With Backlight
Digital Pressure Switch

Series ZSE5B
(For vacuum)
ISE5B
(For positive pressure)

Two independent outputs
Allows the calibration of 2 different setpoints, e.g., change of vacuum pad size requiring different setpoints, or two different supply pressures requiring different pressure confirmation points.

Choice of display units

| Atmosphere          | mmHg ⇔ kPa ⇔ PSI ⇔ kgf/cm² ⇔ bar
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum</td>
<td></td>
</tr>
<tr>
<td>Positive pressure</td>
<td></td>
</tr>
</tbody>
</table>

MPa ⇔ PSI ⇔ kgf/cm² ⇔ bar

Variety of switch output modes

<table>
<thead>
<tr>
<th>Hysteresis mode</th>
<th>P2 P1</th>
<th>ON OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Standard)</td>
<td>(Reversed)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Window comparator mode</th>
<th>P1 P2</th>
<th>n1 n2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Standard)</td>
<td>(Reversed)</td>
<td></td>
</tr>
</tbody>
</table>

Exact detection of atmospheric pressure (For vacuum)

Atmospheric pressure can be detected after vacuum release pressure is applied.

Calibration data

The calibration data is stored in an EEPROM. The EEPROM is rated to keep its memory for 100,000 hours (approx. 11 years) even without power supplied.

Panel mounting available

A special adapter permits panel mounting.

Stainless steel diaphragm

SUS630 and SUS304 are used for wetted parts.

Leakage rate: $1 \times 10^{-4} \text{ atm cc/s}$

The sensor section and fitting are electron beam welded. This switch can be used with liquids and gases.

For General Purpose Fluids

- Hydraulic fluid
- Silicon oil
- Lubrication oil
- Dry air
- Carbon dioxide
- Ammonia
- Drain-containing air
- Argon
- Nitrogen gas
- Freon

For use in various fluid applications

- P Hydraulic fluid
- P Silicone oil
- P Lubrication oil
- P Dry air
- P Carbon dioxide
- P Ammonia
- P Drain-containing air
- P Argon
- P Nitrogen gas
- P Freon

Leakage rate: $1 \times 10^{-4} \text{ atm cc/s}$

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Exact detection of atmospheric pressure (For vacuum)

Atmospheric pressure can be detected after vacuum release pressure is applied.

Calibration data

The calibration data is stored in an EEPROM. The EEPROM is rated to keep its memory for 100,000 hours (approx. 11 years) even without power supplied.

Panel mounting available

A special adapter permits panel mounting.
How to Order

Positive pressure  | ISE5B  | L |
Vacuum            | ZSE5B  | L |

Port size
- T2: NPTF 1/4
- T2: NPTF 1/4

Lead wire length
- L: 3m

Output specifications
- 26: Analog output (1 to 5V)
- 27: NPN Open collector 2 outputs (linking)
- 67: PNP Open collector 2 outputs (sourcing)

Panel mount adaptor No.
- (Panel adaptor A + Panel adaptor B + Mounting bracket)
- ZS-22-03: Panel adaptor A
- ZS-22-02: Panel adaptor B
- ZS-22-03: Mounting bracket

Bracket (Optional)
- ZS-22-D: With four M3 mounting threads

Note: M3 X 0.8 (Female) threaded.

With Backlight Digital Pressure Switch ZSE5B/ISE5B
# Specifications

## Model

<table>
<thead>
<tr>
<th></th>
<th>Vacuum ZSE5B</th>
<th>Positive pressure ISE5B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating pressure range</strong></td>
<td>−100 to 100kPa</td>
<td>−0.1 to 1MPa</td>
</tr>
<tr>
<td><strong>Max. pressure</strong></td>
<td>200kPa</td>
<td>1.5MPa</td>
</tr>
<tr>
<td><strong>Min. display unit</strong></td>
<td>kPa</td>
<td>MPa</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>—</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>0.02</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>0.02</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Indicator light</strong></td>
<td>ON: When Green LED(OUT1) or Red(OUT2) turns on</td>
<td></td>
</tr>
<tr>
<td><strong>Frequency response</strong></td>
<td>200Hz (5ms)</td>
<td></td>
</tr>
<tr>
<td><strong>Hysteresis mode</strong></td>
<td>Adjustable (2 digits or more)</td>
<td>Adjustable (3 digits or more)</td>
</tr>
<tr>
<td><strong>Window comparator mode</strong></td>
<td>Fixed (2 digits)</td>
<td>Fixed (3 digits)</td>
</tr>
<tr>
<td><strong>Fluid</strong></td>
<td>Fluid that will not corrode SUS304 and SUS630</td>
<td></td>
</tr>
<tr>
<td><strong>Temperature characteristics</strong></td>
<td>± 3% F. S. or less</td>
<td></td>
</tr>
<tr>
<td><strong>Repeatability</strong></td>
<td>± 1% F. S. or less</td>
<td></td>
</tr>
<tr>
<td><strong>Supply voltage</strong></td>
<td>12 to 24V DC (Ripple ±10% or less)</td>
<td></td>
</tr>
<tr>
<td><strong>Output specification</strong></td>
<td>NPN open collector 30V, 80mA or less</td>
<td>PNP open collector 80mA or less</td>
</tr>
<tr>
<td><strong>Current consumption</strong></td>
<td>45mA or less</td>
<td></td>
</tr>
<tr>
<td><strong>Error display</strong></td>
<td>Red light blinks. Display the error code on LCD</td>
<td></td>
</tr>
<tr>
<td><strong>Pressure display</strong></td>
<td>3 1/2 digits (10mm-size numerals)</td>
<td></td>
</tr>
<tr>
<td><strong>Self-diagnostic function</strong></td>
<td>Over current (1), Over pressure, Data error, Pressure during 0 clear</td>
<td></td>
</tr>
<tr>
<td><strong>Operating temperature range</strong></td>
<td>0 to 50°C (No condensation)</td>
<td></td>
</tr>
<tr>
<td><strong>Noise resistance</strong></td>
<td>Between external terminals and housing 250V AC, 50/60Hz for 1 min.</td>
<td></td>
</tr>
<tr>
<td><strong>Voltage resistance</strong></td>
<td>Between external terminals and housing 2MΩ (50V DC by megometer)</td>
<td></td>
</tr>
<tr>
<td><strong>Vibration resistance</strong></td>
<td>500Vp-p, Pulse width 1.5µS, Standing: 1nS</td>
<td></td>
</tr>
<tr>
<td><strong>Shock resistance</strong></td>
<td>980 m/s² in X, Y, Z directions (3 times for each direction)</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>126g (including 3m-long lead wire)</td>
<td></td>
</tr>
<tr>
<td><strong>Port size</strong></td>
<td>02: R(PT) 1/4, M5 X 0.8</td>
<td>T2: NPTF1/4, M5 X 0.8</td>
</tr>
<tr>
<td><strong>Protective construction</strong></td>
<td>IP40</td>
<td></td>
</tr>
</tbody>
</table>

### Note 1

- **Hysteresis mode**:  
  ZSE: When the values of P1 and P2 are the same or when P1>P2 within 2 digits, the hysteresis will be automatically 2 digits for the set value of P1.  
  ISE: When the values of P1 and P2 are the same or when P1>P2 within 3 digits, the hysteresis will be automatically 3 digits for the set value of P1.  
- **Window comparator mode**:  
  ZSE: The hysteresis is 2 digits, so separate P1 from P2 by 5 digits or more and set them.  
  ISE: The hysteresis is 3 digits, so separate P1 from P2 by 7 digits or more and set them.  
  +1 digit is the minimum pressure display unit. (See the table above.)

### Note 2

- Analog output has no overcurrent detection function.

## Description

### UP key

Increases ON/OFF set point value. Switched to peak mode high.

### LED (Green)

Displays OUT1 operation condition.

### RESET key

Reset the switch by pressing the UP and DOWN buttons simultaneously. Clears anomaly. Displays "0".

### LCD

Displays present pressure. Displays ON/OFF set point value. Displays error code. Displays unit.

### DOWN key

Decreases ON/OFF set point value. Used for switch to peak mode low, unit change and output mode change.

### LED (Red)

Displays OUT2 operation condition. Blinks on and off when an error occurs.

### SET key

Changes the mode. Used for unit change and output mode change by pressing the button for at least 1 second.
With Backlight Digital Pressure Switch **ZSE5B/ISE5B**

**Calibration Procedure**

1. **Initial setup**
   Select "Display unit" and "Output mode".
   - Press the button "S" for at least 1 second. "1.3" is displayed and the display blinks.
   - Note: "1.3" is a program version of micro computer.

2. **Selection of "Display unit"**
   - Select "Display unit" by pressing the \( \text{\downarrow} \) button.
   - For High pressure: \( \text{MPa} \rightarrow \text{PSI} \rightarrow \text{kgf/cm}^2 \rightarrow \text{bar} \)
   - For Low pressure: \( \text{mmHg} \rightarrow \text{kPa} \rightarrow \text{PSI} \rightarrow \text{kgf/cm}^2 \rightarrow \text{bar} \)
   - Note: "1.3" is a program version of micro computer.

3. **Selection of "OUT1 output mode"**
   - Select "Output mode" by pressing the \( \text{\uparrow} \) button.
   - \( P \): Normal mode
   - \( n \): Reversed output mode
   - (Refer to Table 1)

4. **Selection of "OUT2 output mode"**
   - By pressing the button "S", the calibration is completed.
   - \( P \): Normal mode
   - \( n \): Reversed output mode
   - (Refer to Table 1)

**Table 1 Output mode**

- \( P \): Normal mode
- \( n \): Reversed output mode

**OUT1**

- \( P \) mode:
  - ON
  - OFF

- \( n \) mode:
  - OFF

**OUT2**

- \( P \) mode:
  - ON
  - OFF

- \( n \) mode:
  - OFF

**Note**

- \( H \) (Fixed hysteresis): \( \geq 2 \) digits (ZSE5B) or \( \geq 3 \) digits (ISE5B)
- \( P \) (Hysteresis mode): \( \geq 2 \) digits (ZSE5B) or \( \geq 3 \) digits (ISE5B)
- \( n \) (Hysteresis mode): \( \geq 2 \) digits (ZSE5B) or \( \geq 3 \) digits (ISE5B)

**Normal operation**

- Measured pressure, displayed, switch operation occurs.

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**Initial setup Calibration Normal operation**

1. Initial setup mode
2. Selection of "Display unit"
3. Selection of "OUT1 output mode"
4. Selection of "OUT2 output mode"
ZSE5B/ISE5B

Calibration Procedure

Calibration

**Table 2 Vacuum ZSE5 calibration.**

The setting range for ZSE5 is –100kPa to 100kPa. Take notice that the setting method is different from the positive pressure type.

1. **Hysteresis mode**
   
   *Ex.* When switched at more than –50kPa and hysteresis is 10kPa.
   
   - Set P1 at –40kPa and P2 at –50kPa.
   
   Note) Pressure must be P1>P2.
   
   Note) Set the hysteresis more than 2 digits.
   
   "Digit" is the minimum setting unit of the pressure.
   
   1 digit: 0kPa, 10mmHg
   0.02kgf/cm²
   0.2PSI
   0.02bar

2. **Window comparator mode**
   
   *Ex.* When switched at –70kPa to –30kPa.
   
   - Set P1 at –70kPa and P2 at –30kPa.
   
   Note) Hysteresis is automatically set by 2 digits in case of window comparator mode.

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Note) Set the hysteresis more than 2 digits.
Other Functions

**Peak Mode High**
To display the high peak pressure (highest degree of vacuum), press the UP button during normal operation. The LCD displays "H". To return back to normal operation press the UP button again.

**Peak Mode Low**
To display the low peak pressure (lowest degree of vacuum), press the DOWN button during normal operation. The LCD displays "L". To return back normal operation, press the DOWN button again.

**Reset Function**
Simultaneously pressing the UP and DOWN button will reset the switch:
1) Reset will cause the following during normal operation:
   - Peak high is cleared.
   - Peak low is cleared. Zero is reset.
2) Reset will cause the following when error has occurred:
   - Switch will assume normal operation (all calibration data has retained).
   - In case of data error, reset the setup mode and then switch will assume normal operation.
   - Note) Reset Function does not work during setup mode.

Error Codes

<table>
<thead>
<tr>
<th>Display</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1dE</td>
<td>Calibraton was changed by accident, reason unknown.</td>
<td>Push Up and Down buttons to reset all the data.</td>
</tr>
<tr>
<td>1) CE1</td>
<td>Output 1 output current is exceeding 80mA.</td>
<td>Turn off the power and verify the load connected output 1.</td>
</tr>
<tr>
<td></td>
<td>Output 1 (Black wire) could be shorted out.</td>
<td>Verify that the output is not shorted out and then reset the switch.</td>
</tr>
<tr>
<td>2) CE2</td>
<td>Output 2 output current is exceeding 80mA.</td>
<td>Turn off the power and verify the load connected output 2.</td>
</tr>
<tr>
<td></td>
<td>Output 2 (White wire) could be shorted out.</td>
<td>Verify that the output is not shorted out and then reset the switch.</td>
</tr>
<tr>
<td>PE</td>
<td>Max. operating pressure has been exceeded for more than 2 seconds, 1.5 x MAX. operating pressure for pressure switch 0.5MPa for vacuum switch</td>
<td>Reduce the supply pressure to below the max. pressure rating and then reset the switch.</td>
</tr>
<tr>
<td>XP</td>
<td>Pressure is 2% above rated pressure during 0 clear.</td>
<td>Apply atmospheric pressure and then reset the switch.</td>
</tr>
</tbody>
</table>

Note 1) Do not apply to Analog output type.

Internal Circuit and Wiring

Lead wire colors inside ( ) are those prior to conformity with IEC standards.

**Analog Output Type**
1 to 5V (±5% F.S.)
Load impedance : 1kΩ or more

**NPN Open Collector**
Max. 30V, 80mA
Residual voltage: 1V or less

**PNP Open Collector**
Max. 80mA

Parts List

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Indicator panel</td>
<td>Denatured PPO</td>
</tr>
<tr>
<td>2</td>
<td>Body</td>
<td>PBT</td>
</tr>
<tr>
<td>3</td>
<td>Seal</td>
<td>NBR</td>
</tr>
<tr>
<td>4</td>
<td>Lead wire</td>
<td>Vinyl chloride (Vinyl sheath)</td>
</tr>
<tr>
<td>5</td>
<td>Pressure sensor</td>
<td>SUS3030</td>
</tr>
<tr>
<td>6</td>
<td>Fittings</td>
<td>SUS304</td>
</tr>
</tbody>
</table>

With Backlight Digital Pressure Switch ZSE5B/ISE5B

Construction
**Precautions**

Be sure to read before handling.
Refer to p.0-26 and 0-27 for Safety Instructions common precautions on the products mentioned in this catalog, and refer to p.3.0-7 to 3.0-9 for more detailed precautions on every series.

### Wiring

**Warning**

0. Voltage resistance
Voltage resistance between metal fitting and lead wire of the switch is 250V. Do not apply voltage potential in excess of 250V.

**Caution**

0. When induction noise is expected to be generated from piping, ground the piping.

### Others

**Caution**

0. Panel mounting
0. Insert Adaptor A from the front of panel.
0. Fix Adaptor A firmly with Adaptor B from the back of panel.
0. Insert a pressure switch to Adaptor A from the back of panel.
0. Fix the switch with a mounting bracket.

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### Pressure Source

**Warning**

0. Quality of operating fluid
Section in contact with fluid are made of SUS630 (pressure sensor) and SUS304 (fitting). Use fluid that will not corrode these materials. The corrosion resistance of SUS630 and that of SUS304 are almost the same. For reference, fluid and gas that will not corrode SUS304 are shown below.

<table>
<thead>
<tr>
<th>Fluid Type</th>
<th>Compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry air</td>
<td>☑️</td>
</tr>
<tr>
<td>Drain-contained air</td>
<td>☑️</td>
</tr>
<tr>
<td>Hydraulic fluid (JIS-K2213)</td>
<td>☑️</td>
</tr>
<tr>
<td>Silicon (JIS-K2213)</td>
<td>☑️</td>
</tr>
<tr>
<td>Lubrication (JIS-K6301)</td>
<td>☑️</td>
</tr>
<tr>
<td>Freon</td>
<td>☑️</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>☑️</td>
</tr>
<tr>
<td>Ammonia</td>
<td>☑️</td>
</tr>
<tr>
<td>Nitrogen gas</td>
<td>☑️</td>
</tr>
<tr>
<td>Chlorine gas</td>
<td>☑️</td>
</tr>
</tbody>
</table>
With Backlight Digital Pressure Switch ZSE5B/ISE5B

Dimensions

**Standard**

- Dimensions:
  - Standard
  - With bracket
  - Panel mount

**With bracket**

- Dimensions:
  - Standard
  - With bracket
  - Panel mount

**Panel mount**

- Dimensions:
  - Standard
  - With bracket
  - Panel mount

**Cutout dimensions for panel mount**

- Thickness of panel: 1 to 3.2mm