

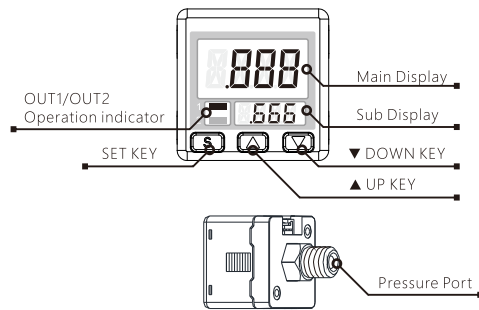
INSTRUCTION MANUAL

Digital Pressure Sensor SP Series

◆◆◆WARNING◆◆◆

- Do not use corrosive or flammable gas or liquid with this product.
- Please use within the rating pressure range. Do not apply pressure beyond recommended maximum withstand pressure, permanent damage to the pressure sensor may occur.
- Do not drop, hit or allow excessive shock. Even if switch body appears undamaged, internal components may be broken and can cause malfunction.
- Turn power off before connecting wiring. Wrong wiring or short circuit will damage and / or cause malfunction.
- Do not use in environment containing steam or oil vapor.
- This product is not explosion-proof rated. Do not use in atmosphere containing flammable or explosive gases.
- Wiring for pressure sensor should avoid power source line and high voltage line. If use in the same circuit, noise may cause malfunction.

A. PANEL DESCRIPTION



B. ORDERING INFORMATION

ECONOMIC SERIES

SP-01C001M

① Series	01: Economic
② Pressure Range	C: -101.3~101.3kPa (Low pressure) P: -0.101~1.000MPa (High pressure)
③ Output	001: 1NPN 003: 1NPN+1Analog(1~5V) 002: 1PNP 004: 1PNP+1Analog(1~5V)
④ Port	M: M5

Standard Series

SP-10C010R

① Series	10: Standard 20: High protection grade (IP65)
② Pressure Range	C: -101.3~101.3kPa (Low pressure) P: -0.101~1.000MPa (High pressure)
③ Output	010: 2NPN+1Analog(1~5V) 011: 2NPN+1Analog(4~20mA) 020: 2PNP+1Analog(1~5V) 021: 2PNP+1Analog(4~20mA)
④ Port	R: R1/8,M5 G: G1/8,M5 N: NPT1/8,M5

Communicative Series

SP-15C030R

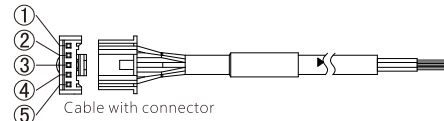
① Series	15: Normal grade 25: High protective grade (IP65)
② Pressure Range	C: -101.3~101.3kPa (Low pressure) P: -0.101~1.000MPa (High pressure)
③ Output	030: 1NPN+1RS485 031: 1PNP+1RS485
④ Port	R: R1/8,M5 G: G1/8,M5 N: NPT1/8,M5

Optimal Parts for purchasing separately

- Metal mounting bracket - L style: XP-BT-01
- Metal mounting bracket - Z style: XP-BT-02
- Panel adapter(have protective lid): XP-PA-01
- Cable - 3 wires: XP-CA-01
- Cable - 5 wires: XP-CA-02

C. Connection connector pin arrangement

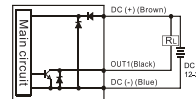
Note: Do not pull by holding the cable without pressing the release lever, as this can cause cable break or connector break.



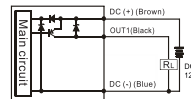
Pin NO.	Terminal name (SP-10/20 series)	Terminal name (SP-01 series)	Terminal name (SP-15/25 series)
① Brown	DC+	DC+	DC+
② Black	OUT1	OUT1	OUT1
③ White	OUT2		485A
④ Orange	AIO		485B
⑤ Blue	DC-	DC-	DC-

D. OUTPUT CIRCUIT WIRING DIAGRAMS

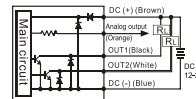
1 NPN (Just for SP-01 Series)



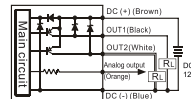
1 PNP (Just for SP-01 Series)



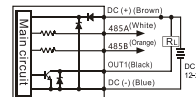
2 NPN+1 Analog



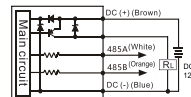
2 PNP+1 Analog



1 NPN+RS485

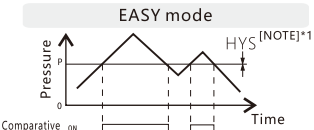


1 PNP+RS485

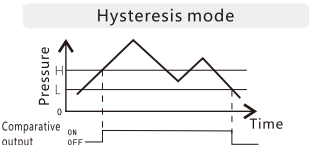


E. OUTPUT TYPE

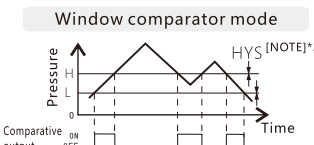
The EASY mode, hysteresis mode or window comparator mode can be selected as the output mode for comparative output 1 and comparative output 2. Please refer to <1.NORMAL mode> for details.



[NOTE]
*1. In the EASY mode, P_{-1} is displayed on the sub-display.



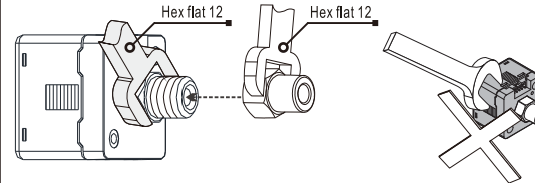
*2. Please refer to <Hysteresis fixed value selection> in <PRO setting> for setting.



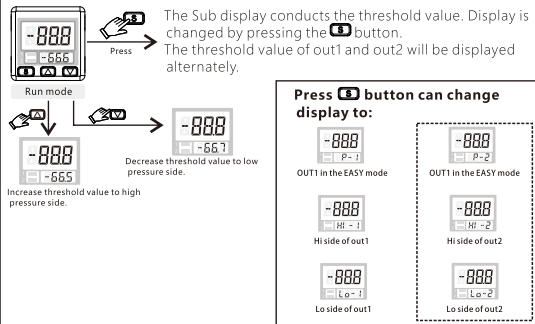
In this mode, the ON or OFF state of the comparative output is controlled with a pressure in the set range.

F. PIPING

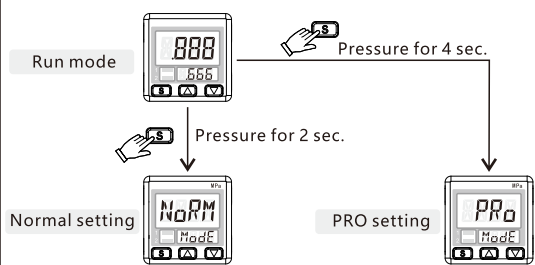
When connecting a commercial coupler to the pressure port, attach a 12mm spanner to the pressure port's hexagon section to fix the port, and then tighten with a tightening torque of 9.8 N·m or less(M5 female: 1N·m or less). The commercial coupler or pressure port section will be damaged if the tightening torque is excessive. Wrap sealing tape around the coupler when connecting to prevent leaks.



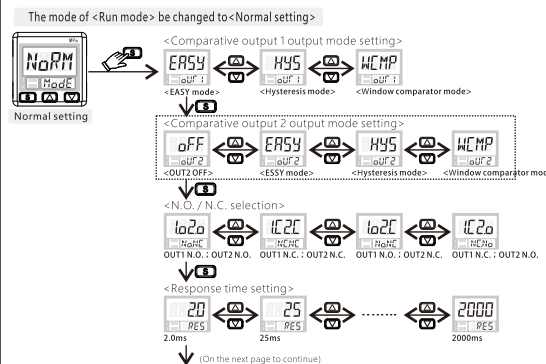
G. RUN MODE



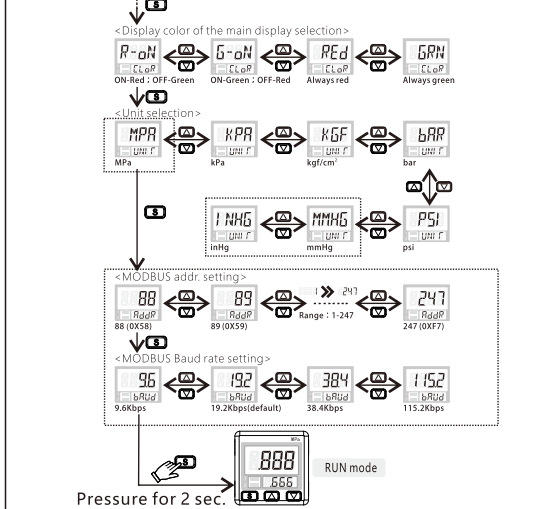
H. MENU SETTING MODE



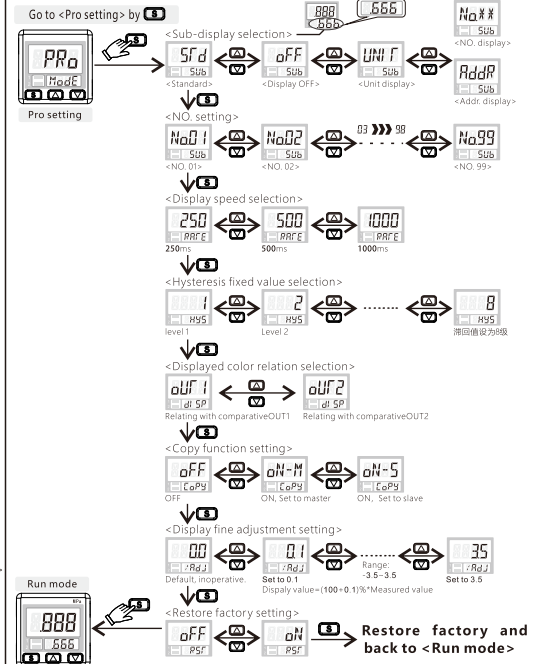
I. NORMAL SETTING



(Connect page)

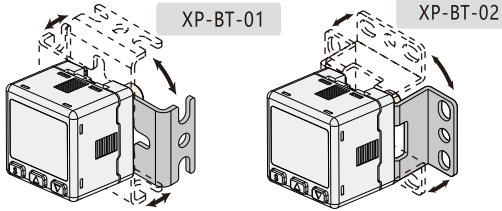


J. PRO SETTING

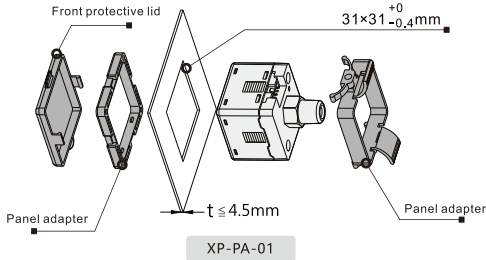


K. MOUNTING

1 - Mounting bracket



2 - panel mounting



L. SUPERSPEED MODE

By the SUPERSPEED mode, response time can up to 1ms!



【NOTE】
JUST for SP10&SP20 series

Press **⏏** + **⏏** button at the same time on the <Run mode> until display show as:



SUPERSPEED ON



SUPERSPEED OFF

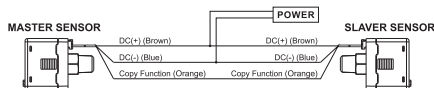
Release the buttons to end setting.

M. COPY FUNCTION SETTING

- Copy function setting can use the master sensor to copy the pressure value to the slave sensors.
- Before copying, please confirm the model of pressure sensor. The function cannot use in difference mode.
- The copy function only can be one-to-one.

【SETTING STEP】

- Please set the copy function to **on** or **off** to be on copy condition by master sensor. Please refer the copy setting of (H) advance setting mode.
- Turn power off to both sensor.
- Refer the connection way with the master and slave sensor as followings.



4. Turn on power at same time. (* 1)

5. Wait 5 sec., when finishing to convey the data.

the master sensor display (mutually display) **CPY** **Load** (display reciprocal)

the slaver sensor displ **SLa** **Load** (display reciprocal)

6. When convey the data is fail,

(Master) sensor displays **CPY** **Load** (display reciprocal) (Slaver) sensor displays **SLa** **Load** (* 2)

7. Turn off power and remove the wire connection. If no remove the wire connection, the sensor would be broken.

- ★ If require to copy another slave sensor, please repeat the step ③ to ⑤.
- ★ Only for KP43□-02-□ and KP43□-04-□ have this setting selection.

【NOTE】

- *1. If turn on power is not synchronization, the data cannot be copied.
- *2. When the data conveys fail, please confirm the wire connection. Then repeat the step ③ to ⑤.

How to cancel the copy mode by master sensor:

- When the master sensor display **CPY** **Load** (display reciprocal), Please **⏏** button to leave the copy mode.

N. SPECIFICATIONS

MODEL	SP-01P High pressure	SP-01C Low pressure	SP-10P High pressure	SP-10C Low pressure	SP-15P High pressure	SP-15C Low pressure	
Rated pressure range	-0.101~1.000MPa	-101.3~101.3kPa	-0.101~1.000MPa	-101.3~101.3kPa	-0.101~1.000MPa	-101.3~101.3kPa	
Display pressure range	-0.100~1.000MPa	-101.0~101.0kPa	-0.100~1.000MPa	-101.0~101.0kPa	-0.100~1.000MPa	-101.0~101.0kPa	
Withstand pressure	1.5MPa	500kPa	1.5MPa	500kPa	1.5MPa	500kPa	
Applicable Fluid	Filtered air, Non-corrosive/Non-flammable gas						
Power supply	12~24V DC ± 10%						
Current consumption	≦ 45mA (With no load)						
Set Pressure re-solution	kPa	—	0.1	—	0.1	—	
	MPa	0.001	—	0.001	—	0.001	—
	kgf/cm ²	0.01	0.001	0.01	0.001	0.01	0.001
	bar	0.01	0.001	0.01	0.001	0.01	0.001
	psi	0.1	0.01	0.1	0.01	0.1	0.01
	mmHg	—	0.1	—	0.1	—	0.1
	inchHg	—	1	—	1	—	1
Switch output *1	NPN Open collector Max. load current: 100mA Max. supply voltage: 30V DC Residual voltage: ≦1.5V			PNP Open collector Max. load current: 100mA Max. supply voltage: 24V DC Residual voltage: ≦1.5V			
Voltage output *1	—		Output voltage: 1~5V ±2.5 % F.S. Linearity: ±1% F.S. Output impedance: about 1KΩ		—		
Current output *1	—		Output Current: 4~20mA ±2.5 % F.S. Linearity: ±1% F.S. Output impedance: Min. 50Ω Max. 300Ω @12V, 600Ω @24V		—		
MODBUS *2	—			√			
Indicator accuracy	±1% F.S. ±1digits(Ambient temperature 25±10℃)						
Repeatability	±0.2% F.S. ±2digits						
Response time	2.0ms, 50ms, 100ms, 250ms, 500ms, 2000ms selectable (NOTE*4)		1.0ms(NOTE*3), 2.0ms, 50ms, 100ms, 250ms, 500ms, 2000ms selectable		2.0ms, 50ms, 100ms, 250ms, 500ms, 2000ms selectable (NOTE*4)		
LCD display	3 color (Red/Green/Orange) Display (Sampling rate: 4times/1sec.)						
Temperature characteristic	1% F.S. of detected pressure (25℃) at temperature range of 0~50℃						
Working environment	0~50℃ (No condensation or freezing); 35~85%RH(No condensation)						
Storage environment	-10~50℃ (No condensation or freezing); 35~85%RH(No condensation)						
Protection level	IP40 (IEC)						
Pressure port	R, R1/8+M5 G, G1/8+M5 N, NPT1/8+M5						
Weight	Approximate 85g (With lead wire)						
Accessories	A cable with connector & an instruction manual						

【NOTE】

- *1. The output type is matched with product series, please refer to "Order Guide".
- *2. Only the SP15 series can support MODBUS communication protocol.
- *3. The response time of 1ms just can be supported with SUPERSPEED Mode.

O. MODBUS

Data format	Address	Funtion	Data	CRC
Single	8bit	8bit	n*8bit	16bit
1 start bit, 8 data bits, 2 stop bits, no parity.				

REGISTER ADDRESS					
addr.	Point to	Value		Corresponding to the set	Limits
		SP-15P	SP-15C		
0001H	Threshold value	-100~1000 ↑ ↓	-1013~1013 ↑ ↓	NC	R
0010H	OUT1	-100~1000 ↑ ↓	-1010~1010 ↑ ↓		R/W
0011H	OUT1 Hi-side	下限値~1000 ↑ ↓ 下限気圧値 ~1.000MPa	下限値~1010 ↑ ↓ 下限気圧値 ~101.0kPa		R/W
0012H	OUT1 Lo-side	-100~上限値 ↑ ↓ -0.100MPa~上限気圧値	-1010~上限値 ↑ ↓ -101.0kPa~上限気圧値		R/W
0013H	OUT1 mode	0~2 ↑ ↓ EASY, HYS, WCMP	0~2 ↑ ↓ EASY, HYS, WCMP		R/W
0014H	Display color	0~3 ↑ ↓ R, ON, G, ON, RED, GREEN	0~3 ↑ ↓ R, ON, G, ON, RED, GREEN		R/W
0015H	Unit	0~4 ↑ ↓ MPa, kPa, kgf/cm², bar, psi	1~6 ↑ ↓ kPa, kgf/cm², bar, psi, mmHg, inHg		R/W
0016H	N.O. N.C.	0~1 ↑ ↓ NO. NC.	0~1 ↑ ↓ NO. NC.		R/W

(On the next page to continue)

(Connect page)

CODE	FUNCTION
03H	Read multiple registers
04H	Read the current pressure
06H	Write a single register
10H	Write multiple registers

Abnormal code	Descriptions
01H	code error
02H	Illegal data address, out of address range or read-write permission
03H	Illegal data, the number of data exceeds the limit or error count
04H	Parameter setting error, parameter setting value writing out of setting range

P. ZERO POINT SETTING



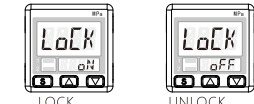
Press **⏏** + **⏏** at the same time until show as follow:



Release the button to end zero setting.



Press **⏏** + **⏏** at the same time until show as follow:



Release the button to end setting.

R. DISPLAY FINE ADJUSTMENT FUNCTION

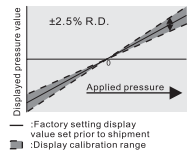
<Pro setting>



R.D. (Real Detect)

【NOTE】1. setting resolution is ± 0.1 % R.D.
2. The signal would be changed with analog output after adjusting.

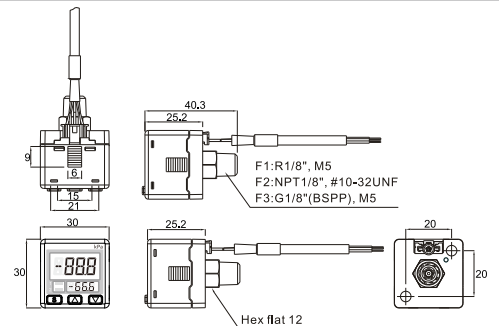
This function eliminates slight differences in the output values and allows uniformity in the numbers displayed.
Displayed values of the pressure sensor can be calibrated to within ± 2.5 % R.D.



S. EEROR CODE

Error Type	Error code	Error Condition	Troubleshooting
Excess load current error	Er 1	Output 1 load current is more than 125 mA	Turn power off and check the cause of overload current or lower the current load under 125 mA, then restart.
Residual pressure error	Er 2	Output 2 load current is more than 125 mA	Change input pressure to ambient pressure and perform zero reset again.

T. DIMENSIONS



Unit: mm