CITIZEN

With confidence and trust, CITIZEN FINEDEVICE
offers the SA series boasting unprecedented levels of
durability and robustness.

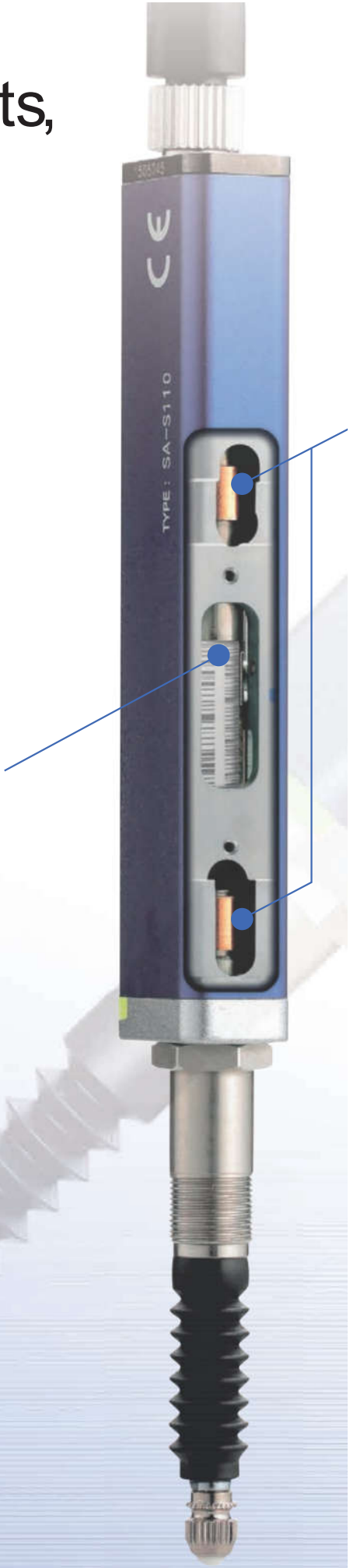
# Absolute × Robust × Durable


Contact-type Displacement Sensor SA Series

Advanced Solution Device Born from Feedback from Professionals

# We listened to your compliments, comments, and complaints, and this sensor was the result.

Its high functionality as you desired.
Its two-point bearing support structure provides highly reliable durability.
It has set a whole new standard.




## Highly accurate counting with the advanced absolute method

This sensor adopts the optical absolute encoder method.
With this method, the absolute position is read instantaneously and saved even after the power is turned off.
This has eliminated the need for zero-point adjustment when the power is turned on, saving the time needed for setup.

### Reduced risk of damage to the sensor shaft

No bearing is used inside the stem, reducing damage caused when the stem is tightened, and in addition, a stopper is used in the stem, reducing internal damage due to over-stroke. The modified anti-rotation mechanism provides significantly improved lateral load bearing and impact resistance.

### Reduced over-stroke errors

Over-stroke, which occurs due to various factors, including human errors and accidental factors, is detected and automatically output as an error. When over-stroke is detected, the device stops immediately to avoid unnecessary problems.

### Easy to detach and attach the cable

The connector is of a screw type, from which the cable can easily be detached and attached and which can prevent the connector from coming off.
In addition, L-shaped and straight types are available depending on the intended use.

### A highly durable ceramic terminal is used as standard.

# Highly reliable durability with a two-point bearing support structure

The Contact-Type Digital Displacement Sensor SA Series has metal bearings above and below its measuring part (glass scale), which are housed in robust die-cast bodies, providing surpassing durability.
Its exceeding robustness to vibration, shock, and lateral loads has won customers' trust.

## With its compact and low-power consumption system, the SA Series won't betray the trust it has earned from professionals.

This sensor is durable and robust and is equipped with a zero-point detection function, which eliminates the need for zero-point adjustment. You can use this function depending on your measurement environment or workpiece.

This sensor adopts the optical absolute encoder method with a minimum reading value of 0.1 µm. In addition, this sensor is equipped with an error detection LED, providing increased reliability.


10 mm

CE Protection grade IP67

**SA-S110**
Resolution 0.1 µm

**SA-S510**
Resolution 0.5 µm

With long stroke (32 mm) design, this sensor is available for components with large gaps and large components with large tolerances.


32 mm

CE Protection grade IP67

**SA-S532**
Resolution 0.5 µm
32-mm long stroke design

# This ultra-small controller is the result of pursuing our ideal.

The compact design expands possibilities.

This controller is available with an industry-standard seamless, high-speed, wide-range network.

## Connection with DIN rails

Up to 16 units can be connected to one power supply and can be controlled all at once.

**SA-SD**
NPN and PNP types are available.

The dual digital display covers a wide range of uses

Self-diagnosis and reporting of broken cables and other errors


Errors, such as sensor head failures and broken and disconnected cables, are detected and output immediately.

Easy-to-read VA high contrast LCD

## Comes with a 49 mm square controller and equipped with a two-color display that enables easy recognition of pass/fail judgment results

[ SA-CD□ ]

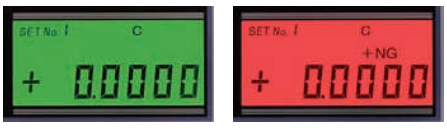
The SA Series' controller has a highly versatile 49 mm square compact body, into which various judgment and calculation functions have been incorporated.

Three types of output methods are available and the backlight switches between red and green, making it easy to recognize pass/fail judgment results.


**SA-CD1**

## Compact with enhanced features

### Easy to recognize a tolerance judgment result




Depending on the setting value, the backlight changes to green (OK) or red (NG), making it easy to recognize a judgment result even from a distance.

High usability with a 7-level sorting function

Compact design with a DIN size of 48 mm × 48 mm

Easy-to-operate, separate push-buttons

### Three types of output terminals available

Standard type (I/O connector only)

BCD type

RS232C type

Standard interface, BCD, and RS232C output models are available.
You can select the model suitable for your equipment.

## Equipped with advanced features and connectable to dual display controllers [ SA-SD□ ]

Up to 16 controllers can be connected to one power supply, which is suitable for layouts with DIN rails.
Its two-line digital display can be set up to display various information and can display the measurement and judgment values at the same time.

# Ultra-compact body with various functions Connect up to 16 units

Up to 15 slave units can be connected to one master unit, allowing for easy multi-point calculation.
Its ultra-compact body has guide tabs for DIN rails, allowing for easy connection with other controllers in production and inspection lines.

* Up to 14 units can be connected when a communication unit is used.

Depending on your existing environment, a Modbus-or CC-Link-compatible communication unit is available.

### Communication unit compatible with high-speed Modbus [ SA-ERS□ ]

CE SA-ERS

Available for wide area network configuration with Modbus serial communication

This communication unit is compatible with speedy, highly expandable RS485 Modbus, which is an industry standard, and can transfer measurement values and external I/O statuses. This communication unit is suitable for wide area network configuration and remote monitoring and can contribute to wire saving in measurement and monitoring systems.

The dedicated communication connector, which can be integrated with the system, allows for easy connection and disconnection.

Power is supplied from the SA-SD controller (master unit).

MEWTOCOL* communication is also available.

Can be connected to a 35-mm DIN rail.

* MEWTOCOL is a registered trademark of Panasonic Industrial Devices SUNX Co., Ltd.

### Communication unit compatible with world-standard CC-Link [ SA-ECL□ ]

CE SA-ECL

CC-Link communication allows for easy configuration of an open network system.

This communication unit is compatible with CC-Link, which is an international communication standard, and offers efficient, speedy data transfer. In addition, this communication unit is highly versatile and you can adjust the communication speed and range flexibly, allowing for easy configuration of a distributed system for individual lines. This enables wire saving in complicated networks.

The dedicated communication connector, which can be integrated with the system, allows for easy connection and disconnection.

High-speed communication with a baud rate of up to 10 Mbps

Power is supplied from the SA-SD controller (master unit).

Can be connected to a 35-mm DIN rail.

* CC-Link is a registered trademark of Mitsubishi Electric Corporation, managed by CC-Link Partner Association.

## Simple controller exclusively designed for data output [ SA-MC□ ]

Up to 16 channels of measurement data can be output via the RS-232C output terminal.

SA-MC8

SA-MC16

DIN rail guide
For both SA-MC8 and SA-MC16, a DIN rail can be installed.

# Easy, convenient multi-channel measurement

### Handy controller compatible with SA Series

You can configure a compact, easy-to-handle, safe, and reliable multi-channel measurement system.
While meeting the required restrictions, you can easily configure a multi-channel system with general-purpose communication of RS-232C.

### 8-channel configuration and 16-channel configuration available

Up to 16 channels can be used to output measurement data.

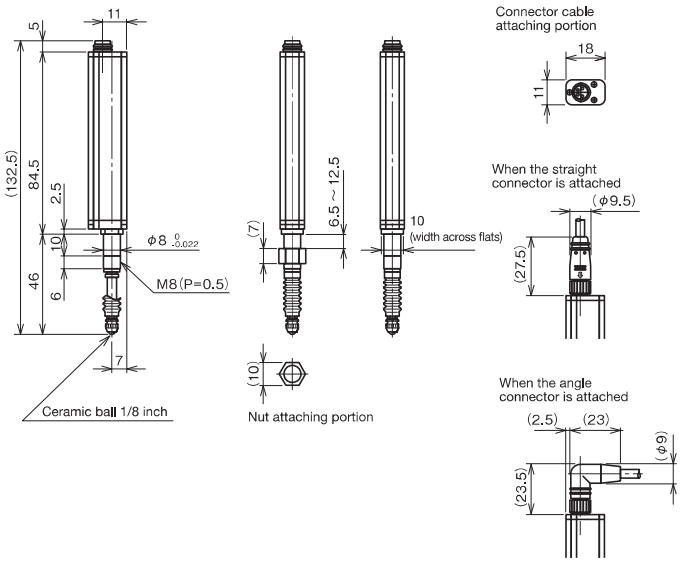
### Simple, easy-to-understand indication

Status LED lights

### Available with DIN rails

## SA-S110 / SA-S510

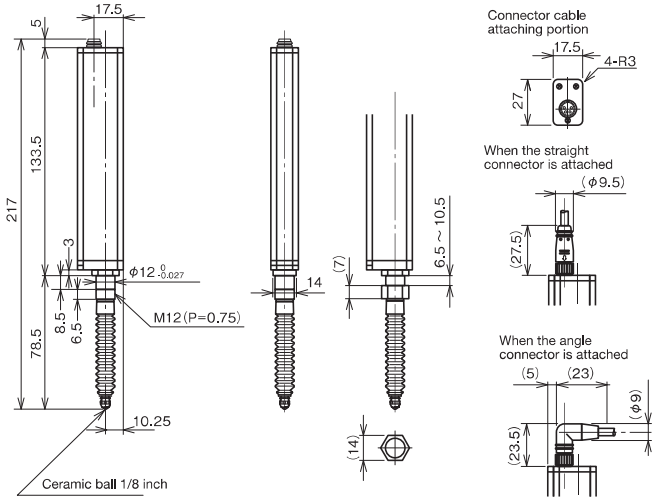
(Unit used in the dimensional drawings: mm)




| Model | SA-S110 / SA-S110/03N | SA-S510 / SA-S510/03N |
|---|---|---|
| Measurement method | Optical absolute linear encoder method | |
| Measurement range | 10 mm | |
| Accuracy | 0.1 µm | 0.5 µm |
| Indication accuracy (P-P)*1 | ≤1.0 µm | ≤2.0 µm |
| Measuring force*2 | ≤1.65N (SA-S□10) / ≤0.35N (SA-S□10/03N) | |
| Protection grade*3 | IP67 | |
| Weight | Approx. 80 g | |
| Cable | Purchase option separately | |
| Measurement terminal | Ceramic ball Ø3.175 mm | |
| Rubber bellows *4 | Material NBR | |

*1 When the ambient temperature is 20°C.
*2 When the measurement terminal is pushed vertically down by 10 mm.
For SA-S□10/03N, this indicates the value when no rubber bellows are installed.
*3 Only when the rubber bellows is installed properly and is not damaged.
*4 For SA-S□10/03N, no rubber bellows are installed.

## SA-S532




| Model | SA-S532 |
|---|---|
| Measurement method | Optical absolute linear encoder method |
| Measurement range | 32 mm |
| Display resolution | 0.5 µm |
| Indication accuracy (P-P)*1 | ≤3.0 µm |
| Measuring force*2 | ≤2.97N |
| Protection grade*3 | IP67 |
| Weight | Approx. 150 g |
| Cable | Purchase option separately |
| Measurement terminal | Ceramic ball Ø3.175 mm |
| Rubber bellows *4 | Material NBR |

*1 When the ambient temperature is 20°C.
*2 When the measurement terminal is pushed vertically down by 32 mm.
*3 Only when the rubber bellows is installed properly and is not damaged.

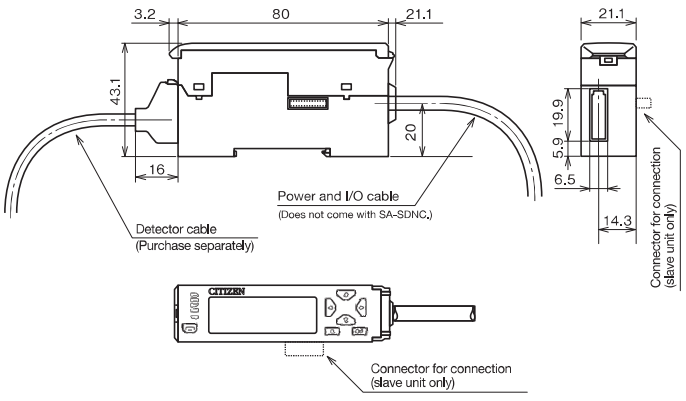
■Detector cable (Purchase separately)
For all SA Series models

**For SA-CD1** Straight SA-CD-SH□M
L-shaped SA-CD-SHL□M

**For SA-SD** Straight SA-SD-SH□M
**For SA-MC** L-shaped SA-SD-SHL□M

* The □ in each model name indicates a placeholder for the cable length. The standard lengths are 2, 5, and 10 m. For example, a straight cable with a cable length of 2 m is represented as SA-CD-SH2M.

## SA-SD1AP / SD1AC / SD1C / SDNC



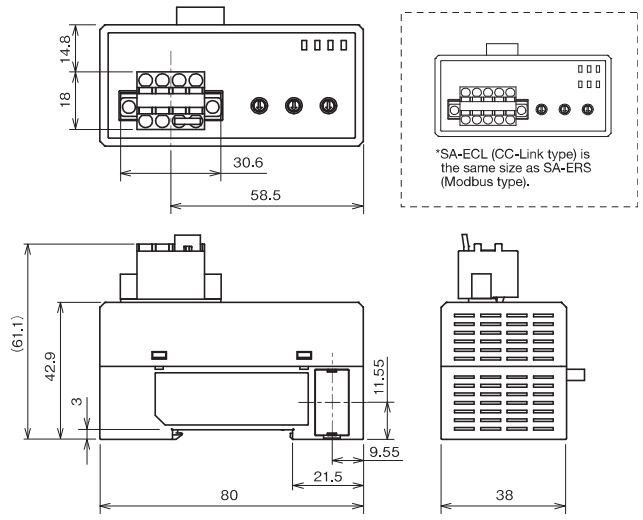

| Model | Type | Master unit | Slave unit | | |
|---|---|---|---|---|---|
| | NPN | SA-SD1AP | SA-SD1AC | SA-SD1C | SA-SDNC |
| | PNP | SA-SD1AP-P | SA-SD1AC-P | SA-SD1C-P | |
| Display | | Omnidirectional VA LCD, polarity, measurement value (2-line display), and circle meter display | | | |
| Display resolution*1 | | 0.1 µm / 1 µm / 10 µm / 100 µm | | | |
| Display range | | -199.9999–199.9999 mm | | | |
| Analog output | | ○ (4–20 mA) | | – | |
| Input/output | | ○ | | | – |
| Number of detector inputs | | 1 ch | | | |
| Connection function | | Up to 15 slave units can be connected to one master unit.*3 | | | |
| Calculation function | | Maximum value, minimum value, flatness, average value, deviation, distortion, warpage, thickness | | | |
| Hold function | | Sample hold, maximum, minimum, maximum - minimum, maximum - minimum/2, etc. | | | |
| Power supply voltage | | 24 VDC (±10%) | | | |
| Consumption current*2 | | 70 mA or less (when the sensor head is connected) | | | |
| Cable | | 2 m composite cable for power supply, analog output, and I/O | 2 m composite cable for analog output and I/O | 2 m cable for I/O | – |

*1 Depends on the accuracy of the sensor head used.
*2 The consumption current does not include the analog current output.
*3 Up to 14 slave units can be connected when the communication unit (SA-ERS) is used.

# SA-ERS (Modbus type) / SA-ECL (CC-Link type)

(Unit used in the dimensional drawings: mm)

SA-ERS (Modbus type)



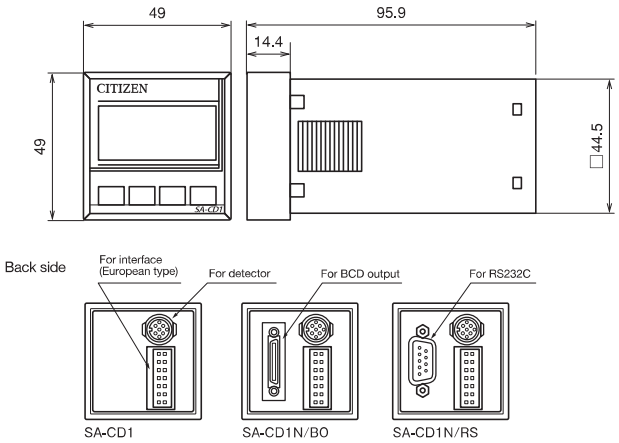

| Model | SA-ERS |
|---|---|
| Compatible controller | SA-SD□ |
| Number of units that can be connected | Up to 15 units (1 master unit and 14 slave units) can be connected to one SA-ERS. |
| Electric characteristics | EIA RS-485-compliant |
| Communication system | Two-wire half-duplex system |
| Communication protocol | MODBUS (RTU/ASCII)/MEWTOCOL-COM *1 |
| Power supply voltage*2 | 24 VDC (±10%) |
| Consumption current | 40 mA or less |

*1 MEWTOCOL is a registered trademark of Panasonic Industrial Devices SUNX Co., Ltd.
*2 Power is supplied from the controller (master unit) connected.

| Model | SA-ECL | | | | |
|---|---|---|---|---|---|
| Compatible controller | SA-SD□ | | | | |
| Number of units that can be connected | Up to 15 controllers (1 master unit and 14 slave units) per one SA-ECL | | | | |
| Power supply voltage*1 | 24 VDC ± 10%, including a ripple voltage of 0.5 V (P-P) | | | | |
| Consumption current | 80 mA or less | | | | |
| Communication system | CC-Link ver. 1.10 / Ver. 2.00, switching type | | | | |
| Remote station type | Remote device station | | | | |
| Number of stations occupied | CC-Link ver. 1.10: 4 stations / Ver. 2.00: 2 stations, switching type | | | | |
| Station number setting | 1 to 64 (An error occurs if the station number is set to 0 or 65 or more.) | | | | |
| Communication speed | 156 kbps | 625 kbps | 2.5 Mbps | 5 Mbps | 10 Mbps |
| Maximum transmission distance | 1,200 m | 900 m | 400 m | 160 m | 100 m |
| Operating ambient temperature | -10°C to +45°C (No dew condensation allowed.) When in storage: -20 to +60°C | | | | |
| Operating ambient humidity | 35 to 85%RH. When in storage: 35 to 85%RH. | | | | |
| Material | Main unit case: PC | | | | |
| Mass | Approx. 80 g | | | | |

*1 Power is supplied from the connected controller (master unit).

# SA-CD1N

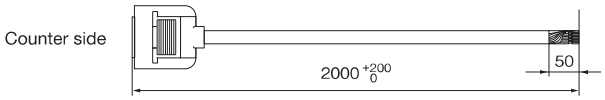



| Model | | SA-CD1N | SA-CD1N/BO | SA-CD1N/RS |
|---|---|---|---|---|
| Display | | LCD with green/red backlight that displays polarity, 6-digit value, and mode | | |
| Display resolution*1 | | 0.1µm / 1µm / 10µm | | |
| Display range | | -99.9999–99.9999 mm | | |
| Input and output | I/O | ○ (-NG / OK / +NG / ****) | | |
| | BCD | — | ○ | — |
| | RS-232C | — | — | ○ |
| Number of detector inputs | | 1 ch | | |
| Data hold method | | Data hold with external signals | | |
| Sorting function | | 7-level display (Up to 7 types can be registered.) | | |
| Peak measurement | | Maximum, minimum, maximum – minimum, maximum – minimum/2 | | |
| Power supply voltage | | 12–24 VDC (±10%) | | |
| Consumption current | | 200 mA or less (when the sensor head is connected) | | |
| Accessories | | Panel mount frame | | |
| Dedicated options (Purchase separately) | | — | Cable with BDC output connector SA-CD-BO2M | RS232C cable*2 SA-DC-RS2M |

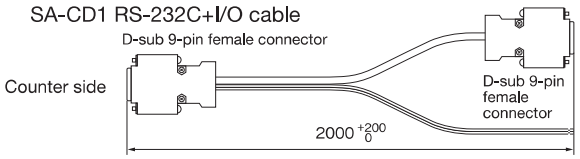
*1 Depends on the accuracy of the sensor head used.
*2 If EXT RS IN (trigger) is not needed, a commercially available interlink cable can be used.

## SA-CD1 External I/O interface cable (optional)

### SA-CD1 BCD cable



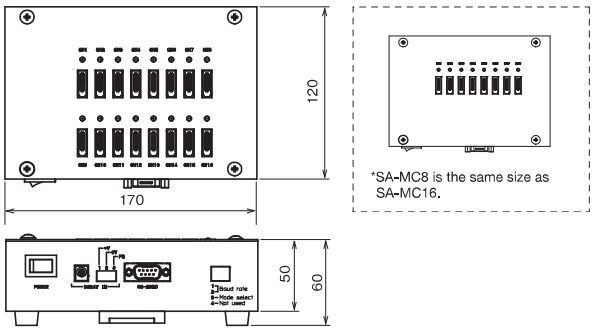

### SA-CD1 RS-232C+I/O cable




* If EXT RS IN (trigger input) is not needed, a commercially available interlink cable can be used.

# SA-MC8 / MC16

SA-MC16




| Model | SA-MC8 | SA-MC16 |
|---|---|---|
| Display | LED for indicating the status of each channel | |
| Resolution*1 | 0.1 µm | |
| Display range | -99.9999–99.9999 mm | |
| Number of sensor head inputs | 8 ch | 16 ch |
| External output | Equipped with RS-232C (measurement data output) | |
| Power supply voltage | 24 VDC (±10%) | |
| Consumption current | 500 mA or less (when the sensor head is connected) | |

*1 Depends on the accuracy of the sensor head used.

# SA Series Lineup

| Product name / Resolution/stroke | | Model |
|---|---|---|
| Sensor head | 0.1 µm, 10 mm | SA-S110 |
| | 0.5 µm, 10 mm | SA-S510 |
| | 0.1 µm, low measuring force | SA-S110/03N |
| | 0.5 µm, low measuring force | SA-S510/03N |
| | 0.5 µm, 32 mm | SA-S532 |

| Product name / Type_transistor type_terminal | | Model |
|---|---|---|
| Controller | Master unit_NPN | SA-SD1AP |
| | Master unit_PNP | SA-SD1AP-P |
| | Slave unit_NPN_ANIO | SA-SD1AC |
| | Slave unit_PNP_ANIO | SA-SD1AC-P |
| | Slave unit_NPN_IO | SA-SD1C |
| | Slave unit_PNP_IO | SA-SD1C-P |
| | Slave unit | SA-SDNC |

| Product name / Connector shape_length | | Model |
|---|---|---|
| Cable<br>For SA-SD | Straight_2M | SA-SD-SH2M |
| | Straight_5M | SA-SD-SH5M |
| | Straight_10M | SA-SD-SH10M |
| | L-shaped_2M | SA-SD-SHL2M |
| | L-shaped_5M | SA-SD-SHL5M |
| | L-shaped_10M | SA-SD-SHL10M |

| Product name / Communication system | | Model |
|---|---|---|
| Communication unit for SA-SD | RS485 unit | SA-ERS |

| Product name / Communication system | | Model |
|---|---|---|
| Communication unit for SA-SD | CC-Link unit | SA-ECL |

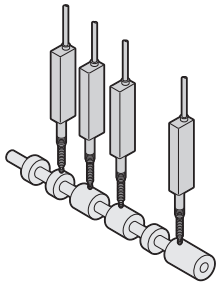
| Product name / Output terminal | | Model |
|---|---|---|
| Controller | STD | SA-CD1N |
| | BCD | SA-CD1N/BO |
| | RS0232C | SA-CD1N/RS |

| Product name / Connector shape_length | | Model |
|---|---|---|
| Cable<br>For SA-CD1N | Straight_2M | SA-CD-SH2M |
| | Straight_5M | SA-CD-SH5M |
| | Straight_10M | SA-CD-SH10M |
| | L-shaped_2M | SA-CD-SHL2M |
| | L-shaped_5M | SA-CD-SHL5M |
| | L-shaped_10M | SA-CD-SHL10M |

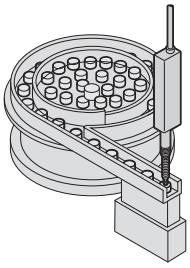
| Product name | | Model |
|---|---|---|
| AC power supply for SA-CD1N | AC power supply | AC-001 |

| Product name / Number of input channels | | Model |
|---|---|---|
| Controller<br>(multi-channel) | 8 ch | SA-MC8 |
| | 16 ch | SA-MC16 |

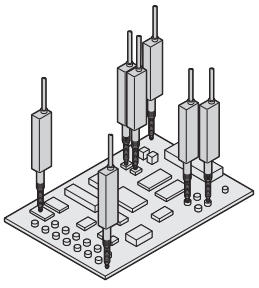
## Suitable for use in delicate, elaborate ultra-precision fields, such as automotive components, mobile device components, and computer components.



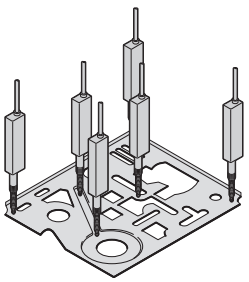
Resin parts with uneven surfaces



Mass-produced general-purpose parts



Multi-point measurement with high density layouts



Flexibility that allows use with complicated shapes

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*CC-Link is a registered trademark of Mitsubishi Electric Corporation, managed by CC-Link Partner Association.
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