2-Color Display High-Precision Digital Pressure Switch

ZSE40A(F)/ISE40A Series

Applicable fluid
Air, Non-corrosive gas, Non-flammable gas

Can copy to up to 10 switches simultaneously.
The settings of the master sensor (source of copy) can be copied to the slave sensors.
- Reducing setting labor
- Minimizing risk of mistakes in setting

Easy handling!
Raised rubber switch buttons for easy and comfortable operation

3-step setting
1. Push
2. Adjust to the set-value by the  or  button
3. Push
Completion of setting

2-color display
See abnormal values at a glance.

Copy

Master sensor (source of copy)
Slave side
1 unit
2 units
10 units
**Piping Variations**

- R1/8, NPT1/8
- M5 x 0.8
- Rc1/8, G1/8
- ø4, ø6 One-touch fitting

**Space-saving**

- New ZSE/ISE40A Series
- ZSE/ISE40 Series

**Mounting Variations**

- Bracket A
- Bracket B
- Bracket D
- Direct mounting (Wall mounting)
- Panel mounting

Interchangeable with the ZSE40/ISE40 series for mounting

**Series**

**ZSE40A** (vacuum pressure)
- Rated pressure range: 0.0 to –101.3 kPa
- Set pressure range: 10.0 to –105.0 kPa
- Withstand pressure: 500 kPa
- Min. unit setting: 0.1 kPa
- Output: *NPN or PNP open collector 2 outputs (with copy function) + Analog output (voltage or current)/Auto-shift input*
- Piping: R1/8, NPT1/8 (With M5 female thread), Rc1/8, G1/8, M5 female thread

**ZSE40AF** (compound pressure)
- Rated pressure range: –100.0 to 100.0 kPa
- Set pressure range: –105.0 to 105.0 kPa
- Withstand pressure: 500 kPa
- Min. unit setting: 0.1 kPa
- Output: *NPN or PNP open collector 2 outputs + Analog output (voltage or current)/Auto-shift input*
- Piping: R1/8, NPT1/8 (With M5 female thread), Rc1/8, G1/8, M5 female thread

**ISE40A** (positive pressure)
- Rated pressure range: 0.0 to 1.000 MPa
- Set pressure range: 0.001 to 1.5 MPa
- Withstand pressure: 1.0 MPa
- Min. unit setting: 0.001 MPa
- Output: *NPN or PNP open collector 2 outputs (with copy function) + Analog output (voltage or current)/Auto-shift input*
- Piping: R1/8, NPT1/8 (With M5 female thread), Rc1/8, G1/8, M5 female thread

**Secret code setting function**
A function to prevent operation by anyone other than the designated operator while the keys are locked.

**Power-saving function**
The display can be turned off to save the power consumption. (Power consumption reduced by max. 20%)

**Resolution conversion function**
The flickering on the display can be eliminated.

**MPa/kPa switching function**
The indication unit for vacuum, compound pressure and positive pressure can be integrated into either MPa or kPa.
2-Color Display High-Precision Digital Pressure Switch

**ZSE40A(F)/ISE40A Series**

**How to Order**

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Symbol</th>
<th>Part no.</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZS-24-A</td>
<td>Bracket A</td>
<td>A</td>
<td>ZS-35-C</td>
<td>C5</td>
</tr>
<tr>
<td>ZS-24-B</td>
<td>Bracket B</td>
<td>B</td>
<td>ZS-35-D</td>
<td>C6</td>
</tr>
<tr>
<td>ZS-24-D</td>
<td>Bracket D</td>
<td>D</td>
<td>ZS-35-F</td>
<td>C5</td>
</tr>
<tr>
<td>ZSE40AF</td>
<td>Panel mount adapter</td>
<td>E</td>
<td>ZS-35-G</td>
<td>C6</td>
</tr>
</tbody>
</table>

**Option 1**

- N11: None
- A: Bracket A
- B: Bracket B
- D: Bracket D
- E: Panel mount adapter
- F: Panel mount adapter + Front protective cover

**Output specifications**

- X: NPN open collector 2 outputs (with copy function)
- Y: PNP open collector 2 outputs (with copy function)
- R: NPN open collector 2 outputs + Analog voltage/Auto-shift switching
- T: PNP open collector 2 outputs + Analog voltage/Auto-shift switching
- S: NPN open collector 2 outputs + Analog current/Auto-shift switching
- V: PNP open collector 2 outputs + Analog current/Auto-shift switching

**Unit specifications**

- M: With unit switching function
- P: Fixed SI unit (Note 1)

**Option 2**

- X501: Lead wire length 100 m
- X531: M12 4-pin pre-wired connector (Lead wire length 100 mm)

**Note:** All texts in both English and Japanese.
ZSE40A(F)/ISE40A Series

How to Order [For M8 (3 pins) connector]

Rated pressure range
- ISE40A: −0.1 to 1.000 MPa
- ZSE40A: 0.0 to −101.3 kPa

For vacuum
- ISE40A: 01 - N - M - L
- ZSE40A: 01 - N - M - L

For positive pressure
- ISE40A: 01 - N - M - L
- ZSE40A: 01 - N - M - L

Piping specifications
- 01: R1/8 (M5 female threaded)
- N01: NPT1/8 (M5 female threaded)

Output specifications
- N: NPN open collector 1 output
- P: PNP open collector 1 output

Unit specifications
- Nil: With unit display switching function (Note 1)
- M: Fixed SI unit (Note 2)
- P: With unit switching function (Initial value psi) (Note 1)

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

Note 2: Unit kPa, MPa

Options 1/Part No.
When optional parts are required separately, use the following part numbers to place an order.

Part no. | Option
--- | ---
ZS-24-A | Bracket A Mounting screw M3 x 5L, M4 x 5L (2 pcs. for each)
ZS-24-D | Bracket D Mounting screw M3 x 5L, M4 x 5L (2 pcs. for each)

M8 connector type
- L

* No lead wires are connected.
### Specifications

Refer to pages 11 and 12 for Pressure Switch Precautions. For details about the Specific Product Precautions, refer to the Operation Manual on the SMC website, http://www.smcworld.com Click here for details.

#### Piping Specifications

<table>
<thead>
<tr>
<th>Part no.</th>
<th>O1</th>
<th>N01</th>
<th>W1</th>
<th>WF1</th>
<th>M5</th>
<th>C4</th>
<th>C6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port size</td>
<td>R1/8 (With M5 female thread)</td>
<td>NPT1/8 (With M5 female thread)</td>
<td>Rc1/8</td>
<td>G1/8</td>
<td>M5 x 0.8 female thread</td>
<td>φ4 One-touch fitting</td>
<td>φ6 One-touch fitting</td>
</tr>
<tr>
<td>Material of parts in contact with fluid</td>
<td>Sensor pressure receiving area</td>
<td>Silicon</td>
<td>Piping port</td>
<td>C3602 (Electroless nickel plating)</td>
<td>ZDC2 O-ring: HNBR</td>
<td>ZDC2, POM, Stainless steel 304, C3604 (Electroless nickel plating)</td>
<td>O-ring: HNBR, NBR</td>
</tr>
<tr>
<td>Weight</td>
<td>78 g</td>
<td>79 g</td>
<td>97 g</td>
<td>104 g</td>
<td>101 g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M8 connector</td>
<td>45 g</td>
<td>46 g</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1) If the applied pressure fluctuates around the set-value, the hysteresis must be set to a value more than the fluctuating width, otherwise chattering will occur.

Note 2) When the analog voltage output is selected, the analog current output cannot be selected.

Note 3) When the analog current output is selected, the analog voltage output cannot be selected.

Note 4) UL temperature rating: The maximum ambient temperature is 50°C.
Set Pressure Range and Rated Pressure Range

Set the pressure 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.

<table>
<thead>
<tr>
<th>Switch</th>
<th>Pressure range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>–100 kPa</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>100 kPa</td>
</tr>
<tr>
<td></td>
<td>500 kPa</td>
</tr>
<tr>
<td></td>
<td>1 MPa</td>
</tr>
<tr>
<td>For vacuum pressure</td>
<td>–101.3 kPa</td>
</tr>
<tr>
<td>For compound pressure</td>
<td>–100 kPa</td>
</tr>
<tr>
<td></td>
<td>105 kPa</td>
</tr>
<tr>
<td>For positive pressure</td>
<td>–100 kPa</td>
</tr>
<tr>
<td></td>
<td>105 kPa</td>
</tr>
</tbody>
</table>

Analog Output

Voltage output

Current output

<table>
<thead>
<tr>
<th>Range</th>
<th>Rated pressure range</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>For vacuum pressure</td>
<td>0.0 to –101.3 kPa</td>
<td>10 kPa</td>
</tr>
<tr>
<td>For compound pressure</td>
<td>–100.0 to 100.0 kPa</td>
<td>–100 kPa</td>
</tr>
<tr>
<td>For positive pressure</td>
<td>–0.100 to 1.000 MPa</td>
<td>–0.100 MPa</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range</th>
<th>Rated pressure range</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>For vacuum pressure</td>
<td>0.0 to –101.3 kPa</td>
<td>10 kPa</td>
</tr>
<tr>
<td>For compound pressure</td>
<td>–100.0 to 100.0 kPa</td>
<td>–100 kPa</td>
</tr>
<tr>
<td>For positive pressure</td>
<td>–0.100 to 1.000 MPa</td>
<td>–0.100 MPa</td>
</tr>
</tbody>
</table>

Rated pressure range of switch
Set pressure range of switch
Internal Circuits and Wiring Examples

-X
NPN (2 outputs) + Copy function

-Y
PNP (2 outputs) + Copy function

-R/-S
-R: NPN (2 outputs) + Analog voltage output
-S: NPN (2 outputs) + Analog current output

-T/-V
-T: PNP (2 outputs) + Analog voltage output
-V: PNP (2 outputs) + Analog current output

For M8 connector, 3 pins
-N
NPN (1 output)

-P
PNP (1 output)
When the pressure switch is used in a place where water and dust splashes may occur, insert a tube into the atmospheric vent port, and route the other end of the tube to a safe place away from water and dust.

* SMC TU0425 (polyurethane, O.D. ø4, I.D. ø2.5) suits to the pressure switch.
2-Color Display High-Precision Digital Pressure Switch ZSE40A(F)/ISE40A Series

Dimensions/For M8 (3-pin) connector

ZSE40A/ISE40A-01-□□□-
-N01-□□□-

When the pressure switch is used in a place where water and dust splashes may occur, insert a tube into the atmospheric vent port, and route the other end of the tube to a safe place away from water and dust.
* SMC TU0425 (polyurethane, O.D. ø4, I.D. ø2.5) suits to the pressure switch.

M8 (3-pin) cable with connector
V100-49-1-

Socket connector pin assignment

Cable length(L) | Part no.
---|---
300 mm | V100-49-1-1
500 mm | V100-49-1-2
1000 mm | V100-49-1-3
2000 mm | V100-49-1-4
5000 mm | V100-49-1-7

PCA-1557772

Socket connector pin assignment

Connections

Plug connector pin assignment
Dimensions (For details about lead wires, refer to the product specifications.)

**ZSE40A(F)/ISE40A-C4**

- **-C6**

When the pressure switch is used in a place where water and dust splashes may occur, insert a tube into the atmospheric vent port, and route the other end of the tube to a safe place away from water and dust.

+ SMC TU0425 (polyurethane, O.D. ø4, I.D. ø2.5) suits to the pressure switch.
**Dimensions** (For details about lead wires, refer to the product specifications.)

**ZSE40A(F)/ISE40A-01-□-□A□**

With bracket A

For M8 (3-pin) connector

**ZSE40A/ISE40A-01-□-□LA**

With bracket A
ZSE40A(F)/ISE40A Series

Dimensions (For details about lead wires, refer to the product specifications.)

ZSE40A(F)/ISE40A-01-□-□D□
-N01-□-□D□

With bracket D

For M8 (3-pin) connector
ZSE40A/ISE40A-01-□-□LD
-N01-□-□LD

With bracket D
2-Color Display High-Precision Digital Pressure Switch **ZSE40A(F)/ISE40A Series**

**Dimensions** (For details about lead wires, refer to the product specifications.)

ZSE40A(F)/ISE40A-W1-□-□A□
-WF1-□-□A□

With bracket A

ZSE40A(F)/ISE40A-W1-□-□B□
-WF1-□-□B□

With bracket B
Dimensions (For details about lead wires, refer to the product specifications.)

ZSE40A(F)/ISE40A-W1-□-□D□
-WF1-□-□D□

With bracket D
Dimensions
(For details about lead wires, refer to the product specifications.)

ZSE40A(F)/ISE40A-01-□-□E□
-ZSE40A(F)/ISE40A-N01-□-□E□

Panel mount adapter

ZSE40A(F)/ISE40A-01-□-□F□
-ZSE40A(F)/ISE40A-N01-□-□F□

Panel mount adapter + Front protective cover
ZSE40A(F)/ISE40A Series

Dimensions (For details about lead wires, refer to the product specifications.)

ZSE40A(F)/ISE40A-W1-□-□E□
-WF1-□-□E□
Panel mount adapter

Panel mount adapter + Front protective cover
**Dimensions** (For details about lead wires, refer to the product specifications.)

**ZSE40A(F)/ISE40A-C4-E**
- **C6-E**

Panel mount adapter

**ZSE40A(F)/ISE40A-C4-F**
- **C6-F**

Panel mount adapter + Front protective cover
Panel fitting dimensions

Panel thickness 1 to 5 mm

Note) This is the minimum value for the piping method 01 or N01.
Take the piping material and tubing into account for design. When the corner is to have radius, it must be R3 or less.
Function Details

A Copy function (F97)
The settings of the master sensor can be copied to the slave sensors, reducing setting labor and minimizing risk of mistakes in setting.
Can copy to up to 10 switches simultaneously.
(Maximum transmission distance 4 m)

1) Wire as shown in the left figure.
2) Select the slave switch which is to be the master, and change it into a master using the buttons. (In the default setting, all switches are set as slaves.)
3) Press the button of the master switch to start copying.

B Auto-preset function (F4)
Auto-preset function, when selected in the initial setting, calculates and stores the set-value from the measured pressure.
The optimum set-value is determined automatically by repeating vacuum and break with the target workpiece several times.

C Display calibration function (F6)
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.)

D Peak/Bottom value indication
This function constantly detects and updates the maximum (minimum) value and allows to hold the maximum (minimum) pressure value.
When the and buttons are simultaneously pressed for 1 second or longer, while “holding”, the hold value will be reset.

E Keylock function
Prevents operation errors such as accidentally changing setting values.

F Zero-clear function
This function clears and resets the zero value on the display of measured pressure.
For the pressure switch with analog output, the analog output shifts according to the indication. The indicated value can be adjusted within ±7% F.S. of the pressure when ex-factory. (ZSE40AF (for compound pressure) ±3.5% F.S.)
Function Details

G Error indication function

<table>
<thead>
<tr>
<th>Error name</th>
<th>Error code</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overcurrent error</td>
<td>Er1</td>
<td>Load current of 80 mA or more is applied to the switch output (OUT1).</td>
<td>Eliminate the cause of the over current by turning off the power supply, and then turn it again.</td>
</tr>
<tr>
<td></td>
<td>Er2</td>
<td>Load current of 80 mA or more is applied to the switch output (OUT2).</td>
<td></td>
</tr>
<tr>
<td>Residual pressure error</td>
<td>Er3</td>
<td>During zero-clear operation, pressure over ±7% F.S. is applied. (ZSE40AF (compound) ±3.5% F.S.) After 1 second, the mode will reset to measurement mode. ±1% F.S. of the zero-clear range varies between individual products.</td>
<td>Perform zero-clear operation again after restoring the applied pressure to an atmospheric pressure condition.</td>
</tr>
<tr>
<td>Applied pressure error</td>
<td>HHH</td>
<td>Supply pressure exceeds the maximum set pressure.</td>
<td>Reset applied pressure to a level within the set pressure range.</td>
</tr>
<tr>
<td></td>
<td>LLL</td>
<td>Supply pressure is below the minimum set pressure.</td>
<td></td>
</tr>
<tr>
<td>Auto-shift error</td>
<td>a or r</td>
<td>The value measured at the time of auto-shift input is outside the set pressure range. * After displaying the error code for about 1 second, the switch returns to the measuring mode.</td>
<td>The controller does not respond to the auto-shift signal. Check the equipment and machinery for this point.</td>
</tr>
<tr>
<td>System error</td>
<td>Er0</td>
<td>Internal data error</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Er4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Er6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Er7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Er8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Er9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

H Anti-chattering function (F3)

A large bore cylinder or ejector consumes a large volume of air in operation and may experience a temporary drop in the supply pressure. This function prevents detection of such temporary drops in the supply pressure as an error.

**<Principle>**

This function averages pressure values measured during the response time set by the user and then compares the average pressure value with the pressure set point value to output the result on the switch.

![Diagram of pressure and time relationship](image)

- **Switch output operation in normal conditions**
- **Switch output operation when anti-chattering function is on.**

I Display unit switching function (F0)

Display units can be switched with this function.

<table>
<thead>
<tr>
<th>Display unit</th>
<th>PR</th>
<th>GF</th>
<th>bR</th>
<th>PS</th>
<th>inHg</th>
<th>mmHg</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZSE40A (vacuum pressure)</td>
<td>0.1</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.01</td>
<td>0.1</td>
</tr>
<tr>
<td>ZSE40AF (compound pressure)</td>
<td>0.1</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.02</td>
<td>0.1</td>
</tr>
<tr>
<td>ISE40A (positive pressure)</td>
<td>1</td>
<td>0.001</td>
<td>0.01</td>
<td>0.01</td>
<td>0.1</td>
<td></td>
</tr>
</tbody>
</table>

* The ZSE40A (vacuum pressure) and ZSE40AF (compound pressure) will have different setting and display resolution when the unit is set to MPa.

Available response time settings

- 20 ms, 100 ms, 500 ms, 1000 ms, 2000 ms
**J** Power-saving mode (F80)

Power-saving mode can be selected. It shifts to the power-saving mode without button operation for 30 seconds. It is set to the normal mode (Power-saving mode is OFF) when ex-factory. (Decimal points and operation indicator light (only when the switch output is turned ON) blink in the power-saving mode.)

**K** Setting of secret code (F81)

Users can select whether a secret code must be entered to release key lock. At the time of shipment from the factory, it is set such that the secret code is not required.

**L** Auto-shift function (F5)

When there are large fluctuations in the supply pressure, the switch may fail to operate correctly. The auto-shift function compensates such supply pressure fluctuations. It measures the pressure at the time of auto-shift signal input and uses it as the reference pressure to correct the set-value on the switch.

**Set-value correction by auto-shift function**

<table>
<thead>
<tr>
<th>Pressure (Differential)</th>
<th>Switch output</th>
<th>Rectified Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply pressure normal</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>Supply pressure drop</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>Supply pressure increase</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Rectified value

When the auto-shift is selected, “−∞” will be displayed for about 1 second, and the pressure value at that point will be saved as a rectified value “\(\pm S\).” Based on the saved rectified values, the set-value \(\text{Note)}\) of “\(P_{-1}\),” “\(H_{-1}\),” “\(P_{+2}\),” and “\(H_{+2}\)” will likewise be rectified.

**Note)** When an output is reversed, “\(n_{-1}\),” “\(H_{-1}\),” “\(n_{+2}\),” “\(H_{+2}\)” will be rectified.

**Settable Range for Auto-Shift Input**

<table>
<thead>
<tr>
<th></th>
<th>Set pressure range</th>
<th>Settable range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compound pressure</td>
<td>–105.0 to 105.0 kPa</td>
<td>–210 to 210 kPa</td>
</tr>
<tr>
<td>Vacuum pressure</td>
<td>10.0 to –105.0 kPa</td>
<td>115.0 to –115.0 kPa</td>
</tr>
<tr>
<td>Positive pressure</td>
<td>–0.105 to 1.050 MPa</td>
<td>–1.155 to 1.155 MPa</td>
</tr>
</tbody>
</table>

**Auto-shift zero**

The basic function of auto-shift zero is the same as the function for auto-shift. Also, it corrects values on the display, based on a pressure value of “\(0\),” when the auto-shift is selected.
ZSE40A(F)/ISE40A Series
Made to Order
Please contact SMC for detailed dimensions, specifications and lead times.

1 Lead Wire Length 3 m

It has a lead wire extended to 3 meters.

How to Order

ZSE40A(F)/ISE40A - X501

Piping specifications
Output specifications
Unit specifications/Option

2 M12 4-pin Pre-wired Connector (Lead wire length 100 mm)

How to Order

ZSE40A(F)/ISE40A - X531

Piping specifications
Unit specifications/Option

Output specifications
X: NPN open collector 2 outputs
Y: PNP open collector 2 outputs

Pin arrangement

Symbol

Refer to “How to Order” on page 47 for standard specifications.