CKD

SM-275351-A

INSTRUCTION MANUAL

COMPACT ELECTRONIC PRESSURE SENSOR

PPE-□A

- 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 (to the level pursuant to JIS B 8370 Pneumatic System Rules).

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:

⚠ Precautions :

- This product is designed for air and compressed dry air. Do not use it with corrosive and combustible gases.
- Do not touch electric wiring connections (exposed live parts): this will cause an electric shock. During wiring, keep the power off. Also, do not touch these live parts with wet hands.

PPE-□A

Compact electronic pressure sensor

Manual No. SM-275351-A

1. PRODUCT

1.1 Specifications

Model code / Item	Vacuum	Positive pressure	
	PPE-V01A- □*1	PPE-P01A- □*1	PPE-P10A- □*1
Rated pressure	0 kPa to −100 kPa	0 kPa to 100 kPa	0 MPa to 1 MPa
Plate line color *2	Red	Green	Blue
Pressure sensitive element	Diffusion semiconductor pressure sensor		
Applicable fluid	Air, non-corrosive gas		
Proof pressure	0.3 MPa	0.3 MPa	1.5 MPa
Accuracy	±1% F.S. or less		
Linearity	±0.3% F.S. or less		
Analog output	1 V to 5 V (output impedance 1KΩ)		
Power supply voltage	12 VDC to 24 VDC±10% (ripple rate 1% or less)		
Current consumption	10mA or less		
Display lamp	Green LED lighting when power supply is energized		
Lead wire length	Standard 3 m (oil resistant vinyl cabtyre cable, 3-conductor, 0.15 mm^2 insulator outer diameter ø1.0)		
Protection circuit	Power reverse connection protection, load short-circuit protection		
Ambient temperature	0°C to 50°C (no freezing)		
Temperature characteristics	±0.12% F.S./°C or less		
Insulation resistance	20 MΩ and over at 500 VDC		
Withstand voltage	1000 VAC for 1 minute		
Vibration resistance	10 Hz to 55 Hz compound amplitude 1.5 mm 4 hours per X, Y, Z direction		
Degree of protection	IEC standards IP65 or equivalent		
Piping method	R1/8, ø6 plug, ø6 push-in fitting		
Weight (with cable)	37g (R1/8 type, plug type) 42g (Push-in joint type)		
Weight (without cable)	9g (R1/8 type, plug type) 14g (push-in joint type)		

＊1. □ section is matched to piping section.
(Refer to How to order.)

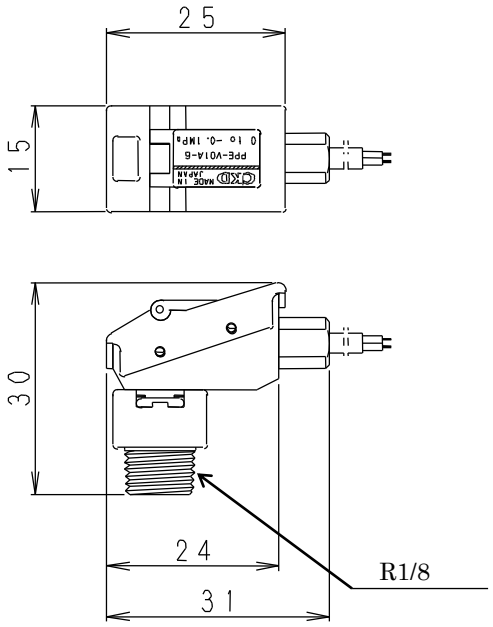
＊2. Name plate line is changed by pressure range.
(To prevent improper use when intermixed.)

1.2 External Dimension

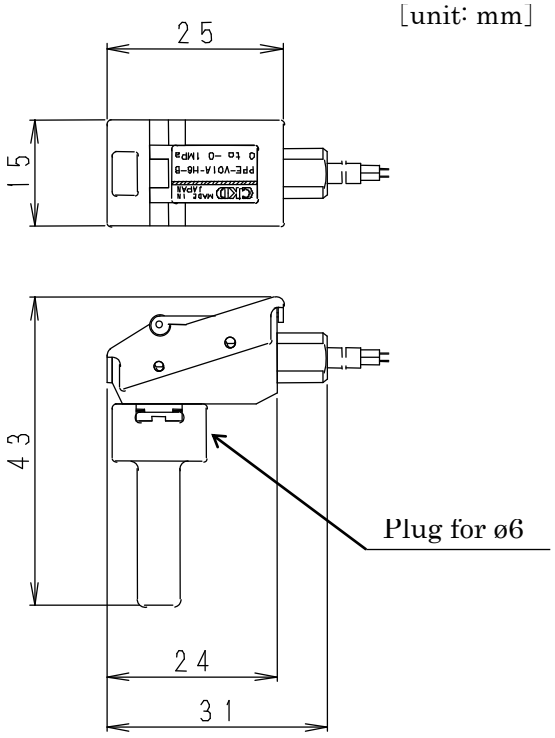
1.2.1 External Dimension

[unit: mm]

● PPE-□A-6



● PPE-□A-H6-B



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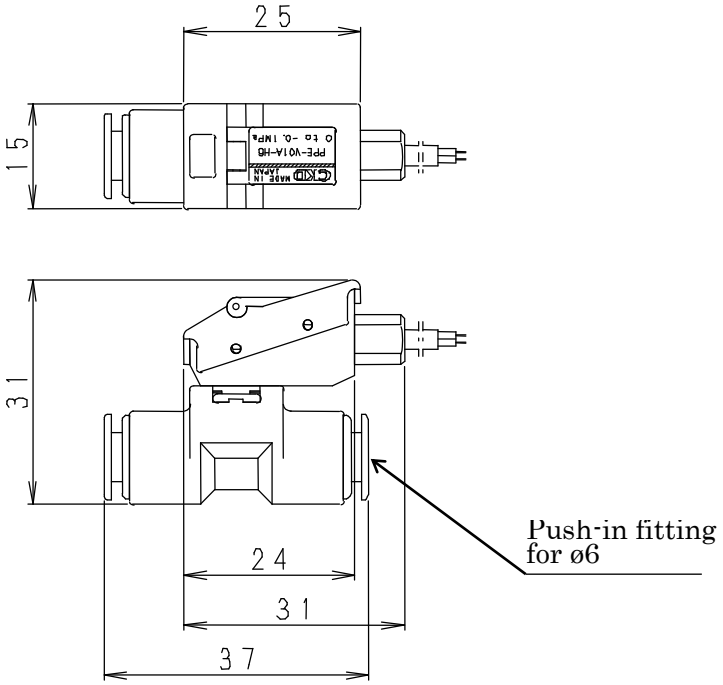
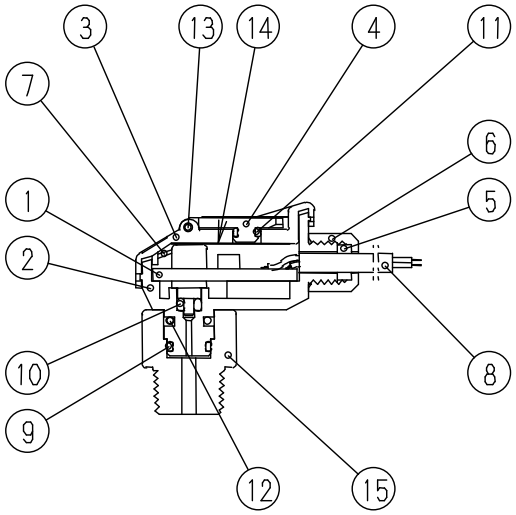


1
PRODUCT

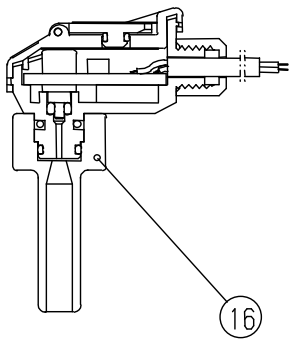
1.3 Internal Structure Drawing

● PPE-□A-6

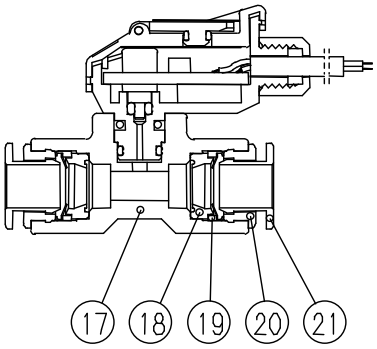


Number	Parts	Material
1	Pressure sensor	Diffusion semiconductor strain gauge
2	Body	PBT
3	Cover	PC
4	Trimmer guard	PC
5	Bush	NBR
6	Bush holder	A2011
7	Cover gasket	VMQ
8	Lead wire (3 m)	PVC
9	O-ring	NBR
10	O-ring	NBR
11	O-ring	NBR
12	Stopper	SUS304WPB
13	Spring pin	SUS420
14	Shield sheet	Aluminum
15	R1/8	PBT
16	Plug	PBT
17	Push-in fitting	PBT
18	Packing	NBR
19	Chuck	C3604B (electroless nickeling)
20	Outer ring	C3604B (electroless nickeling)
21	Push ring	POM

● PPE-□A-H6-B



● PPE-□A-H6



2. CAUTION

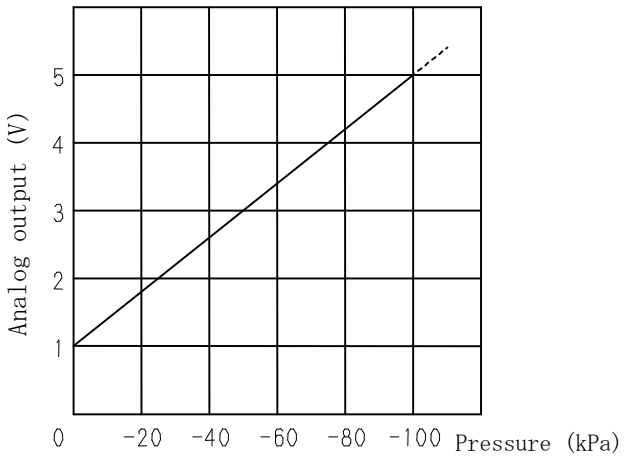
2.1 Caution of Handling the Product

1) In installation, please be sure to hold the product's main body to prevent any impact to body and stress to the flying lead.
2) Please do not apply other media than "indicated" applicable media. In case other media is used, we are not in a position to guarantee the performance of the product and assure the safety. Please never apply corrosive gases, inflammable gases, oxygen etc.
3) When vacuum suction is checked and the positive pressure for vacuum break is applied to this product, ensure the pressure does not exceed the specified value.
4) Do not disassemble this product. If the product is disassembled, a part may be ejected when pressure is applied.
5) Connection area between the body and the joint can be rotated. Do not rotate it repeatedly.
6) The protection is equivalent to IP65. Do not use the product in an environment where water splashes. Take necessary measures to prevent leakage of machining oil or coolant fluid.

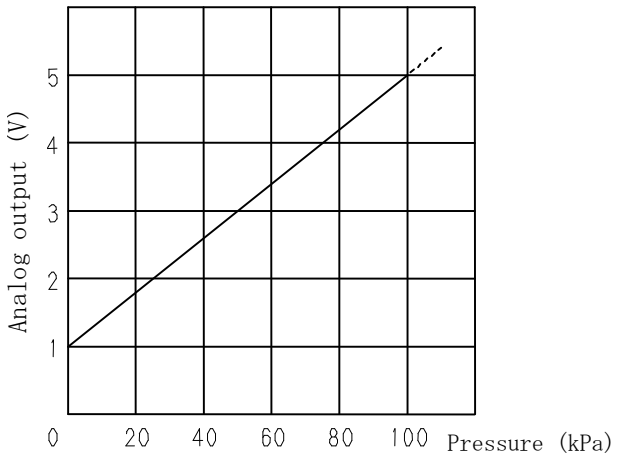
3. OPERATION

3.1 Analog output voltage – pressure characteristics

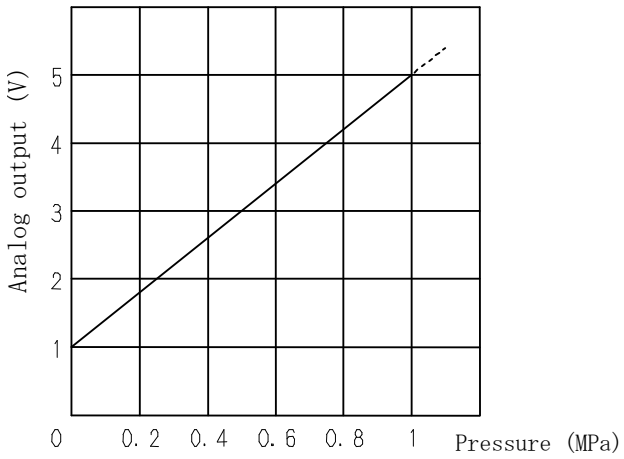
PPE-V01A-□



PPE-P01A-□



PPE-P10A-□



(Precautions)

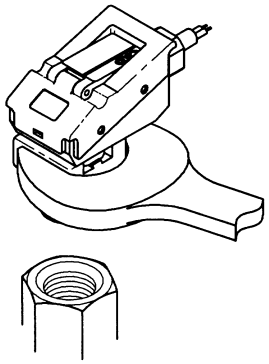
The accuracy of analog output will be affected not only by temperature but also by self exothermic. To prevent the affection, please keep “stand-by” time (5 minutes or longer after energizing) before operation.

4. INSTALLATION

4.1 Piping

1) PPE-□A-6

Place seal tape or a sealing material and use a wrench at the width across flats (13mm) of the R1/8 joint for installation.

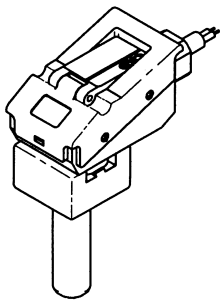


(Precautions)

- The tightening torque must be 1.0 N·m to 1.5 N·m or less. Since it is made of resin, excessive tightening may break the pipe.

2) PPE-□A-H6-B

This type should be installed onto CKD ø6 Push-in fitting.

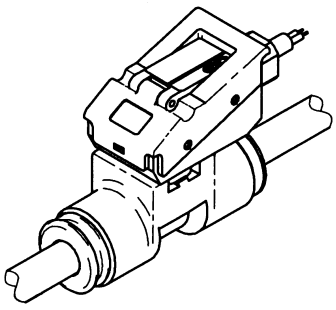


(Precautions)

- Plug part should be inserted firmly and before use, plug should be checked that it is not inserted to the end, plug can be come out and leakage may happen.
- Following push-in joints are recommended, GZ series, GW series and GM series.

3) PPE-□A-H6

Insert 6mm tubes into 2 quick joints for use.



(Precautions)

- Following tubes are recommended nylon tubes, Urethane tube, non-inflammable tube.

Allowable tolerance for tube (outer diameter)

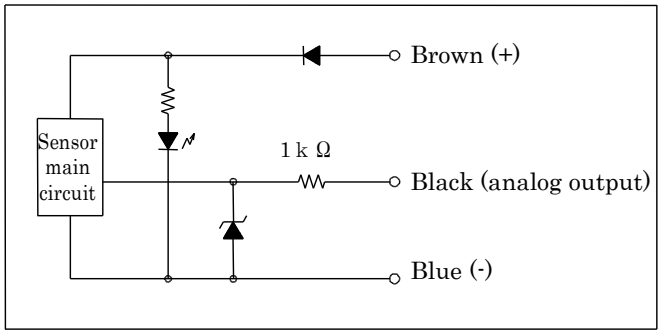
Soft nylon tube	±0.1mm
Urethane tube	+0.1mm −0.2mm or less

- Tubes should be inserted firmly and before use tube should be checked that it is not come out. In case the tube is not inserted to the end, tube can be come out and leakage may happen.
- Cut the tube vertically.

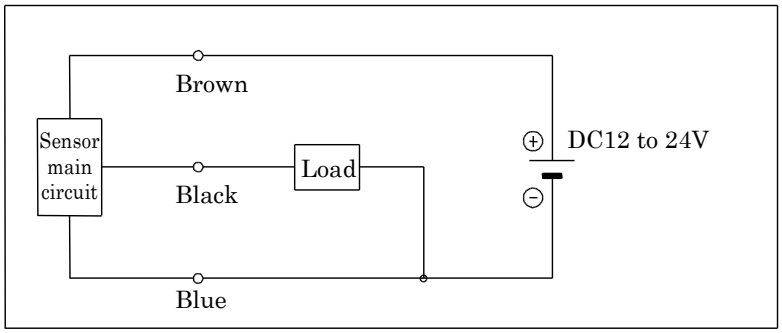
4.2 Wiring

4.2.1 Internal Circuit Diagram and Connection

1) Internal circuit diagram



2) Connecting the lead wire



3) Precautions for wiring

(1) Wiring

Please be sure that the wiring works are done after the electrical supply was cut. Before and during the wiring works, charged static electricity on body or on tools should be discharged. For moving part, flexible cables should be used.

(2) Wiring installation

This product and wiring should be installed as much away as possible from those noise source like strong electric cables. Also please take measures for surge transferred to power source cable.

(3) Power voltage

Do not use this component with higher voltage than specified. If voltage exceeds the specification or alternative current (AC100V) is applied, the equipment may be damaged or burned.

(4) Short-circuiting

Do not short-circuit the wiring, otherwise, damage or burning may occur.

(5) Incorrect wiring

Connect wires to the correct poles or terminals, otherwise, wires may be damaged or burned.

(6) Load

The output impedance of analog output part is 1kΩ. In case the impedance of the connected load is low, the error of output value will be large. Be sure o check the impedance of the connected load.

Calculation example

PPE output impedance : R_0=1 kΩ
Load internal impedance: Rx=1 MΩ

$$\text{Output value} = (1 - \frac{R0}{R0+Rx}) \times 100\%$$

$$= (1 - \frac{1\,k\Omega}{1\,k\Omega+1M\Omega}) \times 100\% \Rightarrow$$

The error of output value approx. 0.1%

5. MAINTENANCE

5.1 Trouble Shooting

Ir-regular phenomenon	Cause	Disposal to correct
The power indicator does not turn on.	Non connection	Check outside wiring
	Broken wiring (Breakage by curvature)	The wiring should be changed so that the curvature will not be happened to only one point of the flying lead, or use flexible wires.
	Broken wiring (Breakage by tension)	The wiring should have allowance so that any tensions will not be happened to the flying lead.
	Incorrect wiring	Do wiring connection correctly
Analog output does not change.	No pressure is applied.	Check applied pressure.
	Supply pressure is stable.	Check applied pressure.
	Damage of PPE (Damage of circuit)	Replace PPE
	Damage of PPE (Sensor breakage by over-pressure)	Replace PPE
Analog output remains unchanged at 0V.	Incorrect wiring (Short-circuiting)	Do wiring connection correctly
	Damage of PPE (Damage of circuit)	Replace PPE
Abnormal analog output, exceeding the 1 -5V range	Over-pressure	Make the applied pressure in the specification range.
	Damage of PPE (Damage of circuit)	Replace PPE
	Damage of PPE (Sensor breakage by over-pressure)	Replace PPE
Analog output is in the lower range.	When the internal impedance of the connected load is small, the analog output will be low because the output error will be bigger due to the partial pressure with output impedance of PPE.	Check the internal impedance of connected load and calculate the analog output error when combined with PPE.
	Voltage supply is small.	Check the power source.
Analog output is not stable.	Noise from outside affects.	Keep the sensor and cable away from noise source.
	The ripple of applied pressure is big	Review piping connection
	The ripple ratio of power is big.	Make it smaller.
	Damage of PPE (Damage of circuit)	Replace PPE
	Damage of PPE (Sensor breakage by over-pressure)	Replace PPE
The trimmer cover opens and the air leaks from there.	Sensor breakage by over-pressure	Replace PPE Take measures so that the higher pressure than the proof pressure will not be applied.

6.MODEL CODING

PPE- a A- b

a	Pressure range
V01	0 kPa to −100 kPa
P01	0 kPa to 100 kPa
P10	0 MPa to 1 MPa

b	Piping shape
6	Rc1/8
H6-B	ø6 mm plug
H6	In-line of push-in fitting for ø6 (2 pcs.)