

AP&T®

Electrostatic Sensor

AP-YV3302H

Operating Instruction

Shanghai Anping Static Technology Co., Ltd.

Floor 3, Building 27, No. 69, Guijing Road, Shanghai, China

Tel: 021-64517676

Fax: 021-64517673

AP-YV3302H Electrostatic Sensor



I. Product Overview

AP-YV3302H electrostatic sensor is a detecting instrument developed and produced by Anping Company to detect the static voltage on the surface of an object with static electricity, which adopts the non-contact measurement technology to minimize the impact of the detecting instrument on the electrostatic field on the surface of the object and ensure the accuracy of measurement.

II. Scope of Application

It can be widely applied in the industries such as electronics, photoelectricity and plastics.

III. Product Features

1. With comfortable feel and beautiful appearance.
2. Detection distance can be selected via dial switch.
3. Wide detection potential range and high detection precision.
4. Alarm threshold can be set and red light alarm indicates exceeding threshold.
5. High-definition and all-dimensional LCD data display terminal.
6. Monitoring data can be transmitted to PC in real time.
7. Conformable for operation and convenient for use.

IV. Product Parameters and Technical Functions

1. Performance parameters
 - 1). Technical specifications:

No.	Technical specifications	
1	Working voltage	DC8-24V
2	Working current	<20mA
3	Vibration	<1KHz
4	Noise	<5dB
5	Signal output	RS485
		NPN (Collector control, 24/100mA)
6	Communication distance	<500m
7	Alarm indication	Red light LED
8	Threshold setting	±100V (default)
9	Alarm range	±50→±5000V
10	Detection angle	<15 °
11	Startup stand-by time	5s
12	Infrared control distance	1m

※ Due to the improvement and upgrading of the product, the specification and performance of the product may be changed; Subject to the real product and please understand that notice cannot be given in advance.

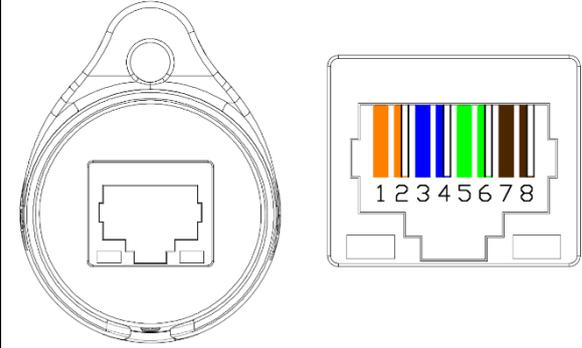
2). The measurement range of static voltage gear and minimum resolution corresponding to each measuring distance:

Detection gear	Detection distance coding	Detection distance	Measurement range	Resolution	Measuring error
1	0	5mm	±2000V	1V	5%
	1	10mm	±4000V	2V	
	2	25mm	±10000V	5V	
	3	50mm	±15000V	10V	
	4	100mm	±20000V	10V	
	5	150mm	±20000V	10V	
	6	200mm	±20000V	15V	
2	7	250mm	±20000V	20V	
	8	300mm	±20000V	10V	
	9	350mm	±20000V	15V	
	A	400mm	±20000V	15V	
3	B	450mm	±20000V	15V	
	C	500mm	±20000V	10V	
	D	550mm	±20000V	15V	
	E	600mm	±20000V	15V	
	F	700mm	±20000V	20V	

Notes: the accuracy of the measured static voltage cannot be guaranteed if the detection gear and distance coding are set incorrectly.

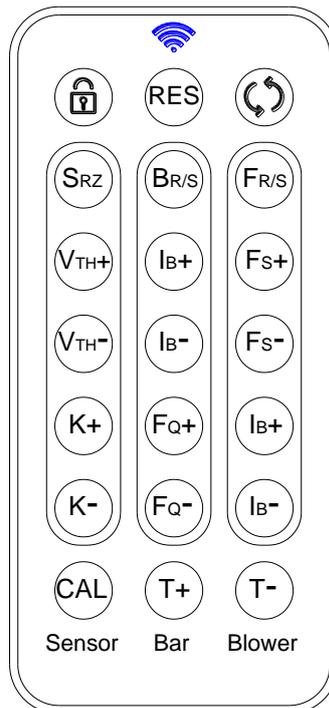
※ Due to the improvement and upgrading of the product, the specification and performance of the product may be changed; Subject to the real product and please understand that notice cannot be given in advance.

3). Wiring information of network port:

Network port			
	1. 2	Orange, white and orange	VCC
	3	Blue	RS485+B
	4	White and blue	RS485+A
	5. 6	Green, white and green	GND
	7	Brown	TTL-H
	8	White and brown	TTL-L
	9	Metallic shield shell	PE

※ Due to the improvement and upgrading of the product, the specification and performance of the product may be changed; Subject to the real product and please understand that notice cannot be given in advance.

4). Technological function of infrared remote control command:



For user:

S_{RZ} : reset zero

V_{TH+}/V_{TH-} : threshold adjustment with step unit 10V.

Unlock:

1. After unlocking, 30seconds delay for active if any button is pressed.
2. After unlocking, exit and lock againif there is no any button is pressed within 30 seconds

Explanatory Drawing of Remote Control

2. Prompts of operating technologies:

2.1. During operation, align with the front LED of the product (the distance is not more than 1m), press the unlock key at first, then press the corresponding functional keys to set, and the red light flashes when the key is pressed.

2.2. During zeroing setting, the calibration plate should be much larger than the detection window of sensor, and the polar plate and sensor should be well grounded.

2.3. During the calibration operation, the calibration plate should be much larger than the detection window of sensor and the sensor should be well grounded.

2.4. There should be no shield between the sensor and the detected object; otherwise the accuracy of the detection result will be affected.

2.5. There should be no electrical equipment that may affect the sensor within the detection range of the sensor.

2.6. To accurately measure the charged object, the plane of the sensor detection window must be parallel to the surface of the detected object.

2.7. When the charged object is smaller than the calibration plate, the measured value will be smaller than the actual electrostatic value of the charged object.

2.8. When the charged object is larger than the calibration plate, the measured value will be larger than the actual electrostatic value of the charged object.

2.9. Do not set zero in electrostatic charge state or in the electrostatic measurement process (non-static calibration process); if zero clearing is made during the electrostatic test, the displayed electrostatic value will be zero.

2.10. Influence of temperature and humidity on electrostatic detection:

The lower the temperature is, the smaller the humidity is, the less water is contained in the space, and the more easily the surrounding object triboelectric and the greater the interference to the electrostatic detection is.

1) The higher the temperature is, the higher the humidity is, the more water is contained in the space, and the more active the movement of water molecules is, which is easy to produce corona or spark discharge to the calibration device and the greater the influence on the uniform electric field generated by the calibration device, the weaker the uniform electric field will be.

2) Under the same humidity, the lower the temperature is, the less water is contained in the space, and the more easily the surrounding object triboelectric and the greater the influence on the electrostatic detection is.

Therefore, during electrostatic calibration/detection, the environmental temperature and humidity should be clearly indicated during calibration/detection.

2.11. Due to the existence of the cosmic rays and micro-radioactive substance in the environment as well as the use of various kinds of electrical equipment, there are inevitably more or less positive and negative ions in the detection space, which may also have certain impact on the detection results.

3. Display information of monitoring terminal

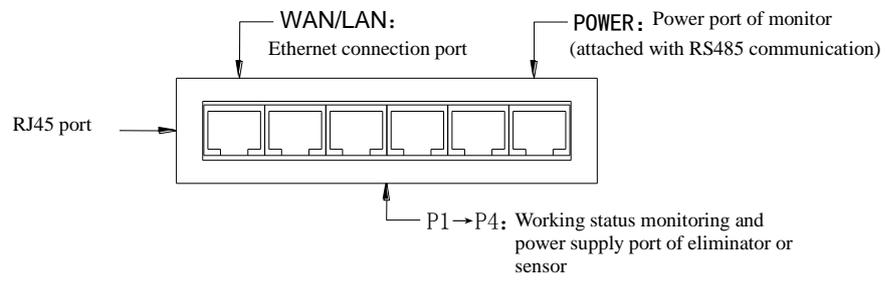
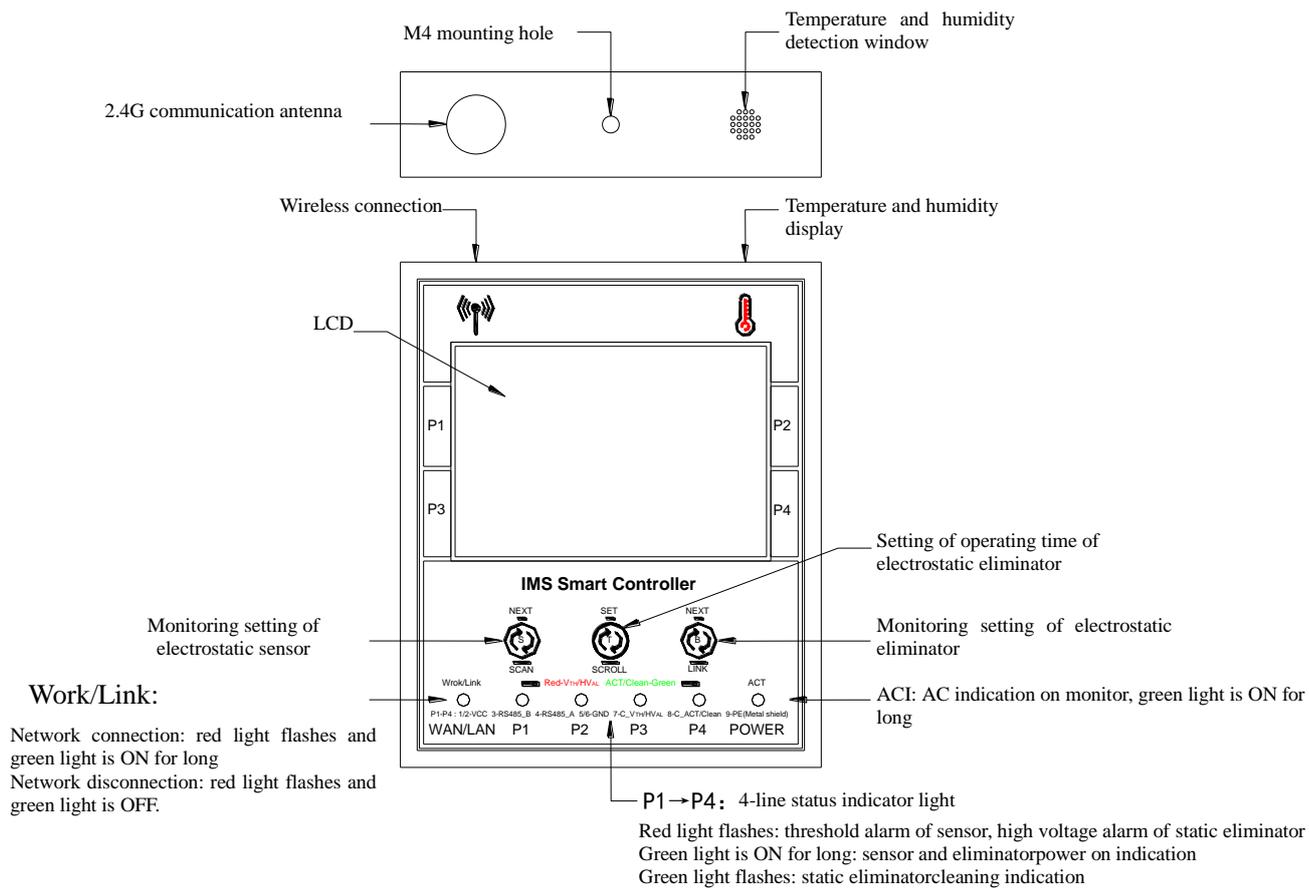
Working status: whether the sensor works normally and has alarm output.

Equipment address: display the address set by the sensor.

Detection distance: display the detection distance set by the sensor.

Threshold voltage: display the set safety (alarm) threshold of static voltage.

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



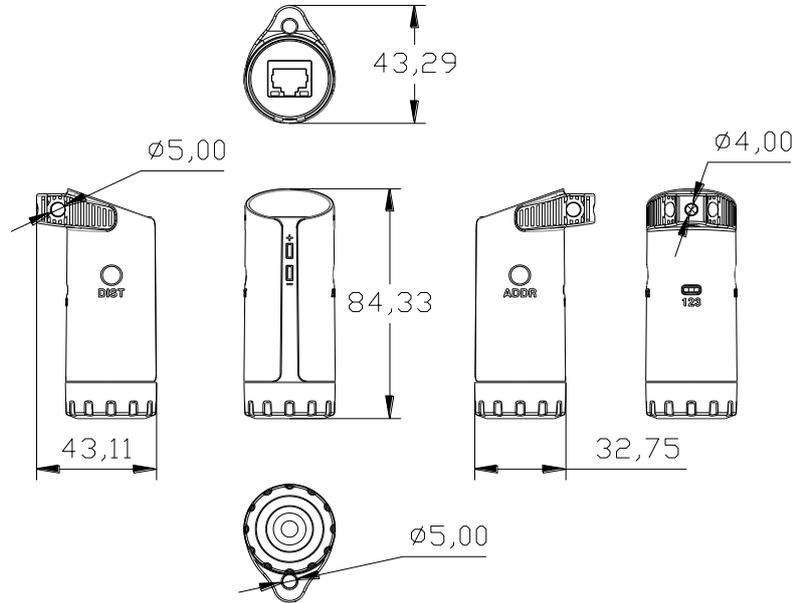
4. Mechanical parameters

① Mechanical parameters of sensor:

Overall dimension: $44*33*85\text{mm}$ (L*W*H)

Net weight: about 49.7g

The overall dimension of sensor is shown as follows:

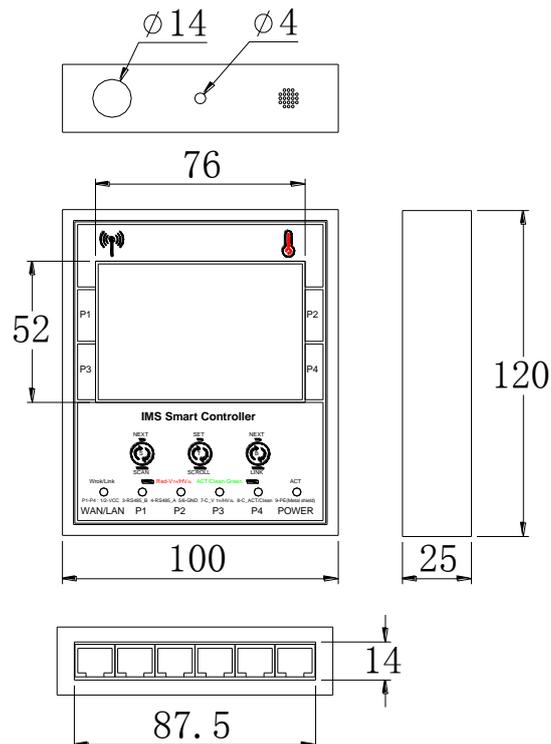


② Mechanical parameters of monitoring terminal

Overall dimension: $100*120*25\text{mm}$ (L*W*H)

Net weight of monitoring terminal: about 400g

The overall dimension of monitoring terminal is shown as follows:

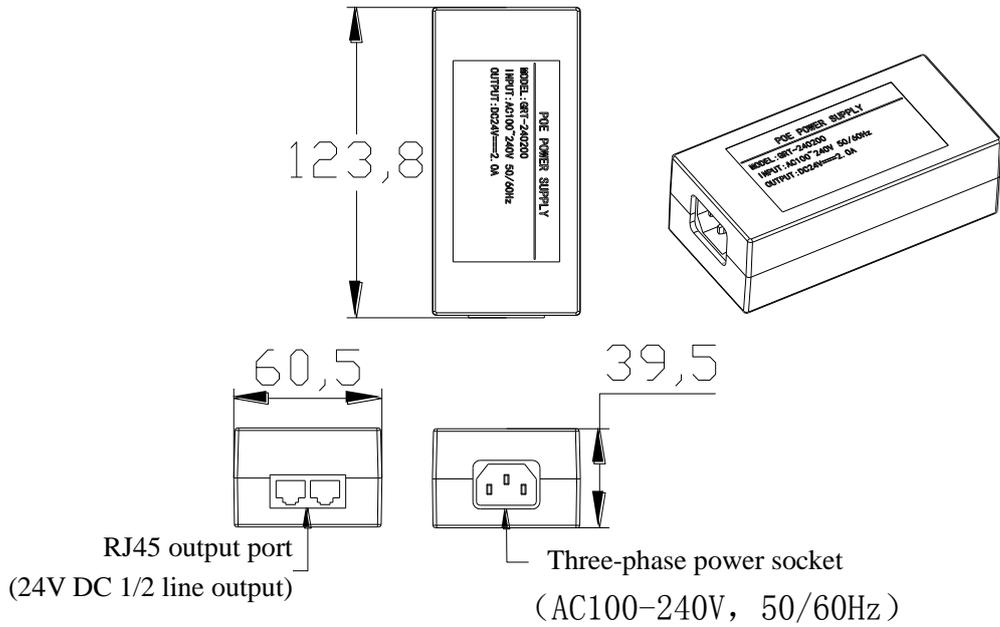


③Mechanical parameters of power adapter:

Overall dimension: 124*61*40mm (L*W*H)

Net weight of power adapter: about 234g

The overall dimension of power adapter is shown as follows:

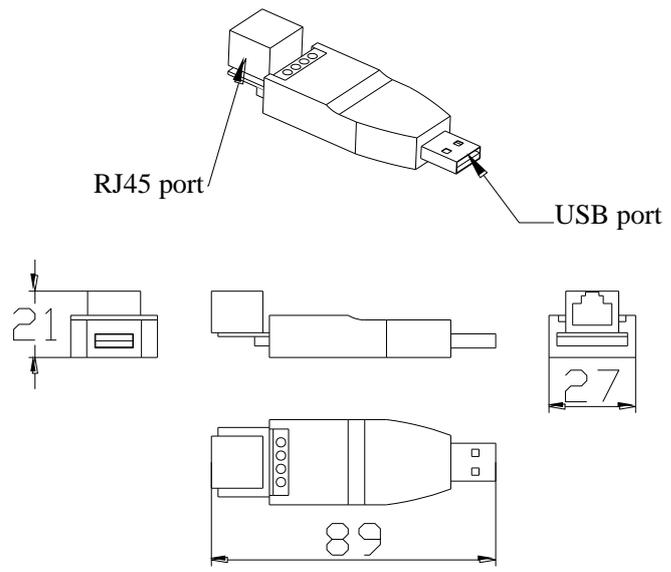


④Mechanical parameters of communication converter:

Overall dimension: <90*28*22mm (L*W*H)

Net weight of communication converter: about 20.5g

The overall dimension of communication converter is shown as follows:

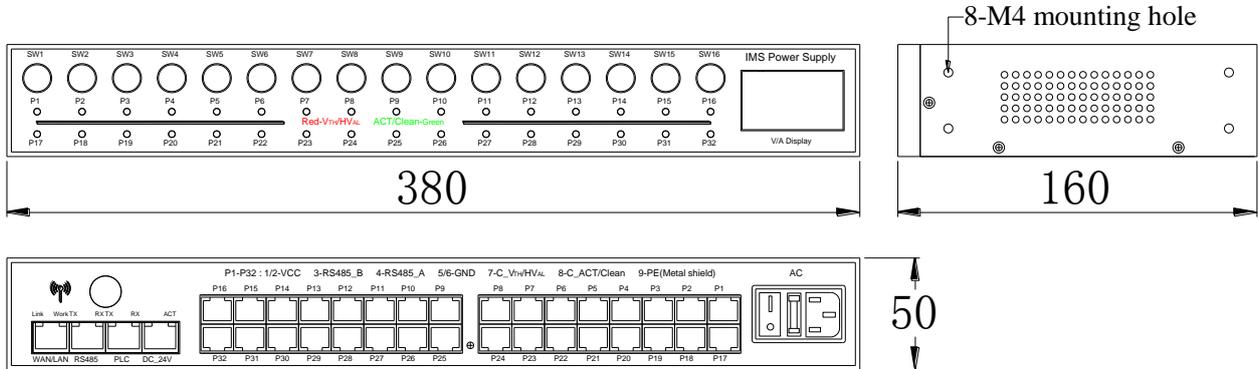


⑤ Mechanical parameters of system integrated power supply:

Overall dimension: 380*160*50mm (L*W*H)

Net weight of terminal power supply: about 2500g

The overall dimension of terminal power supply is shown as follows:



V. Working Environment

Working temperature: 0°C → +50°C

Working humidity: 30 → 65%RH

VI. Product Calibration

1. Calibration environmental conditions

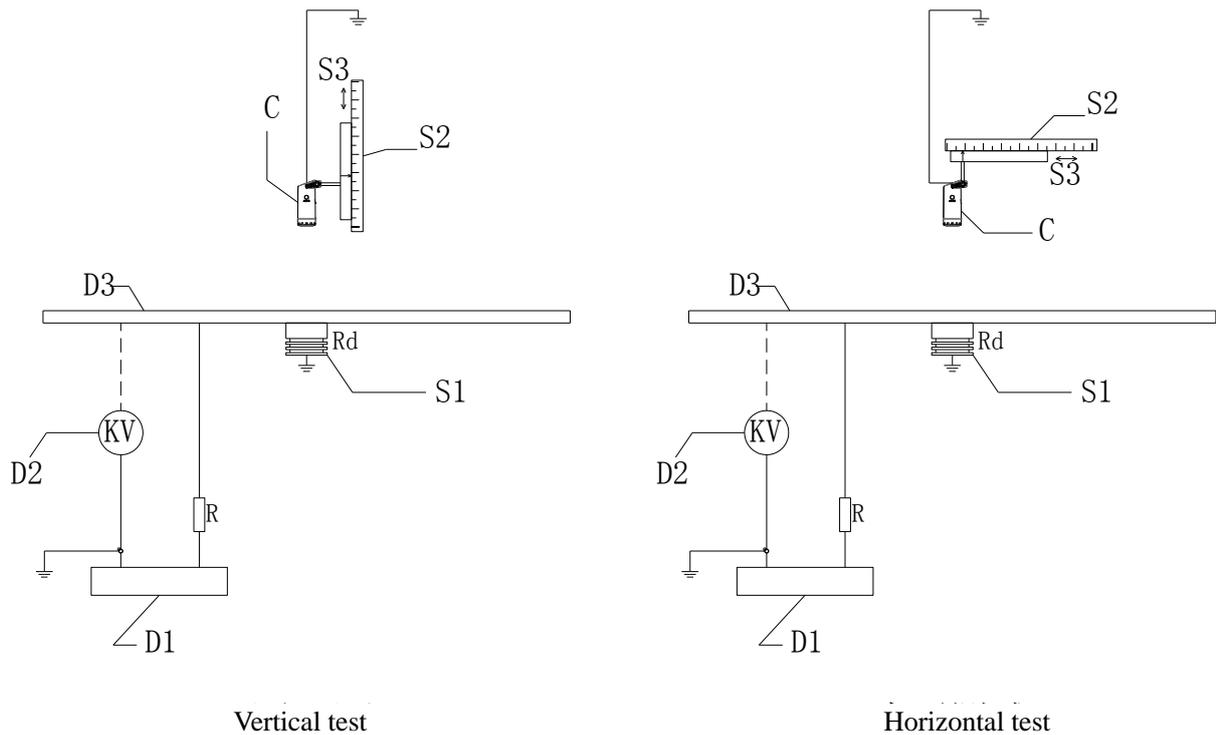
The calibration environmental conditions and requirements are as follows:

- Environmental temperature: 20°C ±5°C
- Relative humidity: 30-60%
- There is no measurable electrical field, magnetic field as well as positive and negative irons around.
- There is ground wire and the resistance of ground is < 100Ω.

2. Equipment for calibration

The instrument and equipment for calibration should be calibrated by the institution of metrological technology, which should meet calibration use requirements within the validity period.

The main calibration equipment mainly consists of DC high voltage meter, DC high voltage power supply, standard plate electrode and distance regulator, etc. The sensor is placed on the central line of the calibration plate and the block diagram of the calibration device for the non-contact electrostatic voltmeter is shown as follows:



The requirements for the equipment and device are as follows:

C——calibrated product: electrostatic sensor

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

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

D3——standard plate electrode: the plate electrode should be circular or square rounded corner. It's appropriate that the radius of curvature on the edge of the electrodes does not generate corona and it's recommended that the edges of the electrodes should be wrapped with insulating materials; the plate area should be large enough and the diameter or side length should be no less than 0.4m. Our calibration plate is square stainless steel plate with the dimension of 600mm*600mm.

R ——protective resistance: the withstand voltage strength of resistance is 20KV and the current through the protective resistance and human body is <5mA and the resistance value R conform to the following formula requirement:

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

Where: R is protective resistance and the unit is Ohm (Ω);

R_d is the resistance of insulating support and the unit is Ohm (Ω); resistance value $R_d > 10^{13}\Omega$ and the withstand voltage strength is $> 25KV$.

The above two kinds of resistance may cause different static voltage values in detection under the same standard voltage due to the different resistance values.

S1——insulating support

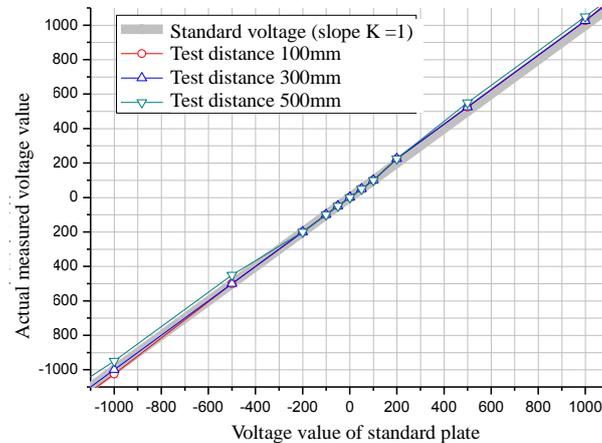
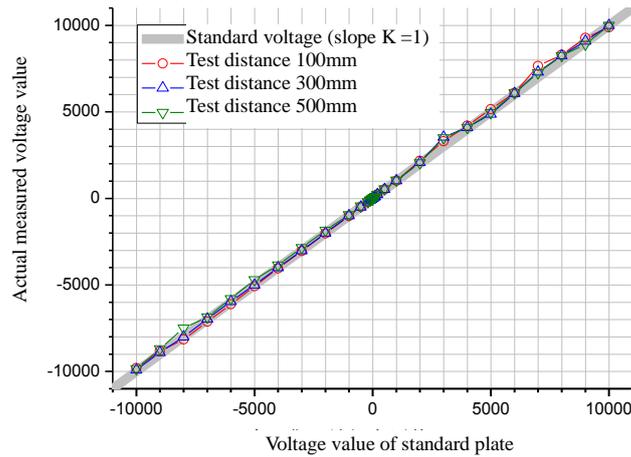
S2——graduated scale, the measurement range is 0mm~750mm and the measurement uncertainty is less than 0.5mm.

S3—distance regulator: the sensor should be placed on the calibration device to extend out the front end. The geometrical shape and materials of the support should minimize the impact on the distribution of the electrical field around the front end of the sensor.

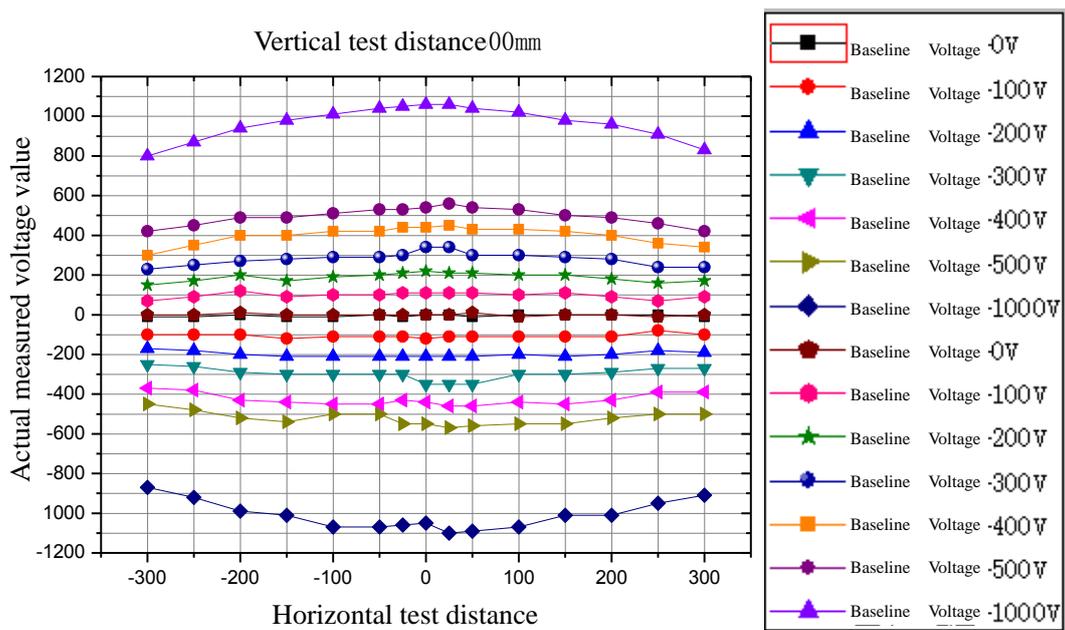
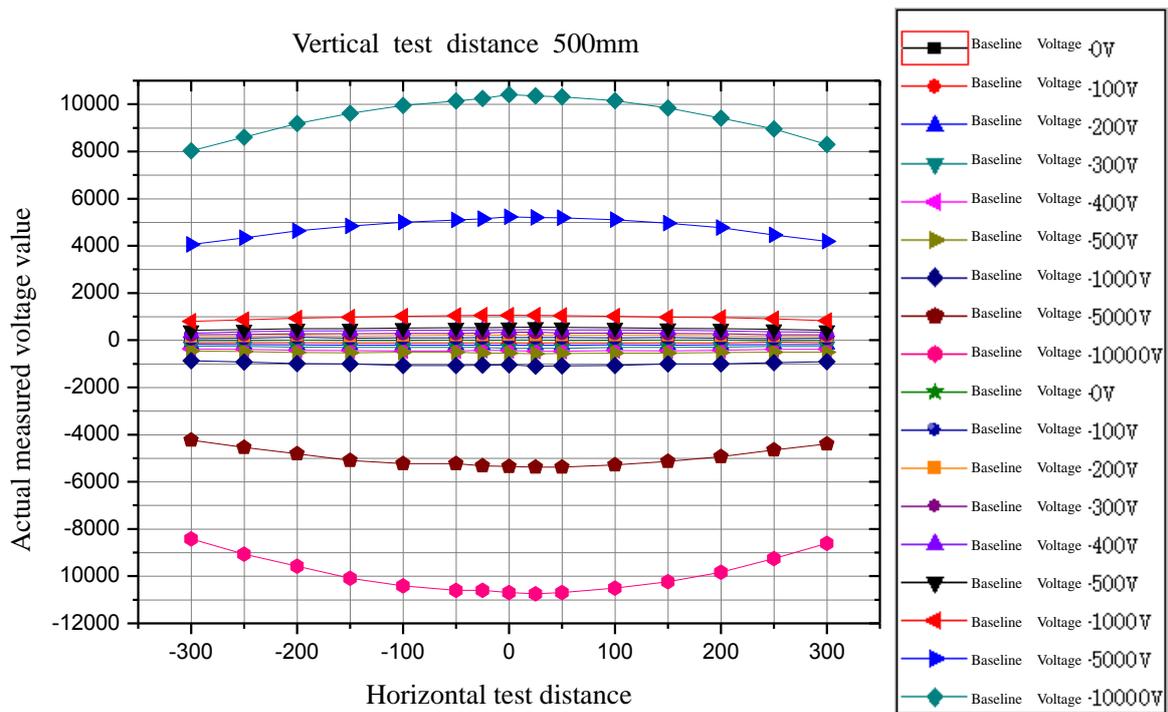
VII. Product Performance

The test data of the standard plate electrode is as follows:

The static voltage values under 3 groups of test distances were detected. The standard plate electrode was 600mm*600mm stainless steel electrode. The test distance was the distance between the surface of plastic shell to that of the plate electrode on one side of the detection window of the electrostatic sensor. The light grey heavy line in the figure is the calibration voltage line when the slope is 1.



The following two figures are the test data maps under different horizontal test distances when the vertical test distance is 500mm, standard plate electrode is 600mm*600mm stainless steel electrode and the sensor is relative to the central position of the detection plate:



VIII. Operation and precautions

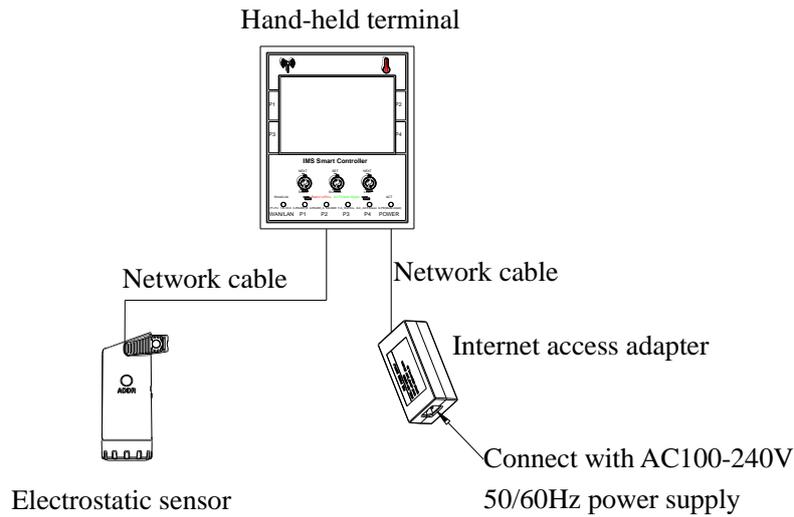
1. Instructions for use:

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

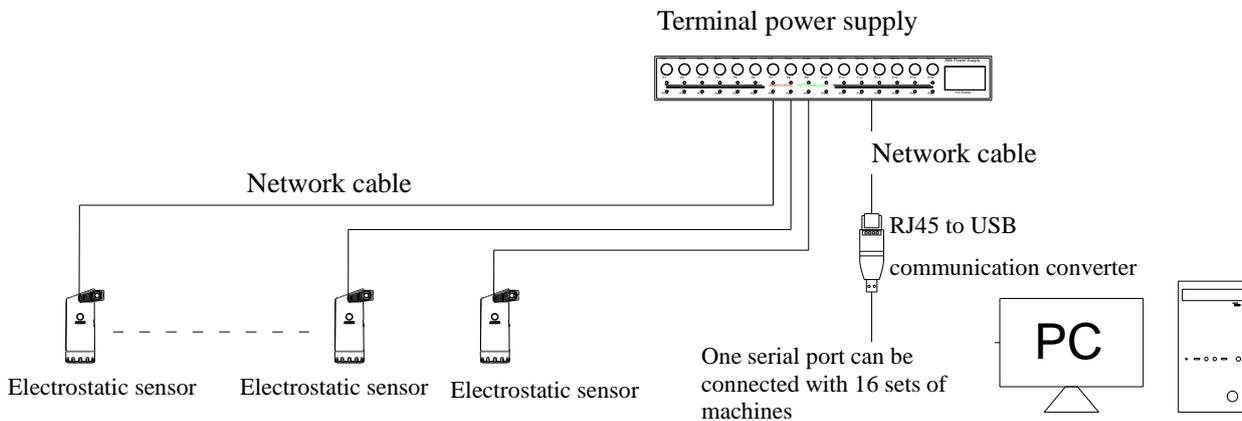
2. On-line mode: **(Monitoring terminal, integrated power supply and communication software need to be purchased additionally)**

For the power output network port, monitoring terminal network port and electrostatic sensor network port of 24V power adapter, the network ports of the three devices are both the power port and the communication port, and the network ports of the three devices can be commonly used.

1) Connection with monitoring terminal:



2) Connection with PC:



3. Operating steps (refer to the following attached drawings):

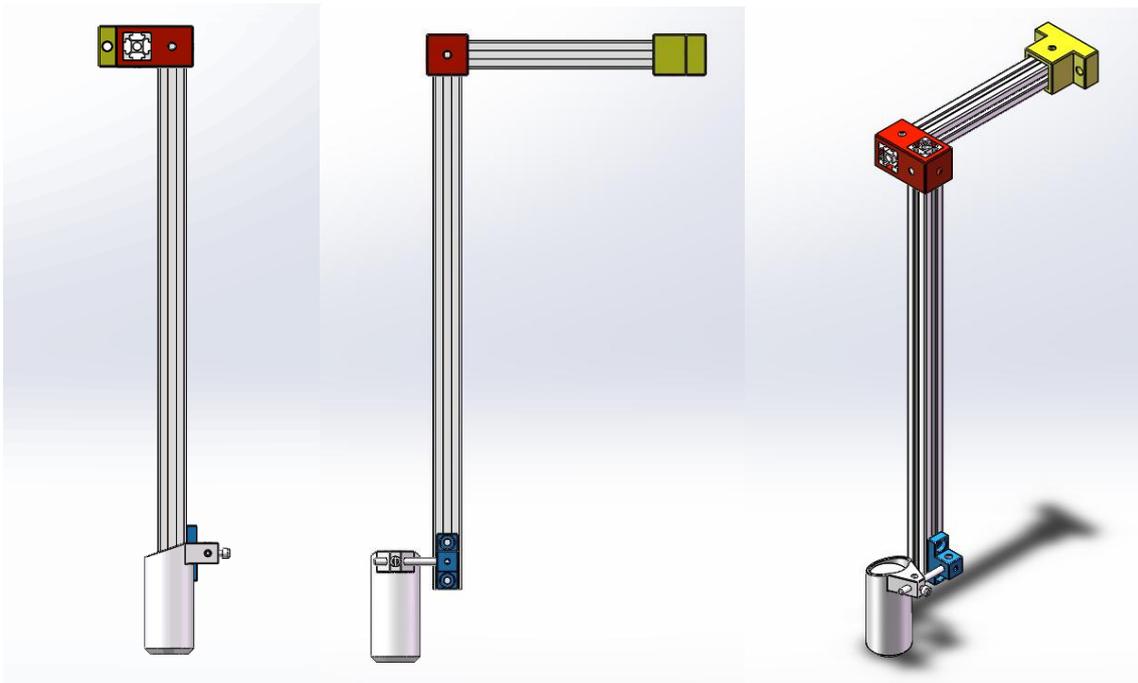
- ① According to the static electricity quantity and the operating environment of the charged object, rotate the circular dial switch with the 3mm diameter cross screwdriver to select the test distance.
- ② According to the static electricity quantity and the operating environment of the charged object, turn the bar dial switch and select the detection gear.
- ③ According to withstand static voltage value of the protected product, set the safety (alarm) threshold of static electricity via the remote controller or monitoring software.

Notes: when the detected static voltage value is within the set threshold of static electricity, the threshold alarm indicator light is green, and it will be red if the set threshold is exceeded.

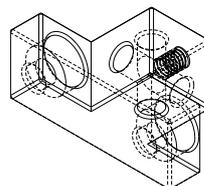
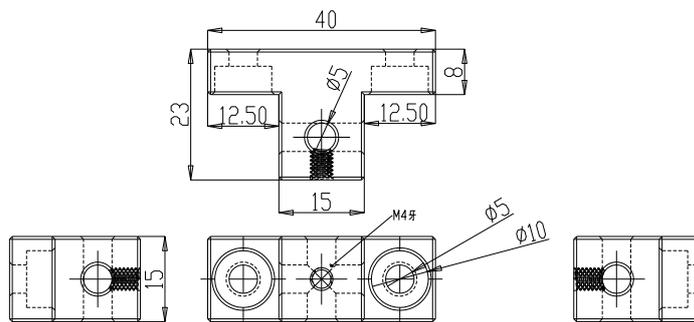
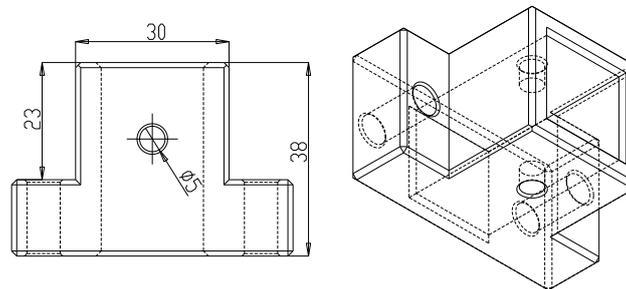
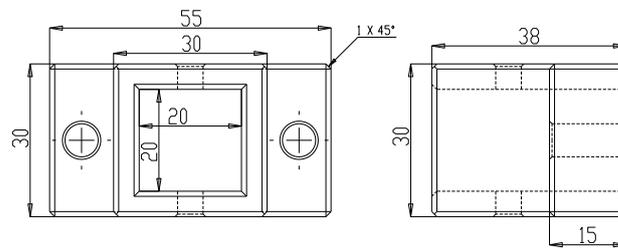
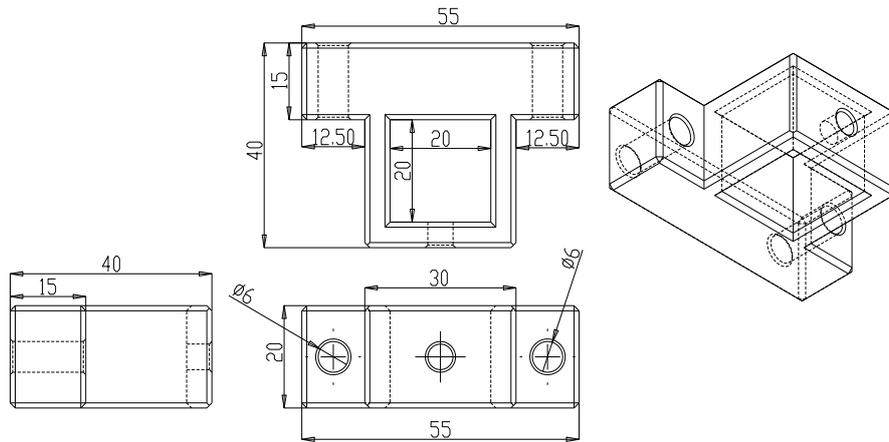
④ According to the production station, rotate the circular dial switch with the 3mm diameter cross screwdriver to set the equipment address.



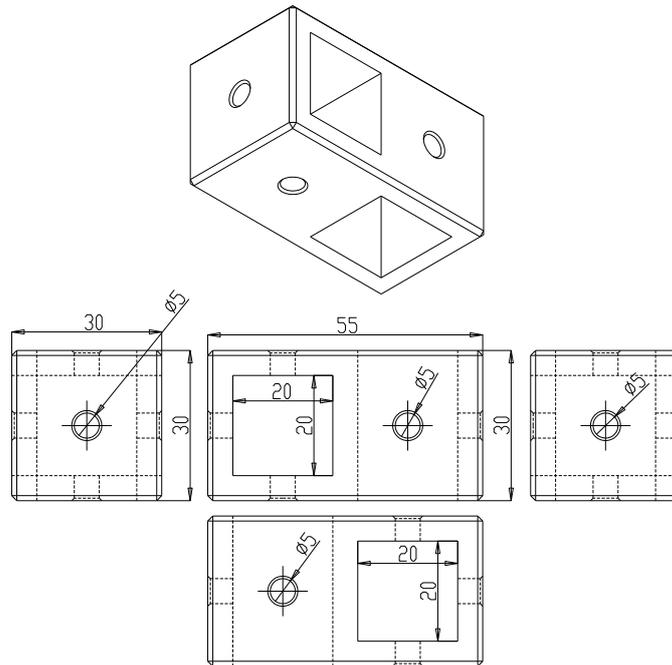
4. Installation drawing:



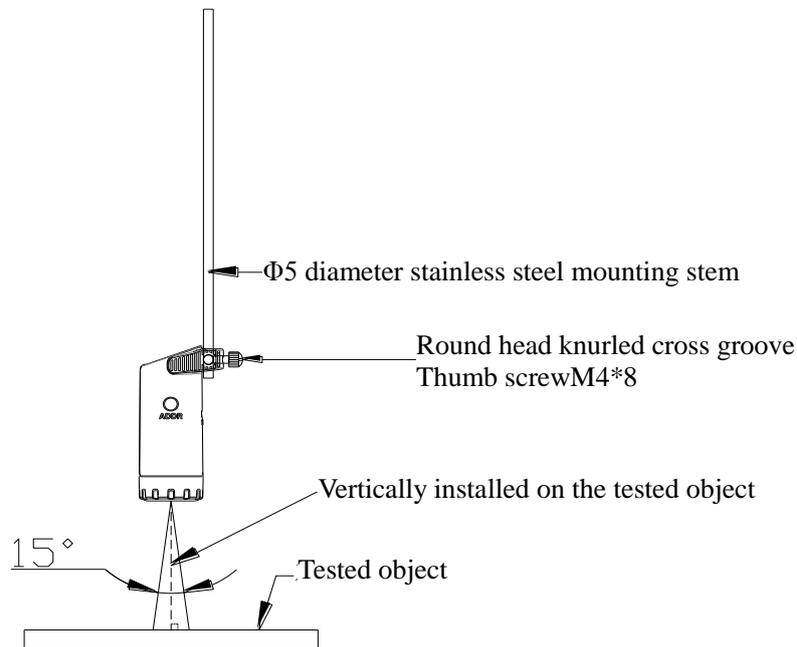
4.1. Structure chart of each mounting fixture:



4.2. Structure chart of fastenings for mounting stem:



4.3. Schematic Diagram for Installed Location:



5. Precautions for Installation and Use:

5.1. Precautions:

- To correctly use the equipment, please carefully read the operating instructions before use.
- Before power on, please check the specification of the provided power supply. Any power supply nonconforming to the specification will cause damage and even failure of product.
- Please operate the product under the specified temperature (0~50°C).
- During test, the distance between the person and the product should be more than 1m to avoid

impact on test by static electricity on human body; the tester must wear anti-static clothing, anti-static hat and anti-static shoes.

- The insertion depth of the $\phi 5$ diameter stainless steel mounting stem should not exceed the position of the detection gear switch on the back of the sensor.
- The surface of the $\phi 5$ diameter stainless steel mounting stem should have no insulation coating.
- During detection, please don't touch the electrostatic detection probe.
- Ensure that the part of the sensor window is not polluted by particles and dust.
- There should be no shield 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 range of the sensor; otherwise, failure and damage may be caused to the internal equipment and chip.
- To accurately measure the charged object, the plane of the sensor detection window must be parallel to the surface of the object being measured.
- Connect power supply for 5s before use; otherwise the data display may be unstable sometimes.
- When the charged object is smaller than the calibration plate, the measured value will be smaller than the actual static value of the charged object.
- When the charged object is larger than the calibration plate, the measured value will be larger than the actual static value of the charged object.
- Don't set zero under static charge state or in static measurement process (non-static calibration process); if zero is set during static measurement, the displayed static value may be zero.
- Don't install high voltage equipment around, such as high voltage power supply, electrostatic generator, iron generator and eliminator, because the high voltage will affect the performance and detection accuracy of the sensor.
- During the installation of high vibration area, please fasten the sensor, otherwise data error may occur.
- Please regularly check the power cable/communication cable of the product and replace it immediately if there is damage, otherwise problems such as electric leakage, poor communication and abnormal work may be caused.
- If the product suffers mechanical impact such as drop, collision and so on, it may cause failure.

5.2. Warnings:

- The whole set of equipment must be reliably grounded during use; otherwise abnormality and even damage may be caused to the sensor.
- It's forbidden to use the equipment in flammable and explosive environment.
- It's forbidden to touch the electrostatic detection window with sharp object.
- The product is strictly prohibited to contact water stain; otherwise abnormality will be caused, thus leading to electric shock or fire.
- If the measurement range of detection is exceeded, it may cause product failure.
- During the inspection or replacement of product, turn off power, otherwise electric shock or fire may be caused.
- This detection instrument is a precision device, please don't dismantle it.
- It's forbidden to dismantle the product arbitrarily; internal maintenance and repair must be made by professional personnel.
- The product is specially designed for detecting static electricity on the surface of the object. It is strictly prohibited to be used for other purposes. Any abnormal use may cause machine failure, electric shock, fire and other hidden dangers.

6. Failure analysis

NO	Fault occurred	Possible cause	Solution
1	Power port indicator light is not ON	Bad contact of power cable	Confirm whether the power cable is good and connected stably.
		Incorrect connection of power cable	Confirm whether the power cable is connected correctly.
		Mismatching of power supply	Confirm the specification and model of power supply (INPUT:100—240VAC 50/60Hz; OUTPUT: 24VDC 2000mA)
2	Detected static voltage value is abnormal or the error is too big	Bad grounding of sensor	Confirm whether the sensor is well grounded.
		There is high voltage equipment, ionization device or strong electromagnetic equipment around the sensor	Remove the high voltage equipment, ionization device or strong electromagnetic equipment.
		Incorrect setting of measurement range gear or detection distance	Refer to the gear and measurement range setting table.
		Improper setting of installation location of sensor	Confirm correct installation location and refer to the operation and use precautions.
3	Green threshold alarm indicator light is not ON	—	Return to the manufacturer for repair.
4	Red threshold alarm indicator light is not ON	The set static threshold value is big or exceeds the measurement range	According to the working environment and static control requirements, refer to the gear and measurement range setting table to reasonably determine the static alarm threshold.
5	Abnormal smell of product	Burning damage of components and parts	Return to the manufacturer for repair.
6	If there are other unlisted problems or the problems still cannot be solved by the above solutions, please contact the manufacturer or seller.		

IX. Maintenance

- To ensure the good performance of the product, please store the equipment in a dry place away from light when it's not used. Please don't press it heavily.
- This equipment is a precision detector; please don't vibrate it intensively during use.

X. After-sales Services

AP-YV3302H electrostatic sensor has received strict testing, inspection and aging treatment before delivery, and its performance can completely reach the relevant indicators specified in the operating instructions. AP&T makes the following commitments to the customer: repair or replace any defective parts free of charge after the inspection by our company from the date of purchase within one year. However, this commitment shall not apply to:

- The equipment is used incorrectly;
- Damage caused by negligence or accident during use;
- Change or dismantle the product arbitrarily or the product has been repaired by other service department not authorized by Shanghai AnpingStatic Technology Co., Ltd.
- Failure caused by external factors such as fire, earthquake, flood and abnormal voltage.

Except for the repair or replacement of the parts within the provision, AP&T shall not assume any obligations unrelated to this and shall not be liable to the user of the product.

XI. Packing Accessories

- Certificate ×1
- Warranty Card ×1
- Operating Instruction ×1
- Power adapter ×1
- 1.8m Power network cable ×1
- International three-phase power cable ×1
- IR remote control ×1
- M4*8 round head knurled cross groove thumb regulating screw ×1
- Dial switch rotation screwdriver ×1 (including straight screwdriver×1, cross screwdriver ×2)
- Installed package: 500mm length φ5 diameter stainless steel mounting stem ×1, anodic oxidation (black) 20×20 four - sided slot industrial aluminum profiles, mounting fixture ×3, support fastenings ×1, M5 round head hexagon socket screw ×3, M5 hexagon socket screw with large flat head, M5 slider nut ×5