



# Operation Manual

(Models 405 and 605)

**TABLE OF CONTENTS**

Buttons .....3

Modes of Operation .....4

    Power Up Mode .....4

    Off and Cool Mode .....4

    Run Mode .....5

        Grill Probe Setpoint Display State.....5

        Grill Probe Actual Display State .....6

        Meat Probe Setpoint Display State.....7

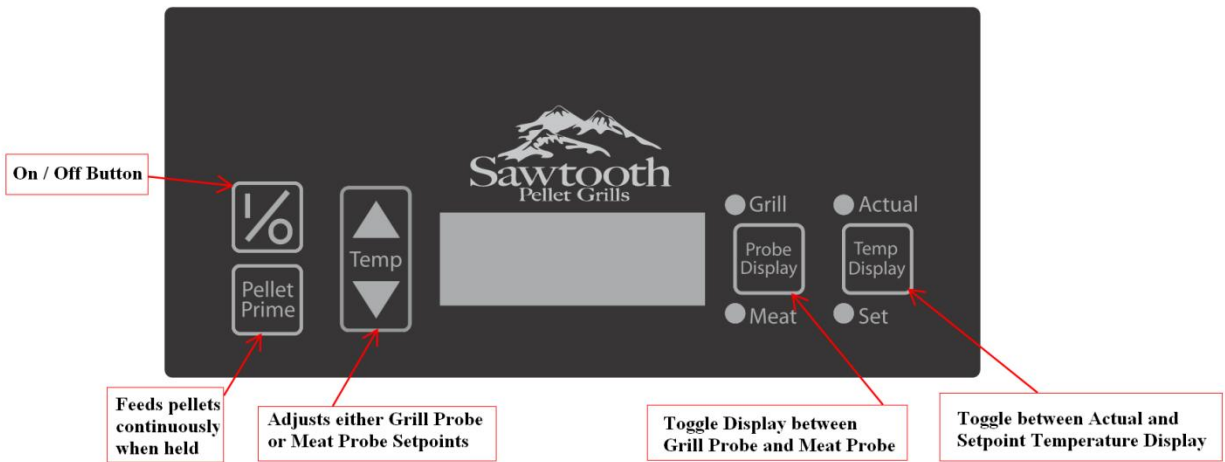
        Meat Probe Actual Display State .....8

        Run Mode Control Procedure.....9

Shutdown Mode.....10

Error Mode .....10

**BUTTONS**



Probe Display – Toggle Display between Grill Probe and Meat Probe

Temp Display – Toggle Display between Actual and Set point

### MODES OF OPERATION

#### POWER UP MODE

When power is applied to the system after plugging into an AC outlet, the grill control will display the following :

**SPG** identifies this as a Sawtooth Pellet Grill for 3 seconds

**605** or **405** showing the current model number for 3 seconds

**U112** identifies the software version running in this control as Version 1.12

Once the display identification is complete, the system will recall and reenter the last known mode prior to power down.

#### OFF AND COOL MODE

The Off and Cool mode is the normal off state of the control when it has cooled below a safe temperature. Following shutdown the display will be dark and one LED light will be blinking. Once a cool state is achieved all LED indicators will be dark. Pressing the On/Off button in this mode will cause the system to enter the Run Mode.

## Sawtooth Pellet Grill Temperature Controller

### RUN MODE

Upon first entering the Run Mode, the system will attempt to light the grill for a maximum of 30 minutes. During this 30 minutes, the auger is run at a 15% duty cycle (on for 1 second, off for 6.7 seconds), the igniter is turned on full, and the fan is turned on full. If after 30 minutes of this operation the measured Grill Probe temperature has not exceeded 150°F, the system will enter the Error mode and display the error code for failure to start (**EP-2**). If the Grill Probe temperature exceeds 150°F, the system will turn off the igniter and begin to control the Grill Probe temperature to the setpoint target.

#### GRILL PROBE SETPOINT DISPLAY STATE

The seven segment display will show the Grill Probe Setpoint temperature by default:



Note that if the Ignitor is on, the LED lit in this column will blink.

In the Grill Probe Setpoint display state, the Grill Probe setpoint can be adjusted with the Temp Up and Down buttons. The Grill Probe setpoint defaults to 350°F, but can be adjusted between 150°F and 550°F in 5°F increments.

Note – Grill will default to last known set point after first start up. Set Point will reset every time the grill is unplugged to the default value.

## Sawtooth Pellet Grill Temperature Controller

### GRILL PROBE ACTUAL DISPLAY STATE

Press the Temp Display button to toggle to the Actual measured temperature of the Grill on the display:



In this state, if the Temp Up or Down buttons are pressed, the display will revert to the Grill Probe Setpoint Display state.

If a Meat Probe is detected, pressing the Probe Display button will change the display state to the Meat Probe.

## Sawtooth Pellet Grill Temperature Controller

### MEAT PROBE SETPOINT DISPLAY STATE

In the Meat Probe Setpoint Display State, the target temperature for the Meat Probe is displayed. The Temp Up and Down buttons can be used to adjust the Meat Probe setpoint between 80°F and 180°F in single degree increments.



Press the Temp Display button to change to the Meat Probe Actual Display State.

## Sawtooth Pellet Grill Temperature Controller

### MEAT PROBE ACTUAL DISPLAY STATE



In this state, if the Temp Up or Down buttons are pressed, the display will revert to the Meat Probe Setpoint Display state.



---

### RUN MODE CONTROL PROCEDURE

#### Deciding whether to control to the Meat Probe Setpoint or the Grill Probe Setpoint

Any time the system is in the run mode, it is attempting to control the Meat Probe to the Meat Probe setpoint first and the Grill Probe to the Grill Probe setpoint second. If a Meat Probe isn't detected, the system does not attempt to control to it. While a Meat Probe is present and the Meat Probe temperature is below the Meat Probe setpoint, the system will control the Grill Probe to the Grill Probe setpoint. When the Meat Probe is within 5 degrees of the Meat Probe setpoint or higher, the system will no longer control the grill temperature to the Grill Probe setpoint, but will instead use the minimum Grill Probe setpoint of 150°F and the display will change to **DONE**.

Taking this action can prevent exceeding the Meat Probe setpoint for some time, but in the case where the Meat Probe setpoint is significantly below the minimum Grill Probe Setpoint (for example if the Meat Probe setpoint is 80°F), the temperature of the item being monitored will likely continue to rise depending on the mass and the amount of time it is allowed to stay in this state. For the best results, either use a Meat Probe setpoint above 150°F or monitor the meat probe closely.

Note – if you are planning on doing multiple stage temperature cooking, you may consider NOT setting the Meat Probe set point. For example, if your recipe calls for cooking at 225° for 1.5 hours, then 250° for another 1.5 hours, the grill will automatically reduce to 150° as described in section above.

#### Controlling the Grill Probe temperature to the Grill Probe Setpoint

Regardless of whether the system has a meat probe connected, the primary function of the controller is to increase the output of fuel to the combustion chamber when the Grill Probe actual temperature is measured to be below the Grill Probe setpoint, and decrease the fuel when the measured temperature exceeds the setpoint. Additionally, the fan output can be reduced in some cases where the call for heat is very low. This is an attempt to maintain a minimum air to fuel ratio for the best combustion at low temperatures. Because the system is attempting to monitor and control to a setpoint, operation with the lid open can dramatically affect the ability to control the system to a setpoint. It is recommended that the grill be operated with the lid closed to the extent this is possible.

#### Reactions to falling temperatures

The system will react to a falling temperature in several ways. First, it will increase the amount of fuel and possibly the amount of air being supplied to the combustion area. If the temperature continues to fall more than 25°F below the setpoint, the igniter will turn on. If the system continues to fall below a minimum operating temperature of 115°F, it will reenter the ignition mode, and if after 30 minutes, the system has failed to reach at least 150°F, it will shut down and display the error code for failure to start (**ep-2**).

#### Reaction to Over-Temperature

If the system detects a temperature on the Grill Probe exceeding 700°F, it will shut down and display the Over Temperature error code (**ep-1**).

## Sawtooth Pellet Grill Temperature Controller

### SHUTDOWN MODE

Shutdown Mode is possibly the most important mode for the system. It uses a procedure to gradually reduce the amount of fuel in the combustion area to reduce the possibility of the flames entering the auger tube and starting a fire in the hopper. It is strongly suggested that the shutdown procedure be used instead of simply unplugging the system from the outlet to turn it off. To initiate shutdown from the Run Mode, press the On / Off button. Over a 30 minute period, the amount of fuel being provided will be gradually reduced to none. The fan will run continuously to reduce the temperature. If the temperature is found to be less than 130°F at the end of the 30 minute shutdown procedure, the fan will turn off, but if it is not, the fan will continue to run until the 130°F temperature is reached. The shutdown procedure will not be attempted if the system has not reached the initial 150°F Run Mode setpoint from startup.

### ERROR MODE

If an error is detected, the system will perform the normal shutdown procedure regardless of the error value. The system cannot run while an error is present. If an error has been detected, it can be cleared by pressing the On / Off button to enter the Run Mode. However, if the cause of the error is still present it will enter the Error Mode again.

ER-1 – Over Temperature Error – This error can be detected at any time, and simply means the Grill Probe temperature exceeded 700°F. This can also be a sign of an open connection between the grill control and the Grill Probe.

ER-2 – Failure to Start Error – Occurs when the ignition procedure fails to increase the temperature above 150°F within a 30 minute window.

ER-3 – Power Failure Error – Occurs when the system is in the Run Mode and power is lost. When power is re-applied if the system detects a temperature of less than 150°F, the assumption is that power was lost and the fire went out while power was removed. It does not attempt to re-light the grill in this case. If power is re-applied before the temperature falls, the system will return to the last setpoint and continue the Run Mode normally.

ER-4 – Grill Probe Short Circuit – Occurs when the system detects a shorted Grill Probe that cannot be used to reliably measure temperature.