DP5/DPH SERIES

New

Head-separated Digital Pressure Sensor

Digital | Automatic sensitivity setting | Auto reference | With analog output

1/1,000 sec. The fastest response in the industry

Conforming to EMC Directive

UL Recognition

Super fast 1 ms

Mounting the detachable head close to the detecting section minimizes piping and enables response time of 1 ms, the fastest in the industry, as well as greatly decreasing tact time delay.
In addition, the ultra-small and light-weight design of the head means it can easily be mounted on moving sections.

Independent use of sensor head possible

Data can be controlled by taking the analog voltage output (1 to 5 V) from the sensor head and feeding it to a digital panel meter.

Convenient intermediate cable with connector

Intermediate cable with connector for connecting the sensor head and the controller makes operation and maintenance easier.

- Standard or flexible intermediate cables are available in 2 m 6.562 ft, 3 m 9.843 ft, and 5 m 16.404 ft types.
- Use the flexible intermediate cable when the sensor head is attached to moving sections.

A total of 10 head variations

A total of 10 head variations to meet all production demands.

Vacuum pressure type (0 to −101.3 kPa)

- M5 male thread
- R (PT) 1/8 male thread / M5 female thread
- NPT 1/8 male thread / 10-32UNF female thread
- 10-32UNF male thread

Positive pressure type (0 to 1.000 MPa)

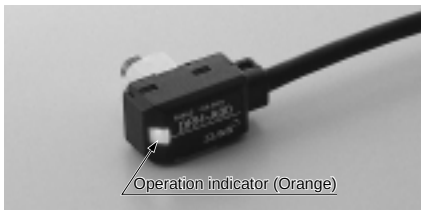
- M5 female thread
- R (PT) 1/8 male thread / M5 female thread
- NPT 1/8 male thread / 10-32UNF female thread

Compound pressure type (−100.0 to 100.0 kPa)

- M5 female thread
- R (PT) 1/8 male thread / M5 female thread
- NPT 1/8 male thread / 10-32UNF female thread

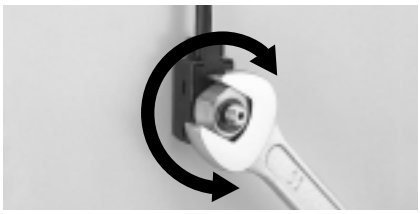
Sensor head with operation indicator

The sensor head is also equipped with operation indicator. Output ON / OFF can be checked on the sensor head, so that it is suitable for checking operation at the suction head. (Linked to Comparative Output 1)



Easy mounting, mobile pressure port

The head's pressure port can be rotated independently (free-turning) of the sensor head. In addition to being easy to mount, the cable can be laid in any direction.



Globally usable

Two types of output, NPN and PNP, are available to allow use of the sensors anywhere in the world. The sensor, of course, conforms to the CE marking EMC Directive.
Further, it has obtained UL recognition.

Conforming to EMC Directive

UL Recognition

Light-weight, compact design

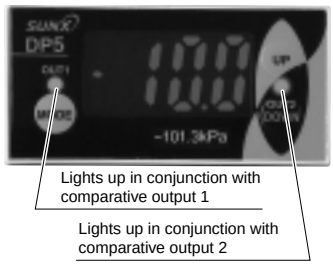
The controller was designed to be light-weight and compact.
Control panel setup is low cost and requires minimal space.

User friendly two-color digital display

The user friendly two-color digital display changes color when output changes (ON / OFF), making it easy to check operation status at a glance. The display color can be linked to Comparative Output 1 or Comparative Output 2.

Two operation indicators

There are two operation indicators that light respectively when Comparative Output 1 or Comparative Output 2 is ON. They are convenient for intensive operation checks.



Sensor head auto-recognition

The head's auto-recognition function means you don't have to manually set the head type at the controller, saving you valuable time.

Two independent outputs plus analog voltage output

In addition to two independent outputs (ON / OFF), analog voltage output (1 to 5 V) is also available. The different outputs allow you to create solutions for a wide variety of applications.

Supplied with a panel mounting bracket

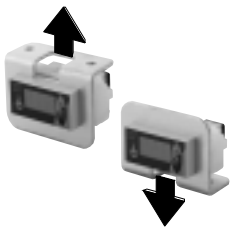
A panel mounting bracket (**MS-DP-1**) is enclosed to enable simple mounting of the controller onto the panel surface, thus contributing to the total cost reduction.
Since the panel thickness can be from 1 to 6 mm 0.039 to 0.236 in, the controller can even be mounted on thick, resin-made panels.
The attached panel mounting bracket enables vertical installation.

2 types of sensor mounting brackets are available

Using the vertical mounting bracket (**MS-DP-3**) and the horizontal mounting bracket (**MS-DP-4**), the devices can be installed in the space inside machines or boxes.

MS-DP-3 for vertical orientation mounting

Installed oriented upwards



Installed oriented downwards

MS-DP-4 for horizontal orientation mounting

Installed oriented to the left

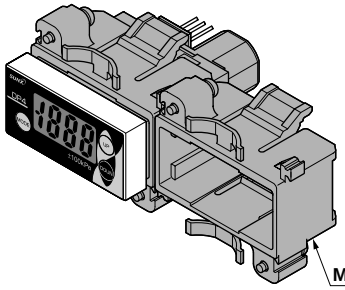
Installed oriented to the right

DIN rail mounting bracket is available

The controller can be mounted even on a 35 mm 1.378 in width DIN rail by using the optional DIN rail mounting bracket (**MS-DP-2**). It can be fitted even in a narrow space inside your equipment because it can be mounted from four directions.

Made for horizontal panel mounting

Using the horizontal multiple panel mounting bracket, the **MS-DP-5** (optional), direct panel surface horizontal mounting is rendered possible. For installation, the panel thickness must be from 1 to 6 mm 0.039 to 0.236 in.



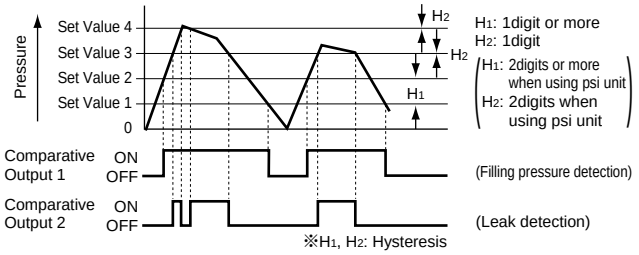
DP5/DPH

The only sensor in the industry with a leak test mode

Four output modes give you complete control.

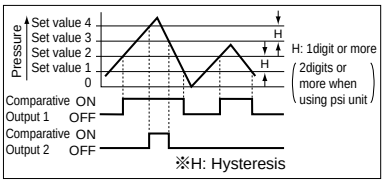
Leak test mode

It is suitable for a leak test since Comparative Output 1 can be set to the hysteresis mode and Comparative Output 2 can be set to the window comparator mode. Using it along with the auto-reference / remote zero-adjustment functions ensures a reliable leak test.



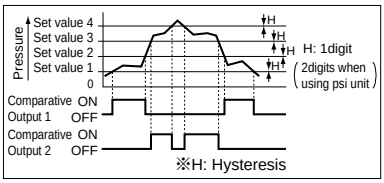
Hysteresis mode

The hysteresis of the comparative outputs can be set arbitrarily by the set values for ON / OFF control.



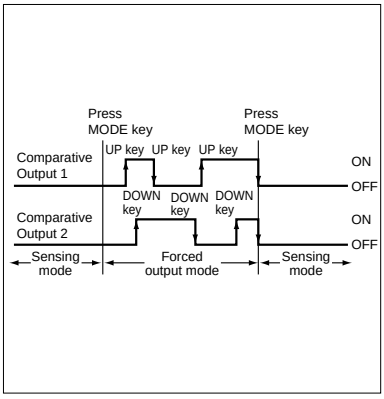
Window comparator mode

The comparative output can be turned ON or OFF by a pressure which is within the set pressure range.



Forced output mode

The comparative outputs are forcibly maintained at OFF level in the sensing mode, irrespective of the set values. Hence, it is convenient for only displaying the pressure value without using the comparative outputs. Further, since the comparative outputs can be forcibly switched ON or OFF with key operation, without actually applying pressure, this mode is suitable for an operation check or a start-up check.



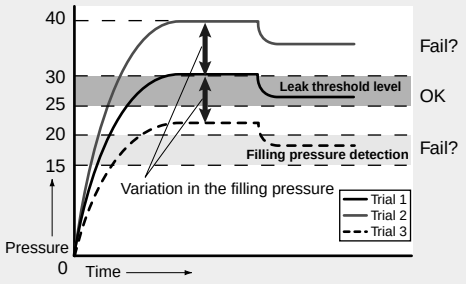
Equipped with auto-reference and remote zero-adjustment functions

If the reference pressure of the equipment changes, the auto-reference function can compensate the threshold levels by the amount of change and the remote zero-adjustment function can reset the display value to zero via external input. These functions are ideal for places where the reference pressure fluctuates wildly, or where fine settings are desired.

Example: When leak test mode is applied, Comparative Output 1 detects the filling pressure and Comparative Output 2 detects the leakage.

Without auto-reference and remote zero-adjustment functions

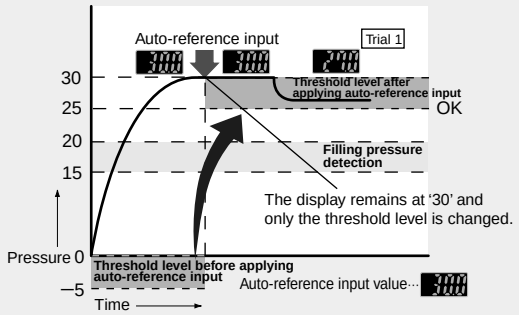
Mode: Leak test mode
Comparative Output 1 (Set value: lower limit···15 / upper limit···20)
Comparative Output 2 (Set value: lower limit···25 / upper limit···30)
Fixed setting



Because the threshold is fixed for conventional pressure sensors, changes in the reference pressure result in wrong decisions.

With auto-reference function applied

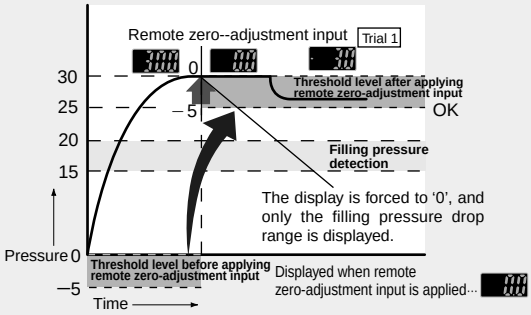
Comparative Output 1 (Set value: lower limit···15 / upper limit···20)
Comparative Output 2 (Set value: lower limit···−5 / upper limit···0)
Sets the absolute threshold level



When auto-reference input is applied, the reference pressure '30' is added to the threshold level. If the reference pressure changes to '20' or '40', the auto-reference input compensates for this every time by changing the threshold level, so any variation in the filling pressure can be ignored.

With remote zero-adjustment function applied

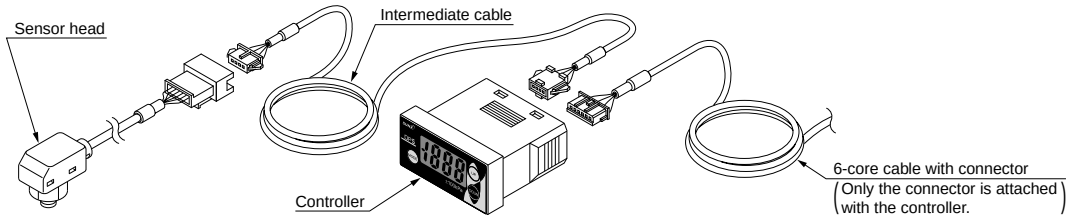
Comparative Output 1 (Set value: lower limit···15 / upper limit···20)
Comparative Output 2 (Set value: lower limit···−5 / upper limit···0)
Sets the absolute threshold level



When remote zero-adjustment input is applied, the reference pressure is forced to '0'. If the reference pressure changes to '20' or '40', the remote zero-adjustment input adjusts the reference pressure to '0' every time the reference pressure changes, so any variation in the filling pressure can be ignored.

ORDER GUIDE

DP5/DPH configuration diagram



Sensor head

An intermediate cable is required to connect the controller and the sensor head. Please order it separately.

Type	Appearance	Rated pressure range (Note)	Model No.	Pressure port	Applicable fluid
Vacuum pressure		0 to −101.3 kPa	**DPH-A00**	M5 male thread	Non-corrosive gas
			DPH-A10	R (PT) 1/8 male thread / M5 female thread	
			DPH-A20	NPT1/8 male thread / 10-32UNF female thread	
			DPH-A30	10-32UNF male thread	
Positive pressure		0 to 1.000 MPa	**DPH-A02**	M5 male thread	
			DPH-A12	R (PT) 1/8 male thread / M5 female thread	
			DPH-A22	NPT1/8 male thread / 10-32UNF female thread	
Compound pressure		−100.0 to 100.0 kPa	**DPH-A07**	M5 male thread	
			DPH-A17	R (PT) 1/8 male thread / M5 female thread	
			DPH-A27	NPT1/8 male thread / 10-32UNF female thread	

Note: The rated pressure range indicates the range for full product performance.

Controller

An intermediate cable is required to connect the controller and the sensor head. Please order it separately.

Appearance	Rated pressure range (Note)	Model No.	Output
	Vacuum pressure: 0 to −101.3 kPa Positive pressure: 0 to 1.000 MPa Compound pressure: −100.0 to 100.0 kPa	**DP5-C**	NPN open-collector transistor
		DP5-C-P	PNP open-collector transistor

Note: The rated pressure range indicates the range for full product performance. It changes automatically according to the connected pressure sensor head.

Intermediate cable

An intermediate cable is required to connect the controller and the sensor head. Please order it separately.

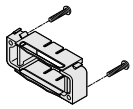
Designation		Appearance	Model No.	Description	
Intermediate cable	Standard		**DPH-CC2**	Length: 2 m 6.562 ft	4-core cable with connector at both ends
			DPH-CC3	Length: 3 m 9.843 ft	
			DPH-CC5	Length: 5 m 16.404 ft	
	Flexible		**DPH-CC2-R**	Length: 2 m 6.562 ft	4-core flexible cable with connector at both ends
			DPH-CC3-R	Length: 3 m 9.843 ft	
			DPH-CC5-R	Length: 5 m 16.404 ft	

DP5/DPH

ORDER GUIDE

Accessory

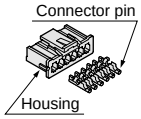
• **MS-DP-1** (Panel mounting bracket)



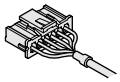
OPTIONS

Designation	Model No.	Description	
Connector	**CN-66**	Set of 10 housings and 60 connector pins	
6-core cable with connector	**CN-66-C2**	Length: 2 m 6.562 ft	0.2 mm² 6-core cabtyre cable with connector Cable outer diameter: ϕ4.8 mm ϕ0.189 in
	CN-66-C5	Length: 5 m 16.404 ft	
DIN rail mounting bracket	**MS-DP-2**	For installation to 35 mm 1.378 in width DIN rail	
Controller mounting bracket	**MS-DP-3**	Vertical mounting bracket	
	MS-DP-4	Horizontal mounting bracket	
Horizontal multiple panel mounting bracket	**MS-DP-5**	Enables the sensors to be attached to each other laterally and mounted on the panel.	

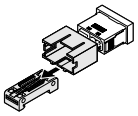
Connector
• **CN-66**



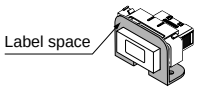
6-core cable with connector
• **CN-66-C2**
• **CN-66-C5**



DIN rail mounting bracket
• **MS-DP-2**



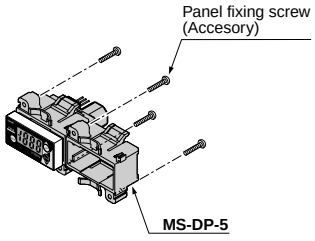
Controller mounting bracket
• **MS-DP-3**



• **MS-DP-4**

Designed with a 9 mm 0.354 in label space to enable the labeling of the sensors with a label printer (9 mm 0.354 in width) for sensor number and application data.

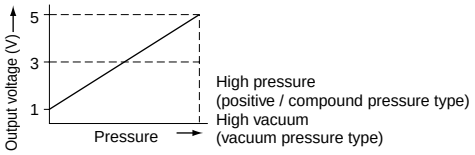
Horizontal multiple panel mounting bracket
• **MS-DP-5**



※ The above illustration shows two units connected in sequence.

SPECIFICATIONS

Pressure sensor head

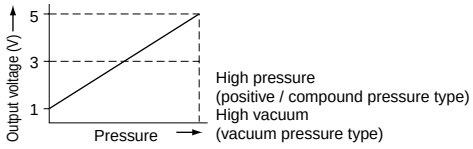
Item \ Type	Vacuum pressure				Positive pressure			Compound pressure		
	− 101 kPa type				1 MPa type			± 100 kPa type		
Model No.	**DPH-A00**	**DPH-A10**	**DPH-A20**	**DPH-A30**	**DPH-A02**	**DPH-A12**	**DPH-A22**	**DPH-A07**	**DPH-A17**	**DPH-A27**
Type of pressure	Gauge pressure									
Rated pressure range (Note)	0 to − 101.3 kPa				0 to 1.000 MPa			− 100.0 to 100.0 kPa		
Pressure withstandability	500 kPa				1.500 MPa			500 kPa		
Applicable fluid	Non-corrosive gas									
Supply voltage	12 to 24 V DC $^{+10}_{-15}$% Ripple P-P 10 % or less									
Current consumption	15 mA or less (operation indicator off) / 17 mA or less (operation indicator on)									
Analog voltage output	• Output voltage: 1 to 5 V (over rated pressure range) • Zero point: within 1 V ± 2 % F.S. (vacuum / positive pressure type) within 3 V ± 3 % F.S. (compound pressure type) • Span: within 4 V ± 3.5 % F.S. • Linearity: within ± 1 % F.S. • Output impedance: 1 kΩ approx. 									
Environmental resistance: Pollution degree	3 (Industrial environment)									
Environmental resistance: Protection	IP40 (IEC)									
Environmental resistance: Ambient temperature	0 to + 50 °C + 32 to + 122 °F (No dew condensation), Storage: − 10 to + 60 °C + 14 to + 140 °F									
Environmental resistance: Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH									
Environmental resistance: EMC	EN 50081-2, EN 50082-2, EN 61000-6-2									
Environmental resistance: Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure									
Environmental resistance: Insulation resistance	50 MΩ, or more, with 500 V DC megger between all supply terminals connected together and enclosure									
Environmental resistance: Vibration resistance	10 to 500 Hz frequency, 3 mm 0.118 in amplitude, or 5 G in X, Y and Z directions for two hours each									
Environmental resistance: Shock resistance	1,000 m/s^2 acceleration (100 G approx.) in X, Y and Z directions for three times each									
Operation indicator	Orange LED [lights up when Comparative Output 1 is ON (only in case of connection to the **DP5** series pressure controller)]									
Temperature characteristics	Over ambient temperature range + 10 to + 40 °C + 50 to + 104 °F: within ± 1 % F.S. of detected pressure at + 25 °C + 77 °F Over ambient temperature range 0 to + 50 °C + 32 to + 122 °F: within ± 3 % F.S. of detected pressure at + 25 °C + 77 °F									
Voltage characteristics	Within ± 0.5 % F.S. for ± 10 % fluctuation of the supply voltage									
Pressure port	**DPH-A0**□: M5 male thread (for installing gasket), **DPH-A1**□: R (PT) 1/8 male thread / M5 female thread **DPH-A2**□: NPT1/8 male thread / 10-32UNF female thread, **DPH-A30**: 10-32UNF male thread (for installing gasket)									
Material	Enclosure: PBT, Pressure port: Brass (nickel plated) [however, stainless steel (SUS303) in case of **DPH-A0**□]									
Connecting method	Connector									
Cable	0.2 mm^2 4-core oil resistant cabtyre cable with connector, 100 mm 3.937 in long									
Cable extension	Extension up to total 10 m 32.808 ft is possible with 0.3 mm^2, or more, cable.									
Weight	**DPH-A0**□ / **DPH-A30**: 6 g approx., **DPH-A1**□ / **DPH-A2**□: 10 g approx.									
Accessories	Gasket (**DPH-A0**□, **DPH-A30** only)									

Notes: 1) The rated pressure range indicates the range for full product performance.
2) The pressure sensor head can be used independently.

DP5/DPH

SPECIFICATIONS

Pressure sensor controller

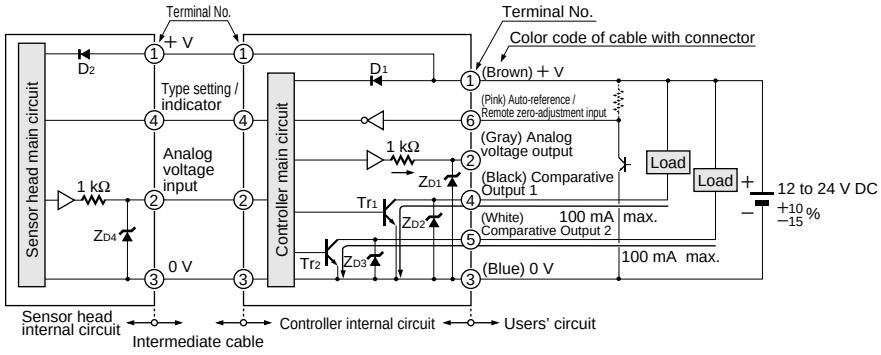
Item \ Type		NPN output type	PNP output type
Model No.		**DP5-C**	**DP5-C-P**
Applicable pressure sensor head		**DPH-A00, DPH-A02, DPH-A07, DPH-A10, DPH-A12, DPH-A17, DPH-A20, DPH-A22, DPH-A27, DPH-A30**	
Rated pressure range (Note 1)		Vacuum pressure: 0 to －101.3 kPa, Positive pressure: 0 to 1.000 MPa, Compound pressure: －100.0 to 100.0 kPa	
Set pressure range (Note 1)		Vacuum pressure: 101.3 to －101.3 kPa (1.033 to －1.033 kgf/cm², 14.70 to －14.70 psi, 1.013 to －1.013 bar, 760 to －760 mmHg, 29.9 to －29.9 inHg) Positive pressure: －1.050 to 1.050 MPa (－10.71 to 10.71 kgf/cm², －152.2 to 152. 2 psi, －10.50 to 10.50 bar) Compound pressure: －199.9 to 199.9 kPa (－1.999 to 1.999 kgf/cm², －19.98 to 19.98 psi, －1.999 to 1.999 bar, －1510 to 1537 mmHg, －59.4 to 60.5 inHg)	
Supply voltage / Current consumption		12 to 24 V DC $\pm^{10}_{15}$% Ripple P-P 10 % or less / 60 mA or less (not including pressure sensor head)	
Sensor supply voltage		Same as supply voltage	
Comparative output (Comparative Output 1 / Comparative Output 2)		NPN open-collector transistor (2 outputs) • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between comparative output and 0 V) • Residual voltage: 1 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current)	PNP open-collector transistor (2 outputs) • Maximum source current: 100 mA • Applied voltage: Same as supply voltage (between comparative output and ＋V) • Residual voltage: 2 V or less (at 100 mA source current)
	Utilization category	DC-12 or DC-13	
	Output operation	NO / NC, selectable by key operation	
	Output modes	Equipped with 4 types of modes: hysteresis mode, window comparator mode, leak test mode, forced output mode (selectable by key operation)	
	Hysteresis	1 digit (however, variable in hysteresis mode, variable for Comparative Output 1 only when using leak test mode)	
	Repeatability	With vacuum / positive pressure type sensor head: within ±0.2 % F.S. ±1 digit (±3 digits) With compound pressure type sensor head: within ±0.2 % F.S. ±2 digits (±6 digits)	
	Response time	1 ms, 16 ms, 128 ms, 512 ms or less, selectable by key operation (however, set response time is ＋2 ms when auto-reference / remote zero-adjustment input is applied)	
	Short-circuit protection	Incorporated	
Input	Pressure sensor head input	Input voltage range: 1 to 5 V DC (over rated pressure range)	
Input	Auto-reference / Remote zero-adjustment input	Input condition: NPN non-contact input [operates in Low (fall) state] Signal condition: High...5 to 30 V, or open Low....0.4 V or less Low level input time...2 ms or more	Input condition: PNP non-contact input [operates in High (rise) state] Signal condition: High...5 to 30 V Low....0.4 V or less, or open High level input time...2 ms or more
Analog voltage output		Output voltage: 1 to 5 V DC (over rated pressure range) Zero point: within 1 V ± 2.5 % F.S. (vacuum / positive pressure type) within 3 V ± 3.5 % F.S. (compound pressure) Span: within 4 V ± 4 % F.S. Linearity: within ± 1 % F.S. Output impedance: 1 kΩ approx.	
Display		3 1/2 digit LCD display (with red and green backlight) (Display refresh rate: 256 ms, 512 ms or 1,024 ms selectable by key operation)	
	Displayable pressure range	Vacuum pressure: 5.1 to －101.3 kPa (0.052 to －1.033 kgf/cm², 0.74 to －14.70 psi, 0.051 to －1.013 bar, 38 to －760 mmHg, 1.5 to －29.9 inHg) Positive pressure: －0.050 to 1.050 MPa (－0.51 to 10.71 kgf/cm², －7.2 to 152.2 psi, －0.50 to 10.50 bar) Compound pressure: －101.3 to 105.0 kPa (－1.033 to 1.071 kgf/cm², －14.70 to 15.22 psi, －1.013 to 1.050 bar, －760 to 787 mmHg, －29.9 to 31.0 inHg)	
	Operation display	LCD segment is red when the comparative output is ON, and green when it is OFF (output is selected via supplementary settings)	
Analog bar display		Bar display in steps of 14 % F.S. approx.	
Operation indicator		Orange LED (lights up when Comparative Output 1 is ON), Green LED (lights up when Comparative Output 2 is ON)	
Environmental resistance	Pollution degree	3 (Industrial environment)	
Environmental resistance	Protection	IP40 (IEC)	
Environmental resistance	Ambient temperature	0 to＋50 °C ＋32 to＋122 °F (No dew condensation), Storage: －10 to＋60 °C ＋14 to＋140 °F	
Environmental resistance	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH	
Environmental resistance	EMC	EN 50081-2, EN 50082-2, EN 61000-6-2	
Environmental resistance	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure	
Environmental resistance	Insulation resistance	50 MΩ, or more, with 500 V DC megger between all supply terminals connected together and enclosure	
Environmental resistance	Vibration resistance	10 to 150 Hz frequency, 0.75 mm 0.030 in amplitude, or 5 G in X, Y and Z directions for two hours each	
Environmental resistance	Shock resistance	100 m/s² acceleration in X, Y and Z directions for three times each	
Temperature characteristics		Over ambient temperature range 0 to＋50 °C ＋32 to＋122 °F: within ±0.5 % F.S. of detected pressure at ＋25 °C ＋77 °F (not including pressure sensor head)	
Material		Front case: ABS, LCD display section: PET, Rear case: PBT	
Connecting method		Connector	
Suitable cable	Conductor cross-section area (Note 2)	0.16 to 0.32 mm² (AWG#25 to #22)	
Suitable cable	Lead wire diameter	φ1.2 to φ1.8 mm φ0.047 to φ0.071 in	
Suitable cable	Wire material	Tin plated, soft, twisted copper wire	
Cable extension		Extension up to total 100 m 328.084 ft (less than 10 m 32.808 ft when conforming to CE marking) is possible with 0.3 mm², or more, cable.	
Weight		20 g approx.	
Accessories		Panel mounting bracket (**MS-DP-1**): 1 set, Connector: 1 set (Housing: 1 pc., Connector pin: 6 pcs.), Pressure unit label: 1 set., Connector cap: 1 pc.	

Notes: 1) The rated pressure range indicates the range for full product performance. It changes automatically according to the connected pressure sensor head.
2) If the wiring is longer than 5 m 16.404 ft, use a cable with a diameter of 0.3 mm² or more.

I/O CIRCUIT AND WIRING DIAGRAMS

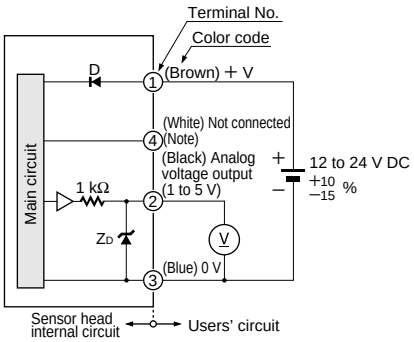
DP5-C NPN output type

I/O circuit diagram



Symbols … D_1, D_2: Reverse supply polarity protection diode
Z_{D1} to Z_{D4}: Surge absorption zener diode
Tr_1, Tr_2: NPN output transistor

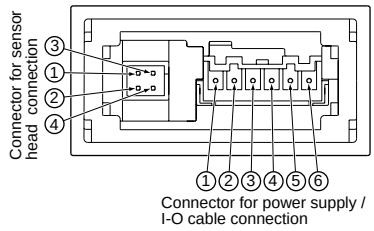
For independent use of Sensor head



Note: In case the sensor head is used independently, insulate the white lead wire (terminal No.4) and keep it open.

Symbols … D : Reverse supply polarity protection diode
Z_D: Surge absorption zener diode

Pin position



Connector for power supply / I-O cable connection

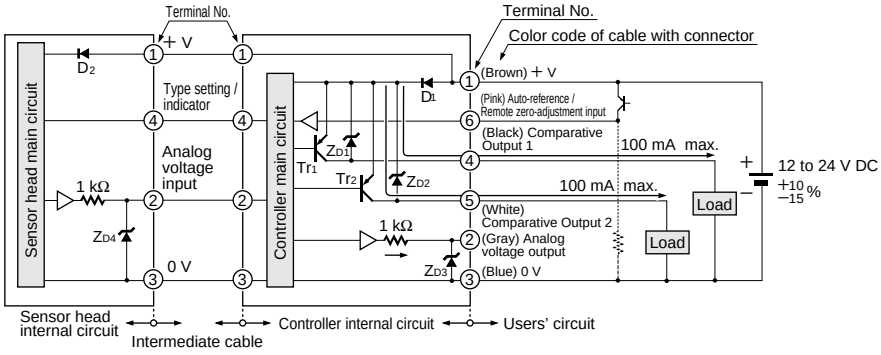
① + V
② Analog voltage output
③ 0 V
④ Comparative Output 1
⑤ Comparative Output 2
⑥ Auto-reference / Remote zero-adjustment input

Connector for sensor head connection

① + V
② Analog voltage output
③ 0 V
④ Not connected

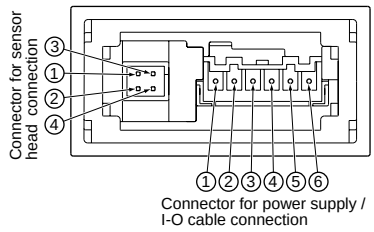
DP5-C-P PNP output type

I/O circuit diagram



Symbols … D_1, D_2: Reverse supply polarity protection diode
Z_{D1} to Z_{D4}: Surge absorption zener diode
Tr_1, Tr_2: NPN output transistor

Pin position



Connector for power supply / I-O cable connection

① + V
② Analog voltage output
③ 0 V
④ Comparative Output 1
⑤ Comparative Output 2
⑥ Auto-reference / Remote zero-adjustment input

Connector for sensor head connection

① + V
② Analog voltage output
③ 0 V
④ Not connected

DP5/DPH

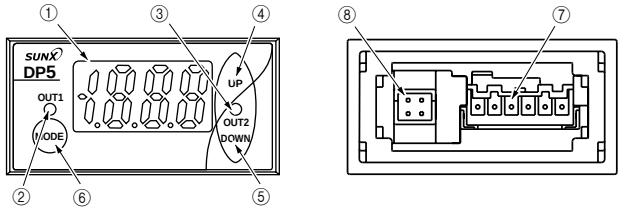
PRECAUTIONS FOR PROPER USE

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

Operation

- If setting is impossible even with pressing the MODE key, verify whether the key-protect function is enabled. Please note that pressing down on the MODE key for an extended moment will enable the key-protect function as soon as the key is released.
- If using the window comparator mode, set the pressure values so that there is a difference of 3 digits, or more, between Set Value 1 (P-1) and Set Value 2 (P-2) and between Set Value 3 (P-3) and Set Value 4 (P-4).

Functional description



	Description	Function
①	$3^{1}/_{2}$ digit LCD display (with red and green backlight)	• Displays measured pressure, settings, error messages and key-protect status. • Its lighting up can be set as Red when ON / Green when OFF with respect to either Comparative Output 1 or Comparative Output 2, according to the backlight relation selection during the supplementary setting mode.
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 (UP) key	• In the initial setting mode and supplementary setting mode, pressing the key changes the setting item. • In the pressure value setting mode, pressing the key changes the set value. • In the sensing mode, pressing the key continuously for 4 sec., or more, displays the peak hold value.
⑤	Decrement (DOWN) key	• In the initial setting mode and supplementary setting mode, pressing the key changes the set conditions. • In the pressure value setting mode, pressing the key changes the set value. • In the sensing mode, pressing the key continuously for 4 sec., or more, displays the bottom hold value.
		In the sensing mode, if both keys are simultaneously pressed continuously, zero-point adjustment is done.
⑥	MODE key	• In the pressure value setting mode, pressing the key changes the setting item. • In the sensing mode, pressing the key continuously for 4 sec., or more, can set / cancel the key-protect. • In the sensing mode, pressing both UP key and MODE key simultaneously changes the mode to the initial setting mode. Whereas, pressing both DOWN key and MODE key simultaneously changes the mode to the supplementary setting mode.
⑦	Connector for power supply / I-O cable connection	• It is the connector for connection of power supply / I-O cable.
⑧	Connector for sensor head connection	• It is the connector for connection of sensor head.

Error messages

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

Error message	Cause		Corrective action
E-0	The controller, sensor head and the intermediate cable are not correctly connected.		Connect the sensor head and the intermediate cable correctly.
	Sensor head cable or intermediate cable have a cable break.		Check the sensor head cable and the intermediate cable and replace the cable having a break.
	The sensor head is damaged.		Replace the sensor head.
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 and compound pressure types	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 (reverse pressure) of displayable pressure range.	
- - - -	Positive pressure and compound pressure types	Applied pressure exceeds the lower limit (reverse pressure) of displayable pressure range.	
	Vacuum pressure type	Applied pressure exceeds the upper limit of displayable pressure range.	

Wiring

- Make sure that the power supply is off while wiring.
- 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 controller, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- If the used power supply generates a surge, connect a surge absorber to the power supply to absorb the surge.
- 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.
- In order to reduce noise, make the wiring as short as possible.
- Take care that wrong wiring will damage the sensor.

Conditions in use for CE conformity

- The controller is a CE conformity product complying with EMC Directive. The harmonized standard with regard to immunity that applies to this product is EN 61000-6-2 (Note) and the following condition must be met to conform to that standard.

Condition

- Cable length between the power supply and the controller should be less than 10 m 32.808 ft .

Note: The EN 50082-2 that previously applied to the products for conforming to EMC Directive was replaced by EN 61000-6-2 starting April 1st, 2002.

Others

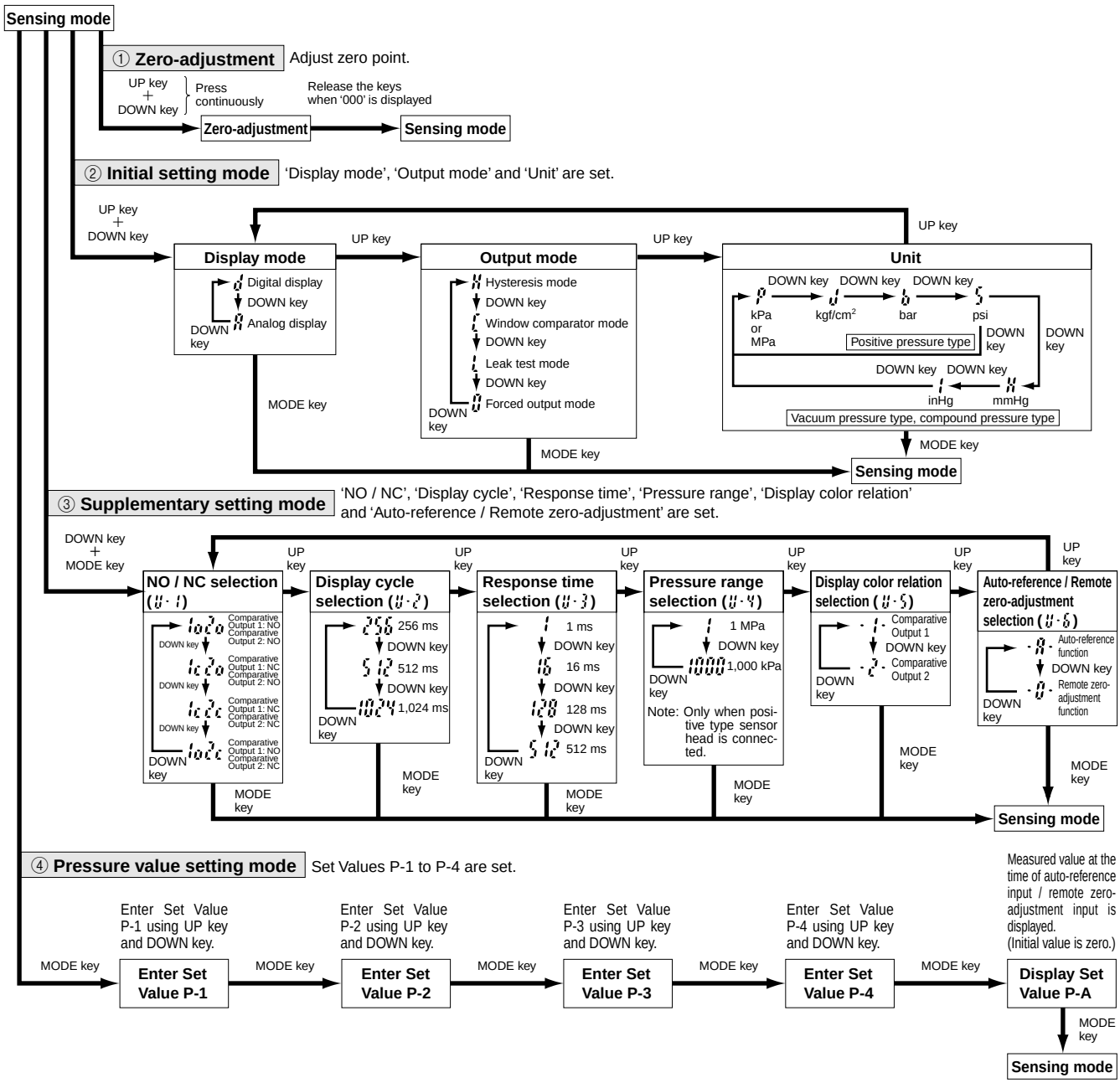
- Use within the rated pressure range.
- Do not apply pressure exceeding the pressure withstandability value. The diaphragm will get damaged and correct operation shall not be maintained.
- Do not use during the initial transient time (**DP5**: 3 sec. approx., **DPH**: 50 ms approx.) after the power supply is switched on.
- Avoid dust, dirt, and steam.
- 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.

PRECAUTIONS FOR PROPER USE

Setting

- If key-protect has been set, make sure to release key-protect before operating the keys. [Please refer to '**Key-protect function**' on p.776 for the procedure.]
- Pressure value setting can be done only if the output mode is set to the hysteresis mode, window comparator mode or the leak test mode. Pressure values cannot be set if the output mode is set to the forced output mode.
- Set Values P-1 to P-4 can be common for all the output modes.
- In the positive pressure type and the compound pressure type, Set Value P-2 can be set only towards the higher pressure side with respect to Set Value P-1 and Set Value P-4 can be set only towards the higher pressure side with respect to Set Value P-3. Further, in the vacuum pressure type, Set Value P-2 can be set only towards the higher vacuum side with respect to Set Value P-1 and Set Value P-4 can be set only towards the higher vacuum side with respect to Set Value P-3.
- The auto-reference function affects only Set Value P-3 and Set Value P-4.
- Set Value P-A is the pressure value when the auto-reference input or the remote zero-adjustment input is applied. When the auto-reference input or the remote zero-adjustment input is not applied, Set Value P-A is zero.
- The set conditions are written and stored into an EEPROM. However, note that the EEPROM has a life span and its guaranteed life is 100,000 write operation cycles. Further, since the Set Value P-A is not stored in the EEPROM, they are not included in the number of write operation cycles.

Setting procedure



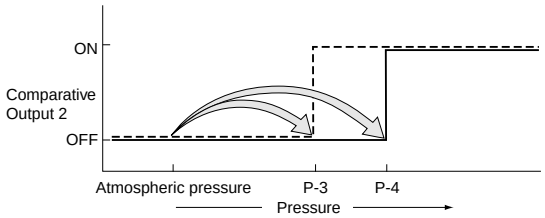
DP5/DPH

PRECAUTIONS FOR PROPER USE

Auto-reference function

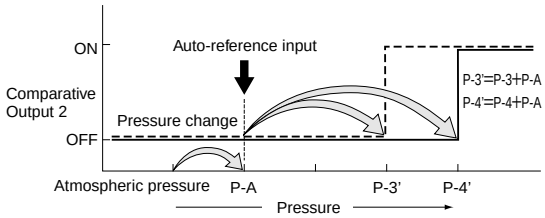
- Auto-reference function corrects Set Value P-3 and Set Value P-4 of Comparative Output 2 by taking the pressure measured at the time of auto-reference input as the reference pressure.

<Before auto-reference input>



- When there is no auto-reference input, the atmospheric pressure is taken as the reference pressure for Set Value P-3 and Set Value P-4.

<After auto-reference input>



- At the time of auto-reference input, the pressure value detected at that instant is temporarily recorded as Set Value P-A and becomes the reference pressure.
- With Set Value P-A as the reference pressure, Set Value P-3 and Set Value P-4 are automatically corrected to 'Set Value P-3 + Set Value P-A' and 'Set Value P-4 + Set Value P-A', respectively.

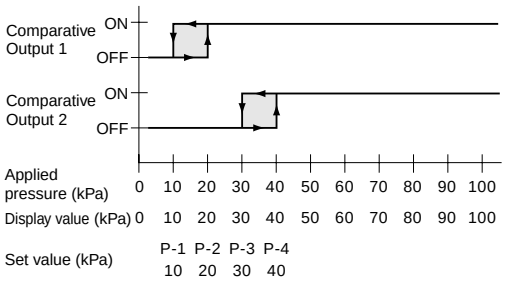
Settable range and set pressure range after correction

- The settable range of Set Value P-3 and Set Value P-4 is wider than the rated pressure range to cater to the auto-reference function.

- At the time of auto-reference input, if the corrected set value exceeds the set pressure range, the set value is automatically corrected to be within the set pressure range. Hence, please see that the set pressure range is not exceeded.

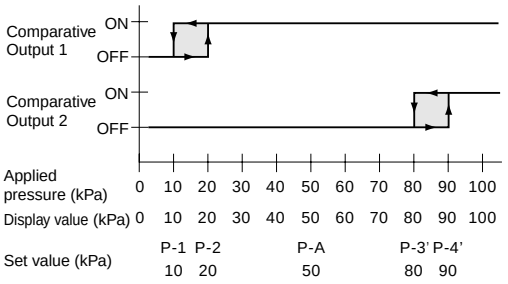
Operation chart

<Normal operation (comparative outputs set to NO)>



<With auto-reference input (comparative outputs set to NO)>

Auto-reference input: 50 kPa
Output mode: Hysteresis mode



Note: As in the case of the hysteresis mode, Set Value P-3 and Set Value P-4 are shifted also in case the output is set to the window comparator mode or the leak test mode.

- Maintain the pressure at a constant level for at least 2 ms after the auto-reference input is made Low (High in case of PNP output type). If used in a transient state, it will result in wrong operation.
- Use Comparative Output 2 at least 'set response time + 2 ms' after the auto-reference input is made Low (High in case of PNP output type).
- At the time of auto-reference input, [in] is displayed on the $3^1/_2$ digit display for 1 sec. approx.
- The auto-reference input value (Set Value P-A) becomes zero when the power supply is switched off and then on again.
- Although it is not possible to display the corrected Set Value P-3' and Set Value P-4', it is possible to display the auto-reference input value (Set Value P-A).

PRECAUTIONS FOR PROPER USE

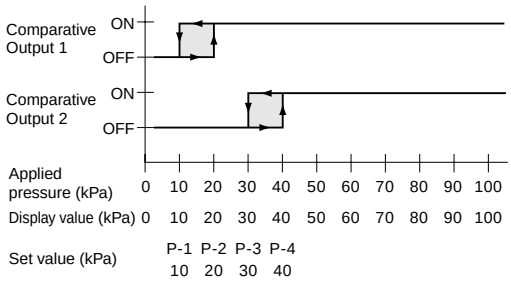
Remote zero-adjustment function

- The remote zero-adjustment function forcibly sets the pressure value at the time of application of an external input signal to zero.

- At the time of remote zero-adjustment input, the set values are not corrected. When using the remote zero-adjustment function, make sure that the pressure and the set values do not exceed the rated pressure range.

Operation chart

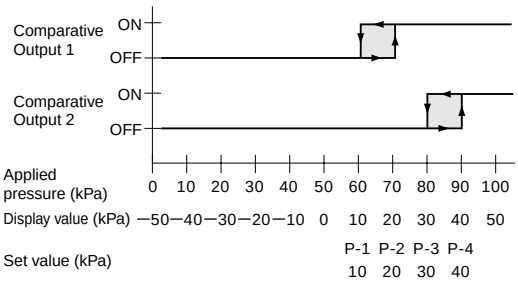
<Normal operation (comparative outputs set to NO)>



<With remote zero-adjustment input (comparative outputs set to NO)>

Remote zero-adjustment input: 50 kPa

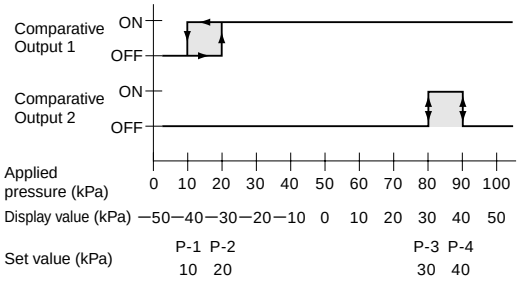
Output mode: Hysteresis mode



Note: As in the case of the hysteresis mode, the displayed values and the ON / OFF points of the output are shifted also in case the output mode is set to the window comparator mode.

Remote zero-adjustment input: 50 kPa

Output mode: Leak test mode



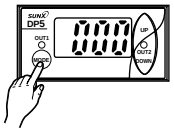
Note: In the leak test mode, the zero-adjustment function is applied only to Comparative Output 2. Comparative Output 1 operates with the atmospheric pressure as the reference.

- Maintain the pressure at a constant level for at least 2 ms after the remote zero-adjustment input is made Low (High in case of PNP output type). If used in a transient state, it will result in wrong operation.
- Use the comparative outputs at least 'set response time ＋2 ms' after the remote zero-adjustment input is made Low (High in case of PNP output type).
- At the time of remote zero-adjustment input, [in] is displayed on the 3½ digit display for 1 sec. approx.
- If the power supply is switched off and then on again, the remote zero-adjustment input value is cleared and the sensor returns to normal operation with atmospheric pressure as the reference.

Forced output mode

- In the initial setting mode, if the output mode is set to the forced output mode ([0]), the comparative outputs are forcibly maintained at OFF level in the sensing mode, irrespective of Set Values P-1 to P-4.
  Further, if the keys are operated as per the procedure given below, the comparative outputs can be forcibly switched either ON or OFF without applying pressure at the pressure port. This is convenient for an operation check of the comparative outputs or for an inspection before commencing work.

(The diagram below appears when the **DP5-C** has been used to set the display to 'Digital display' ([d]).



- In the sensing mode, press MODE key to change to the forced output mode.
- Each time UP key is pressed, Comparative Output 1 switches to ON and OFF, alternately. Each time DOWN key is pressed, Comparative Output 2 switches to ON and OFF, alternately.
- Press MODE key to return to the sensing mode.

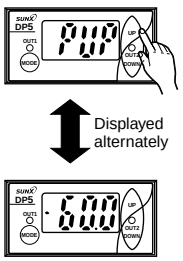
- Output is kept OFF at the point where the mode is changed from another output mode to forced output control mode ([0]).
- Even if output has been set to stay ON during forced output control mode, it will be forcibly changed to OFF at the point where the mode changes back to sensing mode.

Peak hold & bottom hold functions

- Peak hold and bottom hold functions enable the display of the peak value (maximum pressure value) and the bottom value (minimum pressure value) of the varying measured pressure.
  These functions are convenient for finding the pressure variation range or 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.

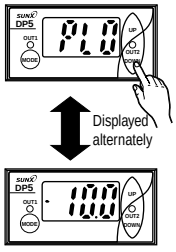
Peak hold display



- In the sensing mode, keep UP key pressed until [PUP] is displayed. (4 sec. or more)
- When the finger is released after [PUP] is displayed, the peak value and [PUP] are displayed alternately.
- Press UP key. Sensor returns to the sensing mode.

(• 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.)

Bottom hold display



- In the sensing mode, keep DOWN key pressed until [PLU] is displayed. (4 sec. or more)
- When the finger is released after [PLU] is displayed, the bottom value [PLU] and are displayed alternately.
- Press DOWN key. Sensor returns to the sensing mode.

(• If the applied pressure exceeds the displayable pressure range, error message ([···] or [···]) and [PLU] 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.)

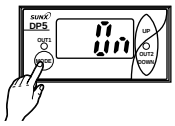
DP5/DPH

PRECAUTIONS FOR PROPER USE

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.

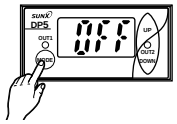
Setting of key-protect



- In the sensing mode, press (MODE) key continuously for 4 sec., or more, 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

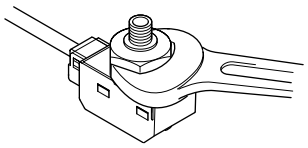


- In the sensing mode, press (MODE) key continuously for 4 sec., or more, and release it immediately when [OFF] is displayed.
  - Key-protect is released and the sensor returns to the sensing mode.

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

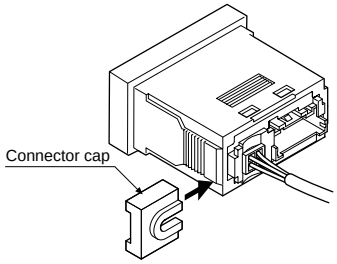
Piping

- When connecting a commercial coupling to the pressure port, hold the hexagonal section of the pressure port with a 11 mm 0.433 in (**DPH-A1**□, **DPH-A2**□: 12 mm 0.472 in) spanner, and make sure that the tightening torque is 1N·m (male thread type of **DPH-A1**□, **DPH-A2**□: 5 N·m) or less. If excessive tightening torque is applied, the M5 male thread of the commercial coupling or the pressure port will get damaged.



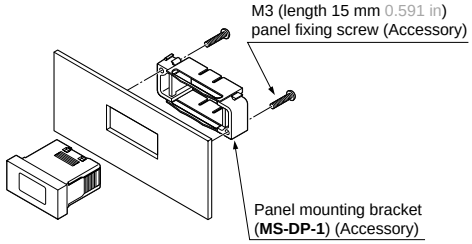
Connecting

- To connect the sensor head to the controller, the optional intermediate cable (**DPH-CC**□) must be used.
- Take care that stress is not directly applied to the cable joint or the connector.
- If the sensor head is to be mounted on a movable part, make sure to use a flexible intermediate cable.
- When connecting the intermediate cable to the controller, make sure to fit the connector cap, supplied as an accessory with the controller, by sliding it as shown in the figure below. If the connector cap is not fitted, there is a danger of the intermediate cable getting disconnected from the sensor.



Mounting

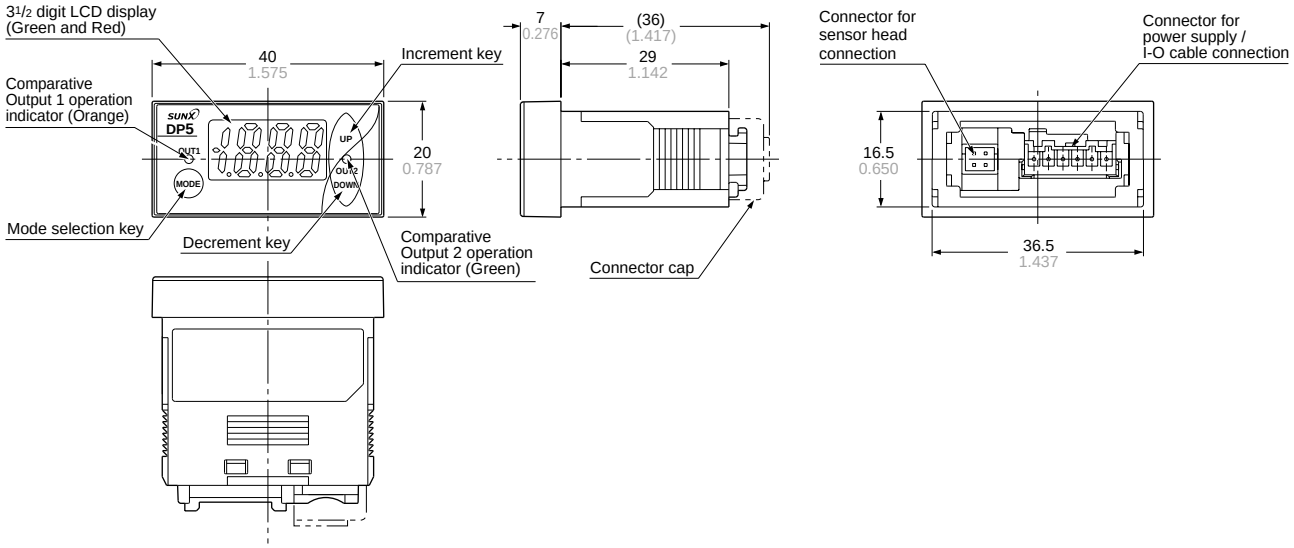
- Install the enclosed panel mounting bracket (**MS-DP-1**) as shown in the figure below.
  The tightening torque should be 0.15 N·m or less. Further, tighten both the right and the left screw gradually and equally, so that the panel mounting bracket does not tilt.



DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from the SUNX website: http://www.sunx.co.jp/

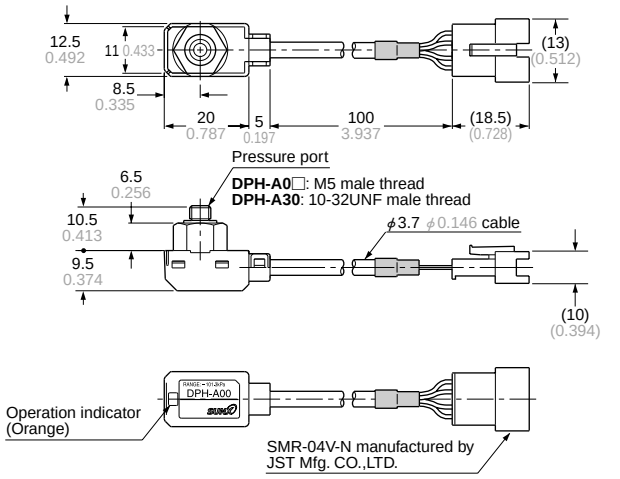
DP5-C
DP5-C-P Controller



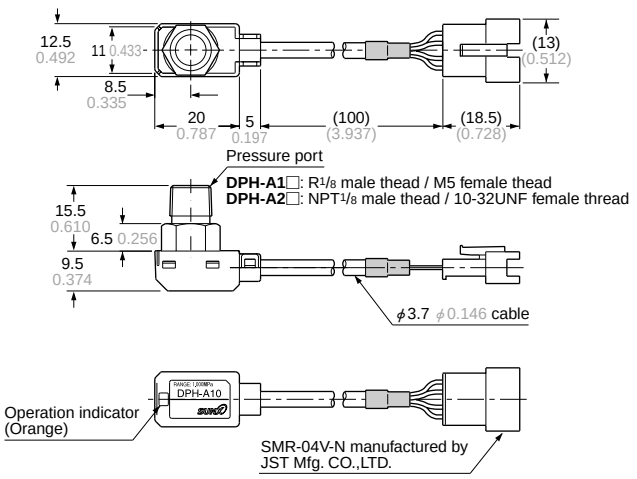
DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from the SUNX website: http://www.sunx.co.jp/

DPH-A0□ DPH-A30 Sensor head

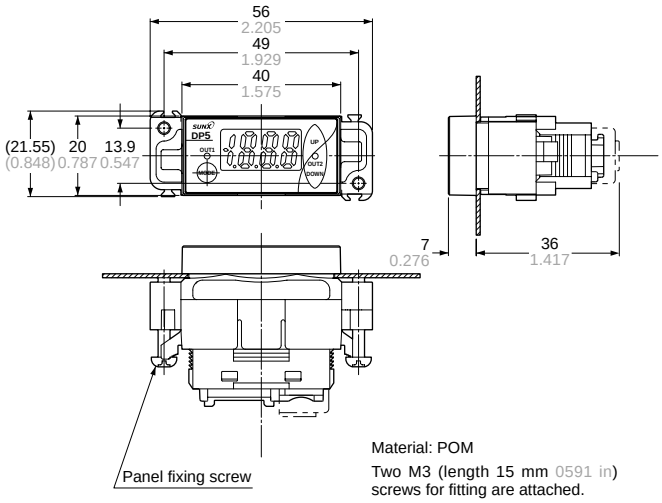


DPH-A1□ DPH-A2□ Sensor head

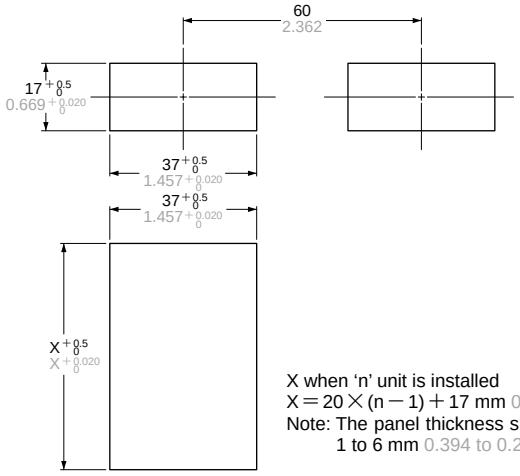


MS-DP-1 Panel mounting bracket (Accessory for the controller)

Assembly dimensions



Panel cut-out dimensions

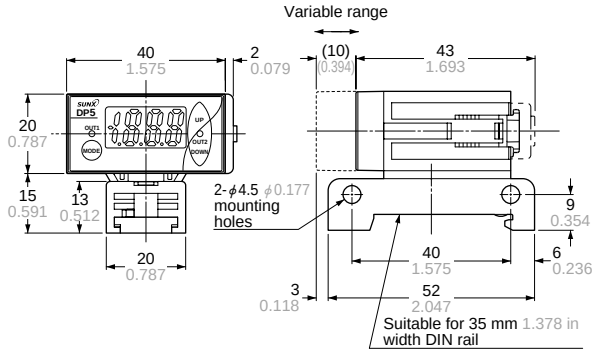


X when 'n' unit is installed
X = 20 × (n − 1) + 17 mm 0.669 in
Note: The panel thickness should be 1 to 6 mm 0.394 to 0.236 in.

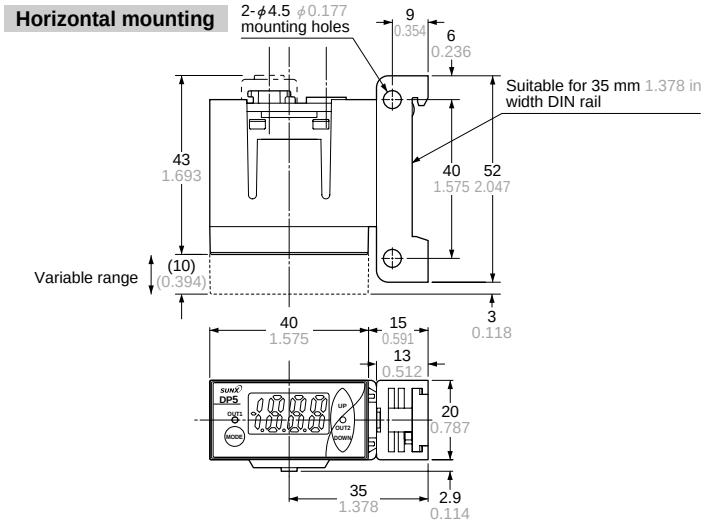
MS-DP-2 DIN rail mounting bracket (Optional)

Assembly dimensions

Vertical mounting



Horizontal mounting

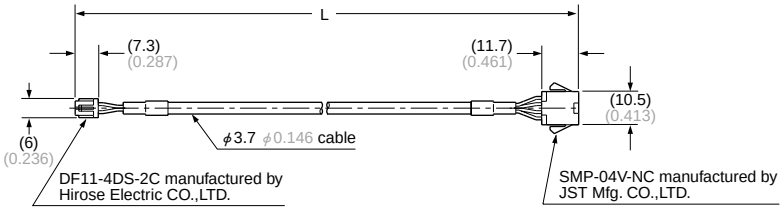


DP5/DPH

DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from the SUNX website: http://www.sunx.co.jp/

DPH-CC□ Intermediate cable (Optional)

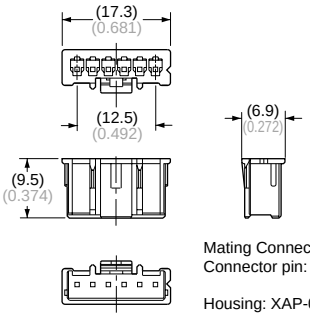


Model No.	Cable length
DPH-CC2(-R)	2 m 6.562 ft
DPH-CC3(-R)	3 m 9.843 ft
DPH-CC5(-R)	5 m 16.404 ft

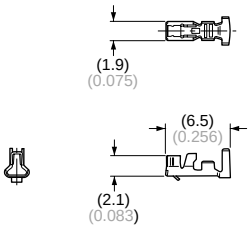
Note: The heat-shrink tube for the standard cable is black, and the heat-shrink tube for the flexible cable is gray.

CN-66 Connector (Optional)

Housing

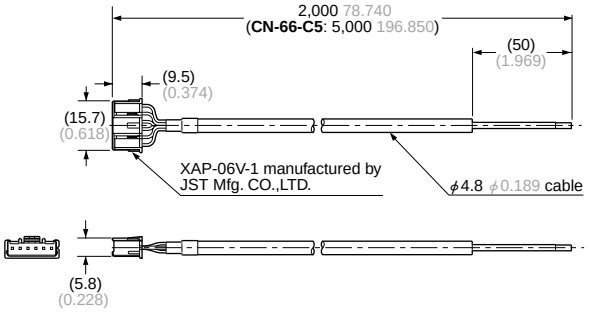


Connector pin

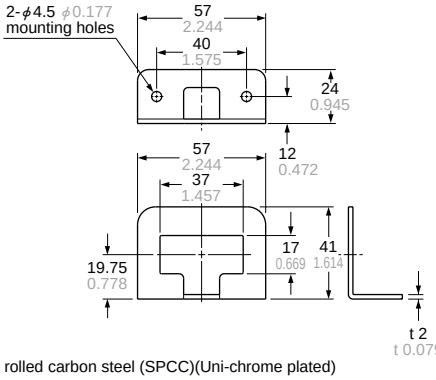


Mating Connector
Connector pin: BXA-001T-P0.6 manufactured by JST Mfg. CO., LTD.
Housing: XAP-06V-01 manufactured by JST Mfg. CO., LTD.
Crimping tool
YC-690R manufactured by JST Mfg. CO., LTD.

CN-66-C2 CN-66-C5 Cable with connector (Optional)



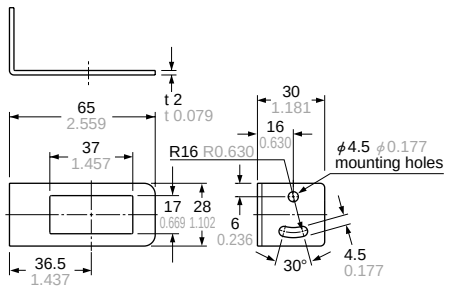
MS-DP-3 Controller mounting bracket (Optional)



Material: Cold rolled carbon steel (SPCC)(Uni-chrome plated)

Note: Use together with panel mounting bracket (**MS-DP-1**) included with controller.

MS-DP-4 Controller mounting bracket (Optional)

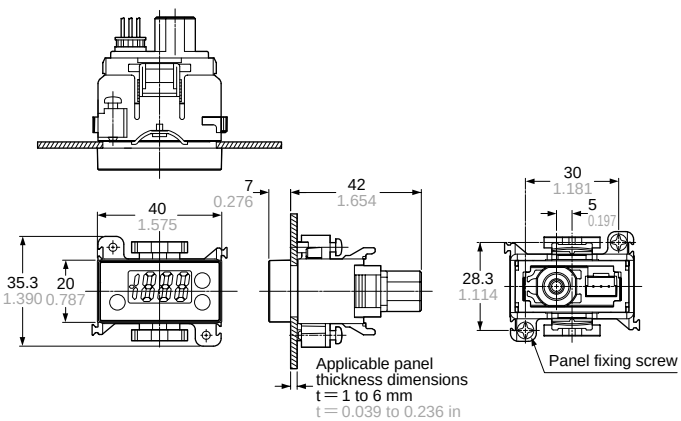


Material: Cold rolled carbon steel (SPCC)(Uni-chrome plated)

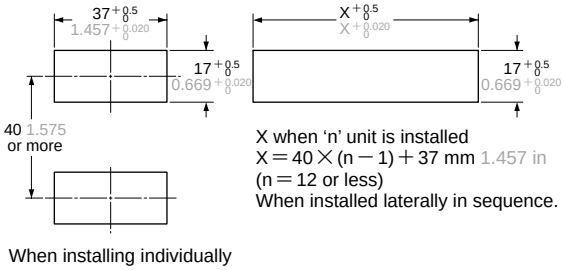
Note: Use together with panel mounting bracket (**MS-DP-1**) included with controller.

MS-DP-5 Horizontal multiple panel mounting bracket (Optional)

Assembly dimensions



Panel cut-out dimensions



X when 'n' unit is installed
X = 40 × (n − 1) + 37 mm 1.457 in
(n = 12 or less)
When installed laterally in sequence.

When installing individually

Note: The panel thickness should be 1 to 6 mm 0.039 to 0.236 in.