

# RUNNING TWO PUMPS WITH ONE AUTOHOT® CONTROLLER

## Output 1 - Pump 1 Operation

- A female plug is installed as standard to provide power to Pump 1
- Pump 1 operates on a demand signal, or temperature drop
- On Demand signal from Temperature sensor T2 (temperature trigger drop)
- The pump will stop when T1 lockout temperature is reached (default: 105°F, adjustable) or Pump run-time limit is reached (default: 5 minutes, adjustable).

### Default Settings (Adjustable)

- Temperature Trigger Drop (T2): 2.5°F (increments of 0.1°F).
- Lockout Temperature (T1): 105°F.
- Delta (Bandwidth): 5°F.

## Output 2 wiring

N = Neutral (unswitched 120 VAC)

L = line/hot (unswitched 120 VAC)

C = relay common (controlled by T#3)

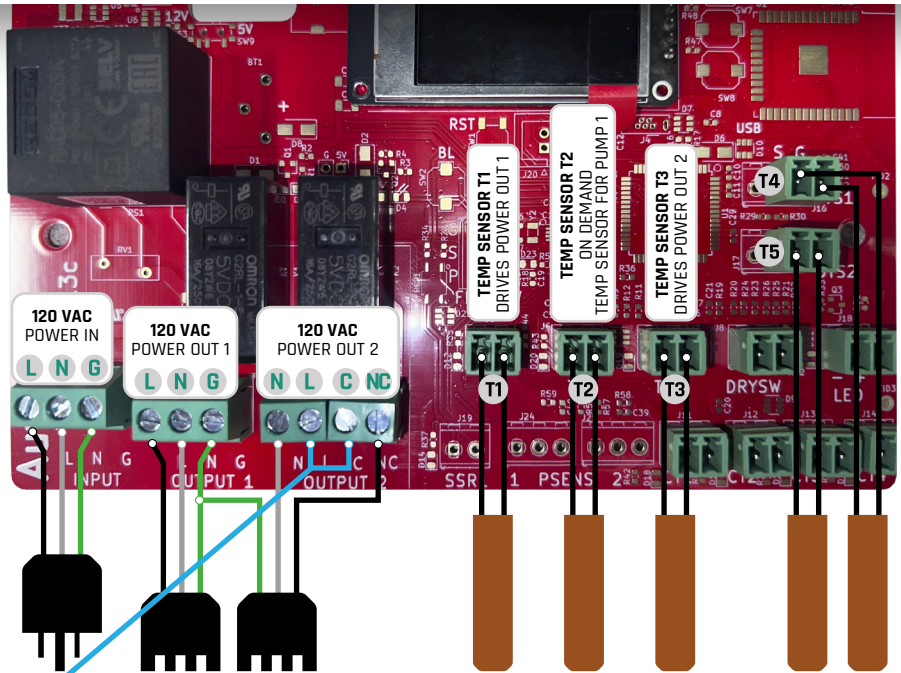
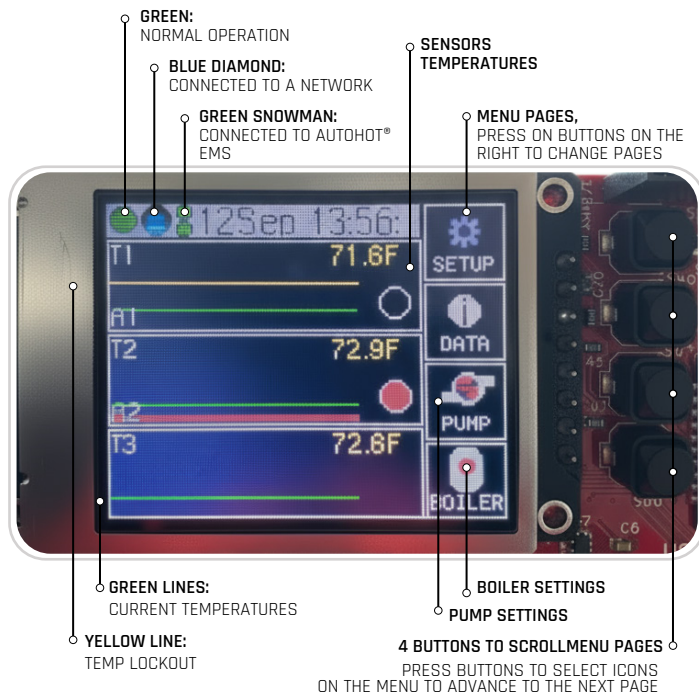
NC = relay "normally-closed" contact (with C)

## To switch the second pump with T3

- Add a short jumper from L to C (this lets the relay switch the hot feed)
- Connect the pump's hot lead to NC
- Connect the pump's neutral to N

Result: T3's relay will turn power to the second pump ON/OFF via the C-NC path

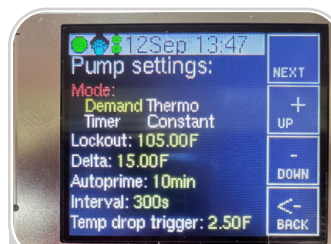
**\*Always de-energize the circuit and follow electrical codes**



**TEMP SENSOR 1, PUMP 1 (OUTPUT 1)**  
Set lock out temp (T1) to run pump 1 (output 1)



**TEMP SENSOR 3, PUMP 2 (OUTPUT 2)**  
Set water heater schedule for T3 to set up pump 2 (output 2) lock out temps



# SINGLE PUMP OPERATION (STANDARD SETUP)

## T2 SENSOR OPERATION

- 💧 The **T2** sensor activates the recirculation pump based on a temperature drop.
- 💧 This drop is adjustable and shown on the display as "Temperature Trigger Drop."
- 💧 It can be adjusted in increments of 0.1°F, with a default of 2.5°F.
- 💧 This is what starts the pump when the controller is in "On Demand" mode.

## HOW IT WORKS IN THE PLUMBING SYSTEM:

- 💧 In domestic hot water systems, the return line comes back to the water heater and tees into the cold water line.
- 💧 When no hot water is being used, the recirculation pump stops once **T1** (return line sensor) reaches the lockout temperature (default 105°F).
- 💧 At that point, no new cold water is entering the water heater. Because the return line is tied into the cold line, some heat transfers into the cold line at the tee.
- 💧 The temp sensor **T2** gets strapped where some of the heat transfers from the return line into the cold water line, about 6 inches away from the tee on the cold water line, so when someone opens a hot water fixture, new cooler cold water flows into the tee causing a temp trigger drop.
- 💧 This temperature drop is detected by **T2**, and it serves as the activation signal to start the recirculation pump.
- 💧 The pump may also activate from an AutoPrime cycle (built into the programming) if no manual demand has occurred for a while.

## T1 SENSOR OPERATION

- 💧 The **T1** sensor, strapped onto the return line, keeps the pump running until the lockout temperature is reached.
- 💧 Lockout temperature is adjustable, with a default of 105°F.

## DELTA (BANDWIDTH)

- 💧 The delta is the adjustable bandwidth around the lockout temperature.
- 💧 Default value: 5°F (user-adjustable).
- 💧 This ensures that once the pump shuts off, it won't restart until the temperature falls below the set delta.

## HYSTERESIS

- 💧 In addition to the delta, the controller has an automatic hysteresis of about 1-2°F to prevent short-cycling.
- 💧 This hysteresis is not user-adjustable.

## RESPONSE TIME (LAG)

- 💧 Once the programmed conditions are met (**T2** temperature drop or **T1** lockout), the controller responds immediately.
- 💧 Any perceived "lag" comes from the plumbing system itself (the time it takes for hot water to reach the sensor), not from the controller.



# DUAL PUMP OPERATION (USING T3 AND BOILER FEATURE)

For customers who want to run two pumps with one AutoHot® commercial controller, the system uses the Boiler feature with the **T3** sensor.

## RELAY AND CONNECTORS

- 💧 The controller provides a second relay with terminals for normally open (NO) and normally closed (NC) connections.
- 💧 Next to this relay connector, there is an additional two-position terminal providing a permanent 120 VAC supply.
- 💧 Together, these look like a four-position connector, but they are separated into relay contacts and constant power contacts.

## JUMPER REQUIREMENT

- 💧 To use the 120 VAC power and the relay to control the second pump, a jumper must be added from the power terminals to the boiler relay.
- 💧 This allows the relay to switch power on and off to the second pump.

## PROGRAMMING WITH T3

- 💧 The output 2 relay is controlled by temp sensor **T3** through a 24 hour schedule.
- 💧 Each hour can be programmed with a specific lockout temperature, allowing temperature settings to vary throughout the day.
- 💧 This feature is typically used to connect in series with a boiler or water heater thermocouple, making the boiler "variable":
  - Normal temperature during high-demand hours.
  - Lower temperature during low-demand hours, saving natural gas for ~12 hours per day.

## USING T3 FOR A SECOND PUMP

- 💧 Instead of using the relay for boiler control, the relay output and 120 VAC connection can be wired to power a second pump.
- 💧 In this configuration, the second pump is controlled by the **T3** temperature sensor and schedule.
- 💧 Unlike **T2**, this operation has no "On Demand" trigger – the pump runs strictly according to the programmed temperature setpoints.
- 💧 Delta and Hysteresis is the same as for **T1** and **T3**.

## TWO COMMON APPLICATIONS

### 1. Split System with Two Loops

- 💧 One boiler or water heater may serve two separate areas (e.g., two buildings).
- 💧 Pump 1 (Relay 1 with **T1** sensor) controls Loop 1.
- 💧 Pump 2 (Relay 2 with **T3** sensor) controls Loop 2.
- 💧 In this case:
  - **T1** sensor is installed on the return line of the first loop.
  - **T3** sensor is installed on the return line of the second loop.

### 2. Lead/Lag Pump Setup (Same Loop)

- 💧 Both pumps are installed on the same recirculation loop, with one as the primary pump and the other as a backup pump.
- 💧 Both **T1** and **T3** sensors are strapped on the same return line.
- 💧 Programming is set so that:
  - The primary pump has a higher lockout temperature.
  - The secondary pump has a lower lockout temperature.
- 💧 If the primary pump fails and the temperature drops below its threshold, the second pump automatically takes over.

