3.5 BBL Pro Surface™ Electric Brewing System (Three-Vessel)

Assembly, Operation, & Maintenance

Congratulations on your new 3.5 BBL Pro Surface™ Electric Brewing System purchase! This manual will familiarize you with the use, assembly, and sanitation procedures.

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 Blichmann Engineering 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 brewhouse.

IMPORTANT | POWER DEMAND FOR THE BREWHOUSE

To avoid nuisance tripping and damage to equipment, it is required to size the main breaker to 125% of the FLA. Use the chart below or comply with your local electrical codes to determine the size of the breaker required for your system. A GFCI breaker is required to be installed in line to the brewhouse control panel, as required by local codes and other regulations.

Figure: Three Vessel Minimum Main Breaker Size

3 Vessel System Voltage:	Full Load Amperage (FLA)	Minimum Breaker
240V/1PH	168A	210A
208V/3PH	112A	140A
240V/3PH	96.6A	125A
480V/3PH	48.6A	65A

*See the data plate on the back of each kettle for proper voltage and amperage requirements.

WHAT'S IN THE BOX?

THREE VESSEL PRO SURFACE™ BREWHOUSE PARTS LIST

Item Number	Description	Qty
BEPS-SRFC-BK/HLT-3.5BBL-240-1P BEPS-SRFC-BK/HLT-3.5BBL-208-3P BEPS-SRFC-BK/HLT-3.5BBL-240-3P BEPS-SRFC-BK/HLT-3.5BBL-480-3P	ProSurface™ Boil Kettle/Hot Liquor Tank for 3.5 BBL Brewhouse	2
BEPS-CP-SRFC-3.5-240-1P-3V	3.5 BBL Control Panel 240V Single Phase 3 Vessel	1
BEPS-CP-SRFC-3.5-208-3P-3V	3.5 BBL Control Panel 208V 3 Phase 3 Vessel	
BEPS-CP-SRFC-3.5-240-3P-3V	3.5 BBL Control Panel 240V 3 Phase 3 Vessel	
BEPS-CP-SRFC-3.5-480-3P-3V	3.5 BBL Control Panel 480V 3 Phase 3 Vessel	
BEPS-MLT-3.5BBL	Mash Tun for 3.5 BBL Brewhouse w/ False Bottom	1
BEPS-LIFTSTAND-3.5BBL	Kettle Stand 3.5 BBL	1
BEPS-PUMP-15HP	1/5 HP Brewery Pump 2	2
BEPS-CHILLER-2.0SQM	Pro Series Chiller 1	1

BEPS-BK/HLT-PARTS-3.5BBL

(TWO BOXES OF THE BELOW ARE INCLUDED)

Item Number	Description	Qty
BE-000096-01	Brush for Level Gauge - 30"	1
BE-000630-00	Cap-1" & 1.5" Sanitary	1
BE-000633-00	Clamp-1" & 1.5" Sanitary	7
BE-000859-00	Cap-2.5" Sanitary	1
BE-000861-00	Clamp-2.5" Sanitary	1
BE-000863-00	Tri-Clamp Elbow-1.5" Sanitary 90 Degree	3
BE-000866-00	Clamp Gasket 2.5" EPDM	1
BE-000868-00	Tri-Clamp Gasket 1.5" EPDM	7
BE-001236-00	Pro Series CIP Speer for Pin Style Spray Ball	1
BE-001084-01	CIP Rotary (Rotating) Sprayball01.5" Pin Style	1
BE-001356-00	Pro Series Multi Position Butterfly Valve, 1.5" TC	2

WHAT'S IN THE BOX?

BEPS-MLT-PARTS-3.5/5BBL

Item Number	Description	Qty
BE-000096-01	Brush-level gauge, 30"	1
BE-000633-00	Clamp-1" & 1.5" sanitary	5
BE-000861-00	Clamp-2.5" sanitary	1
BE-000863-00	Tri-Clamp Elbow-1.5" sanitary 90 degree	2
BE-000866-00	Clamp gasket 2.5" EPDM	1
BE-000868-00	Tri-Clamp gasket 1.5" EPDM	5
BE-001186-00	1/5" Sanitary Pipe 6" in Length	1
BE-001356-00	Pro Series Multi Position Butterfly Valve, 1.5" TC	1
BE-001397-01	CIP Spear with 2.5" Tri Clamp flange to 1.5" TC	1
BE-001629-00	Pro Brewing-Sparge Arm, 2-row 26" OA, 1.5" TC	1

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	3.5 BBL Boil Kettle Stand Pipe	2
BE-001361-01	1.5" TV Thermowell with ½" FNPT Inlet	3
BE-001612-00	RTD PT100 Temp Sensor	3
BE-001634-00	½" NPT Cable Gland, 3-7 mm	3

BEPS-SANITARY HOSE 2/3.5 HOSES FOR HOSE KIT PARTS LIST

Item Number	Description	Qty
BEPS-SanitaryHose-1in-5	1"x5" Hose Assembly	3
BEPS-SanitaryHose-1in-10	1"x10" Hose Assembly	1

BEPS-HOSEKITHARDWARE-2V-HOSE KIT HARDWARE PARTS LIST

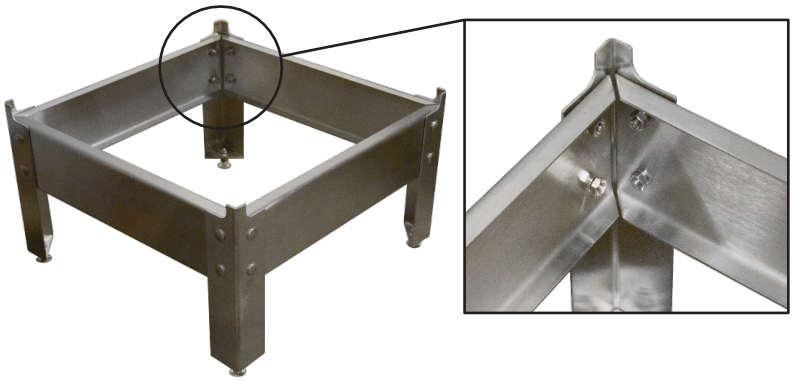
Item Number	Description	Qty
BE-000633-00	1.5" Sanitary Tri-Clamp	6
BE-000868-00	1.5" TC Gasket	6

BE-002098-00 4" CAP KIT

Item Number	Description	Qty
BE-002059-00	4" TC End Cap	2
BE-001738-00	4"TC Gasket	2
BE-001739-00	4" Tri-Clamp	2

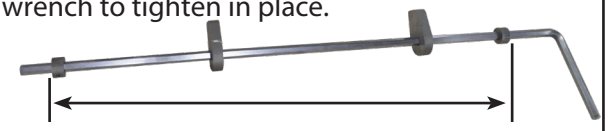
ASSEMBLY INSTRUCTIONS

ASSEMBLE THE MLT STAND (SHOWN BELOW)



MLT STAND LIFTING ARM ASSEMBLY

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

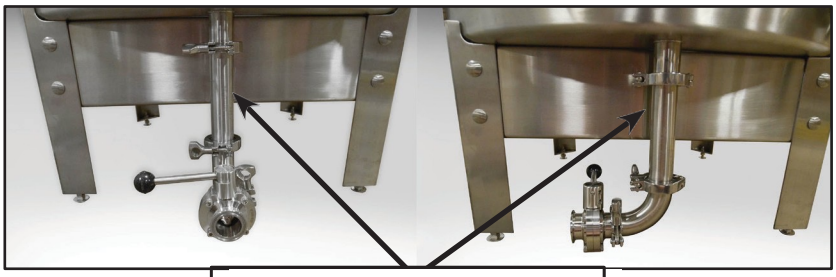


Kettle stand walls

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 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. 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. A 6" is also required for the bottom port on the BK & HLT. Remove the three thumb screws to access the port.

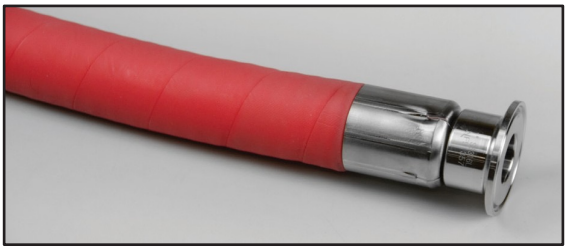


SPOOL FOR MASH TUN ONLY

HOSES

Length (1 inch ID)	Quantity
5 Feet	3
10 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 fermenters, etc. Additional hoses can be purchased.

STAND PIPE

METAL CANE NOT INCLUDED

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.

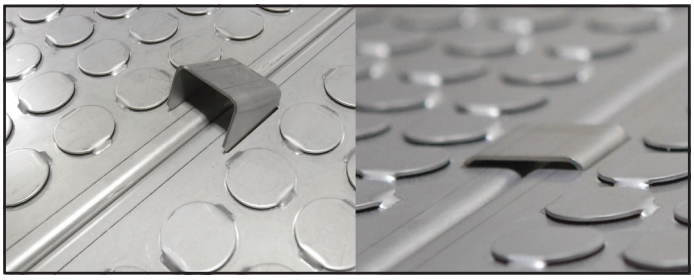
This will keep the bulk of the settled hops and break material in the bottom of kettle and out of the chiller. Use of the stand pipe, while recommended, is optional. If you plan to treat your brewing water by boiling, the use of the stand pipe works well in your HLT to leave settled water salts behind.

An extra stand pipe can be purchased on our parts site or with your order.

ASSEMBLY INSTRUCTIONS

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.



BREWERY VENTILATION

Ventilation needs for an electric brewhouse are minimal, as only the boil kettle needs to be ventilated.
We recommend a traditional commercial kitchen vent hood be installed approximately 6.5 ft from the finished floor.
General rules of thumb are in the table below. It is recommended that you consult your local codes and consult with a professional prior to purchasing or installing your ventilation equipment.

Total power for the Boil Kettle : 20.1 KW

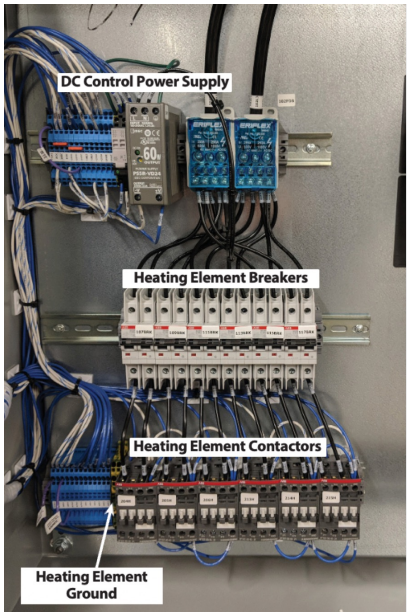
RULES OF THUMB SUMMARY	
Heat Load Factor	1 CFM per 100 BTU/hr (gas) or 34 CFM per KW (electric)
Hood Velocity Factor	50 CFM per ft2 of hood
Room Air Exchange Factor	CFM = Room Volume (ft3) / 6 (you can generally disregard)
Hood Size	Overhang 6" minimum front and sides
Hood Height	32" above kettles – approx. 6.5 ft from floor

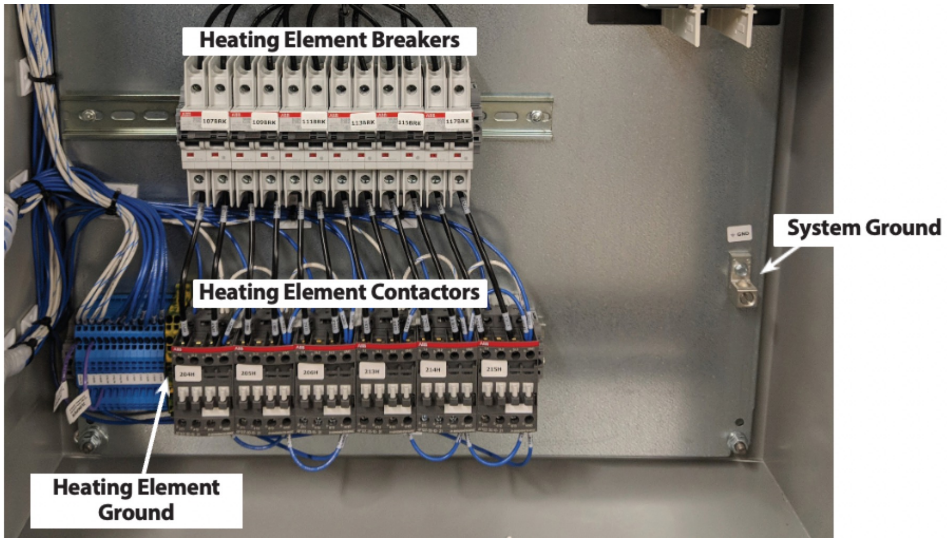
PANEL INSTALLATION:

The back of the panel has four (4) holes for affixing the panel to the wall of the brewhouse or a suitable stand.
We HIGHLY recommend hiring a certified electrician for this work!

The Brewhouse Control panel is equipped with a built-in shut off switch. The shutoff switch serves as a disconnecting means which simultaneously disconnects all vessel heating equipment from all ungrounded conductors. Check with your local codes and regulations if this conforms as a disconnection means.

The main power supply for panel is required to be connected to or fed from a GFCI breaker rated at least 125% of FLA to comply with continuous load operation. See the table below for minimum breaker size. A GFCI breaker is required to be installed in line to the brewhouse control panel, as required by local codes and other regulations. Your contractor will need to punch a hole in the panel for the main power conduit in your desired location.





ASSEMBLY INSTRUCTIONS

PANEL INSTALLATION (CONTINUED):

Figure: Three Vessel Minimum Main Breaker Size

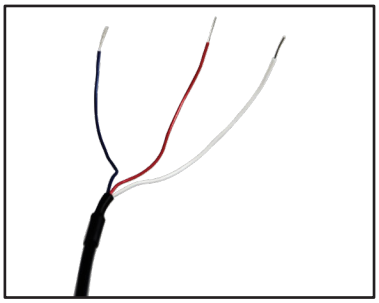
3 Vessel System Voltage:	Full Load Amperage (FLA)	Minimum Breaker
240V/1PH	168A	210A
208V/3PH	112A	140A
240V/3PH	96.6A	125A
480V/3PH	48.6A	65A

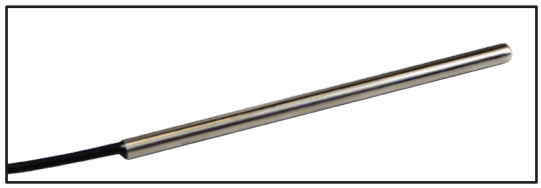
See the data plate on the back of each kettle for voltage and amperage requirements.

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.





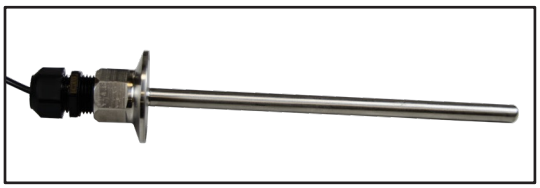


Fig. 10

TERMINAL CODES:

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

KETTLE TO CONTROL PANEL WIRING:

WARNING: ALWAYS FOLLOW ALL LOCAL CODES AND REGULATIONS FOR INSTALLATION OF THE PANEL AND KETTLES. WE HIGHLY RECOMMEND HIRING A CERTIFIED ELECTRICIAN FOR THIS WORK!

ASSEMBLY INSTRUCTIONS*

SUBJECT TO CHANGE

HEATING ELEMENTS:

The power supply wires and element protection circuit wires, for each kettle, are located in the junction box on the rear of the kettle. Each kettle is equipped with three 6700W ultra low watt density cast aluminum heating elements which are required to be connected to the correct contactor in the panel. All three heaters are identical; contactor circuits do not need to be matched with a specific heater in the kettle. The contactor's breaker size is based on the 125% continuous load rule. Unless directed by local regulations, no further de-rating of the conductor is required. Choose a conductor size based on the amperage rating of the breakers in the control panel and any derating requirements established by the NEC or local regulations. *See the table below for recommended conductor sizing based on the installation configuration.*

All wires coming from the same element will be labeled identically. For example – All wires connected to the first Element will be labeled "E1."

It is recommended to install the appropriately sized conduit connectors to the bottom of this junction box with a flexible type waterproof conduit or a flexible water-resistant cable to allow for safe operation in a wet environment and to allow for some mobility of the kettle. Consult with the operator on the location of the kettles during use and consider how much movement of the kettle is required for cleaning and maintenance.

The following chart is for reference only: (Always follow local codes and regulations for electrical installation.)

	Minimum Element Wire Size AWG, Cu		SOOW/SJOOW, Min AWG		Element Protection Circuit
	Number of raceways to kettle		Phase		* 18ga for all System Breaker Sizes
System Breaker Size	3	1	1PH	3PH	
35A	10 Ga	8 Ga	8 Ga	N/A	
25A	12 Ga	8 Ga	N/A	10 Ga	
15A	14 Ga	12 Ga	N/A	14 Ga	

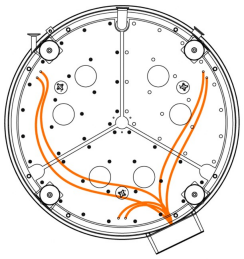


Figure: Element Circuit Wire Drawing (Other circuits omitted for clarity)

Equipment Grounding Electrode:

A 10GA grounding electrode is located on the Junction box. The ground wire connects directly to one of the elements inside of the kettle. There are two jumper wires attached its mounting location and connect to the other two elements.

The grounding conductor in the junction box of each kettle must be connected to the ground terminal block in the panel for each kettle.

Use at least one minimum 10-gauge copper wire for this connection. Metal conduit is not a suitable EGC because the junction box is plastic.

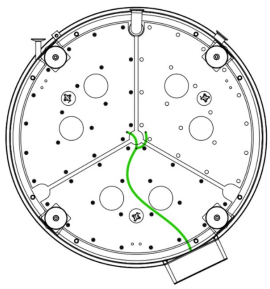


Figure: Grounding Electrode Drawing (Other circuits omitted for clarity)

ASSEMBLY INSTRUCTIONS

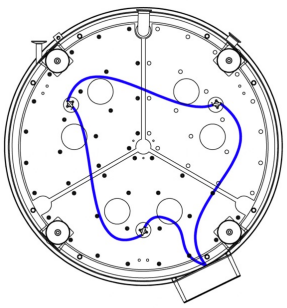


Figure: Element Protection Circuit (Other circuits omitted for clarity)

Element Protection Circuit:

The purpose of this circuit is to halt the current flow to the elements in the event of an over-temperature or dry-run condition. If a kettle is left in the ON position without any liquid, the elements will heat until the over-temperature limit is reached, triggering an automatic shutdown of the kettle by opening the contactors.

The kettle will remain off until the elements cool sufficiently to reset the thermostats.

The elements must be allowed to cool for the thermostats to reset.

Located inside of each Kettle's Junction box is a pair of 18-gauge wires **(Labeled with "T").** These need to be wired to the Element Protection terminals in the panel.

The Element Protection Circuit receives a low amp 24v signal and the conductors must be in a dedicated raceway or separate cable between the kettle and control panel. Connect the wires for each kettle's Element Protection Circuit to the appropriate terminal blocks in the panel. A single race way may be used for these wires, or a water-resistant service cable when allowed by local codes and regulations.

In the event of an over-temperature condition, set the element to **OFF** and allow the kettle to cool down with the lid open before filling with liquid. The Element Protection Circuit lamp will illuminate on the panel indicating an over-temperature condition was reached. After the kettle has cooled, press the reset button on the panel. The lamp shall remain off. Inspect the interior of the kettle for physical damage. Discoloration on the bottom of the kettle may occur. Carefully cover the bottom of the kettle with water to verify that the kettle has cooled. Drain and perform an acid wash cycle to remove any discoloration. Closely monitor the kettle's performance on the next heat cycle. With all three heaters set to ON, the kettle should heat 120 gallons of water at about 1.0 degrees per minute, or 2.0 degrees per minute with 60 gallons.

Contact customer service if the problem persists under normal operating procedures.

CAUTION: Be sure the heater junction box is tight, keeping any water out of the box.
Never immerse the junction box or cord in liquids of any kind!

PLEASE RE-TORQUE ALL SCREW TERMINALS TO THE COMPONENT MANUFACTURERS' CURRENT RECOMMENDED TORQUE SPECS AFTER SHIPMENT AND DURING REGULAR PREVENTATIVE MAINTENANCE (AROUND EVERY 6 MONTHS).

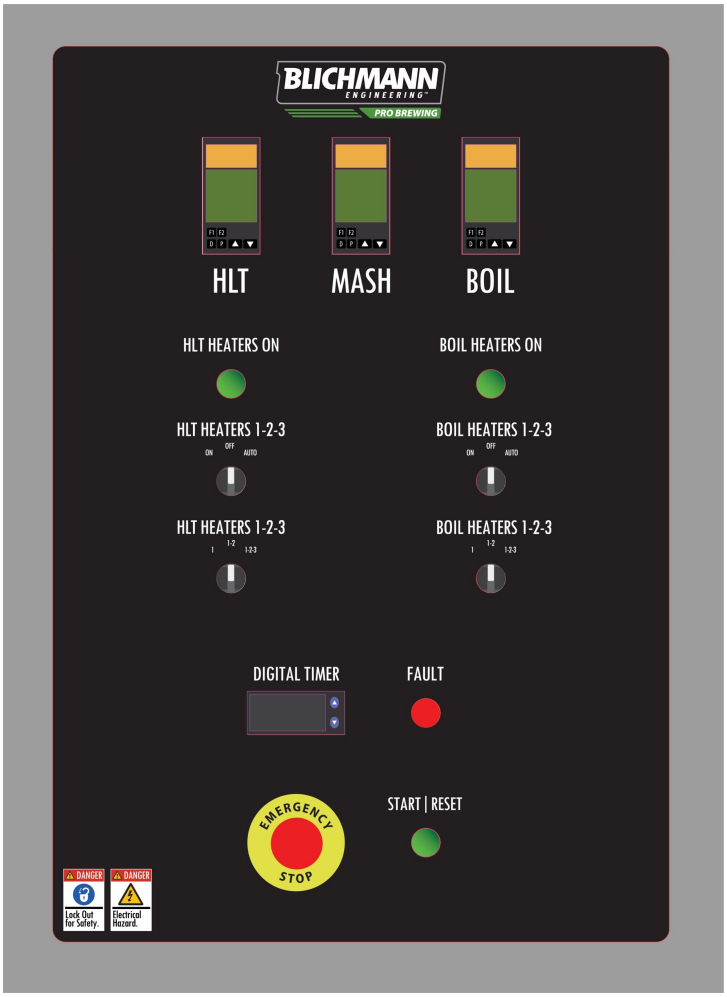
CONTROL PANEL OPERATION

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

Note: The MASH PID is displaying temperature only and does not energize heating elements.

CONTROL PANEL OPERATION **SUBJECT TO CHANGE*

Heater Control Selector Switch: There are three (3) positions for the power selector switch.



ON- Energizes the corresponding heating elements and is used as a manual override.

It bypasses the PID.

OFF- De-energizes the heating elements in all cases and prevents heater from energizing.

Select this position as you begin to drain a tank or wish to prevent unintended powering of the heaters.

AUTO- Allows the PID to automatically turn on the heaters to maintain the desired set temperature.

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), which is helpful for boil control.

WARNING: Always ensure your tanks are full of water prior to turning the timer function ON. Also, ensure your PID selector switch is in the AUTO mode!

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.

CONTROL PANEL OPERATION **SUBJECT TO CHANGE*

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.***

Start/Reset Button: The green pushbutton is used to start the system and reset after a fault trip or power loss. To start the system the Start/Reset button will need pressed once before power can be supplied to the elements. In the event of an overtemperature condition where the safety thermostats are tripped, after they automatically reset, the reset button will need to be pressed to power the kettles back up. Note, it is best practice to turn all the boil heater switches to off before startup or reset of the system.

Fault Light: In the event of an overtemperature condition where the safety thermostats are tripped, the red fault light will illuminate. This will stay illuminated and cannot be cleared until the thermostats cool down and automatically reset. The fault light will not reset automatically when the thermostats reset.

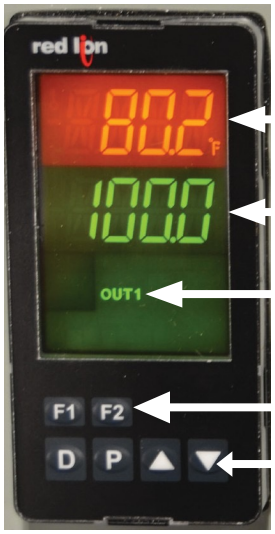
Actual Temperature

Set Temperature

Indicating The Output Is Energized

Switch Between Temperature Control & Power Control

Change Temperature



Actual Temperature

Set Power

Indicating The Output Is Energized

Switch Between Temperature Control & Power Control

Change Power

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).

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]).

WARNING: Energizing the heaters dry will cause the heaters to fail and potentially cause a fire. Keep in mind that unattended boiling water (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 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.

BREWHOUSE OPERATION:

The 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. 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 at least 3 inches of water in the bottom of the kettle.

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.

TIIP: We recommend underletting, so that the malt and water combine. They will need to reach close to your desired rest temperature, at all times. It takes 15-20 minutes to stir in the malt. 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 all the malt is in the Mash Tun. Therefore, underletting is highly advised. Having one person stir while another adds in the malt is extremely 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. 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 at least 3 inches in the bottom, 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, it 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!

MASH OPERATION (CONTINUED):

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 fermenter.

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** 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 & TROUBLE SHOOTING

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

A: 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.

Q: Why is my vessel temperature showing a temp that seems far off from what it should be (or nothing at all)?

A: 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.

Q: 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?

A: 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.

BLICHMANN BREWHOUSE | FAQS & TROUBLE SHOOTING

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

A: 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.

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

A: 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.

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

A: 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.**

BLICHMANN BREWHOUSE | FAQS & TROUBLE SHOOTING

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

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

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

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

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.

This situation can leave you open to dry firing the elements.

Importantly, Dry firing isn't covered under the warranty!

Q: 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?

A: 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.

CAUTION: 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, otherwise severe injury or death can occur! Damage to the equipment and/or control panel is possible if not installed correctly.

Q: 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?

A: 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.