High Precision, Digital Pressure Switch
Series ZSE40/ISE40

High precision/High resolution
Vacuum pressure 1/1000 (0.1kPa)
Compound pressure 1/2000 (0.1kPa)
Positive pressure 1/1000 (0.001MPa)
High speed response: 2.5 ms or less
With anti-chattering function
Stable switch output is possible even with sudden changes.

Anti-chattering function
Devices such as large bore cylinders and high-flow vacuum ejectors consume a large volume of air when they operate, and this may cause a momentary drop in the primary pressure. This function prevents such momentary pressure drops from being detected as abnormal pressures by allowing the response time selection to be changed.

[Selectable response times: t]
- 2.5 ms (normal), 24 ms, 192 ms or 768 ms
- The normal setting is selected when shipped from the factory.

(Operating principle)
The pressure values measured within the user-selected response time are averaged, and switch output (ON/OFF) is determined by comparing this averaged pressure value with the set pressure.

With auto shift function
Allows switch output unaffected by variations in primary pressure.

Auto shift function
Erroneous operation may occur if there is fluctuation in the primary pressure.
The auto shift function compensates for pressure changes to ensure proper ON/OFF switch response during such fluctuations.

(Operating principle)
At the point when the primary pressure fluctuates, the set pressure value is compensated by setting the auto shift input (external input) to low (no-voltage) input, using the pressure measured at that point as a standard.

Compound pressure (ZSE40F)
Able to detect suction pressure (vacuum pressure) and release pressure (positive pressure) with a single pressure switch.

3 types of piping
Different piping methods are possible to accommodate the installation location.

Repeatability
±0.2% F.S. ±1 digit or less

IP65 compatible
Dusttight/Splash proof type
How to Order

**For positive pressure**
- **ISE40**
  - 01 22

**For vacuum/compound pressure**
- **ZSE40**
  - 01 22

### Set pressure range

<table>
<thead>
<tr>
<th>Nil</th>
<th>–0.100 to 1.000 MPa</th>
<th>For positive pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>–100.0 to 100.0 kPa</td>
<td>For vacuum pressure</td>
</tr>
</tbody>
</table>

### Piping specifications

- **01:** R 1/8 (With M5 female threads)
- **W1:** Rc 1/8
- **T1:** NPT 1/8 (With M5 female threads)

- **C4:** With ø4 One-touch fitting
- **M5:** M5 x 0.8 (Female threads)

- **Option**
  - Bracket A (ZS-24-A)
  - Bracket B (ZS-24-B)
  - Panel mount (ZS-22-A)
  - Panel mount + Front protective cover (ZS-24-C)

### Input/Output specifications

<table>
<thead>
<tr>
<th>22</th>
<th>NPN open collector 2 outputs + analog output</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>NPN open collector 2 outputs + auto shift input</td>
</tr>
<tr>
<td>62</td>
<td>PNP open collector 2 outputs + analog output</td>
</tr>
<tr>
<td>70</td>
<td>PNP open collector 2 outputs + auto shift input</td>
</tr>
</tbody>
</table>

### Note

When equipped with auto shift function, the following ranges can be set.

<table>
<thead>
<tr>
<th>Set pressure range</th>
<th>Setting range</th>
</tr>
</thead>
<tbody>
<tr>
<td>–100.0 to 100.0 kPa</td>
<td>–100.0 to 100.0 kPa</td>
</tr>
<tr>
<td>10.0 to –101.3 kPa</td>
<td>101.3 to 101.3 kPa</td>
</tr>
<tr>
<td>–0.1 to 1.000 MPa</td>
<td>–1.000 to 1.000 MPa</td>
</tr>
</tbody>
</table>

### Unit specifications

<table>
<thead>
<tr>
<th>Nil</th>
<th>With unit switching function Note 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>SI unit only Note 2)</td>
</tr>
</tbody>
</table>

Note 1) This will no longer be sold for use in Japan after the new Weight and Measure Act is implemented (October, 1999).

Note 2) Fixed unit:
- For vacuum/compound pressure: kPa
- For positive pressure: MPa

### Lead wire length

<table>
<thead>
<tr>
<th>Nil</th>
<th>0.6 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>3 m</td>
</tr>
</tbody>
</table>
### Specifications

<table>
<thead>
<tr>
<th></th>
<th>ZSE40F (Compound pressure)</th>
<th>ZSE40 (Vacuum pressure)</th>
<th>ISE40 (Positive pressure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated pressure range</td>
<td>–100.0 to 100.0 kPa</td>
<td>0.0 to –101.3 kPa</td>
<td>0.000 to 1,000 MPa</td>
</tr>
<tr>
<td>Operating pressure range/Set pressure range</td>
<td>–100.0 to 100.0 kPa</td>
<td>10.0 to –101.3 kPa</td>
<td>–0.100 to 1,000 MPa</td>
</tr>
<tr>
<td>Withstand pressure</td>
<td>500 kPa</td>
<td>1.5 MPa</td>
<td>–</td>
</tr>
<tr>
<td>Set pressure resolution Note 1</td>
<td>kPa</td>
<td>MPa</td>
<td>psi</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>0.001</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>kgf/cm²</td>
<td>0.001</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>psi</td>
<td>0.02</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>mmHg</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>inHg</td>
<td>0.1</td>
<td>–</td>
</tr>
<tr>
<td>Applicable fluid</td>
<td>Air, Non-corrosive/Non-flammable gas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>12 to 24 VDC ±10%, Ripple (p-p) 10% or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>55 mA or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch output</td>
<td>NPN or PNP 2 outputs</td>
<td>Max. load current: 80 mA</td>
<td>Max. applied voltage: 30 VDC (With NPN output)</td>
</tr>
<tr>
<td>Repeatability</td>
<td>±0.2% F.S., ±1 digit or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>Variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Window comparator mode</td>
<td>Fixed (3 digits) Note 4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time (With anti-chattering function)</td>
<td>2.5 ms or less (With anti-chattering function: 24 ms, 192 ms and 768 ms selections)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output short circuit protection</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>3 1/2 digit LED display (Sampling cycle: 5 times/sec.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display accuracy</td>
<td>±2% F.S., ±1 digit or less (at ambient temperature of 25°C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator light</td>
<td>Green LED (OUT1: Lights when ON), Red LED (OUT2: Lights when ON)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog output Note 2)</td>
<td>Output voltage: 1 to 5 V ±5% F.S. or less (in rated pressure range) Linearity: ±1% F.S. or less Output impedance: Approx. 1 kΩ</td>
<td>Output voltage: 1 to 5 V ±2.5% F.S. or less (in rated pressure range) Linearity: ±1% F.S. or less Output impedance: Approx. 1 kΩ</td>
<td></td>
</tr>
<tr>
<td>Auto shift input Note 3)</td>
<td>Enclosure: IP65 Operating temperature range: Operating: 0 to 50°C, Stored: –10 to 60°C (No condensation or freezing) Ambient humidity range: Operating/Storage: 35 to 85% RH (No condensation) Withstand voltage: 1000 VAC for 1 min. between lead wires and body Insulation resistance: 50 MΩ or more (at 500 VDC) between lead wires and body Vibration resistance: 10 to 500 Hz at the smaller of amplitude 1.5 mm or acceleration 98 m/s² (10 G) in X, Y, Z directions for 2 hrs. each (De-energized) Impact resistance: 980 m/s² (100 G) in X, Y, Z directions 3 times each (De-energized) Temperature characteristics: In a temperature range of 0 to 50°C, ±2% F.S. or less of pressure measured at 25°C Port size: 01: R 1/8, M5 x 0.8, T1: NPT1/8, M5 x 0.8, W1: Rc 1/8 C4: With ø4 One-touch fitting, C6: With ø6 One-touch fitting, M5: M5 female threads Lead wire: 5-wire oil resistant heavy-duty cord (0.15 mm²) Weight: 01/11 types approx. 60 g, W1 type approx. 80 g, C4/C6/M5 types approx. 92 g (Each including 0.6 m lead wires)</td>
<td>Note)</td>
<td>Note)</td>
</tr>
</tbody>
</table>

**Example of Internal Circuit and Wiring**

- **ZSE40F**
  - **ISE40□-22(L)-[M]**
    - With analog output
    - Main circuit: 12 to 24 VDC
  - **ISE40□-30(L)-[M]**
    - With auto shift input
    - Main circuit: 12 to 24 VDC

- **ZSE40F**
  - **ISE40□-62(L)-[M]**
    - With analog output
    - Main circuit: 12 to 24 VDC
  - **ISE40□-70(L)-[M]**
    - With auto shift input
    - Main circuit: 12 to 24 VDC
Description

**3 1/2-digit LED**
Displays present pressure.
Displays each mode.
Displays error mode.

**LED (Green)**
Displays OUT1 output condition
When it is ON, the LED is illuminated.

**UP button**
Switching of the mode and set value

**LED (Red)**
Displays OUT2 output condition.
When it is ON, the LED is illuminated.

**DOWN button**
Switches the mode and set value.

**SET button**
Switches to each mode and fixes the set value.

Calibration Procedures

**Setting procedure**

- **Initial setting**
  Set “Output mode”, “Response time” and “Auto or Manual mode”.

- **Manual pressure setting**
  Enter the set value of the pressure to perform switch output.

- **Auto preset**
  Automatically sets the pressure for the adsorption confirmation or supply pressure confirmation.

- **Zero clear**
  Adjusts the zero point of the atmospheric pressure.

- **Manual pressure setting**
  Allows fine-tuning of the data set automatically by auto preset.

- **Key lock mode**
  Mode is not switched, even if the button is pressed during operation.

- **Normal operation**
  Measured pressure is displayed and the switch operation begins.
**Calibration Procedures**

### Initial Setting

1. **Initial condition mode**
   - Press the “SET” button for more than 2 seconds until “INo” is displayed. Release it when the display turns to “INc”.

   **Unit mode:** When using a product with a unit switching function, refer to the next page for unit-setting (for overseas).

2. **Selection of output mode OUT1**
   - Select the “output mode” for OUT1 by pressing either ▲ button or ▼ button.
   - “INo” Normally open mode
   - “INc” Normally closed mode

3. **Selection of output mode OUT2**
   - Select the “output mode” for OUT2 by pressing either ▲ button or ▼ button.
   - “2INo” Normally open mode
   - “2INc” Normally closed mode

4. **Selection of response time**
   - Select the response time by pressing either ▲ button or ▼ button.
   - (25: 2.5 ms, 24: 24 ms, 192: 192 ms, 768: 768 ms)
   - Select among them.

5. **Setting Auto/Manual**
   - Select “Auto preset mode” or “Manual set mode” by pressing either ▲ button or ▼ button.
   - “RAuto” Auto preset mode
   - “RManual” Manual set mode

### Manual Pressure Setting

**Output mode differs by the pressure set value.**

1. **Manual set mode**
   - Select the manual set mode in the initial condition mode and press the “SET” button until “P_i” or “n_i” is displayed.

   **▲ button:** Increases set value
   **▼ button:** Decreases set value
   - Displays the set values “P_i” or “n_i” alternately.

2. **Input set point value for OUT1 (1)**
   - Press the “SET” button.

3. **Input set point value for OUT1 (2)**
   - Press the “SET” button.

4. **Input set point value for OUT2 (1)**
   - Press the “SET” button.

5. **Input set point value for OUT2 (2)**
   - Press the “SET” button.

6. **Display of setting auto shift**
   - Press the “SET” button to complete the setting.

   **▲ button:** Increases set value
   **▼ button:** Decreases set value
   - Displays the set values “P_i” or “n_i” alternately.

   **▲ button:** Increases set value
   **▼ button:** Decreases set value
   - Displays the set values “P_i” or “n_i” alternately.

   **▲ button:** Increases set value
   **▼ button:** Decreases set value
   - Displays the set values “P_i” or “n_i” alternately.

   **▲ button:** Increases set value
   **▼ button:** Decreases set value
   - Displays the set values “P_i” or “n_i” alternately.

**Only for ZSE40(F)/ISE40-(F)-30/70(L)-M:**
- Displays the input mode “C_i” and the compensation value alternately.
- If auto shift input is not complete, zero is displayed.
Prepare the equipment for use under operating conditions. When setting OUT1 is not required, press both the \(/L50303\) button and \(/L50300\) button simultaneously in this state to skip to "       ".

Select the Auto preset mode in the initial setting mode and press the "SET" button until "       " is displayed.

**Auto Preset (For adsorption confirmation)**

1. **Auto preset mode**

Select the Auto preset mode in the initial setting mode and press the "SET" button until "RP 1" is displayed.

2. **Preparation for auto preset**

Prepare the equipment for use under operating conditions. When setting OUT1 is not required, press both the \(\uparrow\) button and \(\downarrow\) button simultaneously in this state to skip to "RP 2".

3. **Auto preset of OUT1**

Repeat adsorption and non-adsorption release several times in this state. The optimal set value is determined automatically.

4. **Preparation for auto preset**

Supplies vacuum pressure, changing the condition of a workpiece by adsorption nozzle, etc. When setting OUT2 is not required, press both the \(\uparrow\) button and \(\downarrow\) button simultaneously in this state to skip to the measurement mode.

5. **Auto preset of OUT2**

Repeat adsorption and non-adsorption several times in this state. The optimum set value is determined automatically.
Series ZSE40/ISE40

Calibration Procedures

Auto Preset (In the case of confirming the supply pressure)

1. Auto preset mode

Select the Auto preset mode in the initial setting mode and press the “SET” button until “AP1” is displayed.

2. Preparation for auto preset

Prepare the equipment for use under operating conditions. When setting OUT1 is not required, press both the ▲ button and ▼ button simultaneously in this state to skip to “AP2”.

3. Auto preset of OUT1

The pressure is read and the optimal set value is determined automatically.

4. Preparation for auto preset

Press the “SET” button.

5. Auto preset of OUT2

The pressure is read and the optimal set value is determined automatically.

Other Functions

● Key lock mode

Used to avoid a malfunction when buttons on the front part of the switch are pressed.

Initiate key lock

Press the “SET” button for 4 seconds or longer. Release it when the display turns to “UnL”.

Release key lock

Press the “SET” button to complete the setting.

● Peak mode

Allows holding of the maximum pressure value on display under measurement.

While displayed, pressing the ▲ button for 1 second or longer causes the peak mode to display and blink. Pressing the ▲ button once again for 1 second or longer reinstates it. Note: Displaying the peak and the bottom display is not distinguished.

● Bottom mode

Allows holding of the minimum pressure value on display under measurement.

While displayed, pressing the ▼ button for 1 second or longer causes the bottom mode to display and blink. Pressing the ▼ button once again for 1 second or longer reinstates it. Note: Displaying the peak and the bottom display is not distinguished.

● Zero clear

Allows an adjust to zero on the display if the pressure to be measured is within a range of ±70 digits from the atmospheric pressure.

Pressing the ▲ + ▼ buttons simultaneously with the supply pressure released to the atmosphere, causes it to reset to zero on the display and completes the zero clear operation. The function then returns to the measurement mode.
High Precision, Digital Pressure Switch Series ZSE40/ISE40

Dimensions

ZSE40(F)/ISE40-01

* For splash proof use (IP65), insert an air tube into the atmospheric release port.
(Refer to "Precautions" on page 16-2-24 for details.)

ZSE40(F)/ISE40-W1

* For splash proof use (IP65), insert an air tube into the atmospheric release port.
(Refer to "Precautions" on page 16-2-24 for details.)
Caution

1. Immediately after supplying power, there is drift of about ±0.5% F.S. When used with very low pressure, allow the unit to warm up for about 20 to 30 minutes.

2. Do not use in locations where there is splashing or spraying of oils and solvents.

3. When using a commercially available switching regulator, be sure to ground the FG terminal.

4. In locations where the switch is exposed to water and dust, etc., these may enter the switch from the atmospheric release port. Insert ø4 tubing (inside diameter ø2.5) into the atmospheric release port, and extend the other end to a safe area where water, etc., is not splashed or sprayed. Be sure that tubing is not bent and holes are not blocked, etc., or it will become impossible to make correct pressure measurements.

Precautions

For splash proof use (IP65), insert an air tube into the atmospheric release port. (Refer to “Precautions” for details.)