2-Color Display Digital Pressure Switch

Series ISE70/75/75H

- NPN/PNP open collector 2 outputs added.
- Zero-cut off display function added.

CE c UL us

Rated Pressure

Metal Body Type
(Die-cast aluminum)

For General Fluids **10 MPa** (ISE75) • **15 MPa** (ISE75H)

For Air **1 MPa** (ISE70)

2-color digital **IP67**

2-Color Display (Green/Red)

- Selectable from four patterns

	ON	OFF
①	Red	Green
②	Green	Red
③	Red	Red
④	Green	Green

See abnormal values at a glance.

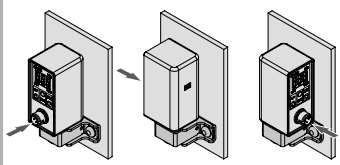
10 mm character height

M12 Connector

- Lead wire with M12 connector (5 m)
- Straight and right-angled connectors

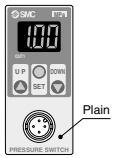
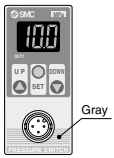
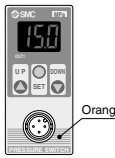
With Bracket

- User-selectable mounting orientation



Functions

- Anti-chattering
- Display calibration
- Zero-clear
- Keylock
- Display unit switching
  (Fixed SI unit in Japan)

For Air	For General Fluids	
ISE70 (1 MPa)	**ISE75** (10 MPa)	**ISE75H** (15 MPa)
		
Plain	Gray	Orange

- **Withstand pressure: 3 times the rated pressure**
- **Model with initial display settings of psi is also available as standard.**
- **Port size**
  Rc1/4, NPT1/4, G1/4 (ISO 1179)

2-Color Display Digital Pressure Switch For Air

Series ISE70

How to Order

1 MPa **ISE70 – 02 – 43 – M**

Piping specifications

02	Rc1/4
N02	NPT1/4
F02	G1/4 (ISO 1179)

Output specifications

27	2 settings NPN open collector 2 outputs (Pin no.: 2, 4)
43	Fixed setting: NPN open collector 1 output (Pin no.: 4) + PNP open collector 1 output (Pin no.: 2)
65	PNP open collector 1 output (Pin no.: 4)
67	2 settings PNP open collector 2 outputs (Pin no.: 2, 4)

Unit specifications

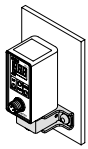
Nil	With display unit switching function
M	Fixed SI unit Note)
P	Pressure unit: psi (Initial value) With display unit switching function

Note 1) Under the New Measurement Law, sales of switches with the unit switching function are not allowed for use in Japan.
Note 2) Fixed unit: MPa

Option 1

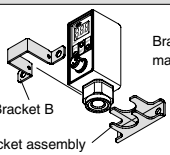
Nil	None
S	Lead wire with M12 connector (5 m), straight
L	Lead wire with M12 connector (5 m), right-angled

Option 2

Nil	None
A	With bracket  Note) Mounting screws are not included.

Option/Part No.

When optional parts are required separately, use the following part numbers to place an order.

Option	Part no.	Note
Bracket	**ZS-31-A**	 Bracket B and the bracket assembly make up one set. Note) Mounting screws are not included.
Lead wire with M12 connector, straight	**ZS-31-B**	Lead wire length: 5 m
Lead wire with M12 connector, right-angled	**ZS-31-C**	Lead wire length: 5 m

Specifications

Model		ISE70
Rated pressure range		0 to 1 MPa
Pressure display range/Set pressure range		–0.1 to 1 MPa
Withstand pressure		1.5 MPa
Pressure display resolution/Set pressure resolution		0.01 MPa
Applicable fluid		Air, Non-corrosive gas, Non-flammable gas
Power supply voltage		12 to 24 VDC±10%, Ripple (p-p) 10% or less (with power supply polarity protection)
Current consumption		55 mA or less (at no load)
Switch output		Output -27: 2 settings; NPN open collector 2 outputs (Pin no.: 2, 4) Output -43: Fixed setting; NPN open collector 1 output (Pin no.: 4) + PNP open collector 1 output (Pin no.: 2) Note 1) Output -65: PNP open collector 1 output (Pin no.: 4) Output -67: 2 settings; PNP open collector 2 outputs (Pin no.: 2, 4)
	Max. load current	80 mA
	Max. applied voltage	30 V (at NPN output)
	Residual voltage	1 V or less (with load current of 80 mA)
	Response time	2.5 ms (with anti-chattering function: 20 ms, 160 ms, 640 ms, 1000 ms, 2000 ms)
	Short circuit protection	With short circuit protection
Repeatability		±0.5%F.S.
Hysteresis	**Hysteresis mode**	Variable (0 or above)
	Window comparator mode	
Display		3-digit, 7-segment indicator, 2-color display (Red/Green) can be interlocked with the switch output, Sampling cycle: 5 times/1 s
Display accuracy		2%F.S.±1 digit (at 25°C±3°C)
Indicator light		OUT1: Light up when output is turned ON. (Green) OUT2: Light up when output is turned ON. (Red: for output -27, -67)
Functions		Anti-chattering function, Display unit switching function, Zero-clear function, Keylock function
Environment	**Enclosure**	IP67 Note 2)
	Fluid temperature range	0 to 50°C (No freezing or condensation)
	Operating temperature range	Operating: 0 to 50°C, Stored: –10 to 60°C (No freezing or condensation)
	Operating humidity range	Operating and stored: 35 to 85%RH (No condensation)
	Withstand voltage	1000 VAC for 1 minute between terminals and housing
	Insulation resistance	50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing
	Vibration resistance	10 to 500 Hz, 1.5 mm or 98 m/s^2 amplitude in X, Y, Z directions for 2 hours each (De-energized)
	Impact resistance	980 m/s^2 in X, Y, Z directions 3 times each (De-energized)
Temperature characteristics (25°C reference: within operating temperature range)		±2%F.S.
Standards		CE Marking, UL/CSA (UL508) compliance
Wetted parts material		Fitting: C3604 (electroless nickel plating) Sensor pressure receiving area: Silicon, O-ring: NBR
Port size		02: Rc1/4, N02: NPT1/4, F02: G1/4 (ISO 1179) Note 3)
Lead wire		Oilproof cable with M12 4-pin pre-wired connector, 4 cores, ø4, 5 m, Conductor O.D.: 0.72 mm, Insulator O.D.: 1.14 mm
Weight		190 g (excluding the lead wire with M12 4-pin pre-wired connector)

Note 1) The NPN and PNP outputs function for a single set point.
Note 2) An FKM gasket is used for the product case seal. Refer to the back of page 64 for details.
Note 3) G1/4: Applicable to ISO 1179-1

Refer to the operation manual for information on how to set and on handling precautions. (Refer to SMC website.)

2-Color Display Digital Pressure Switch For General Fluids

Series ISE75/75H

How to Order

10 MPa ISE75 – 02 – 43 – M □ □ – □

15 MPa ISE75H – 02 – 43 – M □ □ – □

Piping specifications

02	Rc1/4
N02	NPT1/4
F02	G1/4 (ISO 1179)

Made to Order

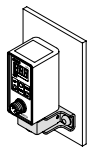
Symbol	Specifications
X500	Analog Voltage Output

Refer to page 63 for details.

Output specifications

27	2 settings NPN open collector 2 outputs (Pin no.: 2, 4)
43	Fixed setting: NPN open collector 1 output (Pin no.: 4) + PNP open collector 1 output (Pin no.: 2)
65	PNP open collector 1 output (Pin no.: 4)
67	2 settings PNP open collector 2 outputs (Pin no.: 2, 4)

Option 2

Nil	None
A	With bracket 

Unit specifications

Nil	With display unit switching function
M	Fixed SI unit [Note]
P	Pressure unit: psi (Initial value) With display unit switching function

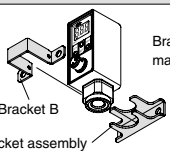
Note 1) Under the New Measurement Law, sales of switches with the unit switching function are not allowed for use in Japan.
Note 2) Fixed unit: MPa

Option 1

Nil	None
S	Lead wire with M12 connector (5 m), straight
L	Lead wire with M12 connector (5 m), right-angled

Option/Part No.

When optional parts are required separately, use the following part numbers to place an order.

Option	Part no.	Note
Bracket	**ZS-31-A**	 Bracket B and the bracket assembly make up one set.
Lead wire with M12 connector, straight	**ZS-31-B**	Lead wire length: 5 m
Lead wire with M12 connector, right-angled	**ZS-31-C**	Lead wire length: 5 m

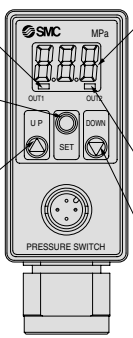
Specifications

Model			ISE75	ISE75H
Rated pressure range			0 to 10 MPa	0 to 15 MPa
Pressure display range/Set pressure range*			0.4 to 10 MPa	0.5 to 15 MPa
Withstand pressure			30 MPa	45 MPa
Pressure display resolution/Set pressure resolution			0.1 MPa	
Applicable fluid			Fluid or gas that will not corrode stainless steel 304, 430 and 630	
Power supply voltage			12 to 24 VDC±10%, Ripple (p-p) 10% or less (with power supply polarity protection)	
Current consumption			55 mA or less (at no load)	
Switch output			Output -27: 2 settings; NPN open collector 2 outputs (Pin no.: 2, 4) Output -43: Fixed setting; NPN open collector 1 output (Pin no.: 4) + PNP open collector 1 output (Pin no.: 2) Note 1) Output -65: PNP open collector 1 output (Pin no.: 4) Output -67: 2 settings; PNP open collector 2 outputs (Pin no.: 2, 4)	
	Max. load current		80 mA	
	Max. applied voltage		30 V (at NPN output)	
	Residual voltage		1 V or less (with load current of 80 mA)	
	Response time		2.5 ms (with anti-chattering function: 20 ms, 160 ms, 640 ms, 1000 ms, 2000 ms)	
	Short circuit protection		With short circuit protection	
Repeatability			±0.5%F.S.	
Hysteresis	**Hysteresis mode**		Variable (0 or above)	
	Window comparator mode			
Display			3-digit, 7-segment indicator, 2-color display (Red/Green) can be interlocked with the switch output, Sampling cycle: 5 times/1 s	
Display accuracy			2%F.S.±1 digit (at 25°C±3°C)	
Indicator light			OUT1: Lights up when output is turned ON. (Green) OUT2: Lights up when output is turned ON. (Red: for output -27, -67)	
Functions			Anti-chattering function, Display unit switching function, Zero-clear function, Keylock function	
Environment	**Enclosure**		IP67 Note 2)	
	Fluid temperature range		–5 to 80°C (No freezing or condensation)	
	Operating temperature range		Operating: –5 to 50°C, Stored: –10 to 60°C (No freezing or condensation)	
	Operating humidity range		Operating and stored: 35 to 85%RH (No condensation)	
	Withstand voltage		250 VAC for 1 minute between terminals and housing	
	Insulation resistance		50 MΩ or more (50 VDC measured via megohmmeter) between terminals and housing	
	Vibration resistance		10 to 500 Hz, 1.5 mm or 98 m/s² amplitude in X, Y, Z directions for 2 hours each (De-energized)	
	Impact resistance		980 m/s² in X, Y, Z directions 3 times each (De-energized)	
Temperature characteristics (25°C reference: within operating temperature range)			±3%F.S.	
Standards			CE Marking, UL/CSA (UL508) compliance	
Wetted parts material	**Pressure sensor**		Stainless steel 630	
	Fitting		Stainless steel 304	Stainless steel 304 (port size Rc1/4) Stainless steel 430 (port size NPT1/4, G1/4)
Port size			02: Rc1/4, N02: NPT1/4, F02: G1/4 (ISO 1179) Note 3)	
Lead wire			Oilproof cable with M12 4-pin pre-wired connector, 4 cores, ø4, 5 m, Conductor O.D.: 0.72 mm, Insulator O.D.: 1.14 mm	
Weight			225 g	225 g (port size Rc1/4) 210 g (port size NPT1/4, G1/4)
			145 g (Lead wire with M12 4-pin pre-wired connector)	

Note 1) The NPN and PNP outputs function for a single set point.
Note 2) An FKM gasket is used for the product case seal. Refer to the back of page 64 for details.
Note 3) G1/4: Applicable to ISO 1179-1
* Refer to page 61 for the pressure display range.

Refer to the operation manual for information on how to set and on handling precautions. (Refer to SMC website.)

Descriptions



Indicator light (Green)

Displays the switch operation status. Lights up when OUT1 is turned ON.

SET button

Use this button to switch the mode and set the set value.

UP button

Use this button to change the mode or increase the ON/OFF set value. It also allows you to switch to the peak value display mode.

LCD

Displays the current pressure condition, set mode and error code. The display mode can be selected from four options: fixed green single-color reading, fixed red single-color reading, green reading interlocked with output for switching to red reading, or red reading interlocked with output for switching to green reading.

Indicator light (Red) Note)

Displays the switch operation status. Lights up when OUT2 is turned ON.

DOWN button

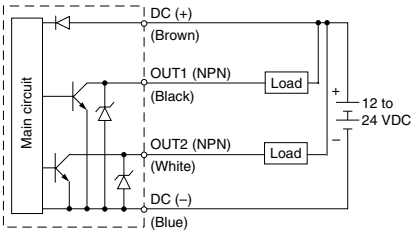
Use this button to change the mode or decrease the ON/OFF set value. It also allows you to switch to the bottom value display mode.

Note) Output -27 and -67 only

Internal Circuits and Wiring Examples

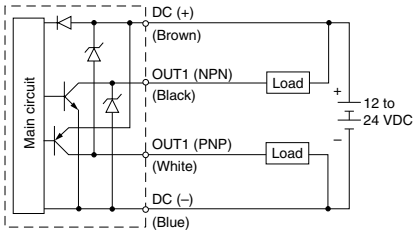
Output -27

2 settings
NPN open collector 2 outputs



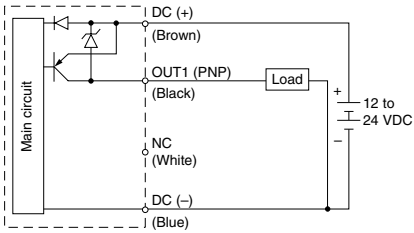
Output -43

Fixed setting
NPN open collector 1 output + PNP open collector 1 output
(The pressure set point for switching the output signal is common to NPN and PNP.)



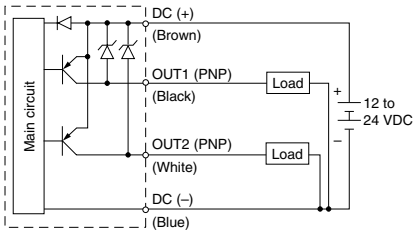
Output -65

PNP open collector 1 output



Output -67

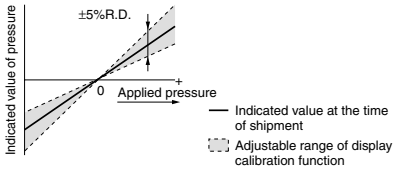
2 settings
PNP open collector 2 outputs



Functions

Display calibration function

Fine adjustment of the indicated value of the pressure sensor can be made within the range of ±5% of the read value.
(The scattering of the indicated value can be eliminated.)



Note) When the display calibration function is used, the set pressure value may change ±1 digit.

Peak/Bottom hold function

This function constantly detects and updates the maximum and minimum pressure values and allows the unit to hold the display value.

Keylock function

Prevents operation errors such as accidentally changing setting values.

Zero-clear function

The measured pressure reading can be adjusted to zero. More specifically, the factory-set reading can be corrected to within ±7%F.S.

Display unit switching function

Display units can be switched with this function.

Unit/Reading resolution	ISE70	ISE75/75H
MPa	0.01	0.1
kgf/cm²	0.1	1
bar	0.1	1
psi	1	1 (X10)

Anti-chattering function

A large bore cylinder or ejector consumes a large amount of air in operation and may experience a temporary drop in the primary pressure. This function prevents detection of such temporary drops in primary pressure as abnormal pressure.

Response time selections: 20 ms, 160 ms, 640 ms, 1000 ms, 2000 ms

Error function

Take the following corrective actions when error occurs.

Error description		LCD display	Description	Action
Over-current error	OUT1	Er1	Load current of switch output exceeds 80 mA.	Eliminate the cause of the over current by turning off the power supply, and then turn on it again.
	Note 1) OUT2	Er2		
Residual pressure error		Er3	During zero-clear operation, pressure over ±7% F.S. is applied. After 3 second, the mode will reset to measurement mode. ±1% F.S. of the zero-clear range varies between individual products.	Perform zero-clear operation again after restoring the applied pressure to an atmospheric pressure condition.
Applied pressure error		HHH	Supply pressure exceeds the maximum set pressure.	Reset applied pressure to a level within the set pressure range.
		LLL	Supply pressure is below the minimum set pressure.	
System error		Er4	Internal data error	Turn the power off and turn it on again.
		Er6	Internal data error	
		Er7	Internal data error	
		Er8	Internal data error	

∗ If the failure cannot be solved after the above instructions are performed, please contact SMC for investigation.

Note 1) Output -27 and -67 only.

Zero-cut off display function

With the ISE75 series, users can enable or disable a function (zero-cut off display function) that displays pressure values of 0.3 MPa or less as zero (0.4 MPa or less in the ISE75H series).

Example pressure displays (shading indicates changed displays)

ISE75-□ (for 10 MPa)

Zero-cut off display function "ON": 0 → Displayed as 0 → 0.4 → 0.5 → 0.6 → ····· → 9.9 → 10.0

Zero-cut off display function "OFF": 0 → 0.1 → 0.2 → 0.3 → 0.4 → 0.5 → 0.6 → ····· → 9.9 → 10.0

ISE75H-□ (for 15 MPa)

Zero-cut off display function "ON": 0 → Displayed as 0 → 0.5 → 0.6 → ····· → 14.9→ 15.0

Zero-cut off display function "OFF": 0 → 0.1 → 0.2 → 0.3 → 0.4 → 0.5 → 0.6 → ····· → 14.9→ 15.0

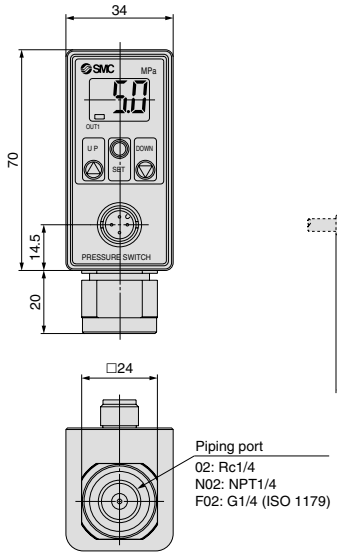
Pressure Display Range

Series	Zero-cut off display function "ON"	Zero-cut off display function "OFF"
ISE75	0, 0.4 to 10.0 MPa	0 to 10.0 MPa
ISE75H	0, 0.5 to 15.0 MPa	0 to 15.0 MPa

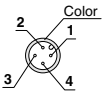
∗ The set pressure range does not change when the zero-cut off display function is disabled.

Dimensions

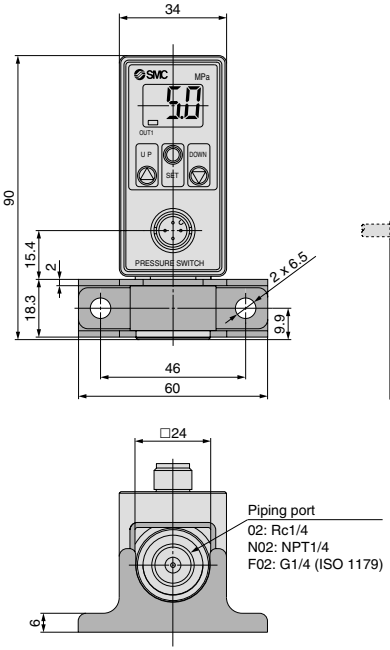
ISE70/75/75H



Note) The connector faces down (toward the piping). Do not attempt to rotate the connector, as it is not rotatable.



Bracket mount



Connector pin number

Output -43
(Color: Gray)

1	Brown	DC (+)
2	White	OUT1 (PNP)
3	Blue	DC (–)
4	Black	OUT1 (NPN)

Output -65
(Color: Black)

1	Brown	DC (+)
2	White	NC
3	Blue	DC (–)
4	Black	OUT1 (PNP)

Output -27 and -67
(Color: Gray)

1	Brown	DC (+)
2	White	OUT2 (NPN or PNP)
3	Blue	DC (–)
4	Black	OUT1 (NPN or PNP)

Series ISE75(H)
Made to Order Specifications

Please contact SMC for detailed dimensions, specifications and lead times.

Made to Order

Symbol

1 Analog voltage output specifications -X500

This product is compatible with NPN open collector 1 output + Analog voltage output.

How to Order

∗ Refer to "How to Order" on page 58 for the standard specifications.

ISE75(H) – □ – 43 – □ – X500

- Piping∗
- Output Note)
- Option∗

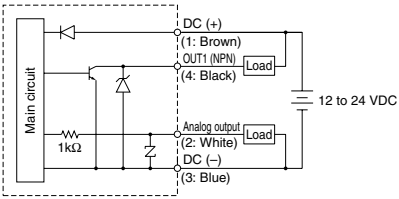
Note) The output is applicable to 43 only.

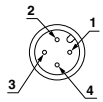
Specifications

Analog voltage output	Output voltage: 1 to 5 V ±2.5% F.S. (In rated pressure range) Output impedance: Approx. 1 kΩ Response time: 300 ms or less

Models other than above are the same specifications as standard.

Electric Circuit Diagram





Connector pin numbers

∗Numbers in the diagram indicate the connector pin numbers.

Series ISE70/75/75H
Specific Product Precautions 1

Be sure to read before handling. Refer to back page 1 for Safety Instructions and "Handling Precautions for SMC Products" (M-E03-3) for Pressure Switch Precautions.

Handling

⚠ Warning

1. Do not use pressure sensors with poisonous, corrosive and/or flammable gases or liquids.

⚠ Caution

1. Do not drop, bump, or apply excessive impacts (980 m/s^2) while handling.

Although the body of the sensor may not be damaged, the internal parts of the sensor could be damaged and lead to a malfunction.

2. The tensile strength of the cord is 50 N.

Applying a greater pulling force on it can cause a malfunction. When handling, hold the body of the sensor—do not dangle it from the cord.

3. Do not exceed the screw-in torque of 40 N·m for the ISE70 and 80 N·m for the ISE75(H) when connecting the pipe to the switch.

Exceeding these values may cause the switch to malfunction.

4. When connecting the pipe to the switch, engage the wrench horizontally to the chamfered barrel of the fitting.

Be careful not to apply excessive force to the switch's main unit.

Connection

⚠ Warning

1. Incorrect wiring can damage the switch and cause a malfunction or erroneous switch output.

2. Connections should be done while the power is turned off.

3. Wire separately from power lines and high voltage lines, avoiding wiring in the same conduit with these lines.

Malfunctions may occur due to noise from these other lines.

4. If a commercial switching regulator is used, make sure that the F.G. terminal is grounded.

Operating Environment

⚠ Warning

1. Our pressure switches are CE marked; however, they are not equipped with surge protection against lightning.

Lightning surge countermeasures should be applied directly to system components as necessary.

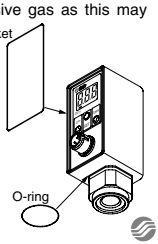
2. Our pressure switches do not have an explosion proof rating.

Never use in the presence of an explosive gas as this may cause a serious explosion.

⚠ Caution

1. Do not use in an environment with spattering liquid of oil or solvent.

This may cause the switch to malfunction due to corrosion and/or swelling in the seals (FKM).



Pressure Source

⚠ Warning

1. Use of poisonous and deleterious substances, corrosive or combustible fluids

Do not use fluids such as poisonous and deleterious substances or corrosive gases. Also, note that the switch is not explosion-proof.

2. Applicable fluids

Do not use the switch for any corrosive or flammable gas or fluid (Series ISE70).

Do not use the switch for any fluid capable of corroding stainless steel 304, 430 and 630; or for any flammable gas or liquid (Series ISE75/75H).

(For corrosiveness of fluids, consult with the manufacturer of the fluid.)

⚠ Caution

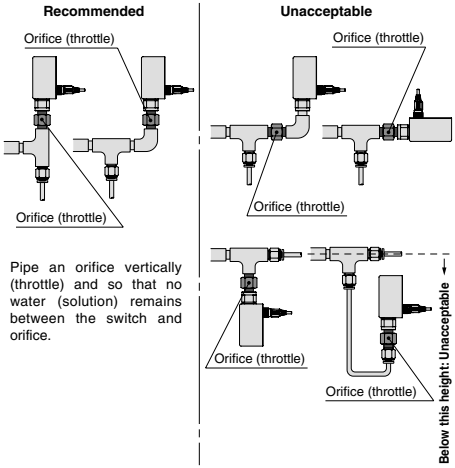
1. Withstand pressure

When liquid fluid is used, rapid pressure change can be generated such as water hammer and surge pressure when a valve is turned ON/OFF.

Install a dumper or an absorber or an accumulator as a countermeasure according to necessity. It may damage the pressure sensor or the switch if pressure over the proof pressure is applied even for a second.

2. Intrusion of water and drain

A pressure sensor of stainless steel diaphragm is used for this switch. The pressure sensor of this switch can be damaged by the rush inertia of water when the drain contained in water and air collide with the pressure sensor in the fluctuations of pressure, and it may cause malfunction with the pressure indication. If there is a possibility of water or drainage getting in, narrow the diameter of the piping to the pressure switch, or make an orifice in the middle of the piping as shown below.



Pipe an orifice vertically (throttle) and so that no water (solution) remains between the switch and orifice.

SMC

Mounting

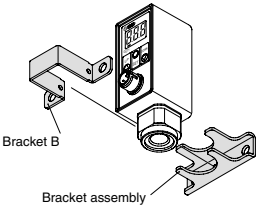
⚠ Caution

1. Piping connection

When connecting the pipe to the switch, apply a torque of 13.6 N·m or greater for the ISE70 series and a torque of 25 N·m or greater for the ISE75/75H series.

2. Mounting with a bracket

Interlock the neck of the switch's piping port between the bracket assembly and bracket B. Using two M6 screws, mount the switch onto a wall. If the panel thickness is less than 5 mm, use nuts or other alternative means to increase the mounting strength.



Bracket B and the bracket assembly make up one set.

Set Pressure Range and Rated Pressure Range

⚠ Caution

1. Set the pressure to within the rated pressure range.

The set pressure range is the range of pressure that is possible in setting.
The rated pressure range is the range of pressure that satisfies the specifications (accuracy, linearity, etc.) on the switch.
Although it is possible to set a value outside the rated pressure range, the specifications will not be guaranteed even if the value stays within the set pressure range.

Switch		Pressure range
		–100 kPa / 0 / 0.4 MPa / 0.5 MPa / 1 MPa / 10 MPa / 15 MPa
For 1 MPa (For Air)	**ISE70**	0 – 1 MPa; –100 kPa (–0.1 MPa) – 1 MPa
For 10 MPa (For General Fluids)	**ISE75**	0 – 10 MPa; 0.4 MPa – 10 MPa
For 15 MPa (For General Fluids)	**ISE75H**	0 – 15 MPa; 0.5 MPa – 15 MPa

∗ The ISE75(H) switch shows zero (0) when the pressure being applied goes below the lower limit of the set pressure range, when the zero-cut off display function is selected.

Rated pressure range of switch
Set pressure range of switch