ETC120 TEMPERATURE CONTROLLER
INSTRUCTION MANUAL *Version 1.0*

1. Overview

This temperature controller contains one temperature probe and two independent outputs. One output is for cooling and the other one is for heating. It can be used for applications such as heating during mashing or fermentation, or for cooling post-boil and during fermentation.

This controller is a plug and play controller. No wiring is needed for the heater or cooler. Both the heating and cooling control modes are simple on/off control, similar to a mechanical thermostat but with much higher precision due to an adjustable hysteresis band, precise sensor and digital read out. Anti-short function is also provided for cooling to protect a refrigerator compressor from being turned on while at high pressure which could damage it.

Different operation temperature ranges of the two outputs can be set separately. Once the cooling range is set, the controller program will automatically limit the heating range to prevent both heating and cooling from being turned on at the same time.

A digital silicon band gap sensor is used with the advantage being that it is much more reliable in a moist environment than a thermistor sensor. It can be immersed over an extended period of time. It also has more uniform accuracy over an entire specified temperature range.

2. Specification

Temperature Control Range	-50 to 125°C/-58 to 257°F
Resolution	0.1° (from -9.9 to 99)
Accuracy	0.5°C/0.9°F
Control Mode	On/Off Heating and Cooling
Control Output	12A/120V
Audio Alarm	High and Low Limit
Sensor Type	Silicon Band Gap
Sensor Size	6mm/0.25"OD by 100mm/4"
Measuring Range	-2°C/28°F to 125°C/257°F
Ambient Temperature	-20°C/-4F° to 50°C/122°F
Dimension	91x140x46mm 3.5x5.5x1.75"
Input Power	15A/110-120V/60Hz
Sensor Cable Length	2.4m/8'
Power Cable Length	1m/3'
Warranty	1 year

3. Front Panel

Measured Temperature
Set Key
Up Key
Dn Key, Mute Alarm
Cooling Device On Indicator
Heating device On Indicator
Receptacle for Cooling Device
Receptacle for Heating Device
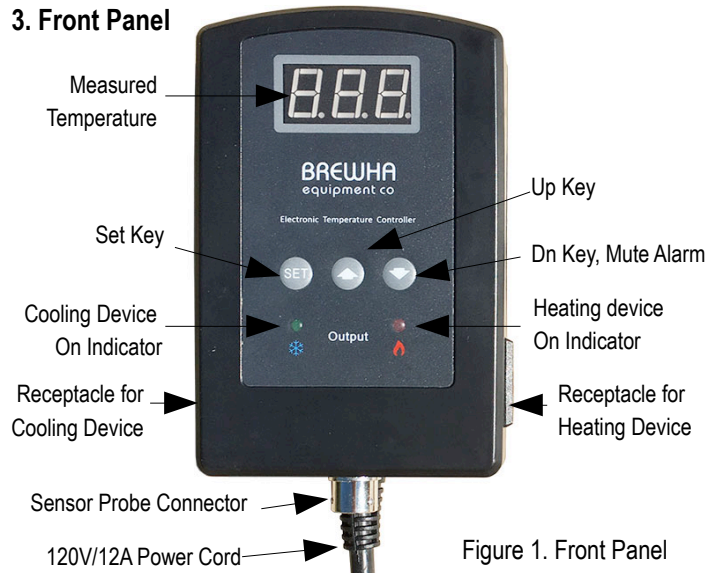Sensor Probe Connector
120V/12A Power Cord

Figure 1. Front Panel

4. Setup Flow Chart

When the controller is plugged in, and the probe is attached, it will display the measured temperature. The controller will keep running according to the saved settings. If the temperature sensor is shorted or removed, the controller will display "Err". Please see Figure 2 for the flow chart to set the parameters.
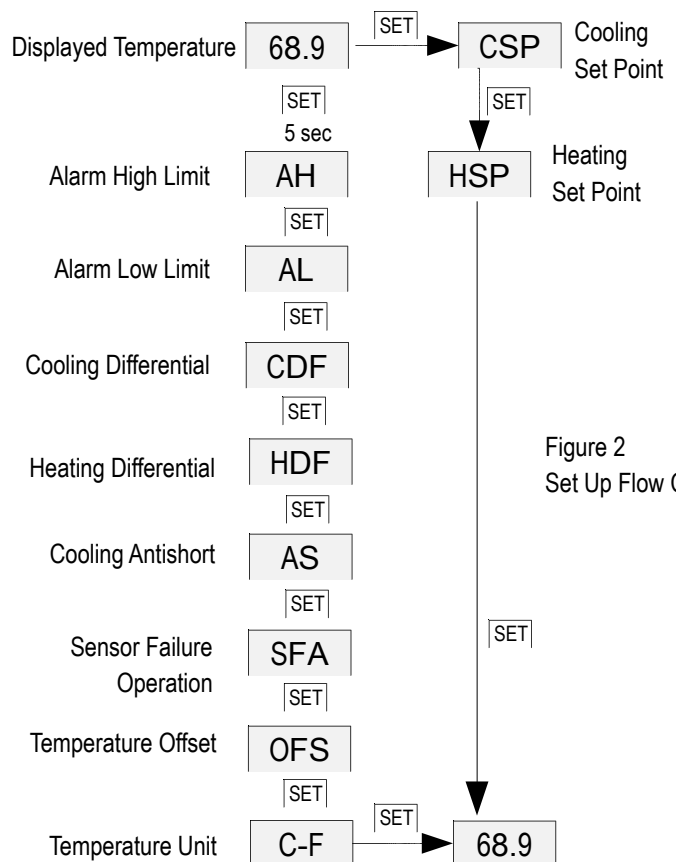

Label	Value
Displayed Temperature	68.9
Cooling Set Point	CSP
Heating Set Point	HSP
Alarm High Limit	AH
Alarm Low Limit	AL
Cooling Differential	CDF
Heating Differential	HDF
Cooling Antishort	AS
Sensor Failure Operation	SFA
Temperature Offset	OFS
Temperature Unit	C-F

Figure 2 Set Up Flow Chart

5. Parameter Settings

To change the temperature set point, press the SET key momentarily. The controller will show CSP (Cooling set point), pressing SET again will show HSP (heating set point). When the controller shows CSP or HSP, use the Up or Down keys to change the value. Then press the SET key again to confirm the change.

To change the system parameters, hold the SET key down for 5 seconds and the controller will enter the parameter set up mode. The first parameter, AH (Alarm High Limit), will show on the display. Use the Up or Down keys to modify the parameter value, then press the SET key to confirm the change. The display will show the parameter again. Press the SET key again to show the next parameter. The instrument will automatically exit if no key is pressed for 10 seconds. Please see Table 1 for the default parameters.

Table 1. Parameter Description

Code	Description	Setting Range	Initial	Note
CSP	Cooling Set Point (temp at which cooling receptacle is powered)	-50 to 125ºC -58 to 248ºF	19.4ºC 67ºF	1
HSP	Heating Set Point (temp at which heating receptacle is powered)	-50 to CSP ºC -58 to CSP ºF	16.6ºC 62ºF	
AH	Alarm High Limit (high temp at which alarm sounds)	-50 to 125ºC -58 to 248ºF	35ºC 95ºF	2
AL	Alarm Low Limit (low temp at which alarm sounds)	-50 to AH ºC -58 to AH ºF	0ºC 32ºF	
CdF	Cooling Differential (from set temp to turn cooling on)	0 to 27 ºC 0 to 50 ºF	3	1
HdF	Heating Differential (from set temp to turn heating on)	0 to 27 ºC 0 to 50 ºF	1	
AS	Cooling Antishort (time delay between turning power on/off)	0-12 min	0	3
SFA	Sensor Failure Operation (if sensor fails, which receptacles are powered)	0-0, 0-1, 1-0	0-0	4
oFS	Temperature Offset (permanently adjust display temp)	0-10	0	5
C-F	Temperature Units	C is Celsius F is Fahrenheit	F	

Note 1. For cooling (or heating), the receptacle will be off when the temperature is below (or over) the set point and will be on again when the temperature rises up (or drops down) to CSP+CdF (or HSP-HdF). This ensures that the ETC does not try to cool and heat at the same time.

The maximum value of the HSP can be set is the current value of CSP. But CSP can be set to the value between -58~248 ºF or -50~125 ºC. When the CSP is set to a value lower than current HSP, the HSP will be adjusted to the CSP value automatically. This means that during mashing and boiling, it is convenient to set the cooling set point above 212F so that the heating set point can be set anywhere below 212F.

For example, when CSP=67.0 ºF, HSP=62 ºF, HSP can be set to any value between -58 and 67.0. For CSP, it can be set to any value between -58 and 248. If you set it to 55.0, the HSP will be set to 55.0 automatically.

A small differential between heating (HdF) and cooling (CdF) set points gives tighter control but a larger differential reduces the frequency of cycling on and off and therefore extends the life of the relay and compressor.

Note 2. When the measured temperature is higher than the AL set point, the high limit alarm will be on; when the measured temperature is lower than AL, the low limit alarm will be on.

When the alarm is on, the display will be flashing between the measured value and the alarm type. To mute the alarm when it is on, press the Down key momentarily. (If the measured value moves out of the alarm zone and then returns into the alarm zone again, the alarm will sound again. To disable the alarm, set AH=AL.)

The maximum upper value that AL can be set to is the current value of AH. But AH can be set to any value between -58~248 ºF or -50~125 ºC. When AH is set to a value lower than the current AL, the AL will be adjusted to the AH value automatically. For example, when AH=95.0 ºF, AL can be set to any value between -58 and 95.0. For AH, it can be set to any value between -58 and 248. If you set it to 25.0, the AL will be lowered to 25.0 automatically as AL cannot be above AH.

Note 3. The Cooling Antishort is the minimum delay time in minutes for turning the cooling load back on. When the controller is used for cooling and the load is a compressor (such as glycol chiller), it should not turn on the compressor when it is at highest pressure (e.g. just after it turned off) otherwise, it may shorten the life of the compressor. The Anti-Short cycle delay function, therefore, can be used to prevent the rapid cycling of the compressor. (Technical note: it does this by establishing the minimum time that the NO contacts remain open—after reaching cutout—before closing again. The delay overrides any Load Demand and does not allow the NO contacts to close until the set time-delay value has elapsed. This allows time for the refrigerant to be released through the evaporator, lowering pressure. It is typically set to 4-6 minutes).

Note 4. The Sensor Failure defines how the output would be if the sensor fails. It is a safety feature. It can be set to 0-0, 0-1 or 1-0. For brewing, the best option is generally 0-0 as this will shut off any heater that is connected. Please refer to table 2 for details.

Table 2. Output of the controller when the sensor fails:

SFA	Controller output when sensor fails
0-0	Cooler and heater off
1-0	Cooler on and heater off
0-1	Cooler off and heater on

Note 5. The Temperature Offset is used to set an input offset to compensate for any error produced by the sensor or input signal itself. This is useful for calibrating your ETC for precise readings. For example, for temperature, if the unit displays 37 ºF when the actual temperature is 32 ºF, setting parameter to F= -5 will make the controller display 32 ºF.

6. How to attach the sensor to the unit.

The sensor connector contains a slot for correct pin connection. It also has a spring lock to prevent disconnections from accidental pulling on the cable. To attach it to the unit, align the slot of the

female connector on the temperature probe to the red mark of the male connector on the ETC unit, then hold the tail and push the female connector forward. To remove the connector, pull the spring loaded collar of the female connector back and the female connector will detach. Please see the Figure 3 and Figure 4 below for details.

Figure 3. Ridge on ETC and notch on sensor cable must be aligned when connecting. Same is true for the sensor cable and sensor.
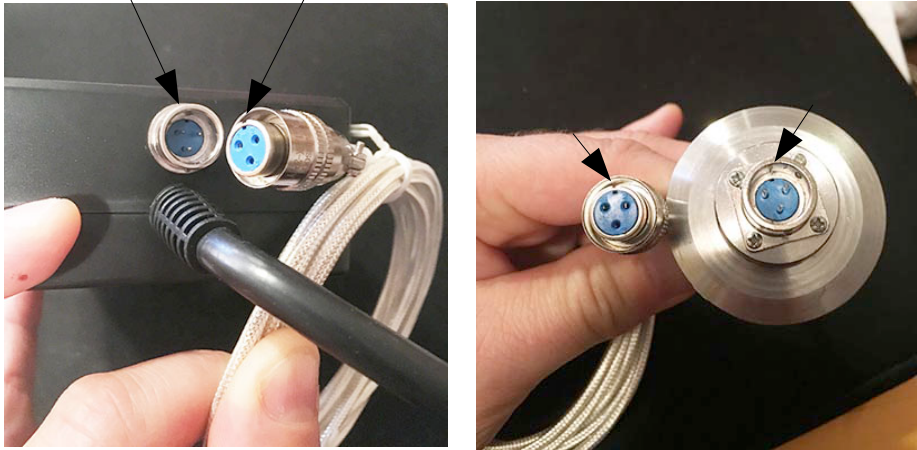

Figure 4. Pull the spring loaded collar to remove the sensor cable.

Questions related to the use of this controller with BREWHA equipment should be directed to:

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