



# TOWER of POWER™

## Modular Brewing Control System

### Operation, Assembly & Maintenance Manual

Congratulations on your purchase, and thank you for selecting the TOWER of POWER™ Modular Brewing Control system from Blichmann Engineering™. We are confident that it will provide you years of service and many gallons of outstanding beer. This manual will familiarize you with the assembly, installation procedures, and use of the TopTier™ brew stand and accessories.

\*\*\*\* PLEASE READ THOROUGHLY PRIOR TO USE FOR IMPORTANT SAFETY INFORMATION \*\*\*\*

#### IMPORTANT !!

**Warning:** Sections labeled “Warning” can lead to serious injury or death if not followed. Please read these thoroughly and understand them completely before use. If you do not understand them or have any questions, contact your retailer or Blichmann Engineering™ ([www.BlichmannEngineering.com](http://www.BlichmannEngineering.com)) **before** use. Do NOT at ANY time operate the product until you have thoroughly read and understood these instructions!

**Caution:** Sections labeled “Caution” can lead to equipment damage or unsatisfactory performance of the equipment. Please read these sections thoroughly. If you have any questions, contact your retailer or Blichmann Engineering ([www.BlichmannEngineering.com](http://www.BlichmannEngineering.com)) before use.

**Important:** Sections labeled “Important” are critical to the proper performance and life of the product.

**Service & Support:** **Please thoroughly read this manual and view our online videos before contacting your retailer with questions.** If after reading this manual and viewing the videos you still have questions please contact your RETAILER for support. Note that the pump is warranted and supported through March Manufacturing directly, not through your retailer or Blichmann Engineering™.

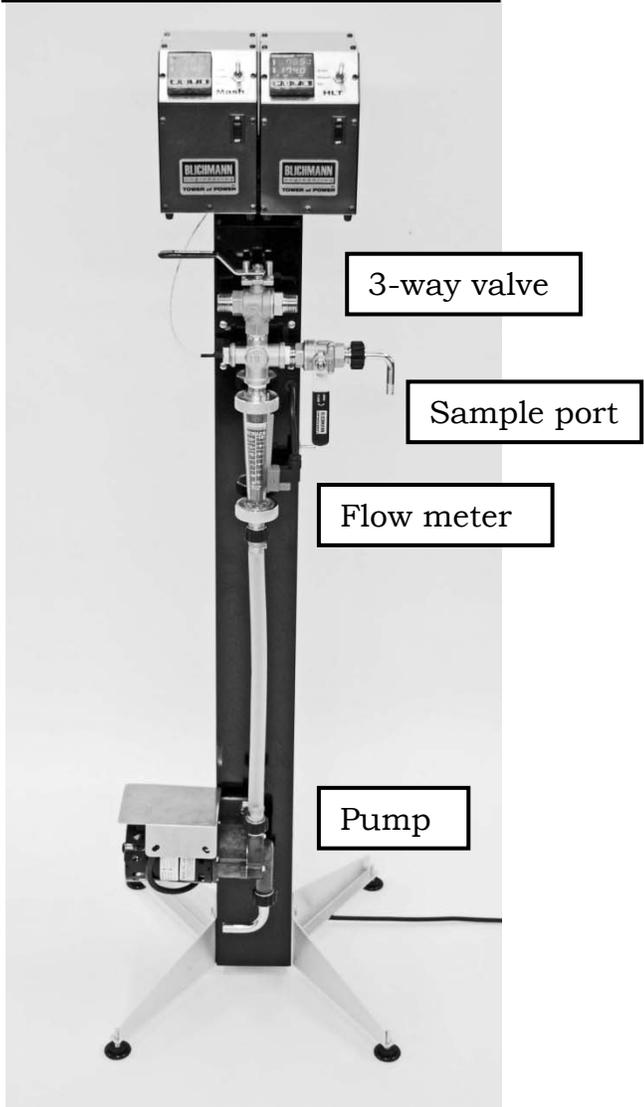
Advanced features (automatic ramping) are accessible through software only and requires the purchase of an optional communication cable. Due to the advanced nature we do not provide direct factory support. Please work through your RETAILER if you have any questions after reading the manuals or viewing the online tutorial.

# Overview of Tower and Control Modules:

The TOWER of POWER™ Modular Brewing Control is, by name, modular in nature. The user can purchase a single or dual control module separately and mount and integrate into their brewing system plumbing. Or if the user does not have the necessary valving, pumps etc., they can purchase the Tower module that provides all the needed plumbing and provides a convenient stand for the control module(s). If you already own a March 809/815 pump you can purchase the Tower without the pump.

**Note:** the hoses that connect from the Tower to the pots are not included. If you are a TopTier™ owner, an optional mounting kit is available to mount it permanently to the stand.

Tower with dual controllers



Controller Module



Mash and HLT labels provided

# Requirements Of Your System:

**IMPORTANT!** Read before unpacking or using this product!

**For the TOWER of POWER™ control system to function properly, your brewing system must meet some basic requirements. If your system is unable to meet these requirements please contact your RETAILER for guidance. We cannot guarantee the performance of the product if these basic minimums are not met.**

Hot liquor tanks perform well on nearly any system that can maintain a moderate flame. Mash Tuns require a couple basic performance parameters to be met for proper performance.

**Important!** Do not use or install the TOWER of POWER™ equipment until you verify that your equipment is capable of the requirements below. If you are using Blichmann Engineering BoilerMaker™ mash tun with our false bottom, and a TopTier™ burner you will not have equipment limitations. However, it is still important that you verify that your crush will allow adequate wort flow! Most stuck mashes are caused by too fine of a crush. It is also expected that

Your mashing system must have the capability to continuously recirculate your wort using a pump for the duration of the mash without sticking. The flow rates in the chart below are minimum values.

Finished Batch Size gal (L)	Min Flow GPM (LPM)
5 (19)	0.5 (2.8)
10 (38)	0.75 (3.8)
15 (57)	1.25 (4.75)
20 (76)	1.5 (5.7)
32 (121)	2.25 (8.5)

**Important:** Grain bed flow rates are highly dependent on crush quality. Move to a coarser crush if you are not able to flow at the above rates. It is also recommended that you allow a 10 min dough-in prior to turning on the pump to allow the air to purge from the grain and for the grain to fully absorb the water.

**Burner Requirement:** Your burner must be capable of operating well at low power settings. If you cannot maintain a flame at about half power your system stability will suffer. Specifically, you should be able to reduce your heat to achieve an average heating rate of 1.5 F/min or less. To do this, recirculate your wort at the above rates or faster (use a stop watch and known volume to measure flow rate). Then apply heat on your burner at the lowest stable level. If over a 20-30 min period the increase in wort temperature divided by the time is at or below 1.5 F/min you have met this requirement.

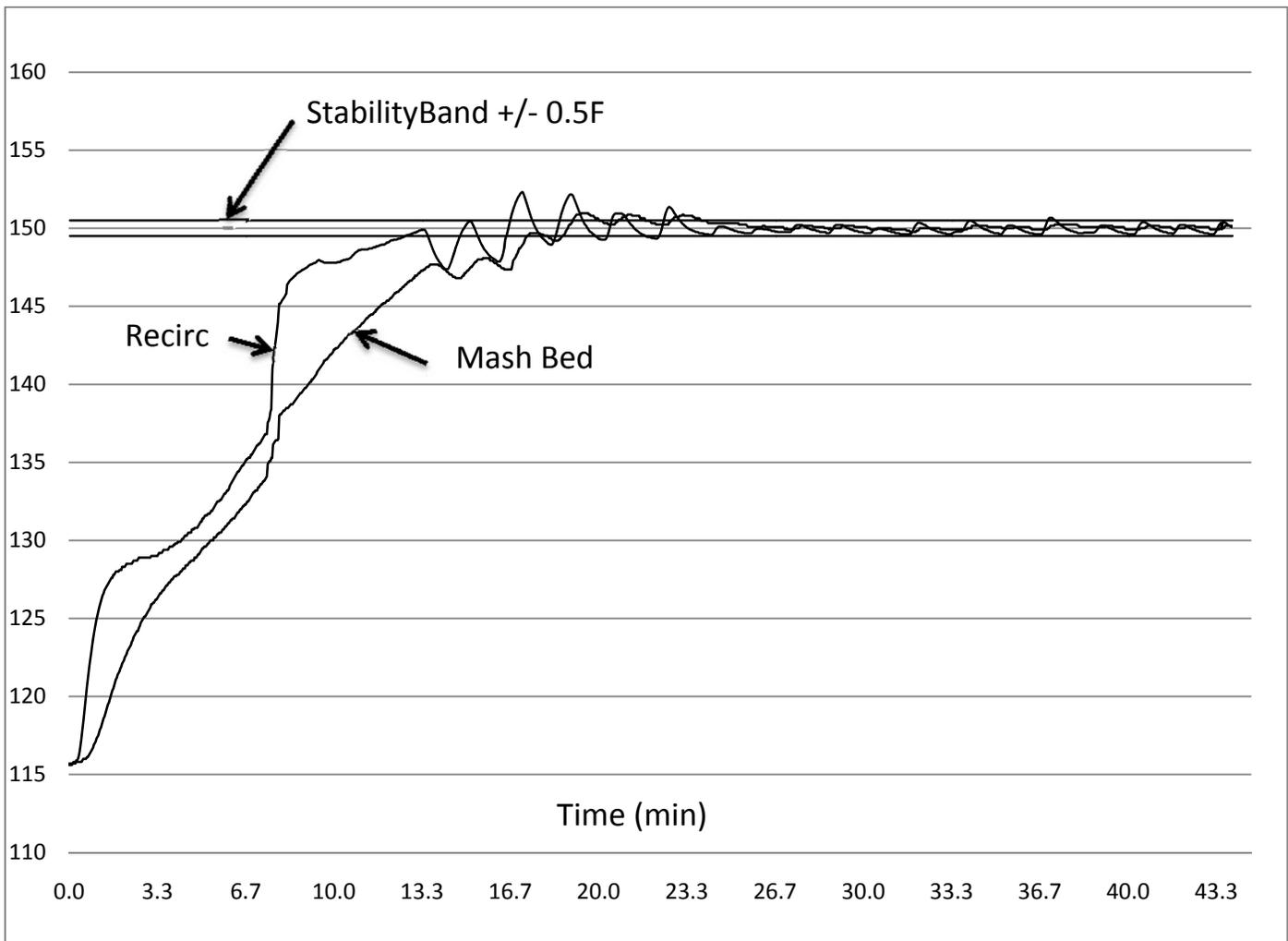
**Fuel Supply:** The solenoid valve supplied is suitable for up to 25 PSI propane regulators and residential natural gas. Fuel flow rate through this valve is adequate to power Blichmann Engineering TopTier™ burners on both fuels, however, other burners may need a larger solenoid valve (not included). Do NOT install a solenoid valve that draws over 2A at 120V including inrush or you may damage the ignition start relay which is NOT a warrantable failure.

# What to Expect From the TOWER of POWER™:

The TOWER of POWER™ control system is a very precise instrument that has been developed to provide exceptional control over a very broad range of batch sizes, flow rates, and input heat values without the need to re-tune as each individual condition changes. However, it DOES require a reasonable set of parameters to be met to achieve these results. When operated within the parameters listed in the previous section, your system should be able to maintain your mash and HLT temperature to within 0.5 F (0.25C) of your set point. Please note that in the case of mash control, we are controlling the temperature of the wort into the top of the mash bed, not the temperature of the mash itself. The large mass of the mash will dampen out the fluctuations of the recirculation temperature and provide incredible stability. If you are not able to achieve the conditions above with your system that is OK, but it must be expected that stability and control will be compromised.

**Note:** A slight overshoot of the recirculation temperature is normal and will NOT harm your enzymes. Enzymes are denatured over a period of time, not instantaneously. We have tuned this system to offer the best match of ramp speed and stability.

**The chart below shows a typical response curve from an actual brew session.** Note that the mash temp will lag behind the recirculation temp by a few degrees as you ramp, but will settle in quickly as you reach the set point. Also note that the recirculation temperature (displayed on your controller) will overshoot by a few degrees. This is NORMAL. Also note that the actual mash temp overshoots very little and settles in quickly to set point, drifting slightly within the +/- 0.5F tolerance band. While we could eliminate the recirculation temp overshoot it would severely slow down your ramp rate.



It is expected that control stability will change slightly as you change your batch size, flow rate, or heat input.

**In general:**

- Faster flow rates reduce oscillation and overshoot
- Lower heat input reduces oscillation and overshoot, but increases heating time
- Higher heat rates increase overshoot and oscillation – shoot for 1.5F/min
- Larger batch sizes generally exhibit less oscillation and overshoot

That said, doing small batches on a system intended for large batch sizes will usually be difficult to control. If this is unavoidable, use the largest water to grist ratio possible, and use the lowest heat setting on your burner, and be ready to accept control outside the +/- 0.5F band.

**It is also expected that you will need to do a few experimental batches** to dial in your specific system and become familiar with the operation and control of your system. You will quickly learn the flame height that results in a 1.5 F/min average ramp rate in your mash bed. You will also discover what flow rates you can achieve without sticking your mash. Note that rice hulls can aid in increasing recirculation rates.

## Assembly:

The TOWER of POWER™ Modular Brewing Control ships partially assembled to allow it to be shipped more economically via ground carriers, and to protect it from shipping damage.

## Parts List:

The following items are shipped with the product. Please check to verify that you received all the parts. Contact your RETAILER if any parts are missing. Blichmann part number is in parentheses.

### Digital Control Module

- 1 Control Module
- 1 Gas solenoid valve (TOP-016-00)
- 1 Solenoid power cord (TOP-017-00)
- 1 Male ¼ NPT X 3/8" Male Flare brass adapter (BE-500008)
- 1 Male ¼ NPT X 3/8" Female Flare brass adapter (BE-500009)
- 1 Ignition electrode (TOP-020-00)
- 1 Screw - #8-32 with nut (installed on electrode)
- 1 Ignition wire (TOP-019-00)
- 1 Temperature sensor (TOP-001-05)
- 1 O-ring (sensor) (BE-00083) – installed on sensor
- 1 O-ring retainer (washer) (BE-00084) – installed on sensor
- 1 Nut – ½-20 UNF SS (BE-000026) – installed on sensor
- 1 Decal – HLT (BE-00062)
- 1 Decal – MASH (BE-00063)
- 1 1/2NPT X ½-20 UNF stainless bushing (TOP-007-01)
- 4 Rubber feet (installed) BE-500013-00
- 6 Reusable plastic Wire twist ties - small McMaster 70535K52
- 6 Reusable plastic Wire twist ties - large McMaster 70535K53

## Optional Tower Stand

- 1 – Tower assembly (enclosure, plumbing manifold, valves, flow meter)
- 1 – Grommet – pump wire, installed McMaster 9600K33
- 1 – Grommet – flow switch wire, installed McMaster 9600K15
- 2 – Legs, LH (TOP-003-03-LEGSET, one RH and one LH per set)
- 2 – Legs, RH
- 4 – Leveling feet BE5000012-00
- 2 – Leg stiffening plates (3" X 2-1/4" plate with 2 holes)
- 1 – Pump mounting bracket (replacement order: aTopTier\_Pump\_Bkt Includes plate, drip shield, hardware)
- 1 – Pump drip shield
- 8 – 1/4-20 X 3/4" L hex bolts, nuts and washers
- 2 – 5/16 X 3/4" hex bolts
- 4 – #10-24 X 3/8" L pan head screws
- 1 – Hose assembly (silicone hose and 2 QuickConnector aQC\_12\_S)
- 1 – 3/8" 90 deg QuickConnector fitting (aQC\_38\_EL)
- 1 – 1/2" 90 deg QuickConnector fitting (aQC\_12\_EL)
- 1 – Pump – March 815 (if ordered with Tower)

## Optional Dual Controller Mounting Plate (reqd for mounting two controllers onto the tower)

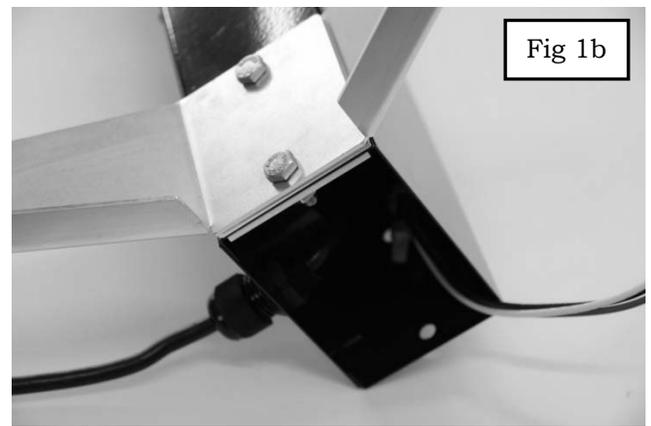
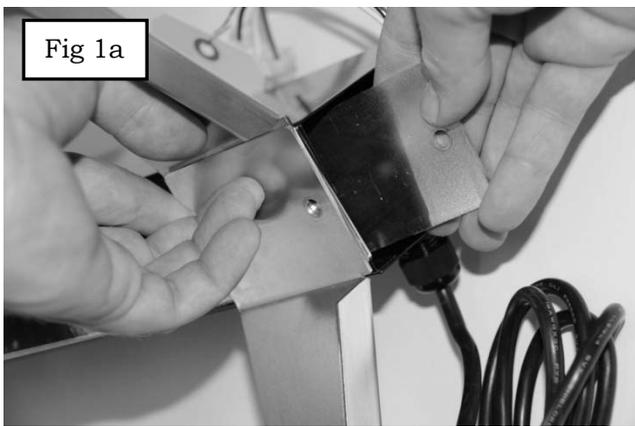
- 1 - Plate (model aCon\_plate\_TOP)
- 4 - #10-24 X 3/8" long pan head screws

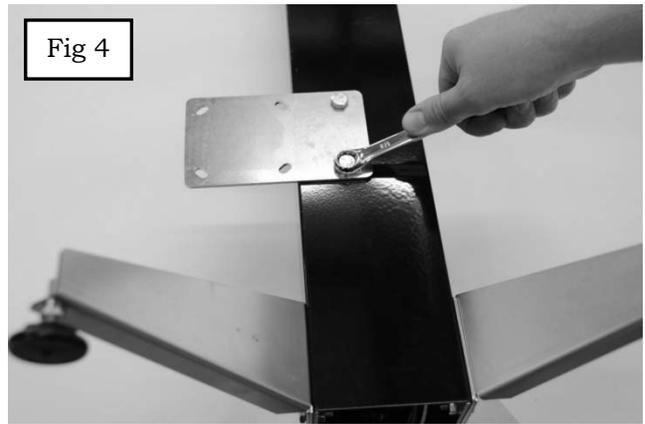
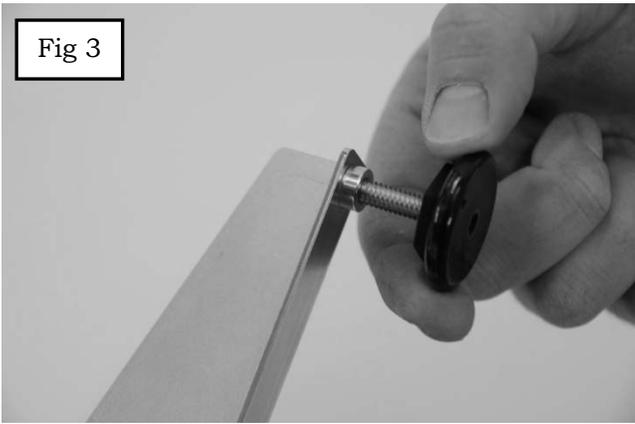
## Assembling the Tower

Prepare a work area with a soft pad to protect the tower enclosure from getting scratched during assembly.

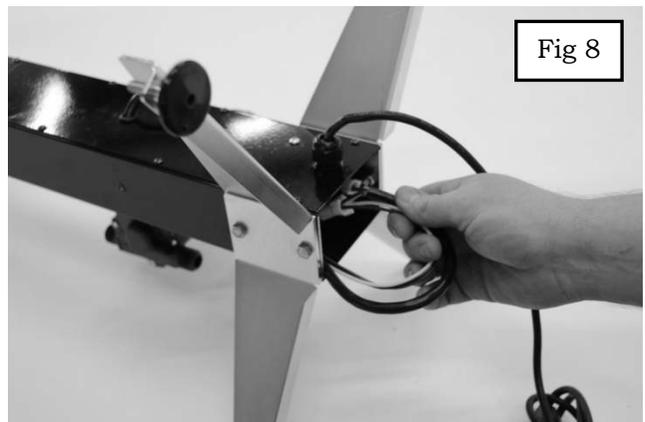
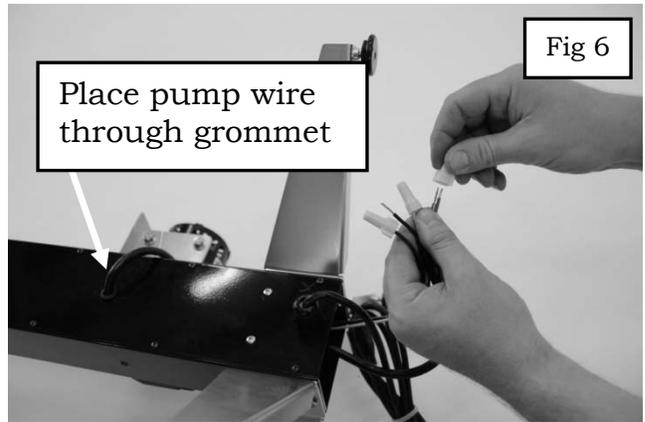
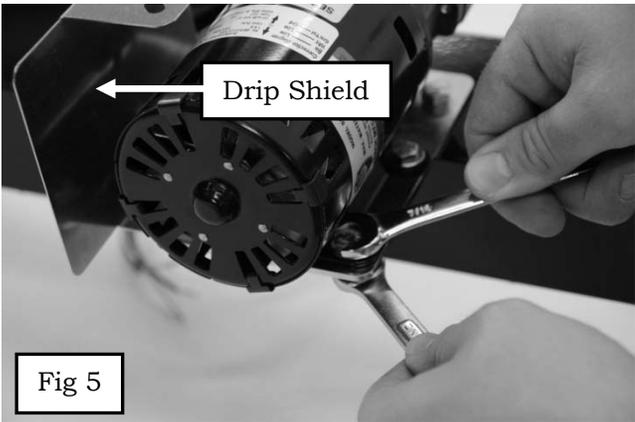
**WARNING!** – Make sure that the tower is NOT plugged in until you have fully completed the assembly!  
Electric shock is possible while wiring the pump!

Begin by unpacking and spreading out the parts. Install the legs to the bottom of the tower using the 1/4-20 bolts, nuts and washers as shown in Fig 1a and 1b. Please note that there are two LH legs, and two RH legs. One of each leg is installed on each side of the enclosure. Make sure to install the rectangular leg stiffening plate on the INSIDE of the enclosure. Next thread a leveling foot into the end of each leg as shown in Fig 3.





Install the pump bracket using the 5/16" bolts as shown in Fig. 4. Then using the 1/4-20 X 1/2" bolts, nuts and washers, install the drip shield and pump as shown in Fig. 5.



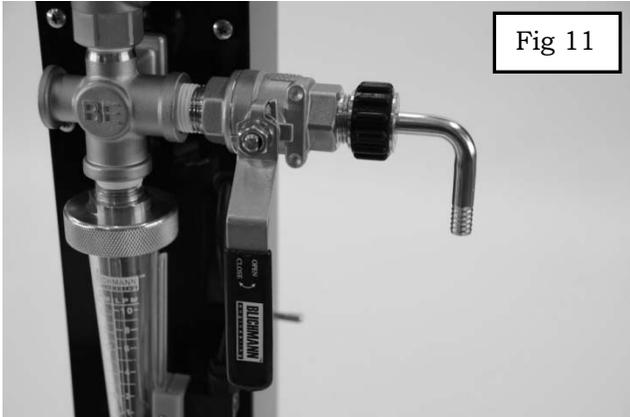
**Important:** Referencing Fig. 7, it may be necessary to re-orient the pump head to so that the inlet faces down and the outlet faces up (flow arrow faces up). Simply remove the 4 mounting screws, rotate the head, and reinstall the pump head. Consult the March manual if needed.

To wire the pump, insert the pump lead wire through the rubber grommet in the back of the enclosure and feed it out the bottom of the enclosure (Fig. 6).

**TIP!** It may be helpful to use needle nose pliers or use the end of a coat hanger to pull the wire out if you cannot reach it with your fingers. Spray the pump wire with a little Windex so that it slides easily through the grommet.

Remove the wire nuts from the green, black and white wires that are labeled “pump power” and connect them to the matching color leads on the pump lead using the wire nuts as shown in Fig 8. Then push the remaining wire up into the bottom of the tower.

Install the pump hose between the pump and the bottom of the flow meter as shown in Fig. 9.  
Install the 1/2” 90 degree QuickConnector onto the bottom of the pump. Fig. 10  
Install the 3/8” 90 degree QuickConnector onto the sampling port valve. Fig. 11



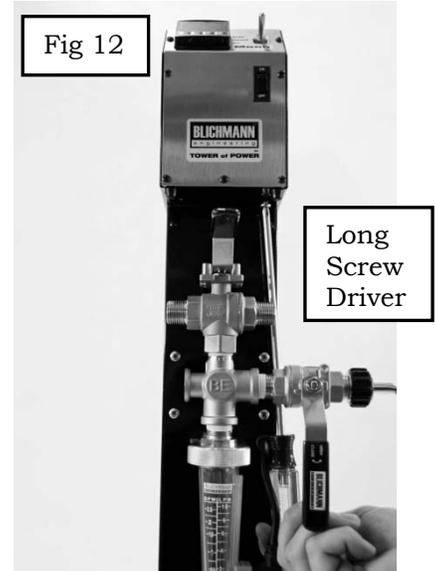
Assembly of the Tower is now complete!

## Installing Single Control Module On The Tower

Using 4 #10 X 3/8" screws install the control module as shown in Fig 12 installing the screws through the through the mating holes in the angle brackets on the top of the Tower.

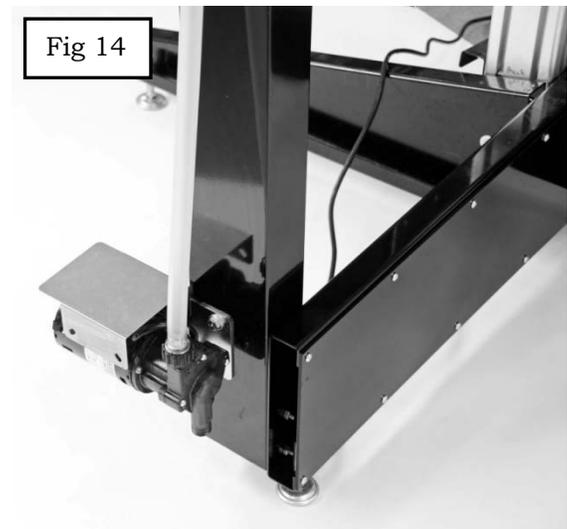
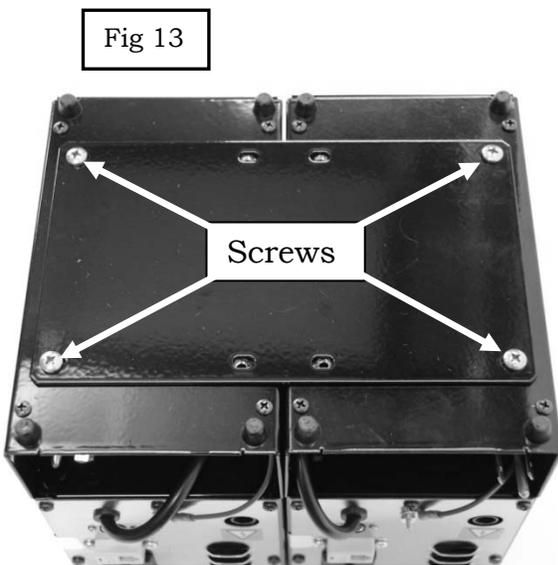
**TIP!** Using a long Phillips screwdriver or a ratcheting or 90 deg screwdriver makes accessing the front two screws easier.

Plug the controller into the GFCI receptacle on the back of the tower.



## Installing Dual Control Module Onto The Tower

Using 4 #10 X 3/8" screws install each control module onto the adapter plate as shown in Fig 13 using the outer most 4 screw holes. Then use an additional 4 screws to mount the assembly onto the tower as shown in Fig 12 using the inner 4 screw holes and placing the screws through the mating holes in the angle brackets on the top of the Tower.



Plug each controller into the GFCI receptacle on the back of the tower.

**WARNING!** – Make sure that the tower is NOT plugged in until you have fully connected the ignition and ground wires or electric shock could occur from the ignition wire!

**NOTE:** An optional mounting kit is available for installing the TOWER of POWER™ onto the TopTier™ modular brewing stand as shown in Fig 14.

That completes the assembly of the tower and control modules!

# Connecting the Controllers to Your System:

**WARNING!** – Make sure that the tower is NOT plugged in until you have fully connected the ignition and ground wires or electric shock could occur from the ignition wire!

**CAUTION! – Heat damages electronics.** Locate the control units, solenoid valves, tower and wiring as far from heat sources (burners) as possible. You should never feel your control modules getting warm to the touch. If they do, they are too close to heat sources! The maximum surface temperature should never exceed 125F (52C). While the solenoid valves will get somewhat warm during operation they should never be uncomfortably hot to the touch. Locate them as far from the heat source as possible.

**Caution!** Always route wires away from heat sources and hot surfaces to prevent burning and short circuits.

**Important Warranty Information!** Electronics damaged from excessive heat are not covered under warranty! We have installed a non-reversible heat detector inside the control enclosure to detect excessive heat. There are no user-serviceable components inside of the enclosure. Tamper labels that have been removed or damaged will void your warranty.

## Never Do These Things!

**NEVER** LEAVE THIS EQUIPMENT UNATTENDED

**NEVER** ALLOW CHILDREN NEAR THIS EQUIPMENT

**NEVER** Expose to heat or moisture. If it is warm to the touch it is too close to heat source.

**NEVER** HEAT COOKING OIL WITH THIS EQUIPMENT

**NEVER** operate on soft, combustible or uneven surfaces like dirt, gravel, wood or asphalt

**NEVER** operate indoors, in a garage, under an overhang, porch, deck, carport or similar structure

**NEVER** use near and combustible chemicals, gasoline or other flammable vapors or liquids

**NEVER** Bypass the GFCI circuit protection

**NEVER** Exceed 125F (52C) surface temperature

**NEVER** use the gas solenoid valve as a normal shutoff

## Always Do These Things!

**ALWAYS** OPERATE OUTSIDE ONLY, AT LEAST 30FT FROM OTHER STRUCTURES

**ALWAYS** USE ONLY ON LEVEL AND STABLE CONCRETE, BRICK OR SIMILAR HARD NON-FLAMMABLE SURFACES.

**ALWAYS** Connect to a GFCI circuit

**ALWAYS** Check that all fasteners are properly tightened prior to each use

**ALWAYS** Ensure that the base of the tower is resting on a hard surface

**ALWAYS** Use the propane tank shutoff valve or a separate valve when not in use

**ALWAYS** Use genuine Blichmann Engineering replacement parts

## Install the gas solenoid valve:

The gas solenoid valve is turned on and off by the controller as needed to maintain the temperature of the tank. Locate it as close to the burner as possible but DO NOT locate it in an area that will expose it to excessive heat. If you can't comfortably rest your hand on the valve during operation it is too hot! We have included a male and a female flare X ¼" NPT fitting to aid you in connecting the valve to your gas supply.

**Note:** Depending on the gas supply you have, you may need to procure additional or different fittings which are not included with the product. In ALL cases, follow your local codes and regulations. If you are not familiar with the local requirements, or are not comfortable doing this work yourself, we would recommend hiring a professional to do this for you.

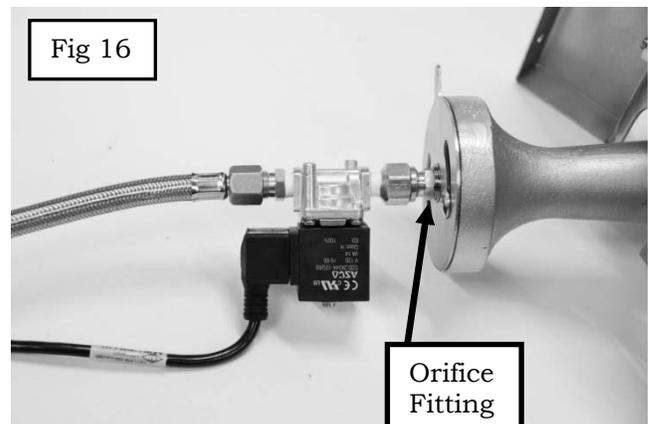
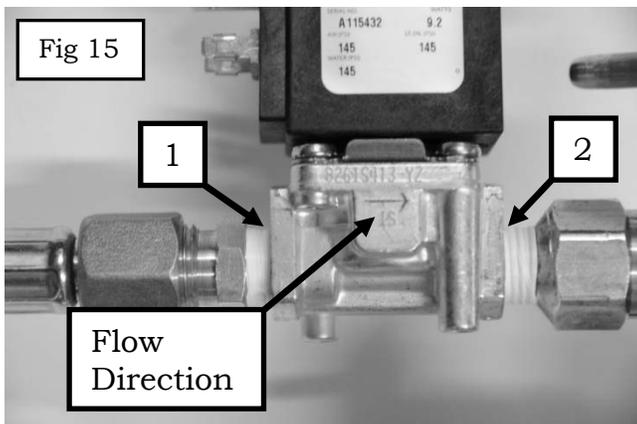
Fig 16 shows a typical installation. Note that it is permissible to install the solenoid valve immediately after the regulator on the propane tank.

**Important!** Valve failures from excessive heat are not covered under warranty!

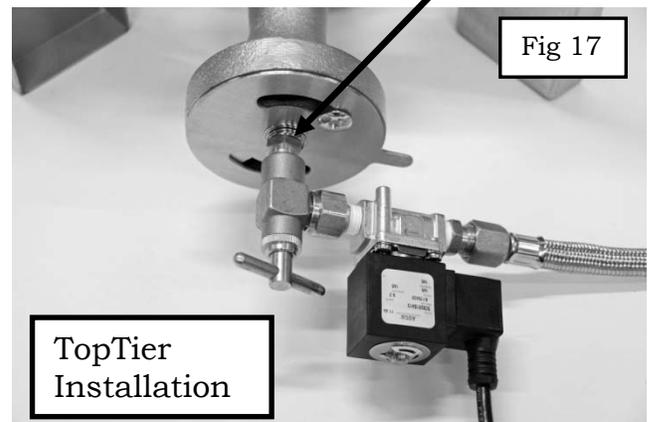
**Warning!** Install the valve with the gas flow going in the direction of the arrow marked on the valve. Fig 15. Installing it backwards can result in poor and/or unsafe operation! The inlet will also be marked with a “1” and the outlet with a “2”.

**Warning!** DO NOT use the solenoid valve as a normal shutoff for the gas! ALWAYS turn the propane tank or gas valve off at the source when not in use!

Fig 16 and 17 show typical installations.



**Important:** The brass orifice fitting (small hole through it) supplied with your burner must ALWAYS be installed directly on the burner casting. Do NOT install this fitting on the inlet to the regulator or your burner will not function properly!



## Install the ignition electrode:

The ignition electrode is used to create a spark to automatically ignite the gas and is activated by the controller. It also lets the controller know if a flame is present.

**Important!** For reliable operation it is important to install the electrode properly!

We have provided an electrode that can easily be modified (cut and/or bent) to fit nearly all burners. You will need to drill two holes to fasten and ground the electrode to the burner frame. Place two marks 3/8" (10mm) in apart and about 1 inch above the surface of the burner. Strike both marks with a center punch. Drill one at 3/8" and the other at 3/16". Typical installations are shown in fig 18 and 19. If you are installing in a

Blichmann Engineering TopTier burner simply use the flame inspection hole (Fig 19) and only one 3/16" hole is needed. New TopTier burners will have all mounting holes provided. Earlier models will require drilling the 3/16" hole.

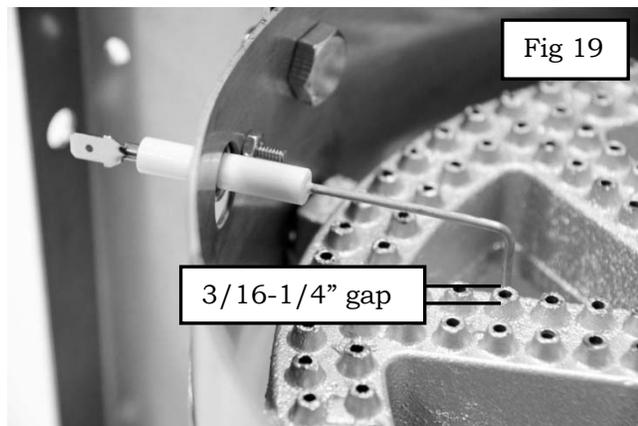
**TIP:** Stainless steel can be challenging to drill – use a cobalt or TiN coated (gold color) bit to drill the 3/16" hole. McMaster Carr part number 2973A19 is a recommended carbide tipped sheet metal drill if a typical steel, coated or cobalt drill bit is not successful.

Mark the electrode wire with a marker so that when bent 90 deg downward it will be in the center of the flame path. For TopTier burners, you'll want the electrode centered over one of the burner nozzles. Measure the distance from the surface of the burner to the mark on the wire and note this distance. Remove the electrode from the frame and using a pliers bend the wire down 90 deg. Install with the included #8-32 X 3/8" screw.

**Important!** The tip of the electrode must be perpendicular to the surface of the burner and must be in the flame path to function properly! A spark gap of 3/16-1/4" (5-6mm) is needed for consistent ignition.

**Caution!** Do not hold the electrode by the ceramic insulator and take care not to crack the insulator! Cracked electrodes are not covered under warranty!

Trim the wire using a wire cutter to the length noted previously. Install the electrode and note the position of tip of the wire with respect to the surface of the burner. Trim as needed to provide a 3/16-1/4" gap. It is OK to bend the wire a bit as needed to center the tip of the electrode. Fig 18 and 19 show typical installations.



## Install the Temperature Sensor (RTD):

**Caution!** The sensor provided with the product is a very high accuracy instrument. Please treat it with care! Do NOT pull on the lead wire or over-tighten the fitting.

### Installing in a Hot Liquor Tank:

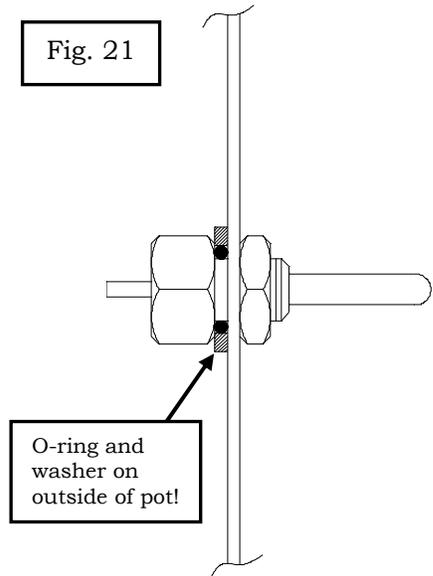
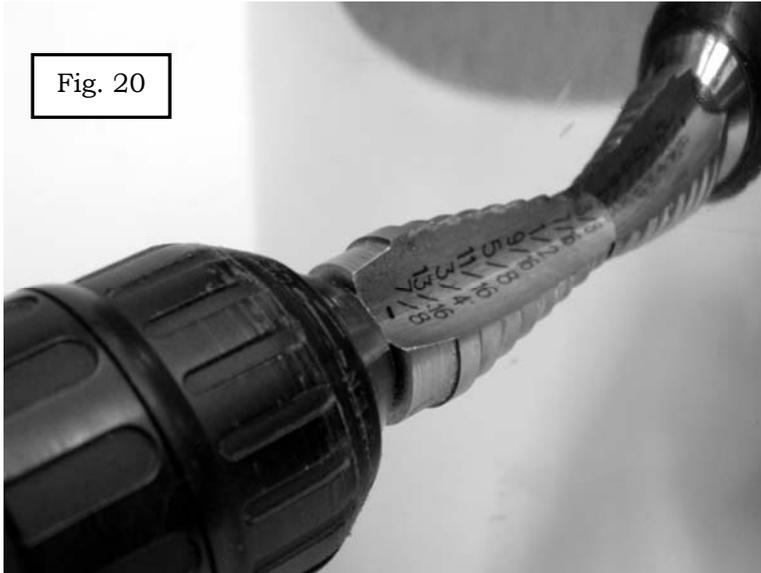
For the HLT install the sensor directly into the hot liquor tank. Since water convects easily it is not necessary to recirculate with a pump. Simply drilling a 0.50 inch diameter hole, or it can be installed in a 1/2" NPT fitting already welded into your tank using the supplied adapter bushing (directions below).

Determine the desired location for the sensor and mark the center point with a permanent marker. We recommend installing it about in the middle of the water level. Drill a 3/16 pilot hole and then enlarge it to 1/2" (+0.015, - 0.010) using a "step drill" as shown in Fig. 1. Step drills are available through any hardware store or home improvement store. After the hole is drilled, ensure both sides of the hole are free from burrs,

which will cut the o-ring leading to potential leaks. The step drill can be used to chamfer (deburr) the hole on either side or you can use a file.

**Important!** The o-ring goes on the OUTSIDE of the pot. Installing it on the inside of the pot will cause it to leak!!

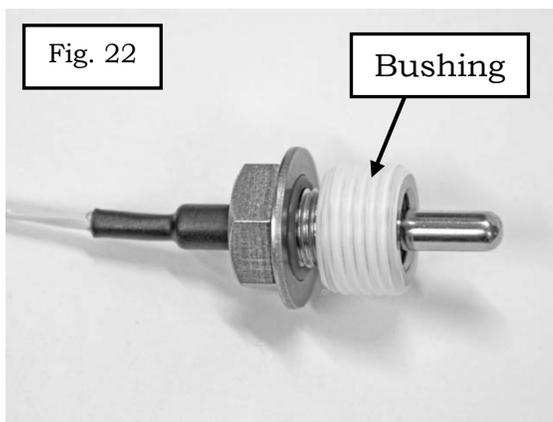
Assemble the sensor as shown in Fig. 2, tightening the nut snugly using wrenches, but do not use excessive force. Do not use pipe tape on the threads.



### Installing in an NPT Fitting:

To install the sensor into a female NPT fitting place the o-ring, washer, and adapter bushing onto the sensor as shown in Fig. 22. Place 4-5 turns of quality Teflon tape (not included) to the external NPT threads of the bushing. Do not use tape on the sensor threads. Then thread the assembly into the fitting.

**Caution!** Once installed, the bushing CANNOT be removed! DO NOT over-tighten! Use a  $\frac{3}{4}$ " wrench to tighten the sensor and thread it into the NPT fitting. When the washer is flush with the fitting as shown in Fig 23 STOP. It is not necessary to fully torque this joint to seal! Additional bushings may be purchased through your retailer.



## Installing Sensor & Plumbing For Mash Control:

**Important!** Do not install the sensor directly into a mash tun! The grain greatly impedes the convection and transfer of heat. It is VITAL to the performance of the product that the sensor be installed so that it is measuring the temperature of the wort returning to the top of the mash bed. Installing the sensor directly into the mash tun will cause severe overshooting, oscillation, scorched wort, and possibly equipment damage!!

**If you have purchased the Tower stand:** install the sensor for the MASH controller in the port indicated in Fig. 24. Note that the HLT sensor will be mounted directly in the hot liquor tank.

**Tip!** We recommend ½" (12mm) ID hose for connecting the Tower to your system. Silicone hose, while expensive, will last a lifetime and can withstand continuous use at boiling temperatures. We recommend ¾" OD thick wall hose.

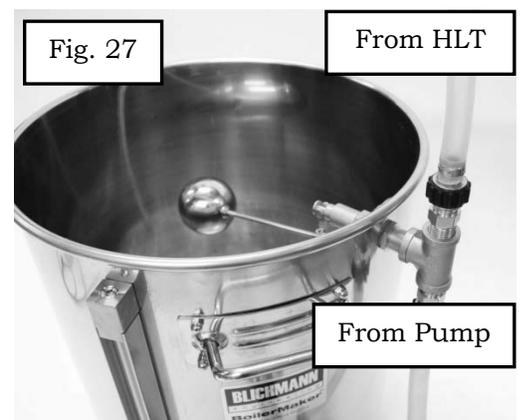
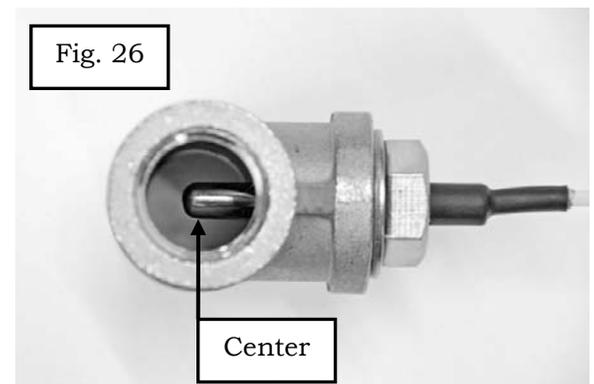
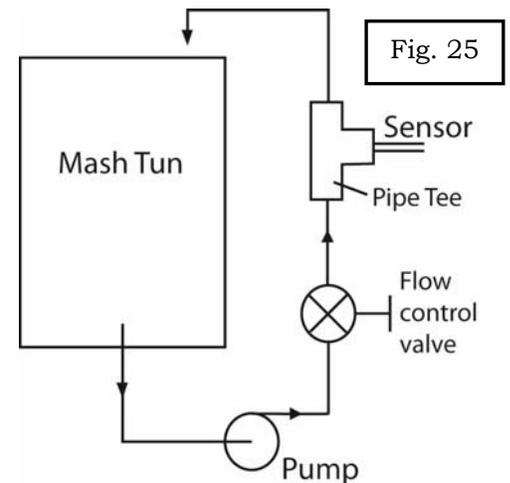
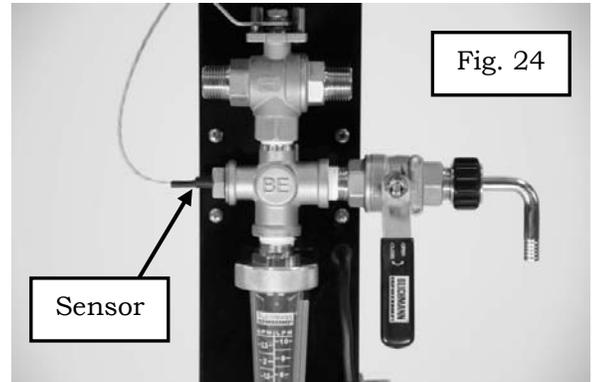
**Warning!** ALWAYS use hose clamps on all hoses!

**Connecting to other systems:** Refer to the schematic of Fig 25. It is VITAL to the performance of the system to connect it in this manner. Connect the outlet valve of your mash tun to the inlet of the pump. Install a flow control valve after the pump. Then plumb through the sensor, and lastly back to the TOP of the mash bed. Note – it is also acceptable to switch the order of the flow control valve and the sensor.

**Installing the sensor in your own system:** locate the sensor according to the schematic in Fig. 25. A close-up of the sensor installed in a pipe T (not included but available through McMaster.com 4464KK51 if needed) is shown in Fig 26. Note that the tip of the sensor must protrude into the middle of flow cavity for it to accurately measure the wort temperature.

**Installing an AutoSparge™ in your system:** We highly recommend using the Blichmann Engineering AutoSparge™ for this application (Fig 27) which is available separately. Lastly, connect the remaining fitting on the 3-way valve to the inlet of your brew pot.

**Tip!** As shown in Fig 27 place a pipe T (not included but available through McMaster.com 4464KK51 if needed) on the inlet of the AutoSparge™. This will allow you to connect it to the HLT and the mash recirculation simultaneously with no need to switch hoses at sparge time! A valve is not needed on the elbow since the valve on the HLT will stop wort from flowing that direction.



## Connecting the Controller To Your System:

Fig 29a, and 29b show the front and rear of the controller. Connect as directed below.

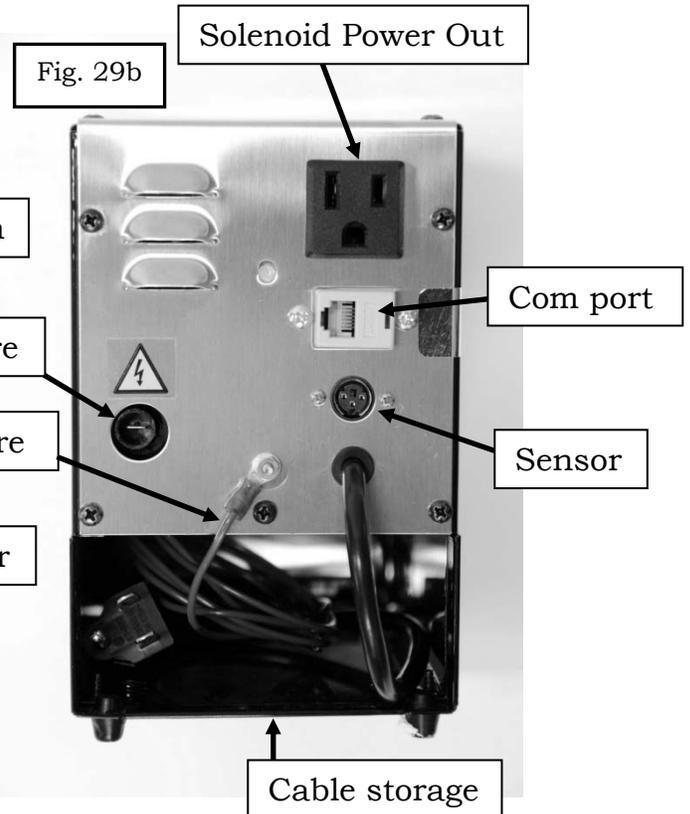
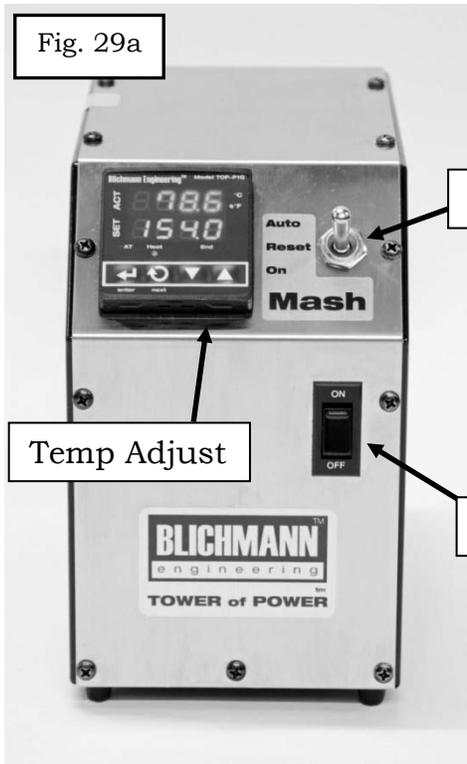
- 1 – Solenoid power out (switched on/off) 2A max, 120V 60hz
- 2 – Communications cable (cable sold separately)
- 3 – RTD Temperature sensor
- 4 – 120V 60 Hz power cable
- 5 – Ground cable – connect to burner frame
- 6 – Ignition cable connector
- 7 – Main power switch with integral thermal breaker
- 8 – Selector switch (Auto/Reset/On)
- 9 – Temperature controller
- 10 – Process label (both MASH and HLT are included)

**Caution:** Connecting a solenoid valve other than the Blichmann Engineering supplied valve can be done, but DO NOT exceed 2A (inrush). Power out is 120V. Exceeding this power will cause permanent damage to the ignition system and is not covered under warranty! Never exceed 30 PSI on the solenoid valve!

**Warning:** The ignition system uses high voltage to create a spark! Do not power up the controller and leave the selector switch in Reset mode until connections of the ground and ignition wires are made or shock could occur! ALWAYS place the black vinyl cover over the end of the ignition wire when not in use (Fig 28).

**Caution:** Use common sense when routing wires so that they are away from heat sources which may lead to burned, melted, or shorted wires. Properly secure them during use with the included twist ties (search McMaster for “reusable cable ties” for additional ties and options).

Fig. 28



## If You Use a TopTier™ Brewing Stand:

Blichmann Engineering™ offers a utility shelf (10" X 10") that readily supports two controllers. We also offer a TopTier™ installation kit for installing your Tower permanently to the stand. See fig 14 on page 9.

## Controller Operation

The TOWER of POWER™ controller uses a digital PID temperature controller to maintain the set temperature of the liquid returning to the TOP of your mash. Again, it is VITAL that you do NOT put the sensor directly into the mash. For your HLT it is recommended to install it directly into your tank.

When heat is needed, the controller simultaneously activates an ignition sequence (sparking on the electrode), turns on the gas flow by opening the gas solenoid valve, and activates an alarm horn letting you know the burner is about to ignite.

When a flame is established, the ignition system detects a change in resistance in the lead wire and turns off the sparking, but leaves the gas valve open. If the flame is lost (eg, a gust of wind) it will automatically reactivate the spark to reignite the flame. If at any time a flame cannot be established within 10 sec it will stop the ignition trial and will sound an alarm horn.

**Warning!** Always make sure that your pot is filled with sufficient liquid before turning on your controller. Adding heat to an empty pot will cause permanent damage!

**Warning!** If you are unable to ignite after 10 sec turn the selector switch to RESET immediately. This will deactivate the gas valve and ignition sequence. Check fuel tank level, and that all gas valves and regulators are on. Check that the solenoid valve is installed in the correct direction, and that the ignition and ground wires are properly installed. At this time you can return the selector switch back to AUTO mode.

**Note:** you need to have the selector switch in RESET mode for at least 3 sec to reset the ignition controller.

**Changing Temperature Setting:** Refer to Fig 30. ACT will display the sensor temperature. SET will display your desired temperature. Press the up and down arrows to increase or decrease the temperature. Leaving the button depressed will increase/decrease the temperature rapidly. While changing the SET temperature, the SET temp display will flash. When you have reached your desired temperature depress the enter button to accept the value and the SET value will stop flashing.

**Important:** if the SET value is flashing it is NOT activated. Always press the enter button after changing the SET point.

**Changing Units F/C** – see appendix at the end of this manual

**Selector Switch Modes** (ref fig 30)

**AUTO** – Use this position to let the PID controller automatically turn your burner on/off

**RESET** – Use to reset the ignition system if you are unable to generate a flame within 10 sec. (3 sec reset) This mode can also be used to disable the flame/ignitor if desired.

**MANUAL** – Use this mode to override the PID controller and turn on the flame to add heat.



## How The Controller Functions As You Ramp:

Review graph on page 4 for a visual representation. As you ramp toward the set point the burner will remain on until you approach the set point. Within a degree of the set point, the controller will go into a 30 sec “cycle mode”. In this temperature band, the burner will remain on only for only a portion of the 30 sec cycle. You will notice some overshoot of the return wort, but the actual mash does not overshoot significantly. Shortly, the temperature will settle out and the burner will ignite for shorter durations and the controller ACT temp will be very close to the SET point. It is normal for the ACT temp to drift above/below the SET point during a rest period, but the actual mash temp will remain quite stable and within the +/- 0.5 F tolerance band.

**Note:** A slight overshoot of the recirculation temperature is normal and will NOT harm your enzymes. Enzymes are denatured over a period of time, not instantaneously. The temperature in your mash bed is what drives the wort character. We have tuned this system to offer the best match of ramp speed and stability.

## Tower Operation

**Flow Meter/Stuck Sparge/Low Flow Alarm:** The Blichmann Engineering™ Tower is equipped with a very high quality flow meter to allow you to accurately and repeatably set your recirculation rate to avoid a stuck mash, to ensure you have adequate flow to maintain a stable system, and for batch-to-batch repeatability. Simply read the flow rate at the top of the red float as shown in Fig 31.

**Low flow switch:** the flow meter is equipped with a low-flow switch and alarm horn that will notify you in advance that your flow is dropping and your mash is beginning to stick. Simply slide the switch assembly up or down to the desired low flow setting.

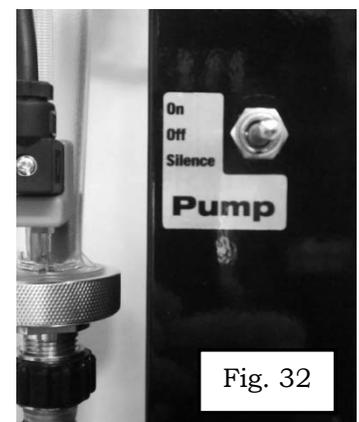
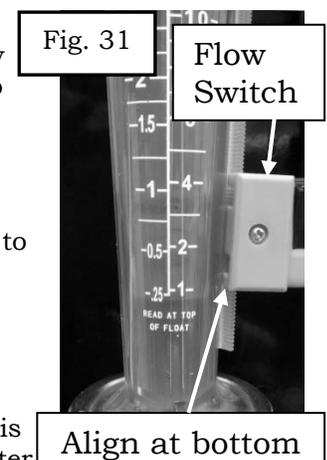
**Important:** It is possible for bits of grain to become lodged in the valve or in the flow meter. This may give a false indication that the mash is sticking. Simply open the throttling valve quickly to dislodge the particles and then return to the original flow. Re-evaluate if the problem has been resolved. Once your mash bed has been set this is generally not a problem. If this is a chronic problem, you may need to install a pre-filter after the mash tun, or improve the sealing of your false bottom or manifold assembly to reduce grain passage.

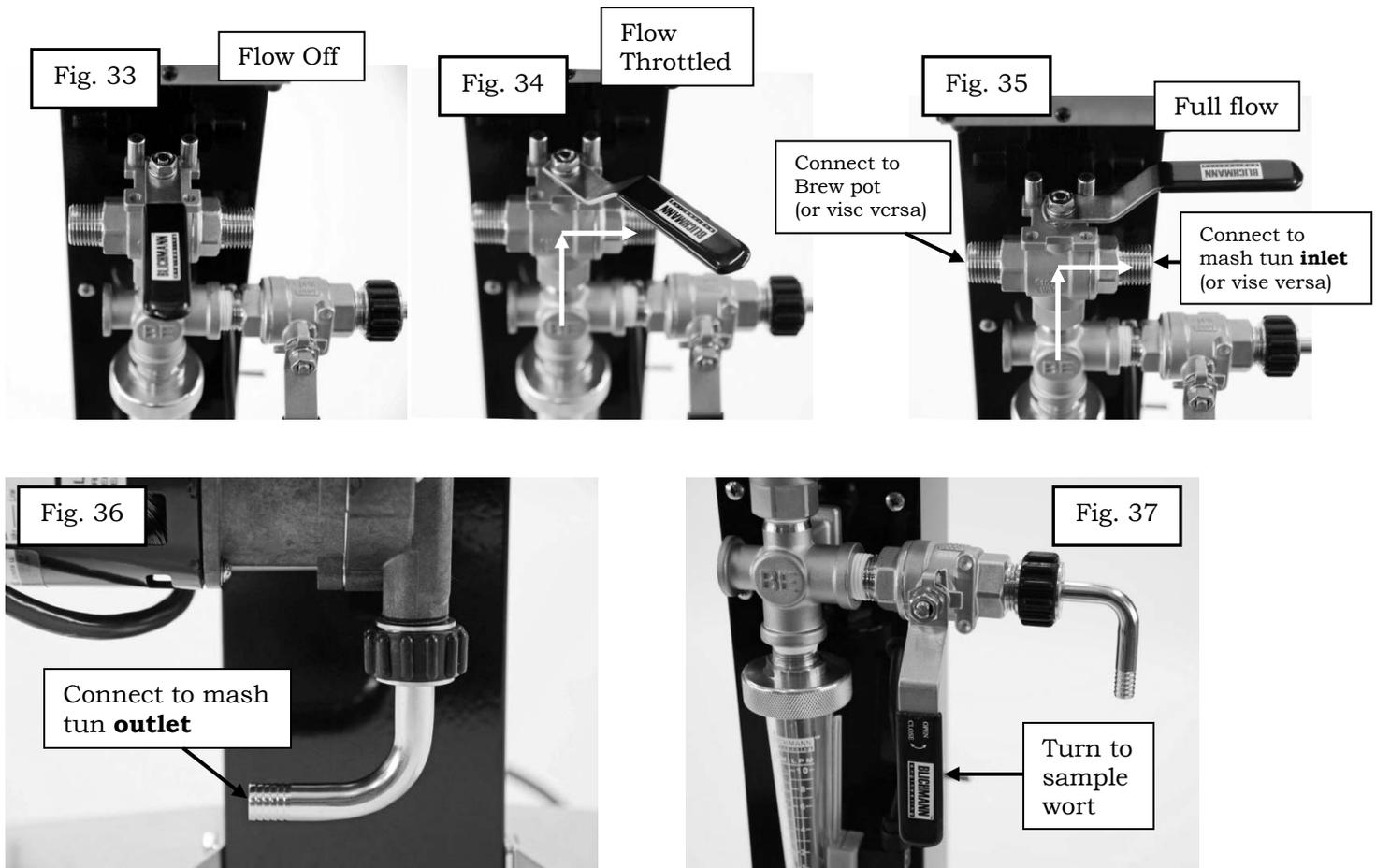
**The pump selector switch** is mounted on the RH side of the Tower. It has a SILENCE position to silence the alarm if desired (Fig 32). In “Silence” mode the alarm will be disabled, but the pump will continue to run. In “Off” mode, both the pump and the alarm will be disabled. Since the lauter rate is generally much lower than the recirculation rate this is a convenient feature.

**Valve Operation** for the Tower is quite intuitive. The 3 way valve will begin to flow to the right when the handle is moved to the right, (similarly to the left), and will be blocked from flowing left or right when facing you.

Depending on the orientation of your brew system, you will connect one outlet of the valve to the mash tun, and the other outlet to your brew pot. When you are ready to sparge, simply divert the flow to the brew pot.

**Note:** The three way valve is also used to throttle the flow which can be measured at the flow meter.





## Brew Day Process

It is recommended that you use plain water initially to test your system and become familiar with the response and operation of your new system. Expect to do a couple actual brew sessions to dial in and master your new system and process.

- (1) Calculate your desired strike temperature using any of the available calculators or brewing software.
- (2) Fill your mash tun and hot liquor tank with the appropriate volume of water.
- (3) Open all valves on your mash system. Open the sample port to purge air and fill your lines with water. **TIP:** make sure the hose running into your mash tun is empty and the AutoSparge (if used) is open to avoid an airlock.
- (4) Turn on your pump and adjust the flow to your desired setting using the handle on the 3-way valve (or your flow control valve) to throttle it back if needed. **NEVER** throttle the flow to the **INLET** of the pump. **ALWAYS** on the **OUTLET** of the pump!
- (5) Place all controller mode selector switches to RESET.
- (6) Turn on the controllers and enter the desired strike water and HLT temperature into the controller.
- (7) Place both controllers in AUTO mode. The burners will ignite and control your tanks to the desired temperature.
- (8) **DO NOT ADD GRAINS AT THIS TIME!**
- (9) When your mash water has reached the desired temp, turn the Mash controller to RESET, turn the pump off and close all the valves.
- (10) Add your grains at this time stirring gently

**Important!** During dough-in always turn the pump OFF or you will airlock your pump and stick your mash. It is important for the water to absorb and the air to purge from the grains. 10 min is usually adequate.

- (11) After dough-in, turn the valves back on, turn on the pump, and place the controller back to AUTO and the burner will ignite as needed.
- (12) To ramp to another temperature simply use the up arrow and press enter to accept. The burner will ignite accordingly.

**Tip!** Wort samples to monitor starch conversion and specific gravity are easy – just open the sample port valve and draw off a sample!

- (13) When your mash is done (usually at 168F (75.5 C)) you may begin the sparge process.

**Caution!** During sparging ALWAYS put BOTH controllers into RESET and turn the gas off! Failure to do so could result in a warped/damaged HLT or mash tun!

- (14) If you are using the Blichmann Engineering™ Tower with an AutoSparge™, simply rotate the 3-way valve toward your boil kettle hose and then open your HLT valve. You may use the 3-way valve to throttle your lauter rate which can be read on the flow meter. The AutoSparge will automatically adjust to the lauter rate into your boil kettle if you are using this option. Again, putting the pump selector switch in the “Silence” position will turn off the alarm horn but leave the pump running.

## Cleaning

Always clean your system immediately after use to flush wort out of the hoses, pump and other cavities. While wort making equipment does not need to be sanitized, it DOES need to be clean. We recommend recirculating PBW (Powdered Brewery Wash) and then StarSan through your system immediately after each use.

Simply use a bottling bucket filled with PBW, elevate it above your pump, and connect with a hose to the inlet of the pump. Place the outlet hose (return hose to your mash tun) in the top of the bucket. Open the valves and start the pump. If using the Tower, opening the sample port will vent air out of your pump. Run for about 15 min, drain, and then repeat with StarSan, then drain and allow to dry. Periodically, you may wish to remove the pump head and disassemble for cleaning. Refer to the March manual for instructions.

## Advanced Operation Mode (auto ramp/soak/monitoring)

This mode of operation requires the purchase of an optional RS485->USB communication cable (purchase through your retailer) and downloading the free Blichmann Engineering TOP-Link interface software from our web page. Please note that a plain USB cable will not work and may damage the controller.

[www.blichmannengineering.com/TOWER\\_of\\_POWER/TOWER\\_of\\_POWER.html](http://www.blichmannengineering.com/TOWER_of_POWER/TOWER_of_POWER.html)

If you are not comfortable with using computers and/or do not like experimenting or tinkering with your system this is probably not a feature you should explore. In any case, we highly recommend that you master operating the product in manual mode first before attempting to operate in auto ramp/soak mode.

**Important:** This is an advanced feature and phone/tech support is not provided through Blichmann Engineering™. If you do have questions or trouble please contact your retailer for assistance. We highly recommend that you review the online video PRIOR to purchasing the cable.

**Important:** this software is only available for Windows platform. It is not available for Mac or portable devices.

**Features:** The auto ramp/soak feature will allow you to automatically follow a user-programmed mash profile. Up to 8 individual mash profiles can be stored in the controller (up to 4 rests each) and they can also be linked together for very complex mash profiles. In addition, the user can save an unlimited number of mash profile files on your computer and recall those as needed. System parameters, such as units, calibration offset, resetting to factory defaults etc. can easily be made through the software. Lastly, the user can graph the controller output and export to a CSV file for documenting the brew day.

For a preview of the software, and for instructions on operation, view our online tutorial video at the page listed below. A written manual is not available for advanced operation mode.

[www.blichmannengineering.com/TOWER\\_of\\_POWER/TOWER\\_of\\_POWER.html](http://www.blichmannengineering.com/TOWER_of_POWER/TOWER_of_POWER.html)

## Trouble-shooting

This section provides suggestions for trouble-shooting problems that may arise with the equipment. Please see our FAQ tab on the TOWER of POWER page for additional updated suggestions.

**IMPORTANT:** Please use this guide for the fastest resolution of your problem. Your retailer is your point of contact for product questions, and your fastest way to resolve your issues if the chart below does not resolve your problem. Your retailer will contact Blichmann Engineering if they are unable to resolve your issues.

Display flashing	Press enter key to accept temperature setting. If flashing does not stop cycle power on front of controller. If this recurs, contact your retailer.
Overshoot	Increase flow and/or decrease heat input (reduce flame). Check that mash is not sticking and flow is adequate
Undershoot	Increase heat input, always flow as fast as possible without sticking mash
No spark	Ensure that spark wire is connected to electrode and controller  Check that ground wire is connected to electrically conductive portion of burner and to controller.  Ensure that controller selector switch is in On or Auto mode. Spark is disabled in Reset mode  Check that SET point is higher than ACT temperature.  If this does not resolve issue contact your retailer.
Sparks but no flame	Check valve on gas supply to make sure it is on and will flow gas. Bypass solenoid valve to check for free gas flow.  Ensure gas solenoid valve is oriented correctly. Reorient if needed.  Feel electrical coil and determine if it is clicking when “heat” light activates on face of controller. If it doesn’t, check for power on electrical plug on back of controller using a volt meter. If no power when HEAT light is on, contact your retailer.  If power present, replace solenoid valve.
Low flow	Open pump throttling valve quickly to dislodge any grain particles. Return to

	original position. If no change, see “Mash is sticking” section
Temperature on controller doesn't match temp on mash tun thermometer	The TOWER of POWER uses a lab grade sensor and high resolution meter. It is accurate to within +/- 0.5 F (0.25C). Use this sensor to calibrate your mash thermometer. Place both sensors in a thermos of water at about 154 F (68 C)  It is normal for the mash temp to lag behind the recirculation temp. Wait for temperatures to stabilize.
Display shows NO CONT	Check that sensor is plugged in, and no pins (3 total) are bent or damaged. If this does not resolve the trouble replace sensor.
Pump Won't Flow	Check that all appropriate valves are open  Check that mash is not stuck (compacted). See below  Check that all hoses downstream of the pump are empty. Install a bleed valve after the pump to vent air and allow the pump to fill with liquid. For Tower users, the sample port can be used.
Mash is sticking	Reduce flow rate  Ensure you have done a dough-in WITHOUT the pump on to allow air to purge from the grain bed.  Check that grain crush is not too fine. Husks should be intact. Use rice hulls if crush is OK.  Ensure that lauter hardware (piping, slots, perforations) are not plugging

## Maintenance

The TOWER of POWER™ temperature control system requires little maintenance. Inspect fasteners, wires and hoses regularly and replace as needed ONLY with genuine Blichmann Engineering™ parts. Parts can be ordered through your retailer. After brewing, wipe any drips off with ordinary soap and a soft sponge.

# Warranty

The TOWER of POWER™ temperature control system is warranted to be free of defects in materials and workmanship for a period of 1yr from the date of purchase (proof of purchase required). Contact your authorized Blichmann Engineering™ retailer for warranty support.

Specifically EXCLUDED from this warranty are normal wear and tear, damage from abuse, misuse, failure to follow cleaning and maintenance procedures, exceeding 125F (52C) inside the enclosure, and damage from over tightening fasteners. Damaging the tamper label on the control enclosure in any way voids the warranty. Blichmann Engineering™ is not responsible for incidental or consequential damages arising from use or misuse of this product. This product is intended for attended OUTDOOR home use only. No warranty or guarantee of suitability (express or implied) is given for commercial, indoor, or unattended use of this product. Blichmann Engineering™ must be notified within 7 days of the delivery date of any hidden shipping damage. Customer is responsible for shipping damage outside of this time period. Customer is responsible to keep all original packing material for warranty returns – Blichmann Engineering™, LLC is not responsible for damage from improperly packaged warrantee returns and these repair costs will be the responsibility of the customer. Resolution of warranty claims will be by repair or replacement and will be the decision solely of Blichmann Engineering™. Shipping costs for warrantee returns are covered only for the contiguous United States. User is responsible for packaging costs and shipping damage if not returned in original packing. Approval for return must be provided by Blichmann Engineering™ prior to any return.

# Appendix

## **To change units from deg F to deg C:**

Press the Enter and Next key simultaneously to unlock the controller (it comes locked from the factory to prevent accidental changes from being keyed into the controller). If you have purchased the optional communication cable, doing this through the software is much easier.

Press and hold the Enter key for 3 sec and Next buttons simultaneously then release  
Press Enter for 3 sec and release  
Press Next until you see tPUn  
Press up/down arrow to change to C  
Press Enter to accept  
Press Enter again to exit setup mode

## To relock the controller to prevent accidental changes to the settings (recommended):

Press the Enter and Next key simultaneously and immediately release  
Repeat previous step  
Press Next until you see LoC  
Press up/down arrow to change to LoC2  
Press Enter to accept