Quick Guide for WS-1211H

Programmable Precision PID Temperature Controller

Version 1.0 (July, 2022)

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Introduction

Thank you for shopping the Auber WS series temperature controller. We sincerely appreciate your decision and trust that our controller will meet your expectations in both the quality of the result and the value of the product. While we are delighted that you may be anxious to operate the controller, please still spend a few minutes reading through this manual because this will 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 use, the process involves high temperature and high wattage appliances and your safety is paramount.

⚠ SAFETY WARNINGS

- This controller is designed only to be used with limited-power device and paring thermal cutoff protection such as a thermostat or thermal.
- Do not place any objects on the top of controller surface because that may prevent venting excess heat during its operation.
- The controller can handle a maximum current up to 12 Ampere. For 120 VAC in US or Canada, this limits the heater power to 1440 watts. Due to its compact size and the splash proof design for kitchen applications, the controller has a limited ability to dissipate the heat generated by the internal solid state relay during the initial heat up. The initial full power heat up process cannot be more than 90 minutes. If you system need take longer time to warm up, please read Appendix 1 "Managing the heat generated by the controller"
- **Always place the temperature sensor in your controlled subject (like your smoker) before you turn on your controller.** Leaving the temperature sensor outside of your controlled subject will form an open loop operation. **If the sensor is left outside**, the controller will assume the temperature is low even if the controlled subject is already very

hot. The controller will provide full power to the heater. It will not only overheat the controller, but also damage your appliance or even cause a fire. If the sensor is not permanently mounted on the system and left outside of the system, there is a potential problem. **If no sensor is connected to the controller**, as protection, this controller will turn off its output to your controlled subject.

- This controller is designed to control the devices recommended by Auber Instruments only. Using it to control a not recommended device can be dangerous and even cause fire. Auber Instruments is not liable for damages caused by misuse of the controller. If you are not sure the controller can be used, please contact Auber Instruments before usage.
- 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

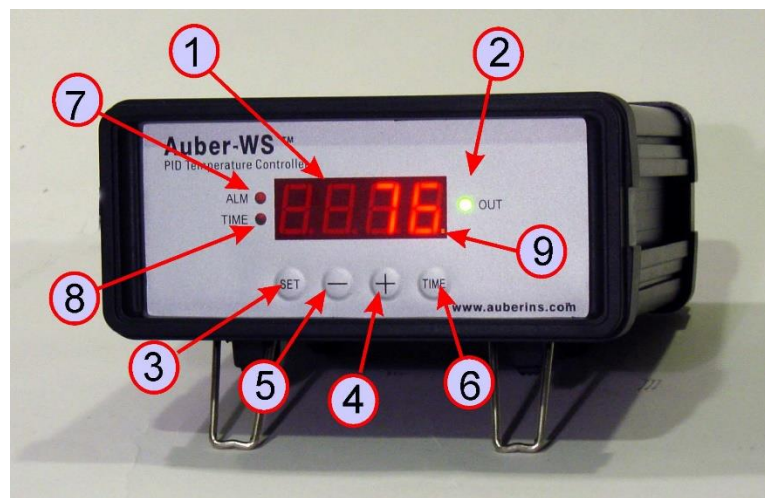## 1. Description of the controller

Figure 1. Front Panel.

The front panel of the controller is shown in Figure 1. The function of each item is described below:

(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 showing current temperature settings, entering parameters setting mode and

confirming various actions taken.

(4) **"+" Key** - To increase the value at parameter setting mode; toggle LED display between the current temperature and the current step number at normal operating mode.

(5) **"-" Key** - To decrease the value at parameter setting mode.

(6) Time Key - To toggle the LED display between the current temperature and the total running time at the normal operating mode.

(7) **Alarm indicator** - Lit when the alarm is on.

(8) **Timer status indicator** – Lit when Time key is pressed.

(9) **Editing indicator** – A dot at the lower right corner. When the dot flashing, the value is editable; pressing the "+" or "-" key to change the value.

The layout of the controller back panel is shown in Figure 2.

Figure 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.
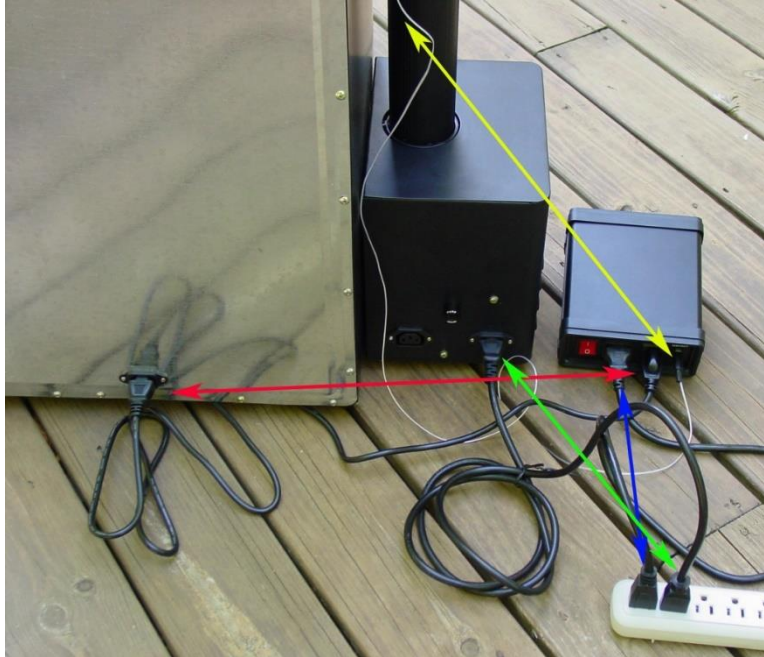
Figure 3. Power connection of the controller and smoker.

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.
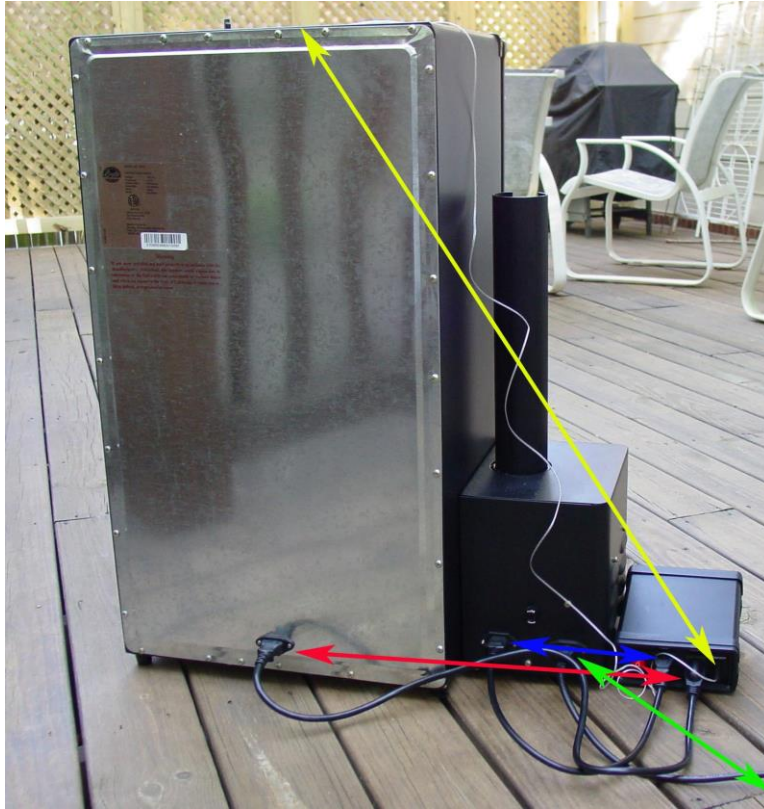
Fig 4. Power connection of the controller and smoker.

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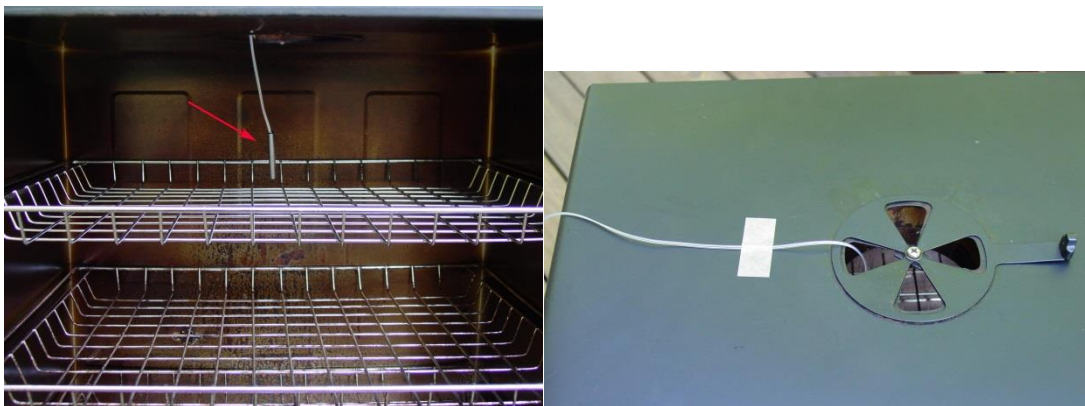
Figure 5. Sensor position. Left, the sensor should be placed close to the food but high enough so that it does not touch the food. Right, hold the sensor in place by a piece of tape.

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 temperature profile.

A total of 6 steps can be programmed for this controller. Each step contains the temperature (C-X) and time duration (t-X) setting. They are represented by the symbol C-X and t-X, where "X" is the step number (e.g. temperature value of Step 4 is represented by C-4 and time value of step 4 is represented by t-4). The character, "t", is displayed as the symbol, "Ł". 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 oven. If the time is set too short, the temperature may not be able to reach set temperature, before it jumps to the next step. The time unit is in minutes with 1 minute resolution. 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 C-1 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 t-1 for a second and then change to the 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 to the step 2 setting. The following is the flow chart for the setting procedure.

The temperature setting will not be changed if SET key is not pressed (confirmed). After programming the necessary cooking steps, you can finish programming by pressing the SET repeatedly until the display passes t-6 and displays 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.

Here is the one step heating program. The temperature profile is programmed to start at 150 °F for 600 minutes of heating.

Table 1. Initial program setting.

Step #	Temp (F)	Step #	Time (min)
C-1	150	t-1	600
C-2	0	t-2	0
C-3	0	t-3	0
C-4	0	t-4	0
C-5	0	t-5	0
C-6	0	t-6	0

4. Checking the current step and the time

The user can check step number, total running time, and the time in the current step using the "Time" or "+" key. Please see the flow chart in Figure 5.
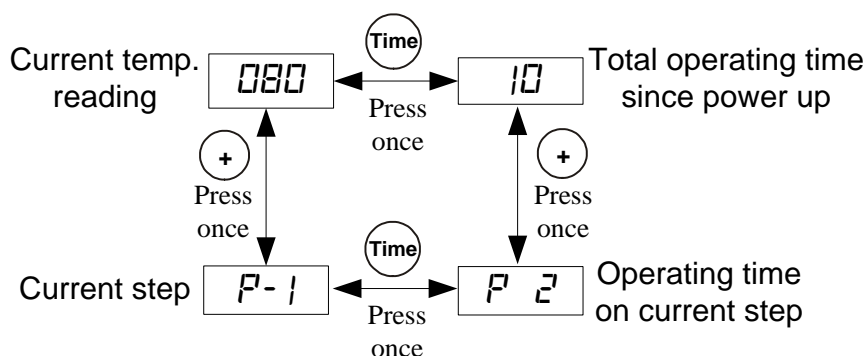

Figure 6. How to check current step and the time.

At normal operating mode, press the "+" key (item 4 in Figure 1) to toggle the display window between the current temperature and the current step number at which the program is running (P-X). At time displaying mode, press the "Time" key to toggle the display between the total time (in minutes) since the controller was powered up and the time past in the current step. For example, the controller has being running for 100 minutes in total, but currently it is at step 2 for 40 minutes. So when you first press "+" key, controller will show "P-2" in the window. If then you press "Time" key, the controller will show "P 40" with the Time Indicator lit.

At normal operating mode, press the "Time" key (item 6 in Figure 1) once to toggle the LED window between the current temperature and the total time (in minutes) since the controller was powered up. The Time Indicator (item 8 in Figure 1) will lit at same time. When the time is being displayed, press the "+" key will toggle the display between the total running time and the running time of the current step. For example, the controller has being running for 100 minutes in total, but currently it is at step 2 for 40 minutes. So when you first press "Time" key, controller

will show "100" in the window with the Time Indicator lit. If then you press "+" key, the controller will show "P 40" while the Time Indicator still lit.

5. System configuration parameters

This section discusses how to configure the controller for a specific application. For most sous vide cooking users, there is no need to read this section. The controller's default setting is for most common configurations of sous vide cooking. **For details on how to access these parameters, please check section 5 of the main instruction manual.**

5.1   The first group of parameter is related to the control performance. They need to be adjusted based on your application. Table 2 shows the list of these parameters, their range and initial set value.

Table 2. List of control parameters and its initial settings under code 166.

Symbol	Display	Description	Range	Initial
P	P	Proportional Band	1-9999	7
I	I	Integral Const. (Sec.)	0-9999	600
d	d	Derivative Const. (Sec.)	0-9999	150
AT	AT	Auto-tune	0=off, 1=on	0
t	T	Cycle Rate (Sec.)	2-9999	2

5.2   The second group is about the system configuration and set up. Once they are set, they normally do not need to be changed. This group of parameters can be accessed by access code 155. If you don't want your system to be altered by others, do not let other people know this code. Table 3 shows the list of the parameters, their range and initial set value.

Table 3. List of control parameters and the initial settings under code 155.

Symbol	Display	Description	Range	Initial
SC	5C	Offset (Degree)	-40~+40	0
OUT	out	Output Power Reduction (%)	0-100	100
C-F	C-F	Temperature Unit	°C or °F	°F
Mod	mod	Mode Selection	PID, Cool, Heat	PID
Hy	HY	Hysteresis Band	0-9999	3
AS	AS	Anti-short Cycle Delay (only for cooling mode)	0-200	6

5.3   The third group of parameters is about the alarm setting with access code 188. Table 5 shows a list of the parameters, their range and initial set value when left the factory.

Table 5. List of control parameters and its initial settings under code 188.

Symbol	Display	Description	Range	Initial
AH	*AH*	Probe High Limit Alarm	-99-9999	290
AL	*AL*	Probe Low Limit Alarm	-99-9999	0
ASt	*ASt*	Step Finish Alarm	on, off	on

Note: **Temperature alarms can be muted by pressing the "-" key. The Step Finish Alarm cannot be muted; it can only be turned off by the ASt setting.**

6. Save and recall recipes

General introduction for the recipe function for this controller
This controller has two "memories" to store the programming steps. One is the current running "memory". This controller will run the programming steps from this running "memory", like C-1, t-1, etc. Another is called recipe "memory". You can "save" your current running memory into this recipe memory with different recipe names, or recall the recipe memory into the current running memory. In that case, the previous steps in running memory will be overwritten. You cannot run the programming steps from the recipe "memory" directly.

This controller can save up to 8 pieces of smoking recipe (programs). Each recipe file can have up to 6 steps (C-1 to C-6). For convenience, we have pre-named these 8 pieces of recipe files as B1 (beef), B2, C1 (chicken), C2, F1 (fish), F2, P1 (pork), and P2. These recipe files are all the same except their names, so you can store your special recipe to any of them. These recipes can be stored in the memory of the controller even when it is powered off. You can overwrite the exist recipe with a new one. **For details on how to access these parameters, please check section 6 of the main instruction manual.**

6.1 Save a recipe.
After a program has been entered, the user can save this current program as a recipe for future use. Under the normal operating mode, press and hold SET key for 3 seconds until the Parameter Window displays "LoCK". Release the SET. The display will show "0". Use "+" and "-" keys to adjust the display to 2 and press SET. The display will show "SAVE" for a second and then the value "End". If press SET key now, you will exit this mode without overwriting any existing programs. Use "+" or "-" key to select the name of recipe to which you want to store the program. If you press "+" (or "-" key) repeatedly, you will see "End", "b1", "b2", "C1", "C2", "F1", "F2", "P1", "P2" one by one. Press the SET key again to store your current program under the selected recipe name. This process will overwrite the current recipe data to the saved recipe data.

6.2 Recall a recipe.

WARNING: You current program will be overwritten by the selected recipe. Please write it down somewhere if it is important to you.

To recall a recipe, press and hold SET key for 3 seconds until the Parameter Window displays "LoCK". Release the SET. The display will show "0". Use "+" and "-" keys to adjust the display to 1 and press SET. The display will show "rC" for a second and then the value "End". If press SET key now, you will exit this mode without overwriting any existing programs. This can prevent your current program been accidently overwritten by a recalled program. Use "+" or "-" key to locate recipe you want to recall. If you press "+" key repeatedly, you will see "End", "b1", "b2", "C1", "C2", "F1", "F2", "P1", and "P2" one by one. After you locate the recipe that you want to recall, press the SET key to select. Current program will be overwritten by the selected program.

7. Single-step mode

In this mode, the controller will hold temperature at one set value (C-1) continuously as long as the controller is powered on. Even if the controller is powered off and turned on again, it will resume working in this mode. You do not need to enter any other program steps in this mode. **For details on how to access these parameters, please check section 7 of the main instruction manual.**

To enter the single-step mode, the user need to set the parameter "PrG" to "off". Under the normal operating mode, to recall a recipe, press and hold SET key for 3 seconds until the Parameter Window displays "LOCK". Release the SET. The display will show "0". Use "+" and "-" keys to adjust the display to 3 and press SET. The display will show "PrG" for a second and then the value "on". Use "+" or "-" key to toggle between "on" to "off". Select "off" and press SET key if you want to enter the single-step mode. Otherwise, select "on" and press SET key to enter the program mode. The controller will go back to the normal operating mode. To set the temperature, press SET key once, and the left window will show "C-1". Use "+" or "-" key to adjust the temperature in the right window, then press SET to save and exit.

In single-step mode, the save and recall function (Section 7) still work. But the change can only be applied to C-1, i.e., you can only store your current set temperature to the C-1 in a selected recipe, or recall the C-1 temperature from a selected recipe to the current set temperature. Other data will remain in the memory of controller but is not accessible under the single-step mode. To exit the single-step mode, you only need to change the "PrG" value to "on".

Please note: In older versions, it may show PrG options as "y" or "n", instead of "on", "off". To enter single-step mode, please select "n".

8. Examples

8.1 Store your program as a recipe (Program Mode)

Before you input your program, check the PrG = on (accessed by LoCK code "3"). Press SET briefly, and enter the program below:

C-1=120, t-1=2.0;

C-2= 290, F-2=160;

C-3=130, F-3=30.0.

You can leave the rest of steps as their default values.

To store in program to recipe b1, long press SET key, set LoCK=2, choose b1, and press SET again to confirm and exit. Now the controller is back to the normal operating mode. It will run on this current program, which has just been saved as recipe b1.

8.2 Recall a recipe to the current program (Program Mode)

Before you input your program, check the PrG = on (accessed by LoCK code "3"). Long press SET, set LoCK=2, choose b1, press set to exit.

Then recipe b1 is recalled back as the current program. The controller is back to the normal operating mode and will start run the current program.

8.3 Store your program as recipe (Single-step Mode)

Before you input your set temperature, check the PrG = off (accessed by LoCK code "3").

Press SET key once, and then set C-1=150, press set again to confirm and exit. The controller will go back to the normal operating mode and start running on this single-step program.

To store current program back to recipe b2, long press SET, set LoCK=2, choose b2, press set to confirm and exit. Now your current program is stored as recipe b2.

8.4 Recall your recipe to current program (Single-step Mode)

Before you input your set temperature, check the PrG = off (accessed by LoCK code "3").

Long press SET, set LoCK=1, choose b2, press set to confirm and exit.

Now the C-1 from the recipe b2 is recalled back to your current program. The controller will start run at this temperature setting.

8.5 Advanced examples

This example will show you how the PrG mode can affect the saved and current recipe/program.

1) Set PrG = on, select "b1" recipe:

C-1=120, t-1=2.0;

C-2= 290, F-2=160;

C-3=130, F-3=30.0;

2) Change PrG=off, now the current single-step program is:
C-1: 120.

3) Set current C-1 to 200, then store current program back to recipe b1. Now the b1 recipe is:
C-1: 200.

4) Change PrG=on, current b1 recipe is:
C-1=200, F-1=2.0;
C-2=190, F-2=160;
C-3= 130, F-3=30.0.

9. Factory reset function

WARNING! This function will restore all the parameters (including receipts in the memory) back to factory default. Please write all the necessary settings down. **For details on how to access these parameters, please check section 9 of the main instruction manual.**

To reset, under the normal operating mode, press and hold SET key for 2 seconds until LED display "LoCK", and then release the SET key. The display will show "0" then. Use "+" key to adjust the number to 666 and press SET key again to confirm. The display will show as "lnlE", then it will show as "off". Press "+" key once to change "off" to "on". Press SET key to confirm factory reset. The display will show "----" then "8.8.8.8." When you see this display back to normal operating mode, factory reset completed.

Please note: In older versions, it may show lnlE options as "y" or "n", instead of "on", "off". To reset, please select "y".