

Scienta 200U Sample Heating Instructions

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Two methods of sample heating are available with the SRC Scienta 200U system. The first method is resistive heating for samples such as silicon and the second method is e-beam heating for metal samples. One method of heating is available at a time based on the choice of sample holder attached to the end of the cold finger.

At the sample holder mounting point (vacuum side) is a terminal block where user connections to samples can be made (Figure 1). Outside the vacuum user connections are made to power supplies through banana or SHV connectors on the Gorovikov Box (Figure 2).

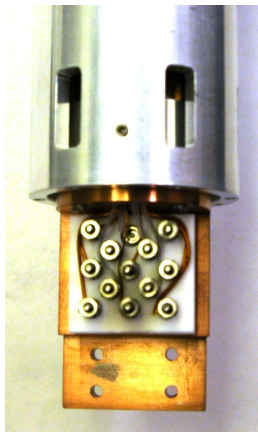


Figure 1. Terminal Block.

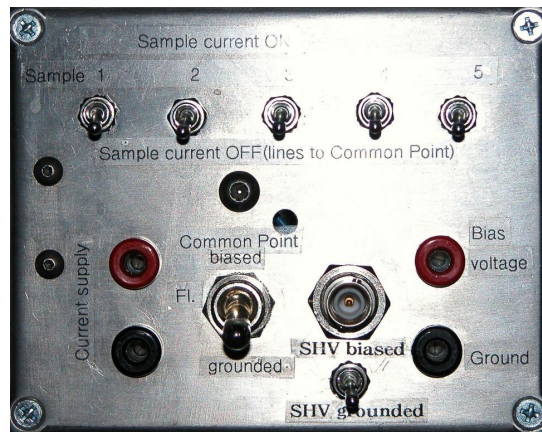


Figure 2. Gorovikov Box Front Panel.

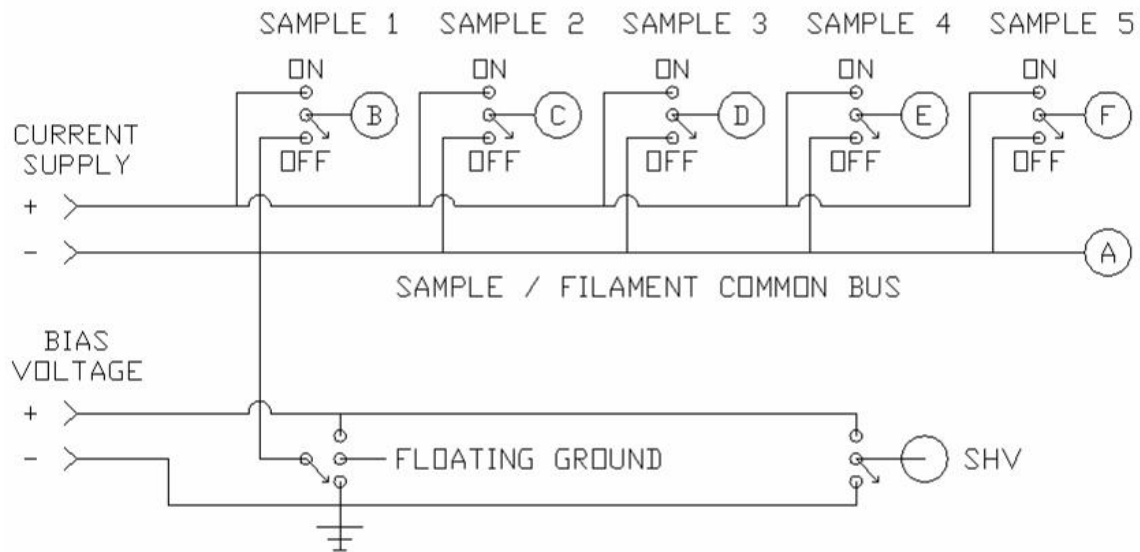


Figure 3. Gorovikov Box Schematic.

Resistive Heating

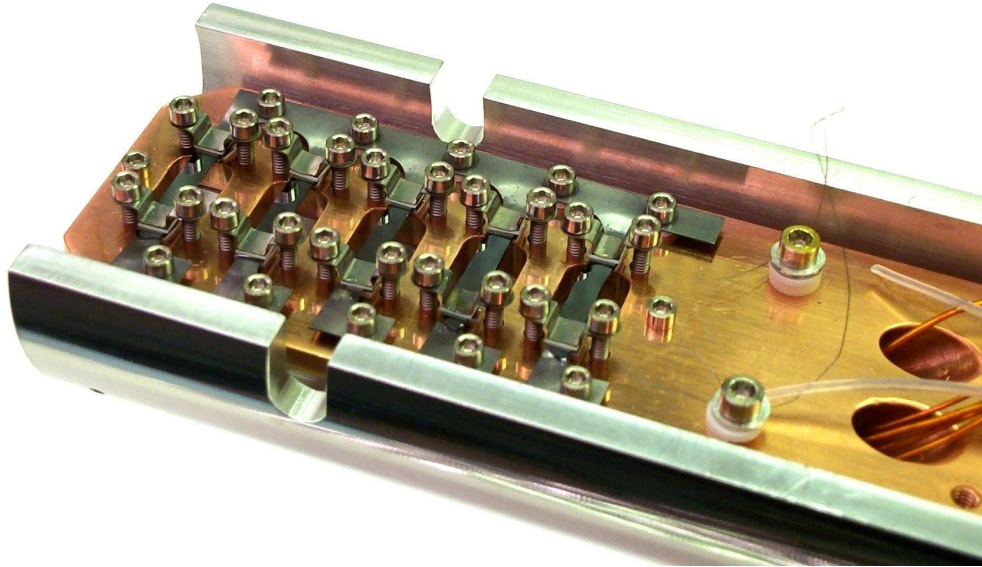


Figure 4. Resistive Heating Sample Holder.

Making the in-vacuum electrical connections

Up to 5 samples can be mounted onto the resistive heating sample holder (Figure 4). They should be mounted as shown on drawing [6108B681](#), with all samples making electrical contact to only the tantalum leads. There are 5 separate leads for the current supply and a common bus for ground.

Leads from the sample holder should be connected to the following terminals (Figure 5):

- Sample Common (Item 5 on [6108B681](#))
- Sample 1 – B
- Sample 2 – C
- Sample 3 – D
- Sample 4 – E
- Sample 5 – F

Samples may be arranged as desired but terminals B through F correspond with samples 1 through 5 respectively on the Gorovikov box. The remaining terminals are not used unless thermocouples will be installed. Up to two “C” type thermocouples can be used, TC1 and TC2.

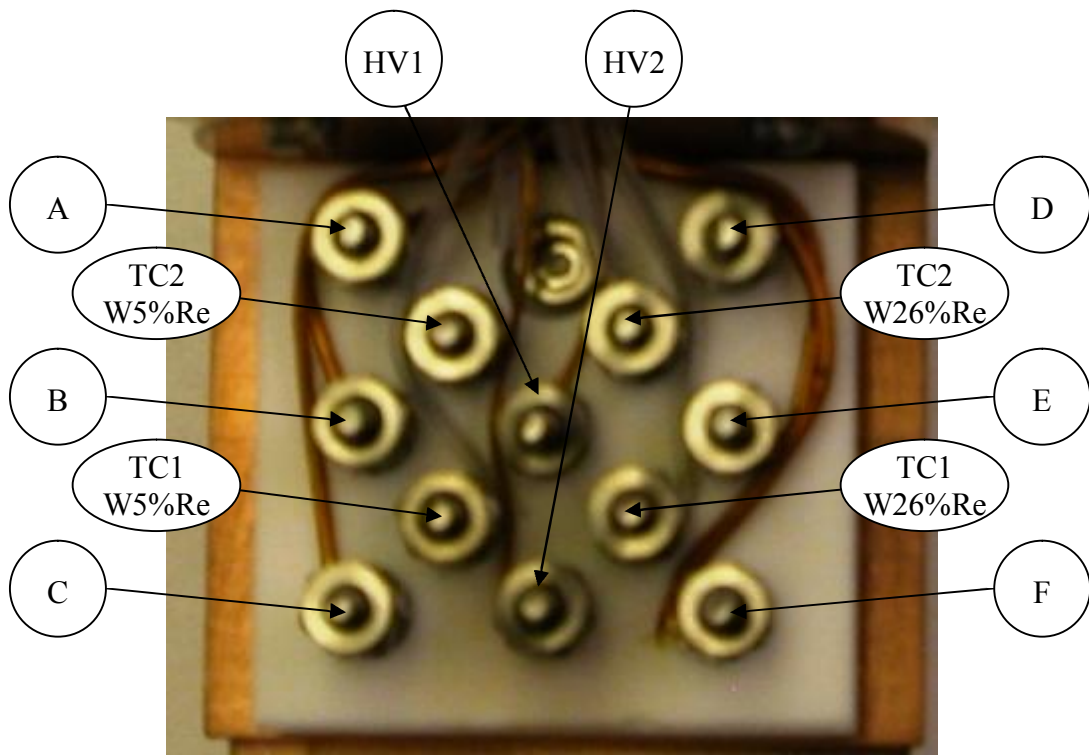


Figure 5. Terminal Block Close Up with Labels.

Making the air-side electrical connections

Connect the multi-pin cable from the box to the feedthrough on the cold finger labeled “Heaters” (Figure 6). Connect either Lambda 1 or Lambda 2 (Figure 7) on the component rack with banana plugs to the current supply input on the box (red to red and black to black).

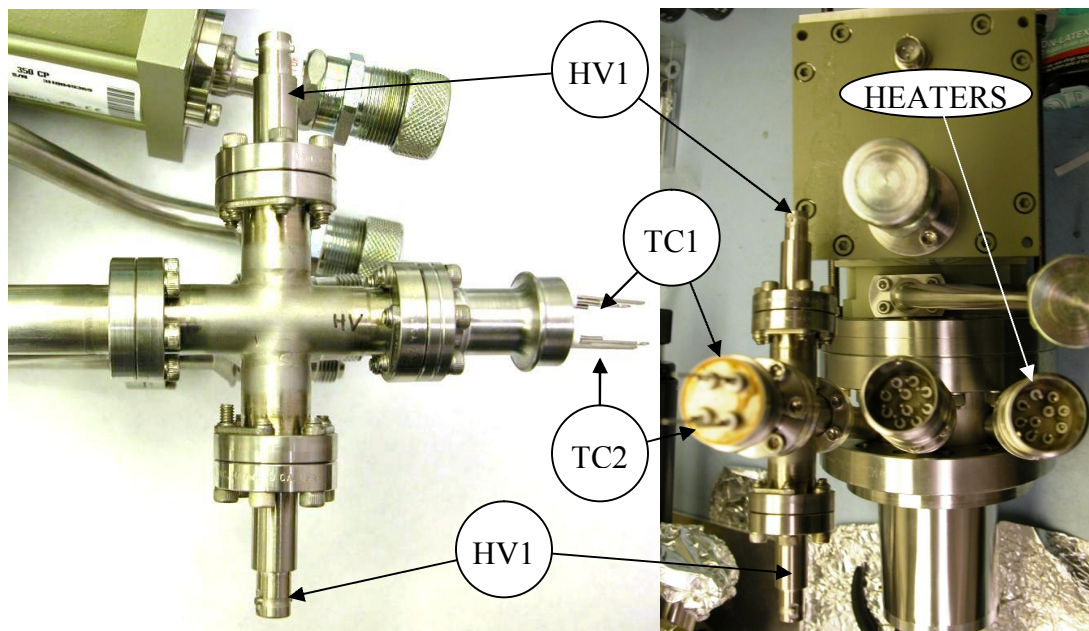


Figure 6. Cold Finger Feedthroughs.



Figure 7. High Voltage and Current Supplies.

Understanding / Using the Gorovikov Box

There are 5 switches under the label “Sample Current.” In the “off” position the circuit from the particular sample to the ground bus will be closed (both leads to each sample will be at the same potential). When the samples are not being heated, all 5 switches should remain in the “off” position.

The common point switch has three positions. It lets the user select the grounding path / potential for the ground bus. With the switch down, the sample ground will be the same as earth / chamber ground. In the middle position, the sample ground is a floating ground, possibly allowing the samples to charge, but also isolating them from any other current or voltage. With the switch in the up position, a bias potential can be applied to the sample ground with a low voltage, high resistance DC supply such as a battery using the bias voltage and ground banana plug input. The SHV inputs are not used.

To apply current, flip only 1 sample switch to the on position at a time.

CAUTION! THE SHV BIAS SWITCH MUST BE SET TO THE GROUND (DOWN) POSITION WHEN CURRENT IS APPLIED.

E-Beam Heating

CAUTION! HIGH VOLTAGE IS USED IN THIS APPLICATION. FAILURE TO FOLLOW THE INSTRUCTIONS BELOW MAY CAUSE PERSONNEL INJURY.



Figure 8. E-Beam Heating Sample Holder.

Making the in-vacuum electrical connections

Up to 3 samples can be mounted onto the e-beam heating sample holder (Figure 8). They should be mounted as shown on drawing [6108700](#), with all samples making electrical contact to only a common high voltage lead HV1 or HV2. If only 2 samples are used they can be wired separately to the high voltage leads. There are 5 separate leads (only 3 are used) for the filament current supply and a common bus for filament ground.

Leads from the sample holder should be connected to the following terminals (Figure 5):

- Samples – HV1 or HV2 in parallel or both separately
- Filament Common – A (Item 3 in [6108702](#))
- Filament 1 – B
- Filament 2 – C
- Filament 3 – D

Samples may be arranged as desired but terminals B through D correspond with samples 1 through 3 respectively on the Gorovikov box. The remaining terminals are not used unless thermocouples will be installed. Up to two “C” type thermocouples can be used, TC1 and TC2.

CAUTION! MOUNTING THERMOCOUPLES DIRECTLY TO THE SAMPLES WILL ENERGIZE THE THERMOCOUPLES WHEN HIGH VOLTAGE IS APPLIED. DO NOT DISCONNECT THE THERMOCOUPLE LEADS FROM THE FEEDTHROUGH OR VOLT METER WHEN THE HIGH VOLTAGE IS ON.

Making the air-side electrical connections

Connect the multi-pin cable from the Gorovikov box to the feedthrough on the cold finger labeled “heaters” (Figure 6). Connect either Lambda 1 or Lambda 2 on the component rack (Figure 7) with banana plugs to the current supply input on the box (red to red and black to black). Connect HV1 or HV2, using an SHV cable to either SHV connector on the side of the box. Connect HV1 or HV2 from the component rack to the other SHV connector on the side of the box.

Understanding / Using the Gorovikov Box

There are 5 switches under the label “Sample Current.” Only switches 1 through 3 will be used. In the “off” position the circuit from the particular e-beam filament to the ground bus will be closed (both leads to each filament will be at the same potential). When the filaments are not being heated, all 5 switches should remain in the “off” position.

The common point switch has three positions. It lets the user select the grounding path / potential for the ground bus. With the switch down, the filament ground will be the same as earth / chamber ground. This is the only setting that should be used for e-beam heating. To apply filament current, flip up only the switch of the filament you want to heat. Apply voltage to the samples using Glassman power supply HV1 or HV2 to heat the samples.

CAUTION! THE SHV BIAS SWITCH MUST BE SET TO THE GROUND (DOWN) POSITION WHEN FILAMENT CURRENT IS APPLIED.

If the samples are not being heated, they should be grounded or biased with respect to the chamber / earth ground. To do this disconnect the SHV cable to the cold finger from the side of the box and connect it to the SHV connector on the front of the box. Flip the SHV switch to the ground position (down) for earth ground. To apply a low bias voltage, first make sure all sample switches (1 through 5) are on the “off” position. Connect a low voltage, high resistance DC supply such as a battery with banana plugs to the bias voltage, and flip the SHV bias switch up.

CAUTION: TURN OFF ALL POWER SUPPLIES BEFORE CONNECTING OR DISCONNECTING ANY CURRENT OR VOLTAGE LEADS.