

## CoolCUBE Setup and Operation

### Introduction

Liquid-cooled PhotonMAX, PIXIS, and ProEM cameras provide low vibration systems for data acquisition. Liquid-cooled PhotonMAX and PIXIS cameras incorporate a closed loop system of circulating fluid instead of using a fan to remove heat. The ProEM can use air circulation (i.e., fan) and/or circulating coolant. The CoolCUBE continuously pumps the 50:50 mixture of room temperature water and ethylene glycol. To prevent voiding the warranty, use only the circulator and hoses shipped with your system.



### Power

A PhotonMAX or PIXIS camera cooled by a CoolCUBE circulator receives its power from the liquid circulator unit, which in turn plugs into a source of AC power: the 10' (3 m) circulator/camera power cable has a Lemo connector on each end and connects between the circulator to the camera to provide the camera power. A ProEM receives its power from a power supply, which in turn plugs into an AC power source.



### Grounding and Safety

**WARNING:** If the equipment is damaged, the protective grounding could be disconnected. Do **not** use damaged equipment until its safety has been verified by authorized personnel. Disconnecting the protective earth terminal, inside or outside the apparatus, or any tampering with its operation is also prohibited.

Before turning on the circulator, the ground prong of the powercord plug must be properly connected to the ground connector of the wall outlet. The wall outlet must have a third prong, or must be properly connected to an adapter that complies with these safety requirements.

Before turning on the ProEM power supply, the ground prong of the powercord plug must be properly connected to the ground connector of the wall outlet. The wall outlet must have a third prong, or must be properly connected to an adapter that complies with these safety requirements.

Inspect the supplied powercord. If it is not compatible with the power socket, replace the cord with one that has suitable connectors on both ends.

**WARNING:** Replacement powercords or power plugs must have the same polarity as that of the original ones to avoid hazard due to electrical shock.

### Coolant Ports

Coolant ports on the CoolCUBE are labeled as Inlet and Outlet based on the coolant flow into and from the circulator. However, the camera coolant ports (located on the rear or side of the camera) are not labeled. This is because coolant can flow through the camera in either direction. It does not matter which hose from the circulator is connected a coolant port on the camera. Use only the hoses and circulator shipped with your system. Attaching any other hoses or circulator voids the warranty.

## Installation Overview

The list and diagrams below briefly describe the sequence of actions required to install your liquid-cooled system and prepare to gather data. Refer to the references for more detailed information. Unless otherwise indicated, the references are to chapters in the camera system manual.

Action	Reference
1. If the system components have not already been unpacked, unpack them and inspect their carton(s) and the system components for in-transit damage.	Chapter 4 System Setup
2. Verify that all system components have been received.	Chapter 4 System Setup
3. If the components show no signs of damage, verify that the appropriate power cord has been supplied.	Chapter System Setup
4. If the application software is not already installed in the host computer, install it.	Chapter 4 System Setup & Software manual
5. If the computer interface card is not already installed in the host computer, install it.	Refer to computer manufacturer's instructions
6. Depending on application, attach lens to the camera or mount the camera to a spectrometer.	Chapter 4 System Setup
7. <b>PhotonMAX:</b> With the circulator/camera power cable disconnected from the camera, connect the Data cable to the DATA port at the rear of the camera and to the DATA port on the installed PCI card. <b>PIXIS:</b> With the circulator/camera power cable disconnected from the camera, connect the USB cable to the USB port at the rear of the camera and to the USB port at the computer. <b>ProEM:</b> With the power supply disconnected from the camera, connect the Ethernet cable to the GigE connector on the rear of the camera and to the Ethernet port on the installed Ethernet card.	
8. Make the coolant hose connections to the camera and then make the power connections. <ul style="list-style-type: none"> <li>• <b>PhotonMAX and PIXIS:</b> Make sure the circulator is set to <b>OFF</b>. Make the circulator/camera power cable connections. Plug the circulator into the power source.</li> <li>• <b>ProEM:</b> Make sure the power supply is set to <b>OFF</b>. Plug the power supply into the rear of the camera and then plug the power supply into the power source.</li> </ul>	<i>"Making the Camera-Circulator Connections"</i> , page 6 of this document
9. Add coolant to the CoolCUBE if necessary.	
10. Turn the circulator <b>ON</b> . <ul style="list-style-type: none"> <li>• <b>PhotonMAX:</b> Then turn the camera <b>ON</b>.</li> <li>• <b>ProEM:</b> Then turn the power supply <b>ON</b>.</li> </ul>	
11. Turn on the computer and begin running the application software.	Software manual
12. Enter the hardware setup information.	Software manual

Action	Reference
13. Set the target array temperature.	Chapter 5 Operation
14. When the system reaches temperature lock, wait an additional 20 minutes and then begin acquiring data in focus mode.	Chapter 5 Operation
15. Adjust the focus for the best image or spectral lines. If you are using WinSpec/32, you may want to use the Focus Helper function for spectroscopy applications.	Chapter 5 Operation

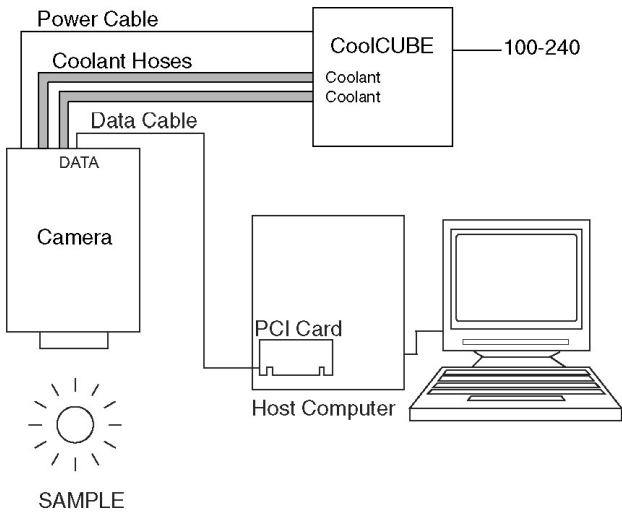


Figure 1. PhotonMAX: Typical Imaging Experiment Layout with Liquid-cooled Camera

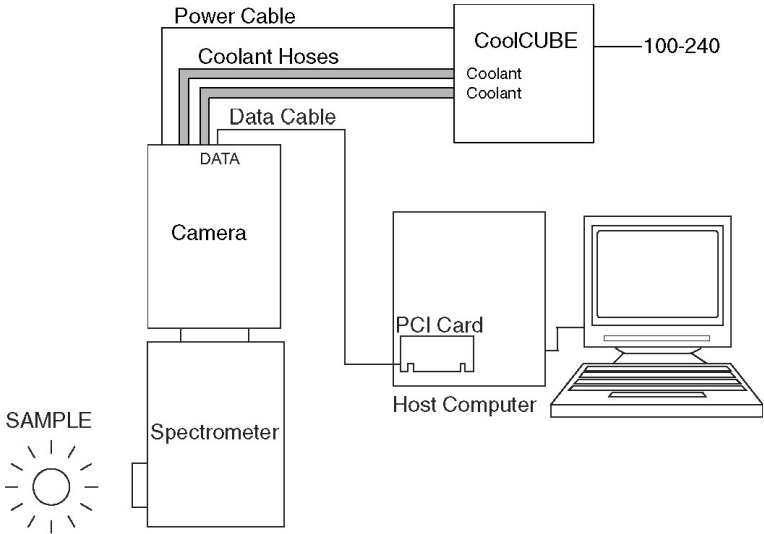


Figure 2. PhotonMAX: Typical Spectroscopy Experiment Layout with Liquid-cooled Camera

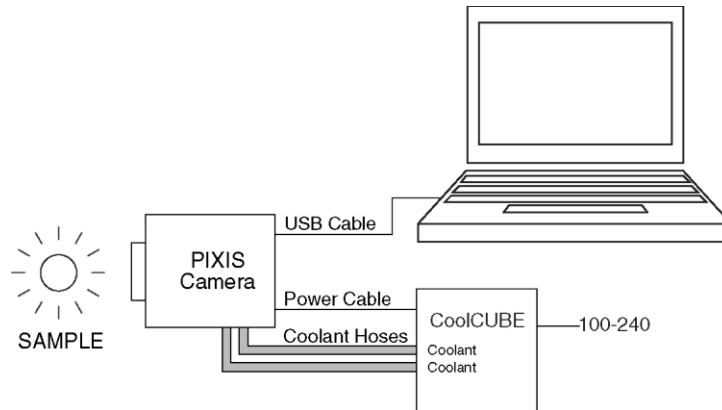


Figure 3. PIXIS: Typical Imaging Experiment Layout with Liquid-cooled Camera

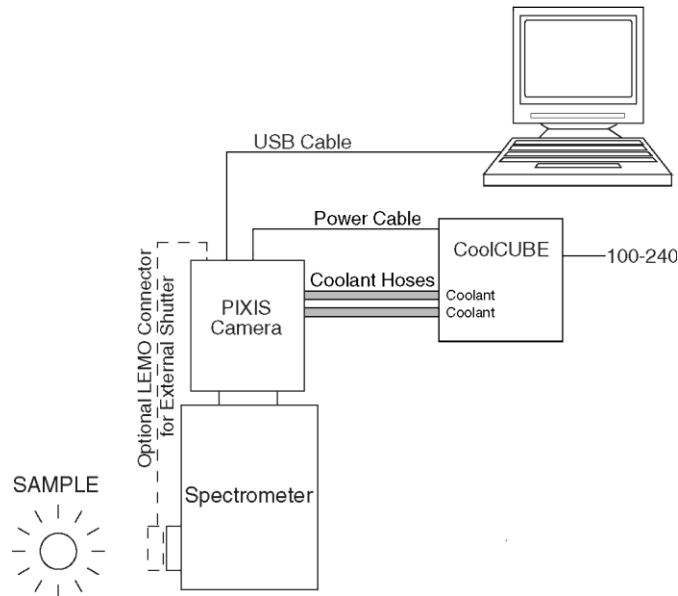


Figure 4. PIXIS: Typical Spectroscopy Experiment Layout with Liquid-cooled Camera

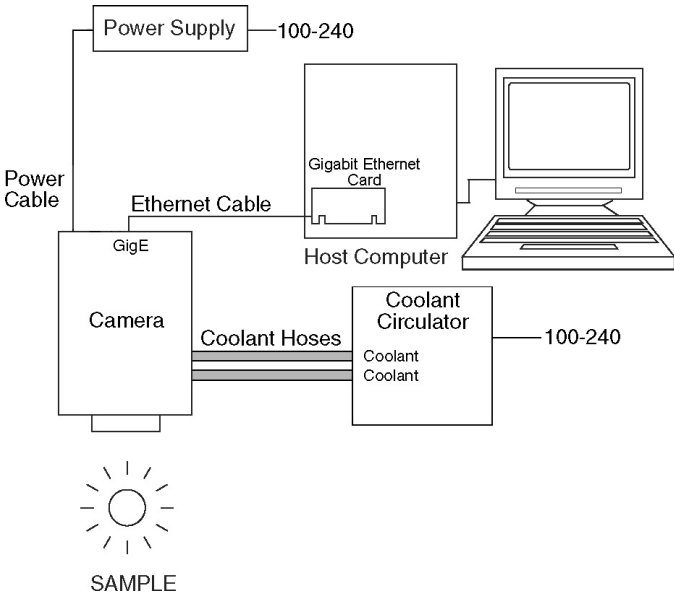


Figure 5. ProEM: Typical Imaging Experiment Layout with Air/Liquid-cooled Camera

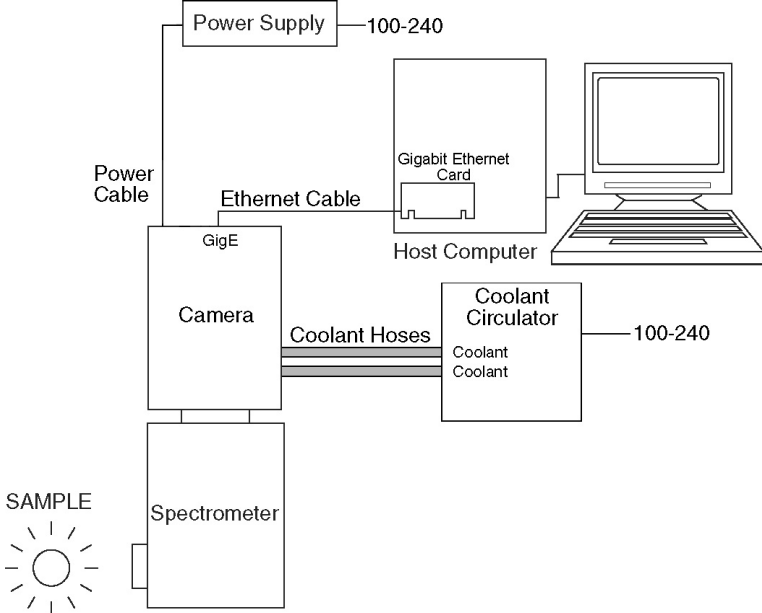


Figure 6. ProEM: Typical Spectroscopy Experiment Layout with Air/Liquid-cooled Camera

### Making the Camera-Circulator Connections

The CoolCUBE circulator provides the camera power for PhotonMAX and PIXIS liquid-cooled cameras and provides a vibration-free method of heat removal. A ProEM camera has a power supply that connects to the rear of the camera and plugs into a 100-240 VAC, 47-63 Hz power source.

1. Make sure the camera (PhotonMAX), power supply (ProEM) and circulator power switches are turned OFF.
2. Make sure the vertical distance between the camera and the circulator is less than three (3) meters.
3. Make the coolant connections between the circulator and the camera. It does not matter which hose from the circulator is plugged into a coolant port on the camera.

**Note:** Make sure that there are no kinks in the hoses that impede the coolant flow. Lack of sufficient flow can seriously harm the detector and any resulting damage is not covered under warranty.

4. Make the circulator/camera power cable connection between the camera and the circulator. If the camera is a ProEM, verify the power supply is turned off, and then plug it into the rear of the camera and into a 100-240 VAC, 47-63 Hz power source.
5. Plug the circulator into a 100-240 VAC, 47-63 Hz power source.
6. Turn the circulator ON.
  - If the camera is a PhotonMAX, also turn the camera power switch ON.
  - If the camera is a ProEM, also turn the power supply ON.
7. Start the application software.

### Cooling Troubleshooting

#### **Temperature Lock Cannot be Achieved or Maintained.**

Possible causes for not being able to achieve or maintain lock could include:

- Ambient temperature greater than +25°C. This condition affects TE-cooled cameras. If ambient is greater than +25°C, you will need to cool the camera environment or raise the set temperature.
- Airflow through the camera and/or circulator is obstructed. The camera needs to have approximately two (2) inches (50 mm) clearance around the vented covers. If there is an enclosure involved, the enclosure needs to have unrestricted flow to an open environment. The camera vents its heat out the vents near the nose. The air intake is near the rear of the camera.
- A hose is kinked. Unkink the hose.
- Coolant level is low. Add coolant.
  1. With hoses connected, place the camera and CoolCUBE circulator at the same level.
  2. Turn on the circulator.
  3. Using the supplied hex tool, open the fill port.
  4. Add a 50:50 mix of ethylene glycol and water (only a few cc's are needed).
  5. Using the supplied hex tool, close the fill port. **DO NOT OVERTIGHTEN.**

**WARNING:** If more than two (2) inches of the coolant line is filled with air, the pump will stop working and may be damaged. If the flow stops while the pump is on, turn off the circulator and add fluid.

- There may be air in the hoses. Add coolant.
  1. With hoses connected, place the camera and CoolCUBE circulator at the same level.
  2. Turn on the circulator.
  3. Using the supplied hex tool, open the fill port.
  4. Add a 50:50 mix of ethylene glycol and water (only a few cc's are needed).
  5. Using the supplied hex tool, close the fill port. **DO NOT OVERTIGHTEN.**
- Circulator pump is not working. If you do not hear the pump running when the circulator is powered on, turn off the circulator and contact Customer Support.
- The camera has been placed three (3) meters or more above the circulator. Reduce the vertical distance between the camera and circulator.
- The vacuum has deteriorated and needs to be refreshed. Contact Customer Support.
- The target array temperature is not appropriate for your particular camera and CCD array.
- The camera's internal temperature may be too high, such as might occur if the operating environment is particularly warm or if you are attempting to operate at a temperature colder than the specified limit. TE cameras are equipped with a thermal-protection switch that shuts the cooler circuits down if the internal temperature exceeds a preset limit. Typically, camera operation is restored automatically in about ten minutes. Although the thermo-protection switch will protect the camera, you are nevertheless advised to power down and correct the operating conditions that caused the thermal-overload to occur.

### CoolCUBE Specifications

#### Closed loop system

**Hoses:** 3/8" ID, with no-drip quick disconnects at the circulator ends and CPC quick disconnects at the camera ends

**Coolant:** 50:50 ethylene glycol and water at 25°C

**Dimensions:** Refer to "*Outline Drawing: CoolCUBE Circulator*", next page

**Circulator Weight (Filled):** 6.0 lbs (2.7 kg)

**Hose Weight (Filled):** 3.0 lbs (1.4 kg) per hose

Outline Drawing

