Guide for Controlling the Bradley Smoker

For Model WS-1200CPH
Version 1.4
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Introduction

Thank you for purchasing the Auber WS series temperature controller. While we are delighted that you may be anxious to operate the controller for your project, a few minutes of your time reading through this manual will only serve to enhance your experience in the months and years ahead. In particular, we urge you to read through the safety warnings below. Although this plug-and-play controller is very easy to operate, the process involves high temperature and high wattage appliances and your safety is paramount.

 **SAFETY WARNINGS**

- The controller needs to be protected from water and rain. Do not leave the controller outside when not in use.
- Do not place any objects on the top of controller surface which is used to vent excess heat during its operation.
- Always place the sensor in the smoker during smoking. Leaving the sensor outside will form an open loop operation. If the sensor is left outside, controller will assume the temperature is low even if the smoker is already very hot. The controller will provide full power to the heater.
- This controller is designed to control devices recommended by Auber Instruments only. Using it to control a non-recommended device can be dangerous and may result in fire. Auber Instruments is not liable for damages caused by misuse of this controller. If you are not sure the controller can be used, please contact Auber Instruments before use.
- If an abnormal display or noise is observed, turn the controller off, unplug the power cord and contact the manufacturer before using it again.
- Clean the controller only when it is cool and unplugged.
- Do not allow children to operate the controller.

Operating Instructions

This guide is for using the temperature controller with the Bradley Smoker only. The WS-1200CPH controller can also be used for controlling any other household cooking devices under 1440 watts (120VAC). For complete information on how to set up the controller for other applications, please read the WS-1200CPH manual

1) **Description of the controller.**

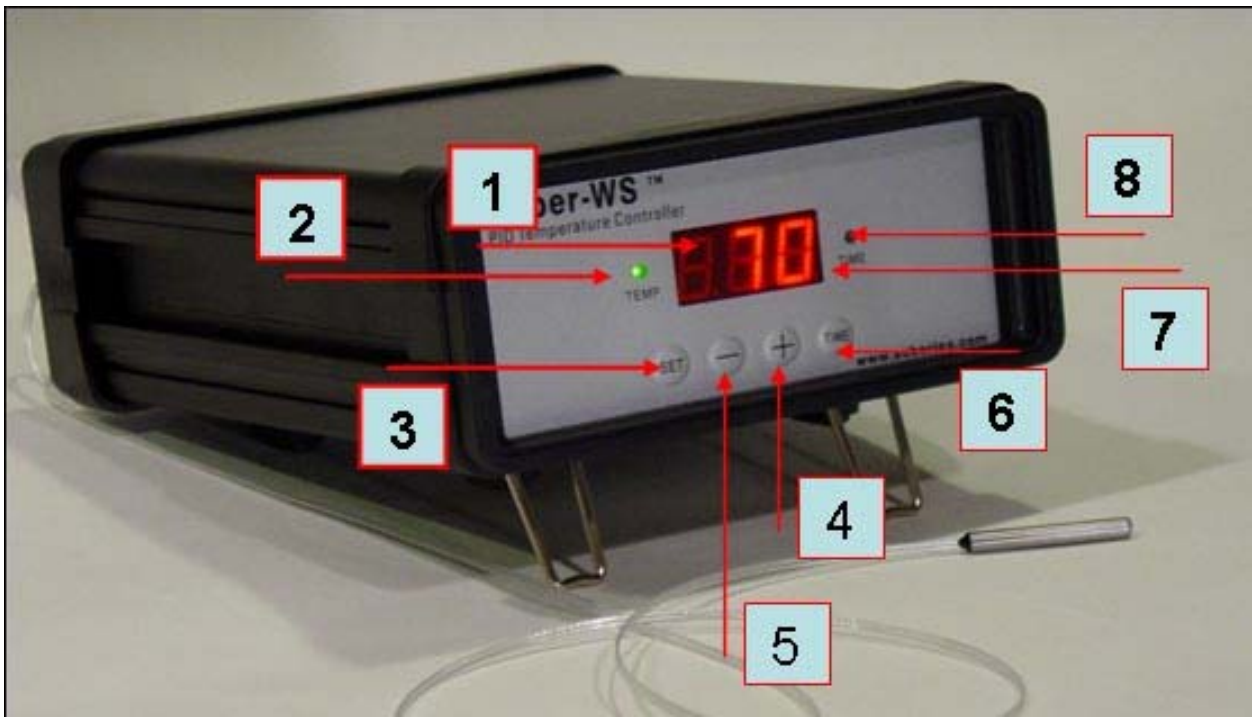

Fig 1. Front Panel

1) **Parameter Window (LED) -** for displaying temperature values and controller's system parameters.
2) **Output status indicator** - In normal mode, this LED indicates the heater status. When it is on (lit), the heater is powered. When it is off, the heater power is off. When it is flashing, it means the heater is on and off intermittently to reduce the power output. It should be synchronized with the power light on the cooking device.
3) **SET Key** - for set the control program (temperature and time of each step), getting into parameters setting mode and confirming various actions taken.
4) **"+" Key -** To increment displayed value.
5) **"-" Key -** To decrement displayed value.
6) **Time Key** – Change the Parameter Window between current timer and temperature values, when pressed.
7) **Mode indicator**, the small "dot" – if it is flashing and the Timer Status Indicator ("8") is lit, the value displayed in the Parameter Window is time that has been

passed since power up. If it is flashing but Timer Status Indicator (“8)”) is off, the value displayed in the Parameter Window is the parameter that needs to be set. The controller is either in the programming setting mode or parameter setting mode.

8) **Timer status indicator**- In normal mode, when “8)” is on and “7)” is flashing, LED shows the time passed since the controller was powered up. When it is off, the LED shows the current temperature detected by the sensor probe.

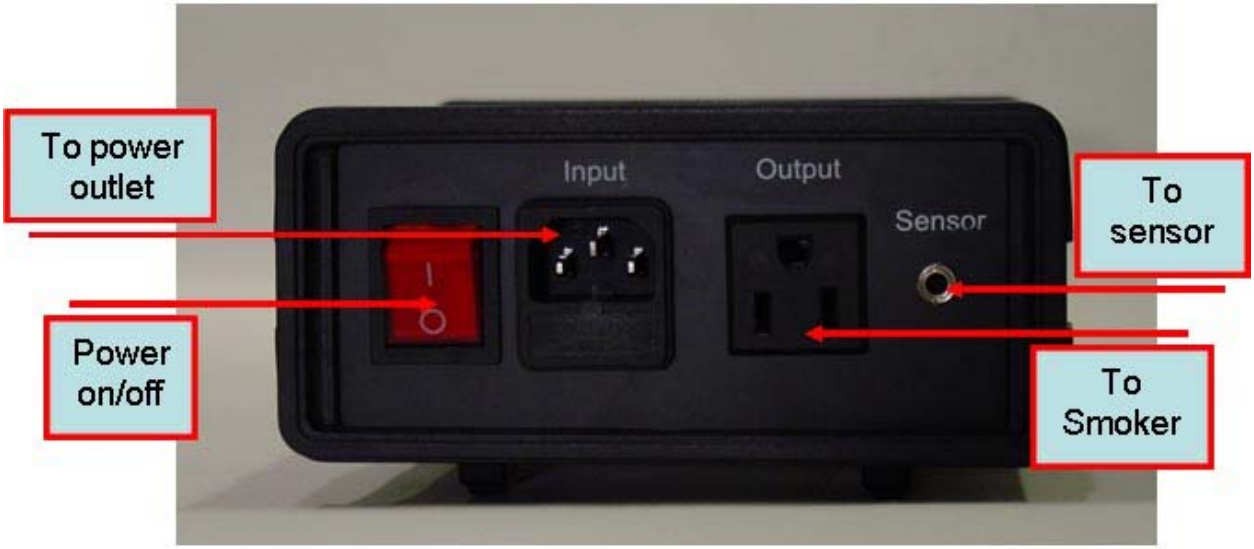

Fig 2, Back Panel

2) Connecting the controller

There are two ways to power up the controller and smoker.

a) Using two power cords and a power strip. This set up is good for the “Original”, Stainless Steel, and Digital Bradley Smoker.

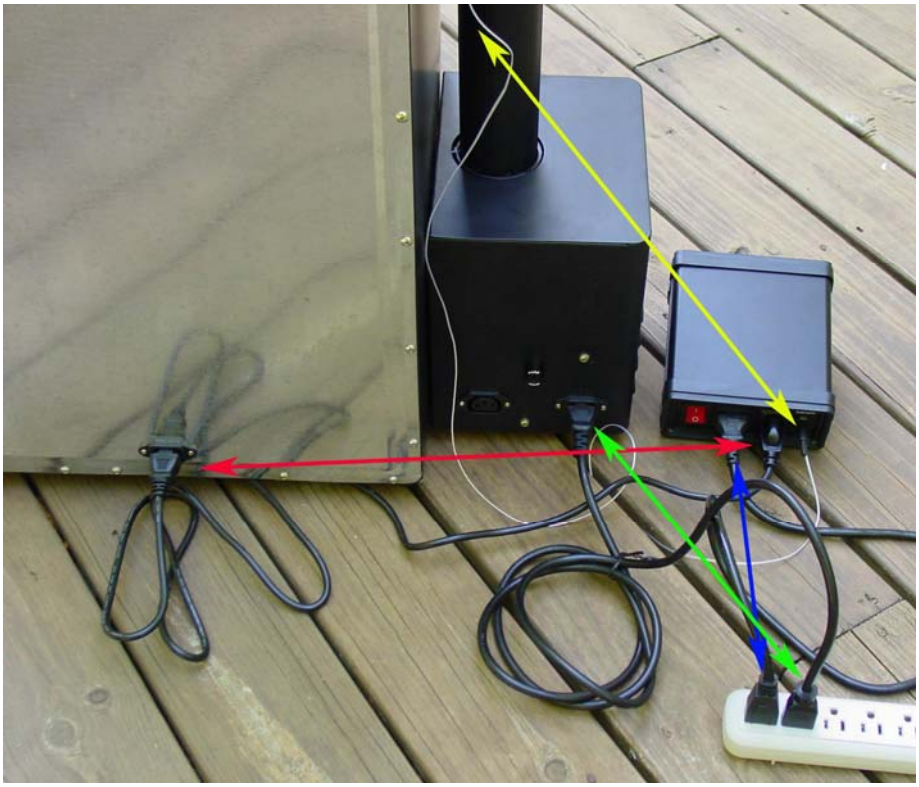

Fig 3. Power connection of the controller and smoker. The input of the controller is connected to the power strip by the 16 AWG power cord supplied (blue arrows).The generator is connected to the power strip by the power cord from Bradley (green arrows). The controller output is connected to the smoker by the optional 18 AWG power cord (red arrows). The sensor is connected to the sensor port on the controller.

b) Using one power cord. This set up is good for the “Original” and Stainless Steel Bradley Smoker only.

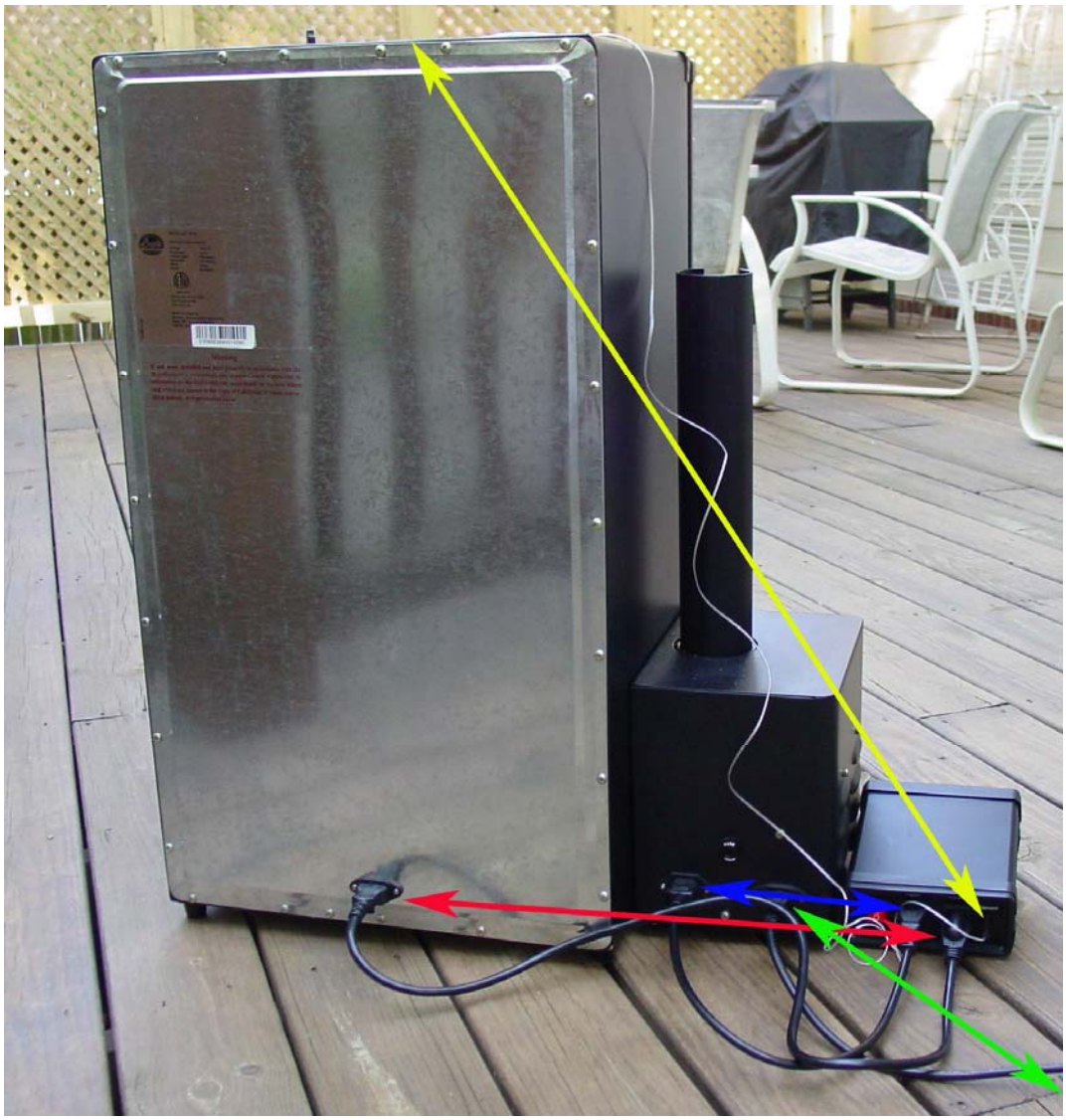

Fig 4. Power connection of the controller and smoker. The generator is connected to the power strip by the power cord from Bradley (green arrows). The input of the controller is connected to the female receptacle on the generator by the power jumper cord provided by the Bradley (blue arrows). It is the cord that used to connect the generator to smoker. The controller output is connected to the smoker by the power cord (red arrows).

Install the sensor. The sensor is plugged into the sensor port on the controller (Fig 4).The tip of the sensor is dropped into the damper hole. It is hold in place by a piece of tape on the top of the smoker tower. (Fig 5)


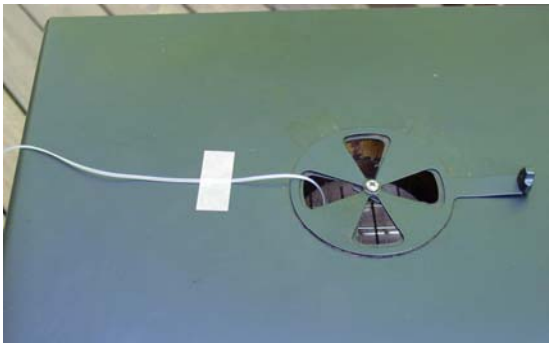

Fig 5. Sensor position. Left, the sensor should be placed close to the food but high enough so that it does not touch the food. Right, hold the sensor in place by a piece of tape.

For the “Original” and Stainless Steel Bradley smoker, the Temperature Heat Control Switch on the smoker tower should be slide to the Hi position (Most right).

For the Bradley Digital Smoker, the original sensor cable from the smoker should be connected between the generator and smoker.

The controller is ready to power up.

3) Programming the smoking temperature profile.

A total of 6 steps can be programmed for this controller. Each step contains the temperature (C0X) and time duration (T0X) setting. They are represented by the symbol C0X and T0X, where “X” is the step number (e. g. Step 4 temperature is represented by C04 and step 4 time is represented by T04). The character, “T”, is displayed as the symbol, “ ”. Time is defined as the duration between the last step and the next step. Please make sure the time is long enough for the heater to heat up the smoker. If the time is set too short, the temperature may not be able to reach the current step temperature setting, before it jumps to the next step. The time unit is in hours with 0.1 hour resolution. Each 0.1 hour equals to 6 minutes. If the recipe only needs one step, you can program the time of the rest of the steps to zero.

To program the temperature profile, press SET key once. The display will show C01 for one second and then display the temperature setting for step 1. Use “+” and “-“ keys to change the setting. When finished, press the SET again to confirm the change. The display will show T01 for a second and then change to the cook time setting for step 1. Use “+” and “-“ keys to change the setting. When finished, press the SET again to confirm the change. The display will go the step 2 setting. The following is the flow chart

for the setting procedure.

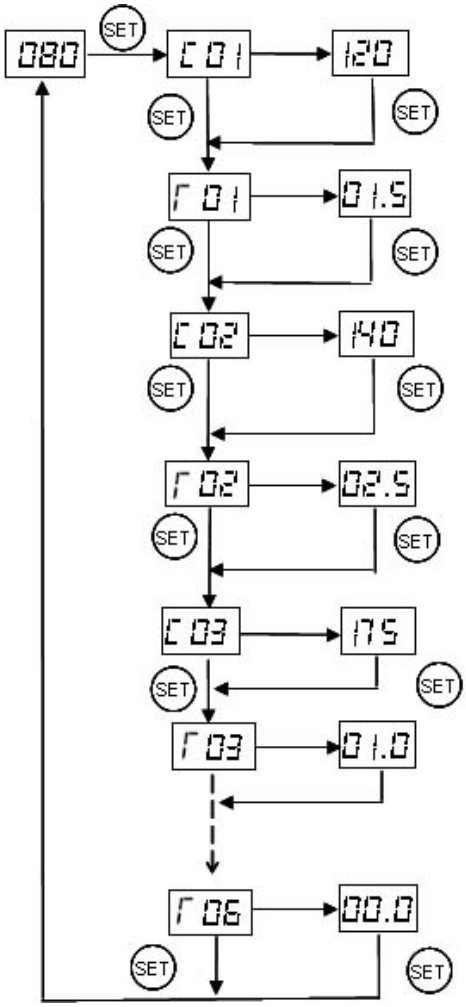

Fig 6, Temperature profile programming flow chart.

The temperature setting will not be changed if SET is not pressed (confirmed). After programming the necessary steps for cooking, you can finish programming by pressing the SET continuously until it passed T06 and display the current temperature. You can also leave the controller alone. The display will return to the normal display mode if no key is pressed within 15 seconds.

The initial program setting for the controller is for smoking the salmon. The temperature profile is programmed to start at 120 °F for 1.5 hour of smoking, rise to 132 °F for 2.5 hours and finish at 175 °F for 1 hour. The recipe is from Kummok:
http://forum.bradleysmoker.com/index.php?topic=107.0
If you like more moisture in the fish and serve it within a day, the last step (175F) can be eliminated.

Step #	Temp (F)	Step #	Time (h)
C01	120	T01	01.5
C02	132	T02	02.5
C03	175	T03	01.0
C04	000	T04	00.0
C05	000	T05	00.0
C06	000	T06	00.0

Tabl1 , Initial program for smoking salmon.

The following is an example of setting for one step smoking at 160F for 9 hours.

	Temp (F)		Time (h)
C01	160	T01	09.0
C02	000	T02	00.0
C03	000	T03	00.0
C04	000	T04	00.0
C05	000	T05	00.0
C06	000	T06	00.0

Table 2. Setting for smoking at 160F for 9 hours.

4) Checking the current step and display the time

This is done by pressing the Time Key (“6)”) once. The display will show T0X for one second before it displays the time it has been on. e. g., it will display t03 for a second, if the controller is in step 3 of cooking. When “8)” is on (lit) and “7)” is flashing at the same time, LED is in timer mode and shows the actual time passed since the controller was last powered up. Please note that this is the total time, not the time that has passed in the current step. Press Time key again will switch the display to the current temperature. Both “7)” and “8)” will be off.

5) Tuning the controller

This controller contains two sets of system parameters that can be changed for different applications. This controller is shipped with the system parameters set for the Bradley Smoker. The user should not need to change these parameters. However, if you feel that performance is not ideal, you can try to manually tune the system or run the auto-tune again. For detailed information on how to tune the controller, please read the WS-1200A manual on the CD.

6) Important consideration for better control results.

The following is a list of things that could affect the result of temperature control.

a) the smoker and controller location. The smoker should not be placed directly under the sun. Direct sun light can heat the smoker to above 140F in the summer time, making controlling the temperature at 140F impossible. This is especially the problem for the Bradley Original Smoker because of its black color. The controller should be placed away from direct sun light also. Although the controller uses a high intensity LED display, it will still be difficult to read when sun light is directly shined to its surface. Users should also avoid exposing the controller to water and rain, which could damage the controller.

b) Low temperature control. The control result for temperatures below 125 F will not be as accurate as for higher temperatures when the smoker generator is on. This is because there are two heaters in the smoker tower. One is the smoker heater controlled by the PID controller. The other is the heater from the generator that is not controlled. Our test shows that the heater in the generator itself can raise the temperature of the smoker tower by 60 F (2 hours, in the shade with damper open). That means when the ambient temperature is at 70 F, the smoker can be heat up to 130 F in 2 hours by the heater of the generator (without using the heater in the smoker).

c) Damper position. Keeping the damper open will result in better temperature stability because more heat loss is created. This is important when the temperature is set below 140F. When the damper is closed, the temperature will take longer time to drop if it is overshot during initial heat up. At higher temperature, closing the damper will not affect the performance much because the heat loss from the wall of the tower is increased,

d) Temperature uniformity of the smoker tower. Our test shows that when the all the shelves were empty, the temperature inside the smoker tower is fairly uniform except the back half of the lowest shelf that is close to the heater. User should avoid placing the sensor too close to the heater because it does not represent the temperature of the rest area. When the shelves are filled, temperature variation might depend on how the foods were placed. The bottom shelf can become hotter if more food is placed in it to block the hot air from going up.

e) Operating the controller when ambient temperature is below 32 °F (0 °C). The controller reading is only accurate for temperature ≥ 32 °F (0 °C). In addition, if the ambient temperature is below 14 °F (-10 °C), the controller will not function because it can’t read the temperature correctly. In that case, user can warm the sensor by holding it with their hands. Once the sensor is above 14 °F (-10 °C), it will turn on the heater. Once the inside of the smoker is heated to above 32 F, the controller will run by itself.

7) Initial System Parameter Setting

In case you have changed the some of the parameter but want to set the controller back to its original condition, here is a list of the initial settings. (See WS-1200CPH manual for

details on how to change these parameters)

Symbol	Display	Description	Range	Initial
P	P	Proportional band (in 0.1 degree)	0-600	70
I	I	Integral constant (second)	0-900	600
d	d	Derivative constant (second)	0-300	150
AT	AT	Auto-tune	0=off 1=on	0
T	T	Cycle rate (second)	1-100	2
SC	SC	Off set (degree)	-20~+20	0
Out	OUt	Output power reduction (%)	1-100	100
C-F	C-F	Temperature unit	°C or °F	°F

Table 1. List of system parameters and its initial settings.