

UVTRON[®] Flame / Discharge Sensors

Precautions for Use



1. Safety, legal, regulatory, and intellectual property precautions

- Hamamatsu Photonics makes constant efforts to improve product quality and reliability, but this does not guarantee the product integrity of UVTRON[®]. Please implement a design providing ample safety (redundant design, fire spread prevention design, malfunction prevention design, etc.) within customer's equipment manufactured using a UVTRON[®] in order to avoid personal injury, fire and damage to society that might possibly occur in the unlikely event of a failure of the UVTRON[®]. In particular, when a UVTRON[®] is used in an equipment or an environment where the malfunction or failure of the UVTRON[®] could result in personal injury, death or serious damage to property (hereinafter referred to as the "particular application"), the safety design must take into account the possible failures. We will not be liable for any use in such particular application unless we give our prior written consent by way of specification sheets, etc.
- Since the durability of UVTRON[®] varies depending on the operating environment and conditions, be sure to evaluate and confirm the operation of UVTRON[®] in the condition in which it is installed in the customer's equipment and in the actual operating environment. If any doubt arises about the safety of UVTRON[®], please notify us as soon as possible and also be sure to implement technical measures for the above stated safety design (redundant design, fire spread prevention design, malfunction prevention design, etc.).
- When exporting a UVTRON[®] (including cases when providing technology), please comply with export-related laws and regulations in your country, such as the Foreign Exchange and Foreign Trade Law of Japan, and be sure to obtain an export license or a service transaction license if necessary. Please contact our sales office for information on whether or not the UVTRON[®] is subject to these export-related laws and regulations.
- The application examples described in our product literature are not intended to guarantee suitability for any particular application or the success or failure of any commercial use. No guarantee or license is granted for the enforcement of any intellectual property rights. We will not be held liable for any intellectual property rights issues that may arise with third parties as a result of using this information.
- When disposing of a UVTRON[®], take appropriate measures in compliance with applicable regulations regarding waste disposal, and correctly dispose of it yourself or entrust proper disposal to a licensed industrial waste disposal company. In any case, be sure to comply with the regulations in your country or state to ensure correct disposal.

2. Precautions for usage environment

● Usage in special environments

The UVTRON[®] is not designed for use in special environments such as those listed below and we assume no responsibility for the use in such special environments and locations.

- (1) In liquids such as water, oil, chemical solutions, and organic solvents
- (2) In dusty environments
- (3) In environments exposed to sea breeze or corrosive gases
- (4) In environments at extremely high temperature
- (5) In environments that causes condensation on the surface of UVTRON[®] glass bulb
- (6) In environments subject to excessive vibrations or shocks
- (7) In environments where strong static charges or electromagnetic waves are generated
- (8) In environments at extremely high or low pressures

● Effect of humidity

UVTRON[®] has an operating temperature range of -40 °C to +125 °C and operating humidity range of 80% or less, so please strictly follow the range. If the operating humidity exceeds 80%, make sure there is no condensation.

Following tendency is observed when used at high or low temperature, or high humidity.

- High temperature | Degradation is accelerated.
- Low temperature | Sensitivity increases as discharge start voltage due to UV light will be dropped.
- High humidity | Operation becomes unstable as voltage leakage or short circuits.

The UVTRON[®] has very high impedance during non-discharge operation (no UV light is detected). Use caution to ensure that the area around the UVTRON[®] leads is well insulated, such as embedding the leads in insulating resin. If leakage current is generated by humidity around the UVTRON[®] leads, this may cause a drop in the anode supply voltage and stop the UVTRON[®] operation. Dirt, dust or other contaminants deposited on the leads can easily absorb moisture, so keep the area around the leads clean and dry.

●Background noise (BG)

When a voltage is applied to a UVTRON®, sporadic discharges may occur in the UVTRON® even with no incident UV light. This is called "background noise (BG)". Major causes of background noise (BG) are as follows:

- (1) Radiation including cosmic rays
When radiation with higher energy than UV light is incident on the cathode (photocathode), a discharge can be caused due to the photoelectric effect.
As it is difficult to completely prevent the entry of radiation such as cosmic rays, which exist in nature, it is necessary to use a signal processing circuit to distinguish it from UV light from a detection target.
- (2) X-rays
When X-rays with higher energy and penetrating properties than UV light is incident on the cathode (photocathode), a discharge can be caused due to the photoelectric effect.
- (3) Static electricity
When an object charged with static electricity comes close to or makes contact with the UVTRON®, the high electric field may ionize the gas molecules in the tube and cause a discharge.
- (4) High electric fields, high magnetic fields, and strong electromagnetic waves
Under high supply voltage conditions, the electric field emission from the cathode (photocathode) may cause photoelectrons to jump out, and this may trigger a discharge.
- (5) Intense light (such as from lasers and LEDs) with extremely high radiant intensity greater than sunlight
When intense light with extremely high radiant intensity is incident on the cathode (photocathode), background noise can increase due to thermionic emission and other factors.
- (6) Unintended UV lights

While this is normal for UVTRON® operation, UV light from sources other than a detection target may cause the device to malfunction. This also can be considered as a type of background noise (BG). UV light is also found abundantly in ordinary life.

UVTRON® will respond to weak UV light from unexpected sources, such as described below. Take sufficient precautions for the area where the UVTRON® is installed and used.

- Sparks from arc welding NOTE: These emit very high intensity UV light.
- Electrical sparks (such as those from pantographs on the roof of electric trains or by motor)
- Sterilization lamps (low-pressure mercury lamps, etc.)
- Halogen lamps (illumination light sources, car headlights, etc.)
- High color-rendering lamps such as xenon lamps and metal halide lamps
- UVTRON® installed within 5 meters of each other NOTE: UVTRON® itself emits UV light when it discharges due to detection of UV light.

UVTRON® is not designed to be radiation-resistant, so to prevent malfunction due to background noise (BG), a signal processing circuit that can distinguish background noise (BG) from UV light from a detection target is required. Please refer to the technical information for details.

UVTRON® driver circuit C10807 and C10423 has background noise (BG) cancellation function. Please contact us if you wish to change the cancellation level.

3. Precautions for handling and using UVTRON®

●UV light

UVTRON® discharges and emits UV light when it detects UV light, so please do not look directly at it from a close distance for long time.

In addition, the checker lamp for UVTRON® emits UV light with the same intensity as lighter. Please do not look directly at it with the naked eye for long time, even it is determined to be harmless by IEC 62471 "Photobiological safety of lamps and lamp systems".

●Voltage

The optimum operating voltage range is specified for each type of the UVTRON®, driver circuits, and UVTRON® modules. Refer to the specifications and use it within the rated voltage range. Operation at a voltage outside the rated range may cause failures or malfunctions. Since a high voltage is applied during UVTRON® operation, use caution to avoid electrical shock.

●Shock

The UVTRON®, driver circuits for UVTRON®, and UVTRON® module have passed the shock test IEC 60068-2-27. However, if subjected to excessive shocks such as from dropping, the glass bulb may crack or internal electrodes may deform, worsening the electrical characteristics. So please use plenty of caution when handling them. If the UVTRON® lead wires are modified such as by cutting them with nippers, the internal electrodes may be subject to shocks exceeding those shown in the table below, causing the electrical characteristics to deteriorate just the same as when dropped. A safe way to lessen the shocks when cutting the lead wires is to align the nipper cutting edges perpendicular to the internal electrodes and cut each lead wire, or cut each lead wire slowly by cutting two or three times instead of cutting them all at once with the nippers. When mounting a UVTRON® onto a multi-split circuit board, split the circuit board in advance before mounting the UVTRON®.

Please lessen the shocks with a safe way to cut lead wires as described below. When mounting a UVTRON® onto a multi-split circuit board, split the circuit board in advance before mounting the UVTRON®.

Product		Shock test IEC 60068-2-27
UVTRON®	R9533, R9454	10000 m/s ² , 1 ms
	Others	1000 m/s ² , 11 ms
Driver circuits for UVTRON®, checker lamp for UVTRON®, driver circuit for checker lamp, UVTRON® module		1000 m/s ² , 11 ms

●Dirt on glass bulb

The UVTRON® operates at a high voltage, which may cause dust and other contaminants to adhere to the surface of the glass bulb due to electrostatic adsorption. If the UVTRON® glass bulb becomes dirty, its UV transmittance may decrease or the glass quality may change. After installing the UVTRON® into equipment, periodically wipe the glass bulb with gauze or cleaning wipes moistened with alcohol to keep it clean. When handling the UVTRON®, do not touch the glass bulb with bare hands. Wear gloves to prevent the oil and grime of your hands from adhering to the glass bulb.

●Polarity

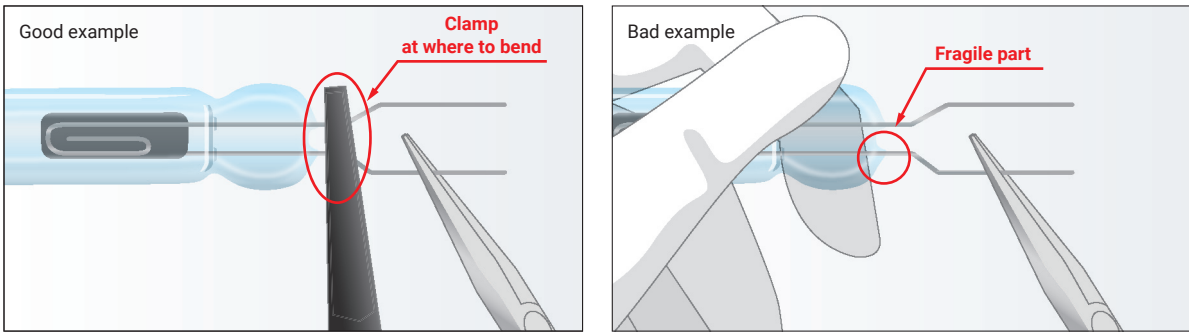
The UVTRON® has an anode and a cathode having electrical polarity. Mistakenly connecting the polarity in reverse will cause malfunctions, so be sure to connect the anode and cathode correctly.

●Lead wires

Bending and cutting lead wires are allowed for 3 types: R2868, R9454 and R244. Processing lead wires for other products is strictly prohibited.

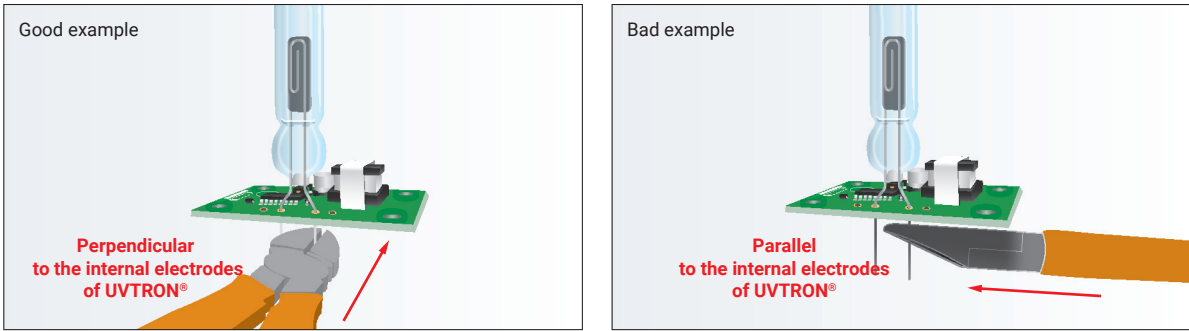
○ How to cut lead wires

The base part of lead wire (glass seal area) is fragile. Please bend the lead wire slowly, while the base is firmly clamped with needle-nose pliers or similar tools. Please do not bend or straighten the wire more than once.



○ How to cut lead wires

To lessen the shocks, please cut the wire with cutting edge of nippers perpendicular to internal electrodes, or cut slowly in two or three passes, instead of cutting all at once.



●Soldering

Heating the UVTRON® leads excessively during soldering may cause the glass bulb to crack or the electrodes to deteriorate leading to faulty operation, so be extra careful when soldering. For the UVTRON® with hard pin leads, we recommend using a dedicated socket we provide. When soldering a UVTRON® directly onto a printed circuit board, use tweezers or similar tools to grip the root of the leads to prevent heat from conducting to the UVTRON®, and then solder at a soldering iron temperature of 350 °C or less within 5 seconds. Avoid using a solder tank. When finished soldering, be sure to completely wipe away the soldering flux with alcohol, etc.

●Layouts

UVTRON® discharges and emits UV light when it detects UV light. In case that multiple UVTRON® are used at the same time, adjacent UVTRON® will detect the UV light emitted from others. Please design not to interfere with each other.

●Storage and transportation

When storing or transporting a UVTRON®, keep it in the packing box. If the packing box is dropped or bumped during storage or transportation, an excessive mechanical stress may be applied, causing damage or degradation of characteristics. Handle with care and take adequate measures to avoid dropping and bumping. The UVTRON® should be stored indoors at low humidity and stable room temperature where no corrosive gases are present and no condensation occurs. Storing a UVTRON® for long periods of time may, in rare cases, lead to degradation of characteristics such as deterioration of the glass bulb. Please use it as soon as possible after delivery.

4. Other precautions

- When giving instructions to the end user, provide adequate explanations of the functions, performance, and handling of the UVTRON® and the equipment using it as well as the appropriate warnings and indications.
- The UVTRON® specifications are subject to change without prior notice due to improvements or other reasons. Our product literature has been carefully prepared to ensure accuracy but in rare cases may contain errors. When using our product, always check the delivery specification sheets for the latest specifications.
- Reproduction or copying of any content of the product literature is prohibited without permission of Hamamatsu Photonics.

5. Warranty period and scope

- If a UVTRON® fails due to manufacturing defects within one year after delivery, we will replace it free of charge. The scope of the warranty is limited to replacement of the product. The product will be out of warranty in case of use in particular application without our prior consent.

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HAMAMATSU PHOTONICS K.K. www.hamamatsu.com

Electron Tube/Laser Applied Sales

314-5, Shimokanzo, Iwata City, Shizuoka Pref., 438-0193, Japan, Telephone: (81)539-62-5245, Fax: (81)539-62-2205

U.S.A.: HAMAMATSU CORPORATION: 360 Foothill Road, Bridgewater, NJ 08807, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218

Germany: HAMAMATSU PHOTONICS DEUTSCHLAND GMBH.: Arzbergerstr. 10, 82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-265-8 E-mail: info@hamamatsu.de

France: HAMAMATSU PHOTONICS FRANCE S.A.R.L.: 19 Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10 E-mail: infos@hamamatsu.fr

United Kingdom: HAMAMATSU PHOTONICS UK LIMITED: 2 Howard Court, 10 Twin Road, Welwyn Garden City, Hertfordshire, AL7 1BW, UK, Telephone: (44)1707-294888, Fax: (44)1707-325777 E-mail: info@hamamatsu.co.uk

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

Italy: HAMAMATSU PHOTONICS ITALIA S.R.L.: Strada della Moia, 1 int. 6, 20044 Arese (Milano), Italy, Telephone: (39)02-93 58 17 33, Fax: (39)02-93 58 17 41 E-mail: info@hamamatsu.it

China: HAMAMATSU PHOTONICS (CHINA) CO., LTD.: 1201 Tower B, Jiaming Center, 27 Dongsanhuan Beilu, Chaoyang District, 100020 Beijing, P.R. China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866 E-mail: hpc@hamamatsu.com.cn

Taiwan: HAMAMATSU PHOTONICS TAIWAN CO., LTD.: 13F-1, No.101, Section 2, Gongdao 5th Road, East Dist., Hsinchu City, 300046, Taiwan(R.O.C), Telephone: (886)3-659-0080, Fax: (886)3-659-0081 E-mail: info@hamamatsu.com.tw

Korea: HAMAMATSU PHOTONICS KOREA CO., LTD.: A-912, 167, Songpa-daero, Seoul, 05855, Republic of Korea, Telephone: (82)2-2054-8202, Fax: (82)2-2054-8207 E-mail: sales@hpkr.co.kr

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