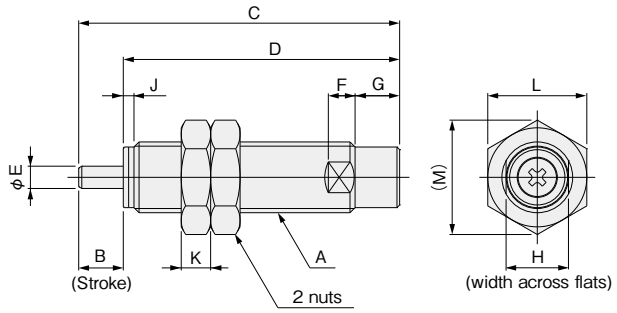
● **With rod end cap: CS-KSHC3×3C,CS-KSHC4×4C**



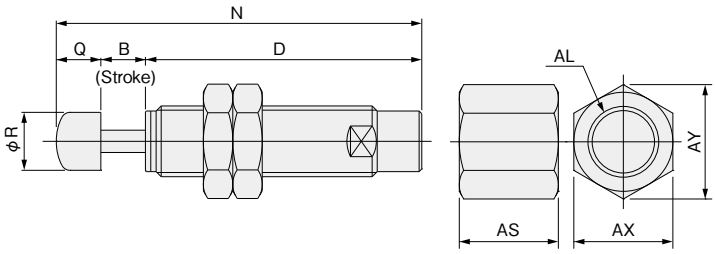
Model \ Symbol	A	B	C	D	E	F	G	H	K	L	M	N	Q
CS-KSHC3×3(C)-F11	#10-32 UNF	0.118	0.984	0.866	0.047	0.043	0.118	0.039	0.1	1/4	0.289	1.122	0.138
CS-KSHC4×4(C)-F11	1/4-32 UNEF	0.157	1.319	1.161	0.079	0.039	0.217	0.039	0.1	3/8	0.433	1.476	0.157

Model \ Symbol	R	AL	AS	AX	AY
CS-KSHC3×3(C)-F11	0.126	#10-32 UNF	0.3	1/4	0.289
CS-KSHC4×4(C)-F11	0.181	1/4-32 UNEF	0.4	3/8	0.433

● **No rod end cap: CS-KSHC□×□**



● **With rod end cap: CS-KSHC□×□C**



Model \ Symbol	A	B	C	D	E	F	G	H	J	K	L	M	N	Q
CS-KSHC5×5(C)(-11)-F11	5/16-32 UNEF	0.197	1.417	1.22	0.098	0.118	0.197	0.276	0.047	0.13	7/16	0.505	1.614	0.197
CS-KSHC6×8(C)-F11	3/8-32 UNEF	0.315	2.087	1.772	0.118	0.157	0.197	0.354	0.079	0.13	1/2	0.577	2.401	0.315
CS-KSHC7×8(C)-F11	7/16-28 UNEF	0.315	2.087	1.772	0.118	0.157	0.197	3/8	0.079	0.15	9/16	0.65	2.401	0.315
CS-KSHC8×8(C)-F11	1/2-20 UNF	0.315	2.087	1.772	0.118	0.197	0.217	7/16	0.079	0.15	5/8	0.722	2.48	0.394
CS-KSHC9×10(C)-F11	9/16-18 UNF	0.394	2.756	2.362	0.157	0.197	0.217	1/2	0.079	7/32	11/16	0.794	3.15	0.394
CS-KSHC11×15(C)-F11	3/4-16 UNF	0.591	3.425	2.835	0.157	0.276	0.236	5/8	0.118	1/4	15/16	1.082	3.819	0.394
CS-KSHC18×25(C)-F11	1-12 UNF	0.984	5.315	4.331	0.236	0.276	0.236	0.875	0.118	3/8	1 1/4	1.443	6.024	0.709

Model \ Symbol	R	AL	AS	AX	AY
CS-KSHC5×5(C)(-11)-F11	0.256	5/16-32 UNEF	7/16	7/16	0.505
CS-KSHC6×8(C)-F11	0.315	3/8-32 UNEF	11/16	1/2	0.577
CS-KSHC7×8(C)-F11	0.315	7/16-28 UNEF	11/16	9/16	0.65
CS-KSHC8×8(C)-F11	0.394	1/2-20 UNF	11/16	5/8	0.722
CS-KSHC9×10(C)-F11	0.433	9/16-18 UNF	3/4	11/16	0.794
CS-KSHC11×15(C)-F11	0.433	3/4-16 UNF	1 1/2	15/16	1.082
CS-KSHC18×25(C)-F11	0.709	1-12 UNF	1 1/2	1 1/4	1.443

About the evaluation of cleanliness (shock absorber KSHC series)

Currently, methods for evaluating the degree of cleanliness of shock absorbers are not defined by JIS or other standards. Because of this, Koganei devises its own independent measurement methods for cleanliness and does evaluations accordingly.

●Measurement method

1. We measure particles in the clean bench (Figure 1) without activating the shock absorber for measurements and the load driving cylinder in the clean bench (background measurement).[Note]

Note: Under the background measurement conditions, the number of particles measures zero.

2. We start driving a load to activate the shock absorber under the measurement conditions, and then measure the particles.

●Measurement conditions

Load impact speed	: 300mm/s
Shock absorber operating frequency	: 30cycle/min[Note]
Particle measurement time	: 1 minute
Suction rate	: 1cf/min
Measured particles	: 0.1μm or greater

For reference, a graph of actual values is shown in Figure 2. The number of particles is the average value of the test samples. Also, the smaller the angle of eccentricity when mounting the shock absorber, the lower the number of particles is likely to be. We recommend mounting the shock absorber so that its angle of eccentricity to the workpiece is as small as possible.

Note1: The number of particles is based on 30 operation cycles. When using the shock absorbers, the customer's evaluation should be based on the customer's own operation frequency.
2: FED-STD Class 1 equivalent.
3: The numbers of particles in the graph are actual values measured under Koganei standards, and are not intended to be guaranteed values.

●Outline of particle measuring device

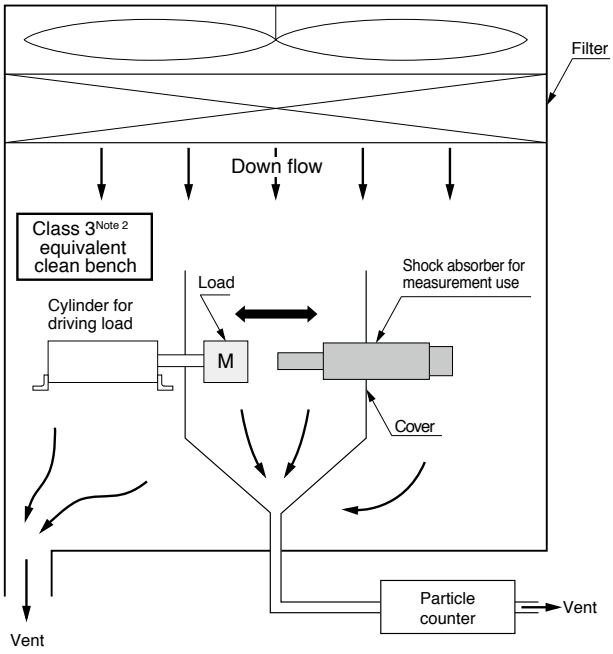


Figure 1

● Number of particles (measured value)[Note 3]

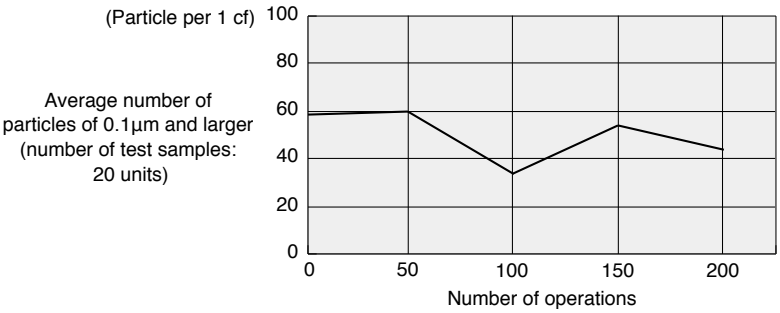
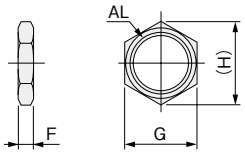


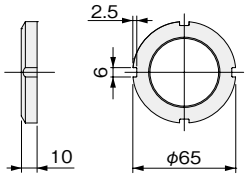
Figure 2

Dimensions of Additional Parts (mm)

●Mounting nut: N-KSH-□-□

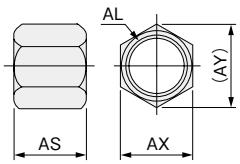


N-KSH-M45 (for **KSHJ45**)



Symbol / Model	AL	F	G	H	Applicable shock absorbers			
					KSHJ	KSHY	KSHP	CS-KSHC
N-KSH-M4	M4×0.5	2	5.5	6.4	KSHJ4	—	—	CS-KSHC3
N-KSH-M6	M6×0.75	2	8	9.2	KSHJ6	KSHY6	KSHP6	CS-KSHC4
N-KSH-M8	M8×0.75	2	10	11.5	KSHJ8(-01,02)	KSHY8(-01,02)	KSHP8	CS-KSHC5
N-KSH-M8-11	M8×1	3	10	11.5	KSHJ8(-11,12)	KSHY8(-11,12)	KSHP8-11	CS-KSHC5-11
N-KSH-M10	M10×1	3	12	13.9	KSHJ10	KSHY10	KSHP10	CS-KSHC6
N-KSH-M12	M12×1	4	14	16.2	KSHJ12	KSHY12	KSHP12	CS-KSHC8
N-KSH-M14	M14×1.5	5	17	19.6	KSHJ14	KSHY14	KSHP14	CS-KSHC9
N-KSH-M16	M16×1.5	7	19	21.9	KSHJ16	KSHY16	KSHP16	CS-KSHC11
N-KSH-M18	M18×1.5	8	21	24.2	KSHJ18	—	KSHP18	—
N-KSH-M20	M20×1.5	8	24	27.7	KSHJ20	KSHY20	KSHP20	CS-KSHC14
N-KSH-M22	M22×1.5	9	27	31.2	KSHJ22	—	—	—
N-KSH-M25	M25×1.5	10	30	34.6	KSHJ25-01	—	KSHP25	CS-KSHC18
N-KSH-M25-11	M25×2	10	30	34.6	KSHJ25(-11,12)	—	—	—
N-KSH-M27	M27×1.5	10	36	41.6	KSHJ27(-01,02)	—	—	—
N-KSH-M27-11	M27×3	12	36	41.6	KSHJ27(-11,12)	—	—	—
N-KSH-M30	M30×1.5	10	36	41.6	KSHJ30	—	KSHP30	—
N-KSH-M33	M33×1.5	10	41	47.3	KSHJ33	—	—	—
N-KSH-M36	M36×1.5	15	46	53.1	KSHJ36	—	KSHP36	—
N-KSH-M42	M42×1.5	15	50	57.7	KSHJ42	—	KSHP42	—
N-KSH-M48	M48×2	15	55	63.5	KSHJ48	—	—	—

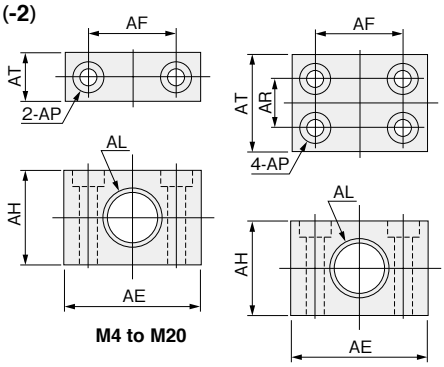
●Stopper nut: S-KSH-□-□ (-2)



Symbol / Model	AL	AS	AX	AY	Applicable shock absorbers			
					KSHJ	KSHY	KSHP	CS-KSHC
S-KSH-M4	M4×0.5	7.5	5.5	6.4	KSHJ4	—	—	CS-KSHC3
S-KSH-M6	M6×0.75	7	8	9.2	KSHJ6	KSHY6	KSHP6	CS-KSHC4
S-KSH-M8	M8×0.75	11	10	11.5	KSHJ8(-01,02)	KSHY8(-01,02)	KSHP8	CS-KSHC5
S-KSH-M8-11	M8×1	11	10	11.5	KSHJ8(-11,12)	KSHY8(-11,12)	KSHP8-11	CS-KSHC5-11
S-KSH-M10	M10×1	17	12	13.9	KSHJ10	KSHY10	KSHP10	CS-KSHC6
S-KSH-M12	M12×1	17	14	16.2	KSHJ12	KSHY12	KSHP12	CS-KSHC8
S-KSH-M14	M14×1.5	18	17	19.6	KSHJ14	KSHY14	KSHP14	CS-KSHC9
S-KSH-M16	M16×1.5	30	19	21.9	KSHJ16	KSHY16	KSHP16	CS-KSHC11
S-KSH-M18	M18×1.5	35	21	24.2	KSHJ18	—	KSHP18	—
S-KSH-M20	M20×1.5	35	24	27.7	KSHJ20	KSHY20	KSHP20	CS-KSHC14
S-KSH-M22	M22×1.5	40	27	31.2	KSHJ22	—	—	—
S-KSH-M25	M25×1.5	40	30	34.6	KSHJ25-01	—	KSHP25	CS-KSHC18
S-KSH-M25-11	M25×2	40	30	34.6	KSHJ25(-11,12)	—	—	—
S-KSH-M27	M27×1.5	40	36	41.6	KSHJ27(-01,02)	—	—	—
S-KSH-M27-11	M27×3	40	36	41.6	KSHJ27(-11,12)	—	—	—
S-KSH-M30	M30×1.5	40	36	41.6	KSHJ30	—	KSHP30	—
S-KSH-M33	M33×1.5	40	41	47.3	KSHJ33	—	—	—
S-KSH-M36	M36×1.5	50	46	53.1	KSHJ36	—	KSHP36	—
S-KSH-M42	M42×1.5	50	50	57.7	KSHJ42	—	KSHP42	—
S-KSH-M45	M45×1.5	60	55	63.5	KSHJ45	—	—	—
S-KSH-M48	M48×2	60	55	63.5	KSHJ48	—	—	—

Dimensions of Additional Parts (mm)

●**Side mounting bracket: 2-KSH-□-□ (-2)**



M4 to M20

M22 to M48

Symbol / Model	AE	AF	AH	AL	AP	AR	AT	Applicable shock absorbers			
								KSHJ	KSHY	KSHP	CS-KSHC
2-KSH-M4	18	12	8	M4×0.5	ϕ3.4, ϕ6.5 Counter bore depth3.3	—	8	KSHJ4	—	—	CS-KSHC3
2-KSH-M6	18	12	10	M6×0.75	ϕ3.4, ϕ6.5 Counter bore depth3.3	—	8	KSHJ6	KSHY6	KSHP6	CS-KSHC4
2-KSH-M8	19	13	13	M8×0.75	ϕ3.4, ϕ6.5 Counter bore depth3.3	—	9	KSHJ8(-01,02)	KSHY8(-01,02)	KSHP8	CS-KSHC5
2-KSH-M8-11	19	13	13	M8×1	ϕ3.4, ϕ6.5 Counter bore depth3.3	—	9	KSHJ8(-11,12)	KSHY8(-11,12)	KSHP8-11	CS-KSHC5-11
2-KSH-M10	22	14	14	M10×1	ϕ3.4, ϕ6.5 Counter bore depth3.3	—	9	KSHJ10	KSHY10	KSHP10	CS-KSHC6
2-KSH-M12	25	16	18	M12×1	ϕ3.4, ϕ6.5 Counter bore depth3.3	—	9	KSHJ12	KSHY12	KSHP12	CS-KSHC8
2-KSH-M14	34	22	22	M14×1.5	ϕ4.5, ϕ8 Counter bore depth4.5	—	10	KSHJ14	KSHY14	KSHP14	CS-KSHC9
2-KSH-M16	38	25	25	M16×1.5	ϕ4.5, ϕ8 Counter bore depth4.5	—	12	KSHJ16	KSHY16	KSHP16	CS-KSHC11
2-KSH-M18	50	34	30	M18×1.5	ϕ6.5, ϕ11 Counter bore depth6.5	—	12	KSHJ18	—	KSHP18	—
2-KSH-M20	50	34	30	M20×1.5	ϕ9, ϕ14 Counter bore depth8.5	—	16	KSHJ20	KSHY20	KSHP20	CS-KSHC14
2-KSH-M22	60	44	35	M22×1.5	ϕ9, ϕ14 Counter bore depth8.5	19	35	KSHJ22	—	—	—
2-KSH-M25	60	44	35	M25×1.5	ϕ9, ϕ14 Counter bore depth8.5	19	35	KSHJ25-01	—	KSHP25	CS-KSHC18
2-KSH-M25-11	60	44	35	M25×2	ϕ9, ϕ14 Counter bore depth8.5	19	35	KSHJ25(-11,12)	—	—	—
2-KSH-M27	60	44	44	M27×1.5	ϕ9, ϕ14 Counter bore depth8.5	19	35	KSHJ27(-01,02)	—	—	—
2-KSH-M27-11	60	44	44	M27×3	ϕ9, ϕ14 Counter bore depth8.5	19	35	KSHJ27(-11,12)	—	—	—
2-KSH-M30	60	44	46	M30×1.5	ϕ9, ϕ14 Counter bore depth8.5	19	35	KSHJ30	—	KSHP30	—
2-KSH-M33	100	70	62	M33×1.5	ϕ18, ϕ26 Counter bore depth18	50	80	KSHJ33	—	—	—
2-KSH-M36	100	70	62	M36×1.5	ϕ18, ϕ26 Counter bore depth18	50	80	KSHJ36	—	KSHP36	—
2-KSH-M42	100	70	62	M42×1.5	ϕ18, ϕ26 Counter bore depth18	50	80	KSHJ42	—	KSHP42	—
2-KSH-M45	120	85	70	M45×1.5	ϕ22, ϕ30 Counter bore depth22	45	80	KSHJ45	—	—	—
2-KSH-M48	120	85	70	M48×2	ϕ22, ϕ30 Counter bore depth22	45	80	KSHJ48	—	—	—

MEMO

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.

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