2-Colour Display Digital Pressure Switch

New

- NPN/PNP open collector 2 outputs added.
- Cut-to-zero display function added.

Rated Pressure

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

For Air **1 MPa** (ISE70)

2-colour digital **IP67**

Metal Body Type
(Die-cast aluminum)

2-Colour Display (Green/Red)

- Selectable from four patterns

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

Easily identifiable abnormal readings

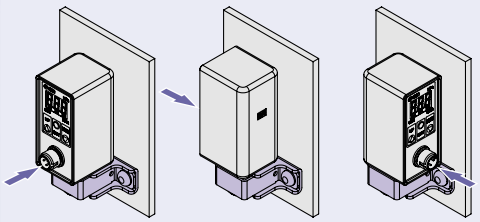
10 mm character height

M12 Connector

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

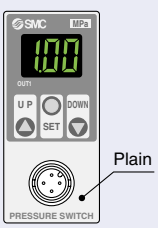
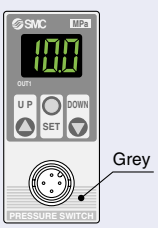
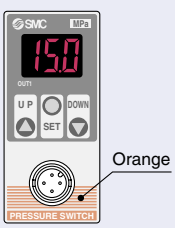
With Bracket

- User-selectable mounting orientation



Functions

- Anti-chattering
- Display calibration
- Zero-out
- Key lock
- Unit display switching
  (Fixed SI unit in Japan)

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

- Withstand pressure: Rated pressure x 3
- Model with initial display settings of PSI is also available as standard.
- Port size
  Rc1/4, NPT1/4, G1/4 (ISO1179)

Series ISE70/75/75H

SMC

CAT.EUS100-52C-UK

2-Colour Display Digital Pressure Switch For Air

Series ISE70

How to Order

1 MPa **ISE70 – 02 – 43 – M □ □**

Piping

02	Rc1/4
N02	NPT1/4
F02	G1/4 (ISO1179)

Output

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)

Display unit

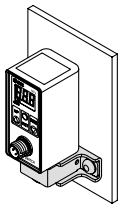
—	With unit display switching function Note 1)
M	Fixed SI unit Note 2)
P	Pressure unit: PSI (Initial value) With unit display switching function Note 1)

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

Option 1

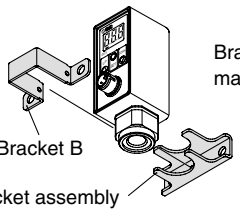
—	None
S	Lead wire with M12 connector (5 m), straight
L	Lead wire with M12 connector (5 m), right-angled

Option 2

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

Optional 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
Set pressure range		–0.1 to 1 MPa
Withstand pressure		1.5 MPa
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. or less
Hysteresis	**Hysteresis mode**	Variable (0 or above)
	Window comparator mode	
Display		3-digit, 7-segment indicator, 2-colour display (Red/Green) can be interlocked with the switch output, Sampling cycle: 5 times/1 s
Display accuracy		2%F.S.±1 digit or less (at 25°C±3°C)
Indication 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, Unit display switching function, Zero-out function, Key lock function
Environ-mental resistance	**Enclosure**	IP67 Note 2)
	Fluid temperature range	0 to 50°C (with no freezing nor condensation)
	Operating temperature range	Operating: 0 to 50°C, Stored: –10 to 60°C (with no freezing nor condensation)
	Operating humidity range	Operating and stored: 35 to 85%RH (with no condensation)
	Withstand voltage	1000 VAC for 1 min. between live parts and case
	Insulation resistance	50 MΩ or more between live parts and case (at 500 VDC Mega)
	Vibration resistance	10 to 500 Hz, 1.5 mm or 98 m/s^2 amplitude in X, Y, Z directions for 2 hours each (Non-energised)
	Impact resistance	980 m/s^2 in X, Y, Z directions 3 times each (Non-energised)
Temperature characteristics (Based on 25°C: within operating temperature range)		±2%F.S. or less
Standards		CE Marking, UL/CSA (UL508) compliance
Wetted parts material		Fitting: C3604 (electroless nickel plated), Sensor port: PBT, Sensor pressure receiving area: Silicon, O-ring: NBR
Port size		02: Rc1/4, N02: NPT1/4, F02: G1/4 (ISO1179) 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
Mass (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 back page 2 for details.
Note 3) G1/4: Applicable to ISO1179-1

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

2-Colour 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

02	Rc1/4
N02	NPT1/4
F02	G1/4 (ISO1179)

Output

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)

Display unit

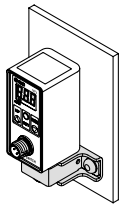
—	With unit display switching function Note 1)
M	Fixed SI unit Note 2)
P	Pressure unit: PSI (Initial value) With unit display switching function Note 1)

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

Option 1

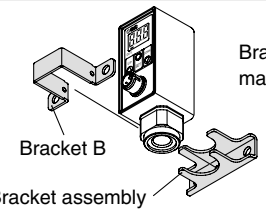
—	None
S	Lead wire with M12 connector (5 m), straight
L	Lead wire with M12 connector (5 m), right-angled

Option 2

—	None
A	With bracket 

Optional 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
Set pressure range		0.4 to 10 MPa	0.5 to 15 MPa
Withstand pressure		30 MPa	45 MPa
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. or less	
Hysteresis	**Hysteresis mode**	Variable (0 or above)	
	Window comparator mode		
Display		3-digit, 7-segment indicator, 2-colour display (Red/Green) can be interlocked with the switch output, Sampling cycle: 5 times/1 s	
Display accuracy		2%F.S.±1 digit or less (at 25°C±3°C)	
Indication 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, Unit display switching function, Zero-out function, Key lock function	
Environ-mental resistance	**Enclosure**	IP67 Note 2)	
	Fluid temperature range	–5 to 80°C (with no freezing nor condensation)	
	Operating temperature range	Operating: –5 to 50°C, Stored: –10 to 60°C (with no freezing nor condensation)	
	Operating humidity range	Operating and stored: 35 to 85%RH (with no condensation)	
	Withstand voltage	250 VAC for 1 min. between live parts and case	
	Insulation resistance	50 MΩ or more between live parts and case (at 50 VDC Mega)	
	Vibration resistance	10 to 500 Hz, 1.5 mm or 98 m/s^2 amplitude in X, Y, Z directions for 2 hours each (Non-energised)	
	Impact resistance	980 m/s^2 in X, Y, Z directions 3 times each (Non-energised)	
Temperature characteristics (Based on 25°C: within operating temperature range)		±3%F.S. or less	
Standards		CE Marking, UL/CSA (UL508) compliance	
Wetted parts material		Pressure receiving area: Stainless steel 630, Fitting: Stainless steel 304 (port size Rc1/4) Pressure receiving area: Stainless steel 630, Fitting: Stainless steel 430 (port size NPT1/4, G1/4)	
Port size		02: Rc1/4, N02: NPT1/4, F02: G1/4 (ISO1179) 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	
Mass (Weight)		225 g (port size Rc1/4), 210 g (port size NPT1/4, G1/4) (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 back page 2 for details.
Note 3) G1/4: Applicable to ISO1179-1

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

Descriptions

Indication light (Green)

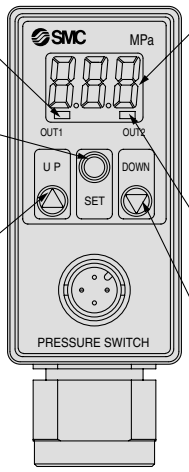
Displays the switch operation status. Lights up when OUT1 is turned ON.

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-colour reading, fixed red single-colour reading, green reading interlocked with output for switching to red reading, or red reading interlocked with output for switching to green reading.

Indication light (Red) Note)

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

DOWN button

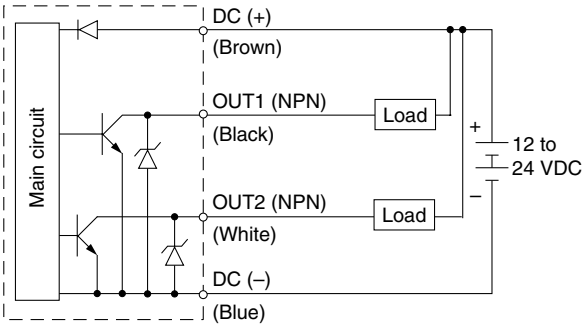
Use this button to change the mode or decrease the ON/OFF set value. It also allows you to switch to the bottom value display mode.

Note) Output -27 and -67 only

Internal Circuits and Wiring Examples

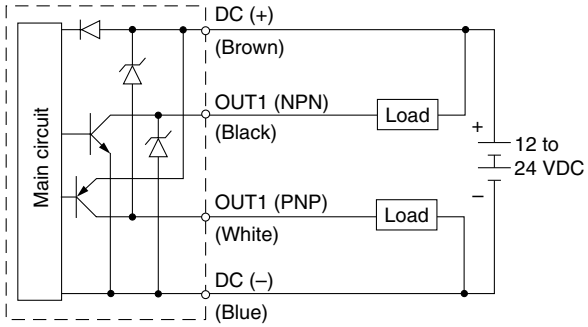
Output -27

2 settings
NPN open collector 2 outputs
Max. 30 V, 80 mA, Residual voltage 1 V or less



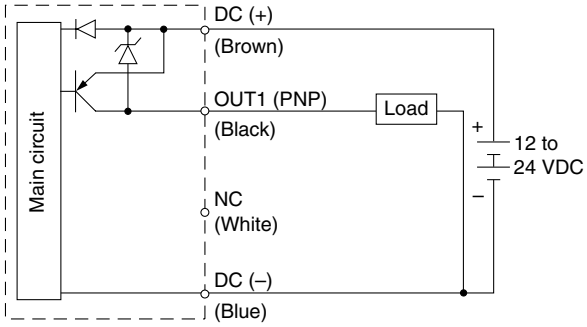
Output -43

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.)
Max. 30 V (NPN only), 80 mA, Residual voltage 1 V or less



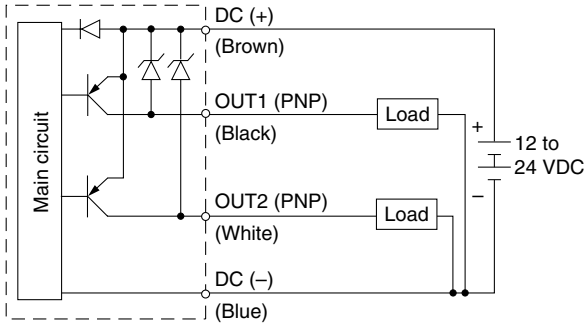
Output -65

PNP open collector 1 output
Max. 80 mA



Output -67

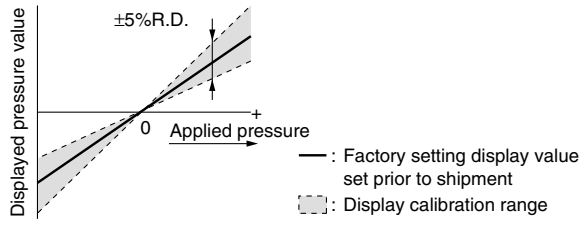
2 settings
PNP open collector 2 outputs
Max. 80 mA



Functions

Display calibration function

This function eliminates slight differences in the output values and allows uniformity in the numbers displayed. Displayed values of the pressure sensor can be calibrated to within ±5% of their readings.



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.

Key lock function

This function prevents incorrect operations such as changing the set value accidentally.

Zero-out function

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

Unit display switching function

The reading unit can be selected.

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 solutions when error occurs.

Error description		LCD display	Description	Solution
Over-current error	OUT1	Er 1	Load current of switch output exceeds 80 mA.	Shut off the power supply. After eliminating the output factor that caused the excess current, turn the power supply back on.
	Note 1) OUT2	Er2		
Residual pressure error		Er3	A pressure level greater than ±7%F.S. has been applied when it is cleared to zero. The switch will automatically return to measuring mode in three seconds, however. Due to individual product differences, the setting range varies by ±1 digit.	Bring the pressure back to atmospheric pressure and try using the zero-out function.
Applied pressure error		HHH	Supply pressure exceeds the maximum set pressure.	Bring the pressure back to within the set pressure range.
		LLL	Supply pressure is below the minimum set pressure.	
System error		Er4	Internal data error	Shut off the power supply. Turn the power supply back on.
		Erb	Internal data error	
		Er7	Internal data error	
		Er8	Internal data error	

∗ If the switch does not recover to normal even after all of the above-mentioned solutions have been applied, consult SMC for investigation.

Note 1) Output -27 and -67 only.

Cut-to-zero display function

With the ISE75 series, users can enable or disable a function (cut-to-zero 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)

Cut-to-zero display function "ON": 0 → Displayed as 0 → 0.4 → 0.5 → 0.6 → ····· → 9.9 → 10.0

Cut-to-zero display function "OFF": 0 → 0.1 → 0.2 → 0.3 → 0.4 → 0.5 → 0.6 → ····· → 9.9 → 10.0

ISE75H-□ (for 15 MPa)

Cut-to-zero display function "ON": 0 → Displayed as 0 → 0.5 → 0.6 → ····· → 14.9→ 15.0

Cut-to-zero display function "OFF": 0 → 0.1 → 0.2 → 0.3 → 0.4 → 0.5 → 0.6 → ····· → 14.9→ 15.0

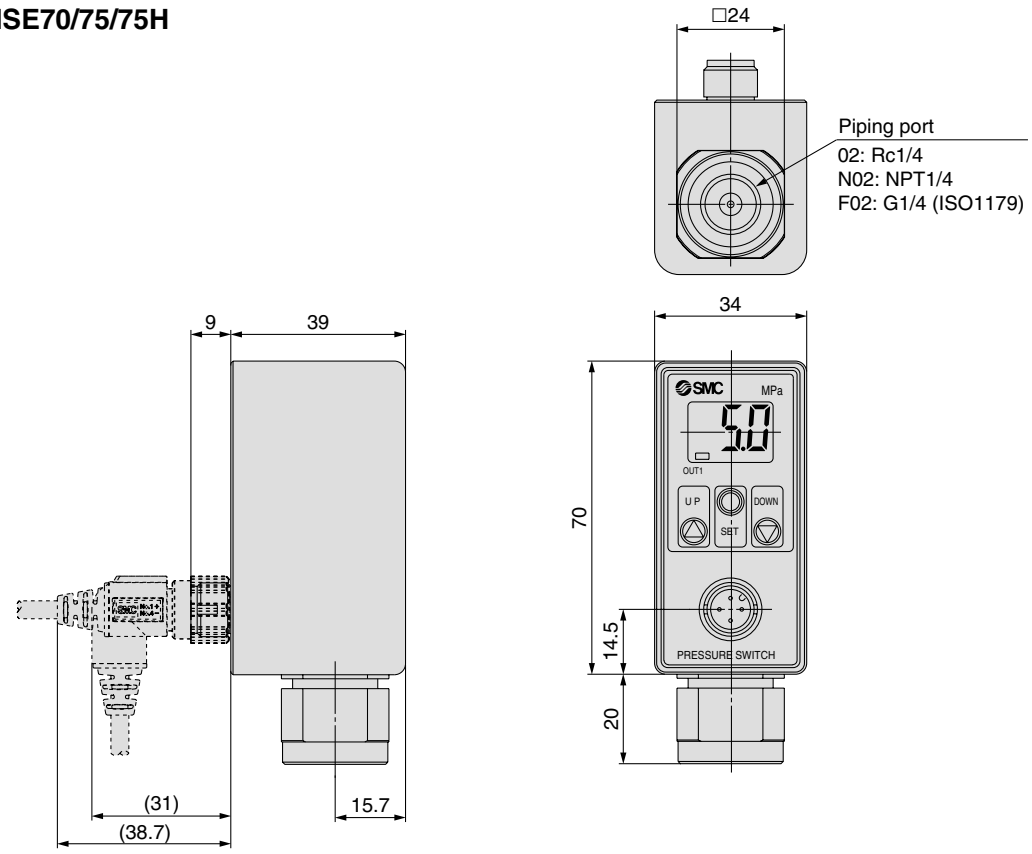
Pressure Display Range

Series	Cut-to-zero display function "ON"	Cut-to-zero 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

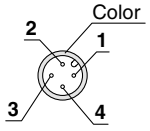
∗ The set pressure range does not change when the cut-to-zero display function is disabled.

Dimensions

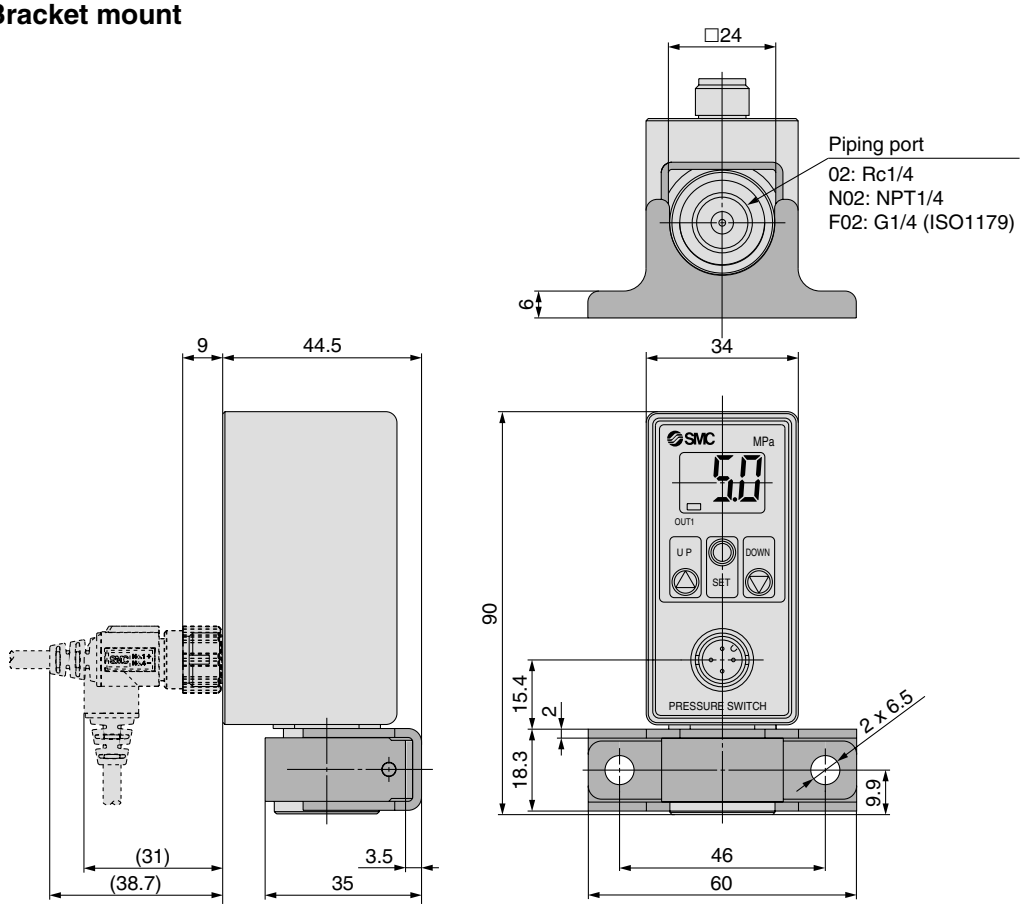
ISE70/75/75H



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



Bracket mount



Connector pin assignments

Output -43
(Color: Grey)

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: Grey)

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

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), Japan Industrial Standards (JIS)*1) and other safety regulations*2).

* 1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1992: Manipulating industrial robots -Safety.
JIS B 8370: General rules for pneumatic equipment.
JIS B 8361: General rules for hydraulic equipment.
JIS B 9960-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
JIS B 8433-1993: Manipulating industrial robots - Safety.
etc.
* 2) Labour Safety and Sanitation Law, etc.

⚠ Caution: Operator error could result in injury or equipment damage.

⚠ Warning: Operator error could result in serious injury or loss of life.

⚠ Danger : In extreme conditions, there is a possibility of serious injury or loss of life.

⚠ 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 catalogue 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. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalogue.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Series ISE70/75/75H
Specific Product Precautions 1

Be sure to read this before handling.
Refer to back page 1 for Safety Instructions and "Precautions for Handling Pneumatic Devices" (M-03-E3A) for Pressure Switches Precautions.

Handling

⚠ Warning

1. Do not drop, bump, or apply excessive impacts (980 m/s²) while handling.
Although the body of the sensor may not be damaged, the internal parts of the sensor could be damaged and lead to 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. Do not use pressure sensors with poisonous, corrosive and/or flammable gases or liquids.

5. 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 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

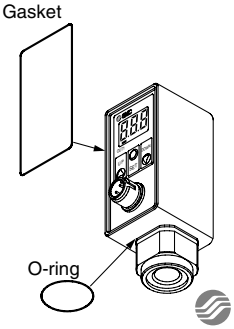
⚠ Warning

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 (ISE70 series).
Do not use the switch for any fluid capable of corroding stainless steel 304, 430 and 630; or for any flammable gas or liquid (ISE75/75H series).
(For corrosiveness of fluids, consult with the manufacturer of the fluid.)

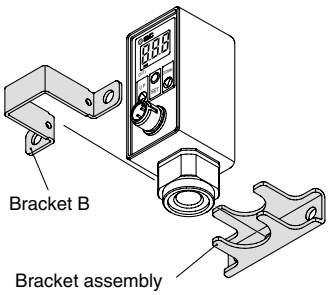
3. Withstand pressure
When liquid fluid is used, rapid pressure change can be generated such as water hammer and surge pressure when a valve is turned ON/OFF.
Install a dumper, an absorber or an accumulator as a countermeasure according to necessity. It may damage the pressure sensor or the switch if pressure over the proof pressure is applied even for a second.

Mounting

⚠ Caution

1. Connecting the pipe to the switch
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. Bracket-mounting the switch
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.

Back page 2

Series ISE70/75/75H
Specific Product Precautions 2

Be sure to read this before handling.
Refer to back page 1 for Safety Instructions and "Precautions for Handling Pneumatic Devices" (M-03-E3A) for Pressure Switches Precautions.

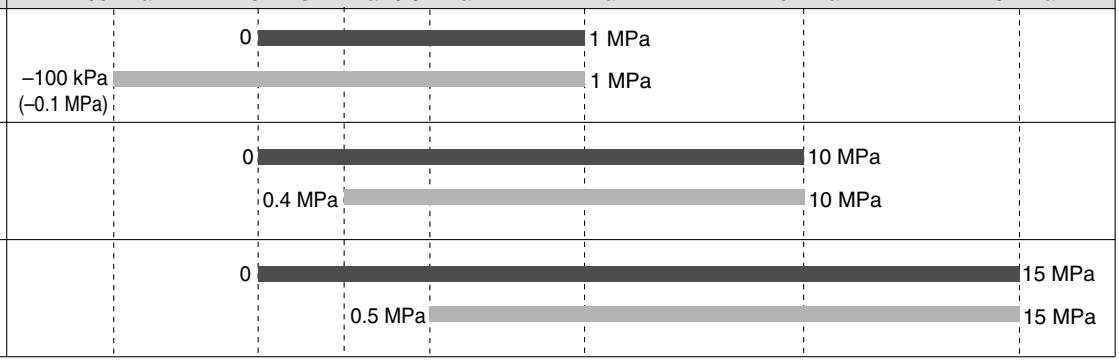
Set Pressure Range and Rated Pressure Range

⚠ Caution

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

The set pressure range is the range of pressure that is possible to set within.
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
For 1 MPa (For Air)	**ISE70**	–100 kPa (–0.1 MPa) to 1 MPa
For 10 MPa (For General Fluids)	**ISE75**	0.4 MPa to 10 MPa
For 15 MPa (For General Fluids)	**ISE75H**	0.5 MPa to 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 cut-too-zero display function is selected.

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