Instruction Manual

SYL-2615 Application Notes

Auber Instruments
(Ver 1.0, Apr 2017)

SELECTING BLOWER SIZE

For Kamado style smokers/grills such as the Big Green Eggs (BGE), a 6.5 CFM blower is usually more than sufficient. When cooking at 225°F with about 40°F ambient temperature, a 6.5 CFM blower only needs to run at less than 5% of the time.

For 18.5" Weber Smoky Mountain (WSM), a 6.5 CFM blower is recommended. It has enough power to drive pit temperature to 300°F. The small bottom vent opening is too small to install the 10 CFM blower. For 22.5" WSM, either a 6.5 CFM or a 10 CFM blower can be used. For a 26" WSM, a 10 CFM blower is recommended.

For BGE and WSM smokers/grills, please do not use a blower that is much stronger than what we recommend. If the blower is too strong, you may not be able to control the temperature well.

For offset smokers with firebox on the side, a 20 CFM blower is recommended.

SELECTING CONTROL MODE

This controller offers two different PID control modes: **PWM** (Pulse Width Modulation) and **FS** (Fan Speed Control). In **PWM** mode, the controller will either turns on the fan at full speed or turn off the fan completely. By changing how much time the fan is turned on during each cycle, which is typically set at 15 seconds, the controller regulates the air flow in a smoker. For example, if the controller decides that 10% output is needed, it will turn on the fan for 1.5 seconds for every 15 seconds cycle. In **FS** mode, the controller adjusts the speed of the fan and hence regulates the air movement in a smoker. Due to the variation of kinetic friction of the blowers, the precision of the fan speed control at the lower output end is not as good as **PWM** mode.

In general, both **PWM** and **FS** modes produce similar control performance when the same PID parameters are used. However, each mode has its own advantages for a specific system.

For WSMs and other similar smokers with metal walls, **FS** mode is recommended. The briquettes used in WSM produce more ashes than lump charcoal used in Kamado smokers. **FS** mode provides a steady low speed air flow, which can avoid blowing up ashes during smoking.

For Kamado style smokers, **PWM** mode is recommended. This type of smoker is very efficient in retaining heat. The typical fan output which is needed to maintain at low to medium smoking temperature is in the range of 1% to 3%. This would be difficult for **FS** mode control because of the poor resolution at its low speed range. In contrast, **PWM** mode works well in this range. Another observation is that using **PWM** mode in Kamado smokers do not blow up much ashes as compared to using **FS** mode in WSMs. This appears to be contradictory to the fact that **PWM** mode turns on the fan at full speed and produces stronger air flow pulses. But it actually make scene because 1) Kamado smokers require less air flow; 2) lump charcoal used in Kamado smokers produce much less ashes than the briquettes used in WSMs.

PIT PROBE LOCATION

Probes should NOT be exposed to open flame nor put in the direct hot air flow from open flame. The probe tip should not be in touch with grate nor set too close to the wall of the smoker. For Kamado smokers, the pit probe can be placed anywhere on the grate above the plate setter. For WSM, the pit probe can be placed anywhere on the grate above where the water pan is, empty or filled.

WHETHER TO USE A WATER PAN?

This is a highly debated topic. Here is our understanding. There are two purposes for the water pan.

1) The main purpose of a water pan is to keep the pit temperature below 250°F. Without a PID temperature controller, people can only rely on adjusting air vents and using a water pan to control the temperature in a smoker. Because water has high heat capacity and it also absorbs a lot of heat during evaporation, using water pan in smoker makes it easier to keep the temperature below 250°F. We did a calculation on how much energy is needed to heat the same volume of water or air from room temperature to 225°F. Heating 100 ml (3.4 fl oz.) of water from its liquid form at room temperature to 225°F water vapor needs 264 KJ of energy. In contrast, only 0.01 KJ of energy is required to heat 100 ml of dry air to the same temperature. Assume the

vent setting is the same, if all these heat is not absorbed by water evaporation, the pit temperature would increase a lot. But nowadays with the help from BBQ controllers, people don't have to use water pan for temperature control purpose. On the contrary, adding a water pan to the smoker make the system a slow response system. From a temperature-controlling point of view, a water pan makes the system difficult to control. Moreover, adding a water pan will make your smoker burn more fuel, and will make it difficult to reach 250°F or higher if the smoker doesn't have good insulation.

2) The second purpose of using water pan is to keep food moist. For single metal wall smokers (e.g., WSM), you can tell the difference between food cooked with filled water pan, and food cooked without. However, water pan is unnecessary for kamado style smokers with good thermal insulation. This is because it consumes relatively less fuel, requires less oxygen, and hence draws less air flow. The food in a Kamado smoker can stay relatively moist compare to food in a single metal wall smoker. For the same reason, many electric smokers do not use water pan because there is very little air flow.

SEALING THE DOME/LID

A good seal is critical to ensure a good air flow control in the smoker, which ultimately affects the pit temperature control.

For Kamado smokers, if you see smoke leaking out from the rim of the dome, you probably need to adjust the upper band or the hinge, or replace the gasket. The gasket material will wear and deteriorate over time. Most of time, the replacement of gasket is unnecessary, a simple adjustment will solve the problem. This is especially true if the upper band has never been adjusted since you purchased smoker. There are many YouTube videos on how to adjust the aligning the seal. Here is an example: https://youtu.be/ZQ0PaSTMgpo

For WSMs, there is no gasket installed by the manufacturer on the smoker lid, or on the door of the center section. The seal on these gaps may vary from smoker to smoker. If your smoker has a large gap between the door and the center section (a common problem for 22" WSM), you can try to bend the door to fit the shape of the center section better. You can also buy a roll of gasket for the door to make a better seal. The leakage from the smoker lid is not as critical as in Kamado smokers because WSMs normally require more air flow.

PREPARING SMOKER FOR LIGHTING

- **Removing Ashes**

Removing ashes can ensure that the air flow is not blocked by residual ashes or small charcoal bits, which is essential for good temperature control. Clean the ashes before firing up your smoker again. For Kamado smokers, you should remove all the ashes and small charcoal bits trapped in the holes in the fire grate and fire box. For WSMs, make sure all the ashes mixed with old briquettes are removed.

- **Loading Fuel**

For Kamado smokers, use lump charcoal to ensure a good air flow. Do not dump charcoal directly to the fire box. Build a charcoal mound by laying large chunks at the bottom, and adding smaller pieces to the top.

For WSMs, the **Minion method** (https://goo.gl/BHkRMI) is good for both 18.5" and 22.5" smokers, which can give a stable temperature control because all briquettes are connected. If you don't need to cook for a long time, the **Fuse method** (https://goo.gl/IXBAQ5) is good for 22.5" WSM. These are recommendations for medium and low temperature range cooking. When cooking at high temperature range, 350°F and above, more burning coals and air are needed. Rake the briquettes into a small pile that is between the center of the fire grate and the vent on which the blower is mounted. The blower may need to be run at about 50% ~ 75% or more to reach temperature from 350°F to 400°F.

- **Lighting**

For WSMs, we prefer to use chimney starter for lighting the briquettes. For Kamado smokers, we prefer to use an electric lighter because it is easy to use. The chimney starter works for the lump charcoal. However, the burning can be violent and dangerous.

ADJUSTING TOP VENT

For Kamado style smokers such as the BGE, the top vent opening needs to be set very small gap. For the ease of discussion, we define the top vent opening as the width at the widest gap of the vent. We recommend to set the top vent to 1/16" to 1/8" (1.5 mm to 3 mm) open when cooking in the medium or low pit temperature, with the ambient temperature between 30°F and 60°F. One easy way of gauging the opening is to use toothpick as shown in the picture below. You can open up the vent a little bit when you are cooking at a higher pit temperature, or when the ambient temperature is colder. When the ambient is higher than 60°F you should probably close the vent completely. When the ambient is below 30°F, you can open the vent to 1/8" or 1/4" Wide. If the pit temperature stays above you set temperature even after the blower has stopped running for more than 20 minutes, then the top vent opening is too big.

For WSM, we recommend to set the top vent to 1/4" wide. We find that the top vent opening is not critical for controlling temperature in WSMs or other smokers with single layer of steel wall. This type of smokers is not thermal efficient, which means they lost much more heat than Kamado style smokers, and so they need more air to burn more fuel in order to main the pit temperature.

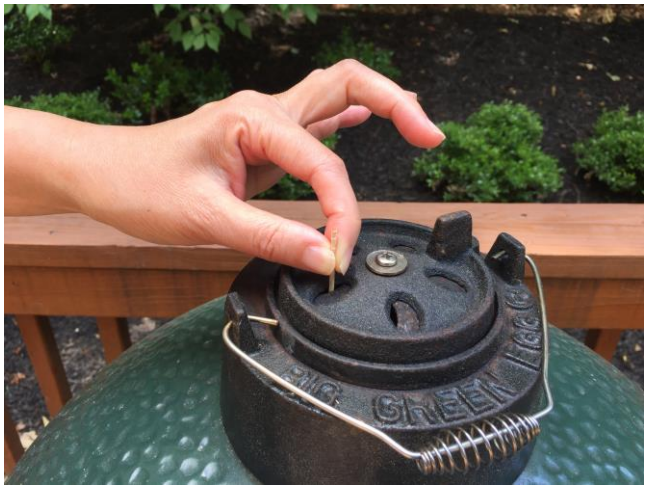

Figure 1. Leave the top vent barely open.

ROUTER LOCATION AND WI-FI SIGNAL

The location of a router can make a big difference for the reliability of the Wi-Fi connection between the router and SYL-2615 controller located outside of a house. The signal from a router located above the ground level can reach much further than the signal from a router located in the basement. You may not feel the effect of the location of a router to its signal strength if you are in the house, because the wooden structure in the house will not block the Wi-Fi signal from the basement. But when you are outside of the house, the signal strength from the router in the basement will reduce much faster than the signal from a router above the ground level as you moving away from the house. So, when you configure the controller's Wi-Fi connection, you should connect to the router that is located above the ground level.

USING THE APP WHEN THERE IS NO INTERNET CONNECTION.

You can use the APP to control the smoker when there is no router that is connected to the internet. There are two ways to do it.

1) You need to have two smart phones, phone A and phone B. Phone A must have the cellular internet connection (hotspot enabled). You can turn on the hotspot (tethering) on phone A. Connect phone B to the hotspot of phone A, then on phone B, setup the controller to the hotspot of phone A. Phone B can be used to run AuberSmart App to control the smoker, over the router of phone A.

2) You need to have a router that can be placed within the Wi-Fi communication range to the smart phone and the controller. You also need a power source the can power up the router (Or portable router with battery). Place the controller, router and phone close to each other. Turn on the router and controller, then connect the phone to that router. Then turn on the Aubersmart app, to setup the controller to that router as usual. Internet access to that router is not necessary. But if no internet is attached to that router, you can only access that controller when your phone is connected to that router. You cannot access that controller via Cellular internet. The blue LED WiFi light may be flashing all the time, but it won't affect the function.

3) Similar to option 2). But you can setup the controller and your smart phone when your router is connected to the internet in advance. Once finished, you can move your controller and router together to a smoking location that has no internet access. Power them up. The router will set up a local network between the controller and phone.

(End)

.
Auber Instruments, Inc.
5755 North Point Parkway, Suite 99
Alpharetta, GA 30022, USA
E-mail: info@auberins.com Tel: 770-569-8420