AP&T®

Horizontal Electrostatic Sensor
AP-YV3301

Horizontal Electrostatic Sensor

AP&T

Suitable for electronics, optoelectronics, plastics...

◈ Product Profile

AP-YV3301 Horizontal Electrostatic Sensor is a testing instrument developed and produced by Anping Company to detect the surface electrostatic voltage of electrostatically charged objects. It uses non-contact measurement technology to minimize the impact of the testing instrument on the object's surface electrostatic field, ensuring measurement accuracy.

◈ Product Features

- ➤ Comfortable to the touch and beautifully styled.
- ➤ Detection distance can be selected by a dip switch.
- ➤ Wide detection potential range and high detection accuracy.
- ➤ Alarm threshold can be set, beyond the threshold red light alarm.
- ➤ Highdefinition, omni-directional LCD data display terminal.
- ➤ Real-time transmission of monitoring data to PC.
- ➤ Comfortable to operate and easy to use.

◈ Product parameters and technical functions

■ Performance Parameters

➤ Technical specifications:

NO.	Parameter							
1	Working voltage	DC8-24V						
2	Working current	< 50mA						
3	Sampling time	About 30ms						
4	Vibration	< 1KHz						
5	Noise	< 5dB						
6	Signal output	RS485(115200bps,8,1,n,n)（≧ 50ms）						
		Open Collector（<50V/100mA）						
7	Network Port Definition	1、2	3	4	5、6	7	8	9
		Orange, White Orange	Blue	White - blue	green,White green	Brown	White brown	Metallic shield shell
		VCC	RS485+B	RS485+A	GND	NPN-C1	NPN-C2	PE
8	Communication distance	< 300m						
9	Alarm indication	LED						
10	Threshold setting	0 ~ ±5000V						
11	Detection angle	< 15°						
12	Test plate size	600mm*600mm						
13	Dimensions	24*22*102mm						
14	Net weight	47.4G						
15	Power-on standby test time	5s						
16	Infrared controlled range	< 20°, 1m						
17	Certification	CE						

※ 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.

➤ The electrostatic voltage range corresponding to each detection distance:

Detection gear	Distance code	Detection distance	Measurement range	Deviation	Calibration
1	0	NC	NC	NC	×
	1				
2	2				
	3	50mm	±20000V	5%	
3	4	100mm	±20000V		√
	5	150mm	±20000V		×
4	6	200mm	±20000V		
	7	250mm	±20000V		
5	8	300mm	±20000V		√
	9	350mm	±20000V		×
6	A	400mm	±20000V		
	B	450mm	±20000V		
7	C	500mm	±20000V		√
	D	NC	NC	NC	×
8	E				
	F				

※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 under-

Technical Tips

- For zeroing, the calibration pole plate should be larger than the sensor detection window, and the pole plate and sensor should be well grounded.
- For calibration operation, the calibration pole plate should be much larger than the sensor detection window, and the sensor should be well grounded.
- There should be no obstruction between the sensor and the object to be detected, otherwise the accuracy of the detection results will be affected.
- There should not be any electrical equipment within the detection distance of the sensor that would affect the sensor.
- In order to accurately measure a charged object, the plane of the sensor's detection window must be parallel to the surface of the object being measured.
- When the charged object is smaller than the calibration plate, the measured value is smaller than the actual electrostatic value of the charged object.
- When the charged object is larger than the calibration plate, the measured value is larger than the actual electrostatic value of the charged object.
- It must not be zeroed in the presence of a static charge or during the static measurement process (not the static calibration process); if it is zeroed during the static test, the displayed static value will be zero.
- **Effect of temperature and humidity on electrostatic detection:**

1)、The lower the temperature, the lower the humidity, and the less moisture there is in the space, the easier it is for the surrounding objects to friction electrify, and the more it interferes with static electricity detection.

2) 、The higher the temperature, the higher the humidity, the more water is contained in the space, the more active the water molecules are, the easier it is for the calibration device to produce corona or spark discharges, and the more it affects the uniform electric field generated by the calibration device, which can weaken the uniform electric field.

3) 、The lower the temperature and the less moisture contained in the space, the easier it is for the surrounding objects to friction electrify at the same humidity, and the greater the effect on static electricity detection.

Therefore, during electrostatic calibration/testing, the ambient temperature during calibration/testing should be clearly indicated.

➤ Due to the presence of cosmic rays, trace radioactive substances in the environment, and the use of various electrical equipment, it is inevitable that there will be more or less positive and negative ions in the testing space, which will also have a certain impact on the test results.

Monitoring of terminal display information

Working state Monitoring of sensors for proper operation and alarm output

Device address Displays the address set by the sensor

Detection distance Displays the detection distance set by the electrostatic sensor

Threshold voltage Display of the set static voltage safety (alarm) thresholds

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

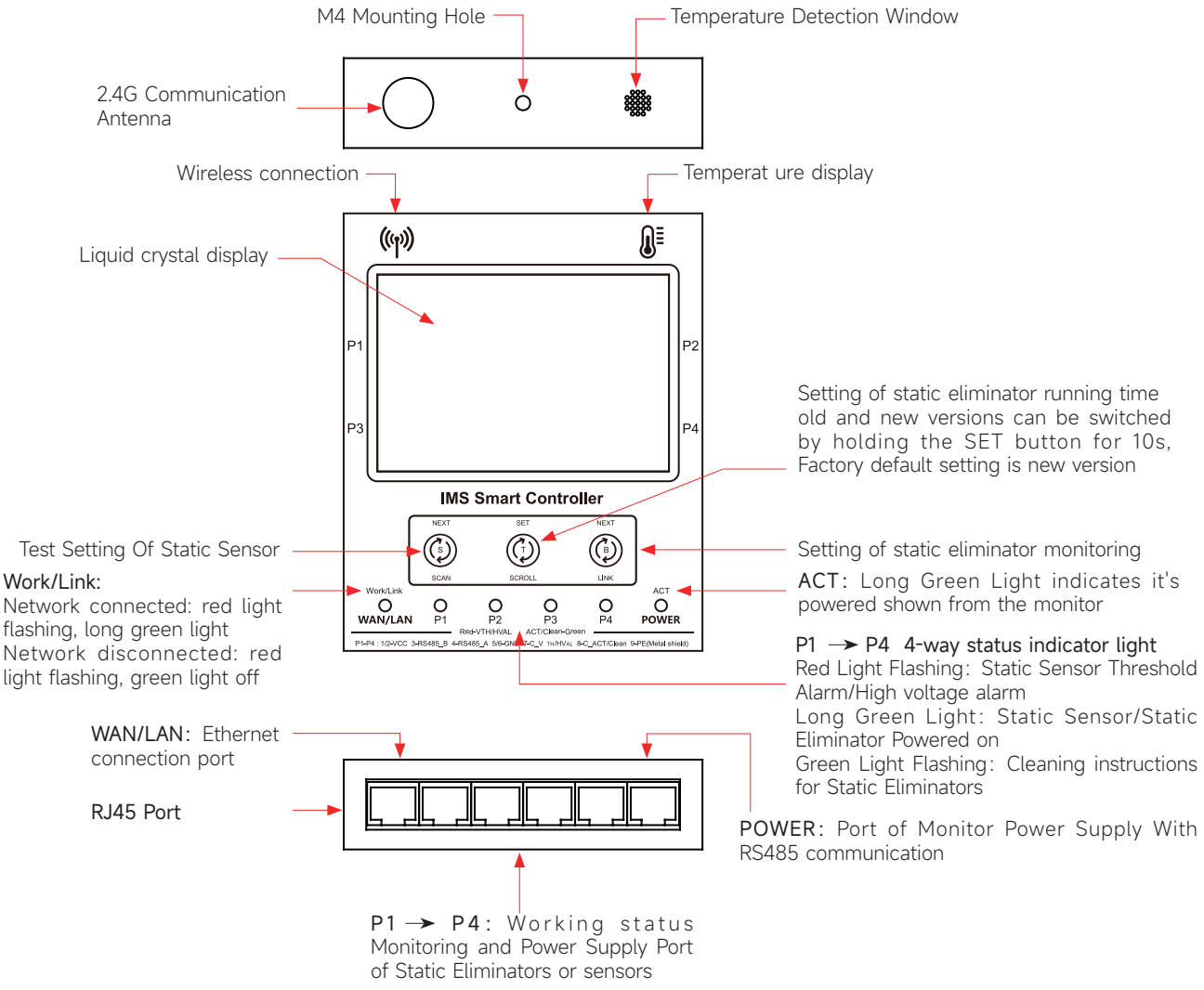


Figure 2 System monitoring terminals

Mechanical parameters

①、Sensor mechanical parameters:

Overall Dimension:

< 24*22*102mm（L*W*H）

N e t W e i g h t :

About 47.4g

The sensor external dimensions and mounting bracket drawings are shown below:

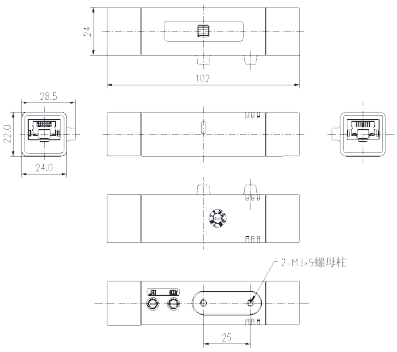


Figure 3
Sensor Dimensions

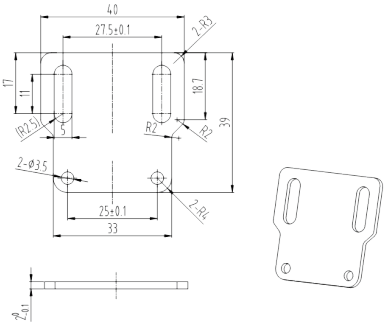


Figure 3-1
Sensor Mounting Bracket Dimensions

②、Monitoring of terminal mechanical parameters:

Overall Dimension:

102*28.5*22mm（L*W*H）

Net weight of monitoring termina:

About 400g

The external dimensions of the monitoring terminal are shown below:

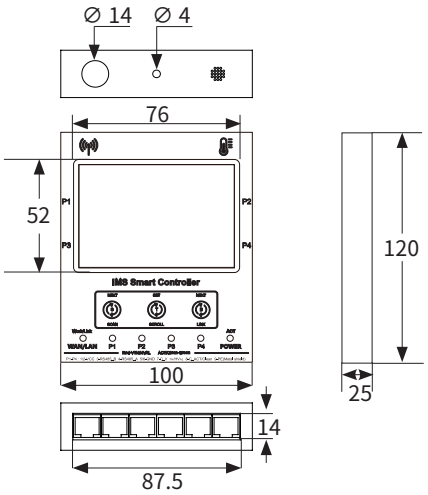


Fig. 4
External Dimensions of System Monitoring Terminal

③、Adaptation of the mechanical parameters of the power supply:

Overall Dimension:

102*28.5*22mm（L*W*H）

Net weight of adapted power supply:

About 400g

The external dimensions of the monitoring terminal are shown below:

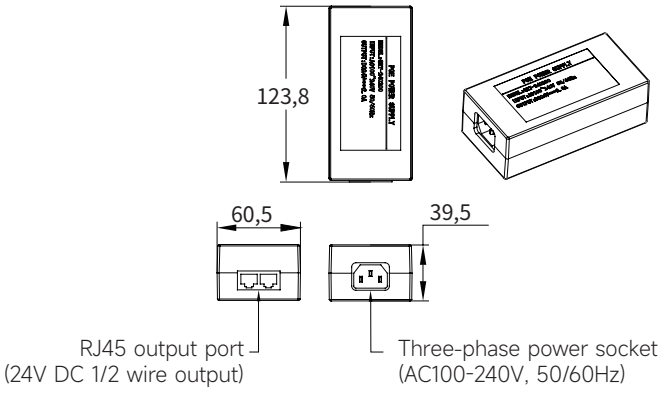


Fig. 5
External Dimensions of Adapted Power Supply

④、Communication converter mechanical parameters:

Overall Dimension:

90*28*22mm（L*W*H）

Net weight of Communication Converter:

About 20.5g

The external dimensions of the monitoring terminal are shown below:

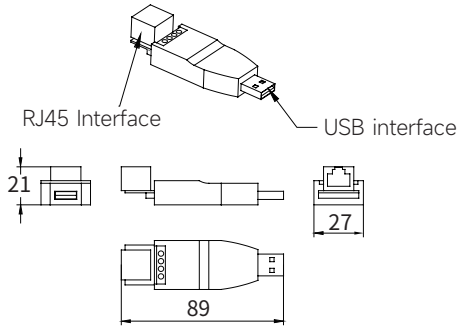


Fig. 6
Communication Converter Outline Dimensions

⑤、Communication converter mechanical parameters:

Overall Dimension:

380*160*50mm（L*W*H）

Net weight of system integrated power supply:

About 2500g

The system integration power supply form factor diagram is shown below:

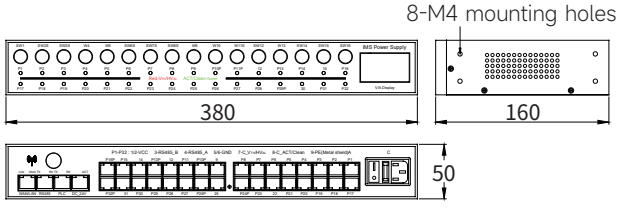


Fig. 7
System Integration Power Supply Outline Dimensions

◈ Work environment

Working temperature: **0°C - +50°C**

Working humidity: **30 - 65%RH**

◈ Product standards

■ Calibration environmental conditions

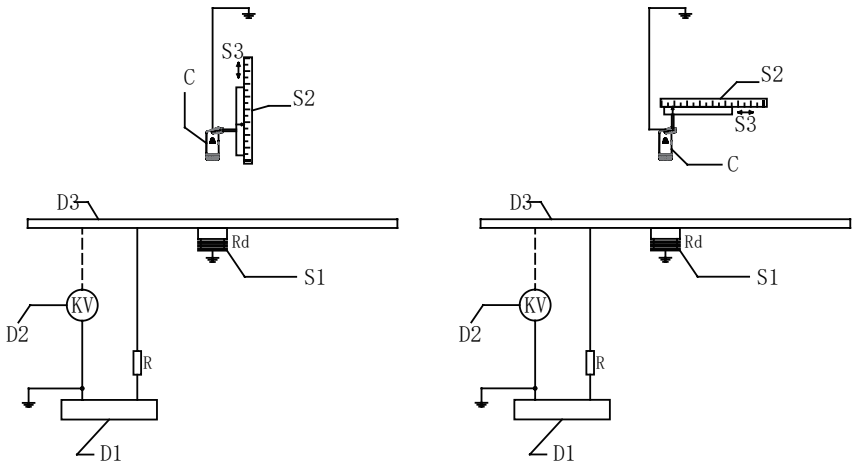
➤ The calibration environmental conditions and their requirements are as follows:

NO.	Element	Model & Parameter
1	High Voltage Power Supplies	BERTAN_205B-20R
2	Flatbed	Material : Stainless steel, Thickness :1mm, Length and width :600mm*600mm
3	Matrix	Clean room, temperature: 20°C—23°C、Humidity: 40％RH—45％RH No measurable electric field, magnetic field, positive and negative ions in the surroundingssurroundings
4	Fixtures	Both sides of the same standard device; ground wire, ground resistance < 1Ω

■ 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, calibration device composition block diagram as follows:



Vertical test　　Horizontal test

Figure 8 Schematic diagram of calibration test

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, the unit is Ohm (Ω)

R_d is the resistance of insulating support, the unit is Ohm (Ω), resistance valu > 10^{13}Ω, he 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.

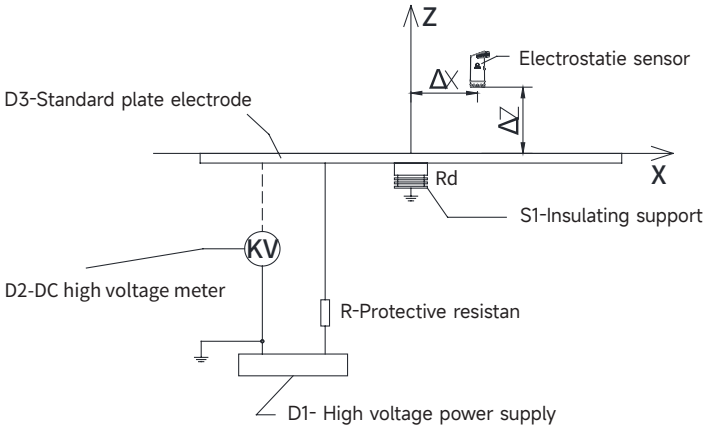
S1—— Insulating support

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 frontn de of the sensor

◈ Product inspection performance test

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



➤ **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 is 600mm*600mm stainless steel electrode. The test distance is the distance between the surface of plastic shell 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 to that of the plate electrode.This calibration line is a virtural line to indicate that the voltage measured by the sensor in an ideal situation is exactly the same as the voltage applied by the standard plate.

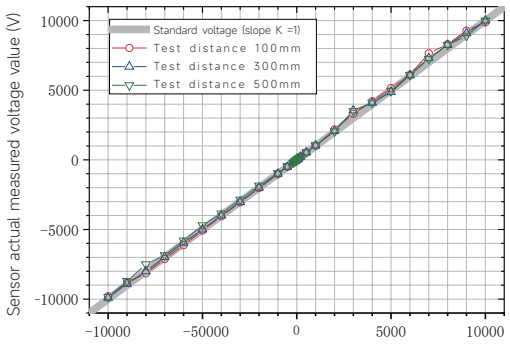


Figure 1-1 Standard test data chart of standard plate electrode

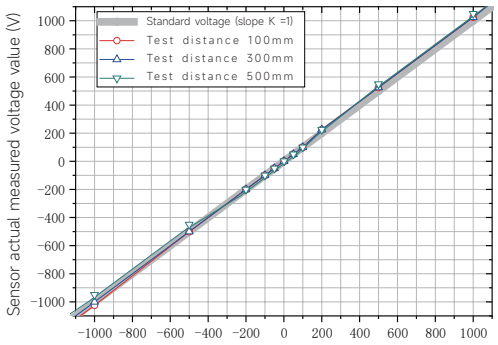


Figure 1-1 Standard test data chart of standard plate electrode

➤ 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:

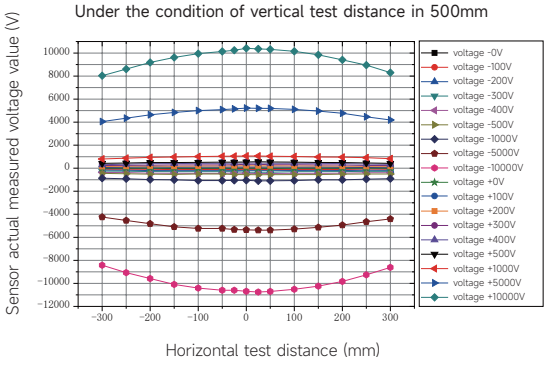


Figure 2-1 Horizontal test data graph of the standard plate electrode when the vertical distance is 500mm

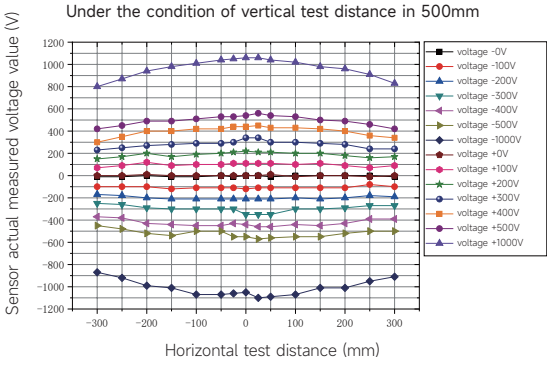


Figure 2-2 Horizontal test data graph of the standard plate electrode when the vertical distance is 500mm

From the above two horizontal test charts, it can be seen that for a 600*600mm standard plate and a 500mm vertical test distance, the measurement error can be kept within 5% and within -200mm ≤ X ≤ 200mm horizontal distance.

➤ ② The following two figures are the test data maps under different horizontal test distances when the vertical test distance is 300mm, standard plate electrode is 600mm*600mm stainless steel electrode and the sensor is relative to the central position of the detection plate:

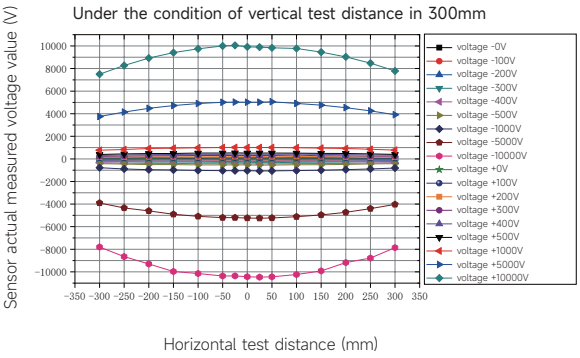


Figure3-1 Horizontal test data graph of the standard plate electrode when the vertical distance is 300mm

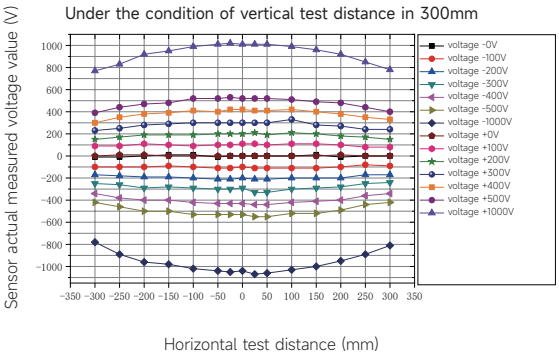


Figure 3-2 Horizontal test data graph of the standard plate electrode when the vertical distance is 300mm

From the above two horizontal test charts, it can be seen that for a 600*600mm standard plate and a 300mm vertical test distance, the measurement error can be kept within 5% and within -200mm ≤ X ≤ 200mm horizontal distance.

➤ ③ The following two figures are the test data maps under different horizontal test distances when the vertical test distance is 100mm, standard plate electrode is 600mm*600mm stainless steel electrode and the sensor is relative to the central position of the detection plate:

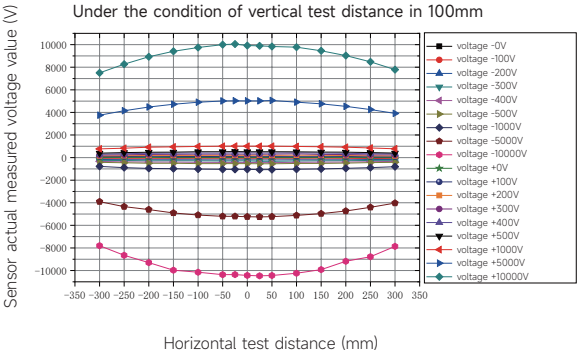


Figure 4-1 Horizontal test data graph of the standard plate electrode when the vertical distance is 100mm

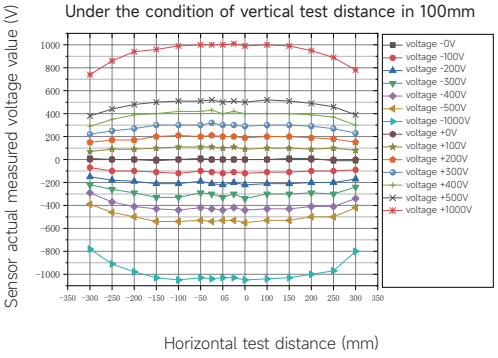


Figure 4-2 Horizontal test data graph of the standard plate electrode when the vertical distance is 100mm

From the above two horizontal test charts, it can be seen that for a 600*600mm standard plate and a 100mm vertical test distance, the measurement error can be kept within 5% and within -200mm ≤ X ≤ 200mm horizontal distance and .

◈ Operational use and precautions

➤ **Instructions for use**

When using, should make the sensor's electrostatic detection window in the plane parallel to the surface of the object to be measured, according to the amount of electrostatic charged objects and the use of environmental selection of the detection distance (i.e., the aforementioned standard detection distance: 50mm, 100mm, 150mm, 200mm, 250mm, 300mm, 350mm, 400mm, 450mm, 500mm) and detection gear according to the electrostatic amount of the charged object and the usage environment; the detection data displayed by the terminal will be most accurate at this time.

➤ **Online mode: (monitoring terminal, integrated power supply and communication software must be purchased separately, see system monitoring terminal and system integrated power supply instruction for comprehensive online mode)**

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

◈ Connection with monitoring terminal

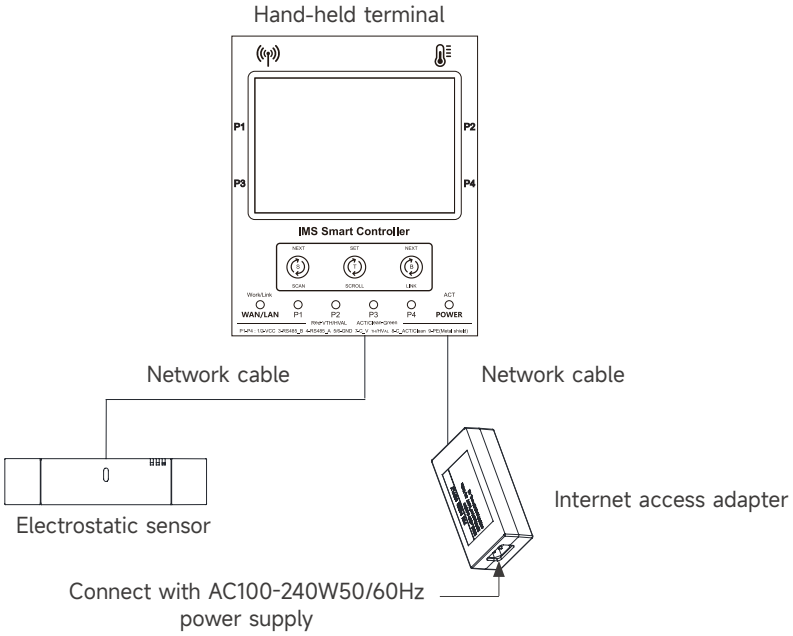


Figure 14 Schematic diagram of the connection monitoring terminal

◈ Connection with PC

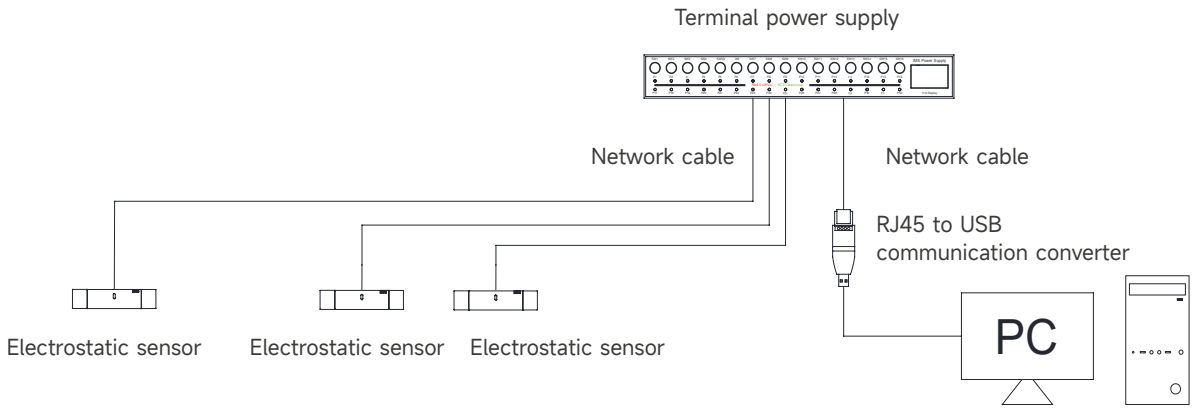
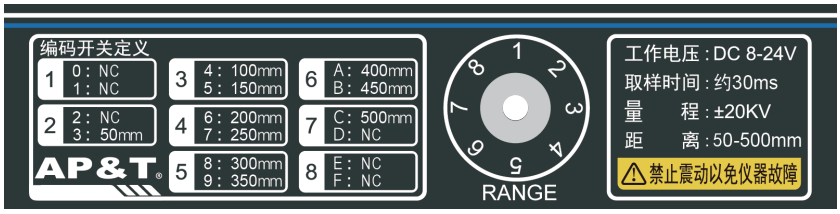


Figure 15 Connecting PC Schematic

➤ **Operational Steps:**

Set the sensor detection parameters as shown in the sensor label description diagram:



- Depending on the amount of static electricity carried by the electrically charged object and the operating environment, use a 3mm diameter Phillips screwdriver 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 of the environment, toggle the "RANGE" circular dip switch to select the detection gear.
- Static safety (alarm) thresholds are set by remote control or monitoring software according to the value of static voltage withstood by the protected product.

  Note: When the detected static voltage value is within the set electrostatic threshold, the threshold alarm indicator is green, and red when it exceeds the set threshold.
- Depending on the production station, use a 3 mm diameter Phillips screwdriver to turn the "ADDR" circular dip switch to set the device address.

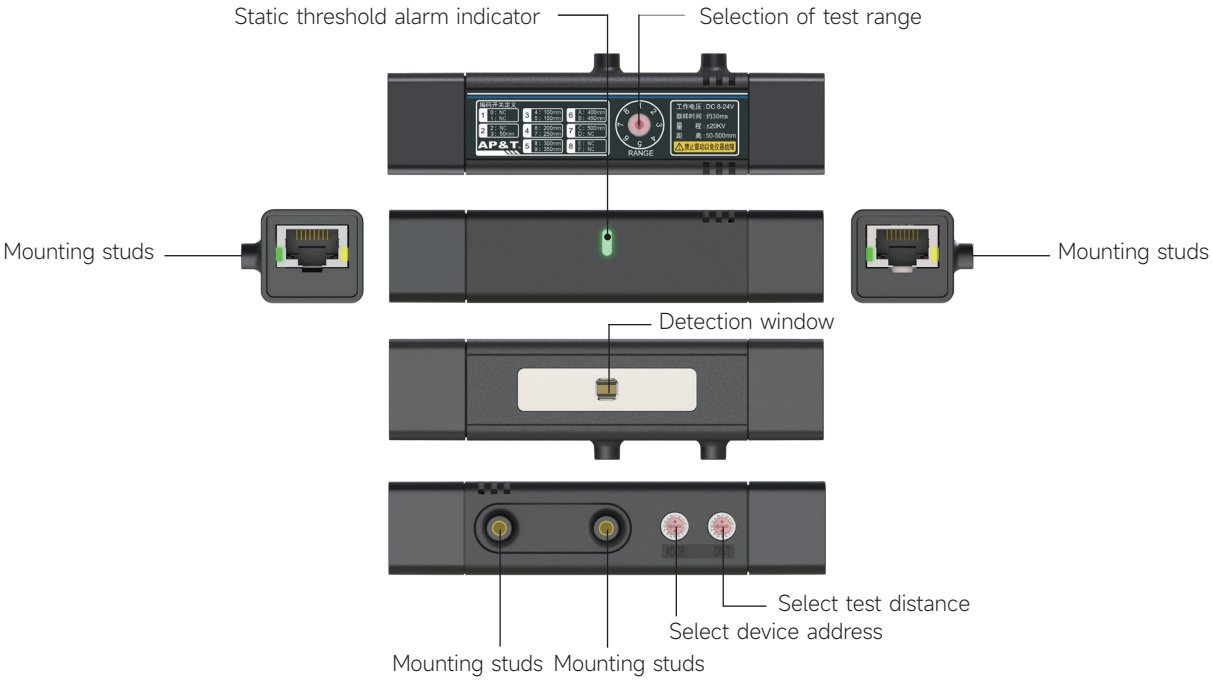


Fig. 16 Schematic diagram of sensor functions

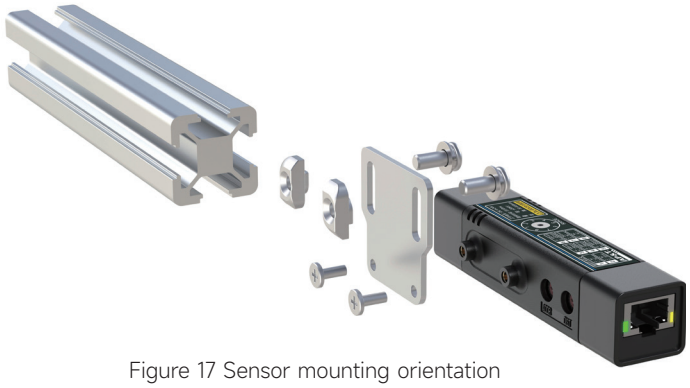


Figure 17 Sensor mounting orientation

⚠ Caveat

- For proper use of the unit, please read the instruction manual carefully before use.
- Before powering up the product, please check the specification of the power supply provided, any power supply that does not meet the specification will cause damage or even malfunction to the product.
- Please operate the product at the specified ambient temperature (0 to 50°C).
- When testing, people and products to maintain a distance of 1m or more to avoid the impact of human static electricity on the test; test personnel must wear electrostatic clothing, electrostatic cap, electrostatic shoes.
- ϕ5 diameter stainless steel mounting rod insertion depth shall not exceed the detection gear switch position on the back of the sensor.
- The surface of the ϕ5 diameter stainless steel mounting rod must not have an insulating coating.
- Do not touch theelectrostatic detection head during testing.
- Ensure that the sensing window area is free from particles and dust.
- There must be no obstructions between the sensor and the object to be detected, otherwise the accuracy of the detection results will be affected.
- There should not be any electrical equipment within the detection distance of the sensor that affects the sensor, otherwise, malfunction and damage to the internal equipment and chips may occur.
- For accurate measurement of electrically charged objects, the plane of the sensor's detection window must be parallel to the surface of the object to be measured.
- Use it after the power is connected for 5 seconds. Otherwise, the data display may be unstable at times.
- When the charged object is smaller than the calibration plate, the measured value is smaller than the actual electrostatic value of the charged object.
- When the charged object is larger than the calibration plate, the measured value is larger than the actual electrostatic value of the charged object.
- Do not zero the sensor in a state with electrostatic charge or during the electrostatic measurement process (not the electrostatic calibration process); if you zero the sensor during the electrostatic test, the displayed electrostatic value will likely be zero.
- Do not install around high-voltage equipment, such as high-voltage power supplies, electrostatic generators, ionizers, and dissipators; high voltages will affect the sensor's performance and detection accuracy.
- Tighten the sensor when installing in high vibration areas; otherwise, data errors may occur.
- Please check the power cord/communication cable of the product regularly, and replace it immediately if it is damaged, otherwise it will easily cause leakage of electricity, poor communication, abnormal operation and other problems.
- The product is subjected to mechanical shocks such as dropping, collision, etc., which may lead to malfunction.

⚠ Safety warning

- The whole set of equipment must be reliably grounded during use, otherwise it will easily lead to abnormal or even damaged sensors.
- It is strictly prohibited to use this equipment in flammable and explosive environments.
- Do not touch the static detection window with sharp objects.
- It is strictly prohibited to contaminate the product with liquids while it is operating, otherwise an abnormality may occur, resulting in electric shock or fire.
- If the detection range is exceeded, the product may malfunction.
- Turn off the power when checking or replacing the product, otherwise it may cause electric shock or fire.
- This tester is a precision device, do not disassemble it.
- Unauthorized disassembly of the product is strictly prohibited, and internal maintenance and repair must be carried out by professionals.
- The product is designed for detecting static electricity on the surface of the object, it is strictly prohibited to do other uses, any abnormal use may cause machine failure, electric shock, fire and other hidden dangers.

⚠ Trouble shooting

NO	Failure	Possible causes	Prescription
1	Power port indicator does not light up	Poor power cord contact	Verify that the power cord is intact and securely connected
		Incorrect power cord connection	Confirm that the power cord is wired correctly
		Power supply mismatch	Confirmation of power supply specifications (INPUT: 100-240VAC 50/60Hz; OUTPUT: 24VDC 2000mA)
2	The measured static voltage value is abnormal or the error is too large	Poor sensor grounding	Verify that the sensor is well grounded
		The presence of high-voltage equipment around the sensor, ionizing equipment or Electromagnetic equipment	Removal of high-voltage, ionizing or strong electromagnetic equipment
		Incorrect setting of range position or detection distance	Reference gear range setting table
		Improper sensor mounting setup orientation	Confirm the correct mounting position and refer to the operation and use precautions
3	Threshold alarm indicator green light does not light up	——	Return to factory for maintenance
4	Threshold alarm indicator red light does not light up	The set electrostatic threshold is large or exceeds the range	According to the use of the environment and static electricity control requirements, refer to the gear range setting table, reasonably determined Constant Static Alarm Threshold
5	Product has an odor	Component burnout	Return to factory for maintenance
6	If you have any other problems not listed above or if you still cannot solve the problem with the above program, please contact the manufacturer or seller		

⚠ Maintenance

- In order to ensure the good performance of the product, when not in use, please store the device in a dry place away from light and do not weigh it down.
- This device is a precision detector, do not use strong vibration.

⚠ After-sales service

- AP-YV3301 electrostatic sensors have been carefully tested and aged before leaving the factory, and their performance fully meets the relevant indexes indicated in the instruction manual.AP&T promises the following to the users: within one year from the date of purchase, we will repair or replace any defective parts that have been inspected by the company free of charge. However, this promise does not apply to the following situations:

  1. The device is being used incorrectly;
  2. Damage caused by negligence or accident during use;
  3, their own alteration, disassembly or has been other non-Ampin authorized service department repair;
  4. Failure caused by external factors such as fire, earthquake, flood and abnormal voltage.

- AP&T does not assume any liability related to misuse of the product except for the repair or replacement of parts as specified above.

⚠ Packaging accessories

- ①: Certificate of Conformity ×1 ②: Manual ×1 ③: Power Adapter ×1 ④: 2.5m Power Cable ×1
  ⑤: national standard three-phase power cord ×1 ⑥: mounting bracket ×1 ⑦: M3 * 5 flat head screws × 4

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