

CC-100

Coolant Circulator

Operation manual

Manual Version 1
Revision B
July 1, 1998



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Chapter 1

Introduction

Description

The Model CC-100 Coolant Circulator is a universal water-to-air heat exchanger. It transfers heat from any heat source into the air. It was designed primarily for removing heat from thermoelectrically cooled CCD cameras. A magnetic drive coolant pump circulates coolant to the CCD camera (or any other heat source). This coolant passes through the hot side of the camera, which raises the temperature of the coolant. The heated coolant is then returned to the radiator of the CC-100. An internal fan forces air through the radiator reducing the temperature of the coolant by convection. The coolant then returns to the pump and repeats the cycle. This efficient closed cycle process can maintain the temperature of the coolant within a few degrees above ambient temperature.

Specifications

Note: All test data and specifications shown are based on pumping water and are guidelines only. Specifications will vary depending on specific fluid, temperatures, and other operating conditions.

Coolant: Water, water/ethylene glycol (50% solution), automotive antifreeze and other inert liquids with viscosity approximately that of water.

Capacity: Approximately 0.9 quart (≈ 0.85 liter), exclusive of external coolant lines and device to be cooled.

Pressure and Flow

- Maximum head pressure 13 feet (4 meters), ≈ 6.38 PSI (≈ 44 kPa), with zero flow.
- Maximum flow is 5 gallons per minute (19 liters/min) with zero head pressure.
- A flow rate of 1 gallon per minute (3.8 liters/min at 5 PSI (34.5 kPa).

In a typical application with 20 feet (6 meters) of 3/16" (4.76 mm) I.D. polyurethane tube, and 8 Swagelock quick connect connectors. The flow rate will be ≈ 1 pint per minute (≈ 0.5 liters/min).

In a typical application with 20 feet (6 meters) of 3/16" (4.78mm) I.D. polyurethane tube with only tube connectors. The flow rate will be ≈ 1 quart per minute (≈ 0.95 l/min).

Cooling Capacity

Temperature rises approximately 0.03°C per watt (3.4 btu/hr). Based on a typical flow rate of between 0.5 (0.47 liter) to 1 quart (0.95 liter) per minute and a thermal load of 100 watts (341 btu/hr).

When using a CC-100 to cool a PI detector, the coldest attainable temperature should be reduced by no more than two degrees compared with using tap water at ambient temperature.

Operating Environment

Temperature

Minimum: 0°F (-18°C). Avoid freezing coolant.

Maximum: 120°F (49°C).

Humidity: Avoid condensation

Clearance

Front: 6 inches (150 mm) minimum

Rear: 12 inches (300 mm) minimum

Side: 1 inch (20 mm) minimum

Power Requirements: 50/60 Hz

2 A @ 105V to 125V AC (standard)

2 A @ 90V to 110 V AC (factory installed option)

1 A @ 210 V to 250 V AC (factory installed option)

Mechanical

Dimensions

D, W, H: 12½" (318mm) × 15¾" (400mm) × 8¼" (210 mm)

Weight (without coolant)

16 lb (7.3 kg) without transformer, standard

19 lb (8.6 kg) with optional transformers for either 100V or 230V AC operation

Fluid Interface

Two ¼" female NPT tapped threads provided at the Inlet and Outlet on the rear panel.

Two ¼" male NPT connectors to ¼" swage tube fittings with two 3" (76mm) by ¼" OD copper tubes provided standard.

Two ¼" plastic Swagelock tube plugs are provided standard.

Options

Tube accessory kit with eight Swagelock quick disconnect connectors and 20 feet (6 m) of polyurethane tubing ¼" OD by 3/16" ID.

Chapter 2

Warnings

Introduction

This chapter contains cautions and notes concerning initial setup and operation of your system. Of course, reading this section should not replace reading the entire manual. The rest of the manual contains complete procedures for installing and operating your system, as well as a more detailed explanation of the following warnings

WARNING

Verify that the line voltage and fuse ratings are compatible before turning on the system. Voltage applied outside the range may damage the apparatus! The line voltage is not selectable. The unit must be modified at the factory for the desired operating voltage. The Model number on the rear panel indicates the line voltage with which this unit is designed to operate. The Model CC100-115V may be used for line voltages between 105 and 125 V AC, 50 or 60 Hz. The Model CC100-230 V may be used for line voltages between 210 and 250 V AC, 50 or 60 Hz. The Model CC100-100V may be used for line voltages between 90 and 100 V AC, 50 to 60 Hz. The fuse ratings are labeled on the rear panel, except Model CC100-100V. For the CC100-100V the fuse rating is 2 A at 120V AC.

WARNING

Protective grounding must be maintained. Protective grounding could become ineffective in apparatus possibly damaged during shipping. Until safety has been verified by Princeton Instruments, Inc, such damaged apparatus should not be used. Tag the unit appropriately to warn any potential user of such a danger.

WARNING

A socket outlet provided with the necessary earth ground contact must be used. Any extension cord or adapters used must also comply with these safety requirements. If the supplied cord plug is not compatible with the power socket, a substitute plug of a compatible design should replace it. Replacement power cords or power plugs must have the same polarity as those of the original equipment to avoid hazard due to electrical shock. Disconnecting the protective earth terminal inside or outside the apparatus is prohibited.

CAUTION

Never run the CC-100 without coolant in the reservoir. Although the magnetic pump can withstand short intervals of operation without coolant, doing so will shorten the life of the pump.

CAUTION

Never allow coolant to freeze. For storage, shipping and operating, a mixture of water/antifreeze or equivalent should be used to prevent freezing and corrosion. Any commercial brand antifreeze, recommended for automotive use, may be used in the CC-100. It is especially important to prevent freezing during shipping, since the temperature to which the CC-100 will be exposed will not be under control. Since it is very difficult to drain the CC-100 completely, it is strongly advised to fill with an antifreeze solution of sufficient concentration to prevent freezing. Circulate coolant solution for at least five minutes prior to draining in preparation for shipment.

WARNING

Do not operate the unit with the top cover removed. The fan blades are exposed inside the CC-100. Primarily, personal injury will result if the operator comes in contact with the rotating fan blades. Secondly, running the CC-100 with the covers removed prohibits air flow through the radiator. The temperature of the coolant will rise, since there will be no exchange of heat between the coolant and the air. The rise in temperature may not damage the CC-100, but may overheat and cause damage to the device that is being cooled.

WARNING

Check all coolant hoses and connectors for leaks. Although the unit is tested for leaks at the factory, a visual check for leaks should be made whenever the top cover is removed. If you observe any coolant leakage, turn off the CC-100 at once. Any leakage inside the CC-100 is an electrical hazard and should be repaired prior to use.

WARNING

Do not pressurize the coolant system. The maximum pressure generated inside of the CC-100 is $\cong 6$ PSI ($\cong 41.4$ kPa). There should be zero pressure in the system when the CC-100 is not in operation. Applying any external pressure to the system is not recommended and will void the warranty.

WARNING

There is no coolant flow indication or protection. It is recommended that the user sense coolant flow and provide protection to the device being cooled, if coolant flow is interrupted.

WARNING

Do not operate the system using 100% ethylene glycol. A high concentration solution is not able to carry away the heat created by the detector. A 50% solution is recommended.

WARNING

During shipment spare parts are taped inside of the CC-100 to the top support bracket. **These parts must be removed prior to applying power to the unit.**

Chapter 3

Installation

Inspection

When unpacking the CC-100, it should be inspected for any obvious shipping damage. Any shipping damage noted should be reported without delay to both the carrier and to Princeton Instruments, Inc., before operating the system. In case of shipping damage, all shipping material should be saved. Princeton Instruments, Inc. and the shipping carrier should be notified immediately. Otherwise Princeton Instruments, Inc. will consider the damage due to abuse. If external damage is unnoticeable, but system specifications are not met, internal damage has probably occurred.

Spare Parts Bag

Remove the top cover of the CC-100 by removing the four screws and washers from each side of the top cover. Remove the package of spare parts containing the copper tubes, nuts, etc. from the inside of the CC-100. Inspect inside the instrument for internal damage. Again, in case of shipping damage, all shipping material should be saved. Princeton Instruments, Inc. and the shipping carrier should be notified immediately. Otherwise Princeton Instruments, Inc. will consider damage as due to abuse.

Connections and Checks

- ◆ Make all the coolant plumbing connections between the CC-100 and the device to be cooled.
- ◆ Remove the lid from the reservoir and fill it with a water/antifreeze mixture of sufficient concentration to prevent freezing. Be careful not to spill any coolant inside of the instrument.
- ◆ Turn the power on and allow the coolant to circulate.
- ◆ Refill the reservoir as required until all the air is out of the system DO NOT OVERFILL the reservoir.
- ◆ Tighten the lid onto the reservoir.
- ◆ Check for both internal and external leaks. Generally, four or five minutes of operation should be sufficient to determine if any leaks are present.
- ◆ Turn the power off.
- ◆ Place the plastic tube plugs in a bag and secure inside the chassis (these parts will be needed if you have to return the instrument for repair). Install the top cover and

secure it with the eight screws and washers removed above. Installation is now complete.

Chapter 4

Maintenance

Air Filter

The frequency of cleaning depends on the environment around the CC-100. Usually, whenever the velocity of air coming out of the CC-100 decreases, it is time to clean the filter. Another indication is the rise in the outlet temperature above ambient. Normally this temperature will be within a few degrees of ambient. The air filter is located in front of the radiator. The easiest way of cleaning the filter is to vacuum it from the outside without any disassembly of the CC-100. If this is not possible, the filter can be cleaned by removing the top cover, removing the brackets holding the radiator in place, tilting the top of the radiator away from the rear panel and removing the air filter. Once the filter is removed, wash out the filter with tap water and allow it to dry before reinstalling it.

Coolant

The antifreeze coolant needs to be maintained annually. A complete flush and refill is recommended per instructions on the particular brand of antifreeze selected.

Coolant Pump

The top cover needs to be removed every six months and the pump oiled. The name plate on the pump indicates the type of oil and the location for lubrication. Apply two or three drops of oil into each location, essentially any type of S.A.E. 20 electric-motor oil can be used.

Figure 3.
100 V Chassis
Wiring
diagram.

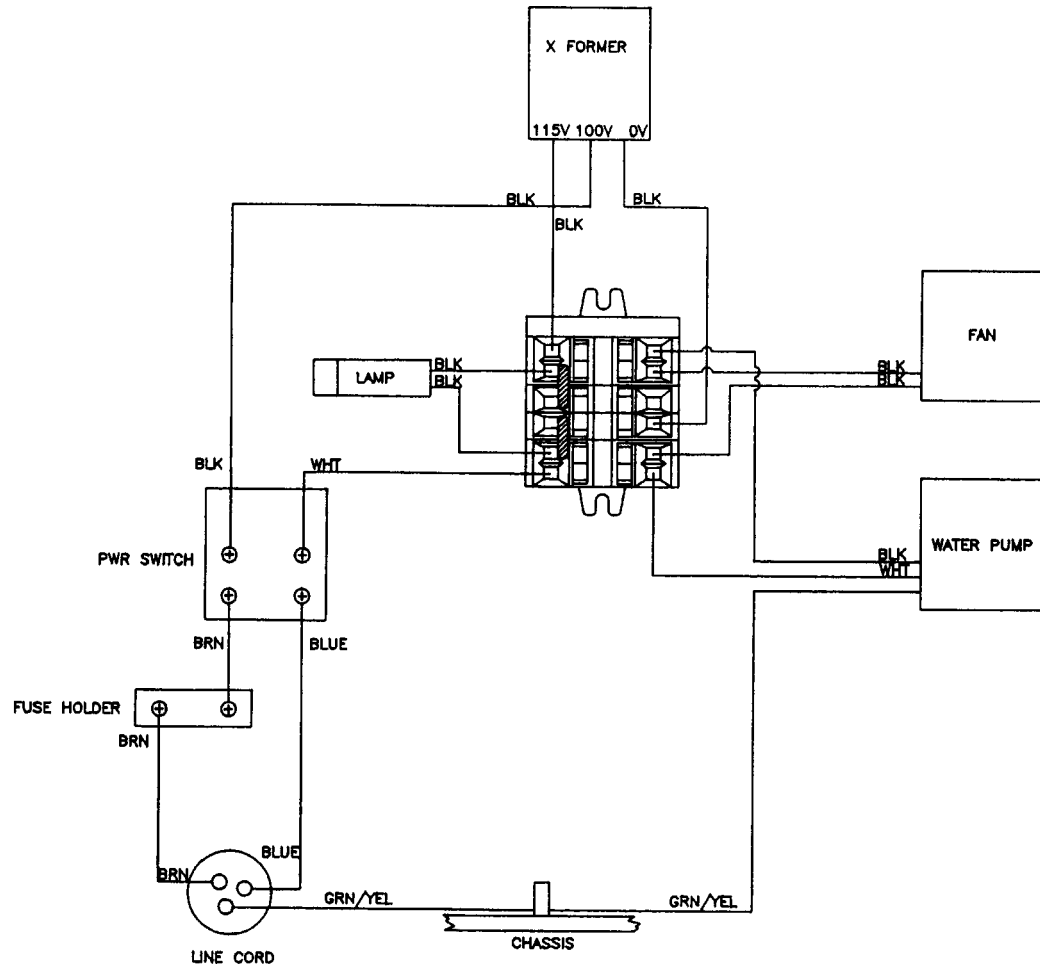
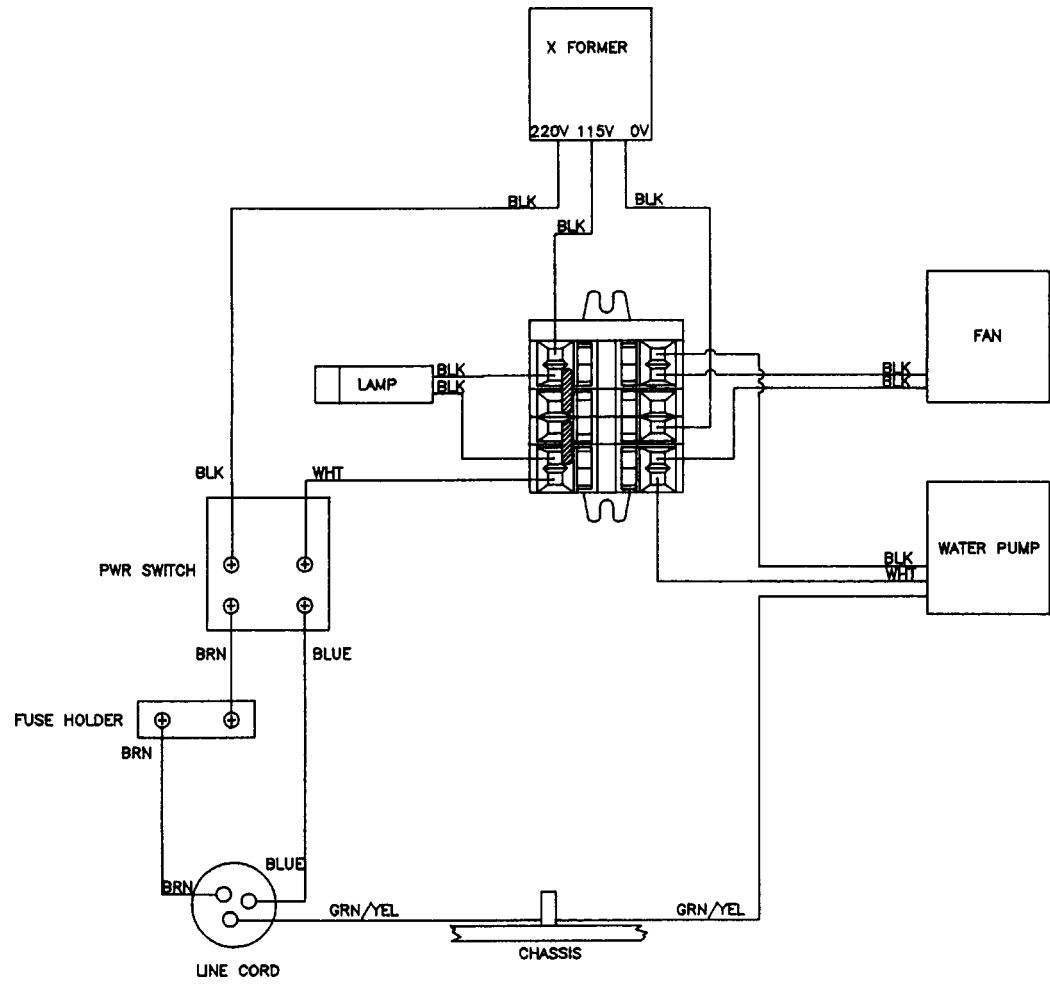


Figure 4.
230 V chassis
wiring.



Warranty and Service

Warranty

This equipment is warranted to be free from defects of material and workmanship. It is sold subject to the mutual agreement that the liability of Princeton Instruments, Inc., is limited to replacing defective parts and/or repairing malfunctioning equipment at its factory, provided the equipment is returned, transportation prepaid, within twelve (12) months of its factory ship date.

The purchaser agrees that Princeton Instruments, Inc. shall assume no liability for consequential damages resulting from its use or from packaging of shipments returned to the factory.

Components which are damaged by misuse are not warranted. Units which have been modified by a customer are not warranted.

UV coatings are not covered by this warranty.

Equipment Repairs

It is recommended that units requiring service in the United States be returned to the factory located in Trenton, New Jersey. Before instrumentation is returned for service, please consult a service engineer at the factory. In many cases, the problem may be cleared up over the telephone.

If the unit needs to be returned, the service engineer will ask for a detailed explanation of the problems encountered and a purchase order to cover any charges. You will then receive a Returned Materials Authorization (RMA) number. Place this number on the package so the returned equipment can be easily identified when received at the factory. You must also include with the equipment a completed RMA form explaining the symptoms or problems encountered. Without this document, repair turnaround time will be considerably longer.

It is especially important to prevent freezing during shipping, because the temperature to which the CC-100 will be exposed will not be under control. Since it is very difficult to drain the CC-100 completely, it is strongly advised to fill with an antifreeze solution of sufficient concentration to prevent freezing and allowed to circulate for at least five minutes prior to draining in preparation for shipment. Before shipping the unit, the plastic tube plugs should be installed on both the inlet and outlet tube fittings to prevent leakage and possible additional damage.

If the unit is under warranty, the customer is only responsible for the transportation and insurance charges to Princeton Instruments. Princeton Instruments is responsible for the return transportation charges. If the unit is out of warranty, the customer is responsible for all transportation charges (including insurance and duty fees, when applicable) as

well as all charges incurred to perform the repairs. In this case, the customer can decide the insurance value.

International customers should contact your local manufacturers representative or distributor for repair information.

Contact Information

Princeton Instrument's manufacturing facility is located at the following address:

Princeton Instruments, Inc.
3660 Quakerbridge Road
Trenton, NJ 08619 (USA)

Tel: 609-587-9797

Fax: 609-587-1970

Tech Support E-mail: techsupport@prinst.com

For technical support and service outside the United States, see our web page at www.prinst.com. An up-to-date list of addresses, telephone numbers, and e-mail addresses of Princeton Instrument's overseas offices and representatives is maintained on the web page.