PROCESS GUIDE

Nano System Process Guide

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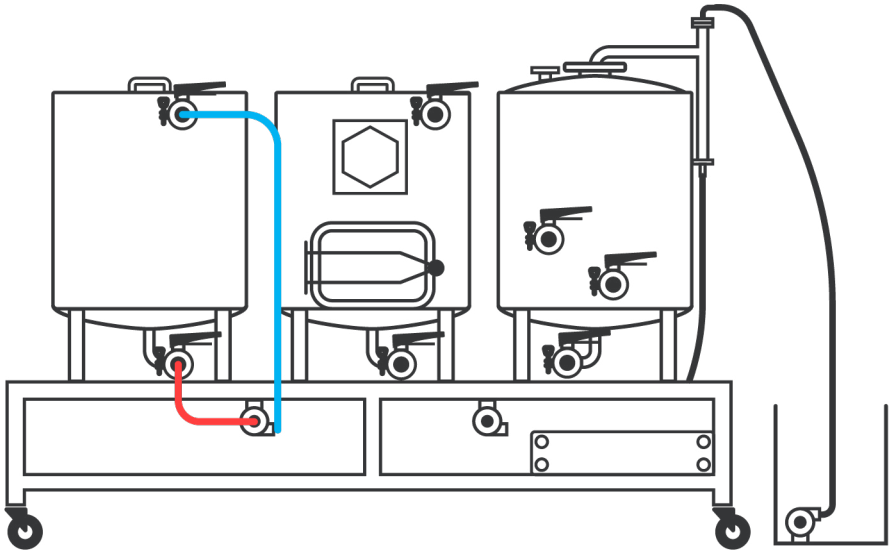
HEATING HLT



- ○ Autotune your HLT - please see our assembly guide here
- ○ Fill HLT to 50 gallons of water
- ○ Connect short hose (red) from bottom of HLT to water pump inlet
- ○ Connect long hose (blue) from pump outlet to top of HLT
- ○ Purge the pump and input (red) hose of air
    - With the HLT drain valve open, open the air bleed valve on the pump until a solid liquid stream flows. Close the valve - your pump is now purged of air
- ○ Turn on the water pump to recirculate the HLT to keep a consistent temp throughout
- ○ Set HLT to 2 degrees above your strike temp

Pro Tip: The HLT takes roughly 60-75mins to heat to strike temps.

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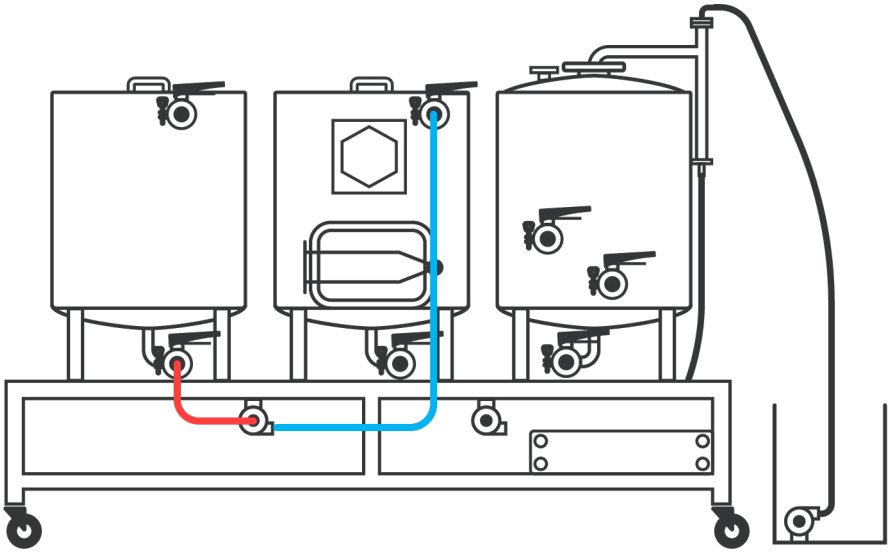
MOVE STRIKE WATER TO MT



- ○ Connect hoses as shown from bottom of HLT to the top of the MT
- ○ Transfer enough strike water to your mash tun
  - If your strike water is too hot you can add cold water
  - If your strike water is too cold use the Mash Control System (discussed in 'Recirculating the Mash' step below) heater to heat to desired strike temp
- ○ Once your strike water is the correct temp add the grain
  - Stir to remove dough balls

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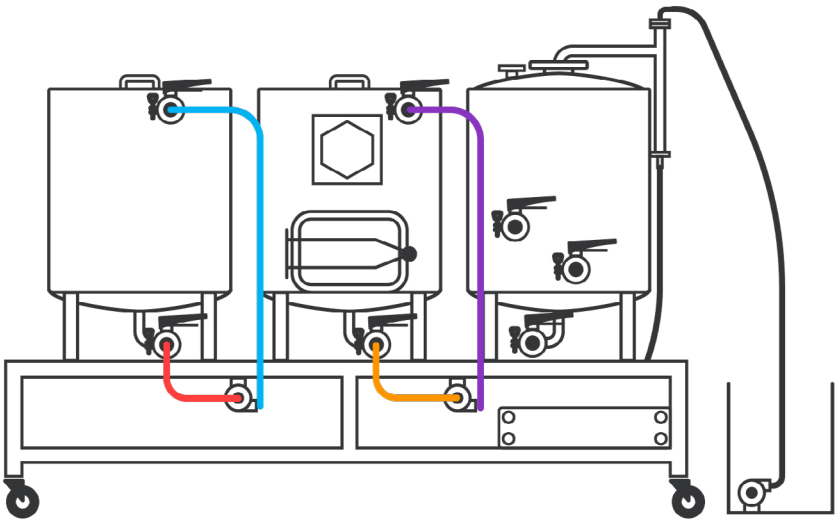
USING THE MASH CONTROL SYSTEM (MCS)



- ◯ Add a short hose (yellow) from the bottom port of the MT to wort pump inlet
- ◯ Add a long hose (purple) from the wort pump outlet to the top port of the MT
- ◯ The MT temp will be controlled by the Mash Tun PID and MCS

Pro Tip: The MCS element and pump are interlocked to prevent accidental scorching/dry firing. The element can not be turned on unless the pump is running.

There are 4 different ways the Spike Nano can be used to mash:

1. Single Infusion – Mash Element: Off Wort Pump: Off
   - After mashing in, place the lid on the MT and let the mash rest for the entire mash duration
   - Set the mash element to 'OFF' and the wort pump to 'OFF'
2. Auto Mash – Mash Element: On Wort Pump: Auto Mash
   - After mashing in, install the vorlauf arm into the top quick connect fitting and place the lid on the MT
   - Set the mash tun PID to your desired mash temp
   - Set the mash element to 'ON' and the wort pump to 'AUTO MASH'
   - In this setting the pump and element will turn on once the mash tun drops below 1F of your desired temp

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USING THE MASH CONTROL SYSTEM (MCS)

3. Recirculated Mash – Mash Element: On Wort Pump: On
   - After mashing in, install the vorlauf arm into the top quick connect fitting and place the lid on the MT
   - Set the mash tun PID to your desired mash temp
   - Set the mash element to 'ON' and the wort pump to 'ON'
   - The pump will remain on during the entire mash. The element will keep the mash at the desired temp

Pro Tip: If you use this technique the vorlauf step can be skipped as a vorlauf was performed during the entire mash step.

4. Step Mash – Mash Element: On Wort Pump: Auto Mash
   - After mashing in, install the vorlauf arm into the top quick connect fitting and place the lid on the MT
   - Set the mash tun PID to your desired mash temp
   - Set the mash element to 'ON' and the wort pump to 'AUTO MASH
   - After each mash step is completed increase the mash tun PID to the next desired mash temp

Pro Tip: Ramp speed is roughly .75 F/min.

Pro Tip: We recommend a slow trickle over the grain bed when recirculating. Use the ball valve to slow flow as a ball valve gives more precise control than a butterfly valve. Never restrict flow to the inlet of the pump - only on the outlet.

Pro Tip: Use the mash period to refill the HLT and bring to 170 F for sparging. The excess water can be used for double batching.

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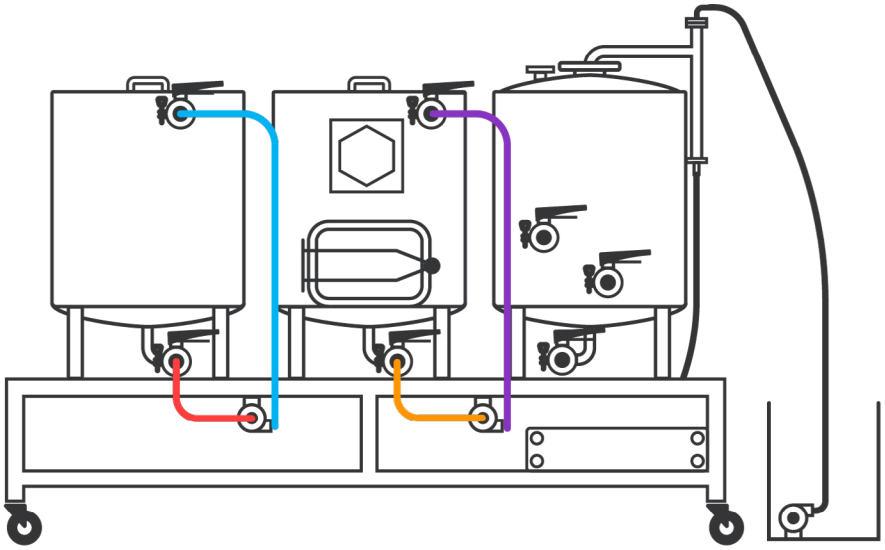
VORLAUF



- ○ If you haven't already, add a short hose (yellow) from the MT drain to the wort pump inlet
- ○ Add a long hose (purple) from the wort pump outlet to the top port of the MT
- ○ Install the vorlauf arm into the quick connect fitting on the top port of the MT
- ○ Vorlauf for ~15min or until the wort runs clear

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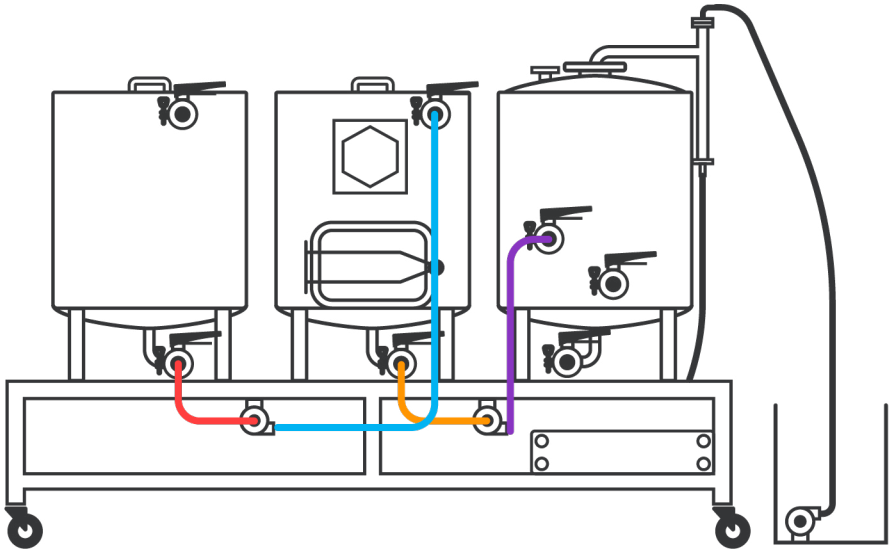
SPARGING



- ◯ Move the blue hose from the top of the HLT to the top of the MT
- ◯ Move the purple hose from the top of the MT to the top port on the BK
- ◯ Remove the vorlauf arm and install the sparge arm
- ◯ Open both the water and wort pump outlet ball valves about ¼ of the way
- ◯ Turn on the water pump and wort pump
- ◯ Adjust the valve on the wort pump so a slow trickle of water is flowing into the BK
- ◯ The flow into the MT and out of the BK should match
- ◯ Sparge the desired amount and fill the BK until you reach your pre-boil target volume

Pro Tip: Once the wort in the BK covers the elements they can be turned on. (see next step)

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BOILING

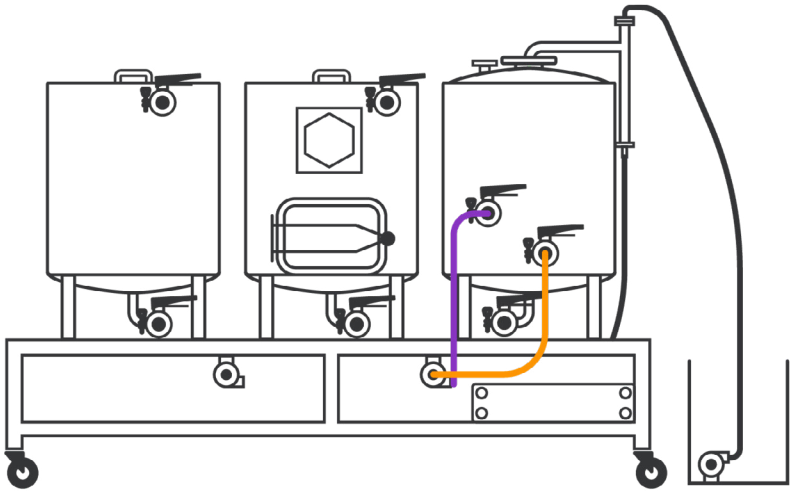
Pro Tip: The BK PID is based on % power output to fine tune a rolling boil. This is opposed to the temperature control like the HTL and MT.

- ○ Once the elements are submerged the BK can be set to 100% and turned on
- ○ Press ⮌ 3 times until you see 'out'. Use the up and down arrow to change the % power output
- ○ When the BK is nearing boil be sure to watch out for hot break and boil overs
- ○ Once the hot break has passed you can cover the BK with the steam condenser lid and reduce the BK PID to roughly 40-50%
- ○ Fill your steam condenser bucket (provided by the brewer; we recommend a 5gal bucket) with cool water and place the condenser pump in it

Pro Tip: The steam condenser will use about 20gal of water during a brew day.

- ○ Boil for the amount of time called out by the recipe and watch that the steam condenser reservoir doesn't run dry

WHIRLPOOL



- ○ Turn wort pump on and whirlpool for 15 minutes. Lastly, let wort stand for 10 minutes before moving to knockout

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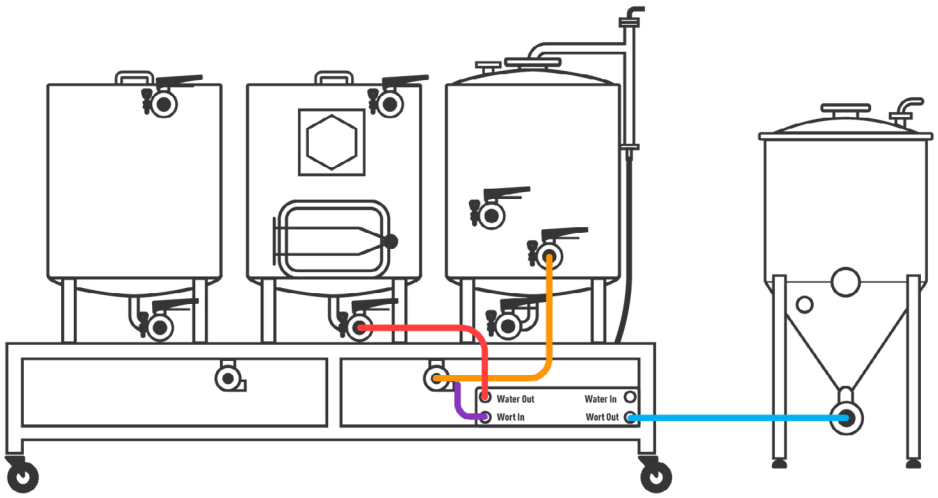
KNOCKOUT + TRANSFER



- ○ Move the purple hose from the whirlpool port to the 'Wort In' on the chiller
- ○ Move the yellow hose from the bottom drain on the MT to the racking port on the BK

Pro Tip: The racking arm can be rotated during draining to avoid transferring hop and trub into your fermenter.

- ○ Attach a garden hose to the 'Water In' on the heat exchanger

Pro Tip: Before proceeding make sure the MT has been emptied of grain and rinsed down. The water exiting the heat exchanger will be roughly 155F and can be used for CIP.

- ○ Attach a hose from the "Water Out" to the bottom drain of the MT
- ○ Ensure the heat exchangers inline temp probe is plugged into the panel

Pro Tip: The best way to lower "Wort Out" temps is to slow the flow from the wort pump by using the ball valve. Increasing the flow of "Water In" can help as well but will use more water.

- ○ Open the valves and turn the wort pump on
- ○ Adjust the flow on the wort pump outlet until the correct pitch temp is read on the panel's heat exchanger PID

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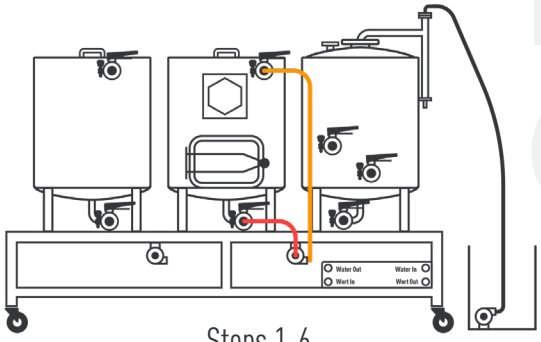
CLEANING

Pro Tip: Since the HLT is only used for clean water it does not need to be CIP'd. Also the water pump will not need to be CIP'd as it was only used to move clean water as well.

1. Before CIP, it is recommended to rinse all loose material (hops, malt, etc) out of the tanks through the bottom drain. Also we recommend removing the false bottom and scrubbing with a brush.
2. At this point your MT will have hot reclaimed water from the knocking out step. 10 gallons of reclaimed water will be enough. The water will be roughly 150F which should be hot enough for most caustic cleaning chemicals. If it is not the MCS heater can be used to heat the water. You can add your caustic to the MT as prescribed by the caustic instructions.
3. Move the red hose from the heat exchanger 'Water Out' to the wort pump inlet.



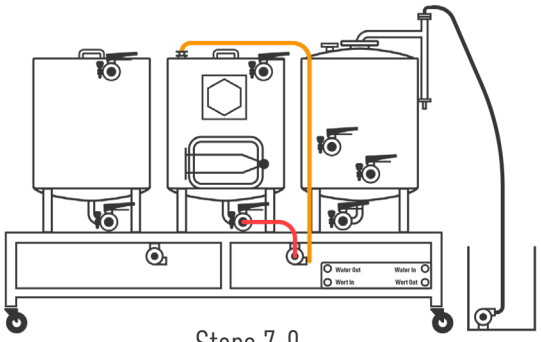
Steps 1-6

4. Move the yellow hose from the wort pump inlet to the wort pump outlet. Move the other end from the BK racking port to the top port on the MT.
5. Attach the vorlauf arm to the inside of the MT and turn the wort pump on. Let this run for a minute or until the plate and tube have been cleaned.
6. Turn the wort pump off.

Pro Tip: With the pump on, close the 3-piece valve and open the bottom bleed valve. This will ensure the bleed system is cleaned.

Pro Tip: 3 piece valves are great at giving precise flow control but they are a little harder to clean. With the pump on, open and close the 3 piece valve slowly to make sure the ball and seats are cleaned thoroughly.

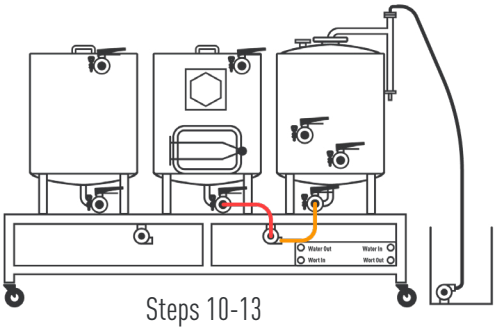
7. Attach the CIP ball to the flat lid with the 1.5" TC port. Add this lid to the MT.
8. Move the yellow hose from the top port on the MT to the CIP ball.
9. Turn the wort pump on and let the CIP ball clean the inside of the tank for about 5 minutes. Turn the wort pump off and inspect inside for any areas that didn't get cleaned. If there are areas that are still dirty a quick hand scrub with a brush or more time with the CIP ball might be needed.



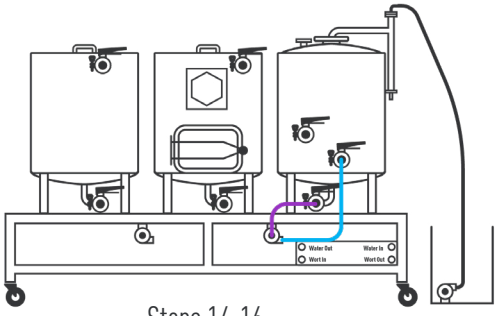
Steps 7-9

CLEANING

10. Once the MT is cleaned move all the liquid from the MT to the BK.
11. Move the yellow hose from the top CIP ball port to the bottom drain of the BK.
12. Turn on the wort pump until all the liquid is drained from the MT.
13. The red and yellow hoses are now clean. We will use the purple and blue for the next step to ensure those are clean.
14. Attach the purple hose from the BK drain to the wort pump inlet.
15. Attach the blue hose from the wort pump outlet to the BK racking port.
16. Turn on the wort pump for about 2 minutes. This will clean the racking arm and racking valve.

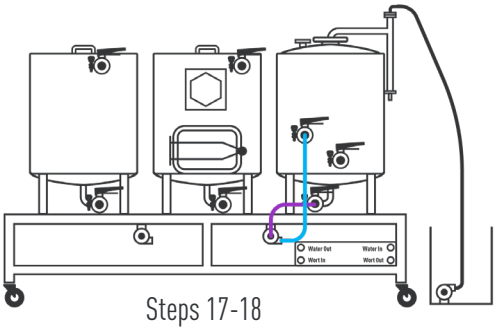


Steps 10-13

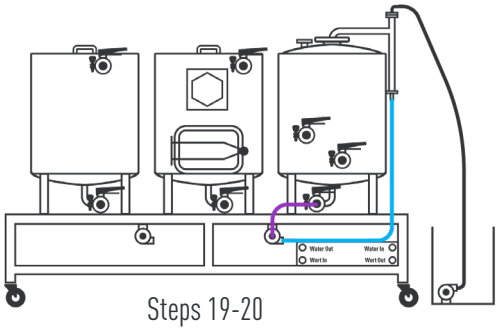


Steps 14-16

17. Move the blue hose from the BK racking port to the BK whirlpool port.
18. Turn on the wort pump for about 2 minutes. This will clean the whirlpool arm and whirlpool valve.
19. Remove the steam condenser tube and move the blue hose from the whirlpool port to the bottom of the steam condenser.
20. Turn on the wort pump for about 2 minutes. This will clean the steam condenser piping.



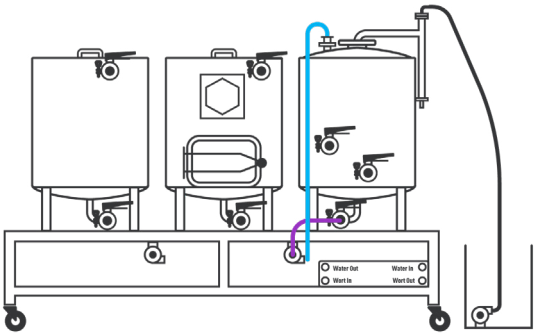
Steps 17-18



Steps 19-20

CLEANING

21. Remove the cap from the BK steam condensing lid. Move the CIP ball from the MT lid to the BK lid.
22. Move the blue hose from the bottom of the steam condenser piping to the CIP ball.
23. Turn the wort pump on and let the CIP ball clean the inside of the tank for about 5 minutes. Turn the wort pump off and inspect inside for any areas that didn't get cleaned. If there are areas that are still dirty a quick hand scrub with a brush or more time with the CIP ball might be needed.
24. Once the BK is cleaned the heat exchanger will be cleaned.

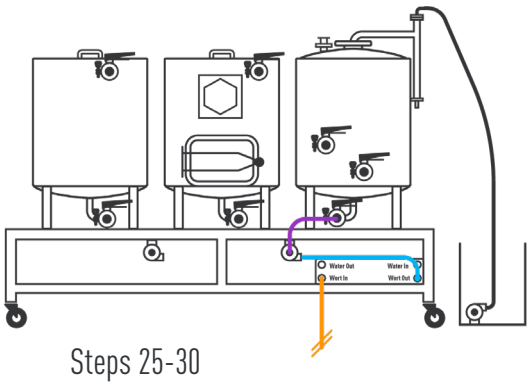


Steps 21-24

Pro Tip: The heat exchanger should be flushed clean with the opposite flow direction used when knocking out. This is so any particulates that made it into the heat exchanger get flushed out instead of pushed further into the heat exchanger.

25. Move the blue hose from the top CIP port to the 'Wort Out' port.
26. Connect the yellow hose to the 'Wort In' port and lead that to your floor drain or collection vessel.

Pro Tip: The steam condenser drain tube can be used on the 'Wort In' port to clean the inside. Otherwise it will need to be flushed clean separately.



Steps 25-30

27. Turn on the wort pump until the BK is drain completely.
28. Step 1-27 should be repeated with clean water to flush the system of the caustic cleaner.
29. Steps 1-27 can be repeated with a sanitizer as well.
30. Once the system is fully cleaned, place the lids on all the tanks to avoid dust getting inside and open all valves so everything can air dry.