#  

| Nisplay unit e- |  |
| :---: | :--- |
| $\mathbf{M}$ | With unit switching <br> function Note 1) |
| $\mathbf{P}^{*}$ | Fixed SI unit Note 2) <br> With unit switching <br> function Note 1) <br> (Initial value psi) |

* Made to Order

Note 1) Under the New Measurement Law, sales of switches with the unit switching function are not allowed for use in Japan.
Note 2) Fixed unit $\mathrm{kPa}, \mathrm{MPa}$


Note) For output types N and P , the number of core of lead wires will be 3 , and for other types, it will be 4 .
How to Order
Qutput

| N | NPN open collector 1 output |
| :--- | :--- |
| P | PNP open collector 1 output |
| A | NPN open collector 2 outputs |
| B | PNP open collector 2 outputs |
| C* | NPN open collector 1 output + Analog voltage output |
| D $^{*}$ | NPN open collector 1 output + Analog current output |
| E | PNP open collector 1 output + Analog voltage output |
| F* | PNP open collector 1 output + Analog current output |

* Made to Order

- Option 3

| Symbol | Operating manual | Calibration <br> certificate |
| :---: | :---: | :---: |
|  | Booklet | - |
| $\mathbf{Y}$ | - | - |
| $\mathbf{K}$ | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{T}$ | - | $\bigcirc$ |

- Option 2


Specifications
Refer to the SMC website for Pressure Switches Precautions (M-E03-3) and Specific Product Precautions (Operation Manual).

| Model |  |  | 10-ZSE30A (Vacuum pressure) | 10-ZSE30AF (Compound pressure) | 10-ISE30A (Positive pressure) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Rated pressure range |  |  | 0.0 to -101.0 kPa | -100.0 to 100.0 kPa | -0.100 to 1.000 MPa |
| Display/Set pressure range |  |  | 10.0 to -105.0 kPa | -105.0 to 105.0 kPa | -0.105 to 1.050 MPa |
| Withstand pressure |  |  | 500 kPa | 500 kPa | 1.5 MPa |
| Display/Smallest settable increment |  |  | 0.1 kPa | 0.1 kPa | 0.001 MPa |
| Applicable fluid |  |  | Air, Non-corrosive gas, Non-flammable gas |  |  |
| Power supply voltage |  |  | 12 to 24 VDC $\pm 10 \%$, Ripple (p-p) 10\% or less (with power supply polarity protection) |  |  |
| Current consumption |  |  | 40 mA or less |  |  |
| Switch output |  |  | NPN or PNP open collector 1 output, NPN or PNP open collector 2 outputs (selectable) |  |  |
|  | Maximum load current |  | 80 mA |  |  |
|  | Maximum applied voltage |  | 28 V (at NPN output) |  |  |
|  | Residual voltage |  | 1 V or less (with load current of 80 mA ) |  |  |
|  | Response time |  | 2.5 ms or less (with anti-chattering function: $20,100,500,1000,2000 \mathrm{~ms}$ ) |  |  |
|  | Short circuit protection |  | Yes |  |  |
| Repeatability |  |  | $\pm 0.2 \%$ F.S. $\pm 1$ digit |  |  |
| Hysteresis | Hysteresis mode |  | Variable (0 or above) Note 1) |  |  |
|  | Window comparator mode |  |  |  |  |
| Analog output | Note 2) <br> Voltage output | Output voltage (Rated pressure range) | 1 to 5 V | .5\% F.S. | 0.6 to $5 \mathrm{~V} \pm 2.5 \%$ F.S. |
|  |  | Linearity | $\pm 1 \%$ F.S. |  |  |
|  |  | Output impedance | Approx. $1 \mathrm{k} \Omega$ |  |  |
|  | Note 3) <br> Current output | Output current (Rated pressure range) | 4 to 20 m | 2.5\% F.S. | 2.4 to $20 \mathrm{~mA} \pm 2.5 \%$ F.S. |
|  |  | Linearity | $\pm 1 \%$ F.S. |  |  |
|  |  | Load impedance | Maximum load impedance: Power supply voltage $12 \mathrm{~V}: 300 \Omega$, Power supply voltage 24 V : $600 \Omega$ Minimum load impedance: $50 \Omega$ |  |  |
| Display |  |  | 4-digit, 7-segment, 2-color LCD (Red/Green) |  |  |
| Display accuracy |  |  | $\pm 2 \%$ F.S. $\pm 1$ digit (Ambient temperature of $25 \pm 3^{\circ} \mathrm{C}$ ) |  |  |
| Indicator light |  |  | Lights up when switch output is turned ON. OUT1: Green, OUT2: Red |  |  |
| Environment resistance | Enclosure |  | IP40 |  |  |
|  | Operating temperature range |  | Operating: 0 to $50^{\circ} \mathrm{C}$, Stored: -10 to $60^{\circ} \mathrm{C}$ (No freezing or condensation) |  |  |
|  | Operating humidity range |  | Operating/Stored: 35 to 85\% RH (No condensation) |  |  |
|  | Withstand voltage |  | 1000 VAC for 1 minute between live parts and case |  |  |
|  | Insulation resistance |  | $50 \mathrm{M} \Omega$ or more between live parts and case (at 500 VDC Mega) |  |  |
| Temperature characteristics |  |  | $\pm 2 \%$ F.S. (Based on $25^{\circ} \mathrm{C}$ ) |  |  |
| Lead wire |  |  | $\begin{array}{rll}\text { Oilproof heavy-duty vinyl cable, } 3 \text { cores } & \left.\begin{array}{l}\varnothing .5,2 \mathrm{~m} \\ 4 \text { cores } \\ \text { Conductor area: } 0.15 \mathrm{~mm}^{2} \text { (AWG26), Insulator O.D.: } 1.0 \mathrm{~mm}\end{array}\right]\end{array}$ |  |  |
| Standards |  |  | CE UL/CSA(E216656) RoHS |  |  |
| Cleanliness class (ISO class) |  |  | Class 4 |  |  |

Note 1) If applied pressure fluctuates near the set value, set the hysteresis above the fluctuation range to prevent chattering.
Note 2) When analog voltage output is selected, analog current output cannot be used together.
Note 3) When analog current output is selected, analog voltage output cannot be used together.

## Piping Specifications

| Model |  | 01 | N01 | C4H | C6H | N7H | C4L | C6L | N7L |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Port size |  | $\begin{gathered} \mathrm{R} 1 / 8 \\ \text { M5 } \times 0.8 \\ \hline \end{gathered}$ | $\begin{array}{r} \text { NPT1/8 } \\ \text { M5 } \times 0.8 \\ \hline \end{array}$ | - | - | - | - | - | - |
|  | One-touch fitting, Straight type | - | - | $\begin{gathered} \varnothing 4 \mathrm{~mm} \\ \varnothing 5 / 32 \text { inch } \\ \hline \end{gathered}$ | $ø 6 \mathrm{~mm}$ | ø1/4 inch | - | - | - |
|  | One-touch fitting, Elbow type | - | - | - | - | - | $\begin{gathered} \varnothing 4 \mathrm{~mm} \\ \varnothing 5 / 32 \text { inch } \\ \hline \end{gathered}$ | ø6 mm | ø1/4 inch |
| Wetted parts material | Sensor pressure receiving area | Sensor pressure receiving area: Silicon |  |  |  |  |  |  |  |
|  | Piping port | C3602 (electroless nickel plated) <br> O-ring: HNBR |  | PBT, POM, Stainless steel 304, C3604 (electroless nickel plated) O-ring: HNBR |  |  |  |  |  |
| Weight | Including lead wire with connector ( 3 cores, 2 m ) | 81 g |  | 70 g | 71 g | 73 g | 75 g | 73 g | 75 g |
|  | Including lead wire with connector ( 4 cores, 2 m ) | 85 g |  | 74 g | 75 g | 77 g | 79 g | 77 g | 79 g |
|  | Excluding lead wire with connector | 43 g |  | 32 g | 33 g | 35 g | 37 g | 35 g | 37 g |

## Options/Part No.

When optional parts are required separately, use the following part numbers to place an order.

| Part no. | Option | Note | Part no. | Option | Note |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 10-ZS-38-A1 | Bracket A | Mounting screw (with 2 pcs. of M $3 \times 5$ L) | 10-ZS-38-4G | Lead wire with connector (with connector cover) | 4 cores, for 2 outputs, 2 m |
| 10-ZS-38-A2 | Bracket B | Mounting screew (with 2 pcs. of M3x5L) | 10-ZS-38-5L | Lead wire with a connector for copying | 3 cores, copy function, 1 m |
| 10-ZS-38-A3 | Bracket C | Mounting screew (with 2 pcs. of M3x5L) | 10-ZS-38-U | Lead wire unit with a connector for copying | Copy function (up to 10 slaves) |
| 10-ZS-27-C | Panel mount adapter | Mounting scree (with 2 pcs. of M3x8L) | 10-ZS-38-C4H | One-touch fittings ø4 mm straight | O-ring, one-touch clip included |
| 10-ZS-27-D | Panel mount adapter + Front protection cover | Mounting screew (with 2 pcs. of M3x8L) | 10-ZS-38-C6H | One-touch fittings ø6 mm straight | O-ring, one-touch clip included |
| 10-ZS-27-01 | Front protection cover |  | 10-ZS-38-N7H | One-touch fittings $\varnothing 1 / 4$ inch straight | O-ring, one-touch clip included |
| 10-ZS-38-3L | Lead wire with connector | 3 cores, for 1 output, 2 m | 10-ZS-38-C4L | One-touch fittings ø 4 mm elbow | O-ring, one-touch clip included |
| 10-ZS-38-4L | Lead wire with connector | 4 cores, for 2 outputs, 2 m | 10-ZS-38-C6L | One-touch fittings ø6 mm elbow | O-ring, one-touch clip included |
| 10-ZS-38-3G | Lead wire with connector (with connector cover) | 3 cores, for 1 output, 2 m | 10-ZS-38-N7L | One-touch fittings $\varnothing 1 / 4$ inch elbow | O-ring, one-touch clip included |

## 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.

| Switch |  | Pressure range |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | -100 kPa | 0 | 100 kPa | 500 kPa | 1 MPa |
| For vacuum pressure | 10-ZSE30A | $\begin{gathered} -101 \mathrm{kPa} \\ -105 \mathrm{kPa} \end{gathered}$ |  |  |  |  |
| For compound pressure | 10-ZSE30AF | $\begin{array}{r} -100 \mathrm{kPa} \\ -105 \mathrm{kPa} \end{array}$ | $!$ | $\begin{aligned} & 100 \mathrm{kPa} \\ & 105 \mathrm{kPa} \end{aligned}$ |  | + |
| For positive pressure | 10-ISE30A | $\begin{gathered} -100 \mathrm{kPa} \\ -105 \mathrm{kPa} \\ (-0.105 \mathrm{MPa}) \end{gathered}$ |  |  |  | 1 MPa <br> 1.05 MPa |

Rated pressure range of switch Set pressure range of switch

## Analog Output

## Voltage output



Current output



## 

## Air Grippers

## 



## Internal Circuits and Wiring Examples

## -N <br> NPN (1 output)



Max. $28 \mathrm{~V}, 80 \mathrm{~mA}$
Residual voltage 1 V or less

## -A <br> NPN (2 outputs)



Max. 28 V, 80 mA
Residual voltage 1 V or less
-P
PNP (1 output)


Max. 80 mA
Residual voltage 1 V or less

## -B <br> PNP (2 outputs)



[^0]
## -C <br> NPN (1 output) + Analog voltage output



Max. 28 V, 80 mA
Residual voltage 1 V or less
Analog voltage output
Output impedance: Approx. $1 \mathrm{k} \Omega$

## -D <br> NPN (1 output) + Analog current output



Max. $28 \mathrm{~V}, 80 \mathrm{~mA}$
Residual voltage 1 V or less
Analog current output
Max. load impedance:
Power supply voltage $12 \mathrm{~V}: 300 \Omega$
Power supply voltage 24 V : $600 \Omega$
Min. load impedance: $50 \Omega$

## -E

PNP (1 output) + Analog voltage output


Max. 80 mA
Residual voltage 1 V or less
Analog voltage output
Output impedance: Approx. $1 \mathrm{k} \Omega$

## -F PNP (1 output) + Analog current output



Max. 80 mA
Residual voltage 1 V or less
Analog current output
Max. load impedance:
Power supply voltage $12 \mathrm{~V}: 300 \Omega$
Power supply voltage 24 V : $600 \Omega$
Min. load impedance: $50 \Omega$

[^1]Dimensions (For details about lead wires, refer to the product specifications.)


## 01 /N01



C4H
One-touch fitting ø4 mm ø5/32 inch straight


## C4L

One-touch fitting ø4 mm ø5/32 inch elbow


With bracket

## 10-ZSE30A(F)/10-ISE30A - <br> $\square$ - <br> 

## A1

## Bracket A

(Option unit part no.: 10-ZS-38-A1)


## A2

Bracket B
(Option unit part no.: 10-ZS-38-A2)

## A3

Bracket C
(Option unit part no.: 10-ZS-38-A3)


* Bracket configuration allows mounting in four orientations.

* Bracket configuration allows mounting in four orientations.



## Dimensions

Panel mount


B
Panel mount adapter (Option unit part no.: 10-ZS-27-C)


D


Panel mount adapter + Front protection cover (Option unit part no.: 10-ZS-27-D)


Lead wire with connector
(Option unit part no.: 10-ZS-38-3L)

(Option unit part no.: 10-ZS-38-4L)


## Panel-cut dimensions

1 pc. mounting


Multiple (2 pcs. or more) vertical mounting


## Function Details

## A Copy function (F97)

The settings of the master sensor can be copied to the slave sensors.
It is to reduce the time taken for setting and prevent the input of wrong values.
Settings can be copied to up to 10 slave sensors at once.
(Max. transmission distance: 4 m )


1) The sensors are connected by a dedicated lead wire (10-ZS-38-5L (for master and one slave) or 10-ZS-38-U (for master and up to 10 slaves)). Copying is performed through a dedicated communication line.
2) Make the slave sensor which needs to be the master into the master by button operation. (Initially all sensors are set as slaves.)
3) Press the $S$ button on the master sensor to start copying.

Wiring example when using 10-ZS-38-U


## B Auto-preset function (F5)

Auto-preset function, when selected in the 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.
Suction Verification


## C Precision indicator setting function (F6)

Fine adjustment of the indicated value of the pressure sensor can be made within the range of $\pm 5 \%$ of the read value. The scattering of the indicated value can be eliminated.


Note) When the precision indicator setting function is used, the set pressure value may change $\pm 1$ digit.

Formula for Obtaining the Set-Value

| P_1 or P_2 | H_1 or H_2 |
| :---: | :---: |
| P_1 $\left(P \_2\right)=A-(A-B) / 4$ | $H \_1\left(H \_2\right)=(A-B) / 2$ |
| $n \_1\left(n \_2\right)=B+(A-B) / 4$ |  |

## D Peak and bottom display function

This function constantly detects and updates the maximum (minimum) value and allows to hold the maximum (minimum) pressure value.
When the $\Delta \nabla$ buttons are simultaneously pressed for 1 second or longer, while "holding", the held value will be reset.

## E Key lock function

This function prevents incorrect operations such as accidentally changing the set-value.

## F Zero-out 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. A displayed value can be adjusted within $\pm 7 \%$ F.S. of the pressure when ex-factory. ( $\pm 3.5 \%$ F.S. for 10-ZSE30AF (compound pressure))

## G Error indication function

| Error name | Error code | Description | Solution |
| :---: | :---: | :---: | :---: |
| Overcurrent error | Eri | Load current of switch output (OUT1) exceeds 80 mA . | Shut off the power supply. After eliminating the output factor that caused the excess current, turn the power supply back on. |
|  | $E \mathrm{EF}$ | Load current of switch output (OUT2) exceeds 80 mA . |  |
| Residual pressure error | ErI | A pressure of $\pm 7 \%$ F.S. of atmospheric pressure is applied in the zero-out function. ( $\pm 3.5 \%$ F.S. or more for 10 -ZSE30AF (compound pressure)) <br> The switch will automatically return to measuring mode in 1 second, however. Due to individual product differences, the setting range of the zero-out function varies within $\pm 1 \%$ F.S. | Bring the pressure back to atmospheric pressure and try using the zero-out function. |
| Applied pressure error | H3\% | Supply pressure exceeds the maximum set pressure. | Bring the pressure back to within the set pressure range. |
|  | LLI | Supply pressure is below the minimum set pressure. |  |
| System error | Eri] | Internal data error | Shut off the power supply. Turn the power supply back on. If the switch will not recover to normal, consult SMC for investigation. |
|  | $E \sim H$ |  |  |
|  | ErE |  |  |
|  | $E \sim 7$ |  |  |
|  | $E \mathrm{Er}$ |  |  |
|  | $E \mathrm{Er}$ |  |  |

If the switch will not recover to normal even after all of the above-mentioned solutions have been applied, consult 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.

| Available response time settings |
| :---: |
| $20 \mathrm{~ms}, 100 \mathrm{~ms}, 500 \mathrm{~ms}, 1000 \mathrm{~ms}, 2000 \mathrm{~ms}$ |

## 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.


## 1 Display unit switching function (F0)

Display units can be switched with this function.

| Smallest <br> settable increment | Display unit |  | PA |  | GF | bAr | PSi |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | kPa | $\mathrm{MPa} *$ | $\mathrm{kgf} / \mathrm{cm}^{2}$ | bar | psi | inHg | mmHg |
| 10-ZSE30A <br> (Vacuum pressure) | 0.1 | 0.001 | 0.001 | 0.001 | 0.01 | 0.1 | 1 |
| 10-ZSE30AF <br> (Compound pressure) | 0.1 | 0.001 | 0.001 | 0.001 | 0.01 | 0.1 | 1 |
| 10-ISE30A <br> (Positive pressure) | 1 | 0.001 | 0.01 | 0.01 | 0.1 |  |  |

* For the 10-ZSE30A (vacuum pressure) and 10-ZSE30AF (compound pressure), when the display unit is MPa , setting and display resolutions are changed.


## J Power-saving mode (F7)

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 Secret code setting (F8)

It can be set whether code number input is required or not when key is locked. It is set to input no code number when ex-factory.


[^0]:    * The FUNC terminal is connected using a dedicated lead wire ( $10-\mathrm{ZS}-38-5 \mathrm{~L}$ or $10-\mathrm{ZS}-38-\mathrm{U}$ ) when the copy function is used. (Refer to "Copy function" on page 1321.)

[^1]:    * The FUNC terminal is connected using a dedicated lead wire (10-ZS-38-5L or 10-ZS-38-U) when the copy function is used. (Refer to "Copy function" on page 1321.)

