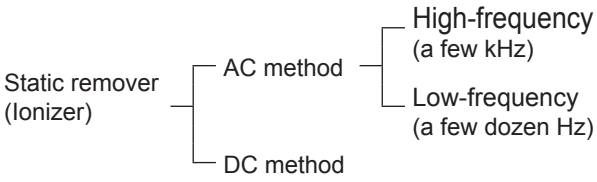
INTRODUCTION

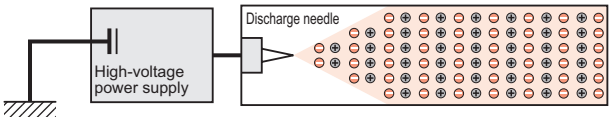
Static removers (ionizers)

- A static remover (ionizer) is a device that uses ions to neutralize static electricity, that causes troubles such as electrostatic breakdown and the malfunction of devices. Ionizers are divided into the AC method and DC method according to the method they use to produce ions.
  The AC method applies AC voltage to the discharge needles and alternately produces positive ions and negative ions.
  The DC method applies DC voltage to the discharge needles and produces either positive ions or negative ions only.
  In addition, the AC method ionizers are divided into a high frequency method (a few kHz) and a low frequency method (a few dozen Hz) according to the frequency that produces the desired ions.



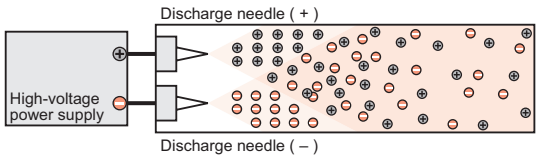
AC method

- This is a method that creates a corona discharge (refer to p.1497) by applying AC voltage to the discharge needles and alternately produces positive ions and negative ions.



DC method

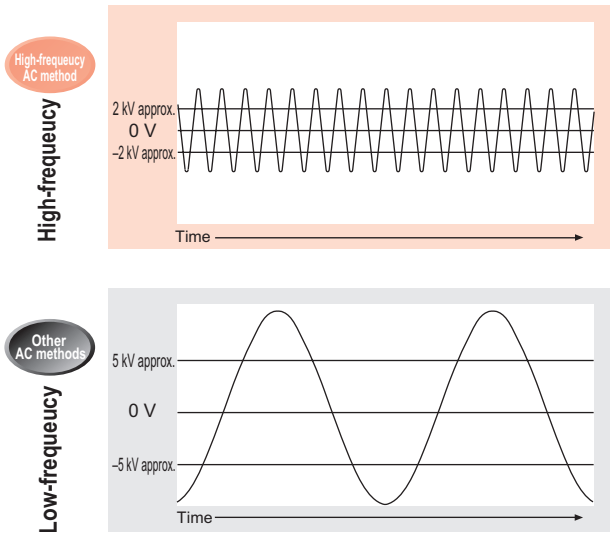
- This is a method that creates a corona discharge by applying DC voltage to the discharge needles and produces either positive ions or negative ions only.



FEATURES OF HIGH-FREQUEUCY AC METHED

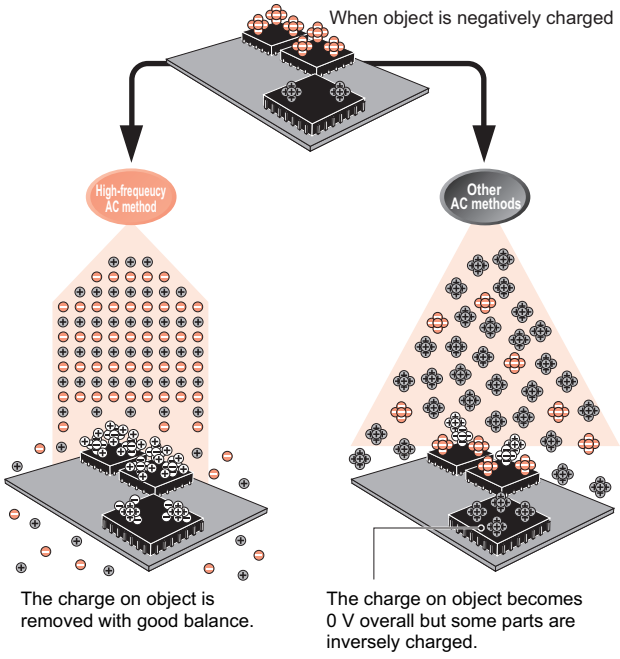
Stable ion balance and excellent electricity neutralization performance

- In contrast to previous low-frequency DC method, the high-frequency AC method generates positive ions and negative ions more efficiently and thus it creates a stable environment with high ion density. This means that a stable ion balance and excellent charge removal performance can be provided regardless of the setting distance.



No damage to electronic devices from oppositely-charging

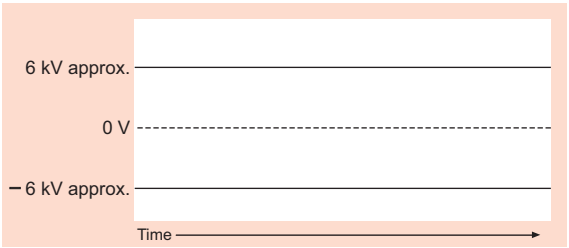
- A high-frequency 68,000 Hz AC corona discharge is used, so that positive ions and negative ions are emitted in rapid alternation. Because there are none of the sudden ion discharges that occur with other types, there is no tendency to partial oppositely-charging even when charge removal insulators with different localized charges, so that any damage to electronic devices can be avoided.



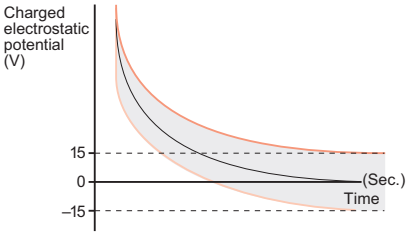
FEATURES OF THE DC METHOD

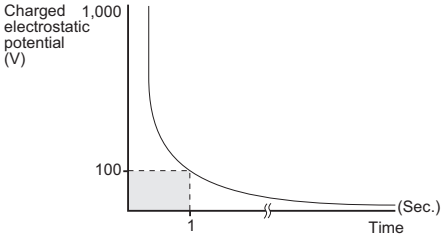
Excellent neutralization rate

- The DC method generates positive ions and negative ions constantly without having the ion generation cycle that exists in the AC method, thus its neutralization rate is faster.



GLOSSARY

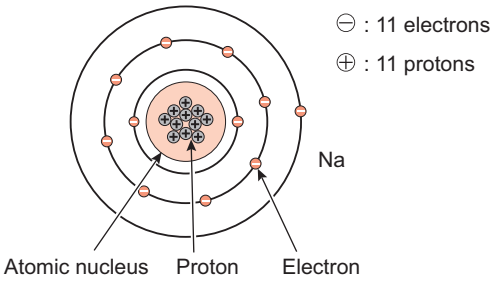
Term	Description
Ion	A small amount of positively- or negatively-charged particles. Positive ions are atomic elements or molecules that have lost electrons. Negative ions are atomic elements or molecules that have gained electrons. Positive ions and negative ions are naturally attracted to each other. If the total number of positive ions is equivalent to the total number of negative ions, they are electrically neutralized. Ionizers produce positive ions or negative ions to make use of their natural properties in order to neutralize static electricity and make an object electrically neutral.
Corona discharge	A phenomenon that occurs when a high voltage is applied to a localized area like a needle tip, and electric discharge occurs toward the ground. In a dark room, a watery light (pale light) can be observed. Ionizers remove static electricity by irradiating ions created as a result of the corona discharge intentionally produced using this principle.
Ion balance	Ionizers create a corona discharge on their discharge needles thereby producing positive and negative ions. The range of unbalance between the positive ions and negative ions is called ion balance. If the charged electrostatic potential of a device is 20 V, an ionizer with an ion balance of more than ±20 V may break the device due to reverse charging. Therefore, such an ionizer cannot be used with that device. 
Ozone	O_3. This is an oxygen allotrope and it has a certain odor. It is often used for disinfecting, bleaching, and oxidation. Ozone itself is toxic and has strong oxidizing properties. However, in the natural world, ozone exists at about 0.005 ppm. The acceptable concentration of ozone in the workplace environment in Japan is 0.1 ppm for 8 hours. (That means it is fine to stay in a room with ozone of 0.1 ppm for 8 hours.) The Panasonic Industrial Devices SUNX's high frequency AC method has an ozone concentration of less than about 0.05 ppm at 300 mm 11.811 in away from the discharge needles; hence there is almost no influence on the human body.
Charge plate monitor (CPM)	An instrument to monitor the ionizer's performance of removing electric charge (charge removal time, ion balance). The monitoring is performed by measuring changes in the electric potential of a metal plate that has been electrically insulated. [International standards regarding ionizer performance evaluations] IEC 61340-5-1 (TR2: 1998): evaluate the charge removal time using the CPM and use a metal plate of □150 mm □5.906 in and 20 pF.

Term	Description
Charge removal time	Time required to reduce the electric charge of an electrified body from ±1000 V to ±100 V. Ionizers with shorter charge removal time have higher performance. 
Electrification	A phenomenon that generated static electricity is accumulated in objects. When the intensity of the electric field, caused by an electrified body, exceeds dielectric breakdown strength (this means it gets charged a lot), static electricity discharge occurs causing various troubles.
Oppositely-charging	A phenomenon that a charged object, which could have been originally neutralized by ion to remove charge, is charged instead.
Electrostatic induction	A phenomenon that when an insulated conductor is brought close to a charged object, the internal electrons of the conductor moves, and then the surface that faces the charged object is charged with opposite polarity against the charged object.
Electric field	Electrically-distorted space in the medium around an electrified body. Electric energy in this electric field ionizes gas molecules near the discharge needles; then, ionizers produce ion pairs of positive and negative ions.
Surface potential meter	A meter used for measuring the surface potentials of an electrified body. It is effective for checking how much electric charge is being removed from an electrified body by using an ionizer.
Dry air clean air	Air that is dry and does not contain any dust. When using the **EC-B/G** series, **ER-VW/V** series, please provide air that has been passed through the following conditioning equipment; an air dryer (dew point: about –20 °C –4 °F) and an air filter (mesh size: about 0.01 μm).
Pressure drop	A decrease of air pressure as a result of a piping arrangement from the air supply source or adding air pressure parts. Check the pressure applied to an ionizer at the point right before the air intake of the ionizer.
Dust removal	To remove dirt and dust attached to an object using the force of air that contains the ions of an ionizer. For removing dust, it is recommended to use the **ER-V** series that can provide a high air flow volume.

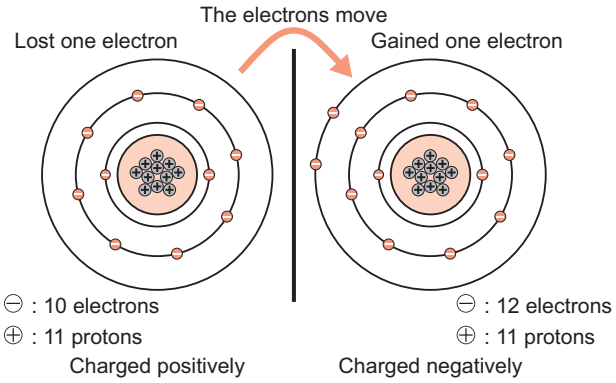
ABOUT STATIC ELECTRICITY

Generating principle of static electricity

- The number of electrons is fixed that can exist on each orbit around atomic nucleus. The innermost orbit has 2 electrons, the second has 8, and the third has 18. Sodium (Na) has 11 electrons, but the innermost and second orbits are full. Therefore, the last electron travels in the outer orbit. This state is electrically stable because it has the same number of protons (positive) and electrons (negative).



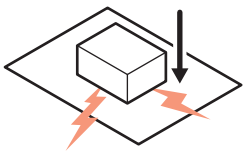
- When two materials come into close contact, negative electrons move freely from molecule to molecule between the two.
One material receives electrons and is charged negatively. The other material loses electrons and is charged positively. Then, static electricity is produced.



Type of electrification

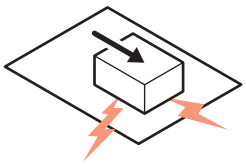
- **Contact electrification**

Electrification that occurs when two objects are simply brought into contact with each other.



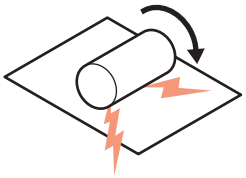
- **Frictional electrification**

Electrification that occurs due to friction.



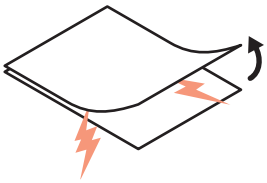
- **Rolling electrification**

Electrification that occurs when a solid of revolution rolls over another object.



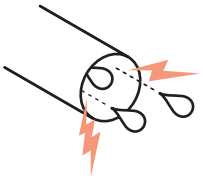
- **Separation electrification**

Electrification that occurs due to the separation of contact sides. When the separation speed is faster, the amount of electrification becomes greater.



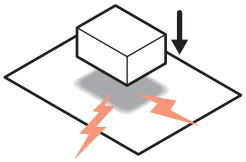
- **Ejection electrification**

Electrification that occurs due to friction when high pressure gas or liquid is ejected from nozzles.



- **Induction charging**

Electrification that occurs due to electrostatic induction. When an electrically charged material is brought close to another material, ions of opposite polarity to the electrified material cluster on the surface and electrification occurs.



Factors that determine the amount of electrification

- **Contact dimensions**

As contact dimensions become larger, the amount of static electricity becomes greater.

- **Pressure**

As pressure becomes higher, the amount of static electricity becomes greater.

- **Frictional**

As the amount of friction becomes greater, the amount of static electricity becomes greater.

- **Temperature**

There are no significant changes. However, when temperature is higher, the resistance value becomes smaller (insulator).

- **Humidity**

When humidity becomes higher, the amount of static electricity becomes smaller.

Photoelectric Sensors
Pressure Sensors
Flow Sensors
Inductive Proximity Sensors
Displacement Sensors
Electrostatic Sensors
Static Removers
About Laser Beam
General Precautions