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Sep 15,2003
C6979-11(C4251-02)-E-B

# CONSTANT CURRENT POWER SUPPLY C6979-11 AND STARTER C4251-02 FOR CONTINUOUS MODE SUPER-QUIET XENON AND MERCURY-XENON LAMPS

## INSTRUCTION MANUAL



- Before operating, inspecting or servicing the C6979-11 power supply and C4251-02 starter, read this manual carefully and make yourself familiar with the information provided. Do not attempt to operate or inspect the C6979-11/C4251-02 until you thoroughly understand the contents of this manual. Never handle or operate the C6979-11/C4251-02 in a manner not described in this manual, otherwise serious accidents may result.
- The operator or manager in charge of this equipment should not permit anyone who does not understand the contents of this manual to operate the equipment.
- Even after you have read this manual, keep it near the equipment so that you can easily refer to it as necessary.
- If this manual is lost or damaged, immediately contact Hamamatsu sales office near you to receive an additional copy.
- When the C6979-11/C4251-02 are transferred or sold, ensure that this manual accompanies them, and explain to the new user the need to read through this manual.

HAMAMATSU

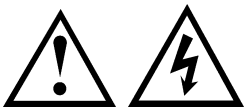
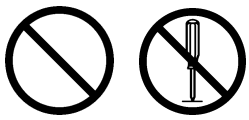
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# 1. SAFETY ITEMS

Before using the C6979-11/C4251-02, read the following safety notes and precautions carefully and observe the instructions provided.

## 1-1 Warning Remarks and Classification

The warning remarks described in this manual and warning labels affixed on the C6979-11/C4251-02 are classified into the following three types for better understanding by the operator and to safeguard the operator and equipment.

| | |
|---|---|
|  **DANGER** | Failure to follow DANGER instructions will result in severe injury or death to the operator or person servicing the product. |
|  **WARNING** | Failure to follow WARNING instructions could result in serious injury or death to the operator or person servicing the product. |
|  **CAUTION** | Failure to follow CAUTION instructions may result in injury to the operator or the person servicing product, or damage to the product or peripheral equipment. |
|  | This warning symbol shows a caution or warning you must observe. A specific warning is sometimes indicated in this symbol. Read the warning instructions carefully to ensure correct and safe product use. |
|  | This type of symbol shows something you must NOT do. The specific prohibited item or action is often indicated in the symbol. Read the instructions carefully and never attempt the prohibited action. |
|  | This type of symbol shows something you must DO. The specific instruction is often indicated in the symbol. Read the instructions carefully and always use the specified procedure. |



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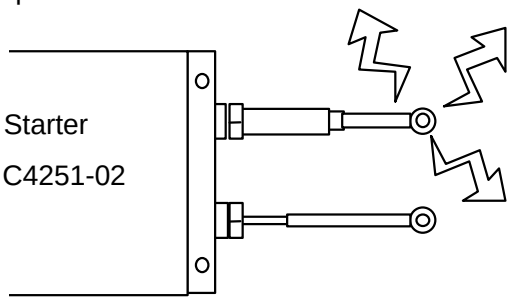
## 1-2 Safety Precautions

To ensure correct and safe use of the C6979-11/C4251-02, be sure to observe the following precautions.

- **High voltage trigger - Electrical shock hazard**

**DANGER**

Never turn on the power while no lamp is installed. There is the danger of an electrical shock since a high voltage (20 to 30kV) is output from the lamp starter (C4251-02) when the lamp is turned on.




- **Vibration and shock**

**WARNING**

Handle the equipment with extreme caution.
Internal components of the C6979-11/C4251-02 are precisely adjusted. Protect them from excessive shocks and vibrations, otherwise the adjustment may become unreliable and a fire or electrical shock may result.

- **Covers and internal components**

Do not remove the covers. Never adjust or alter any internal components.
Internal components are precisely adjusted. Never adjust or alter them, otherwise abnormal operation may occur or a fire or electrical shock may result.

- **If any abnormality occurs**

If smoke, a peculiar odor, or unusual noise is noticed, immediately turn off the power switch of the C6979-11 power supply and then unplug the AC power cable from the outlet. Continuous operation with abnormality not corrected may result in a fire or electrical shock.



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- **Connectors**



Securely connect the power supply connectors to prevent looseness or play. Loose connections may cause faulty operation.

- **Ground**



Proper grounding with a minimum distance must be provided in order to prevent the danger of an electrical shock.



Never ground to a gas pipe, as this is extremely dangerous, possibly causing a fire.

- **Input voltage**



Before plugging in the power cable at the AC outlet, check that the voltage selector switch and AC input fuse on the rear of the C6979-11 power supply are correctly set. If not, a fire or electrical shock or defect of power supply may result. See pages 13 for more details.

- **Output current selector switch**



Before turning on the lamp, check that the output current selector switch is correctly set. If not, this may shorten the lamp service life or damage the lamp. See pages 14 for more details.

- **CAUTION**



**CAUTION**

Avoid installing the C6979-11/C4251-02 in locations with poor ventilation and/or at high temperature and high humidity.
Do not install the C6979-11/C4251-02 in locations where exhausted air from the cooling fan remains or the cooling fan and air intake vents are blocked. Operation in such environments may cause faulty operation or fire.
Install the C6979-11/C4251-02 on a stable place and keep it level. If not installed correctly, faulty operation may result or the equipment may fall over if an earthquake occurs.

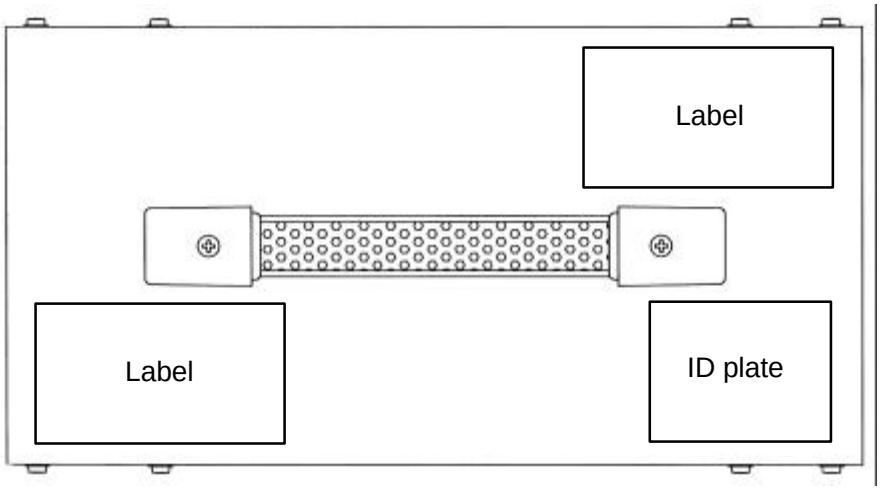


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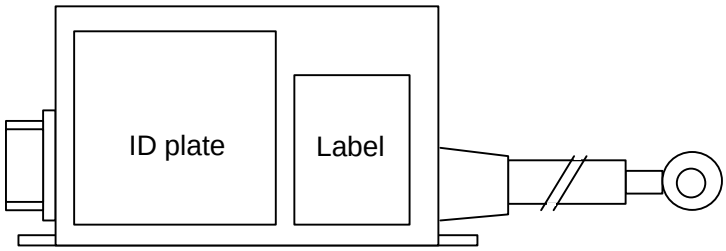
## 1-3 Warning Labels on the Equipment

The warning labels on the C6979-11/C4251-02 must be obviously noticed by the operator or other personnel at all times. If any label becomes dirty or starts to peel off, replace with a new label. Please contact the address Hamamatsu sales office near you for warning labels. We will resupply additional warning labels (with extra charge).

### C6979-11




### C4251-02






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* Unclear, inaccurate or omitted description
* Irregular pages or missing leaf
* This manual was missing or damaged



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# 2. GENERAL

The C6979-11 is a constant current power supply designed to operate xenon lamps and mercury-xenon lamps (continuous mode) developed for photometric applications. Compared to conventional models, the C6979-11 power supply is compact yet capable of operating various lamps ranging from 35 W to 100 W. This is auto start type power supply.

# 3. FEATURES

- **Separate lamp starter ensures reliable and safe start**
  The lamp starter (C4251-02) is separated from the C6979-11 power supply and can be installed in the lamp house to prevent possible high-voltage leakage.
- **Highly regulated constant-current power supply**
  Discharge current is controlled by the highly regulated constant-current circuit. The radiant output from the lamp is extremely stable over extended periods of time.
- **Compact and lightweight**

| | | |
|---|---|---|
| Dimensions | C6979-11 | (W)144 mm×(D)280 mm×(H)176 mm |
| | C4251-02 | (W)100 mm×(D) 89 mm×(H) 60 mm |
| Weight | C6979-11 | Approx. 10 kg |
| | C4251-02 | Approx. 810 g |

# 4. CONFIGURATION

This equipment comes with the following items and accessories. After unpacking, check for any damage caused by an accident during transport and also check that all items and accessories are included as listed. If any part is missing or damage is found, contact your Hamamatsu sales office as soon as possible.

**C6979-11 Power Supply**

- Main unit.....1
- Accessories
  - Output cable.....1
  - AC power cable.....1
  - Spare fuse
    - AC input fuse (6.3 A) .....2(1p in inert)
    - Overload protection fuse (1 A).....1
- Instruction manual.....1

**C4251-02 Starter**

- Starter unit .....1
- Output plug .....1

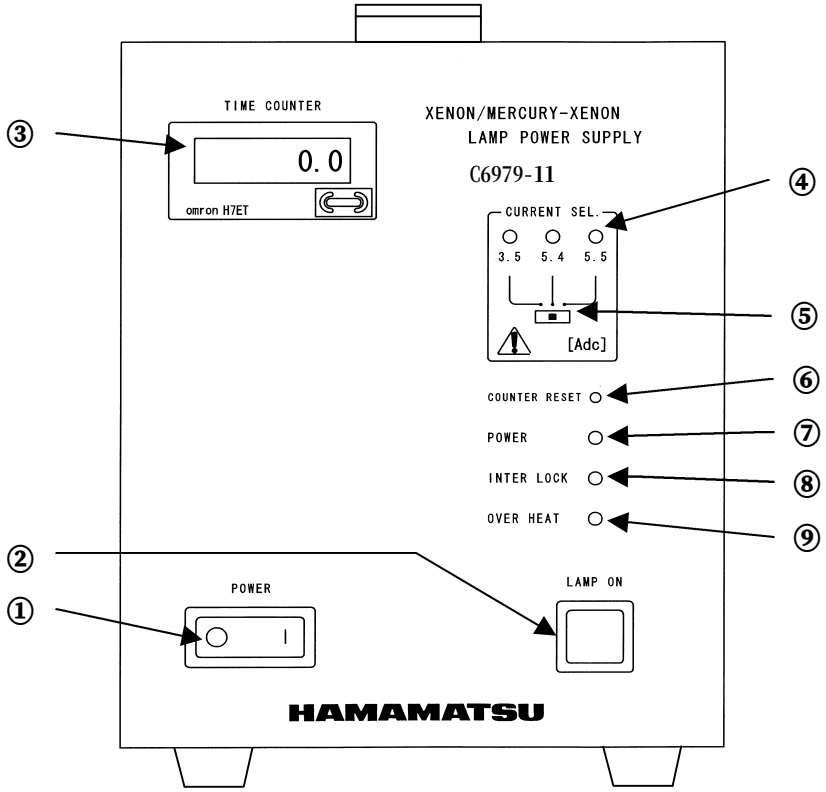
NOTE: The C6979-11 power supply must be used in combination with the C4251-02 starter. These cannot be used independently to operate a lamp.



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# 5. PART NAMES AND FUNCTIONS

## 5-1 C6979-11: Front Panel




**①POWER switch**

This is the power on switch of this power supply. When it turns "I" side, lamp start to operate by applied 20 kV to 30 kV trigger voltage from starter unit. At the same time, the indicator lamp of this switch illuminates.

**②LAMP ON switch**

Lamp ON switch is not used because this is auto start type power supply, but lamp on indicator ignites at the same time of lamp ignition.

**③TIME COUNTER**

This indicates the accumulated operating time(unit:hours) of the lamp. Always reset this counter when you replace the lamp with a new one. To reset, push the COUNTER RESET ⑥ by pin.

(Reset button on TIME COUNTER cannot be used.)




Push with a pin

**④CURRENT SELECT (output current indicator) lamps**

These lamps indicate the output current selected by the output current selector switch ⑤. The output current is preset to the operating current of lamp which is used with this power supply at the time of shipment.



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**⑤CURRENT SELLECT (output current selector) switch**

This switch selects the output current. Set the lamp rating used by pin etc. before using. See page 17 for the lamp ratings. The output current is preset to the operating current of the lamp which is used with this power supply at the time of shipment.

**⑥COUNTER RESET**

Push with a pin when accumulated time of counter is reset.

**⑦POWER indicator lamp**

This LED lamp illuminates when the POWER switch is turned on.

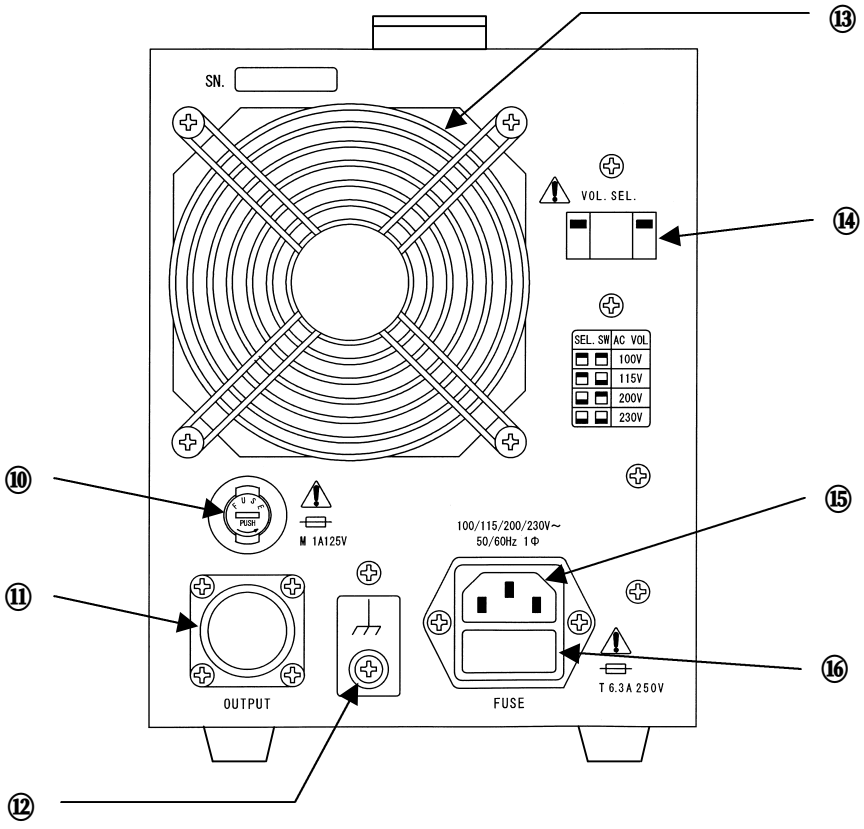
**⑧INTERLOCK indicator lamp**

This LED lamp shows the operating status of the interlock circuit. It illuminates in yellow when the interlock circuit functions. To reset, check the interlock circuit and then turn the POWER switch off.

**⑨OVERHEAT indicator lamp**

This LED lamp illuminates in yellow if an abnormal temperature rise occurs inside the equipment. To reset, turn the POWER switch off.

## 5-2 C6979-11: Rear Panel






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**⑩Overload protection fuse**

This fuse protects the internal circuit from overload.

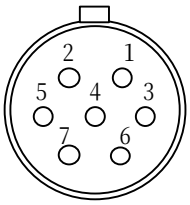
Replace a fuse after take AC plug off in order to avoid electrical shock.

**⑪OUTPUT connector**

Using the accessory output cable, connect the starter (C4251-02) to this connector.

Make secure connections to avoid contact failure.

| Output cable pin No. | Output cable connection |
|---|---|
| 1 | (+) |
| 2 | (-) |
| 3 | Ground (GND) |
| 4 | Interlock |
| 5 | Interlock |
| 6 | (+) 24 Vdc |
| 7 | (-) 0 Vdc |




**⑫Ground terminal**

Proper grounding must be implemented from this terminal at a minimum distance, in order to prevent electrical shock that could be caused by accidental short-circuits or electrical breakdowns.

**⑬Cooling fan**

This is the fan to exhaust the heat generated inside of power supply and avoid thermal increase. In order to make better a ventilation, wall or obstacle must be placed apart at least 10 cm from the back panel, 2 cm from the vent of side panel.

**⑭Input voltage select switch**

The AC input voltage can be selected (100/115/200/230Vac) according to the AC line voltage. This is set to AC input voltage in your country at the time of shipment.

**⑮AC INPUT connector**

Plug in the accessory AC power cable to this connector.

**⑯AC input fuse**

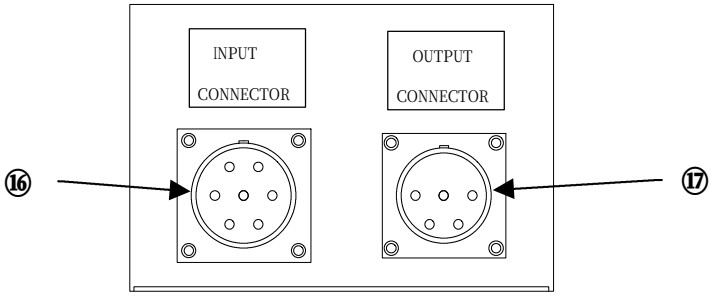
This is a fuse for AC power input. 6.3 A fuse is set.

Replace a fuse after take AC plug off in order to avoid electrical shock.



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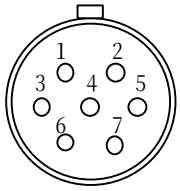
## 5-3 C4251-02: Connector Side




### ⑯INPUT CONNECTOR

Using the accessory output cable (7-conductor cable), connect between this connector and the C6979-11 power supply.

| Output cable pin No. connection | Output cable |
|---|---|
| 1 | (+) |
| 2 | (-) |
| 3 | Ground (GND) |
| 4 | Interlock |
| 5 | Interlock |
| 6 | (+) 24 Vdc |
| 7 | (-) 0 Vdc |



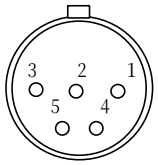

### ⑰OUTPUT CONNECTOR

Connect the accessory plug (5-pin plug) to this connector.

For the interlock and cooling fan output, refer to page 16.

Pin No.4 and 5 of the output plug are shorted (in the plug) at the time of shipment.

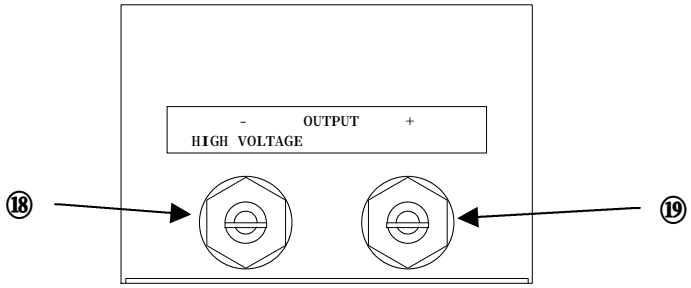
| Output cable pin No. | Output cable connection |
|---|---|
| 1 | (+) 24 Vdc |
| 2 | (-) 0 Vdc |
| 3 | Ground (GND) |
| 4 | Interlock |
| 5 | Interlock |






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## 5-4 C4251-02:High-Voltage Output Cable Side




**⑱Minus (-) high voltage output cable**

Connect this cable to the minus (-) terminal of the lamp.

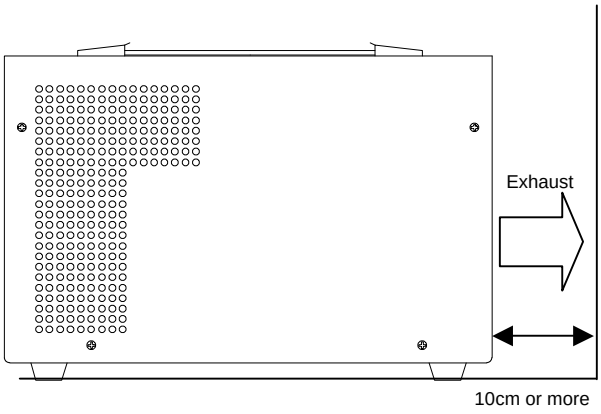
**⑲Plus (+) high voltage output cable**

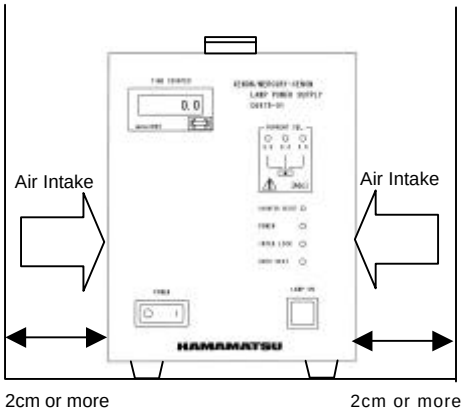
Connect this cable to the plus (+) terminal of the lamp.

# 6. INSTALLATION

**CAUTION**

- Avoid installing the C6979-11/C4251-02 in locations at high temperature and high humidity.
- Install the C6979-11/C4251-02 in locations where air circulates well so that exhausted air from the cooling fan does not remain.
- Wall or obstacle must be placed apart at least 10 cm from the cooling fan exhaust of pack panel, 2 cm from the air inlet of side panel (both sides).






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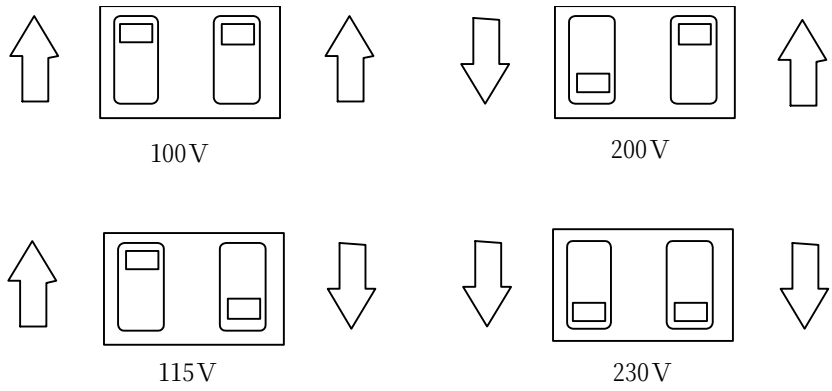
# 7. OPERATION

## 7-1 Preparation

Before using the C6979-11/C4251-02, check that the AC power cable is unplugged and the fuse holders are securely screwed into place, then follow the procedures below.

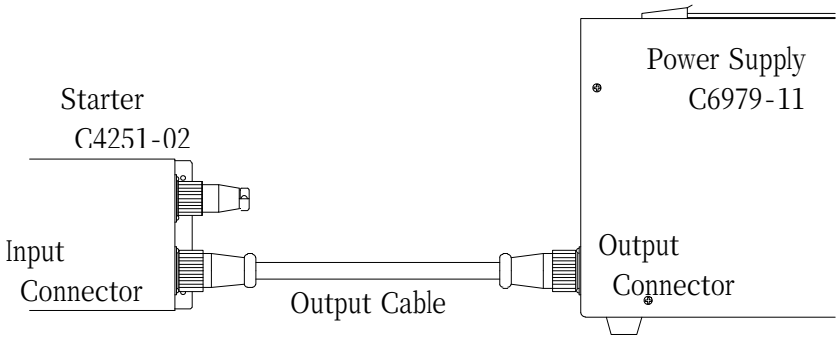
### 7-1-1 Checking the AC input voltage

Check that the AC voltage selector on the rear of the C6979-11 is set in the correct positions to match the AC line voltage. (This is set to AC input voltage in your country at the time of shipment.) Use the slotted screwdriver to set it in the correct positions as necessary.




### 7-1-2 Connecting the C4251-02 starter

The C6979-11 power supply must be used in combination with the C4251-02 starter. Using the accessory output cable, make connections between the C6979-11 and the C4251-02 as shown below.

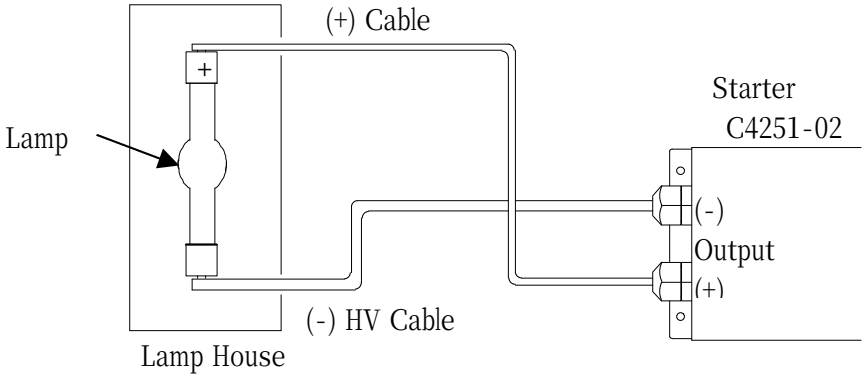





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### 7-1-3 Connecting the lamp

Two high-voltage cables are provided at the output of the C4251-02 starter. Connect each of the high-voltage cables to the lamp house while checking the polarity. The plus cable must be connected to the plus (+) side (marked on the metal base) of the lamp, and the minus high-voltage cable to the minus (-) side of the lamp. Securely connect these high-voltage cables to prevent looseness or play and resulting contact failure.

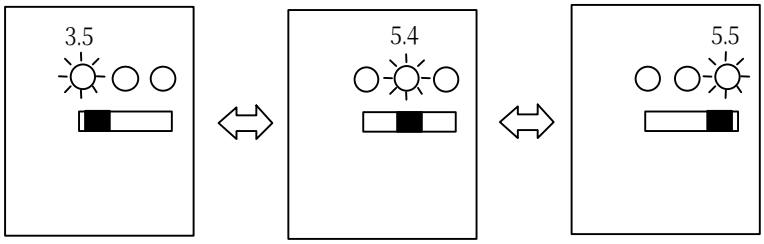



### 7-1-4 Connecting the ground terminal

An extremely high voltage (20 to 30kV) is output from the C4251-02 starter. Be sure to provide proper grounding from the ground terminal on the rear of the C6979-11 at a minimum distance, in order to prevent electrical shock that could be caused by accidental short-circuits or electrical breakdowns.

## 7-2 Turning the Lamp ON (Starting the Lamp Discharge)

**7-2-1** Set the operating current switch to meet the lamp used by pin etc.
At the shipping, it is set to meet the lamp used.

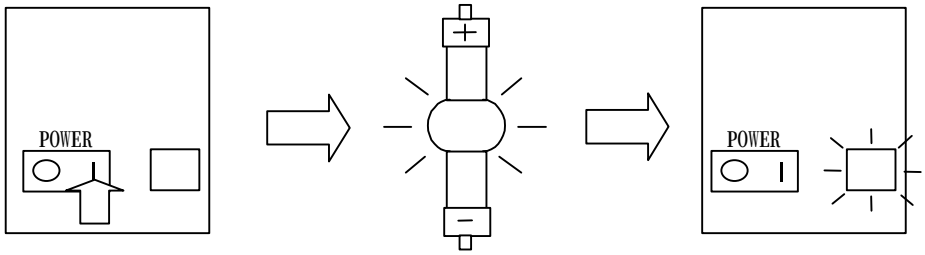



**7-2-2** Insert AC plug into AC outlet.



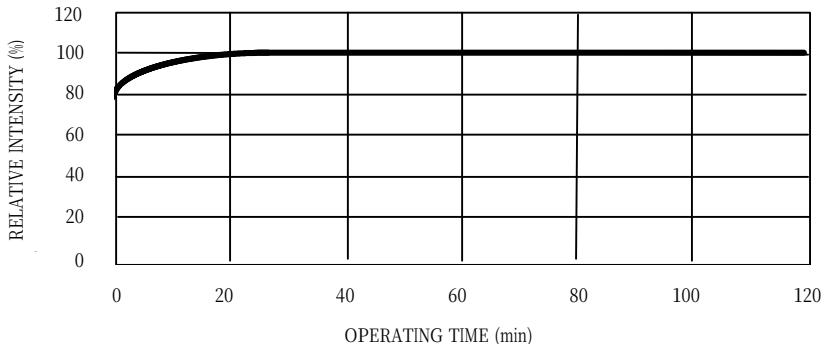
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**7-2-3** When power switch on the front panel turns ON ("I" side), lamp start to operate by applied 20kV to 30kV trigger voltage from starter unit. Then, lamp on indicator ignites at the same time of lamp ignition.




## 7-3 Warm-up

The radiant output intensity of the lamp shows a fluctuation (drift) until it reaches thermal equilibrium. The output will normally become stable 10 to 20 minutes after the lamp is turned on, although this depends on the ambient temperature and lamp house structure and heat capacity.




## 7-4 Turning the Lamp OFF

Place the POWER switch of the C6979-11 in the off position("○") and the lamp turns off.



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# 8. ACCESSORY FUNCTIONS

## 8-1 Interlock

The C6979-11 provides an interlock output. This allows you to configure an interlock mechanism by installing a microswitch in the lamp house and laying out the necessary wiring, so that the power supply output is shut off when the lamp house cover is opened. This ensures the operator's safety.

《 Connections to the output connector of the C4251-02 starter 》

Between pin Nos. 4 and 5 Power supply output
Shorted ..... ON
Open ..... OFF

《 Interlock indication and resetting 》

The C6979-11 incorporates an abnormal operation indicator lamp which functions in response to the interlock output. If any abnormal operation occurs, the yellow LED lamp on the front panel illuminates. For example, when the interlock terminals (pin Nos. 4 and 5) of the C4251-02 starter output connector are open, the yellow LED lamp illuminates.
To reset, short between the interlock terminals and then turn OFF the POWER switch of the C6979-11.
The interlock terminals (pin Nos. 4 and 5) are shorted in the output socket at the time of shipment.

## 8-2 Cooling Fan Output

The C6979-11 provides an output of 24Vdc/0.5A Max. which is used for cooling the lamp house. This cooling fan output is available from the output connector of the C4251-02 starter.

Pin No.1 ..... (+)24 V
Pin No.2 ..... 0 V



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# 9. SPECIFICATIONS

| | | | |
|---|---|---|---|
| Output voltage with no load(DC) ..... | C6979-11 | Typ.130 V | |
| Trigger voltage output..... | C4251-02 | 20 kV～30 kV | |
| Output current (DC) ..... | 3.5 A | 5.4 A | 5.5 A |
| Steady operation voltage (DC) ..... | 12 V±4 V | 14 V±2 V | 18 V±2 V |
| Lamp wattage rating | | | |
| Xenon lamps..... | 35 W | 75 W | — |
| Mercury-xenon lamps..... | 50 W | 75 W | 100 W |
| Typical applicable lamps | | | |
| Xenon lamps..... | L2173<br>L2193 | L2174<br>L2194 | — |
| Mercury-xenon lamps..... | L2421 | L2481 | L2422<br>L7046<br>L8029 |

Output regulation
- Input regulation..... ±0.1 % or less (for ±10 % change in AC line input)
- Load regulation..... ±0.1 % or less (for ±10 % change in load)
- Ripple (p-p)..... 0.1 % or less (at rated input and output)
- Drift..... ±0.1 %/h or less (after 30 minute warm-up)

Overload protection ..... 1A

AC input voltage ..... 100 V／115 V／200 V／230 V ±10 %

(Selectable by input voltage selector switch) 50 Hz／60 Hz

AC input fuse ..... 6.3 A

Current consumption ..... 400 VA

Operating temperature..... 0 ℃ to +40 ℃

Performance guaranteed Temperature..... +5 ℃ to +35 ℃

Cooling method..... C6979-11 Forced air cooling
C4251-02 Non (natural cooling)

Dimensions ..... C6979-11 (W)144 mm×(D)280 mm×(H)176 mm
C4251-02 (W)100 mm×(D) 89 mm×(H) 60 mm

Weight..... C6979-11 Approx. 10 kg
C4251-02 Approx. 810 g

NOTE:

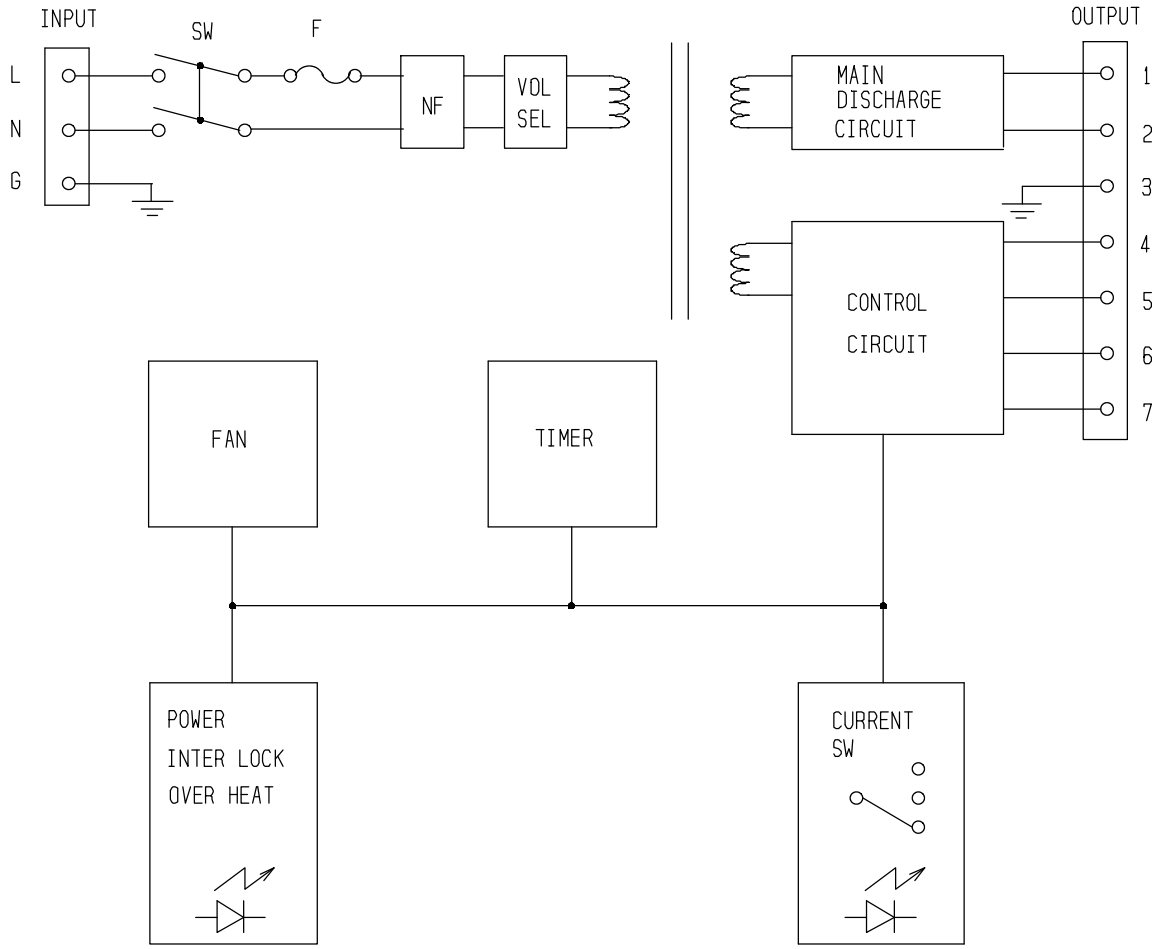
1. The C6979-11 power supply must be used in combination with the C4251-02 starter.
2. The above specifications are measured at 23 ℃±5 ℃ after 30 minute warm-up.
3. Specifications are subject to change without prior notice due to performance improvement or other factors.



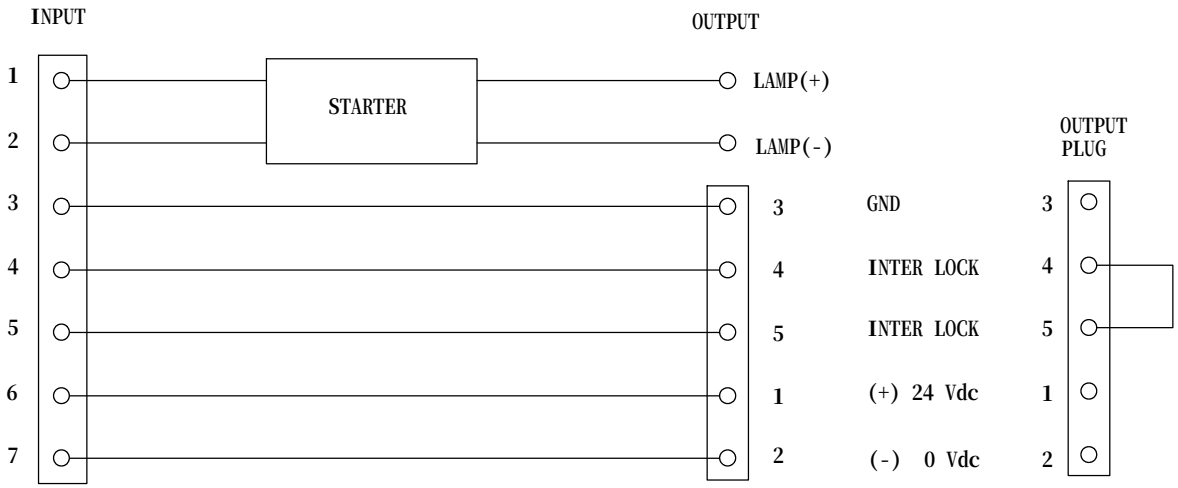
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# 10. BLOCK DIAGRAMS

## 10-1 C6979-11




## 10-2 C4251-02

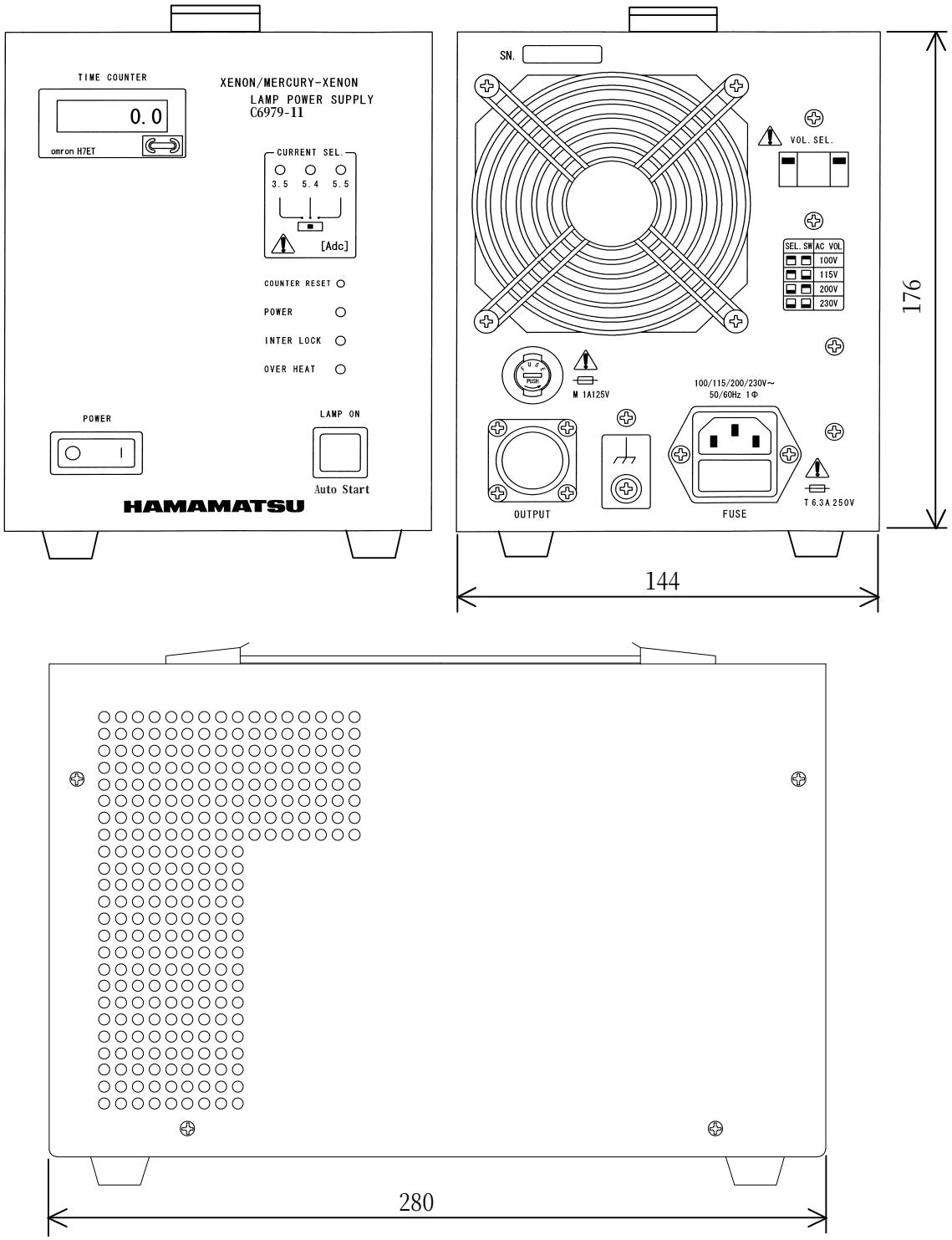





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# 11. DIMENSIONAL OUTLINE

## 11-1 C6979-11

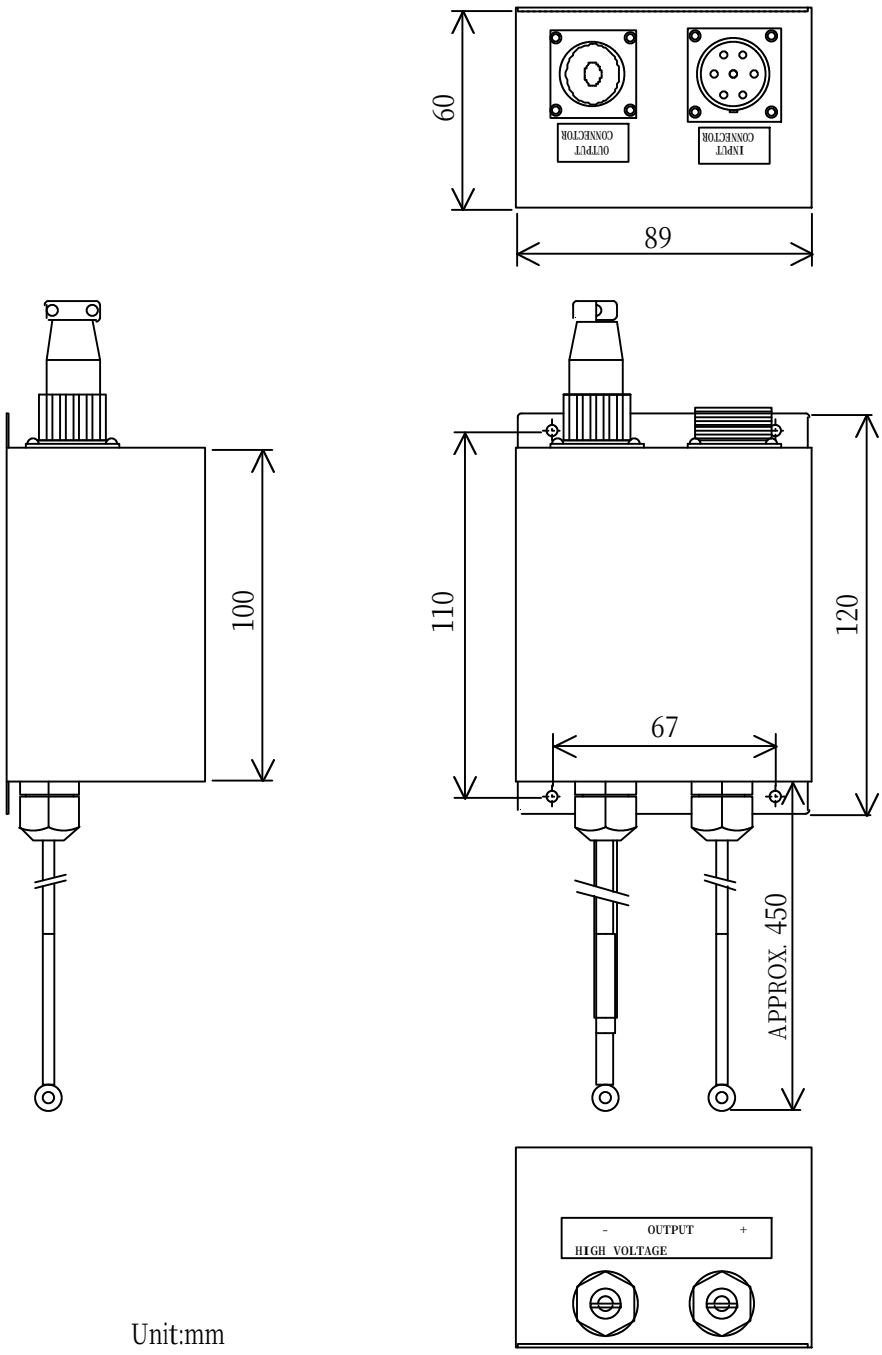



Unit: mm



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## 11-2 C4251-02




Unit:mm



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# 12. WARRANTY AND MAINTENANCE

## Warranty

This C6979-11/C4251-02 are warranted for a period of one year from the date of delivery. If any failure is found in the workmanship or materials within this warranty period, Hamamatsu will repair or replace the defective parts without charge. However, repair or replacement in the following cases will be charged even within the warranty period.

(1) The C6979-11/C4251-02 were misused with regard to the precautions and instructions described in this manual, or faults were caused by inadvertent handling.
(2) Faults were caused by electrical or mechanical modifications to the C6979-11/C4251-02.
(3) Faults were caused or induced by natural disaster or man-made accident.
The warranty is limited to repair or replacement.

## Maintenance

If problems arise due to the life end of parts after a long time of operation, return the equipment to our sales office. We will repair or replace the parts and make necessary adjustments.
While every effort is made to repair the returned equipment in as short a time as possible, the repair of equipment which has been purchased some time ago may require additional time. Please acknowledge that repair of equipment using parts which are not in current production or equipment which has been modified or severely damaged by the customer may be refused.

HAMAMATSU
HAMAMATSU PHOTONICS K.K., Electron Tube Center
http://www.hamamatsu.com/
314-5, Shimokanzo, Toyooka-village, Iwata-gun, Shizuoka-ken, 438-0193, Japan
Telephone: (81)539-62-5248, Fax: (81)539-62-2205

## Sales Offices

***ASIA:***
**HAMAMATSU PHOTONICS K.K.**
325-6, Sunayama-cho,
Hamamatsu City, 430-8587, Japan
Telephone: (81)53-452-2141, Fax: (81)53-456-7889

***U.S.A.:***
**HAMAMATSU CORPORATION**
***Main Office***
360 Foothill Road, P.O. BOX 6910,
Bridgewater, N.J. 08807-0910, U.S.A.
Telephone: (1)908-231-0960, Fax: (1)908-231-1218
E-mail: usa@hamamatsu.com

***Western U.S.A. Office***
Suite 110, 2875 Moorpark Avenue,
San Jose, CA 95128, U.S.A.
Telephone: (1)408-261-2022, Fax: (1)408-261-2522

***United Kingdom:***
**HAMAMATSU PHOTONICS UK LIMITED**
Lough Point, 2 Gladbeck Way, Windmill Hill,
Enfield, Middlesex EN2 7JA, United Kingdom
Telephone: 44(20)8-367-3560, Fax: 44(20)8-367-6384

***France, Portugal, Belgium, Switzerland, Spain:***
**HAMAMATSU PHOTONICS FRANCE S.A.R.L.**
8, 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

***Swiss Office***
Richtersmattweg 6a
CH-3054 Schüpfen, Switzerland
Telephone: (41)31/879 70 70, Fax: (41)31/879 18 74

***Belgian Office***
7, Rue du Bosquet
B-1348 Louvain-La-Neuve, Belgium
Telephone: (32)10 45 63 34, Fax: (32)10 45 63 67

***Spanish Office***
Centro de Empresas de Nuevas Tecnologias
Parque Tecnologico del Valles
08290 CERDANYOLA (Barcelona), Spain
Telephone: (34)3 582 44 30, Fax: (34)3 582 44 31

***Germany, Denmark, Netherland:***
**HAMAMATSU PHOTONICS DEUTSCHLAND GmbH**
Arzbergerstr. 10,
D-82211 Herrsching am Ammersee, Germany
Telephone: (49)8152-375-0, Fax: (49)8152-2658

***Danish Office***
Erantisvej 5, Tilst
DK-8381 Mundelstrup, Denmark
Telephone: (45)4346-6333, Fax: (45)4346-6350

***Netherland Office***
PO Box 50.075
1305 AB Almere, The Netherlands
Telephone: (31)36-5382123, Fax: (31)36-5382124

***North Europe:***
**HAMAMATSU PHOTONICS NORDEN AB**
Smidesvägen 12
SE-171-41 Solna, Sweden
Telephone: (46)8-509-031-00, Fax: (46)8-509-031-01

***Italy:***
**HAMAMATSU PHOTONICS ITALIA S.R.L.**
Strada della Moia, 1/E,
20020 Arese, (Milano), Italy
Telephone: (39)02-935 81 733, Fax: (39)02-935 81 741

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