

Digital gap switch GPS3 Series



DIGITAL GAP SWITCH GPS3 SERIES

*Easily confirm the Contact
Numerical confirmation*



Highly precise 2-point output



The wide range gap switch is digitally displayed and easy to use!

Clog warning lamp

Output display 1

Output display 2

You can choose the output display color.

OFF: Green ON: Orange*2

or

OFF: Orange ON: Green

*2: Default setting

Key lock

Now equipped with a passcode function.

Operation button

We focused on the arrangement of keys and display to make operation very simple.



Guide value*1

*1: The value is calculated based on the distance of the detection nozzle to the workpiece, and there are no units.

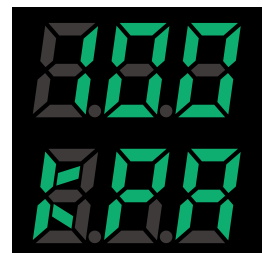
Threshold 1

Threshold 2



Pressure display

Threshold display can be switched to display the detected inlet pressure with the ▲ ▼ keys.

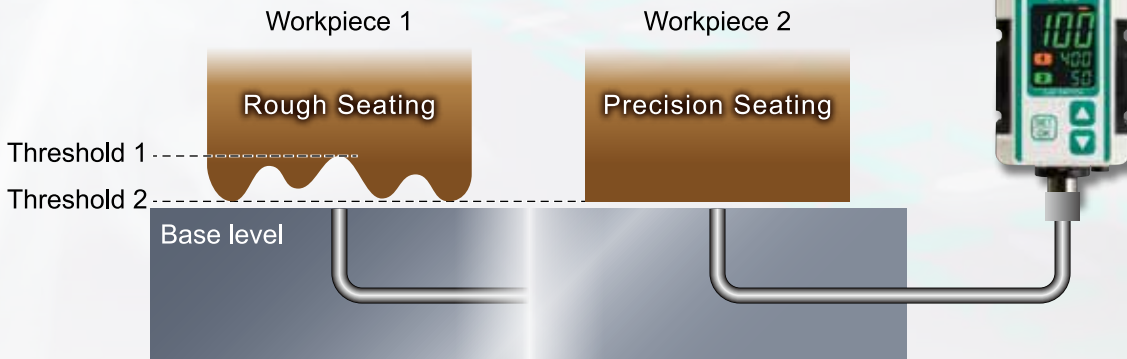


Digital gap switch

GPS3 SERIES

Highly precise 2 point output

Two points within the detection range can be set as the threshold. For example, after confirming the precise contact of the clamped workpiece, another threshold can be set from the value measured in a rough contact. This can be done with just one device.

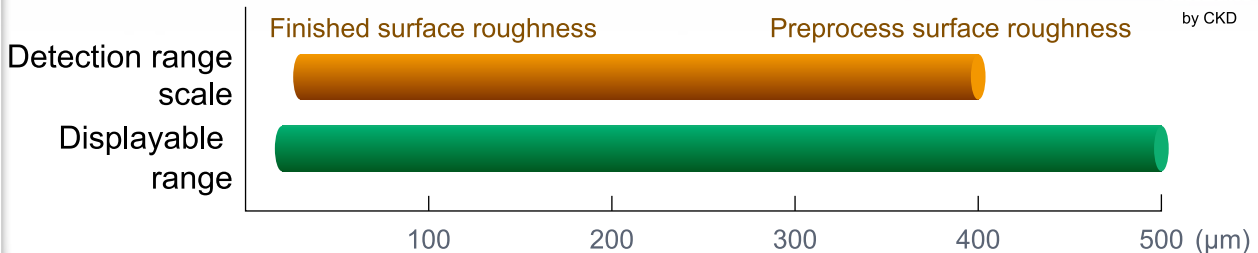


The first in the industry!!
PAT.P

February 2016
Researched
by CKD

Wide range detection from a rough surface to a precision surface

With a detection range of 0.03 mm to 0.4 mm, both the finished surface roughness and preprocess surface roughness can be set with just a single unit.



Industry No.1!!
Wide range

February 2016
Researched
by CKD

High maintainability (preventive maintenance)

[Clog warning lamp]

When a clog is detected in the air flow, a flashing lamp notifies this situation. The speed of repetition signifies where the clog is occurring, enabling quick troubleshooting.

(The default setting is OFF)



Fast flashing: Possible clog in internal orifice
Slow flashing*3: Possible clog in detection nozzle

[Easy Orifice Cleaning]

The orifice can be removed without disassembling the product.

Reset the threshold after cleaning.



[Direct blow]

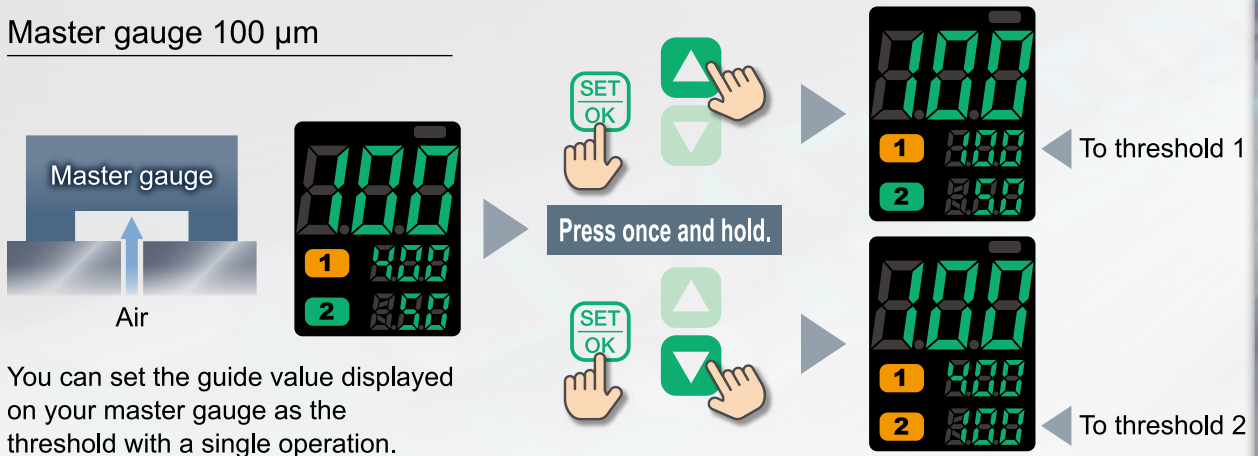
It can blow directly at MAX 0.6 MPa.

*3: Flashes even when there is no workpiece. (Due to the detection structure, it flashes during normal contact status as well).

User Friendly

You can easily set the threshold with the currently used master gauge.

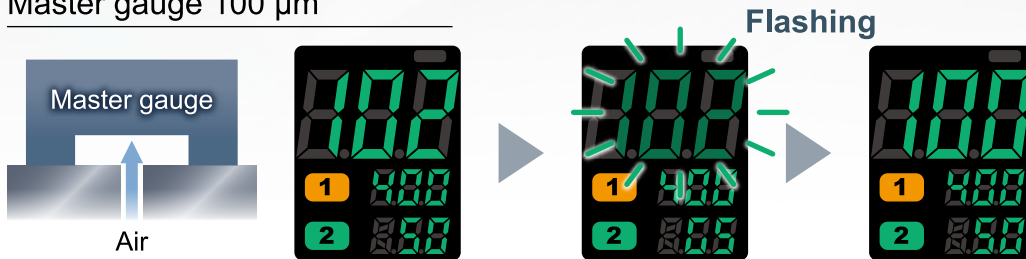
Master gauge 100 μm



You can set the guide value displayed on your master gauge as the threshold with a single operation.

Displayed value can be corrected (with actual measurements)

Master gauge 100 μm



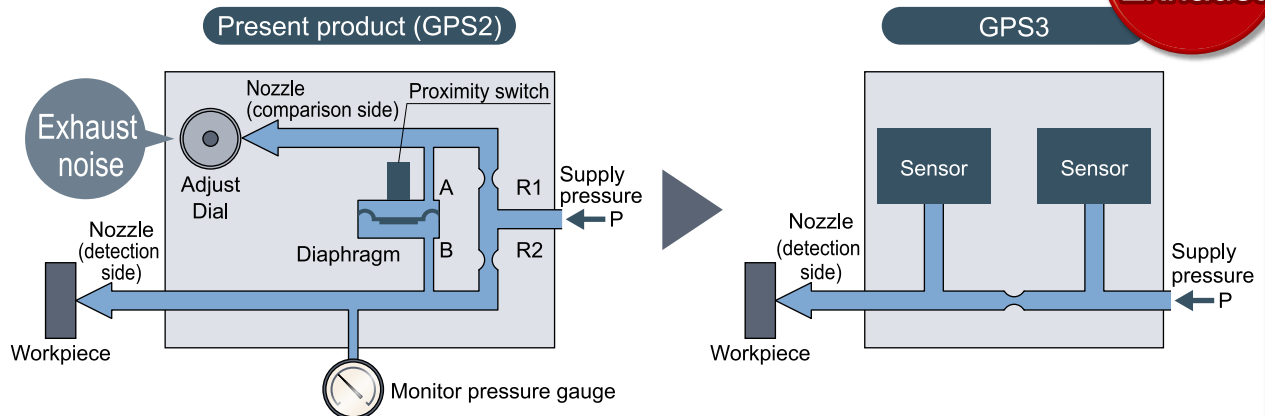
The function to correct the gap between your master gauge and the displayed guide value is now possible.

(Refer to the flow operation for details)

Less noise

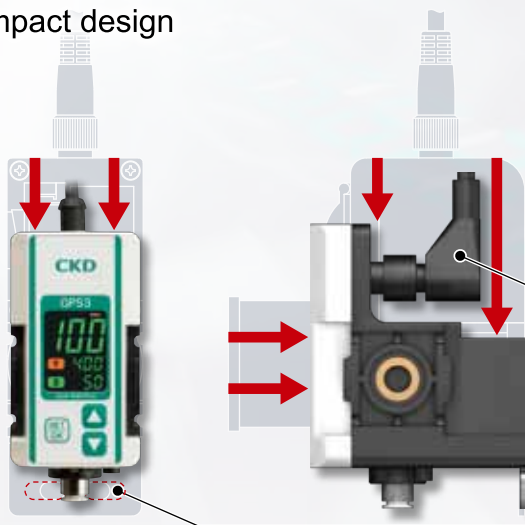
The air exhaust from the comparison side is now zero with the revision of the detection circuit. The constant noise is now a thing of the past.

Air consumption is also reduced.



Superior installation ability

Compact design



A stylish appearance that can match any equipment's design. As mounting is compatible to conventional GPS2 products, with a more compact and lightweight design, nothing stands in the way of replacing your existing device.

M12 connector (4-pin)

As connection is made from the rear, there is no need to make extra room.

With installation compatibility

Manifold / Unit are supported. Expansion is facilitated.

Manifold MGPS3

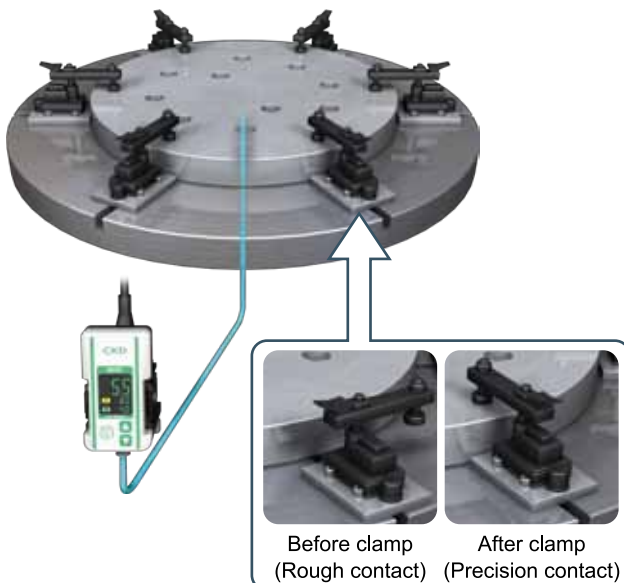


Unit UGPS3



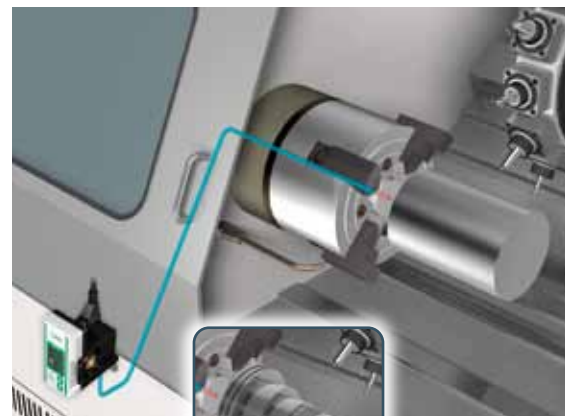
Applications

Detection at 2 points: rough seating and precision seating.



Detection at 2 points: rough machining and precision machining.

Rough machining



Precision machining



Contact confirmation switch (digital gap switch) Discrete

GPS3 Series

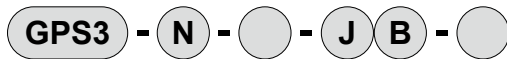
- Port size: Rc1/8



Specifications

| Description | GPS3 |
|---|--|
| Working fluid | Compressed clean air (lubrication not possible after filtration rating 5 μm) |
| Working pressure kPa | 50 to 200 |
| Proof pressure kPa | 600 |
| Detection range scale mm | 0.03 to 0.4 |
| Guide value display range | 20 to 500 (display unit 1) |
| Repeatability mm | ±0.01 (detection range scale min to 0.1) |
| Hysteresis | Variable (variable from guide value 1. Varies every increment. Default setting 10) |
| Temperature characteristics (+25°C as base) | 0.030 mm or less (detection distance: min. to 0.3 mm) 0.1 mm or less (detection distance: 0.3 to 0.4 mm) |
| Detection nozzle | Single hole nozzle φ 1.5 |
| Power supply voltage V | DC24±10%、ripple P-P10% or less (with reverse connection protection) |
| Current consumption mA | 25 or less |
| Output style | 2-point output (NPN, PNP open collector) |
| Output rated | 30 VDC, 100 mA or less |
| Internal voltage drop V | 2 or less (at 100 mA) |
| Short-circuit protection circuit | Equipped |
| Display | Guide value, threshold (2 points), output status display (2 points), detection side pressure, clog warning display |
| Insulation resistance | No abnormality after application of 1000 VAC for 1 minute |
| Withstand voltage | 10 MΩ and over at 500 VDC MB |
| Ambient temperature °C | 0 to 50 (no freezing, no dew condensation) |
| Degree of protection | IP67 equiv. |
| Port size | Inlet port Rc1/8, detection port, push-in fitting φ 6 |
| Wiring | M12 connector, 4-pin |
| Weight g | 128 (without cable) |
| Air consumption L/min | 22 or less |

How to order



A Output type

B Port size (inlet side)

C Connector cable

D Bracket

E Pressure display unit

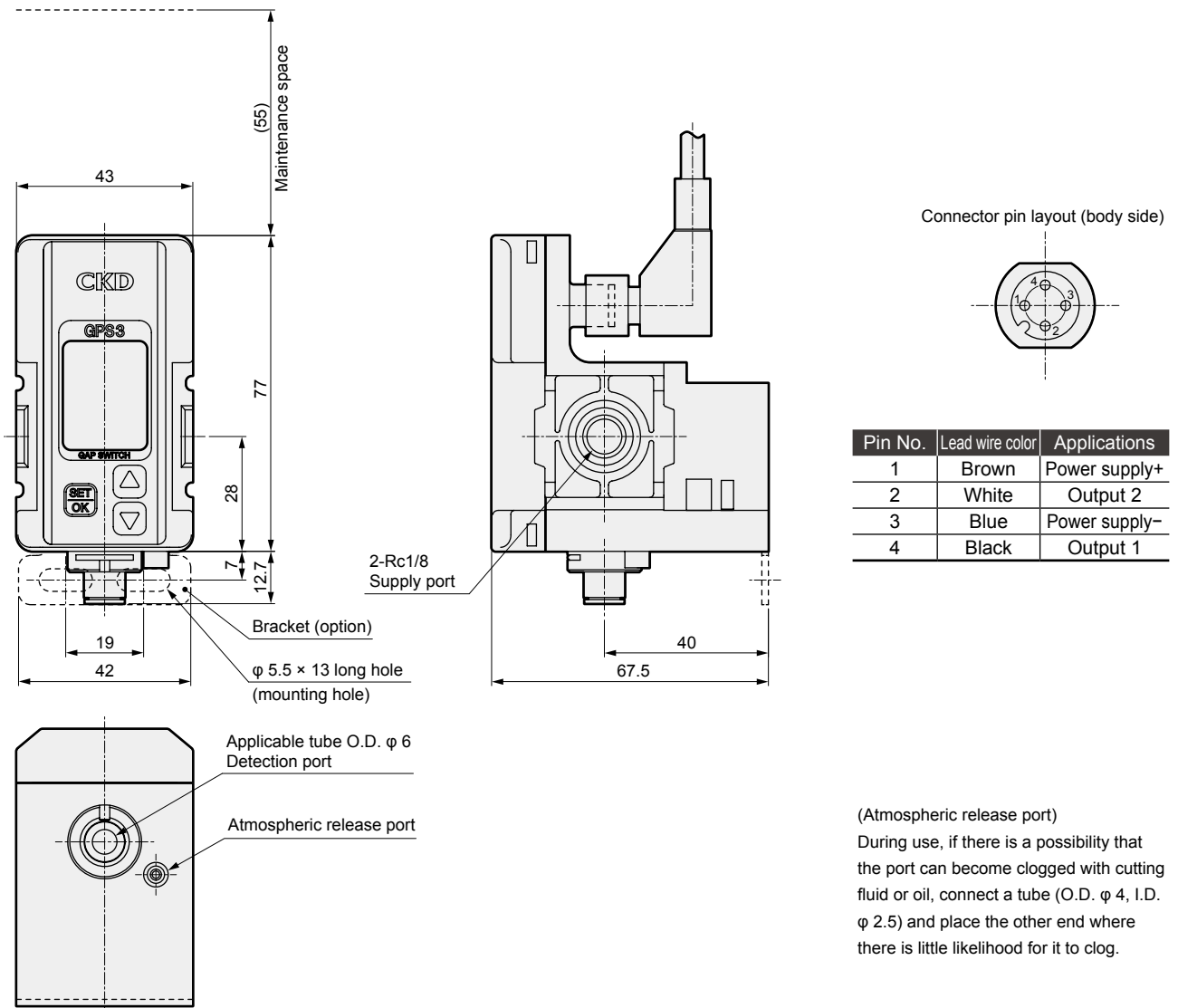
| Description | |
|---------------------------------------|---|
| A Output type | |
| N | NPN open collector (2 points) |
| P | PNP open collector (2 points) |
| B Port size (inlet side) | |
| Blank | Rc1/8 |
| C Connector cable | |
| Blank | 5 m connector cable is attached |
| J | Without connector cable |
| D Bracket | |
| Blank | Without bracket |
| B | With bracket |
| E Pressure display unit Note 1 | |
| Blank | SI units only (domestic models) |
| KA | Unit switch function on board (export models) Note 1 |



Note on model No. selection

Note 1: In compliance with new Measurement Laws, export models (with unit switch function "KA") cannot be used in Japan.

Dimensions





Gap switch Manifold

MGPS3 Series

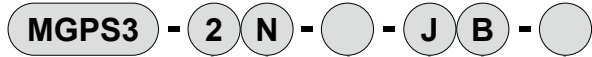
● Station No.: 2 to 6 stations



Specifications

Basic specifications are the same as discrete on page 1.

How to order



A Station No.

B Output type

C Port size (inlet side)

D Connector cable

E Bracket

F Pressure display unit

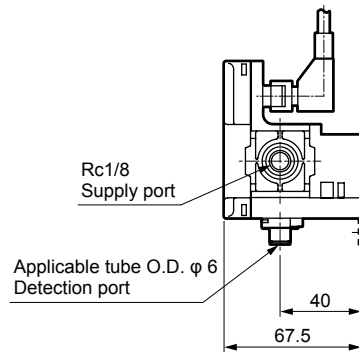
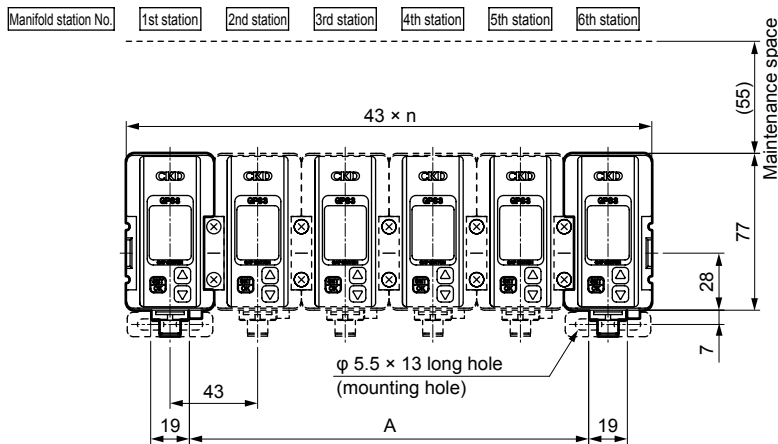
| Description | |
|---------------------------------------|--|
| A Station No. | |
| 2 | 2 stations |
| 3 | 3 stations |
| 4 | 4 stations |
| 5 | 5 stations |
| 6 | 6 stations |
| B Output type | |
| N | NPN open collector (2 points) |
| P | PNP open collector (2 points) |
| C Port size (inlet side) | |
| Blank | Rc1/8 |
| D Connector cable | |
| Blank | 5 m connector cable is attached |
| J | Without connector cable |
| E Bracket | |
| Blank | Without bracket |
| B | With bracket |
| F Pressure display unit Note 1 | |
| Blank | SI units only (domestic models) |
| KA | Unit switch function on board (export models) Note 1 |



Note on model No. selection

Note 1: In compliance with new Measurement Laws, exported models (with unit switch function "KA") cannot be used in Japan.

Dimensions



| Dimensions A | Station No. n | | | | |
|--------------|---------------|----|-----|-----|-----|
| | 2 | 3 | 4 | 5 | 6 |
| | 24 | 67 | 110 | 153 | 196 |



Gap switch Unit UGPS3 Series

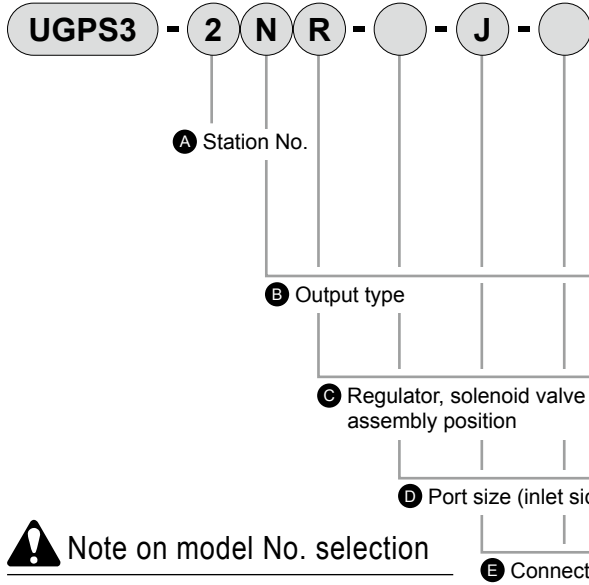
- Solenoid valve with needle, regulator integrated general purpose unit



Specifications

Basic specifications are the same as discrete on page 1.

How to order

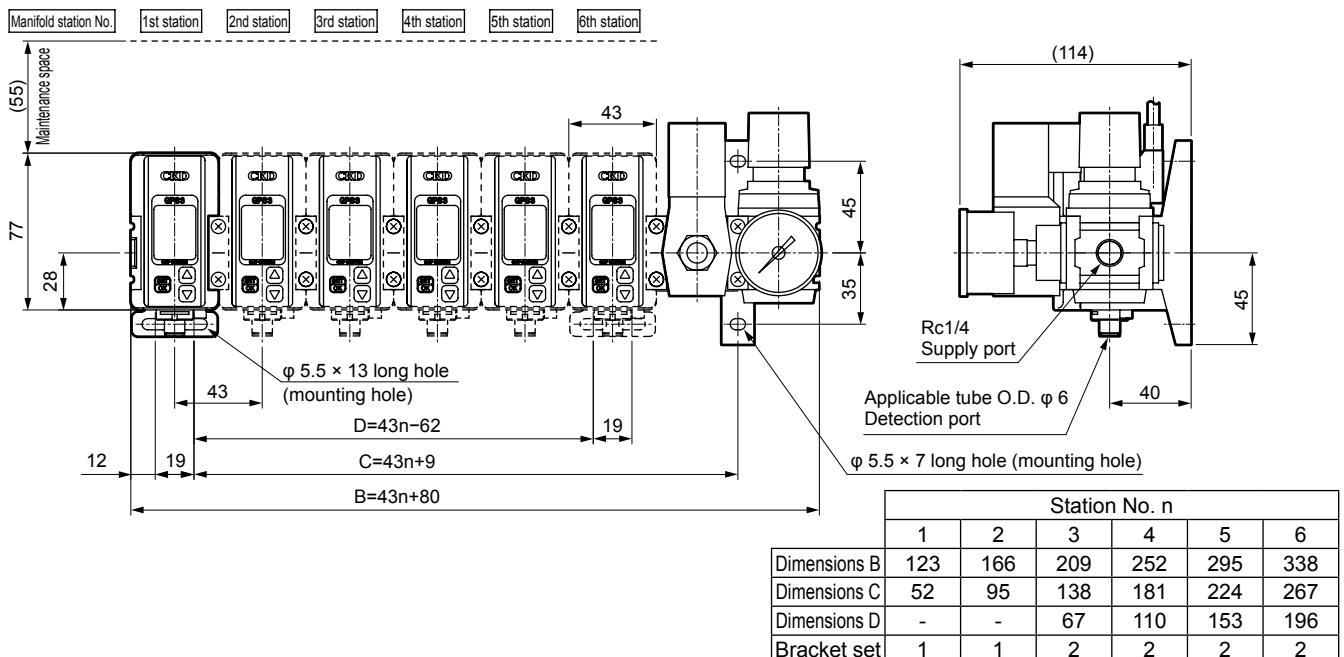


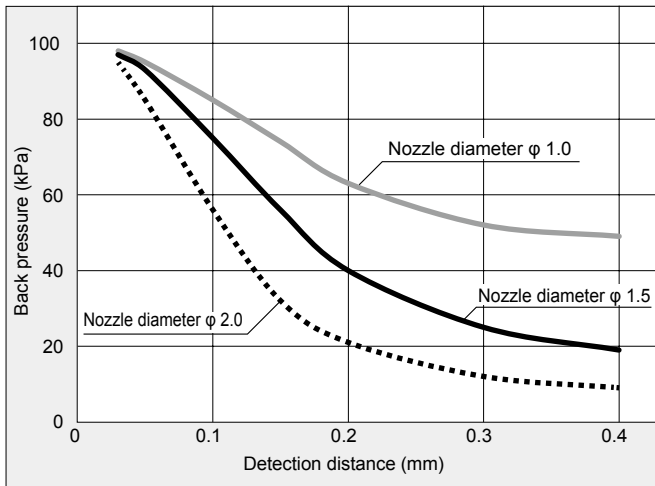
| Description | |
|---|--|
| A Station No. | |
| 1 | 1 station |
| 2 | 2 stations |
| 3 | 3 stations |
| 4 | 4 stations |
| 5 | 5 stations |
| 6 | 6 stations |
| B Output type | |
| N | NPN open collector (2 points) |
| P | PNP open collector (2 points) |
| C Regulator, solenoid valve assembly position Note 2 | |
| R | Right side assembly (inlet port on right) |
| L | Left side assembly (inlet port on left) |
| D Port size (inlet side) Note 3 | |
| Blank | Rc1/4 Note 3 |
| E Connector cable | |
| Blank | 5 m connector cable is attached |
| J | Without connector cable |
| F Pressure display unit Note 1 | |
| Blank | SI units only (domestic models) |
| KA | Unit switch function on board (export models) Note 1 |

Note on model No. selection

- Note 1: In compliance with new Measurement Laws, exported models (with unit switch function "KA") cannot be used in Japan.
- Note 2: For regulator, assemble R1000 for low pressure, for solenoid valve with needle, assemble GPS2-AB3X-2H-FL-DC24V. The directions (left and right) of assembling position describes directions (left and right) facing to the surface of GPS3.
- Note 3: Solenoid valve port size with regulator and needle is indicated. (port size of GPS3 itself is Rc1/8)

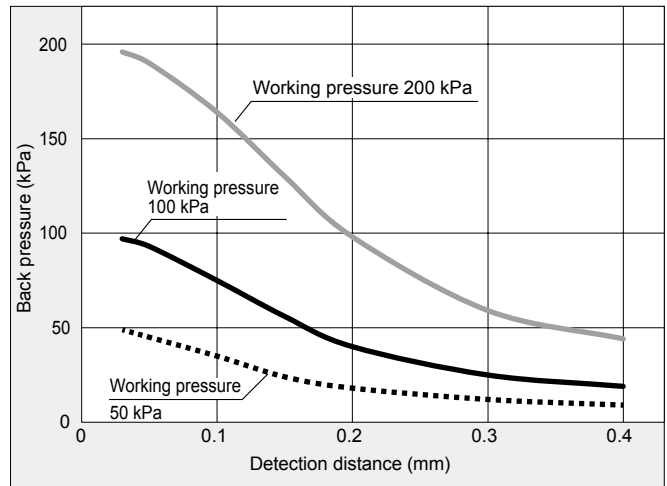
Dimensions





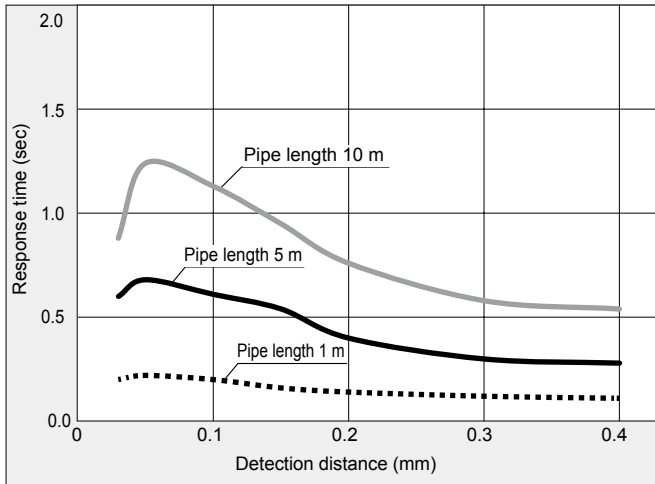
● Change in back pressure with respect to detection nozzle diameter.

- Type: GPS3 • Bore size: $\phi 6 \times \phi 4$ • Pipe length: 5 m
- Supply pressure: 100 kPa



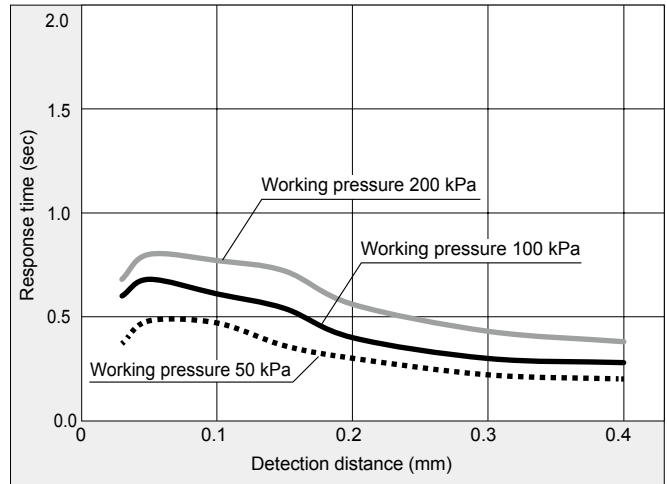
● Change in back pressure with respect to working pressure.

- Type: GPS3 • Bore size: $\phi 6 \times \phi 4$ • Pipe length: 5 m
- Nozzle diameter: $\phi 1.5$ (flat edge)



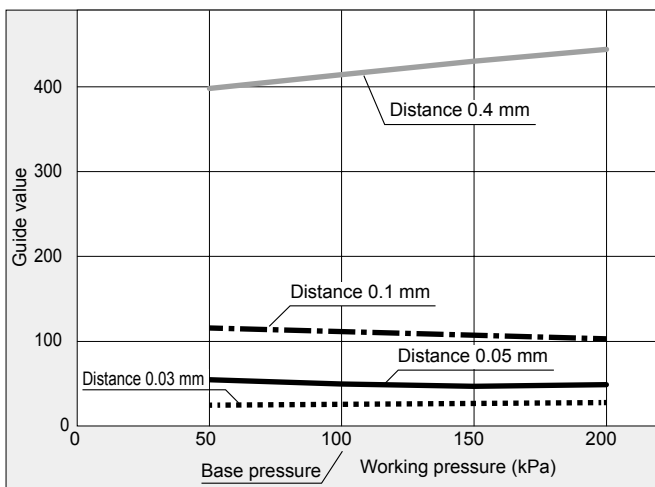
● Effect of pipe length on response time (OFF → ON).

- Type: GPS3 • Bore size: $\phi 6 \times \phi 4$ • Supply pressure: 100 kPa
- Nozzle diameter: $\phi 1.5$ (flat edge)
- (Response time is measured based on 80% length of threshold)



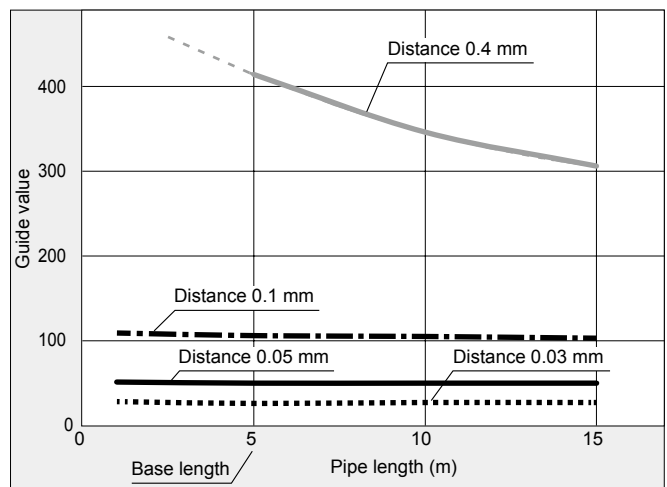
● Effect of working pressure on response time (OFF → ON).

- Type: GPS3 • Bore size: $\phi 6 \times \phi 4$ • Pipe length: 5 m
- Nozzle diameter: $\phi 1.5$ (flat edge)
- (Response time is measured based on 80% length of threshold)



● Effect of working pressure on guide value.

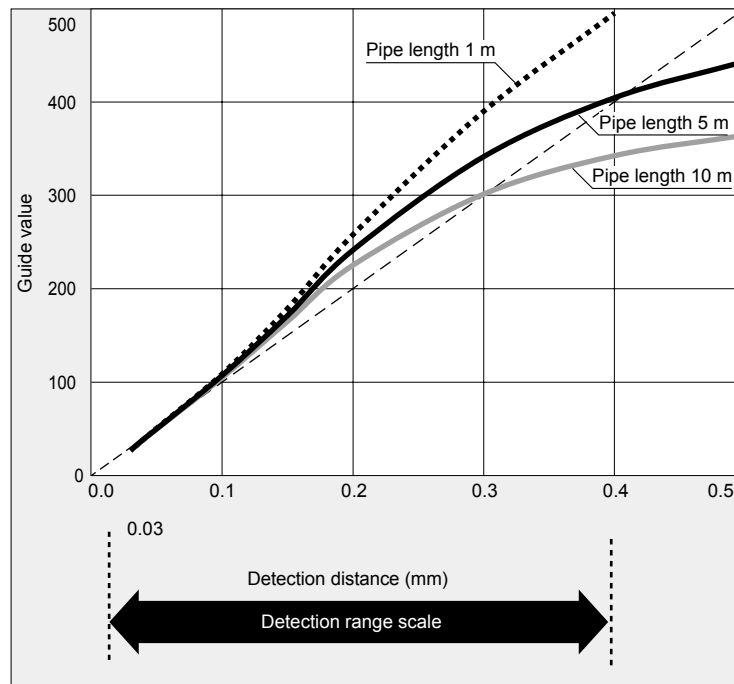
- Type: GPS3 • Bore size: $\phi 6 \times \phi 4$ • Pipe length: 5 m
- Nozzle diameter: $\phi 1.5$ (flat edge)



● Effect of pipe length on guide value.

- Type: GPS3 • Bore size: $\phi 6 \times \phi 4$ • Base pipe length: 5 m
- Supply pressure: 100 kPa • Nozzle diameter: $\phi 1.5$ (flat edge)

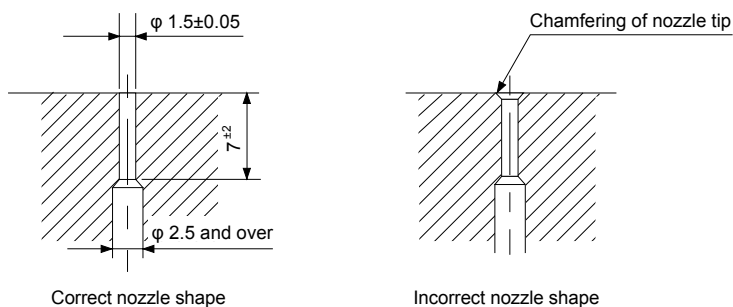
Characteristics data



- Relationship between detection length and guide value
 - Type: GPS3 • Bore size: $\phi 6 \times \phi 4$
 - Supply pressure: 100 kPa • Nozzle diameter: $\phi 1.5$ (flat edge)
 - Data based on default setting (base pipe length: 5 m).

Design of detection nozzle

- Single hole nozzle

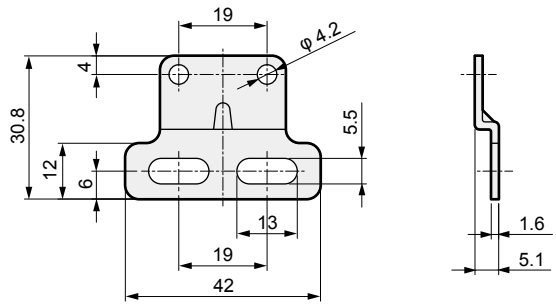


Design the detection nozzle with a diameter of 1.5 mm and depth of 7 ± 2 mm. The blow-off section of the nozzle cannot be chamfered. If chamfered, the nozzle retracts from the contact place, and the guide value and actual dimensions will not coincide.

GPS3 Series

● How to order bracket

GPS3 - B

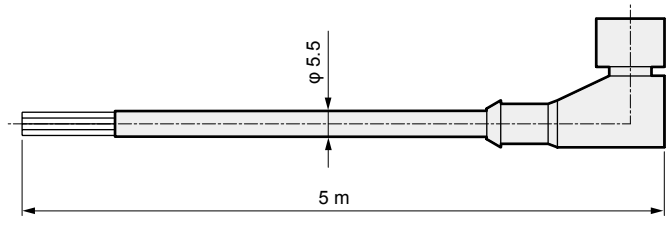


Weight: 10 g

● How to order connector cable

GPS3 - C

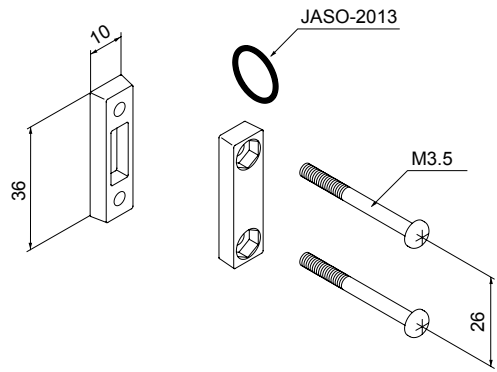
| Lead wire color | Applications |
|-----------------|---------------|
| Brown | Power supply+ |
| White | Output 2 |
| Blue | Power supply- |
| Black | Output 1 |



Weight: 183 g

● How to order joiner set

C1000 - J100 - W



Weight: 11 g

● Gasket



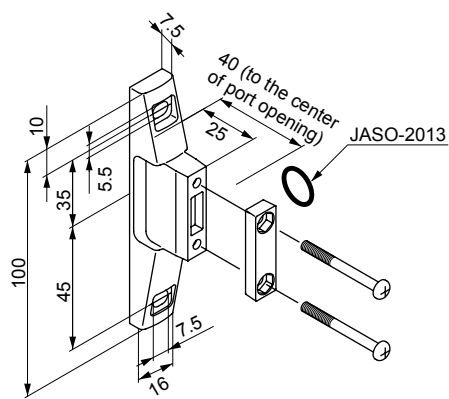
Material: NBR

| Model No. | Applicable model | Standards |
|--------------|------------------|-----------|
| C1000-GASKET | 1000 Series | For CKD |

Min. lot size is 5 pcs.
Used with joiner for GPS3 connection.

● How to order T type bracket set

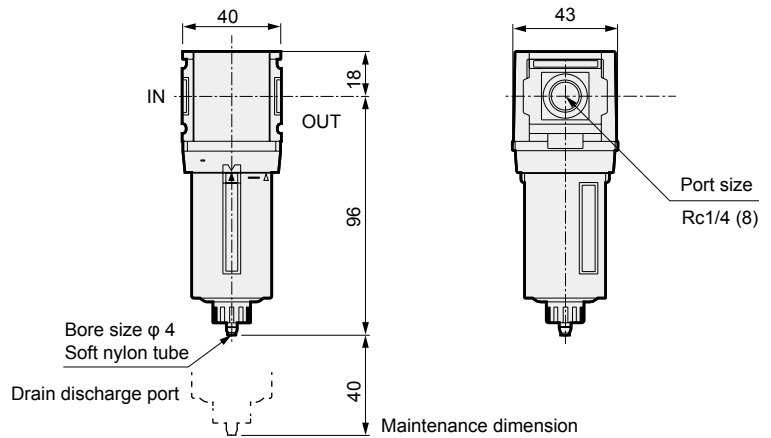
B110 - W



Weight: 24 g

● How to order air filter

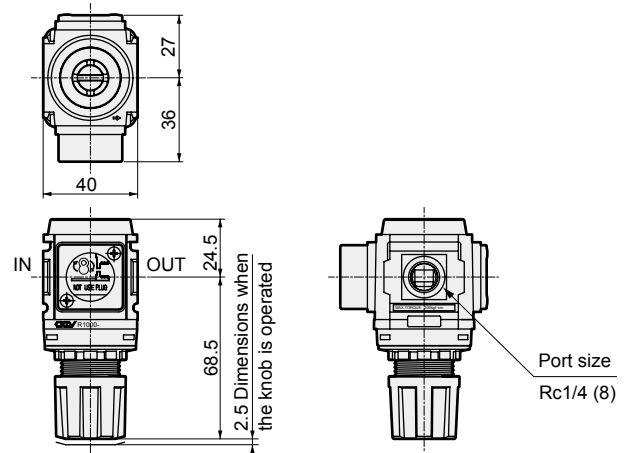
F1000 - **8** - **W**



Weight: 87 g

● How to order regulator

R1000 - **8** - **W** - **LT**



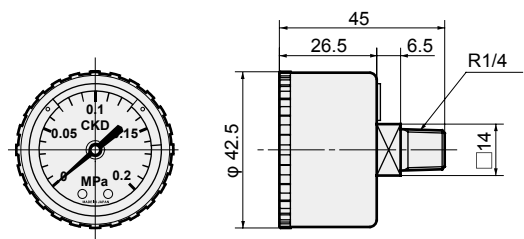
Weight: 150 g

● How to order pressure gauge with safety mark

GPS2 - **G40D** - **8** - **P02** - **S501**

- A** Model No.
- B** Port size
- C** Pressure display

| | | |
|----------|-------------|---------------------------------|
| A | G40D | Pressure gauge with safety mark |
| B | 8 | R1/4 |
| C | P02 | 0 to 0.2 MPa |
| | P04 | 0 to 0.4 MPa |
| | P10 | 0 to 1.0 MPa |



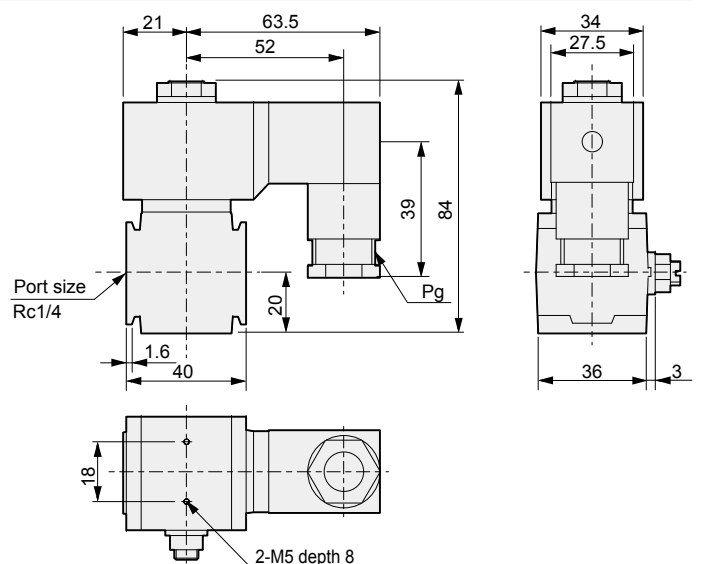
- *1. Safety zone setting range: 0.03 to 0.2 MPa
- *2. Safety zone setting max. range: 0.09 MPa
- *3. Gauge accuracy: JIS B 7505, old class 3.0
- *4. Cover material: Transparent nylon

Weight: 85 g

● How to order solenoid valve with needle

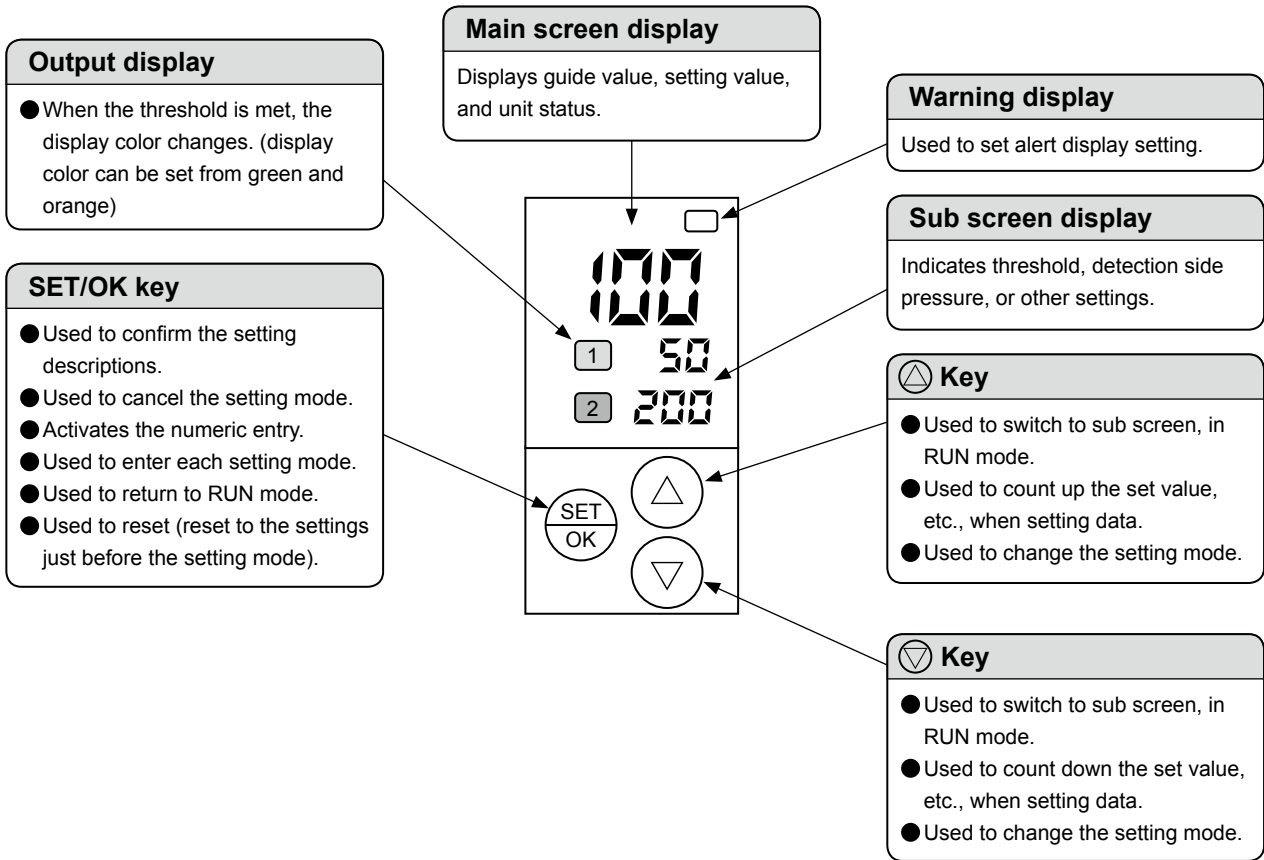
GPS2 - **AB3X** - **2H** - **FL** - **DC24V**

- A** Terminal box
- 2H** DIN terminal box with light

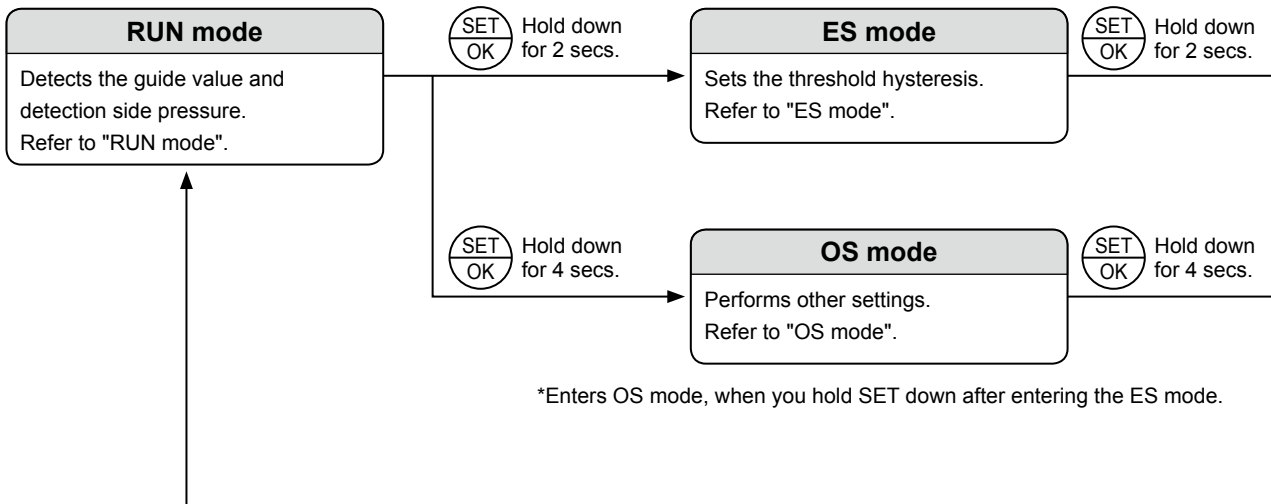


Weight: 280 g

Names and functions of display/operation section



Setting

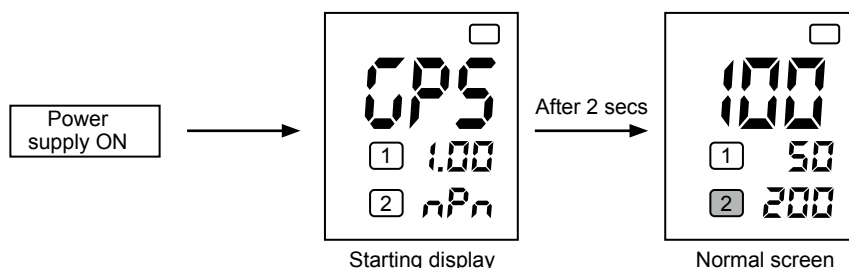


RUN Mode (normal operation)

● RUN mode is the normal operation mode, in which the device displays or outputs after the starting display when the power is turned on.

Starting display

The starting display is as shown below when the power is turned on.

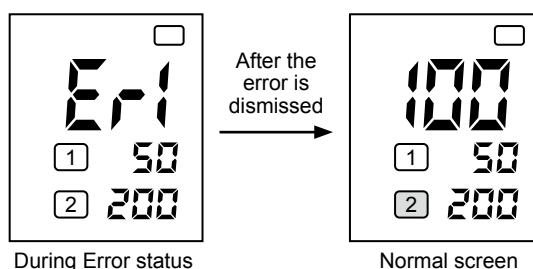


Normal screen

| Screen | Display | Display color |
|-----------------------|--|--|
| Main screen | 20 to 500 FF (overs the display range limit) -FF (goes under the display range limit) | Green display |
| Sub screen | Threshold (CH1, 2): 20 to 500, OFF Detection side pressure kPa: 0 to 220 bar : 0 to 2.20 (only options for export) PSI: 0 to 31.9 (only options for export) | Green display |
| CH1, 2 output display | Lamp on | 2 color display (green, orange) *Optional setting is possible |
| Warning display | Flashing or off *Optional setting is possible (the default settings: OFF) | Orange display |

Detecting problems

When the device detects an abnormal situation, the error code will be displayed on the main screen to notify the details of the error.
(The error code remains displayed until the error is dismissed.)



| Error display | Description | Countermeasures |
|----------------|--|--|
| Er1 | Sensor signal error <small>Note 1 (damage, disconnection, excessive pressure (over 250 kPa), P2≥P1×1.1)</small> | Displayed in case of disconnection or sensor exceeds the full scale. Return supply pressure to within the rated pressure. |
| Er2 | Out of the setting range (0 point correction) | Set the supply pressure to OFF, and perform 0 point correction the sensor in atmospheric pressure status. |
| Er3 | Out of the setting range (settings) | Set within the setting range. |
| Er4 | Passcode input error | Input the set passcode. |
| Er7 | Abnormal temperature sensor <small>Note 1</small> | Return to the normal operating temperature range (0 to 50°C). |
| Er8 | Over current (contact output part) <small>Note 1</small> | Make the contact output to within 100 mA. |
| Er9 | Memory trouble (ROM, RAM, EEPROM) | Contact the nearest CKD. |
| -H- (flashing) | Supplied pressure exceeds 220 kPa <small>Note 1</small> | Lower the supply pressure to within the rated pressure range. |
| -L- (flashing) | Supplied pressure is below 45 kPa <small>Note 1</small> | Increase the supply pressure to within the rated pressure range. |
| FF | Exceeds the max. pressure range. | Detect the distance to within 500+ guide value display range. |
| -FF | Falls below the min. pressure range. | Detect the distance to within less than 20 guide value display range. |

(Note 1: output will be OFF. When it returns to the specifications range, this will be automatically reset.)

Initialization

Turn on the power, with pressing SET+△+▽ buttons concurrently when the supply power is OFF.

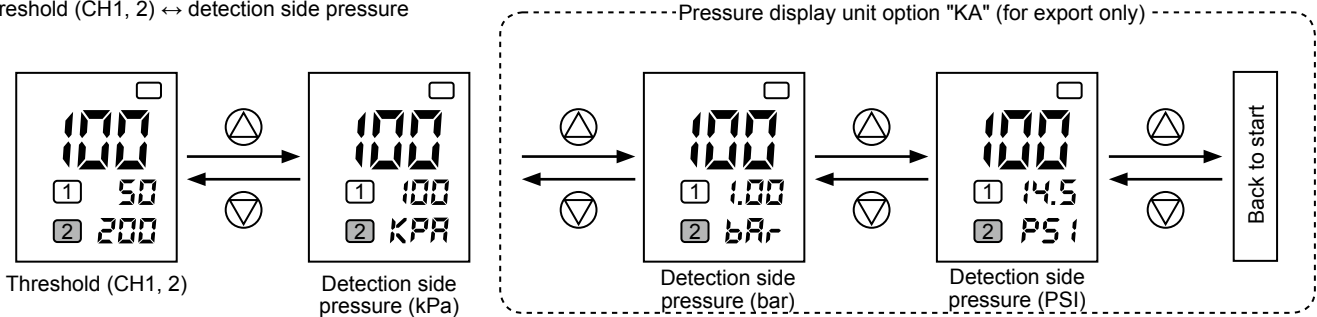
Note) To initialize, make sure to keep the set value by taking note, etc.

Easy setting (in RUN mode)

● Commonly used settings can be set during the normal operation.

Sub screen selection

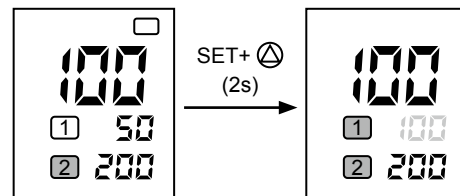
You can switch the sub screen with \triangle or ∇ .
Threshold (CH1, 2) \leftrightarrow detection side pressure



CH1 Auto threshold setting

Set the current display value as CH1 threshold by press and hold SET+ \triangle (more than 2 secs.)

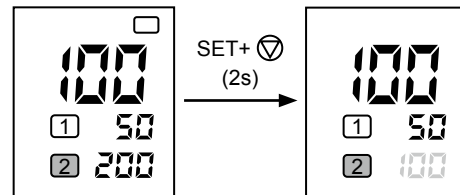
* When outside of the set range, Er3 will be displayed on the sub-screen.



CH2 Auto threshold setting

Set the current display value as CH2 threshold by press and hold SET+ ∇ (more than 2 secs.)

* When outside of the set range, Er3 will be displayed on the sub-screen.

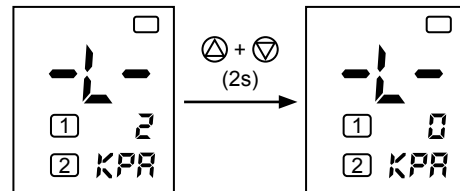


0 point correction

Press and hold \triangle + ∇ (more than 2 secs.) to recalibrate the 0-pt. value on the detection display (to recalibrate the 0-pt. drift).

Set the supply pressure to OFF before performing this function.

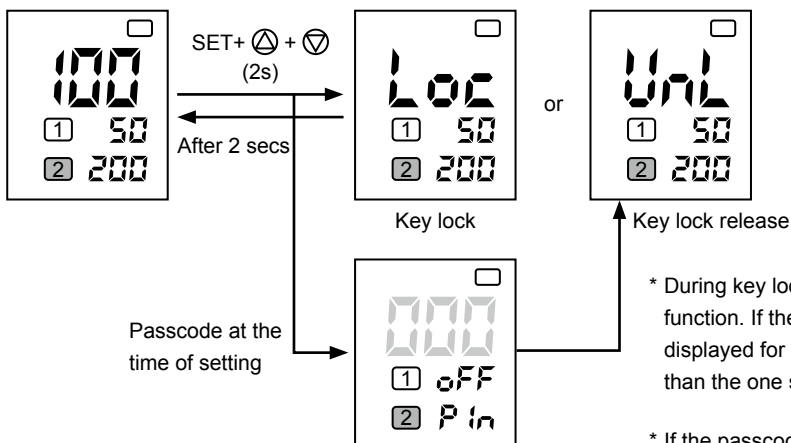
* When outside of the set range, Er2 will be displayed on the sub-screen.



Key lock

Press and hold SET+ \triangle + ∇ (more than 2 secs.) to set/release the key lock.

This function prevents each setting from being changed mistakenly by locking out the buttons.



* During key lock, all key settings will be locked other than this function. If the keys are pressed during the lock, "Loc" will be displayed for 1 sec. Also, if a different passcode is pressed other than the one set, "Er4" will be displayed for 1 sec.

* If the passcode is inputted and there is no operation for more than 30 secs., the device will return to RUN mode.

*Change numeric with \triangle or ∇

ES Mode

- Sets the threshold hysteresis.

When entering ES mode, normal operation will stop. *Output will maintain the mode that was set.

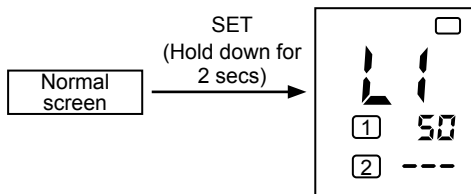
(1) List of ES mode

| Display | Setting items | Description |
|---------|----------------|------------------------|
| L1 | CH1 threshold | Setting CH1 threshold |
| H1 | CH1 hysteresis | Setting CH1 hysteresis |
| L2 | CH2 threshold | Setting CH2 threshold |
| H2 | CH2 hysteresis | Setting CH2 hysteresis |

(2) How to enter ES mode

Enter ES mode by pressing and holding SET (2 secs and over) on the normal screen.

After entering ES mode, settings can be toggled with or .

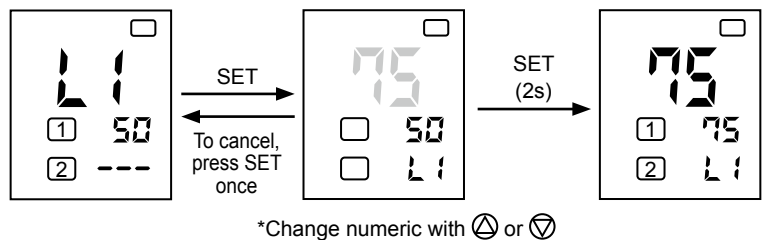


(3) How to go back to the normal screen

Press and hold SET (2 secs and over) to go back to the RUN mode.

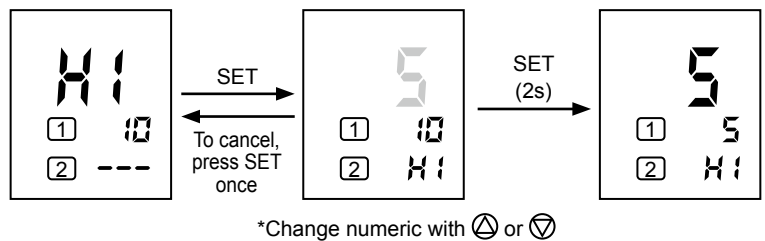
Setting CH1 threshold (Default setting: 50)

CH1 threshold can be set between 20 and 500, or OFF.



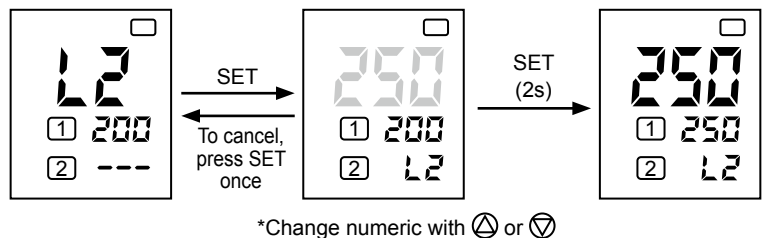
Setting CH1 hysteresis (Default setting: 10)

CH1 hysteresis can be set between 1 and 20.



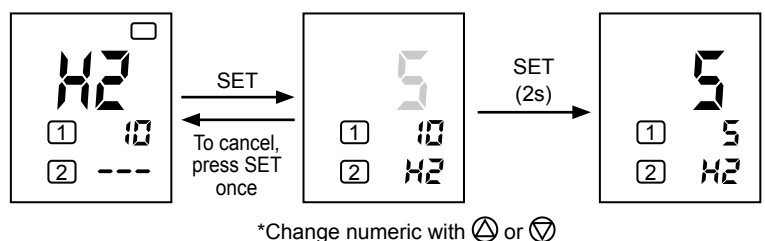
Setting CH2 threshold (Default setting: 50)

CH2 threshold can be set between 20 and 500, or OFF.



Setting CH2 hysteresis (Default setting: 10)

CH2 hysteresis can be set between 1 and 20.



OS Mode

- Performs other settings.

When entering OS mode, normal operation will stop. *Output will maintain the mode that was set.

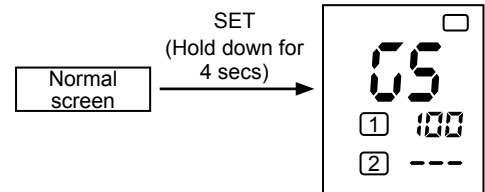
(1) List of OS mode

| Display | Setting items | Description |
|---------|-----------------------------|---|
| GS | Actual measuring correction | To conform the master gauge gap to the guide value (guide value: 30 to 100) |
| Cor | Display color | To set the ON/OFF color of CH1 and CH2. |
| Por | Turn off the backlight | To turn the light on/off on the main/sub screens. |
| Inf | Warning display | To set the clog warning display of the orifice and nozzle. |
| Pin | Passcode | To set the passcode. |

(2) How to enter OS mode

Enter OS mode by pressing and holding SET (4 sec and over) on the normal screen.

After entering OS mode, functions can be toggled with Δ or ∇ .



(3) How to go back to the normal screen

Press and hold SET (2 sec and over) to go back to the RUN mode.

Correction of Actual Measurements A recalculated guide value will be displayed from the pressure at the time of master setting or open setting, Setting order (1) → (2) Note: You need to reset the threshold, after the actual measurement correction.

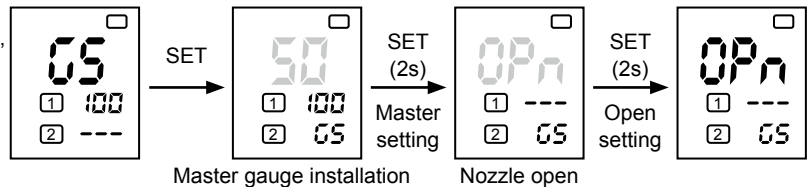
(1) Master setting:

After setting the master gauge (which acts as a standard), enter the guide value (30 to 100). The pressure at the time of the master gauge installation will be recorded.

(2) Open setting:

Records the pressure when nozzle is opened.

Note: Perform this setting with nozzle fully opened.

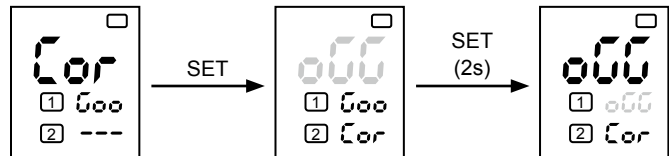


*Input numeric (30 to 100) with Δ or ∇

Display color setting (Default setting: Goo)

Set the display color of ON/OFF for CH1 and CH2

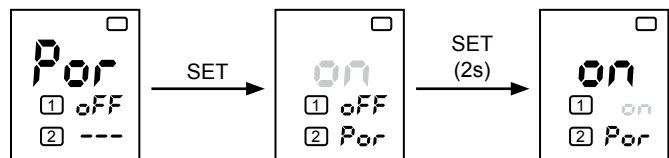
From left; the display color of no output, CH1: ON and CH2: ON (G = green, o = orange)



*Choose Goo or oGG with Δ or ∇

Backlight setting (Default setting: OFF)

Sets the backlight function of the main/sub screens. During this time, the output and warning displays will only be lit. (If there is no key input for 3mins. after this function is turned on.)



* Choose off or on with Δ or ∇

Warning display settings (Default setting: OFF)

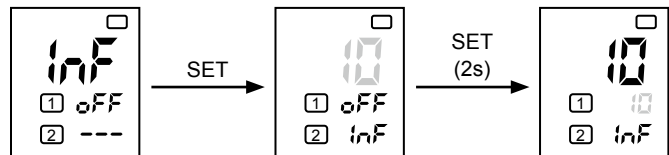
This function sets the rate of change in the pressure (%) in the detected pressure, and if it exceeds the set rate:

→ the display will blink slowly (there's a possibility of a clog in the nozzle).(*1)

If the detected pressure exceeds and then falls below the set rate: → the display will blink rapidly (there's a possibility of a clog in the orifice).

(*1) Blinking will occur even if there is no workpiece.

(Due to the detection structure, blinking will occur even at normal seating.)



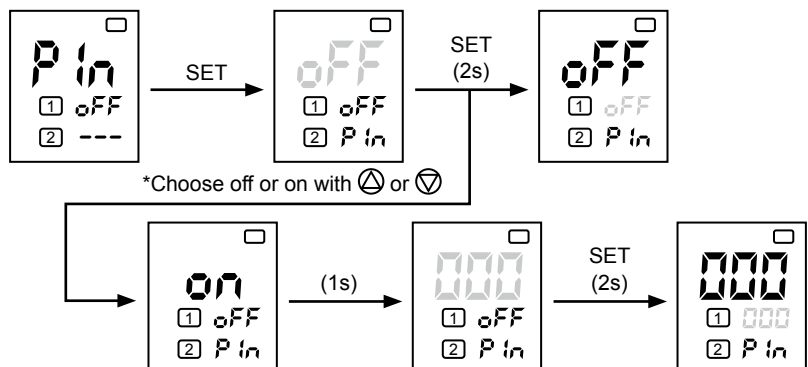
* Change numeric (10 to 80) with Δ or ∇

Perform settings with supply pressure ON and nozzle is opened.

* Display Er3 on the main screen, in case of the outside of the supply range.

Setting passcode (Default setting: OFF)

Set the passcode (000 to 999) which is required to unlock the key.



* Change numeric with Δ or ∇

* If you press SET shortly before confirming the setting, the setting will be canceled. This applies for both settings.



Safety Precautions

Always read this section before use.

When designing and manufacturing a device using CKD products, the manufacturer is obligated to check that device safety 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 a safe device is manufactured.




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 with specifications.
This product must be used within its stated specifications. It must not be modified or machined additionally.
This product is intended for use as a device or part for general-purpose industrial machinery. It is not intended for use outdoors (except for outdoor type) or for use under the following conditions or environment.
(Note that this product can be used when CKD is consulted prior to use and the customer consents to CKD product specifications. The customer must provide safety measures to avoid risks in the event of problems.)
 - 1** Use for special applications including nuclear energy, railways, aircrafts, marine vessels, vehicles, medicinal devices, devices or applications coming into contact with beverages or foodstuffs, amusement devices, emergency cutoff circuits, press machines, brake circuits, or safety devices or applications.
 - 2** Use for applications where life or assets could be significantly affected, and special safety measures are required.
 - 3** Observe body standards and regulations, etc., related to the safety of device design and control, etc.
ISO4414, JIS B 8370 (General rules for pneumatic systems)
JFPS2008 (Principles for pneumatic cylinder selection and use)
Including High Pressure Gas Safety Act, Industrial Safety and Health Act, other safety rules, body standards and regulations, etc.
 - 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 the machinery and equipment using 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 precautions 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, and 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.
Every item provides important information and must be observed.

Limited warranty and disclaimer

- 1** Term of warranty
This warranty shall be valid for one year after delivery to the customer's designated site.
- 2** Scope of warranty
If any faults, found to be the responsibility of CKD, occur during the above warranty term, the product shall be replaced, the required replacement parts provided free of charge, or shall be repaired at the CKD factory free of charge.
Note that the following faults are excluded from the warranty scope:
 - (1) Faults due to use exceeding the conditions and environments set forth in the catalog or these specifications.
 - (2) Faults resulting from factors other than this product.
 - (3) Faults caused by improper use of the product.
 - (4) Faults resulting from modifications or repairs made without CKD consent.
 - (5) Faults caused by matters that could not be predicted with the technologies applied when the product was delivered.
 - (6) Faults resulting from natural disasters or accidents for which CKD is not liable.The warranty covers the actually delivered product, and does not cover any damage resulting from losses induced by faults in the delivered product.
- 3** Compatibility confirmation
The customer is responsible for confirming the compatibility of CKD products with the customer's systems, machines and equipment.



Pneumatic components (sensors)

Safety Precautions

Always read this section before use.

Refer to Intro 63 for general cautions of pneumatic components, and to "▲ Safety precautions" in this section for detailed cautions on each series.

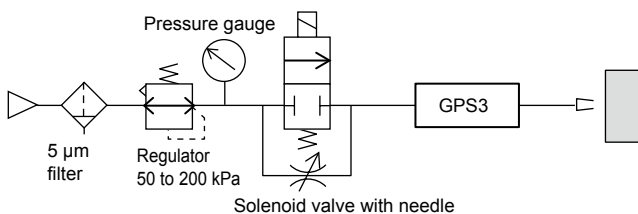
Individual precautions: Digital gap switch GPS3 Series

Design & selection

▲ WARNING

- Use this product in accordance within the specifications range.
Contact CKD when using the product outside the specifications or for special applications.
 - Exceeding the specifications range may result in poor performance, and safety cannot be secured.
- Confirm that the product can withstand the working environment.
 - This product cannot be used in environments where functional obstacles could occur.
 - The main materials of this product is resin.
Do not use in atmosphere where corrosive gases are present.
For example, an environment reaching high temperatures, with a chemical atmosphere, or where chemicals, vibration, humidity, moisture, coolant or gas are present.
 - Compressed air quality must satisfy JIS 1.4.1, "oilless clean dry air."
- This device is not a measuring instrument, which shows the absolute value from the base line to the workpiece. It is a pressure sensor which calculates the detected pressure and shows the guide value (non-dimensional number). Refer to the characteristics data on the technical data page for the relationship between the guide value and the distance.
- The working fluid must be clean air from which solids, water and oil have been sufficiently removed using a dryer, filter and oil mist filter. Never supply oiled air.
 - This product has a small orifice, so use clean air with the recommended circuit shown below (Fig. 1) through an air filter (5 μm or less), preventing foreign matter from entering.

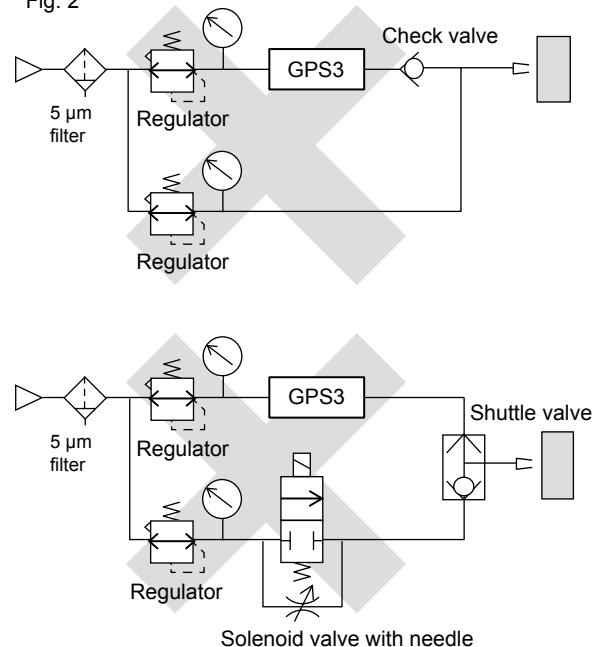
Fig. 1 Recommended circuit



- Do not use the following air circuit when the air is flowing in the nozzle during detection.

- Circuit with check valve
The check valve will act as an exhaust resistance and limit the adjustable range.
- Circuit with shuttle valve and 2-way valve
Residual pressure in the OUT side of the 2-way valve prevents correct detection. Also, even if a 3-port valve is used, the shuttle valve may excessively vibrate vertically.

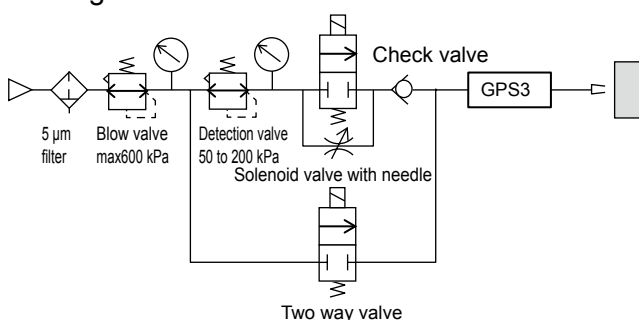
Fig. 2



CAUTION

- The entry of compressor oil and tarry substances may obstruct the flow of air and result in problems. Regularly inspect the compressor and discharge drainage.
- Keep the air flow constant so coolant and oil do not flow back from the detection nozzle, or use a solenoid valve with needle and flow a small amount of air from the bypass as shown in the recommended circuit (Fig. 1).
- Swarf and grinder chips, etc., could clog the nozzle. Switch the supply pressure (max. 600 kPa) on workchip shipment of the finishing process, to prevent detection nozzle from being clogged. (Fig. 3)

Fig. 3 Circuit for detection and air blow



(when you use in high pressure, "Er1" or "-H-" will be displayed in GPS3, and the output will be OFF.

- Select an output format (NPN, PNP) matching the input unit of the programmable controller being used.
- Operation may be disabled if a capacitance load such as an AC/DC buzzer is connected to the load. A protection circuit is provided to prevent damage from incorrect wiring or over current. A relay must be used when connecting a capacitance load.
- Caution
 - The base of piping (tube) on the detection side is O.D. $\phi 6$, I.D. $\phi 4$, length 5 m. If the piping condition (tube length) is different, change the guide value using the actual correction function to make the guide value closer to the true value.
 - The detection of contact condition by this machine works in the supply pressure range of 50 to 200 kPa. If it goes out of the working range, the display will be "Er1", "-H-", or "-L-", then the output will be OFF. In the circuit like Fig. 3, "Er1" will be displayed when detection nozzle is blown in high pressure. In addition, when it returns to the normal supply pressure, the output will be OFF \rightarrow ON \rightarrow OFF, for a moment, due to the left pressure. In this circuit, set the signal just after the blow valve switching to disabled.
 - To use the solenoid valve with needle valve on the supply side, "-L-" which means the normal supply pressure down, when the solenoid valve is OFF. When there is a lot of soft wind through the needle, the numeric will be displayed, however, disable the guide value and output.

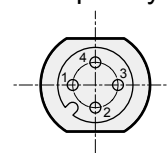
Installation & adjustment

CAUTION

- Observe the following items when installing:
 - Install this product so the detection port faces downward.
 - Install this product at a position higher than the contact surface to prevent coolant from entering.
 - Provide enough space for adjustment, monitoring, and maintenance.
 - Use rust-resistant material such as nylon tubes or stainless steel pipes for the piping material.
 - Before piping, blow pipes with compressed air to remove foreign matter and swarf.
 - When you connect the equipments or pipes, prevent seal tape or sealant from entering.
 - When installing this product on a device, check that no load is applied to the device.
 - When using steel pipes, securely fix the pipe to prevent excessive bending force from being applied to the connection.
 - Do not contact or bump this product.
 - When welding near this product, cover it to prevent spatter from coming in contact.
 - When housing this product in a box, provide an exhaust port so atmospheric pressure is maintained in the box.
- Observe the following items when wiring:
 - When using a switching regulator for the power supply, ground the F.G. (frame ground).
 - Avoid using in the transient state, 1 second after the power is turned on.
 - Take special care to prevent load short-circuits or incorrect wiring. The protective circuit will be activated.

- M12 connector pins are arranged as shown in Fig. 4. Take special care to prevent incorrect wiring.
- When using a load with a large rush current, such as a motor, the protection circuit will activate. Use a relay in this case.
- If there is a device (motor, welder) that generates a large surge near this product, insert a surge suppressor, such as a variable resistor at the source of the surge.
- If this product's lead wire is wired with the drive cable or power cable, it will be affected by the surge and noise deteriorating or damaging the sensor element in the close contact confirmation switch. Use separate wiring.

Fig. 4 Connector pin layout (body side)



| Pin No. | Lead wire color | Applications |
|---------|-----------------|---------------|
| 1 | Brown | Power supply+ |
| 2 | White | Output 2 |
| 3 | Blue | Power supply- |
| 4 | Black | Output 1 |

- M12 connector is casted with the GPS3 body. Never wire the cable. Fix the cables with banding bands.
- Do not bind or cross the sensor cable with the AC power cord.
- M12 connector's pin arrangement is compatible with the GPS2 Series (wiring option C*). (except: pin No. 2)

- NPN output type and PNP output type are available. Wire the switch based on the output as shown in Fig. 5.

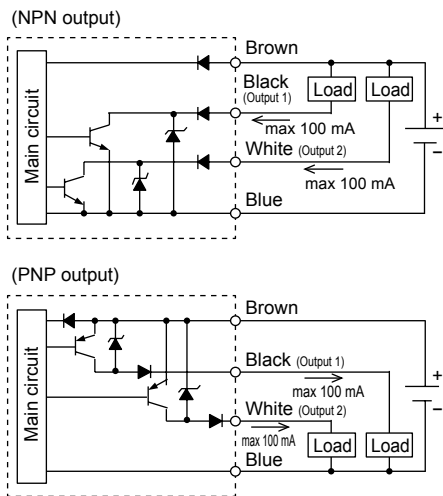
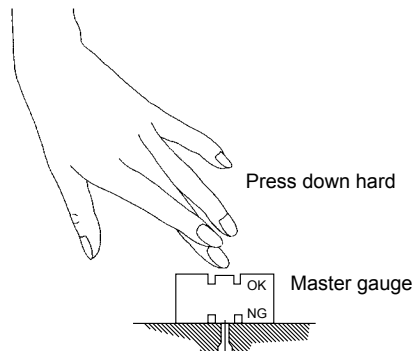


Fig. 5 Output circuit

- Do not bump or drop the main unit, or apply excessive bending or tensile force to the lead wire because the lead could be disconnected. Failure to observe this could result in a wire break. Handle this adjustment dial with care.
- Using the master gauge and gap
 - Three workers are required: one to set the gauge, one to operate the machine, and one to adjust this product. The gauge is adjusted while operating the machine, so three workers must cooperate so no one is exposed to risk.
 - Clearance cannot be set unless the master gauge or gap gauge is accurately pressed against the detection nozzle.

Fig. 6



- One detection nozzle can be used for 1 of these product units.

■ Precautions for adjustment

- Setting threshold
 - Threshold can be set by the items below. Refer to the operation for details.
 1. Auto threshold setting
 - You can use the guide value when you put your master gauge as the threshold.
 2. Numeric input threshold setting
 - Even without the master gauge, you can set the threshold with buttons.
- Actual measurement correction
 - It can correct by matching the gap of the master gauge amount to the guide value. (Guide value 30 to 100) Refer to the operation for details.
 - Note: Threshold should be reset after actual measurement correction.

During use & maintenance

⚠ CAUTION

- Immediately after work is started, the coolant from the nozzle may accumulate in the pipe and cause the sensor to turn ON for a short time. Wait for coolant to be discharged by the detection air before starting the machine.
- If the nozzle is clogged, remove the pipe on this product's side, and blow out stuck foreign matter with an air gun. If foreign matter cannot be removed, poke a needle, etc., through the detection nozzle on the end.

Related products

Air unit CXU Series

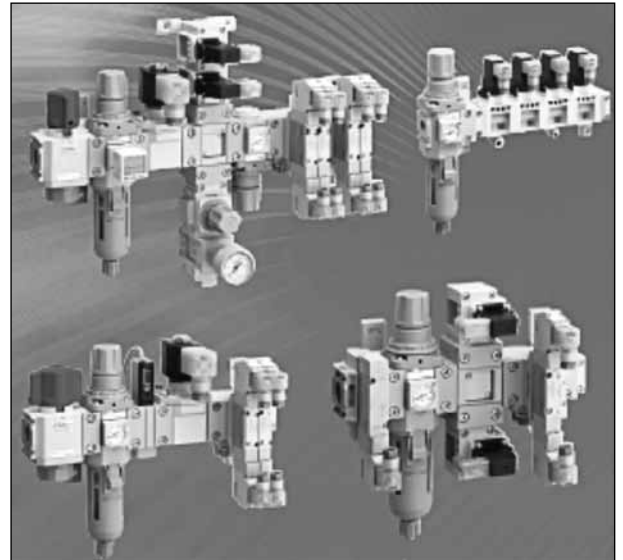
No piping, no complicated work

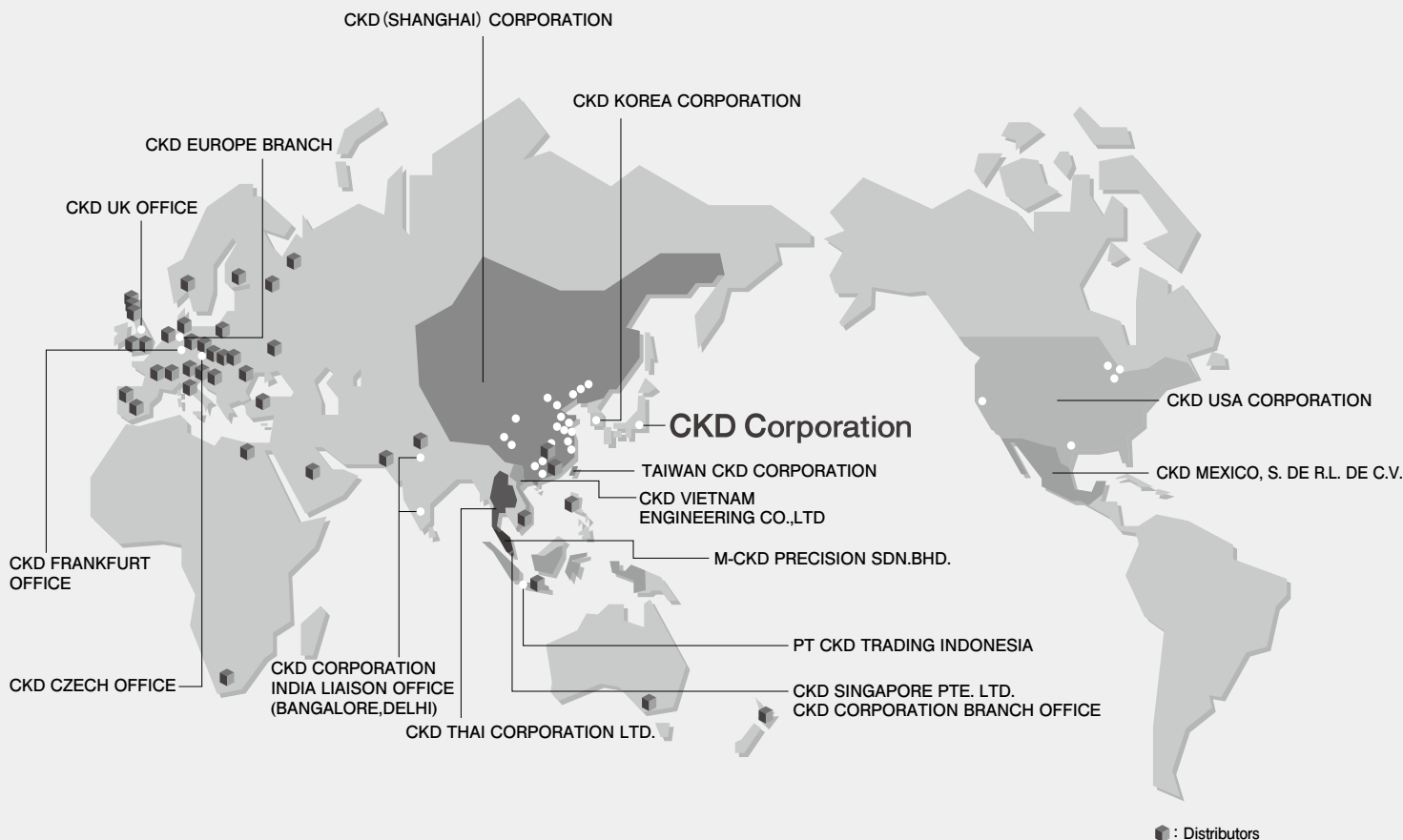
- Space saving and well-organized without piping and tube
- Prevents the external leakage as it has no screw-in volume

Flexible combination

- Vertical and horizontal piping can be changed flexibly.
Direct connection of solenoid valve is possible
- Module connection enables flexible change and expansion of pneumatic components

Catalog No. CC-901A





CKD Corporation

- 2-250 Uji Komaki, Aichi 485-8551, Japan
- PHONE +81-(0)568-74-1338 FAX +81-(0)568-77-3461

U.S.A.

CKD USA CORPORATION

- CHICAGO HEADQUARTERS
4080 Winnetka Avenue, Rolling Meadows, IL 60008, USA
PHONE +1-847-368-0539 FAX +1-847-788-0575
- CINCINNATI OFFICE
- SAN ANTONIO OFFICE
- SAN JOSE OFFICE
- DETROIT OFFICE

Mexico

CKD MEXICO, S. DE R.L. DE C.V.

- Cerrada la Noria No. 200 Int. A-01, Querétaro Park II, Parque Industrial Querétaro, Santa Rosa Jáuregui, Querétaro, C.P. 76220, México
PHONE +52-442-161-0624

Europe

CKD CORPORATION EUROPE BRANCH

- De Fruituin 28 Hoofddorp, the Netherlands
PHONE +31-(0)23-5541490 FAX +31-(0)23-5541491
- CZECH OFFICE
- UK OFFICE
- FRANKFURT OFFICE

Malaysia

M-CKD PRECISION SDN.BHD.

- HEAD OFFICE
Lot No.6, Jalan Modal 23/2, Seksyen 23, Kawasan MIEL, Fasa 8, 40300 Shah Alam, Selangor Darul Ehsan, Malaysia
PHONE +60-(0)3-5541-1468 FAX +60-(0)3-5541-1533
- JOHOR BAHRU BRANCH OFFICE
- MELAKA BRANCH OFFICE
- PENANG BRANCH OFFICE

Thailand

CKD THAI CORPORATION LTD.

- SALES HEADQUARTERS
Suiwan Tower, 14/1 Soi Saladaeng 1, North Sathorn Road, Kwaeng Silom, Khet Bangrak, Bangkok 10500, Thailand
PHONE +66-(0)2-267-6300 FAX +66-(0)2-267-6305
- RAYONG OFFICE
- NAVANAKORN OFFICE
- EASTERN SEABOARD OFFICE
- LAMPHUN OFFICE
- KORAT OFFICE
- AMATANAKORN OFFICE
- PRACHINBURI OFFICE
- SARABURI OFFICE

Singapore

CKD SINGAPORE PTE. LTD.

- No.33 Tannery Lane #04-01 Hoesteel Industrial Building, Singapore 347789, Singapore
PHONE +65-67442623 FAX +65-67442486

CKD CORPORATION BRANCH OFFICE

- No.33 Tannery Lane #04-01 Hoesteel Industrial Building, Singapore 347789, Singapore
PHONE +65-67447260 FAX +65-68421022
- INDIA LIAISON OFFICE BANGALORE
- INDIA LIAISON OFFICE DELHI

Indonesia

PT CKD TRADING INDONESIA

- Wisma Keiai, 17th Floor, Jl. Jendral Sudirman Kav.3, Jakarta 10220, Indonesia
PHONE +62-(0)21-572-3220 FAX +62-(0)21-573-4112

Vietnam

CKD VIETNAM ENGINEERING CO.,LTD.

- 18th Floor, CMC Tower, Duy Tan Street, Cau Giay District, Hanoi, Vietnam
PHONE +84-4-37957631 FAX +84-4-37957637

Taiwan

台灣喜開理股份有限公司

TAIWAN CKD CORPORATION

- 16F-3, No. 7, Sec. 3, New Taipei Blvd., Xinzhuang Dist., New Taipei City 242, Taiwan
PHONE +886-(0)2-8522-8198 FAX +886-(0)2-8522-8128
- 新竹營業所 (HSINCHU OFFICE)
- 台中營業所 (TAICHUNG OFFICE)
- 台南營業所 (TAINAN OFFICE)

Website <http://www.ckd.co.jp/>

China

喜開理(上海)機器有限公司

CKD(SHANGHAI)CORPORATION

- 營業部 / 上海浦東事務所 (SALES HEADQUARTERS / SHANGHAI PUXI OFFICE)
Room 601, 6th Floor, Yuanzhongkeyan Building, No. 1905 Hongmei Road, Xinhui District, Shanghai 200233, China
PHONE +86-(0)21-61911888 FAX +86-(0)21-60905356
- 上海浦東事務所 (SHANGHAI PUDONG OFFICE)
- 無錫事務所 (WUXI OFFICE)
- 杭州事務所 (HANGZHOU OFFICE)
- 寧波事務所 (NINGBO OFFICE)
- 南京事務所 (NANJING OFFICE)
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- 長沙事務所 (CHANGSHA OFFICE)
- 廣州事務所 (GUANGZHOU OFFICE)
- 深圳西區事務所 (WEST SHENZHEN OFFICE)
- 深圳東區事務所 (EAST SHENZHEN OFFICE)
- 東莞事務所 (DONGGUAN OFFICE)
- 廈門事務所 (XIAMEN OFFICE)

Korea

CKD KOREA CORPORATION

● HEADQUARTERS

- (3rd Floor), 44, Sinsu-ro, Mapo-gu, Seoul 121-856, Korea
PHONE +82-(0)2-783-5201~5203 FAX +82-(0)2-783-5204
- 水原營業所 (SUWON OFFICE)
- 天安營業所 (CHEONAN OFFICE)
- 蔚山營業所 (ULSAN OFFICE)

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