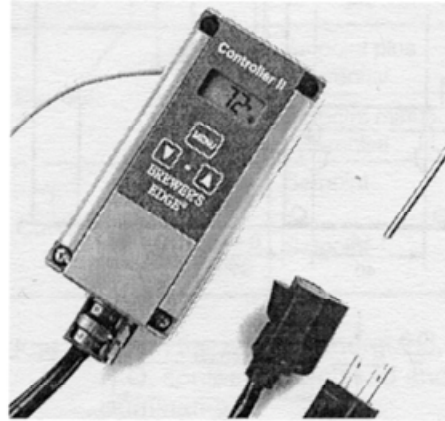


E54 Brewer's Edge[®] Controller II with Display

The Brewer's Edge[®] Controller II is an electronic temperature control for both refrigeration and electric heating. It features a keypad for programming and an LCD (Liquid Crystal Display) for viewing temperature and the status of other functions. A front panel LED (Light-Emitting Diode) indicates whether the Controller is providing power to a refrigerator or heater.

The Controller II has jumper-selectable heating or cooling modes of operation with adjustable setpoint and differential, a stainless steel sensor on a 6' cord, a lockable keypad to help prevent unauthorized tampering, adjustable anti-short cycle delay to protect your compressor, and both Fahrenheit and Centigrade display modes.



Features and Benefits

<input type="checkbox"/> Easy to Read LCD Display	Displays temperature and other function status. Custom icons indicate system status at a glance. Digital display allows precise setpoint setting.
<input type="checkbox"/> Front Panel Keypad with Lock	Allows the user to quickly change setpoint, differential, and other functions. Concealed jumper deters unauthorized changes to control setting.
<input type="checkbox"/> Cooling or Heating Modes	Open the Case and change two jumpers to change from heating to cooling.
<input type="checkbox"/> Wide Adjustable Differential 1 to 30 F° or C°	Enables the user to optimize system performance for a given application; allows a tighter differential than typical electromechanical controls (1 F° or C°).
<input type="checkbox"/> Field-selectable Mode Jumpers	Enables the user to select either Heating or Cooling mode and whether cut-in or cut-out occurs at setpoint.
<input type="checkbox"/> Sensor Failure Indication	Notifies the user in the event of temperature sensor/wiring failure, whether the circuit has failed open or shorted, and allows the user to select output on or output off as the control default.
<input type="checkbox"/> Anti-short Cycle Time Delay	Allows the user to determine how rapidly the control can cycle the load off and on.

Dimensions

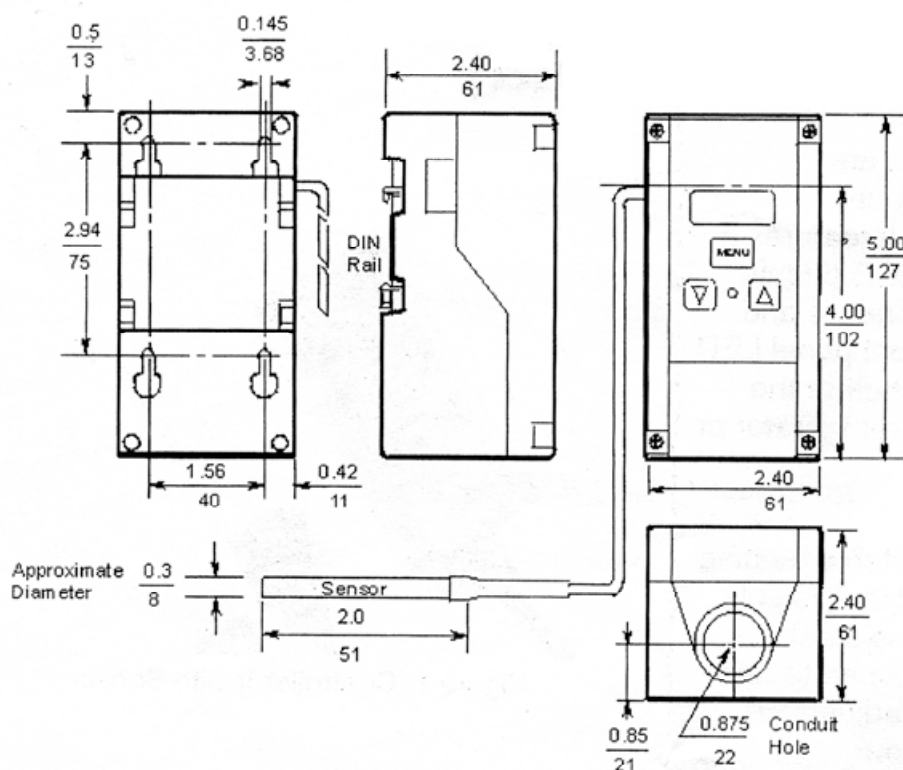


Figure 2: Dimensions, in. (mm)

Application Overview

The Controller II can be used to control a wide variety of heating and cooling units:

- A spare refrigerator for home brewing (the freezer part will not be usable)
- A spare freezer for home brewing
- Turns any refrigerator or freezer into an inexpensive wine cellar

FCC Compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

Overview



IMPORTANT: All Controller II controls are designed for use only as operating controls. Where an operating control failure would result in personal injury or loss of property, it is the responsibility of the installer to add devices (safety, limit controls) or systems (alarm, supervisory systems) that protect against, or warn of, control failure.

The Controller II Temperature Control operates on 120 VAC.

Definitions

- Cut-in:** The point at which the Normally Open (N.O.) contact closes.
- Cut-out:** The point at which the N.O. contact opens.

Functions

The Controller II allows the user to set a variety of functions using the keypad and jumpers. This section describes these functions. For instructions on setting functions, see the *Adjustments* section.

Keypad Programmable Functions

Setpoint (SP): This is the temperature at which the equipment is switched on or off. The user can select whether the equipment is switched on or off at the setpoint. Setpoint range is -30 to 212°F (-34 to 100°C). See *Cooling/Heating and Setpoint Modes*.

If Setpoint mode is set to cut-in, setpoint is defined as the temperature at which the control closes the N.O. contacts. If Setpoint mode is set to cut-out, setpoint is defined as the temperature at which the N.O. contacts open. See Figures 5 and 6.

Differential (dIF): This is the difference in temperature between the off and on points. The differential is measured relative to the setpoint and can be set from 1 to 30 F° or C°.

Anti-Short Cycle Delay (ASd): This feature determines the minimum time the equipment will remain off before starting again. When anti-short cycle delay is preventing the equipment from being started, the LCD will alternately flash "Asd" and the sensor temperature. The anti-short cycle delay can be set at 0 to 12 minutes.

For example, if the anti-short cycle delay is set for 7 minutes, the Controller II will not restart the system until 7 minutes after the system has turned off, regardless of the temperature. See Figure 3. Within the 7 minute period, if the temperature reaches the point where the on cycle would normally begin, the display alternates between the sensor temperature and ASd to indicate that the on cycle is being delayed. After the 7 minute delay has elapsed, the system turns on, and ASd stops flashing.

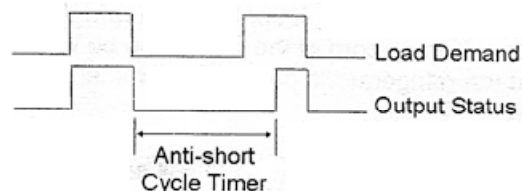


Figure 3: Anti-short Cycle Delay

Sensor Failure Operation (SF): This function sets control output to be forced on (operates the equipment continuously) or off (shuts down the equipment) if the sensor or sensor wiring were to fail. When the control detects failure, the LCD flashes "SF" alternately with "OP" if the sensor circuit is open, or "SH" if the sensor circuit is shorted.

Before indicating failure, the control implements a 1 minute delay. This setting time allows positive identification of failure conditions avoiding nuisance failure indications.

Temperature Offset (OFS): This feature is not used in the Controller II.

Temperature Units: The LCD can display temperature in Celsius or Fahrenheit.

Functions Set by Jumpers

For instructions on setting jumpers, see *Positioning the Jumpers* in the *Adjustments* section. For jumper location, see Figure 10.

Heating/Cooling: Removing or installing the P4-Heat jumper determines whether the control is in Heating or Cooling mode.

Setpoint Mode: Removing or installing the P4-Cut-out jumper determines whether the control is set to cut-in or cut-out at setpoint.

Keypad Lock: Removing or installing the P5-Unlock jumper determines whether the keypad is locked or unlocked. Locking the keypad deters accidental or unauthorized modification of the setpoint and other parameters.

Connecting your Refrigerator or Freezer

Put the probe in the area where the temperature needs to be controlled. If controlling a refrigerator or freezer, the small cord of the probe can be wrapped around the refrigerator's door seal, eliminating the need to cut a hole.

The metal sensing probe is stainless steel and can be immersed in water. The sensor cable is splash proof, but is not food grade and should not be immersed in liquid or touch beer or other food items.

Place the unit in a readily accessible area (4 screw holes provided on back of case for mounting). The Controller II is now installed and ready for use.

Display

The Controller II front panel contains a LCD display and a relay status LED.

LCD Display

During normal operation the LCD shows the sensor temperature, a symbol indicating Fahrenheit or Celsius (°F or °C), and a mode icon for Heating (⬆) or Cooling (⬆) as shown in Figure 4 below. The temperature display ranges from -30 to 212°F (-34 to 100°C) in increments of 1°F or 1°C. The display also displays "BIN" if the Offset function is in use.

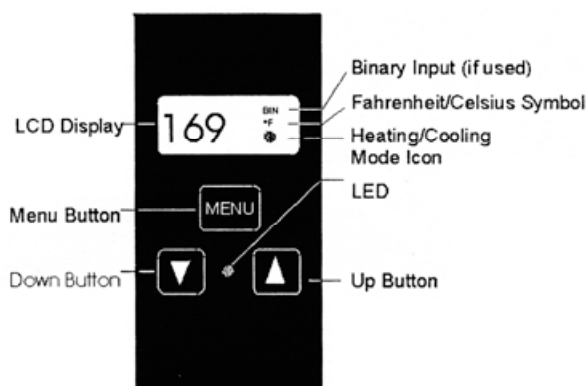


Figure 4: Front Panel and Display

During programming, the LCD displays the available functions and their values. After 30 seconds of inactivity, the display returns to the sensor temperature. See the *Adjustments* section for instructions on using the keypad to change settings.

Relay Status LED

A green front panel LED illuminates when the relay is energized (when the N. O. contacts are closed).

Cooling/Heating and Setpoint Modes

Jumpers are used to place the Controller II in Cooling or Heating mode and set whether cut-in or cut-out occurs at the setpoint. Thus, four operating modes are possible: Cooling/Cut-in, Cooling/Cut-out, Heating/Cut-in, and Heating/Cut-out.

Cooling Modes

When **Cooling/Cut-in mode** is selected, the differential is below the setpoint. The relay and LED indicator will energize when the temperature rises to setpoint. When the temperature drops to setpoint, *minus* the differential setting, the relay and LED indicator will de-energize.

Cooling/Cut-in mode is the factory default, and is recommended for home brewing or wine cellar cooling applications.

When **Cooling/Cut-out mode** is selected, the differential is above the setpoint. The relay and LED indicator will energize when the temperature rises to setpoint *plus* the differential setting. When the temperature drops to setpoint, the relay and LED indicator will de-energize.

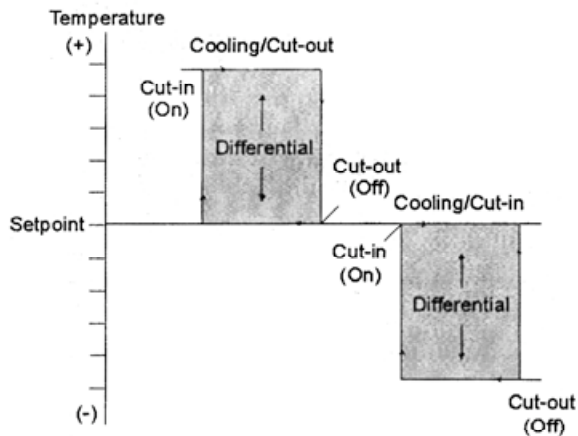


Figure 5: Cooling Modes

Heating Modes

When **Heating/Cut-out mode** is selected, the differential is below the setpoint temperature. The relay and LED indicator will energize when the temperature drops to setpoint *minus* the differential setting. When the temperature rises to setpoint, the relay and LED indicator will de-energize.

Heating/Cut-out is recommended for most brewing applications (set the differential for 3 degrees or less when in Heating/Cut-out mode).

When the **Heating/Cut-in mode** is selected, the differential is above the setpoint. The relay and LED indicator will energize when the temperature drops to setpoint. When the temperature rises to setpoint *plus* the differential setting, the relay and LED will de-energize.

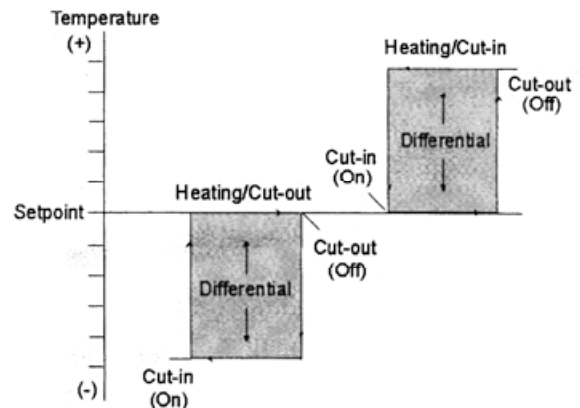


Figure 6: Heating Modes

Adjustments

This section provides instructions for adjusting the Controller II control using jumpers and keypad.



WARNING: Unplug the pronged power supply cord from the wall electrical outlet before proceeding to remove the cover screws.



CAUTION: Verify that the Cooling/Heating jumper is positioned properly before powering the Controller II control. If not, the device may activate the relay in response to the opposite signal.

Positioning the Jumpers

Jumpers P4 labeled Heat, P4 labeled Cut-out, and P5 labeled Unlock configure the Controller II for either the Cooling or Heating mode of operation, Cut-in or Cut-out at setpoint, and to lock or unlock the keypad.

To remove any jumper, reposition the jumper so it is connected to just one pin on the control board. To install a jumper, connect the jumper to both pins.

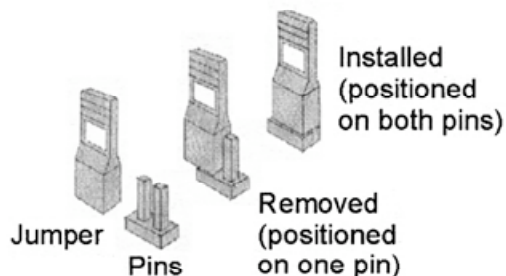


Figure 7: Jumper Placement

Set the jumpers as follows, using Figures 7 and 8 as guides.

1. Unplug the power supply cord from the wall electrical outlet.
2. Remove the Controller II cover by loosening the four captive cover screws.
3. Position the jumpers to set Cooling/Heating, Setpoint, and Keypad Lock functions.
4. Replace the cover and fasten in place with the four screws.
5. Plug the pronged power supply cord back into the wall electrical outlet.

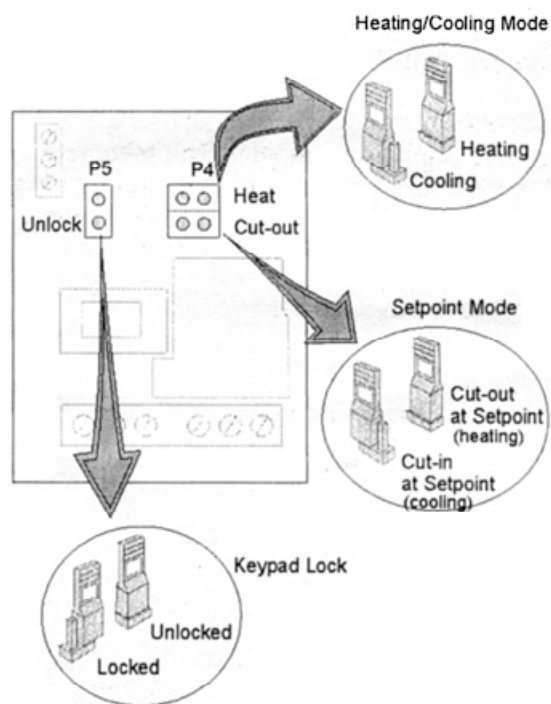


Figure 8: Jumper Positions

Table 3: Jumper Settings

Function	Jumper Label	Setting	Jumper Position*	Factory Setting
Cooling/Heating	P4-Heat	Cooling	Removed	Cooling
		Heating	Installed	
Setpoint	P4-Cut-out	Cut-in	Removed	Cut-in
		Cut-out	Installed	
Keypad Lock	P5-Unlock	Locked	Removed	Unlock
		Unlocked	Installed	

* Do not discard a removed jumper in case you need to restore the jumper to its installed position in the future. This is especially important in the Keypad Lock function because, without the jumper, you cannot unlock the keypad.

Changing Temperature Units



Press the Up and Down buttons simultaneously to toggle between °F and °C.

Note: The Keypad Lock jumper must be in the unlocked position (installed) before adjusting the control. If the keypad is locked, pressing buttons has no effect on the control.

Setting the Setpoint

Before setting the setpoint, be sure the control is set to the temperature units you want to use, Celsius or Fahrenheit.

To view and adjust the setpoint, use the following method.



1. Press and hold the Menu button for about 2 seconds until the display changes to flashing SP.

Note: If no entries are made for 30 seconds, the control reverts to the temperature display.



2. Press the Menu button again. The current setpoint is displayed.



3. Press the Up or Down button to adjust the setpoint temperature.



4. Press the Menu button to save. The display then returns to the sensor temperature.

Note: If the Menu button is not pressed after changing the setpoint, the control reverts to the setpoint value previously programmed into the Controller II.

Table 4: Function Ranges and Settings

Function	Range	Factory Setting
SP Setpoint	-30 to 212°F (-34 to 100°C)	30
dIF: Differential	1 to 30° (F or C)	5
ASd: Anti-short Cycle Delay	0 to 12 minutes	1
SF: Sensor Failure Operation	0 = output off 1 = output on	1

Note: **Operation at Extremes:** If the combination of setpoint plus or minus the differential falls outside the temperature range (-30°F to 212°F [-34°C to 100°C]), the Controller II operates as follows:

Cooling/Cut-in: If the control is operating in Cooling/Cut-in mode and setpoint minus differential is less than -30°F, the control switches on at setpoint and off when the temperature drops below -30°F (-34°C).

Heating/Cut-in: If the control is operating in Heating/Cut-in mode and setpoint plus differential is greater than 212°F (100°C), the control switches on at setpoint and off when the temperature exceeds 212°F (100°C).

Cooling/Cut-out: If the control is operating in Cooling/Cut-out mode and setpoint plus differential is greater than 212°F (100°C), the control switches on when the temperature exceeds 212°F (100°C) and off at setpoint.

Heating/Cut-out: If the control is operating in Heating/Cut-out mode and setpoint minus differential is less than -30°F (-34°C), the control switches on when the temperature drops below -30°F (-34°C) and off at setpoint.

Setting Other Functions

To set the Differential (dIF), Anti-short Cycle Delay (ASd), Temperature Offset (OFS), or Sensor Failure (SF) operation, use the following method.

Figure 11 illustrates the order of functions shown using the Up or Down button. The Up button accesses functions in the clockwise direction, Down button in the counterclockwise direction.

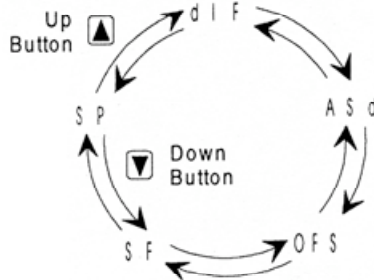


Figure 11: Order of the Functions



1. Press and hold the Menu button down for approximately 2 seconds until the display changes to flashing SP.

Note: If no entries are made for 30 seconds while programming is in progress, the control reverts to the temperature display.



2. Press the Up or Down button repeatedly until the desired function is displayed.



3. Press the Menu button to display the function's current value.



4. Press the Up or Down button until the desired value is displayed.



5. Press the Menu button to save the new value. The display then returns to the sensor temperature.

Note: If you do not press the Menu button after setting the new value, the control reverts to the previously programmed value for that function.

Checkout

Before applying power, make sure installation and wiring connections are according to job specifications. After necessary adjustments and electrical connections have been made, put the system in operation and observe the control for at least three complete operating cycles before leaving the installation.

Plug the black pronged cord into the wall outlet, and plug the unit to be controlled (refrigerator or freezer) into the female cord receptacle located on the Controller II's other electrical cord.

Troubleshooting

If the control system does not function properly, verify that the unit is correctly configured and set properly. If the problem persists, use the following procedures to determine the cause of the problem:

1. **Check for proper voltage applied to the Controller II control.**
 - a. Select AC volts on a voltmeter and connect it between the COM and 120V terminals located on the terminal block below the relay).
 - b. Verify that the voltage is between 102 and 132 VAC.

If the voltmeter reading is within the required voltage range, proceed to Step 2.

If the voltmeter reading is **not** within the required voltage range, check the power source.

2. Check the temperature sensor for proper operation.

- a. Unplug the unit from the wall electrical outlet.
- b. Using an accurate thermometer, take an independent temperature measurement at the sensor location.
- c. Disconnect the sensor from the control. Using an ohmmeter, measure the resistance across the two sensor leads. Consult *Table 5: Nominal Temperature vs. Sensor Resistance*, to verify that measured values conform to listed values.
- e. If the sensor reading conforms to the values in Table 5, proceed to Step 3.
- d. If the sensor's measured resistance value is substantially different from the expected value for that temperature, check the sensor wiring and correct. If wiring is correct, the sensor may be defective. Contact your Controller II distributor for assistance.

Table 5: Nominal Temperature vs. Sensor Resistance

Temperature		Resistance
°F	°C	ohms
-30	-34	640.3
-20	-29	671.9
-10	-23	704.6
0	-18	738.4
10	-12	773.3
20	-7	809.3
30	-1	846.3
40	4	884.5
50	10	923.7
60	16	964.0
70	21	1005.4
80	27	1047.8
90	32	1091.4
100	38	1136.0
110	43	1181.6
120	49	1228.3
130	54	1276.1
140	60	1324.9
150	66	1374.7
160	71	1425.6
170	77	1477.6
180	82	1530.6
190	88	1584.6
200	93	1639.6
210	99	1695.6
212	104	1707.0

3. Check for proper operation.

Note: Perform *Troubleshooting Steps 1 and 2* before performing this step.

- a. Unplug the cord from the wall electrical outlet.
- b. Check to be sure the Keypad Lock jumper is installed (unlocked).
- c. Reconnect the sensor and plug the pronged cord back into the wall electrical outlet.
- d. Check the control parameters for proper values.
- e. Press and hold the Menu button until the setpoint appears (about 2 seconds).
- f. Use the Up and Down buttons to change the setpoint temperature above and below the sensor temperature until the control relay energizes and de-energizes as shown in Table 6.

Note: If an anti-short cycle delay has been set, the relay will not energize until the duration of the delay has elapsed.

- g. If the relay does **not** perform as indicated in Table 6, replace the Controller II.

Table 6: Normal Controller II Operation

Operating Mode	Action	Relay Energized At	Relay De-energized At
Cut-out	Cooling	Setpoint plus differential	Setpoint
	Heating	Setpoint minus differential	Setpoint
Cut-in	Cooling	Setpoint	Setpoint minus differential
	Heating	Setpoint	Setpoint plus differential

Note: When the relay is energized, the N.O. contacts are closed and the LED is illuminated.

Working with Alarm and Fault Codes

If the LCD displays an alarm or fault code, SF or EE, consult Table 7 for information.

Table 7: Alarm and Fault Codes

Error Code	Definition	System Status	Solution
SF flashing alternately with OP	Open temperature sensor	Output functions according to the selected sensor failure mode (SF setting)	See <i>Troubleshooting</i> section. Cycle power to reset the control.
SF flashing alternately with SH	Shorted temperature sensor	Output functions according to the selected sensor failure mode (SF setting)	See <i>Troubleshooting</i> section. Cycle power to reset the control.
EE	Program failure	Output is off	Reset the control by pressing the Menu button. If problems persist, replace the control.

Repairs and Replacement

Field repair of the Controller II is not possible. Please return the Controller II to the dealer where purchased for warranty replacement and repair information.

The Brewer's Edge® Controller II is sold to authorized distributors by:

William's Brewing
P.O. Box 2195
San Leandro, CA 94577
www.williamsbrewing.com

Specifications

Product	Controller II Electronic Temperature Control with Display		
Setpoint Range	-30 to 212°F (-34 to 100°C)		
Differential Range	1 to 30 F° (1 to 30 C°)		
Supply Voltage	120 VAC, 60 Hz		
Power Consumption	1.8 VA Maximum		
Relay Electrical Ratings	SPST	120V	
	Full Load Amperes (N.O. [N.C.]):	12 [5.8] A	
	Locked Rotor Amperes (N.O. [N.C.]):	72 [34.8] A	
	Non-inductive Amperes (N.O. [N.C.]):	10 [10] A	
	Pilot Duty:	125 VA (Normally Open and Normally Closed.) @ 120 VAC	
Sensor Type	PTC Sensor with 6.6 ft (2.01 m) Leads		
Control Ambient Temperature	Operating:	-30 to 140°F (-34 to 60°C)	
	Shipping:	-40 to 185°F (-40 to 85°C)	
Ambient Humidity	0 to 95% RH Non-condensing; Maximum Dew Point: 85°F (29°C)		
Control Material	Case and Cover: NEMA 1 High-impact Thermoplastic		

The performance specifications are nominal and conform to acceptable industry standards.