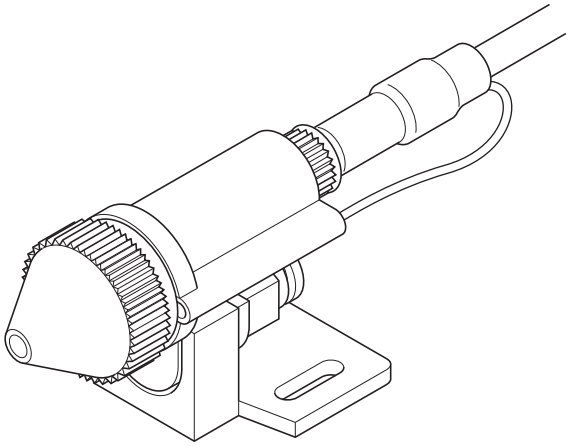
SHISHIDO ELECTROSTATIC, LTD.

Instruction Manual

Static Eliminator ELIMINOSTAT

Air-type static eliminating electrode AP-5



Thank you for purchasing the Static Eliminator ELIMINOSTAT Air-type static eliminating electrode AP-5.
Please read this manual before using the product in order to fully understand its functions.
Also make sure to store this manual so that it can be referred to in the future.

⚠Caution Because this device handles high AC voltages of up to 7,000 VAC, there is considerable danger of electrical shock. Be sure to take sufficient care when handling and connecting this device.

Functions

Air-type static eliminating electrode AP-5 is a neutralizing electrode for the Static Eliminator ELIMINOSTAT. This device connects to a high voltage power supply (purchased separately) and emits air that is ionized by the coronal discharge of a discharge electrode, to eliminate static electricity.
Neutralization and cleaning of remote locations can be made possible by supplying a suitable air pressure.

Characteristics

1. The AP-5 employs coronal discharge, resulting in an optimum balance in the generated amount of positive and negative ions, and a stable neutralizing effect.
2. The AP-5 has a shock-reducing structure that minimizes the possibility of electrical shocks.
3. Its point-type nozzle is ideal for neutralizing and cleaning small objects.
4. You can select from two types of nozzle caps depending on the situation: the safety-priority type nozzle cap and the performance-priority type nozzle cap.

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Safety Precautions

Statements in this manual indicated with a ⚠ mark are precautions that must be followed in order to use the product safely. Make sure to follow the statements found in this manual. Also make sure to observe the statements below, as the internal circuitry and electrodes of the device contain high voltage.

⚠Danger This device does not conform to explosion-proof specifications. Do not install it in locations where flammable gases or solvents are handled, such as painting booths etc. Doing so may result in fire or explosion.

⚠Caution This device is a high voltage device. Avoid installing it in wet, oily, hot, and humid locations. In particular, avoid locations of high humidity and condensation. There is a possibility of fire due to breakdown.

Installation

● Install the device in a location close to the neutralizing electrodes, where operations and supervision are easily performed.

● Do not install the device in any of the following locations, as doing so may cause fire or electrocution.

- Locations subject to high or low temperature, or high humidity
- Dusty locations
- Locations where the device may be exposed to organic solvents such as thinner
- Locations where the device may be exposed to corrosive gas
- Locations subject to flames or explosions
- Locations subject to frequent vibrations
- Locations subject to sudden changes in temperature or humidity
- Locations subject to condensation
- Locations where the device may be exposed to water or oil

Power Supply

- Make sure to grasp the plug when removing the power cord. Pulling the power cord by the cord may cause it to break, or become damaged and have its core be exposed, which may cause a short circuit, or current leakage and electrocution.
- Make sure to insert the power cord firmly into the power socket. Failure to fully insert the power cord into the socket may cause fire or electrocution.
- Do not insert or remove the power cord with wet hands. Doing so may cause electrocution.
- Do not step on the power cord or place heavy objects on it. Doing so may cause damage to the cord.

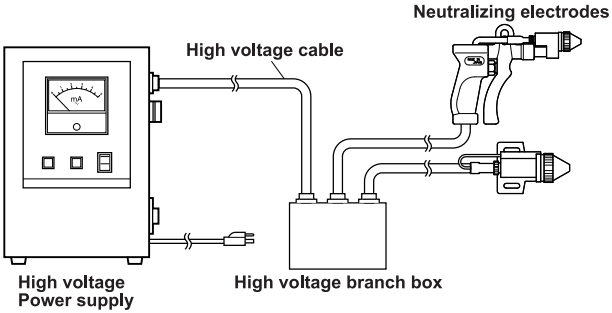
Maintenance

- Periodically remove the power cord and wipe any dust on the power socket away with a dry cloth. If you leave the power cord inserted in the power socket for a long period in a location with high humidity, dust, or oil, the dust will absorb the humidity, etc., which may result in a short circuit, and cause a fire.
- Make sure to turn the main power of the device OFF before removing the power cord for cleaning.

Handling

- Do not disassemble or modify the device.
- The device may affect medical devices such as hearing aids or pacemakers.
- Take care when using the device, as its internal parts are subject to high voltage.
- Do not insert any foreign objects into the device. Doing so may result in a short circuit or current leakage, and cause fire or electrocution.
- Make sure to connect the earth wire to an appropriate place. Forgetting to connect the earth wire, or connecting the earth wire to an inappropriate place may cause electrocution.
- For safety purposes, remove the power cable if you plan on not using the device for an extended period of time.
- If the device emits any abnormal odors or sounds, smoke, or heat, turn OFF the main power immediately, remove the power cord, and contact your point of purchase. Failure to do so may result in fire or a short circuit.
- Do not directly touch the discharge needles with your hands.
- Do not remove name plates or labels.
- Do not do anything with the device that is not described in this manual.

Block Diagram of Static Eliminator ELIMINOSTAT



Static Eliminator ELIMINOSTAT is constructed from neutralizing electrodes, a SAT series high voltage power supply, and high voltage cables for connected them.
Make sure that the length of cables in structures using each of the following devices does not exceed the result of the corresponding equation.

SAT-11、AT-10	[length of electrode] + [length of cable] ≦ 8m
SAT-20、SAT-30	[length of electrode] ≦ 10m + [length of cable] ≦ 12m

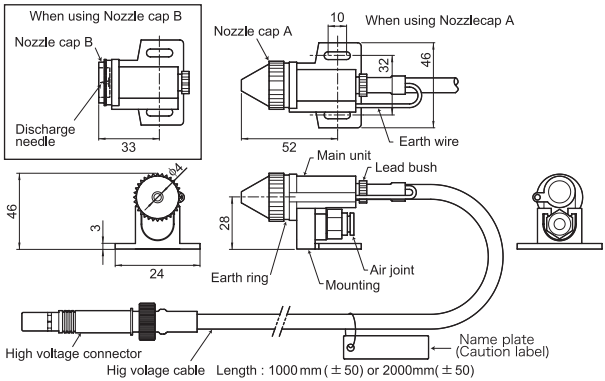
* The length of the branch box was calculated as 1 m, and the lengths of the electrodes AP-5, AG-5, and FAPS-GP as 0.5 m.

This document is the instruction manual for the high voltage power supply. For instructions concerning high voltage cables and neutralizing electrodes, refer to the respective instruction manuals.

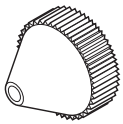
Parts and Items Included With the Device

Confirm that the following items are included with the device before using it for the first time.

■ Main Device



■ Nozzle cap A x 1
(Attached to main unit)



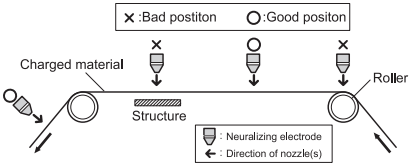
■ Nozzle cap B x 1

■ Instruction manual/warranty x 1 (this document)

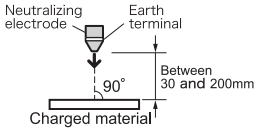
Installation Procedure

Installing the Neutralizing Electrode

The best location for installing the neutralizing electrode is immediately in front of the area where problems due to static electricity occur.
If you install the neutralizing electrode in a location where the charged body is in contact with or proximity to another object, the neutralizing effect cannot be achieved. Attach the neutralizing electrode in a location where the charged body is suspended in isolation (Diagram 1).



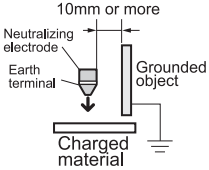
(Diagram 1)



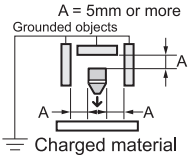
(Diagram 2)

Position the neutralizing electrode so that the discharge needle of the electrode is perpendicular to the charged object.
The distance to the charged object should be 30 - 200 mm from the earth terminal (Diagram 2).

If there is a grounded object of metal etc. beside the neutralizing electrode, and the grounded object extends to a position closer to the charged object than the earth terminal of the neutralizing electrode, position the neutralizing electrode so that there is a gap of 10 mm or more between it and the grounded object (Diagram 3). Also, If there are grounded structural components to the side or rear of the neutralizing electrode, position the electrode so that there is a gap of 5 mm or more between it and the grounded component(s) (Diagram 4).



(Diagram 3) Where there is a grounded object in front of the electrode.



(Diagram 4) Where there are structural components close to the electrode.

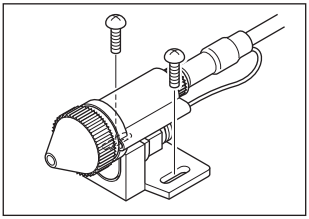
The neutralizing effect cannot be achieved in locations where charged objects overlap. Make sure you install the neutralizing electrode in a location where the charged object is by itself (Diagram 5). Also, air-type electrodes should be installed in locations where other objects cannot enter their air inlets.

(Diagram 5) Effect of overlaying charged objects.

1. Affix the device in a suitable location.

Using the screw for the attachment hole (M4 x 2), check that the main unit is firmly fixed.

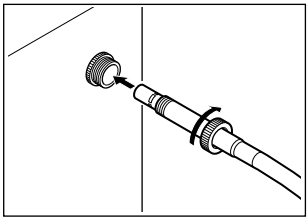
NOTE Install the device in a location where objects cannot enter the air inlet of the nozzle.



2. Connect the high voltage cable

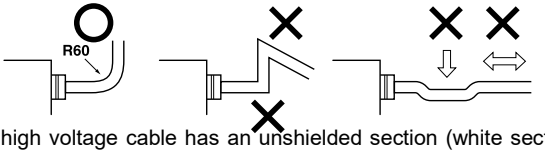
Insert the male connector connected to the high voltage cable end of the neutralizing electrode into the high voltage output terminal at the side of case of the device, and turn the locking nut of the male connector to fix it to the terminal.

Make the cable as short as possible to minimize discharge loss from the surface of the cable.



NOTE

- Connect a high voltage cable whose radius of curvature is 60mm or more.
- Do not pull the cable at the connector or place a load on the cable.
- Do not fix the cables together too strongly with cable ties, etc.



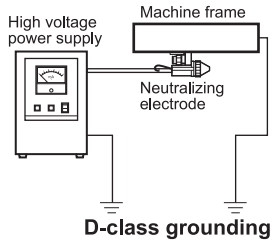
- The high voltage cable has an unshielded section (white section) about 30 to 50 mm from the electrode. Do not bring this section into contact with stoppers, conductors, grounding cables, etc.
- If you are connecting 2 or more electrodes to one high voltage outlet terminal, use the high voltage branch box HVB and high voltage cable SAT-ECS, purchased separately.
- Do not remove any labels attached to cables.

Warning Inappropriate handling of high voltage cables can result in fire due to breakdown of the insulation.

Caution When connecting and disconnecting the high voltage code, be sure to turn the power switch off. Failure to do so result in electrical shock.

3. Connect the earth (ground) lead

- Ground the machine frame.
  Ground the machine frame to which the neutralizing electrode is attached using D-class grounding (the cross-sectional area of the earth cable (maximum 100 Ω) should be at least 1.25mm^2).
- Ground the neutralizing electrode.
  The earth terminal of the electrode is grounded when the high voltage connector is connected.
- Ground the high voltage power supply.
  Ground the earth terminal on the high voltage power supply with a 0.5 mm^2 or more copper lead.

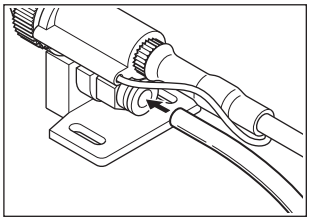


This document is the instruction manual for the neutralizing electrode. It does not apply to high voltage power supplies.
For details about handling high voltage power supplies, refer to the appropriate instruction manuals.

Caution If grounding is incomplete, not only is there the possibility of electrical shock if someone comes into contact with the earth of the neutralizing electrode or the case of the high voltage power supply, but the neutralizing electrodes will not operate effectively.

4. **Connect the air hose to the one-touch air joint of the device**

Attach the air hose (Φ6 mm) to an air supply (air compressor) via a pressure regulator. The pressure regulator and air supply must be prepared separately.

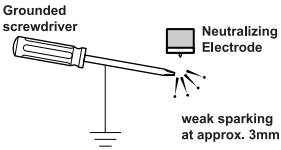


NOTE

- Supply clean dry air (air that does not contain water or oil). Contaminated air can cause burning or deterioration of the electrode(s).
- Suitable air pressure for the device is from 0.01 MPa to 0.5 MPa.

Checking the Operation of the Neutralizing Electrode

To verify whether the neutralizing electrode is operating correctly, turn on the power to the neutralizing device, and bring the tip of an earthed screwdriver into proximity with the tip of the discharge needle. When the distance between the discharge needle and the screwdriver is around 3 mm, there will be a small spark if the discharge needle is operating correctly. If you are using the nozzle cap A, remove the nozzle cap to verify the operation of the discharge needle.



Operating Procedure

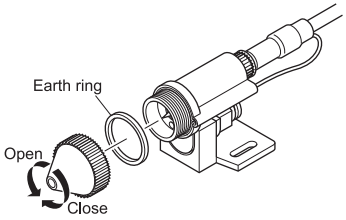
1. Turn on the air compressor.
2. Turn on the power switch of the high voltage power supply.
3. When you want to stop the device, turn off the air compressor after turning off the high voltage power supply.

NOTE

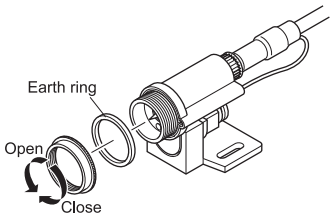
- When not using the device, make sure you turn off the switch of high voltage power supply. If you leave the high voltage power supply turned on, it may cause increased deterioration of the electrodes(s).

Replacing the Nozzle Cap

When replacing the nozzle cap, rotate the nozzle cap to detach it.
When re-attaching the nozzle cap, be sure to attach the earth ring first.



Nozzle Cap A



Nozzle Cap B

Although nozzle cap B exhibits a stronger neutralizing effect than nozzle A, it places the discharge needle in an exposed condition. Take care not to cut your fingers etc. on the sharp end of the needle.

NOTE

- The earth ring is not fixed - be careful not to lose it.

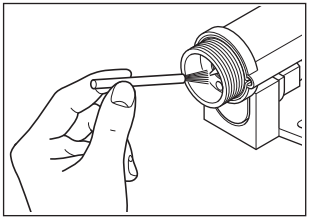
Maintenance

⚠Danger Before cleaning the device, be sure to turn the power switch off and disconnect the power cord from the power outlet. Failure to do so may result in electrocution.

Because the insulator incorporated in the neutralizing electrode is exposed to an AC high voltage electrical field, it gradually deteriorates. Even if properly maintained, the lifetime of the electrode is approximately 10,000 hours, after which time it is recommended that you replace the electrode. Because the lifetime of the electrode decreases still further if it has not been sufficiently maintained, you must carry out correct maintenance at regular intervals.

Removing Contaminants and Cleaning the Discharge Needle and Surroundings

Contaminants such as paper dust, fluff, etc. easily attach to the discharge needle and its surroundings. If there are contaminants, remove them with a nylon brush or pressurized air.



NOTE

- Take great care when cleaning the needle, and make sure not to bump it with any hard objects. Do not under any circumstances use a wire brush. This will lead to damage and deformation of the discharge needle, and may cause a reduction in neutralizing performance and burnout.
- To remove contaminants that are difficult to remove, wipe the area with a clean cloth and isopropyl alcohol. Do not under any circumstances use solvents or cleaners that include solvents.

Maintenance of the high voltage cables

If the insulation protecting a high voltage cable is damaged, replace the cable with a new one. If the cable is dirty, remove the dirt with a clean cloth or rag and isopropyl alcohol.

Troubleshooting

If the device does not operate correctly, it may be the result of one of the following.

Status	A shock is received from touching the case of the high voltage power supply or the earth of the neutralizing electrode.
Cause	● The earth terminals of the power supply and neutralizing electrode are not securely grounded. ● The device to which the neutralizing electrode is connected is not securely grounded.

Status	The neutralizing effect is not achieved.
Cause	● The power cord of the high voltage power supply is not connected to the power outlet. ● Power is not being correctly supplied to the power outlet. ● The high voltage cable are not securely connected to the output terminal of the power supply. ● The earth terminals of the power supply and neutralizing electrode are not securely grounded. ● A circuit in the high voltage power supply is not operating correctly. ● Air is not being supplied to the neutralizing electrode(s) correctly. ● The neutralizing electrode is dirty (perform a maintenance check). ● The supplied air is contaminated, and a reduction in the insulation inside the electrode has occurred. ● The high voltage cable is damaged. ● The neutralizing electrode has burnt out.

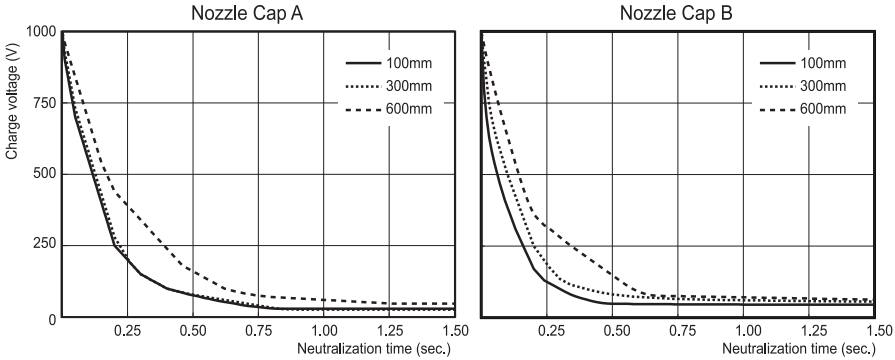
⚠Caution If abnormal sparking from the neutralizing electrode(s) or high voltage cables occurs, turn the device off immediately and contact Shishido Electrostatic, Ltd. The device will need to be replaced.

⚠Caution If a fault still occurs even after you have checked and corrected the above causes, the product may require adjustment or repair by a specialist. Please contact the distributor where your bought the product.

⚠Caution If sparking in the operation check of the neutralizing electrode is weak or no longer occurs, carry out a maintenance inspection. Also, if the electrode is in an abnormal discharging condition with extremely strong sparking, stop the device immediately and replace it with a new one.

Neutralizing Properties

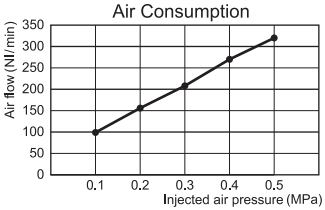
The neutralizing properties of the static eliminating electrodes are represented by the neutralization time and ion balance. These values were obtained using a charged plate monitor (type H0601, from SHISHIDO ELECTROSTATIC).
The neutralization time indicates the measured time taken (in seconds) to dampen a plate with a ±1kV charge to ±100V (dampening time). The offset voltage (in volts) of the charged plate in a steady state is used as the measured ion balance voltage (this conforms to the American EOS/ESD-S3.1-1991 standard).
Refer to the following values for the neutralization time based on distance from the front of the device. The values below are average dampening values (±).



* This data is for reference purposes and is not guaranteed. These figures are based on an injected air pressure of 0.20 MPa.

Specification

Indoor/Outdoor classification: Indoor
Material of electrode main body: PBT
Filler material: epoxy resin
Discharge needle material: tungsten
Operation temperature: between 0 and 40°C
Humidity: between 5 and 70 %(no condensation)
Injected air pressure: 0.01 MPa to 0.50 Mpa (Φ6 tube; 300 mm from electrode main body)
Injected air temperature: 10 to 40°C (no condensation)
Noise: 81 dB (Nozzle cap A; Injected air pressure: 0.3 MPa)
Applicable power supplies: SAT-11, SAT-20, SAT-30
Ozone produced: less than 0.05ppm
(150mm from the center of the front of the air vent)
Weight: 260g(with cable length of 2000 mm)
Air consumption: refer to the graph to the right
(figures are for reference purposes only)



Warranty Valid for: 1 year after delivery

Product name	Static Eliminator ELIMINOSTAT Air-type static eliminating electrode			
Model	AP-5	Serial number		
Date of Delivery			Inspection Stamp	

1. If any malfunctions or damage occur to the product due to any of the following reasons, a charge will be incurred for repairing or replacing the product.
2. Malfunctions or damage occurring to the product due to misuse or improper storage.
   - Malfunctions or damage occurring to the product due to repairs or modifications conducted by a party other than SHISHIDO ELECTROSTATIC or a company specified by SHISHIDO ELECTROSTATIC.
   - Malfunctions or damage occurring to the product due to fire, natural disasters, or other acts of providence.
   - Other malfunctions or damage occurring to the product deemed not to be the responsibility of SHISHIDO ELECTROSTATIC.

For any queries relating to the product, contact the sales office where you purchased the product.

SHISHIDO ELECTROSTATIC, LTD. http://www.shishido-esd.co.jp/

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