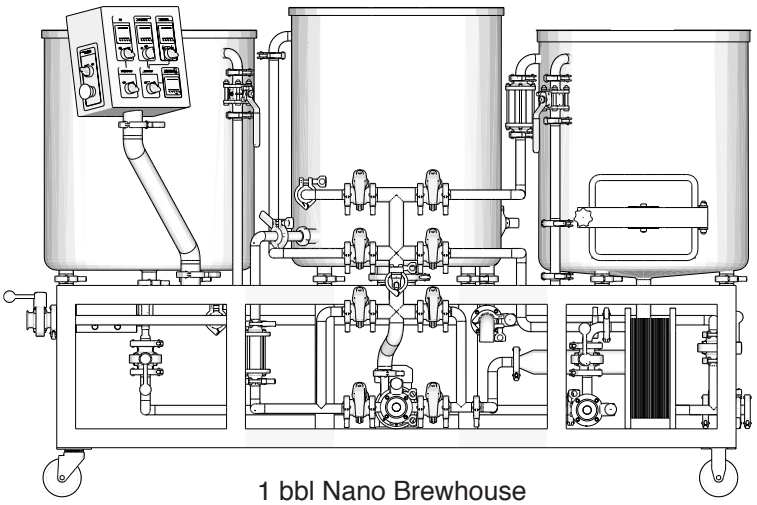
ENGINEERING BETTER BEER

1 bbl Nano Brewhouse

IN THE CRATE

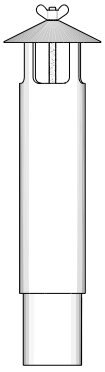


1 bbl Nano Brewhouse

HLT Lid

Mash Tun Lid

Kettle Lid



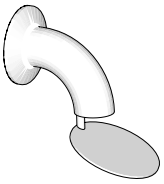
Kettle Calandria

HLT Liquid Level Marker

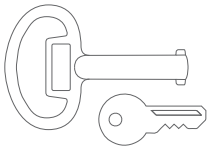
Mash Tun Liquid Level Marker

Kettle Liquid Level Marker

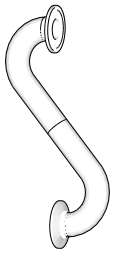
Sparge Ring



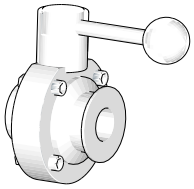
Vorlauf Attachment



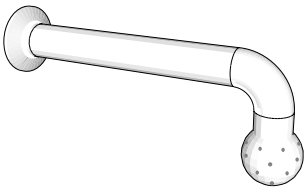
Panel Keys



S-Shaped Vorlauf/Sparge Extension (x2)

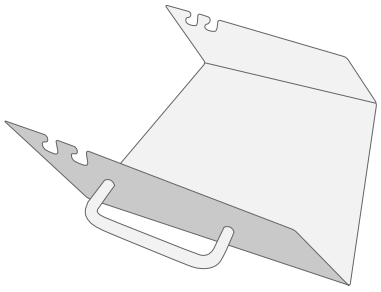


TC Butterfly Valve (x1)

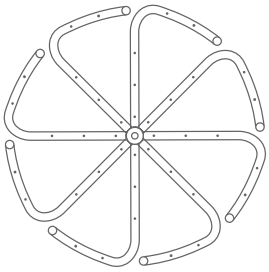


CIP Arm

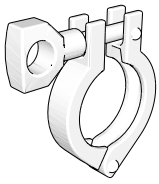
TC Dump Elbow (x3)



Grain-out Chute

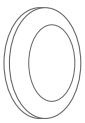


Recirculation Manifold w/ Silicone Tube and 1.5” TC Attachment



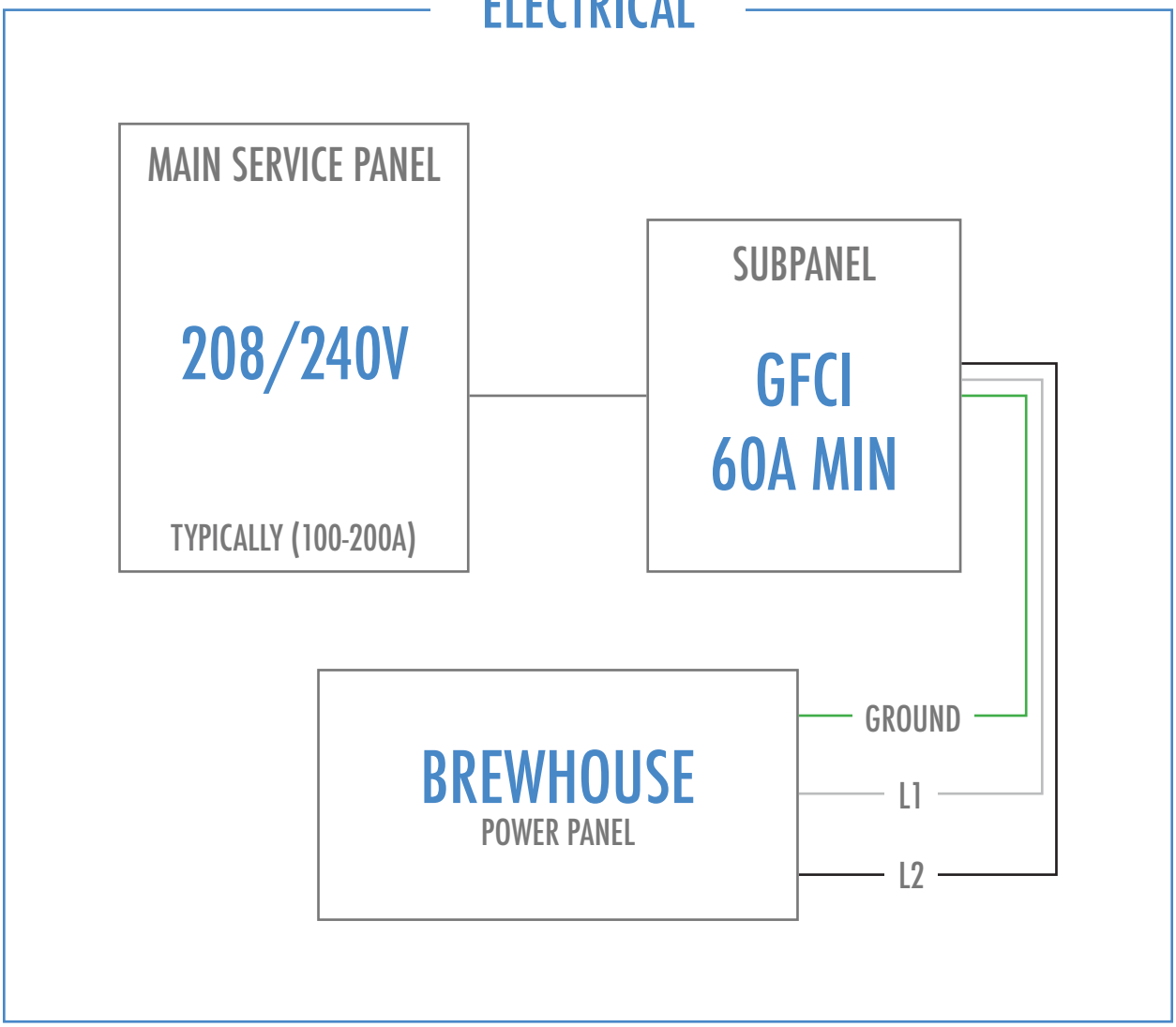
1.5” TC Clamp (x4)

1.5” TC Gasket (x4)



1.5” TC Cap

ELECTRICAL



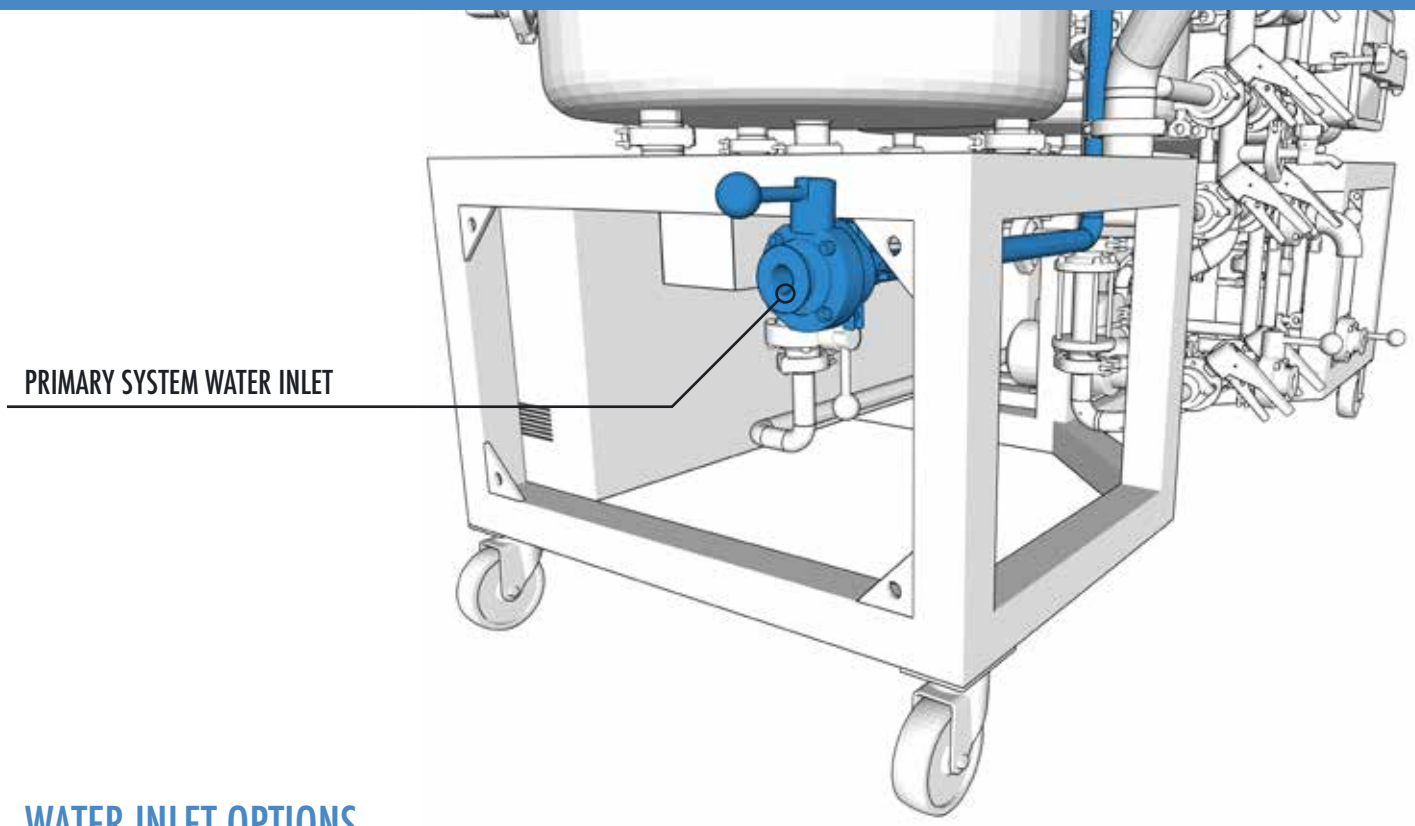
ELECTRICAL GUIDELINES

The brewhouse will arrive prewired with an 8 gauge, 3-wire pigtail extending from the service panel located on the right side of the cart. As shown above, the black and white leads represent L1 and L2 in a single phase wiring configuration. The green wire is the ground lead.

We recommend that a licensed electrician perform the installation in the configuration illustrated. A dedicated 60 amp circuit should be run from the structure's main panel to a sub panel with a 60 amp GFCI breaker. A GFCI (Ground Fault Circuit Interrupter) breaker is recommended when working with liquids to prevent electrocution. This specialized breaker is designed to trip when any current passes through the brewhouse ground lead. These subpanels are very commonly available and can be acquired at any home improvement store, they are often referred to as "Spa Panels".

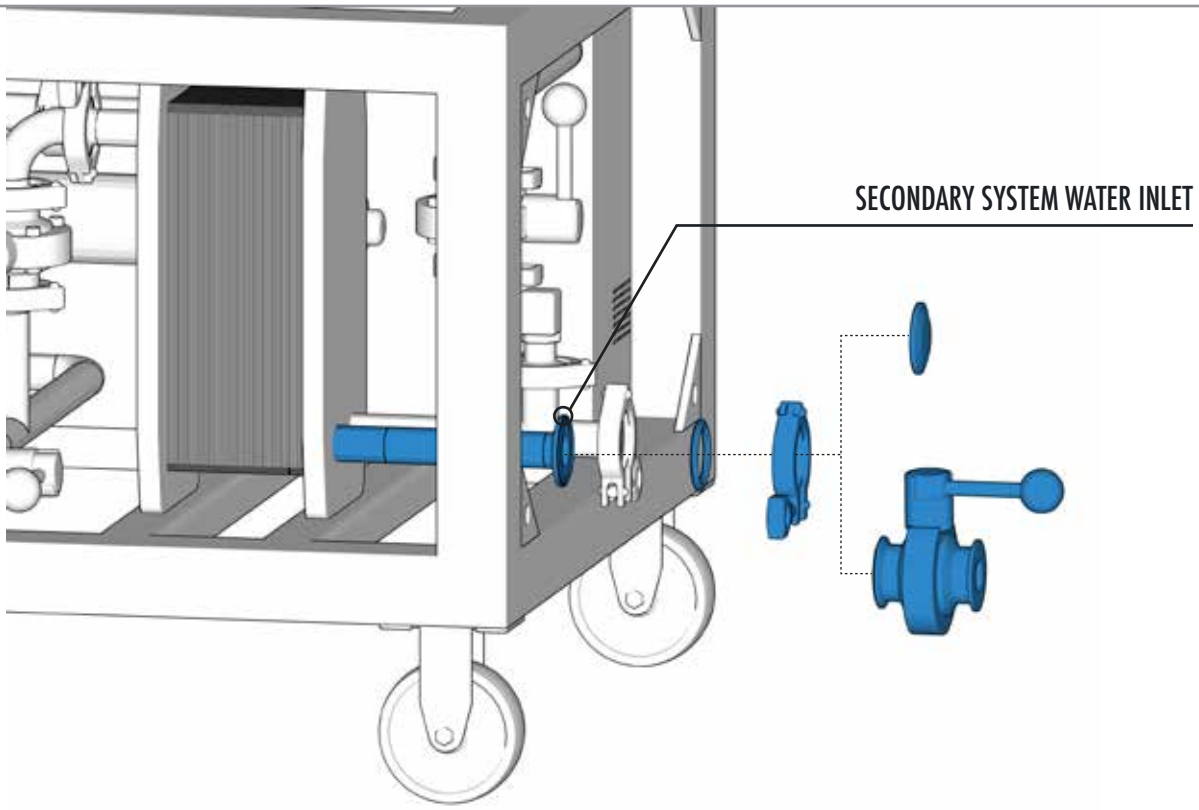
From the sub panel, we recommend wiring the pigtail directly to the panel's breaker, using a cable gland for strain relief. Depending on local codes, the brewhouse pigtail may need to be installed using flexible conduit. This type of installation is acceptable.

The brewhouse should never be installed outdoors.



WATER INLET OPTIONS

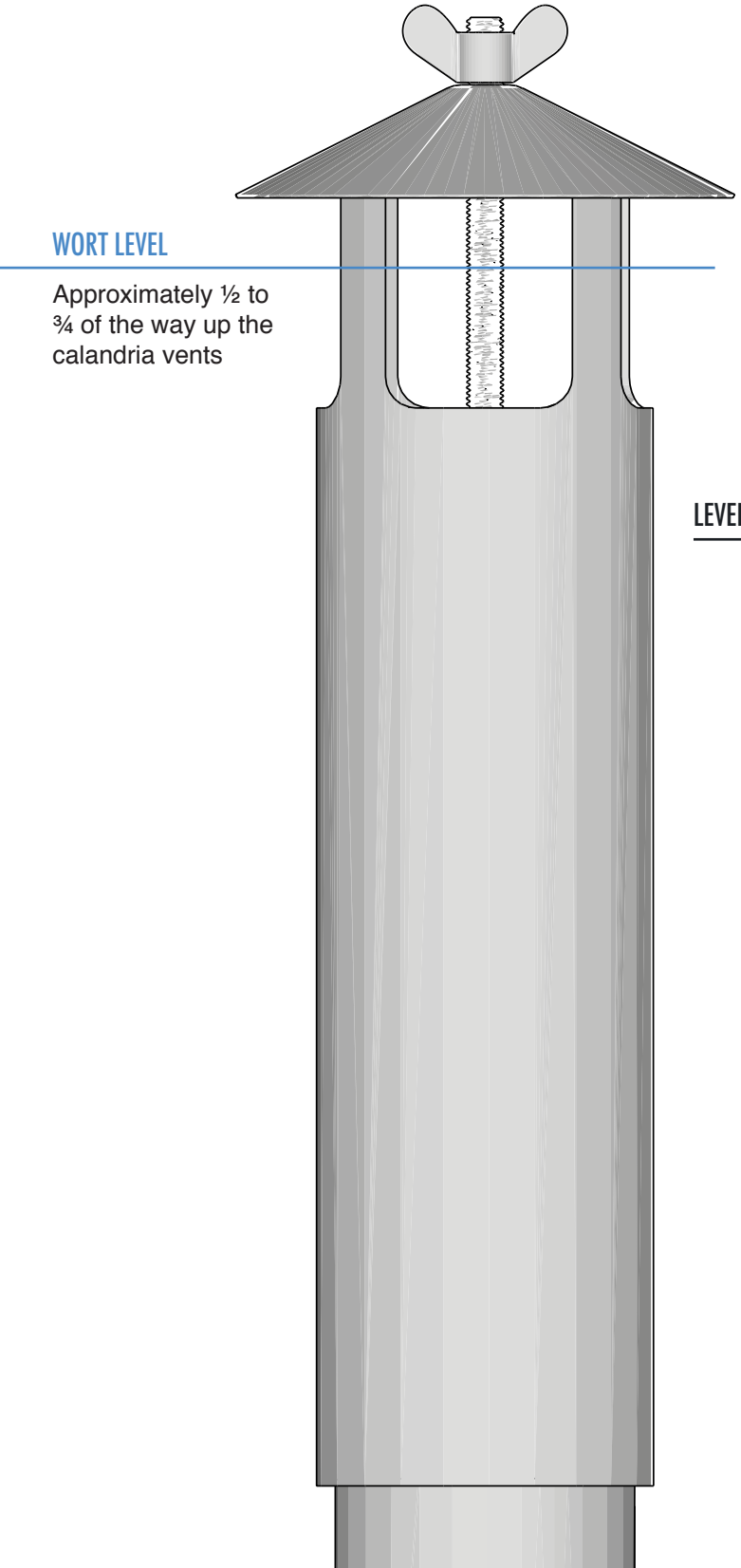
The primary system water inlet is located on the left side of the brewhouse, as shown. From here, water can be directed into the HLT for filling or to the heat exchanger for cooling during the knockout process.

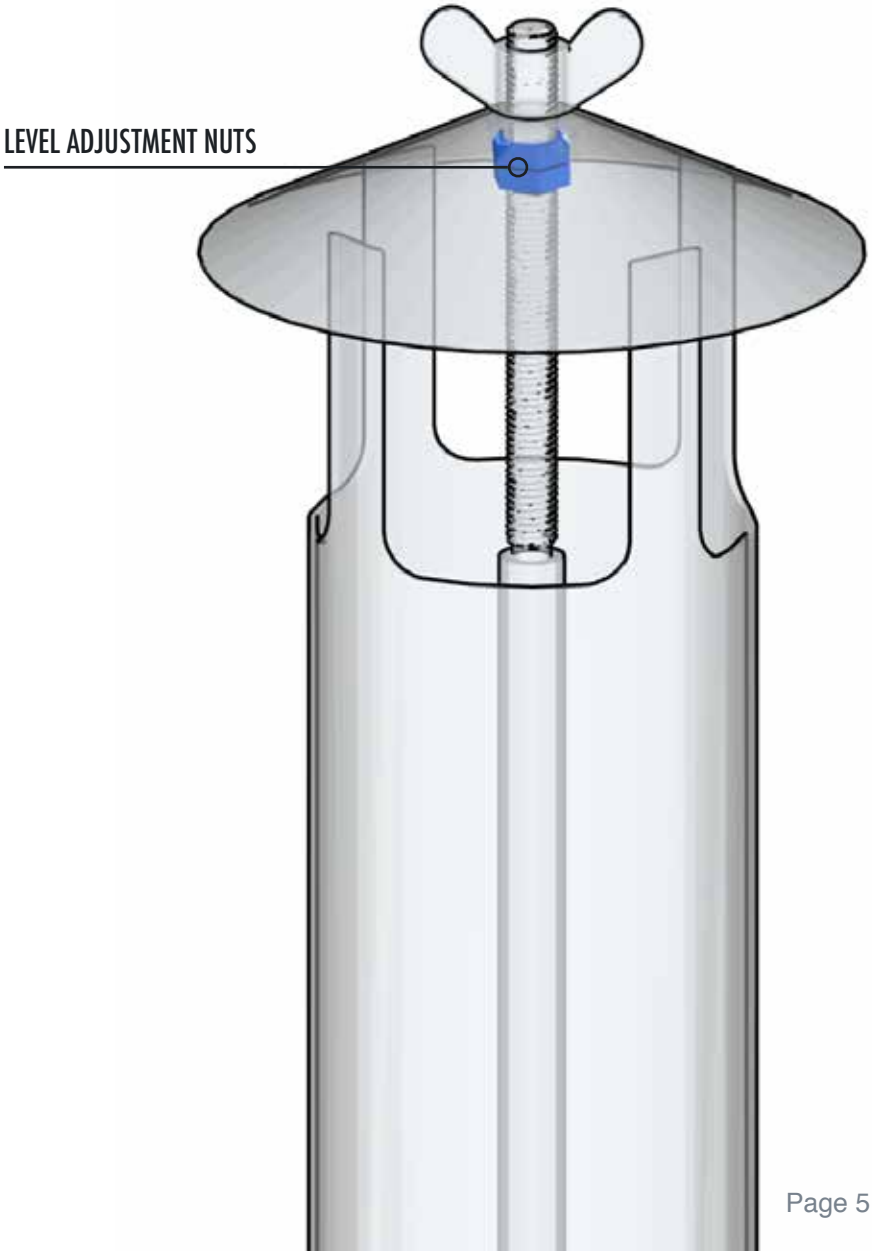


If an alternative water source is to be used for knockout, say from a cold liquor tank for example, the open TC port near the heat exchanger can be used as a secondary system water inlet. The included 1.5” TC butterfly valve can be installed to close this pathway when not in use.

BOIL KETTLE

Double check that the element assembly is secured properly in the base of the kettle and the 4” TC connection beneath the kettle is tight and secure. Next, thread the calandria base tube onto the shaft extending from the center of the element assembly. The calandria base tube has level adjustment nuts on the spindle which establish the height of the upper tube and deflection plate. Adjust the nut to reflect the estimated kettle full volume and then install the upper tube with deflection plate. Secure the assembly with the included wing nut. The wort level should be approximately ½ to ¾ of the way up the calandria vents at the start of the boil.





CONTROL PANEL

The 1 bbl Nano Brewhouse is controlled by way of the centralized control panel located nearest the HLT. The control panel allows the operator to:

- Monitor vessel temperatures
- Monitor the temperature of wort exiting the heat exchanger
- Toggle heating elements ON/OFF
- Program temperature set values for switching heating elements ON/OFF
- Toggle pumps ON/OFF

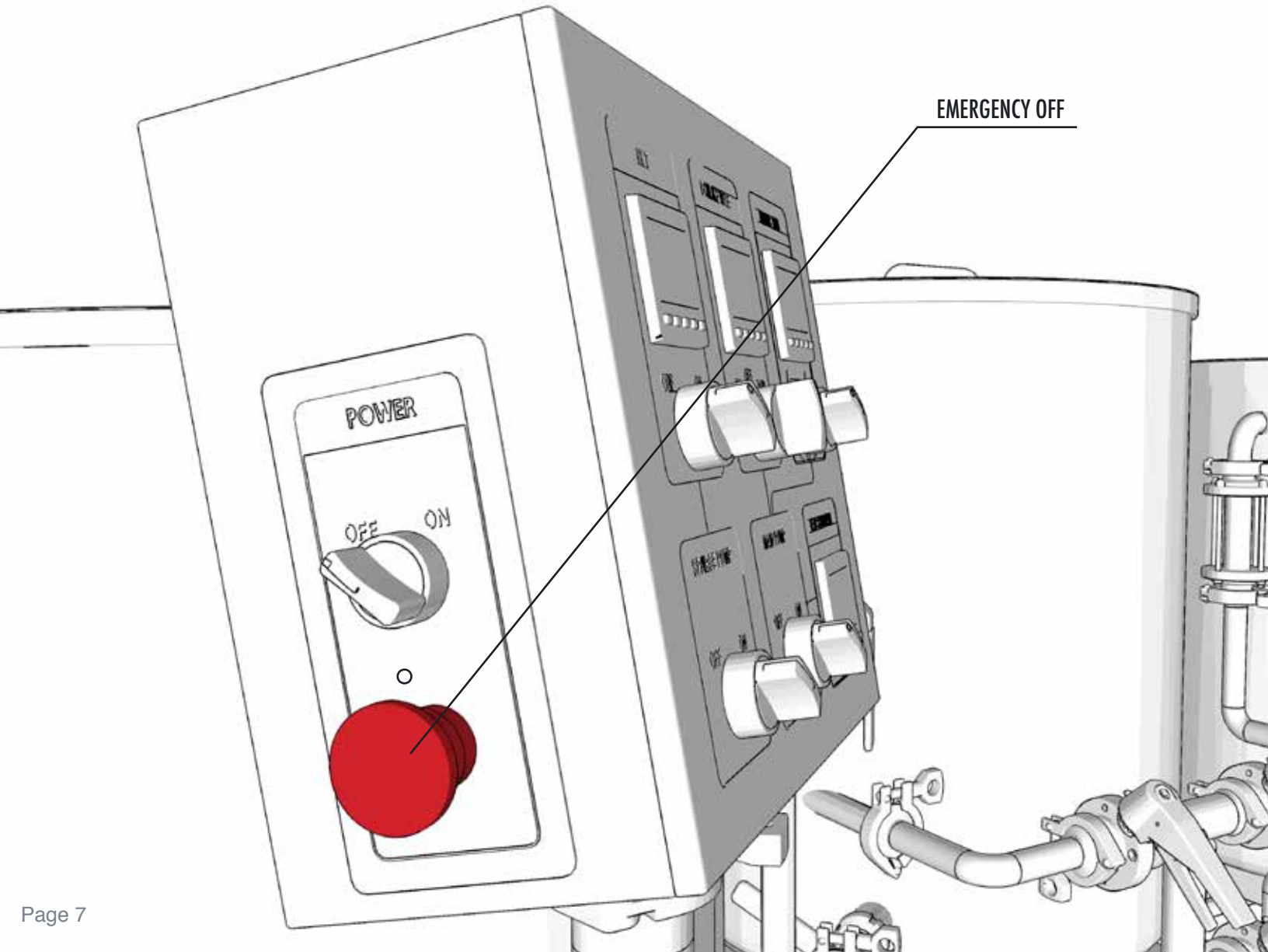
CONTROL PANEL (POWER)

The switch for toggling the control panel ON/OFF is located on the left side of the control panel box. Additionally, an Emergency Stop (E-Stop) switch is located just beneath the main power switch. In the event of an emergency, press the E-Stop in to quickly kill power to the entire system. Twist the E-Stop clockwise to release.

NOTE: The brewhouse control panel will not power on if the E-Stop is engaged. Additionally, if the primary breaker or control panel breaker in the brewhouse power panel are in the downward “OFF” position the control panel will not power on.

WARNING

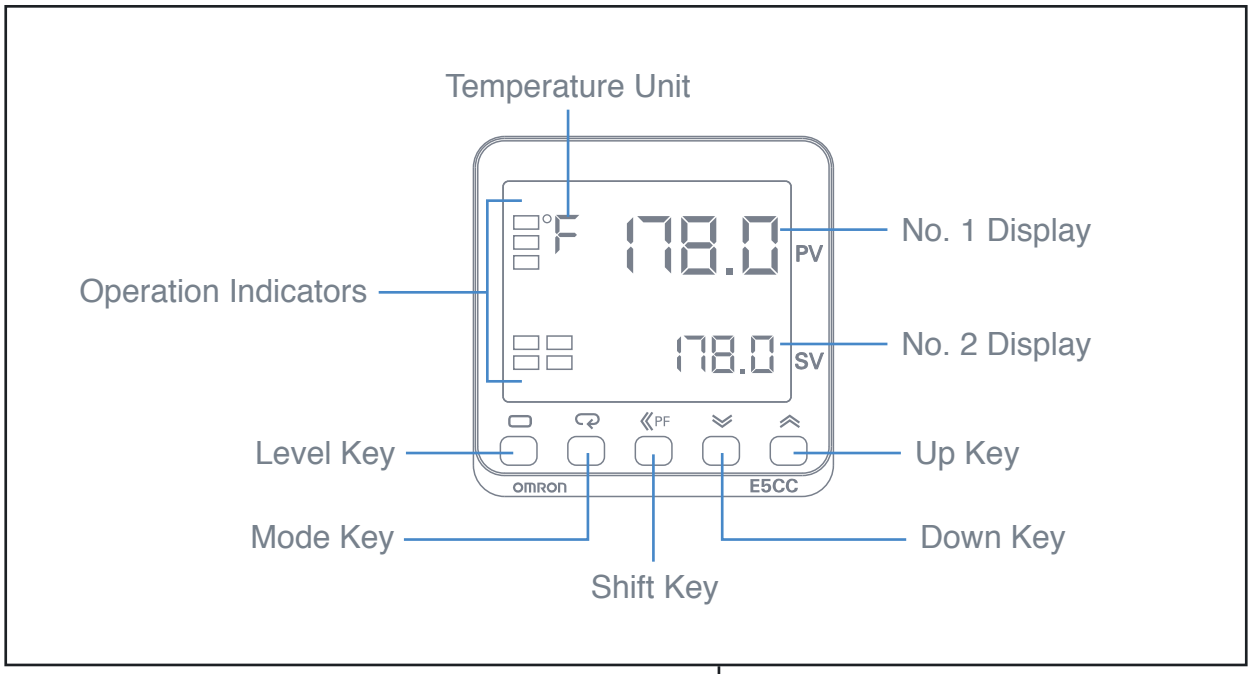
Before powering on the control panel, make certain that all switches for brewhouse elements and pumps are in the “OFF” position. Failure to do so may result in damage or injury.



CONTROLLER ADJUSTMENTS

The Omron controllers on the 1 bbl Nano Brewhouse control panel come pre-programmed and "locked-out" to avoid accidental changes to crucial settings. The controllers for the HLT, Boil Kettle, and Mash Tun allow the user to adjust temperature settings using the down and up keys. The controller for the heat exchanger has no adjustable settings and is for display purposes only.

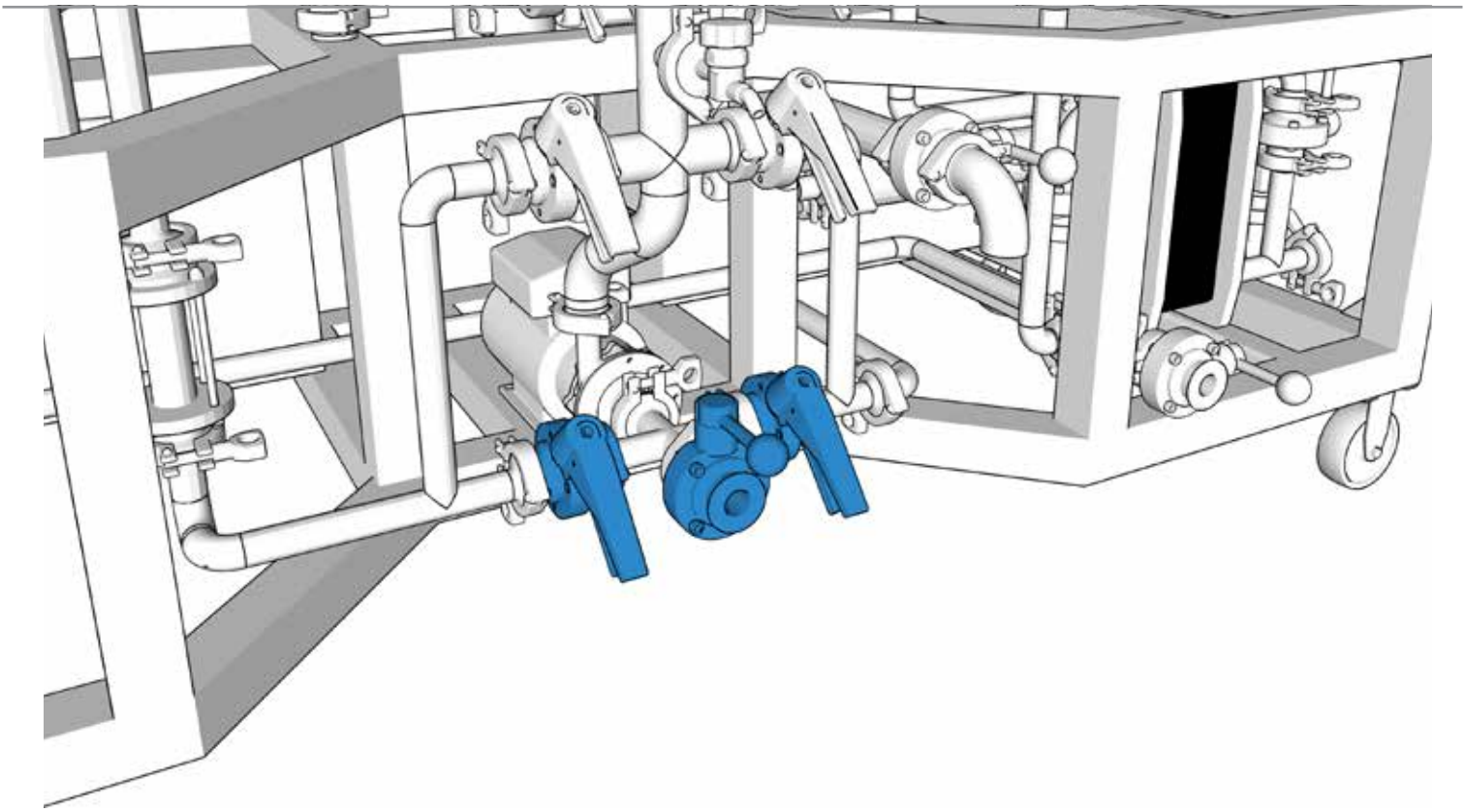
In the event that accessing more advanced settings is desired or required, we recommend reaching out to Ss Brewtech or consulting an Omron User Guide.



Selecting the correct suction and discharge points on the 1 bbl Nano Brewhouse's pump inlets and valve tree is crucial to a successful brew day. In this section, we have highlighted the various process piping runs along with the necessary valve positions and control panel functions for each process carried out on a typical brew day.

VALVE TREE PUMP INLETS

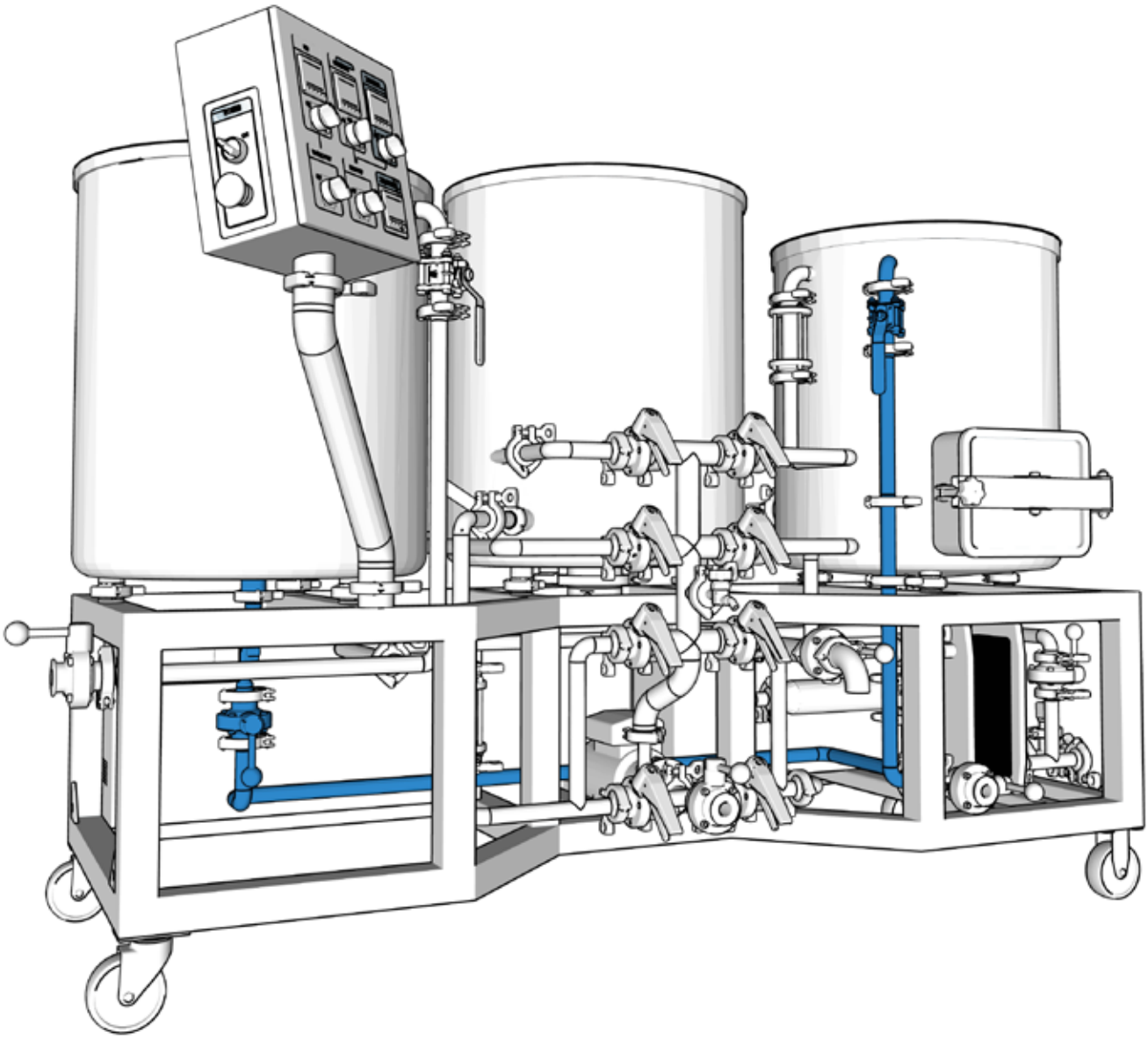
The three valves at the base of the valve tree control the suction side of the primary brewhouse pump. The valve on the left allows for liquids to be drawn from the boil kettle. The valve on the right allows for liquids to be drawn from the mash tun. The valve extending out of the center serves as both a valve tree dump port, as well as an accessory suction port where liquids can be pumped from an auxiliary vessel. It is important to select the proper suction side, and make sure that only one valve is open during a given process.



NOTE: Before activating the primary brewhouse pump, it is important to prime the head by opening a valve on the suction side of the pump head. Opening a downstream valve will help ensure the head is flooded with fluid by clearing air from the discharge side of the process piping. While the pump may be safely deadheaded (ran against a closed valve) momentarily, this is not best practice as excessive back pressure can damage the pump. Therefore, best practice is to establish a pathway to and from the pump before activating.

SPARGE PUMP VALVES

The sparge pump, positioned just underneath the HLT, is easily primed via gravity by opening the valve located just beneath the pump. The ball valve located near the top of the mash tun on the sparge pathway can be opened as well for good measure, and MUST be opened when the sparge pump is activated.

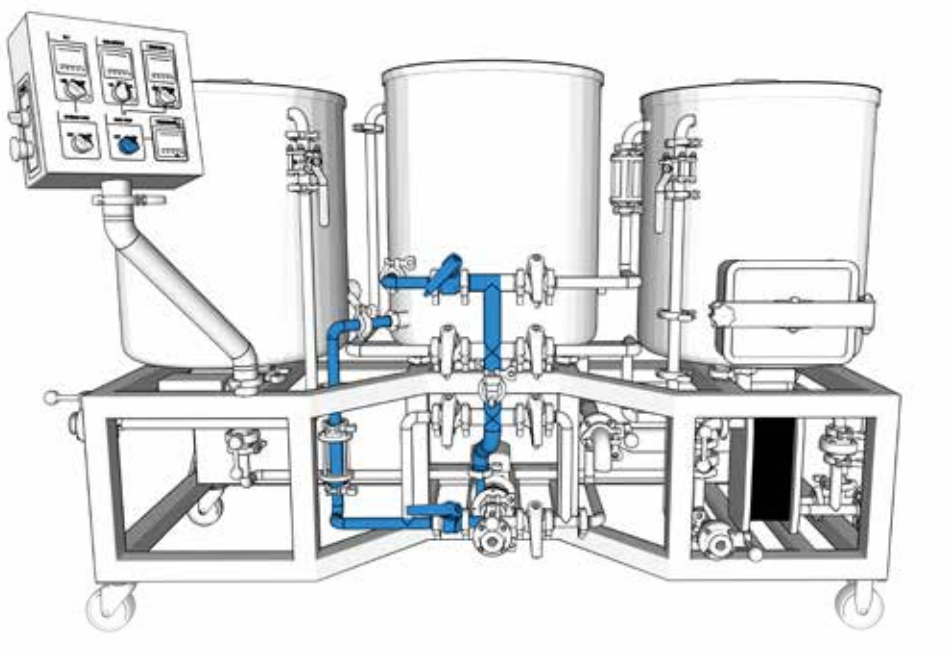


WARNING

Never throttle the valves leading into the suction side of the pump to control flow, instead, always use the discharge side of the pump to throttle flow rate or stop flow altogether. Restricting the pumps inlet can cause cavitation and damage to the pump's impeller and input shaft bearings. Never activate either pump without making sure the pump is fully primed. Running the pump dry will quickly damage the pumps impeller and bearings, resulting in pump failure. Running the pump dry or restricting the inlet under any circumstance will result in voiding the pump's warranty.

WHIRLPOOL

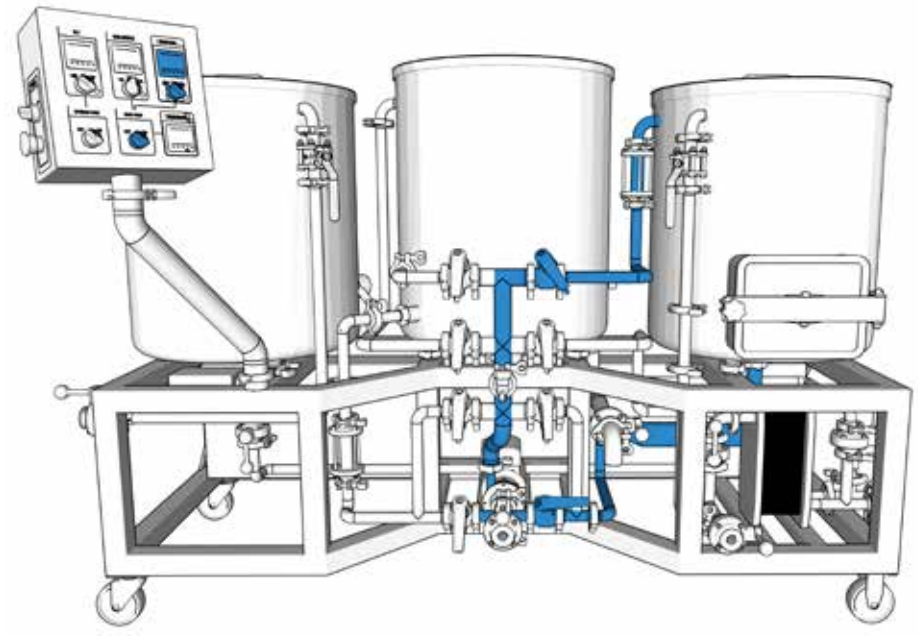
The whirlpool process is typically carried out after the boil. Wort is pumped from the kettle racking arm through the tangential whirlpool port using the main brewhouse pump. The whirlpool process helps to separate trub before knocking out through the heat exchanger. This aids in wort clarification and helps prevent the clogging of your heat exchanger. Many brewers also use the whirlpool for hop additions, with the goal of extracting aroma as opposed to earlier bittering additions in the boil.

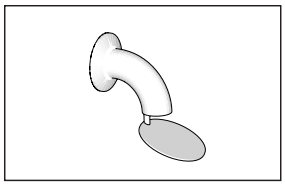


VORLAUF / RIMS

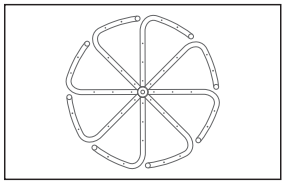
The vorlauf process is typically carried out in the latter stages of the mash rest in a single infusion mash. Wort is pumped from the mash tun and recirculated back over the grain bed using the main brewhouse pump. This process serves to help set the grain bed before runoff and aids in clarifying the wort. This can be seen visually by viewing the wort through the site glass on the vorlauf pathway.

The vorlauf pathway can also be used in conjunction with the RIMS (Recirculating Infusion Mash System) heating element to maintain or raise the temperature of the mash. When doing so, it is important to use the recirculation manifold for even dispersion of wort to avoid temperature swings. Other benefits of the RIMS and/or vorlauf processes include establishing a uniform grain bed consistency, which may lead to increased mash efficiency.





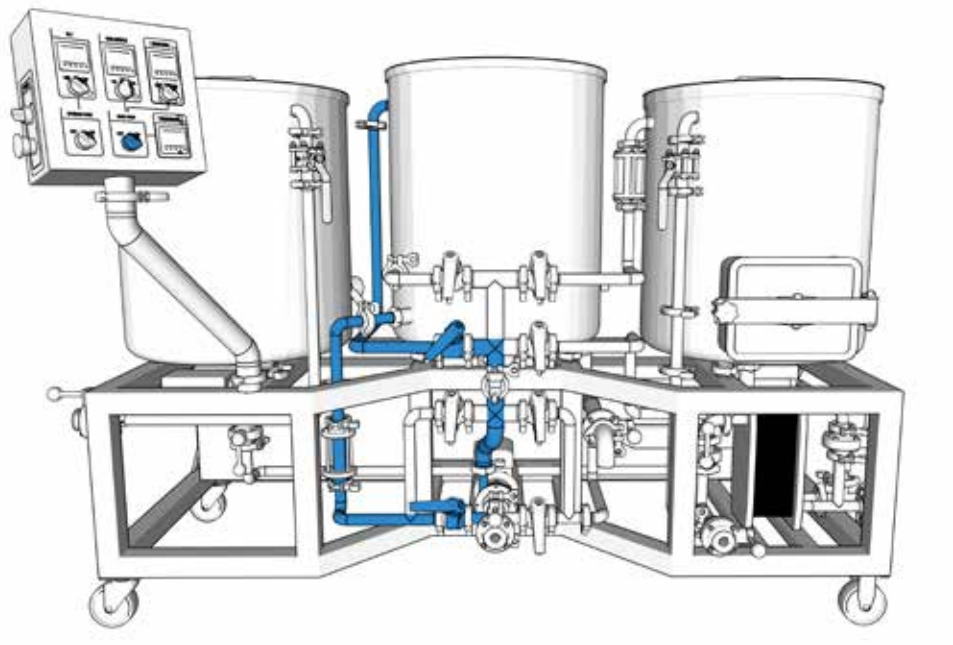
Vorlauf Attachment



Recirculation Manifold

KETTLE CIP

The kettle CIP (clean in place) pathway can be used to recirculate a water/cleaning agent mixture from the kettle racking arm up through the kettle CIP spray attachment using the main brewhouse pump. This allows the user to clean the vessel surfaces by way of a recirculating CIP loop for easy cleaning.



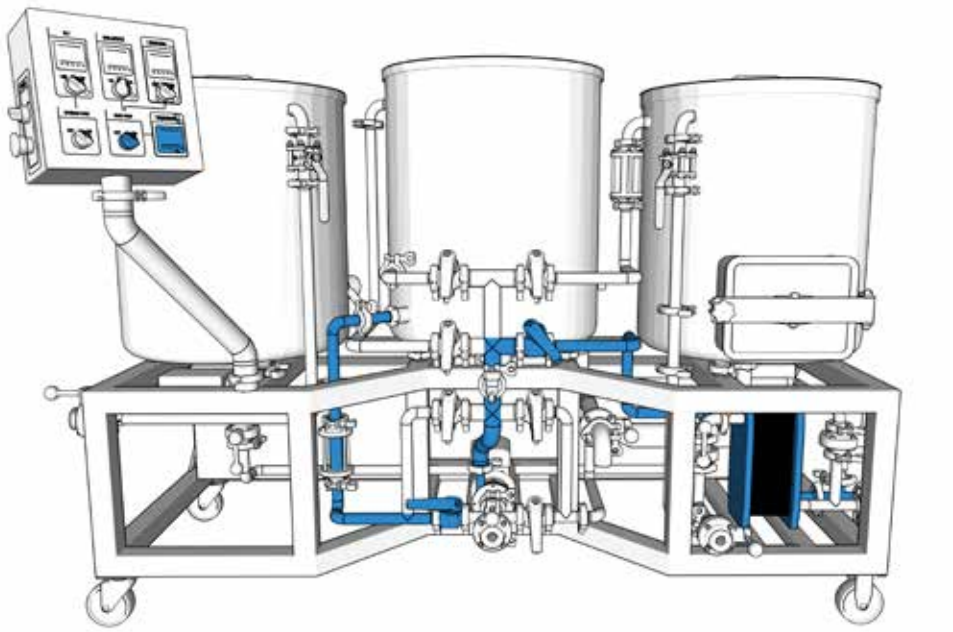
WARNING

Any time the kettle CIP pathway is being used, it is ESSENTIAL that the kettle CIP valve is not fully opened and that the kettle lid is firmly in place. A ¼ to ½ turn of the valve is more than adequate for cleaning purposes. Failure to follow these instructions will cause fluid to exit the vessel, which may result in property damage, personal injury, or even death.

KNOCK OUT

The knockout pathway is used to push wort through the heat exchanger to cool from near boiling to acceptable pitching temperatures. Wort is pumped from the kettle racking arm through the heat exchanger using the main brewhouse pump. From the heat exchanger, the wort will continue on to a clean and sterilized fermentation vessel.

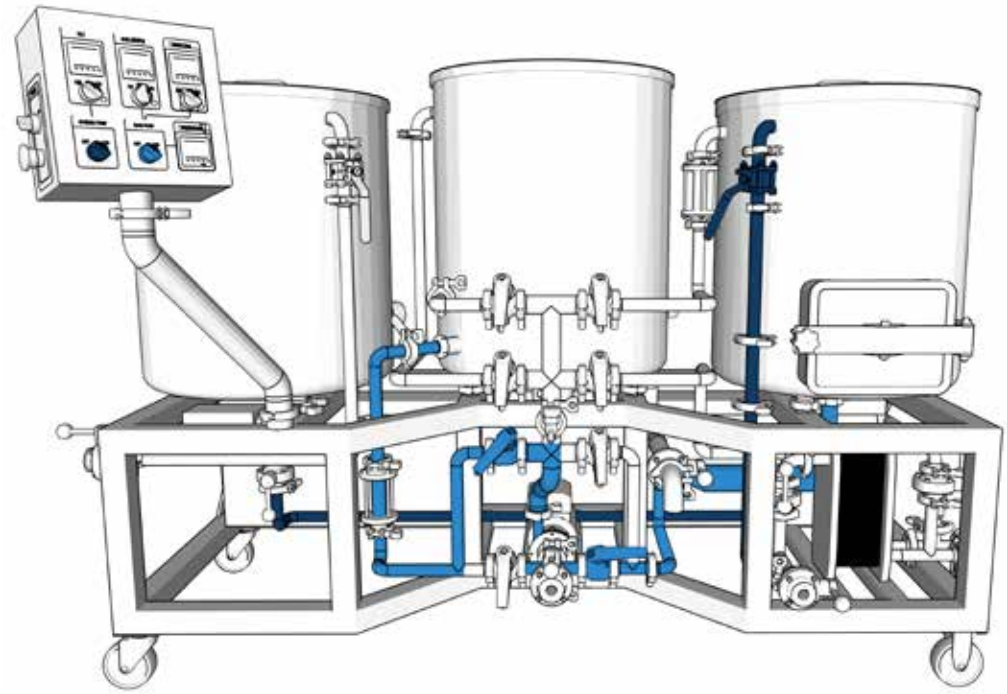
Before starting the main brewhouse pump, activate the flow of cold water through the heat exchanger. Water will enter the heat exchanger opposite the direction of wort flow, what's known as a counter-flow heat exchanger. Hot water exiting the heat exchanger can be recovered in the HLT to be used in a subsequent brew or for cleaning purposes, or may be dumped to the drain. The temperature of the outgoing wort can be monitored on the Heat Exchanger controller on the brewhouse control panel.



RUN OFF / SPARGE

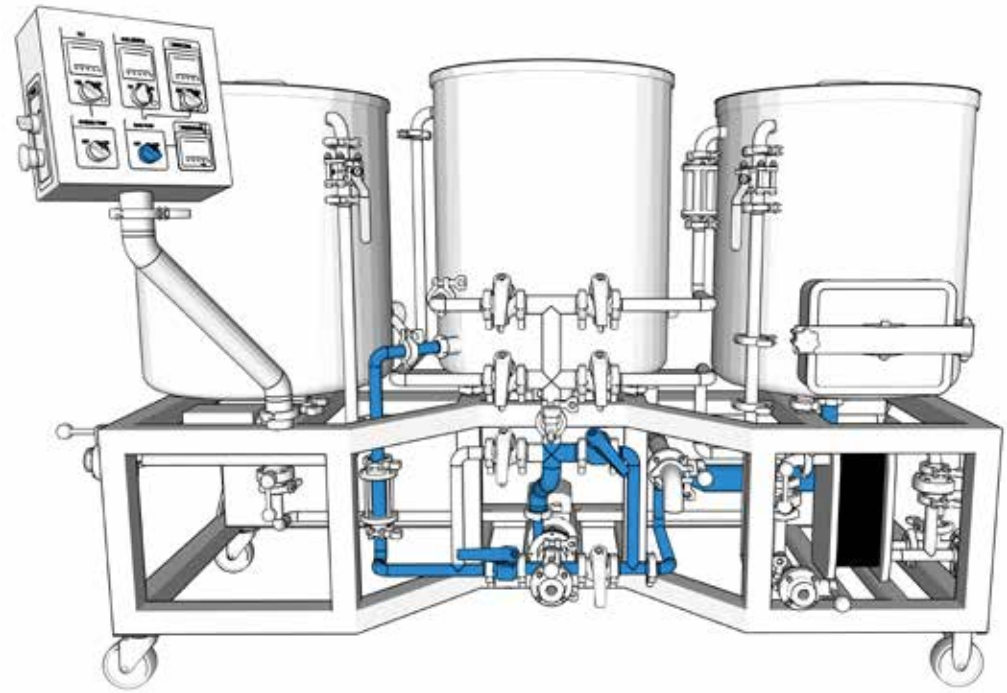
Runoff is the process by which the brewer separates wort from grain as it is pumped from the mash tun to the kettle using the main brewhouse pump. Simultaneously, hot water (typically 168°-172°F) is run through the sparge manifold to displace first wort runnings and rinse the grain bed.

It is important to control flow rate during this process by throttling back the runoff valve. Opening the valve fully may lead to lowered efficiency, wort clarity issues, and/or the dreaded stuck mash.



UNDERLET

The underlet pathway can be used in instances when the runoff process has slowed to a crawl or halted entirely as a result of an overly compacted grain bed. During this process, wort that has already been runoff is pumped from the kettle back into the mash tun through the mash tun pick-up point using the main brewhouse pump to resuspend the grain bed. This will have the effect of loosening the grain bed, and runoff can resume without starting over the vorlauf process. Alternatively, hot liquor can be used for the underlet by attaching a piece of tubing from the sparge TC fitting on the inside of the mash tun and connecting to the valve tree auxiliary suction port.

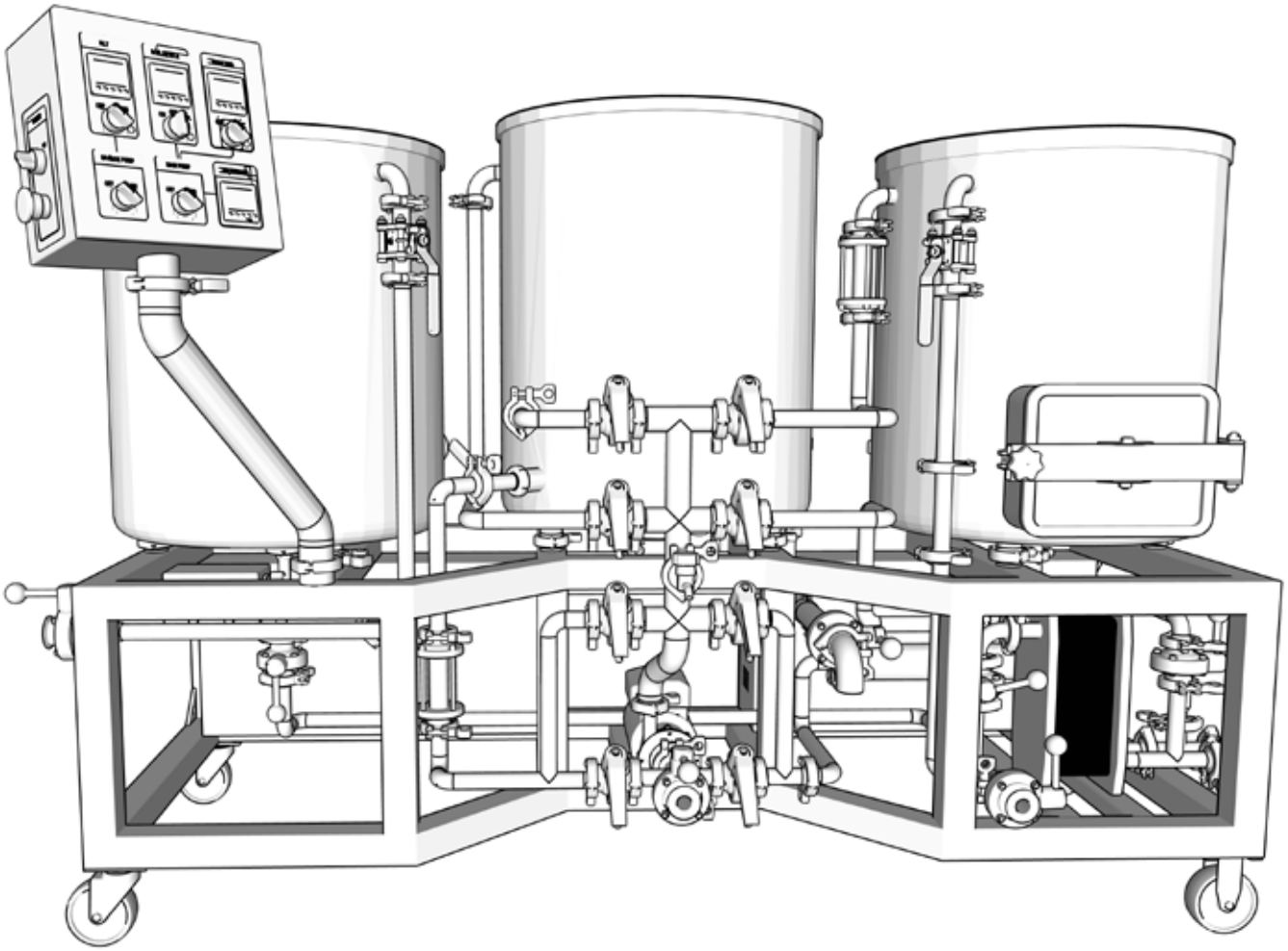


BREW DAY OPERATION

INTRODUCTION

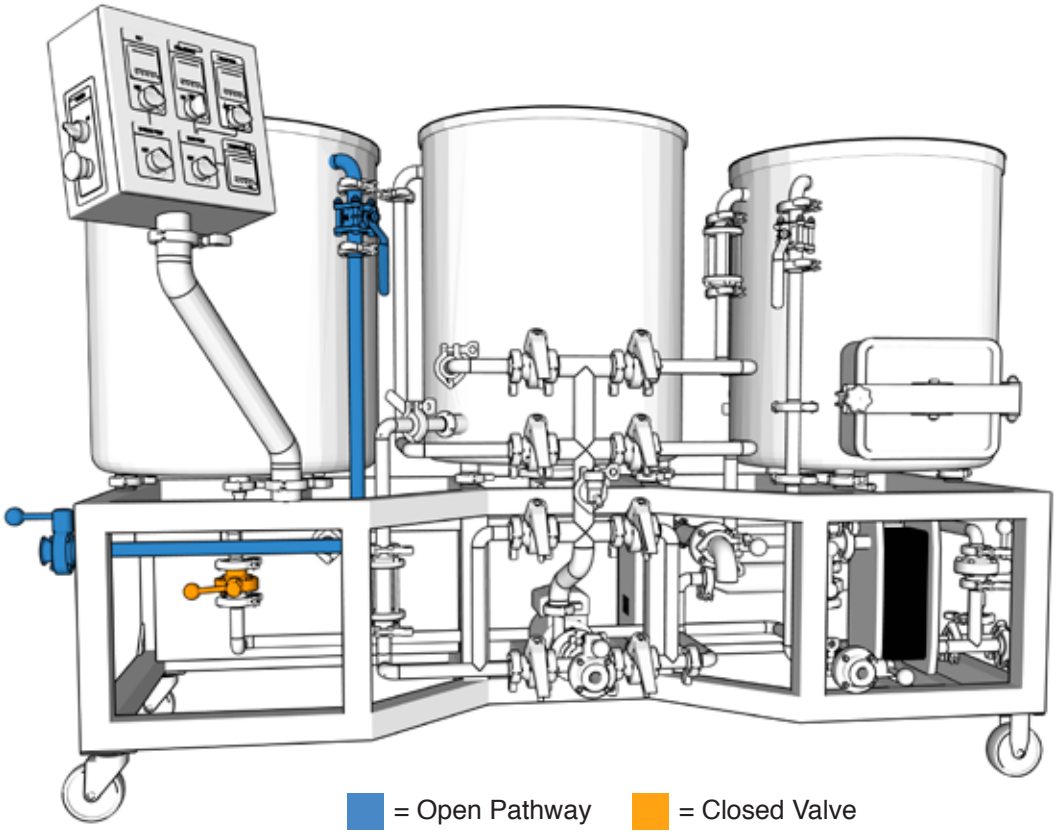
The following is a basic overview of a typical brew day using the Ss Brewtech 1 bbl Nano Brewhouse. This guide is for instructional purposes only and does not cover all processes that a brewer may employ on brew day. Specific times, temperatures and technical aspects of the brewing process are purposely omitted as techniques will vary from brewer to brewer. Piping runs and open valves are highlighted in blue, while valves that MUST be closed during a given process are highlighted in orange.

It is highly recommended that the brewer performs one or more simulated “water brews” on the system before committing to using real ingredients. This allows the user to become acquainted with the brewhouse controls and processes, as well as providing an opportunity to record data regarding dead space, temperature ramp rates, temperature losses during transfers, and other variables of interest to the brewer. Be sure to record this data and any observations carefully and adjust recipes and processes accordingly. Happy Brewing!



HEATING YOUR STRIKE WATER

Begin the brew day by filling the hot liquor tank (HLT). To do so, open the system water inlet valve as well as the ball valve located on the front of the HLT. Use the removable scale labeled “HLT” to fill to the desired volume.



= Open Pathway = Closed Valve

Once the desired volume is reached, activate the HLT heating element by turning the HLT switch to the “ON” position on the brewhouse control panel. Set the desired strike water temperature on the HLT controller by using the up and down selection arrows.

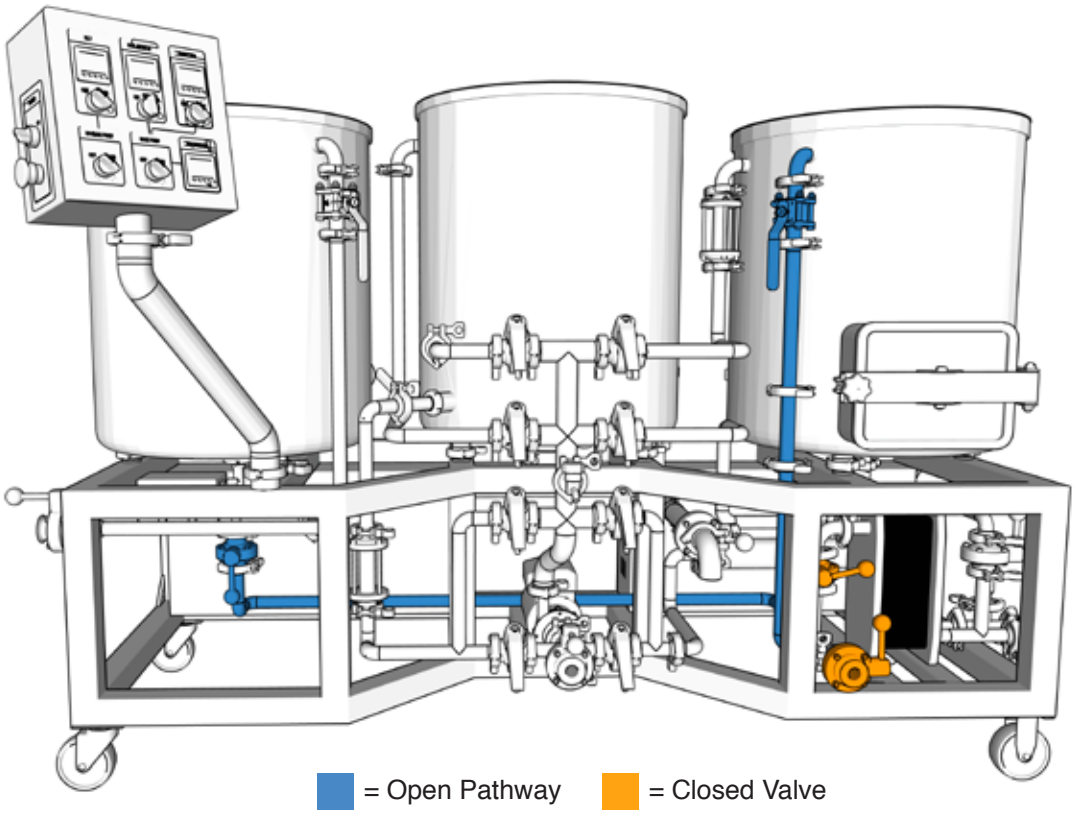
WARNING

It is IMPERATIVE that the HLT heating element is fully submerged, and remains submerged, any time the element is turned on. Dry-firing the element will cause irreversible damage to the element coil and voids the manufacture warranty. Prolonged dry-firing can cause damage to the brewhouse’s electrical components and may result in further property damage and/or personal injury.

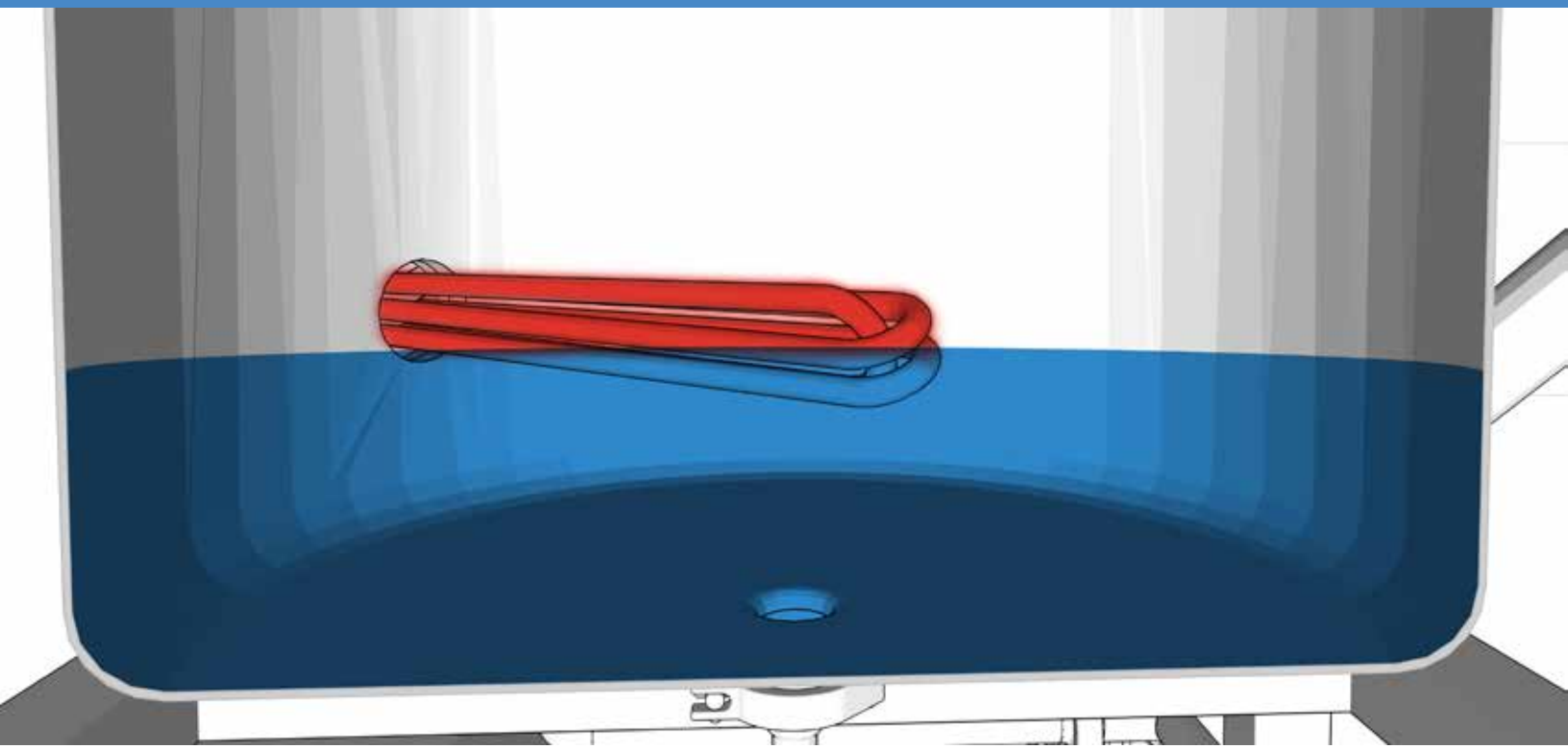
MASHING-IN

Mash-in procedures will vary based on the brewer's preference. Some brewers choose to fill the mash tun with the full volume of water required before adding in grain, while others simply fill with enough "foundation liquor" to cover the false bottom then begin mixing in grain as the mash tun continues to fill. Rather than debating the merits of various methods for graining-in and mashing, this guide focuses on the best practices for basic operations using the Ss Brewtech 1 bbl Nano Brewhouse.

To begin the transfer of hot liquor to the mash tun, start by opening the valve located just beneath the sparge pump. Next, open the ball valve near the top of the mash tun and start the sparge pump. The sparge ring attachment can be removed from the inside of the mash tun for faster filling if needed. Adjust the ball valve to achieve the desired flow rate into the mash tun.



= Open Pathway = Closed Valve



WARNING

Be sure to closely monitor the volume of water in the HLT when transferring to the mash tun. Make sure the HLT heating element is turned OFF if the volume being transferred will cause the liquid level to drop below the HLT heating element or damage will occur.

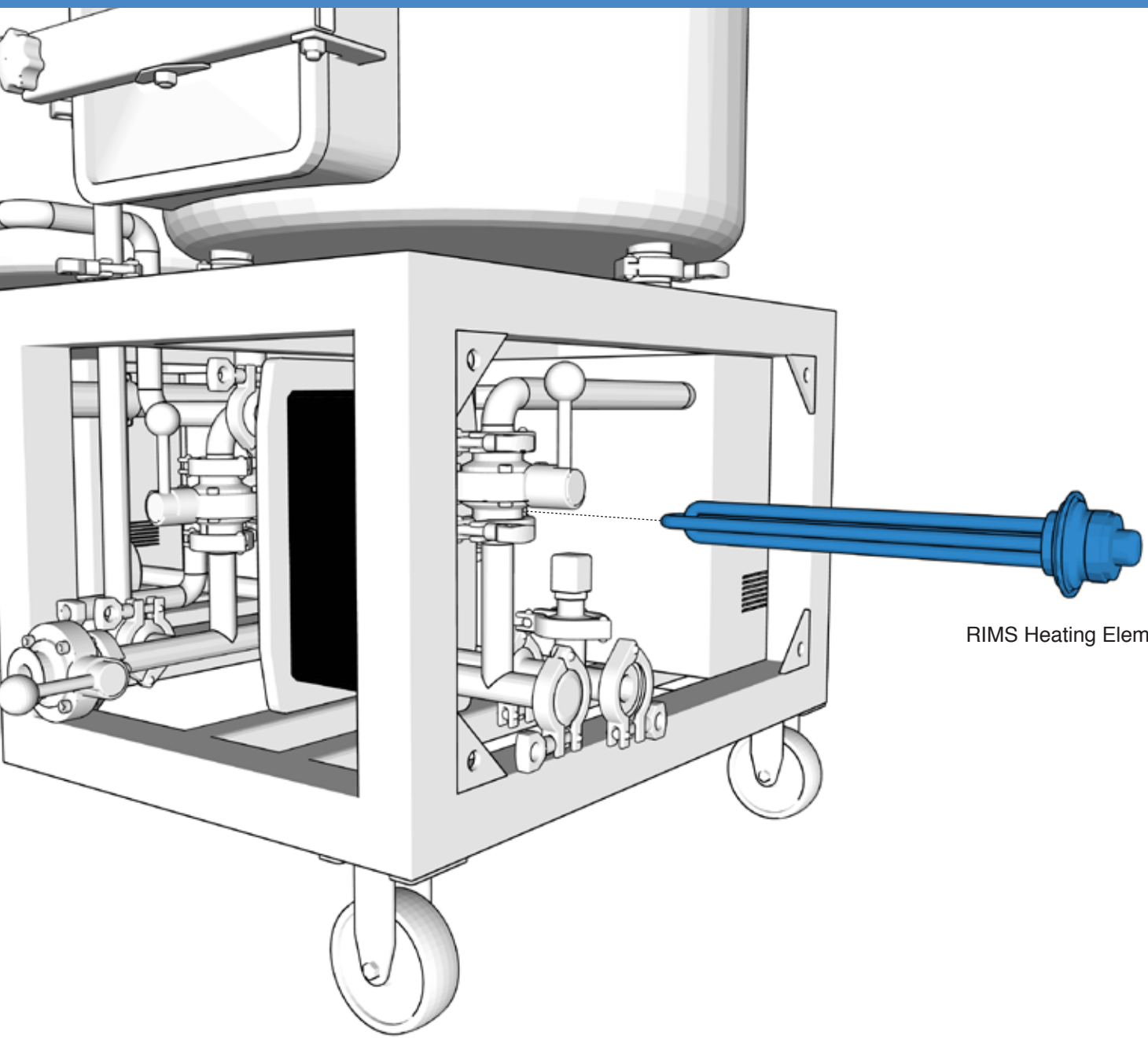
MASHING-IN (CONTINUED)

If grain is to be added during the strike water filling process, be sure to closely monitor the HLT volume scale to calculate the volume of water that has been transferred. Remember to factor in dead space volume (volume under the false bottom) when calculating mash water volume required to achieve a given liquor to grist ratio.

Once the false bottom has been covered with foundation liquor, or the full strike volume has been added to the mash tun, begin mixing in crushed grains. Slowly adding grain and stirring continuously with a long-handled paddle will help ensure even mixing and avoid the formation of dough balls. Continue mixing in grain until the grain bill has been consumed.

Once the mash-in is complete, begin filling your HLT and heating water required for sparge. This will give the HLT ample time to reach the desired sparge temperature. We recommend including an additional 10% water volume over the recipe requirement which can be used for final volume adjustments later on.

NOTE: Pre-heating the mash tun before building strike water is crucial in minimizing temperature loss and achieving the desired mash temperature. This can be accomplished in a variety of ways, but perhaps the most effective method is to recirculate hot water through the Vorlauf pathway long enough to warm the vessel. Use of the RIMS heating element during this process is optional.



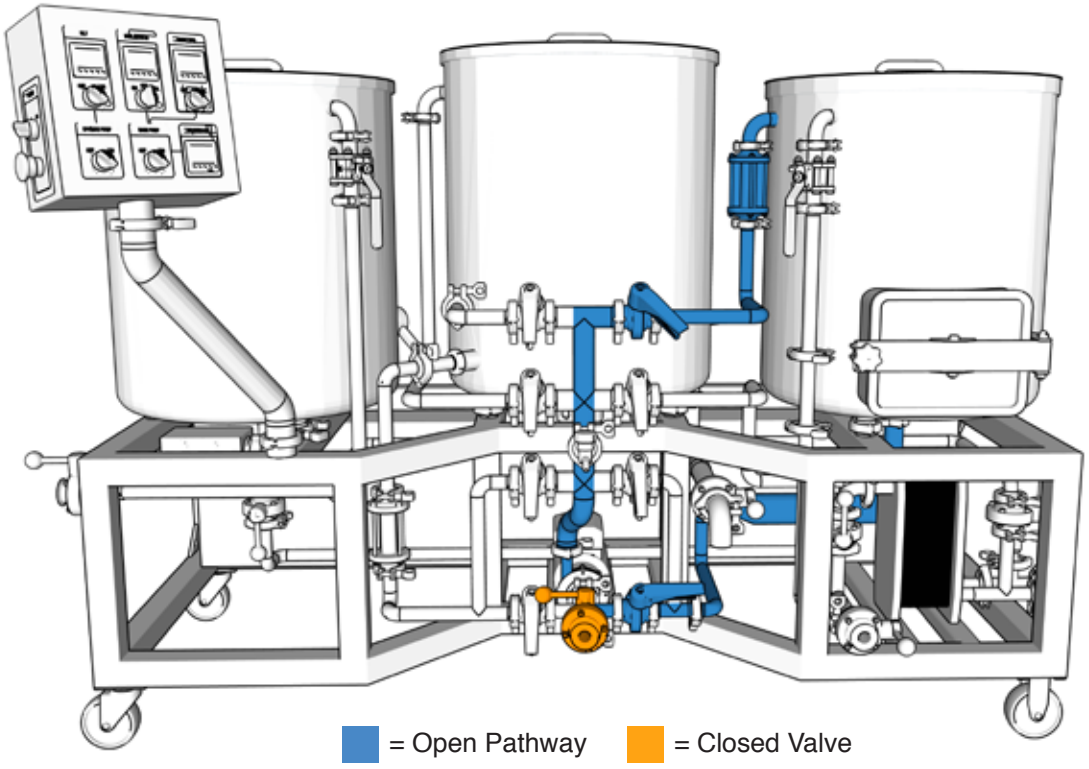
RIMS Heating Element

THE MASH

The 1 Bbl Nano Brewhouse comes equipped with a built-in RIMS heating element. The element can be used either to maintain a specific mash temperature or to increase the temperature of the mash at given intervals, a process known as temperature programmed mashing. The use of the RIMS element and continuous recirculation of the mash is, of course, optional.

THE MASH (CONTINUED)

Begin by installing the recirculation manifold at the termination of the Vorlauf / RIMS pathway inside the mash tun. Open the valve leading to the suction side of the main brewhouse pump from the mash tun. Next, crack the Vorlauf / RIMS valve on the valve tree to prime the pump. Do not open the valve fully initially. To ensure the pump has been primed, you can open the sample valve on the brewhouse valve tree until liquid flows.



Start the main brewhouse pump and establish the desired flow for recirculation by adjusting the Vorlauf / RIMS valve. Once the desired flow has been achieved, turn on the RIMS heating element by switching the mash tun controller to “ON”. Set the desired mash temperature using the up and down arrows.

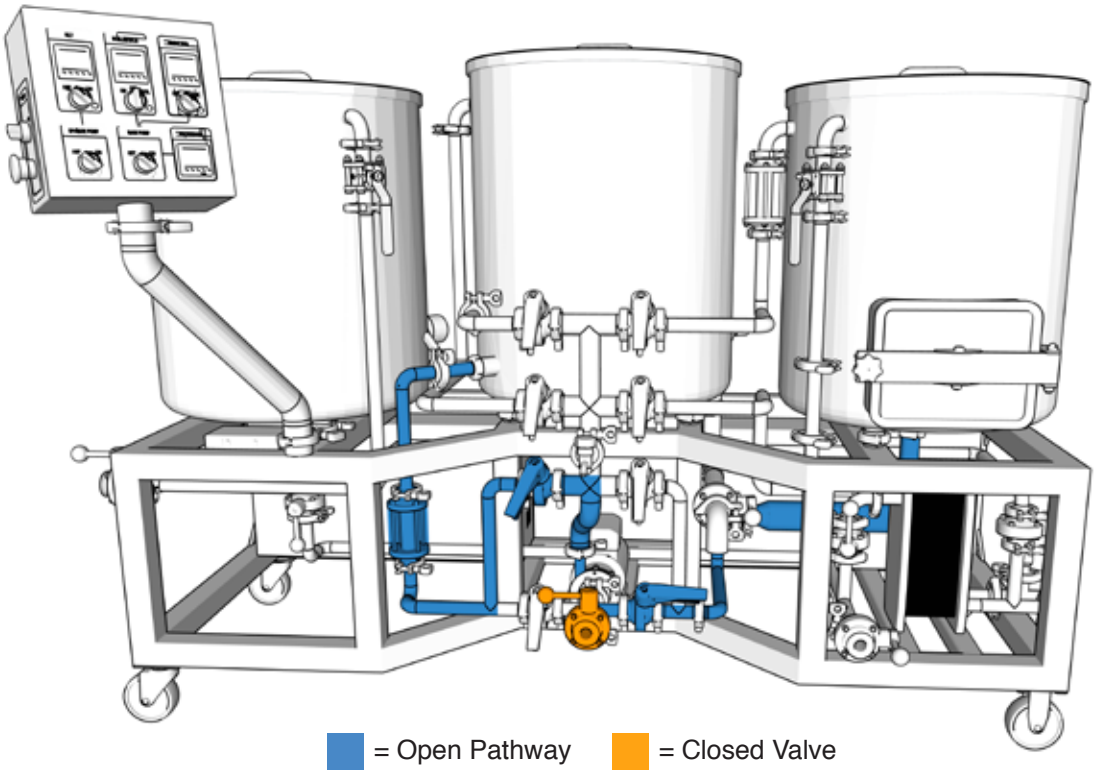
WARNING

It is important to establish and MAINTAIN flow any time you are using the RIMS element. Failure to do so can lead to scorching of your wort.

At the conclusion of the mash rest, the Vorlauf / RIMS pathway can be used for wort clarification before runoff. The steps will be essentially the same as detailed above for recirculation, however the vorlauf attachment can be installed at the termination of the Vorlauf / RIMS pathway inside the mash tun.

RUNNING OFF

Once the mash rest and vorlauf processes are complete, it's time to start "running off" your wort into the kettle. Wort is transferred from the mash tun to the kettle through the kettle racking arm by way of the Runoff pathway. Your brewhouse pump should already be primed and ready to go from the recirculation/ vorlauf process. We recommended only slightly cracking the Runoff valve before starting the pump and runoff process in order to minimize the risk of a stuck mash. Start the pump and adjust the Runoff valve until the desired flow rate has been achieved. As a rule of thumb, Runoff should be slow and steady to avoid low efficiencies and/or a stuck mash.

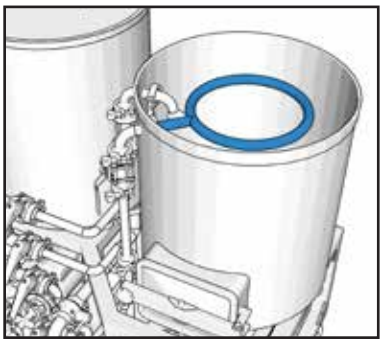


= Open Pathway = Closed Valve

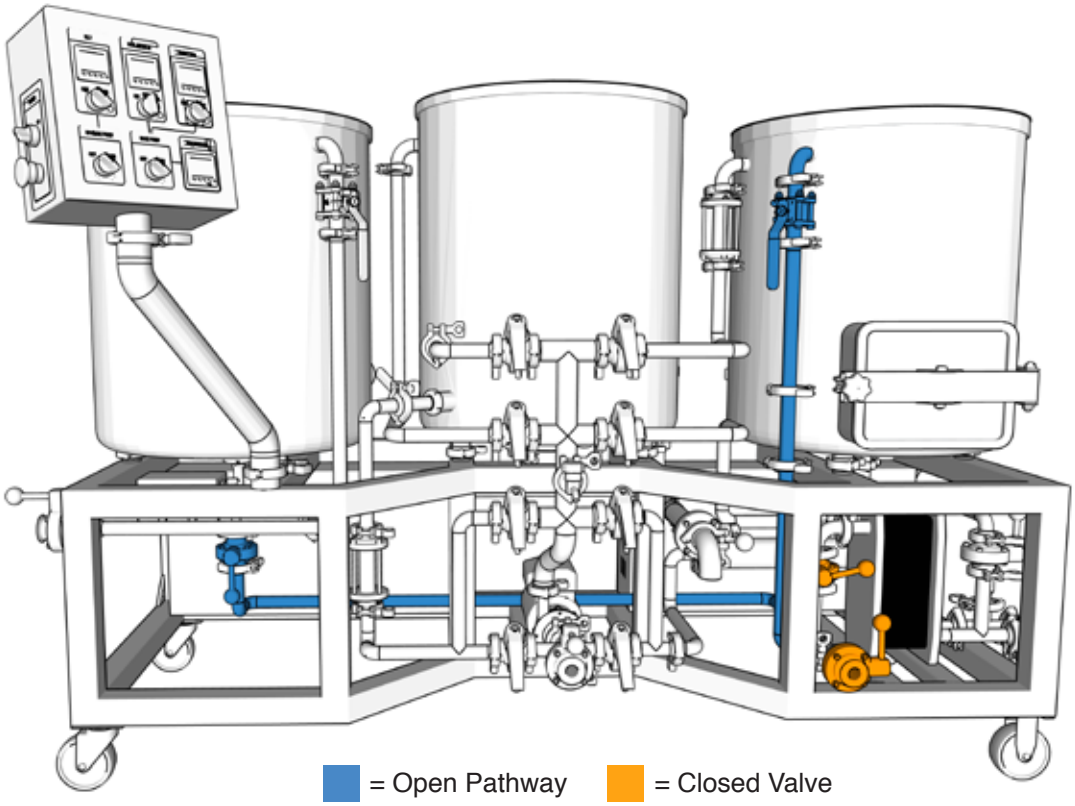
SPARGE

Sparging refers to the process whereby fermentable sugars entrenched within the grain bed are “rinsed” using fresh water so that they may be collected into the kettle. Traditionally, sparging is accomplished using one of two methods; batch sparging or fly sparging. Fly sparging refers to the process whereby fresh water is continuously trickled over the top of the grain bed during the runoff process at a flow rate which closely matches the runoff. This is considered the optimal method using the 1 bbl Nano Brewhouse, so we will focus on this method in more detail.

The HLT should be full of sparge water and up to the desired temperature by this point, provided it was refilled following mash-in. Ensure that the sparge ring is installed inside the mash tun, and that the sparge pump is primed. Turn the sparge pump to “ON” at the point in time during the runoff when the liquid level is just an inch or two above the grain bed. Match flow rates with the runoff process by throttling the ball valve at the inlet of the mash tun so that the sparge water enters at a rate that allows you to keep the liquid level just over the grain bed as previously mentioned.



Sparge Ring



Turn the sparge pump to “OFF” once the sparge water has been consumed based on your recipe. Turn the main brewhouse pump to “OFF” and cease runoff when the kettle full volume has been reached or when the “last runnings” drop below a useful gravity.

BOIL

We designed the kettle element to support voltage modulation to fine tune the element's wattage output. This feature allows the user to dial in the perfect rolling boil by reducing the element output as necessary rather than a more traditional "on/off" control.

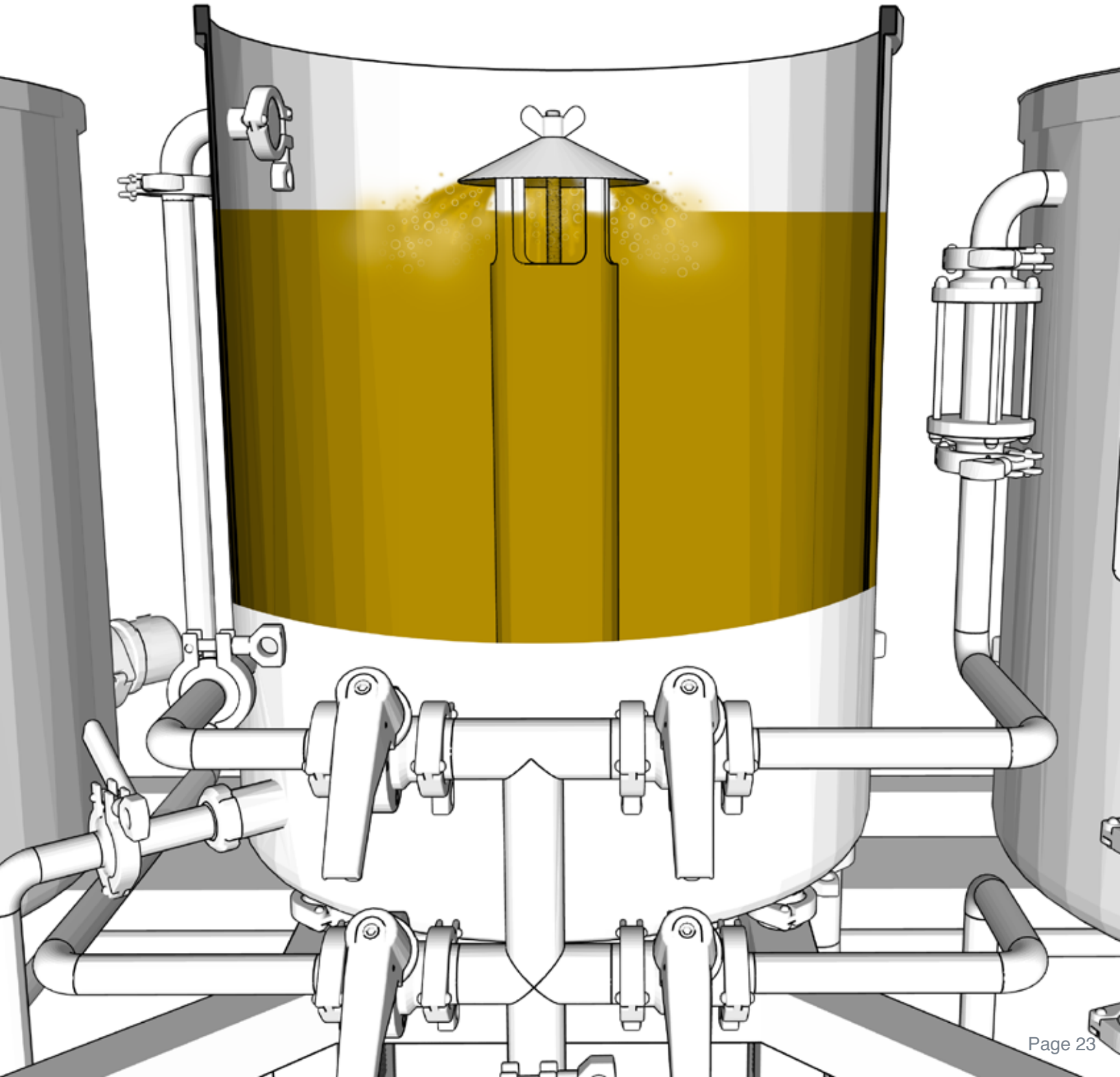
When the kettle is in "BOIL" mode, the set value on the temperature controller is indicative of the percentage of total wattage output for the element. For example, if the set value is "100", this represents 100% of the element's total output. Accordingly, a set value of "50" represents 50% of the element's total output.

When the kettle is in "ON" mode, the temperature controller is setup to modulate the element's output in order to achieve a specific temperature. This is most effectively used in situations where the brewer wishes to maintain a specific, sub-boiling temperature such as when kettle souring. In this case, a set value of "110" would represent a temperature of 110º Fahrenheit.

BOIL (CONTINUED)

Once the element is fully submerged during runoff, the element can be switched on. Begin by running the element at 100% in “BOIL” mode until a boil is achieved. Once a boil is achieved, the setting can be decreased to a value where a rolling boil is maintained.

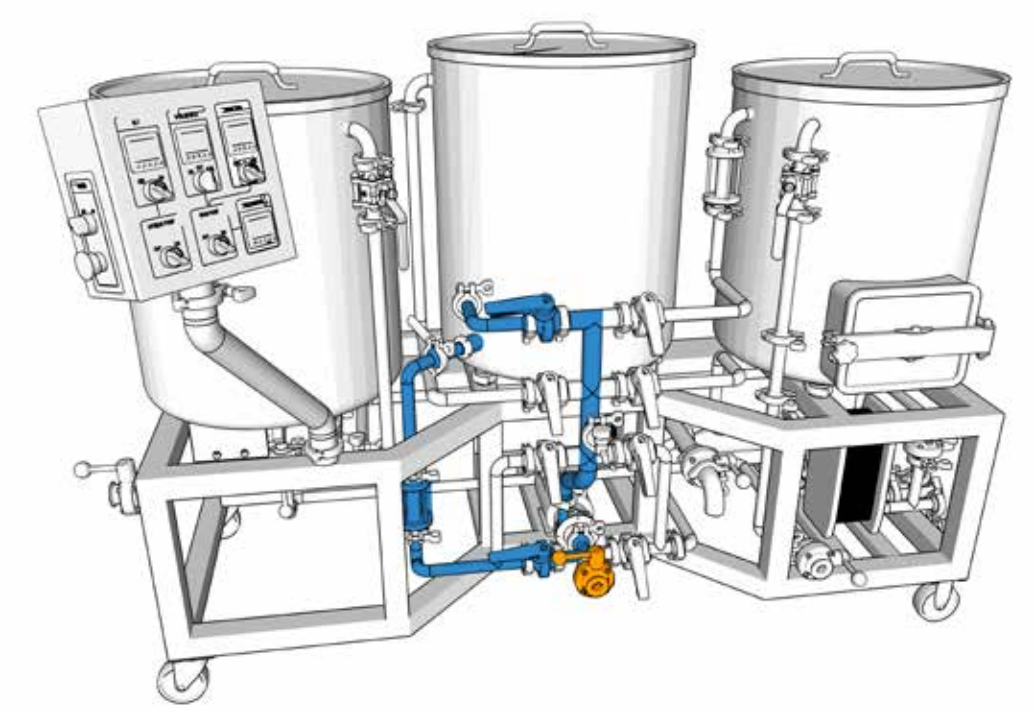
A rolling boil will occur as wort is superheated inside the calandria and dispersed through the upper vents, where it then comes into contact with the deflection plate. As a result, the temperature probe, being located on the outer wall of the kettle, may read a few degrees below the expected boil temperature of 212º Fahrenheit. No need to worry, as this is indeed a normal phenomenon. Continue to boil for the prescribed period of time and make kettle additions as called for by your recipe.



WHIRLPOOL

At the conclusion of the boil, the Whirlpool pathway can be used to aid in wort clarification. This will significantly decrease the risk of clogging the brewhouse heat exchanger if properly executed. Many brewers will also use the whirlpool for the addition of hops in order to extract flavor/aroma as opposed to earlier “bittering” hop additions.

Begin by opening the valve between the kettle racking arm and pump inlet. The sample valve can again be opened to ensure the pump has been primed, however be EXTREMELY CAREFUL as your wort will be at or near boiling temperatures. Slowly open the Whirlpool valve and switch the brewhouse pump to the “ON” position.



= Open Pathway = Closed Valve

WARNING

Be sure to open the Whirlpool valve slowly. Failure to do so may result in damage or injury, as hot wort may spray from the kettle.

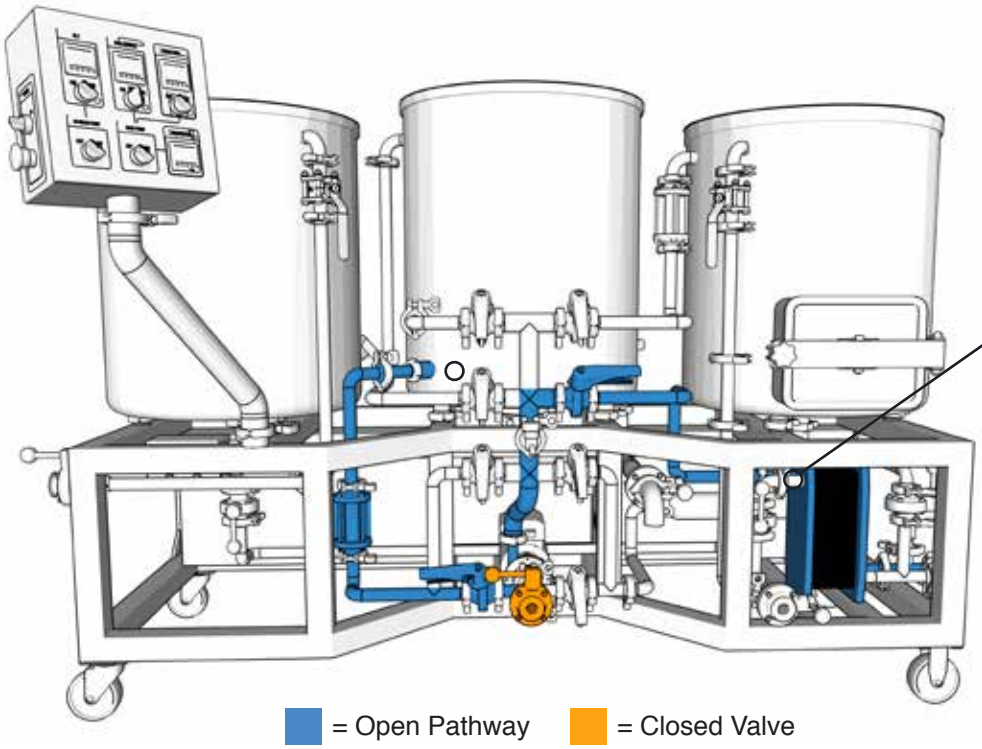
Wort will now be pumped from the kettle racking arm back into the kettle through the tangential inlet in the side of the kettle, causing the formation of a whirlpool. Whirlpool for the prescribed amount of time, then switch the pump to “OFF” and allow the remainder of trub and hops to settle, forming a cone in the center of the kettle.

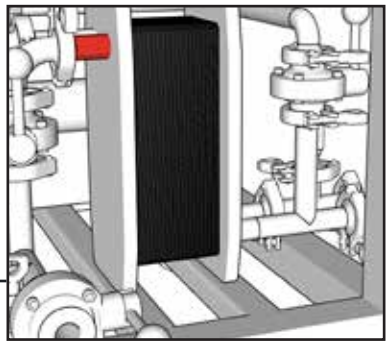
KNOCKING-OUT

By now, a clean and sanitized fermenter should be waiting and ready to fill. A clean and sanitized "knockout line" (brewery hose, silicone tubing, etc.) should be attached to the outlet of the brewhouse heat exchanger and run to your fermenter. It is important to make sure the fermenter is vented while filling to prevent an airlock.

Before activating the brewhouse pump, establish the flow of cold water through your heat exchanger by opening the valve located on the heat exchanger water inlet piping. The configuration of valves and piping on the heat exchanger water outlet allow the brewer to either recapture water into the HLT for a subsequent brew or dump the spent water to the drain.

Once flow has been established, slowly open the Knockout valve and switch the brewhouse pump to "ON" to begin knocking out into the fermenter. Monitor the controller labeled "Heat Exchanger" to monitor the temperature of the outgoing wort. With the flow of cooling water fixed, throttle the Knockout valve in order to achieve the desired knockout temperatures. For example, slightly closing the Knockout valve and restricting flow of wort through the heat exchanger will allow the brewer to lower the temperature of the outgoing wort.





HEAT EXCHANGER WATER OUTLET

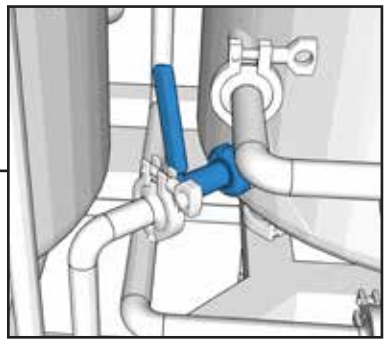
= Open Pathway = Closed Valve

KNOCKING-OUT (CONTINUED)

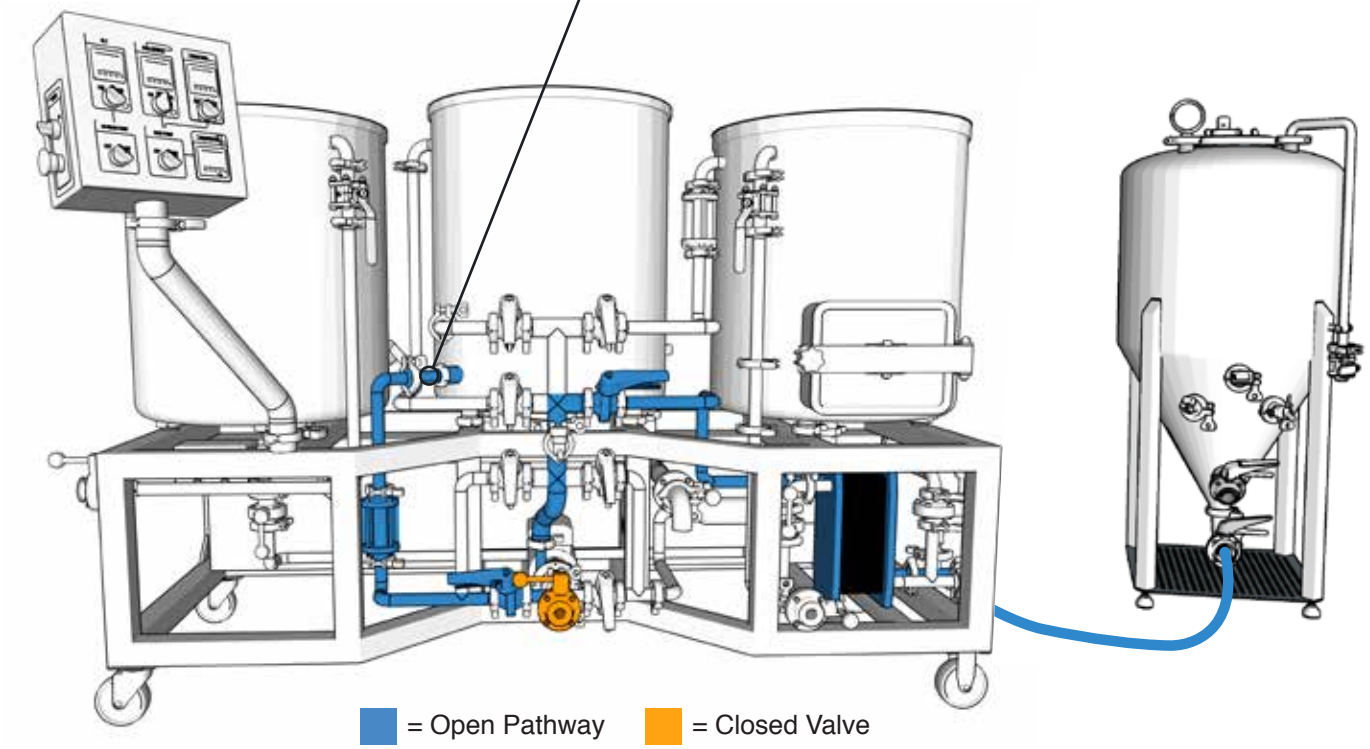
Monitor the level of the kettle closely and turn the pump to “OFF” immediately if air begins to enter the suction side of the pump. The rotatable racking arm can be manipulated in order to collect as much wort as possible without disrupting the trub/hop cone formed during the whirlpool.

Once the kettle has been emptied of all useful wort, turn off the brewhouse pump. Close all valves on the brewhouse. Pitch your yeast (if you haven’t already) and close your fermentation vessel.

Congratulations! You’ve made your first batch of beer on the Ss Brewtech 1 bbl Nano Brewhouse.



RACKING ARM



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