

Measuring Resistivity	App-001
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Question: How can a user measure resistivity of sample materials at low temperatures in the presence of magnetic fields or special illumination?

Solution: The Montana Instruments Cryostation™ allows the user 29 connections into the sample chamber. These are accessed internally by the connectors shown in Figure 1 below. The external access is using the male D9 and 20 pin header connectors on the back of the cooler unit, shown in Figure 2.

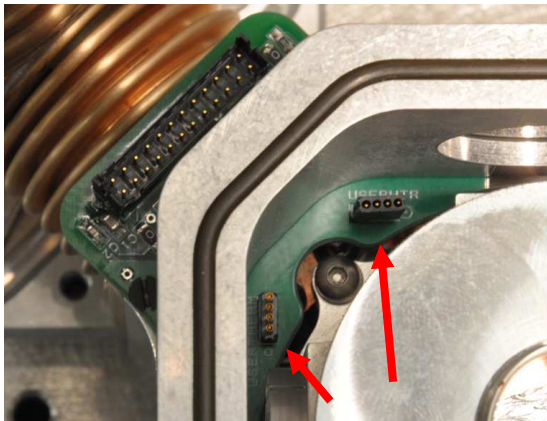


Figure 1. Internal Connectors

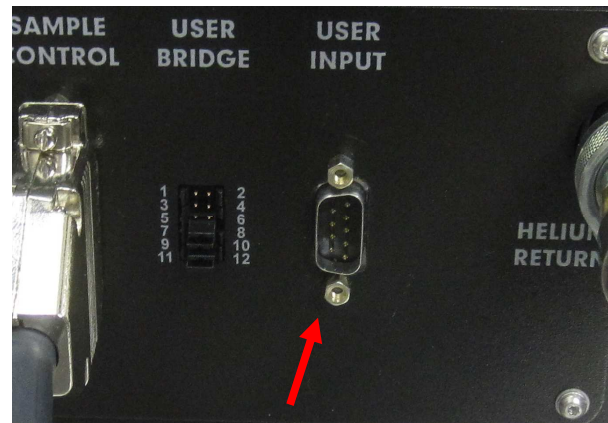


Figure 2. User Connector

The internal connections can be directly wired to contacts on or near the sample, taking care to not compromise the thermal isolation of the sample. Figure 3 shows how the circuit would look. A digital recording voltmeter connects to the back-panel connector and to the computer for data logging. The back panel user connector is wired internally to the four small connectors within the sample chamber. These should be wired to whatever the experiment requires, for example, the sample or other devices or sensors on within the sample area.

The computer may also control the sample temperature through the Active X interface to the CAN bus. By coordinating commands for new temperatures and polling the voltage, current, and sample temp, an accurate profile of the performance can be obtained.

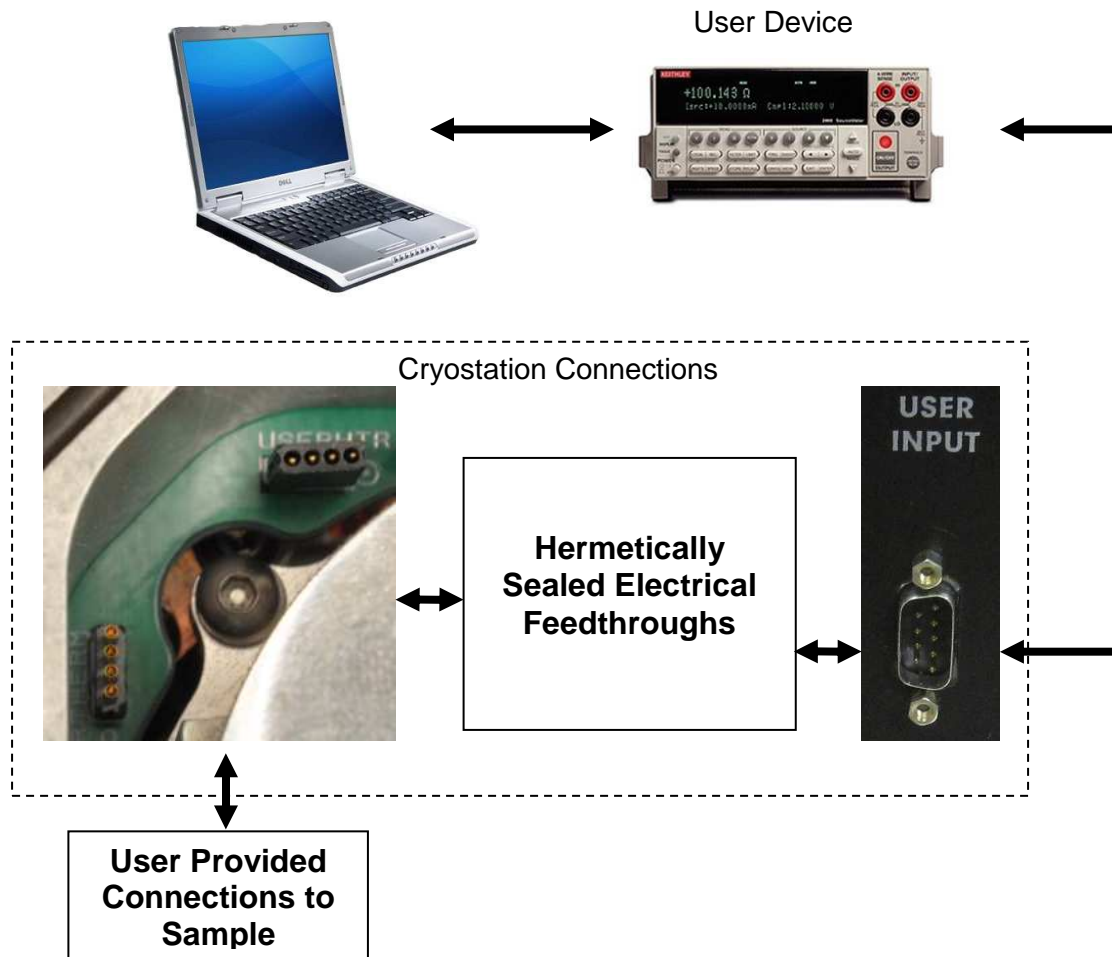


Figure 3. Connections for Electrical Measurements of Sample

For example, the user may connect to heaters, sensors, magnetic sources, direct connections to the sample, or motion control stages. A magnetic field may be applied either internal to the chamber, or externally by surrounding the sample chamber. The sample enclosure is designed with no magnetic parts, so it is safe to use around magnetic fields. Contact an application engineer at Montana Instruments for special instructions or to discuss design considerations.