

## Your new BIAB controller

Thanks for buying your controller from us!!! The mash side of your controller is based on the MYPIN TA4 series PID controller. Unlike cheap REX branded controllers, MYPIN controllers are manufactured in China using modern Surface Mount technology. This is the same technology used to manufacture your high quality cell phone. The boil side of your controller uses a PWM controller we designed and we also use modern Surface Mount technology for our controllers.

### How your controller works



#### **Your new controller has four controls:**

A red mushroom button at the bottom left that serves as an on/on switch as well as a panic stop button

The MYPIN TA4 controller at the top right that manages your mash temperature.

The dial at the top left that sets your rate of boil.

A mode switch at the bottom right that switches between boil and mash.

Your controller has a 12' 10 gauge heavy duty power cord.

Depending on the model your controller will have a 3 prong "dryer plug" or 4 prong "dryer plug". All 240V models ship with a standard 3 prong twist lock 30 Amp rated power socket. This controller can safely manage a heating element as large as 6000 Watts.

All units come with a water tight K type thermocouple with 1/4" MPT

type threads.


### GFCI Protection

Regardless of which version you purchased your controller was tested behind GFCI and is designed to be compatible with GFCI protection. We highly recommend that you install a spa panel that incorporates GFCI to protect you and your brewery.

### Pump Control

When we designed these controllers we understood that many customers would plug them into existing 3 prong dryer outlets. A combination of 3 wire X 120V X 240V loads can-not be GFCI compatible. You need 4 wires and a 4 prong power plug to make this combination GFCI compatible. We make a tough decision between pump control and safety, chose safety and made all of our BIAB controllers GFCI compatible. This means that you will need to provide separate 120V pump control for your brewery.

## MYPIN Controller Features



The image shows a black MYPIN Temperature Controller TA4. The top row of the display shows '88.88'. Below that, 'PV' and 'SV' are displayed with '88.88' and '88.88' respectively. There are four indicator lights: OUT1, OUT2/AL2, AL1, and AT. Below the lights are four buttons: a yellow 'SET' button, a blue '<</AT' button, a green up arrow button, and a green down arrow button. The MYPIN logo is on the bottom left and TA4 is on the bottom right.

**Top Row** – Displays the current temperature  
**Second Row** – Displays the set temperature (the temperature you want to regulate to)  
**Out1** – Is on - red when the element is on & off when the element is off  
**Out2/AL2** – Not used in our application  
**AL1** – Turns on when AL1 value is crossed. We set AL1 to 170F.  
**AT** – On when in auto tune mode  
**SET** - Hold down to go into programming mode  
**SET** + **<</AT** - Change the set temperature – Press **SET** then **<</AT** until the second row, right digit is flashing to change temp.  
**<</AT** - Press to select the set temperature digit you want to modify  
**↑** **↓** - Press to move digit up or down  
**<</AT** - Hold down to auto tune

### Basic MASH Operation

For single-step mash you should set the controller to your mash temperature and leave it set. For convenience we test all of our controllers at 145F, the most common temperature for a single step mash, and if you mash at 145F you may not need to make any changes at all!

For a multi-step mash you should start at the lowest temperature then increase the temperature based on your mash schedule. We suggest that you do a trial run with water while monitoring the temperature mid-way down your BIAB pot so that you understand how long it takes for the temperature change to propagate through your system. Temperature changes will not be instant because of the time it takes for your pump to circulate water through your system.

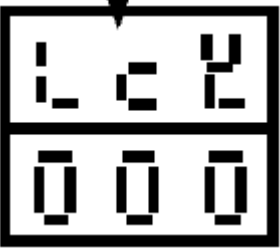





### BIAB Boil Operation






The one real advantage to BIAB is after your mash is done you lift out the grain bag, let it drain and start your boil.


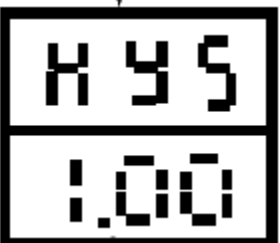
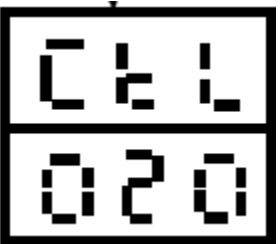
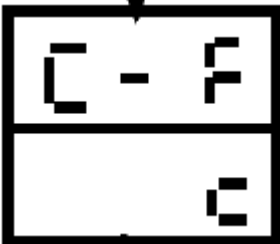
With our controller you just flip the mode switch down to boil, turn the boil knob all the way up until you start boil then adjust the knob to the boil rate you want – and assuming you have a way to hang your grain bag above your pot, all while your grain bag is still draining!!! There is nothing to unplug, plug in or to switch over. And there are no controller settings to fiddle with. Controls are simple and the boil control knob is sensitive enough to set exactly where you want.

### Initial MYPIN Settings

We set the initial settings and calibrate the thermocouple before shipping your controller to you. In most cases you will not need to make any changes but because no two systems are exactly alike you may need to modify these setting to make your BIAB system perform better. To go into programming mode hold down the **SET** button. Once in programming mode pressing the **SET** button will go through each of these menus in order.

	<p><b>Lock Screen</b></p> <p>This is the first screen you enter programming mode. The value should stay set to 000.</p> <p>Press the  button to advance to the next step.</p>
	<p><b>AL1</b></p> <p>The factory value is 900 – we set to 170 because 170F is the denature temperature of your mash enzymes. You can change the value to anything you like without impacting the PID's operation.</p>
	<p><b>AL1 Mode</b></p> <p>2 is the default and we leave the setting at 2.</p>
	<p><b>AL2</b></p> <p>We do not use this.</p>
	<p><b>AL2 Mode</b></p> <p>We do not use this.</p>

	<p>Offset value used to calibrate your thermocouple. All thermocouples must be calibrated before they can be used because small differences in the alloys used cause errors in their measurements. A thermocouple only needs to be calibrated once.</p> <p>Also, any new thermocouple must be calibrated before use or your measurements will be off.</p> <p><b>We have already calibrated your thermocouple</b> and the calibration (PUF setting) is _____</p>
	<p>Temperature input type.</p> <p>This PID will accept K, J, T, E &amp; S thermocouples and will also accept Pt100 type RTDs. We use K type thermocouples and the input is set to K.</p>
	<p><b>Proportional Band</b></p> <p>This modifies how hard the heating element comes on based on the percentage the temperature is away from your set temp.</p> <p>Default value is 3 but we found that a value of 2 works better for the BIAB systems we tested with.</p> <p>If your temperature tends to overshoot and run high then you should reduce this value only after trying the I value first. If your temperature tends to stay low then you should increase this value only after trying the I value first.</p>
	<p><b>Integral Time Range</b></p> <p>This modifies how hard the heating element comes on based on how long your temperature is outside your set temp.</p> <p>Default value is 240 but we found that a value of 180 works better for the BIAB systems we tested with.</p> <p>If your temperature tends to overshoot and run high then you should reduce this value. If your temperature tends to stay low then you should increase this value.</p>
	<p><b>Derivative Time Range</b></p> <p>This is only used when managing large areas like the temperature of a large room.</p> <p>Default is off and we leave it off.</p>

	<p><b>Control Direction</b></p> <p>The MYPIN controller can be used to manage heat or cool.</p> <p>Default is heat which is exactly what we need.</p>
	<p><b>Control Hysteresis</b></p> <p>This sets the amount the temperature is allowed to drift before the PID controller will attempt to correct the temperature.</p> <p>Default is 1 and we leave it set at 1.</p>
	<p><b>Output Control Mode</b></p> <p>This sets the control (on/off) cycle time in seconds</p> <p>Default time for the model we use is 2 and we leave it set at 2.</p>
	<p><b>Measurement and Display</b></p> <p>C – Celsius, F = Fahrenheit</p> <p>Default is C and we change the value to F before shipping</p>

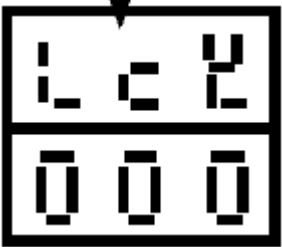


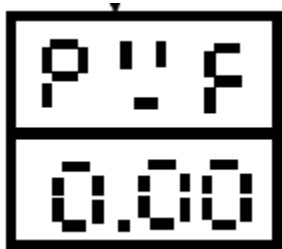





### Calibrating your Controller for maximum Accuracy

We already calibrate your controller at 212F – the boiling point of water, but thermocouples are not perfectly linear across their entire range. Your controller should do a great mash right out of the box but to get maximum accuracy you should calibrate your controller at the mash temperature you use most often. For single step mash this is likely in the 143F – 147F range. If you do step mashing you should calibrate to somewhere mid-range. When calibrated this way the other temperatures will be off by very little.

To calibrate you need to set the system up with water and use a thermometer you trust. If you don't have one you trust then you'll need to obtain at least three that you can compare. Most homebrewers have one or two and one or two they can borrow from friends.

To start calibration you should place your reference thermometer or thermometers as close to your thermocouple as possible. Set your mash temperature then start your mash cycle. Once your temperature stabilizes record your temperatures and use the process below to adjust the PID's offset.

*Note: If you use more than one reference thermometer don't be surprised if there is 5 or more degrees difference between them. We've seen as much as 10 degrees difference between household thermometers which is why we calibrate to the temperature of boiling water.*

	<p><b>To calibrate to your mash temperature</b></p> <p>Press and hold the  button until LcK shows in the top display</p> <p>Leave the second line set to 000.</p> <p>Press and release the  button to advance to the PUF step.</p>
	<p><b>This is the offset value used to calibrate your thermocouple.</b></p> <p>Press the  key to program the offset. As you press the  key you will see each digit in the second line flash. Press the   keys to move digit up or down</p> <p>Note: The offset should be set the same direction as the error. For example, if the PID is 3 degrees F high then +3 is added to the offset that may already be programmed into the PUF value.</p> <p>To exit, press and hold the  button until the top display returns to normal</p> <p>You may need to go through this cycle several times until calibration is perfect.</p>

### Fine Tuning your Controller

Before using your controller to do a mash you should do a trial run with water. When set up correct you should see the temperature rise to your set temp, over shoot a little then come back down to your set temp. Then the temperature should fluctuate slightly above and below your set temp. How fast this happens depends on the water volume you use and your system's configuration. If your mash temperature over shoots your setting then stays high you should try reducing your PID's 'I' value then reducing your PID's 'P' value. If your mash temperature does not quite reach your set temperature and it stays low then you need to look at the first three items on the list below. If none of these are a correctable factor then start increasing the 'I' value until your temperature runs high then reduce until your temperature is in control. If changing 'I' value does not seem to have an impact then you should increase the 'P' value.

### Five main factors control the accuracy of your MYPIN controller.

**Heating Element Size** – Your heating element size, or more correctly your heating element size relative to your mash size will impact the stability of your mash temperature. Generally speaking, a 5500 Watt element is more than large enough for up to a 20 gallon or larger grain bill, and can easily bring a 10 gallon grain bill from faucet temperature to mash temperature within 30 minutes.

It's easy to tell if your heating element is under size. Once you reach mash temperature your element should be off more time than on. You can monitor the element by watching the red OUT1 light on the PID. If the red light is on more than it's off then the element is working very hard to keep your mash up to temperature.

**Circulation** – BIAB depends on circulation, so much so that circulation is critical. Without enough circulation your temperature will stratify. Even with circulation you should expect some delay between your PID setting and your overall mash temperature because the temperature change will move through your BIAB system in a wave.

**Radiation and Evaporation Losses** – As you heat your mash you are also constantly losing heat through the sides and top of your pot. Most heat is lost from the top surface of your mash because you lose radiant and evaporation heat from the top surface. You should always keep a cover on your pot to minimize both.

**The PID 'P' Setting** – This setting modifies how strong the heating element comes on relative to how far off your mash temperature is. The higher the 'P' setting the harder the element comes on. We found by experience that an initial value of 2 is best.

**The PID 'I' Setting** – This setting modifies how strong the heating element comes on relative to how long your mash temperature has been low. The higher the 'I' setting the harder the element comes on. We found by experience that an initial value of 180 is best.