No-contact sensor for confirming workpiece placement, with a configuration that is less affected by supply pressure change.

**Easy-to-set-up LED level meter**
Proper set position is steadily and easily set due to the LED level meter and setting dial.

**Stably detects 10 μm clearance**
The configuration is unlikely to be affected by supply pressure change due to the air pressure bridge circuit and semi-conductor pressure sensor.

**Compliant with manifolds of up to 6 stations**
Compliant with centralized wiring and piping

**Free mounting position**
Stable detection is available at any mounting position due to the pressure sensor.

**Wide adjustment range**
Compliant between 10 and 300 μm

**IP66-compliant**
Dustproof and dripproof type
Air Catch Sensor
Series ISA

How to Order

Individual wiring/Centralized wiring

ISA - - 01

Output specifications

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>NPT open collector output</td>
</tr>
<tr>
<td>15</td>
<td>PNP open collector output</td>
</tr>
</tbody>
</table>

Stations 1 to 6

Option

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>DIN rail compliant</td>
</tr>
<tr>
<td>B</td>
<td>With bracket</td>
</tr>
<tr>
<td>G</td>
<td>With gauge</td>
</tr>
</tbody>
</table>

DIN rail must be ordered separately.

Wiring specifications

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>Individual wiring (Without terminal block BOX)</td>
</tr>
<tr>
<td>L</td>
<td>Centralized wiring (With terminal block BOX, left side)</td>
</tr>
<tr>
<td>R</td>
<td>Centralized wiring (With terminal block BOX, right side)</td>
</tr>
</tbody>
</table>

Ex. 1) NPN output, 4 stations, centralized wiring terminal block BOX (left), with bracket and gauge
ISA11-4L-01BG

Ex. 2) PNP output, individual wiring, with gauge
ISA15-1-01G

Accessory

- Bracket: ISA-1-A
- Gauge: G33-3-01
- DIN rail: ISA-2-1 to 7

- Gauge: G33-3-01

Description

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cover glass</td>
<td>glass</td>
</tr>
<tr>
<td>2</td>
<td>Outer frame</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>3</td>
<td>Inner frame</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>4</td>
<td>Round head Phillips screw</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>5</td>
<td>Socket</td>
<td>Brass</td>
</tr>
</tbody>
</table>

- Bracket: ISA-1-A

Material: SPC (Nickel plated)

- DIN rail: ISA-2-1 to 7

Material: Aluminum

Each part order comes with two M3 x 8 tapping screws.

Part no. | L | Applicable model
---------|---|------------------|
ISA-2-1  | 105 | ISA 1
ISA-2-2  | 140 | ISA 2
ISA-2-3  | 175 | ISA 3
ISA-2-4  | 210 | ISA 4
ISA-2-5  | 245 | ISA 5
ISA-2-6  | 280 | ISA 6
ISA-2-7  | 315 | ISA 7
Series ISA

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid</td>
<td>Dry air (filtered to 5 μm)</td>
</tr>
<tr>
<td>Operating pressure range</td>
<td>0.05 to 0.2 MPa</td>
</tr>
<tr>
<td>Recommended pressure range</td>
<td>0.1 to 0.2 MPa</td>
</tr>
<tr>
<td>Detection distance range</td>
<td>10 to 300 μm</td>
</tr>
<tr>
<td>Repeatability including temperature characteristics</td>
<td>±10 μm (0 to 60°C (standard 25°C))</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>10 μm or less (Detection distance: 10 to 150 μm)</td>
</tr>
<tr>
<td>Detection nozzle O.D.</td>
<td>ø1.0 standard (Refer to page 820 for data when the nozzle diameter is modified.)</td>
</tr>
<tr>
<td>Display function</td>
<td>Operating indicator light (Lights ON), Deviation level indicator light</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>12 to 24 VDC ±10%, Ripple (p-p) 10% or less (With power supply polarity protection)</td>
</tr>
<tr>
<td>Current consumption</td>
<td>±10%, Ripple (p-p) 10% or less (With power supply polarity protection)</td>
</tr>
<tr>
<td>Switch output</td>
<td>ISA11</td>
</tr>
<tr>
<td></td>
<td>NPN open collector: 30 V, 80 mA or less</td>
</tr>
<tr>
<td></td>
<td>ISA15</td>
</tr>
<tr>
<td></td>
<td>PNP open collector: 80 mA or less</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>0 to 60°C (No condensation)</td>
</tr>
<tr>
<td>Operating humidity range</td>
<td>35 to 85 % RH (No condensation)</td>
</tr>
<tr>
<td>Noise resistance</td>
<td>1000 Vp-p, Pulse width 1 μs, Rise time 1 ns</td>
</tr>
<tr>
<td>Withstand voltage</td>
<td>1000 VAC in 50/60 Hz for 1 minute between live parts and case</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>2 MΩ or more between live parts and case (at 500 VDC by megameter)</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>1.5 mm amplitude in 10 to 500 Hz or acceleration of 98 m/s², whichever is smaller for 2 hours in X, Y, Z direction each (De-energized)</td>
</tr>
<tr>
<td>Impact resistance</td>
<td>980 m/s² in X, Y and Z direction, 3 times each (De-energized)</td>
</tr>
<tr>
<td>Lead wire</td>
<td>Oil-resistant vinyl cabtire code (3 cores, ø3.4, 5 m), Cross section: 0.2 mm², Insulator O.D.: 1.1 mm</td>
</tr>
<tr>
<td>Mass</td>
<td>250 g (including gauge and 5-m lead wire)</td>
</tr>
<tr>
<td>Port size</td>
<td>Rc 1/8</td>
</tr>
<tr>
<td>Enclosure</td>
<td>IP66 (Dustproof and dripproof type)</td>
</tr>
<tr>
<td>Air consumption</td>
<td>Supply pressure</td>
</tr>
<tr>
<td></td>
<td>0.15 MPa</td>
</tr>
<tr>
<td></td>
<td>0.20 MPa</td>
</tr>
</tbody>
</table>

Working Principle

In a bridge circuit as in the figure above, a detection gap is applied to the detection nozzle (S4) while the setting dial S3 is adjusted to balance the pressure applied to the pressure sensor (P1 = P2). The pressure sensor detects the differential pressure generated when the detection nozzle (S4) is released. When the work piece comes close to the detection nozzle, the back pressure P2 increases until it is larger than P1 (P2 ≥ P1). Then the switch output turns on to notify that the pressure is below the detection gap.

How to Set Pressure

Air catch sensor is adjusted by using the LED level meter and the setting dial.

1. For accurate setting, create the proper setting conditions by applying a clearance gauge to the detection nozzle beforehand.
2. Confirm that pressure is being applied. At this time, if the setting dial is fully closed, all LEDs should be off.
3. Turning the setting dial in a plus direction (counterclockwise) will cause the LEDs to turn on in order: Red 1, Red 2, Green 1, Green 2.
4. When the Green 1 LED level meter comes on, output will be switched on, so please end the setting process at the point when Green 1 comes on.
5. Apply a clearance gauge to the detection nozzle once more, and confirm that Green 1 has switched on.
6. Hold the setting dial with a finger, and tighten the lock nut with a wrench. Tighten so that the setting dial will not turn.
Internal Circuit and Wiring

NPN-type open collector

<table>
<thead>
<tr>
<th>DC (+)</th>
<th>Brown</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC (-)</td>
<td>Blue</td>
</tr>
<tr>
<td>OUT</td>
<td></td>
</tr>
</tbody>
</table>

Max.80 mA
12 to 24 VDC

PNP-type open collector

<table>
<thead>
<tr>
<th>DC (+)</th>
<th>Brown</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC (-)</td>
<td>Blue</td>
</tr>
<tr>
<td>OUT</td>
<td></td>
</tr>
</tbody>
</table>

Max.80 mA
12 to 24 VDC

Centralized wiring type

Refer to the below figure for the relation between terminal block wiring in terminal box and switch.

L side

1 2 3 4 5 6
GND VCC NC OUT

R side

Switch assembly part no.  
(O-ring: 2, Gasket: 1 enclosed)  
ISA11-0 For NPN output  
ISA15-0 For PNP output

Specific Product Precautions

Read before handling.  
Refer to front matters 58 and 59 for Safety Instructions and pages 687 to 691 for Pressure Switch Precautions.

Caution

1. If the detection nozzle is exposed to splashes of water or cutting oil, do not allow backflow from the detection nozzle to the switch body. Install the switch body at a position higher than the detection nozzle wherever possible.

Piping

Caution

1. Piping equipment

In the piping between the switch body and the detection nozzle, do not use equipment or fittings that can possibly cause leakage or serve as resistance. 

Do not use One-touch fittings in an environment where the air catch sensor is exposed to water or other liquid.

Pressure Source

Caution

1. Supply air

Since the orifice of the air catch sensor is small, prevent foreign matter from entering the equipment. For this purpose, use supply air that is dry and filtered 5 μm or better.

2. Operating pressure

Since the product adopts a semiconductor pressure sensor, keep the operating pressure not larger than 0.2 MPa.

Caution

1. How to change

After loosening the four mounting screws (M4 x 8), pull straight back on the switch body. Pulling back diagonally can result in bending of the connector pin, etc., so take precautions.

2. When mounting the switch body to the base, push the pin (main body side) straight into the connector (base side), and evenly mount with four mounting screws (M4 x 8). Be sure not to forget to include seals, etc. (Tightening torque 0.45 N·m)

Switch assembly

Gasket

Base

O-ring

Maintenance

Caution

1. When an air catch sensor is contained in a box, provide an air outlet to constantly keep the atmospheric pressure inside the box. Internal pressure rises will hinder normal air discharge and may lead to possible malfunction.

2. The air catch sensor is IP66-compliant, but when there is a possibility of water, oil, etc. from the exhaust port entering the case interior, use an M5 fitting to connect a tube, and discharge air in a place where water and oil will not enter the interior. When attached with a gauge, there is a danger of materials entering the gauge interior and causing malfunction, so please remove the gauge and use a plug instead.

When mounting a gauge to the exterior, please use piping of as short a length as possible. Failure to do so may result in slower response speed.

Operating Environment

Caution

1. Supply air

Since the orifice of the air catch sensor is small, prevent foreign matter from entering the equipment. For this purpose, use supply air that is dry and filtered 5 μm or better.

2. Operating pressure

Since the product adopts a semiconductor pressure sensor, keep the operating pressure not larger than 0.2 MPa.
When the bracket has two stations and the terminal block box is on the right side, it attaches to the second switch, while when it is on the left side, it attaches to the first switch. With n stations, it attaches to the first switch and the nth switch.
Dimensions: Individual Wiring Type (Lead Wire Type)

**Body**
- Lead wire (5 m)
- Deviation level indicator light
- Gauge
- Bracket
- EXH port
- Detection port
- Rc 1/8

**With bracket**
- Lead wire (5 m)
- SUP port
- DIN rail center
- Setting dial
- Station 1
- EXH port
- Detection port
- Rc 1/8

**Manifold**
- Lead wire (5 m)
- Deviation level indicator light
- Gauge
- Bracket
- Station 1
- EXH port
- Detection port
- Rc 1/8

When the bracket has two stations, it attaches to the first switch. With n stations, it attaches to the first switch and the nth switch.

**Dimensions: With DIN rail**

<table>
<thead>
<tr>
<th>Station</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>70</td>
<td>105</td>
<td>140</td>
<td>175</td>
<td>210</td>
</tr>
<tr>
<td>L2</td>
<td>—</td>
<td>36</td>
<td>71</td>
<td>106</td>
<td>141</td>
</tr>
<tr>
<td>L3</td>
<td>140</td>
<td>175</td>
<td>210</td>
<td>245</td>
<td>280</td>
</tr>
</tbody>
</table>

**Dimensions: Individual Wiring Type (Lead Wire Type)**

<table>
<thead>
<tr>
<th>Station</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>70</td>
<td>105</td>
<td>140</td>
<td>175</td>
<td>210</td>
</tr>
<tr>
<td>L2</td>
<td>—</td>
<td>36</td>
<td>71</td>
<td>106</td>
<td>141</td>
</tr>
<tr>
<td>L3</td>
<td>140</td>
<td>175</td>
<td>210</td>
<td>245</td>
<td>280</td>
</tr>
</tbody>
</table>
Series ISA

**Operation guideline: Design data**

When you design the pneumatic circuit using the air catch sensor, please refer to the data below. The detection distance of the air catch sensor is between 10 and 300 μm. However, please note that stable detection cannot be done when supply pressure or nozzle size are different.

**Relation between Nozzle Diameter and Detection Distance**

The data in the following charts are characteristics of hysteresis at the detection distance. In case accuracy is required by the settings, the design should be made so that the hysteresis will stay within the optimum adjustment range not larger than 10 μm. The smaller the hysteresis, the better the sensitivity. In cases where the hysteresis exceeds 10 μm, the air catch sensor should be used to check the presence of the work piece.

Ex. 1) To detect 300 μm, select a ø1.0 detection nozzle and supply pressure of 0.2 MPa.
Ex. 2) To detect 10 μm, select a ø1.5 detection nozzle.

**Nozzle Shape**

Please keep the nozzle shape as illustrated below. Take every caution against chamfer on the detection surface and/or nozzle hole, which could affect the characteristics as illustrated in Figure (1).

**Figure (1)**

Chamfer is not allowed.

Detection surface
Response Time

Response time changes with detection distance and piping length. It is hardly influenced by the supply pressure and nozzle diameter (ø1.0 to ø2.0). While both graphs assume a fixed set distance with changes in the detection distance, Fig. 2 shows responses at various set values and Fig. 3 shows responses at various piping lengths. If the detection distance is equal to the set value, the response becomes quicker as the set value becomes smaller or the piping length becomes shorter.

Supply Pressure Dependence

The charts illustrate changes in the detection distance with fluctuations in the supply pressure.
**Air Catch Sensor**

**Series ISA2**

**Non-Contact Sensor for Workpiece Placement Verification**

Stable detection of **0.01 to 0.5 mm clearance**

Due to the pneumatic bridge circuit and semiconductor pressure sensor, the non-contact type sensor is hardly affected by fluctuations in the supply pressure.

- **Plug connectors** (Centralized wiring)
  - Requires less man hours to wire.
  - Easy to add and remove manifold stations.

- **Modular construction**
  - Requires less man hours to wire.

Check optimum position at a glance. LED level meter

- **Above set position**
- **Set position**
- **Below set position**

Terminal block box

- With regulator + 2 port solenoid valve
- With 2 port solenoid valve

2 wiring methods

- **Individual wiring**
- **Centralized Wiring**

- **Minimum operating pressure 30 kPa (ISA2-G)**
  - Energy consumption can be reduced compared with the conventional models (Conventional models: 50 kPa)

- **Position of supply port:** Either right side or left side is available.
Air Catch Sensor
Series ISA2

How to Order

Manifold

Without control unit
IISA2 N PL - 3 B

With control unit
IISA2 C SL - 3 B 1 D E2

Control unit
- C With regulator + 2 port solenoid valve
- V With 2 port solenoid valve

Electrical entry and supply port position
- SR Centralized wiring with supply port on the right
- SL Centralized wiring with supply port on the left
- PR Individual wiring with supply port on the right
- PL Individual wiring with supply port on the left

Note) The supply port position is the one when the switch is viewed from the front.

Stations
1 1 station
2 2 stations
3 3 stations
4 4 stations
5 5 stations
6 6 stations

Option
- Nil Without bracket
- B With bracket
- D With mounting bracket for DIN rail

Note) DIN rail must be ordered separately. (Refer to page 879.)

Electrical entry of 2 port solenoid valve

Voltage of 2 port solenoid valve
1 100 VAC
2 200 VAC
3 110 VAC
4 220 VAC
5 24 VDC
6 12 VDC
36 230 VAC

Pressure gauge of regulator
- A Without pressure gauge
- E2 MPa single notation 0.2
- Z2 psi single notation MPa
- E4 MPa single notation 0.4
- Z4 psi single notation MPa
- G2 MPa single notation 0.2
- P2 MPa-psi double notation MPa
- G4 MPa single notation 0.4
- P4 MPa-psi double notation MPa

Note 1) Due to new Japanese weight and measurement legislation, psi notation type cannot be sold or used in Japan.
Note 2) The pressure gauge port is Rc 1/8.
* Produced upon receipt of order

Throttle/Manual lock of 2 port solenoid valve
- Nil Without throttle, without manual lock
- C With throttle, without manual lock
- W Without throttle, with manual lock
- M With throttle, with manual lock

Note) DIN rail must be ordered separately. (Refer to page 879.)

Electrical entry of 2 port solenoid valve

Square embedded pressure gauge

Without pressure gauge

Round pressure gauge

Note) The supply port position is the one when the switch is viewed from the front.

DIN rail must be ordered separately. (Refer to page 879.)

Throttle/Manual lock of 2 port solenoid valve

* Produced upon receipt of order

Electrical entry of 2 port solenoid valve

D : DIN connector
DL : DIN connector (With indicator light)
D0 : DIN connector (Without connector)
T : Conduit terminal
TL : Conduit terminal (With indicator light)
How to Order

For single and double notation type and additional stations

Air catch sensor

**ISA2** - **G** | **E2** | **1**

Detection distance

- **G** 0.01 to 0.25 mm
- **H** 0.03 to 0.5 mm

Piping specifications

- **Nil** Rc 1/8
- **N** NPT 1/8
- **F** G 1/8

* Production upon receipt of order

+ According to ISO228-1

Output specifications

- **1** NPN output
- **5** PNP output

Electrical entry

- **Nil**
- **Straight**
- **Right angle**
- **L** Without lead wire
- **P** Terminal block box

Pressure gauge

| **Note 1)** | **Square embedded pressure gauge**
| **Without pressure gauge** | **Note 2)** | **Round pressure gauge**

Pressure gauge type

- **A**
- **E2** MPa single notation
- **Z2** psi single notation
- **E4** MPa single notation
- **Z4** psi single notation
- **G2** MPa single notation
- **P2** MPa-psi double notation
- **G4** MPa single notation
- **P4** MPa-psi double notation

**Note 1)** Due to new Japanese weight and measurement legislation, psi notation type cannot be sold or used in Japan.

**Note 2)** The pressure gauge port is Rc 1/8.

Produced upon receipt of order

Ordering Example

Without control unit

Centralized wiring

- Terminal block box
- Supply port
- Right Bracket
- Stations

Individual wiring

- Terminal block box
- Supply port
- Left Bracket
- Stations

Centralized wiring/Supply port right

- Terminal block box
- Supply port
- Right Bracket
- Stations

With control unit

Centralized wiring/Supply port left

- 2 port solenoid valve
- Regulator
- Supply port
- Left Bracket
- Stations

Individual wiring/Supply port right

- 2 port solenoid valve
- Supply port
- Right Bracket
- Stations

Prefix the part number of the air catch sensor with an asterisk (+).

Prefix the part number of the air catch sensor with an asterisk (+).

Prefix the part number of the air catch sensor with an asterisk (+).
### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>ISA2-G□□□□</th>
<th>ISA2-G□□□□□5</th>
<th>ISA2-H□□□□</th>
<th>ISA2-H□□□□5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection distance</td>
<td>0.01 to 0.25 mm</td>
<td>0.03 to 0.50 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid</td>
<td>Dry air (filtered to 5 μm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating pressure range</td>
<td>30 to 200 kPa</td>
<td>50 to 200 kPa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended detection nozzle</td>
<td>ø1.5</td>
<td>ø2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption flow rate L/min (ANR)</td>
<td>50 kPa</td>
<td>10 or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply pressure</td>
<td>100 kPa</td>
<td>8 or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 kPa</td>
<td>12 or less</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>12 to 24 VDC ±10%, Ripple (p-p) 10% or less (With power supply polarity protection)</td>
<td>15 mA or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch output</td>
<td>NPN: open collector: 1 output</td>
<td>NPN: open collector: 1 output</td>
<td>PNP: open collector: 1 output</td>
<td>PNP: open collector: 1 output</td>
</tr>
<tr>
<td>Maximum load current</td>
<td>80 mA</td>
<td>30 VDC (at NPN output)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum load voltage</td>
<td>1.5 V or less (at 80 mA)</td>
<td>1.5 V or less (at 80 mA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual voltage</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis (Including temperature characteristics)</td>
<td>0.01 mm or less (Detection distance range 0.01 to 0.15 mm, supply pressure 100 to 200 kPa)</td>
<td>0.01 mm or less (Detection distance range 0.01 to 0.15 mm, supply pressure 100 to 200 kPa)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator light</td>
<td>LED level meter Note 2) with 1 red, 2 green</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>IP66: without pressure gauge</td>
<td>IP40: with pressure gauge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>Operating: 0 to 60 °C, Stored: –20 to 70 °C (No condensation or freezing)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating humidity range</td>
<td>Operating/stored: 35 to 85%RH (No condensation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstand voltage</td>
<td>1000 VAC (in 50/60 Hz) for 1 minute between terminals and housing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>2 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port size</td>
<td>Nil: Rc 1/8, N type: NPT 1/8, F type: G 1/8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead wire with connector (Individual wiring type)</td>
<td>4 cores, oil-resistant cable (ø6, 5m) with M12 4-pin pre-wired connector, Conductor O.D.: 0.90 mm, Insulator O.D.: 1.72 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal block box (Centralized wiring type)</td>
<td>Front wiring (Electrical entry ø21)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Individual wiring type (body only): 253 g, common wiring type (body only): 250 g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Terminal block box: 205 g, lead wire: 278 g, connecting bracket with sealing for additional station: 4 g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standards</td>
<td>CE, RoHS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1) Refer to "Relation between Nozzle Diameter and Detection Distance" (page 870) for hysteresis.

Note 2) Refer to "Setting Procedure" (page 872) for LED level meter.

### Working Principle

In a bridge circuit as in the left figure, a detection gap is applied to the detection nozzle (S4) while the setting dial S3 is adjusted to balance the pressure applied to the pressure sensor (P1 = P2). The pressure sensor detects the differential pressure generated when the detection nozzle (S4) is released. When the work piece comes close to the detection nozzle, the back pressure P2 increases until it is larger than P1 (P2 ≥ P1). Then the switch output turns on to notify that the pressure is below the detection gap.
### Wiring

#### Individual wiring

1. Insert the connector of the lead wire with its key groove at the proper position.
2. Hold the knurl with 2 fingers and rotate it clockwise. Do not use tools.
3. Connect the colored wires coming from the cable terminal. Refer to the circuit diagram and table above to avoid mistakes.

#### Centralized wiring

1. Mount the seal conduit on the terminal block box. For mounting procedure, refer to the catalog and operation manual provided by the manufacturer of the seal conduit.
2. Thread the cable through the seal conduit and arrange wiring according to the polarity of the terminal block illustrated above.
3. Fasten the seal conduit with a tightening torque not greater than 5 N·m. Do not hold the terminal block box or the switch.

#### Internal Circuits and Wiring Examples

##### NPN (1 output)

- **Main circuit**
  - Brown DC (+)
  - Black OUT
  - Blue DC (−)

- **Load**
  - + 12 to 24 VDC

##### PNP (1 output)

- **Main circuit**
  - Brown DC (+)
  - Black OUT
  - Blue DC (−)

- **Load**
  - + 12 to 24 VDC
Relation between Detection Distance and Hysteresis (Typical example)

The data in the following charts are characteristics of hysteresis at the detection distance. The smaller the hysteresis, the better the sensitivity. In cases where the hysteresis exceeds 0.01 mm, the air catch sensor should be used to check the presence of the workpiece.

**ISA2-G**

- **Detection nozzle**: ø1.5
- **Detection side piping**: ø6 x ø4 tubing 5 m

**ISA2-H**

- **Detection nozzle**: ø2.0
- **Detection side piping**: ø6 x ø4 tubing 5 m

Supply Pressure Dependence (Typical example)

The charts illustrate changes in the detection distance with fluctuations in the supply pressure.

**ISA2-G**

- **Standard pressure**: 100 kPa
- **Detection nozzle**: ø1.5
- **Detection side piping**: ø6 x ø4 tubing 5 m

**ISA2-H**

- **Standard pressure**: 100 kPa
- **Detection nozzle**: ø2.0
- **Detection side piping**: ø6 x ø4 tubing 5 m
Response Time (Typical example)

Response time changes with detection distance and piping length. While all graphs assume a fixed set distance with changes in the detection distance, the upper charts show responses at various set values and the lower charts show responses at various piping lengths. The response time becomes quicker as the set value becomes larger. Additionally, the response time becomes quicker as the piping length becomes shorter.

ISA2-G

Detection nozzle: ø1.5  Supply pressure: 100 kPa  Detection side piping: ø6×ø4 tubing 5 m

Detection nozzle: ø2.0  Supply pressure: 100 kPa  Detection side piping: ø6×ø4 tubing 5 m

Detection distance—Response time characteristics

Detection nozzle: ø1.5  Supply pressure: 100 kPa  Detection side piping: ø6×ø4  Set distance: 0.15 mm

Detection nozzle: ø2.0  Supply pressure: 100 kPa  Detection side piping: ø6×ø4  Set distance: 0.3 mm

Piping tubing length—Response time

Nozzle Shape

Please keep the nozzle shape as illustrated below.
Take every caution against chamfer on the detection surface and/or nozzle hole, which could affect the characteristics as illustrated in Figure (1).

Figure (1)
Setting Procedure

The detection distance is set with the LED level meter and setting dial.
Keep the setting dial pulled out while in use. If released, it will return to its original position and become unable to rotate.

1. For accuracy in setting, apply a clearance gauge to the detection nozzle to replicate the set condition in advance.
2. Confirm that the set pressure is applied. If the setting dial is fully open, the LED level meter appears as \( \text{Light OFF} \). Complete the setting when this condition is observed.
3. Pull the setting dial and rotate it in the positive direction. The lights will turn on in the order shown below.

4. The sensor output comes on when the lights on the LED level meter turn on as \( \text{Light OFF} \). Complete the setting when this condition is observed.
5. Apply the clearance gauge again to confirm that the lights turn on as \( \text{Light OFF} \).

Handling and setting of 2 port solenoid valve

Throttle setting for blowing to prevent water and cutting oil from entering the nozzle.
(Clockwise: Close throttle; Counterclockwise: Open throttle)

- The setting is not applicable to valves without throttle.

1. Power off the valve.
2. Rotate the throttle clockwise for adjustment so that the detection nozzle will not suck up water or cutting oil.
3. Power on the valve, then off again.
   Confirm that the detection nozzle does not suck up water or cutting oil.

Example

<table>
<thead>
<tr>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum 0.24 MPa</td>
</tr>
<tr>
<td>Minimum 0.16 MPa</td>
</tr>
</tbody>
</table>

Handling and setting of limit gauge indicator

1. **Removal of cover**
   Hook the finger on the front cover ridge and rotate it in the direction of the OPEN arrow until it stops (15°).
   Then pull out and remove the cover.

2. **Setting the installation needle**
   The installation needle should be moved by the fingertip.
   Set the 2 green installation needles at the maximum and minimum limits of pressure.

3. **Installation of cover**
   After setting the installation needles, locate the OPEN arrow at the top right position and insert the claws on the cover into the grooves on the case (indicated by △ in the expanded view of A part). Rotate the cover clockwise until it stops. Confirm that the cover is firmly secured.
Relation between Dial Scale and Detection Distance (Typical example)

Test procedure and conditions
Dial scales when the detection nozzle is under the following conditions;
Supplied pressure: 100 kPa
Piping: ø6 x ø4 tubing, 5 m in length.
Detection nozzle: ISA2-G...ø1.5
ISA2-H...ø2.0

Results of measurement  
Note 1) This data provides reference values as a guide only, this should not be viewed as a guarantee of our products performance.
Note 2) Set dial scales are as follows;

<table>
<thead>
<tr>
<th>Detection distance (mm)</th>
<th>0.05</th>
<th>0.10</th>
<th>0.15</th>
<th>0.20</th>
<th>0.25</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISA2-G</td>
<td>1.2</td>
<td>2.6</td>
<td>3.9</td>
<td>5.0</td>
<td>6.1</td>
</tr>
<tr>
<td>ISA2-H</td>
<td>2.9</td>
<td>5.9</td>
<td>7.8</td>
<td>9.0</td>
<td>9.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Detection distance (mm)</th>
<th>0.05</th>
<th>0.04</th>
<th>0.03</th>
<th>0.02</th>
<th>0.01</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISA2-G</td>
<td>0.004</td>
<td>0.003</td>
<td>0.002</td>
<td>0.001</td>
<td>0.0001</td>
</tr>
<tr>
<td>ISA2-H</td>
<td>0.015</td>
<td>0.010</td>
<td>0.005</td>
<td>0.001</td>
<td>0.0005</td>
</tr>
</tbody>
</table>

Average variation per scale (Detection distance [mm])

 ISA2-G (Detection nozzle: ø1.5)

 ISA2-H (Detection nozzle: ø2.0)

Between each major scales, it is sub divided into ten smaller settings (for example, between 2.0 to 3.0—2.1, 2.2, 2.3, etc.), settings are possible at 0.1 scale.
Dimensions: Centralized Wiring Type

With bracket

When the SUP port is on the left, the stations are sequentially numbered from the side of the terminal block box.

For the bracket mounting position, refer to page 877.

With DIN rail

For the bracket mounting position, refer to page 877.
Dimensions: Individual Wiring Type

With bracket

For the bracket mounting position, refer to page 877.

With DIN rail

Electrical entry dimensions

The direction of a right angle connector cannot be changed.
Series ISA2

Dimensions: With Control Unit

SUP port on the left

SUP port on the right

Lead wire with connector
ISA-8-A

Lead wire with connector
ISA-8-B
Bracket Mounting Position

With 2 stations, the bracket is mounted on the second sensor from the left.

With n stations, the bracket is mounted on the first and “n” th sensor from the left.

Addition of Manifold Stations

1. Disassembly

2. Insertion

3. Assembly

End plate removal

1. Loosen the screws and remove the 2 mounting brackets on the front and back side.
2. Disassemble the switch carefully so that the O-ring on the SUP port will not be detached.

1. Fit seal for additional station (ISA-7-B) to the recess of the SUP port of the additional switch.
2. Fit the protrusion of the additional switch into the existing switch.
3. Mount joint brackets (ISA-3-A) at 2 positions.
   Note) Perform temporary tightening of screws.
4. Confirm that the recess of the SUP port of the existing switch has seal for additional station attached.
5. Fit the protrusion of the existing switch into the recess of the additional switch.
6. Mount the existing joint bracket.
   Note) Perform temporary tightening of screws.

1. Tighten the joint brackets with the prescribed tightening torque of 1.2 N·m.
2. Arrange pneumatic piping and confirm that there is no air leakage from new joints.
**Series ISA2**

**Parts List**

**Spacer**
- Y200-A

**Seal for additional station**
- ISA-7-B
  - When 2 air catch sensors are connected or when a 2 port solenoid valve is connected to the left:
- ISA-7-A
  - When a 2 port solenoid valve is connected to the right:

**End plate L**
- ISA-6-A

**End plate R**
- ISA-6-B

**Joint bracket**
- ISA-3-A
  - A pair consists 1 set.

**Lead wire with connector (Individual wiring type)**
- ISA-8-A
  - Straight, 5 m
- ISA-8-B
  - Right angle, 5 m

**Bracket**
- ISA-4-A

**DIN rail mounting bracket**
- ISA-9-A

**Terminal block box**
- ISA-11-L (Centralized wiring/Supply port left)
- ISA-11-R (Centralized wiring/Supply port right)

---

When a 2 port solenoid valve is connected to the right:

- When 2 air catch sensors are connected or when a 2 port solenoid valve is connected to the left:
Note) The pressure gauge port is 1/8. The pressure gauge is included in the package.

When a regulator with square embedded pressure gauge (psi single notation) is required, change the part number suffix to "-X2175".

Example) AR20-02E-1-B-X2175

Note) For double notation of MPa and psi, add "-X30" at the end of part number.
Example) G36-P4-01-X30

Note) Vibration resistance: No malfunction resulted in a one-sweep test in a 10 to 300 Hz range in the axial and right angle directions of the main valve and armature, for both energized and de-energized states.

Shock resistance: No malfunction resulted in an impact test using a drop impact tester. The test was performed in the axial and right angle directions of the main valve and armature, for both energized and de-energized states.

Nil (Semi-standard specification)

- Without manual lock
- Without throttle
- With manual lock
- Without manual lock and throttle

Option (The shape of pressure gauge)

- E: Square embedded pressure gauge (With limit indicator, MPa single notation)
- G: Round pressure gauge (With limit indicator, MPa single notation)
- P: Round pressure gauge (With limit indicator, MPa-psi double notation)

Note) The pressure gauge port is 1/8. The pressure gauge is included in the package (not assembled).

- When a regulator with square embedded pressure gauge (psi single notation) is required, change the part number suffix to "-X2175".
- Example) AR20-02E-1-B-X2175
- Under the New Measurement Law, this type is only sold outside Japan. (The SI unit is used inside Japan.)

Standard Specifications:

<table>
<thead>
<tr>
<th>Model</th>
<th>AR20-B (X2105)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port size</td>
<td>1/8</td>
</tr>
<tr>
<td>Fluid</td>
<td>Air</td>
</tr>
<tr>
<td>Ambient and fluid temperature °C</td>
<td>−5 to 60 (No freezing)</td>
</tr>
<tr>
<td>Proof pressure MPa</td>
<td>1.5</td>
</tr>
<tr>
<td>Maximum operating pressure MPa</td>
<td>1.0</td>
</tr>
<tr>
<td>Set pressure range MPa</td>
<td>0.02 to 0.2</td>
</tr>
<tr>
<td>Construction</td>
<td>Relieving type</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>0.16</td>
</tr>
</tbody>
</table>

Note) The type with square embedded pressure gauge does not have connection.

Attention}

Special specifications

A. Maximum display pressure of the pressure gauge

- Nil
- 0.2 MPa
- 0.4 MPa

Note) For double notation of MPa and psi, add "-X30" at the end of part number.
Example) G36-P4-01-X30

Standard Specifications

<table>
<thead>
<tr>
<th>Valve type</th>
<th>Direct operation poppet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid</td>
<td>Air, Inert gas</td>
</tr>
<tr>
<td>Withstand pressure MPa</td>
<td>2.0</td>
</tr>
<tr>
<td>Body material</td>
<td>Al</td>
</tr>
<tr>
<td>Seal material</td>
<td>HNBR</td>
</tr>
<tr>
<td>Ambient temperature °C</td>
<td>−20 to 60</td>
</tr>
<tr>
<td>Fluid temperature °C</td>
<td>−10 to 60 (No freezing)</td>
</tr>
<tr>
<td>Atmosphere</td>
<td>Environment with no corrosive or explosive gas</td>
</tr>
<tr>
<td>Valve leakage cm³/min (ANR)</td>
<td>0.2 or less</td>
</tr>
<tr>
<td>Mounting orientation</td>
<td>Free</td>
</tr>
<tr>
<td>Vibration resistance/Impact resistance m/s²</td>
<td>30/150 or less</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>24/12 VDC, 100/110/200/220 VAC (50/60 Hz)</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>−10% rated voltage</td>
</tr>
<tr>
<td>Type of coil insulation</td>
<td>B type</td>
</tr>
<tr>
<td>Power consumption</td>
<td>DC</td>
</tr>
<tr>
<td>Apparent power</td>
<td>VCA2: 6.5 W</td>
</tr>
<tr>
<td>Power consumption</td>
<td>VCA2: 7.5 VA</td>
</tr>
</tbody>
</table>

Note 1) Since the AC specifications include a rectifying device, there is no difference between the apparent power required for starting and holding.

Note 2) Vibration resistance: No malfunction resulted in a one-sweep test in a 10 to 300 Hz range in the axial and right angle directions of the main valve and armature, for both energized and de-energized states.

Note 3) Power consumption: No malfunction resulted in an impact test using a drop impact tester. The test was performed in the axial and right angle directions of the main valve and armature, for both energized and de-energized states.
3-Color Display

Digital Gap Checker

Check at a glance if the workpiece is placed or not!

Main screen

ON: Placed
OFF: Not placed

The clearance distance between the detection surface and the workpiece can be found intuitively!

Sub screen

Switch output

Change the settings while checking the displayed value!

Simple Setting

3 steps

Energy Saving

- Air consumption: 60% reduction
- Improved drainage resistance: 10 times or more
- Easier maintenance

Environmental Resistance

ISA3 Series

Manifold

New Centralized lead wire (With control unit)

CAT.ES100-105C
3-Color Display Digital Gap Checker ISA3 Series

3 Step Setting (Switch Point Change Mode)

A simple operation to enter the switch point value (point at which the clearance reaches the switch point value)

- Press the \( \text{TAB} \) and \( \text{ENTRY} \) buttons for a minimum of 1 second, then releasing the buttons when the displayed switch point value disappears, will make the switch point the same as the current displayed value.

Features of the 2-Screen, 3-Color Digital Display

The seating condition can be checked at a glance. The sub screen display can be selected from 6 display options.

**Main screen**

- Placed (Switch output ON)
- Not placed (Switch output OFF)

**Sub screen**

- Level meter
- Displayed value
- SUP side pressure
- OUT side pressure
- Switch point value
- Display OFF

* The displayed value is a reference value obtained by converting the distance between the workpiece and the detection surface into a digital numerical value, it is not displayed in units. For details, refer to Relationship between Displayed Value and Distance on page 12.

Improved Environmental Resistance

**Easier maintenance**

The internal orifice part can be removed for cleaning. It is not necessary to remove the piping or metal connection fitting for cleaning when the product is installed in the user’s equipment.

**Measures against drainage**

- Drainage resistance: \( 10 \times \) or more
- Based on the SMC’s specific testing condition (oil proof test).
- Compared with the ISA2.

- Withstand pressure expanded \( 3 \times \) compared with the ISA2
- Max.: \( 600 \ \text{kPa} \)
- \( +1 \) Compared with the ISA2 with 0.2 MPa pressure gauge.

**High pressure flushing**

- The switch output will be OFF during flushing.
The current model (ISA2) needs to exhaust air from the exhaust port due to the bridge circuit. The ISA3 does not exhaust air from the product body. This reduces noise considerably compared with the current model.

The new detection principle eliminates air being exhausted from the product. This makes the flow consumption 0 L/min. when the workpiece is seated. A much lower air consumption is required than the current model.

*1: Conditions: Unseated for 5 seconds and seated for 20 seconds (For G type)

Comparison of detection circuit

By reducing the number of internal orifices from 3 to 1, there is less possibility of variations in the output due to clogging. By removing the setting dial for S3, variations in the detection distance are prevented.

A larger orifice area provides less possibility of clogging. Even if the orifice is clogged with foreign matter, the product construction enables cleaning with the internal orifice removed.

*1: Except F type
Compact & Lightweight

Volume: **40%** reduction
Weight: **55%** reduction

(Comparison between the ISA3-GC and the current model ISA2 with One-touch fitting)

---

Space-saving & Reduction of Work-Hours (Centralized Lead Wire)

Installation space: **30 mm** reduction

Requires less work-hours to wire.

**Current model**

- Separate cable is required between the terminal block box and junction terminal block.

**ISA3**

- Wiring can be performed without tools with the M12 connector.
- Centralized lead wire
- 5 m lead wire supports wiring to the junction terminal block.

Cable processing and crimping work including Y-terminals and round terminals are required for the number of stations of the gap checker.
Keylock Function

A key LED turns ON when the product is locked and the button operation is disabled to prevent unintentional changes to set values.

Piping Variations

- **C type**
  - Supply side: Rc1/8
  - One-touch fitting (ø4)
  - Detection side: G1/8

- **F type**
  - Supply side: G1/8
  - Detection side: G1/8

*1: Conforming to ISO1179-1

Mounting

- **Bracket**
- **DIN rail**

Manifold

- **With control unit**
  - Regulator
  - 2 port solenoid valve
  - Centralized lead wire

- **Without control unit**
  - Centralized lead wire

Supply port: Left side

Supply port: Right side

*: The electrical entry of centralized lead wire for M12 connector is on the right side.
If the supply port on the right side is used, arrange the centralized lead wire so that it does not interfere with the control unit.
Application Examples

Confirmation of the reference plane for press fitting of a shaft

- **Shaft**
- **Reference plane**

ON: Placed
OFF: Not placed

Confirmation of close contact with the workpiece for machining

Main Functions

Display OFF mode
Display OFF mode can be selected. The display can be turned OFF to reduce power consumption.

Security code
By activating the security code, the key lock cannot be released without entering a security code.

Display color
The color of the main display can be set to change depending upon the output activity. The display color change makes visual identification of the output ON/OFF easier.

- When ON: Green
- When OFF: Orange
- Normally: Orange

Displayed value compensation
The displayed value can be corrected within ±20% R.D. of the displayed value at the time of shipment.

Forced output
The output can be fixed to an ON/OFF state when starting the system or during maintenance. This enables confirmation of the wiring and prevents system errors due to unexpected output.

Unit selection
The pressure unit displayed on the sub screen can be changed.

<table>
<thead>
<tr>
<th>Display unit</th>
<th>kPa</th>
<th>bar</th>
<th>psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallest settable increment</td>
<td>1</td>
<td>0.01</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Zero-clear of pressure display
The pressure value displayed on the sub screen can be cleared to zero.
CONTENTS

ISA3 Series

3-Color Display Digital Gap Checker ISA3 Series

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3-Color Display Digital Gap Checker Without Control Unit

**ISA3 Series**

**How to Order**

ISA3- **G C N - M 2**

**Rated distance range**
- **F**: 0.01 to 0.03 mm
- **G**: 0.02 to 0.15 mm
- **H**: 0.05 to 0.30 mm

**Supply side Detection side**
- **C**: Rc1/8
- **F**: G1/8

- **1**: When F is selected for the rated distance range.
- **2**: When G or H is selected for the rated distance range.
- **3**: Conforming to ISO1179-1

**Output specifications**
- **N**: NPN output
- **P**: PNP output

**Unit specifications of pressure value**
- **Nil**: With unit selection function
- **M**: Fixed SI unit

- **9**: Under the New Measurement Act, sales of digital gap checkers with the unit selection function have not been allowed for use in Japan.
- **10**: Unit: kPa

**Bracket mounting position**

**Option 2 (Bracket)**
- Nil (DIN rail mounting)
- **B**: With bracket

**Stations**
- 1: 1 station
- 2: 2 stations
- 3: 3 stations
- 4: 4 stations
- 5: 5 stations
- 6: 6 stations

**Option 1 (Cable)**

<table>
<thead>
<tr>
<th>Stations</th>
<th>Nil</th>
<th>Straight</th>
<th>S</th>
<th>Centralized lead wire (Lead wire only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nil</td>
<td>Straight</td>
<td>S</td>
<td>Centralized lead wire (Lead wire only)</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Bracket mounting position**

- **2 stations** (Mount to 1st and 2nd stations)
- **n stations** (Mount to 1st and nth stations)

**Piping specifications**
- **Supply side**
- **Detection side**

- **G1/8 One-touch fitting**: ø6

- **G1/8 One-touch fitting**: ø4

- **Option 2 (Bracket)**
  - Nil
  - **B**: With bracket

- **Unit specifications of pressure value**
  - **Nil**: With unit selection function
  - **M**: Fixed SI unit

- **9**: Under the New Measurement Act, sales of digital gap checkers with the unit selection function have not been allowed for use in Japan.
- **10**: Unit: kPa

- **Option 1 (Cable)**
  - Nil
  - **S**: Straight

- **S**: S

- **L**: Right angle

- **N**: None

- **T**: Centralized lead wire (With bracket)

- **4**: Cannot be selected for 1 station. One set is provided per manifold. A centralized lead wire is provided with M12 connectors for the number of stations. Refer to page 19 for details.

- **5**: At the factory, the options are not attached to the product, but packed together with it for shipment.

- **6**: Cables are provided for the number of stations.
3-Color Display Digital Gap Checker
With Control Unit
ISA3 Series

How to Order

**ISA3-GCN-M2BL1**

**Rated distance range**
- **F**: 0.01 to 0.03 mm
- **G**: 0.02 to 0.15 mm
- **H**: 0.05 to 0.30 mm

**Output specifications**
- **N**: NPN output
- **P**: PNP output

**Unit specifications of pressure value**
- **Nil**: With unit selection function
- **M**: Fixed SI unit

**Regulator (Refer to page 16.)**
- **N**: Without regulator
- **1**: With regulator (AR-A), round type pressure gauge
- **2**: With regulator (AR-B), square embedded type pressure gauge

**2 port solenoid valve**
- **Rated voltage**: Nil 24 VDC
  - **1**: 100 VAC
  - **2**: 110 VAC
  
+11: Made to Order

**Control unit**
- **L**: Control unit (Supply port: Left side)
- **R**: Control unit (Supply port: Right side)

**Control unit piping specifications**
- **Gap checker piping specifications**: Nil G1/8 F G1/8
  - **C**: Rc1/8
- **Supply port piping specifications**: Nil G1/4 F RC1/4
  - **C**: G1/4

+12: Under the New Measurement Act, sales of digital gap checkers with the unit selection function have not been allowed for use in Japan.

13: Unit: kPa

**Supply side Detection side**
- **C**: Rc1/8
  - ø4 One-touch fitting
- **F**: G1/8
  - ø6 One-touch fitting

**Option 1 (Cable)**
- **N**: None
  - **4**: Cannot be selected for 1 station. One set is provided per manifold. A centralized lead wire is provided with M12 connectors for the number of stations. Refer to page 19 for details.
  - **5**: At the factory, the options are not attached to the product, but packed together with it for shipment.
  - **6**: Cables are provided for the number of stations.

- **S**: Centralized lead wire (Lead wire only)
- **T**: Centralized lead wire (With bracket)

**Option 2 (Bracket)**
- **B**: With bracket

+7: The bracket for control unit is shipped mounted on the product.
### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>ISA3-F</th>
<th>ISA3-G</th>
<th>ISA3-H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable fluid</td>
<td>Dry air (Filtered through a 5 (\mu)m filter)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated distance range</td>
<td>0.01 to 0.03 mm</td>
<td>0.02 to 0.15 mm</td>
<td>0.05 to 0.30 mm</td>
</tr>
<tr>
<td>Displayable/Settable range (Distance reference)</td>
<td>0 to 60 (*4)</td>
<td>10 to 300 (*4)</td>
<td>30 to 500 (*4)</td>
</tr>
<tr>
<td>Minimum display unit (Distance reference)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated pressure range</td>
<td>100 to 200 kPa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Displayable range (Pressure value)</td>
<td>−20 to 220 kPa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstand pressure</td>
<td>600 kPa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detection nozzle</td>
<td>ø1.5 (*3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption flow rate</td>
<td>5 L/min or less</td>
<td>12 L/min or less</td>
<td>22 L/min or less</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>24 VDC ±10%, Ripple (p-p) 10% or less (With power supply polarity protection)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>25 mA or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch output</td>
<td>1 output (NPN or PNP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum load current</td>
<td>10 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum applied voltage</td>
<td>26.4 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual voltage</td>
<td>1 V or less (at 10 mA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short circuit protection</td>
<td>Provided</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>0.005 mm</td>
<td>0.010 mm</td>
<td>0.020 mm</td>
</tr>
<tr>
<td>Temperature characteristics (Reference: 25°C)</td>
<td>0.015 mm</td>
<td>0.030 mm</td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>0 to variable (Default: 3)</td>
<td>0 to variable (Default: 20)</td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>2-screen display, LCD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enclosure</td>
<td>IP67 equivalent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>Operating: 0 to 50°C, Stored: −20 to 70°C (No condensation or freezing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating humidity range</td>
<td>Operating: 35 to 85% RH (No condensation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstand voltage</td>
<td>1000 VAC or more (in 50/60 Hz) for 1 minute between terminals and housing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>2 M(\Omega) or more (500 VDC measured via megohmmeter) between terminals and housing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piping specifications</td>
<td>C type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplies port</td>
<td>Rc1/8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detection port</td>
<td>ø4 One-touch fitting</td>
<td>ø6 One-touch fitting</td>
<td></td>
</tr>
<tr>
<td>F type</td>
<td>Supply port</td>
<td>G1/8 (Conforming to ISO1179-1)</td>
<td></td>
</tr>
<tr>
<td>Detection port</td>
<td>G1/8 (Conforming to ISO1179-1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable</td>
<td>Lead wire with connector</td>
<td>M12 lead wire with 4 pin connector, 4 cores, ø4, 5 m</td>
<td></td>
</tr>
<tr>
<td>Centralized lead wire</td>
<td>M12 lead wire with 4 pin connector part, 5 cores, ø4, 5 m, 4 to 6 stations: 5 cores, ø6, 5 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>113 g (Cable not included, One-touch fitting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standards</td>
<td>CE, RoHS compliant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1: For details, refer to Relationship between Displayed Value and Distance on page 12.
2: The pressure value will be indicated on the sub screen.
3: For details of the detection nozzle, refer to the figures on page 12.
4: If hysteresis is set to 3 (Default setting), “Displayable/Settable range” of F type is limited to 57. If hysteresis is set to 20 (Default setting), G type is limited to 280 and H type is limited to 480.

### Caution

The displayed value is a reference value obtained by converting the distance between the workpiece and the detection surface into a digital numerical value, it is not displayed in units.

For details, refer to Relationship between Displayed Value and Distance on page 12.

Displayable/Settable range: It is possible to display or set values, but it is not guaranteed to meet the specifications.

#### Rated Distance Range and Displayable/Settable Range

<table>
<thead>
<tr>
<th>Model</th>
<th>0 mm</th>
<th>0.02 mm</th>
<th>0.05 mm</th>
<th>0.15 mm</th>
<th>0.30 mm</th>
<th>0.50 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISA3-F type</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
</tr>
<tr>
<td>ISA3-G type</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
</tr>
<tr>
<td>ISA3-H type</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
</tr>
</tbody>
</table>
Supply Pressure Dependence Characteristics

The distance for the product to turn ON varies depending on the supply pressure.
The graphs below show the variation of the distance for the product to turn ON, for 3 types of gap, by changing the supply pressure (±50 kPa) when the product is set to turn ON at 150 kPa supply pressure.

<table>
<thead>
<tr>
<th>Test conditions</th>
<th>Detection nozzle: ø1.5</th>
<th>Piping: F type ø4 x ø2.5 tube/G, H type ø6 x ø4 tube</th>
<th>Reference pressure: 150 kPa</th>
</tr>
</thead>
</table>

*: Use within the rated pressure range (100 kPa to 200 kPa).

It will be impossible to measure the gap when the operating pressure is less than or equal to 80 kPa or more than 220 kPa. And the output will be OFF.
(Refer to Relationship between Supply Pressure and Display on page 21.)
Response Time

Response time is the elapsed time between the pressure supply and the turning ON of the switch output.
The response time varies depending on the piping length from the OUT port to the detection nozzle, and the seating condition of the workpiece.
The graphs below show the response time when the workpiece is approached at 90% distance and 0% distance (close contact). (*: The switch point is 100% distance.)
(Example: When the switch point is set to 0.1 mm, the response time when the workpiece is at 0.09 mm and 0 mm are measured.)

**Test conditions**
- Detection nozzle: ø1.5
- Piping: F type ø4 x ø2.5 tube/G, H type ø6 x ø4 tube
- Supply pressure: 200 kPa

** ISA3 Series**
**Relationship between Displayed Value and Distance**

The graphs below show the relationship between the displayed value and distance. *: The data shown below are for reference. They change depending on the individual product differences, machining dimensions of the nozzle, etc.

<table>
<thead>
<tr>
<th>Test conditions</th>
<th>ISA3-F</th>
<th>ISA3-G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection nozzle: ø1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detection nozzle piping: F type ø4 x ø2.5 tube 1 m, 3 m, 5 m/G, H type ø6 x ø4 tube 1 m, 3 m, 5 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply pressure: 200 kPa</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** ISA3-F  

![Graph of ISA3-F](image)

** ISA3-G  

![Graph of ISA3-G](image)

** ISA3-H  

![Graph of ISA3-H](image)

** Nozzle Shape  

The nozzle shape must be similar to Fig. 1. Do not chamfer the nozzle as shown in Fig. 2, as the characteristics will be affected.

Fig. 1: Recommended nozzle shape  

Fig. 2: Unsuitable nozzle shape

** Internal Circuit and Wiring Example  

ISA3-□□N NPN (1 output)

ISA3-□□P PNP (1 output)

*: Refer to the WEB catalog for wiring details of the VX2 series (2 port solenoid valve).
ISA3 Series

Construction Diagram

Without control unit

With control unit
Supply port: Left side
SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.
### Parts List

1. Joint screws (2 pcs.)
   - 2 screws, 2 spacers, 2 nuts
   - ISA-16

2. Seal for extra station
   - ISA-15
   - 1 pc.

3. Threaded plug with seal
   - ISA-12
   - 1 pc.

*1: Spacers are included for 4 and 6 stations.

### DIN rail

- **ISA-5**

![DIN rail diagram]

<table>
<thead>
<tr>
<th>Stations</th>
<th>Part no.</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ISA-5-1</td>
<td>73.0</td>
</tr>
<tr>
<td>2</td>
<td>ISA-5-2</td>
<td>135.5</td>
</tr>
<tr>
<td>3</td>
<td>ISA-5-3</td>
<td>173.0</td>
</tr>
<tr>
<td>4</td>
<td>ISA-5-4</td>
<td>210.5</td>
</tr>
<tr>
<td>5</td>
<td>ISA-5-5</td>
<td>248.0</td>
</tr>
<tr>
<td>6</td>
<td>ISA-5-6</td>
<td>285.5</td>
</tr>
</tbody>
</table>

### Bracket

- **ISA-14**

With 3 tapping screws (3 x 8)

### Lead wire with connector

- **ZS-31-B** Straight 5 m
- **ZS-31-C** Right angle 5 m

### Centralized lead wire

- **ISA-19**

<table>
<thead>
<tr>
<th>Stations</th>
<th>Part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>ISA-19-2</td>
</tr>
<tr>
<td>3</td>
<td>ISA-19-3</td>
</tr>
<tr>
<td>4</td>
<td>ISA-19-4</td>
</tr>
<tr>
<td>5</td>
<td>ISA-19-5</td>
</tr>
<tr>
<td>6</td>
<td>ISA-19-6</td>
</tr>
</tbody>
</table>

### Bracket for centralized lead wire

- **ISA-20**
Parts List (Control Unit)

- Regulator (Round type pressure gauge) 
  AR20 - [ ] 02G - 1 [ ] - A
  - Piping specifications
    - Nil 
    - Rc1/4 
    - $F$ G1/4 $^*$
    +1: Conforming to ISO16030
  - Flow direction
    - Nil 
    - Flow direction (Left → Right)
  - Round type pressure gauge

- Regulator (Square embedded type pressure gauge) 
  AR20 - [ ] 02E - 1 [ ] - B
  - Piping specifications
    - Nil 
    - Rc1/4 
    - $F$ G1/4 $^*$
    +1: Conforming to ISO16030
  - Flow direction
    - Nil 
    - Flow direction (Right → Left)
  - Square embedded type pressure gauge

Refer to the WEB catalog for details.

2 port solenoid valve

- VX210 [ ] X276
- Body material/Port size/Orifice diameter
  - Symbol | Body material | Port size | Orifice diameter |
  - $Z$ | Al | No thread machining (1/8) | $\varnothing4$
  - $B$ $^*$ | | Rc1/4 | |
  - $D$ $^*$ | | G1/4 | |
  +1: Made to Order

- Voltage/Electrical entry
  - Symbol | Voltage | Electrical entry |
  - $Z2A$ | 24 VDC | DIN terminal with light (With surge voltage suppressor) |
  - $Z2B$ $^*$ | 100 VAC | |
  - $Z2C$ $^*$ | 110 VAC | |
  +2: Made to Order. When 100 VAC and 110 VAC are selected, the product without thread machining (symbol: $Z$) cannot be selected.

- Specifications
  - Symbol | Specifications |
  - $X276$ | With restrictor |

For specifications other than X276, refer to the WEB catalog.

Bracket (when control unit fitted)
ISA-17

- With 2 tapping screws (3 x 8)

Spacer with bracket
Y200T-A

Modular adapter
E210-U01

Spacer
ISA-18

With O-ring

$^*$: When a 2 port solenoid valve is connected to the right.
ISA3 Series

Dimensions

ISA3-□□ (Bracket mounting)

ISA3-□□ (DIN rail mounting)

When centralized lead wire is used.

<table>
<thead>
<tr>
<th>Slates</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>38</td>
<td>76</td>
<td>114</td>
<td>152</td>
<td>190</td>
<td>228</td>
</tr>
<tr>
<td>L2</td>
<td>62.5</td>
<td>125</td>
<td>162.5</td>
<td>200</td>
<td>237.5</td>
<td>275</td>
</tr>
<tr>
<td>L3</td>
<td>73</td>
<td>135.5</td>
<td>173</td>
<td>210.5</td>
<td>248</td>
<td>285.5</td>
</tr>
</tbody>
</table>

Piping type C (ø4 One-touch fitting) C (ø6 One-touch fitting) F (G thread)

Piping type C (ø4 One-touch fitting) C (ø6 One-touch fitting) F (G thread)

Unit: mm

+1: Conforming to ISO1179-1

When centralized lead wire is used.

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DC (+)</td>
</tr>
<tr>
<td>2</td>
<td>N.C.</td>
</tr>
<tr>
<td>3</td>
<td>DC (–)</td>
</tr>
<tr>
<td>4</td>
<td>OUT1</td>
</tr>
</tbody>
</table>

Unit: mm

+1: Conforming to ISO1179-1

When centralized lead wire is used.
**Dimensions**

**ISA3-□□□□□□□□B-L1 (With control unit)**

Supply port
ISA3-C: Rc1/4
ISA3-F: G1/4

Detection port
ISA3-C: One-touch fitting
ISA3-F: G1/4

**ISA3-□□□□□□□□B-R1**

Supply port
ISA3-C: Rc1/4
ISA3-F: G1/4

**ISA3-□□□□□□□□B-B-LN**

Supply port
ISA3-C: Rc1/4
ISA3-F: G1/4

**ISA3-□□□□□□□□B-RN**

Supply port
ISA3-C: Rc1/4
ISA3-F: G1/4

---

**Stations**

<table>
<thead>
<tr>
<th>Stations</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>55.6</td>
<td>93.6</td>
<td>131.6</td>
<td>169.6</td>
<td>207.6</td>
<td>245.6</td>
</tr>
<tr>
<td>L2</td>
<td>136.4</td>
<td>174.4</td>
<td>212.4</td>
<td>250.4</td>
<td>288.4</td>
<td>326.4</td>
</tr>
</tbody>
</table>

Piping type
- C: (ø4 One-touch fitting)
- E: (ø6 One-touch fitting)
- F: (G thread)

*H: 13
13.6
19

---

*: Bracket mounting only
*1: Conforming to ISO16030
*2: Conforming to ISO1179-1
## ISA3 Series

### Dimensions

#### ZS-31-B (Cable with connector)

![Diagram of ZS-31-B](image)

#### ZS-31-C (Cable with connector)

![Diagram of ZS-31-C](image)

#### ISA-19-□ (Centralized lead wire)

![Diagram of ISA-19-□](image)

### Connector pin no.

**Pin no.** | **Lead wire color** | **Description**
---|---|---
1 | Brown | DC (+)
2 | White | N.C.
3 | Blue | DC (–)
4 | Black | OUT1

### Stations Part no. L

<table>
<thead>
<tr>
<th>Stations</th>
<th>Part no.</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>ISA-19-2</td>
<td>139</td>
</tr>
<tr>
<td>3</td>
<td>ISA-19-3</td>
<td>177</td>
</tr>
<tr>
<td>4</td>
<td>ISA-19-4</td>
<td>215</td>
</tr>
<tr>
<td>5</td>
<td>ISA-19-5</td>
<td>253</td>
</tr>
<tr>
<td>6</td>
<td>ISA-19-6</td>
<td>291</td>
</tr>
</tbody>
</table>

### Unit: mm

<table>
<thead>
<tr>
<th>M12 connector no.</th>
<th>Pin no.</th>
<th>Description</th>
<th>Lead wire color</th>
<th>(Output wire color)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DC (+)</td>
<td>Brown</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>N.C.</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>DC (–)</td>
<td>Blue</td>
<td></td>
<td>+1</td>
</tr>
<tr>
<td>4</td>
<td>OUT1</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>DC (+)</td>
<td>Brown</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>N.C.</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>DC (–)</td>
<td>Blue</td>
<td></td>
<td>+1</td>
</tr>
<tr>
<td>4</td>
<td>OUT1</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>DC (+)</td>
<td>Brown</td>
<td>Gray</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>N.C.</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>DC (–)</td>
<td>Blue</td>
<td></td>
<td>+1</td>
</tr>
<tr>
<td>4</td>
<td>OUT1</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>DC (+)</td>
<td>Brown</td>
<td>Orange</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>N.C.</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>DC (–)</td>
<td>Blue</td>
<td></td>
<td>+1</td>
</tr>
<tr>
<td>4</td>
<td>OUT1</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>DC (+)</td>
<td>Brown</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>N.C.</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>DC (–)</td>
<td>Blue</td>
<td></td>
<td>+1</td>
</tr>
<tr>
<td>4</td>
<td>OUT1</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>DC (+)</td>
<td>Brown</td>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>N.C.</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>DC (–)</td>
<td>Blue</td>
<td></td>
<td>+1</td>
</tr>
<tr>
<td>4</td>
<td>OUT1</td>
<td>—</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1: Brown and blue are connected inside the product.
Dimensions

ISA-14 (Bracket when control unit not fitted)

Y200T-A (Spacer with bracket)

ISA-17 (Bracket when control unit fitted)

ISA-20 (Bracket for centralized lead wire)
## Error Indication

### Main screen

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply pressure error</td>
<td>Displayed when supply pressure is outside the range of 80 kPa to 220 kPa. Measurement is not possible.</td>
<td>Supply rated pressure (100 kPa to 200 kPa). The product will return to measurement mode automatically.</td>
</tr>
<tr>
<td>Outside of the displayable range (Switch point change mode)</td>
<td>The workpiece is outside the displayable range.</td>
<td>Move the workpiece closer to the detection nozzle.</td>
</tr>
<tr>
<td>\text{Er}1</td>
<td>OUT1 over current error</td>
<td>The switch output (OUT1) load current has exceeded 80 mA.</td>
</tr>
<tr>
<td>\text{Er}3</td>
<td>Zero clear error</td>
<td>Zero clear was not performed at atmospheric pressure. (Pressure outside of ±14 kPa was supplied present.)</td>
</tr>
<tr>
<td>\text{Er}0</td>
<td>System error</td>
<td>An internal data error has occurred.</td>
</tr>
</tbody>
</table>

### Sub screen

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply pressure error (When [SUP side pressure value display] is set to the sub screen)</td>
<td>Pressure exceeding 220 kPa is supplied.</td>
<td>Keep the supply pressure within the displayable range of –20 kPa to 220 kPa.</td>
</tr>
<tr>
<td>Vacuum pressure (less than or equal to –20 kPa) is supplied.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Relationship between Supply Pressure and Display

- **Cannot be detected.**
- **Detection which satisfies the specifications are available.**
- **Cannot be detected.**

Can be detected, but specifications are not satisfied.  Can be detected, but specifications are not satisfied.  Breakage may occur.

### Main screen

- \text{[---]}: Range in which [ON/OFF] is displayed in the main screen
- Switch output is automatically turned OFF.

### Sub screen

- \text{[LLL]}: Range which can be displayed when [SUP side pressure value display] is set to the sub screen
- Switch output is normally output.

---

Pressure [kPa]

- -20
- 80
- 100
- 200
- 220
- 600 (Withstand pressure)
These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1, and other safety regulations.

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air transportation, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Revision history

Edition 4
- Added F type (Rated distance range: 0.01 to 0.03 mm).

Edition 3
- Added centralized lead wire.
  - Added the AR-B series regulator (control unit).
  - Added AC type 2 port solenoid valve (control unit).
  - Number of pages increased from 16 to 24.

US

Edition 2
- Added F type (Rated distance range: 0.01 to 0.03 mm).

Edition 1
- Added AC type 2 port solenoid valve (control unit).

ST