Objective Heater Controller Instructions Series 5

Objective Heater Controller package contains:

A) Power Supply with multi-plugs
B) Controller
C) Miniature screwdriver
D) 1/8" Phone Jack
E) 3 Pin Mini DIN connector
F) Calibration plug

Figure 1

Setup:

1. Retract the retaining clip that holds the protective cap over the AC plug, socket and replace with the appropriate plug to mate with your AC outlet.
2. Plug the power supply cable into the back of the controller. Socket Labeled Power 12VDC.
3. Plug the power supply into your AC source.
4. Attach the Objective Heater to the objective **before** plugging the Objective Heater into the controller!
5. Plug the Objective heater cable with 6 pin Mini DIN into the front of the controller.

Figure 2

Description of Interface *(Figure 3)*:

Power Button turns the unit on and off.
Select Key will cycle through the display modes.
(While the following LEDs are illuminated the display indicates):

Red Top Left = Setpoint is the temperature that the controller is maintaining at the sensor
Yellow = Objective is the temperature of the sensor in contact with the objective
Green = Reference temperature of the reference thermistor
Red Alarm (top right) an error has occurred. When flashing an alarm will sound and power to the Objective Heater is interrupted.

Reset Button (top right) silences the alarm, restores the output to the Objective Heater.
Up Arrow Key – Increments setting values
Down Arrow Key – decrements setting values

WARNING:

Always **unplug** the Objective Heater before removing it from an objective! Also **always** make sure the Objective Heater is mounted to an objective before plugging it into controller. If you plug the Objective Heater into a controller that is powered on without being attached to an objective the heater band will be damaged because it has no load! The heater band will **not** be covered under warranty if this occurs!

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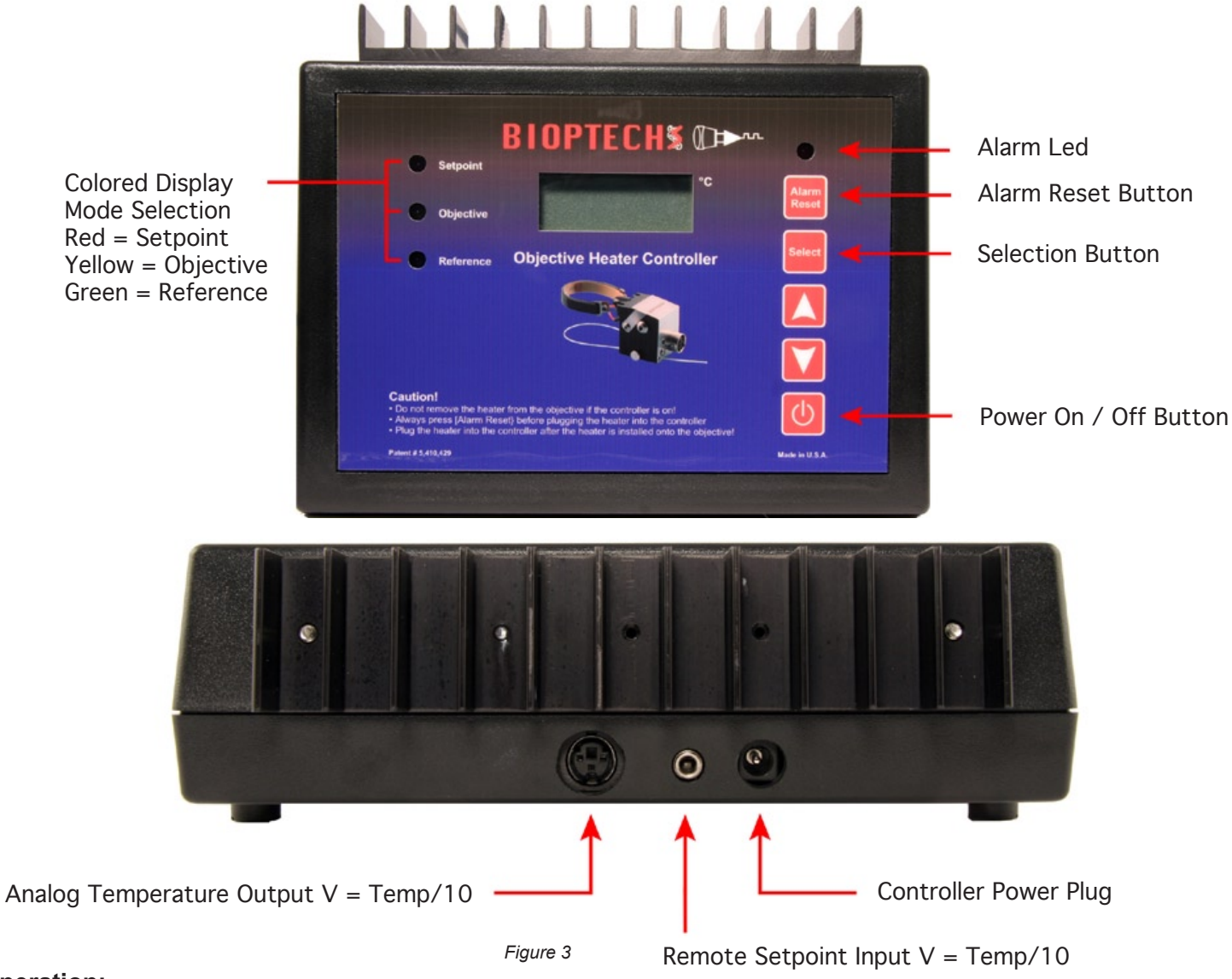

Figure 3

Operation:
The Bioptechs Objective Heater control system is unique in that it warms the objective around approximately 3/4 of the diameter of the objective then samples the temperature of the objective in the gap between the two ends of the heating surface. In this manner the regulation is based on the actual temperature of the metal of the objective and not the temperature of the heat source. This method of regulation provides the best consistency and accuracy. In order to obtain the desired temperature at the specimen plane it will be necessary to characterize your objective. This process is necessary because all objectives have different thermal profiles. The thermal profile is affected by the amount and distribution of brass, glass, and airspace, in the objective as well as the amount of heat that is lost to the nosepiece. Heat will propagate from the source through the objective made of these various mediums and eventually influence the specimen at the specimen plane. Characterization is the process that enables you to find the correct Setpoint for your particular objective.

Procedure for Adjusting the Setpoint:
Following this procedure will enable you to find the correct Setpoint for your objective. ***Setup:*** With the objective secured in the nosepiece of the microscope, mount the Objective Heater on the objective and place the reference thermistor on top of the objective resting in a drop of immersion oil. *(Figure 4)* It may be necessary to temporarily tape the thermistor wire in place. Plug in the reference thermistor to the pigtail in the Objective Heater connector. Plug the Objective Heater into the controller and the controller into its power source and turn it on. ***Procedure:*** When the controller is turned on the default mode is Setpoint as indicated by the red LED adjacent the text Setpoint on the front of the controller. The Setpoint can be adjusted by pressing the up or down arrows, but only when the red Setpoint led is lit. The best way to start the process is to set the setpoint 2 degrees less than the

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desired temperature of the objective. Then press Select to illuminate the Objective LED to display the Objective sensor temperature. Allow the system to come up to temperature then let it stabilize for an additional 20 minutes. Press the Select button to illuminate the Reference LED to display the reference temperature. Use the difference of this temperature to make corrections to the setpoint value to obtain the desired temperature at the specimen plane. Example; you want the objective to be 37°C, the reference tell you it is at 36.6°C. You need to add 0.4°C to the current setpoint value. Wait another 20 minutes and re-test to confirm your setting. Once you have this value you do not need to repeat this process for this objective.

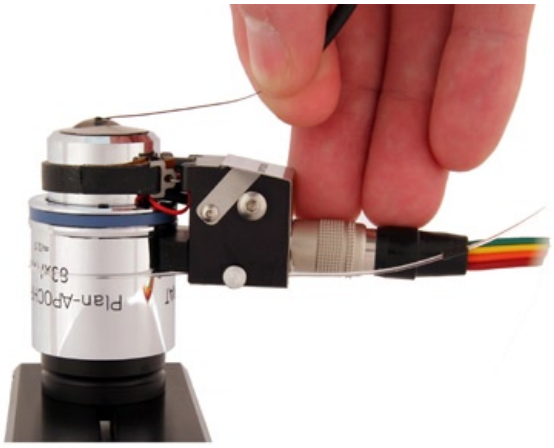

Figure 4

Calibration:
The calibration of the unit can be checked and adjusted using the following procedure: Unplug the Objective Heater from controller if plugged in. Plug the enclosed calibration plug into the front of the controller *(Figure 5)* and press Select to display so that the Objective led is lit. The display should read 25.0°. If it needs adjustment, turn the potentiometer with the enclosed miniature screwdriver by inserting it into the 3mm hole farthest from the 6 pin mini DIN plug *(Figure 5)*. Press Select again to display the Reference temperature. The display should read 25.0°. The potentiometer in the access hole nearest from the plug will adjust the Reference circuit. When calibration is complete you can remove the calibration plug and re-insert the Objective Heater.

Figure 5

Alarm:
The Objective Heater circuit is equipped with an alarm and power interrupt to protect the objective If the temperature of the objective drops below 0.9 degrees below setpoint after it reaches setpoint the alarm will sound, the Reset LED will flash and power to the heater-band will be shut off. This is to prevent thermal runaway. If the alarm goes off you must inspect the contact point of the thermal sensor. It is important that this sensor sends accurate information to the controller. If the sensor is not making firm contact with the objective, damage could occur to the objective and heater band.

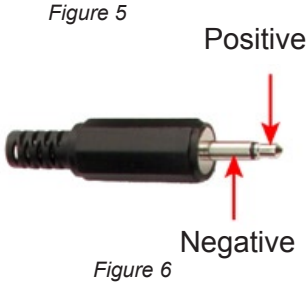

Figure 6

Remote Setpoint:
The Objective Heater can be remotely programmed by applying a DC voltage equal to setpoint temperature ÷ 10 to the Remote setpoint plug on the backside of the controller. Example: If you want to operate at 37.0 degrees then ramp to 42.0 degrees, send the controller 3.7 Volts then 4.2 volts. There is a 1/8" phone plug provided to make the connection. It is most convenient to use a digital to analog converter device from a computer but any common grounded DC voltage source will work. *See Figure 6 for wiring.*

Temperature monitor:
The Objective Heater temperature can be monitored in analog form by reading the voltage available from the 3 pin Mini-DIN plug on the backside of the controller *(Figure 4)*. The voltage is equal to temperature in °C ÷ 10. Example: 37.0°C = 3.7 volts. A mating 3 pin mini DIN plug is included for your convenience. *See figure 7 for wiring.*

Cleaning:
The controller can be wiped down with mild soap and water. Do not use petroleum-based solvents. Do not immerse.

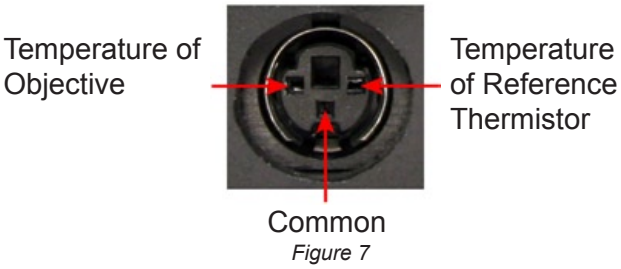

Figure 7

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