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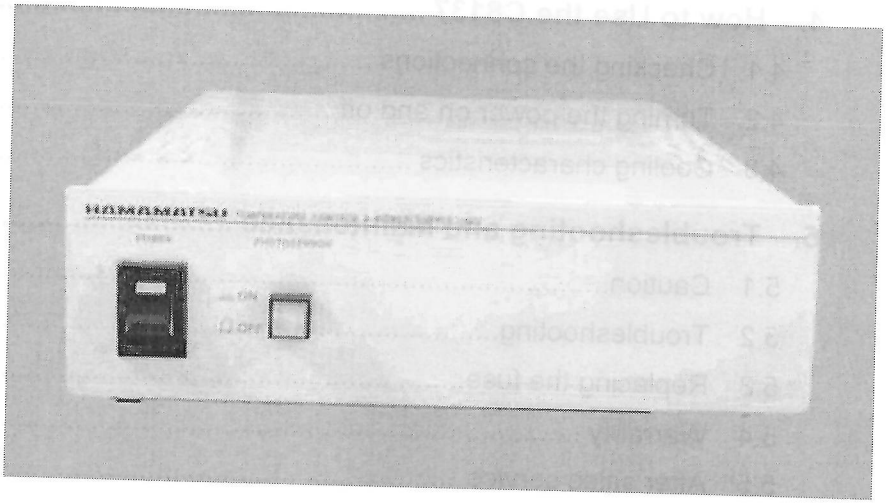
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C8137

Temperature Control & Power Supply Unit For H7421 Series Photon Counting Head

INSTRUCTION MANUAL



- **Before using this product, be sure to read the "Safety Precautions".**
- **The C8137 undergoes complete in-house testing before shipment. However, if any damage caused by transportation is found or operational failure is suspected, immediately contact your Hamamatsu sales office.**
- **This product is 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.**

HAMAMATSU

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1. Before Using This Product

When you receive this product, unpack it carefully and check that there is no damage on the exterior and that all components and accessories are included. If any components are missing, contact your Hamamatsu sales office.

1.1 Safety precautions (Always ensure safety!)

This product was designed with sufficient consideration of safety and reliability. However, like most electrical products, improper handling or misoperation may cause fire or electrical shock, resulting in accidents that may include serious injury or death. Be sure to observe the precautions listed in this manual or on the warning labels to prevent accidents.

Observe caution items for safety

Read the caution items described in this manual carefully and follow the instructions.
These caution items include general precautions relating to this product.

If any abnormality occurs ...

For example, if smoke or an unusual sound or odor is sensed, immediately turn off the power supply.

- This product uses symbol marks showed below.

  ~ Alternating current

  | ON(Power)

  ○ OFF(Power)

- Warning information in this manual is shown classified into the following items by the extent of danger or damage that may result if the product is improperly used not by following these instructions.

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 person servicing product, or damage to the product or peripheral equipment.

- Warning symbols used in this manual are classified as explained below. Make sure that you thoroughly understand the meaning of each symbol and follow the instruction. (These symbols are just examples.)

CAUTION	Symbols showing a caution or warning you must pay attention to
Must NOT do	Symbols showing what you must NOT do
Must DO	Symbols showing what you must DO

WARNING

Do not allow water or foreign matter to enter the product.



Avoid placing any containers holding water near the C8137.

If water spills and enters the interior of the case, immediately turn off the power switch and disconnect the power cable plug, then contact your Hamamatsu sales office for correct servicing.

Do not disassemble or alter any part of this product.



Do not open the case of the C8137. A high voltage is applied to some internal parts. Touching them may cause fire, electrical shocks or injury.

If smoke, excessive heat or an unusual odor is sensed, immediately disconnect the power cable plug.



Continuous operation may generate heat due to electrical shorts or insulation failure, resulting in fire or electrical shocks. Immediately turn off the power switch and disconnect the power cable plug.

Stop using the power cable if damaged and disconnect the power cable plug.



Continuous operation may generate heat due to electrical shorts or insulation failure, resulting in fire or electrical shocks. Immediately disconnect the power cable plug.

Remove dust deposits on the power cable plug.



Dust deposits or metallic chips adhering to the power cable plug may cause electrical shorts or insulation failure by moisture, resulting in fire or electrical shocks. If they are deposited, disconnect the plug and wipe off with dry cloth. Check to see if dust and foreign matter adhere to the plug periodically.

Do not touch the power cable plug with moist hands.



Electricity conducts through water so touching the power cable plug with moist hands may result in electrical shocks.

Always ground the unit.



Electrical Shock



Must DO

To prevent electrical shocks, always ground the C8137 by using the ground terminal of the power cable (supplied).

Do not ground to a gas pipe.



Fire



Must NOT Do

Never ground the C8137 to a gas pipe, as this is extremely dangerous, possibly causing a fire.

CAUTION

Avoid installing this product in locations subject to excessive soot, steam, humidity, dust and vibration.


Fire


Must NOT do

Soot, steam, humidity, dust, corrosive gases and inflammable gases have detrimental effects on the C8137.

Do not tug on the power cable to unplug it.


Fire


Electrical Shock


Must NOT do

Tugging on the power cable may damage the cable. Continuous operation with a damaged cable may generate heat due to electrical shorts or insulation failure, resulting in fire or electrical shocks.

Unplug the power cable for safety during maintenance or long-term storage.


Fire


Electrical Shock


Must DO

Touching an internal part by mistake during maintenance may result in electrical shocks. Storing the C8137 with power still supplied for extended periods of time may cause fire due to insulation failure or electrical shorts.

Read this manual thoroughly and follow the instructions.


Fire


Electrical Shock


Must DO

Failure to take necessary safety measures or mishandling not following the instructions in this manual may result in serious accidents.

Avoid using this product in a vacuum.


Fire


Electrical Shock


Must NOT do

The C8137 is designed for use under normal air pressures. Operation in a vacuum may cause fire or electrical shocks.

Do not allow any object to enter the case.


Fire


Electrical Shock


Must NOT do

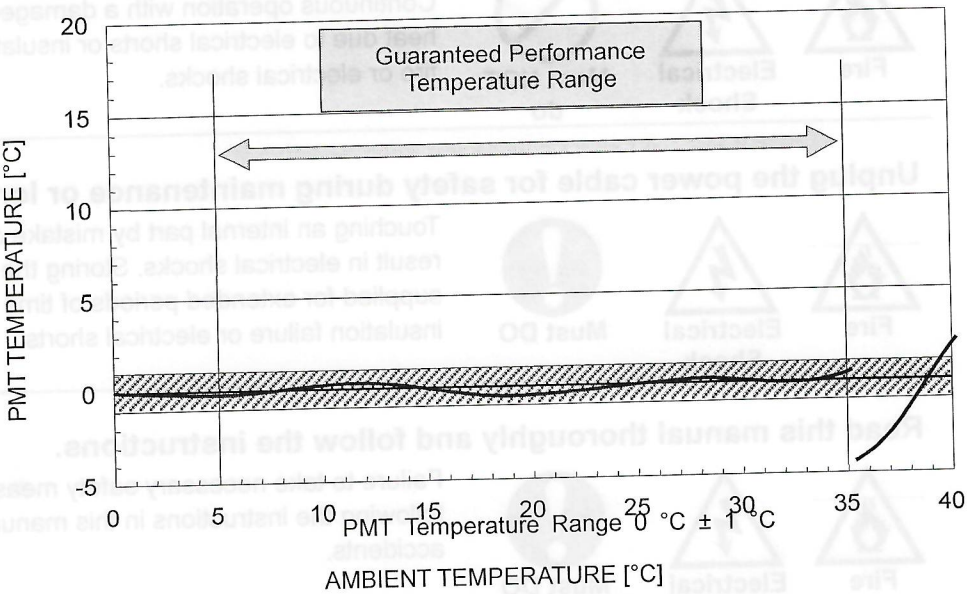
Do not allow any liquid, metallic debris or flammable objects to enter the interior of the case through the air vent holes. Such objects may cause troubles by electrical shorts, fire by overheating or electrical shocks.

1.2 Features

The C8137 is a power supply with a temperature control function specifically designed to operate the H7421 series photon counting heads.

ℓTemperature control ensures stable operation of the H7421 series

The H7421 series uses a thermoelectric cooling element (Peltier element) that reduces thermal noise in the built-in photomultiplier tube to deliver a higher S/N ratio. The C8137 is designed to control the Peltier element current to maintain stable output and noise level in the H7421 series, even when the ambient temperature fluctuates.



PMT Temperature vs. Ambient Temperature

ℓEasy operation

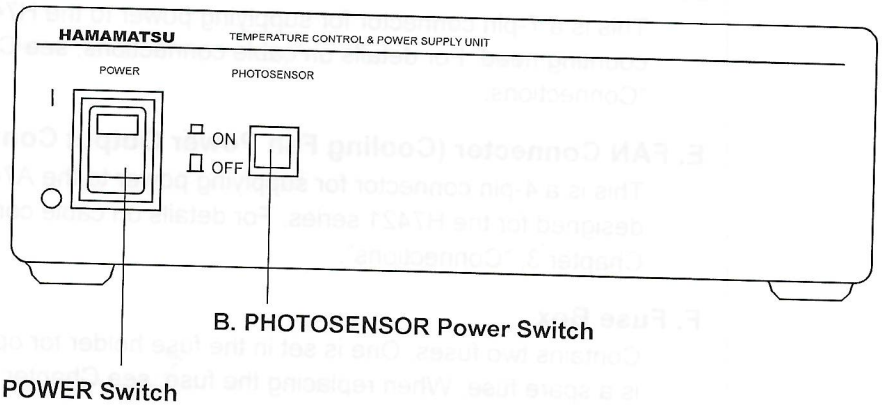
The C8137 is designed specifically for the H7421 series. Just connecting the C8137 to AC power provides the voltage necessary for H7421 series operation.

ℓWide input voltage range

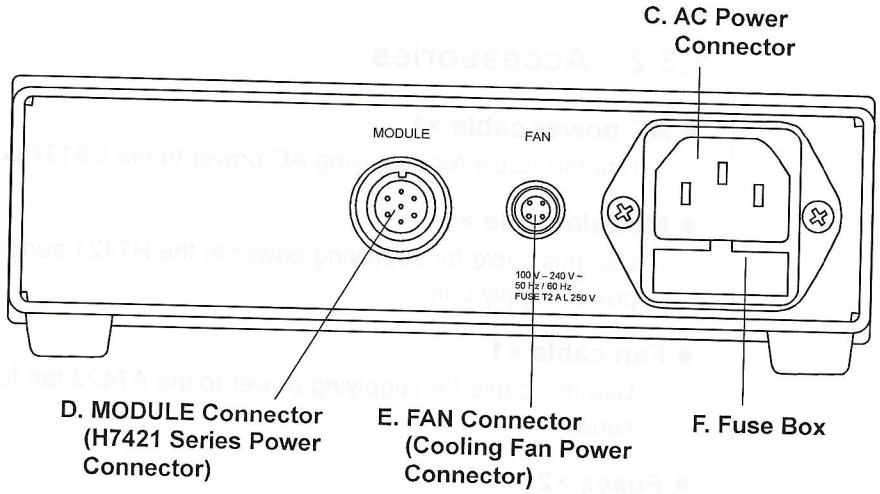
The C8137 can be operated on an AC voltage ranging from 100 V to 240 V.

1.3 Part names and accessories

1.3.1 Part names



Front Panel



Rear Panel

A. POWER (Main Power) Switch

Pressing the upper part of this switch turns the power on and the LED lights up. Pressing the lower part of this switch turns the power off and also turns the LED off. When this switch is turned on, power is also supplied to the Peltier element and fan to start cooling the detector (PMT) in the H7421 series. The detector temperature will stabilize to allow making measurements about 3 minutes after the power is turned on.

B. PHOTOSENSOR Power Switch

Pressing this switch to the down position supplies power to the detector (PMT) in the H7421 series and the switch LED also lights up, allowing you to start measurements. To cut off power to the detector, press this switch again.



Must NOT do

If excessive light enters the window of the H7421 series while the PHOTOSENSOR power switch still remains on, the service life of the H7421 series may shorten considerably or the photocathode may be damaged. Always turn off this switch before exposing to excessive light.

C. AC Power Connector

This is for supplying AC power to the C8137. For details on cable connections, see Chapter 3, "Connections".

D. MODULE Connector (H7421 Series Power Connector)

This is a 7-pin connector for supplying power to the H7421 series photon counting head. For details on cable connections, see Chapter 3, "Connections.

E. FAN Connector (Cooling Fan Power Output Connector)

This is a 4-pin connector for supplying power to the A7423 cooling fan designed for the H7421 series. For details on cable connections, see Chapter 3, "Connections".

F. Fuse Box

Contains two fuses. One is set in the fuse holder for operation and the other is a spare fuse. When replacing the fuse, see Chapter 5, "Cautions".

1.3.2 Accessories

- **AC power cable ×1**

  Use this cable for supplying AC power to the C8137 power supply unit.

- **Module cable ×1**

  Use this cable for supplying power to the H7421 series from the C8137 power supply unit.

- **Fan cable ×1**

  Use this cable for supplying power to the A7423 fan for cooling the H7421 series.

- **Fuses ×2**

  Two fuses are contained in the fuse box, including one spare fuse. These fuses have the following ratings.

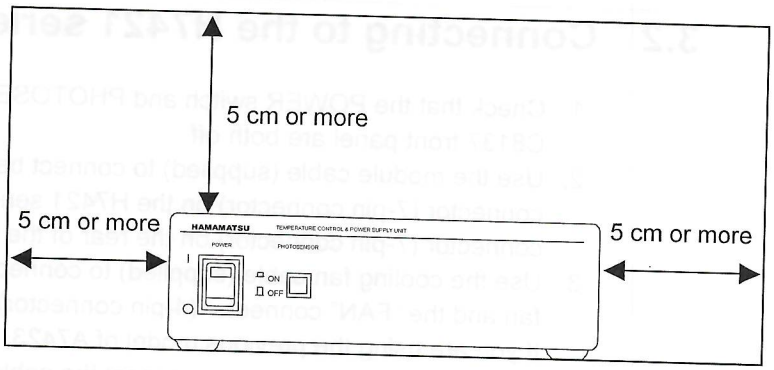
  Rated current: 2 A
  Rated voltage: 250 V
  Fuse characteristics: Time-delay type (T), low temp capacitance (L)

- **Instruction manual (this manual) ×1**

2. Installation

Cautions

- Avoid installing the C8137 in locations with high temperatures or high humidity.
- Install the C8137 in a flat, level location, with the feet facing downwards.
- Leave a space of at least 5 cm between the top/side panels of the C8137 and the surrounding walls or objects so the heat vent holes are not blocked.



3. Connections

The C8137 is designed to easily connect to the H7421 series photon counting head. This chapter explains how to make necessary connections.

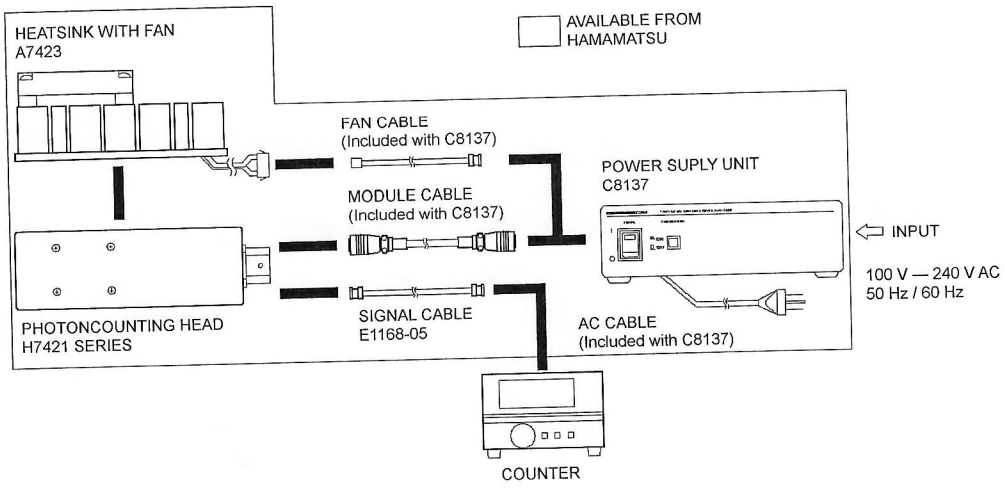
3.1 Before connection

Before making connections, check that the optical systems for the H7421 series are completely connected and that no excessive light is incident on the detector in the H7421 series.

3.2 Connecting to the H7421 series

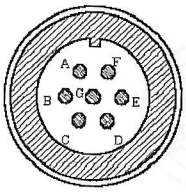
1. Check that the POWER switch and PHOTOSENSOR power switch on the C8137 front panel are both off.
2. Use the module cable (supplied) to connect between the "POWER IN" connector (7-pin connector) on the H7421 series and the MODULE connector (7-pin connector) on the rear of the C8137.
3. Use the cooling fan cable (supplied) to connect between the A7423 cooling fan and the "FAN" connector (4-pin connector) on the rear of the C8137. If you are using the previous model of A7423, the connector will not mate with the C8137. In this case, connect the cables by directly soldering the wires. The red or orange wire is positive (+) and the black or gray wire is negative (-), so solder wires of the same polarity together.

3.2.1 Connection diagram

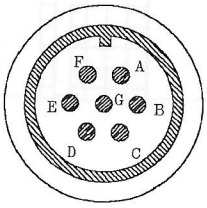


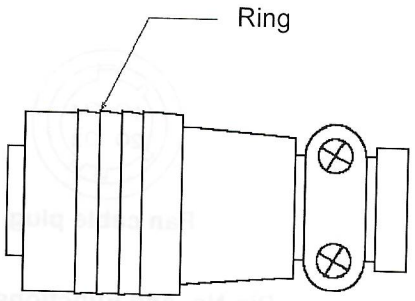
3.2.2 Connecting to the MODULE connector

The MODULE connector on the rear of the C8137 is used to supply power to the H7421 series.
When making connections, align the guide mark on the ring of the module cable plug with the "MODULE" label printed on the rear of the C8137, and insert the plug into the MODULE connector while gripping the end of the plug. To disconnect, grip the plug ring of the module cable and pull it out.



Connector on C8137 rear panel





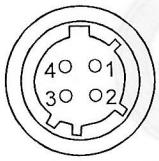
Module cable plug

Pin No. and Functions

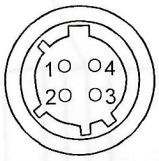
Pin No.	Name	Description
A	Thermistor 1	These terminals are connected to the thermistor in the H7421 series. The C8137 controls the Peltier element in the H7421 series by using the output from the thermistor, to maintain stable cooling characteristics.
B	Thermistor 2	
C	Peltier element (+)	Current output terminals for operating the Peltier element
D	Peltier element (−)	
E	DC +5 V	Voltage output terminal for a +4.5 V to +5.5 V dc voltage supply
F	IC	Internally connected. Do not use.
G	GND	Ground terminal

3.2.3 Connecting to the FAN connector

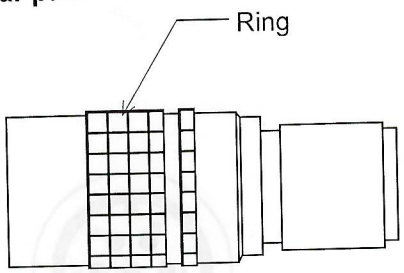
The "FAN" connector on the rear of the C8137 is used to supply power to the cooling fan.
When making connections, align the widest guide on the ring of the fan cable plug with the "FAN" label printed on the rear of the C8137 and insert the plug into the "FAN" connector while gripping the end of the plug. To disconnect, grip the plug ring of the fan cable and pull it out.



Connector on C8137 rear panel



Fan cable plug

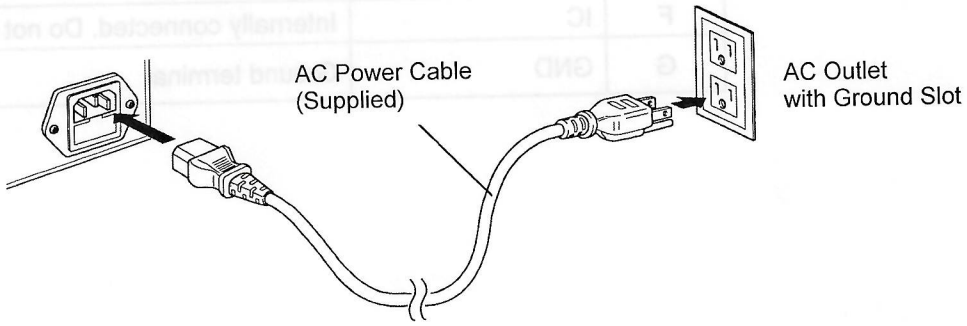


Pin No. and Functions

Pin No.	Name	Description
1	Fan	+12 V supply
2	GND	Ground terminal
3	NC	No connection
4	NC	

3.3 Connecting to the AC power

Use the AC power cable (supplied) to connect the C8137 to an AC outlet with a ground slot. The unit must be securely grounded through this power cable.



4. How to Use the C8137

4.1 Checking the connections

Before turning on the power switch, check the following points.

Optical systems connections
Check that the optical systems for the H7421 series are securely connected. If the optical systems connections are not complete and a light leak occurs, accurate measurements cannot be made and the measurement units may be damaged.

Ground connection
Check that the C8137 and measurement units are securely grounded.

4.2 Turning the power on and off

To turn the power on:

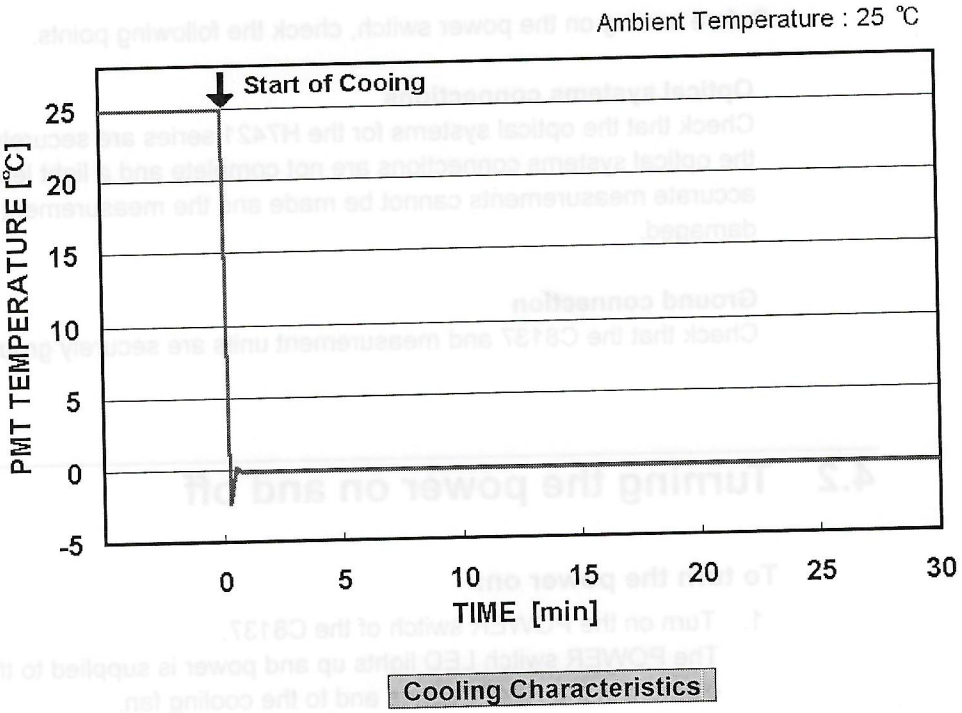
1. Turn on the POWER switch of the C8137.
   The POWER switch LED lights up and power is supplied to the Peltier element in the H7421 series and to the cooling fan.
2. Wait about 3 minutes until the unit sets to standby.
3. Turn on the PHOTOSENSOR power switch on the C8137.
   The switch LED lights up and the switch is in the down position.

To turn the power off:

1. Turn off the PHOTOSENSOR switch of the C8137.
   The switch LED also turns off and the switch is now in the up position.
2. Turn off the POWER switch of the C8137.
   The POWER switch LED also turns off.

4.3 Cooling characteristics

When the H7421 series is used with the C8137, the detector (PMT) in the H7421 series can be cooled quickly and the PMT temperature kept at 0 °C with high stability as shown in the graph below.



Cooling Characteristics

5. Troubleshooting and Maintenance

5.1 Caution

When the C8137 is not to be used for a long period of time, unplug the power cable from the AC outlet.

5.2 Troubleshooting

If you encounter troubles when using the C8137 along with the H7421 series, please check the following points or check "Troubleshooting" in the H7421 instruction manual before asking us for repair.

Symptom	What's probably wrong	What to do
No output signal appears from the H7421 series	Poor connection · Connector is loose or disconnected	Check electrical connections. (p.12)
	Power supply circuit is defective. · Excessive voltage was applied to the power supply unit. · A device other than the H7421 series is connected.	Contact us for repair.
The POWER switch on the C8137 cannot be turned on. (The POWER switch LED will not light up.)	Poor connection · The AC plug is disconnected from the C8137 or the AC outlet.	Check electrical connections. (p.12)
	The fuse has blown. · Power supply unit overload occurred. · The power supply unit is defective.	Check the connections (p.12) and then replace the fuse (p.18) with the spare fuse. If the fuse blows again after replacing with new one, there might be another problem, so contact our sales office for instructions.

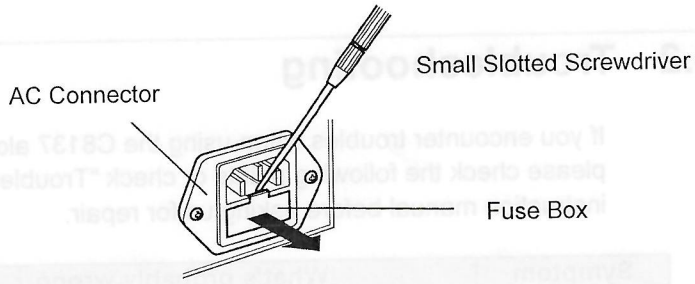
If the problem is not corrected even after checking the above items, contact us with the specific symptom and detailed description of the trouble, as well as the production serial number.

CAUTION: Pay strict attention to packing in order to prevent damage from occurring during shipment. (Use the packing box in which this product was shipped to you or pack ample amounts of cushioning material in a slightly oversized box.)

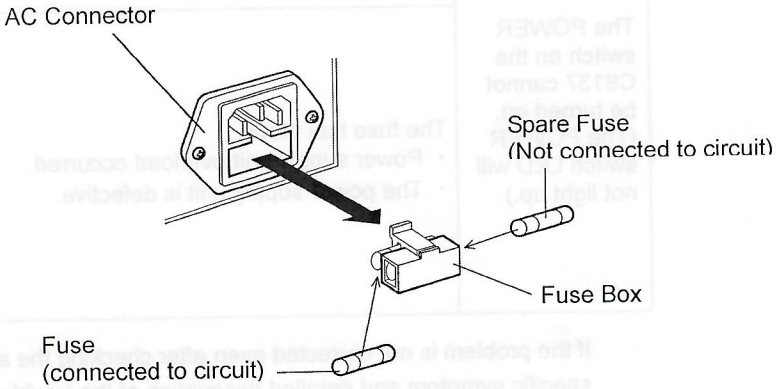
5.3 Replacing the fuse

A fuse (rated current: 2 A, rated voltage: 250 V, fuse characteristics: time-delay type (T), low temp capacitance (L)) is housed, along with a spare fuse, in the fuse box at the upper side of the AC connector on the rear of the C8137. If the fuse has blown, first find and repair the cause of the blown fuse and then replace the fuse as described below.

1. Unplug the AC power cable and then remove the fuse box by using a small slotted screwdriver as shown below.



2. Replace the blown fuse with the spare fuse.
   The spare fuse is on the outward (closer) side and the in-circuit (blown) fuse is further inside the fuse box.



3. Each time you use a spare fuse for replacement, we recommend providing with another spare fuse.
   The spare fuse must have the following characteristics.
   Rated current: 2 A
   Rated voltage: 250 V
   Fuse characteristics: Time-delay type (T), low temp capacitance (L)

CAUTION

If the fuse blows again after replacing with a new one, there might be another problem. Immediately stop operation and contact our sales office for proper instructions.

5.4 Warranty

This product is 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. The warranty shall not apply to failure in the following cases.

(1) Failure or trouble was caused by misoperation, mishandling, or not following the instructions and precautions described in this manual.
(2) The product has been modified electrically or mechanically by the customer.
(3) Failure was caused by accidents such as natural or man-made disasters.

The warranty is limited to repair or replacement.

5.5 After sales service

If a failure has occurred after extended periods of operation, which was caused by the long-term wear of replaceable parts, ship the product back to us for repair, replacement and adjustment.

6. Specifications

6.1 Ratings

Parameter		Rated Value	Unit
Input power voltage		100 to 240	V ac
Input power frequency		50 / 60	Hz
Power consumption		30	VA
Main unit output voltage		+4.5 to +5.5	V
Maximum output current for Peltier element		2.2	A
Output voltage for cooling fan		10.2 to 13.8	V
Cooling temperature setting (preset at factory prior to shipping)		0	°C
Ambient operating temperature *		-10 to +50	°C
Ambient operating humidity *		30 to 90	% Rh
Maximum operation altitude		2000	m
Performance-guaranteed temperature*		+5 to +35	°C
Performance-guaranteed humidity *		30 to 90	% Rh
Storage temperature *		-10 to +50	°C
Storage humidity *		10 to 95	% Rh
Maximum Ripple Noise (at maximum load)	Main unit	100	mV p–p
	Peltier element	30	
	Cooling fan	100	
Protective circuit		Excess current protection	-
Overvoltage category(per: IEC1010–1)		II	-
Pollution degree(per: IEC1010–1)		2	-
Dimensions (excluding projecting parts)		160(W) × 212(D) × 46(H)	mm
Weight (excluding cables)		Approx. 1	kg

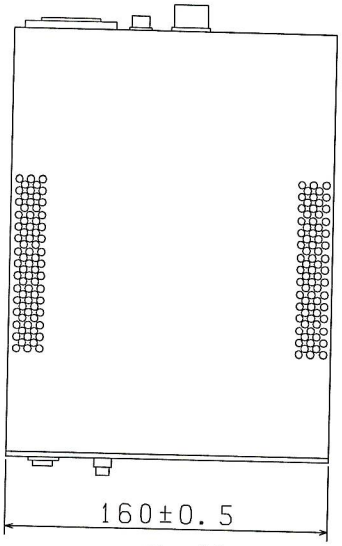
* No condensation

6.2 Accessories

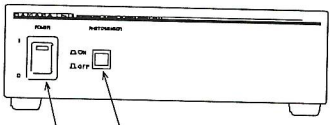
AC power input cable (2 m) 1
Module cable (1.5 m) 1
Fan cable (1.5 m) 1
Fuse/Spare fuse ..... 1 each
(Housed in fuse box on the rear panel)
Instruction manual 1

6.3 Dimensional Outlines

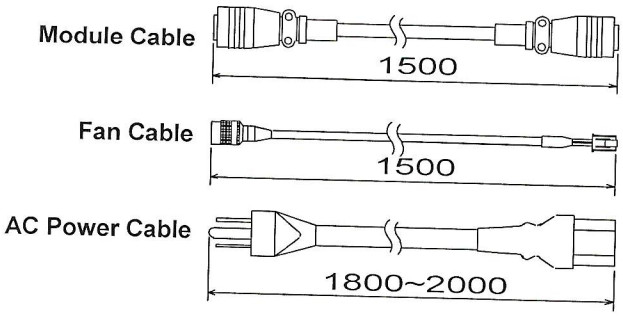
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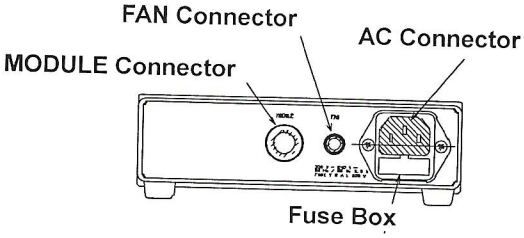


Top View

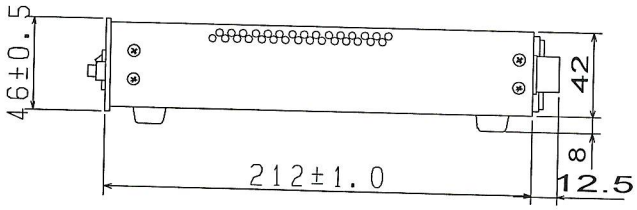


Front View





Rear View



Side View

MEMO

2000.5.18 First edition

For further information, contact our sales office in your country.

HAMAMATSU

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