

## Intelligent Electrostatic Sensor

(The second generation)



# Using non-contact vibration capacitance electrostatic detection technology ...

## Intelligent Set the electrostatic alarm threshold

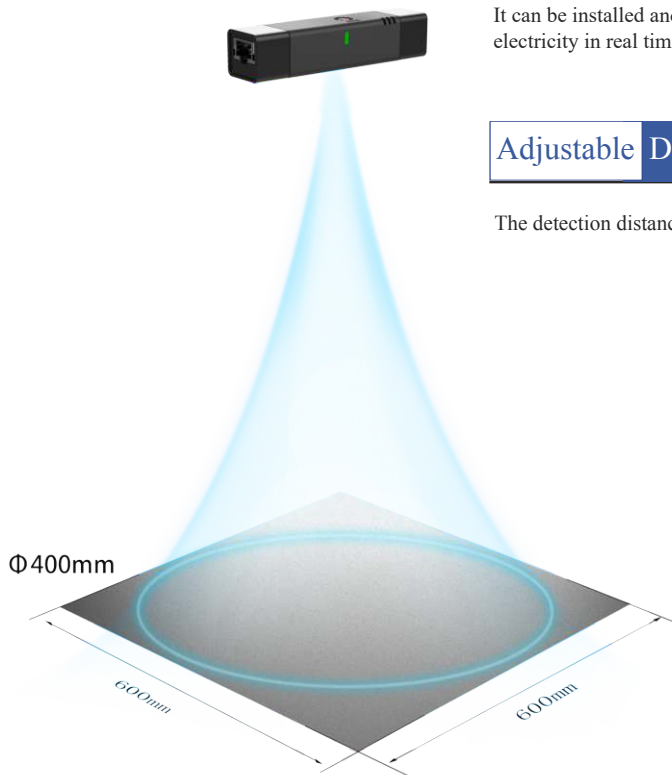
The electrostatic safety (alarm) threshold can be set by remote control or monitoring software. The red light will alarm if the threshold is exceeded while the threshold alarm indicator will be green if the threshold is within the electrostatic threshold,

## Online Detect static electricity online automatically

It can be installed and fixed above the object to be detected and detect the static electricity in real time.

## Adjustable Detection distance

The detection distance can be selected by the DIP switch.



## Closed loop Static electricity detection, monitoring, elimination

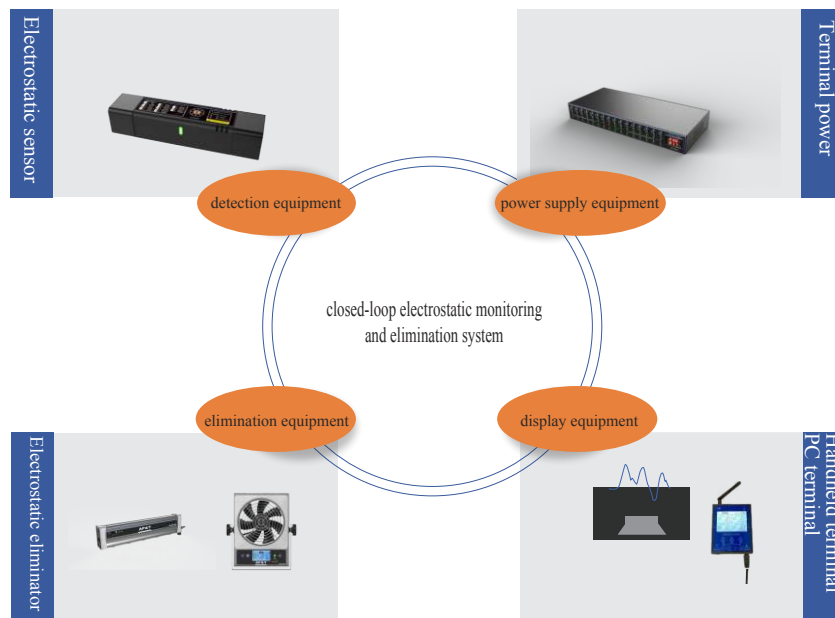
A closed-loop monitoring and elimination system is formed by electrostatic sensing detection equipment, electrostatic elimination equipment, power supply equipment, display equipment and IMS (ionization monitoring system) to realize automatic and unmanned electrostatic monitoring and elimination.

## Network Monitoring data is transmitted to PC in real time

The monitoring data is transmitted to the PC in real time, which can realize data storage and data collection.

# Closed-loop electrostatic detection, monitoring and elimination system ...

The closed-loop electrostatic monitoring and elimination system, formed by detection equipment, elimination equipment, power supply equipment, display equipment and IMS (Ionization Monitoring System), can realize real-time monitoring, data storage, and dynamic display under the control of system software to solve the long-term recording problems of electrostatic monitoring and data collection, which can be customized and developed according to the individual needs of customers, truly achieve increased production capacity, improved efficiency, automatic and intelligent electrostatic monitoring.



## Human VS Machine

Difficult to record paperless

ESD cannot be monitored online in real time

Data cannot be centrally managed

Unable to link alarm abnormally

Unable to control the source



Reduce people and increase efficiency

Online monitoring linkage control

Seamless connection with open protocols

Traceability to the source of non-performing rate

Low power consumption, environmental protection and energy saving

Systematize online intelligent monitoring

# Product specifications and technical functions ...

## Product specifications and technical functions

### 1) Technical Specifications:

| Specification one |                           |  |            |         |                   |             |        |
|-------------------|---------------------------|--|------------|---------|-------------------|-------------|--------|
| NO.               | Basic parameter           |  |            |         |                   |             |        |
| 1                 | Working voltage           | DC8-24V                                  |            |         |                   |             |        |
| 2                 | Working current           | < 50mA                                   |            |         |                   |             |        |
| 3                 | Sampling time             | About 1ms                                |            |         |                   |             |        |
| 4                 | Vibration                 | < 1KHz                                   |            |         |                   |             |        |
| 5                 | Noise                     | < 5dB                                    |            |         |                   |             |        |
| 6                 | Signal output             | RS485(115200bps,8,1,n,n) ( $\geq 20ms$ ) |            |         |                   |             |        |
|                   |                           | Collector open circuit (<50V/100mA)      |            |         |                   |             |        |
| 7                 | Network port definition   | 1、2                                      | 3          | 4       | 5、6、9             | 7           | 8      |
|                   |                           | White-orange/orange                      | White-blue | Blue    | White-green/green | White-brown | Brown  |
|                   |                           | VCC                                      | RS485_B    | RS485_A | GND、PE            | NPN-C1      | NPN-C2 |
| 8                 | Communication distance    | < 300m                                   |            |         |                   |             |        |
| 9                 | Alarm indication          | LED                                      |            |         |                   |             |        |
| 10                | Threshold setting range   | 0 ~ $\pm 5000V$                          |            |         |                   |             |        |
| 11                | Detection angle           | < 15°                                    |            |         |                   |             |        |
| 12                | Test plate size           | 600mm*600mm                              |            |         |                   |             |        |
| 13                | Startup test time         | 5S                                       |            |         |                   |             |        |
| 14                | Infrared controlled range | < 20°, 1m                                |            |         |                   |             |        |

※ Product specifications and performance may be changed due to product improvements and upgrades. Please refer to the actual product without prior notice.

### 2) The static voltage range and minimum resolution corresponding to each detection distance:

| Specification two |                 |                    |              |            |       |             |             |
|-------------------|-----------------|--------------------|--------------|------------|-------|-------------|-------------|
| Detection gear    | Distance coding | Detection distance | Range        | Resolution | Error | Zero runout | Calibration |
| 1                 | 0               | 5mm                | $\pm 2000V$  | 1V         | 10%   | $\pm 1V$    | ×           |
|                   | 1               | 10mm               | $\pm 4000V$  | 2V         |       | $\pm 2V$    |             |
| 2                 | 2               | 25mm               | $\pm 20000V$ | 10V        |       | $\pm 10V$   |             |
|                   | 3               | 50mm               | $\pm 20000V$ | 10V        |       | $\pm 10V$   |             |
| 3                 | 4               | 100mm              | $\pm 20000V$ | 10V        |       | $\pm 10V$   | √           |
|                   | 5               | 150mm              | $\pm 20000V$ | 10V        |       | $\pm 10V$   | ×           |
| 4                 | 6               | 200mm              | $\pm 20000V$ | 10V        |       | $\pm 10V$   |             |
|                   | 7               | 250mm              | $\pm 20000V$ | 10V        |       | $\pm 10V$   |             |
| 5                 | 8               | 300mm              | $\pm 20000V$ | 10V        |       | $\pm 10V$   | √           |
|                   | 9               | 350mm              | $\pm 20000V$ | 10V        |       | $\pm 10V$   | ×           |
| 6                 | A               | 400mm              | $\pm 20000V$ | 10V        |       | $\pm 10V$   |             |
|                   | B               | 450mm              | $\pm 20000V$ | 10V        |       | $\pm 10V$   |             |
| 7                 | C               | 500mm              | $\pm 20000V$ | 10V        |       | $\pm 10V$   | √           |
|                   | D               | 550mm              | $\pm 20000V$ | 10V        |       | $\pm 10V$   | ×           |
| 8                 | E               | 600mm              | $\pm 20000V$ | 10V        |       | $\pm 10V$   |             |
|                   | F               | 700mm              | $\pm 20000V$ | 10V        |       | $\pm 10V$   |             |

※ Product specifications and performance may be changed due to product improvements and upgrades. Please refer to the actual product without prior notice.

### 3) Infrared remote control command technology function:



#### Customer use

SRZ: reset  
 $V_{TH+}/V_{TH-}$ : Threshold adjustment in 10V unit

#### Unlock (unlock before debugging)

30s delay if any key is pressed after unlocking  
 Exit and re-locked if no key is pressed after unlocking

## Product Operation Technical Tips

- Aim at the LED on the front of the product during operation (the distance should not exceed 1m), first press the unlock key, and then press the corresponding function key to set, the red light flashes when the key is pressed.
- The calibration plate should be much larger than the sensor detection window, and the plate and sensor should be well grounded when performing zero adjustment.
- The calibration plate should be much larger than the sensor detection window, and the sensor should be well grounded when performing calibration.
- There should be no obstruction between the sensor and the detected object, otherwise the accuracy of the detection result will be affected.
- There should be no electrical equipment that may affect the sensor within the detection distance of the sensor.
- The plane of the sensor detection window must be parallel to the surface of the object to be measured to accurately measure charged objects.
- The measured value is smaller than the actual electrostatic value of the charged object when the charged object is smaller than the calibration plate.
- The measured value is larger than the actual electrostatic value of the charged object when the charged object is larger than the calibration plate.
- Do not adjust zero in the static charge state or in the electrostatic detection process (Non-electrostatic calibration process); the displayed static value will be zero if reset it during static electricity testing.
- Influence of temperature and humidity on electrostatic detection:

- ① The lower the temperature, the lower the humidity, the less moisture in the space, the easier the surrounding objects are to be electrified by friction, and the greater the interference to electrostatic detection.
  - ② The higher the temperature, the higher the humidity, the more moisture in the space, the more active the movement of water molecules, the more easily the calibration device generates corona or spark discharges, and the greater the impact on the uniform electric field generated by the calibration device which will weaken the uniform electric field.
  - ③ The lower the temperature, the less moisture in the space, the easier the surrounding objects are to be electrified by friction, and the greater the impact on electrostatic detection under the same humidity.
- Therefore, the ambient temperature and humidity during calibration/testing should be clearly marked when doing electrostatic calibration/testing.

- There will inevitably be more or less positive and negative ions in the detection space which will also have a certain impact on the detection results due to the existence of cosmic rays, trace radioactive substances in the environment, and the use of various electrical equipment.

## Monitor terminal display information

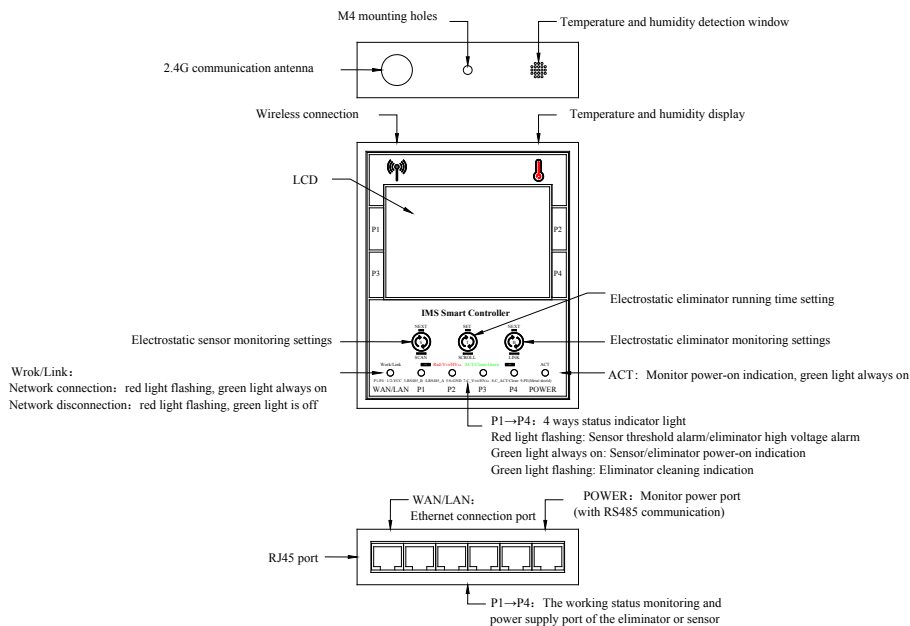
Working status: monitor whether the sensor is working normally and alarm output

Equipment Address: Display the address set by the sensor

Detection distance: Display the detection distance set by the electrostatic sensor

Threshold voltage: Displays the set static voltage safety (alarm) threshold

Real-time voltage: display the static voltage value on the surface of the measured object



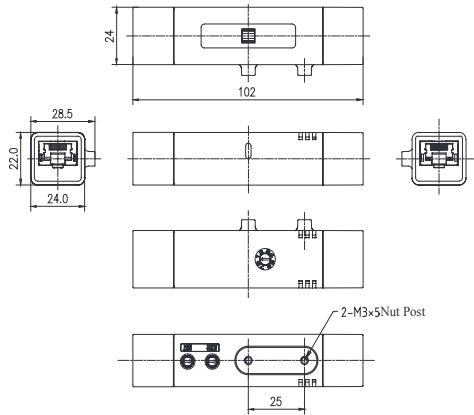
## Mechanical parameters

### ① Sensor mechanical parameters;

Dimensions: < 44\*33\*85mm (L\*W\*H)

Net weight: about 49.7g

The external dimension of the sensor is as follows;

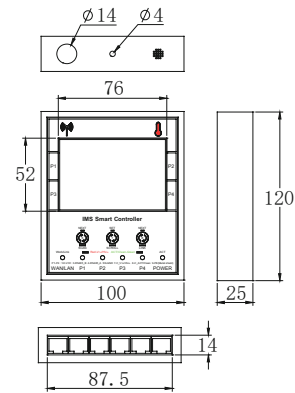


### ② Monitoring terminal mechanical parameters;

Dimensions: 102\*28.5\*22mm (L\*W\*H)

Monitoring terminal net weight: about 400g

The external dimension of the monitoring terminal is as follows;

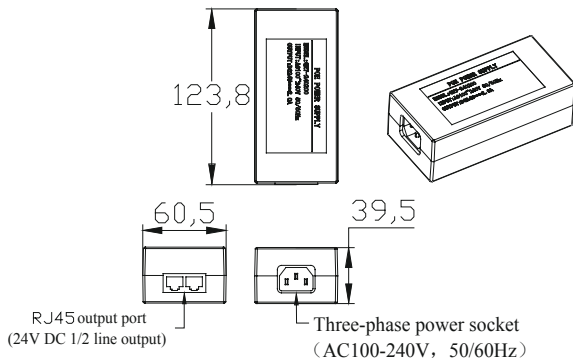


### ③ Adapter power mechanical parameters;

Dimensions: 124\*61\*40mm (L\*W\*H)

Adapter power net weight: about 234g

The external dimension of the adapter power is as follows;

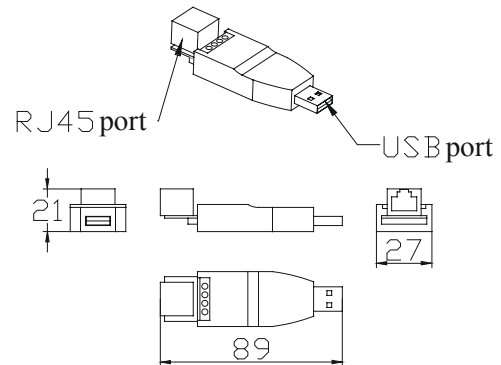


### ④ Communication converter mechanical Parameters;

Dimensions: < 90\*28\*22mm (L\*W\*H)

Communication converter net weight: about 20.5g

The external dimension of the communication converter is as follows;

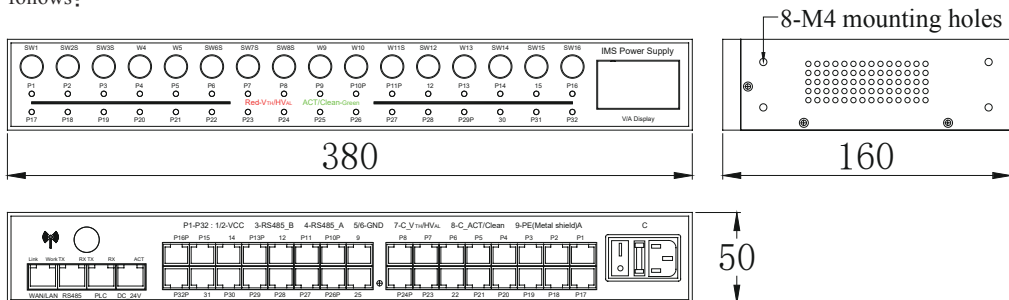


### ⑤ System integrated power supply mechanical parameters;

Dimensions: 380\*160\*50mm (L\*W\*H)

System integrated power supply net weight: about 2500g

The external dimension of the system integrated power supply is as follows;



# Product calibration ...

## Calibration environmental conditions

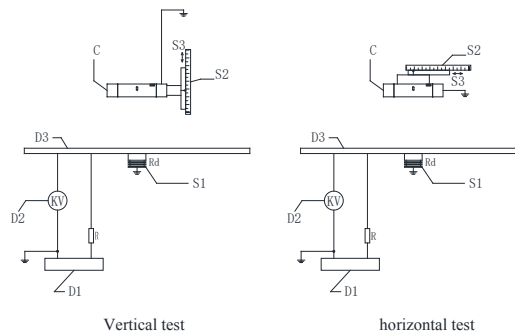
The calibration environmental conditions and requirements are as follows:

| NO. | Contents                  | Model and parameters  |
|-----|---------------------------|---|
| 1   | High voltage power supply | BERTAN_205B-20R   |
| 2   | Plate                     | Material: stainless steel, thickness: 1mm, length and width: 600mm*600mm  |
| 3   | Environment               | Dust-free room, temperature: 20°C—23°C, humidity: 40 % RH—45 % RH, there is no measurable electric field, magnetic field, positive and negative ions around |
| 4   | Device                    | The same standard device on both sides; ground wire, and the ground wire resistance is less than 1Ω   |

## Calibration equipment

The instruments and equipment used for calibration must be calibrated by a metrological technical institution, meet the requirements for calibration use, and be within the validity period.

The calibration equipment is mainly composed of: DC high voltage meter, DC high voltage power supply, standard plate electrode, distance regulator and so on. The sensor is located on the center line of the calibration plate, and the block diagram of the non-contact electrostatic voltmeter calibration device is as follows:



The equipment and device requirements are as follows:

C—calibrated product: electrostatic sensor;

D1—DC high voltage power supply: the output range is -20KV ~ +20KV, continuously adjustable, or the minimum step is 10V, and the measurement uncertainty is less than 1/4 of the allowable error limit of the calibrated meter;

D2—DC high voltage meter: the measurement range is -40KV ~ +40KV, and the measurement uncertainty is less than 1/4 of the allowable error limit of the calibrated meter;

D3—Standard plate electrode: the plate electrode should be round or square with rounded corners, and the radius of curvature of the electrode edge should not cause corona phenomenon; the area of the plate should be large enough, and the diameter or side length should not be less than 0.4m. The size of our calibration plate is 600mm\*600mm square stainless steel plate.

R—Protection resistance: The withstand voltage of the resistance should be > 20KV, the current passing through the protection resistance and the human body should be < 5mA, and the resistance value should meet the requirements of the following formula:

$$R/(R+R_d) < 0.1\%$$

In the formula: R is the protection resistance, the unit is ohm (Ω);

$R_d$  is the resistance of the insulating support, the unit is ohm (Ω), the resistance value is > 1013Ω, and the withstand voltage is > 25KV.

The different resistance values of the above two resistors may result in different static voltage values detected under the same standard voltage

S1—Insulation bracket.

S2—Scale, measuring range: 0mm ~ 750mm, measurement uncertainty less than 0.5mm.

S3—Distance regulator: The sensor is placed on the calibration device with the front end of the sensor extending. The geometry and material of the bracket should minimize the effect on the electric field distribution around the front end of the sensor.

# Product testing performance testing ...

The test is divided into vertical test and horizontal test. The schematic diagram 9 of the sensor test device is as follows:

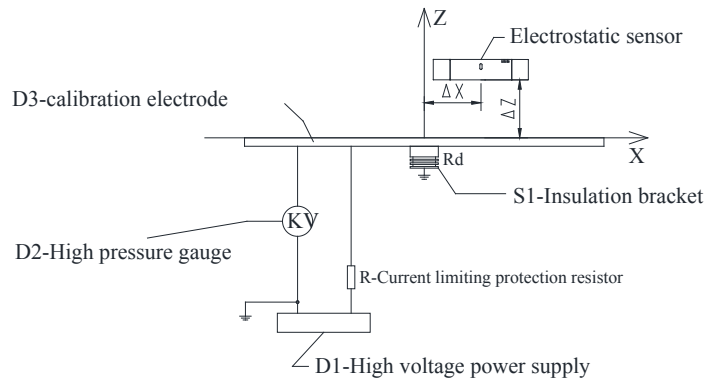


Figure 9 Schematic diagram of the sensor testing device

The vertical test data of the sensor and the standard plate electrode are as follows:

The static voltage values under 3 sets of test distances are detected. The standard plate electrode is 600mm\*600mm stainless steel electrode. The test distance is the distance between the surface of the plastic shell and the surface of the calibration plate electrode on the side of the electrostatic sensor detection window (the sensor was located directly above the center point of the calibration electrode). The light gray thick solid line in Figure 10 below is the calibration voltage line with a slope equal to 1. This calibration line is a virtual line, which is designed to mark the ideal situation where the measured voltage value of the sensor is exactly the same as the voltage value applied by the standard plate.

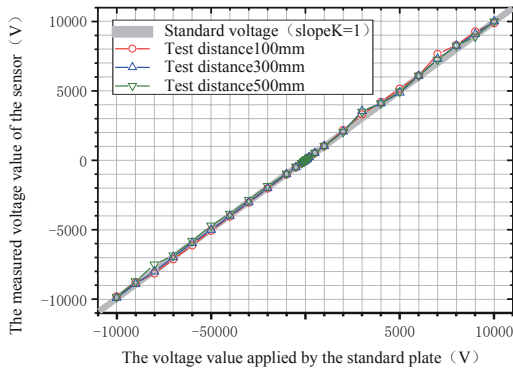


Figure 10-1 Vertical test data chart of standard plate electrode

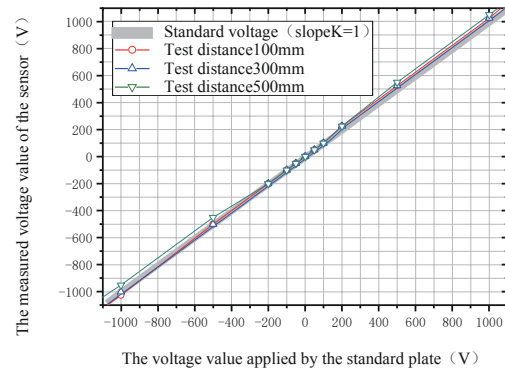


Figure 10-2 Vertical test data chart of standard plate electrode



The horizontal test data of the sensor and the standard plate electrode are as follows:

① Figure 11 shows the test data at different horizontal test distances under a vertical test distance of 500mm, the standard plate electrode of 600mm\*600mm stainless steel electrode, and the sensor with the center position of the calibration plate as the coordinate origin:

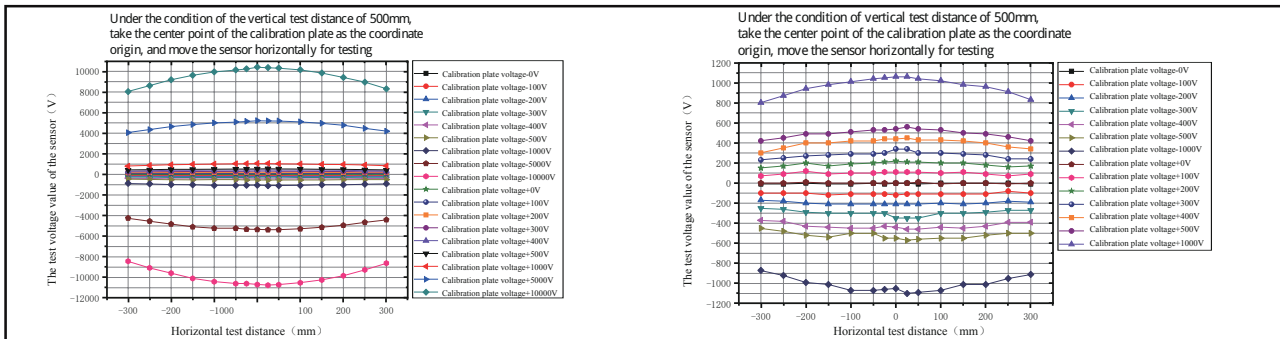


Figure 11-1 the horizontal test data of standard plate electrode at a vertical distance of 500mm

Figure 11-2 the horizontal test data of standard plate electrode at a vertical distance of 500mm

It can be seen from the above two horizontal test charts that the measurement error of the sensor can be kept within 5% within the horizontal distance range of  $-200\text{mm} \leq X \leq 200\text{mm}$  under the vertical test distance of 500mm for the 600\*600mm calibration plate.

② Figure 12 shows the test data at different horizontal test distances under a vertical test distance of 300mm, the standard plate electrode of 600mm\*600mm stainless steel electrode, and the sensor with the center position of the calibration plate as the coordinate origin:

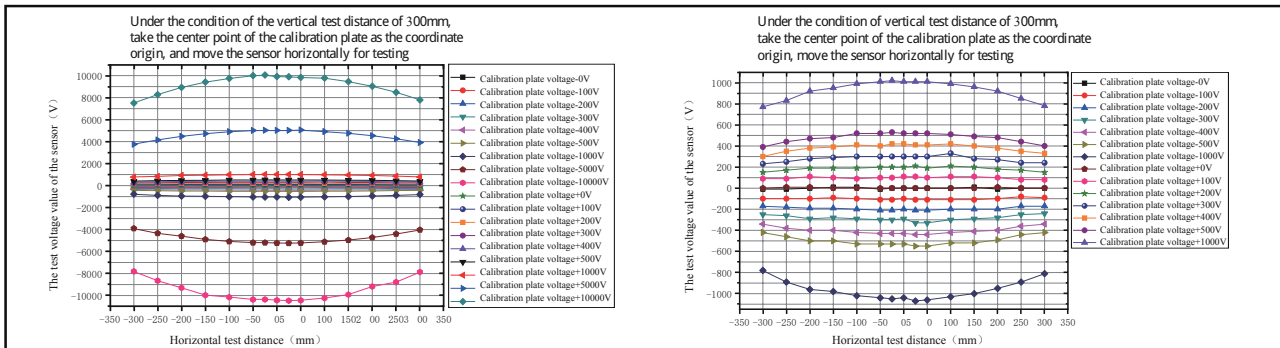


Figure 12-1 the horizontal test data of standard plate electrode at a vertical distance of 300mm

Figure 12-2 the horizontal test data of standard plate electrode at a vertical distance of 300mm

It can be seen from the above two horizontal test charts that the measurement error of the sensor can be kept within 5% within the horizontal distance range of  $-200\text{mm} \leq X \leq 200\text{mm}$  under the vertical test distance of 300mm for the 600\*600mm calibration plate.

③ Figure 13 shows the test data at different horizontal test distances under a vertical test distance of 100mm, the standard plate electrode of 600mm\*600mm stainless steel electrode, and the sensor with the center position of the calibration plate as the coordinate origin:

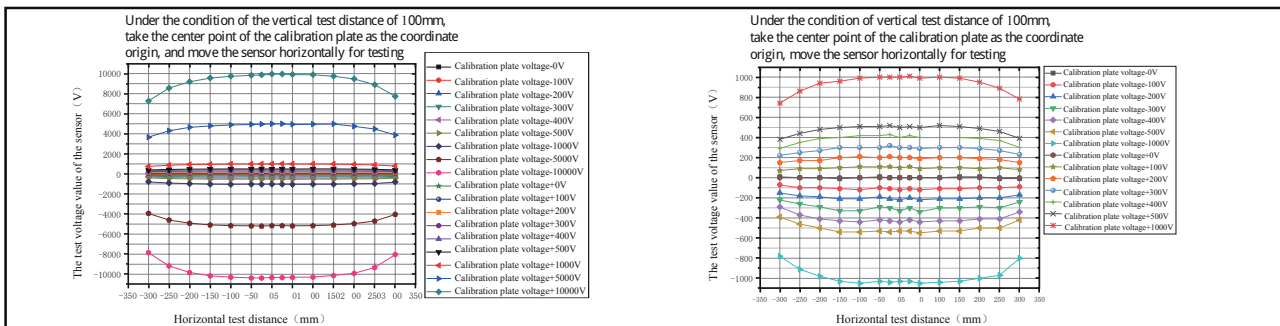


Figure 13-1 the horizontal test data of standard plate electrode at a vertical distance of 100mm

Figure 13-2 the horizontal test data of standard plate electrode at a vertical distance of 100mm

It can be seen from the above two horizontal test charts that the measurement error of the sensor can be kept within 5% within the horizontal distance range of  $-200\text{mm} \leq X \leq 200\text{mm}$  under the vertical test distance of 100mm for the 600\*600mm calibration plate.

# Operation and precautions...

## Instructions

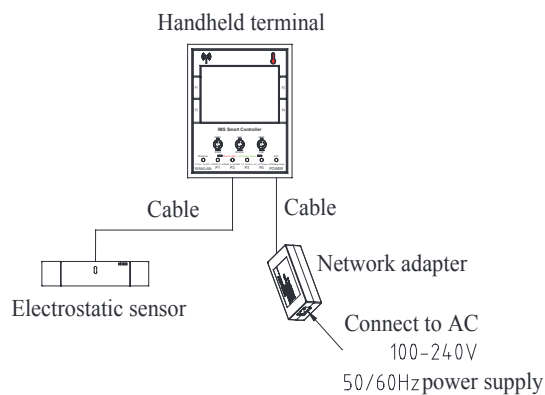
The plane of the electrostatic detection window of the sensor should be parallel to the surface of the object to be measured, and the detection distance (the standard detection distance specified above: 5mm, 10mm, 25mm, 50mm, 100mm, 150mm, 200mm, 250mm, 300mm, 350mm, 400mm, 450mm, 500mm, 550mm, 600mm, 700mm) and detection gear should be selected according to the amount of static electricity carried by the charged object and the use environment during using; the detection data displayed by the terminal is the most accurate at this point.

## On-line mode

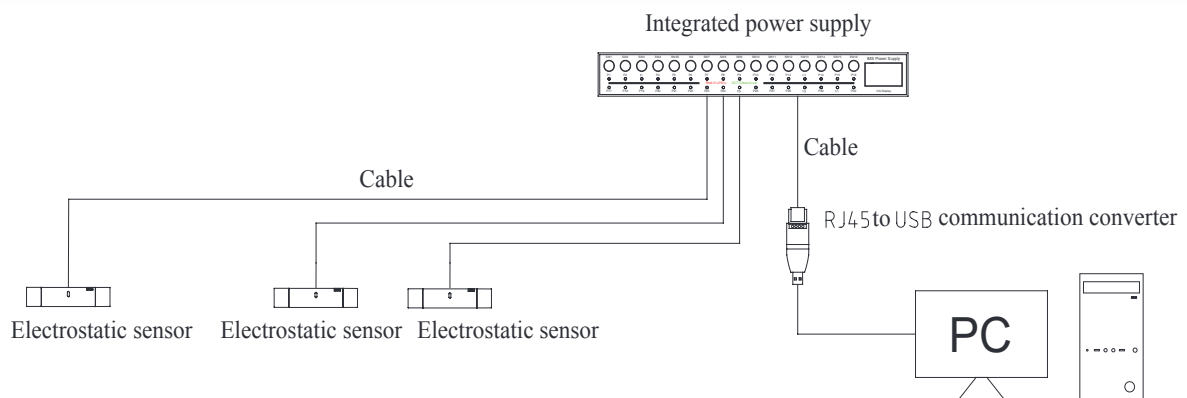
On-line mode: (Monitoring terminal, integrated power supply and communication software must be purchased separately. Please refer to the instruction manual of system monitoring terminal and system integrated power supply for comprehensive on-line mode )

These three network ports of the 24V power adapter, the monitoring terminal, and the electrostatic sensor are both power ports and communication ports which can be used in common.

## Connection to monitoring terminal

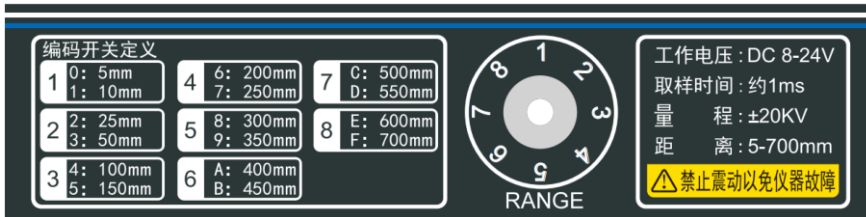


## Connection to PC



## Steps

Set the sensor detection parameters according to the sensor label description:



- ① Use a Phillips screwdriver with a diameter of 3mm to turn the "DIST" circular DIP switch to select the test distance according to the amount of static electricity carried by the charged object and the use environment.
- ② Toggle the "RANGE" circular DIP switch to select the detection gear according to the amount of static electricity carried by the charged object and the use environment.
- ③ Set the static electricity safety (alarm) threshold value through the remote control or monitoring software according to the withstand static voltage value of the protected product.  
Note: The threshold alarm indicator light is green when the detected static voltage value is within the set electrostatic threshold value while the light is red when it exceeds the set threshold value.
- ④ Use a Phillips screwdriver with a diameter of 3mm to turn the "ADDR" circular DIP switch to set the device address according to the production station.

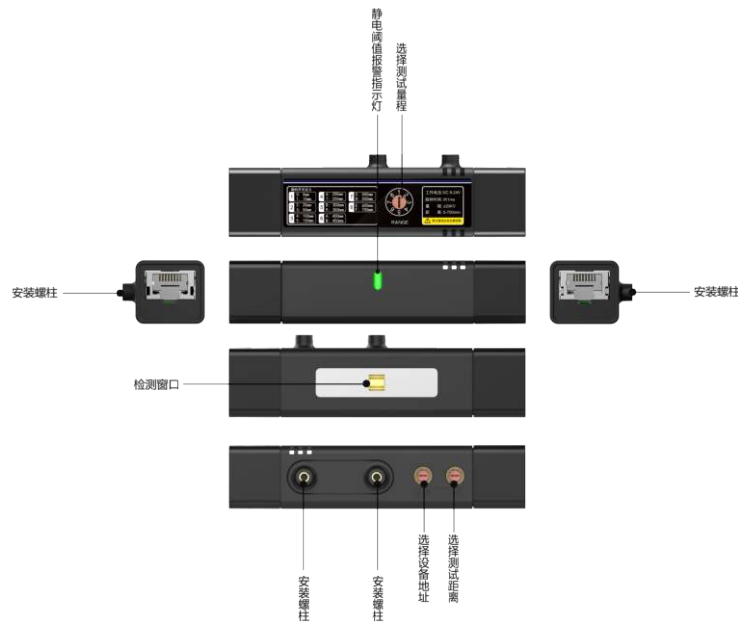


Figure 16 Schematic diagram of sensor function

## Installation



Figure 17 Schematic diagram of sensor installation orientation

### Working environment

Working temperature: 0°C → + 50°C  
Working humidity: 30 → 65%RH

## ▲ Installation and use precautions







### Precautions:

- Please read the operating instruction carefully before using the device in order to use it correctly.
- Please check the specifications of the power supply before powering on the product. Any power supply that does not meet the specifications may cause damage or even failure to the product.
- Please operate at the specified ambient temperature (0 to 50°C).
- Keep a distance of more than 1m between the people and the product to avoid the impact of human static electricity on the test during the test. Testers must wear electrostatic clothes, electrostatic caps and electrostatic shoes.
- The insertion depth of the  $\phi 5$  diameter stainless steel mounting rod must not exceed the position of the detection switch on the back of the sensor.
- The surface of the  $\phi 5$  diameter stainless steel mounting rod must not have insulating coating.
- Do not touch the electrostatic detection head during detection.
- Make sure that the sensor window is free from particulates and dust pollution.
- There should be no obstruction between the sensor and the detected object, otherwise the accuracy of the detection result will be affected.
- There should be no electrical equipment that affects the sensor within the detection distance of the sensor. Otherwise, the internal equipment and chip may be failed or damaged.
- The plane of the sensor detection window should be parallel to the surface of the object to be measured to measure charged objects accurately.
- 5 seconds of power connection before use. Otherwise, sometimes the data display will be unstable.
- The measured value is smaller than the actual electrostatic value of the charged object when the charged object is smaller than the calibration plate.
- The measured value is larger than the actual electrostatic value of the charged object when the charged object is larger than the calibration plate.
- Do not adjust zero in the state of static charge or during electrostatic measurement(non-electrostatic calibration process). The displayed static value may be zero if zero is set during static testing.
- Do not install the sensor around high-voltage equipment, such as high-voltage power supplies, electrostatic generators, ion generators, and eliminators. High voltages will affect the performance and detection accuracy of the sensor.
- Tighten the sensor when installing a high-vibration area; otherwise, data errors may occur.
- Please check the power cable or communication cable of the product regularly and replace it immediately if it is damaged. Otherwise it will easily cause problems such as leakage of electricity, poor communication, and abnormal work.
- It may cause failure when the product suffers from mechanical shocks such as drops, bumps, etc..

### Warning:

- The whole equipment must be reliably grounded during use; Otherwise, it is easy to cause abnormal or even damage.
- Do not use the equipment in inflammable and explosive environment.
- Do not touch the electrostatic detection window with sharp objects.
- The product is strictly prohibited to touch liquid during use, otherwise there will be abnormal, resulting in electric shock or fire.
- Exceeding the detection range may result in product failure.
- Power must be turned off during inspecting or replacing the product, otherwise it may cause electric shock or fire.
- Do not disassemble the detector which is a precision equipment.
- It is strictly forbidden to disassemble products without authorization. Internal maintenance and repair must be carried out by professional personnel.
- The product is specially designed for detecting static electricity on the surface of objects and is strictly prohibited for other purposes. Any abnormal use may machine failure, electric shock, fire and other hidden dangers.

## Sensor Accessories List

| Part name  | Standard or optional | Part No.  | Specification   | Picture   | Application  |
|--|----------------------|-----------|---|---|--|
| Black shielded network cable with crystal connectors at both ends (with bag) | Standard             | 8WXI00004 | Super five double shielded network cable  |  | Used to connect product power supply data interaction        |
| Power Adapter  | Standard             | AP2930003 | Input voltage: AC100-240V<br>Output voltage: DC24V<br>Output current: 2A<br>Output power: 48W |  | Used for product power supply data interaction               |
| National standard power cord   | Standard             | 8YXG25110 | Standard 1.8m,<br>Optional 3m/5m  |  | Used to connect adapters                                     |
| Black shielded network cable with single-ended crystal head -2.5m (with bag) | Optional             | 8WXI00002 | Super five double shielded single-ended network cable   |  | Used to connect to PLC/machine/ large slitting machine, etc. |
| Mounting brackets  | Standard             | AP8038012 | 40*39*2 waist hole diameter 5mm, round hole diameter 3.5                                      |  | Used to fix electrostatic sensors                            |
| Infrared remote control  | Standard             | AP2253002 | AP&T Three-in-one panel<br>L*W*H=85.76*39.76*6.66   |  | Used to adjust electrostatic sensors                         |

## Trouble shooting

| NO | Problems  | Reasons   | Solutions  |
|----|---|---|--|
| 1  | The power port indicator light is off   | Poor contact of the power cable   | Check whether the power cable is in good condition and securely connected  |
|    |   | Wrong power cable connection  | Check the power cord is connected correctly  |
|    |   | Power supply mismatch   | Confirm the power supply specification ( INPUT: 100—240VAC 50/60Hz; OUTPUT: 24VDC 2000mA )   |
| 2  | The measured static voltage value is abnormal or the error is too large   | Poor contact of sensor grounding  | Confirm the sensor is well grounded  |
|    |   | There are high voltage equipments, ionization equipments or strong electromagnetic equipments around the sensor | Remove high voltage equipments, ionizing equipments or strong electromagnetic equipments   |
|    |   | The range gear or detection distance is set incorrectly   | Refer to the gear range setting table  |
|    |   | Bearing set of sensor is improper   | Confirm the correct bearing set and refer to the precautions for operation and use   |
| 3  | The threshold alarm indicator green light is off  | —   | Return to factory for maintenance  |
| 4  | The threshold alarm indicator red light is off  | The set electrostatic threshold is larger or exceeds the range  | Refer to the gear range setting table to determine the static alarm threshold reasonably according to the use environment and static control requirements, |
| 5  | Product has an odor   | Component burn out  | Return to factory for maintenance  |
| 6  | Please contact the manufacturer or seller if there are other unlisted problems or the problem cannot be solved through the above solutions. |   |  |

## Maintenance

1. Please store the equipment in a dry place away from light and do not put heavy pressure on it when not in use in order to ensure the good performance of the product.
2. Do not vibrate the equipment strongly when using it which is a precision detector.

## After-sales service

AP-YV3303 intelligent electrostatic sensor has undergone rigorous testing and aging treatment before ex-work. Its performance has completely reached the relevant indicators marked in the usage instruction. AP&T makes a commitment to the customer that any defective parts inspected by AP&T will be repaired or replaced free of charge within one year from the date of purchase. However, this commitment does not apply to:

- 1、 The device is incorrectly used.;
  - 2、 Damage caused by negligence or accident during use;
  - 3、 Modified, disassembled or repaired by other service departments not authorized by Anping Company;
  - 4、 Faults are caused by external factors such as fire, earthquake, flood and abnormal voltage.
- AP&T shall not be liable for any incorrect use of the products except for repair or replacement of parts as specified above.

# AP&T®

AP&T

Professional electrostatic intelligent monitoring/analysis  
and elimination solution provider

## Speciality Creates Value

Shanghai Anping Static Technology Co.,Ltd

Tel : +86-21-64517676

Fax : +86-21-64517673

Postcode : 200233

Website : [www.ap-static.com](http://www.ap-static.com)

Address : 3/F,Building 27,No.69,Guiqing Road,Shanghai,China



AP&T