**Digital Gap Checker**

- **IO-Link Compatible**
- **3-Screen Display**
- **New**
- **RoHS**

**Displayed value**
Converted value of the gap distance (Reference) 16-bit data

**Supply pressure value**
Product supply pressure (SUP) 16-bit data

**Outlet pressure value**
Detection nozzle side pressure (Back pressure) 16-bit data

**Monitoring the placement condition of the workpiece**
Indicates failure/abnormality

**3-Screen Display (Setting)**
Upper 4-digit Lower 4-digit x 2-screen

- **GAP CHECKER**

**NPN/PNP Switch Function**
Both NPN and PNP are available.

- The number of stock items can be reduced.

**Window Comparator Type**
The gap range is adjustable.

- 50 ≤ Pass ≤ 70

<table>
<thead>
<tr>
<th>Model</th>
<th>Distance [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>ISA3-F</td>
<td><img src="image1" alt="Bar Graph" /></td>
</tr>
<tr>
<td>ISA3-G</td>
<td><img src="image1" alt="Bar Graph" /></td>
</tr>
<tr>
<td>ISA3-H</td>
<td><img src="image1" alt="Bar Graph" /></td>
</tr>
</tbody>
</table>

- Adjustable to 0

**Zero cut-off range can be changed.**
The lower limit of the display/setting range has been extended.
Double sensor providing improved preventive and predictive maintenance (IoT) based on IO-Link

Process data provides not only the Displayed value (1), but also the Outlet pressure value (2) and the Supply pressure value (3) detected using pressure sensors before and after the orifice.

### Process Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Gap size (Reference): 16 Bit signed integer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit offset</td>
<td>63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Supply pressure value: 16 Bit signed integer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit offset</td>
<td>47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Outlet pressure value: 16 Bit signed integer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit offset</td>
<td>31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Error diagnosis</th>
<th>Pressure diagnosis</th>
<th>Outlet side SW2</th>
<th>Outlet side SW1</th>
<th>Supply side SW2</th>
<th>Supply side SW1</th>
<th>Distance detection SW2</th>
<th>Distance detection SW1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit offset</td>
<td>15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Diagnosis item
- Abnormal temperature
- Display pressure range has exceeded the lower limit
- Internal product malfunction
- Outside of zero-clear range

#### Diagnosis item
- Detected pressure: Less than –20 kPa

### Example of Detection Applications Using the Switching Outputs and Value

<table>
<thead>
<tr>
<th>Setting example</th>
<th>Outlet pressure value</th>
<th>Supply pressure value</th>
<th>Displayed value (Gap size)</th>
<th>Diagnosis item</th>
</tr>
</thead>
<tbody>
<tr>
<td>En_2: 5.0</td>
<td>EP1L: 25.0</td>
<td>EP1H: 50.0</td>
<td>SP_2: 200.0</td>
<td></td>
</tr>
<tr>
<td>Mode</td>
<td>Hysteresis Window comparator</td>
<td>Hysteresis</td>
<td>Hysteresis</td>
<td>Hysteresis</td>
</tr>
<tr>
<td>Setting contents</td>
<td>Turns ON at 5 kPa or less</td>
<td>Turns ON at 25 to 50 kPa</td>
<td>Turns ON at 200 kPa or more</td>
<td>Turns ON at 100 kPa or less</td>
</tr>
<tr>
<td>Output status</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
<td>—</td>
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<td>—</td>
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<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

○: The corresponding bit in the process data is “1:ON”  —: The corresponding bit in the process data is “0:OFF” or not determined
Process data provides (1) Displayed value, (2) Outlet pressure and (3) Supply pressure value.

Not only the displayed value, but also the pressure value (supply pressure, outlet pressure) which affect the detection can be transmitted in real time.

The displayed value is converted value of the gap distance and is a guideline. The displayed value (gap distance guideline) is affected by the detection nozzle clogging or the internal orifice clogging. The displayed value alone may not be the correct detection result. It is important to check the detection nozzle and the orifice for clogging.

The outlet pressure while the workpiece is being transferred (not placed) also varies depending on the supply pressure. The supply pressure and the outlet pressure need to be monitored simultaneously.

The relationship between the displayed value (gap distance guideline) and detection nozzle clogging/orifice clogging

Monitoring of the outlet pressure value

The displayed value varies if the detection nozzle or internal orifice is clogged. It is possible to detect clogging by monitoring the outlet pressure during workpiece transfer (the workpiece is not placed).

Monitoring of the supply pressure value

Change of the outlet pressure when the supply pressure changes
IO-Link is an open communication interface technology between the sensor/actuator and the I/O terminal that is an international standard, IEC61131-9.

Visualization of operation/equipment status
Remote monitoring and control by communication

Device settings can be set by the master.
* Switch point value
* Operation mode, etc.

Read the device data.
* Switch ON/OFF signal and analog data
* Device information: Manufacturer, Product part number, Serial number, etc.
* Normal or abnormal device status
* Cable breakage

Configuration File (IODD File*)
- Manufacturer
- Product part no.
- Set value

* IODD File
IODD is an abbreviation of IO Device Description. This file is necessary for setting the device and connecting it to a master. Save the IODD file on the PC to be used to set the device prior to use.

Automatic setting function
[Data storage function]
When replacing the sensor with the same type (the same device ID), the parameters (set values) stored in the IO-Link master are automatically copied (set) to the new sensor.

Settings are automatically copied when replaced.

Displays the output communication status and indicates the presence of communication data

<table>
<thead>
<tr>
<th>Operation and Display</th>
<th>SIO mode</th>
<th>Start-up mode</th>
<th>Preoperate mode</th>
<th>Operate mode</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication with master</strong></td>
<td><strong>IO-Link status indicator light</strong></td>
<td><strong>Status</strong></td>
<td><strong>Screen display</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>Yes</td>
<td>Normal</td>
<td>Operate</td>
<td><strong>Mode oPE</strong></td>
<td>Normal communication status (readout of measured value)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Start up</td>
<td><strong>Mode St</strong></td>
<td>At the start of communication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preoperate</td>
<td><strong>Mode PrE</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Abnormal</td>
<td>Version does not match</td>
<td><strong>Er 15</strong></td>
<td>IO-Link version does not match that of the master. The master uses version 1.0. * The applicable IO-Link version is 1.1.</td>
</tr>
<tr>
<td></td>
<td>Communication disconnection</td>
<td></td>
<td><strong>Mode oPE</strong></td>
<td>Normal communication was not received for 1 second or longer.</td>
</tr>
</tbody>
</table>

* In IO-Link mode, the IO-Link indicator is ON or flashes. *2 When the sub screen is set to Mode
* “ModE LoC” is displayed when the data storage lock is enabled. (Except for version mismatch or when in SIO mode)
When the workpiece is away from the detection surface, the level meter will not reach the switch point value bar.

When the workpiece is seated on the detection surface, the level meter will reach the switch point value bar.

The number of level meter symbols changes depending on the clearance between the workpiece and the detection surface. Even clearances which cannot be visually confirmed are indicated on the display.

The displayed value (estimated gap distance) will vary depending on individual product differences and nozzle machining dimensions.

Status can be checked in more detail due to the increase of the level meter digits.
3-Step Setting (Switch Point Change Mode)

- Simple setting of the switch point value (point at which the clearance reaches the switch point value)

1. To reproduce the placement condition, press the button while the sub display shows the OUT1 switch point value (n_1).
   * Operation is different from products which are not IO-Link compliant (1 output, 2 outputs type).

2. Press the or button to set the switch point value.

3. Press the button to complete the setting.

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 displayed value.

Snap shot function

3-Screen Digital Display

- The seating condition can be checked at a glance. The sub screen can display 1 of 12 display options.

Main screen

Placed (Switch output ON)

Workpiece

Not placed (Switch output OFF)

Workpiece

Sub screen

Level meter

Displayed value

Supply pressure

Outlet pressure

OUT1 switch point value

OUT1 hysteresis

OUT2 switch point value (Low side)

OUT2 switch point value (High side)

OUT2 hysteresis

Supply pressure lower value

Supply pressure upper value

Communication status

*1 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 the Relationship Between Displayed Value and Distance on page 18.

Rated Distance Range: 3 types are available.

<table>
<thead>
<tr>
<th>Model</th>
<th>Distance [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>ISA3-F type</td>
<td></td>
</tr>
<tr>
<td>ISA3-G type</td>
<td></td>
</tr>
<tr>
<td>ISA3-H type</td>
<td></td>
</tr>
</tbody>
</table>

- Rated distance range
- Displayable/ Settable range
- When zero cut-off is minimum
### 3 Setting Modes

Select the setting mode that best meets your needs.

<table>
<thead>
<tr>
<th>Simple Setting Mode</th>
<th>Simple Setting Mode</th>
<th>Function Selection Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Step Setting Mode</td>
<td>Simple Setting Mode</td>
<td>Function Selection Mode</td>
</tr>
<tr>
<td>• Switch point value setting or • Hysteresis value setting</td>
<td>• Switch point value setting • Hysteresis value setting • Delay time setting&quot;¹</td>
<td>• Output target selection • Output mode selection • Selection of normal or reversed • Switch point value setting • Hysteresis value setting • Delay time setting&quot;¹ • Display color selection</td>
</tr>
<tr>
<td>3-Step Setting Mode</td>
<td>Simple Setting Mode</td>
<td>Function Selection Mode</td>
</tr>
<tr>
<td>• Switch point value setting or • Hysteresis value setting</td>
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<td>• Output target selection • Output mode selection • Selection of normal or reversed • Switch point value setting • Hysteresis value setting • Delay time setting&quot;¹ • Display color selection</td>
</tr>
</tbody>
</table>

### 1. Mode selection

Press the SET button while the sub display is showing the target item.

### 2. Output target selection

OUT1 is fixed to distance detection. For OUT2, select distance, supply pressure, outlet pressure, etc. can be set for OUT2.

### 3. Output mode selection

Select from • Hysteresis mode • Window comparator mode When “Others” is selected as the output target for OUT2, • Error output or Output off can be selected.

### 4. Normal or reversed output selection

Select from • Normal output • Reversed output

### 5. Set value (Switch point value) setting

• Adjust the numerical value.

### 6. Hysteresis value setting

• Adjust the numerical value.

### 7. Display color selection

Select from • ON Green / OFF Red (OUT1 or OUT2) • ON Red / OFF Green (OUT2 or OUT2) • Normally Red / Normally Green

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*¹ Available when OUT2 is not set for “distance.” It can be set in the next step of the Hysteresis value setting.

*² Refer to the Operation Manual for details on setting the OUT2.
2 Outputs Type

- Displayed value, Outlet pressure value, and Supply pressure value can be selected in OUT2.

The pressure and gap size are detected by the pressure sensors at the front and back of the orifice before output.

Monitoring of the Outlet Pressure Value (2)

- OUT2 detection of rising pressure when a workpiece is not placed that signifies detection nozzle clogging.

Only nozzle clogging is detected by the window comparator mode and setting the response time.

Monitoring of the Displayed Value (Gap Size) (1)

- Can discern between 2 different types of workpiece

Can detect raw material workpieces and defective workpieces via the pressure (OUT2)

Monitoring of the Supply Pressure Value (3)

- Detection of rated pressure range via OUT2

Can discern between 2 different types of workpiece

Can detect raw material workpieces and defective workpieces via the pressure (OUT2)
### 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 even when the product is installed in the user's equipment.

**Measures against drainage**

Drainage resistance increased by **10 times or more**

- Based on SMC's specific testing conditions (Oil proof test)
- Compared with the ISA2

**Withstand pressure**

Max.: **600 kPa**

- Compared with the ISA2 with a 0.2 MPa pressure gauge

**High-pressure flushing**

- The switch output will be OFF during flushing.

---

### Noise reduction, Energy saving, Measures against clogging

**Exhaust noise:** Zero

The existing model (ISA2) needs to exhaust air from the exhaust port due to its bridge circuit. However, the ISA3 does not exhaust air from the product body. This reduces noise considerably compared with the existing model.

**Air consumption:** 60% reduction

The new detection principle eliminates the need for air to be exhausted from the product. This makes the flow consumption 0 L/min when a workpiece is seated. The result is a great reduction in air consumption compared with the existing model.

**Number of orifices:** 3 → 1

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

**Orifice area ratio:** 68% increase

A larger orifice area lowers the possibility of clogging. However, even if the orifice does become clogged with foreign matter, the product construction allows for the internal orifice to be removed for cleaning.

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* Once the orifice has been removed, the switch point will need to be set again.
Compact & Lightweight

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

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

Space saving and man-hour reduction by centralized lead wires

- Installation space: **30 mm reduction**

Requires less wiring labor

**ISA3-L**

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

**Existing model**

- A separate cable is required between the terminal block box and 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 button operation is disabled to prevent unintentional changes to set values.

Piping Variations

- Piping specification: C type
- Piping specification: F type

Mounting

- Bracket
- DIN rail

Manifold

- With control unit
- Without control unit

- The electrical entry of the centralized lead wire for the M12 connector is on the right side.
  When using a right-sided supply port, arrange the centralized lead wire so that it does not interfere with the control unit.
### Main Functions

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

![Display OFF mode](image)

**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: Green
- Normally: Orange

**Unit selection function**
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>Minimum setting resolution</td>
<td>0.1</td>
<td>0.001</td>
<td>0.02</td>
</tr>
</tbody>
</table>

**Security code**
When the security code is activated, the code needs to be entered before the product can be operated.

![Security code](image)

**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 the confirmation of the wiring and prevents system errors due to unexpected output.

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

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### Application Examples

- **Detection of the table and pallet seating**

  ![Detection of the table and pallet seating](image)

- **Workpiece clamp detection**

  ![Workpiece clamp detection](image)
## Series Variations

<table>
<thead>
<tr>
<th>Function</th>
<th>ISA3-L</th>
<th>ISA3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of display digits</td>
<td>Main 4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Sub 9</td>
<td>6</td>
</tr>
<tr>
<td>Output specifications</td>
<td>IO-Link communication/OUT1 + OUT2</td>
<td>1 output</td>
</tr>
<tr>
<td>OUT1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OUT2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting mode</td>
<td>3-step setting mode</td>
<td></td>
</tr>
<tr>
<td>Function selection mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Display fine adjustment</td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td>Dual display</td>
<td></td>
</tr>
<tr>
<td>Line name display</td>
<td>Dual display is available.</td>
<td></td>
</tr>
<tr>
<td>Zero cut-off range can be changed,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display OFF function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting of all functions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure zero-clear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure span adjustment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initialization</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **OUT1**
  - IO-Link communication
  - Window comparator mode
  - Normal/Reversed output setting

- **OUT2**
  - OUT2 Window comparator mode
  - OUT2 Normal/Reversed output setting
  - Error output, Output OFF setting
  - Delay time setting

- **Setting mode**
  - 3-step setting mode
  - Depends on the sub screen
  - Simple setting mode
  - Function selection mode
When F is selected for the rated distance range
-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 ISO 1179-1

Option 2 (Bracket)

Option 1 (Cable)

Bracket mounting position

Piping specification

Supply side Detection side

C Rc1/8
-6 One-touch fitting +1
-6 One-touch fitting +2

F G1/8 +3
G1/8 +3

Output specification

L
IO-Link: Switch output 1 + Switch output 2 (Switch output: NPN or PNP switching type)

OUT1: Gap size detection
OUT2: Gap size, outlet pressure, supply pressure detection (Select from the above.)

Unit specification of pressure value

Nil
With unit selection function +9
M Fixed SI unit +10

Stations

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

+9 Under the New Measurement Act, digital gap checkers with the unit selection function are no longer allowed for use in Japan.
+10 Unit: kPa

How to Order

ISA3-G CL 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 +3
G1/8 +3

How to Order

Option 2 (Bracket)

Nil None
(DIN rail mounting) +7

B With bracket +5 +8

Option 1 (Cable)

Nil Straight +5 +6

L Right angle +5 +6

N None

S Centralized lead wire (Lead wire only) +4 +5

T Centralized lead wire (With bracket) +4 +5

Bracket mounting position

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

n stations
(Mount to 1st and nth stations)

+7 Order DIN rail separately. (Refer to page 21.)
+8 About the number of brackets, 1 station: 1 piece is packed, 2 stations or more: 2 pieces are packed.
3-Screen Display Digital Gap Checker
With Control Unit
**ISA3-L Series**

**How to Order**

**ISA3-**

- **C**
- **L**
- **M** [2]
- **B**
- **L** [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

**Output specification**
- IO-Link: Switch output 1 + Switch output 2
- (Switch output: NPN or PNP switching type)

**Unit specification of pressure value**
- Nil
- With unit selection function *12
- Fixed SI unit *13

- *12 Under the New Measurement Act, digital gap checkers with the unit selection function are no longer allowed for use in Japan.
- *13 Unit: kPa

**Option 1 (Cable)**
- **N**
  - Straight *5* *6
- **L**
  - Right angle *5* *6
- **N**
  - None

- *5 Cannot be selected for 1 station
- *6 A centralized lead wire is provided with M12 connectors for the number of stations.
- *7 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.

**Option 2 (Bracket)**
- **B**
  - With bracket *7* *8*

- *7 The bracket for control unit is shipped mounted on the product.
- *8 When the control unit is mounted, the piping specifications of the supply port will be changed due to piping specification of the gap checker.
- *9 Conforming to ISO 16030

**Control unit piping specification**
- **C**
- **F**

- *8 When the control unit is mounted, the piping specifications of the supply port will be changed due to piping specification of the gap checker.
- *9 Conforming to ISO 16030
### ISA3-L Series

**Specifications**

<table>
<thead>
<tr>
<th>Applicable fluid</th>
<th>ISA3-FL</th>
<th>ISA3-GL</th>
<th>ISA3-HL</th>
</tr>
</thead>
<tbody>
<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 μ</td>
<td>0 to 300 μ</td>
<td>0 to 500 μ</td>
</tr>
<tr>
<td>Minimum display resolution (Distance reference)</td>
<td>0.1 mm</td>
<td>±0.1 mm</td>
<td>±0.1 mm</td>
</tr>
<tr>
<td>Rated pressure range</td>
<td>100.0 to 200.0 kPa</td>
<td>0.0 mm</td>
<td>0.0 mm</td>
</tr>
<tr>
<td>Displayable range (Pressure value)</td>
<td>±20.0 kPa</td>
<td>±20.0 kPa</td>
<td>±20.0 kPa</td>
</tr>
<tr>
<td>Repeatability</td>
<td>0.005 mm or less</td>
<td>0.010 mm or less</td>
<td>0.020 mm or less</td>
</tr>
<tr>
<td>Temperature characteristics (Reference: 25 °C)</td>
<td>0.015 mm or less</td>
<td>0.030 mm or less</td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>0 to variable (Default: 3)</td>
<td>0 to variable (Default: 20)</td>
<td>0 to variable (Default: 20)</td>
</tr>
</tbody>
</table>

**Rated Distance Range and Displayable/Settable Range**

**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 the Relationship Between Displayed Value and Distance on page 18.

Ranged distance range: Distance range within which the product meets the specifications

Displayable/Settable range: Range within which it is possible to display or set values, (Not guaranteed to meet the specifications)

<table>
<thead>
<tr>
<th>Model</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 mm</td>
</tr>
<tr>
<td>ISA3-F type</td>
<td><img src="#" alt="Rated distance range" /></td>
</tr>
<tr>
<td>ISA3-G type</td>
<td><img src="#" alt="Rated distance range" /></td>
</tr>
<tr>
<td>ISA3-H type</td>
<td><img src="#" alt="Rated distance range" /></td>
</tr>
</tbody>
</table>

*1 For details, refer to the Relationship Between Displayed Distance and Distance on page 18.

*2 When the pressure fluctuates around the set value, the hysteresis must be set to a value more than the fluctuating width, otherwise the functioning will be affected.

*3 Due to the applied pressure fluctuates around the set value, the hysteresis must be set to a value more than the fluctuating width, otherwise the functioning will be affected.

*4 When the applied pressure fluctuates around the set value, the hysteresis must be set to a value more than the fluctuating width, otherwise the functioning will be affected.

*5 Due to the zero-cut function, the values of 29 and under are displayed as 0 at factory default setting.

*6 The pressure value displayed on the main screen is the indicated value on the sub screen.

*7 The configuration file can be downloaded from the SMC website. [https://www.smcworld.com](https://www.smcworld.com)

*8 If the applied pressure fluctuates around the set value, the hysteresis must be set to a value more than the fluctuating width, otherwise the functioning will be affected.

*9 For details on the detection nozzle, refer to the figures on page 18.

*10 Only applies to the digital gap checker body excluding the control unit.

*11 The configuration file can be downloaded from the SMC website.
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.

Test conditions

<table>
<thead>
<tr>
<th>Detection nozzle</th>
<th>Piping</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø1.5</td>
<td>F type ø4 x ø2.5 tube/G, H type ø6 x ø4 tube</td>
</tr>
</tbody>
</table>

Reference pressure: 150 kPa

* 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 over 220 kPa. And the output will be OFF. (Refer to the Relationship Between Supply Pressure and Display on page 26.)
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.)

<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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Supply pressure: 200 kPa</td>
<td></td>
</tr>
</tbody>
</table>

Test conditions

- ISA3-FL
  - Piping length: 1 m
  - Piping length: 3 m
  - Piping length: 5 m

- ISA3-GL
  - Piping length: 1 m
  - Piping length: 3 m
  - Piping length: 5 m

- ISA3-HL
  - Piping length: 1 m
  - Piping length: 3 m
  - Piping length: 5 m

(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.)
### Relationship Between Displayed Value and Distance

The graphs below show the relationship between the displayed value and distance.

1. The data shown below are for reference. They change depending on the individual product differences and machining dimensions of the nozzle.
2. The zero-cut function forcibly displays 0 when the value is less than the set value. Although the zero cut-off range can be set to 0, it may not be 0 even in close contact, due to the characteristics of the product.

#### Internal Circuits and Wiring Examples

When used as a switch output device
- The numbers in the circuit diagrams show the connector pin layout.

#### Setting of NPN open collector 2 outputs

* Refer to the Web Catalog for wiring details of the VX2 series (2-port solenoid valve).

---

**ISA3-FL**

- Detection nozzle: ø1.5
- 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
- Supply pressure: 200 kPa

---

**ISA3-GL**

- Detection nozzle: ø1.5
- 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
- Supply pressure: 200 kPa

---

**ISA3-HL**

- Detection nozzle: ø1.5
- 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
- Supply pressure: 200 kPa

---

**Detection 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**

---

**Detection 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.

* Default setting: Values of 8 and under are displayed as "0."
* Default setting: Values of 29 and under are displayed as "0."

---

**ISA3-FL**

- Detection nozzle: ø1.5
- 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
- Supply pressure: 200 kPa

---

**ISA3-GL**

- Detection nozzle: ø1.5
- 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
- Supply pressure: 200 kPa

---

**ISA3-HL**

- Detection nozzle: ø1.5
- 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
- Supply pressure: 200 kPa

---

**Detection 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 Circuits and Wiring Examples**

When used as a switch output device
- The numbers in the circuit diagrams show the connector pin layout.

**Setting of NPN open collector 2 outputs**

* Refer to the Web Catalog for wiring details of the VX2 series (2-port solenoid valve).
**ISA3-L Series**

**Construction Diagram**

**Without control unit**

- **Supply port**: Left side
- **Centralized lead wire**: ISA-21/L52408
- **Atmospheric vent port ø2.6**: ISA-20
- **Bracket for centralized lead wire**: ISA-20
- **Threaded plug with seal**: ISA-12/L52408
- **Joint screws**: ISA-16/L52408
- **Seal for extra station**: ISA-15
- **Bracket with connector**: ZS-31-B
- **Cable with connector**: ZS-31-C
- **Centralized lead wire**: ISA-21/L52408
- **Bracket for centralized lead wire**: ISA-14

**With control unit**

- **Supply port**: Left side
- **2-port solenoid valve**: Y2007-A
- **Regulator**: Flow direction (Left → Right)
- **Centralized lead wire**: ISA-21/L52408
- **Bracket for centralized lead wire**: ISA-20
- **Threaded plug with seal**: ISA-12/L52408
- **Joint screws**: ISA-16/L52408
- **Seal for extra station**: ISA-15
- **Bracket with connector**: ZS-31-B
- **Cable with connector**: ZS-31-C
- **Centralized lead wire**: ISA-21/L52408
- **Bracket for centralized lead wire**: ISA-14
- **Modular adapter**: E210-U01
- **Spacer with bracket**: Y2007-A
- **Atmospheric vent port ø2.6**: ISA-20
If there is a possibility that the atmospheric vent port of the gap checker will be exposed to water or dust, insert a tube into the atmospheric vent port and route the other end of the tube to a safe place away from water or dust.

* For tubing, please use the SMC TU0425 (polyurethane, O.D. ø4, I.D. ø2.5) for the gap checker.

**Caution**

**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.
### ISA3-L Series

#### Parts List

1. **Joint screws**
   - 2 screws, 2 spacers, 2 nuts
   - Stations | Part no. |
   - 2        | ISA-16-2 |
   - 3        | ISA-16-3 |
   - 4        | ISA-16-4 |
   - 5        | ISA-16-5 |
   - 6        | ISA-16-6 |

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

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

* Spacers are included for 4 and 6 stations.

### Bracket ISA-14

- With 3 tapping screws (3 x 8)

### DIN rail ISA-5

- Stations | L |
- 1        | 73.0 |
- 2        | 135.5 |
- 3        | 173.0 |
- 4        | 210.5 |
- 5        | 248.0 |
- 6        | 285.5 |

### Lead wire with connector ZS-31-B

- Straight 5 m

### Centralized lead wire ISA-21

- Stations | L |
- 2        | 139 |
- 3        | 177 |
- 4        | 215 |
- 5        | 253 |
- 6        | 291 |

* With 2 mounting screws (M3 x 16L)
For details, refer to the Web Catalog.

### Parts List (Control Unit)

**Regulator**

AR20-02-B

- **Pipe thread type**
  - Nil
  - Rc
  - G

- **Flow direction**
  - Nil
  - F
  - G

- **Option (Pressure gauge shape)**
  - Nil
  - R

- **Max. display pressure of the pressure gauge**
  - Nil
  - With square embedded type pressure gauge (With limit indicator)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Pressure gauge shape</th>
<th>Max. display pressure of the pressure gauge</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Without pressure gauge</td>
<td>Max. display pressure: 0.4 MPa, MPa single notation</td>
</tr>
<tr>
<td>G+1</td>
<td>With round type pressure gauge (With limit indicator)</td>
<td>Max. display pressure: 0.4 MPa</td>
</tr>
<tr>
<td>P+1</td>
<td>With round type pressure gauge (With limit indicator, MPa-psi double notation)</td>
<td>Max. display pressure: 0.4 MPa</td>
</tr>
</tbody>
</table>

*1 The pressure gauge port is 1/8. The pressure gauge is included in the package, but not assembled.

*2 This product is for overseas use only according to the New Measurement Act. (The SI unit type is provided for use in Japan.)

### 2-port solenoid valve

**Body material/Port size/Orifice diameter**

- **Symbol**
  - Z
  - B+1
  - D+1

- **Material**
  - Aluminum
  - No thread machining (1/8)
  - Rc1/4
  - G1/4

- **Orifice diameter**
  - ø4

### Voltage/Electrical entry

<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>DIN terminal with light (With surge voltage suppressor)</td>
</tr>
<tr>
<td>Z2B+2</td>
<td>100 VAC</td>
<td>110 VAC</td>
</tr>
</tbody>
</table>

*2 Produced upon receipt of order

When 100 VAC and 110 VAC are selected, the product without thread machining (symbol: Z) cannot be selected.

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-L Series

Dimensions

ISA3-L-□□□□B (Bracket mounting)

Supply port
ISA3-LC: Rc1/8
ISA3-LF: G1/8\(^{+1}\)

Detection port
ISA3-LC: One-touch fitting
ISA3-LF: G1/8\(^{+1}\)

+1 Conforming to ISO 1179-1

When centralized lead wire is used

Pin no. Description
1 DC (+)
2 OUT2
3 DC (−)
4 OUT1

ISA3-L-Series

 ISA3-L-□□□□ (DIN rail mounting)

Supply port
ISA3-LC: Rc1/8
ISA3-LF: G1/8\(^{+1}\)

Detection port
ISA3-LC: One-touch fitting
ISA3-LF: G1/8\(^{+1}\)

+1 Conforming to ISO 1179-1

When centralized lead wire is used

Pin no. Description
1 DC (+)
2 OUT2
3 DC (−)
4 OUT1

Stations 1 2 3 4 5 6
L1 38 76 114 152 190 228
L2 62.5 125 162.5 200 237.5 275
L3 73 135.5 173 210.5 248 285.5

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

H 13 13.6 19

Unit: mm

ISA3-L Series

ISA3-L-□□□□ (DIN rail mounting)
**ISA3-L Series**

**Dimensions**

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

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Lead wire color</th>
<th>Description</th>
<th>Pin no.</th>
<th>Lead wire color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brown</td>
<td>DC(+)</td>
<td>3</td>
<td>Blue</td>
<td>DC(−)</td>
</tr>
<tr>
<td>2</td>
<td>White</td>
<td>OUT2</td>
<td>4</td>
<td>Black</td>
<td>OUT1</td>
</tr>
</tbody>
</table>

**M12 connector no.**

1. DC(+) Brown
2. OUT2
3. DC(−) Blue
4. OUT1

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

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Lead wire color</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>OUT2</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>

**ISA-21-□ (Centralized lead wire)**

**For 2 to 3 Stations**

<table>
<thead>
<tr>
<th>M12 connector no.</th>
<th>Pin no.</th>
<th>Description</th>
<th>Output lead wire color</th>
<th>Output lead wire color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>DC(+)</td>
<td>Brown/□</td>
<td>Orange</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>OUT2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC(−)</td>
<td>Blue/□</td>
<td>Black</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>Orange</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>OUT2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC(−)</td>
<td>Blue/□</td>
<td>Black</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>Orange</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>OUT2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC(−)</td>
<td>Blue/□</td>
<td>Black</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>OUT1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**For 4 to 6 Stations**

<table>
<thead>
<tr>
<th>M12 connector no.</th>
<th>Pin no.</th>
<th>Description</th>
<th>Output lead wire color</th>
<th>Output lead wire color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>DC(+)</td>
<td>Brown/□</td>
<td>Yellow</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>OUT2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC(−)</td>
<td>Blue/□</td>
<td>Black</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>Orange</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>OUT2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC(−)</td>
<td>Blue/□</td>
<td>Black</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>Orange</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>OUT2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC(−)</td>
<td>Blue/□</td>
<td>Black</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>OUT1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**ISA-17 (Bracket when control unit fitted)**

**Y200T-A (Spacer with bracket)**

**ISA-20 (Bracket for centralized lead wire)**

*1 Brown and blue are connected inside the product.*
### Error Indication

<table>
<thead>
<tr>
<th>Main screen</th>
<th>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 outside the range of 80 kPa to 220 kPa. Measurement is not possible.</td>
<td>Supply rated pressure (100 kPa to 220 kPa). The product will return to measurement mode automatically.</td>
</tr>
<tr>
<td></td>
<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><img src="Err1" alt="" /></td>
<td>OUT1 over current error</td>
<td>The switch output (OUT1) load current of 80 mA or more flows.</td>
<td>Turn the power OFF and remove the cause of the over current. Then turn the power ON again.</td>
</tr>
<tr>
<td><img src="Err2" alt="" /></td>
<td>OUT2 over current error</td>
<td>The switch output (OUT2) load current of 80 mA or more flows.</td>
<td>Turn the power OFF and remove the cause of the over current. Then turn the power ON again.</td>
</tr>
<tr>
<td><img src="Err3" alt="" /></td>
<td>Zero clear error</td>
<td>Zero clear was not performed at atmospheric pressure. (Pressure outside of ±14 kPa was supplied present.)</td>
<td>Perform zero clear at atmospheric pressure.</td>
</tr>
<tr>
<td><img src="Err30" alt="" /></td>
<td>Pressure adjustment error during calibration</td>
<td>Fine adjustment of the pressure display at the OUT port was not performed correctly during calibration. (When the pressure after the adjustment is below the supply pressure lower limit (80 kPa) or exceeds the display set range upper limit (220 kPa))</td>
<td>Keep the SUP port pressure and OUT port pressure the same and perform fine adjustment of the OUT port pressure display value. Set the pressure within 80 kPa to 220 kPa.</td>
</tr>
<tr>
<td><img src="Err0" alt="" /></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>
<tr>
<td><img src="Err4" alt="" /></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>
<tr>
<td><img src="Err5" alt="" /></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>
<tr>
<td><img src="Err15" alt="" /></td>
<td>Version does not match</td>
<td>IO-Link version does not match that of the master. The master uses version 1.0.</td>
<td>Ensure that the master IO-Link version matches the device version.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub screen</th>
<th>Name</th>
<th>Description</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<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></td>
<td>Vacuum pressure (less than –20 kPa) is supplied.</td>
<td>Vacuum pressure (less than –20 kPa) is supplied.</td>
<td>Vacuum pressure (less than –20 kPa) is supplied.</td>
</tr>
</tbody>
</table>

### Relationship Between Supply Pressure and Display

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

**Main screen**
- [ ] Range in which [ON/OFF] is displayed in the main screen
- Switch output is automatically turned OFF.
- Switch output is normally output.
- Switch output is automatically turned OFF.

**Sub screen**
- [ ] Range which can be displayed when [SUP side pressure value display] is set to the sub screen
- Cannot be detected
- Can be detected, but specifications are not satisfied
- Can be detected, but specifications are not satisfied
- Breakage may occur.

![Pressure Diagram](Attachment)
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.

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**Danger**
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.

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

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**Safety Instructions**

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.

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**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 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.

**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.

   The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations 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.

**Safety Instructions**

Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual” before use.