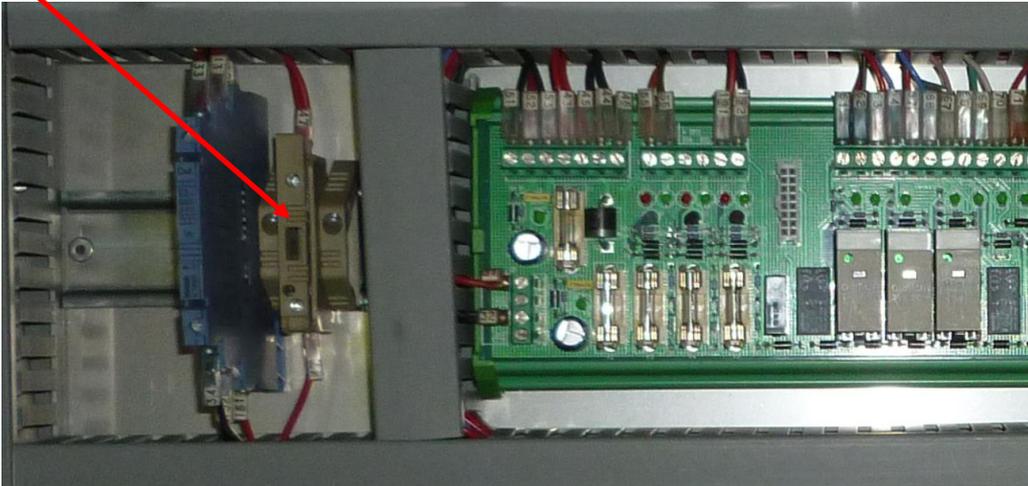
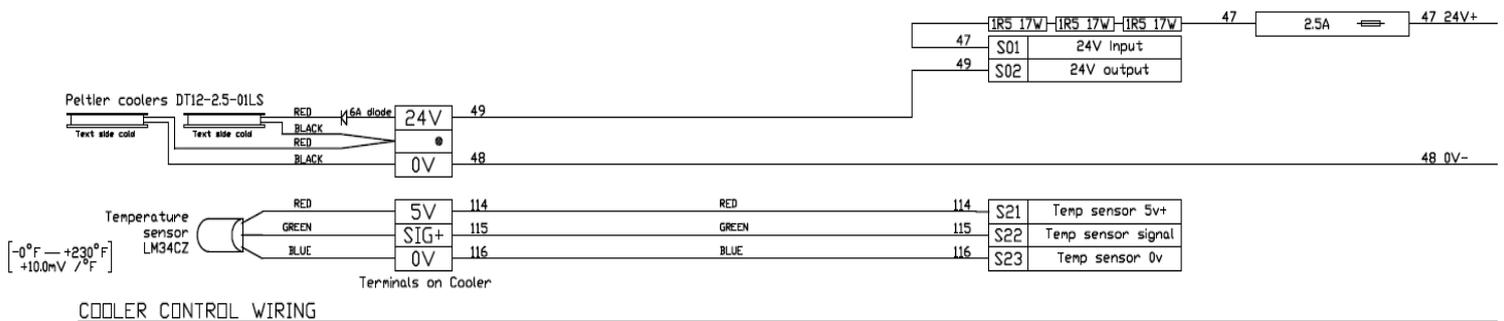


BioTector Cooler Troubleshooting

1. Check the continuity on the 2.5A Cooler fuse. This fuse is located on the Cooler DIN Rail (see wire 47), which is next to the Relay PCB.



2. Looking at the drawing below, check and confirm that there is 24V power in the Cooler at wires 48-49 and 5V power in the temperature sensor at wires 114-116. If there is power in both components, this means that there is nothing wrong with the power supply.

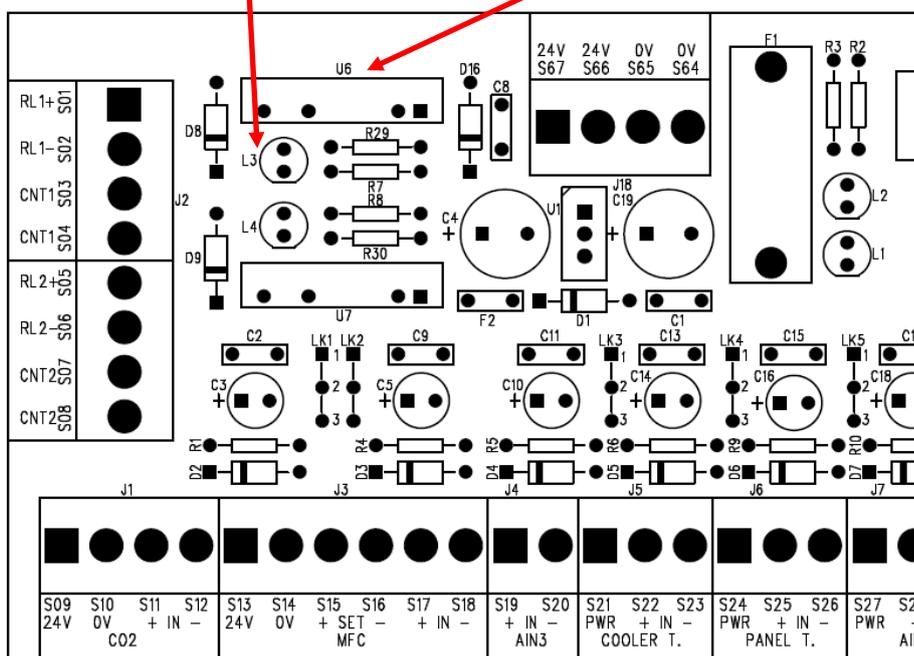


3. Measure the signal voltage between wires 115-116 as shown in drawing above and compare the temperature reading displayed for Cooler in “Simulate” menu. As can be seen in the drawing, the temperature range of the temperature sensor is from 0°F to 230°F (from -17.8°C to 110°C) and each 10mV signal corresponds to 1°F. The equation to convert °F to °C is as follows

$$[^{\circ}\text{C}] = ([^{\circ}\text{F}] - 32) \times 5/9$$

This means that when you measure e.g. 428 mV at these terminals, the system should display e.g. ~6°C for Cooler in the Simulate menu if the BioTector temperature is 22°C and the Cooler is programmed as 16°C DIFF in Cooler Program menu [428 mV / 10 = 42.8 °F = 6°C). This is because the BioTector cooler operates in a differential “DIFF” mode, where the system tries to keep the temperature of the cooler typically 16°C below the ambient temperature. In other words, if the BioTector temperature is 22°C and the Cooler is programmed as 16°C DIFF in Cooler Program menu, the Cooler temperature should be ~6°C. If the temperature readings are OK, this means that there is nothing wrong with the temperature sensor.

4. Observe the ON and OFF operation of the Cooler in Simulate menu. The asterisk “*” sign will appear when Cooler is ON and disappear when cooler is OFF.
5. Observe the Cooler LED on the Signal PCB. Depending on system software version, the LED will be either
 - i) ON for ~3 seconds and OFF for ~7 seconds or
 - ii) ON for ~240 milliseconds and OFF for ~560 milliseconds
 See Cooler Program in BioTector User Manual for details.
6. Confirm that the LED 3 (L3), located on the top left corner on the Signal PCB (see drawing below), also lights on and off. If Cooler operation and LED are OK, this means that there is nothing wrong with the Signal PCB and the Cooler Control Relay (U6) on the Signal PCB.



7. When the Cooler is on, the voltage measured at wires 48-49 should be ~17V. If voltage is not ~17 Volts, this means that there is no current drawn by the peltier elements of the cooler and one or more of the peltier elements could be faulty or damaged.
8. Loop a multi-meter in DC Ampere mode to wire 49 (or alternatively at the Cooler fuse) and measure the current drawn by the peltier elements of the cooler. When powered (when the cooler is on), the current measured on the peltier elements should be ~1.4 Amp and the voltage on each peltier element should be ~8V. The factory measured Ampere current values are printed and attached on the side of the cooler. If there is no current drawn by the peltier elements, the cooler needs to be replaced.