SUNX

INSTRUCTION MANUAL

LED Display • Digital Pressure Sensor

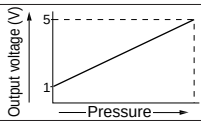
DP2 Series For use outside Japan

MJE-DP2 No.0580-05

Thank you very much for using SUNX sensors. Please read this Instruction Manual carefully and thoroughly for the correct and optimum use of this sensor. Kindly keep this manual in a convenient place for quick reference.

⚠
- 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.
- In case this sensor is used within Japan, SI unit most be used since use of pressure units in Japan is restricted to SI units.

1 SPECIFICATIONS

Item \ Type		Vacuum pressure				Positive pressure					
		−101kPa type				100kPa type			1MPa type		
		Standard	Flat	IP67	Light weight	Standard	Flat	IP67	Standard	Flat	IP67
Model No.	Asian	**DP2-20**	——	**DP2-60**	**DP2-80**	**DP2-21**	**DP2-41**	**DP2-61**	**DP2-22**	**DP2-42**	**DP2-62**
	North American (Note)	DP2-20F(-P)	**DP2-40N**	**DP2-60N**	——	DP2-21F(-P)	**DP2-41N**	**DP2-61N**	DP2-22F(-P)	**DP2-42N**	**DP2-62N**
	European	——	**DP2-40E**	**DP2-60E**	——	——	**DP2-41E**	**DP2-61E**	——	**DP2-42E**	**DP2-62E**
Type of pressure		Gauge pressure									
Rated pressure range		0 to −101.3kPa				0 to 100.0kPa			0 to 1.000MPa		
Set pressure range		5.1 to −101.3kPa				−5.0 to 100.0kPa			−0.050 to 1.000MPa		
Pressure withstandability		490kPa							1.47MPa		
Applicable fluid		Non-corrosive gas									
Selectable units		kgf/cm², bar, psi, mmHg, inHg				kgf/cm², bar, psi					
Supply voltage		12 to 24V DC $^{+10}_{-15}$% 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 • IP67 types)> 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 sink current) 0.4V 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)					
Output modes		Equipped with 4 types of modes: hysteresis mode, window comparator mode, dual output mode, automatic 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. ±1 digit									
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.  High pressure (Positive pressure type) High vacuum (Vacuum pressure type)									
Display		3½ digit red LED display (Sampling rate: 4 times/sec. approx.)									
Displayable pressure range		5.1 to −101.3kPa				−5.0 to 100.0kPa			−0.050 to 1.000MPa		
Analog bar display		LED bar display in steps of 10% F.S. approx.									
Operation indicators	Comparative Output 1	Orange LED (lights up when Comparative Output 1 is ON)									
	Comparative Output 2	Green LED (lights up when Comparative Output 2 is ON)									
Protection		Standard • Flat • 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									
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 • IP67 types: Rc (PT) 1/8 female thread, Light weight type: M5 female thread									
	North American	Standard type: NPTF 1/8 female thread, Flat • IP67 types: NPT 1/8 female thread									
	European	Flat • 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 reinforced), pressure port is brass (nickel plated)] Front cover (IP67 type only): Polycarbonate									
Cable		0.15mm² 5-core oil resistant cabtyre cable, 2m long (IP67 type: 5m long)									
Cable extension		Extension up to total 100m is possible with 0.3mm², or more, cable.									
Weight		Standard type: 95g approx., Flat type: 120g approx., IP67 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.

2 CAUTIONS

DP2 series is designed for use with non-corrosive gas. It cannot be used for liquid or corrosive gas.

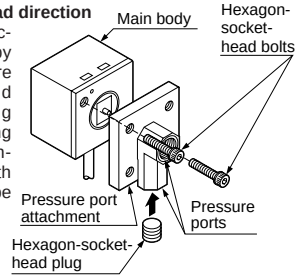
- Use within the rated pressure range.
- Do not apply pressure exceeding the pressure withstandability value. The diaphragm will get damaged and correct operation shall not be maintained.
- Make sure to carry out the wiring in the power supply off condition.
- Take care that wrong wiring will damage the sensor.
- 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 of the equipment to an actual ground.
- Do not use during the initial transient time (0.5 sec.) after the power supply is switched on.
- 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.
- Cable extension, using 0.3mm², or more, cable, should be 100m or less overall.
- Avoid use of standard type, flat type and light weight type of sensor 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.

3 SETTING OF PRESSURE LEAD DIRECTION AND PIPING

Standard type

● Setting of pressure lead direction

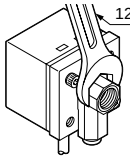
- The pressure lead direction can be changed by dismantling the pressure port attachment and changing the mounting direction. The tightening torque of the hexagon-socket-head bolt (length 9mm or less) should be 0.29N·m or less.



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

● Piping

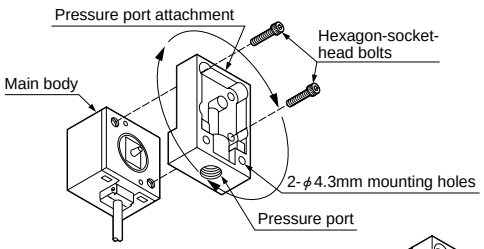
- When connecting a hexagon-socket-head plug or coupling to the pressure port, hold the hexagonal part of the pressure port with a 12mm spanner and make sure that the tightening torque is 9.8N·m or less. Also, in order to prevent any leakage, wind a sealing tape on the coupling when connecting.
  However, sealing tape is not required for North American type using NPTF 1/8 coupling. (Sealing tape is required if NPT1/8 coupling is used.)



Flat type, Light weight type

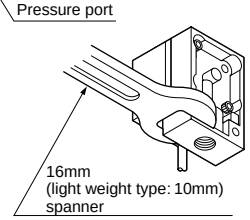
● Setting of pressure lead direction

- 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.



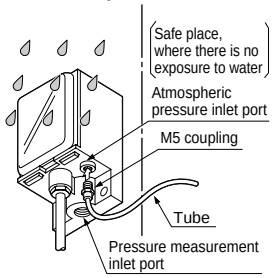
IP67 type

● Piping for pressure measurement inlet port

- When connecting a coupling to the pressure measurement inlet port, hold the pressure port attachment with 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.

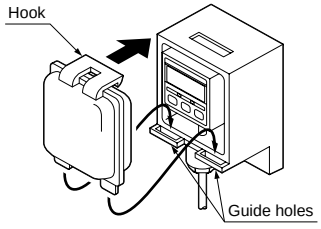
● Piping for atmospheric pressure inlet port

- 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 the tube does not get clogged.



● Fitting of front cover

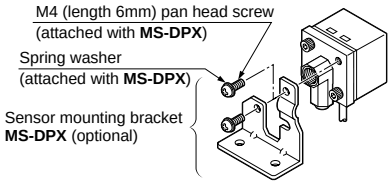
- Insert the bosses on the front cover into the guide holes at the bottom of the pressure port attachment, and push in the direction of the arrow to fit the hook.
  When removing the front cover, release the hook first.



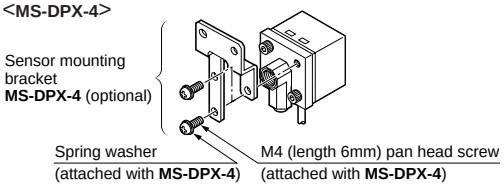
4 MOUNTING OF STANDARD TYPE SENSOR

● A sensor mounting bracket **MS-DPX** and **MS-DPX-4** (optional) may be used.
When mounting the sensor with the sensor mounting bracket, etc., the tightening torque should be 1.2N·m or less.

<MS-DPX>

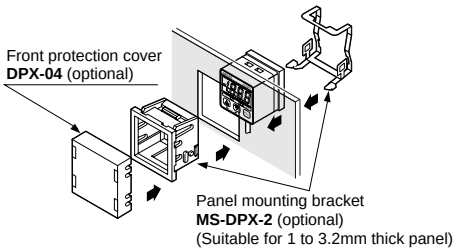


<MS-DPX-4>



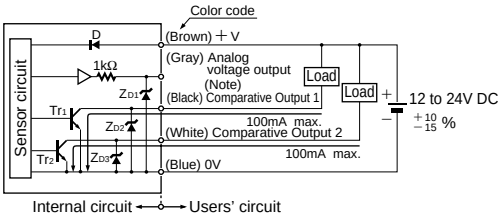
Note: In case mounting brackets or screws other than the sensor mounting bracket shown in the fiqure above are used, the length of the screws inserted into the pressure port attachment should be 5mm or less. If the length of the screws is longer than 5mm, the sensor may be damaged.

● Panel mounting bracket **MS-DPX-2** (optional) and a front protection cover **DPX-04** (optional) are also available.



5 I/O CIRCUIT DIAGRAM

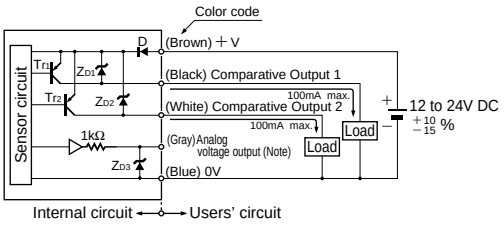
NPN output type



Note: The analog voltage output is not incorporated with a short-circuit protection circuit. Do not directly connect a power supply or a capacitive load. When using the analog voltage output, take care to connect external equipment 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_{D1}, Z_{D2}, Z_{D3}: Surge absorption zener diode
Tr_1, Tr_2: NPN output transistor

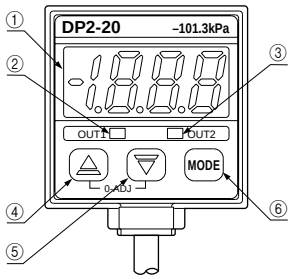
PNP output type



Note: The analog voltage output is not incorporated with a short-circuit protection circuit. Do not directly connect a power supply or a capacitive load. When using the analog voltage output, take care to connect external equipment 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_{D1}, Z_{D2}, Z_{D3}: Surge absorption zener diode
Tr_1, Tr_2: PNP output transistor

6 FUNCTIONAL DESCRIPTION OF OPERATION PANEL



	Description	Function	
①	$3\frac{1}{2}$ digit LED display (Red)	Displays measured pressure, settings, error messages and key-protect status.	
②	Comparative Output 1 operation indicator (Orange)	Lights up when Comparative Output 1 is ON.	
③	Comparative Output 2 operation indicator (Green)	Lights up when Comparative Output 2 is ON.	
④	Increment key (▲)	• In the initial setting mode, pressing the key changes the settable digit. • In the Set Value 1, 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. • In the sensing mode, if the key is pressed continuously for 4 sec. or more, the display shows peak hold value.	In the sensing mode, if both the keys are pressed simultaneously, zero-point adjustment is done.
⑤	Decrement key (▼)	• In the initial setting mode, pressing the key changes the set conditions. • In the Set Value 1, 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. • In the sensing mode, if the key is pressed continuously for 4 sec. or more, the display shows bottom hold value.	
⑥	Mode selection key (MODE)	• Pressing the key changes the selected mode to sensing mode, Set Value 1 (P1) set mode and Set Value 2 (P2) set mode. • In the sensing mode, if the key is pressed continuously for about 3 sec., key-protect can be set/released. • In the sensing mode, if the mode selection key is pressed while pressing the increment key (▲) , the initial setting mode is obtained.	

7 ERROR MESSAGES

● When an error occurs, take the following corrective action.

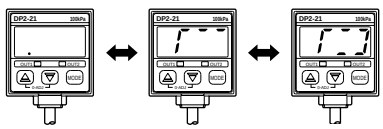
Error message	Cause		Corrective action
E-1	Overcurrent due to short-circuit.		Switch off the power supply and check the load.
E-3	Pressure is being applied during zero-point adjustment.		Applied pressure at the pressure port should be brought to atmospheric pressure and zero-point adjustment should be done again.
- - -	Positive pressure type	Applied pressure exceeds the upper limit of displayable pressure range.	Applied pressure should be brought within the rated 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.	

8 ANALOG BAR DISPLAY

● Pressure changes are displayed in an analog fashion by using LED bars. Hence, any sudden changes in pressure can be detected at a glance.
● The analog bar display shows the measured pressure, irrespective of the pressure unit, in steps of 10% F.S. approx.
(• Please refer to **11 SETTING ② Initial setting** for the procedure to change to analog bar display.)

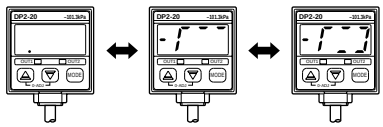
Analog bar display for positive pressure type sensor

Atm. pressure condition **High pressure condition**



Analog bar display for vacuum pressure type sensor

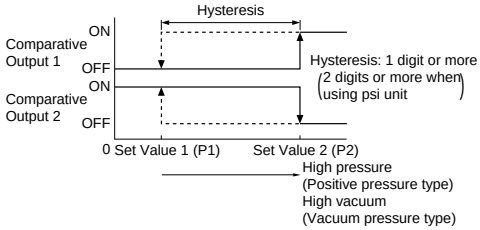
Atm. pressure condition **High vacuum condition**



9 OUTPUT MODES & THEIR CHARACTERISTICS

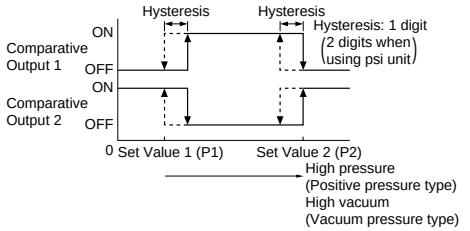
Hysteresis mode (H)

● The common hysteresis of the comparative outputs can be set, as desired, with the set values.



Window comparator mode (L)

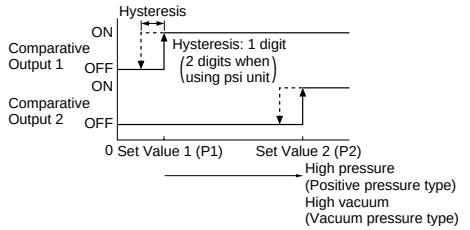
● The comparative outputs can be turned ON or OFF by a pressure which is within the pressure range set by Set Value 1 and Set Value 2.



• When operating in window comparator mode (L) Set Value 1 (P1) and Set Value 2 (P2) should be set with a difference of 3 digits or more. However, when the pressure unit is set to 'psi', the difference should be 6 digits or more.

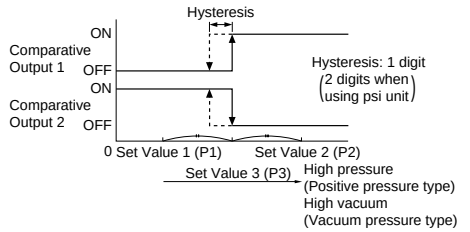
Dual output mode (d)

● The outputs can be put to different use such as detection of different kinds of objects, control function, alarm function etc.



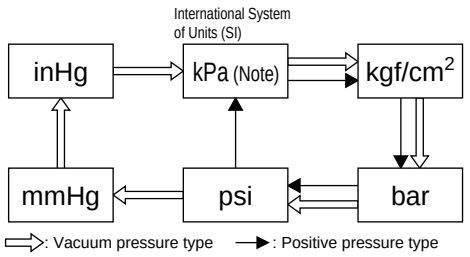
Automatic sensitivity setting mode (A)

● Using actual objects, if the pressure values for OK objects and NG objects are input, then the sensor is automatically set to the optimum pressure value (mid-value).



10 PRESSURE UNITS

● The pressure unit can be selected as per customer's requirement.
● In case of positive pressure type, the pressure unit can be changed from International System of Units (SI) 'kPa' or 'MPa' to 'kgf/cm², 'bar' or 'psi'. In case of vacuum pressure type, the pressure unit can be changed from International System of Units (SI) 'kPa' to 'kgf/cm², 'bar', 'psi', 'mmHg' or 'inHg'.
(• When the pressure unit is changed, the set values and the measured value are automatically converted.
• Please refer to **11 SETTING ② Initial setting** for the procedure to change the pressure unit.)



Note: MPa in case of **DP2-22**□, **DP2-42**□ and **DP2-62**□.

11 SETTING

- If key-protect has been set, make sure to release key-protect before operating the keys. (Please refer to **15 KEY-PROTECT FUNCTION** for the procedure.)
- 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	② Initial setting	③ Pressure value setting	Measurement
Adjust zero-point	Set [Display], [Output mode], and [Unit]	Enter Set Value 1 (P1) Set Value 2 (P2) Set Value 3 (P3)	Commence measurement on completion of setting

① Zero-point adjustment

- The displayed pressure when the pressure port is left open is adjusted to zero.

Set to sensing mode

- The sensor will automatically enter the sensing mode when power is supplied.
  - The figure on the left shows the display when the pressure unit and display are set to 'kPa' and 'digital display', respectively.

Perform zero-point adjustment

- 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 finger is released, zero-point adjustment is completed and the sensor returns to the sensing mode.

- If pressure has been applied during zero-point adjustment, [E-3] is displayed when the keys are pressed. Bring the applied pressure to atmospheric pressure (i.e., no applied pressure condition) and carry out the zero-point adjustment once again.

② Initial setting

- Pressure [Unit], [Display] and [Output mode] of the comparative outputs are set.

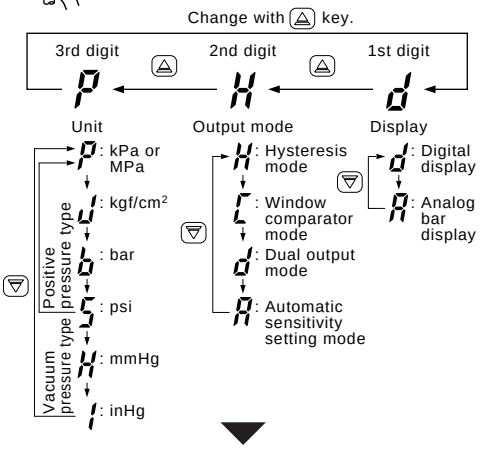
Set to initial setting mode

- In the sensing mode, press MODE key while pressing △ key.
  - Initial setting is displayed.
  - If sensor is being used for the first time, [PHd] is displayed.

Set initial conditions

- The settable digit blinks.
- The settable digit changes when △ key is pressed.

- Change the setting of each digit as desired.
- The setting is changed when ▽ key is pressed.



Set to sensing mode

- Press MODE key.
  - The sensor returns to sensing mode after the initial conditions have been set.
  - Since the initial conditions which have been set are stored in an EEPROM, they are not erased even if the power supply is switched off.
  - The figure on the left shows the display when the unit and display are set to 'kPa' and 'digital display', respectively.

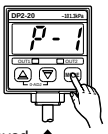
③ Setting of pressure values

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

- [Set Value 1 (P1)] and [Set Value 2 (P2)] of the comparative outputs are set.

- The setting of Set Value 2 (P2) with respect to Set Value 1 (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 Value 1 (P1) and Set Value 2 (P2) can be made common for all the output modes. However, when a changeover is made to the automatic sensitivity setting mode, since Set Value 3 (P3) has not been set, make sure to carry out the pressure value settings for the automatic sensitivity mode.

Set to Set Value 1 (P1) set mode



- In the sensing mode, press MODE key.
  - [P-1] and Set Value 1 (P1) which is being set are displayed alternately.
  - The figure on the left shows the display of a vacuum pressure type sensor when the pressure unit has been set to 'kPa'.

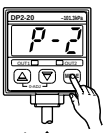
Displayed alternately

Enter Set Value 1 (P1)

- Enter using △ key and ▽ key.
- In case of the positive pressure type sensor, if △ key is pressed once the set value changes towards the high pressure side by 1 digit and if ▽ key is pressed once the set value changes towards the low pressure side by 1 digit.
  In case of the vacuum pressure type sensor, if △ key is pressed once the set value changes towards the high vacuum side by 1 digit and if ▽ key is pressed once the set value changes towards the low vacuum side by 1 digit.
- If △ key or ▽ key is pressed continuously, the set value changes quickly.
  - If the set pressure range is exceeded, either [UP] (upper limit exceeded) or [LO] (lower limit exceeded) is displayed.

Displayed alternately

Set to Set Value 2 (P2) set mode



- In the Set Value 1 (P1) set mode, press MODE key.
  - [P-2] and Set Value 2 (P2) which is being set are displayed alternately.

Displayed alternately

Enter Set Value 2 (P2)

- Using △ key and ▽ key, enter in a manner similar to that for entering Set Value 1 (P1).
  - If the set pressure range is exceeded, either [UP] (upper limit exceeded) or [LO] (lower limit exceeded) is displayed.

Displayed alternately

- If the output mode has been set to the window comparator mode (C) in the initial setting mode, Set Value 1 (P1) and Set Value 2 (P2) should be set with a difference of 3 digits or more. However, when unit is set to 'psi', the difference should be 6 digits or more.

Set to sensing mode

- Press MODE key.
  - The sensor returns to sensing mode after Set Value 1 (P1) and Set Value 2 (P2) have been set.
  - Since the values which have been set are stored in an EEPROM, they are not erased even if the power supply is switched off.

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

- Comparative outputs' [Set Value 1 (P1)], [Set Value 2 (P2)] and [Set Value 3 (P3)] are set.

- The setting of Set Value 2 (P2) with respect to Set Value 1 (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 Value 3 (P3) is automatically set to the mid-value of Set Value 1 (P1) and Set Value 2 (P2). However, if Set Value 1 (P1) is set to a value on the vacuum pressure side for a positive pressure type sensor or to the positive pressure side for a vacuum pressure type sensor, Set Value 3 (P3) is automatically set to the mid-value of 'zero'(atmospheric pressure) and Set Value 2 (P2). Further, if both, Set Value 1 (P1) and Set Value 2 (P2) are set to a value on the vacuum pressure side for a positive pressure type sensor or to the positive pressure side for a vacuum pressure type sensor, Set Value 3 (P3) is automatically set to 'zero'(atmospheric pressure).
- The automatically set Set Value 3 (P3) can be changed manually.
- Since display of error messages is not possible during pressure value setting in the automatic sensitivity setting mode, make sure that the sensor is used within the rated pressure range.

Set to Set Value 1 (P1) set mode

- In the sensing mode, press MODE key.
  - [P-1] and Set Value 1 (P1) which is being set are displayed alternately.
  - The figure on the left shows the display of a vacuum pressure type sensor when the pressure unit has been set to 'kPa'.

Displayed alternately

Enter Set Value 1 (P1)

- Within the required permissible pressure range, having created a pressure state which is nearest to the atmospheric pressure, press ▽ key.
  - The pressure value at the time of pressing ▽ key is entered as Set Value 1 (P1). Set Value 1 (P1) and [P-1] are displayed alternately.
  - If the set pressure range is exceeded, either [UP] (upper limit exceeded) or [LO] (lower limit exceeded) are displayed and Set Value 1 (P1) is set automatically to the upper or lower limit of the set pressure range.
  - The setting of Set Value 1 (P1) can be repeated several times in the Set Value 1 (P1) set mode.

Displayed alternately

Set to Set Value 2 (P2) set mode

- In the Set Value 1 (P1) set mode, press MODE key.
  - [P-2] and Set Value 2 (P2) which is being set are displayed alternately.

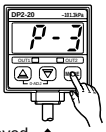
Displayed alternately

Enter Set Value 2 (P2)

- 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.
  - The pressure value at the time of pressing △ key is entered as Set Value 2 (P2). Set Value 2 (P2) and [P-2] are displayed alternately.
  - If the set pressure range is exceeded, either [UP] (upper limit exceeded) or [LO] (lower limit exceeded) are displayed and Set Value 2 (P2) is set automatically to the upper or lower limit of the set pressure range.
  - The setting of Set Value 2 (P2) can be repeated several times in the Set Value 2 (P2) set mode.

Displayed alternately

Set to Set Value 3 (P3) set mode



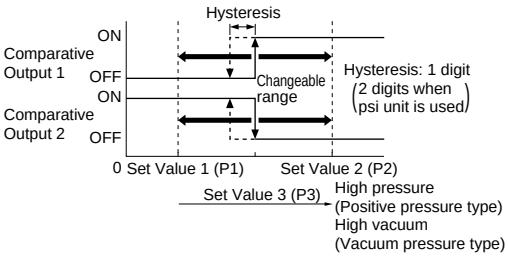
- In the Set Value 2 (P2) set mode, press MODE key.

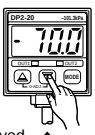
(• P-3 and the automatically set Set Value 3 (P3) are displayed alternately.
• In case
Set Value 1 (P1) = −50.0kPa
Set Value 2 (P2) = −100.0kPa
then
Set Value 3 (P3) = $\frac{-50.0+(-100.0)}{2}$ = −75.0kPa
(Digits smaller than the displayed digits are discarded.)

Displayed alternately

In case Set Value 3 (P3) is to be changed

• The automatically set Set Value 3 (P3) can be manually changed to a value between Set Value 1 (P1) and Set Value 2 (P2). However Set Value 3 (P3) cannot be set to a value on the vacuum pressure side for a positive pressure type sensor or to the positive pressure side for a vacuum pressure type sensor.





- Enter using ▲ key and ▼ key.
- In case of a positive pressure type sensor, if ▲ key is pressed once, the set value changes towards the high pressure side by 1 digit and if ▼ key is pressed once, the set value changes towards the low pressure side by 1 digit.
  In case of a vacuum pressure type sensor, if ▲ key is pressed once the set value changes towards the high vacuum side by 1 digit and if ▼ key is pressed once the set value changes towards the low vacuum side by 1 digit.
- If ▲ key or ▼ key is pressed continuously, the set value changes quickly.

(• If the set pressure range is exceeded, either UP (upper limit exceeded) or LO (lower limit exceeded) is displayed.)

Displayed alternately

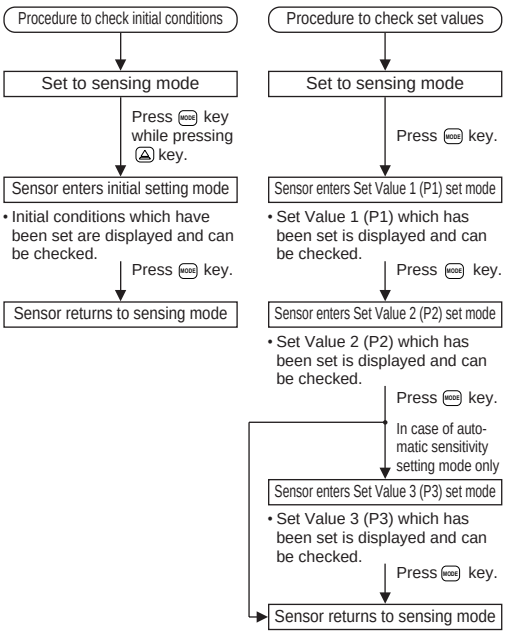
Set to sensing mode

- Press MODE key.

(• The sensor returns to the sensing mode after Set Value 1 (P1), Set Value 2 (P2) and Set Value 3 (P3) have been set.
• Since the values which have been set are stored in an EEPROM, they are not erased even if the power supply is switched off.)

12 PROCEDURE FOR CHECKING SET VALUES

● The conditions which have been set in the initial setting and the pressure settings can be checked by the following procedure.



• Please note that if any key, except MODE key, is pressed in any setting mode, the set conditions shall get changed.

13 CONVERSION OF PRESSURE UNITS

● In the **DP2** 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 following table.

Conversion procedure

• For example, if 2kPa is to be expressed in kgf/cm², since 1kPa=1.01972×10⁻²kgf/cm², 2kPa becomes 2×1.01972×10⁻² ≒ 0.020kgf/cm²

Conversion table for pressure units

	kPa	MPa	kgf/cm²	bar	psi	mmHg (Torr)	inHg	atm
1kPa	1	1×10^{-3}	1.01972×10^{-2}	1×10^{-2}	1.45038×10^{-1}	7.50062	0.2953	9.86923×10^{-3}
1MPa	1×10^{3}	1	1.01972×10	1×10	1.45038×10^{2}	7.50062×10^{3}	0.2953×10^{3}	9.86923
1kgf/cm²	9.80665×10	9.80665×10^{-2}	1	9.80665×10^{-1}	1.42234×10	7.35559×10^{2}	2.8959×10	9.67841×10^{-1}
1bar	1×10^{2}	1×10^{-1}	1.01972	1	1.45038×10	7.50062×10^{2}	2.953×10	9.86923×10^{-1}
1psi	6.89473	6.89473×10^{-3}	7.03065×10^{-2}	6.89473×10^{-2}	1	5.17147×10	2.036	6.80457×10^{-2}
1mmHg (1Torr)	1.33322×10^{-1}	1.33322×10^{-4}	1.35951×10^{-3}	1.33322×10^{-3}	1.93368×10^{-2}	1	3.9370×10^{-2}	1.31579×10^{-3}
1inHg	3.3864	3.3864×10^{-3}	3.4531×10^{-2}	3.3864×10^{-2}	0.4912	2.5400×10	1	3.342×10^{-2}
1atm	1.01325×10^{2}	1.01325×10^{-1}	1.03323	1.01325	1.46960×10	7.60000×10^{2}	2.9921×10	1

14 PEAK HOLD & BOTTOM HOLD FUNCTIONS

● Peak hold and bottom hold functions enable the display of the peak value (maximum pressure value in case of the positive pressure type sensor and maximum vacuum pressure value in case of the vacuum pressure type sensor) and the bottom value (minimum pressure value in case of the positive pressure type sensor and minimum vacuum pressure value in case of the vacuum pressure type sensor) of the varying measured pressure.

● These functions are convenient for finding the pressure variation range or for determining the reference for pressure settings.

• Please note that the peak value and the bottom value data is erased when it is no longer displayed.
• The response time of the comparative outputs becomes slower during the peak hold and bottom hold display.

Peak hold display

Initiating peak hold display

- In the sensing mode, keep ▲ key pressed until PUP is displayed. (4 sec. approx.)
  When the finger is released after PUP is displayed, the peak value and PUP are displayed alternately.

(• If the applied pressure exceeds the displayable pressure range, error message (---- or ----) and PUP are displayed alternately. In this case, bring back the applied pressure to within the rated pressure range.
• The figure on the left shows the display of a vacuum type sensor when the pressure unit has been set to 'kPa'.)

Displayed alternately

Ending peak hold display

- Press ▲ key.

[• Sensor returns to sensing mode.]

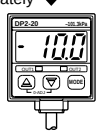
Bottom hold display

Initiating bottom hold display

- In the sensing mode, keep ▼ key pressed until PLO is displayed. (4 sec. approx.)
  When the finger is released after PLO is displayed, the bottom value and PLO are displayed alternately.

(• If the applied pressure exceeds the displayable pressure range, error message ---- or ---- and PLO are displayed alternately. In this case, bring back the applied pressure to within the rated pressure range.
• The figure on the left shows the display of a vacuum type sensor when the pressure unit has been set to 'kPa'.)

Displayed alternately



Ending bottom hold display

- Press ▼ key.

[• Sensor returns to sensing mode.]

15 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 sec. and release it immediately when On is displayed.

(• Key-protect is set and the sensor returns to the sensing mode.)

• Since the key-protect information is stored in an EEPROM, it is not erased even if the power supply is switched off.
• Please take care to remember if the key-protect function has been set.

Release of key-protect

- In the sensing mode, press MODE key continuously for about 3 sec. and release it immediately when OFF is displayed.

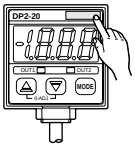
(• Key-protect is released and the sensor returns to the sensing mode.)

• When the keys are to be operated, make sure that key-protect is released.

16 LABEL FOR CHANGE IN PRESSURE UNIT

● When a pressure unit other than 'kPa' or 'MPa' has been selected in the initial setting mode, the label (supplied as accessory) which corresponds to the selected unit should be stuck at the position shown in the figure below.

Pressure unit label (accessory)



Stick the pressure unit label at the position shown.

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