

I want to program an esp32 device to automate an outdoor water heater. It will require taking information from 2 temperature sensors (One to read the temperature of water, and the other to read the temperature of the outside air). Then with defined rules/macros, the esp32 will trigger 2 relays to turn on the water heater and to turn on the water pump. I would also like to be able to override the rules with a switch on my phone.

Devices:

ESP32

Sensor 1 = Water Temperature

Sensor 2 = Outside Air Temperature

Relay 1 = Water Pump

Relay 2 = Heater

Switch 1 = App Controlled Switch

There will be two main programs: Maintain and Heat.

When the Maintain is enabled, if the outside temperature is lower than 34 degrees F, the water pump will turn on for 30 seconds to circulate the water through the system so the pipes don't freeze. If the water temperature gets less than 40 degrees F, then the water pump and heater will turn on to heat the water until it reaches 44 degrees F. The heater can only run for a maximum of 20 minutes at a time, so if the water takes longer to heat than 20 minutes, the heater and pump will need to be turned off for a minute and then run its cycle again until it reaches the temperature of 44 degrees F. Once the water temperature is high enough, it will revert back to circulating the water for 30 seconds every 5 minutes if the outside temperature is lower than 34 degrees F.

When the Heat Program is enabled, through an app controlled switch, It will act similar to the maintain program, but the water temperature will need to be higher than 102 and lower than 104. Again, the heater can only run for a maximum of 20 minutes at a time, so if the water takes longer to heat than 20 minutes, the heater and pump will need to be turned off for a minute and then run its cycle again until it reaches the temperature of 104 degrees F. Also, like the Maintain program, if the outside temperature is lower than 34 degrees F, the water pump will need to turn on for 30 seconds every 5 minutes to circulate the water through the system so the pipes don't freeze. Once the water temperature is reached, it will need to maintain that temperature between 102 and 104 degrees F., until the heat program is disable. When the heat program is disabled through the app controlled switch, the system will revert back to the Maintain program.

Maintain Program:

Macro 1 Trigger: If Sensor 2 (Outside Air Temperature) is less than 34 degrees F

Macro 1 Action: Trigger Relay 1 (Water Pump) for 30 seconds

Macro 2 Trigger: Every 5 minutes (ongoing)

Macro 2 Action: Run Macro 1

Macro 3 Trigger: If Sensor 1 (Water Temperature) is less than 40 degrees F

Macro 3 Action: Disable Macro 1

Macro 3 Action: Disable Macro 2

Macro 3 Action: Trigger Relay 1 (Water Pump) for 19 minutes

Macro 3 Action: Trigger Relay 2 (Heater) for 20 minutes

Macro 4 Trigger: Every 25 minutes

Macro 4 Action: Enable Macro 3

Macro 5 Trigger: If Sensor 1 (Water Temperature) is greater than 44 degrees F

Macro 5 Action: Reset Macro 3

Macro 5 Action: Enable Macro 2

Heat Program:

Macro 6 Trigger: App controlled switch turned On

Macro 6 Action: Disable Macro's 3, 4, and 5.

Macro 6 Action: Enable Macros 8 and 9

Macro 7 Trigger: If Sensor 1 (Water Temperature) is less than 101 degrees F.

Macro 7 Action: Trigger Relay 1 (Water Pump) for 19 minutes

Macro 7 Action: Trigger Relay 2 (Heater) for 20 minutes

Macro 8 Trigger: Every 25 minutes (on going)

Macro 8 Action: Enable Macro 7

Macro 9 Trigger: If Sensor 1 (Water Temperature) is higher than 103 degrees F

Macro 9 Action: Reset Macros 7 and 8.

Macro 10 Trigger: App controlled Switch Turned Off

Macro 10 Action: Run Macro 2