



# Operation Manual

PRODUCT NAME

*Electrostatic Sensor*

MODEL / Series / Product Number

IZD10-\*10

**SMC Corporation**

# Contents

1. Safety Instruction .....	2
2. Outline .....	7
3. How to Order .....	8
4. Specification .....	8
5. Mounting.....	8
5-1. Electrostatic sensor installation .....	8
5-1-1. Sensor head installation .....	8
5-1-2. Installation of the sensor amplifier.....	9
5-2. Circuitry and wiring chart .....	10
6. Performance.....	11
6-1. Output signal.....	11
6-2. Detection range.....	12
6-3. Cautions on installation.....	12
6-4. Timing chart .....	13
7. Exterior dimensions.....	13



# 1. Safety Instruction

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)<sup>\*)</sup>, and other safety regulations.

\*) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components  
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components  
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements  
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots  
etc.



## **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**

### **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. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.**

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.



# 1. Safety Instructions

## Caution

**We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.**

**Use in non-manufacturing industries is not covered.**

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

The new Measurement Act prohibits use of any unit other than SI units in Japan.

## 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.\*2)  
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.

**\*2) 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 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.

## Selection

### Warning

- (1) This product is intended to be used for general FA equipment.
- (2) Keep specified voltage and temperature range to avoid malfunction, damage, electric shock and fire.
- (3) This product is not explosion proof.  
Don't use environment where explosion by particle is possible or containing flammable/explosive gas.

### Caution

- (1) This product is not cleaned. To bring it into a clean room, flushing for the product must be done for several minutes to ensure having necessary cleanness.
- (2) Do not flush the detect hole with high pressure.  
High pressure flushing may deform the detection mechanism which disables correct detection of charged potential, and lead to cause failure.

## Mounting

### Warning

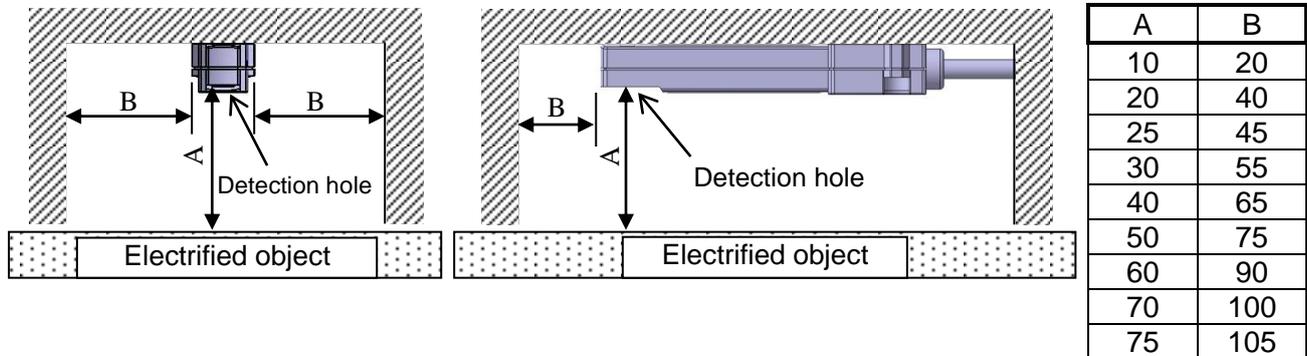
- (1) **Keep adequate space for maintenance and wiring when mounting.**  
Joint part with external component shall have space for attachment/removal of the cable after installation.  
Don't bend the cable more than min. bend radius so that the rood of cable entries, which are for the connect part for external component and the sensor head, and the amplifier, do not receive excess stress. Fix the cable as close to the products as possible to avoid bending with acute angle. Stressful wiring leads to cause malfunction, disconnection, and fire.  
Min. bend radius : Sensor cable - - - - 25mm  
(Note : Bend radius allowable for fixed wiring at 20°C. If bent under 20°C, excess stress will be applied to the entry of the cable at the joint part with external part or the sensor head, and the entry of amplifier cable even if the bend radius is larger than min. bend radius. )
- (2) Mount to the flat surface  
Mounting on uneven surface will apply excess force to the case which lead to cause damage or failure.
- (3) Do not drop nor hit  
Do not drop, hit nor apply impact to avoid malfunction and accident.
- (4) Do not used where noise(electromagnetic wave, surge, etc.) generated to avoid malfunction, deterioration and damage of internal element. Prepare solution against the noise and keep lines apart.
- (5) Keep tightening torque. (Tightening torque : See "5-1. Installation of electrostatic sensor".)  
Tightening with excessive torque lead to damage of set screws and set bracket. With inadequate torque, joint screws will be loosened.
- (6) Do not contact the sensor head detect surface with metal tools to avoid disabling functions and performances on the spec. , and failure and accident.

- (7) Do not apply tape/seal to the body to avoid electrification which disables correct detection of electrified potential.
- (8) Stop supplying the power to the electrostatic sensor during installation and adjustment.
- (9) Keep the distance for installation so that the sensor head is not charged. (See Effective inspection distance : "4. Specification")  
The sensor head may be charged depending on potential of the subject. Charging of sensor head may damage the sensor.

## ⚠ Caution

- (1) Install the electrostatic sensor apart from the wall(see drawing below).

Charged potential may not be measured correctly if walls exist in the range below.



- (2) After installation, confirm if electrified potential is correctly measured. (Unit: mm)  
Detected value of electrified potential depends on ambient installation conditions. Confirm detection condition of sensor electrified potential.

## Wiring / Piping

## ⚠ Warning

- (1) Ensure adequate electric capacity and voltage satisfying spec. value.
- (2) Only connect to SELV circuit type power supplies, which have reinforced insulation to the low voltage mains of the building installation. (SELV according to EN60950-1)
- (3) Ensure safety of wiring and surrounding conditions before supplying power.
- (4) Do not connect/remove wiring with power supplied to avoid the malfunction of the electrostatic sensor. Cut power supply whenever wires (including plugging and removing the connector).
- (5) Using power lines and high voltage line in one system causes malfunction due to noise. Use them separately.
- (6) Ensure no mistake on wiring before starting operation. Incorrect wiring lead to cause product damage and malfunction.  
Application of DC24V from the sensor output directly leads to the breakage of internal circuit.

## Operating / Storage environment

### Warning

- (1) Keep operating ambient temp. range  
Operating ambient temp. range is 0 to 50°C. Even if ambient temp. is within spec. range, environment with sharp temp. change will can form dew. Don't use it there.
- (2) Environment to avoid  
Do not operate nor store the product under following environment to avoid failure.
  - a. Ambient temp. is out of 0 to 50°C.
  - b. Ambient humidity is out of 35 to 85%RH.
  - c. Place with sudden sharp temp. change. which form dew.
  - d. Place containing corrosive gas, explosive gas, or volatile flammable object.
  - e. Atmosphere in which exposed to dust, conductive iron particle, oil mist, sodium, organic solvent, swarf, particles and cutting fluid(water, liquid).
  - f. Place exposed to direct sunlight or radiation heat.
  - g. Place generate strong noise(strong electric field, strong magnetic field, place generates surge).
  - h. Place generates static electricity discharge other than from the ionizer. Place where static electricity is charged to the sensor.
  - i. Please generates strong high frequency.
  - j. Place where thunder strike is possible.
  - k. Place applies direct vibration or impact to the sensor.
  - l. Condition where the sensor receive force or weight which deform the sensor.
- (3) Electrostatic sensor is not proof against electrical surges caused by lightning strike.  
Appropriate protection measures should be taken by the users.

## Maintenance

### Caution

- (1) Periodic inspection  
Periodic inspection is necessary to ensure operation without failure. Sensor shall be inspected by experienced person with adequate knowledge.
- (2) Do not overhaul nor modify to avoid electric shock, failure, fire, etc. Overhauled or modified product does not guarantee spec. function or performances.

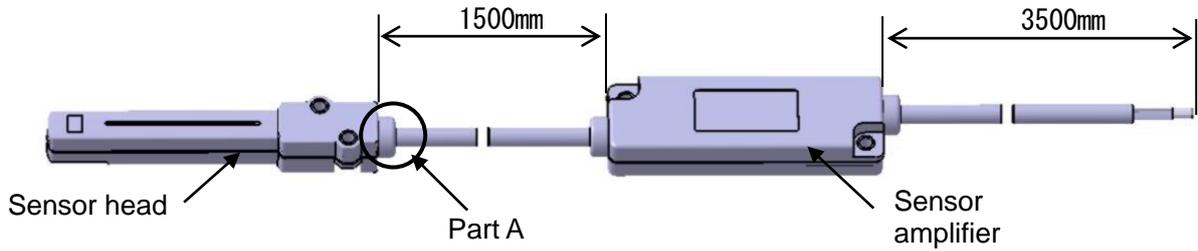
## Handling

### Warning

- (1) Do not drop, hit nor apply excess impact(100m/s<sup>2</sup> or more).  
Even if the appearance of electrostatic sensor is not damaged, internal parts will be damaged resulting in malfunction.
- (2) Don't handle with wet hand to avoid electric shock and accident.
- (3) Wait for 10min. or longer after applying the power.  
Detected value may be unstable right after supplying the power.
- (4) The direct-current power supply to combine should use UL authorization power supply which is the class 2 power supply based on UL1310 or the power supply is using the transformer of a class 2 based on UL1585.

## 2. Outline

Electrostatic sensor consists of the sensor head and sensor amplifier.



Electrostatic sensor has two types of sensors below.

### # Model : IZD10-110

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

Drawing below shows sensor output voltage when the distance between the sensor and measured subject is 25mm.

The color of the Part A is equal to the sensor head.

### # Model : IZD10-510

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

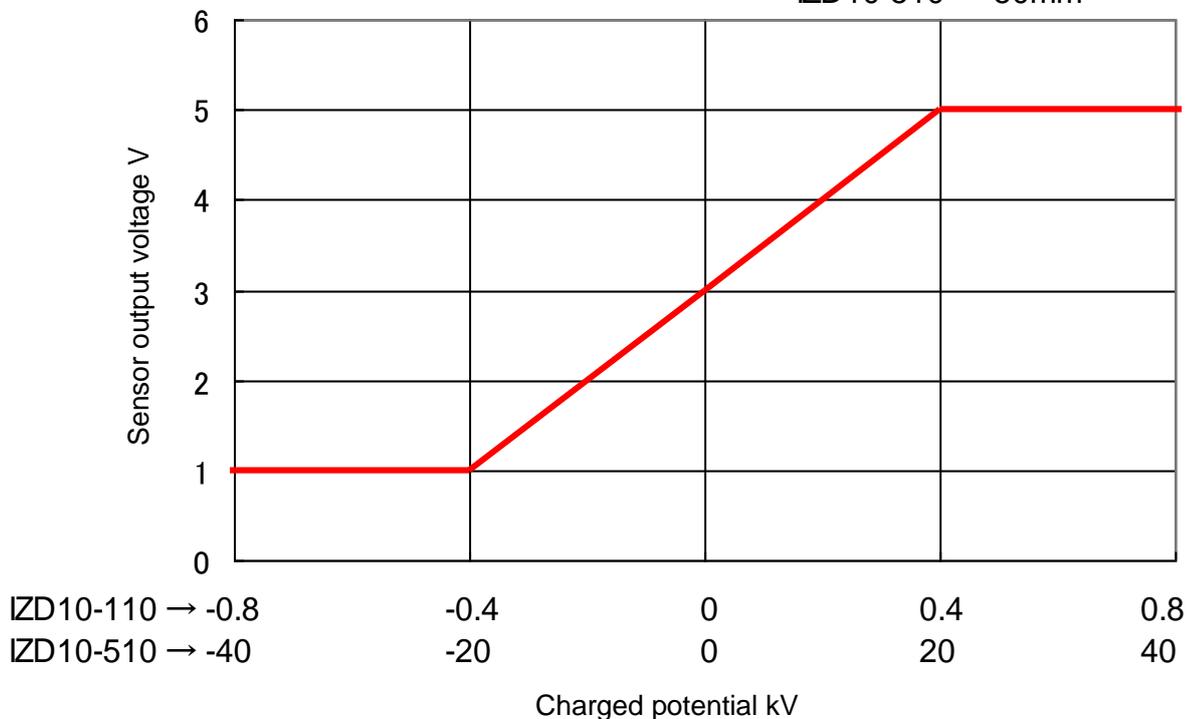
Drawing below shows sensor output voltage when the distance between the sensor and measured subject is 50mm.

The color of Part A on the sensor head is yellow.

### Relation of charged potential and sensor output

Distance from measured subject: IZD10-110 → 25mm

IZD10-510 → 50mm



Relation between the output voltage of the electrostatic sensor and detected charged electricity depends on the distance between the sensor head and measured object. (See "6-1 Output signal" for the relation between the output voltage of the electrostatic sensor and detected charged potential based on installed distance )

### 3. How to Order

IZD10 - \*10

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

### 4. Specification

Electrostatic sensor model no.	IZD10-110	IZD10-510
Measuring range	+/- 0.4kV (when detection distance 25mm)* 1	+/- 20kV (when detection distance 50mm)* 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 25mm)	+/- 5%F.S. (when 0 to 50°C, detection distance 50mm)
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 (No dew formed)	
Material	Head case:ABS Amplifier case:ABS	
Vibration resistance	Resisting 50Hz Fluctuation 1mm XYZ 2hours for each	
Impact resistance	100m/s <sup>2</sup>	
Weight	185g (Including cable weight)	
EN Standard Applicable Conditions	Protection Class:Class III equipment(according to EN60950-1) Environment:Pollution degree 3 Ce marking:Low Voltage Directive:73/23/EEC,93/68/EEC Only connect to SELV-type external circuits	
EMC Directive	89/336/EEC,92/31/EEC,93/68/EEC,2004/108/EC	

\*1 : Relation between measuring range and output voltage depends on detection distance. See the chart in "6-1 Output signal" for the relation between the detected potential and the output voltage based on detection distance.

### 5. Mounting

#### 5-1. Electrostatic sensor installation

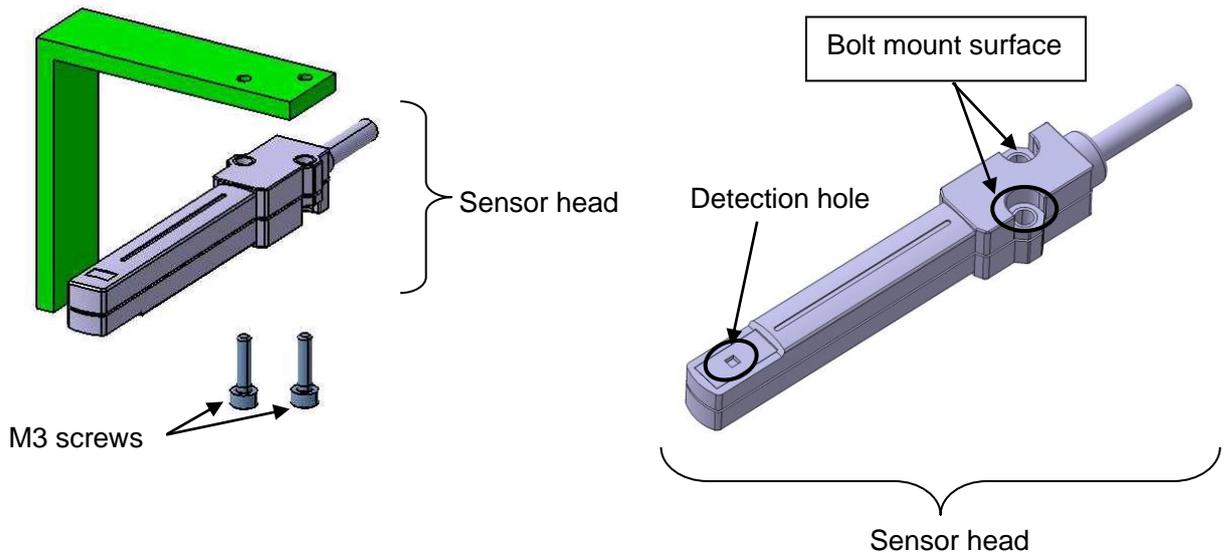
##### 5-1-1. Sensor head installation

When using the electrostatic sensor, install it to the place where the sensor head detection hole can detect the object. (See "6-2. Detection range")

[Note ] Pitch between the inspection hole and inspected subject surface depends on sensor model. Refer [4. Specifications] to avoid the hole from contacting the subject. Charged potential of inspected subject may be discharged to the sensor head. Keep the subject and the sensor head apart when installing. Discharge to the sensor head lead to cause damage of the sensor head. Output signal and detection range depend on installation distance. See 6-1, 6-2.

Use two M3 screws for mounting the sensor head(prepare separately).

Recommended tightening torque for M3 screw : 0.61 to 0.63Nm.



Mate M3 bolt to the bolt mount surface. Mounting from the opposite side leads to cause the breakage of the sensor head.

The sensor head body is common with GND due to the sensor structure. Attention should be taken not to short circuit +24V power source during installation and power supply.

Detection hole is closed to detect static electricity. If foreign material enter inside, and the hole is touched with operation tools, the sensor can be damaged or malfunctioning which disables correct detection of static electricity.

Do not pull the cable out of the sensor head, or turn it from the root of the head. They lead to cause the sensor head breakage or disconnection.

#### 5-1-2. Installation of the sensor amplifier

Mount the sensor amplifier with two M3 screws(prepare separately).

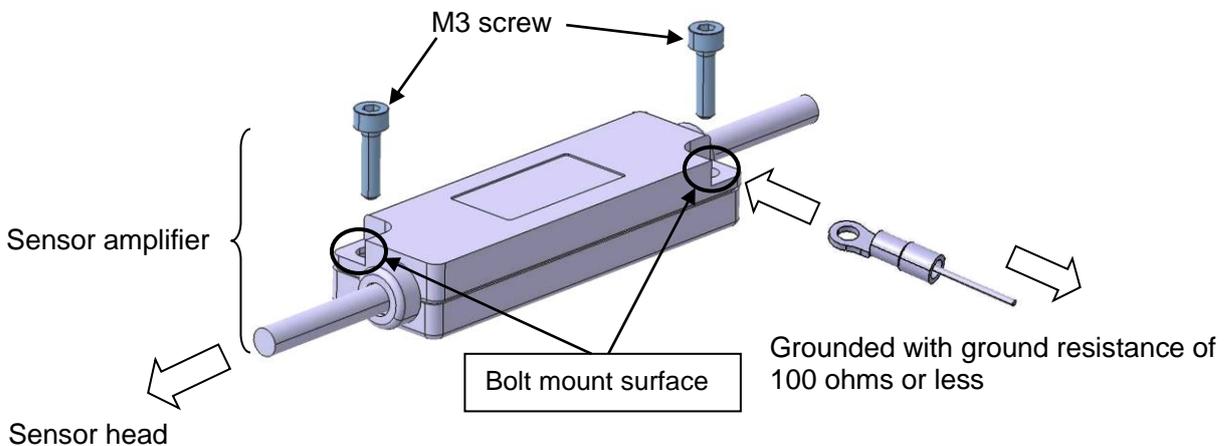
Recommended tightening torque for M3 screw. : 0.61 to 0.63Nm

Mate M3 bolt to the bolt mount surface. Mounting from the opposite side leads to cause the breakage of the sensor amplifier.

Do not pull the cable out of the sensor amplifier, or turn it from the root of the amplifier. They lead to cause the sensor amplifier breakage or disconnection.

Sensor amplifier case is common with FG. It shall be grounded with the ground resistance of 100ohms or less.

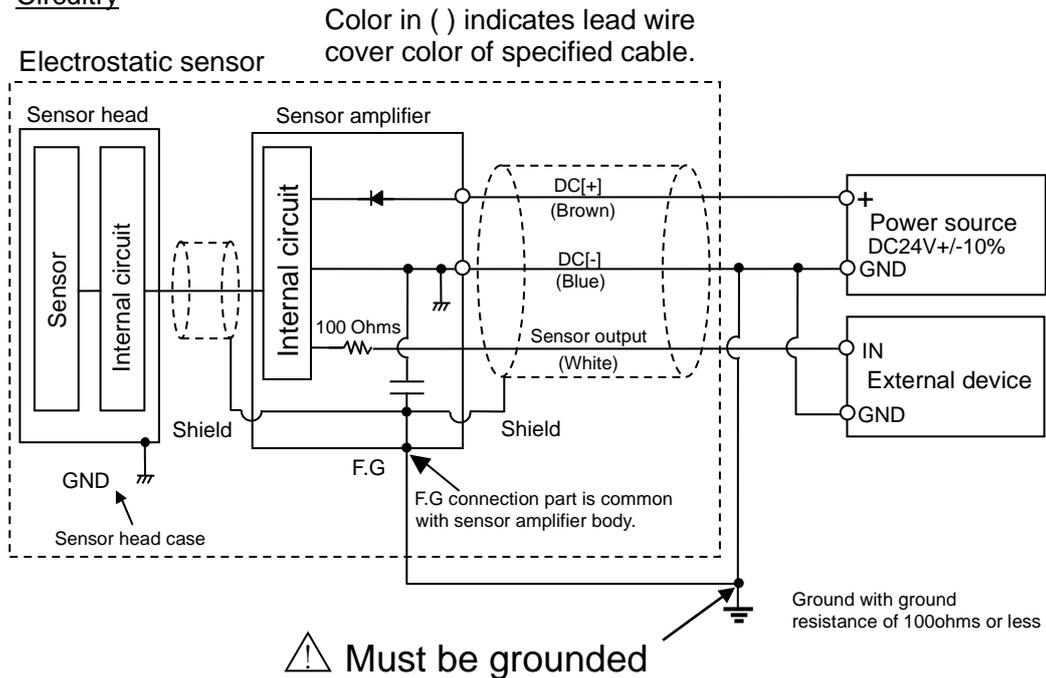
Recommended crimp terminal. : Crimp terminal with insulation coating made by Nichifu TMEV1.25-3.



## 5-2. Circuitry and wiring chart

Wire leads according to circuitry and wiring chart.

### (1) Circuitry



GND shall be grounded to earthing resistance of 100 ohms or less. 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, connected component could malfunction or be damaged.

When the cable for connecting external equipment is cut in short length, do not connect the shield line (Shield line is common with amplifier case. Frame ground shall be prepared with the amplifier case side).

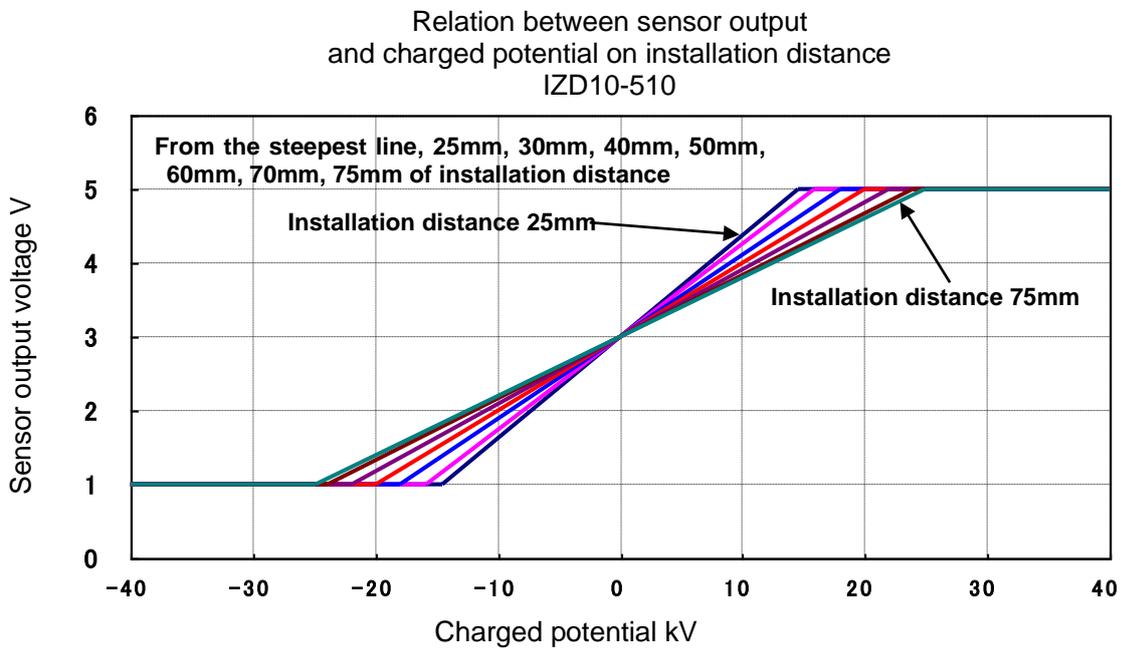
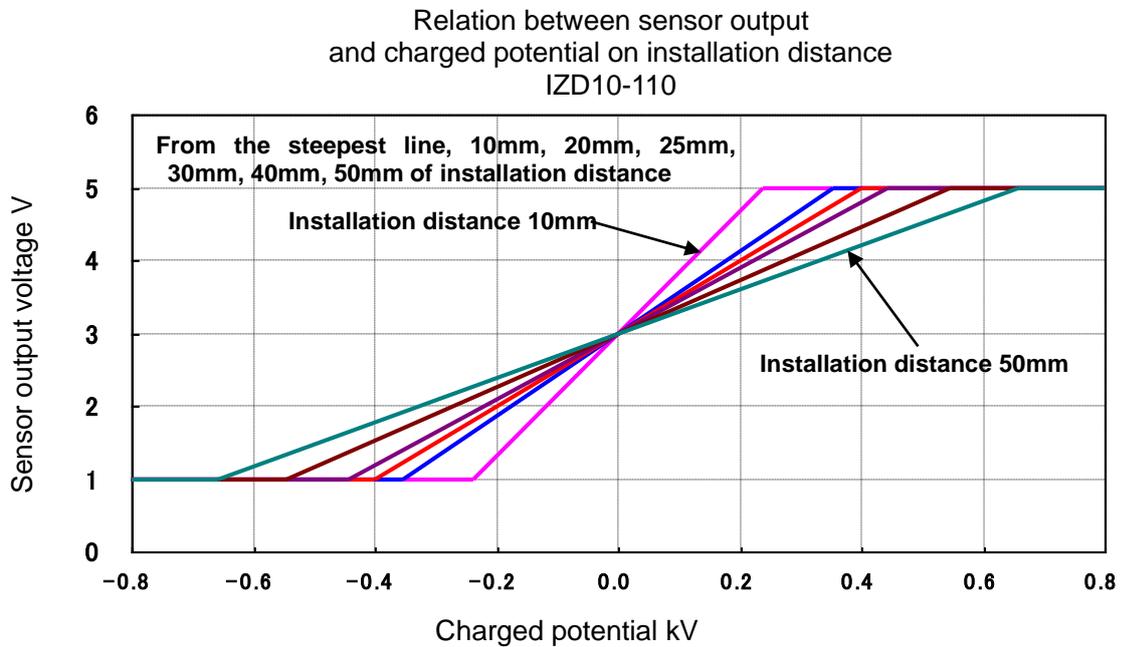
### (2) Wiring chart

Lead wire cover color	Meaning	Function
Brown	DC[+]	Power source DC24V
Blue	DC[-]	Power source 0V
White	Sensor output	1 to 5V analog output

## 6. Performance

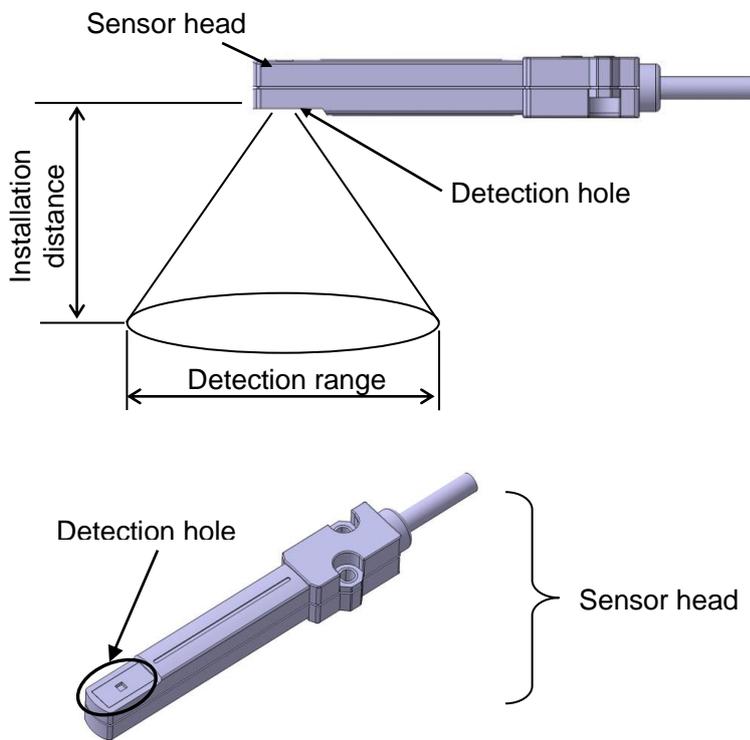
### 6-1. Output signal

When measuring the potential of charged object with electrostatic sensor, the relation between measured charged potential and output voltage depends on the sensor installation distance. See the chart below for the relation. (Installation distance in the chart indicates the distance between measured object and the electrostatic sensor.)



### 6-2. Detection range

Electrostatic sensor installation distance and detection range are shown below.



IZD10-110

Installation distance mm	Detection range mm
10	45
20	85
25	100
30	120
40	150
50	180

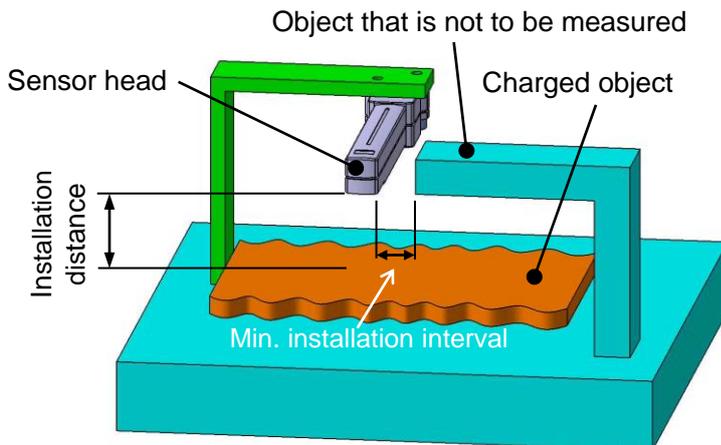
IZD10-510

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

### 6-3. Cautions on installation

When an object other than measured object is installed close to the electrostatic sensor, the sensor output can be different from actual value due to the effect of charged potential of installed object. Don't place the object, which is not to be measured, or the sensor head cable around the sensor detection hole. Brackets to fix the sensor shall not be covered with insulation layer such as paint or surface treatment.

When installing the object around the electrostatic sensor, keep the object which is not to be measured apart more than minimum installation interval in the table below.



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

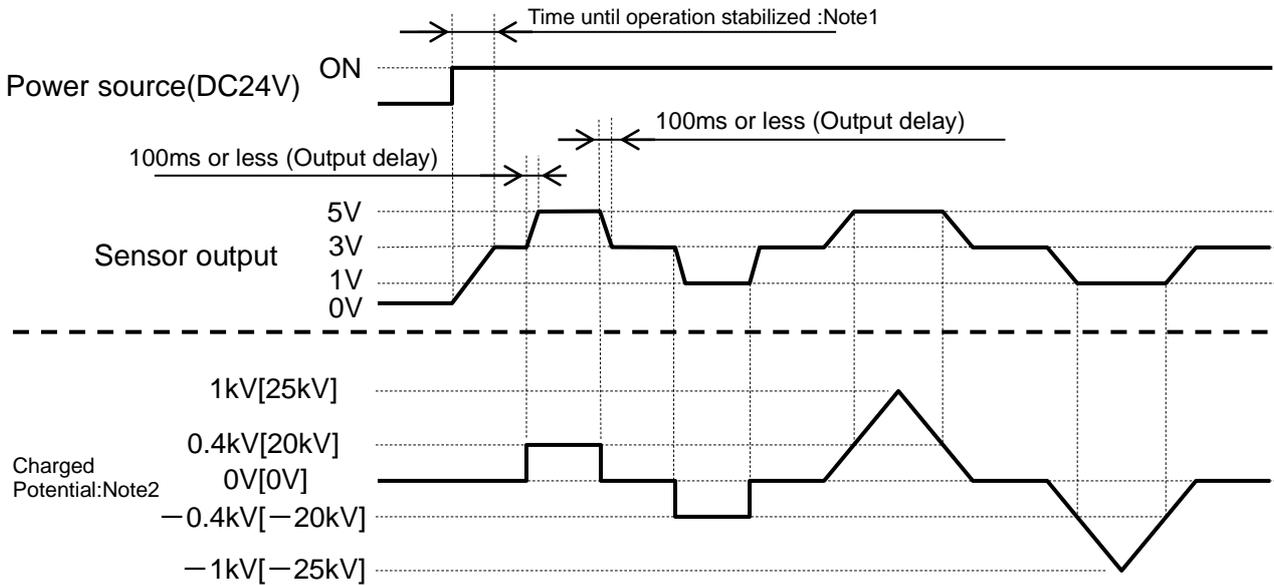
Electrostatic sensor is affected by electric field or electromagnetic field due to its operation principle.

If the cable, transmitter, or wireless equipment that carries large amount of current is present by the sensor head, correct detection of static electricity could be disabled.

Avoid using the sensor where those components are present.

### 6-4. Timing chart

Chart below shows the timing chart when installation distance of IZD10-110(distance from measured subject) is 25mm. (50mm for IZD10-510)

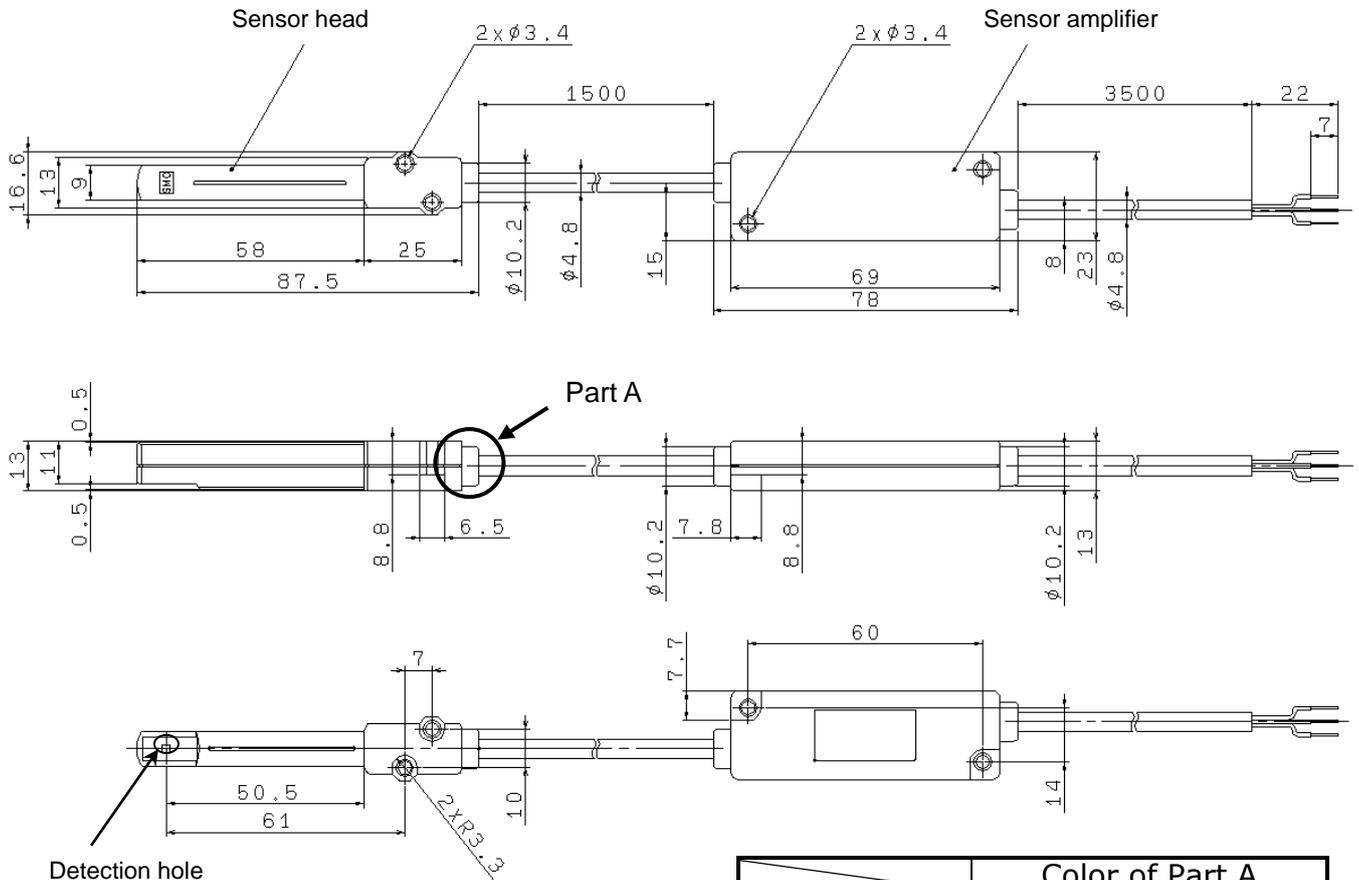


Note1: Although the sensor becomes operable one second after supplying the power, values may be unstable. It is recommended to wait for 10min. or longer for start operation.

Note 2: The case of IZD10-110. Value in [ ] shows the case of IZD10-510.

### 7. Exterior dimensions

Common in IZD10-110 and IZD10-510



	Color of Part A
IZD10-110	The same color as sensor head
IZD10-510	Yellow

#### Revision history

Revision A (October.30.2006)

Addition of IZD10-510.

Revision B (March.27.2024)

The Safety Instructions. (p2, p3)

The words deleted. (Please consult SMC for other application (esp. application described on (4) on previous page.) (p4)

The back cover. (p14)

## SMC Corporation

Tel: + 81 3 5207 8249 Fax: +81 3 5298 5362

URL <https://www.smcworld.com>

---

Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.  
© SMC Corporation All Rights Reserved