

# Before Use

High-precision Digital Pressure Switch

ISE70/ISE71/  
ISE70G/ISE75G/ISE76G/ISE77G/ISE78G\*



Thank you for purchasing an SMC ISE70/ISE71/ISE70G/ISE75G/ISE76G/ISE77G/ISE78G Series High-precision Digital Pressure Switch. Please read this manual carefully before operating the product and make sure you understand its capabilities and limitations. Please keep this manual handy for future reference.

To obtain the operation manual about this product and control unit, please refer to the SMC website (URL <https://www.smcworld.com>) or contact SMC directly.

## 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) and other safety regulations.

- Caution:** CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
- Warning:** WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
- Danger:** DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

## Operator

- The operation manual is intended for those who have knowledge of machinery using pneumatic equipment, and have sufficient knowledge of assembly, operation and maintenance of such equipment. Only those persons are allowed to perform assembly, operation and maintenance.
- Read and understand the operation manual carefully before assembling, operating or providing maintenance to the product.

## Safety Instructions

### Warning

- Do not disassemble, modify (including changing the printed circuit board) or repair.** An injury or failure can result.
- Do not operate the product outside of the specifications.** Do not use for flammable or harmful fluids. Fire, malfunction, or damage to the product can result. Verify the specifications before use.
- Do not operate in an atmosphere containing flammable or explosive gases.** Fire or an explosion can result. This product is not designed to be explosion proof.
- Do not use the product in a place where static electricity is a problem.** Otherwise it can cause failure or malfunction of the system.
- If using the product in an interlocking circuit:**
  - Provide a double interlocking system, for example a mechanical system
  - Check the product regularly for proper operation
  - Otherwise malfunction can result, causing an accident.
- The following instructions must be followed during maintenance:**
  - Turn off the power supply
  - Stop the air supply, exhaust the residual pressure and verify that the air is released before performing maintenance work
  - Otherwise an injury can result.

### Caution

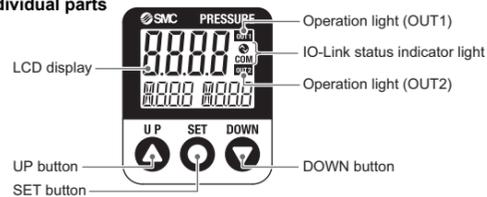
- Do not touch the terminals and connectors while the power is on.** Otherwise electric shock, malfunction or damage to the product can result.
- After maintenance is complete, perform appropriate functional inspections and leak tests.** Stop operation if the equipment does not function properly or there is a leakage of fluid. When leakage occurs from parts other than the piping, the product might be faulty. Disconnect the power supply and stop the fluid supply. Do not apply fluid under leaking conditions. Safety cannot be assured in the case of unexpected malfunction.

## NOTE

- The direct current power supply to be used should be UL approved as follows: Circuit (of Class 2) which is of maximum 30 Vrms (42.4 V peak), with UL1310 Class 2 power supply unit or UL1585 Class 2 transformer.
- The product is a UL approved product only if it has a mark on the body.

## Summary of Product parts

### Names of individual parts



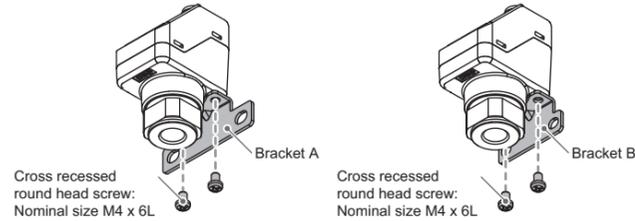
## Mounting and Installation

### Installation

- Mounting with bracket**
  - Mount the bracket to the body with mounting screws (Cross recessed round head screw: Nominal size M4 x 6L (2 pcs.)), then set the body to the specified position.
  - Tighten the bracket mounting screws to a torque of 0.76±0.1 N·m.

•Bracket A (Part No.: ZS-50-A)

•Bracket B (Part No.: ZS-50-B)



- Mounting with orifice**
  - Tighten the orifice to a torque of 1.5±0.1 N·m.
  - ISE70G/ISE75G/ISE76G/ISE77G/ISE78G can be mounted.

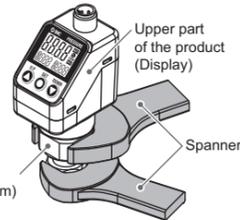
•Orifice (Part No.: ZS-48-A)



### Piping

- Piping specification: -02 and -N02** After hand tightening, tighten the fitting using a spanner on the flat surfaces of the fitting. The tightening torque must be 8 to 12 N·m.
- Piping specification: -F02** After hand tightening, tighten the fitting using a spanner on the flat surfaces of the fitting. The tightening torque must be 4 to 5 N·m.

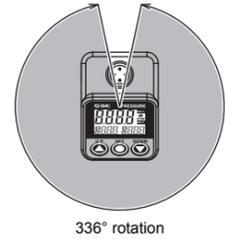
Fitting (width across flats: 24 mm)



When tightening, do not hold the upper part of the product (Display) with a spanner.



•The upper part (display) of the product can be rotated by 336°. Rotating the display with excessive force will damage the end stopper.



### Wiring

- Connections should be made with the power supply turned off.
- Use a separate route for the product wiring and any power or high voltage wiring. Otherwise, malfunction may result due to noise.
- If a commercially available switching power supply is used, be sure to ground the frame ground (FG) terminal. If the switching power supply is connected, switching noise will be superimposed and it will not be able to meet the product specifications. In that case, insert a noise filter such as a line noise filter/ferrite between the switching power supplies or change the switching power supply to the series power supply.

### How to use connector

- Align the cable connector key groove with the product connector key to insert and rotate the knurled part of the connector.
- Connect the wires of the lead wire with M12 connector as shown below.

### M12 connector (Port Class A)

| No. | Name | Lead wire colour | Function  |
|-----|------|------------------|---|
| 1   | L+   | Brown            | 18 to 30 VDC  |
| 2   | DO   | White            | Switch output 2                                     |
| 3   | L-   | Blue             | 0 V   |
| 4   | C/Q  | Black            | Communication data (IO-Link)/ Switch output 1 (SIO) |

## Outline of Settings [Measurement mode]

Power is supplied

The product code is displayed for approximately 3 sec. after power is supplied. Then, measurement mode will be displayed.  
\*: Within approximately 0.2 sec. after power-on, the switch starts.

**[Measurement mode]**  
Detects the pressure after power is supplied, and indicates the display and switch operating status. This is the basic mode; other modes should be selected for set-point changes and other function settings.

Measurement mode screen

Current pressure value (Main display)

Item (Sub display (left))

Set value or peak/bottom value (Sub display (right))

Sub display  
In measurement mode, the sub display can be temporarily changed by pressing the UP or DOWN buttons.

\*: One arbitrary display mode can be added to the sub display by setting the [F10] sub display. If the sub display is switched during the arbitrary display setting, the display will be returned to the arbitrary display 30 sec. later. (The default setting does not include arbitrary display.)

Press the SET button once. **[3 step setting mode]** Set either of set value or hysteresis.

Press the SET button between 1 and 3 sec. **[Simple setting mode]** Select the set value, hysteresis and delay time.

Press the SET button between 3 and 5 sec. **[Function selection mode]** Change the function settings.

**[Other Settings]** •Zero-clear function •Key-lock function

- The outputs will continue to operate during setting.
- If a button operation is not performed for 30 sec. during the setting, the display will flash. (This is to prevent the setting from remaining incomplete if, for instance, an operator were to leave during setting.)
- 3 step setting mode, simple setting mode and function selection mode settings are reflected each other.

## Pressure Setting

### Default settings

When the pressure exceeds the set value, the switch will be turned on. When the pressure falls below the set value by the amount of hysteresis or more, the switch will be turned off. The default setting is to turn on the pressure switch when the pressure reaches the center of the atmospheric pressure and upper limit of the rated pressure range. If this condition, shown to the right, is acceptable, then keep these settings.

## 3 Step Setting Mode

**[3 step setting mode (hysteresis mode)]**  
In the 3 step setting mode, the set value (P\_1 or n\_1) and hysteresis (H\_1) can be changed. Set the items on the sub display (set value or hysteresis) with the UP or DOWN button. When changing the set value, follow the operation below. The hysteresis setting can be changed in the same way.

- Press the SET button once when the item to be changed is displayed on the sub display. The set value on the sub display (right) will star flashing.
- Press the UP or DOWN button to change the set value. The set value can be increased with the UP button and can be reduced with the DOWN button. When the UP and DOWN buttons are pressed and held simultaneously for 1 sec. or longer, the set value is displayed as [- -], and the set value will be the same as the current pressure value automatically (snap shot function). Afterwards, it is possible to adjust the value by pressing the UP or DOWN button.
- Press the SET button to complete the setting. The pressure switch turns on within a set pressure range (from P1L to P1H) during window comparator mode. Set P1L, the lower limit of the switch operation, and P1H, the upper limit of the switch operation and WH1 (hysteresis) following the instructions given above. (When reversed output is selected, the sub display (left) shows [n1L] and [n1H].)  
\*: Set OUT2 in the same way. (ex. P\_2, H\_2)  
\*: Setting of the normal/reverse output switching and hysteresis/window comparator mode switching are performed with the function selection mode [F 1] OUT1 setting and [F 2] OUT2 setting.

## Simple Setting Mode

- Press and hold the SET button between 1 and 3 sec. in measurement mode. [SE] is displayed on the main display. When the button is released while in the [SE] display, the current pressure value is displayed on the main display, [P\_1] or [n\_1] is displayed on the sub display (left), and the set value is displayed on the sub display (right) (Flashing).
- Change the set value with the UP or DOWN button, and press the SET button to set the value. Then, the setting moves to hysteresis setting. (The snap shot function can be used.)
- Change the set value with the UP or DOWN button, and press the SET button to set the value. Then, the setting moves to the delay time of the switch output. (The snap shot function can be used.)
- Press the UP or DOWN button, the delay time of the switch output can be selected. Delay time setting can prevent the output from chattering. The delay time can be set in the range 0.00 to 60.00 sec. in 0.01 sec. increments.
- Press the SET button for less than 2 sec. to complete the OUT1 setting. [P\_2] or [n\_2] is displayed on the sub screen (left). Continue with setting the OUT2. Press and hold the SET button for 2 sec. or longer to complete the setting. The product will return to measurement mode.

In the window comparator mode, set P1L, the lower limit of the switch operation, and P1H, the upper limit of the switch operation, WH1 (hysteresis) and dt1 (delay time) following the instructions given above. (When reversed output is selected, the sub display (left) shows [n1L] and [n1H].)  
\*: Set OUT2 in the same way.

## Function Selection Mode

### Function selection mode

In measurement mode, press the SET button between 3 and 5 sec., to display [F 0]. Select to display the function to be changed [F00]. Press and hold the SET button for 2 sec. or longer in function selection mode to return to measurement mode.  
\*: Some products do not have all the functions. If no function is available or selected due to configuration of other functions, [- -] is displayed on the sub display (right).

### Default setting

The default setting is as follows. If no problem is caused by this setting, keep these settings.

- [F 0] Display units, switch output specifications and diagnostic information selection function

| Item                         | Default setting                       |
|------------------------------|---------------------------------------|
| Display unit                 | Unit specification ["Ni" or "M"]; MPa |
| Switch output specifications | PNP                                   |
| Diagnostic information       | ALL                                   |

### [F 1] Setting of OUT1

| Item             | Default setting   |
|------------------|---|
| Output mode      | Hysteresis mode   |
| Reversed output  | Normal output   |
| Pressure setting | ISE70(G): 0.500 MPa/ISE71: 0.800 MPa/ISE75G: 1.000 MPa/ISE76G: 2.50 MPa/ISE77G: 5.00 MPa/ISE78G: 8.00 MPa |
| Hysteresis       | ISE70(G): 0.050 MPa/ISE71: 0.080 MPa/ISE75G: 0.100 MPa/ISE76G: 0.25 MPa/ISE77G: 0.50 MPa/ISE78G: 0.80 MPa |
| Delay time       | 0.00 sec.   |
| Display colour   | Output ON: Green Output OFF: Red (Linked to OUT1)   |

### [F 2] Setting of OUT2 Same setting as [F 1] OUT1.

### Other parameter settings

| Item                                   | Default setting | Item                                | Default setting     |
|--|-----------------|-------------------------------------|---------------------|
| [F 3] Digital filter setting           | 0.00 ms         | [F80] Power saving mode             | OFF                 |
| [F 4] Auto-preset function             | OFF             | [F81] Security code                 | OFF                 |
| [F 6] Fine adjustment of display value | 0.0%            | [F90] Setting of all functions      | OFF                 |
| [F10] Sub display setting              | std (Standard)  | [F96] Number of pressurizing errors | -                   |
| [F11] Display resolution setting       | 1000-split      | [F98] Output check                  | N/A (normal output) |
| [F14] Zero cut-off setting             | 0.0             | [F99] Reset to default settings     | OFF                 |

If the product is to be used with changed settings, refer to the SMC website (URL <https://www.smcworld.com>) for more detailed information, or contact SMC.

## Other Settings

### Peak/bottom value indication

The max. (min.) pressure when the power is supplied is detected and updated. The value can be displayed on the sub display by pressing the UP or DOWN button in measurement mode.

### Snap shot function

The current pressure value can be stored to the switch output ON/OFF set point. When the set value and hysteresis are set, press the UP and DOWN buttons for 1 sec. or longer simultaneously. Then, the set value of the sub display (right) shows [- -], and then values corresponding to the current pressure values are automatically displayed.

### Zero-clear function

In measurement mode, when the UP and DOWN buttons are pressed for 1 sec. or longer simultaneously, the main display shows [- -], and the reset to zero. The display returns to measurement mode automatically.

### Key-lock function

To set each of these functions, refer to the SMC website (URL <https://www.smcworld.com>) for more detailed information, or contact SMC.

## Maintenance

### How to reset the product after a power cut or forcible de-energizing

The setting of the product will be retained as it was before a power cut or de-energizing. The output condition is also basically recovered to that before a power cut or deenergizing, but may change depending on the operating environment. Therefore, check the safety of the whole installation before operating the product. If the installation is using accurate control, wait until the product has warmed up (approximately 10 to 15 minutes).

## Troubleshooting

### Error indication function

This function is to display error location and content when a problem or error has occurred.

| Error                   | Error displayed                    | Description  | Measures  |
|-------------------------|------------------------------------|--|---|
| Over current error      | Er 1, Er 2                         | The switch output load current is 80 mA or more.   | Turn the power off and remove the cause of the over current. Then supply the power again. |
| Residual pressure error | Er 3                               | During zero clear operation, pressure greater than ±7%F.S. is present. Note that the mode is returned to measurement mode automatically 1 sec. later. The zero clear range varies by ±1%F.S. due to variation between individual products. | Release the applied pressure to atmospheric pressure, and retry the zero clear operation. |
| Pressurizing error      | HHH, LLL                           | Pressure exceeding the upper limit of the set pressure range is applied. Pressure exceeding the lower limit of the set pressure range is applied.  | Reset applied pressure to a level within the set pressure range.                          |
| System error            | Er 0, Er 4, Er 6, Er 7, Er 8, Er 9 | Displayed if an internal data error has occurred.  | Turn the power off and on again. If the failure cannot be solved, contact SMC.            |
| Version does not match  | Er 15                              | IO-Link Master and product version are not matched. Mismatch because master version is 1.0.  | Align the master IO-Link version to the device.   |

If the error cannot be reset after the above measures are taken, or errors other than above are displayed, please contact SMC. Refer to the SMC website (URL <https://www.smcworld.com>) for more information about troubleshooting.

## Specifications/Outline with Dimensions (in mm)

Refer to the product catalog or SMC website (URL <https://www.smcworld.com>) for more information about the product specifications and outline dimensions.

SMC Corporation URL <https://www.smcworld.com>

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.  
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