2-Color Display High-Precision Digital Pressure Switch
ZSE30A(F)/ISE30A *Series*
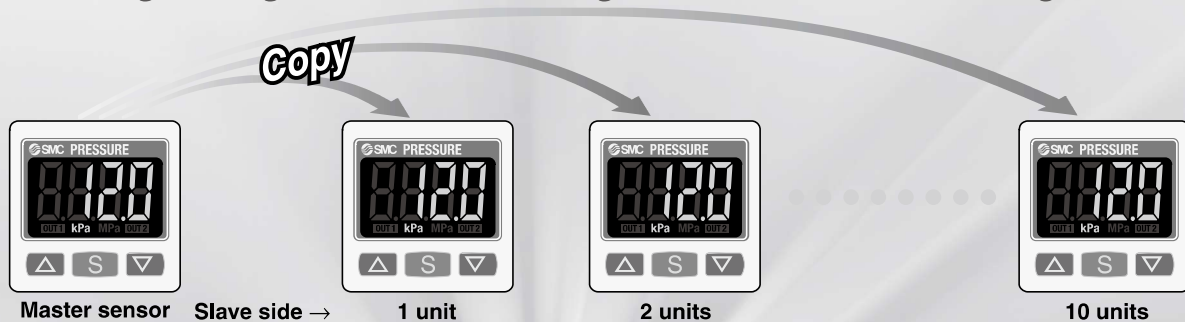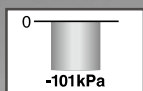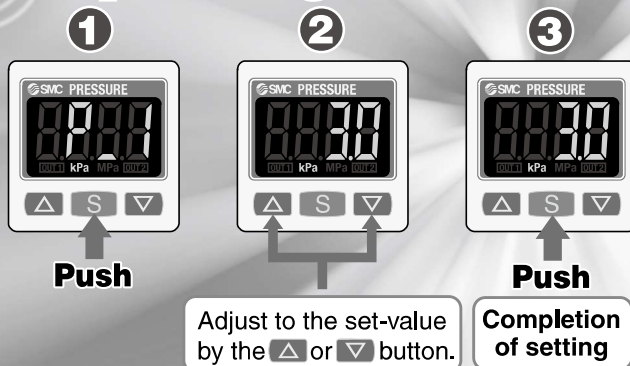
CE cℝ$\!$US

RoHS

Can copy to up to 10 switches simultaneously.

The settings of the master sensor can be copied to the slave sensors.

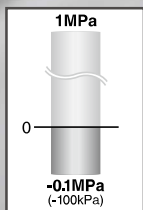● **Reducing setting labor**   ● **Minimizing risk of mistakes in setting**

copy

| Master sensor | Slave side → | 1 unit | 2 units | 10 units |

3-step setting

❶ ❷ ❸

Push

Adjust to the set-value by the △ or ▽ button.

Completion of setting

Push

Added vacuum range.

0

−101kPa

● **Rated pressure range: 0.0 to −101.0 kPa**

Expanded pressure range for positive-pressure type to the vacuum range.

1MPa

0

−0.1MPa
(−100kPa)

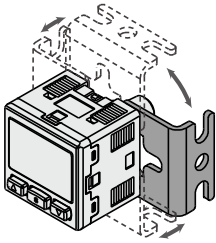● **Rated pressure range: −0.100 to 1.000 MPa**

2 added outputs

● **NPN or PNP open collector 2 outputs**
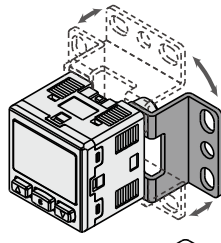● **NPN or PNP open collector 1 output + Analog output (1 to 5 V or 4 to 20 mA)**

● Mounting

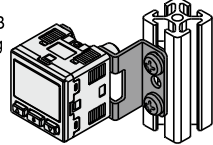**Bracket configuration allows mounting in four orientations.**
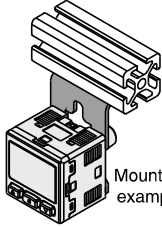
Bracket A

Bracket B/C
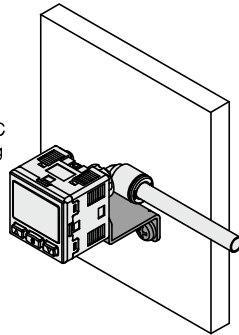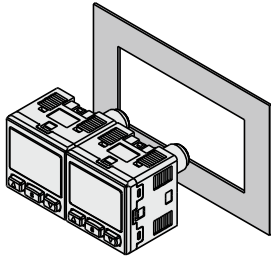
Bracket B
Mounting
example

Mounting
example

Bracket C
Mounting
example

Panel mount

Mountable side by side
without clearance

One opening!
- **Reduced panel fitting labor**
- **Space-saving**

● Series

Series	ZSE30A (vacuum)	ZSE30AF (compound)	ISE30A (positive)
Rated pressure range	0.0 to −101.0 kPa	−100.0 to 100.0 kPa	−0.100 to 1.000 MPa
	0 / −101 kPa	100 kPa / 0 / −100 kPa	1 MPa / 0 / −0.1 MPa (−100 kPa)
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
Minimum unit setting	0.1 kPa	0.1 kPa	0.001 MPa
Output	NPN or PNP open collector 1 output NPN or PNP open collector 2 outputs NPN or PNP open collector 1 output + Analog output (voltage or current)		
Piping	R1/8, NPT1/8 (M5 female threaded) ø4, ø6, ø5/32, ø1/4 One-touch fittings		

● Replaceable One-touch fittings

**The clip type allows easy removal of fittings.
Fitting's type and size can be changed.**

Clip

One-touch fitting
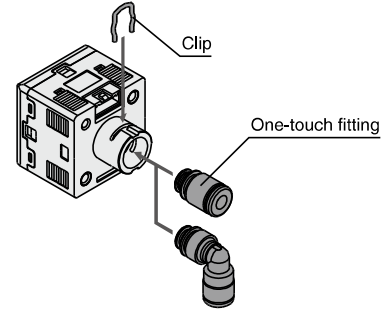
● Lead wire

Added the connector cover.

Connector cover

Lead wire with connector
(2 m)
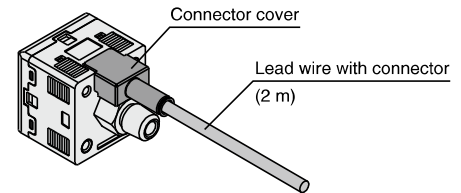
● 4-digit display

4-digit display allows easy reading of displayed values.
Example: 0.5 MPa

**30A Series
(New)**

30 Series
(Current)

● Possible to check set-value during key locking

● Additional functions

◆ **Secret code setting function**
The key locking function keeps unauthorized persons
from tampering with buttons.

◆ **Power-saving function**
Power consumption is reduced by turning off the monitor.
(Reduce power consumption by up to 20%.)

◆ **Resolution-switch function**
It reduces the monitor to flicker.

1/1000

1/100

(Accuracy is not changed, only the displayed values.)

◆ **MPa/kPa switch function**
Vacuum, compound and/or positive pressure can be
displayed in MPa or kPa.

MPa

kPa

SMC

2-Color Display
High-Precision
Digital Pressure Switch
ZSE30A(F)/ISE30A Series

CE c(UL)US RoHS

How to Order

Output specifications

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

Rated pressure range

ISE30A	−0.1 to 1 MPa

For positive pressure

ISE30A – 01 – N – M ☐ ☐ ☐ – ☐

For vacuum/ compound pressure

ZSE30A – 01 – N – M ☐ ☐ ☐ – ☐

Rated pressure range

ZSE30A	0 to −101 kPa
ZSE30AF	−100 to 100 kPa

Made to Order (P.43)

Symbol	Specifications/Description
X510	For M12 4-pin pre-wired connector

Available only for output specifications "A", "B", and option 1 "G".

Option 3

Symbol	Operation manual (Note)	Calibration certificate (Note)
Nil	○	—
Y	—	—
K	○	○
T	—	○

Note) All texts in both English and Japanese.

Piping specifications

01	R1/8 (M5 female threaded)	
N01	NPT1/8 (M5 female threaded)	
C4H	One-touch fitting ø4 mm, ø5/32 inch	Straight type
C6H	One-touch fitting ø6 mm	
N7H	One-touch fitting ø1/4 inch	
C4L	One-touch fitting ø4 mm, ø5/32 inch	Elbow type
C6L	One-touch fitting ø6 mm	
N7L	One-touch fitting ø1/4 inch	

Option 2

Nil	None	
A1	Bracket A	
A2	Bracket B	
A3	Bracket C	
B	Panel mount adapter	
D	Panel mount adapter + Front protection cover	

Unit specifications

Nil	With display unit Note 1) switching function
M	Fixed SI unit Note 2)
P*	With display unit Note 1) switching function (Initial value psi)

* Made to Order

Note 1) Under the New Measurement Law, sales of switches with the unit switching function have not been allowed for use in Japan.

Note 2) Unit: kPa, MPa

Option 1

Nil	Without lead wire	
L	Lead wire with connector (Lead wire length 2 m) Note)	
G	Lead wire with connector (Lead wire length 2 m) Note) With connector cover	Connector cover

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.

SMC

33

Specifications

Model		ZSE30A (Vacuum pressure)	ZSE30AF (Compound pressure)	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/Minimum unit setting		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 ±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		
	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 ms)		
	Short circuit protection	Yes		
Repeatability		±0.2% F.S. ±1 digit		
Hysteresis	Hysteresis mode	Variable (0 or above) Note 1)		
	Window comparator mode			
Analog output	Voltage output Note 2)	Output voltage (Rated pressure range)	1 to 5V ±2.5% F.S.		0.6 to 5 V ±2.5% F.S.
		Linearity	±1% F.S.		
		Output impedance	Approx. 1 kΩ		
	Current output Note 3)	Output current (Rated pressure range)	4 to 20 mA ±2.5% F.S.		2.4 to 20 mA ±2.5% F.S.
		Linearity	±1% F.S.		
		Load impedance	Maximum load impedance: Power supply voltage 12 V: 300 Ω, Power supply voltage 24 V: 600 Ω Minimum load impedance: 50 Ω		
Display		4-digit, 7-segment, 2-color LCD (Red/Green)		
Display accuracy		±2% F.S. ±1 digit (Ambient temperature of 25 ±3°C)		
Indicator light		Lights up when switch output is turned ON. OUT1: Green, OUT2: Red		
Environment	Enclosure	IP40		
	Operating temperature range	Operating: 0 to 50°C, Stored: −10 to 60°C (No freezing or condensation)		
	Operating humidity range	Operating/Stored: 35 to 85% RH (No condensation)		
	Withstand voltage	1000 VAC for 1 minute between terminals and housing		
	Insulation resistance	50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing		
Temperature characteristics		±2% F.S. (25°C reference)		
Lead wire with connector		Oilproof heavy-duty vinyl cable, 3 cores ø3.5, 2 m 4 cores Conductor area: 0.15 mm² (AWG26), Insulator O.D.: 1.0 mm		
Standards		CE, UL/CSA (E216656), RoHS		

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	R1/8 M5 x 0.8	NPT1/8 M5 x 0.8	—	—	—	—	—	—
One-touch fitting, Straight type	—	—	ø4 mm ø5/32 inch	ø6 mm	ø1/4 inch	—	—	—
One-touch fitting, Elbow type	—	—	—	—	—	ø4 mm ø5/32 inch	ø6 mm	ø1/4 inch
Wetted parts material — Sensor pressure receiving area	Sensor pressure receiving area: Silicon							
Wetted parts material — Piping port	C3602 (electroless nickel plating) O-ring: HNBR		PBT, POM, Stainless steel 304, C3604 (electroless nickel plating) O-ring: NBR					
Weight — Including lead wire with connector (3 cores, 2 m)	81 g	70 g	71 g	73 g	75 g	73 g	75 g	
Weight — Including lead wire with connector (4 cores, 2 m)	85 g	74 g	75 g	77 g	79 g	77 g	79 g	
Weight — Excluding lead wire with connector	43 g	32 g	33 g	35 g	37 g	35 g	37 g	

Option/Part No.

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

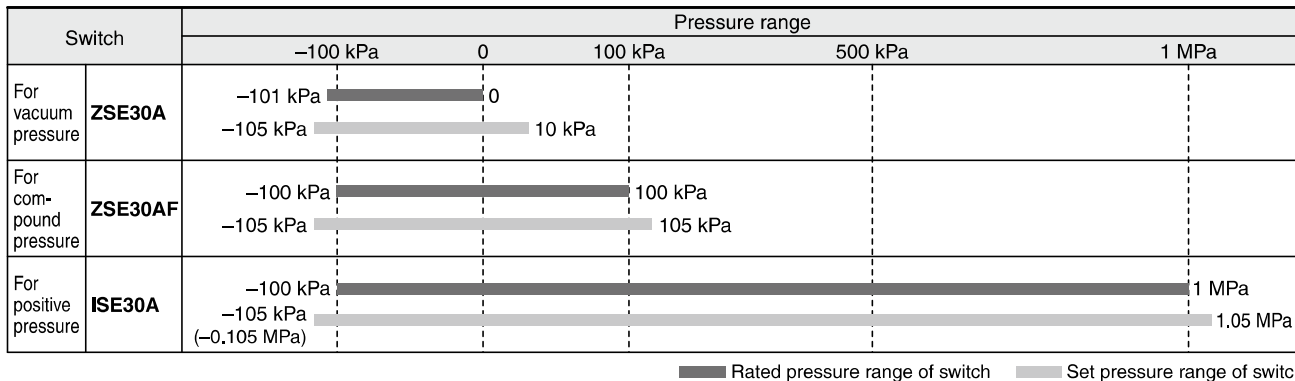| Part no.	Option	Note	Part no.	Option	Note
ZS-38-A1	Bracket A	Mounting screw (with 2 pcs. of M3 x 5L)	ZS-38-4G	Lead wire with connector (with connector cover)	4 cores, for 2 outputs, 2 m
ZS-38-A2	Bracket B	Mounting screw (with 2 pcs. of M3 x 5L)	ZS-38-5L	Lead wire with a connector for copying	3 cores, copy function, 1 m
ZS-38-A3	Bracket C	Mounting screw (with 2 pcs. of M3 x 5L)	ZS-38-U	Lead wire unit with a connector for copying	Copy function (up to 10 slaves)
ZS-27-C	Panel mount adapter	Mounting screw (with 2 pcs. of M3 x 8L)	ZS-38-C4H	One-touch fittings ø4 mm straight	O-ring, one-touch clip included
ZS-27-D	Panel mount adapter + Front protection cover	Mounting screw (with 2 pcs. of M3 x 8L)	ZS-38-C6H	One-touch fittings ø6 mm straight	O-ring, one-touch clip included
ZS-27-01	Front protection cover		ZS-38-N7H	One-touch fittings ø1/4 inch straight	O-ring, one-touch clip included
ZS-38-3L	Lead wire with connector	3 cores, for 1 output, 2 m	ZS-38-C4L	One-touch fittings ø4 mm elbow	O-ring, one-touch clip included
ZS-38-4L	Lead wire with connector	4 cores, for 2 outputs, 2 m	ZS-38-C6L	One-touch fittings ø6 mm elbow	O-ring, one-touch clip included
ZS-38-3G	Lead wire with connector (with connector cover)	3 cores, for 1 output, 2 m	ZS-38-N7L	One-touch fittings ø1/4 inch elbow	O-ring, one-touch clip included

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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	**ZSE30A**	−101 kPa ▬▬▬ 0 −105 kPa ▬▬▬▬▬ 10 kPa				
For compound pressure	**ZSE30AF**	−100 kPa ▬▬▬▬▬ 100 kPa −105 kPa ▬▬▬▬▬ 105 kPa				
For positive pressure	**ISE30A**	−100 kPa ▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬ 1 MPa −105 kPa (−0.105 MPa) ▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬ 1.05 MPa				

▬▬ Rated pressure range of switch   ▬▬ Set pressure range of switch

Analog Output

Voltage output
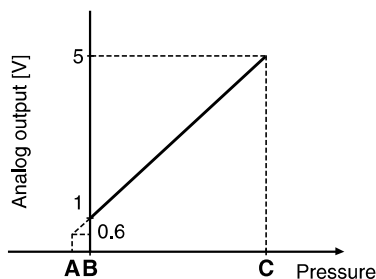
Current output
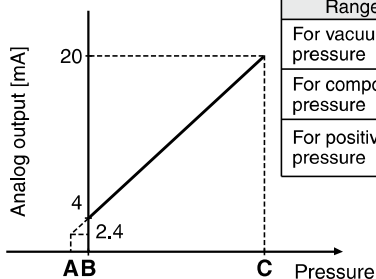
Range	Rated pressure range	A	B	C
For vacuum pressure	0.0 to −101.0 kPa	—	0	−101 kPa
For compound pressure	−100.0 to 100.0 kPa	—	−100 kPa	100 kPa
For positive pressure	−0.100 to 1.000 MPa	−0.1 MPa	0	1 MPa

Functions (Refer to pages 41 and 42 for details.)

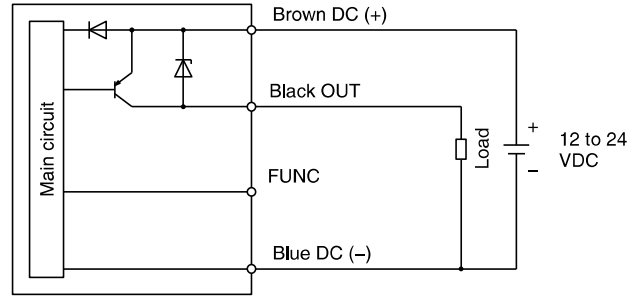|	
Copy function	Copies the settings of the master sensor to the slave sensors.
Auto-preset function	This function is to calculate a rough set-value automatically based on the on-going operation.
Display calibration function	Evens out deviations in the displayed value.
Peak display function	Can retain the maximum pressure value displayed during measurement.
Bottom display function	Can retain the minimum pressure value displayed during measurement.
Keylock function (Selectable secret code)	The key board can be locked to prevent any incorrect function of the operation switch.
Zero-clear function	The pressure display can be set at zero when the pressure is open to the atmosphere.
Anti-chattering function	Prevents possible malfunction due to sudden fluctuations in the primary pressure by adjusting the response time.
Unit display switching function	Can convert the display value.
Power-saving mode	Reduces power consumption.
Display resolution-switch function	Converts display resolution from the normal value of 1/1000 to 1/100. It reduces the monitor to flicker.
kPa ↔ MPa switch function	Converts the unit between kPa and MPa.

ZSE20
ISE20

ZSE30
ISE30

ZSE40
ISE40

ZSE10
ISE10

ISE70

ZSE80
ISE80

PS

ISA3

ISA2

ISE35

PSE

IS

ISG

ZSM1

Internal Circuits and Wiring Examples

-N
NPN (1 output)
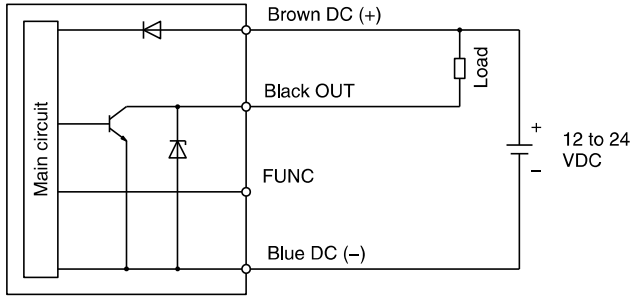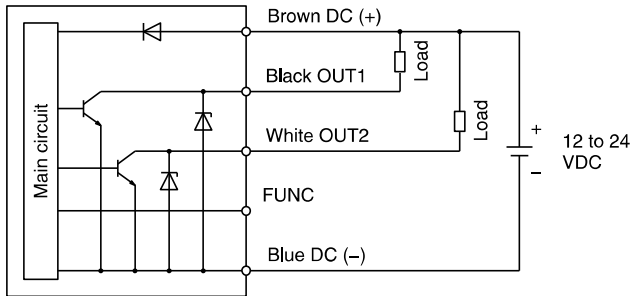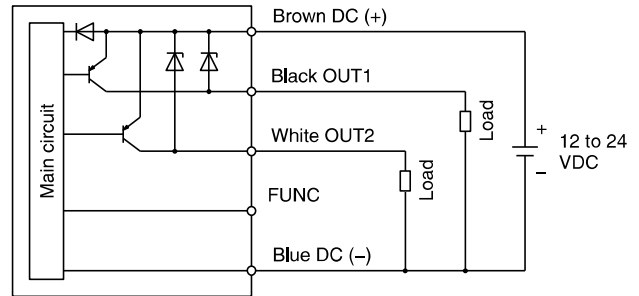
- Brown DC (+)
- Black OUT
- FUNC
- Blue DC (−)
- Load
- 12 to 24 VDC

-P
PNP (1 output)

- Brown DC (+)
- Black OUT
- FUNC
- Blue DC (−)
- Load
- 12 to 24 VDC

-A
NPN (2 outputs)

- Brown DC (+)
- Black OUT1
- White OUT2
- FUNC
- Blue DC (−)
- Load
- 12 to 24 VDC

-B
PNP (2 outputs)

- Brown DC (+)
- Black OUT1
- White OUT2
- FUNC
- Blue DC (−)
- Load
- 12 to 24 VDC

-C
NPN (1 output) + Analog voltage output

- Brown DC (+)
- Black OUT1
- White OUT2
- FUNC
- Blue DC (−)
- Load
- 12 to 24 VDC

-D
NPN (1 output) + Analog current output

- Brown DC (+)
- Black OUT1
- White OUT2
- FUNC
- Blue DC (−)
- Load
- 12 to 24 VDC

-E
PNP (1 output) + Analog voltage output

- Brown DC (+)
- Black OUT1
- White OUT2
- FUNC
- Blue DC (−)
- Load
- 12 to 24 VDC

-F
PNP (1 output) + Analog current output

- Brown DC (+)
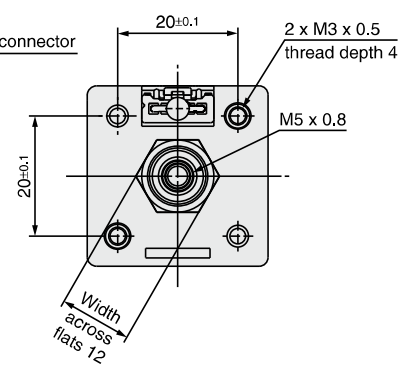- Black OUT1
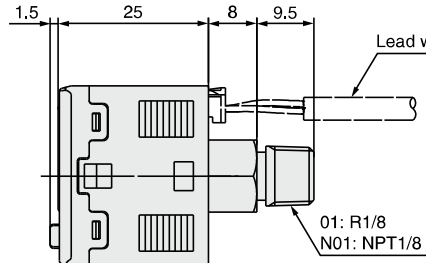- White OUT2
- FUNC
- Blue DC (−)
- Load
- 12 to 24 VDC
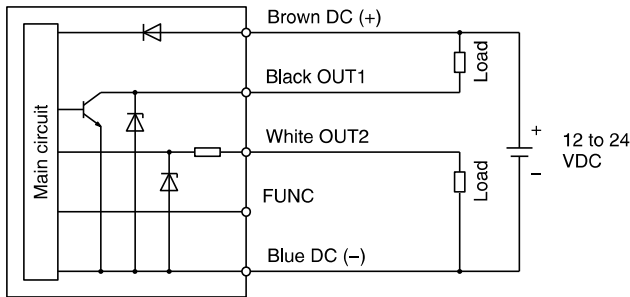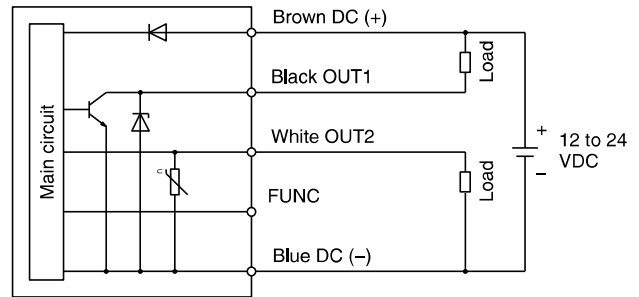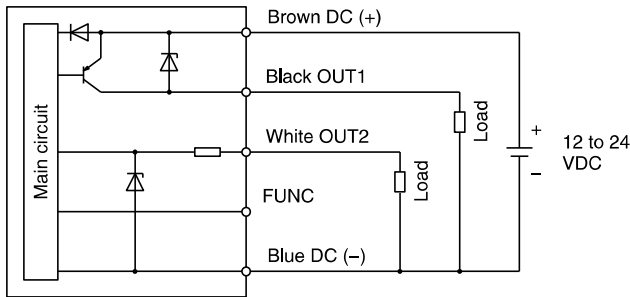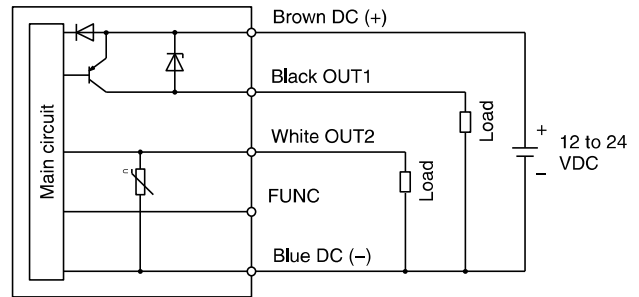
∗ The FUNC terminal is connected when using the copy function. (Refer to "Copy function" on page 41.)

SMC

Dimensions

Z/ISE30A(F) – ☐ – ☐ – ☐☐☐☐

● **Piping specifications**

01 / **N01**

01: R1/8
N01: NPT1/8

Lead wire with connector

2 x M3 x 0.5 thread depth 4

M5 x 0.8

Width across flats 12

C4H
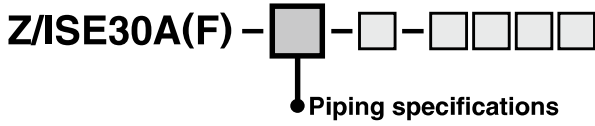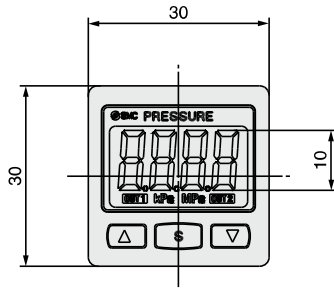
One-touch fitting ⌀4 mm ⌀5/32 inch straight

C6H
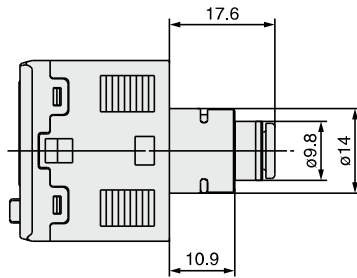
One-touch fitting ⌀6 mm straight

N7H
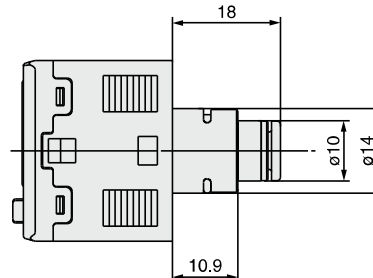
One-touch fitting ⌀1/4 inch straight

C4L
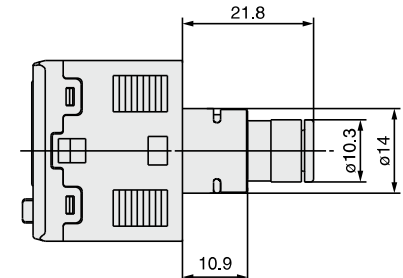
One-touch fitting ⌀4 mm ⌀5/32 inch elbow

C6L
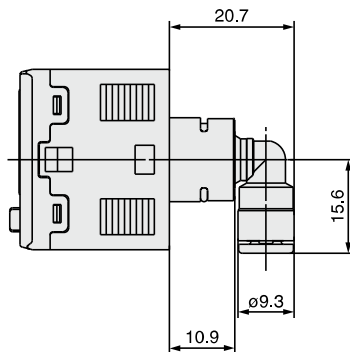
One-touch fitting ⌀6 mm elbow

N7L
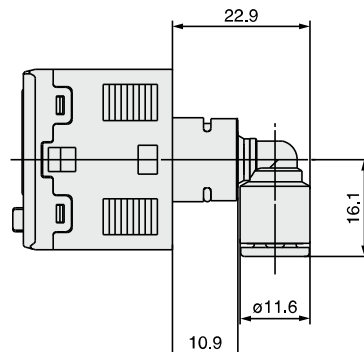
One-touch fitting ⌀1/4 inch elbow
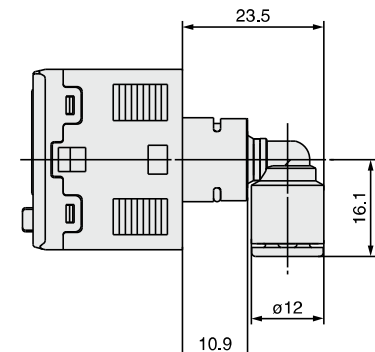
ZSE30A(F)/ISE30A *Series*

Dimensions

With bracket

Z/ISE30A(F) –☐–☐–☐☐▧☐

● Option 2

A1

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

* Bracket configuration allows mounting in four orientations.

A2

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

A3

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

* Bracket configuration allows mounting in four orientations.

	A	B
Bracket B	41.4	16.4
Bracket C	53	28

* When using the bracket B or C, install it by taking the dimensions of the piping part into consideration.

SMC

Panel mount adapter

Z/ISE30A(F) −☐−☐−☐☐▨☐

● **Option 2**

B

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

34.5

34.5

7.2 17.8 8 9.5

8.5

Panel thickness 0.5 to 6

50.8
47.8

R4.5 R4.5

21

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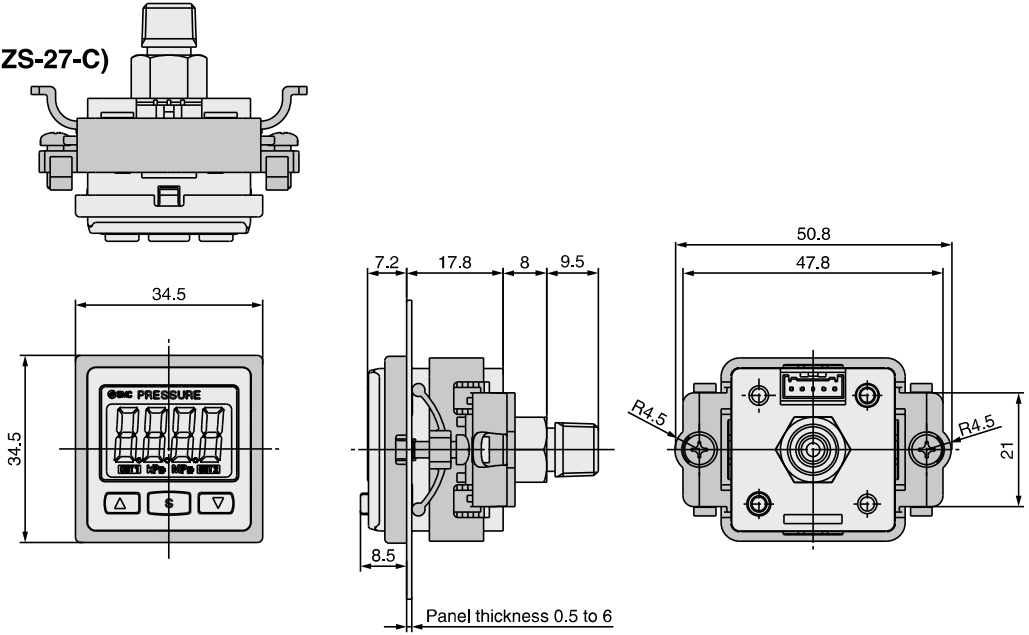
Panel mount adapter + Front protection cover
(Option unit part no.: ZS-27-D)

42.4
33.5

33.5

11 17.8 8 9.5

Panel thickness 0.5 to 6
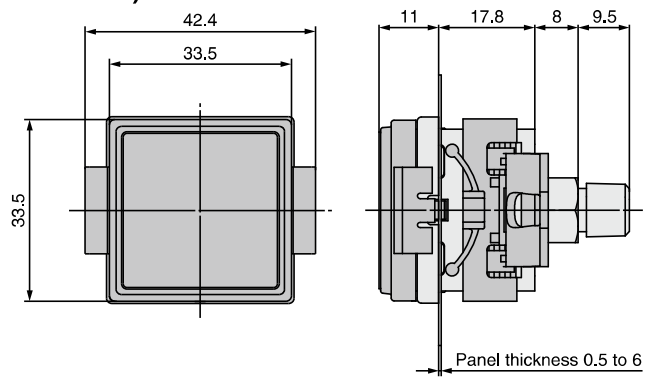
Lead wire with connector
(Option unit part no.: ZS-38-3L)
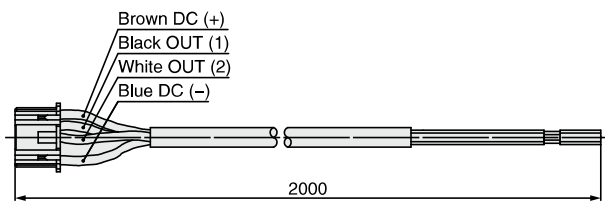
Brown DC (+)
Black OUT (1)
Blue DC (−)

2000

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

Brown DC (+)
Black OUT (1)
White OUT (2)
Blue DC (−)

2000

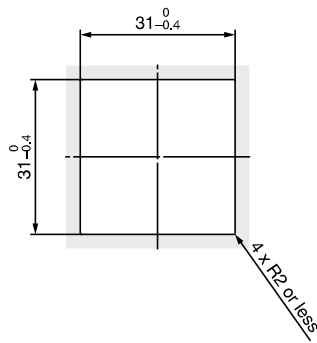ZSE20
ISE20
ZSE30
ISE30
ZSE40
ISE40
ZSE10
ISE10
ISE70
ZSE80
ISE80
PS
ISA3
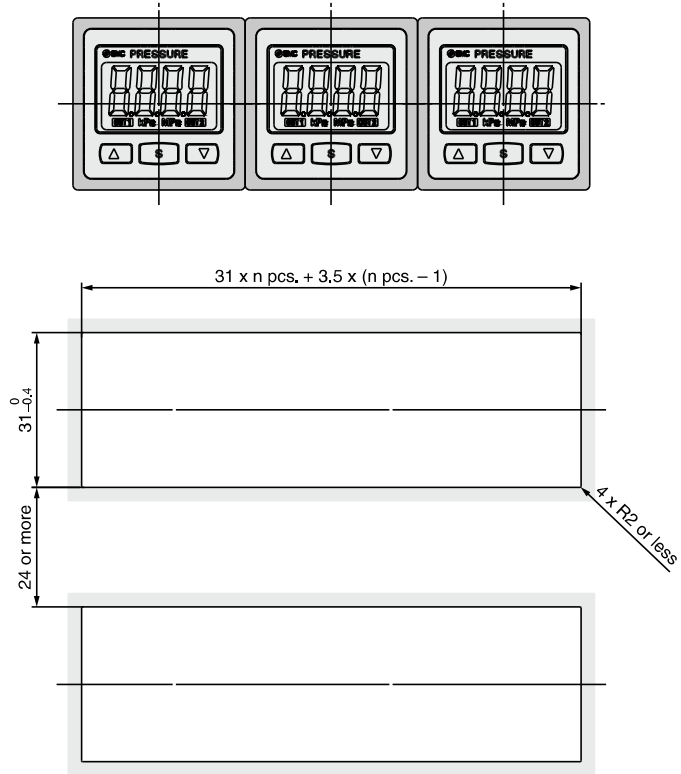ISA2
ISE35
PSE
IS
ISG
ZSM1

SMC

ZSE30A(F)/ISE30A *Series*
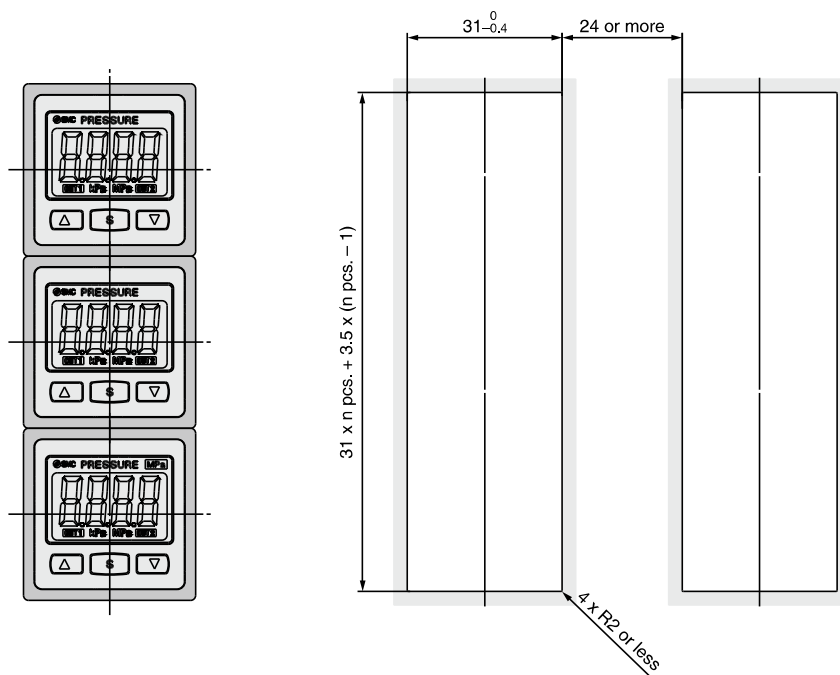
Dimensions

Panel fitting dimensions

1 pc. mounting

Multiple (2 pcs. or more) horizontal mounting

$31^{0}_{-0.4}$

$31^{0}_{-0.4}$

4 x R2 or less

$31 \times n \text{ pcs.} + 3.5 \times (n \text{ pcs.} - 1)$

$31^{0}_{-0.4}$

24 or more

4 x R2 or less

Multiple (2 pcs. or more) vertical mounting

$31^{0}_{-0.4}$

24 or more

$31 \times n \text{ pcs.} + 3.5 \times (n \text{ pcs.} - 1)$

4 x R2 or less
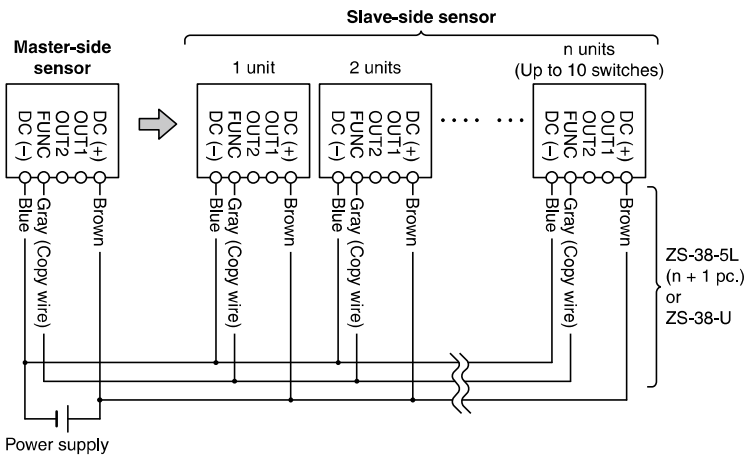
SMC

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.
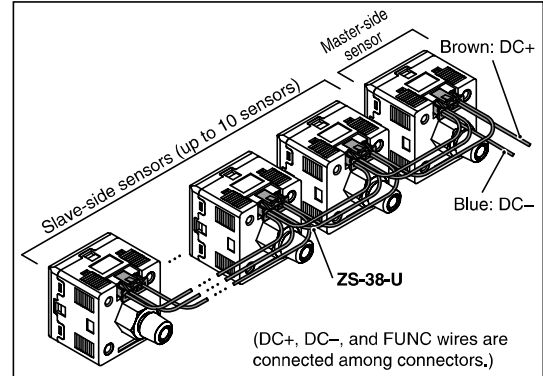**Can copy to up to 10 switches simultaneously.**
(Maximum transmission distance 4 m)

Master
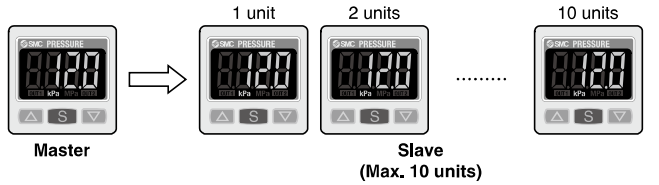
Slave
(Max. 10 units)

1) The sensors are connected by a dedicated lead wire (ZS-38-5L (for master and one slave) or ZS-38-U (for master and up to 10 slaves)). Copying is performed through a dedicated communication line.
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 S button of the master switch to start copying.

**Wiring example when using ZS-38-U**

ZSE20
ISE20
ZSE30
ISE30
ZSE40
ISE40
ZSE10
ISE10
ISE70
ZSE80
ISE80
PS
ISA3
ISA2
ISE35
PSE
IS
ISG
ZSM1

B Auto-preset function (F5)

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.
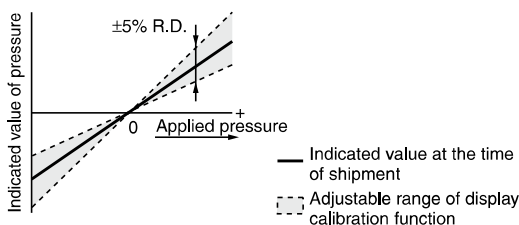
Suction Verification
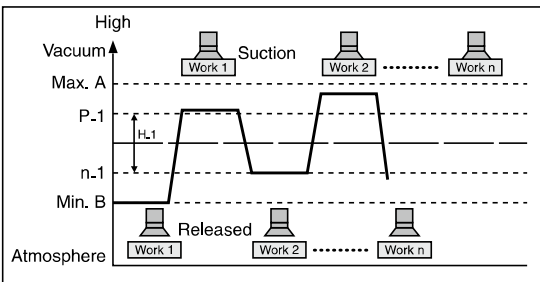
Formula for Obtaining the Set-Value

P_1 or P_2	H_1 or H_2
P_1 (P_2) = A − (A-B)/4 n_1 (n_2) = B + (A-B)/4	H_1 (H_2) = I (A-B)/2I

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.)

Note) When the display calibration function is used, the set pressure value may change ±1 digit.

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 △ ▽ buttons are simultaneously pressed for 1 second or longer, while "holding", the held 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. (ZSE30AF (for compound pressure) ±3.5% F.S.)

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Function Details

G Error indication function

Error name	Error code	Description	Action
Overcurrent error	$Er1$	Load current of 80 mA or more is applied to the switch output (OUT1).	Eliminate the cause of the over current by turning off the power supply, and then turn on it again.
	$Er2$	Load current of 80 mA or more is applied to the switch output (OUT2).	
Residual pressure error	$Er3$	During zero-clear operation, pressure over ±7% F.S. is applied. (ZSE30AF (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.	Perform zero-clear operation again after restoring the applied pressure to an atmospheric pressure condition.
Applied pressure error	HHH	Supply pressure exceeds the maximum set pressure.	Reset applied pressure to a level within the set pressure range.
	LLL	Supply pressure is below the minimum set pressure.	
System error	$Er0$	Internal data error	Turn off the power supply and then turn on it again. If the failure cannot be solved, please contact SMC for investigation.
	$Er4$		
	$Er6$		
	$Er7$		
	$Er8$		
	$Er9$		

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.

Available response time settings
20 ms, 100 ms, 500 ms, 1000 ms, 2000 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.
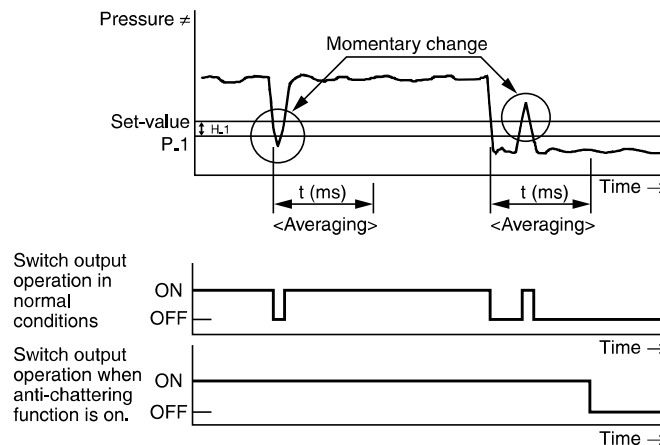
I Display unit switching function (F0)

Display units can be switched with this function.

Display unit / Min. unit setting	PA		GF	bAr	PSi	inH	mmH
	kPa	MPa*	kgf/cm²	bar	psi	inHg	mmHg
ZSE30A (Vacuum pressure)	0.1	0.001	0.001	0.001	0.01	0.1	1
ZSE30AF (Compound pressure)	0.1	0.001	0.001	0.001	0.01	0.1	1
ISE30A (Positive pressure)	1	0.001	0.01	0.01	0.1		

* The ZSE30A (vacuum pressure) and ZSE30AF (compound pressure) will have different setting and display resolution when the unit is set to MPa.

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 Setting of secret code (F8)

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.

ZSE20
ISE20

ZSE30
ISE30

ZSE40
ISE40

ZSE10
ISE10

ISE70

ZSE80
ISE80

PS

ISA3

ISA2

ISE35

PSE

IS

ISG

ZSM1

ZSE30A(F)/ISE30A *Series*
Made to Order
Please contact SMC for detailed dimensions, specifications and lead times.

1 **M12 4-pin Pre-wired Connector (Lead wire length 100 mm)**   **X510**

How to Order

∗ Refer to "How to Order" on page 33 for standard specifications.

ZSE30A(F)/ISE30A – ☐ – ☐ – ☐ **G** ☐ – **X510**

Piping specifications∗

Output specifications
A: NPN open collector 2 outputs
B: PNP open collector 2 outputs

Unit specifications∗

Option∗

42.5   100 $^{+30}_{0}$ 9.4

ø15

M12 4 pin connector
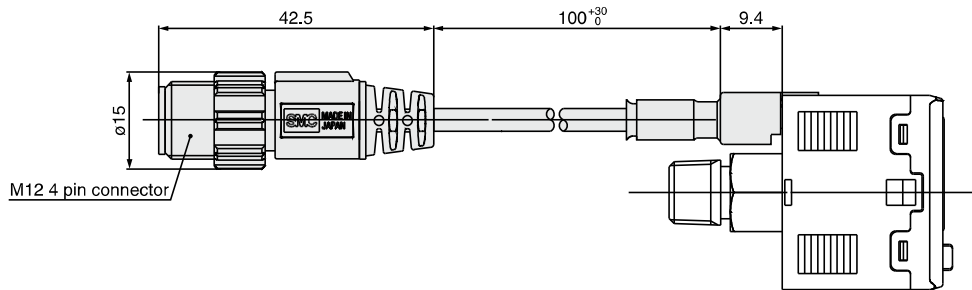
Option cable
ZS-38-4GM12

29.6

14

15.2   100 $^{+30}_{0}$ 42.5

ø15

Connector pin numbers

2 White   1 Brown

② ①
③ ④

3 Blue   4 Black
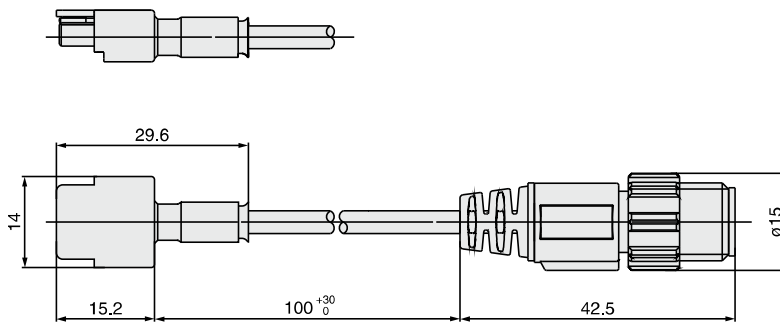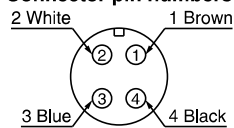
Pin no.	Pin description
1	DC (+)
2	OUT (2)
3	DC (−)
4	OUT (1)

SMC

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