Easy to check with dual digital display! New product

Digital pressure sensor
PPX series

DIGITAL PRESSURE SENSOR PPX SERIES
New easy-to-use high-function digital pressure sensor PPX series with dual display to check (current value) and (set value) of pressure at the same time, 3-color display, copy function of setting details, and 3-mode setting, etc.

**Direct setting with dual display**

The main screen to display "current value" and the sub screen to display "set value" are compactly incorporated. The set value can be adjusted and set with [current value] displayed. The screens turn ON/OFF during setting, so usable as volume type sensor. Key lock is also equipped.

**Compact size of □30 X 25.5**

**3-mode setting to match applications**

The operation mode is designed according to setting applications as daily operation setting "RUN MODE", basic setting "MENU MODE" and high function "PRO MODE". Operation and setting are very easy.

**Digital pressure sensor**

PPX Series
display!

3-color display (red/green/orange)
The main display section is changed to green/red in accordance with output ON/OFF, and orange during setting. The sensor state is easily read.

Copy function to reduce man-hours and to prevent mistake
The copy of sensor setting details can be quickly made to other sensors with data communication. Problems caused by incorrect installation is prevented if the same setting is applied to several units.

Independent two outputs are equipped (standard type)
2 independent comparison outputs are provided, so either detection mode can be selected.

[3 detection mode]
- EASY MODE
  ON/OFF control of comparison output
- Hysteresis mode
  ON/OFF control with hysteresis setting of comparison output
- Window comparator mode
  Comparison output ON/OFF control within set pressure range

High-function type meeting different applications
High-function type to select analog voltage output or external input instead of comparison output in the other side is available to meet different applications.

Easy to operate
- Easy-to-read alpha-numeric display
  Alpha-numeric with 12-segment is provided. Alphabet and number are easily read.
- Peak/bottom hold
  Maximum and minimum values of fluctuated pressure is displayed with using two screens.
- Response time change possible with 10 steps (2.5ms to 5000ms)
- Setting details display possible with code no.

Energy saving mode equipped
Power consumption reduced by 30 to 40% (with lower brightness of display section and turning off the light)

Space saving
Contact installation possible

Customized sub-display section
Alphabet and number other than the setting can be displayed in the sub-display section. Troubles of putting labels such as normal pressure range and equipment No. are saved.

Model for foreign markets available
Unit switching available (MPa, kPa, kgf/cm², bar, psi, mmHg, inchHg)

CE Marked products
RoHS directive compliant
# Digital pressure sensor applications

<table>
<thead>
<tr>
<th><strong>Positive pressure and vacuum confirmation or interlock</strong></th>
<th><strong>Leakage inspection (high-function type)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Positive Pressure Diagram" /></td>
<td><img src="image2" alt="Leakage Inspection Diagram" /></td>
</tr>
<tr>
<td>VRA2000</td>
<td>Easy setting with auto-reference/remote zero adjusting</td>
</tr>
<tr>
<td>PPX</td>
<td>PPX</td>
</tr>
<tr>
<td>PPX</td>
<td>PPX</td>
</tr>
<tr>
<td>PPX</td>
<td>PPX</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Manifold</strong></th>
<th><strong>Both vacuum pressure and break pressure can be controlled with a single unit.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Manifold Diagram" /></td>
<td><img src="image4" alt="Manifold Unit Diagram" /></td>
</tr>
<tr>
<td>Tension controlling buffer FBU2</td>
<td>PPX</td>
</tr>
</tbody>
</table>

| **Contact confirmation**                                   |                                                                                  |
|-----------------------------------------------------------|                                                                                  |
| ![Contact Diagram](image5)                                |                                                                                  |
When designing and manufacturing a device using CKD products, the manufacturer is obligated to check that device safety mechanical mechanism, pneumatic control circuit, or water control circuit and the system operated by electrical control that controls the devices is secured.

It is important to select, use, handle, and maintain the product appropriately to ensure that the CKD product is used safely. 
Observe warnings and precautions to ensure device safety. Check that device safety is ensured, and manufacture a safe device.

**WARNING**

1. This product is designed and manufactured as a general industrial machine part. It must be handled by an operator having sufficient knowledge and experience in handling.

2. Use this product in accordance of specifications.
   Contact CKD when using the product outside the unique specifications range, when using it outdoors, and when using it under the conditions and environment below. Do not attempt to modify or additionally machine the product.
   1. Use for special applications requiring safety including nuclear energy, railroad, aviation, ship, vehicle, medical equipment, equipment, or applications coming into contact with beverage or food, amusement equipment, emergency shutoff circuits, press machine, brake circuits, or for safeguard.
   2. Use for applications where life or assets could be adversely affected, and special safety measures are required.

3. Observe corporate standards and regulations, etc., related to the safety of device design and control, etc.
   ISO4414, JIS B 8370 (pneumatic system rules)
   JPAS 005 (principles for pneumatic cylinder use and selections)
   Such as High Pressure Gas Maintenance Law and Occupational Safety and Sanitation Laws, other safety rule and corporate standards and regulations

4. Do not handle, pipe, or remove devices before confirming safety.
   1. Inspect and service the machine and devices after confirming safety of the entire system related to this product.
   2. Note that there may be hot or charged sections even after operation is stopped.
   3. When inspecting or servicing the device, turn off the energy source (air supply or water supply), and turn off power to the facility. Discharge any compressed air from the system, and pay enough attention to possible water leakage and leakage of electricity.
   4. When starting or restarting a machine or device that incorporates pneumatic components, make sure that the system safety, such as pop-out prevention measures, is secured.

5. Observe warnings and cautions on the pages below to prevent accidents.

- The safety cautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.

**DANGER:** When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, or when there is a high degree of emergency to a warning.

**WARNING:** When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.

**CAUTION:** When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation. In any case, important information that must be observed is explained.
Pneumatic components (electronic pressure switch and sensors)

Safety precautions
Always read this section before starting use. Refer to "Pneumatic, vacuum and auxiliary components CB-024SA".

Design & Selection

WARNING

■ Use this product in accordance of specifications.
  - Applications, load current, voltage, temperature, shock and working environment, etc. exceeding the specifications range could lead to destruction and malfunction of peripheral equipment.

■ Do not use oxygen, corrosive or combustible gas, or toxic fluid for this product.

■ Do not use this product in flammable atmosphere
  - The pressure switch is not explosion proof. Do not use this product in flammable atmosphere, or explosions could occur.

■ Do not install the product in completely sealed enclosure.
  - The internal pressure in the closed chamber could change if the fluid leaks in an accident. Use this product in the control box with safety device to control internal pressure, or indoors with no pressure differential from the outside.

■ Power voltage
  Use the product within the specified power voltage range. If voltage exceeding specified rage is applied, or alternating current power (100 V AC) is applied, circuit damage could occur.

■ Load short circuit
  Do not short-circuit the load, or circuit damage could occur.

■ Incorrect wiring
  Avoid incorrect wiring such as connecting to the wrong electrode of the power source, etc., or the circuit damage could occur.

CAUTION

■ Working fluid
  When using working fluid other than air; nitrogen gas, etc., oxygen deficiency could be caused. Observe the following instructions.
  - Use this product in well ventilated location.
  - Ventilate the work area when nitrogen gas is being used.
  - Inspect piping regularly, so nitrogen gas does not leak.

■ If this product is used for vacuum suction confirmation, care must be taken for following matters.
  - The pressure exceeding withstanding pressure in the specifications must not be applied to the product if positive pressure of vacuum break is applied.

■ Working environment
  - Avoid use in the place that vibration or shock not less than 100m/s² is applied.
  - Care must be taken in not exceeding media and ambient temperature range in cluding piping area.
  - Do not use the product in locations that water or oil may contact the products.

■ Considering errors, etc. caused by precision/temperature characteristics, decide the setting.

■ Care must be taken when this product is used in an interlock circuit.
  - When a pressure switch is used to issue interlock signals, if high reliability is required, provide mechanical guards for a failure, or provide dual interlock as a switch (sensor) other than pressure switch is used. Execute inspection regularly to check that the normal operation is done.

■ Responsiveness is adversely affected depended on working pressure and volume of loads. Install a regulator before the sensor if stable repeatability is required.

■ Use conditions to comply with CE marking
  - PPX series is CE marked products complied with EMC directive. EN61000-6-2; regulation matched to immunity applies to this product. Conditions below are necessary to comply with these standards.
  - Length of power line connected to the sensor is to be less than 10m.

■ Take the following countermeasures to prevent malfunction caused by noise.
  - Provide a line filter in AC power line.
  - Do not share power with an inverter or components causing motor noise, etc.
  - Remove noise from inductive load (such as solenoid valve and relay) with a surge suppressor such as CR or diode in the source side.
  - When using components (such as switching regulator and inverter motor) causing noise around the sensor installation section, ground a frame ground (F.G.) terminal of components.

■ When the secondary side control pressure is released to atmosphere as air blow, pressure may fluctuate depended on piping and blow conditions. Execute a test under actual working conditions or contact to CKD.

■ Select the product whose flow is not less than the total of that used for sensors when selecting a dryer, an air filter, an oil mist filter and a regulator.
Installation & Adjustment

WARNING
- Avoid incorrect connection.
  - An incorrect connection may cause a fatal error not only to this product but also peripheral devices.

- DC power not insulated from AC primary side may damage the product and power, so an electric shock could occur. Do not use the product in this case.

- If a switching regulator at store is used for power, ground a frame ground (F.G.) terminal of power.

CAUTION
- Do not use the product where the product is exposed to direct-sunlight, or may come in contact with water or oil.

- Avoid use in high steam and dirt environments.

- Care must be taken to avoid product contact with organic solvents such as thinner, water, oil and fat.

- Do not put wire, etc. into the pressure port, or diaphragm may be damaged to prevent a normal operation.

- Performance could not be guaranteed in strong electromagnetic field.

- Flash air pipe connected to sensors before connecting. Prevent pipe from catching tips of sealing tape when piping.

- Apply adequate torque when connecting pipes.
  - Tighten by hand at first, then use a tool to prevent screw thread damaged.

<table>
<thead>
<tr>
<th>Set screw</th>
<th>Tightening torque N·m</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3</td>
<td>0.3 to 0.6</td>
</tr>
<tr>
<td>M5</td>
<td>1 to 1.5</td>
</tr>
<tr>
<td>Rc1/8</td>
<td>3 to 5</td>
</tr>
</tbody>
</table>

Piping
- Apply a 12mm spanner (14 mm for PPX-6G type) on the pressure port hexagon head section to fix, then apply tightening torque 9.8N·m or less if a joint at store is connected to the pressure port. A joint or the pressure port section could be broken if too much torque is applied. Use seal tape to connect joints to prevent air leak.

Installation

WARNING
- Sensor bracket PPX-KL is available.
  - If a sensor is installed with a bracket, etc., tightening torque must be 0.5N·m or less.

- Panel bracket PPX-KHS (optional) and front cover PPX-KCB (optional) are available.
CAUTION

Care must be taken for protection of body and lead wire.

- Do not apply stress to cable outlet or connector section directly.

- Do not dent or drop the body. Do not apply excessive repeated bending force and tension to lead wire, or could result in disconnection.

- Connect an elastic material as a cable bearer to the movable part.

Connector wiring

- Insert cable with connector PPX-C* into the connector section of this product as right when connection.

- Pull out the connector while pressing the jaw of cable with connector when disconnecting.

- If the cable section is pulled out without pressing the jaw when disconnecting, the cable or connector could be broken.

<Connector pin layout drawing>

<table>
<thead>
<tr>
<th>Connector pin No.</th>
<th>Terminal name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+V</td>
</tr>
<tr>
<td>2</td>
<td>Standard type: Comparison output 1</td>
</tr>
<tr>
<td>3</td>
<td>High-function type: Analog voltage output or external input</td>
</tr>
<tr>
<td>4</td>
<td>0V</td>
</tr>
</tbody>
</table>

- Use an applicable cable and crimp tools for housing and contact if connected with the connector set (PPX-CN).

<Applicable cable>

<table>
<thead>
<tr>
<th>Lead wire diameter</th>
<th>Lead wire cross-section areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.12 to 0.32mm (AWG26 to 22)</td>
<td></td>
</tr>
</tbody>
</table>

- voltage must rise or fall quickly when power is turned ON or OFF. If the rated voltage is not reached, the sensor could malfunction. In some cases, the sensor could not recover after the rated voltage is reached. Reset the power in that case. Even if the voltage drops temporarily, shut down the power once, then turn ON the power again.

- Avoid use during the transient state (0.5s) when power turned ON.

- Install the product and wiring as far as possible from noise source such as a strong electric line, etc. Take other countermeasures for the surge from inductive loads on the power line.

- Do not operate the control unit, machinery or equipment suddenly after wiring. Due to wrong setting, signals not expected could be outputted. First stop control unit, machinery and equipment, while energize these to test. Set the target setting after test.

- Cable with 0.3mm² and over can be extended up to 100m. Note that the power line connected to this product must be less than 10m if used as a CE marked product.

Stop machinery and equipment, and check safety before setting switch output.

Operate the key with a fingertip. Knife, screwdriver and other hard tip tools or objects may damage the plastic film over the control.

Piping

- Apply seal tape or sealant to screw-in joint, then screw the joint into the port to avoid excessive torque. Apply a spanner on the metal section to tighten.

- When winding seal tape, wind the tape leaving 2mm and over open from the thread top. If seal tape extrudes from the thread top, seal tape chips could be created when screwed in. These chips could enter into the circuit, and cause malfunction.

- Use pipe 1m long, and do not apply tension and impact to the pipe. If longer pipe is used, tension not expected could be created by the pipe weight, vibration or impact. In this case, use an intermediate support to fix the pipe on the machine or equipment.

Do not connect relays, switches or other devices to the output of this sensor in parallel at the PLC. Do not short-circuit the PLC input terminal connected to this sensor and (-) side of power to test input devices, neither, or the output circuit of this unit could be damaged.
During Use & Maintenance

**WARNING**
- **Do not apply overcurrent.**
  - Due to short-circuit of load, if overcurrent applies to the pressure switch, the switch could be damaged or ignite. Install a fuse on output or power line as a overcurrent protective circuit.

**CAUTION**
- **Do not disassemble the product.**
  - Disassembling the product could result in damage or deterioration of the product. CKD will not guarantee the performance after disassembling. When replacing or moving the product, remove the sensor without disassembling pressurized port.

**Stop machinery and equipment, then check the safety before operating the product.**

**The case is made of resin. Do not use solvent, alcohol or any other cleaning agent, etc., to remove contamination, etc., or resin could be corroded or damaged. Wipe contaminations with a well wrung rag, etc., after soaked in weakened neutral detergent.**

**Care must be taken for disconnection and reverse current caused by wiring resistance. When components including pressure switches are connected to the same power source of pressure switch, if (-) sides of output and power lines are short-circuited to check input devices of the control panel, or if (-) side of power line is disconnected, reverse current may apply to the output circuit of pressure switch, causing damages.**

Take countermeasures as followings to prevent damages caused by reverse current.

1. Do not concentrate current to the power line, especially, (-) side power line, and use wire as fat as possible.
2. Limit numbers of components connected to the same power source of pressure switch.
3. Connect a diode in series to the pressure switch output line to prevent reverse current.
4. Connect a diode in series to power line (-) side of the pressure switch to prevent reverse current.

**Care must be taken for surge current leading.**

When the power is shared with inductive loads that create surge current such as pressure switches, solenoid valves or relays, if the circuit is closed with inductive loads activated, surge current could lead to the output circuit, causing damages.

Take countermeasures as followings to prevent damage caused by surge current leading.

1. Separate outputs creating inductive load such as solenoid valve and relay, etc. and power of inputs such as pressure switch, etc.
2. If the power can not be separated from the inductive load, install a surge suppressor per load. The surge suppressor connected to PLC, etc. merely protects the unit connected.
3. Connect surge suppressors to the points as following to reduce damages when lines are disconnected.

When components are connected with connectors, if a connector is dislocated during energizing, the output device could be damaged because of the reason above. Turn off the power before dislocating a connector.
# Specifications

<table>
<thead>
<tr>
<th>Descriptions</th>
<th>Standard type</th>
<th>High-function type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low pressure</strong></td>
<td><strong>High pressure</strong></td>
<td><strong>Low pressure</strong></td>
</tr>
<tr>
<td>PPX-R01*</td>
<td>PPX-R10*</td>
<td>PPX-R01*H</td>
</tr>
</tbody>
</table>

## Pressure sensitive element
- **Diffused semiconductor pressure sensor**

## Working fluid
- Air/non-corrosive gas

## Type of pressure
- Gauge pressure

## Rated pressure range

<table>
<thead>
<tr>
<th>Type</th>
<th>Unit</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low pressure</strong></td>
<td>kPa</td>
<td>-100.0 to +100.0kPa</td>
</tr>
<tr>
<td><strong>High pressure</strong></td>
<td>MPa</td>
<td>-0.100 to +1.000MPa</td>
</tr>
</tbody>
</table>

## Display unit

<table>
<thead>
<tr>
<th>Unit change</th>
<th>Only available for domestic market (-KA)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low pressure</strong></td>
<td>(MPa, kPa, kgf/cm², bar, psi, mmHg, inchHg)</td>
</tr>
<tr>
<td><strong>High pressure</strong></td>
<td>(MPa, kPa, kgf/cm², bar, psi, mmHg, inchHg)</td>
</tr>
</tbody>
</table>

## Withstanding pressure

<table>
<thead>
<tr>
<th>Type</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low pressure</strong></td>
<td>kPa</td>
<td>500kPa</td>
</tr>
<tr>
<td><strong>High pressure</strong></td>
<td>MPa</td>
<td>1.5MPa</td>
</tr>
</tbody>
</table>

## Repeatability

<table>
<thead>
<tr>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low pressure</strong></td>
<td>±0.1%F.S. (within ±2 digits)</td>
</tr>
<tr>
<td><strong>High pressure</strong></td>
<td>±0.2%F.S. (within ±2 digits)</td>
</tr>
</tbody>
</table>

## Temperature characteristics (+20 °C reference)

<table>
<thead>
<tr>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low pressure</strong></td>
<td>Within ±0.5%F.S.</td>
</tr>
<tr>
<td><strong>High pressure</strong></td>
<td>Within ±1%F.S.</td>
</tr>
</tbody>
</table>

## Indicator

- **4 + 4 digit 3 color LCD display** (display update cycle: 250ms and 1000ms, select with key operation.)
- **Orange LED** (Comparison output 1 operational indicator light, comparison output 2 operational indicator light: comparison output ON lighting)
- **Orange LED** (Comparison output 1 operational indicator light: comparison output ON lighting, analog voltage output operation display light: lighting during setting)

## Power voltage

- 12 to 24V DC±10% ripple P-P10% or less

## Power consumption

- Normal: 840mW or less (current consumption 35mA or less at 24 V power)
- ECO MODE: 600mW or less at STD (current consumption 25mA or less at 24 V power) and 480mW or less at FULL (current consumption 20mA or less at 24 V power)

## Comparison output (switch output)

<table>
<thead>
<tr>
<th>Type</th>
<th>Note 1</th>
<th>Output operation</th>
<th>Output mode</th>
<th>Hysteresis (hysteresis)</th>
<th>Response time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low pressure</strong></td>
<td>NPN output type</td>
<td>Select NO/NC with the key operation.</td>
<td>EASY MODE/HYSTERESIS MODE/WINDOW COMPARATOR MODE</td>
<td>Min. 1 digit (variable)</td>
<td>2.5ms, 5ms, 10ms, 25ms, 50ms, 100ms, 250ms, 500ms, 1000ms and 5000ms, select with key operation.</td>
</tr>
<tr>
<td><strong>High pressure</strong></td>
<td>PNP output type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Short circuit protection

- **Equipment**

## Environment conditions

- **Protective structure**: IP40 (IEC)
- **Ambient temperature**: -10 to +50°C or to store: -10 to +60°C
- **Ambient humidity**: 35 to 85%RH (to be no dew condensation and unfrozen.) or to store: 35 to 85%RH
- **Withstanding voltage**: 1000V AC for one minute applied to all charged sections and between cases
- **Insulation resistance**: 50MΩ and over and with 500 V DC mega applied to all charged sections and between cases
- **Mechanical vibration proof**: Endurance 10 to 500Hz, compound amplitude 3mm, 2 hours to each XYZ direction (to mount on panel: endurance 10 to 150Hz, compound amplitude 0.75mm, 2 hours to each XYZ direction)
- **Mechanical shock proof**: Endurance 100m/s² (10 G), 3 times to each XYZ direction

## Connection

<table>
<thead>
<tr>
<th>Port size</th>
<th>Note 1</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low pressure</strong></td>
<td>M5 female thread +R (PT) 1/8 male thread</td>
<td></td>
</tr>
</tbody>
</table>

## Wire length

- Available up to 100m (less than 10m when CE marking complied) with cable not less than 0.3mm² when wiring is extended.

## Weight

- **Product weight**: 40g, weight including package: 135g

## Accessory

- **Note 2**: PPX-C2 (2m cable with connector): 1 pcs.
- **Unit seal label (for -KA with unit change)**: MPa, kPa, kgf/cm², bar, psi, mmHg, inchHg

Note 1: Refer to "Table 1" on the following page for the products for the foreign markets.

Note 2: Cable with connector is not included for (-J).
### How to order

**<How to order for domestic market>**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPX-</td>
<td></td>
</tr>
<tr>
<td>R01</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td></td>
</tr>
<tr>
<td>KA</td>
<td></td>
</tr>
</tbody>
</table>

- **Pressure range**
  - R01: -100.0 to 100.0 kPa
  - R10: -0.100 to 1.000 MPa

- **Output type**
  - N: NPN transistor output 2 point (standard type)
  - P: PNP transistor output 2 point (standard type)
  - NH: NPN transistor output 1 point + analog voltage output or external input (high-function type)
  - PH: PNP transistor output 1 point + analog voltage output or external input (high-function type)

- **Piping shape**
  - 6M: R1/8, M5

- **Connector cable**
  - Blank
  - With connector cable

**Note 1:** It is available only if **output type** "N" or "P" is selected.

**Note 2:** With the new Measurement Law, the product with the unit change function for foreign markets can not be used in Japan.

**Note 3:** Refer to Intro 6 for the unit seal label to be attached.

**Table 1**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Cable with connector 1m</td>
</tr>
<tr>
<td>C2</td>
<td>Cable with connector 2m</td>
</tr>
<tr>
<td>C3</td>
<td>Cable with connector 3m</td>
</tr>
<tr>
<td>C5</td>
<td>Cable with connector 5m</td>
</tr>
<tr>
<td>CN</td>
<td>Connector set (10 pcs. per set)</td>
</tr>
<tr>
<td>KL</td>
<td>Bracket (set screw attached)</td>
</tr>
<tr>
<td>KHS</td>
<td>Panel bracket</td>
</tr>
<tr>
<td>KCB</td>
<td>Front protective cover (when panel bracket used)</td>
</tr>
</tbody>
</table>

### How to order

**<How to order for foreign markets>**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPX-</td>
<td></td>
</tr>
<tr>
<td>R01</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td></td>
</tr>
<tr>
<td>KA</td>
<td></td>
</tr>
</tbody>
</table>

- **Pressure range**
  - R01: -100.0 to 100.0 kPa
  - R10: -0.100 to 1.000 MPa

- **Output type**
  - N: NPN transistor output 2 point (standard type)
  - P: PNP transistor output 2 point (standard type)
  - NH: NPN transistor output 1 point + analog voltage output or external input (high-function type)
  - PH: PNP transistor output 1 point + analog voltage output or external input (high-function type)

- **Piping shape**
  - 6M: R1/8, M5

- **Connector cable**
  - Blank
  - With connector cable

**Note 1:** It is available only if **output type** "N" or "P" is selected.

**Note 2:** **output type** "P" or "PH" is only available.

**Note 3:** It is available only if **output type** "N" or "P" is selected.

**Note 1:** Refer to Intro 6 for the unit seal label to be attached.

### Table 1

<table>
<thead>
<tr>
<th>Type</th>
<th>Model no.</th>
<th>Port size</th>
<th>Output type</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard type</td>
<td>PPX-R01N-6M-(J)-KA</td>
<td>M5 female thread +R (PT) 1/8 male thread</td>
<td>NPN transistor and open collector</td>
<td>For Asia</td>
</tr>
<tr>
<td></td>
<td>PPX-R01P-6M-(J)-KA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High-function type</td>
<td>PPX-R01NH-6M-KA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPX-R01PH-6M-KA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPX-R01P6N-(J)-KA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard type</td>
<td>PPX-R01N-6N-(J)-KA</td>
<td>M5 female thread +NPT1/8 male thread</td>
<td>NPN transistor and open collector</td>
<td>For North America</td>
</tr>
<tr>
<td></td>
<td>PPX-R01P-6N-(J)-KA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPX-R01NH-6N-KA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPX-R01PH-6N-KA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High-function type</td>
<td>PPX-R01N-6N-KA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPX-R01P-6N-KA</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>PPX-R01NH-6N-KA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPX-R01PH-6N-KA</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Analog output voltage - pressure characteristics

PPX-R01NH
R01PH

PPX-R10NH
R10PH

Pressure (kPa)

Voltage (V)

-100.0 0 100.0

Pressure (MPa)

Voltage (V)

-0.100 0 1.000
Dimensions with options

Bracket (PPX-KL)

Installation drawing

Panel bracket (PPX-KHS) installation drawing

Panel cut dimensions

Installing 1 pc.

Installing consecutive n pcs. horizontally.

Installing consecutive n pcs. vertically.

(Note 1): Panel thickness must be 0.5 to 6mm.
Dimensions with options

- Front protective cover (PPX-KCB) installation drawing

Front protective cover (when panel bracket used)

- Cable with connector (PPX-C*)

Cable with connector (PPX-C*)

- Connector set (PPX-CN)
  - Housing: JST MFG CO. LTD. PAP-04V-S
  - Contact: JST MFG CO. LTD. SPHD-001T-P0.5

<table>
<thead>
<tr>
<th>Model no.</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPX-C1</td>
<td>1m</td>
</tr>
<tr>
<td>PPX-C2</td>
<td>2m</td>
</tr>
<tr>
<td>PPX-C3</td>
<td>3m</td>
</tr>
<tr>
<td>PPX-C5</td>
<td>5m</td>
</tr>
</tbody>
</table>
PPX Series

Circuit and connection methods

NPN output type

- Standard type

Lead wire color of cable with connector

<Example of external connection>

PNP output type

- Standard type

Lead wire color of cable with connector

<Example of external connection>

Leakage inspection (high-function type)

- Standard type

Lead wire color of cable with connector

<Example of external connection>

Load

- (White) comparison output 2
- (Brown) +V
- (Black) comparison output 1
- (Blue) 0V

100mA MAX.

12 to 24V DC ±10%

5V

1kΩ

External input

12 to 24V DC ±10%

100mA MAX.

100mA MAX.
Name of display and controls

Output mode and output operation

- The output mode for comparison output 1 and comparison output 2 can be selected from EASY MODE, HYSTERESIS MODE and WINDOW COMPARATOR MODE. Refer to "Comparison output 1/2 output mode setting" in the menu setting mode section on page 12 for the details.

**EASY MODE**

- This mode controls ON/OFF of comparison output.

![Easy Mode Diagram]

(Note 1): Hysteresis varies with 8 steps. Refer to "Switching fixed hysteresis value" in "PRO MODE" on page 13 for the setting method.

(Note 2): "P-1" is displayed in the sub-display section for comparison output 1, while "P-2" for comparison output 2.

**HYSTERESIS MODE**

- This mode controls ON/OFF of comparison output with setting hysteresis randomly.

![Hysteresis Mode Diagram]

(Note 1): "H(hysteresis)" is displayed in the sub-display section for comparison output 1, while "H(hysteresis)" for comparison output 2.

**WINDOW COMPARATOR MODE**

- This mode controls ON or OFF of comparison output within set pressure range.

![Window Comparator Diagram]

(Note 1): Hysteresis varies with 8 steps. Refer to "Switching fixed hysteresis value" in "PRO MODE" section on page 13 for the setting method.

(Note 2): "H(hysteresis)" is displayed in the sub-display section for comparison output 1, while "H(hysteresis)" for comparison output 2.
<Installation procedure>

**RUN MODE**

This is the pressure detection state. Refer to "RUN MODE" (page 10, 11).

**PRO MODE**

This is detailed setting mode. Refer to "PRO MODE" on page 13.

**Threshold value setting**

Refer to <setting comparison output 1/2 output mode> and <switching analog voltage output/external input> in the "menu setting mode" on page 12 for the setting conditions.

The sub-display section display is only switched when setting the threshold value, so the following diagram shows only sub-display section.

(Note 1): If set pressure range is overflowed, "U" (upper limit over) or "L" (lower limit over) is displayed in the sub-display section. When setting threshold value in "hysteresis mode/window comparator mode", if Hi side threshold value is smaller than Lo side threshold value, "L" is displayed.

<For standard type>

<Setting conditions 1>
Comparison output 1 output mode: "EASY MODE" (EASY MODE) Comparison output 2 output mode: "OFF" (OFF)

<Setting conditions 2>
Comparison output 1 output mode: "EASY MODE" (EASY MODE) Comparison output 2 output mode: "EASY MODE" (EASY MODE)

<Setting conditions 3>
Comparison output 1 output mode: "EASY MODE" (EASY MODE) Comparison output 2 output mode: "hysteresis mode" or "window comparator mode"

<Setting conditions 4>
Comparison output 1 output mode: "hysteresis mode" or "window comparator mode" Comparison output 2 output mode: "OFF" (OFF)

(Note 1): The mode is switched to menu setting mode in 2 seconds after pressing the mode switchover key, however, keep it press down.
Zero adjusting is the function that pressure display is forcibly set to "zero" when the pressure port is released to atmospheric pressure.

**Key lock**

Key lock is the function that rejects key operation as the each setting mode is not changed incorrectly.

**Peak/bottom hold**

Peak/bottom hold is the function that displays peak and bottom values of fluctuated pressure. Peak value is displayed in the main display section, and bottom value is displayed in the sub-display section.

**Peak and bottom hold setting**

**Peak and bottom hold release**

(Note 1): Auto-reference and remote zero adjusting values are displayed. Refer to "Auto-reference" section on page 15 and "Remote zero adjusting" section on page 16 for the details.
Menu setting mode

- If the mode switch over key is held down for 2 seconds during RUN MODE, the mode is switched to menu setting mode.
- Hold down the mode switch over key for several seconds during the setting to switch to RUN MODE. In that case, the changed descriptions are set.
- The state of left end display section is default.

**RUN MODE**

Hold down for 2 s.

### Comparison output 1 output mode setting

- **EASY**
  - (EASY MODE)
- **HYS**
  - (HYSTERESIS MODE)
- **WOMP**
  - (WINDOW COMPARATOR MODE)

### Comparison output 2 output mode setting

- **OFF**
  - (OFF MODE)
- **EASY**
  - (EASY MODE)
- **HYS**
  - (HYSTERESIS MODE)
- **WOMP**
  - (WINDOW COMPARATOR MODE)

### Analog voltage output/external input switching

- **Route**
  - Auto-reference input
- **REF**
  - Remote zero adjusting input

### N.O./N.C. switching

- **N.O.**
  - (N.O.)
- **N.C.**
  - (N.C.)

### Response time setting

- 2.5ms
- 5ms
- 5,000ms

### Switching display color of main display section

- Red when turned ON
- Green when turned OFF
- Normally red
- Normally green

### Unit switching

- MPa
- kPa
- kgf/cm²
- bar
- (inchHg)
- (mmHg)
- (psi)

### Only for foreign markets (with unit change)

### Setting descriptions | Descriptions
--- | ---
Comparison output 1 output mode setting | Output mode of comparison output 1 is set.
Comparison output 2 output mode setting | Output mode of comparison output 2 is set.
Switching analog voltage output/external input (Only high-function type) | Analog voltage output, auto-reference input or remote zero adjusting input switching can be selected.
N.O./N.C. switching (Note 1) | Normally open (N.O.) or normally closed (N.C.) can be set.
Response time setting | Response time is set.
Switching display color of main display section | Display color of main display section can be switched.
Unit switching | Pressure unit can be switched.

(Note 1): The same display as high-function type applies to N.O./N.C. switching display if the comparison output 2 output mode setting is set to "OFF".
(Note 2): Default of high pressure type is "N.O.". Default of low pressure type is "N.C.".
(Note 3): Default of low pressure type is "MPa". "MPa" is not displayed.
(Note 4): High pressure type does not display this unit.
**PPX Series**

---

**PRO MODE**

- The mode will be switched to PRO MODE if the mode switchover key is held down for 4 seconds during RUN MODE.
- Hold down the mode switchover key for several seconds during the setting to switch to RUN MODE. In that case, the changed descriptions are set.
- The left end display section is default.

---

**RUN MODE**

- Hold down for 4 s.

**PRO MODE**

- To set No. display or custom display with sub-display section switching.

**Sub-display section switching**

- **(Standard)**
- **(Display OFF)**
- **(Unit display)**
- **(No. display)**
- **(Custom display)**

**Display speed switching**

- **(250ms)**
- **(500ms)**
- **(1,000ms)**

**Switching fixed hysteresis value**

- 1 level: 1 digit (Pa unit)

**Switching linked with display color**

- **(Linked with comparison output 1)**

**Setting ECO MODE**

- **(Max.)**

**Setting confirmation code**

**Setting copy mode**

- **(Copy send OFF)**
- **(Copy send ON)**
- **(Copy send ON-L)**

**Reset setting**

- **(Copy ready)**
Setting descriptions | Descriptions
--- | ---
**Sub-display section switching** | Sub-display section display during RUN MODE is switched.
- "[O]": Nothing is displayed.
- "[L]": The current pressure unit is displayed.
- "[O/N]": Specified number is displayed.
- "[O/N/L]": Specified number, character (some characters can not be displayed) or symbol is displayed.

**Display speed switching** | Display speed of pressure displayed in the main display section is switched.

**Fixed hysteresis value switching** | Hysteresis of EASY MODE and WINDOW COMPARATOR MODE is set.
(8 steps)

**Switching display color** | The descriptions set with main display section display color switching in the menu setting mode are compared. Interlock with either output 1 or comparison output 2 can be switched.

(Only standard) | The descriptions set with main display section display color switching in the menu setting mode are compared. Interlock with either output 1 or comparison output 2 can be switched.

**Setting ECO MODE** | Power consumption can be reduced.
- "[O]": Normally (ECO MODE OFF)
- "[S]": Display section is turned OFF if the key operation is not done for 5 seconds in RUN MODE.

**Setting confirmation code** | The current setting details can be checked. Refer to the code list for codes.

**Setting copy mode** | A copy of master side sensor setting details can be made to a slave side sensor. Refer to "Setting copy function" section on page 15 for the details.
- "[O]": A copy of setting details is sent.
- "[L]": A copy of setting details is sent, then key lock applies to the slave side sensor.

**Reset setting** | Default setting applies.

---

<table>
<thead>
<tr>
<th>Code</th>
<th>1st digit</th>
<th>2nd digit</th>
<th>3rd digit</th>
<th>4th digit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard type</td>
<td>High-function type</td>
<td>Threshold value display</td>
<td>Display color of main display section</td>
</tr>
<tr>
<td></td>
<td>Comparison output 1 output mode</td>
<td>Comparison output 2 output mode</td>
<td>Analog voltage threshold value display</td>
<td>ECO MODE</td>
</tr>
<tr>
<td>EASY</td>
<td>N.O.</td>
<td>OFF</td>
<td>N.O.</td>
<td>P-1, Lo-1</td>
</tr>
<tr>
<td></td>
<td>N.O.</td>
<td>OFF</td>
<td>Hi-1</td>
<td>turned ON</td>
</tr>
<tr>
<td></td>
<td>N.O.</td>
<td>Hi-1</td>
<td>P-2, Lo-2</td>
<td>Green when Comparison output 1</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>N.O.</td>
<td>Auto-reference</td>
<td>N.O.</td>
<td>-</td>
</tr>
<tr>
<td>Window comparator</td>
<td>N.O.</td>
<td>Remote adjusting</td>
<td>N.O.</td>
<td>Hi-2</td>
</tr>
<tr>
<td>N.O.</td>
<td>N.O.</td>
<td>-</td>
<td>Hi-2</td>
<td>turned ON</td>
</tr>
<tr>
<td>N.O.</td>
<td>N.O.</td>
<td>-</td>
<td>-</td>
<td>Comparison output 2</td>
</tr>
<tr>
<td>-</td>
<td>N.O.</td>
<td>-</td>
<td>-</td>
<td>Comparison output 2</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Comparison output 2</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Code</th>
<th>5th digit</th>
<th>6th digit</th>
<th>7th digit</th>
<th>8th digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response time</td>
<td>Unit switching</td>
<td>Display speed</td>
<td>ECO MODE</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>2.5ms</td>
<td>MPa</td>
<td>250ms</td>
<td>OFF</td>
</tr>
<tr>
<td>1</td>
<td>5ms</td>
<td>kPa</td>
<td>500ms</td>
<td>Std</td>
</tr>
<tr>
<td>2</td>
<td>10ms</td>
<td>kgf/cm²</td>
<td>1,000ms</td>
<td>Full</td>
</tr>
<tr>
<td>3</td>
<td>25ms</td>
<td>bar</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>50ms</td>
<td>psi</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>100ms</td>
<td>mmHg</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>250ms</td>
<td>inchHg</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>500ms</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>8</td>
<td>1,000ms</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>9</td>
<td>5,000ms</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Only for foreign markets (with unit change)**
<Installation procedure>

1. Set setting copy mode of the master sensor as "sending ON" or "ON-L", then press the mode switch key to set ready state. Refer to "Setting copy mode" in the PRO MODE section on page 13 for details.
2. Turn off the power of master side sensor.
3. Wire between master and slave sides as the following diagram.
4. Turn the power of the master and slave side sensors ON at the same time. (Note 2) (Note 3)
5. Setting details are 16-bit encoded, and displayed with orange characters in the main display section of the master side sensor, then a copy starts.
6. The same codes as the procedures 5 are displayed with green characters in the main display section of the slave side sensor, and "COMPLETE" is displayed in the sub-display section. (A copy is completed).
7. Turn off the power of the master and slave side sensors, then remove wiring.
   * If a copy of setting details is repeatedly made to another sensor, follow procedures 3 to 6.

(Note 1): Analog voltage output/external input applies for high function type.

(Note 2): A copy of setting details could not be made if power is not turned on at the same time.
(Note 3): Pulse output is outputted from the comparison output 1 output, if power is turned on.

<To reset the master side sensor setting copy mode.>

1. Turn on power of a master side sensor (with wiring of slave side sensor removed).
2. Hold down the mode switchover key for 2 seconds.

Auto-reference (only high-function type)

* Auto-reference is the function that compensates the setting of detection pressure as the reference pressure when auto-reference input.
* Based on detection pressure $P(a)$ when auto-reference input, the setting $(1)^\prime$ is automatically compensated to "setting $(1) + P(a)$".

The set pressure range is wider than the rated pressure range in accordance with auto-reference.

Set range and set pressure range after compensation

* The set pressure range is wider than the rated pressure range in accordance with auto-reference.

If the compensated settings overflow set pressure range when auto-reference input, the setting is automatically compensated to set pressure range.
Do not overflow set pressure range.
Remote zero adjusting (only high-function type)

- Remote zero adjusting is the function that forcibly set the pressure at that time to "zero" with an external input signal.

The setting can not be compensated when remote zero adjusting input. Do not overflow set pressure range for the pressure and the setting during remote zero adjusting.

Error display

<table>
<thead>
<tr>
<th>Error display</th>
<th>Descriptions</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Error Code" /></td>
<td>The load is short-circuited, and overcurrent flows.</td>
<td>Check a load after the power turned OFF.</td>
</tr>
<tr>
<td><img src="image2" alt="Error Code" /></td>
<td>Pressure is applied during zero point adjustment.</td>
<td>Apply atmospheric pressure to the pressure port, then execute zero adjustment again.</td>
</tr>
<tr>
<td><img src="image3" alt="Error Code" /></td>
<td>External input overflows the rated pressure range.</td>
<td>Reset applied pressure to the rated pressure range.</td>
</tr>
<tr>
<td><img src="image4" alt="Error Code" /></td>
<td>Communication error (disconnection or incorrect connection, etc.)</td>
<td>Check wiring before using the copy function.</td>
</tr>
<tr>
<td><img src="image5" alt="Error Code" /></td>
<td>Communication error (A different model is used.)</td>
<td>Check the configuration used with same models before using the copy function.</td>
</tr>
<tr>
<td><img src="image6" alt="Error Code" /></td>
<td>Applied pressure reaches the upper limit of display pressure range.</td>
<td>Set applied pressure within rated pressure range.</td>
</tr>
<tr>
<td><img src="image7" alt="Error Code" /></td>
<td>Applied pressure reaches the lower limit (back pressure) of display pressure range.</td>
<td></td>
</tr>
</tbody>
</table>
Example of setting operation per application | EASY MODE

(Note 1): This is the example of setting if operated from default setting (default).
(Note 2): If the setting conditions are unknown, operate <reset setting> in PRO MODE, and reset to default before using.

- **Suction confirmation**
  
  To EASY MODE
  
  R01 type (-100.0 to 100.0kPa)
  
  • Start from the mode when power turned ON (RUN MODE).
  • If RUN MODE is not selected, hold down the "MODE" key for several seconds to display the RUN MODE state.

  ![Comparison output 1 EASY MODE](image)
  
  Comparison output 2 OFF

  ![Comparison output 2 EASY MODE](image)

- **Suction + vacuum break confirmation**
  
  ![Comparison output 1 EASY MODE](image)
  
  Comparison output 2 EASY MODE

- **RUN MODE screen**

  ![RUN MODE screen](image)

  ![Menu setting mode screen](image)

  ![RUN MODE screen](image)

  ![Menu setting mode screen](image)

  ![RUN MODE screen](image)

- **RUN MODE screen**

  ![RUN MODE screen](image)

  ![Menu setting mode screen](image)

  ![RUN MODE screen](image)

  ![Menu setting mode screen](image)
Example of setting operation per application | HYS MODE (hysteresis mode)

(Note 1): This is an example of setting if operated from default setting.
(Note 2): If the setting conditions are unknown, operate <reset setting> in PRO MODE, and reset to default before using.

● Suction confirmation
To HYS MODE (hysteresis mode)
R01 type (-100.0 to 100.0kPa)
- Start from the mode when power turned ON (RUN MODE).
- If RUN MODE is not selected, hold down the “MODE” key for several seconds to display the RUN MODE state.

RUN MODE screen

Menu setting mode screen

RUN MODE screen

● Suction + vacuum break confirmation

RUN MODE screen

Menu setting mode screen
Example of setting operation per application  WCMP MODE (window comparator mode)

(Note 1): This is an example of setting if operated from default setting.
(Note 2): If the setting conditions are unknown, operate <reset setting> in PRO MODE, and reset to default before using.

- Source pressure confirmation

  To WCMP MODE (window comparator mode)
  R01 type (-0.100 to 1.000MPa)
  - Start from the mode (RUN MODE) when power turned ON.
  - If RUN MODE is not selected, hold down the “MODE” key for a while to enter RUN MODE.

---

**RUN MODE screen**

**Menu setting mode screen**

**RUN MODE screen**

Setting completion
Related products

Precision regulator RP1000, RP2000 series

This is an appropriate regulator for applications such as tension control and balancers

- High accuracy pressure control
- Large relief flow
- Extremely low pressure setting possible (RP1000)
- Compact
- The long service life (RP2000)