

# CRYO

## Microscopy Cryogenic WORKSTATIONS

Optical cryostats for use in microscopy and spectroscopy

'Performance by Design'



**CLOSED CYCLE**  
**CRYOGEN FREE**  
**CRYO COOLER**  
**CRYOCOOL-CF3**  
**FOR MICROSCOPY**

# **CLOSED CYCLE** **CRYO COOLER** **CRYOCOOL-CF3** **FOR MICROSCOPY**

## **Introduction**

CRYO's closed cycle 'CRYO COOLER' provides a continuous cold helium gas stream – without using liquid helium. The system incorporates a “closed cycle” cooler. Press the On/Off switch and the cooling begins. Warm gas enters the refrigerator cryostat where it is cooled to low temperatures. The cold gas flows through a transfer line (bellows section) to the microscopy cryostat's cold finger. The sample is attached to the cold finger, which is cooled by the cold gas stream.

The refrigerator vibration is isolated because the microscopy cryostat is separate from the refrigerator cryostat. The system is ideal for low vibration sensitive experiments.

The refrigerator operates on the Gifford-McMahon gas expansion cycle. Compressed helium gas is supplied by the compressor. The work cycle cools two heat exchangers inside the refrigerator cryostat, *two stage refrigerator*. The refrigerator's compressed gas is 'closed loop' and used over and over.

Do not confuse the refrigerator closed gas flow loop with the microscopy closed gas cooling flow loop.

### 1. Refrigerator gas loop

Gas flow from the compressor to the refrigerator cryostat through the stainless steel high pressure hoses. The gas is heated when cooling the two internal heat exchanger stations (*heat sinks*). The gas is returned to the compressor where it is cooled by water or an air cooled heat exchanger. The gas is then looped back into the refrigerator (*closed loop, closed cycle*).

### 2. Cooling gas loop

Warm helium gas flows into the refrigerator cryostat where it is cooled by two heat exchangers. This inlet helium gas flows in a tube internally attached to each 'heat station of the refrigerator. The refrigerator removes heat from the gas flowing in the tube. The gas

is cooled first by the 1<sup>st</sup> stage of the refrigerator and then by the 2<sup>nd</sup> stage. The cold gas flows from the 2nd stage heat exchanger through the transfer line into the microscopy cryostat. The 'cold finger' in the microscopy cryostat is cooled by the cold gas stream. The flow can be operated in a closed or open loop. When closed, the diaphragm pump returns the gas to the refrigerator cryostat. When 'open' flow, the gas is supplied from a 'helium gas cylinder' and vented after cooling the cold finger and sample.

A temperature controller is attached to the cold finger of the microscopy cryostat, allowing automatic continuous control of the sample temperature. The controller continuously controls and displays the temperature.

The temperature controller is also attached to the second stage of the refrigerator allowing automatic continuous control of the gas temperature. The controller continuously controls and displays the temperature.

Liquid helium is not used. The refrigerator provides the cooling needed, reliably and economically.

The system can be operated in a closed or open loop. In the closed loop mode, the cooling gas is recirculated by a diaphragm pump. In the open loop mode, the gas is supplied continuously from a compressed gas cylinder.

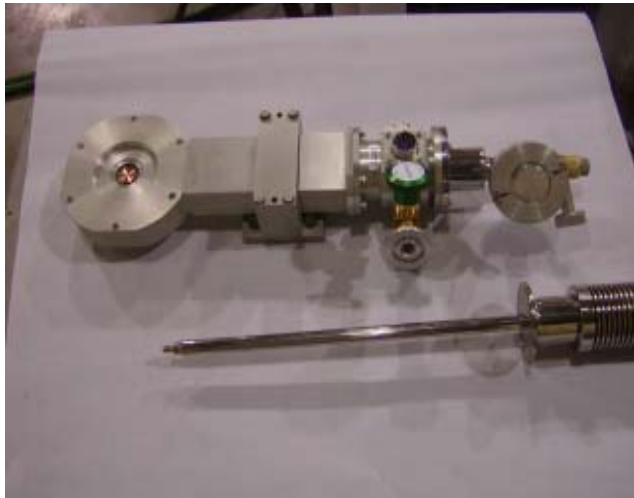
Turn on some gas flow, start the compressor, set the temperature controller and the gas flows and cools.

This microscopy cryostat exchanges directly with the standard liquid helium transfer line. This unique feature allows access to the lowest temperatures when needed, while avoiding the high cost of liquid helium for most of the operating temperature range.

**This CRYO Cooler is a superior low maintenance system.** A system designed for low vibration experiments such as microscopy.

→ **SETUP**

1. The transfer line will connect into the cryostat.



To insert the transfer line into the microscopy cryostat simply push the transfer line all the way in through the quick connect at the top of the cryostat.



→ **Refrigerator**

Your cryogenic WORKSTATION provides reliable refrigeration at cryogenic temperatures for long continuous periods, without using cryogenic liquids.

The cooling gas is recirculated through the refrigerator.

