

# Smart Recirculation Control 32 - Installation Guide

## QUICKSTART GUIDE SEE PAGE 2

Congratulations on purchasing the most advanced micro processor controlled, hot water recirculation pump controller made. This system is designed to run the recirculation pump only when you need it thus saving both water and energy. It is designed and built with pride in the USA to provide years of service and savings.

### Contents:

- 1 Smart Recirculation Control 32 with RJ-45 connector



- 2 Temperature Sensors with RJ-14 connectors and RJ-14 Y Connector



- 1 3/4" or 1" NPT Flow Sensor with JST connector



- 1 Wiring Harness with RJ-45, RJ-14 and JST connectors



Needed: The following items are needed for the installation, but are not included.  
Electrical Tape  
PTFE (Teflon) Tape  
Wire fasteners for securing wiring to the wall

# QUICKSTART GUIDE

## Prior to installation perform the following system test.

1. Connect the wiring harness to the controller.
2. Connect the flow meter to the wiring harness.
3. Connect the temperature sensors to the wiring harness.
4. Plug the controller into a wall outlet and ensure that the LED on the controller flashes green 3 times.
5. Blow through the flow meter in the direction of the arrow and ensure the controller makes a slight audible click and the red LED turns on for approximately 10 seconds.

If this test fails, disconnect all connections and inspect the wires to ensure they are not broken or loose and that the pins in the Y connector are not pushed to one side or the other. **NOTE:** If the controller blinks fast red, the issue is with a temperature sensor connection at the Y connector. See Trouble Shooting page 9, item 1.

1. Install the flow meter at the cold water input to the water heater ensuring the arrow on the flow meter points in the direction of flow. **NOTE:** PTFE tape is necessary when joining to a female NPT connector. PTFE tape is NOT necessary when connecting to a flexible hook-up line as they use a washer to create a seal. If installing in hard copper piping it is recommend to install the flow meter using a union fitting.
2. Attach one temperature sensor to smooth copper piping near the hot water outlet from the water heater with electrical tape ensuring the entire length of the sensor is in contact with the pipe. **Do not attach it to the hook-up hose or a coupler.** Cover the temperature sensor with insulation. If installing in PEX you will need to plumb in a 4" section of copper pipe to which to attache the temperature sensor. The temperature sensor lines can be extended with RJ-14 telephone line extensions if needed. Tested lines can be purchased from the Smart Recirculation Control online store.
3. Attach the second temperature sensor to smooth copper piping on the returning hot water line before the return line T's into the cold water feed and upstream from the check valve. It is preferable to install the sensor upstream from the recirculation pump as the thermal mass of the pump can cause slightly longer run time. Ensure the entire length of the sensor is in contact with the pipe and secure it with electrical tape. **Do not attach it to a coupler.** Cover the sensor with insulation.
4. Connect the temperature sensors to the wiring harness using the RJ-14 Y connector, connect the flow meter to the wiring harness and plug the wiring harness into the controller.
5. Plug the controller into an outlet and plug the pump into the controller.
6. Turn a hot water faucet fully on for 1 second and the pump should turn on. If the hot water line is cold the pump will continue to run until hot water recirculates throughout the house and raises the temperature of the return sensor to within 5F° (default) of the outgoing hot water sensor.

If the pump fails to turn on or fails to stay on past the initial 10 seconds or continues to run for longer than 5 minutes and the piping feels hot, see Trouble Shooting on page 9.

## LED Legend:

**GREEN LED:** will blink 3 times when first plugged in to indicate the unit is functioning correctly

**GREEN LED:** solid on when a timer is active and pump is not running

**GREEN LED:** will blink every 10 seconds when no other LED is lit (e.g. no timer active, pump not running)

**RED LED:** fast blinking indicates that one or both of the temperature sensors are not connected properly

**RED LED:** solid on when the pump is running whether due to a timer or due to demand

**BLUE LED:** solid on when connected via the smart phone app

## DETAILED INSTRUCTIONS

Please read over the following detailed instructions. If you are not comfortable with any part of them please contact a licensed plumber to perform the installation.

Prior to installation you must perform the system test at the beginning of the Quickstart Guide on page 2.

### Installation:

1. Note setting of the water heater thermostat and then set it to lowest temperature setting (do not turn off the pilot light).
2. Shut off the cold water supply to the water heater.
3. Open the closest hot water faucet to the water heater to depressurize the hot water line. When water quits flowing, turn off the faucet.

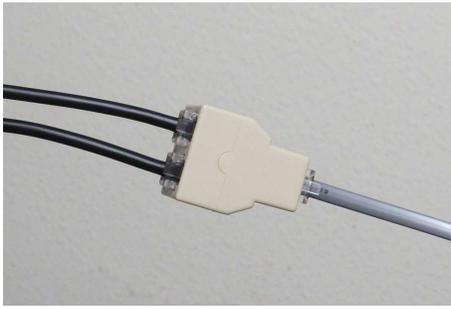


4. Disconnect the cold water supply line from water heater. Be careful not to bend and crease the supply line when manipulating it. Be prepared with some towels as some water will flow out of the hookup line. You don't have to drain the tank. As long as all the faucets remain closed you should not get any back flow from the hot water line.
5. Connect the flow meter to the cold water input of the water heater using PTFE tape being sure that the arrow on the flow meter is pointing toward the water heater.
6. Connect the cold water supply line to the input side of the flow meter. The supply line uses a washer to seal so you don't need to use PTFE tape on this connection. Hand tighten and turn an additional  $\frac{1}{4}$  to  $\frac{1}{2}$  turn. **DO NOT OVER TIGHTEN!**
7. Turn on the cold water supply to the water heater and inspect for leaks.
8. Turn the water heater thermostat back to its original temperature setting.

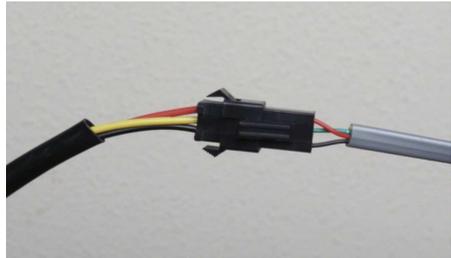


9. Attach one temperature sensor to smooth copper piping near the hot water outlet from the water heater with electrical tape ensuring the entire length of the sensor is in contact with the pipe. **Do not attach it to corrugated copper pipe, the hook-up hose or a coupler.** Cover the temperature sensor with insulation. **NOTE:** If installing in PEX you will need to plumb in a 4" section of copper pipe to which to attach the temperature sensors. PEX is a pretty good insulator and will cause a lag in the controller sensing the temperature change.
10. Locate the recirculation pump.
11. Attach the other temperature sensor to smooth copper piping upstream from the pump with electrical tape ensuring the entire length of the sensor is in contact with the pipe. **Do not attach it to corrugated copper pipe or a coupler.** Cover the temperature sensor with insulation. You may install the sensor downstream from the pump however the pump absorbs heat requiring it to run longer before the temp sensor will see the increase in temperature. **NOTE:** The temperature sensor

**MUST** be placed before the return line T's back into the cold water supply line.



12. Connect the temperature sensors to the wiring harness using the RJ-14 splitter. **NOTE:** This is the main source of issues when installing the controller. If, when the controller is plugged in it blinks fast red, the issue is with a temperature sensor connection at the Y connector. See Trouble Shooting page 9, item 1 for more details.



13. Connect the flow meter to the wiring harness via the JST connector ensuring it snaps together securely.
14. Secure the wires to the wall away from the water heater.



15. Plug the wiring harness into the Smart Recirculation Control 32 via the RJ-45 connector ensuring it snaps in securely.



16. Plug the recirculation pump into the Smart Recirculation Control 32 and plug the Smart Recirculation Control 32 into an electrical outlet.
17. The green LED on the side of the controller will blink 3 times if everything is OK. If the red LED flashes quickly see Trouble Shooting page 9, item 1.
18. Turn a hot water faucet fully on for 1 second. This will trigger the recirculation pump to turn the pump on. The red LED turns on while the pump is running.
19. If the hot water line is cold the pump will continue to run until the temperature difference between the two sensors is less than the small temperature difference (default 5F°).
20. The temperature of the sensors and the status of the pump can be monitored via the smart phone app by selecting “Live Data”™ from the menu.

21. If the pump fails to turn on when a faucet is fully opened for 1 second, see Trouble Shooting page 9, item 2.
22. If the pump fails to stay on past the initial pump run time of 10 seconds, see Trouble Shooting page 9, item 3.
23. If the pump runs for longer than 5 minutes and the piping feels hot see Trouble Shooting page 9, item 4.

## Smart Recirculation Control 32 Setup with Smart Phone

The Smart Recirculation Control 32 can be used simply as an on demand controller for your recirculation pump or it can be configured to run on a timer via an iPhone or Android smart device so that it will keep the recirculation loop hot between specific times of day and on specific days of the week (up to 10 timers can be set). Even when a timer is active it only runs the pump until the recirculation loop has heated up and then it shuts the pump off while continuing to monitor the recirculation loop temperature.

The app uses Bluetooth in order to communicate with the controller so you need to be sure that Bluetooth is enabled on your smart device. The app can be downloaded for free from either the Apple App Store or from Google Play by searching for “Smart Recirculation Control 32”. Do not “pair” the Bluetooth device, running the app will find and connect to the Smart Recirculation Control 32 and display the “Live Data”™. The blue LED on the controller will illuminate when the app is connected.

### **Live Data™ (initial screen displayed):**

This screen displays the high and low temperature sensor values, the calculated difference, the flow meter value and whether the pump is running or there is a timer active. There is also a “Trigger Pump” button to activate the controller from the app. This screen is useful for trouble shooting and configuration of the controller. For example, if you find that the controller isn’t turning on when hot water is drawn from a faucet, this screen will show you the flow value the controller is seeing. If the value is less than the Sensitivity setting, the controller will not turn on. If the flow is greater than the Sensitivity setting and the controller doesn’t turn on then the temperature difference is not greater than the large difference value in the Temperature Range setting.

### **Settings:**

This screen provides for controlling all the settings of the firmware. There is a list of basic settings and the ability to expand the settings to show “Advanced Settings”.

### **Basic Settings**

**Sensitivity** – The sensitivity setting allows the user to set how many pulses of the flow meter are required to turn the controller on. The default value is 20 which is fine for most installations. If you find that the controller is not turning on when you turn a faucet on and off, you would decrease this value to make the controller more sensitive to flow (require fewer pulses to turn the controller on). Correspondingly, if you find that the controller is turning on when there is no timer active and no hot water being drawn, you would increase this number to make the unit less sensitive to fluctuations in flow (require more pulses to turn the controller on).

**Temperature Range** – The temperature range setting allows the user to set the temperature differences that cause the controller to turn the pump on and off. When the controller senses flow, it checks to see if the temperature difference between the two temperature sensors is greater than the large difference and if it is, it turns the pump on. It runs the pump until the temperature difference is less than or equal to the small difference. The default large difference is 8F° and the default small difference is 5F°. These values work fine for most installations, however if you find that the controller is turning on and never turning off, you should increase the value of the small difference. It is recommended to keep at least a 3F° difference between the high and low temperature difference values.

**Timers Enabled** – This switch enables and disables the timers. This can be used to turn the timers off when you go away on vacation or to simply turn them off if you just want to use the on demand feature of the controller. The Smart Recirculation Control 32 implements “Smart Timers”™ which, regardless of this setting, will automatically disable if no hot water usage is detected within 24 hours. The timers are re-enabled as soon as hot water flow is detected or the controller is connected to via the app.

## Advanced Settings

**Dormant Interval** – The dormant interval is the number of minutes that the controller lies dormant after sensing flow and heating up the loop. As long as there is hot water flow within the dormant interval the dormant interval timer is reset. The dormant interval is also the number of minutes that the controller waits when a timer is active between pump runs. If you want the pump to turn on more quickly while a timer is active or more quickly between pump runs when you draw hot water you would reduce this value. The default value is 10 minutes which is fine for most installations.

**Flow Meter Delay** – The flow meter delay is the amount of time in hundredths of a second during which the controller counts the number of pulses that occur in the flow meter. If the number of pulses counted is above the sensitivity threshold then the controller deems that there is flow in the hot water line. The default value is 75 hundredths of a second which is fine for most installations.

**Initial Pump Run Time** – The initial pump run time is the number of seconds that the pump runs when it first senses flow if the Dormant Interval has expired. This is to ensure that hot water from the water heater makes it to the first temperature sensor in order to obtain an accurate temperature comparison between the two temperature sensors. When a timer is active the pump will turn on every Dormant Interval for the length of the Initial Pump Run Time in order to check the temperature of the recirculation loop. The default value is 10 seconds which is fine for most installations. If the temperature sensor for the hot water outlet is installed some distance from the water heater this value may have to be increased.

**Bluetooth Advertising Power** – This is the power at which the Bluetooth radio advertises it's presence. The app searches for this signal when connecting. The higher this value the further away from the controller the app can find and connect to the controller. The default value is 5.

**Bluetooth Transmission Power** – This is the power at which the Bluetooth radio communicates with the app once its presence is detected. The higher this value the further away from the controller the app can be taken once the app is connected. The default value is 5.

**Reset to Factory** – This will reset the Smart Recirculation Control 32 back to the factory defaults. If the controller isn't operating as expected, resetting to the factory defaults is a good thing to try to resolve the issue. You must type "yes" when prompted in order for the factory reset to take place.

## Timers:

This screen displays the timers. They are black when the timers are enabled. If they are gray then they are disabled. Tap the timer to edit or delete it. To add a new timer tap the Add Timer button.

The real time clock in the Smart Recirculation Control 32 is set when you connect to the controller with your smart phone. The Smart Recirculation Control 32 has a built in power backup that will keep the clock's time for approximately 48 hours without power. After which the clock will lose its time and the controller's timers won't function until the time is set by running the app and connecting to the Smart Recirculation Control 32.

The clock does not adjust for daylight savings time so when the time changes you will need to connect to the Smart Recirculation Control 32 with your smart device and the time will be set to the time of your smart device.

## Log:

Displays a rolling log of the last 227 controller activations.

**Firmware:**

The firmware of the Smart Recirculation Control 32 can be updated via the smart phone app. The app will notify when you first connect if there is a new firmware available and selecting OK will navigate you to the Firmware screen. By default only the firmware your type of controller will be displayed and if there is an update available it will be enabled. Tap on the firmware and then tap the “Update Firmware” button and the controller will begin the update process. Do not allow the application to go to the background or the phone to sleep while the firmware update is running. If the firmware is already installed it will be gray and not able to be selected.

There is an option on this screen to “Show All Firmware Versions” which will display the firmware from our entire product line. The sensor requirements are different for the different firmware versions so updating to a different product without understanding the implications may provide unexpected results. Please see our web site for a description of the different products.



## Trouble Shooting

- SYMPTOM:** Red LED flashes quickly after it is plugged in and never stops.

**ISSUE:** The Smart Recirculation Control 32 is not able to get temperature information from the temperature sensors.

**RESOLUTION:** Unplug the Smart Recirculation Control 32 from the wall and disconnect all three connections at the Y connector where the sensors connect to the wiring harness. Inspect the pins in the connector and ensure they are not pushed to one side or the other. If they are you can straighten them with a small screwdriver or pen knife. If they are not visibly bent then it can help to wiggle the RJ-14 connectors as you insert them to ensure the pins drop into the slot in the connector and make solid contact. Plug the wiring harness back into the Smart Recirculation Control 32. Plug the Smart Recirculation Control 32 back into the wall outlet.
- SYMPTOM:** Pump won't turn on when hot water is drawn from a faucet.

**ISSUE 1:** The temperature difference between the two temperature sensors is less than the large value in the "Temperature Range" setting (default 8F°) and therefore the controller will not turn on.

**RESOLUTION:** If the temperature difference has been met then there is no reason to run the pump. This is normal behavior as the controller should only run the pump when there is demand and the loop is not up to temperature. To cause the controller to turn on you will need to wait for the temperature at the end of the loop to drop and create a temperature difference than 8F° or decrease the large difference value in the "Temperature Range" setting.

**ISSUE 2:** The flow being seen at the controller is too low to activate the pump.

**RESOLUTION:** Go into "Live Data"<sup>TM</sup>, open the faucet in question and observe the flow value. If the value is not greater than the "Sensitivity" setting the controller will not turn on. Adjust the "Sensitivity" value to be less than the observed value in in "Live Data"<sup>TM</sup>. **NOTE:** If you are seeing very low flow at the faucet it is possible the aerator in the faucet is clogged. Removing it and tapping it to remove any accumulated sediment can restore the flow, but they are inexpensive so replacing it is recommended.
- SYMPTOM:** Pump won't continue running after the initial pump run time expires.

**ISSUE:** The controller isn't sensing a temperature difference greater than the large difference that is set in the Temperature Range setting (default 8F°).

**RESOLUTION 1:** Ensure that the temperature sensor is securely connected to the copper piping coming out of the water heater as close to the water heater as reasonable. Typically this will be after the hook-up hose. If it is loose, re-secure it in place with electrical tape, cover it with insulation and test it again. If it still won't stay on see RESOLUTION 2.

**RESOLUTION 2:** This is typically a situation where it is taking longer than 10 seconds for the pump to get hot water out to the location of the first temperature sensor and cause the temperature difference to be greater than the large difference that is set in the Temperature Range setting (default 8F°). To test this, after the pump has run for the initial 10 seconds, turn the hot water on again for 5 or so seconds. If the pump kicks on and starts running then you need to increase the "Initial Pump Run Time" under "Advanced Settings". The default is 10 seconds. I would recommend increasing this by 5 seconds and test again when the system is cold. You can also view the "Live Data"<sup>TM</sup> in the app which displays live temperature values and difference to see what temperature value is actually being sensed.
- SYMPTOM:** Pump continues to run even though the piping feels hot.

**ISSUE:** The controller isn't sensing the temperature difference dropping below the small difference that is set in the "Temperature Range" setting (default 5F°).

**RESOLUTION 1:** Ensure that the temperature sensor at the end of the recirculation loop is securely connected to smooth copper piping and that it is connected before it T's into the cold water feed into the water heater. If it is loose, re-secure it in place with electrical tape, cover it with insulation and test it again. If it still won't stay on see RESOLUTION 2.

**RESOLUTION 2:** Open the smart phone app view the temperature value and temperature difference displayed in “Live Data”<sup>TM</sup>. If this difference is greater than the small temperature difference in the “Temperature Range” setting (default 5F°) then the pump won’t turn off. Go into the “Temperature Range” setting and increase the small temperature difference value to be greater than the value observed in “Live Data”<sup>TM</sup> and the pump will turn off. This typically happens in homes where the hot water line isn’t well insulated and the water loses temperature as it recirculates throughout the home. Do your best to insulate all hot water pipes that you can reasonably access. It will make the system perform better and it will save you money on energy bills. **NOTE:** It is recommend that you set the large temperature difference value to be at least 3F° higher than the small temperature difference value.

5. **SYMPTOM:** Pump turns on when no hot water is being drawn.

**ISSUE:** Pressure spikes in the cold water supply line caused by abrupt turning on or off of the cold water (for instance when a toilet fills or a sprinkler system turns on or by fluctuations in the feed from the utility company) can cause the Smart Recirculation Control 32 to trigger the hot water recirculation pump to turn on.

**RESOLUTION:** The sensitivity value of the Smart Recirculation Control 32 is too low and should be adjusted higher. The default value of 20 works well, but can be susceptible to these false triggers. It is recommended to increase it by 5 pulses at a time to filter out these anomalies.

6. **SYMPTOM:** No flow is seen on the “Live Data”<sup>TM</sup> screen when a faucet is opened.

**ISSUE 1:** A wire connecting the flow meter is broken.

**RESOLUTION:** Inspect the wiring harness where it connects to the flow meter to ensure none of the three wires appear broken. If they are contact Lerdian Dynamics to get a replacement harness. If it looks good see ISSUE 2.

**ISSUE 2:** Sediment or scale is blocking the flow meter.

**RESOLUTION:** To ensure that this is indeed the issue perform the following test. Remove the sensor from the flow meter that is held on with 2 small silver screws (don’t worry, it won’t leak water when the sensor is removed). Start the smart phone app, view the “Live Data”<sup>TM</sup> screen and quickly wave a magnet back and forth over the sensor. You should see the flow value change. The flow meter works by spinning a magnet on a turbine that is read by the sensor. If you see a flow value in the smart phone app then the flow meter is blocked with sediment or scale and will need to be removed and cleaned. If you do not see a flow value then there is an issue with the sensor and/or the wiring harness and it will have to be replaced.

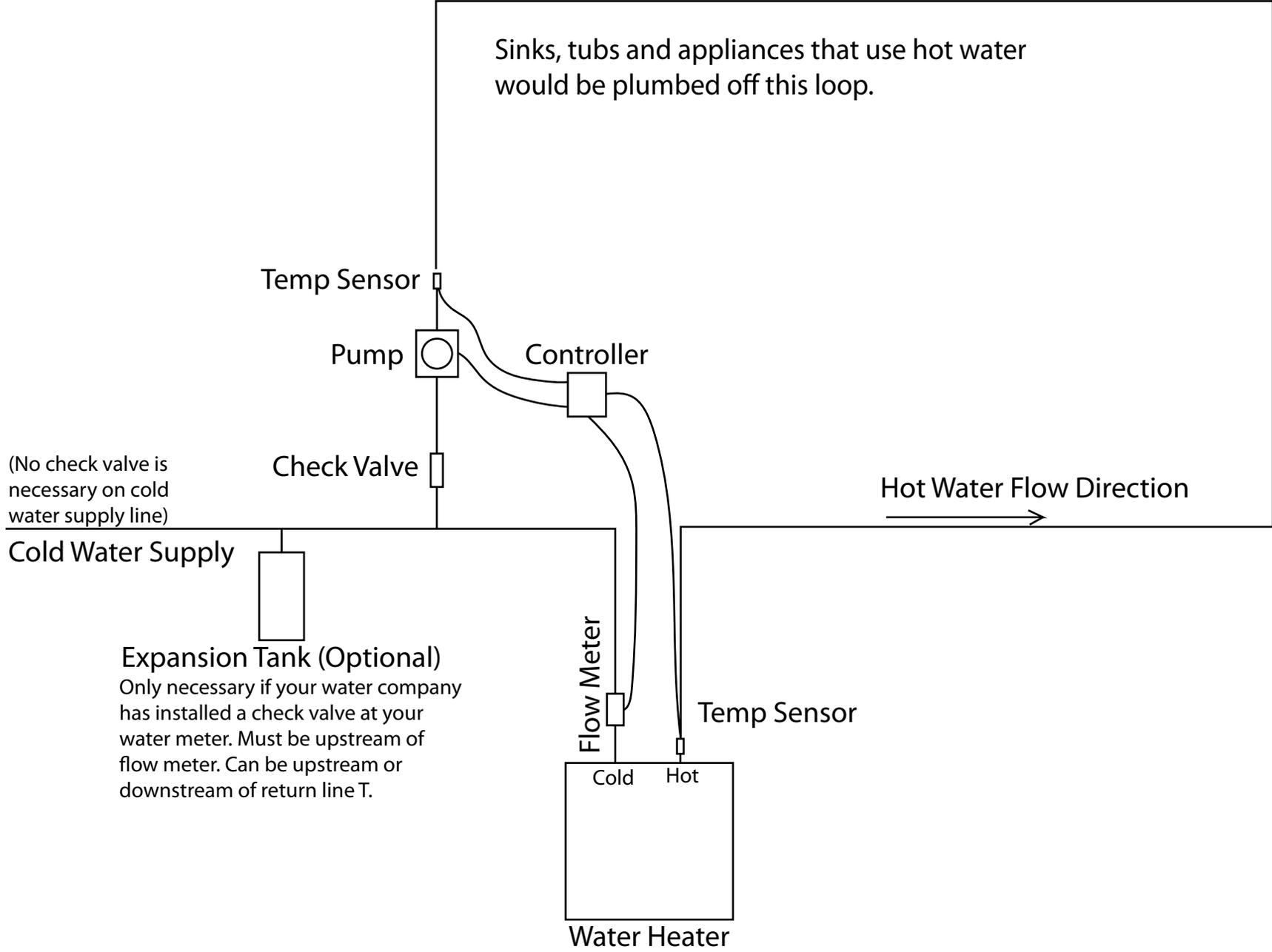
If you need further support please contact:

Lerdian Dynamics, Inc.

support@smartrecirculationcontrol.com

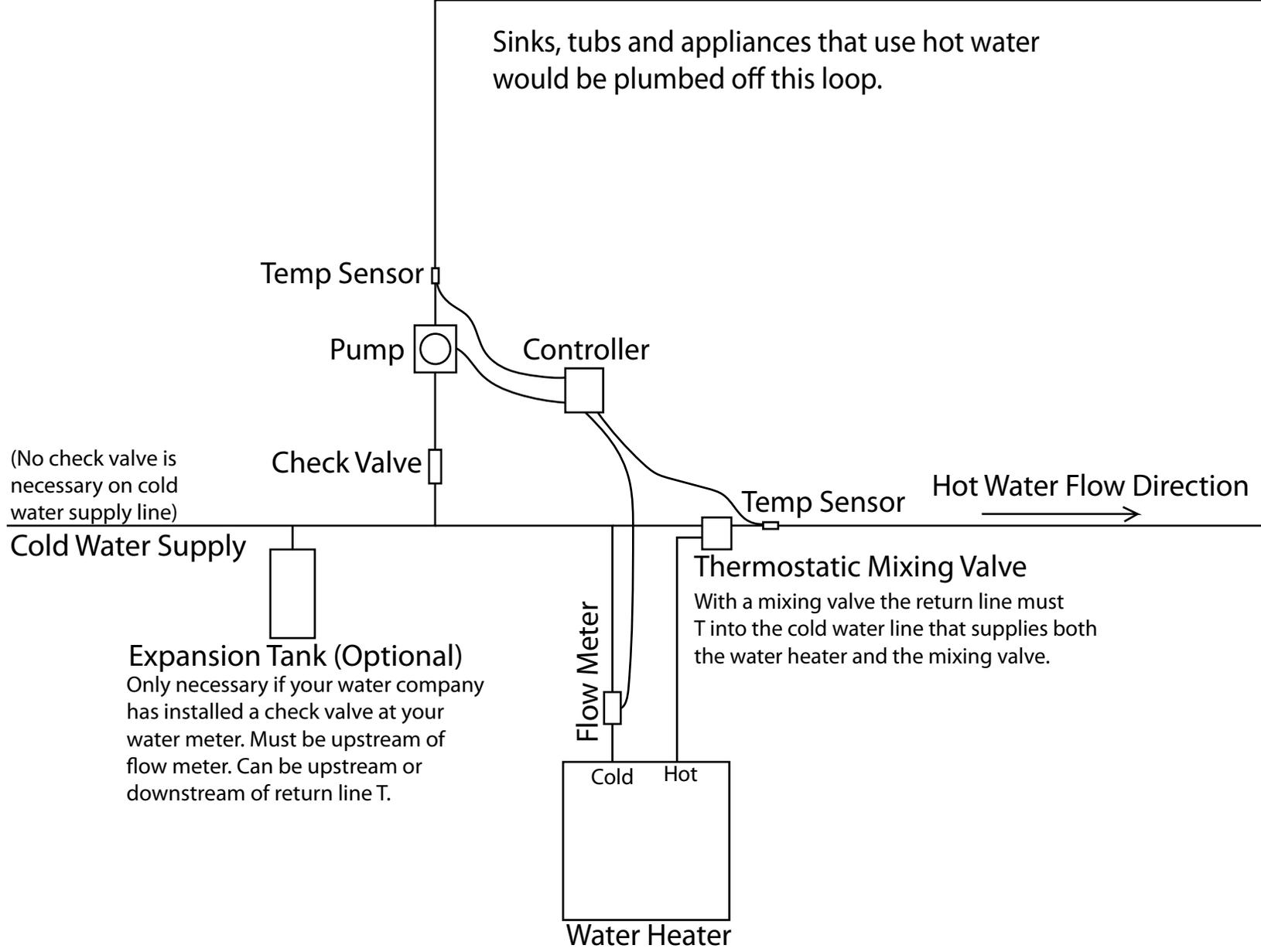
or 831-761-8659

# Typical Installation



NOTE: The recirculation return line can be plumbed into the drain spigot of the hot water tank but is more typically T'ed into the cold water supply line.

# Installation with Thermostatic Mixing Valve



(No check valve is necessary on cold water supply line)

**Expansion Tank (Optional)**  
Only necessary if your water company has installed a check valve at your water meter. Must be upstream of flow meter. Can be upstream or downstream of return line T.

Sinks, tubs and appliances that use hot water would be plumbed off this loop.

**Thermostatic Mixing Valve**  
With a mixing valve the return line must T into the cold water line that supplies both the water heater and the mixing valve.

NOTE: The recirculation return line can be plumbed into the drain spigot of the hot water tank but is more typically T'ed into the cold water supply line.