High-Precision Digital Pressure Switch Series ZSE40(F)/ISE40



With anti-chattering function

The pressure values measured within the response time that are selected by the user are averaged. By comparing this average pressure value with the set pressure value, switch output is determined.

With auto shift function

Able to transmit the output signal of a switch by not reflecting the fluctuations of the supply pressure.

Compound pressure (ZSE40F)

Able to detect the adsorption confirmation pressure (for vacuum pressure) and the vacuum release pressure (for positive pressure) with one pressure switch.

3 types of piping

A wide variety of piping allows installation in various locations.

Repeatability

±0.2% F.S. ±1 digit or less

IP65 compliant

Dusttight, Low jetproof type

For panel mount

Dedicated adaptor makes it easier to assemble in a panel-mount application.

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BSMC

(E High-Precision Digital Pressure Switch Series ZSE40 //SE40



706

SMC

Specifications

| Model | | | ZSE40F (Compound pressure) | ZSE40 (Vacuum pressure) | ISE40 (Positive pressure) | |
|------------------------------|-----------------|-------------|--|---|-----------------------------|--|
| Rated pressure range | | | -100.0 to 100.0 kPa | 0.0 to –101.3 kPa | 0.000 to 1.000 MPa | |
| Set pressure range | | | -100.0 to 100.0 kPa | 10.0 to -101.3 kPa | -0.100 to 1.000 MPa | |
| Extended analog output range | | ange | _ | 10.0 to 0 kPa | -0.100 to 0 MPa | |
| Withstand p | pressure | | 500 | kPa | 1.5 MPa | |
| Set pressu | re resolution | kPa | 0.1 | | — | |
| Set pressu | eresolution | MPa | — | | 0.001 | |
| Applicable | fluid | | Air, Non-corrosive/Non-flammable gas | | | |
| Power supp | oly voltage | | 12 to 24 VDC ±10%, Ripple (p-p) 10% or less (with power supply polarity protection) | | | |
| Current cor | nsumption | | 55 mA or less | | | |
| Switch outp | out | | NPN or PNP open collector output: 2 output | | | |
| | Max. load curr | ent | | 80 mA | | |
| | Max. applied v | oltage | | 30 V (with NPN output) | | |
| | Residual volta | ge | | 1 V or less (with load current of 80 mA) | | |
| | Response time | e | 2.5 ms or less (Response time | e selections with anti-chattering functio | n:24 ms, 192 ms and 768 ms) | |
| | Short circuit p | rotection | | With short-circuit protection | | |
| Repeatabili | ty | | | \pm 0.2% F.S. \pm 1 digit or less | | |
| Hysteresis mode | | | Variable (0 or above) | | | |
| Hysteresis | Window compa | rator mode | Fix (3 digits) | | | |
| Display | | | 3 1/2-digit, 7 segment indicator (Sampling frequency: 5 times/sec) | | | |
| Display acc | curacy | | \pm 2% F.S. \pm 1 digit or less (With ambient temperature of 25°C) | | | |
| Operation i | ndicator light | | Green LED (OUT1: Lights when ON), Red LED (OUT2: Lights when ON) | | | |
| | | | Output voltage: 1 to 5 V Output voltage: 1 to 5 V +2.5% F.S. or less (in rated pressure range) | | | |
| | | | +5% F.S. or less (in rated pressure range) 0.6 to 1 V $+5%$ F.S. or less (in extended analog output range) | | | |
| Analog out | put Note 1) | | Linearity: +1% E.S. or less | Linearity: +1% F.S. or less | | |
| | | | Output impedance: Approx 1 kO | Output impedance: Approx 1 kO | | |
| | | | | | | |
| Auto shift i | nput Note 2) | | No-voltage input (reed or solid state), input 5 ms or more | | | |
| | Enclosure | | IP65 | | | |
| | Ambient temper | ature range | Operating: 0 to 50°C, Stored: -10 to 60°C (with no condensation or freezing) | | | |
| Environ- | Ambient humi | dity range | Operating/Stored: 35 to 85% RH (with no condensation) | | | |
| mental | Withstand vol | tage | 1000 VAC for 1 min. between live parts and case | | | |
| resistance | Insulation res | istance | $50 \text{ M}\Omega$ or more (at 500 VDC) between live parts and case | | | |
| Vibration resistance | | | 10 to 500 Hz at the smaller of amplitude 1.5 mm or acceleration 98 m/s ² in X, Y, Z directions for 2 hrs. each (De-energized) | | | |
| Impact resistance | | | 980 m/s ² in X, Y, Z directions 3 times each (De-energized) | | | |
| Temperature characteristics | | ics | ±2% F.S. or less of pressure measured at 25°C | | | |
| Port size | | | 01: R1/8, M5 x 0.8, T1: NPT1/8, M5 x 0.8, W1: Rc1/8 | | | |
| | | | C4: With ø4 One-touch fitting, C6: With ø4 One-touch fitting, M5: M5 female threads | | | |
| Lead wires | | | Oil-resistant cabtire cord 5 cores, ø3.5, Cross section: 0.15 mm ² , Conductor O.D.: 0.97 mm | | | |
| Mass | | | 01/T1 types approx. 60 g, W1 type approx. 80 g, C4/C6/M5 types approx. 92 g (each including 0.6 m lead wires) | | | |
| Standard | | | Compliant with CE marking | | | |
| | | | $40 \square 22$ | | | |

Note 1) In case of ZSE40F/ZSE40/ISE40- \Box - $\frac{1}{62}$ Note 2) In case of ZSE40F/ZSE40/ISE40- \Box - $\frac{30}{70}$ Note:

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

| Model | Set pressure range |
|------------------------------|----------------------|
| ZSE40F-□- ³⁰ | –100.0 to 100 kPa |
| ZSE40-□- ³⁰ 70 | –101.3 to 101.3 kPa |
| ISE40-□- ³⁰ | -1.0000 to 1.000 MPa |
| | |

Function

Various additional functions are available for easy measurement, switch operation and confirmation of measured values suitable for the conditions of the measured fluid.

| Auto shift function Note 1) | Can correct the pressure set point value of switch output according to fluctuations in the primary pressure. | | |
|------------------------------|--|--|--|
| Anti-chattering function | Prevents possible malfunction due to sudden fluctuations in the primary pressure by adjusting the response time. | | |
| Key lock function | Key operation can be locked to prevent any incorrect function of the operation switch. | | |
| Peak hold function Note 2) | Can retain the maximum pressure value displayed during measurement. | | |
| Bottom hold function Note 2) | Can retain the minimum pressure value displayed during measurement. | | |
| Zero-out function | The pressure display can be set at zero when the pressure is open to the atmosphere. | | |
| Unit conversion Note 1) | Can convert the display value. | | |

Note 1) Select and order by specifying the types and models.

Note 2) Display blinks when using the peak and bottom hold functions.

Series **ZSE40** //**ISE40**

Calibration Procedures



Description



High-Precision Digital Pressure Switch Series ZSE40 //SE40

Output Type



Internal Circuits and Wiring Examples

ZSE40(F)/ISE40-□-22(L)-(M)

With analog output



ZSE40(F)/ISE40-□-62(L)-(M) With analog output



ZSE40(F)/ISE40-□-30(L)-(M)

With auto shift input



ZSE40(F)/ISE40-□-70(L)-(M) With auto shift input



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Series **ZSE40** //**ISE40**

Dimensions

ZSE40(F)/ISE40-01 T1



Bracket A



Bracket D









20

Wigh across flats 72

M5 x 0.8 thread depth 5

2 x M3 x 0.5 thread depth 4

20

View A



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High-Precision Digital Pressure Switch Series ZSE40 // SE40

Dimensions











View A

E

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ZSE ISE

ZSP

PS

ISA

PSE

IS

ISG

ZSM

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Series **ZSE40** //**ISE40**

Dimensions



ZSE40(F)/ISE40-^{C4}_{C6}_{M5}



High-Precision Digital Pressure Switch Series ZSE40 //SE40

Dimensions





Panel fitting dimension



Panel thickness: 1 to 3.2 mm

Panel mount + Front protective cover



| Z | SE SE |
|---|----------|
| Z | ZSP |
| F | PS |
| I | SA |
| F | PSE |
| I | S |
| I | SG |
| Z | SM |
| | |

Series ZSE40 // ISE40

Methods of Connecting Pipe

When connecting a hexagon socket plug or fitting on the pressure port, fix the hexagon part of the pressure port, applying a 12 mm width wrench and fasten with the torque of 8.8 N·m or less. -W1 type has a removable pressure port base and can change the orientation of inducing pressure.



Assembly of Mounting Bracket

When installing a mounting bracket on -01 or -W1 type, use stainless steel cross-recessed head machine screws: M3 x 5L (2 pcs.) The tightening torque should be 0.98 N·m or less.

When installing a mounting bracket on -C4, -C6, -M5, -W1 or -WF1 type, use stainless steel cross-recessed head machine screws: M4 x 5L (2 pcs.) The tightening torque should be 0.98 N·m or less.





-W1, -WF1 type



Error Correction

Take the following corrective solutions when errors occur.

| Error description | | LCD display | Description | Solution | |
|-------------------------------|--------------|-------------|---|---|--|
| Over- current error | OUT1 OUT2 | Er 1 ErZ | Current exceeding 80 mA is being applied for the load, OUT. | Shut off the power supply. After eliminating the output factor that caused the overourrent.tum the power supply back on. | |
| Residual pressure error | | Er3 | When zero clear is performed, the following pressure differences have occurred. (ISE40: ±0.071 MPa or more (ZSE40(F): ±7.1 kPa or more * After displaying for approx. 3 seconds, it automatically reinstates to the measurement mode. | Only after reinstating to the atmospheric pressure, operate zero clear one more time. | |
| Applied pressure error | | | Pressure exceeding the upper limit of the regulating pressure range is applied. | Reduce/Increase supply pressure to be within the raguleting pressure range. | |
| | | | Pressure below the lower limit of the regulating pressure range is applied. | | |
| Auto shift error | | บบบ | Pressure above the apper limit of the regulating pressure range is applied. * After displaying for approx. 1 second, it returns to the measurement mode. | Reset the value, so that the sum of the applied pressure and set pressure at the time of auto shift input will not exceed the regulating pressure range. | |
| | | LLL | Pressure below the lower limit of the regulating pressure range is applied. * After displaying for approx. 1 second, it returns to the measurement mode. | | |
| System error | | ЕгЧ | Internal data error. | Shut off the power supply and then turn it back on. If it can not be reinstated, contact SMC for further investigation. | |
| | | ٤rБ | Internal system error. | | |
| | | Er٦ | Internal data error. | | |
| | | Er8 | Internal system error . | | |

Upper limit side and lower limit side are described in the table below. Besides, the relation between the upper limit and lower limit is reversed for the vacuum pressure only.

| | Regulating pressure range | Lower limit side | Upper limit side | |
|-------------------|---------------------------|------------------|------------------|--|
| Compound pressure | –100.0 to 100.0 kPa | –100.0 kPa | 100.0 kPa | |
| Vacuum pressure | 10.0 to –101.3 kPa | 10.0 kPa | –101.3 kPa | |
| Positive pressure | -0.100 to 1.000 MPa | –0.100 MPa | 1.000 MPa | |
| | With auto shift function | | | |
| | Set pressure range | Lower limit side | Upper limit side | |
| Compound pressu | re -100.0 to 100.0 kPa | –100.0 kPa | 100.0 kPa | |
| Vacuum pressure | -101.3 to 101.3 kPa | 101.3 kPa | –101.3 kPa | |
| Positive pressure | -1.000 to 1.000 MPa | -1.000 MPa | 1.000 MPa | |

With Auto Shift Function

Auto shift function

Assuming the measured pressure at the time of auto shift input to be the standard pressure value, it functions to compensate the set value of switch output 1 " P_1 " or " n_1 " and " P_2 " or " n_2 ", and the set value of switch output 2 " P_2 " or " n_2 " and " P_2 " or "n_4".

When the auto shift is NOT used:

When the supply pressure fluctuates, correct operation is no longer possible.



When the auto shift is used:

At the point when the supply pressure fluctuates, and if the auto shift input is set at "Lo", the pressure at the time is saved and the set pressure is to be compensated by that value to enable correct function.



Analog Output

Applicable model number: ZSE40(F)/ISE40-□-22/62(L)-(M)

Series ISE40/ZSE40





Auto shift function

- •Keep the pressure for 5 ms or more, after the trailing edge signal of auto shift input.
- When the auto shift is activated, display panel shows " [][]] " for approx. 1 second, and the pressure value at that point is memorized to be as a compensation value "5 5".
- The memorized compensation value makes the set value "P_ (" to "P_4" or " n_{-} (" to " n_{-} 4" to be compensated.
- Time between the auto shift input and switch output activation is 10 ms or less.
- •When the set value compensated by the auto shift input exceeds the possible set range, compensation value is not saved. When the value exceeds the upper limit, "UUU" is displayed, whereas, "[[[]" is displayed when it is below the lower limit.
- The compensation value "[_5" immediately after the auto shift function disappears when the power supply is turned off.
- The compensation value "[_5" for the auto shift function is reset to zero (initial value) when the power source is applied once again.

* EEPROM is not used to store the compensation value.

With auto shift function, allowable setting range is as follows:

| Regulating pressure range | Set pressure range |
|---------------------------|---------------------|
| -100.0 to 100.0 kPa | -100.0 to 100.0 kPa |
| 10.0 to –101.3 kPa | 101.3 to –101.3 kPa |
| -0.1 to -1.000 MPa | -1.000 to 1.000 MPa |

715

Series **ZSE40** //**ISE40** Made to Order Specifications



Please consult SMC for detailed dimensions, specifications and delivery.

Extended auto shift specifications

When the auto shift is activated and the compensated set value exceeds the regulating pressure range, the set value is automatically adjusted within the regulating pressure range.

Either 1 output (OUT 2 only) or 2 outputs (OUT 1 and 2) are available for the auto shift activation.



External dimensions are the same as those of standard products.

Space saving specifications 2

Product has larger allowable space for installing a panel mount, etc, by making a small the mold of an electrical entry beneath the housing.



* This product is rated for IP40 enclosure. (Standard product is IP65.)

[Standard products]

[This special product (X129)]







Series ZSE40 //ISE40 **Specific Product Precautions**

Be sure to read before handling. Refer to front matters 58 and 59 for Safety Instructions and pages 687 to 691 for Pressure Switch Precautions.

Wiring

🗥 Caution

1. When using a switching regulator on the market, make sure to ground the FG terminal.

Operating Environment

\land Warning

1. Although this pressure switch is CE conformed product, it does not resist surges resulting from electrical storms. Please take proper precautions to prevent damage to equipment.

Caution

- 1. Please do not use in an environment where oil or solvent is splashed.
- 2. In places where the switch main body is splashed by water or dust, etc, may enter the switch through the atmospheric release port. Please insert ø4 tube (I.D. ø2.5) into the atmospheric release port and connect the opposite end to a cleaner environment where water, etc is not splashed. Please do not bend the tube or block the hole, this could lead to incorrect pressure measurement.



Regulating pressure range and rated pressure range

\land Caution

Set the pressure within the rated pressure range.

The regulating 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 sensor.

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 regulating pressure range.

| Switch | | Pressure range | | | | |
|-----------------------|--------|--------------------------|-----------------|--------------------|---------|--------------------------|
| | | -100 kPa | 0 | 100 kPa | 500 kPa | 1 MPa |
| For vacuum pressure | ZSE40 | –101.3 kPa –101.3 kPa | 0 kPa 10 kPa | a | | |
| For compound pressure | ZSE40F | –100 kPa –100 kPa | | 100 kPa 100 kPa | | |
| For positive pressure | ISE40 | -100 kPa (-0.1 MPa) | 0 | | | 1 MPa 1 MPa |
| | | | | | Bated | pressure range of switch |

Regulating pressure range of switch



ZSP PS ISA PSE IS ISG ZSM

Other

| 🛆 Caut | tion |
|--------|------|
|--------|------|

1. Immediately after the electric power is supplied, some drifting, as much as ±0.5% F.S., takes place. When used for micro pressure, allow it to warm up for about 20 to 30 minutes.