

## LED DISPLAY DIGITAL PRESSURE SENSOR



**Complete  
functionality!  
Selection from a  
wide line-up**

### High Accuracy-High Resolution-High Speed

It achieves a 2.5ms, or less, response time at a high resolution of 1/1,000. It enables highly accurate sensing with its excellent repeatability and temperature characteristics.

#### Response time

2.5ms or less

#### Repeatability

with +0.25%F.S. +1 digit

#### Temperature characteristics

within +1%F.S.

### Clearly Visible LED Display with 3+1/2 Digits

Bright red LED 7-segment display having 3 $\frac{1}{2}$  digits, 10mm high. The displayed figures are remarkably noticeable not only in a dark area, but also in a well-lit place.



Incorporates  
Minus sign  
indication

### Setting with Easy Key Operation

Initialization and threshold value settings are easily done by key operation while seeing the values on the display.



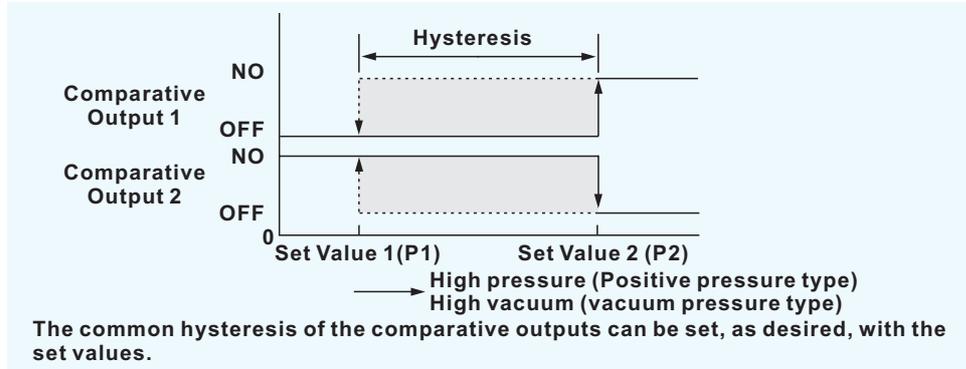
### Pigtail type for easily connect

M8 PICO 5 PIN+6" cable the pigtail type, for easily install and connect.

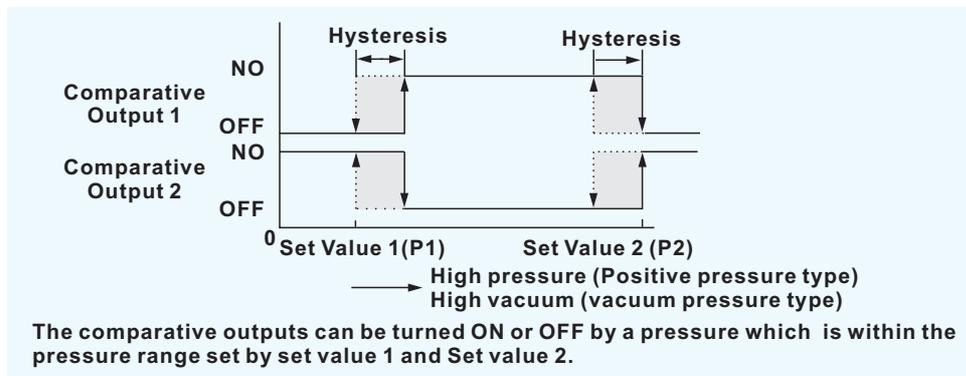
# LED DISPLAY DIGITAL PRESSURE SENSOR

## Four Output Modes Enable Versatile Pressure Level Control

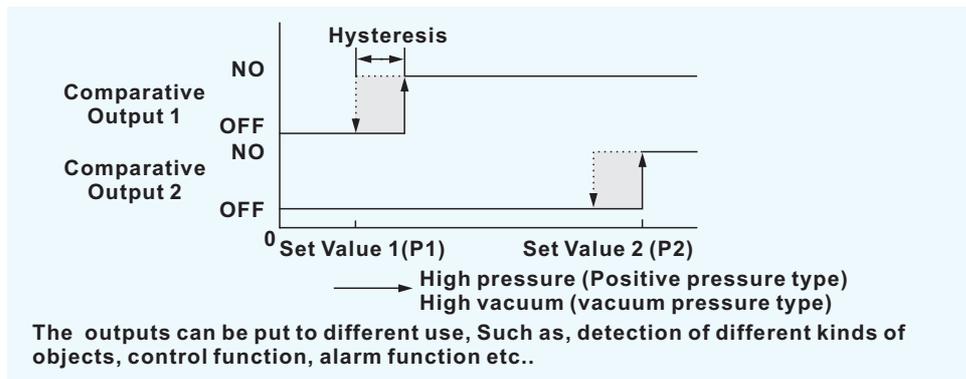
### 1 Hysteresis mode



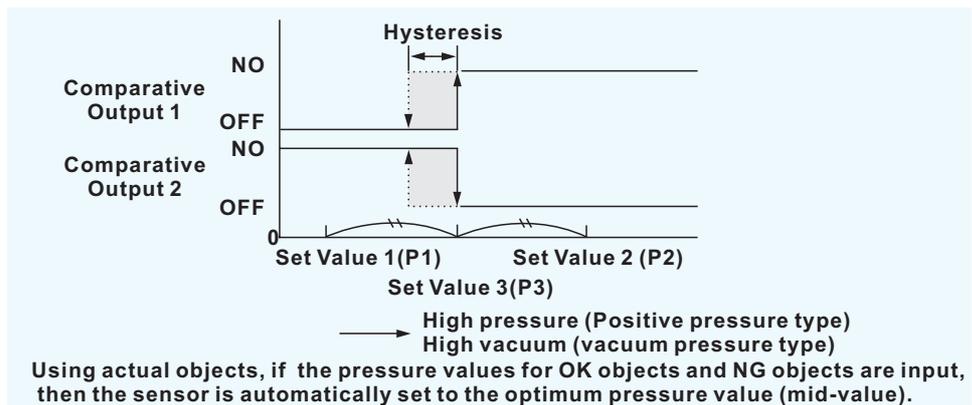
### 2 Window comparator mode



### 3 Dual output mode



### 4 Automatic sensitivity setting mode

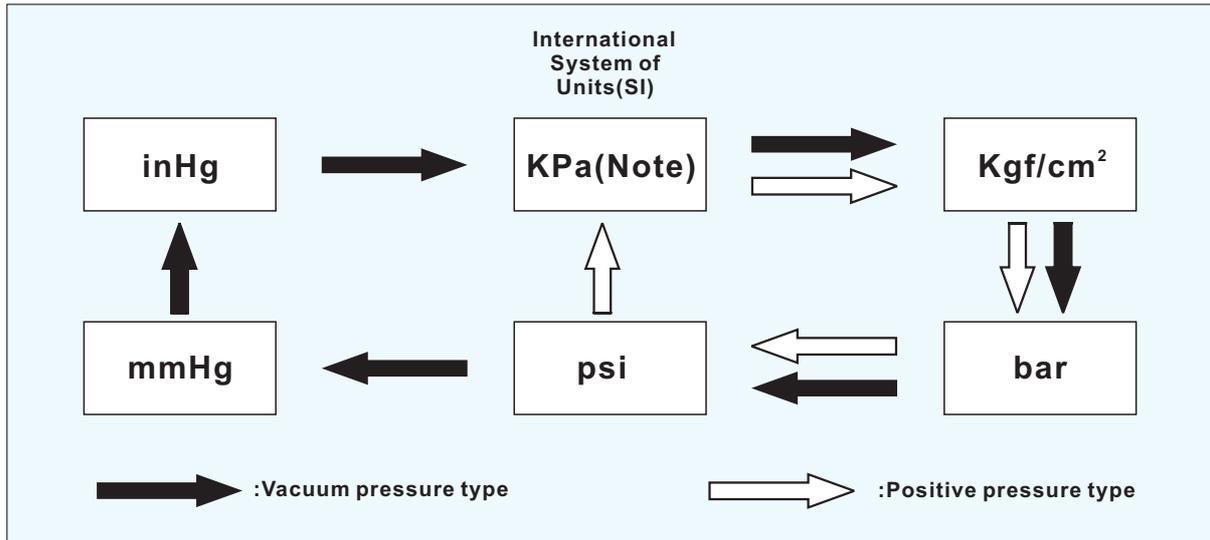


# LED DISPLAY DIGITAL PRESSURE SENSOR

## Selection from Six Pressure Units

The pressure unit can be selected from six different systems to suit your requirement.

The selectable pressure units differ with the sensor type. When the pressure unit is changed, the measured pressure value and the set values are automatically converted.



Note: "Mpa" in case of PD1-11□, PD1-21□ and PD1-31□.

## Analog Voltage Output Incorporated as a standard

Since a linear analog voltage output (1 to 5V) is incorporated, the sensor is ideally suited for real time monitoring or for remote control in combination with an analog controller.

## Peak Hold/Bottom Hold Display

The peak value or the bottom value of the varying pressure can be displayed. This function is convenient for finding the pressure variation range or for determining a reference for pressure settings.

## Analog Bar Display

Pressure changes can also be displayed in an analog fashion using LED bars. Hence, sudden pressure changes can be recognized at a glance.

( LED bars indicate the pressure level in steps )  
( of 10%F.S, regardless of the pressure unit. )

Analog bar display

Digital display



# LED DISPLAY DIGITAL PRESSURE SENSOR

## ORDER GUIDE(CABLE MODE)

Type			Appearance	Rated pressure range	Mode.NO	Pressure port	Comparative output		
Standard	Vacuum pressure	-100kpa type	Asian		0 to -100.0kPa	PD1-10VA	Rc(PT) 1/8 female thread	NPN open-collector transistor	
			North American			PD1-10VN	NPTF 1/8 female thread	PNP open-collector transistor	
			Asian			PD1-10VN-P			
		100kpa type	Asian			0 to 100.0kPa	PD1-10PA	Rc(PT) 1/8 female thread	NPN open-collector transistor
			North American				PD1-10PN	NPTF 1/8 female thread	PNP open-collector transistor
			Asian				PD1-10PN-P		
	1Mkpa type	Asian		0 to 1.000MPa	PD1-11PA	Rc(PT) 1/8 female thread	NPN open-collector transistor		
		North American			PD1-11PN	NPTF 1/8 female thread	PNP open-collector transistor		
		Asian			PD1-11PN-P				
	Flat	Vacuum pressure	-100kpa type	Asian		0 to -100.0kPa	PD1-40VA	M5 female thread	NPN open-collector transistor
				North American			PD-20VN	NPT 1/8 female thread	
				European			PD1-20VE	G(PF) 1/8 female thread	PNP open-collector transistor
100kpa type			Asian			0 to 100.0kPa	PD1-20PA	Rc(PT) 1/8 female thread	NPN open-collector transistor
			North American				PD1-20PN	NPT 1/8 female thread	PNP open-collector transistor
			European				PD1-20PE	G(PF) 1/8 female thread	
1Mkpa type		Asian		0 to 1.000MPa	PD1-21PA	Rc(PT) 1/8 female thread	NPN open-collector transistor		
		North American			PD1-21PN	NPT 1/8 female thread	PNP open-collector transistor		
		European			PD1-21PE	G(PF) 1/8 female thread			
IP67		Vacuum pressure	-100 kpa type	Asian		0 to -100.0kPa	PD1-30VA	Rc(PT) 1/8 female thread	NPN open-collector transistor
				North American			PD1-30VN	NPT 1/8 female thread	PNP open-collector transistor
				European			PD1-30VE	G(PF) 1/8 female thread	
	100kpa type		Asian			0 to 100.0kPa	PD-30PA	Rc(PT) 1/8 female thread	NPN open-collector transistor
			North American				PD1-30PN	NPT 1/8 female thread	PNP open-collector transistor
			European				PD1-30PE	G(PF) 1/8 female thread	
	1Mkpa type	Asian		0 to 1.000MPa	PD1-31PA	Rc(PT) 1/8 female thread	NPN open-collector transistor		
		North American			PD1-31PN	NPT 1/8 female thread	PNP open-collector transistor		
		European			PD1-31PE	G(PF) 1/8 female thread			

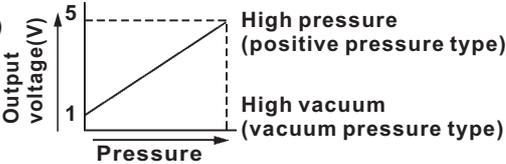
# LED DISPLAY DIGITAL PRESSURE SENSOR

## ORDER GUIDE(PIGTAIL MODE)

Type			Appearance	Rated pressure range	Mode.NO	Pressure port	Comparative output		
Standard	Vacuum pressure	-100kpa type	Asian		0 to -100.0kPa	PD1-10VA/P	Rc(PT) 1/8 female thread	NPN open-collector transistor	
			North American			PD1-10VN/P	NPTF 1/8 female thread	PNP open-collector transistor	
			North American			PD1-10VN-P/P			
		100kpa type	Asian		0 to 100.0kPa	PD1-10PA/P	Rc(PT) 1/8 female thread	NPN open-collector transistor	
			North American			PD1-10PN/P	NPTF 1/8 female thread	PNP open-collector transistor	
			North American			PD1-10PN-P/P			
	1Mkpa type	Asian	0 to 1000.0kPa	PD1-11PA/P	Rc(PT) 1/8 female thread	NPN open-collector transistor			
		North American		PD1-11PN/P	NPTF 1/8 female thread	PNP open-collector transistor			
		North American		PD1-11PN-P/P					
	Flat	Vacuum pressure	-100kpa type	Asian		0 to -100.0kPa	PD1-40VA/P	M5 female thread	NPN open-collector transistor
				North American			PD-20VN/P	NPT 1/8 female thread	PNP open-collector transistor
				Euro-Asian			PD1-20VE/P	G(PF) 1/8 female thread	
100kpa type			Asian	0 to 100.0kPa		PD1-20PA/P	Rc(PT) 1/8 female thread	NPN open-collector transistor	
			North American			PD1-20PN/P	NPT 1/8 female thread	PNP open-collector transistor	
			Euro-Asian			PD1-20PE/P	G(PF) 1/8 female thread		
1Mkpa type		Asian	0 to 1000.0kPa	PD1-21PA/P	Rc(PT) 1/8 female thread	NPN open-collector transistor			
		North American		PD1-21PN/P	NPT 1/8 female thread	PNP open-collector transistor			
		Euro-Asian		PD1-21PE/P	G(PF) 1/8 female thread				
IP67		Vacuum pressure	-100 kpa type	Asian		0 to -100.0kPa	PD1-30VA/P	Rc(PT) 1/8 female thread	NPN open-collector transistor
				North American			PD1-30VN/P	NPT 1/8 female thread	PNP open-collector transistor
				Euro-Asian			PD1-30VE/P	G(PF) 1/8 female thread	
	100kpa type		Asian	0 to 100.0kPa		PD-30PA/P	Rc(PT) 1/8 female thread	NPN open-collector transistor	
			North American			PD1-30PN/P	NPT 1/8 female thread	PNP open-collector transistor	
			Euro-Asian			PD1-30PE/P	G(PF) 1/8 female thread		
	1Mkpa type	Asian	0 to 1000.0kPa	PD1-31PA/P	Rc(PT) 1/8 female thread	NPN open-collector transistor			
		North American		PD1-31PN/P	NPT 1/8 female thread	PNP open-collector transistor			
		Euro-Asian		PD1-31PE/P	G(PF) 1/8 female thread				

# LED DISPLAY DIGITAL PRESSURE SENSOR

## SPECIFICATIONS

Item	Model No	Type	Vacuum pressure				Positive pressure					
			-100kPa type				100kPa type			1MPa type		
			Standard	Light weight	Flat	IP67	Standard	Flat	IP67	Standard	Flat	IP67
	Asian	PD1-10VA	PD1-40VA	—	PD1-30VA	PD1-10PA	PD1-20PA	PD1-30PA	PD1-11PA	PD1-21PA	PD1-31PA	
	North American	PD1-10VN (-P)	—	PD1-20VN	PD1-30VN	PD1-10PN (-P)	PD1-20PN	PD1-30PN	PD1-11PN	PD1-21PN	PD1-31PN	
	European	—	—	PD1-20VE	PD1-30VE	—	PD1-20PE	PD1-30PE	—	PD1-21PE	PD1-31PE	
Type of pressure			Gauge pressure									
Rated pressure range			0 to -100.0kPa				0 to 100.0kPa			0 to 1.000MPa		
Set pressure range			1.5 to -100.0kPa 0.015 to -1.020kgf/cm <sup>2</sup> . 0.015 to -1.000bar 0.21 to -14.50psi, 11.25 to -750mmHg 0.44 to -29.53inHg				-1.5 to 100.0kPa -0.015 to 1.020kgf/cm <sup>2</sup> -0.015 to 1.000bar -0.21 to 14.50psi			-0.015 to 1.000MPa -0.015 to 10.20Kgf/cm <sup>2</sup> -0.015 to 10.00bar -2.17 to 145.0psi		
Pressure with stand ability			490kPa									
Applicable fluid			Non-corrosive gas									
Selectable units			KPa,kgf/cm <sup>2</sup> ,bar,psi,mmHg,inHg				KPa,kgf/cm <sup>2</sup> ,bar,psi			MPa,kgf/cm <sup>2</sup> ,bar,psi		
Supply voltage			12 to 24V DC <sup>+10</sup> / <sub>-15</sub> %Ripple P-P 10% or less									
Current consumption			50mA or less									
Comparative outputs (comparative output 1) (comparative output 2)			< Asian, North American(standard NPN output, flat and Ip67 type > NPN open-collector transistor • Maximum sink current:100mA • Applied voltage:30V DC or less(between comparative output and 0V) • Residual Voltage:1V or less(at 100mA source sink current). 0.4 or less (at 16mA sink current)						< North American(standard PNP output type), European > PNP open-collector transistor • Maximum source current:100mA • Applied voltage:30V DC or less(between comparative output and +V) • Residual Voltage:2V or less(at 100mA source current).			
Utilization category			DC -12 or DC-13									
Output modes			Equipped with 4 types of modes: hysteresis mode, window comparator mode, dual output mode, auto sensitivity setting mode(selectable by key operation).									
Hysteresis			1 digit (however, variable in hysteresis mode and 2 digits when using psi unit)									
Repeatability			Within+ 0.2% F.S. + 1digit									
Response time			2.5ms or less									
Short-circuit protection			Incorporated									
Analog voltage output			Output voltage: 1 to 5V (over rated pressure range) Zero-point: within 1V±5% F.S. Span: within 4V±5% F.S. Linearity: within ±1% F.S. Output impedance:1KΩ approx.									
Analog bar display			LED bar display in steps of 10% F.S. Approx.									

# LED DISPLAY DIGITAL PRESSURE SENSOR

## SPECIFICATIONS

Item	Model No	Type	Vacuum pressure				Positive pressure					
			-100kPa type				100kPa type			1MPa type		
			Standard	Light weight	Flat	IP67	Standard	Flat	IP67	Standard	Flat	IP67
			Asian	PD1-10VA	PD1-40VA	—	PD1-30VA	PD1-10PA	PD1-20PA	PD1-30PA	PD1-11PA	PD1-21PA
		North American	PD1-10VN (-P)	—	PD1-20VN	PD1-30VN	PD1-10PN (-P)	PD1-20PN	PD1-30PN	PD1-11PN	PD1-21PN	PD1-31PN
		European	—	—	PD1-20VE	PD1-30VE	—	PD1-20PE	PD1-30PE	—	PD1-21PE	PD1-31PE
Display		3 <sup>1/2</sup> digit red LED display (sampling rate: 4 times/sec. Approx.)										
Displayable pressure range		1.5 to -100.0kPa 0.015 to -1.020kgf/cm <sup>2</sup> , 0.015to -1.000bar 0.21 to -14.50psi, 11.25 to -750mmHg 0.44 to -29.53inHg				-1.5 to 100.0kPa -0.015 to 1.020kgf/cm <sup>2</sup> -0.015 to 1.000bar -0.21 to 14.50psi			-0.015 to 1.000MPa -0.015 to 10.20Kgf/cm <sup>2</sup> -0.015 to 10.00bar -2.17 to 145.0psi			
Operation indicators	Comparative output1	Orange LED (lights up when Comparative Output 1 is ON)										
	Comparative output2	Green LED (lights up when Comparative Output 2 is ON)										
Environmental resistance	Pollution degree	3(Industrial environment)										
	Protection	Standard, Flat and Light weight types:IP40(IEC),IP67 type:IP67(IEC)										
	Ambient temperature	-10 to +50°C (No dew condensation or icing allowed),Storage:-10 to +60°C										
	Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH										
	EMC	Emission: EN50081-2, Immunity: EN50082-2										
	Voltage with standability	1000V AC for one min. Between all supply terminals connected together and enclosure										
	Insulation resistance	50MΩ, or more, with 500V DC megger between all supply terminals connected together and enclosure										
	Vibration resistance	10 to 150Hz frequency, 0.75mm amplitude in X,Y and Z directions for two hours each										
Shock resistance	100m/s <sup>2</sup> acceleration (10G approx.) in X, Y and Z directions for three times each											
Temperature characteristics		Over ambient temperature range -10 to +50°C: within±1% F.S. of detected pressure at 20°C										
Pressure port	Asian	Standard, Flat and IP 67 types: Rc (PT) 1/8 female thread, Light weight type: M5 female thread										
	North American	Standard type:NPTF 1/8 female threed, Flat and Ip67 types: NPT 1/8 female thread										
	European	Flat and Ip67 types: G (PF) 1/8 female thread										
Material		Front case: ABS, Rear case:PPS (glass fiber reinforced ), Display surface: Acrylic Pressure port attachment: Die-cast zinc alloy[ Light weight type: POM (glass fiber reinforce), pressure port is brass( nickel plated)] front cover(IP 67 type only): Polycarbonate										
Cable		0.15mm <sup>2</sup> - 5 - core oil resistant cabtyre cable, 2m long (IP 67 type: 5m long)										
Pigtail type		Pico 5 pins+6" cable										
Cable extension		Extension up to total 100m is possible with 0.3mm <sup>2</sup> , or more, cable.										
Weight		Standard type: 95g approx., Flat type: 120g approx., IP 67 type:370g approx., Light weight type: 70g approx.										
Accessories		Hexagon-socket- head plug for pressure port: 1 No . (Standard type only), Pressure unit label: 1 NO .										

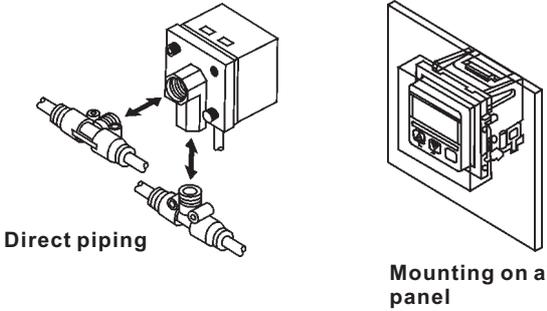
Note: Model Nos. Of North American standard type having the suffix '-P' are PNP output type.

# LED DISPLAY DIGITAL PRESSURE SENSOR

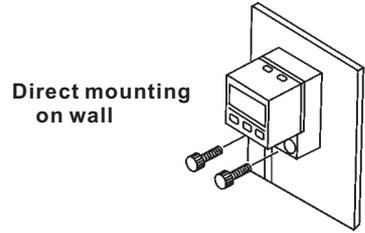
## A Wide Variety of Models

Models are selectable according to mounting style, environmental resistance, and manner of use.

### Standard type/PD1-1



### Flat type/PD1-2

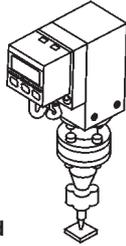


The PD1 series covers world-wide usage with the Asian type, the North American type and the European type. Each type provides the customary pressure unit, suitable transistor output and pressure port.

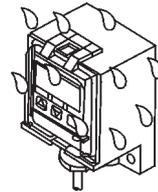
### Light weight type/PD1-4

Total weight 70g approx.

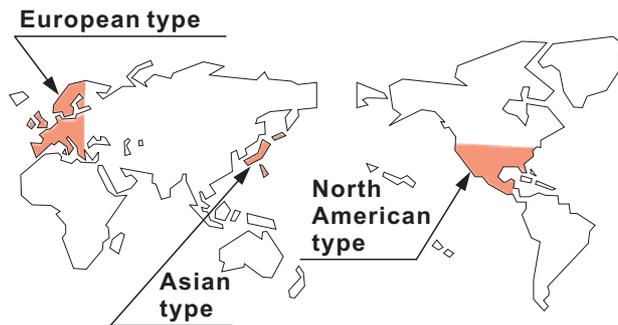
The sensor can be mounted on the suction head of a chip mounter.



### IP67 type/PD1-3



Water and dust proof



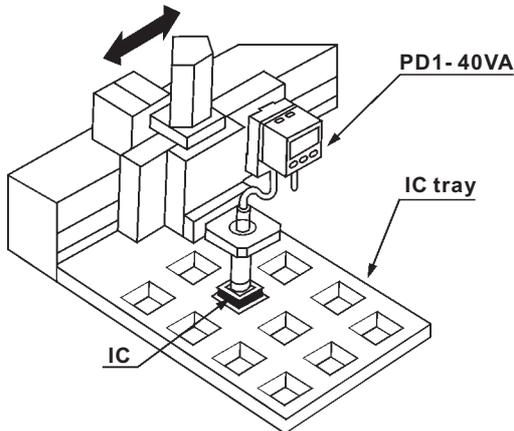
	Pressure unit		Output	Pressure port
	The international system of unit (SI)			
Asian	Pa	Kg/cm <sup>2</sup> (Positive pressure type) mmHg (Vacuum pressure type)	NPN and analog voltage	Rc (PT) <sup>1/8</sup> or M5 female thread
North American		psi (Positive pressure type) inHg (Vacuum pressure type)	NPN and analog voltage	NPT <sup>1/8</sup> or NPTF <sup>1/8</sup> female thread
European		bar	PNP and analog voltage	G(PF) <sup>1/8</sup> or NPTF <sup>1/8</sup> female thread

# LED DISPLAY DIGITAL PRESSURE SENSOR

## APPLICATIONS

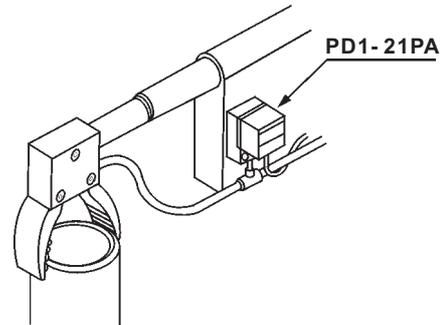
### Confirmation of chip component suction

The light weight type does not disturb the movement of the suction head, even if it is mounted close to the head.



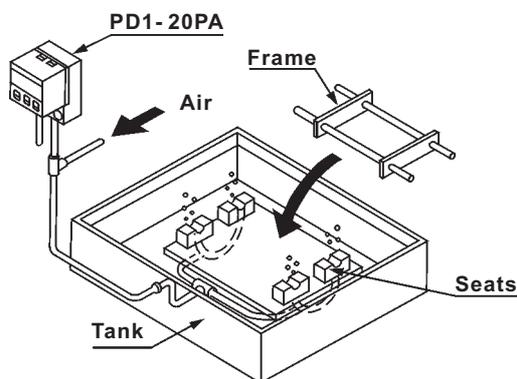
### Controlling clamping force

The clamping force can be changed to suit the workpiece by controlling the supplied air pressure.



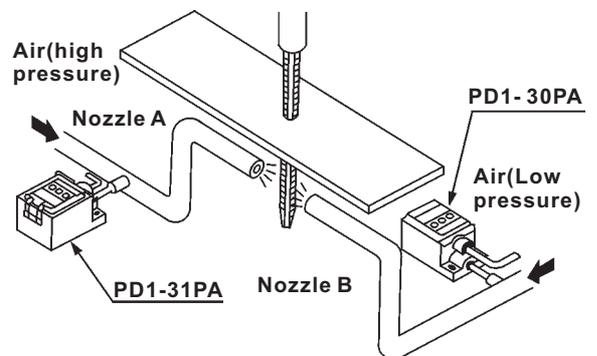
### Verifying placement of frame

High pressure is attained when the frame is exactly seated. Hence, the pressure change when the frame is exactly placed is detected.



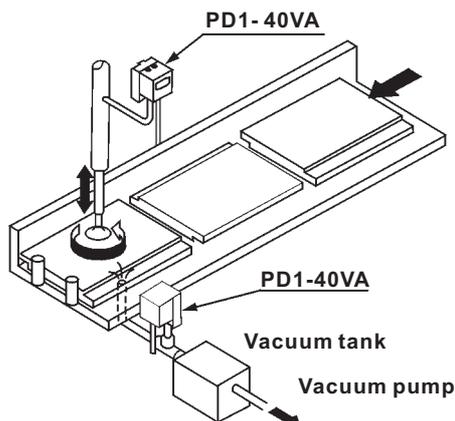
### Detecting tap breakage

Two opposed nozzles are supplied air at different pressures. If the tap breaks, the pressure at the lower pressure side nozzle is affected by the air of the higher pressure side nozzle. This change in pressure is detected.



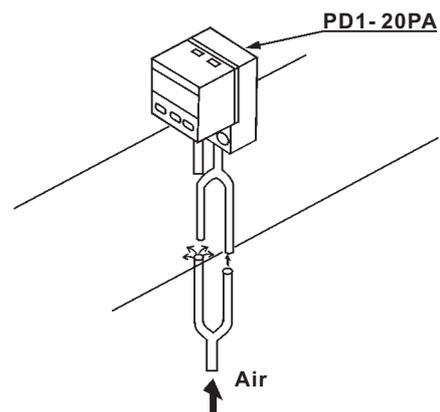
### Inspecting orientation of glass sheet

The orientation of the glass sheet can be recognized by detecting the change in vacuum due to presence/absence of indentation.



### Controlling edge of winding film

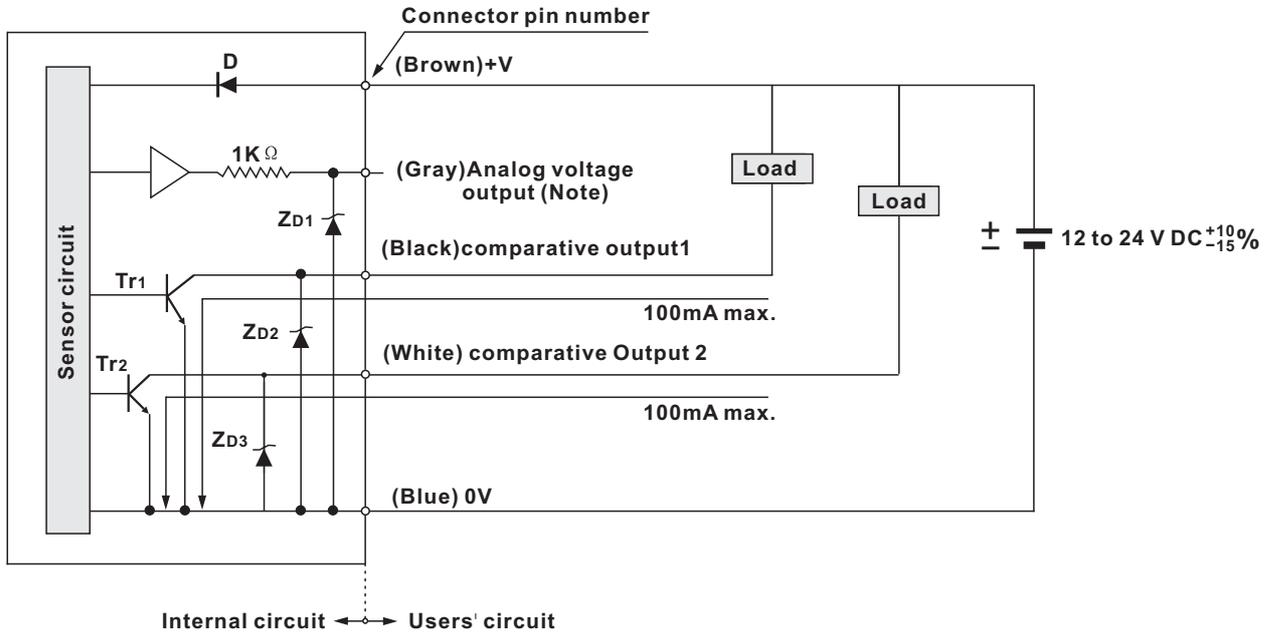
With bifurcated nozzles placed on both sides of the film, the position of the winding film is recognized as right-shifted (high pressure), OK (middle pressure), or left-shifted (low pressure).



# LED DISPLAY DIGITAL PRESSURE SENSOR

**NPN output type**

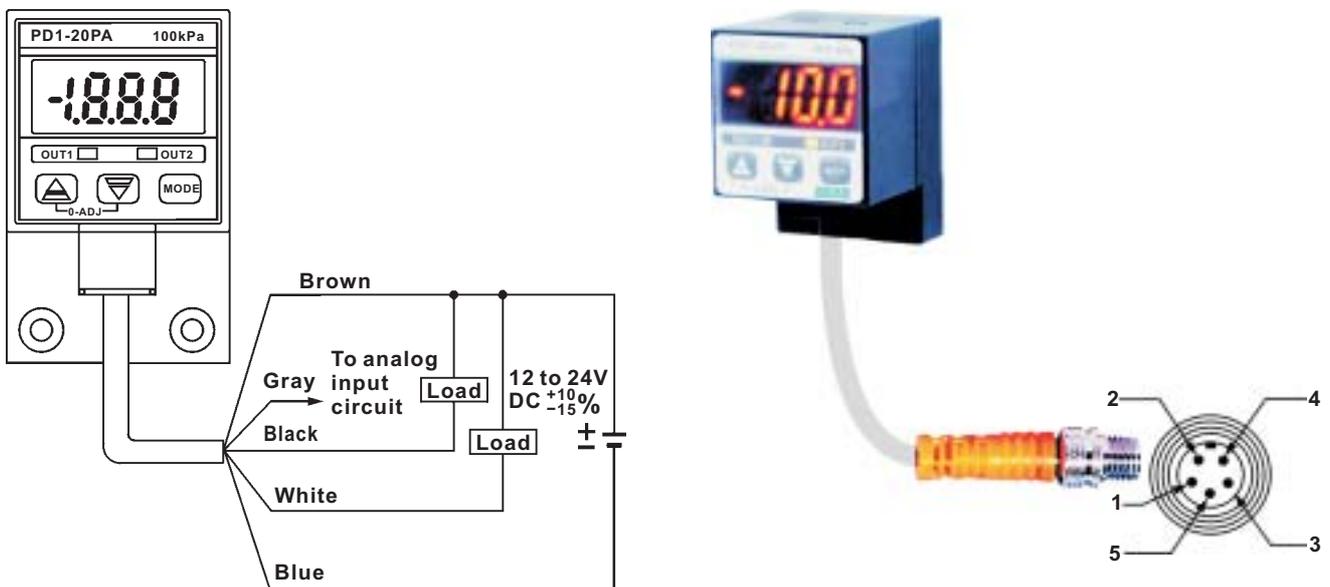
**I/O circuit diagram**



**Note:** When using the analog voltage output, take care to connect external device of proper input impedance. Also, when a cable extension is used, voltage drop due to cable resistance should be taken into account.

Symbols...D: Reverse supply polarity protection diode  
 Z<sub>D1</sub>, Z<sub>D2</sub>, Z<sub>D3</sub>: Surge absorption zener diode  
 Tr<sub>1</sub>, Tr<sub>2</sub>: NPN output transistor

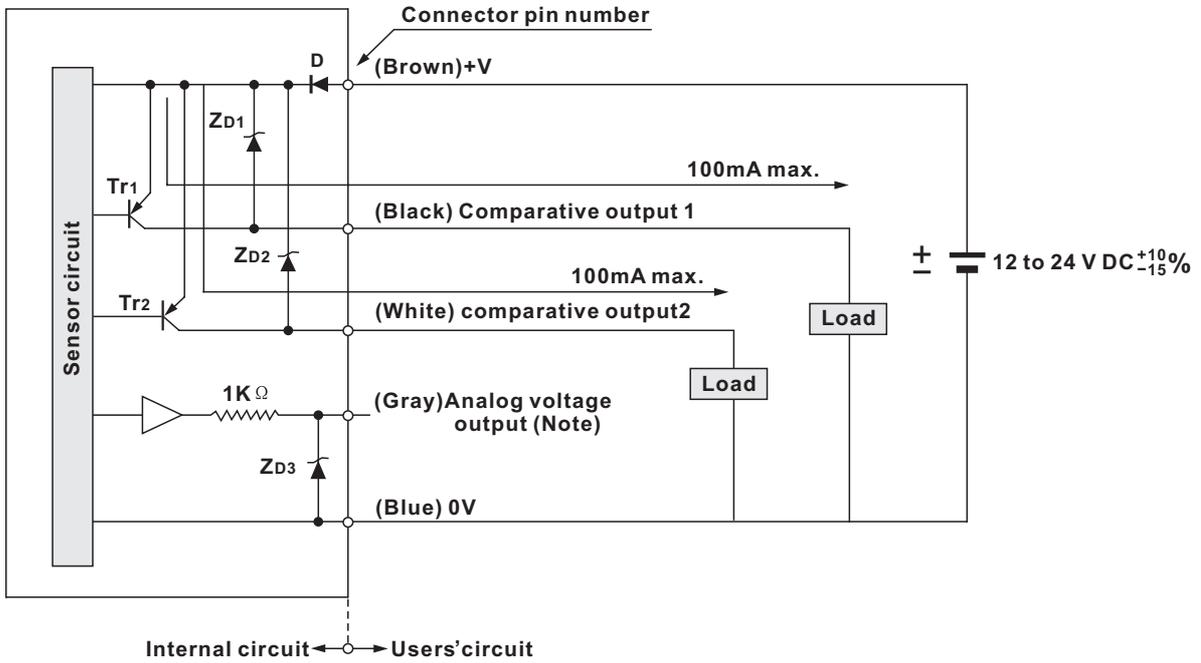
**Wiring diagram**



# LED DISPLAY DIGITAL PRESSURE SENSOR

## PNP output type

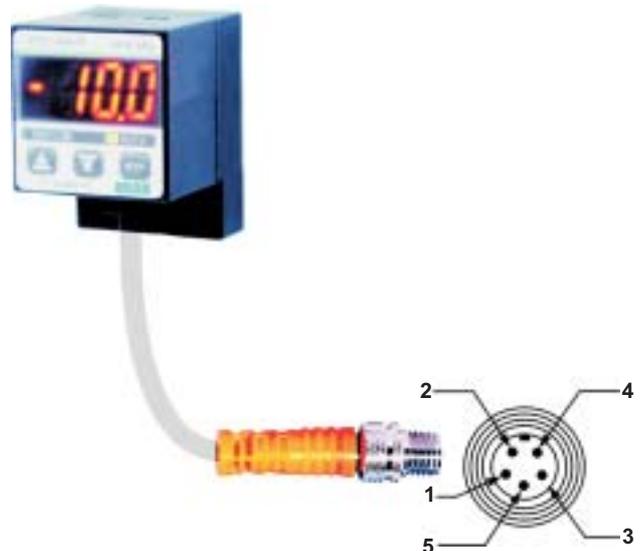
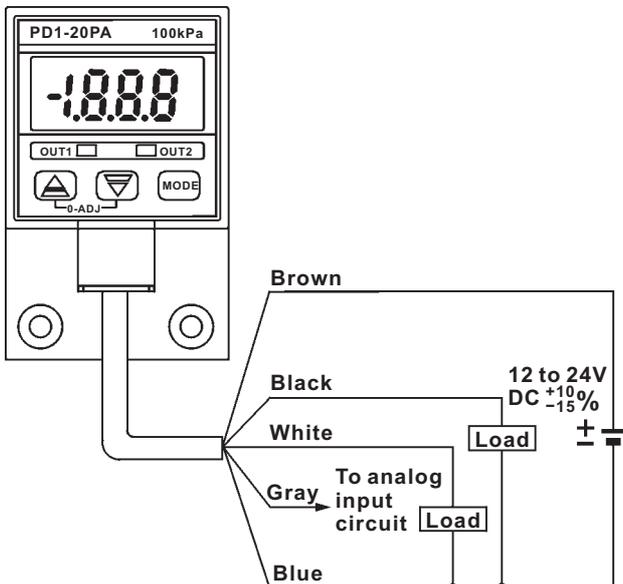
### I/O circuit diagram



**Note:** When using the analog voltage output, take care to connect external device of proper input impedance. Also, when a cable extension is used, Voltage drop due to cable resistance should be taken into account.

Symbols...D: Reverse supply polarity protection diode  
 ZD1, ZD2, ZD3: Surge absorption zener diode  
 Tr1, Tr2: NPN output transistor

### Wiring diagram



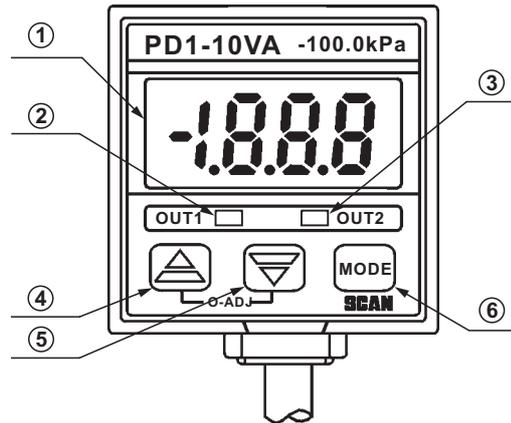
## LED DISPLAY DIGITAL PRESSURE SENSOR

### PRECAUTIONS FOR PROPER USE (All models)



This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal pressure detection sensor. The PD1 series is designed for use with non-corrosive gas. It cannot be used with liquid or corrosive gas.

### Functional description



	Description	Function
①	3 1/2 digit LED display (Red)	Displays measured pressure, settings, error messages and key-protect status.
②	Comparative output1 operation indicator (Orange)	Lights up when Comparative Output1 is ON
③	Comparative output2 operation indicator (Green)	Lights up when Comparative Output2 is ON
④	Increment key (▲)	<ul style="list-style-type: none"> <li>In the initial setting mode, pressing the key changes the settable digit.</li> <li>In the set value1,2 modes, pressing the key changes the set value to the high pressure side in case of positive pressure type sensor and to the high vacuum side in case of vacuum pressure type sensor.</li> <li>In the sensing mode, if the key is pressed continuously for 4 sec. The display shows peak hold value.</li> </ul>
⑤	Decrement key (▼)	<ul style="list-style-type: none"> <li>In the initial setting mode, pressing the key changes the set conditions.</li> <li>In the set value1,2 modes, pressing the key changes the set value to the low pressure side in case of positive pressure type sensor and to the low vacuum side in case of vacuum pressure type sensor.</li> <li>In the sensing mode, if the key is pressed continuously for 4 sec or more the display shows bottom hold value.</li> </ul>
⑥	Mode selection key (MODE)	<ul style="list-style-type: none"> <li>Each press of the key changes the selected mode to sensing mode, Set Value1(P1) set mode and Set Value2 (P2) set mode.</li> <li>In the sensing mode, if the key is pressed continuously for about 3 seconds, Key-protect can be set/released.</li> <li>In the sensing mode, if the mode selection key is pressed while pressing the increment key ▲, the initial setting mode is obtained.</li> </ul>

# LED DISPLAY DIGITAL PRESSURE SENSOR

## PRECAUTIONS FOR PROPER USE (All models)

### Error messages

When an error occurs, take the following corrective action.

Error message	Cause	Corrective active
[-1]	Over current due to short-circuit	Switch off the power supply and check the load.
[-3]	Pressure is being applied during zero-point adjustment.	Applied pressure at the pressure port should be brought to atmospheric pressure and zero-point adjustment should be done again.
---	Positive pressure type	Applied pressure exceeds the upper limit of displayable pressure range.
	Vacuum pressure type	Applied pressure exceeds the lower limit of displayable pressure range.
----	Positive pressure type	Applied pressure exceeds the lower limit of displayable pressure range.
	Vacuum pressure type	Applied pressure exceeds the upper limit of displayable pressure range.

Applied pressure should be brought within the rated pressure range.

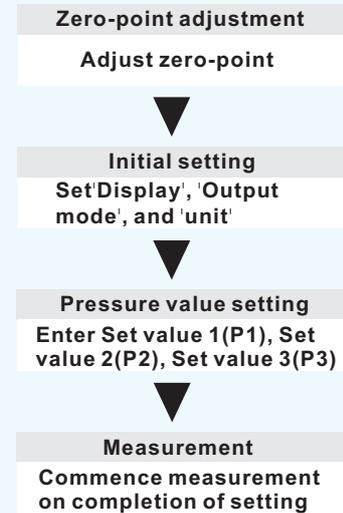
### Wiring

- Make sure to carry out the wiring in the power supply off condition
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground(F.G) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment( switching regulator, inverter motor, etc.) is used in the vicinity of this sensor, connect the frame ground(F.G)terminal if the equipment to an actual ground.
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.
- The analog voltage output is mot incorporated with a short-circuit protection circuit. Do mot directly connect a power supply or capacitive load.

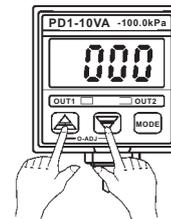
### Setting

- If key-protect has been set, make sure to release key-protect before operating the keys.(please refer to key-protect function on P16 for the procedure.)
- Set value 1(P1) and Set value 2(P2) can be made common for all the output modes.
- The setting of Set value 2(P2) with respect to Set value1 (P1) can only be towards the high pressure side in case of the positive pressure type sensor and only towards the high vacuum side in case of the vacuum pressure type sensor.
- Set value3(P3) is automatically set to the mid-value of Set Value 1(P1) and Set Value 2(P2)
- The conditions which are set are stored in an EEPROM. Kindly note that the EEPROM has a life span and its guaranteed life is 100,000 write operation cycles.

### Setting procedure



#### 1 Zero-point adjustment



- The displayed pressure when the pressure port is left open is adjusted to zero.
- The sensor will automatically enter the sensing mode when power is supplied.
- Let the pressure port be at atmospheric pressure (i.e.,no applied pressure condition), and press, simultaneously, the increment and decrement keys continuously .
- **000** is displayed and, when the fingers are released, zero-point adjustment is completed and the sensor returns to the sensing mode.

# LED DISPLAY DIGITAL PRESSURE SENSOR

## Setting procedure

### ② Initial setting



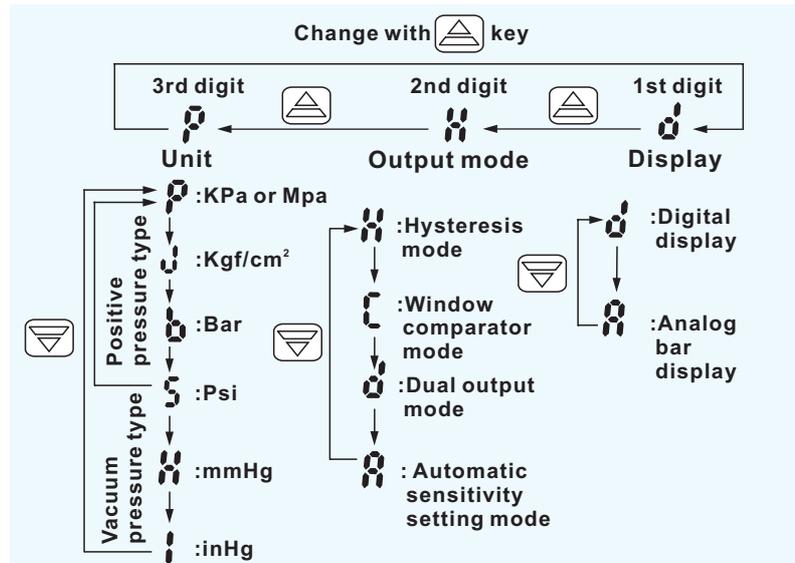
- Pressure 'unit', 'display' and 'output mode' of the comparative outputs are set.

- In the sensing mode press **MODE** key while pressing **▲** key.

- Initial setting is displayed.
- If sensor is being used for the first time, **PNo** is displayed.

- The settable digit blinks.

- The settable digit changes when **▲** key is pressed and the setting is changed when **▼** key is pressed.



### ③ Pressure value setting

For the case when output mode is set to either hysteresis mode (**H**), window comparator mode (**C**) or dual output mode (**d**).

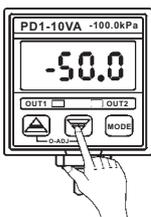
- 'Set Value 1 (P1)' and 'Set Value 2 (P2)' of the comparator outputs are set.



- Press **MODE** key in the sensing mode to set to Set value 1(P1) set mode.
- Enter Set value 1(P1) using **▲** key and **▼** key.
- Then, press **MODE** key to set to Set value 2 (P2) set mode.
- Enter Set value 2(P2) using **▲** key and **▼** key.
- Then, press **MODE** key to set to sensing mode.

For the case when output mode is set to automatic sensitivity setting mode (**A**).

- 'Set Value 1(P1)', 'Set Value 2 (P2)' and 'Set Value 3(P3)' of the comparative outputs are set.



- Press **MODE** key in the sensing mode to set to Set value 1(P1) set mode.
- Within the required permissible pressure range, having created a pressure state which is nearest to the atmospheric pressure, press **▼** key to enter Set value 1(P1).
- Then, press **MODE** key to set to Set value 2(P2) set mode.
- Within the required permissible pressure range, having created a pressure state which is nearest to the high pressure end (for a positive pressure type sensor) or the high vacuum end (for a vacuum pressure type sensor), press **▲** key to enter Set value 2(P2).
- Then, press **MODE** key to set to Set value 3(P3) set mode.
- Check Set value 3(P3) which has been set automatically. When Set value 3(P) is to be changed, enter Set value 3(P3) using **▲** key and **▼** key.
- After checking and setting, press **MODE** key to set to sensing mode.

- The automatically set Set value 3(P3) can be manually changed to a value between Set value 1(P1) and Set value 2 (P2).

# LED DISPLAY DIGITAL PRESSURE SENSOR

## PRECAUTIONS FOR PROPER USE

### Conversion of pressure units

In the DP1 series, the conversion to different units is automatically done on changing the setting of the pressure unit. However, this conversion can also be obtained by multiplying the values by the coefficients given in the table on the under.

#### Conversion table for pressure units

	KPa	MPa	kgf/cm <sup>2</sup>	bar	Psi	mmHg (Torr)	inHg	atm
1kPa	1	1×10 <sup>-3</sup>	1.01972×10 <sup>-2</sup>	1×10 <sup>-2</sup>	1.45038×10 <sup>-1</sup>	7.50062	0.2953	9.86923×10 <sup>-3</sup>
1MPa	1×10 <sup>3</sup>	1	1.01972×10	1×10	1.45038×10 <sup>2</sup>	7.50062×10 <sup>3</sup>	0.2953×10 <sup>3</sup>	9.86923
1kgf/cm <sup>2</sup>	9.80665×10	9.80655×10 <sup>-2</sup>	1	9.80665×10 <sup>-1</sup>	1.42234×10	7.35559×10 <sup>2</sup>	2.8959×10	9.67841×10 <sup>-1</sup>
1 bar	1×10 <sup>2</sup>	1×10 <sup>-1</sup>	1.01972	1	1.45038×10	7.50062×10 <sup>2</sup>	2.953×10	9.86923×10 <sup>-1</sup>
1 psi	6.89473	6.89473×10 <sup>-3</sup>	7.03065×10 <sup>-2</sup>	6.89473×10 <sup>-2</sup>	1	5.17147×10	2.036	6.80457×10 <sup>-2</sup>
1mmHg (1Torr)	1.33322×10 <sup>-1</sup>	1.33322×10 <sup>-4</sup>	1.35951×10 <sup>-3</sup>	1.33322×10 <sup>-3</sup>	1.93368×10 <sup>-2</sup>	1	3.9370×10 <sup>-2</sup>	1.31579×10 <sup>-3</sup>
1 in Hg	3.3864	3.3864×10 <sup>-3</sup>	3.4531×10 <sup>-2</sup>	3.3864×10 <sup>-2</sup>	0.4912	2.5400×10	1	3.342×10 <sup>-2</sup>
1 atm	1.01325×10 <sup>2</sup>	1.01325×10 <sup>-1</sup>	1.03323	1.01325	1.46960×10	7.60000×10 <sup>2</sup>	2.9921×10	1

#### Conversion procedure

For example, if 2kPa is to be expressed in kgf/cm<sup>2</sup>, since 1kPa=1.01972×10<sup>-2</sup>kgf/cm<sup>2</sup>, 2kPa becomes 2×1.01972×10<sup>-2</sup>≈0.020kgf/cm<sup>2</sup>

### Key-protect function

Key-protect is a function which prevents any unintentional change in the conditions which have been entered in each setting mode by making the sensor not to respond to the key operations .

#### Setting of key-protect



- In the sensing mode, press **MODE** key continuously for about 3 second. And release it immediately when **0n** is displayed.
- [ Key-protect is set and the sensor returns to the ] sensing mode.

#### Release of key-protect



- In the sensing mode, press **MODE** key continuously for about 3 second. And release it immediately when **OFF** is displayed.
- [ Key-protect is released and the sensor returns to ] the sensing mode.

### Others

- Use within the rated pressure range.
- Do not apply pressure exceeding the pressure with-standability value. The diaphragm will get damaged and correct operation shall not be maintained.
- Do not use during the initial transient time(0.5 second.) After the power supply is switched on.
- Avoid use of standard type, flat type and light weight type of sensors in places where steam and dust is excessive.
- Take care that the sensor does not come in direct contact with water, oil, grease, or organic solvents, such as , thinner, etc.
- Do not insert wires, etc., into the pressure port . The diaphragm will get damaged and correct operation shall not be maintained.
- Do not operate the keys with pointed or sharp objects.

# LED DISPLAY DIGITAL PRESSURE SENSOR

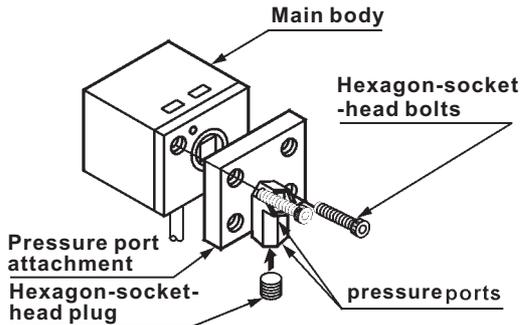
## PRECAUTIONS FOR PROPER USE (All models)

### Standard type

#### Setting of pressure lead direction

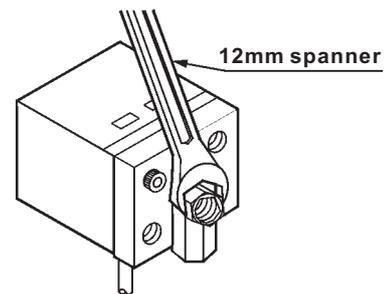
- The pressure lead direction can be changed by dismantling the pressure port attachment and changing the mounting direction. The tightening torque of the hexagon-socket-head bolt (length:9mm or less) should be 0.29N.m or less.

Note: Make sure to close any unused pressure port with the hexagon-socket-head plug supplied as accessory.



#### Piping

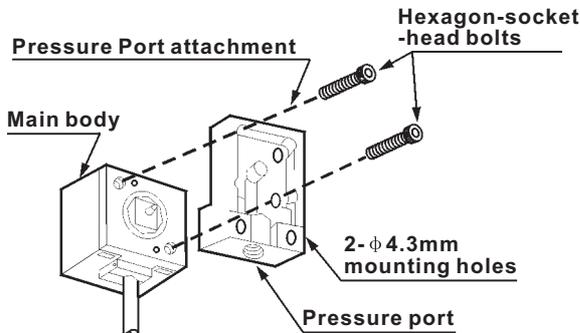
- When connecting a hexagon-socket-head plug or coupling to the pressure port, hold the hexagonal part of the pressure port with a 12mm spanner and make sure that the tightening torque is 9.8N.m or less. Also, in order to prevent any leakage, wind a sealing tape on the coupling when connecting. However, sealing tape is not required for North American type (PD1-1□) using NPTF 1/8 coupling. (Sealing tape is required if NPT 1/8 coupling is used.)



### Flat type (light weight type)

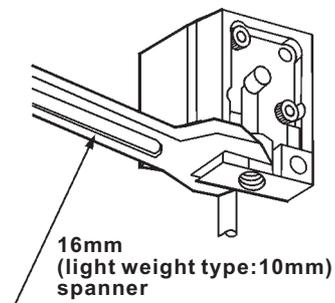
#### Setting of pressure lead direction

- The pressure lead direction can be changed by dismantling the pressure port attachment and changing the mounting direction. The tightening torque of the hexagon-socket-head bolt (length:9mm or less) should be 0.29N.m or less



#### Piping

- When connecting a coupling to the pressure port, hold the pressure port attachment with a 16mm (light weight type: 10mm) spanner and make sure that the tightening torque is 9.8N.m or less (light weight type: 1.47N.m or less). Also, in order to prevent any leakage, wind a sealing tape on the coupling when connecting.



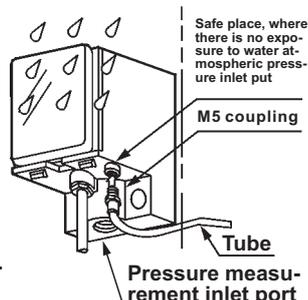
### IP67 type

#### Piping for pressure measurement inlet port

- When connecting a coupling to the pressure measurement inlet port, hold the pressure port attachment with inlet port, hold the pressure port attachment with a spanner and make sure that the tightening torque is 9.8N.m or less. Also, in order to prevent any leakage, wind a sealing tape on the coupling when connecting.

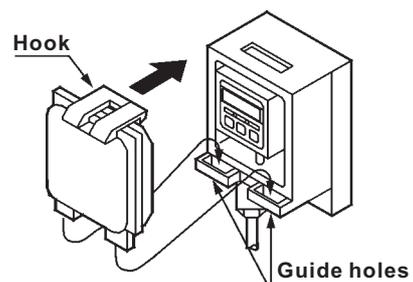
#### Piping for atmospheric pressure inlet port

- If there is a possibility of water entering into the sensor enclosure through the atmospheric pressure inlet port, connect a tube to the atmospheric pressure inlet port through a M5 coupling and extend the other end of the tube to a safe place. In this case, ensure that this end of tube does not get clogged.



#### Fitting of front cover

- Insert the bosses on the front cover into the guide holes at the bottom of the pressure port attachment, and push in the direction of the arrow to fit the hook. When removing the front cover, release the hook first.

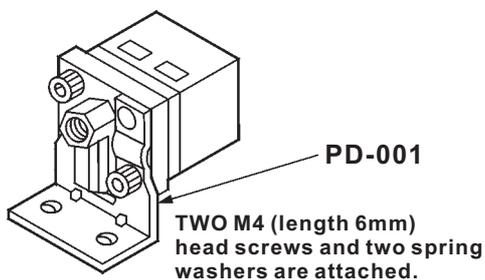


# LED DISPLAY DIGITAL PRESSURE SENSOR

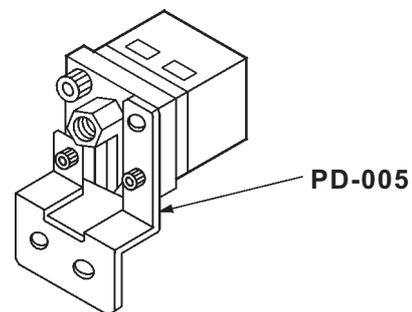
## OPTIONS

Designation	Model No	Description
Sensor mounting bracket (for standard type)	PD-001	Mounting bracket for standard type [ Two M4(length 6mm) pan head screws and two spring washers ] are attached
Straight bush	PD-002	Changes the pressure port from female [Rc(PT)1/8] to male thread [R(PT)1/8]
Panel mounting bracket (For standard type)	PD-003	It can be used for mounting on a panel (1 to 3.2mm thick).
Front protection cover (For standard type)	PD-004	It protects the sensor's adjustment panel. (It can be fitted when the panel mounting bracket is used.)
Sensor mounting bracket (for standard type)	PD-005	Mounting bracket for standard type Two M4(length 6mm) pan head screws and two spring washers are attached

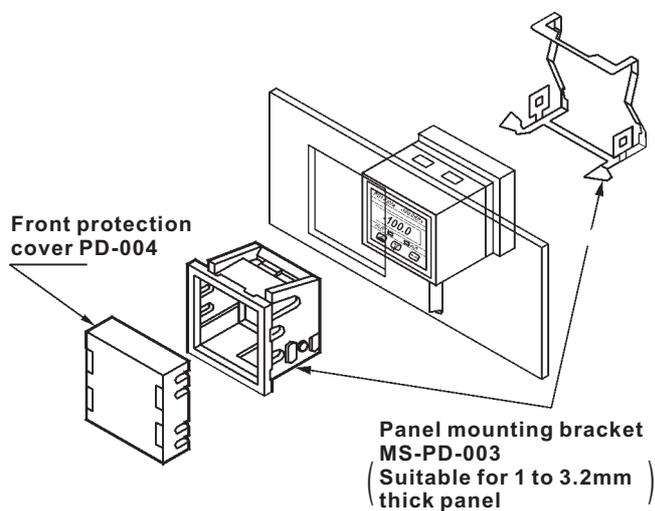
### ● Sensor mounting bracket



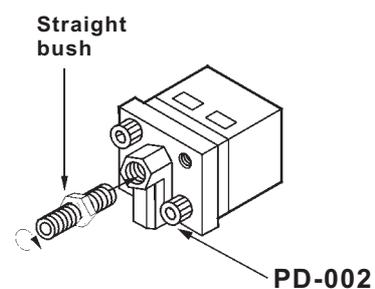
### ● Sensor mounting bracket



### ● Panel mounting bracket, Front protection cover



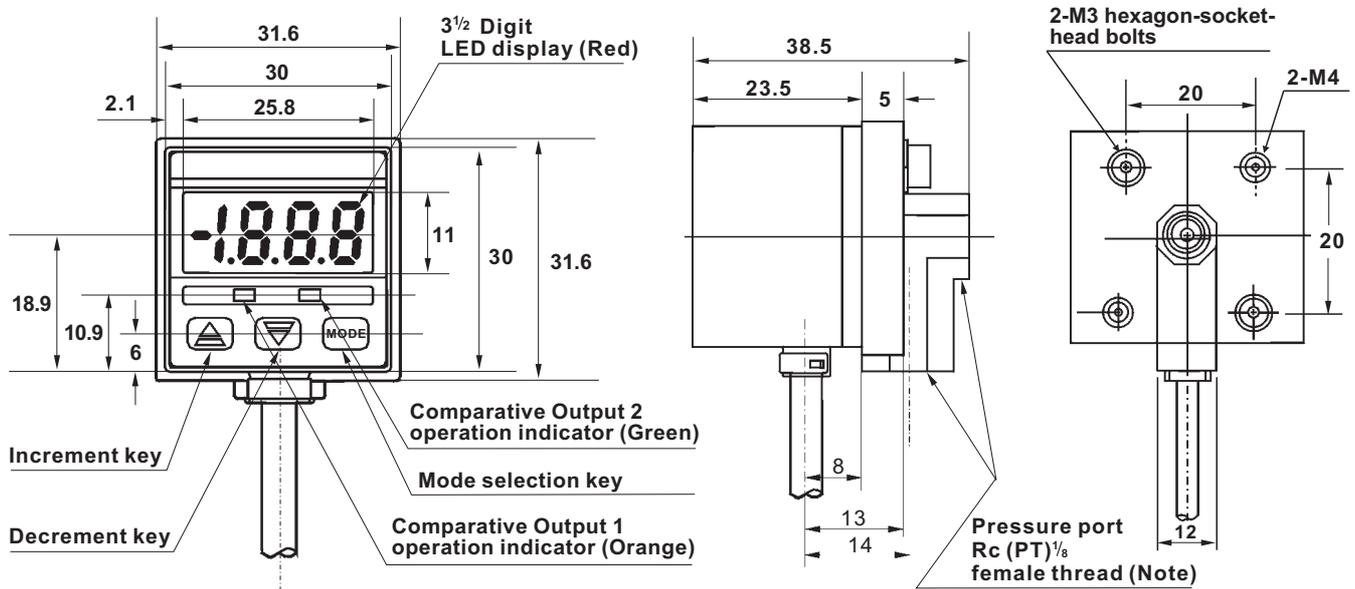
### ● Straight bush



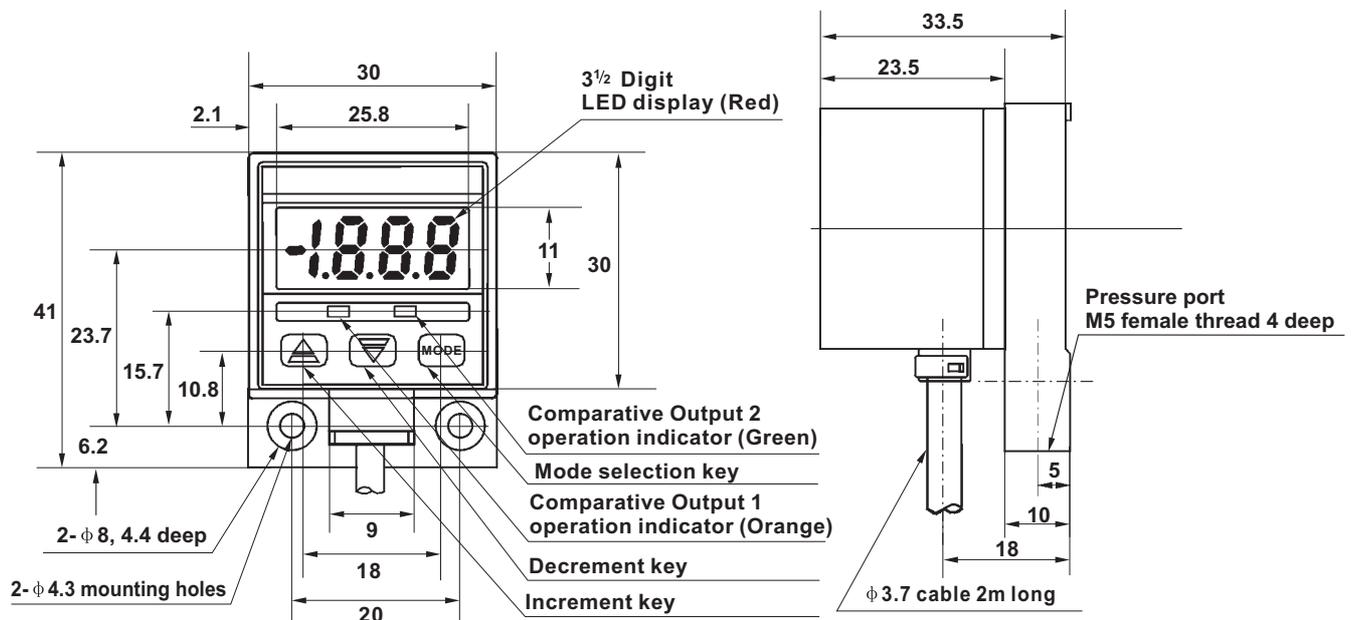
# LED DISPLAY DIGITAL PRESSURE SENSOR

## DIMENSIONS (Unit: mm)

Standard type (PD1-10V□/PD1-10P□/PD1-11P□)



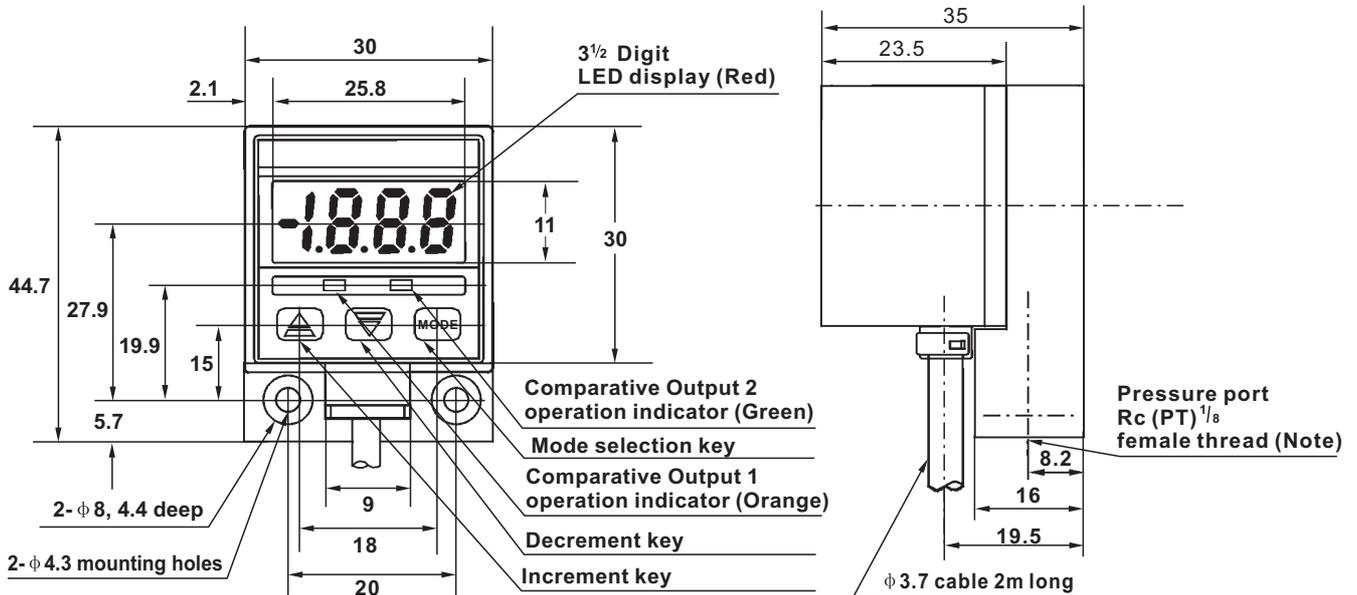
Light weight type (PD1-40VA)



# LED DISPLAY DIGITAL PRESSURE SENSOR

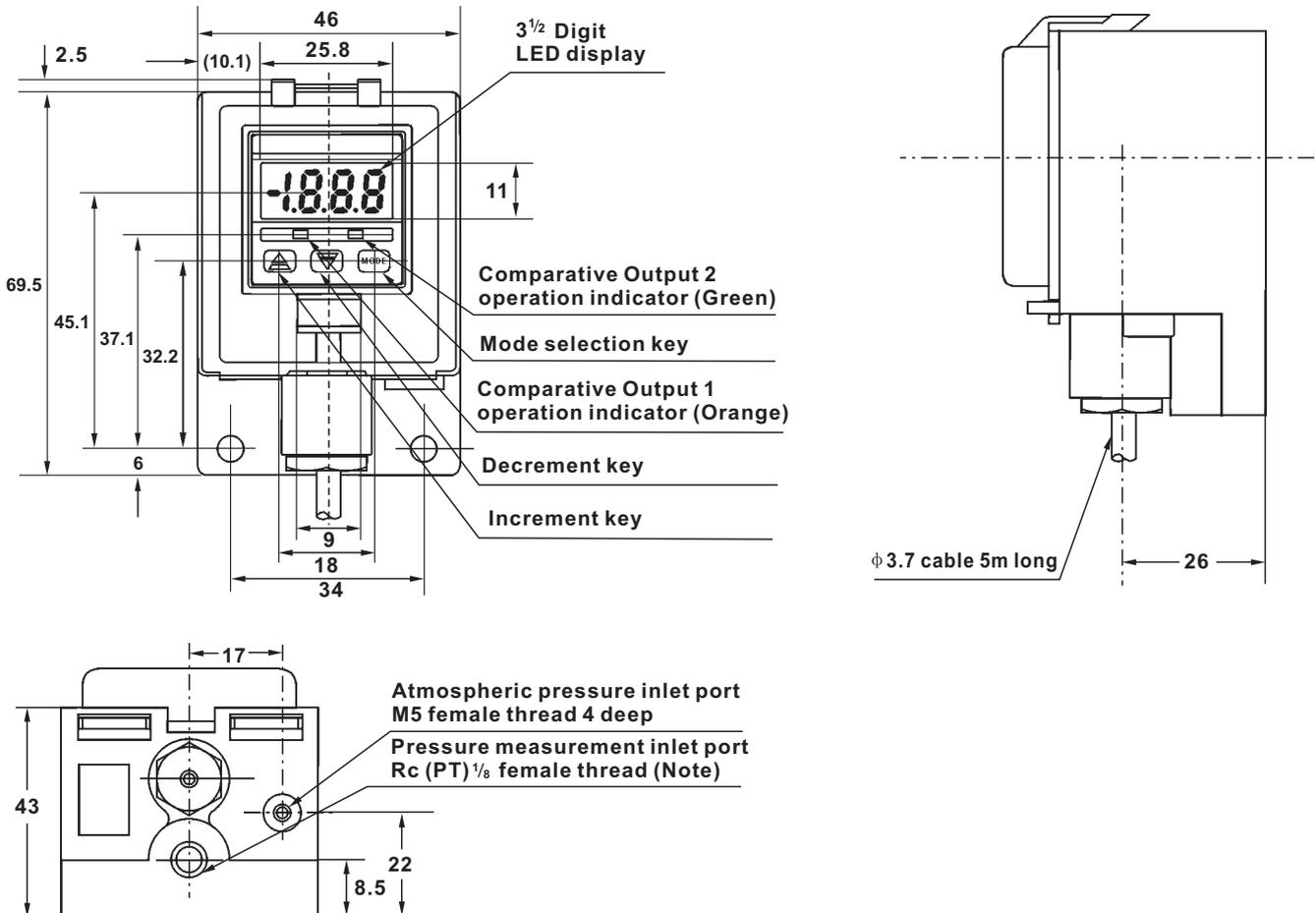
## DIMENSIONS (Unit: mm)

### Flat type (PD1-20V□/PD1-20P□/PD1-21P□)



Note: NPT <sup>1</sup>/<sub>8</sub> female thread for North American type, and G (PT) <sup>1</sup>/<sub>8</sub> Female thread for European type.

### IP67 type (PD1-30V□/PD1-30P□/PD1-31P□)

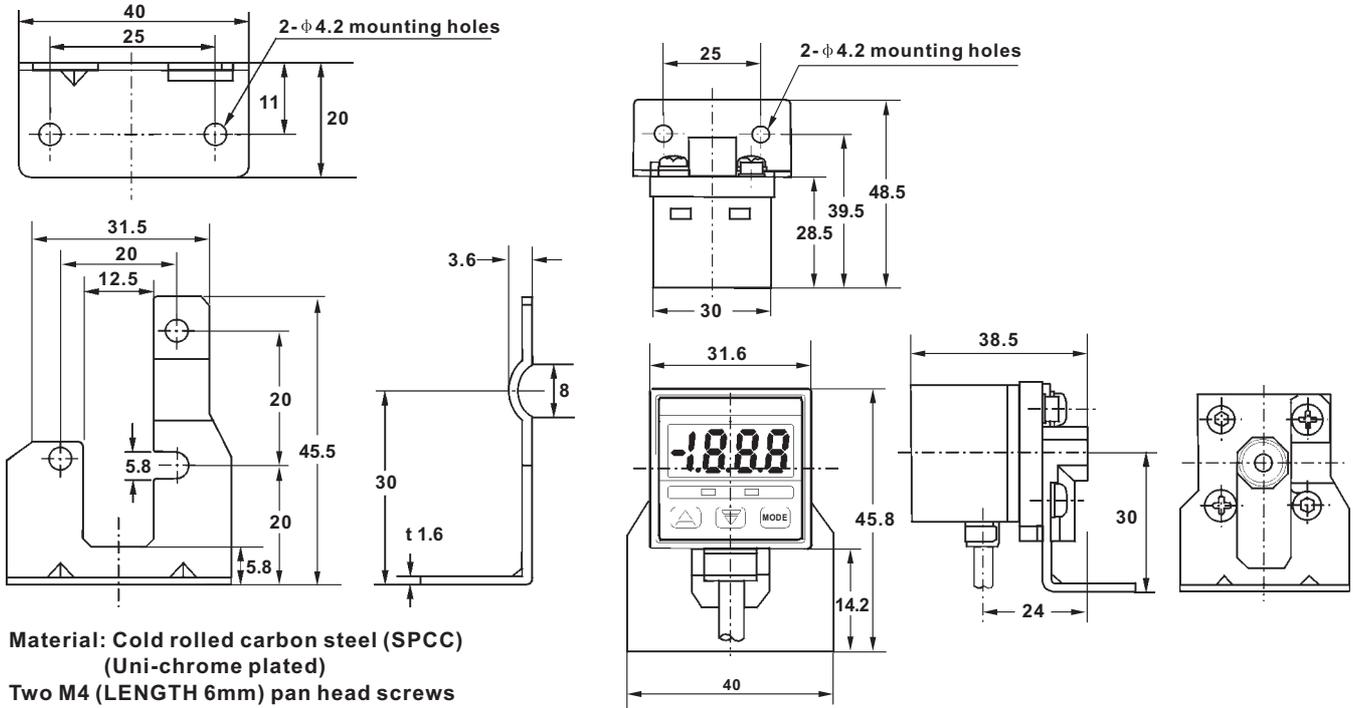


Note: NPT <sup>1</sup>/<sub>8</sub> for North American type, and G (PT) <sup>1</sup>/<sub>8</sub> FOR European type.

# LED DISPLAY DIGITAL PRESSURE SENSOR

## DIMENSIONS (Unit: mm)

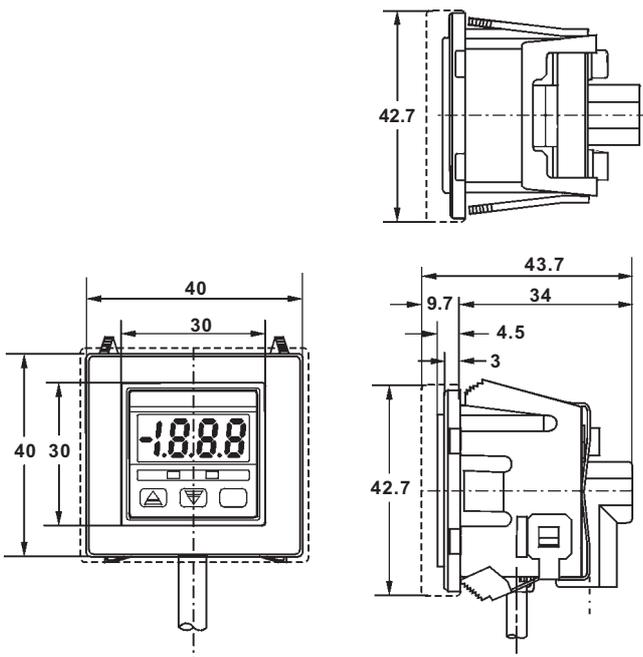
### Sensor mounting bracket for standard type (Optional) : PD-001



Material: Cold rolled carbon steel (SPCC)  
(Uni-chrome plated)  
Two M4 (LENGTH 6mm) pan head screws  
and two spring washers are attached.

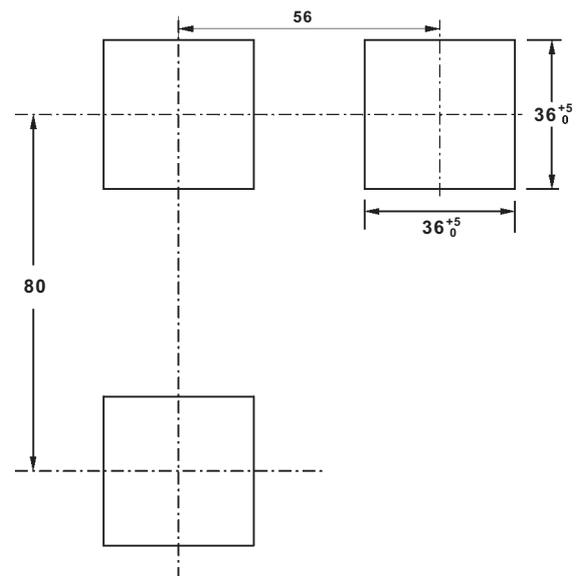
### Panel mounting bracket, front protection cover for standard type (Optional) : PD-003 PD-004

#### Assembly dimensions



Portion shows the front protection cover.  
Material: Polycarbonate (Front protection cover)  
Nylon 6, Stainless steel (SUS304)  
(Panel mounting bracket)

#### Panel cut-out dimensions



Note: The panel thickness should be 1 to 3.2mm.