ELECTROSTATIC CHARGE REMOVERS

Photolonizer®

New choices for removing static charges
Reliable and efficient removal of static charges. X-rays are what make it possible!

Hamamatsu PhotoIonizers are electrostatic charge removers that use “photoionization” to apply low-energy soft X-rays to remove static electricity. Photoionization is an innovative ionization method that utilizes X-ray characteristics to neutralize static charges much more reliably and efficiently than other types of ionizers. Photoionization is effective in neutralizing static charges on objects, in environments, and under conditions that were impossible to treat up until now such as neutralization of static charges on complex structures and simultaneously neutralizing both sides of sheet materials. Since X-rays are emitted in a conical pattern, static charges over a wide area can be neutralized with just a single PhotoIonizer. Hamamatsu PhotoIonizers will completely eliminate static charges that cause serious problems in various manufacturing processes.

What are soft X-rays?
Soft X-rays are the type of light with very low energy compared to other X-rays and artificial radiation used for medical diagnostic imaging such as CT (computed tomography), PET (positron emission tomography), and X-ray photography. Soft X-rays are easy to handle and used in a wide variety of applications.

PRINCIPLE OF STATIC CHARGE NEUTRALIZATION

Photoionization mechanism

When soft X-rays are emitted into air, they knock electrons out from stable atoms and molecules in the air leaving positive ions. These knocked out electrons then combine with other stable atoms and molecules to produce negative ions. Ions generated near an electrostatically charged target object are attracted to the target object by static electricity and neutralize the static charges on the target object. Other ions generated during this process return to their original atoms and molecules.
From static charge neutralization performance to maintainability, “photoionization” completely eliminates the root causes of problems thought impossible to solve up to now!

Static charge removal or neutralization using conventional corona-discharge ionizers always brings problems such as residual static charges, dust generation, and frequently needed maintenance which are unavoidable due to its principle of neutralizing static charges. Hamamatsu PhotoIonizers do not involve an electrical discharge to generate ions but use photoionization technology that directly ionizes atoms and molecules in the air by irradiating them with soft X-rays. This photoionization technology eliminates all problems associated with conventional ionizers and ensures highly efficient and reliable removal of static charges.

**Completely removes all static charges**

Photoionization constantly generates ions uniformly over the entire range irradiated with soft X-rays. The high density of the generated ions helps remove all static charges very efficiently by neutralizing them to 0 volts.

**No need for concern about “overshoot”**

Because photoionization generates an equal amount of positive and negative ions, there is NO risk of blowing an unbalanced amount of positive and negative ions onto target objects, and NO risk of causing “overshoot” that often occurs with conventional ionizers. So there is absolutely NO need to adjust the ion supply and so NO need to worry about overshoot. Overshoot: Phenomenon in which a target object is charged at an opposite polarity due to an unbalanced amount of positive and negative ions.

**Needs no air flow that can badly affect the target objects**

There is no need to blow air to move the generated ions to the target objects since ions are also constantly generated in the vicinity of target objects. This means that no dust flies up and there are no bad effects on target objects. Photoionization is also effective in removing static charges from lightweight components and powdery materials.

**Clean design that does not generate dust**

Photoionization is a clean process for removing static charges. It does not generate dust particles and electrostatic noise which might cause problems such as product defects and malfunctions in peripheral electrical devices.

**NO maintenance required to keep charge neutralization performance**

Unlike corona-discharge ionizers whose discharge electrodes need frequent cleaning and periodic replacement, photoionization requires zero maintenance. The static charge neutralization performance is retained over a long period of time without any troublesome maintenance.

**Works great even in various special environments**

Photoionization works well even in special environments including inert gases, dry air, etc. It eliminates problems at their source which has been impossible up to now.
A great feature of photoionization using soft X-rays is that it can remove static charges from any type of object without any bad effect on the object. Due to high versatility and ease-of-use, Hamamatsu PhotoIonizers are used in a wide range of application fields and help solve the problems caused by static electricity to boost the throughput and yield rate in manufacturing processes.

Effectively removes static charges from any object in any place. Widely used in various application fields due to high versatility and ease-of-use.

Liquid crystal and organic EL displays
The size and resolution of liquid crystal and organic EL displays keep on increasing, so appropriate measures must be taken to remove static charges on a larger surface area. PhotoIonizers cover a wide area to neutralize static charges down to 0 volts to eliminate problems caused by static charges in production processes, including defects caused by particle adhesion and electrostatic discharge (ESD) that may occur during component pickup.

Semiconductors
The increasing degree of miniaturization and circuit integration of semiconductor devices makes them more vulnerable to static charges. This makes it essential to take measures against static charges since they damage or destroy internal circuitry or cause device defects due to particle adhesion or from electrostatic discharge (ESD) that may occur during pickup.

Printing
Static electricity charged on paper and films can cause ink to bleed, splatter or spatter as well as particle adhesion and paper alignment errors creating serious printing problems. Hamamatsu PhotoIonizers revolve those problems stemming from static charges and help maintain the desired production efficiency and yield rate in the printing process.
Films
Static electricity accumulates on the surface of films where they repeatedly make and break contact. An especially large amount of static electricity accumulates on films near the feed and take-up rollers. Hamamatsu PhotoIonizers neutralize the stored static charges that might otherwise emit sparks and damage (perforate) films or cause product defects due to particle adhesion or poor conditions in the work environment.

Powder
Electrostatically charged powder particles tend to easily adhere to nozzles and containers, which prevents packing and conveying powder in uniform amounts and causes serious problems such as drops in production efficiency and yield rates. Photoionization needs no air flow to remove static charges from powder particles and so can solve such problems that were impossible for conventional ionizers to handle.

Rechargeable batteries
Static electricity is likely to occur in a low humidity environments such as dry cleanrooms on production lines for products such as for rechargeable batteries, so sufficient measures must be taken to neutralize static electricity. PhotoIonizers can be used at these places to remove static charges that might damage (perforate) separator films or cause particle adhesion, thus preventing product defects and increasing the yield rate.

Coating/painting
Coating and painting are utilized in countless applications including metal and plastic automotive parts. Static charges on such parts can cause coating materials to bleed, splatter or spatter and also cause particle adhesion, creating problems with coating and painting. PhotoIonizers can prevent such problems and thus improve coating and painting quality.
A wide lineup of electrostatic charge removers

Innovative electrostatic charge removers using "photoionization" by low-energy soft X-rays. Our lineup includes products with features optimized for various applications so choose the one that best suits your application.
Low initial costs
Ease of X-ray shielding
Installation flexibility
Charge neutralization area
Charge neutralization speed

Photolonizer
L14471, C14472

Photolonizer
L14471, C14546
The L12645 is a standard model of Photolonizer that has eliminated many problems caused by static charges. The L12645 is designed to provide a good balance of charge neutralization speed, installation flexibility, low initial costs, and ease of X-ray shielding, making it ideal for removing static charges from a wide range of objects, in environments, and under conditions.
The C11952 controller is capable of controlling up to 4 PhotoIonizer heads (L9491) at the same time. It is ideal for removing static charges from large objects with large surface areas or for using multiple heads on multiple production lines.

**Static Charge Removal Performance**

**Dimensional Outlines (Unit: mm)**

**Photolonizer head: L9491**

**Controller: C12646**

Accessories
- Control cable A9654-10 (10 m)
- Power cable (2 m)
- External control connector (15-pin D-sub)

**Options**

**Four-head controller C11952**

The C11952 controller is capable of controlling up to 4 Photolonizer heads (L9491) at the same time. It is ideal for removing static charges from large objects with large surface areas or for using multiple heads on multiple production lines.
DC (24 V) model that operates without a dedicated controller

The L9873 is designed for mounting into manufacturing equipment. It operates on power supplied from the manufacturing equipment and is directly controllable by the manufacturing equipment controller or control system. So there is no need to prepare an additional controller and it easily mounts into small spaces.
STATIC CHARGE REMOVAL PERFORMANCE

DIMENSIONAL OUTLINES (Unit: mm)

Accessories
Plug housing XHP-10
Contact pin BXH-001T-P0.6

Weight: Approx. 0.4 kg
High-end model (Operating two-heads type) with the highest static charge removal performance

The L14471 Photolonizer is designed to boost static charge removal performance up to the maximum. This allows removing static charges on large objects with large surface areas in a short time, leading to big gains in productivity in the manufacturing process. The L14471 is also effective in removing static charges from objects that are heavily charged or moving at high speeds.
STATIC CHARGE REMOVAL PERFORMANCE

DIMENSIONAL OUTLINES (Unit: mm)

Photolonizer head: L14471

Controller: C14472

Accessories
Power cable (2 m)
External control connector (15-pin D-sub)
SHORT PLUG

OPTION

**CONTROL CABLE A10885 / -25**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Cable length</th>
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<tr>
<td>A10885</td>
<td>20 m</td>
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<tr>
<td>A10885-25</td>
<td>25 m</td>
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</table>
High-end model (Operating four-heads type) with the highest static charge removal performance

The L14471 Photolonizer is designed to boost static charge removal performance up to the maximum. This allows removing static charges on large objects with large surface areas in a short time. In addition, the four-heads controller enables operation in multiple production lines. These features lead to big gains in productivity in the manufacturing process.

The L14471 Photolonizer is designed to boost static charge removal performance up to the maximum. This allows removing static charges on large objects with large surface areas in a short time. In addition, the four-heads controller enables operation in multiple production lines. These features lead to big gains in productivity in the manufacturing process.
STATIC CHARGE REMOVAL PERFORMANCE

DIMENSIONAL OUTLINES (Unit: mm)

Photolonizer head: L14471

Controller: C14546

Accessories
Power cable (2 m)
External control connector (15-pin D-sub)
Short Plug

OPTION
●CONTROL CABLE A10885 / -25

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<tr>
<td>A10885-25</td>
<td>25 m</td>
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</table>

Measurement conditions:
- Statically charged plate: 150 mm, 20 pF
- Charging voltage: 1 kV ~ 100 V
- Temperature: 25 °C
- Humidity: 50 %
**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>L12645</th>
<th>L9873</th>
<th>L14471 C14472</th>
<th>L14471 C14546</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Soft X-ray tube</td>
<td>9.5</td>
<td>15</td>
<td></td>
<td></td>
<td>kV</td>
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<tr>
<td>X-ray emission angle</td>
<td>130</td>
<td>150</td>
<td></td>
<td></td>
<td>°</td>
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<td>Input voltage</td>
<td>AC100 V to AC240 V Single phase 50 Hz / 60 Hz</td>
<td>DC24 V</td>
<td>AC100 V to AC240 V Single phase 50 Hz / 60 Hz</td>
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<tr>
<td>Power consumption (Max.)</td>
<td>—</td>
<td>11</td>
<td>7</td>
<td>100</td>
<td>240 W</td>
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<tr>
<td>Operating temperature range</td>
<td>0 to +40 °C</td>
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<td>Storage temperature range</td>
<td>-10 to +60 °C</td>
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<td>Operating humidity range</td>
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<td>Ion ON/OFF control</td>
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<td>—</td>
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<td>Ion ON signal output, Error signals</td>
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<td>IEC 61326-1:2013, Group 1, Class A</td>
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**PREVENTIVE MEASURES FOR X-RAY EXPOSURE**

Key points for avoiding X-ray exposure are to isolate the X-ray irradiation area and not to enclose it. It is important that operators can visually recognize the X-ray irradiation area but cannot physically enter that area. When these conditions are met, X-ray shielding will prove sufficient even if there is an opening in the irradiation area.

To avoid inadvertent exposure to X-rays, be sure to provide a safety interlock function that immediately cuts off X-ray emissions when the X-ray shielding door or panel is opened.

**Shield thickness**

<table>
<thead>
<tr>
<th>Shielding material</th>
<th>L12645</th>
<th>L9873</th>
<th>L14471 C14472</th>
<th>L14471 C14546</th>
<th>Unit</th>
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<tr>
<td>SUS304 stainless steel</td>
<td>0.22</td>
<td>0.4</td>
<td></td>
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<td>mm</td>
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<tr>
<td>Aluminum</td>
<td>1.3</td>
<td>7</td>
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<tr>
<td>PVC (polyvinyl chloride)</td>
<td>2.2</td>
<td>10</td>
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<tr>
<td>Acrylic</td>
<td>21.7</td>
<td>—</td>
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</tbody>
</table>

* To check X-ray leakage from the shield, use a radiation detector such as a survey meter. Please consult us for details.

**Safety precautions**

- Soft X-rays emitted from this product are harmful to human health. Handle carefully and never allow yourself get exposed to X-rays.
- When using this product, place the head unit inside an X-ray shielded area and always install a safety interlock.

**Legal regulations involving this product**

This product must be used in compliance with health and safety regulations enforced to prevent bodily harm caused by ionizing radiation. Users of this product must be familiar with applicable laws that regulate use of X-ray emission devices. To obtain more information, refer to international or domestic laws and regulations on ionizing radiation and comply with the required procedures listed there.

**Warranty period**

This product is guaranteed for one year from the date of delivery. The warranty is limited to replacement of the product. Even if within the warranty period, the warranty does not cover damage caused by misuse or accidents such as natural disasters.

**RELATED PRODUCTS**

Electrostatic charge remover VUV Ionizer L12542

The L12542 is a VUV Ionizer designed to remove static charges in a vacuum which up to now has been very difficult. “Photoionization” by vacuum ultraviolet light enhances high static charge removal performance even in a vacuum and contributes to a better throughput and yield rate in various types of production processes.

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