

# Proportional Control Valve New



**100 L/min\*1**    **300 L/min\*1**

\*1 With air

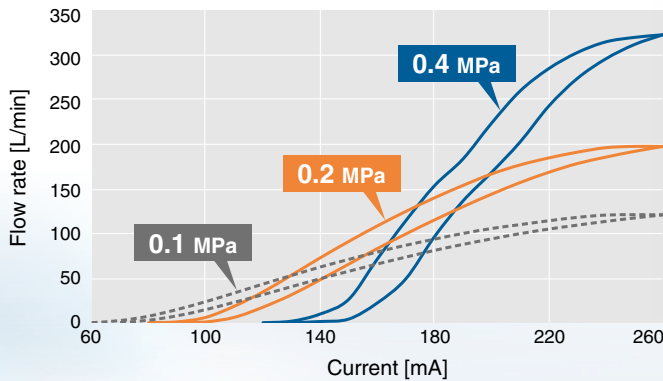
**IP67**

**Control the flow rate smoothly according to the current**

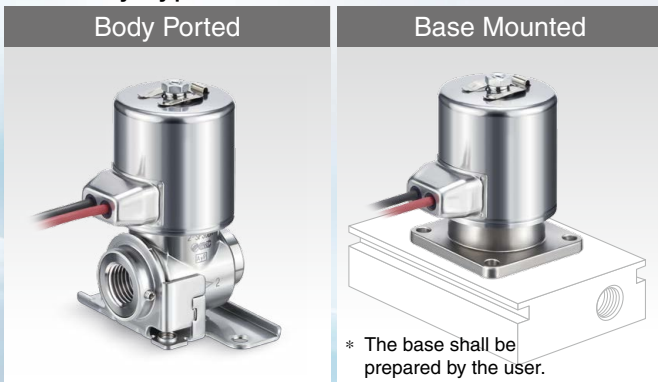
**Power consumption 4 W (For JSP10)**

**Repeatability ±3% F.S. or less**

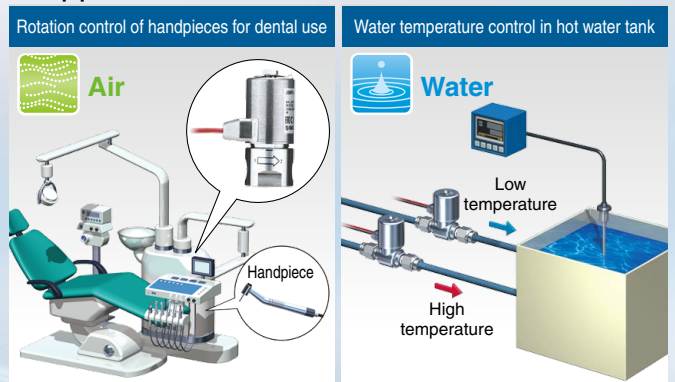
**Sensitivity 2% F.S. or less**



## 2 Body Types



## Applications



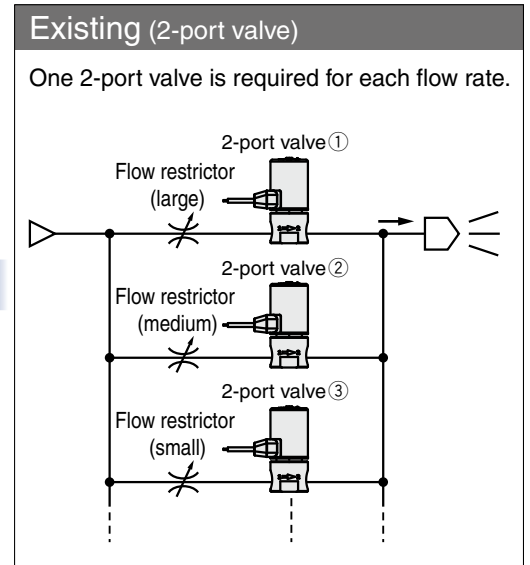
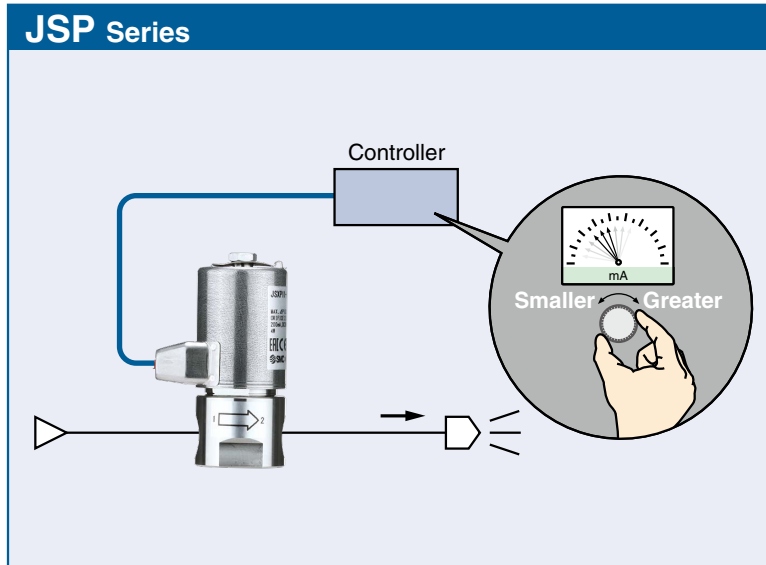
Please use the product in accordance with the specifications provided in the catalogs/operation manuals. It is your responsibility to check the suitability for your workpiece and equipment.

Size	Port size	Orifice diameter [mmφ]	Flow rate*2 [L/min]						Body material
			Air			Water			
			100	200	300	1	2	3	
10	1/8	1.4	50				1.5		Stainless steel Brass
		2.3	100						
20	1/4 3/8	2.0		125				3	
		3.2			300				

\*2 At the max. operating pressure differential

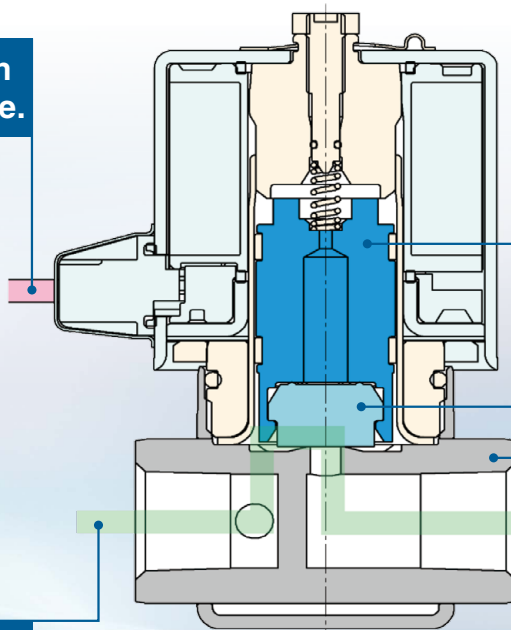
**JSP Series**

**With a single proportional solenoid valve, it is possible to control the flow rate in a stepless manner.**



**360° lead wire insertion and removal is possible.**

As the coil rotates 360°, the lead wire is easy to handle.



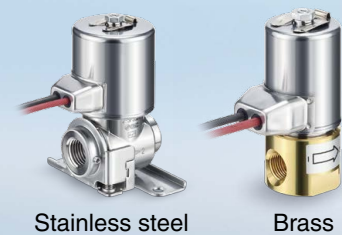
**IP67 enclosure**

\* IP65 for models with a DIN terminal

**Improved armature durability**

**Seal material: FKM**

**Choice of Body material**



**Improved control**

Suppresses the pressure fluctuation at time of valve opening, and suppresses the oscillation of the iron core

**Electrical entry**



Grommet



Conduit

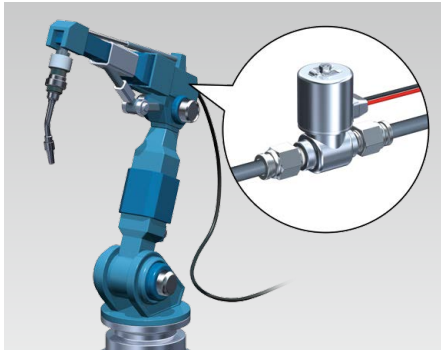


DIN terminal

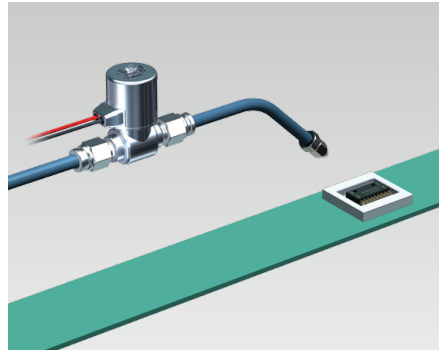
## Applications

### Air

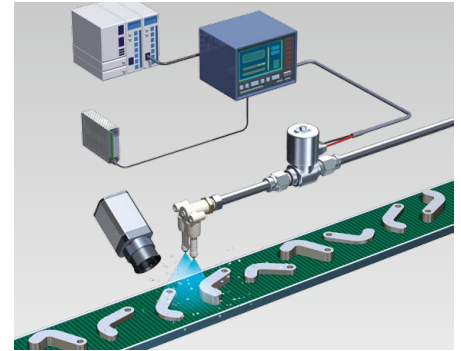
Shielding gases in welding machine



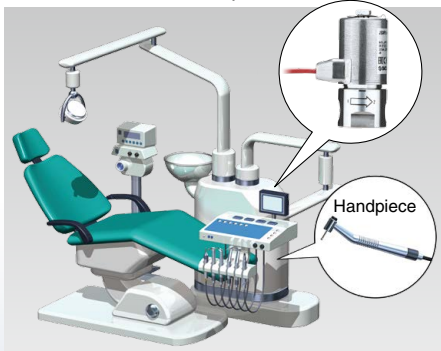
Air purge and blowing of substrate



Air blowing for draining and constant flow rate control (flow rate sensor feedback)



Rotation control of handpieces for dental use

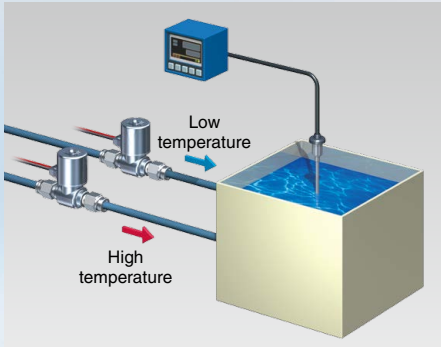


### ⚠ Caution

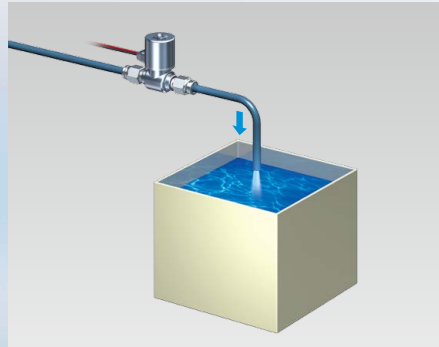
Please use the product in accordance with the specifications provided in the catalogs/operation manuals. It is your responsibility to check the suitability for your workpiece and equipment.

### Water

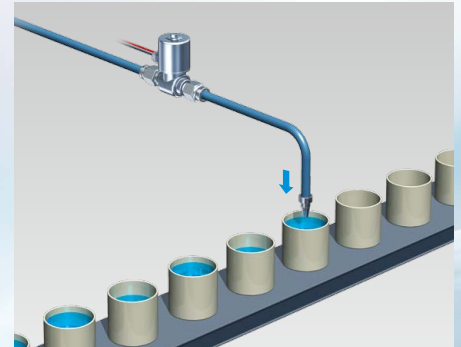
Water temperature control in hot water tank



Diluting



Replenishment



## CONTENTS

How to Order .....	p. 3
Common Specifications .....	p. 4
Flow Rate Characteristics .....	p. 4
Flow Rate Characteristics / Hysteresis .....	p. 5
Construction .....	p. 6

### Dimensions

<b>JSP10</b> Body Ported	Port Size 1/8	Body Material Stainless Steel, Brass	.....	p. 7
<b>JSP10</b> Base Mounted	Port Size 1/8	Body Material Stainless Steel, Brass	.....	p. 9
<b>JSP20</b> Body Ported	Port Size 1/4, 3/8	Body Material Brass	.....	p. 10
<b>JSP20</b> Body Ported	Port Size 1/4, 3/8	Body Material Stainless Steel	.....	p. 12
<b>JSP20</b> Base Mounted	Body Material	Stainless Steel, Brass	.....	p. 14
Bracket Options .....	pp. 8, 11, 13			
Glossary of Terms .....	p. 15			
Specific Product Precautions .....	p. 16			

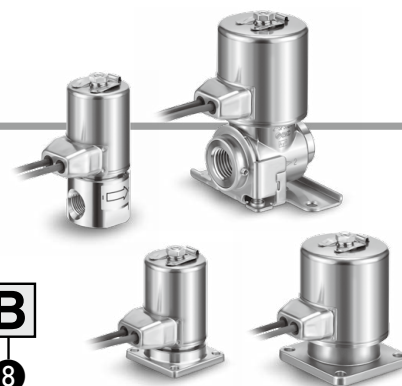
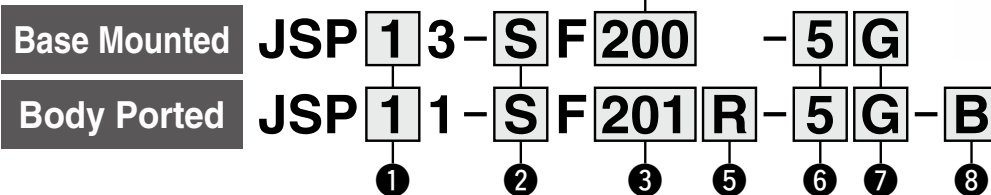
For **Air**  
**Water**

# Proportional Control Valve

## JSP Series



### How to Order



#### ① Size

Symbol	Size
1	10
2	20

#### ② Body material

Symbol	Material
S	Stainless steel
C	Brass

#### ③ [Body Ported] Orifice diameter and port size

Symbol	Orifice diameter [mmø]	Port size	Size	
			10	20
101	1.4	1/8	●	—
201	2.3	1/8	●	—
202	2.0	1/4	—	●
203		3/8	—	●
302	3.2	1/4	—	●
303		3/8	—	●

#### ④ [Base mounted] Orifice diameter and port size

Symbol	Orifice diameter [mmø]	Port size	Size	
			10	20
100	1.4	—	●	—
200	2.3	—	●	—
200	2.0	—	—	●
300	3.2	—	—	●

\* 4 mounting screws are included.

#### ⑤ Thread type

Symbol	Thread type
R	Rc
N	NPT
F	G

#### ⑥ Voltage type

Symbol	Voltage type
5	24 VDC
6	12 VDC

#### ⑦ Electrical entry

Symbol	Electrical entry	Size	
		10	20
G	Grommet	●	●
CS	Conduit (With surge voltage suppressor)	—	●
DS	DIN terminal (With surge voltage suppressor)	●	●
DN	DIN terminal without connector (With surge voltage suppressor)	●	●

#### ⑧ Bracket

Symbol	Bracket	
B	Without bracket	
	With bracket	
	Size: 10	Size: 20
	Stainless steel, Brass	Stainless steel Brass

#### Bracket Assembly Part Nos.

##### Size 10

Part no.	Body material	Bracket material	Note
JSX021-12A-3	Stainless steel, Brass	Stainless steel	With mounting screw (Stainless steel)

##### Size 20

Part no.	Body material	Port size	Bracket material	Note
JSX022-12A-2-1	Stainless steel	(Rc, NPT, G)1/4	Stainless steel	With set screw (Stainless steel)
JSX022-12A-2-1		(Rc, NPT)3/8		
JSX022-12A-2-2		(G)3/8		
JSX20-12A-4	Brass	(Rc, NPT, G)1/4, 3/8		With mounting screw (Stainless steel)

## Common Specifications

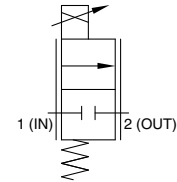
Size		10	20
Valve specifications	Valve construction	Direct operated poppet	
	Fluid and fluid temperatures	Air: 0 to 50°C Water: 1 to 50°C (No freezing)*1	
	Ambient temperature	0 to 50°C	
	Withstand pressure	0.6 MPa	
	Max. system pressure	1.0 MPa	
	Valve leakage/External leakage*2	1 cm <sup>3</sup> /min (ANR) or less	
	Mounting orientation*3	Unrestricted	
	Enclosure*4	IP67 (IP65 for the DIN terminal)	
	Body material	Stainless steel, Brass	
Seal material	FKM		
Coil specifications	Rated current/Rated voltage*5	200 mA/24 VDC 400 mA/12 VDC	260 mA/24 VDC 520 mA/12 VDC
	Power consumption*6	4 W	5.6 W
	Temperature rise*6	80°C	

- \*1 Availability depends on the orifice diameter. Refer to the applicable fluid table.
- \*2 The valve leakage rate is determined when the pressure differential is 0.05 MPa or more, upward orientation of solenoid, and ambient temperature of 20°C.  
Since the leakage from this product is not zero, it cannot be used for applications such as holding pressure in a pressure vessel.
- \*3 It is recommended that the solenoid is mounted upwards to prevent accumulation of foreign matter.
- \*4 This product has an IP67 enclosure, but if water enters the product, it may result in malfunction or breakage.
- \*5 Use with the power voltage set to the rated voltage and current restriction.  
If you perform voltage control, due to current change associated with the coil temperature rise, it is not possible to control flow rate.
- \*6 This is the value when current control was conducted at the rated current.

## Applicable Fluid

Applicable fluid	Orifice diameter [mm]			
	Size: 10		Size: 20	
	ø1.4	ø2.3	ø2	ø3.2
Air	●	●	●	●
Water	●	—	●	—

## Symbol



- \* When the valve is opened, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

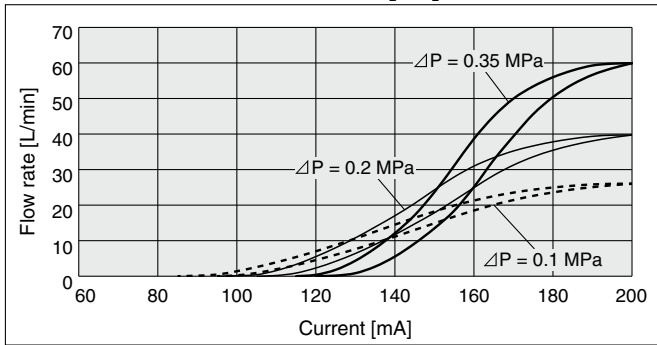
## Flow Rate Characteristics

Size	Body material	Body type	Port size	Orifice diameter [mmø]	Max. flow rate *1 [Air] [L/min]	Max. flow rate *1, *2, *3 [Water] [L/min]	Max. operating pressure differential*4 [MPa]	Repeatability	Sensitivity	Model
10	Stainless steel Brass	Body ported	1/8	1.4	50	1.5	0.35	±3% F.S. or less	2% F.S. or less	JSP1 $\frac{1}{3}$ - $\frac{5}{8}$ F10 $\frac{1}{2}$
		Base mounted		2.3	100	—				JSP1 $\frac{1}{3}$ - $\frac{5}{8}$ F20 $\frac{1}{2}$
20	Stainless steel Brass	Body ported	1/4	2	125	3	0.4			JSP2 $\frac{1}{3}$ - $\frac{5}{8}$ F20 $\frac{3}{8}$
		Base mounted	3/8	3.2	300	—				JSP2 $\frac{1}{3}$ - $\frac{5}{8}$ F30 $\frac{3}{8}$

- \*1 This is the value at the max. operating pressure differential.
- \*2 When using size 20 with water, the inner diameter of the outlet pipe must be ø6.5 mm or more.
- \*3 When a nozzle or similar is connected at the end of the pipe, the nozzle diameter should be larger than the orifice diameter.
- \*4 Even when the pressure differential is within the max. operating pressure differential, if the secondary side pressure becomes high due to a restrictor, such as nozzle, on the secondary side, stable flow rate control may not be possible.  
For guidance on allowable secondary side pressure, refer to the specific product precautions on page 16.
- \* For hysteresis, refer to the flow rate characteristics graph.

## Flow Rate Characteristics / Hysteresis

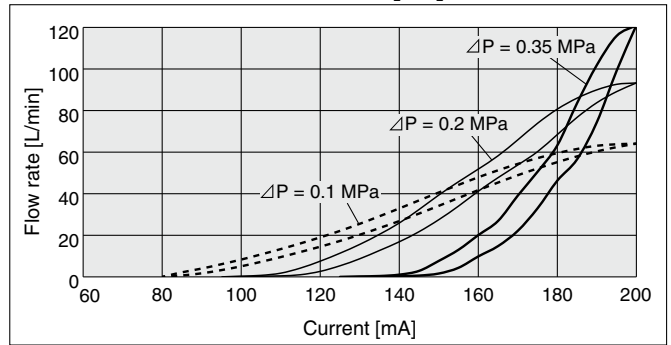
**Size 10 Orifice diameter  $\phi$ 1.4 [Air]**



**Hysteresis (% F.S.)**

$\Delta P$	With PWM control	Without PWM control
0.1 MPa	4	12
0.2 MPa	4	13
0.35 MPa	6	17

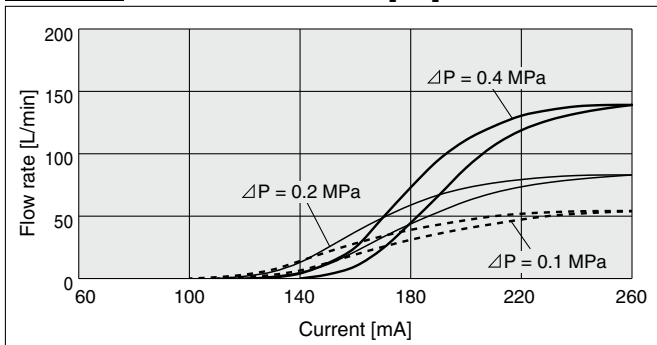
**Size 10 Orifice diameter  $\phi$ 2.3 [Air]**



**Hysteresis (% F.S.)**

$\Delta P$	With PWM control	Without PWM control
0.1 MPa	3	9
0.2 MPa	4	13
0.35 MPa	7	19

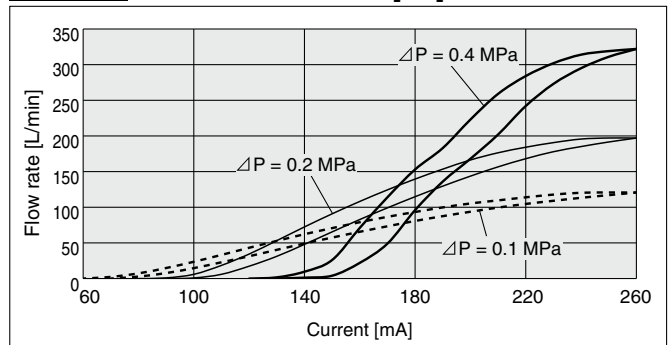
**Size 20 Orifice diameter  $\phi$ 2.0 [Air]**



**Hysteresis (% F.S.)**

$\Delta P$	With PWM control	Without PWM control
0.1 MPa	5	15
0.2 MPa	6	16
0.4 MPa	6	19

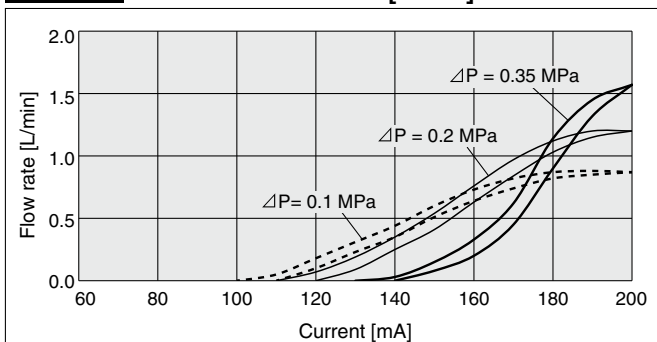
**Size 20 Orifice diameter  $\phi$ 3.2 [Air]**



**Hysteresis (% F.S.)**

$\Delta P$	With PWM control	Without PWM control
0.1 MPa	4	11
0.2 MPa	6	14
0.4 MPa	8	17

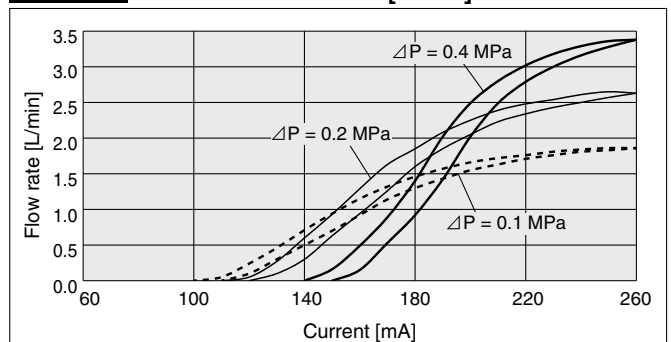
**Size 10 Orifice diameter  $\phi$ 1.4 [Water]**



**Hysteresis (% F.S.)**

$\Delta P$	With PWM control	Without PWM control
0.1 MPa	4	12
0.2 MPa	4	13
0.35 MPa	6	17

**Size 20 Orifice diameter  $\phi$ 2.0 [Water]**



**Hysteresis (% F.S.)**

$\Delta P$	With PWM control	Without PWM control
0.1 MPa	5	15
0.2 MPa	6	16
0.4 MPa	6	19

\* The flow rate characteristics graph and hysteresis are only guides, and they indicate values when the secondary side is open to the atmosphere. The hysteresis shown are average values.

\* Recommended conditions at time of PWM control: voltage = 24 VDC, frequency = 450 Hz (size 10) / 350 Hz (size 20)

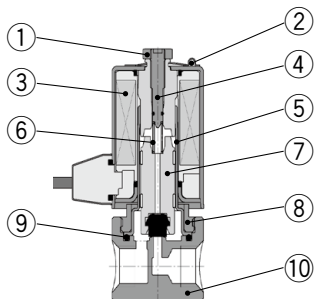
\* The flow rate characteristics may differ depending on the individual unit, operating conditions, and piping conditions.

Fully conduct a check under the actual operating conditions, and select a model with a sufficient margin with respect to the required flow rate.

## Construction

### JSP10 Body Ported

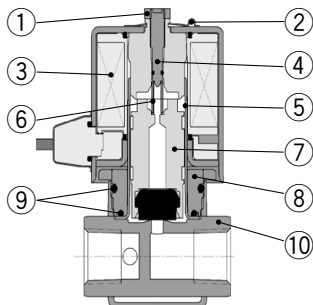
Body Material: Stainless steel, Brass



No.	Description	Material
1	<b>Nut</b>	Stainless steel
2	<b>Clip</b>	Stainless steel
3	<b>Solenoid coil</b>	Stainless steel, Cu, Resin
4	<b>Adjusting screw</b>	Stainless steel
5	<b>Tube assembly</b>	Stainless steel
6	<b>Return spring</b>	Stainless steel
7	<b>Armature assembly</b>	Stainless steel, PTFE, FKM
8	<b>Set nut</b>	Stainless steel
9	<b>Gasket</b>	FKM
10	<b>Body</b>	Stainless steel   Brass

### JSP20 Body Ported

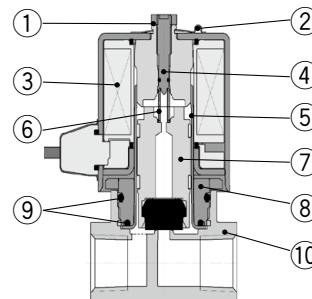
Body Material: Stainless steel



No.	Description	Material
1	<b>Nut</b>	Stainless steel
2	<b>Clip</b>	Stainless steel
3	<b>Solenoid coil</b>	Stainless steel, Cu, Resin
4	<b>Adjusting screw</b>	Stainless steel
5	<b>Tube assembly</b>	Stainless steel
6	<b>Return spring</b>	Stainless steel
7	<b>Armature assembly</b>	Stainless steel, PTFE, FKM
8	<b>Nut</b>	Stainless steel
9	<b>Gasket</b>	FKM
10	<b>Body</b>	Stainless steel

### JSP20 Body Ported

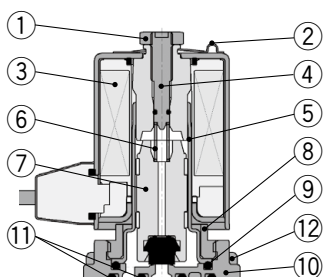
Body Material: Brass



No.	Description	Material
1	<b>Nut</b>	Stainless steel
2	<b>Clip</b>	Stainless steel
3	<b>Solenoid coil</b>	Stainless steel, Cu, Resin
4	<b>Adjusting screw</b>	Stainless steel
5	<b>Tube assembly</b>	Stainless steel
6	<b>Return spring</b>	Stainless steel
7	<b>Armature assembly</b>	Stainless steel, PTFE, FKM
8	<b>Nut</b>	Stainless steel
9	<b>Gasket</b>	FKM
10	<b>Body</b>	Brass

### JSP10 Base Mounted

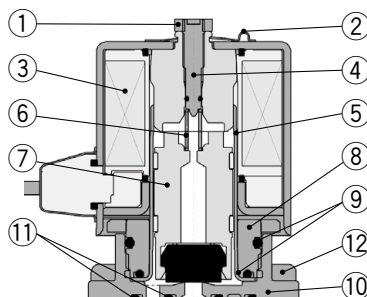
Body Material: Stainless steel, Brass



No.	Description	Material
1	<b>Nut</b>	Stainless steel
2	<b>Clip</b>	Stainless steel
3	<b>Solenoid coil</b>	Stainless steel, Cu, Resin
4	<b>Adjusting screw</b>	Stainless steel
5	<b>Tube assembly</b>	Stainless steel
6	<b>Return spring</b>	Stainless steel
7	<b>Armature assembly</b>	Stainless steel, PTFE, FKM
8	<b>Set nut</b>	Stainless steel
9	<b>Gasket</b>	FKM
10	<b>Base mounted body</b>	Stainless steel   Brass
11	<b>Interface O-ring</b>	FKM
12	<b>Mounting screw</b>	Stainless steel

### JSP20 Base Mounted

Body Material: Stainless steel, Brass

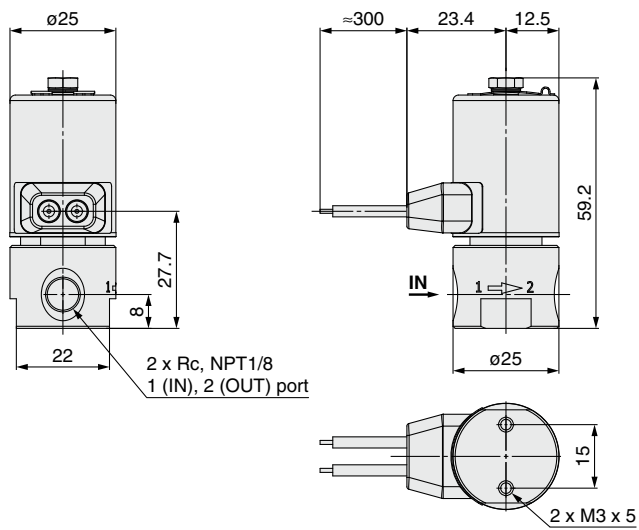


No.	Description	Material
1	<b>Nut</b>	Stainless steel
2	<b>Clip</b>	Stainless steel
3	<b>Solenoid coil</b>	Stainless steel, Cu, Resin
4	<b>Adjusting screw</b>	Stainless steel
5	<b>Tube assembly</b>	Stainless steel
6	<b>Return spring</b>	Stainless steel
7	<b>Armature assembly</b>	Stainless steel, PTFE, FKM
8	<b>Nut</b>	Stainless steel
9	<b>Gasket</b>	FKM
10	<b>Base mounted body</b>	Stainless steel   Brass
11	<b>Interface O-ring</b>	FKM
12	<b>Mounting screw</b>	Stainless steel

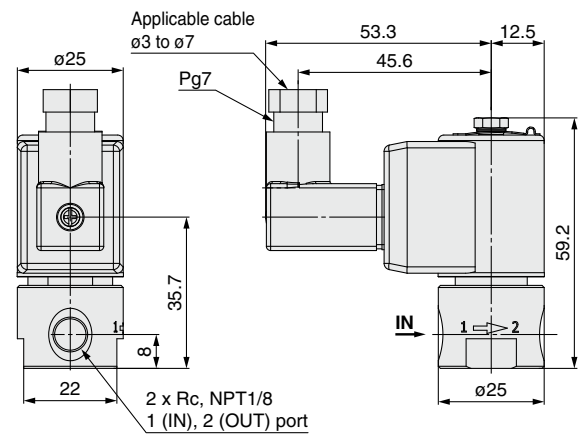
# JSP Series

Dimensions: JSP **10** Body Ported Port Size **1/8** Body Material **Stainless Steel, Brass**

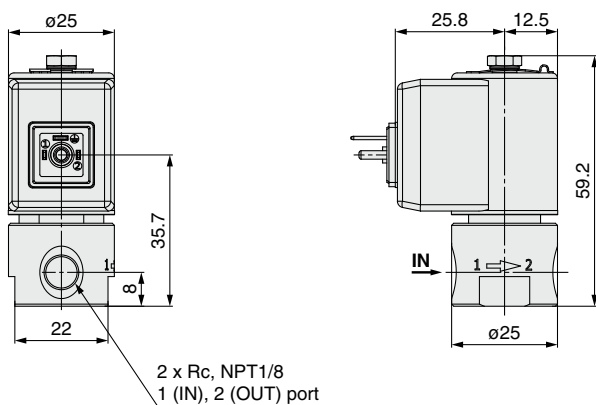
## G: Grommet



## DS: DIN terminal

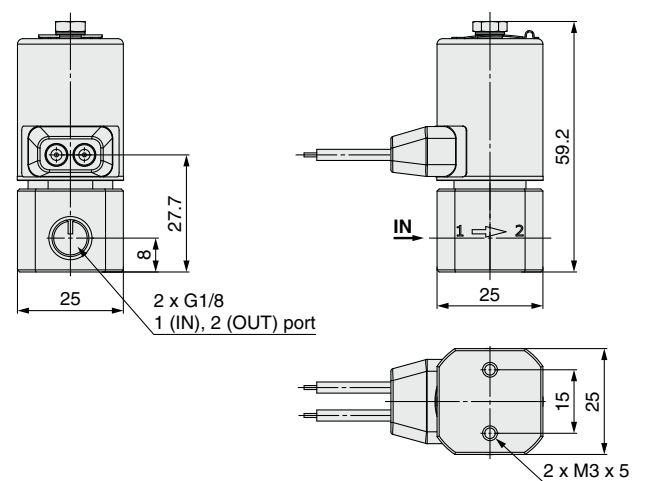


## DS: DIN terminal without connector



## G thread type

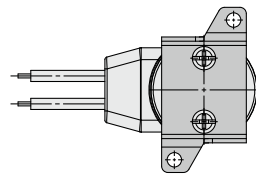
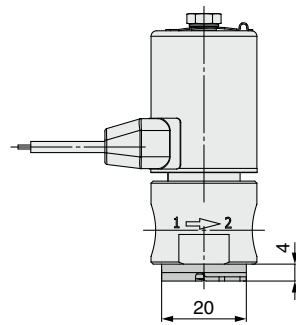
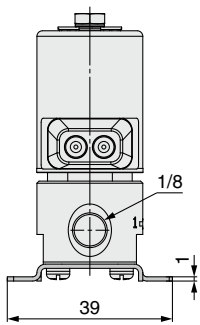
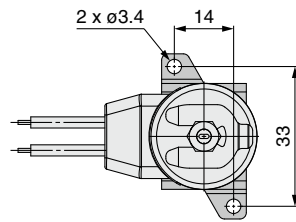
\* The dimensions other than those below are the same as those of the Rc type.





Dimensions: JSP **10** Body Ported Port Size **1/8** Body Material **Stainless Steel, Brass**

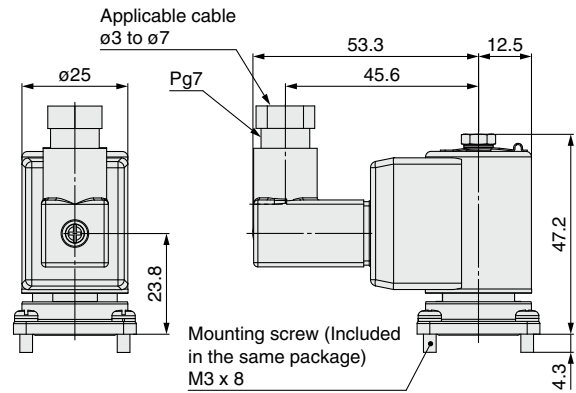
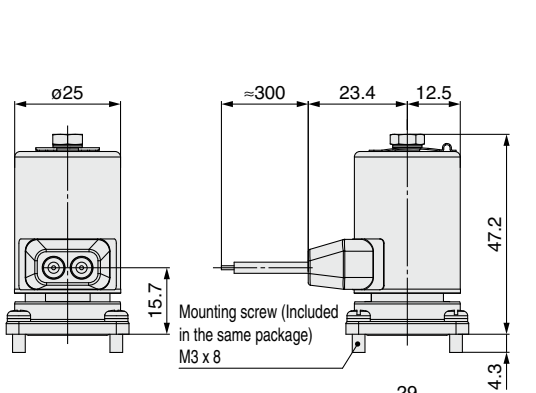
Bracket options



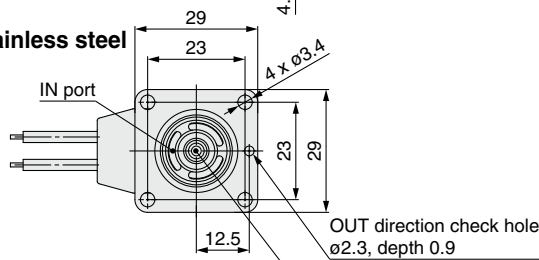
Dimensions: JSP **10** Base Mounted **Body Material** **Stainless Steel, Brass**

**G: Grommet**

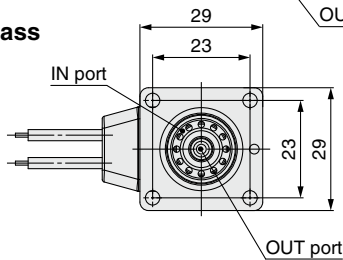
**DS: DIN terminal**



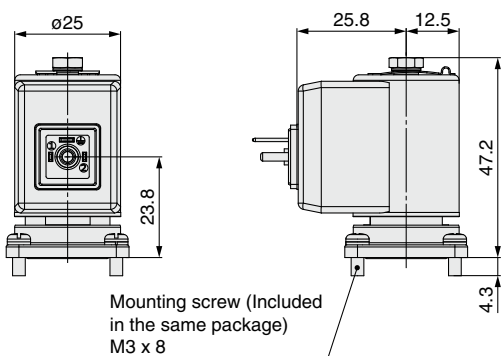
**Body material: Stainless steel**



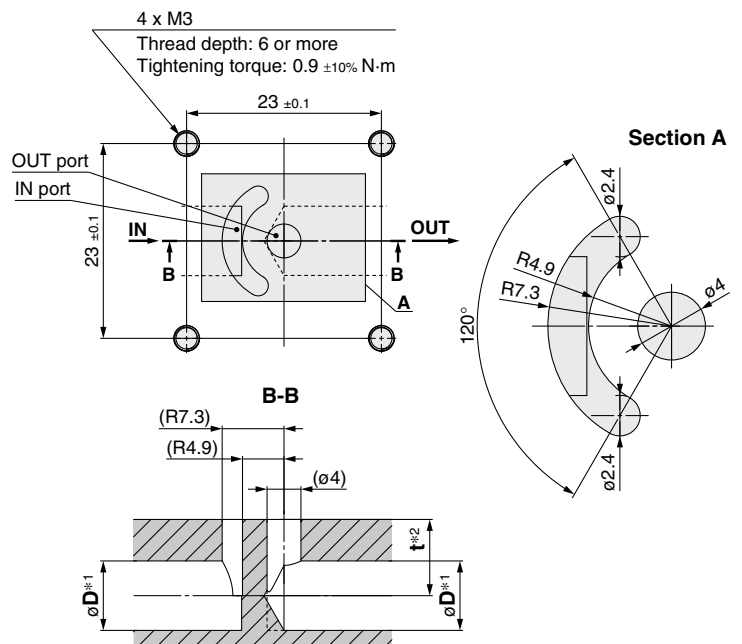
**Body material: Brass**



**DN: DIN terminal without connector**



**Base hole dimension**



\*1 For  $\phi D$  dimension, we recommend  $\phi 8.2$  (equivalent to Rc1/8 pilot hole) or larger.

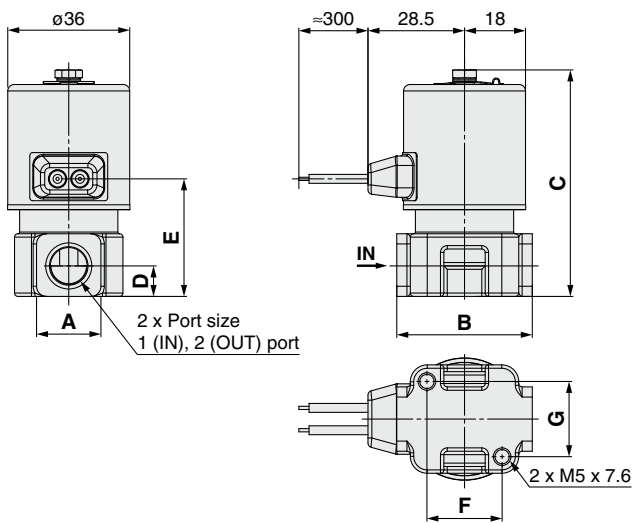
\*2 We recommend  $t$  dimension of 20 or smaller.

If the  $t$  dimension is larger than this, the flow rate may decrease.

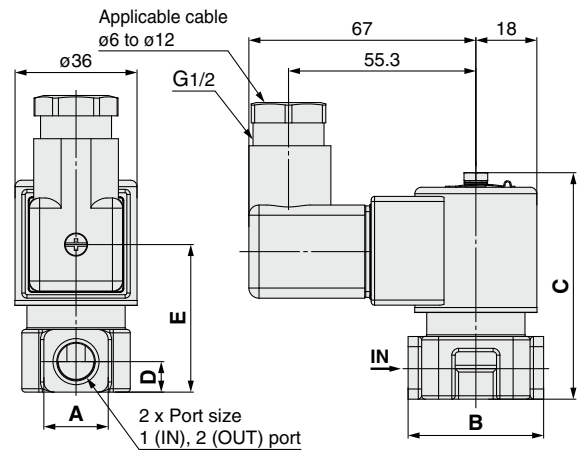
Therefore, fully conduct a check under the actual operating conditions.

Dimensions: **JSP20** Body Ported **Port Size 1/4, 3/8** **Body Material Brass**

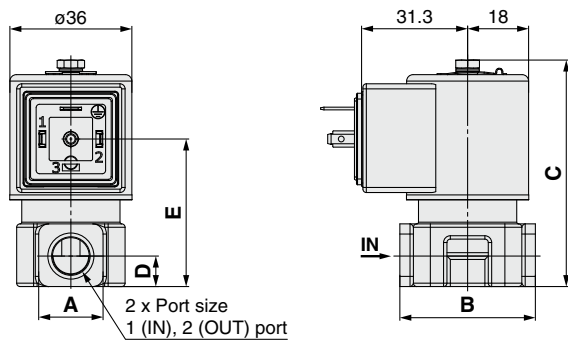
**G: Grommet**



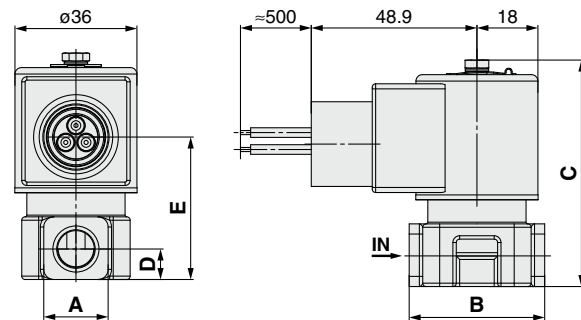
**DS: DIN terminal**



**DN: DIN terminal without connector**



**CS: Conduit**



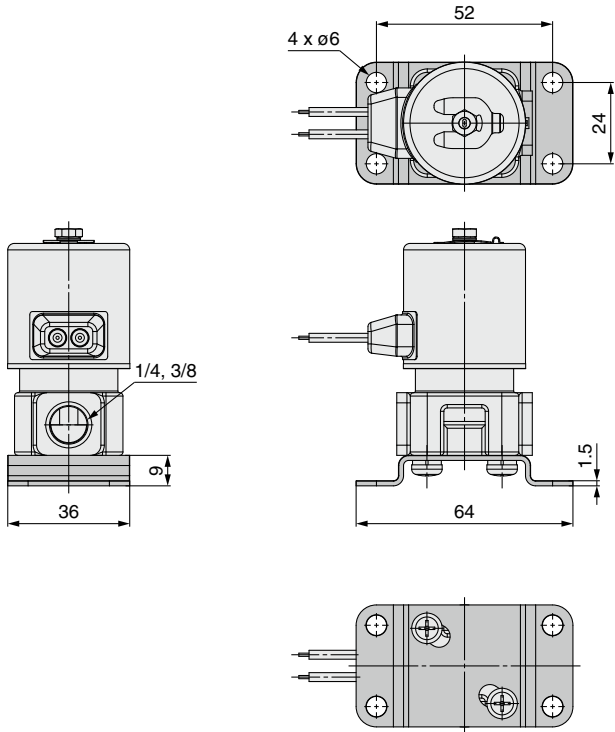
[mm]

Port size	A	B	C	D	E			F	G
					Grommet (G)	DIN terminal without connector (DS, DN)	Conduit (CS)		
Rc, NPT, G1/4	19	40	66.9	9	34.7	43.6	42.1	22.2	22.2
Rc, NPT, G3/8	22	48	70.9	11.3	38.7	47.6	46.1	19	20.6

# JSP Series

Dimensions: JSP20 Body Ported Port Size 1/4, 3/8 Body Material Brass

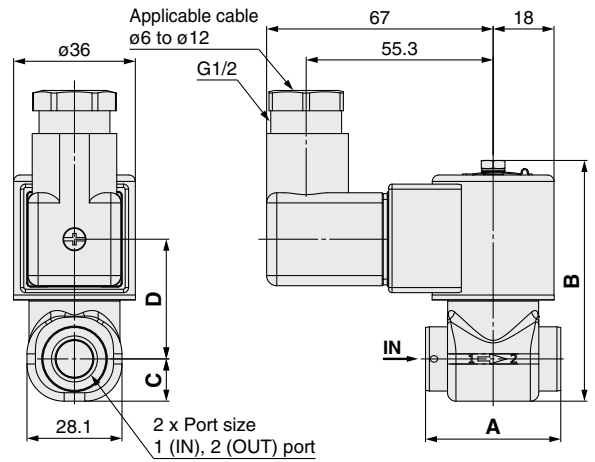
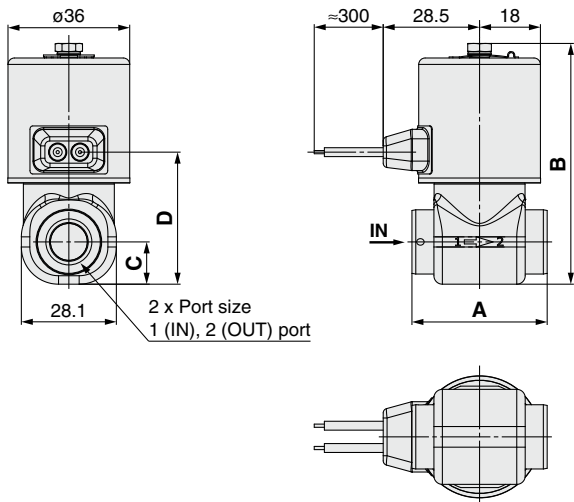
## Bracket options



Dimensions: **JSP20** Body Ported **Port Size 1/4, 3/8** **Body Material Stainless Steel**

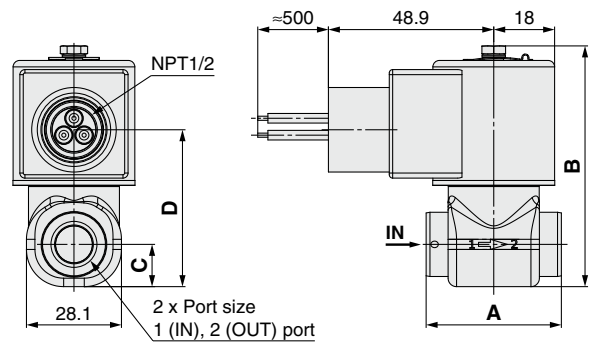
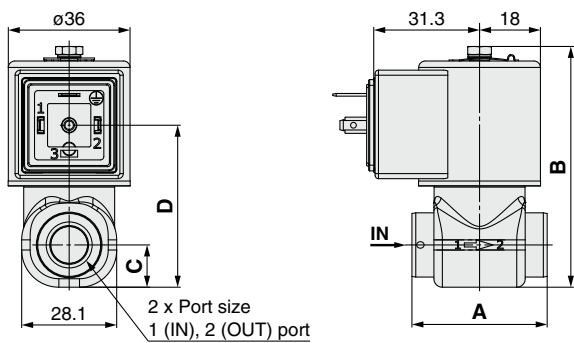
**G: Grommet**

**DS: DIN terminal**



**DN: DIN terminal without connector**

**CS: Conduit**



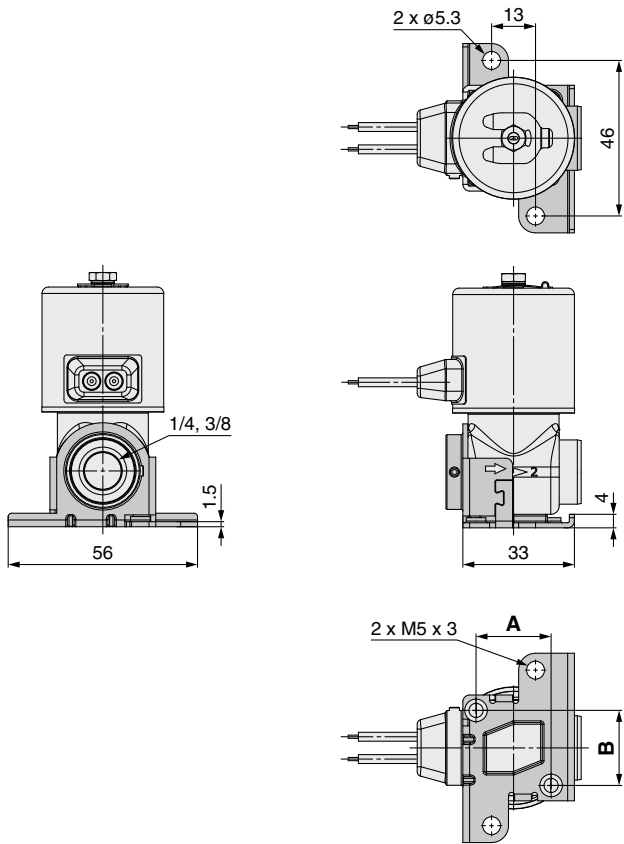
[mm]

Port size	A	B	C	D		
				Grommet (G)	DIN terminal without connector (DS, DN)	Conduit (CS)
Rc, NPT, G1/4	40	71.2	12.5	39	47.9	46.4
Rc, NPT3/8	48					
G3/8		74.2	14	42	50.9	49.4

# JSP Series

Dimensions: JSP**20** Body Ported Port Size **1/4, 3/8** Body Material **Stainless Steel**

## Bracket options



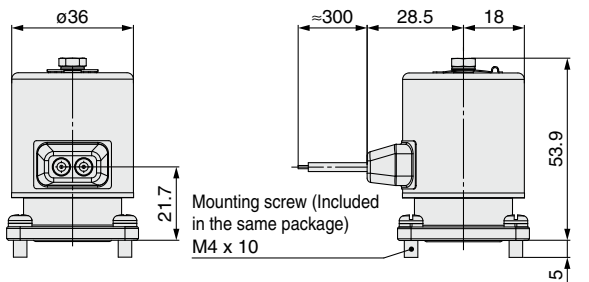
[mm]

Port size	A	B
Rc, NPT1/4, 3/8	22.2	22.2
G3/8	19	20.6

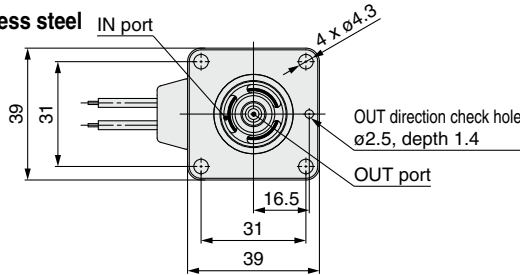
Dimensions: **JSP20** Base Mounted

Body Material **Stainless Steel, Brass**

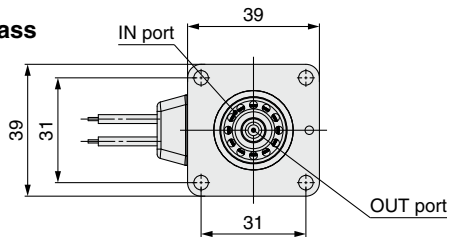
**G: Grommet**



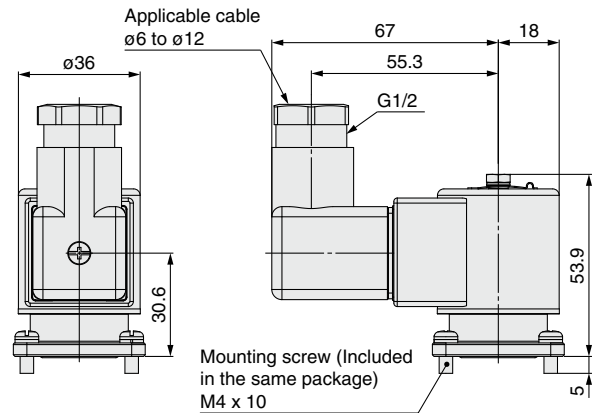
Body material: **Stainless steel**



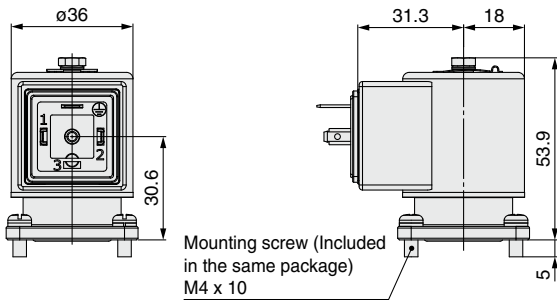
Body material: **Brass**



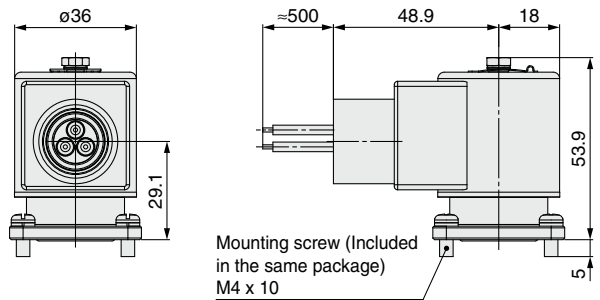
**DS: DIN terminal**



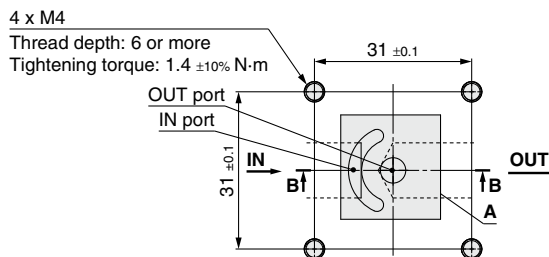
**DN: DIN terminal without connector**



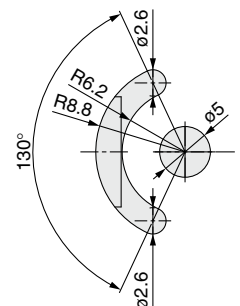
**CS: Conduit**



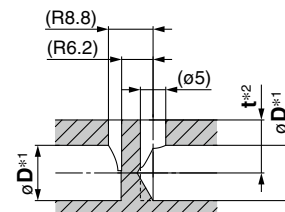
**Base hole dimension**



**Section A**



**B-B**



\*1 For  $\sigma D$  dimension, we recommend  $\sigma 10.9$  (equivalent to Rc1/4 pilot hole) or larger.  
 \*2 We recommend  $t$  dimension of 20 or smaller.  
 If the  $t$  dimension is larger than this, the flow rate may decrease. Therefore, fully conduct a check under the actual operating conditions.

## Proportional control

Control the fluid proportionally according to input signal (current).

## Max. operating pressure differential

The max. pressure differential (the difference between the inlet and outlet pressure) which is allowed for operation. When the outlet pressure is 0 MPa, this becomes the max. operating pressure.

## Withstand pressure

The pressure in which the valve must be withstood without a drop in performance after holding for one minute under prescribed pressure and returning to the operating pressure range.  
(Value under the prescribed conditions)

## Max. system pressure

The max. pressure that can be applied inside the pipelines (line pressure).

[The pressure differential of the solenoid valve portion must not exceed the max. operating pressure differential.]

## Hysteresis

Flow rate difference between current increase and current decrease (with the same current).  
(Percentage divided by max. flow rate)

## Repeatability

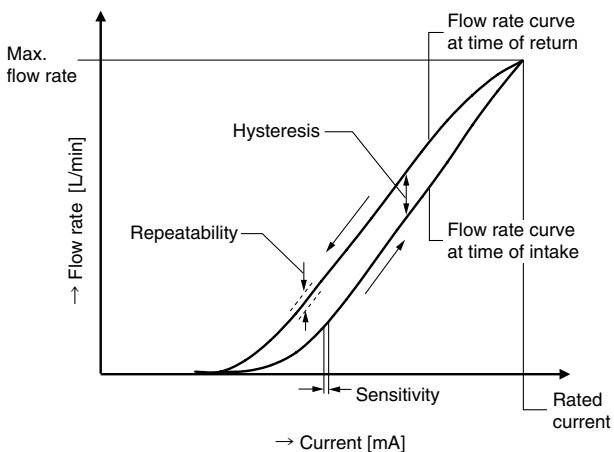
Indicates a variation of output flow rate under the same current when the product is repetitively operated in a short period under the same conditions  
(Percentage divided by max. flow rate)

## Sensitivity

This is the minimum current value required to change the flow rate in the same direction (further increasing or decreasing flow rate).  
(Percentage divided by rated current)

## PWM control (pulse width modulation)

Changes the output current by repeatedly turning ON/OFF the switch at constant intervals and changing the ON time or OFF time



**Flow characteristics graph**





# JSP Series

## Specific Product Precautions 1

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For 2-port solenoid valve for fluid control precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” on the SMC website.

### Design

#### ⚠ Warning

##### 1. Confirm the specifications.

Give careful consideration to the operating conditions, such as the application, fluid, and environment, and use within the specified operating ranges. If the product is used beyond the specification range, this may cause the product to break or malfunction. We do not guarantee against any damage if the product is used outside of the specification range.

##### 2. Cannot be used for pressure (including vacuum) holding

This product cannot be used to hold the pressure (including vacuum) inside of a pressure vessel because valve air leakage is unavoidable.

##### 3. Extended periods of continuous energization

The solenoid coil will generate heat when continuously energized. Avoid using in a tightly shut container. Install the valve in a well-ventilated area. Furthermore, do not touch it while it is being energized or right after it has been energized.

##### 4. Back pressure

If there is a possibility that back pressure will be applied, take countermeasures by installing a check valve, etc., on the downstream side.

##### 5. This product makes proportional control possible with constant current.

Set the voltage to the rated product voltage, and use the product by controlling the current.

If voltage control is used, due to current change associated with the coil temperature rise, it is not possible to control flow rate.

##### 6. Pressure difference

The flow rate of this product is controlled by balancing the valve elements via pressure difference, electromagnetic force, and spring force. Even when the pressure differential is within the max. operating pressure differential, if the secondary side pressure becomes high due to a restrictor, such as nozzle, on the secondary side, stable flow rate control may not be possible.

By using the corresponding allowable secondary side pressure shown in the table below as a guide, fully check the controllability under the actual operating conditions.

#### Allowable Secondary Side Pressure (Approx.)

Fluid	Size	Orifice diameter [mmφ]	Guide for allowable secondary side pressure [MPa]			
			Inlet pressure 0.1 MPa	Inlet pressure 0.2 MPa	Inlet pressure 0.35 MPa	Inlet pressure 0.4 MPa
Air	10	1.4	0.06 or less	0.12 or less	0.21 or less	—
		2.3				
Air	20	2.0	0.06 or less	0.12 or less	0.21 or less	0.24 or less
		3.2				
Water	10	1.4	0.05 or less	0.09 or less	0.16 or less	—
		2.0				
Water	20	2.0	0.05 or less	0.09 or less	0.16 or less	0.18 or less
		2.0				

\* The value is taken when a nozzle of the same diameter as the orifice is connected to the end of the pipe on the secondary side and the rated current is applied.

##### 7. Flow rate characteristics

The flow rate characteristics may differ depending on the individual unit, operating, and piping conditions.

Fully conduct a check under the actual operating conditions, and select a model with a sufficient margin with respect to the required flow rate.

##### 8. PWM control

This product can suppress the hysteresis by conducting PWM control. Use this product at the frequency of 450 Hz (size 10) or 350 Hz (size 20).

### Design

#### ⚠ Warning

##### 9. The product is adjusted to individual specification at the time of shipment from the factory.

Do not operate the adjustment screw by loosening the nut on the top of this product. Operating the adjustment screw may lead to a malfunction.

Do not perform disassembly or removal of parts as doing so will cause a failure.

##### 10. Flow rate is controlled by balancing the valve body.

Do not expose the product to external vibration and impact as it changes the flow rate.

##### 11. Port size of size 20 (water)

When using size 20 (orifice φ2) with water, make the inner diameter of the secondary side pipe φ6.5 mm or larger.

##### 12. Nozzle diameter

When a nozzle is connected at the end of a pipe, the nozzle diameter should be larger than the orifice diameter.

If the nozzle diameter is small, stable flow rate control may not be possible.

Check the controllability thoroughly under the actual operating conditions.

### Operating Environment

#### ⚠ Warning

Do not use the product in locations such as those described below.

##### 1. Locations with atmospheres in which water vapor is present or locations in which corrosive fluids (chemicals), sea water, or water may come into contact with the product

Implement appropriate protective measures if water will be applied to the product for long periods of time, even for products which have IP65 or IP67 enclosures. Such water may enter through microscopic gaps in the product's external surfaces, resulting in fire damage or short-circuiting of the solenoid valve coils. If installing the product in close proximity to equipment such as machine tools, processing machines, etc., which use large amounts of liquids or oils, be sure to confirm that liquid dispersal or spatter from the peripheral equipment does not come into contact with the product.

##### 2. Locations with explosive atmospheres

##### 3. Locations subject to vibration or impact

##### 4. Locations where radiated heat will be received from nearby heat sources

##### 5. Locations that are outdoors

##### 6. Locations where freezing may occur within piping lines [When the fluid is liquid]

If the product is to be used in cold regions or during winter, be sure to implement measures to prevent the freezing of fluids.

If the fluid is likely to freeze, implement measures such as draining the water in the piping when the equipment is OFF or installing a heater or insulation in the piping.

If warming the solenoid valve, be sure to avoid the coil portion as warming it will result in poor heat dissipation.

##### [When the fluid is air]

With high flow rates, drain may be generated due to adiabatic expansion, resulting in freezing.

Be sure to periodically drain the product or conduct drain removal using an air dryer.



# Specific Product Precautions 2

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For 2-port solenoid valve for fluid control precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” on the SMC website.

### Fluid

#### Warning

##### 1. Fluid selection

Compatibility between the components and fluids should be checked in the application before use.

##### 2. Do not use the product with the fluids shown below.

- 1) Fluids that are harmful to humans
- 2) Combustion-supporting or flammable fluids
- 3) Corrosive gas
- 4) Sea water, saline solution

##### 3. Install a filter (strainer) to ensure clean fluids.

1) The use of a fluid that contains foreign matter can cause problems, such as malfunction and seal failure by promoting the wear of the valve seat and armature, by sticking to the sliding parts of the armature, etc. Install a filter (strainer) on the upstream side of the valve to remove foreign matter.

Air: 5 µm or less, Water: 100 mesh or more

2) Replace or clean the filter (strainer) when the pressure drop reaches 0.1 MPa to prevent them from getting clogged.

##### 4. When using water or heated water, poor operation or leaks may be caused by dezincification, erosion, corrosion, etc.

Stainless steel body type with improved corrosion resistance is also available. Please select the type that best suits the application.

### Fluid Quality

#### Warning

##### 1. Air

Do not use compressed air that contains chemicals, synthetic oils that include organic solvents, salt, corrosive gases, etc., as it can cause malfunction or damage.

##### 2. Water

1) Be aware that rust stains, chloride separation, etc., from the piping may cause malfunction, leakage, or, in worse case scenarios, damage due to corrosion. Also, such damage may result in the spraying of fluids or scattering of parts.

Please be sure to have protective measures in place in case such incidents should occur.

2) In the case that water contains substances such as calcium and magnesium, which generate hard scale and sludge, install water softening equipment and a filter (strainer) directly upstream from the valve to remove these substances, as this scale and sludge can cause the valve to malfunction.

### Mounting


#### Warning


##### 1. Mounting orientation


It is recommended that the coil is mounted upwards to prevent accumulation of foreign matter.

## Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)\*1), and other safety regulations.

 **Danger :** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

 **Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

 **Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

\*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components  
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components  
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements  
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots etc.

### Warning

#### 1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

#### 2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

#### 3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

#### 4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

### Caution

**We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.**

**Use in non-manufacturing industries is not covered.**

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

The new Measurement Act prohibits use of any unit other than SI units in Japan.

## Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

### Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.\*2)  
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.  
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

\*2) **Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

### Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

## Safety Instructions

Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual” before use.

**SMC Corporation**