5 BBL Single Wall Hybrid Brewhouse

Assembly, Operation, & Maintenance

Congratulations on your purchase, and thank you for selecting the 5 BBL Hybrid Brewhouse 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 use, assembly, and the sanitation procedures for the product.

IMPORTANT INFORMATION

PLEASE READ AND THOROUGHLY UNDERSTAND THIS MANUAL PRIOR TO USE FOR IMPORTANT SAFETY INFORMATION!

WARNING: Sections labeled "Warning" can lead to serious injury or death if not followed. Please thoroughly read these sections 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) before use.

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) before use.

IMPORTANT: Sections labeled "Important" should specifically be followed to ensure satisfactory results with the product.

IMPORTANT: Power demand for the brewhouse is 156A at 208V (three phase), 66A at 480V (three phase) or 228A at 240V (single phase). Select a main breaker setting for 20% above the appropriate amperage to avoid nuisance tripping or as directed by your local codes.

What's In the Box?

Item Number	Description	Qty
BEPS-MLT-5BBL-SW	5BBL Single Wall MLT	1
BEPS-HLT-5BBL-SW	5BBL Single Wall HLT	1
BEPS-BK-5BBL-SW	5BBL Single Wall Boil Kettle	1
BEPS-Stand-5BBL	Kettle Stand 5BBL	3
BEPS-CP-5-240V-SW **OR** BEPS-CP-5-208V-SW	5BBL Control Panel 240V Single Phase **OR** 5BBL Control Panel 208V 3-Phase	1
BEPS-SanitaryHeater-5BBL **OR** BEPS-SanitaryHeater-5-208V	5BBL 240V Sanitary Heater Assembly Set of 3 **OR** 5BBL 208V Sanitary Heater Assembly Set of 3	2
BEPS-PUMP-15HP	1/5hp Brewery Pump	1
BEPS-Pump-1HP	1HP Brewing Pump	1
BEPS-CHILLER-2.0SQM	Pro Series Chiller	1

BEPS-MLT-PARTS-5BBL - Single Wall Mash Tun Parts Kit Parts List:

Item Number	Description	Qty
BE-000633-00	1.5" Sanitary Tri-Clamp	1
BE-000859-00	2.5" Sanitary Cap	1
BE-000861-00	2.5" Sanitary Tri-Clamp	1
BE-000863-00	1.5"TC Elbow - 90°	1
BE-000866-00	2.5"TC Gasket	1
BE-000868-00	1.5"TC Gasket	1
BE-001356-00	1.5"TC Butterfly Valve	1
BE-001236-00	CIP Speer for Pin Style Spray Ball	1
BE-001396-00	CIP Rotating Sprayball - 2.5" OD, 1.5" Pin Style Connection	1

What's In the Box?

BEPS-ControlKit-3Ves - Control Panel Accessory Kit Parts List:

Item Number	Description	Qty
BE-000633-00	1.5" Sanitary Tri-Clamp	3
BE-000868-00	1.5" TC Gasket	3
BE-001132-01	3.5BBL Boil Kettle Stand Pip	2
BE-001361-01	1.5" TC Thermowell with 1/2" FNPT inlet	3
BE-001612-00	RTD PT100 Temp Sensor	3
BE-001634-00	1/2" NPT Cable Gland, 3-7mm	3

BEPS-BK/HLT-Parts-3.5BBL- 3.5BBL BK & HLT Parts Kit Parts List (1 of 2):

Item Number	Description	Qty
BE-000096-01	Brush for Level Gauge - 30"	1
BE-000630-00	1.5" Cap	1
BE-000633-00	1.5" Sanitary Tri-Clamp	7
BE-000859-00	2.5" Cap	1
BE-000861-00	2.5" Sanitary Tri-Clamp	1
BE-000863-00	1.5" TC Elbow - 90°	3
BE-000866-00	2.5" TC Gasket	1
BE-000868-00	1.5" TC Gasket	7
BE-001236-00	CIP Spear for Pin Style Spray Ball	1
BE-001084-01	CIP Rotary Sprayball	1
BE-001356-00	1.5" TC Butterfly Valve	2

BEPS-BK/HLT-Parts-3.5BBL- 3.5BBL BK & HLT Parts Kit Parts List (2 of 2):

Item Number	Description	Qty
BE-000096-01	Brush for Level Gauge - 30"	1
BE-000630-00	1.5" Cap	1
BE-000633-00	1.5" Sanitary Tri-Clamp	7
BE-000859-00	2.5" Cap	1
BE-000861-00	2.5" Sanitary Tri-Clamp	1
BE-000863-00	1.5" TC Elbow - 90°	3
BE-000866-00	2.5" TC Gasket	1
BE-000868-00	1.5" TC Gasket	7
BE-001236-00	CIP Spear for Pin Style Spray Ball	1
BE-001084-01	CIP Rotary Sprayball	1
BE-001356-00	1.5" TC Butterfly Valve	2

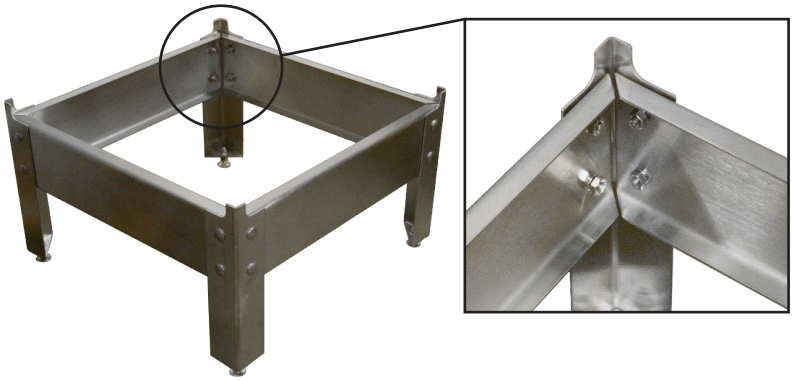
BEPS-Sanitary Hose5 - Hoses for Hose Kit Parts List:

Item Number	Description	Qty
BEPS-SanitaryHose-1in-7	1"x7' Hose Assembly	3
BEPS-SanitaryHose-1in-12	1"x12' Hose Assembly	1

BEPS-HoseKitHardware-3V - Hose Kit Hardware Parts List:

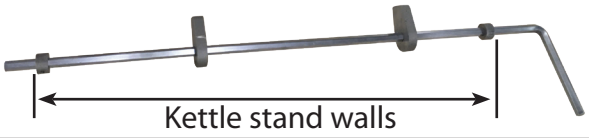
Item Number	Description	Qty
BE-000633-00	1.5" Sanitary Tri-Clamp	8
BE-000868-00	1.5" TC Gasket	8

ASSEMBLE THE KETTLE STANDS AS SHOWN



LIFTING ARM ASSEMBLY

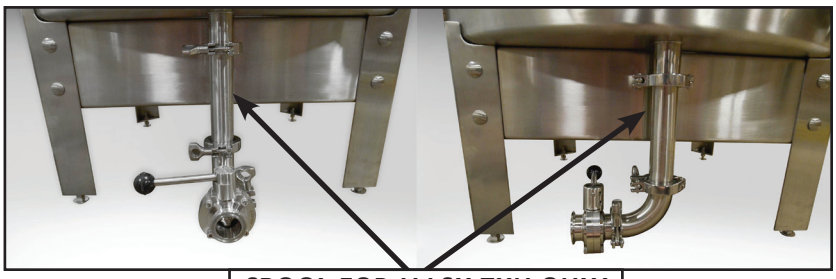
Attach the lifting arm to the holes in the mash kettle strand. Use the included allen wrench to tighten in place.



KETTLE PLACEMENT & FITTINGS INSTALLATION

Place stands in the desired location Use a level to ensure that the stand arms are level. Adjust the leveling feet as needed. It is recommended that you allow enough clearance between kettles and also on the sides and rear to allow personnel access for cleaning and service of the ancillary equipment. Although in practical use, the kettles can easily be slid out for any service needs.

Install valves and fittings as shown in the images below. Note that a 6" spool is added to the mash tun drain to allow the valve to swing under the stand so that a spent grain tote can be placed under the manway. It is not necessary to add the spool to the BK/HLT.

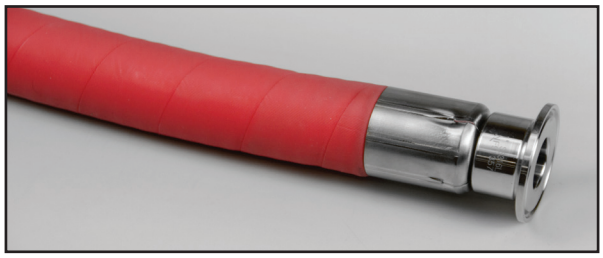


SPOOL FOR MASH TUN ONLY

HOSES

Length (1.5 inch ID)	Quantity
7 Feet	3
12 Feet	1

Construction:
Tube: FDA white EPDM (non oily transfer applications)
Reinforcement: Multiple plies of polyester tire cord with wire helix
Cover: Red EPDM
Temperature Range: -40°F to +225°F
Not for continuous steam service
Stainless Steel 1.5 Inch Tri-Clamp ends



Note: that you can easily couple hoses together with a clamp and gasket to make long runs to fermentors etc.

Additional hoses can be purchased.

HEATING ELEMENTS

Place heating elements (3) into the boil kettle and hot liquor tank. Ensure the nuts on the element junction boxes are tight to prevent water entry into the heater as shown. **Water entry into the element will cause failure.**

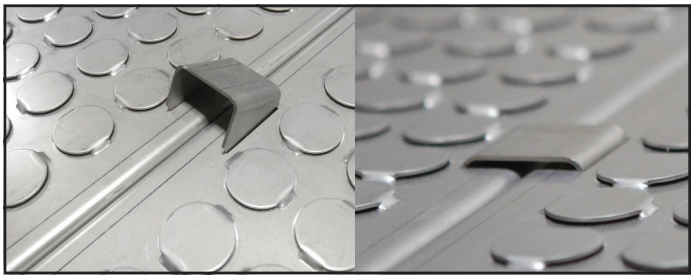
3.5 BBL Heating Element

STAND PIPE

For the Boil Kettle only install the stand pipe in the drain fitting inside the kettle as shown. To install and remove the standpipe, simply use a hook to lower it into the drain hole and reverse for removal. This will keep the bulk of the settled hops and break material in the bottom of kettle and out of the chiller. Use of the stand pipe, while recommended, is optional. If you plan to treat your brewing water by boiling, the use of the stand pipe works well in your HLT to leave settled water salts behind. An extra stand pipe can be purchased on our parts site or at time of order.

FALSE BOTTOM

Install the false bottom through the manway in the mash tun (MT) one segment at a time starting with the center section. Install the U-shaped securing clips between the sections to secure them as shown.



SINGLE PHASE CONTROLLER

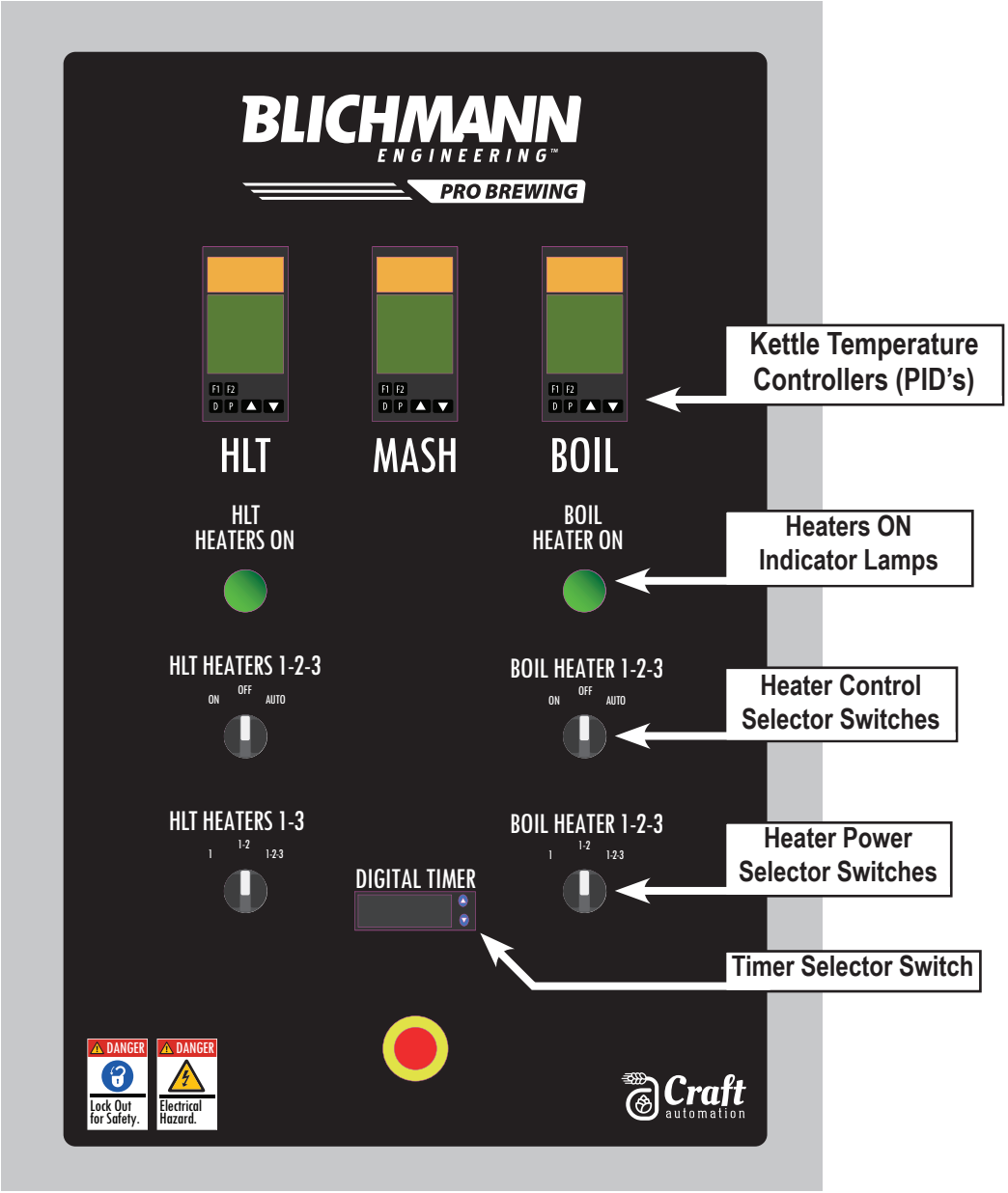
Warning: Always follow ALL local codes and regulations for installation of this panel. We highly recommend hiring a certified electrician for this work! This panel is designed for 230 VAC single phase power only.

The back of the panel has 4 holes for affixing the panel to the wall of the brewhouse or onto a suitable stand. Mounting hardware or stand is not included. The image below indicates the locations of the main components.

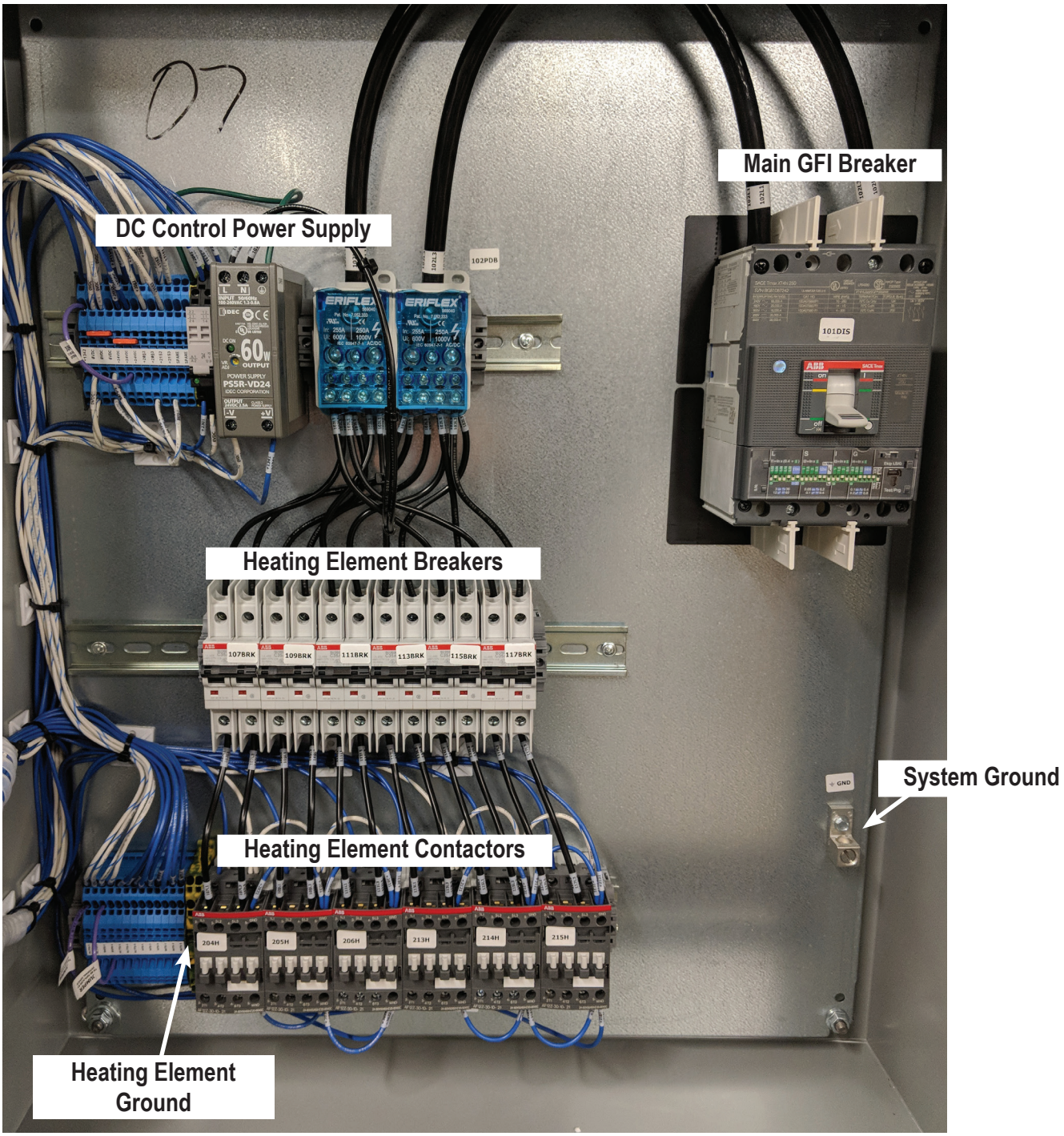
THREE PHASE CONTROLLER

Warning: Always follow ALL local codes and regulations for installation of this panel. We highly recommend hiring a certified electrician for this work! This panel is designed for 208/230 VAC three phase power only. Contact us for single phase system options.

The back of the panel has 4 holes for affixing the panel to the wall of the brewhouse or onto a suitable stand. Mounting hardware or stand is not included. The image below indicates the locations of the main components.

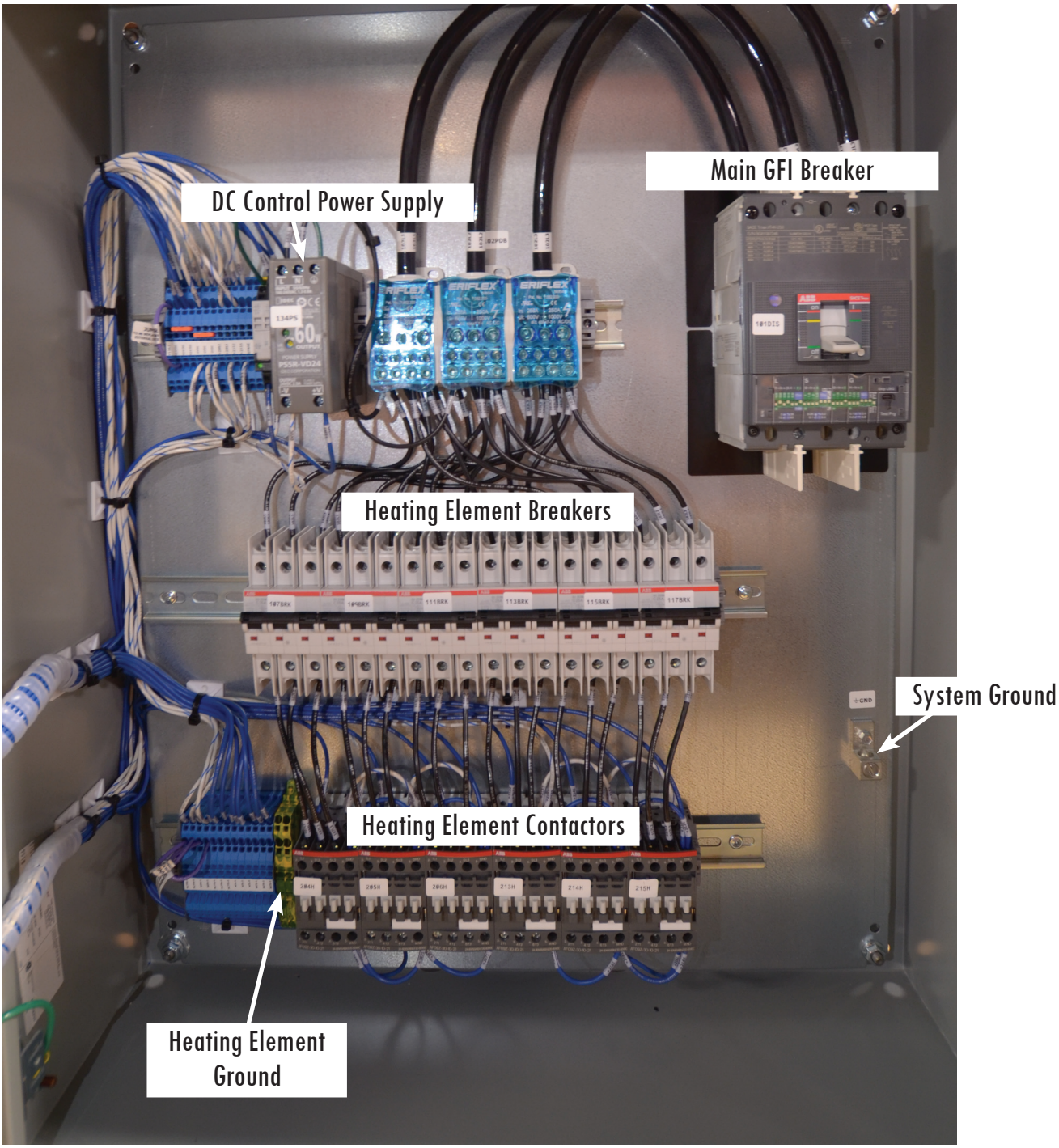


SINGLE PHASE CONTROLLER



Main Power GFI Breaker – this industrial grade GFI (ground fault interrupting) breaker is the connection point for main power cables connected to the panel. Consult your local codes to determine if you can utilize this breaker as a main disconnect as well. In any case, we highly recommend a suitable disconnect switch be installed prior to the panel for safe servicing of the panel. Your contractor will need to punch a hole in your panel for the main power cable conduit in your desired location. Power demand for the brewhouse is 150A at 230V (single phase). Select a main breaker setting for 20% above the appropriate amperage to avoid nuisance tripping or as directed by your local codes.

THREE PHASE CONTROLLER

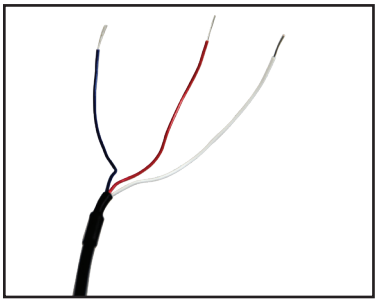


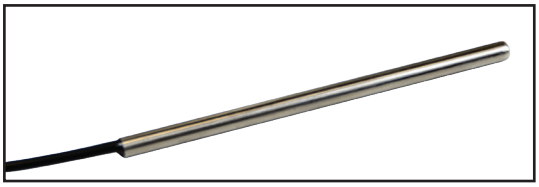
Main Power GFI Breaker – this industrial grade GFI (ground fault interrupting) breaker is the connection point for main power cables connected to the panel. Consult your local codes to determine if you can utilize this breaker as a main disconnect as well. In any case, we highly recommend a suitable disconnect switch be installed prior to the panel for safe servicing of the panel. Your contractor will need to punch a hole in your panel for the main power cable conduit in your desired location. Power demand for the brewhouse is 102A at 208V (three phase). Select a main breaker setting for 20% above the appropriate amperage to avoid nuisance tripping or as directed by your local codes.

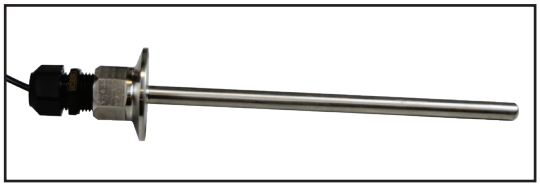
RTD WIRING

Your system is supplied with PT100 RTD temperature probes with 30 feet of cable. Insert the Temperature Probe into the cord grip and thermowell until the probe bottoms out. **It is important to ensure it is inserted all the way, otherwise this can cause your temperature readings to be inaccurate.** Tighten the cord grip until the probe cable is locked into place.

Connect the white, red, and blue wires to the control panel listed below.







RTD Wiring Inside Control Panel

Boil Kettle
Blue to BKTS-1
Red to BKTS-2
White to BKTS-3

Mash Tun
Blue to MTS-1
Red to MTS-2
White to MTS-3

HLT
Blue to HLTTS-1
Red to HLTTS-2
White to HLTTS-3

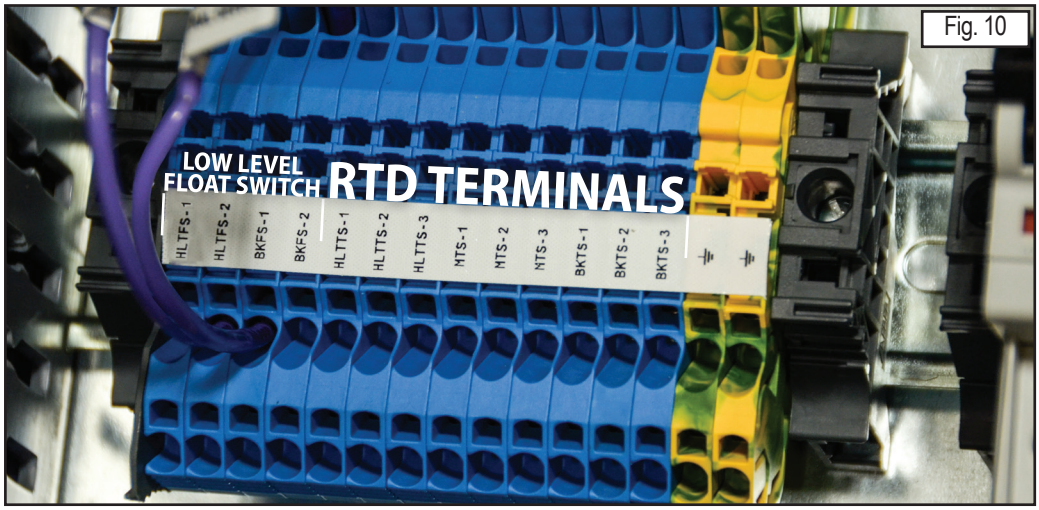


Fig. 10

Heating Elements: The brewhouse is supplied with six 9,000 W ultra-low watt density heating elements. Each heating element is specific to the type of panel ordered. The individual heating element amperages as well as connection types are below. We recommend SJOOW type cable. Again, your local codes will dictate the cable type and gauge.

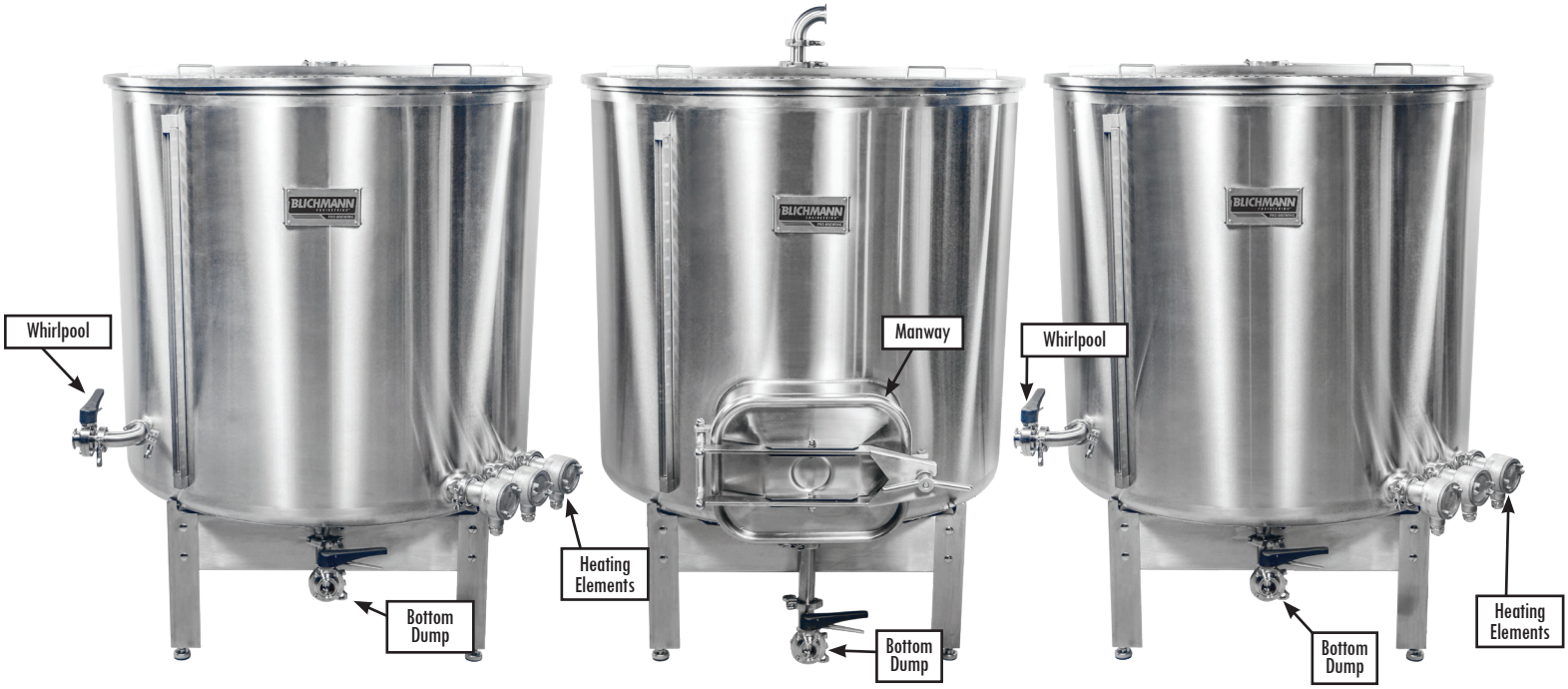
IMPORTANT: Always consult your local codes to determine what type of cable is acceptable, what gauge is required, and maximum lengths of flexible cable allowed.

Voltage	Amperage Per Element	Connection Type
208V/230V - 3 Phase	26A	L15-30
240V - 1 Phase	38A	Customer Supplied
480V - 3 Phase	11A	Customer Supplied

Float Switches – float switches are provided to help prevent unintended energizing of the heating elements. It is vital that the heating elements be immersed in liquid prior to energizing them. Failure to immerse the heating elements will cause them to fail and potentially cause a fire! Using the wires included, run the wire from the float switches to the terminal block shown in the panel **(Fig. 10)**. Polarity is not important. Hook your HLT float switch blue and brown wires into terminals HLTFS-1 and HLTFS-2 in the panel. Hook your BK float switch blue and brown wires into terminals BKFS-1 and BKFS-2 in the panel. Again, polarity is not important. If jumper wires are installed in the panel remove them when you install the switch wires.

When wiring the float switches to the control panel use a continuity tester on the leads to ensure that the switch is open when in the down (empty) position, and is closed (has continuity) in the up (full) position.

CAUTION: THE LOW WATER LEVEL SWITCHES ARE A BACKUP TO AN UNINTENDED ENERGIZING OF THE HEATERS. THEY ARE NOT INTENDED TO BE NORMAL SHUTOFF SWITCHES AND SOLELY RELIED UPON TO KEEP THE HEATERS FROM UNINTENTIONALLY ENERGIZING! DRY-FIRED HEATING ELEMENTS ARE NOT COVERED UNDER WARRANTY!



CONTROL PANEL OPERATION

Reference the figures on pages 3 and 4 for locations of components.

PID's – The PID controllers are pre-set for optimum heating rates and minimum overshoot. The corresponding large green lamp below the PID will indicate when the control is powering the heating elements. As the temperature approaches the set point the controller will automatically begin to cycle the heating elements on and off for a short period approximately every 30 seconds to maintain the set temperature. Typical stability is about +/- 1F. Note that the MASH PID is displaying temperature only and does not energize heating elements.

To change the set point press the UP/DOWN arrows until you reach your desired setting.

Heater Control Selector Switch – there are three positions for the power selector switch.

ON - Energizes the corresponding heating elements at all times and is used as manual override. It bypasses the PID and the low water level float switch. It is used as an emergency override should a component fail during a brew day.

OFF - De-energizes the heating elements in all cases and prevents heater from energizing. Select this position as you begin to frain a tank or wish to prevent unitended powering of the heaters.

AUTO - Allows the PID to automatically turn on the heaters to maintain the desired set temperature and allows the low level switches protect the heating elements from firing while dry.

Heater Power Selector Switches – the heater selector switches are used to select the total power input to your kettle. Each switch controls 3 heating elements. You may select, for example, element 1 only (1/3 power), element 1-2 (2/3 power), or 1-2-3 (full power). This is particularly helpful during the boil to control the boil intensity.

Timer – a start delay timer is provided to allow you to start heating brewing liquor in advance of your brew day so that you have hot liquor available at the exact desired temperature upon arrival for brewing. The factory setting is 0-999 minutes of delay. To select a delay push the 'SET' button on the timer to turn the timer on. Use the up and down arrows to set the minutes of delay. Press 'SET' again to lock in the selected time. To turn the timer off press the set button until the timer displays off.

Note: Boil Kettle and/or Hot Liquor Tank must be turned to the 'Auto' position to turn on at the end of the timer delay.

WARNING: Always ensure your tanks are full of water prior to turning the timer function ON and also ensure your PID selector switch in in the AUTO mode! Energizing the heaters dry will cause the heaters to fail and potentially cause a fire. Boiling water unattended (if heaters left in the ON position) will cause a similar failure if the water boils off.

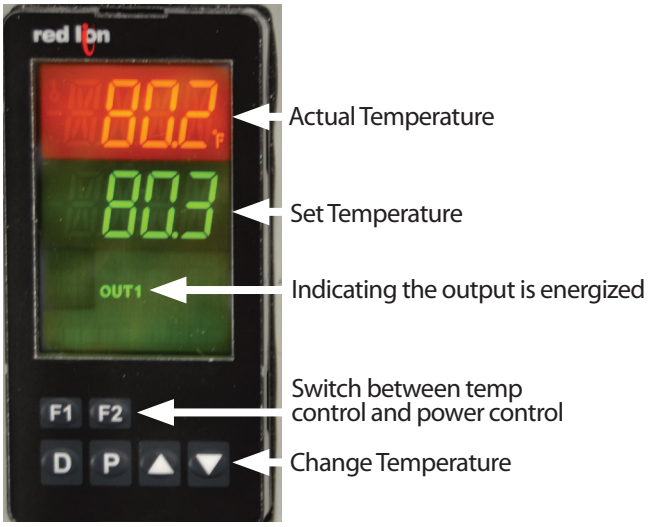
WARNING: Consult your local codes and regulations for unattended operation of your system.

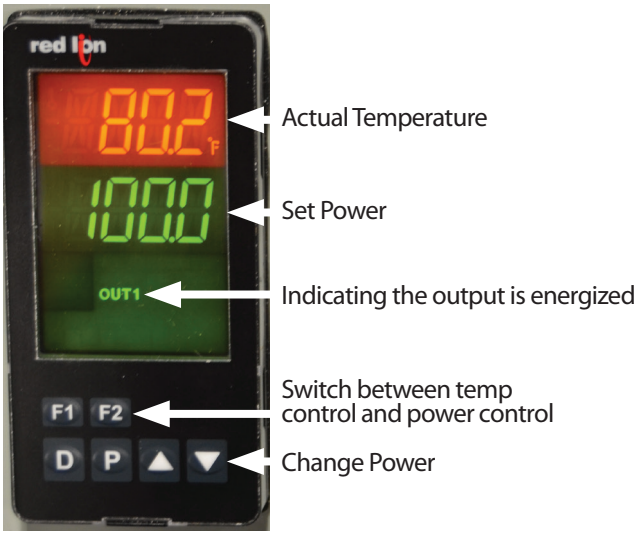
Emergency Stop – this switch disables all heater contactors in the panel and also can be used for ensuring your heaters do not inadvertently power on. For safety, install a padlock through the hole in the switch to prevent unauthorized operation of the panel.

WARNING: pressing the emergency stop button does NOT cut power from the inside of the panel! All internal components will be live! To service the panel, disconnect main power to the panel before opening the panel.

Please re-torque all screw terminals to the component manufactures current recommended torque specs after shipment and during regular preventative maintenance (every 6 months)

Temperature Mode





RED LION GENERAL OPERATING INSTRUCTIONS

This document is authored for those comfortable with PID operation and parameter navigation. Please keep in mind that unintended parameter alteration can render the unit inoperable or cause unintended functionality.

PLEASE PROCEED WITH CAUTION!

CHANGING TEMPERATURE SETPOINTS

-Simply use the Up/Down arrows to change your vessel/s target setpoints.

***If you have a 3.5BBL System or larger, you have the option to enter two different setpoints and easily toggle/alternate between the two setpoints (SP1 & SP2) using the 'F1' key**

***To change the values of SP1 and/or SP2, press the 'F1' key until [SP1] or [SP2] shows on the display, use the Up/Down arrows to change.**

ALARMS (ALM1 & ALM2)

The Red Lion controllers have embedded fault/alarm features to alert a user that the temperature is out of range. When faulted, the display will turn red and indicate which alarm is tripped by showing either ALM1 or ALM2. To acknowledge/clear the fault alarm, press the 'F2' key.

To change the values at which the Alarm faults occur, press the 'P' key to display either [ALM1 or ALM2]. Use the Up/Down arrows to change.

ALM1 will fault ABOVE the entered value (overtemperature alert), while ALM2 will fault BELOW the entered value (under temperature alert).

2BBL SYSTEMS AUTO/MANUAL HEATING MODES

For the 2BBL Brewhouse Control Panels, there are two options for utilizing the heaters' On/Off control; Auto Mode (automatically targets temperature setpoints), and Manual Mode (overrides the temperature setpoint and operates the heating elements based on a Percentage of Output Control from 0-100%)

To toggle between Auto Mode and Manual Mode, simply press the F1 key.

When in Manual Mode, the letters [MAN] will display on the controller.

To change the Manual Heating Output Percentage, press the 'D' key until [OP1] shows on the controller display, then use the Up/Down arrows to change the value to anything between 0-100%.

A setting of 50% will pulse the heater On & Off 50/50 (about a half second on, and a half second off).

When in Manual Mode, the controller WILL NOT shut the heating elements off at or above your temperature set point values! This is intended to control the level of boiling.

PID AUTO TUNE. FOR 2BBL SYSTEMS ONLY!

For the 2BBL systems only, which utilize Solid State Relay control of the heating elements (NOT Contactors). Before you start the Auto Tuning process, you will want your vessel/s to be filled to the volume you'd most frequently be utilizing throughout your brewing processes.

Hold down the 'P' button until the display alternates between [TUNE] and [NO].

Press the 'UP' arrow once to show [YES] and press the 'P' key to confirm/start the Auto Tuning process.

The display will now show the letters [AT] to indicate Auto Tune is underway.
The Auto Tune feature is explained on page 36 of the full Red Lion user manual, near the bottom of that page.

CHANGING THE TEMPERATURE DISPLAY TO METRIC INSTEAD OF ENGLISH UNITS.

These Red Lion controllers can be switched between English or Metric units depending on personal preference. This is parameter 'SCAL' within the 1-1N program loop. The factory default for this parameter is *F.

To change the parameter 'SCAL', hold down the 'P' key until the display shows either [CNFP/NO] or [TUNE/NO], if [CNFP/NO] displays first then skip to the next step

If [TUNE/NO] shows up first, we need to navigate to [CNFP] by pressing the 'P' key several times.

Once the display alternates between [CNFP] and [NO], press the 'UP' arrow once to show [1-1N]

Press 'P' to enter the '1-1N' program loop

'SCAL' is the second parameter within the '1-1N' loop. Press 'P' once to skip [tYPE] until [SCAL] displays.

Once [SCAL] is displayed, use the Up/Down arrows to toggle between *F or *C

After your desired unit of measure is selected, press 'P' to save and the controller will progress to the next parameter.

Press the 'D' key to exit the programming loops, the controller will briefly display [END] to show it is exiting controller configuration mode.

CHECKING PROBE TYPE AND CHANGING PROBE TYPE

Every time the control panel is powered up, the programmed probe type will briefly flash on the display in the green section. Factory Default for the Red Lions is [tC-J]. This needs to be set to [r385] in order to show accurate temperatures for the 3-wire PT100 temperature probes supplied with your equipment.

To change the parameter 'TYPE', Hold down the 'P' key until the display shows either [CNFP/NO] or [TUNE/NO], if [CNFP/NO] displays first then skip to the next step.

If [TUNE/NO] shows up first, we need to navigate to [CNFP] by pressing the 'P' key several times.

Once the display alternates between [CNFP] and [NO], press the 'UP' arrow once to show [1-1N].

Press the 'P' key to enter this programming loop.

[TYPE] is the first parameter within the 1-1N loop.

Use the 'UP' or 'DOWN' arrows to find [r-385].

Once [r-385] is displayed, press the 'P' key to save this setting, the display will progress to the next parameter within the 1-1N loop.

Press the 'D' key to exit the programming loops, the controller will briefly display [END] to show it is exiting controller configuration mode.

CHANGING CONTROL ACTION TO/FROM PID OR ON/OFF

If your Red Lion controller's Control Mode (CtrL) is set to PID (heaters are pulsing On/Off) and you have a 3.5BBL System or larger, the Control Mode will need to be changed to On/Off. The factory default for this parameter is PID.

To change the parameter 'CtrL', hold down the 'P' key until the display shows either [CNFP/NO] or [TUNE/NO], if [CNFP/NO] displays first then skip to the next step.

If [TUNE/NO] shows up first, we need to navigate to [CNFP] by pressing the 'P' key several times.

Once the display alternates between [CNFP] and [NO], press the 'UP' arrow twice to show [2-OP].

Press the 'P' key to enter this programming loop.

[CtrL] is the second parameter within the 2-OP loop, press 'P' once to navigate from [OPAC] to [CtrL].

Once [CtrL] is displaying on the controller, use the 'UP' or 'DOWN' arrows to find [On/Of].

After you've found [On/Of] on the display, press the 'P' key to save, the display will progress to the next parameter within the loop.

Press the 'D' key to exit the programming loops, the controller will briefly display [END] to show it is exiting controller configuration mode.

APPLYING A SHIFT/OFFSET (TEMP PROBE CORRECTION/CALIBRATION)

If your temperature is consistently showing off by a specific value as compared to a recently calibrated/trusted temperature probe, a correction can be made on the Red Lion controller to compensate. This is the parameter 'SHFt' within the 1-1N programming loop.

This is best done by temporarily removing the probe from the vessel and making an ice water bath. The value the probe is above/below 0*C or 32*F is the value that should be used in the 'SHFt' parameter.

To compensate the displayed temperature either higher or lower, Hold down the 'P' key until the display shows either [CNFP/NO] or [TUNE/NO], if [CNFP/NO] displays first then skip to the next step

If [TUNE/NO] shows up first, we need to navigate to [CNFP] by pressing the 'P' key several times.

Once the display alternates between [CNFP] and [NO], press the 'UP' arrow once to show [1-1N].

Press the 'P' key to enter the '1-1N' loop.

Press the 'P' key several more times to find [SHFt].

Use the 'UP' or 'DOWN' keys to change the value above/below 0 (this is the offset/compensation in degrees). This value can either be + or – from 0.

Once desired value is entered for compensation, press the 'P' key to save.

-Press the 'D' key to exit the programming loops (display will show [END]).

BREWHOUSE OPERATION

The hybrid design combines the conveniences of a traditional brewhouse with the simplicity, familiarity, and lower start-up cost of a homebrew system. This allows a fast and easy transition into commercial brewing with very few sacrifices! As such, startup and the learning curve is quite simple. This system is a fly-sparge design and includes a boil kettle, a hot liquor tank, and a mash/lauter tun. Note that the boil kettle and HLT are identical kettles for convenience. Both contain a whirlpool port. For the HLT, simply cap the whirlpool port with the included fittings.

IMPORTANT: This manual is not intended as a brewing guide. If you are not intimately familiar with all grain brewing techniques we highly recommend the following texts from the Brewers Association:

How to Brew (Palmer)
Water (Palmer & Kaminski)
Yeast (Zainasheff and White)
Malt (John Mallet)
For the Love of Hops (Stan Hieronymus)
Brewing Classic Beer Styles (Zainasheff & Palmer)

HEATING HOT LIQUOR

For a typical brew day you will fill your HLT with enough water for your full brew length. Always better to have too much hot liquor than too little! For higher gravity beers it may be necessary to add more liquor to your HLT after dough-in. Or simply heat your strike water in your boil kettle, and separately heat your sparge water in your HLT. It is really a matter of preference.

TIP: For recipe calculation and strike water temps we have loaded the 3.5 BBL kettles into BeerSmith. We highly recommend this software for all of your brews. It will take a few brews to dial in all of your parameters to achieve consistent results.

CAUTION: prior to powering up your panel, or pulling the emergency stop switch to the ON position, turn all heater control selector switches to OFF! This will prevent unintended energizing of the heating elements. ALWAYS be in the habit of turning the heater power selector switches to OFF prior to draining any kettle! Fill your HLT and (and/or boil kettle) with the desired amount of water ensuring that there is enough water to actuate the float switches. If the switches are not floating they will not allow the heaters to energize!

Set your strike water to the desired temperature. Remember to press the enter key to accept the new value. If the screen is flashing the new setting has NOT been accepted.

MASH OPERATION

When the temperature has been reached and you are ready to pump liquor to the MT turn the PID selector switch to OFF. Underlet water into the MT by pumping water from the HLT into the BOTTOM of the MT. When you have 3-4" of water above the false bottom begin adding and stirring the malt as you continue to pump.

TIP: we recommend underletting so that the malt and water combine and reach close to your desired rest temperature at all times. It takes 15-20 min to stir in all the malt and conversion does begin quickly. If you were to fill the MT with all the hot liquor and then add the malt you would over-shoot your infusion temperature for the first 15-20 minutes until you had all the malt in the MT. Therefore underletting is highly advised. Having one person stir while another adds malt is very helpful.

Your mash tun, even though uninsulated, will lose less than 1 F/hr. Rarely do commercial breweries perform step mashing. Modern malts are highly modified and very little is to be gained by step mashing. Homebrew kettles, on the other hand, are so small that they lose heat quickly so temperature maintenance is common (RIMS/HERMS).

After your scarification rest period, vorlauf (recirculate) your wort for about 10 minutes to clarify the wort and set the grain bed in preparation for runoff to the BK. Now is a good time to check that you have your stand pipe installed in your boil kettle as detailed previously.

Lautering (sparging) and vorlauf are both performed using the CIP ball included with the system to gently distribute liquor or wort over the top of the grain bed. See the image below. Take care to avoid too fast of a runoff which may stick the mash. Note that the level gauge also acts as a manometer that measures the suction pressure on the grain bed. If the level in the gauge is more than 1/3 lower than the level in the tank you are drawing too quickly and will soon stick your mash. In general, you want to lauter your mash for 45 -60 min for optimum efficiency. Stop runoff when your runnings are below 1.010 SG (2.5 deg Plato) or when your runnings reach 6 pH.

IMPORTANT: Do NOT sparge or vorlauf at full pump flow or you are very likely to stick your mash, and your efficiency will suffer severely!

TIP: Your pumps are equipped with sanitary diaphragm valves that make easy work of balancing your flow rates. After a few brews you will determine the number of turns on the valve to achieve your desired flow. Simply make the same number of turns on each pump and your flows will be very close to balanced.

TIP: Raking (stirring) the top 1/3 of the mash every 15 minutes during lautering helps to remove any preferential flow paths and provides a more efficient uniform lauter.

BOILING: Once the level of the wort in your BK / HLT has reached your float switch, turn the corresponding heater control selector switch to AUTO and adjust the set point on the PID to 220F to achieve a boil. That will fire the elements continuously.

CAUTION: if you turn your heater control selector switch to ON when boiling, your float switches are bypassed and will NOT protect your heating elements should you inadvertently drain the BK with the elements energized! Dry fired heating elements that fail are not covered under warranty!

TIP: If the boil is too aggressive use the heater selector switch to de-energize one of the heating elements. Note that a proper boil is between a simmer and a surging boil. Shoot for a 3-5% boil off rate per hour.

IMPORTANT: To drive off DMS ALWAYS boil with the lid open!

After your boil is complete turn your heater power selector switch to the OFF position. You can either whirlpool manually with the stir paddle or connect the pump to the system and recirculate through the tangential port on the side of the kettle. Either method provides a suitable whirlpool. Note that a slow rotation is really all that's needed. After whirlpool, close the lid and allow 15-20 minutes for the convection currents to slow and the hop and trub to settle to the bottom center of the kettle.

CHILLER

Sanitize the chiller by either pumping StarSan or similar copper friendly sanitizer through the chiller. Alternately the chiller may be submerged (fittings up) into a pail of sanitizer. Drain the chiller after the recommended time with the fittings facing down. Connect the chiller per the instructions on the nameplate.

Drain off the first gallon or so of wort from the boil kettle to a waste drain to eject any solids in the piping and to ensure only clear wort flows through the chiller to prevent plugging. Then divert the flow to the chiller. Adjust the wort flow and/or the cooling water flow to achieve the desired wort temperature to your fermentor.

IMMEDIATELY after use back-flush the chiller with hot water to eject any solids and wort. IMMEDIATELY soak the chiller fittings up in PBW or other copper friendly cleaning agents for 30 min or pump through the chiller. Rinse with hot water and then soak in sanitizer. Allow to drain fittings down, and then store with the chiller horizontal. Following this procedure consistently will give you a very long service life for your chiller.

PUMPS

The pumps included with the system are seal-less magnetic drive pumps. They **MUST NOT** be run dry or the impeller bearing surface will be damaged! **This is NOT covered under warranty.** Ensure the hoses and pump head are filled with liquid before turning on the pump. If you hear a loud squeal stop the pump immediately!

Caution: NEVER restrict the inlet to the pump. Always place flow throttling valves on the OUTLET of the pump ONLY. Failure to do this will cause cavitation in the pump possibly leading to failure of the impeller. If you hear any grumbling or grinding in the pump STOP IMMEDIATELY as this is cavitation. Cavitation failures are NOT covered under warranty.

CLEANING YOUR SYSTEM

Mash tun: Spent grains can easily be removed through the manway in the mash tun. Drain all remaining wort out of the bottom drain and then open the door. Utilizing a non-marring hoe (available in our maintenance kit) rake out the spent grains into a tub. Remove the false bottom sections and spray them off with hot water and allow to dry. Spray excess grain from the sidewalls and bottom of the kettles with a hose.

HLT/BK/MT: Due to the easy access through the top of the relatively small tanks, and small size of the chiller and pumps, it is usually fastest to scour the kettles with a scrub brush mounted on a pole and spray them out with a hose. Optional cleaning tools are available through Blichmann Engineering to make this a fast and thorough job. Alternately, you can utilize one of the heated vessels to heat and hold your CIP (clean in place) chemicals and use one pumps to recirculate through the CIP ball and the second pump to return back into the chemical kettle. It is recommended that you turn off all heaters while running the CIP system to avoid dry firing them. Tip your kettles forward so that all water drains out the bottom valve, leave the lid open, and allow the kettles to dry thoroughly.

Tip: A spray of StarSan on the interior surfaces after cleaning will help prevent mildew between uses.
Tip: Place your chiller in-line with the pump to clean it at the same time.

SYSTEM DATA

Typical heating rates are 0.8-1.5 F/min.
Expect about a 5% boil-off rate
Strike water will cool about 10F when pumped from the HLT to the MT
Temperature loss in MT – less than 1F/hr
Temperature stability of control system approximately +/- 1 F

BLICHMANN BREWHOUSE
FAQS & TROUBLESHOOTING

Q1: The power to my panel is on, but why aren't the door mounted controllers on?

A1: Check that the Emergency Stop Pushbutton is not pressed in. A simple Clockwise turn should release the E-Stop. Check that the Main Circuit Breaker within the control panel is turned on and not tripped. For panels with individual heater breakers, the indicator should be red for operation and green for tripped.

Q2: Why is my vessel temperature showing a temp that seems far off from what it should be (or not showing a temperature at all)?

A3: The Red Lion Controllers can accept multiple signal/probe types, it's possible that the incorrect probe type is selected.

Checking Probe Type and Changing Probe Type

Every time the control panel is powered up, the programmed probe type will briefly flash on the display in the green section. Factory Default for the Red Lions are [tC-J]. This needs to be set to [r385] in order to show accurate temperatures for the 3-Wire PT100 temperature probes supplied with your equipment.

To change the parameter 'TYPE', Hold down the 'P' key until the display shows either [CNFP/NO] or [TUNE/NO], if [CNFP/NO] displays first then skip to the next step.

If [TUNE/NO] shows up first, we need to navigate to [CNFP] by pressing the 'P' key several times.

Once the display alternates between [CNFP] and [NO], press the 'UP' arrow once to show [1-1N].

Press the 'P' key to enter this programming loop

[TYPE] is the first parameter within the 1-1N loop

Use the 'UP' or 'DOWN' arrows to find [r-385]

Once [r-385] is displayed, press the 'P' key to save this setting, the display will progress to the next parameter within the 1-1N loop.

Press the 'D' key to exit the programming loops, the controller will briefly display [END] to show it is exiting controller configuration mode

Q3: Why is my green light for heating indication flashing on and off?

A3: For 2BBL systems, this is occurring by design. The Red Lion controllers in these instances are using what is called the PID control mode. Essentially the heating elements are being pulsed on & off so that the vessel temperatures do not critically overshoot your desired setpoints. The further away from your target temperature the vessel is, the longer the heating elements will stay pulsed on, while the vessel approaches the target temperature these 'on' pulses will shorten considerably. Once the vessel is at the target temperature, these pulses On/Off will continue to maintain a steady temperature. **If you have a 3.5BBL system or larger, the components/hardware within your panel are not designed to operate using PID action. Leaving your controller in PID mode will significantly shorten the lifespan on the heater contactors within the control panel.**

Changing Control Action to/from PID or On/Off

If your Red Lion controller's Control Mode (CtrL) is set to PID (heaters are pulsing On/Off) and you have a 3.5BBL System or larger, the Control Mode will need to be changed to On/Off. The factory default for this parameter is PID.

To change the parameter 'CtrL', Hold down the 'P' key until the display shows either [CNFP/NO] or [TUNE/NO], if [CNFP/NO] displays first then skip to the next step.

If [TUNE/NO] shows up first, we need to navigate to [CNFP] by pressing the 'P' key several times.

Once the display alternates between [CNFP] and [NO], press the 'UP' arrow twice to show [2-OP].

Press the 'P' key to enter this programming loop.

[CtrL] is the second parameter within the 2-OP loop, press 'P' once to navigate from [OPAC] to [CtrL].

Once [CtrL] is displaying on the controller, use the 'UP' or 'DOWN' arrows to find [OnOf].

After you've found [OnOf] on the display, press the 'P' key to save, the display will progress to the next parameter within the loop.

Press the 'D' key to exit the programming loops, the controller will briefly display [END] to show it is exiting controller configuration mode.

Q4: Why is my 2BBL system drastically overshooting my target setpoints even though I made sure PID mode is enabled on my controller, and my heaters pulse on and off?

A4: The Red Lion controller has no way to know how much volume is contained within your vessel, if your vessel is only half full it's likely going to overshoot your target setpoint by several degrees. Try keeping your Hot Liquor Tank topped off prior to your Strike or Sparging processes. If your vessels are at full volume and the controller continues to overshoot your target setpoints, some PID tuning may need to be performed. Please contact Craft Automation support.

Q5: Why does the Red Lion Controller show ALM1 and/or ALM2?

A5: ALM1 and ALM2 is just a customizable upper/lower limit fault alert. This can be handy for your Strike/Sparge & Mash Tun temperature displays, alerting the user if/when the vessel temperature is outside of the limits for each respective stage/process. You may refer to the "Red Lion General Programming Instructions", Section 2, which details the alarm actions and how to change those values.

Q6: Why is my Red Lion controller showing [OPEN], [OLOL], [SHrt] or [ULUL] instead of a temperature?

A6: The probes need to be wired to the control panel in a specific way in order to function correctly. As of the writing of this document (10/14/2022), the **Blue** lead from the 3-Wire temperature probe needs to be on the 'A' terminal for each respective vessel as shown on the wiring schematics (probes with wire colors Blue, Red, and White), the two 'B' terminal leads can be interchanged with one another but neither 'B' lead from the probe can be landed on the 'A' terminal. If you suspect your probe is different, or the color coding is different, you may use a multimeter/voltmeter to measure the resistance between all three pairs, one pair at a time. Two of the leads will have 0.0 Ohms resistance (or very close to), these two wires are the 'B' terminals which leaves the third wire to be the 'A' terminal, you should be able to measure a resistance of approximately 100-110 Ohms at room temperature between the 'A' lead and either one of the two 'B' leads. **If wiring has been confirmed and is verified correct, please contact customer support.**

Q7: I prefer Metric units rather than English (*C instead of *F), can the Red Lion controllers be changed in this regard?

A7: Yes, please refer to the "Red Lion General Programming Instructions", Section 7.

Q8: Why aren't my heating elements turning on? I've already checked my E-Stop, my Temp setpoint, and my control switch positions.

A8: There are a few things that can be checked to resolve this:

1: Verify that the Mini-Circuit breakers inside the control panel are all turned on, each heating element circuit is protected by its own branch breaker, which are located immediately above the heater contactors within the control panel. Red indicators mean they are on.

2: Check float switch wiring/configuration. The float switch/es will prevent the heating elements from coming on if their floats are either above the water line, not wired correctly, or operating opposite of what they should (heating elements can come on if water is below float but shut off if water is above float).

3: If the float has failed, you can bypass their operation by reinstalling the jumper that was in the float switch terminals when the panel was shipped to you. This situation can leave you open to dry firing the elements and should only be used until the float can be replaced. **Importantly, Dry firing isn't covered under the warranty!**

Q9: I have a few wiring and installation related questions. I'm very handy and intend on doing the installation myself. Can you guide me with the schematics, and suggest the type of wire/cables & connectors we need to purchase?

A9: We can answer some frequent questions and, in some instances give advice. However, these control panels and the wiring are not DIY type projects. These systems draw a lot of energy, at medium to high voltages. They can be extremely dangerous if not handled appropriately and wired adequately. **If you are not a qualified and licensed electrician, please seek the assistance of someone who is qualified and licensed. These installations need to be safe and to up to code, <u>otherwise severe injury or death can occur!</u> Damage to the equipment and/or control panel is possible if not installed correctly.**

Q10: One or more of my mini-circuit breakers (branch breakers) which feeds my heating element circuits is continually tripping, I keep resetting it, but it keeps tripping every time I turn the heating element back on. What can I do?

A10: Power down the control panel. Do not keep resetting the breaker, as it'll shorten the lifespan of the circuit breaker considerably. With the panel powered down, have a qualified and licensed electrician check the circuit using a multi-meter, looking for short circuits from one phase to another on the load side of the control panel. Also check for shorts to Ground. Have the electrician inspect the heating element housing for loose wire strands and cable plugs/receptacles, if applicable.

Blichmann Engineering Product Warranty

A. Limited Warranty

1. Blichmann Engineering warrants to the original purchaser that this product will be free from manufacturing defects in material and workmanship for a period of one (1) year from the date of purchase by the customer. Proof of purchase is required. Blichmann Engineering's obligation to repair or replace defective materials or workmanship is the sole obligation of Blichmann Engineering under this limited warranty.
2. The limited warranty covers only those defects that arise as a result of normal use of the product and does not cover any other problems, including, but not limited to, those that arise as a result of:
   a. Improper maintenance or modification;
   b. Damage due to incorrect voltage or improper wiring by customer;
   c. Operation outside of the product's specifications;
   d. Carelessness or neglect to operate the product in accordance with instructions provided with the product;
   e. Damaging the tamper label on the product;
   f. Damage by over-tightening the fasteners;
   g. Failure to follow cleaning and / or maintenance procedures; or
   h. Exceeding published operational temperatures.
3. Blichmann Engineering reserves the right to request delivery of the defective component for inspection before processing the warranty claim. If Blichmann Engineering receives, during the applicable warranty period, notice of a defect in any component that is covered by the warranty, Blichmann Engineering shall either repair or replace the defective component with a new or rebuilt component at Blichmann Engineering's option.
4. Blichmann Engineering must be notified within seven (7) days of the delivery date of any shipping damage. Customer is responsible for shipping damage outside of this time period. Approval for return must be provided by Blichmann Engineering prior to any return. Customer is responsible for keeping all original packaging material for warranty returns. Blichmann Engineering is not responsible for damage from improperly packaged warranty returns, and these repair costs will be the sole responsibility of the customer. Shipping costs for warranty returns are covered only for the contiguous United States.
5. Blichmann Engineering's limited warranty is valid in any country where the product is distributed.

B. Limitations of Warranty

1. Any implied warranty that is found to arise by way of state or federal law, including any implied warranty of merchantability or any implied warranty of fitness, is limited in duration to the terms of this limited warranty and is limited in scope of coverage to this warranty. Blichmann Engineering disclaims any express or implied warranty, including any implied warranty of fitness for a particular purpose or merchantability, on items excluded from coverage as set forth in this limited warranty.
2. Blichmann Engineering makes no warranty of any nature beyond that contained in this limited warranty. No one has authority to enlarge, amend, or modify this limited warranty, and Blichmann Engineering does not authorize anyone to create any other obligation for it regarding this product.
3. Blichmann Engineering is not responsible for any representation, promise, or warranty made by any independent dealer or other person beyond what is expressly stated in this limited warranty. Any selling or servicing dealer is not Blichmann Engineering's agent, but an independent entity.

C. Limitations of Liability

1. The remedies provided in this warranty are the customer's sole and exclusive remedies.
2. Except for the obligations specifically set forth in this warranty, in no event shall Blichmann Engineering be liable for direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory and whether or not advised of the possibility of such damages.
3. This warranty does not cover, and in no event shall Blichmann Engineering be liable for, travel, lodging, or any other expense incurred due to manufacturing defects in material and workmanship, or any other reason.
4. Any performance of repairs after the warranty coverage period has expired or performance of repairs regarding anything excluded from coverage after this limited warranty shall be considered good-will repairs and they will not alter the terms of this limited warranty, or extend any warranty coverage period.
5. Venue for any legal proceedings relating to or arising out of this warranty shall be in Tippecanoe County, Indiana, United States, which courts will have exclusive jurisdiction.

D. Local Law

1. This warranty gives the customer specific legal rights. The customer may also have other rights that vary from state to state in the United States or other countries.
2. To the extent that this warranty is inconsistent with local law, it shall be deemed modified, only to the extent necessary to be consistent with such local law.