Autonics

DIGITAL PRESSURE SENSOR (Pneumatic type)
PSQ SERIES
INSTRUCTION MANUAL

Thank you for choosing our Autonics product.
Please read the following safety considerations before use.

■ Safety Considerations

※Please observe all safety considerations for safe and proper product operation to avoid hazards.
※⚠ symbol represents caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow these instructions may result in serious injury or death.
⚠ Caution Failure to follow these instructions may result in personal injury or product damage.

⚠ Warning

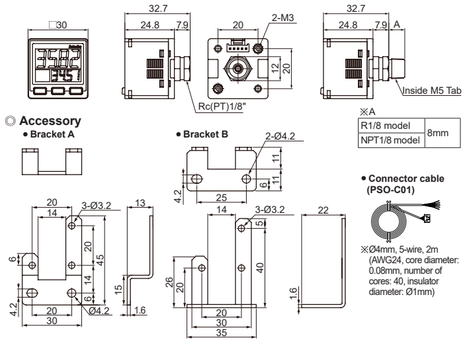
1. **Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)**
   Failure to follow this instruction may result in personal injury, fire or economic loss.
2. **Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
   Failure to follow this instruction may result in fire or explosion.
3. **Install on a device panel or to a pressure port directly to use.**
   Failure to follow this instruction may result in fire.
4. **Do not connect, repair, or inspect the unit while connected to a power source.**
   Failure to follow this instruction may result in fire.
5. **Check 'Connections' before wiring.**
   Failure to follow this instruction may result in fire.
6. **Do not disassemble or modify the unit.**
   Failure to follow this instruction may result in fire.

⚠ Caution

1. **Use the unit within the rated specifications.**
   Failure to follow this instruction may result in fire or product damage.
2. **Use dry cloth to clean the unit, and do not use water or organic solvent.**
   Failure to follow this instruction may result in fire.
3. **This product is designed to detect the pressure of noncorrosive gas. Do not use for corrosive gas.**
   Failure to follow this instruction may result in product damage.
4. **Keep metal chip, dust, and wire residue from flowing into the unit.**
   Failure to follow this instruction may result in fire or product damage.

■ Dimension

(unit: mm)



※A

R1/8 model	8mm
NPT1/8 model	

◎ Accessory

● Bracket A

● Bracket B

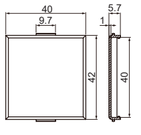
● Connector cable (PSO-C01)

※Ø4mm, 5-wire, 2m (AWG24, core diameter: 0.08mm, number of cores: 40, insulator diameter: Ø1mm)

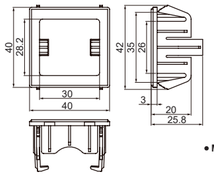
◎ Sold separately

● Integrated installation set

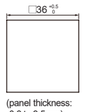
・Front cover (PSO-P01)



・Panel bracket (PSO-B02)

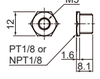


・Panel cut-out



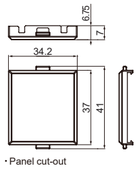
(panel thickness: 0.8 to 3.5mm)

● M5 gender (PSO-Z01)

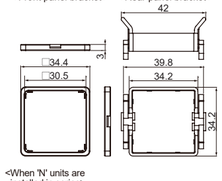


● Separate installation set

・Front cover (PSO-P02)



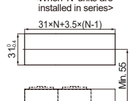
・Front/Rear panel bracket set (PSO-B04)
<Front panel bracket> <Rear panel bracket>



・Panel cut-out

(panel thickness: 0.5 to 7mm)

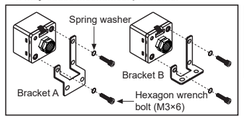
<When 'N' units are installed in series>

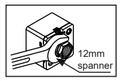


※The above specifications are subject to change and some models may be discontinued without notice.
※Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

■ Installation

1. Since pressure port is divided to standard and optional specification, be cautious when using commercial one touch fitting. (Standard: Rc1/8, Option: R1/8, NPT1/8)
2. Use a spanner (12mm) at the metal part of the unit in order not to overload on the body when connecting one touch fitting.
3. Two different fixing brackets are provided for PSQ Series. Select proper one according to your application environments.
4. At first, please unscrew hexagon wrench bolt and assemble the bracket on this unit by fixing hexagon the wrench bolt. **In this case, tightening torque of hexagon wrench should be max. 3N·m. It may cause mechanical problems.**

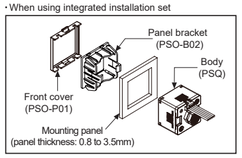




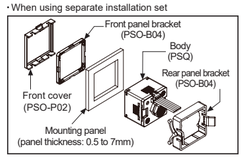
⚠ Caution
The tightening torque of one touch fitting should be max. 10N·m. It may cause mechanical problems.

5. PSQ Series has panel bracket and front cover (sold separately). When mounting the unit on panel, please follow the below figure.

・When using integrated installation set



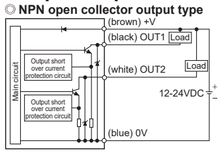
・When using separate installation set



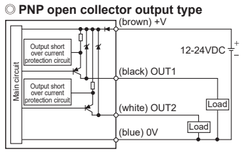
6. Do not pull the cable with a tensile strength of 30N or over.

■ Input/Output Circuit and Connections

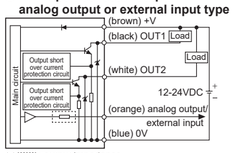
◎ NPN open collector output type



◎ PNP open collector output type

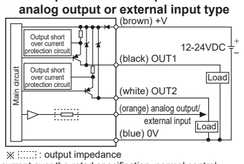


◎ NPN open collector output+ analog output or external input type



※ : output impedance

◎ PNP open collector output+ analog output or external input type



※ : output impedance

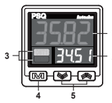
※If short-circuit the control output terminal or supply current over the rated specification, normal control signal is not output due to the output short over current protection circuit

■ Specifications

Pressure type	Gauge pressure (compound pressure)			
Type	NPN or PNP open collector output type		NPN or PNP open collector output +analog output or external input type	
Model※1	PSQ-C01C-□	PSQ-C1C-□	PSQ-C01CU-□	PSQ-C1CU-□
Rated pressure range	-100.0 to 100.0kPa	-100 to 1,000kPa	-100.0 to 100.0kPa	-100 to 1,000kPa
Display & Setting pressure range	-101.3 to 110.0kPa	-101 to 1,100kPa	-101.3 to 110.0kPa	-101 to 1,100kPa
Min. display unit	0.1kPa	1kPa	0.1kPa	1kPa
Max. pressure range	2 times of rated pressure	1.5 times of rated pressure	2 times of rated pressure	1.5 times of rated pressure
Applied fluid	Air, non-corrosive gas			
Power supply	12-24VDC⎓ (ripple P-P: max. 10%)			
Allowable voltage range	90 to 110% of rated voltage			
Current consumption	Max. 50mA		Max. 50mA (analog output: max. 70mA)	
Control output	NPN or PNP open collector output • Load voltage: max. 30VDC⎓ • Load current: max. 100mA • Residual voltage: max. 2VDC⎓			
Hysteresis※2	Min. display interval			
Repeat error	±0.2% F.S. ± min. display interval			
Response time	Select one; 2.5ms, 5ms, 10ms, 25ms, 50ms, 100ms, 250ms, 500ms, 1,000ms, 5,000ms			
Protection circuit	Output short over current protection circuit			
Analog output※3 Voltage output	—		• Output voltage: 1-5VDC⎓ ±2.5% F.S. • Linear: max. ±1% F.S. • Resolution: 1/2,000 • Output impedance: approx. 240Ω • Response time: 50ms	
Analog output※3 Current output	—		• Output current: DC4-20mA ±2.5% F.S. • Linear: max. ±1% F.S. • Resolution: 1/2,000 • Output impedance: approx. 100kΩ • Response time: 50ms	
External input※3 (Auto shift/ Remote zero/ Hold)	—		• ON voltage: Max. 0.4VDC⎓ • OFF voltage: 5-Vin or open • Resolution: 1/2,000 • Output impedance: approx. 100kΩ	
Display digits	Present value (PV) indicator, setting value (SV) indicator: 4-digit			
Display method	12 segment LCD method			
Min. display interval MPa	0.001	0.001	0.001	0.001
Min. display interval kPa	0.1	1	0.1	1
Min. display interval kgf/cm²	0.001	0.01	0.001	0.01
Min. display interval bar	0.001	0.01	0.001	0.01
Min. display interval psi	0.02	0.2	0.02	0.2
Min. display interval mmHg	1	—	1	—
Min. display interval inHg	0.1	—	0.1	—
Min. display interval mmH₂O	0.1	—	0.1	—
Display accuracy	0 to 50°C: max. ±0.5% F.S., -10 to 0°C: max. ±1% F.S.			
Insulation resistance	Over 50MΩ (at 500VDC megger)			
Dielectric strength	1,000VAC 50/60Hz for 1 min			
Vibration	1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each of X, Y, Z direction for 2 hours			
Environment Ambient temp.	-10 to 50°C, storage: -20 to 60°C			
Environment Ambient humi.	30 to 80%RH, storage: 30 to 80%RH			
Protection structure	IP40 (IEC standard)			
Material	Front case: polycarbonate, rear case: polybutylene terephthalate + glass 15%, pressure port: stainless steel 303			
Approval	CE, cULus			
Weight※4	Approx. 165g (approx. 80g)			

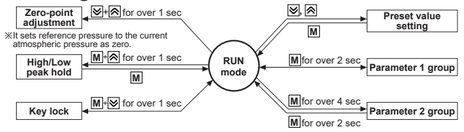
※1: □ in model represents the type of pressure port. Standard: Rc1/8, option: R1/8, NPT1/8.
※2: In hysteresis output mode, it is variable.
※3: Select one between analog output (voltage or current) and external input.
※4: The weight includes packaging. The weight in parenthesis is for unit only.
※For using mmH₂O unit, multiply display value by 100.
※Environment resistance is rated at no freezing or condensation.

■ Unit Descriptions



1. **Present value (PV) display part (green, red, orange by setting/status)**
   RUN mode: Displays PV.
   Setting mode: Displays parameter.
2. **Setting value (SV) display part (green)**
   RUN mode: Displays setting value, unit, etc.
   Setting mode: Displays SV.
3. **Output indicator (OUT1, OUT2) (orange)**
   : Turn ON while the control output turns ON.
4. **M key**
   RUN mode: Press the M key for over 2 sec to enter parameter 1 group.
   Press the M key for over 4 sec to enter parameter 2 group.
   Parameter setting mode: Press the M key to select the setting items.
   Press the M key for over 2 sec to return RUN mode.
5. **▽ △ key**
   RUN mode: Press the ▽, △ key to set preset value of output operation mode.
   Press the M+▽ keys to set key lock/unlock.
   Press the M+△ keys to adjust zero point.
   Press the M+▽ keys to set peak hold.
   Preset value setting mode: Press the ▽, △ key to increase/decrease setting value.
   Setting mode: Changes the parameter.

■ Setting for Each Mode



■ Preset Setting

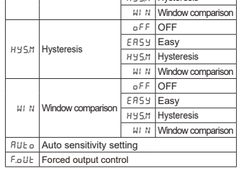
◎ Setting guide

・To enter the preset setting mode, press the ▽, △ key in RUN mode.
・Press the ▽, △ key to change preset value, the M key to move to the next mode.
・If there is no additional key or the M key input for over 2 sec during setting, the value is automatically set and it returns to RUN mode. (except forced output control mode)

●NPN or PNP open collector output(OUT1/2)

1. Select OUT1/2 operation mode [oUt 1/2] to use in parameter 1 group.
   (OUT1/2 operation mode: easy, hysteresis, window comparison, auto sensitivity setting, forced output control)
2. Enter the preset setting mode from RUN mode.
   (set items are displayed in the order of OUT1 - OUT2)
3. Set the value for each item.

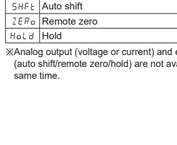
・Setting example
OUT1: Hysteresis mode
OUT2: Window comparison mode



●Analog output/External input

1. Select analog output/external input mode [Io]to use in parameter 1 group.
   (analog output/external input: analog voltage output, analog current output, auto shift, remote zero, hold)
2. Enter the preset setting mode from RUN mode.
   (analog output/external input items are displayed after OUT1 - OUT2)
3. Set the value for each item.

・Setting example
Analog current output scale



●Note
・Setting items and setting value are displayed at the setting value (SV) display part alternatively.
・Operation mode (easy, hysteresis, window comparison, auto sensitivity setting) that can be set separately per each output (OUT1/OUT2) display parameter name with identification number.([St]: [St 1]/[St2])
・When changing pressure unit or analog output/extenal input, the preset value is initialized corresponding to changed item.
・When changing operation mode, the preset value is reset for the changed mode.

●Preset setting by output operation mode

Output operation mode		Preset		Setting range	Factory default -100.0 to 100.0kPa	Factory default -100 to 1,000kPa
EASY	Easy	P	Pressure detection level	Min. display pressure < [P] ≤ Max. display pressure	0500	0500
HYSM	Hysteresis	St	Pressure detection level	Min. display pressure < [St] ≤ Max. display pressure	0500	0500
		HYS	Hysteresis level	Min. display pressure ≤ [HYS] < [St]	-500	0000
WIN	Window comparison	Lo	Pressure detection level low-limit	Min. display pressure ≤ [Lo] ≤ Max. display pressure - (3 × min. display unit)	-500	0000
		Hi	Pressure detection level high-limit	[Lo] + (3 × min. display unit) ≤ [Hi] ≤ Max. display pressure	0500	0500
AUto	Auto sensitivity setting	St 1	Pressure detection level 1	Min. display pressure ≤ [St 1] ≤ Max. display pressure - 1% of rated pressure	-500	0000
		St2	Pressure detection level 2	[St 1] + 1% of rated pressure ≤ [St2] ≤ Max. display pressure	0500	0500
		SEt	Pressure detection level	SEt= (St 1+St2)/2, [St 1] ≤ [SEt] ≤ [St2] Pressure detection level [SEt] can be selectable by pressing the △, ▽ key.	0000	0250
FoUt	Forced output control	—	—	—	—	—
A-V	Analog voltage output	A-1V	1V output SV	0% F.S. ≤ [A-1V] ≤ 100% F.S.	4000	0000
		A-5V	5V output SV	[A-1V] + 10% F.S. ≤ [A-5V] ≤ 100% F.S. or 0% F.S.≤ [A-5V] ≤ [A-1V] - 10% F.S.	1000	1000
A-C	Analog current output	A-04	4mA output SV	0% F.S. ≤ [A-04] ≤ 100% F.S.	4000	0000
		A-20	20mA output SV	[A-04] + 10% F.S. ≤ [A-20] ≤ 100% F.S. or 0% F.S. ≤ [A-20] ≤ [A-04] - 10% F.S.	1000	1000

●Preset setting by external input mode

External input mode		Preset		Setting range	Factory default
SHFt	Auto shift	SHI N	Auto shift correction value※	Min. preset setting value < [SHI N] < Max. preset setting value	0000
ZERo	Remote zero	ZEI N	Remote zero correction value※	Min. preset setting value < [ZEI N] < Max. preset setting value	0000
HoLd	Hold	—	—	—	—

※Apply 0VDC to orange cable over 1ms to operate auto shift or remote zero mode.
※Press the ▽+△ keys for over 1 sec to delete set auto shift correction.

◎ Supported operation mode list

NPN or PNP open collector output			
OUT1		OUT2	
EASY	Easy	oFF	OFF
		EASY	Easy
		HYSM	Hysteresis
		WIN	Window comparison
HYSM	Hysteresis	oFF	OFF
		EASY	Easy
		HYSM	Hysteresis
		WIN	Window comparison
WIN	Window comparison	oFF	OFF
		EASY	Easy
		HYSM	Hysteresis
		WIN	Window comparison
AUto	Auto sensitivity setting		
FoUt	Forced output control		

Analog output※	
A-V	Analog voltage output
A-C	Analog current output

External input※	
SHFt	Auto shift
ZERo	Remote zero
HoLd	Hold

※Analog output (voltage or current) and external input (auto shift/remote zero/hold) are not available at the same time.

■ Parameter Setting

※After entering parameter 1/2 group, if there is no additional key input for 60 sec, it maintains previous setting value and it returns to RUN mode.
※Press the ▽, △ key to set the setting value.
※After entering parameter 1/2 group, press the M key for over 2 sec to return to RUN mode.
※When pressing the M key once returning RUN mode from parameter 1 group, 2 group within 2 sec, it enters the previous parameter group.
※Some parameters are activated/deactivated according to the setting of other parameters. Refer to the description of each parameter.

◎ Parameter Group

Parameter 1 group

Parameter name		Setting range		Description	Factory default
oUt 1	OUT1 operation mode	EASY HYSM WIN AUto FoUt	Easy Hysteresis Window comparison Auto sensitivity setting Forced output control	Select OUT1 operation mode. ※When setting OUT1 operation mode as auto sensitivity setting mode [AUto] or forced output control mode [FoUt], OUT2 operation mode is set automatically same as the setting value of OUT1 operation mode.	EASY
oUt2	OUT2 operation mode	oFF EASY HYSM WIN	OFF Easy Hysteresis Window comparison	Select OUT2 operation mode.	oFF
I/oSEL	Analog output/ External input	A-V A-C SHFt ZERo HoLd	Analog voltage output Analog current output Auto shift Remote zero Hold	Select analog output/external input operation mode. Auto shift: When reference pressure of the pressure sensor changes, it corrects present pressure to reference pressure and by moving detection level as much as fluctuation level. Remote zero: It is the same function as auto shift but remote zero makes the measured pressure as 0 forcibly. Hold: The function to hold present value (PV) and control output while signal is input. ※When OUT1 operation mode is set as [FoUt] or applied pressure is higher/lower than the display pressure range, auto shift [SHFt], remote zero [ZERo] functions are not available.	A-V
SHot※	Auto shift applied terminal	oUt 1 oUt2 ALL	OUT1 OUT2 OUT1 & OUT2	Select auto shift applied terminal. ※Appears when Analog output/External input is [SHFt].	oUt 1
ZEot※	Remote zero applied terminal	oUt 1 oUt2 ALL	OUT1 OUT2 OUT1 & OUT2	Select remote zero applied terminal. ※Appears when analog output/external input is [ZERo].	oUt 1
NoNC	Output type	No NC toPo toPC tCPo tCPC	OUT1: Normally Open, OUT2: OFF OUT1: Normally Closed, OUT2: OFF OUT1: Normally Open, OUT2: Normally Open OUT1: Normally Closed, OUT2: Normally Open OUT1: Normally Open, OUT2: Normally Closed OUT1: Normally Closed, OUT2: Normally Closed	※Appears when OUT2 operation mode is [oFF]. ※Appears when OUT1 operation mode is [AUto], or OUT2 operation mode is [HYSM], [WIN].	No
SPd	Response time	25.5, 10, 25, 50, 100, 250, 500, 1000, 5000		It can prevent control output from chattering by changing response time. ※If the response time is getting longer, the detection will be more stable but present value (PV) might be different from the real pressure value.	25
CLoR	PV display color	R-oN G-oN REd GREn	Normal: Green / Output: Red Normal: Red / Output: Green Fixed red Fixed green	Select the present value (PV) display and the color linked output..	R-oN
di SP	Color linked output	oUt 1 oUt2 ALL	OUT1 OUT2 OUT1 & OUT2	Select the color linked output. ※Appears when OUT2 operation mode is not [oFF] and PV display color is set as [R-oN] and [G-oN].	oUt 1
UNIt	Display unit	KPA MPA KGF bAR PSI MMHG INHG H2O	kPa MPa kgf/cm² bar psi mmHg inHg mmH₂O	Select the display unit. ※For using mmH₂O unit, multiply display value by 100.	KPA

Parameter 2 group

Parameter name		Setting range		Description	Factory default
Sub	SV display part	Std UNIt oFF	Standard Unit OFF	Select the display type at the SV display part in RUN mode. Standard [Std]: Display setting value (SV) always. Unit [UNIt]: Display pressure unit normally. When pressing ▽, △ key, display setting value (SV) for 5 sec. None [oFF]: It does not display any value normally. When pressing ▽, △ key, display setting value (SV) for 5 sec. ※If select unit [UNIt] or None [oFF], changing setting value (SV) is available when setting value is displayed.	Std
CoPy	Parameter copy	oFF oN oN-L	OFF ON ON with key lock	This function is for copying parameter settings of Master to Slave 1:1. ※For the details, refer to ▣ Parameter C opy.	oFF
InIt	Parameter reset	oFF oN	OFF Reset parameter setting	Reset the parameter settings.	oFF
PWd	Password	0000 to 9999		Set the 4-digit password. [0000]: Disable password [000 1]: Only checking parameters	0000
SoUt	Control output switching	NPN PNP	NPN PNP	Select type of control output.	NPN
HYS	Hysteresis for easy mode	1 to 111111111	Bar type (Min: 1ea , Max: 8ea)	Set the hysteresis for easy mode. Rated pressure range | Hysteresis per 1 Bar -100.0 to 100.0kPa | 0.1kPa -100.0 to 1,000kPa | 1kPa ※Appears when OUT1 or OUT2 operation mode is easy mode. ※Although the display unit is changed, standard unit of hysteresis for easy mode is not changed.	111

※1: Appears only in NPN or PNP open collector output + analog output or external input model.

■ Error and Troubleshooting

When occurring error, follow the below troubleshooting.

Display	Cause	Troubleshooting
ERR1	When adjusting zero point 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 by adjusting load resistance.
ERR3	When the range of Auto sensitivity setting mode St 1, St2 is set incorrectly.	Check the setting range and set St 1, St2.
ERR4	When connection between master and slave is wrong during copying parameters.	Check the cables between sensors and the connection of the same models.
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.	
-HH-	When the correction value of auto shift, remote zero exceeds the high-limit of the setting range.	Set the correction value of auto shift, remove zero within the setting range.
-LL-	When the correction value of auto shift, remote zero exceeds the low-limit of the setting range.	
-HL-	When [HH], [LL] occur both.	

■ High/Low Peak Hold

This function is to diagnose malfunction of the system caused by parasitic pressure through memorizing input the max./min. pressure occurred from the system.

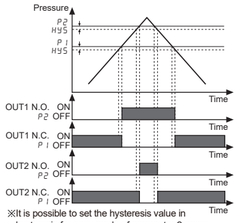
●Setting method
1. Press the M+△ key for over 1 sec in RUN mode and set the peak hold.
2. High peak is displayed on present value (PV) display, and low peak is displayed on setting value (SV) display.
3. Press the M+▽ key for over 1 sec, initialize high/low peak value.

■ Output Operation Mode

※**PSQ Series has 5 output operation mode. Use the proper operation mode in accordance with the desired application of detection.**

◎ Easy mode [EASY]

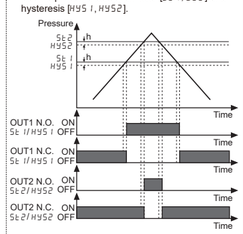
・Set the hysteresis of pressure detection automatically.
・Set the pressure detection level [P 1, P2].



※It is possible to set the hysteresis value in hysteresis for easy mode of parameter 2 group.

◎ Hysteresis mode [HYSM]

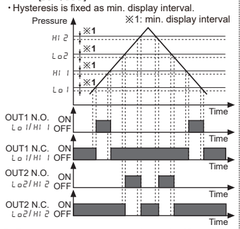
・Set the hysteresis of pressure detection.
・Set the pressure detection level [St 1, St2] and hysteresis [HYS 1, HYS2].



◎ Window comparison output mode [WIN]

・It detects pressure at the desired range.
・Set high-limit value of pressure detection level [Hi 1, Hi 2], and low-limit value of pressure detection level [Lo 1, Lo2].
・Hysteresis is fixed as min. display interval.

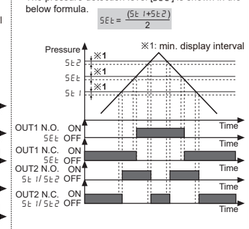
※1: min. display interval



◎ Auto sensitivity setting mode [AUto]

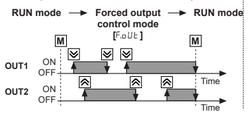
・It sets the proper detection sensitivity automatically.
・It sets by the two pressure points [St 1, St2].
・Hysteresis is fixed as min. display interval.
・The pressure detection level [SEt] is shown in the below formula.

$$SEt = \frac{(St\ 1 + St2)}{2}$$



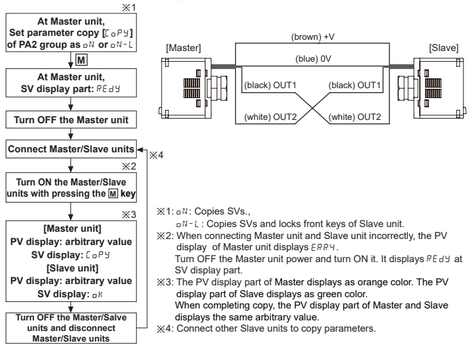
◎ Forced output control mode [FoUt]

・Regardless of setting value, it maintains comparison output OFF and displays present pressure.
・Set OUT1 operation mode [oUt 1] of parameter 1 group as [FoUt] and return to RUN mode. The PV display part displays the measured pressure and the SV display part displays [FoUt].
・During forced output control mode, press the ▽ or △ key to turn ON/OFF OUT1, 2 manually.



■ Parameter Copy

This function is for copying parameter settings of Master to Slave 1:1.
Master and Slave should be the same specification model.



※1: oN: Copies SVs.,
oN-L: Copies SVs and locks front keys of Slave unit.
※2: When connecting Master unit and Slave unit incorrectly, the PV display of Master unit displays ERR4.
Turn OFF the Master unit power and turn ON it. It displays REdy at SV display part.
※3: The PV display part of Master displays as orange color. The PV display part of Slave displays as green color.
When completing copy, the PV display part of Master and Slave displays the same arbitrary value.
※4: Connect other Slave units to copy parameters.

■ Cautions during Use

1. Follow instructions in 'Cautions during Use'.
   Otherwise, it may cause unexpected accidents.
2. 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
3. Use the product, 3 sec after supplying power.
4. When using switching mode power supply, frame ground (F.G.) terminal of power supply should be grounded.
5. Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
6. This unit may be used in the following environments.
   ①Indoors (in the environment condition rated in 'Specifications')
   ②Altitude max. 2,000m
   ③Pollution degree 3
   ④Installation category II

■ Major Products

■ Photoelectric Sensors
■ Fiber Optic Sensors
■ Door Sensors
■ Door Side Sensors
■ Area Sensors
■ Proximity Sensors
■ Pressure Sensors
■ Rotary Encoders
■ Connectors/Sockets
■ Switching Mode Power Supplies
■ Control Switches/Lamps/Buzzers
■ I/O Terminal Blocks & Cables
■ Stepper Motors/Drivers/Motion Controllers
■ Graphic/Logic Panels
■ Field Network Devices
■ Laser Marking System (Fiber, CO_2, Nd: YAG)
■ Laser Welding/Cutting System
■ Temperature Controllers
■ Temperature/Humidity Transducers
■ SSRs/Power Controllers
■ Counters
■ Timers
■ Panel Meters
■ Tachometer/Pulse (Rate) Meters
■ Display Units
■ Sensor Controllers

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