



# HEAD SEPARATED DIGITAL PRESSURE SENSOR

**New**

Pressure sensor controller

**DP5** SERIES

Pressure sensor head

**DPH** SERIES



**1/1,000 sec.**

The advantage of the fastest response in the industry



**High speed in response to the needs of the times. Achieves 1 ms response time, the fastest in the industry.**

In response to the needs of the times and amid the continuing quest for faster and more efficient production lines comes the DP5/DPH series, a digital pressure sensor with a detachable head. The response time of 1 ms makes this the fastest sensor in the industry. In addition to the fast response time, the detachable head represents a major breakthrough for ease of operation and maintenance.



#### Independent Use of Sensor Head Possible

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

#### Extremely Small, Extremely Light Head (6g)

##### Sensor Head with Operation Indicator

The sensor head is also equipped with an operation indicator. Output ON/OFF can be checked at the sensor head and operation can be checked at the suction head. (Linked to Comparative Output 1)

##### Convenient Intermediate Cable

An intermediate cable with connectors for connecting the sensor head and the controller makes operation and maintenance easier.

##### Easy Mounting, Mobile Pressure Port

The head's pressure port can be rotated independently (freeturning) from the sensor head. In addition to being easy to mount, the cable can be positioned in any direction.



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



# Super fast 1 ms

Mounting the detachable head close to the detecting section minimizes piping and enables a 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 be easily mounted on moving sections.

## A Total of 10 Head Variations to Meet all Production Demands

| Vacuum pressure type                                                                                                                                                                                                  | Positive pressure type                                                                                                                                                                  | Compound pressure type                                                                                                                                                                  |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| (0 to -101.3kPa)                                                                                                                                                                                                      | (0 to 1.000MPa)                                                                                                                                                                         | (-100.0 to 100.0kPa)                                                                                                                                                                    |                                                                                    |
| <ul style="list-style-type: none"> <li>● M5 male thread</li> <li>● R (PT) 1/8 male thread/<br/>M5 female thread</li> <li>● NPT 1/8 male thread/<br/>10-32UNF female thread</li> <li>● 10-32UNF male thread</li> </ul> | <ul style="list-style-type: none"> <li>● M5 female thread</li> <li>● R (PT) 1/8 male thread/<br/>M5 female thread</li> <li>● NPT 1/8 male thread/<br/>10-32UNF female thread</li> </ul> | <ul style="list-style-type: none"> <li>● M5 female thread</li> <li>● R (PT) 1/8 male thread/<br/>M5 female thread</li> <li>● NPT 1/8 male thread/<br/>10-32UNF female thread</li> </ul> |                                                                                    |

Both NPN and PNP outputs are available so that this sensor can be used anywhere in the world. This sensor conforms to the CE marking EMC Directive and has obtained UL recognition.



## Detachable head means layout freedom.

### Use it any way you want.

#### Light-weight, Compact Design

The controller inherits its light-weight compact design from the popular compact digital pressure sensor, the DP4 series. The control panel setup is inexpensive 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 to Comparative Output 2.

#### Two Independent Outputs Plus Analog Voltage Output

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

### Two Operation Indicators

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

### Sensor Head Auto-recognition

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



## Handy Attachments for Flexible Controller Mounting

### Panel Mounting Bracket is Supplied

A panel mounting bracket is enclosed that allows simple mounting of the controller onto the panel surface. This makes for a more cost-effective system.

### DIN Rail Mounting Bracket Is Available

The controller can even be mounted on a 35mm width DIN rail by using the optional DIN rail mounting bracket (MS-DP2). It can be fitted in a narrow space inside your equipment because it can be mounted from four different directions.

### Can be Used with Panel

#### Thicknesses from 1 to 6mm

Since the panel thicknesses can be from 1 to 6mm, the controller can be mounted on thick, resin-made panels.



### Select from Six Pressure Units

Select the pressure unit from six different systems to suit your requirements. The selectable pressure units differ with the sensor type. When the pressure unit is changed, the measured pressure value and the set values are automatically adjusted.



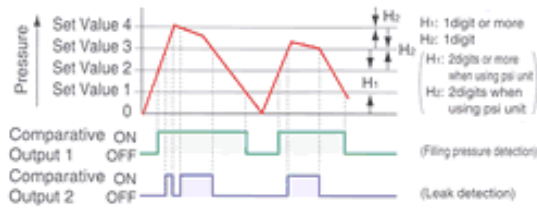
Note: 'MPa' when combining with DPH-A02, DPH-A12 or DPH-A22 positive pressure sensor head.

## Full Range of Functions in a Compact Body Gives You a Wide Variety of Control Options

The only sensor in the industry with a leak test mode. Four output modes give you complete control.

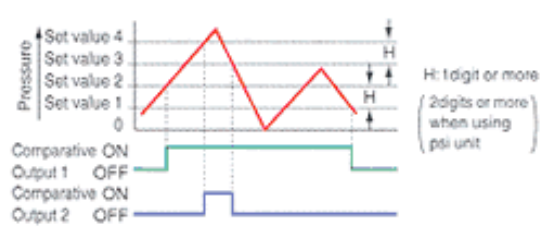
Leak Test Mode

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 autoreference/remote zero-adjustment functions ensures a reliable leak test.



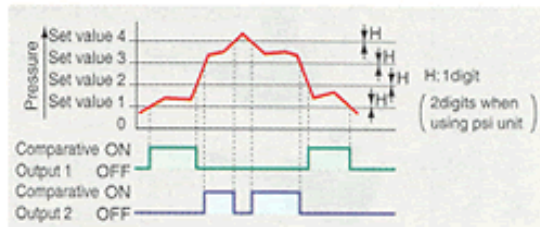
Hysteresis mode

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



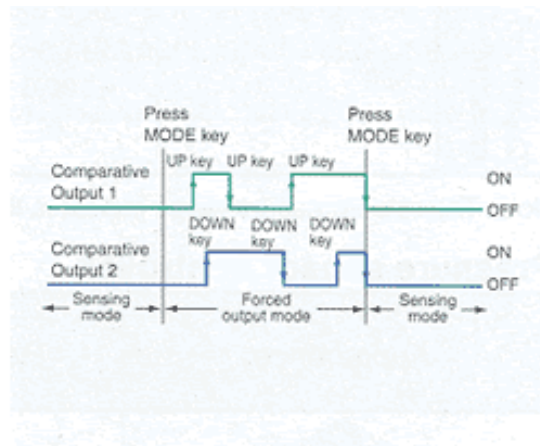
Window comparator mode

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. This is convenient for displaying the pressure value without using the comparative outputs. 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 or a start-up check.

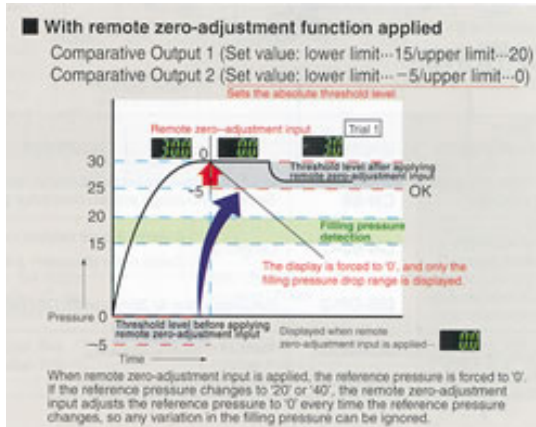
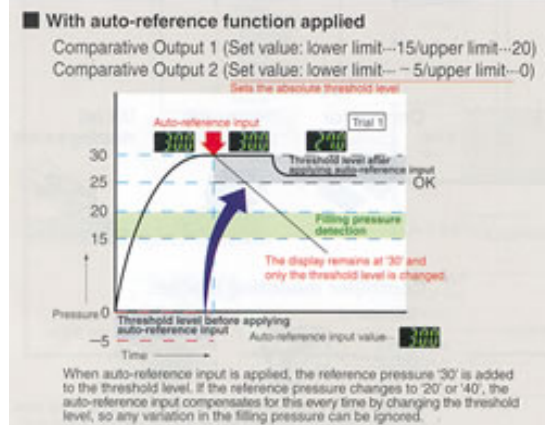
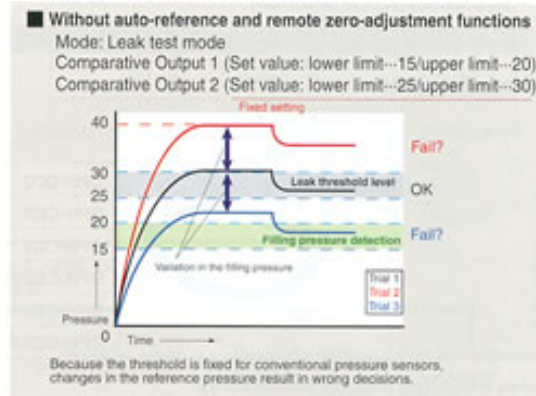




## Equipped with auto-reference and remote zero-adjustment function. More accurate pressure control with minimal effort.

If the reference pressure of the equipment changes the auto-reference function can adjust 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 significantly or where precise settings are desired.

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



## DP5/ DPH

### ORDER GUIDE

#### Pressure sensor head

| Type              | Appearance | Rated pressure range (Note) | Model No. | Pressure port                             | Applicable fluid  |
|-------------------|------------|-----------------------------|-----------|-------------------------------------------|-------------------|
| Vacuum pressure   |            | 0 to -101.3kPa              | 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 1.000MPa               | 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 100.0kPa          | 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.

#### Pressure sensor controller

| Appearance | Rated pressure range (Note)                                                                                  | Model No. | Output                        |
|------------|--------------------------------------------------------------------------------------------------------------|-----------|-------------------------------|
|            | Vacuum pressure: 0 to -101.3kPa<br>Positive pressure: 0 to 1.000MPa<br>Compound pressure: -100.0 to 100.0kPa | 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.

An intermediate cable is required to connect the pressure sensor controller and the pressure sensor head. Please purchase the intermediate cable separately.

Intermediate cable

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

Panel mounting bracket (accessory)



MS-DP-1  
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: 2m                               | 0.2mm <sup>2</sup> 6-core cabtyre cable with connector<br>Cable outer diameter: $\phi$ 4.8mm |
| DIN rail mounting bracket   | MS-DP-2   | For installation to 35mm width DIN rail  |                                                                                              |
| Controller mounting bracket | MS-DP-3   | Vertical mounting bracket                |                                                                                              |
|                             | MS-DP-4   | Horizontal mounting bracket              |                                                                                              |

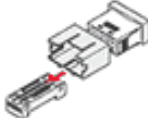
Connector



6-core cable with connector



DIN rail mounting bracket



Controller mounting bracket  
MS-DP-3 ----- MS-DP-4

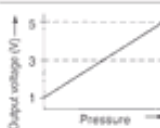


You can attach a commercially available label (9 mm) to the top of the unit to display the sensor number and the sensor application.

# DP5/DPH

SPECIFICATIONS

Pressure sensor head

|                             |                                                                                         | Type                                                                                                                                                                                                                                                                                                                            | Vacuum pressure |         |         |               | Positive pressure                                                                 |         |                    | Compound pressure |         |  |
|-----------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|---------|---------------|-----------------------------------------------------------------------------------|---------|--------------------|-------------------|---------|--|
|                             |                                                                                         |                                                                                                                                                                                                                                                                                                                                 | -101kPa type    |         |         |               | 1MPa type                                                                         |         |                    | ±100kPa type      |         |  |
| Item                        | 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 -101.3kPa                                                                                                                                                                                                                                                                                                                  |                 |         |         | 0 to 1.000MPa |                                                                                   |         | -100.0 to 100.0kPa |                   |         |  |
| Pressure withstandability   |                                                                                         | 500kPa                                                                                                                                                                                                                                                                                                                          |                 |         |         | 1.500MPa      |                                                                                   |         | 500kPa             |                   |         |  |
| Applicable fluid            |                                                                                         | Non-corrosive gas                                                                                                                                                                                                                                                                                                               |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
| Supply voltage              |                                                                                         | 12 to 24V DC <sup>+10%</sup> <sub>-15%</sub> Ripple P-P 10% or less                                                                                                                                                                                                                                                             |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
| Current consumption         |                                                                                         | 15mA or less (operation indicator off) / 17mA or less (operation indicator on)                                                                                                                                                                                                                                                  |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
| Analog voltage output       |                                                                                         | <ul style="list-style-type: none"><li>Output voltage: 1 to 5V (over rated pressure range)</li><li>Zero point: within 1V±2%F.S. (vacuum/positive pressure type)<br/>within 3V±3%F.S. (compound pressure type)</li><li>Span: within 4V±3.5%F.S.</li><li>Linearity: within ±1%F.S.</li><li>Output impedance: 1kΩ approx.</li></ul> |                 |         |         |               |  |         |                    |                   |         |  |
| Environmental resistance    | Pollution degree                                                                        | 3 (industrial environment)                                                                                                                                                                                                                                                                                                      |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
|                             | Protection                                                                              | IP40 (IEC)                                                                                                                                                                                                                                                                                                                      |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
|                             | Ambient temperature                                                                     | 0 to +50°C (No dew condensation), Storage: -10 to +60°C                                                                                                                                                                                                                                                                         |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
|                             | Ambient humidity                                                                        | 35 to 85% RH, Storage: 35 to 85% RH                                                                                                                                                                                                                                                                                             |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
|                             | EMC                                                                                     | Emission: EN50081-2, Immunity: EN50082-2                                                                                                                                                                                                                                                                                        |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
|                             | Voltage withstandability                                                                | 1,000V AC for one min. between all supply terminals connected together and enclosure                                                                                                                                                                                                                                            |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
|                             | Insulation resistance                                                                   | 50MΩ, or more, with 500V DC megger                                                                                                                                                                                                                                                                                              |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
| Vibration resistance        | 10 to 500Hz frequency, 3mm amplitude, or 5G in X, Y and Z directions for two hours each |                                                                                                                                                                                                                                                                                                                                 |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
| Shock resistance            | 1,000m/s <sup>2</sup> acceleration 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: within ±1% F.S. of detected pressure at +25°C<br>Over ambient temperature range 0 to +50°C: within ±3% F.S. of detected pressure at +25°C                                                                                                                                          |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
| 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<br>DPH-A2□: NPT 1/8 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                       |                                                                                         | 0.2mm <sup>2</sup> 4-core connector attached oil resistant cabtyre cable, 100mm long                                                                                                                                                                                                                                            |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
| Cable extension             |                                                                                         | Extension up to total 10m is possible with 0.3mm <sup>2</sup> , or more, cable.                                                                                                                                                                                                                                                 |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
| Weight                      |                                                                                         | DPH-A0□/DPH-A30: 6g approx., DPH-A1□/DPH-A2□: 10g approx.                                                                                                                                                                                                                                                                       |                 |         |         |               |                                                                                   |         |                    |                   |         |  |
| Accessories                 |                                                                                         | Gasket (DPH-A0□, DPH-A30, only)                                                                                                                                                                                                                                                                                                 |                 |         |         |               |                                                                                   |         |                    |                   |         |  |

## Notes:

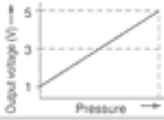
1. The rated pressure range indicates the range for full product performance.
2. The pressure sensor head can be used independently.

## DP5/DPH

### SPECIFICATIONS

#### Pressure sensor controller



| Type                                                                   | NPN output type                                                                                                                                                                                                                                                                                                                                                                                                                           |       | PNP output type                                                                                                                                                                                                              |  |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Item                                                                   | 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 -101.3kPa, Positive pressure: 0 to 1.000MPa, Compound pressure: -100.0 to 100.0kPa                                                                                                                                                                                                                                                                                                                                  |       |                                                                                                                                                                                                                              |  |
| Set pressure range (Note 1)                                            | Vacuum pressure: 101.3 to -101.3kPa (1.033 to -1.033kgf/cm <sup>2</sup> , 14.70 to -14.70psi, 1.013 to -1.013bar, 760 to -760mmHg, 29.9 to -29.9inHg)<br>Positive pressure: -1.050 to 1.050MPa (-10.71 to 10.71kgf/cm <sup>2</sup> , -152.2 to 152.2psi, -10.50 to 10.50bar)<br>Compound pressure: -199.9 to 199.9kPa (-1.999 to 1.999kgf/cm <sup>2</sup> , -19.98 to 19.98psi, -1.999 to 1.999bar, -1510 to 1537mmHg, -59.4 to 60.5inHg) |       |                                                                                                                                                                                                                              |  |
| Supply voltage/Current consumption                                     | 12 to 24V DC $\pm 5\%$ Ripple P-P 10% or less / 60mA or less (not including pressure sensor head)                                                                                                                                                                                                                                                                                                                                         |       |                                                                                                                                                                                                                              |  |
| Sensor supply voltage                                                  | Same as supply voltage                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                                                                                                                                                                                                              |  |
| Comparative output<br>(Comparative Output 1)<br>(Comparative Output 2) | NPN open-collector transistor (2 outputs)<br>• Maximum sink current: 100mA<br>• Applied voltage: 30V DC or less (between comparative output and 0V)<br>• Residual voltage: 1V or less (at 100mA sink current)<br>0.4V or less (at 16mA sink current)                                                                                                                                                                                      |       | PNP open-collector transistor (2 outputs)<br>• Maximum source current: 100mA<br>• Applied voltage: Same as supply voltage<br>(between comparative output and +V)<br>• Residual voltage: 2V or less (at 100mA 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                                                             | 1digit (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 $\pm 0.2\%$ F.S. $\pm 1$ digit ( $\pm 3$ digits)<br>With compound pressure type sensor head: within $\pm 0.2\%$ F.S. $\pm 2$ digits ( $\pm 6$ digits)                                                                                                                                                                                                                              |       |                                                                                                                                                                                                                              |  |
| Response time                                                          | 1ms, 16ms, 128ms, 512ms or less, selectable by key operation<br>(however, set response time is +2ms when auto-reference/remote zero-adjustment input is applied)                                                                                                                                                                                                                                                                          |       |                                                                                                                                                                                                                              |  |
| Short-circuit protection                                               | Incorporated                                                                                                                                                                                                                                                                                                                                                                                                                              |       |                                                                                                                                                                                                                              |  |
| Pressure sensor head input                                             | Input voltage range: 1 to 5V DC (over rated pressure range)                                                                                                                                                                                                                                                                                                                                                                               |       |                                                                                                                                                                                                                              |  |
| Auto-reference/Remote zero-adjustment input                            | • Input condition: NPN non-contact input<br>[operates in Low (fall) state]<br>• Signal condition: High...5 to 30V, or open<br>Low...0.4V or less<br>Low level input time...2ms or more                                                                                                                                                                                                                                                    |       | • Input condition: PNP non-contact input<br>[operates in High (rise) state]<br>• Signal condition: High...5 to 30V<br>Low...0.4V or less, or open<br>High level input time...2ms or more                                     |  |
| Analog voltage output                                                  | • Output voltage: 1 to 5V DC (over rated pressure range)<br>• Zero point: within $1V \pm 2.5\%$ F.S.<br>(vacuum/positive pressure type)<br>within $3V \pm 3.5\%$ F.S. (compound pressure)<br>• Span: within $4V \pm 4\%$ F.S.<br>• Linearity: within $\pm 1\%$ F.S.<br>• Output impedance: 1k $\Omega$ approx.                                                                                                                            |       |                                                                                                                                             |  |
| Display                                                                | 3 1/2 digit LCD display (with red and green backlight)<br>(Display refresh cycle: 256ms, 512ms or 1024ms selectable by key operation)                                                                                                                                                                                                                                                                                                     |       |                                                                                                                                                                                                                              |  |
| Displayable pressure range                                             | Vacuum pressure: 5.1 to -101.3kPa (0.052 to -1.033kgf/cm <sup>2</sup> , 0.74 to -14.70psi, 0.051 to -1.013bar, 38 to -760mmHg, 1.5 to -29.9inHg)<br>Positive pressure: -0.050 to 1.050MPa (-0.51 to 10.71kgf/cm <sup>2</sup> , -7.2 to 152.2psi, -0.50 to 10.50bar)<br>Compound pressure: -101.3 to 105.0kPa (-1.033 to 1.071kgf/cm <sup>2</sup> , -14.70 to 15.22psi, -1.013 to 1.050bar, -760 to 787mmHg, -29.9 to 31.0inHg)            |       |                                                                                                                                                                                                                              |  |
| Operation display                                                      | LCD segment is red when 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)                                                                                                                                                                                                                                                                                                                             |       |                                                                                                                                                                                                                              |  |
| Pollution degree                                                       | 3 (Industrial environment)                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                                                                                                                                                                                                              |  |
| Protection                                                             | IP40 (IEC)                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                                                                                                                                                                                                              |  |
| Ambient temperature                                                    | 0 to +50°C (No dew condensation), Storage: -10 to +60°C                                                                                                                                                                                                                                                                                                                                                                                   |       |                                                                                                                                                                                                                              |  |
| Ambient humidity                                                       | 35 to 85% RH, Storage: 35 to 85% RH                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                                                                                                                                                                                                              |  |
| EMC                                                                    | Emission: EN50081-2, Immunity: EN50082-2                                                                                                                                                                                                                                                                                                                                                                                                  |       |                                                                                                                                                                                                                              |  |
| Voltage withstandability                                               | 1,000V AC for one min. between all supply terminals connected together and enclosure                                                                                                                                                                                                                                                                                                                                                      |       |                                                                                                                                                                                                                              |  |
| Insulation resistance                                                  | 50M $\Omega$ , or more, with 500V DC megger between all supply terminals connected together and enclosure                                                                                                                                                                                                                                                                                                                                 |       |                                                                                                                                                                                                                              |  |
| Vibration resistance                                                   | 10 to 150Hz frequency, 0.75mm amplitude, or 5G in X, Y and Z directions for two hours each                                                                                                                                                                                                                                                                                                                                                |       |                                                                                                                                                                                                                              |  |
| Shock resistance                                                       | 100m/s <sup>2</sup> acceleration in X, Y and Z directions for three times each                                                                                                                                                                                                                                                                                                                                                            |       |                                                                                                                                                                                                                              |  |
| Temperature characteristics                                            | Over ambient temperature range 0 to +50°C: within $\pm 0.5\%$ F.S. of detected pressure at +25°C (not including pressure sensor head)                                                                                                                                                                                                                                                                                                     |       |                                                                                                                                                                                                                              |  |
| Material                                                               | Front case: ABS, LCD display section: PET, Rear case: PBT                                                                                                                                                                                                                                                                                                                                                                                 |       |                                                                                                                                                                                                                              |  |
| Connecting method                                                      | Connector                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |                                                                                                                                                                                                                              |  |
| Conductor cross-section area (Note 2)                                  | 0.16 to 0.32mm <sup>2</sup> (AWG#25 to #22)                                                                                                                                                                                                                                                                                                                                                                                               |       |                                                                                                                                                                                                                              |  |
| Lead wire diameter                                                     | $\phi 1.2$ to $\phi 1.8$ mm                                                                                                                                                                                                                                                                                                                                                                                                               |       |                                                                                                                                                                                                                              |  |
| Wire material                                                          | Tin plated, soft, twisted copper wire                                                                                                                                                                                                                                                                                                                                                                                                     |       |                                                                                                                                                                                                                              |  |
| Cable extension                                                        | Extension up to total 100m is possible with 0.3mm <sup>2</sup> , or more, cable.                                                                                                                                                                                                                                                                                                                                                          |       |                                                                                                                                                                                                                              |  |
| Weight                                                                 | 20g approx.                                                                                                                                                                                                                                                                                                                                                                                                                               |       |                                                                                                                                                                                                                              |  |
| Accessories                                                            | Panel mounting bracket (MS-DP-1): 1 set, Connector: 1 set (Housing: 1 No., Connector pin: 6 Nos.), Pressure unit label: 1 No., Connector cap: 1 No.                                                                                                                                                                                                                                                                                       |       |                                                                                                                                                                                                                              |  |

## 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 2m, use a cable with a diameter of 0.3mm<sup>2</sup> or more.

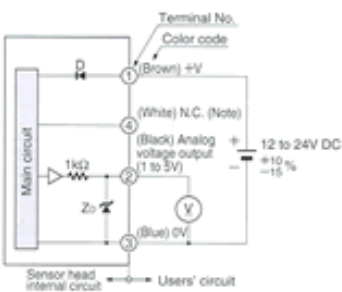
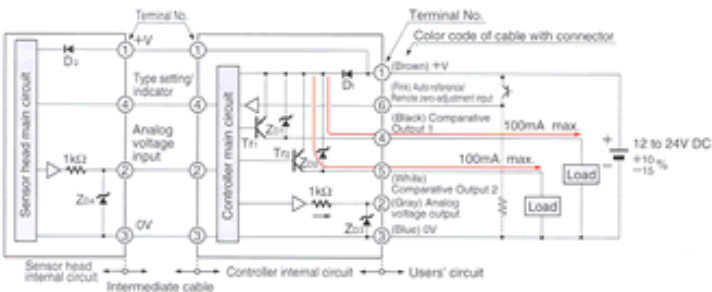
## DP5/DPH

## I/O CIRCUIT AND WIRING DIAGRAMS

## DP5-C NPN output type

## I/O circuit diagram

For independent use of sensor head

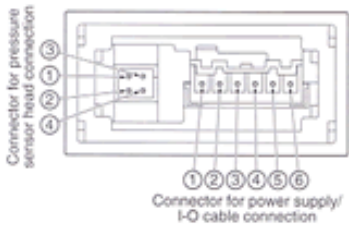


Symbols...  
D1, D2: Reverse supply polarity protection diode  
ZD1 to ZD4: Surge absorption zener diode  
Tr1, Tr2: NPN output transistor

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

Symbols...  
D: Reverse supply polarity protection diode  
ZD: Surge absorption zener diode

Pin position



Connector for power supply/ I-O cable connection

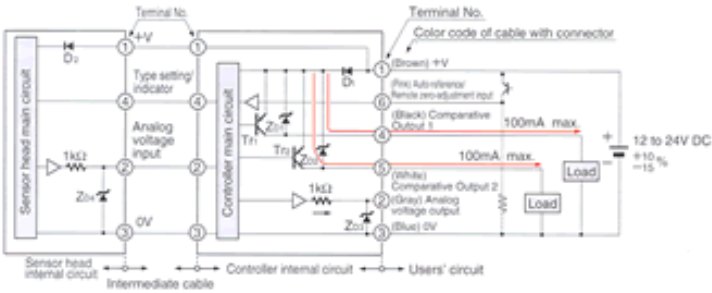
1. +V
2. Analog voltage output
3. 0V
4. Comparative Output 1
5. Comparative Output 2
6. Auto-reference/ Remote zero-adjustment input

Connector for pressure sensor head connection

1. +V
2. Analog voltage output
3. 0V
4. N. C.

DP5-C-P PNP output type

I/O circuit diagram

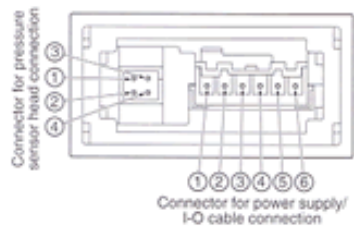


Symbols...  
D1, D2: Reverse supply polarity protection diode  
ZD1 to ZD4: Surge absorption zener diode  
Tr1, Tr2: PNP output transistor

Connector for power supply/ I-O cable connection

Connector for pressure sensor head connection

Pin position



- |                                                |                          |
|------------------------------------------------|--------------------------|
| 1. +V                                          | 1. +V                    |
| 2. Analog voltage output                       | 2. Analog voltage output |
| 3. OV                                          | 3. OV                    |
| 4. Comparative Output 1                        | 4. N. C.                 |
| 5. Comparative Output 2                        |                          |
| 6. Auto-reference/Remote zero-adjustment input |                          |

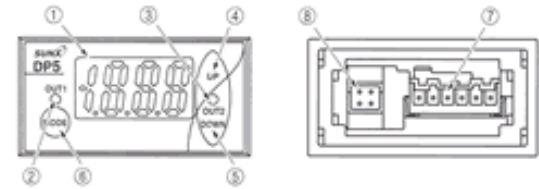
# DP5/DPH

## PRECAUTIONS FOR PROPER USE



- This product is not a safety sensor. Its use is not intended or designed to protect life or prevent bodily 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 gases. It cannot be used with liquids or with corrosive gas.

### Functional description



### Error messages

- When an error occurs take the following corrective action.

| Error message | Cause                                                                                        | Corrective action                                                                                                               |
|---------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|               | The controller, pressure sensor head and the intermediate cable are not correctly connected. | Connect the pressure sensor head and the intermediate cable correctly.                                                          |
|               | Pressure sensor head cable or intermediate cable have a cable break.                         | Check the pressure sensor head cable and the intermediate cable and replace the cable having a break.                           |
|               | The pressure sensor head is damaged.                                                         | Replace the pressure sensor head.                                                                                               |
|               | Overcurrent due to short-circuit.                                                            | Switch off the power supply and check the load.                                                                                 |
|               | 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 type                                                 | Applied pressure exceeds the upper limit of displayable pressure range.                                                         |
|               | Vacuum pressure type                                                                         | Applied pressure exceeds the lower limit (reverse pressure) of displayable pressure range.                                      |
|               | Positive pressure and compound pressure type                                                 | 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 certain that the power is off before the wiring is installed. 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

|   | Description                                            | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ① | 3 1/2 digit LCD display (with red and green backlight) | <ul style="list-style-type: none"><li>Displays measured pressure, settings, error messages and key-protect status.</li><li>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.</li></ul>                                                                                                                                    |
| ② | Comparative Output 1 operation indicator (Orange)      | <ul style="list-style-type: none"><li>Lights up when Comparative Output 1 is ON.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                 |
| ③ | Comparative Output 2 operation indicator (Green)       | <ul style="list-style-type: none"><li>Lights up when Comparative Output 2 is ON.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                 |
| ④ | UP key                                                 | <ul style="list-style-type: none"><li>In the initial setting mode and supplementary setting mode, pressing the key changes the setting item.</li><li>In the pressure value setting mode, pressing the key changes the set value.</li><li>In the sensing mode, pressing the key continuously for 4 sec., or more, displays the peak hold value.</li></ul>                                                                                                                                   |
| ⑤ | DOWN key                                               | <ul style="list-style-type: none"><li>In the initial setting mode and supplementary setting mode, pressing the key changes the set conditions.</li><li>In the pressure value setting mode, pressing the key changes the set value.</li><li>In the sensing mode, pressing the key continuously for 4 sec., or more, displays the bottom hold value.</li></ul>                                                                                                                               |
| ⑥ | MODE key                                               | <ul style="list-style-type: none"><li>In the pressure value setting mode, pressing the key changes the setting item.</li><li>In the sensing mode, pressing the key continuously for 4 sec., or more, can set/cancel the key-protect.</li><li>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.</li></ul> |
| ⑦ | Connector for power supply I/O cable connection        | <ul style="list-style-type: none"><li>It is the connector for connection of power supply I/O cable.</li></ul>                                                                                                                                                                                                                                                                                                                                                                              |
| ⑧ | Connector for pressure sensor head connection          | <ul style="list-style-type: none"><li>It is the connector for connection of pressure sensor head.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                |

(FG.) terminal of the equipment to an actual ground.

- If the 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 could cause malfunction due to induction.
- In order to reduce noise, make the wiring as short as possible. Improper wiring will damage the sensor.

Other Precautions

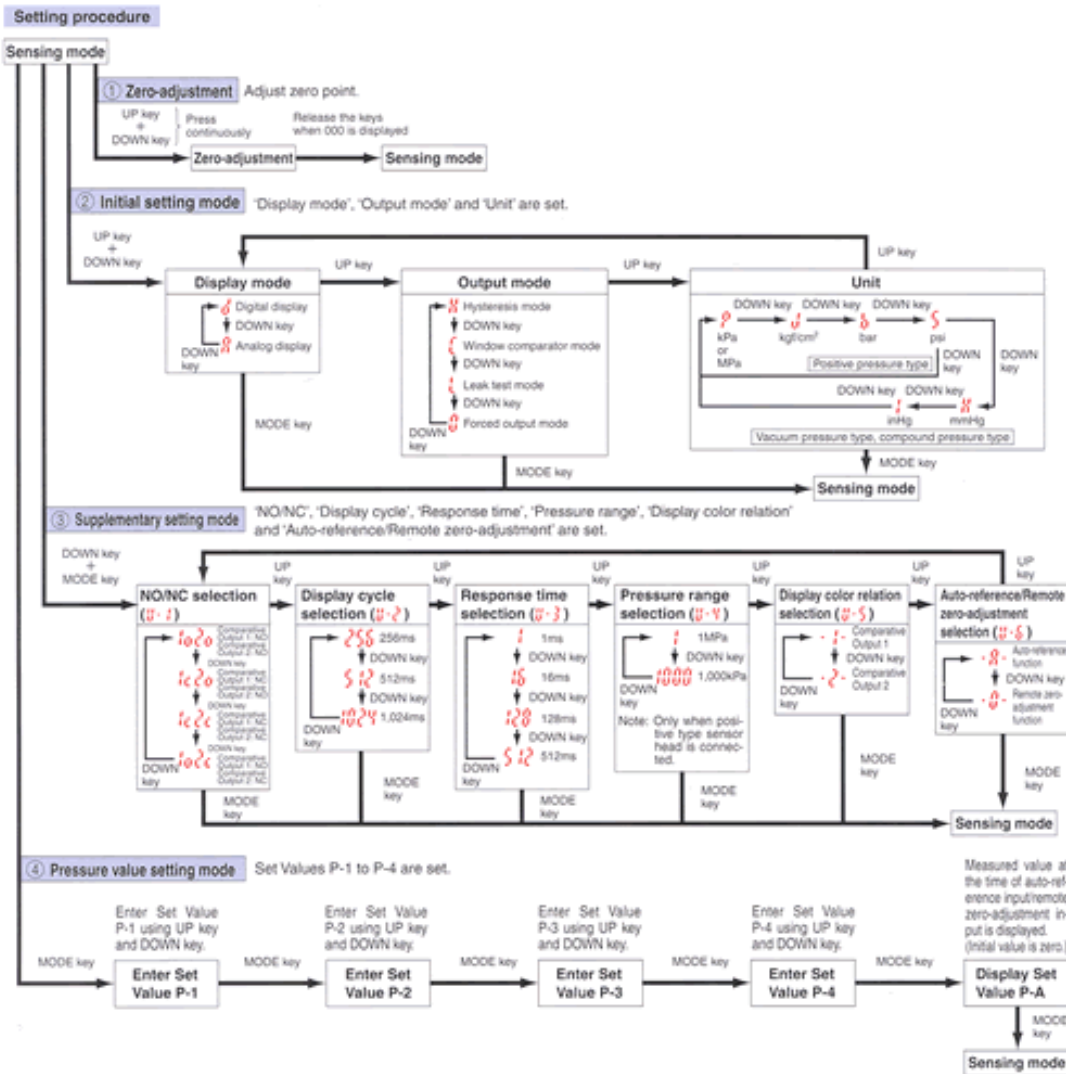
- Use within the rated pressure range.
- Do not apply pressure exceeding the pressure limits. Excessive pressure will damage the diaphragm and the unit will not function.
- Do not use during the initial transient time (DP5: 3 sec. approx., DPH: 50ms approx.) after the power supply is switched on.
- Avoid 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. This could damage the diaphragm and the unit will not function.
- Do not operate the keys with pointed or sharp objects.

DP5/DPH

PRECAUTIONS FOR PROPER USE

## Setting

- If key-protect has been set, make certain that you release the key-protect before operating the keys. (Please refer to "Key-protect function" later in this section.)
- 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.
- For the positive pressure type and the compound pressure type, Set Value P-2 should be set towards the higher pressure side with respect to Set Value P-1 and Set Value P-4 should be set towards the higher pressure side with respect to Set Value P-3. Also, in the vacuum pressure type, Set Value P-2 should be set towards the higher vacuum side with respect to Set Value P-1 and Set Value P-4 should be set 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 in an EEPROM. Note that the EEPROM has a guaranteed lifespan of 100,000 write operation cycles. Since the auto-reference input value and the remote zero-adjustment input value are not stored in the EEPROM, they are not included in the number of write operation cycles.





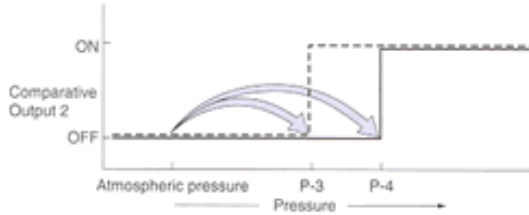
# DP5/DPH

## PRECAUTIONS FOR PROPER USE

### Auto-reference function

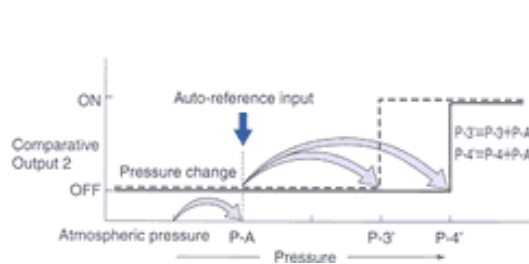
- Auto-reference function corrects Set Value P-3 and Set Value P-4 of Comparative Output 2 by taking the pressure measured at the time of auto-reference input as the reference pressure.

<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>



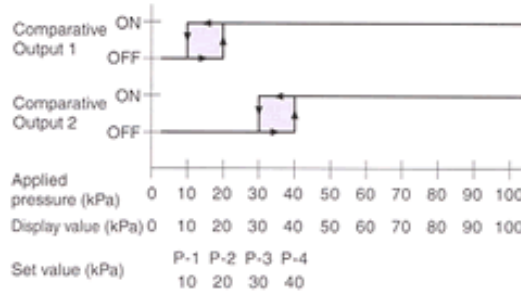
- At the time of auto-reference input, the pressure value detected at that instant is temporarily recorded as Set Value P-A and becomes the reference pressure.
- With Set Value P-A as the reference pressure, Set Value P-3 and Set Value P-4 are automatically corrected to 'Set Value P-3 + Set Value P-A'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

### Operation Chart

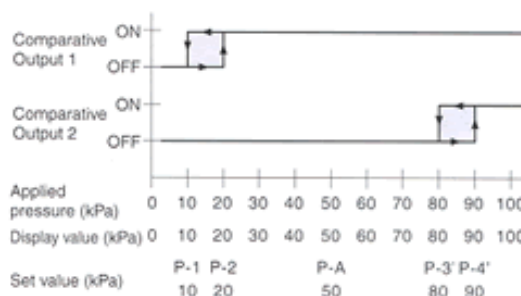
<Normal operation (comparative outputs set to NO)>



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

Auto-reference input: 50kPa

Output mode: Hysteresis mode



Note: In the hysteresis mode, Set Value P-3 and Set Value P-4 are shifted. The output is set to the window comparator mode or the leak test mode.

- Maintain the pressure at a constant level for at least 2ms after the auto-reference input is changed to Low (High in case of PNP output type). If used in a transient state it will not operate properly..
- Use Comparative Output 2 at least 'set response time + 2ms' after the auto-reference input is made changed to Low (High in case of PNP output type).
- At the time of auto-reference input,  is displayed on the 3-1/2 digit display for approximately 1 second.
- The auto-reference input value (Set Value P-A)



- 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. Please make certain that the set pressure range is not exceeded.

changes to 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).

## DP5/DPH

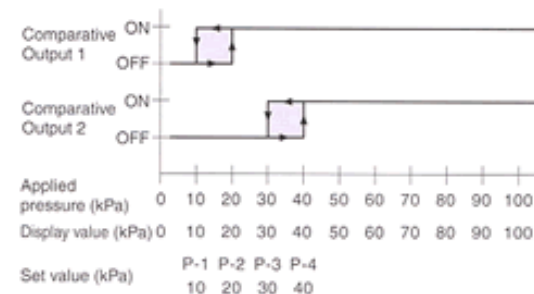
### PRECAUTIONS FOR PROPER USE

#### 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 certain that the pressure and the set values do not exceed the rated pressure ranges.

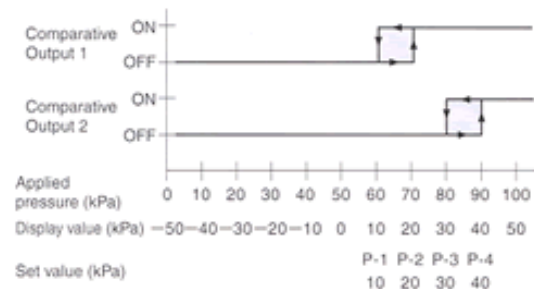
#### Operation chart

##### Normal operation (comparative outputs set to NO)



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

Remote zero-adjustment input: 50kPa  
Output mode: Hysteresis mode



Note: In the hysteresis mode the displayed values and the ON/OFF points of the output are changed in case the output mode is set to the window comparator mode.

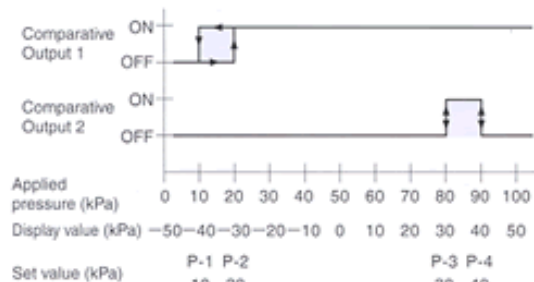
Remote zero-adjustment input: 50kPa  
Output mode: Leak test mode

#### Forced output mode

- In the initial setting mode, if the output mode is set to the forced output mode (a), the comparative outputs are forcibly maintained at OFF level in the sensing mode, irrespective of Set Values P-1 to P-4. 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 starting 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 the (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 the DOWN key is pressed, Comparative Output 2 switches to ON and OFF alternately.
- Press the (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 (a).
- 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



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.

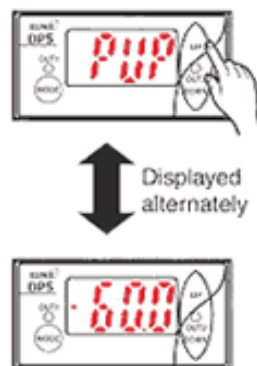
the mode changes back to sensing mode.

### Peak hold & bottom hold function

- 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.

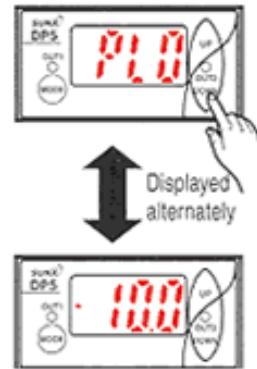
### Peak hold display

- Maintain the pressure at a constant level for at least 2ms after the remote zero-adjustment input is changed to 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 + 2ms' after the remote zero adjustment input is changed to Low (High in case of PNP output type).
- At the time of remote zero-adjustment input,  is displayed on the 3-1/2 digit display for approximately 1 second.
- 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.



- In the sensing mode, keep the UP key pressed until  is displayed. (4 sec. or more).
- When the finger is released after  is displayed, the peak value and  are displayed alternately.
- Press the UP key.
- ( If the applied pressure exceeds the displayable pressure range an error message  or  and  are displayed alternately. When this happens restore the applied pressure to within the rated pressure range.
- The figure above shows the display of a vacuum type sensor.)

## Bottom hold display



- In the sensing mode, keep the DOWN key pressed until the **01.0** is displayed. (4 sec. or more).
- When the finger is released after **01.0** is displayed, the bottom value and **01.0** are displayed alternately.
- Press the DOWN key.
- ( If the applied pressure exceeds the displayable pressure range, error message ( **01.0** or **1.0** ) and **01.0** are displayed alternately. In this case, bring back the applied pressure to within the rated pressure range.
- The figure above shows the display of a vacuum type sensor. )

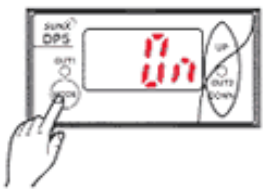
# DP5/DPH

## PRECAUTIONS FOR PROPER USE

### Key-protect function

- Key-protect is a function which prevents any unintentional change to settings which you have entered.

#### Setting of key-protect



In the sensing mode,  
press **MODE** key  
continuously for 4 sec.  
or more and release it  
immediately when **01.0**  
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 when the power supply is switched off.
- Please check to see if the key-protect function has been set.

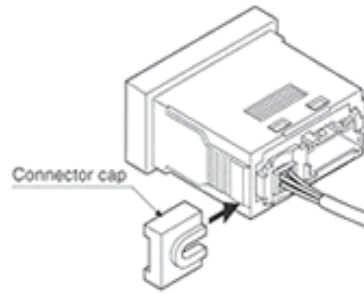
### Connecting

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

### Release of key-protect

In the sensing mode,

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



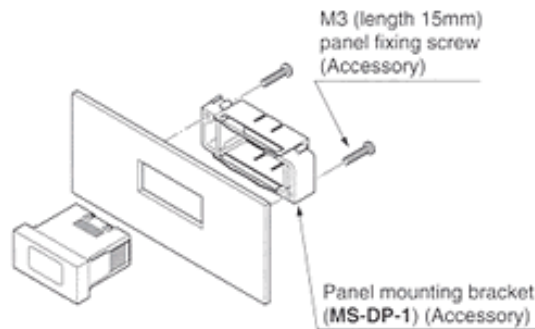
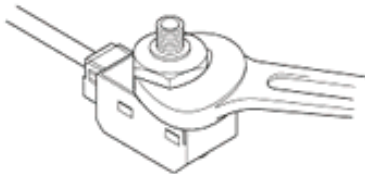
When the keys are to be operated, make sure that the key-protect function is released.

### Piping

When connecting a commercial coupling to the pressure port, hold the hexagonal section of the pressure port with an 11 mm (**DPH-A1•** ) or a 12mm (**DPHA2•** ) spanner, and make certain that the tightening torque is 1 N·m for male thread type of **DPH-A1•** or 5N·m or less for the **DPH-A2•** ). If excessive tightening torque is applied the M5 male thread of the commercial coupling or the pressure port could be damaged.

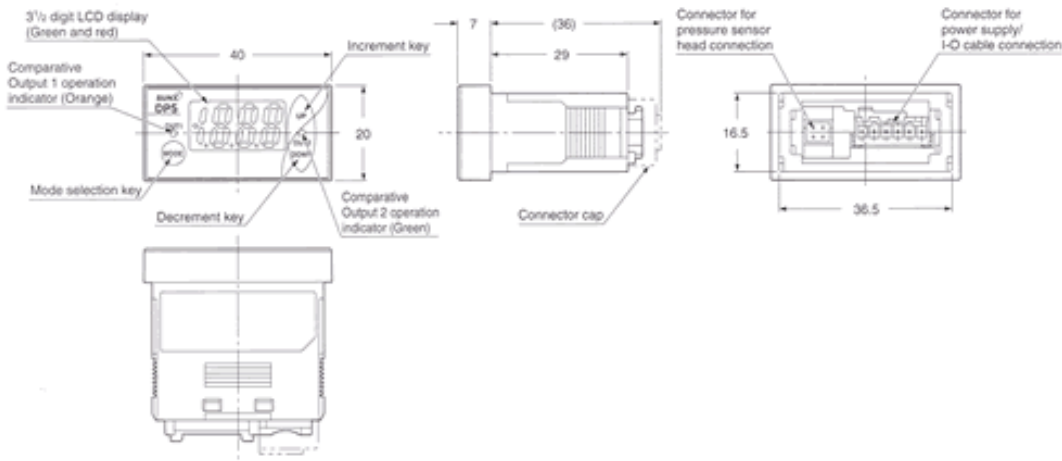
### Mounting

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



### DIMENSIONS (Unit: mm)

#### DP5-C• Pressure controller

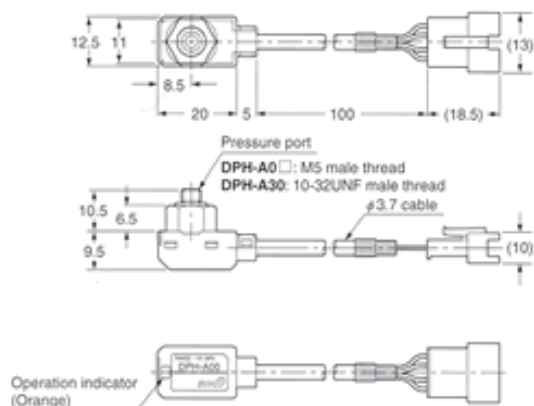


# DP5/DPH

## DIMENSIONS (Unit: mm)

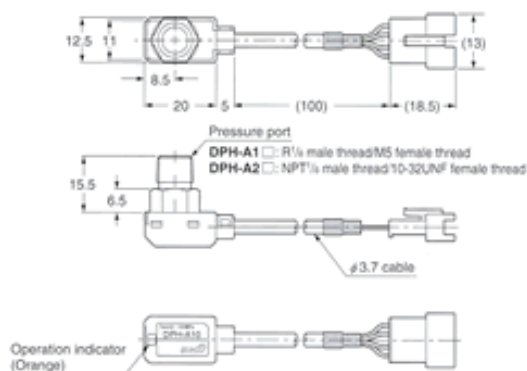
### DPH-A0•

#### DPH-A30 Sensor head



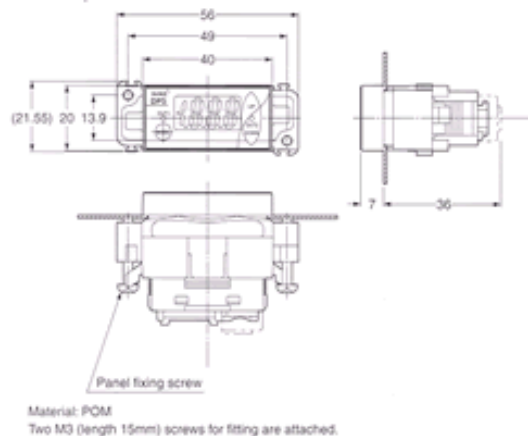
### DPH-A1•

#### DPH-A2• Sensor head

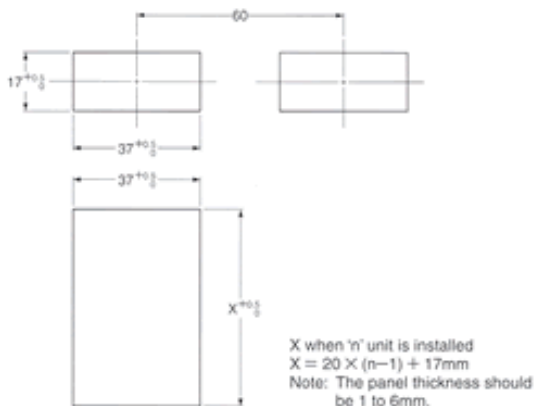


### MS-DP-1 Panel mounting bracket (accessory)

#### Assembly dimensions



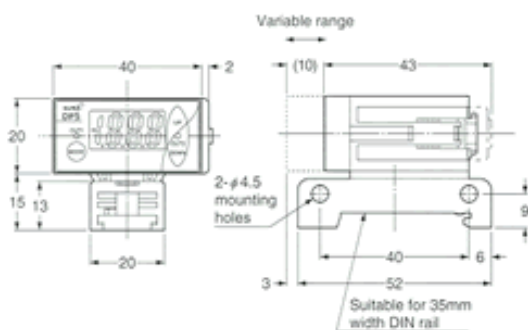
#### Panel cut-out dimensions



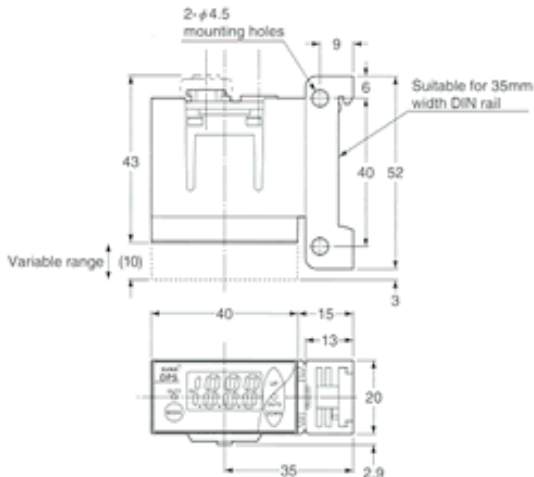
### MS-DP2 DIN rail mounting bracket (optional)

#### Assembly dimensions

#### Horizontal mounting



#### Vertical mounting



# DP5/DPH

## DIMENSIONS (Unit: mm)

### DPH-CC• Intermediate cable (optional)





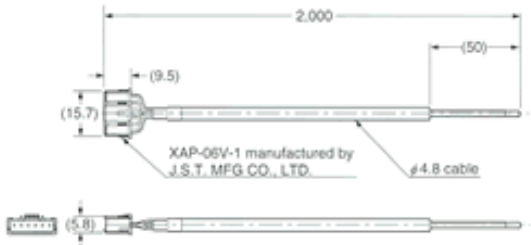
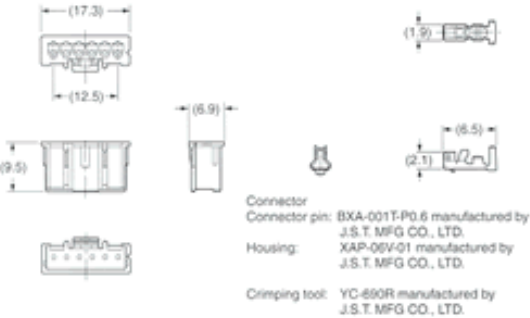
| Model No.    | Cable length |
|--------------|--------------|
| DPH-CC2 (-R) | 2m           |
| DPH-CC3 (-R) | 3m           |
| DPH-CC5 (-R) | 5m           |

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

CN-66 Connector (optional)

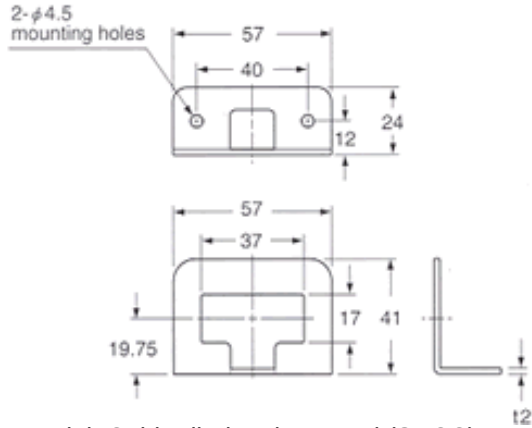
CN-66-C2 Cable with connector (optional)

Housing - Connector pin

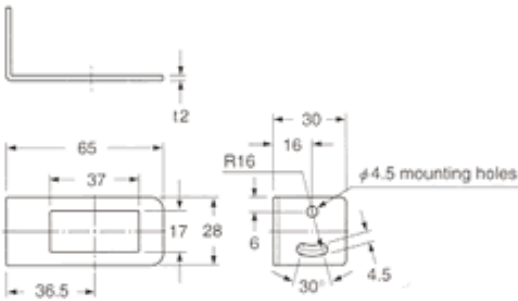


MS-DP-3 Controller mounting bracket (optional)

MS-DP-4 Controller mounting bracket (optional)



Material: Cold rolled carbon steel (SPCC)  
(Uni-chrome plated)  
Note: Use together with panel mounting bracket included with sensor.



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