

Dual Display Type Pressure Sensors

PSQ Series

INSTRUCTION MANUAL

TGD210186AC

Autonics

Thank you for choosing our Autonics product.

Read and understand the instruction manual and manual thoroughly before using the product.

For your safety, read and follow the below safety considerations before using. For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.

Keep this instruction manual in a place where you can find easily.

The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Follow Autonics website for the latest information.

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow instructions may result in serious injury or death.

01. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime / disaster prevention devices, etc.)
Failure to follow this instruction may result in personal injury, economic loss or fire.

02. Do not use the unit in the place where flammable / explosive / corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.
Failure to follow this instruction may result in explosion or fire.

03. Install on a device panel or to a pressure port directly to use.
Failure to follow this instruction may result in fire.

04. Do not connect, repair, or inspect the unit while connected to a power source.
Failure to follow this instruction may result in fire.

05. Check 'Connections' before wiring.
Failure to follow this instruction may result in fire.

06. Do not disassemble or modify the unit.
Failure to follow this instruction may result in fire or electric shock.

⚠ Caution Failure to follow instructions may result in injury or product damage.

01. Use the unit within the rated specifications.

Failure to follow this instruction may result in fire or product damage.

02. Use a dry cloth to clean the unit, and do not use water or organic solvent.
Failure to follow this instruction may result in fire.

03. This product is designed to detect the pressure of noncorrosive medium. Do not use for corrosive medium.
Failure to follow this instruction may result in product damage.

04. Keep the product away from metal chip, dust, and wire residue which flow into the unit.
Failure to follow this instruction may result in fire or product damage.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- 12 - 24 VDC≐ power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Use the product, 3 sec after supplying power.
- When using switching mode power supply, frame ground (F.G.) terminal of power supply should be grounded.
- Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
- This unit may be used in the following environments.
 - Indoors (in the environment condition rated in 'Specifications')
 - Altitude max. 2,000 m
 - Pollution degree 3
 - Installation category II

Ordering Information

This is only for reference, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website.

PSQ - ① ② ③ ④ ⑤ - ⑥

① Applicable medium

No mark: Pneumatic type
(air, non-corrosive gas)
B: Fluid type (gas, liquid)

② Pressure type

C: Compound

③ Pressure range [unit: kPa]

01: -100.0 to 100.0
1: -100 to 1,000

④ Cable

No mark: Cable type (fluid type)
C: Connector type (pneumatic type)

⑤ Option input / output

No mark: No support
U: Support (analog output or external input)

⑥ Pressure port

Pressure port	Medium	Pneumatic type	Fluid type
R1/8		○	○ (default)
Rc1/8		○ (default)	○
NPT1/8		○	-
R1/4		-	○
NPT1/4		-	○
9/16-18UNF (Metal gasket sealing)		-	○

Product Components

- Product
- Instruction manual
- Pneumatic type: bracket A, B
- Fluid type: bracket C
- Connector type: Connector wiring (PSO-C01)

Sold Separately

- Integrated installation set: Front cover (PSO-P01), Panel bracket (PSO-B02)
- Separate installation set⁰¹⁾: Front cover (PSO-P02), Front / rear panel bracket set (PSO-B04)

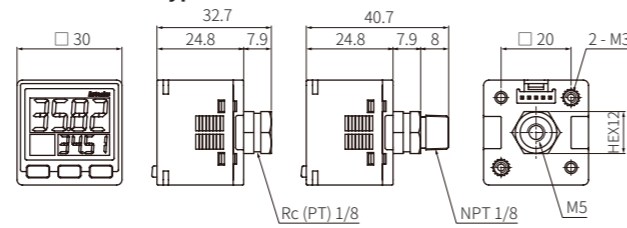
- M5 gender⁰¹⁾ (PSO-Z01)

01) Only for pneumatic type model

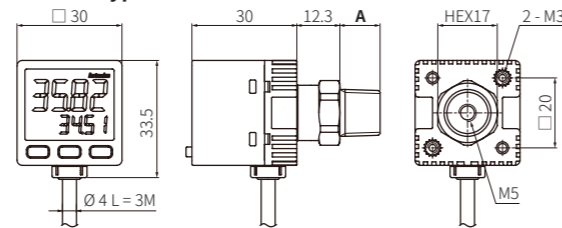
Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.

■ Pneumatic type



■ Fluid type

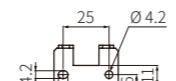


Pressure port	R1/8	Rc1/8	R1/4	NPT1/4	9/16-18UNF
A	8	0	11.5	11.5	15.4

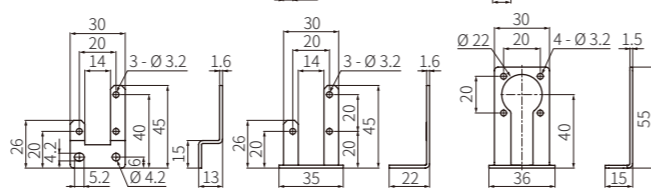
■ Bracket A



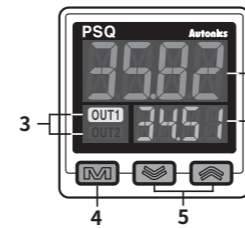
■ Bracket B



■ Bracket C



Unit Descriptions



1. PV display part (green, red, orange)

RUN mode: Displays PV (present value).
Setting mode: Displays parameter.

2. SV display part (green)

RUN mode: Displays SV (setting value), unit, etc.
Setting mode: Displays SV.

3. Output (OUT1, OUT2) indicator (orange)

Turns ON while the control output turns ON.

4. [M] key

Enters parameter, selects the setting item and returns RUN mode.

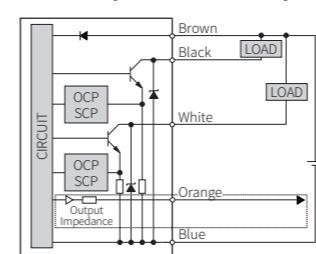
5. [▼], [▲] key

Sets preset of output operation mode, executes modes and changes parameters.

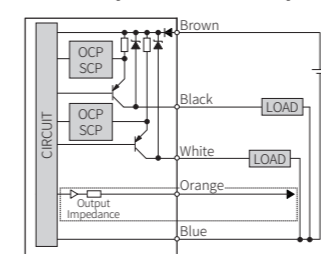
Connections

Color	Function
Brown	+V
Blue	0 V
Black	OUT 1
White	OUT 2
Orange	Analog output / External input (not available at the same time.)

■ NPN open collector output



■ PNP open collector output

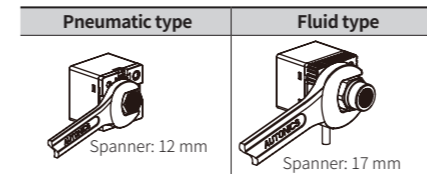


- OCP (Over Current Protection), SCP (Short Circuit Protection)
- The control output is abnormal when the control output circuit is shorted or over current is supplied.
- circuit is supported only for option input/output model.

Installation

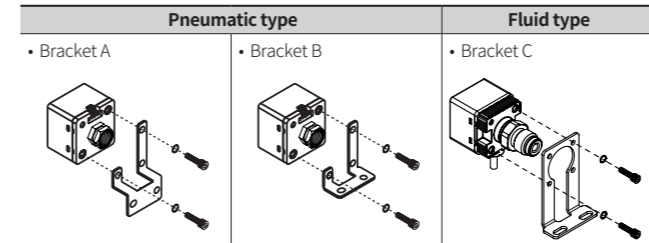
■ One touch fitting

Use a spanner at the metal part of the unit in order not to overload on the body when connecting one touch fitting.



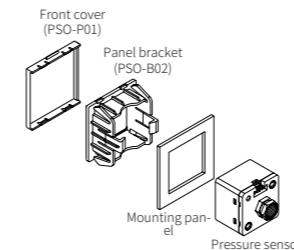
■ Bracket

Select proper bracket with considering your application environments, and install by using spring washer and hexagon wrench bolt. (tightening torque: ≤ 3 N·m)



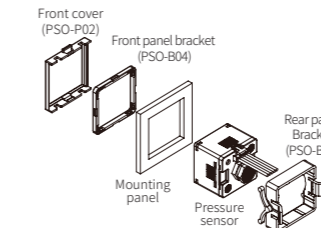
■ Integrated installation set

- Supported model: Pneumatic / Fluid type model
- Sold Separately: Integrated installation set
- Panel thickness: 0.8 to 3.5 mm



■ Separate installation set

- Supported model: Pneumatic type model
- Sold Separately: Separate installation set
- Panel thickness: 0.5 to 7 mm



Specifications

Model	PSQ-C□□□□□	PSQ-BC□□□□□
Applicable medium	Pneumatic type (air, non-corrosive gas)	Fluid type (non-corrosive gas and fluid that do not corrode stainless steel 316L)
Pressure type	Gauge pressure	Sealed gauge pressure ⁰¹⁾
Rated pressure range	-100.0 to 100.0 kPa / -100 to 1,000 kPa model	
Display and setting pressure range	Different by rated pressure range	
-100.0 to 100.0 kPa model	-101.3 to 110.0 kPa	
-100 to 1,000 kPa model	-101 to 1,100 kPa	
Display type	PV / SV display part: 12 segment LCD, 4-digit	
Display accuracy	-10 to 0°C: ≤ ± 1% F.S., 0 to 50°C: ≤ ± 0.5% F.S.	
Min. display unit	Different by rated pressure range	
-100.0 to 100.0 kPa model	0.1 kPa	
-100 to 1,000 kPa model	1 kPa	
Min. display interval	Different by pressure unit ⁰²⁾	
Max. pressure range	Different by rated pressure range	
-100.0 to 100.0 kPa model	Rated pressure × 2	Rated pressure × 3
-100 to 1,000 kPa model	Rated pressure × 1.5	Rated pressure × 3
Connection	Connector type	Cable type
Cable	Ø 4 mm, 5-core, 2 m	Ø 4 mm, 5-core, 3 m
Wire	AWG 24 (0.08 mm, 40-seam), insulator diameter: Ø 1 mm	
Material	Front case: PC back case: PBT + G15 % pressure port: SUS303	Front case: PC back case: PA6 pressure port: SUS316L
Protection structure	IP40 (IEC standard)	IP65 (IEC standard)
Certification	CE, RoHS, REACH, ENEC	
Unit weight (packaged)	≈ 80 g (≈ 165 g)	≈ 125 g (≈ 210 g)

01) The unit is sealed structure. It is based on atmospheric pressure 101.3kPa.

02) Refer to 'Minimum Display Interval per Pressure Unit'.

Power supply	12 - 24 VDC≐ (ripple P-P: ≤ 10%)
Allowable voltage range	90 to 110 % of rated voltage
Current consumption	≤ 50 mA (analog output model: ≤ 70 mA)
Control output	NPN or PNP open collector output
Load voltage	≤ 30 VDC≐
Load current	≤ 100 mA
Residual voltage	≤ 2 VDC≐
Hysteresis	Different by output operation mode (parameter) ⁰¹⁾
Repeat error	±0.2% F.S. ± min. display interval
Response time	2.5 to 5,000 ms (parameter)
Protection circuit	Output short over current protection circuit
Insulation resistance	≥ 50 MΩ (500 VDC≐ megger)
Dielectric strength	Between the charging part and the case: 1,000 VAC~ 50 / 60 Hz for 1 min
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 2 hours
Ambient temperature	-10 to 50 °C, storage: -20 to 60 °C (no freezing or condensation)
Ambient humidity	30 to 80 %RH, storage: 30 to 80 %RH (no freezing or condensation)

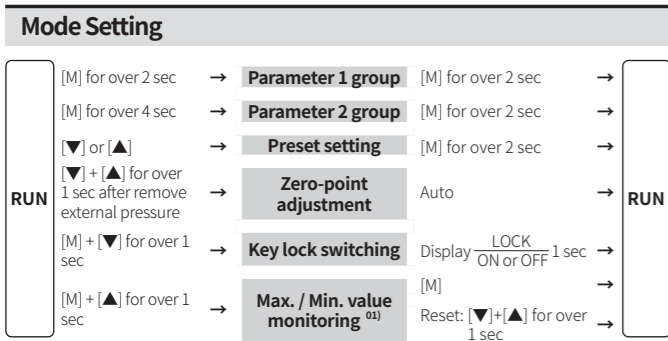
01) Refer to 'Output Operation Mode'.

External input	Auto shift - Remote zero - Hold (parameter)	
ON / OFF voltage input	ON voltage: ≤ 0.4 VDC≐ OFF voltage: 5-Vin or open input impedance: ≈ 100 kΩ	
Resolution	1 / 2,000	
Option output	Analog voltage - Analog current output (parameter)	
Analog voltage output	1 - 5 VDC≐ ± 2.5 % F.S., output impedance: ≈ 240 Ω	
Analog current output	DC4 - 20 mA ± 2.5 % F.S., output impedance: ≈ 100 kΩ	
Linearity	≤ ± 1 % F.S.	
Resolution	1 / 2,000	
Response time	50 ms	

Minimum Display Interval per Pressure Unit

Pressure unit	Display interval	
	Pressure range -100.0 to 100.0 kPa model	Pressure range -100 to 1,000 kPa model
MPa	0.001	0.001
kPa	0.1	1
kg/cm ²	0.001	0.01
bar	0.001	0.01
psi	0.02	0.2
mmHg	1	-
inHg	0.1	-
mmH ₂ O	0.1 ⁰¹⁾	-

01) Multiply display value by 100.



01) PV display part: displays maximum value, SV display part: displays minimum value

Parameter Setting

- Some parameter are activated / deactivated depending on other parameters. Refer to the description.
- It returns to RUN mode when there is no additional key input for 60 sec in each parameter group.
- When pressing the [M] key once within 2 sec when returning RUN mode from parameter groups, it enters the previous parameter group.

Parameter 1 group

Parameter	Display	Default	Setting range	Condition		
1-1 operation mode	oUt 1	E R S Y	EASY: easy, HYS.M: hysteresis, WIN: window comparison output, AUTO: auto sensitivity setting, F.OUT: forced output control	-		
1-2 operation mode	oUt 2	o F F	OFF, EASY: easy, HYS.M: hysteresis, WIN: window comparison output Auto setting (following OUT1 setting)	1-1 OUT1 operation mode: EASY, HYS.M, WIN 1-1 OUT1 operation mode: AUTO, F.OUT		
1-3 analog output / external input terminal ⁰¹⁾	i / o	R - V'	[Option input / output model] A-V: analog voltage output, A-C: analog current output, SHFT: auto shift, ZERO: remote zero, HOLD: hold	-		
1-4 Auto shift applied terminal	S H o t	o Ut 1	[Option input / output model] OUT1, OUT2, ALL: OUT1 & OUT2	1-3 analog output / external input terminal: SHFT		
1-5 Remote zero applied terminal	Z E o t	o Ut 1	[Option input / output model] OUT1, OUT2, ALL: OUT1 & OUT2	1-3 analog output / external input terminal: ZERO		
1-6 Output type	N o N C	N o	OUT1	OUT2	1-2 OUT2 operation mode: OFF 1-1 OUT1 operation mode: AUTO or 1-2 OUT2 operation mode: HYS.M, WIN	
			NO	Normally Open		OFF
			NC	Normally Closed		OFF
			1O2O	Normally Open		Normally Open
			1O2C	Normally Open		Normally Closed
1C2O	Normally Closed	Normally Open				
1C2C	Normally Closed	Normally Closed				
1-7 Response time	S P d	2.5	2.5, 5, 10, 25, 50, 100, 250, 500, 1000, 5000 ms	-		
1-8 PV display part color	C L o P	R - o N	• Display color: default / output R-ON: green / red, G-ON: red / green, RED: red / red, GREN: green / green	-		
1-9 Display color linked output	d i S P	o Ut 1	OUT1, OUT2, ALL: OUT1 & OUT2 • Select the output terminal which apply the setting of 1-8 PV display part color.	1-2 OUT2 operation mode: EASY, HYS.M, WIN & 1-8 PV display part color: R-ON, G-ON		
1-10 Display unit	U N i t	k P R	kPa, MPa, KGF: kgf/cm ² , bar, psi, mmHg, inHg, H2O: mmH ₂ O	-		

01) When '1-1 OUT1 operation mode' is set as 'F.OUT' or applied pressure is higher / lower than the display pressure range, auto shift [SHFT], remote zero [ZERO] functions are not available.

Parameter 2 group

Parameter	Display	Default	Setting range	Condition
2-1 SV display part	S U b	S t d	STD: preset, UNIT: pressure unit, OFF: no display	-
2-2 Parameter copy	C o P y	o F F	OFF, ON, ON-L: key lock after copying • Refer to 'Parameter Copy'.	-
2-3 Parameter reset	r e s e t	o F F	OFF, ON: parameter reset	-
2-4 Password	P W d	0000	0000: off, 0001: checking parameter setting value only, 0002 to 9999	-
2-5 Control output switching	S o U t	N P N	NPN, PNP	-
2-6 Easy mode hysteresis ⁰¹⁾	H y S	111	1 to 111111 (display bar type, 1 to 8) • Hysteresis value per 1 bar 0.1 kPa (pressure range -100.0 to 100.0 kPa model), 1 kPa (pressure range -100 to 1,000 kPa model)	1-1 OUT1 operation mode or 1-2 OUT2 operation mode: EASY

01) Although the display unit is changed, standard unit of hysteresis for easy mode is not changed.

Preset Setting

Setting method

- Setting name and value are cross-displayed in SV display part.
- Set the operation mode in parameter 1 group.
- Enter the preset setting mode by pressing [▼] or [▲] key from RUN mode.
- Select the setting item by [M] key and change the preset by [▼] or [▲] key.
- Press [M] key over 2 sec or no key input over 2 sec, save setting and return to RUN mode. (except forced output control mode)

Preset setting by operation mode

- 'Default' values are based on rated pressure range -100.0 to 100.0 kPa model. The values in parenthesis '()' is for -100.0 to 1,000 kPa model.

Operation mode	Preset	Default	Setting range
Easy	E R S Y	P	50.0 (500) Min. value of display pressure < 'P' ≤ max. value of display pressure
Hysteresis	Pressure detection level	5 t	50.0 (500) Min. value of display pressure < 'ST' ≤ max. value of display pressure
	Hysteresis level	H Y S	-50.0 (0) Min. value of display pressure ≤ 'HYS' < 'ST'
Window comparison output	Pressure detection low limit	L o	-50.0 (0) Min. value of display pressure ≤ 'LO' ≤ max. value of display pressure - (3 × min. display unit)
	Pressure detection high limit	H i	50.0 (500) 'LO' + (3 × min. display unit) ≤ 'HI' ≤ max. value of display pressure
Auto sensitivity setting	Pressure level 1	5 t 1	-50.0 (0) Min. value of display pressure ≤ 'ST1' ≤ max. value of display pressure - 1% of rated pressure range
	Pressure level 2	5 t 2	050.0 (500) 'ST1' + 1% of rated pressure range ≤ 'ST2' ≤ max. value of display pressure
	Pressure detection level	5 E t	0.0 (250) 'ST1' ≤ 'SET' ≤ 'ST2', SET = $\frac{(ST1+ST2)}{2}$ • Manual setting is possible by [▼] or [▲] key.
Forced output control	F o U t	-	-
Analog voltage output scale	1V output	R - 1V'	-100.0 (0) Min. value of display pressure < 'A-1V' < max. value of display pressure
	5V output	R - 5V'	100.0 (1,000) 'A-1V' + 10% of rated pressure range < 'A-5V' < max. value of display pressure, or min. value of display pressure < 'A-5V' < 'A-1V' - 10% of rated pressure range
Analog current output scale	4 mA output	R - 04	-100.0 (0) min. value of display pressure < 'A-04' < max. value of display pressure
	20 mA output	R - 20	100.0 (1,000) 'A-04' + 10% of rated pressure range < 'A-20' < max. value of display pressure, or min. value of display pressure < 'A-20' < 'A-04' - 10% of rated pressure range

Preset setting by external input mode

- Apply 0 VDC≐ to orange cable over 1 ms to operate auto shift or remote zero mode.
- Press [▼] + [▲] key over 1 sec to delete set auto shift correction.

Operation mode	Preset	Default	Setting range
Auto shift	S H F t	S H i N 0	Min. value of preset setting < 'SH.IN' ≤ max. value of preset setting
Remote zero	Z E R o	Z E i N 0	Min. value of preset setting < 'ZE.IN' ≤ max. value of preset setting
Hold	H o l d	-	-

Precaution

- The operation modes (easy, hysteresis, window comparison, auto sensitivity setting) that can be set separately per each output (OUT1 / 2) display parameter name with identification number.
- The preset is reset when changing '1-10 Display unit', '1-3 Analog output / external input terminal' parameter.
- The preset is reset to default when changing '1-1 / 1-2 OUT1 / 2 operation mode' parameter.
But, if there is the previous preset in changed operation mode, it is set the value.

Setting guide

NPN or PNP open collector output (OUT1/2)

- Set the output operation mode to use in '1-1 / 1-2 OUT1 / 2 operation mode' parameter.
- Enter preset setting mode from RUN mode. The items are displayed in the order of OUT1 - OUT2.
- Set the preset for each item.

Setting example - OUT1: hysteresis mode, OUT2: window comparison output mode			
OUT1 operation mode	Hysteresis mode	5 t 1	Pressure detection level
		H Y S 1	Hysteresis level
OUT2 operation mode	Window comparison output mode	L o 2	Pressure detection low limit value
		H i 2	Pressure detection high limit value

Analog output / external input

- Set the operation mode to use in '1-3 Analog output / external input terminal' parameter.
- Enter preset setting mode from RUN mode. (analog output/external input items are displayed after OUT1 - OUT2)
- Set the preset for each item.

Setting example - analog current output scale			
Analog output / external input terminal	Analog current output	R - 04	4 mA output SV
		R - 20	20 mA output SV

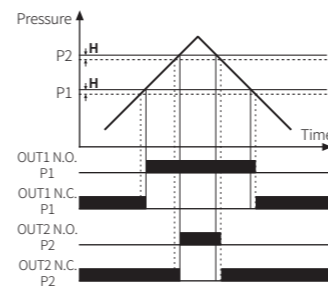
Output Operation Mode

Change the output operation mode to change pressure detection method.

ON: ■■■■■ OFF: _____ H: hysteresis A: Min. display interval

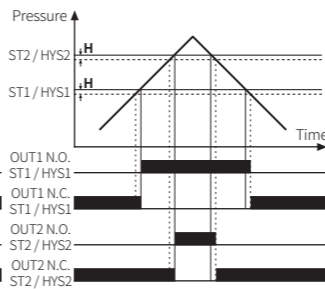
Easy mode

- Pressure is detected by applying the hysteresis which is set in '2-6 Easy mode hysteresis' parameter.
- Setting: Pressure detection level (P1, P2)



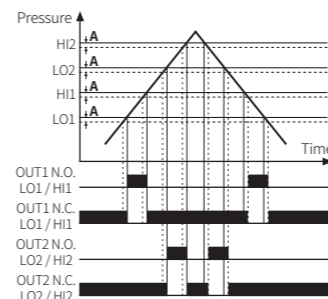
Hysteresis mode

- Set the hysteresis for pressure detection directly.
- Setting: Pressure detection level (ST1, ST2), hysteresis (HYS1, HYS2)



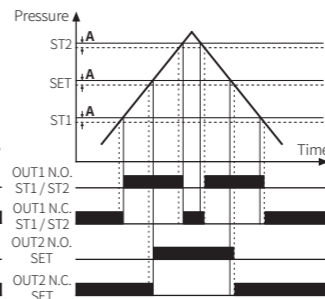
Window comparison output mode

- It detects pressure at the desired range.
- Hysteresis is fixed as min. display interval.
- Setting: High limit (HI1, HI2), low limit (LO1, LO2) of pressure detection level



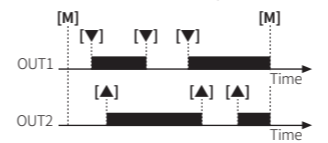
Auto sensitivity setting mode

- It sets the proper detection sensitivity for pressure detection level (SET) automatically by applying two pressure point (ST1, ST2).
- Setting: SET = $\frac{(ST1+ST2)}{2}$
- Hysteresis is fixed as min. display interval.



Forced output control mode

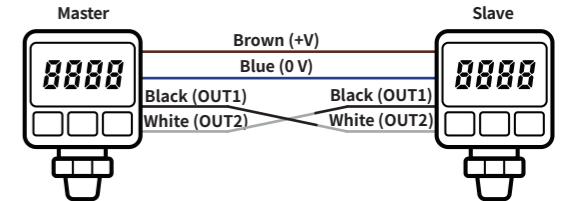
- Regardless of setting value, it maintains comparison output OFF and displays present pressure.
- During forced output control mode, press the [M], [▼] or [▲] key to turn ON/OFF OUT1, 2 manually.



Parameter Copy

It is function to copy parameter setting from master to slave by 1 : 1.

- Master and Slave should be the same specification model.
- Select 'ON' or 'ON-L' of master '2-2 Parameter copy' parameter to activate the ready status of parameter copy.
ON: Copsy setting values of parameters.
ON-L: After copying the setting values of parameters, activate the key lock function of slave.
 - Check the 'REDY' on SV display part of the master, and turn OFF the master power.
 - Connect the master and slave by referring the below diagram.



- Turn ON the master power with pressing the [M] of the slave. Parameter copy function is executed.
- When connecting master and slave incorrectly, the PV display of master displays 'ERR4'. After checking the connection, turn OFF the master power and turn ON it.
- If parameter copy is in progress, the following message is displayed.
Master - PV display part: arbitrary value (orange) / SV display part: 'COPY'
Slave - PV display part: arbitrary value (green) / SV display part: 'OK'
- When completing copy, the PV display parts of master and slave display the same arbitrary value. Turn OFF the master and slave power and disconnect them. Repeat from step 3 to proceed with additional copying.

Error

Display	Cause	Troubleshooting
ERR1	When zero-point adjustment is executed while external pressure is input.	Try again after removing external pressure.
ERR2	When over-current is applied on control output.	Remove the over current conditions such as adjusting load resistance.
ERR3	When the range of 'ST1', 'ST2' ('auto sensitivity setting mode') is set incorrectly.	Check the setting range and set 'ST1', 'ST2'.
ERR4	When connection between master and slave is wrong during copying parameters.	Check if the cables connection is correct and the models are same.
ERR5	When entering invalid password.	Enter valid password.
HHHH	When applied pressure exceeds the high-limit of display pressure range.	Apply pressure within the display pressure range.
LLLL	When applied pressure exceeds the low-limit of display pressure range.	Set the correction value of auto shift or remove zero within the setting range.
-HH-	When the correction value of auto shift or remote zero exceeds the high-limit of the setting range.	
-LL-	When the correction value of auto shift or remote zero exceeds the low-limit of the setting range.	
-HL-	When '-HH-', '-LL-' occur both.	