Installation and Maintenance Manual
Electrostatic Sensor
*Series IZD10-*10*

Read this manual before using this product

- For future reference, please keep manual in a safe place.
- This manual should be read in conjunction with the current catalogue.

1 Safety

1.1 General recommendation

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by label of "**Caution**", "**Warning**" or "**Danger**".

This product is class A equipment that is intended for use in an industrial environment.

⚠ **DANGER**	DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious 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 low level of risk which, if not avoided, could result in minor or moderate injury.

⚠ WARNING

- **Do not service machinery/equipment or attempt to remove components until safety is confirmed.**
  - Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
  - When equipment is to be removed, confirm the safety process as mentioned above. Switch off air and electrical supplies and exhaust all residual compressed air in the system.

- **Contact SMC if the product is to be used in any of the following conditions:**
  - Conditions and environments beyond the given specifications, or if product is used outdoors.
  - Installations on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.
  - An application, which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

1.2 Specific recommendations

⚠ WARNING

(1) This product is intended for use in general factory automation systems.
Please consult SMC for other applications (especially any described in section 1 above).
(2) Maintain specified voltage and temperature range to avoid malfunction, damage, electric shock or fire.
(3) This product is not explosion proof.
Do not use in the presence of flammable or explosive gas.

⚠ CAUTION

(1) This product has not been cleaned. When using this product in a clean room environment, flush and confirm the product's purification level before use.
(2) Do not flush the detection hole with high pressure. High pressure flushing may deform the detection mechanism and disable the correct detection of charged potential, which leads to product failure.

2 Model Indication Method

IZD10 - [*] 10

Measuring range	
1	+/- 0.4kV
5	+/- 20kV

3 Intended Conditions of Use

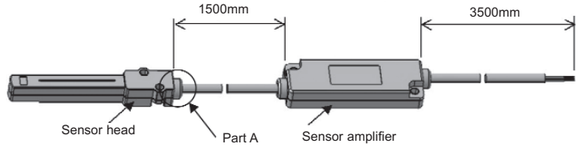
3.1 Specifications

Electrostatic sensor model no.	IZD10-110	IZD10-510
Measuring range	+/- 0.4kV (when detection distance 25 mm) NOTE 1	+/- 20kV (when detection distance 50 mm) NOTE 1
Output voltage	1 to 5V (Output impedance Approx. 100ohms)	
Effective detection distance	10 to 50mm	25 to 75mm
Linearity	+/- 5% F.S. (when 0 to 50°C, detection distance 25 mm)	+/- 5% F.S. (when 0 to 50°C, detection distance 50 mm)
Output delay time	Within 100ms	
Source voltage	DC24V +/-10%	
Power consumption	40mA or less	
Operating ambient temp.	0 to 50°C	
Operating ambient humidity	35 to 85%Rh (Non-condensing)	
Material	Case material : ABS Amplifier material : ABS	
Vibration resistance	Withstand 50Hz Fluctuation 1mm XYZ 2 hours for each	
Impact resistance	100m/s2	
Weight	185g (Including cable)	

NOTE 1: Relationship between measuring range and output voltage depends on detection distance. See the chart in "3.3 Output signal" for the details of this relationship.

3.2 Outline

The electrostatic sensor consists of a sensor head and sensor amplifier



There are 2 types of Electrostatic sensor as follows:

Model : IZD10-110

The purpose of this sensor is to confirm the static electricity elimination effect of the ionizer. The sensor is set so that the detected charged potential is output in a relatively small range of charged potential.

Refer to the drawing below for the sensor output voltage for a given level of charge when the distance between the sensor and measured subject is 25mm.

For identification the colour of Part A on the sensor head is equal to the sensor head.

Model : IZD10-510

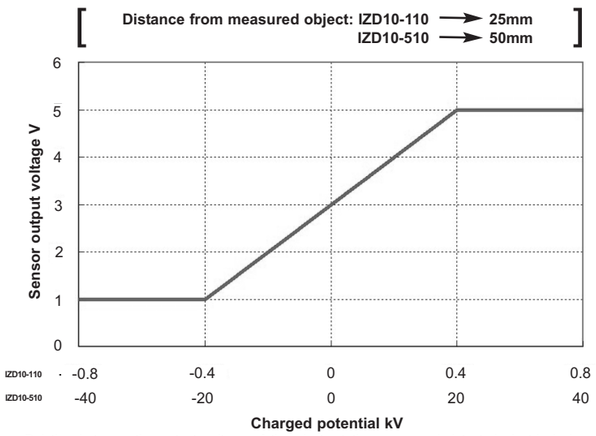
The purpose of this sensor is to confirm the potential of the charged object. Therefore, the sensor is set so that it detects the charged potential of high voltage.

Refer to the drawing below for the sensor output voltage for a given level of charge when the distance between the sensor and measured subject is 50mm.

For identification the colour of Part A on the sensor head is yellow.

Relationship between charged potential and sensor output

[Distance from measured object: IZD10-110 ⟶ 25mm
IZD10-510 ⟶ 50mm]



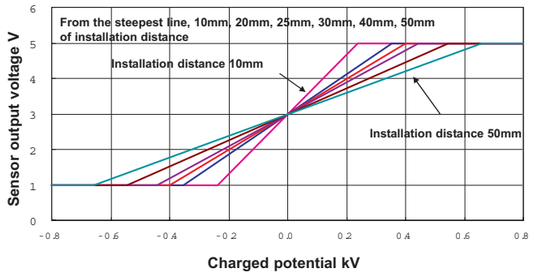
Relation between the output voltage of the electrostatic sensor and detected electrical charge depends on the distance between the sensor head and measured object. (See "3.3 Output signal" for the relation between the output voltage of the electrostatic sensor and detected charged potential based on installed distance.

3 Intended Conditions of Use (Continued)

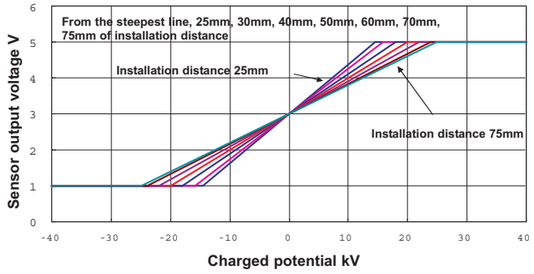
3.3 Output signal

When measuring an object with the electrostatic sensor, the voltage output for a particular level of charged potential varies with the sensor installation distance. See the chart below for the relationship. (Installation distance in the chart indicates the distance between measured object and the electrostatic sensor).

Sensor output vs. charged potential for differing installation distances IZD10-110

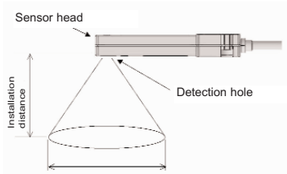


Sensor output vs. charged potential for differing installation distances IZD10-510



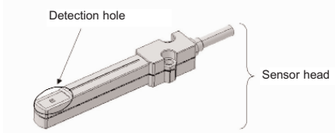
3.4 Detection range

Electrostatic sensor installation distance and detection range are shown below.



IZD10-110

Installation distance mm	Detection range mm
10	20
20	40
25	50
30	60
40	80
50	100

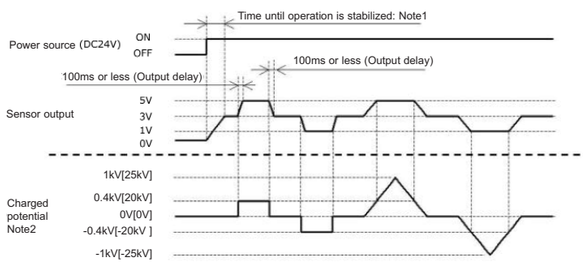


IZD10-510

Installation distance mm	Detection range mm
25	100
30	120
40	150
50	180
60	205
70	225
75	235

3.5 Timing chart

The chart below shows the timing charge when installation distance of IZD10-110 (distance form measured object) is 25mm. (50mm for IZD10-510)

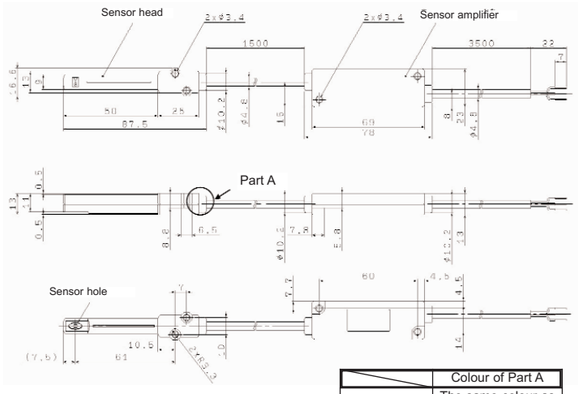


Note1: Although the sensor becomes operable one second after supplying the power, values may be unstable. It is recommended to wait for 10min. or longer before starting operation.

Note2: These values are for IZD10-110. The values in [ ] are for IZD10-510.

4 Outline with dimensions

Dimensions are common for IZD10-110 and IZD10-510



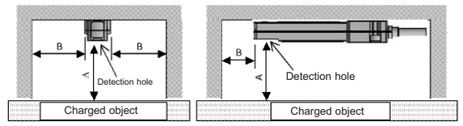
	Colour of Part A
IZD10-110	The same colour as sensor head
IZD10-510	Yellow

5 Installation

5.1 Mounting

⚠ CAUTION

(1) Install the electrostatic sensor away from any walls, refer to the drawing and table below for minimum installation distances.
Correct measurement of electrical potential will not be possible if the stated clearances are not maintained.



A	B
10	20
20	40
25	45
30	55
40	65
50	75
60	90
70	100
75	105

(2) After installation, confirm if charged potential is correctly measured.
Detected value of charged potential depends upon local installation conditions. Confirm these conditions before operation.

⚠ WARNING

- Do not install unless the safety instructions have been read and understood.

(1) Keep adequate space for maintenance and wiring when mounting.
Electrical entry of sensor shall have sufficient space for attachment/removal of cable after installation.
Do not bend the cable more than the minimum bend radius. This is to ensure that the mounting bases at any of the electrical entry points on the sensor or amplifier, are not overly stressed.
To avoid any acute bends in the cable, securely fix it as close to the sensor and amplifier as possible.
Stressed wiring can lead to malfunction, disconnection and even fire.
Minimum bend radius of sensor cable = 25mm.

Note: The bend radius is that allowed for fixed wiring at 20°C. If the cable is bent with the temperature below 20°C, then excess stress will be applied to the electrical entries of the sensor and amplifier units. Increased stress will be applied even if the bend radius is greater than the minimum allowed.

(2) Install only on a flat surface.
A curved or uneven mounting surface may cause excessive force to be applied to the frame or case, which may result in damage and failure.

(3) Do not drop or hit.
Do not drop, hit or apply excessive shock to the product.This may result in damage and failure.

(4) Do not use in areas subject to electrical noise
It may cause malfunction, deterioration or damage to internal components. Take measures to prevent noise at source and avoid power and signal lines from coming into close contact.

(5) Tighten with the specified torque
Refer to the following table for the correct tightening torque. If the tightening torque is exceeded the mounting screws and brackets may be broken. If the tightening torque is insufficient, the mounting screws and brackets may become loose.
For correct tightening torque, see section 5.5 Mounting.

(6) Do not allow any metallic objects to come into contact with the sensor detector head
Damage to the sensor may lead to improper performance or failure.

(7) Do not apply tape or seal to the product.
If conductive adhesive or reflective paint is contained in the tape or seal, it is possible that due to the dielectric effect, charge could build up causing an electro-static discharge or electrical leakage.

(8) Install or adjust the product only after power supply is turned off.

5 Installation (Continued)

5.2 Environment

⚠ WARNING

- Do not use in an environment where the product is directly exposed to corrosive gases, chemicals, salt water, water or steam.
- Do not use in an explosive atmosphere.
- The product should not be exposed to prolonged sunlight. Use a protective cover.
- Do not mount the product in a location where it is subject to strong vibrations and/or shock. Check the product specifications for above ratings.
- Do not mount the product in a location where it is exposed to radiant heat.

(1) Use only within the specified ambient temperature range

The operating ambient temperature range is 0 to 50°C. Rapid temperature changes can cause condensation to form, even if the ambient temperature does not exceed the operating temperature range. Do not use the device in such an environment.

(2) Environments to avoid

Do not use or store under the following conditions, as these may cause equipment failure:

- Ambient temperatures outside the range 0 to 50°C.
- Ambient humidity outside the range 35 to 85 % RH.
- Areas where rapid temperature changes may cause condensation.
- Areas where corrosive gas, flammable gas or other volatile flammable substances are stored.
- Areas where the product may be exposed to conductive powder such as iron powder or dust, oil mist, salt, organic solvent, machining chips, particles or cutting oil.
- Directly in the path of air conditioners.
- In enclosed, poorly ventilated areas.
- Exposed to direct sunlight and/or radiant heat.
- Areas where strong electromagnetic noise is generated, such as strong electrical and magnetic fields or supply voltage spikes.
- Areas where the product may be subject to electro-static discharge.
- Areas where RF noise is generated.
- Areas prone to lightning strikes.
- Areas where the product may receive direct impact or vibration.
- Areas where the product may be subject to forces or weight that could cause physical deformation.

If any of these conditions are unavoidable, take appropriate protection measures

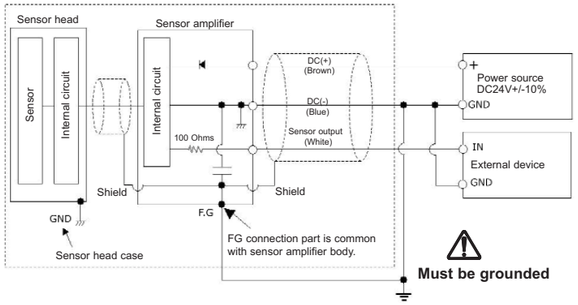
(3) This product is not immune to lightning strikes.

Protection against lightning should be provided for the device.

5.3 Electrical connection

Wire device according to the following circuit diagram and wiring table.

(1) Circuit diagram



The GND connection must be grounded to an earthing resistance of 100 ohms or less.

An exclusive power supply is recommended for the power to actuate the sensor. If other components are connected to this power supply when static electricity is discharged to the sensor head or noise interrupt GND, any connected component could malfunction or be damaged.

When cables for connecting external equipment are cut in short lengths, do not connect the shield line (Shield line is common with amplifier case. Frame ground should be connected to the amplifier case side).

(2) Wiring table

Lead wire colour	Description	Function
Brown	DC24V	Power supply DC24V
Blue	GND	Power supply 0V
White	Sensor output	1 to 5V analogue output

⚠ WARNING

(1) Ensure the power supply has adequate capacity to meet the specification.
(2) Only connect to SELV type power supplies, which have reinforced insulation to the low voltage mains of the building installation.
(3) Ensure safety of wiring and surrounding conditions before supplying power.
(4) Do not connect/remove wiring with power supplied to avoid malfunction of the electrostatic sensor. Remove power supply whenever altering the wiring (including plugging and removing the connector).
(5) Using signal lines and high voltage lines close together can lead to errors because of noise. Keep them separate.
(6) Ensure the wiring is correct before operation. Faulty wiring can lead to product damage and malfunction. Application of DC24V from the sensor output will cause damage to the internal circuit.

5 Installation (Continued)

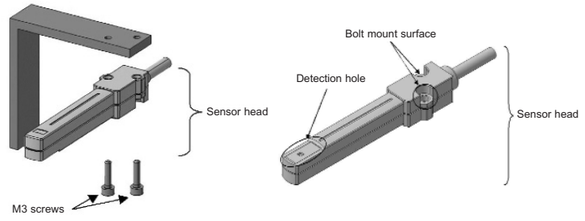
5.4 Mounting

5.4.1 Sensor head installation

When using the electrostatic sensor, install it so that the detection hole is within range of the object. Refer to 3.4 Detection range.

Note: The distance between the detection hole and inspected subject surface depends on the sensor model. Refer to 3.1.[Specifications]
The charged potential of the inspected subject may be discharged to the sensor head. Keep the subject and the sensor head apart when installing.
Discharge to the sensor head may lead to damage of the sensor head.
The output signal and detection range depend upon the installation distance, refer to 3.3 and 3.4.

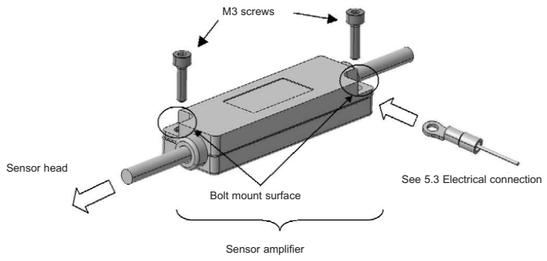
Use two M3 screws for mounting the sensor head (not supplied with electrostatic sensor).
Mate M3 bolt to the bolt mount surface. Mounting from the opposite side will cause damage to the sensor head.



Due to its construction, the case of the sensor head is common with GND. Care should be taken not to create a short circuit between the +24V power supply and case during installation.
The detection hole is open to enable the sensor to detect static electricity. If foreign material or objects enter the opening, the sensor could be damaged, rendering correct detection of static electricity impossible.
Do not pull the cable out of the sensor head, or twist it from the root of the head. If the cable is pulled or twisted with force, the sensor head may be disconnected or damaged.

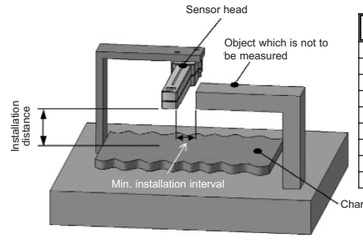
5.4.2 Installation of the sensor amplifier

(1) Mount the sensor amplifier with two M3 screws (not supplied with sensor amplifier).
Mate M3 bolt to the bolt mount surface. Mounting from the opposite side will cause damage to the sensor amplifier.
Recommended tightening torque for M3 screws: 0.61 to 0.63Nm
(2) Do not pull the cable out of the sensor amplifier, or twist it from the root of the amplifier. If the cable is pulled or twisted with force, the sensor amplifier may be disconnected or damaged.
(3) Sensor amplifier case is common with FG. It must be grounded with a resistance less than 100ohms.
(4) Recommended crimp terminal: Insulated crimp terminal manufactured by Nichifu, part number TMEV1.25-3



5.4.3 Cautions on installation

- If an object other than the one to be measured is placed close to the electrostatic sensor, the output of the sensor may become inaccurate. Any charge on the undesired object can interfere with the correct detection of the charge intended for measurement.
- Do not place any objects, including the electrostatic sensor cable, close to the detection hole.
- If another object must be installed near to the electrostatic sensor, ensure that the minimum installation interval, shown in the table below, is maintained.
- An insulating layer, such as paint or other surface treatment, must not cover any brackets used to fix the electrostatic sensor



Installation distance mm	Min. installation interval mm
10	20
20	40
25	45
30	55
40	65
50	75
60	90
70	100
75	105

5 Installation (Continued)

Due to its operating principle, the electrostatic sensor is influenced by electrical or electromagnetic fields.
If high current cables, transmitters, or wireless equipment are close to the sensor head, the ability to correctly detect the level of charge may be impaired. Avoid using the sensor where such items are present.

6 Maintenance

⚠ CAUTION

(1) Periodic inspection
Periodic inspection is necessary to ensure operation without failure. The sensor should only be inspected by experienced personnel with sufficient knowledge for the task.
(2) To avoid electric shock, failure, fire etc. do not service or modify the sensor.
Non-SMC serviced or modified product is not guaranteed to meet the published specification.

⚠ WARNING

- Failure to follow proper procedures may cause the product to malfunction and could lead to damage to other equipment or machinery.
- Do not make any modifications to the product
- Do not disassemble the product, unless required by installation or maintenance instructions.

7 Limitations of Use

⚠ WARNING

(1) Failure to follow proper procedures may cause the product to malfunction and cause damage to other equipment or machinery.
(2) Do not drop, hit or apply excess impact (10m/s^2 or more).
Even if the outside of the electrostatic sensor does not appear to be damaged, internal parts may be, resulting in malfunction.
(3) To avoid electric shock or other potential accidents, do not handle with wet hands.
(4) Wait for 10min. or longer after applying the power.
The detected value may be unstable immediately after supplying the power.

8 Contact

AUSTRIA	(43) 2262 62280	NETHERLANDS	(31) 20 531 8888
BELGIUM	(32) 3 355 1464	NORWAY	(47) 67 12 90 20
CZECH REP.	(420) 541 424 611	POLAND	(48) 22 211 9600
DENMARK	(45) 7025 2900	PORTUGAL	(351) 21 471 1880
FINLAND	(358) 207 513513	SLOVAKIA	(421) 2 444 56725
FRANCE	(33) 1 6476 1000	SLOVENIA	(386) 73 885 412
GERMANY	(49) 6103 4020	SPAIN	(34) 945 184 100
GREECE	(30) 210 271 7265	SWEDEN	(46) 8 603 1200
HUNGARY	(36) 23 511 390	SWITZERLAND	(41) 52 396 3131
IRELAND	(353) 1 403 9000	UNITED KINGDOM	(44) 1908 563888
ITALY	(39) 02 92711		

SMC Corporation

URL http://www.smcworld.com (Global) http://www.smceu.com (Europe)