

2002 Catalog Excerpts Thermoelectric Coolers

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Thermoelectric Coolers

High Performance Thermoelectric Coolers C4877, C4878 Series



Left: C4877 Power Supply
Right: C4877 Cooled PMT Housing

TACCF0161

The C4877 series and C4878 series are thermoelectric coolers constructed with enhanced electrostatic and magnetic shielding (C4877 Series). This minimizes the influence of external noise on the photomultiplier tube and thus significantly improves photometric accuracy. These coolers offer user-friendly functions such as easy temperature control and pilot lamp blanking. The C4877 series is designed for use with 51 mm (2") or 38 mm (1-1/2") diameter head-on photomultiplier tubes, and the C4878 series for

Features

- Thermoelectric cooling using Peltier elements
- About -30 °C cooling temperature (with +20 °C cooling water)
- Evacuated, double-pane window with heater for frost prevention
- Built-in electrostatic and magnetic shielding (C4877 Series)
- Water shut-off protection to guard the Peltier elements
- Stable operation due to a regulated power supply

Specifications

[Cooled PMT Housing]

Parameter	Value/Description	
Cooling	Thermoelectric cooling using Peltier elements	
Heat Exchange Medium	Water	
Amount of Cooling Water	1 L/min to 3 L/min	
Cooling Temperature (with cooling water at +20 °C)	Approx. -30 °C	
Temperature Controllable Range (with cooling water at +20 °C)	-30 °C to 0 °C (continuously adjustable)	
Cooling Time	Approx. 120 min	
Optical Window Material	Evacuated double-pane fused silica window with heater	
Applicable PMTs (Optional)	C4877 Series	28 mm (1-1/8") Dia. and 38 mm (1-1/2") Dia. and 51 mm (2") Dia. Head-on
	C4878 Series	MCP-PMT (R3809U-50 Series)
Applicable Socket Assembly or PMT Holder (Optional)	C4877 Series	E2762 Series ^(A)
	C4878 Series	E3059-500 (R3809U-50 Series)
Weight	5.8 kg	

[Power Supply]

Parameter	Value/Description	
Input Voltage (AC)	C4877, C4878	100 V ± 10 V (50 Hz/60 Hz)
	C4877-01, C4878-01	120 V ± 12 V (50 Hz/60 Hz)
	C4877-02, C4878-02	230 V ± 23 V (50 Hz/60 Hz)
Power Consumption	270 V·A	
Output Voltage	28 V	
Output Current	4.3 A	
Protection Circuit	Functions against cooling water suspension and over current/short circuit	
Weight	8.5 kg	

[Components and Accessories]

- Cooled PMT Housing (Including an input window)
- Power Supply
- Light Shield Cap
- Spare Fuse
- Water Hose Clamps
- Connection Cable (1.5 m)
- AC Line Cable (2 m)

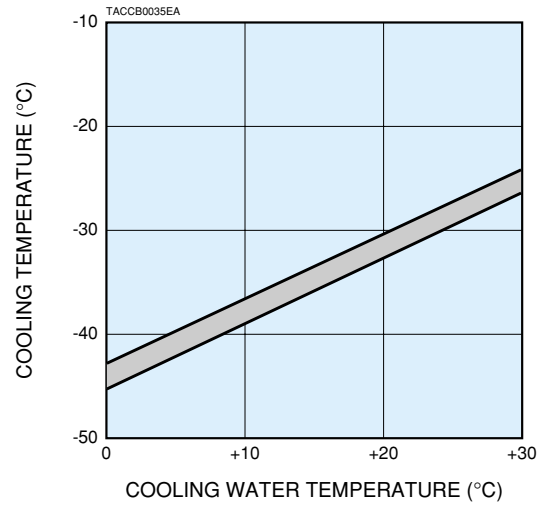
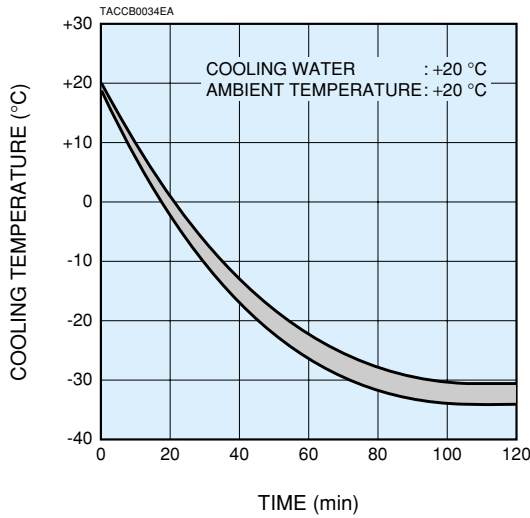
To operate C4877 and C4878, water hoses with an inner diameter of 15 mm are required.

NOTE: ^(A)

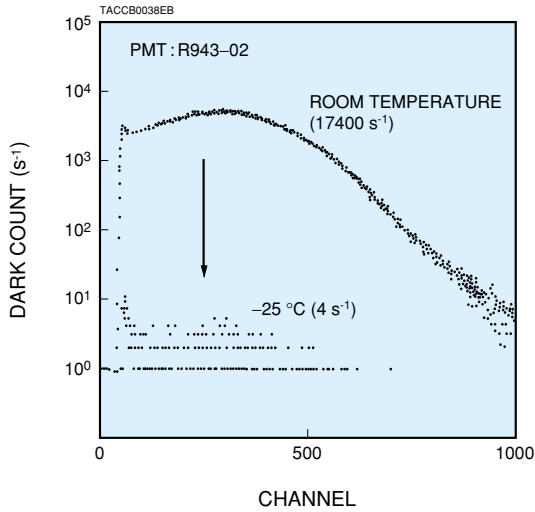
E2762 Series	PMT
E2762-502	R1767
E2762-506	R943-02, R3310-02
E2762-509	R464, R585, R649
E2762-510	R329, R331
E2762-511	R316-02, R374, R2228, R5929, R6249
E2762-513	R375, R669

All 6 models E2762 series listed here are SHV high voltage input and BNC current output type.

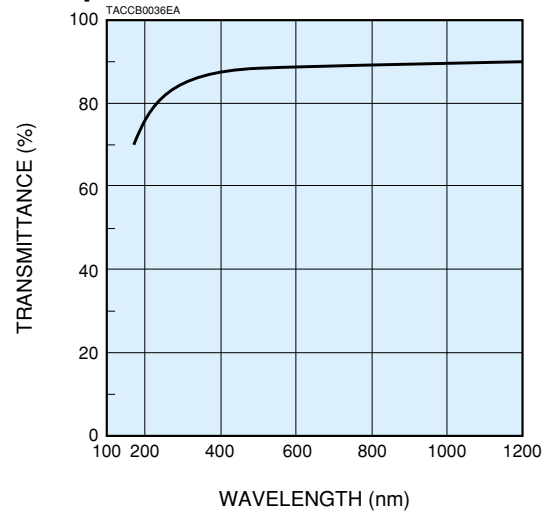
Cooling Characteristics



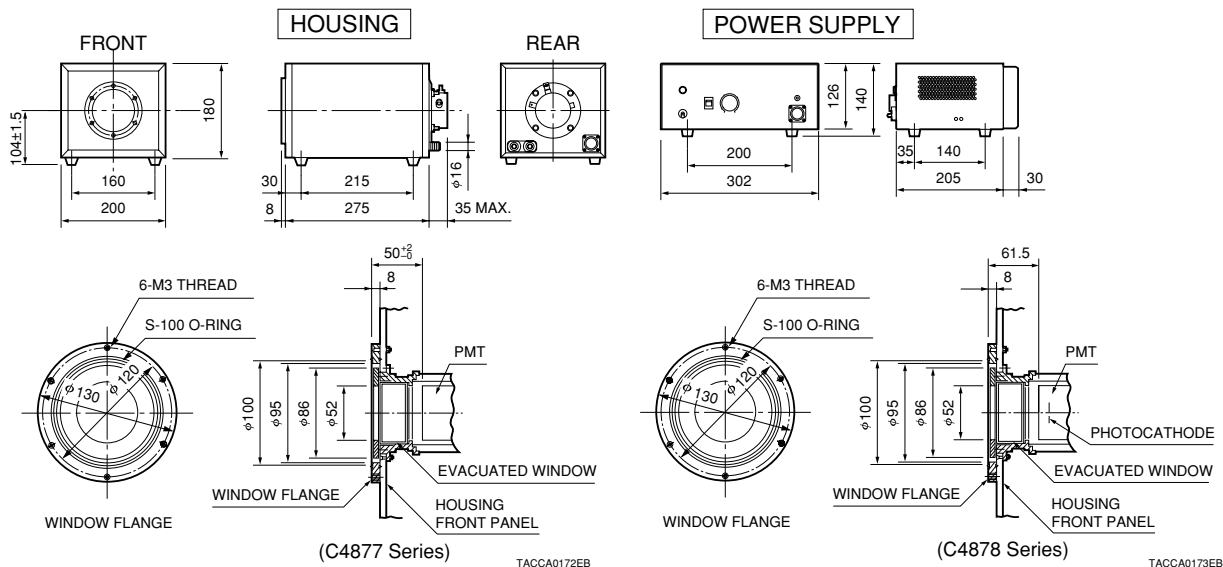
Cooling Effect on Dark Count (C4877)



Spectral Transmission Characteristics of Optical Window



Dimensional Outlines (Unit: mm)



* CE C4877-02 and C4878-02 conform to the EMC directive (89/336/EEC) and the LVD (73/223/EEC) of the European Union.

Thermoelectric Coolers

Thermoelectric Coolers C659 Series



▲Left: C659-50 Series Right: C659-70 Series

The C659 series is a thermoelectric cooler designed to reduce photomultiplier tube dark current and to enhance the photomultiplier tube lower detection limit. When used with a photomultiplier tube having an Ag-O-Cs photocathode in DC mode, the dark current can be reduced to 1/200 of its normal level at room temperature.

In cooling a photomultiplier tube one sometimes encounters problems such as dewing on the incident window and leakage current on the socket or base of the tube. But these problems are eliminated by use of an evacuated, double pane window and custom socket assembly.

The C659-50 series is designed for 38 mm (1-1/2") and 28 mm (1-1/8") diameter head-on photomultiplier tubes. The C659-70 series is specifically intended for use with 28 mm (1-1/8") diameter side-on photomultiplier tubes.

Features

- Thermoelectric cooling using Peltier elements
- Evacuated, double-pane window with heater for frost prevention
- Water shut-off protection to guard Peltier elements
- Built-in magnetic shield

Specifications

[Cooled PMT Housing]

Parameter		Value/Description
Cooling		Thermoelectric cooling using Peltier elements
Heat Exchange Medium		Water
Amount of Cooling Water		1 L/min to 3 L/min
Cooling Temperature ^(A)	C659-50 Series	Approx. -20 °C
	C659-70 Series	Approx. -15 °C
Cooling Time		Approx. 60 min
Optical Window Material		Evacuated double-pane fused silica window with heater
Applicable PMTs	C659-50 Series	38 mm (1-1/2") Dia. and 28 mm (1-1/8") Dia. Head-on
	C659-70 Series	28 mm (1-1/8") Dia. Side-on
Applicable Socket Assemblies	C659-50 Series	E1135-500, -501, -502 (Optional) ^(A)
	C659-70 Series	E1135-503 (Supplied) ^(A)
Weight	C659-50 Series	4.8 kg
	C659-70 Series	2 kg

NOTE: ^(A) Cooling water: +20 °C, Cooling temperature differs depending on photomultiplier tube type.

[Power Supply]

Parameter		Value/Description
Input Voltage (AC)	C659-50, -70	100 V ± 10 V (50 Hz/60 Hz)
	C659-51, -71	115 V ± 12 V (50 Hz/60 Hz)
	C659-52, -72	220 V ± 22 V (50 Hz/60 Hz)
Power Consumption	C659-50 Series	160 V·A
	C659-70 Series	110 V·A
Output Voltage	C659-50 Series	6 V
	C659-70 Series	3.4 V
Output Current	C659-50 Series	12 A
	C659-70 Series	12 A
Protection Circuit		Functions against cooling water suspension
Weight	C659-50 Series	10.7 kg
	C659-70 Series	8.5 kg

[Components and Accessories]

- Cooled PMT Housing (Including a magnetic shield and input window)
- Power Supply
- Light Shield Cap
- Connection Cable (2 m)
- Protective Circuit Cable (2 m)
- AC Line Cable (2 m)

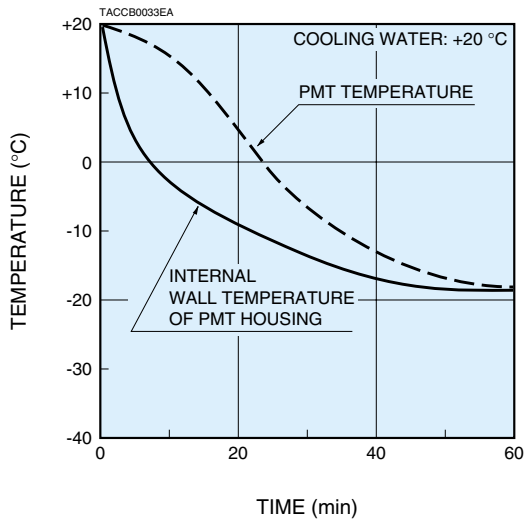
To operate C659 series, water hoses with an inner diameter of 15 mm are required.

NOTE: ^(A)

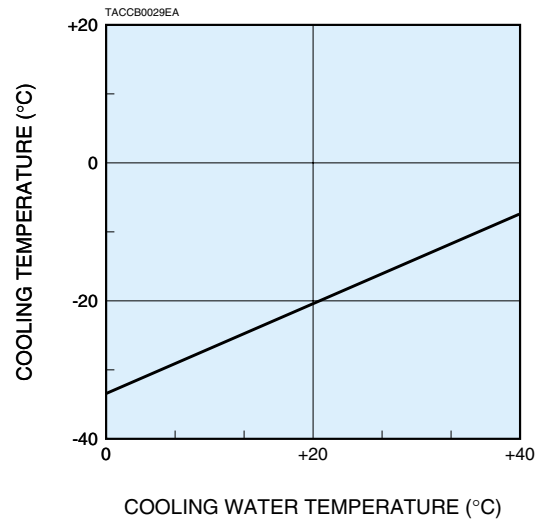
E1135 Series	PMT
E1135-500	R980, R1387
E1135-501	R580
E1135-502	R6248
E1135-503	28 mm Dia. Side-on

All 4 models E1135 series listed here are SHV high voltage input and BNC current output type.

Cooling Characteristics (C659-50 Series)

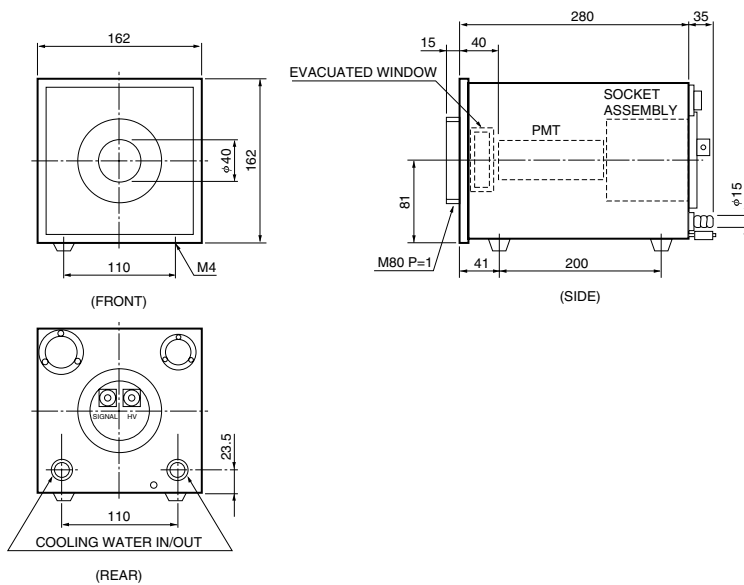


Effect by Cooling Water Temperature (C659-50 Series)

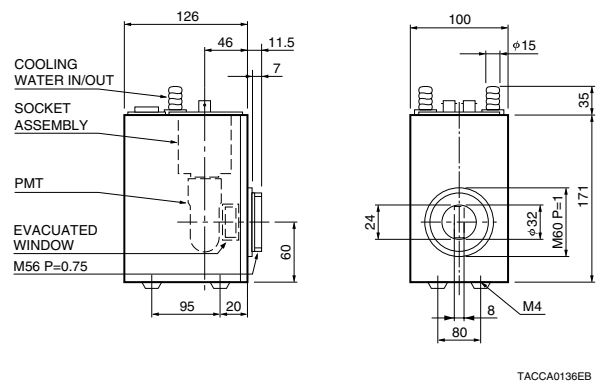


Dimensional Outlines (Unit: mm)

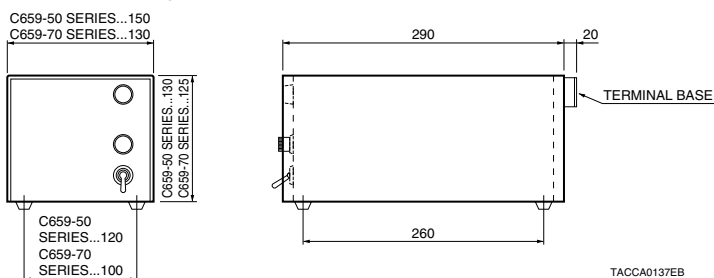
● Cooled PMT Housing (C659-50 Series)



● Cooled PMT Housing (C659-70 Series)



● Power Supply



Caution and Warranty

SAFETY PRECAUTIONS

WARNING



A high voltage is applied to a photomultiplier tube during operation. Always provide adequate safety measures to prevent the operator or service personnel from electrical shock and the equipment from being damaged.



The outer surface of metal package PMT R7400 and R5900 is connected to the cathode. When this PMT is operated with a high negative voltage applied to the cathode, the package is also at a high negative voltage so caution is required.

HANDLING PRECAUTIONS

● Handle tubes with extreme care.

Photomultiplier tubes have evacuated glass envelopes. Allowing the glass to be scratched or subjected to shock can cause cracks. Take extreme care during handling, particularly for tubes with graded sealing on synthetic silica bulbs.

● Keep faceplate and base clean.

Do not touch the faceplate and base with bare hands. Dirt and grime on the faceplate causes loss of transmittance and dirt or grime on the base may cause ohmic leakage. If the faceplate becomes soiled wipe it clean using alcohol.

● Do not expose to strong light.

The photocathode of photomultiplier tubes may be damaged if exposed to direct sunlight or intense illumination. Never allow strong light to strike the photocathode.

● Carefully handle tubes with a glass base.

Photomultiplier tubes with a glass base (also called button stem) are less rugged than tubes with a plastic base, so sufficient care must be taken when handling this type of tube. When fabricating a voltage-divider circuit by soldering resistors and capacitors to socket lugs, solder them while the tube is fully inserted into the socket.

● Helium permeation through silica bulb

Helium will permeate through silica bulbs and increase noise, leading to damage that makes photomultiplier tubes unusable. Avoid operating or storing them in an atmosphere where helium is present.

WARRANTY

Hamamatsu photomultiplier tubes and related products are warranted to the original purchaser for a period of 12 months after delivery. The warranty is limited to repair or replacement of a defective product due to defects in workmanship or materials used in its manufacture.

Even if within the warranty period, the warranty shall not apply to failures due to misuse, mishandling, modification by the customer, or to accidents such as natural or man-made disasters.

The customer should inspect and test all products as soon as they are delivered.

ORDERING INFORMATION

Photomultiplier tubes and related products are warranted to the original purchaser. This catalog lists photomultiplier tubes and related products currently available from Hamamatsu Photonics. Please select those products that best match your design specifications. If you do not find the products you want in this catalog, feel free to contact our sales office nearest you. We will modify our current products or design new types to meet your specific needs.

* Characteristics and specifications in this catalog are subject to change without prior notice due to product improvement or other factors.

Before you design equipment according to the characteristics and specifications of our products listed in this catalog, please con-

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Information in this catalog is believed to be reliable. However, no responsibility is assumed for possible inaccuracies or omission.

Specifications are subject to change without notice. No patent rights are granted to any of the circuits described herein.

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