Прецизионный датчик давления/вакуума с трёхэкранным дисплеем

ZSE20(F)/ISE20

Предназначен для контроля уровня давления или вакуума в пневмосистеме

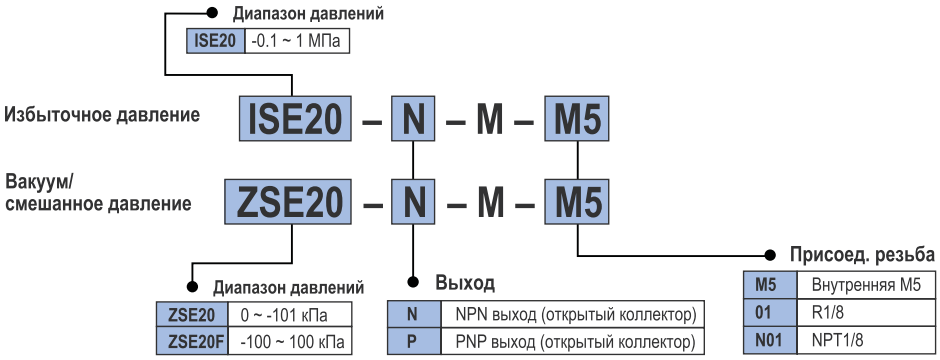
- Три номинальных диапазона: 0 ~ −101 кПа, −100 ~ 100 кПа, −0.1 ~ 1 МПа
- Дисплей с тремя экранами позволяет одновременно просматривать измеряемое давление и настраивать пороговые значения
- Три режима настройки
- Время реакции от 1.5 мс, потребление тока не более 25 мА
- Дискретный (PNP/NPN) выход
- Компактность, малый вес
- Крепёжные угольники обеспечивают установку в четырех положениях

Технические характеристики

Модель		ZSE20	ZSE20F	ISE20
Номинальный диапазон давлений		Вакуум	Смешанное	Избыточное
		0 ~ -101 кПа	-100 ~ 100 кПа	-0.1 ~ 1 МПа
Настраиваемый диапазон давлений		10 ~ -105 кПа	-105 ~ 105 кПа	-0.105 ~ 1.05 МПа
Испытательное давление		500 кПа		1.5 МПа
Наименьшая единица отображения		0.1 кПа		0.001 МПа
Рабочая среда		Воздух, нейтральные газы		
Напряжение питания (V DC)		12 ~ 24, отклонения напряжения не более ±10%, с защитой от подачи напряжения питания обратной полярности		
Потребление тока (мА)		не более 25		
Точность индикации дисплея		±2% полного диапазона ±1 ед. младшего разряда (при 25±3°C)		
Воспроизводимость		±0.2% полного диапазона ±1 ед. младшего разряда		
Влияние температуры		Не более ±2 % от полного диапазона в рабочем диапазоне температур по сравнению с измерением при 25 °C		
Дискретный выход	Тип	Выход NPN или PNP, открытый коллектор, защита от к.з.		
	Режимы	Окно, гистерезис, сигнал ошибки, отключение выхода		
	Логика выходного сигнала	Прямая логика, обратная логика		
	Макс. ток нагрузки (мА)	80		
	Макс. напряжение (В)	28 (NPN выход)		
	Внутр. падение напряжения (остаточное напряжение) (В)	Не более 1 (при 80 мА)		
	Время задержки (мс)[1]	1.5 (при использовании функции защиты от скачков давления может быть установлено по выбору: 20, 100, 500, 1000, 2000 или 5000 мс)		
Гистерезис	Режим гистерезиса	Регулируемый (может быть установлен с нуля)		
	Режим окна			
ЖК-дисплей	Единицы отображения	МПа, кПа (по запросу: kgf/cm^2, бар, psi, lnHg, mmHg)		МПа, кПа (по запросу: kgf/cm^2, бар, psi)
	Число экранов	3 (один главный экран и два подэкрана)		
	Число разрядов	Основной экран: 4 разряда, 7 сегментов, красный/зеленый цвет; подэкран: 4 разряда (старший разряд - 11 сегментов, остальные - 7 сегментов), оранжевый цвет		
Индикатор состояния выхода		При активации выхода OUT1 загорается оранжевый индикатор		
Цифровой фильтр[2]		0, 10, 50, 100, 500, 1000, 5000 мс		
Степень защиты		IP40		
Электрическая прочность изоляции		Устойчивость к воздействию испытательного напряжения 1000 V AC, приложенного в течение 1 мин. между токоведущими частями и корпусом		
Сопротивление изоляции		Между токоведущими частями и корпусом не менее 50 МОм (при 500 V DC)		
Присоединительная резьба		M5 внутр., R1/8		
Материалы, контактирующие со средой	Измерительный блок	Кремний		
	Фитинги	PBT, CB156, термостойкий PPS, C3604 никелированная, нерж. сталь 304 уплотнение - HNBR		
Рабочая температура (°C)		-5 ~ 50 (хранение: -10 ~ 60 (не допускать образования конденсата или замерзания)		
Относительная влажность (%)		Рабочая и хранения: 35 ~ 85 (не допускать конденсации)		
Кабель (заказывается отдельно)		3 жилы, 2 м, Ø3.4, маслостойкая изоляция, провода 0.15 мм^2 (AWG26), диаметр по изоляции 1 мм		
Вес (г)	С кабелем	С резьбой M5: 57, с переходником R1/8:67		
	Без кабеля	С резьбой M5: 22, с переходником R1/8: 32		

1) Значение без цифрового фильтра (при 0 мс)
2) Время реакции примерно соответствует времени, за которое расход достигает 90% заданного значения

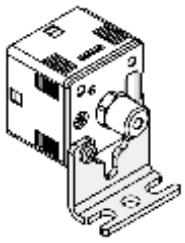
Номер для заказа



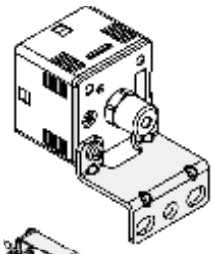
Принадлежности (заказываются отдельно)

Наименование	Номер для заказа	Примечание
Крепёжный угольник A	**ZS-46-A1**	2 самонарезающих винта 3x8 в комплекте
Крепёжный угольник B	**ZS-46-A2**	
Комплект для крепления на панели	**ZS-46-B**	
Комплект для крепления на панели + защитное стекло	**ZS-46-D**	
Защитное стекло	**ZS-27-01**	
Ответная часть разъема с кабелем питания и выходного сигнала	**ZS-46-3L**	3 жилы, 2 м
Переходник R1/8	**ZS-46-N1**	

Крепёжный угольник A



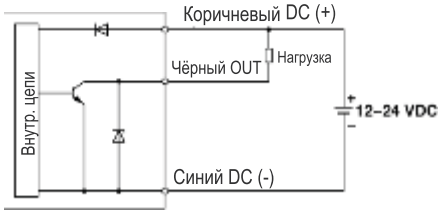
Крепёжный угольник B



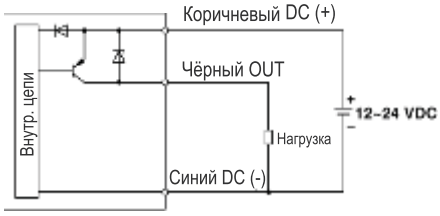
Комплект для крепления на панели

Электрическая схема и схема подключений

Выход NPN



Выход PNP



3-Screen Display

High-Precision Digital Pressure Switch

New • **Added Variations!**
For general fluids | IP65 | 2 outputs | Analog output

RoHS

Setting is possible while checking the measured value.

Main screen	Measured value (Current pressure value)
Sub screen	Label (Display item), Set value (Threshold value)

Visualization of Settings

Set value (Threshold value)	P_1	Peak value	H_H	Hysteresis value	H_1
Bottom value	H_Lo	Delay time	dt1		

Delay Time 1.5 ms[*1] or less

Current Consumption 25 mA[*2] or less

*1 Select from 1.5 ms or less, 20 ms, 100 ms, 500 ms, 1000 ms, 2000 ms, or 5000 ms.

*2 Further reduced by approx. 60% in power-saving mode (For 20 series)

The 20A, 20B, and 20C series have been added to the product lineup.

Applicable fluid	Series	Output type	Enclosure	Copy function	Piping: M5 female thread	Piping: 1/8 (R, NPT)	Piping: 1/4 (R, NPT, G) (URJ*1/TSJ*2)
Air	ZSE20(F)/ ISE20 p. 7	1 output	IP40	—	●	●	—
Air	New ZSE20A(F)/ ISE20A p. 9	2 outputs Analog output (Voltage/Current)	IP40	●	●	●	—
Air	New ZSE20B(F)/ ISE20B p. 11	2 outputs Analog output (Voltage/Current)	IP65	●	●	●	—
General fluids	New ZSE20C(F)/ ISE20C(H) p. 19	2 outputs Analog output (Voltage/Current)	IP65	●	●*3	● (Rc thread only)	●

*1 Face seal fitting *2 Compression fitting *3 With 1/4 (R, NPT, G) M5 female thread

ZSE20□(F)/ISE20□ Series

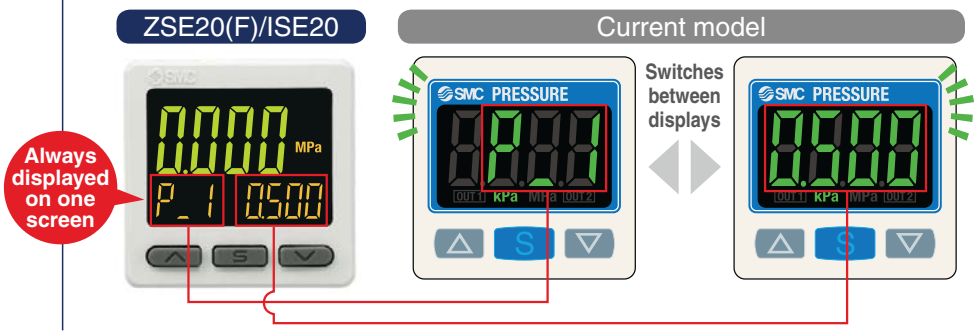
SMC

CAT.ES100-114B

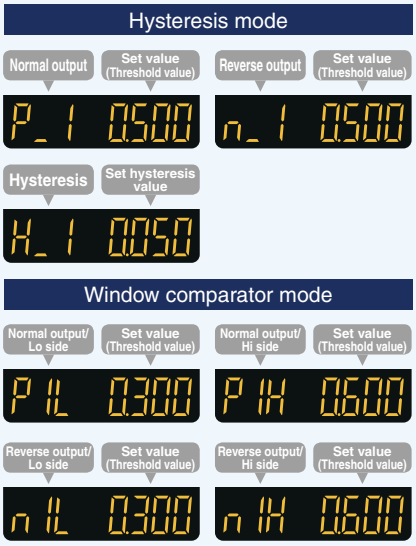
Improved Operability

Visualization of Settings

The sub screen (label) shows the item to be set.

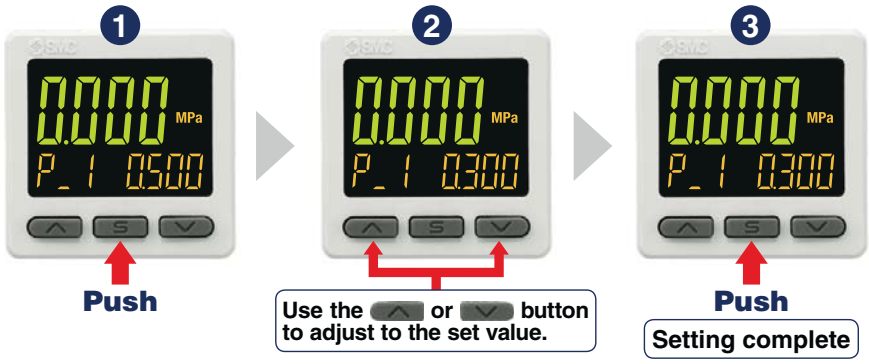


Mode Examples

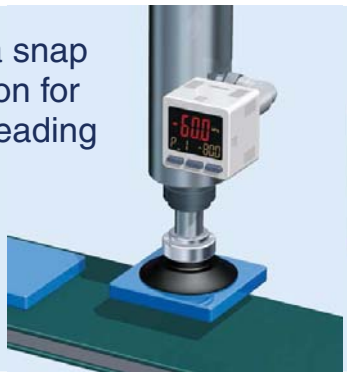


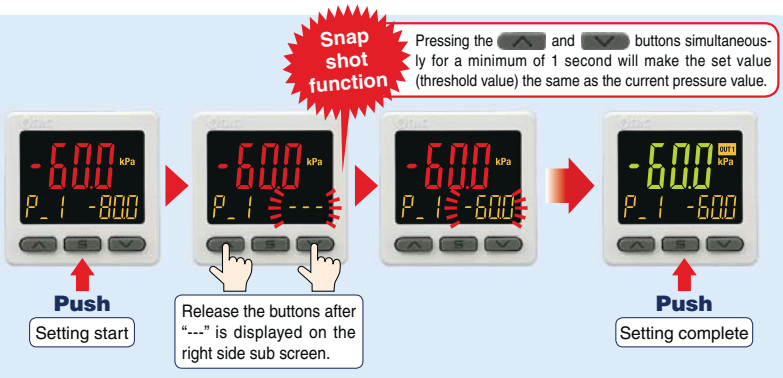
Simple 3-Step Setting

When the S button is pressed and the set value (P_1) is being displayed, the set value (threshold value) can be set. When the S button is pressed and the hysteresis (H_1) is being displayed, the hysteresis value can be set.



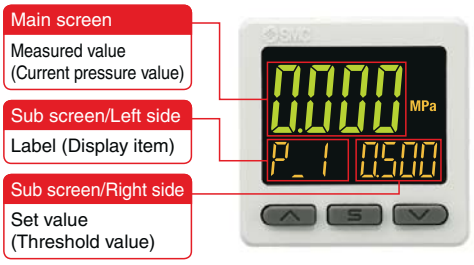
Now with a snap shot function for set value reading



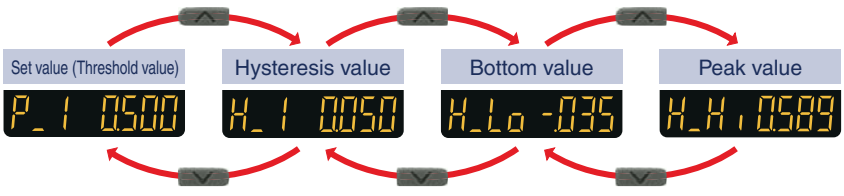


Easy Screen Switching

It is possible to change the settings while checking the measured value.



The sub screen can be switched by pressing the up/down buttons.



* One additional arbitrary display mode can be added via the function settings. (Refer to page 3.)
* Example for 1 output

3 Setting Modes

Select the setting mode that best meets your needs.

	3-Step Setting Mode	Simple Setting Mode	Function Selection Mode
	• Threshold value setting or • Hysteresis value setting	• Threshold value setting • Hysteresis value setting • Delay time selection	• Output mode selection • Selection of normal or reversed • Threshold value setting • Hysteresis value setting • Delay time selection • Display color selection

Simple ← Settings → Higher function

1 Mode selection

Press the S button once. | Press the S button for between 1 and 3 seconds. | Press the S button for between 3 and 5 seconds.

2 Output mode selection

Select from • Hysteresis mode • Window comparator mode • Error output • Output OFF

3 Normal or reversed output selection

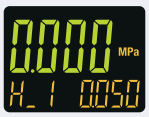
Select from • Normal output • Reversed output

4 Set value (Threshold value) setting

• Adjust the numerical value.

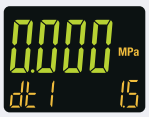
5 Hysteresis value setting

• Adjust the numerical value.



6 Delay time selection

Select from • 1.5 ms or less • 20 ms • 100 ms • 500 ms • 1000 ms • 2000 ms • 5000 ms



7 Display color selection

Select from
• ON Green/OFF Red (OUT1 or OUT2)
• ON Red/OFF Green (OUT1 or OUT2)
• Normally Red/Normally Green

Setting Complete | Setting Complete | Setting Complete

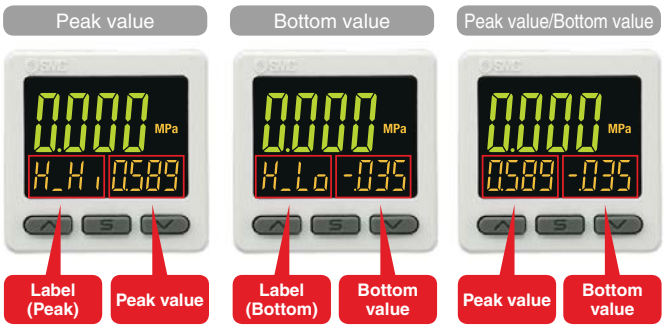
∗ For 1 output

Improved Operability

Other Sub Screen Display

The peak value or bottom value, or both values can be displayed on one screen!

* Peak and bottom values are maintained even if the power supply is cut.



Output mode/Output type display

Hysteresis mode		Window comparator mode	
Normal output	Reversed output	Normal output	Reversed output

Rated range display

Vacuum pressure range	Compound pressure range	Positive pressure range
VACU	Con1	Pos1

Level bar display

Pressure unit display

kPa	MPa	psi	bar
kPA	MPA	PSI	bAr

* A combination of the displays shown above and the set values can be displayed on the 2 sub screens.

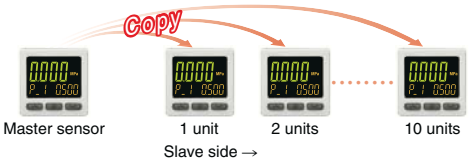
Convenient Functions

p. 13, 21

Functions	Copy function	Auto-shift function	Secret code setting function	Power-saving function	Resolution switch function	MPa/kPa switch function
20	—	—	●	●	●	●
20A	●	●	●	●	●	●
20B	●	●	●	●	●	●
20C	●	●	●	●	●	●

Copy function

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



Auto-shift function

This measures the pressure at the time of external input and uses it as a reference to correct the on-off point of the switch.

Secret code setting function

The key-lock function keeps unauthorized persons from tampering with the settings.

Power-saving function

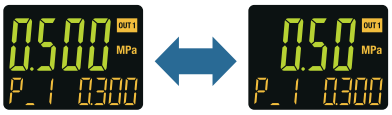
Power consumption is reduced by turning off the monitor.

Series	Current consumption	Reduction rate*1
20	25 mA or less	Approx. 60% reduction
20A	35 mA or less	Approx. 40% reduction
20B		
20C		

*1 In power-saving mode

Display resolution switch function

Reduces monitor flickering

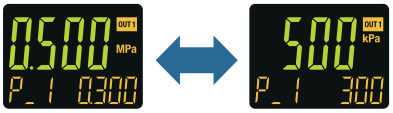


1/1000 1/100

(Only the displayed values are changed; the accuracy remains the same.)

MPa/kPa switch function

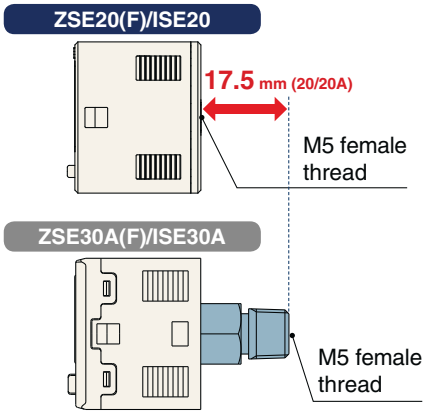
Vacuum, compound, and/or positive pressure can be displayed in MPa or kPa.



Compact & Lightweight

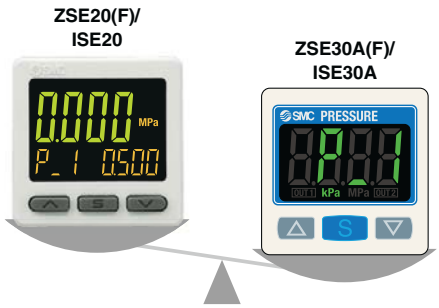
Compact: Max. 17.5 mm shorter

(When an M5 female thread is used.)



Lightweight: Max. 21 g lighter

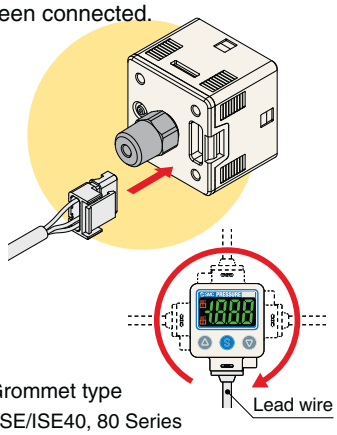
(When an M5 female thread is used.)



Improved Installability

Connector type

Wiring is possible after piping has been connected.



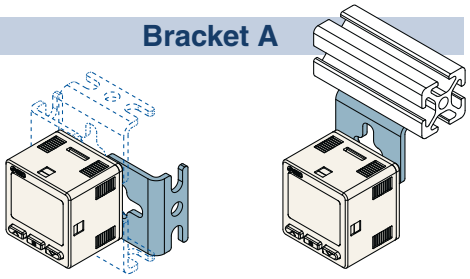
Mounting

Available Mounting Options

Series	Bracket A	Bracket B	Bracket C	Panel mount
20	●	●	—	●
20A	●	●	—	●
20B	●	●	—	●
20C	●	—	●	●

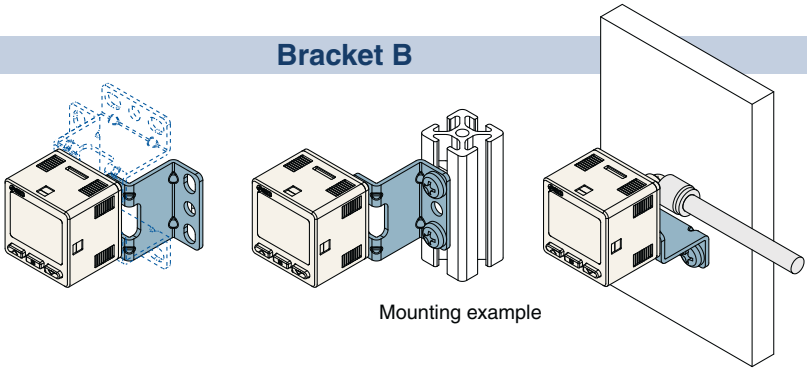
The bracket configuration allows for mounting in four orientations.

Bracket A



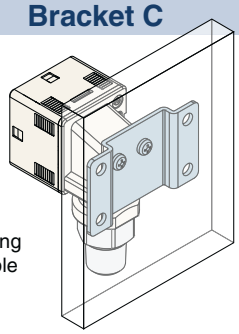
Mounting example

Bracket B



Mounting example

Bracket C



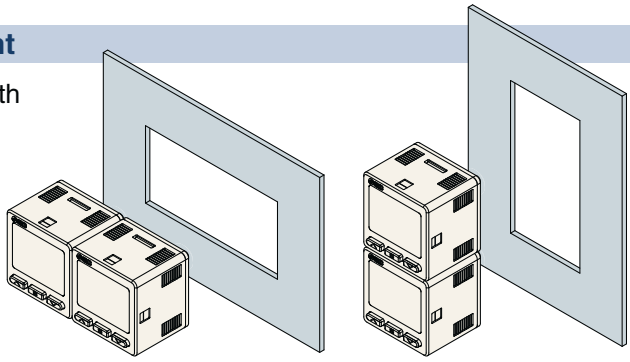
Mounting example

Panel mount

Mountable side by side both vertically and horizontally

One opening!

· Reduced panel fitting labor
· Space saving



For General Fluids ZSE20C(F)/ISE20C(H) p. 19

Stainless diaphragm

Oil-free (Single-layer diaphragm structure)

Sensor unit: **Stainless steel 630**
Fitting parts: **Stainless steel 304**

A stainless steel 316L option is also available for the sensor unit and fitting parts.

Enclosure: IP65

Leakage

1 x 10^{-10}Pa·m³/s
<Face seal and compression fitting>

1 x 10^{-5}Pa·m³/s
<Threaded type (R, Rc, NPT, G)>

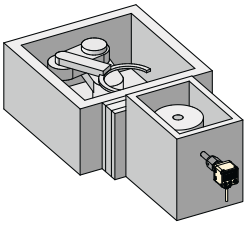
Welded structure for sensor units and fitting parts

Select from a face seal or compression fitting.

Face seal

Compression

Confirmation of the atmospheric pressure of a load lock chamber



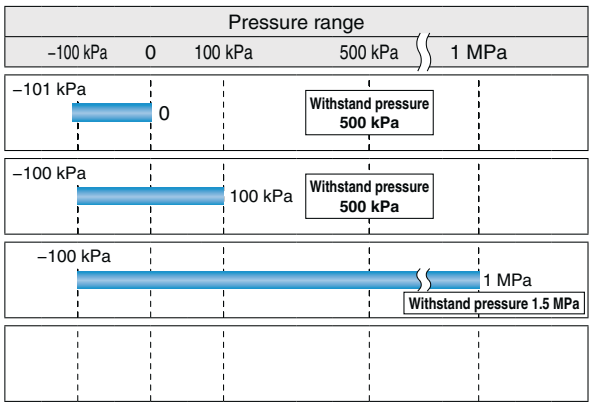
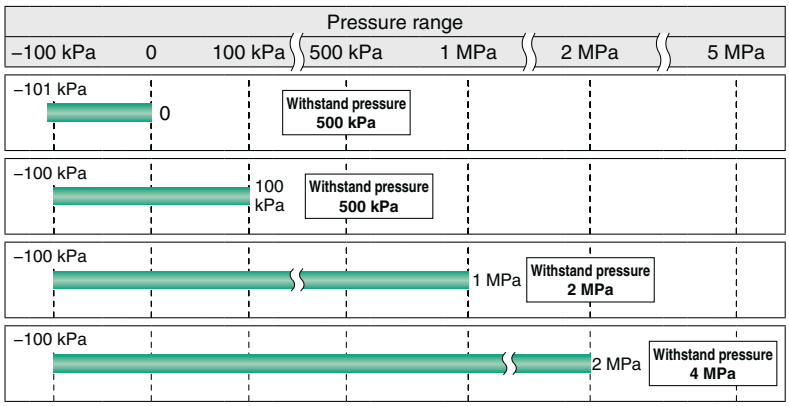
Applicable Fluid Examples

- Water
- Hydraulic fluid (JIS-K2213)
- Silicone oil (JIS-K2213)
- Lubricant (JIS-K6301)
- Fluorocarbon
- Argon
- Carbon dioxide
- Air-containing drainage
- Nitrogen

Introduction of Series

	1 output IP40 ZSE/ISE20 p. 7	2 outputs IP40 ZSE/ISE20A p. 9
		
Applicable fluid	Air	
Switch	Pressure range: −100 kPa, 0, 100 kPa, 500 kPa, 1 MPa	Pressure range: −100 kPa, 0, 100 kPa, 500 kPa, 1 MPa
Rated pressure range — For vacuum pressure	−101 kPa to 0; Withstand pressure 500 kPa	−101 kPa to 0; Withstand pressure 500 kPa
Rated pressure range — For compound pressure	−100 kPa to 100 kPa; Withstand pressure 500 kPa	−100 kPa to 100 kPa; Withstand pressure 500 kPa
Rated pressure range — For positive pressure — 1 MPa	−100 kPa to 1 MPa; Withstand pressure 1.5 MPa	−100 kPa to 1 MPa; Withstand pressure 1.5 MPa
Rated pressure range — For positive pressure — 2 MPa		
Output specification	1 output (NPN/PNP)	2 outputs (NPN/PNP) Analog (Voltage/Current)
Enclosure	IP40	IP40
Piping	M5 female thread, R1/8, NPT1/8	
Note	—	Copy function, Auto-shift function

CONTENTS

2 outputs IP65 ZSE/ISE20B p. 11	2 outputs IP65 ZSE/ISE20C p. 19
	
Air	General fluids
	
2 outputs (NPN/PNP)	2 outputs (NPN/PNP)
Analog (Voltage/Current)	Analog (Voltage/Current)
IP65	IP65
M5 female thread, R1/8, NPT1/8	R1/4*1, NPT1/4*1, G1/4*1, Rc1/8, URJ1/4*2, TSJ1/4*3
Copy function, Auto-shift function	Copy function, Auto-shift function

*1 M5 female threaded *2 Face seal fitting *3 Compression fitting

3-Screen Display High-Precision Digital Pressure Switch
ZSE20B(F)/ISE20B Series

3-Screen Display High-Precision Digital Pressure Switch For General Fluids
ZSE20C(F)/ISE20C(H) Series

1 Output

3-Screen Display High-Precision Digital Pressure Switch

ZSE20(F)/ISE20 Series

RoHS

IP40

How to Order

Rated pressure range

ISE20	–0.1 to 1 MPa

For positive pressure: **ISE20 – N – M – M5 – □□□**

For vacuum/compound pressure: **ZSE20 – N – M – M5 – □□□**

❶ ❷ ❸ ❹ ❺ ❻ ❼

❶ Rated pressure range

ZSE20	0 to –101 kPa
ZSE20F	–100 to 100 kPa

❷ Output specification

Symbol	Description
N	NPN open collector 1 output
P	PNP open collector 1 output

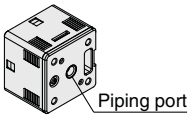
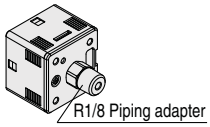
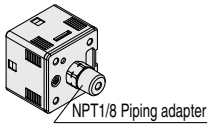
❸ Unit specification

Symbol	Description
Nil	Unit selection function*1
M	SI unit only*2
P	Unit selection function (Initial value psi)*1

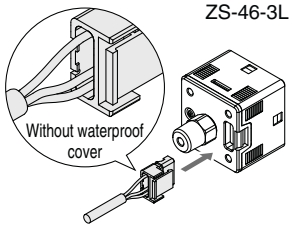
*1 Under the New Measurement Act, switches with the unit selection function are not permitted for use in Japan.

*2 Fixed unit: kPa, MPa

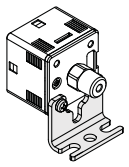
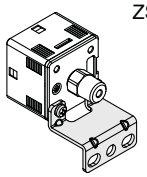
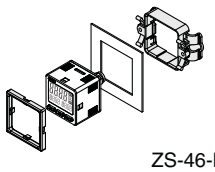
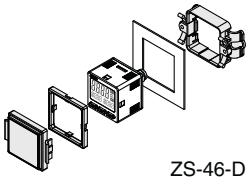
❹ Piping specification

Symbol	Description
M5	M5 female thread 
01	R1/8  ZS-46-N1
N01	NPT1/8  ZS-46-N2

❺ Option 1

Symbol	Description	
Nil	Without lead wire	
L	Lead wire with connector (3-core, 2 m lead wire)	ZS-46-3L 

❻ Option 2

Symbol	Description	
Nil	None	
A1	Bracket A (Vertical mounting)	ZS-46-A1 
A2	Bracket B (Horizontal mounting)	ZS-46-A2 
B	Panel mount adapter	 ZS-46-B
D	Panel mount adapter + Front protection cover	 ZS-46-D

❼ Option 3

Symbol	Operation manual*1	Calibration certificate*1
Nil	○	—
Y	—	—
K	○	○
T	—	○

*1 All texts are in both English and Japanese.

Options/Part Nos.

When only optional parts are required, order with the part numbers listed below.

Description	Part no.	Note
Bracket A	ZS-46-A1	Tapping screw: Nominal size 3 x 8 L (2 pcs.)
Bracket B	ZS-46-A2	Tapping screw: Nominal size 3 x 8 L (2 pcs.)
Panel mount adapter	ZS-46-B	—
Panel mount adapter + Front protection cover	ZS-46-D	—
Lead wire with connector	ZS-46-3L	3-core, 2 m, Non-waterproof (Without waterproof cover)
Front protection cover	ZS-27-01	—
R1/8 piping adapter	ZS-46-N1	
NPT1/8 piping adapter	ZS-46-N2	

SMC

For details on the specific product precautions, refer to the "Operation Manual" on the SMC website.

Specifications

Model			ZSE20 (Vacuum pressure)	ZSE20F (Compound pressure)	ISE20 (Positive pressure)
Applicable fluid			Air, Non-corrosive gas, Non-flammable gas		
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
	Minimum display unit/Smallest settable increment		0.1 kPa		0.001 MPa
	Withstand pressure		500 kPa		1.5 MPa
Power supply	Power supply voltage		12 to 24 VDC ±10%, Ripple (p-p) 10% or less		
	Current consumption		25 mA or less		
	Protection		Polarity protection		
Accuracy	Display accuracy		±2% F.S. ±1 digit (Ambient temperature of 25 ±3°C)		
	Repeatability		±0.2% F.S. ±1 digit		
	Temperature characteristics		±2% F.S. (25°C standard)		
Switch output	Output type		NPN or PNP open collector 1 output		
	Output mode		Hysteresis mode, Window comparator mode, Error output, Output OFF		
	Switch operation		Normal output, Reversed output		
	Max. load current		80 mA		
	Max. applied voltage (NPN only)		28 V		
	Internal voltage drop (Residual voltage)		1 V or less (at load current of 80 mA)		
	Delay time*1		1.5 ms or less (with anti-chattering function: 20, 100, 500, 1000, 2000, 5000 ms)		
	Hysteresis	Hysteresis mode	Variable from 0*2		
		Window comparator mode			
	Short circuit protection		Yes		
Display	Unit*3		MPa, kPa, kgf/cm², bar, psi, InHg, mmHg		MPa, kPa, kgf/cm², bar, psi
	Display type		LCD		
	Number of screens		3-screen display (Main screen, Sub screen x 2)		
	Display color		1) Main screen: Red/Green 2) Sub screen: Orange		
	Number of display digits		1) Main screen: 4 digits (7 segments) 2) Sub screen: 4 digits (Upper 1 digit 11 segments, 7 segments for other)		
	Indicator light		Lights up when switch output is turned ON. OUT1: Orange		
Digital filter*4			0, 10, 50, 100, 500, 1000, 5000 ms		
Environment	Enclosure		IP40		
	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		
	Operating temperature range		Operating: −5 to 50°C, Stored: −10 to 60°C (No condensation or freezing)		
	Operating humidity range		Operating/Stored: 35 to 85%RH (No condensation)		
Standards			UL/CSA (E216656), CE, RoHS		
Length of lead wire with connector			2 m		

*1 Value without digital filter (at 0 ms)
*2 If the applied pressure fluctuates around the set value, the hysteresis must be set to a value more than the amount of fluctuation or chattering will occur.
*3 Setting is only possible for models with the unit selection function. Only MPa or kPa is available for models without this function.
*4 The response time indicates when the set value is 90% in relation to the step input.
* Products with tiny scratches, smears, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

Piping Specifications and Weights

Model		M5	01	N01
Port size		M5 x 0.8	R1/8	NPT1/8
Materials of parts in contact with fluid	Sensor pressure receiving area	Silicon		
	Piping port (Common)	PBT, CB156, Heat-resistant PPS, O-ring: HNBR		
	Piping port	—	C3604 (Electroless nickel plating), Stainless steel 304, NBR	
Weight	Body	22 g	32 g	34 g
	Lead wire with connector	+35 g		

Cable Specifications

Conductor area		0.15 mm² (AWG26)
Insulator	O.D.	1.0 mm
	Color	Brown, Blue, Black (3-core)
Sheath	Finished O.D.	ø3.4

"Set Pressure Range and Rated Pressure Range" "Functions" ➡ p. 13
"Internal Circuits and Wiring Examples" ➡ p. 13 "Dimensions" ➡ From p. 15

2 Outputs + Analog Output (Voltage/Current)

3-Screen Display High-Precision Digital Pressure Switch

ZSE20A(F)/ISE20A Series

RoHS

IP40

How to Order

Rated pressure range

ISE20A	−0.1 to 1 MPa

For positive pressure: **ISE20A − X − M − M5 − □□□**

For vacuum/compound pressure: **ZSE20A − X − M − M5 − □□□**

❶ ❷ ❸ ❹ ❺ ❻ ❼

❶ Rated pressure range

ZSE20A	0 to −101 kPa
ZSE20AF	−100 to 100 kPa

❷ Output specification

Symbol	Description
R	NPN open collector 2 outputs + Analog voltage output *1
S	NPN open collector 2 outputs + Analog current output *1
T	PNP open collector 2 outputs + Analog voltage output *1
V	PNP open collector 2 outputs + Analog current output *1
X	NPN open collector 2 outputs + Copy function
Y	PNP open collector 2 outputs + Copy function

*1 Can be switched to auto-shift or copy function

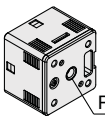
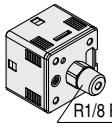
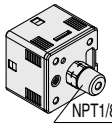
❸ Unit specification

Symbol	Description
Nil	Unit selection function*1
M	SI unit only*2
P	Unit selection function (Initial value psi)*1

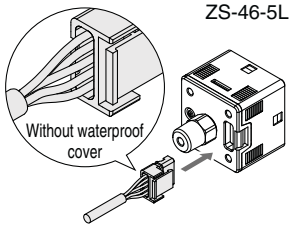
*1 Under the New Measurement Act, switches with the unit selection function are not permitted for use in Japan.

*2 Fixed unit: kPa, MPa

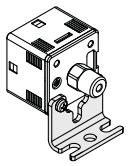
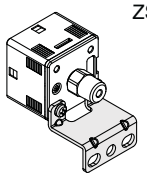
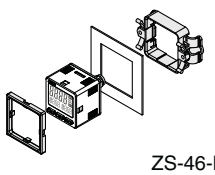
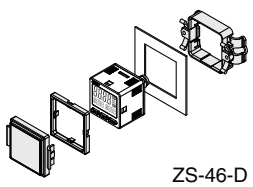
❹ Piping specification

Symbol	Description
M5	M5 female thread 
01	R1/8  ZS-46-N1
N01	NPT1/8  ZS-46-N2

❺ Option 1

Symbol	Description	
Nil	Without lead wire	
J	Lead wire with connector (5-core, 2 m lead wire)	ZS-46-5L 

❻ Option 2

Symbol	Description	
Nil	None	
A1	Bracket A (Vertical mounting)	ZS-46-A1 
A2	Bracket B (Horizontal mounting)	ZS-46-A2 
B	Panel mount adapter	 ZS-46-B
D	Panel mount adapter + Front protection cover	 ZS-46-D

❼ Option 3

Symbol	Operation manual*1	Calibration certificate*1
Nil	○	—
Y	—	—
K	○	○
T	—	○

*1 All texts are in both English and Japanese.

Options/Part Nos.

When only optional parts are required, order with the part numbers listed below.

Description	Part no.	Note
Bracket A	**ZS-46-A1**	Tapping screw: Nominal size 3 x 8 L (2 pcs.)
Bracket B	**ZS-46-A2**	Tapping screw: Nominal size 3 x 8 L (2 pcs.)
Panel mount adapter	**ZS-46-B**	—
Panel mount adapter + Front protection cover	**ZS-46-D**	—
Lead wire with connector	**ZS-46-5L**	5-core, 2 m, Non-waterproof (Without waterproof cover)
Front protection cover	**ZS-27-01**	—
R1/8 piping adapter	**ZS-46-N1**	
NPT1/8 piping adapter	**ZS-46-N2**	

For details on the specific product precautions, refer to the "Operation Manual" on the SMC website.

Specifications

Model			ZSE20A (Vacuum pressure)	ZSE20AF (Compound pressure)	ISE20A (Positive pressure)
Applicable fluid			Air, Non-corrosive gas, Non-flammable gas		
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
	Minimum display unit/Smallest settable increment		0.1 kPa		0.001 MPa
	Withstand pressure		500 kPa		1.5 MPa
Power supply	Power supply voltage		12 to 24 VDC ±10%, Ripple (p-p) 10% or less		
	Current consumption		35 mA or less		
	Protection		Polarity protection		
Accuracy	Display accuracy		±2% F.S. ±1 digit (Ambient temperature of 25 ±3°C)		
	Repeatability		±0.2% F.S. ±1 digit		
	Analog output accuracy		±2.5% F.S. (Ambient temperature of 25 ±3°C)		
	Analog output linearity		±1% F.S.		
	Temperature characteristics		±2% F.S. (25°C standard)		
Switch output	Output type		NPN or PNP open collector 2 outputs		
	Output mode		Hysteresis mode, Window comparator mode, Error output, Output OFF		
	Switch operation		Normal output, Reversed output		
	Max. load current		80 mA		
	Max. applied voltage (NPN only)		28 V		
	Internal voltage drop (Residual voltage)		1 V or less (at load current of 80 mA)		
	Delay time*1		1.5 ms or less (with anti-chattering function: 20, 100, 500, 1000, 2000, 5000 ms)		
	Hysteresis	Hysteresis mode	Variable from 0*2		
		Window comparator mode			
	Short circuit protection		Yes		
Analog output	Voltage output	Output type	Voltage output: 1 to 5 V		Voltage output: 0.6 to 5 V
		Output impedance	Approx. 1 kΩ		
	Current output	Output type	Current output: 4 to 20 mA		Current output: 2.4 to 20 mA
		Load impedance	Maximum load impedance at power supply voltage of 12 V: 300 Ω at power supply voltage of 24 V: 600 Ω Minimum load impedance: 50 Ω		
Auto-shift input	Input type		Non-voltage input: 0.4 V or less		
	Input mode		Select from Auto-shift or Auto-shift zero.		
	Input time		5 ms or more		
Display	Unit*3		MPa, kPa, kgf/cm², bar, psi, InHg, mmHg		MPa, kPa, kgf/cm², bar, psi
	Display type		LCD		
	Number of screens		3-screen display (Main screen, Sub screen x 2)		
	Display color		1) Main screen: Red/Green 2) Sub screen: Orange		
	Number of display digits		1) Main screen: 4 digits (7 segments) 2) Sub screen: 4 digits (Upper 1 digit 11 segments, 7 segments for other)		
	Indicator light		Lights up when switch output is turned ON. OUT1, OUT2: Orange		
Digital filter*4			0, 10, 50, 100, 500, 1000, 5000 ms		
Environment	Enclosure		IP40		
	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		
	Operating temperature range		Operating: −5 to 50°C, Stored: −10 to 60°C (No condensation or freezing)		
	Operating humidity range		Operating/Stored: 35 to 85%RH (No condensation)		
Standards			UL/CSA (E216656), CE, RoHS		
Length of lead wire with connector			2 m		

*1 Value without digital filter (at 0 ms)
*2 If the applied pressure fluctuates around the set value, the hysteresis must be set to a value more than the amount of fluctuation or chattering will occur.
*3 Setting is only possible for models with the unit selection function. Only MPa or kPa is available for models without this function.
*4 The response time indicates when the set value is 90% in relation to the step input.
* Products with tiny scratches, smears, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

Piping Specifications and Weights

Model		M5	01	N01
Port size		M5 x 0.8	R1/8	NPT1/8
Materials of parts in contact with fluid	Sensor pressure receiving area	Silicon		
	Piping port (Common)	PBT, CB156, Heat-resistant PPS, O-ring: HNBR		
	Piping port	—	C3604 (Electroless nickel plating), Stainless steel 304, NBR	
Weight	Body	24 g	34 g	36 g
	Lead wire with connector	+39 g		

Cable Specifications

Conductor area		0.15 mm² (AWG26)
Insulator	O.D.	1.0 mm
	Color	Brown, Blue, Black, White, Gray (5-core)
Sheath	Finished O.D.	ø3.5

"Set Pressure Range and Rated Pressure Range" "Functions" ➡ p. 13
"Internal Circuits and Wiring Examples" ➡ p. 14 "Dimensions" ➡ From p. 15

2 Outputs + Analog Output (Voltage/Current)

3-Screen Display High-Precision Digital Pressure Switch

ZSE20B(F)/ISE20B Series

RoHS

IP65

How to Order

Rated pressure range

ISE20B	−0.1 to 1 MPa

For positive pressure ISE20B − X − M − M5 − ❑ ❑ ❑

For vacuum/ compound pressure ZSE20B − X − M − M5 − ❑ ❑ ❑

❶ ❷ ❸ ❹ ❺ ❻ ❼

❶ Rated pressure range

ZSE20B	0 to −101 kPa
ZSE20BF	−100 to 100 kPa

❷ Output specification

Symbol	Description
R	NPN open collector 2 outputs + Analog voltage output*1
S	NPN open collector 2 outputs + Analog current output*1
T	PNP open collector 2 outputs + Analog voltage output*1
V	PNP open collector 2 outputs + Analog current output*1
X	NPN open collector 2 outputs + Copy function
Y	PNP open collector 2 outputs + Copy function

*1 Can be switched to auto-shift or copy function

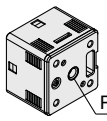
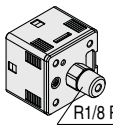
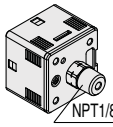
❸ Unit specification

Symbol	Description
Nil	Unit selection function*1
M	SI unit only*2
P	Unit selection function (Initial value psi)*1

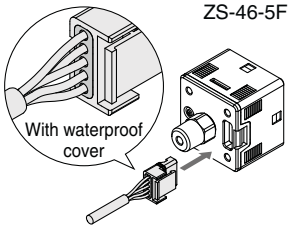
*1 Under the New Measurement Act, switches with the unit selection function are not permitted for use in Japan.

*2 Fixed unit: kPa, MPa

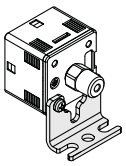
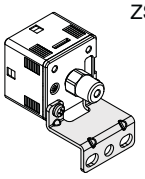
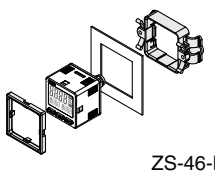
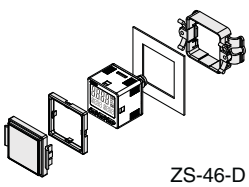
❹ Piping specification

Symbol	Description
M5	M5 female thread 
01	R1/8  ZS-46-N1
N01	NPT1/8  ZS-46-N2

❺ Option 1

Symbol	Description	
Nil	Without lead wire	
W	Lead wire with connector (5-core, 2 m lead wire, With waterproof cover)	ZS-46-5F 

❻ Option 2

Symbol	Description	
Nil	None	
A1	Bracket A (Vertical mounting)	ZS-46-A1 
A2	Bracket B (Horizontal mounting)	ZS-46-A2 
B	Panel mount adapter	 ZS-46-B
D	Panel mount adapter + Front protection cover	 ZS-46-D

❼ Option 3

Symbol	Operation manual*1	Calibration certificate*1
Nil	○	—
Y	—	—
K	○	○
T	—	○

*1 All texts are in both English and Japanese.

Options/Part Nos.

When only optional parts are required, order with the part numbers listed below.

Description	Part no.	Note
Bracket A	**ZS-46-A1**	Tapping screw: Nominal size 3 x 8 L (2 pcs.)
Bracket B	**ZS-46-A2**	Tapping screw: Nominal size 3 x 8 L (2 pcs.)
Panel mount adapter	**ZS-46-B**	—
Panel mount adapter + Front protection cover	**ZS-46-D**	—
Lead wire with connector	**ZS-46-5F**	5-core, 2 m, Waterproof (With waterproof cover)
Front protection cover	**ZS-27-01**	—
R1/8 piping adapter	**ZS-46-N1**	
NPT1/8 piping adapter	**ZS-46-N2**	

For details on the specific product precautions, refer to the "Operation Manual" on the SMC website.

Specifications

Model			ZSE20B (Vacuum pressure)	ZSE20BF (Compound pressure)	ISE20B (Positive pressure)
Applicable fluid			Air, Non-corrosive gas, Non-flammable gas		
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
	Minimum display unit/Smallest settable increment		0.1 kPa		0.001 MPa
	Withstand pressure		500 kPa		1.5 MPa
Power supply	Power supply voltage		12 to 24 VDC ±10%, Ripple (p-p) 10% or less		
	Current consumption		35 mA or less		
	Protection		Polarity protection		
Accuracy	Display accuracy		±2% F.S. ±1 digit (Ambient temperature of 25 ±3°C)		
	Repeatability		±0.2% F.S. ±1 digit		
	Analog output accuracy		±2.5% F.S. (Ambient temperature of 25 ±3°C)		
	Analog output linearity		±1% F.S.		
	Temperature characteristics		±2% F.S. (25°C standard)		
Switch output	Output type		NPN or PNP open collector 2 outputs		
	Output mode		Hysteresis mode, Window comparator mode, Error output, Output OFF		
	Switch operation		Normal output, Reversed output		
	Max. load current		80 mA		
	Max. applied voltage (NPN only)		28 V		
	Internal voltage drop (Residual voltage)		1 V or less (at load current of 80 mA)		
	Delay time*1		1.5 ms or less (with anti-chattering function: 20, 100, 500, 1000, 2000, 5000 ms)		
	Hysteresis	Hysteresis mode	Variable from 0*2		
		Window comparator mode			
	Short circuit protection		Yes		
Analog output	Voltage output	Output type	Voltage output: 1 to 5 V		Voltage output: 0.6 to 5 V
		Output impedance	Approx. 1 kΩ		
	Current output	Output type	Current output: 4 to 20 mA		Current output: 2.4 to 20 mA
		Load impedance	Maximum load impedance at power supply voltage of 12 V: 300 Ω at power supply voltage of 24 V: 600 Ω Minimum load impedance: 50 Ω		
Auto-shift input	Input type		Non-voltage input: 0.4 V or less		
	Input mode		Select from Auto-shift or Auto-shift zero.		
	Input time		5 ms or more		
Display	Unit*3		MPa, kPa, kgf/cm², bar, psi, InHg, mmHg		MPa, kPa, kgf/cm², bar, psi
	Display type		LCD		
	Number of screens		3-screen display (Main screen, Sub screen x 2)		
	Display color		1) Main screen: Red/Green 2) Sub screen: Orange		
	Number of display digits		1) Main screen: 4 digits (7 segments) 2) Sub screen: 4 digits (Upper 1 digit 11 segments, 7 segments for other)		
	Indicator light		Lights up when switch output is turned ON. OUT1, OUT2: Orange		
Digital filter*4			0, 10, 50, 100, 500, 1000, 5000 ms		
Environment	Enclosure		IP65		
	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		
	Operating temperature range		Operating: −5 to 50°C, Stored: −10 to 60°C (No condensation or freezing)		
	Operating humidity range		Operating/Stored: 35 to 85%RH (No condensation)		
Standards			UL/CSA (E216656), CE, RoHS		
Length of lead wire with connector			2 m		

*1 Value without digital filter (at 0 ms)
*2 If the applied pressure fluctuates around the set value, the hysteresis must be set to a value more than the amount of fluctuation or chattering will occur.
*3 Setting is only possible for models with the unit selection function. Only MPa or kPa is available for models without this function.
*4 The response time indicates when the set value is 90% in relation to the step input.
* Products with tiny scratches, smears, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

Piping Specifications and Weights

Model		M5	01	N01
Port size		M5 x 0.8	R1/8	NPT1/8
Materials of parts in contact with fluid	Sensor pressure receiving area	Silicon		
	Piping port (Common)	PBT, CB156, Heat-resistant PPS, O-ring: HNBR		
	Piping port	—	C3604 (Electroless nickel plating), Stainless steel 304, NBR	
Weight	Body	24 g	34 g	36 g
	Lead wire with connector	+39 g		

Cable Specifications

Conductor area		0.15 mm² (AWG26)
Insulator	O.D.	1.0 mm
	Color	Brown, Blue, Black, White, Gray (5-core)
Sheath	Finished O.D.	ø3.5

"Set Pressure Range and Rated Pressure Range" "Functions" ➡ p. 13
"Internal Circuits and Wiring Examples" ➡ p. 14 "Dimensions" ➡ From p. 15

Set Pressure Range and Rated Pressure Range

Set the pressure within the rated pressure range.
The set pressure range is the range of pressure within which setting is possible.
The rated pressure range is the range of pressure that satisfies the specifications (accuracy, linearity, etc.) of the switch.
Although it is possible to set a value outside the rated pressure range, the specifications cannot 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	**ZSE20 ZSE20A ZSE20B**	–101 kPa 0 –105 kPa 10 kPa
For compound pressure	**ZSE20F ZSE20AF ZSE20BF**	–100 kPa 100 kPa –105 kPa 105 kPa
For positive pressure	**ISE20 ISE20A ISE20B**	–100 kPa 1 MPa –105 kPa (–0.105 MPa) 1.05 MPa

Rated pressure range of the switch Set pressure range of the switch

Functions

Sub screen setting function	The display of the sub screen can be selected.
Auto-preset function	This function calculates a rough set value automatically based on the on-going operation.
Display value fine adjustment function	Evens out deviations in the displayed value
Peak value indication function	Can retain the maximum pressure value displayed during measurement
Bottom value indication function	Can retain the minimum pressure value displayed during measurement
Key-lock function (Selectable secret code)	The keyboard can be locked to prevent the accidental operation of the operation switch.
Zero-clear function	The pressure display can be set to zero when the pressure is open to the atmosphere.
Error indication function	This function displays the error location and content when a problem or error has occurred.
Anti-chattering function	Prevents possible malfunctions due to sudden fluctuations in the primary pressure by adjusting the delay time
Unit selection function	Can convert the display value
Power-saving mode	Reduces power consumption
Display resolution switch function	Converts the display resolution from the normal value of 1/1000 to 1/100 Can reduce flickering of the monitor
kPa ↔ MPa switch function	Converts the unit between kPa and MPa
Copy function∗1	The settings of the master sensor can be copied to the slave sensors.
Auto-shift function∗1	Measures the pressure at the time of external input and uses it as a reference to correct the set value of the switch

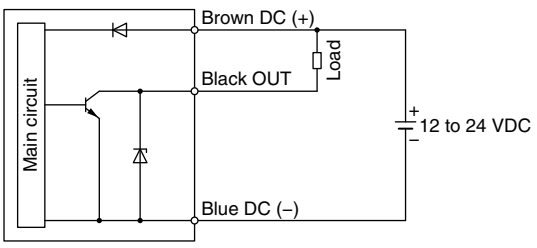
∗1 For 20A/20B

Internal Circuits and Wiring Examples

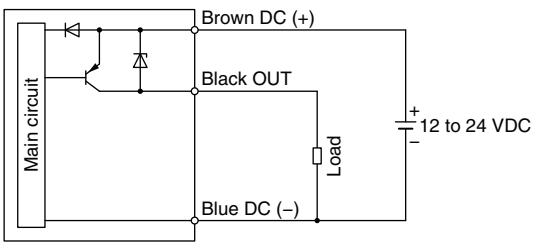
ZSE20(F)
ISE20 – □ – □ – □ – □□□

Output specification

-N
NPN (1 output)



-P
PNP (1 output)



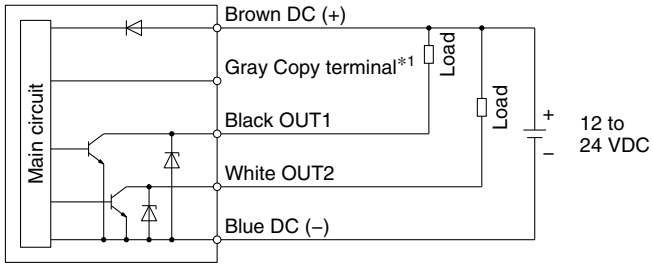
Internal Circuits and Wiring Examples

ZSE20A(F)
ZSE20B(F)
ISE20A
ISE20B

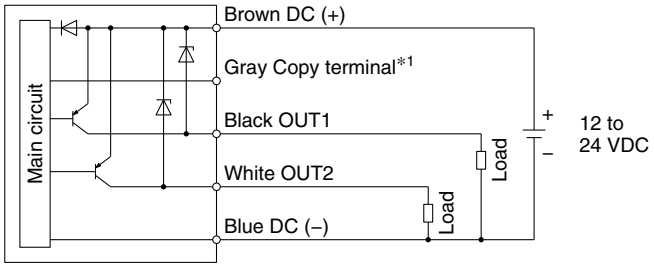
– □ – □ – □ – □□□

• **Output specification**

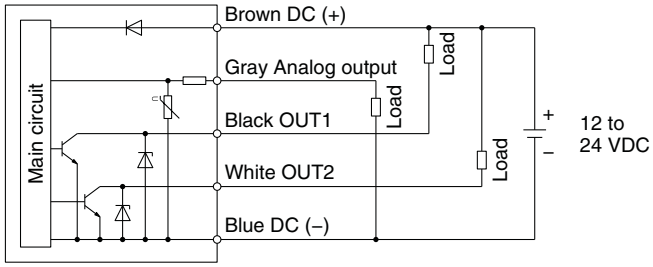
-X
NPN (2 outputs) + Copy function



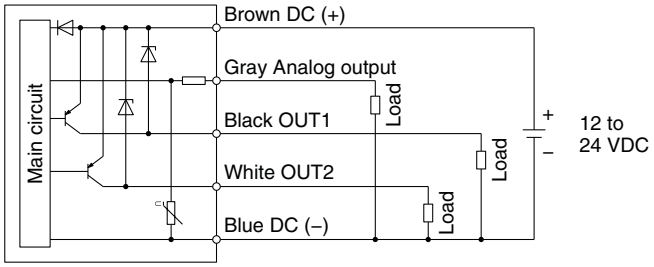
-Y
PNP (2 outputs) + Copy function



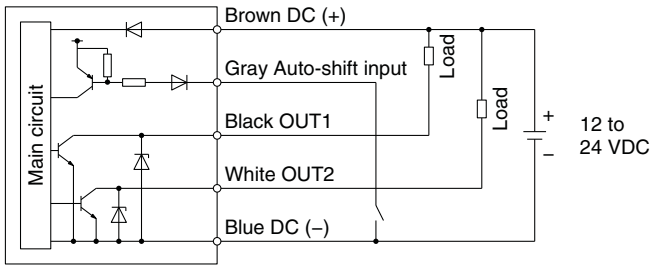
-R: NPN (2 outputs) + Analog voltage output
-S: NPN (2 outputs) + Analog current output



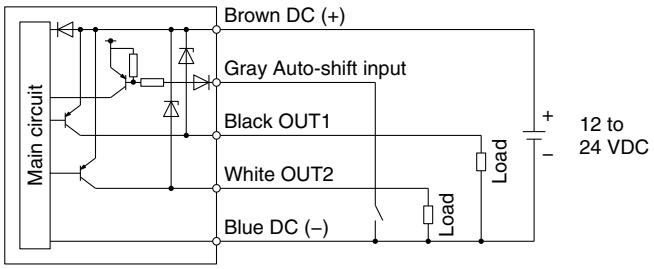
-T: PNP (2 outputs) + Analog voltage output
-V: PNP (2 outputs) + Analog current output



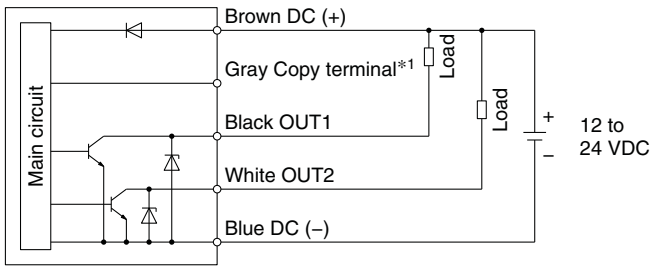
-R: NPN (2 outputs) + Auto-shift input
-S: NPN (2 outputs) + Auto-shift input



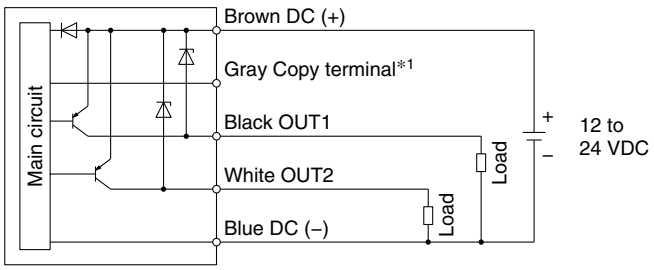
-T: PNP (2 outputs) + Auto-shift input
-V: PNP (2 outputs) + Auto-shift input



-R: NPN (2 outputs) + Copy function
-S: NPN (2 outputs) + Copy function



-T: PNP (2 outputs) + Copy function
-V: PNP (2 outputs) + Copy function



*1 Refer to page 32.

Dimensions

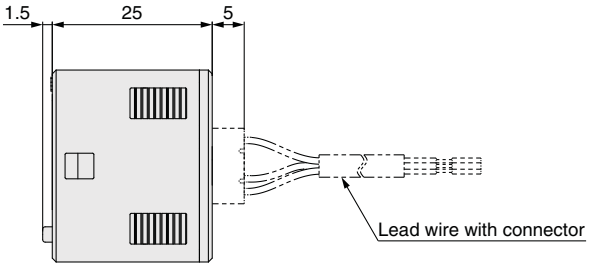
ZSE20□(F)
ISE20□ –□–□–■–□□□

Piping specification

M5

M5 female thread

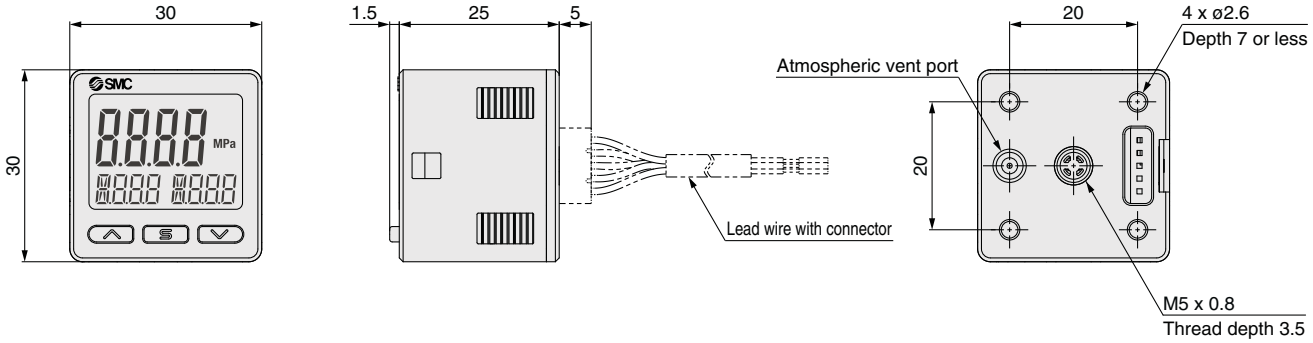
For 20



If there is a possibility that the atmospheric vent port of the switch will be exposed to water or dust, insert a tube into the atmospheric vent port and route the other end of the tube to a safe place away from water or dust. (Z/ISE20B)

* For tubing, please use the SMC TU0425 (polyurethane, O.D. ø4, I.D. ø2.5) for the pressure switch.

For 20A/20B

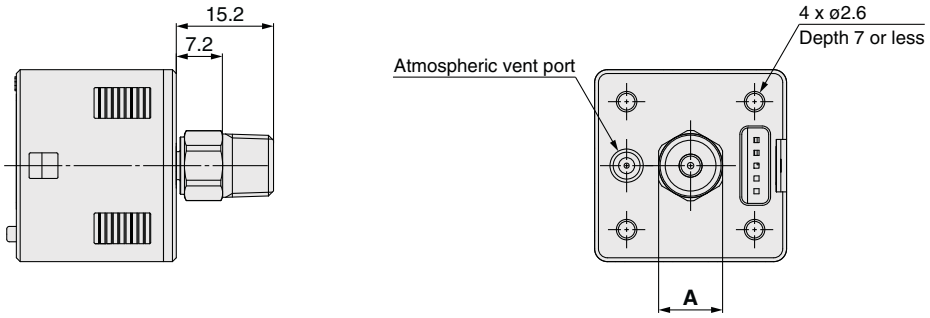


01

R1/8

N01

NPT1/8



Piping specification	Port size	A
01	R1/8	Width across flats 10
N01	NPT1/8	Width across flats 12

Dimensions

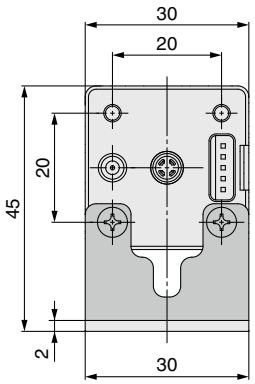
With bracket

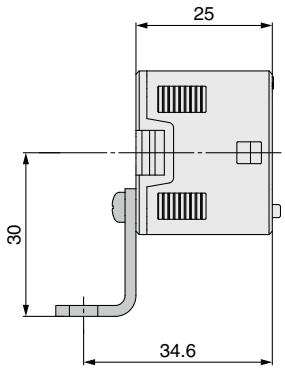
ZSE20□(F)
ISE20□ –□–□–□–□□□

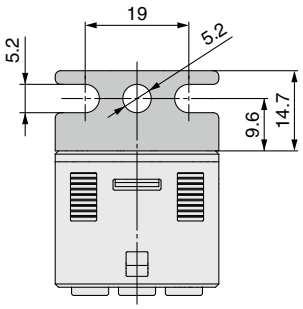
Option 2

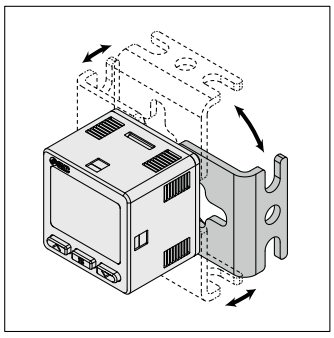
A1

Bracket A
(Part no.: ZS-46-A1)





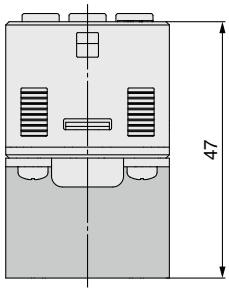


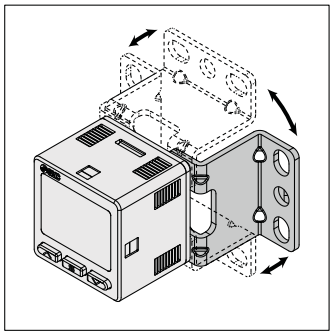


∗ The bracket configuration allows for mounting in four orientations.

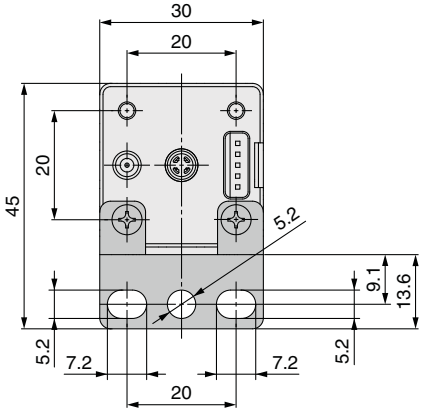
A2

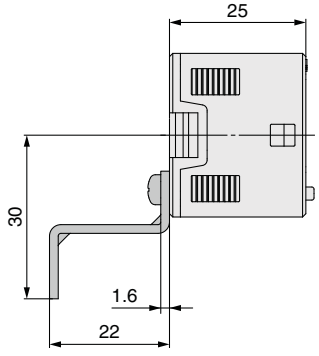
Bracket B
(Part no.: ZS-46-A2)





∗ The bracket configuration allows for mounting in four orientations.





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

Dimensions

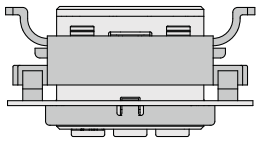
Panel mount adapter

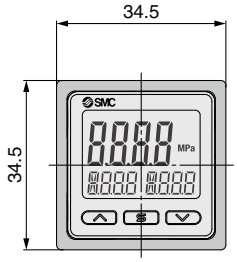
ZSE20□(F)
ISE20□ –□–□–□–□□□

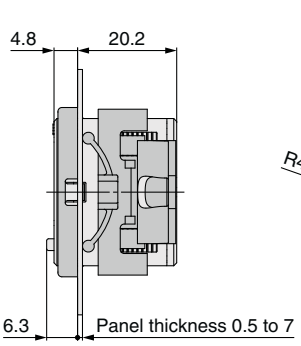
Option 2

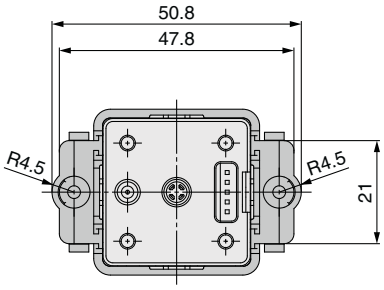
B

Panel mount adapter
(Part no.: ZS-46-B)



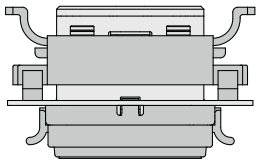


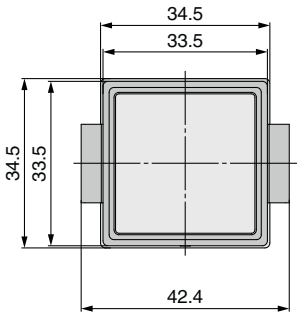


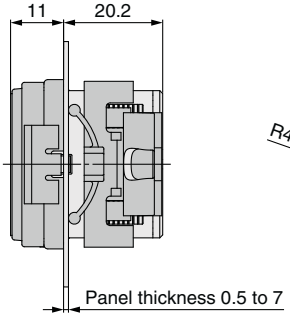


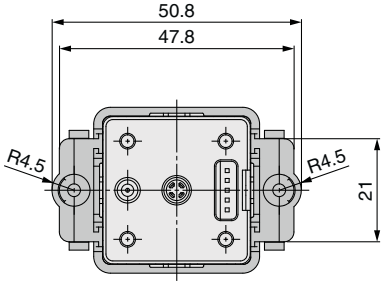
D

Panel mount adapter + Front protection cover
(Part no.: ZS-46-D)



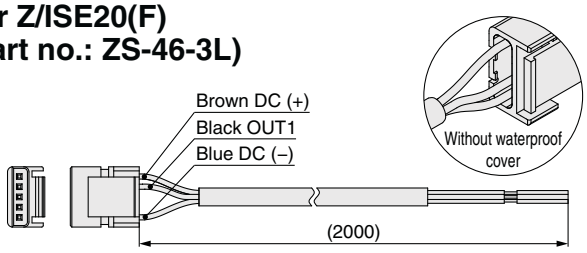




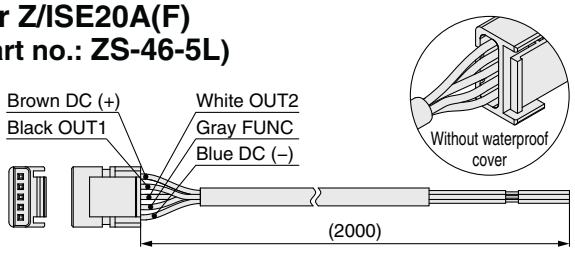


Lead wire with connector

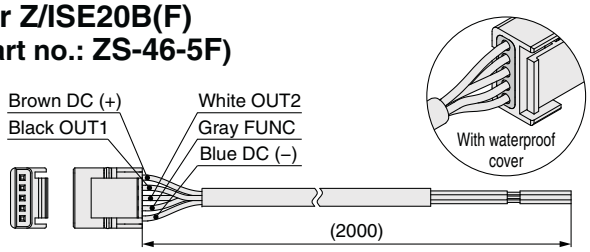
For Z/ISE20(F)
(Part no.: ZS-46-3L)



For Z/ISE20A(F)
(Part no.: ZS-46-5L)



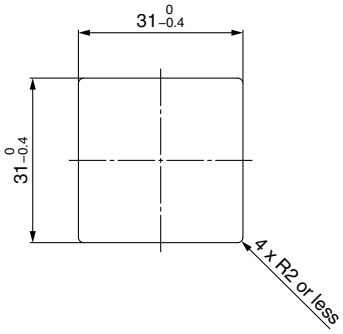
For Z/ISE20B(F)
(Part no.: ZS-46-5F)



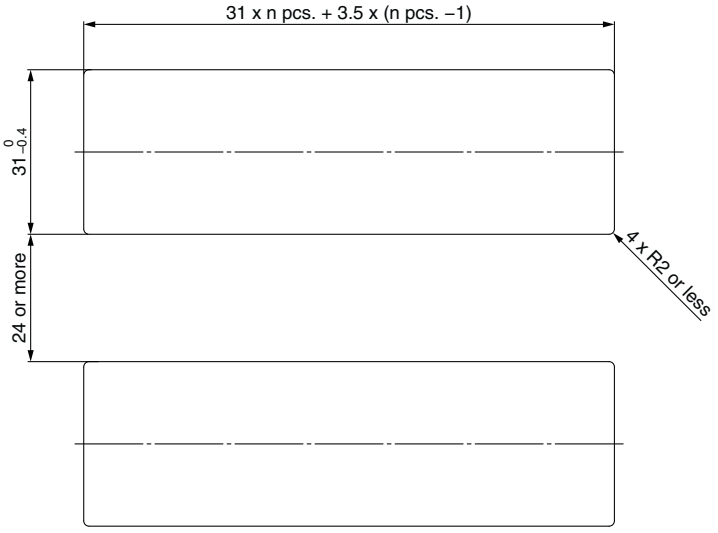
Dimensions

Panel fitting dimensions

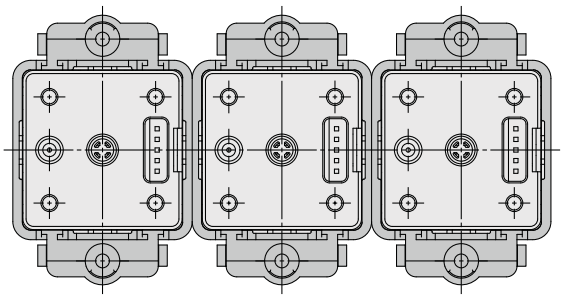
Individual mounting



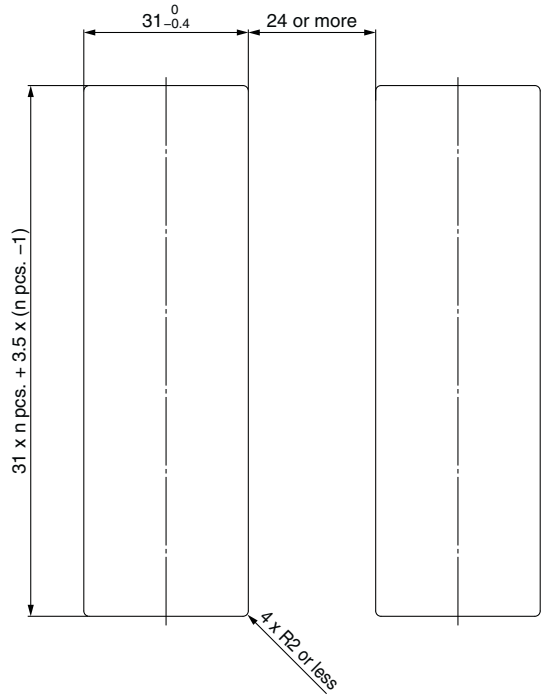
Multiple (2 pcs. or more) secure mounting
<Horizontal>



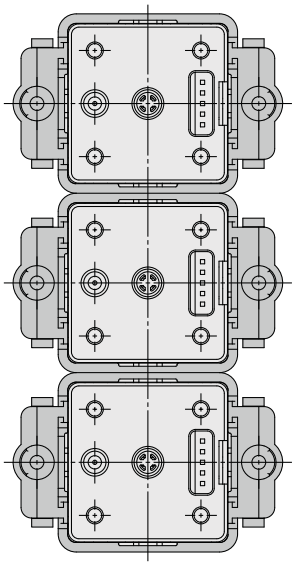
Panel mount example
<Horizontal>



<Vertical>



Panel mount example
<Vertical>



2 Outputs + Analog Output (Voltage/Current)

3-Screen Display High-Precision Digital Pressure Switch For General Fluids

ZSE20C(F)/ISE20C(H) Series

RoHS

IP65

How to Order

Rated pressure range

ISE20C	−0.1 to 1 MPa
ISE20CH	−0.1 to 2 MPa

For positive pressure: **ISE20C − X − M − 02 □ − □ □ □**

For vacuum/compound pressure: **ZSE20C − X − M − 02 □ − □ □ □**

❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽

❶ Rated pressure range

ZSE20C	0 to −101 kPa
ZSE20CF	−100 to 100 kPa

❷ Output specification

Symbol	Description
R	NPN open collector 2 outputs + Analog voltage output*1
S	NPN open collector 2 outputs + Analog current output*1
T	PNP open collector 2 outputs + Analog voltage output*1
V	PNP open collector 2 outputs + Analog current output*1
X	NPN open collector 2 outputs + Copy function
Y	PNP open collector 2 outputs + Copy function

*1 Can be switched to auto-shift or copy function

❸ Unit specification

Symbol	Description
Nil	Unit selection function*2
M	SI unit only*3
P	Unit selection function (Initial value psi)*3

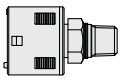
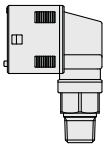
*2 Under the New Measurement Act, switches with the unit selection function are not permitted for use in Japan.

*3 Fixed unit: kPa, MPa

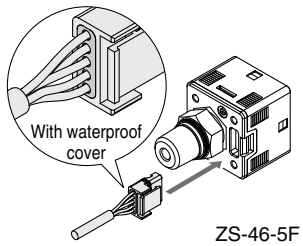
❹ Piping specification

Symbol	Description
02	R1/4 (M5 female threaded)
N02	NPT1/4 (M5 female threaded)
F02	G1/4 (M5 female threaded)
C01	Rc1/8
A2	URJ1/4 (Face seal fitting)
B2	TSJ1/4 (Compression fitting)

❺ Piping direction

Nil	Rear ported 
L	Bottom ported 

❻ Option 1

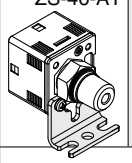
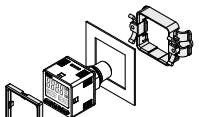
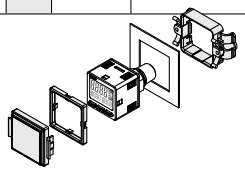
Symbol	Description
Nil	Without lead wire
W	Lead wire with connector, 5-core (2 m lead wire, With waterproof cover)  ZS-46-5F

❼ Option 2

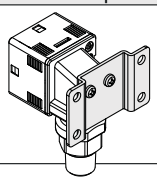
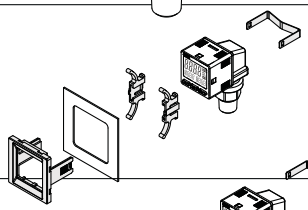
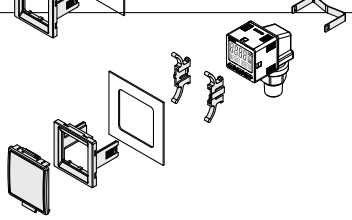
* Note that the optional parts that can be used vary depending on the piping direction.

Symbol	Description
Nil	None

Rear ported (❺ Piping direction: Nil)

Symbol	Description		Symbol	Description	
A1	Bracket A	ZS-46-A1 	B	Panel mount adapter	 ZS-46-B
D	Panel mount adapter + Front protection cover	 ZS-46-D			

Bottom ported (❺ Piping direction: L)

Symbol	Description	
A3	Bracket C	 ZS-46-E
E	Panel mount adapter	 ZS-35-B
F	Panel mount adapter + Front protection cover	 ZS-35-E

❽ Option 3

Symbol	Operation manual*4	Calibration certificate*4
Nil	○	—
Y	—	—
K	○	○
T	—	○

*4 All texts are in both English and Japanese.

Options/Part Nos.

When only optional parts are required, order with the part numbers listed below.

Description	Part no.	Note
Bracket A	ZS-46-A1	For rear ported/Tapping screw: Nominal size 3 x 8 L (2 pcs.)
Bracket C	ZS-46-E	For bottom ported/Tapping screw: Nominal size 3 x 10 L (2 pcs.)
Panel mount adapter	ZS-46-B	Rear ported
	ZS-35-B	Bottom ported
Panel mount adapter + Front protection cover	ZS-46-D	Rear ported
	ZS-35-E	Bottom ported
Lead wire with connector	ZS-46-5F	5-core, 2 m, Waterproof (With waterproof cover)
Front protection cover	ZS-27-01	Rear ported
	ZS-35-01	Bottom ported

SMC

For details on the specific product precautions, refer to the "Operation Manual" on the SMC website.

Specifications

Model			ZSE20C (Vacuum pressure)	ZSE20CF (Compound pressure)	ISE20C (Positive pressure)	ISE20CH (Positive pressure)
Applicable fluid			Fluid that will not corrode stainless steel 630 and 304			
Pressure	**Rated pressure range**		0.0 to −101.0 kPa	−100.0 to 100.0 kPa	−0.100 to 1.000 MPa	−0.100 to 2.000 MPa
	Display/Set pressure range		10.0 to −105.0 kPa	−105.0 to 105.0 kPa	−0.105 to 1.050 MPa	−0.105 to 2.100 MPa
	Minimum display unit/Smallest settable increment		0.1 kPa		0.001 MPa	
	Withstand pressure		500 kPa		2 MPa	4 MPa
Power supply	**Power supply voltage**		12 to 24 VDC ±10%, Ripple (p-p) 10% or less			
	Current consumption		35 mA or less			
	Protection		Polarity protection			
Accuracy	**Display accuracy**		±2% F.S. ±1 digit (Ambient temperature of 25 ±3°C)			
	Repeatability		±0.2% F.S. ±1 digit			
	Analog output accuracy		±2.5% F.S. (Ambient temperature of 25 ±3°C)			
	Analog output linearity		±1% F.S.			
	Temperature characteristics		±3% F.S. (25°C standard)			
Switch output	**Output type**		NPN or PNP open collector 2 outputs			
	Output mode		Hysteresis mode, Window comparator mode, Error output, Output OFF			
	Switch operation		Normal output, Reversed output			
	Max. load current		80 mA			
	Max. applied voltage (NPN only)		28 V			
	Internal voltage drop (Residual voltage)		1 V or less (at load current of 80 mA)			
	Delay time∗1		1.5 ms or less (with anti-chattering function: 20, 100, 500, 1000, 2000, 5000 ms)			
	Hysteresis	**Hysteresis mode**	Variable from 0∗2			
		Window comparator mode				
	Short circuit protection		Yes			
Analog output	**Voltage output**	**Output type**	Voltage output: 1 to 5 V		Voltage output: 0.6 to 5 V	Voltage output: 0.8 to 5 V
		Output impedance	Approx. 1 kΩ			
	Current output	**Output type**	Current output: 4 to 20 mA		Current output: 2.4 to 20 mA	Current output: 3.2 to 20 mA
		Load impedance	Maximum load impedance at power supply voltage of 12 V: 300 Ω at power supply voltage of 24 V: 600 Ω Minimum load impedance: 50 Ω			
Auto-shift input	**Input type**		Non-voltage input: 0.4 V or less			
	Input mode		Select from Auto-shift or Auto-shift zero.			
	Input time		5 ms or more			
Display	**Unit**∗3		MPa, kPa, kgf/cm², bar, psi, InHg, mmHg		MPa, kPa, kgf/cm², bar, psi	
	Display type		LCD			
	Number of screens		3-screen display (Main screen, Sub screen x 2)			
	Display color		1) Main screen: Red/Green 2) Sub screen: Orange			
	Number of display digits		1) Main screen: 4 digits (7 segments) 2) Sub screen: 4 digits (Upper 1 digit 11 segments, 7 segments for other)			
	Indicator light		Lights up when switch output is turned ON. OUT1, OUT2: Orange			
Digital filter∗4			0, 10, 50, 100, 500, 1000, 5000 ms			
Environment	**Enclosure**		IP65			
	Withstand voltage		250 VAC for 1 minute between terminals and housing			
	Insulation resistance		2 MΩ or more (50 VDC measured via megohmmeter) between terminals and housing			
	Operating temperature range		Operating: −5 to 50°C, Stored: −10 to 60°C (No condensation or freezing)			
	Operating humidity range		Operating/Stored: 35 to 85%RH (No condensation)			
Standards			UL/CSA (E216656), CE, RoHS			
Length of lead wire with connector			2 m			

∗1 Value without digital filter (at 0 ms)
∗2 If the applied pressure fluctuates around the set value, the hysteresis must be set to a value more than the amount of fluctuation or chattering will occur.
∗3 Setting is only possible for models with the unit selection function. Only MPa or kPa is available for models without this function.
∗4 The response time indicates when the set value is 90% in relation to the step input.
∗ Products with tiny scratches, smears, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

Piping Specifications and Weights

Model		02	N02	F02	C01	A2	B2
Port size		R1/4	NPT1/4	G1/4	Rc1/8	URJ1/4	TSJ1/4
Materials of parts in contact with fluid		Pressure sensor: Stainless steel 630, Fitting: Stainless steel 304					
Weight	**Body (Rear ported)**	51 g	51 g	48 g	47 g	54 g	46 g
	Body (Bottom ported)	77 g	78 g	74 g	65 g	81 g	72 g
	Lead wire with connector	+39 g					

Cable Specifications

Conductor area		0.15 mm² (AWG26)
Insulator	**O.D.**	1.0 mm
	Color	Brown, Blue, Black, White, Gray (5-core)
Sheath	**Finished O.D.**	ø3.5

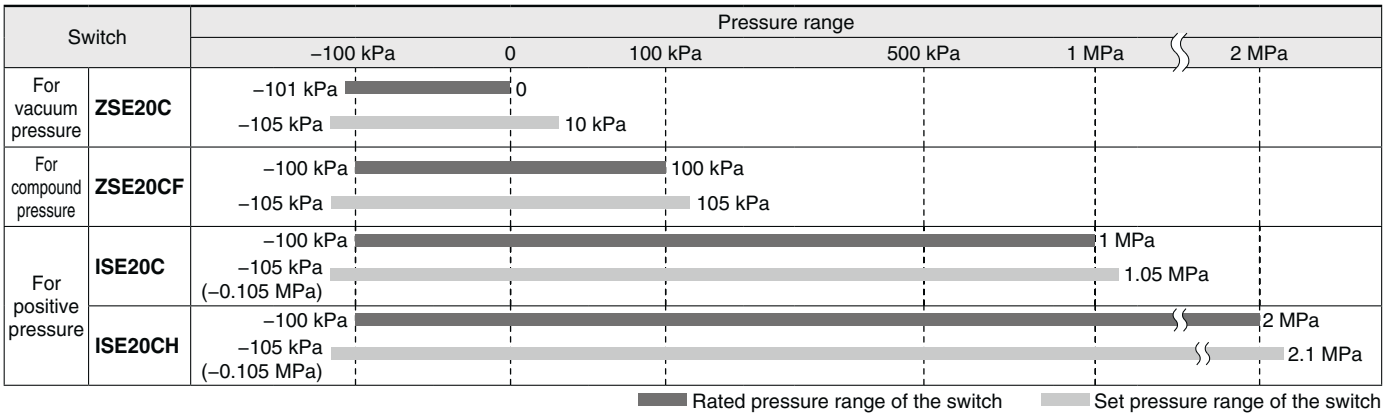
Set Pressure Range and Rated Pressure Range

Set the pressure within the rated pressure range.

The set pressure range is the range of pressure within which setting is possible.

The rated pressure range is the range of pressure that satisfies the specifications (accuracy, linearity, etc.) of the switch.

Although it is possible to set a value outside the rated pressure range, the specifications cannot be guaranteed even if the value stays within the set pressure range.



Functions

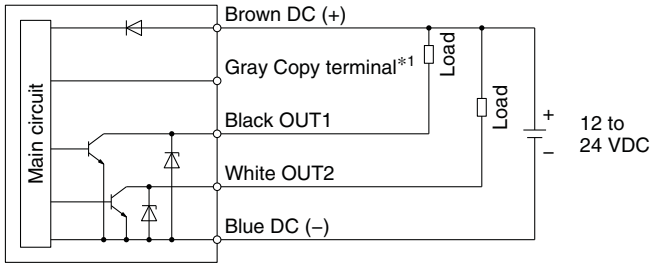
Sub screen setting function	The display of the sub screen can be selected.
Auto-preset function	This function calculates a rough set value automatically based on the on-going operation.
Display value fine adjustment function	Evens out deviations in the displayed value
Peak value indication function	Can retain the maximum pressure value displayed during measurement
Bottom value indication function	Can retain the minimum pressure value displayed during measurement
Key-lock function (Selectable secret code)	The keyboard can be locked to prevent the accidental operation of the operation switch.
Zero-clear function	The pressure display can be set to zero when the pressure is open to the atmosphere.
Error indication function	This function displays the error location and content when a problem or error has occurred.
Anti-chattering function	Prevents possible malfunctions due to sudden fluctuations in the primary pressure by adjusting the delay time
Unit selection function	Can convert the display value
Power-saving mode	Reduces power consumption
Display resolution switch function	Converts the display resolution from the normal value of 1/1000 to 1/100 Can reduce flickering of the monitor
kPa ↔ MPa switch function	Converts the unit between kPa and MPa
Copy function	The settings of the master sensor can be copied to the slave sensors.
Auto-shift function	Measures the pressure at the time of external input and uses it as a reference to correct the set value of the switch

Internal Circuits and Wiring Examples

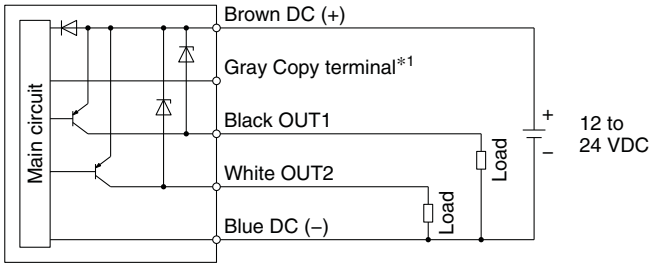
ZSE20C(F)
ISE20C(H) – □ – □ – □ □ □ – □□□

Output specification • Piping specification • Piping direction

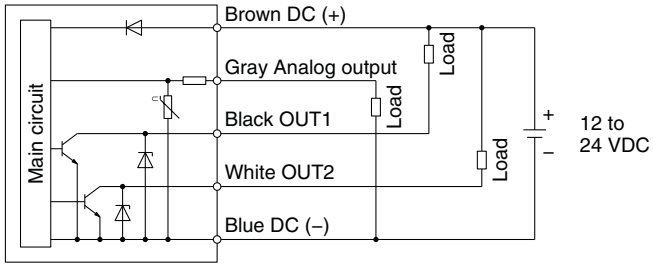
-X
NPN (2 outputs) + Copy function



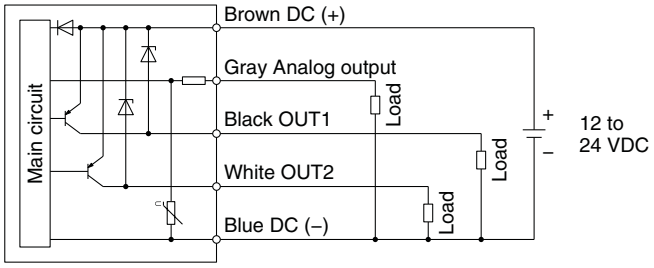
-Y
PNP (2 outputs) + Copy function



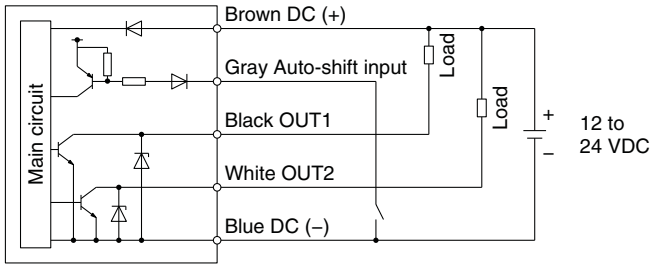
-R: NPN (2 outputs) + Analog voltage output
-S: NPN (2 outputs) + Analog current output



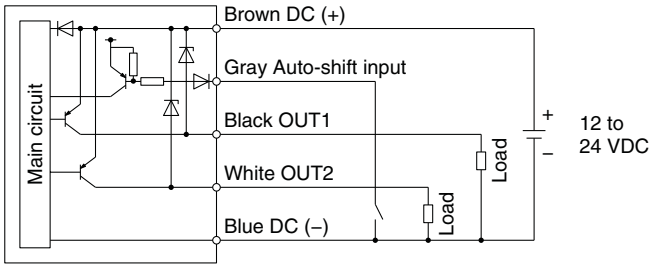
-T: PNP (2 outputs) + Analog voltage output
-V: PNP (2 outputs) + Analog current output



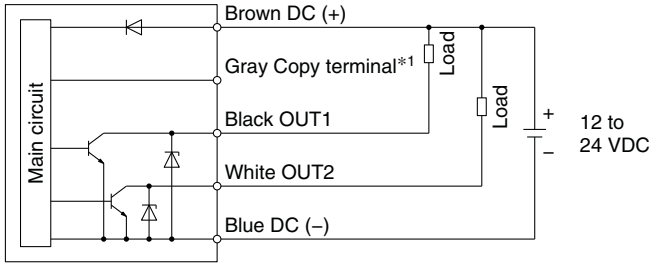
-R: NPN (2 outputs) + Auto-shift input
-S: NPN (2 outputs) + Auto-shift input



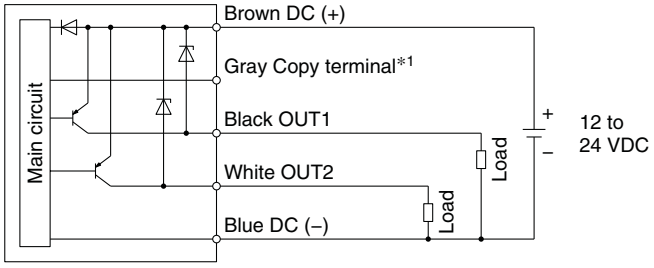
-T: PNP (2 outputs) + Auto-shift input
-V: PNP (2 outputs) + Auto-shift input



-R: NPN (2 outputs) + Copy function
-S: NPN (2 outputs) + Copy function



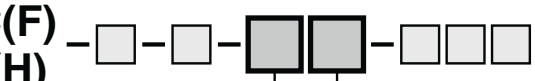
-T: PNP (2 outputs) + Copy function
-V: PNP (2 outputs) + Copy function



*1 Refer to page 32.

Dimensions

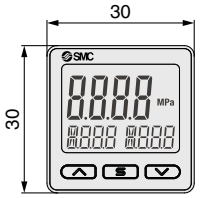
ZSE20C(F)
ISE20C(H)

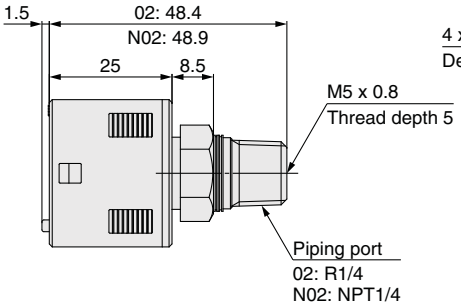


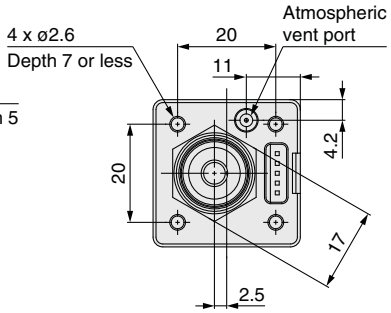
Piping specification **Piping direction**

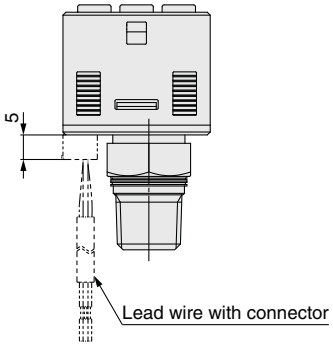
02
R1/4

N02
NPT1/4







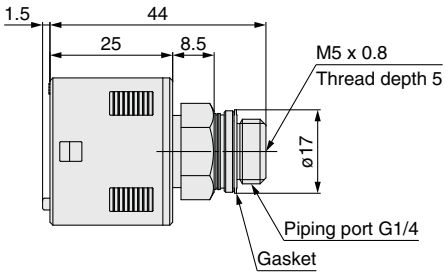


If there is a possibility that the atmospheric vent port of the switch will be exposed to water or dust, insert a tube into the atmospheric vent port and route the other end of the tube to a safe place away from water or dust.

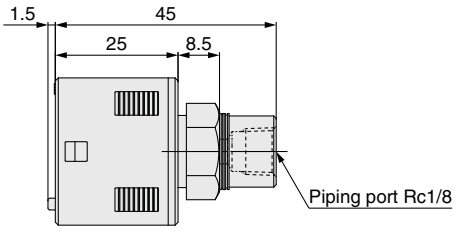
* For tubing, please use the SMC TU0425 (polyurethane, O.D. ø4, I.D. ø2.5) for the pressure switch.

* If it is expected that the pressure, such as water hammer or surge pressure, will fluctuate rapidly, refer to the precautions in the Operation Manual on the SMC website (http://www.smcworld.com).

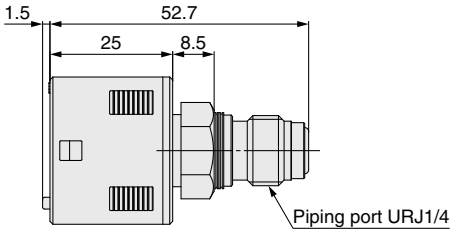
F02
G1/4



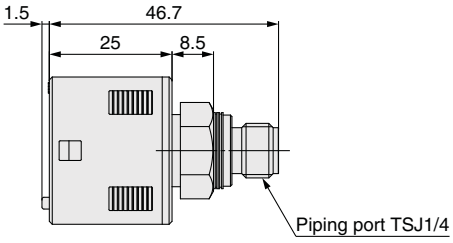
C01
Rc1/8



A2
URJ1/4



B2
TSJ1/4



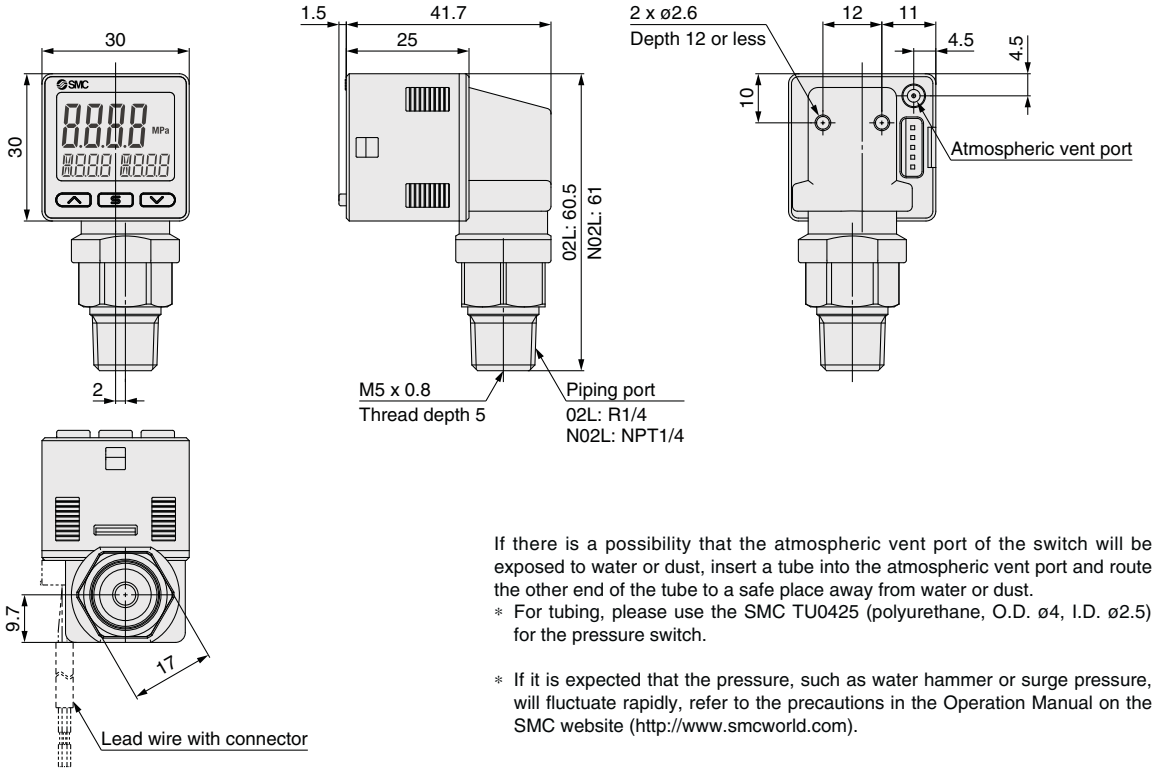
Dimensions

ZSE20C(F)
ISE20C(H) –□–□–■■–□□□

Piping specification ● ● Piping direction

02L
R1/4

N02L
NPT1/4



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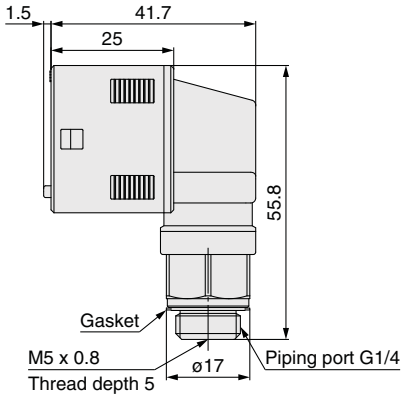
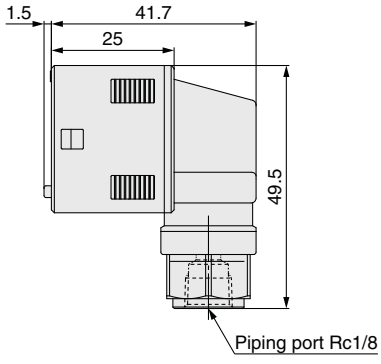
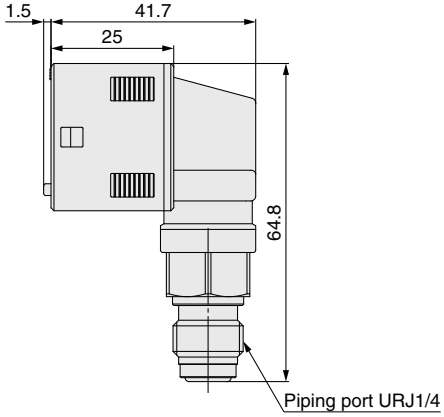
F02L
G1/4



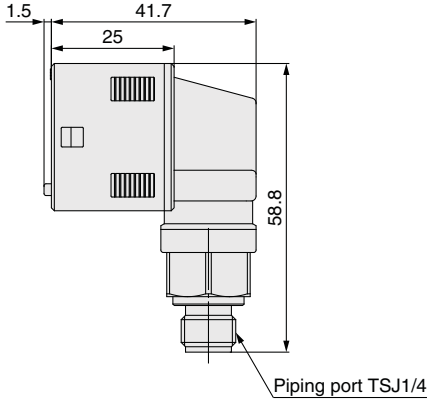
C01L
Rc1/8



A2L
URJ1/4



B2L
TSJ1/4



Dimensions

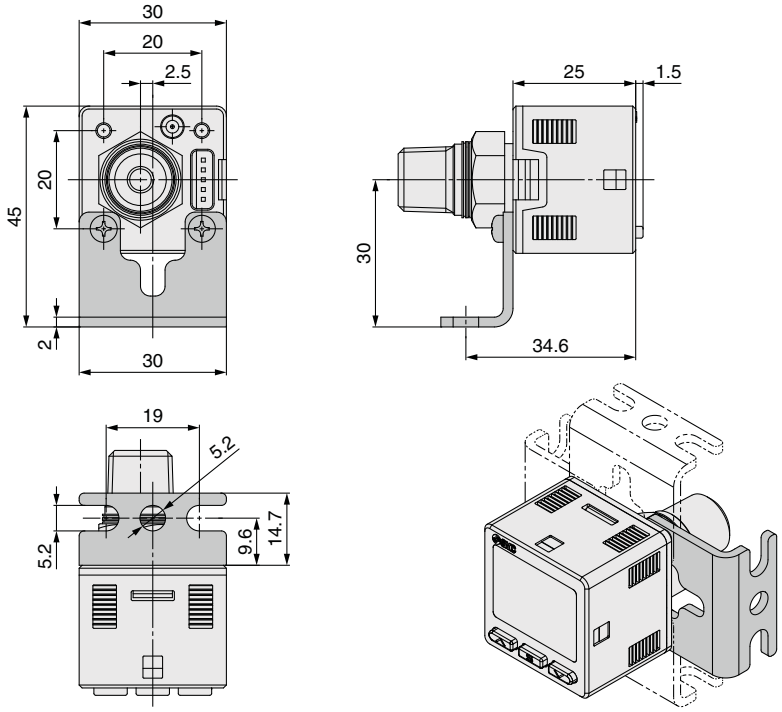
With bracket

ZSE20C(F)
ISE20C(H) –□–□–□□–□□□

Option 2

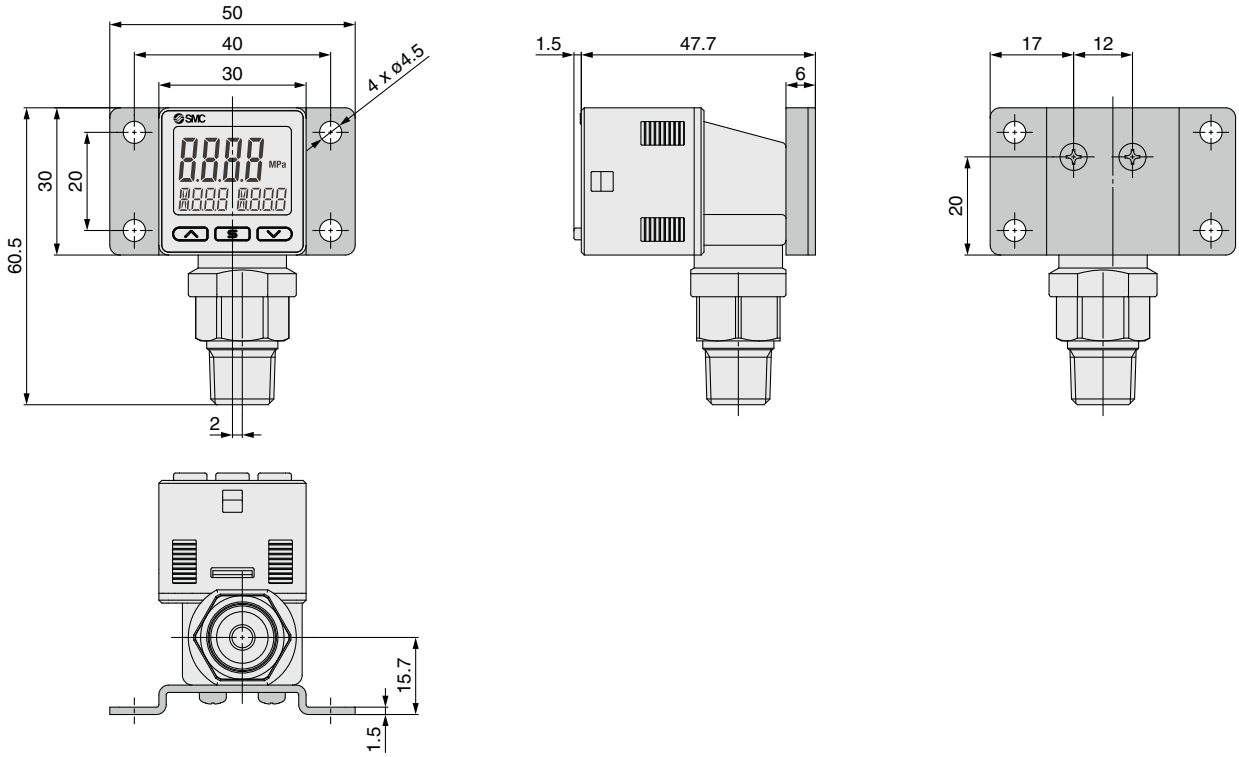
A1

Bracket A (Rear ported)
(Part no.: ZS-46-A1)



A3

Bracket C (Bottom ported)
(Part no.: ZS-46-E)



Dimensions

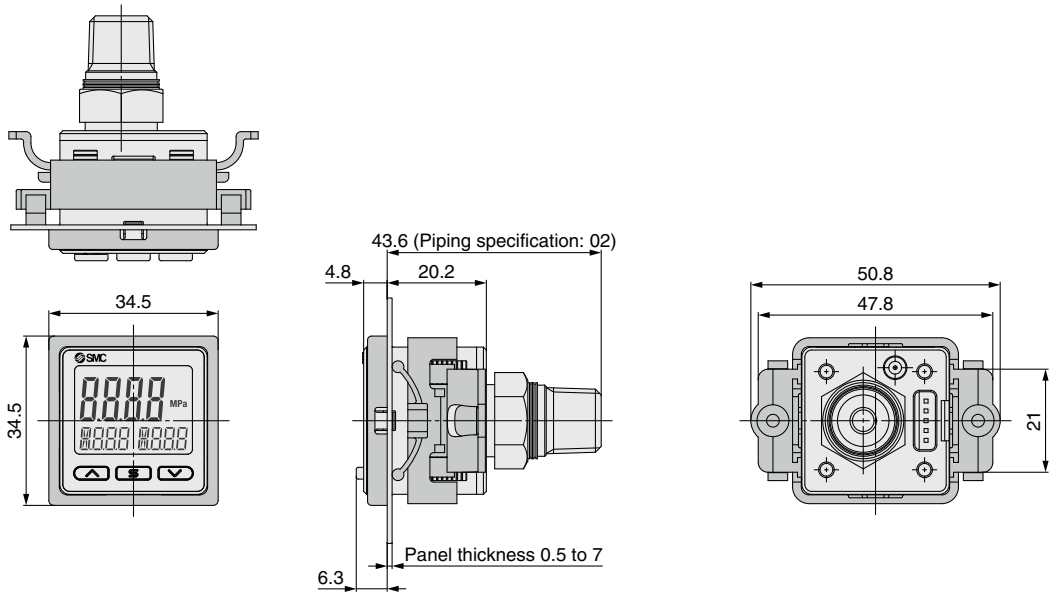
Panel mount adapter

ZSE20C(F)
ISE20C(H) –□–□–□□–□□□

Option 2

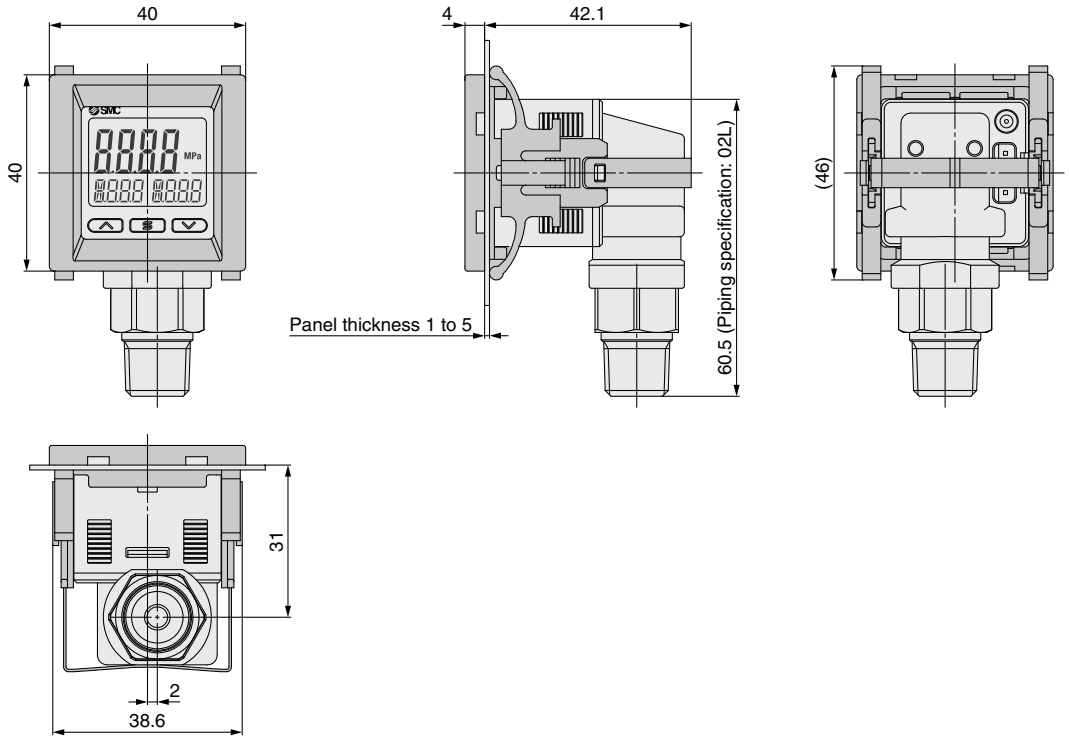
B

Panel mount adapter (Rear ported)
(Part no.: ZS-46-B)



E

Panel mount adapter (Bottom ported)
(Part no.: ZS-35-B)



Dimensions

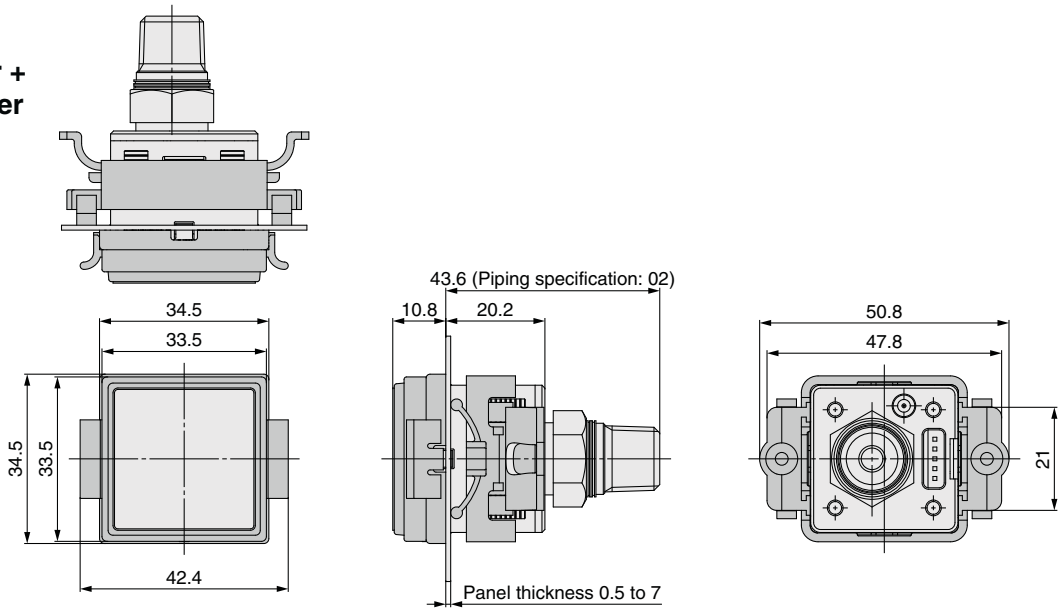
Panel mount adapter

ZSE20C(F)
ISE20C(H) –□–□–□□–□■□

Option 2

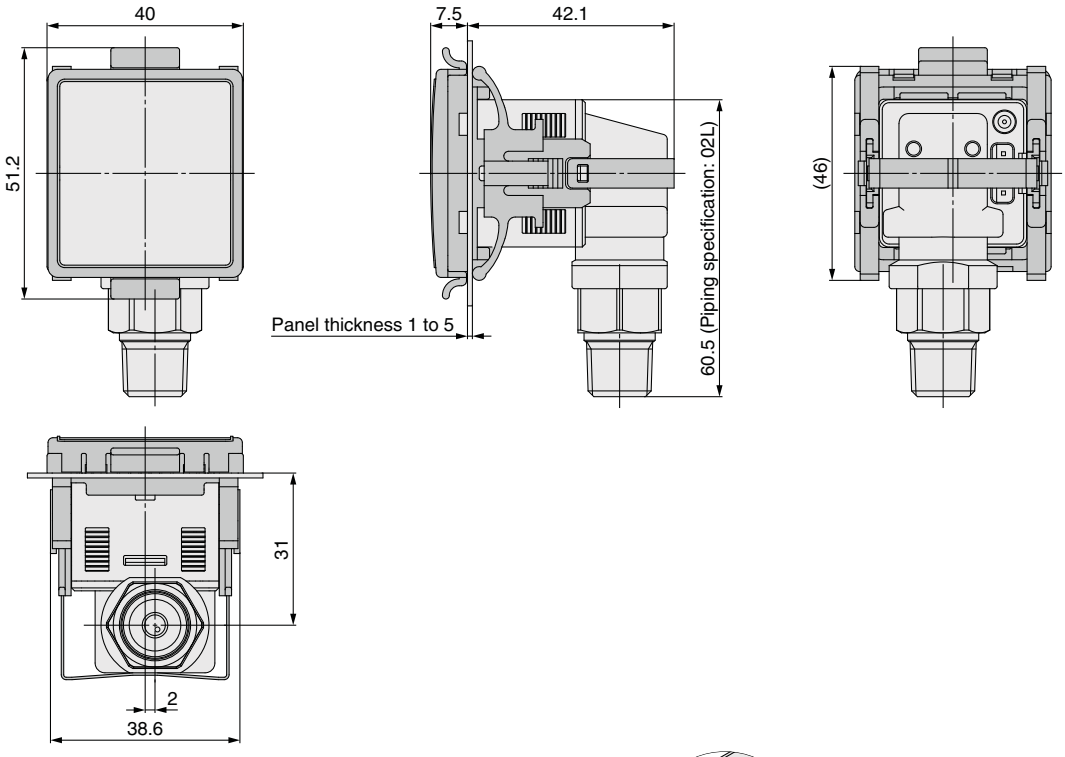
D

Panel mount adapter +
Front protection cover
(Rear ported)
(Part no.: ZS-46-D)



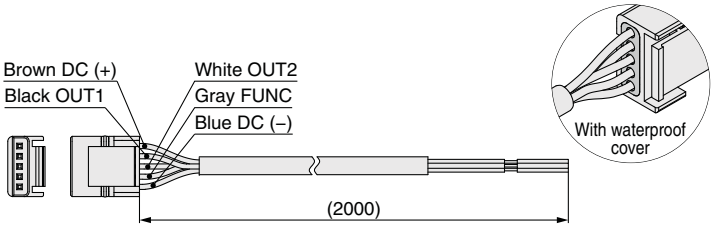
F

Panel mount adapter +
Front protection cover
(Bottom ported)
(Part no.: ZS-35-E)



Lead wire with connector

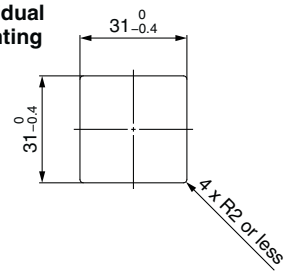
For ZSE20C(F)/ISE20C(H)
(Part no.: ZS-46-5F)



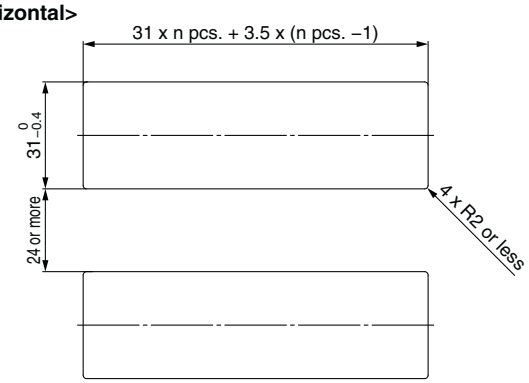
Dimensions

Panel fitting dimensions (Rear ported)

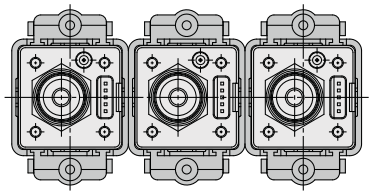
Individual mounting



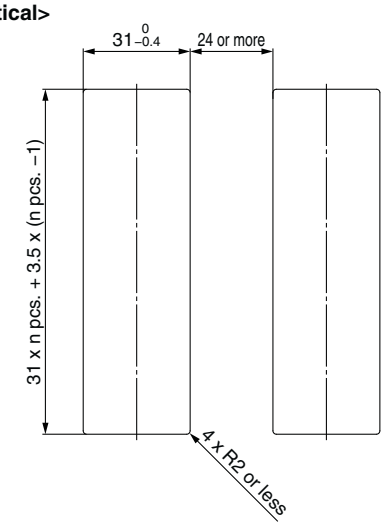
Multiple (2 pcs. or more) secure mounting
<Horizontal>



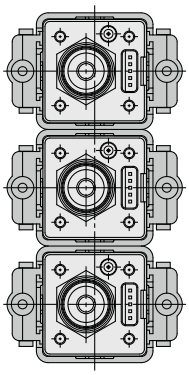
Panel mount example
<Horizontal>



<Vertical>

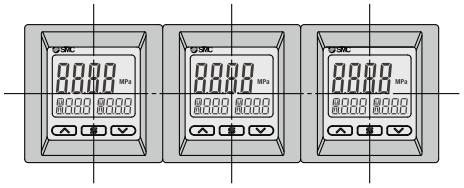


Panel mount example
<Vertical>

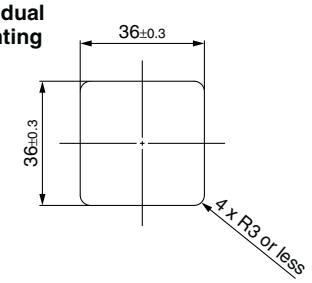


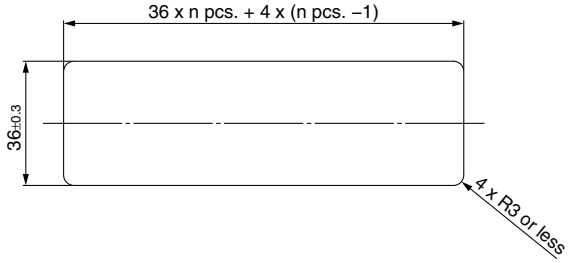
Panel fitting dimensions (Bottom ported)

Multiple (2 pcs. or more) secure mounting
<Horizontal>



Individual mounting

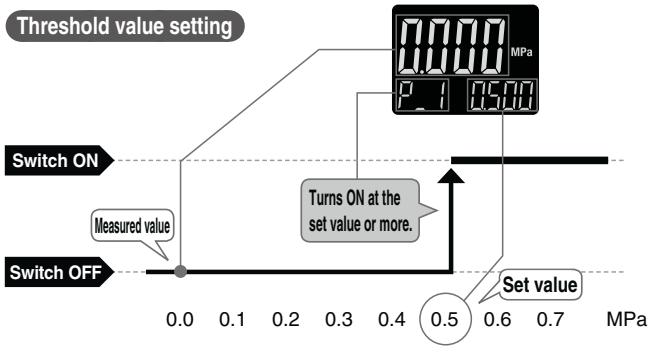


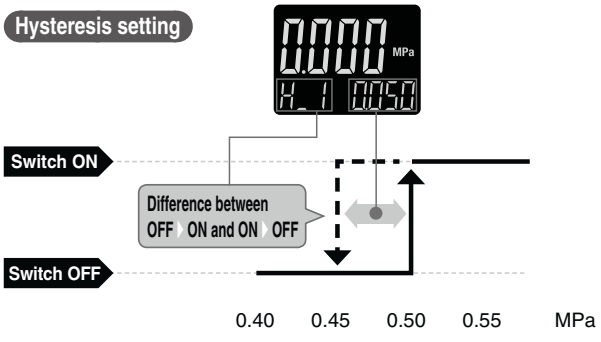


Function Details

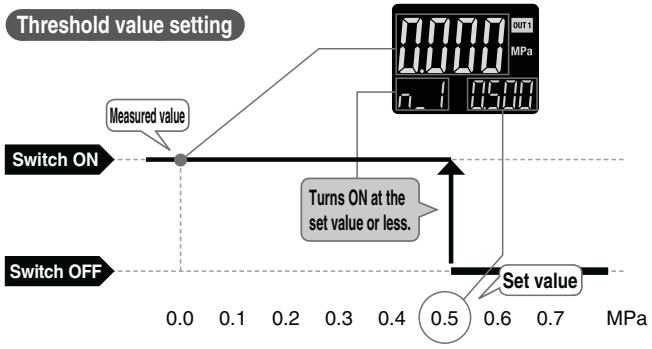
Display examples of the main and sub (set value) screens of each mode. (For ISE20□ (for Positive pressure))

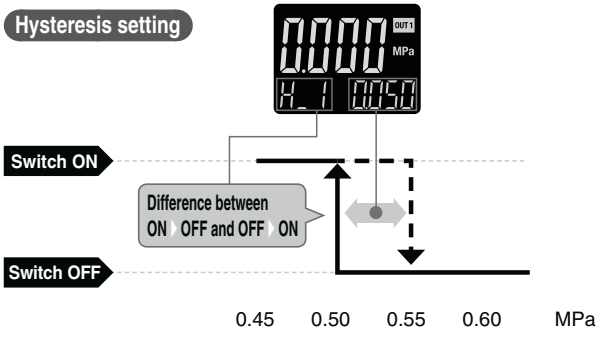
Hysteresis mode Normal output



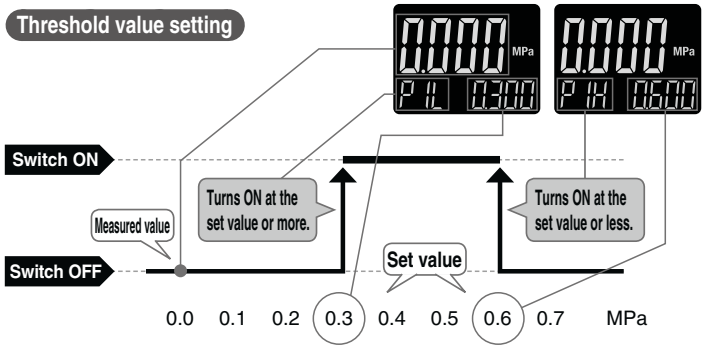


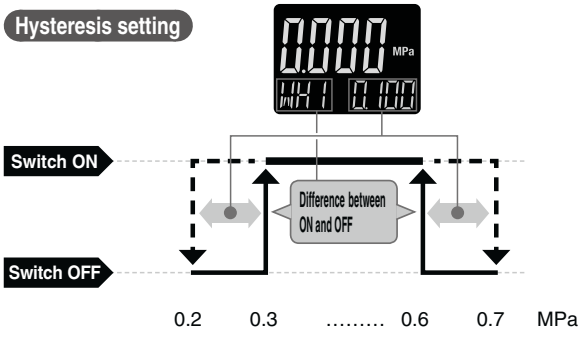
Hysteresis mode Reversed output



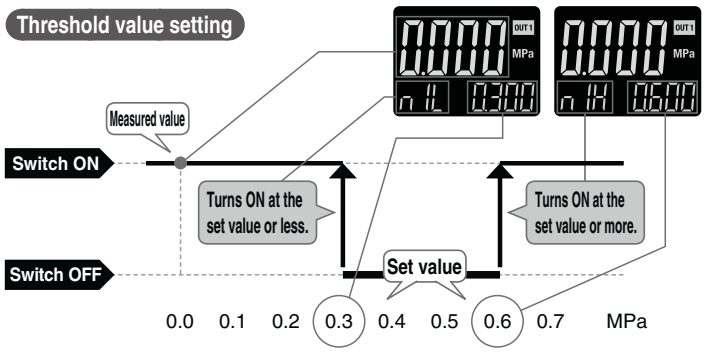


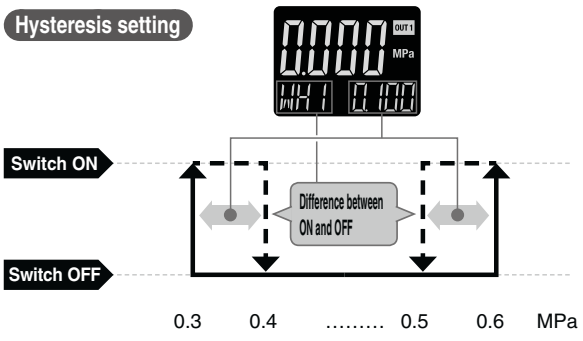
Window comparator mode Normal output





Window comparator mode Reversed output





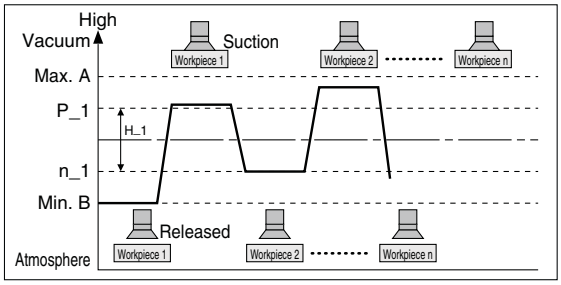
The F□ in ( ) shows the function code number. Refer to the operation manual for details about operation procedures and function codes.

Function Details

A Auto-preset function (F4)

Auto-preset function, when selected in the initial setting, calculates and stores the set value from the measured pressure. For example, if this function is used for suction verification, the optimum set value is determined automatically by performing suction and release of several workpieces.

Suction Verification

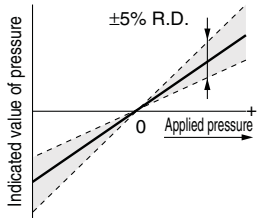


Formula for Obtaining the Set Value

P_1 or n_1	H_1
P_1=A–(A–B)/4 n_1=B+(A–B)/4	H_1=|(A–B)/2|

B Display value fine adjustment 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.)



* When the display value fine adjustment function is used, the set pressure value may change ±1 digit.

C Peak/Bottom value display

This function constantly detects and updates the maximum (minimum) pressure when the power is supplied, and allows to hold the maximum (minimum) pressure value.

The held value is maintained even if the power supply is cut.

When the S and ▽ buttons are simultaneously pressed for 1 second or longer, while "holding", the held value will be reset.

D Key-lock function

Prevents operation errors such as accidentally changing setting values

E Zero-clear function

This function clears and resets the zero value on the display of measured pressure.

The indicated value can be adjusted within ±7% F.S. of the pressure when ex-factory.

(ZSE20□F (for compound pressure) ±3.5% F.S.)

F Error display function

When an error or abnormality arises, the location and contents are displayed.

Error name	Error code	Description	Action
Over current error	Er 1 oC1 / Er 2 oC2	Load current of 80 mA or more is applied to the switch output.	Turn the power off and remove the cause of the over current. Then supply the power again.
Residual pressure error	Er 3 ZEro	During zero-clear operation, pressure over ±7% F.S. (±3.5% F.S. for compound pressure) is present. Note that the mode is returned to measurement mode automatically 1 second later. The zero clear range varies by ±1% F.S. due to variation 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	Er 0 / Er 7 / Er 4 / Er 8 / Er 6 / Er 9	Internal data error	Turn the power off and then on again. If the failure cannot be solved, please contact SMC for investigation.
Copy error	Er 13 SLAv	The copy function does not operate properly.	After clearing the error by pressing the △ and ▽ buttons simultaneously for a minimum of 1 second, check the wiring and the model, and then attempt to copy again.

If the error cannot be reset after the above measures are taken, or errors other than those above are displayed, please contact SMC for investigation.

Function Details

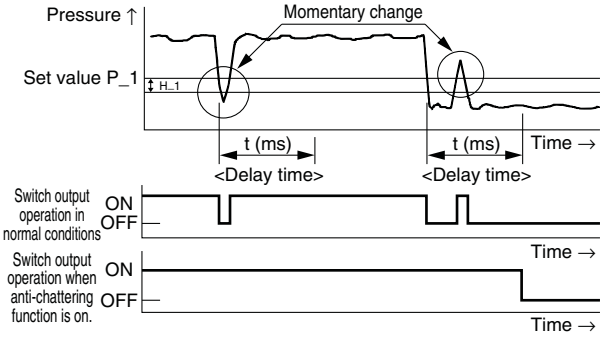
The F□ in ( ) shows the function code number. Refer to the operation manual for details about operation procedures and function codes.

G Anti-chattering function (Simple setting mode or F1)

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 by changing the delay time setting.

Available delay time settings
1.5 ms or less, 20 ms, 100 ms, 500 ms, 1000 ms, 2000 ms, 5000 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.



H Unit selection function (F0)

Display units can be switched with this function.

Display unit / Smallest settable increment	MPA	kPA	kGF	bAr	PSi	inCH	mmHG
	MPa*1	kPa	kgf/cm^2	bar	psi	inHg	mmHg
ZSE20□ (Vacuum pressure)	0.001	0.1	0.001	0.001	0.01	0.1	1
ZSE20□F (Compound pressure)	0.001	0.1	0.001	0.001	0.02	0.1	1
ISE20□ (Positive pressure)	0.001	1	0.01	0.01	0.1		
ISE20□H (Positive pressure)	0.001	1	0.01	0.01	0.2		

*1 The ZSE20□ (vacuum pressure) and ZSE20□F (compound pressure) will have different setting and display resolution when the unit is set to MPa.

I Selection of power-saving mode (F80)

The power-saving mode can be selected.
With this function, if no buttons are pressed for 30 s, it shifts to power-saving mode.
At the time of shipment from the factory, the product is set to the normal mode (the power-saving mode is turned off).
(During power-saving mode, [ECo] will flash in the sub screen and the operation light will be ON (only when the switch is ON).)

J Setting of security code (F81)

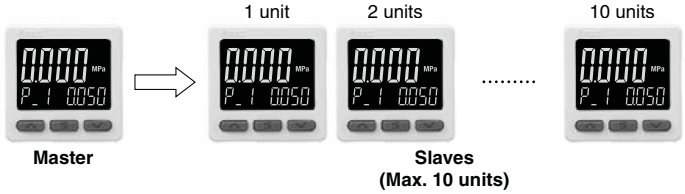
The user can select whether a security code must be entered to release the key-lock function.
At the time of shipment from the factory, it is set such that a security code is not required.

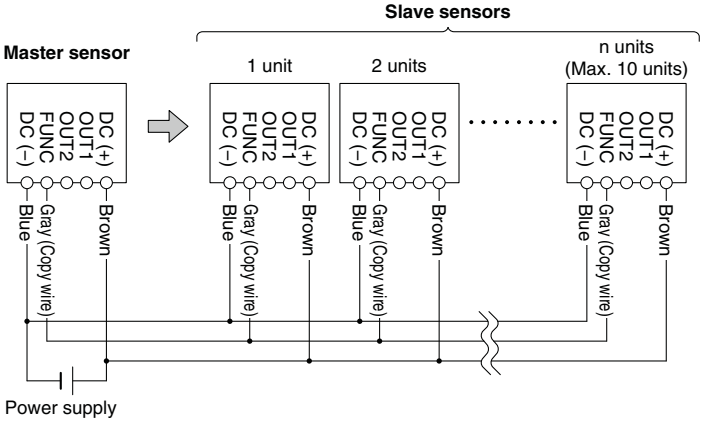
The F□ in ( ) shows the function code number. Refer to the operation manual for details about operation procedures and function codes.

Function Details

K Copy function (F97) (Z/ISE20A, 20B, 20C series only)

The settings of the master sensor can be copied to the slave sensors, reducing setting labor and minimizing the risk of setting mistakes.
The set value can be copied to up to 10 switches simultaneously. (Maximum transmission distance: 4 m)



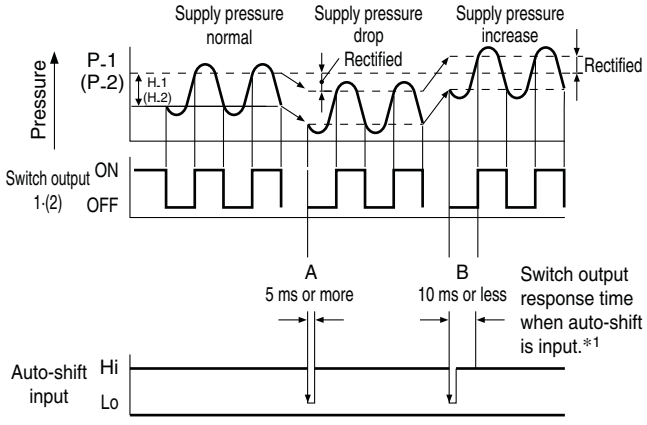


1) Wire as shown in the figure on the left.
2) Select the slave sensor which is to be the master, and change it into a master using the buttons. (In the default setting, all sensors are set as slaves.)
3) Press the S button on the master sensor to start copying.

L Auto-shift function (F5) (Z/ISE20A, 20B, 20C series only)

When there are large fluctuations in the supply pressure, the switch may fail to operate correctly. The auto-shift function compensates for such supply pressure fluctuations. It measures the pressure at the time of auto-shift signal input and uses it as the reference pressure to correct the set value on the switch.

Set value correction by auto-shift function



*1 When delay time is 1.5 ms or less

When the auto-shift function is selected, "AS in 000" will be displayed on the sub screen for about 1 second, and the pressure value at that point will be saved as reference value "C_S." Based on the saved reference value, output on-off points controlled by set values*2 such as "P_1," "H_1," "P_2," and "H_2" will also be rectified.

*2 When an output is reversed, output on-off points displayed at "n_1," "H_1," "n_2," and "H_2" will be rectified.
The above is an example in hysteresis mode. On-off points are similarly rectified in window comparator mode. Outputs that enable the auto-shift function can be changed via the settings.

Settable Range for Auto-Shift Input

	Set pressure range	Settable range
Compound pressure	–105.0 to 105.0 kPa	–210 to 210 kPa
Vacuum pressure	10.0 to –105.0 kPa	115.0 to –115.0 kPa
Positive pressure	–0.105 to 1.050 MPa	–1.155 to 1.155 MPa
Positive pressure*3	–0.105 to 2.100 MPa	–2.20 to 2.205 MPa

*3 Z/ISE20C series only

Auto-shift zero
The basic function of auto-shift zero is the same as that of auto-shift. However, it corrects values on the display based on a pressure value of "0", which is set as the reference value when auto-shift function is selected.

ZSE20□(F)/ISE20□ Series
Made to Order Specifications

Please contact SMC for detailed dimensions, specifications, and lead times.

Made to Order

1 Parts in Contact with Fluid: Stainless Steel 316L

This pressure switch has better corrosion resistance because it uses stainless steel 316L for the parts in contact with fluid (pressure sensor and fitting).

How to Order

ZSE20C(F)/ISE20C – □ – □ – □ – □□□ – X500

Enter the standard product number. (Refer to page 19.)

∗ Not applicable to the rated pressure –0.1 to 2 MPa specifications (ISE20CH).
∗ A restrictor (equivalent to -X510) is installed inside the fitting. (Piping specifications A2(L) and B2(L) are excluded.)

Specifications

Model	ZSE20C(F)	ISE20C
Withstand pressure	500 kPa	1.5 MPa
Applicable fluid	Liquids and gases do not corrode stainless steel 316L	

Models other than those above have the same specifications as the standard product.

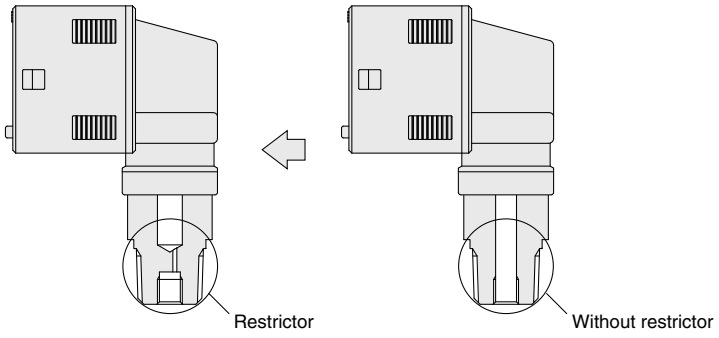
2 Restrictor-installed Fitting

A restrictor is installed inside the fitting in order to reduce the effects of water collision with inertia force in the piping when adsorption is broken.

How to Order

ZSE20C(F)/ISE20C(H) – □ – □ – □ – □□□ – X510

Enter the standard product number. (Refer to page 19.)



Made to Order: "-X510" **Standard**

∗ Not applicable for piping specifications A2(L) and B2(L).
∗ There are cases in which this product will not effectively suppress of the effects of water hammer. It is advised that other measures be taken in such cases.

3 M12 4-pin Pre-wired Connector (Lead wire length 100 mm)

Lead wire with M12 connector

ZS-46-5LM12 (Non-waterproof)

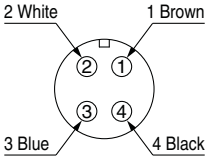
ZS-46-5FM12 (Waterproof)

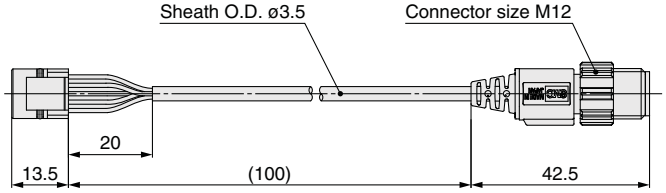
∗ If you wish to order the lead wire which is built into the pressure switch body, please contact SMC.

Pin no.	Pin name	Lead wire color
1	DC (–)	Blue
2	Function	Gray
3	OUT (2)	White
4	OUT (1)	Black
5	DC (+)	Brown

∗ Nothing is connected to "Function." If you intend to make a connection to "Function," please contact SMC.

Connector pin assignment





SMC

⚠ Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

⚠ Caution: **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

⚠ Warning: **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠ Danger : **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
etc.

⚠ Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/ equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

⚠ Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

⚠ Caution

SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

Revision History

Edition B * New variations (for general fluids, IP65, 2 outputs, and analog output) have been added.
* Number of pages has been increased from 16 to 36. VX