Operation Manual

PRODUCT NAME

Digital Gap Checker

MODEL / Series / Product Number

ISA3 series

SMC Corporation
# Table of Contents

## 1 Before Use

| Safety Instructions | 2 |

## 2 About this product

| Features | 7 |
| Model Indication and How to Order | 8 |
| Summary of Product parts | 14 |
| Specification | 15 |
| Specifications (ISA3) | 15 |
| Specifications (Regulator) | 16 |
| Specifications (2 port solenoid valve) | 16 |
| Characteristics graph | 17 |
| Dimensions | 20 |

## 3 Installation

| Mounting and Installation | 26 |
| Piping | 26 |
| Installation | 29 |
| Wiring | 34 |
| Part structure | 38 |

## 4 How to use

| Outline of setting | 41 |
| Measurement mode | 42 |

### Switch Point Setting

| Switch point change mode | 44 |
| Table of default settings | 44 |
| Preparation before setting | 45 |
| Setting | 45 |

### Function Setting

| Function selection mode | 46 |
| Table of default settings | 46 |

### Key lock (Security code setting)

| 58 |

## 5 Troubleshooting

| Maintenance | 59 |
| Troubleshooting | 60 |
| Error indication | 61 |
| Relationship between Supply Pressure and Display | 61 |
## Safety Instructions

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) ISO 4414: Pneumatic fluid power -- General rules relating to systems.
ISO 4413: Hydraulic fluid power -- General rules relating to systems.
IEC 60204-1: Safety of machinery -- Electrical equipment of machines .(Part 1: General requirements)

### Caution
Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

### Warning
Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

### Danger
Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

---

### Warning

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 navigation, space, shipping, vehicles, military, medical treatment, 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.
Safety Instructions

⚠️ Caution

1. The product is provided for use in manufacturing industries.
   The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary. If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements
The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements". Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first. *
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.
   * Vacuum pads are excluded from this 1 year warranty. A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

⚠️ Caution

SMC products are not intended for use as instruments for legal metrology. Products that SMC manufactures or sells are not measurement instruments that are qualified by pattern approval tests relating to the measurement laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the measurement laws of each country.
■ Important

In order to use this product safely, be sure to read and follow the instructions given in “Pressure switches/Flow switches common precautions” which can be found under “Handling Precautions for SMC Products” on the SMC website, before use.

■ Operator

♦ This operation manual is intended for those who have knowledge of machinery using pneumatic equipment, and have sufficient knowledge of assembly, operation and maintenance of such equipment. Only those persons are allowed to perform assembly, operation and maintenance.
♦ Read and understand this operation manual carefully before assembling, operating or providing maintenance to the product.

■ Specific product precautions

⚠ Warning

About this product

♦ This product is not designed to be explosion proof.
♦ Do not use a fluid containing chemicals, synthetic oils including organic solvent, salt and corrosive gases.
   Otherwise damage to the product, malfunction and failure can result.
♦ Writing time of input data to product is 1000000 times.

Design

♦ The product should be positioned higher than the detection nozzle.
   If the product is positioned lower than the detection nozzle, water or oil may enter the detection port, causing a malfunction or operational failure.

♦ Do not use multiple detection nozzles with one product.
   Correct measurement may not be possible. If multiple nozzles are to be used, please test them on the actual equipment. It is necessary for the user to verify correct operation.
**Warning**

**Mounting/Installation**
- If the entering of foreign material to the fluid is possible, install the filter (5 μm or less) or the mist separator to the upstream side.
- If compressed air containing condensate is used, install the air dryer or the drain catch before the filter, and perform drainage regularly.
  If regular drainage is difficult, the use of a filter with an auto drain is recommended.

**Piping**
- Eliminate any dust left in the piping by air blow before connecting the piping to the product.
  Otherwise it can cause damage to the product, malfunction or failure.
- Perform function and leakage inspection after piping.
  Safety cannot be assured in the case of unexpected malfunction. Disconnect the power supply and stop the fluid supply if the equipment does not function properly or if there is leakage of fluid.
- Do not use equipment or fittings that may leak or obstruct the air flow between the product and the detection nozzle.

**Wiring**
- The product is CE marked, but not immune to lightning strikes. Take measures against lightning strikes in the system.
- Limit of the cable tensile force is 50 N.
  Do not lift or carry the product by holding the cables.
- If the lead wire can move, fix it near the body of the product.
- Keep wiring as short as possible to prevent interference from electromagnetic noise and surge voltage.
  Do not use a cable longer than 10 m.
  Wire the DC (-) line (blue) as close as possible to the power supply.

**Operating environment**
- Do not use the product in an environment where the product is constantly exposed to water or oil splashes.
  Otherwise it can cause failure or malfunction. Take measures such as using a cover.
- Do not use in an atmosphere containing oil, corrosive gases, chemicals, sea water, or where there is direct contact with any of these.
  Even exposure for a short period of time, will have adverse effects including damage, failure, malfunction and hardening of the cable.
- Do not use the product in the presence of a magnetic field.
  Otherwise malfunction can result.
- Do not operate close to a heat source, or in a location exposed to radiant heat.
  Otherwise malfunction can result.
- When the product is contained in a box for use, provide an exhaust port for constant release of pressure to atmosphere.
  If the pressure in the box is not atmospheric pressure, correct inspection will not be available and malfunction may result.
### Warning

#### Usage

- **Do not short-circuit the load.**
  - When the load is short circuit, generated excess current lead to cause the damage of the product.
- **Do not press the setting buttons with a sharp pointed object.**
  - It may damage the setting buttons.
- **During the any setting, the product will switch the output according to the existing settings until the changes are complete.**
  - Confirm the output has no adverse effect on machinery and equipment before setting.
  - Stop the control system before setting if necessary.
- **Perform settings suitable for the operating conditions.**
  - Incorrect setting can cause operation failure.
  - For details of each setting, refer to each "Setting" page of this manual.
- **Do not touch the LCD during operation.**
  - The display can vary due to static electricity.

#### Maintenance Service

- **Drain system regularly.**
  - If condensate enters the secondary side, it may cause malfunction of pneumatic equipment.

◆ Please read and understand the cautions in the Operation Manuals for VX2 series (2 port solenoid valve) and AR20 series (Regulator) before use.
Features

The Gap between the detection surface and the workpiece (0.02 mm to 0.15 mm, 0.05 mm to 0.30 mm) can be detected. The Gap condition is indicated on the main screen in Green (ON) or Orange (OFF). *: Default setting. The sub screen indicates the distance between the detection surface and the workpiece using a level meter. This product is a non-contact switch which will not scratch the workpiece.

(A) The Workpiece is not seated in the correct position due to a foreign object.

(B) Within the acceptable range (Seats correctly).

(C) The Workpiece is more closely in contact than in (B).
Model Indication and How to Order

Without control unit

ISA3 - G C N - M 1 -

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

Option 2 (Bracket)

Nil | None (DIN rail mounting) ※9
---|---
B | With bracket ※7 ※10

Piping specifications
- C: Supply side: Rc1/8
- Detection side: φ 4 One-touch fitting ※1
- φ 6 One-touch fitting ※2
- F: Supply side: G1/8 ※3
- Detection side: G1/8 ※3

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

Unit specifications
- Nil: With units selection function ※4
- M: Fixed SI unit ※5

Number of stations
- 1: 1 Station
- 2: 2 Stations
- 3: 3 Stations
- 4: 4 Stations
- 5: 5 Stations
- 6: 6 Stations

Option 1 (Cable)
- N: None
- L: Right angle ※7
- S: Centralized lead wire (Lead wire only) ※6 ※7 ※8
- T: Centralized lead wire (With bracket) ※6 ※7 ※8

※1: To be used for the rated distance range of "F".
※2: To be used for the rated distance range of "G" or "H".
※3: ISO1179-1
※4: The new Measurement Law prohibits the use of pressure switch with the units selection function in Japan.
※5: Fixed unit: kPa
※6: Cannot be selected for 1 station.
※7: At the factory, the options are not attached to the product, but packed together with it for shipment.
※8: Refer to ※8 (page 10).
※9: DIN rail must be ordered separately.
※10: About the number of brackets.

1 station: 1 piece is packed
More than 2 stations: 2 pieces is packed
With control unit

**ISA3 - **

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

- **Piping specifications**
  - C: Supply side: Rc1/8, Detection side: φ4 One-touch fitting
  - F: Supply side: G1/8, Detection side: G1/8

- **Control unit piping**
  - Gap checker piping: C - Rc1/4, F - G1/4

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

- **Unit specifications**
  - Nil: With units selection function
  - M: Fixed SI unit

- **Number of stations**
  - 1: 1 Station
  - 2: 2 Stations
  - 3: 3 Stations
  - 4: 4 Stations
  - 5: 5 Stations
  - 6: 6 Stations

- **Option 1 (Cable)**
  - N: Straight
  - L: Right angle
  - N: None

- **Option 2 (Bracket)**
  - S: Centralized lead wire (Lead wire only)
  - T: Centralized lead wire (With bracket)

- **Rated voltage**
  - 2 port solenoid valve
    - Nil: 24 VDC
    - 1 -10: 100 VAC
    - 2 -10: 110 VAC

- **Regulator**
  - N -10: Without regulator
    - 1: With regulator (AR-A) round pressure gauge
    - 2: With regulator (AR-B) square embedded gauge

- **Control unit**
  - With control unit (Supply port: Left side)
  - With control unit (Supply port: Right side)

- **With bracket**
2 About this product

*1: To be used for the rated distance range of "F".
*2: To be used for the rated distance range of "G" or "H".
*3: ISO1179-1
*4: The new Measurement Law prohibits the use of pressure switch with the units selection function in Japan.
*5: Fixed unit: kPa
*6: Cannot be selected for 1 station.
*7: At the factory, the options are not attached to the product, but packed together with it for shipment.
*8: 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.

Supply port: Left side

Supply port: Right side

*9: The bracket for control unit will be assembled before shipment.
*10: Made to order
*11: When the control unit is mounted, the piping specifications of the supply port will be changed due to piping specification of the gap checker.
*12: ISO16030
Option/Part number

Joint screws
(2 screws, 2 spacers *, 2 nuts)

<table>
<thead>
<tr>
<th>Number of stations</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>ISA-16-2</td>
</tr>
<tr>
<td>3</td>
<td>ISA-16-3</td>
</tr>
<tr>
<td>4 *</td>
<td>ISA-16-4</td>
</tr>
<tr>
<td>5</td>
<td>ISA-16-5</td>
</tr>
<tr>
<td>6 *</td>
<td>ISA-16-6</td>
</tr>
</tbody>
</table>

Bracket (when control unit not fitted)
(Nominal size:3 x 8, 3 screws)

ISA-14

DIN rail
ISA-5-

<table>
<thead>
<tr>
<th>L</th>
<th>Number of stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>73.0</td>
<td>1</td>
</tr>
<tr>
<td>135.5</td>
<td>2</td>
</tr>
<tr>
<td>173.0</td>
<td>3</td>
</tr>
<tr>
<td>210.5</td>
<td>4</td>
</tr>
<tr>
<td>248.0</td>
<td>5</td>
</tr>
<tr>
<td>285.5</td>
<td>6</td>
</tr>
</tbody>
</table>

Threaded plug with seal
ISA-12-

<table>
<thead>
<tr>
<th>Piping type</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rc1/8</td>
<td>ISA-12-A</td>
</tr>
<tr>
<td>G1/8</td>
<td>ISA-12-C</td>
</tr>
</tbody>
</table>

Seal for extra station *
ISA-15

*: Spacers are included for 4 and 6 stations.

*: This is applicable in both piping specification C and F.
Centralized lead wire
ISA-19-

<table>
<thead>
<tr>
<th>Stations</th>
<th>Model</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

Regulator (Round pressure gauge)
AR20-02G-1□-A

AR20 - □02G - 1□ - A

Flow direction
- Nil: Flow direction: left → right
- R: Flow direction: right → left

Piping specifications
- Nil: Rc1/4
- F: G1/4 *
- *: ISO16030

Regulator (Square embedded gauge)
AR20-02E-1□-B

AR20 - □02E - 1□ - B

Flow direction
- Nil: Flow direction: left → right
- R: Flow direction: right → left

Piping specifications
- Nil: Rc1/4
- F: G1/4 *
- *: ISO16030
**2 port solenoid valve**

**VX210**

---

**Specifications**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Voltage</th>
<th>Electrical entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z2A</td>
<td>24 VDC</td>
<td>With DIN terminal and light</td>
</tr>
<tr>
<td>Z2B *1</td>
<td>100 VAC</td>
<td>(with surge voltage suppressor)</td>
</tr>
<tr>
<td>Z2C *2</td>
<td>110 VAC</td>
<td></td>
</tr>
</tbody>
</table>

*1: Made to order. When AC100 V and AC110 V are selected, the product without thread machining (symbol: Z) cannot be selected.

---

**Voltage and Electrical entry**

- **Voltage**
  - Z2A: 24 VDC
  - Z2B *1: 100 VAC
  - Z2C *2: 110 VAC

- **Electrical entry**
  - With DIN terminal and light
  - (with surge voltage suppressor)

---

**Body material, Port size, Orifice size**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Body material</th>
<th>Port size</th>
<th>Orifice size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>Al</td>
<td>Without thread machining (1/8)</td>
<td>φ 4</td>
</tr>
<tr>
<td>B *1</td>
<td>Al</td>
<td>Rc1/4</td>
<td></td>
</tr>
<tr>
<td>D *2</td>
<td>Al</td>
<td>G1/4</td>
<td></td>
</tr>
</tbody>
</table>

*1: Made to order

---

**Bracket (when control unit fitted)**

- **Nominal size:** 3 x 8, 2 screws
- **ISA-17**

---

**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.
# Summary of Product parts

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>See below</td>
</tr>
<tr>
<td>UP button (▲ button)</td>
<td>Selects the mode and the display shown on the sub screen, or increases the switch point.</td>
</tr>
<tr>
<td>SET button (▼ button)</td>
<td>Press this button to change the mode and to fix the settings.</td>
</tr>
<tr>
<td>DOWN button (▼ button)</td>
<td>Selects the mode and the display shown on the sub screen, or decreases the switch point.</td>
</tr>
<tr>
<td>Connector</td>
<td>Electrical connection.</td>
</tr>
<tr>
<td>SUP port (Supply port)</td>
<td>Port to supply pressure.</td>
</tr>
<tr>
<td>Bracket mounting hole</td>
<td>Used to attach the bracket to the product.</td>
</tr>
<tr>
<td>Tie rod holes</td>
<td>Used to connect additional products.</td>
</tr>
<tr>
<td>OUT port (Detection port)</td>
<td>Port to be connected to the detection nozzle.</td>
</tr>
<tr>
<td>Atmospheric vent port</td>
<td>Port to vent exhaust air to the atmosphere.</td>
</tr>
<tr>
<td>DIN rail mounting latch</td>
<td>Used to mount the product on a DIN rail.</td>
</tr>
</tbody>
</table>

## Display

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main screen</td>
<td>ON/OFF, display value and error code are displayed. (2 colour display)</td>
</tr>
<tr>
<td>Operation LED</td>
<td>Indicates the switch output status. Turns ON (orange) when the switch output is ON.</td>
</tr>
<tr>
<td>Sub screen</td>
<td>Level meter, display value, switch point, pressure etc. are displayed.</td>
</tr>
<tr>
<td>Key-lock indicator</td>
<td>Turns ON when keys are locked.</td>
</tr>
<tr>
<td>Unit indicator (pressure)</td>
<td>When pressure is displayed on the sub screen, indicates the pressure unit currently selected.</td>
</tr>
</tbody>
</table>
## Specification

### Specifications (ISA3)

<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 μm 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 (^{-2})</td>
<td>10 to 300 (^{-2})</td>
<td>30 to 500 (^{-2})</td>
</tr>
<tr>
<td>Minimum display resolution (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>(\phi 1.5) (^{-4})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current flow</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>Max. load current</td>
<td>10 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. 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>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 temp. range</td>
<td>Operation: 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>Operation/Stored: 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 MΩ or more at 500 VDC, between terminals and housing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piping option C</td>
<td>Supply port</td>
<td>Rc1/8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Detection port</td>
<td>(\phi 4) One-touch fitting</td>
<td>(\phi 6) One-touch fitting</td>
</tr>
<tr>
<td>Piping option F</td>
<td>Supply port</td>
<td>G1/8 (ISO1179-1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Detection port</td>
<td>G1/8 (ISO1179-1)</td>
<td></td>
</tr>
<tr>
<td>Lead wire with connector</td>
<td>M12 lead wire with 4 pin connector, 4 cores, (\phi 4), 5 m</td>
<td>Conductor O.D.: 0.72 mm, Insulator O.D.: 1.14 mm</td>
<td></td>
</tr>
<tr>
<td>Centralized lead wire</td>
<td>M12 lead wire with 4 pin connector part, 4 cores, (\phi 4), Insulator O.D.: 1.14 mm</td>
<td>Centralized lead wire part, 2 to 3 stations; 5 cores, (\phi 4), 5 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 to 6 stations: 8 cores, (\phi 6), 5 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conductor O.D.: 0.50 mm, Insulator O.D.: 1.00 mm (2 to 6 stations common)</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>Standard</td>
<td>CE, RoHS compliant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^{1}\): Refer to the Characteristics Curve on page 19 for the relationship between the display value and the detected distance.

\(^{2}\): For ISA3-F type, the range is up to 57, with a hysteresis of 3.

For ISA3-G type, the range is up to 280, with a hysteresis of 20.

For ISA3-H type, the range is up to 480, with a hysteresis of 20.

\(^{3}\): The Pressure value will be indicated on the sub screen.

\(^{4}\): Refer to page 27 for details of the detection nozzle.
Specifications (Regulator)
Refer to the standard regulator catalogue for detailed specifications.

Specifications (2 port solenoid valve)
Refer to “Option/Part number” (page 13) or the catalogue of the standard 2 port solenoid valve for the detailed specifications of models other than X276.
Characteristics graph

Supply pressure dependence characteristics

The detection distance for turning ON the output depends 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</th>
<th>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 80 kPa or more than 220 kPa. And the output will be OFF.

<table>
<thead>
<tr>
<th>Piping length: 1 m</th>
<th>Piping length: 1 m</th>
<th>Piping length: 1 m</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Graph for ISA3-F" /></td>
<td><img src="image2" alt="Graph for ISA3-G" /></td>
<td><img src="image3" alt="Graph for ISA3-H" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Piping length: 3 m</th>
<th>Piping length: 3 m</th>
<th>Piping length: 3 m</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Graph for ISA3-F" /></td>
<td><img src="image2" alt="Graph for ISA3-G" /></td>
<td><img src="image3" alt="Graph for ISA3-H" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Piping length: 5 m</th>
<th>Piping length: 5 m</th>
<th>Piping length: 5 m</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Graph for ISA3-F" /></td>
<td><img src="image2" alt="Graph for ISA3-G" /></td>
<td><img src="image3" alt="Graph for ISA3-H" /></td>
</tr>
</tbody>
</table>
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 0.00 mm are measured).

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

### Response time when the workpiece is set at 90% distance.
### Response time for close contact of workpiece.

<table>
<thead>
<tr>
<th>Piping length: 1m</th>
<th>Piping length: 1m</th>
<th>Piping length: 1m</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISA3-F</td>
<td>ISA3-G</td>
<td>ISA3-H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time [sec]</td>
<td>Response time [sec]</td>
<td>Response time [sec]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Piping length: 3m</th>
<th>Piping length: 3m</th>
<th>Piping length: 3m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time [sec]</td>
<td>Response time [sec]</td>
<td>Response time [sec]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Piping length: 5m</th>
<th>Piping length: 5m</th>
<th>Piping length: 5m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time [sec]</td>
<td>Response time [sec]</td>
<td>Response time [sec]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
○ Relationship between the display value (switch point) and distance

The graphs below show the relationship between [display value (switch point) on the sub screen] and [the actual distance between the detection surface and the workpiece].

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

** ISA3-F **  
Piping length: 1m, 3m, 5m

** ISA3-G **  
Piping length: 1m, 3m, 5m

** ISA3-H **  
Piping length: 1m, 3m, 5m
Dimensions

- ISA3-□□ (Without control unit, Bracket mounting)

Supply port
ISA3-□□C: Rc1/8
ISA3-□□F: G1/8

*: ISO1179-1

When centralized lead wire is used.

Detection port
ISA3-□□C: One-touch fitting
ISA3-□□F: G1/8

- ISA-14 (Bracket when control unit not fitted)

<table>
<thead>
<tr>
<th>Number of 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>38</td>
<td>76</td>
<td>114</td>
<td>152</td>
<td>190</td>
<td>226</td>
</tr>
<tr>
<td>Piping specifications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C (Φ4 One-touch fitting)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>13</td>
<td>13.6</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

-20-
• ISA3-□ (Without control unit, DIN rail mounting)

Supply port
ISA3-□C: Rc1/8
ISA3-□F: G1/8 *

Detection port
ISA3-□C: One-touch fitting
ISA3-□F: G1/8 *

*: ISO1179-1

When centralized lead wire is used.

<table>
<thead>
<tr>
<th>Number of 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>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>246</td>
<td>285.5</td>
</tr>
</tbody>
</table>

Piping specifications
- C (ϕ 4 One-touch fitting)
- C (ϕ 6 One-touch fitting)
- F (G-thread (screw))

<table>
<thead>
<tr>
<th>H</th>
<th>13</th>
<th>13.6</th>
<th>19</th>
</tr>
</thead>
</table>
### About this product

- **ISA3-□□□□□□□B-L1 (With control unit, Bracket mounting)**

**Supply port**
- ISA3-□□□C: Rc1/4
- ISA3-□□□F: G1/4 *1

**Detection port**
- ISA3-□□□C: One-touch fitting
- ISA3-□□□F: G1/8 *2

- *1: Only bracket mounting is applicable for use with a control unit.
- *2: ISO1179-1

**Number of stations**

<table>
<thead>
<tr>
<th>Number of 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 specifications**

<table>
<thead>
<tr>
<th>Piping specifications</th>
<th>C (φ4 One-touch fitting)</th>
<th>C (φ6 One-touch fitting)</th>
<th>F (G-thread (screw))</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>13</td>
<td>13.6</td>
<td>19</td>
</tr>
</tbody>
</table>
- About this product -

**ISA3-xxxx-xxxx-B-R1**

L1 46.2 41.6

Supply port ISA3-C: Rc1/4
ISA3-F: G1/4 +1

**ISA3-xxxx-xxxx-B-R2**

52.5 30

Supply port ISA3-C: Rc1/4
ISA3-F: G1/4 +1

**ISA3-xxxx-xxxx-B-LN**

30 52.5

Supply port ISA3-C: Rc1/4
ISA3-F: G1/4 +1

**ISA3-xxxx-xxxx-B-RN**

L1 44.6

Supply port ISA3-C: Rc1/4
ISA3-F: G1/4 +1

Number of stations | 1 | 2 | 3 | 4 | 5 | 6
--- | --- | --- | --- | --- | --- | ---
L1 | 55.6 | 93.6 | 131.6 | 169.6 | 207.6 | 245.6

Piping specifications | C (ϕ4 One-touch fitting) | C (ϕ6 One-touch fitting) | F (G-thread screw)
--- | --- | --- | ---
H | 13 | 13.6 | 19

* Only bracket mounting is applicable for use with a control unit.
+1: ISO16030
+2: ISO1179-1
• ISA-17 (Bracket when control unit fitted)

• Y200T-A (Spacer with bracket)

• ISA-20 (Bracket for centralized lead wire)
- About this product -

- ZS-31-B (Lead wire with connector (Straight))

- ZS-31-C (Lead wire with connector (Right angle))

- ISA-19-□ (Centralized lead wire)

<table>
<thead>
<tr>
<th>Number of stations</th>
<th>Part number</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>
Mounting and Installation

- Piping

- SUP port (supply port)
  - Use the correct tightening torque. Refer to the following table for the appropriate tightening torque.
  - Fit the seal plug (supplied with the product) to the unused port.

<table>
<thead>
<tr>
<th>Product</th>
<th>Nominal thread size</th>
<th>Proper tightening torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISA3</td>
<td>Rc1/8 • G1/8</td>
<td>7 to 9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product</th>
<th>Nominal thread size</th>
<th>Proper tightening torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulator</td>
<td>Rc1/4 • G1/4</td>
<td>12 to 14</td>
</tr>
</tbody>
</table>

- OUT port (detection port)
  - Use the correct tightening torque. Refer to the following table for the appropriate tightening torque.

<table>
<thead>
<tr>
<th>Nominal thread size</th>
<th>Proper tightening torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1/8</td>
<td>7 to 9</td>
</tr>
</tbody>
</table>

  - For ø4 one-touch fitting, use tube with O.D. 4 mm, and I.D. 2.5 mm.
  - For ø6 one-touch fitting, use tube with O.D. 6 mm, and I.D. 4 mm.

- Caution

  - Do not use equipment or fittings that may leak or obstruct the air flow between the product and the detection nozzle.
  - The product should be positioned higher than the detection nozzle.

  If the product is positioned lower than the detection nozzle, water or oil may enter the detection port, causing a malfunction or operational failure.
- Installation -

**Atmospheric vent port**
- Connect tubing (sold separately) to the atmospheric vent port if there is a possibility that the port could be blocked by water or dust.
- Recommended tube is TU0425 (material: polyurethane, O.D. ø4, I.D. ø2.5) made by SMC.
- The other end of the air tubing should be routed to a safe place to prevent it from being exposed to water or dust.
- Ensure the tubing has no sharp bends.

![Atmospheric vent port](image)

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

![Fig.1: Recommended nozzle shape](image)

![Fig.2: Unsuitable nozzle shape](image)
**Restrictor setting of 2 port solenoid valve**

Air can be continuously supplied by adjusting the restrictor. This reduces the possibility of water or cutting oil etc. entering the 2 port solenoid valve from the OUT port (detection port).

- Turn off the power to the 2 port solenoid valve.
- Adjust the restrictor by turning the screw with a flat head screwdriver etc.

- Turn on the 2 port solenoid valve. Check that no water or cutting oil etc. is exhausted from the detection nozzle.
- When water or cutting oil etc. is exhausted, turn the restrictor screw in a clockwise direction (closing).

*: Do not turn the restrictor screw more than 5 rotations from the fully closed position as the screw will come out.
### Installation

#### DIN rail

**Mounting**
1. Hook the claw part 1 to the DIN rail.
2. Push the claw part 2 down until it clicks.

**Removal**
1. Pull the DIN rail mounting latch downward for unlocking.
2. Pull out the OUT port (detection port) side.
**Bracket**

- Mount the bracket using the mounting screws supplied.
- The tightening torque of the mounting screw must be 0.45 Nm ±10%.

- When the product is mounted using the bracket, fix with M5 screws (2 pcs.) or equivalent.
- The Bracket thickness is approx. 1.6 mm.
- Refer to the bracket dimension drawing (page 20) for the mounting hole dimensions.
• Mounting position of the bracket

2 stations
(Mount to 1st. and 2nd. station)

n stations
(Mount to 1st. and nth. station)
- Bracket (when control unit fitted)
  - When a product with control unit is ordered, the bracket will be mounted to the product before shipment.

- Mount the spacer with bracket using an M5 mounting screw or equivalent.
- Thickness of the spacer with bracket is approximately 3.5 mm.
- Refer to the “Bracket mounting” dimensions (page 22) for the mounting hole dimensions.

- Mount the bracket using M5 mounting screws (2 pcs.) or equivalent.
- The bracket plate thickness is approximately 1.6 mm.
- Refer to the “Bracket mounting” dimensions (page 22) for the mounting hole dimensions.
○ Assembly procedure to increase/decrease the number of product.
  - Remove the joint screws of product using a Phillips head screwdriver and separate the Product body.

- Take care not to lose the seals.

- Insert a product and the seal for extra station (ISA-15) between the products to increase the number of stations.
- Remove a product and the seal from the products to decrease the number of stations.

*: Spacers are included for 4 and 6 stations.

- Connect the products using the joint screws. (Tightening torque: 0.75 Nm ±10%)
### Wiring

- **Mounting and removal of connector**
  - Tighten the connector by hand.
  - Align the body connector key and the cable connector key groove to insert vertically.
  - Turn the knurled part of the cable side connector clockwise.
  - Connection is complete when the knurled part is fully tightened. Check that the connection is not loose.

- **Connector pin No. (Body side)**

<table>
<thead>
<tr>
<th>Connector 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>
**Connector pin No. (Cable side)**

<table>
<thead>
<tr>
<th>Connector pin No.</th>
<th>Lead wire colour</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brown</td>
<td>DC(+)</td>
</tr>
<tr>
<td>2</td>
<td>White</td>
<td>N.C.</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>DC(-)</td>
</tr>
<tr>
<td>4</td>
<td>Black</td>
<td>OUT1</td>
</tr>
</tbody>
</table>

-ZS-31-B-

-ZS-31-C-
### ISA-19-

![Diagram of ISA-19-36](image)

<table>
<thead>
<tr>
<th>M12 Connector No.</th>
<th>Pin No.</th>
<th>Description</th>
<th>Lead wire colour</th>
<th>(Output wire colour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>DC(+)</td>
<td>Brown *</td>
<td>Black</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>N.C.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC(-)</td>
<td>Blue *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>OUT1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>DC(+)</td>
<td>Brown *</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>N.C.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC(-)</td>
<td>Blue *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>OUT1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>DC(+)</td>
<td>Brown *</td>
<td>Gray</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>N.C.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC(-)</td>
<td>Blue *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>OUT1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>DC(+)</td>
<td>Brown *</td>
<td>Orange</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>N.C.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC(-)</td>
<td>Blue *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>OUT1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>DC(+)</td>
<td>Brown *</td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>N.C.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC(-)</td>
<td>Blue *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>OUT1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>DC(+)</td>
<td>Brown *</td>
<td>Green</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>N.C.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC(-)</td>
<td>Blue *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>OUT1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: Brown and blue are connected in the product inside.

#### Caution

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.
Internal circuit and wiring examples

Wire the product according to the circuit diagram below.

- ISA3-□□N

- ISA3-□□P

Refer to the VX2 series Operation Manual for wiring details of the VX2 series (2 port solenoid valve).
Part structure

Without control unit
○ With control unit (Supply port: Left side)

- Centralized lead wire
  ISA-19

- Threaded plug with seal
  ISA-12

- Joint screws
  ISA-15

- With connector cable
  ZS-31-B

- With connector cable
  ZS-31-C

- Modular adapter
  E210-U01

- Seal for extra station
  ISA-15

- Bracket for centralized lead wire
  ISA-20

- Bracket
  ISA-17

- Atmospheric vent port
  φ 2.6

- 2 port solenoid valve

- Spacer with bracket
  Y200T-A

- Regulator
  Flow direction: left → right
With control unit (Supply port: Right side)

- Modular adapter E210-U01
- With connector cable ZS-31-C
- With connector cable ZS-31-B
- Spacer Y200T-A
- Spacer ISA-18
- Atmospheric vent port φ2.6
- Seal for extra station ISA-15
- Joint screws ISA-16-c
- Bracket ISA-17
- Threaded plug with seal ISA-12-c

Regulator Flow direction: right → left

2 port solenoid valve
Outline of setting

Power is supplied

The identification code of the product is displayed.

Measurement mode

Measurement mode starts automatically when supply pressure is between 80 and 220 kPa.
Switch status ON or OFF will be displayed on the main screen.
Level meter will be displayed on the sub screen (default setting).

- OFF displayed
- ON displayed

(Refer to page 42)

Switch point change mode
The switch point value can be changed.
(Refer to page 44)

Function selection mode
Each function can be changed individually.
(Refer to page 46)

Key lock mode
(Refer to page 58)

*: Parameters other than the level meter can be displayed, by selecting the parameter using function selection mode [F10].
(Refer to page 52)
**Measurement mode**

- Placement verification screen
- Switch point value bar
- Level meter

- **Placement verification screen (Main screen)**
  The Placement condition is indicated by the switch output status (ON/OFF).

- **Level meter (Sub screen)**

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch point value bar</td>
<td>A bar to indicate the switch point value which has been set, is automatically displayed. Refer to how to change the switch point value (page 44).</td>
</tr>
<tr>
<td>Level meter</td>
<td>The workpiece gap condition approaching the nozzle is indicated by the number of “O” displayed. This display is a reference only. It is not an accurate distance measurement.</td>
</tr>
</tbody>
</table>

- **Relationship between the display and the placement status (Example)**

<table>
<thead>
<tr>
<th>Display</th>
<th>Placement status</th>
<th>Switch output</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Detection surface and the workpiece are very distant.</td>
<td>Switch output is OFF.</td>
</tr>
<tr>
<td>OFF</td>
<td>Detection surface and the workpiece are too far apart.</td>
<td>Switch output is OFF.</td>
</tr>
<tr>
<td>OFF</td>
<td>Detection surface and the workpiece are slightly apart.</td>
<td>Switch output is OFF.</td>
</tr>
<tr>
<td>ON</td>
<td>Workpiece is placed on the detection surface.</td>
<td>Switch output is ON.</td>
</tr>
<tr>
<td>ON</td>
<td>Workpiece is in close contact with the detection surface.</td>
<td>Switch output is ON.</td>
</tr>
</tbody>
</table>
### Change of sub screen

In measurement mode, the display of the sub screen can be temporarily changed by pressing the ▲ or ▼ buttons. 30 seconds after changing, the display will automatically return to the screen set in [F10] of function selection mode. (Refer to page 52)

- Level meter: Displays the measured distance (reference) by figure.
- Display value: Displays the measured distance (reference) by value.
- SUP side pressure: Displays the pressure value supplied to the SUP port (supply port).
- OUT side pressure: Displays the pressure value supplied to the OUT port (detection port).
- Switch point value: Displays the switch point value.
- Display OFF: Displays nothing

#### Zero-clear operation

When the SUP port pressure value or OUT port pressure value is indicated on the sub screen, the display can be cleared to zero [0 kPa] by pressing the ▲ and ▼ button for 1 second or longer at atmospheric pressure.
Switch Point Setting

Switch point change mode

The mode in which the switch point value can be changed. To change the hysteresis etc., refer to the function selection mode on page 48.

Table of default settings

Refer to the figure below for the default settings.

ISA3-F

The switch output turns ON when the display value is less than switch point. (Solid line in the chart)
The switch output turns OFF when the display value is greater than the switch point added to the hysteresis value. (Dashed line in the chart)

ISA3-G

ISA3-H

Refer to the following pages for how to change the settings.
■ Preparation before setting

(1) Supply pressure to the product. (100 to 200 kPa)

(2) Insert an acceptable clearance gauge between the detection surface and the workpiece. Alternatively, place a sample workpiece (non-defective workpiece) on the detection nozzle.

■ Setting

(1) Press the button while in measurement mode. The display value will be displayed in the main screen and the switch point in the sub screen.

(2) Press the or buttons to adjust the switch point value.
   • Pressing the and buttons simultaneously 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 display value. (Snap shot function)
   Then, it is possible to adjust the switch point value by pressing the or buttons.

(3) Press the button to complete the switch point setting. The product will return to measurement mode.
Function Setting

Function selection mode
In measurement mode, press the button for 2 seconds or longer to display [F 0]. Select to display the function to be changed, [F 0]. Press the button for 2 seconds or longer in function selection mode to return to measurement mode.

<Operation>

![Measurement mode button press](image)

Table of default settings
Refer to the table below for the default settings.

<table>
<thead>
<tr>
<th>Function number</th>
<th>Function name</th>
<th>Default setting</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>F 0 (Unit)</td>
<td>Units selection *</td>
<td>[PA] kPa</td>
<td>Page 47</td>
</tr>
<tr>
<td>F 1 (OUT1)</td>
<td>OUT1 setting</td>
<td>Switch point</td>
<td>Page 48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ISA3-F: [20]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ISA3-G: [50]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ISA3-H: [50]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hysteresis</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ISA3-F: [3]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ISA3-G: [20]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ISA3-H: [20]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Display colour</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[SoG] Green when ON, Orange when OFF</td>
<td></td>
</tr>
<tr>
<td>F 2 (OUT2)</td>
<td>(Not available)</td>
<td></td>
<td>Page 50</td>
</tr>
<tr>
<td>F 6 (FS)</td>
<td>Display value compensation</td>
<td>[0.0] Compensated value: 0.0</td>
<td>Page 51</td>
</tr>
<tr>
<td>F10 (SUB)</td>
<td>Sub screen</td>
<td></td>
<td>Page 52</td>
</tr>
<tr>
<td>F80 (DSP)</td>
<td>Display OFF mode</td>
<td>[on] Normal operation mode</td>
<td>Page 53</td>
</tr>
<tr>
<td>F81 (PIN)</td>
<td>Security code</td>
<td>[off] Security code is not set</td>
<td>Page 54</td>
</tr>
<tr>
<td>F90 (ALL)</td>
<td>Setting of all functions</td>
<td>[off] Not set all items</td>
<td>Page 55</td>
</tr>
<tr>
<td>F98 (TES)</td>
<td>Forced output</td>
<td>[normal] Normal output</td>
<td>Page 56</td>
</tr>
<tr>
<td>F99 (INI)</td>
<td>Reset to default settings</td>
<td>[off] Not return to default settings</td>
<td>Page 57</td>
</tr>
</tbody>
</table>

*: This setting is only available for models with the units selection function.
- [F 0] Units selection for pressure value
  Select the units for the pressure value to be indicated on the sub screen. This setting is only available for models with the units selection function. Units cannot be selected with the product number "-M". When models other than the units selection type are used, "---" will be indicated on the sub screen.

<Operation>

- Measurement mode
  
  - Function selection mode [F 0]
    [Unit] and [the current set value] are displayed alternately on the sub screen.

- Units selection
  
  - kPa display
  - Bar display
  - PSI display
[F 1] Setting the switch point, hysteresis, display colour

Setting the switch point (P_1), hysteresis (H_1), and display colour. Refer to the figure below for the default settings.

The switch output turns ON when the display value is less than switch point. (Solid line in the chart)
The switch output turns OFF when the display value is greater than the switch point added to the hysteresis value. (Dashed line in the chart)

Refer to the following pages for how to change the settings.
<Operation>

**OFF**

Measurement mode

Set ≥ 2 secs.

**F 0**

Function selection mode [F 0]

**F 1**

Function selection mode [F 1]

[Out1] and [HYS] are displayed alternately on the sub screen.

**P.1 setting**

Changes the switch point on the sub screen.

**H.1 setting**

Changes the hysteresis on the sub screen.

**Colour selection**

ON: Green
OFF: Red

ON: Red
OFF: Green

Normally: Red
Normally: Green

*: The display value on the main screen can be converted to the switch point setting by pressing the ▲ and ▼ buttons simultaneously for 1 second or longer and releasing them (To reduce the setting operation).
[F 2]
Not available
"- - -" will be indicated on the sub screen.
[F 6] Display value compensation

The display value can be corrected within ±20% R.D. of the display value, at the time of shipment.

<Operation>

- Measurement mode
- Function selection mode [F 0]
- Function selection mode [F 6]
  - [FSt] and [the current set value] are displayed alternately on the sub screen.
  - Display value compensation
    - Change the display value on the main screen.
    - Change rate will be displayed on the sub screen.

≥2 secs.
4 How to use

○[F10] Sub screen setting
The sub screen indication during measurement mode can be selected from the following:
Level meter, Display value, SUP side pressure, OUT side pressure, Switch point value and Display OFF can be selected.

<Operation>

![Diagram of operation steps]

- Measurement mode
  - Press and hold [F10] for ≥ 2 secs.
- Function selection mode [F 0]
  - Press [▲] or [▼] to select function
- Function selection mode [F10]
  - [SUB] and [the current set value] are displayed alternately on the sub screen.

Sub display setting
- Press [▲] or [▼] to select display mode
- Level meter, Display value, SUP side pressure, OUT side pressure, Switch point value, Display OFF

- Press and hold [▲] or [▼] for ≥ 2 secs.

---

No.PS※※-OMR0002-F
[F80] Display OFF mode

The display can be turned OFF to reduce power consumption. When no buttons have been pressed for 30 seconds, the display will shift to display OFF mode. While the display is OFF, the decimal points of the sub screen will flash. The default setting is “Display ON” (Normal operation mode).

Display OFF mode.

<Operation>

Measurement mode

Function selection mode [F0]

Function selection mode [F80]

[cDSP] and [the current set value] are displayed alternately on the sub screen.

Display OFF mode setting

Display ON (Normal operation mode)  Display OFF

≥ 2 secs.
• [F81] Setting the security code for key-lock

A security code can be selected, which must be entered to unlock the keys. When the security code has been set, the code entry is required to unlock the keys. Refer to page 58 for key-lock and changing of the security code. The default setting is “Security code is not set”.

<Operation>

Measurement mode

Function selection mode [F 0]

Function selection mode [F81]

[Pin] and [the current set value] are displayed alternately on the sub screen.

Setting the security code for key-lock

Security code is not set.

Security code is set.
[F90] Setting of all functions
The setting of all functions in function selection mode is available.

<Order of function settings>

<table>
<thead>
<tr>
<th>Order</th>
<th>Function</th>
<th>Applicable model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>[Uni] Setting of pressure value units.</td>
<td>This setting is only available for models with the units selection function.</td>
</tr>
<tr>
<td>2</td>
<td>[P_1] Switch point</td>
<td>All models</td>
</tr>
<tr>
<td>3</td>
<td>[H_1] Hysteresis</td>
<td>All models</td>
</tr>
<tr>
<td>4</td>
<td>[Col] Setting display colour.</td>
<td>All models</td>
</tr>
<tr>
<td>5</td>
<td>[oU2]</td>
<td>*Cannot be set. Press the button to proceed to the next function.</td>
</tr>
<tr>
<td>6</td>
<td>[ ] display value compensation</td>
<td>All models</td>
</tr>
<tr>
<td>7</td>
<td>[Sub] Sub screen</td>
<td>All models</td>
</tr>
<tr>
<td>8</td>
<td>[dSP] Display OFF mode</td>
<td>All models</td>
</tr>
<tr>
<td>9</td>
<td>[P in] Reset to default settings.</td>
<td>All models</td>
</tr>
</tbody>
</table>
[F98] Forced output
Forced output to test the product and the wiring.

<Operation>

Measurement mode

Function selection mode [F 0]

Function selection mode [F98]
[IESI] is displayed on the sub screen.

Forced output setting

Normal output  Forced output

Forced output OFF  Forced output ON
- [F99] Reset to default settings
  The product can be returned to its factory default settings.

<Operation>
Key lock (Setting security code)

<Operation>

- Select security code [on] in function selection mode [F81]

- Perform key-lock in measurement mode.

- Release the key-lock.

- The security code is requested. The default setting is [000].
  Press the button for 1 second when the security code is [000].

- When the key-lock is released, [UnLoC] will be displayed.
  A new security code can be set by pressing the and buttons simultaneously for 5 seconds or longer.

- Press the or button to change the “100” digit.
  When the required number is determined, press the button.

- Press the or button to change the “10” digit.
  When the required number is determined, press the button.

- Press the or button to change the “1” digit.
  When the required number is determined, press the button.

- The display will stop flashing. Check the new security code.
  Press the button for 1 second or longer when the new security code is confirmed.

- Return to measurement mode. The security code setting is complete.

*: If no key operation is performed for 30 seconds during input or change of the security code, the display will return to measurement mode with [LoC] status.

*: If the security code entered is wrong, [FAL] will be indicated on the sub screen. If an incorrect security code is entered 3 times, the display will return to measurement mode with [LoC] status.
**Maintenance**

**Nozzle Cleaning**

The OUT port orifice can be removed for cleaning by removing the retaining screw. Flush inside the orifice with air or wipe off foreign matter with a soft clean cloth. Correct detection may not be possible if the orifice is dirty or scratched.

1. Remove the screw (2 pcs.) at the side of the OUT port.
2. Remove the OUT port with a flat head screwdriver as shown in the figure below. Take care to keep the direction of removal straight.
3. Remove the O-ring from the orifice for cleaning. Clean the orifice.

4. Place the O-ring back into the orifice.
5. Ensure correct orientation of the OUT port, and insert it straight into the body.

6. Tighten the screws on the OUT port side. (Tightening torque: 0.3 Nm).

*: If the orifice is taken out, perform set-up again.
# Troubleshooting

If an operation failure of the product occurs, please confirm the cause of the failure from the following table. If a cause applicable to the failure cannot be identified and normal operation can be recovered by replacement with a new product, this indicates that the product itself was faulty. Problems with the product may be due to the operating environment (installation etc). Please consult SMC.

● Cross-reference for troubleshooting

<table>
<thead>
<tr>
<th>Fault</th>
<th>Possible cause</th>
<th>Countermeasures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output does not turn ON</td>
<td>Supply pressure error</td>
<td>Supply rated pressure. (100 kPa to 200 kPa)</td>
</tr>
<tr>
<td></td>
<td>Setting is not correct</td>
<td>Perform setting correctly. (Refer to Page 41)</td>
</tr>
<tr>
<td></td>
<td>Air leakage</td>
<td>Connect piping correctly and eliminate any air leakage.</td>
</tr>
<tr>
<td>Output stays ON (Does not turn OFF)</td>
<td>Setting is not correct</td>
<td>Perform setting correctly. (Refer to Page 41)</td>
</tr>
<tr>
<td></td>
<td>Clogged piping</td>
<td>Apply pressure lower than the withstand pressure to eliminate the cause of clogging of piping.</td>
</tr>
<tr>
<td>The indicator LED operates correctly. Output does not turn ON</td>
<td>Incorrect wiring</td>
<td>Connect wires correctly. (Refer to Page 34)</td>
</tr>
<tr>
<td></td>
<td>Selected product is not correct.</td>
<td>Check if the output specification (NPN / PNP) is correct.</td>
</tr>
<tr>
<td></td>
<td>Incorrect supply pressure.</td>
<td>Supply rated pressure. (100 kPa to 200 kPa)</td>
</tr>
<tr>
<td></td>
<td>Nozzle shape is not correct.</td>
<td>Correct the nozzle shape. (Refer to Page 27)</td>
</tr>
<tr>
<td>The Gap cannot be detected correctly.</td>
<td>Multiple detection nozzles are used.</td>
<td>Do not use multiple detection nozzles with one product. If multiple nozzles are to be used, please test them on the actual equipment. It is necessary for the user to verify correct operation.</td>
</tr>
<tr>
<td></td>
<td>Equipment or fittings causing leakage or resistance are used.</td>
<td>Do not use equipment or fittings that may leak or obstruct the air flow between the product and the detection nozzle.</td>
</tr>
<tr>
<td></td>
<td>The product is not higher than the detection nozzle.</td>
<td>The product should be positioned higher than the detection nozzle.</td>
</tr>
</tbody>
</table>

If the troubleshooting of ISA3 does not solve the problems, it is possible that the regulator or 2 port solenoid valve has problems. Take appropriate corrective action by referring the troubleshooting for the regulator and 2 port solenoid valve.
## Error indication

<table>
<thead>
<tr>
<th>Main screen</th>
<th>Error Name</th>
<th>Description</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Supply pressure error</td>
<td>Displayed when supply pressure is not in the range 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></td>
<td>Display value outside of the displayable range (Switch point setting mode)</td>
<td>The workpiece is outside the displayable range.</td>
<td>Move the workpiece closer to the detection nozzle.</td>
</tr>
<tr>
<td></td>
<td>OUT1 over current error</td>
<td>The switch output (OUT1) load current has exceeded 80 mA.</td>
<td>Turn the power OFF and remove the cause of the over current. Then turn the power ON again.</td>
</tr>
<tr>
<td></td>
<td>Zero clear error</td>
<td>Zero clear was performed in non-atmospheric pressure (Pressure outside of ±14 kPa was supplied present.)</td>
<td>Perform zero clear at atmospheric pressure.</td>
</tr>
<tr>
<td></td>
<td>System error</td>
<td>An internal data error has occurred.</td>
<td>Turn the power OFF and turn it ON again.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub screen</th>
<th>Error Name</th>
<th>Description</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Supply pressure error</td>
<td>Pressure exceeding 220 kPa is supplied.</td>
<td>Keep the supply pressure within the display range of -20 kPa to 220 kPa.</td>
</tr>
<tr>
<td></td>
<td>Supply pressure error</td>
<td>Vacuum pressure (-20 kPa or less) is supplied.</td>
<td></td>
</tr>
</tbody>
</table>

## Relationship between supply pressure and display

- Cannot be detected
- Detection which satisfies the specification is available
- Cannot be detected
- Rated pressure range
- Can be detected but specification is not satisfied
- Can be detected but specification is not satisfied
- Broken
- [- - -]
- Range in which [ON/OFF] is displayed in the main screen
- [- - -]
- Sub screen
- Range which can be displayed when [pressure display] is set in the sub screen
- [H H H]
- (-20 80 100 200 220 600 (withstand pressure)]
Revision history

A: Contents are added.
B: Modified errors in text.
C: Additional model.
D: Modified errors in text.
E: Contents revised in several places.
F: Contents revised in several places.