Discontinue

CKD

SM－277766－A

INSTRUCTION MANUAL

PALECT PRESSURE SWITCH

PPS2

- Please read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

Ver. 2

CKD Corporation

For Safety Use

To use this product safety, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (ISO 4414 *1, JIS B 8370 *2).

We do not bear any responsibility for accidents caused by any person without such knowledge or arising from improper operation.

Our customers use this product for a very wide range of applications, and we cannot keep track of all of them. Depending on operating conditions, the product may fail to operate to maximum performance, or cause an accident. Thus, before placing an order, examine whether the product meets your application, requirements, and how to use it.

This product incorporates many functions and mechanisms to ensure safety. However, improper operation could result in an accident. To prevent such accidents, **read this operation manual carefully for proper operation.**

Observe the cautions on handling described in this manual, as well as the following instructions:

⚠ **DANGER** : Failure to pay attention to DANGER notices may cause a situation that results in a fatality or serious injury and that requires urgent addressing.

⚠ **WARNING** : Failure to pay attention to WARNING notices may result in a fatality or serious injury.

⚠ **CAUTION** : Failure to pay attention to WARNING notices may result in injury or damage to equipment or facilities.

*1) ISO 4414 : Pneumatic fluid power ··· Recommendations for the application of equipment to transmission and control systems.

*2) JIS B 8370 : General rule for pneumatic systems

About design and selection

⚠ WARNING :

a) Use the product correctly under the specified conditions.

- Note that the product may be damaged or malfunction if it is used for a purpose for which it is not intended or subjected to a load current, voltage, temperature, shock, or environmental condition that is beyond the scope of the product specifications.

b) Never use the product with oxygen, corrosive or flammable gas, or toxic fluid.

c) Do not install this product inside a hermetically closed control box or room.

- Because an accidental leakage of the medium will change the pressure inside the closed space. Always use this product in a control box that has a safety device for preventing sudden pressure changes or in a room that allows ventilation with external air.

⚠ CAUTION :

a) Use of fluids other than those specified

- The product includes such mechanisms as O-ring type sealing and screw type joints that allow a very small amount of air to escape (1cm^3/min ANR).
- The acceptability of this product in an application that handles a corrosive but nonflammable gas should be judged in view of your knowledge about the gas. If you wish to use the product for such an application, do so at your own risk only after validating the safety and providing necessary safety measures.
- If the product is used for a purpose such as detecting the successful suction of a wet workpiece, the compressed air fed to the product may include water and/or oil. For such an application, choose a PPD□-S type switch that has a higher resistance to corrosion (with a stainless diaphragm sensor).

b) Be careful if you are going to use the product for detecting the successful suction of a workpiece using vacuum.

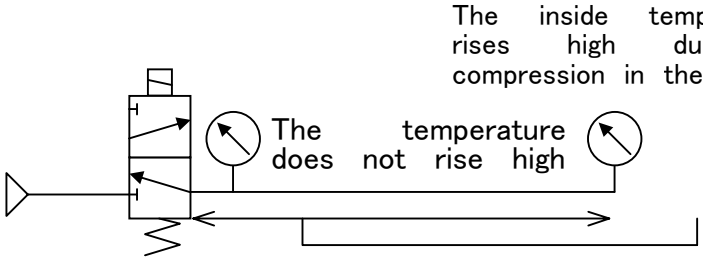
- If the product is going to be applied a positive pressure for vacuum breaking, make sure that the pressure will not exceed the specified withstanding pressure.

c) Operating environment

- Do not installer use the product in a place where it is exposed to vibrations of 98 m/s^2 or to impact.
- Also, pay attention to the measured fluid temperature and the atmospheric temperature around the piping. If a pressure gauge is connected to the end of long piping, in which pressurization and depressurization take place repeatedly, the inside temperature of the piping increases, and the pressure gauge temperature also rises considerably and sometimes exceeds the rated temperature range due to compression at pressurization. The temperature of piping laid in a hot environment, in

⚠ CAUTION :

particular, is quite prone to exceed the operating temperature range. In this case, the product may be damaged even if it is installed in an environment within the operating temperature range, or the joint may become disconnected because of the tube softened by the heat. Take proper measures to prevent temperature rise such as installing a pressure gauge in the middle of the piping not at an end, adding dummy piping before the pressure gauge, and avoiding a hot environment.



Do not install or use the product in a place where a corrosive or combustible gas is generated, where the product is exposed to a chemical, solvent, oil or water, in a place contaminated with dust or cutting chips, in a pressurized or depressurized environment, or in a place where the temperature significantly varies or highly humid air is produced.

- Connect some tube to the screw M3×0.5 at the inlet for leading atmosphere to keep water proof preference for the sensor substance at the case of sensor-separate type.

d) Determine the value to be set considering an error attributable to accuracy or temperature characteristics . Even if the pressure is constant, an error occurs due to the change of the detected value within the tolerance or due to the temperature.

e) If you are going to use the product with charging equipment for detecting the completion of a vacuuming operation prior to a charging operation, make sure that the charged liquid will not reach to the product. Protect the product from the liquid using a filter or the like. If you chose the vacuum sensing switch PPS2-V01□, consider the barometric pressure when determining the value set to the switch. Note that the degree of vacuum achievable by a vacuum pomp is limited by the current barometric pressure. With a strong barometric depression or at a high altitude, you may not be able to achieve a high vacuum (-100kPa, for example). When determining the value set to the switch, consider the degree of vacuum that will be achievable and take account of the errors and allowances intrinsic to the sensor and those caused by the temperature variation. For sensing of a high vacuum pressure with a stable accuracy, choose a PPS2 series switch with an absolute pressure sensor.

f) Be sure that load impedance for analogue output is over 1kΩ.

About mounting, installation and adjustment

⚠ WARNING :

a) Take extreme care never to make a wrong connection.

- A mistake in connecting wires may cause fatal damage such as the burning of the components not only to this product but also to the peripheral devices.

b) Never use a DC power supply unit that not provide any isolation between the primary side (AC power) and the secondary side (output).

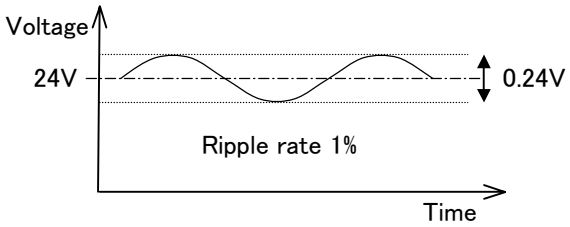
⚠ CAUTION :

a) Take care to protect the unit and lead wires from damage.

- Carefully avoid bouncing, dropping, charging an excessive load to the lead cord or giving frequent bending stress to the cord. They could result in an unsatisfactory level of accuracy, disconnection or failure.
- Use such flexible wires as robot wires for movable portions.

b) Wiring operation

- Cut the electrical power before starting any wiring operation.
  Before conducting a wiring operation, and from time to time during the wiring operation, discharge the static electricity from your body and the tool.
- Use a stabilized power supply unit that can provide a noiseless power with a ripple voltage of 1% or less.



- Carefully tighten terminal screws applying a range of tightening torque, 0.5 to 0.7N・m.
- Install it and its wiring in remote area from noise source such as high tension line as far as possible. Provide some independent measure against power line which surge overrides to.
- Do not operate any control unit, device or machine just after the wiring of this product has been completed because the product may issue an unexpected signal according to an unintended unit or set value. Turn ON the product with all of the other devices OFF to confirm whether it is energized, and set the desired switch data and unit.

c) Reverse current and overcorrect protection circuits

- There are various protective measures such as reverse connection protection or over current protective circuit. These are effective against only some limned range of erroneous connections or short circuit but not necessarily all problems. It is unable to protect from reverse connection of output, over current, connection

with AC. Be always alert that erroneous connection may cause severe damage to not only this product but also peripheral equipment.

⚠ CAUTION :

- Over current protective function of this model shuts OFF the output as soon as detecting over current. Would like to reset power source after having done circuit check in order to let you return.

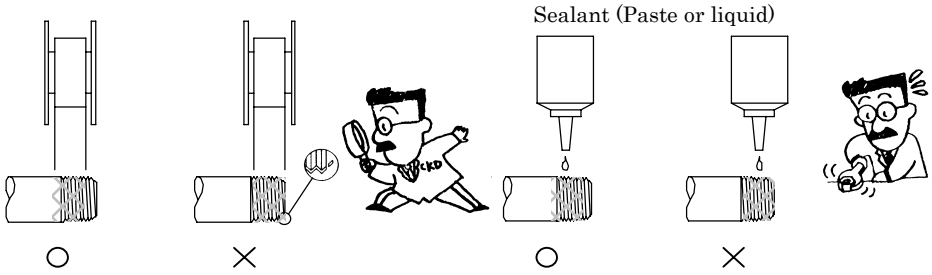
d) Pressure setting

- Before setting data A and data B, turn OFF the machine or device for safety.

e) Piping operation

- If you chose a product that has a screw type joint, apply a seal tape or sealant to the connecting portion and screw a tube into the joint taking care not to apply an excessive torque. For tightening, apply a wrench to the metal portion.
- When applying a seal tape, start from a position 2-mm or more away from the end of the thread portion on the tube, to a direction opposite to the tip of the tube, and wind the tape around the tube in a direction reverse to the direction of the thread.

※ If a part of the seal tape is positioned closer to the tip of the tube than the thread portion, the tape may be threaded into pieces as the tube is screwed into the joint; they may go into the tube and cause trouble.



- The tube length should be about one meter. Eliminate any possibility of a tensile force or a shock transmitted though the tube. A longer tube may produce an unexpectedly large force by its own weight, by its swinging, or by transmitting a shock. To distribute the tube and joint weights, fix a part of the tube to the machinery or use an intermediate joint and fix it to the machinery.
- Do not insert a needle or the like into the pressure lead-in port in the bottom of the product or leave it clogged up with dust. The blocked port not only makes accurate measurement impossible but also damages the pressure sensor. Install a 5-micron filter on the primary side of the fluid circuit.

f) Do not connect the output from the product parallel to the output from a relay contact, an operation switch, or another device. Do not short the input terminal provided for the product to the negative (-) side power line for the purpose of testing the input device, because the output circuit of the product may be damaged.

About use and maintenance

⚠ CAUTION :

a) As a general rule, the product should not be disassembled.

- Disassembling may damage the product or decrease its performance. The manufacturer does not guarantee the performance of a product that has been disassembled. When replacing or relocating the product, be sure to remove the product together with its mount (pressurizing port).

b) Before touching the installed product, stop the equipment and ensure safety.

- During adjusting, it sometimes cause remarkable delay the response of switch output or forced to turn OFF (while setting data).
- The last mode as power was turned OFF comes back when power is turned ON again.
- Be sure that sensor separated type substance and sensor are same lot No. on use because their adjustment depends on each other. (When each lot No. are different, it occurs different press. Indication from actual press.)

c) The value displayed is updated four times a second, whereas switch output takes place about 200 times a second. The pressure changes so fast that the display cannot follow it. The switch sometimes starts to operate although the displayed pressure value does not reach the set value. This is because the pressure varies at a very high rate and the pressure value display cannot track it.

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PPS2
Palect pressure switch
Manual No. SM-277766-A

Dec. 18. 2002
Nov. 21. 2008

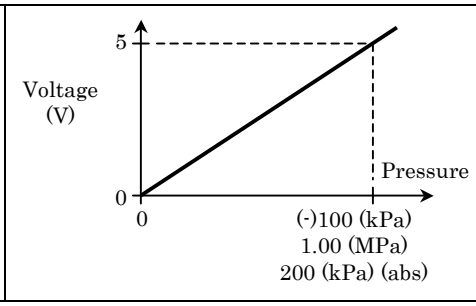
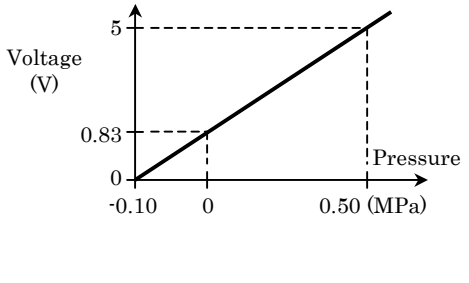
1. PRODUCT

1.1 Specification

Model code ※1 / Item		PPS2-P01A (kPa)	PPS2-P10P (MPa)	PPS2-V01A (kPa)	PPS2-V01A-A (kPa)	PPS2-VPP (MPa)
Pressure range		0 to 100.0 kPa	0 to 1.000 MPa	0 to -101.3 kPa	0 to 200 kPa (abs)	-0.101 to 0.5 MPa
Strain transducer		Diffusing semi-conductor strain gage				
Working media		Air or non-corrosive gas				
Withstanding pressure		150kPa	1.5MPa	150kPa	300kPa (abs)	0.75MPa
Display		3 1/2 digits, LED display, red, 8mm high				
Display sampling rate		Approx. 4times/sec				
Power source		DC11 to 26V, 100mA (Ripple less than 1%)				
Set value self holding		Holds it for 10 years with no power (E²PROM adopted)				
Displaying accuracy		±1%F.S.±1dig (25℃)				
Temperature characteristics		Zero shift : ±0.1%F.S./℃ Span shift : ±0.1%F.S./℃				
Switch rating		No. of output points : 4 points Type of output : Non-polar transistor Proof voltage : MAX. 30V Current : MAX. 100mA Internal voltage drop : Less than 3V				
Switch response		Over 200Hz (less than 5msec)				
Analog output		Output : DC0 to 5V (0 to F.S.) ※2 Accuracy : ±2% F.S. (25℃) Temperature characteristics : ±0.1%F.S. /℃ Impedance of load : Over 1kΩ				
Special function		• Zero point adjustment • Short circuit protection of switch output and error display • Capable of shifting switch output between NO and NC (Normally open and normally closed)				
Environment condition	Working temperature range	0 to 50 ℃				
	Range of storage temperature	-20 to 60 ℃				
	Working humidity range	0 to 85%R.H.				
	Water proof	Non (Option : IP66 for only front operating face) Only the sensor of the sensor-separate type is IP 65				
	Mechanical vibration proof	10 to 55Hz Amplitude 1.5mm X, Y and Z each direction 2 hours				
	Mechanical shock proof	100m/s² (Approx. 10G) X, Y and Z each direction				
Port size		Rc1/8 (PT1/8 female)				
Mass		Approx. 180g				

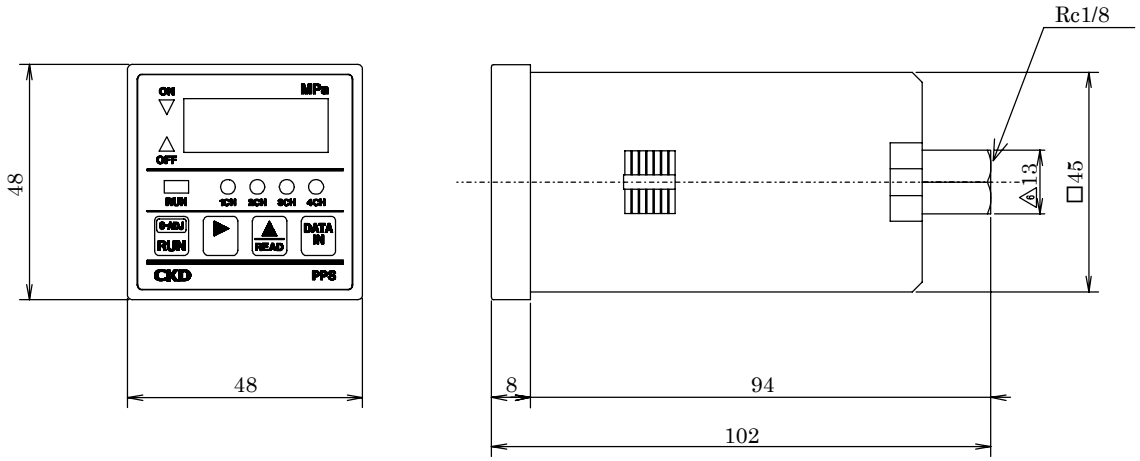
※1 This mark of the model is not full for the products. Check and select the mark which is mentioned in "HOW TO ORDER" at the case of selecting the detail of the product.

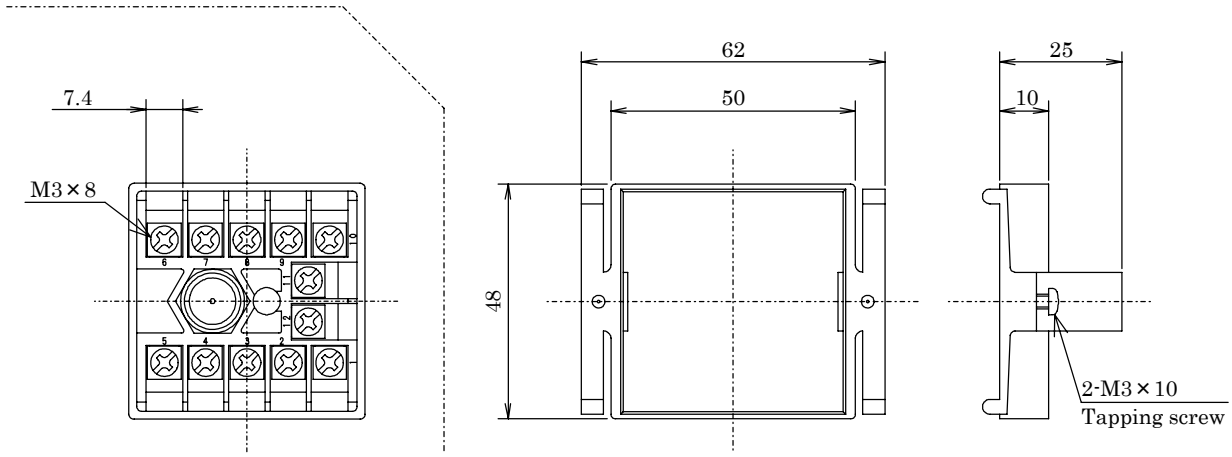
※2 Analog output voltage characteristics.

P01A P10P V01A V01A-A		VPP	

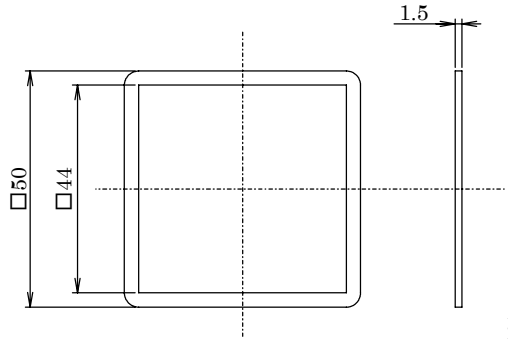
1.2 External Dimension

1.2.1 Sensor-included type





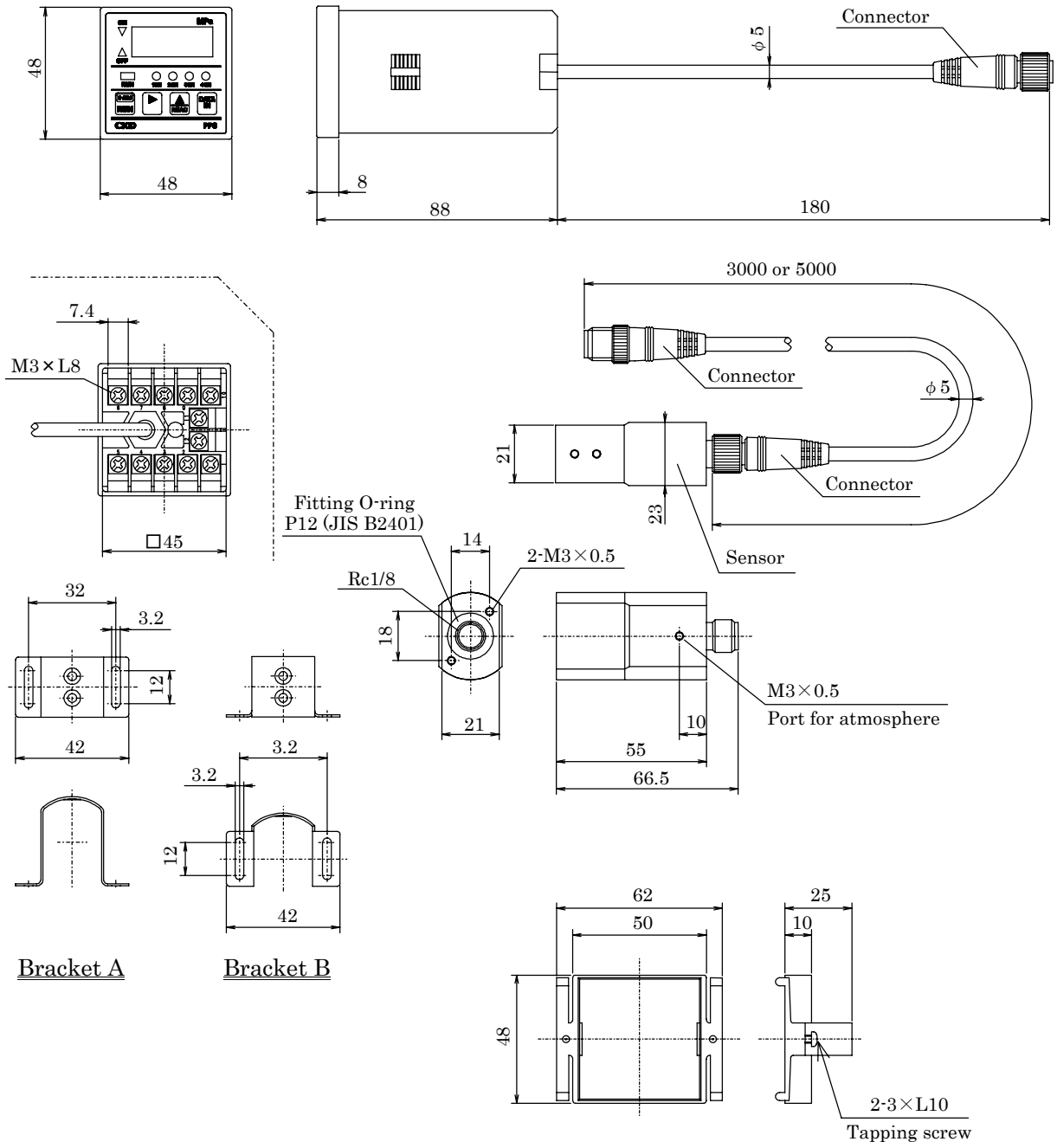
<Adapter>



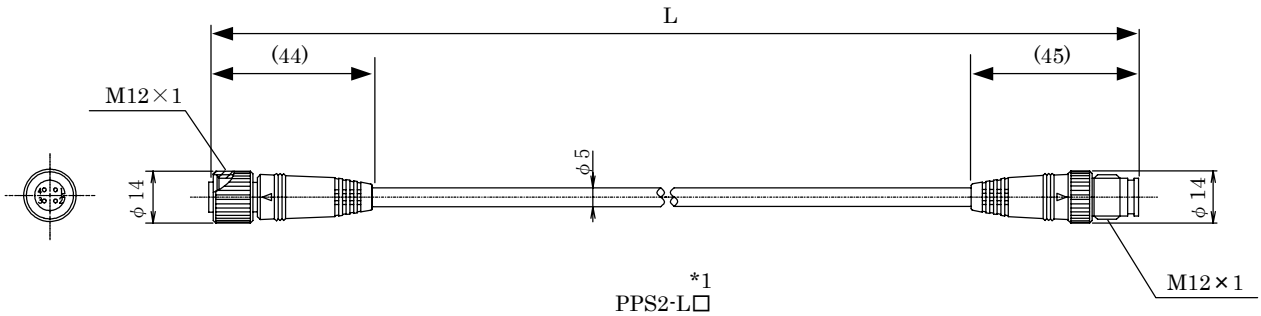
<Water resistant rubber packing>

※ Shipment together on mounting for option 「-w」 means water proof.

1.2.2 Sensor-separate type



1.2.3 Connector cable (PPS2-L3, PPS2-L5)



Pin No.	Means
1	+9V
2	Shield
3	GND
4	Sensor output

*1
PPS2-L□

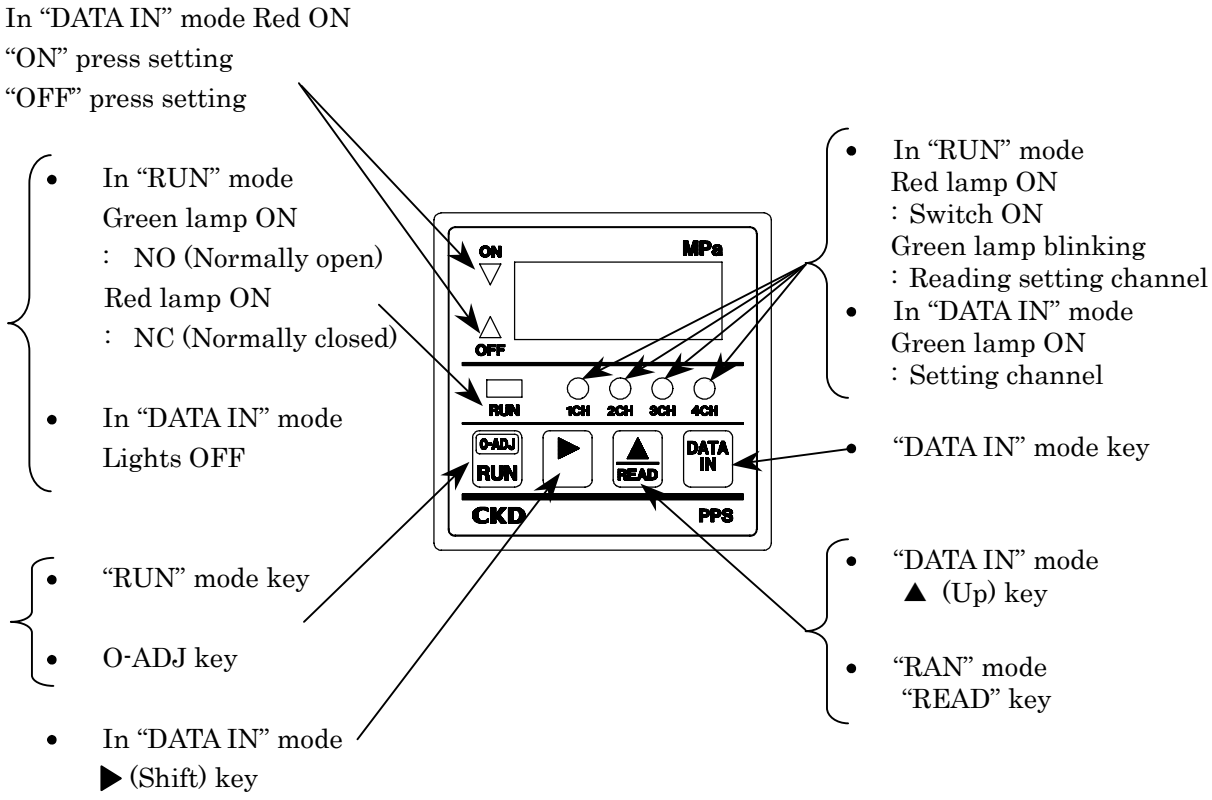
*1 Connector cable	Length
3	3000 $^{+100}_{0}$
5	5000 $^{+100}_{0}$

⚠ CAUTION :

- This connector cable is for only PPS2 on use. Be sure to use for the connection with PPS2 and sensor. Don't connect it to the other equipment which has the other similar form connector (At that case, the damage for PPS2 and the other equipment is possible).
- Possible to extend the cable length by connecting additional ones Max. length is 20m on use.

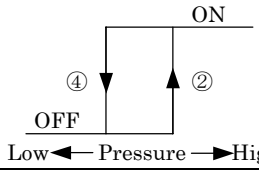
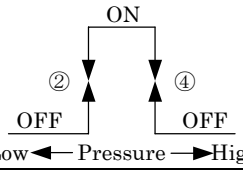
2. OPERATION

2.1 Explanation of front panel



2.2 Switching pressure setting

Possible to set 2 kind modes according to the setting orders.

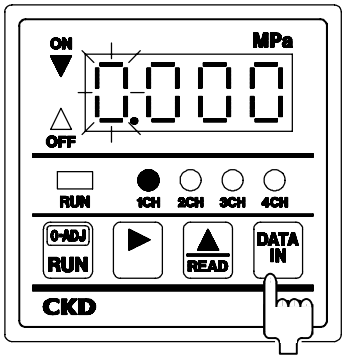
	ON pressure > OFF pressure	ON pressure < OFF pressure
Setting chart		
①	Press “DATA IN” key button In “DATA IN” mode “RUN” lamp OFF “1CH” green lamp ON “ON” lamp	Same left
②	Setting “ON” pressure using ▷ key and △ key	Move the place by ▷ key and Set the min. press. at turning the switch on by △ key.
③	Press “DATA IN” key button “1CH” Green lamp ON “OFF” lamp ON	Same left
④	Setting “OFF” pressure (Same ② operation)	Set the Max. press. at turning the switch on by same operation as ②.
⑤	At the case of switch channel 2 to 4 on use, push DATA IN key and repeat operation ② to ④ at the same time to check to turn on 2CH lamp to 4CH lamp.	Same left
⑥	Press “RUN” key button “RUN” lamp ON (※) In “RUN” mode	Same left

(Note) “High” and “Low” is reverse against standard type for PPS2-V01□ type.

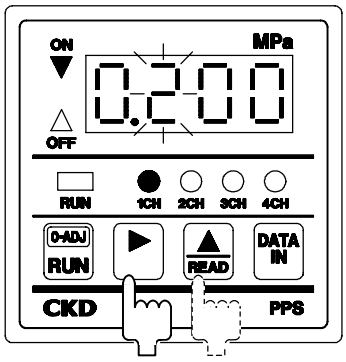
(Note) “Low” means “vacaum side” and “High” means “pressurized side” for V01□-A type.

(※) { Green lamp ON : NO (Normally open)
Red lamp ON : NC (Normally closed)

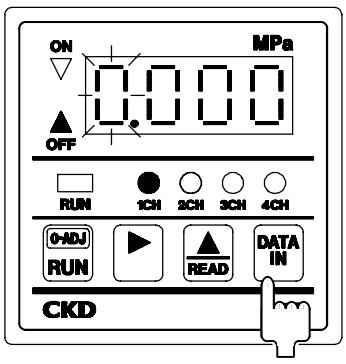
①



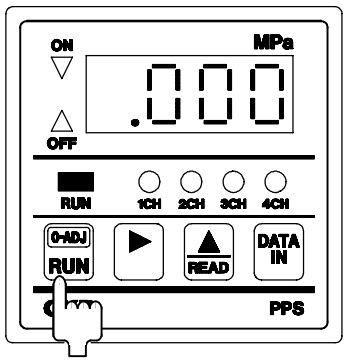
②



③

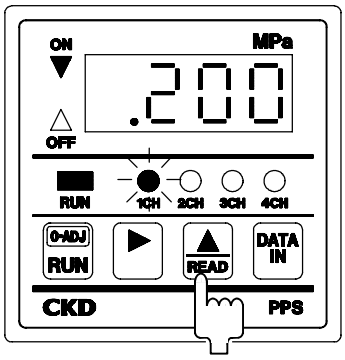


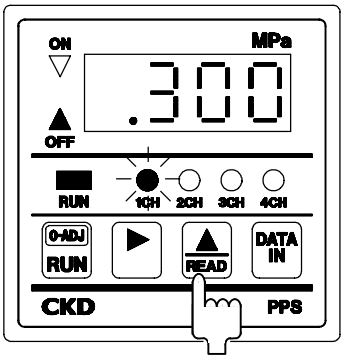
④



2.3 Reading out the set value

Under running on RUN mode, push READ key to check each setting press.. 1CH green lamp turns on and off, ON lamp turns on and setting value of ON side for channel「1」is indicated.
At the case of pushing READ key again, OFF lamp turns on and setting value of OFF side for channel「1」is indicated.
Likewise, the setting value of ON or OFF side for each channel is indicated and possible to check at each time of pushing READ key.
After keeping free from pushing the key more than 5 sec., actual pressure value is indicated instead of setting value.





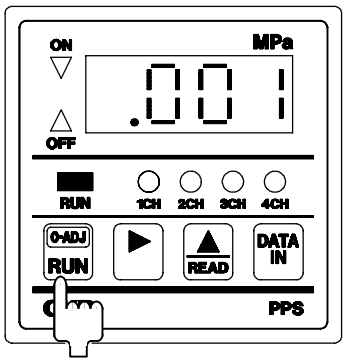
2.4 Operation stop

When power is turned OFF, it stops. Beware that it memorizes the mode as just before power was turned OFF. Therefore, it starts in the mode memorized, namely "RUN" mode if it was stopped in that mode and "DATA IN" mode if it was stopped in that mode. It does not, however, memorize the selective pressure input.

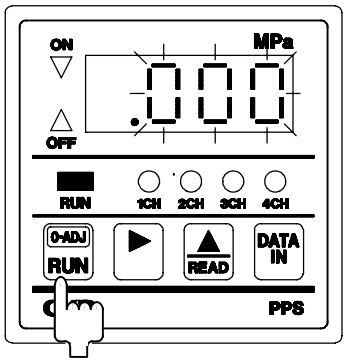
⚠ CAUTION : Be aware that the mode condition at the time of re-enenergizing after di-energizing keeps the same as the mode condition before di-energizing.

2.5 Zero point adjustment

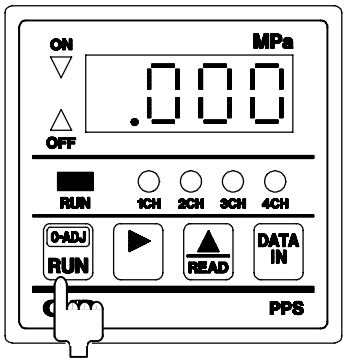
If the pressure display is other than 0 while no pressure is being charged press “0-ADJ” key to adjust 0 point.
Zero point setting is achieved as “000” displayed, when “0-ADJ” key is kept pressed in “RUN” mode for over 2 seconds.



Keep pushing



Keep pushing even if
「000」 turns on and off



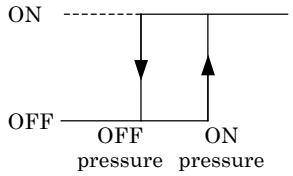
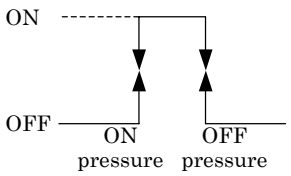
「000」 turns ON. Zero point adjustment is finished

CAUTION : Impossible to operate Zero point adjustment for absolute press. type.

2.6 Setting NO (normally open) or NC (normally closed) of Switch output

When “DATA IN” key is kept pressed in “DATA IN” mode, it displays “NO”, and it displays “NC” when either △(Up) key or ▽(Down) key is pressed. It comes back to “RUN” mode when “RUN” key is pressed.

NO : RUN lamp ON, green. CHLED is lit when power is ON.
NC : RUN lamp ON, red. CHLED is lit when power is ON.

<table>
<tr><td rowspan="4">“NO” mode
(Normally open)</td><td colspan="2">Switch output</td></tr>
<tr><td>ON pressure > OFF pressure</td><td>ON pressure < OFF pressure</td></tr>
<tr><td> 
</td><td> 
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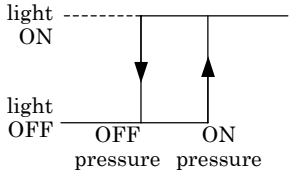
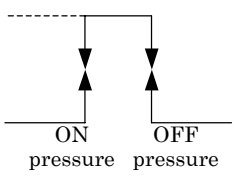
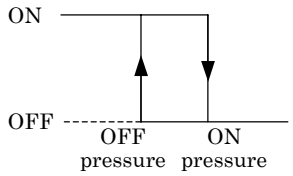
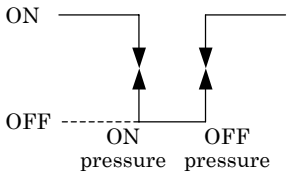
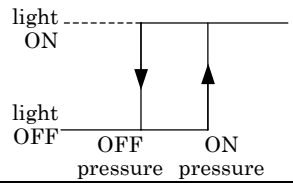
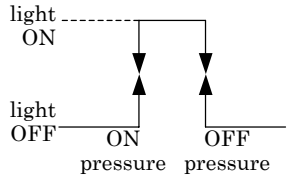
<tr><td colspan="2">Channel lamp</td></tr>
<tr><td colspan="2"> 


</td></tr>
<tr><td rowspan="4">“NC” mode
(Normally closed)</td><td colspan="2">Switch output</td></tr>
<tr><td>ON pressure > OFF pressure</td><td>ON pressure < OFF pressure</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td colspan="2">Channel lamp</td></tr>
<tr><td colspan="2"> 

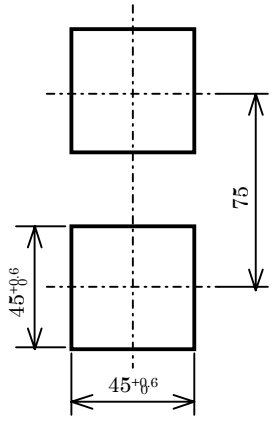

</td></tr>
</table>

2.7 Self holding the set value

Set value is memorized by E2PROM and set data do not fade away even when power is turned OFF.

3. INSTALLATION

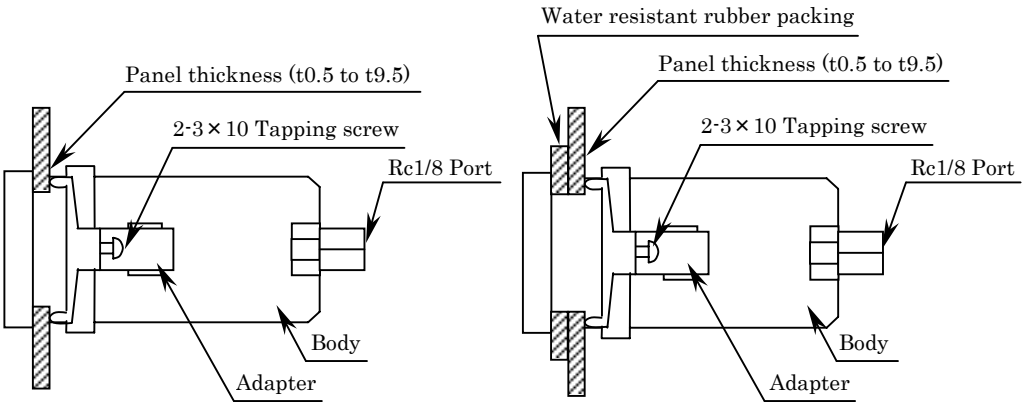
3.1 Panel cutting dimension



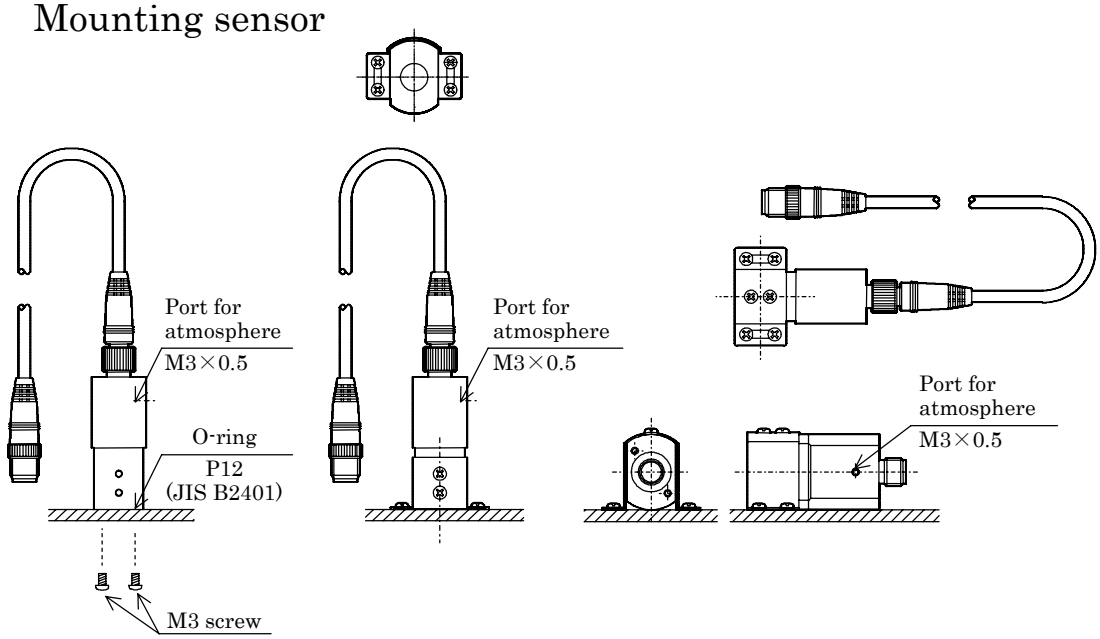
3.2 Mounting it

3.2.1 Mounting body

At first, insert its body through square cut on panel. Secondly insert mounting panel from rear of body and push it into the gap between body and panel and fix it with mounting screws. And be sure to use the water resistant rubber packing for panel mounting on mounting for option [-W] (front operating face keep water-proof).



3.2.2 Mounting sensor



(Direct mount) (Bracket B) (Bracket A)

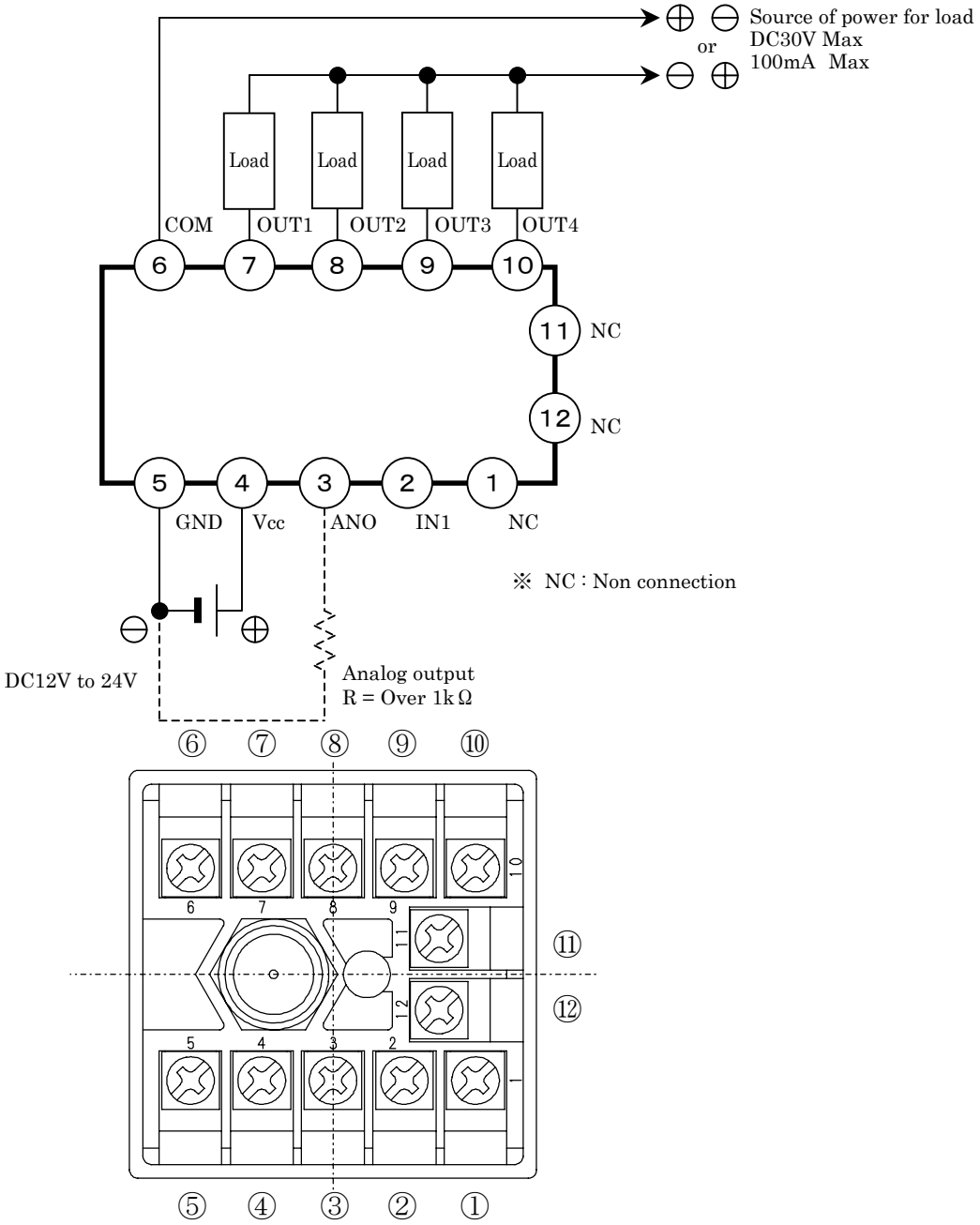
CAUTION :

- Install it seperately away from high tension wire with noise.
- Be sure that sensor separated type substance and sensor are same lot No. on use because their adjustment depends on each other. (When each lot No. are different, it occurs different press. indication from actual press.)

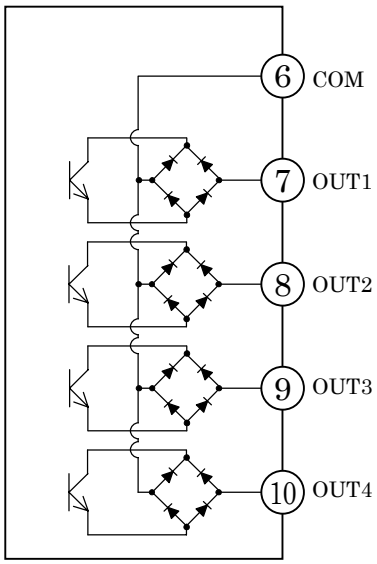
3.3 Wiring

⚠ CAUTION :

- Practice the wiring to this equipment properly acording to the following wiring diagram (indicated on the very thing also) to avoid the wrong wiring and prevent the damage on energizing the different voltage. And don't energize while at work of wiring.
- Be sure that load impedance for analogue output is over 1kΩ.
- Carefully tighten terminal screws applying a range of tightening torque, 0.5 to 0.7N・m

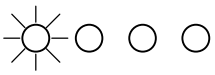


3.4 Circuit of switch



4. MAINTENANCE

4.1 Error display

Display	Content of Error	Remedies
OFF	Charged pressure is higher than 1.2 times of rated pressure.	Correct the charging pressure lower than rated pressure.
Err	Trying Zero-adjusting while pressure is being charged.	Remove charged pressure once, then do zero-adjusting again.
 (Proper channel lamp blinks)	Detecting overcurrent of switch output at the channel red light is blinking. (Switch output is shut OFF as for overcurrent protection.)	Inspect wiring with connected load and state of load current. Turn power OFF once. Then re-set overcurrent protection. (Unless power is turned OFF once, red blinking light and switch output OFF are not re-set even after removing overcurrent.)

4.2 Trouble and Corrective Measures

Ir-regular phenomenon	Cause	Disposal to corrent	Replacement Model No.
Press. value is not indicated	• Supply power is not wired correctly	• Check outside wiring • Wire the rated supply power correctly	
	• Ir-regular operation from noise	• Separate the very thing and cable far away from noise source	
	• Damage of PPS2	• Change the PPS2	PPS2-VPPS-FL278439
Press. indication shows abnormal value	• Energize more than rated pressure	• Supply the pressure within rated pressure	
	• Leak air on piping	• Check the piping condition	
	• Ir-regular supply voltage (Low voltage, short source capacity)	• Supply the rated source • Keep source capacity	
	• Zero-adjustment on the pressurized condition	• Adjust the zero point under atmosphere condition	
	• Damage of PPS2 sensor	• Change the PPS2 and check the air quality	PPS2-VPPS-FL218682
Switch output doesn't turn on or come out	• Broken wiring	• Check the wiring	
	• Wrong setting for switch setting value (ON data = OFF data)	• Check the setting values and correction	
	• Non connection to COM terminal	• Connect COM terminal ⊕ to common ⊖ or common	
	• Wrong selection for input circuit (outer load) (non-operation for the load according to inner voltage drop of the switch output part)	• Check the spec. for input circuit (outer load) and change	
	• Damage of PPS2 output circuit	• Change the PPS2	PPS2-VPPS-FL278439
Switch output doesn't turn OFF	• Wrong setting for the switch setting value	• Check the setting values and correction	
	• Wrong selection for input circuit (outer load) (non-operation for the load according to inner voltage drop of the switch output part)	• Check the spec. for input circuit (outer load) and change	
	• Damage of the PPS2 output circuit	• Change the PPS2	PPS2-VPPS-FL278439

5. HOW TO ORDER

5.1 Sensor-included type

PPS2 – a – b

(a) Model No. and Pressure range	
P01A	0 to 100.0kPa
P10P	0 to 1.000MPa
V01A	0 to -101.3kPa
V01A-A	0 to 200.0kPa (abs)
VPP	-0.101 to 0.5MPa

(b) Option	
No code	Non-Waterproof
W	Waterproof (IP66) ※1

※1 Only front operating face of the substance.

5.2 Sensor-separate type

PPS2 – a – b – c – d

(a) Model No. (※2) and Pressure range	
P01AS	0 to 100.0kPa
P10PS	0 to 1.000MPa
V01AS	0 to -101.3kPa
V01AS-A	0 to 200kPa (abs)
VPPS	-0.101 to 0.5MPa

(b) Length of connector cable	
3	3m
5	5m

(c) Bracket	
A	Bracket A (for horizontal mounting)
B	Bracket B (for vertical mounting)

※2「S」means the sensor separate from the substance.

(d) Option	
No code	Non-Waterproof
W	Waterproof (IP66) ※3

※3 Only front operating face of the substance.
IP67 is applied to sensor part.

5.3 Connector cable

PPS2 – L – ○

Length of connector cable	
3	3m
5	5m