ELECTROSTATIC CHARGE REMOVERS

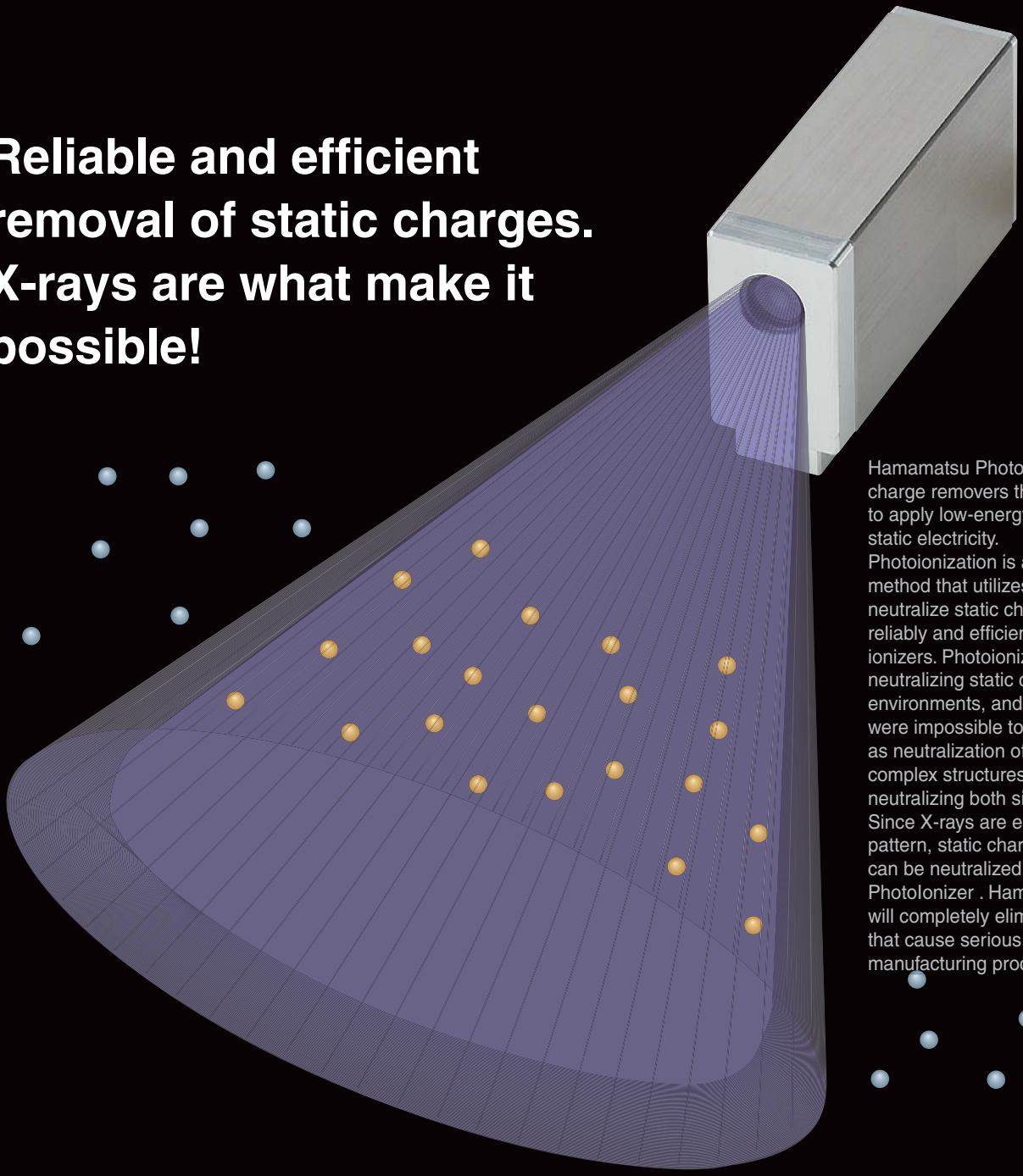
Photolonizer®

New choices for removing static charges

HAMAMATSU

PHOTON IS OUR BUSINESS

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



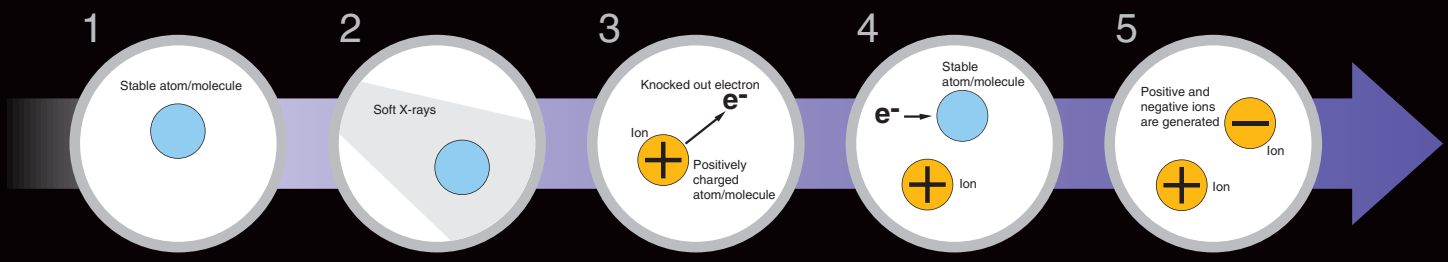
Hamamatsu PhotoIonizers are electrostatic charge removers that use “photoionization” to apply low-energy soft X-rays to remove static electricity.
Photoionization is an innovative ionization method that utilizes X-ray characteristics to neutralize static charges much more reliably and efficiently than 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.

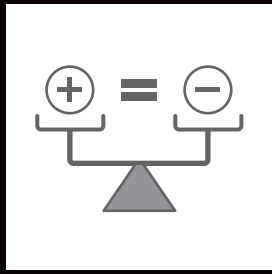
From static charge neutralization performance to maintainability, “photoionization” completely eliminates the root causes of problems thought impossible to solve up to now!

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.

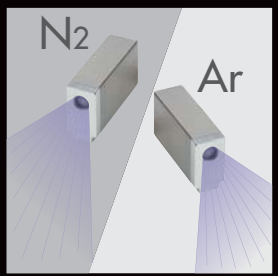
Clean design that does not generate dust

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



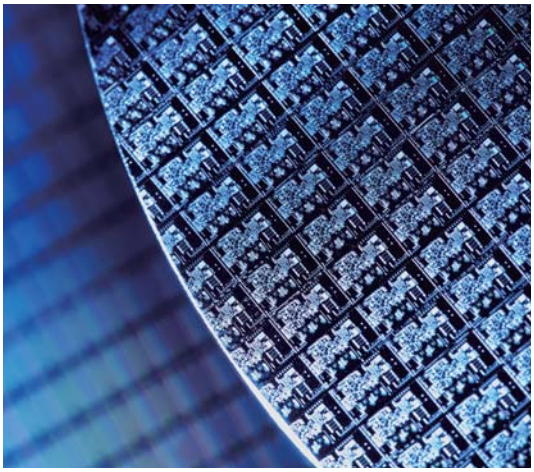
Photoionization works well even in special environments including inert gases, dry air, etc. It eliminates problems at their source which has been impossible up to now

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

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.

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.

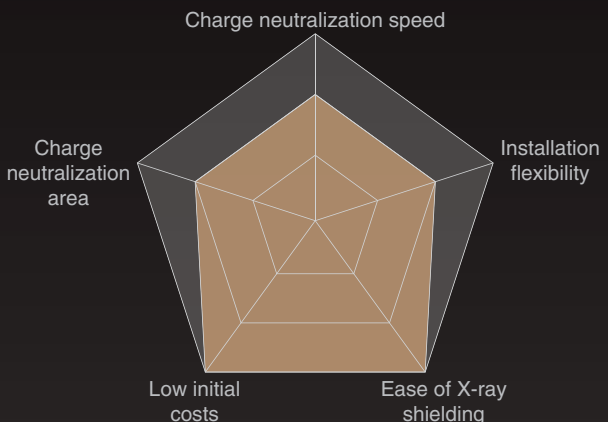
Coating/painting

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.

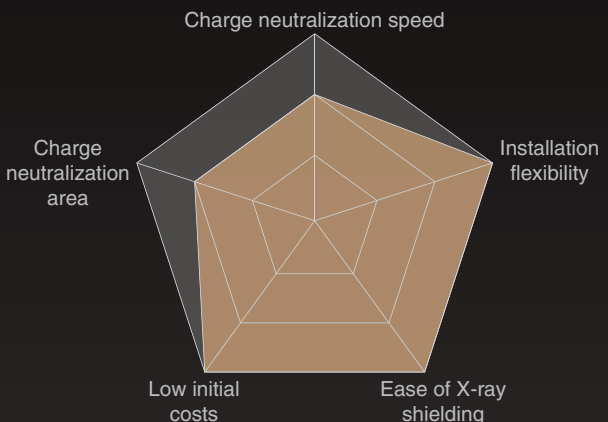
A wide lineup of electrostatic charge removers

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.

Photolonizer L12645

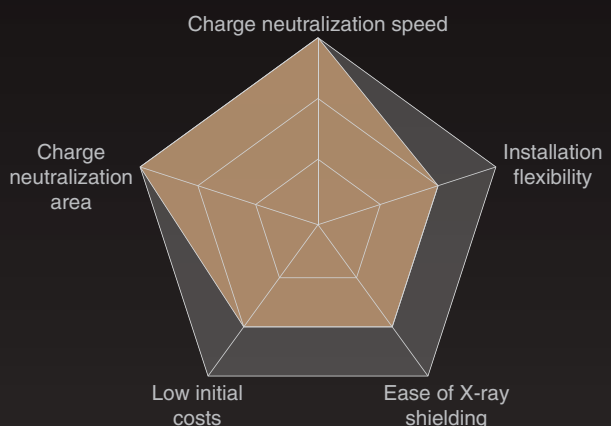


Photolonizer L9873



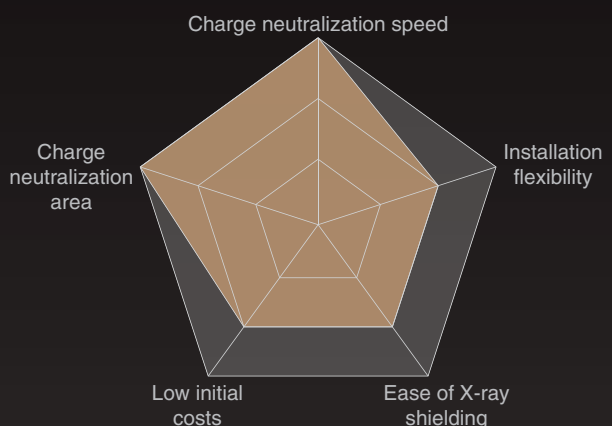
PhotoIonizer

L14471, C14472



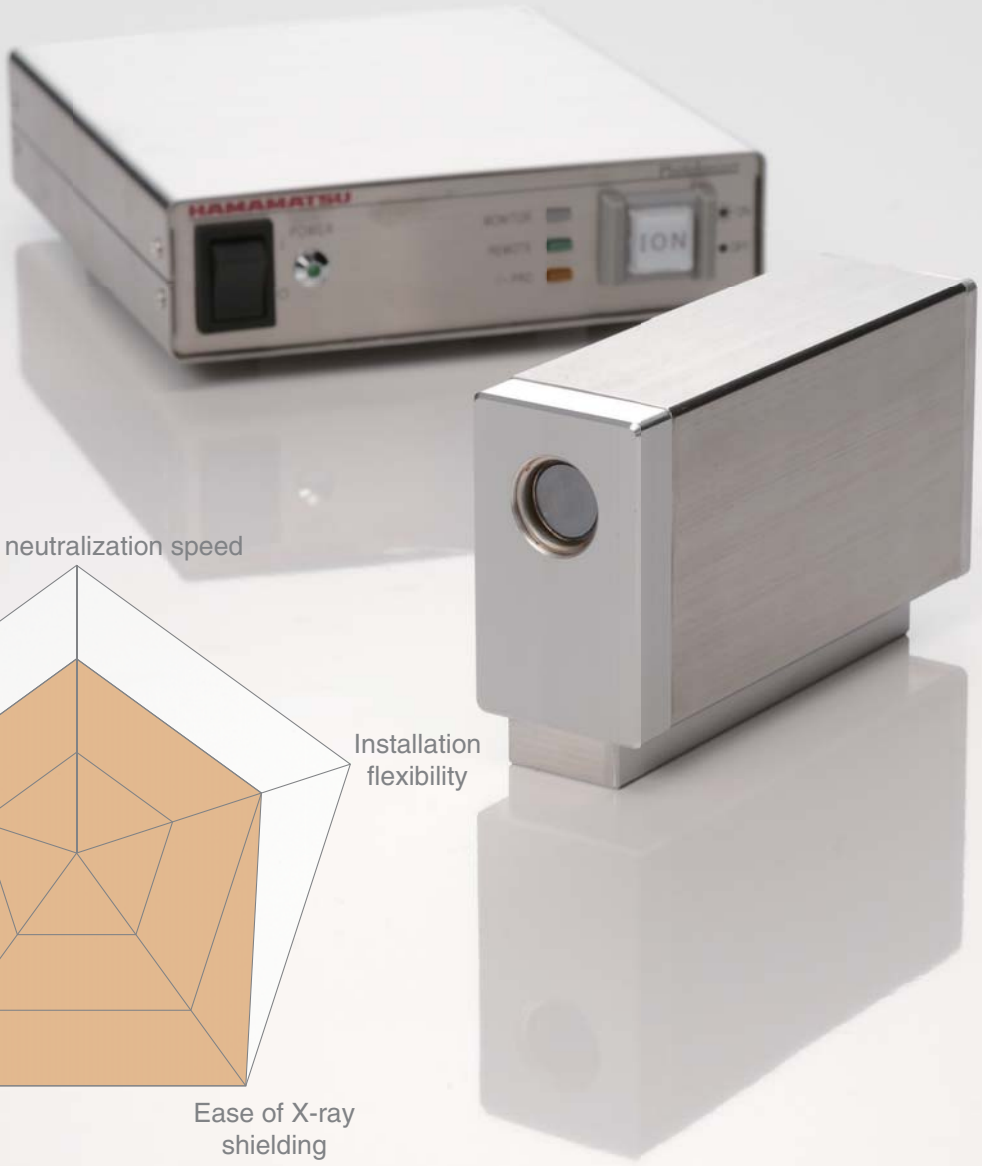
PhotoIonizer

L14471, C14546



Photolonizer® L12645

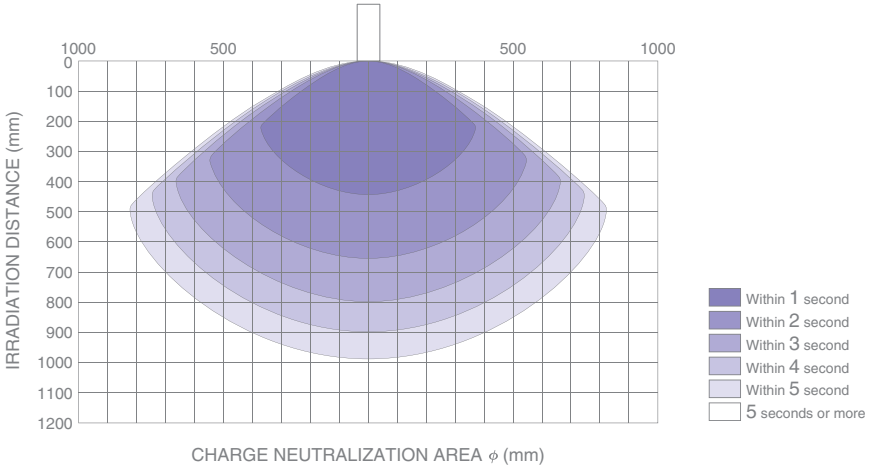
Standard model having built-in reliability and long record of high performance



The L12645 is a standard model of PhotoIonizer 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.

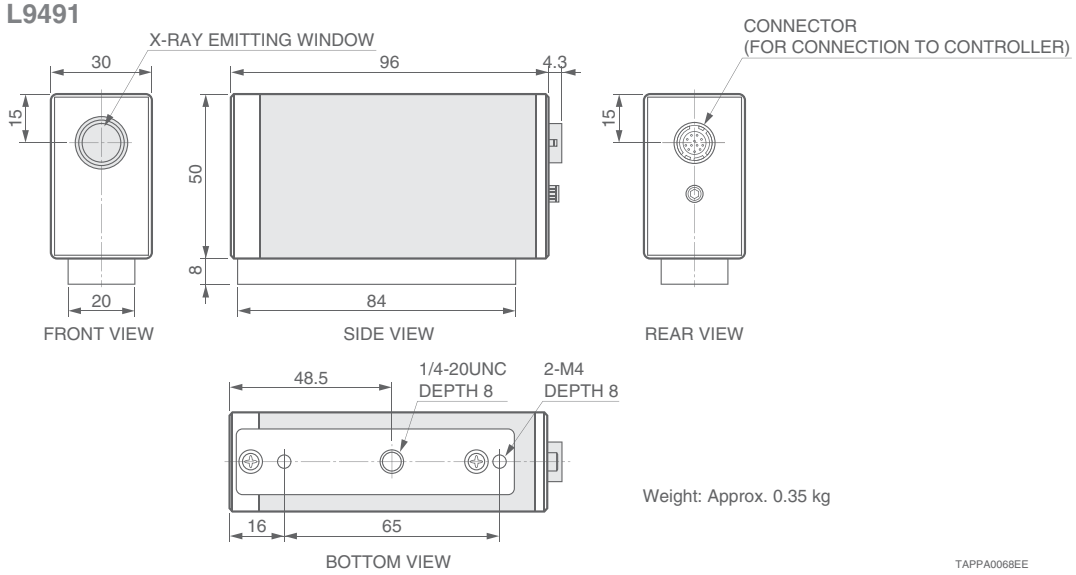
STATIC CHARGE REMOVAL PERFORMANCE

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

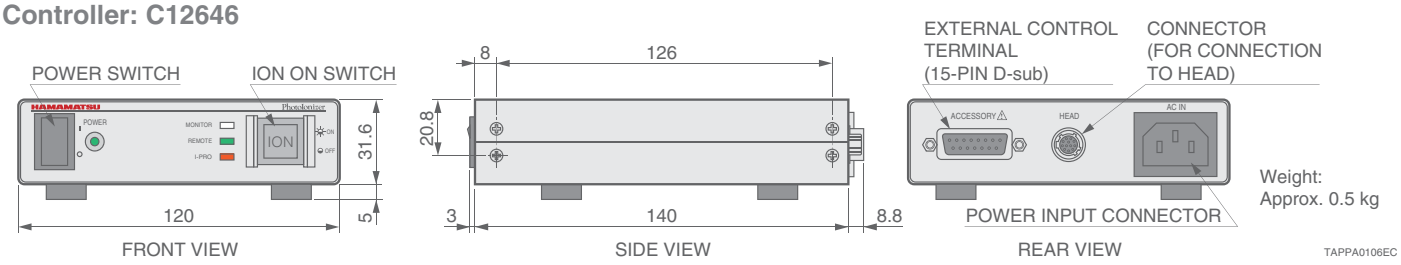


DIMENSIONAL OUTLINES (Unit: mm)

Photolonizer head: L9491



Controller: C12646



Accessories

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

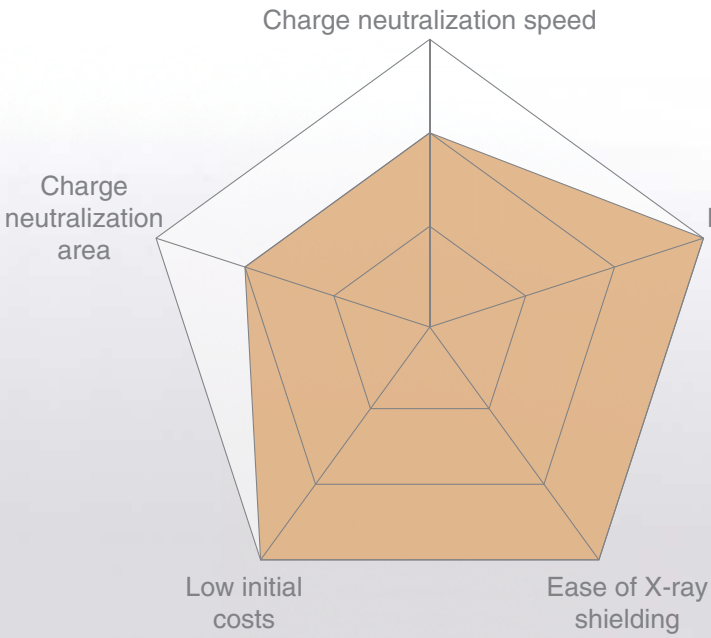
OPTIONS

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.

Photolonizer® L9873

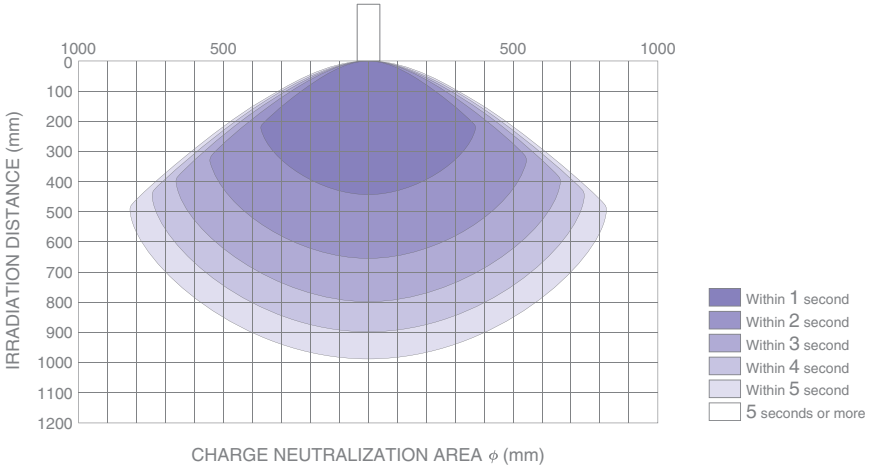
DC (24 V) model that operates without a dedicated controller



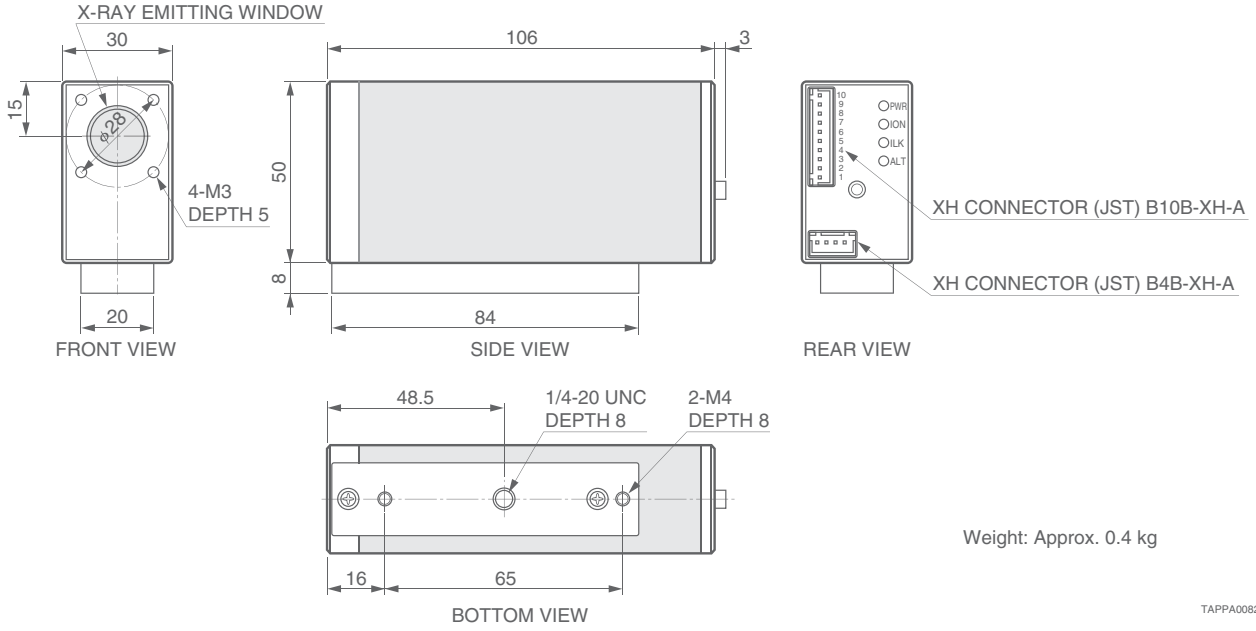
The L9873 is designed for mounting into manufacturing equipment. It operates on power supplied from the manufacturing equipment and is directly controllable by the manufacturing equipment controller or control system. So there is no need to prepare an additional controller and it easily mounts into small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

STATIC CHARGE REMOVAL PERFORMANCE

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



DIMENSIONAL OUTLINES (Unit: mm)



Weight: Approx. 0.4 kg

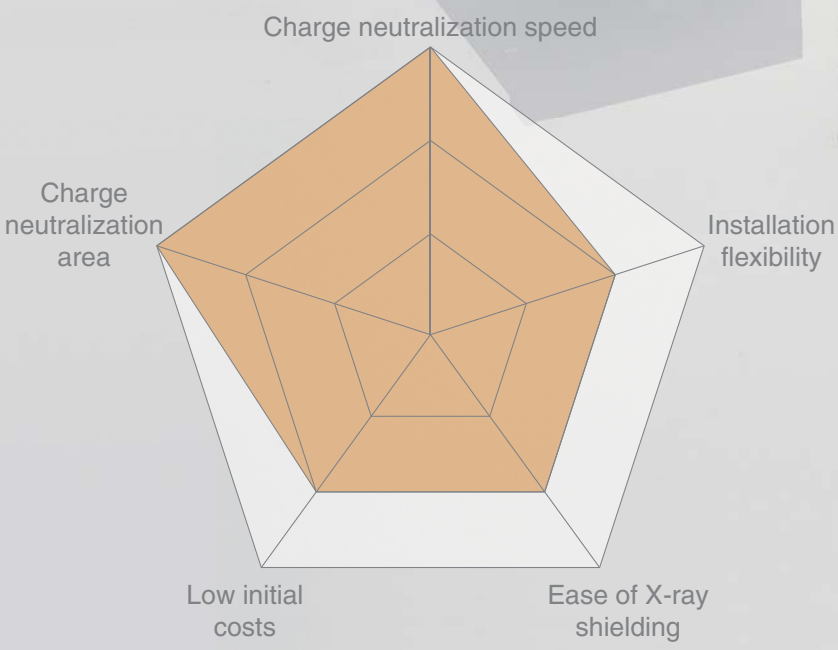
TAPPA0082JD

Accessories

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

Photolonizer® L14471, C14472

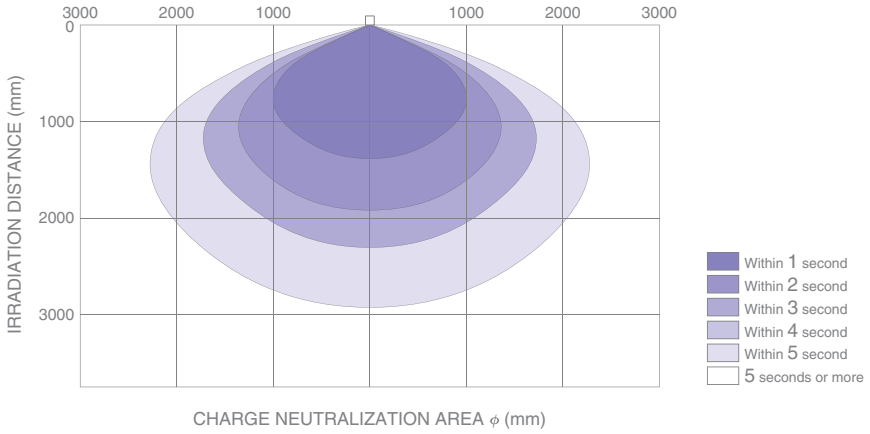
High-end model (Operating two-heads type) with the highest static charge removal performance



The L14471 PhotoIonizer 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.

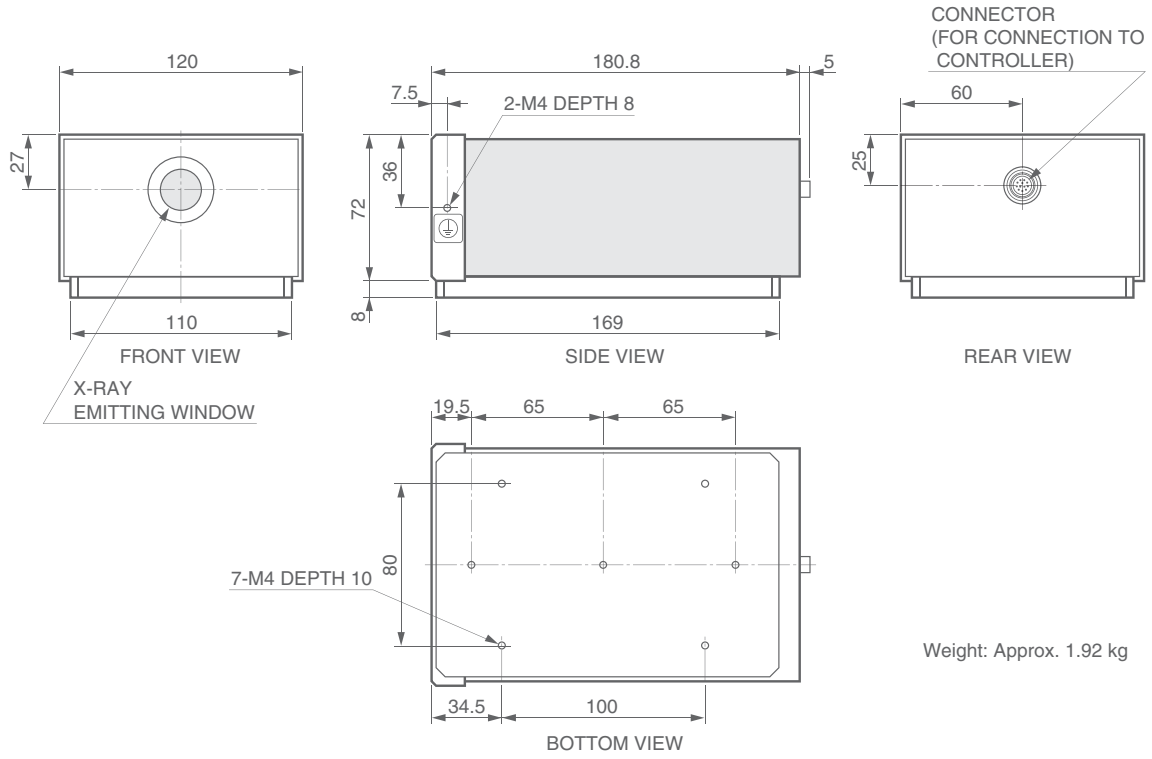
STATIC CHARGE REMOVAL PERFORMANCE

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



DIMENSIONAL OUTLINES (Unit: mm)

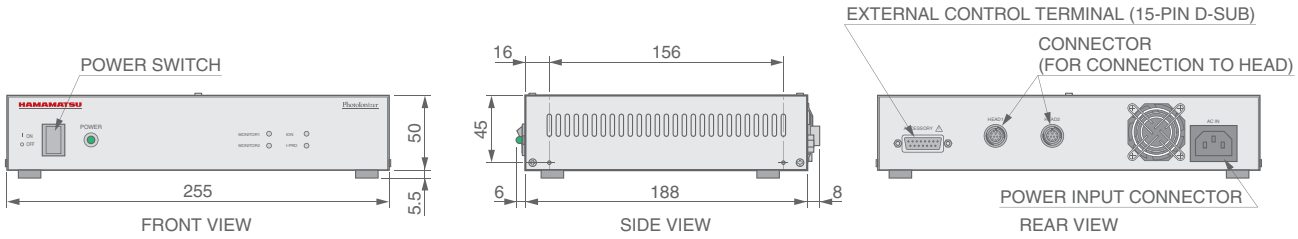
Photolonizer head: L14471



Weight: Approx. 1.92 kg

TAPPA0117EA

Controller: C14472



Weight: Approx. 1.67 kg

TAPPA0118EA

Accessories

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

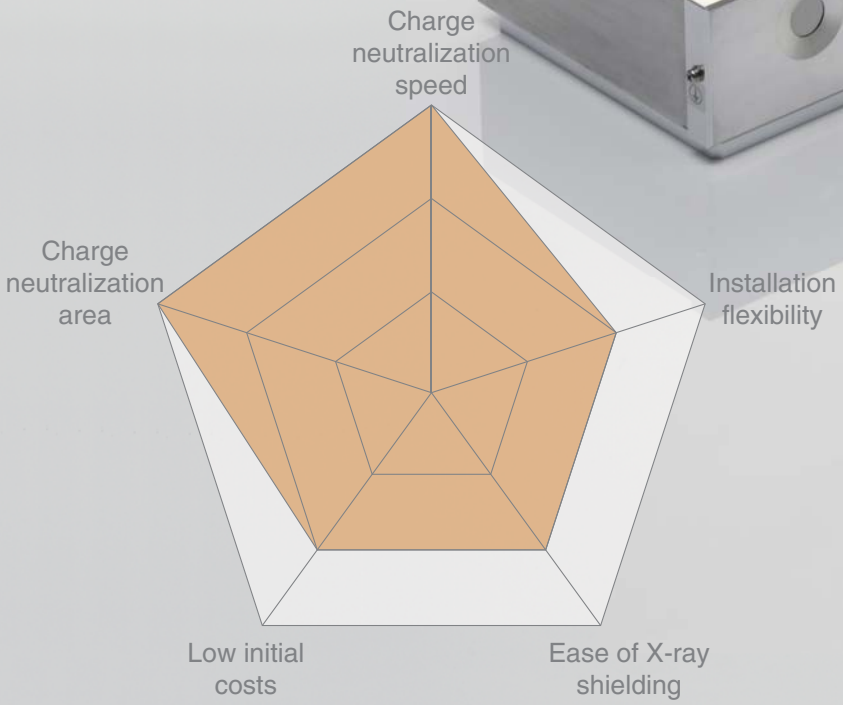
OPTION

●CONTROL CABLE A10885 / -25

Type No.	Cable length
A10885	20 m
A10885-25	25 m

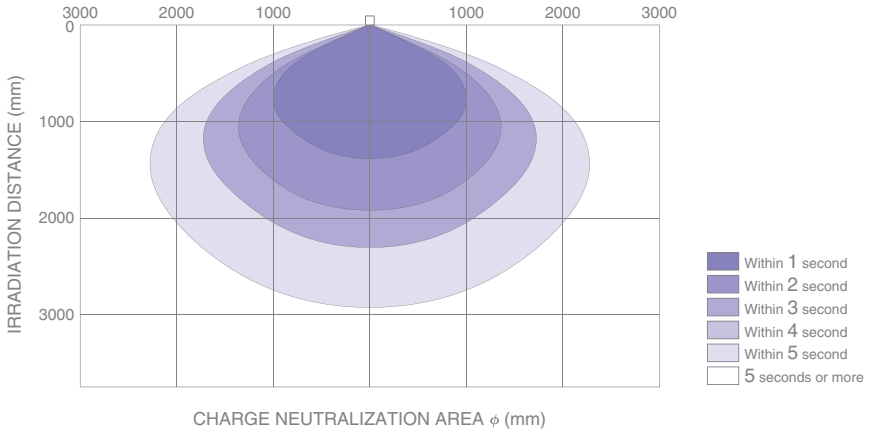
PhotoIonizer® L14471, C14546

High-end model (Operating four-heads type) with the highest static charge removal performance



The L14471 PhotoIonizer 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.

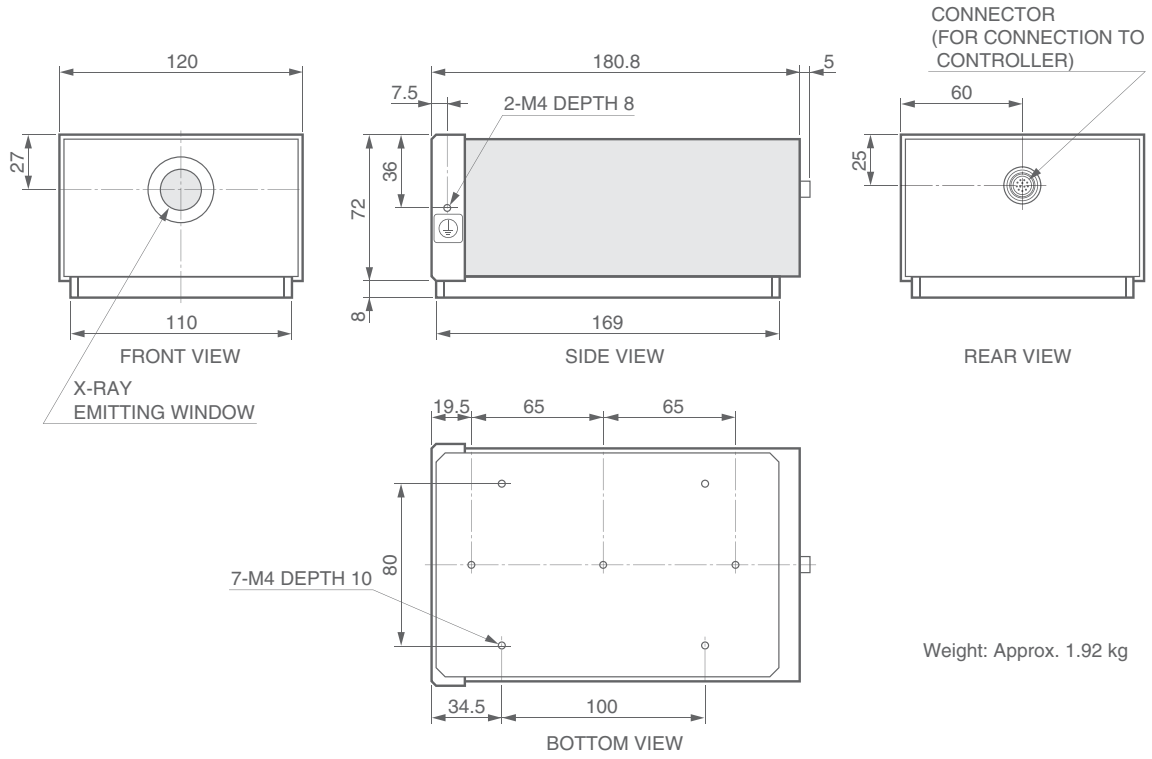
STATIC CHARGE REMOVAL PERFORMANCE



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

DIMENSIONAL OUTLINES (Unit: mm)

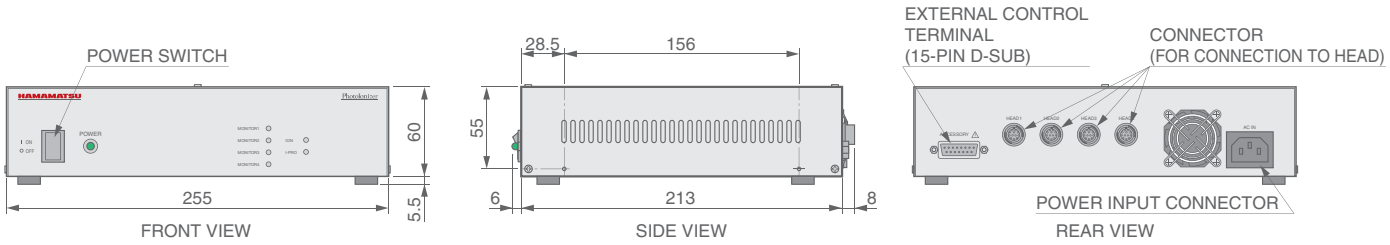
Photolonizer head: L14471



Weight: Approx. 1.92 kg

TAPPA0117EA

Controller: C14546



Weight: Approx. 2.1 kg

TAPPA0119EA

Accessories

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

OPTION

●CONTROL CABLE A10885 / -25

Type No.	Cable length
A10885	20 m
A10885-25	25 m

SPECIFICATIONS

Parameter		L12645	L9873	L14471 C14472	L14471 C14546	Unit
Soft X-ray tube	Tube voltage (DC)	9.5		15		kV
	X-ray emission angle	130		150		°
Input voltage		AC100 V to AC240 V Single phase 50 Hz / 60 Hz	DC24 V	AC100 V to AC240 V Single phase 50 Hz / 60 Hz		—
Power consumption (Max.)		11	7	100	240	W
Operating temperature range		0 to +40				°C
Storage temperature range		-10 to +60				°C
Operating humidity range		Below 60 % (no condensation)				—
Storage humidity range		Below 85 % (no condensation)				—
External control		Ion ON/OFF control Ion ON signal output, Error signals	—	Ion ON/OFF control Ion ON signal output, Error signals		—
Applicable standards	EMC	IEC 61326-1:2013, Group 1, Class A				—
	Safety	IEC61010-1: 2010				
	Environment	RoHS directive WEEE directive				

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

Shielding material	L12645	L9873	L14471 C14472	L14471 C14546	Unit
SUS304 stainless steel	0.22		0.4		mm
Aluminum	1.3		7		
PVC (polyvinyl chloride)	2.2		10		
Acrylic	21.7		—		

* 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 ensures high static charge removal performance even in a vacuum and contributes to a better throughput and yield rate in various types of production processes.

HAMAMATSU PHOTONICS K.K. www.hamamatsu.com

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North Europe: Hamamatsu Photonics Norden AB: Torshamnsgatan 35 16440 Kista, Sweden, Telephone: (46)8-509 031 00, Fax: (46)8-509 031 01 E-mail: info@hamamatsu.se
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