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POWER YOUR PROPANE BURNER

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Run your flames on a simple switch

BY JP MARTEL

As a homebrewer I am interested in the process of making beer, and of course the beer itself. However, as I came to realize, there is another aspect to the hobby that I wasn't fully aware of . . . all the cool hardware and gadgets that are available to us homebrewers. When I first started brewing, many of the kettles, pumps, hardware, and other gadgets were just not available.

Like most homebrewers I began my all-grain brewing journey with a small kit consisting of a mash cooler and one pot. Brewing inside was time consuming and messy, so I bought my first propane burner and moved outside. This would provide me with other challenges such as how to keep the mash from cooling down too much on cold-weather brew days. Up to this point I would only brew during the summer months, but my homebrew supply suffered in the off-season. I needed a solution, one that a bit of research would provide.

I discovered a new term and a solution to my temperature issues. Enter the heat-exchanged recirculating mash system, or more colloquially known as HERMS. In case you are unfamiliar, a HERMS recirculates wort from the mash tun through tubing that is immersed in hot water, usually a hot liquor tank. This water is heated just above the desired mash temperature and maintained. Many systems have an automatically lit burner powered by a controller with temperature sensors. The temperature is set and when the temperature drops in the hot liquor tank the controller calls for heat and the burner ignites. There are two main types of HERMS tank heating options — electric and propane (or natural gas if available to you). Electric would be impractical for my conditions so I opted to go with propane.

The problem I had was trying to find information on building a pilot-lit burner while at the same time making it safe to operate in outdoor conditions. I was finding a lot of designs that used a pilot light that was constantly lit but not controlled by a sensor and valve. The pilot light being blown out with a gust of wind was a concern. So, I set my sights on using a smart valve that would control the flow of propane safely.

This build needed to meet one more criteria to be a viable solution. Since I brew outside and store my brew setup indoors, I would need a brewery that I could take apart and easily move indoors for storage. The burner modification had to be contained to my burner's housing unit, making it tough for an automated, sensor-driven system.

When I started my HERMS system project build I broke it up into three phases so it wasn't so daunting. First the HERMS tank and heat exchanger, second was the burner, and finally the controller. These instructions will concentrate on my burner modification itself rather than my HERMS setup. The burner can be used without a controller by means of a manual switch if building this in a phased approach like I did. When my brewstand is built, a controller will turn the burner on and off for me.

Tools and Materials

- Smart valve, low-pressure (I used a Honeywell SV9501)
- Hot surface igniter pilot
- Propane burner
- Low-pressure propane regulator (11-in. WC) and hose
- ¼-in. MNPT x ⅜-in. MGF control valve orifice (CVO)
- Pilot light aluminum tubing ¼-in. OD
- Copper tubing ¼-in. ID
- (2) ¼-in. flare to ½ male brass fittings
- 24V 40VA transformer
- Power strip with on/off switch
- Copper tubing flaring tool

The pilot light being blown out with a gust of wind was a concern. So, I set my sights on using a smart valve . . .

Photos by JP Martel

STEP BY STEP

1. MODIFY BURNER TO RAISE IT CLOSER TO THE TOP OF THE STAND

If you already have a burner and you're not looking at increasing your BTU output or kettle size, then great, you can check that off the materials list. If you need to get a burner, look for one with a solid BTU output. I already had a Bayou Classic stand with a banjo-style burner so I was set. It's quiet and heats water quickly.

When you use one of these high-BTU burners you notice that the flame can be set really low, or scary jet engine level high. When we introduce a smart valve, we will lose that range and it will always be at a lower setting. The propane pressure needs to be lowered for the smart valve to function properly. A lower flame means longer heat times, but there is a fix. What we need to do is move the burner head closer to the bottom of the pot. To do this you might have to cut some of the burner housing and drill new holes for the screws. I moved mine up two inches (5 cm) and found that the heat times before and after reducing the pressure were nearly the same. I am considering making this change to my other burner as well just to save on propane. Also, you can check out the "Heat Shield" build in the September 2020 issue of *BYO*.

2. MOUNT SMART VALVE

You will need to install the smart valve onto your burner's housing unit on the same side you have your propane tank. The smart valve has gas-in and gas-out ports. In my case, my tank is on the right-hand side of my burner so I mounted the smart valve on the right.

Using a piece of 2-in. x 6-in. (5-cm x 15-cm) metal plate, I drilled a ¾-in. (19-mm) hole that fit against the smart valve where the gas-out port is. This allows the brass fitting to be connected to the gas-out port described later. Drill four holes that line up with the four holes in the smart valve. Drill two more holes that allow a U-bolt to be used to mount the plate and smart valve to the frame of the burner. Mount the plate to the smart valve with four screws and then using the U-bolt, mount the plate and valve to the frame of the burner.

Attach the brass fittings to the smart valve gas-in and gas-out ports.

3. INSTALL THE IGNITER AND IGNITER END OF ¼-INCH ALUMINUM

On the same side that the smart valve is installed locate a spot between the burner housing and the burner head. The igniter has a small plate with a hole in it that can be used to mount it to the burner housing. Make a mark on the inside of the burner housing where the hole is on the small plate making sure that the igniter is about 1 in. (2.5 cm) above the burner head. Drill a hole at the mark.

Using a small pipe bender bend the ¼-in. aluminum tubing so that it will fit between the igniter and the smart valve igniter port. Connect the igniter end and mount the igniter to the burner housing.


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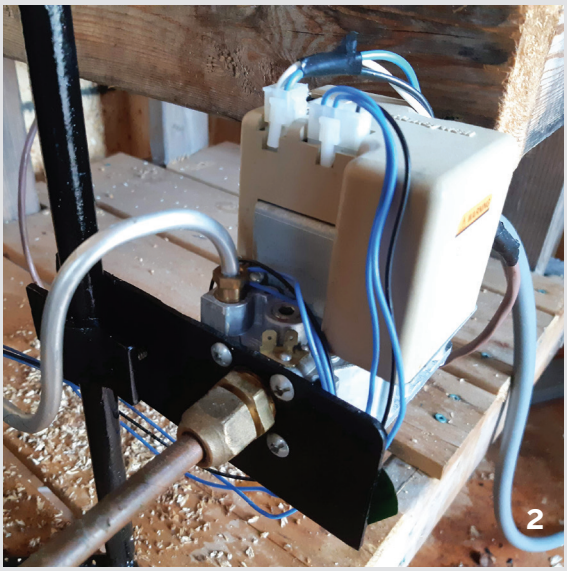
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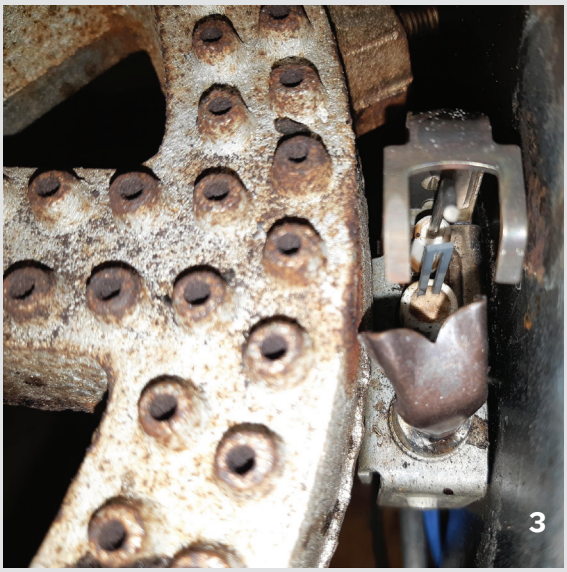
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4. CONNECT TUBING AND PROPANE VALVE

Install the new needle valve to the burner. To do this remove the existing propane hose and orifice that is connected to the burner head and thread the valve in its place making sure that the gas-in side is pointing towards the gas-out of the smart valve (photo 4A).

Cut a piece of ¼-in. ID copper tubing to the length between the gas-out fitting of the smart valve and the needle valve on the burner. Using a flaring tool, flare the ends and connect the tubing to the smart valve gas-out and the needle valve. Tighten the brass fittings.

Connect the ¼-in. aluminum tubing to the igniter port on the smart valve with a small brass compression fitting. The igniter I bought came with these fittings included.

Connect the new low-pressure propane tubing coming from the propane tank to the gas-in brass fitting on the smart valve (photo 4B).

5. HOOK SENSOR CONNECTORS AND POWER TO VALVE

There should be two connectors on the smart valve, and they each have a different number of pins. Plug in the igniter connector then the control connector (photo 5A).

Take the wires coming from the control connector and connect them to the transformer (photo 5B) on the 24V side. On the other side wire the transformer to the 120VAC power strip. (In a slightly more advanced build, a digital temperature sensor could signal a PID controller when to have the burner turn on and off automatically based on a pre-set temperature in the HERMS kettle. Due to my current logistical restrictions, my system works well for me as I monitor the temperature manually and play the part of the PID controller with the power strip switch.)

6. TESTING

Check to make sure the smart valve is switched on and the needle valve on the burner is open fully. Open the propane tank valve. With some soapy water and a small paintbrush, brush some soapy water on the connection between the propane tank and the smart valve to check for gas leaks. The soapy water will bubble if there are any.

With the transformer plugged into a power strip with an on/off switch, plug the power strip into an electrical outlet and make sure the switch on the power strip is on. The smart valve should attempt to light the igniter. This might take several attempts since the air in the lines will have to be forced out by propane. Once the igniter is lit the burner should then light. Check the other connections with soapy water. Tighten any leaky connections. To shut the burner off, just switch the power bar off and, when all wrapped up, turn off the valve on the propane tank. BYO

Brewing with electricity and propane can be hazardous. There is a risk of electrical shock or death. If you decide to build this, your design and finished project should be reviewed by a licensed electrician. Any 120VAC power used in brewing operations should be protected by a Ground Fault Circuit Interrupter (GFCI).


4A


4B

5A

5B


6