



H-3185B CONTROLLER OPERATING INSTRUCTIONS



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1.0 Introduction

The H-3185B controller (Figure 1) uses on-off control of heating and cooling devices to cycle between two temperatures. It can be set to cycle between two temperatures for a finite number of cycles and then stop. When set to run for a finite number of cycles, ramp rate between temperature extremes can be adjusted as well as soak duration at each temperature extreme. The controller is programmed to cycle from 40°F to 0°F when set to run in cycle mode. The controller is designed to be wall mounted near the Freeze/Thaw machine and runs on 125VAC power. The controller also utilizes a temperature chart recorder with circular chart paper for tracking and documenting the test cycles. A J type thermocouple is also supplied with the controller.



Figure 1



2.0 Setup

1. Mount the controller box securely on a wall nearest to the Freeze/Thaw cabinet, but away from water or extreme moisture.
2. Plug in all electrical devices on the cabinet such as heaters, cooling system compressor, fan, and mechanical thermostat to the sockets at the bottom of the controller box (Figure 2). All electrical connections have twist to lock plugs that easily attach to the controller box. Each connection is different and no two connections can be confused.



Figure 2

3. Open the door to the controller box and check the toggle switches inside the controller box. If they are switched off as in Figure 3, switch heater, cooler, and fan to the ON position.




Figure 3

4. Plug the main power cord from the controller box into an appropriate receptacle. The controller requires a 125VAC, 30 amp power source.
5. Connect the thermocouple wire from the machine to the matching connector coming from under the chart recorder.
6. The main circuit breaker is located on the side of the controller box near the door latches. Set the breaker to the ON position.
7. Wait for the controller to go through its self test. When the self test is complete, the upper red display and the lower green display will show temperature readings. The green display is the set value and the red display is the actual temperature reading from the TC (Figure 4).



Figure 4

3.0 Set Value Control

The default mode for the controller is “Normal” mode. In this mode, the controller will try to maintain the temperature controlled by the Set Value (green display). When the controller receives power, it will automatically go to this mode. The controller will continue to heat or cool to maintain the set value temperature until it is manually stopped. To change the Set Value, press the up or down arrow button  and the value in the green display will change. The speed that the value in the display changes is a function of the length of time the button is held down. The longer the button is held down, the faster the display value will change.



4.0 Operational Modes

There are four modes of operation with this controller. These modes are as follows:

1. FOP – Fixed Output Percentage

The Freeze-Thaw machine does not use this function.

2. nor – Normal

This mode, as stated in section 3.0, is the normal mode in which the controller will maintain the set value temperature.

3. stby – Standby





This mode puts the controller on standby. The heating and cooling functions of the machine will be shut off.

4. r.s – Ramp/Soak Recipe

This mode is for running a controlled temperature cycle for a finite number of cycles. **This is the mode used for freeze-thaw testing.**



4.1 Changing Operational Modes

1. To change the mode of operation, press and hold the Mode button  for at least three seconds. The red display will read “Ctrl” and the green display will read whatever mode it is currently in.
2. Use the up or down arrow buttons   to change the setting on the green display to show the mode desired.
3. When the desired mode is set, return to the temperature readings and begin the operation by holding down the Mode button  again until the displays show the actual temperature and set value readings as in Figure 4.

4.1.1 Normal Mode



1. To change to Normal mode, follow the step 1 in section 4.1 for changing the operational mode.
2. When the red display reads “Ctrl”, press one of the arrow buttons   until the green display reads “nor” (Figure 5).



Figure 5

3. Follow step 3 in section 4.1 to return to the temperature readings and begin the operation.

Note: When in Normal mode operation, the controller will try to maintain the temperature of the set value (green display). If it is desired to maintain the test samples at a certain temperature, Normal mode should be used. If the controller was on standby when power to the controller was disconnected and later reconnected, the controller will automatically go into normal mode when it receives power.

4.1.2 Standby Mode

1. To change to Standby mode, follow the step 1 in section 4.1 for changing the operational mode.



- 2. When the red display reads “Ctrl”, press one of the arrow buttons until the green display reads “Stby” (Figure 6).

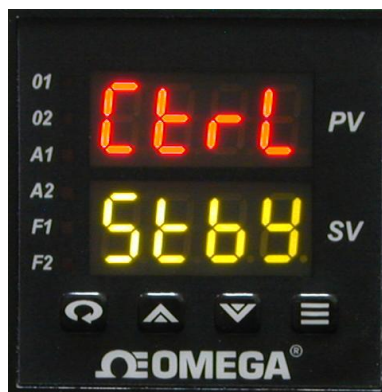


Figure 6

- 3. Follow step 3 in section 4.1 to return to the temperature readings and begin the operation. The red display will alternate back and forth from the temperature reading to the word “stby” (Figure 7)

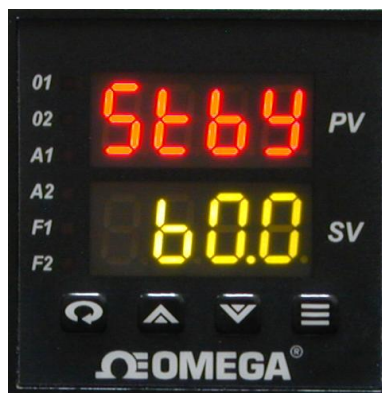




Figure 7



Note: When in Standby mode operation, the controller will be put on standby and heating and cooling functions of the machine will be shut off.

4.1.3 Ramp/Soak Cycle Mode

1. To change to Standby mode, follow the step 1 in section 4.1 for changing the operational mode.
2. When the red display reads “Ctrl”, press one of the arrow buttons   until the green display reads “r.s” (Figure 8).

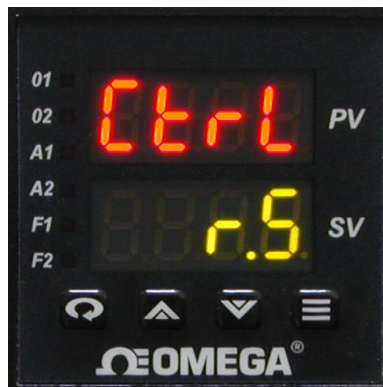


Figure 8

3. Follow step 3 in section 4.1 to return to the temperature readings and begin the operation. The red display will switch back and forth from the temperature reading to the word “rS.r1” when it begins the cycle.

Note: When in Ramp/Soak mode, the controller will begin to cycle as it is programmed and the machine will begin the freeze/thaw cycle as called out in




ASTM C 666. The controller allows for up to 100 cycles in this mode. The controller is set up to cycle down to 0°F and then up to 40°F for a total of 36 cycles. When the last cycle has been completed, the controller will automatically go to standby mode.

5.0 Changing Ramp/Soak Cycle Settings

The settings in the cycle recipe can be changed to the user's needs. The temperature set points, ramp times, soak times, and number of cycles can be changed by going into the recipe menu. One cycle can have up to eight temperature set points. Each temperature set point has an associated ramp time to reach that temperature set point and a soak time at that temperature. This controller is preset to have two temperature set points in a cycle.

5.1 Setting Recipe Options

1. Press the Menu button  on the front of the controller and hold it down for at least three seconds until the display changes.
2. Press the Menu button again quickly to change the red display. It may be necessary to press the Menu button several times until the red display reads “r-S” (Figure 9).

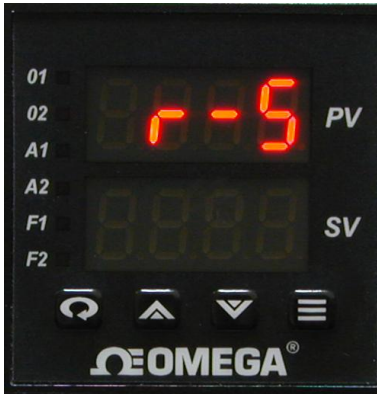


Figure 9




3. Press the Mode button  and the green display will show the first cycle recipe setting. The green display should alternate between “rOPt” (Figure 10) and “8.r.S”. There are three setting options: “8.r.S”, “S.SP.r”, and “diS”. The settings can be changed by pressing the up or down arrow buttons  . This setting should remain on “8.r.S”. Otherwise, the recipe function will not cycle between the two temperature set points.



Figure 10



5.2 Setting Holdback Band


1. Continuing from section 5.1, while the green display is alternating between “rOPT” and “8.r.S” as in step 3 of the previous section, push the Mode button  again until the green display reads “HLd.b” (Figure 11). This is the Holdback Band function. The green display will alternate between “HLd.b” and the holdback set temperature variance.



Figure 11

Note: The Holdback Band changes the allowed temperature variance from the set value. If the actual temperature goes beyond this variance during the cycle, the ramp timer will stop and the controller will attempt to reach the set value temperature by switching back and forth between heating and cooling until the set value is reached before continuing. This setting is preset to 2° which is slightly less than the 3° variance specified by the ASTM standard at the cycle extremes. Increasing this setting could allow the test sample to exceed the allowed variance at the cycle temperature extremes. Decreasing this setting could cause non-uniform cycling



temperature changes as well as the overall cycling time. It is not recommended that this setting be changed.

5.3 Setting Termination State




1. Continuing from section 5.2, while the green display is alternating between “HLd.b” and “2.0” as in the previous section, push the Mode button  again until the green display reads “tEr.S” (Figure 12). This is the Termination State function. The green display will alternate between “tEr.S” and “Stby”. Options for this function are Last Set point “LASt”, Default Set point “dEFt”, and Standby “Stby”.



Figure 12


2. To change this setting, press the up or down arrow button   until the green display shows the desired setting.



Note: The Termination State tells the controller what to do at the end of the test. The controller is preset to go to standby when the testing is complete.

1.

5.4 Setting Number of Cycles

1. Continuing from section 5.3, while the green display is alternating between “tEr.S” and “Stby” as in the previous section, push the Mode button  again repeatedly until the green display reads “rcY.n” (Figure 13). The green display will alternate between “rcY.n” and the number of cycles desired minus one (i.e for 36 total cycles, it should display 35).

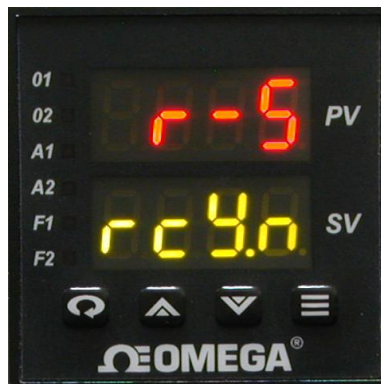




Figure 13

2. To change the number of cycles, press the up or down arrow button   until the desired number minus one is displayed.



5.5 Setting Power Fail-Resume Options




1. Continuing from section 5.4, while the green display is alternating between "reY.n" and the set number of cycles as in the previous section, continue pressing the Mode button  until the green display reads "PFrE" (Figure 14). The display will alternate between "PFrE" and "on".




Figure 14

2. To change the option, press the up or down arrow button   until the option is displayed.

Note: This setting controls what happens when the power fails during a cycling operation. The controller is preset to resume the cycling when power returns. The options are "on" and "OFF".



5.6 Setting Ramp Times

1. Continuing from section 5.5, while the green display is alternating between “PFrE” and the set option as in the previous section, continue pressing the Mode button  until the green display reads “rt1” (Figure 15). The display will alternate between “rt1” and the ramp time value (in minutes) for the first ramp in the cycle. It is capable of 8 ramp operations in the cycle. This is the first ramp time setting. The soak time and temperature for the first ramp must be programmed or skipped before going to the next ramp time setting. It is preset to 5 minutes.

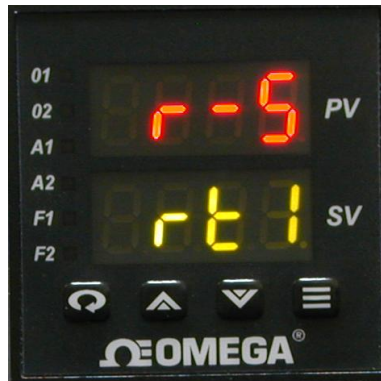




Figure 15


2. To change the ramp time, press the up or down arrow button   until the desired ramp time is achieved.

Note: Due to the thermal behavior of the Freeze/Thaw machine and the response of the sample material, it is not recommended that this setting be increased as this



could cause fluctuations in the cycle ramp and greatly increase the overall cycle time.

5.7 Setting Soak Temperatures

1. Continuing from section 5.6, while the green display is alternating between “rt1” and the set ramp time value, continue pressing the Mode button  until the green display flashes “SL1” (Figure 16). The display will alternate between “SL1” and the soak temperature value in degrees F. As in the case of the ramp time, this is the first of 8 soak levels available. Soak level 1 is preset to 0.

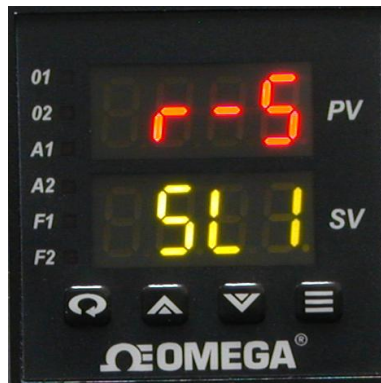




Figure 16

2. To change the soak temperature, press the up or down arrow button   until the desired temperature is achieved.



5.8 Setting Soak Time

1. Continuing from section 5.7, while the green display is alternating between “SL1” and the soak temperature, continue pressing the Mode button until the green display flashes “St1” (Figure 17). The display will alternate between “St1” and the soak time (in minutes). As in the case of the ramp time, this is the first of 8 soak times available. Soak time 1 is preset to 0 so that as soon as the temperature reaches the set point, the controller switches to the next ramp to reach the next temperature set point.

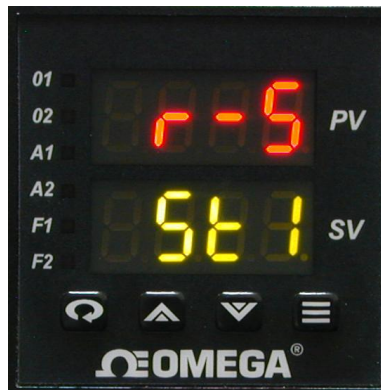





Figure 17

2. To change the soak time, press the up or down arrow button   until the desired time is achieved.

Note: It is necessary to set ramp time 1, soak level 1, and soak time 1 before setting ramp 2 and soak 2. Simply continue pressing the Mode button until rt2, SL2, and St2 appear in the green display. If no more temperature levels are



required in the cycle, return to the main operating mode by pressing and holding down the Menu button  until the red display reads the current temperature. Ramp time 2 is preset to 5 minutes. Soak level 2 is preset to 40°F. Soak time 2 is preset to 0. The remaining 6 ramp times are preset to 0. If the ramp time is set to 0, the ramp will be skipped.

6.0 Service

For any service issues, contact Humboldt Scientific, Inc. at 1-800-537-4183 between 8:00 AM and 5:00 PM Eastern Time.